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U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

DOT HS 808 305

June 1995

Final Report

Moving Deformable Barrier into Left Side of 1995 Solectria Force at 52.9 kph.

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16. Abstract The purpose of this test was to gather data concerning the application of FMVSS 214, "Side Impact Protection - Passenger Cars," in the 48/24 kph 270° driver's side impact mode to electric vehicles. This test was conducted with a 1995 Solectria Force 4-door sedan, VIN 2C1MR529X6756913, at Transportation Research Center Inc. on May 16, 1995. The impact velocity was 52.9 kph. The vehicle's maximum crush was 346 mm. The ambient temperature was 21° C. The driver's Thoracic Trauma Index (TTI) was 63.8. The driver's pelvis maximum lateral acceleration was 77.5 g. The left rear passenger's TTI was 89.7. The left rear passenger's pelvis maximum lateral acceleration was 83.6 g.					
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.54	centimeters	cm
ft	feet	30.48	centimeters	cm
yd	yards	0.9144	meters	m
mi	miles	1.60934	kilometers	km
AREA				
in ²	square inches	6.4516	square centimeters	cm ²
ft ²	square feet	0.092903	square meters	m ²
yd ²	square yards	0.836127	square meters	m ²
mi ²	square miles	2.599987	square kilometers	km ²
	acres	0.404686	hectares	ha
MASS (weight)				
oz	ounces	28.3495	grams	g
lb	pounds	0.453592	kilograms	kg
	short tons (2000 lb)	0.907185	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	0.473176	liters	l
qt	quarts	0.946353	liters	l
gal	gallons	3.78541	liters	l
ft ³	cubic feet	0.0283168	cubic meters	m ³
yd ³	cubic yards	0.764555	cubic meters	m ³

TEMPERATURE (exact)

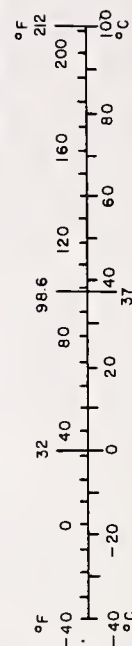
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
----	------------------------	----------------------------	---------------------	----

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
----	---------------------	-------------------	------------------------	----



* 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.

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Section 1.0

Purpose and Test Procedure

Purpose

This 48/24 kph moving deformable barrier left side impact test was conducted for Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC). The purpose of this test was to gather data concerning the application of FMVSS 214, "Side Impact Protection - Passenger Cars," in the 48/24 kph 270° driver's side impact mode to electric vehicles. The test was conducted with a 1995 Solectria Force 4-door sedan.

Test Procedure

This test was conducted using NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-214D-03 as a guideline with the addition of a post-test static rollover test to determine if electrolyte leakage occurred into the passenger's compartment. Data was obtained relative to FMVSS 214, "Side Impact Protection - Passenger Cars," performance.

The test vehicle was instrumented with eighteen (18) accelerometers to measure longitudinal, lateral, and vertical axis accelerations. The vehicle was positioned 63° from the tow track centerline.

The test vehicle contained two (2) Part 572 F 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the rear outboard designated seating positions according to the dummy placement procedure specified as an attachment of the Laboratory Test Procedure. Both dummies were instrumented with primary and redundant spine, rib, and pelvis accelerometers to measure lateral accelerations. Each dummy was restrained by a three-point unbelt.

The moving barrier was instrumented with five (5) accelerometers to measure longitudinal, lateral and vertical axis accelerations. The moving deformable barrier's specified impact velocity range was 53.1 to 54.7 kph. The intended impact point of the left side of the moving deformable barrier face was 940 millimeters forward of the vehicle's wheelbase midpoint. The moving deformable barrier's wheels were crabbed 27° clockwise from the barrier's longitudinal centerline.

The thirty-nine (39) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 12,500 samples per second and processed per Section 12 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and six (6) high-speed motion picture cameras.

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 214 data are presented in Section 3.0. The vehicle, occupant, moving deformable barrier, and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the dummy calibration data. Appendix D contains miscellaneous test information.

Section 2.0

Side Impact Test Summary

Test Results Summary

This 48/24 kph 270° driver's side impact test was conducted at TRC on May 16, 1995.

The test vehicle was a Solectria Force 4-door sedan. The passenger's Thoracic Trauma Index (TTI) calculation exceeded 85 g's. The driver's TTI calculation was less than 85 g's. The driver's and passenger's pelvis lateral accelerations did not exceed 130 g's as measured by the Part 572 F dummies seated in the driver and left rear outboard designated seating positions. The vehicle's left side doors did not separate from the body. The vehicle's right side doors remained closed during the impact.

The test vehicle was equipped with a three-point unbelt at the driver's and left rear passenger's seating positions. The vehicle's test weight was 1334 kilograms. The moving deformable barrier's test weight was 1364 kilograms. The moving deformable barrier's impact speed was 52.9 kph. The vehicle's maximum static crush was 346 millimeters.

The driver's Thoracic Trauma Index (TTI) was 63.8. The driver's pelvis maximum lateral acceleration was 77.5 g.

The left rear passenger's TTI was 89.7. The left rear passenger's pelvis maximum lateral acceleration was 83.6 g.

The vehicle's left side doors did not separate from the body. The vehicle's right side doors did not open during the impact. No electrolyte was found in the passenger's compartment after completion of the static rollover test.

Table 1 Test Conditions

Test number:	950516
Test date:	05/16/95
Test time:	1408
Ambient temperature at impact area:	21° C
Temperature in occupant compartment:	22° C
Vehicle year/make/ model/body style:	1995/Solectria/Force/4-door sedan
Vehicle test weight:	Actual: 1334 kg Intended: 1334 kg
Moving deformable barrier test weight:	
Actual:	1364 kg
Intended:	1367 kg
Impact point ¹ :	
Actual:	931 mm
Intended:	940 mm
Impact velocity ² :	
Actual:	52.9 kph
Intended:	53.1 - 54.7 kph
Maximum vehicle static crush:	346 mm
Number of cameras:	
Real-time:	1
High-speed:	6
Door opening data:	
Left-front:	Difficult
Right-front:	Easy
Left-rear:	Difficult
Right-rear:	Easy

¹ As measured forward of the subject vehicle's wheelbase midpoint

² Speed trap measurement ($\pm .08$ kph (.05 mph) accuracy)

Table 1 Test Conditions, Cont'd.

Seat movement:	Front:	Rear:
Seat back failure:	None	None
Seat shift:	None	None

Remarks:

Driver's seat back angle was 25°.

Glazing damage: Both left door glasses were shattered. The left side of the windshield cracked.

Dummies:	<u>Driver #199</u>	<u>Passenger #191</u>
Type:	SID	SID
Location:	Left front	Left rear
Restraint:	Airbag and three-point unbelt	Three-point unbelt
Number of data channels:	8	8

Visible dummy contact points:

Head:	None	C-pillar
Chest:	Door panel	Door panel
Abdomen:	Door panel	Door panel
Left knee:	Door panel	Door panel
Right knee:	NA	NA

Other notable impact effects: None

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1995/Solectria/Force/4-door sedan

Color: Red

VIN:

Electric motor data:

 Placement: Transverse/lateral

 Type: One A.C. motor and gear box

Final drive: X fwd, __rwd, __4wd

Date vehicle received: 05/09/95

Odometer reading: 155

Dealer's name
and address: NA

Accessories:

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

Certification data from vehicle's label:

Vehicle manufactured by: CAMI Automotive, Inc.

Date of manufacture: 03/95

VIN: 2C1MR529X6756913

GVWR: 1249 kg

GAWR: Front: 649 kg

 Rear: 619 kg

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P155/80R13

Tire pressure with maximum
capacity vehicle load:

Front: 300 kPa

Rear: 300 kPa

Spare tire: None

Type of seats:

Front: Bucket

Rear: Bench

Tire & capacity data from vehicle's label:

Recommended tire size: P155/80R13

Recommended cold tire pressure:

Front: 220 kPa

Rear: 220 kPa

Designated seating capacity:

Front: 2

Rear: 2

Total: 4

Vehicle capacity weight: 312 kg

Test vehicle attitudes:

Delivered attitude: LF: 662 mm RF: 639 mm LR: 616 mm RR: 618 mm

Fully loaded attitude: LF: 640 mm RF: 657 mm LR: 575 mm RR: 585 mm

Pre-test attitude: LF: 620 mm RF: 628 mm LR: 585 mm RR: 595 mm

Post-test attitude: LF: 606 mm RF: 640 mm LR: 581 mm RR: 586 mm

Table 2 Test Vehicle Information, Cont'd.

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

Right front	260 kg	Right rear	293 kg
Left front	272 kg	Left rear	303 kg
Total front weight	532 kg	(47.2% of total vehicle weight)	
Total rear weight	596 kg	(52.8% of total vehicle weight)	
Total delivered weight	1128 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1128 kg)

VCW = Vehicle Capacity Weight (312 kg)

DSC = Designated Seating Capacity (4)

RCLW = VCW - 68 (DSC) = 40 kg

Target test weight = UDW + RCLW + (Number of SID dummies x 79 kg per dummy)

Target test weight = 1128 + 40 + 158

Target test weight = 1326 kg

Weight of test vehicle with required dummies and 48 kg of cargo weight:

Right front	302 kg	Right rear	325 kg
Left front	338 kg	Left rear	369 kg
Total front weight	640 kg	(48.0% of total vehicle weight)	
Total rear weight	694 kg	(52.0% of total vehicle weight)	
Total test weight	1334 kg		

Weight of ballast secured in vehicle cargo area: 0 kg

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 1229 mm

Vehicle Wheelbase: 2363 mm

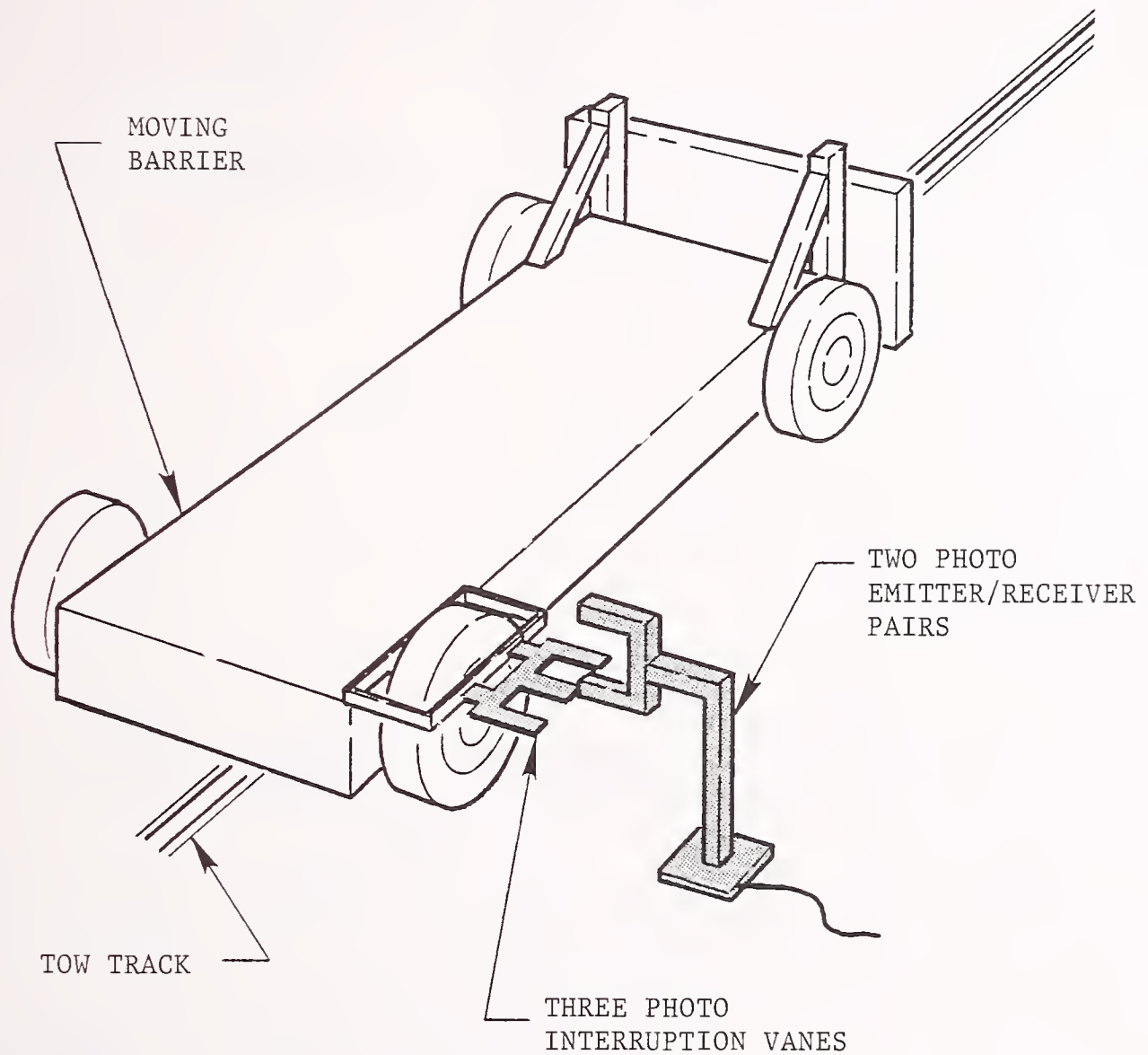
Table 3 Post-Impact Data

Test number:	950516
Test date:	05/16/95
Test time:	1408
Test type:	Left side impact
Impact angle ¹ :	270°
Crabbed angle ² :	27°
Ambient temperature at impact area:	21° C
Temperature in occupant compartment:	22° C
Impact velocity:	
Primary:	52.9 kph
Secondary	52.9 kph
Specified range:	53.1 to 54.7 kph
Distance from barrier to vehicle:	
Entering velocity trap:	356 mm
Exiting velocity trap:	51 mm

¹ Angle measured clockwise from longitudinal axis of struck vehicle to longitudinal axis of moving barrier.

² Angle measured clockwise from longitudinal axis of moving barrier to its velocity vector.

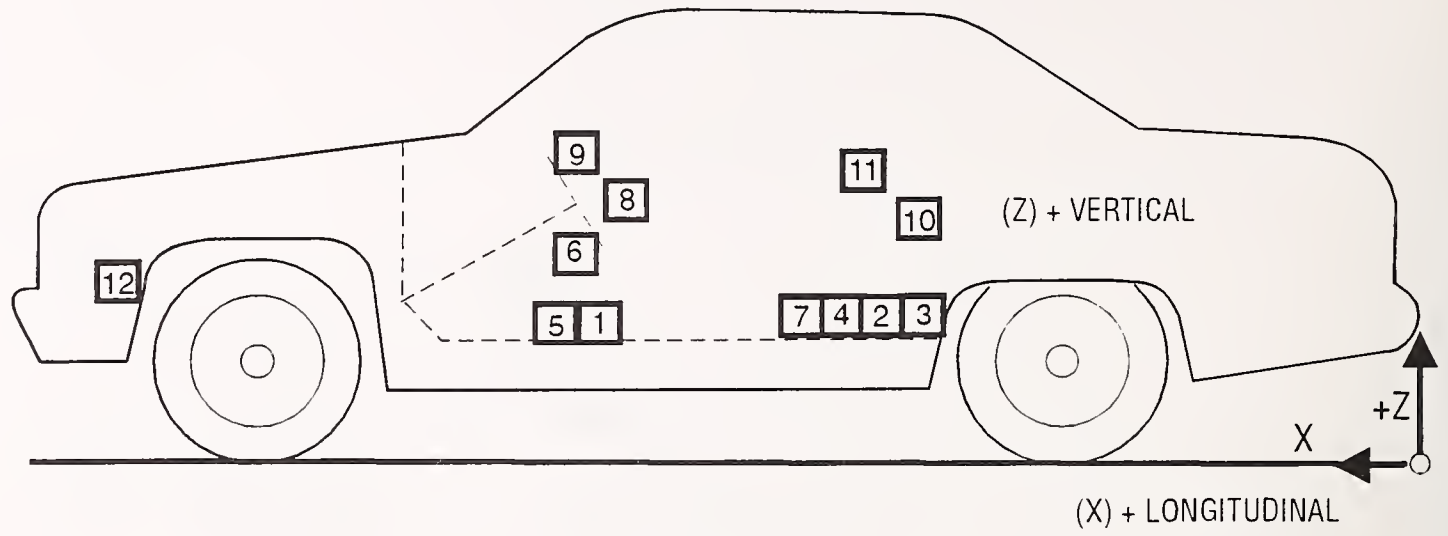
Figure 1 Impact Velocity Measurement System



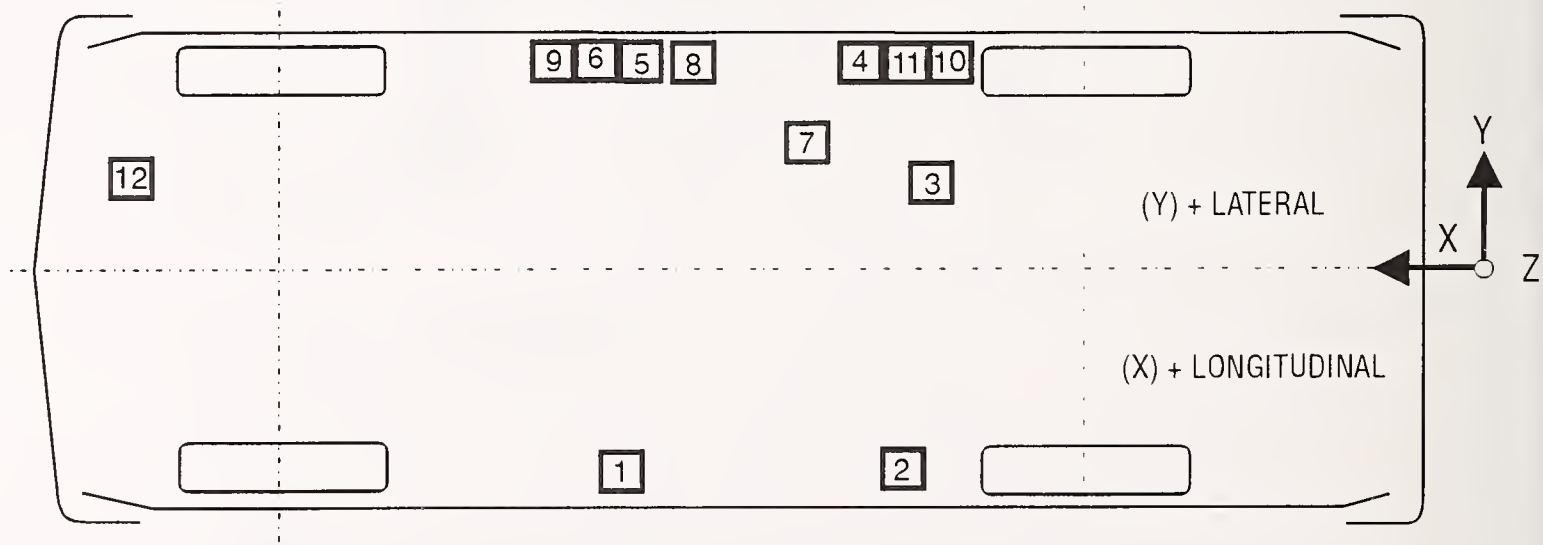
The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

Figure 2 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 950516					POSITIVE		NEGATIVE	
No.	LOCATION	X	Y	Z	DIRECTION		DIRECTION	
1	RIGHT FRONT SILL	1605 mm	614 mm	266 mm				
	LONGITUDINAL		7.2 g		@ 21.1 ms	3.7 g	@ 39.0 ms	
	LATERAL		23.5 g		@ 18.4 ms	4.8 g	@ 60.6 ms	
	VERTICAL		7.5 g		@ 6.2 ms	5.1 g	@ 53.6 ms	
	RESULTANT		24.3 g		@ 6.4 ms			
2	RIGHT REAR SILL	2447 mm	617 mm	241 mm				
	LONGITUDINAL		6.7 g		@ 11.0 ms	4.0 g	@ 39.0 ms	
	LATERAL		30.2 g		@ 7.3 ms	4.4 g	@ 51.8 ms	
	VERTICAL		3.7 g		@ 66.5 ms	6.6 g	@ 43.1 ms	
	RESULTANT		30.3 g		@ 7.3 ms			
3	REAR BATTERY BOX	3434 mm	353 mm	317 mm				
	LATERAL		18.1 g		@ 27.5 ms	2.6 g	@ 132.4 ms	
	VERTICAL		10.2 g		@ 74.9 ms	10.4 g	@ 49.4 ms	
4	LEFT REAR SILL	2444 mm	-620 mm	352 mm				
	LATERAL		101.5 g		@ 7.2 ms	75.3 g	@ 11.3 ms	
5	LEFT FRONT SILL	1612 mm	-635 mm	261 mm				
	LATERAL ¹		---		---	---	---	
6	LEFT FRONT DOOR	1855 mm	-674 mm	548 mm				
	CENTERLINE							
	LATERAL		109.4 g		@ 9.4 ms	41.0 g	@ 18.6 ms	

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

TEST NUMBER: 950516				POSITIVE		NEGATIVE	
No. LOCATION	X	Y	Z	DIRECTION		DIRECTION	
7 RIGHT REAR SEAT LATERAL	2435 mm	109 mm	256 mm	28.4 g	@ 6.8 ms	6.7 g	@ 33.5 ms
8 LEFT FRONT DOOR MID-REAR LATERAL	2074 mm	-672 mm	577 mm	122.0 g	@ 4.1 ms	57.2 g	@ 19.5 ms
9 LEFT FRONT DOOR UPPER CENTERLINE LATERAL	1862 mm	-678 mm	796 mm	122.0 g	@ 4.1 ms	57.2 g	@ 19.5 ms
10 LEFT REAR DOOR MID-REAR LATERAL	2908 mm	-668 mm	610 mm	76.0 g	@ 19.8 ms	37.3 g	@ 25.2 ms
11 LEFT REAR DOOR UPPER CENTERLINE LATERAL	2734 mm	-666 mm	820 mm	117.9 g	@ 11.3 ms	46.1 g	@ 34.3 ms
12 FRONT BATTERY BOX LATERAL VERTICAL	714 mm	430 mm	207 mm	20.8 g	@ 19.5 ms	6.3 g	@ 95.4 ms
				15.2 g	@ 30.0 ms	9.9 g	@ 61.1 ms

REFERENCE: X: + REARWARD FROM FRONT BUMPER
Y: + RIGHTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

¹ See DATA ACQUISITION EXPLANATIONS

Figure 3 Moving Deformable Barrier Accelerometer Placement

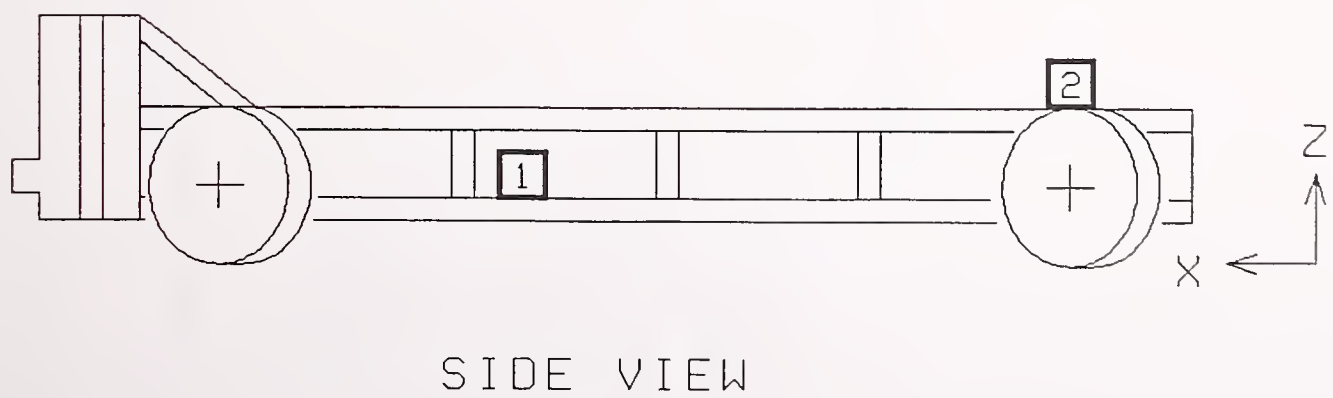
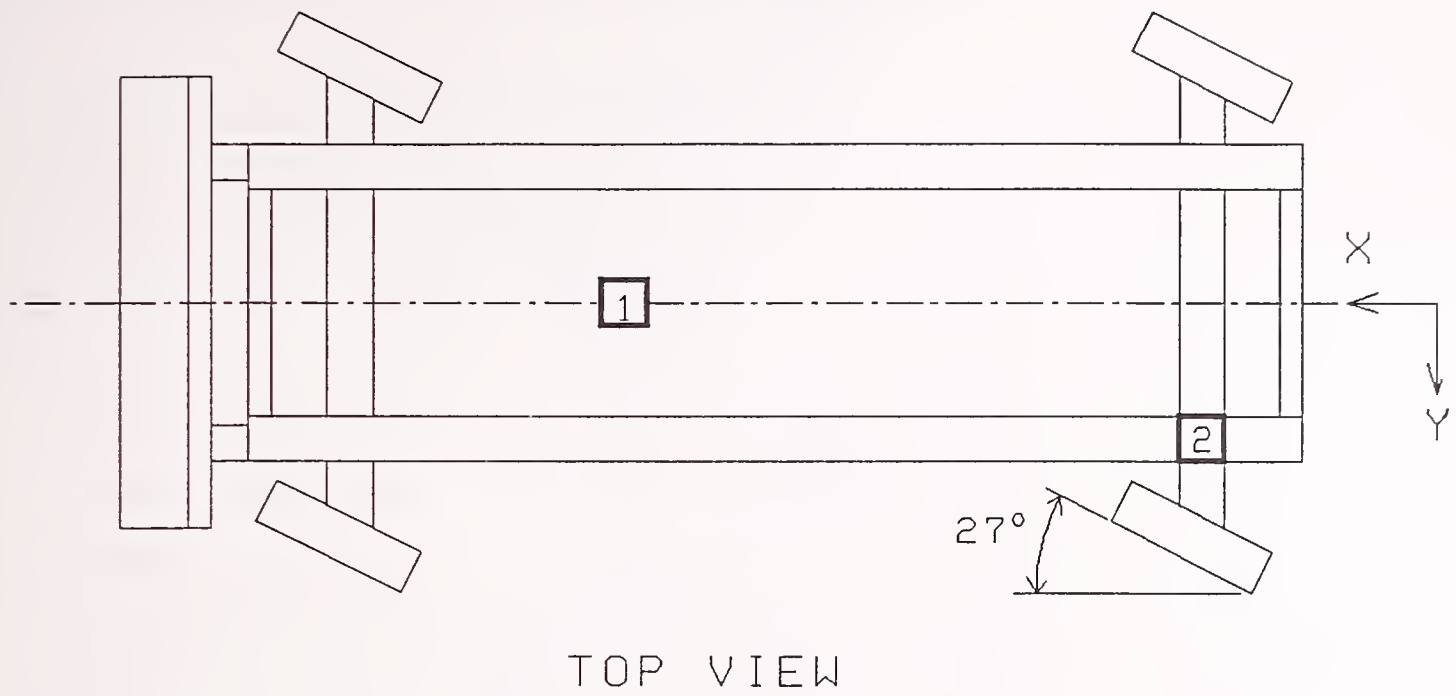


Table 5 Moving Deformable Barrier Accelerometer Locations and Data Summary

TEST NUMBER: 950516					POSITIVE		NEGATIVE	
No.	LOCATION	X	Y	Z	DIRECTION		DIRECTION	
1	CENTER OF GRAVITY	2273 in	0.0 in	325 in				
	LONGITUDINAL ¹			15.6 g	@ 34.5 ms	0.4 g	@	0.0 ms
	LATERAL ¹			0.9 g	@ 63.0 ms	7.9 g	@	21.6 ms
	VERTICAL ¹			4.0 g	@ 31.2 ms	2.4 g	@	51.0 ms
	RESULTANT ¹			17.0 g	@ 34.2 ms			
2	LEFT FRAME RAIL	3729 in	-640 in	622 in				
	OVER REAR AXLE							
	LONGITUDINAL ¹			21.1 g	@ 25.1 ms	0.5 g	@	80.0 ms
	LATERAL ¹			4.4 g	@ 20.0 ms	3.1 g	@	80.0 ms

REFERENCE: X: REARWARD FROM FRONT OF VEHICLE
Y: RIGHTWARD FROM VEHICLE CENTERLINE
Z: UPWARD FROM GROUND LEVEL

¹ See DATA ACQUISITION EXPLANATIONS

Data Acquisition Explanations

The left front sill Y-axis accelerometer, LFSYG1, lost data at 10 milliseconds as a result of the accelerometer's cable being damaged by the vehicle's crush on impact.

The following moving deformable barrier channels lost data at approximately 90 milliseconds as a result of the multiplexing box of the data acquisition system not being attached to the barrier. The box moved on impact breaking the accelerometer cables. The data loss also affected the barrier center of gravity resultant acceleration calculation.

BCGXG - moving barrier center of gravity X-axis accelerometer

BCGYG - moving barrier center of gravity Y-axis accelerometer

BCGZG - moving barrier center of gravity Z-axis accelerometer

BSRXG - moving barrier left rear frame rail X-axis accelerometer

BSRYG - moving barrier left rear frame rail Y-axis accelerometer

Section 3.0

FMVSS 214 Data

Table 6 Dummy Data Summary

TEST NUMBER: 950516

DRIVER DUMMY SERIAL NUMBER: 199

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

LOWER SPINE

LATERAL (P)	70.1 g	@	28.1 ms	11.8 g	@	76.9 ms
LATERAL (R)	71.2 g	@	28.1 ms	11.5 g	@	76.9 ms

LEFT UPPER RIB

LATERAL (P)	54.1 g	@	23.1 ms	9.5 g	@	91.2 ms
LATERAL (R)	55.8 g	@	23.1 ms	9.9 g	@	72.5 ms

LEFT LOWER RIB

LATERAL (P)	57.5 g	@	34.4 ms	9.9 g	@	71.3 ms
LATERAL (R)	55.5 g	@	34.4 ms	10.1 g	@	71.3 ms
	TTI (P)		63.8			
	TTI (R)		63.5			

PELVIS

LATERAL (P)	77.5 g	@	30.0 ms	11.3 g	@	51.3 ms
LATERAL (R)	82.3 g	@	30.6 ms	14.3 g	@	50.6 ms

POSITIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: UPWARD

NEGATIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: DOWNWARD

Table 6 Dummy Data Summary, Cont'd.

