V2898

Report Number NCAP-TRC-98-007

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

General Motors Corporation

1997 EV1

2-door coupe

NHTSA Number: RV0199

TRC Test Number: 980527

Prepared By:

Transportation Research Center Inc.

10820 State Route 347

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June 25, 1998

Final Report

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16. Abstract

A 56 kph (35 mph) frontal load cell barrier impact test was conducted on a 1997 General Motors EV1 Electric Vehicle 2-door coupe, NHTSA No. RV0199, at Transportation Research Center Inc. on May 27, 1998. This test was conducted in accordance with Office of Crashworthiness Standards NCAPTP090196 for the determination of vehicle crashworthiness. The barrier impact velocity was 56.3 kph. The vehicle's maximum static crush was 745 millimeters. The ambient temperature was 22° C.

The driver's Head Injury Criteria (HIC) was 749. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.7 g. The driver's maximum chest deflection was 32 millimeters. The driver's left and right femur maximum axial forces were 3005 N and 3311 N, respectively.

The passenger's HIC was 1085. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.2 g. The passenger's maximum chest deflection was 38 millimeters. The passenger's left and right femur maximum axial forces were 2426 N and 2872 N, respectively.

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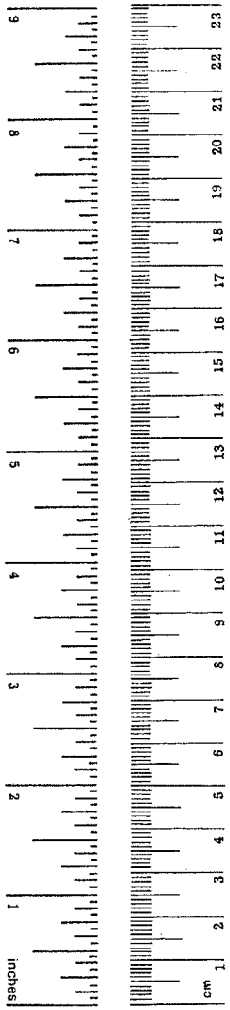
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

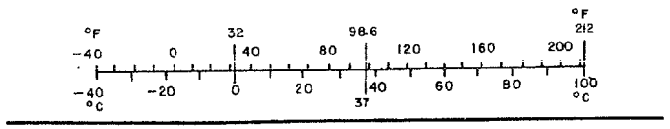
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Section 1.0

Purpose and Test Procedure

Purpose

This 56 kph (35 mph) frontal barrier impact test is part of the New Car Assessment Program (NCAP) conducted for the National Highway Traffic Safety Administration's (NHTSA) Office of Crashworthiness Standards by Transportation Research Center Inc. (TRC) under Contract Number DTNH22-96-D-22010.

The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for the subject vehicle, a 1998 General Motors EV1 Electric Vehicle 2-door coupe, NHTSA Number RV0199, at an impact speed of 56.3 kph (35 mph) FMVSS 208, 212, 219, and 301 requirements.

Test Procedure

This 56 kph (35 mph) test was conducted in accordance with NHTSA's Office of Crashworthiness Standards Laboratory Indicant Test Procedure, NCAPTP090196. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with nine (9) accelerometers to measure longitudinal axis accelerations. The driver's and passenger's restraint systems were instrumented with load cells to measure lap and shoulder belt forces and potentiometers to measure shoulder belt stretch and spoolout. The vehicle impacted a frontal load cell barrier instrumented with thirty-six (36) barrier face load cells. The vehicle's specified impact velocity range was 55.5 to 57.1 kph.

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 of the Laboratory Indicant Test Procedure.

Both dummies were instrumented with primary and redundant head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. The dummies were also instrumented with neck moment and force load cells, chest deflection potentiometers, foot accelerometers to measure longitudinal and vertical axis accelerations, and upper and lower tibia load cells to measure forces and moments.

The one-hundred-thirty (130) data channels were digitally sampled and recorded at 12,500 samples per second and processed per Section 11.13 of the Laboratory Indicant Test Procedure.

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

The vehicle, occupant, and load cell barrier data are presented in Section 2.0. The occupant, camera, and vehicle measurements are presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the dummy, vehicle, and load cell barrier data plots. Appendix C contains the dummy certification data. Appendix D contains miscellaneous test information. Appendix E contains the restraint system instructions from the owner's manual.

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This frontal load cell barrier test was conducted at TRC on May 27, 1998.

The test vehicle, a 1997 General Motors EV1 Electric Vehicle 2-door coupe, NHTSA Number RV0199, was equipped with a automatic transmission, power steering, and power brakes. The vehicle's test weight was 1516 kg. The vehicle's impact speed was 56.3 kph. The vehicle sustained 745 millimeters of static crush during the impact.

The driver's Head Injury Criteria (HIC) was 749. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.7 g. The driver's maximum chest deflection was 32 mm. The driver's left and right femur maximum axial forces were 3005 N and 3311 N, respectively.

The right front passenger's HIC was 1085. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.2 g. The passenger's maximum chest deflection was 38 mm. The passenger's left and right femur maximum axial forces were 2426 N and 2872 N, respectively.

There was 87% retention of windshield periphery.

There was no penetration through the windshield.

Following the impact, no fluid spilled from the vehicle's battery tub prior to the static rollover test or during the static rollover test.

Data Acquisition Explanations

The passenger's chest Y-axis accelerometer, CSTYG2, recorded questionable data after 70 milliseconds. This affected the passenger's three (3) milliseconds minimum duration chest maximum resultant acceleration and the resultant calculation. The redundant chest accelerometers were used to calculate the 3 millisecond duration resultant acceleration.

The driver's seat belt extension, SBED1, recorded questionable data throughout the impact. This affected the seat belt performance data.

The passenger's shoulder belt twisted during impact, therefore it did not retract properly, causing the shoulder belt displacement potentiometer to not return to zero. This affected the seat belt performance data.

The vehicle's right brake caliper X-axis data channel, BCRXG1, lost data between approximately 55 to 110 milliseconds.

The vehicle's left brake caliper X-axis data channel, BCLXG1, lost data after approximately 70 milliseconds.

The load cell barrier position, BA5F, recorded questionable data before the event. This affected the barrier group #2 total and grand total calculations.

Table 1 Crash Test Summary

NHTSA number:	RV0199	
Test type:	Frontal Load Cell Barrier	
Test date:	05/27/98	
Test time:	1730	
Ambient temperature:	22° C	
Vehicle year/make/ model/body style:	1997/General Motors/EV1 Electric Vehicle/2-door coupe	
Vehicle test weight:	1516.0 kg	
Impact angle[1]:	0°	
Impact velocity[2]:	Primary = 56.3 kph Secondary = 56.4 kph	
Maximum static crush:	745 mm	
Average rebound:	1309 mm	
Dummies:	Driver #192	Passenger #142
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag and 3-point unibelt	Airbag and 3-point unibelt
Number of data channels:	40	40
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 year/make/ model/body style:	1997/General Motors EV1/2-door coupe
Color:	Red
VIN:	4G5PX225XV0200590
NHTSA number:	RV0199
Engine data:	
Placement:	electric motor
Cylinders:	N/A
Displacement	N/A
Transmission data:	___speed, ___manual, _X_automatic, ___overdrive
	_X_FWD, ___RWD, ___4WD
Date vehicle received:	04/28/98
Odometer reading:	N/A
Dealer's name and address:	N/A

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	No
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Other			

Certification data from vehicle's label:

Vehicle manufactured by:	General Motors Corporation
Date of manufacture:	03/97
VIN:	4G5PX225XV0200590
GVWR:	3410 lbs.
GAWR: Front:	1705 lbs.
Rear:	1705 lbs.

Table 2 Test Vehicle Information, Cont'd.

Size of tires:	Michelin Proxima RR, P175/65R14
Tire pressure with maximum capacity vehicle load:	
Front:	50 psi
Rear:	50 psi
Spare tire:	None
Type of front seats:	Bucket

Tire & capacity data from vehicle's label:

Recommended tire size:	P175/65R14
Recommended cold tire pressure:	
Front:	50 psi
Rear:	50 psi

Designated seating capacity:

Front	2
Rear	0
Total	2

Vehicle capacity weight: 200 kg

Test vehicle attitude:

Delivered attitude:	LF 660 mm;	RF 660 mm;	LR 345 mm;	RR 345 mm
Pre-test attitude:	LF 650 mm;	RF 649 mm;	LR 503 mm;	RR 502 mm
Post-test attitude:	LF 677 mm;	RF 597 mm;	LR 509 mm;	RR 502 mm

Table 2 Test Vehicle Information Cont'd

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

Right front	322.0 kg	Right rear	318.4 kg
Left front	346.5 kg	Left rear	322.0 kg
Total front weight	668.5 kg	(51.1% of total vehicle weight)	
Total rear weight	640.4 kg	(48.9% of total vehicle weight)	
Total delivered weight	1308.9 kg		

Calculation of test vehicle's target test weight:

RCLW[1] = Rated cargo and luggage weight

UDW = Unloaded delivered weight (1308.9 kg)

VCW = Vehicle capacity weight (200 kg)

DSC = Designated seating capacity (2)

RCLW[1] = VCW - 68 (DSC) = 200 - 68(2) = 64 kg

Target test weight = UDW + RCLW[1] + (Number of Hybrid III dummies x 76 kg/dummy)

Target test weight = 1308.9 + 64 + 152

Target test weight = 1524.9 kg

Weight of test vehicle with required dummies and 55.1 kg of cargo weight:

Right front	363.5 kg	Right rear	393.5 kg
Left front	373.0 kg	Left rear	386.0 kg
Total front weight	736.5 kg	(48.6% of total vehicle weight)	
Total rear weight	779.5 kg	(51.4% of total vehicle weight)	
Total test weight	1516.0 kg	(0.6% under target test weight)	

Weight of ballast secured in vehicle: 10 lbs. in rear

Components removed to meet target test weight: Rear glass, trunk lid, rear speakers and rear shelf, rear taillights, rear bumper and facia, rear sail panel trim plates, rocker exterior panels, rear underbody aeroshield, battery ventilation airfilter box

CG rearward of front wheel centerline: 1293.2 mm

[1] Cargo weight for multipurpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 136 kilograms, whichever is less.

Table 3 Post-Impact Data

Test number:	980527
NHTSA number:	RV0199
Test date:	05/27/98
Test time:	1730
Test type:	Frontal load cell barrier
Impact angle:	0°
Ambient temperature at impact area:	22° C
Temperature in occupant compartment:	20° C
Impact velocity:	
Primary	56.3 kph
Secondary	56.4 kph
Specified range	55.5 to 57.1 kph

Distance from vehicle to barrier:

Entering velocity trap		610 mm				
Exiting velocity trap		51 mm				

Test vehicle static crush:

Overall length of test vehicle:

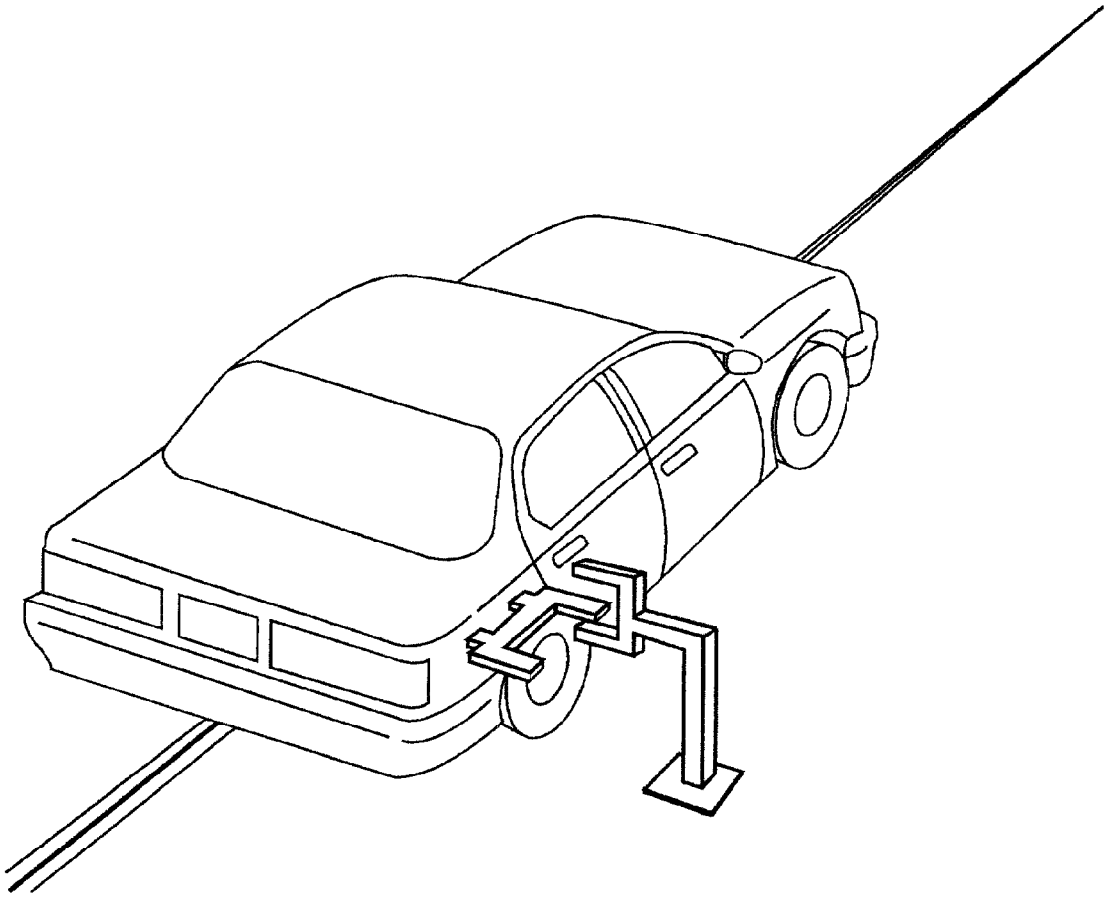
Pre-test:	L	4833 mm;	C	4875 mm;	R	4822 mm
Post-test:	L	4120 mm;	C	4130 mm;	R	4105 mm
Total crush:	L	713 mm;	C	745 mm;	R	717 mm
Average crush:	725 mm					

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L	1380 mm;	C	1239 mm;	R	1309 mm
Average rebound	1309 mm					

Figure 1 Impact Velocity Measurement System

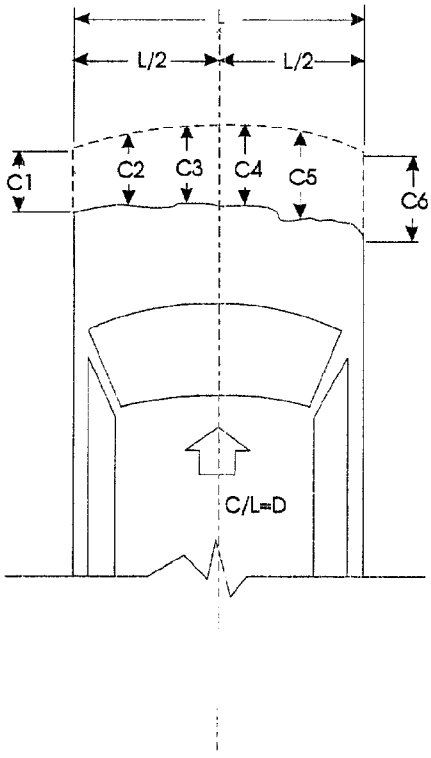


The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 610-millimeter spacing.

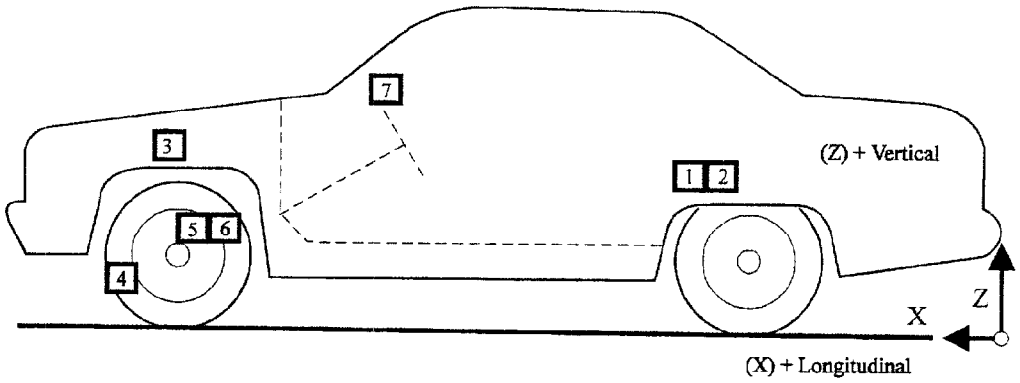
Figure 2 Accident Investigation Division Data
for 56 kph (35 mph) Frontal Barrier Impact

NHTSA number:	RV0199
Test date:	05/27/98
Vehicle year/make/ model/body style:	1997/General Motors EV1/2-door coupe
Vehicle size category:	Subcompact
VIN:	4G5PX225XV0200590
Build date:	03/97
Test weight:	1516.0 kg
Vehicle wheelbase:	2515 mm
Maximum width:	1717 mm
Front overhang:	820 mm

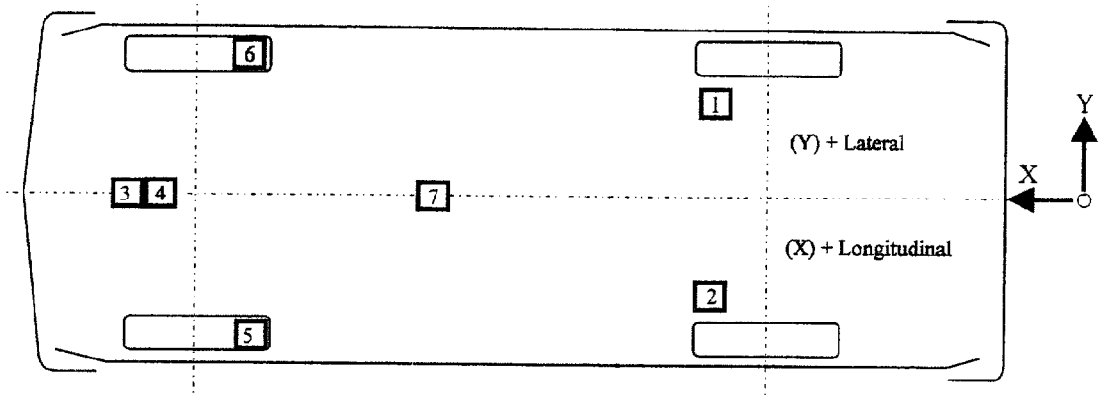


Collision Deformation Classification (CDC) code:	12FDEW3
Crush depth measurements:	C1 = 713 mm
	C2 = 698 mm
	C3 = 742 mm
	C4 = 734 mm
	C5 = 690 mm
	C6 = 717 mm
Midpoint of damage:	D: Vehicle Longitudinal Centerline
Length of damaged region:	L: 1118 mm

Figure 3 Vehicle Accelerometer Placement



Side View



Bottom View

Table 4 Vehicle Accelerometer Locations and Data Summary

No.	LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
TEST NUMBER: 980527									
1	LEFT REAR SEAT CROSSMEMBER	PRE	2162 mm	570 mm	635 mm				
		POST	2152 mm	570 mm	630 mm				
	LONGITUDINAL					3.8 g	@ 119.9 ms	32.5 g	@ 71.9 ms
	REDUNDANT					4.0 g	@ 119.8 ms	32.4 g	@ 71.9 ms
2	RIGHT REAR SEAT CROSSMEMBER	PRE	2162 mm	-610 mm	635 mm				
		POST	2152 mm	-610 mm	630 mm				
	LONGITUDINAL					2.3 g	@ 120.0 ms	36.5 g	@ 58.6 ms
	REDUNDANT					2.4 g	@ 120.1 ms	36.3 g	@ 58.7 ms
3	ENGINE TOP	PRE	4215 mm	0 mm	727 mm				
		POST	3885 mm	-30 mm	686 mm				
	LONGITUDINAL					60.3 g	@ 44.6 ms	162.9 g	@ 33.5 ms
4	ENGINE BOTTOM	PRE	4097 mm	20 mm	157 mm				
		POST	3791 mm	20 mm	36 mm				
	LONGITUDINAL					36.7 g	@ 58.2 ms	111.2 g	@ 36.6 ms
5	RIGHT BRAKE CALIPER	PRE	4154 mm	-664 mm	218 mm				
		POST	3960 mm	-704 mm	226 mm				
	LONGITUDINAL[1]					0.6 g	@ 8.32 ms	70.0 g	@ 50.0 ms
6	LEFT BRAKE CALIPER	PRE	4164 mm	664 mm	218 mm				
		POST	3978 mm	768 mm	226 mm				
	LONGITUDINAL[1]					1.6 g	@ 8.4 ms	392.3 g	@ 60.0 ms
7	INSTRUMENT PANEL CENTER	PRE	3260 mm	0 mm	810 mm				
		POST	3180 mm	0 mm	820 mm				
	LONGITUDINAL					49.5 g	@ 62.9 ms	58.5 g	@ 73.6 ms

REFERENCE: X: + FORWARD ACCELERATION
Y: + LEFT FROM VEHICLE CENTERLINE
Z: + UP FROM GROUND LEVEL

[1] See Data Acquisition Explanations

Table 5 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	Driver #192	Passenger #142
Head	Airbag, head restraint	Airbag, head restraint
Chest	Airbag	Airbag
Abdomen	None	None
Left knee	Instrument panel	Instrument panel
Right knee	Instrument panel	Instrument panel

Door Opening:

	Left	Right
Front	Difficult	Easy
Rear	N/A	N/A

Seat Movement:

	Seat Back Failure	Seat Shift
Front	None	None
Rear	NA	NA

Glazing Damage: The lower portion of the windshield was cracked on impact.

Other Notable Impact Effects: None

Table 6 FMVSS 208 Data Summary

Vehicle year/make/
model/body style: 1997/General Motors/EV1/2-door coupe

Vehicle NHTSA number: RV0199

Test date: 05/27/98

	Driver Dummy #192		Passenger Dummy #142	
Maximum Accelerations:				
Head X-axis	-65.9	g	-79.5	g
Head Y-axis	9.8	g	13.6	g
Head Z-axis	-26.4	g	-26.6	g
Head resultant	68.3	g	80.1	g
Chest X-axis[3]	-55.2	g	-57.8	g
Chest Y-axis[3]	3.4	g	-2.8	g
Chest Z-axis[3]	-15.5	g	-13.4	g
Chest resultant[3]	53.7	g	56.2	g
Chest resultant time interval[1]	.003	sec	.003	sec
Head Injury Criteria (HIC) Values:				
HIC[2]	749		1085	
HIC starting time	.062	sec	.065	sec
HIC ending time	.098	sec	.097	sec
Average head resultant acceleration during HIC time interval	53.4	g	65.6	g
Maximum Chest Deflections:				
Chest X-axis	31.5	mm	37.6	mm
Maximum chest deflection time	.071	sec	.087	sec
Maximum Compressive Femur Forces:				
Left femur	3004.5	N	2425.7	N
Right femur	3311.0	N	2872.3	N
Maximum Seat Belt Forces:				
Lap belt	6412.1	N	5518.2	N
Shoulder belt	4194.2	N	4832.4	N

Note: All values listed must be occurring during primary impact event.
(Head accelerations listed must be during HIC time interval.)

[1] 0.003 Sec. Minimum duration.
[2] The maximum HIC time interval is 36 milliseconds.
[3] Passenger data taken from redundant accelerometer channels.

Table 7 Hybrid III Data Summary

Vehicle year/make/
model/body style: 1997/General Motors/EV1/2-door coupe

Vehicle NHTSA number: RV0199

Test date: 05/27/98

	Driver Dummy #192	Passenger Dummy #142
Maximum Forces		
Neck X-axis shear force	-1313.5 N	-515.9 N
Neck Y-axis shear force	-128.3 N	421.4 N
Neck Z-axis axial force	1252.2 N	1696.4 N
Maximum Moments		
Neck moment about X-axis	-9.6 N·m	37.9 N·m
Neck moment about Y-axis	101.9 N·m	-40.9 N·m
Neck moment about Z-axis	13.7 N·m	13.0 N·m
Maximum Accelerations:		
Pelvis X-axis	-56.2 g	-50.3 g
Pelvis Y-axis	8.6 g	-8.7 g
Pelvis Z-axis	32.8 g	28.8 g
Pelvis resultant	59.9 g	57.4 g

Table 7 Hybrid III Data Summary, Cont'd.

Vehicle year/make/
model/body style: 1997/General Motors/EV1/2-door coupe

Vehicle NHTSA number: RV0199

Test date: 05/27/98

	Driver Dummy #192	Passenger Dummy #142
Left upper tibia moment about X-axis	45.5 N·m	82.4 N·m
Left upper tibia moment about Y-axis	155.6 N·m	240.7 N·m
Right upper tibia moment about X-axis	82.4 N·m	71.1 N·m
Right upper tibia moment about Y-axis	198.5 N·m	228.5 N·m
Left lower tibia X-axis force	-1072.6 N	-1745.4 N
Left lower tibia Z-axis force	-7958.4 N	-8633.5 N
Left lower tibia moment about Y-axis	-47.3 N·m	-45.7 N·m
Right lower tibia X-axis force	-1224.8 N	-1637.1 N
Right lower tibia Z-axis force	-8480.2 N	-7948.2 N
Right lower tibia moment about Y-axis	-120.5 N·m	-74.1 N·m
Left foot X-axis acceleration	-67.2 g	-195.0 g
Left foot Z-axis acceleration at heel	104.6 g	122.6 g
Left foot Z-axis acceleration at toe	183.7 g	189.1 g
Right foot X-axis acceleration	-176.3 g	N/A
Right foot Z-axis acceleration at heel	178.7 g	N/A
Right foot Z-axis acceleration at toe	236.5 g	N/A

Note: All values listed must be occurring during primary impact event.

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest were restrained by the driver's airbag as the dummy's torso was restrained by the three-point unibelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point unibelt.

Right Front Passenger Dummy

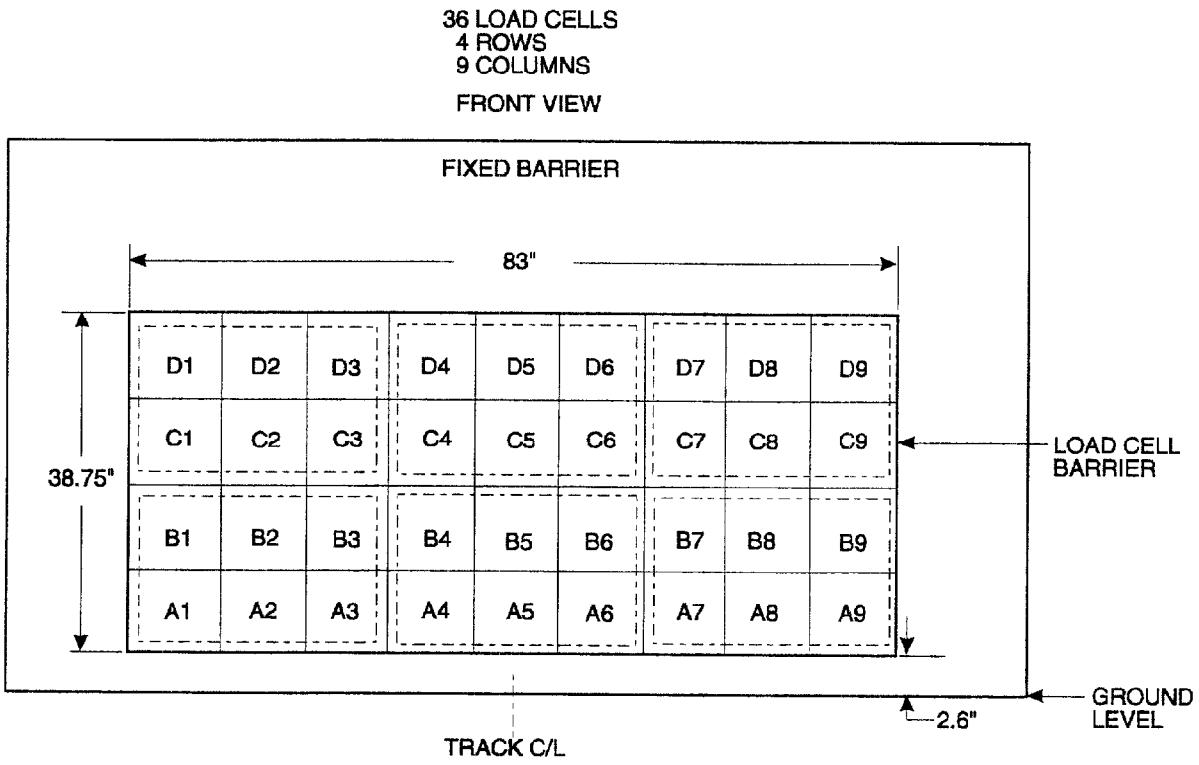
Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward as the dummy's head and chest were restrained by the passenger's airbag and the dummy's torso was restrained by the three-point unibelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated upright in the right front passenger's seat, restrained by the three-point unibelt. The belt was twisted in the D-ring and did not retract back properly.

Table 8 Seat Belt Performance Assessment Test Data

	Driver	Passenger
Belt length data:		
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	2850 mm	2682 mm
Shoulder belt length as measured on Part 572 dummy.	885 mm	890 mm
Lap belt length as measured on Part 572 dummy.	660 mm	665 mm
Shoulder belt spool-off length:		
As determined by film analysis[1]	N/A	N/A
As determined mechanically	152 mm	135 mm
As determined electronically	106 mm	150 mm
Belt stretch length:		
As measured mechanically	0 mm/m	0 mm/m
As measured electronically[2]	N/A .01	4 mm/m .149
Retractor lock-up time:		
As determined by shoulder belt spool-off[1]	N/A	N/A

[1] There were not any onboard cameras because of test weight.
[2] The driver's side extension potentiometer did not work properly.

Figure 4 Load Cell Barrier Configuration



Group 1: A1 through B3
Group 2: A4 through B6
Group 3: A7 through B9
Group 4: C1 through D3
Group 5: C4 through D6
Group 6: C7 through D9

Table 9 Load Cell Barrier Data Summary

TEST NUMBER: 980527 LOCATION	POSITIVE DIRECTION	NEGATIVE DIRECTION
TOTAL GROUP 1	1.9 kN @ 8.1 ms	97.1 kN @ 55.8 ms
TOTAL GROUP 2	2.3 kN @ 2.2 ms	275.4 kN @ 57.1 ms
TOTAL GROUP 3	1.9 kN @ 7.1 ms	68.6 kN @ 54.1 ms
TOTAL GROUP 4	1.5 kN @ 9.8 ms	48.3 kN @ 37.9 ms
TOTAL GROUP 5	0.2 kN @ 4.3 ms	36.0 kN @ 36.5 ms
TOTAL GROUP 6	0.7 kN @ 17.7 ms	24.3 kN @ 38.8 ms
TOTAL LOAD CELL FORCE	0.1 kN @ 200.3 ms	484.5 kN @ 56.4 ms

TENSION IS POSITIVE
COMPRESSION IS NEGATIVE

Section 3.0

FMVSS 212, 219 (partial), and 301 Data

Figure 5 FMVSS 212 Test Data

Details of windshield mounting such as retention method, trim type, etc.:

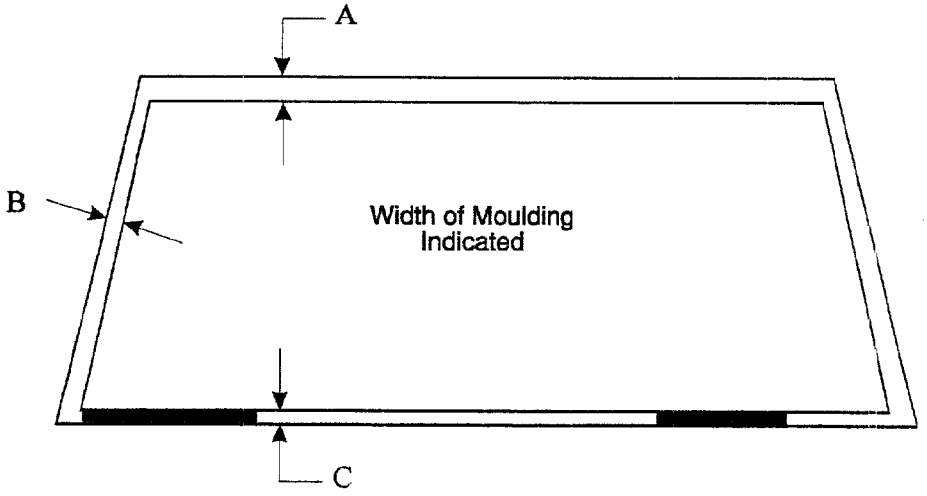
FMVSS 212 requirements: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

	Pre-test	Post-test	Percent retention
Right side	2065 mm	1833 mm	81
Left side	2265 mm	2100 mm	93
Total	4530 mm	3933 mm	87

Pre-test windshield mounting material temperature: 22° C

A = 20 mm
B = 30 mm
C = N/A



Front view of windshield[1]

Loss of windshield retention lengths: 432 mm and 165 mm along the lower side of the perimeter.

[1] Indicate areas of loss of retention, if any, on windshield diagram.

Figure 6 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 = 1260 mm

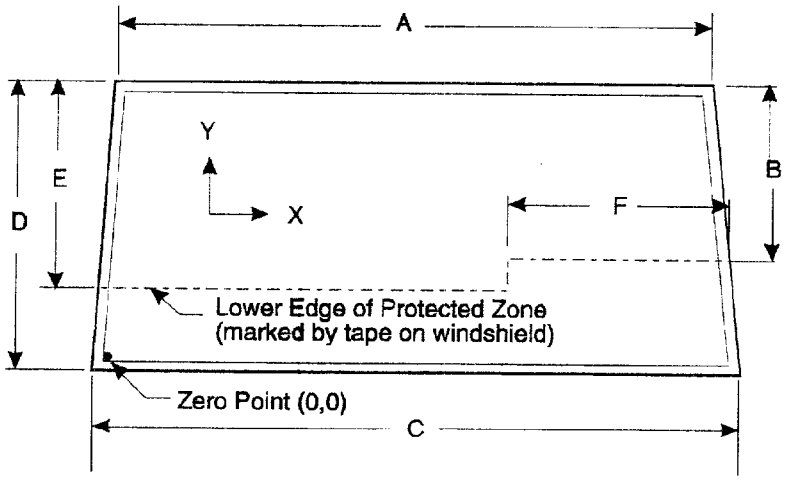
B = 610 mm

C = 1970 mm

D = 750 mm

E = 625 mm

F = 1000 mm



FRONT VIEW

Method of adhering protected zone template to windshield: NA

Areas of windshield template penetration greater than 6 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.

Table 10 Fuel System Data

Vehicle year/make/ model/body style:	1997/General Motors/EV1/2-door coupe
NHTSA number:	RV0199
Fuel system capacity:	N/A
Usable capacity:	N/A
Test volume range:	N/A
Actual test volume:	N/A
Test fluid type:	N/A
Specific gravity:	N/A
Kinematic viscosity:	N/A
Test fluid color:	N/A
Did electric fuel pump operate with ignition switch "on" and the engine not operating.	N/A
Details of fuel system:	N/A

The vehicle was an electric vehicle with an electric motor under the hood. The charge port was located in the rear of the vehicle.

Table 11 FMVSS 301 Post-Impact Test Data

NHTSA number: RV0199

Test date: 05/27/98

Vehicle year/make/
model/body style: 1997/General Motors/EV1/2-door coupe

Test requirements:

The electric vehicle was fully charged for the crash. It was turned off during the rollover portion of the test. Part 572 test dummies located at each front designated seating position.

There should not be any electrolyte leakage from battery tub.

Test vehicle impact type:

_x_ Frontal (_56_ kph)

___ Oblique (48 kph) with __° barrier face first contacting ___ (driver/pass.) side

___ Rear moving barrier (48 kph)

___ Lateral moving barrier (32 kph)

Battery tub fluid spillage measurements:

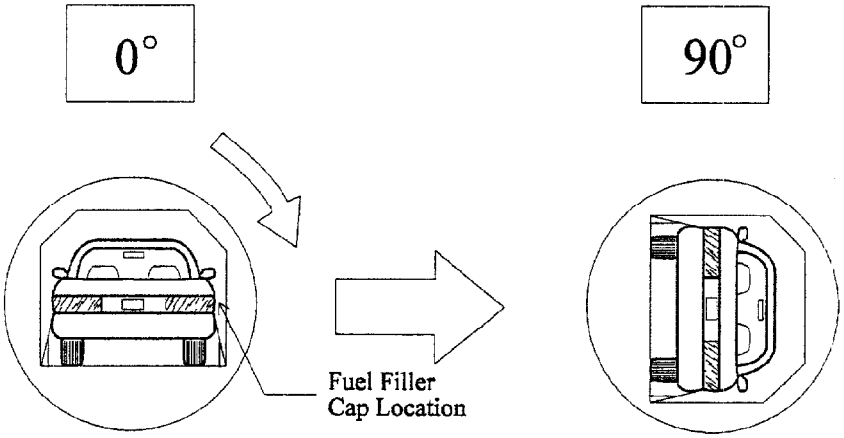
		Test Results	Maximum Allowable
1.	From impact until vehicle motion ceases	0 g	28 g
2.	5-minute period after vehicle motion ceases	0 g	142 g
3.	Next 25 minutes after 5-minute period	0 g	28 g/min

Battery tub fluid spillage location(s): None

Figure 7 FMVSS 301 Static Rollover Test Data

NHTSA number: RV0199

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	7	minutes		

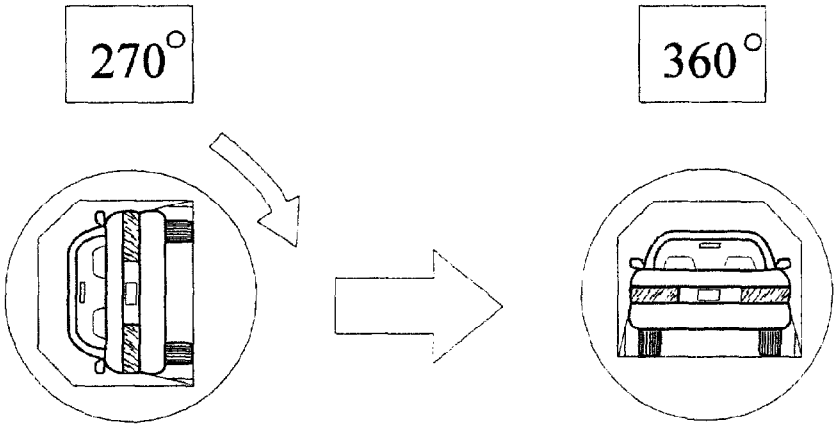
Battery tub fluid spillage measurements:

0° to 90° rotation (fuel filler cap down)	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Battery tub fluid spillage location(s): None

Figure 7 FMVSS 301 Static Rollover Test Data. Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0 seconds
FMVSS 301 position hold time	=	5	minutes,	0 seconds
Total	=	7	minutes,	0 seconds
Next whole minute interval	=	28	minutes	

Battery tub fluid spillage measurements:

270° to 360° rotation	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Battery tub fluid spillage location(s): None

Section 4.0

Occupant, Camera, and Vehicle Information

Figure 8 Dummy Measurement Locations for Front Seat Occupants

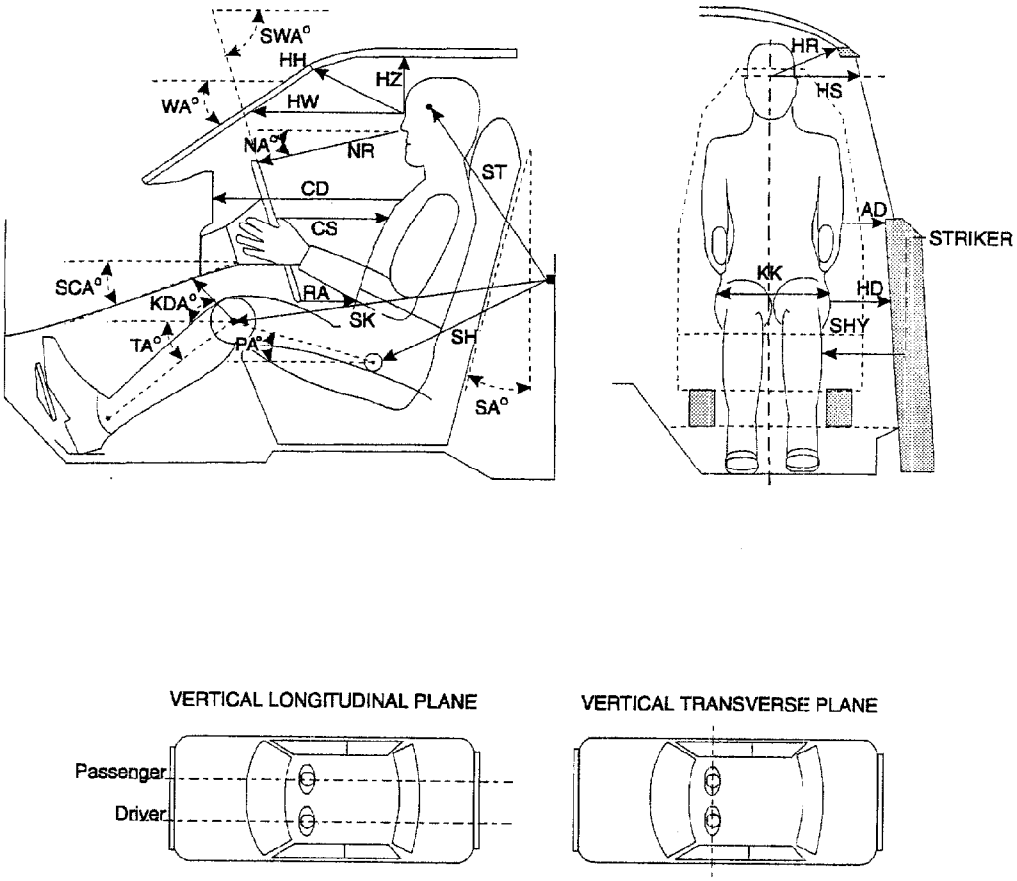


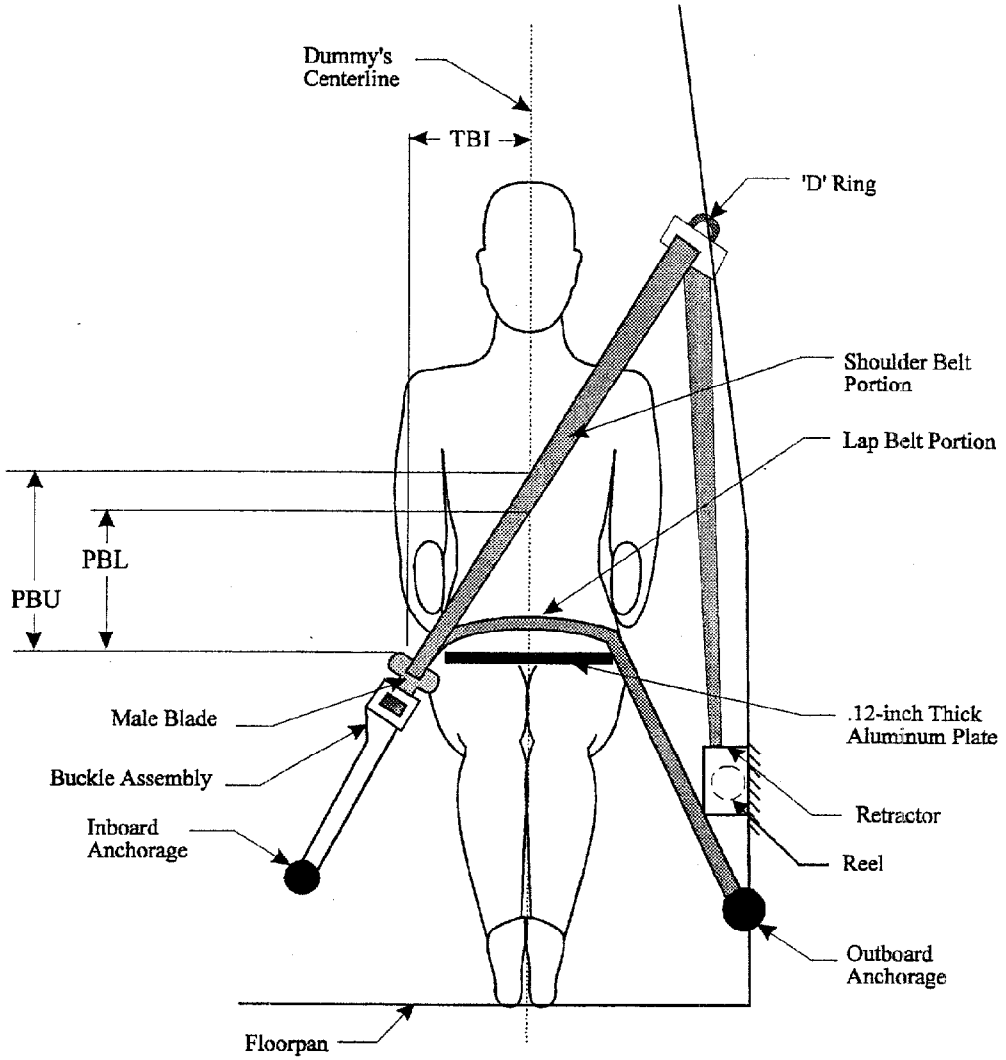
Table 12 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #192)	Passenger (Serial #142)
WA	Windshield angle	25.4°	25.4°
SWA	Steering wheel angle	73°	NA
SCA	Steering column angle	17°	NA
SA	Seat back angle	25°	25°
HZ	Head to roof	155 mm	155 mm
HH	Head to header	395 mm	361 mm
HW	Head to windshield	596 mm	593 mm
HR	Head to side header	147 mm	140 mm
NR	Nose to rim	372 mm	NA
NA	Nose to rim angle	10°	NA
CD	Chest to dash	512 mm	515 mm
CS	Steering wheel to chest	342 mm	NA
RA	Rim to abdomen	228 mm	NA
KDL	Left knee to dash	192 mm	183 mm
KDR	Right knee to dash	172 mm	184 mm
KDA	Outboard knee to dash angle	30°	34°
PA	Pelvic angle	25°	24°
TA	Tibial angle	26°	30°
KK	Knee to knee	291 mm	285 mm
ST[1]	Striker to head	566 mm	558 mm
	Striker to head angle	-61°	-61°
SK[1]	Striker to knee	801 mm	813 mm
	Striker to knee angle	2°	5°
SH[1]	Striker to H-point	455 mm	464 mm
	Striker to H-point angle	25°	20°
SHY	Striker to H-point (Y dir.)	198 mm	205 mm
HS	Head to side window	250 mm	241 mm
HD	H-point to door	103 mm	85 mm
AD	Arm to door	81 mm	75 mm

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

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

Figure 9 Seat Belt Positioning Data



	Driver	Passenger
PBU - Top surface of aluminum plate to belt upper edge	320 mm	327 mm
PBI - Top surface of aluminum plate to belt lower edge	240 mm	230 mm
TBI - Dummy centerline to intersection of upper torso belt and lap belt	N/A	N/A

Figure 10 Camera Positions

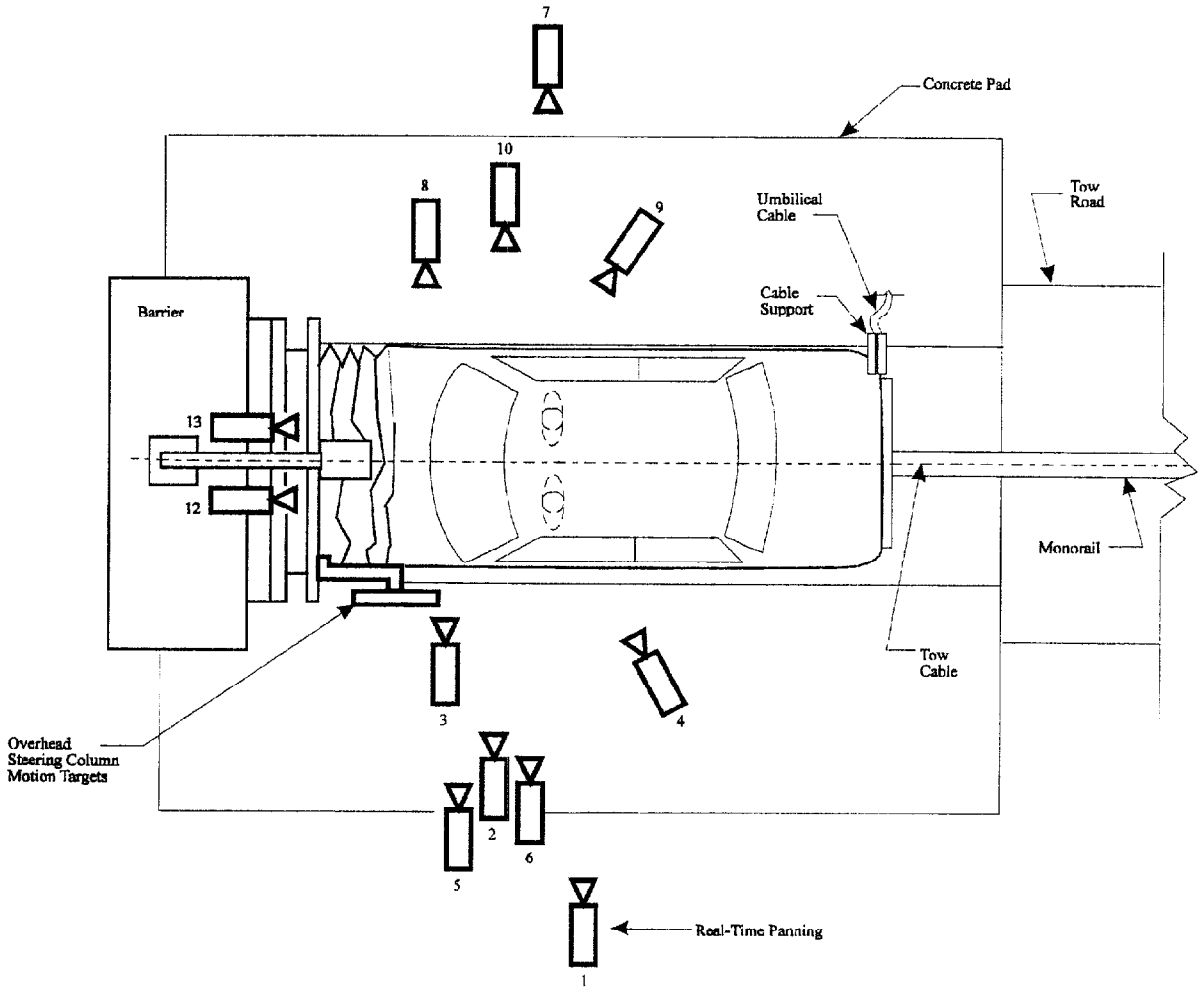


Figure 10 Camera Positions, Cont'd.

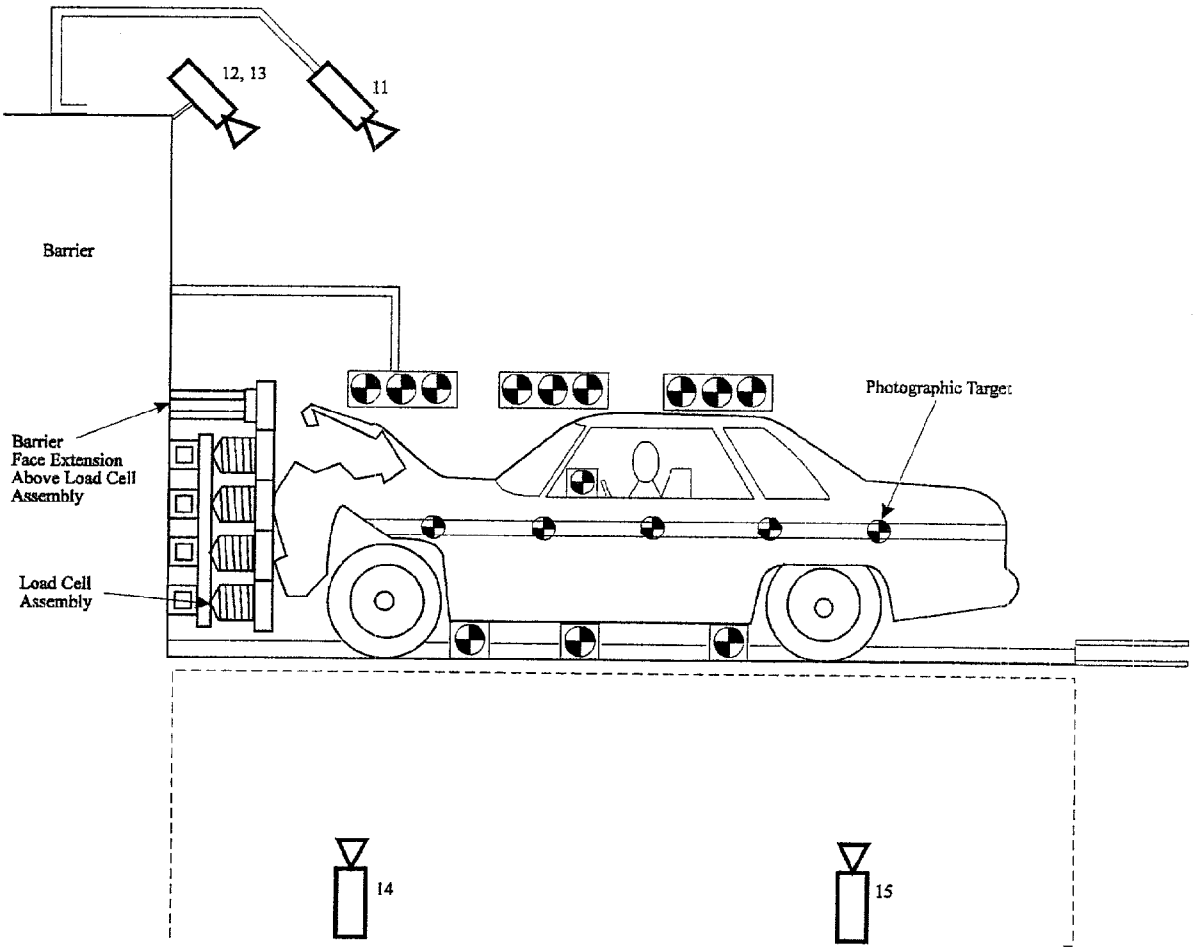


Table 13 Motion Picture Camera Locations

Test Number: 980527

Vehicle Year/Make/Model/Body Style: 1997/General Motors/EV1/2-door coupe

Camera Number	View	Camera Positions[1] X	Y	Z	Angle[2]	Film Plane to Head Target	Lens	Film Speed
1	Real-time panning	-3607 mm	2802 mm	1549 mm	NA	NA	16	24 frames/s
2	Left medium tight	-4572 mm	7670 mm	2591 mm	-27°	7264 mm	25	---[3] frames/s
3	Left windshield intrusion	-1346 mm	7859 mm	1074 mm	0°	NA	50	1000 frames/s
4	Dummy angled view	-1054 mm	2438 mm	1118 mm	-12°	2819 mm	25	985 frames/s
5	Column movement - upper	-3657 mm	7924 mm	2616 mm	-14°	NA	25	1000 frames/s
6	Column movement - lower	-3657 mm	7924 mm	1908 mm	-9°	NA	25	1000 frames/s
7	Right side overall	-2065 mm	-6767 mm	942 mm	-2°	NA	13	983 frames/s
8	Right windshield intrusion	-968 mm	-7775 mm	1118 mm	0°	NA	50	988 frames/s
9	Passenger angled view	-986 mm	-2438 mm	1151 mm	7°	3048 mm	25	1000 frames/s
10	Right medium tight	-4674 mm	-6629 mm	2540 mm	-26°	6184 mm	25	1027 frames/s
11	Windshield - barrier center	-925 mm	0 mm	2489 mm	-40°	NA	8.5	1000 frames/s
12	Driver - barrier view	-173 mm	368 mm	2159 mm	-41°	NA	17	1005 frames/s
13	Passenger - barrier view	-114 mm	-351 mm	2159 mm	-40°	NA	17	995 frames/s
14	Crush & fluid spillage - front pit	-1283 mm	0 mm	-2347 mm	90°	NA	13	1002 frames/s
15	Fluid spillage - rear pit	-2522 mm	0 mm	-2515 mm	90°	NA	13	995 frames/s

[1] +X = Film plane forward of barrier face
+Y = Film plane to left of monorail centerline
+Z = Film plane above ground level

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

[3] Camera did not run properly.

Figure 11 Vehicle Target Locations

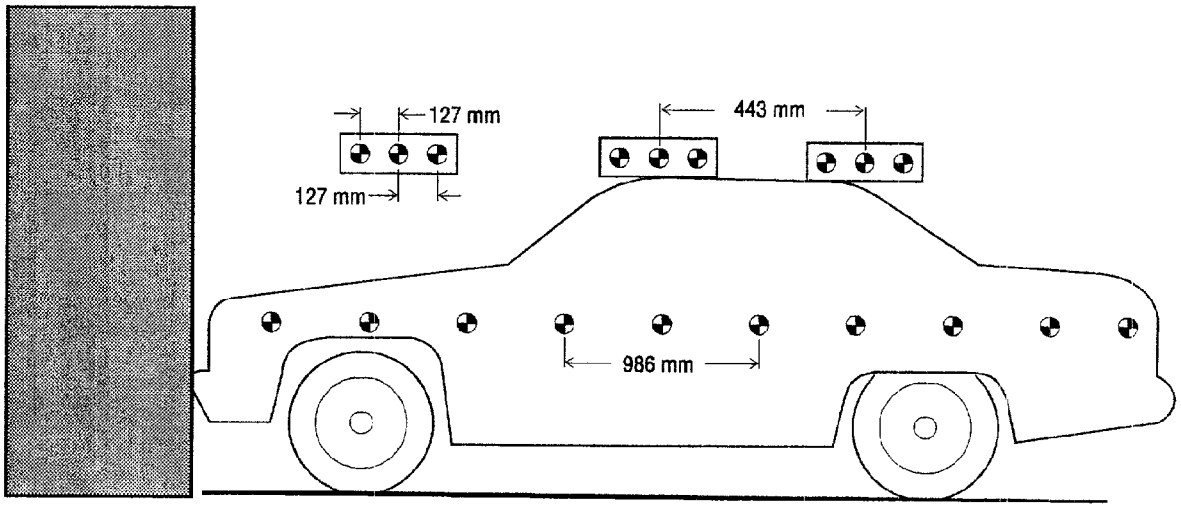


Figure 12 Pre-Test And Post-Test Measurement Points

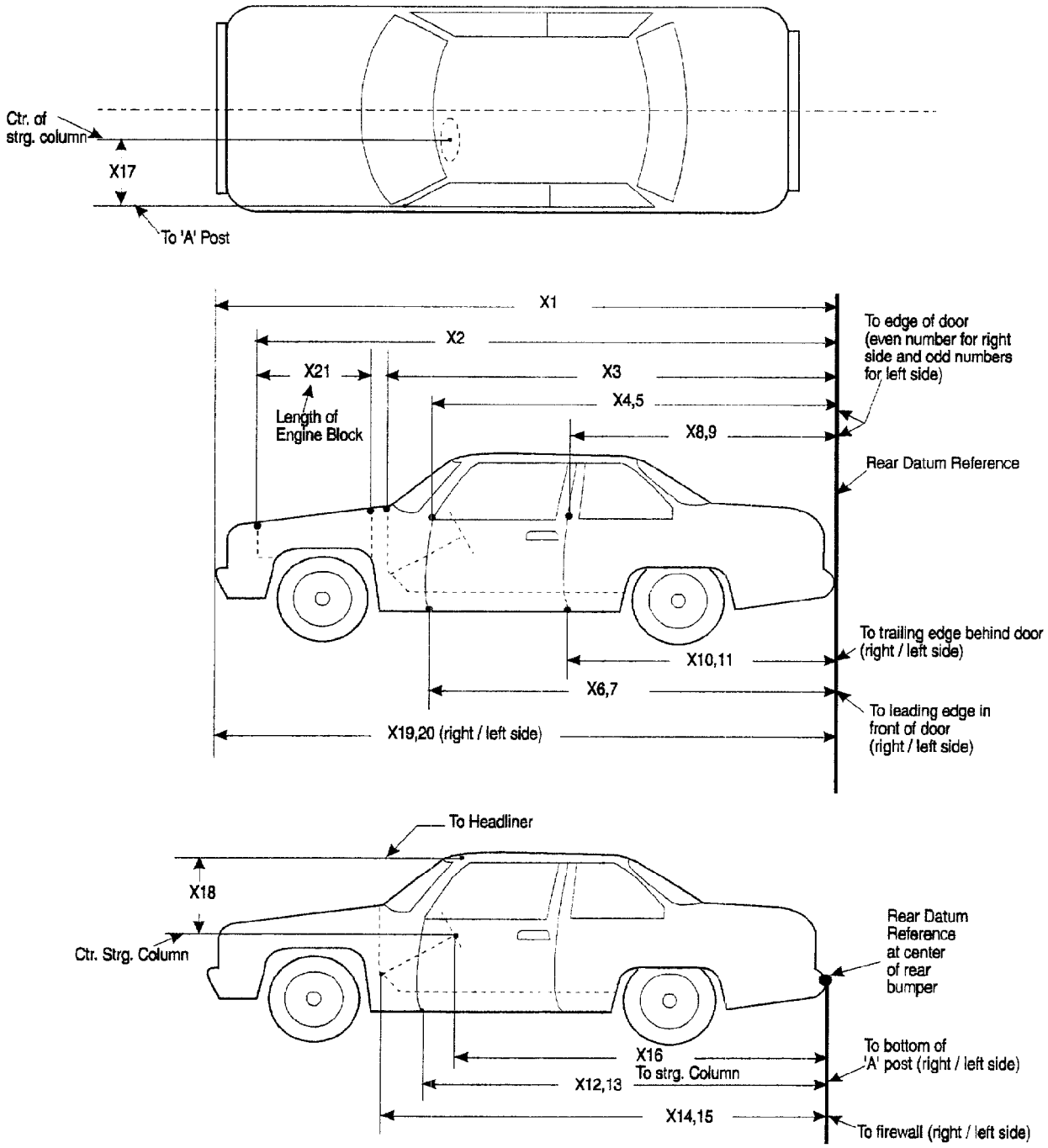


Table 14 Impacted Vehicle Measurements

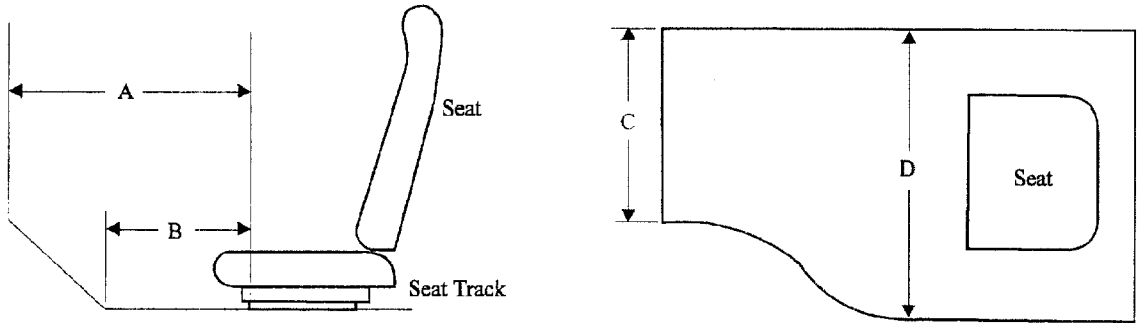
Test number: 980527

Vehicle year/make/model/body style: 1997/General Motors/EV1/2-door coupe

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	4875 mm	4130 mm	745 mm
X2	Rear surface of vehicle to front of engine block	4300 mm	3935 mm	365 mm
X3	Rear surface of vehicle to firewall	4000 mm	3890 mm	110 mm
X4	Rear surface of vehicle to upper leading edge of right door	3355 mm	3347 mm	8 mm
X5	Rear surface of vehicle to upper leading edge of left door	3360 mm	3335 mm	25 mm
X6	Rear surface of vehicle to lower leading edge of right door	3405 mm	3378 mm	27 mm
X7	Rear surface of vehicle to lower leading edge of left door	3400 mm	3378 mm	22 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2153 mm	2143 mm	10 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2151 mm	2130 mm	21 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2152 mm	2127 mm	25 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2153 mm	2130 mm	23 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3355 mm	3338 mm	17 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3365 mm	3323 mm	42 mm
X14	Rear surface of vehicle to firewall - right side	3934 mm	3785 mm	149 mm
X15	Rear surface of vehicle to firewall - left side	3942 mm	3750 mm	192 mm
X16	Rear surface of vehicle to steering wheel center	3008 mm	2910 mm	98 mm
X17	Center of steering column to "A" post	253 mm	139 mm	114 mm
X18	Center of steering column to headliner	400 mm	360 mm	40 mm
X19	Rear surface of vehicle to right side of front bumper	4822 mm	4105 mm	717 mm
X20	Rear surface of vehicle to left side of front bumper	4833 mm	4120 mm	713 mm
X21	Length of engine block	730 mm	730 mm	0 mm

Figure 13 Vehicle Intrusion Measurements

Static Footwell Deformation



Driver's Side

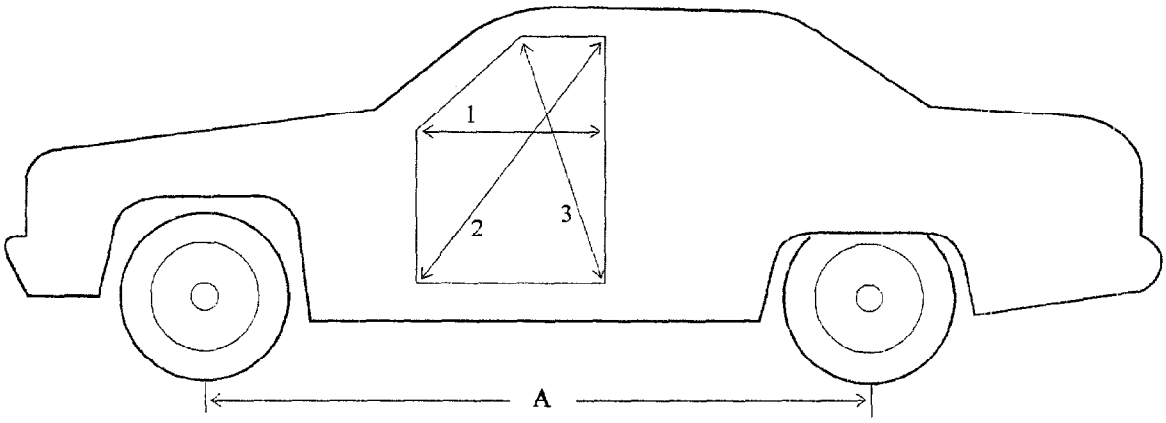
Measurement	Pre-Test	Post-Test	Difference
A	704 mm	634 mm	70 mm
B	649 mm	591 mm	58 mm
C	443 mm	420 mm	23 mm
D	455 mm	457 mm	-2 mm

Passenger's Side

Measurement	Pre-Test	Post-Test	Difference
A	716 mm	667 mm	49 mm
B	609 mm	559 mm	50 mm
C	400 mm	367 mm	33 mm
D	445 mm	448 mm	-3 mm

Figure 14 Vehicle Intrusion Measurements

Door Opening Width

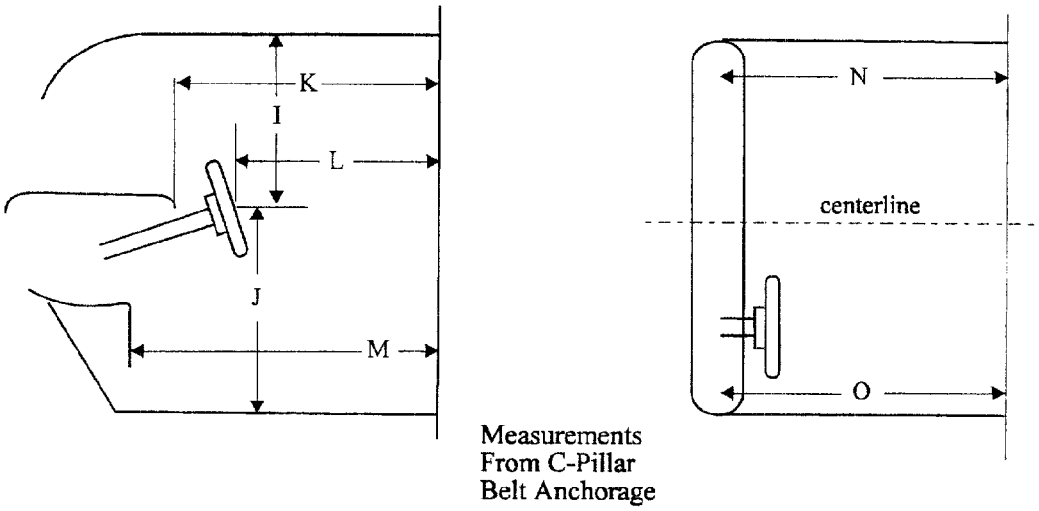


Units (mm)	Left			Right		
Measurement	1	2	3	1	2	3
Pre-Test	1194 mm	1406 mm	1023 mm	1184 mm	1418 mm	1030 mm
Post-Test	1160 mm	1412 mm	1047 mm	1170 mm	1420 mm	1040 mm
Difference	34 mm	-6 mm	-24 mm	14 mm	-2 mm	-10 mm

Units (mm)	A = Wheelbase Left	A = Wheelbase Right
Pre-Test	2515 mm	2515 mm
Post-Test	2325 mm	2332 mm
Difference	190 mm	183 mm

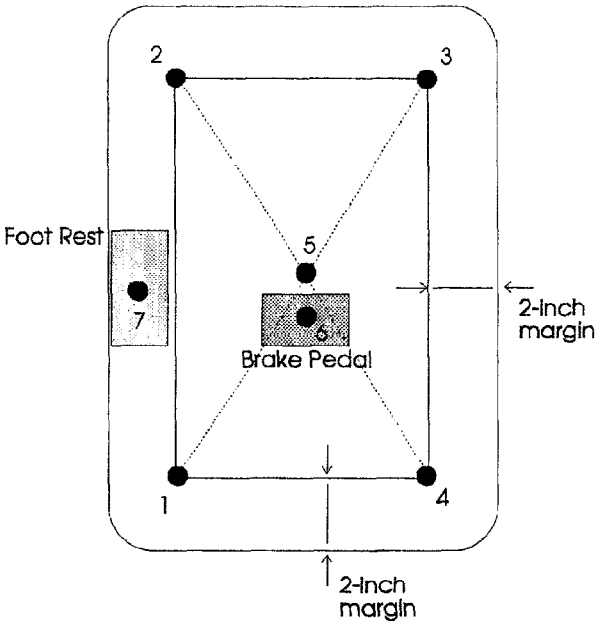
Figure 15 Vehicle Intrusion Measurements

Static Passenger Compartment Intrusion



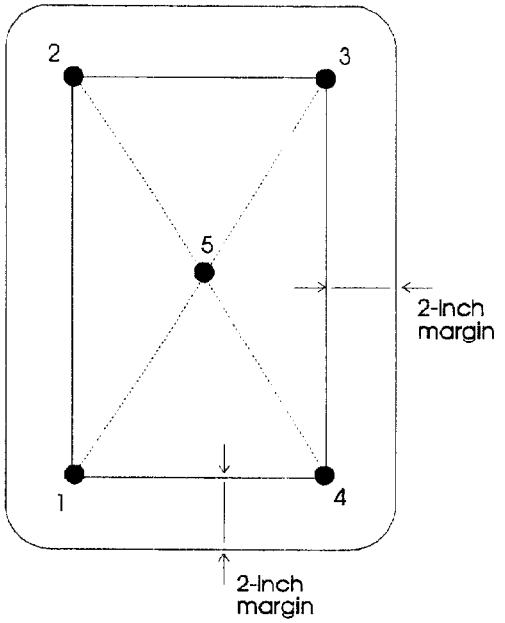
Measurement	Pre-Test	Post-Test	Difference
I	410 mm	360 mm	50 mm
J	580 mm	663 mm	-83 mm
K (driver's side)	1107 mm	1060 mm	47 mm
L	1130 mm	1080 mm	50 mm
M (driver's side)	1140 mm	1097 mm	43 mm
N	1350 mm	1335 mm	15 mm
O	980 mm	952 mm	28 mm
Passenger's side	1300 mm	1275 mm	25 mm
Passenger's side	1150 mm	1140 mm	10 mm

Figure 16 Driver Toeboard Measurements



Driver Side		X	Z
1	Pre-Test	642	213
	Post-Test	639	195
	Crush	4	18
2	Pre-Test	1162	208
	Post-Test	1133	190
	Crush	29	18
3	Pre-Test	1156	208
	Post-Test	1115	190
	Crush	41	18
4	Pre-Test	672	213
	Post-Test	673	195
	Crush	-1	18
5	Pre-Test	930	195
	Post-Test	920	155
	Crush	10	40
6	Pre-Test	1188	402
	Post-Test	953	480
	Crush	235	-78
7	Pre-Test	1230	326
	Post-Test	1140	327
	Crush	90	-1

Figure 17 Passenger Toeboard Measurements



Passenger Side		X	Z
1	Pre-Test	690	213
	Post-Test	690	220
	Crush	0	-7
2	Pre-Test	1235	215
	Post-Test	1140	195
	Crush	95	20
3	Pre-Test	1215	215
	Post-Test	1141	250
	Crush	74	-35
4	Pre-Test	645	213
	Post-Test	651	178
	Crush	-6	35
5	Pre-Test	970	185
	Post-Test	1940	210
	Crush	30	-25
6	Pre-Test	N/A	N/A
	Post-Test	N/A	N/A
	Crush	N/A	N/A
7	Pre-Test	N/A	N/A
	Post-Test	N/A	N/A
	Crush	N/A	N/A