TEST NUMBER: 950516

PASSENGER DUMMY SERIAL NUMBER: 191

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

LOWER SPINE

LATERAL (P)	73.1 g	@	39.4 ms	24.2 g	@	69.4 ms
LATERAL (R)	72.2 g	@	39.4 ms	24.2 g	@	69.4 ms

LEFT UPPER RIB

LATERAL (P)	75.8 g	@	36.9 ms	7.5 g	@	76.3 ms
LATERAL (R)	75.1 g	@	36.9 ms	8.1 g	@	76.3 ms

LEFT LOWER RIB

LATERAL (P)	106.2 g	@	37.5 ms	32.5 g	@	64.4 ms
LATERAL (R)	105.6 g	@	37.5 ms	32.5 g	@	64.4 ms
	TTI (P)		89.7			
	TTI (R)		88.9			

PELVIS

LATERAL (P)	83.6 g	@	35.6 ms	14.4 g	@	80.6 ms
LATERAL (R)	85.5 g	@	33.7 ms	14.4 g	@	80.6 ms

POSITIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: UPWARD

NEGATIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: DOWNWARD

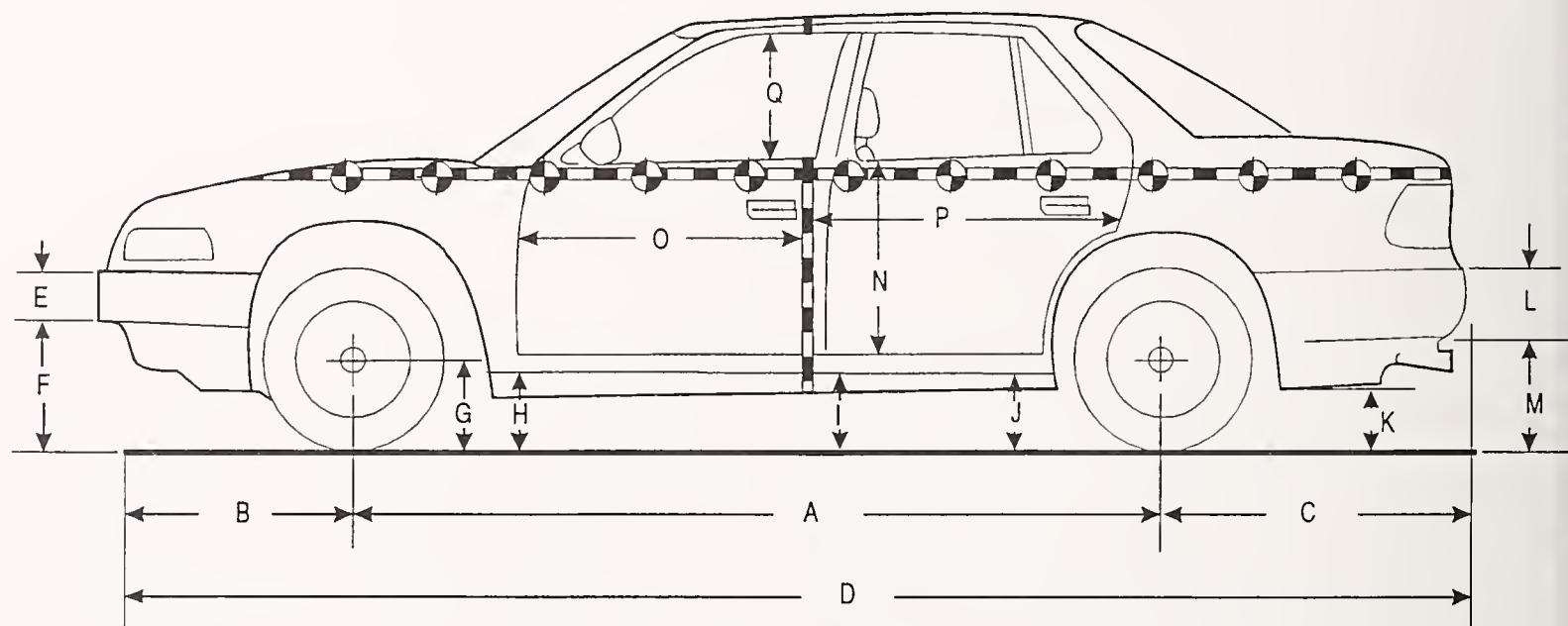
Section 4.0

Vehicle, Occupant, Moving Deformable Barrier, and Camera Measurements

Figure 4 Pre-Test and Post-Test Measurements

Vehicle: 1995 Solectria Force 4-door sedan

Test Date: 05/16/95 VIN: 2C1MR52X6756913



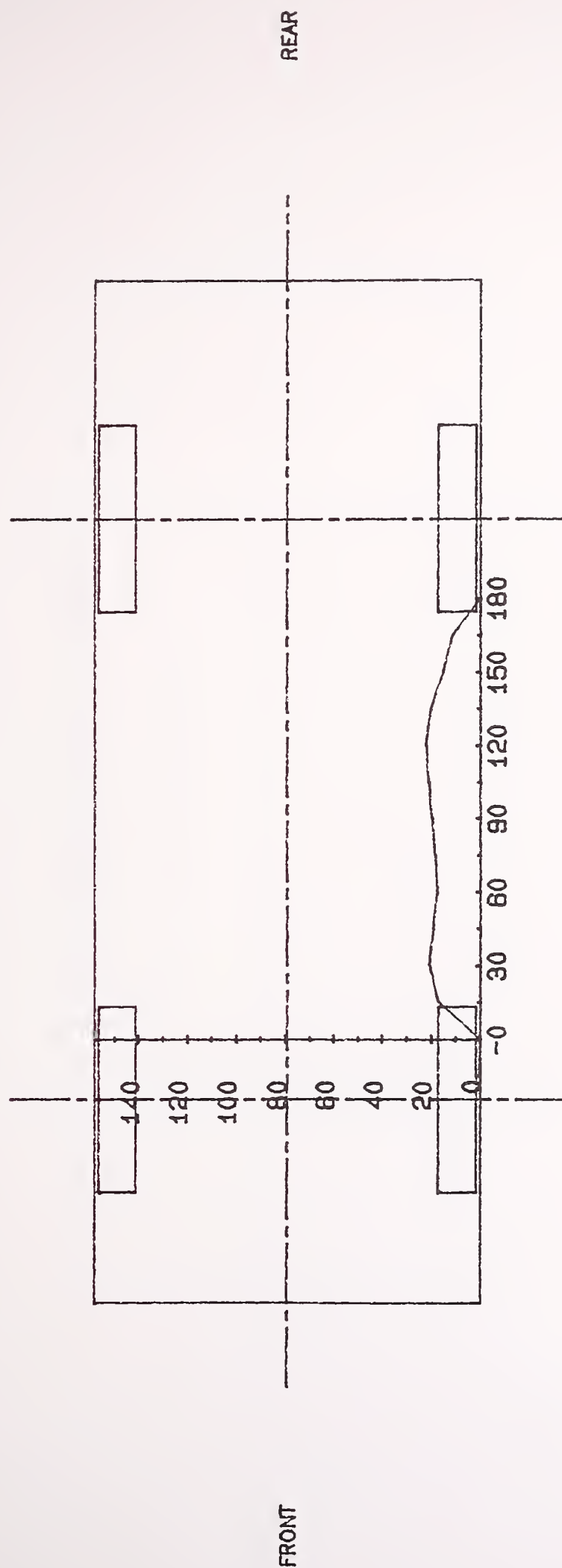
LEFT SIDE VIEW

	Delivered	Post-Test	Change		Delivered	Post-Test	Change
A	2362	2295	67	J	234	211	23
B	832	840	-8	K	276	268	8
C	973	985	-12	L	90	90	0
D	4176	4120	56	M	535	286	249
E	105	105	0	N	630	578	52
F	466	230	236	NA	635	629	6
G	273	273	0	P	1376	1280	96
H	245	249	-4	Q	413	374	39
I	218	153	65				

All distance measurements are in millimeters.

Figure 5

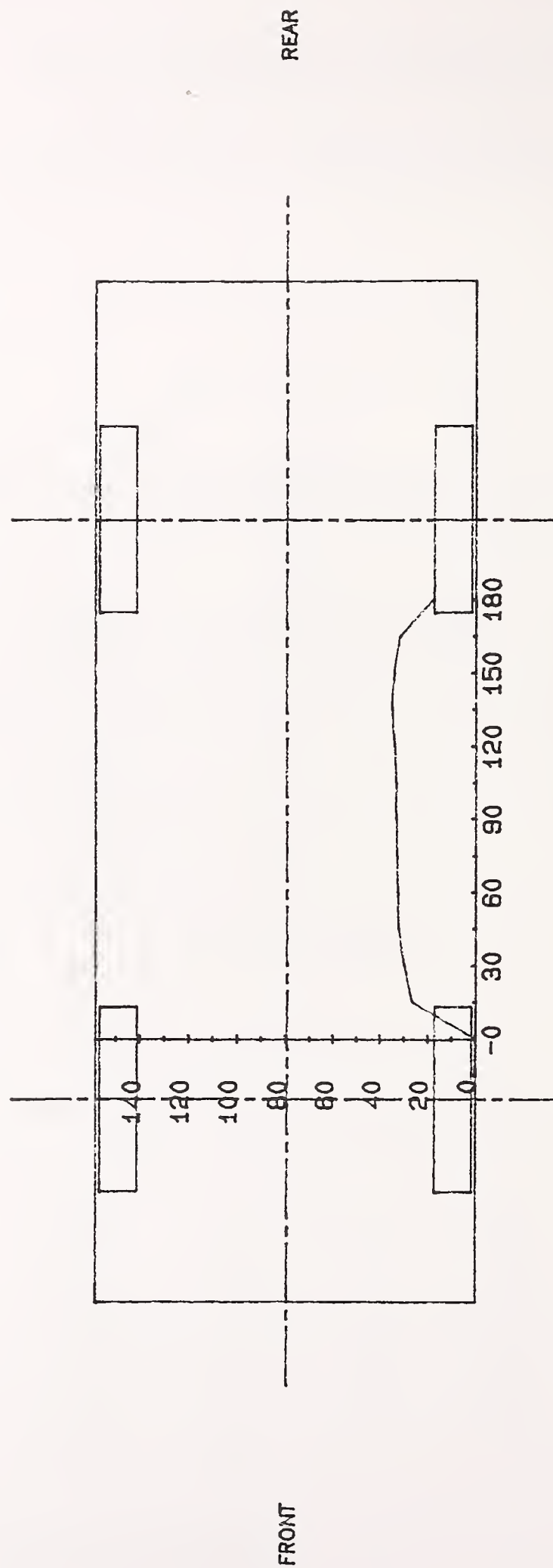
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 29.7 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

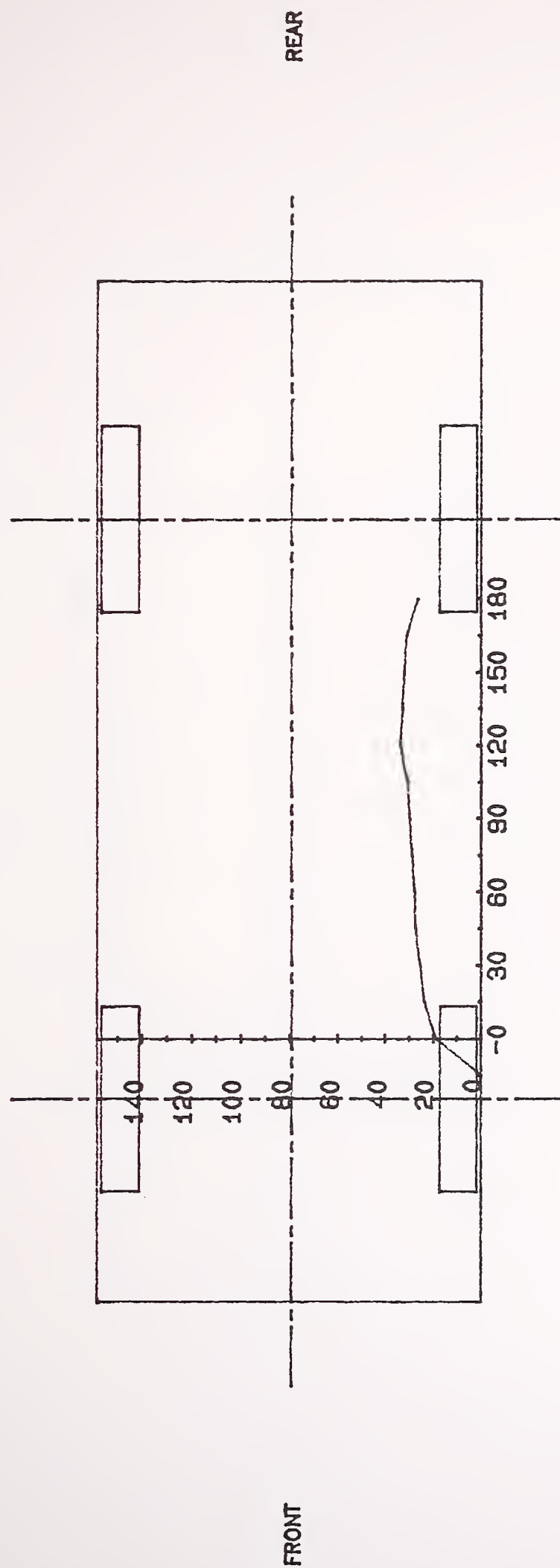
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 48.2 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

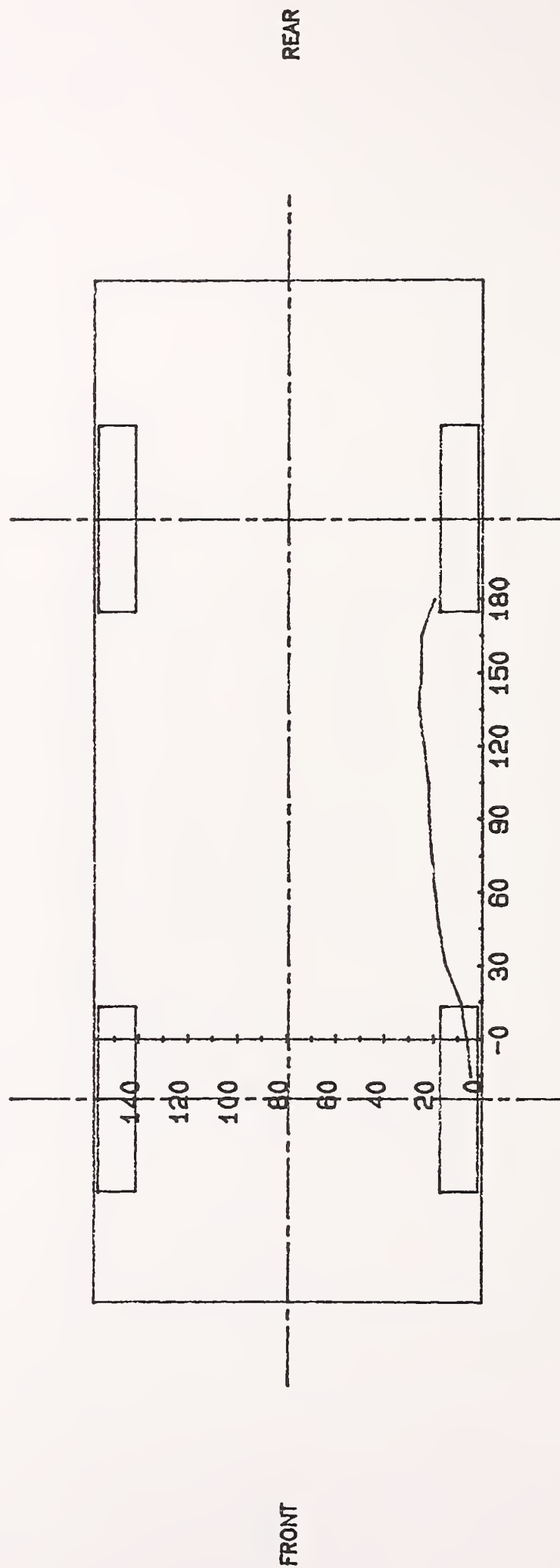
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 60.1 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 86.3 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

VEHICLE EXTERIOR STATIC CRUSH PROFILE

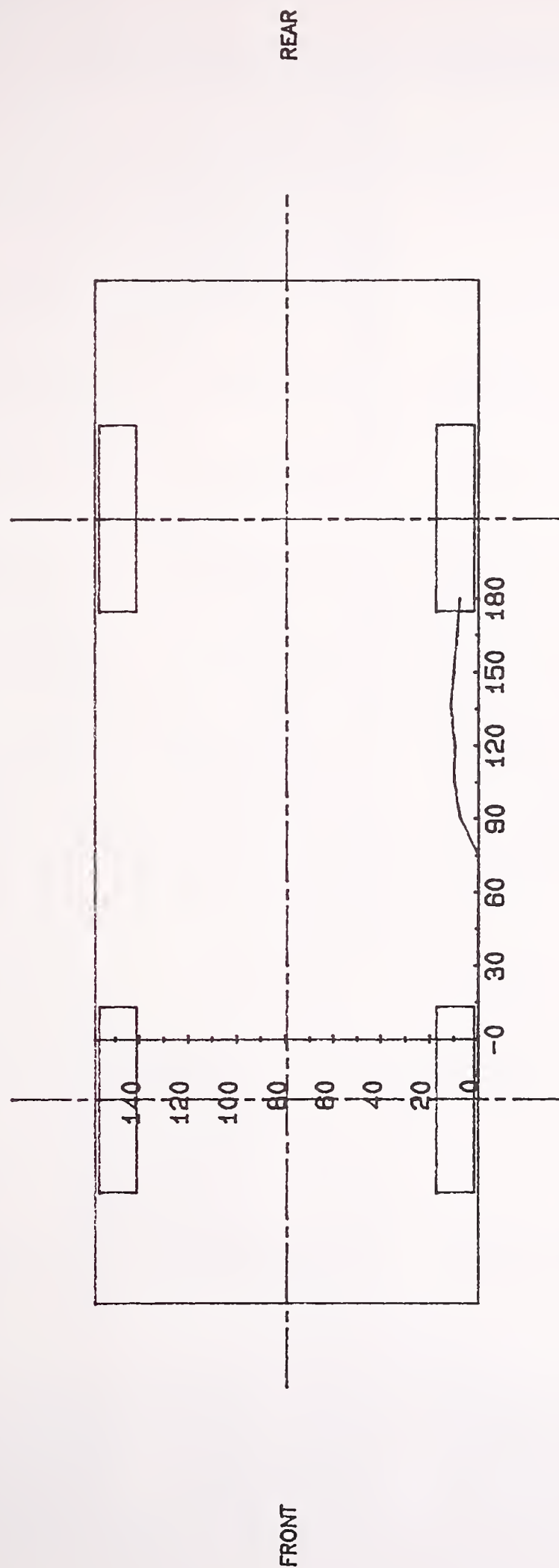


TABLE 7 VEHICLE EXTERIOR PROFILES AND STATIC CRUSH
ZERO DISTANCE AT PROJECTED IMPACT POINT¹

LOCATION	HEIGHT (mm)	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800
PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE ²)															
AXLE HEIGHT	297	0	0	472	478	484	488	490	488	489	490	487	481	476	0
H-POINT	482	0	0	439	440	441	441	441	438	439	439	438	439	438	441
MID DOOR	601	0	427	432	436	434	437	438	432	432	431	430	431	431	432
WINDOW SILL	863	524	509	500	490	484	484	484	474	473	469	466	467	466	466
WINDOW TOP	1336	0	0	0	0	0	0	0	718	715	717	721	725	729	736

LOCATION	HEIGHT (mm)	POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE ²)													
AXLE HEIGHT	297	0	0	641	683	674	658	671	684	698	710	685	629	587	0
H-POINT	482	0	0	702	737	761	764	768	769	770	775	784	777	753	615
MID DOOR	601	0	613	666	688	706	714	724	727	735	764	753	747	737	692
WINDOW SILL	863	567	568	586	638	659	676	689	688	693	706	722	712	712	658
WINDOW TOP	1336	0	0	0	0	0	0	0	791	811	812	833	821	814	809

LOCATION	HEIGHT (mm)	STATIC CRUSH (mm)													
AXLE HEIGHT	297	0	0	169	205	190	170	181	196	209	220	198	148	111	0
H-POINT	482	0	0	263	297	320	323	327	331	331	336	346	338	315	174
MID DOOR	601	0	186	234	252	272	277	286	295	303	333	323	316	306	260
WINDOW SILL	863	43	59	86	148	175	192	205	214	220	237	256	245	246	192
WINDOW TOP	1336	0	0	0	0	0	0	0	73	96	95	112	96	85	73

Column readings are front to rear from left to right.

All measurements are in millimeters.

¹Projected impact point is 940 mm forward of driver's side wheelbase midpoint.²Reference plane is parallel to and 1200 mm from the vehicle's longitudinal centerline

Figure 6 Dummy and Seat Positioning Data

Vehicle: 1995 Solectria Force
 Seat Type: Front - Bucket; Rear - Bench
 Adjuster Type: Manual
 Bucket Seat Back type: Manually adjustable
 Technicians: D. Summers, S. Orts
 Positioning Date: 05/16/95
 Ambient Temperature: 22° C
 Time: 1230

Driver Dummy¹ #199; Type: SID

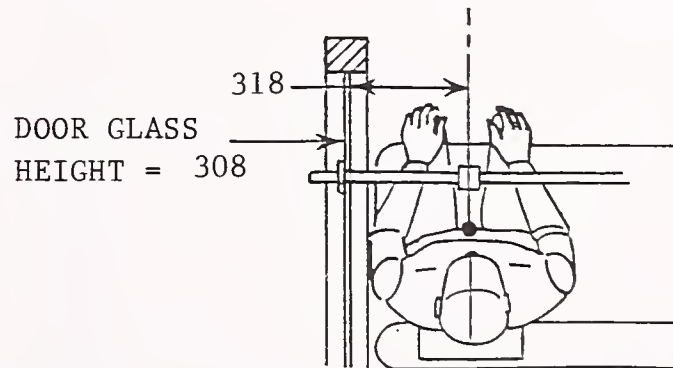
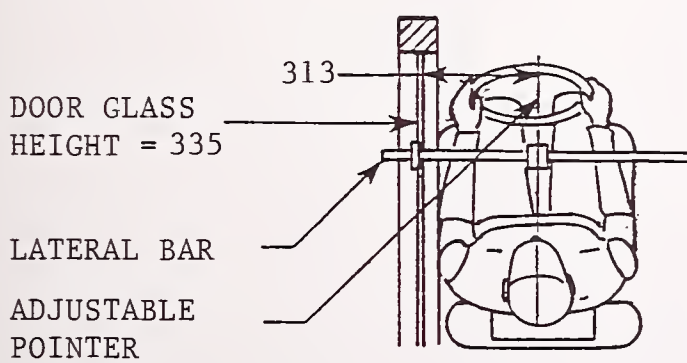
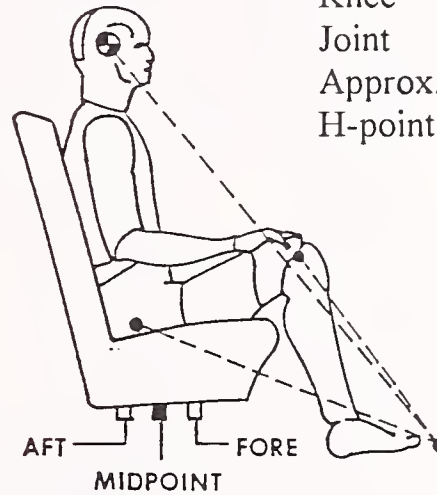
Head 471
 Target -50°
 Knee 579
 Joint 95°
 Approx. 253
 H-point 130°



Left Rear

Passenger Dummy² #191; Type: SID

Head 399
 Target -22°
 Knee 702
 Joint 99°
 Approx. 430
 H-point 127°



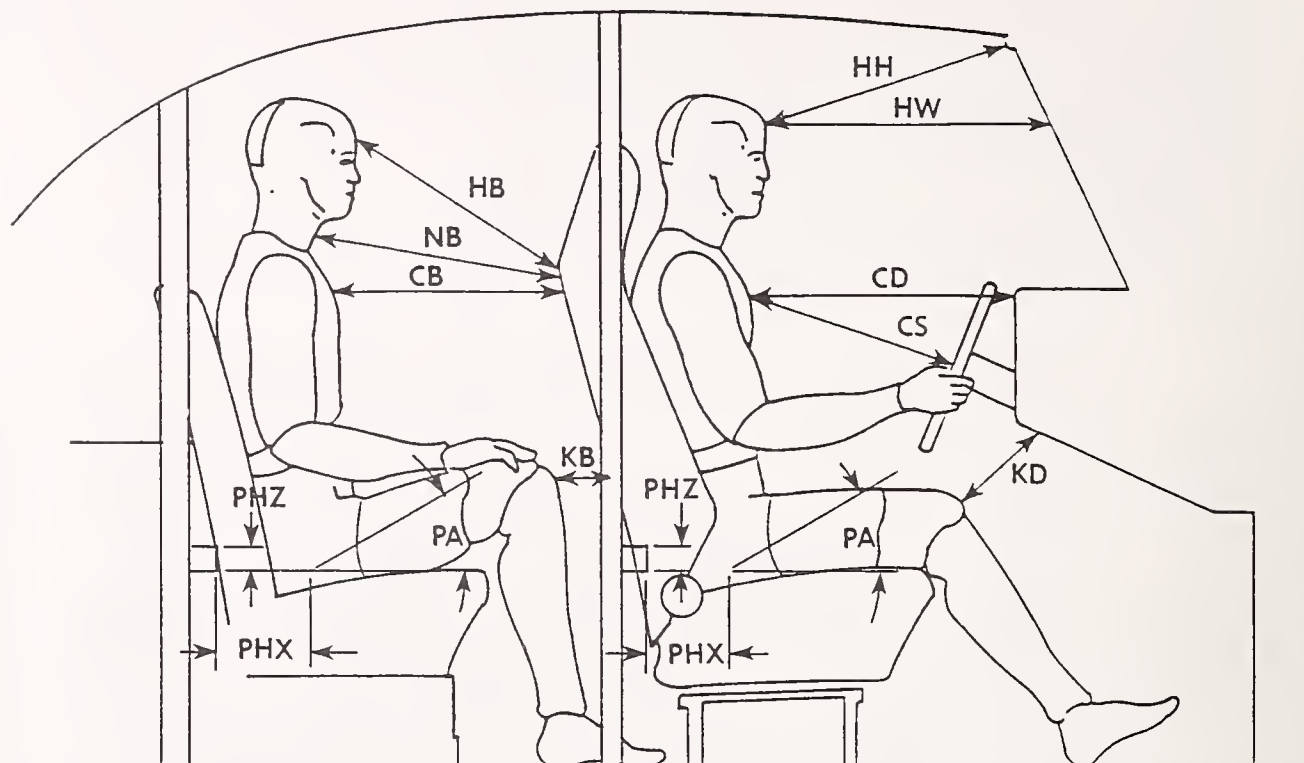
¹ Driver dummy measurements are referenced to top of front door striker.

² Passenger dummy measurements are referenced to top of rear door striker.

All distance measurements are in millimeters.

All angles are referenced to vertical.

Figure 7 Dummy Longitudinal Clearance Measurements



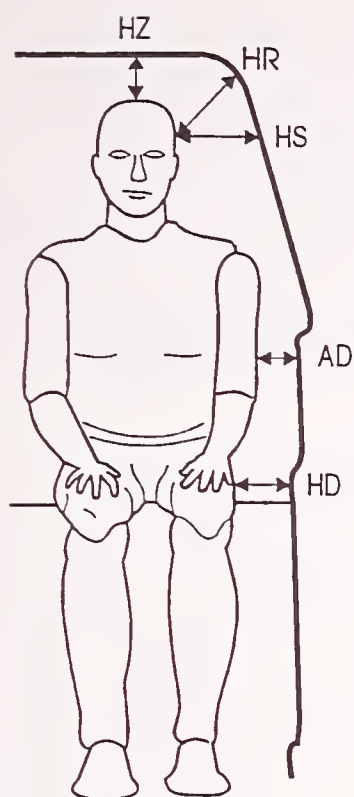
	Driver	Left Rear Passenger
HH	430	NA
HW	603	NA
CD	552	NA
CS	375	NA
KDL	102	NA
KDR	101	NA
PA	23°	24°
PHX	203	324
PHZ	144	310
HB	NA	520
NB	NA	NA
CB	NA	454
KBL	NA	96
KBR	NA	92

Note: The rear passenger's PHX and PHZ measurements are referenced to the front door striker.

All distance measurements are in millimeters.

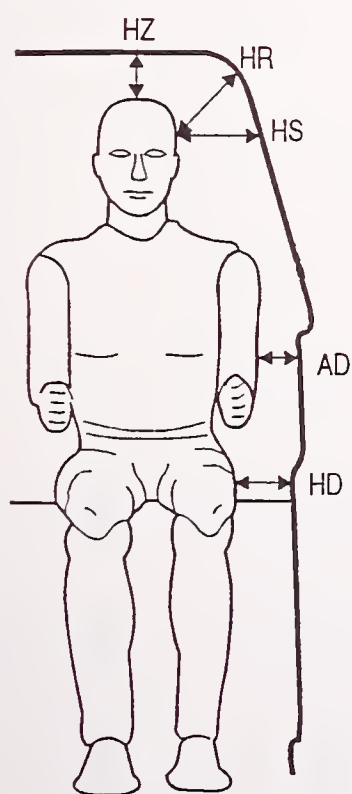
All angles are referenced to horizontal.

Figure 8 Dummy Lateral Clearance Measurements



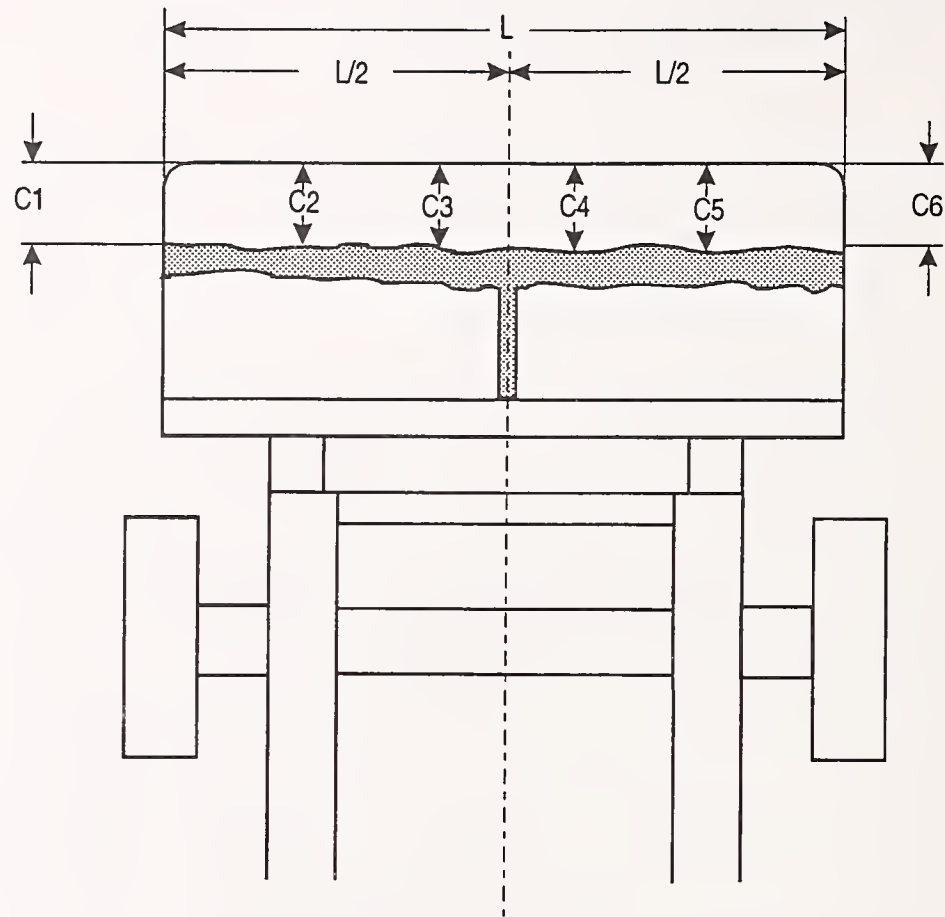
	Driver	Left Rear Passenger
--	--------	---------------------

HR	163	133
HS	227	160
AD	93	104
HD	105	134
HZ	146	56



All distance measurements are in millimeters.

Figure 9 Moving Deformable Barrier Face Crush



NOTES: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL moving barrier centerline.

	Pre-test	Post-test	Crush
L	1630 mm		
C1	250 mm	316 mm	66 mm
C2	226 mm	259 mm	33 mm
C3	224 mm	249 mm	25 mm
C4	226 mm	254 mm	28 mm
C5	224 mm	259 mm	35 mm
C6	239 mm	239 mm	0 mm
CL	229 mm	251 mm	22 mm

Table 8 Moving Deformable Barrier Face Static Crush

Location	Height	Zero distance at barrier centerline ¹												Post-test profile (distance in millimeters from reference plane ²)												Static crush (mm)											
		Pre-test profile (distance in millimeters from reference plane ²)																																			
Top of face	813	333	328	333	328	328	328	325	330	330	328	328	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
Mid-face	559	333	328	333	328	328	328	325	328	330	328	328	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
Bumper	432	250	229	226	226	224	226	224	226	229	226	226	224	224	226	221	224	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
Top of face	813	358	325	307	318	325	330	325	330	328	330	333	328	330	333	328	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
Mid-face	559	358	343	333	330	335	343	343	336	339	338	338	333	335	335	333	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338
Bumper	432	315	279	259	249	257	259	254	257	251	249	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Top of face	813	25	-3	-26	-10	-3	2	0	0	-2	2	5	3	5	5	20	59	84	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mid-face	559	25	15	0	2	7	15	18	8	9	10	10	8	10	10	15	28	31	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Bumper	432	65	50	33	23	33	33	30	31	22	23	24	29	26	29	35	36	15	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65

¹ Column readings are left to right across barrier face from left to right.

² Reference plane is the rear surface of the deformable barrier face.

All measurements are in millimeters.