Appendix A

Photographs

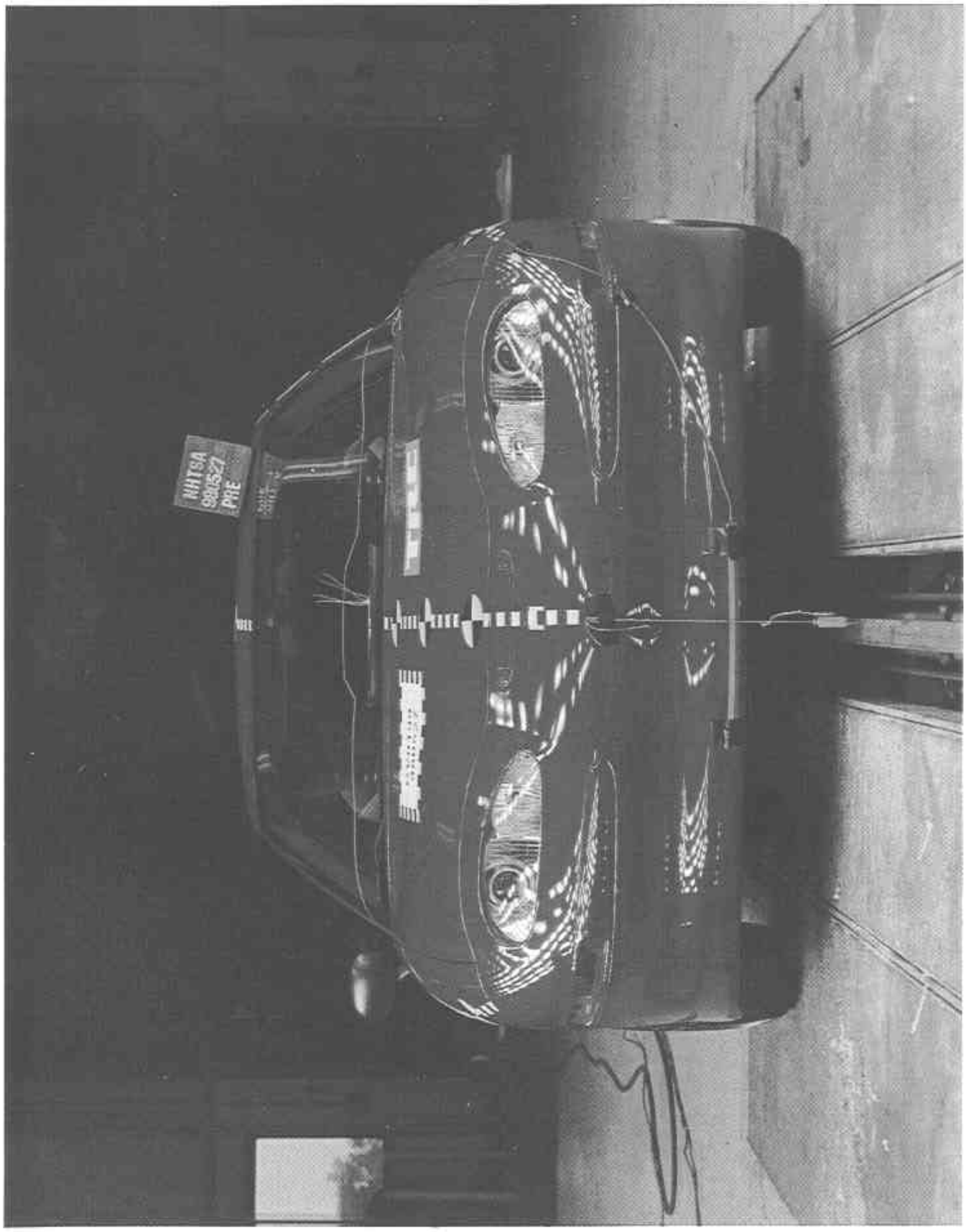


Figure A-1 Pre-Test Front View

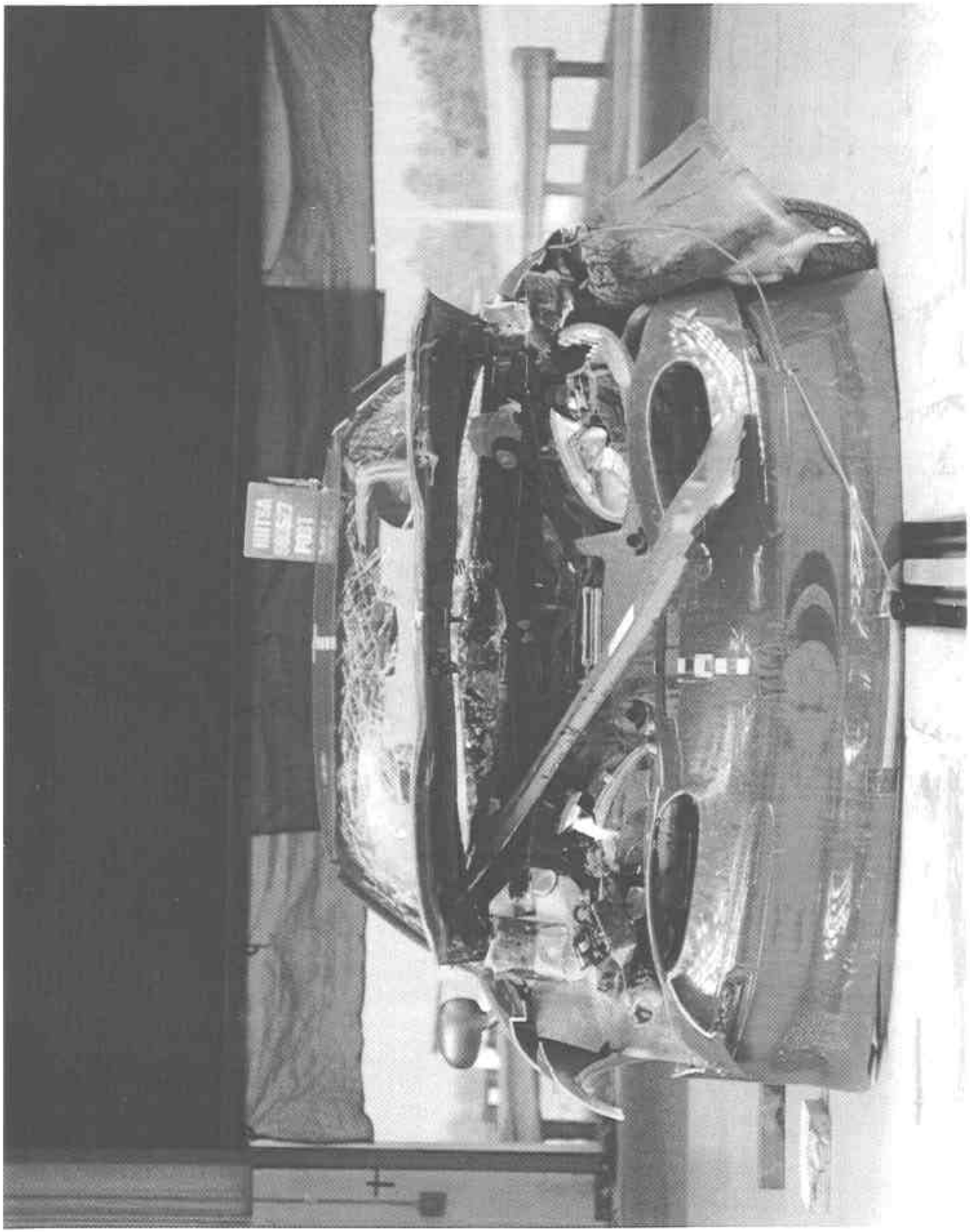


Figure A-2 Post-Test Front View

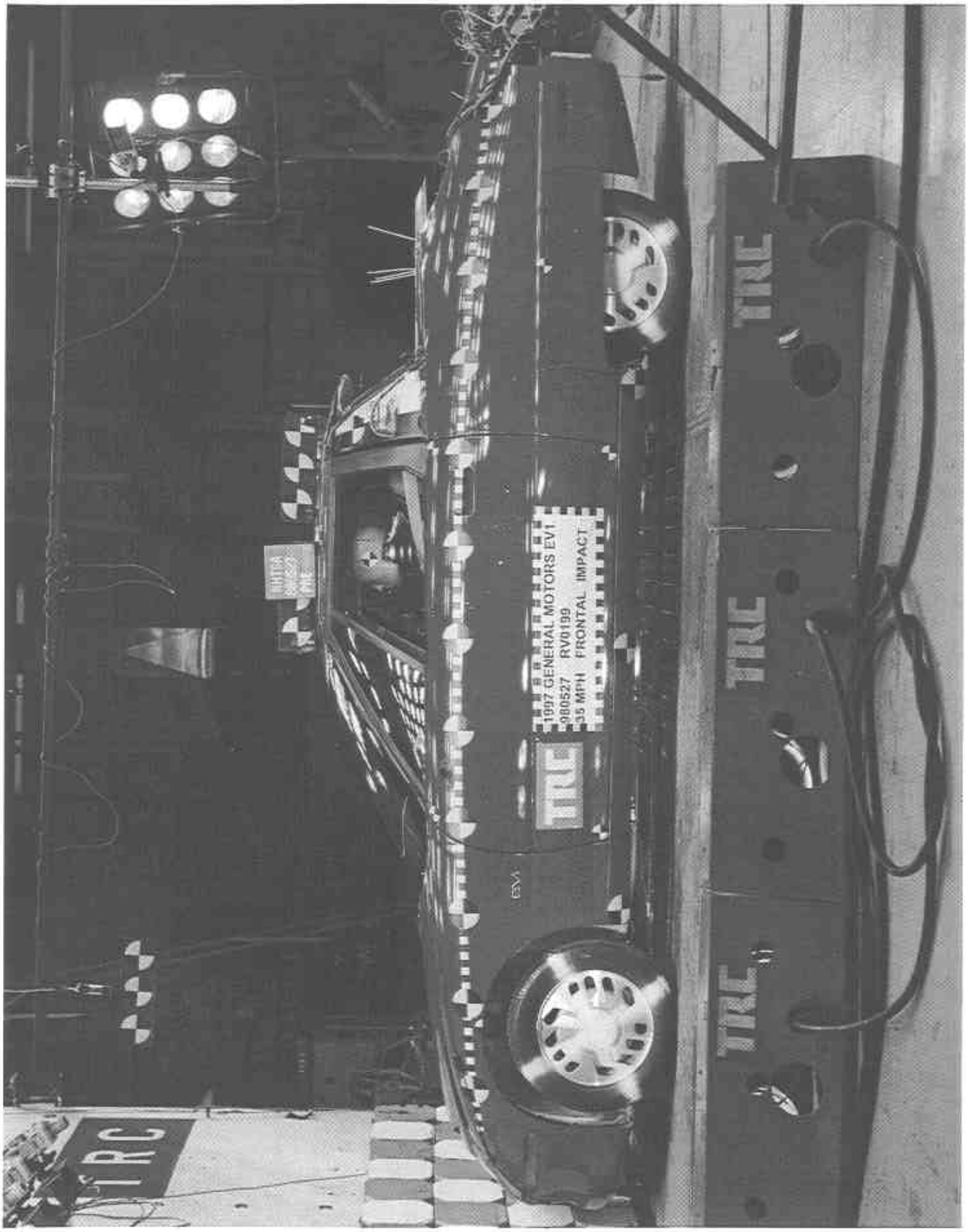


Figure A-3 Pre-Test Left Side View

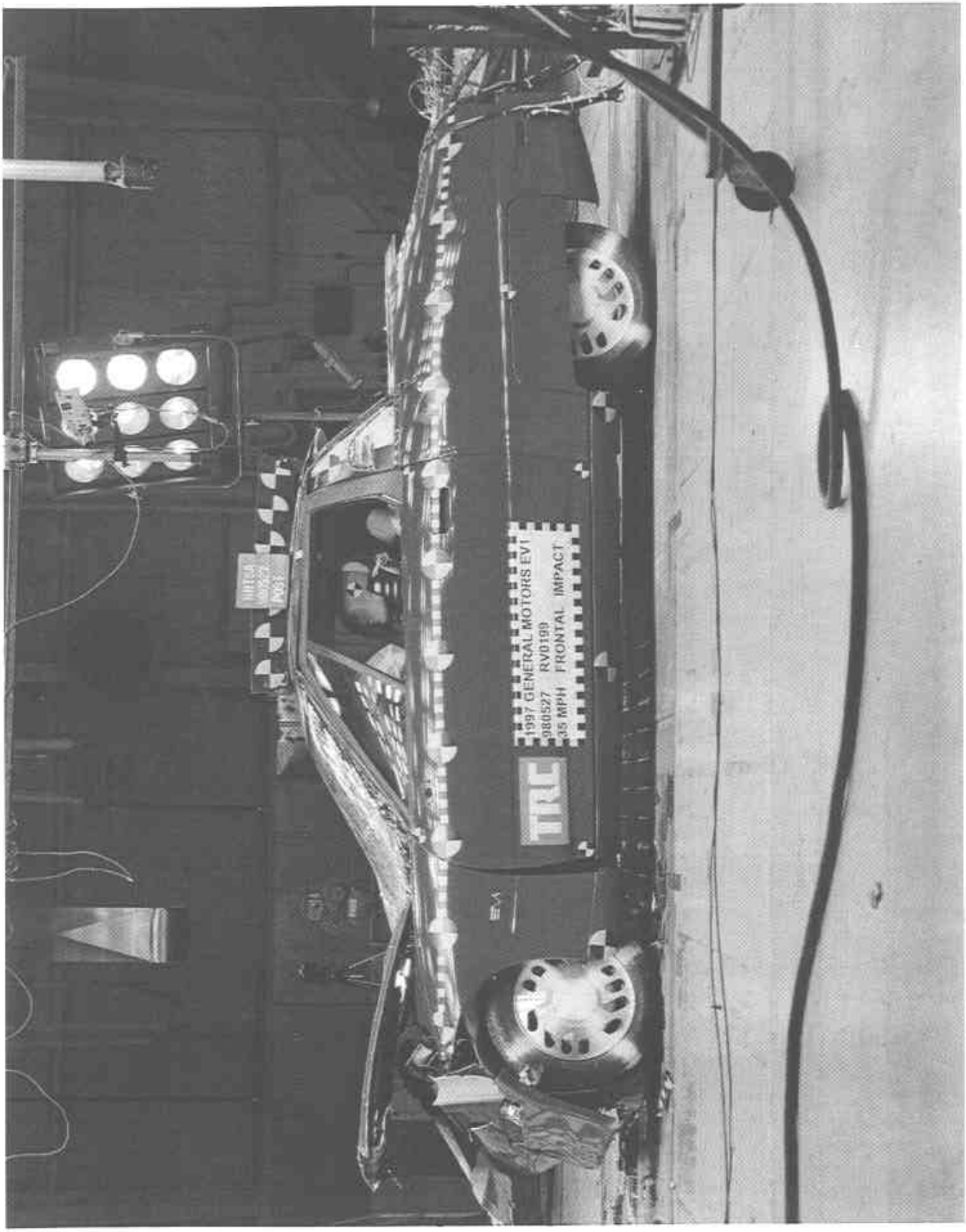


Figure A-4 Post-Test Left Side View

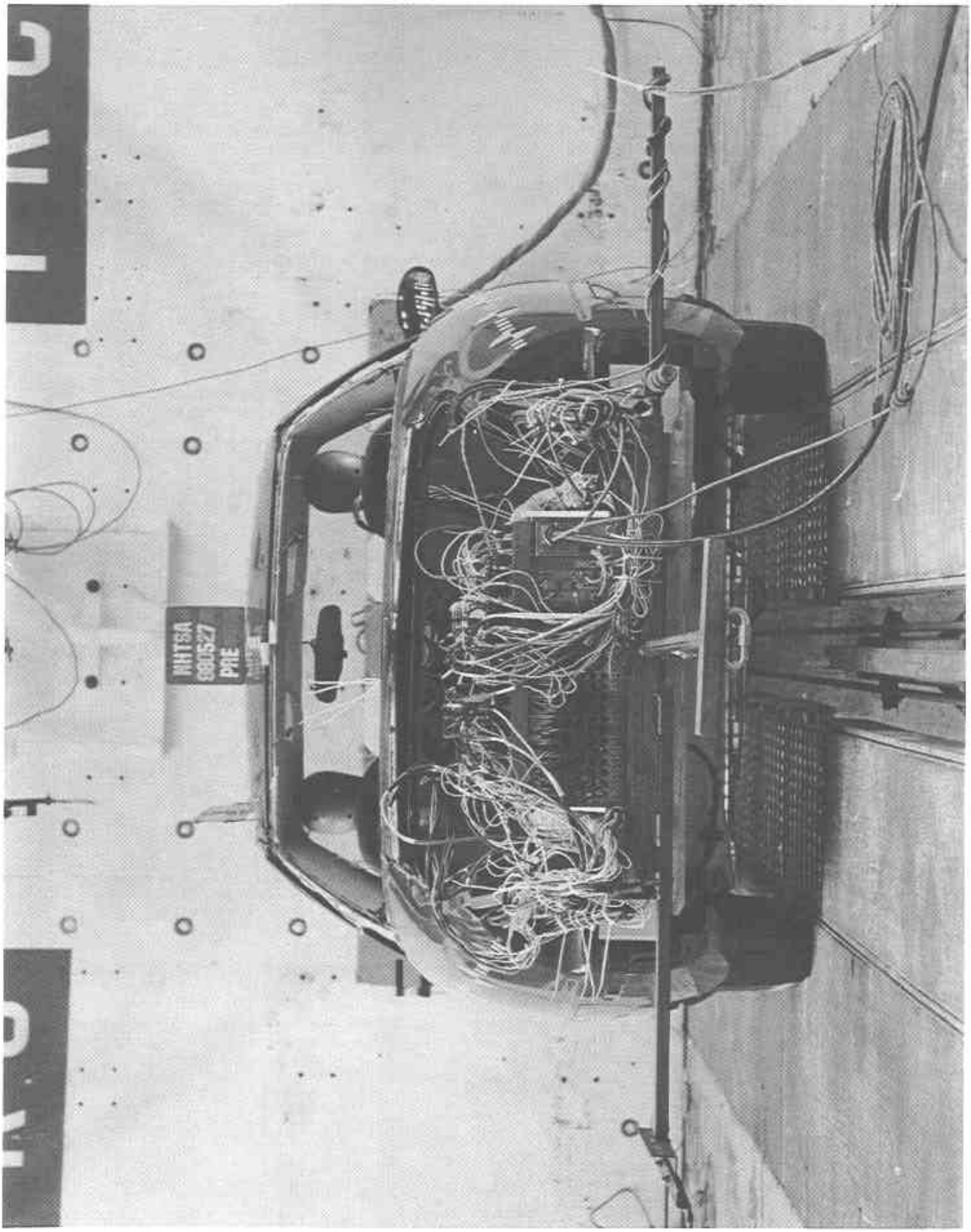


Figure A-5 Pre-Test Rear View

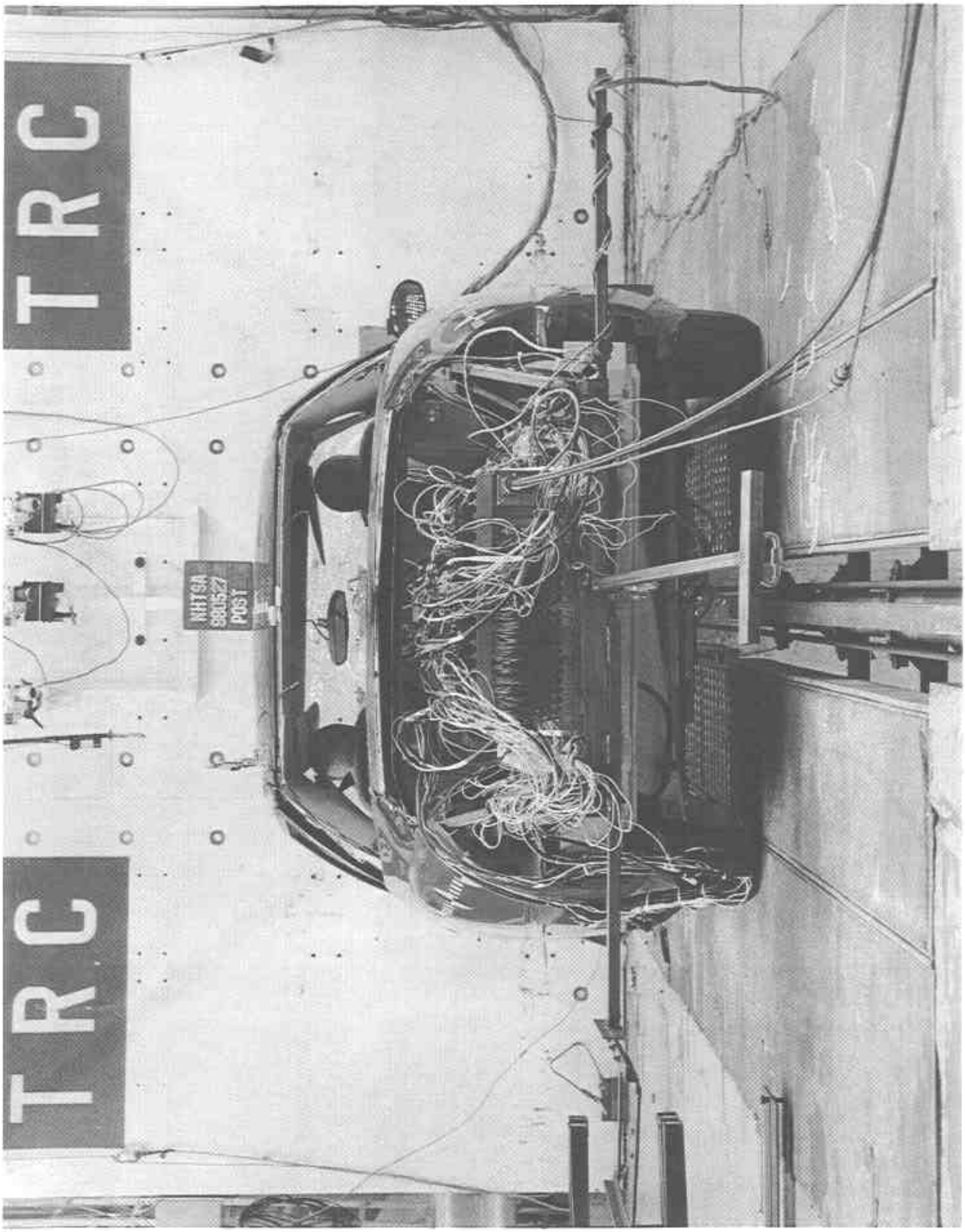


Figure A-6 Post-Test Rear View

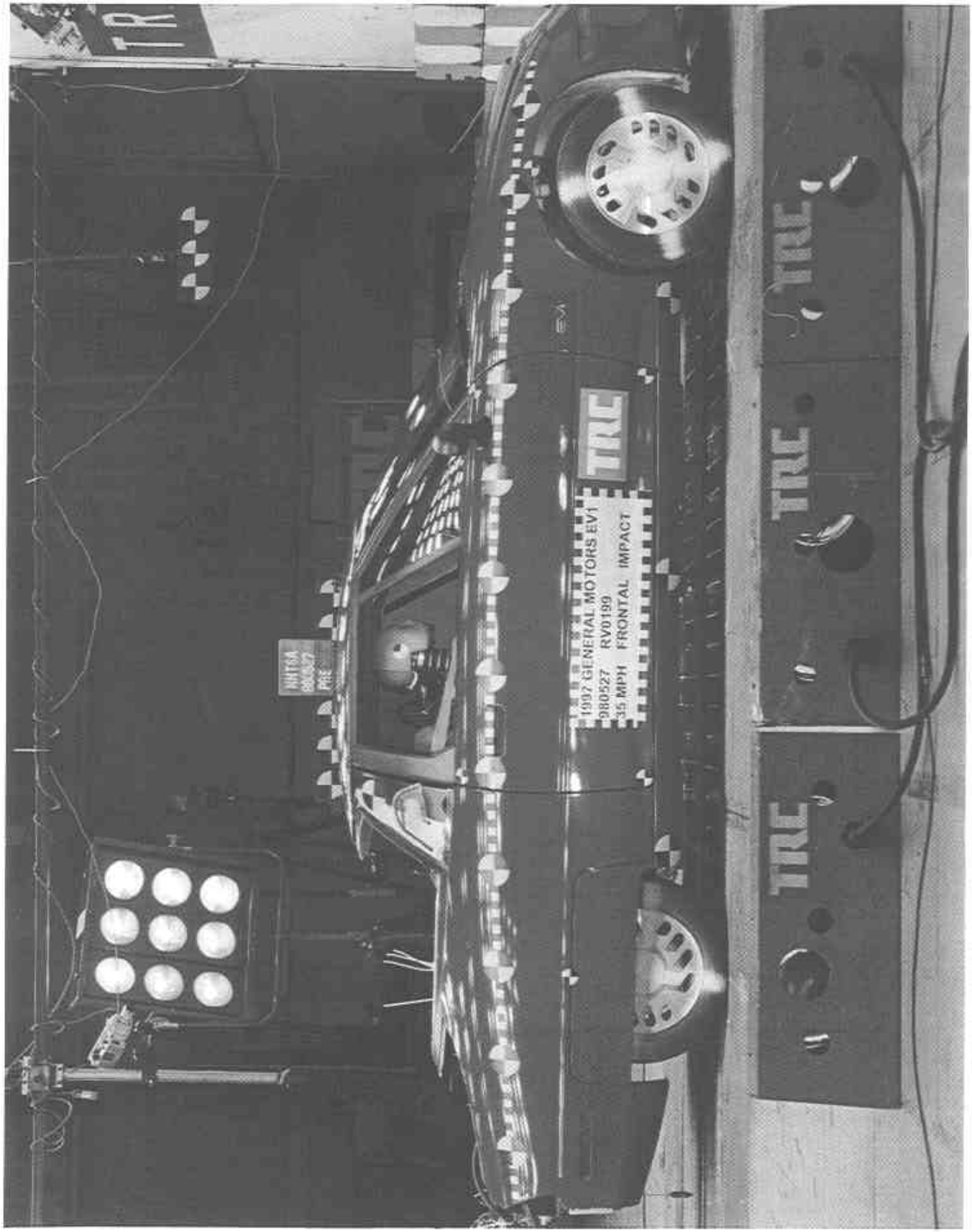


Figure A-7 Pre-Test Right Side View

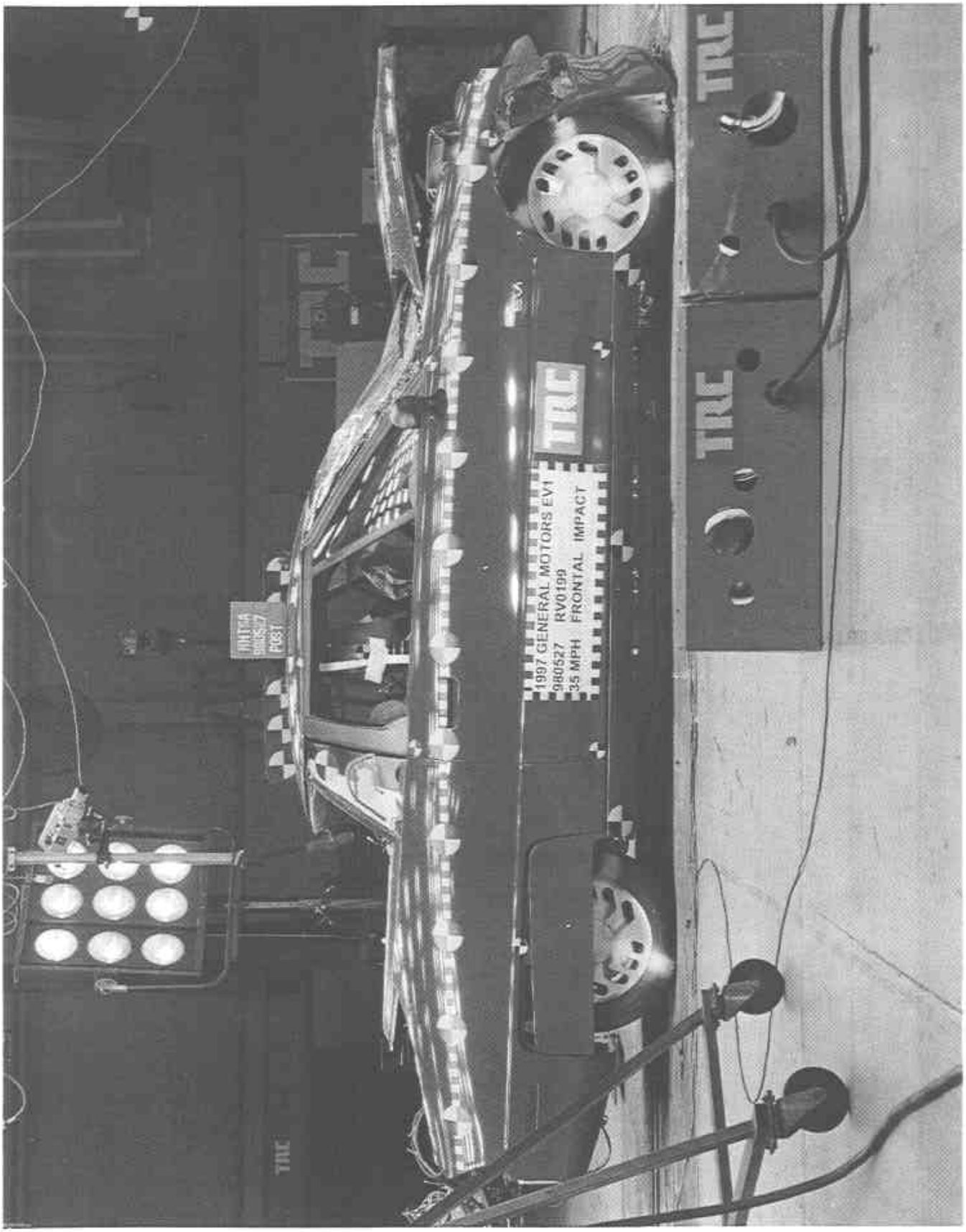


Figure A-8 Post-Test Right Side View

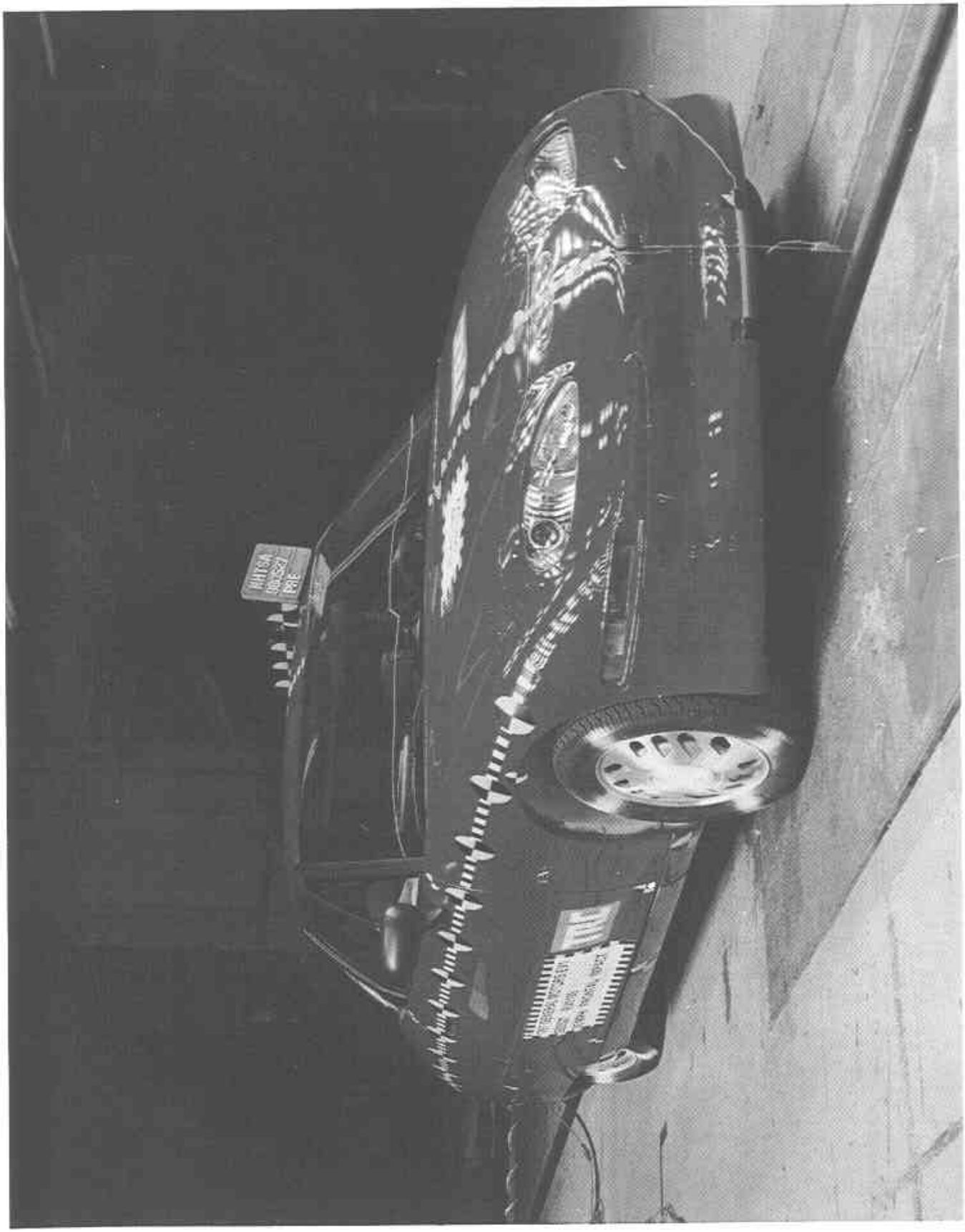


Figure A-9 Pre-Test Right Front Three-Quarter View

Figure A-10 Post-Test Right Front Three-Quarter View

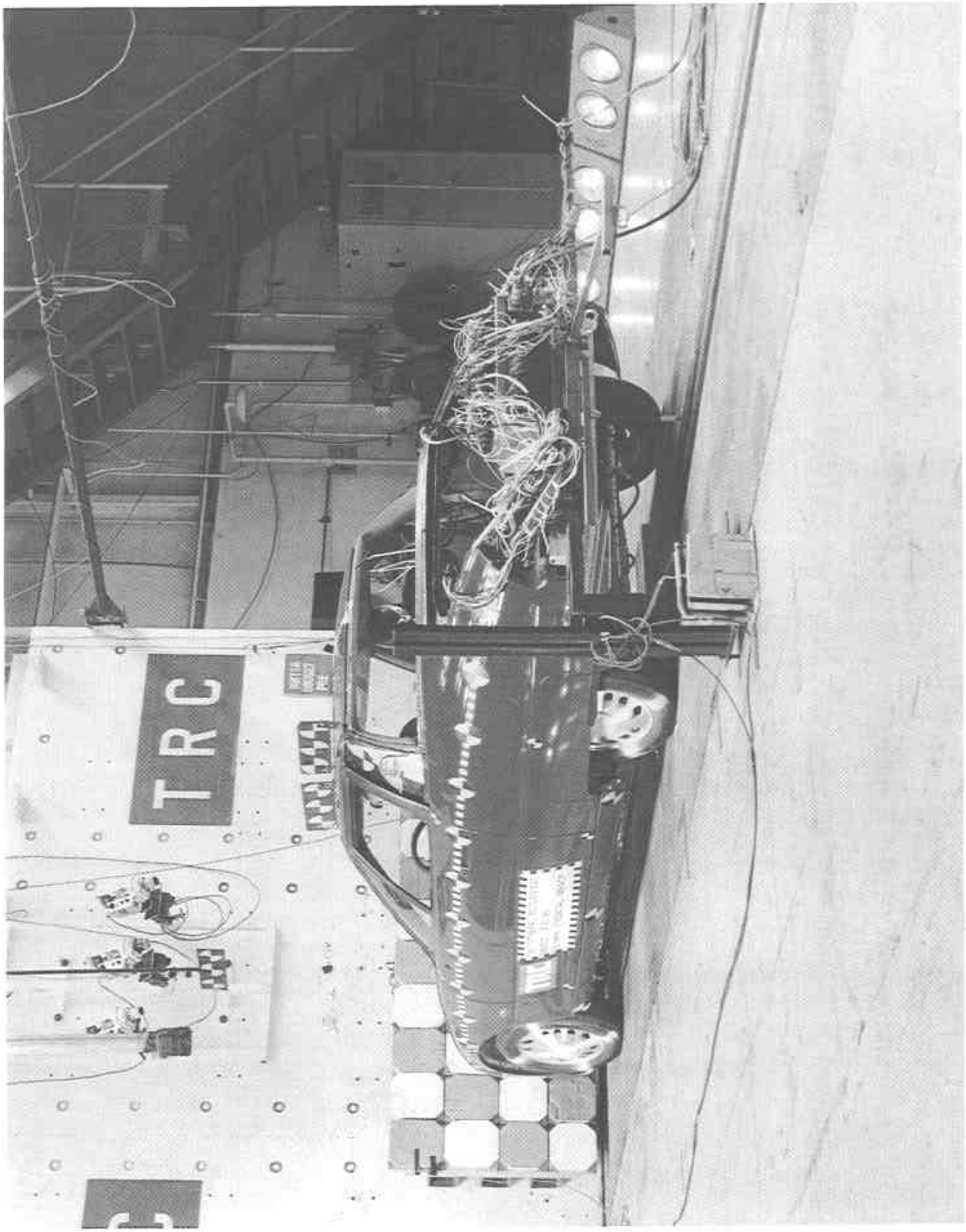


Figure A-11 Pre-Test Left Rear Three-Quarter View

Figure A-12 Post-Test Left Rear Three-Quarter View

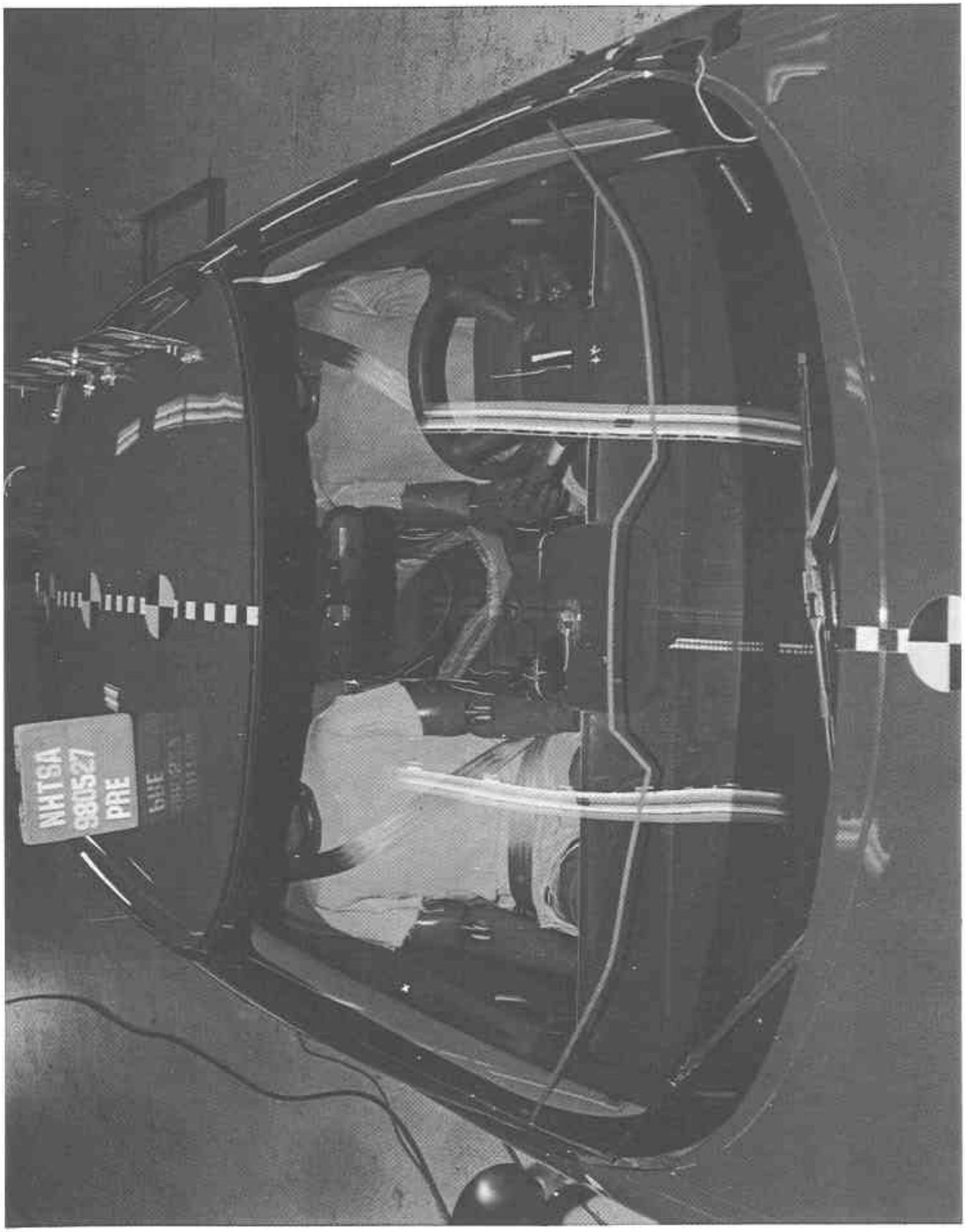


Figure A-13 Pre-Test Windshield View

Figure A-14 Post-Test Windshield View

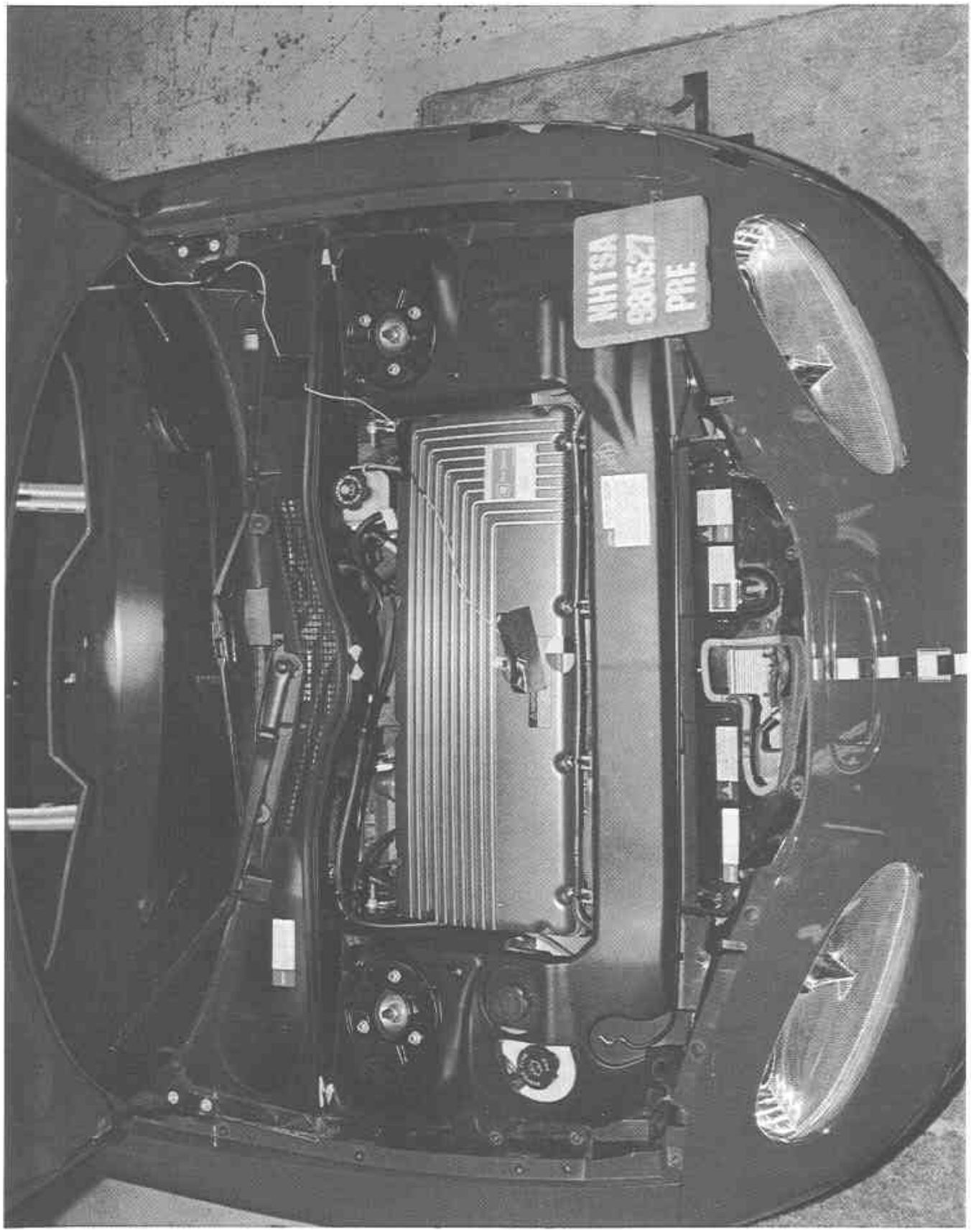


Figure A-15 Pre-Test Engine Compartment View

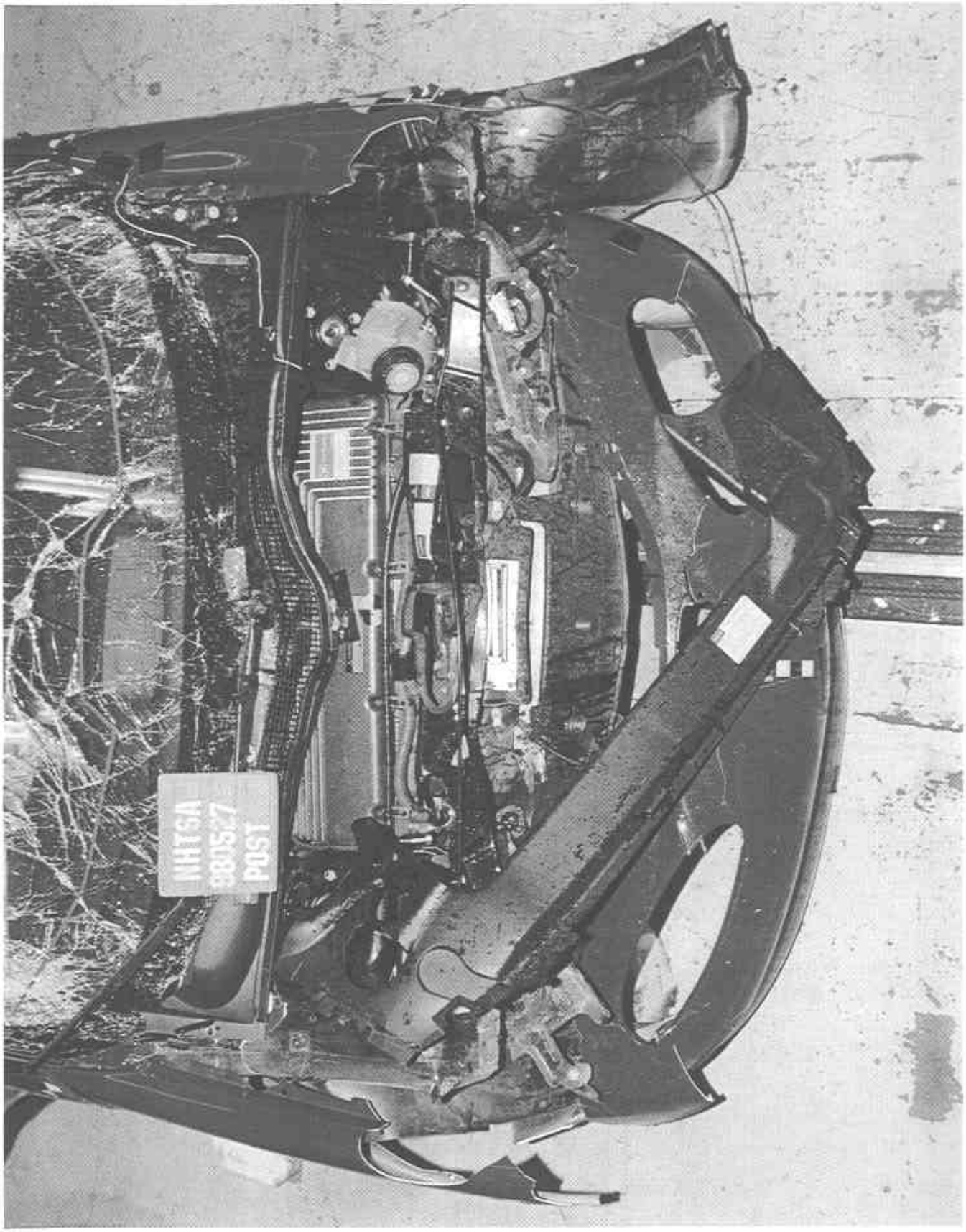


Figure A-16 Post-Test Engine Compartment View

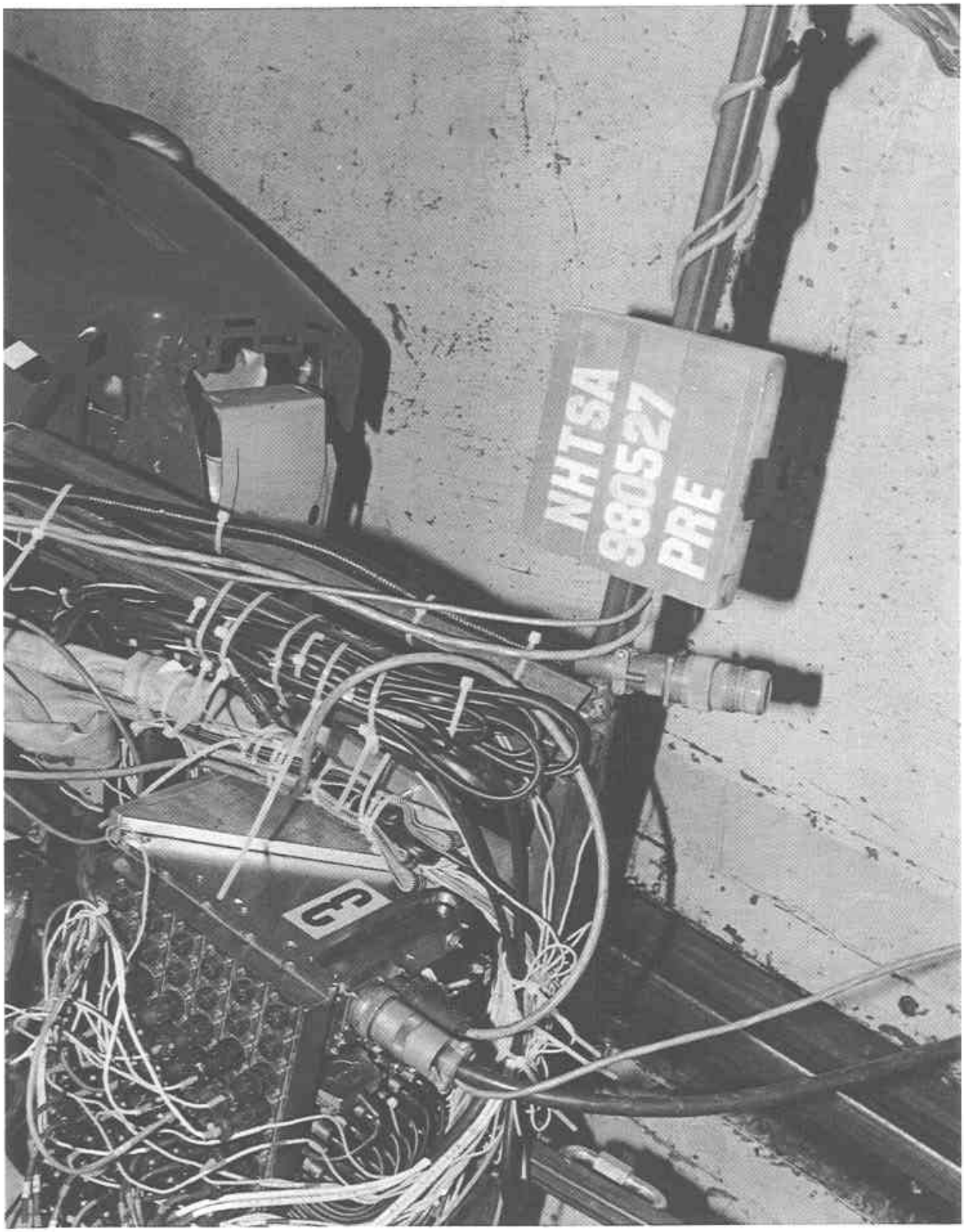


Figure A-17 Pre-Test Charger Cable View

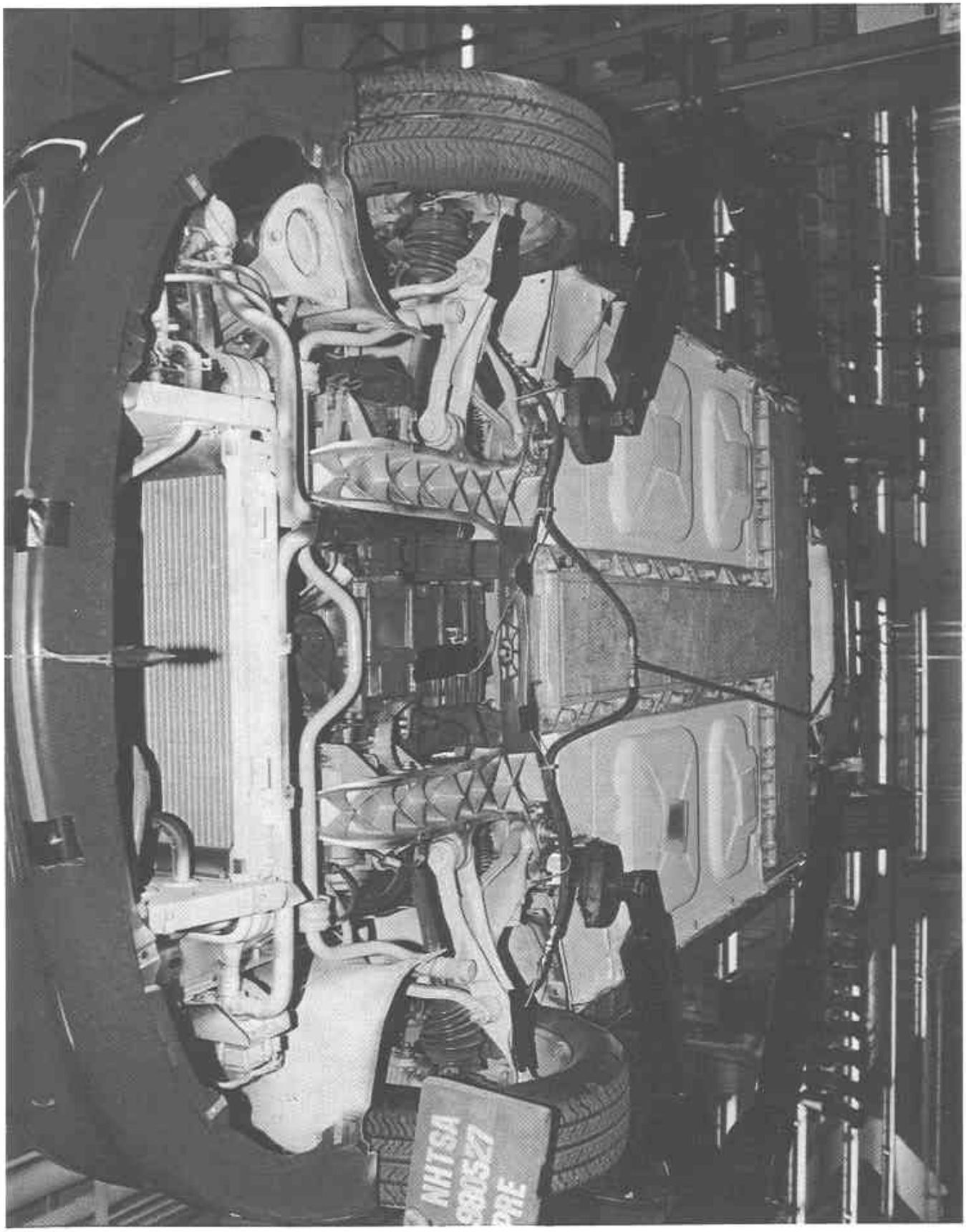


Figure A-18 Pre-Test Front Underbody View

Figure A-19 Post-Test Front Underbody View

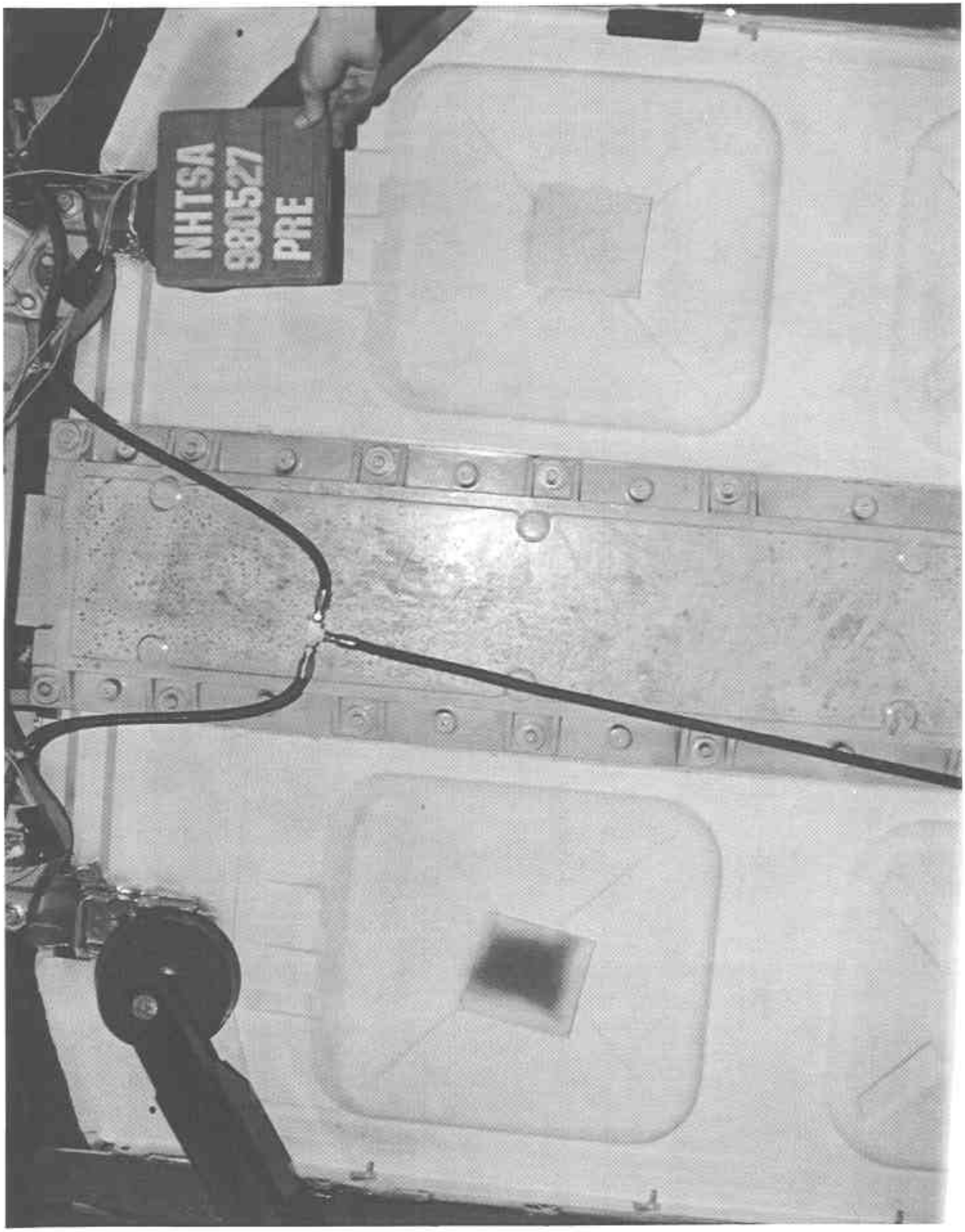


Figure A-20 Pre-Test Mid Underbody - View 1

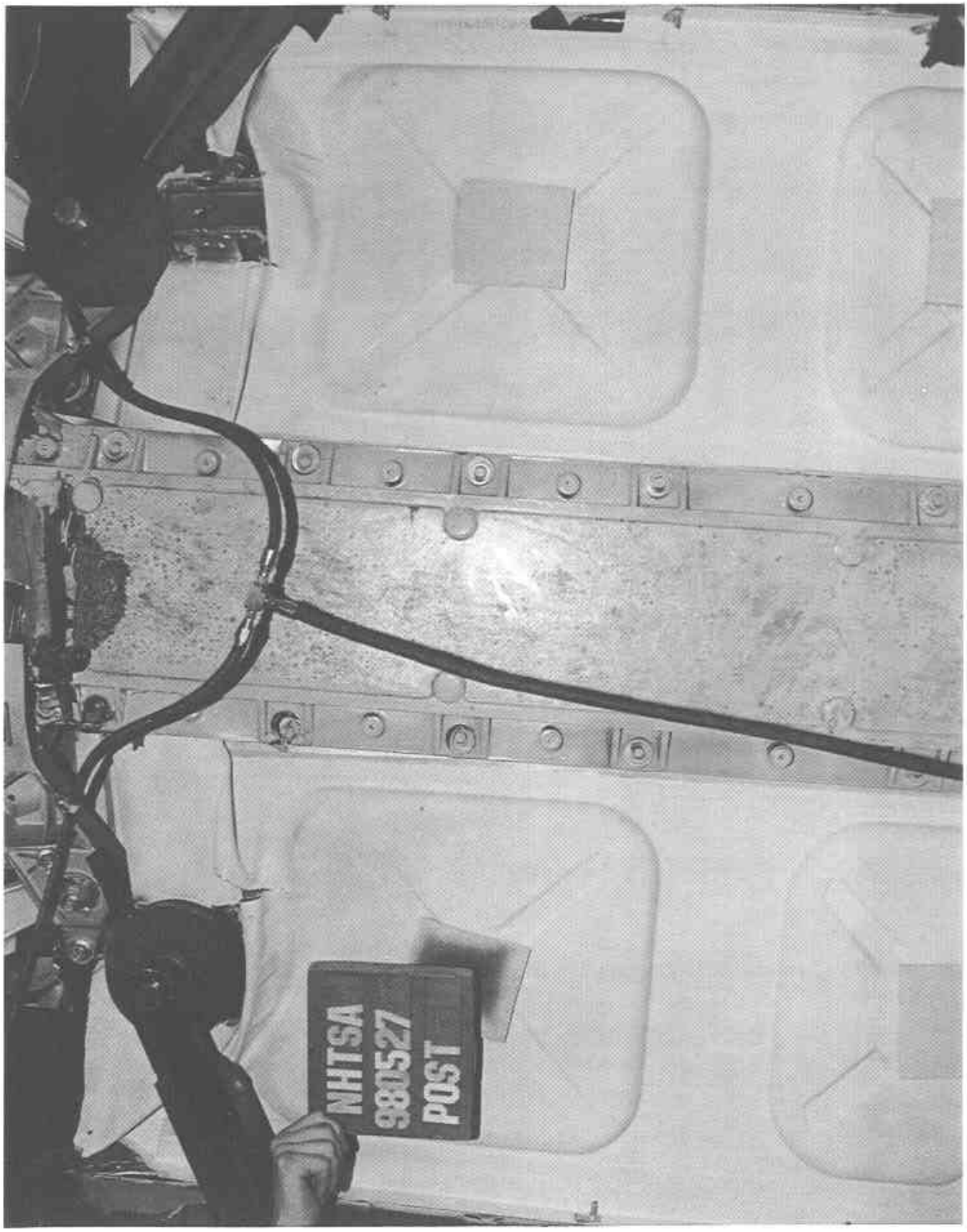


Figure A-21 Post-Test Mid Underbody - View 1

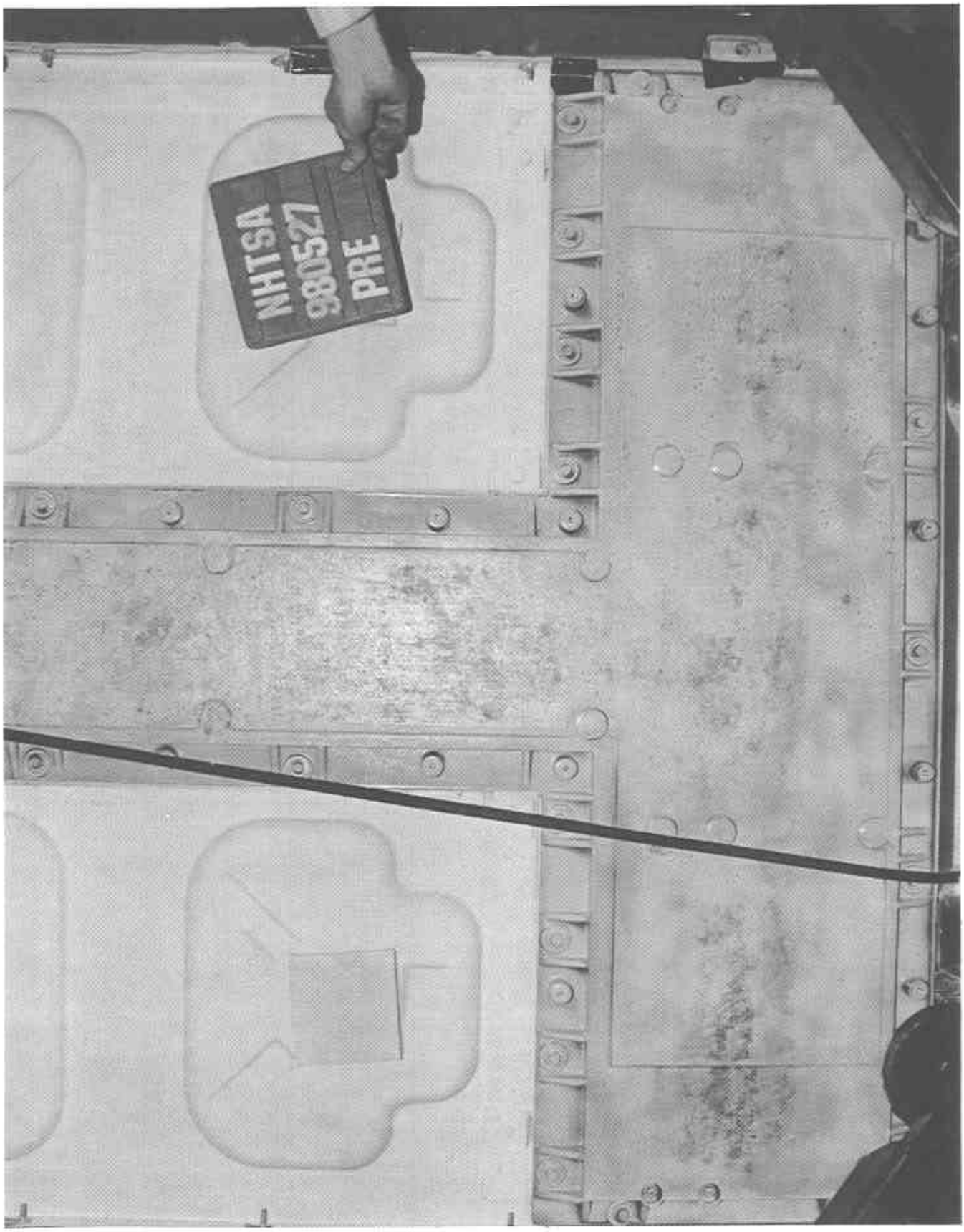


Figure A-22 Pre-Test Mid Underbody - View 2

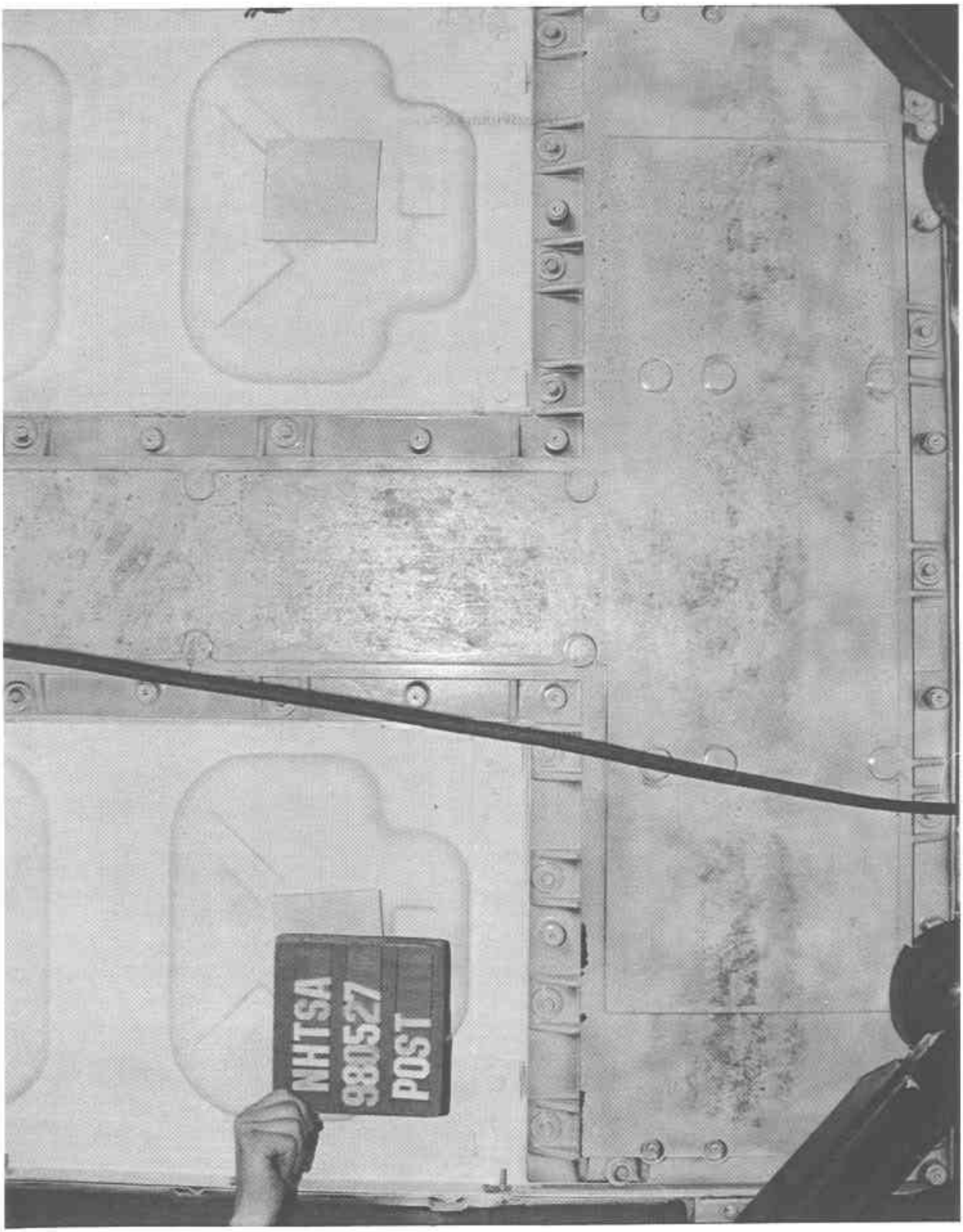


Figure A-23 Post-Test Mid Underbody - View 2

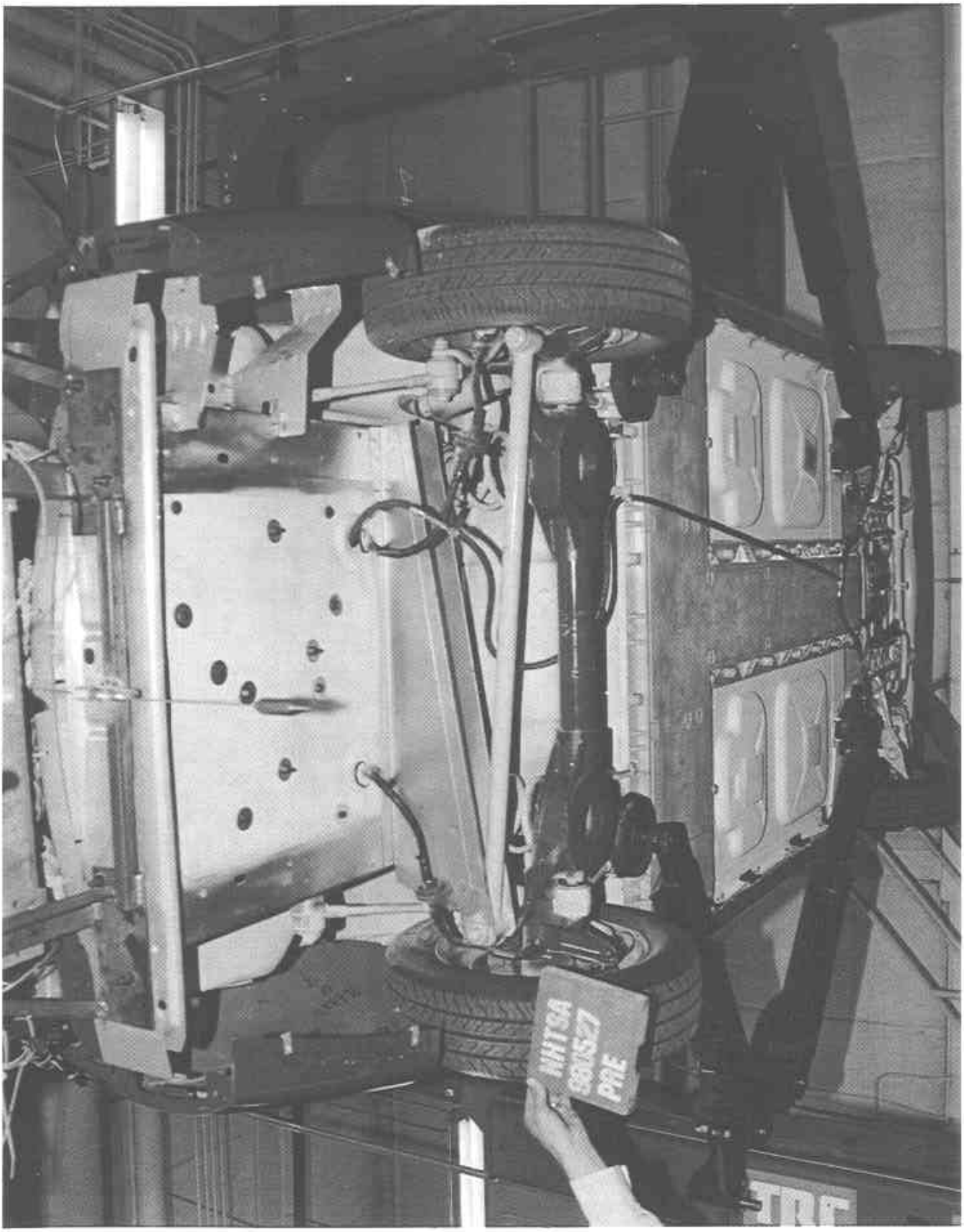


Figure A-24 Pre-Test Rear Underbody View

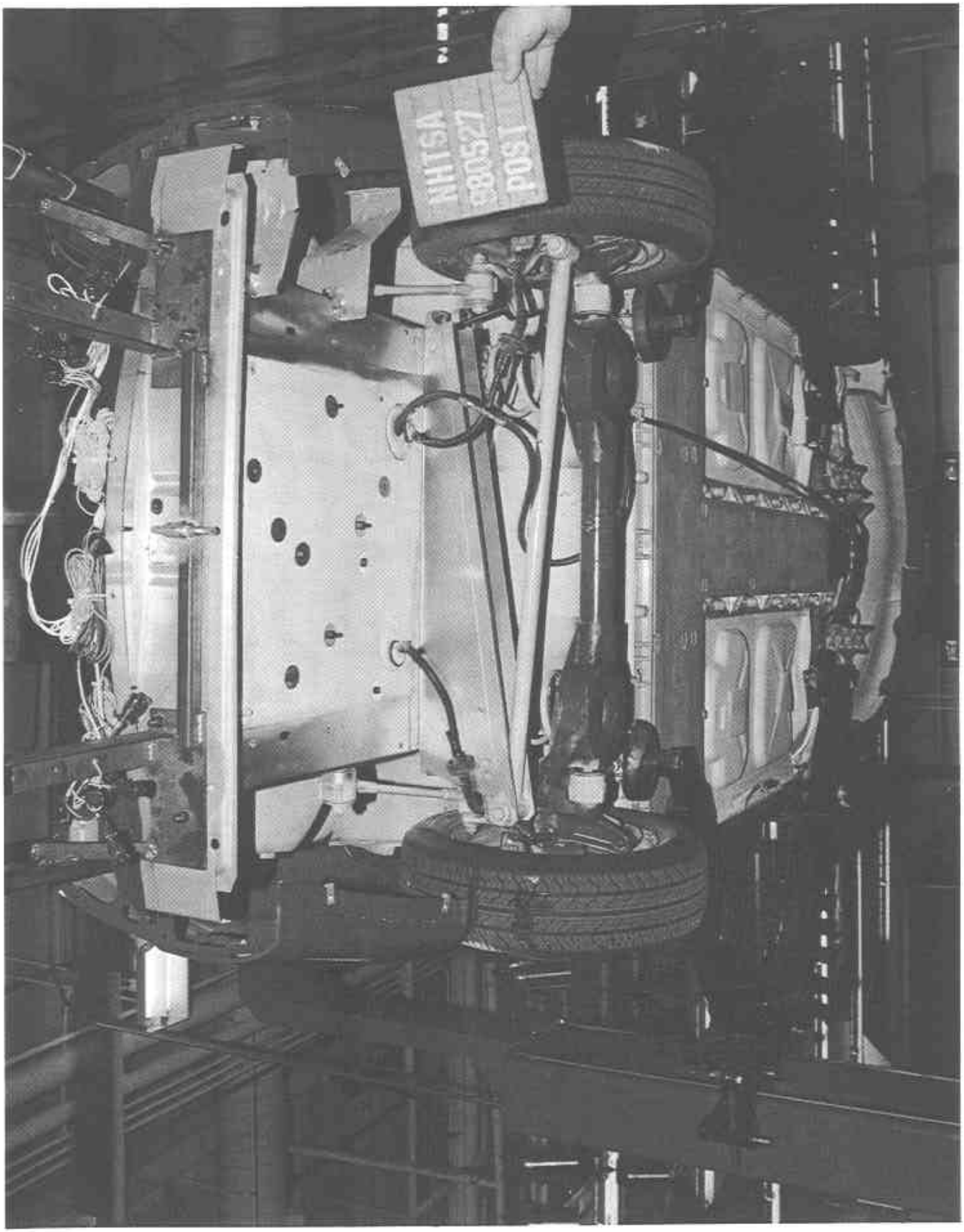


Figure A-25 Post-Test Rear Underbody View

Figure A-26 Pre-Test Driver Dummy Position View

Figure A-27 Post-Test Driver Dummy Position View

Figure A-28 Pre-Test Passenger Dummy Position View

Figure A-29 Post-Test Passenger Dummy Position View

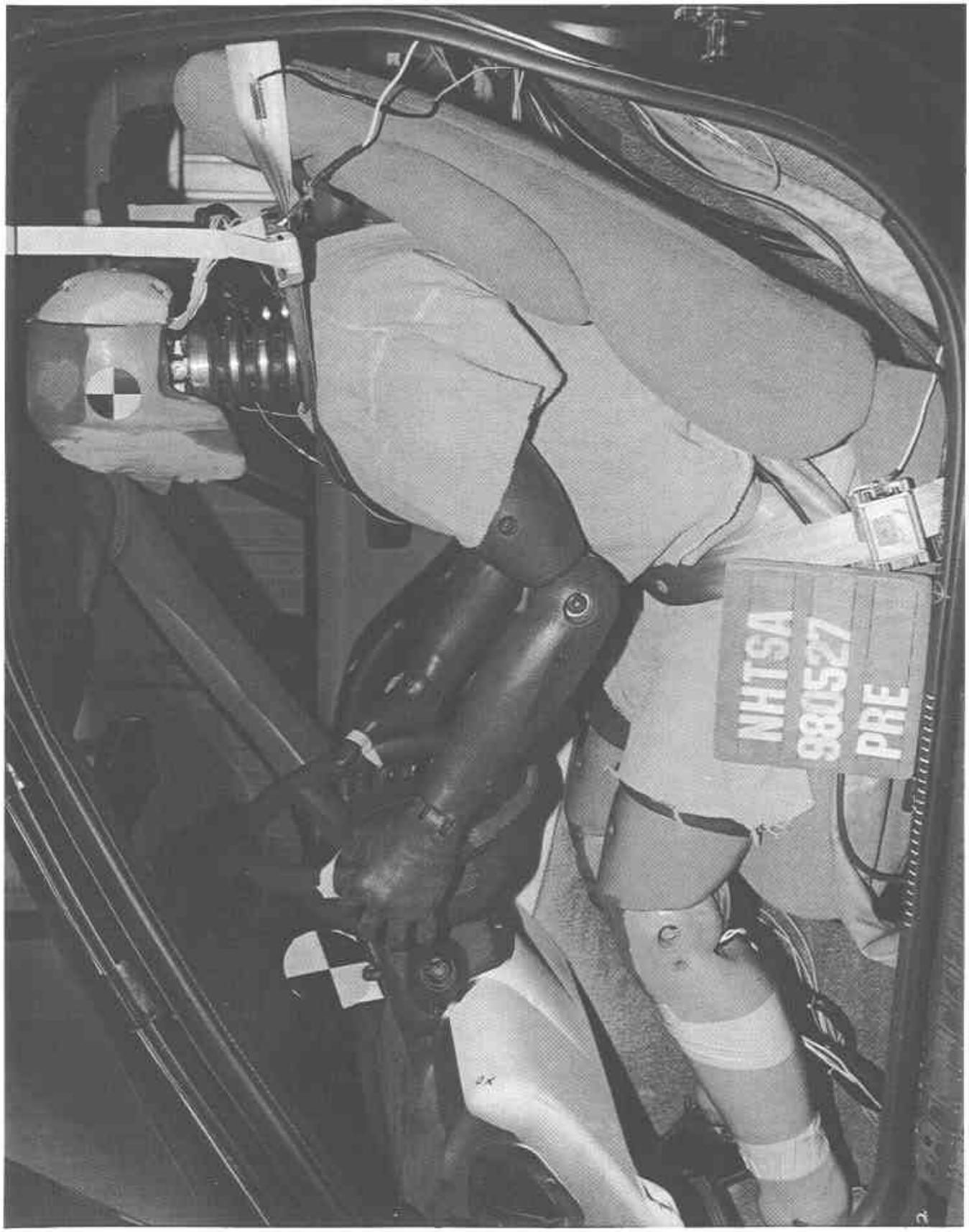


Figure A-30 Pre-Test Driver Dummy and Vehicle Interior - View 1

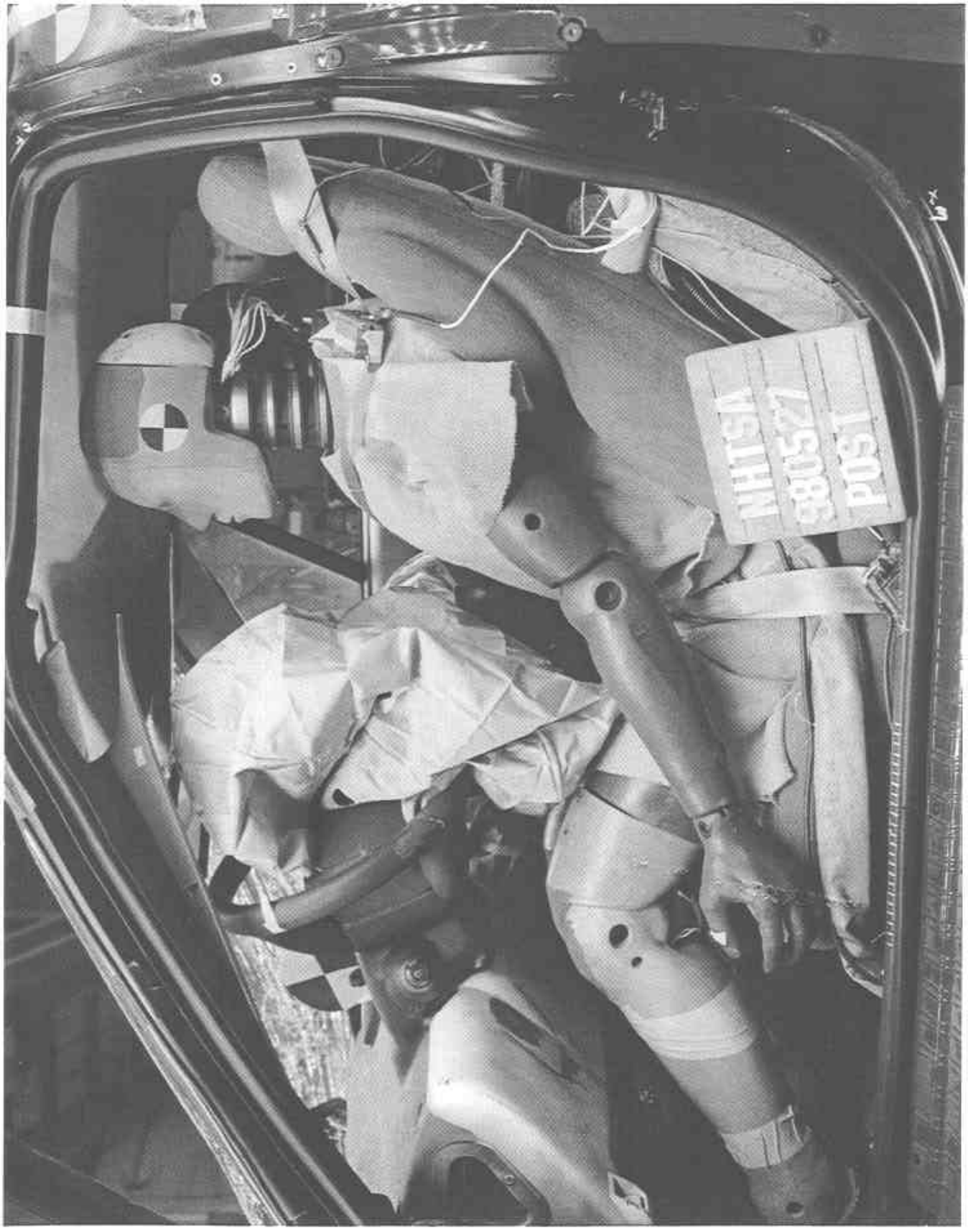


Figure A-31 Post-Test Driver Dummy and Vehicle Interior - View 1

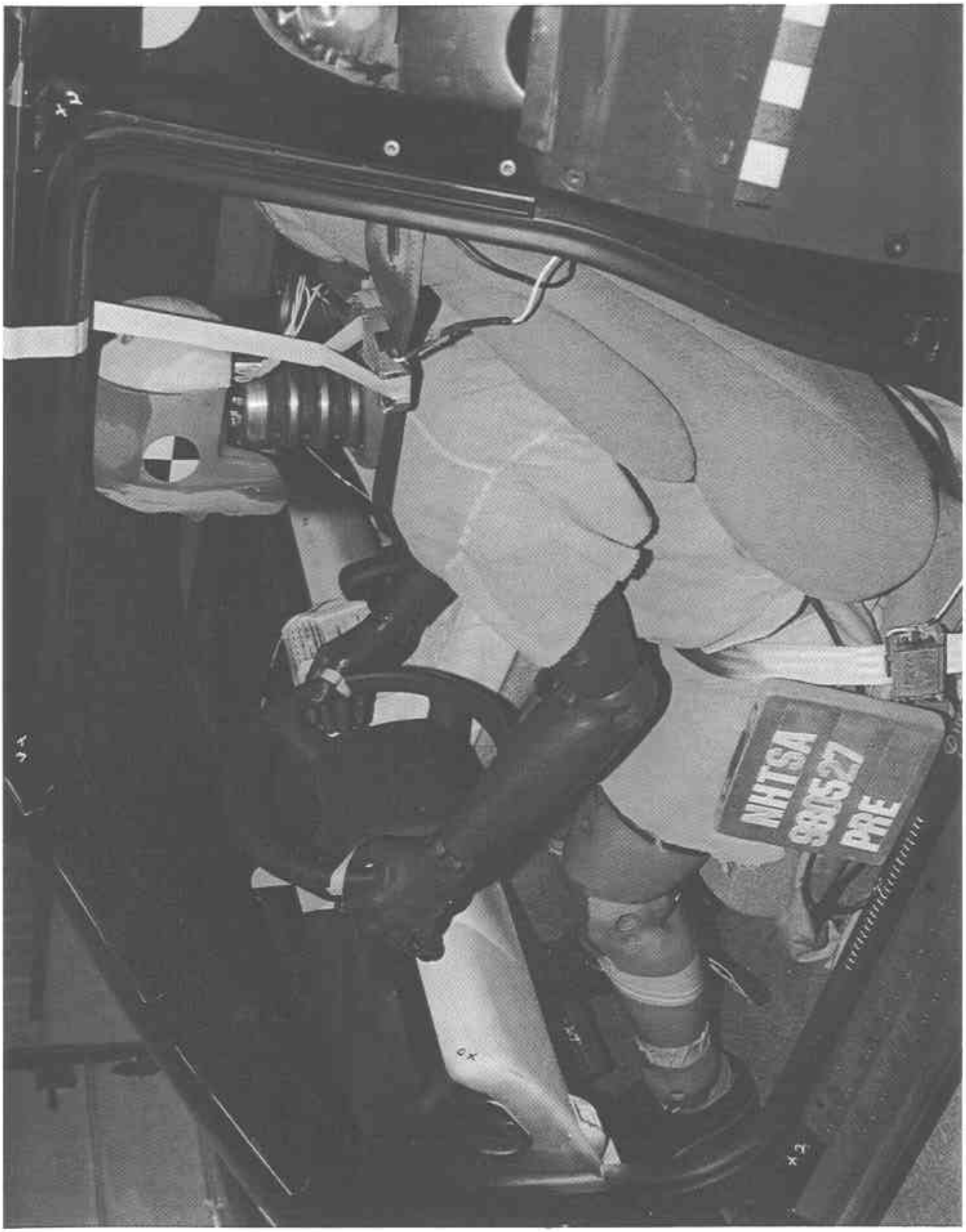


Figure A-32. Pre-Test Driver Dummy and Vehicle Interior - View 2

Figure A-33 Post-Test Driver Dummy and Vehicle Interior - View 2

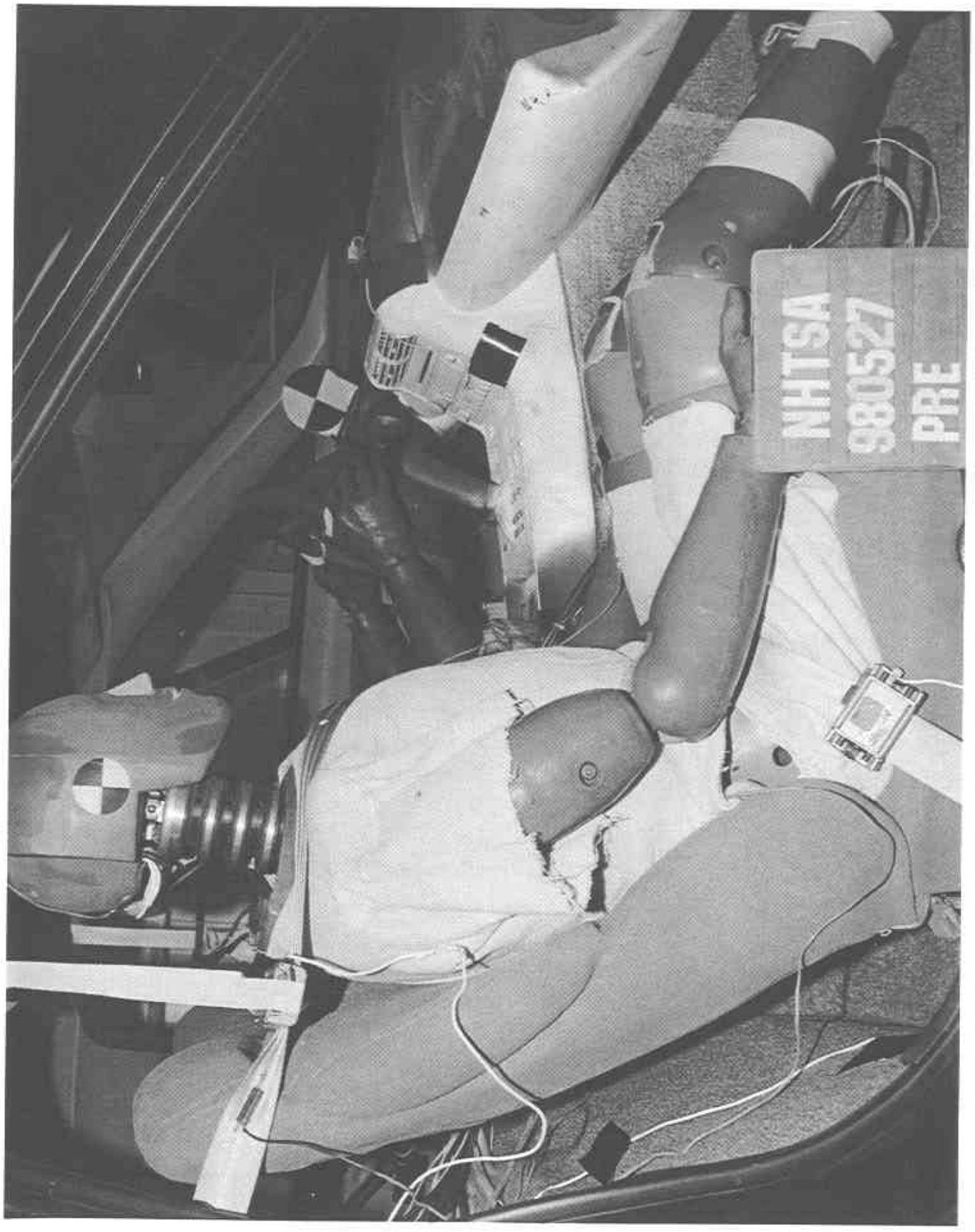


Figure A-34 Pre-Test Passenger Dummy and Vehicle Interior - View 1

Figure A-35 Post-Test Passenger Dummy and Vehicle Interior - View 1

Figure A-36 Pre-Test Passenger Dummy and Vehicle Interior - View 2

Figure A-37 Post-Test Passenger Dummy and Vehicle Interior - View 2

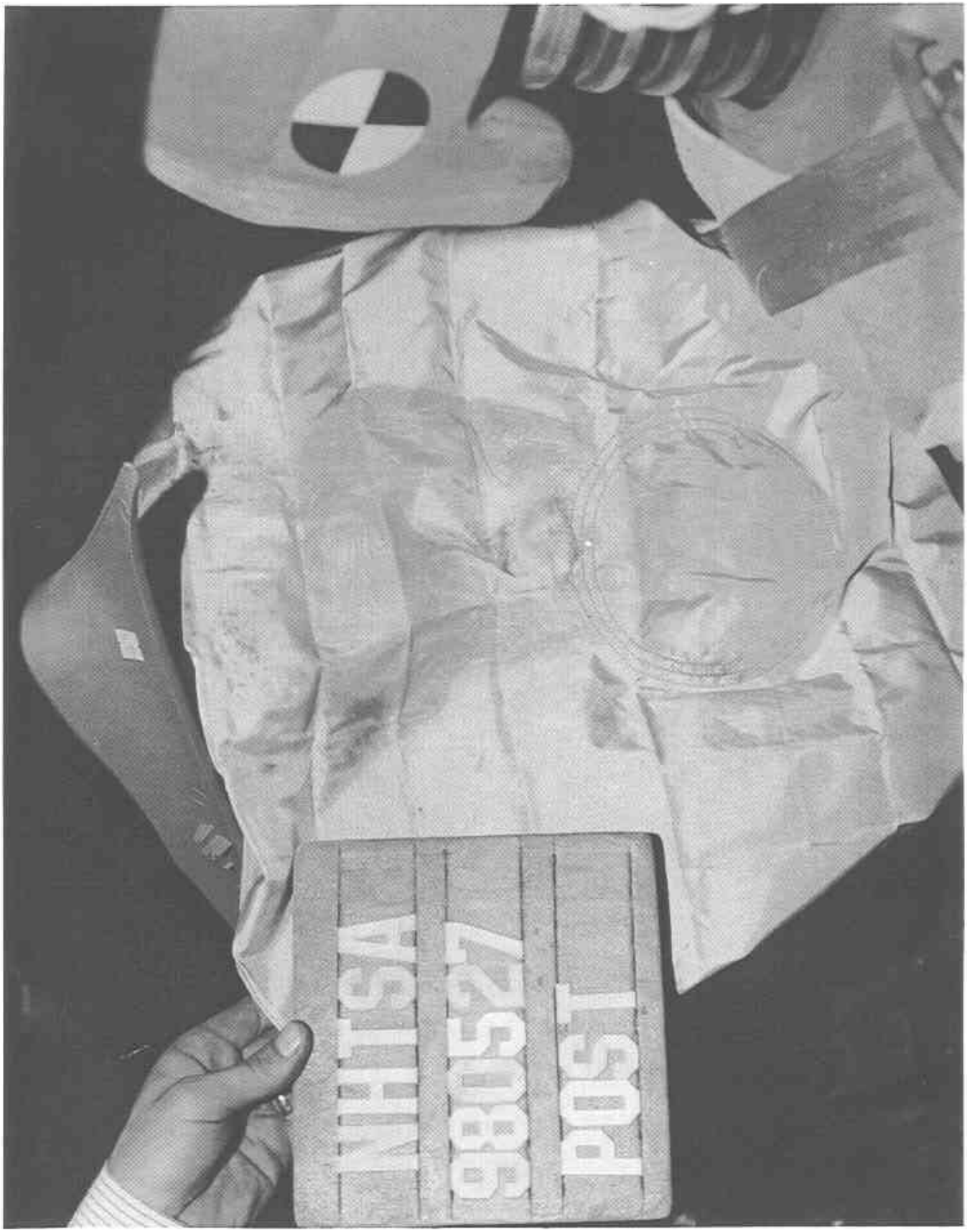


Figure A-38 Post-Test Driver Dummy Head Contact - View 1

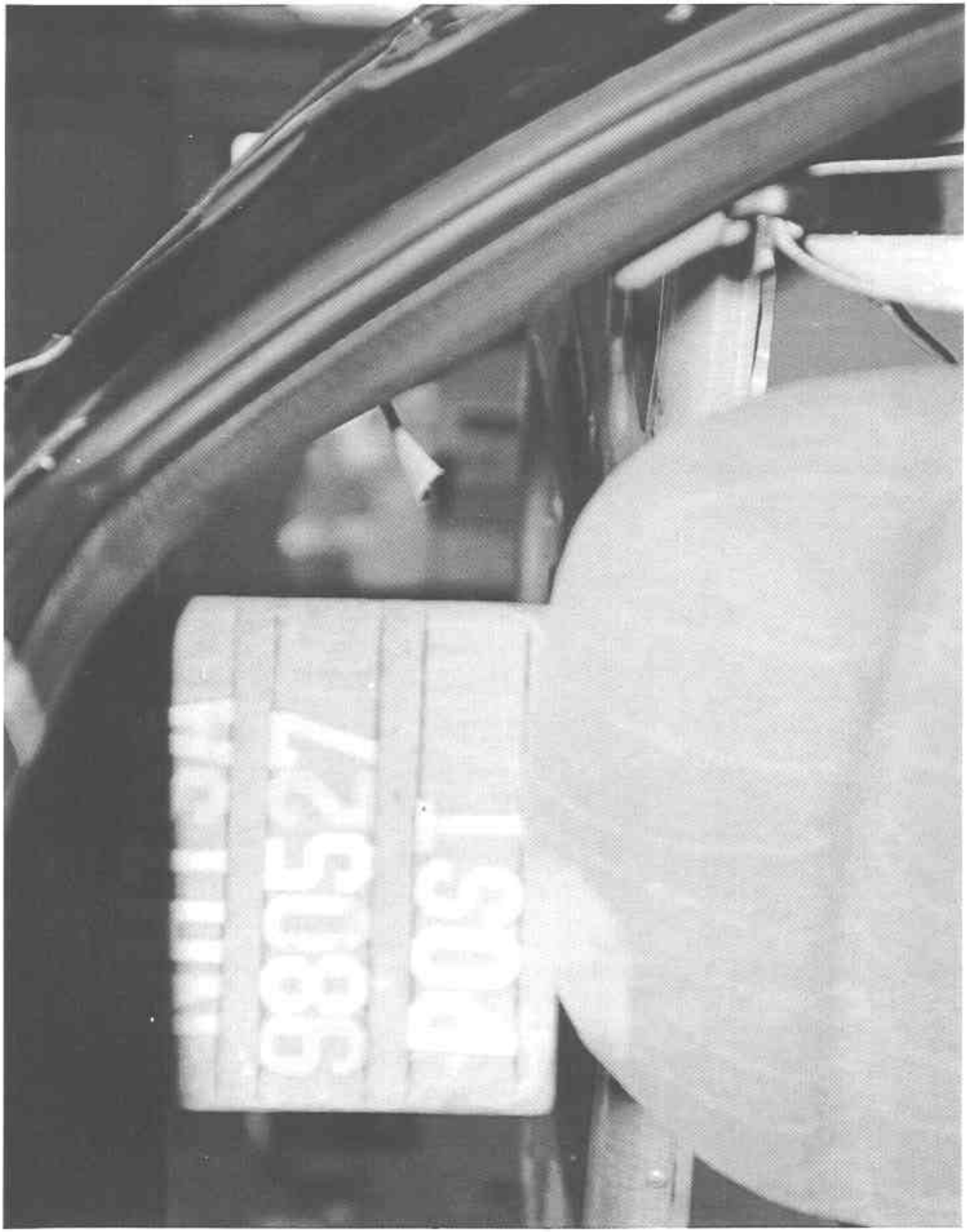


Figure A-39 Post-Test Driver Dummy Head Contact - View 2

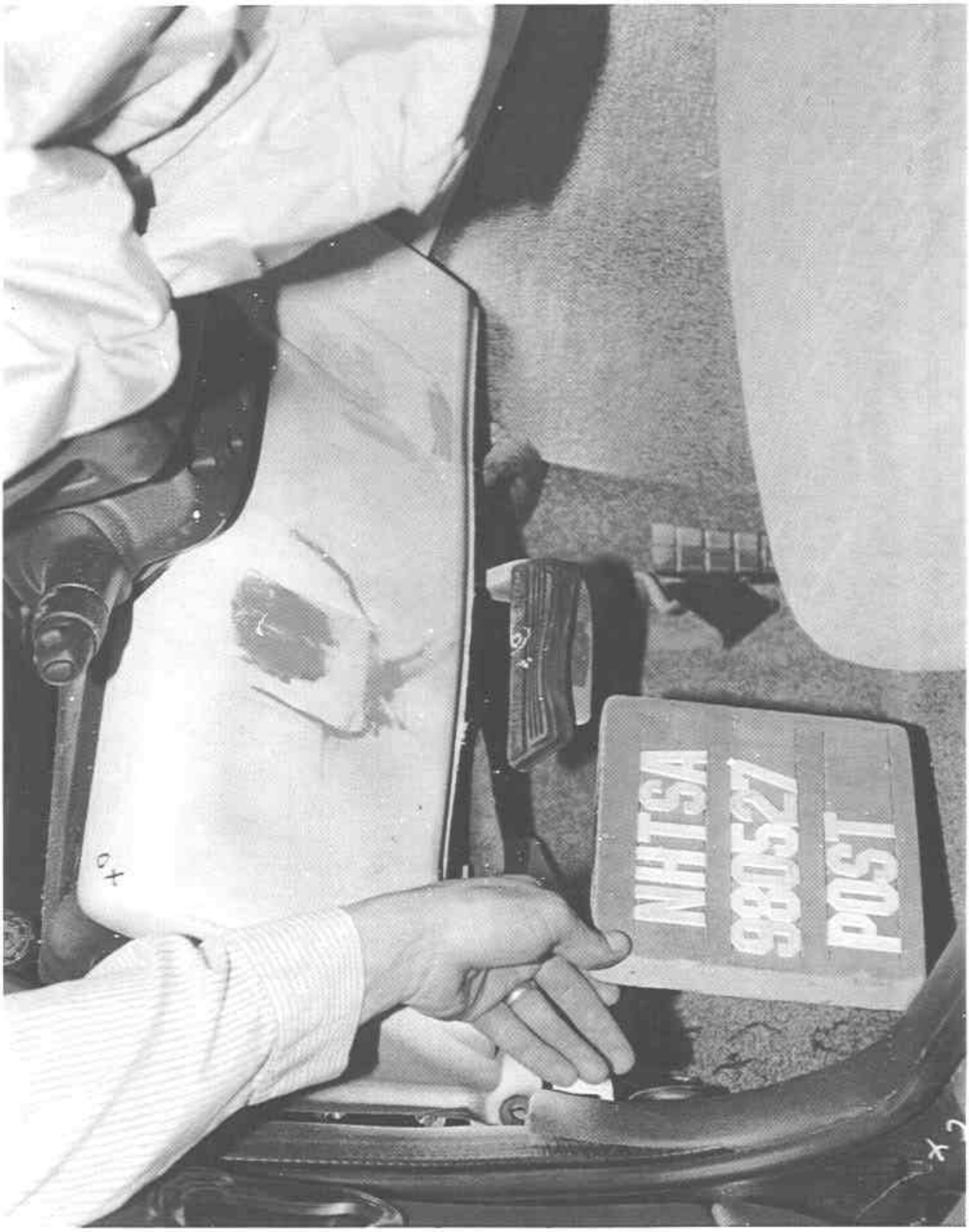


Figure A-40 Post-Test Driver Dummy Knee Contact - View 1

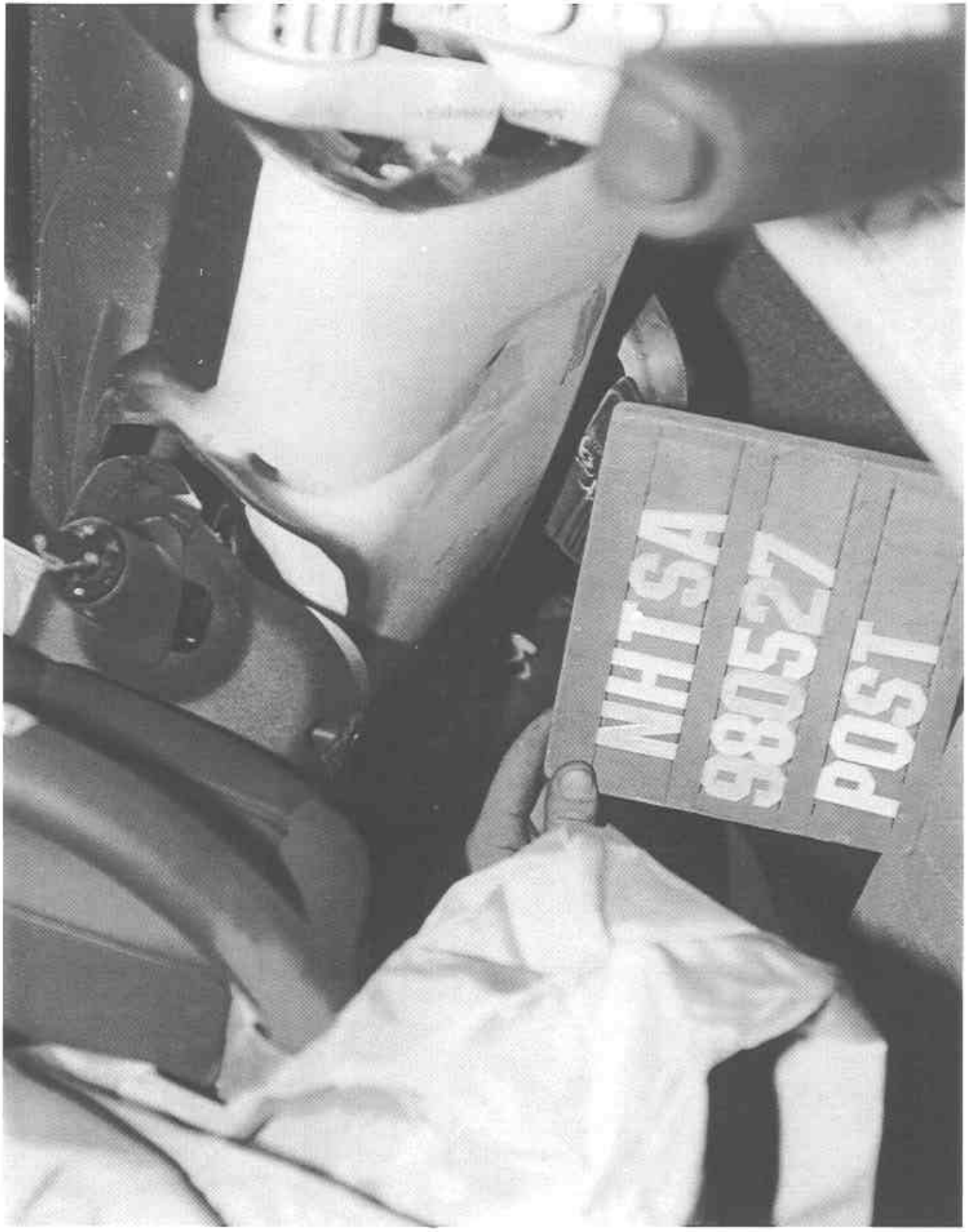


Figure A-41 Post-Test Driver Dummy Knee Contact - View 2

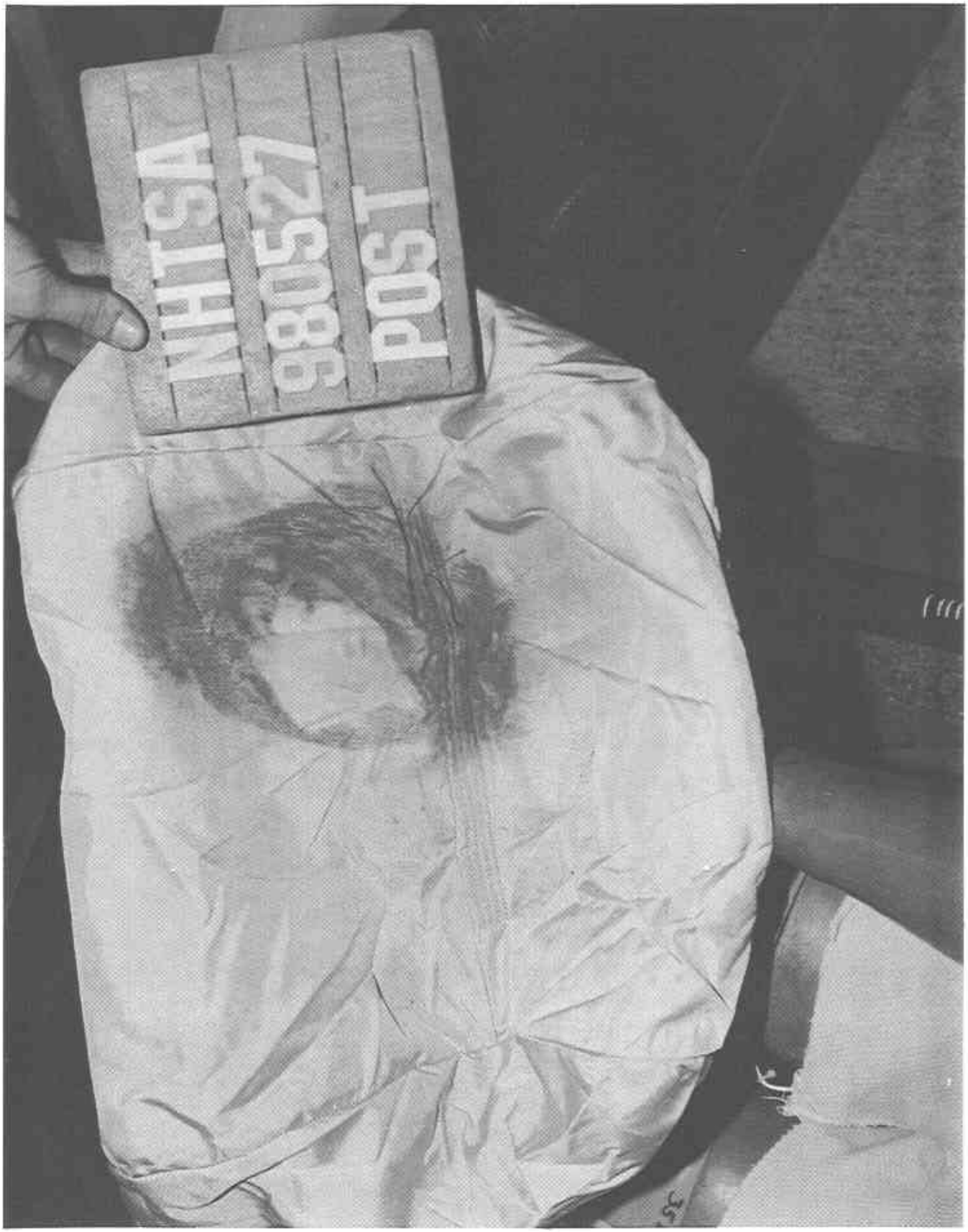


Figure A-42 Post-Test Passenger Dummy Head Contact - View 1

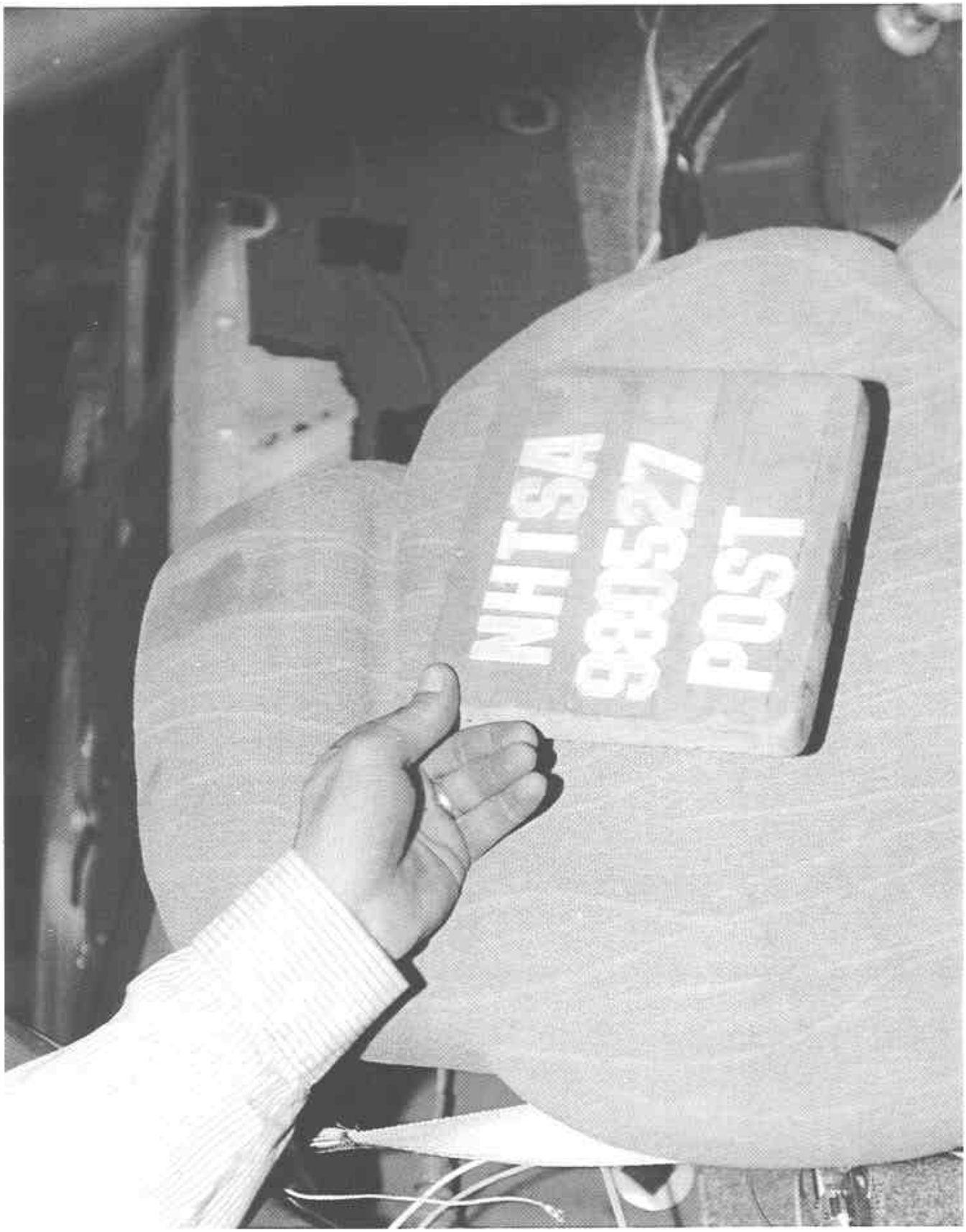


Figure A-43 Post-Test Passenger Dummy Head Contact - View 2

Figure A-44 Post-Test Passenger Dummy Knee Contact View

Figure A-45 Vehicle Certification Label View

Figure A-46 Vehicle Tire Load Label View

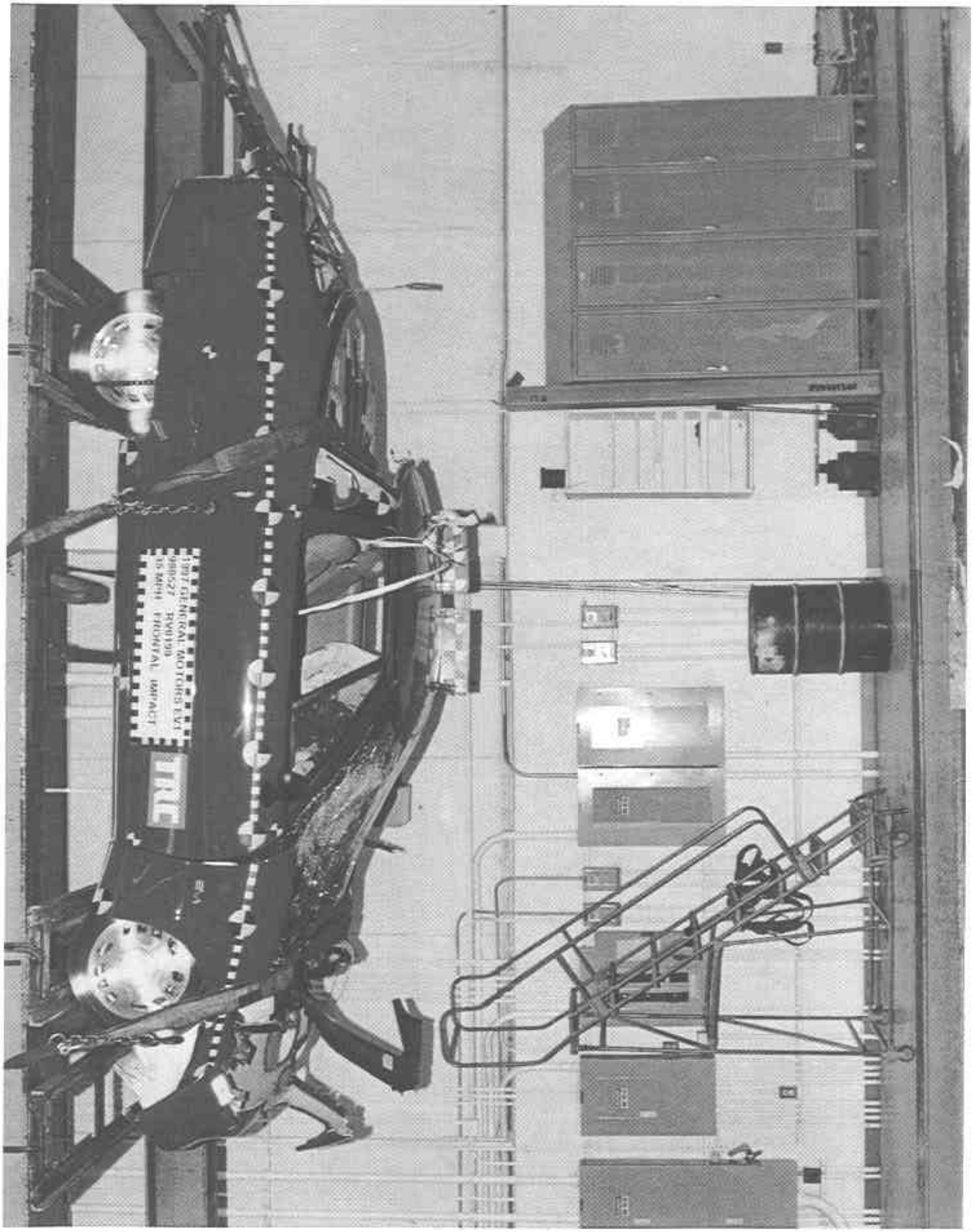
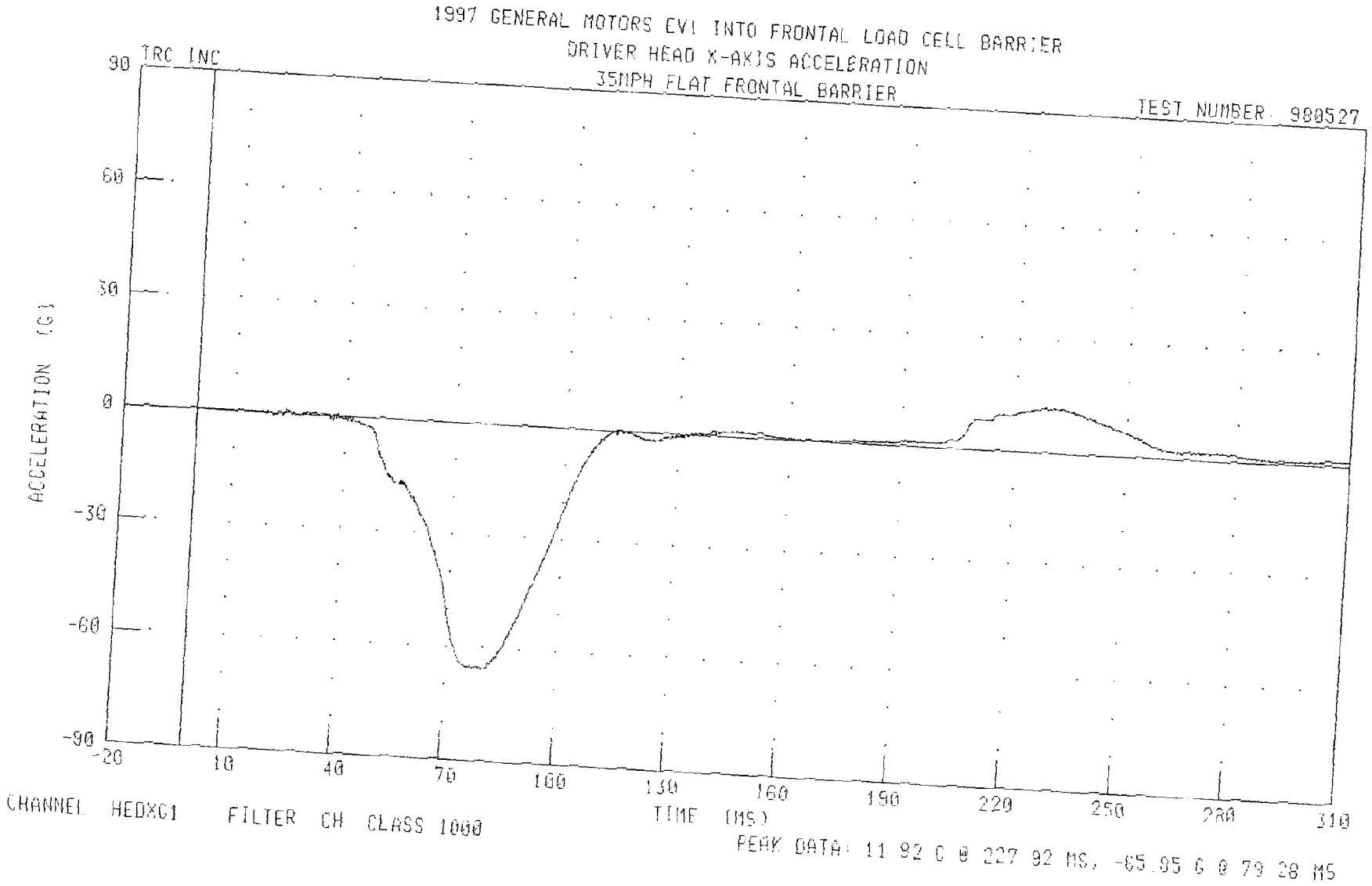
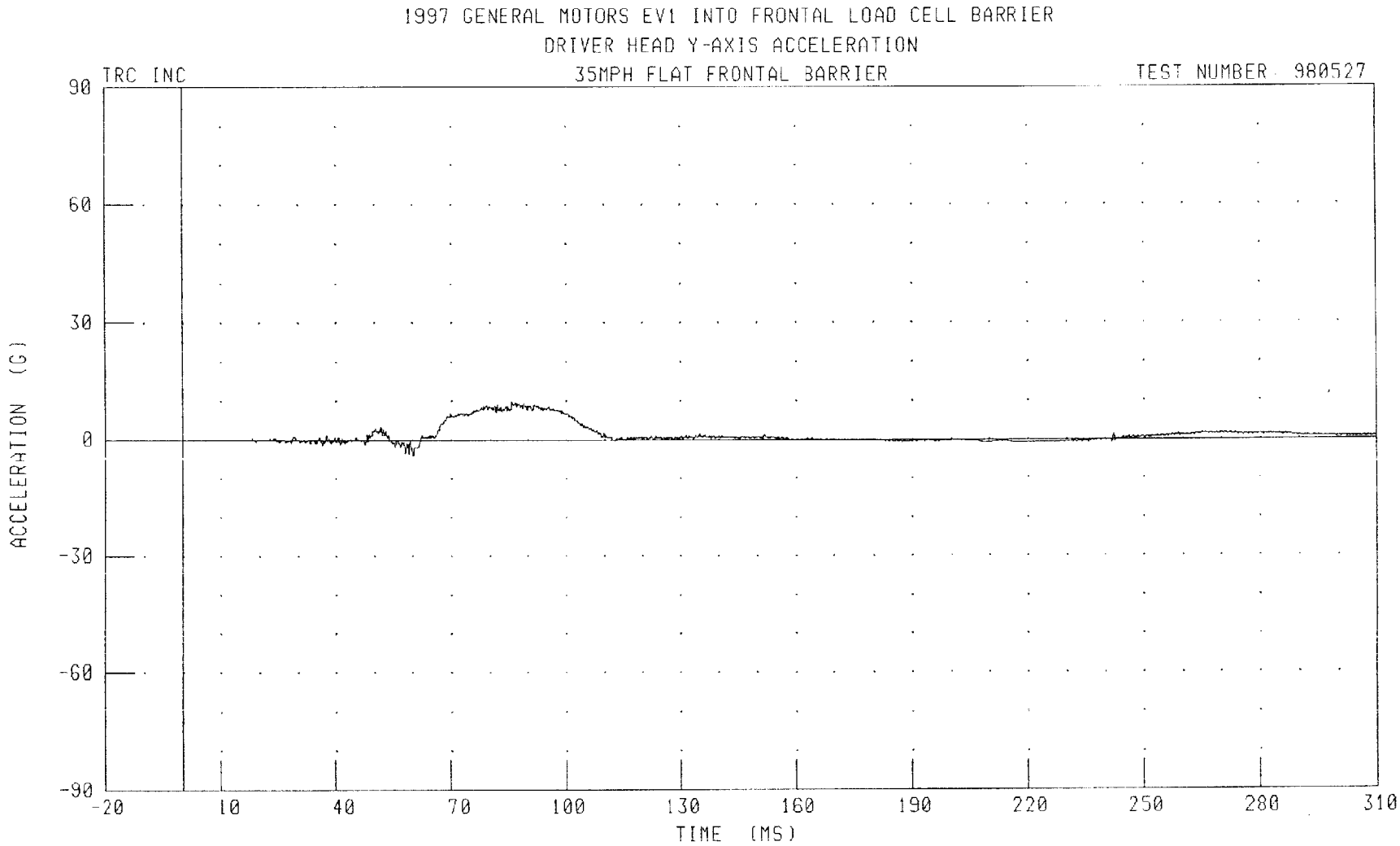


Figure A-47 Post-Test Vehicle On Static Rollover Device

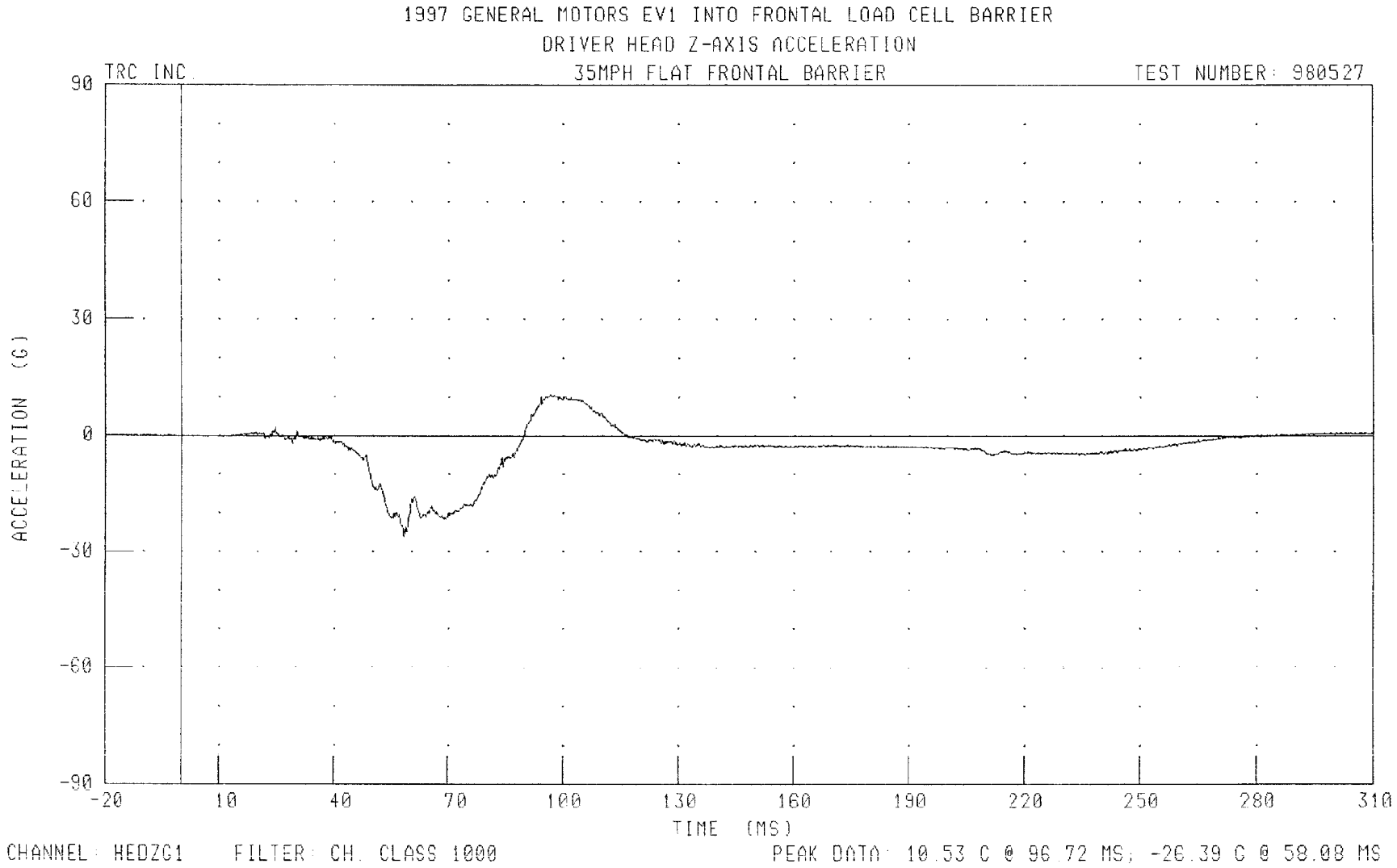
Appendix B

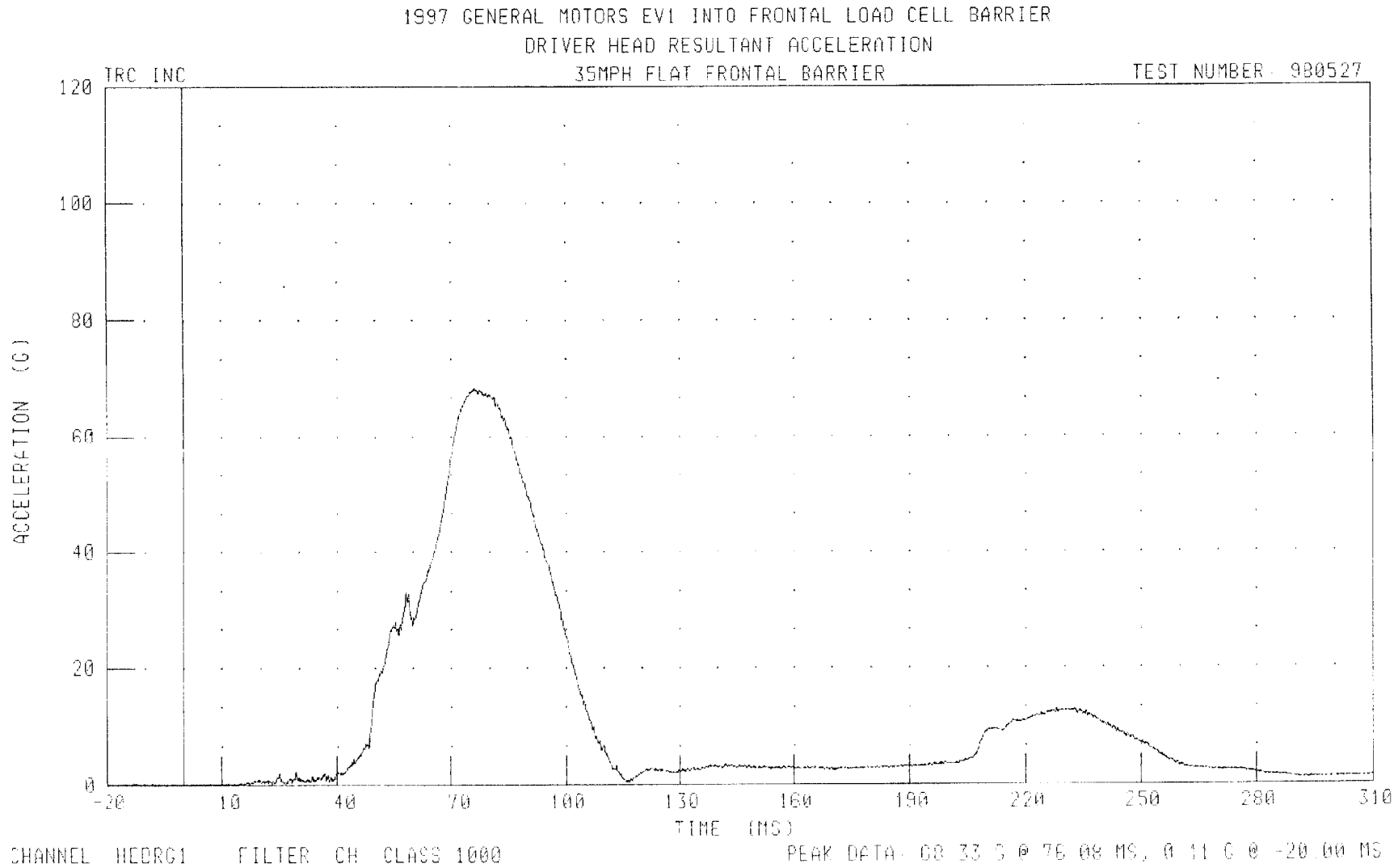
Data Plots

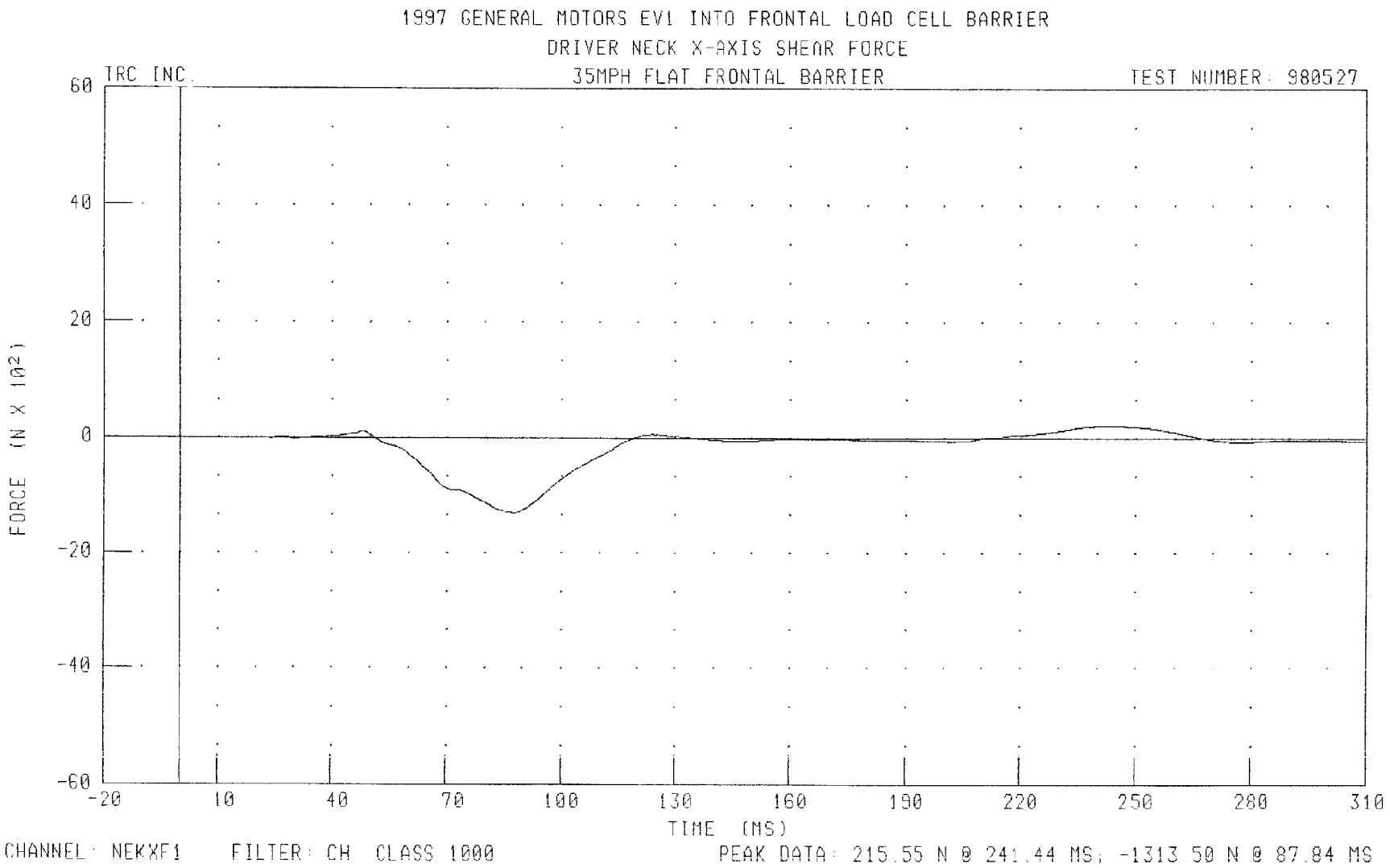

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL HEDXG1 FILTER CH CLASS 1000
PEAK DATA: 11.92 G @ 227.92 MS, -65.95 G @ 79.28 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
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: 9.77 G @ 86.00 MS; -3.92 G @ 60.32 MS

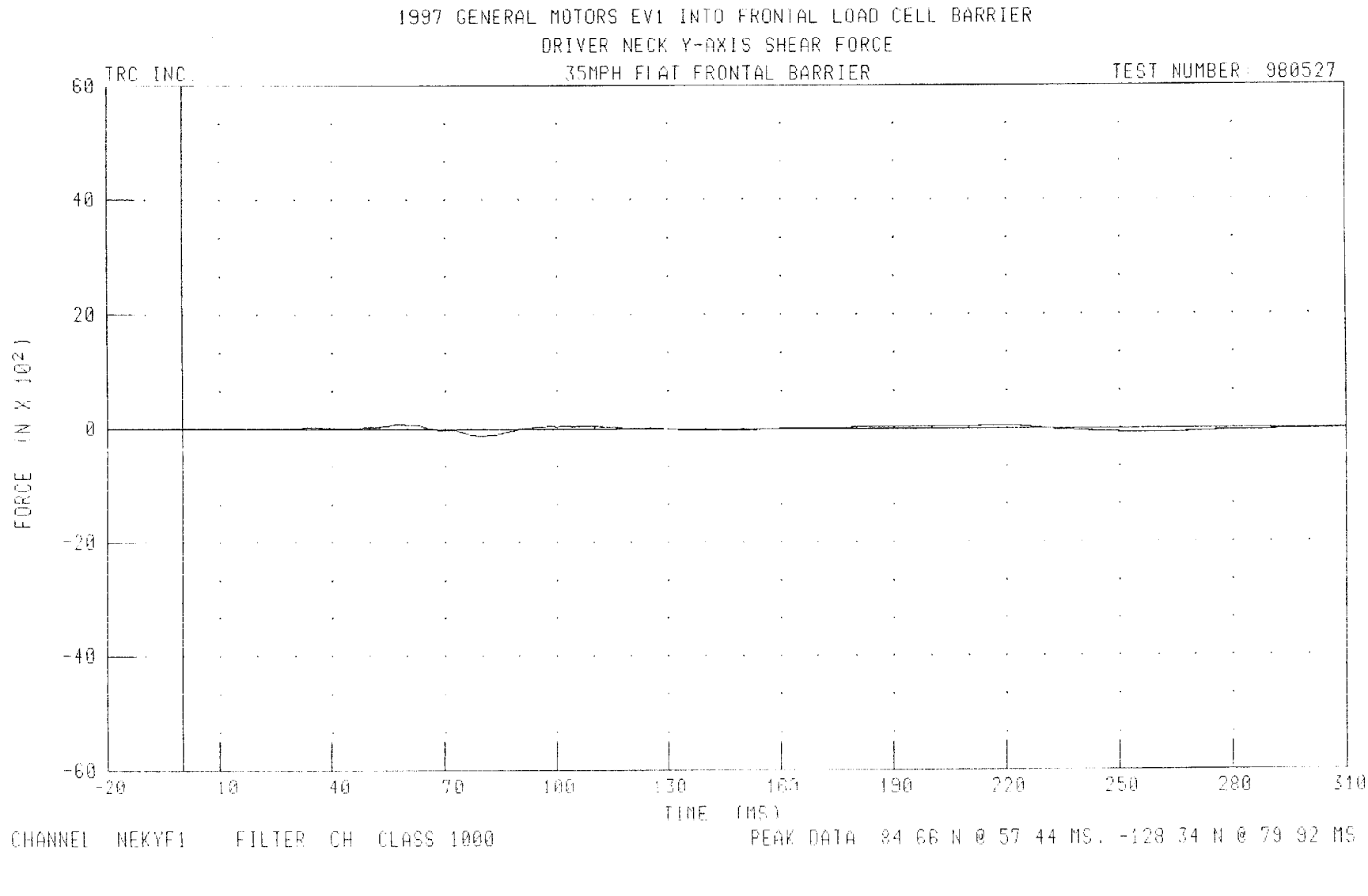
980527

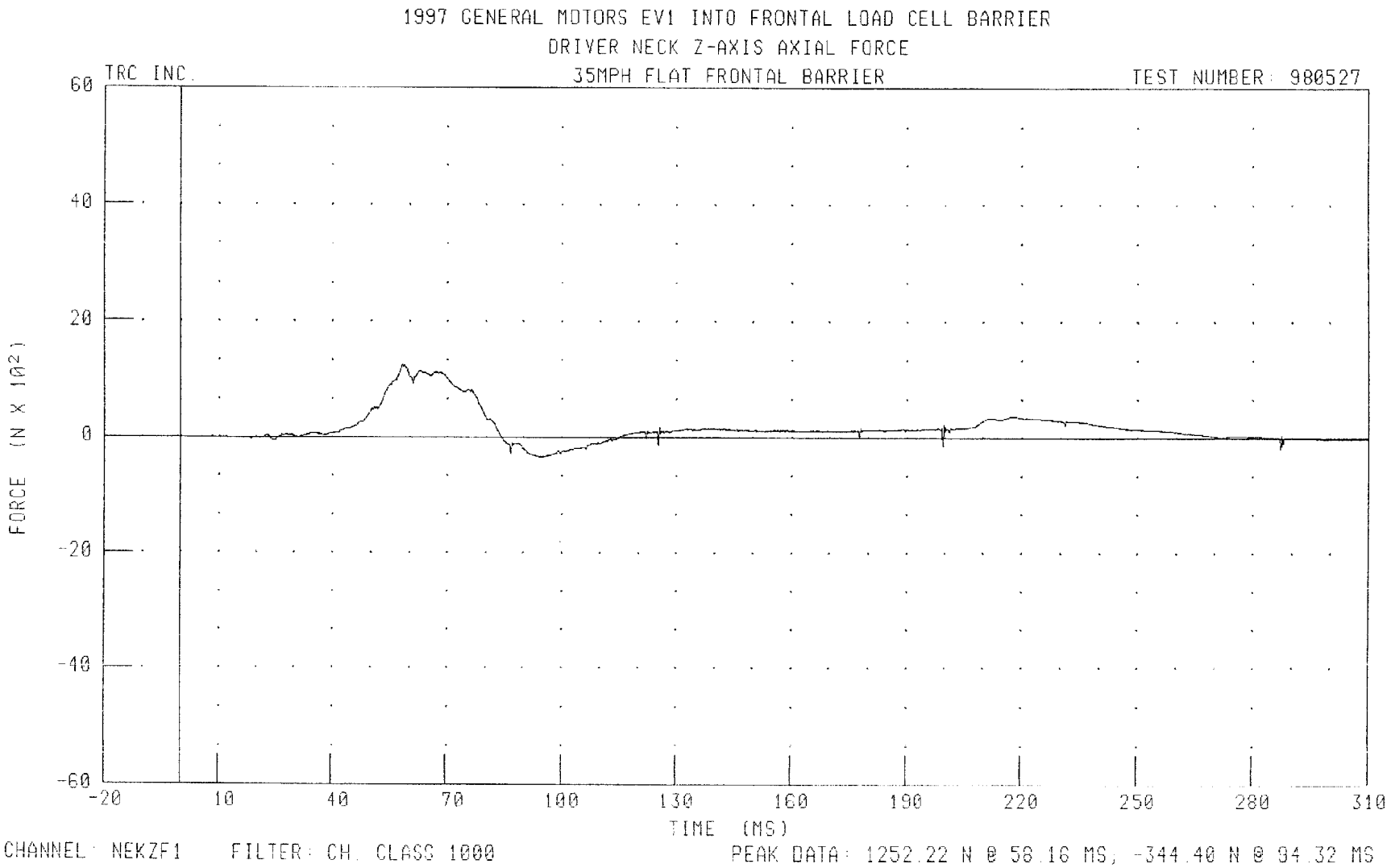

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZC1
FILTER: CH. CLASS 1000
PEAK DATA: 10.53 C @ 96.72 MS; -26.39 C @ 58.08 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
120
100
80
60
40
20
0
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG1 FILTER CH CLASS 1000
PEAK DATA: 68.33 G @ 76.08 MS, 0.11 G @ -20.00 MS

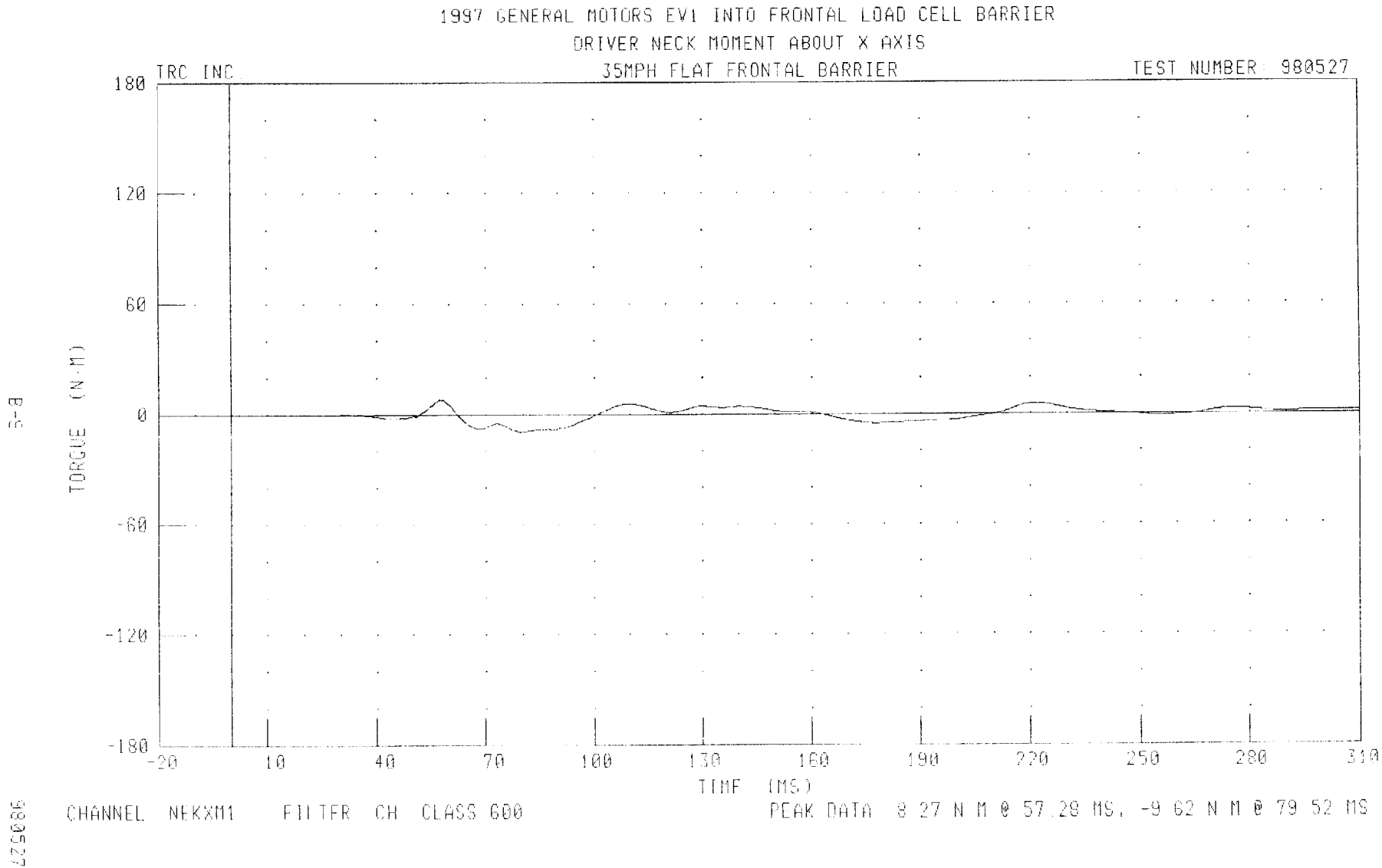

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK X-AXIS SHEAR FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKXF1
FILTER: CH CLASS 1000
PEAK DATA: 215.55 N @ 241.44 MS; -1313.50 N @ 87.84 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK Y-AXIS SHEAR FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
FORCE (N X 10^2)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL NEKYF1 FILTER CH CLASS 1000
PEAK DATA 84.66 N @ 57.44 MS, -128.34 N @ 79.92 MS

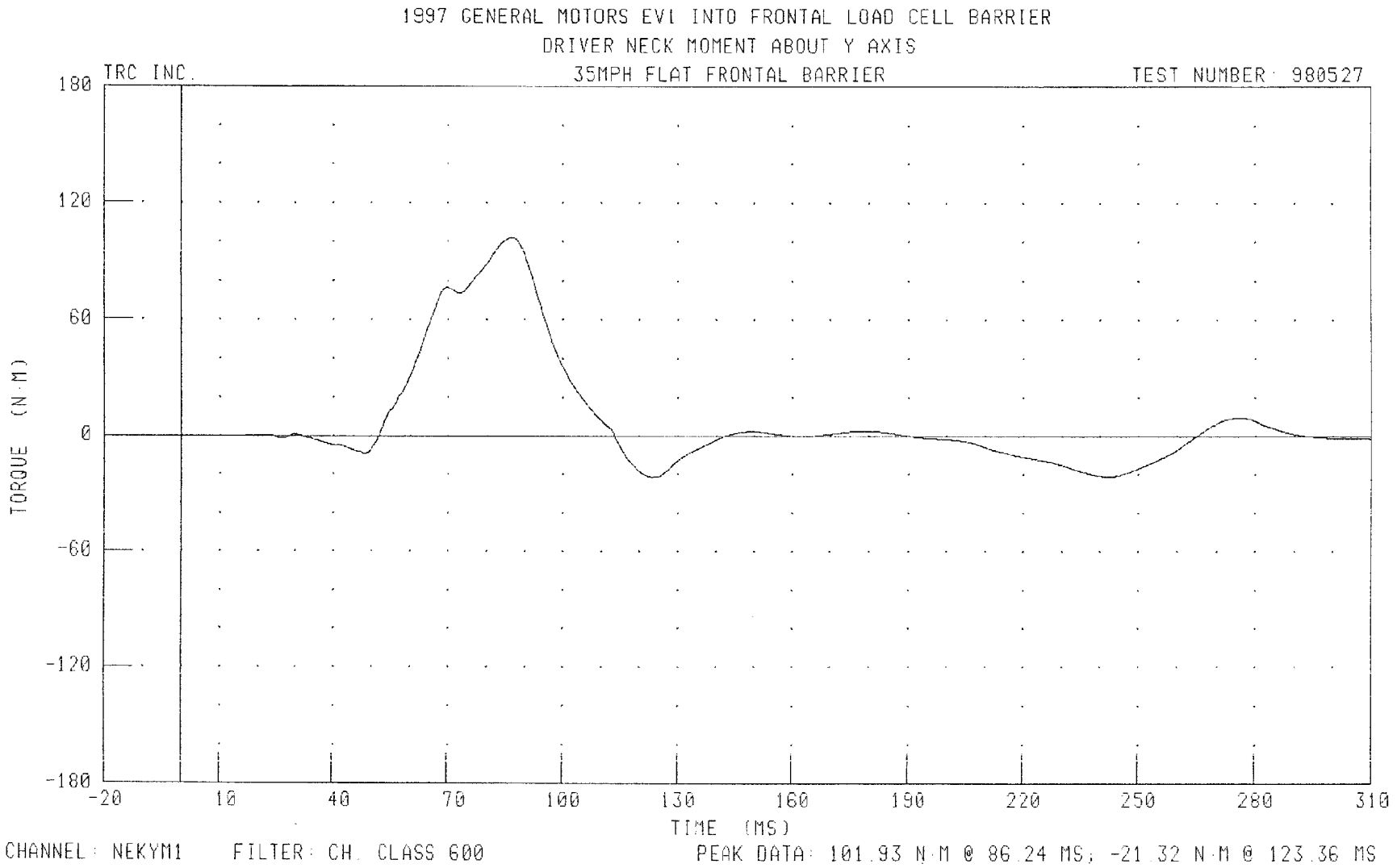

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK Z-AXIS AXIAL FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZF1
FILTER: CH. CLASS 1000
PEAK DATA: 1252.22 N @ 58.16 MS, -344.40 N @ 94.32 MS

980527

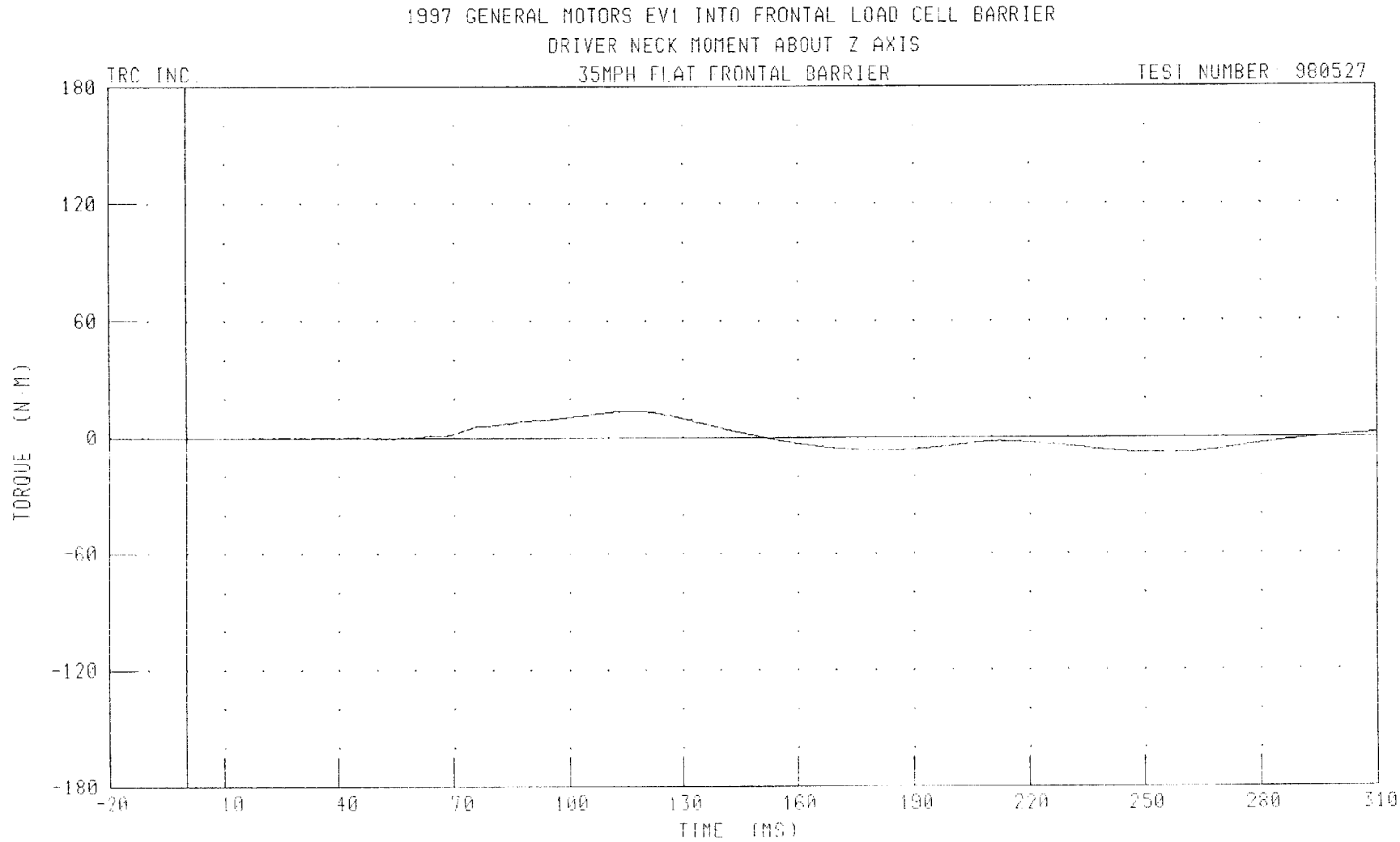

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT X AXIS
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N.M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL NEKXM1
FILTER CH CLASS 600
PEAK DATA 8.27 N M @ 57.20 MS, -9.62 N M @ 79.52 MS

B-5

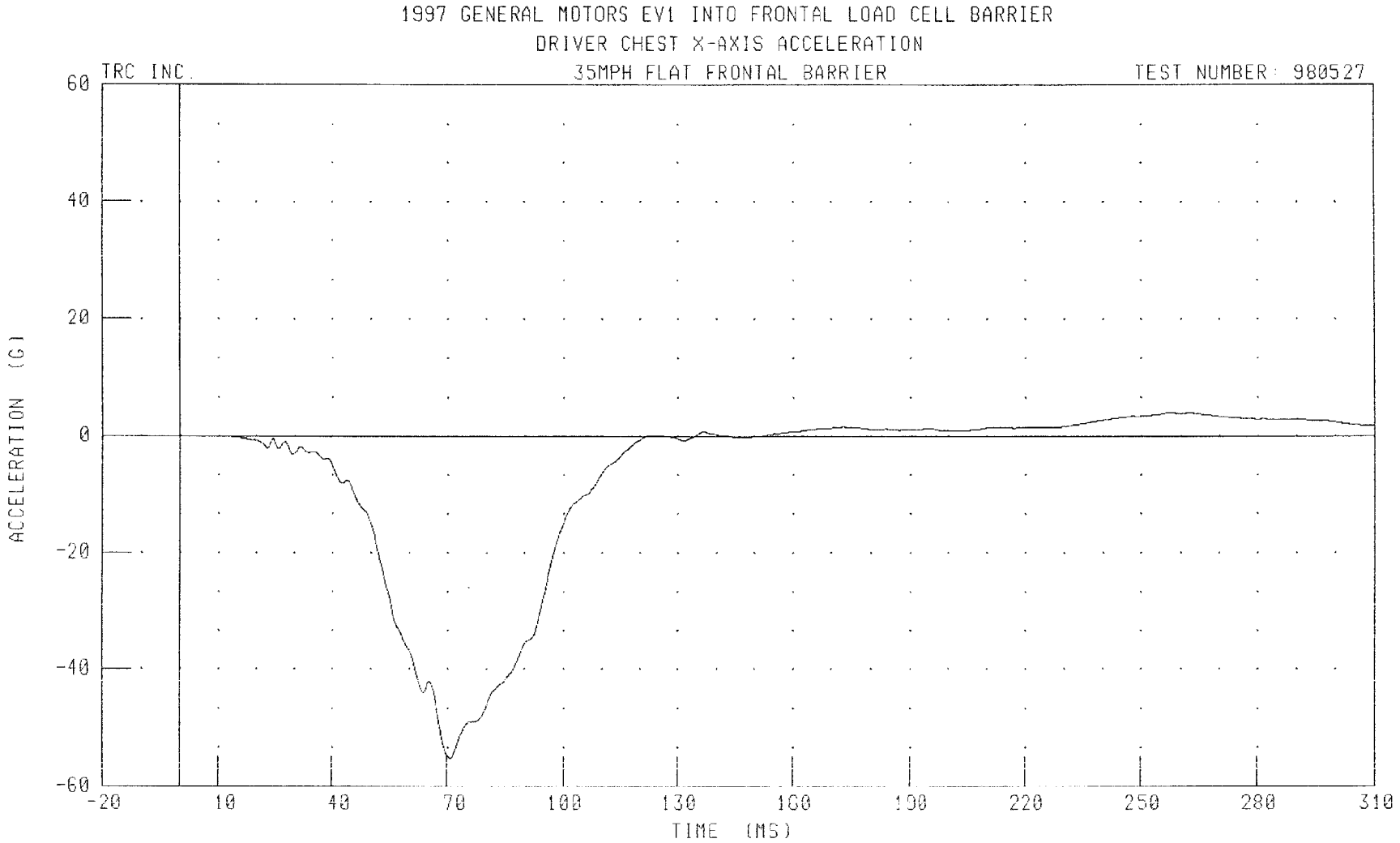
980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Y AXIS
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYM1
FILTER: CH. CLASS 600
PEAK DATA: 101.93 N-M @ 86.24 MS; -21.32 N-M @ 123.36 MS

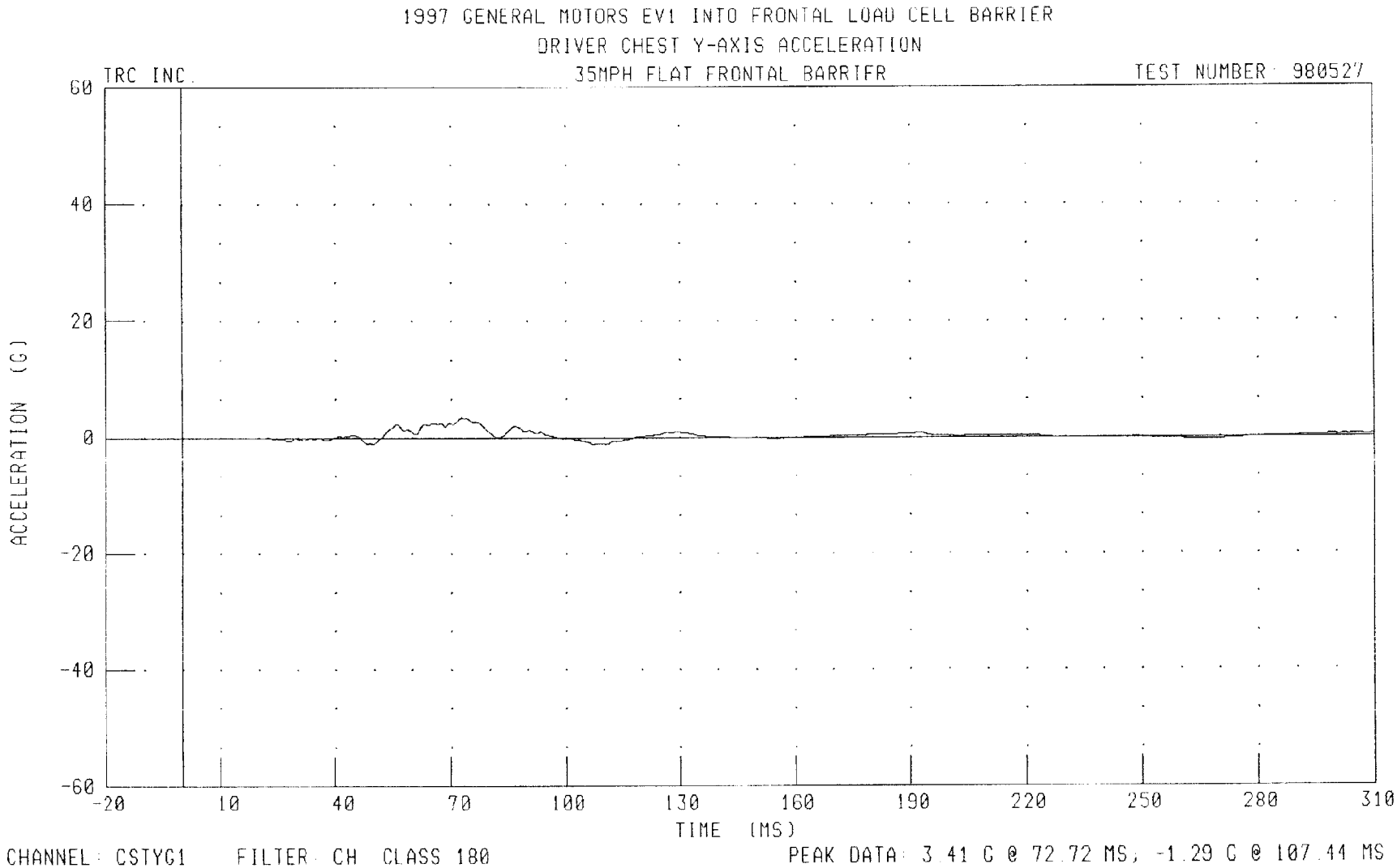
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZM1
FILTER: CH. CLASS 600
PEAK DATA: 13.72 N-M @ 117.60 MS, -8.19 N-M @ 257.28 MS

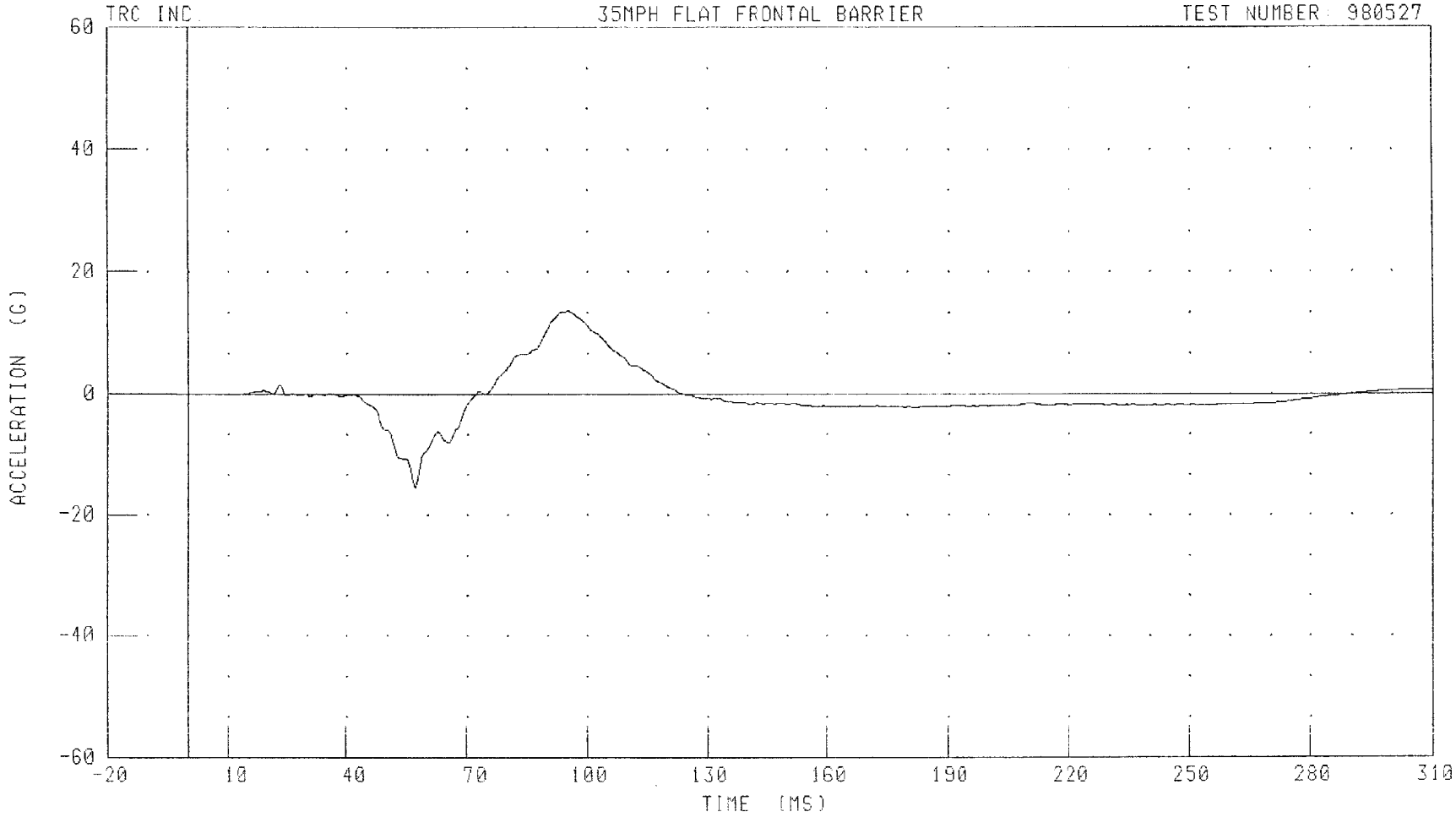
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXG1
FILTER: CH. CLASS 180
PEAK DATA: 4.01 G @ 257.28 MS; -55.22 G @ 70.80 MS

980527

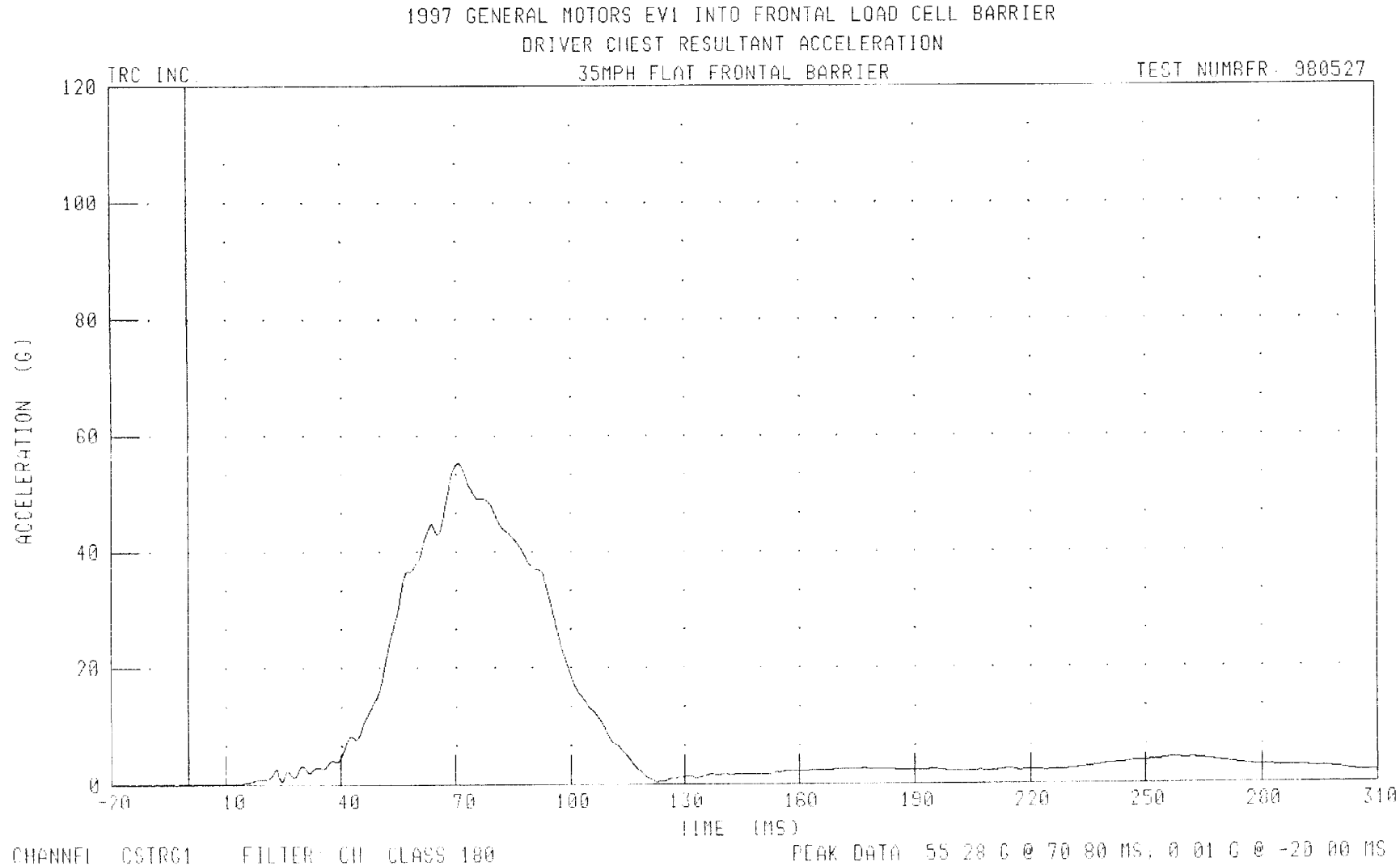

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG1
FILTER: CH CLASS 180
PEAK DATA: 3.41 G @ 72.72 MS, -1.29 G @ 107.44 MS

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION

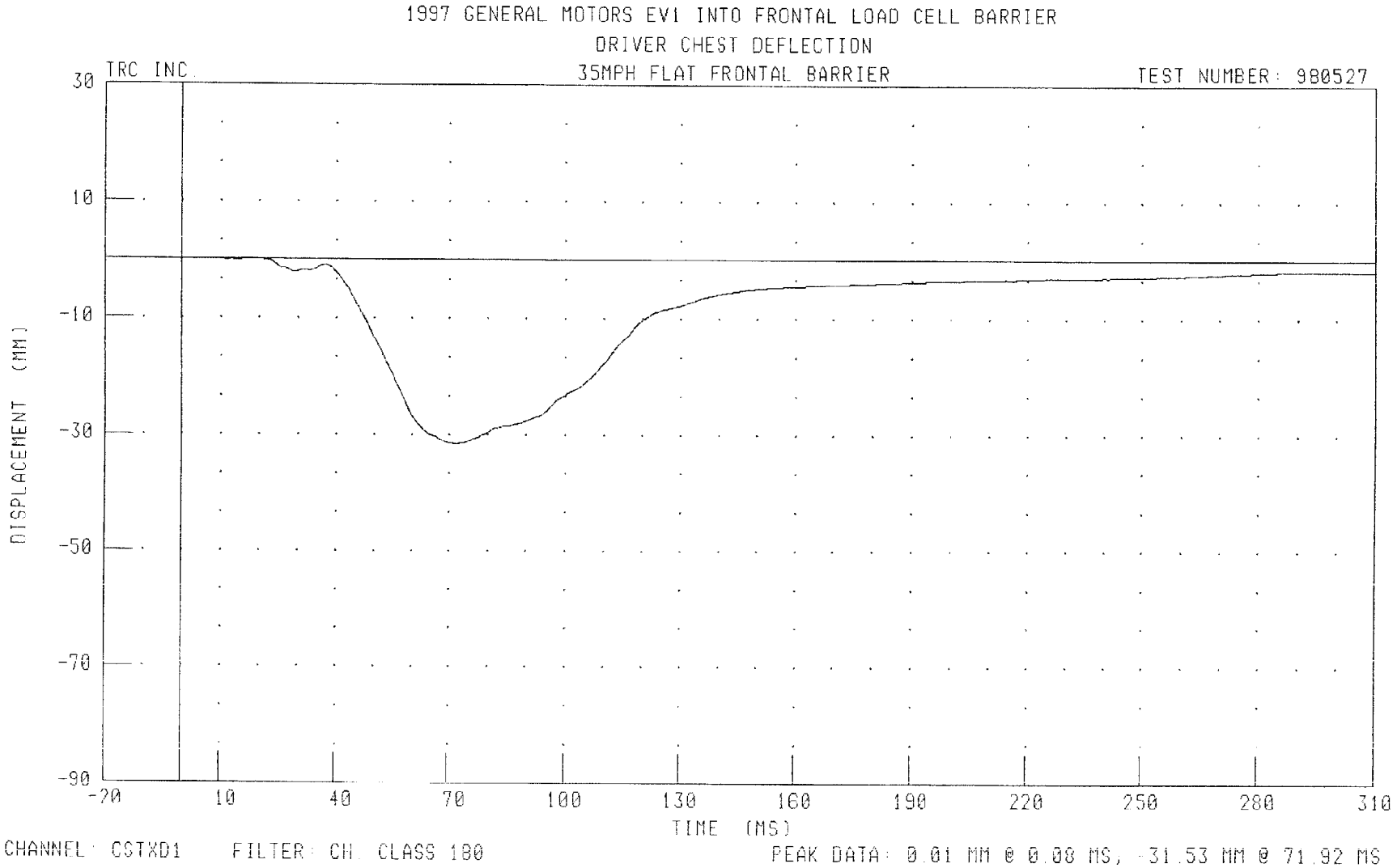


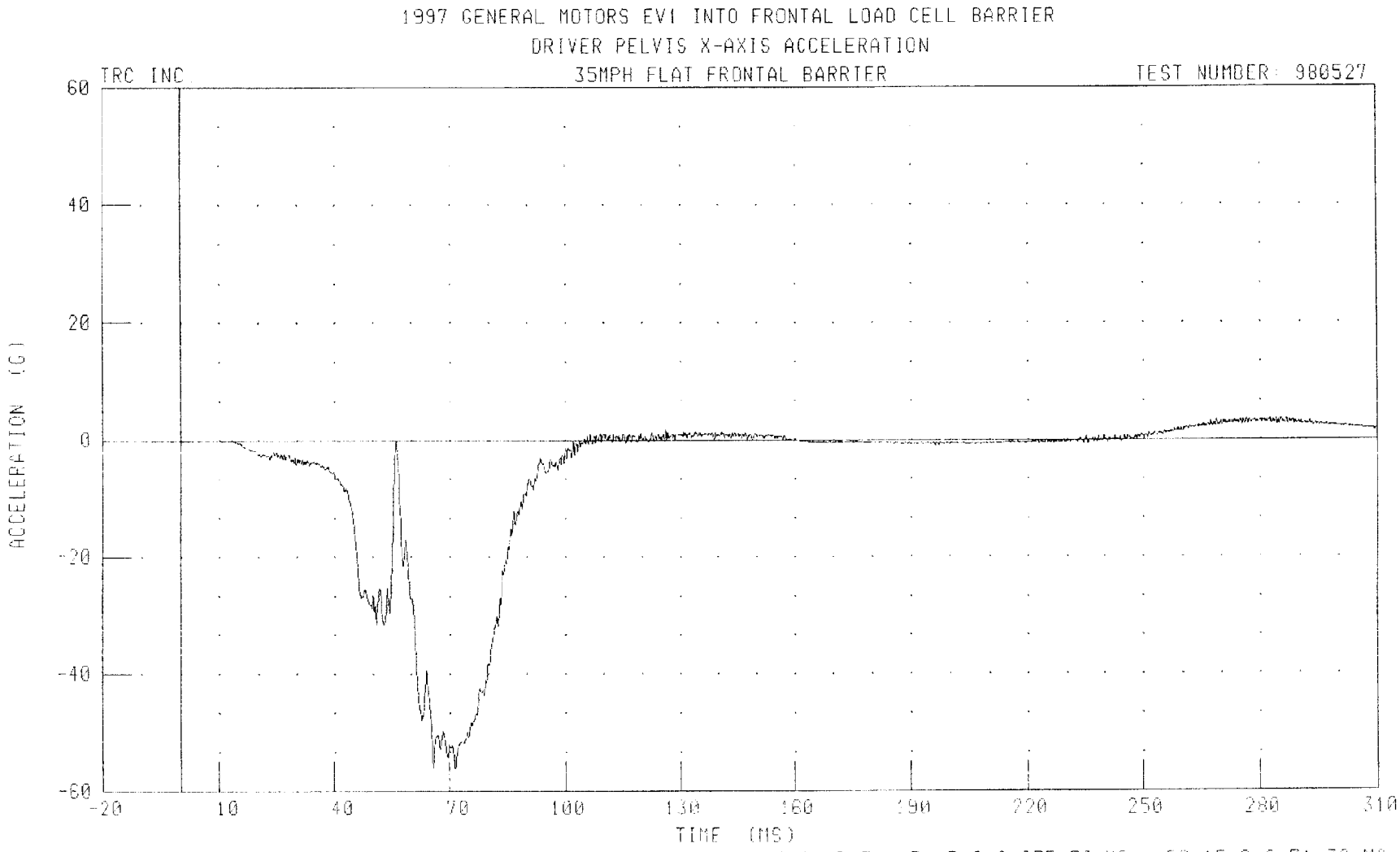
CHANNEL: CSTZG1 FILTER: CH. CLASS 180 PEAK DATA: 13.64 G @ 95.36 MS; -15.49 G @ 56.96 MS

980527

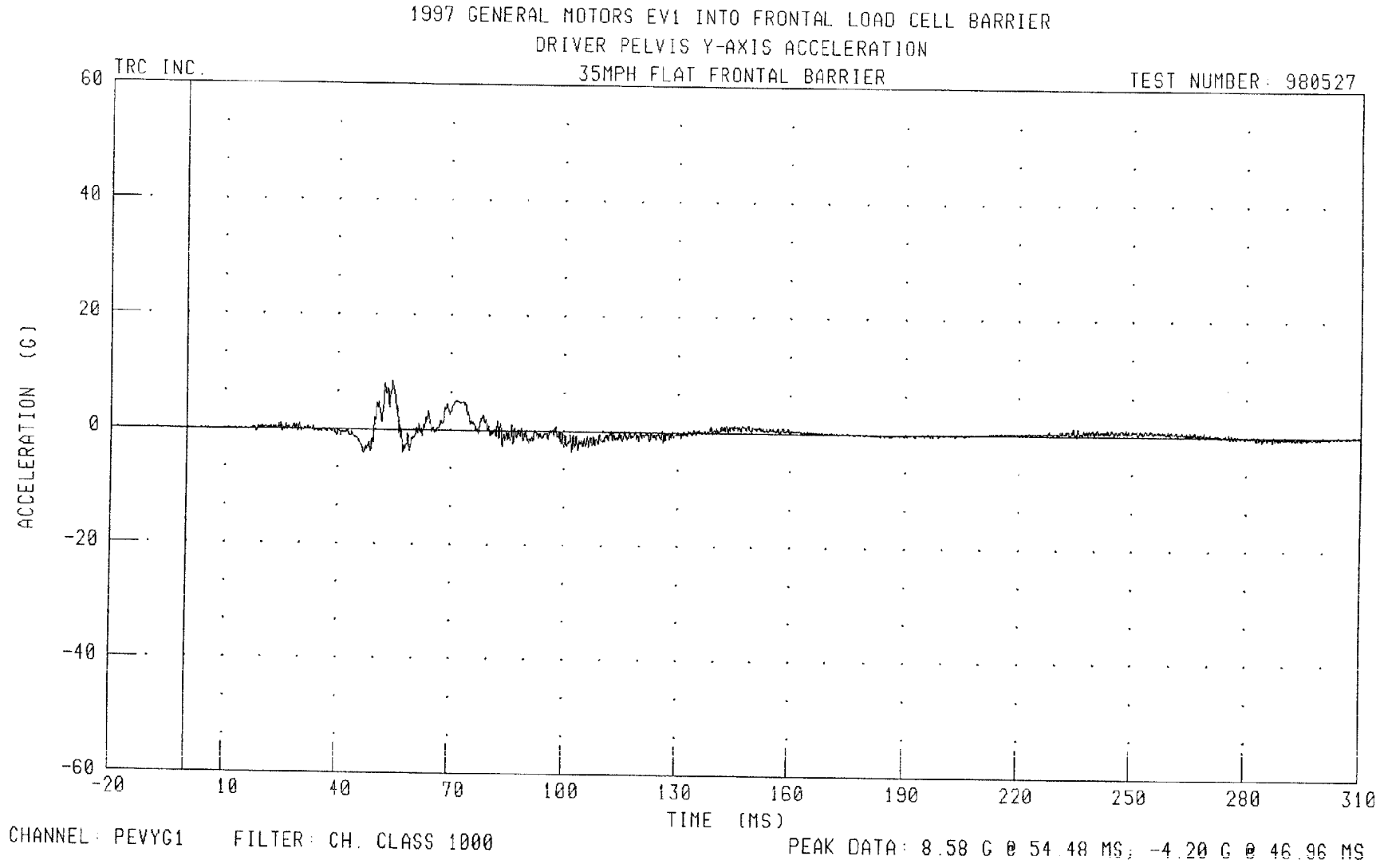

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER 980527
120
100
80
60
40
20
0
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL CSTRG1
FILTER CH CLASS 180
PEAK DATA 55 28 G @ 70 80 MS, 0 01 G @ -20 00 MS

980527

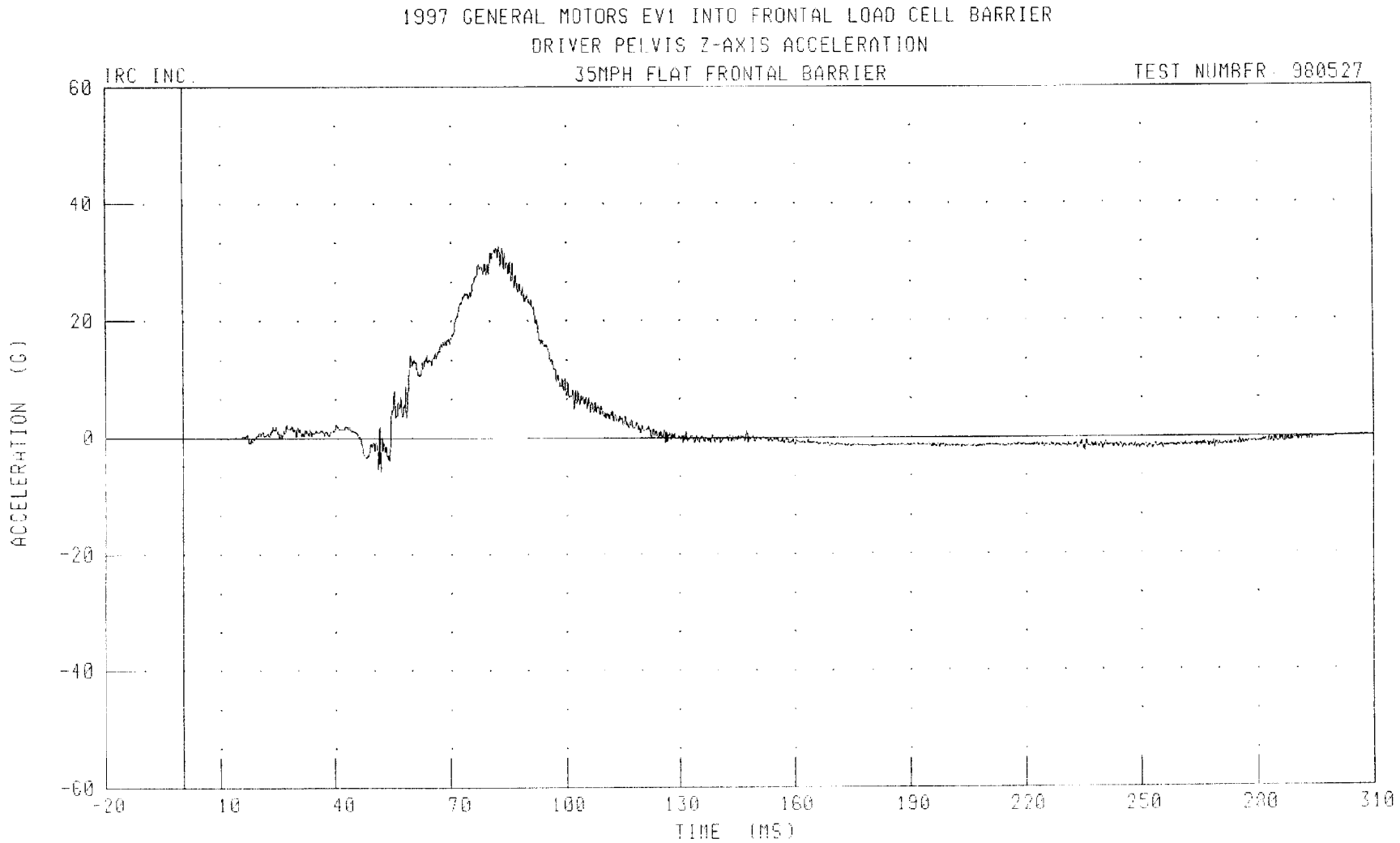

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST DEFLECTION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
30
10
-10
-30
-50
-70
-90
DISPLACEMENT (MM)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD1
FILTER: CH. CLASS 180
PEAK DATA: 0.01 MM @ 0.08 MS, -31.53 MM @ 71.92 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL PEVXC1 FILTER CH CLASS 1000
PEAK DATA 3.47 G @ 275.76 MS, -50.15 G @ 71.30 MS