Figure 10 Camera Positions

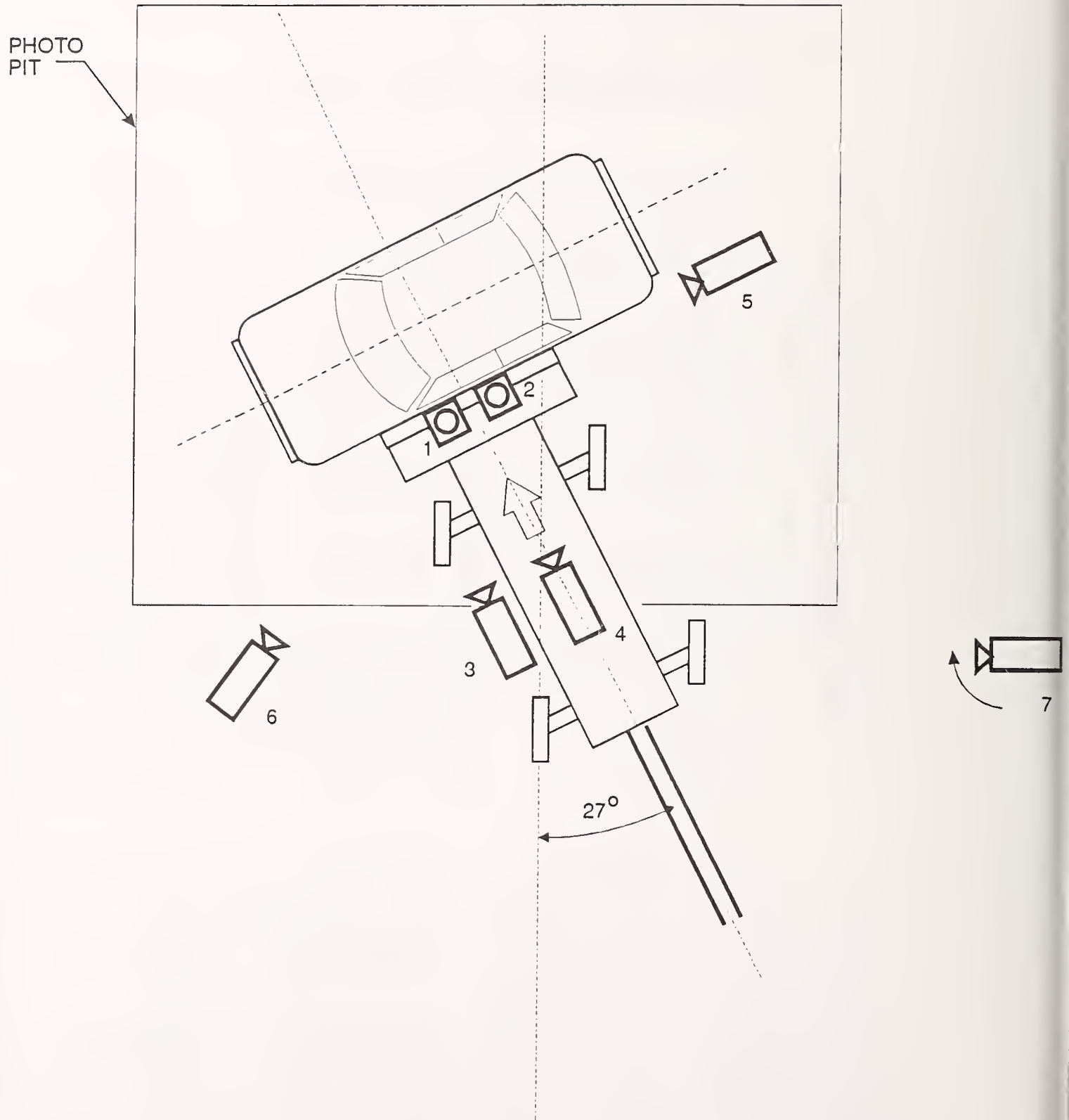


Table 9 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1995/Solertia/Force/4-door sedan

Test number: 950516

Camera Number	View	Camera Positions ¹			Camera Angle ²	Lens (mm)	Film Speed (fps)	Purpose
		X	Y	Z				
1	Overhead wide	NA	NA	1069 cm	-90°	8.5	498	Vehicle crush
2	Overhead tight	NA	NA	1069 cm	-90°	25	500	Vehicle crush
3	Onboard barrier - side ³	NA	NA	NA	0°	25	NA	Impact alignment
4	Onboard barrier - center ³	NA	NA	NA	-15°	13	NA	Impact alignment
5	Right wide	-977 cm	-20 cm	87 cm	0°	13	515	Vehicle crush
6	Left wide	479 cm	-406 cm	108 cm	0°	25	505	Vehicle crush
7	Real-time panning	NA	NA	NA	NA	120	24	Vehicle Dynamics

¹ +X: Film plane forward of vehicle's impact point

+Y: Film plane to right of vehicle's impacted side

+Z: Film plane above ground level

² +Angle: Film plane angled upward from horizontal plane

³ No camera timing recorded as a result of a damaged camera cable.