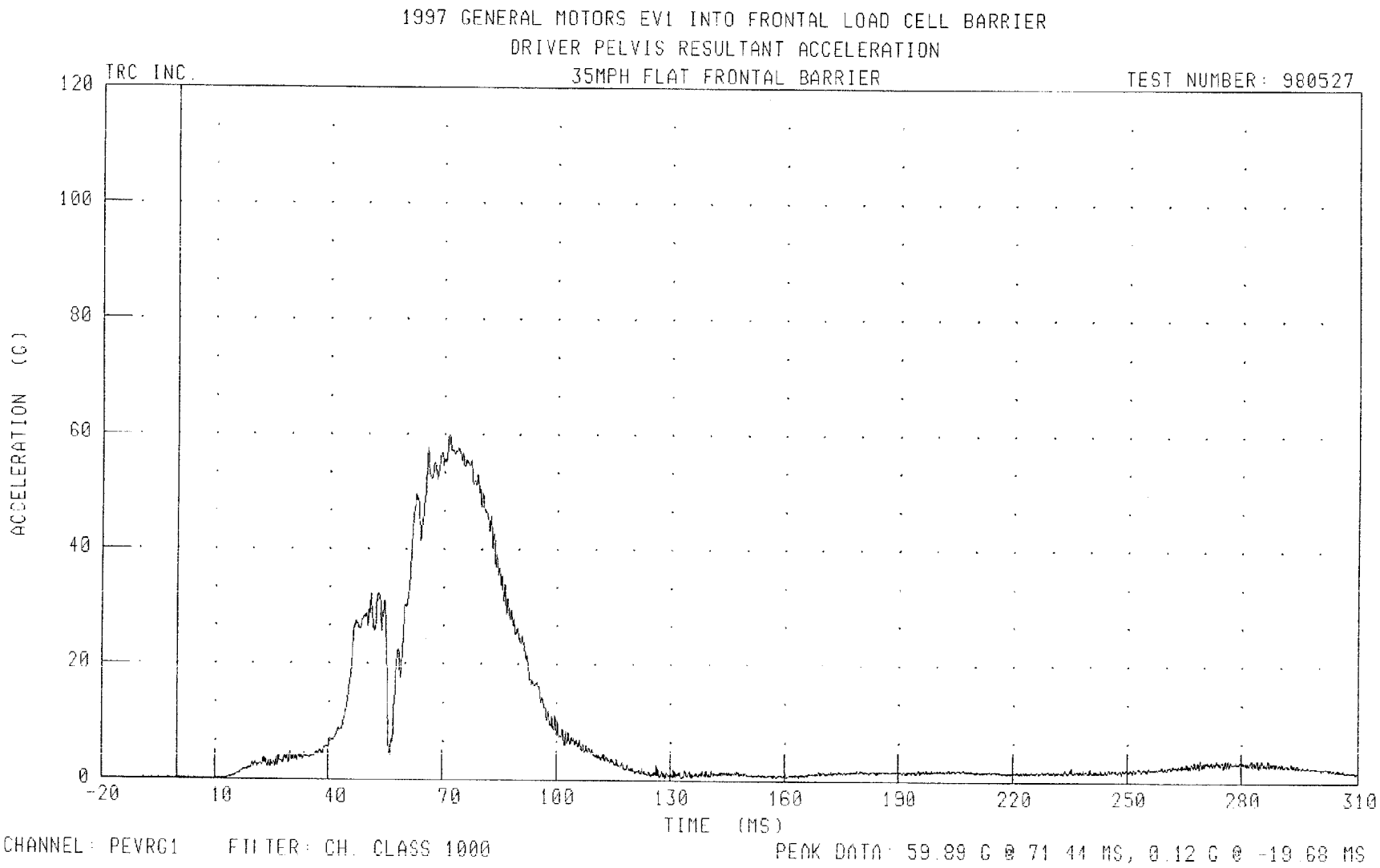
980527

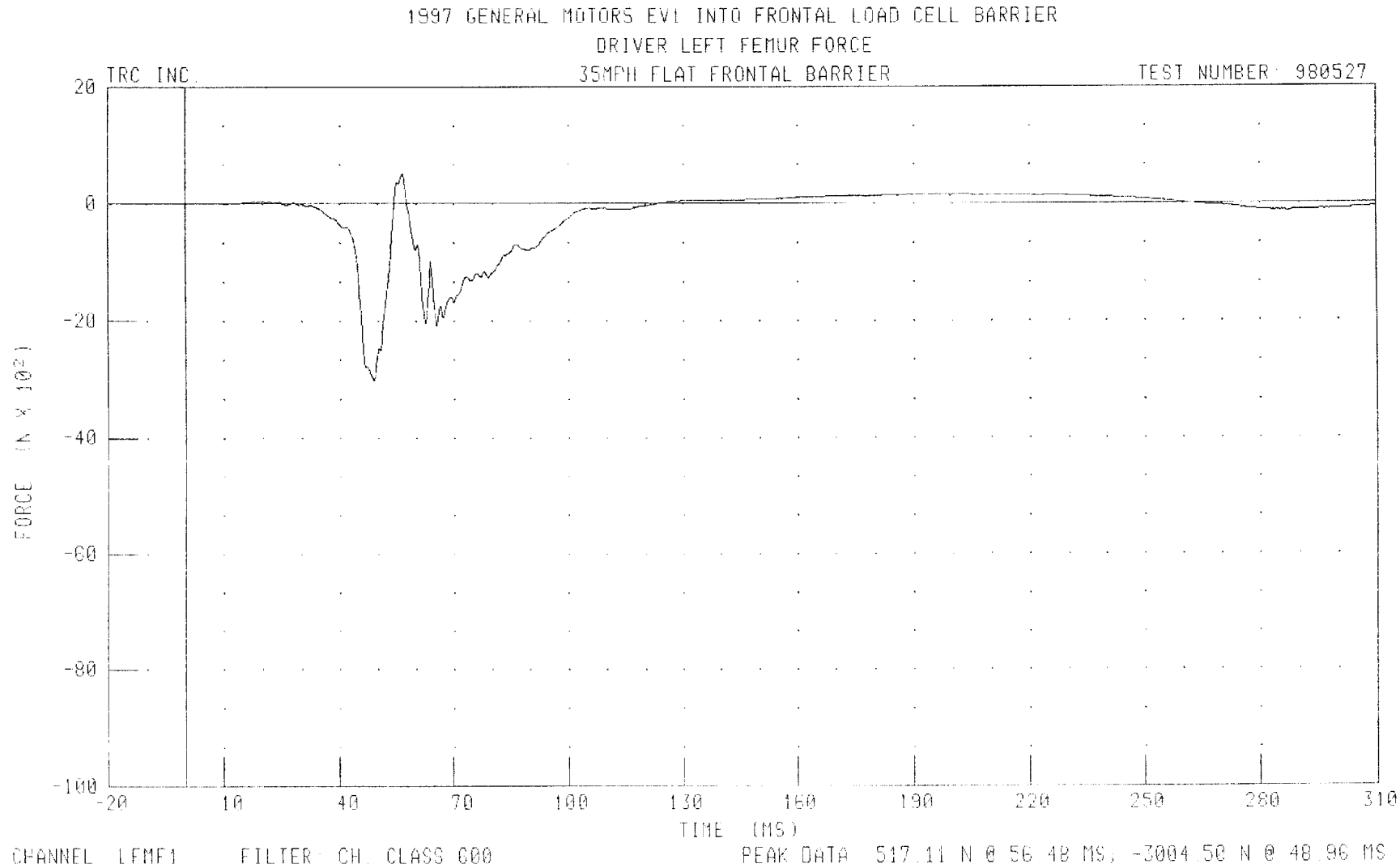

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS Y-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVYG1
FILTER: CH. CLASS 1000
PEAK DATA: 8.58 G @ 54.48 MS; -4.20 G @ 46.96 MS

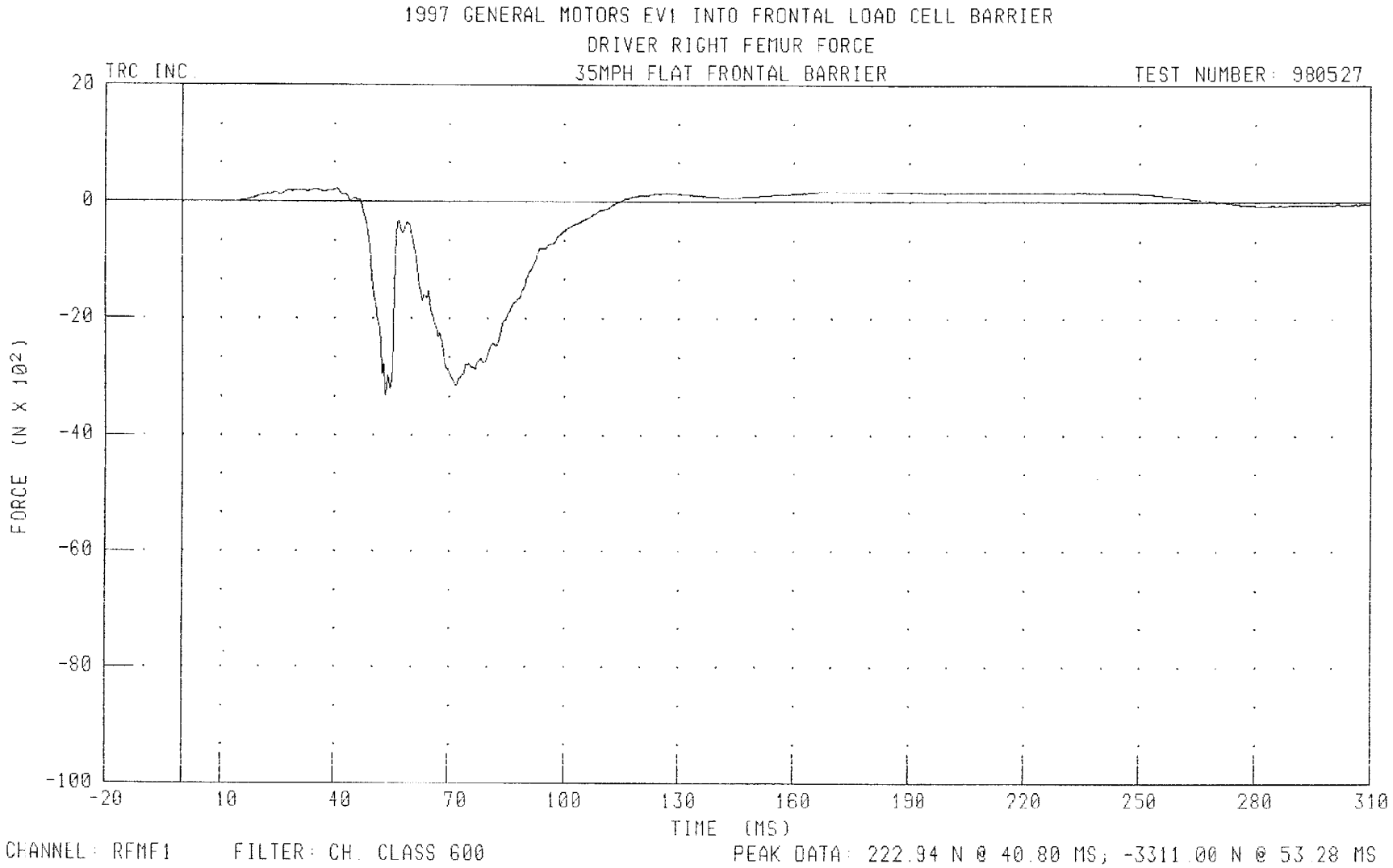
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS Z-AXIS ACCELERATION
IRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL PEVZC1 FILTER CH CLASS 1000
PEAK DATA 32 80 G @ 82 56 MS; -5 60 G @ 51 76 MS

980527

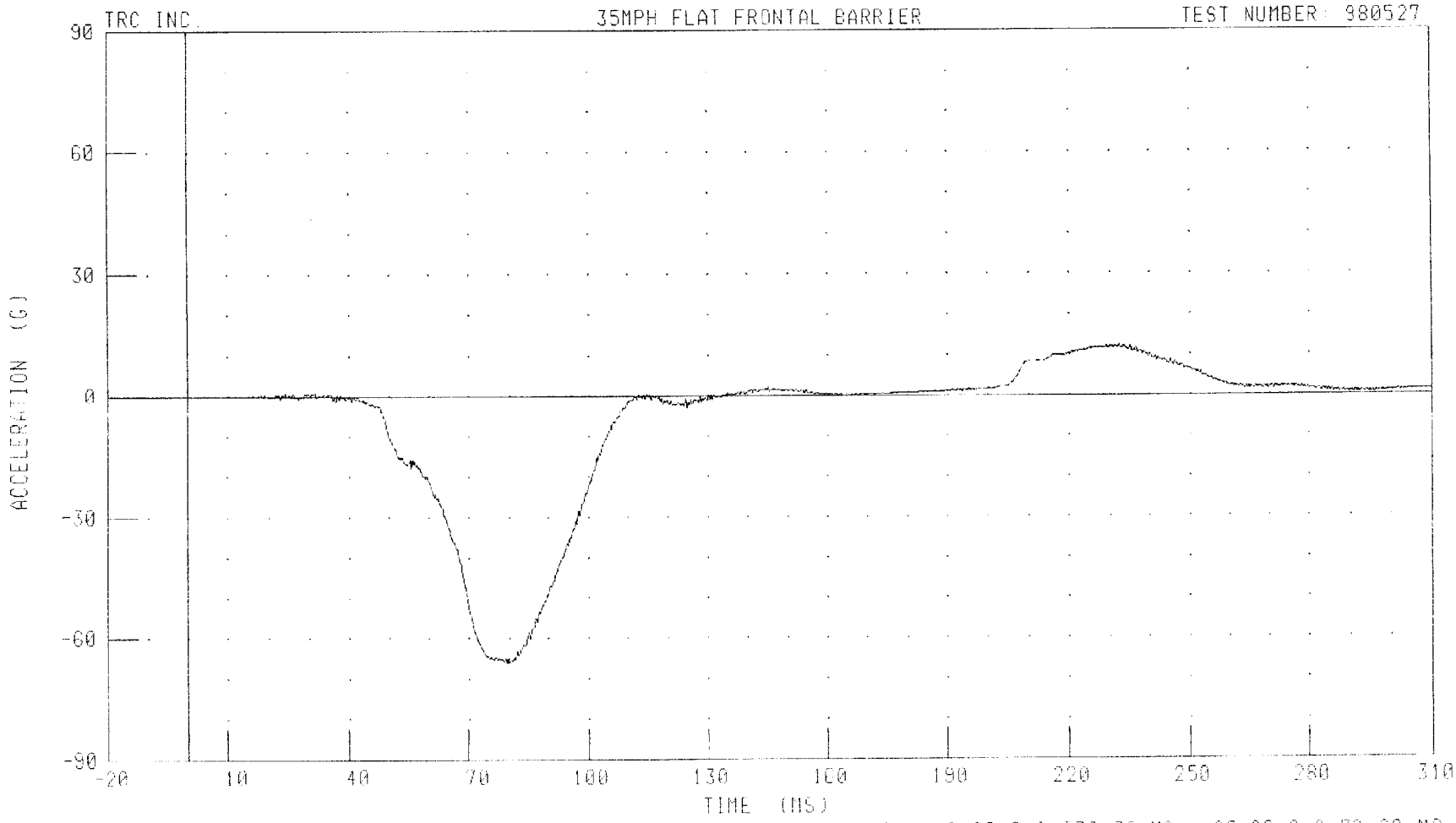

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS RESULTANT ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVRG1
FILTER: CH. CLASS 1000
PEAK DATA: 59.89 G @ 71.44 MS, 0.12 G @ -19.68 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10^2)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF1
FILTER: CH. CLASS 600
PEAK DATA: 517.11 N @ 56.48 MS, -3004.50 N @ 48.96 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FEMUR FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF1
FILTER: CH. CLASS 600
PEAK DATA: 222.94 N @ 40.80 MS; -3311.00 N @ 53.28 MS

980527

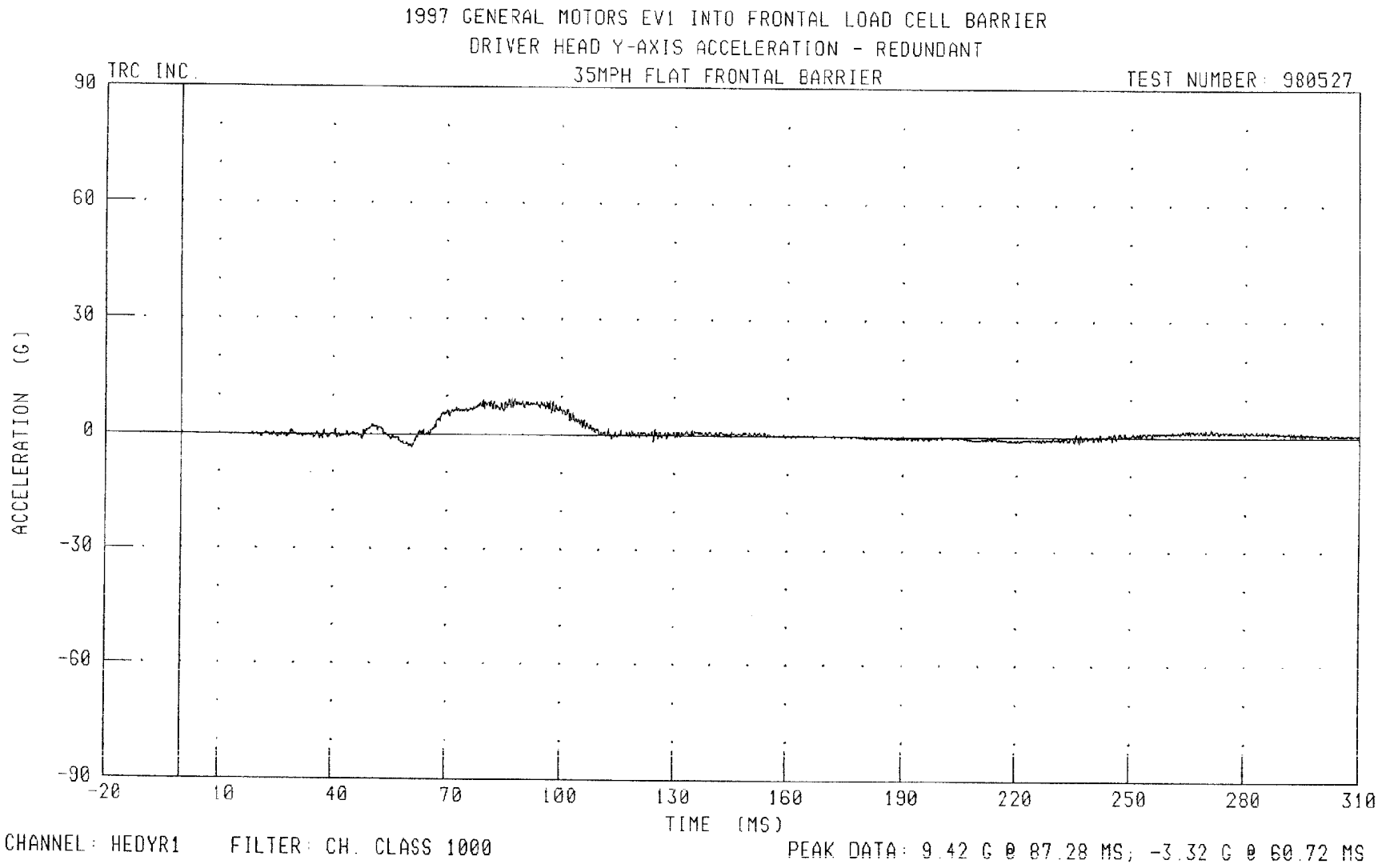
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD X-AXIS ACCELERATION - REDUNDANT



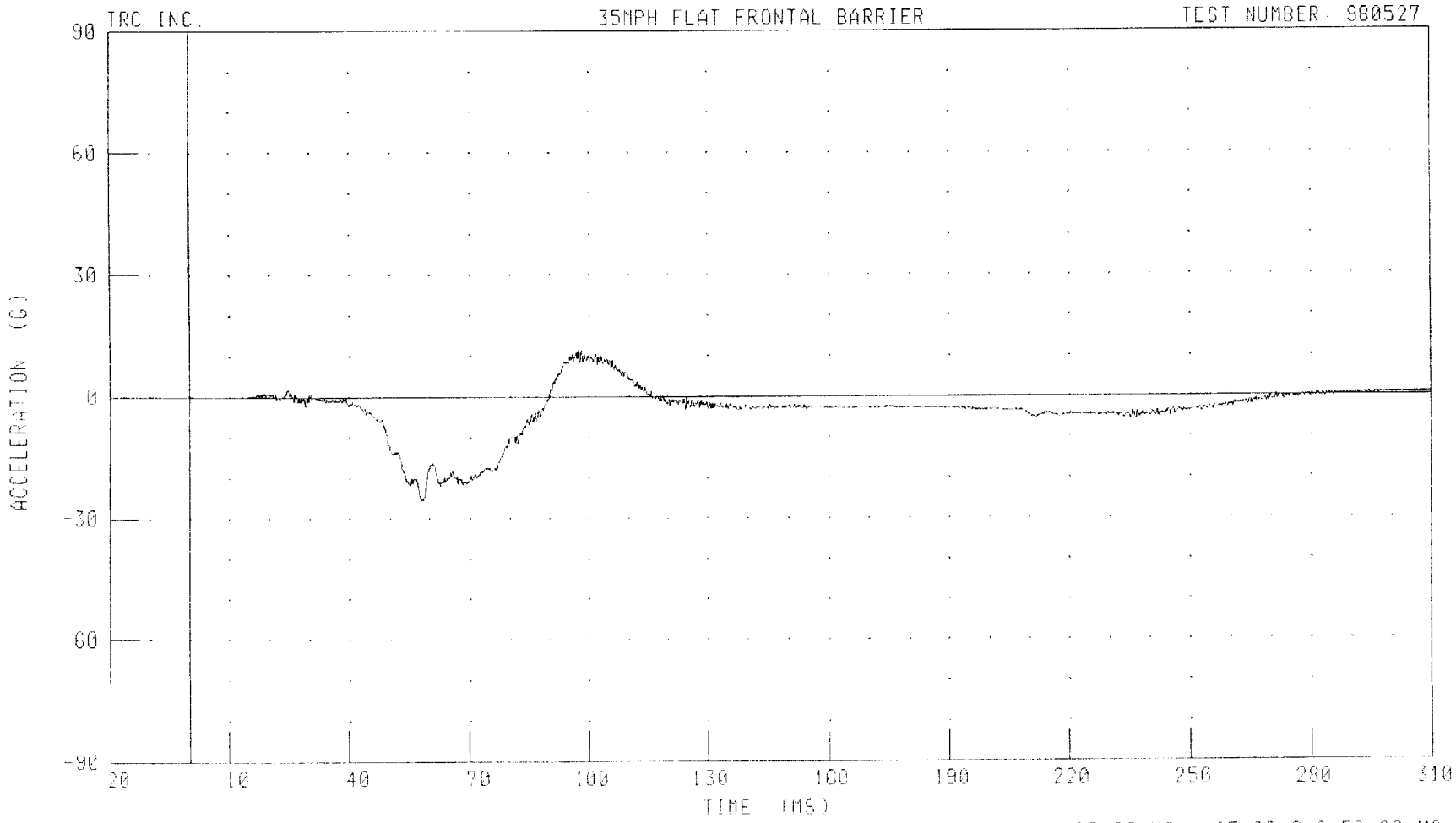
CHANNEL: HEDXR1 FILTER: CH CLASS 1000 PEAK DATA: 12.28 G @ 232.32 MS, -66.29 G @ 79.68 MS

8-27

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION - REDUNDANT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYR1
FILTER: CH. CLASS 1000
PEAK DATA: 9.42 G @ 87.28 MS; -3.32 G @ 60.72 MS

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION - REDUNDANT



CHANNEL HEDZR1 FILTER CH CLASS 1000 PEAK DATA 11.57 G @ 97.28 MS, -25.80 G @ 58.08 MS

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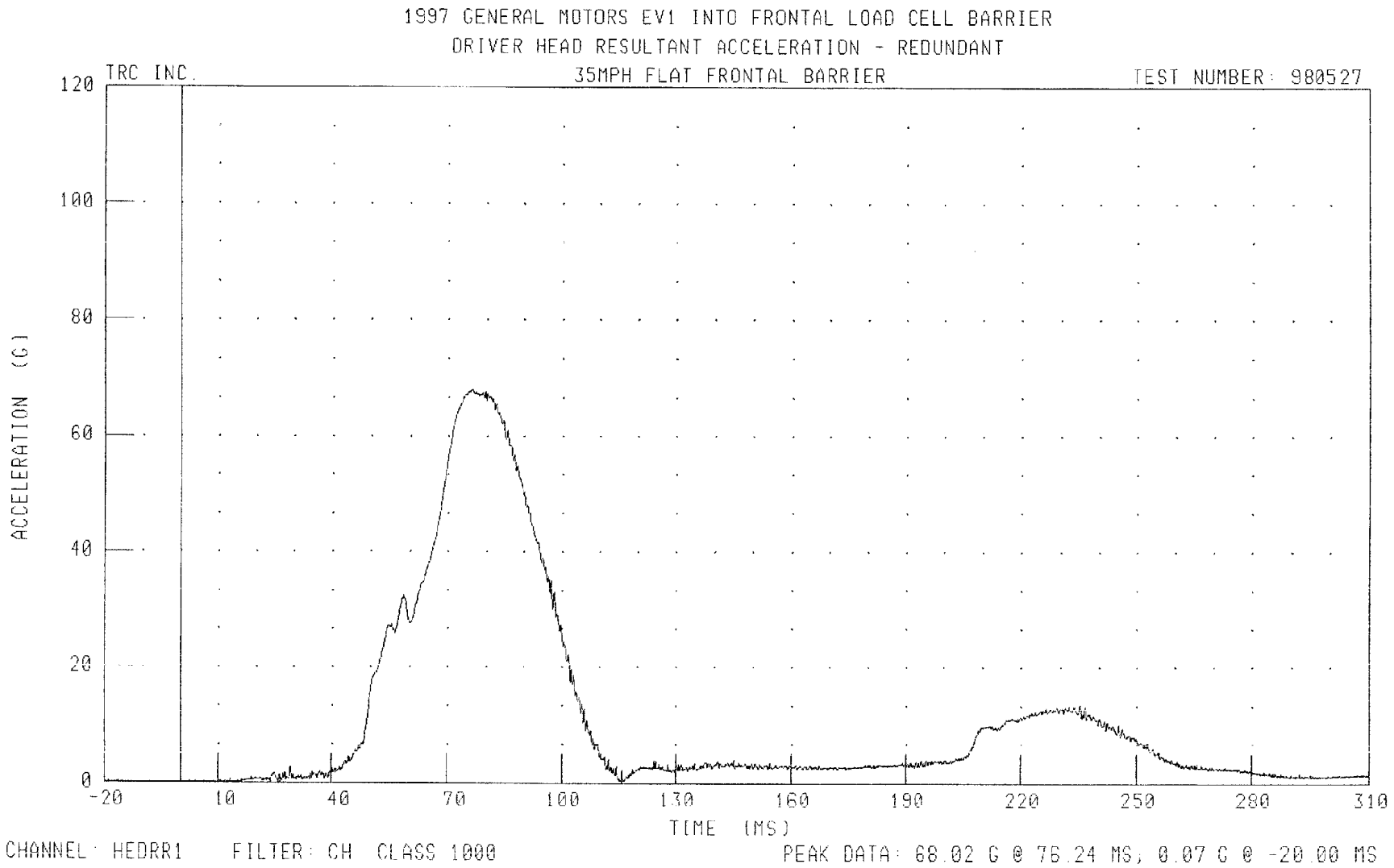
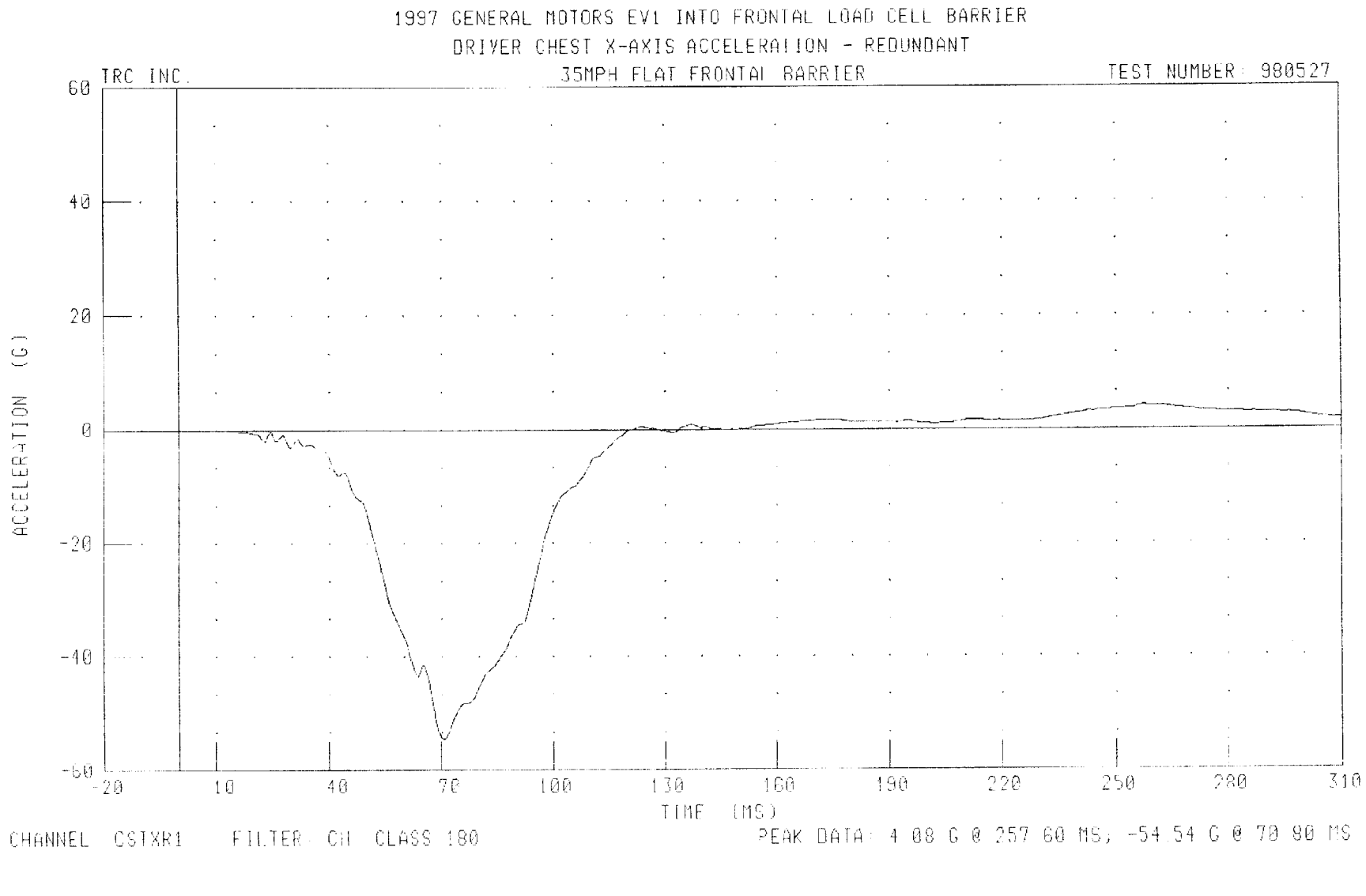
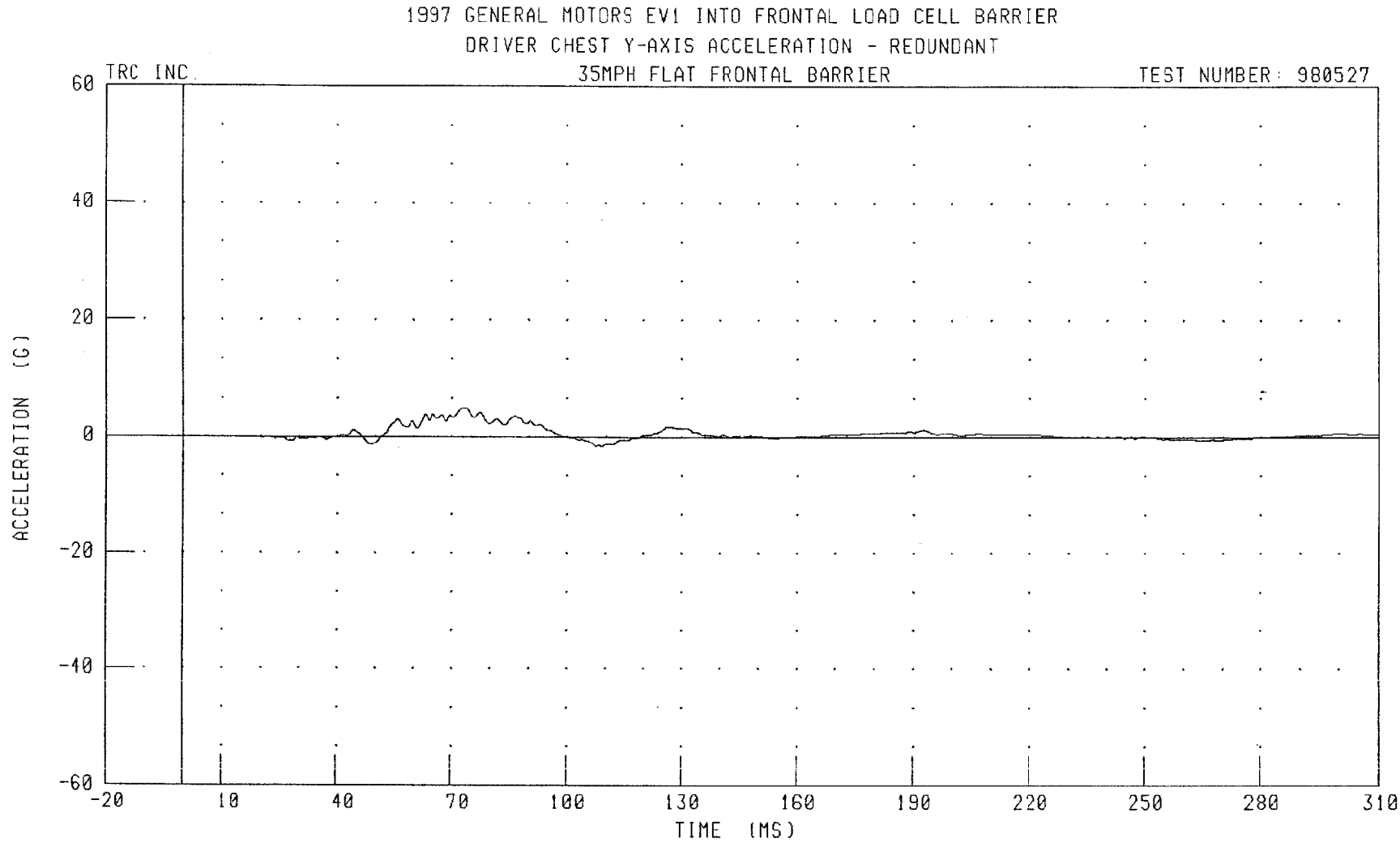
980527

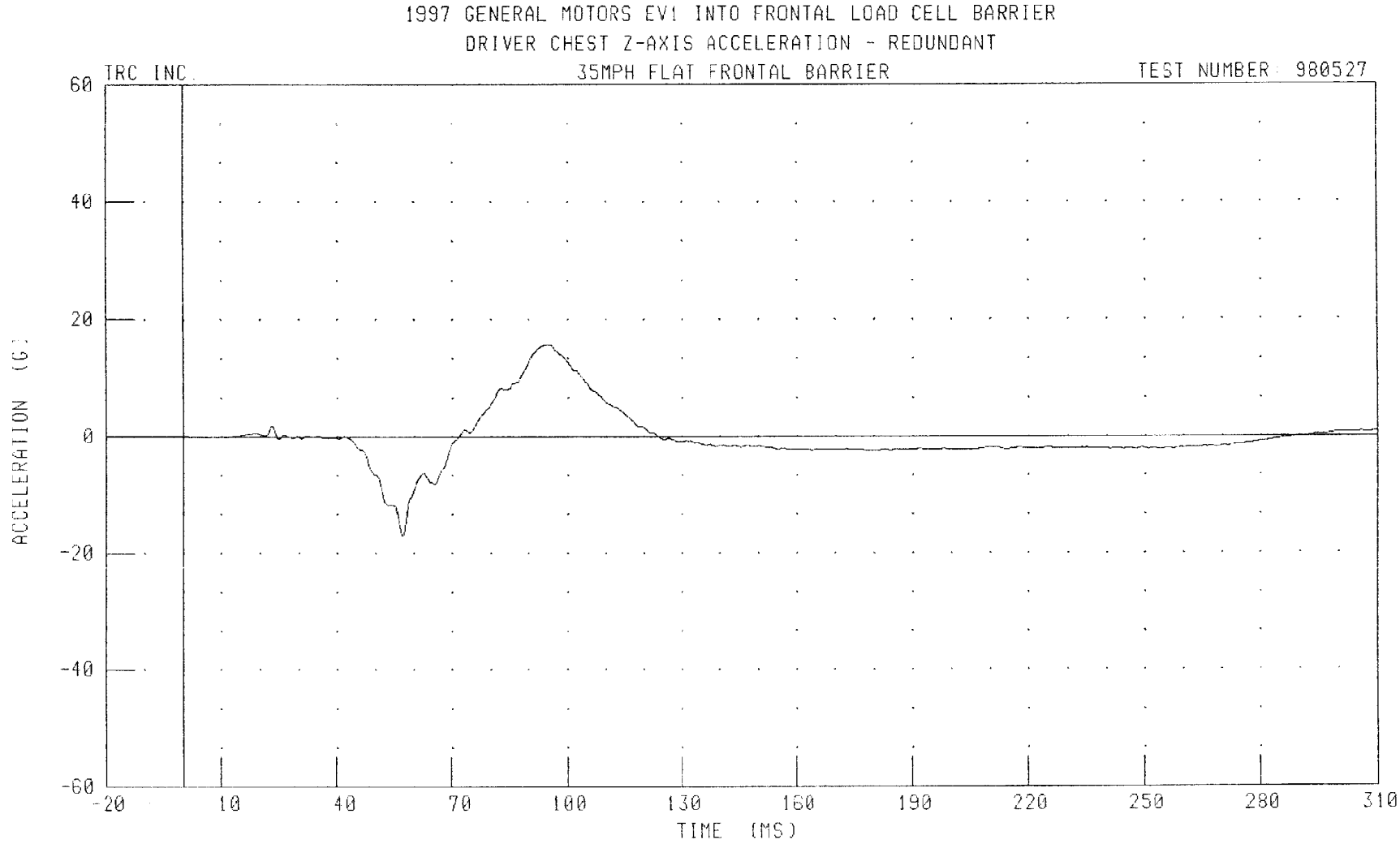

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION - REDUNDANT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRR1
FILTER: CH CLASS 1000
PEAK DATA: 68.02 G @ 76.24 MS, 0.07 G @ -20.00 MS

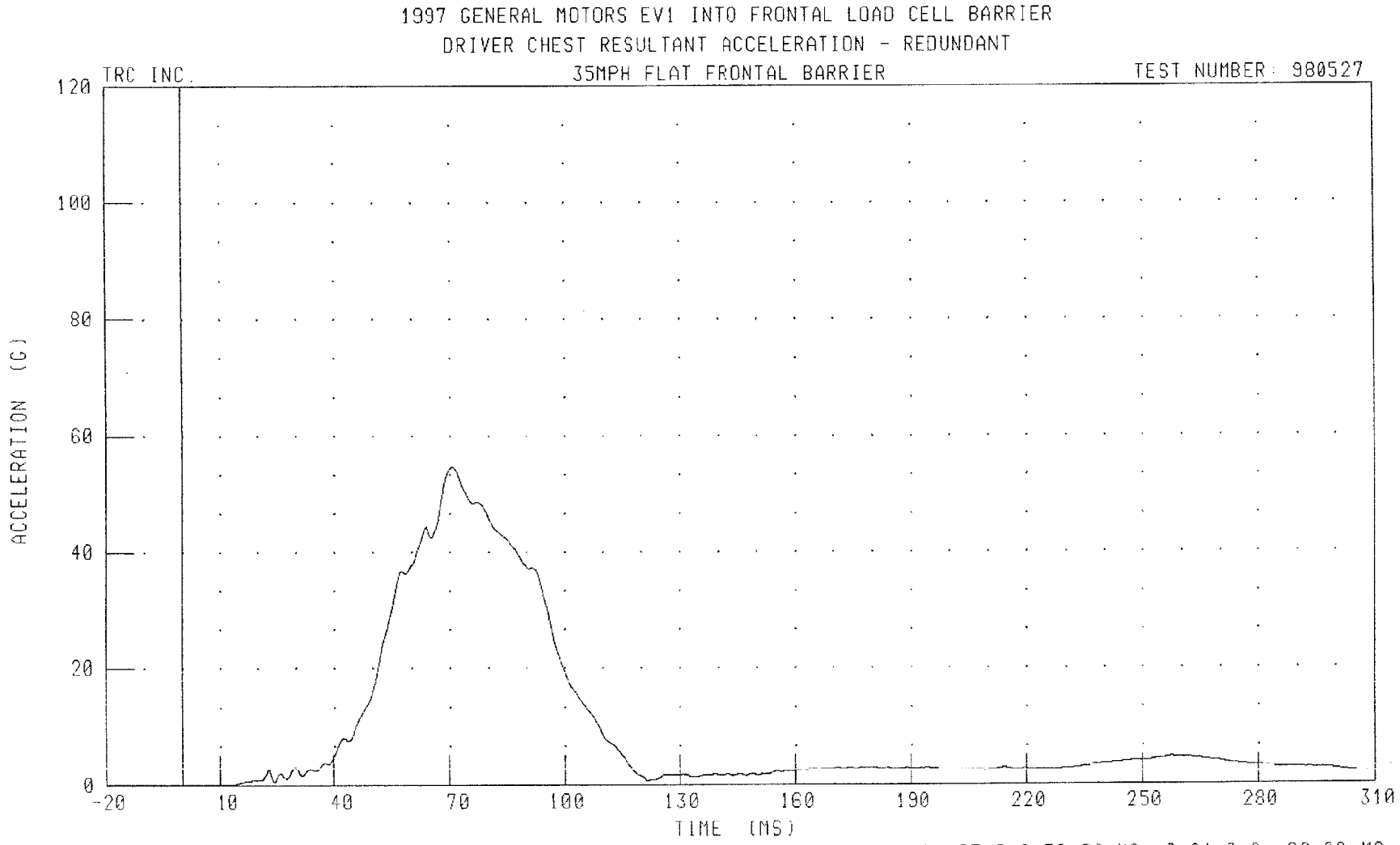

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST X-AXIS ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSIXR1 FILTER: CH CLASS 180
PEAK DATA: 4.08 G @ 257.60 MS, -54.54 G @ 70.90 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYR1
FILTER: CH. CLASS 180
PEAK DATA: 4.88 G @ 73.52 MS; -1.60 G @ 109.12 MS

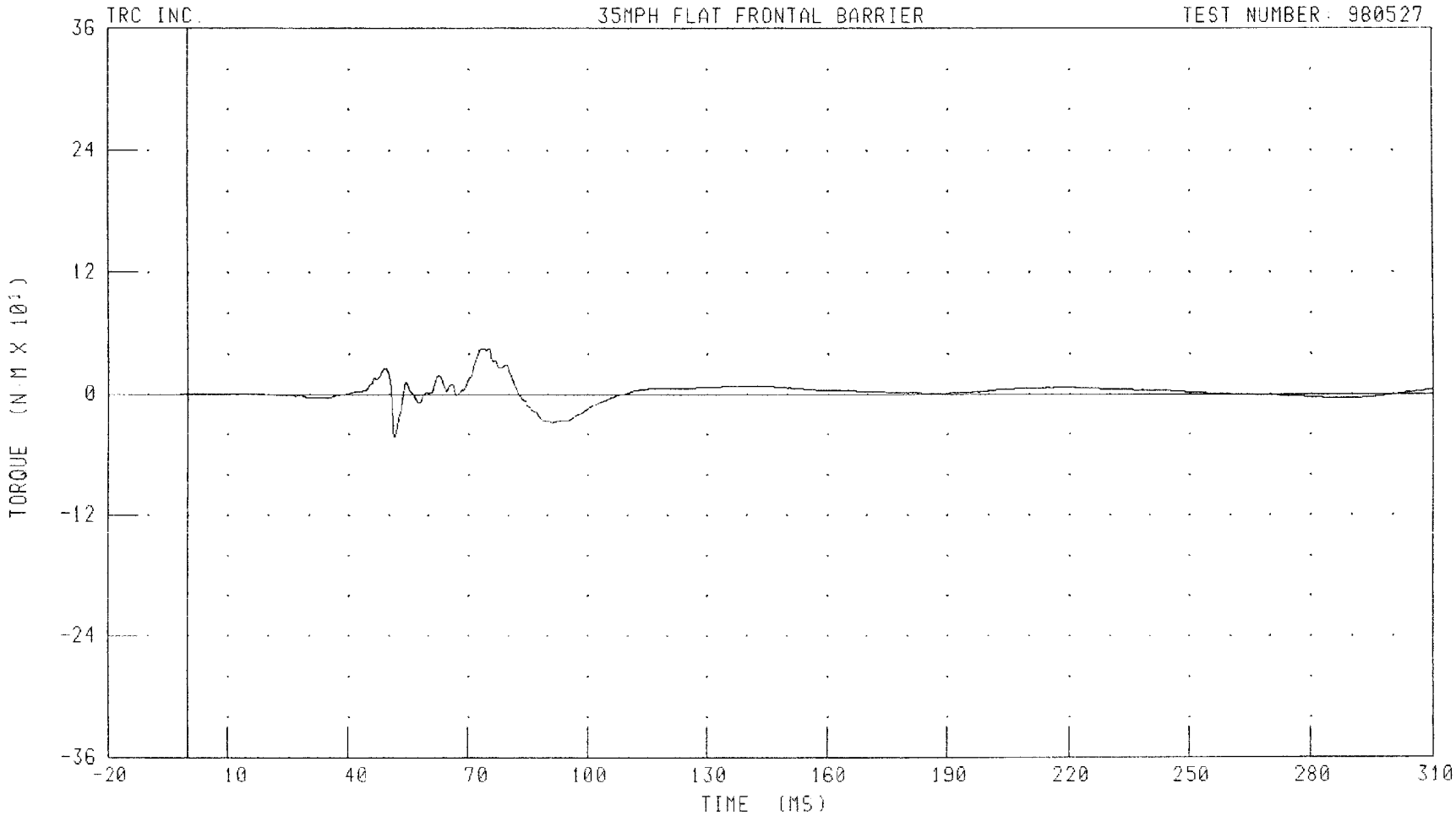
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION - REDUNDANT
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZR1
FILTER: CH CLASS 180
PEAK DATA: 15.72 G @ 95.44 MS; -17.05 G @ 57.12 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRR1
FILTER: CH. CLASS 180
PEAK DATA: 54.65 G @ 70.80 MS; 0.01 G @ -20.00 MS

980527

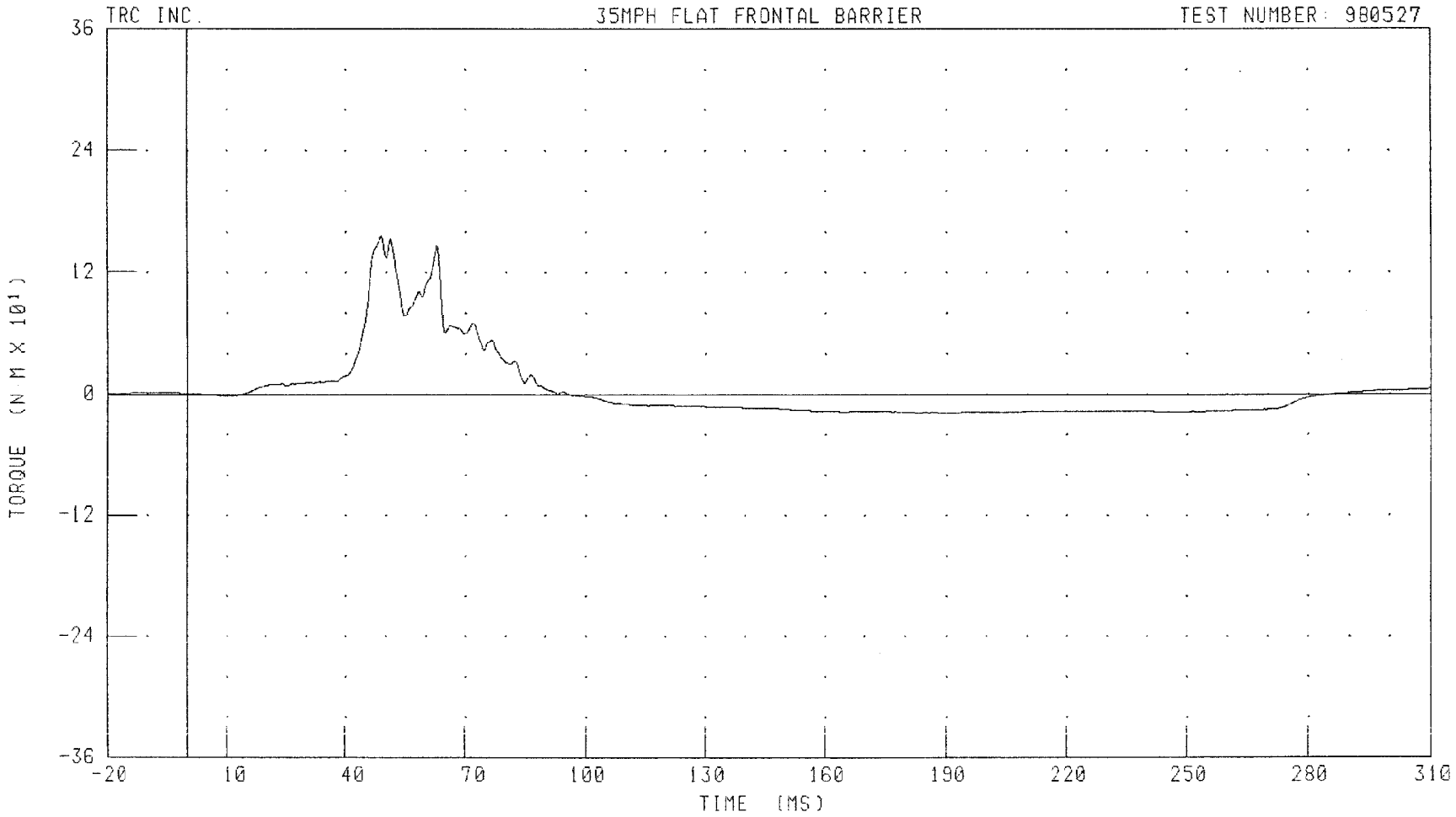
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT X AXIS



CHANNEL: TBLXM1 FILTER: CH CLASS 600 PEAK DATA: 45.50 N-M @ 75.12 MS, -42.55 N-M @ 51.44 MS

980527

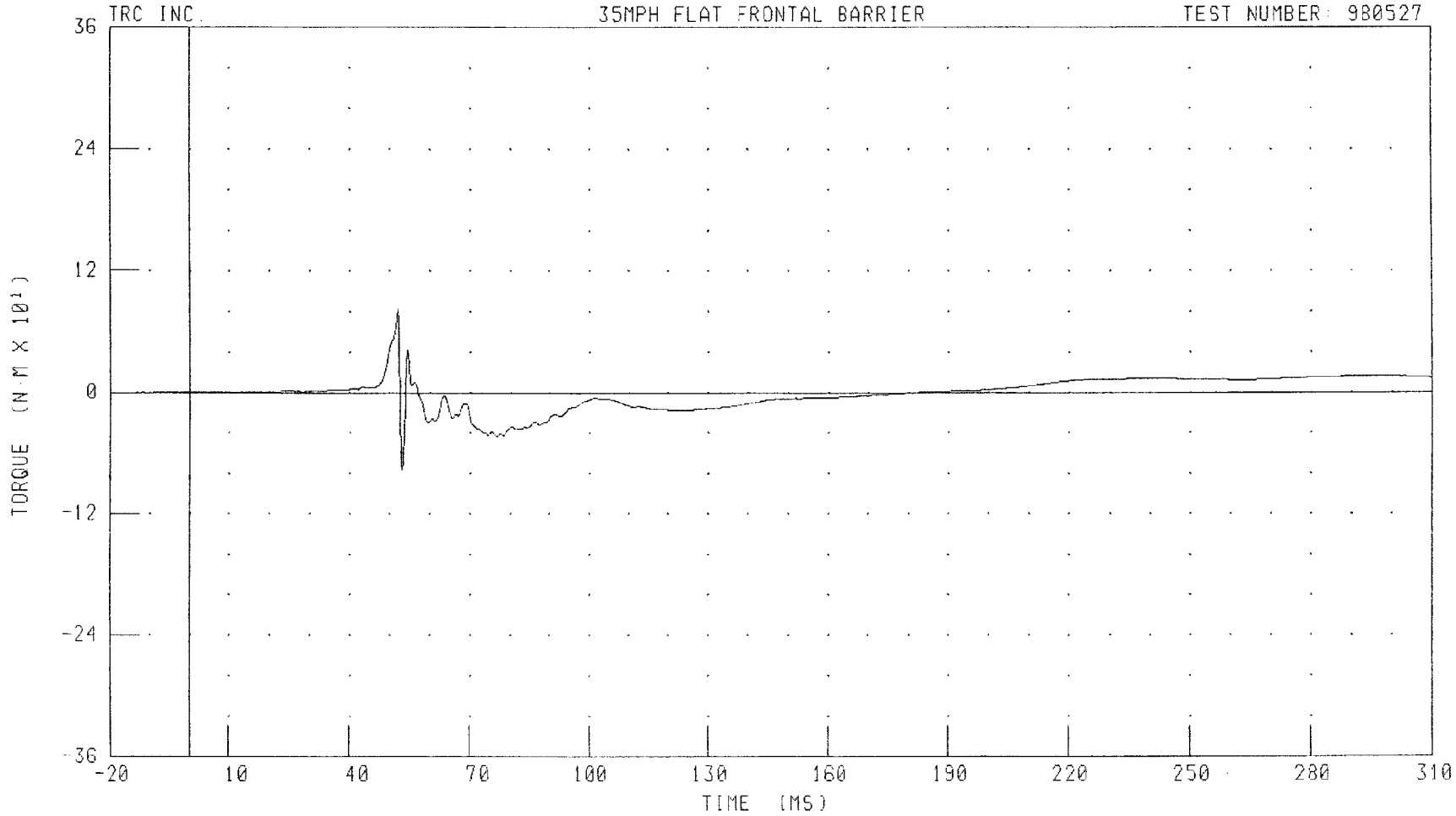
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS



CHANNEL: TBLYM1 FILTER: CH. CLASS 600 PEAK DATA: 155.58 N-M @ 48.96 MS; -18.67 N-M @ 189.68 MS

980527

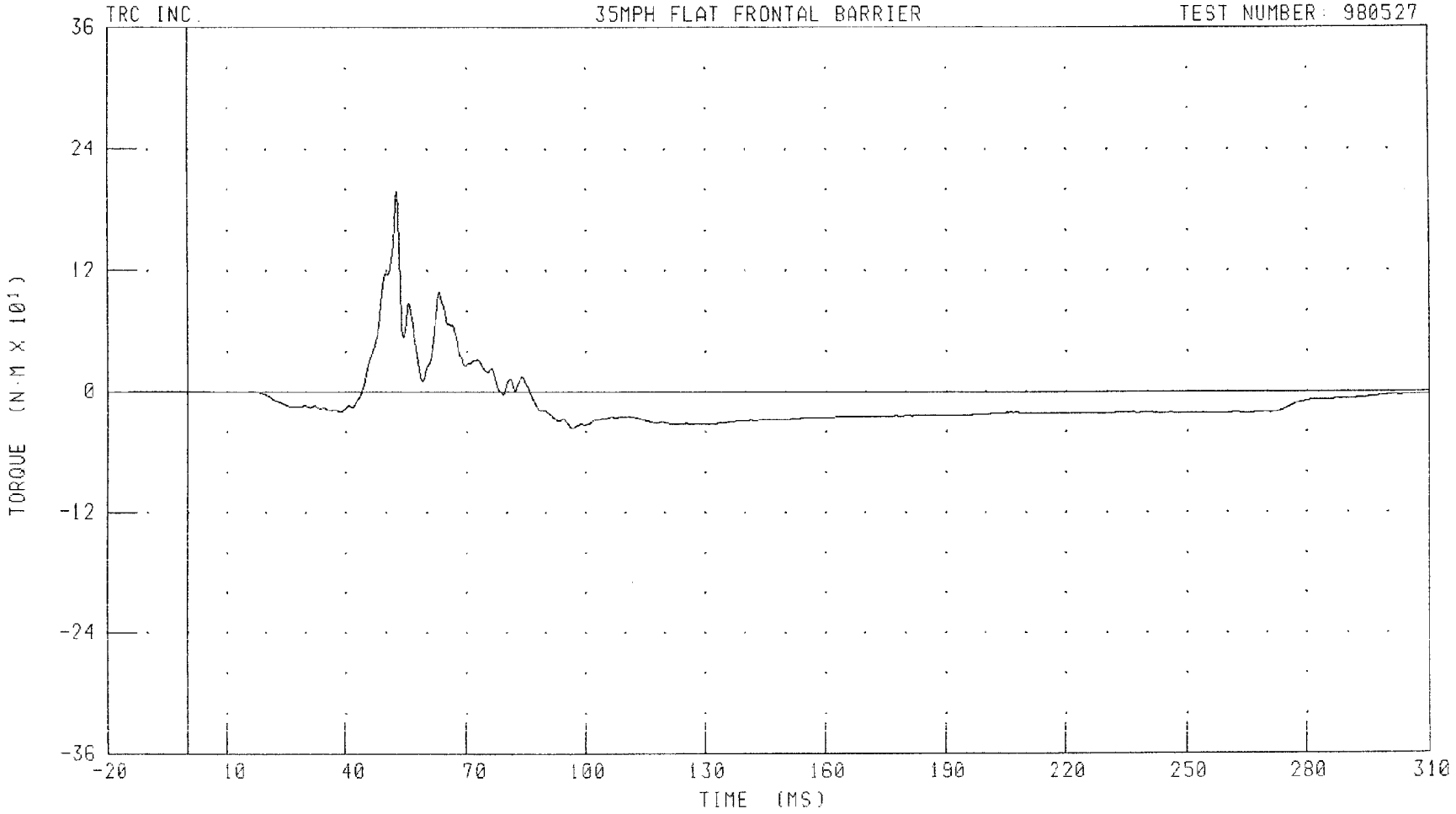
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS



CHANNEL: TBRXM1 FILTER: CH. CLASS 600 PEAK DATA: 82.43 N-M @ 52.08 MS, -77.07 N-M @ 53.12 MS

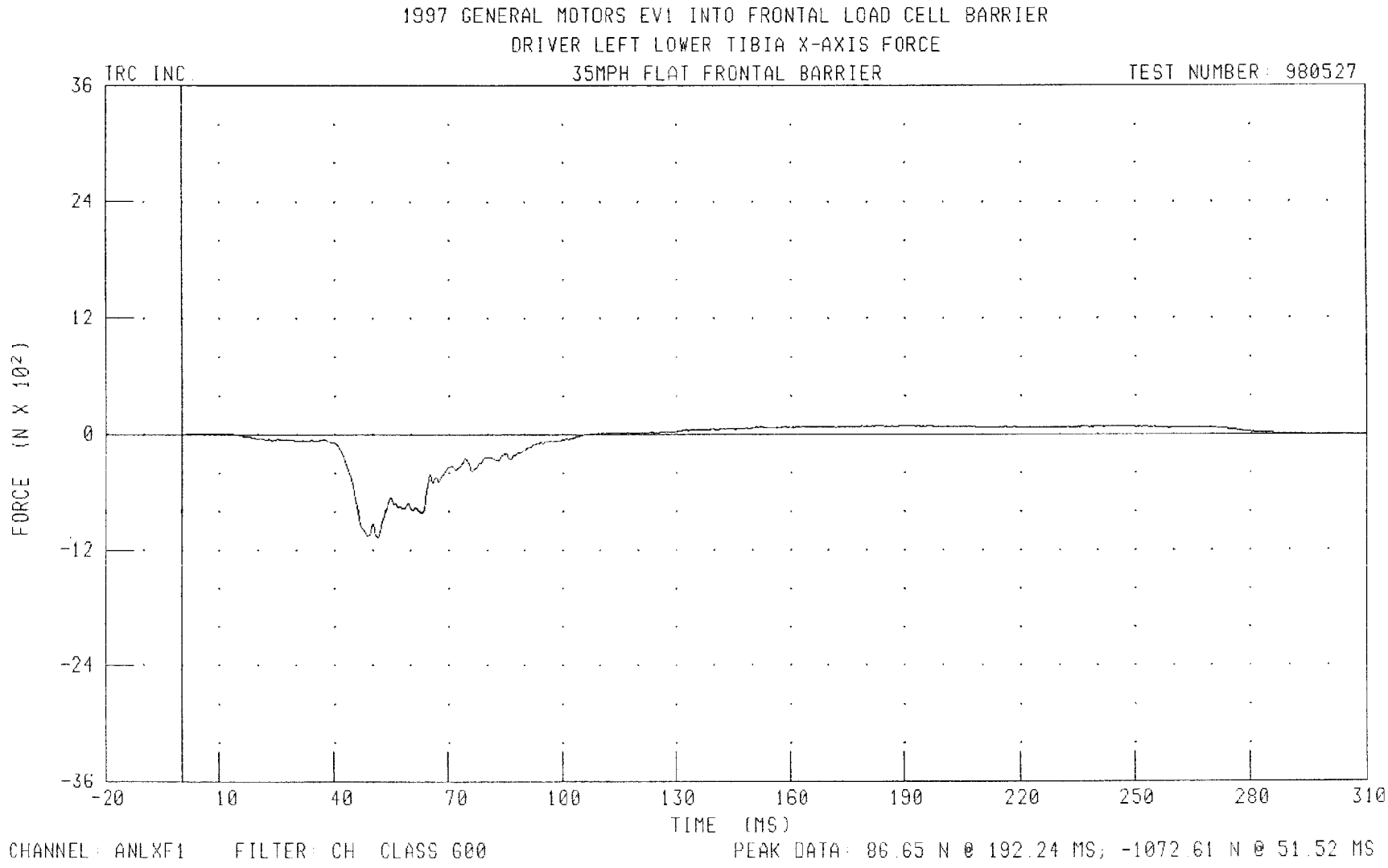
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS

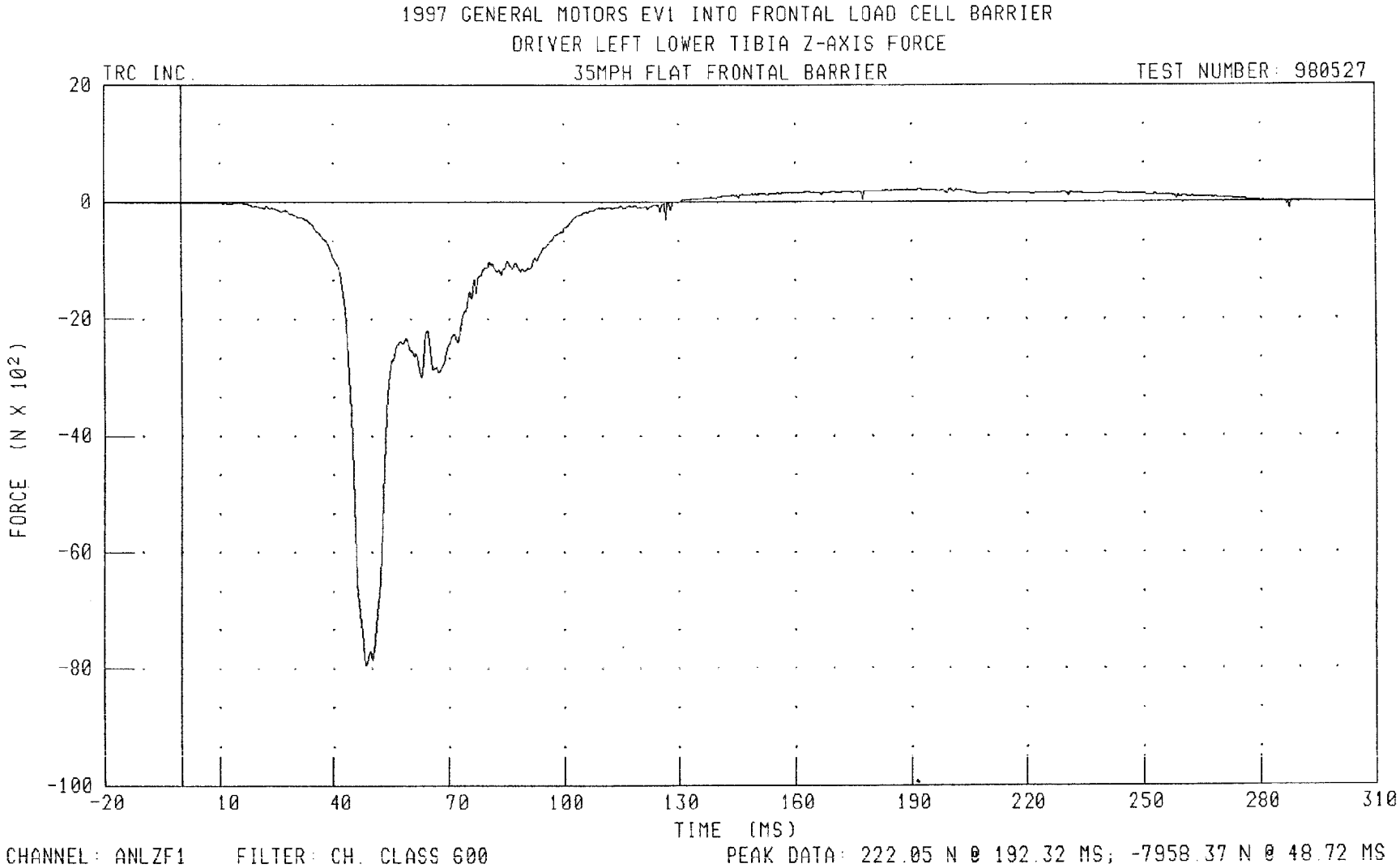


CHANNEL: TBRYM1 FILTER: CH CLASS 600 PEAK DATA: 198.53 N-M @ 52.72 MS; -36.23 N-M @ 96.80 MS

980527

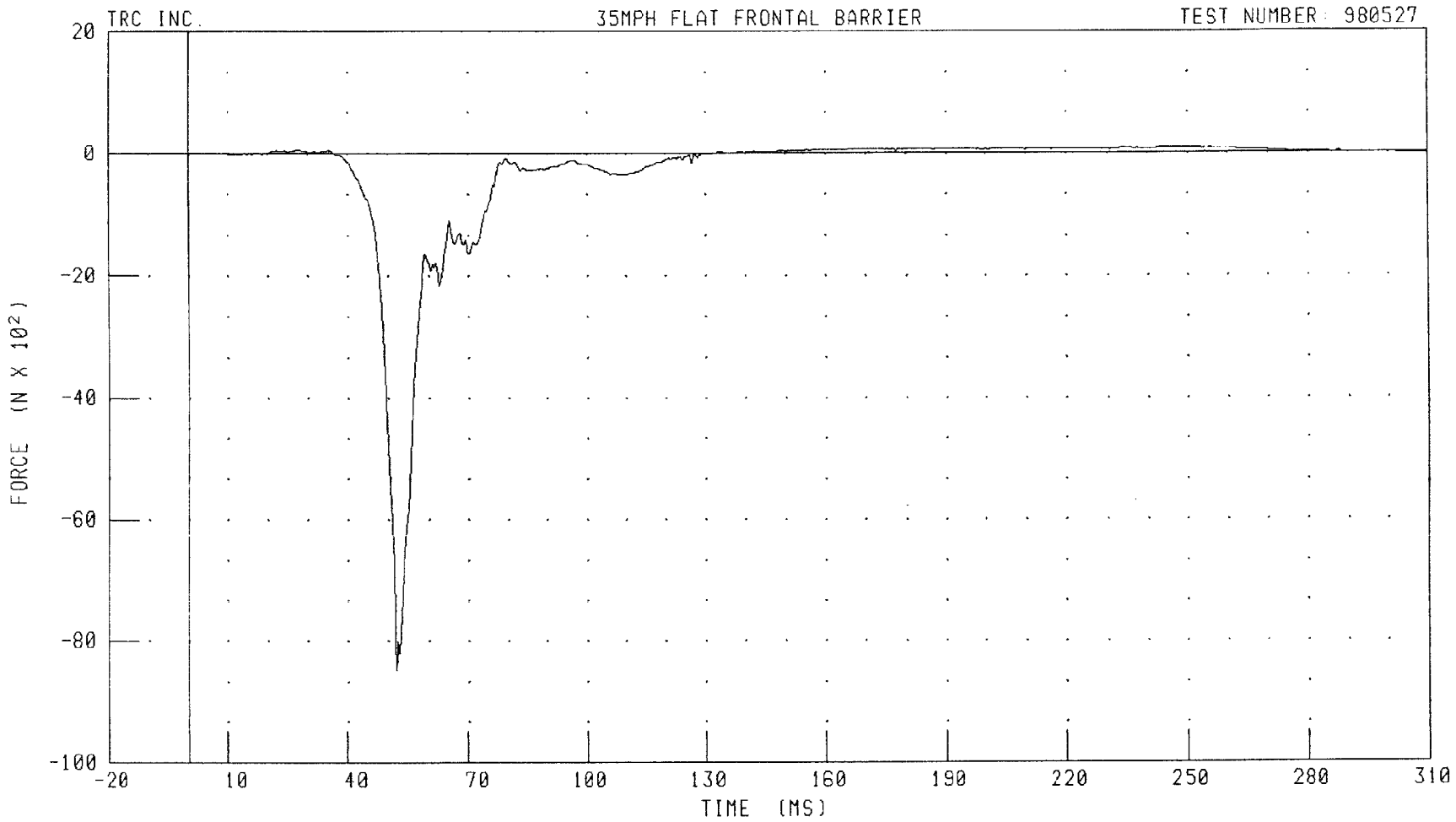

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT LOWER TIBIA X-AXIS FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLXF1
FILTER: CH CLASS 600
PEAK DATA: 86.65 N @ 192.24 MS; -1072.61 N @ 51.52 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT LOWER TIBIA Z-AXIS FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLZF1
FILTER: CH. CLASS 600
PEAK DATA: 222.05 N @ 192.32 MS; -7958.37 N @ 48.72 MS

980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE



CHANNEL: ANRZF1 FILTER: CH. CLASS 600 PEAK DATA: 91.00 N @ 251.44 MS; -8480.18 N @ 52.08 MS

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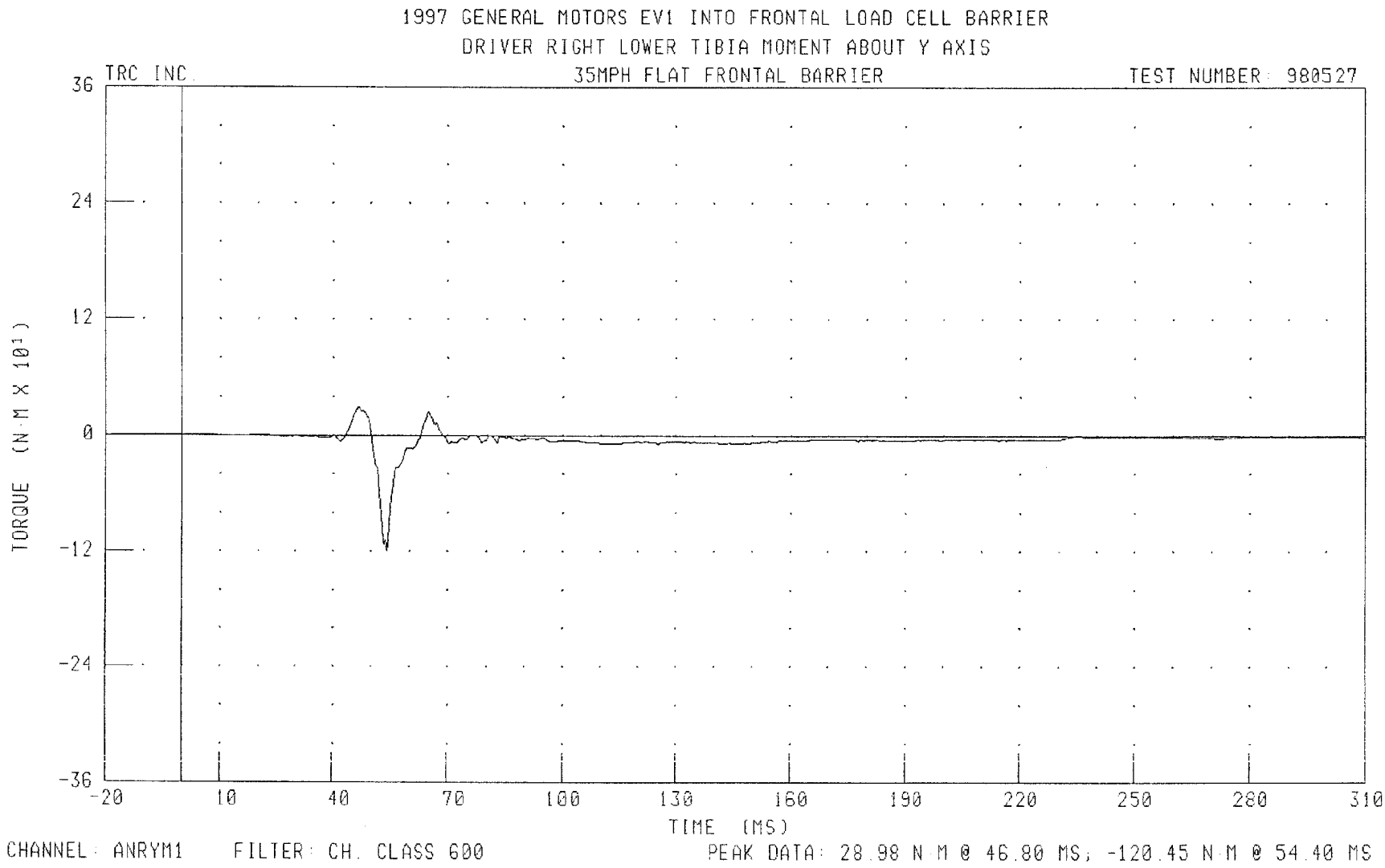
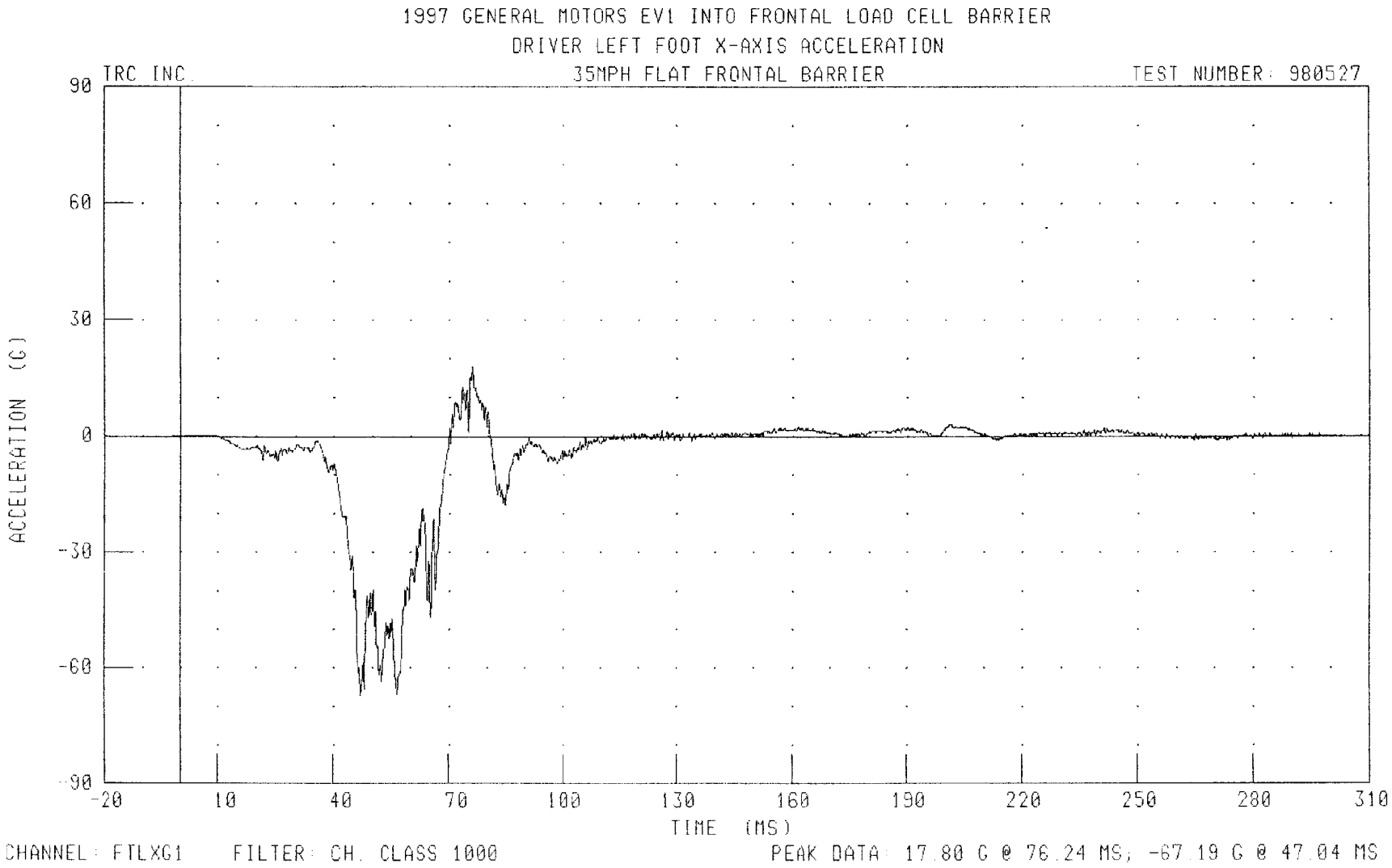
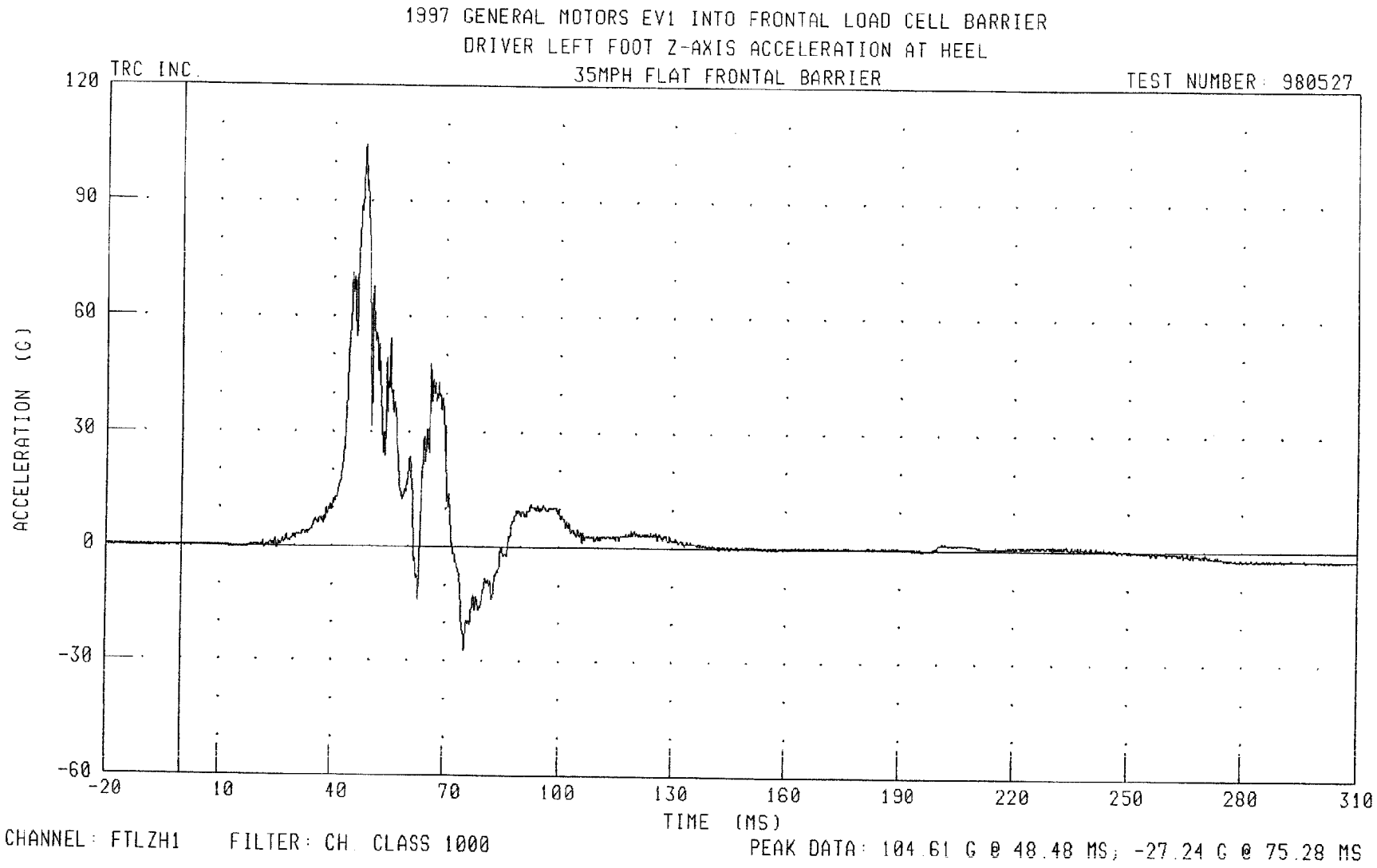
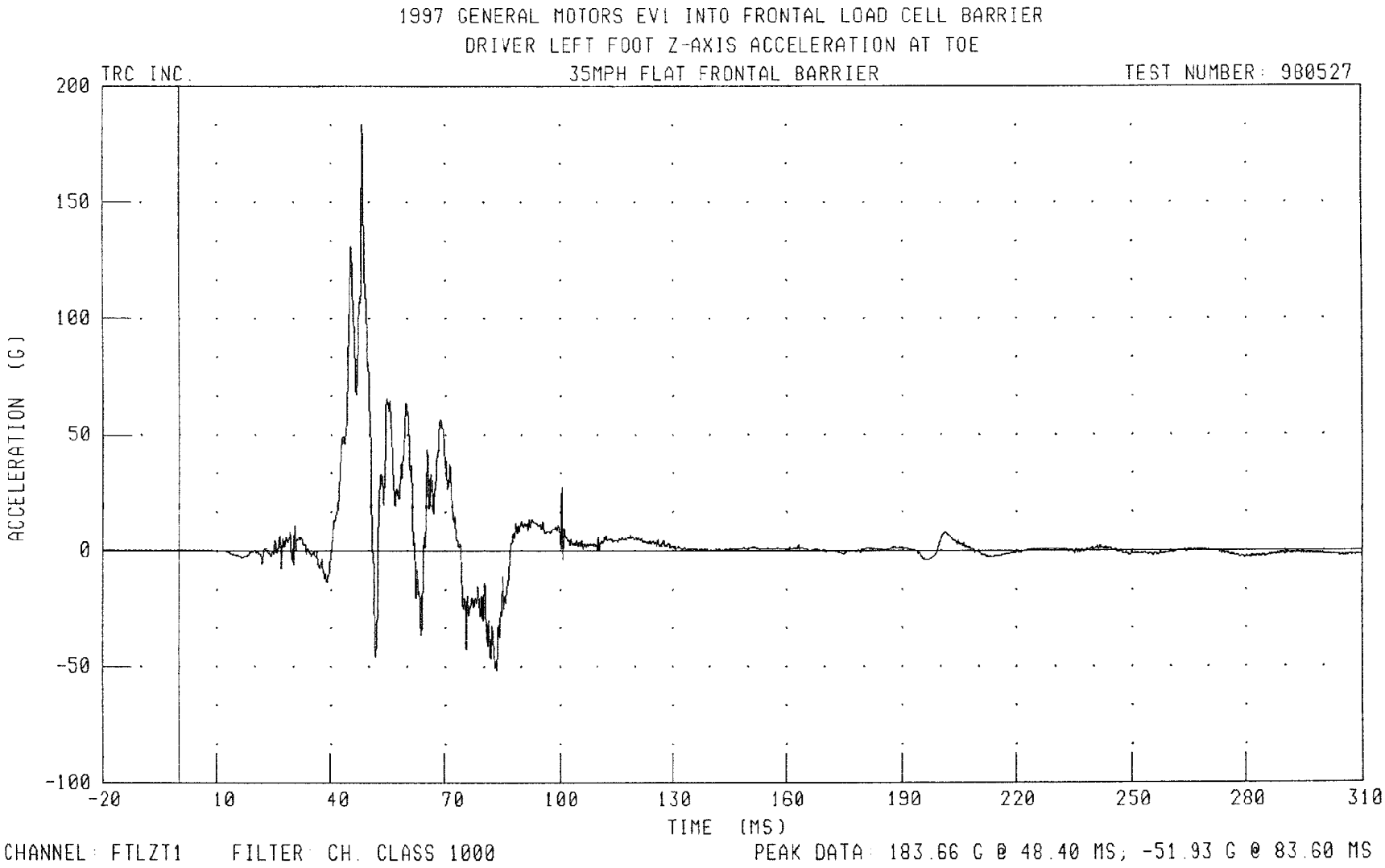
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
TORQUE (N M X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANRYM1
FILTER: CH. CLASS 600
PEAK DATA: 28.98 N M @ 46.80 MS; -120.45 N M @ 54.40 MS

980527

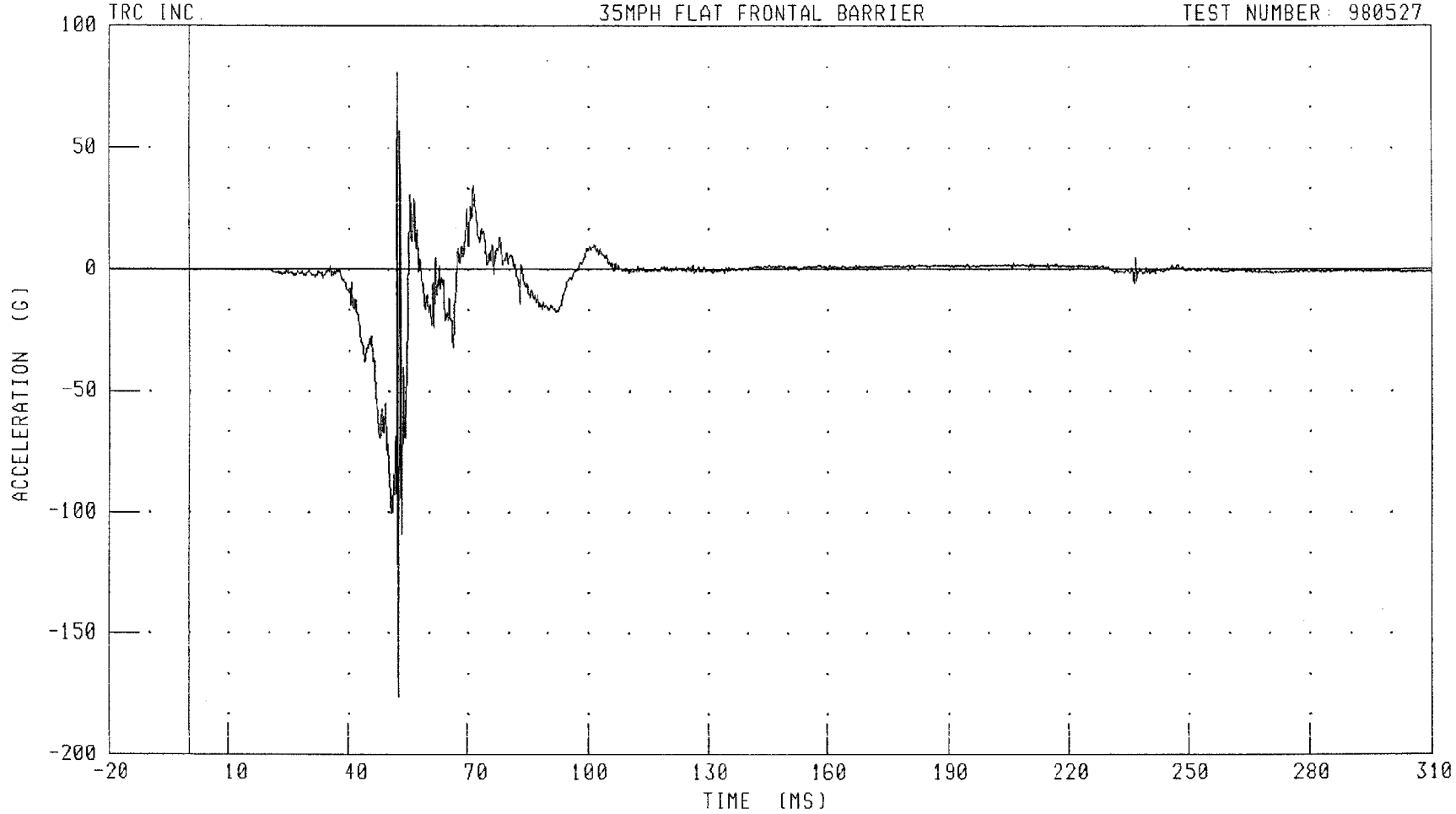

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FOOT X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLXG1
FILTER: CH. CLASS 1000
PEAK DATA: 17.80 G @ 76.24 MS, -67.19 G @ 47.04 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT HEEL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
120
90
60
30
0
-30
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLZH1
FILTER: CH CLASS 1000
PEAK DATA: 104.61 G @ 48.48 MS; -27.24 G @ 75.28 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT TOE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
200
150
100
50
0
-50
-100
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLZT1
FILTER: CH. CLASS 1000
PEAK DATA: 183.66 G @ 48.40 MS; -51.93 G @ 83.60 MS

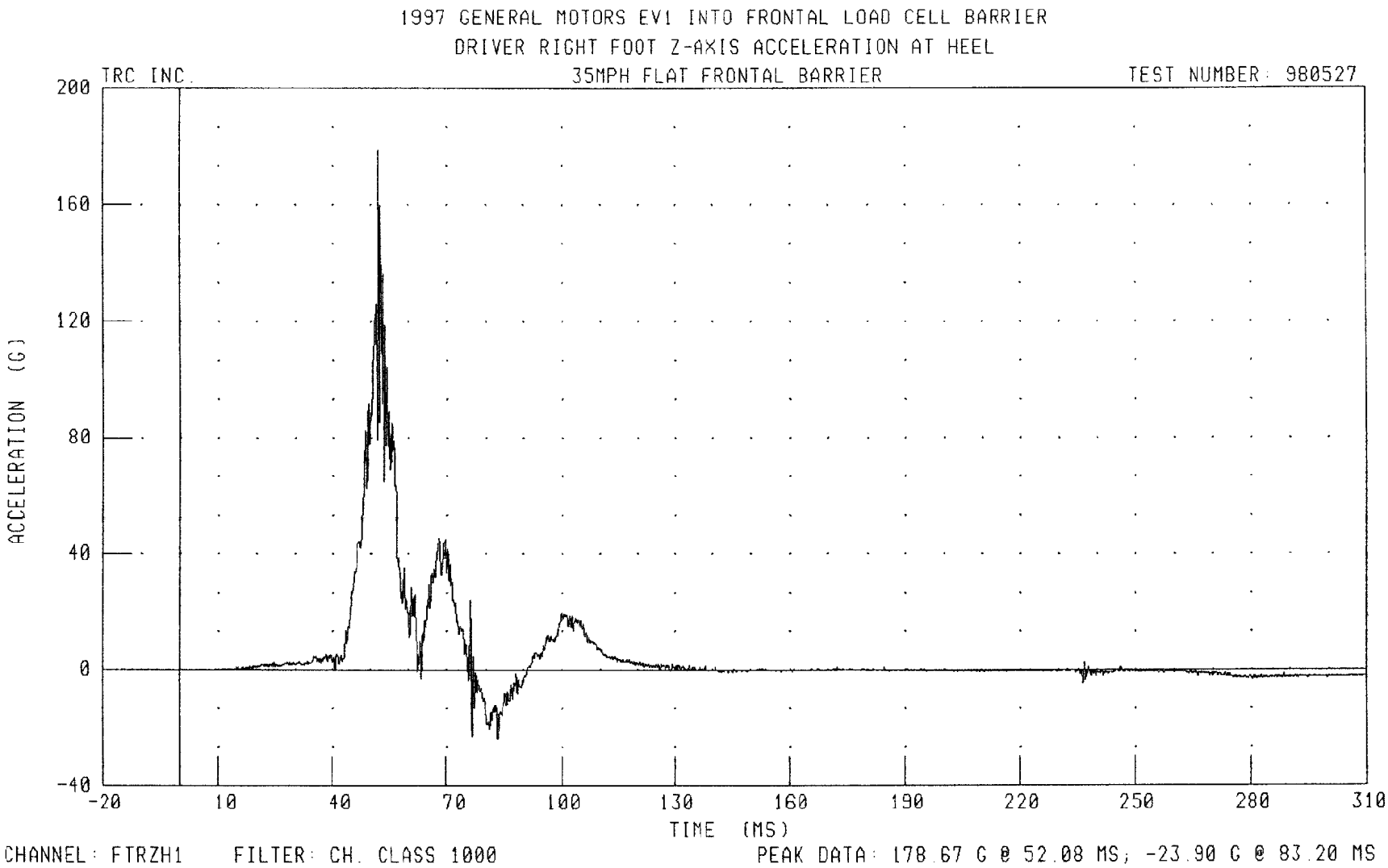
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FOOT X-AXIS ACCELERATION

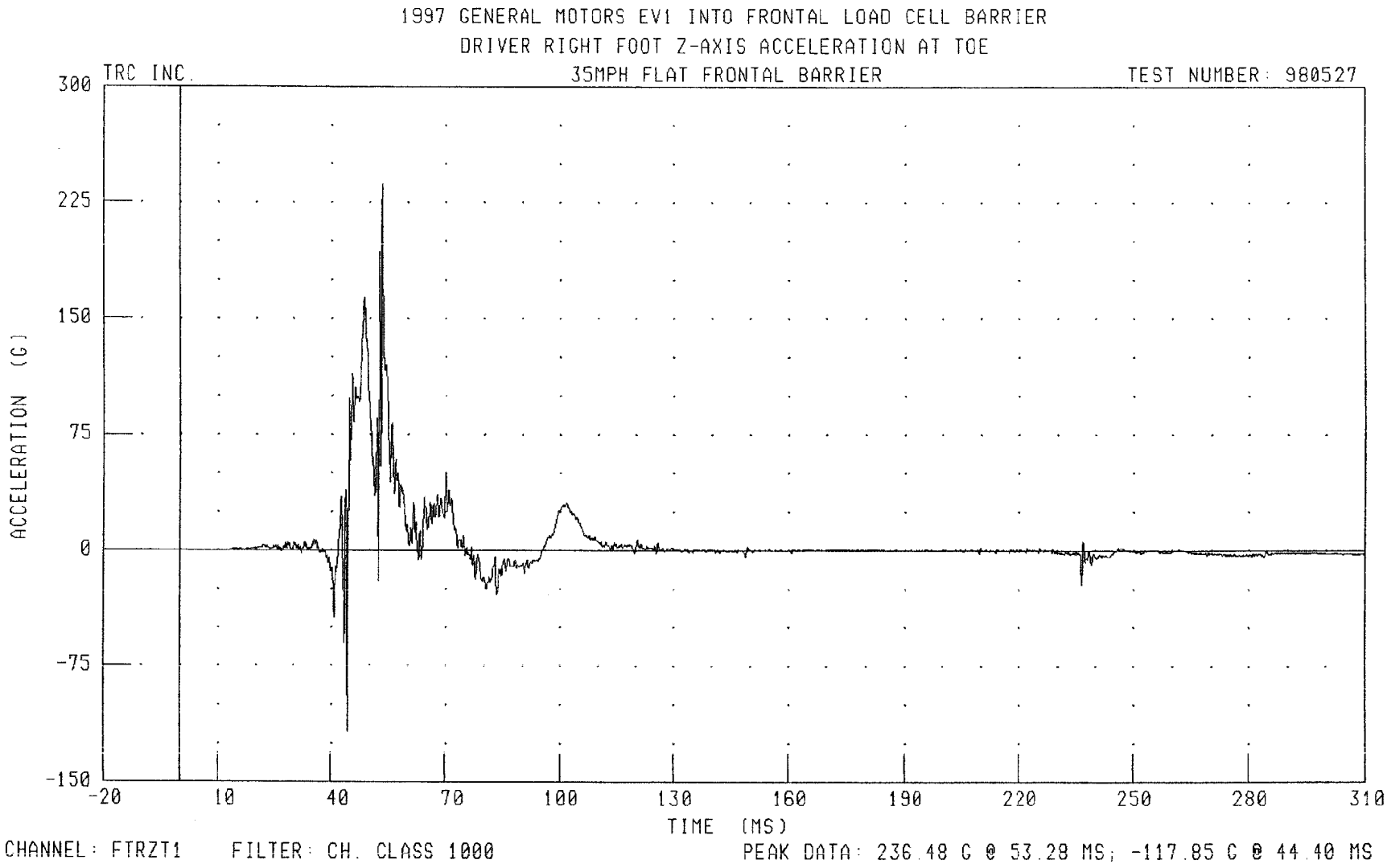


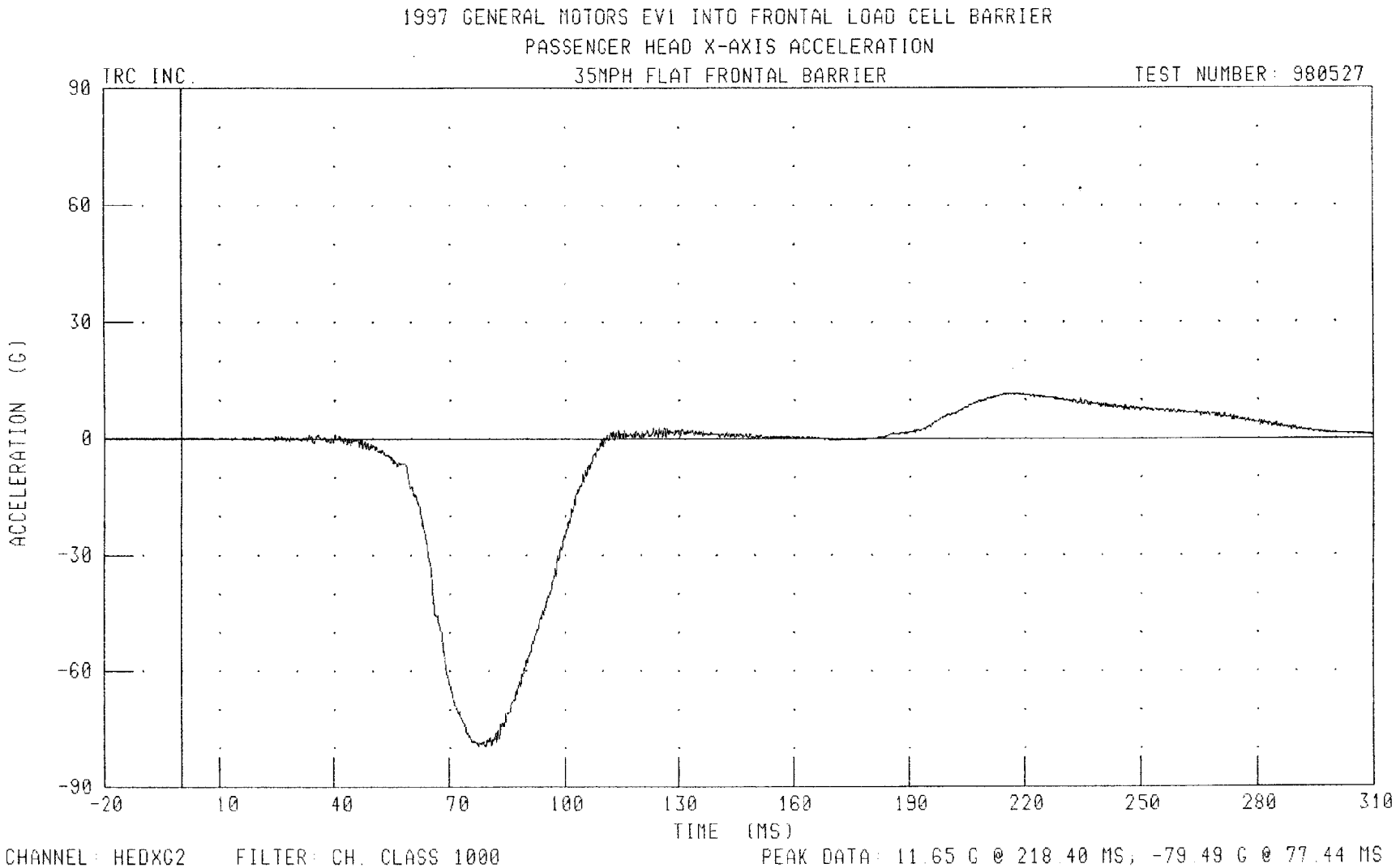
CHANNEL: FTRXG1 FILTER: CH. CLASS 1000 PEAK DATA: 81.08 G @ 52.24 MS; -176.28 G @ 52.64 MS

980527

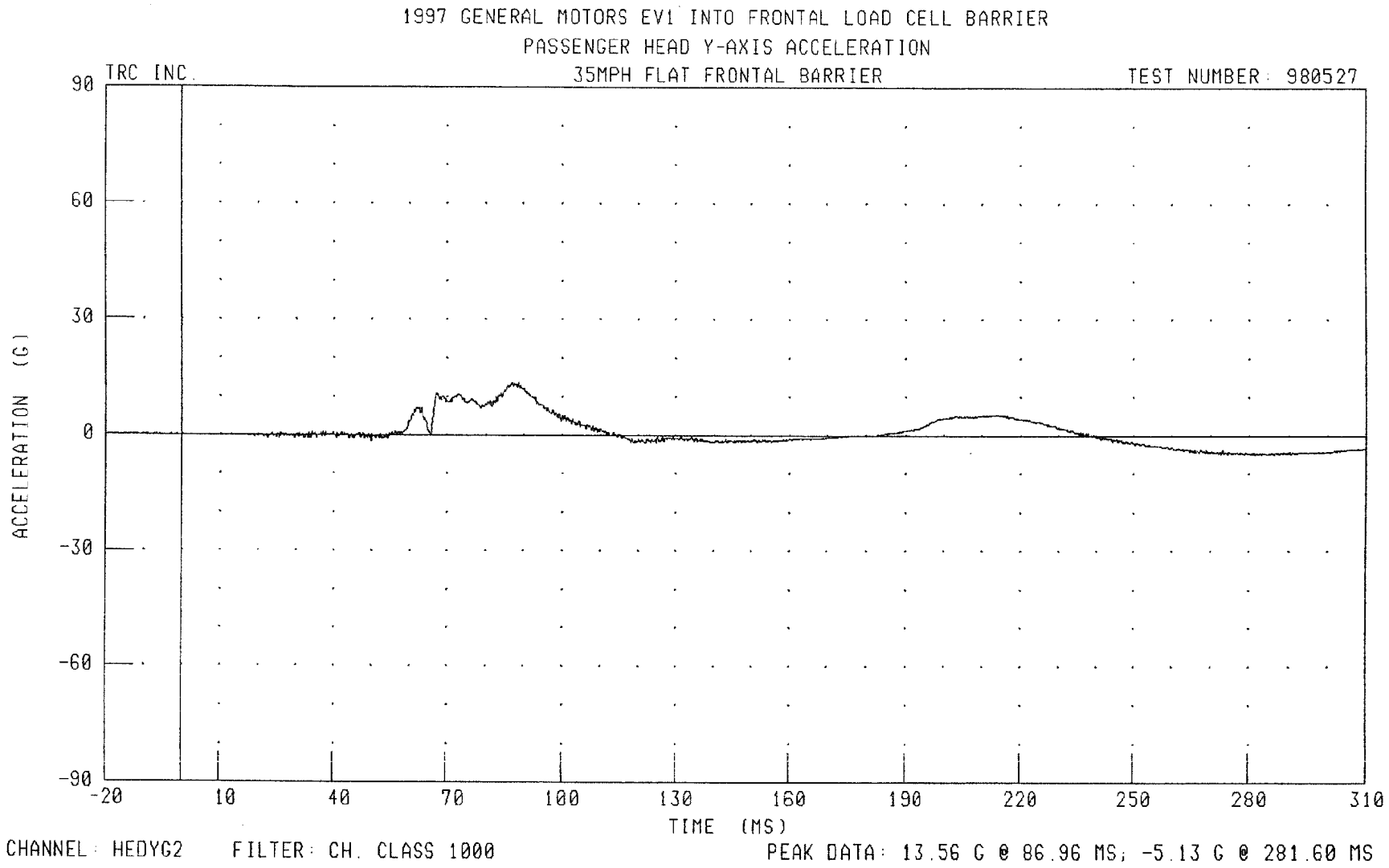

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT HEEL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
200
160
120
80
40
0
-40
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTRZH1
FILTER: CH. CLASS 1000
PEAK DATA: 178.67 G @ 52.08 MS; -23.90 G @ 83.20 MS

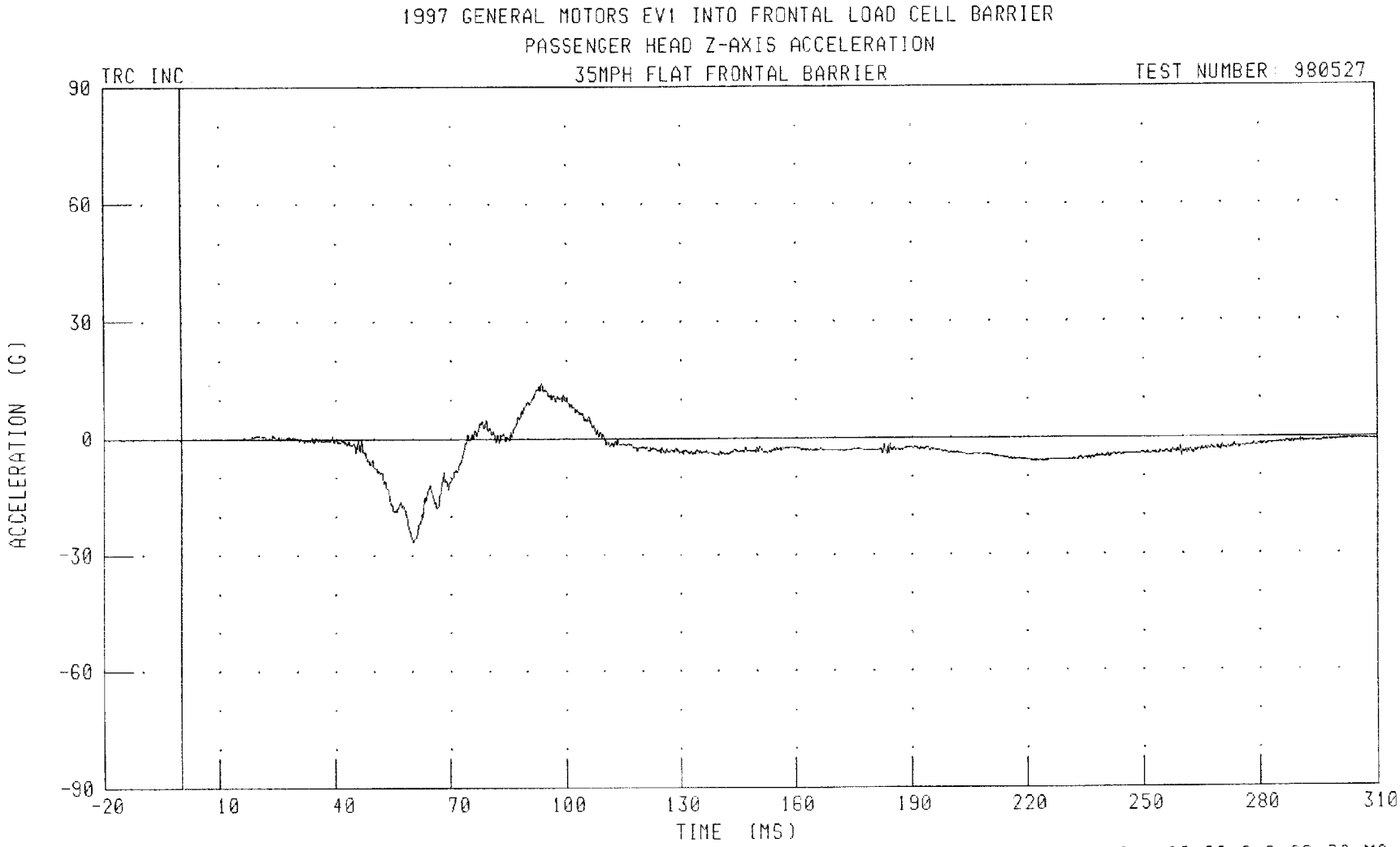
980527

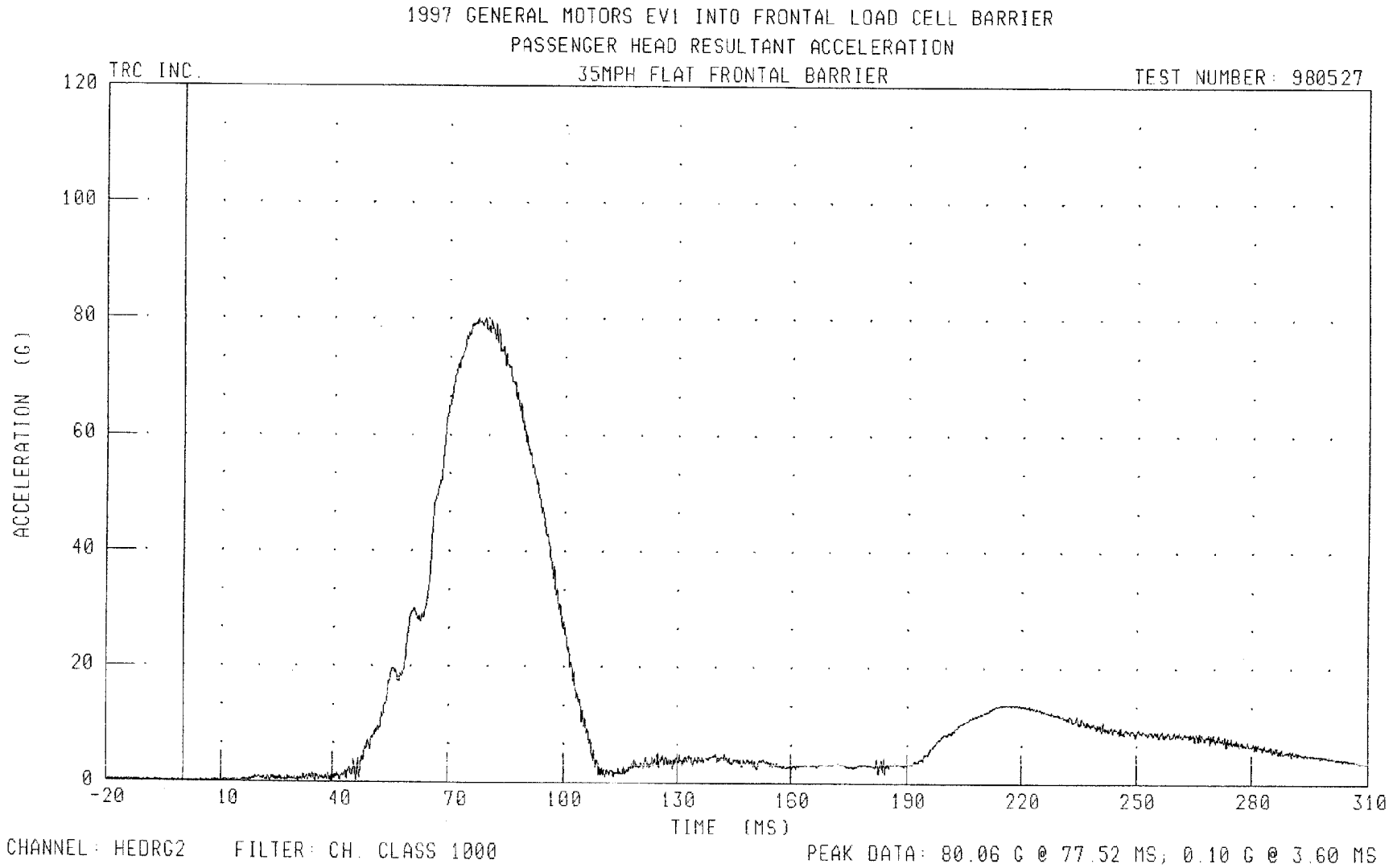

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT TOE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
300
225
150
75
0
-75
-150
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTRZT1
FILTER: CH. CLASS 1000
PEAK DATA: 236.48 G @ 53.28 MS; -117.85 G @ 44.40 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXC2
FILTER: CH. CLASS 1000
PEAK DATA: 11.65 G @ 218.40 MS, -79.49 G @ 77.44 MS

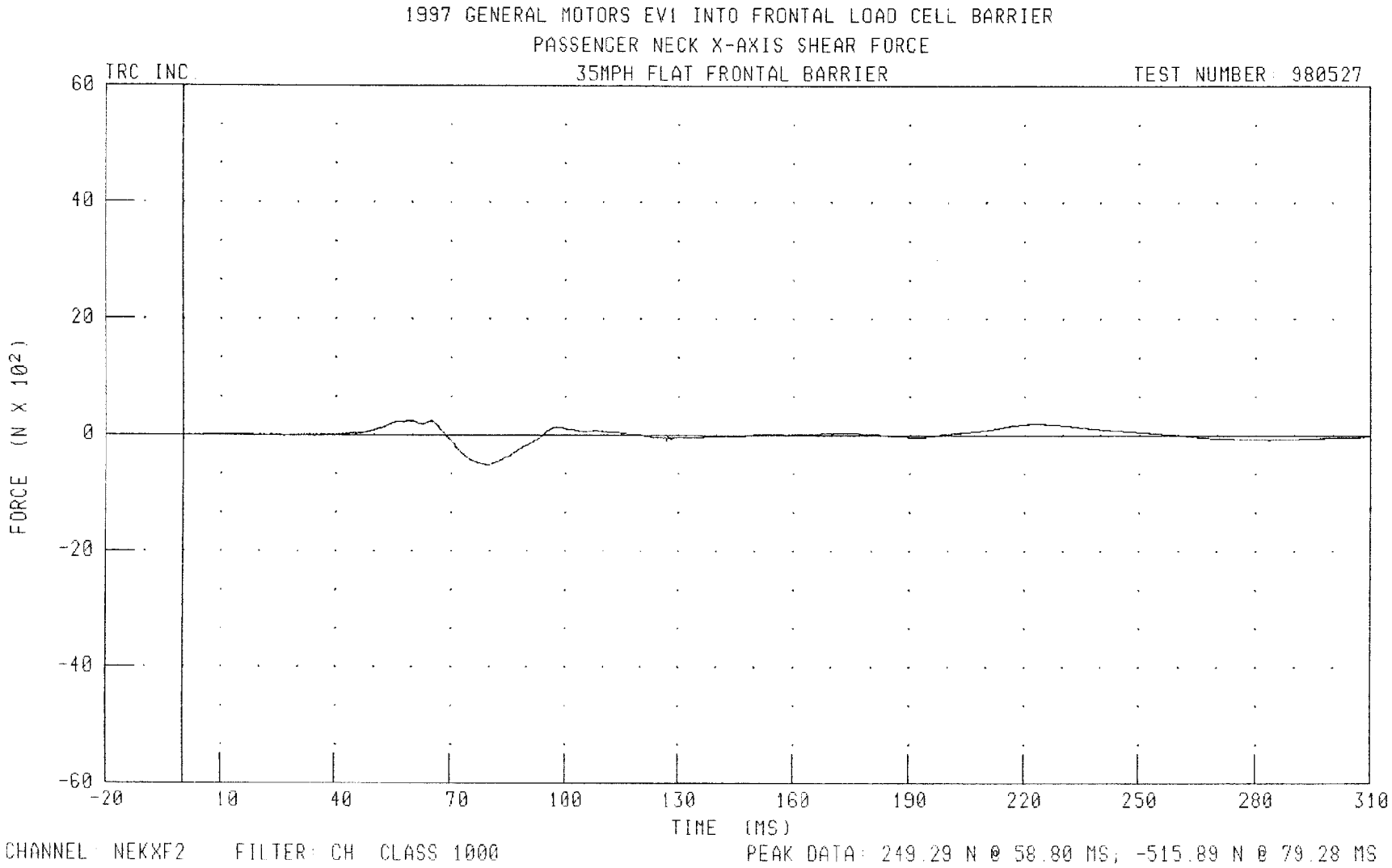
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG2
FILTER: CH. CLASS 1000
PEAK DATA: 13.56 G @ 86.96 MS; -5.13 G @ 281.60 MS

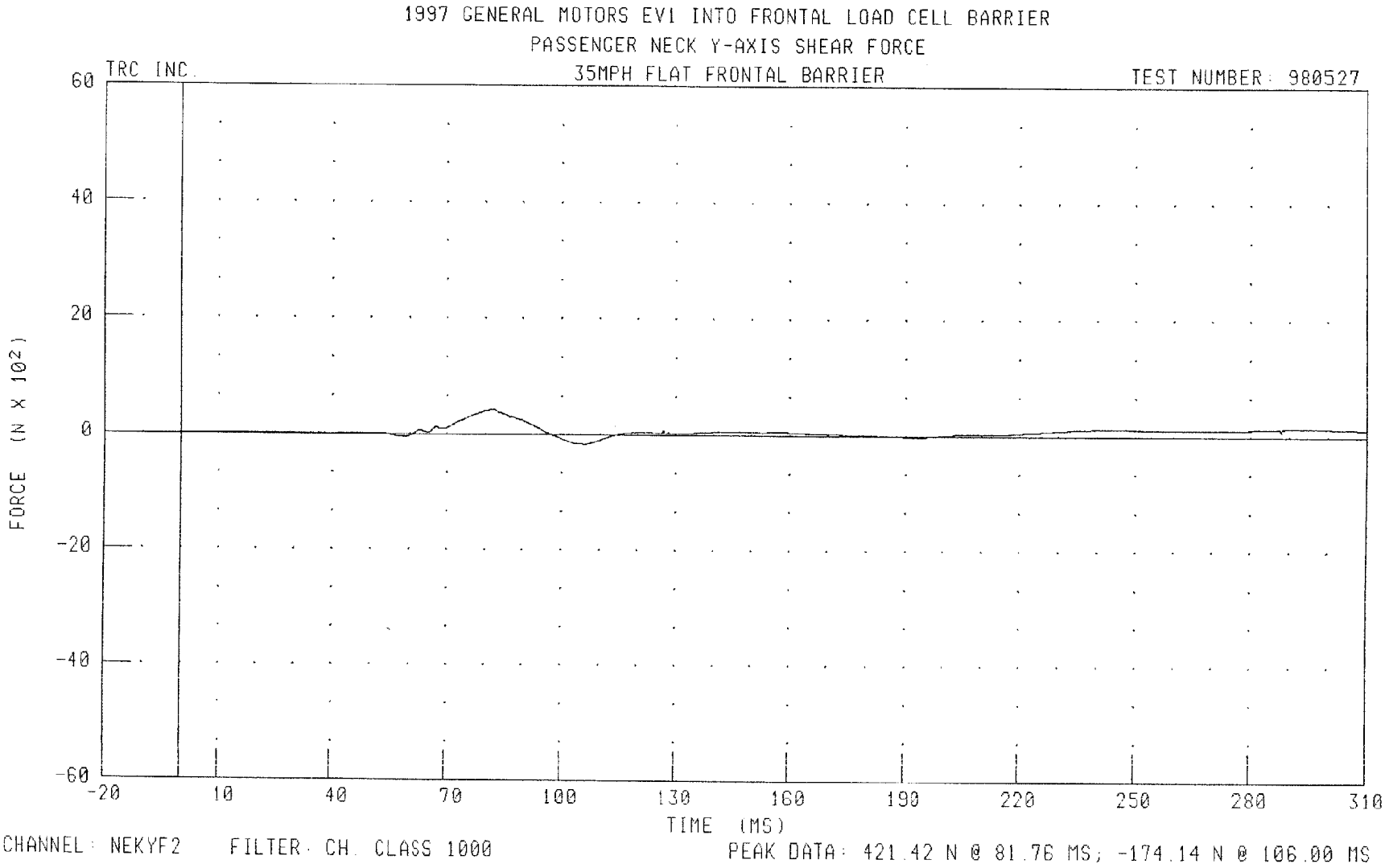

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZC2
FILTER: CH. CLASS 1000
PEAK DATA: 14.18 G @ 93.76 MS; -26.62 G @ 60.32 MS

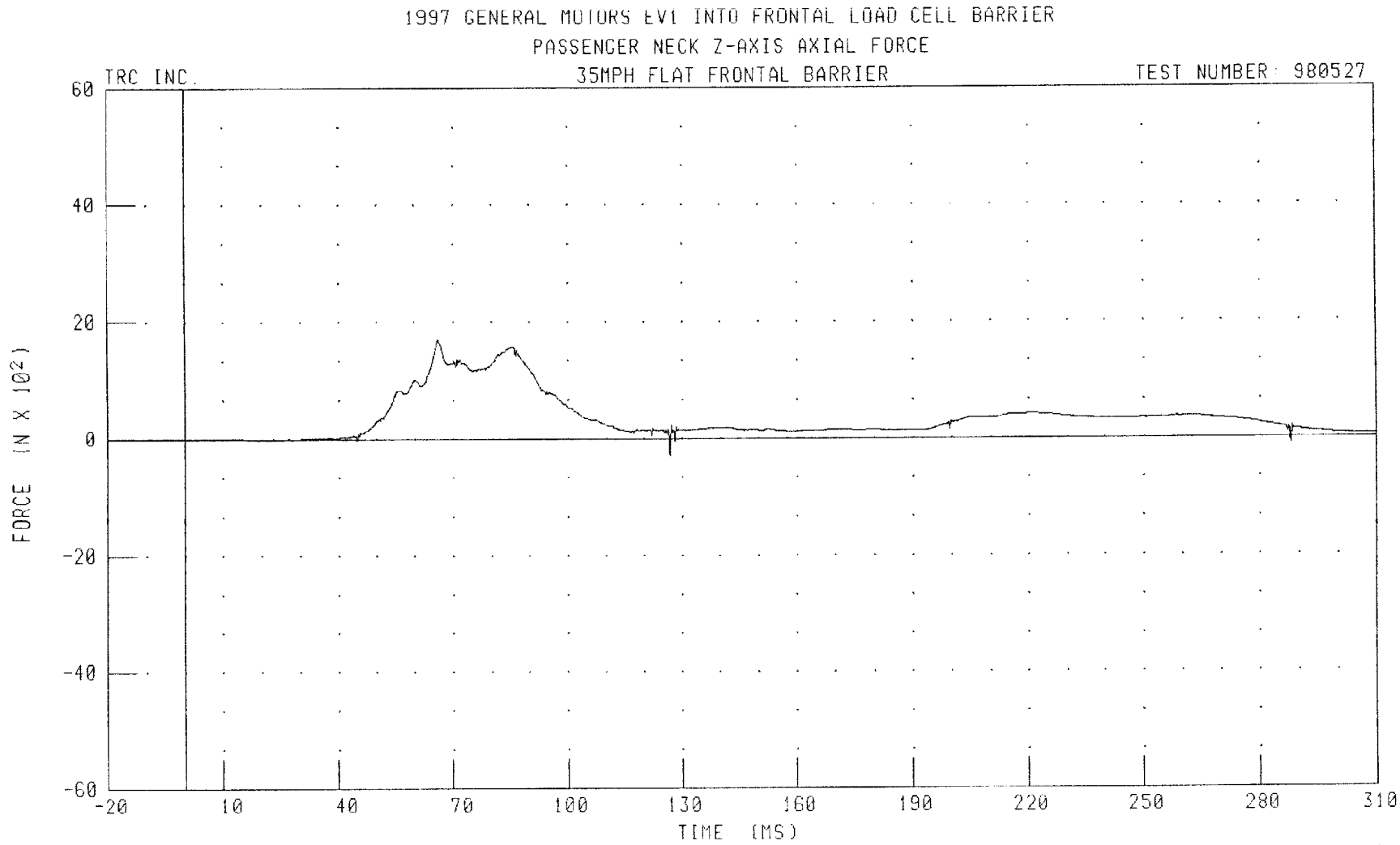

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG2
FILTER: CH. CLASS 1000
PEAK DATA: 80.06 G @ 77.52 MS; 0.10 G @ 3.60 MS

980527

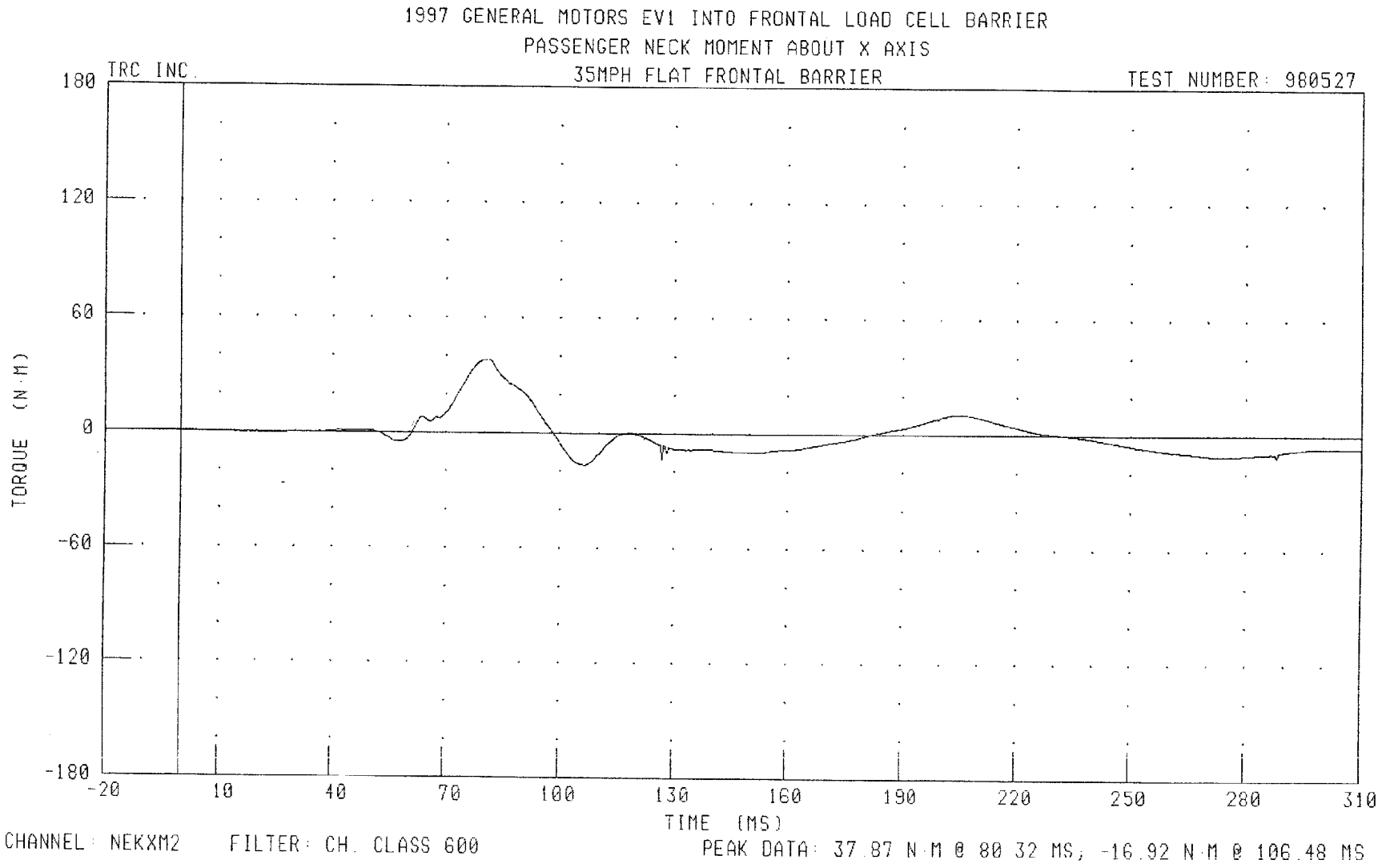

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKXF2
FILTER: CH CLASS 1000
PEAK DATA: 249.29 N @ 58.80 MS; -515.89 N @ 79.28 MS

980527

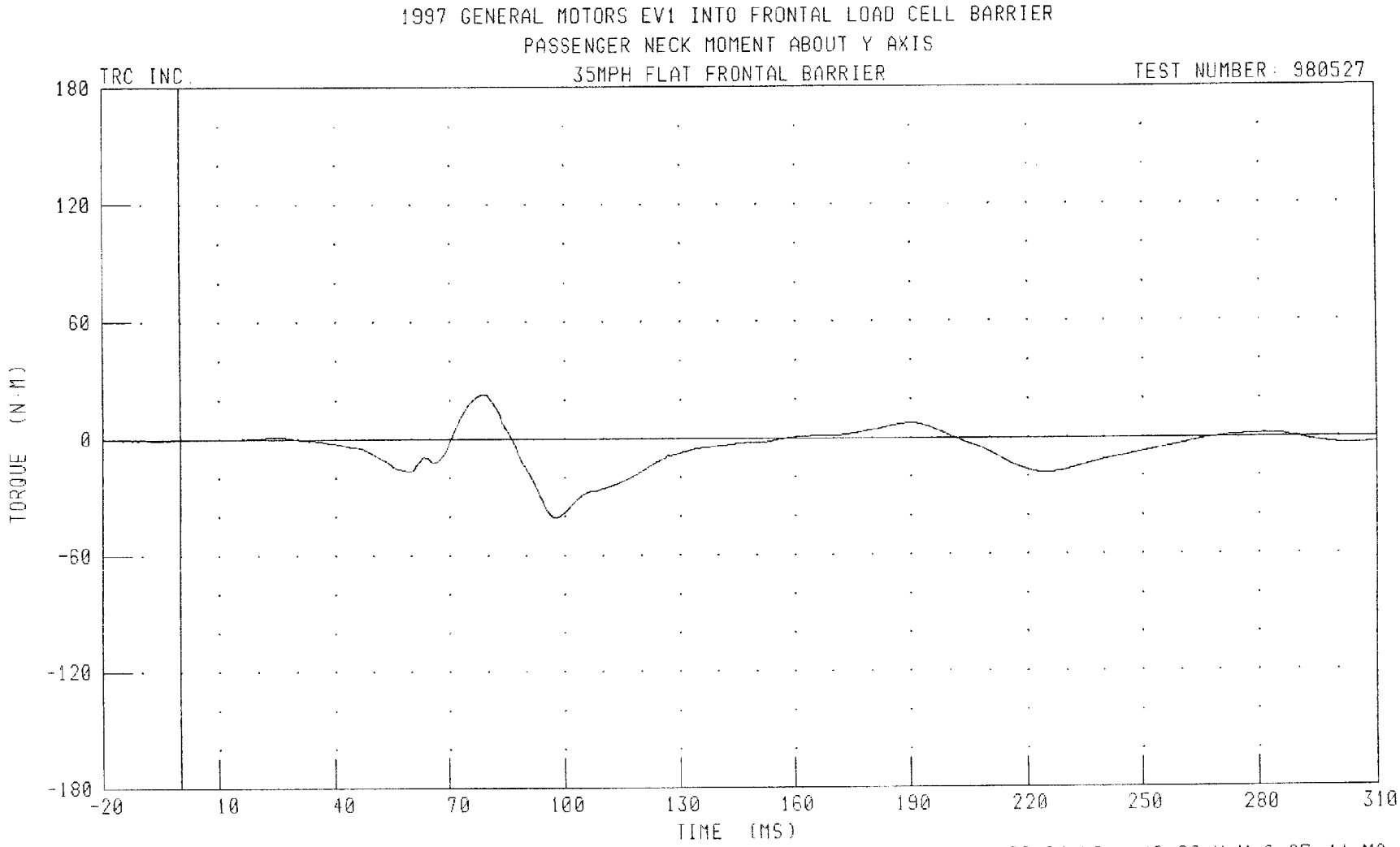

1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Y-AXIS SHEAR FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYF2
FILTER: CH. CLASS 1000
PEAK DATA: 421.42 N @ 81.76 MS; -174.14 N @ 106.00 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
FORCE (N X 10²)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL NEKZF2 FILTER: CH CLASS 1000
PEAK DATA: 1696.44 N @ 66.16 MS, -297.54 N @ 126.96 MS