Appendix A

Photographs

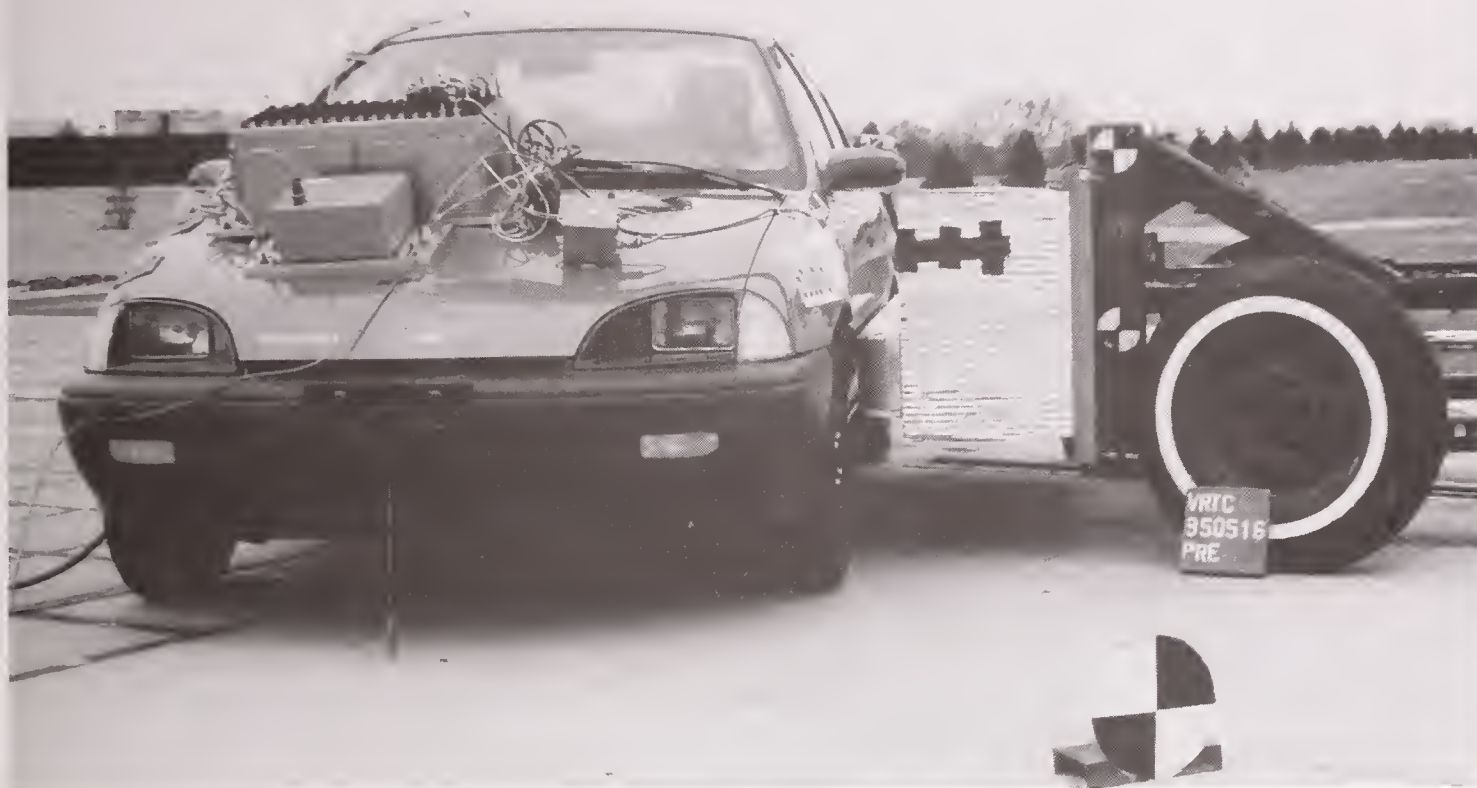


Figure A-1 Pre-test Barrier and Vehicle Front View

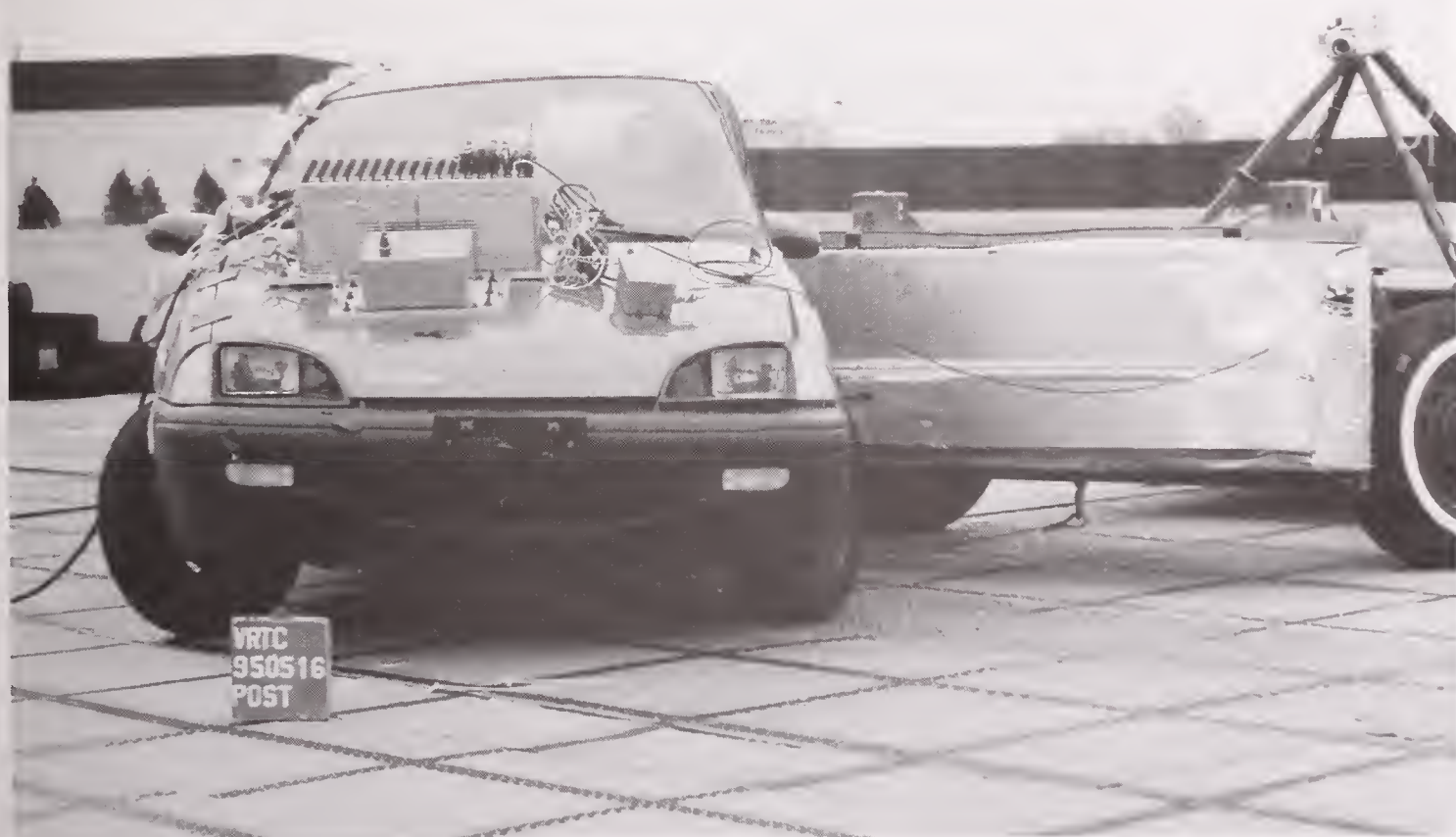


Figure A-2 Post-test Barrier and Vehicle Front View



Figure A-3 Pre-test Left Side View

Intentionally Left Blank



Figure A-4 Pre-test Barrier and Vehicle Rear View



Figure A-5 Post-test Barrier and Vehicle Rear View

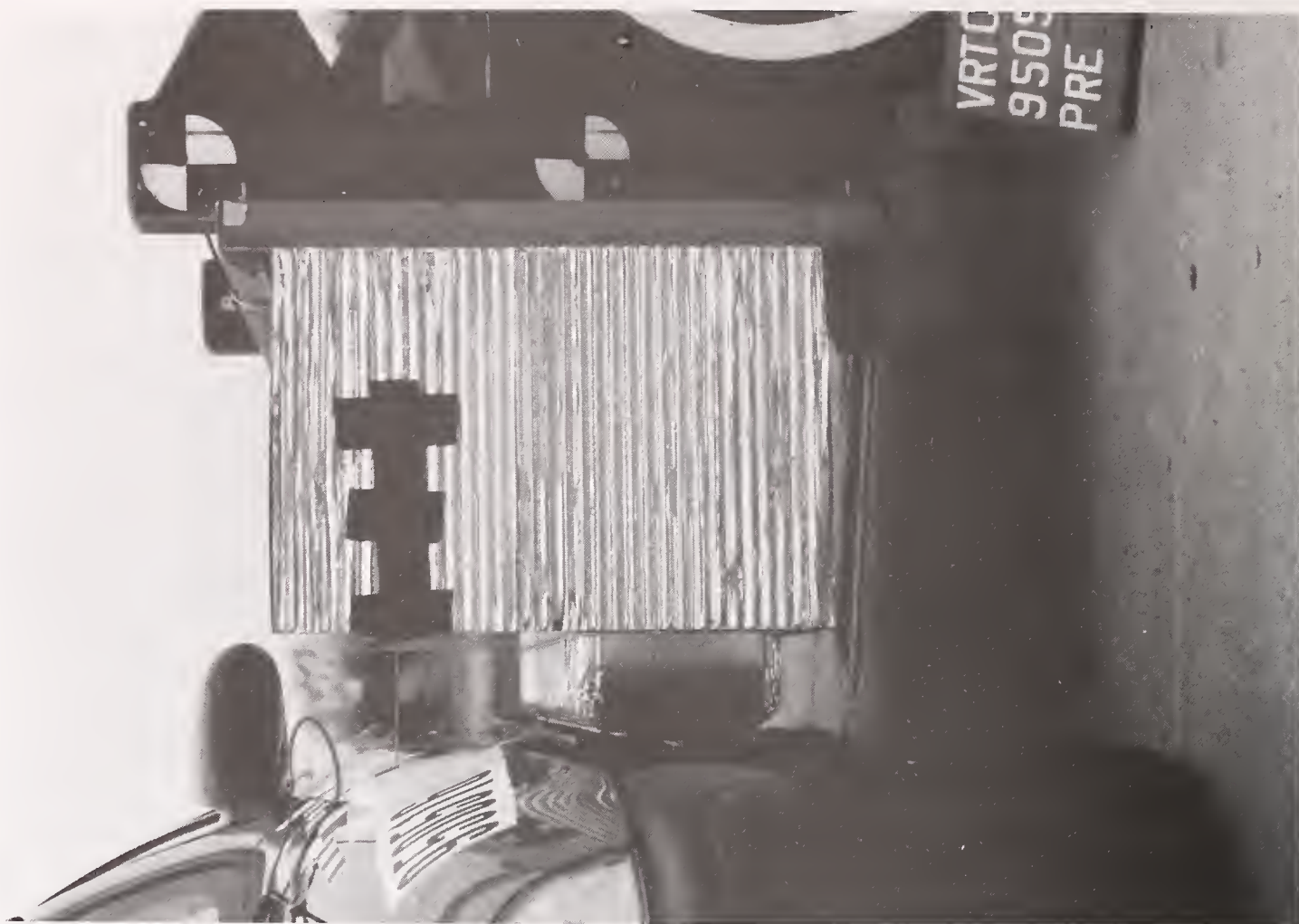


Figure A-6 Pre-test Left Front Close-up View



Figure A-7 Pre-test Left Rear Close-up View

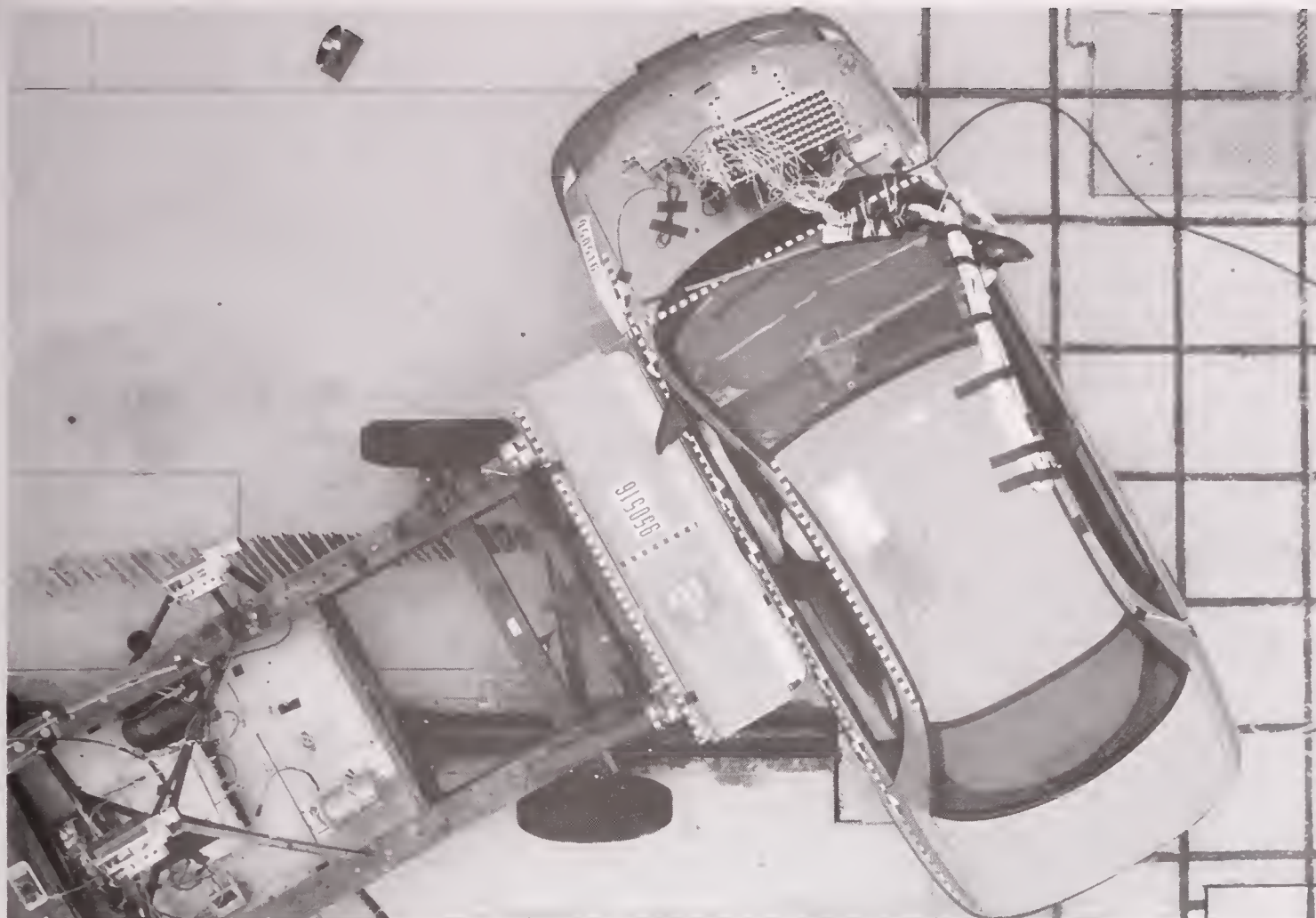


Figure A-8 Pre-test Overhead View

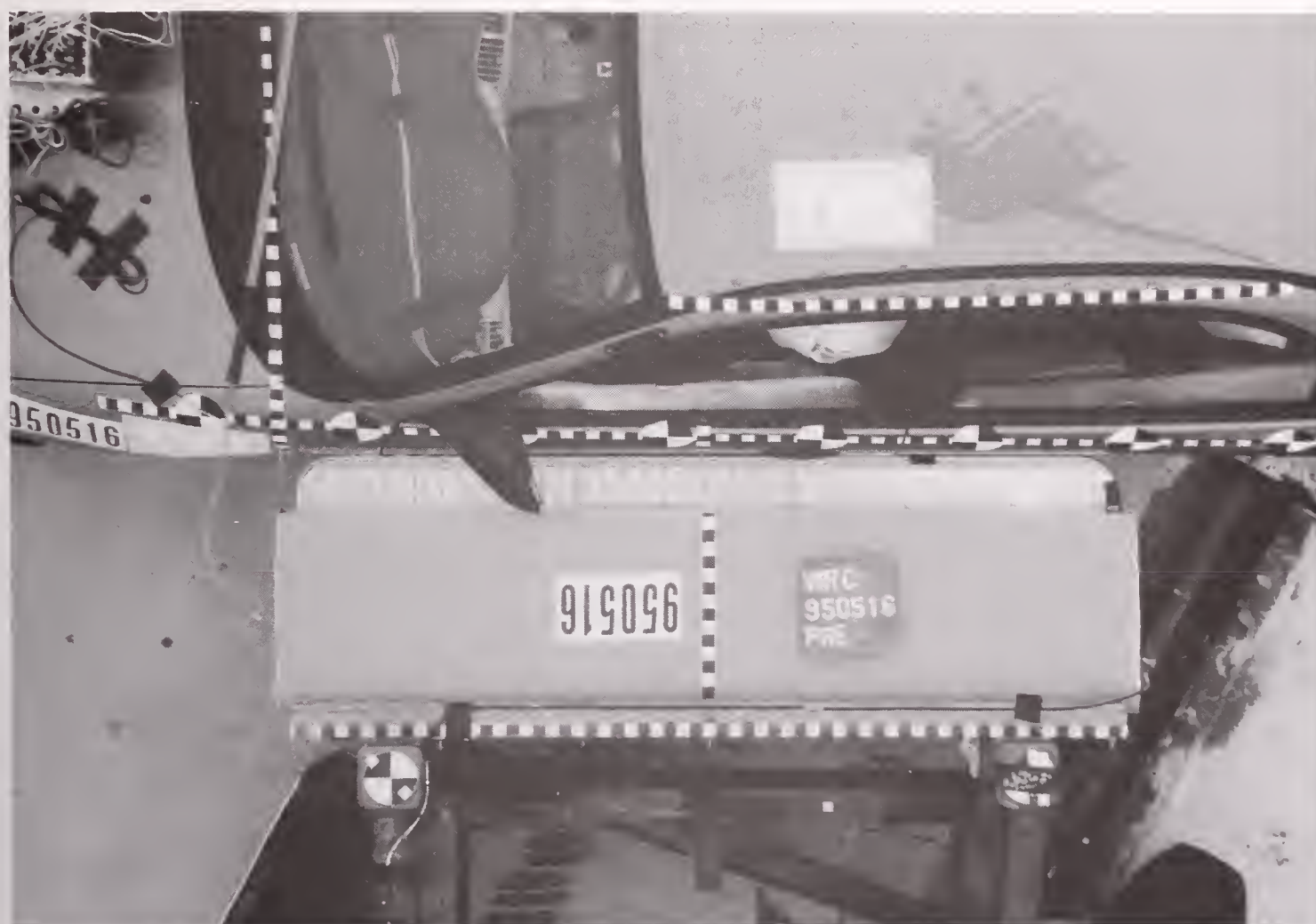


Figure A-9 Pre-test Overhead Close-up View

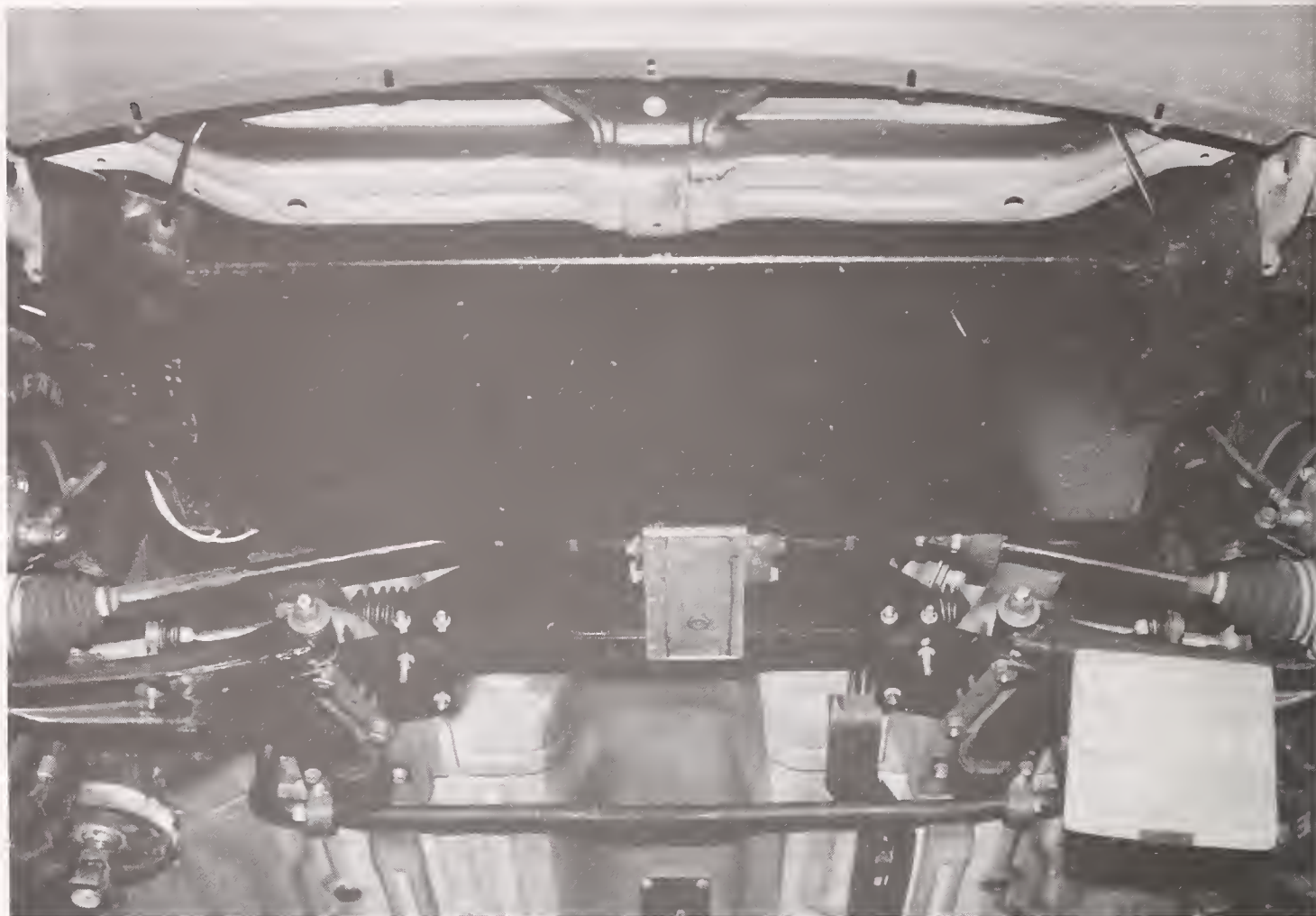


Figure A-10 Pre-test Front Underbody View

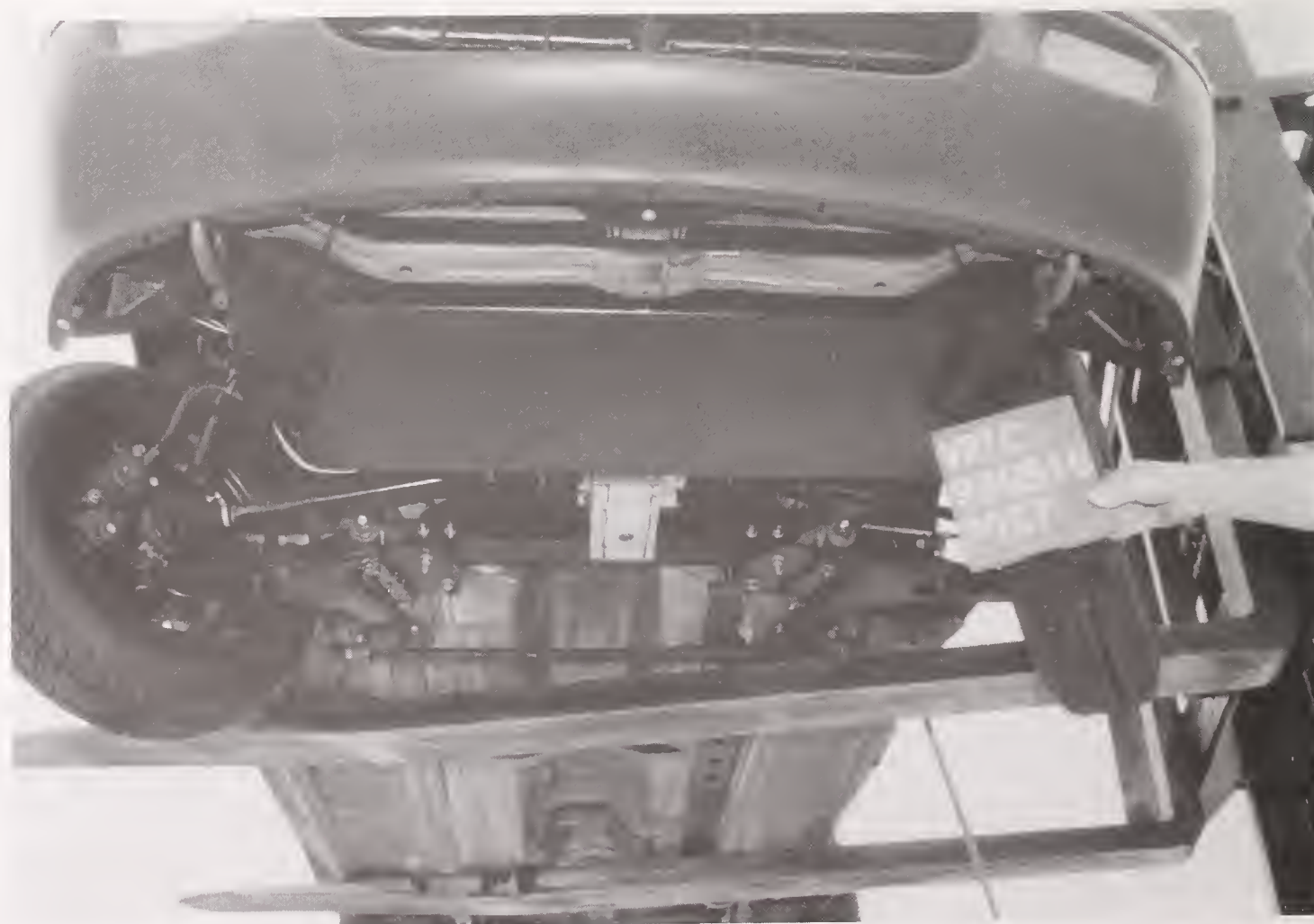


Figure A-11 Post-test Front Underbody View

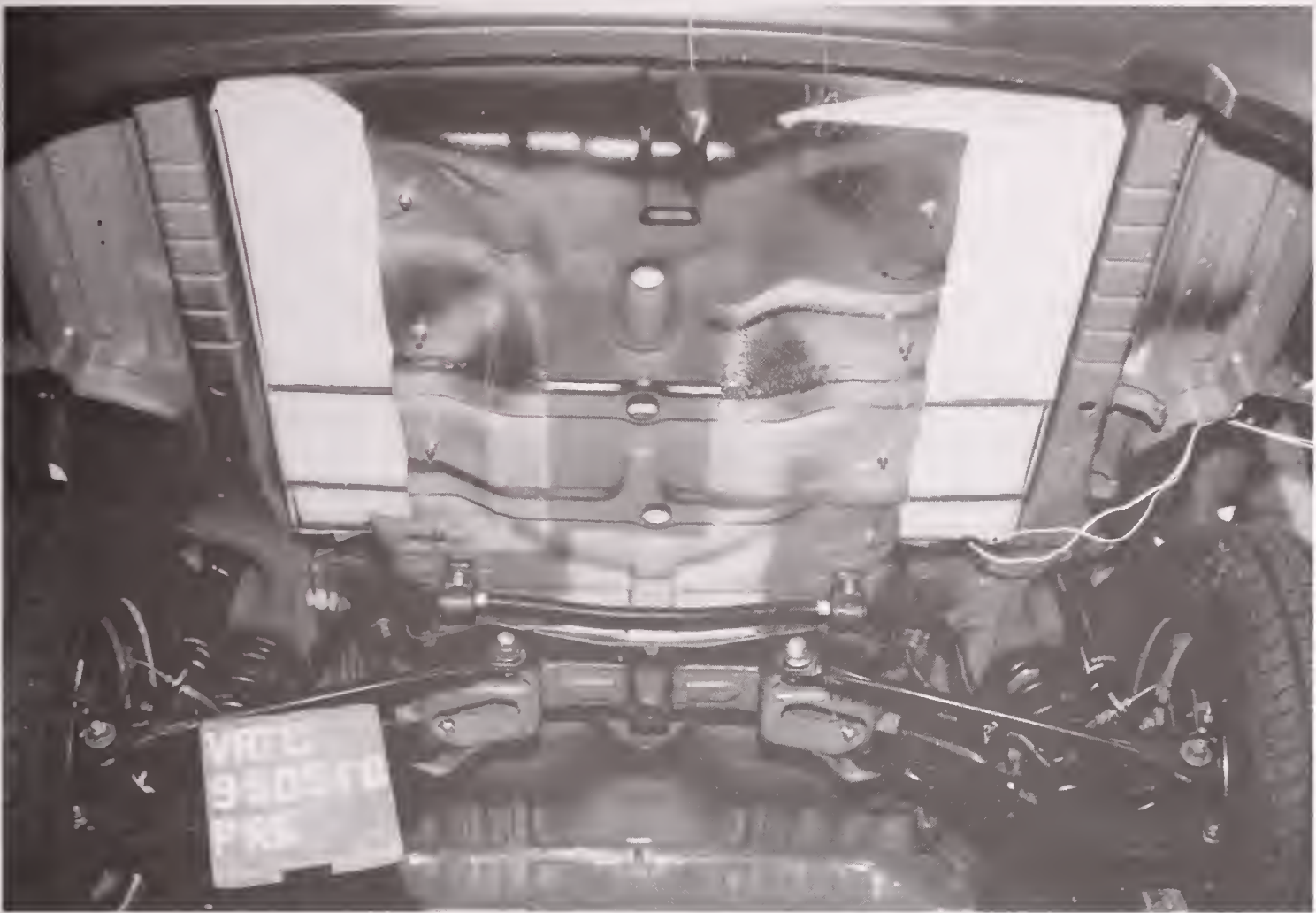


Figure A-12 Pre-test Rear Underbody View



Figure A-13 Post-test Rear Underbody View



Figure A-14 Pre-test Driver Dummy Position View



Figure A-15 Post-test Driver Dummy Position View



Figure A-16 Pre-test Driver Dummy and Vehicle Interior - View 1



Figure A-17 Pre-test Driver Dummy and Vehicle Interior - View 2



Figure A-18 Post-test Driver Dummy and Vehicle Interior View

Intentionally Left Blank



Figure A-19 Pre-test Passenger Dummy Position View



Figure A-20 Post-test Passenger Dummy Position View



Figure A-21 Pre-test Passenger Dummy and Vehicle Interior - View 1



Figure A-22 Pre-test Passenger Dummy and Vehicle Interior - View 2

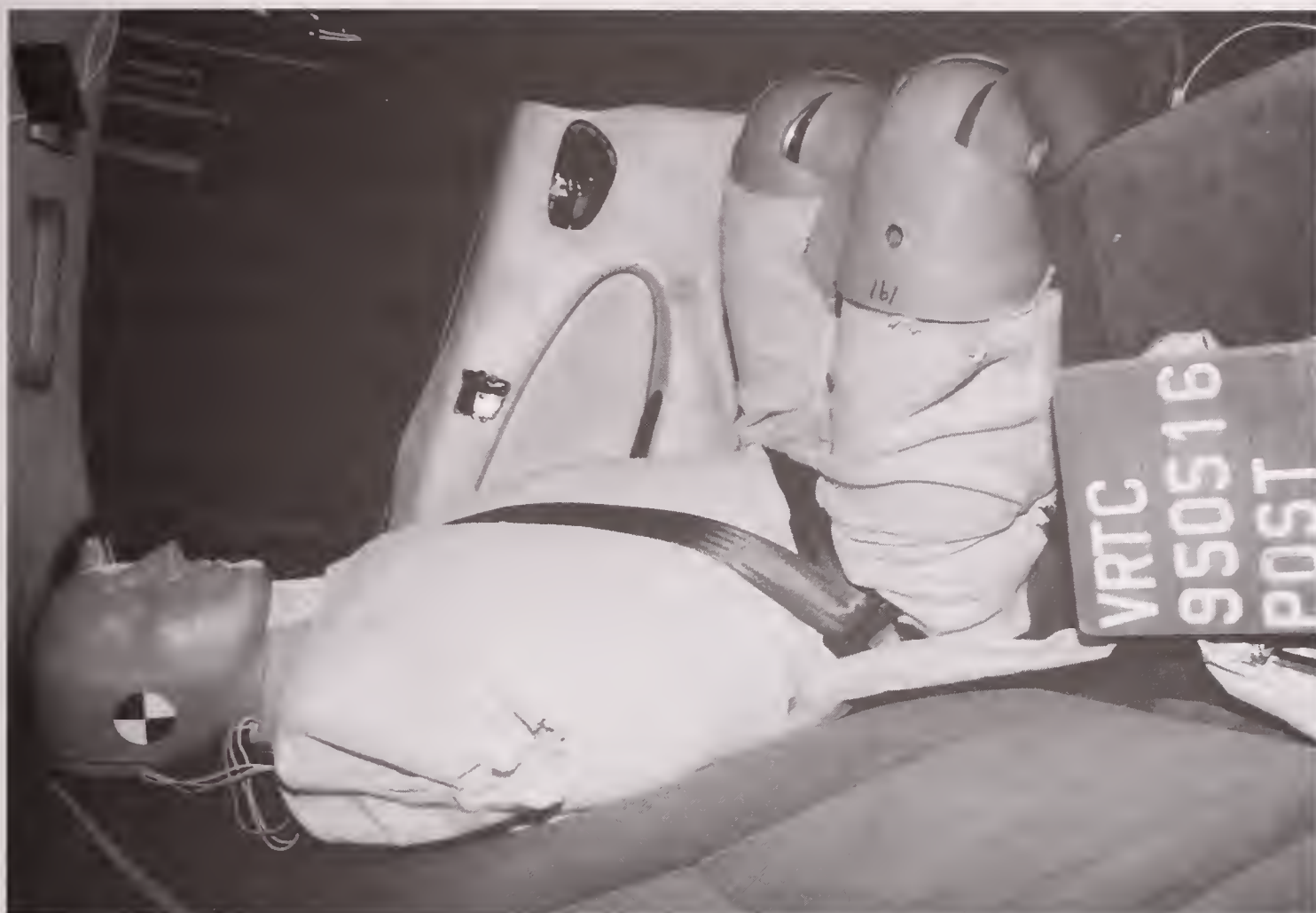


Figure A-23 Post-test Passenger Dummy and Vehicle Interior View

Intentionally Left Blank

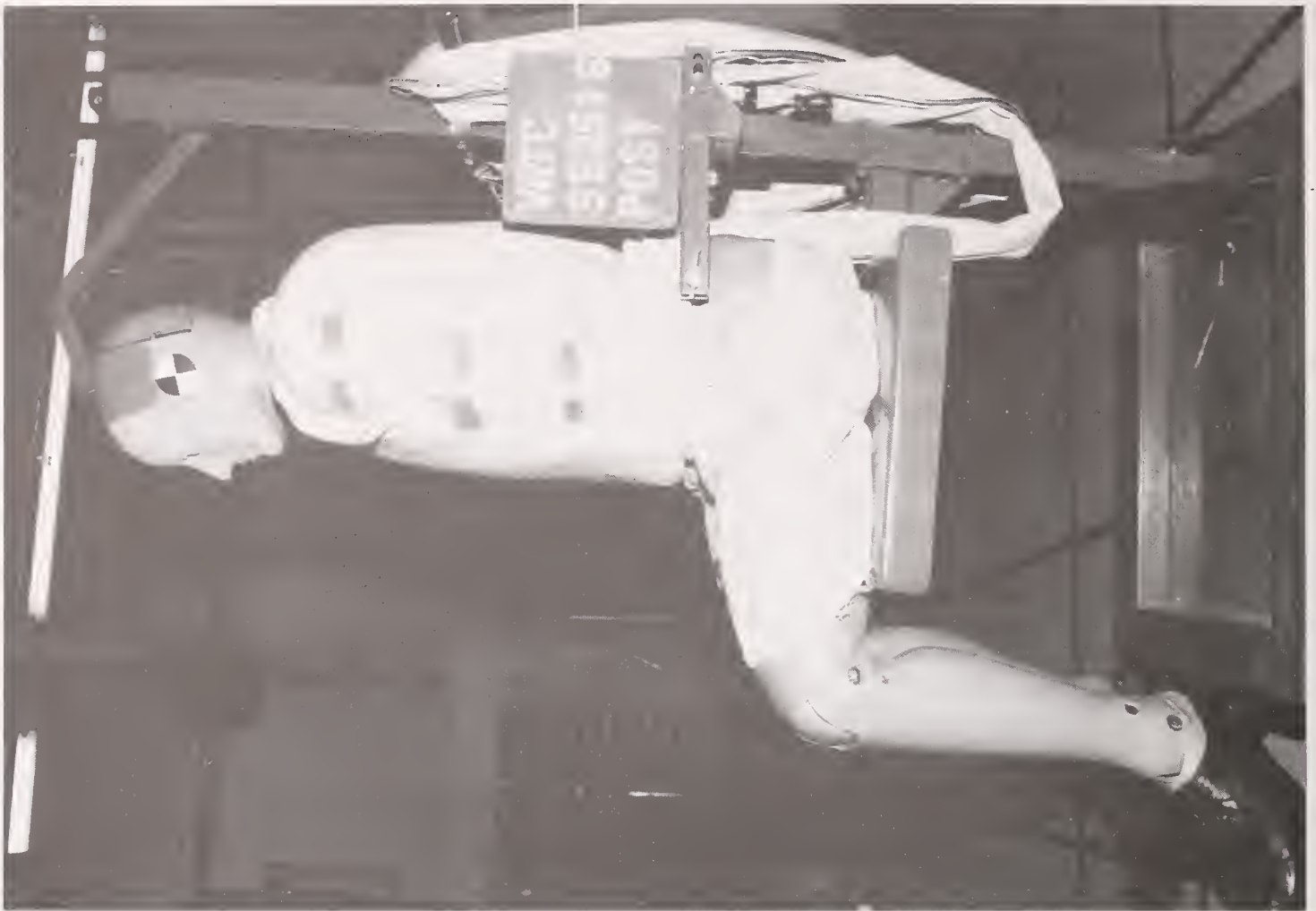


Figure A-24 Post-test Driver Dummy Contact - View 1



Figure A-25 Post-test Driver Dummy Contact - View 2

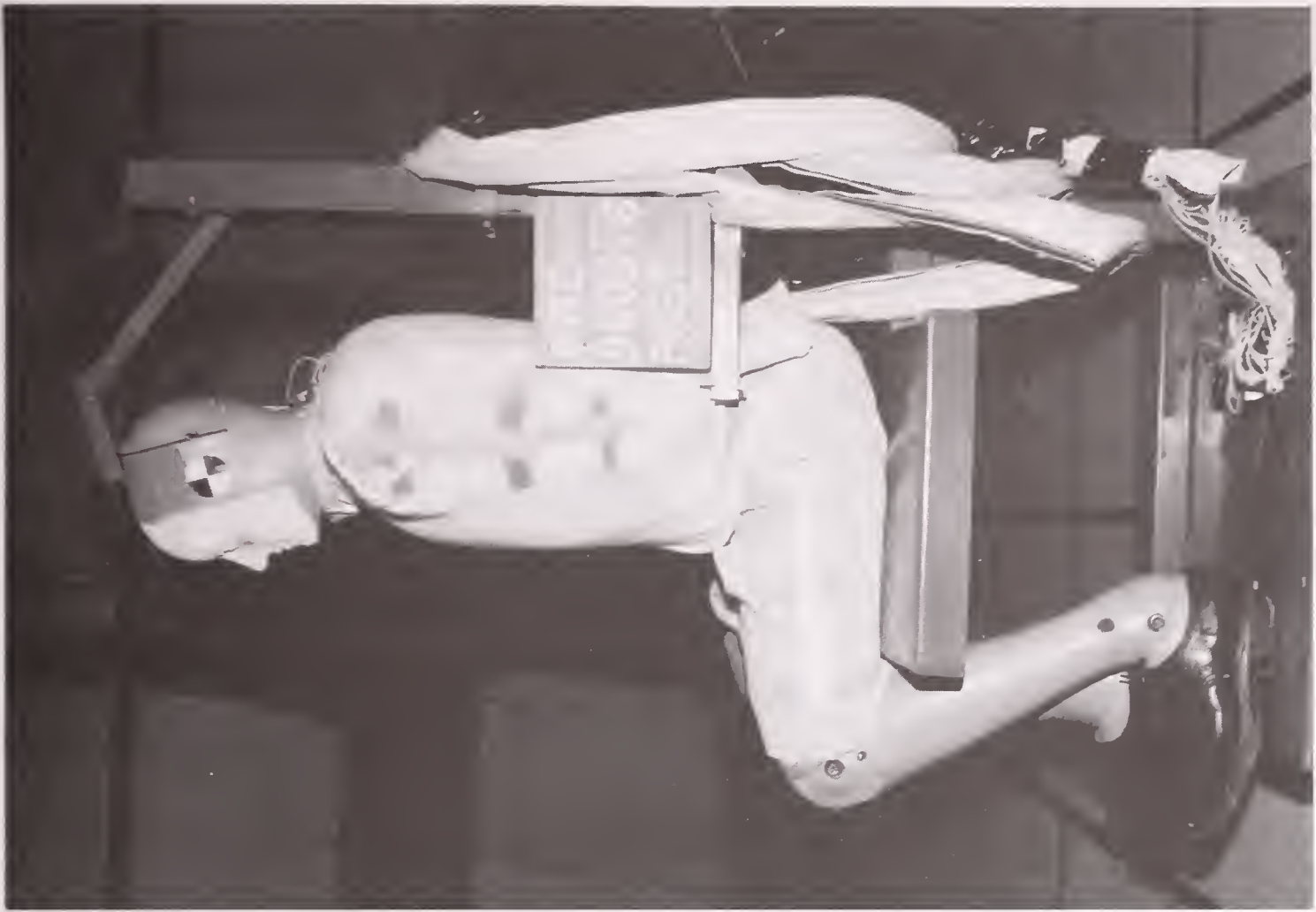


Figure A-26 Post-test Passenger Dummy Contact View

Intentionally Left Blank



Figure A-27 Post-test Deformable Barrier Face Right Side View

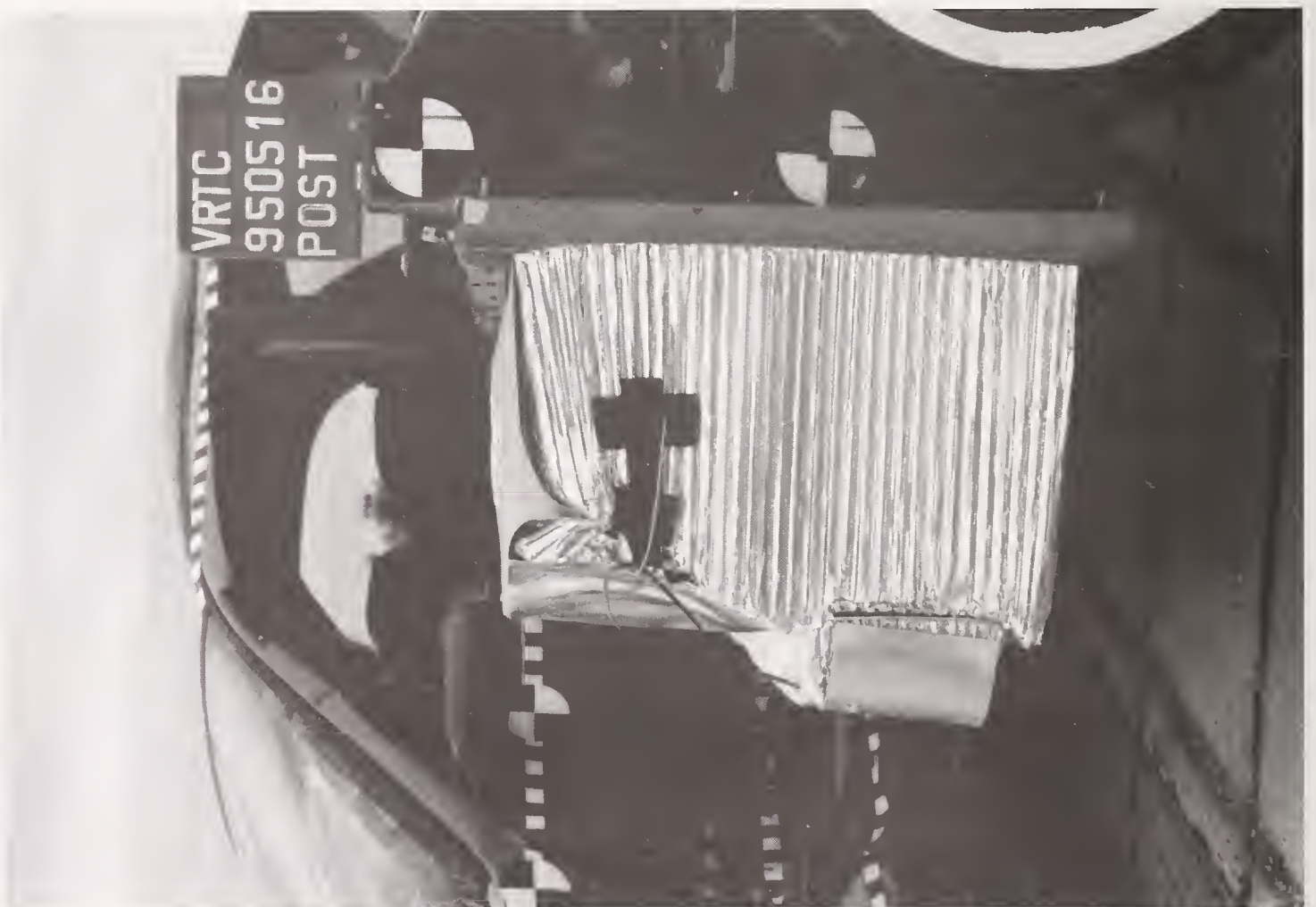


Figure A-28 Post-test Deformable Barrier Face Left Side View



Figure A-29 Pre-test Left Mid Underbody View

Intentionally Left Blank

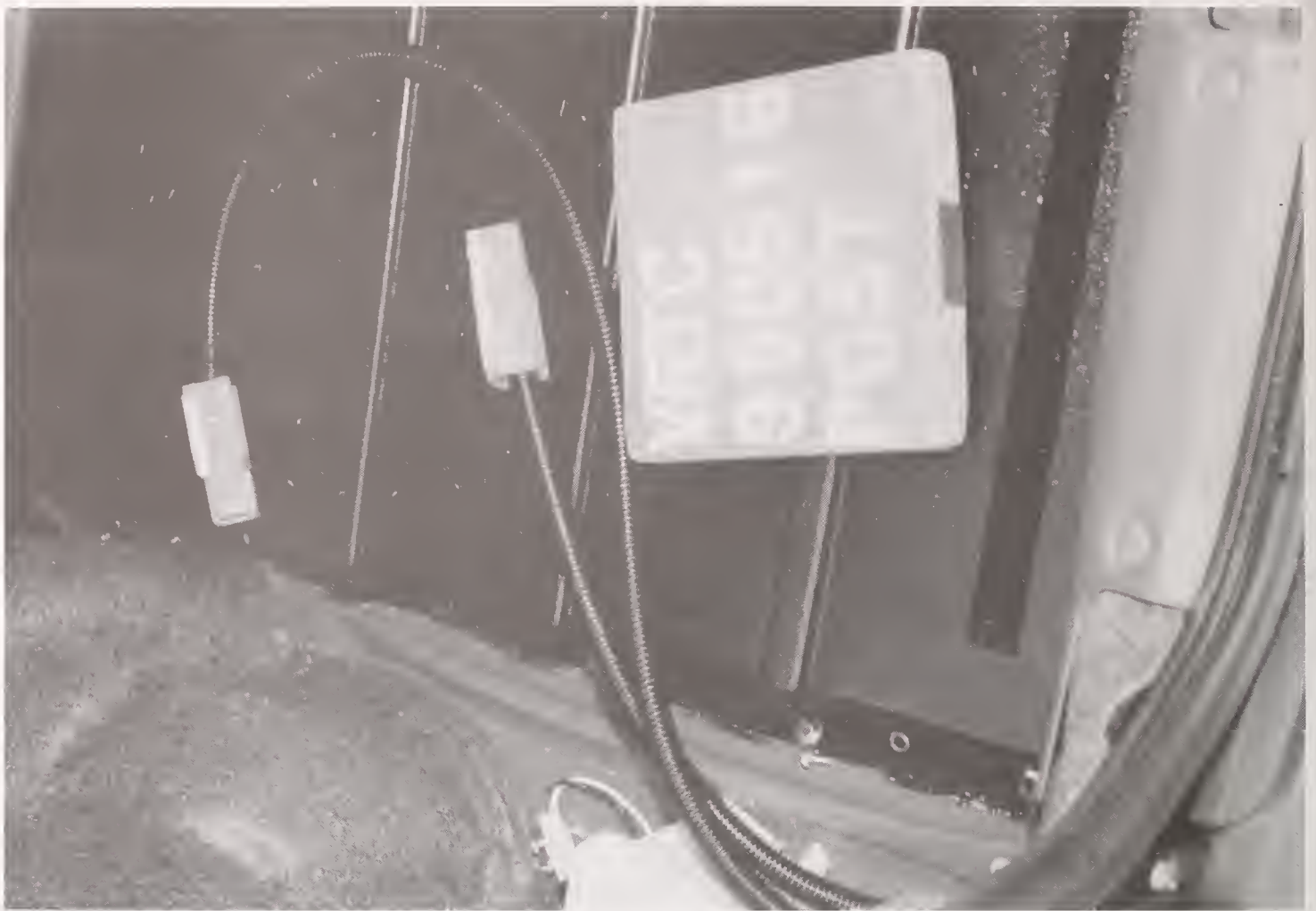


Figure A-30 Post-test Rear Battery Box Cover - View 1



Figure A-31 Post-test Rear Battery Box Cover - View 2



Figure A-32 Post-test Vehicle on Static Rollover View

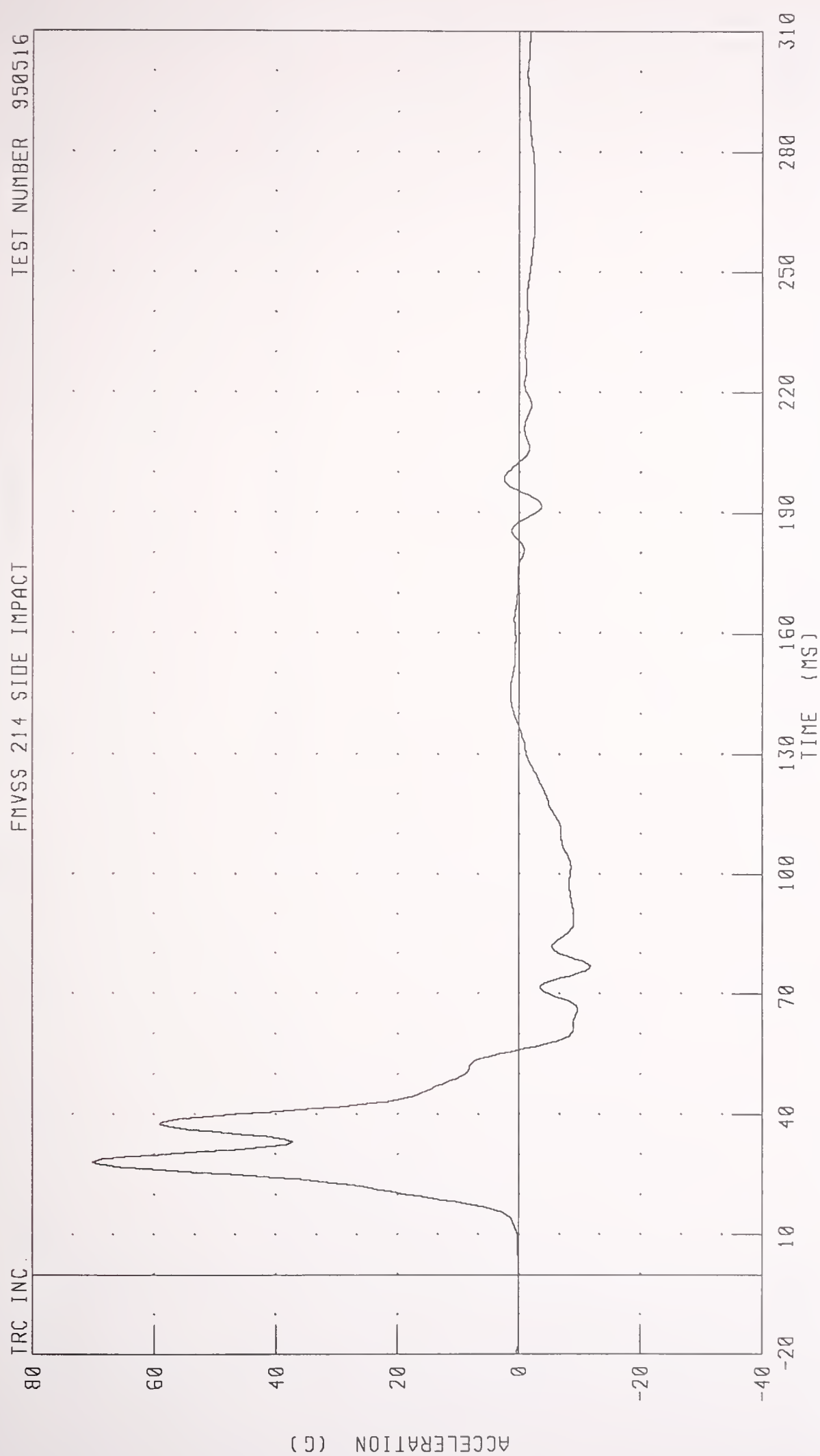


Appendix B

Data Plots

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LOWER SPINE Y-AXIS ACCELERATION

TRC INC. FNVSS 214 SIDE IMPACT TEST NUMBER 950516



CHANNEL: T12YG1 FILTER: FIR 100

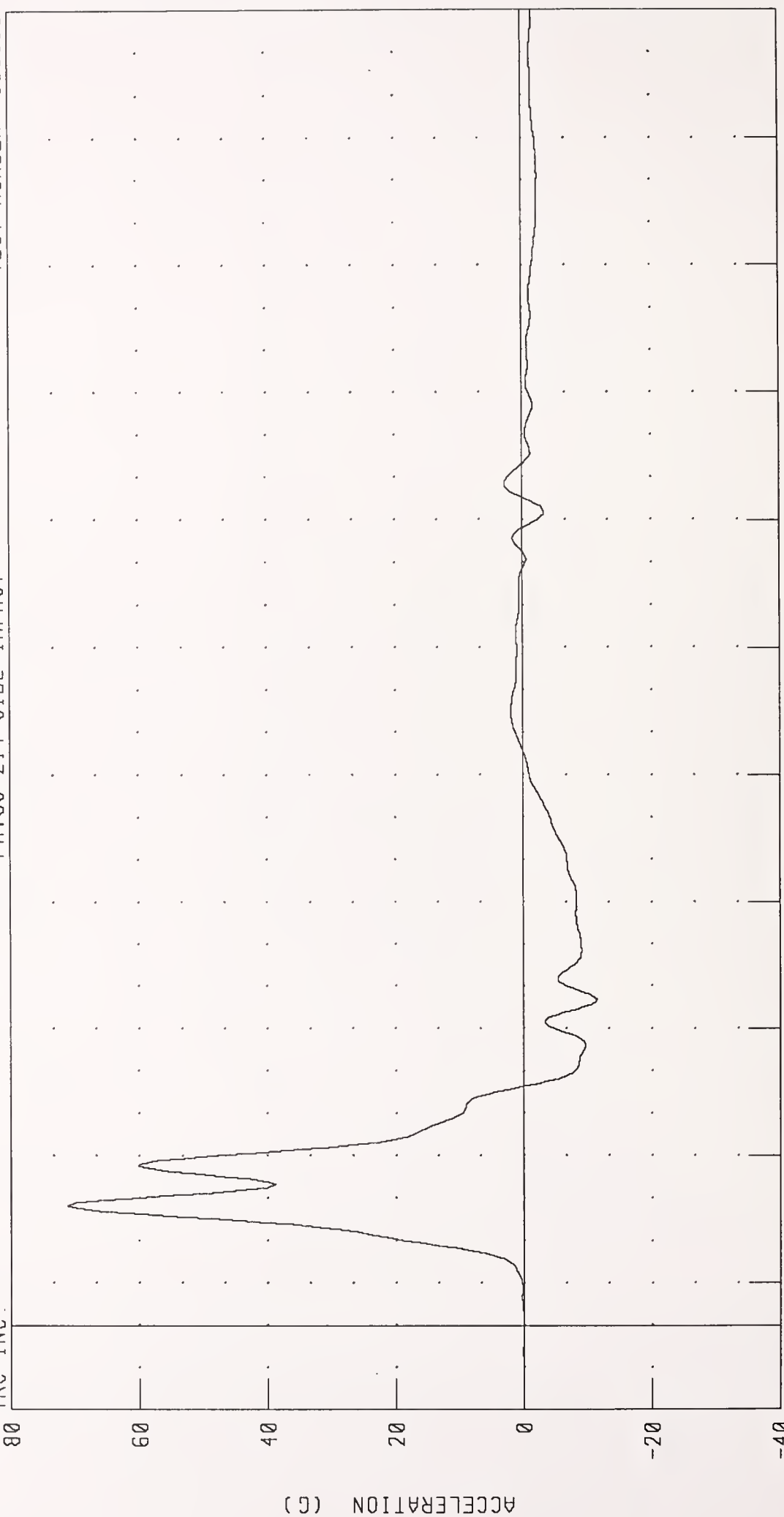
PEAK DATA: 70.06 G @ 28.13 MS; -11.80 G @ 76.88 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LOWER SPINE Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: T12YGA FILTER: FIR 100

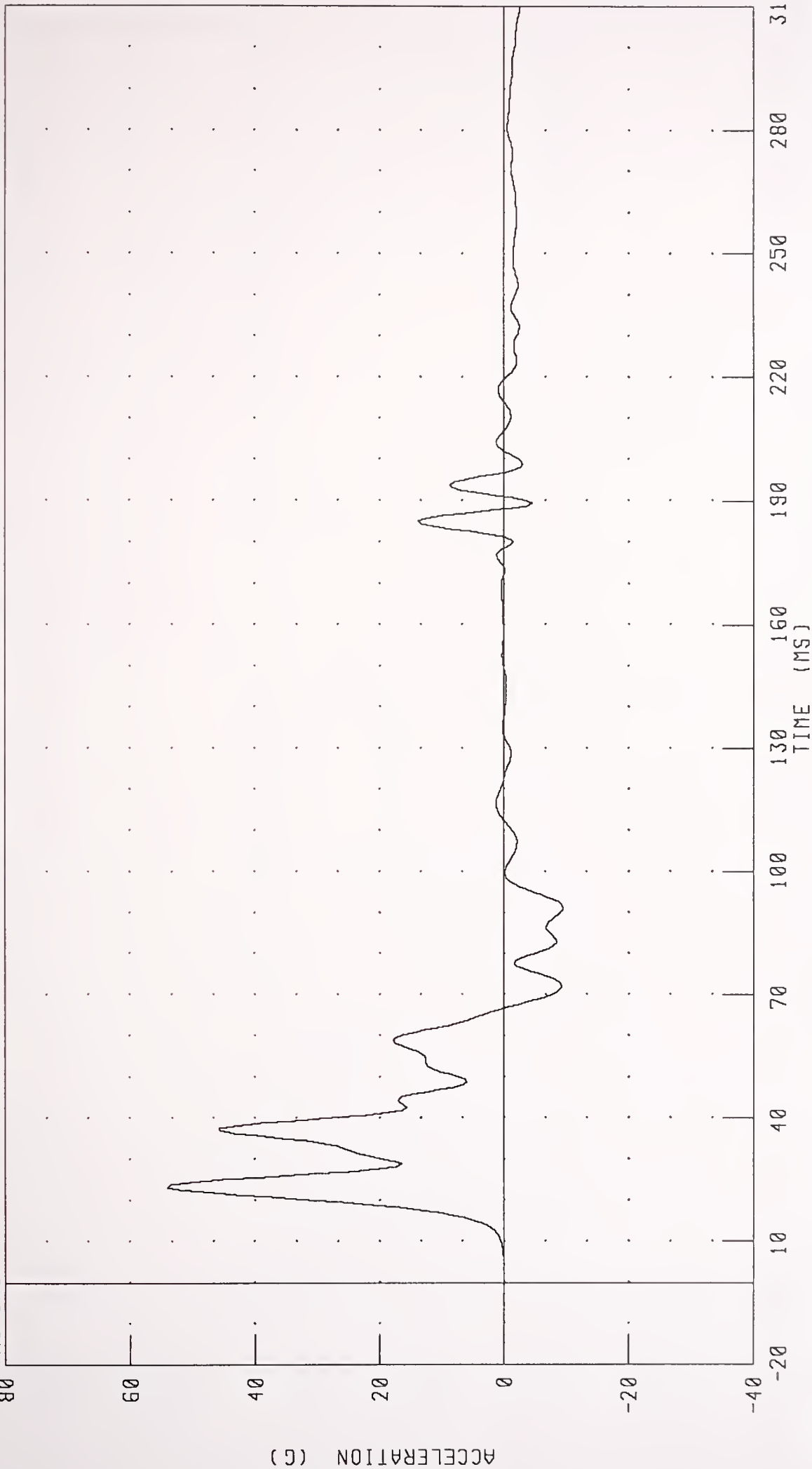
PEAK DATA: 71.19 G @ 28.13 MS, -11.50 G @ 76.88 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT UPPER RIB Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC



CHANNEL: LURYG1 FILTER: FIR 100

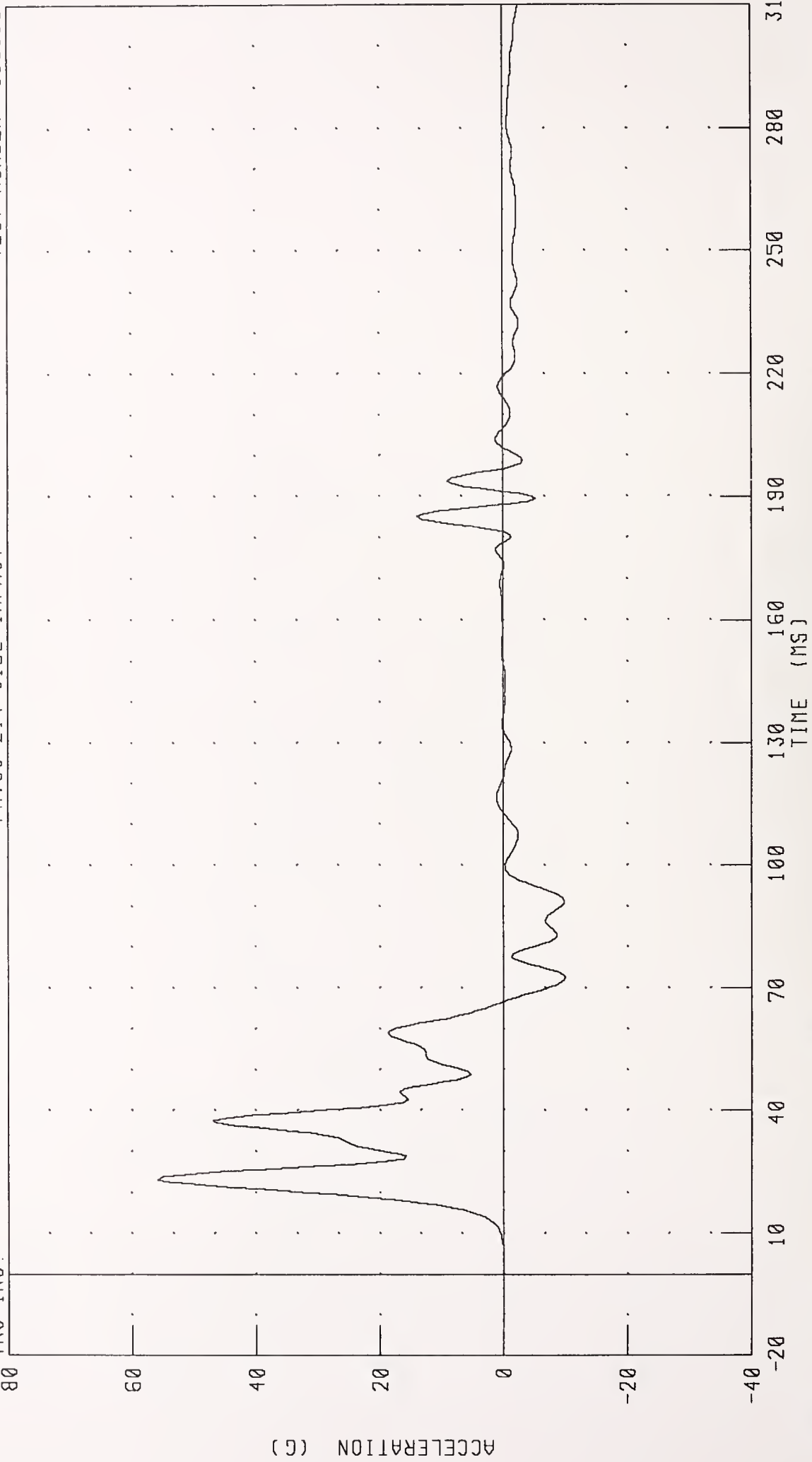
PEAK DATA: 54 06 G @ 23.13 MS, -9.49 G @ 91.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LURYGA FILTER: FIR 100

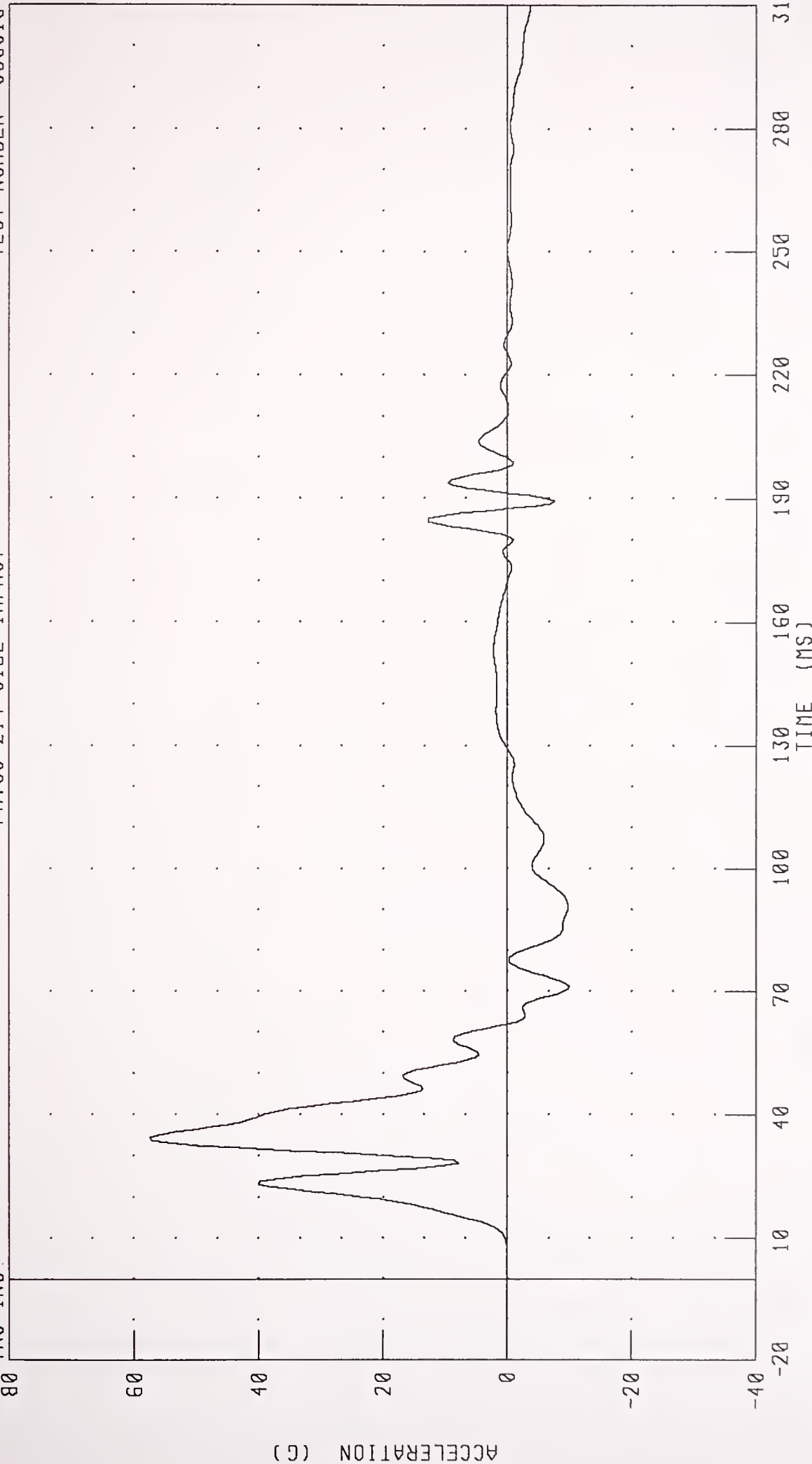
PEAK DATA: 55.83 G @ 23.13 MS; -9.90 G @ 72.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT LOWER RIB Y-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LLRYG1 FILTER: FIR 100

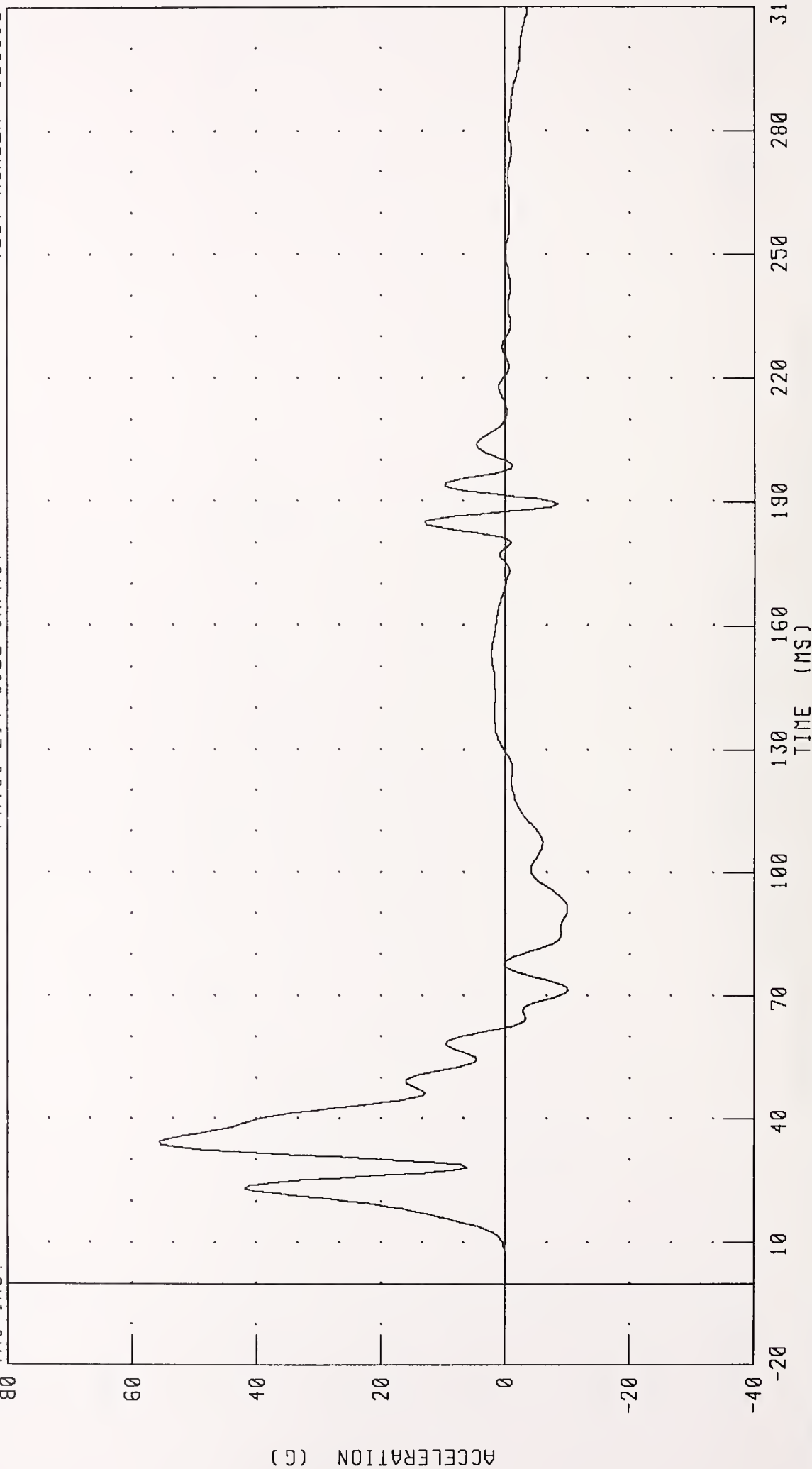
PEAK DATA: 57.46 G @ 34.38 MS; -9.91 G @ 71.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT LOWER RIB Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LLRYGA FILTER: FIR 100

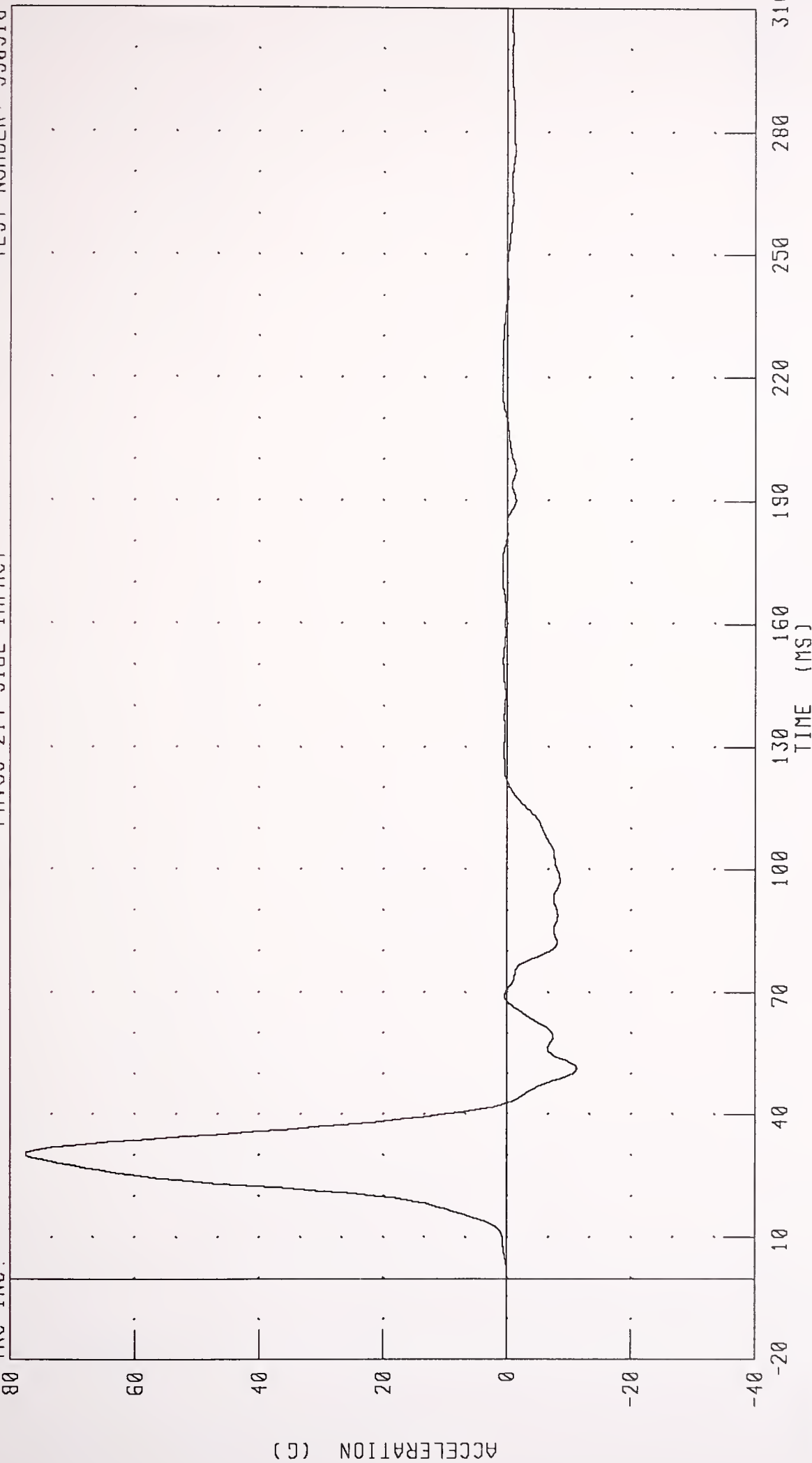
PEAK DATA: 55.50 G @ 34.38 MS; -10.08 G @ 71.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: PEVYG1 FILTER: FIR 100

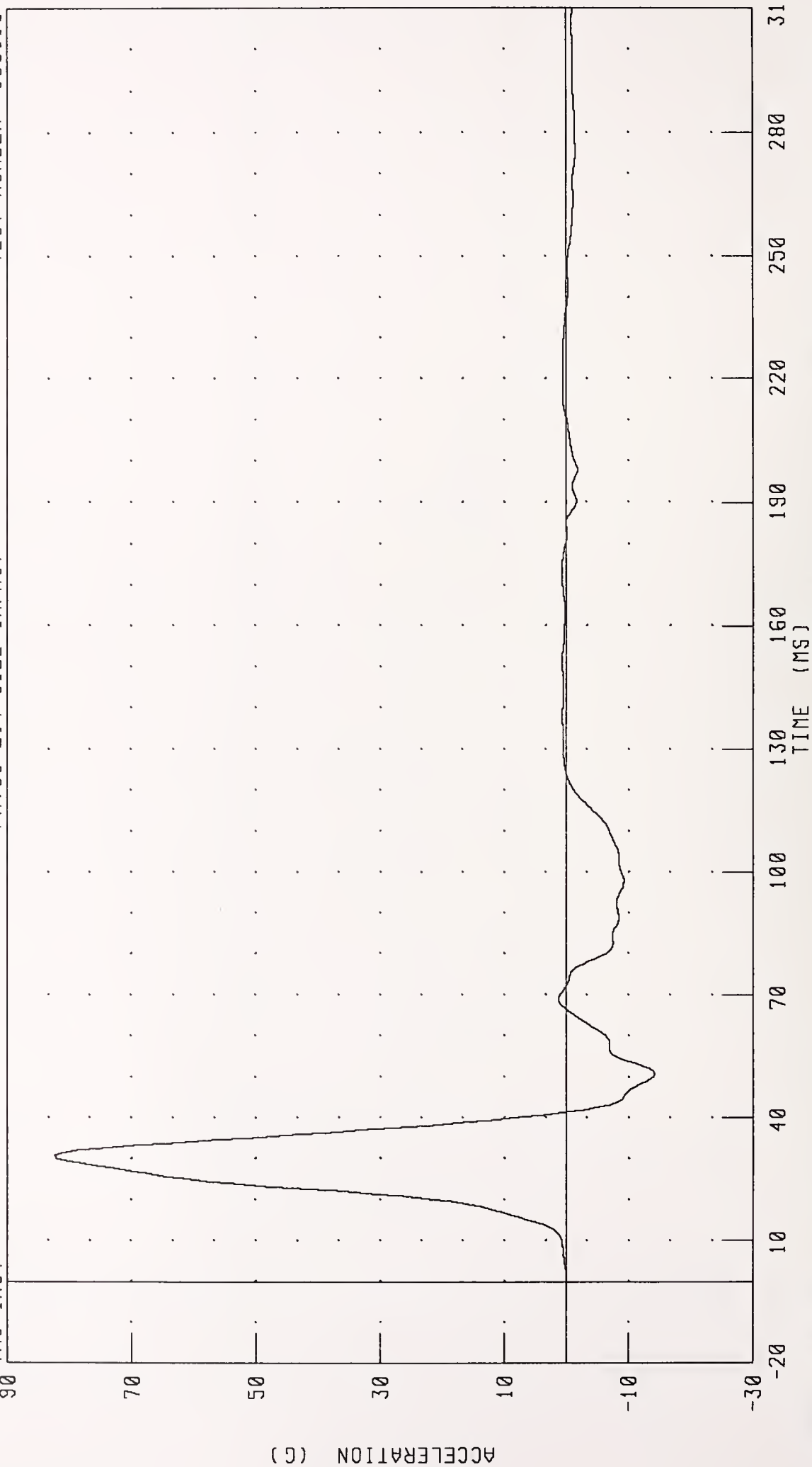
PEAK DATA: 77.48 G @ 30.00 MS; -11.31 G @ 51.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER PELVIS Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER 950516

FNVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: PEVYGA FILTER: FIR 100

PEAK DATA: 82.35 G @ 30.62 MS; -14.25 G @ 50.63 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT

TRC INC.

300

235

170

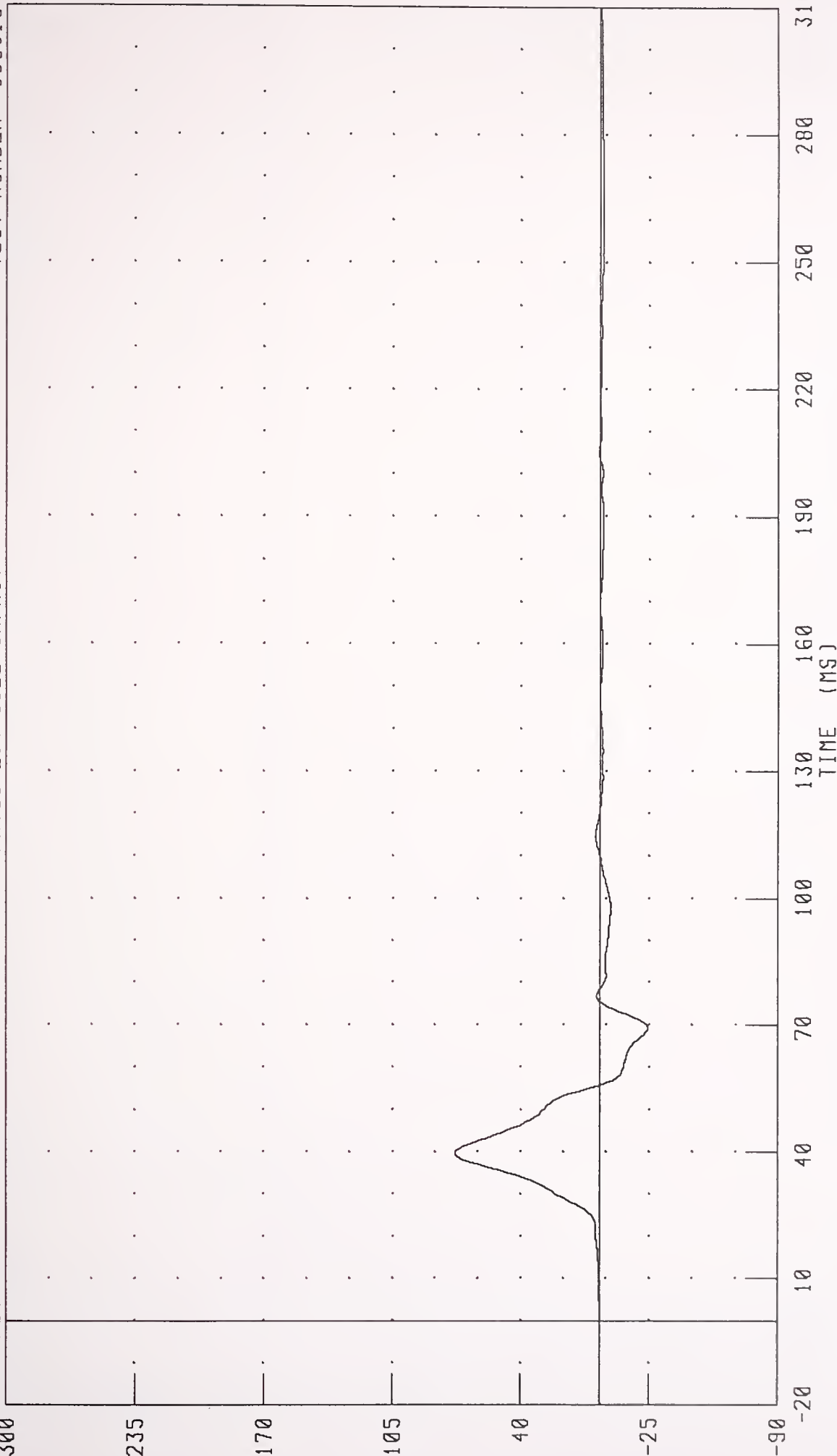
105

40

-25

-90

ACCELERATION (G)



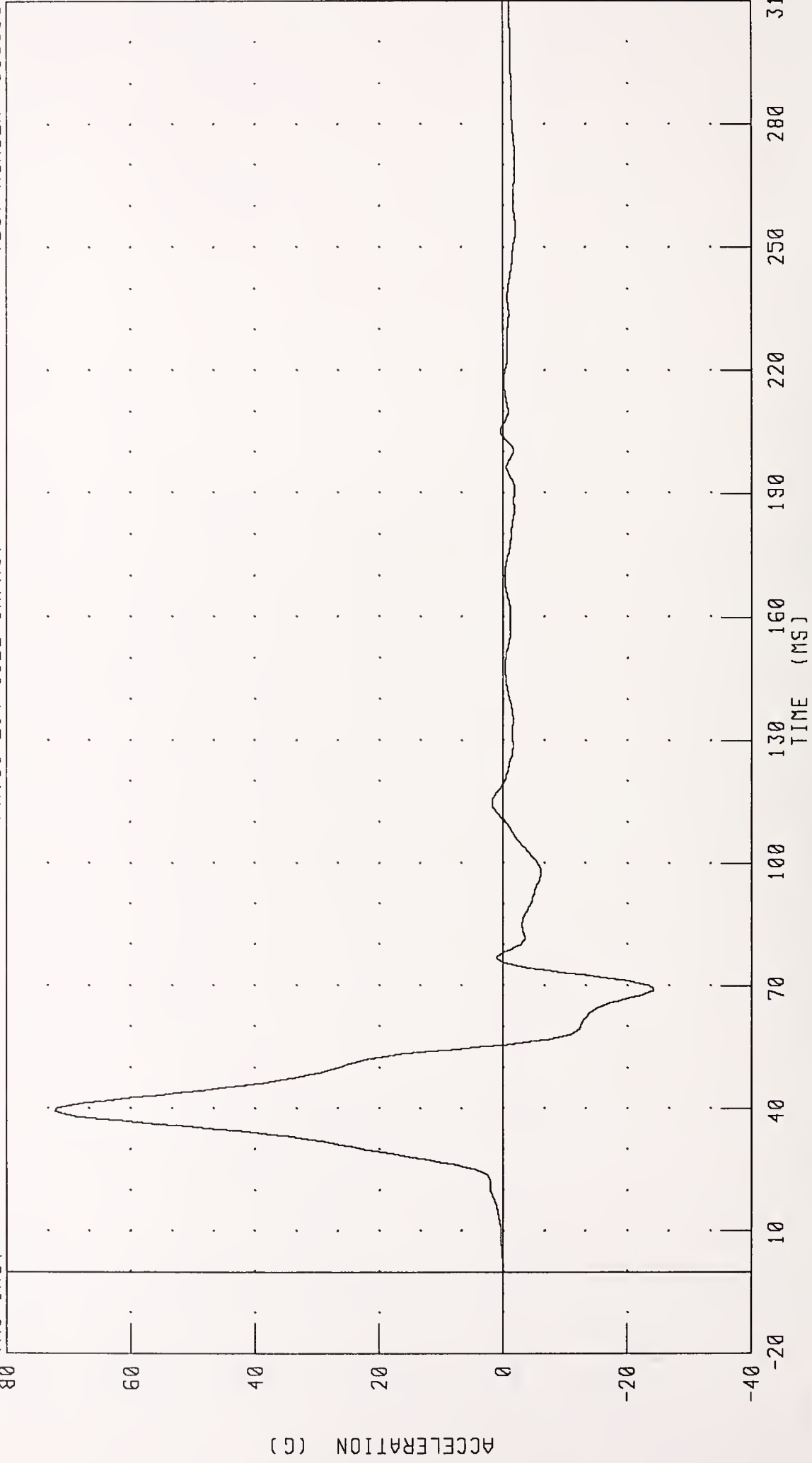
CHANNEL: T12YG4 FILTER: FIR 100

PEAK DATA: 73.12 G @ 39.38 MS; -24.23 G @ 69.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION REDUNDANT

FMVSS 214 SIDE IMPACT TEST NUMBER 950516

TRC INC.

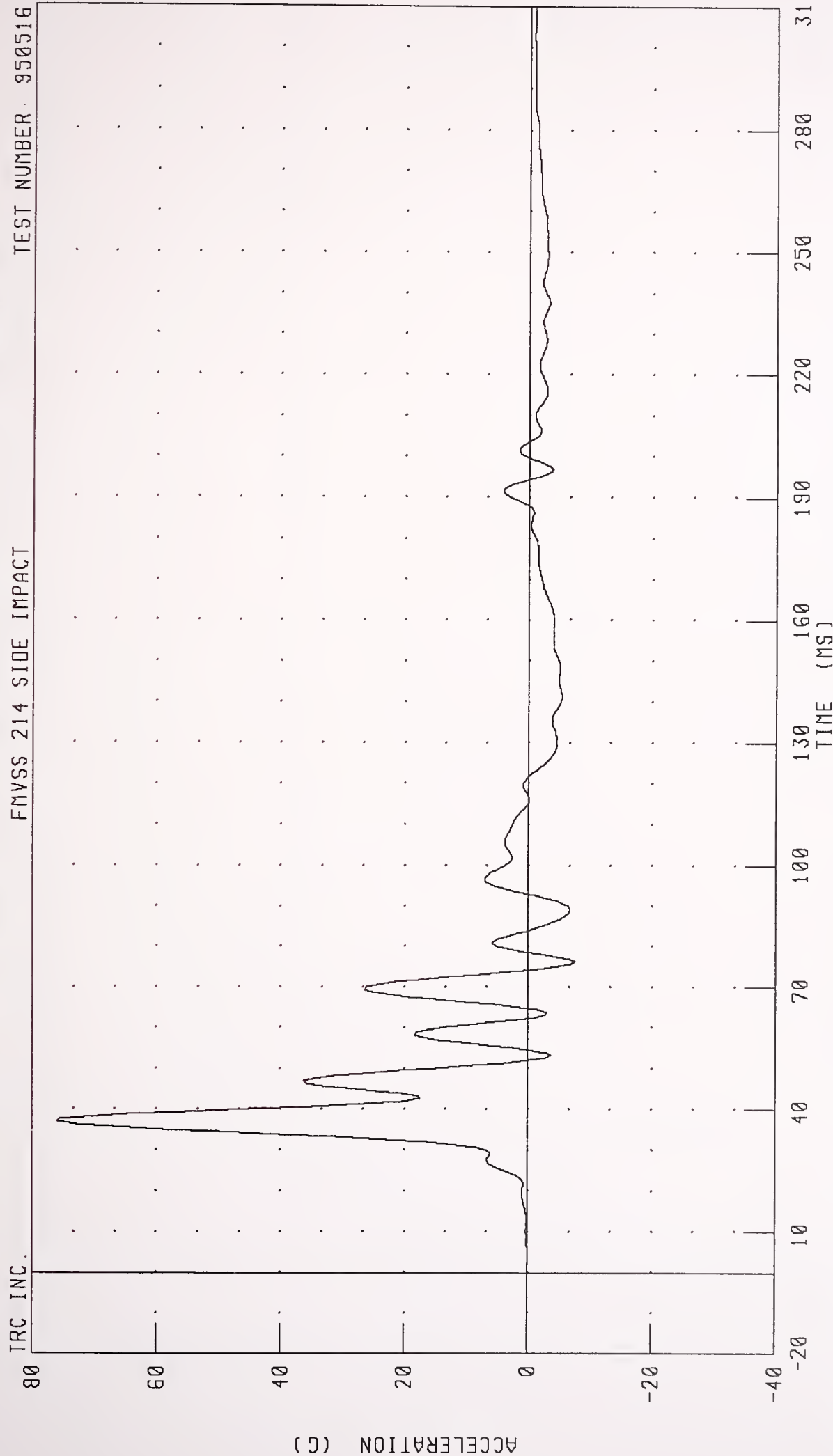


CHANNEL: T12YGD FILTER: FIR 100

PEAK DATA: 72.21 G @ 39.38 MS; -24.23 G @ 69.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT

TRC INC. FNVSS 214 SIDE IMPACT TEST NUMBER 950516



CHANNEL: LURYG4 FILTER: FIR 100

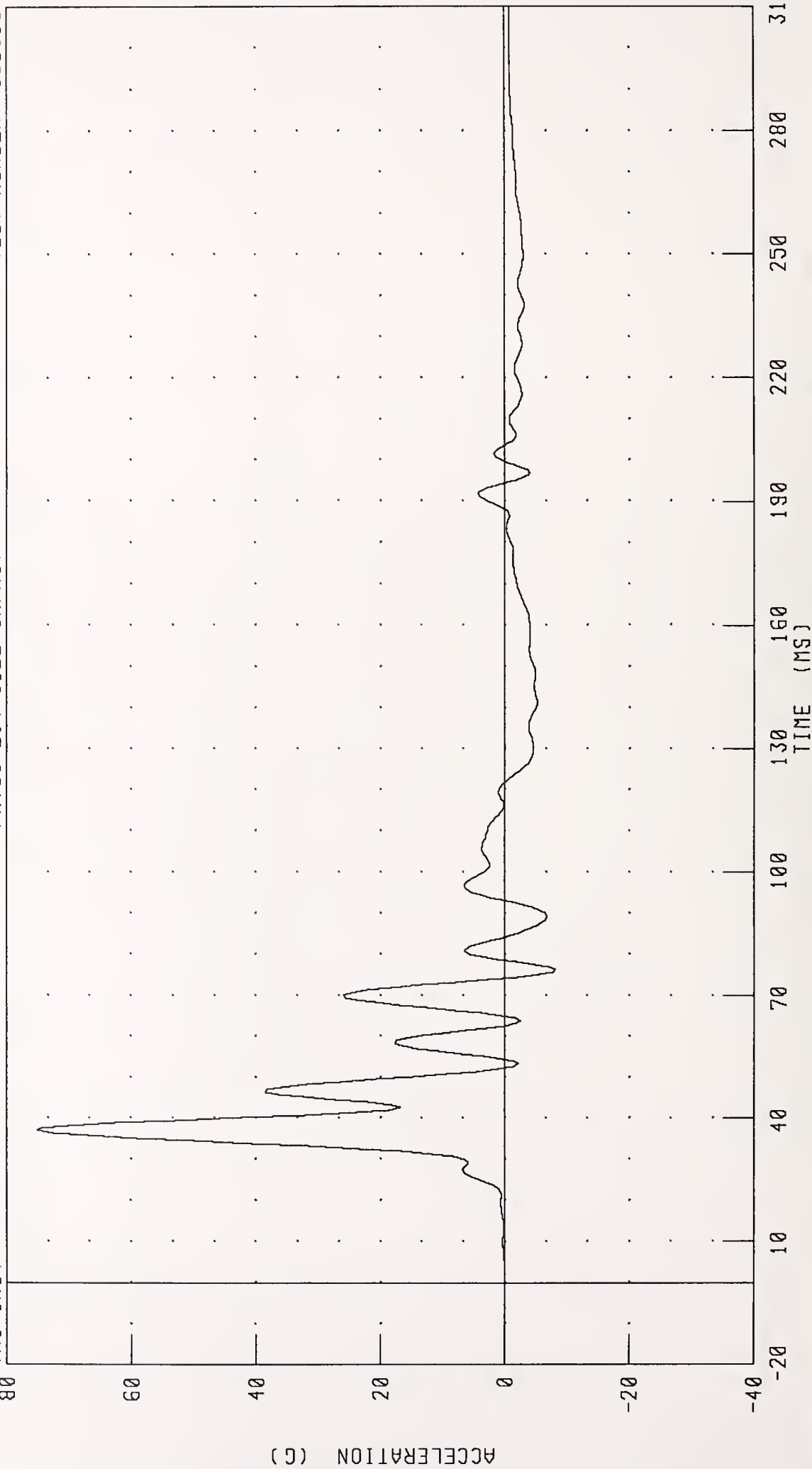
PEAK DATA: 75.84 G @ 36.88 MS; -7.55 G @ 76.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LURYGD FILTER: FIR 100