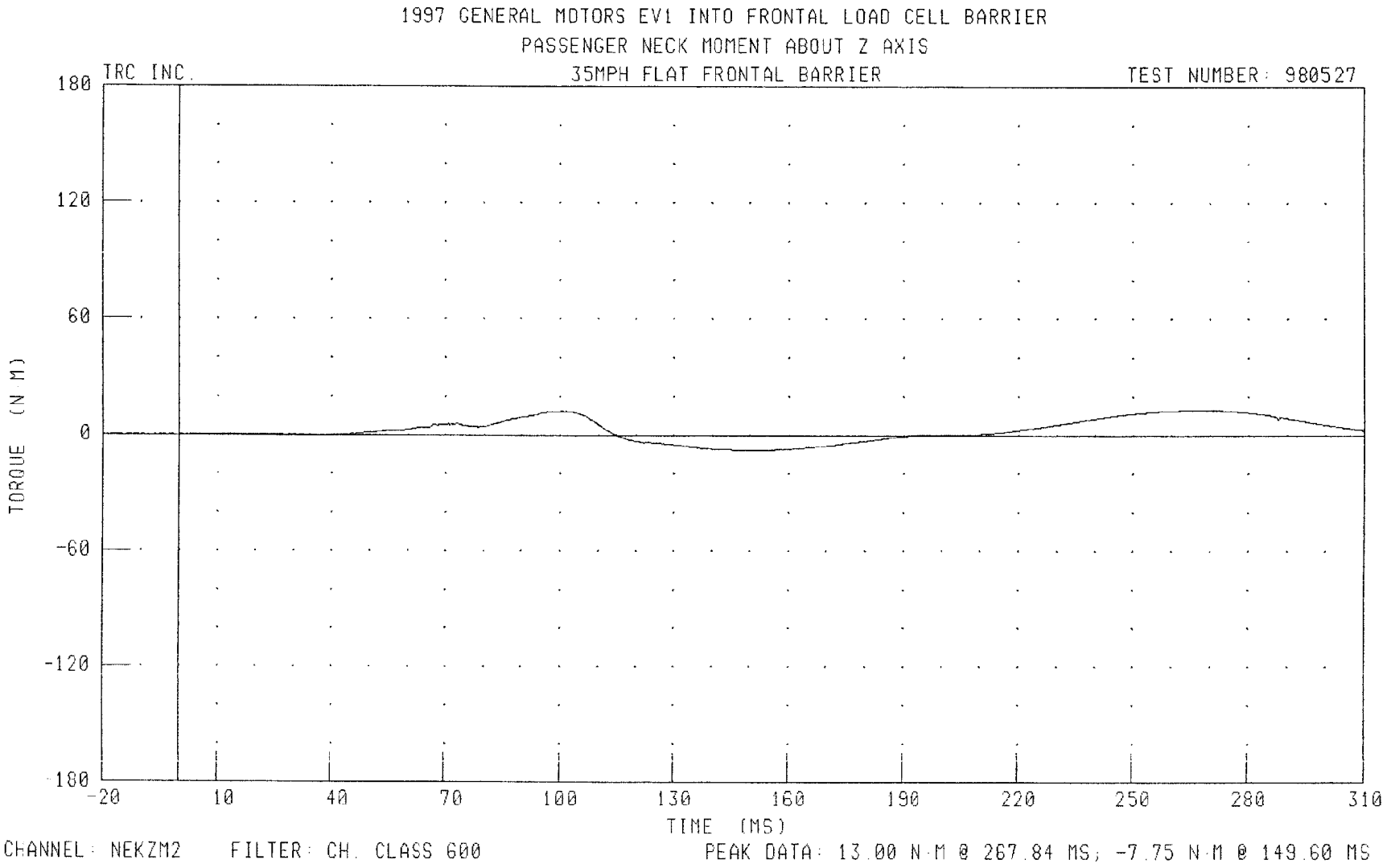
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT X AXIS
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKXM2
FILTER: CH. CLASS 600
PEAK DATA: 37.87 N-M @ 80.32 MS; -16.92 N-M @ 106.48 MS

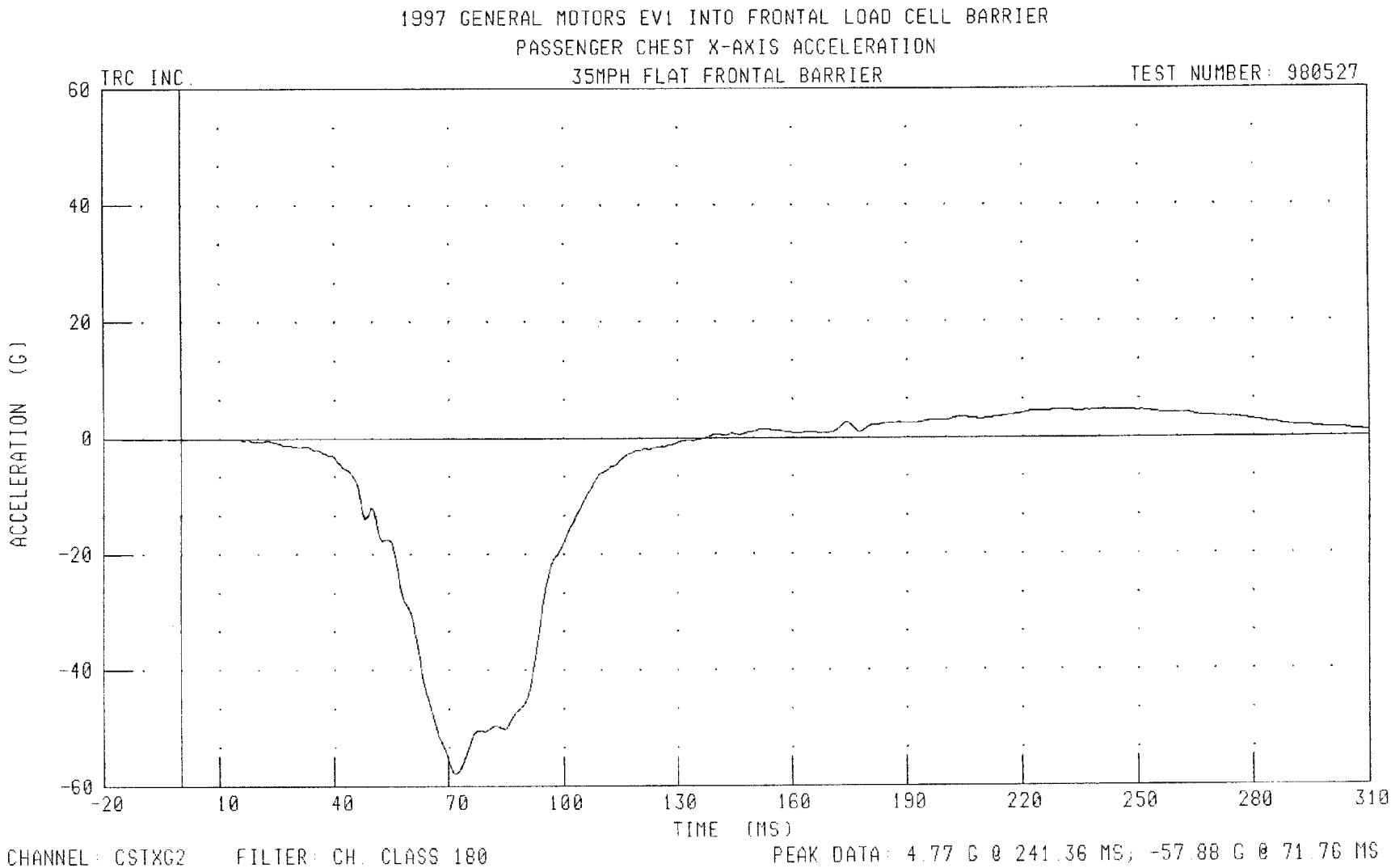
980527

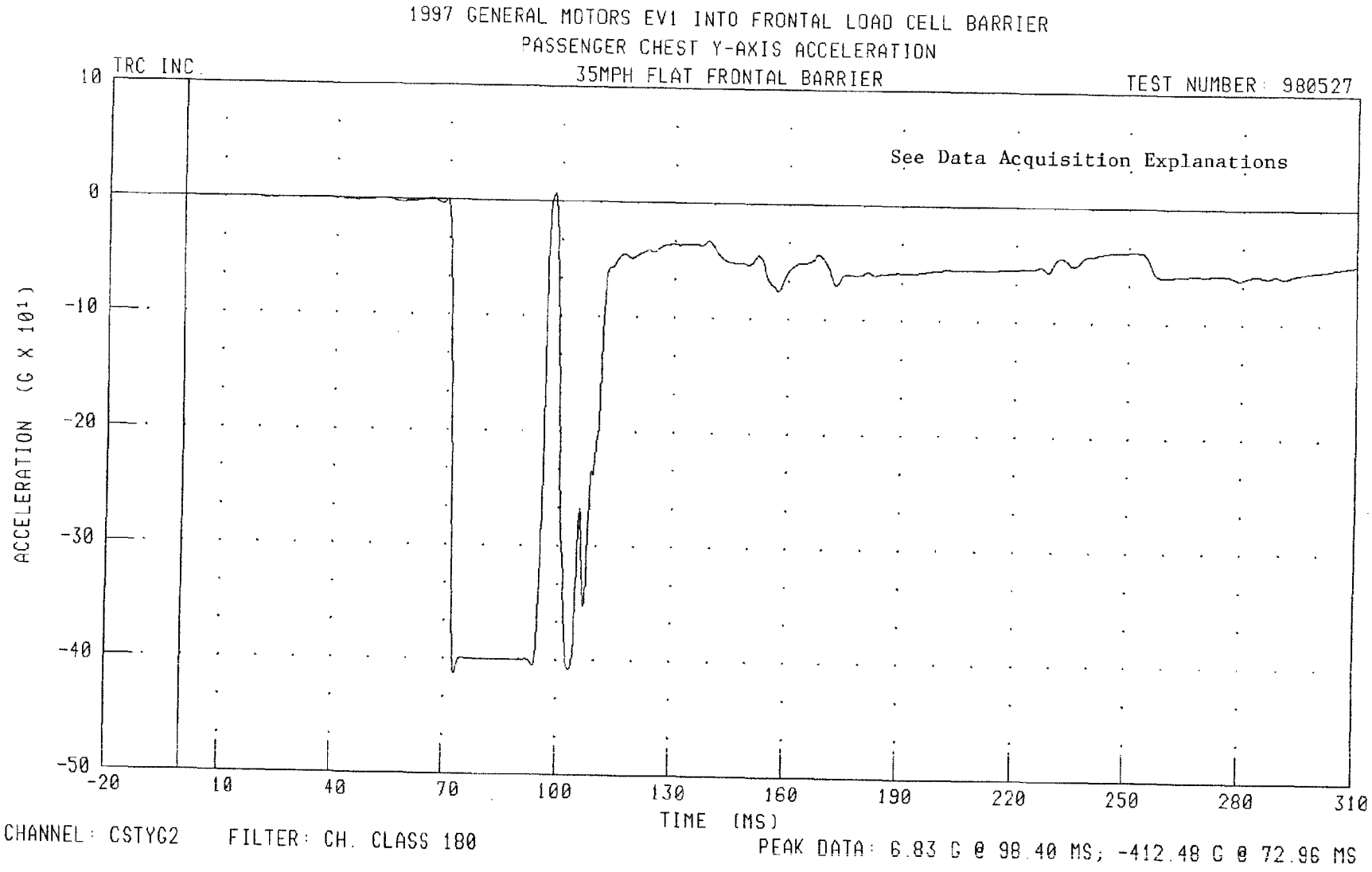

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Y AXIS
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYM2 FILTER: CH CLASS 600
PEAK DATA: 22.72 N-M @ 79.04 MS; -40.86 N-M @ 97.44 MS

980527

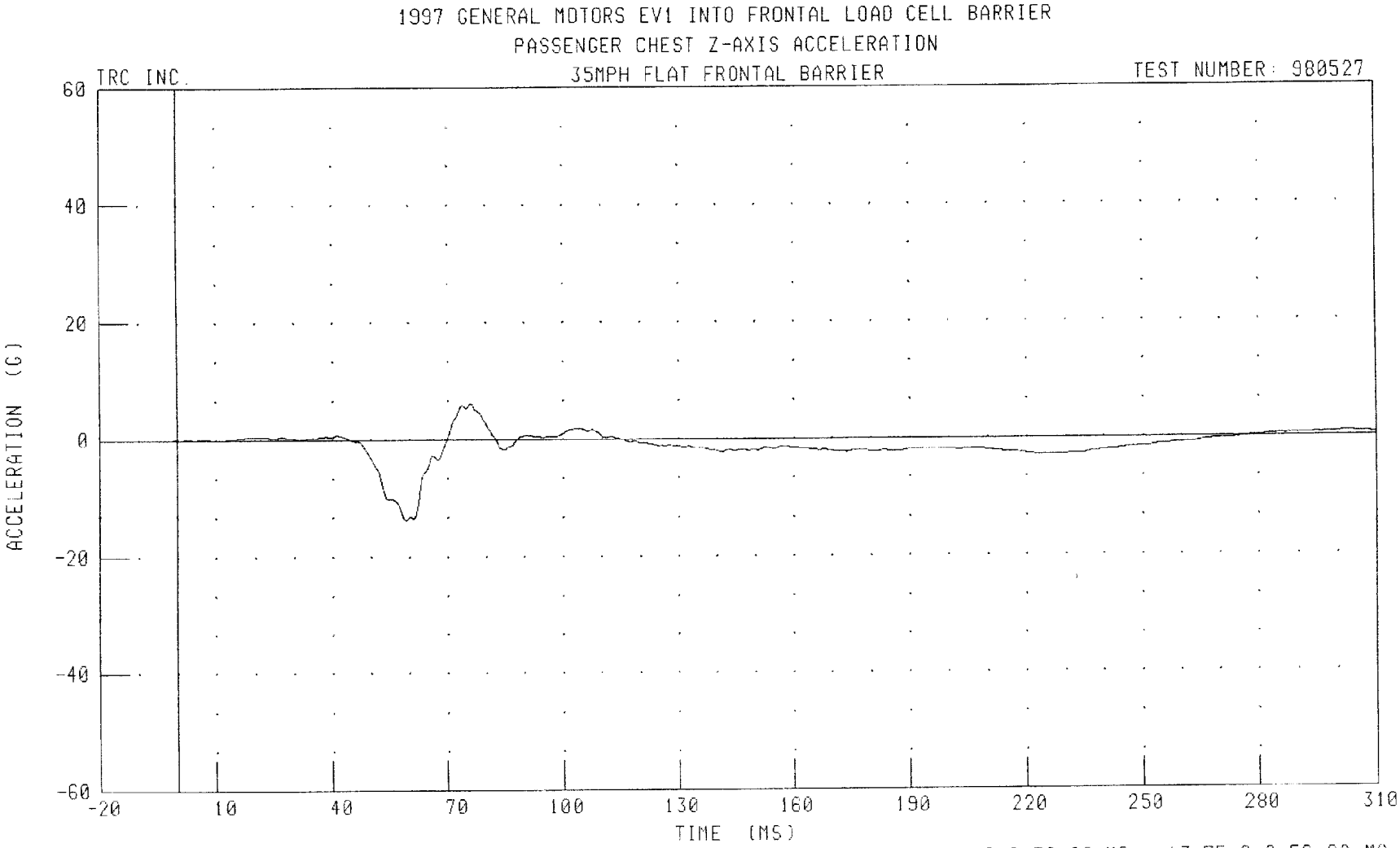

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Z AXIS
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZM2
FILTER: CH. CLASS 600
PEAK DATA: 13.00 N-M @ 267.84 MS; -7.75 N-M @ 149.60 MS

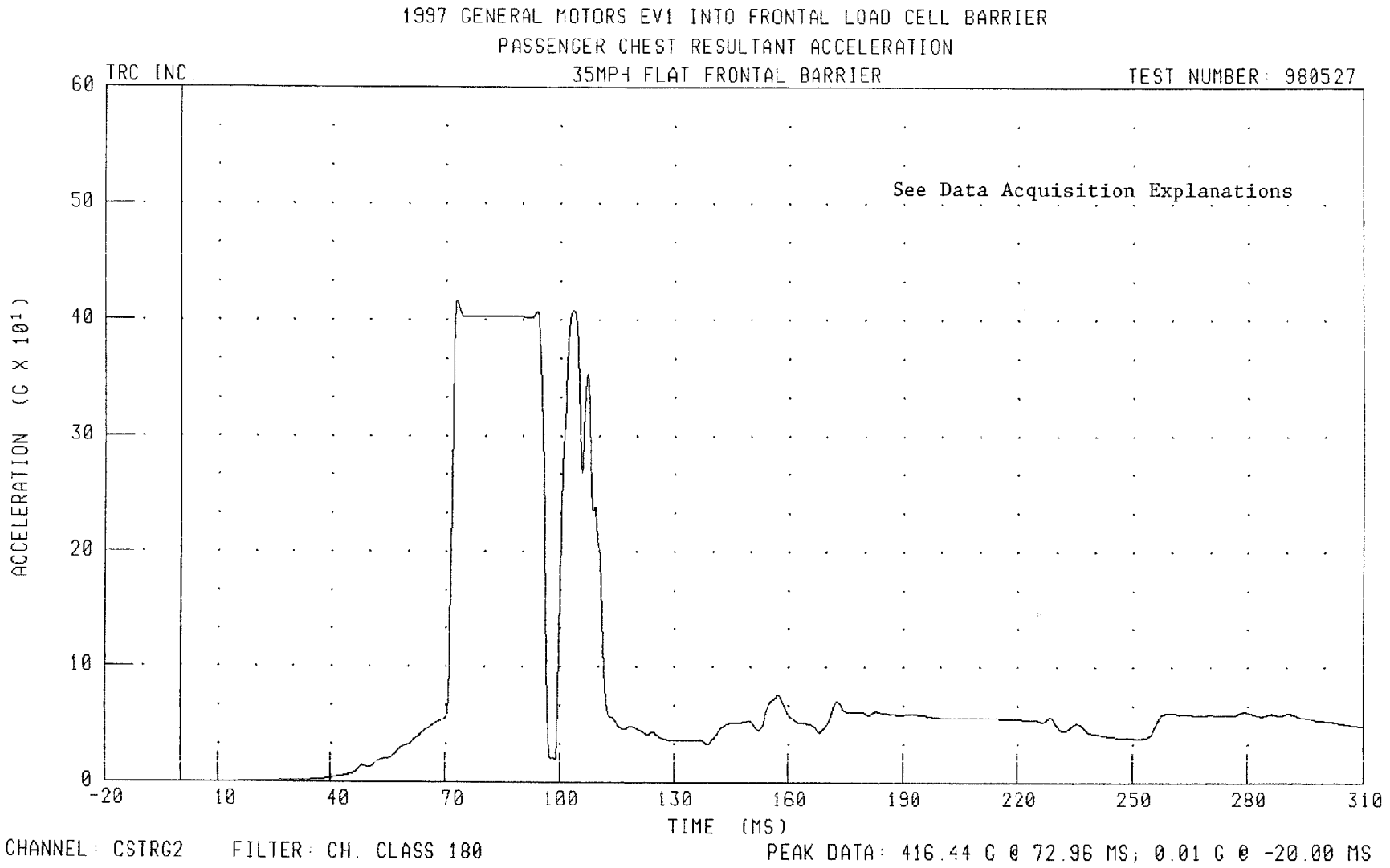
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
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: 4.77 G @ 241.36 MS; -57.88 G @ 71.76 MS

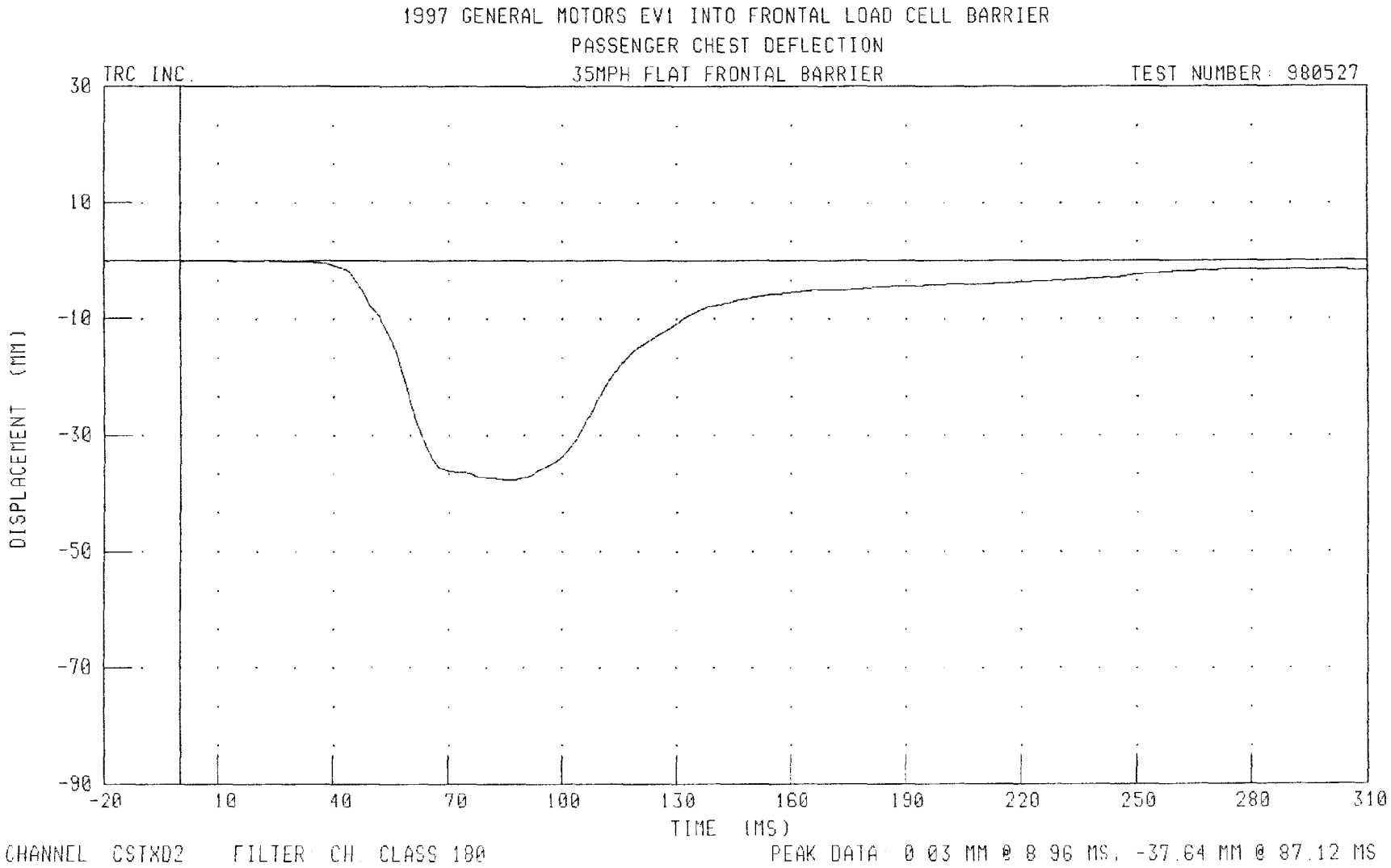

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
See Data Acquisition Explanations
ACCELERATION (G X 10-1)
10
0
-10
-20
-30
-40
-50
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG2
FILTER: CH. CLASS 180
PEAK DATA: 6.83 G @ 98.40 MS; -412.48 G @ 72.96 MS

980527

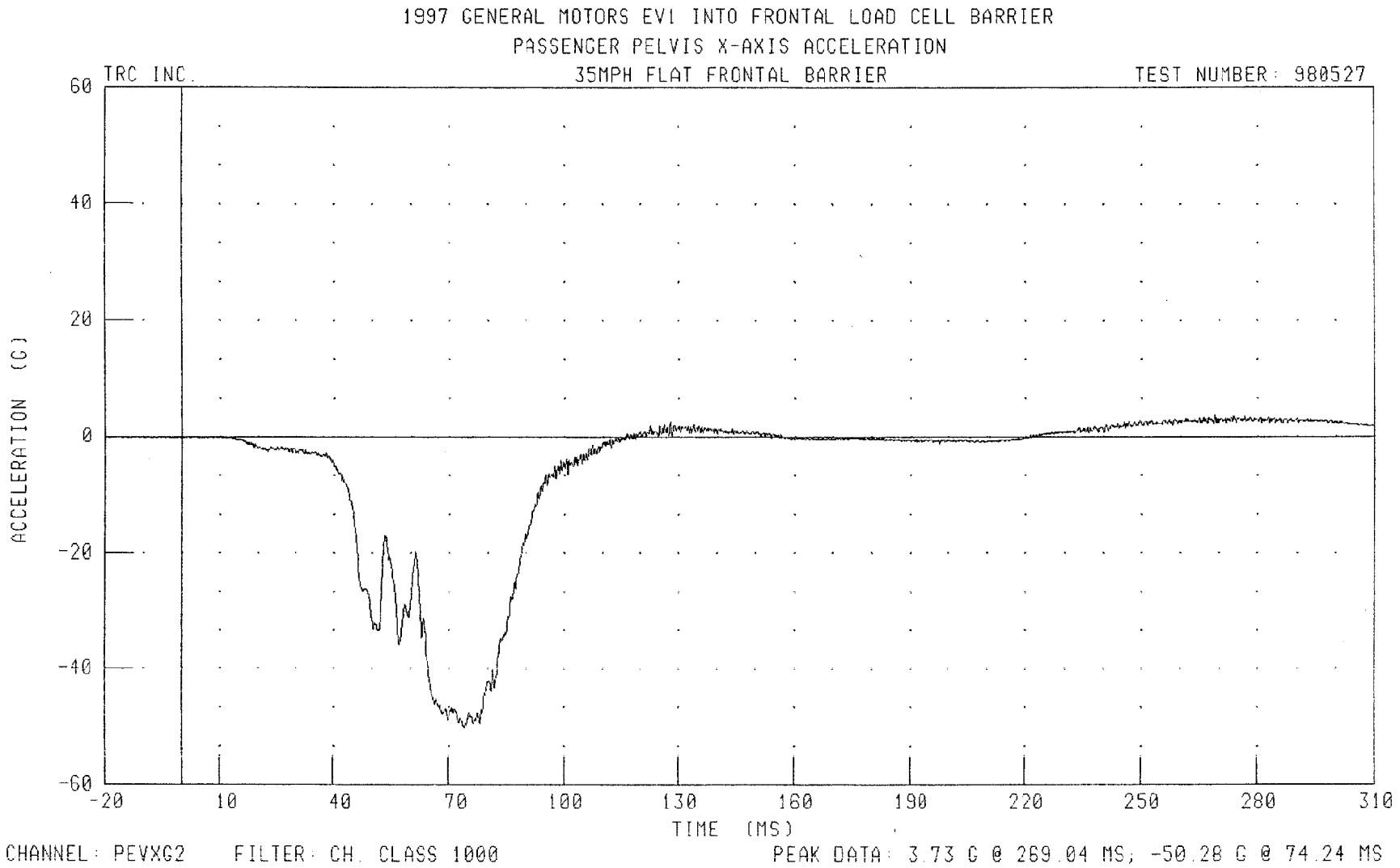

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG2
FILTER: CH. CLASS 180
PEAK DATA: 6.14 G @ 76.08 MS, -13.75 G @ 59.28 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
See Data Acquisition Explanations
ACCELERATION (G X 10¹)
60
50
40
30
20
10
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG2
FILTER: CH. CLASS 180
PEAK DATA: 416.44 G @ 72.96 MS; 0.01 G @ -20.00 MS

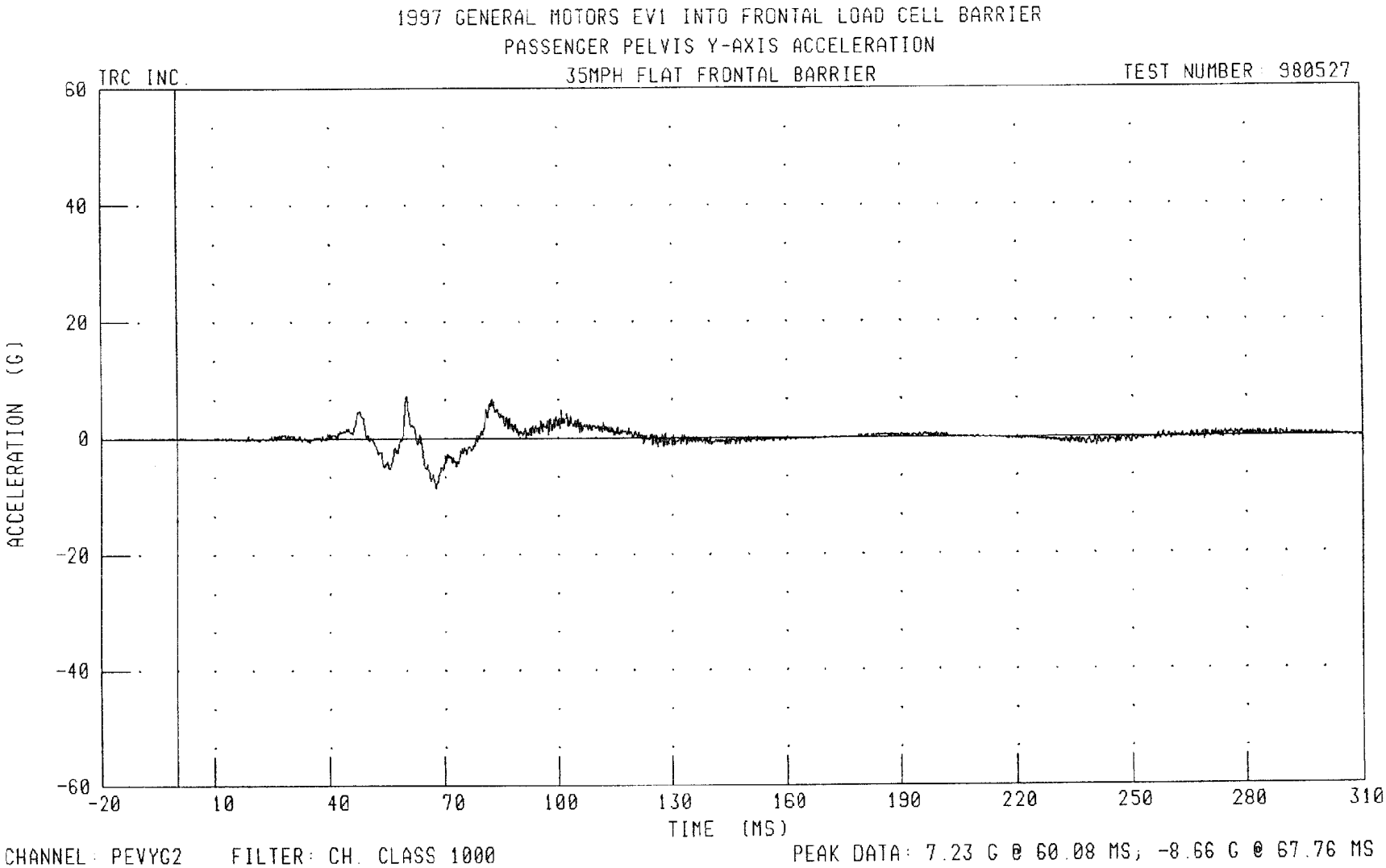
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST DEFLECTION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
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: 0.03 MM @ 8.96 MS, -37.64 MM @ 87.12 MS

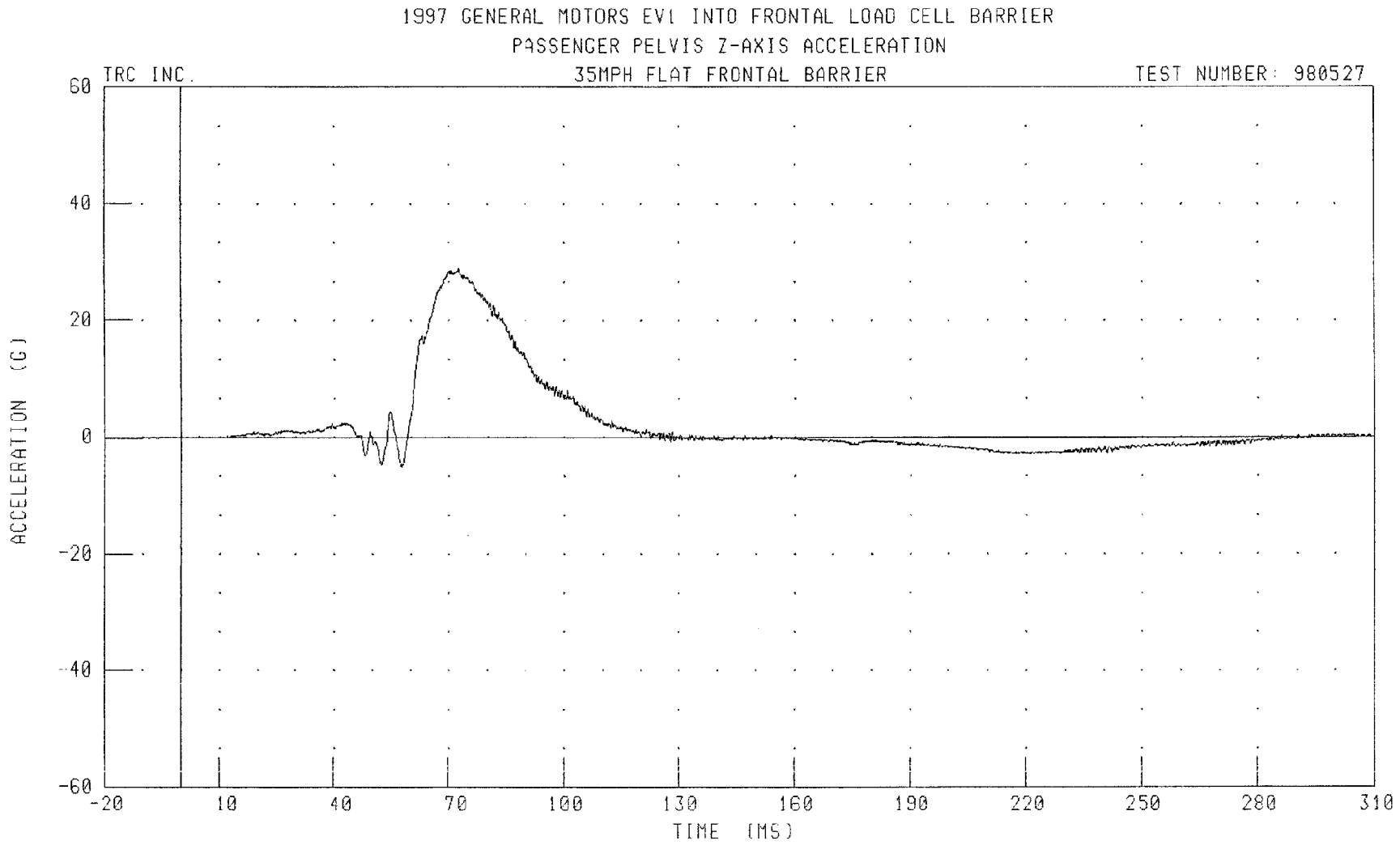
930527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVXG2
FILTER: CH. CLASS 1000
PEAK DATA: 3.73 G @ 269.04 MS; -50.28 G @ 74.24 MS

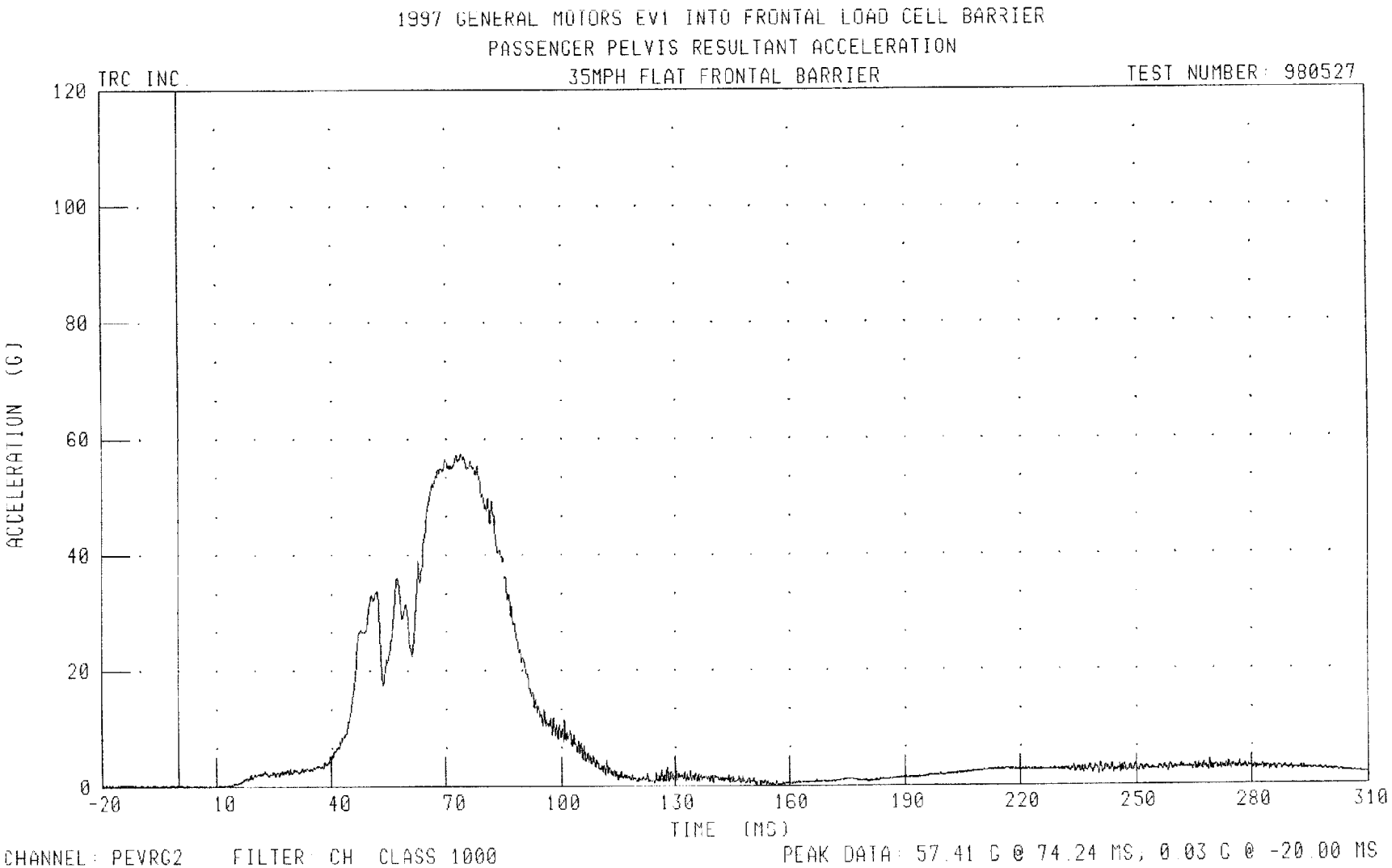
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS Y-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVYG2
FILTER: CH. CLASS 1000
PEAK DATA: 7.23 G @ 60.08 MS; -8.66 G @ 67.76 MS

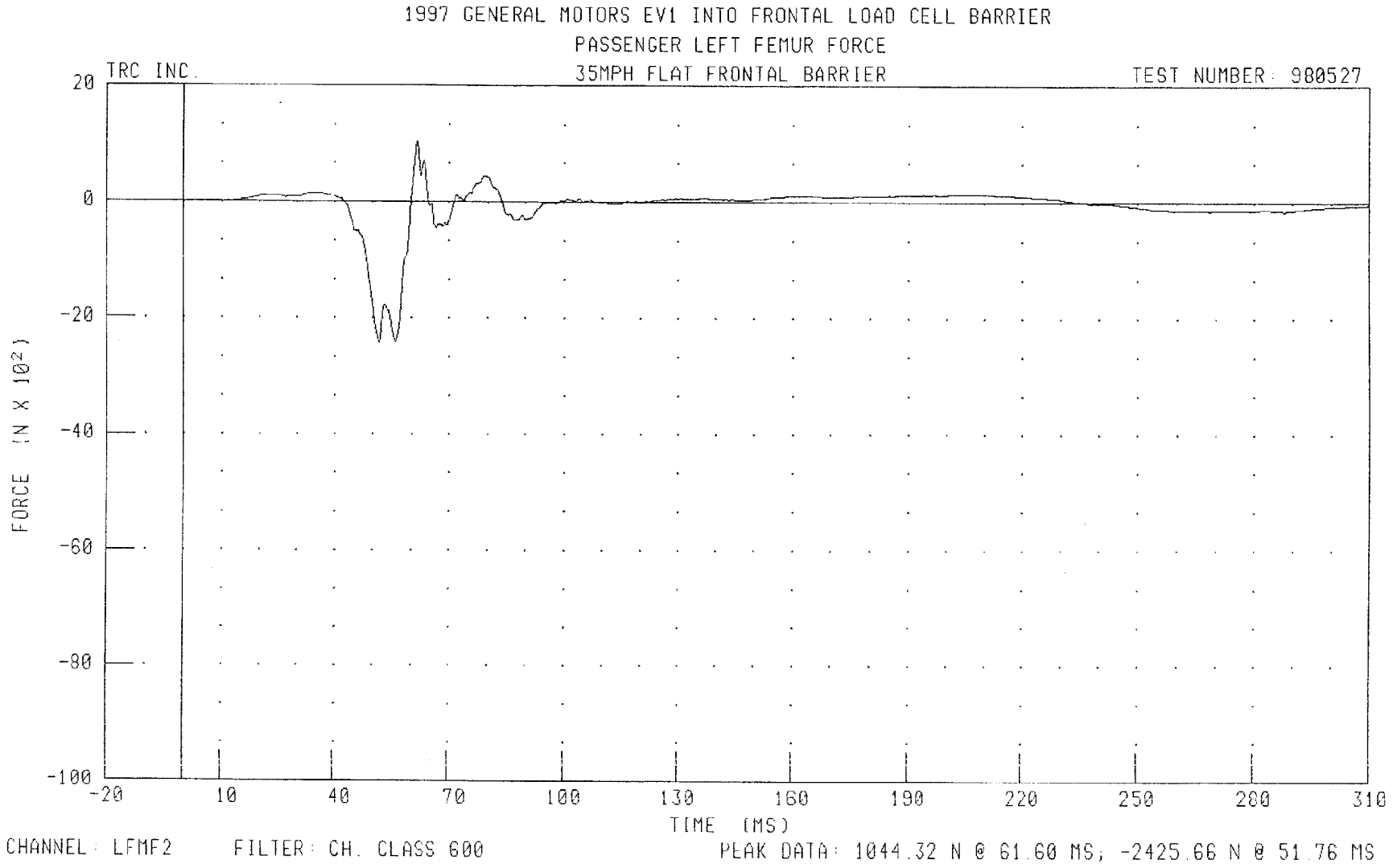
980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS Z-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVZG2
FILTER: CH. CLASS 1000
PEAK DATA: 28.81 G @ 72.72 MS, -5.10 G @ 57.60 MS

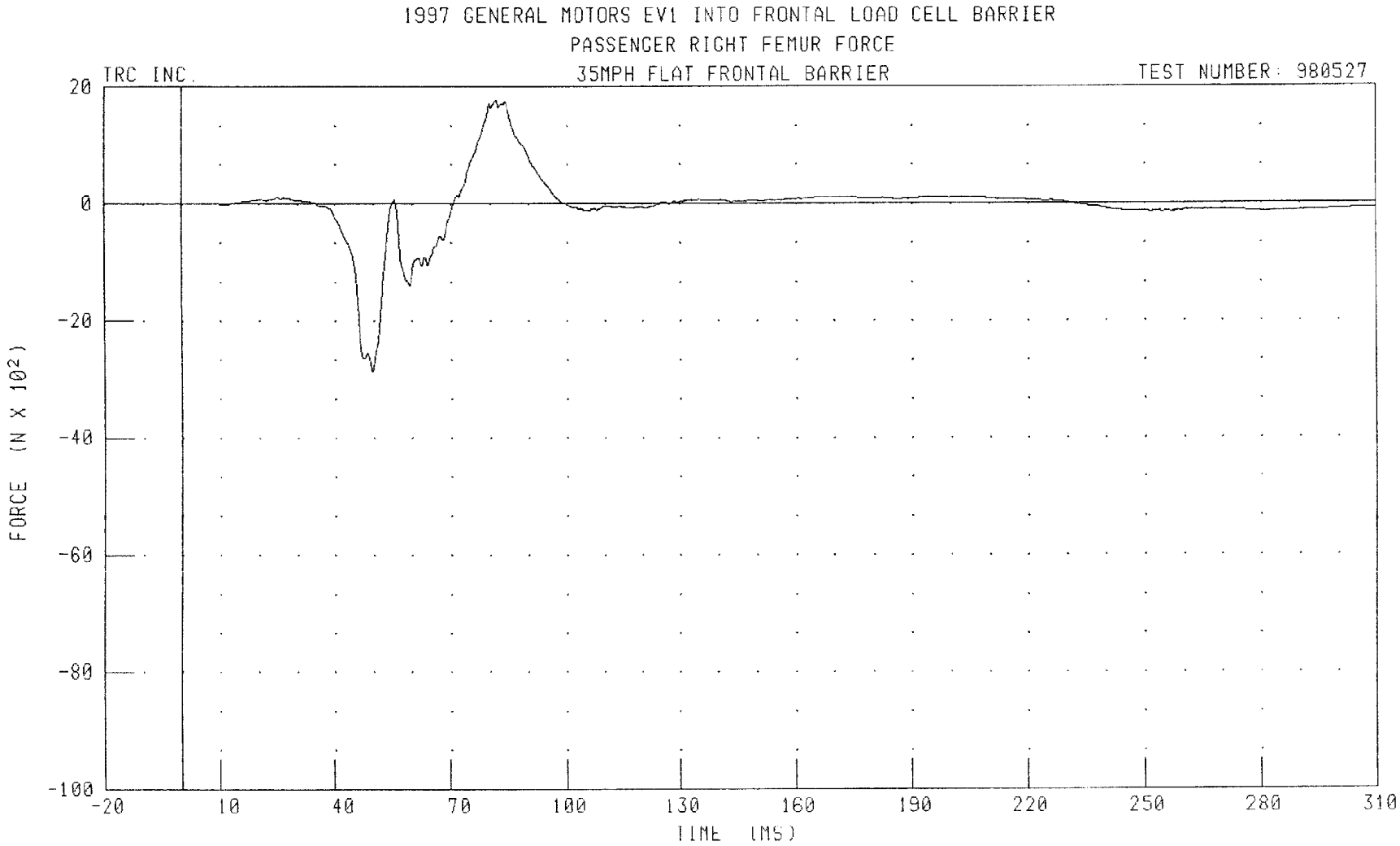
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS RESULTANT ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVRG2
FILTER: CH CLASS 1000
PEAK DATA: 57.41 G @ 74.24 MS, 0.03 G @ -20.00 MS

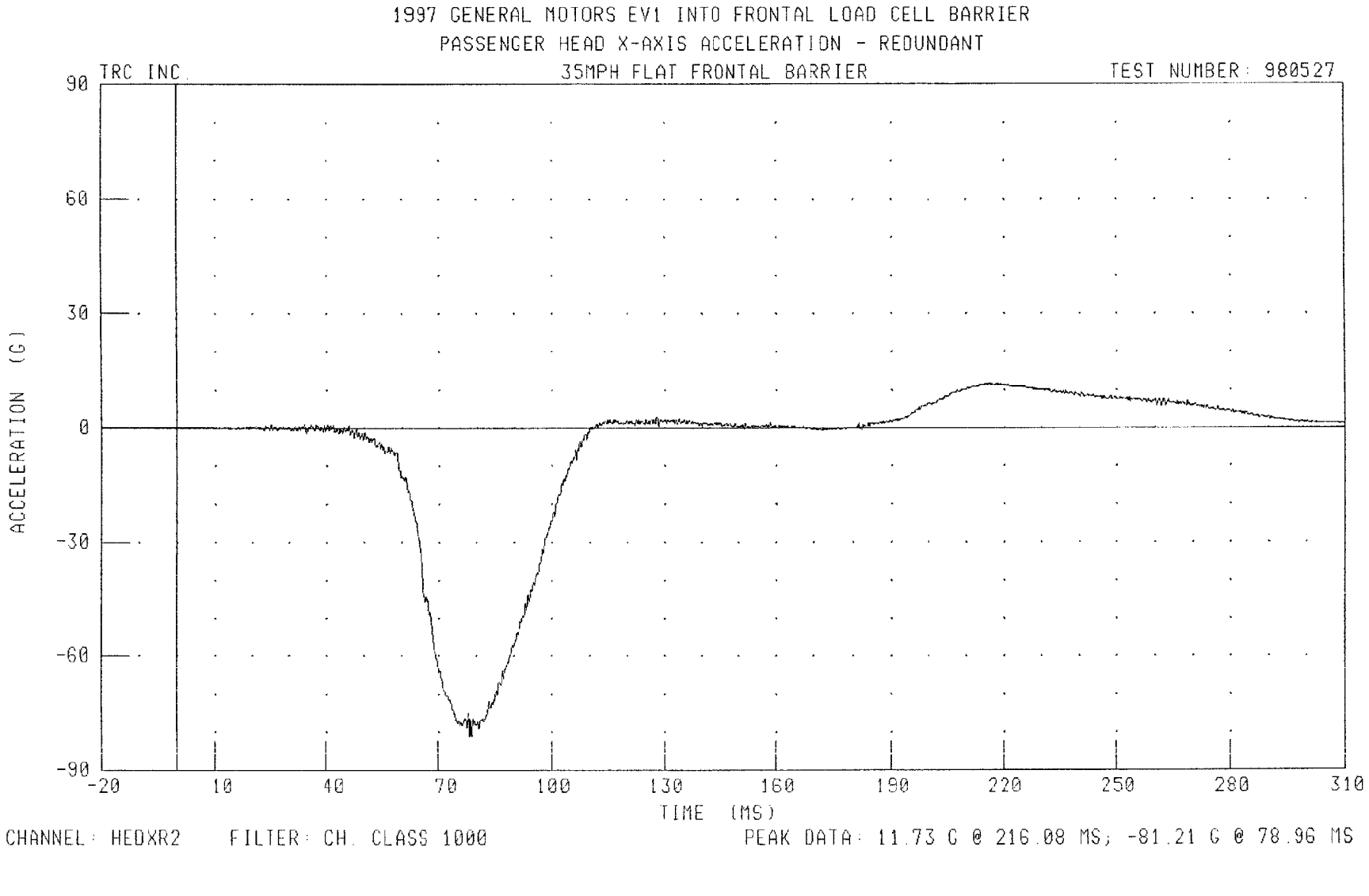
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF2
FILTER: CH. CLASS 600
PEAK DATA: 1044.32 N @ 61.60 MS; -2425.66 N @ 51.76 MS

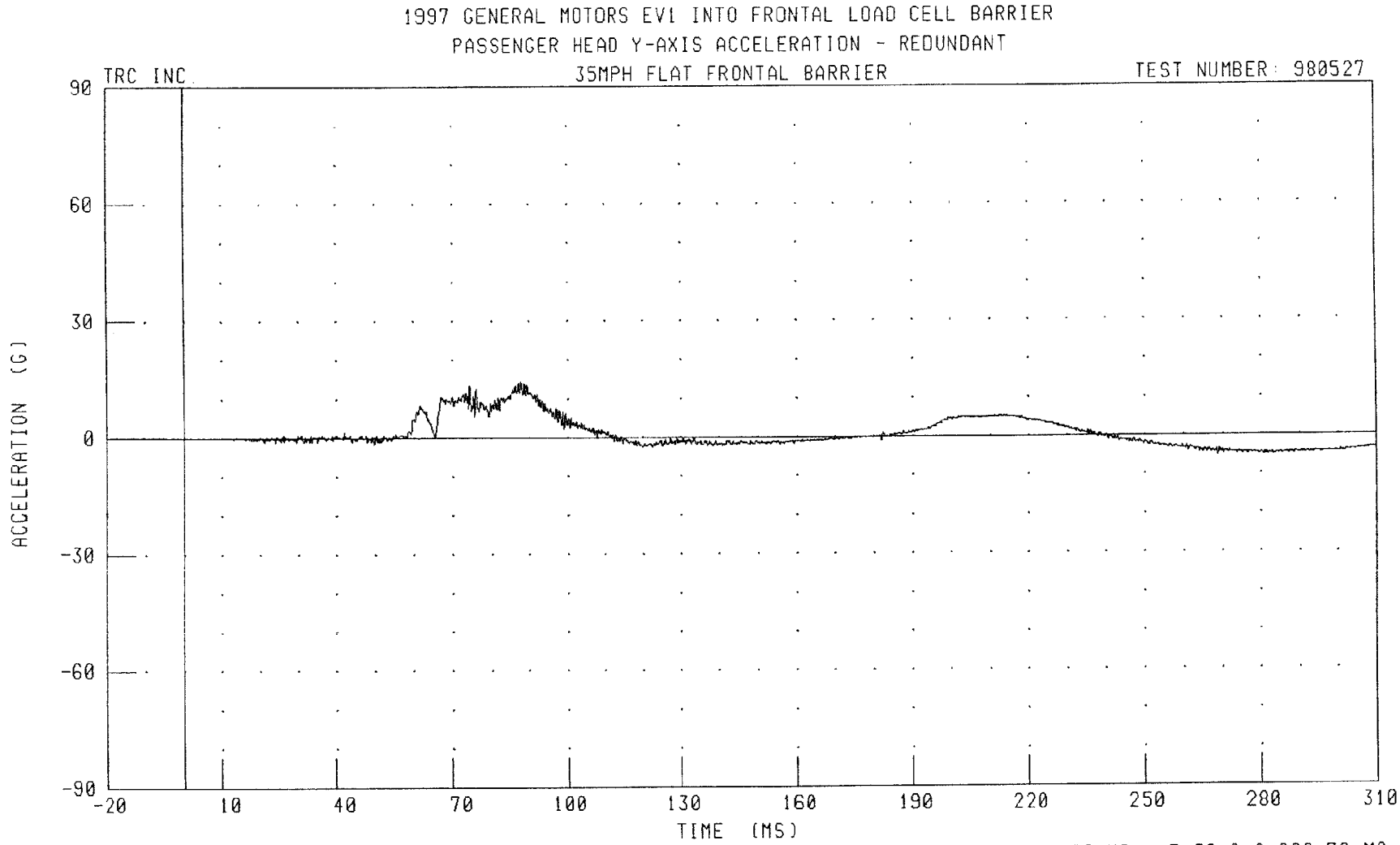
980527

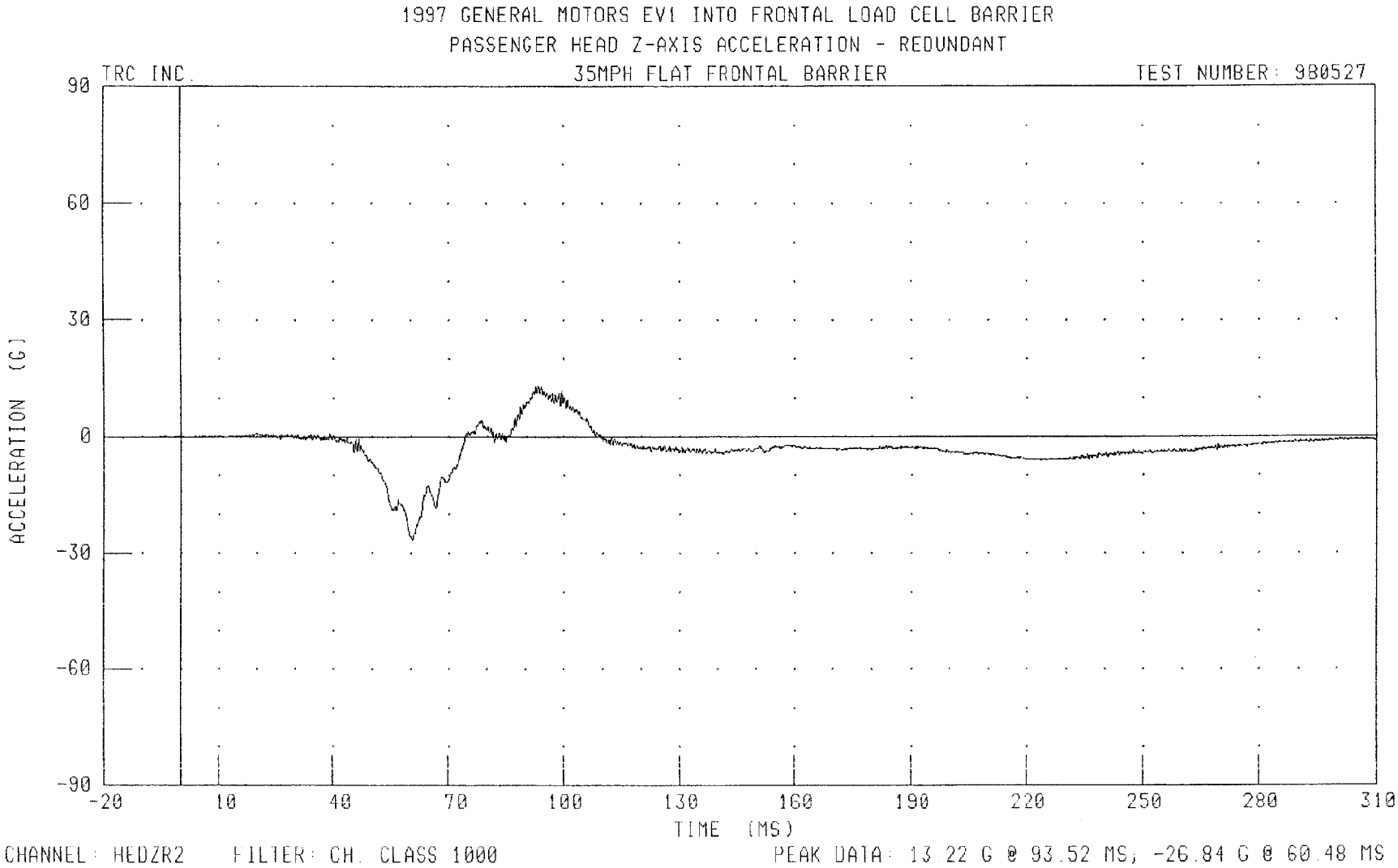

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FEMUR FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF2
FILTER: CH. CLASS 600
PEAK DATA: 1769.63 N @ 81.60 MS; -2872.33 N @ 49.76 MS

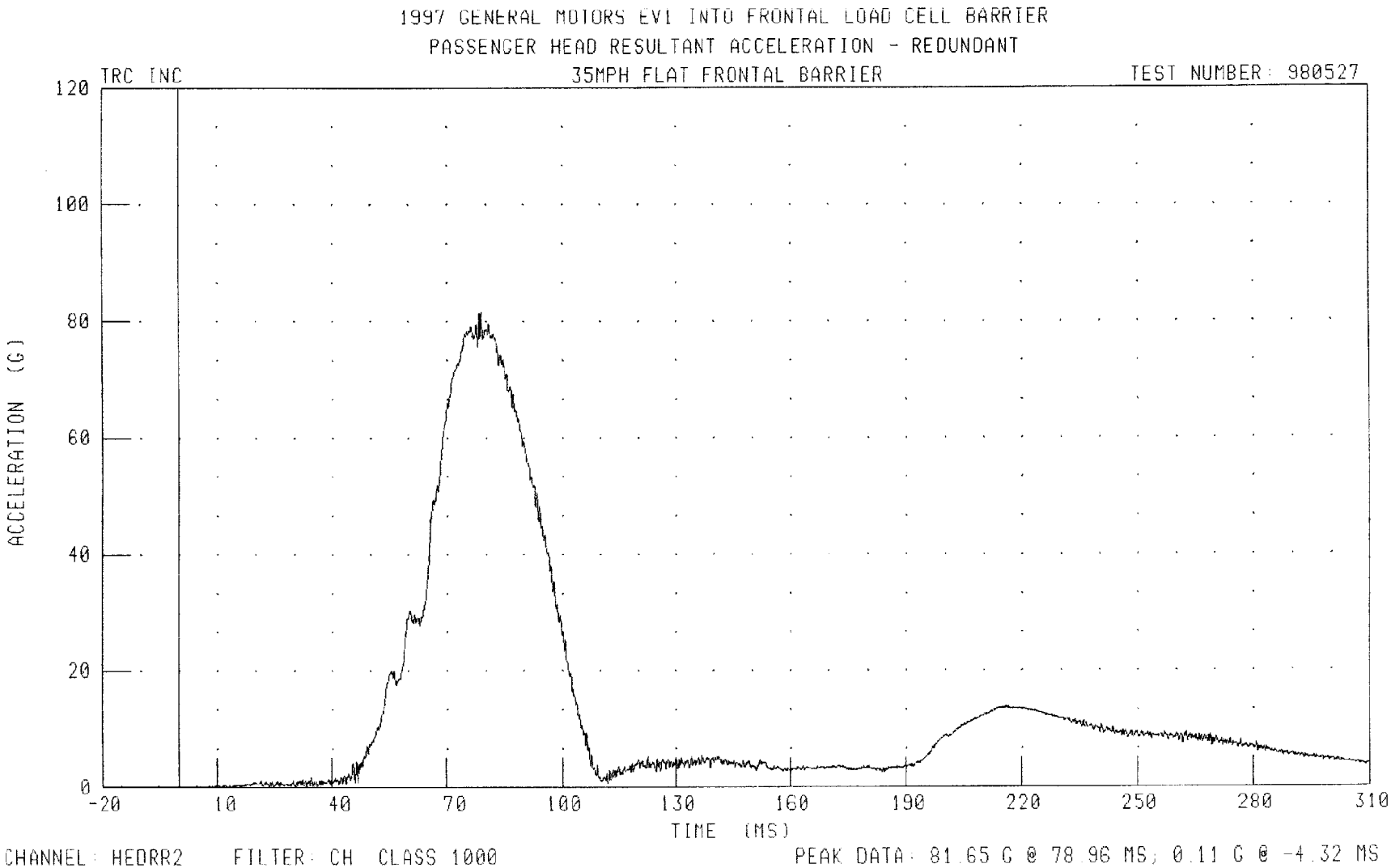
980527

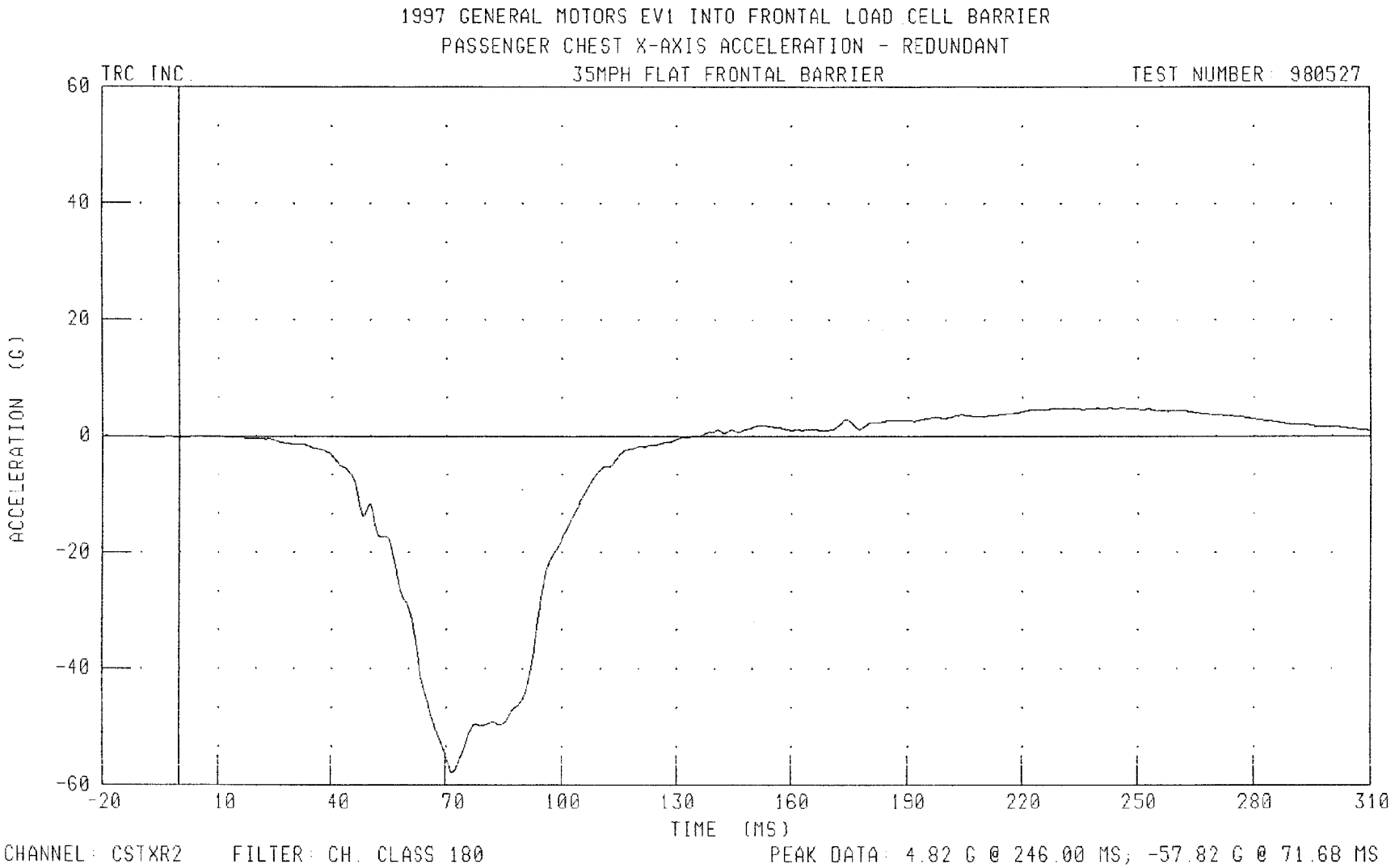

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION - REDUNDANT
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXR2
FILTER: CH. CLASS 1000
PEAK DATA: 11.73 G @ 216.08 MS; -81.21 G @ 78.96 MS

980527

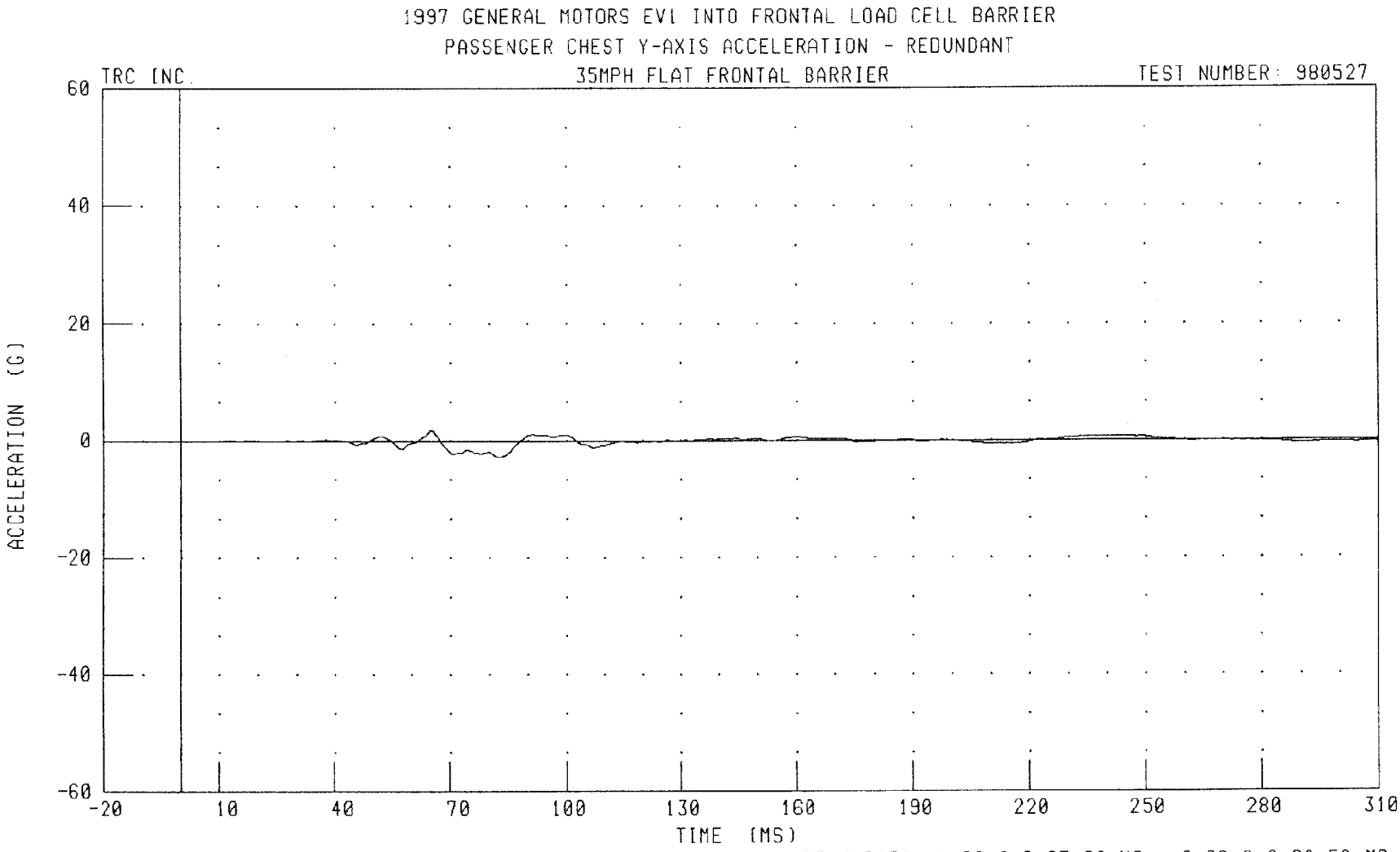

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION - REDUNDANT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYR2
FILTER: CH. CLASS 1000
PEAK DATA: 14.24 G @ 88.00 MS; -5.30 G @ 280.72 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 9B0527
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZR2
FILTER: CH. CLASS 1000
PEAK DATA: 13.22 G @ 93.52 MS, -26.84 G @ 60.48 MS

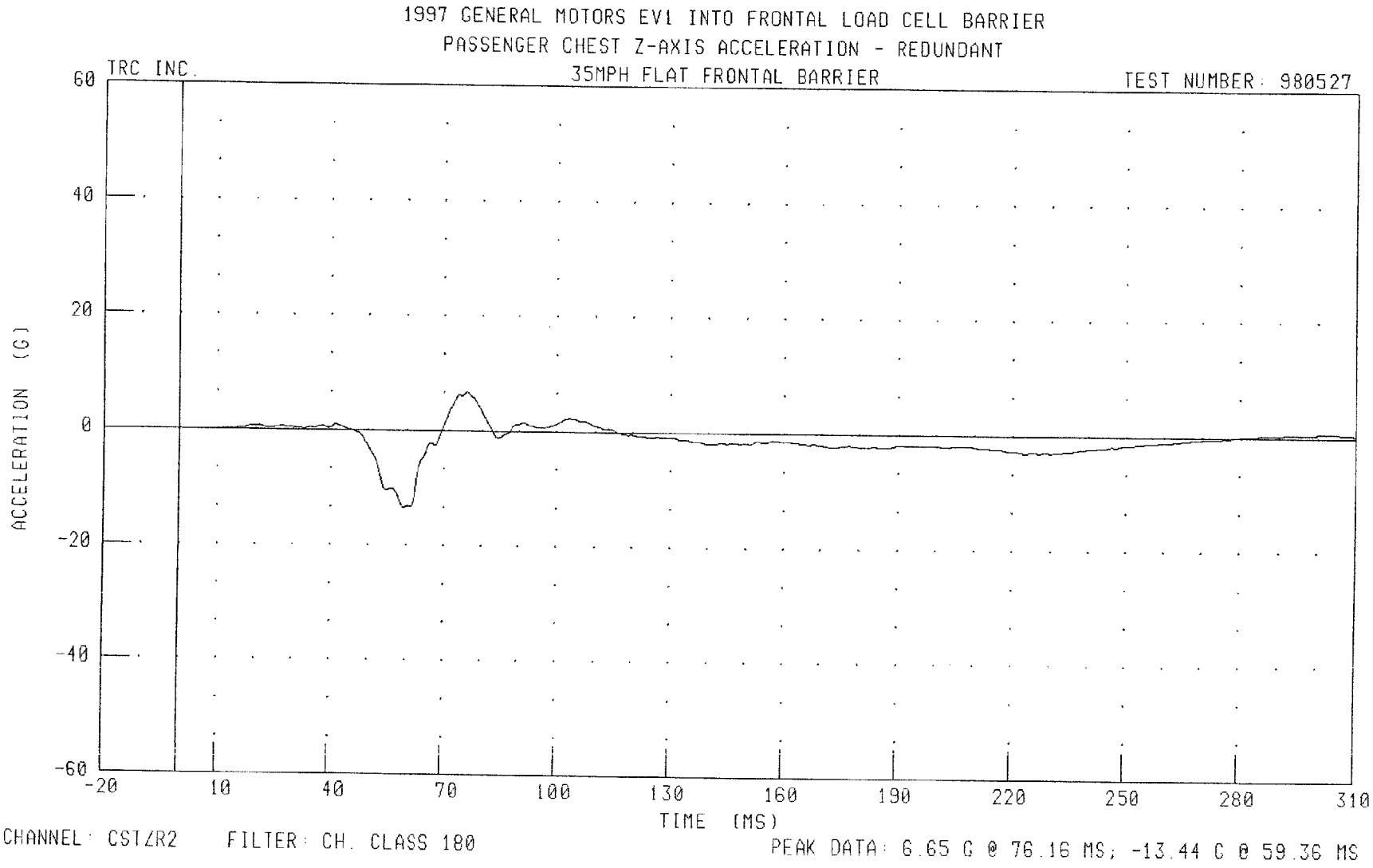

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION - REDUNDANT
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRR2
FILTER: CH CLASS 1000
PEAK DATA: 81.65 G @ 78.96 MS; 0.11 G @ -4.32 MS

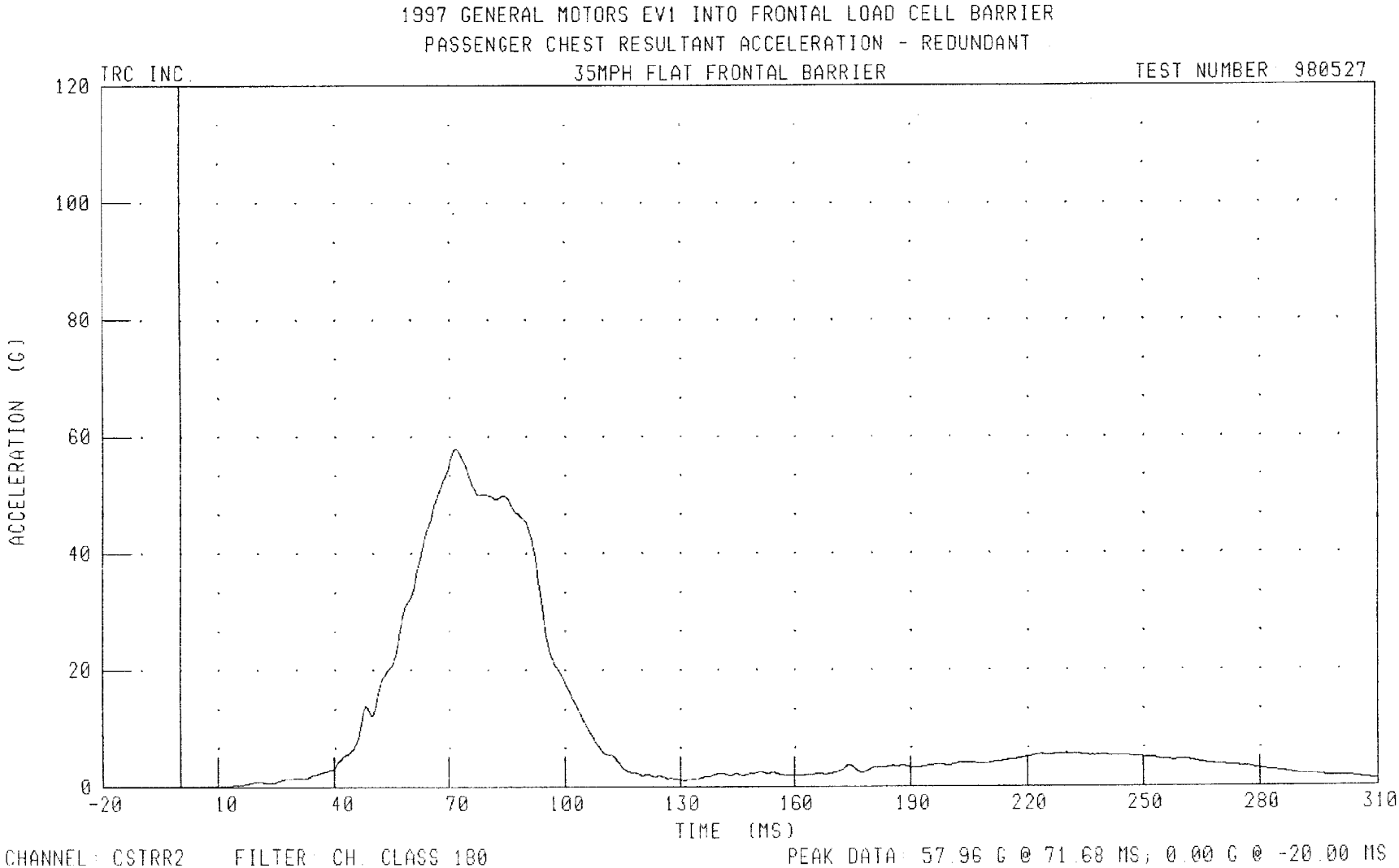

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXR2
FILTER: CH. CLASS 180
PEAK DATA: 4.82 G @ 246.00 MS; -57.82 G @ 71.68 MS

980527

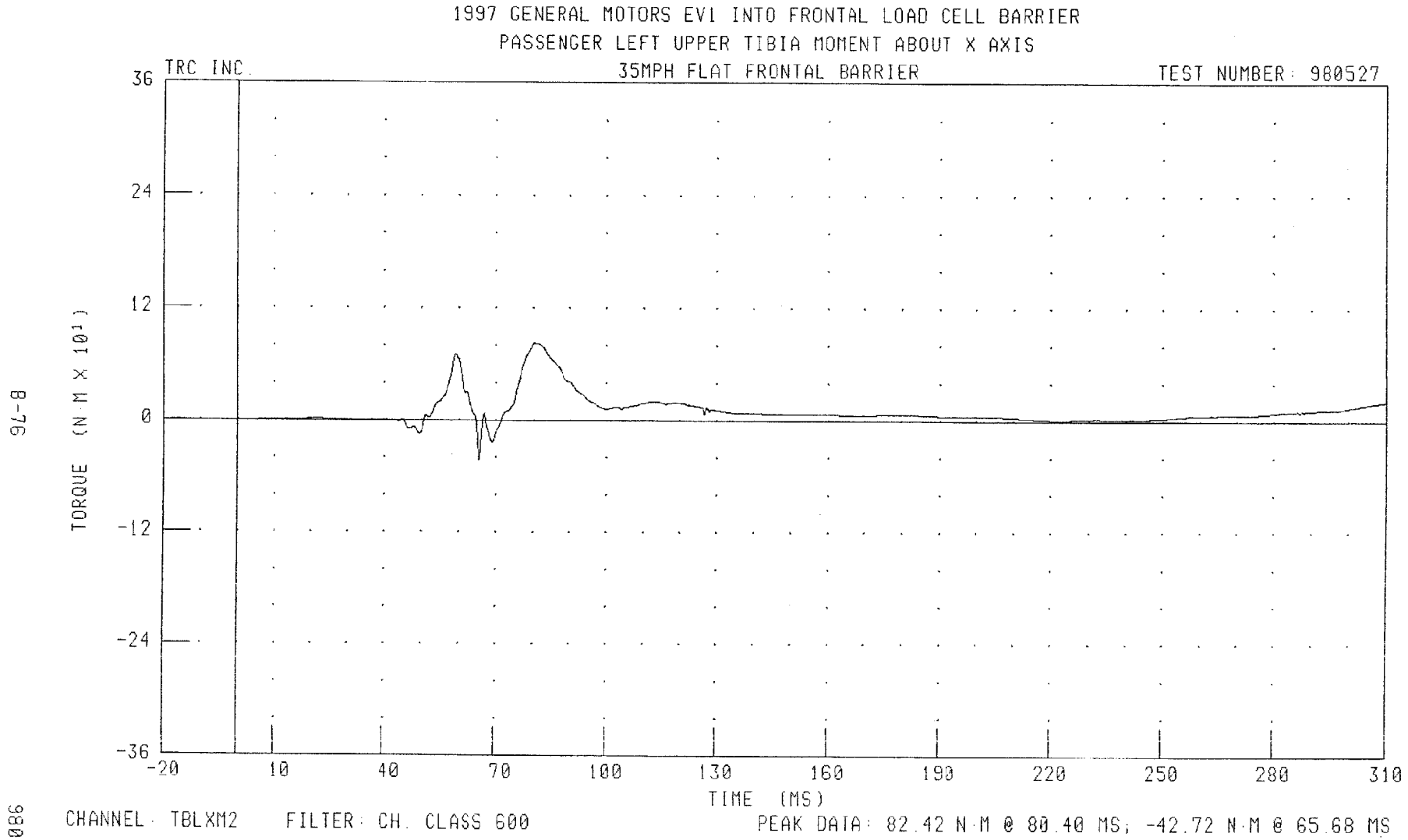

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYR2
FILTER: CH. CLASS 180
PEAK DATA: 1.86 G @ 65.20 MS; -2.80 G @ 82.56 MS

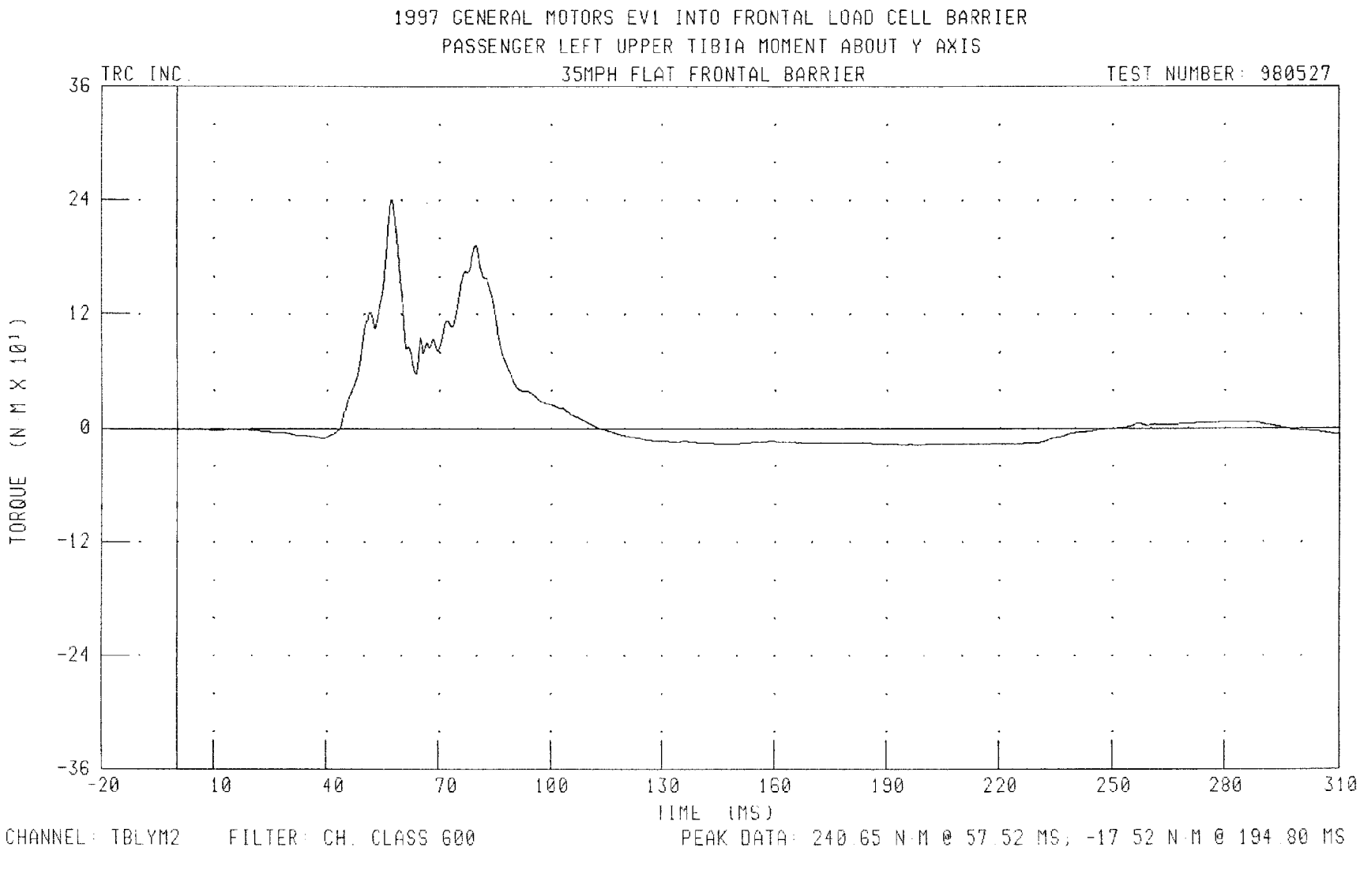
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION - REDUNDANT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CST/R2
FILTER: CH. CLASS 180
PEAK DATA: 6.65 G @ 76.16 MS; -13.44 G @ 59.36 MS

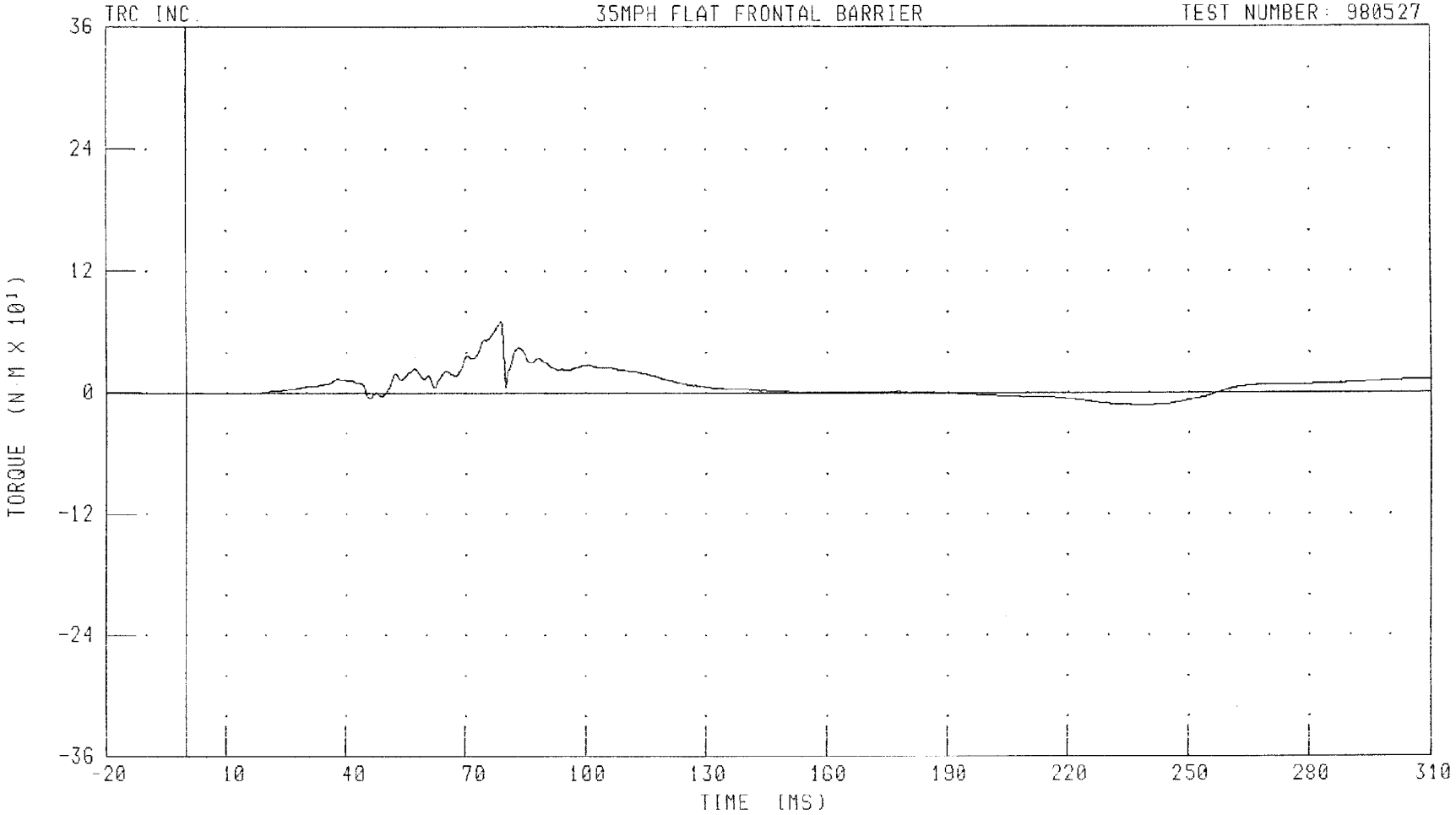

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION - REDUNDANT
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRR2
FILTER: CH. CLASS 180
PEAK DATA: 57.96 G @ 71.68 MS; 0.00 G @ -20.00 MS

980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X AXIS
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
TORQUE (N-M X 10¹)
36
24
12
0
-12
-24
-36
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TBLXM2
FILTER: CH. CLASS 600
PEAK DATA: 82.42 N-M @ 80.40 MS; -42.72 N-M @ 65.68 MS

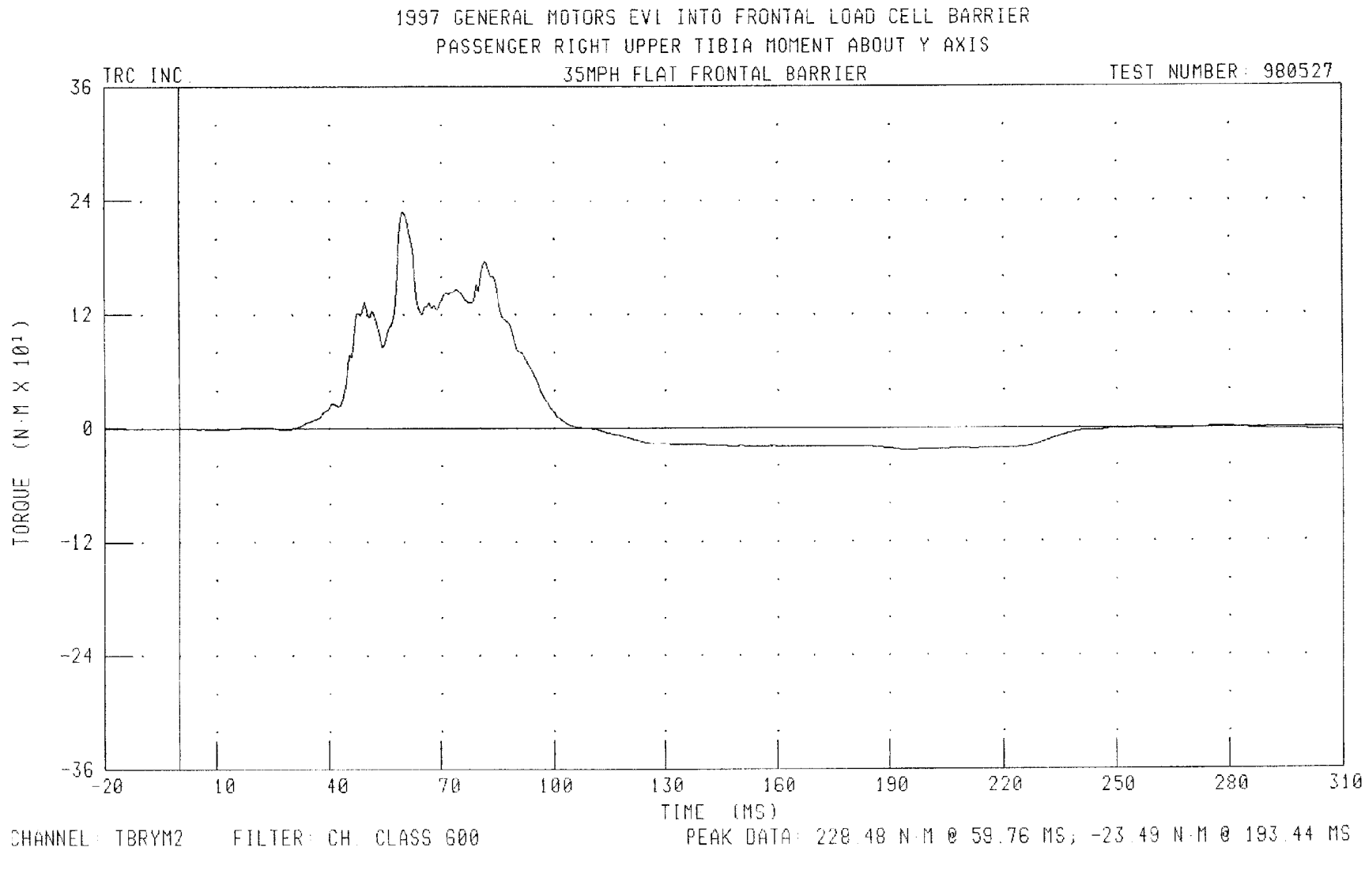

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
TORQUE (N-M X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TBLYM2
FILTER: CH. CLASS 600
PEAK DATA: 240.65 N-M @ 57.52 MS; -17.52 N-M @ 194.80 MS

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS

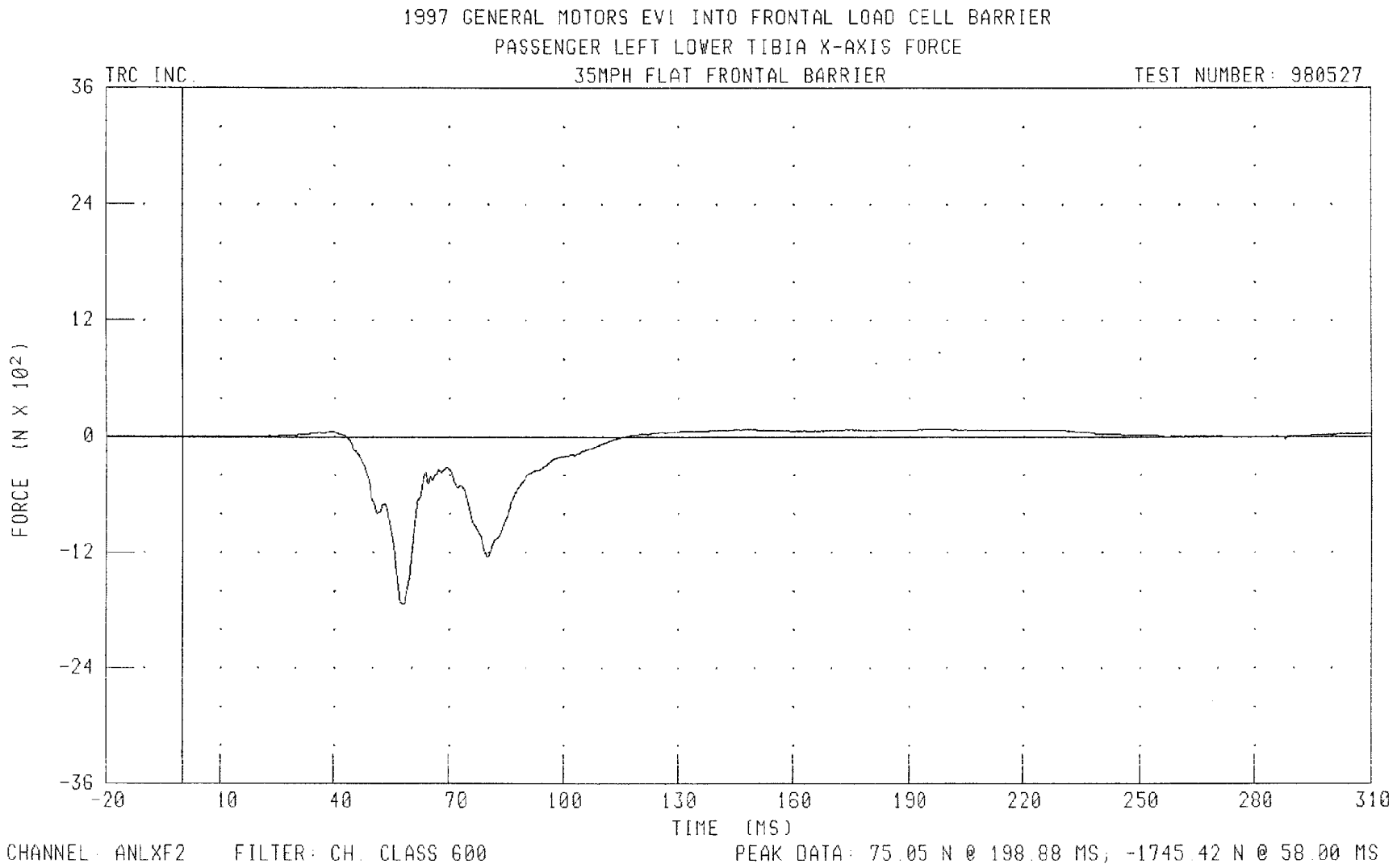


CHANNEL: TBRXM2 FILTER: CH. CLASS 600 PEAK DATA: 71.10 N-M @ 79.04 MS, -12.97 N M @ 239.04 MS

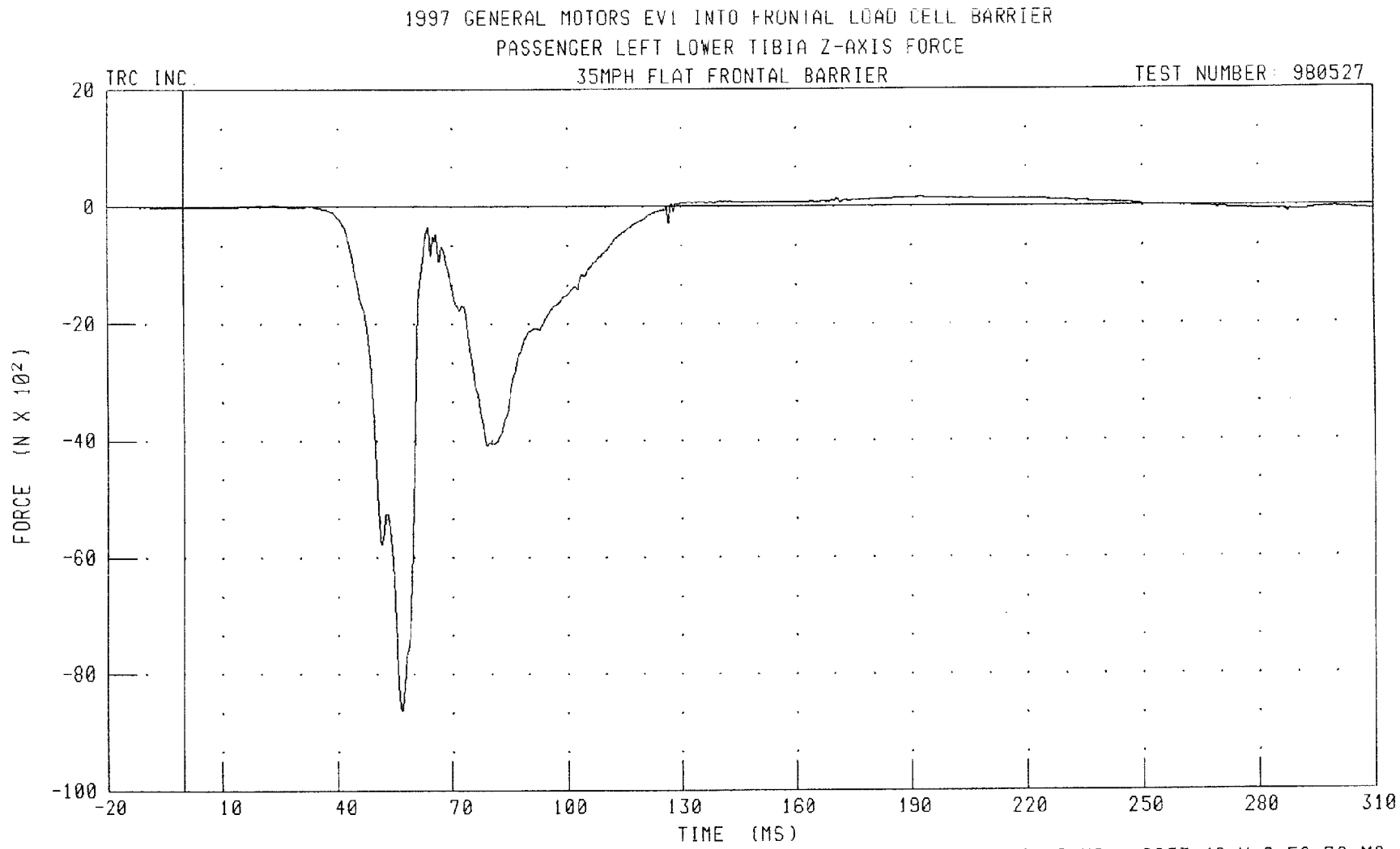
980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
TORQUE (N-M X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TBRYM2
FILTER: CH CLASS 600
PEAK DATA: 228.48 N-M @ 59.76 MS; -23.49 N-M @ 193.44 MS

980527

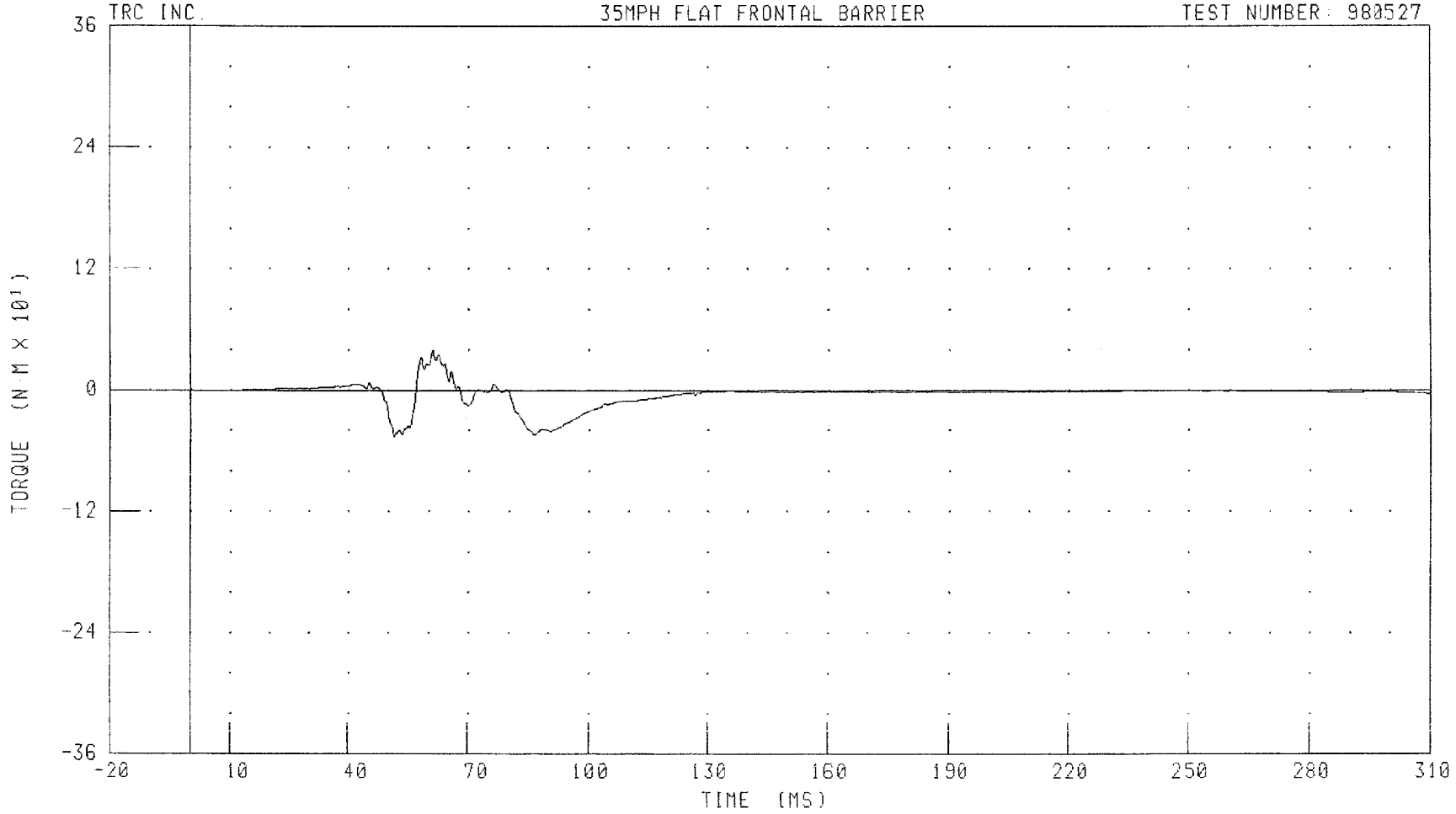

1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA X-AXIS FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLXF2
FILTER: CH. CLASS 600
PEAK DATA: 75.05 N @ 198.88 MS; -1745.42 N @ 58.00 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLZF2
FILTER: CH. CLASS 600
PEAK DATA: 151.51 N @ 192.48 MS; -8633.48 N @ 56.72 MS

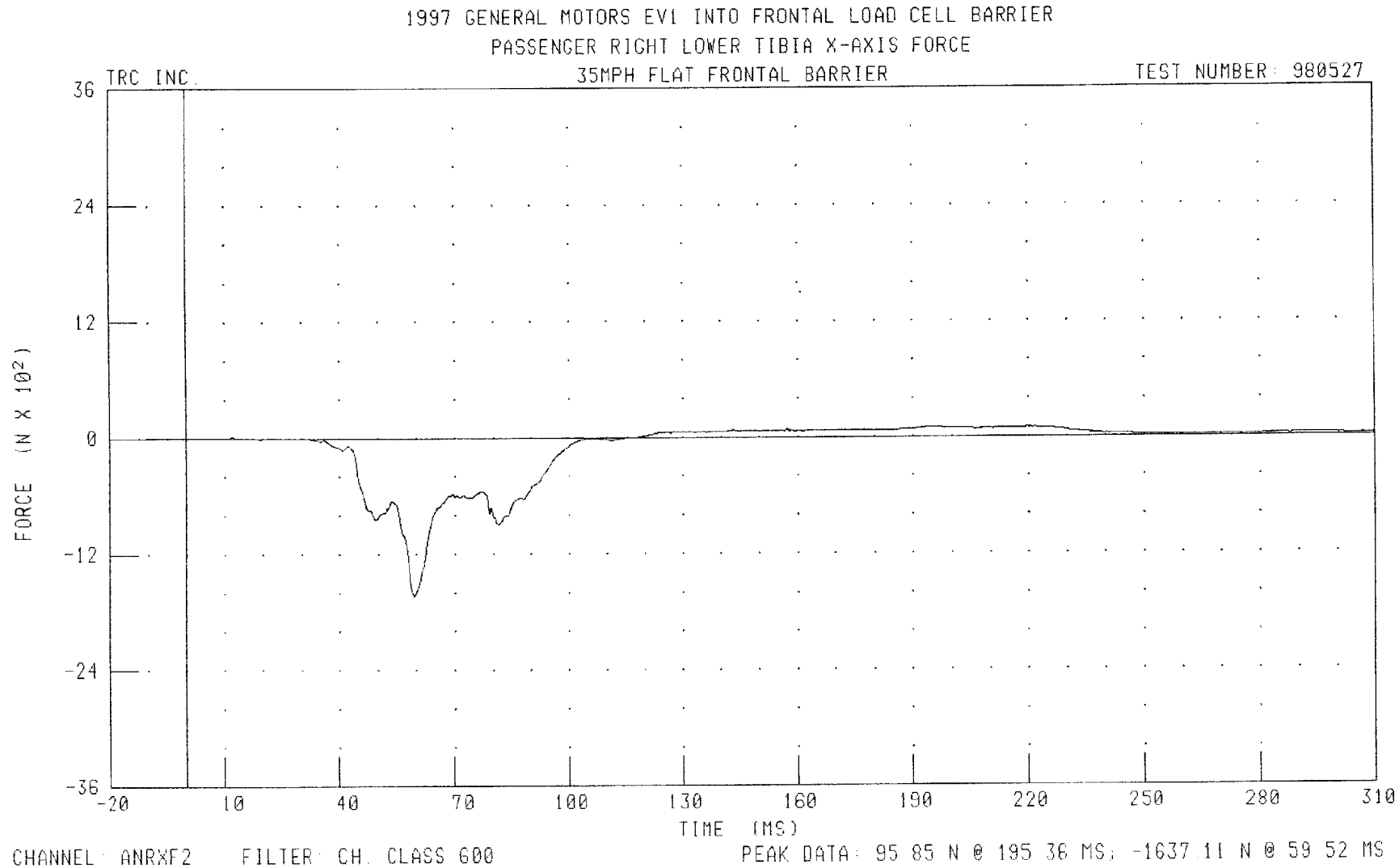
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

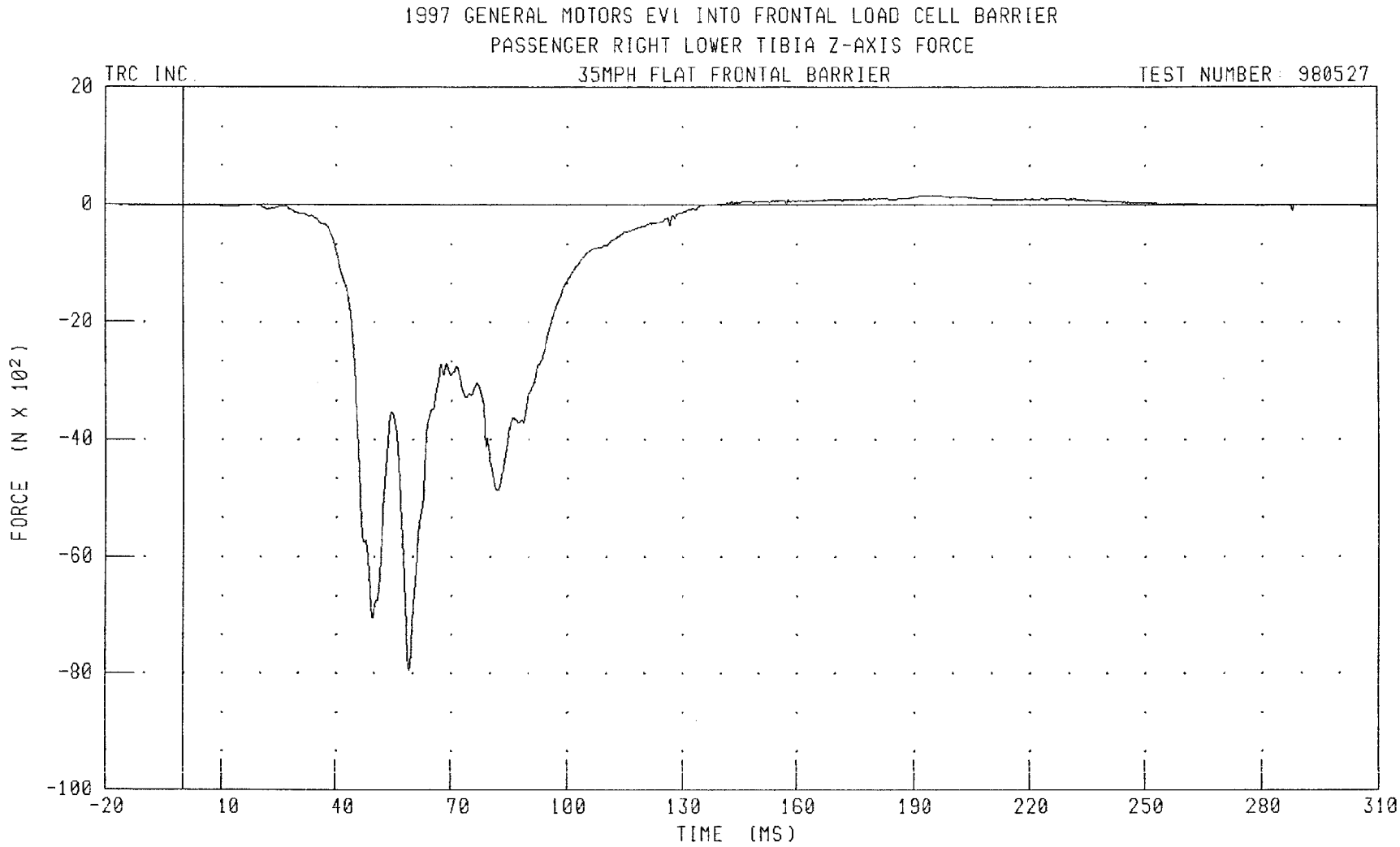


CHANNEL: ANLYM2 FILTER: CH. CLASS 600 PEAK DATA: 39.07 N·M @ 61.12 MS; -45.70 N·M @ 51.44 MS

980527

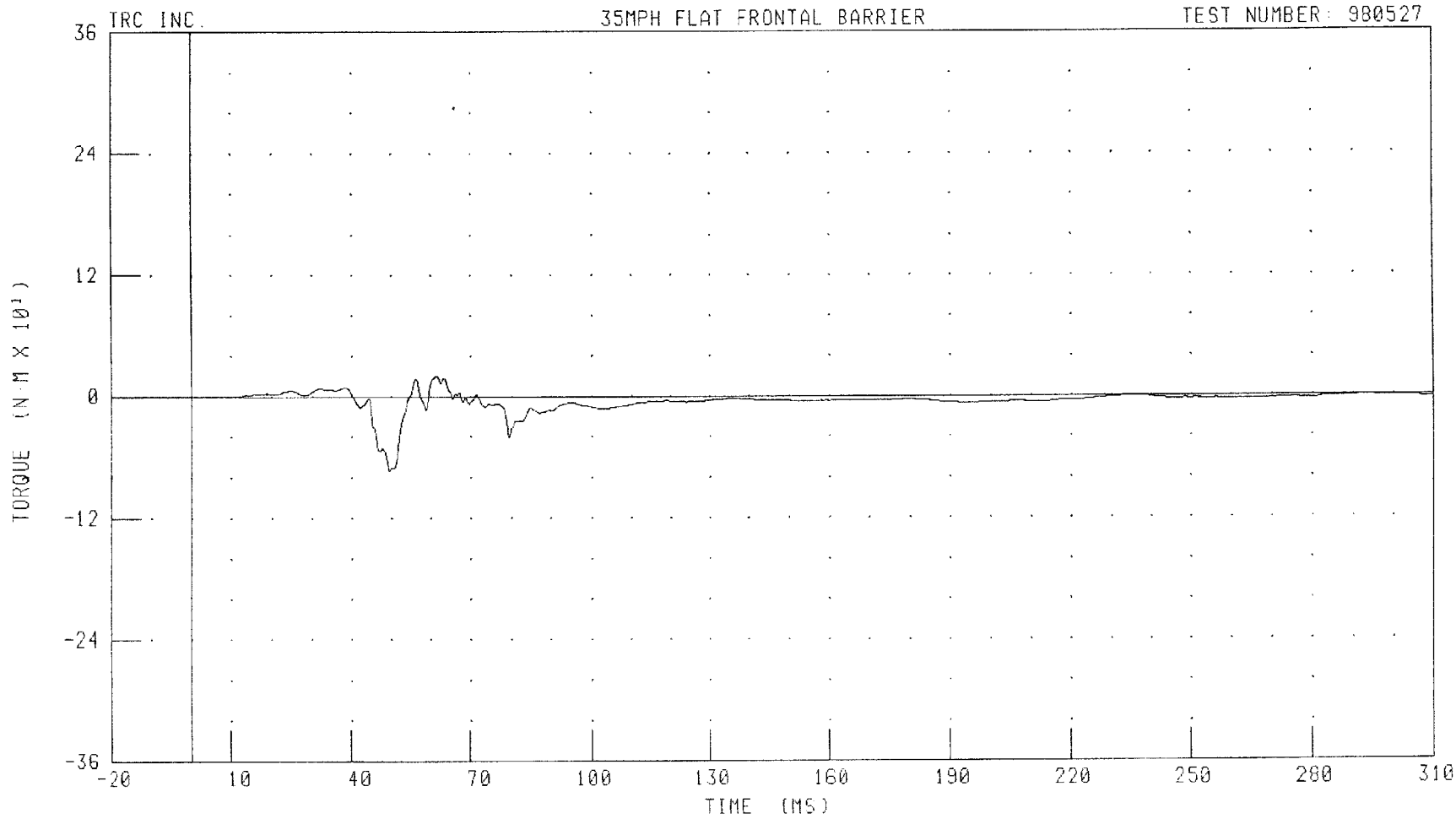

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
36
24
12
0
-12
-24
-36
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANRXF2
FILTER: CH. CLASS 600
PEAK DATA: 95.85 N @ 195.36 MS; -1637.11 N @ 59.52 MS

980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
FORCE (N X 10²)
20
0
-20
-40
-60
-80
-100
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANRZF2
FILTER: CH. CLASS 600
PEAK DATA: 165.11 N @ 194.16 MS; -7948.17 N @ 59.20 MS

980527

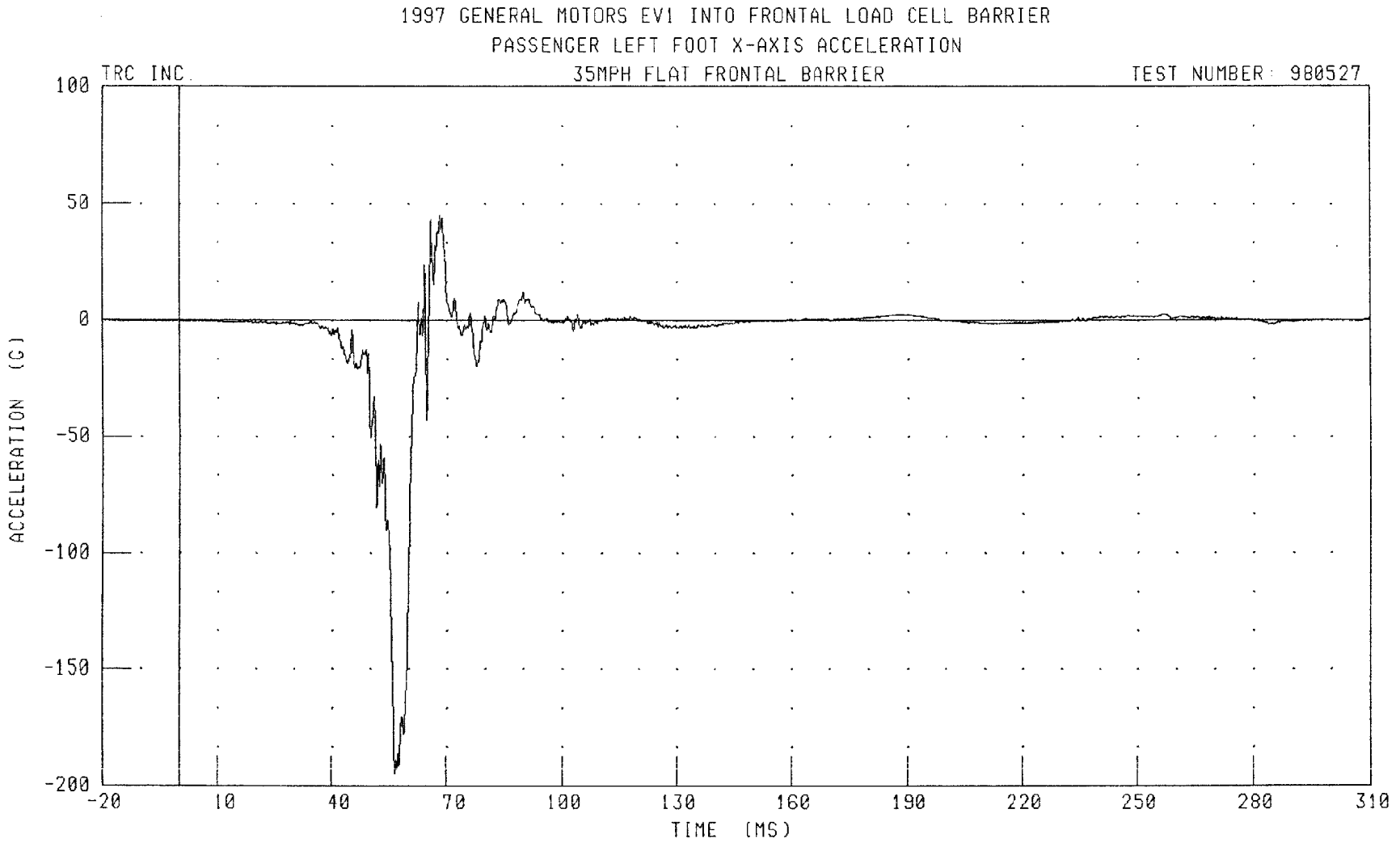
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS



CHANNEL: ANRYM2 FILTER: CH CLASS 600 PEAK DATA: 20.07 N-M @ 61.60 MS, -74.09 N-M @ 49.60 MS

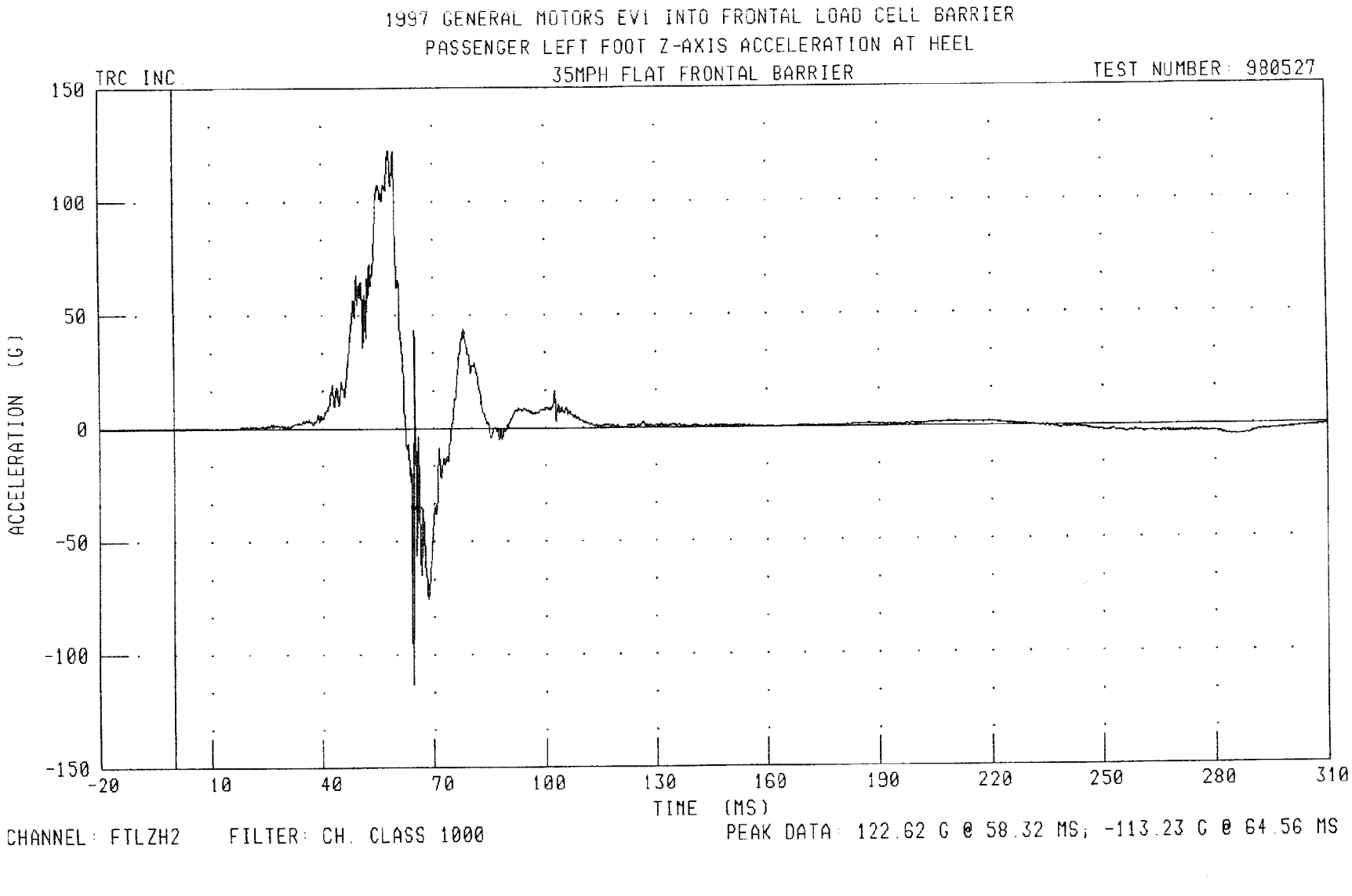
S8-B

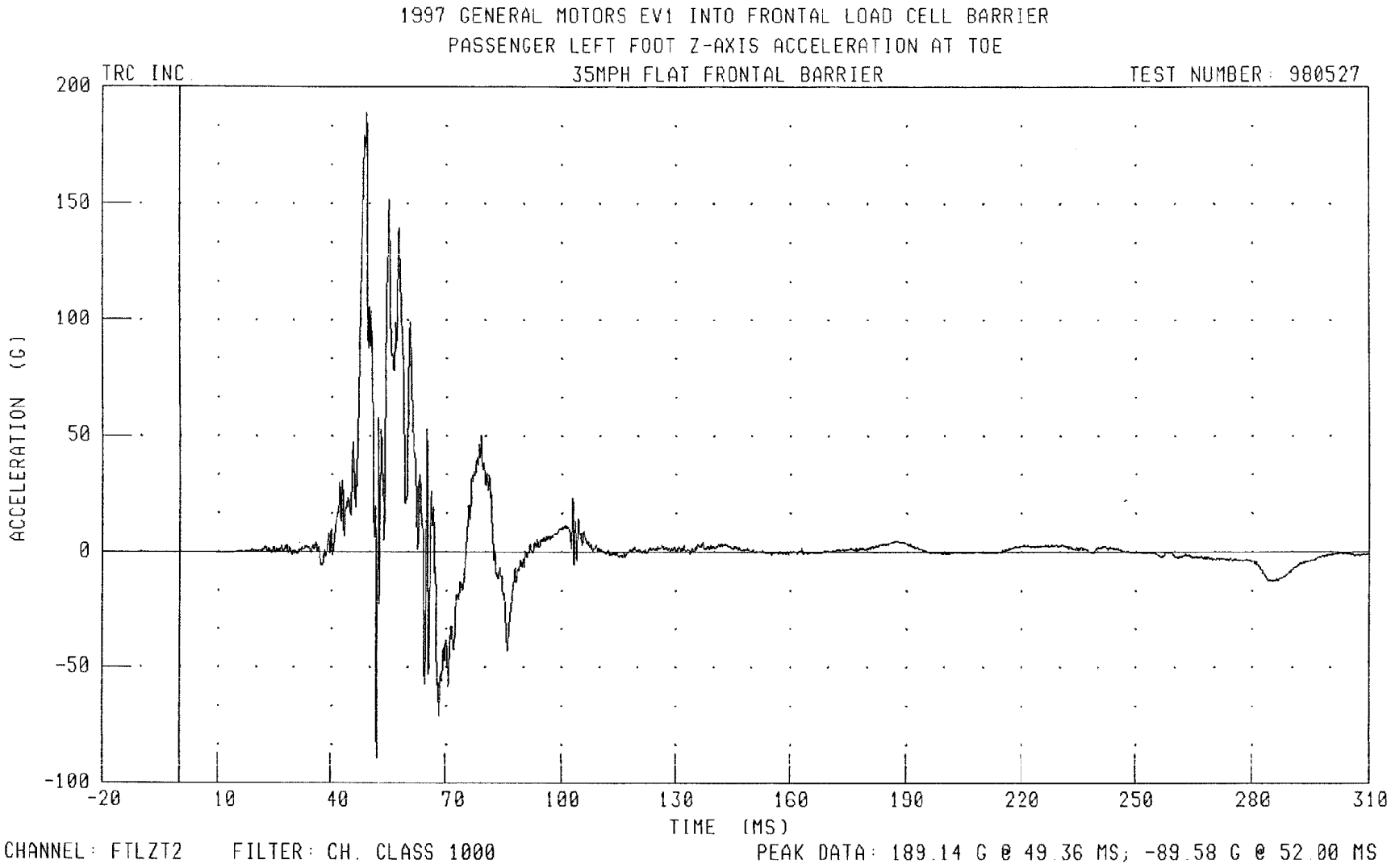
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
100
50
0
-50
-100
-150
-200
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLXG2
FILTER: CH. CLASS 1000
PEAK DATA: 45.19 G @ 68.32 MS; -194.99 G @ 56.40 MS

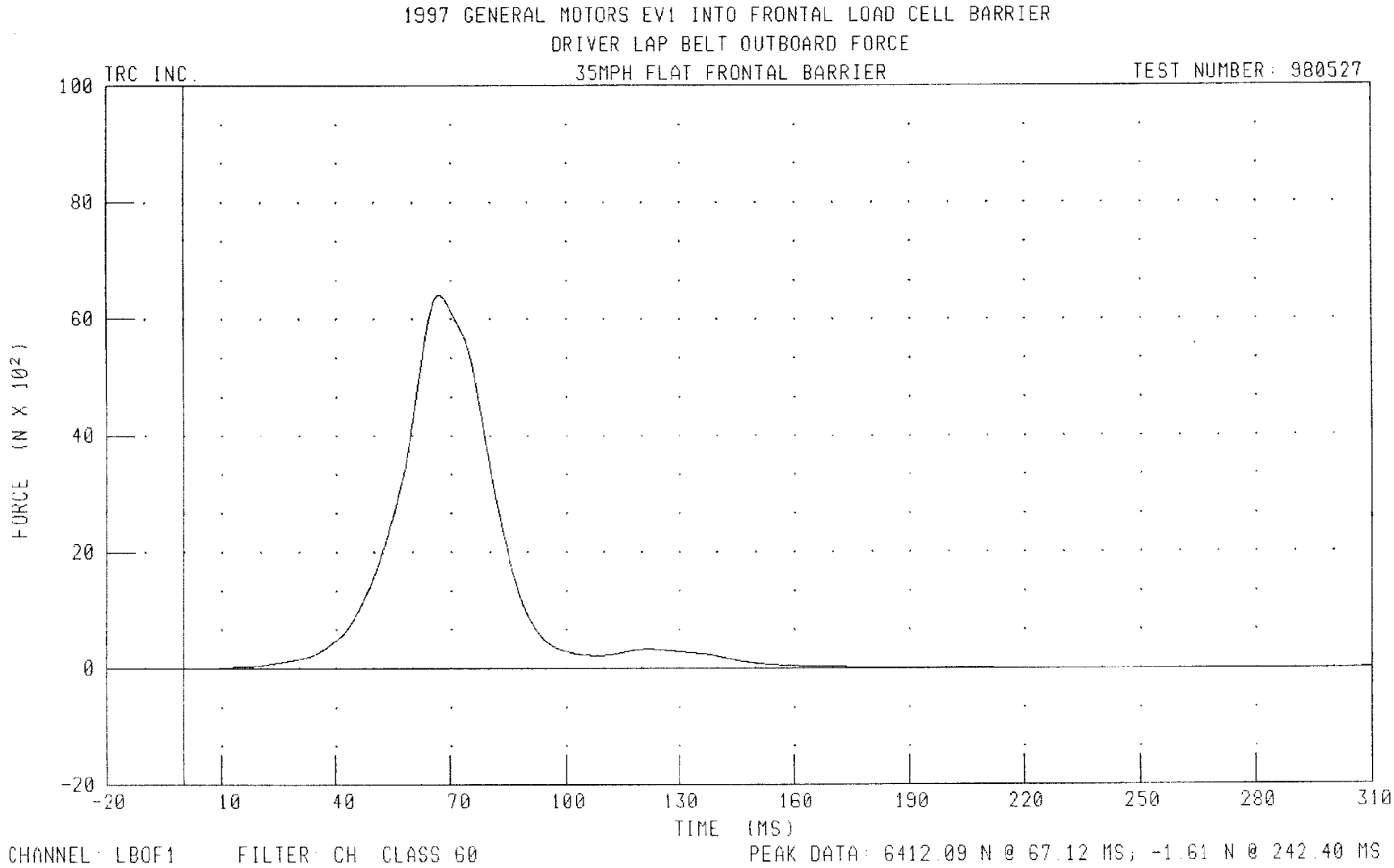
B-86

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT HEEL
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
150
100
50
0
-50
-100
-150
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLZH2
FILTER: CH. CLASS 1000
PEAK DATA: 122.62 G @ 58.32 MS; -113.23 G @ 64.56 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT TOE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
ACCELERATION (G)
200
150
100
50
0
-50
-100
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLZT2
FILTER: CH. CLASS 1000
PEAK DATA: 189.14 G @ 49.36 MS; -89.58 G @ 52.00 MS

980527

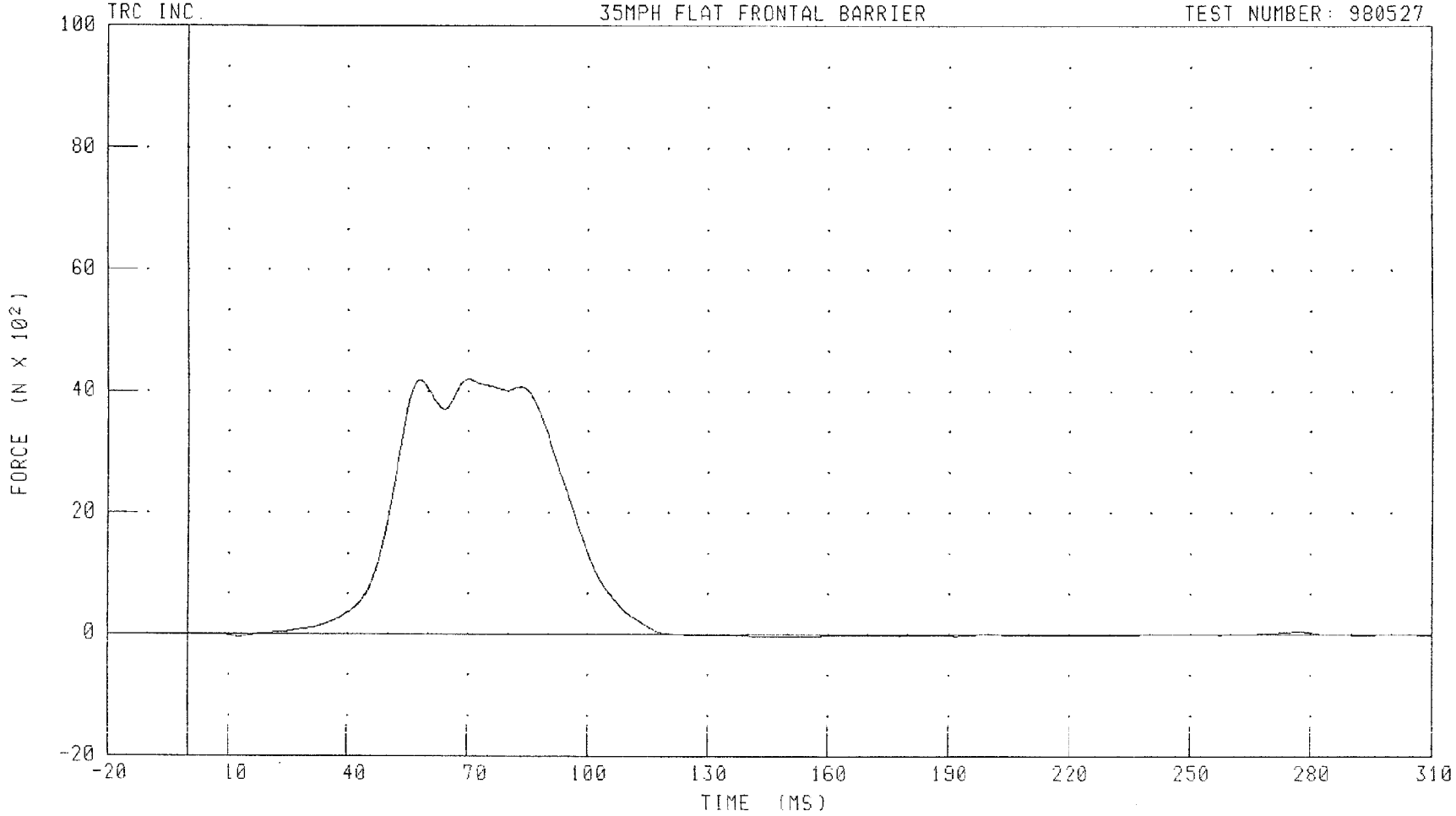

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
100
80
60
40
20
0
-20
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LBOF1
FILTER: CH CLASS 60
PEAK DATA: 6412.09 N @ 67.12 MS; -1.61 N @ 242.40 MS

980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT FORCE
35MPH FLAT FRONTAL BARRIER

TRC INC.

TEST NUMBER: 980527

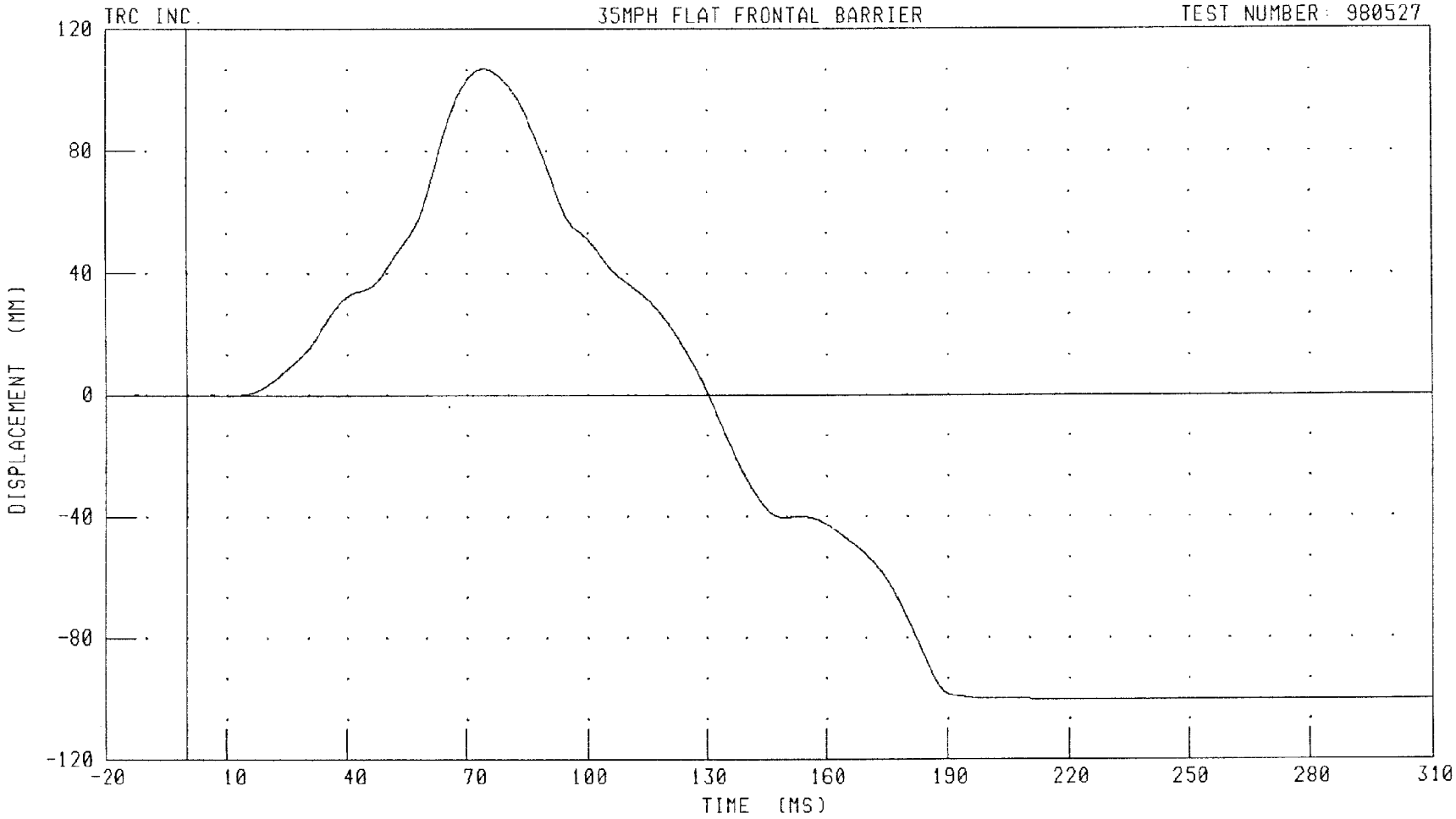


CHANNEL: SHBF1 FILTER: CH. CLASS 60

PEAK DATA: 4194.23 N @ 70.24 MS, -49.03 N @ 12.80 MS

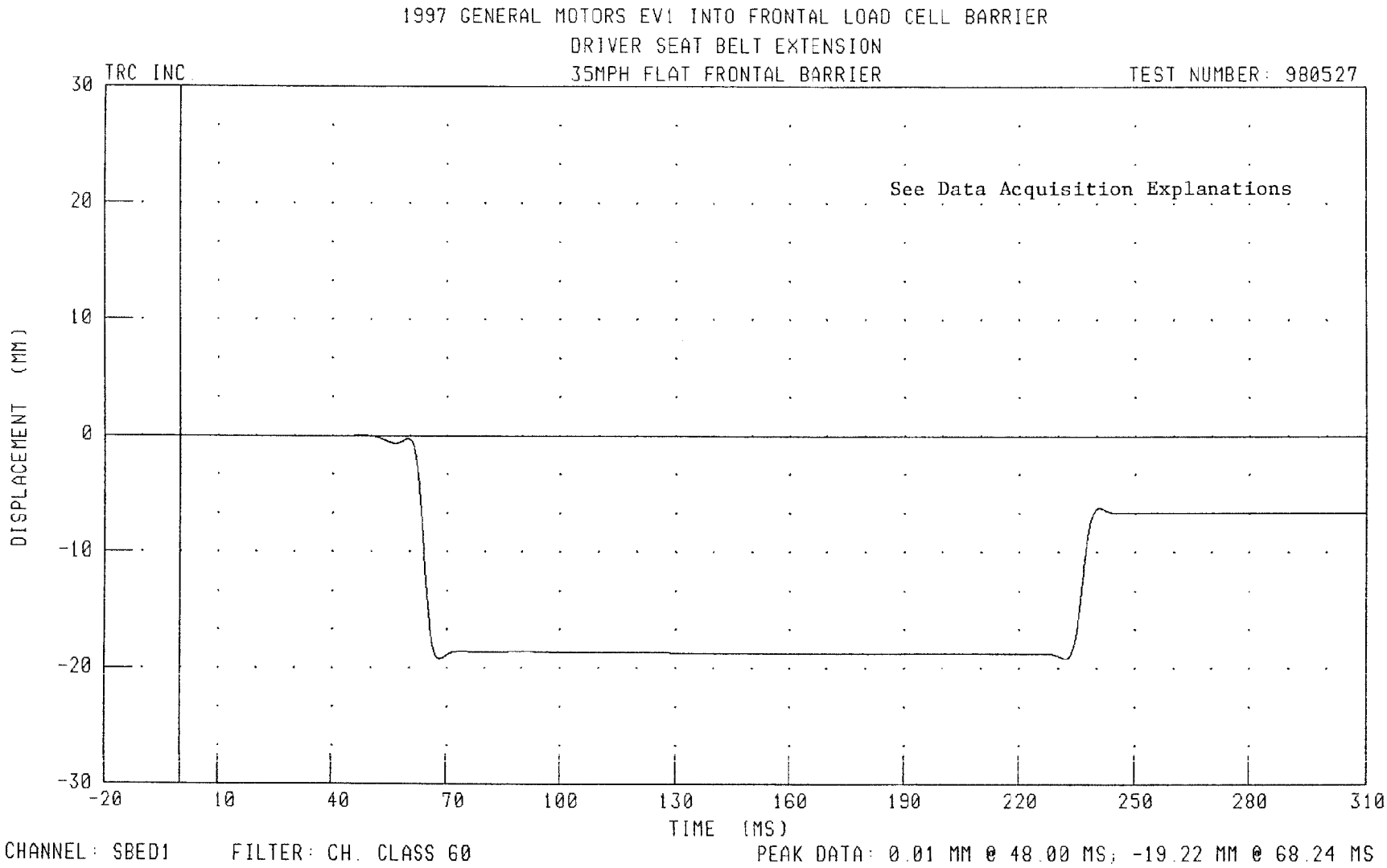
980527

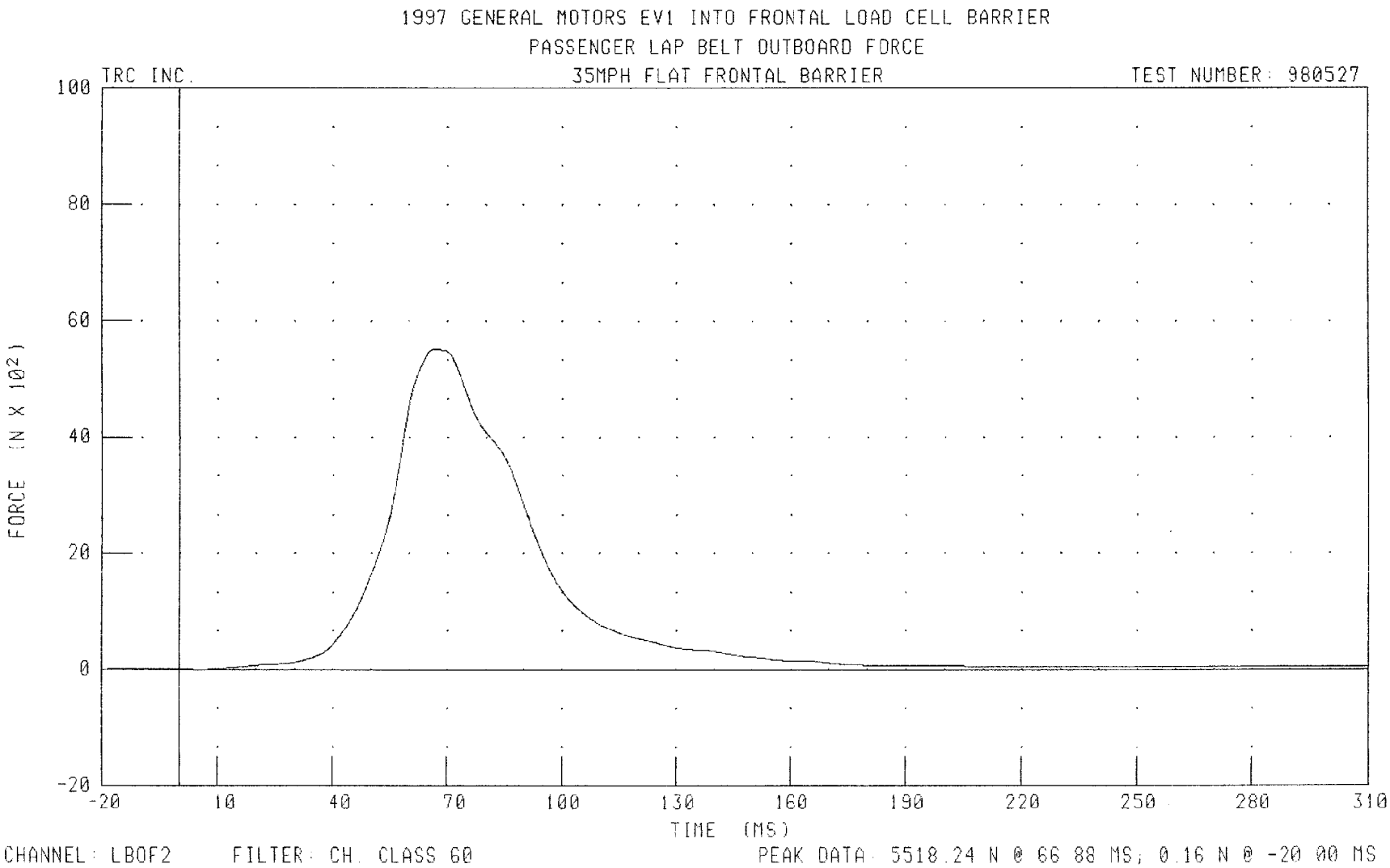
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT



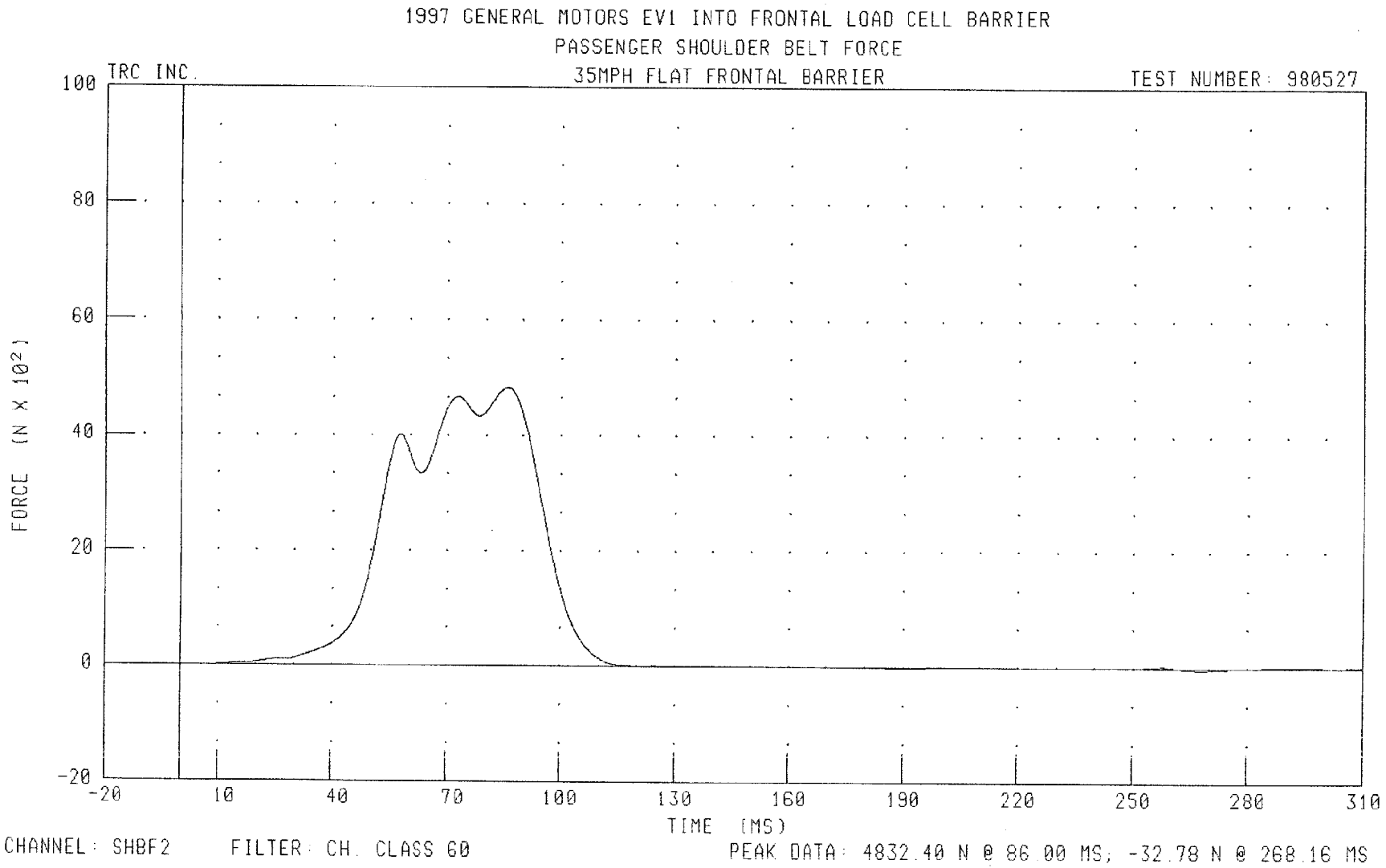
CHANNEL: SHBD1 FILTER: CH. CLASS 60 PEAK DATA: 106.84 MM @ 74.32 MS; -100.39 MM @ 275.68 MS

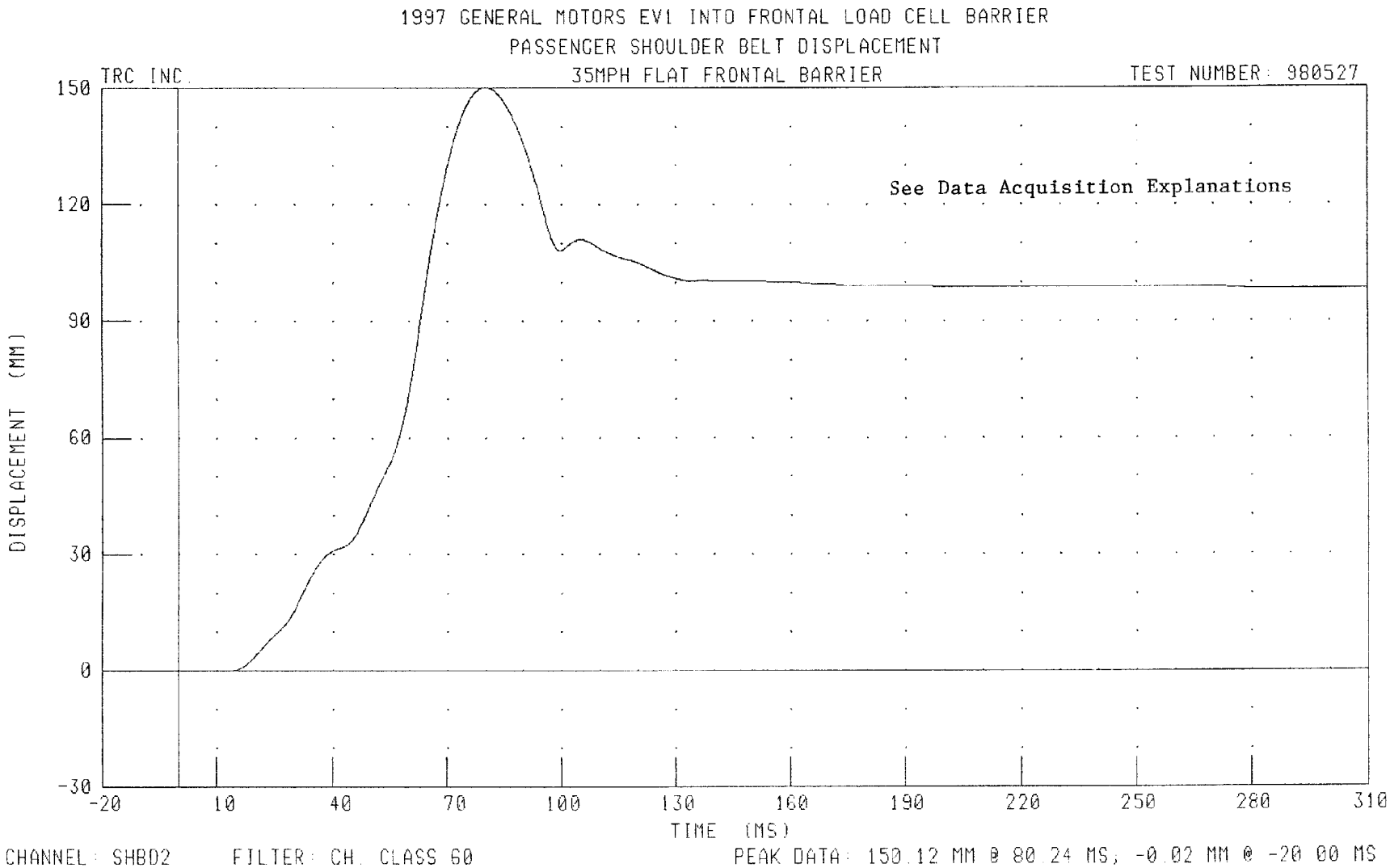
980527

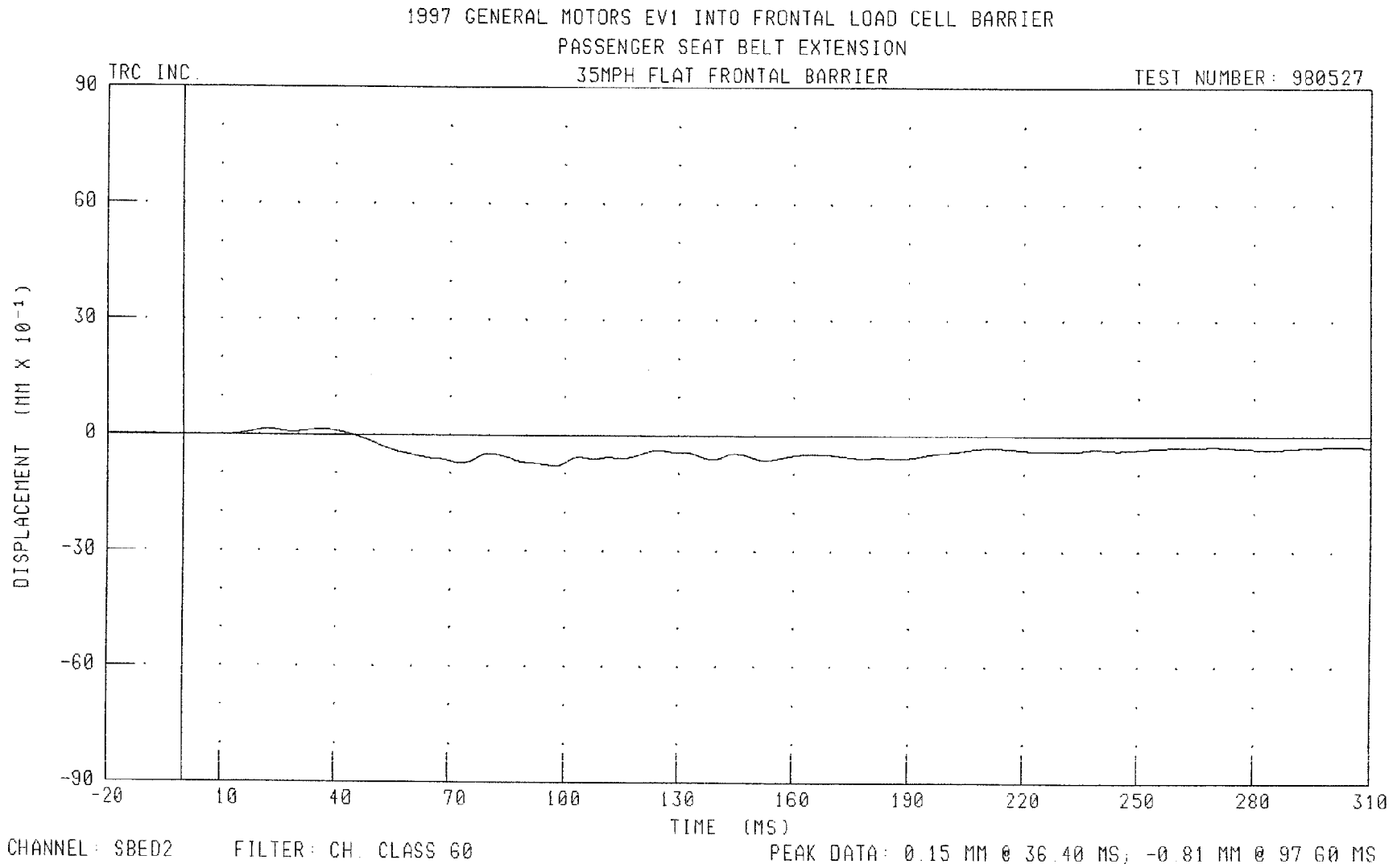

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
DRIVER SEAT BELT EXTENSION
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER: 980527
See Data Acquisition Explanations
DISPLACEMENT (MM)
30
20
10
0
-10
-20
-30
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SBED1
FILTER: CH. CLASS 60
PEAK DATA: 0.01 MM @ 48.00 MS; -19.22 MM @ 68.24 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
100
80
60
40
20
0
-20
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LBOF2
FILTER: CH. CLASS 60
PEAK DATA: 5518.24 N @ 66.88 MS; 0.16 N @ -20.00 MS

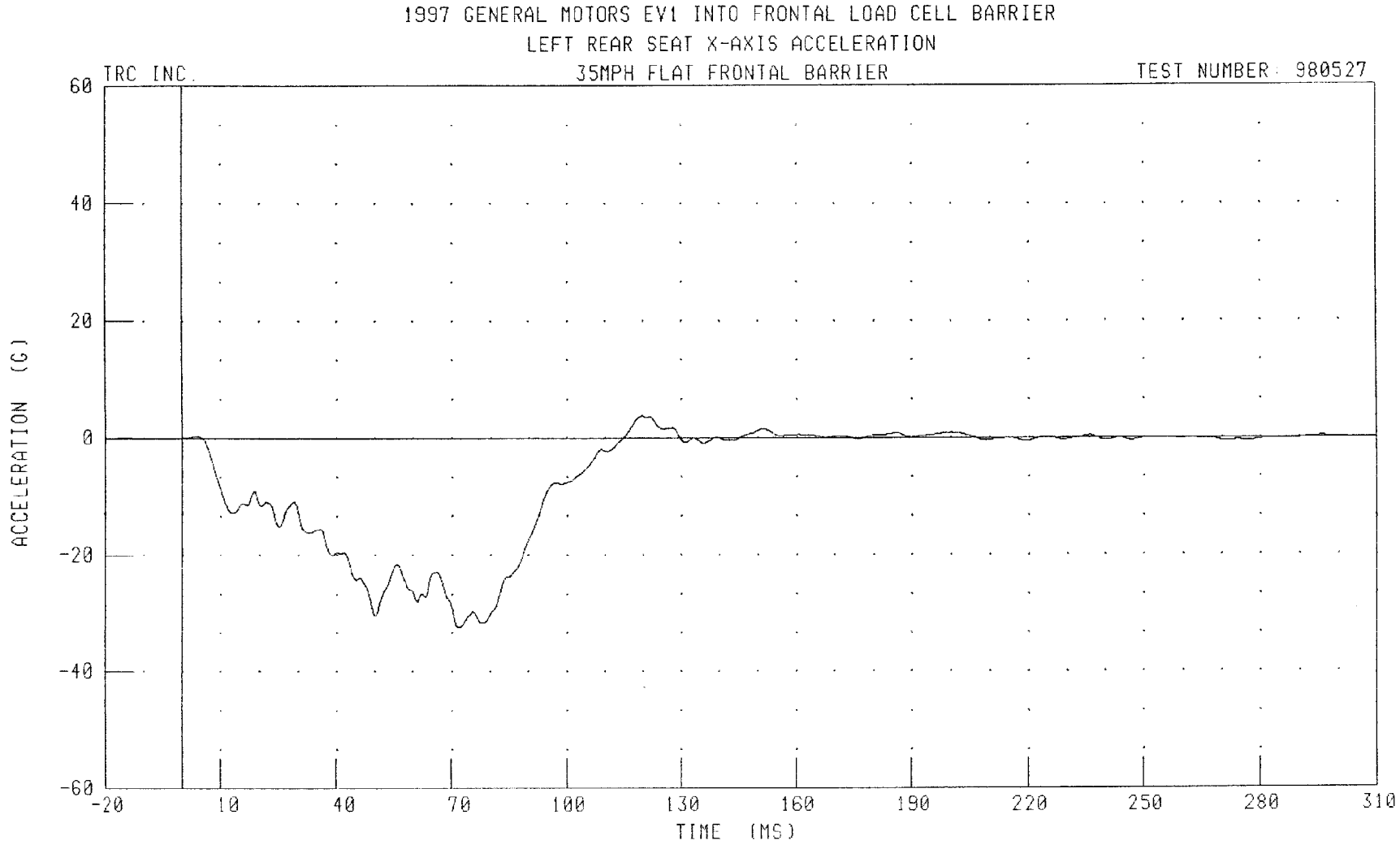
980527

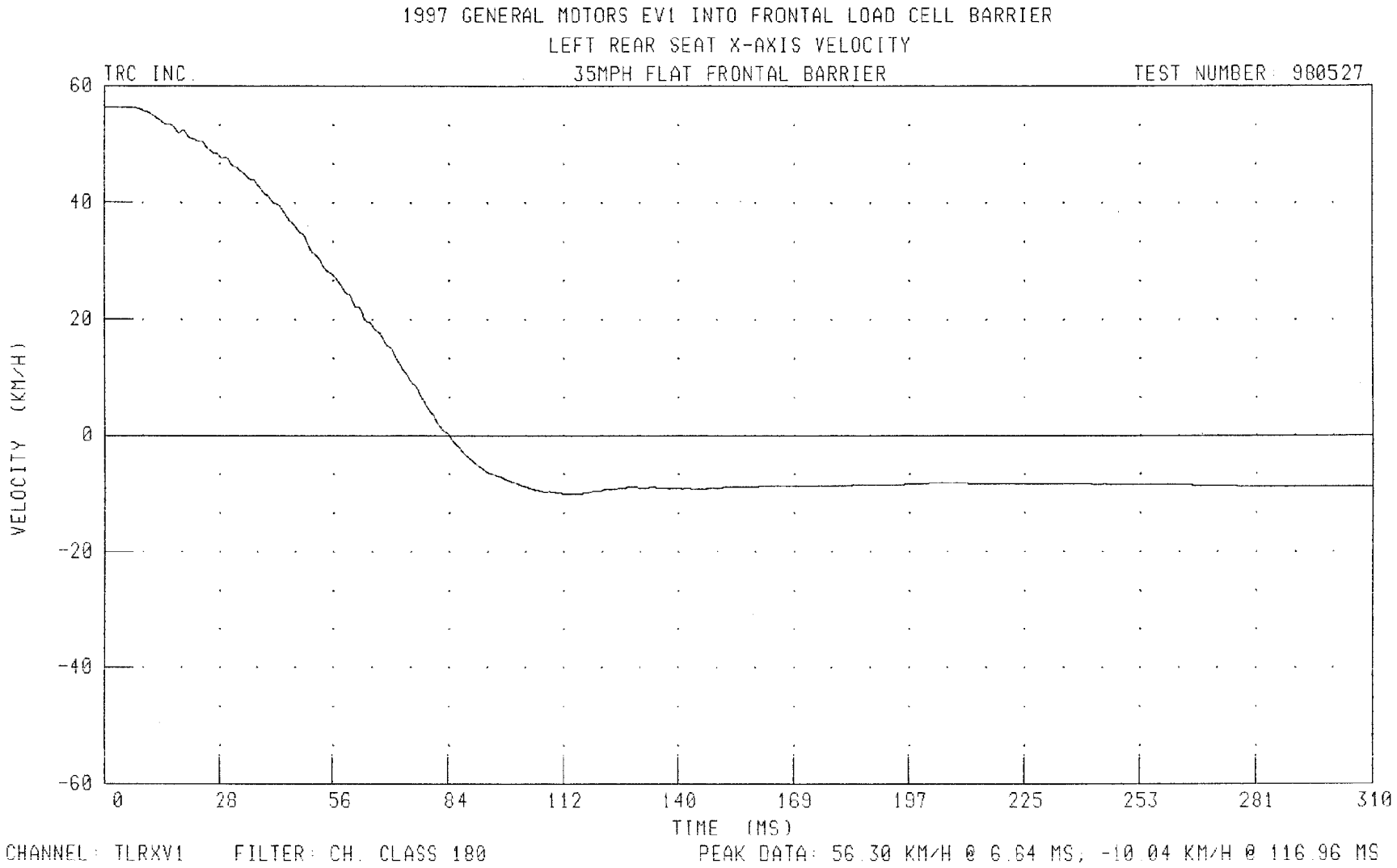

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
FORCE (N X 10²)
100
80
60
40
20
0
-20
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SHBF2
FILTER: CH. CLASS 60
PEAK DATA: 4832.40 N @ 86.00 MS; -32.78 N @ 268.16 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
See Data Acquisition Explanations
DISPLACEMENT (MM)
150
120
90
60
30
0
-30
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SHBD2
FILTER: CH. CLASS 60
PEAK DATA: 150.12 MM @ 80.24 MS, -0.02 MM @ -20.00 MS

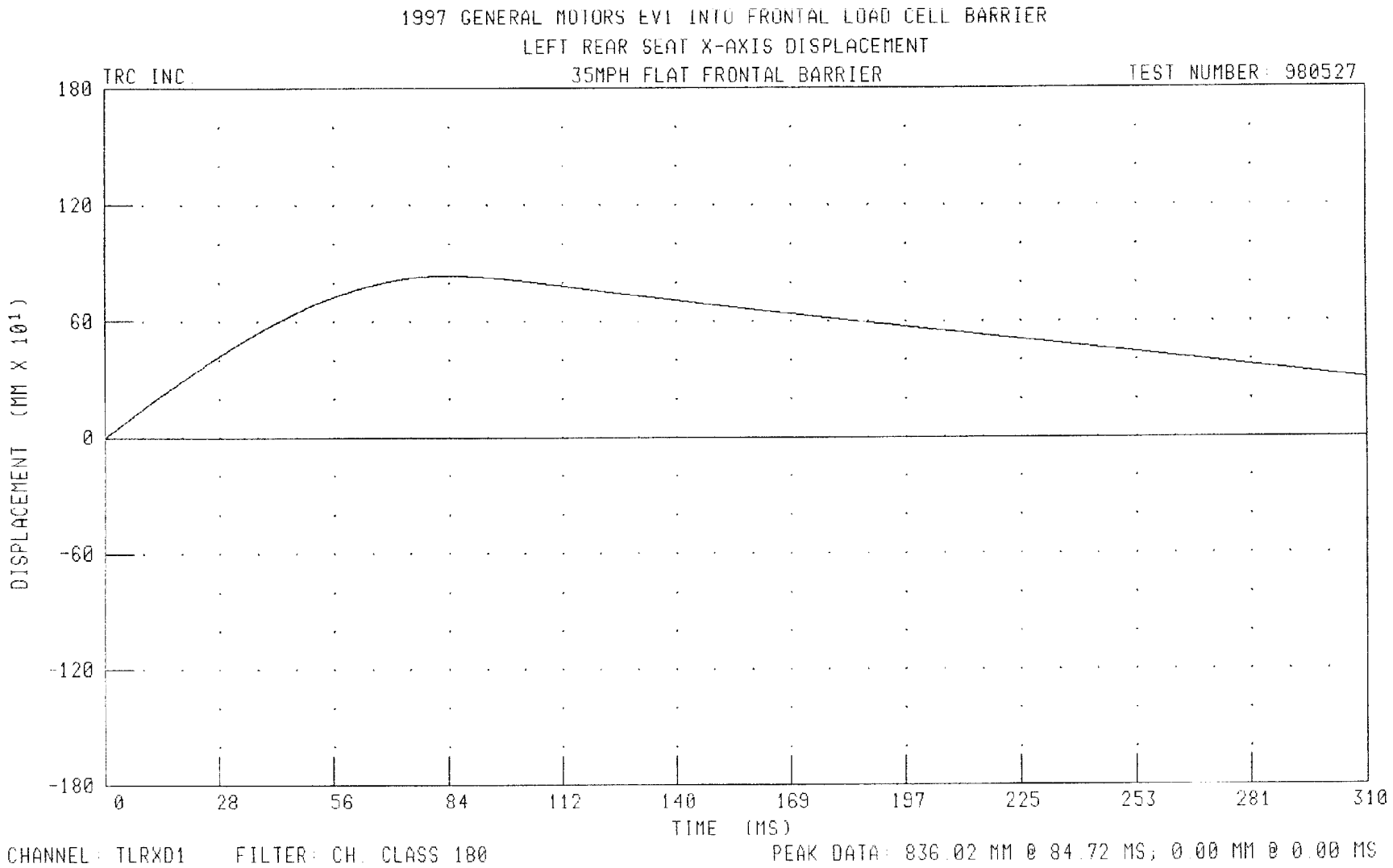

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
90
60
30
0
-30
-60
-90
DISPLACEMENT (MM X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SBED2
FILTER: CH. CLASS 60
PEAK DATA: 0.15 MM @ 36.40 MS; -0.81 MM @ 97.60 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
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: 3.76 G @ 119.92 MS; -32.48 G @ 71.92 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
VELOCITY (KM/H)
0
28
56
84
112
140
169
197
225
253
281
310
TIME (MS)
CHANNEL: TLRXV1
FILTER: CH. CLASS 180
PEAK DATA: 56.30 KM/H @ 6.64 MS, -10.04 KM/H @ 116.96 MS

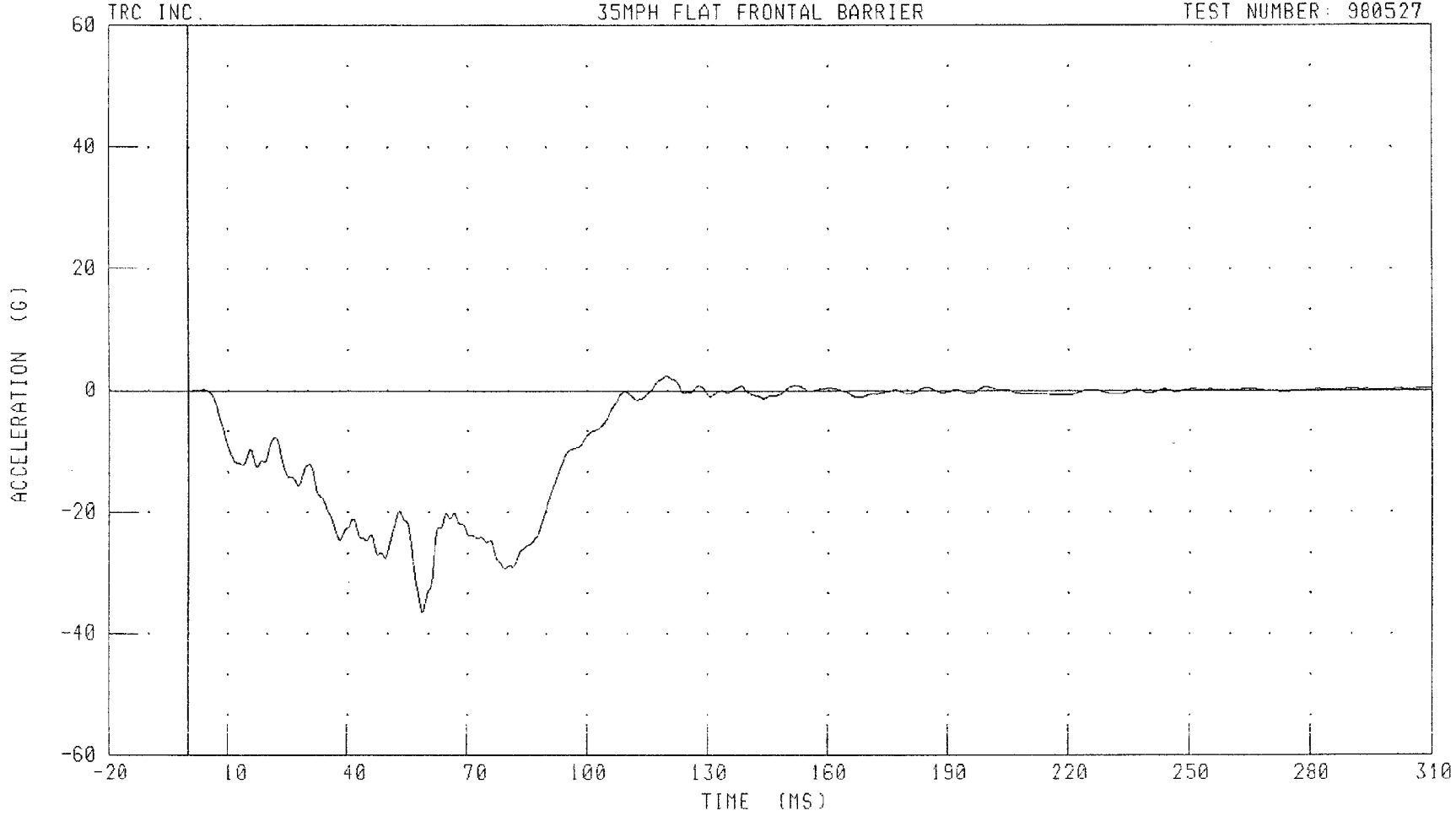
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS DISPLACEMENT
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
180
120
60
0
-60
-120
-180
DISPLACEMENT (MM X 10¹)
0
28
56
84
112
140
169
197
225
253
281
310
TIME (MS)
CHANNEL: TLRXD1
FILTER: CH. CLASS 180
PEAK DATA: 836.02 MM @ 84.72 MS; 0.00 MM @ 0.00 MS

980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

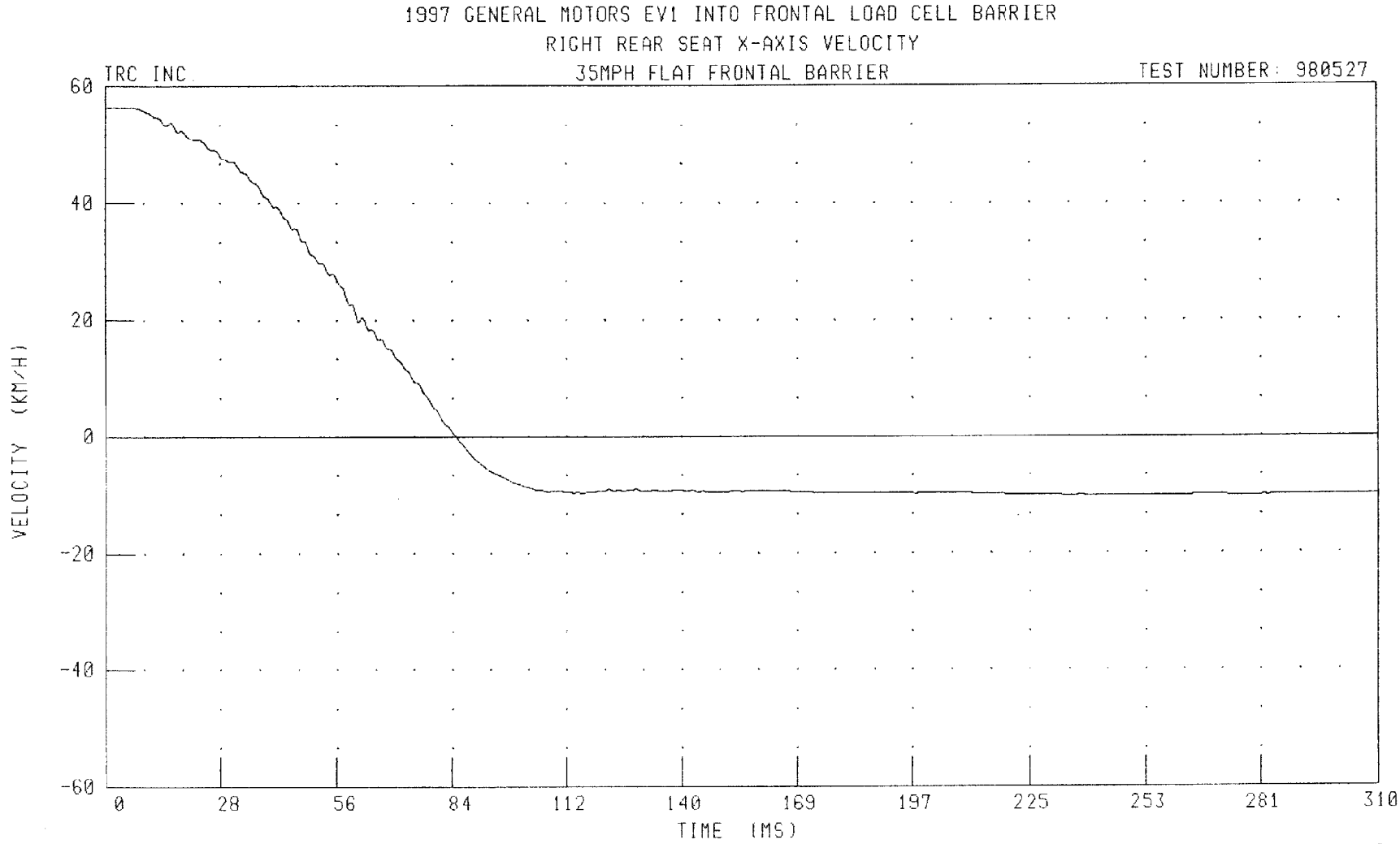
TRC INC. 35MPH FLAT FRONTAL BARRIER TEST NUMBER: 980527



CHANNEL: TRRXG1 FILTER: CH. CLASS 60 PEAK DATA: 2.29 G @ 120.00 MS; -36.51 G @ 58.64 MS

001-8

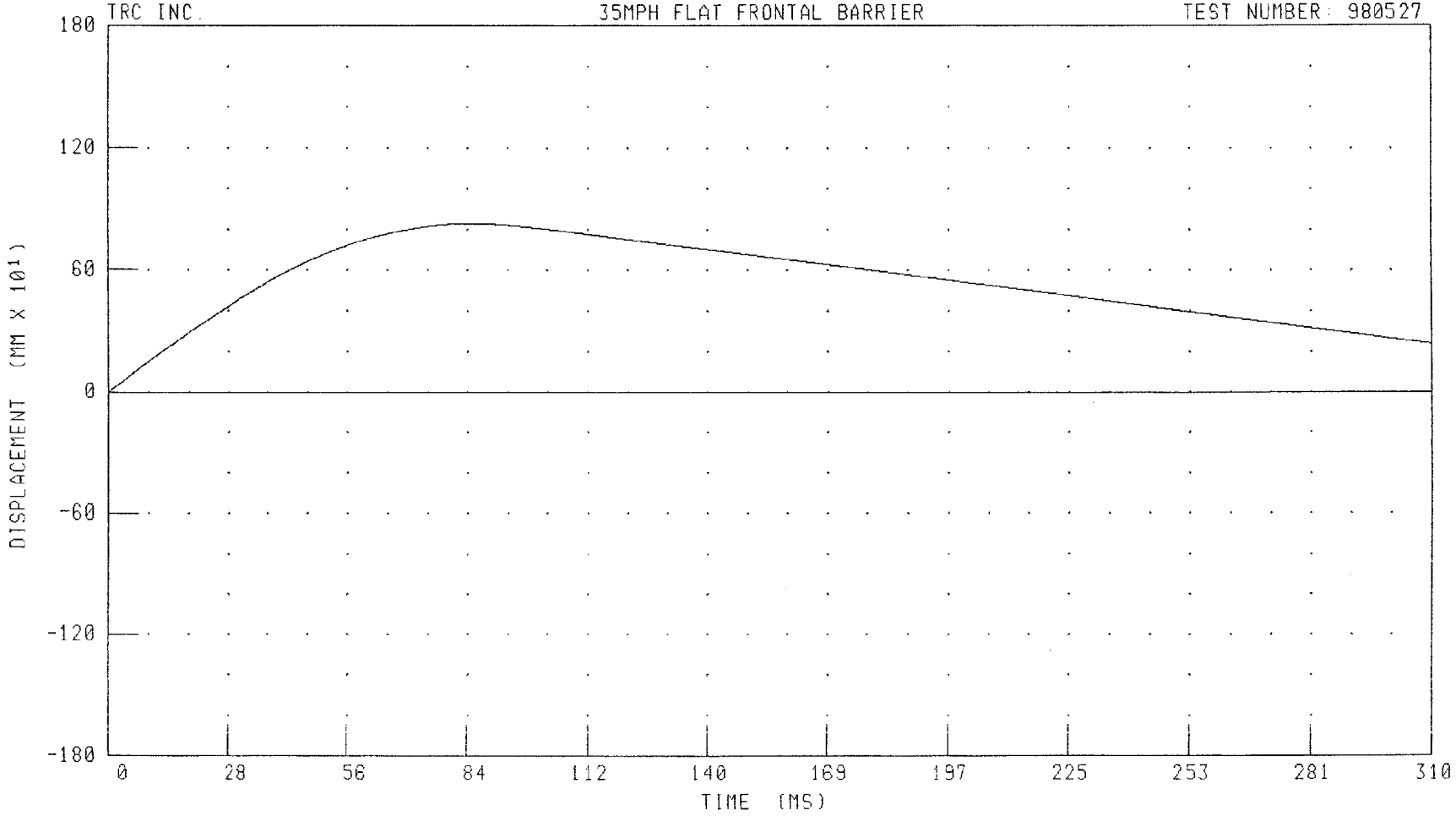
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
VELOCITY (KM/H)
0
28
56
84
112
140
169
197
225
253
281
310
TIME (MS)
CHANNEL: TRRXV1
FILTER: CH. CLASS 180
PEAK DATA: 56.30 KM/H @ 0.08 MS, -10.24 KM/H @ 247.76 MS

980527

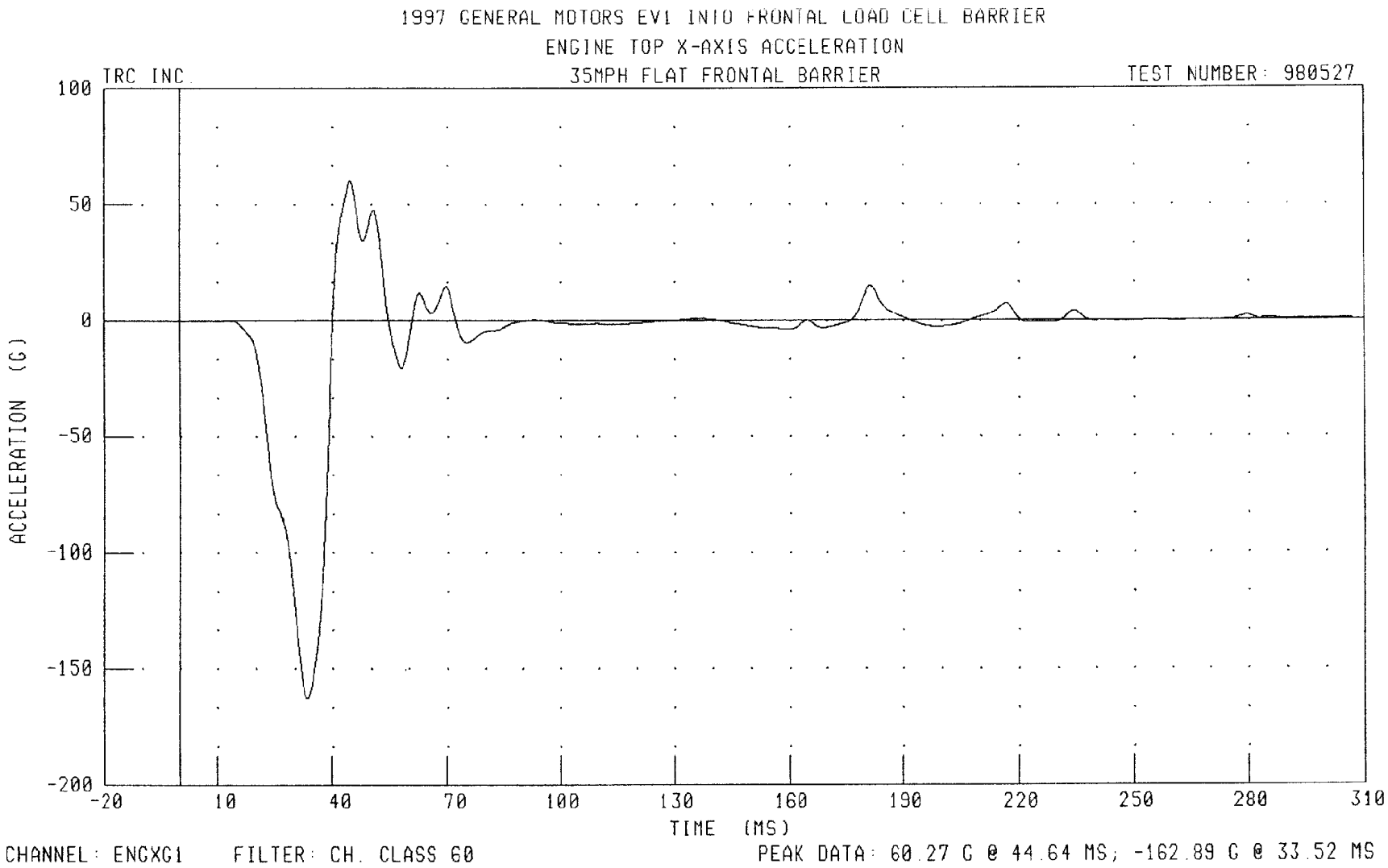
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS DISPLACEMENT

TRC INC. 35MPH FLAT FRONTAL BARRIER TEST NUMBER: 980527



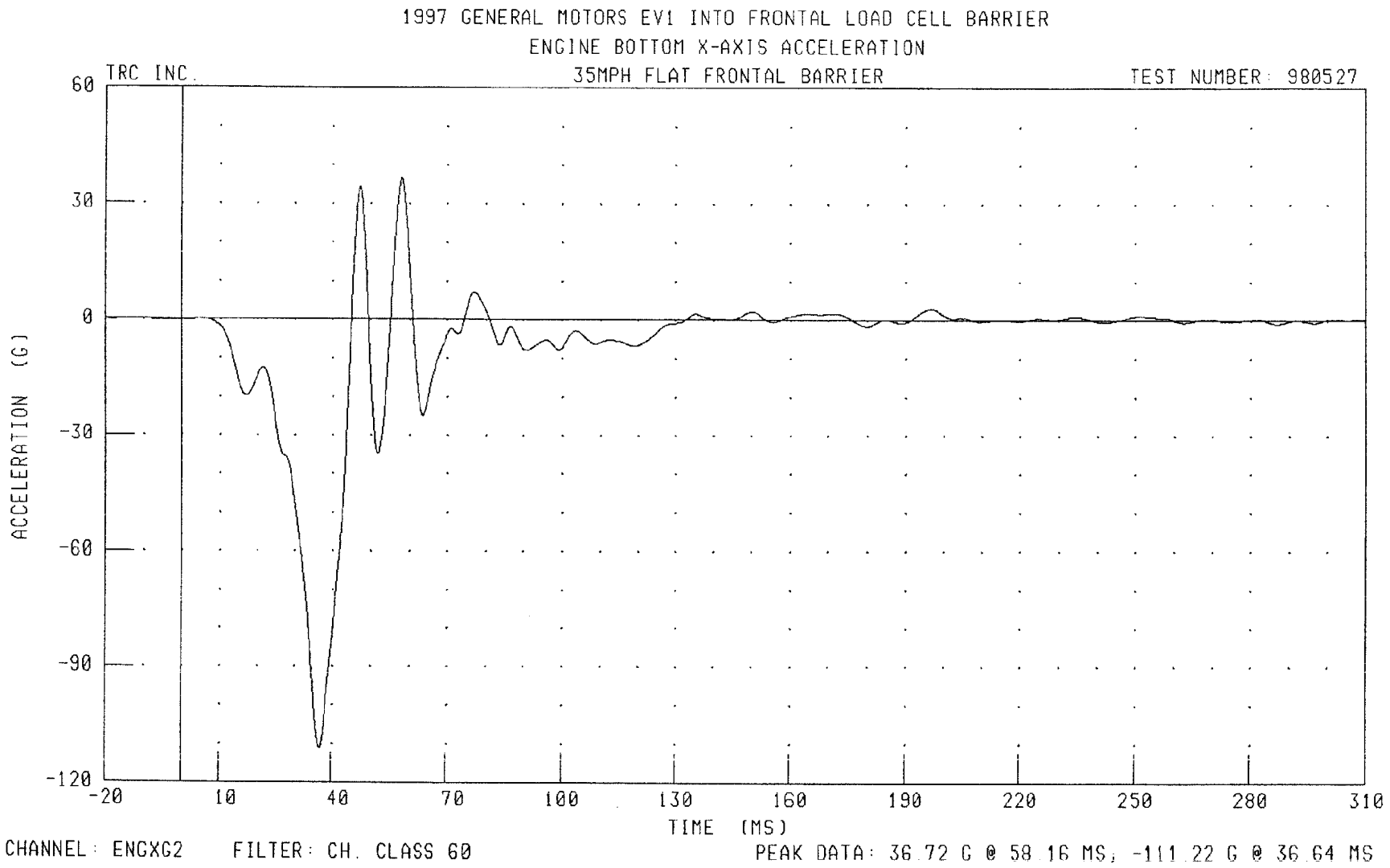
CHANNEL: TRRXD1 FILTER: CH. CLASS 180 PEAK DATA: 826.95 MM @ 85.52 MS; 0.00 MM @ 0.00 MS

980527

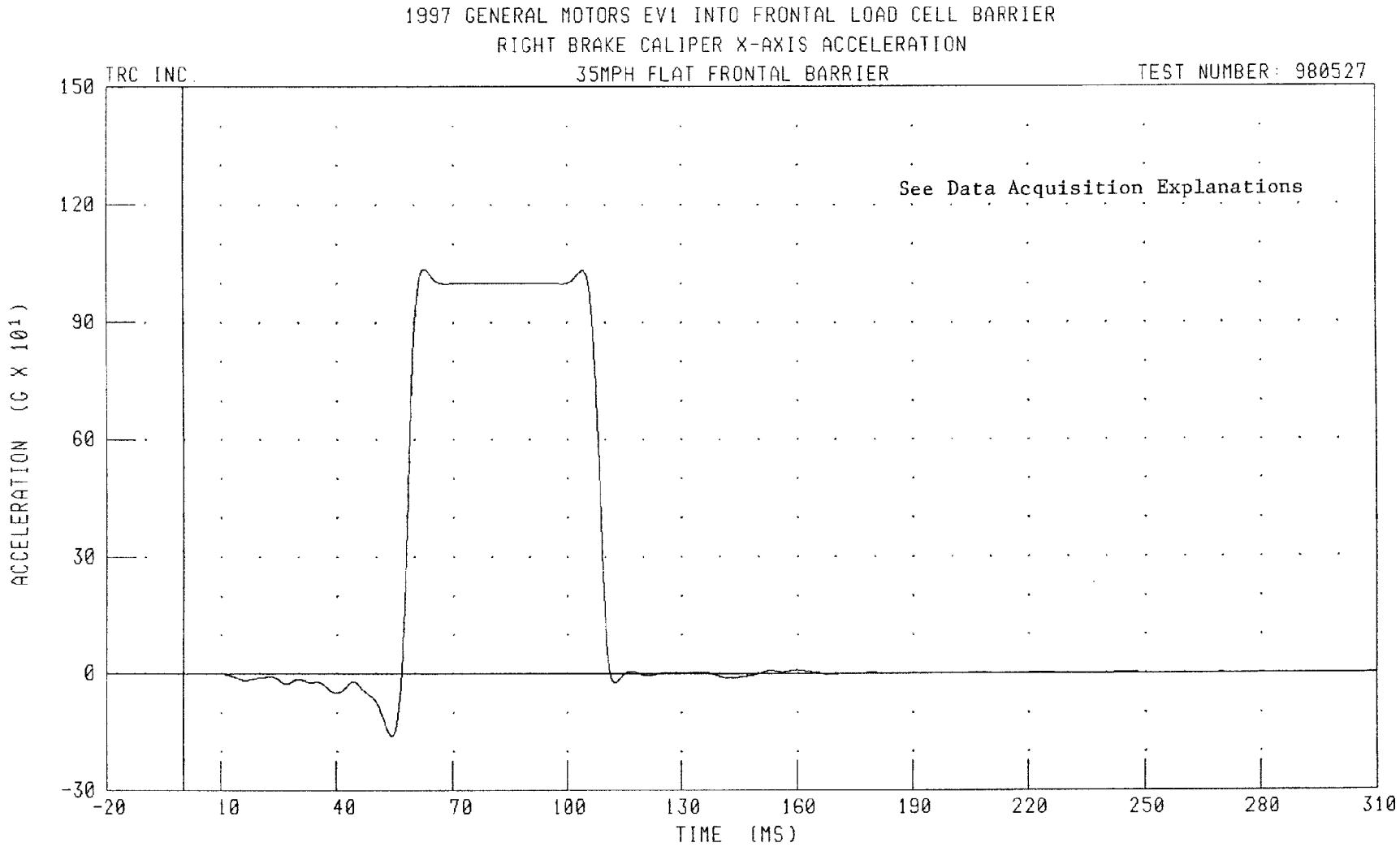

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
ENGINE TOP X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
100
50
0
-50
-100
-150
-200
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ENGXG1
FILTER: CH. CLASS 60
PEAK DATA: 60.27 G @ 44.64 MS; -162.89 G @ 33.52 MS

8-103

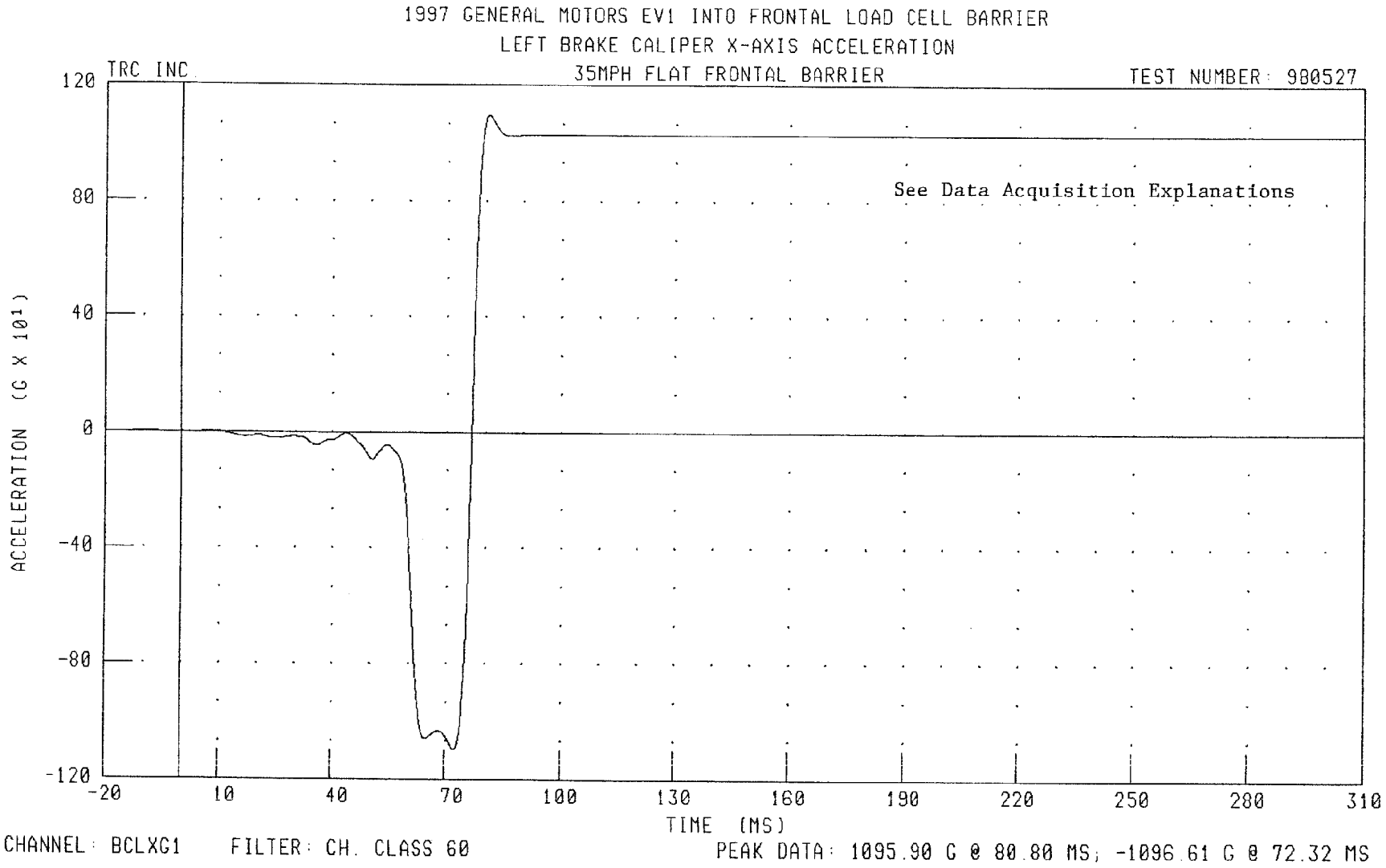
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
30
0
-30
-60
-90
-120
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ENGXG2
FILTER: CH. CLASS 60
PEAK DATA: 36.72 G @ 58.16 MS, -111.22 G @ 36.64 MS

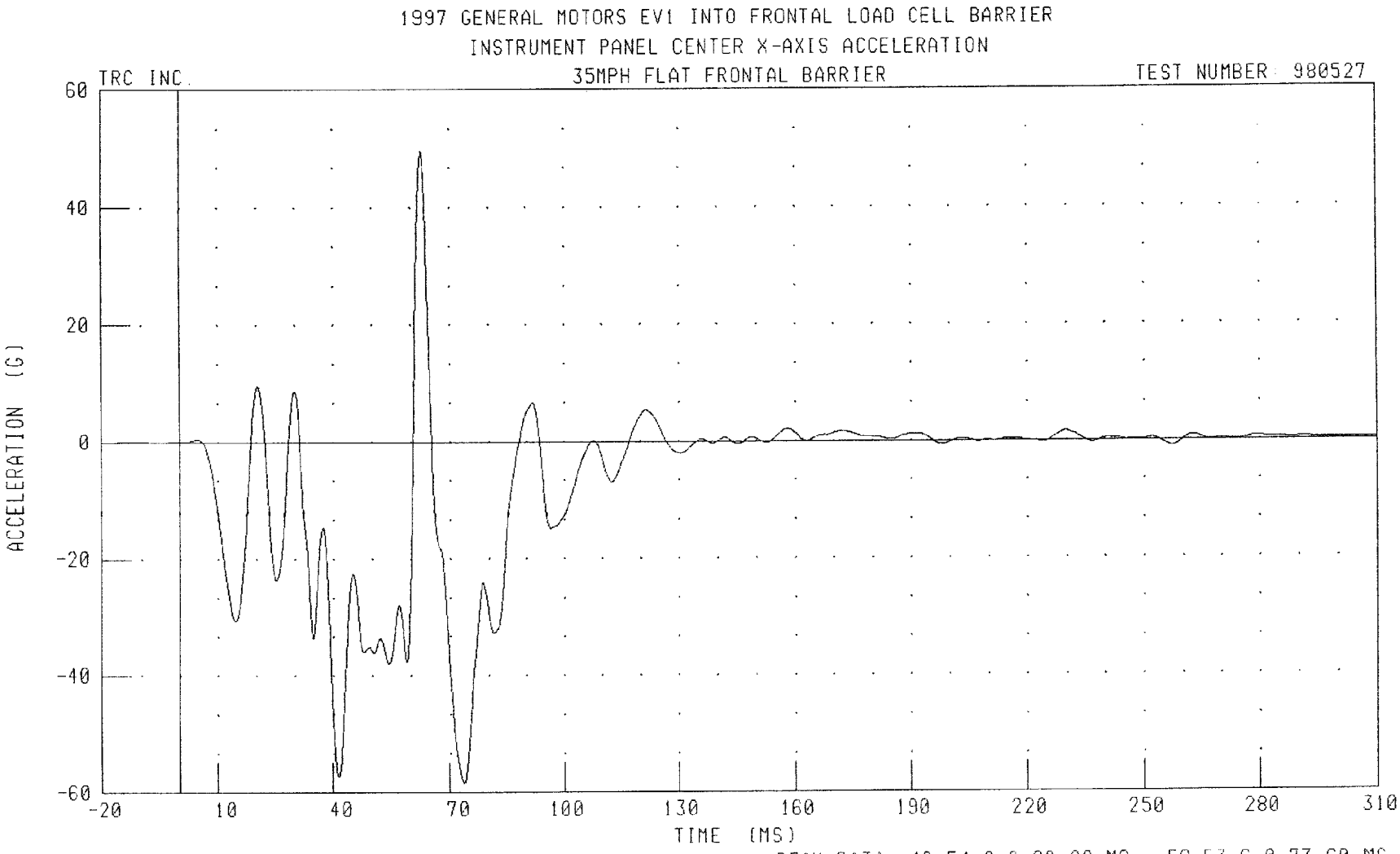
980527

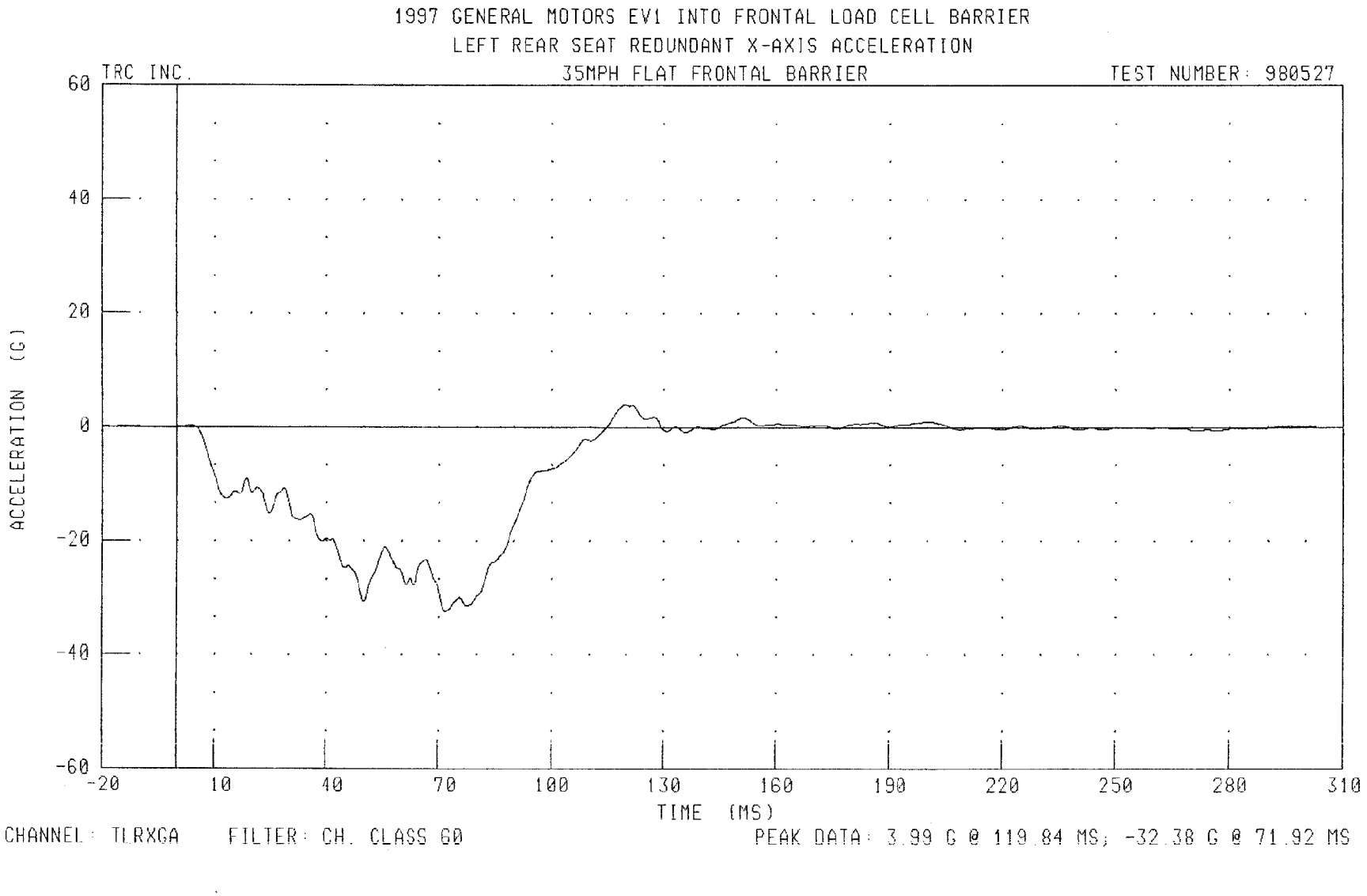

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
See Data Acquisition Explanations
ACCELERATION (G X 10¹)
150
120
90
60
30
0
-30
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCRXG1
FILTER: CH CLASS 60
PEAK DATA: 1036.90 G @ 62.64 MS; -160.58 G @ 54.16 MS

980527

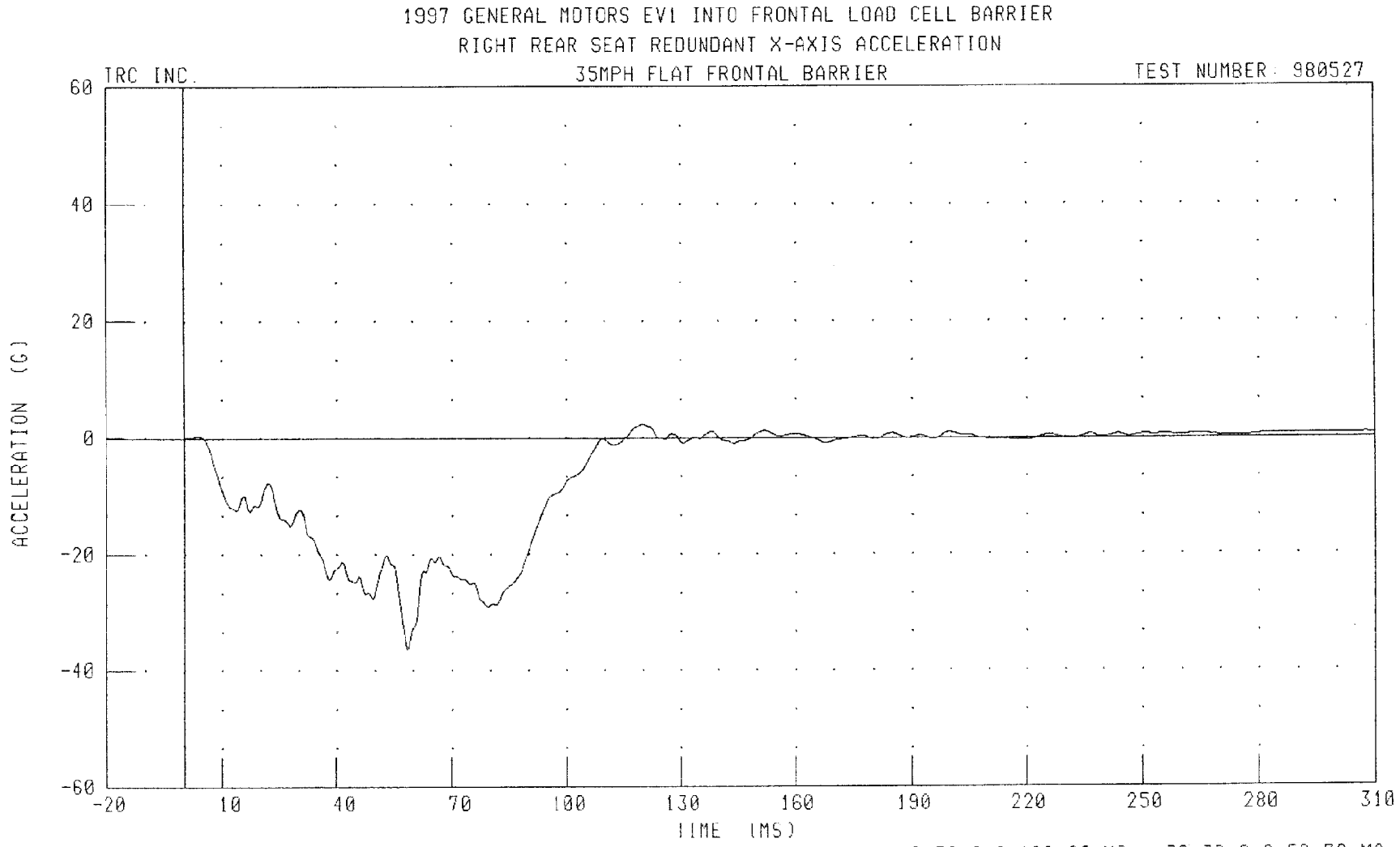

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER: 980527
See Data Acquisition Explanations
ACCELERATION (G X 10¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCLXG1
FILTER: CH. CLASS 60
PEAK DATA: 1095.90 G @ 80.80 MS; -1096.61 G @ 72.32 MS

980527

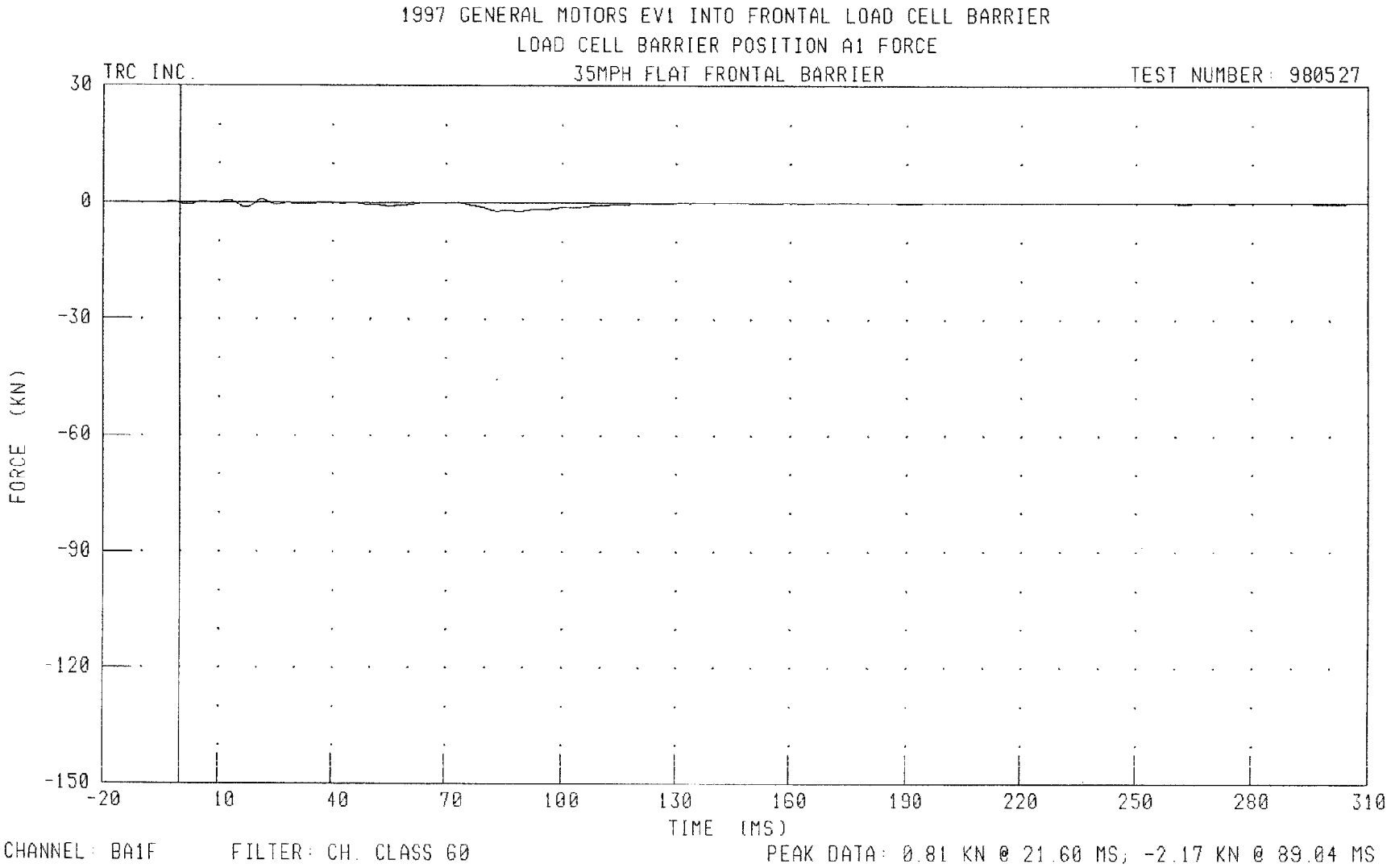

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: DPCXG1
FILTER CH. CLASS 60
PEAK DATA: 49.54 G @ 62.88 MS, -58.53 G @ 73.60 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT REDUNDANT X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TLRXGA
FILTER: CH. CLASS 60
PEAK DATA: 3.99 G @ 119.84 MS; -32.38 G @ 71.92 MS

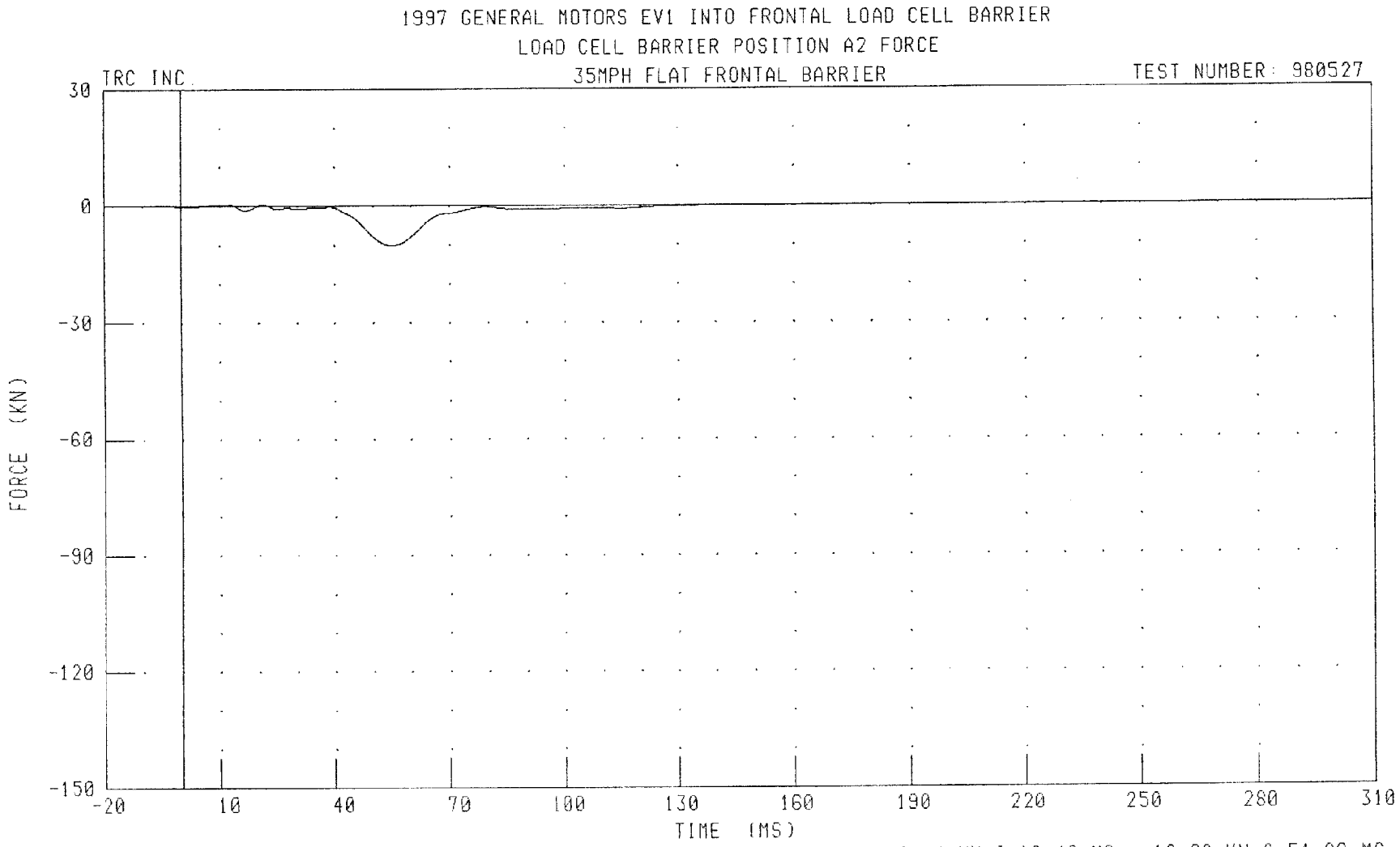
980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT REDUNDANT X-AXIS ACCELERATION
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TRRXGA
FILTER: CH. CLASS 60
PEAK DATA: 2.36 G @ 120.08 MS, -36.32 G @ 58.72 MS

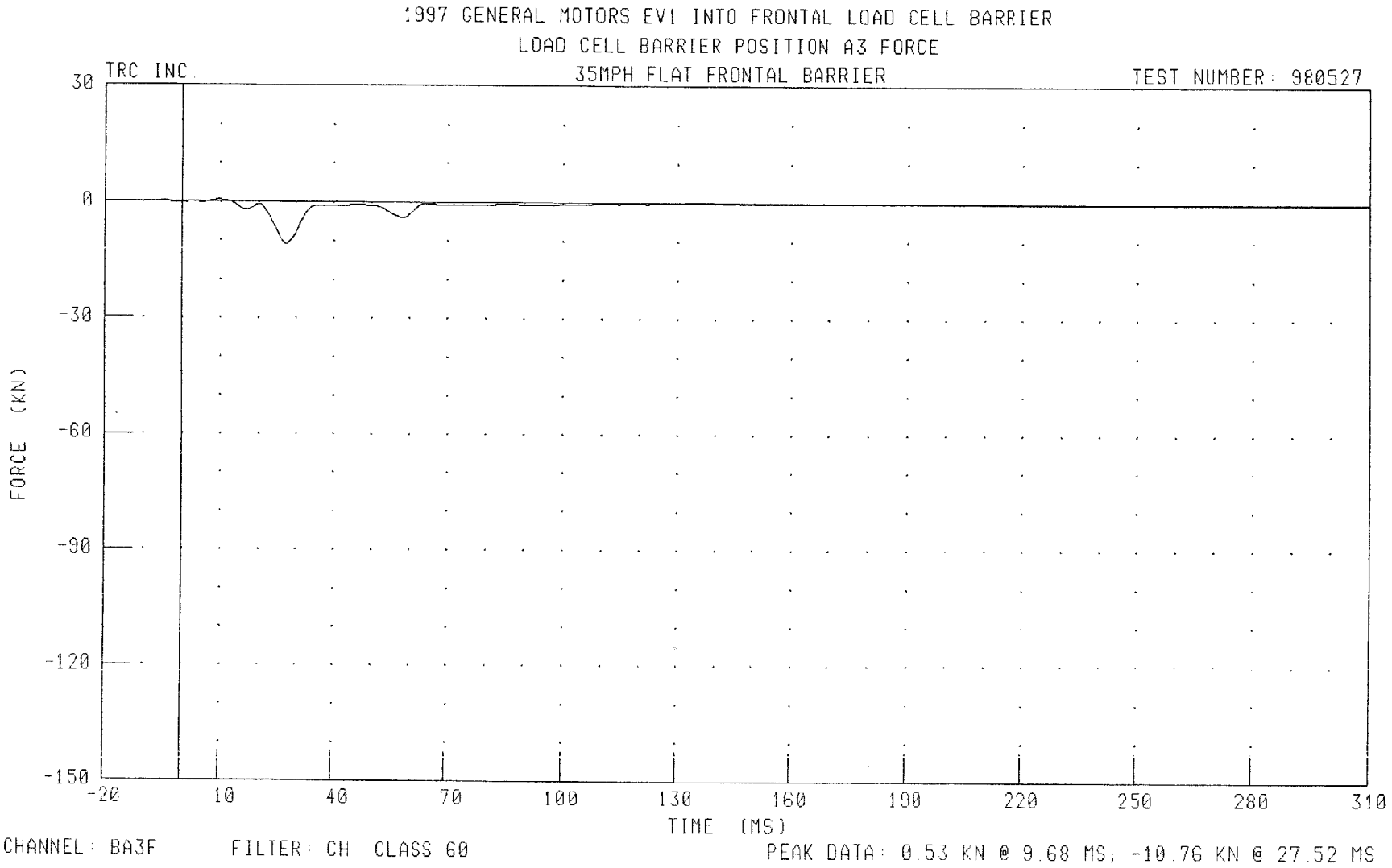
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A1 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA1F
FILTER: CH. CLASS 60
PEAK DATA: 0.81 KN @ 21.60 MS; -2.17 KN @ 89.04 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A2 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA2F
FILTER: CH CLASS 60
PEAK DATA: 0.44 KN @ 12.40 MS, -10.08 KN @ 54.88 MS

980527

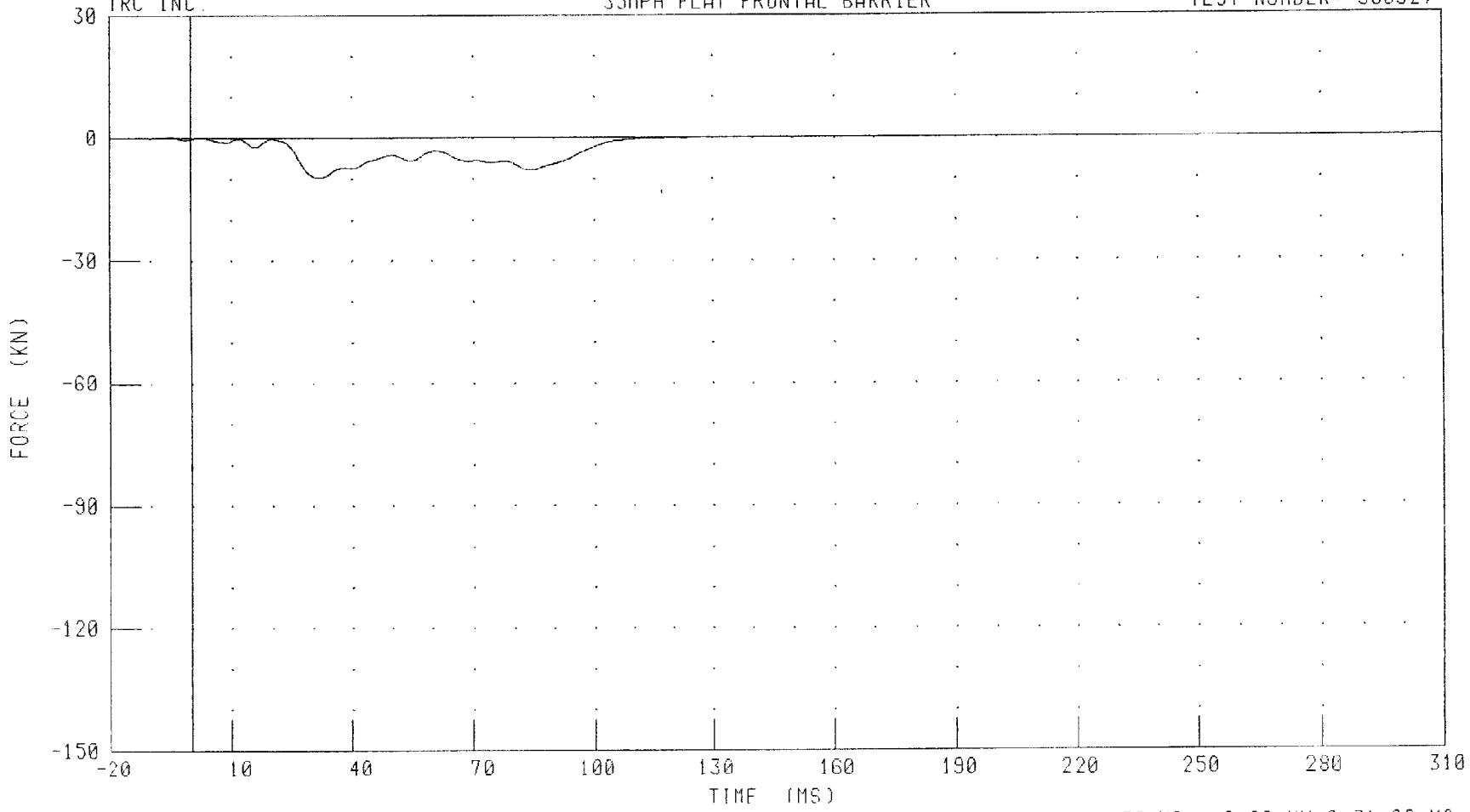

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A3 FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA3F
FILTER: CH CLASS 60
PEAK DATA: 0.53 KN @ 9.68 MS; -10.76 KN @ 27.52 MS

980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER

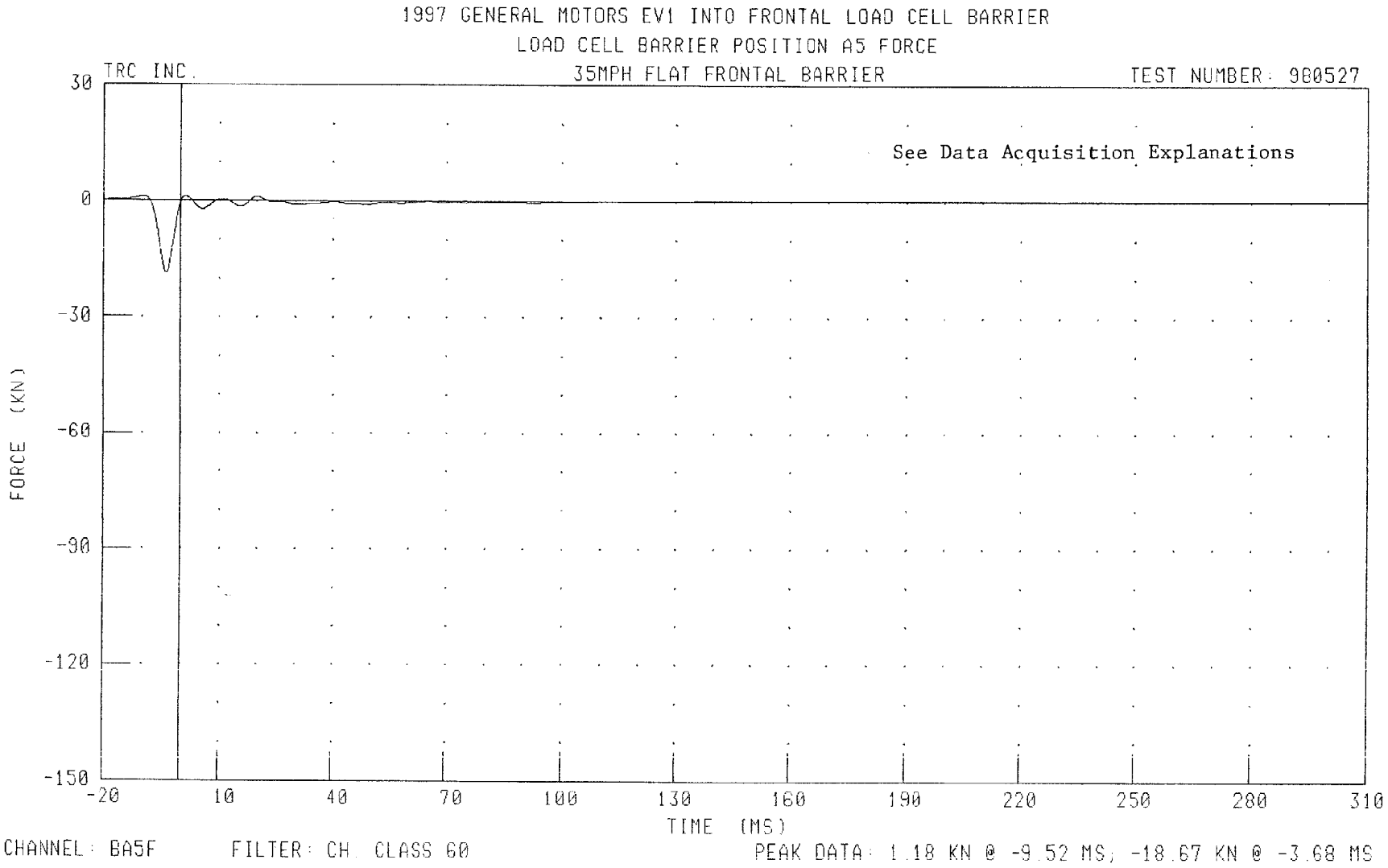
LOAD CELL BARRIER POSITION A4 FORCE

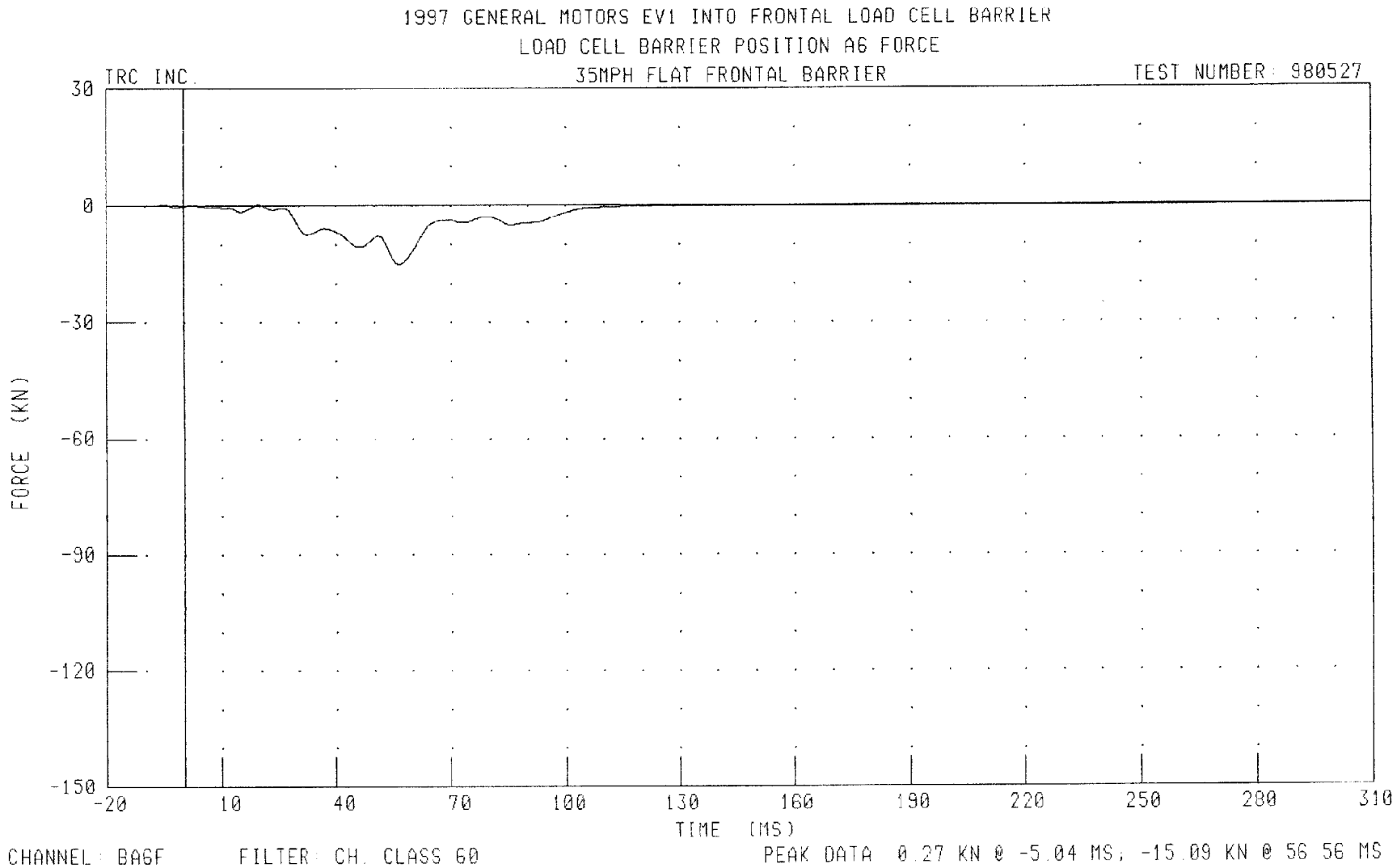
TRC INC. 35MPH FLAT FRONTAL BARRIER TEST NUMBER: 980527



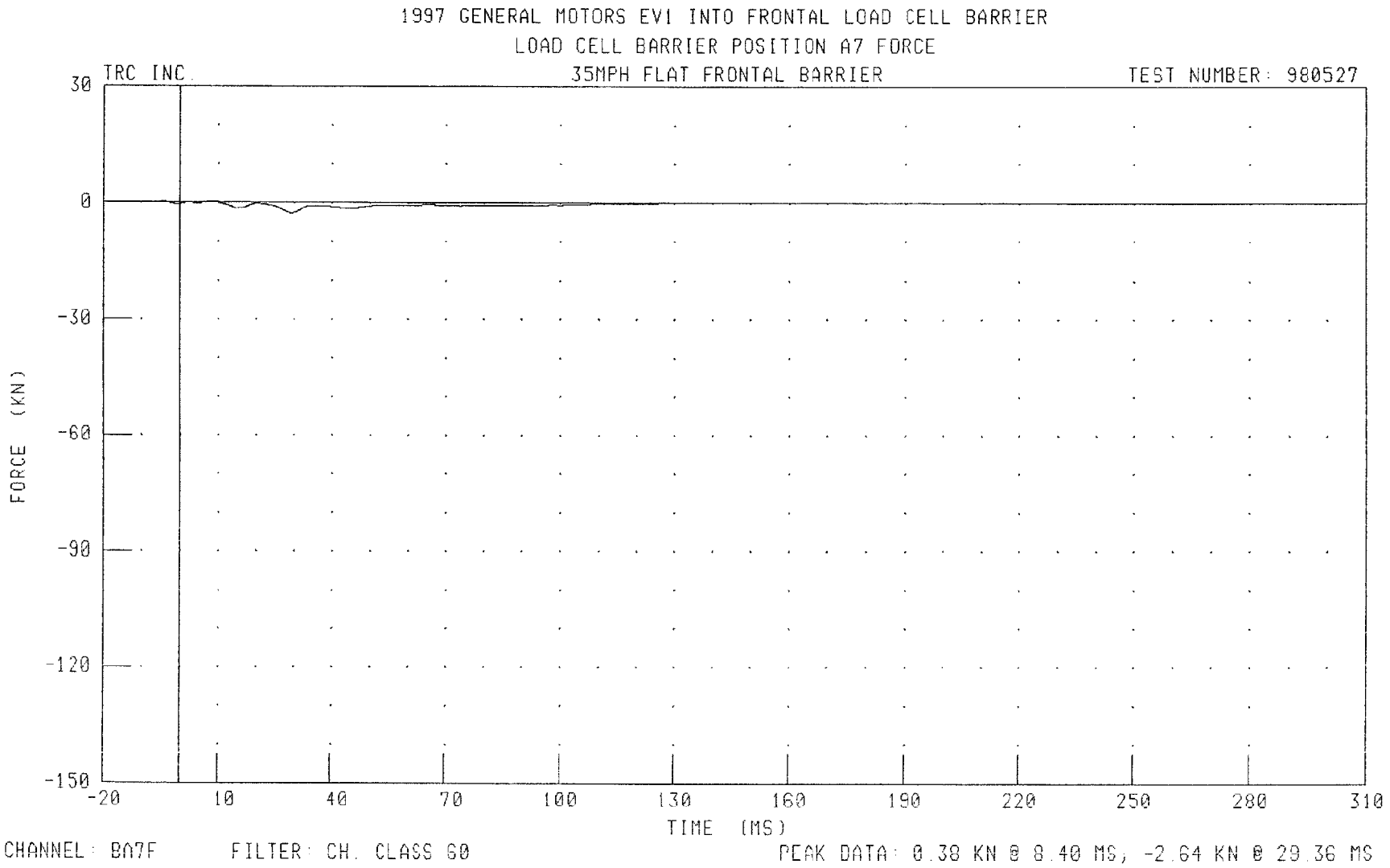
CHANNEL: BA4F FILTER: CH. CLASS 60 PEAK DATA: 0 30 KN @ -4 72 MS; -9.69 KN @ 31.92 MS

980527

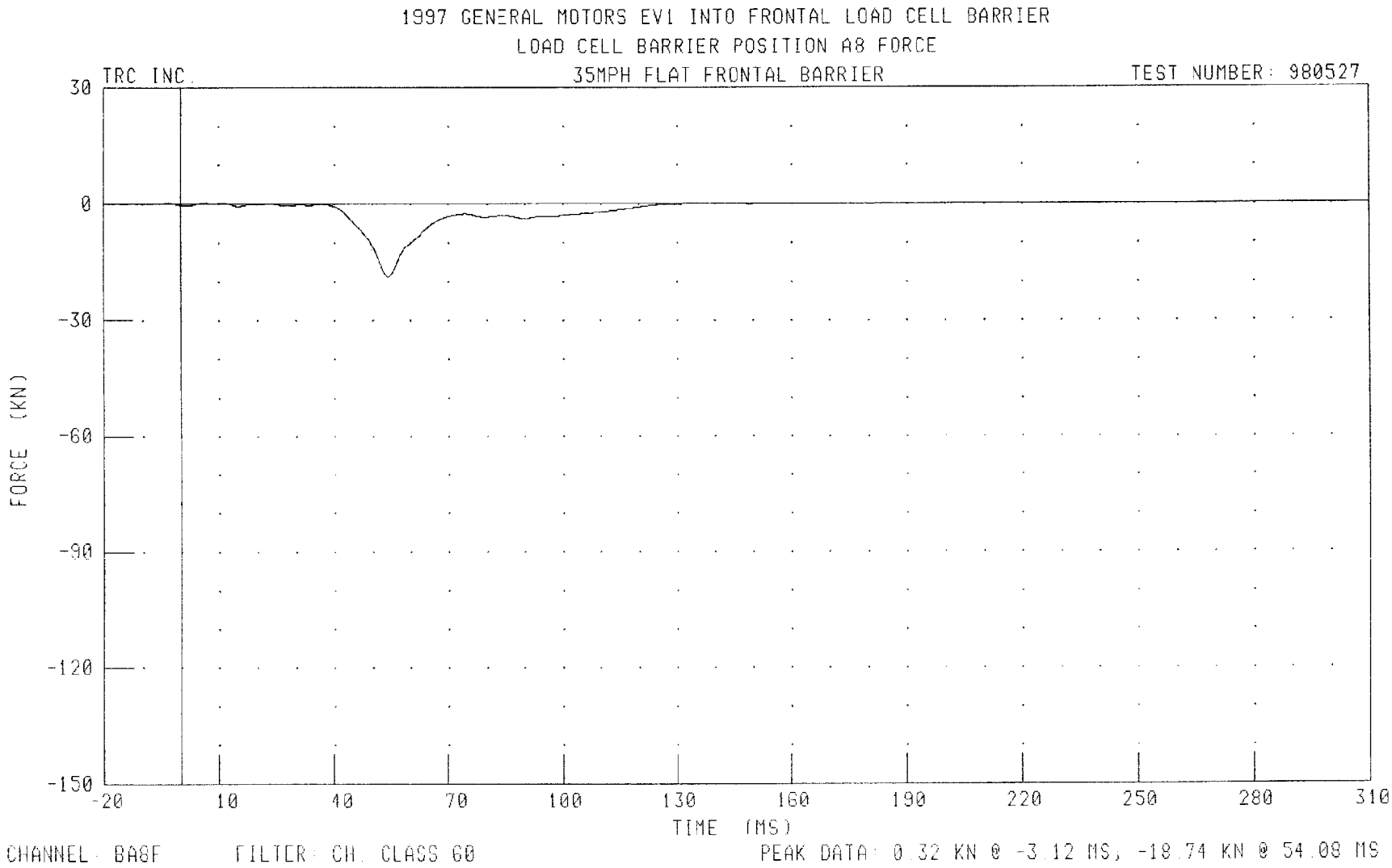

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A5 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
See Data Acquisition Explanations
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA5F
FILTER: CH. CLASS 60
PEAK DATA: 1.18 KN @ -9.52 MS, -18.67 KN @ -3.68 MS

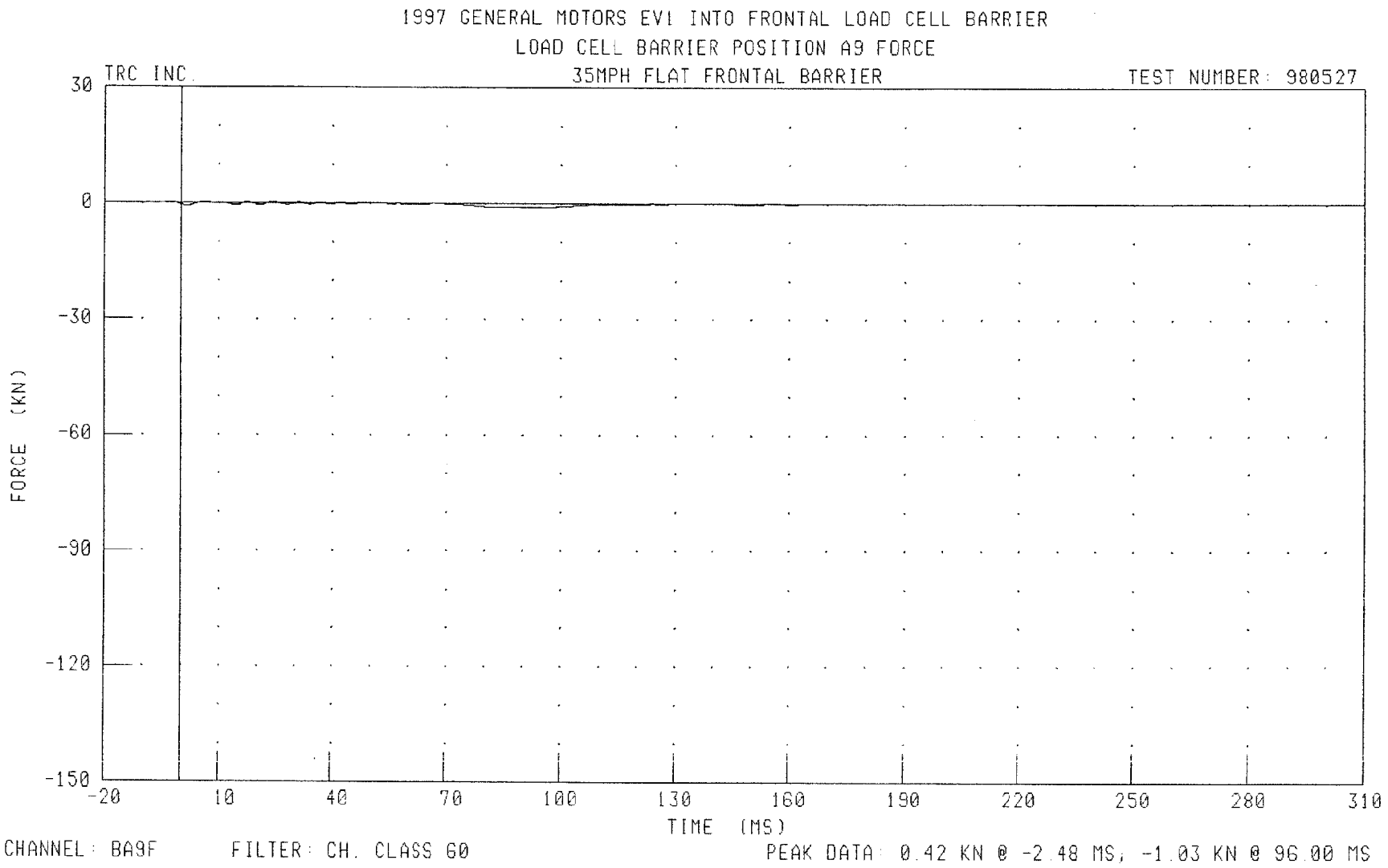

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC.
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAGF
FILTER: CH. CLASS 60
PEAK DATA 0.27 KN @ -5.04 MS, -15.09 KN @ 56.56 MS

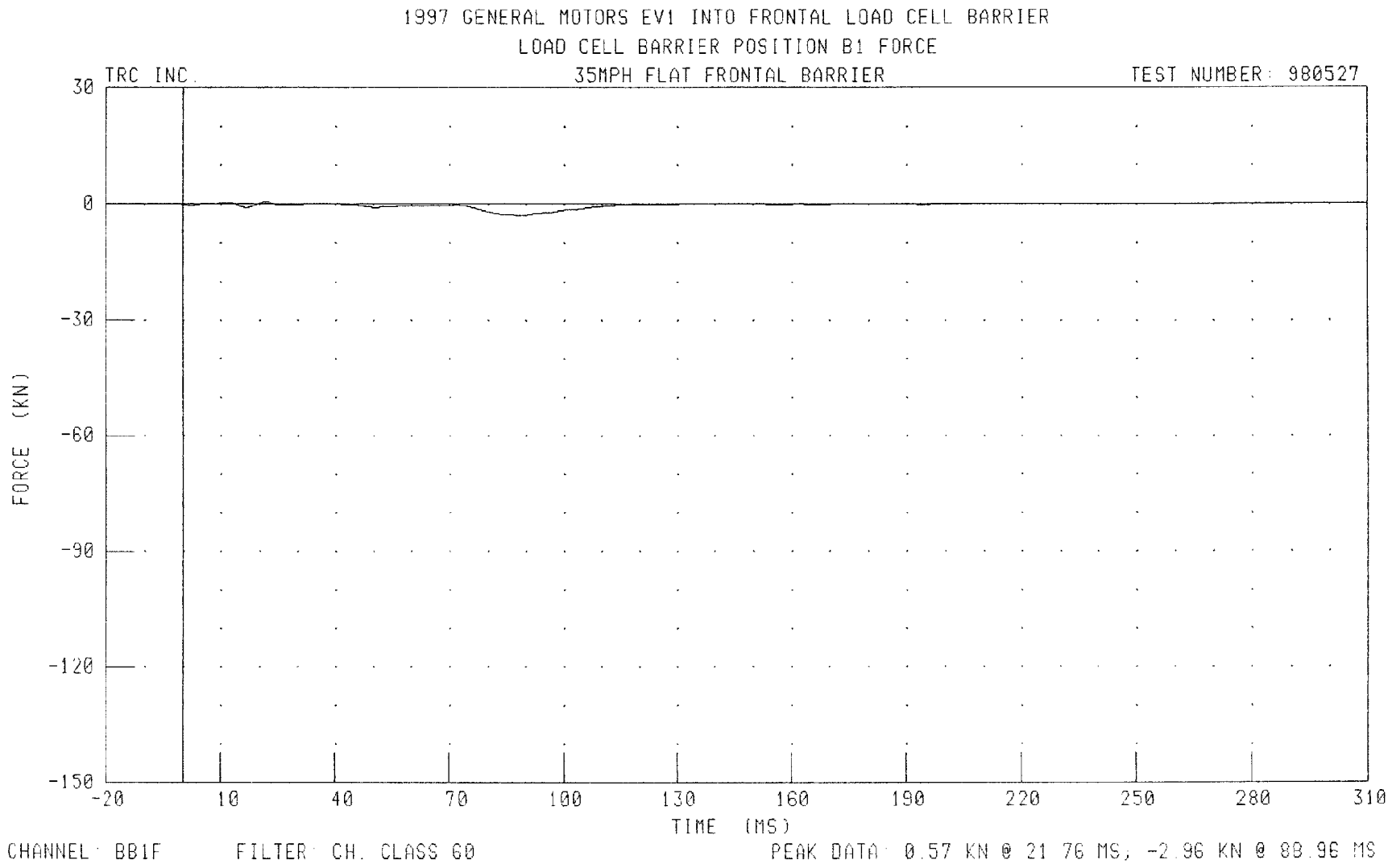
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A7 FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA7F
FILTER: CH. CLASS 60
PEAK DATA: 0.38 KN @ 8.40 MS, -2.64 KN @ 29.36 MS

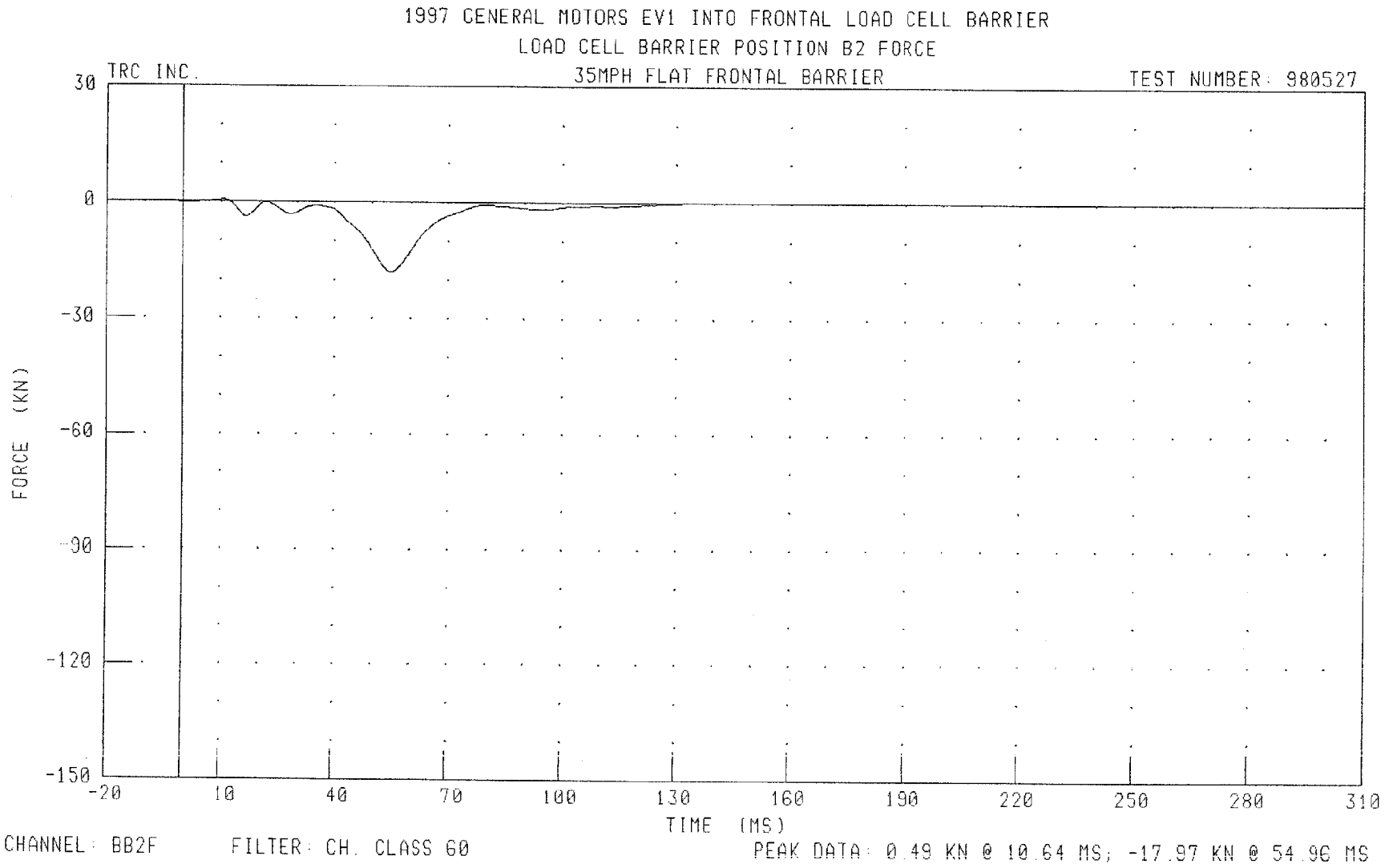
980527


1997 GENERAL MOTORS EVI INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A8 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA8F
FILTER: CH. CLASS 60
PEAK DATA: 0.32 KN @ -3.12 MS, -18.74 KN @ 54.08 MS

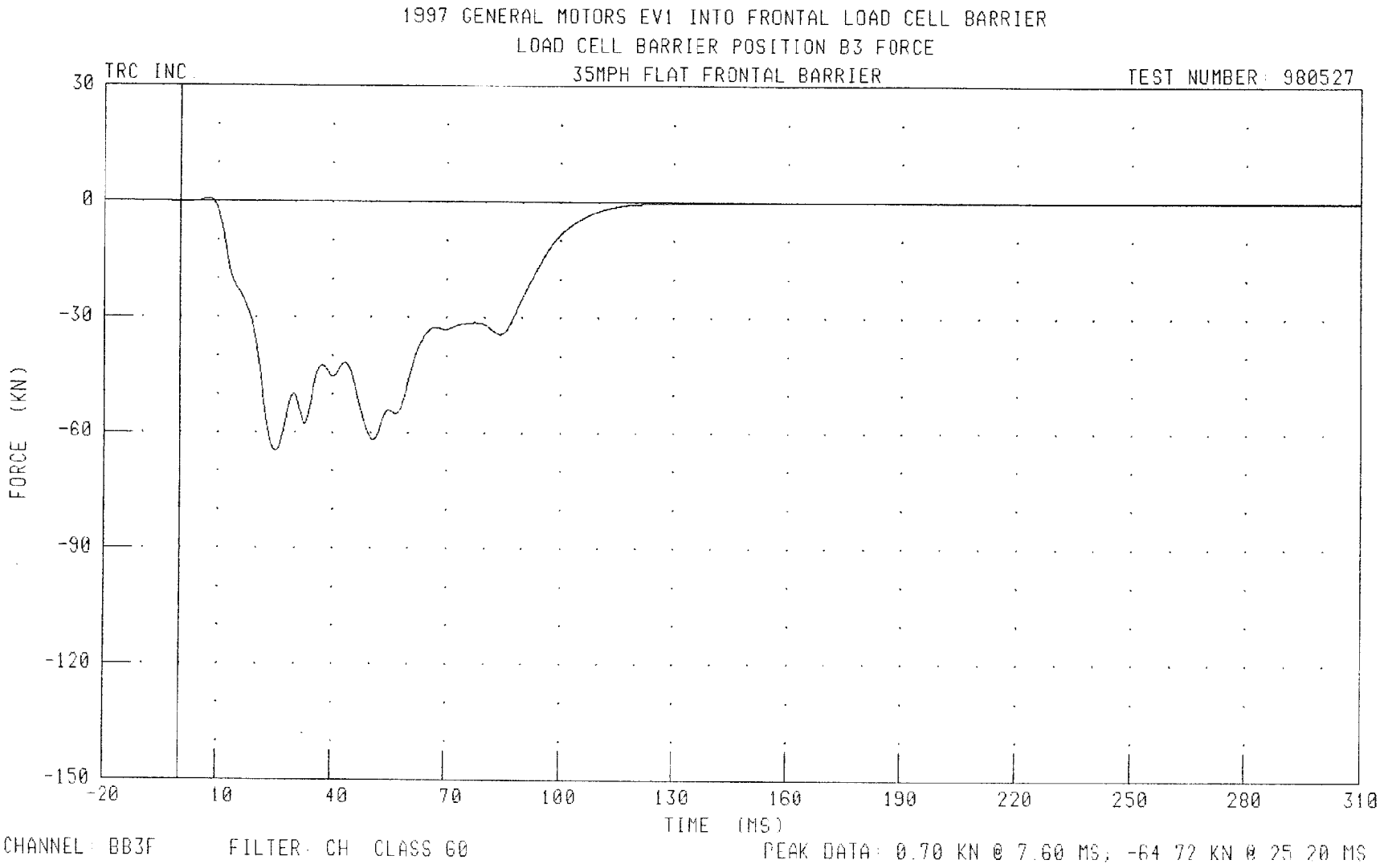

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A9 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BA9F
FILTER: CH. CLASS 60
PEAK DATA: 0.42 KN @ -2.48 MS, -1.03 KN @ 96.00 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B1 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BB1F
FILTER: CH. CLASS 60
PEAK DATA: 0.57 KN @ 21.76 MS, -2.96 KN @ 89.96 MS

980527

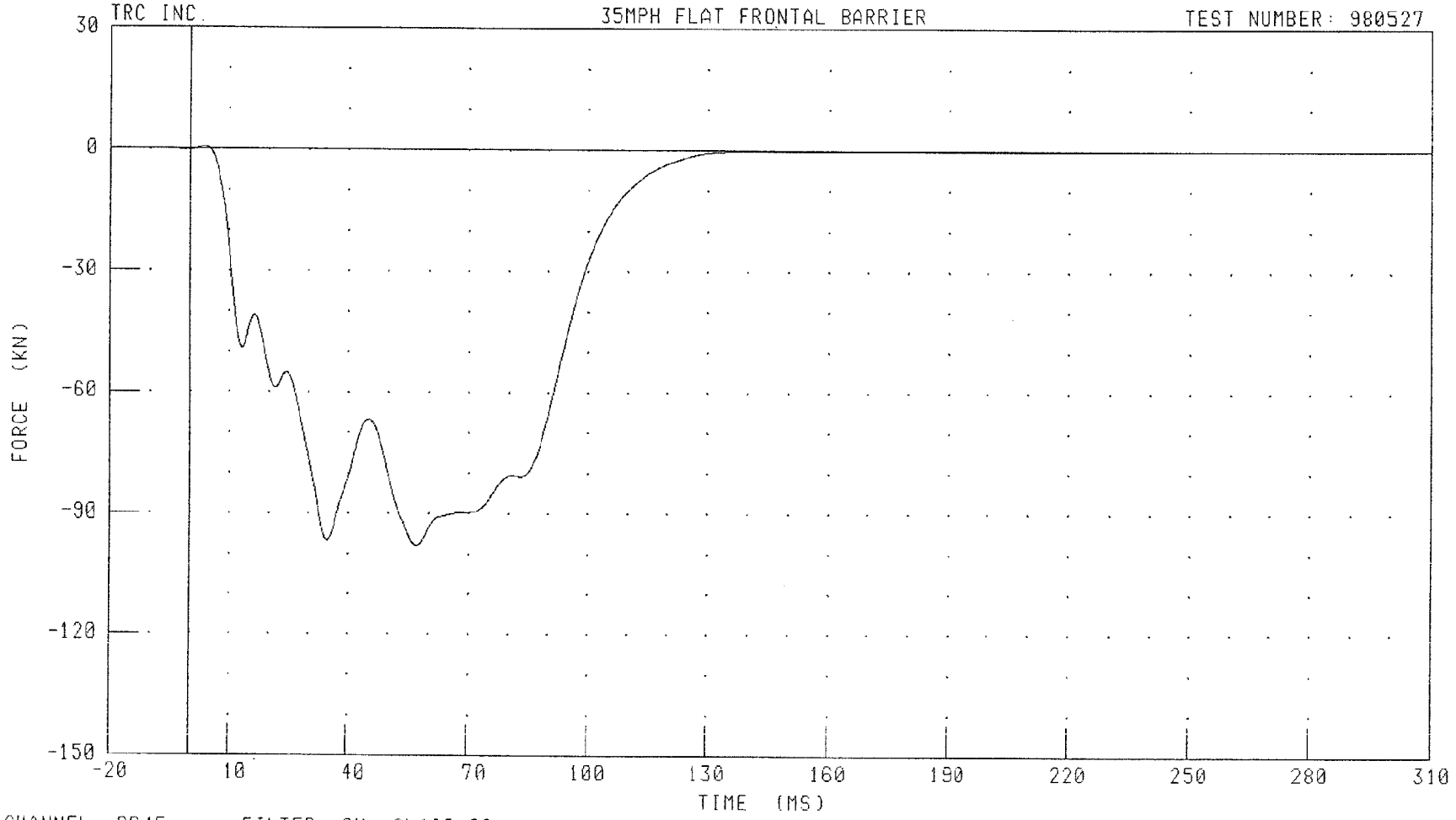

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BB2F
FILTER: CH. CLASS 60
PEAK DATA: 0.49 KN @ 10.64 MS; -17.97 KN @ 54.96 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B3 FORCE
35MPH FLAT FRONTAL BARRIER
TRC INC
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BB3F
FILTER: CH CLASS 60
PEAK DATA: 0.70 KN @ 7.60 MS; -64.72 KN @ 25.20 MS