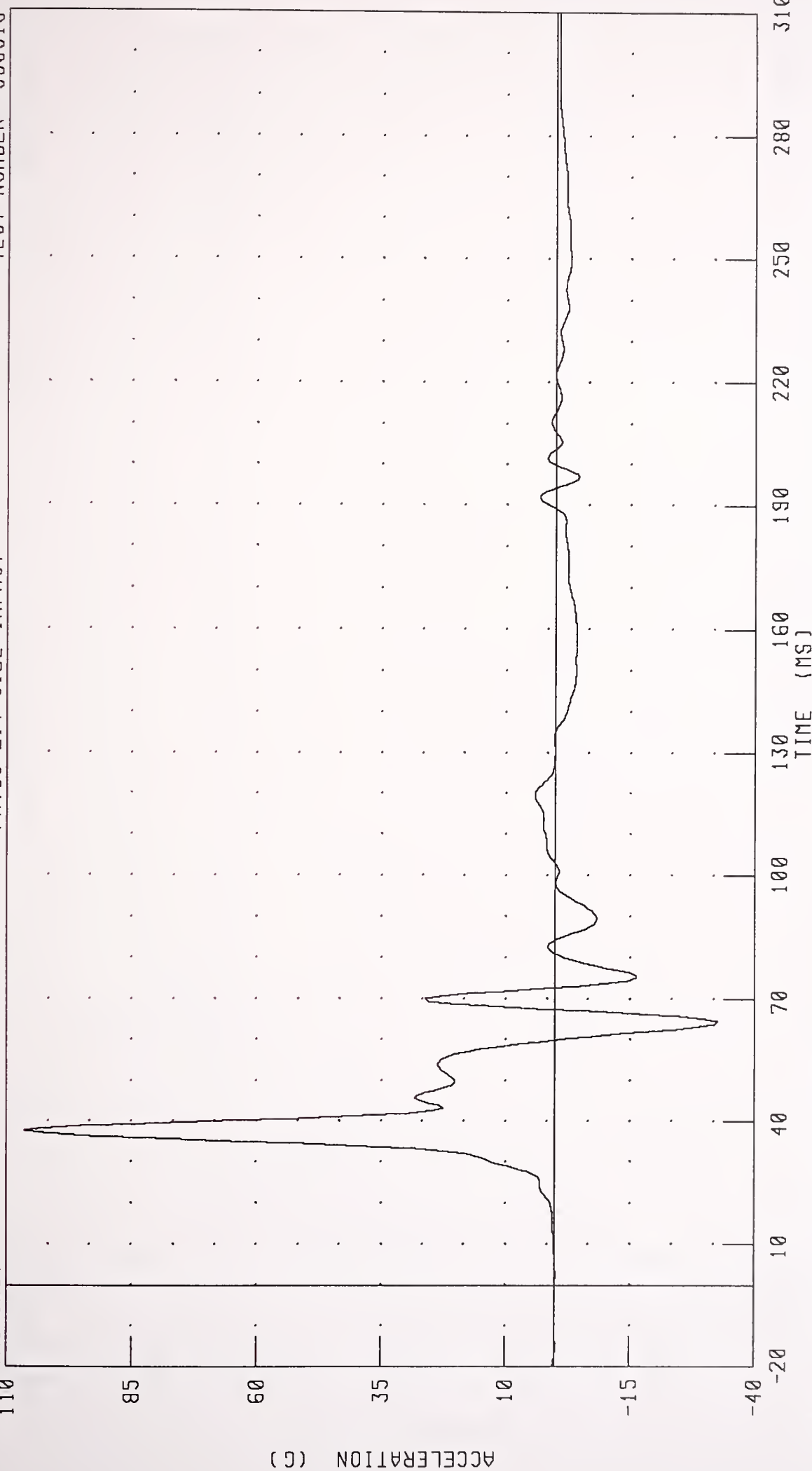
PEAK DATA: 75.12 G @ 36.88 MS, -8.14 G @ 76.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENGER LEFT LOWER RIB Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LLRYG4 FILTER: FIR 100

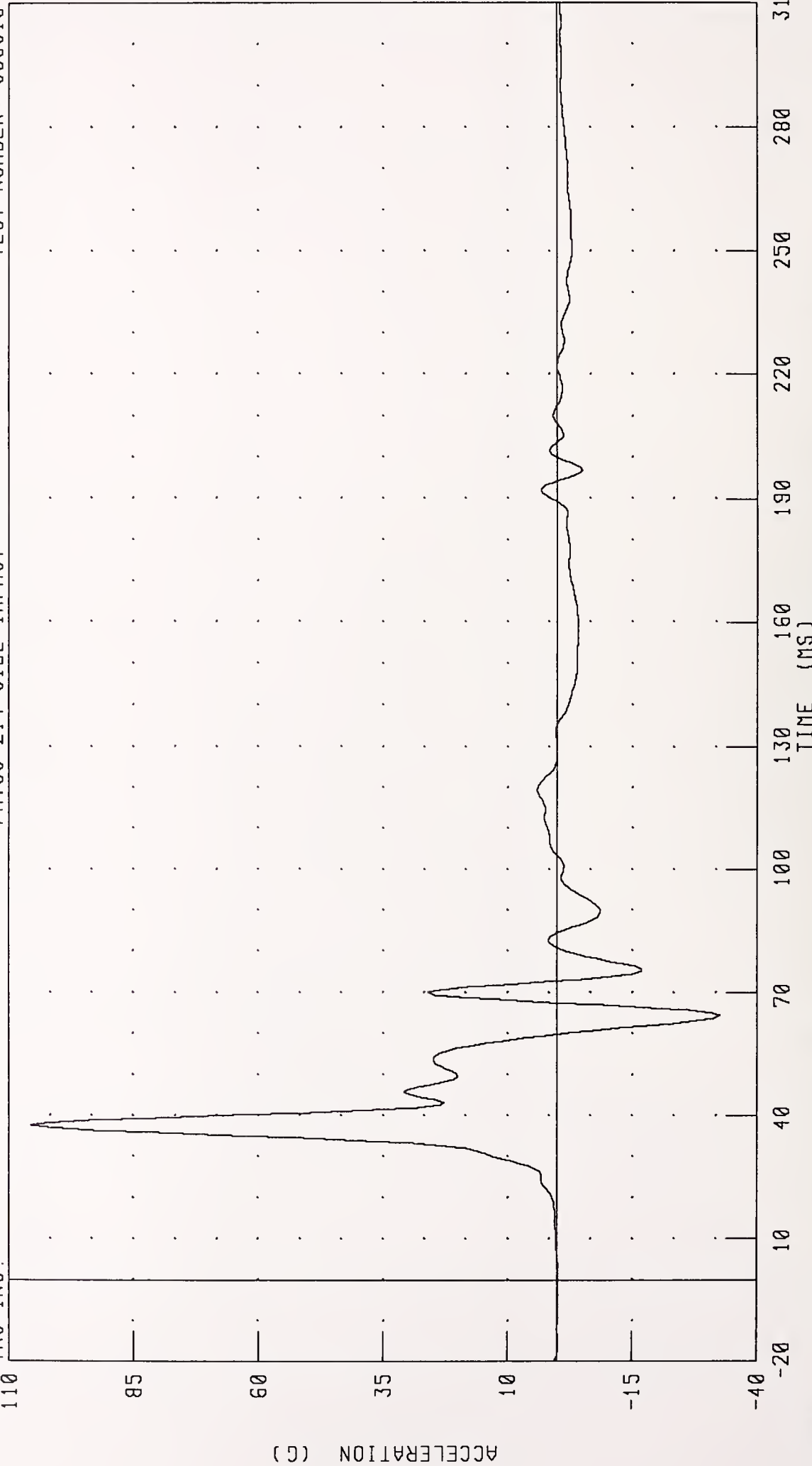
PEAK DATA: 106.25 G @ 37.50 MS; -32.50 G @ 64.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT LOWER RIB Y-AXIS ACCELERATION REDUNDANT

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LLRYGD FILTER: FIR 100

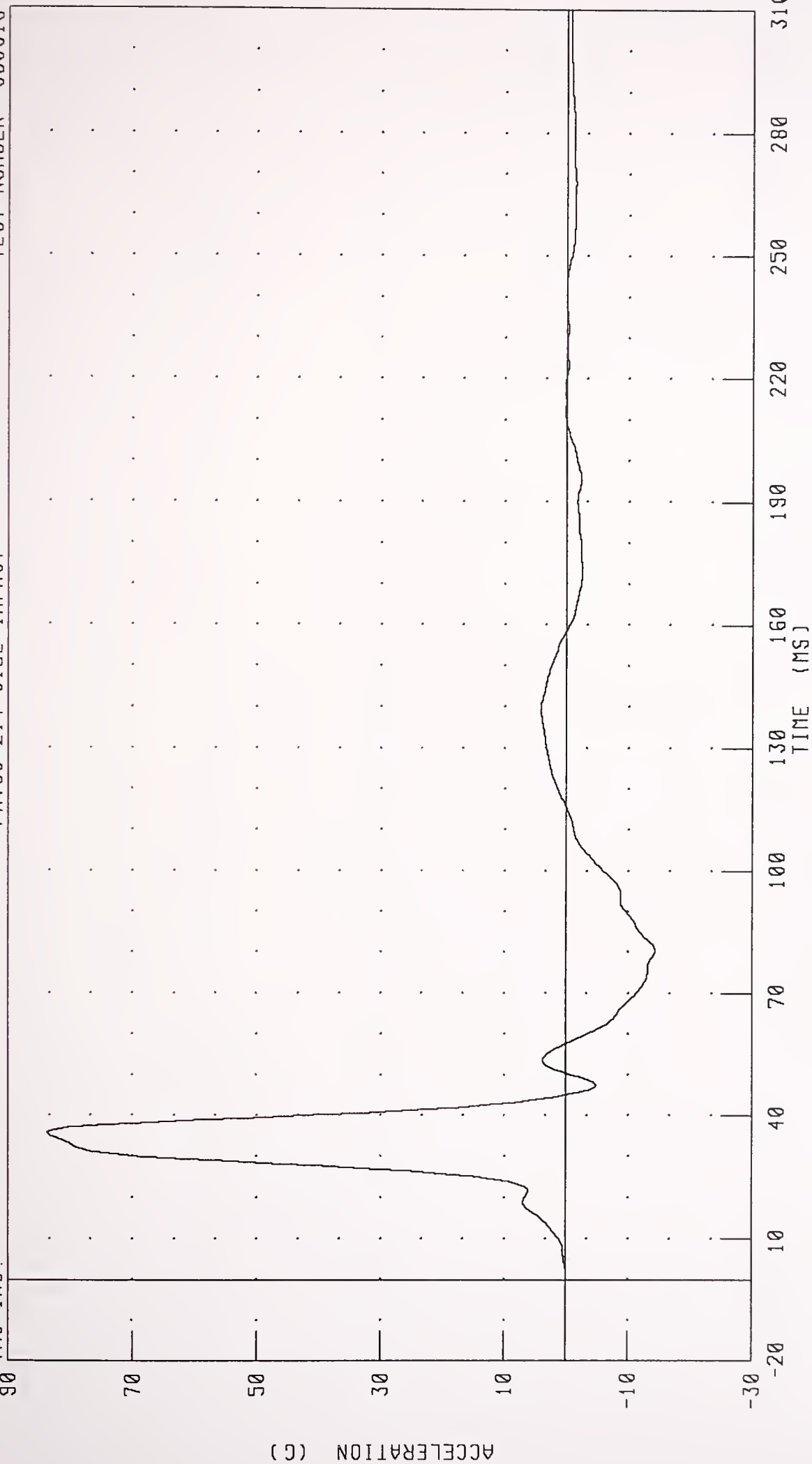
PEAK DATA: 105.60 G @ 37.50 MS; -32.52 G @ 64.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: PEVYG4 FILTER: FIR 100

PEAK DATA: 83.60 G @ 35.63 MS; -14.37 G @ 80.63 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION REDUNDANT
 FNVSS 214 SIDE IMPACT

TEST NUMBER: 950516

TRC INC.

90

70

50

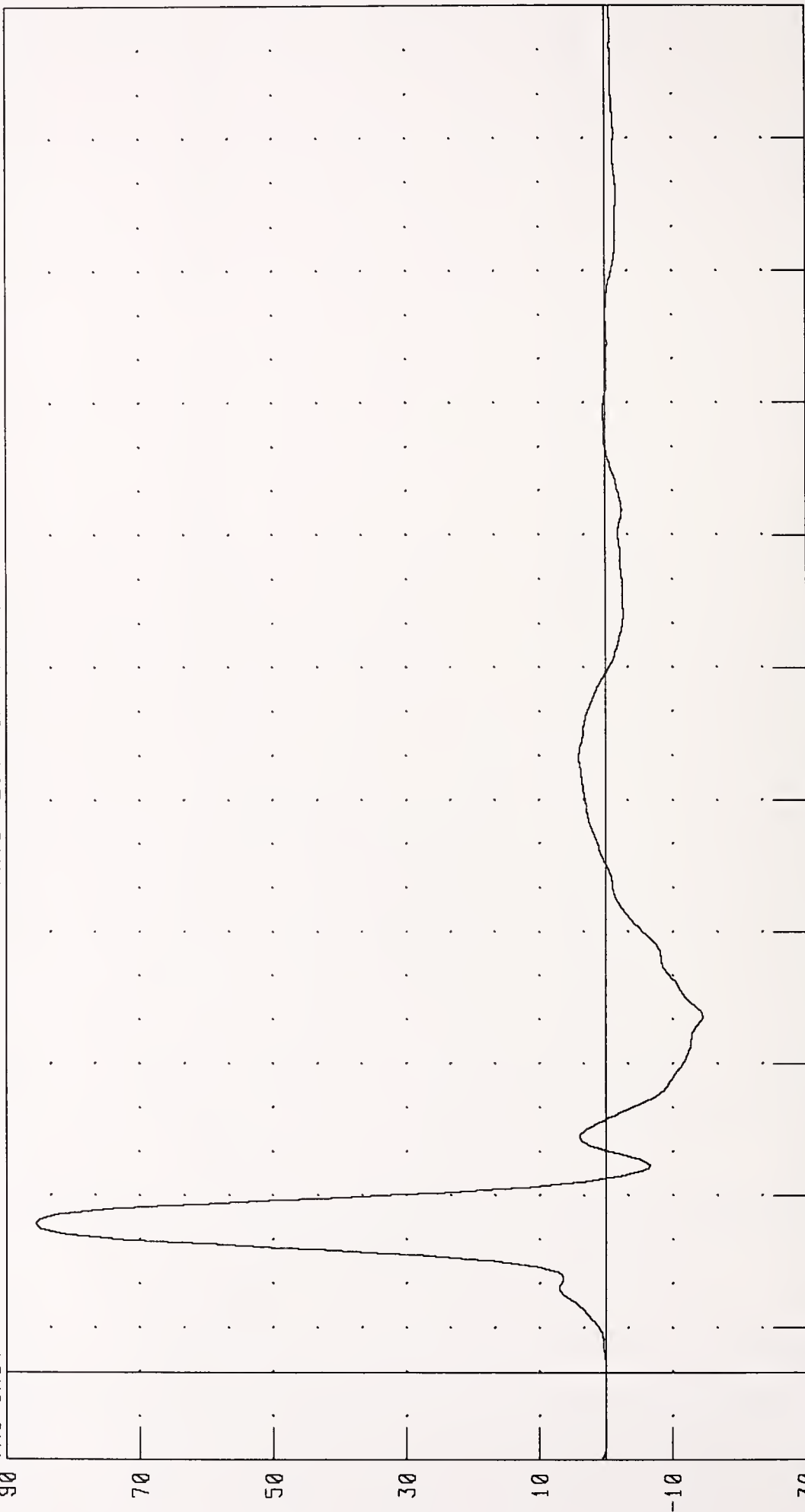
30

10

-10

-30

ACCELERATION (G)



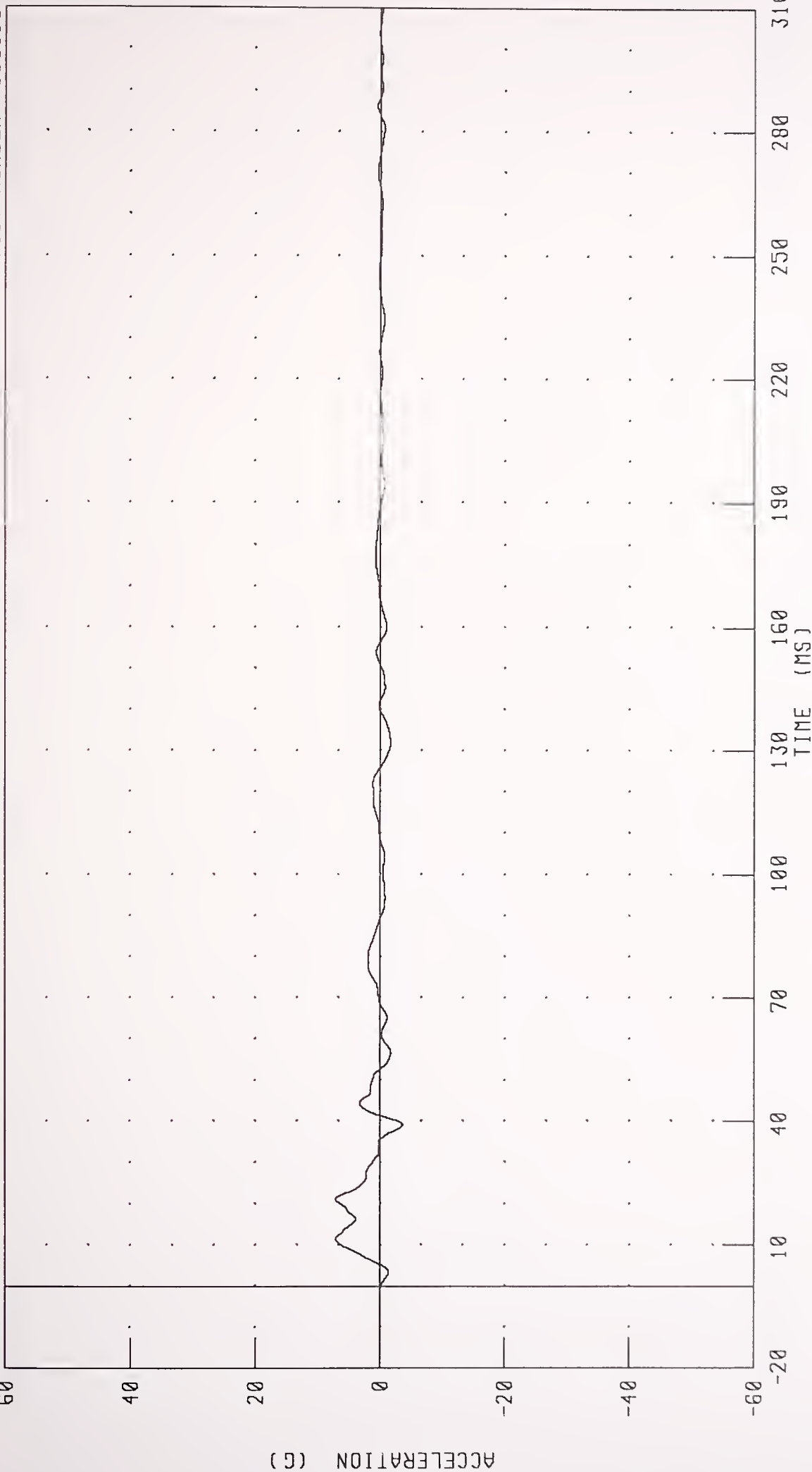
CHANNEL: PEVYGD FILTER: FIR 100
 PEAK DATA: 85.52 G @ 33.75 MS; -14.44 G @ 80.63 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT FRONT SILL X-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL RFSXG FILTER CH. CLASS 60

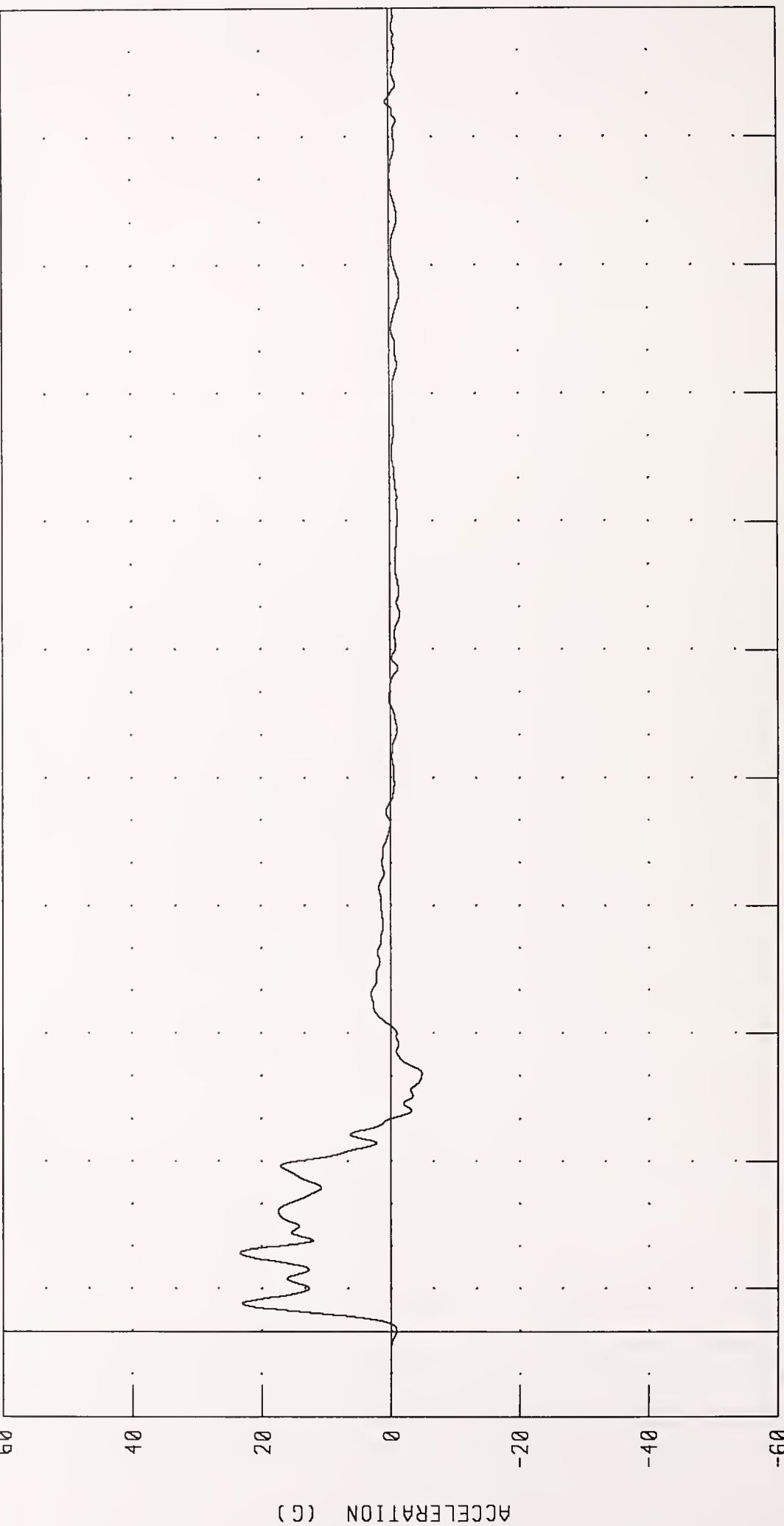
PEAK DATA: 7.16 G @ 21.12 MS; -3.65 G @ 39.04 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT FRONT SILL Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: RFSYG FILTER: CH. CLASS 60

TIME (MS)

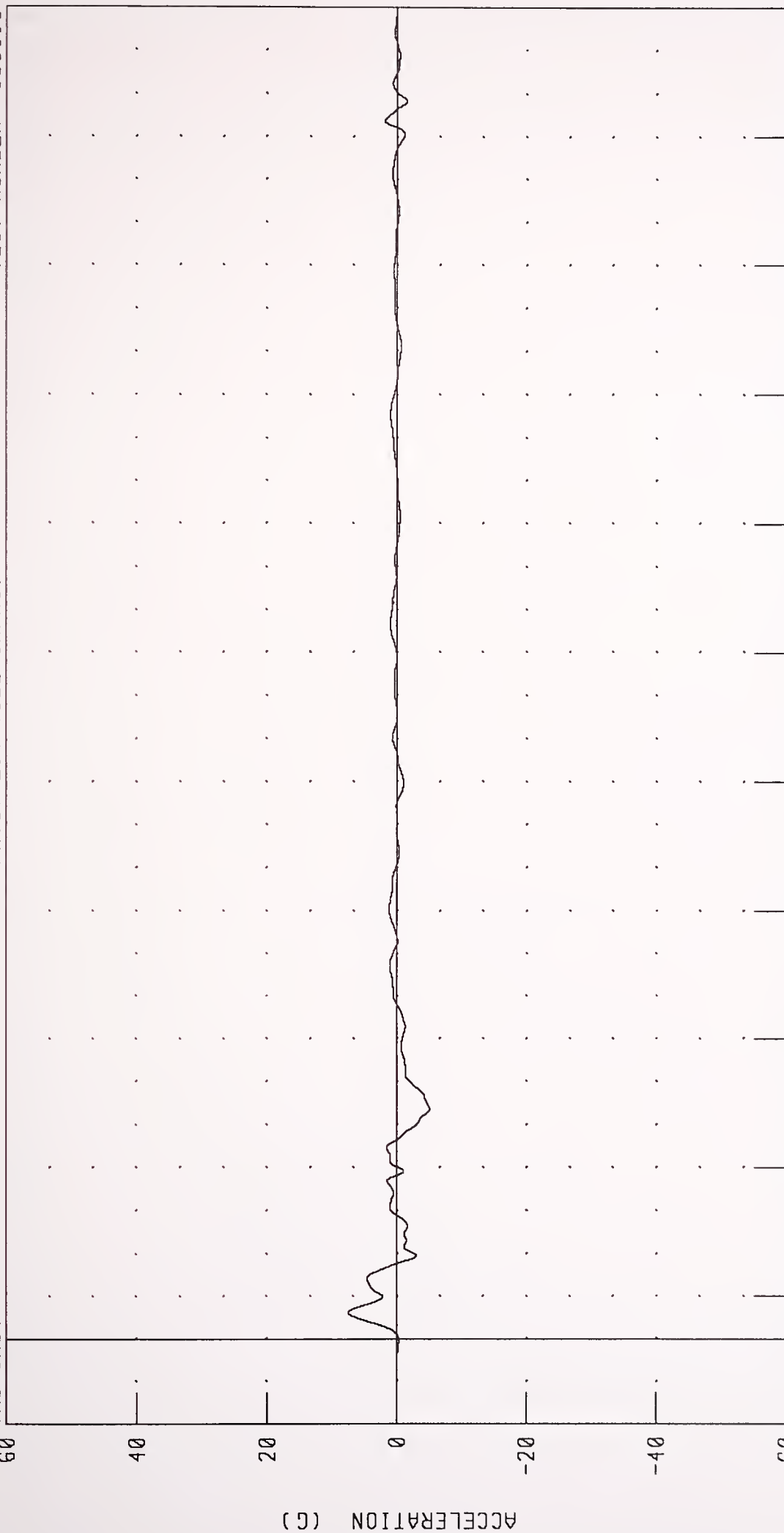
PEAK DATA: 23.46 G @ 18.40 MS; -4.82 G @ 60.56 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE RIGHT FRONT SILL Z-AXIS ACCELERATION

TEST NUMBER: 950516

FMYSS 214 SIDE IMPACT

TRC INC.