980527

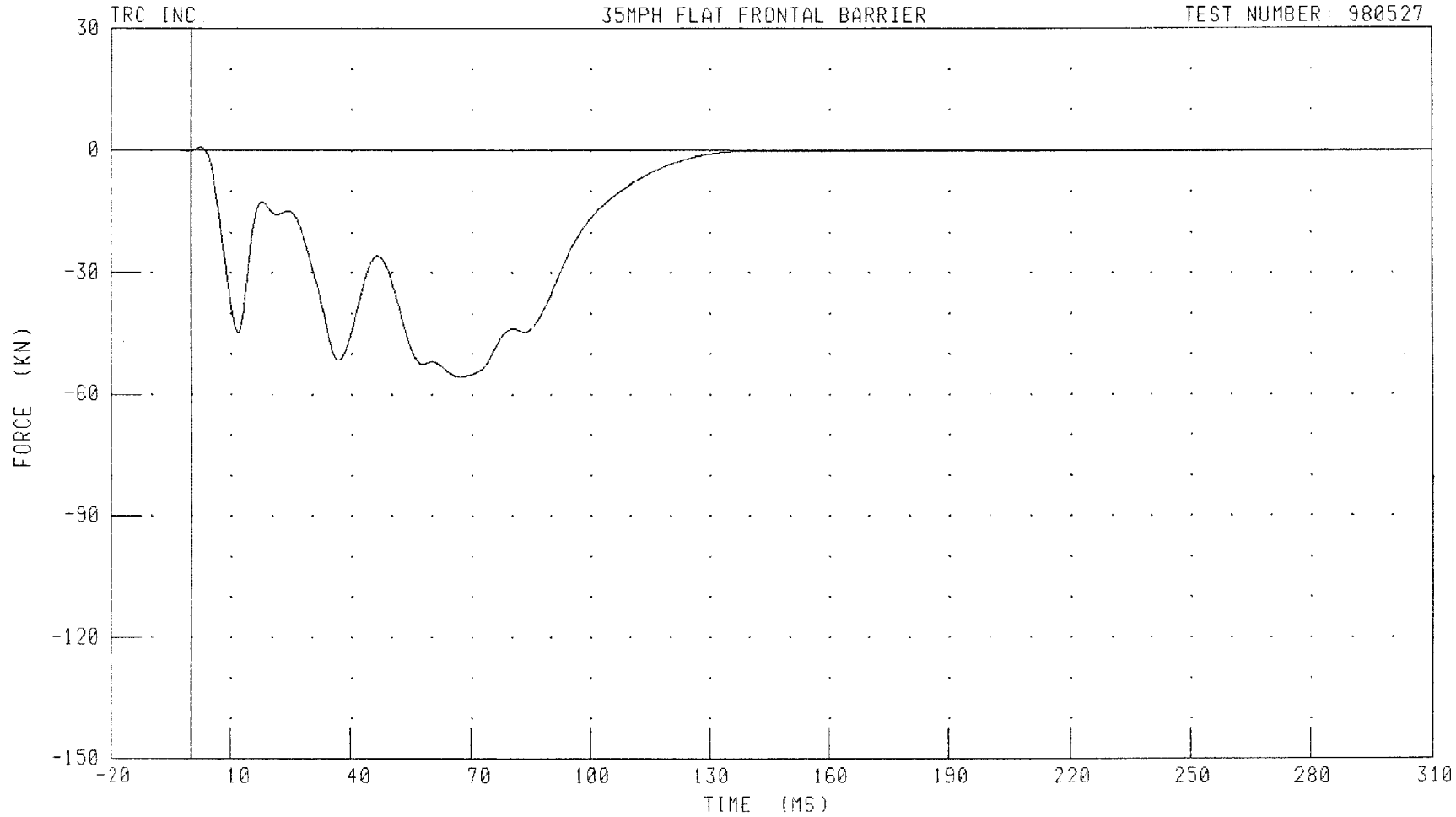
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE
35MPH FLAT FRONTAL BARRIER



CHANNEL: BB4F FILTER: CH. CLASS 60 PEAK DATA: 0.67 KN @ 3.76 MS, -97.96 KN @ 57.12 MS

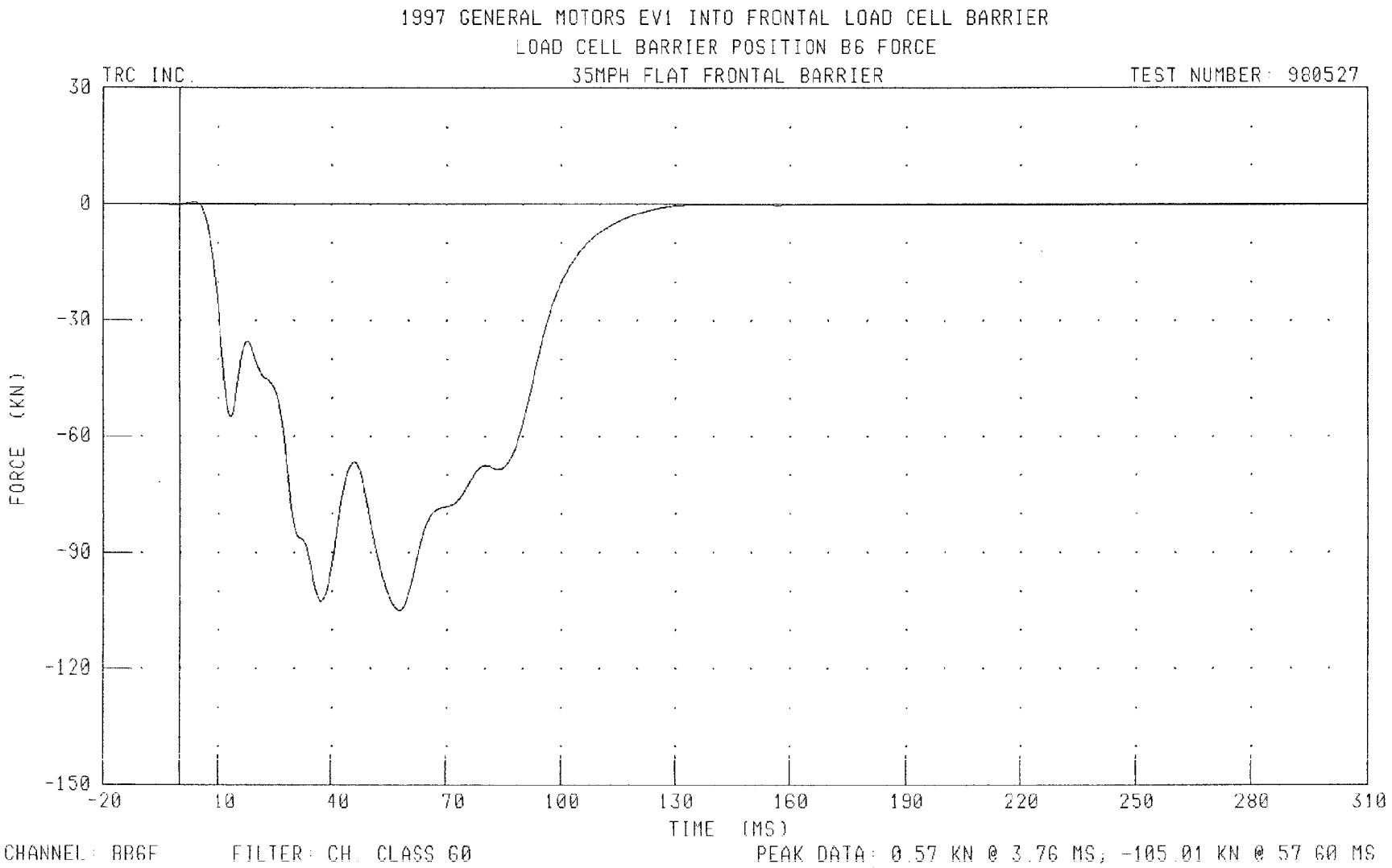
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B5 FORCE

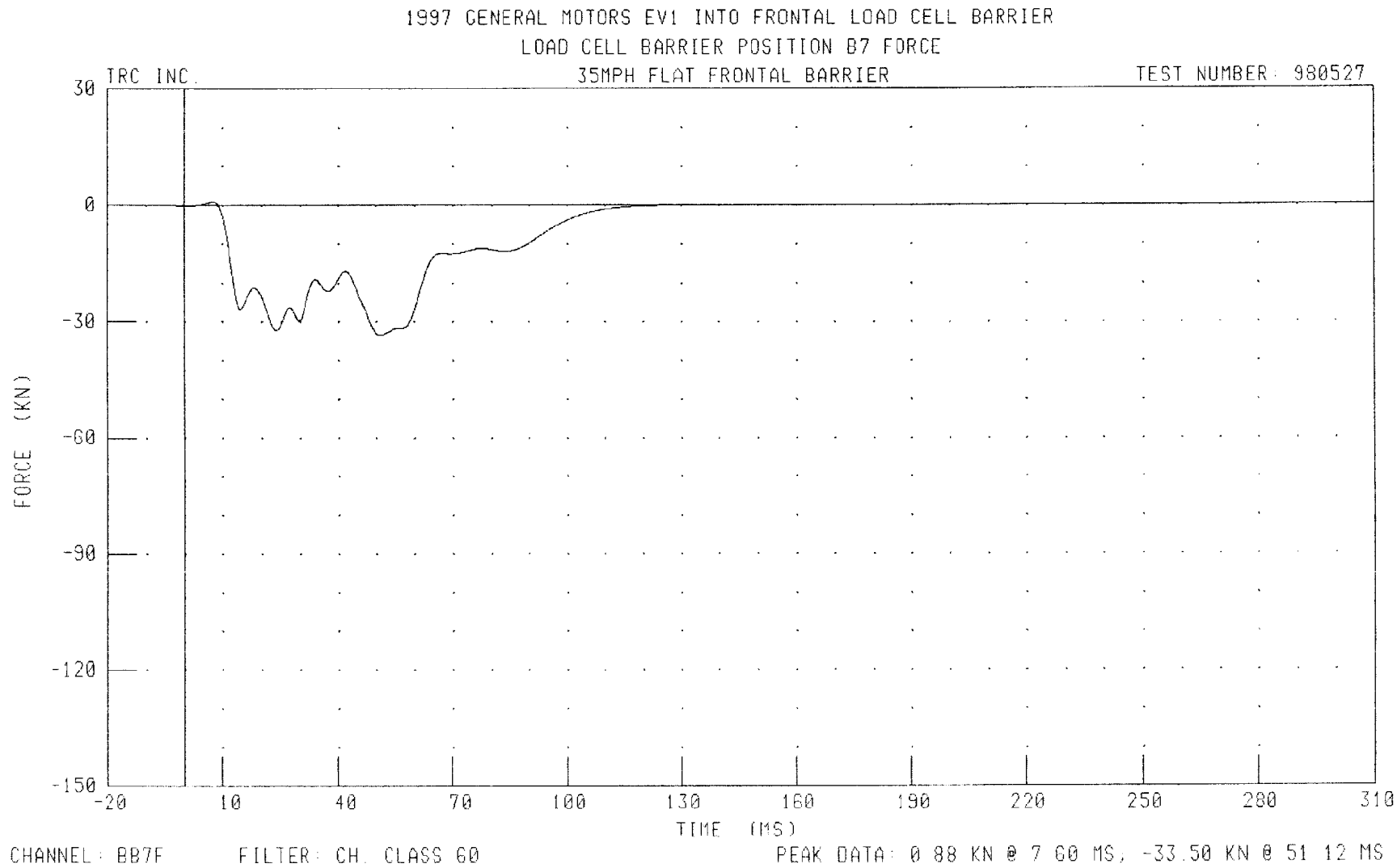


CHANNEL: BB5F FILTER: CH. CLASS 60 PEAK DATA: 0.73 KN @ 2.32 MS; -55.69 KN @ 67.20 MS

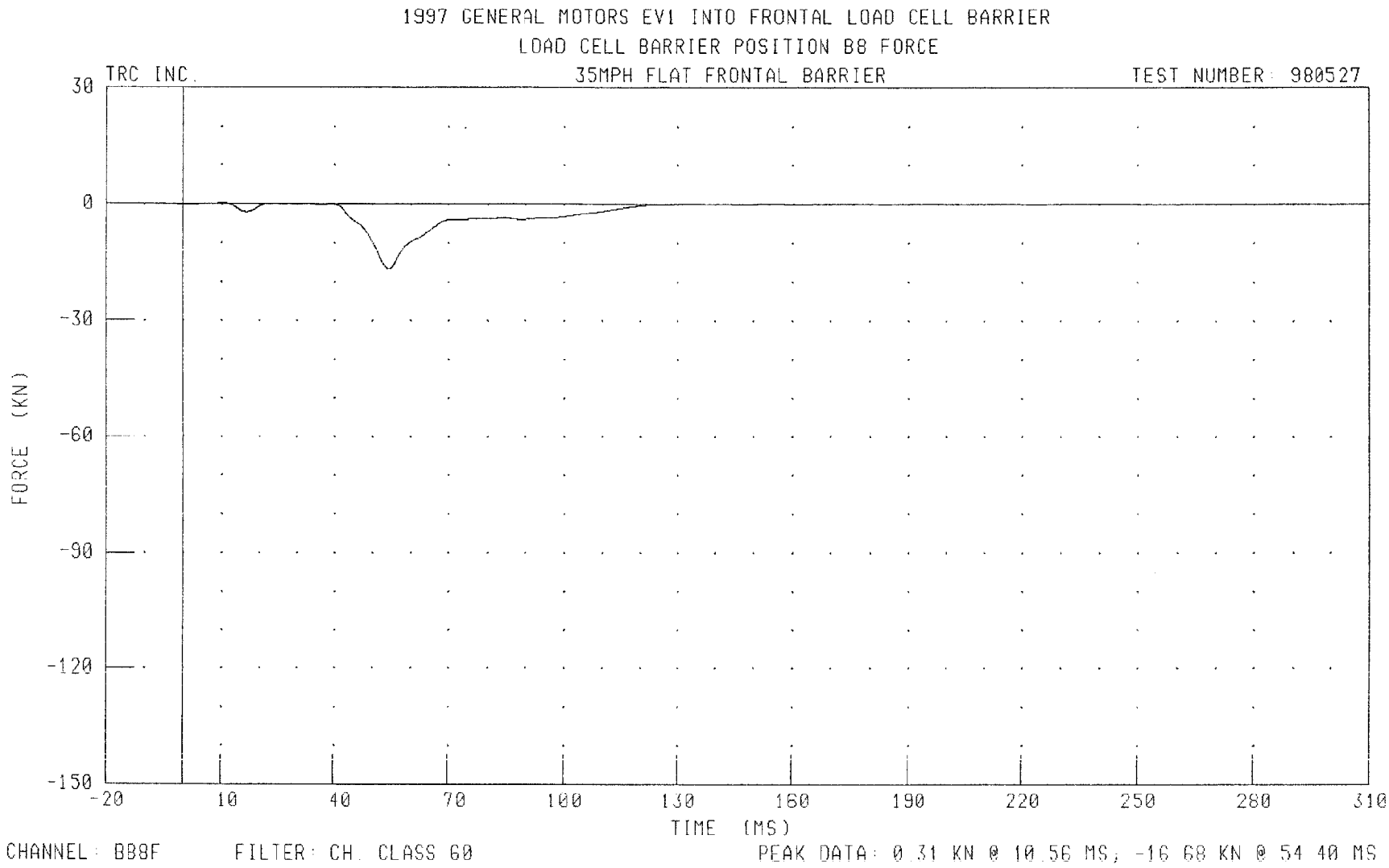
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BB6F
FILTER: CH CLASS 60
PEAK DATA: 0.57 KN @ 3.76 MS; -105.01 KN @ 57.60 MS

980527

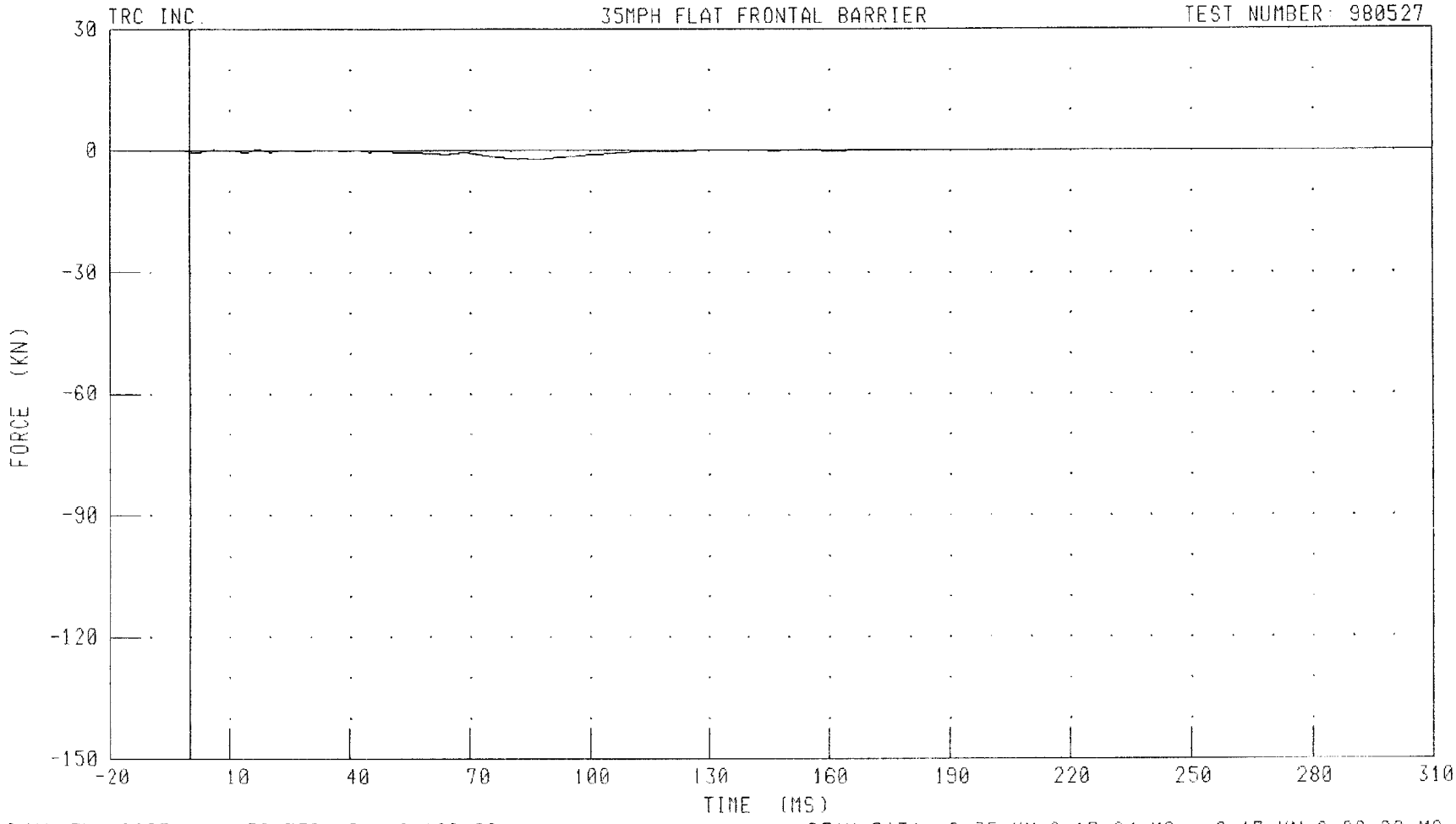

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B7 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BB7F
FILTER: CH. CLASS 60
PEAK DATA: 0.88 KN @ 7.60 MS, -33.50 KN @ 51.12 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B8 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8SF
FILTER: CH. CLASS 60
PEAK DATA: 0.31 KN @ 10.56 MS; -16.68 KN @ 54.40 MS

980527

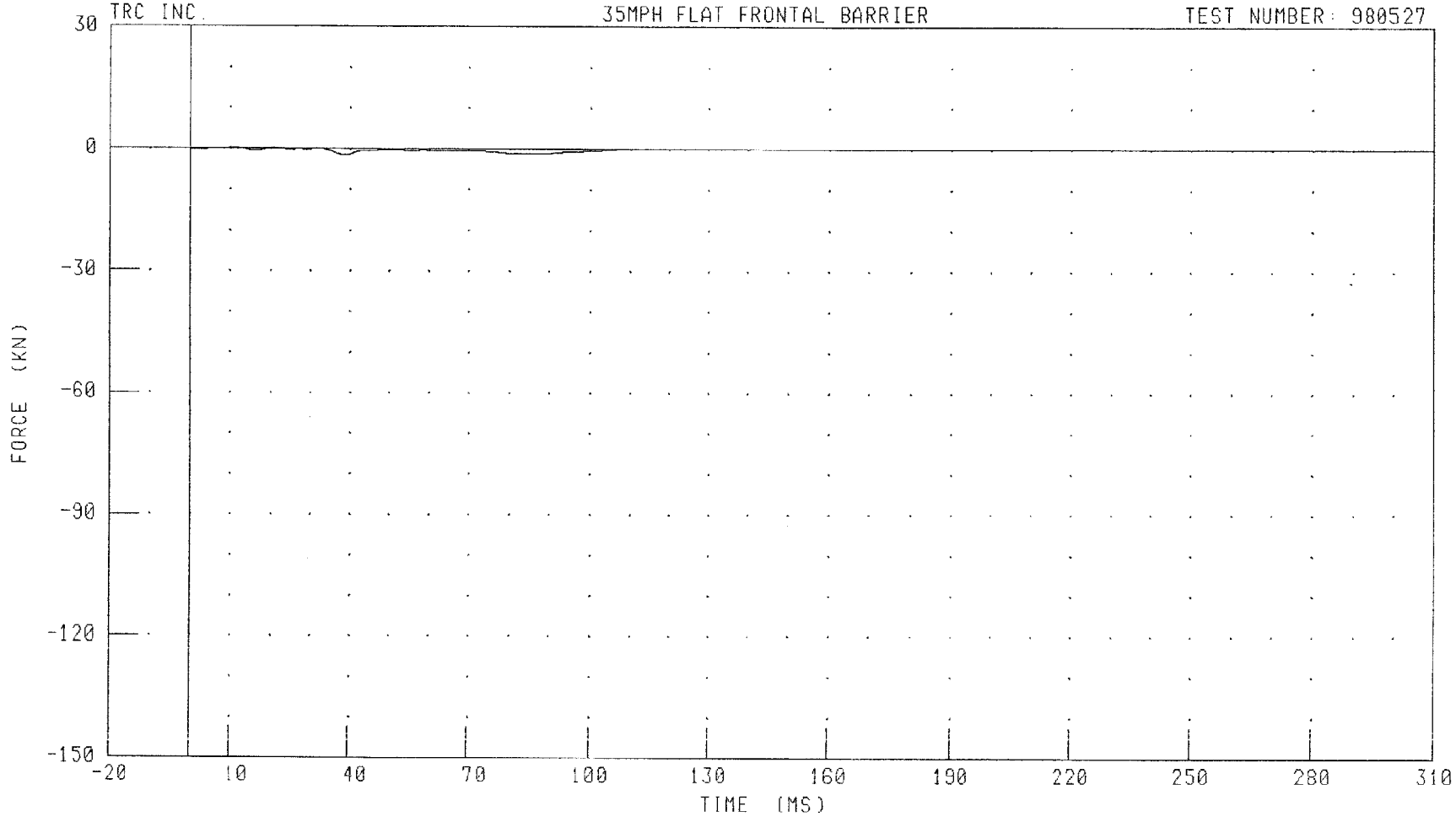
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B9 FORCE



CHANNEL: BB9F FILTER: CH. CLASS 60 PEAK DATA: 0.35 KN @ 17.04 MS, -2.17 KN @ 86.96 MS

980527

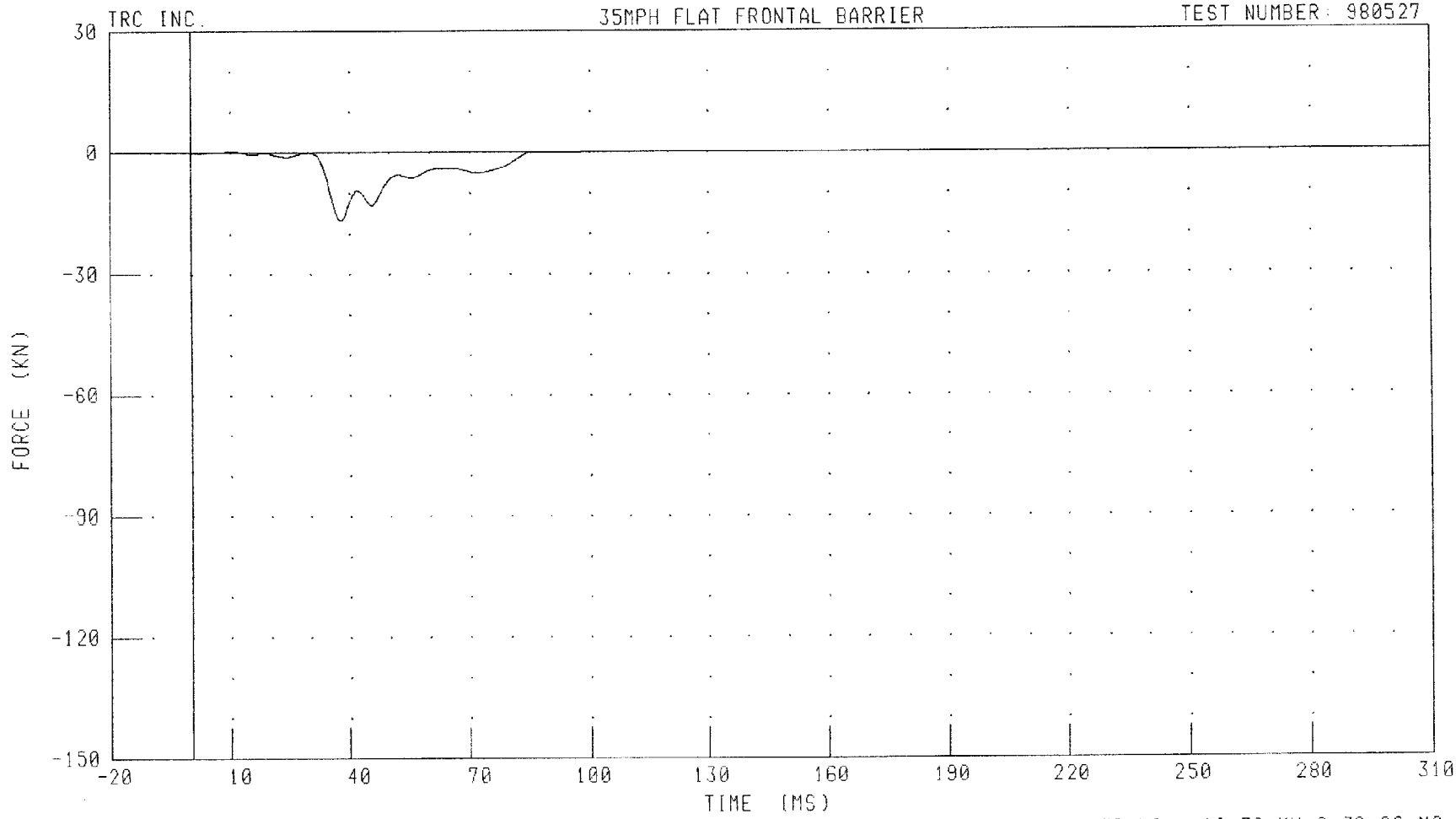
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE



CHANNEL: BC1F FILTER: CH. CLASS 60 PEAK DATA: 0.29 KN @ 10.88 MS; -1.53 KN @ 38.96 MS

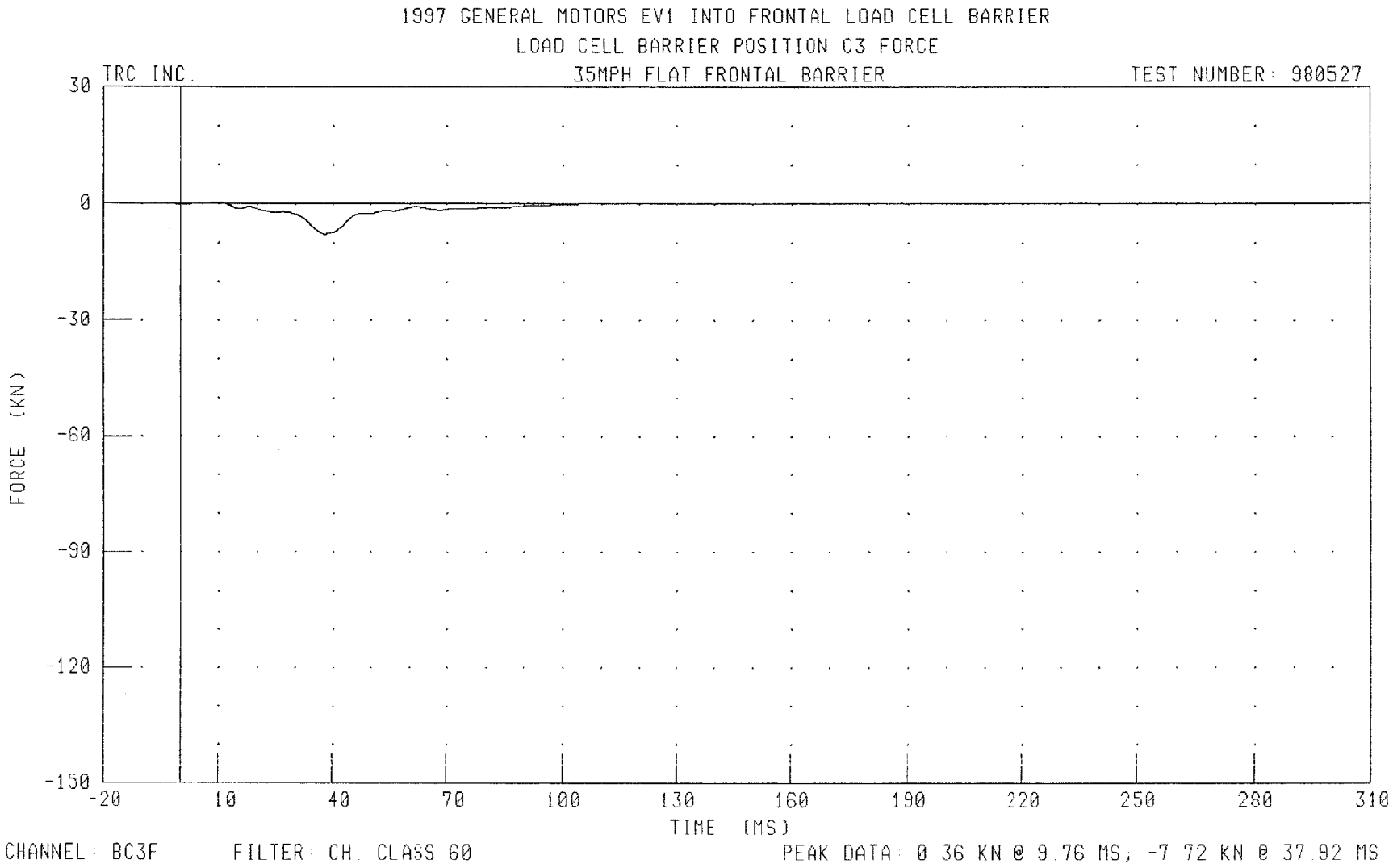
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C2 FORCE
TRC INC. 35MPH FLAT FRONTAL BARRIER TEST NUMBER: 980527

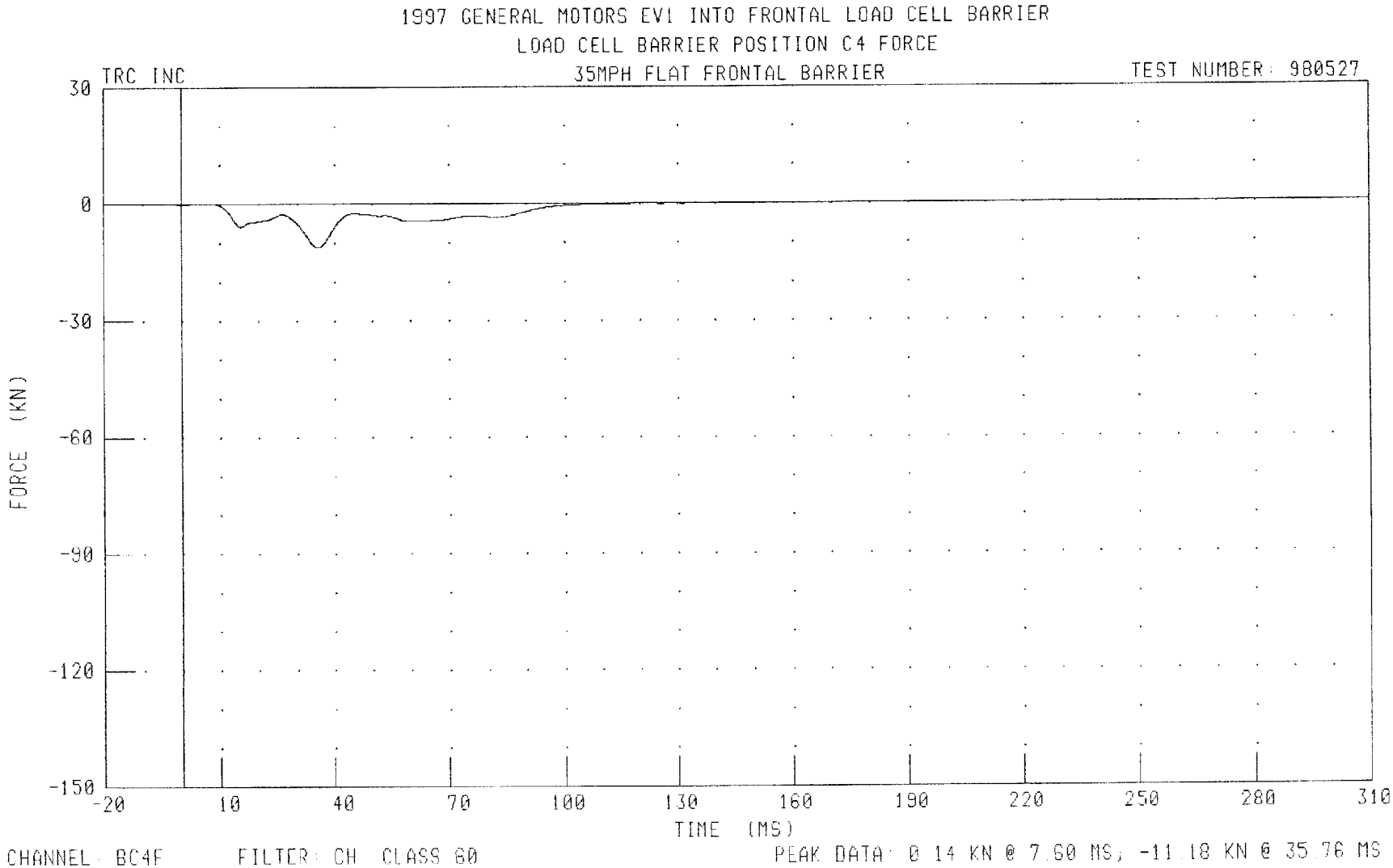


CHANNEL: BC2F FILTER: CH. CLASS 60 PEAK DATA: 0.33 KN @ 10.56 MS, -16.78 KN @ 38.00 MS

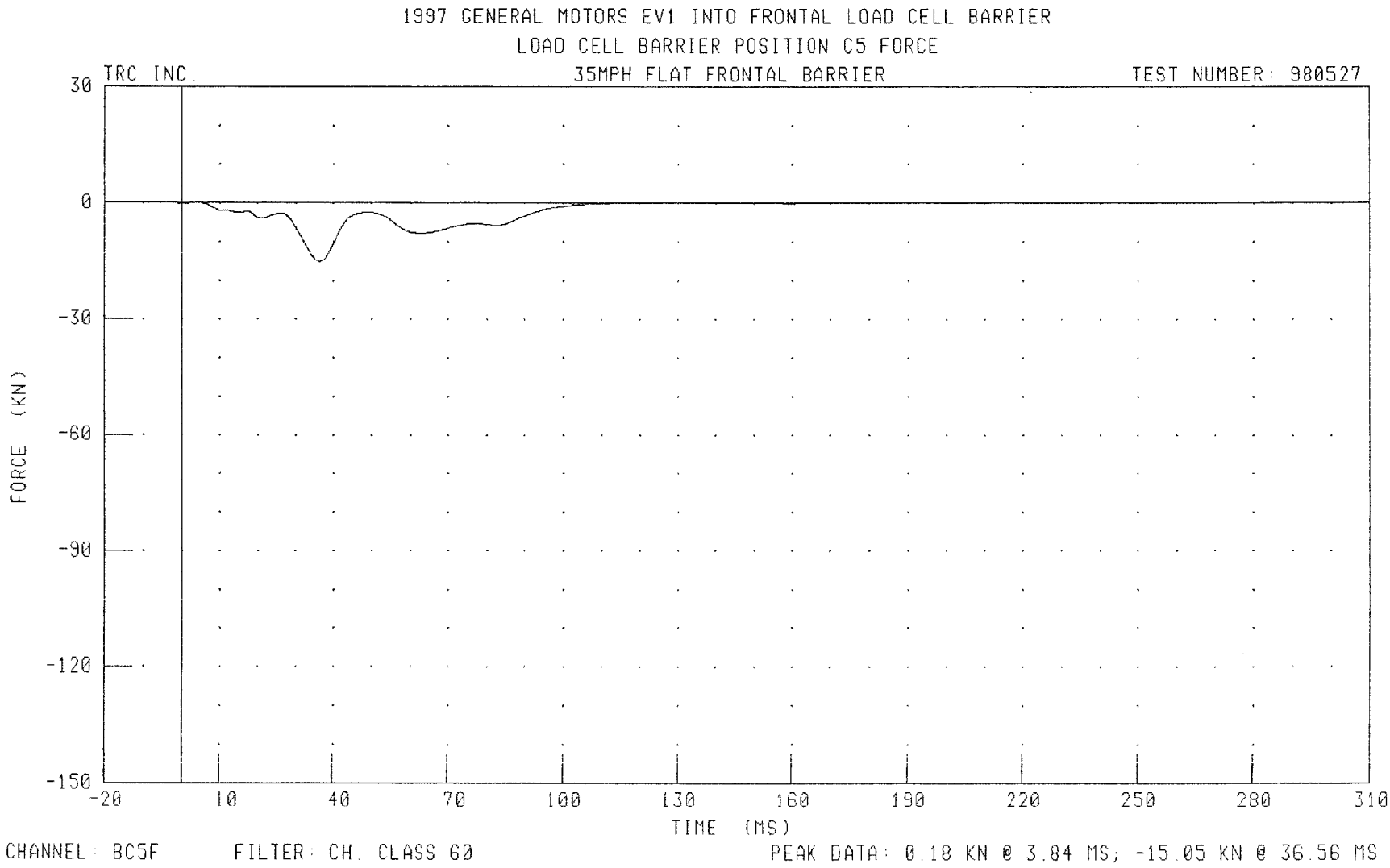
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C3 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC3F
FILTER: CH. CLASS 60
PEAK DATA: 0.36 KN @ 9.76 MS; -7.72 KN @ 37.92 MS

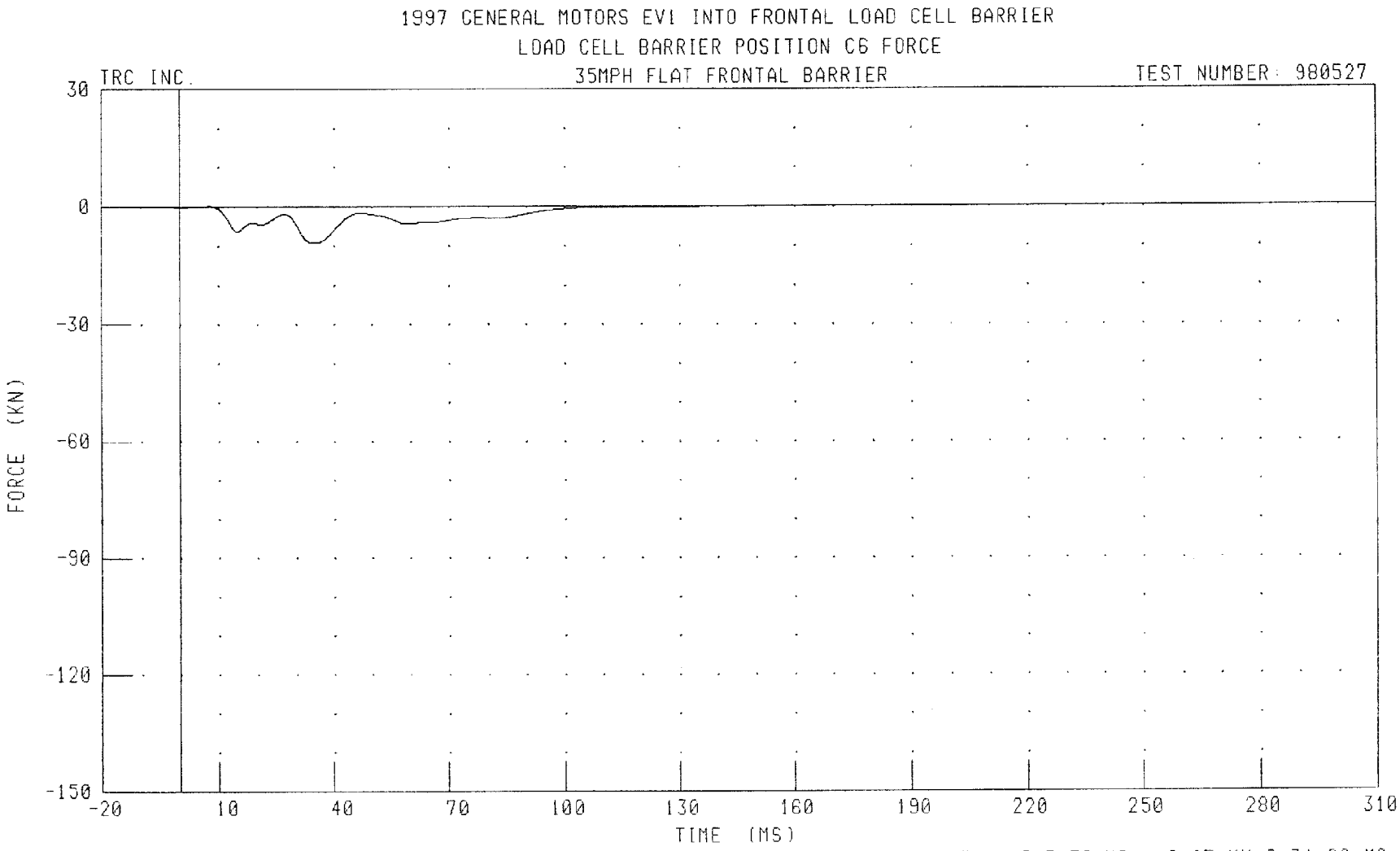
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C4 FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC4F
FILTER: CH CLASS 60
PEAK DATA: 0.14 KN @ 7.60 MS, -11.18 KN @ 35.76 MS

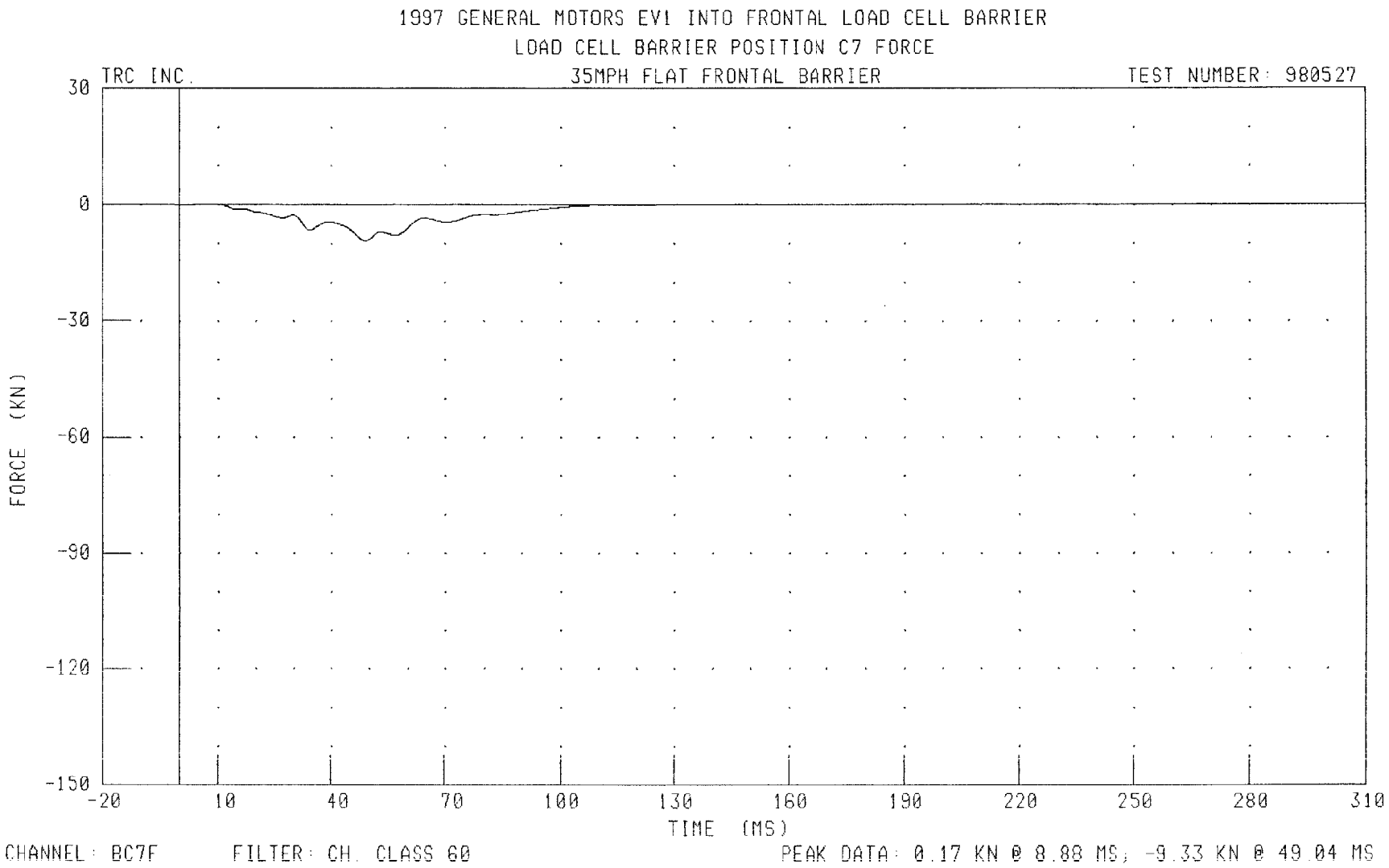
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC5F
FILTER: CH. CLASS 60
PEAK DATA: 0.18 KN @ 3.84 MS; -15.05 KN @ 36.56 MS

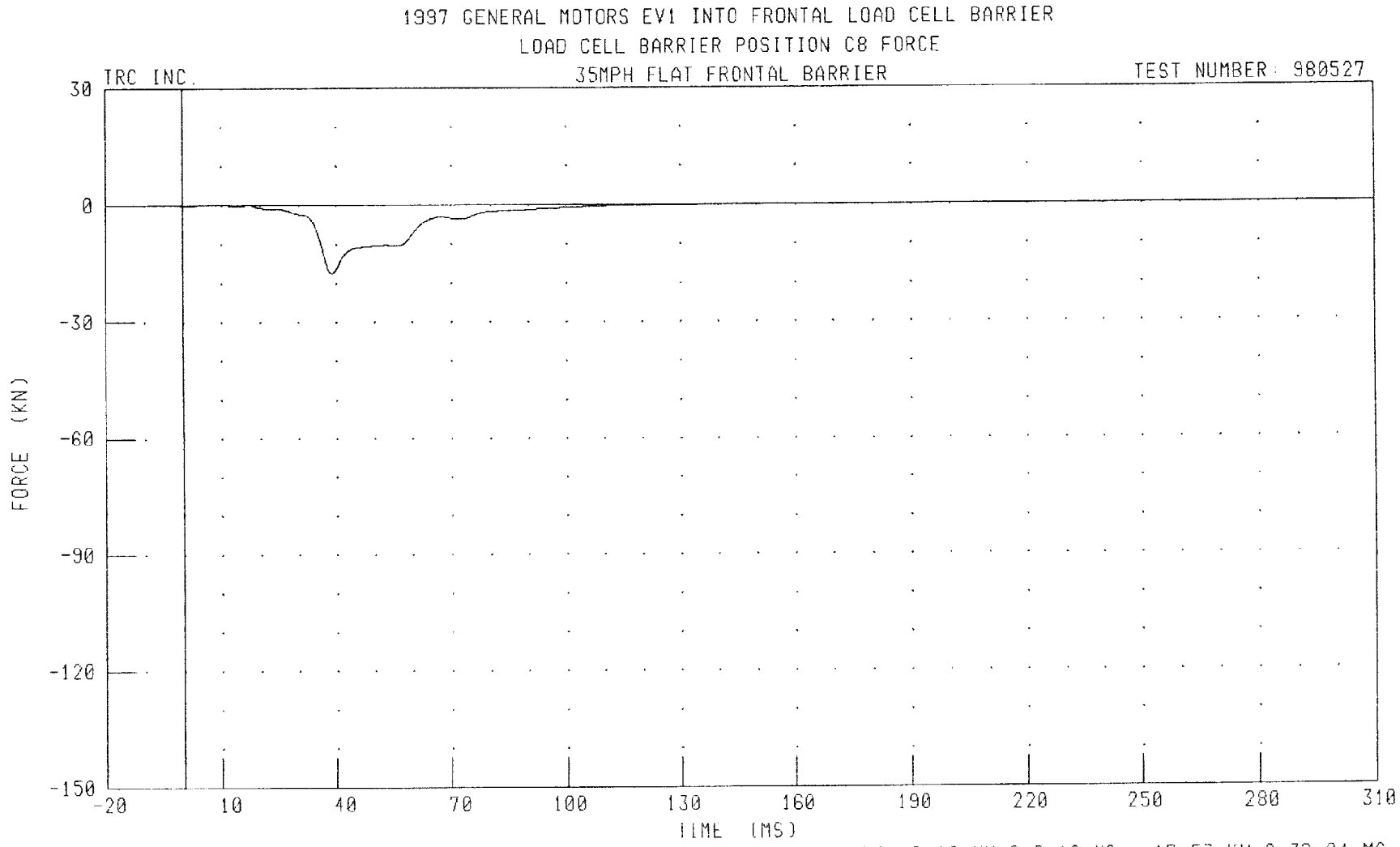
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C6 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC6F
FILTER: CH. CLASS 60
PEAK DATA: 0.23 KN @ 7.76 MS; -9.05 KN @ 34.88 MS

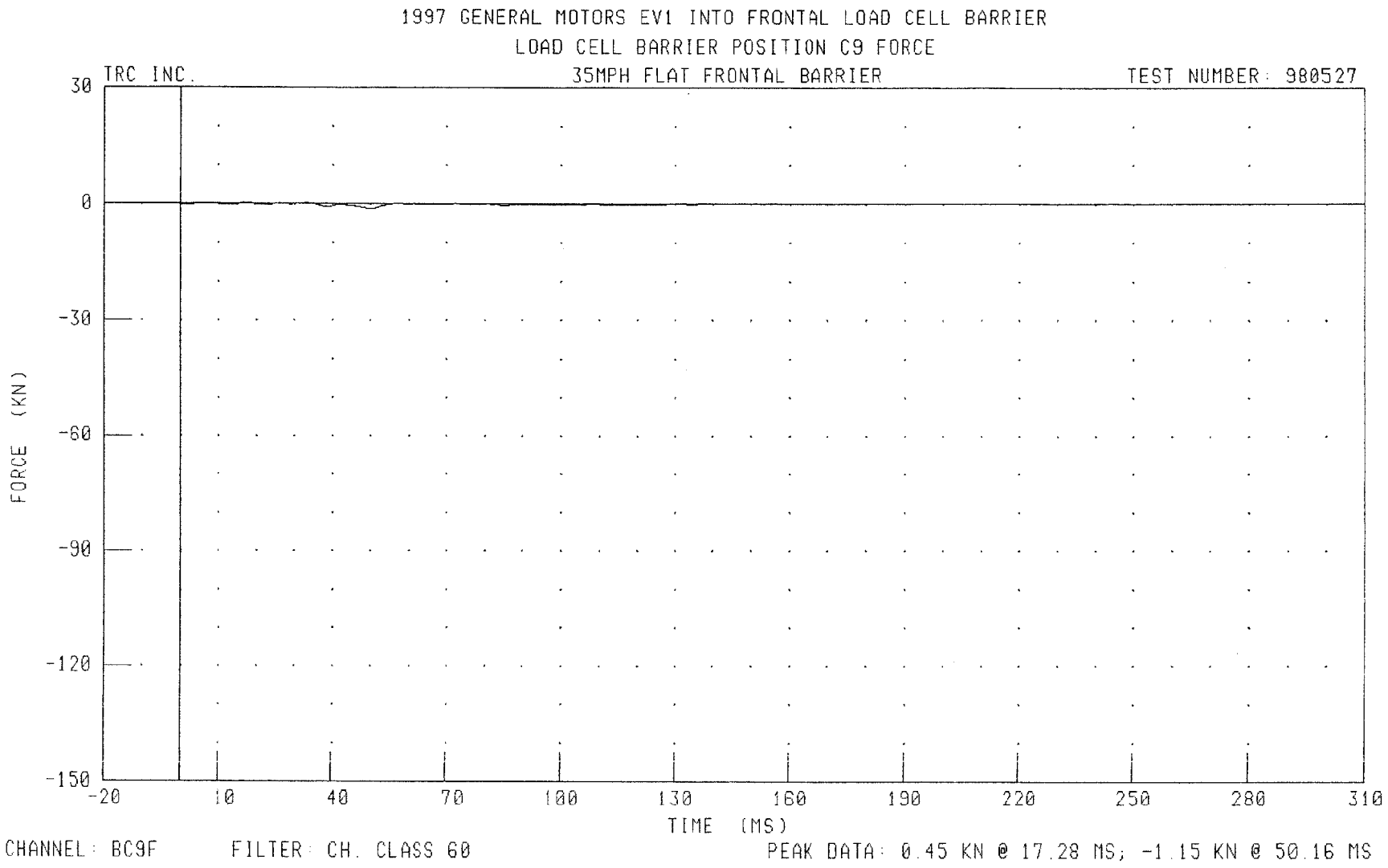
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC7F
FILTER: CH. CLASS 60
PEAK DATA: 0.17 KN @ 8.88 MS; -9.33 KN @ 49.04 MS

980527

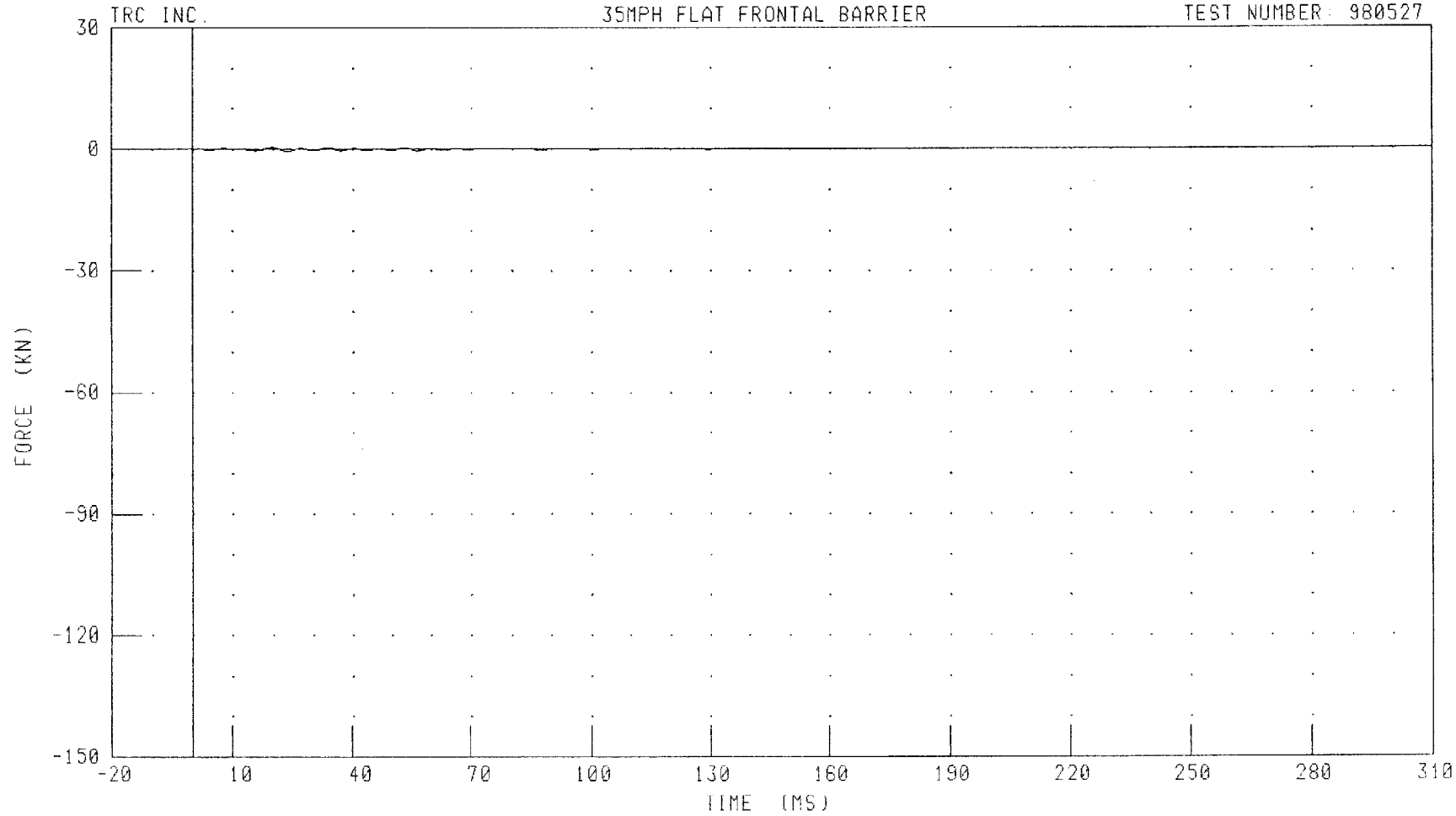

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C8 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC8F
FILTER: CH CLASS 60
PEAK DATA: 0.10 KN @ 6.16 MS; -17.53 KN @ 39.04 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BC9F
FILTER: CH. CLASS 60
PEAK DATA: 0.45 KN @ 17.28 MS; -1.15 KN @ 50.16 MS

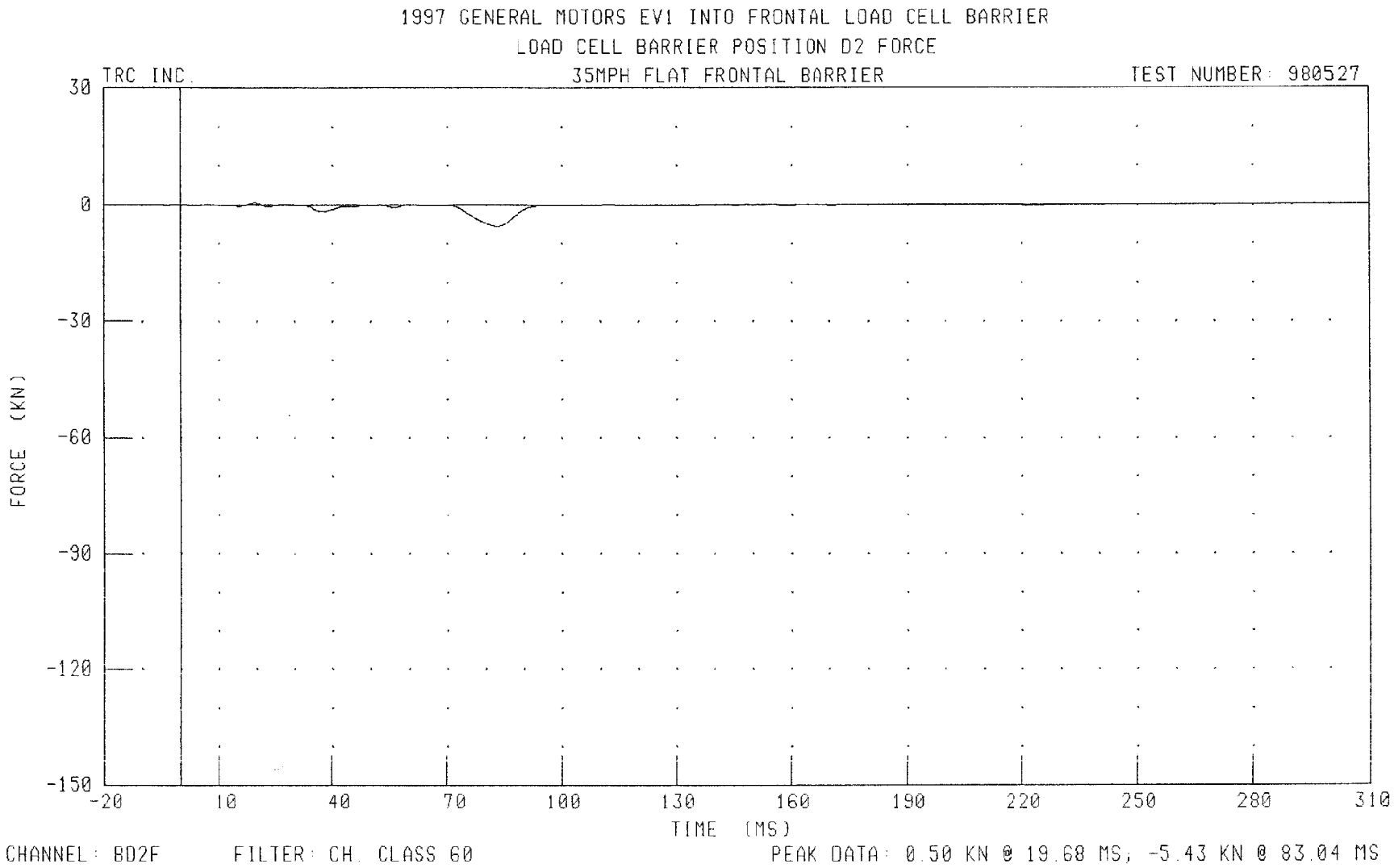
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D1 FORCE



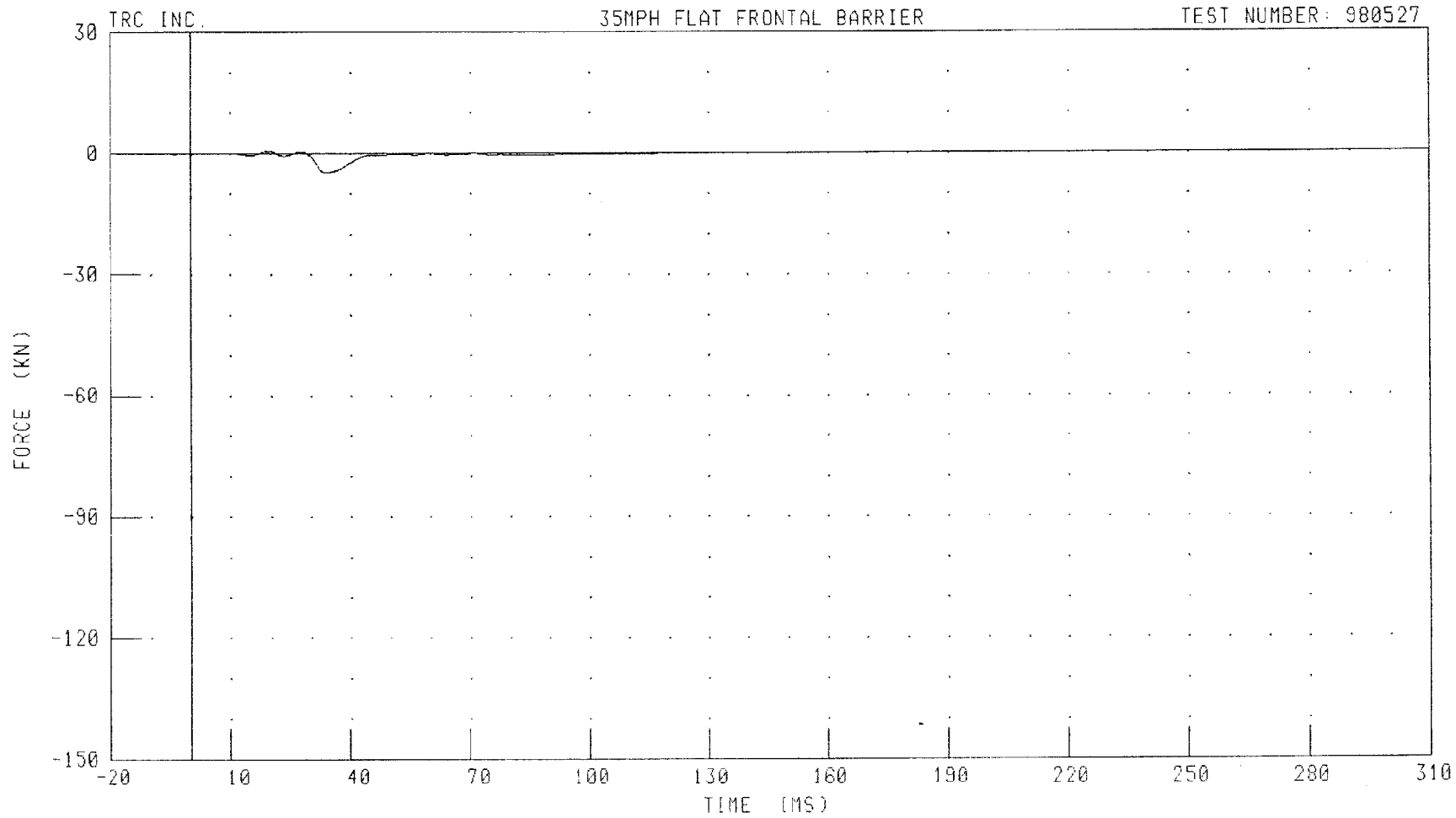
CHANNEL: BD1F FILTER: CH. CLASS 60 PEAK DATA: 0.47 KN @ 19.84 MS, -0.39 KN @ 23.60 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D2 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD2F
FILTER: CH. CLASS 60
PEAK DATA: 0.50 KN @ 19.68 MS, -5.43 KN @ 83.04 MS

980527

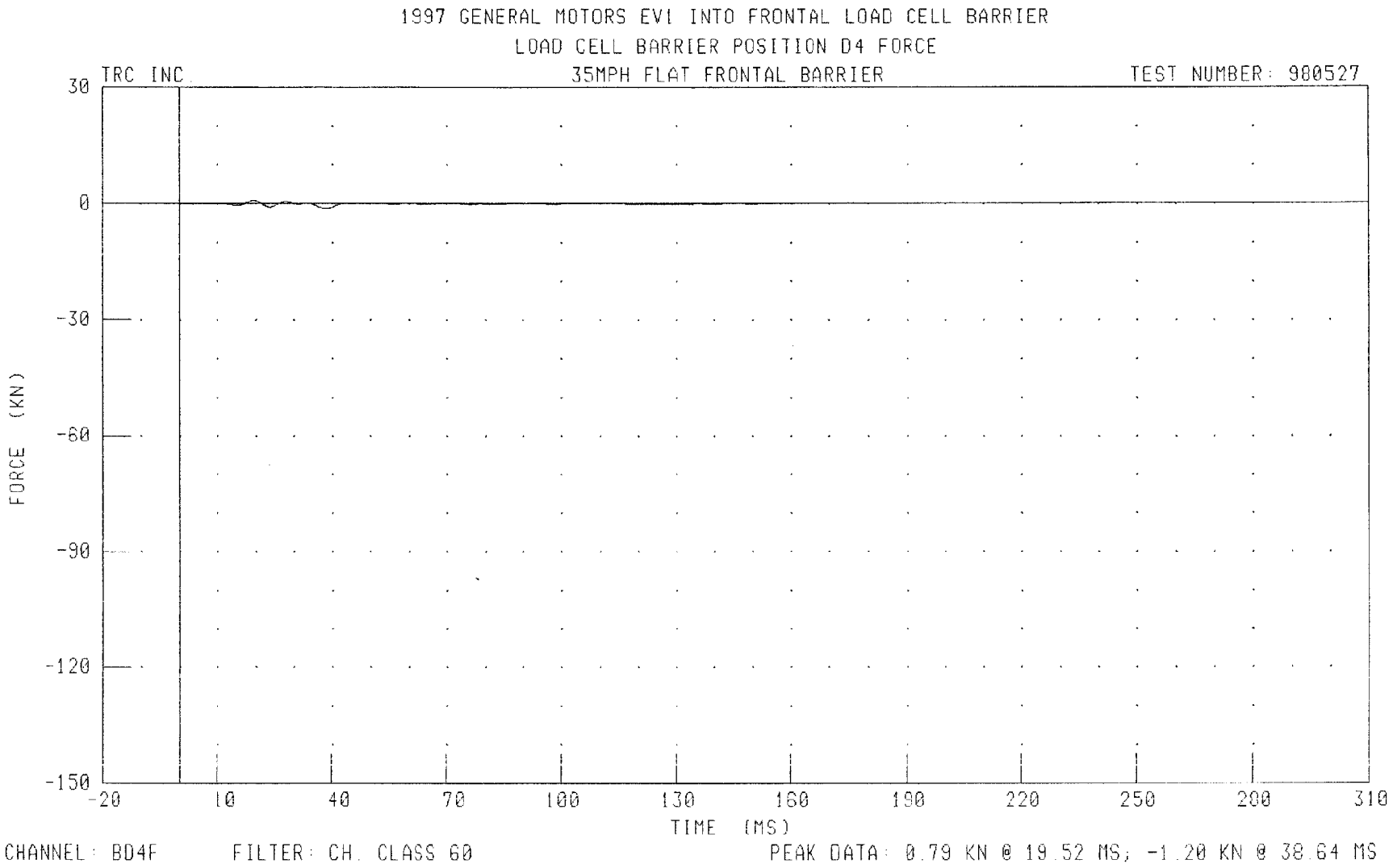
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D3 FORCE



CHANNEL: BD3F FILTER: CH CLASS 60 PEAK DATA: 0.66 KN @ 19.60 MS, -4.86 KN @ 34.24 MS

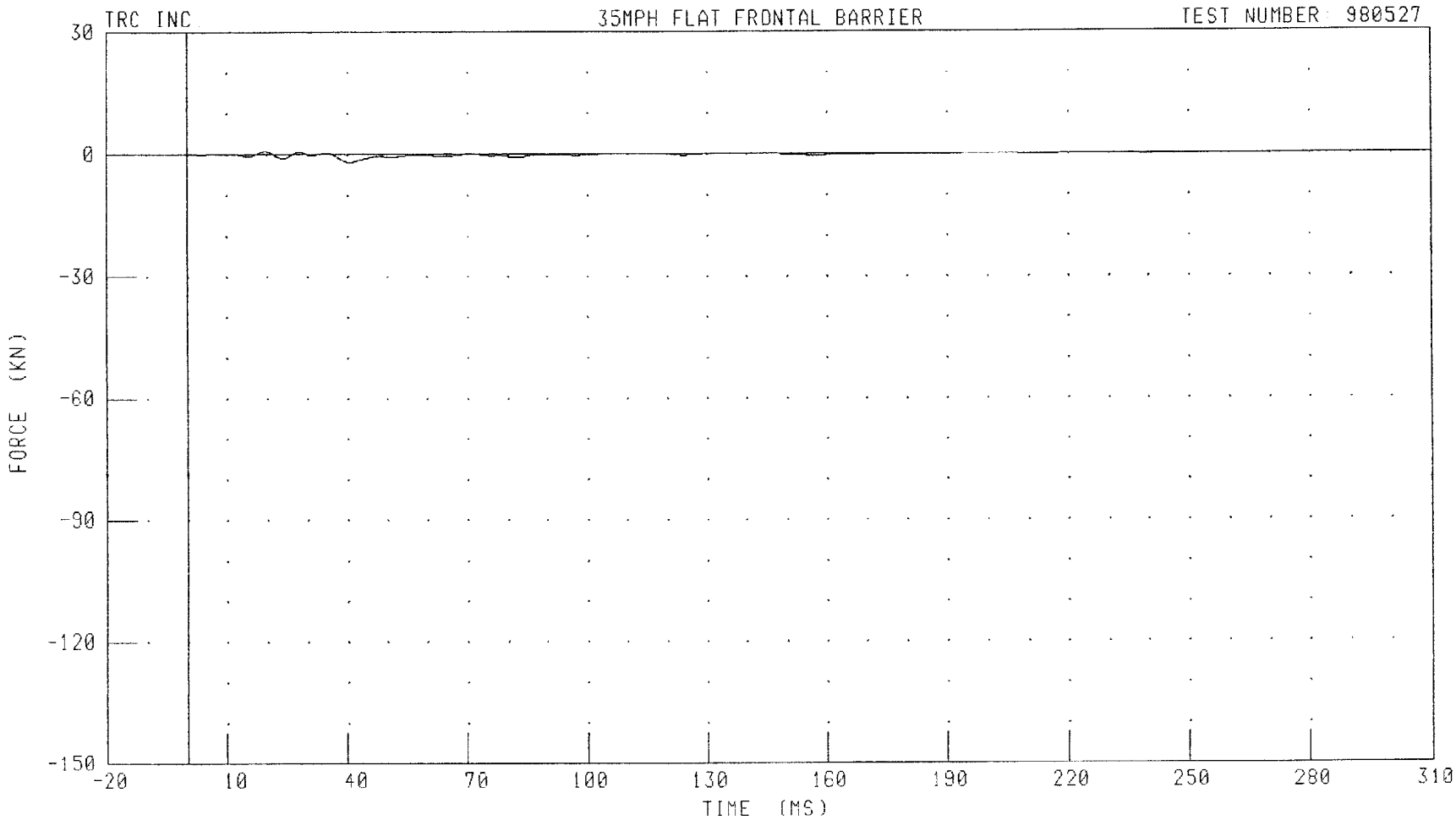
B-153

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D4 FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD4F
FILTER: CH. CLASS 60
PEAK DATA: 0.79 KN @ 19.52 MS; -1.20 KN @ 38.64 MS

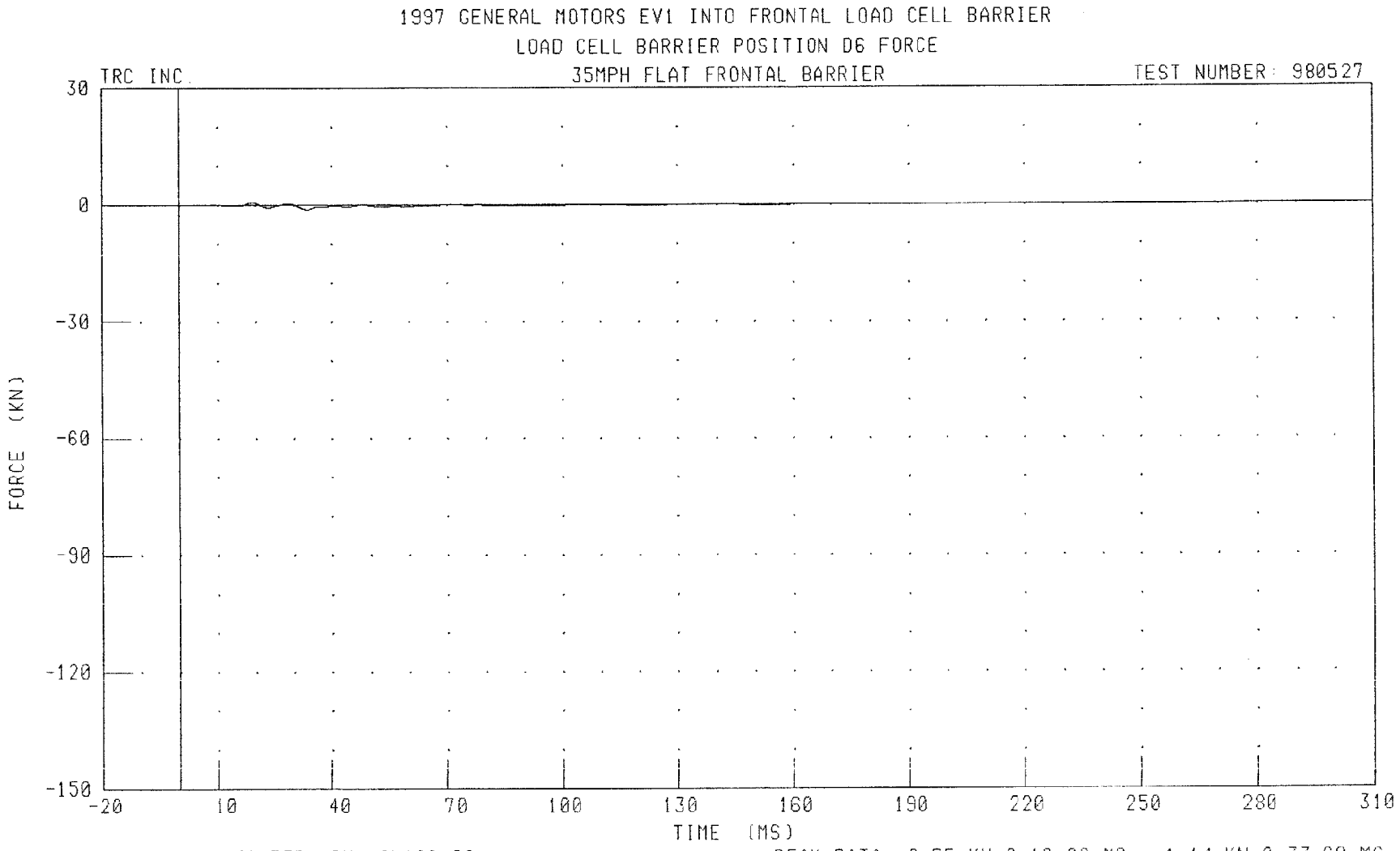
980527

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D5 FORCE

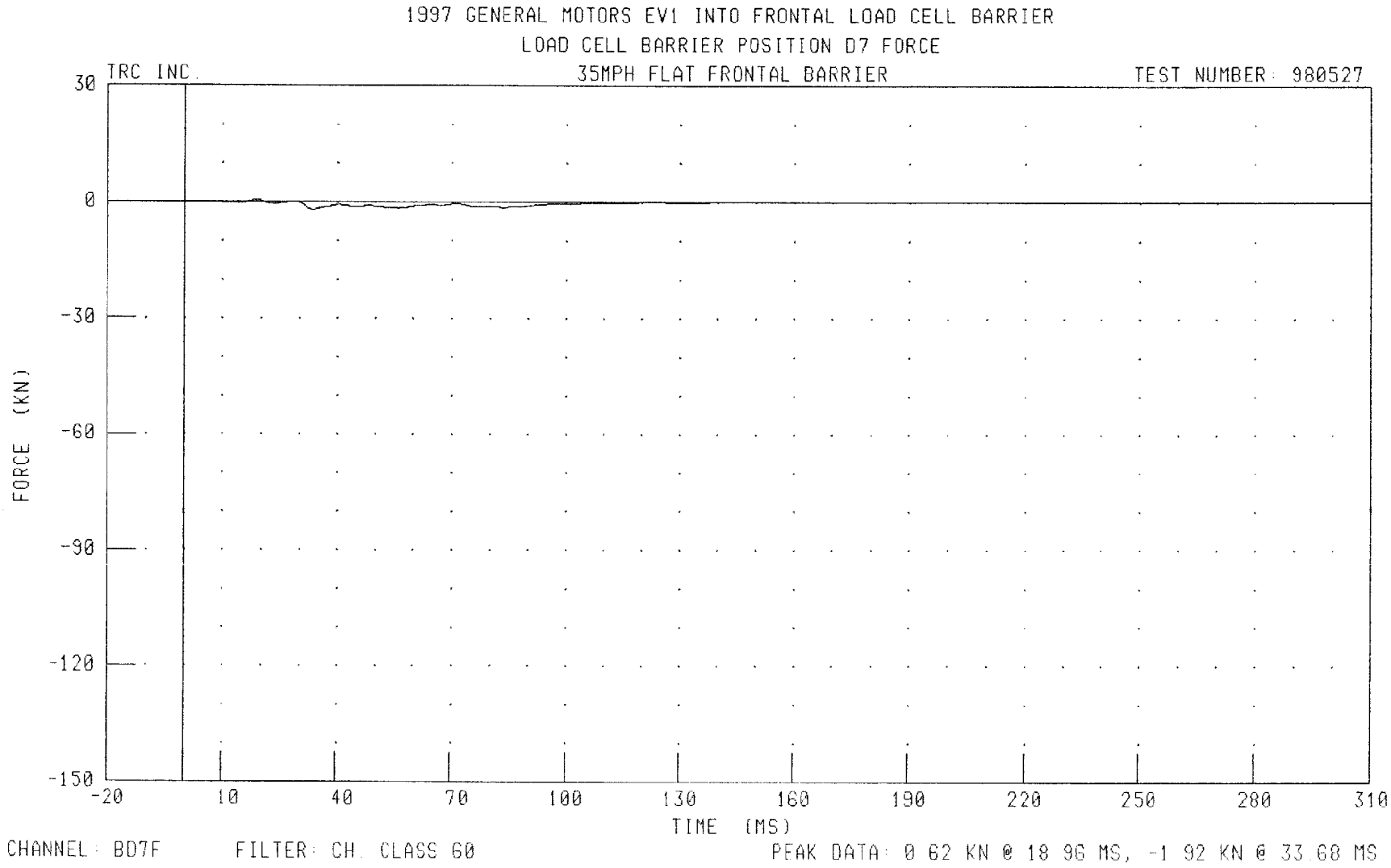


CHANNEL: BD5F FILTER: CH. CLASS 60 PEAK DATA: 0.75 KN @ 19.60 MS, -1.91 KN @ 40.80 MS

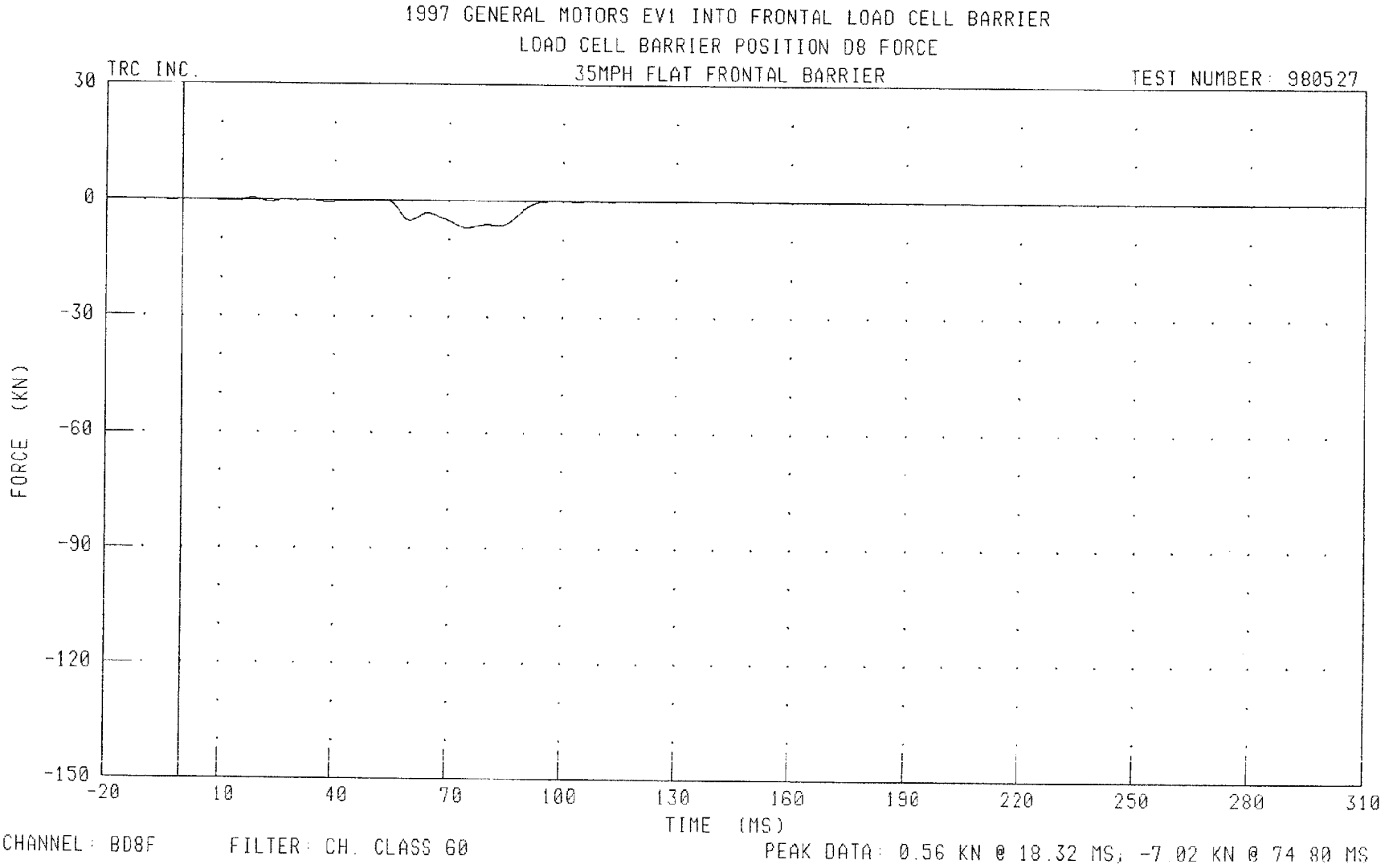
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D6 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD6F
FILTER: CH. CLASS 60
PEAK DATA: 0.75 KN @ 19.28 MS; -1.14 KN @ 33.68 MS

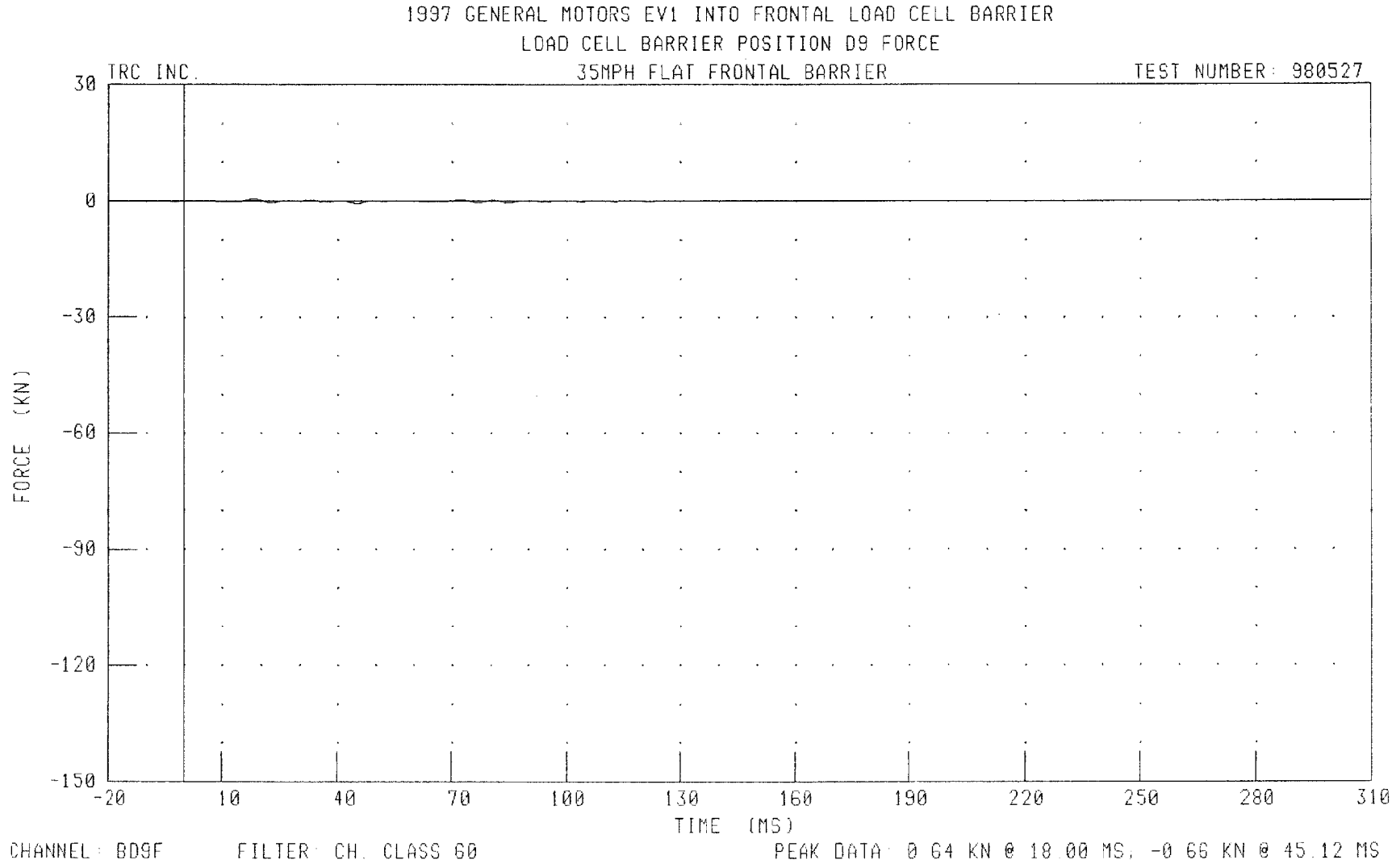
980527

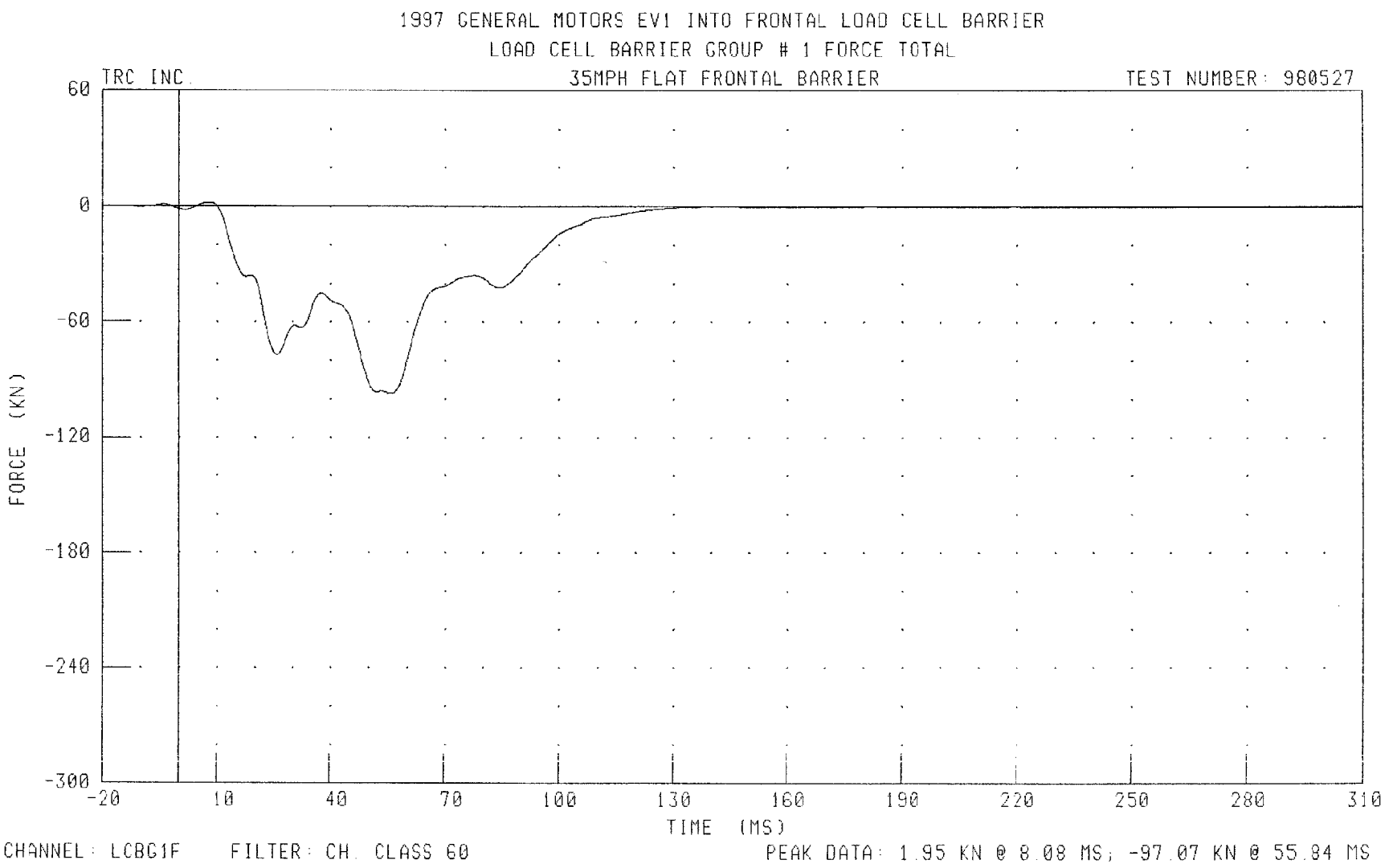

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D7 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD7F
FILTER: CH. CLASS 60
PEAK DATA: 0 62 KN @ 18 96 MS, -1 92 KN @ 33 68 MS

980527

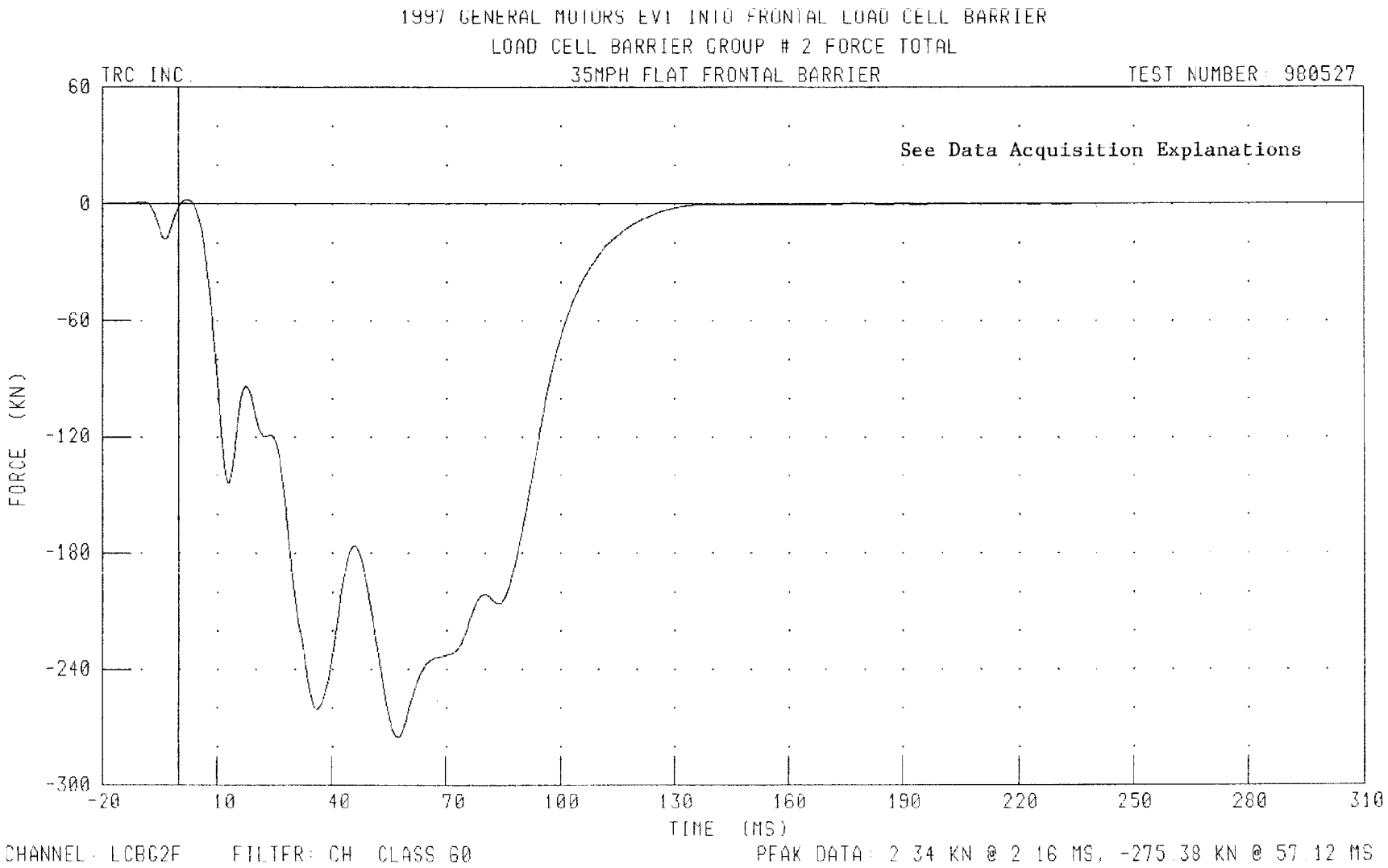

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D8 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD8F
FILTER: CH. CLASS 60
PEAK DATA: 0.56 KN @ 18.32 MS, -7.02 KN @ 74.80 MS

980527

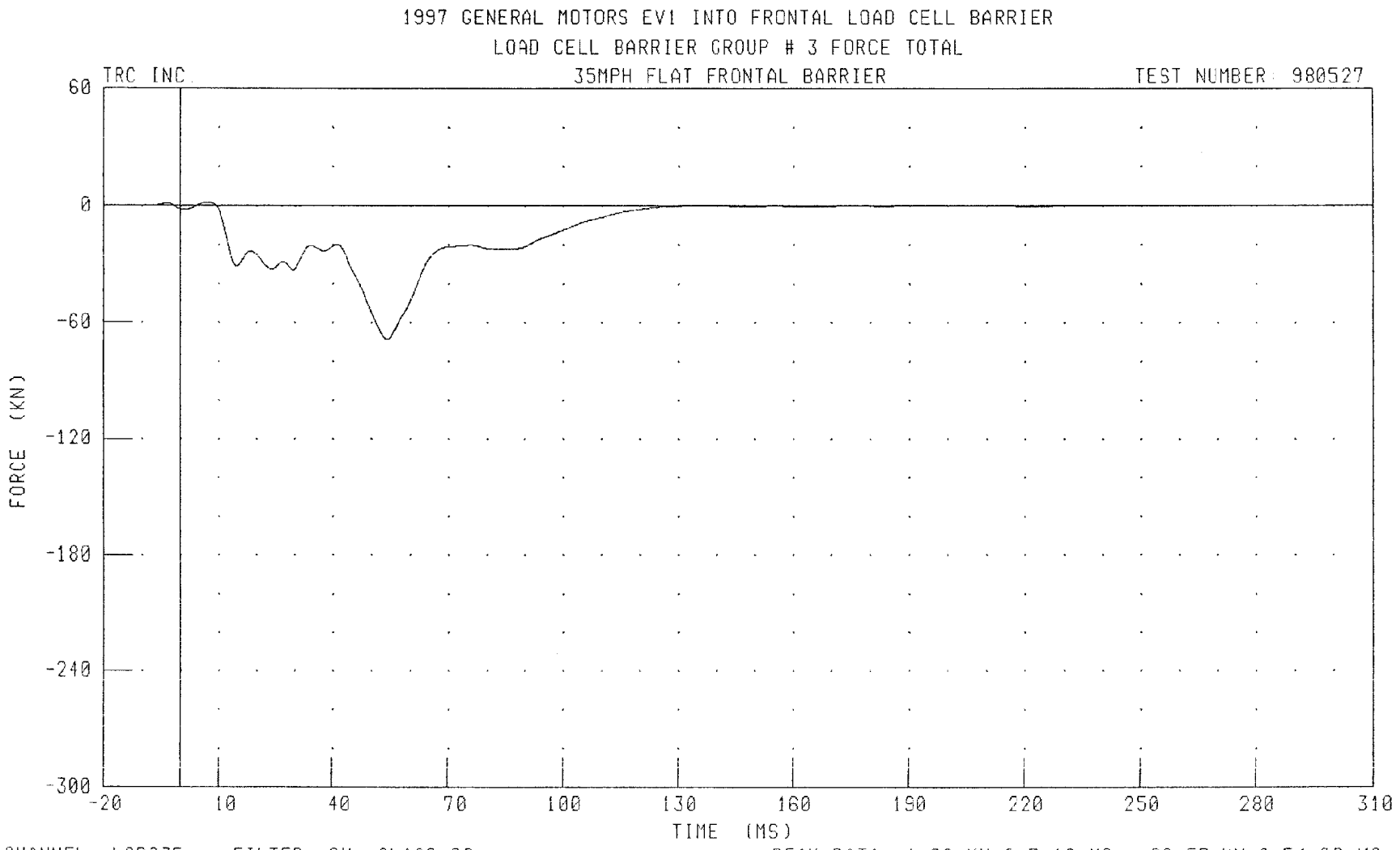

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D9 FORCE
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
30
0
-30
-60
-90
-120
-150
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BD9F
FILTER: CH. CLASS 60
PEAK DATA: 0.64 KN @ 18.00 MS, -0.66 KN @ 45.12 MS


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 1 FORCE TOTAL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
0
-60
-120
-180
-240
-300
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBG1F
FILTER: CH. CLASS 60
PEAK DATA: 1.95 KN @ 8.08 MS; -97.07 KN @ 55.84 MS

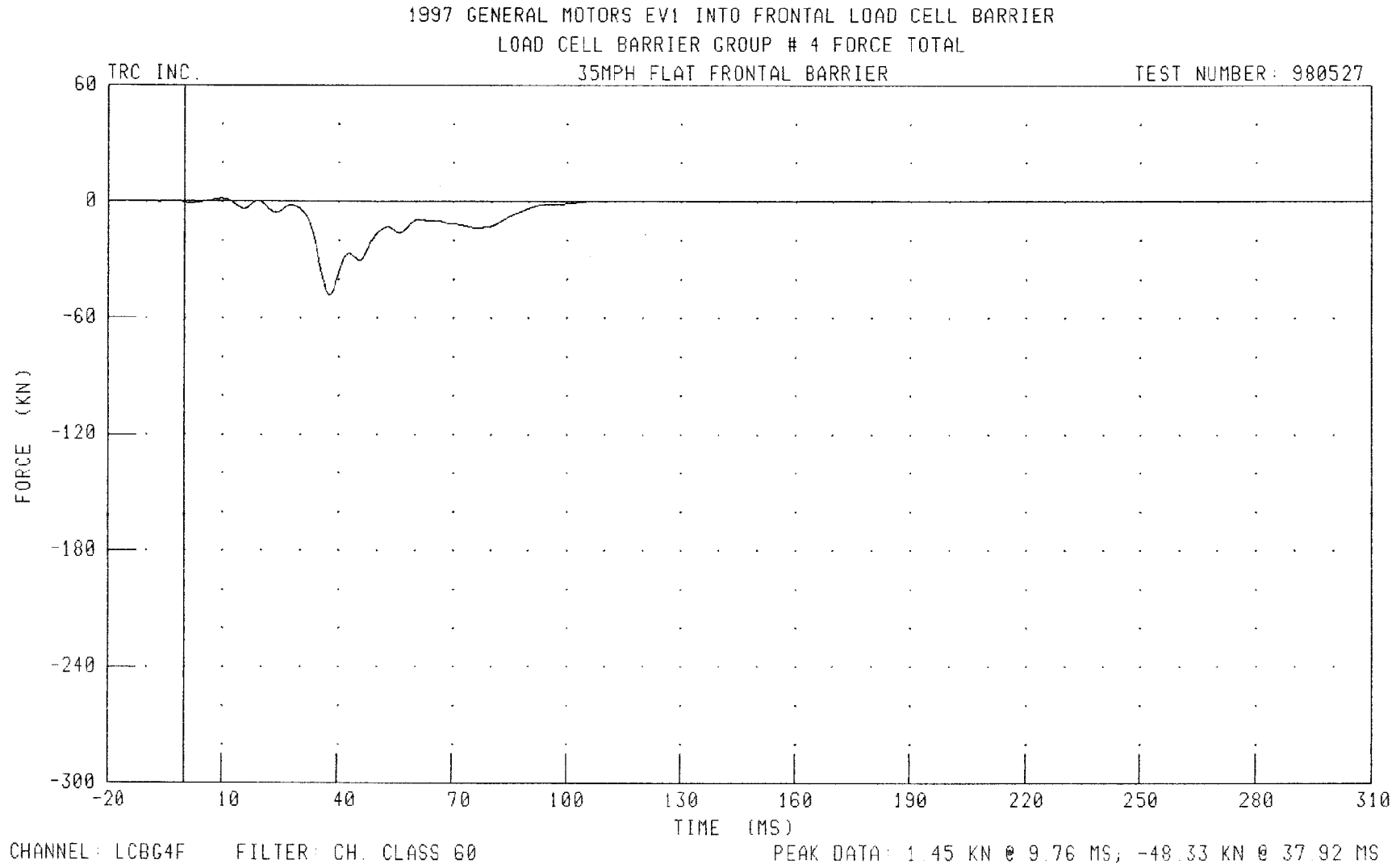
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 2 FORCE TOTAL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
See Data Acquisition Explanations
60
0
-60
-120
-180
-240
-300
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBG2F
FILTER: CH CLASS 60
PEAK DATA: 2.34 KN @ 2.16 MS, -275.38 KN @ 57.12 MS

980527

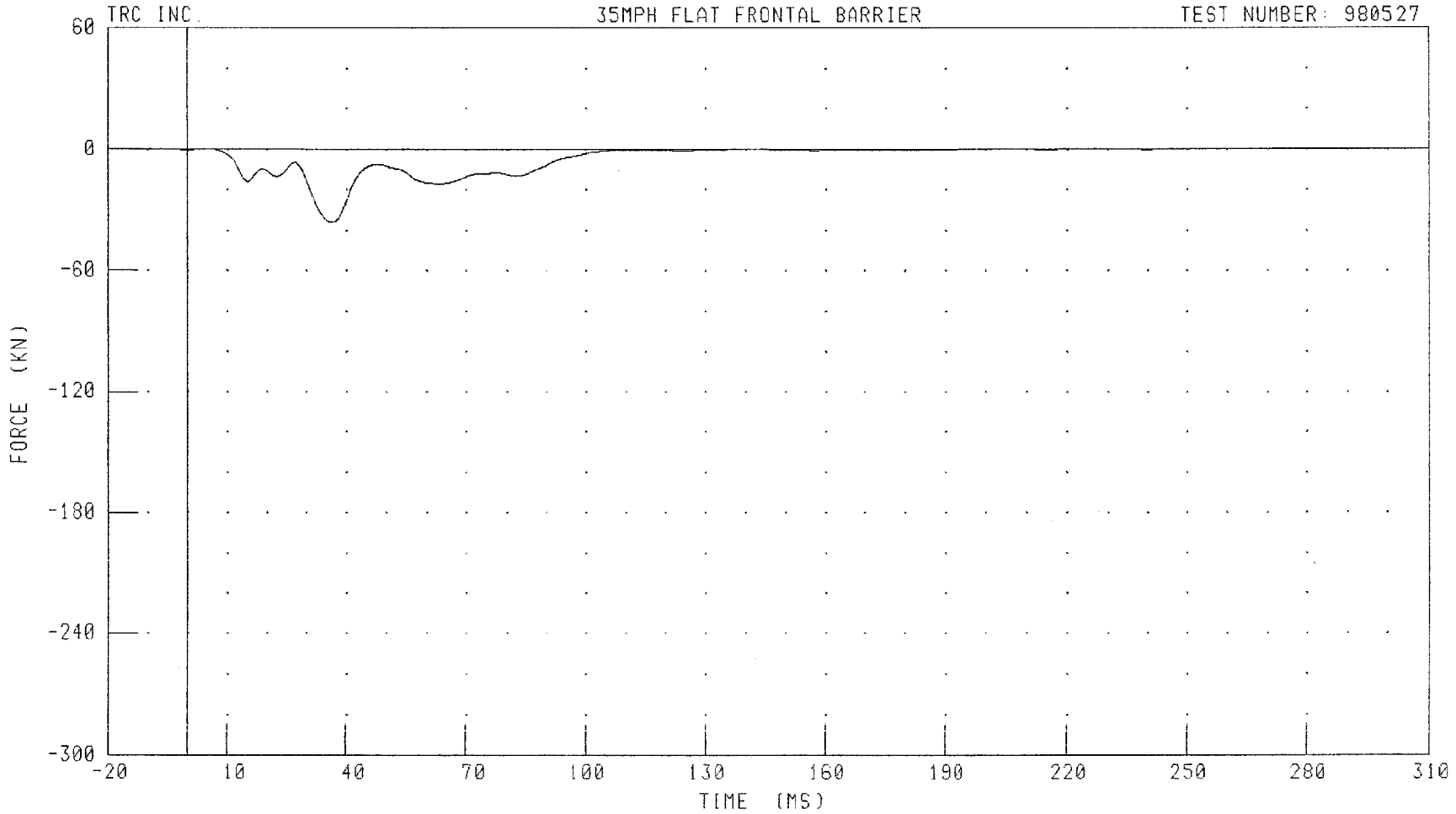

1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 3 FORCE TOTAL
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
0
-60
-120
-180
-240
-300
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBG3F
FILTER: CH. CLASS 60
PEAK DATA: 1.92 KN @ 7.12 MS; -68.57 KN @ 54.08 MS

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 4 FORCE TOTAL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
0
-60
-120
-180
-240
-300
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBG4F
FILTER: CH. CLASS 60
PEAK DATA: 1.45 KN @ 9.76 MS; -48.33 KN @ 37.92 MS

980527

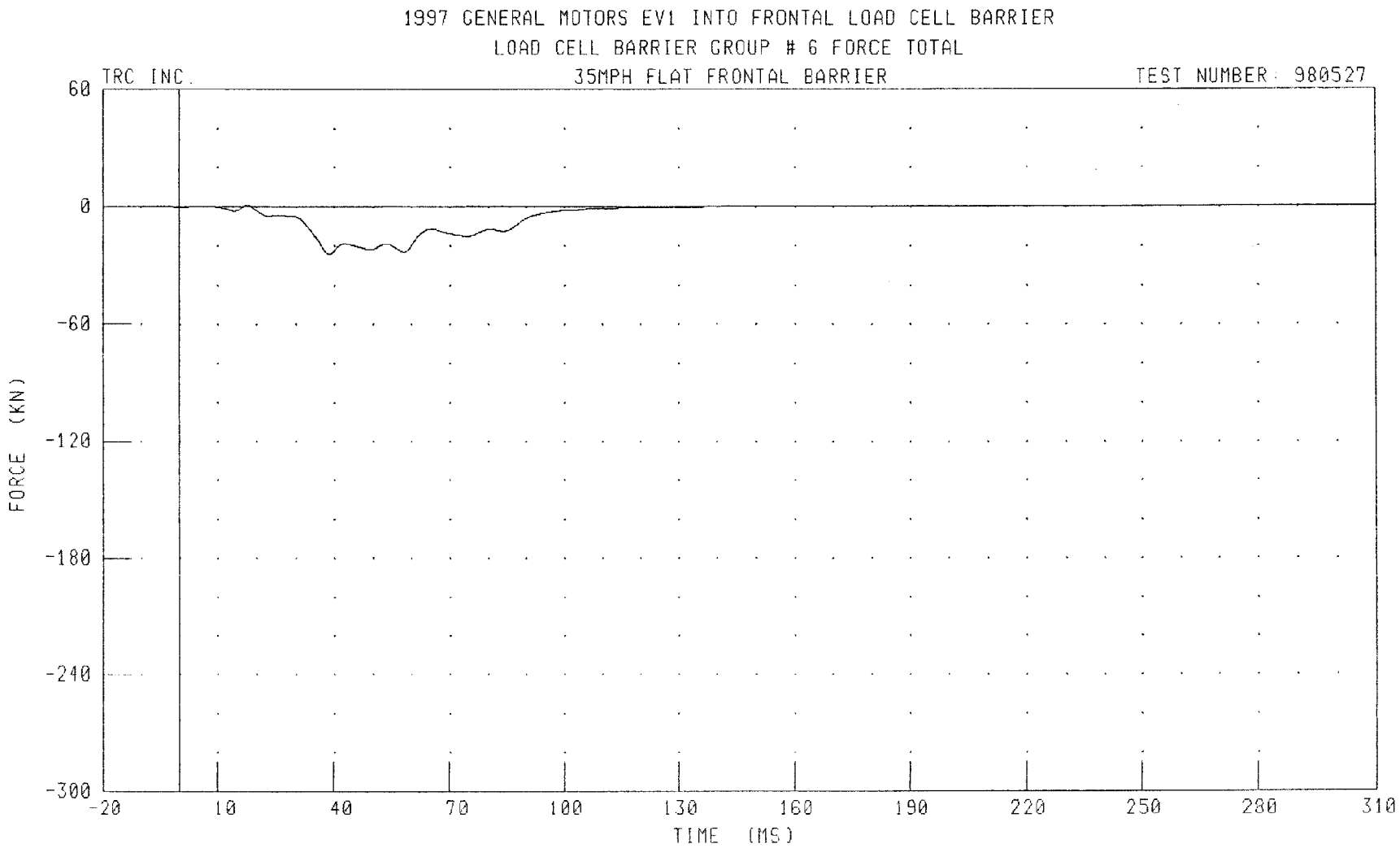
1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 5 FORCE TOTAL



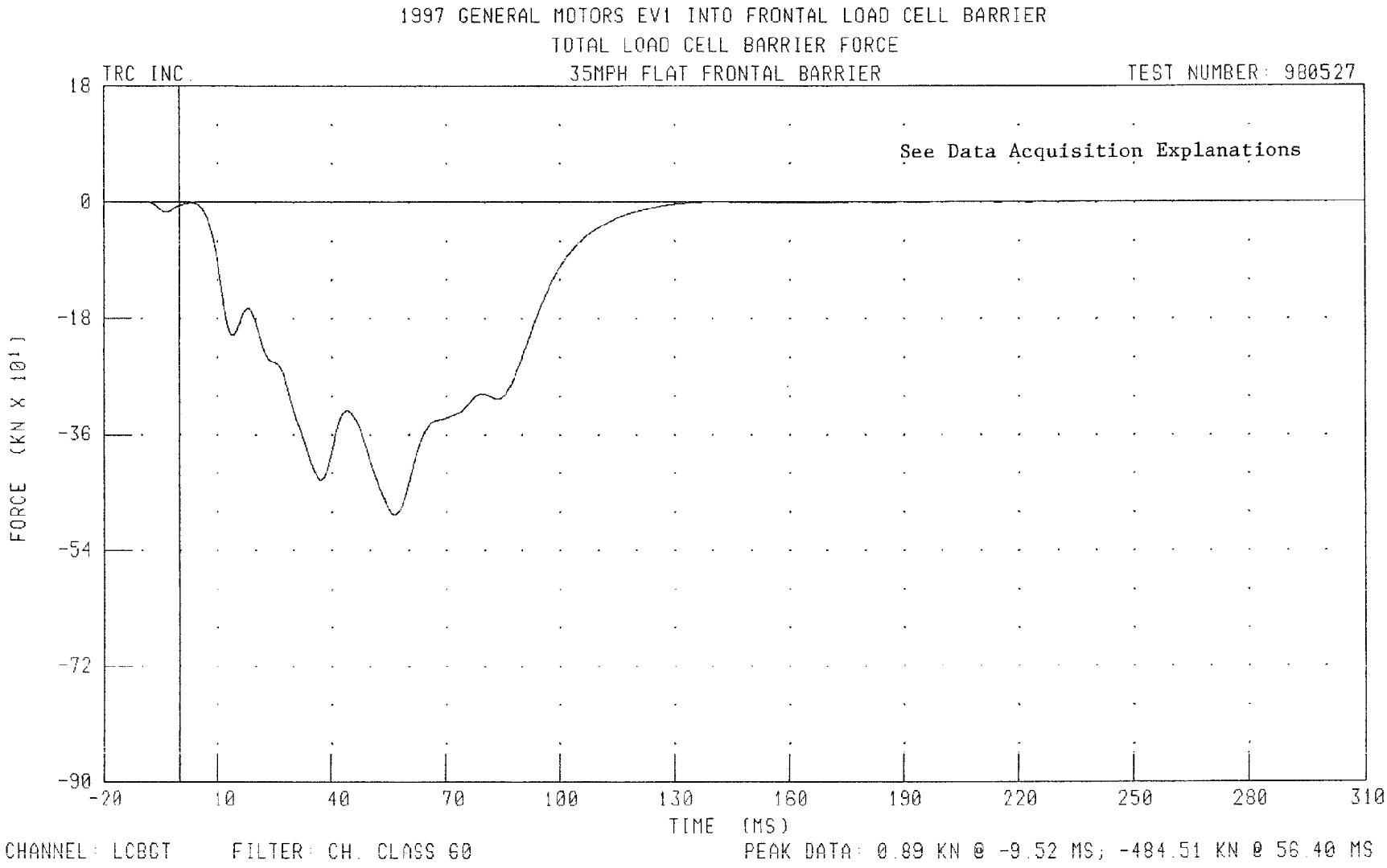
CHANNEL: LCBG5F FILTER: CH. CLASS 60 PEAK DATA: 0.25 KN @ 4.32 MS, -36.00 KN @ 36.48 MS

B-150

980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 6 FORCE TOTAL
TRC INC.
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
60
0
-60
-120
-180
-240
-300
FORCE (KN)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBG6F
FILTER: CH. CLASS 60
PEAK DATA: 0.74 KN @ 17.68 MS, -24.28 KN @ 38.80 MS

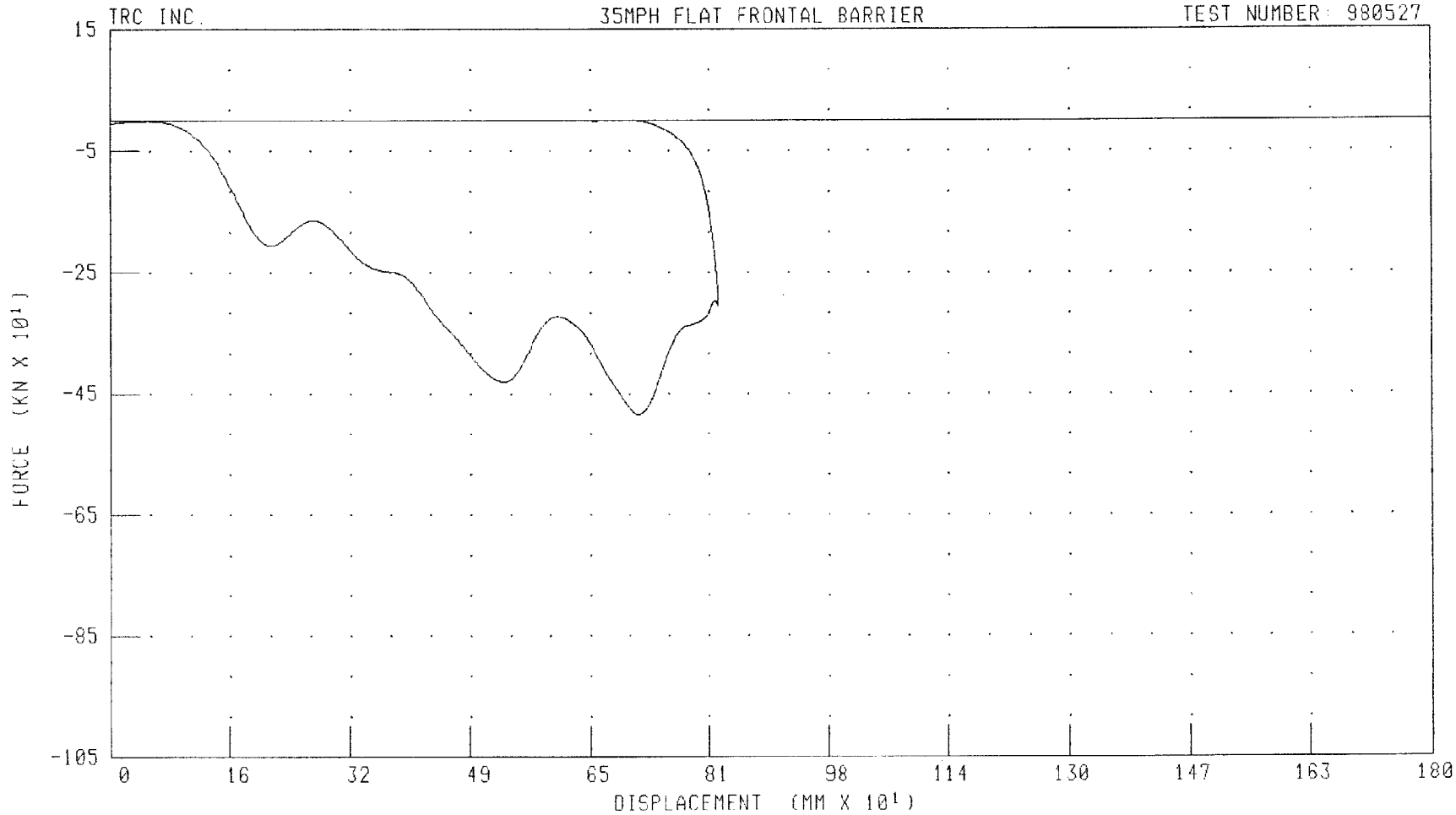
980527


1997 GENERAL MOTORS EV1 INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE
TRC INC
35MPH FLAT FRONTAL BARRIER
TEST NUMBER: 980527
See Data Acquisition Explanations
FORCE (KN X 10¹)
18
0
-18
-36
-54
-72
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LCBCT
FILTER: CH. CLASS 60
PEAK DATA: 0.89 KN @ -9.52 MS; -484.51 KN @ 56.40 MS

980527

1996 JEEP GRAND CHEROKEE INTO FRONTAL LOAD CELL BARRIER

TOTAL LOAD CELL BARRIER FORCE VS AVERAGE VEHICLE X-AXIS DISPLACEMENT



CHANNEL: OTHXD FILTER: CH CLASS 180
LCBGT CH CLASS 60

PEAK DATA: 831.46 MM @ 85.04 MS, 0.00 MM @ 0.00 MS
0.13 KN @ 200.32 MS, -484.51 KN @ 56.40 MS

980527

Appendix C

Dummy Certification Data

Pre-test Certification Data

Driver Dummy S/N: 192

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

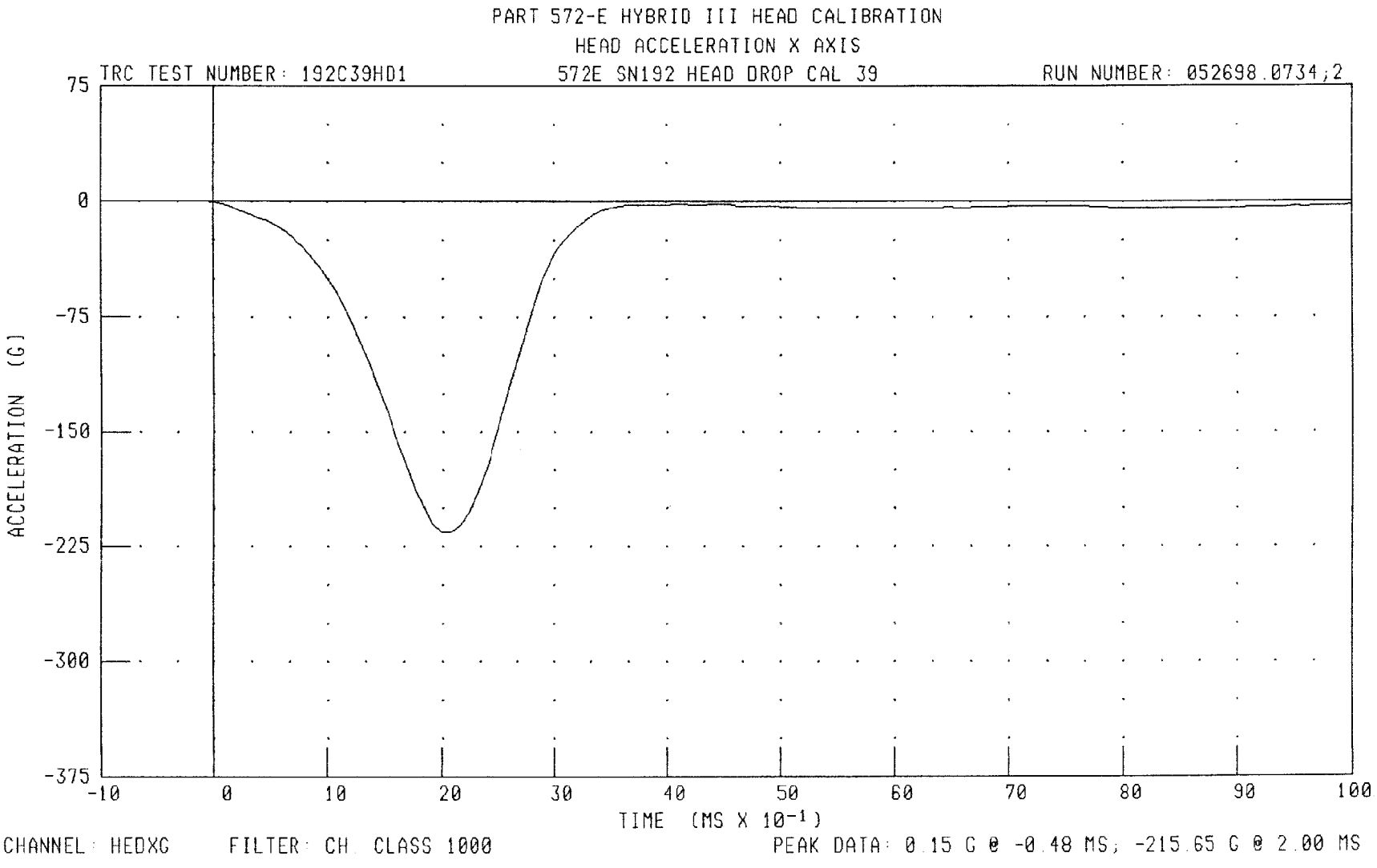
HYBRID III 50th 22-MAY-98

TRC INC. TEST NO: 192C39HD1 572E SN192 HEAD DROP CAL 39

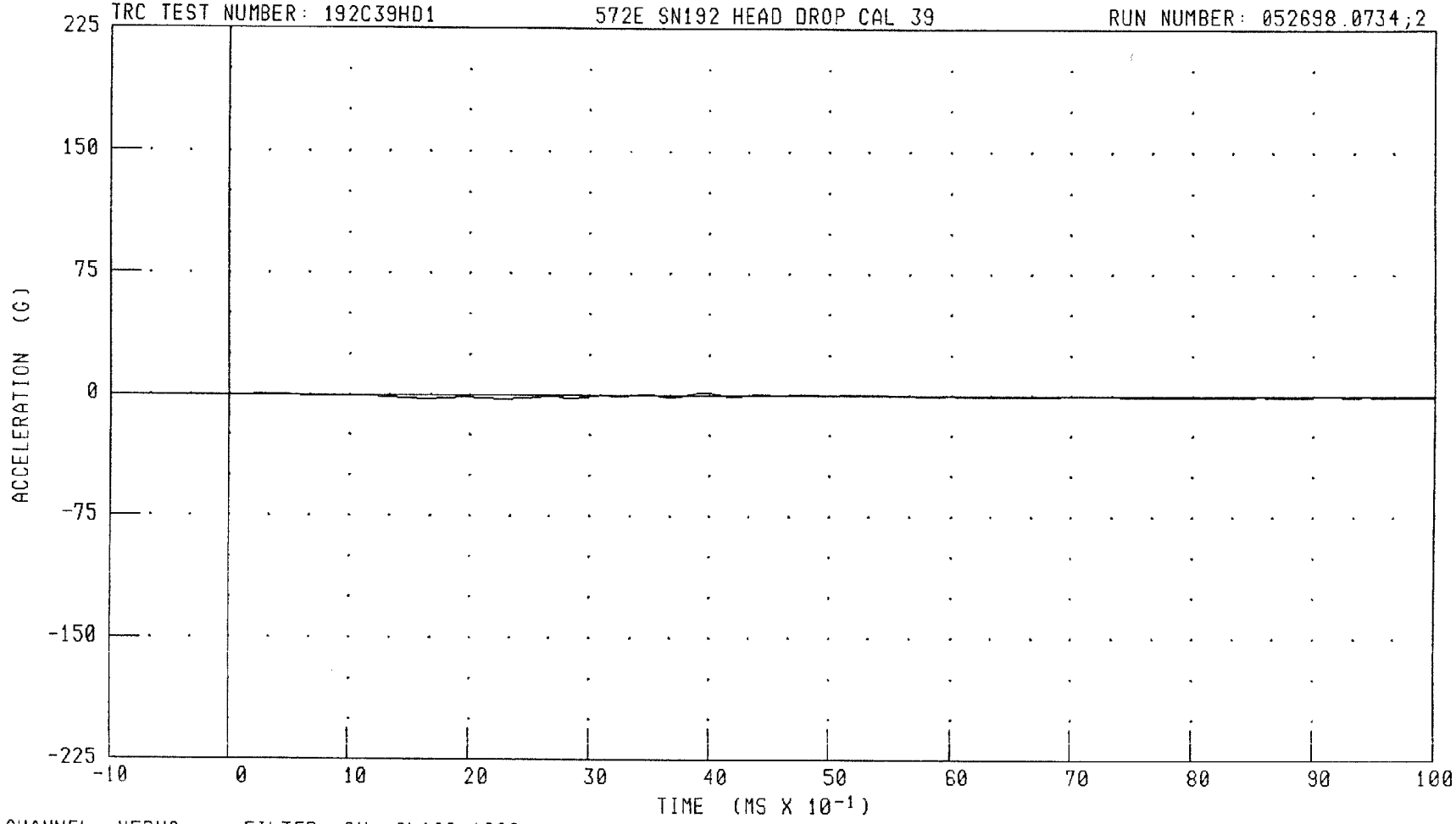
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	244.26 G
PEAK LATERAL ACCELERATION	15 G MAX	-2.56 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

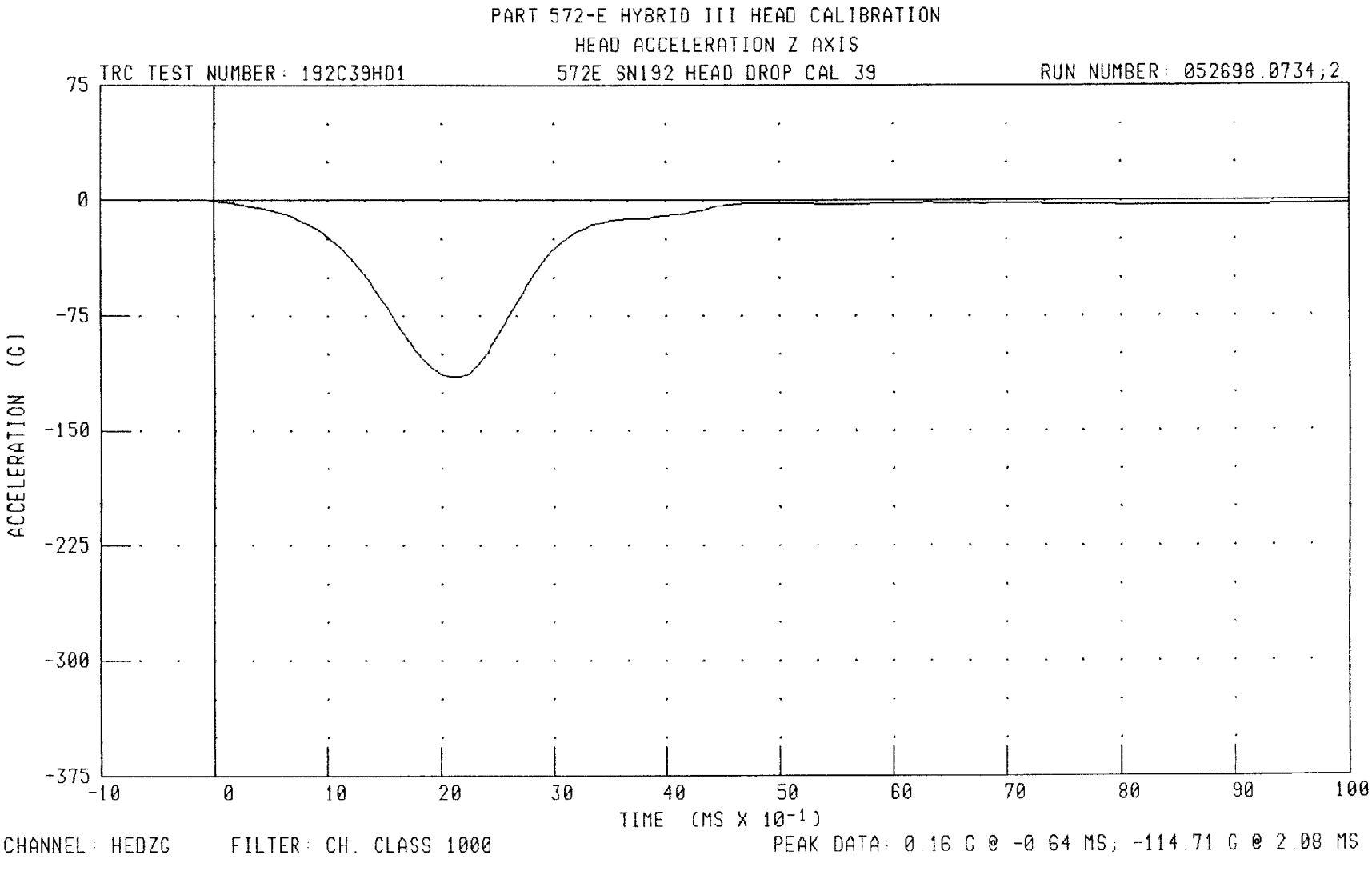
TECHNICIAN _____ RUN NUMBER: 052298.0843;1


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 192C39HD1
572E SN192 HEAD DROP CAL 39
RUN NUMBER: 052698.0734;2
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: 0.15 G @ -0.48 MS; -215.65 G @ 2.00 MS

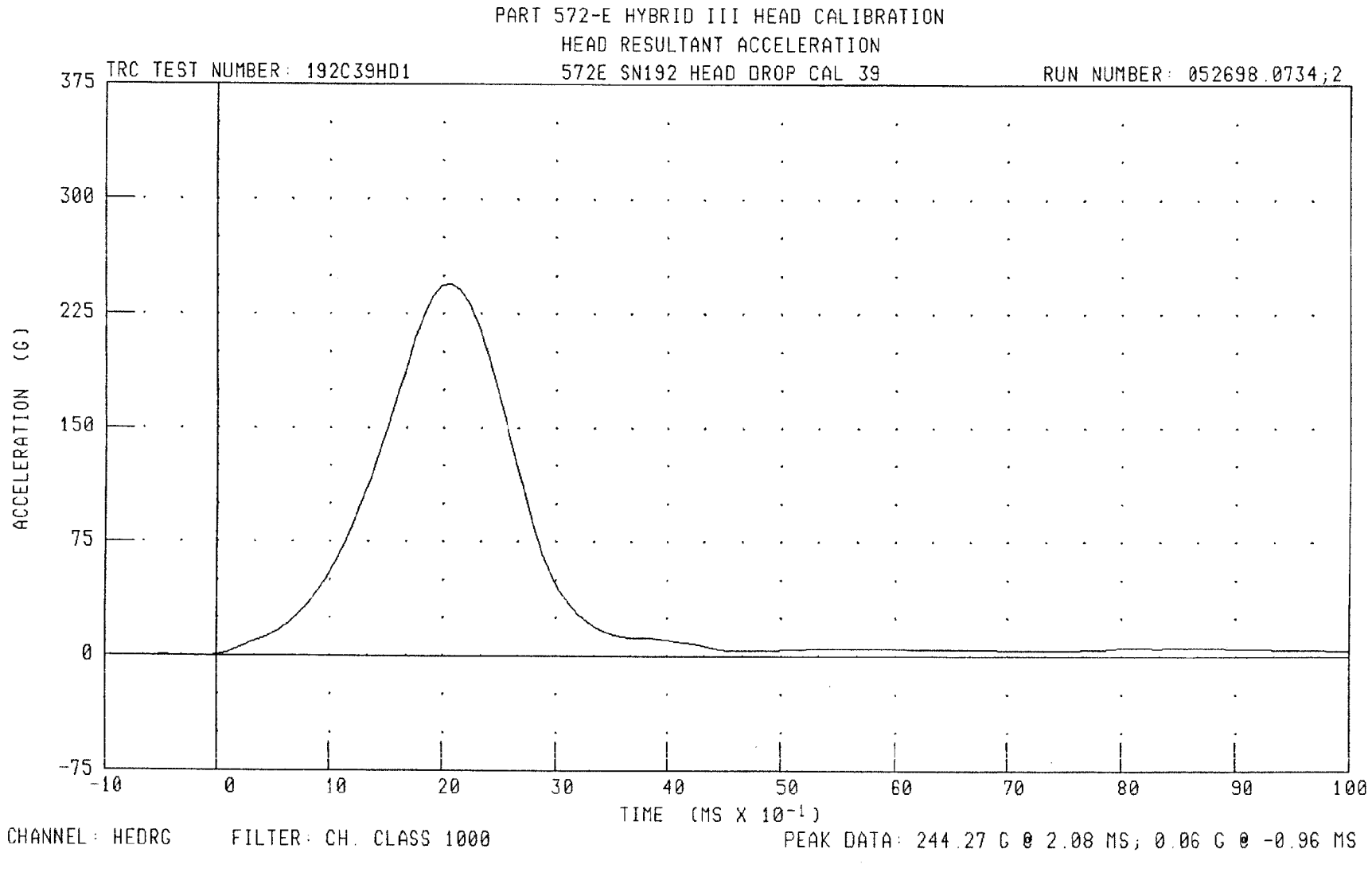
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS



980527


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 192C39HD1
572E SN192 HEAD DROP CAL 39
RUN NUMBER: 052698.0734;2
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: HEDZC
FILTER: CH. CLASS 1000
PEAK DATA: 0.16 G @ -0.64 MS, -114.71 G @ 2.08 MS

980527


PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 192C39HD1
572E SN192 HEAD DROP CAL 39
RUN NUMBER: 052698.0734;2
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: 244.27 G @ 2.08 MS; 0.06 G @ -0.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th 26-MAY-98

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 192C39NF8 572E SN192 NECK FLEXION CAL39

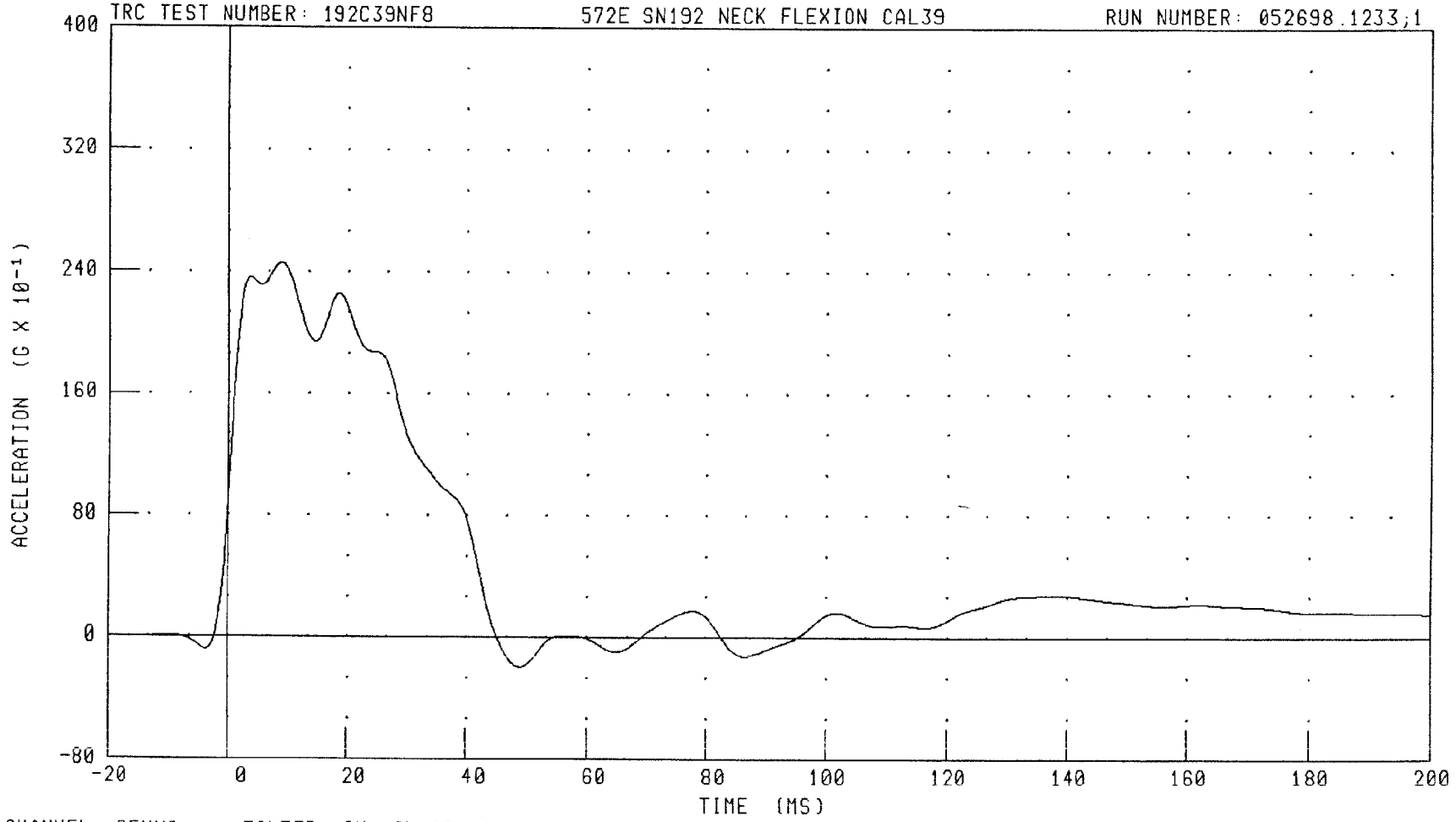
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	6.99 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.09 G
	20 MS	17.60 - 22.60 G	21.75 G
	30 MS	12.50 - 18.50 G	13.21 G
MAX PENDULUM G		29 G MAX	24.56 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	13.13 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	41.76 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	72.21 DEG.
	TIME	57 - 64 MS	60.40 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	97.19 NM
	TIME	47 - 58 MS	54.80 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	113.68 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	101.52 MS

TEST MEETS SPECIFICATIONS

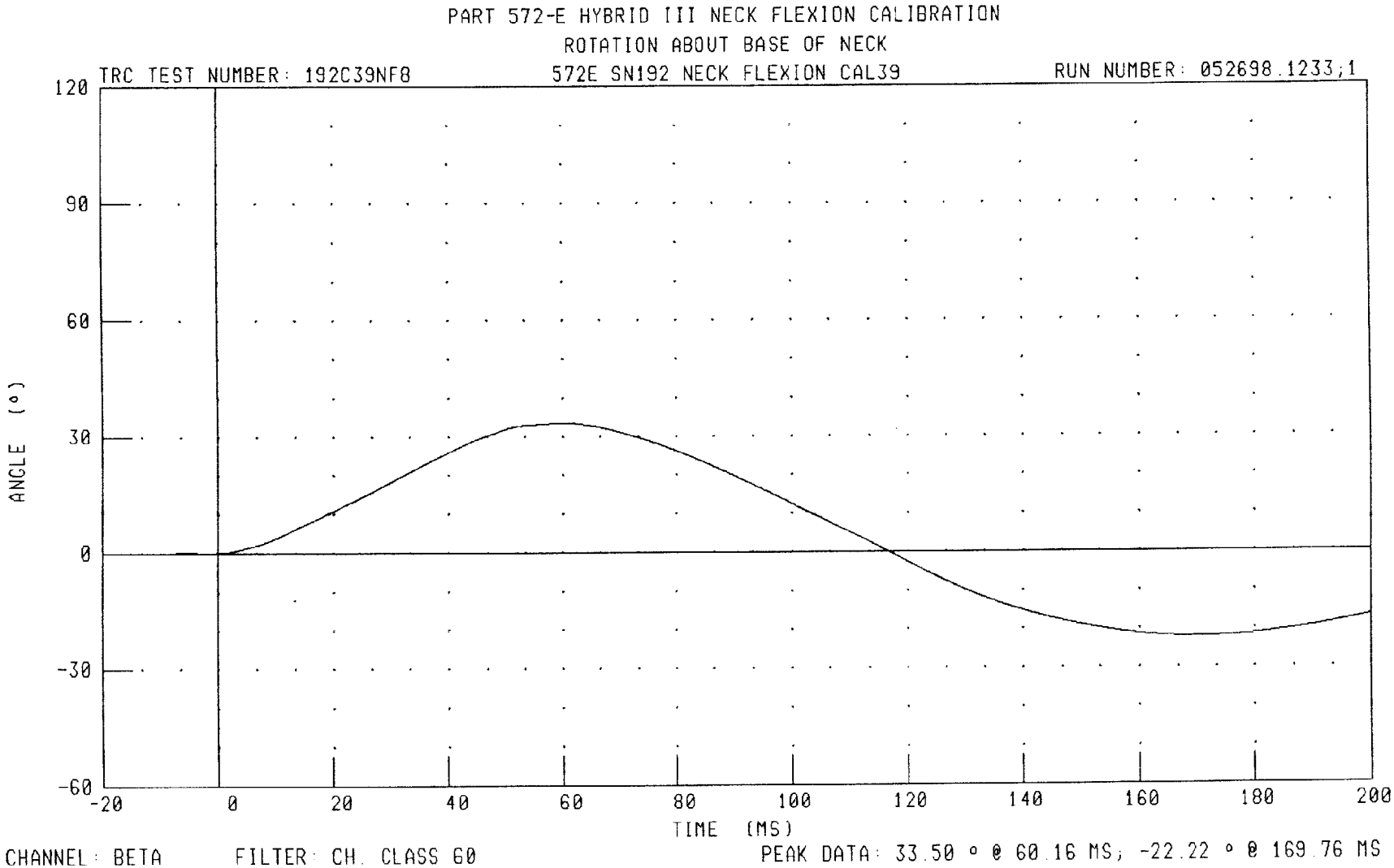
TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1233;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

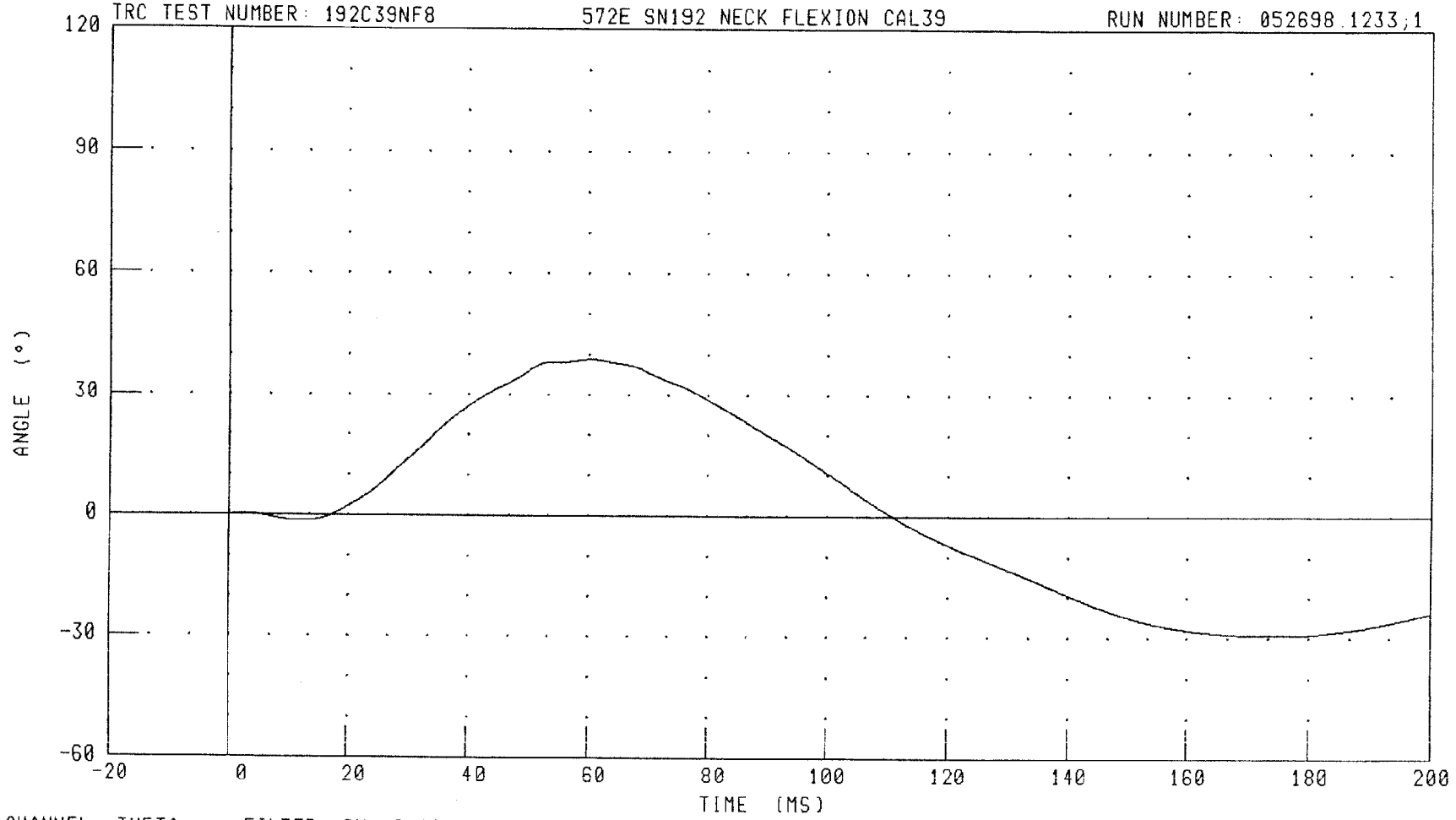


980527


PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 192C39NF8
572E SN192 NECK FLEXION CAL39
RUN NUMBER: 052698.1233;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 33.50 ° @ 60.16 MS; -22.22 ° @ 169.76 MS

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

TRC TEST NUMBER: 192C39NF8 572E SN192 NECK FLEXION CAL39 RUN NUMBER: 052698.1233;1



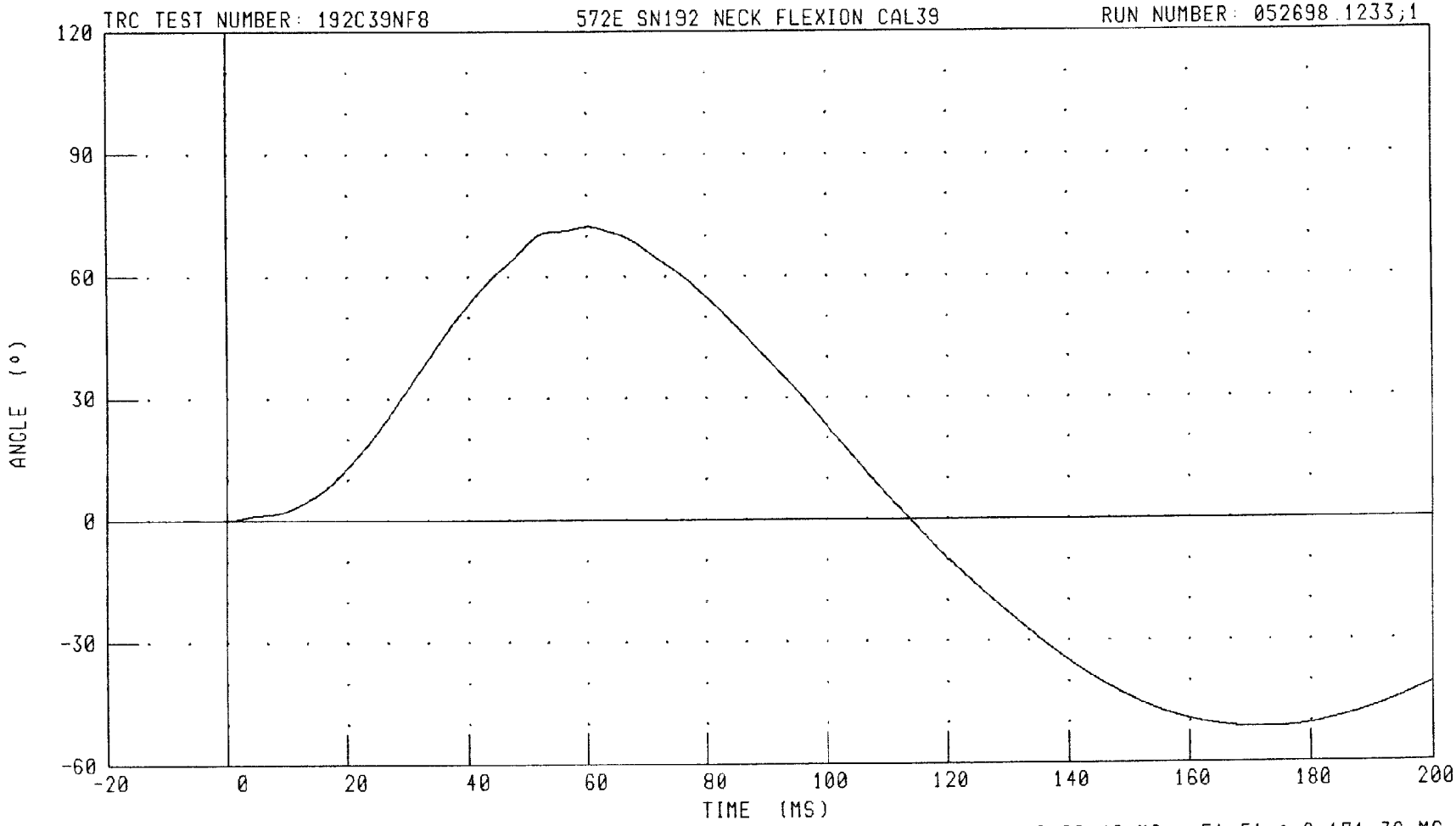
CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 38.72 ° @ 60.56 MS; -29.39 ° @ 174.96 MS

980527

PART 572-E HYBRID III NECK FLEXION CALIBRATION

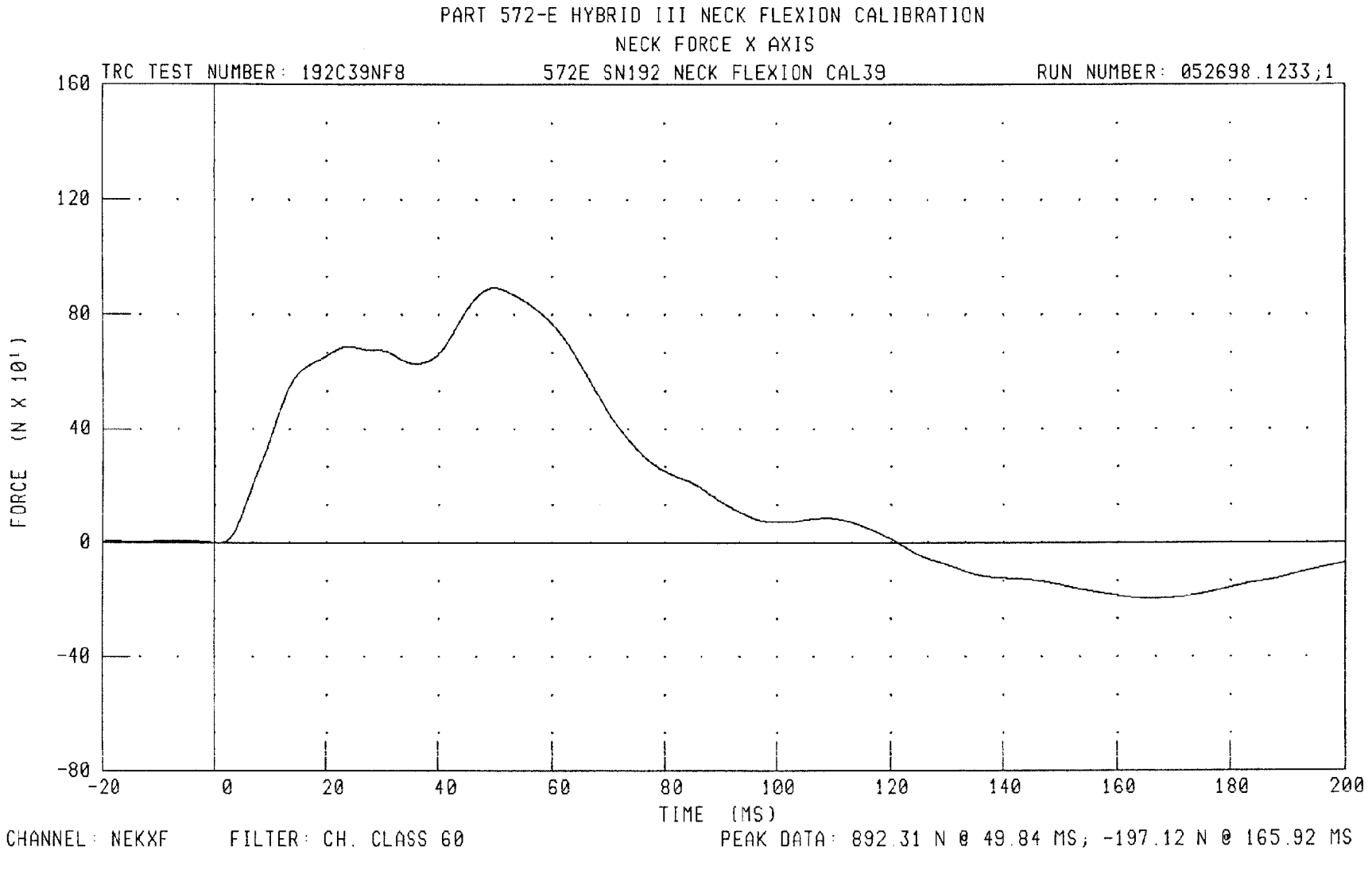
TOTAL ROTATION

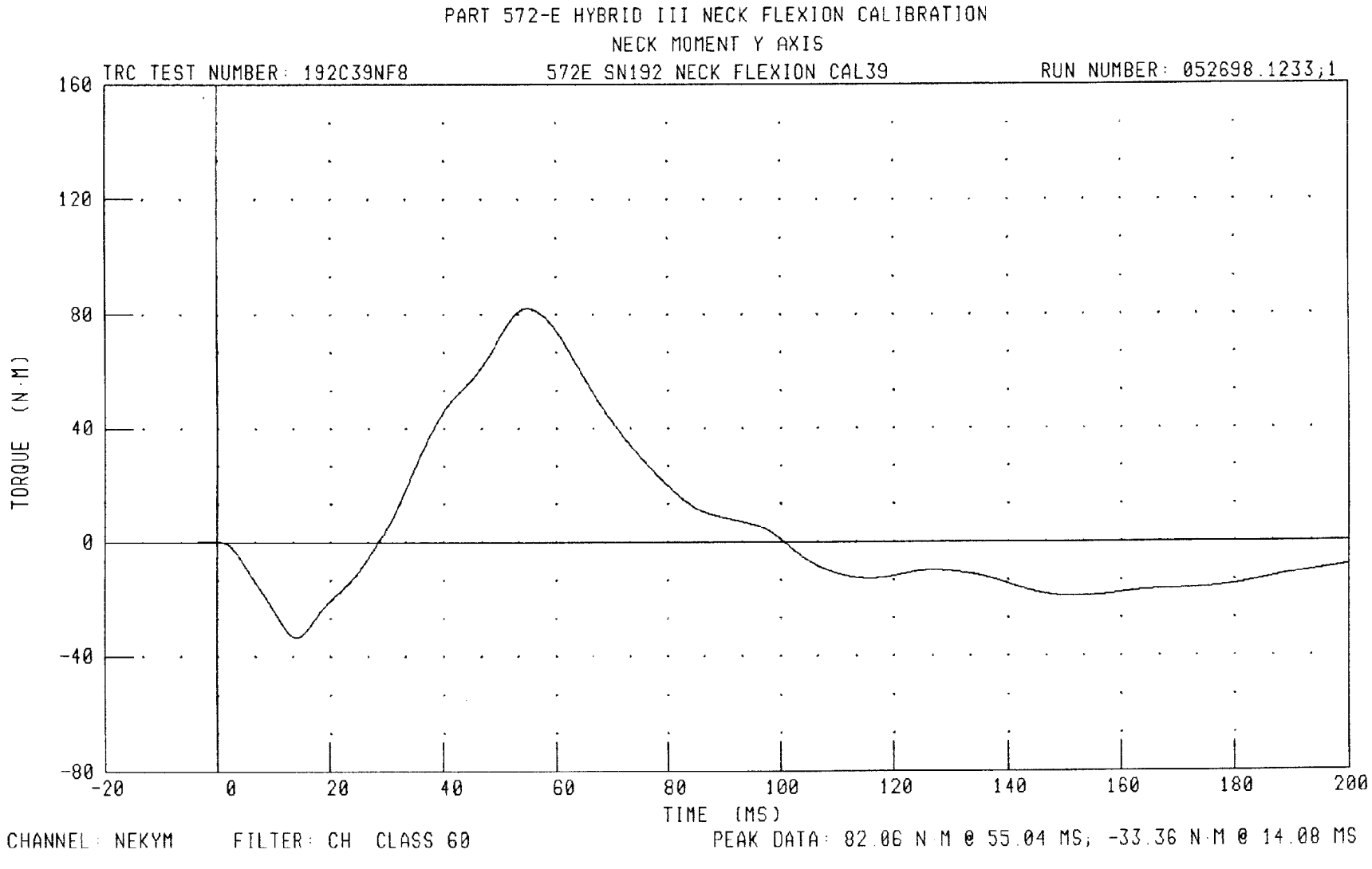
TRC TEST NUMBER: 192C39NF8 572E SN192 NECK FLEXION CAL39 RUN NUMBER: 052698.1233;1

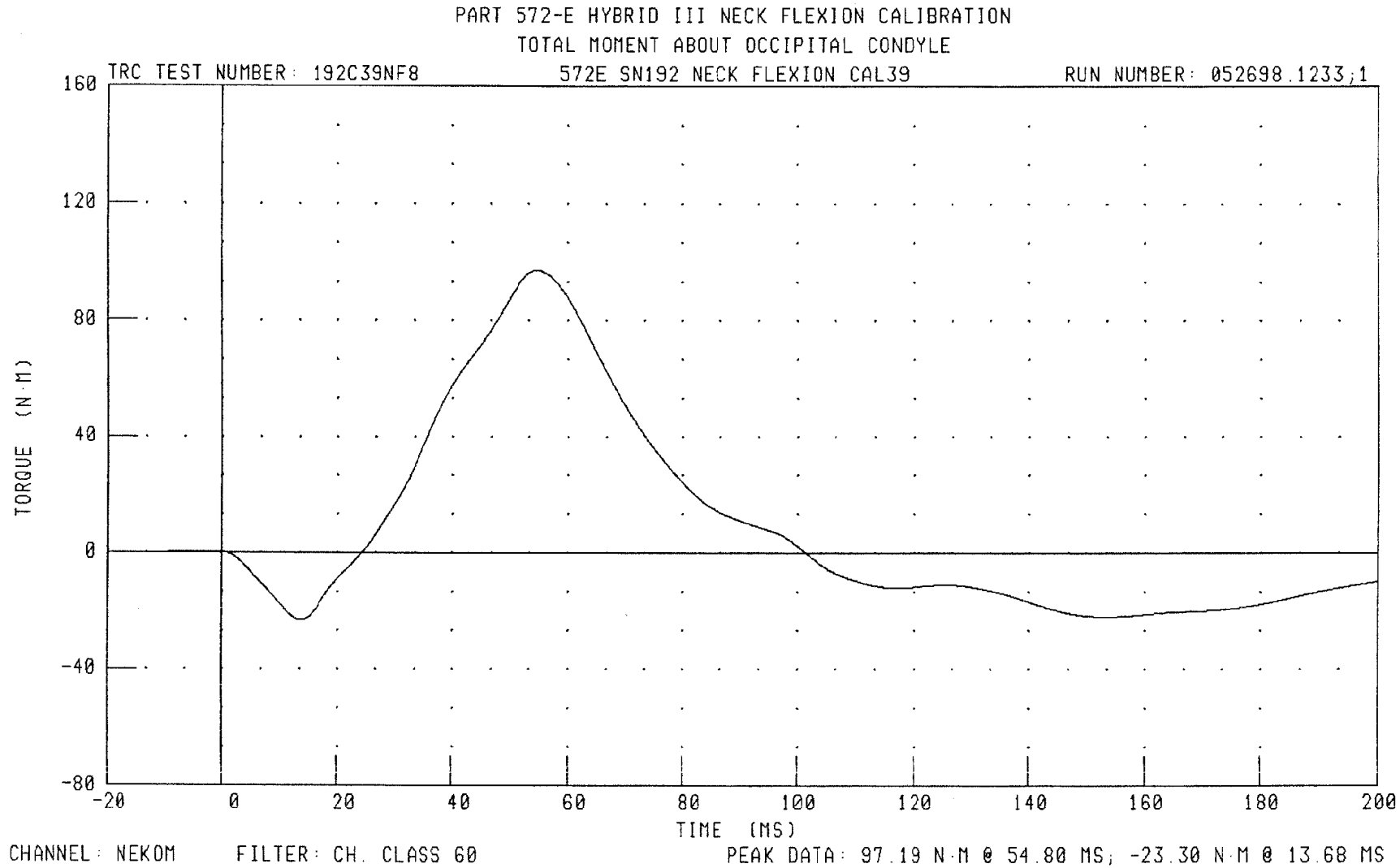


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 72.22 ° @ 60.40 MS; -51.51 ° @ 171.36 MS

980527


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 192C39NF8
572E SN192 NECK FLEXION CAL39
RUN NUMBER: 052698.1233;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: 892.31 N @ 49.84 MS; -197.12 N @ 165.92 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 192C39NF8
572E SN192 NECK FLEXION CAL39
RUN NUMBER: 052698.1233;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: 82.06 N M @ 55.04 MS; -33.36 N-M @ 14.08 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 192C39NF8
572E SN192 NECK FLEXION CAL39
RUN NUMBER: 052698.1233;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: 97.19 N-M @ 54.80 MS; -23.30 N-M @ 13.68 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th 26-MAY-98

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 192C39NE1 572E SN192 NECK EXT CAL39

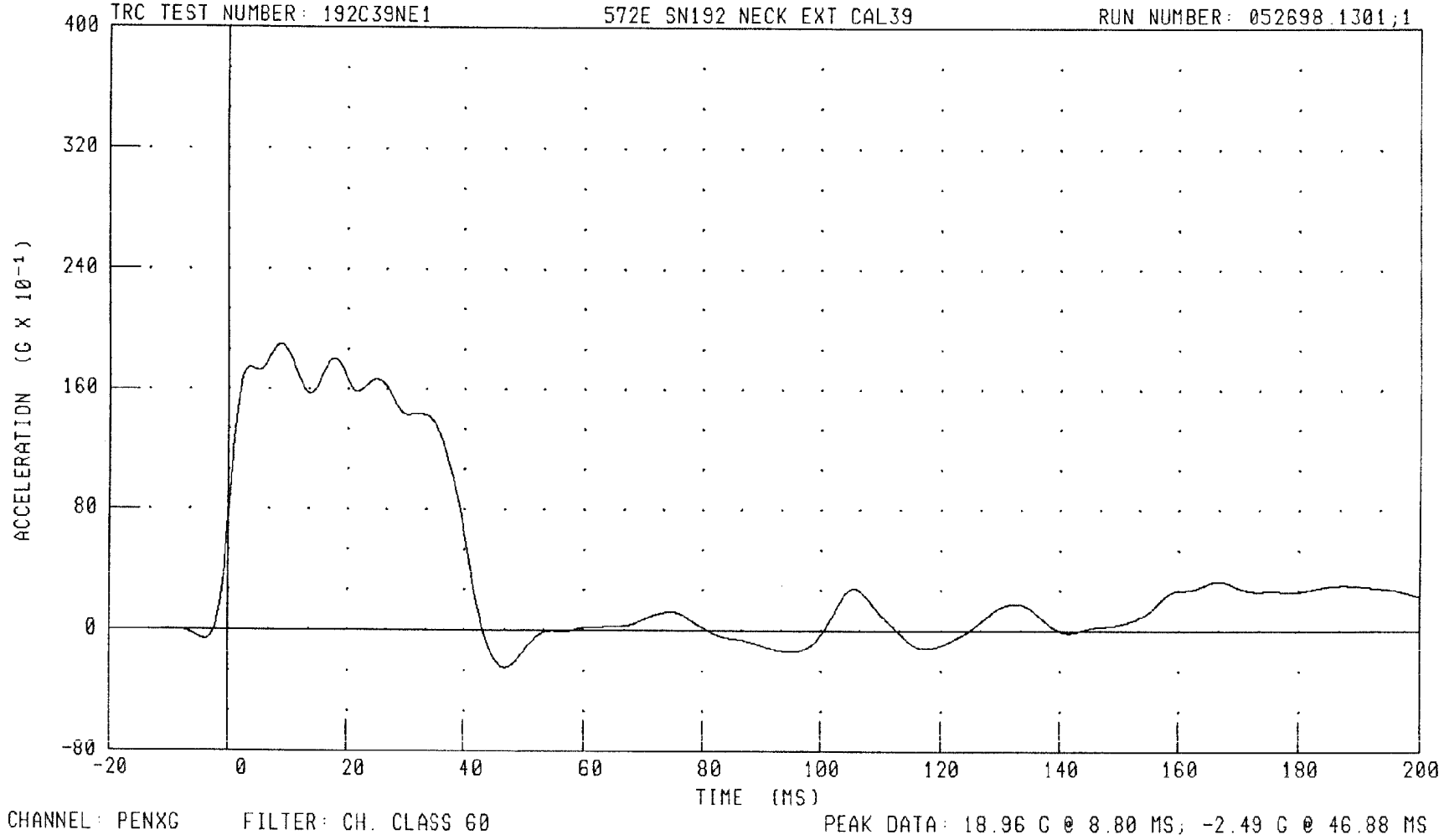
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.00 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.52 G
	20 MS	14.00 - 19.00 G	16.71 G
	30 MS	11.00 - 16.00 G	14.31 G
MAX PENDULUM G		22 G MAX	18.95 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.35 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.64 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	95.50 DEG.
	TIME	72 - 82 MS	76.16 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-62.76 NM
	TIME	65 - 79 MS	71.52 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	154.96 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	140.16 MS

TEST MEETS SPECIFICATIONS

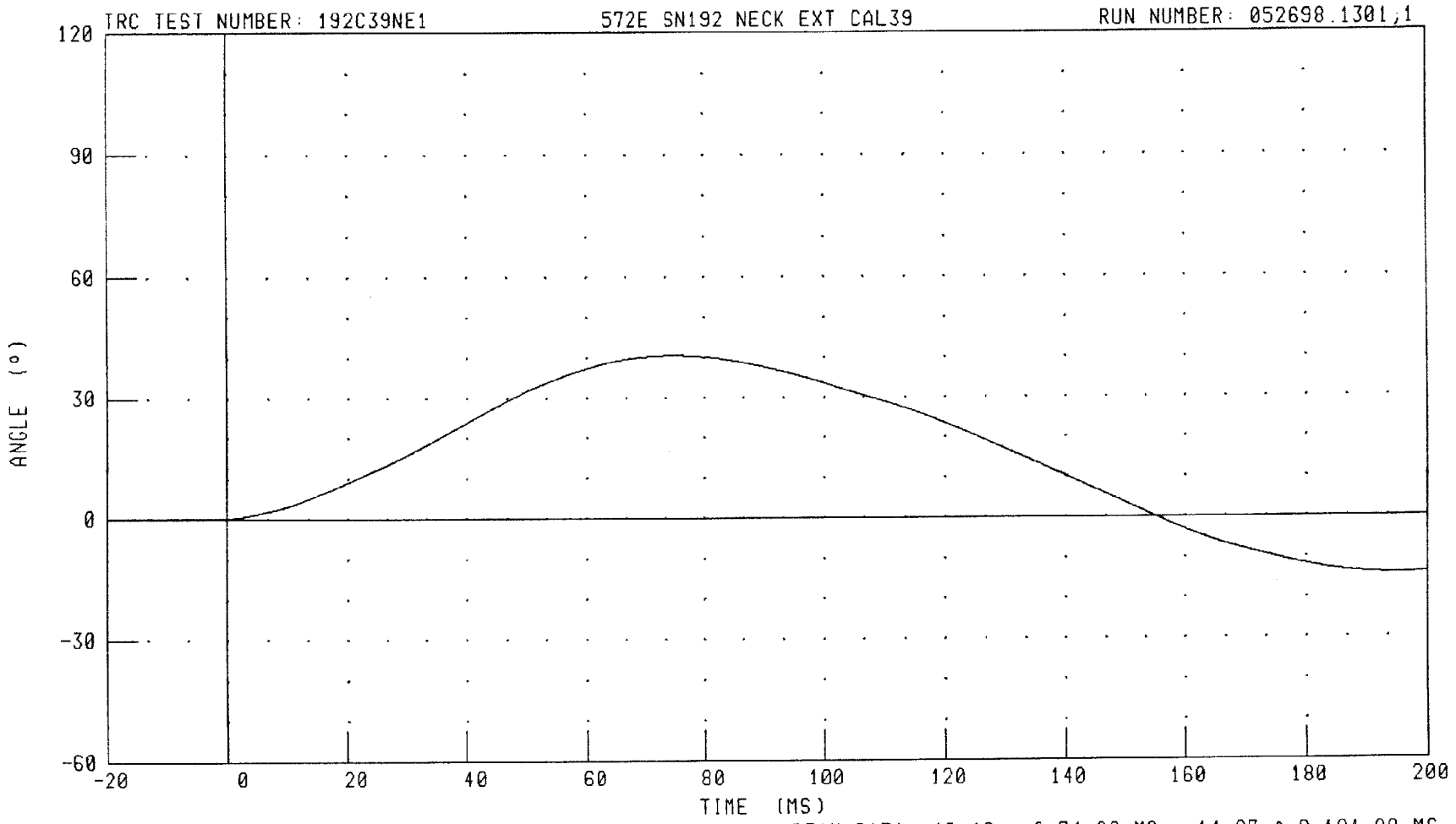
TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1300;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION



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



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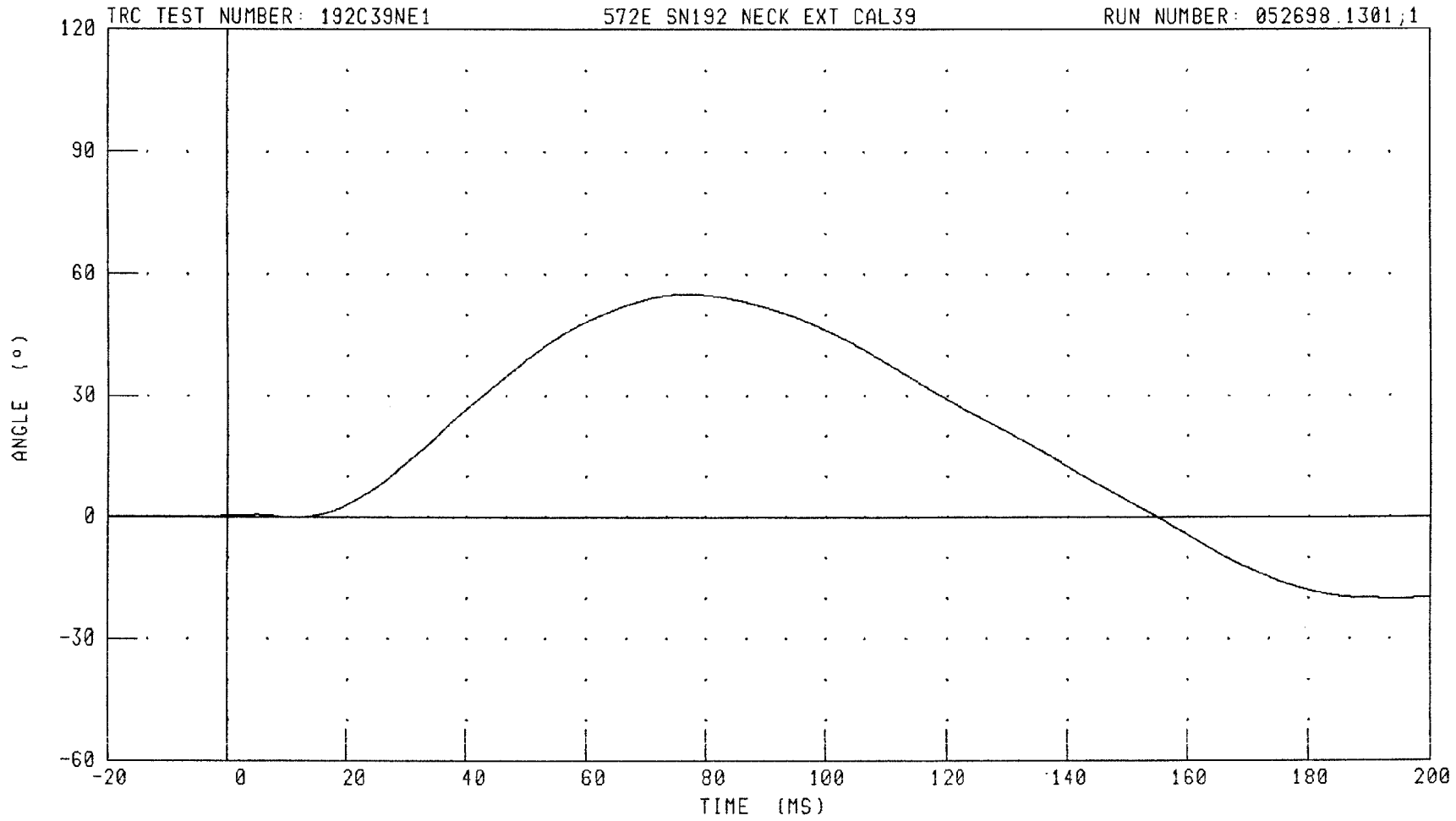
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE



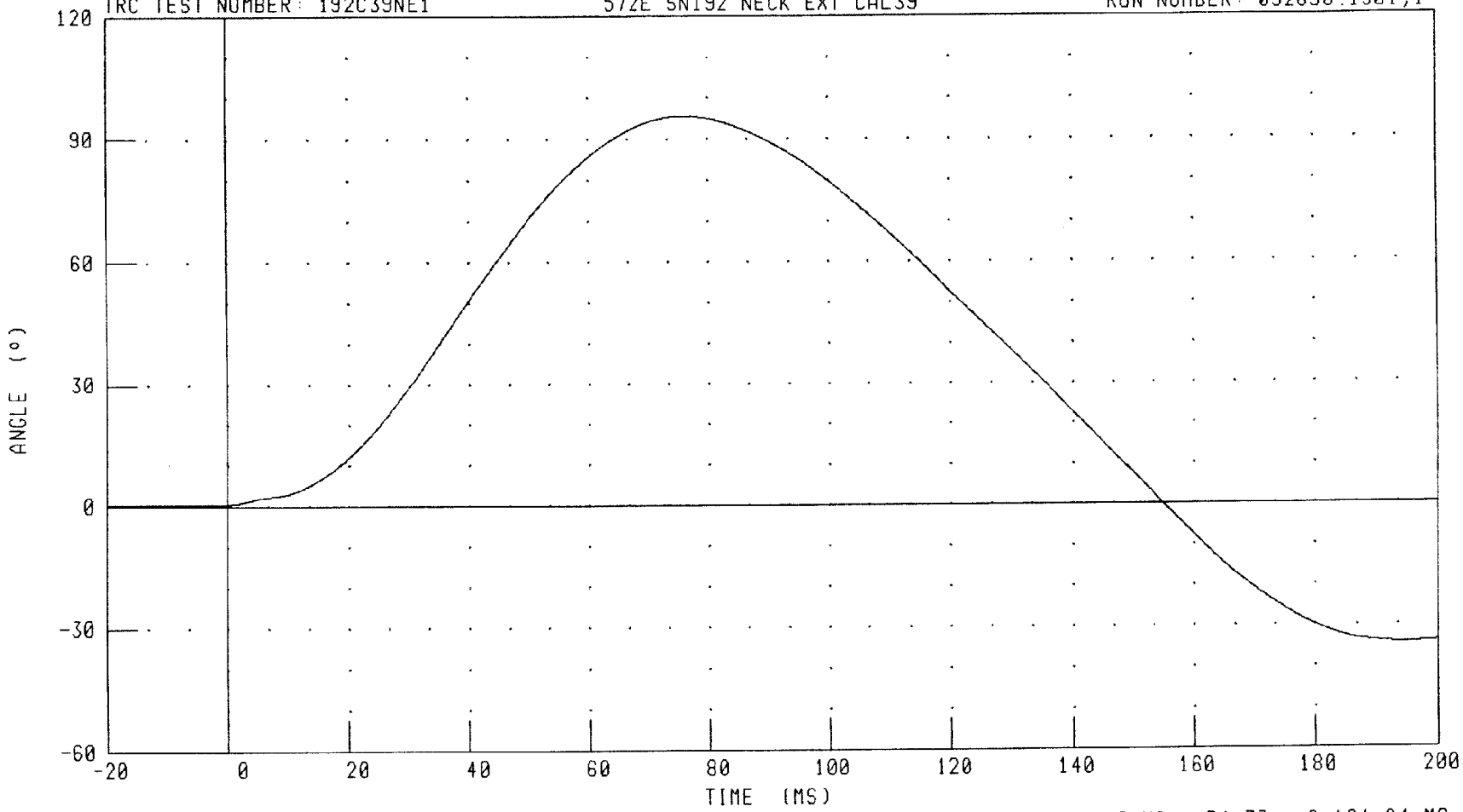
CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 55.07 ° @ 77.04 MS; -20.06 ° @ 194.24 MS

980527

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 192C39NE1 572E SN192 NECK EXT CAL39 RUN NUMBER: 052698.1301;1

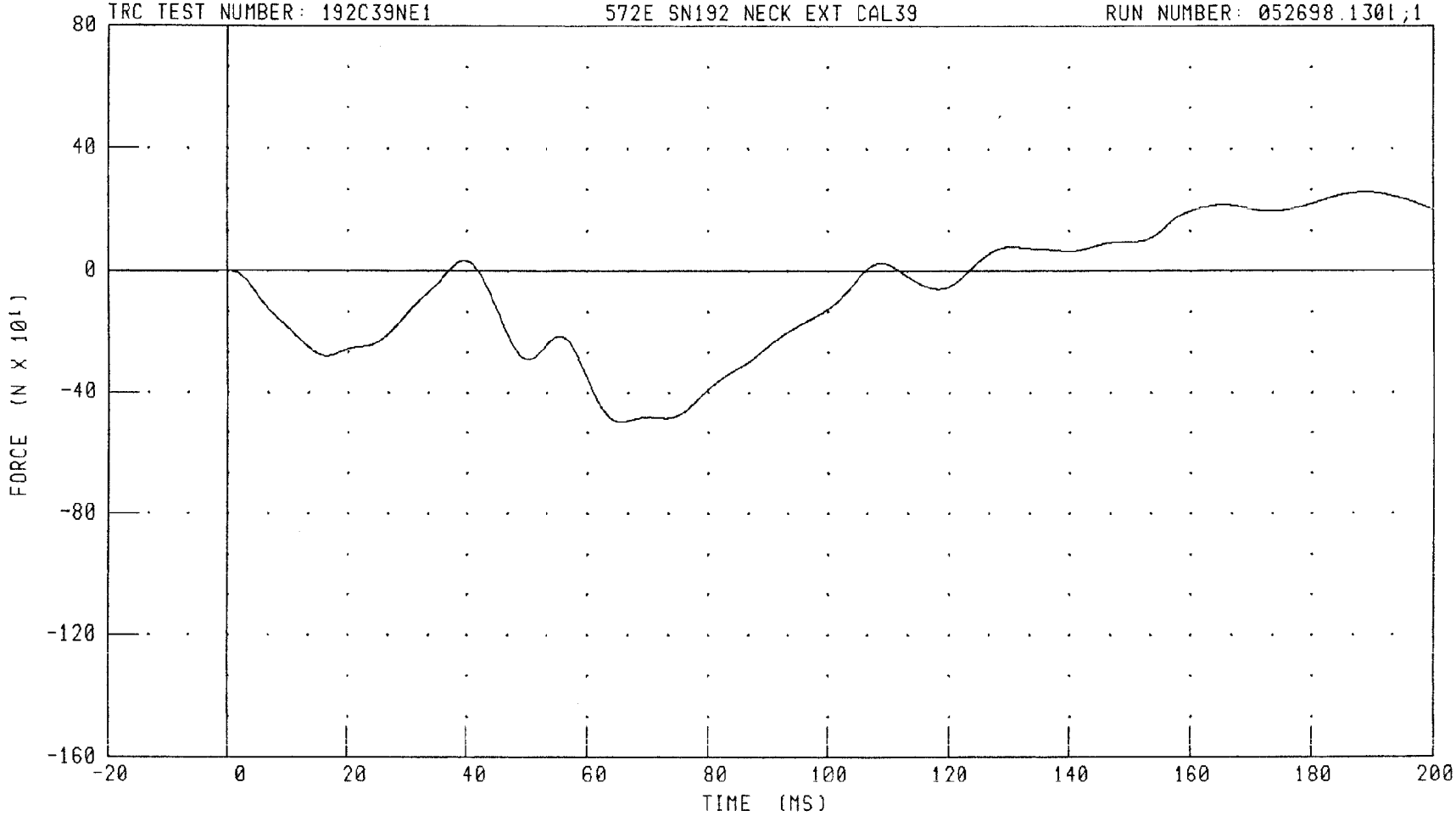


CHANNEL: TOTAN FILTER: CH CLASS 60 PEAK DATA: 95.51 ° @ 76.16 MS; -34.33 ° @ 194.64 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 192C39NE1 572E SN192 NECK EXT CAL39 RUN NUMBER: 052698.1301;1



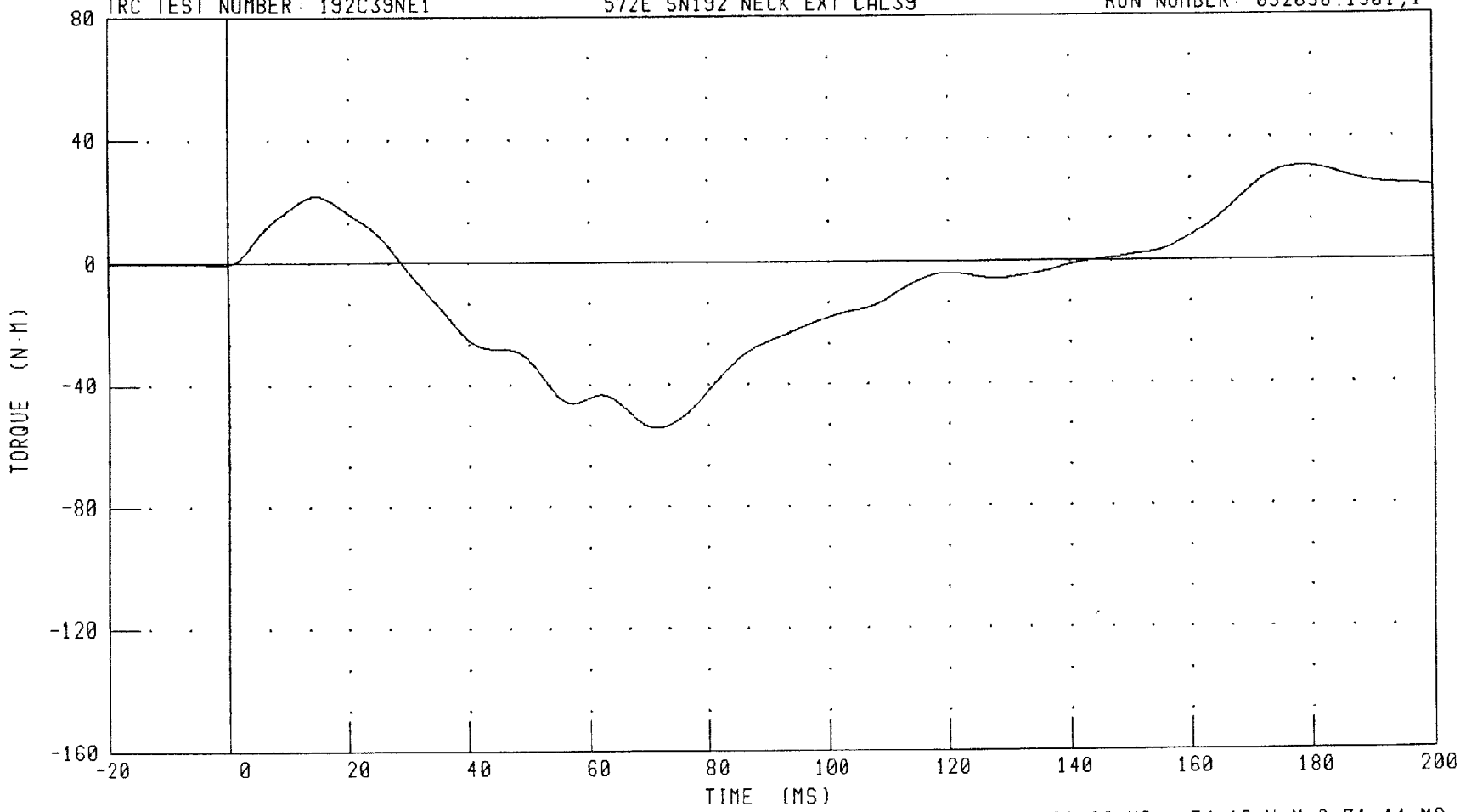
CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 258.17 N @ 188.88 MS; -496.55 N @ 65.60 MS

980527

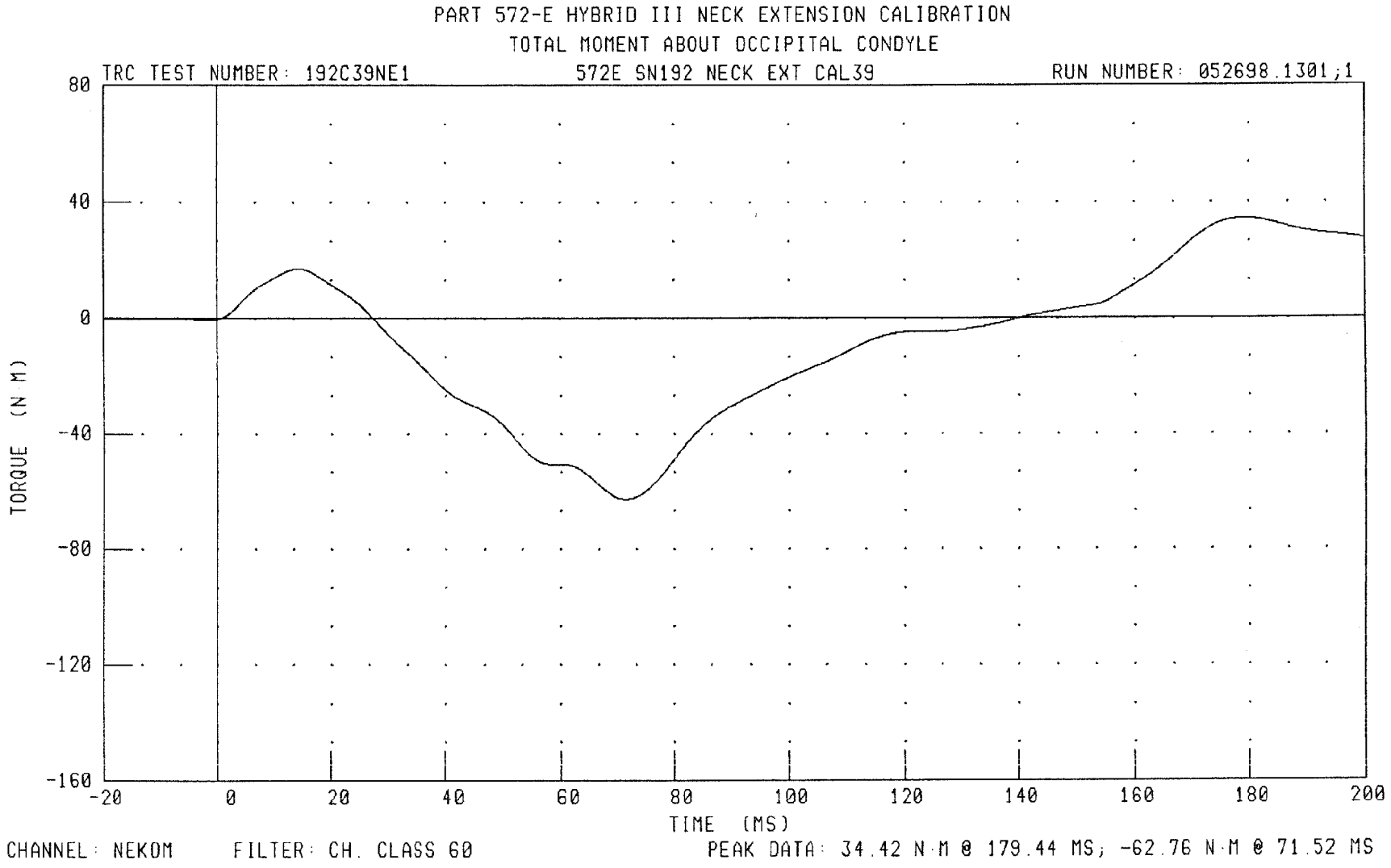
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 192C39NE1 572E SN192 NECK EXT CAL39 RUN NUMBER: 052698.1301;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 30.59 N-M @ 178.80 MS, -54.18 N-M @ 71.44 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 192C39NE1
572E SN192 NECK EXT CAL39
RUN NUMBER: 052698.1301;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: 34.42 N-M @ 179.44 MS; -62.76 N-M @ 71.52 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III 50th 26-MAY-98

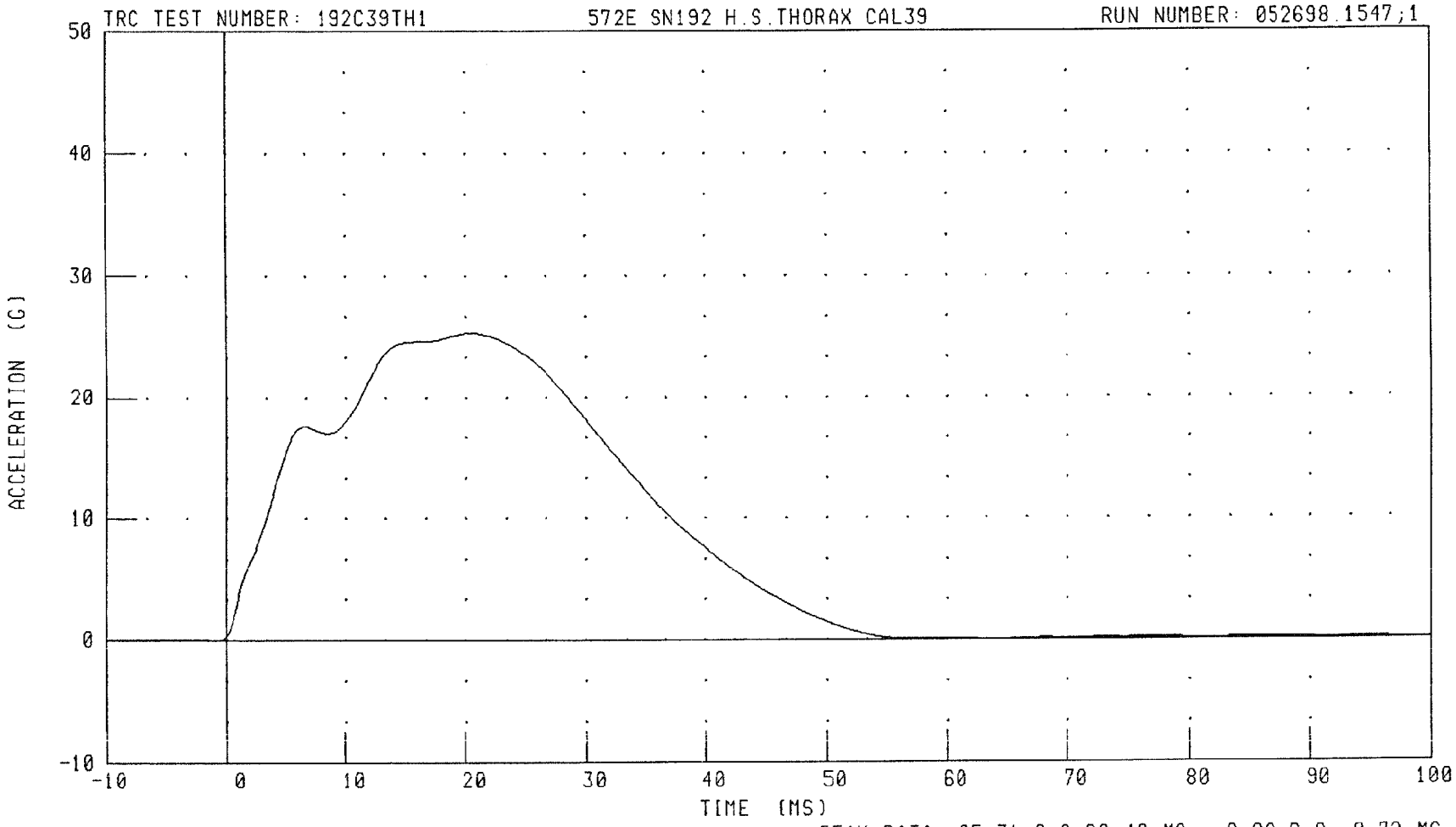
TRC INC. TEST NO: 192C39TH1 572E SN192 H.S.THORAX CAL39

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.71 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.4 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5798. N
INTERNAL HYSTERESIS	69% - 85%	72.3%

TEST MEETS SPECIFICATIONS

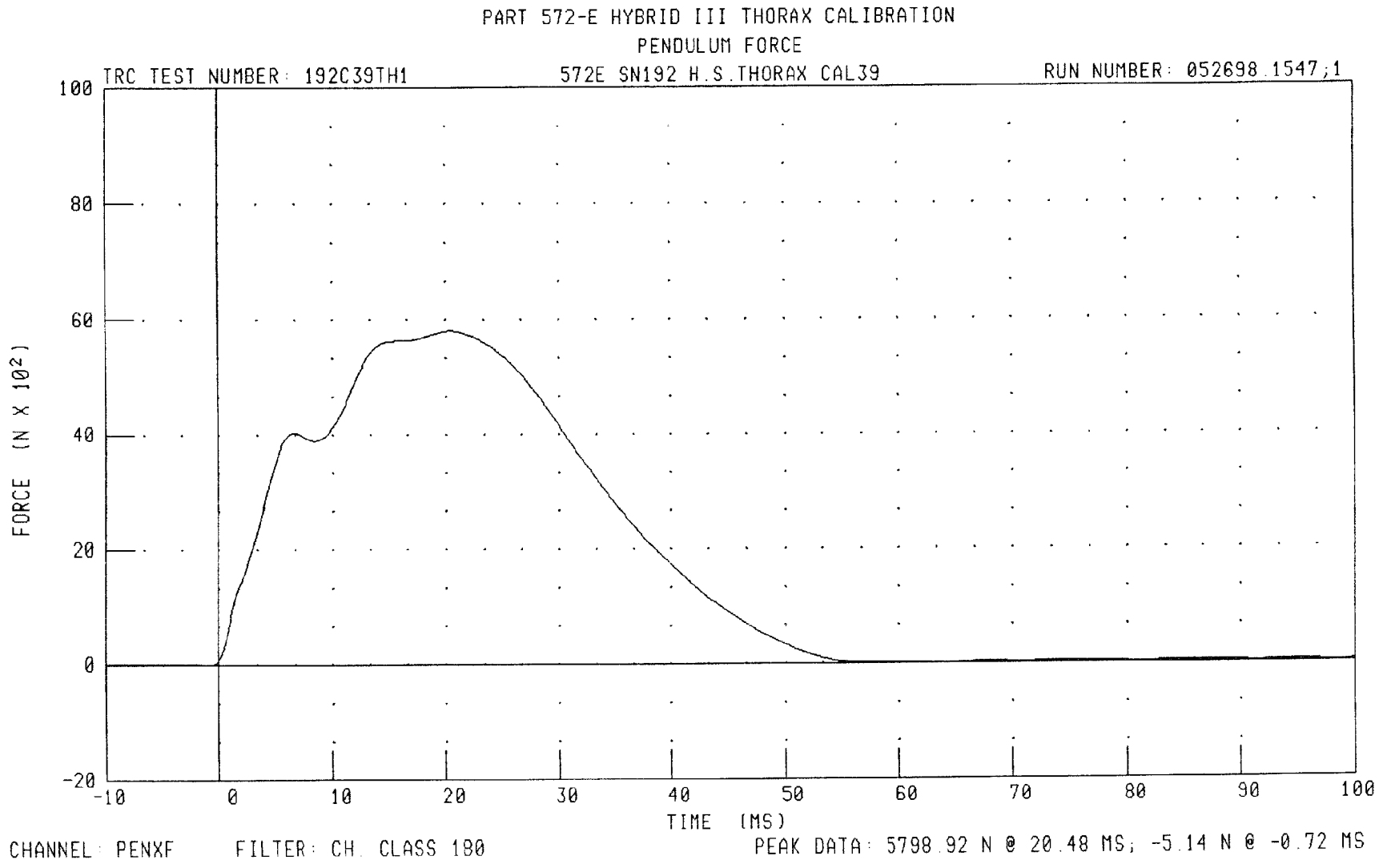
TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1546;1

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 25.31 G @ 20.48 MS; -0.02 G @ -0.72 MS

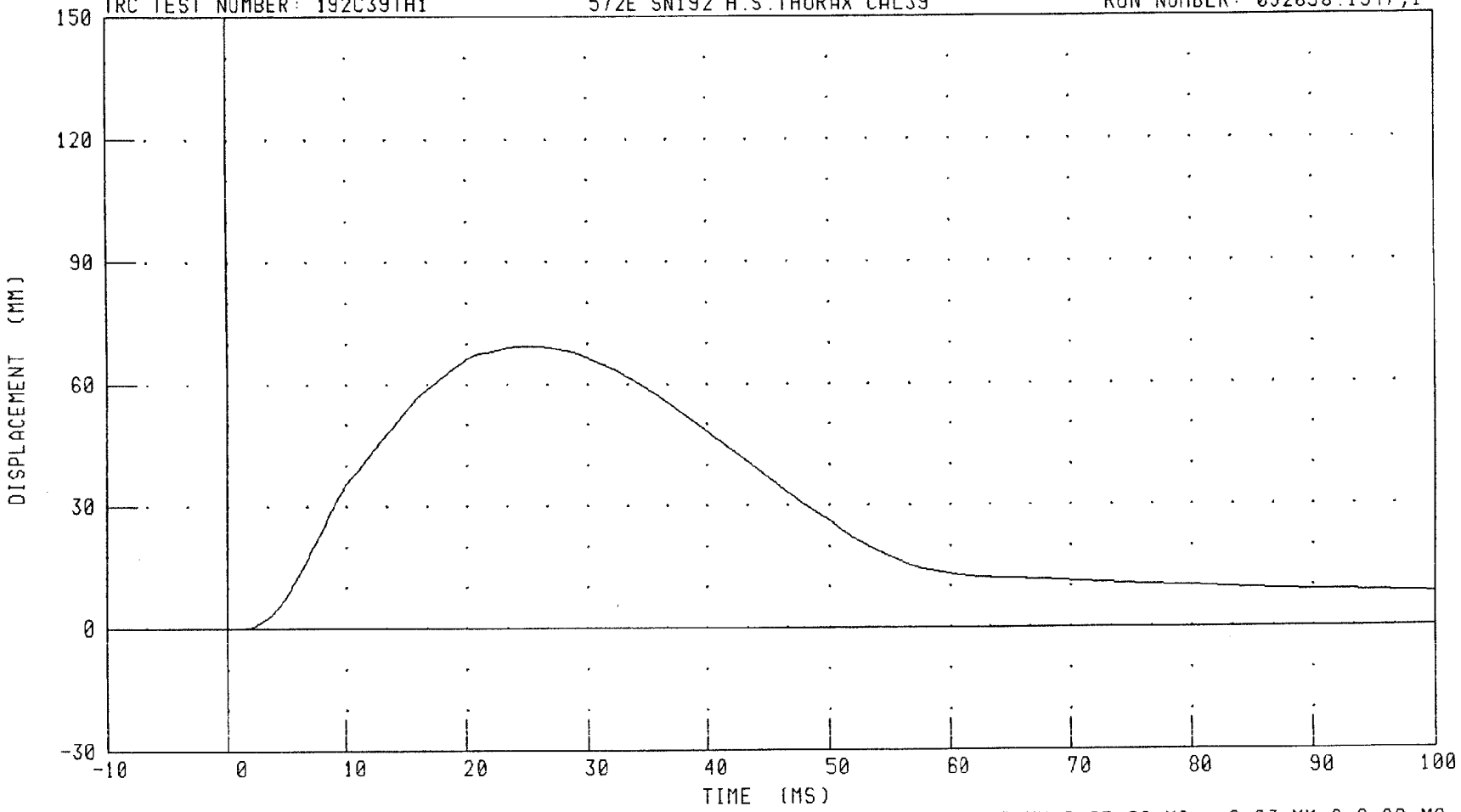
980527


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE
TRC TEST NUMBER: 192C39TH1
572E SN192 H.S.THORAX CAL39
RUN NUMBER: 052698.1547;1
FORCE (N X 10²)
100
80
60
40
20
0
-20
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXF
FILTER: CH. CLASS 180
PEAK DATA: 5798.92 N @ 20.48 MS; -5.14 N @ -0.72 MS

PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

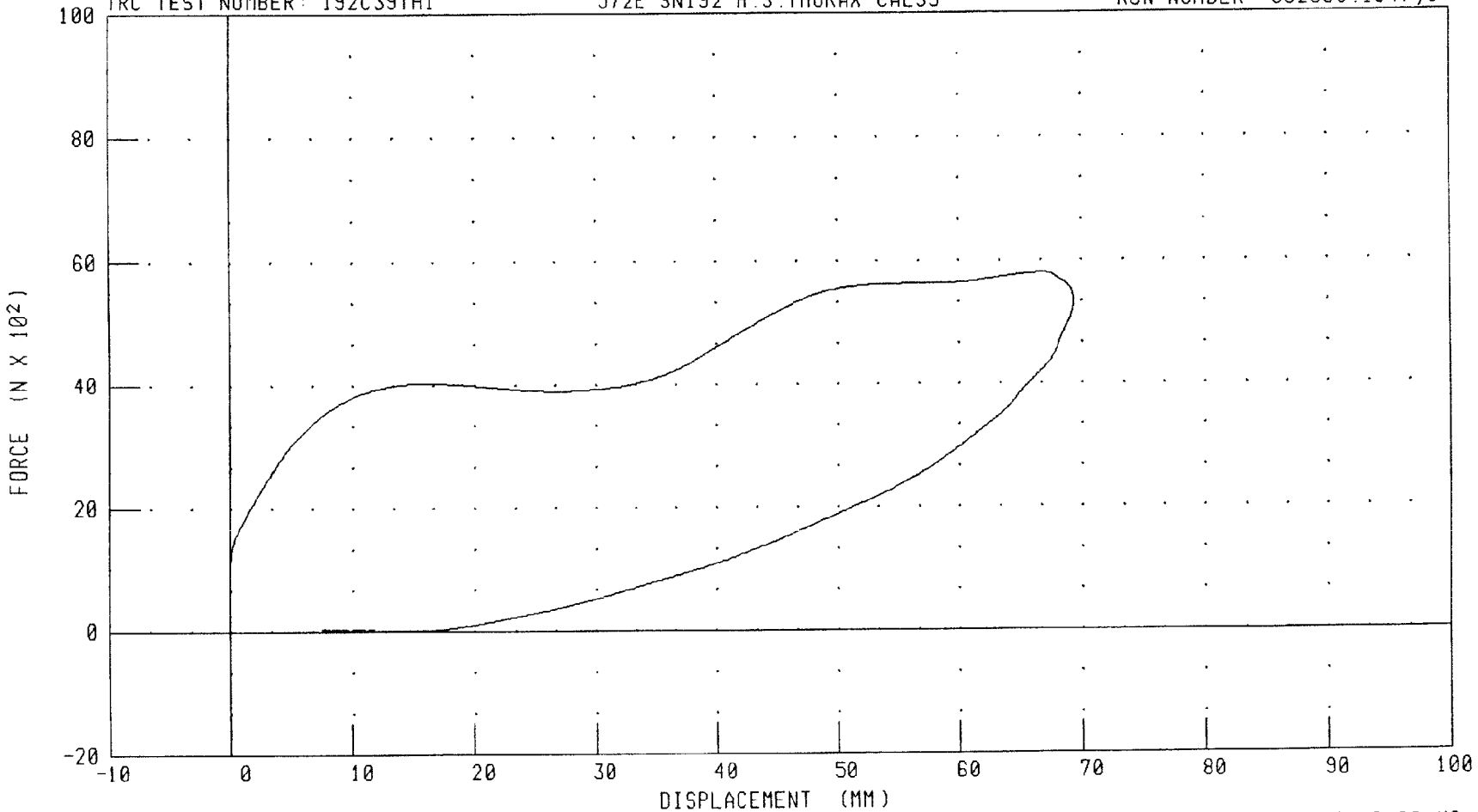
TRC TEST NUMBER: 192C39TH1 572E SN192 H.S.THORAX CAL39 RUN NUMBER: 052698.1547;1



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 69.40 MM @ 25.28 MS; -0.03 MM @ 0.96 MS

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

TRC TEST NUMBER: 192C39TH1 572E SN192 H.S.THORAX CAL39 RUN NUMBER: 052698.1547;1



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

PEAK DATA: 69.40 MM @ 25.28 MS; -0.03 MM @ 0.96 MS
5798.92 N @ 20.48 MS; -5.14 N @ -0.72 MS

980527

TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

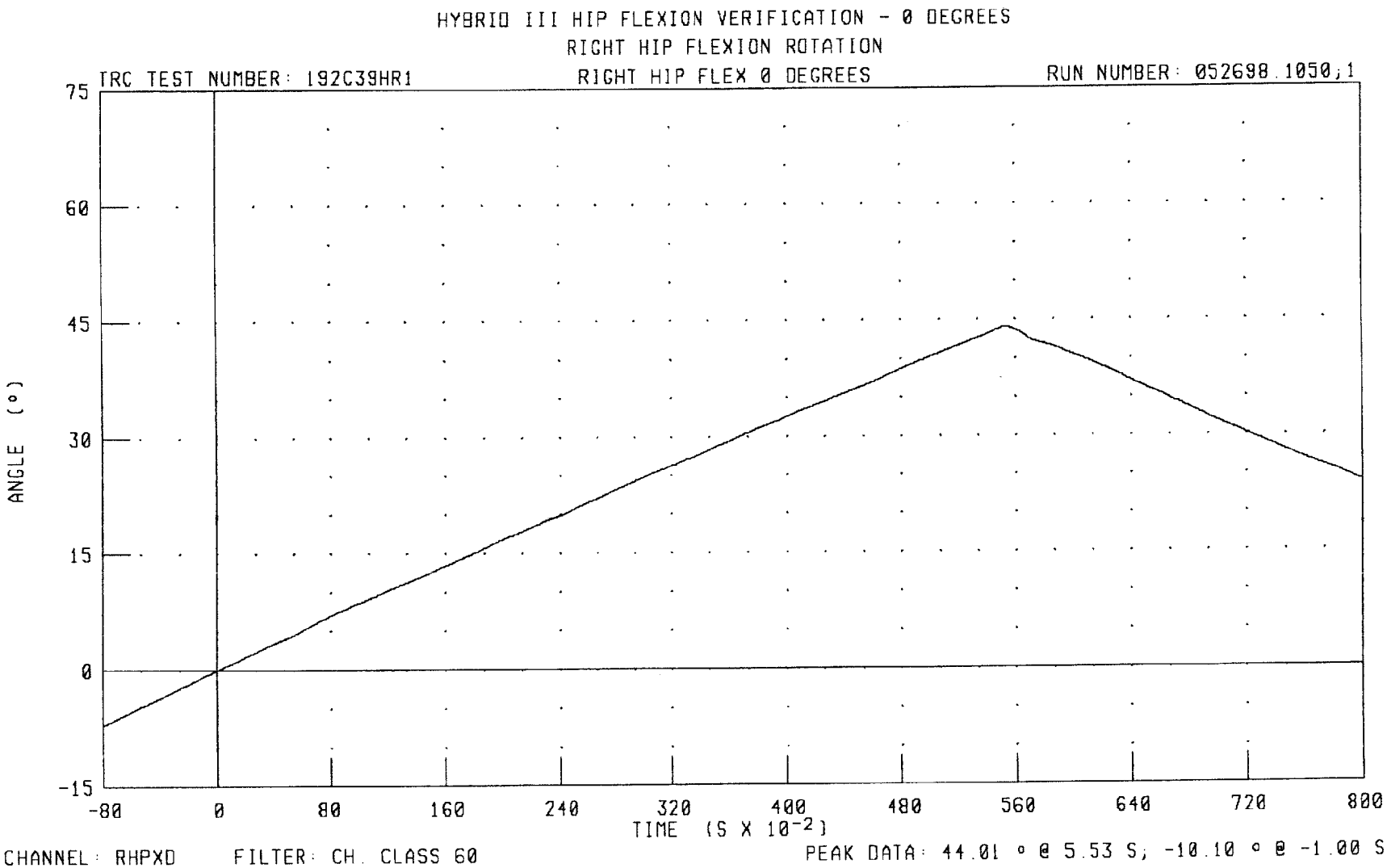
HYBRID III PART 572E 14-JAN-98

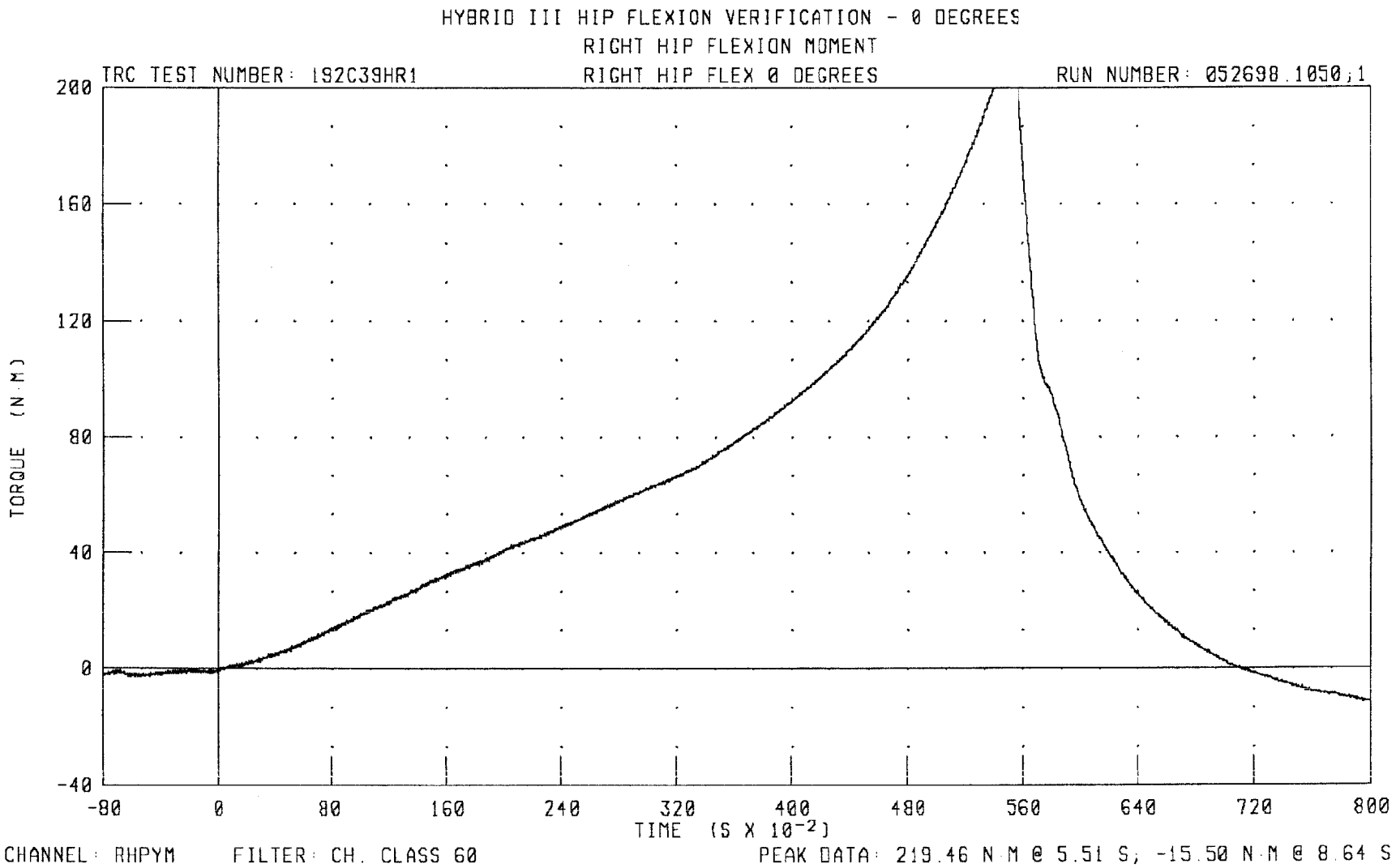
TRC INC. TEST NO: 192C39HR1 RIGHT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	81.1 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	43.3 deg.

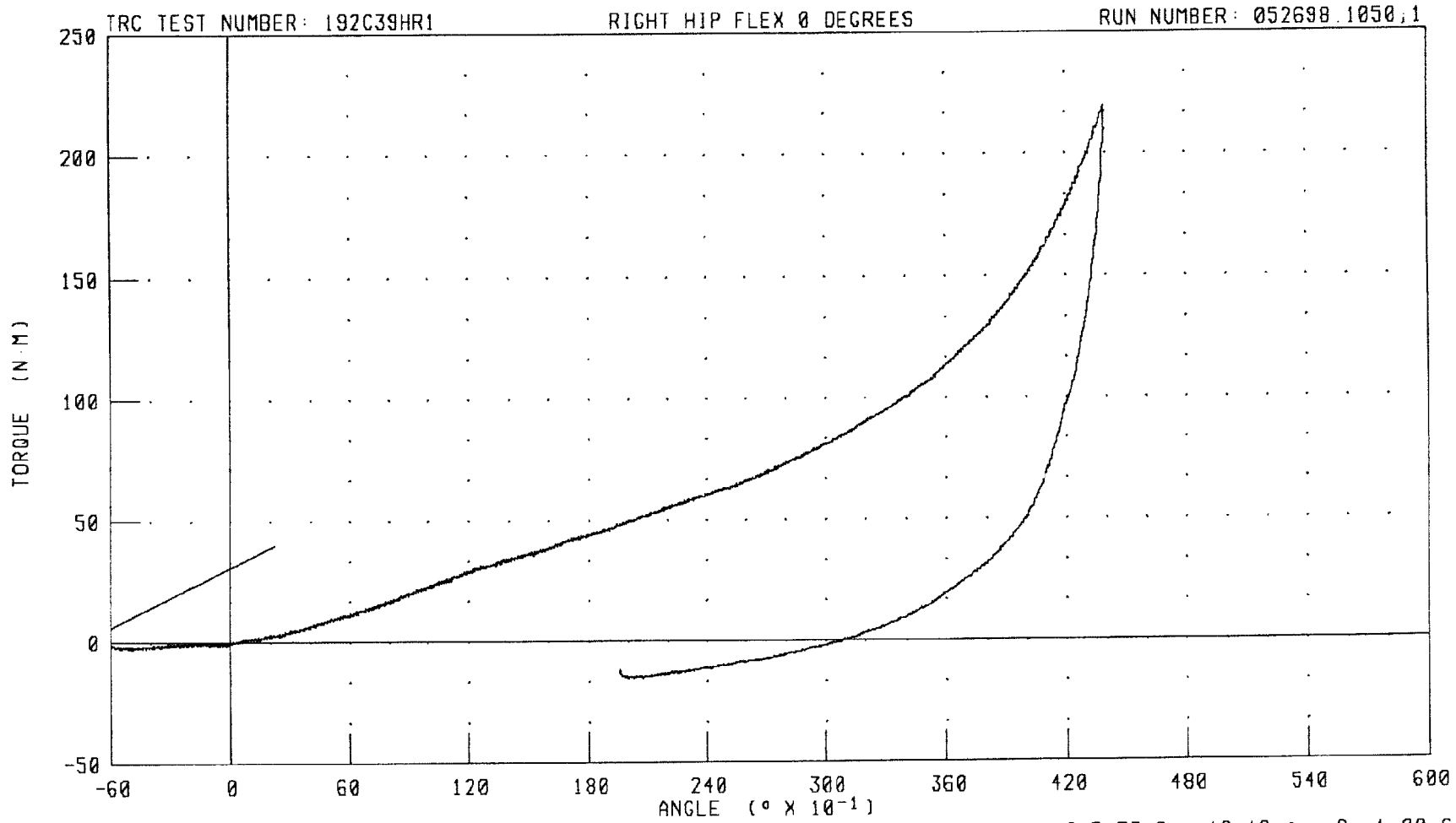
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1050;1


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION ROTATION
TRC TEST NUMBER: 192C39HR1
RIGHT HIP FLEX 0 DEGREES
RUN NUMBER: 052698.1050;1
75
60
45
30
15
0
-15
ANGLE (°)
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10-2)
CHANNEL: RHPXD
FILTER: CH. CLASS 60
PEAK DATA: 44.01 ° @ 5.53 S; -10.10 ° @ -1.00 S


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION MOMENT
RIGHT HIP FLEX 0 DEGREES
TRC TEST NUMBER: IS2C39HR1
RUN NUMBER: 052698.1050;1
TORQUE (N.M)
200
160
120
80
40
0
-40
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10-2)
CHANNEL: RHPYM
FILTER: CH. CLASS 60
PEAK DATA: 219.46 N.M @ 5.51 S; -15.50 N.M @ 8.64 S

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



TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

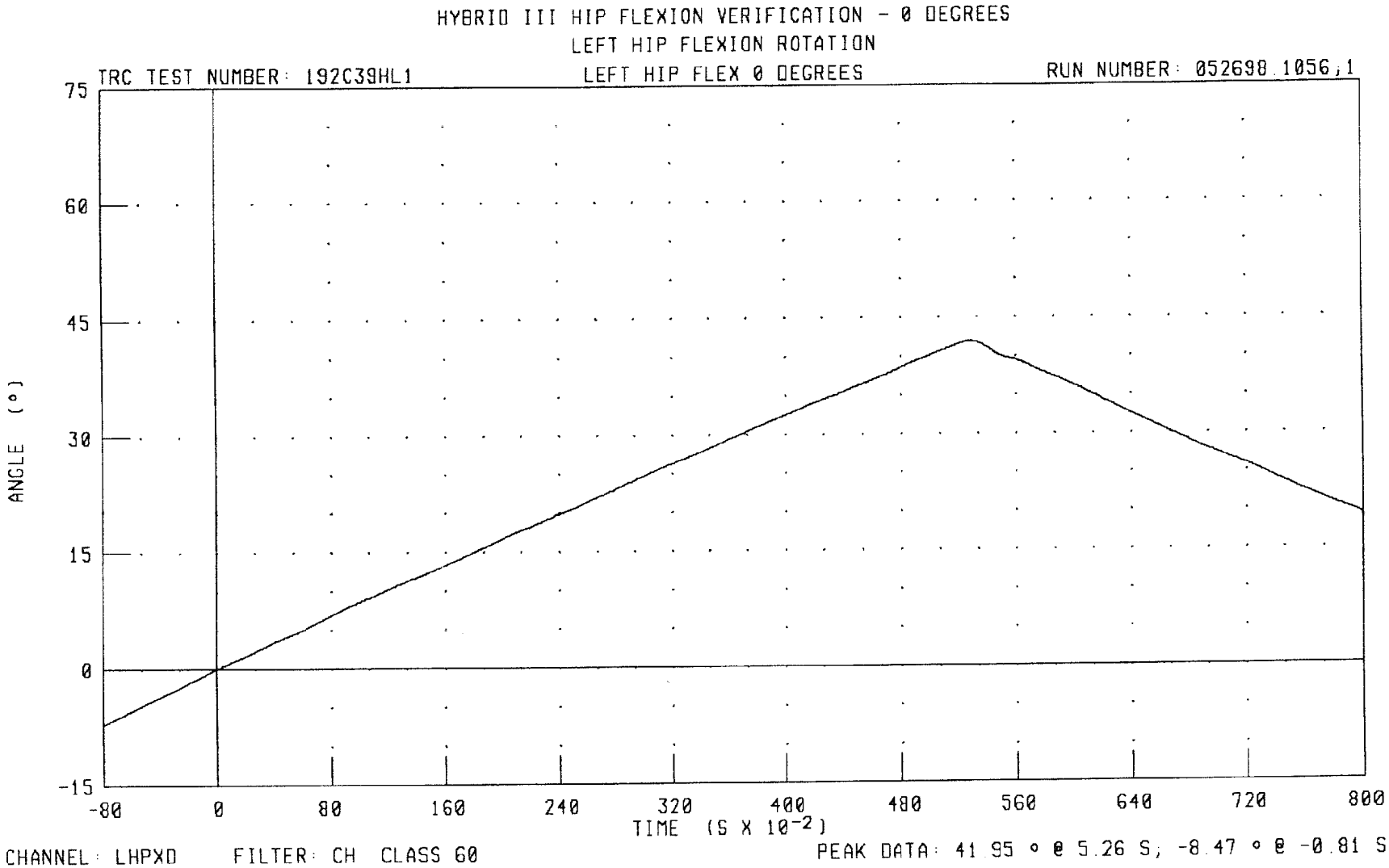
HYBRID III PART 572E 26-MAY-98

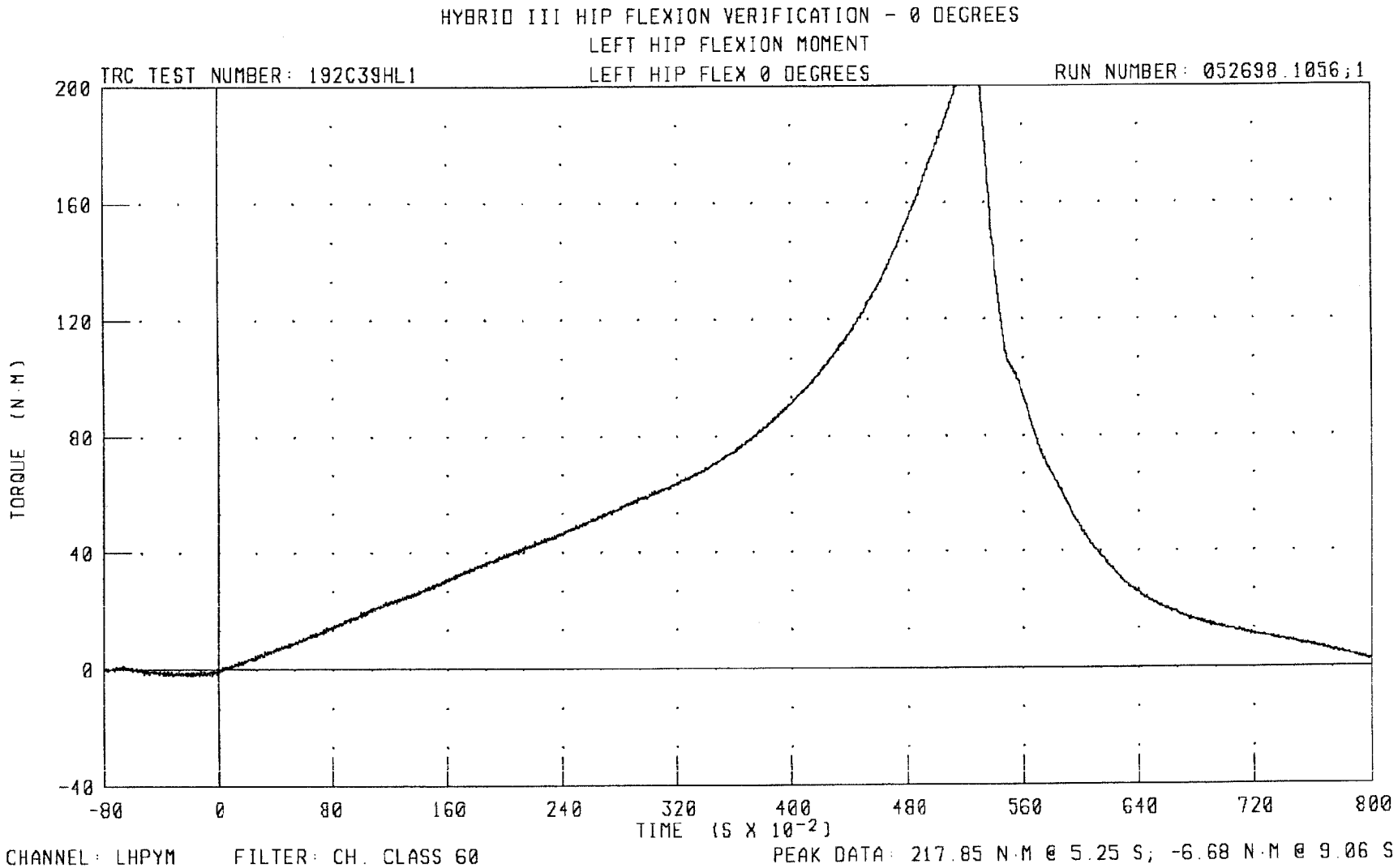
TRC INC. TEST NO: 192C39HL1 LEFT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	77.9 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	41.3 deg.

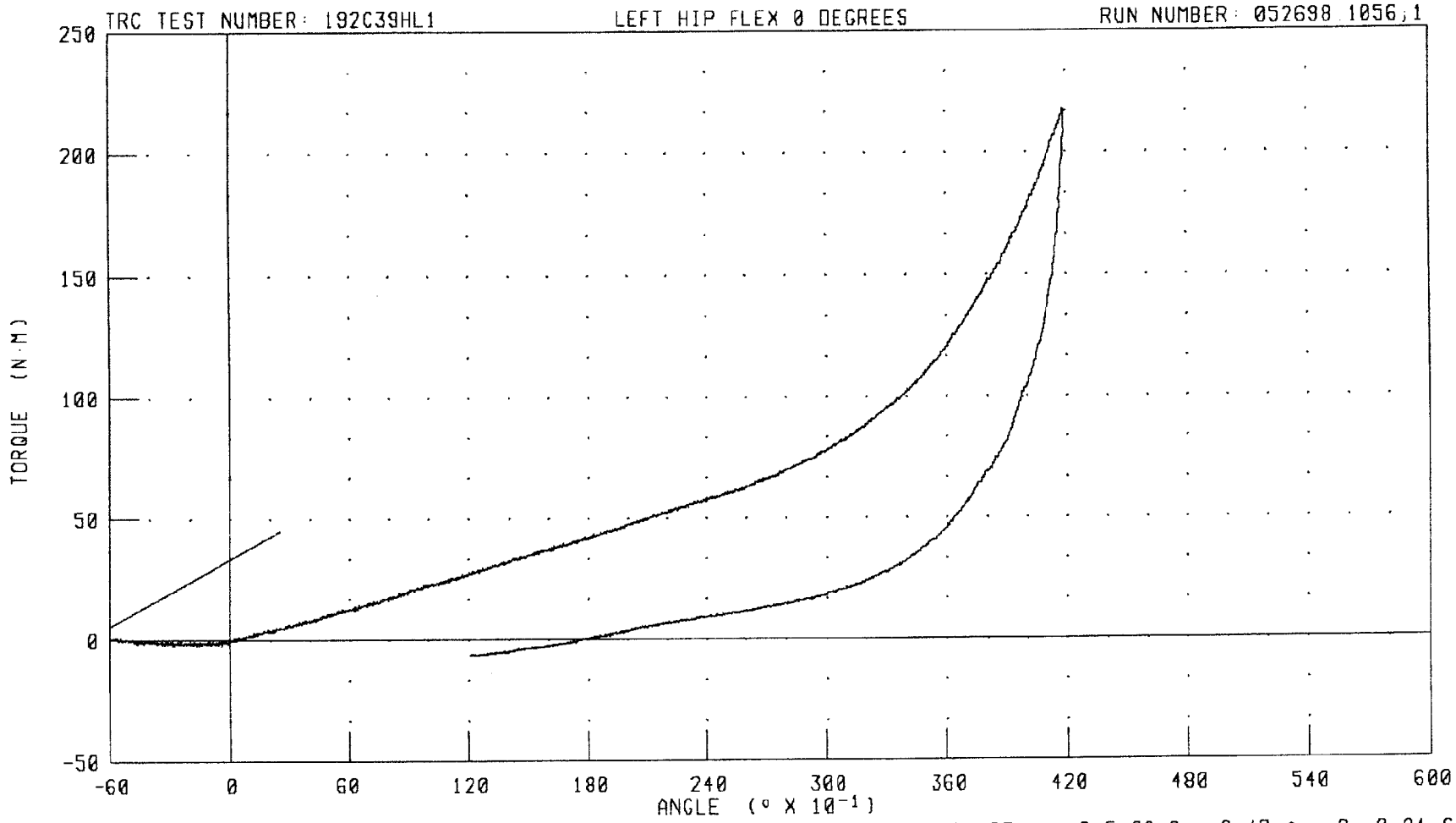
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1056;1


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION ROTATION
TRC TEST NUMBER: 192C39HL1
LEFT HIP FLEX 0 DEGREES
RUN NUMBER: 052698.1056,1
75
60
45
30
15
0
-15
ANGLE (°)
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10-2)
CHANNEL: LHPXD
FILTER: CH CLASS 60
PEAK DATA: 41.95 ° @ 5.26 S; -8.47 ° @ -0.81 S


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT
LEFT HIP FLEX 0 DEGREES
TRC TEST NUMBER: 192C39HL1
RUN NUMBER: 052698.1056;1
TORQUE (N·M)
200
160
120
80
40
0
-40
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10-2)
CHANNEL: LHPYM
FILTER: CH. CLASS 60
PEAK DATA: 217.85 N·M @ 5.25 S; -6.68 N·M @ 9.06 S

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



CHANNEL: LHPXD FILTER: CH. CLASS 60
LHPYM CH. CLASS 60

PEAK DATA: 41.95 ° @ 5.26 S; -8.47 ° @ -0.81 S
217.85 N·M @ 5.25 S; -6.68 N·M @ 9.06 S

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TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

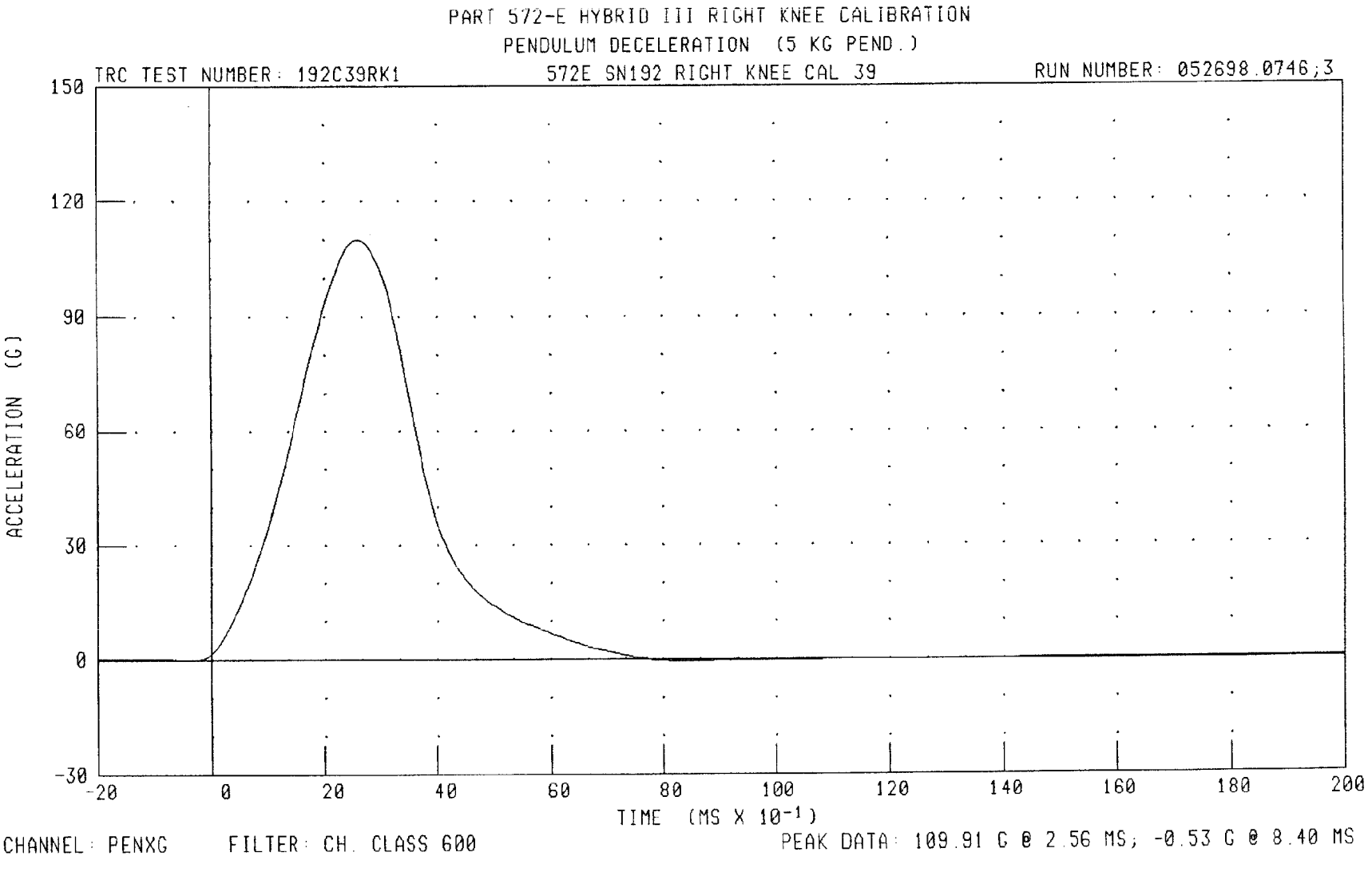
HYBRID III 50th 22-MAY-98

TRC INC. TEST NO: 192C39RK1 572E SN192 RIGHT KNEE CAL 39

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5377.6 N

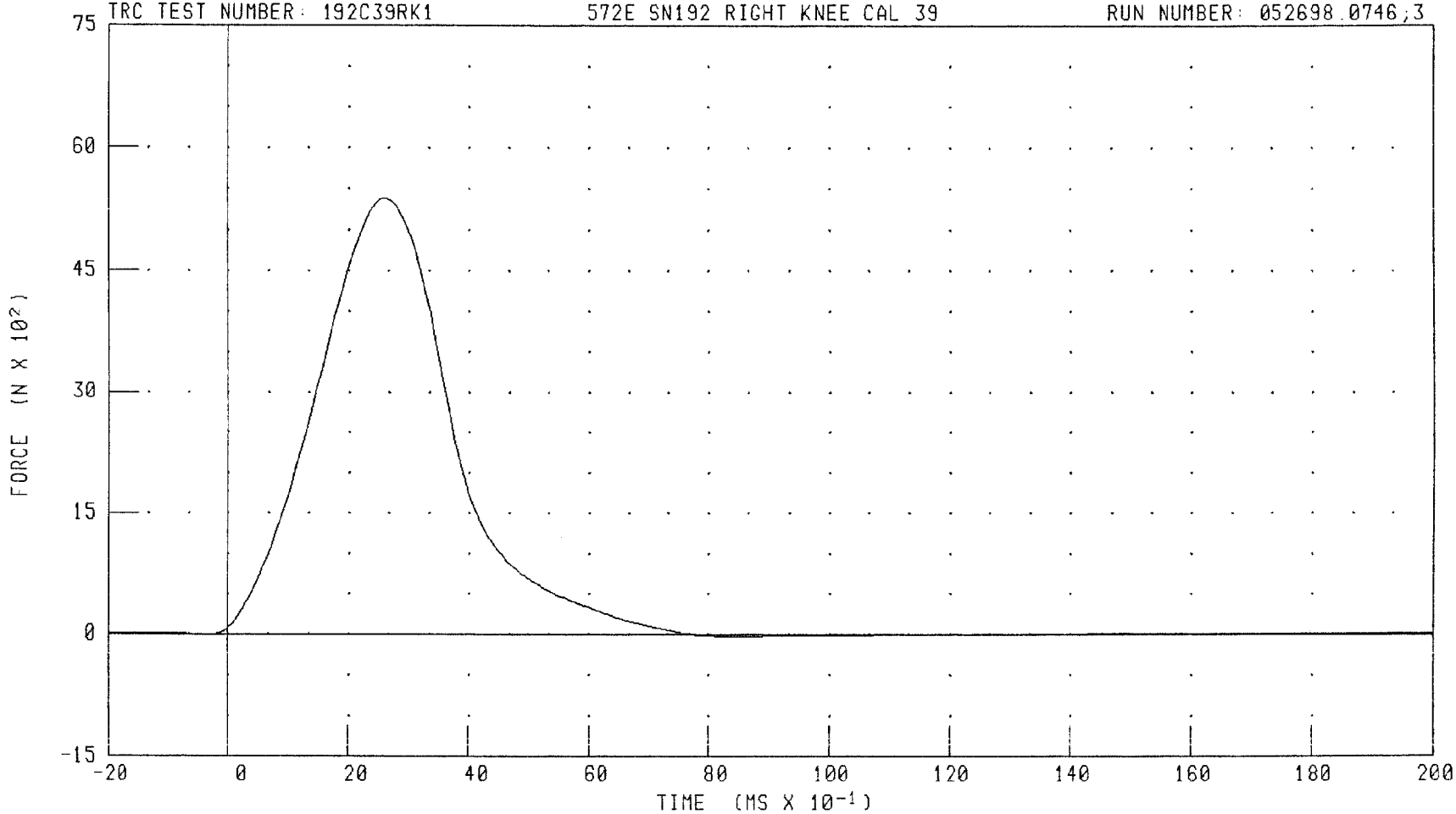
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 052698.0745;3


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)
TRC TEST NUMBER: 192C39RK1
572E SN192 RIGHT KNEE CAL 39
RUN NUMBER: 052698.0746;3
150
120
90
60
30
0
-30
ACCELERATION (G)
-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: 109.91 G @ 2.56 MS; -0.53 G @ 8.40 MS

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

TRC TEST NUMBER: 192C39RK1
572E SN192 RIGHT KNEE CAL 39
RUN NUMBER: 052698.0746;3



CHANNEL: PENXF FILTER: CH. CLASS 600
PEAK DATA: 5377.62 N @ 2.56 MS; -25.83 N @ 8.40 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

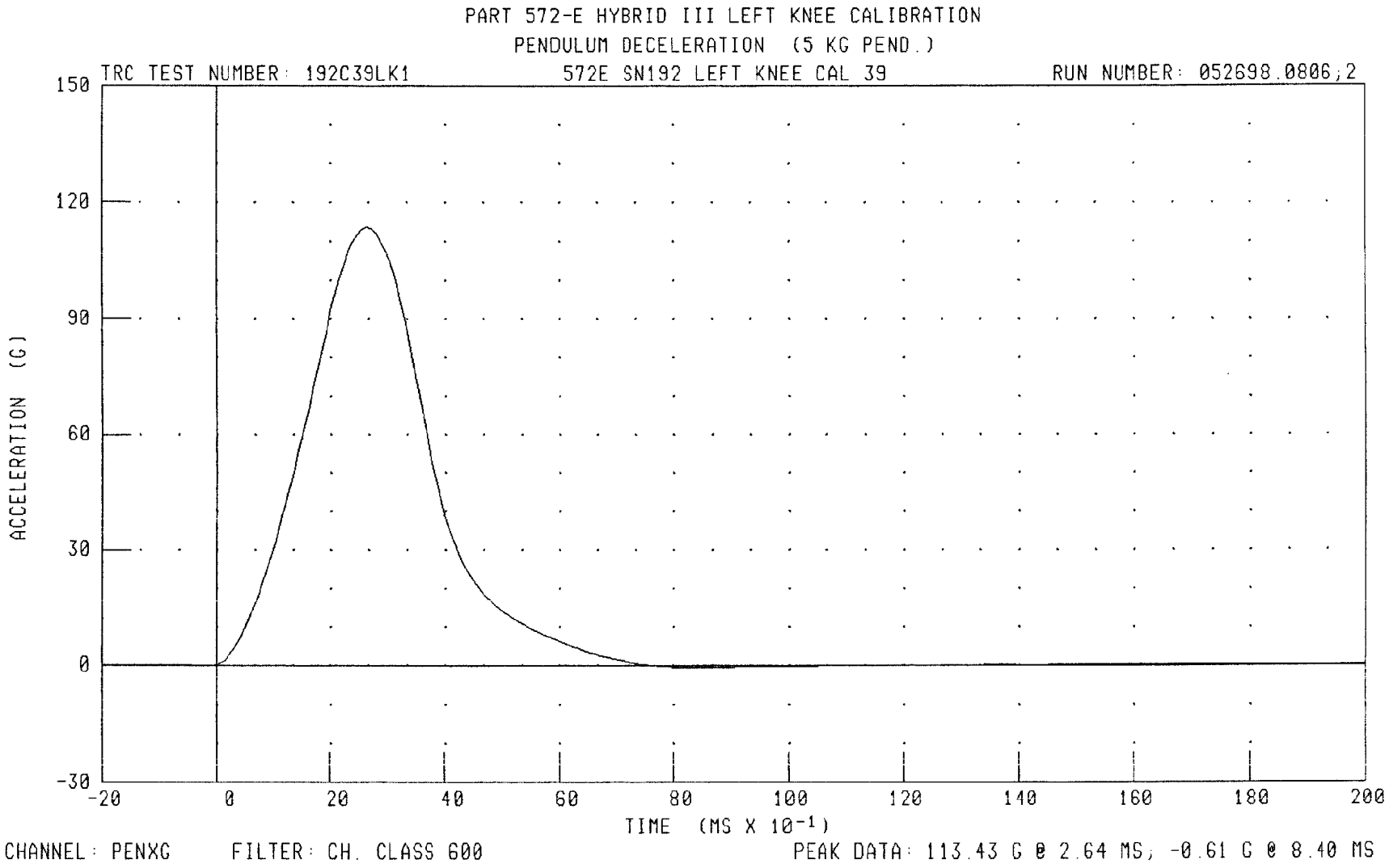
HYBRID III 50th 26-MAY-98

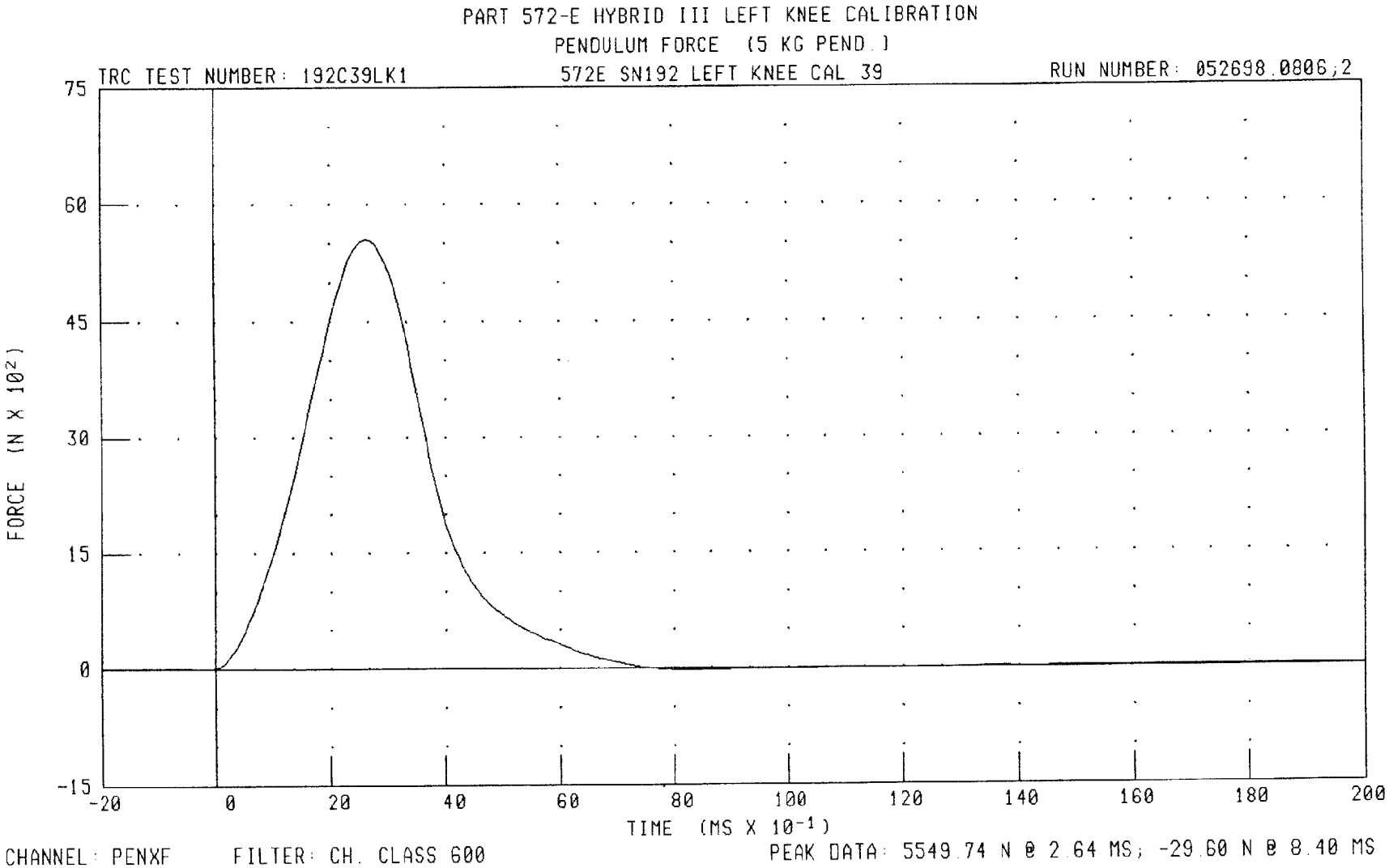
TRC INC. TEST NO: 192C39LK1 572E SN192 LEFT KNEE CAL 39

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5549.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN By Cert RUN NUMBER: 052698.0805;2


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)
TRC TEST NUMBER: 192C39LK1
572E SN192 LEFT KNEE CAL 39
RUN NUMBER: 052698.0806;2
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: 113.43 G @ 2.64 MS; -0.61 G @ 8.40 MS


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)
TRC TEST NUMBER: 192C39LK1
572E SN192 LEFT KNEE CAL 39
RUN NUMBER: 052698.0806;2
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: 5549.74 N @ 2.64 MS; -29.60 N @ 8.40 MS

Pre-test Certification Data

Passenger Dummy S/N: 142

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

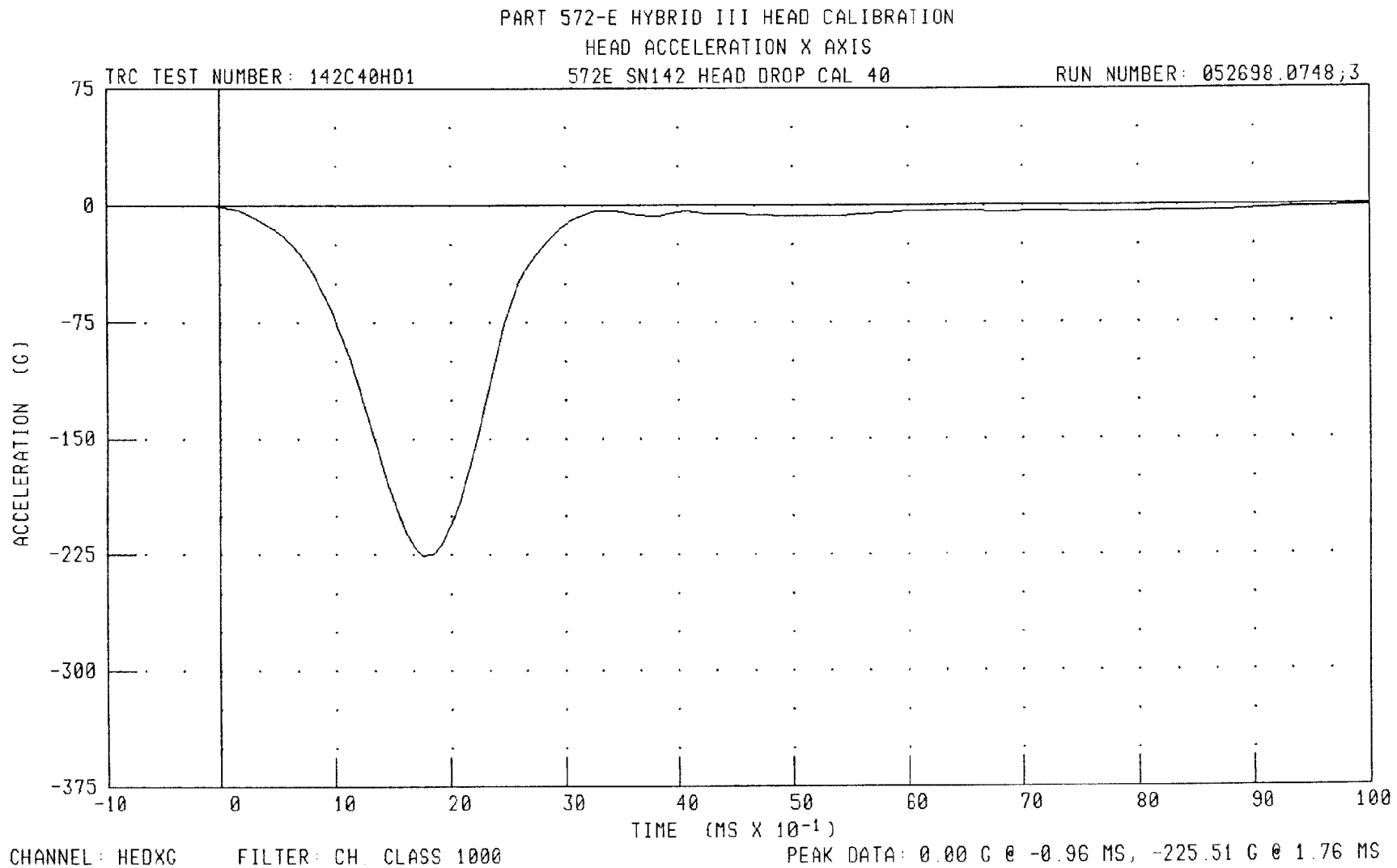
HYBRID III 50th 23-MAY-98

TRC INC. TEST NO: 142C40HD1 572E SN142 HEAD DROP CAL 40

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	254.12 G
PEAK LATERAL ACCELERATION	15 G MAX	4.72 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

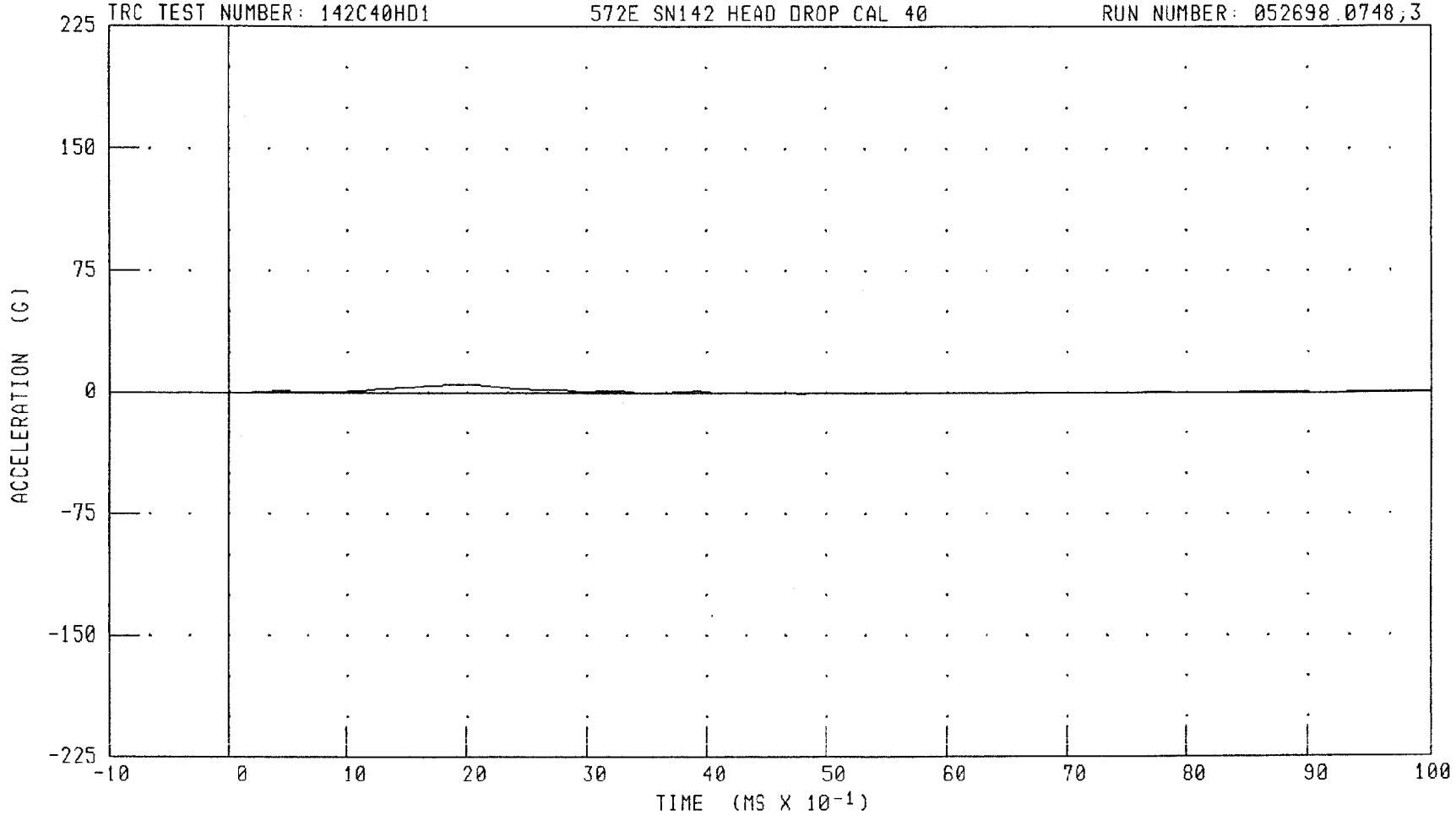
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 052398.0901;1

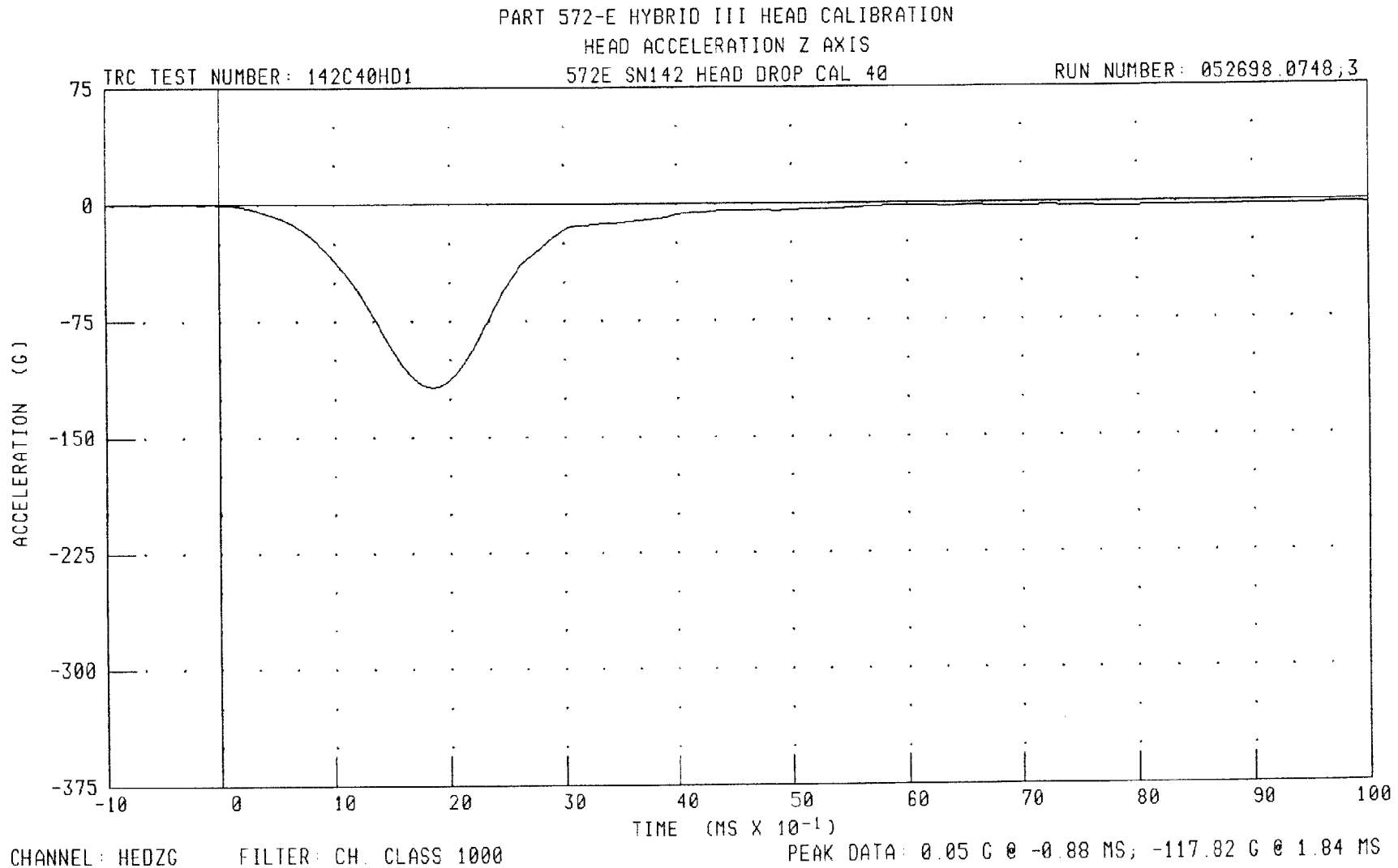

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 142C40HD1
572E SN142 HEAD DROP CAL 40
RUN NUMBER: 052698.0748;3
75
0
-75
-150
-225
-300
-375
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH CLASS 1000
PEAK DATA: 0.00 G @ -0.96 MS, -225.51 G @ 1.76 MS