TIME (MS)

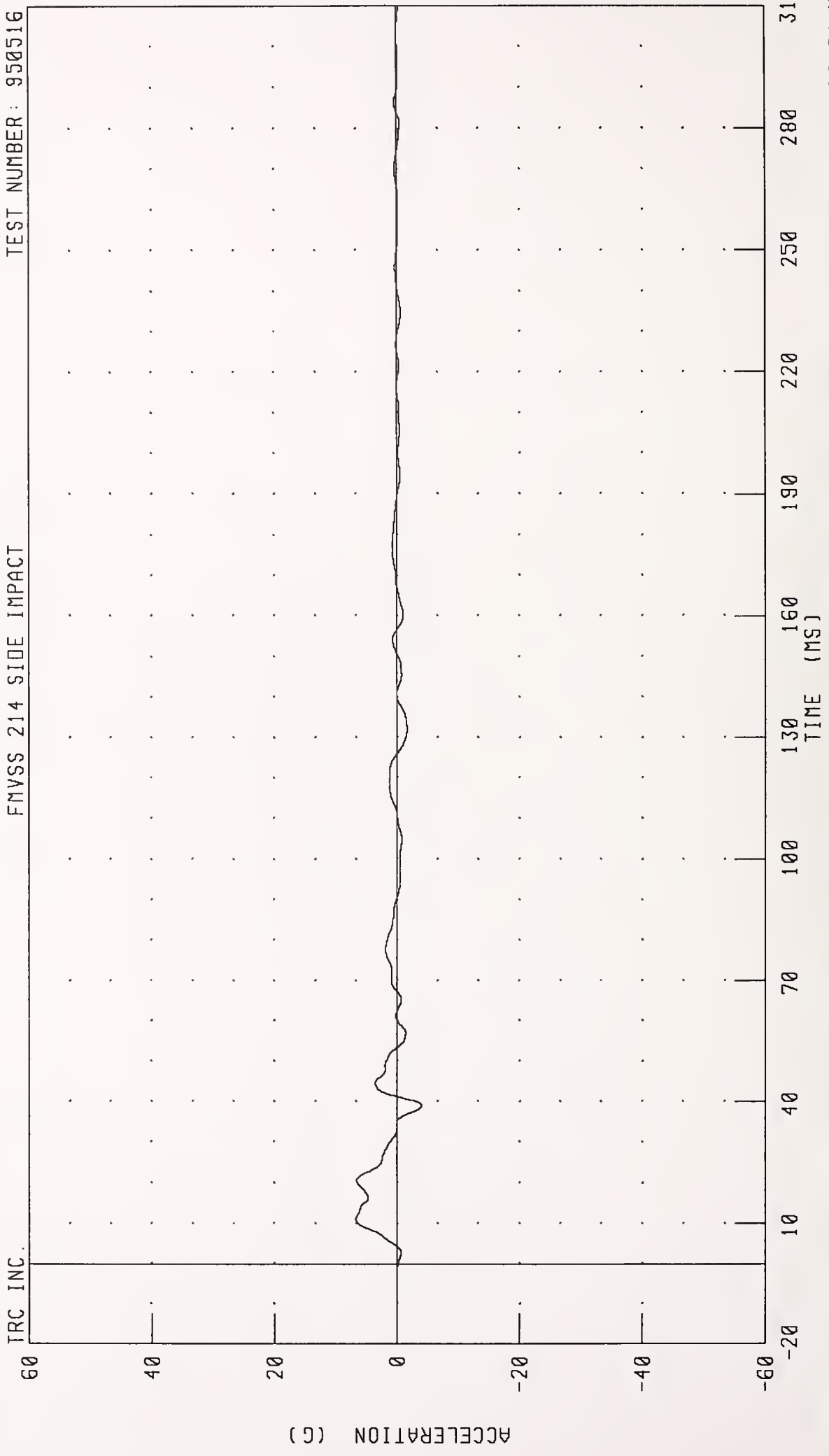
PEAK DATA: 7.49 G @ 6.16 MS; -5.05 G @ 53.60 MS

CHANNEL: RFSZG FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 RIGHT REAR SILL X-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT



CHANNEL: RRSXG FILTER: CH. CLASS 60

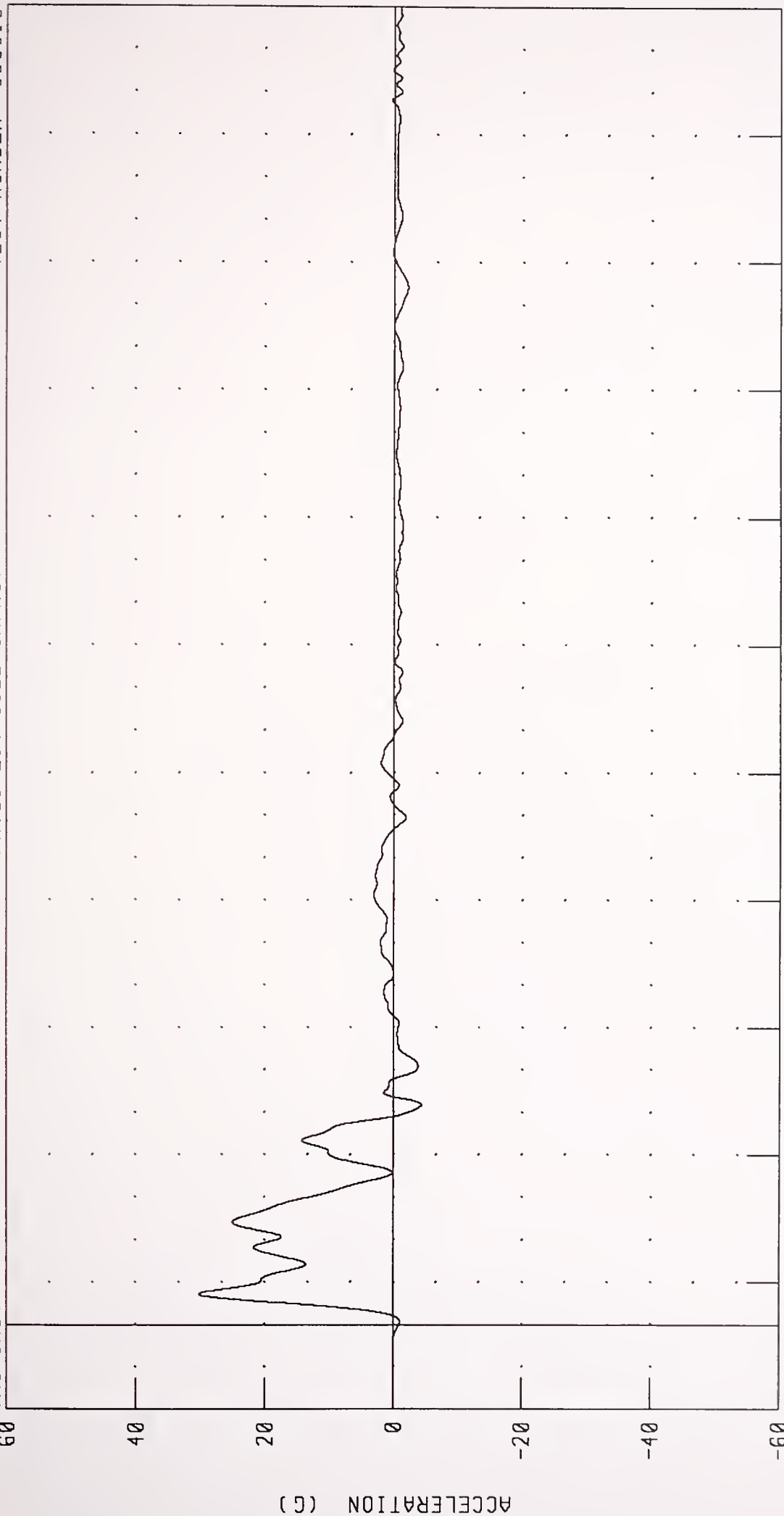
PEAK DATA: 6.73 G @ 10.96 MS; -4.03 G @ 39.04 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SILL Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: RRSYG FILTER: CH. CLASS 60

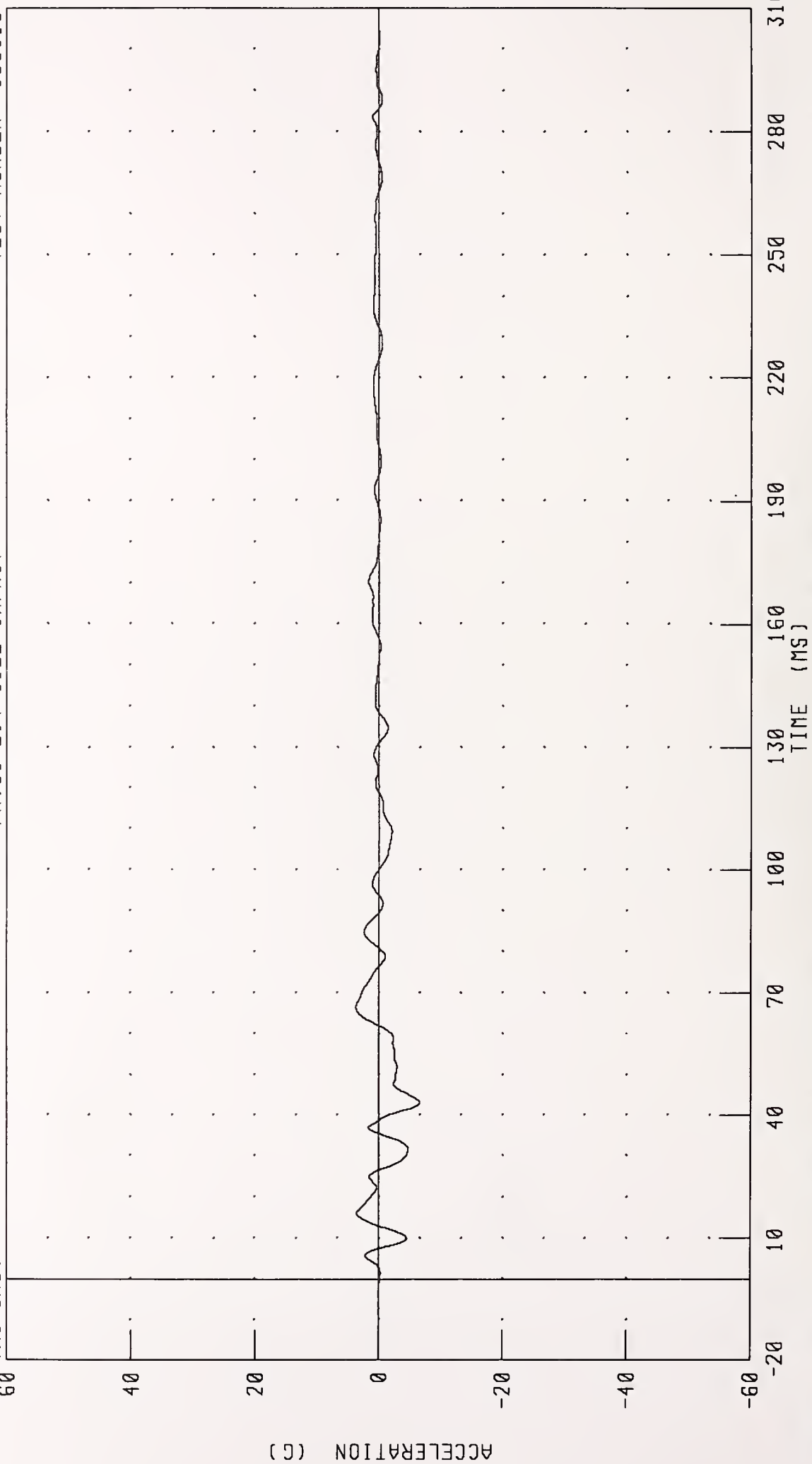
PEAK DATA: 30.21 G @ 7.28 MS, -4.38 G @ 51.76 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SILL Z-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: RRSZG FILTER: CH. CLASS 60

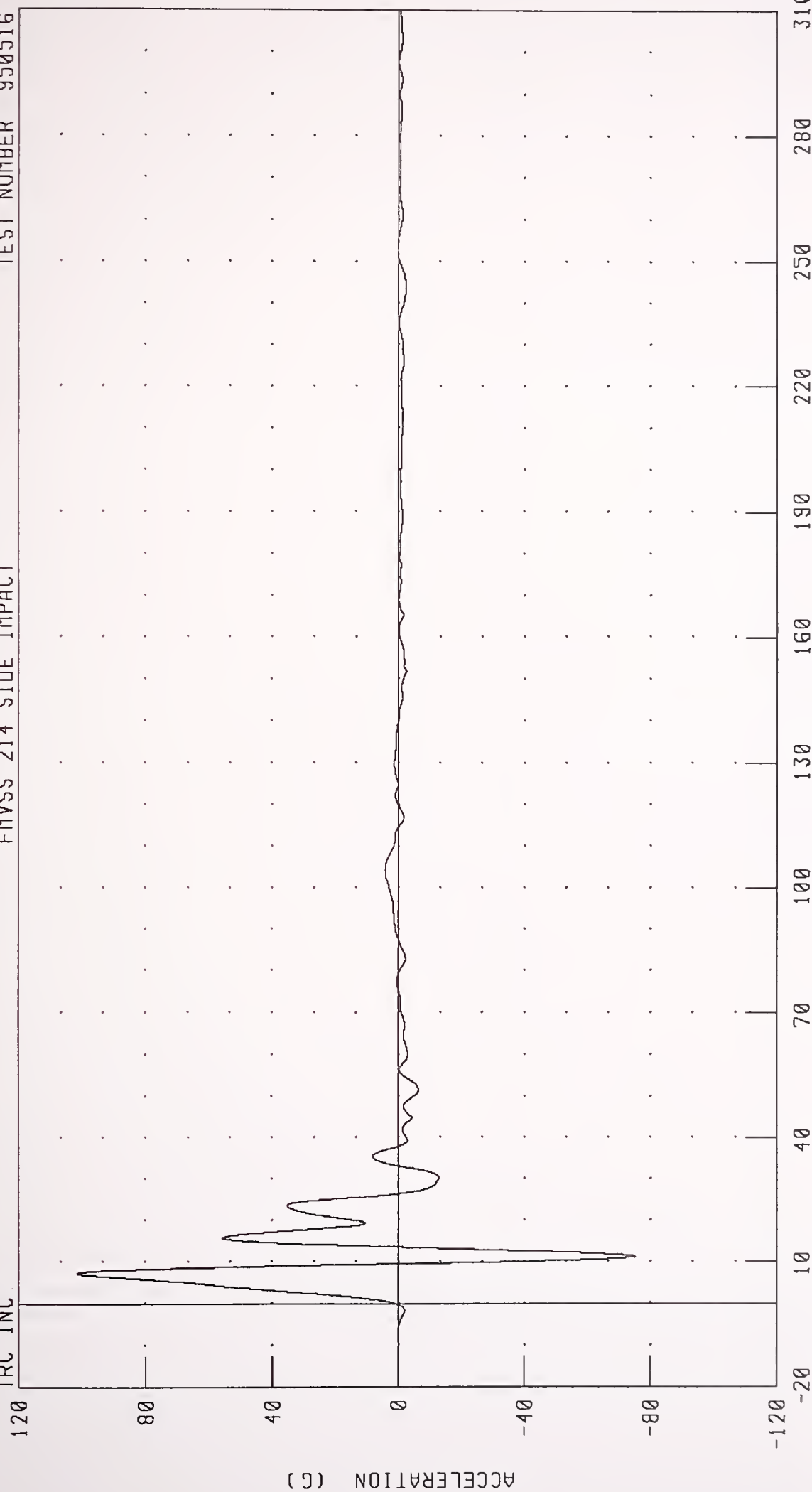
PEAK DATA: 3.69 G @ 66.48 MS; -6.62 G @ 43.12 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR SILL Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: LRSYG FILTER: CH. CLASS 60

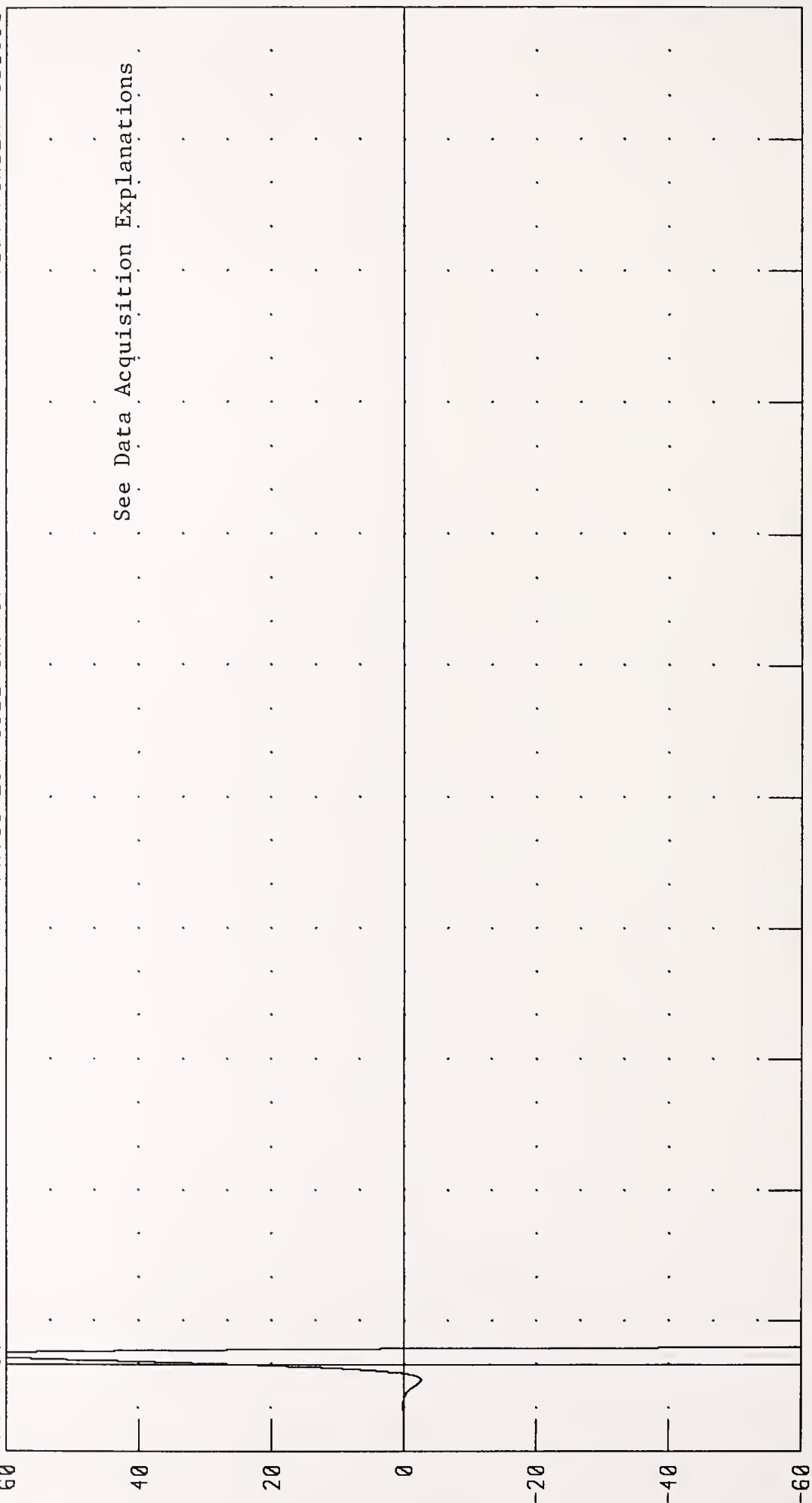
PEAK DATA: 101.52 G @ 7.20 MS, -75.30 G @ 11.28 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT SILL Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



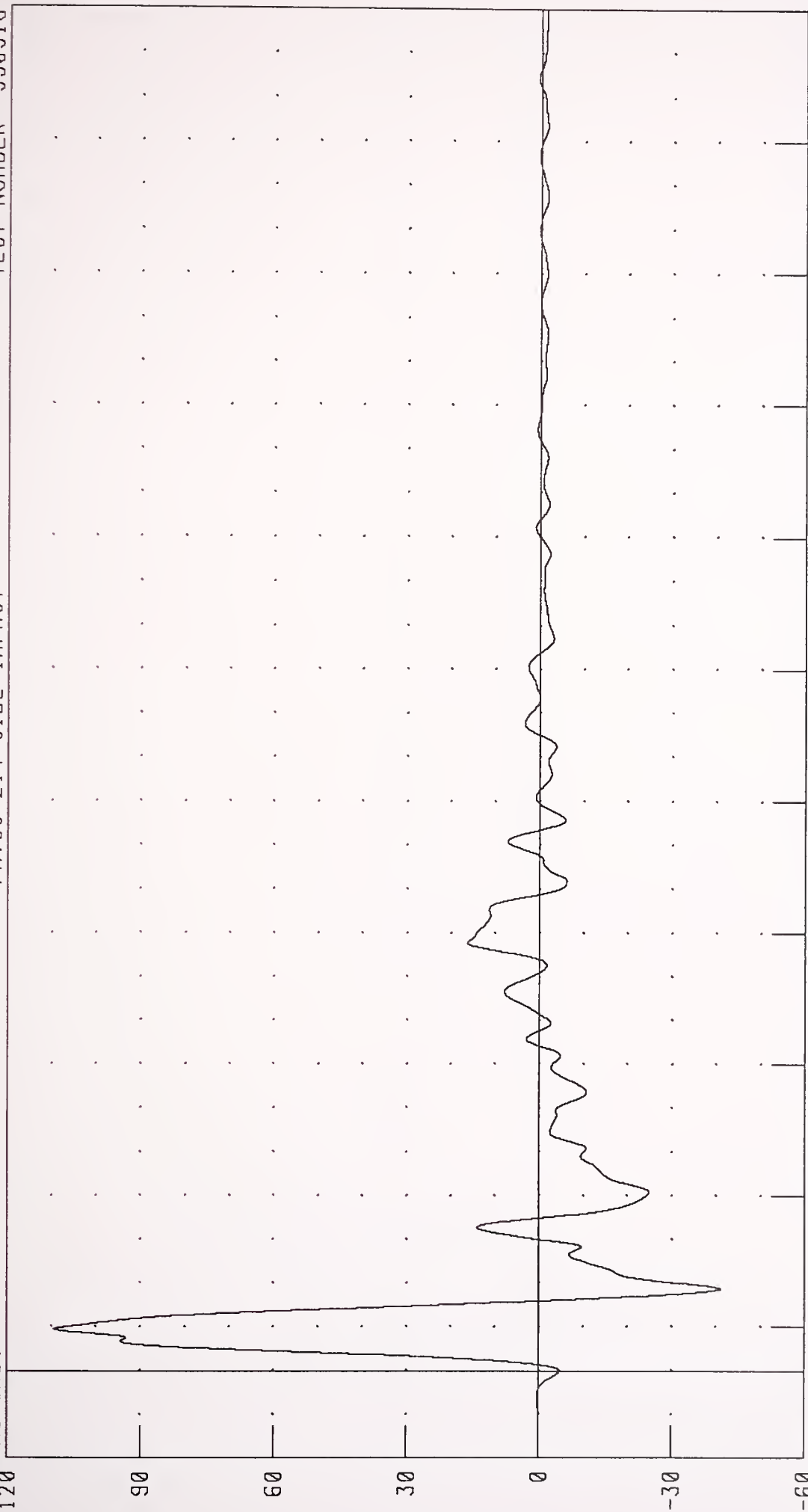
CHANNEL: LFSYG FILTER: CH. CLASS 60
PEAK DATA: 67.02 G @ 2.16 MS; -1058.46 G @ 9.60 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR CENTERLINE Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.



TIME (MS)

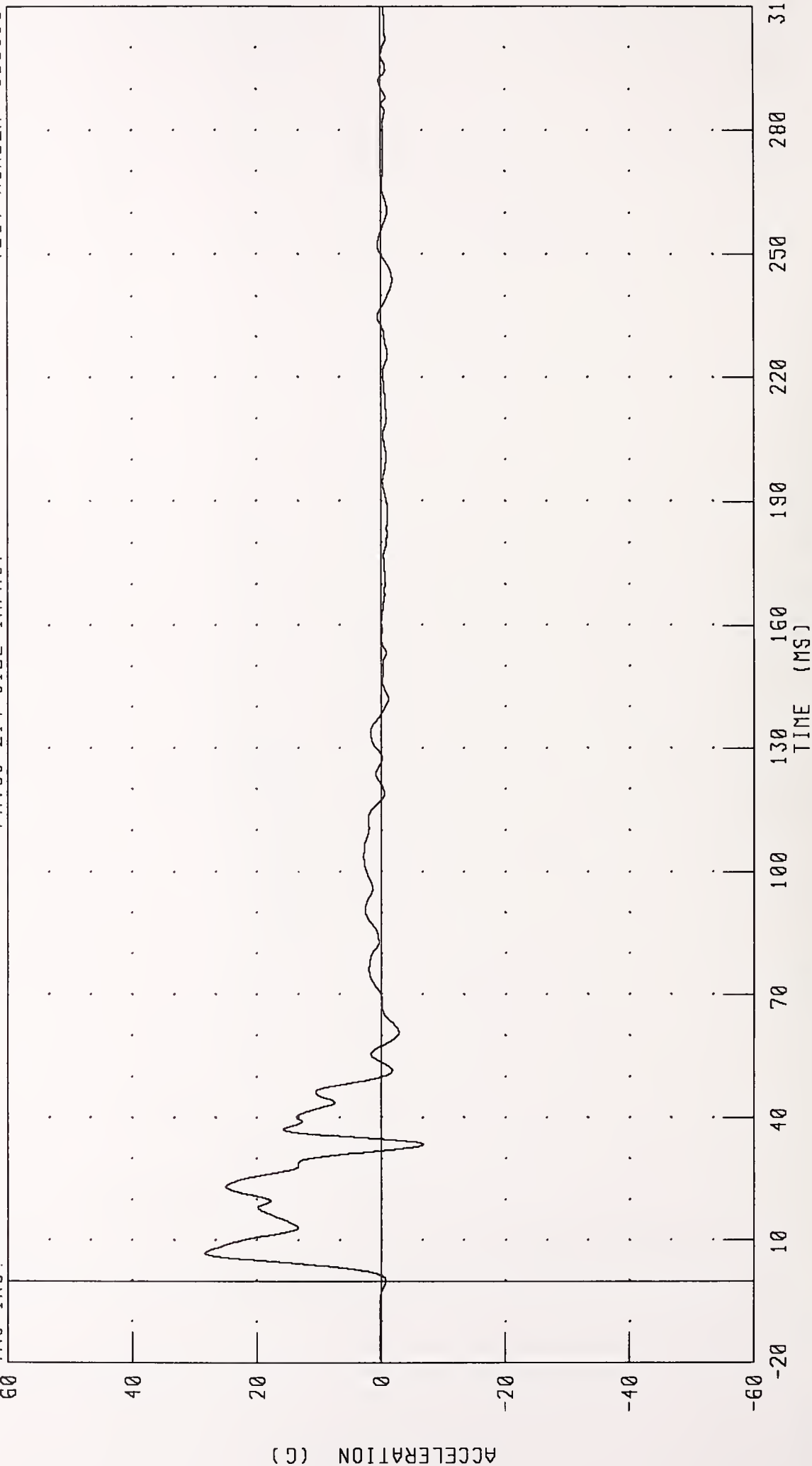
CHANNEL: LFDYG1 FILTER: CH. CLASS 60

PEAK DATA: 109.40 G @ 9.44 MS; -41.05 G @ 18.64 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 RIGHT REAR SEAT Y-AXIS ACCELERATION
 FMVSS 214 SIDE IMPACT

TEST NUMBER: 950516

TRC INC.



CHANNEL: TRRYG FILTER: CH. CLASS 60

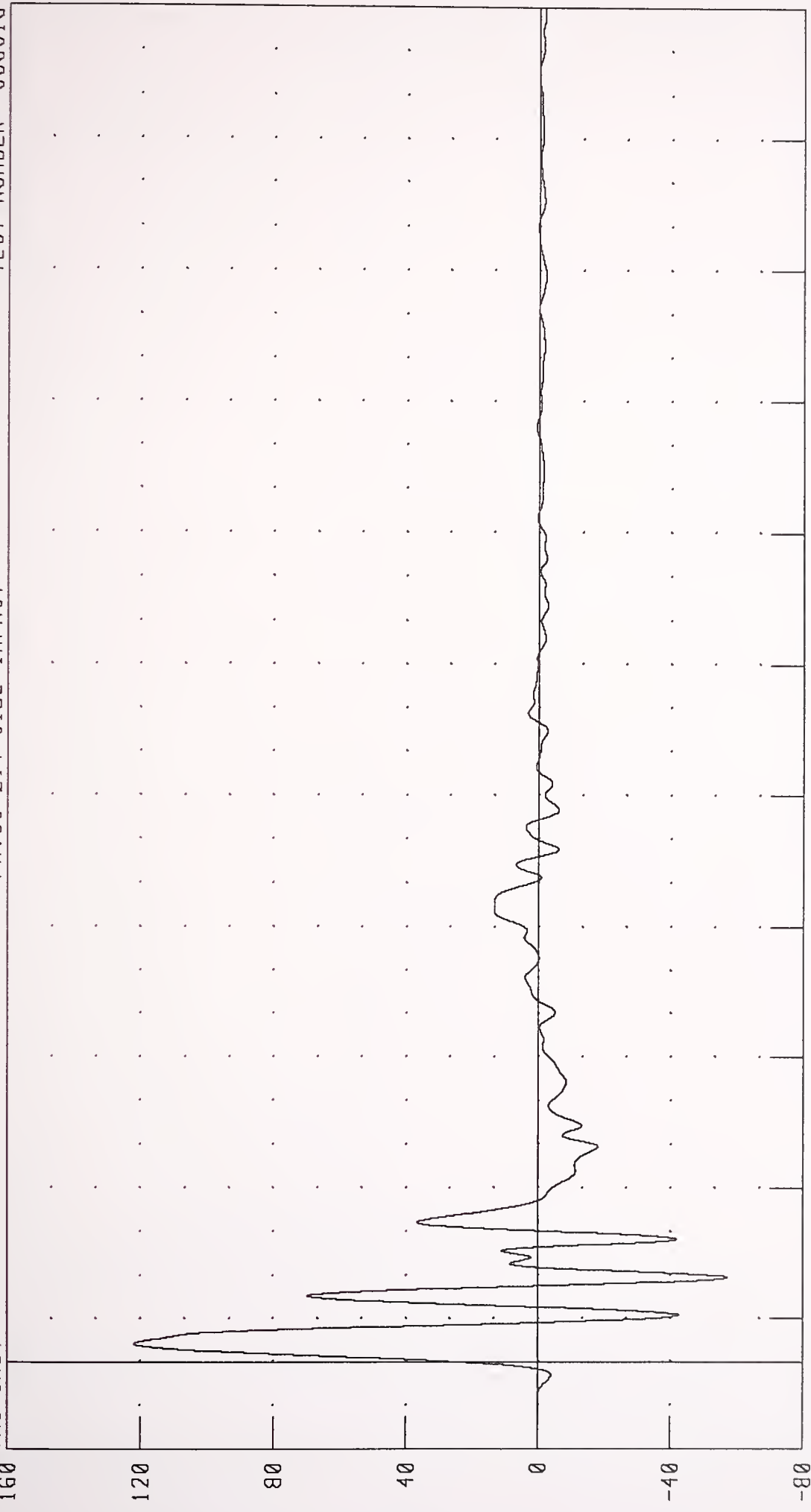
PEAK DATA: 28.38 G @ 6.80 MS; -6.68 G @ 33.52 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR MID-REAR Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMYSS 214 SIDE IMPACT

TRC INC.



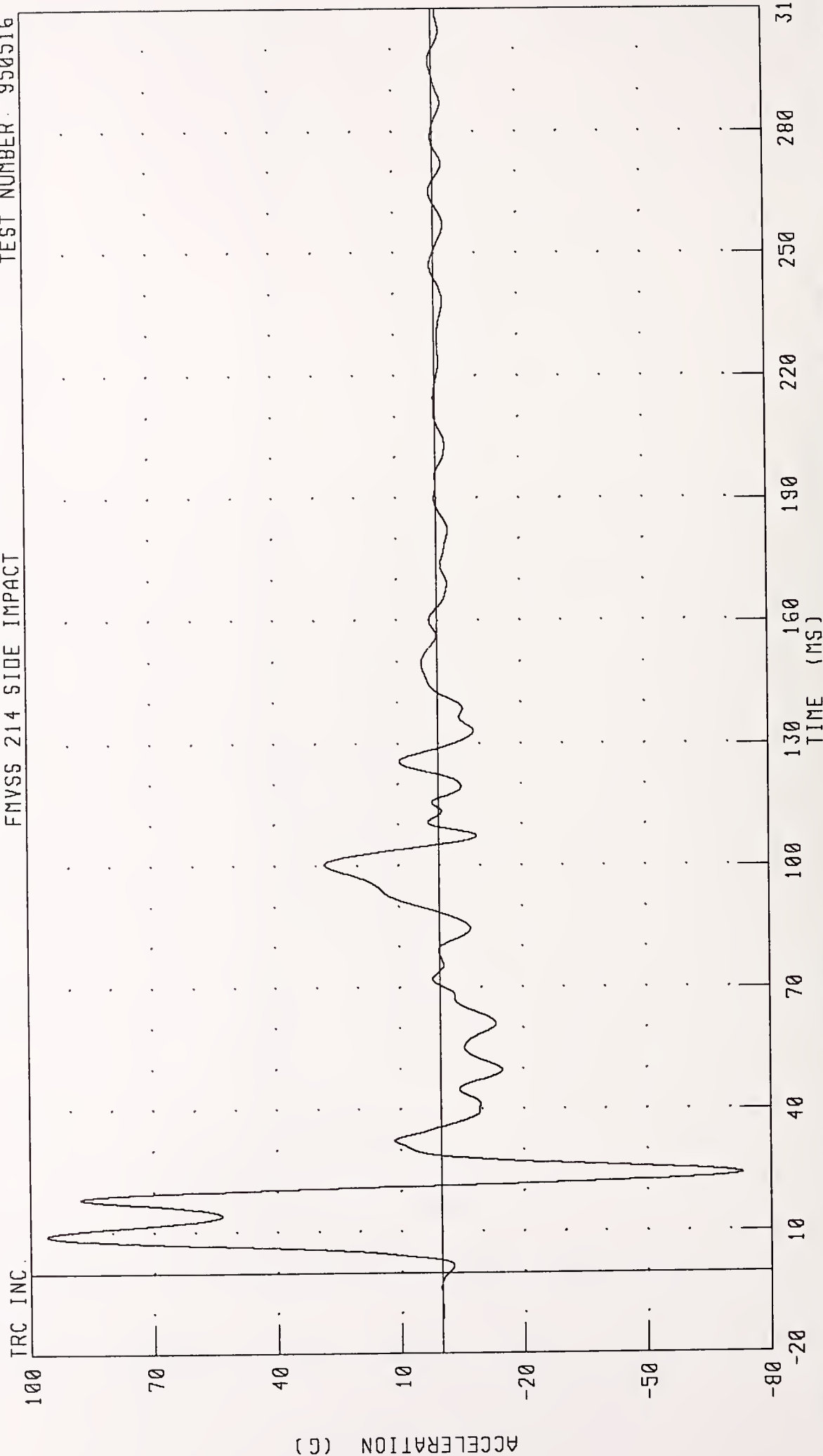
CHANNEL: LFDYCG2 FILTER: CH. CLASS 60

PEAK DATA: 122.00 G @ 4.08 MS; -57.23 G @ 19.52 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR UPPER CENTERLINE Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT



CHANNEL: LFDY3 FILTER: CH. CLASS 60

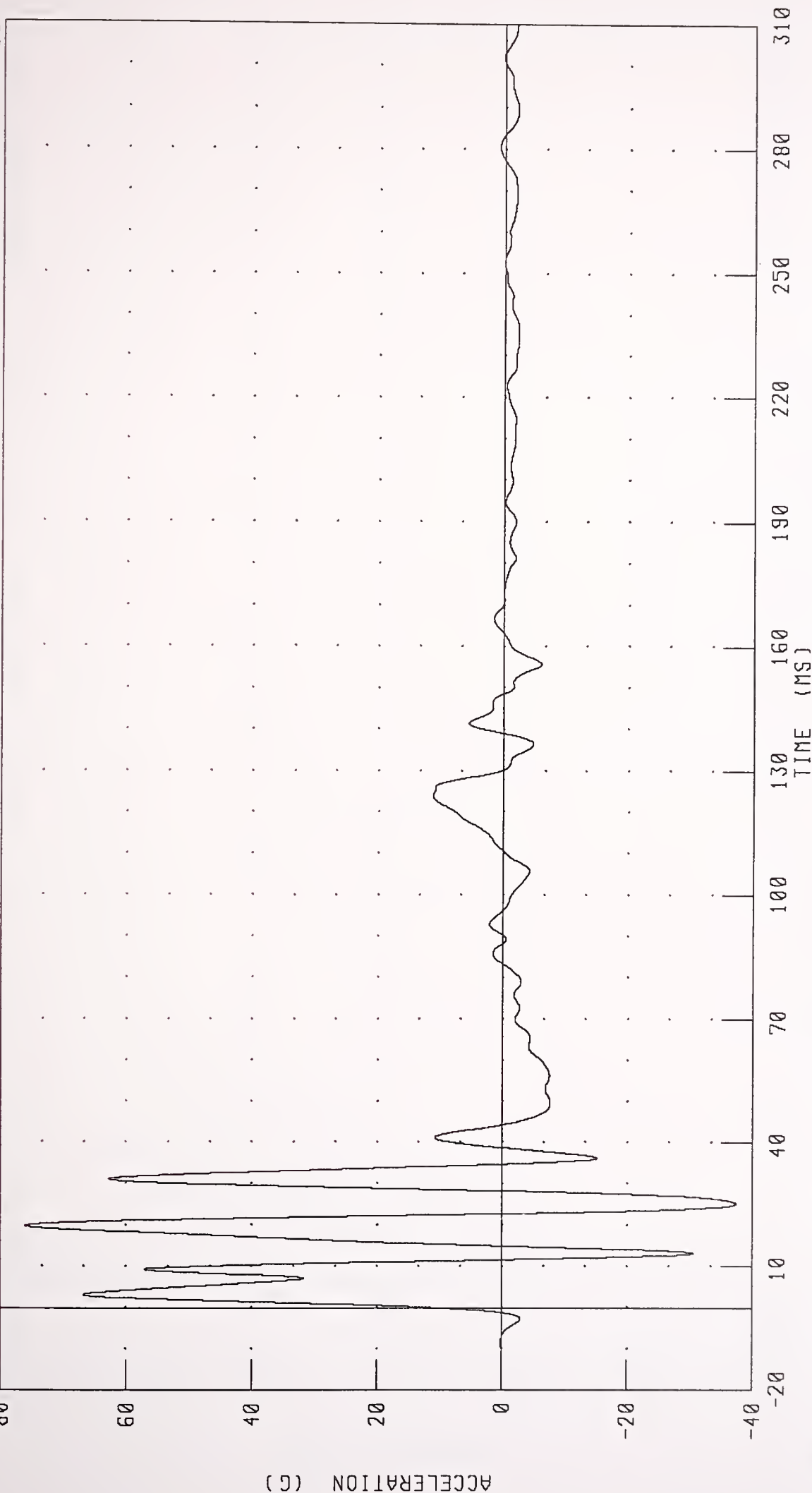
PEAK DATA: 95.81 G @ 9.20 MS; -73.11 G @ 24.24 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR DOOR MID-REAR Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.