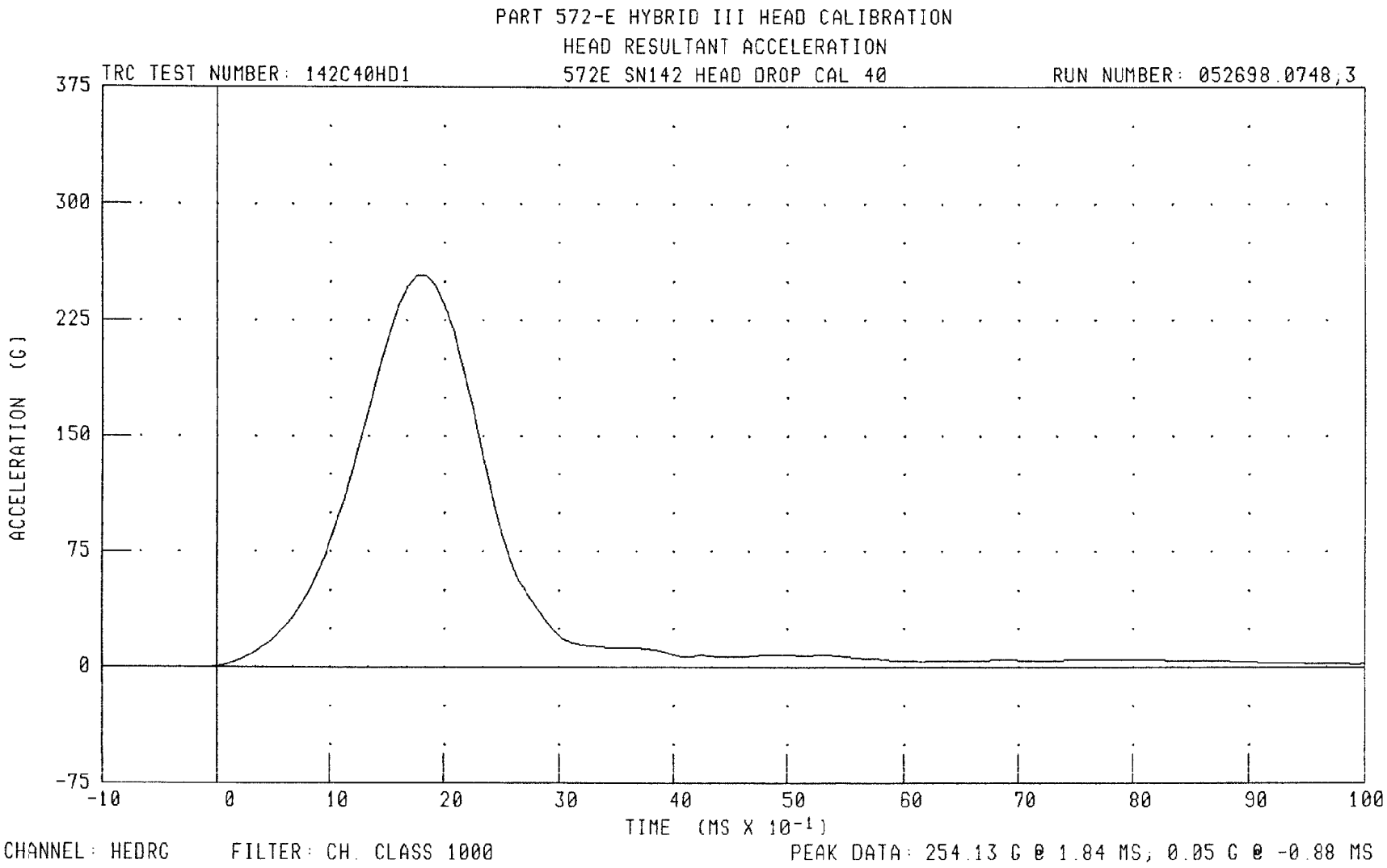
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 142C40HD1 572E SN142 HEAD DROP CAL 40 RUN NUMBER: 052698.0748;3



CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 4.73 G @ 1.92 MS; -0.78 G @ 4.80 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 142C40HD1
572E SN142 HEAD DROP CAL 40
RUN NUMBER: 052698.0748;3
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: 0.05 G @ -0.88 MS; -117.82 G @ 1.84 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 142C40HD1
572E SN142 HEAD DROP CAL 40
RUN NUMBER: 052698.0748,3
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: HEDRC
FILTER: CH. CLASS 1000
PEAK DATA: 254.13 G @ 1.84 MS; 0.05 G @ -0.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th 26-MAY-98

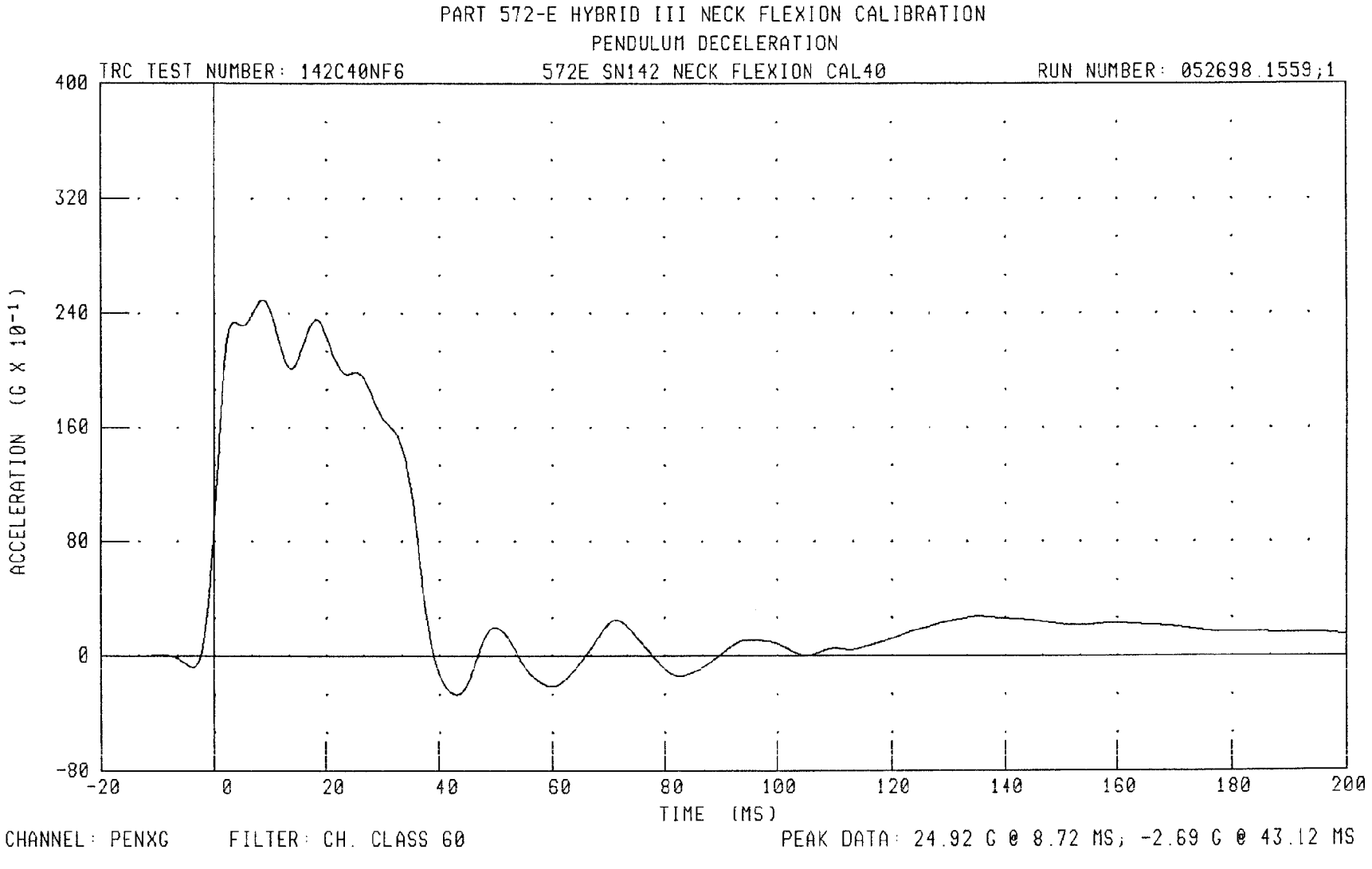
NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 142C40NF6 572E SN142 NECK FLEXION CAL40

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	40.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	6.99 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.20 G
	20 MS	17.60 - 22.60 G	22.51 G
	30 MS	12.50 - 18.50 G	16.67 G
MAX PENDULUM G		29 G MAX	24.92 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.62 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.04 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	71.75 DEG.
	TIME	57 - 64 MS	59.36 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	101.78 NM
	TIME	47 - 58 MS	51.36 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.68 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	100.88 MS

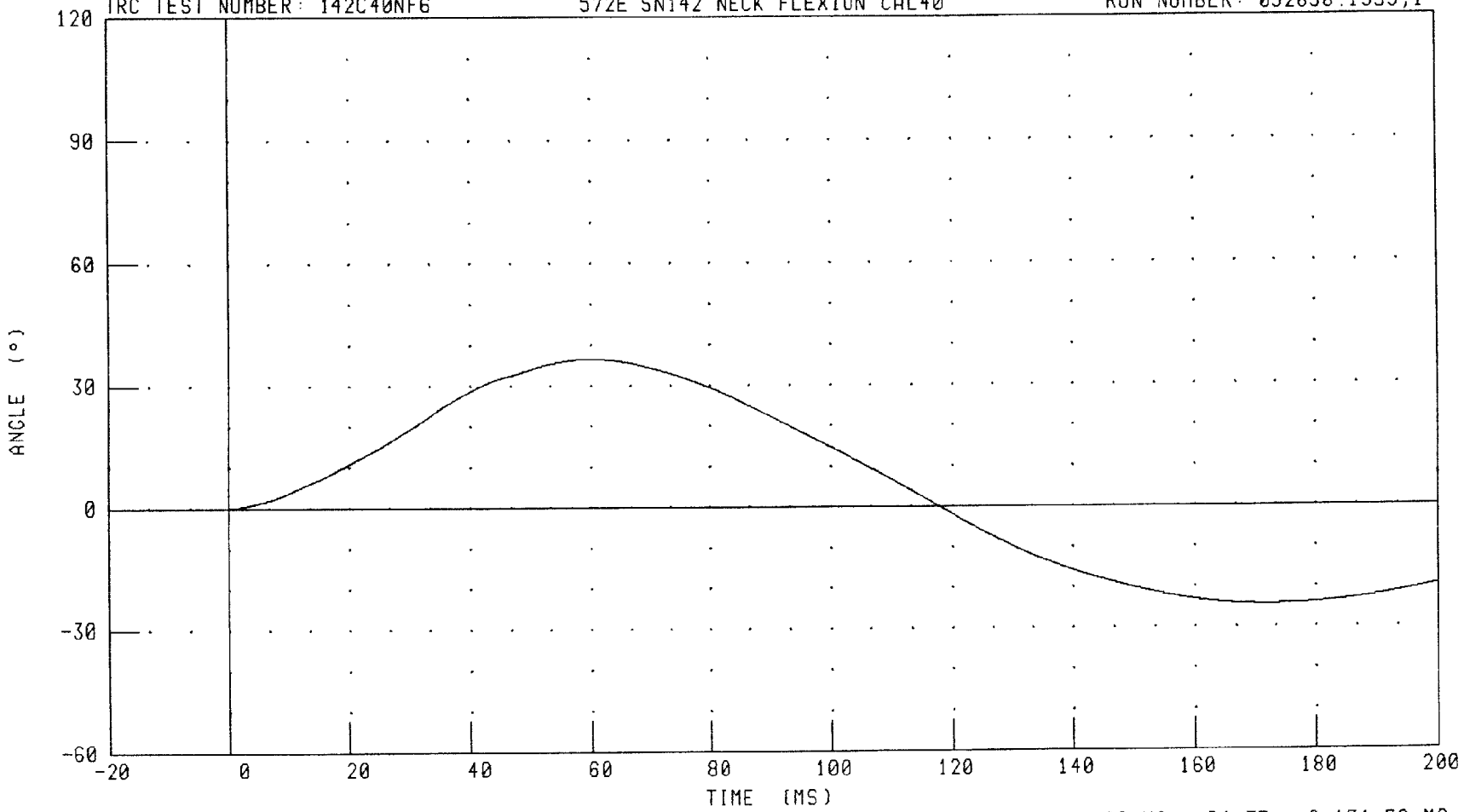
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1559;1


PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C40NF6
572E SN142 NECK FLEXION CAL40
RUN NUMBER: 052698.1559;1
ACCELERATION (G X 10-1)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 60
PEAK DATA: 24.92 G @ 8.72 MS; -2.69 G @ 43.12 MS

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

TRC TEST NUMBER: 142C40NF6 572E SN142 NECK FLEXION CAL40 RUN NUMBER: 052698.1559;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 36.56 ° @ 59.92 MS; -24.37 ° @ 171.76 MS

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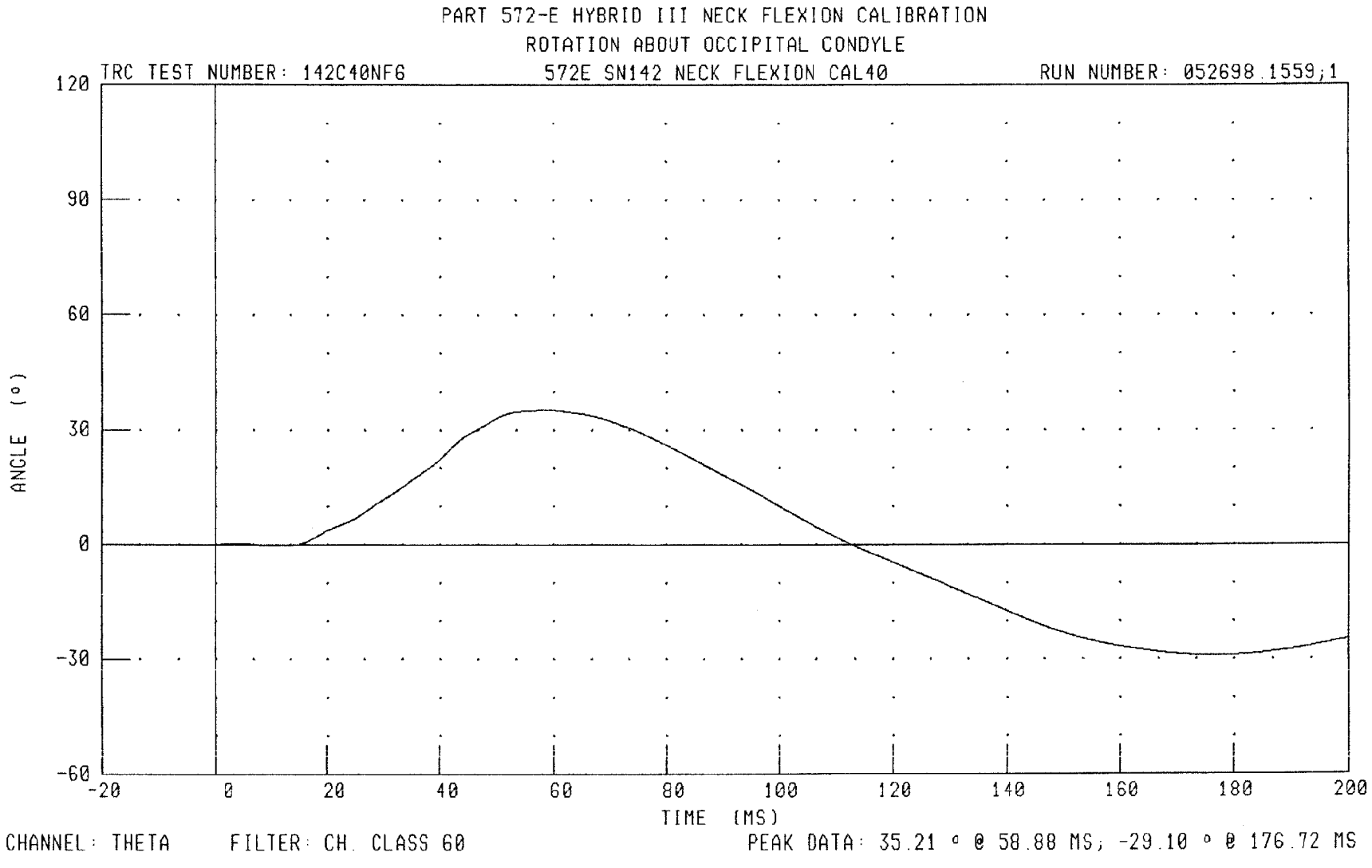
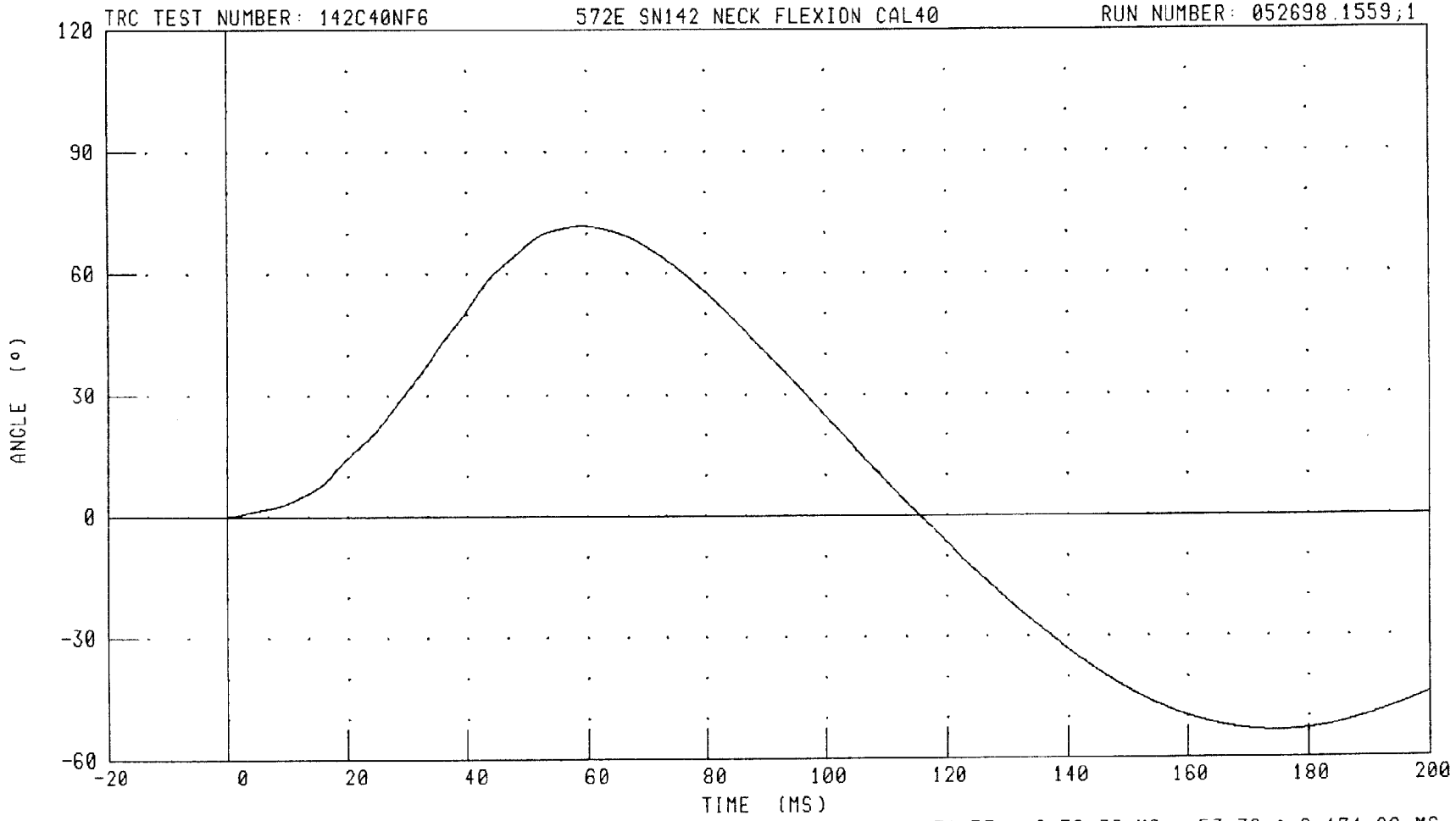

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C40NF6
572E SN142 NECK FLEXION CAL40
RUN NUMBER: 052698.1559;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 35.21 ° @ 58.88 MS; -29.10 ° @ 176.72 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

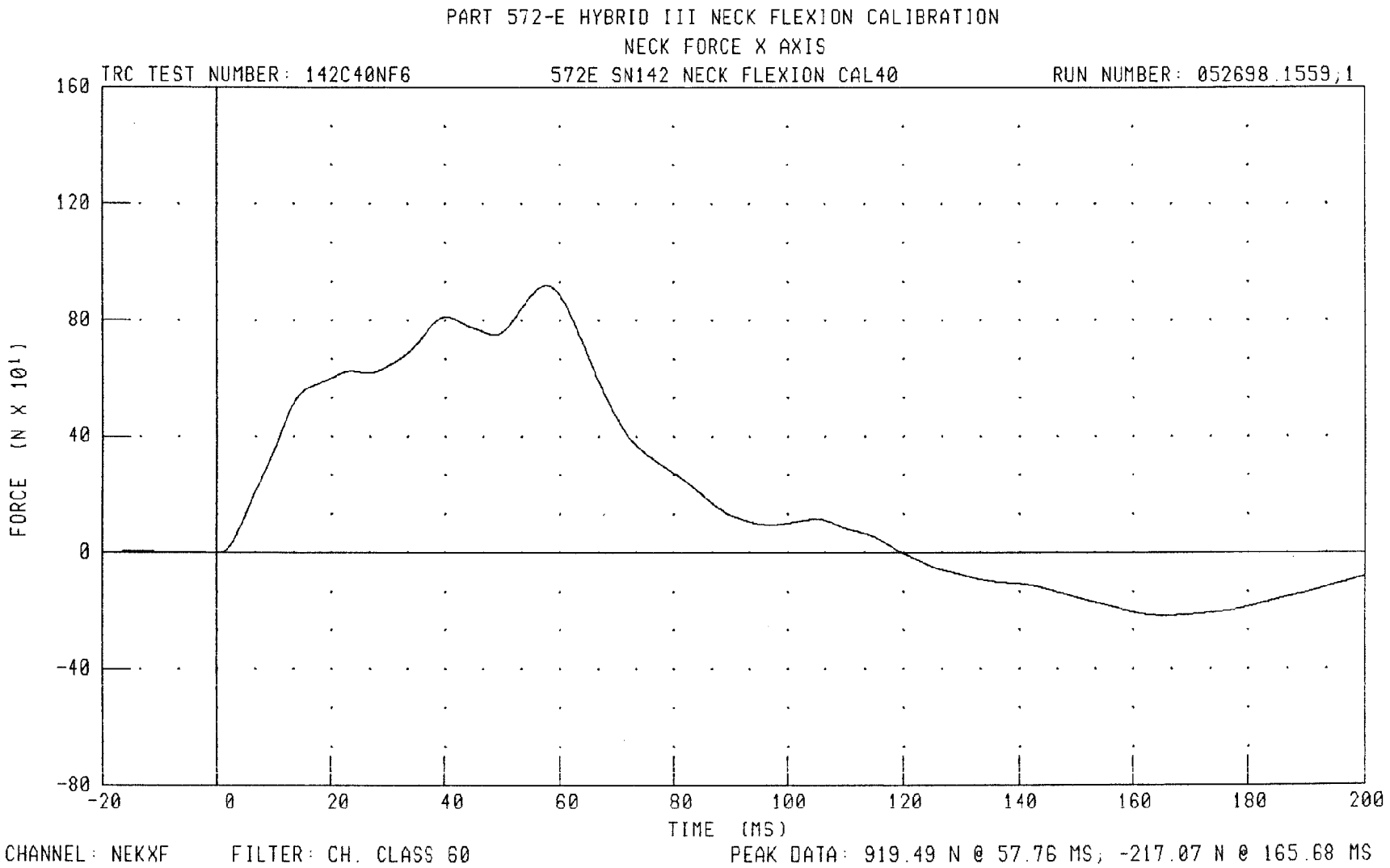
TOTAL ROTATION

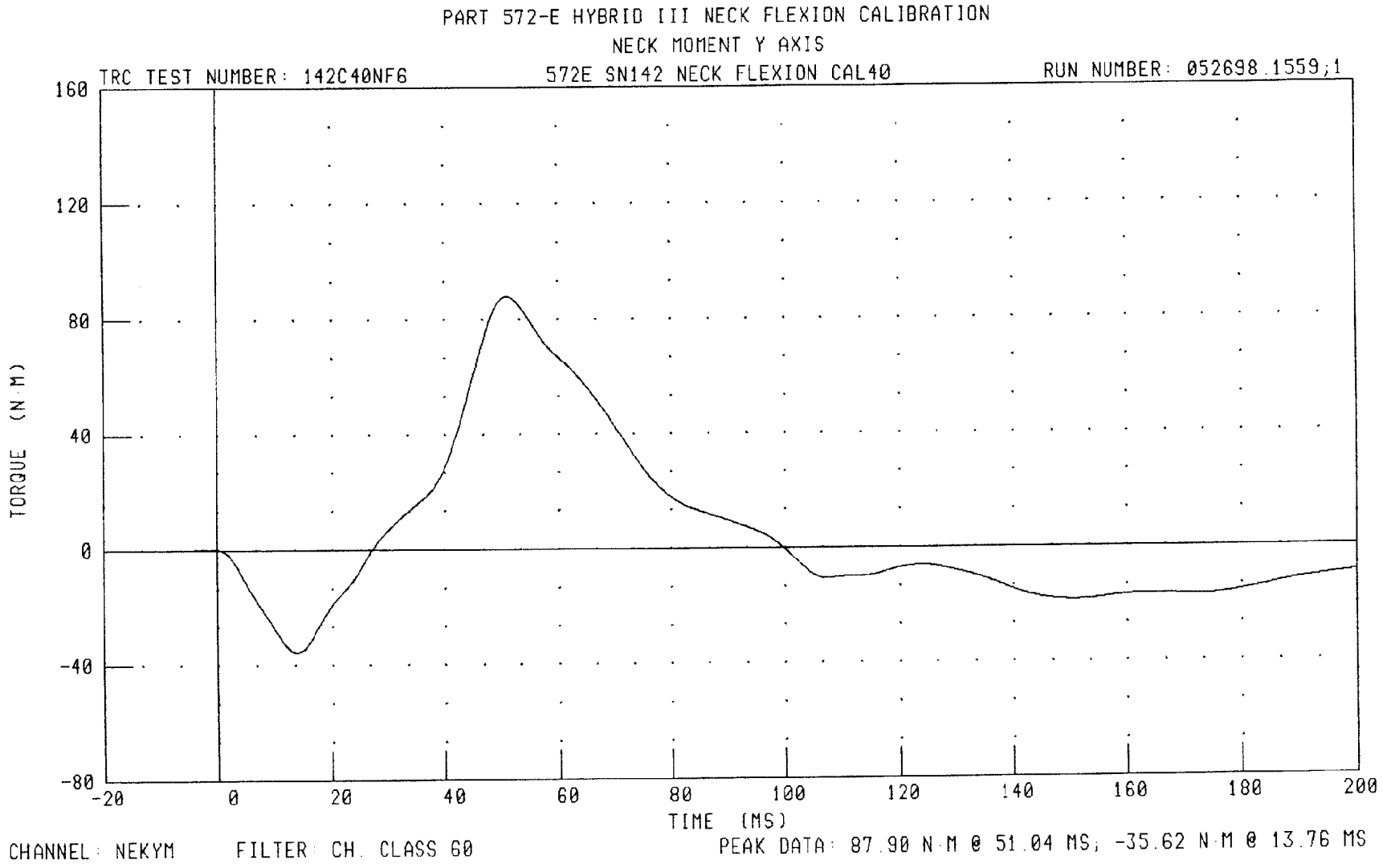
TRC TEST NUMBER: 142C40NF6 572E SN142 NECK FLEXION CAL40 RUN NUMBER: 052698.1559;1

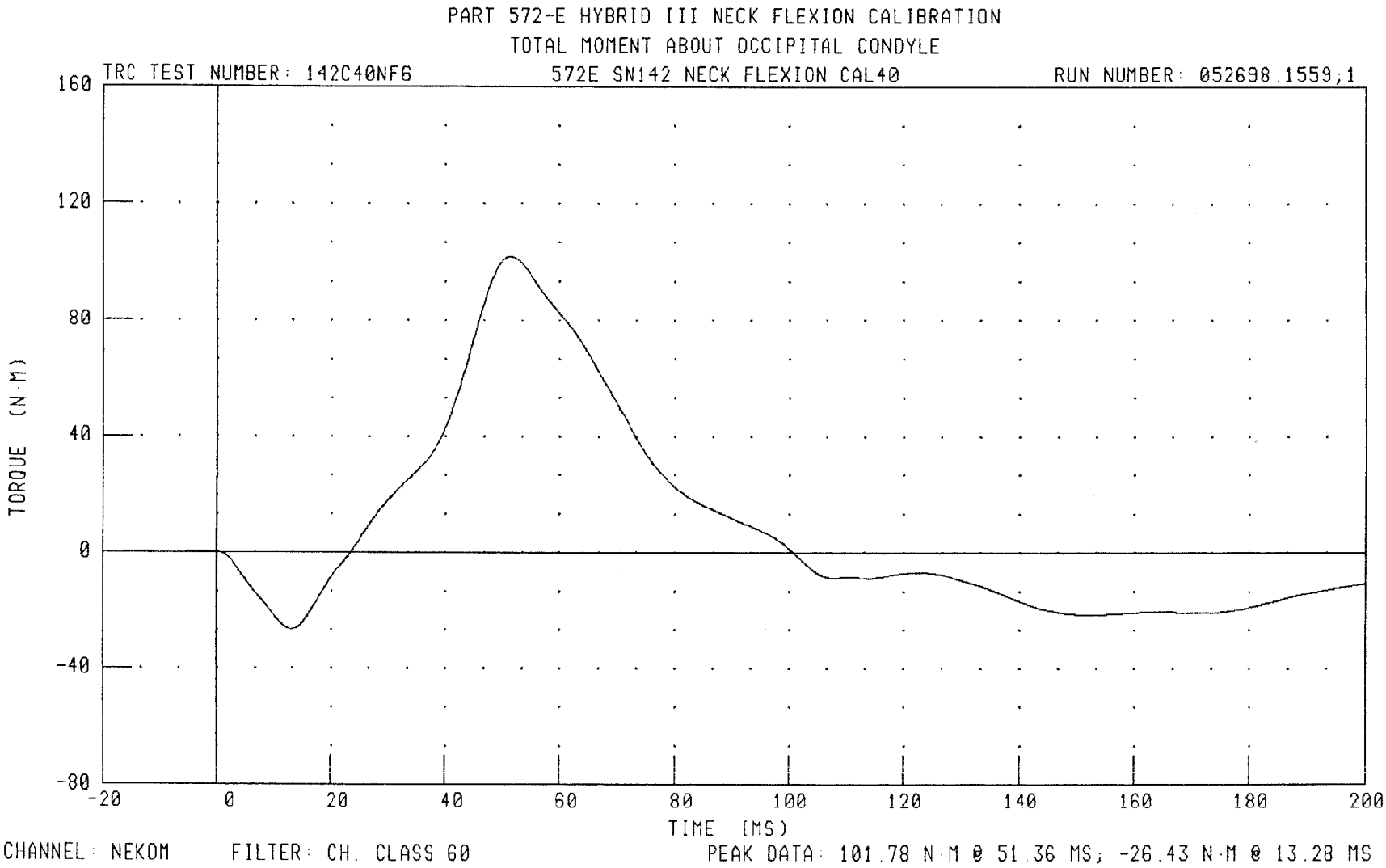


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 71.75 ° @ 59.36 MS; -53.38 ° @ 174.88 MS

980527


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 142C40NF6
572E SN142 NECK FLEXION CAL40
RUN NUMBER: 052698.1559;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: 919.49 N @ 57.76 MS; -217.07 N @ 165.68 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 142C40NF6
572E SN142 NECK FLEXION CAL40
RUN NUMBER: 052698.1559;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: 87.90 N-M @ 51.04 MS; -35.62 N-M @ 13.76 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C40NF6
572E SN142 NECK FLEXION CAL40
RUN NUMBER: 052698.1559;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: 101.78 N-M @ 51.36 MS; -26.43 N-M @ 13.28 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th 26-MAY-98

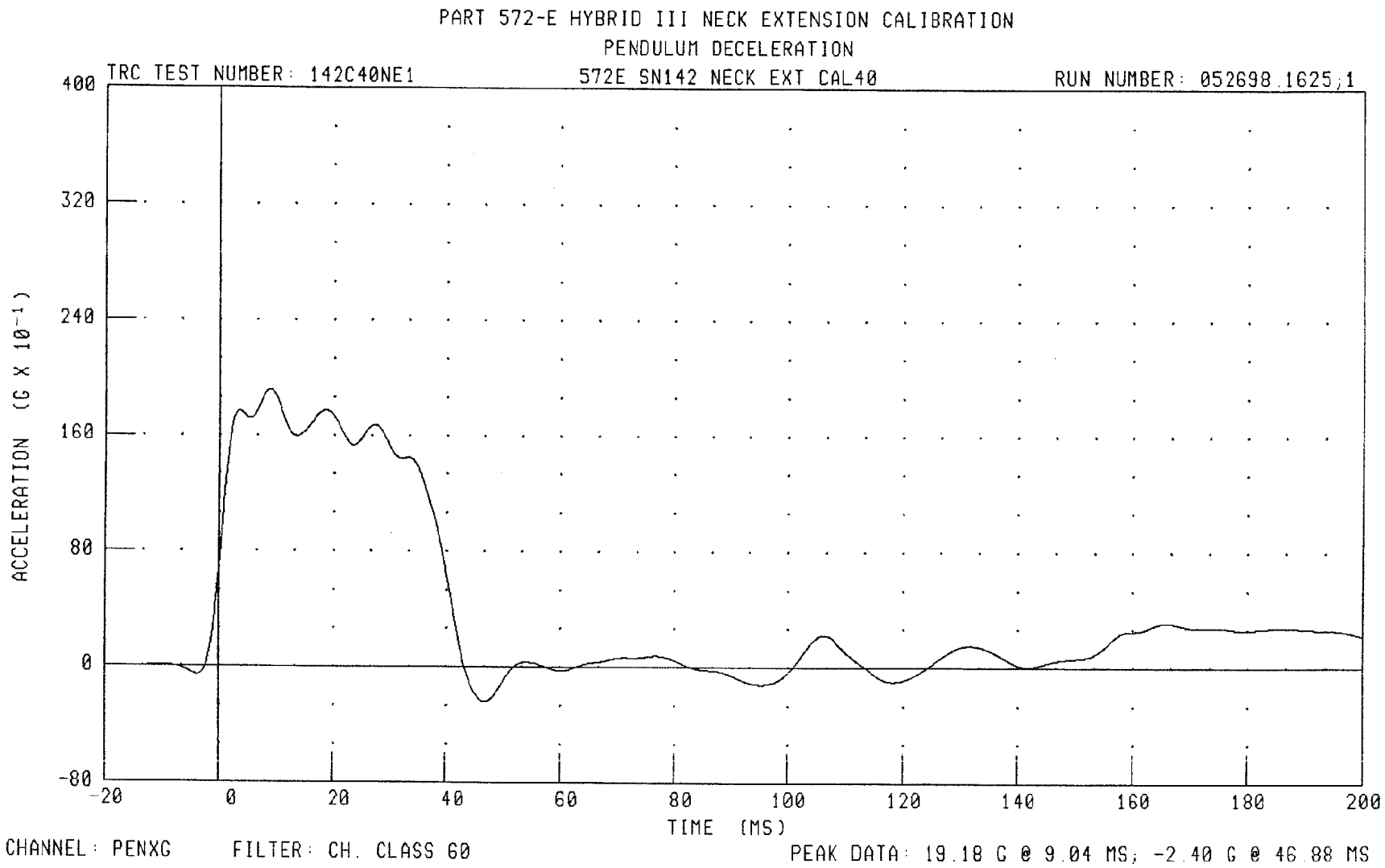
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 142C40NE1 572E SN142 NECK EXT CAL40

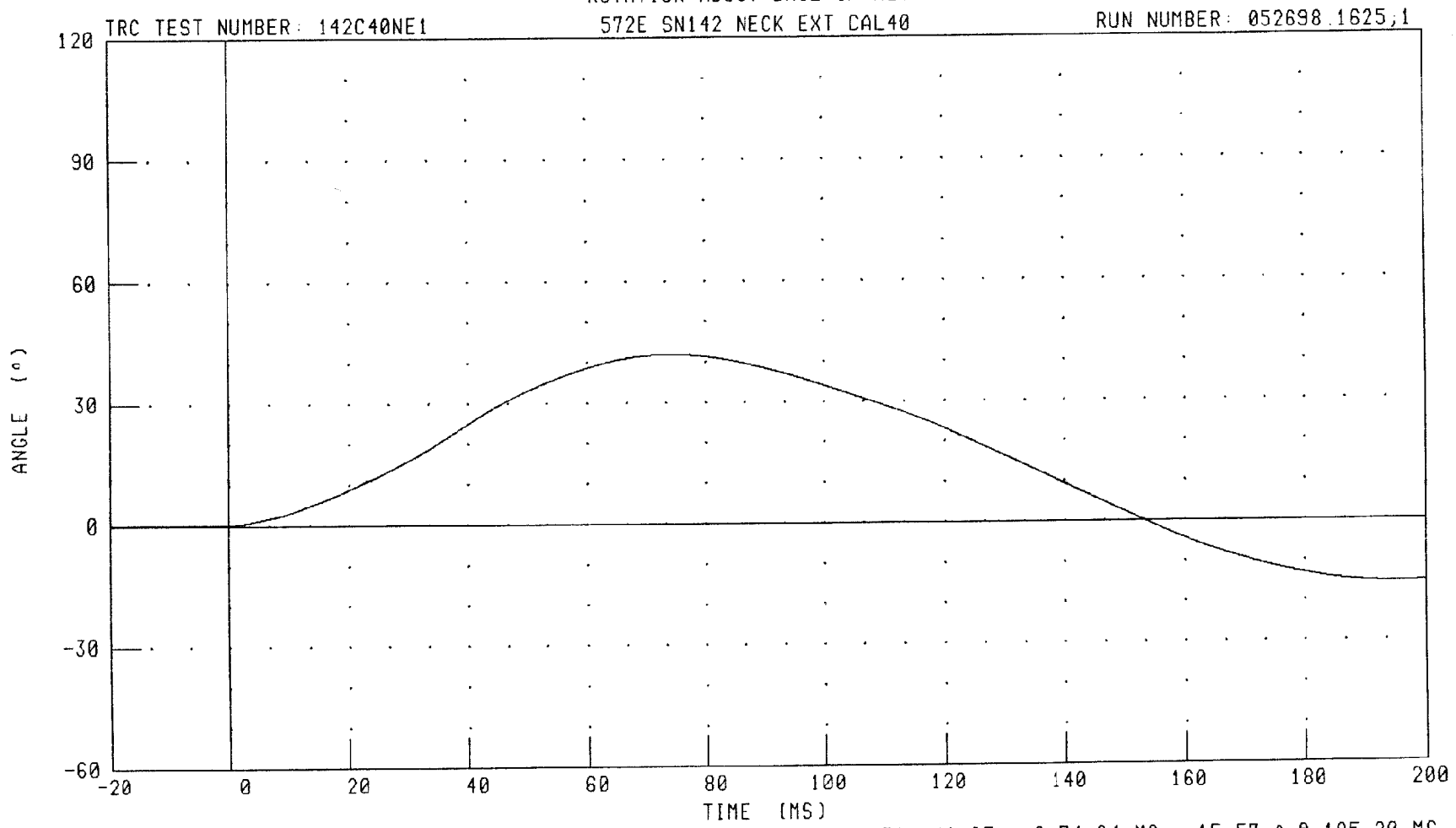
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	40.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.80 G
	20 MS	14.00 - 19.00 G	17.37 G
	30 MS	11.00 - 16.00 G	15.23 G
MAX PENDULUM G		22 G MAX	19.18 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	15.17 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.72 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	95.71 DEG.
	TIME	72 - 82 MS	74.96 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-73.55 NM
	TIME	65 - 79 MS	70.32 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	155.52 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.72 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1625;1


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C40NE1
572E SN142 NECK EXT CAL40
RUN NUMBER: 052698.1625;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: 19.18 G @ 9.04 MS; -2.40 G @ 46.88 MS

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



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 41.87 ° @ 74.24 MS; -15.57 ° @ 195.20 MS

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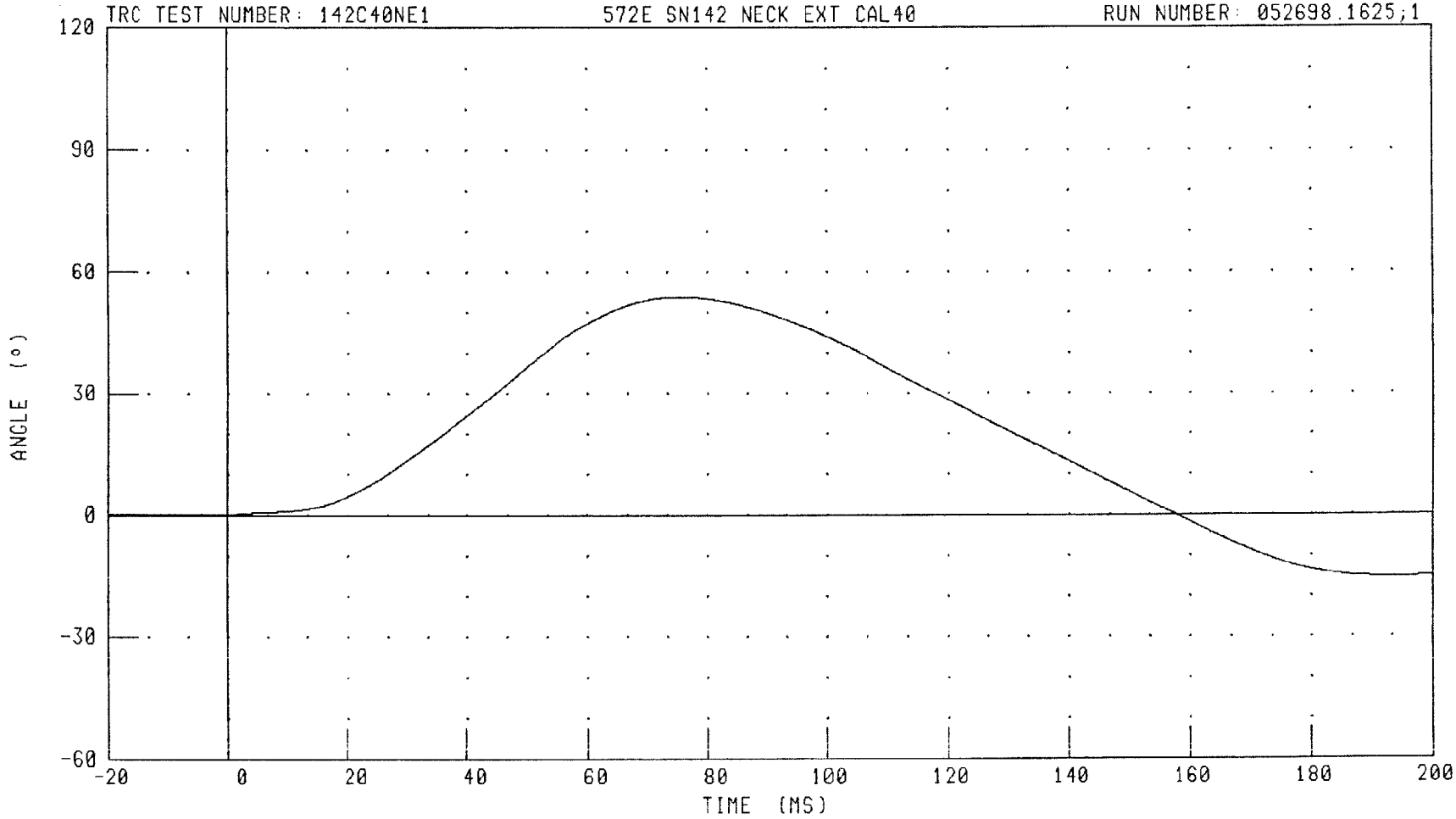
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 142C40NE1 572E SN142 NECK EXT CAL40 RUN NUMBER: 052698.1625;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 53.86 ° @ 75.52 MS; -15.28 ° @ 194.00 MS

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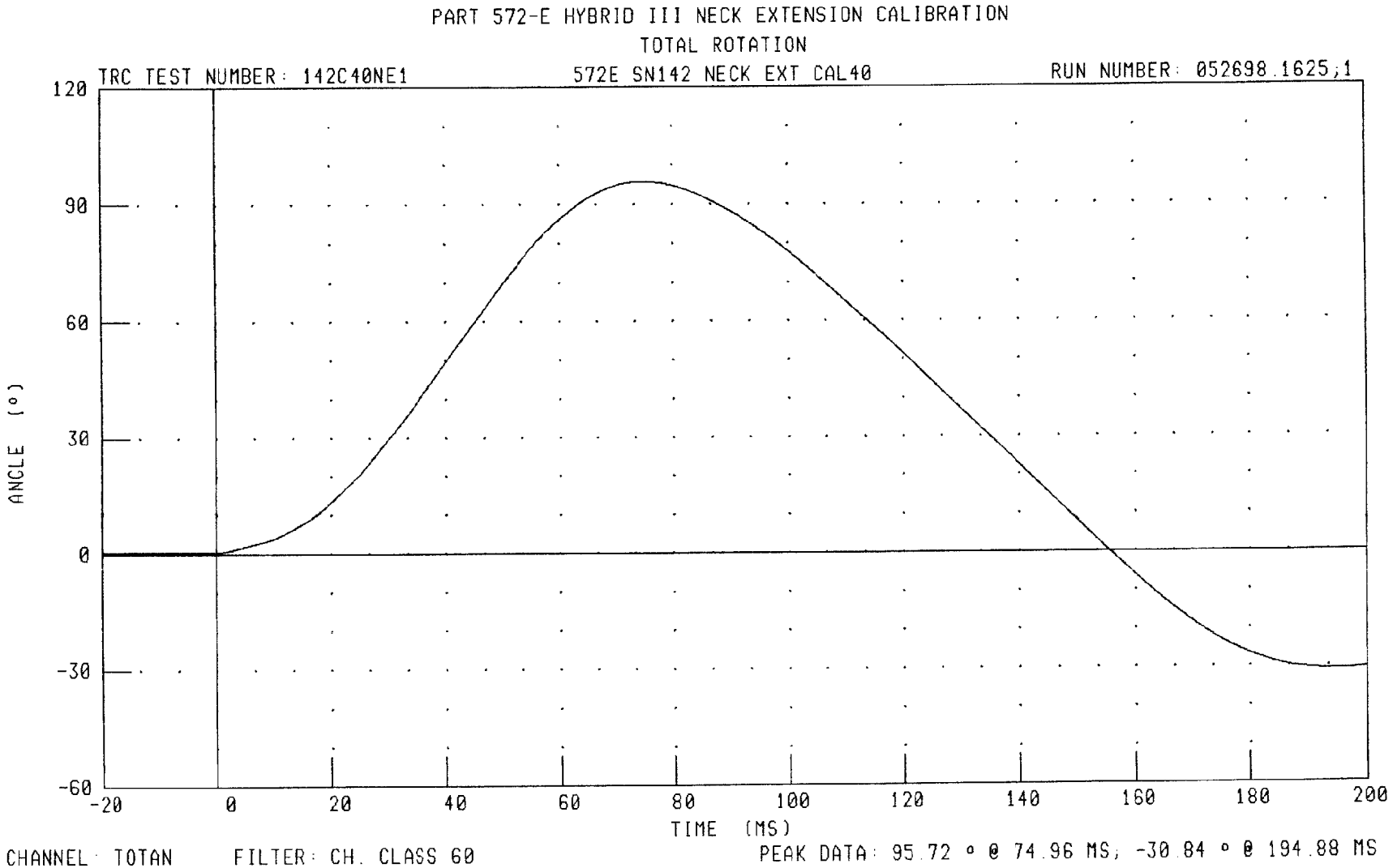
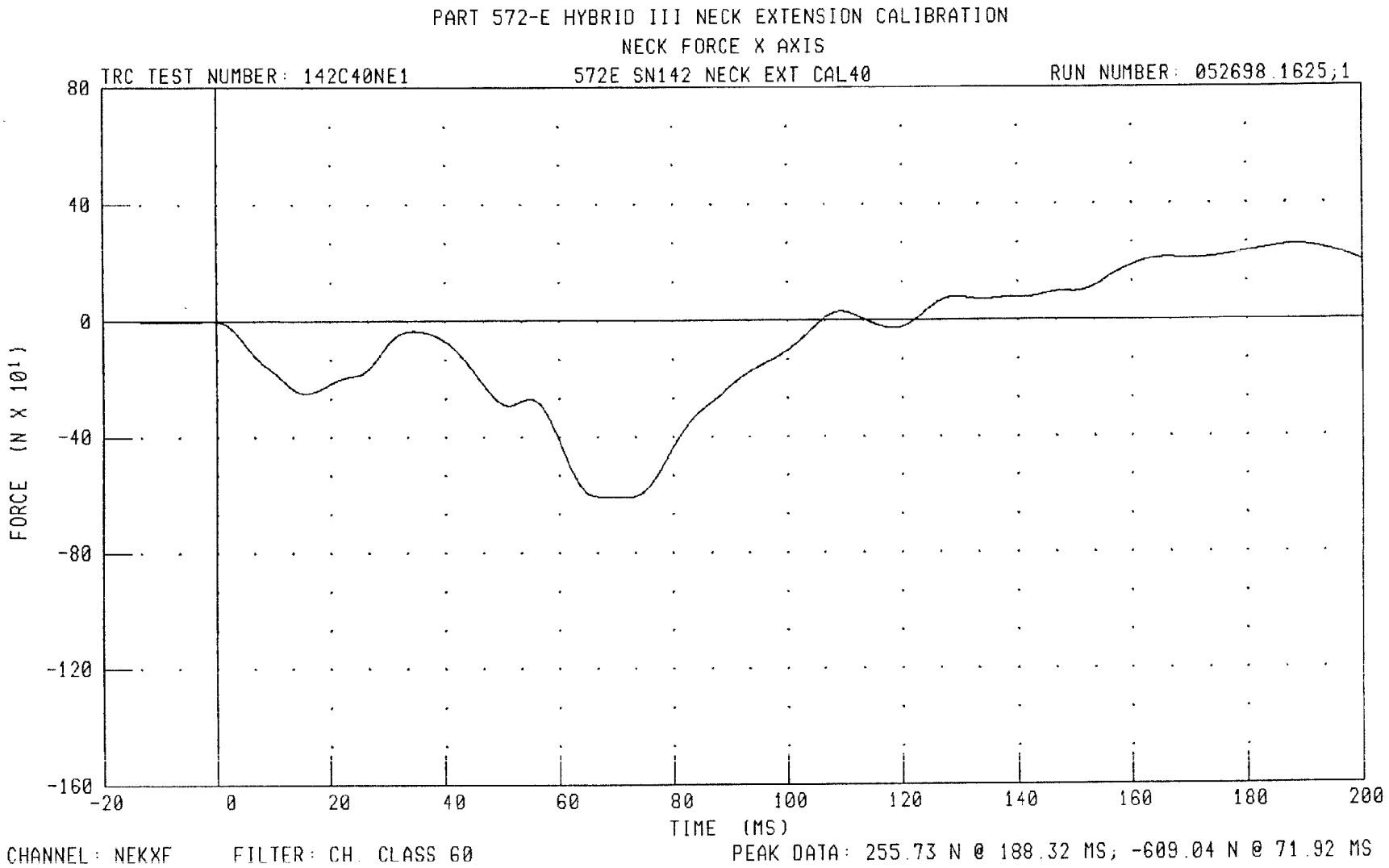
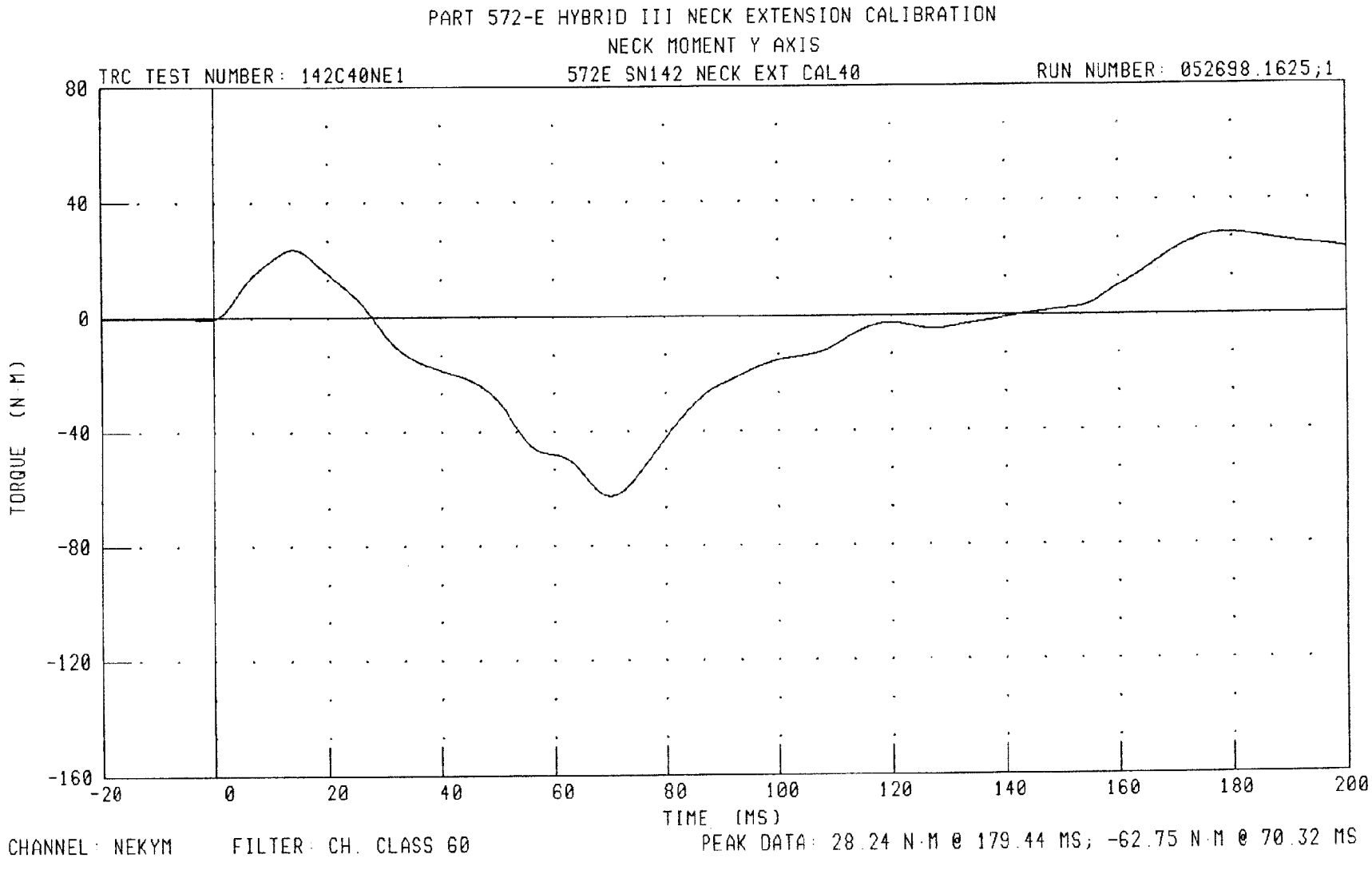
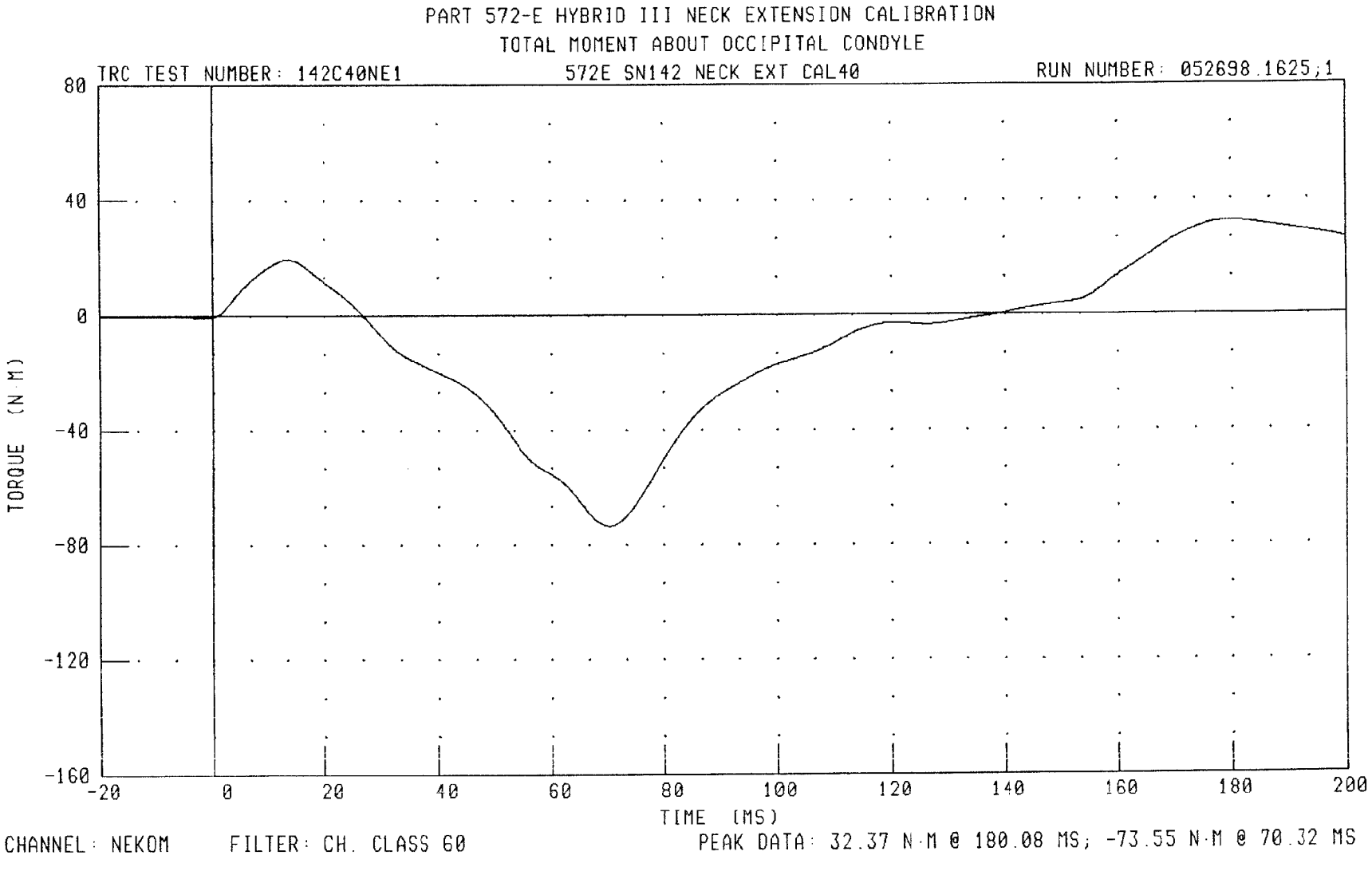

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 142C40NE1
572E SN142 NECK EXT CAL40
RUN NUMBER: 052698.1625;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 95.72 ° @ 74.96 MS; -30.84 ° @ 194.88 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 142C40NE1
572E SN142 NECK EXT CAL40
RUN NUMBER: 052698.1625;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: 255.73 N @ 188.32 MS; -609.04 N @ 71.92 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 142C40NE1
572E SN142 NECK EXT CAL40
RUN NUMBER: 052698.1625;1
80
40
0
-40
-80
-120
-160
TORQUE (N-M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKYM
FILTER: CH. CLASS 60
PEAK DATA: 28.24 N-M @ 179.44 MS; -62.75 N-M @ 70.32 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C40NE1
572E SN142 NECK EXT CAL40
RUN NUMBER: 052698.1625;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: 32.37 N-M @ 180.08 MS; -73.55 N-M @ 70.32 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

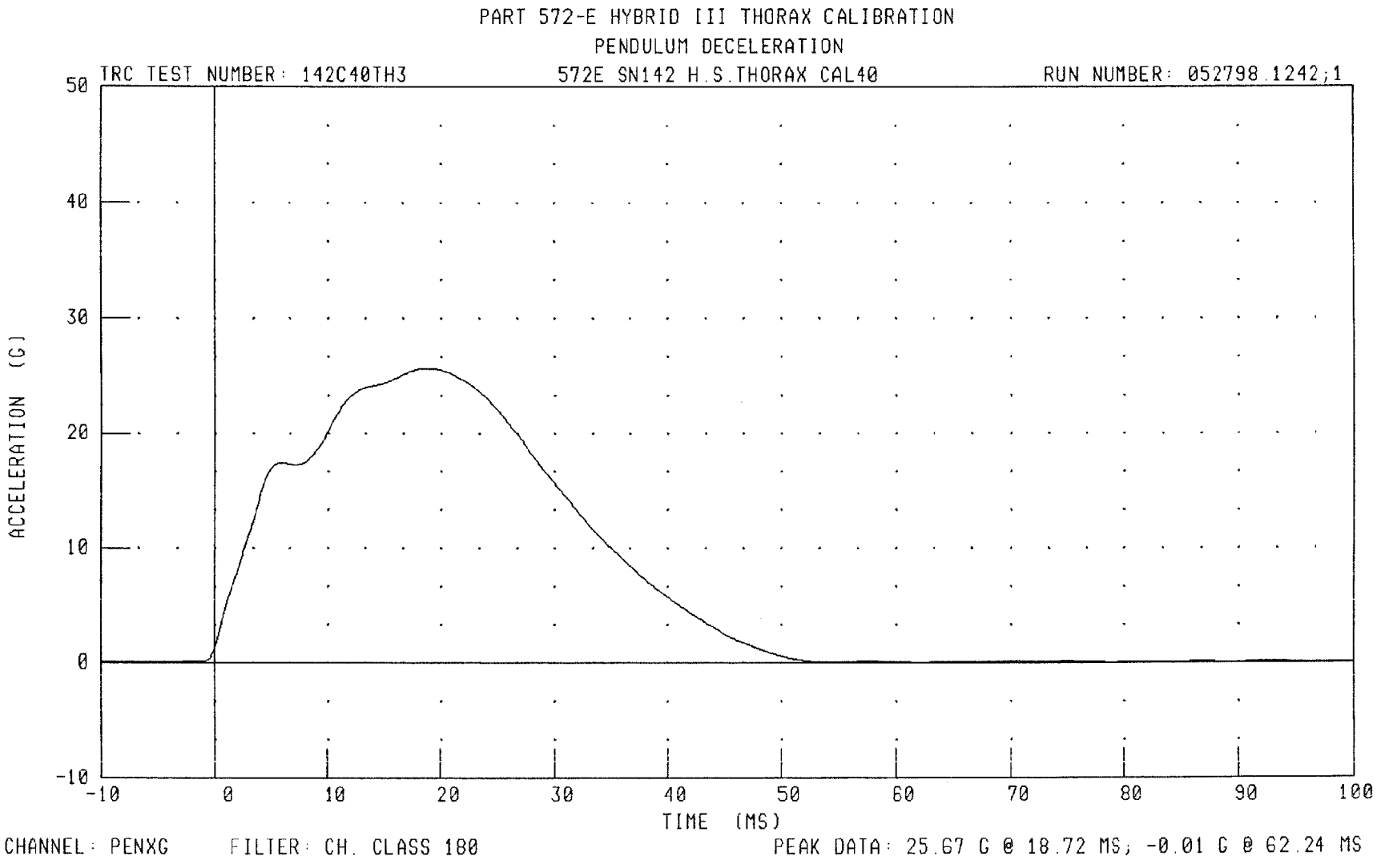
HYBRID III 50th 27-MAY-98

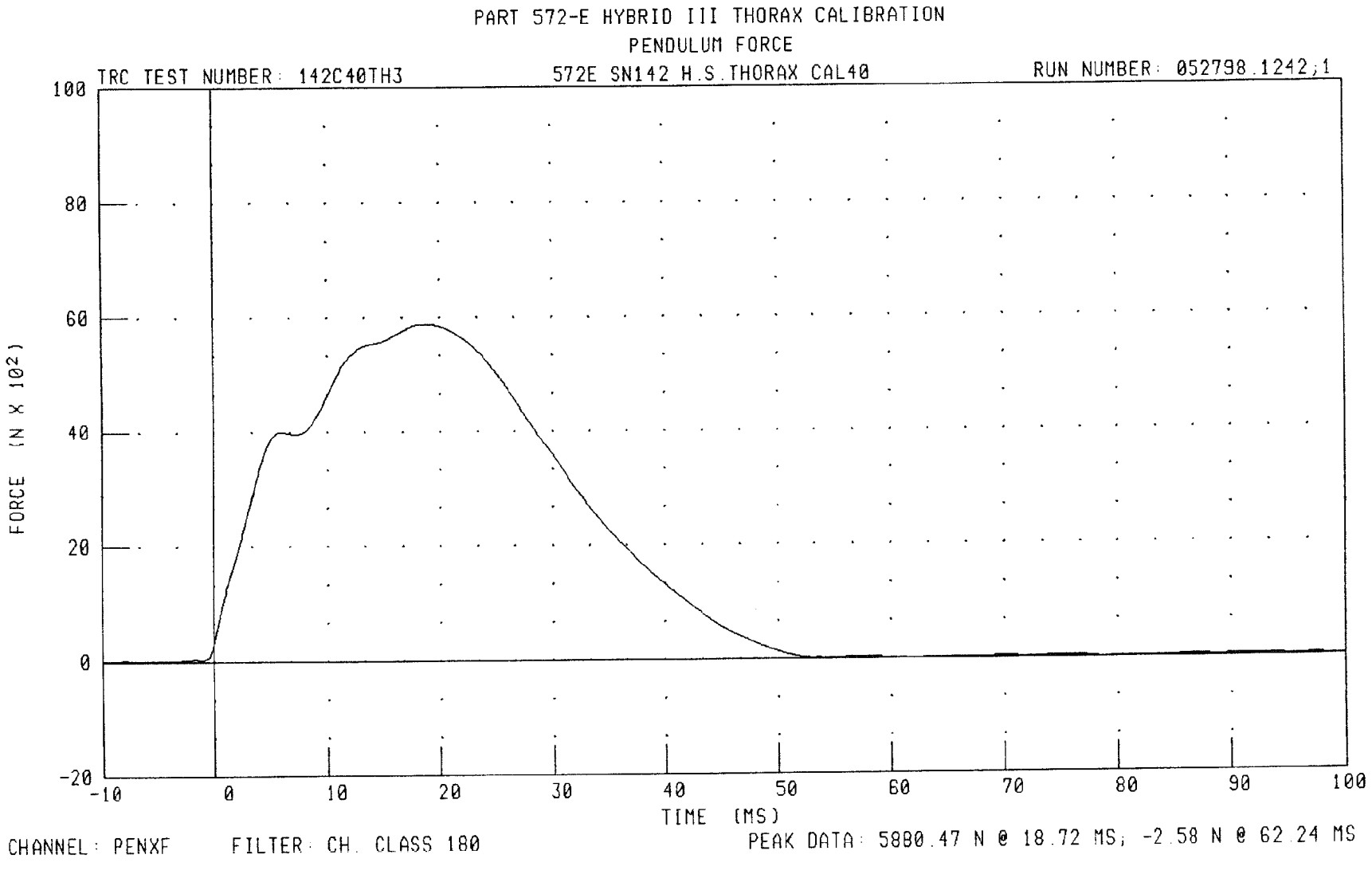
TRC INC. TEST NO: 142C40TH3 572E SN142 H.S.THORAX CAL40

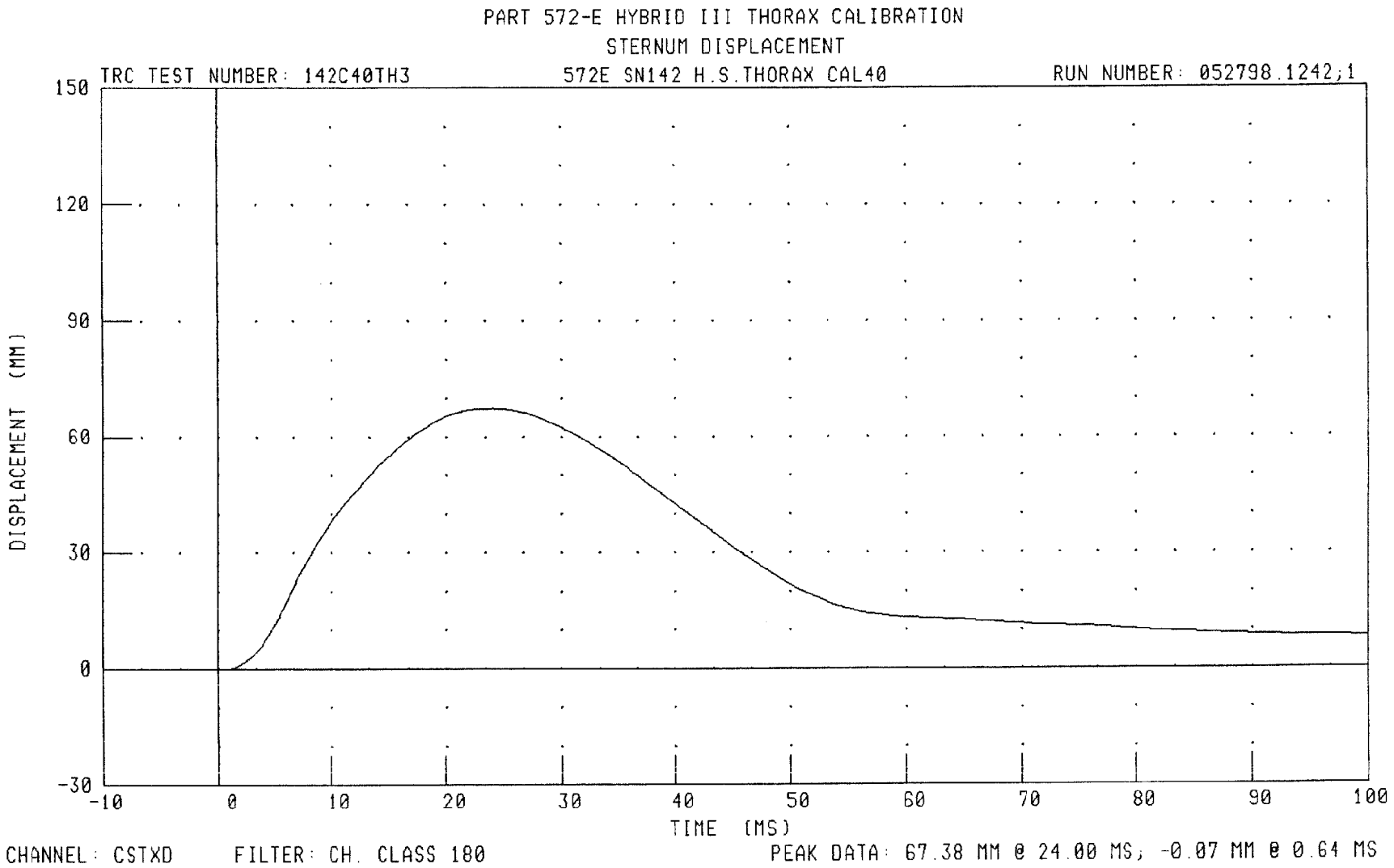
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	20.6 DEG. C
RELATIVE HUMIDITY	10 - 70 %	54.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	67.3 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5880. N
INTERNAL HYSTERESIS	69% - 85%	73.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052798.1241;1

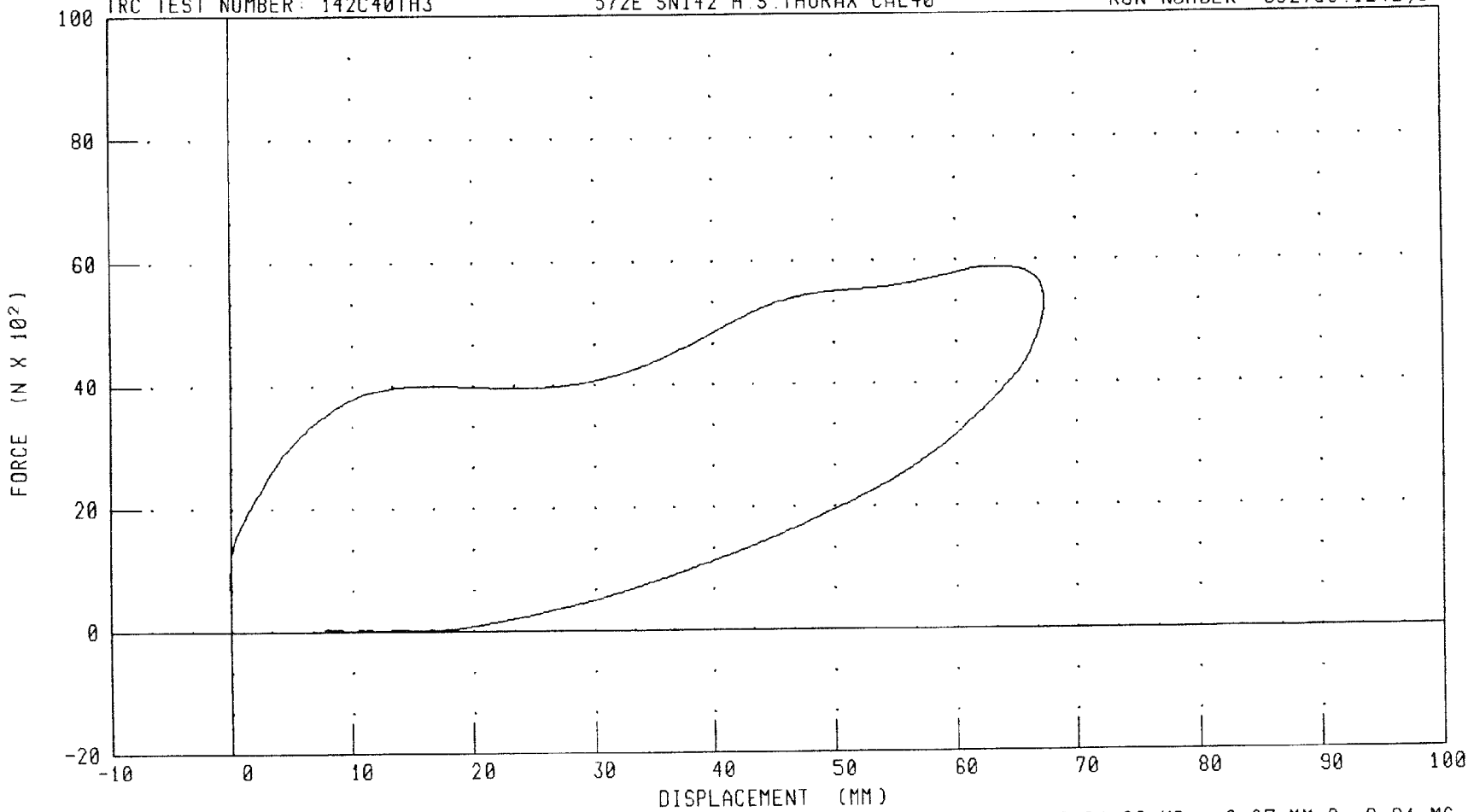

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C40TH3
572E SN142 H.S.THORAX CAL40
RUN NUMBER: 052798.1242;1
ACCELERATION (G)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 25.67 G @ 18.72 MS; -0.01 G @ 62.24 MS


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE
TRC TEST NUMBER: 142C40TH3
572E SN142 H.S.THORAX CAL40
RUN NUMBER: 052798.1242;1
FORCE (N X 10²)
100
80
60
40
20
0
-20
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXF
FILTER: CH. CLASS 180
PEAK DATA: 5880.47 N @ 18.72 MS; -2.58 N @ 62.24 MS


PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT
TRC TEST NUMBER: 142C40TH3
572E SN142 H.S.THORAX CAL40
RUN NUMBER: 052798.1242;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: 67.38 MM @ 24.00 MS; -0.07 MM @ 0.64 MS

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

TRC TEST NUMBER: 142C40TH3
572E SN142 H.S.THORAX CAL40
RUN NUMBER: 052798.1242,1



CHANNEL: CSTXD
PENXF

FILTER: CH. CLASS 180
CH. CLASS 180

PEAK DATA: 67.38 MM @ 24.00 MS; -0.07 MM @ 0.64 MS
5880.47 N @ 18.72 MS; -2.58 N @ 62.24 MS

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TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 26-MAY-98

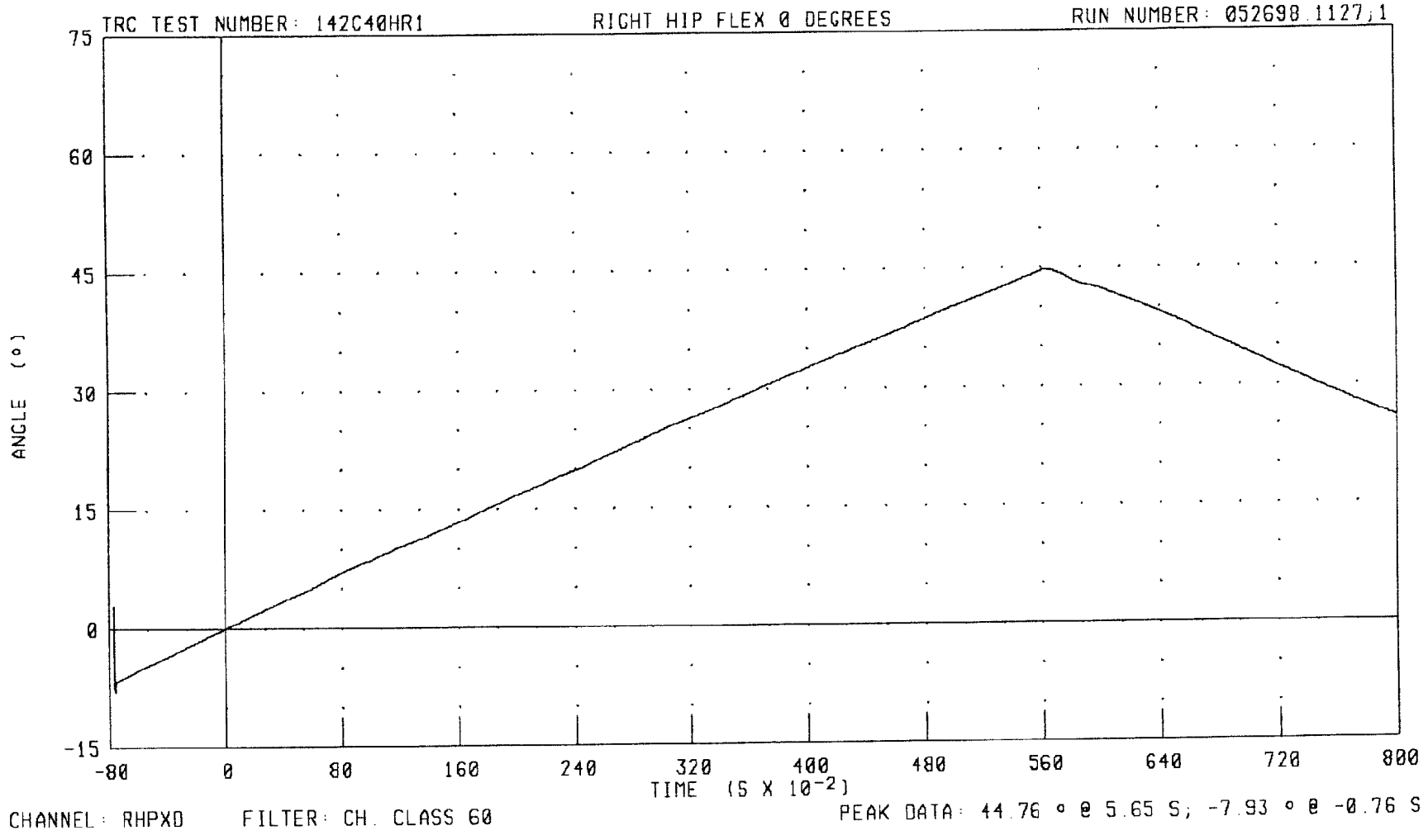
TRC INC. TEST NO: 142C40HR1 RIGHT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	76.5 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	43.9 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1126;1

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



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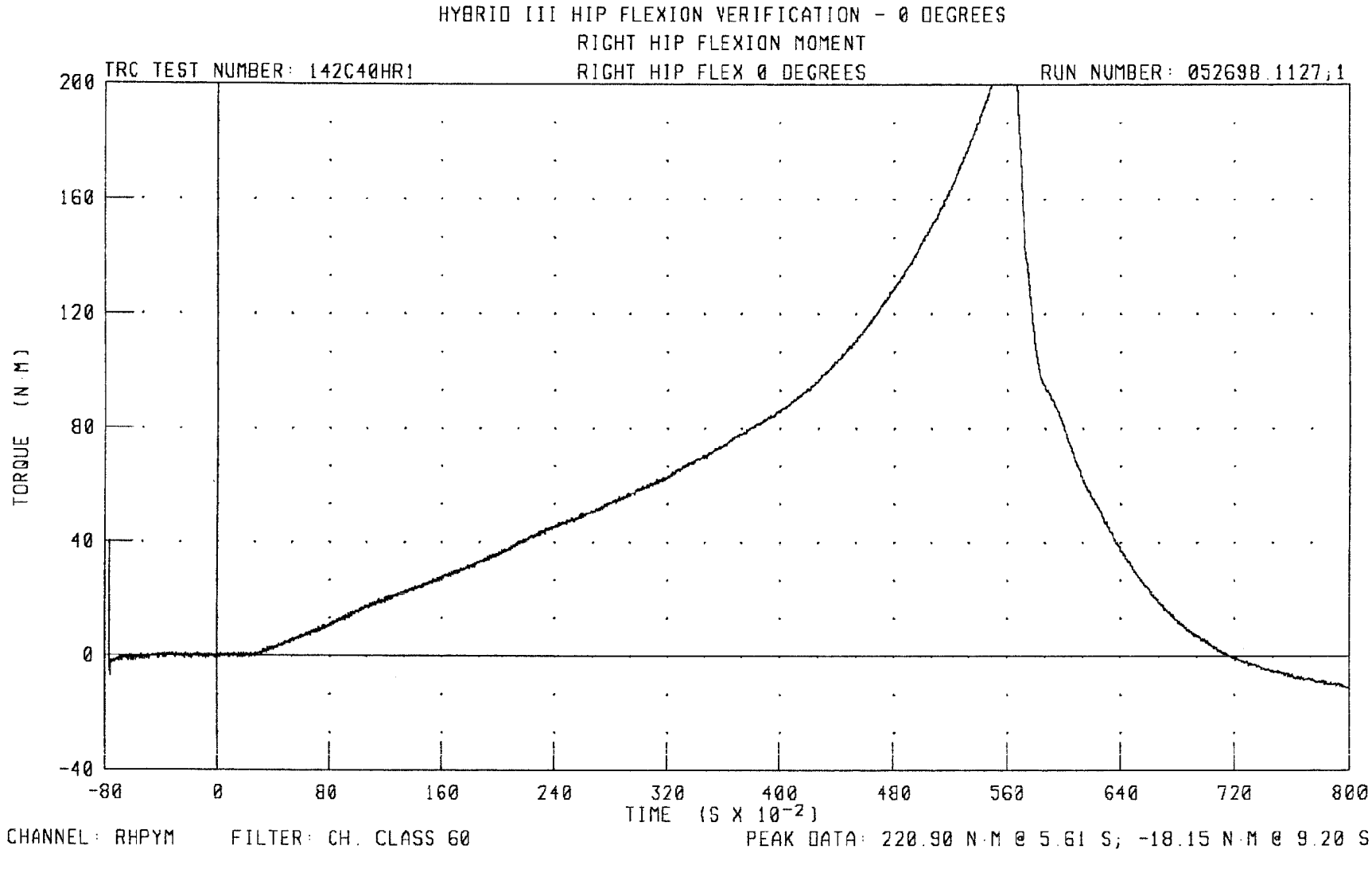
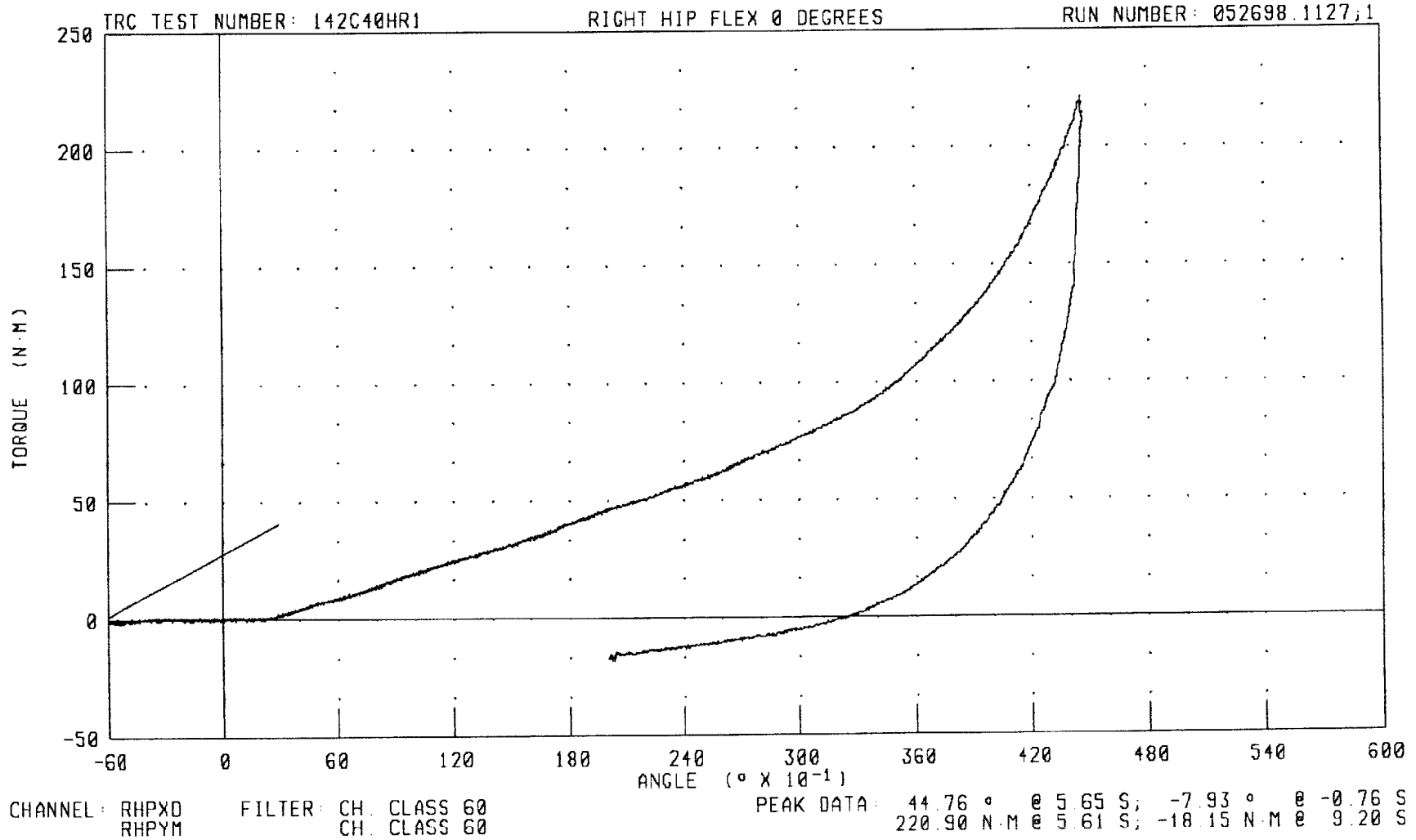

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION MOMENT
RIGHT HIP FLEX 0 DEGREES
TRC TEST NUMBER: 142C40HR1
RUN NUMBER: 052698.1127;1
TORQUE (N-M)
200
160
120
80
40
0
-40
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10-2)
CHANNEL: RHPYM
FILTER: CH. CLASS 60
PEAK DATA: 220.90 N-M @ 5.61 S; -18.15 N-M @ 9.20 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION MOMENT VS ROTATION ANGLE



CHANNEL: RHPXD FILTER: CH. CLASS 60
RHPYM CH. CLASS 60

PEAK DATA: 44.76 ° @ 5.65 S; -7.93 ° @ -0.76 S
220.90 N·M @ 5.61 S; -18.15 N·M @ 9.20 S

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TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 26-MAY-98

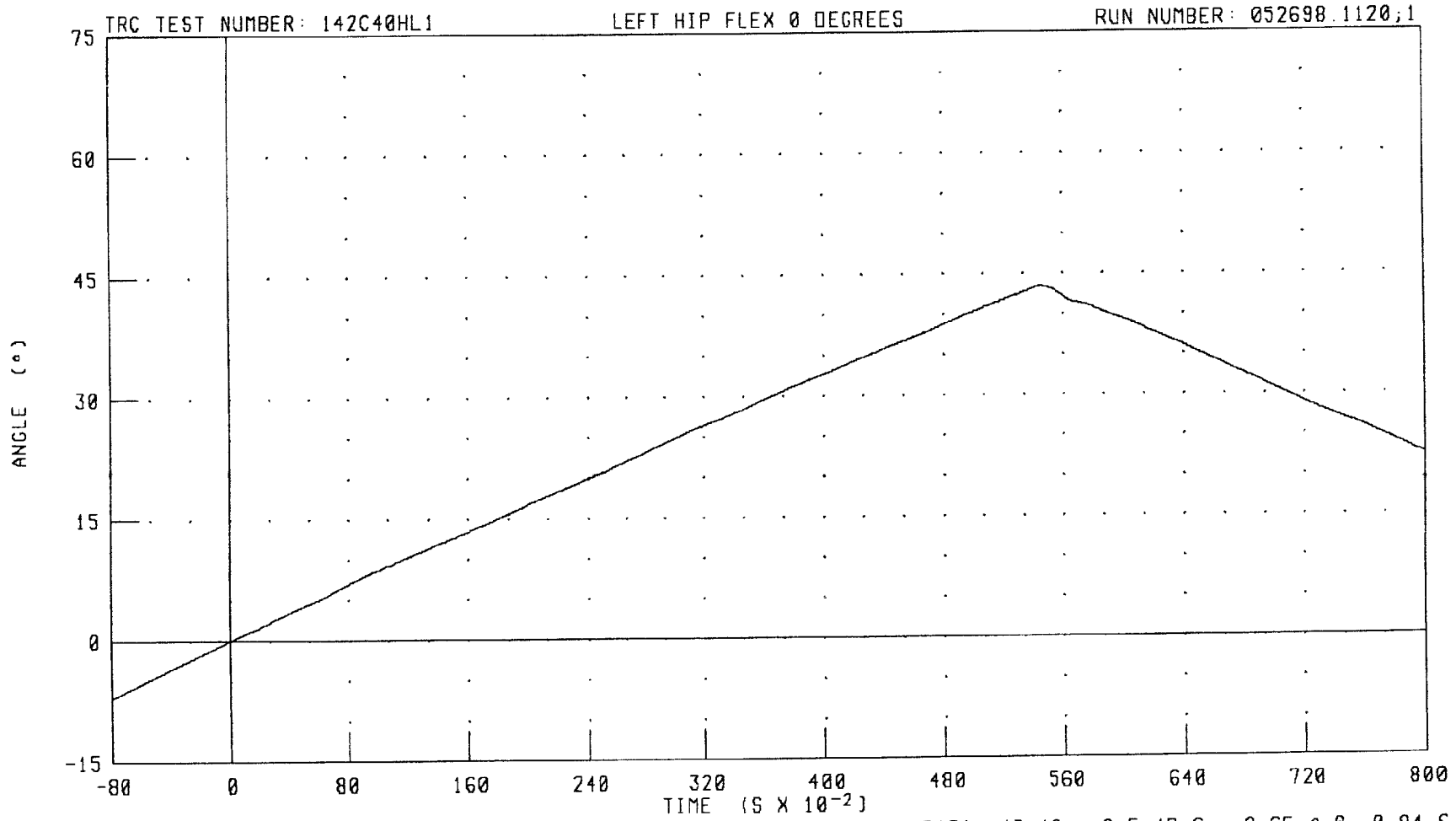
TRC INC. TEST NO: 142C40HL1 LEFT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	68.7 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	42.8 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins RUN NUMBER: 052698.1120;1

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



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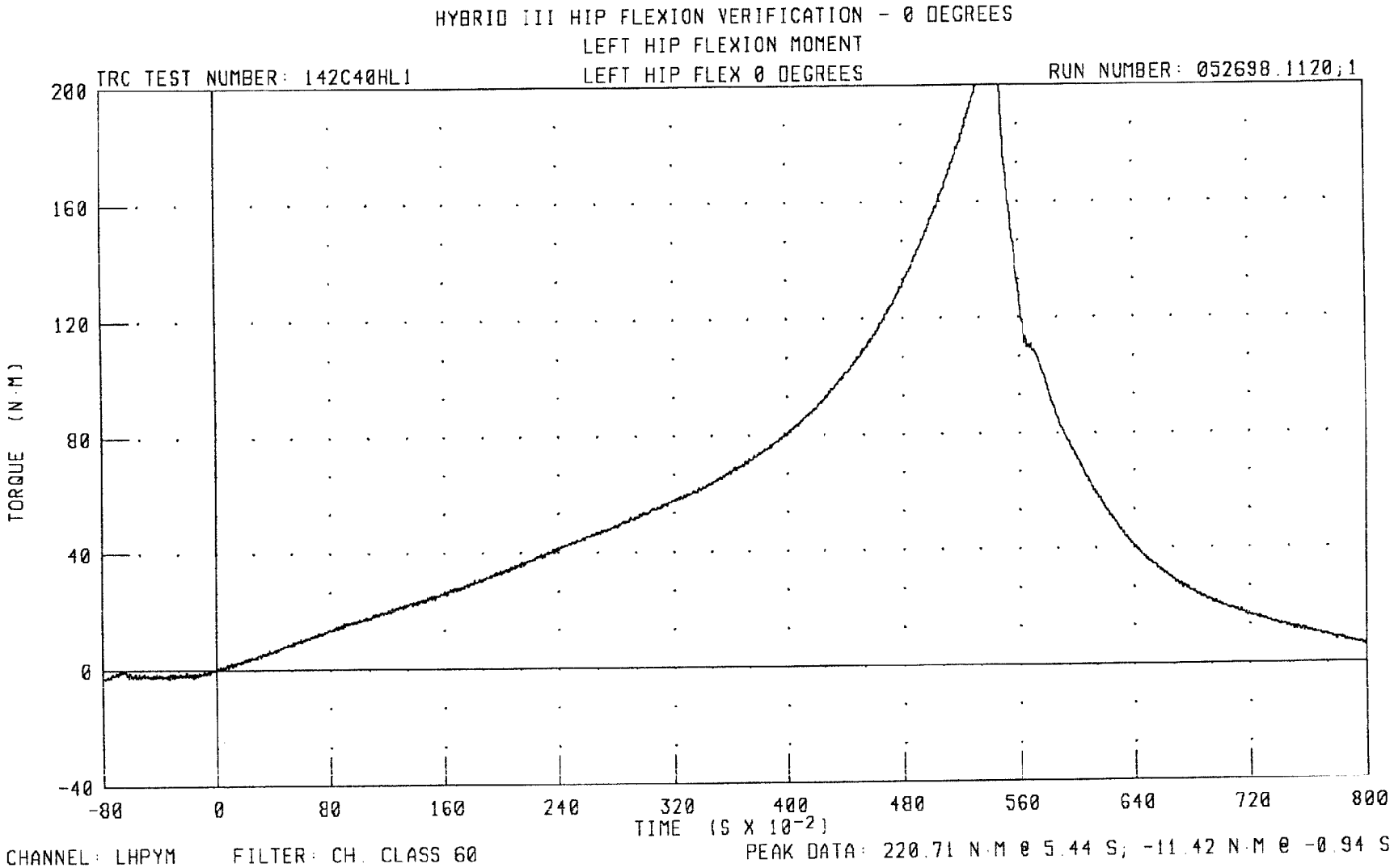
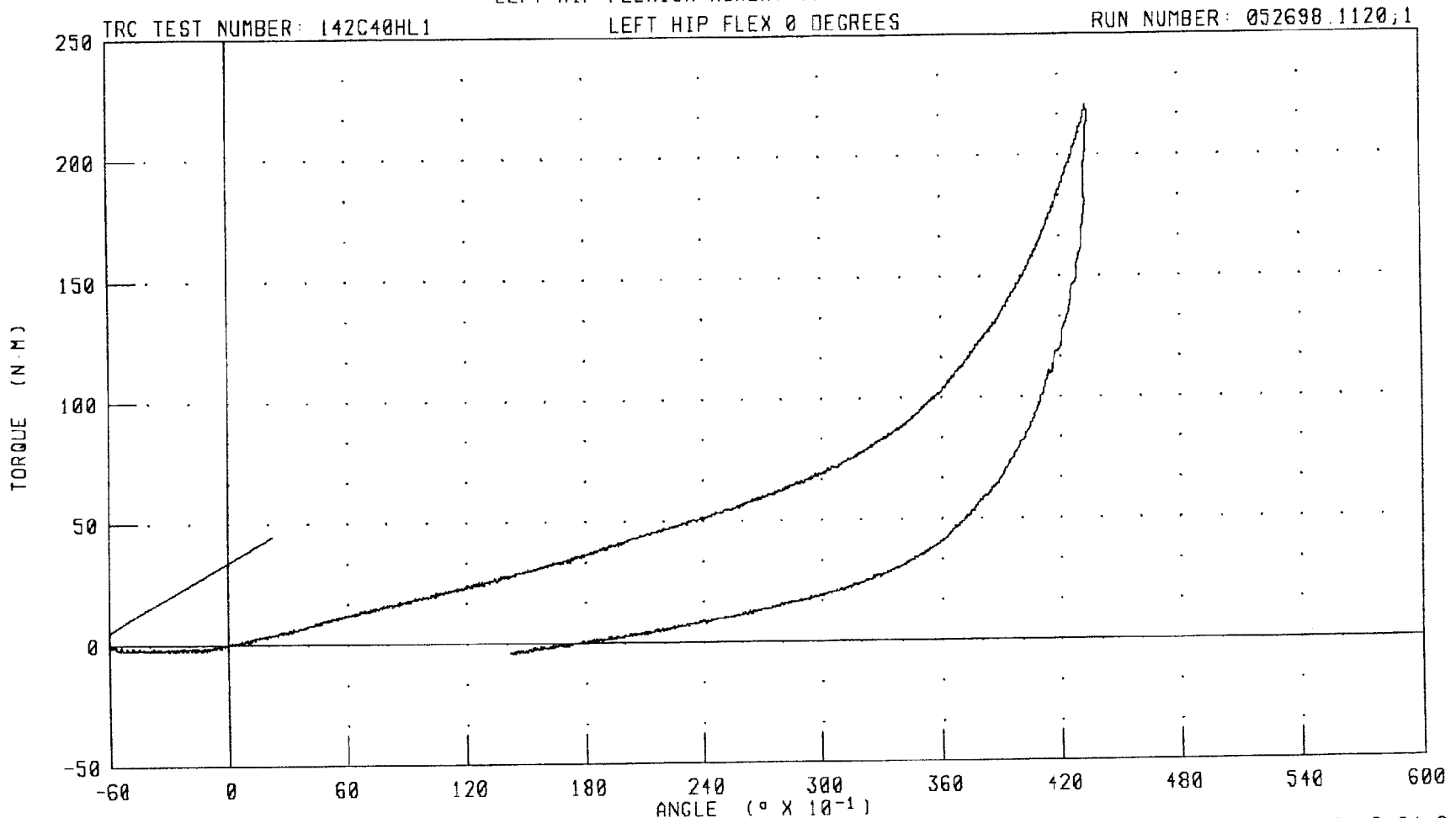

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT
LEFT HIP FLEX 0 DEGREES
TRC TEST NUMBER: 142C40HL1
RUN NUMBER: 052698.1120;1
TORQUE (N.M)
200
160
120
80
40
0
-40
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10^-2)
CHANNEL: LHPYM
FILTER: CH. CLASS 60
PEAK DATA: 220.71 N.M @ 5.44 S; -11.42 N.M @ -0.94 S

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



CHANNEL: LHPXD
LHPYM
FILTER: CH. CLASS 60
CH. CLASS 60

PEAK DATA: 43.49 ° @ 5.47 S; -9.65 ° @ -0.94 S
220.71 N-M @ 5.44 S, -11.42 N-M @ -0.94 S

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

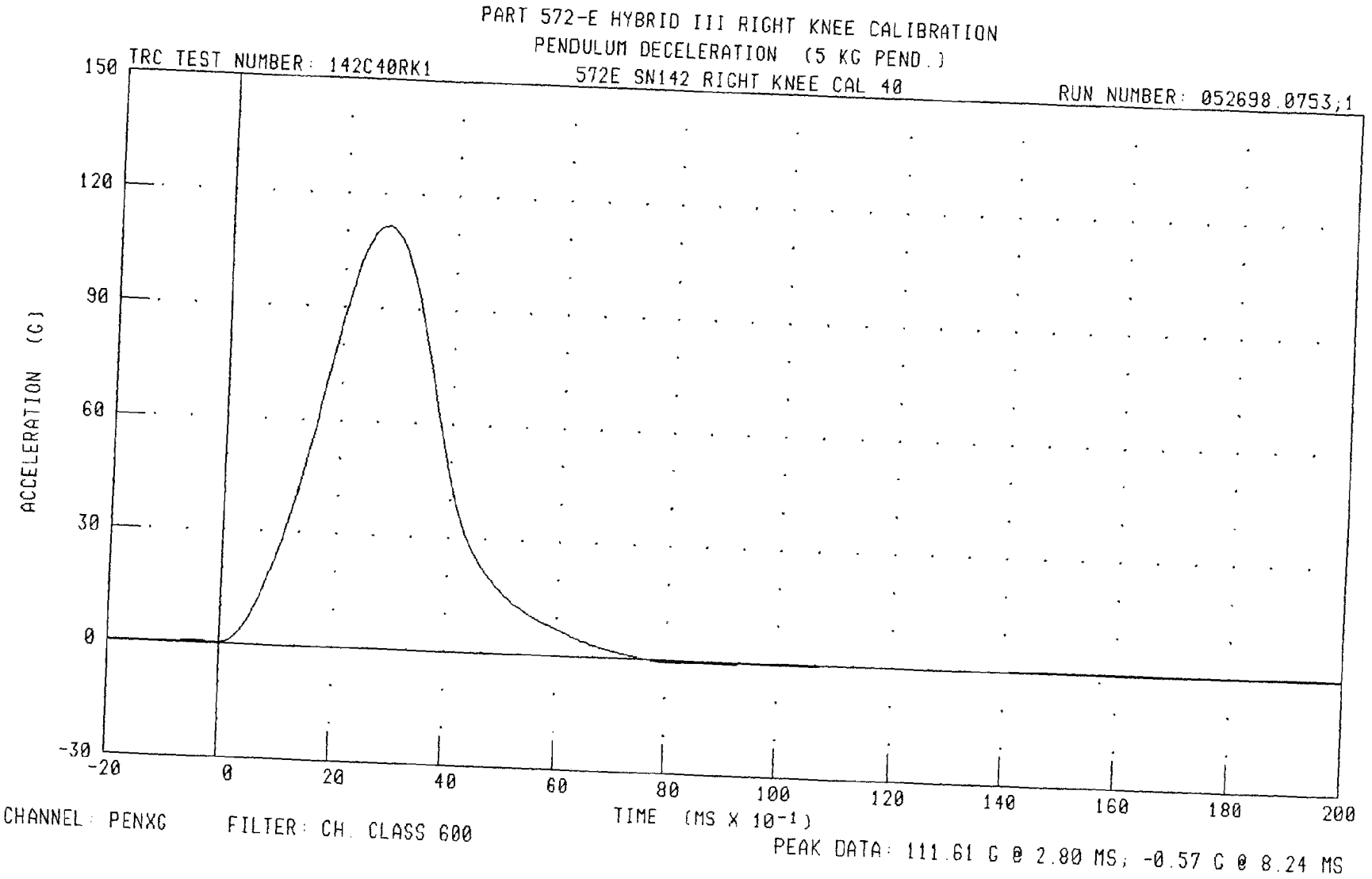
HYBRID III 50th 22-MAY-98

TRC INC. TEST NO: 142C40RK1 572E SN142 RIGHT KNEE CAL 40

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5460.8 N

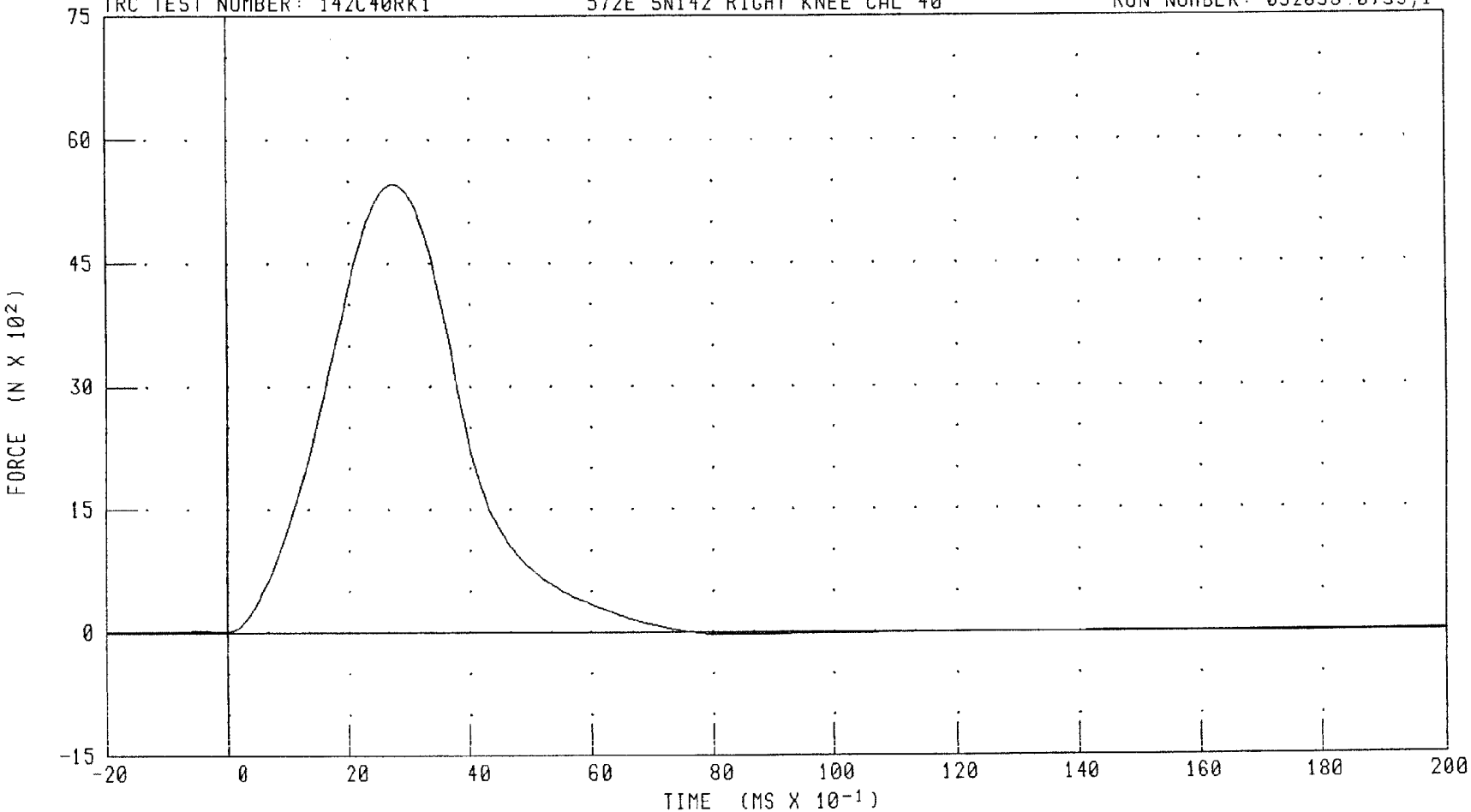
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 052398.0712;1


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)
TRC TEST NUMBER: 142C40RK1
572E SN142 RIGHT KNEE CAL 40
RUN NUMBER: 052698.0753;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: PENXC
FILTER: CH. CLASS 600
PEAK DATA: 111.61 G @ 2.80 MS; -0.57 G @ 8.24 MS

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

TRC TEST NUMBER: 142C40RK1
572E SN142 RIGHT KNEE CAL 40
RUN NUMBER: 052698.0753;1



CHANNEL: PENXF FILTER: CH. CLASS 600
PEAK DATA: 5460.85 N @ 2.80 MS; -27.85 N @ 8.24 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

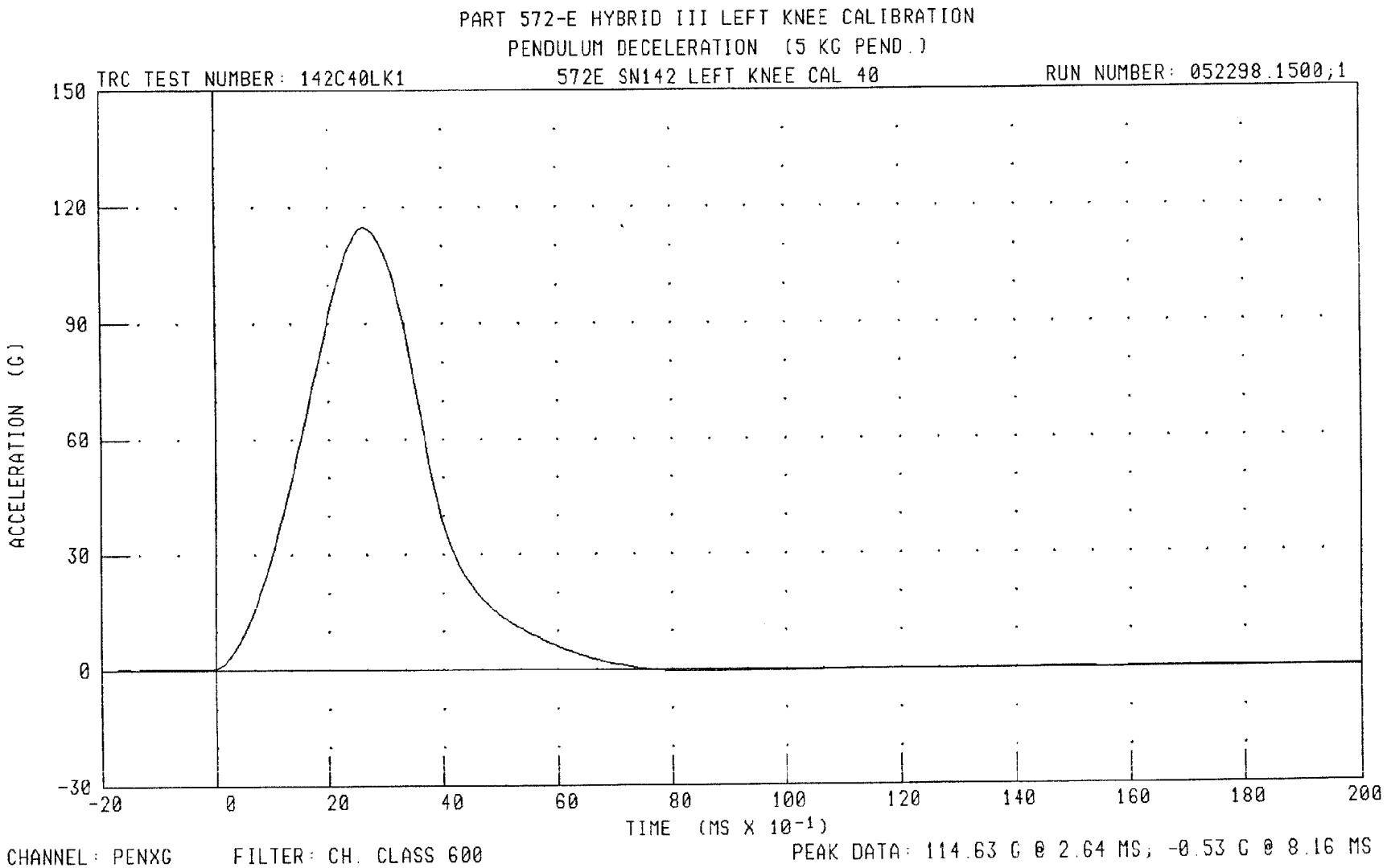
HYBRID III 50th 22-MAY-98

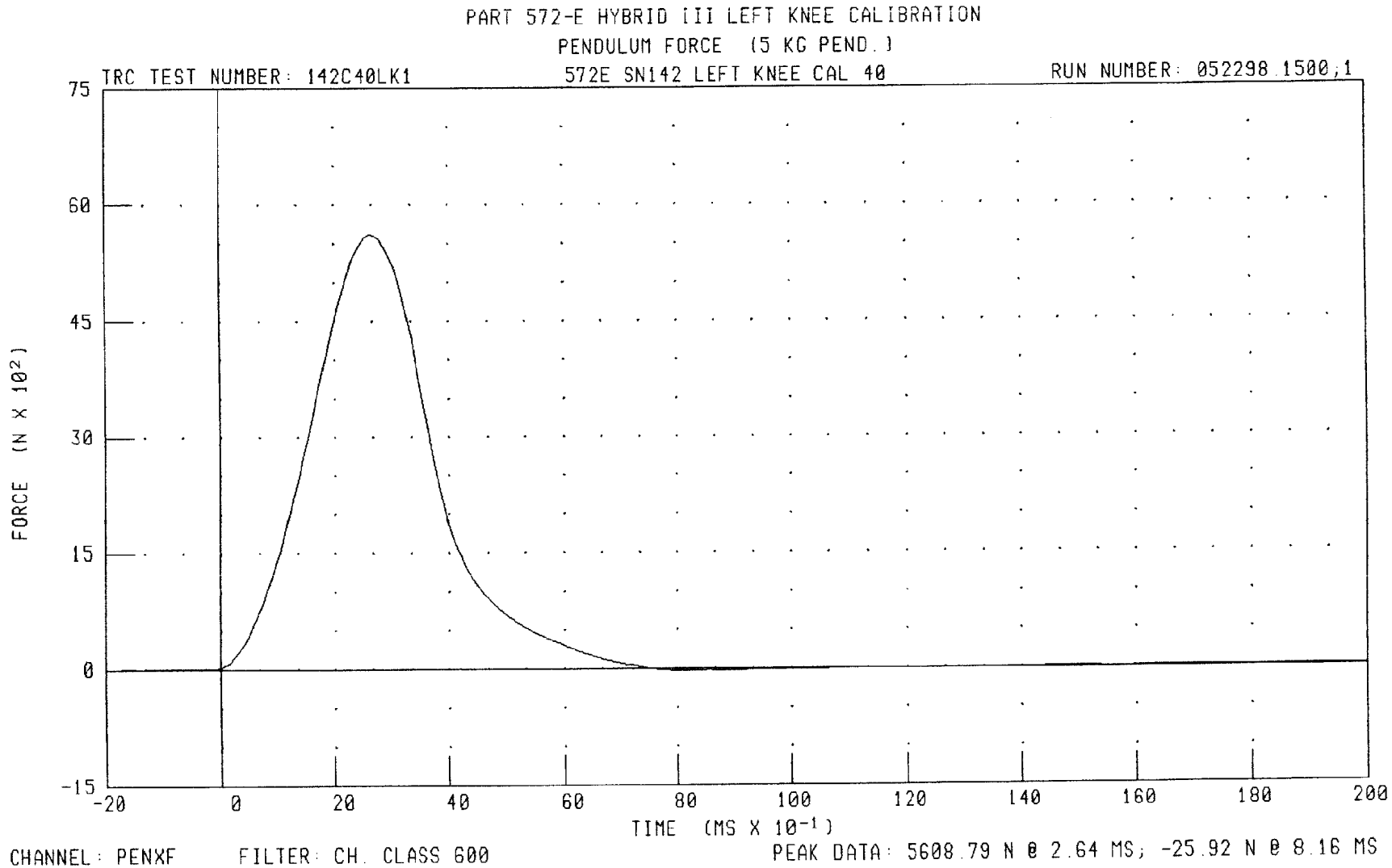
TRC INC. TEST NO: 142C40LK1 572E SN142 LEFT KNEE CAL 40

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	40.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5608.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN By Calt RUN NUMBER: 052298.1459;1


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)
TRC TEST NUMBER: 142C40LK1
572E SN142 LEFT KNEE CAL 40
RUN NUMBER: 052298.1500;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: 114.63 G @ 2.64 MS; -0.53 G @ 8.16 MS


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)
TRC TEST NUMBER: 142C40LK1
572E SN142 LEFT KNEE CAL 40
RUN NUMBER: 052298.1500,1
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: 5608.79 N @ 2.64 MS; -25.92 N @ 8.16 MS

Appendix D

Miscellaneous Test Information

Dummy Instrument Calibrations
Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Head X-axis accelerometer	J19897	7264	Endevco	04/13/98	10/13/98
Head X-axis accelerometer-redundant	J19847	7264	Endevco	02/27/98	08/27/98
Head Y-axis accelerometer	J20124	7264	Endevco	04/13/98	10/13/98
Head Y-axis accelerometer-redundant	J20158	7264	Endevco	04/13/98	10/13/98
Head Z-axis accelerometer	J19639	7264	Endevco	04/13/98	10/13/98
Head Z-axis accelerometer-redundant	J20582	7264	Endevco	08/28/98	02/28/98
Chest X-axis accelerometer	J20015	7264	Endevco	04/13/98	10/13/98
Chest X-axis accelerometer-redundant	J21764	7264	Endevco	04/13/98	10/13/98
Chest Y-axis accelerometer	J20625	7264	Endevco	04/13/98	10/13/98
Chest Y-axis accelerometer-redundant	AJ8J7	7264	Endevco	04/13/98	10/13/98
Chest Z-axis accelerometer	J20294	7264	Endevco	11/17/97	05/17/98
Chest Z-axis accelerometer-redundant	J22166	7264	Endevco	05/13/98	11/13/98
Left femur force load cell	263	2121	Denton	04/22/98	10/22/98
Right femur force load cell	264	2121	Denton	04/22/98	10/22/98
Neck X-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Y-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Z-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about X-axis load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about Y-axis load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about Z-axis load cell	445	1716	Denton	10/01/97	04/01/98
Pelvis X-axis accelerometer	J21941	7264	Endevco	04/22/98	10/22/98
Pelvis Y-axis accelerometer	J23957	7264	Endevco	04/22/98	10/22/98
Pelvis Z-axis accelerometer	J23958	7264	Endevco	04/22/98	10/22/98
Chest deflection potentiometer	87313-96	14CB1-2981	Vernitech	04/13/98	10/13/98
Lap belt force load cell	612	3419	Lebow	05/27/98	11/27/98
Shoulder belt force load cell	234	3419	Lebow	01/02/98	07/02/98

Dummy Instrument Calibrations, Cont'd.
Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Left upper tibia moment about X-axis load cell	0616-MX	1583	Denton	10/01/97	04/01/98
Left upper tibia moment about Y-axis load cell	0616-MY	1583	Denton	10/01/97	04/01/98
Right upper tibia moment about X-axis load cell	0617-MX	1583	Denton	10/01/97	04/01/98
Right upper tibia moment about Y-axis load cell	0617-MY	1583	Denton	10/01/97	04/01/98
Left Lower tibia X-axis force load cell	0599-FY	1584	Denton	10/01/97	04/01/98
Left Lower tibia Z-axis force load cell	0599-FZ	1584	Denton	10/01/97	04/01/98
Left Lower tibia moment about Y-axis load cell	0599-MX	1584	Denton	10/01/97	04/01/98
Right Lower tibia X-axis force load cell	0600-FY	1584	Denton	10/01/97	04/01/98
Right Lower tibia Z-axis force load cell	0600-FZ	1584	Denton	10/01/97	04/01/98
Right Lower tibia moment about Y-axis load cell	0600-MY	1584	Denton	10/01/97	04/01/98
Left foot X-axis accelerometer	J19562	7264	Endevco	08/28/97	02/28/98
Left foot heel Z-axis accelerometer	J19884	7264	Endevco	11/17/97	05/17/98
Left foot toe Z-axis accelerometer	DM66J	7264	Endevco	04/13/97	10/13/98
Right foot X-axis accelerometer	J21943	7264	Endevco	04/22/97	10/22/98
Right foot heel Z-axis accelerometer	J21917	7264	Endevco	04/22/97	10/22/98
Right foot toe Z-axis accelerometer	J21589	7264	Endevco	05/12/98	11/12/98

Dummy Instrument Calibrations, Cont'd.
Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Head X-axis accelerometer	J21855	7264	Endevco	04/13/98	10/13/98
Head X-axis accelerometer-redundant	J21762	7264	Endevco	04/22/98	10/22/98
Head Y-axis accelerometer	J21500	7264	Endevco	02/27/98	08/27/98
Head Y-axis accelerometer-redundant	J21792	7264	Endevco	04/22/98	10/22/98
Head Z-axis accelerometer	J22021	7264	Endevco	04/13/98	10/13/98
Head Z-axis accelerometer-redundant	J21942	7264	Endevco	04/22/98	10/22/98
Chest X-axis accelerometer	J19885	7264	Endevco	04/13/98	10/13/98
Chest X-axis accelerometer-redundant	J19547	7264	Endevco	08/28/97	02/28/98
Chest Y-axis accelerometer	J19694	7264	Endevco	04/13/98	10/13/98
Chest Y-axis accelerometer-redundant	J20085	7264	Endevco	08/28/97	02/28/98
Chest Z-axis accelerometer	J20329	7264	Endevco	04/13/98	10/13/98
Chest Z-axis accelerometer-redundant	J19905	7264	Endevco	04/13/98	10/13/98
Left femur force load cell	257	2121	Denton	01/05/98	07/05/98
Right femur force load cell	258	2121	Denton	01/05/98	07/05/98
Neck X-axis force load cell	441	1716	Denton	10/01/97	04/01/98
Neck Y-axis force load cell	441	1716	Denton	10/01/97	04/01/98
Neck Z-axis force load cell	441	1716	Denton	10/01/97	04/01/98
Neck Moment about X-axis load cell	441	1716	Denton	10/01/97	04/01/98
Neck Moment about Y-axis load cell	441	1716	Denton	10/01/97	04/01/98
Neck Moment about Z-axis load cell	441	1716	Denton	10/01/97	04/01/98
Pelvis X-axis accelerometer	10089	7264	Endevco	01/05/98	07/05/98
Pelvis Y-axis accelerometer	AP0A1	7264	Endevco	07/03/97	07/05/98
Pelvis Z-axis accelerometer	J14136	7264	Endevco	03/17/98	07/05/98
Chest deflection potentiometer	142	14CB1-2981	Servo	01/05/98	07/05/98
Lap belt force load cell	616	3419	Lebow	07/03/97	01/03/98
Shoulder belt force load cell	134	3419	Lebow	03/17/98	09/17/98

Dummy Instrument Calibrations, Cont'd.
Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Left upper tibia moment about X-axis load cell	0614-MX	1583	Denton	10/01/97	04/01/98
Left upper tibia moment about Y-axis load cell	0614-MY	1583	Denton	10/01/97	04/01/98
Right upper tibia moment about X-axis load cell	0615-MX	1583	Denton	10/01/97	04/01/98
Right upper tibia moment about Y-axis load cell	0615-MY	1583	Denton	10/01/97	04/01/98
Left Lower tibia X-axis force load cell	0597-FY	1584	Denton	10/01/97	04/01/98
Left Lower tibia Z-axis force load cell	0597-FZ	1584	Denton	10/01/97	04/01/98
Left Lower tibia moment about Y-axis load cell	0597-MX	1584	Denton	10/01/97	04/01/98
Right Lower tibia X-axis force load cell	0598-FY	1584	Denton	10/01/97	04/01/98
Right Lower tibia Z-axis force load cell	0598-FZ	1584	Denton	10/01/97	04/01/98
Right Lower tibia moment about Y-axis load cell	0598-MX	1584	Denton	10/01/97	04/01/98
Left foot X-axis accelerometer	J21582	7264	Endevco	04/13/98	10/13/98
Left foot heel Z-axis accelerometer	J21844	7264	Endevco	03/18/98	09/18/98
Left foot toe Z-axis accelerometer	J19629	7264	Endevco	04/03/98	10/03/98
Right foot toe Z-axis accelerometer	J21572	7264	Endevco	04/03/98	10/03/98

Vehicle and Calibration Laboratory Instrument Calibrations

Vehicle Accelerometers

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Left rear seat crossmember X-axis	J15376	7264	Endevco	01/06/98	07/06/98
Left rear seat crossmember X-axis redundant	J21803	7264	Endevco	05/01/98	11/01/98
Right rear seat crossmember X-axis	J21749	7264	Endevco	03/04/98	09/04/98
Right rear seat crossmember X-axis redundant	J21823	7264	Endevco	04/13/98	10/13/98
Engine top X-axis	10102	7264	Endevco	02/23/98	08/23/98
Engine bottom X-axis	10101	7264	Endevco	01/07/98	07/07/98
Right brake caliper X-axis	AC721	7264	Endevco	12/15/97	06/15/98
Left brake caliper X-axis	J23956	7264	Endevco	04/22/98	10/22/98
Instrument panel center X-axis	10263	7264	Endevco	11/07/97	07/07/98

Calibration Laboratory Instruments

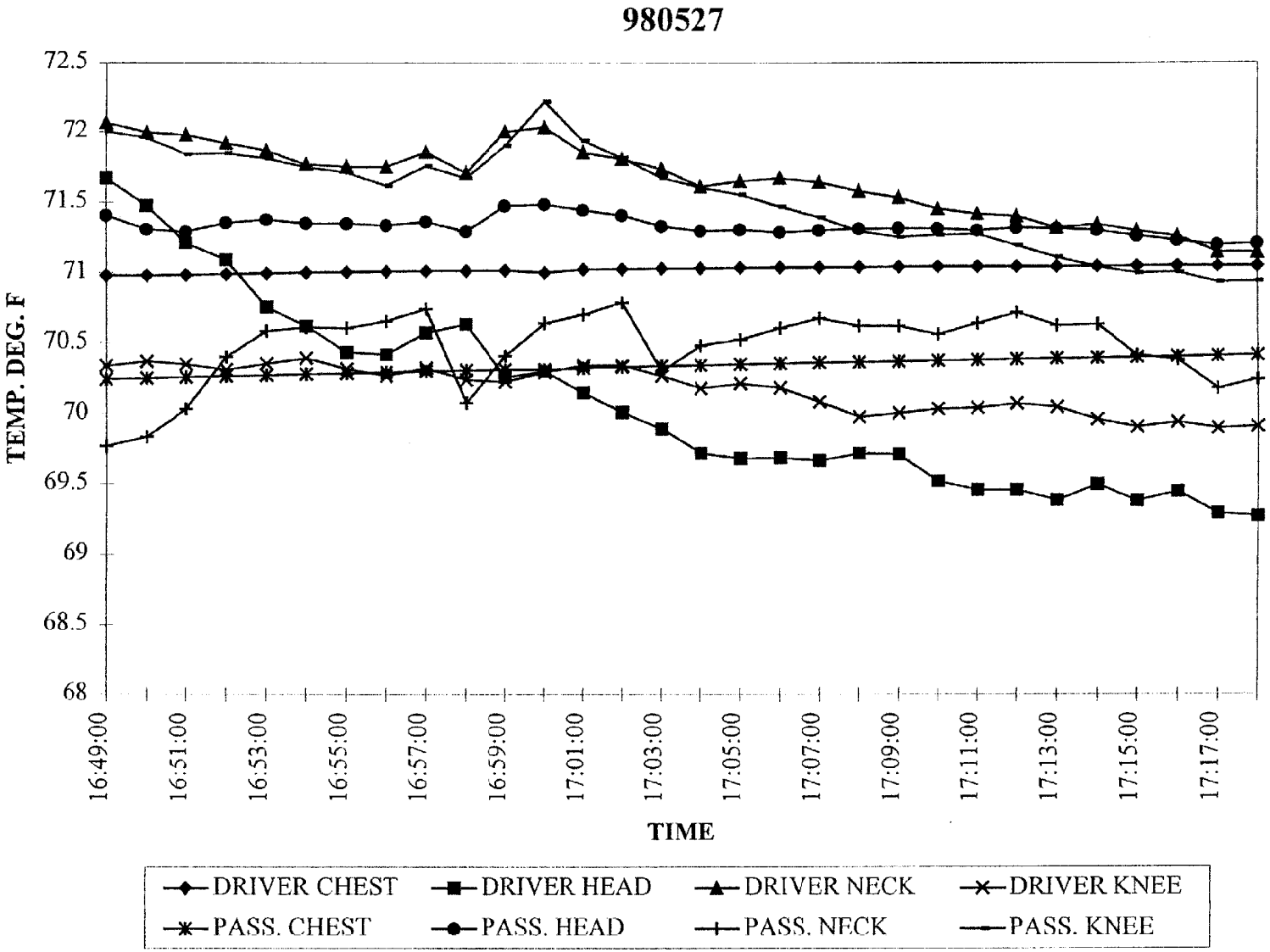
	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Neck bending pendulum accelerometer	CB27	7232	Endevco	03/18/98	09/18/98
Neck bending rotary potentiometer	6	6657S-1-102	Bournes	02/04/98	08/04/98
Neck bending rotary potentiometer	7	6657S-1-102	Bournes	02/04/98	08/04/98
Thorax/Hybrid III pendulum accelerometer	CC64	7232	Endevco	03/18/98	09/18/98
Hybrid III femur pendulum accelerometer	CB35	7232	Endevco	03/18/98	09/18/98

Sign Convention
NHTSA Data Tape Reference Guide

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

Frequency Response Classes
SAE J211 OCT88

Typical Test Measurements	Channel Class
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	180
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Head form Accelerations	1000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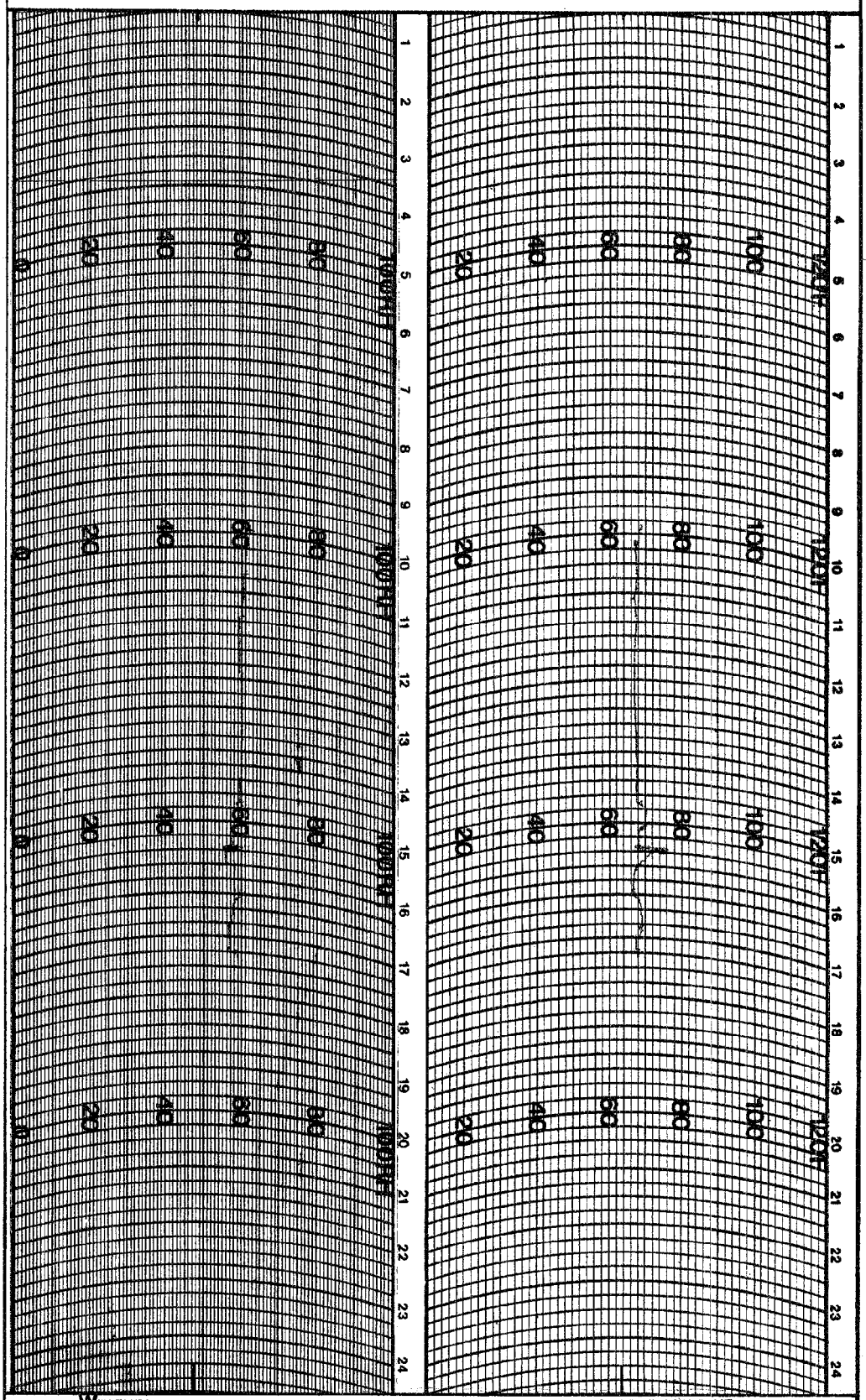

WEATHER MEASURE
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HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # 699123

STATION _____ DATE ON 5-27-98 DATE OFF _____