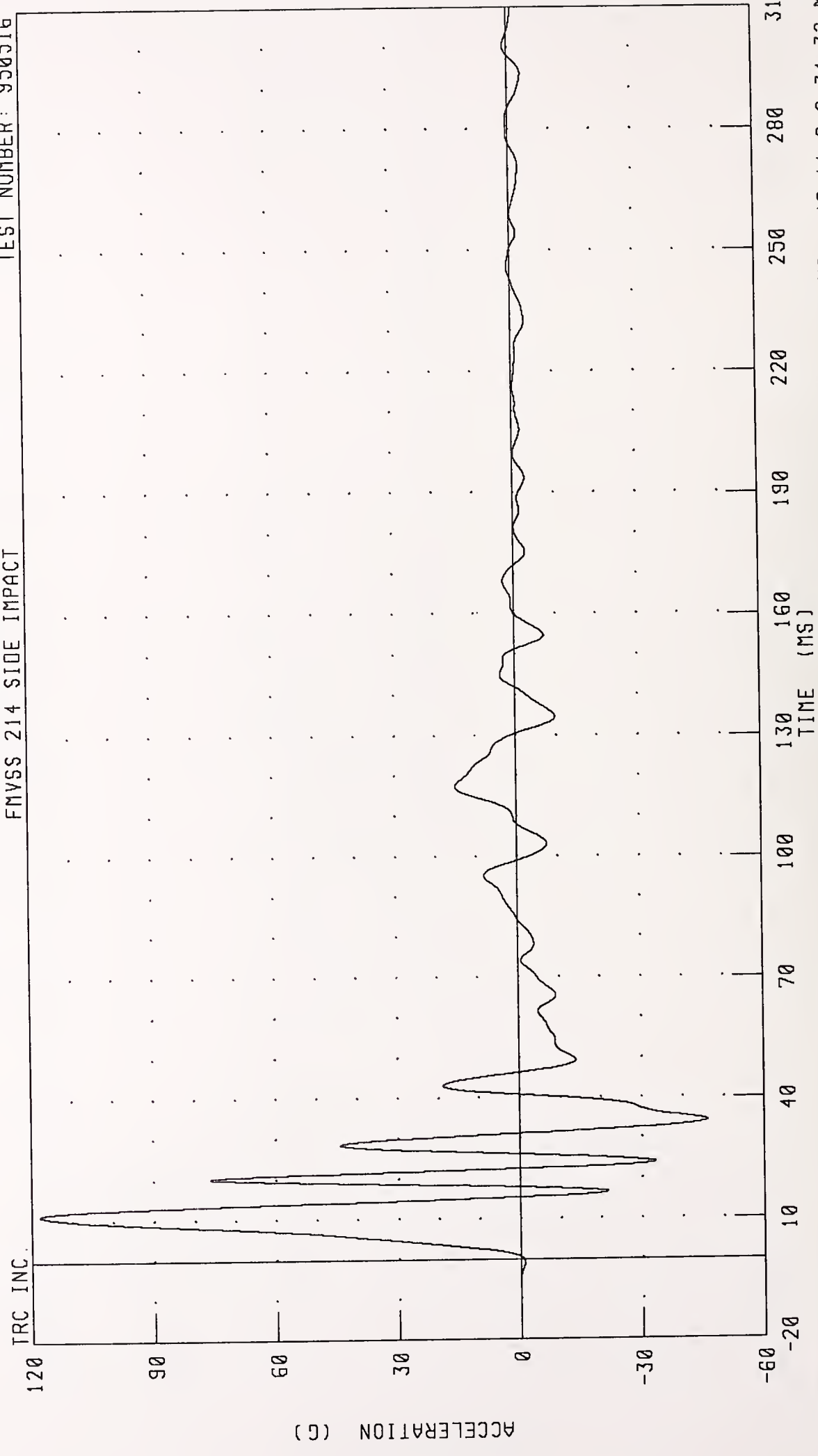


CHANNEL: LR0YG1 FILTER CH. CLASS 60

PEAK DATA: 76.04 G @ 19.84 MS, -37.34 G @ 25.20 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 LEFT REAR DOOR UPPER CENTERLINE Y-AXIS ACCELERATION
 FMVSS 214 SIDE IMPACT

TEST NUMBER: 950516



CHANNEL: LRDYG2 FILTER: CH. CLASS 60

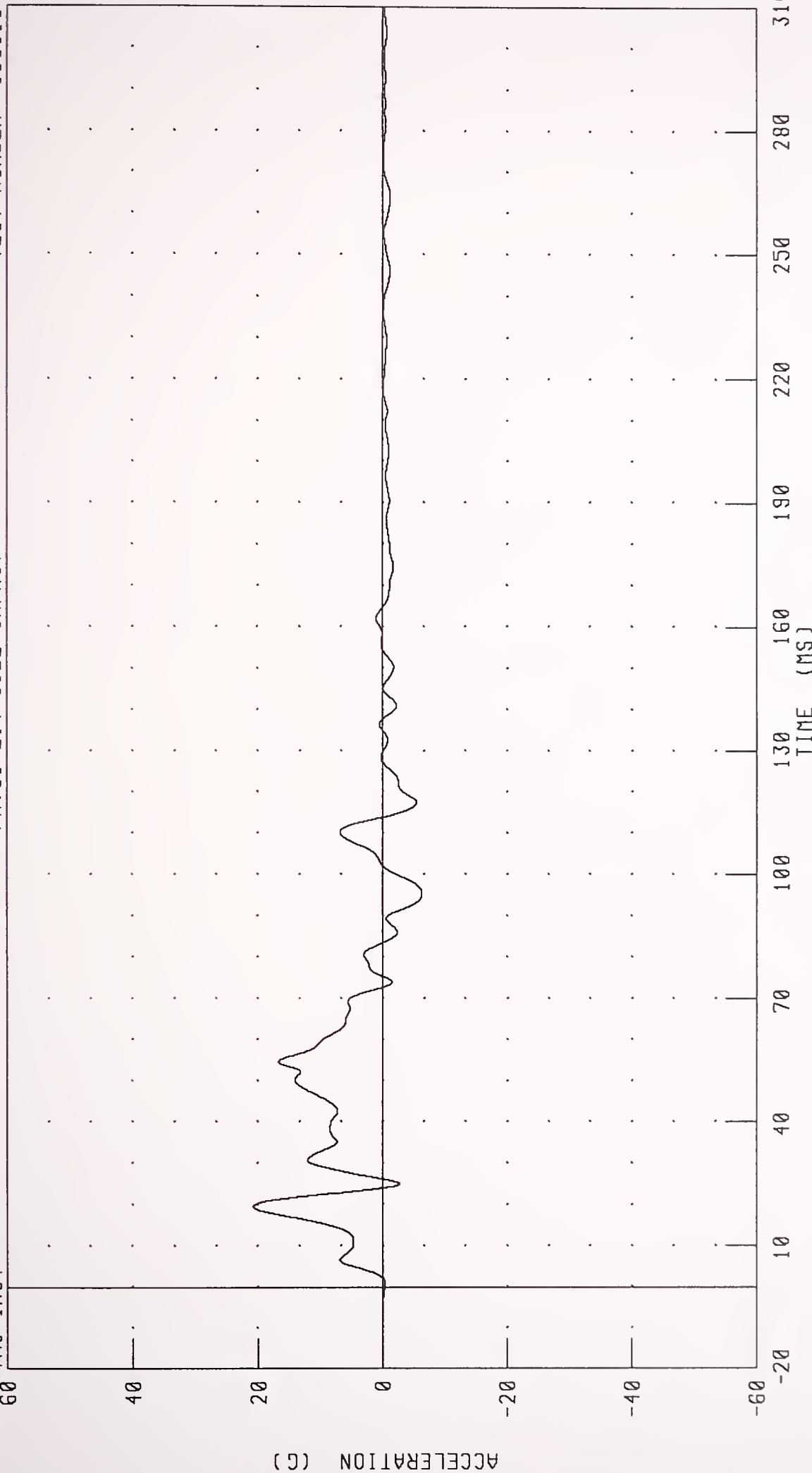
PEAK DATA: 117.91 G @ 11.28 MS; -46.11 G @ 34.32 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE FRONT BATTERY BOX Y-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: FBBYG FILTER: CH CLASS 60

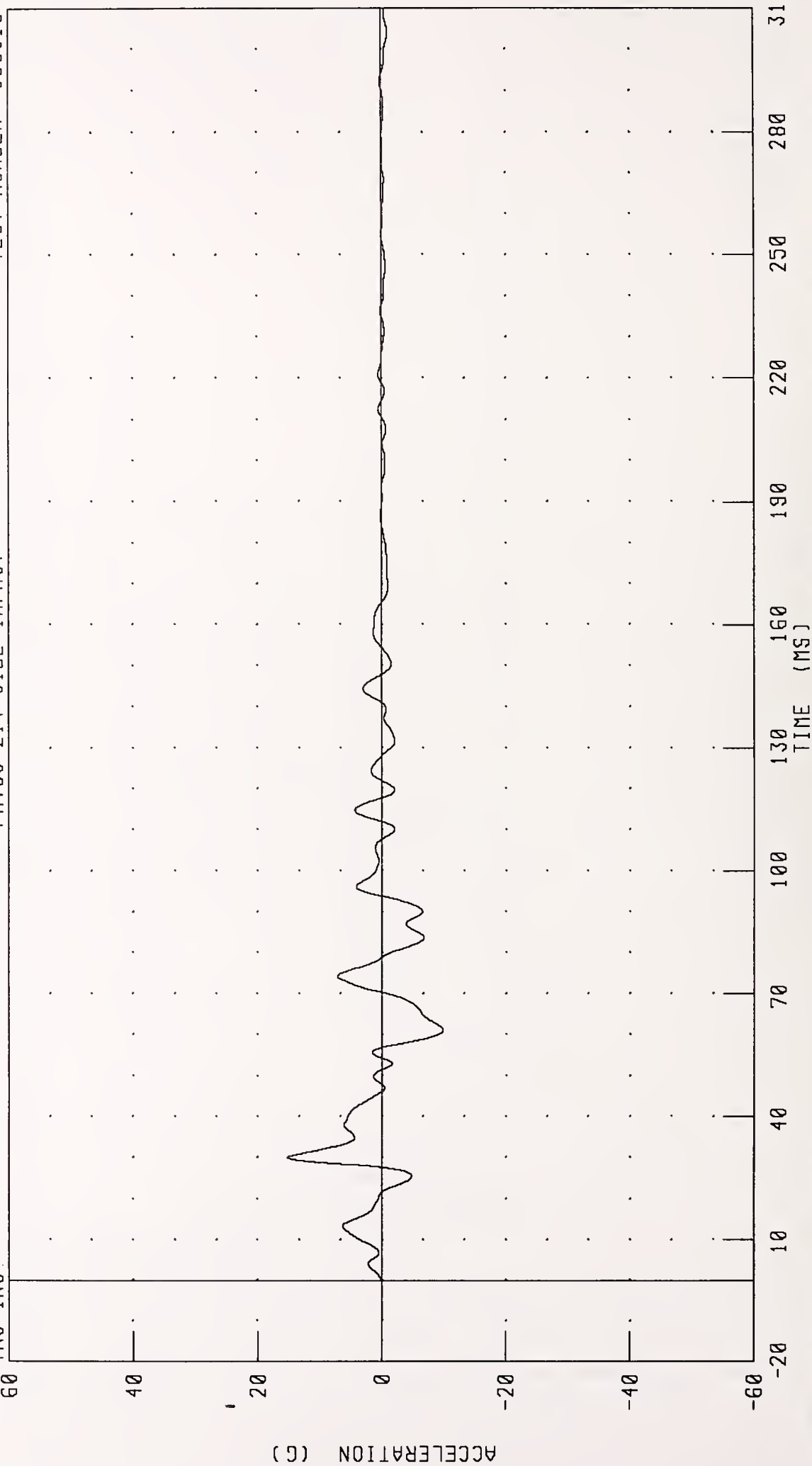
PEAK DATA: 20.76 G @ 19.52 MS; -6.29 G @ 95.36 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
FRONT BATTERY BOX Z-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC



CHANNEL: FBBZG FILTER: CH. CLASS 60

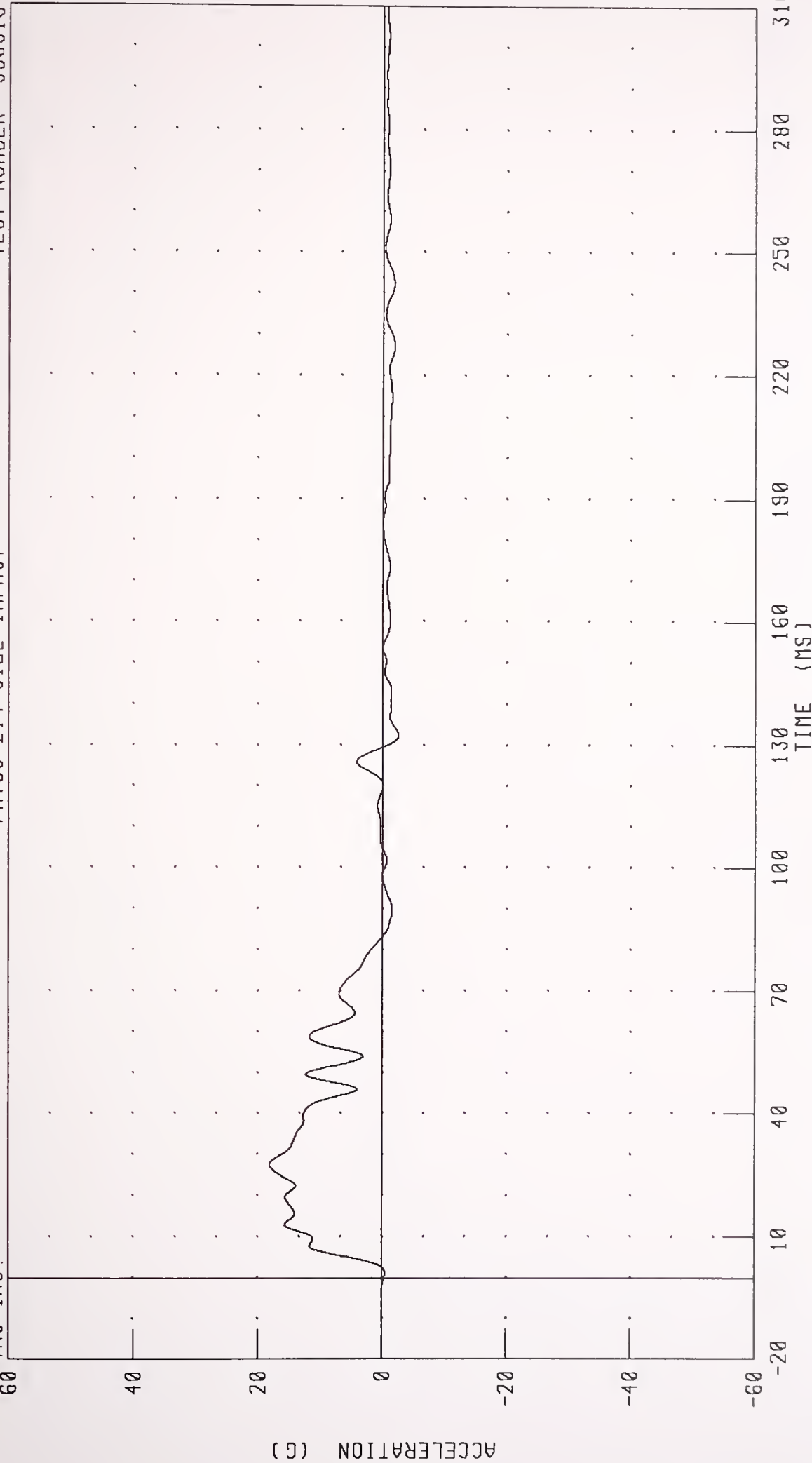
PEAK DATA: 15.21 G @ 30.00 MS; -9.86 G @ 61.12 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 REAR BATTERY BOX Y-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: RBBYG FILTER: CH. CLASS 60

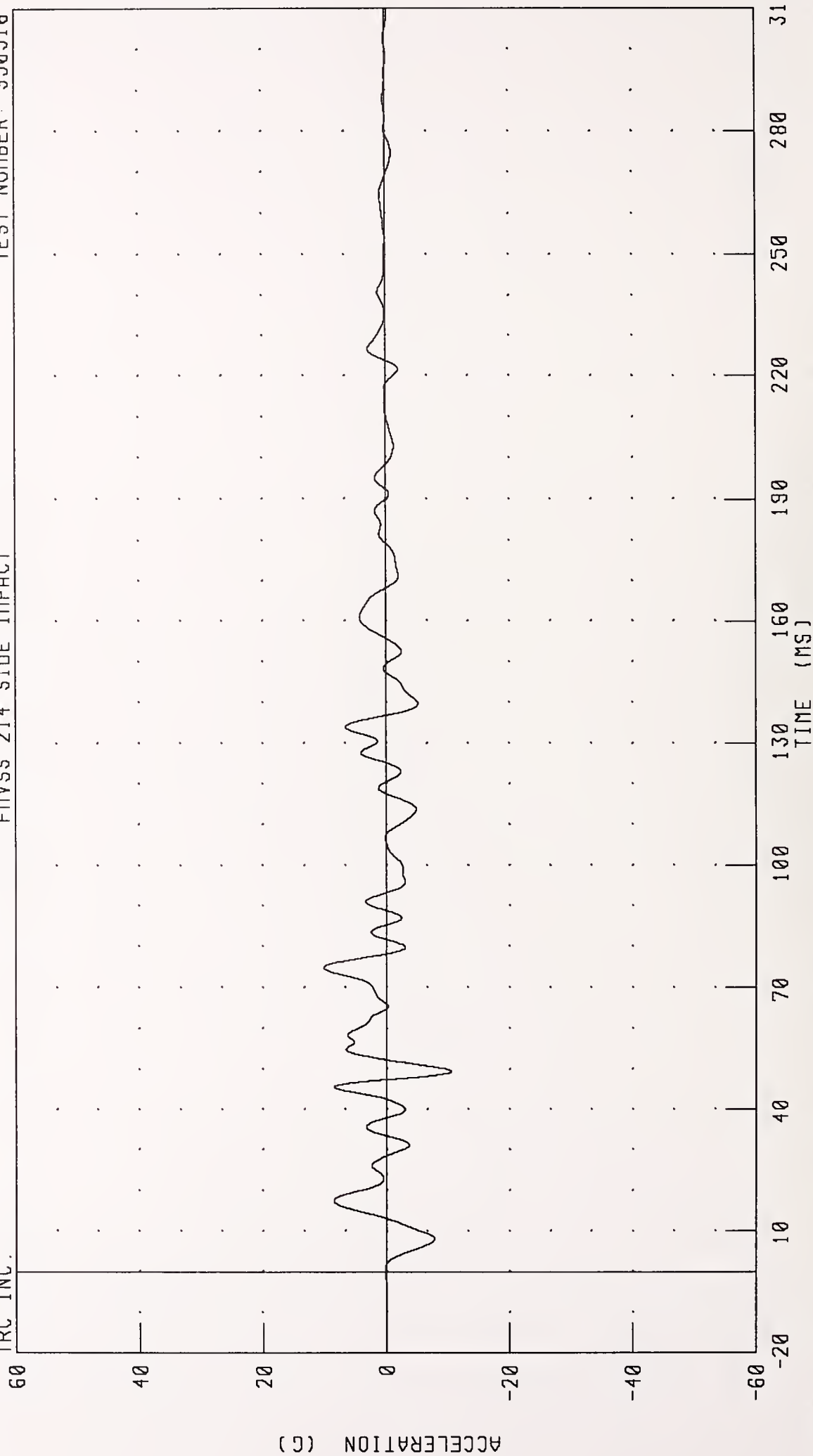
PEAK DATA: 18.12 G @ 27.52 MS; -2.62 G @ 132.40 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
 REAR BATTERY BOX Z-AXIS ACCELERATION

TEST NUMBER 950516

FMVSS 214 SIDE IMPACT

TRC INC.



CHANNEL: RBBZG FILTER: CH. CLASS 60

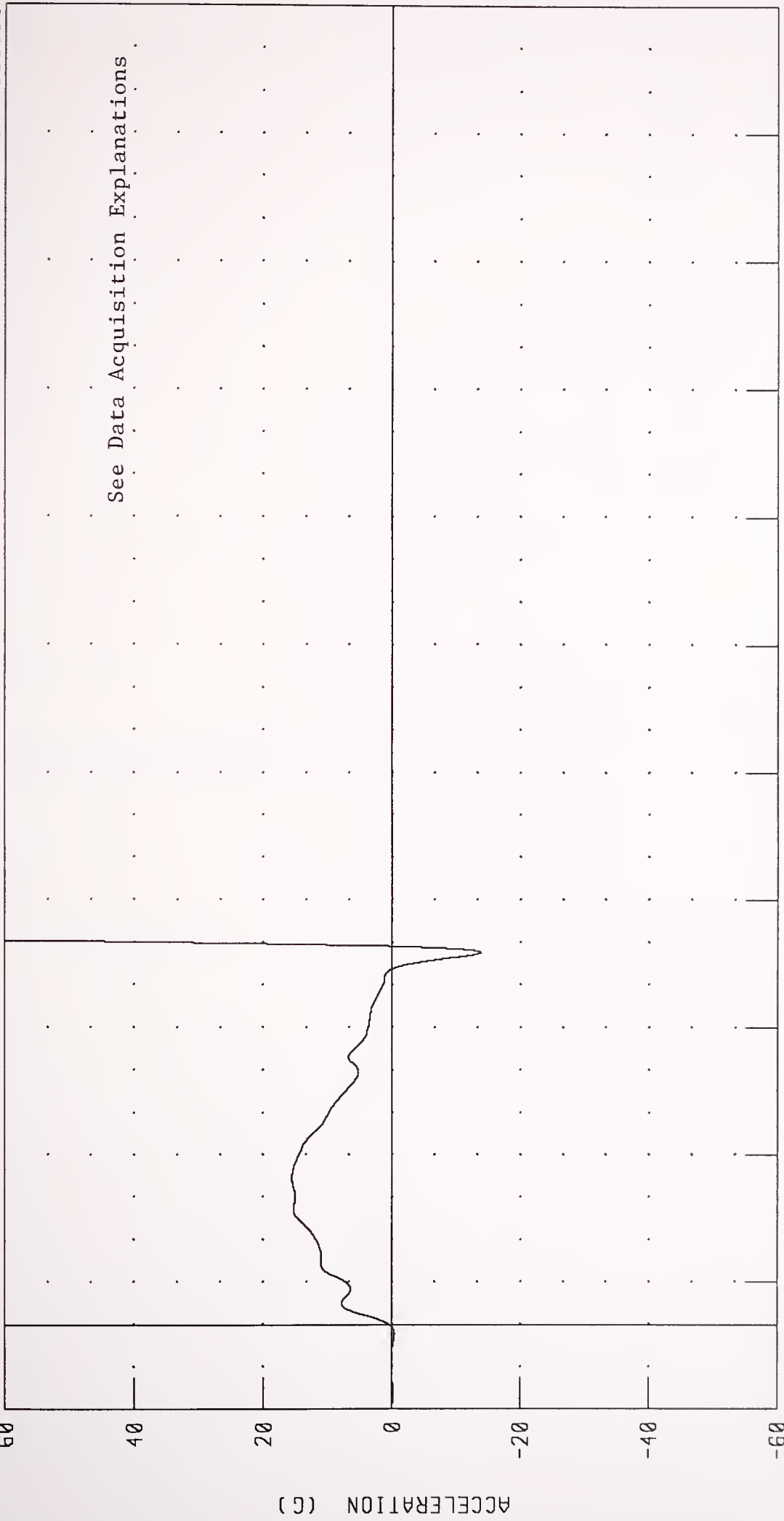
PEAK DATA: 10.19 G @ 74.88 MS; -10.45 G @ 49.36 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER: 950516

ENVSS 214 SIDE IMPACT

TRC INC.



See Data Acquisition Explanations.

CHANNEL: BCGXG FILTER: CH. CLASS 60

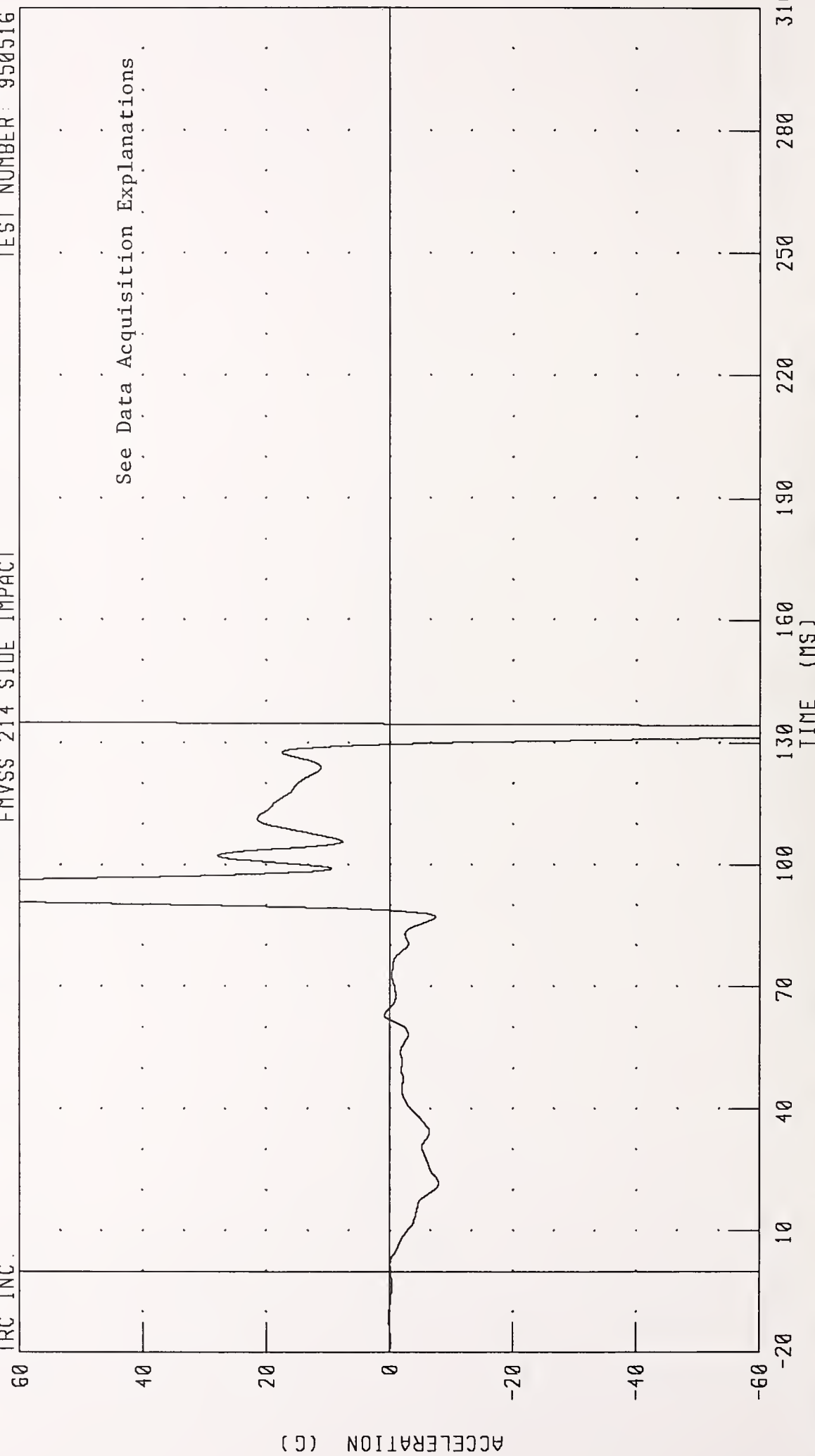
PEAK DATA: 425.58 G @ 283.76 MS; -13.86 G @ 87.68 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC.

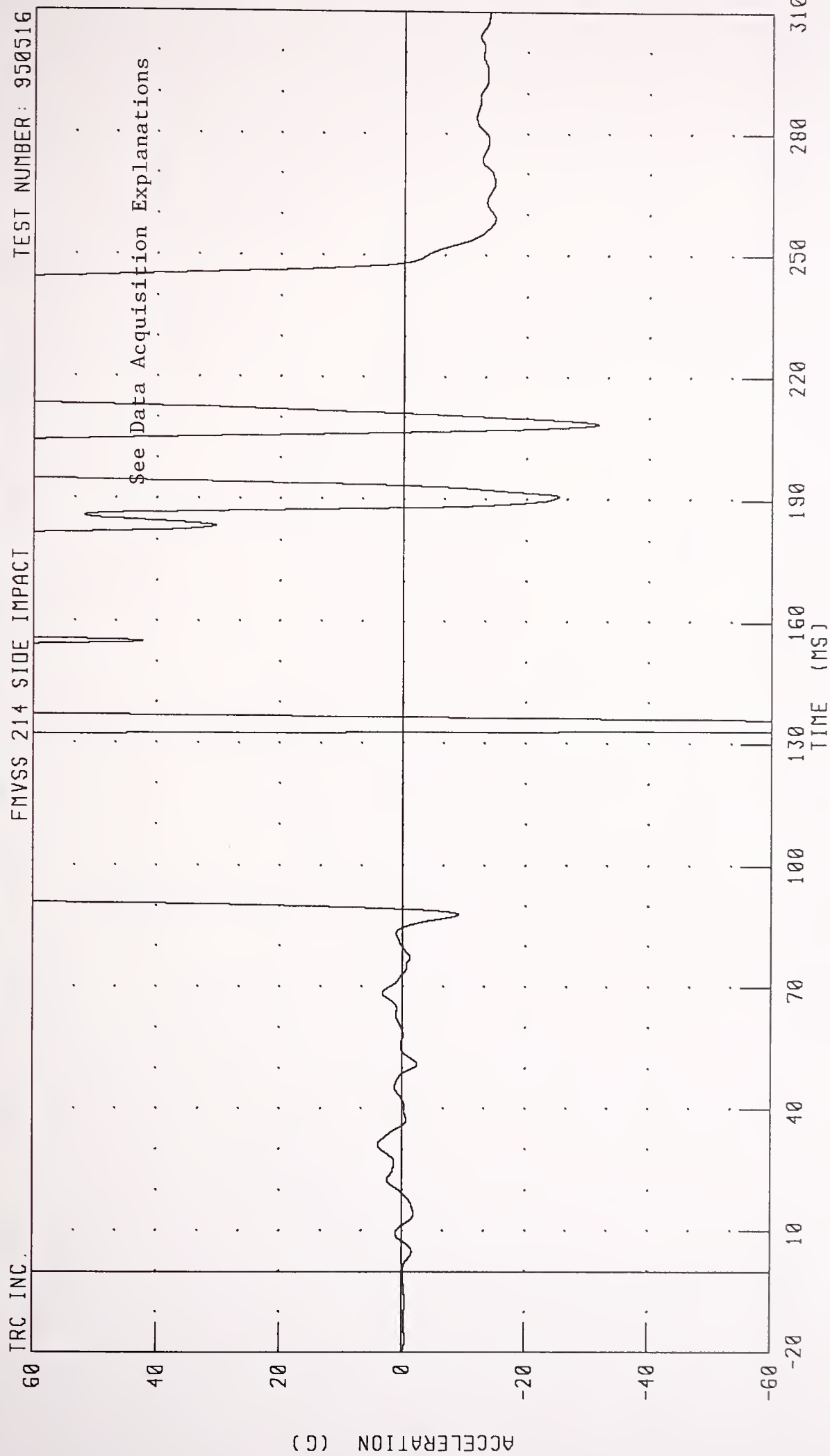


See Data Acquisition Explanations.

CHANNEL: BCCYG FILTER: CH. CLASS 60

PEAK DATA: 439.16 G @ 140.00 MS; -126.49 G @ 132.96 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE MOVING BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION



CHANNEL BCGZG FILTER: CH. CLASS 60

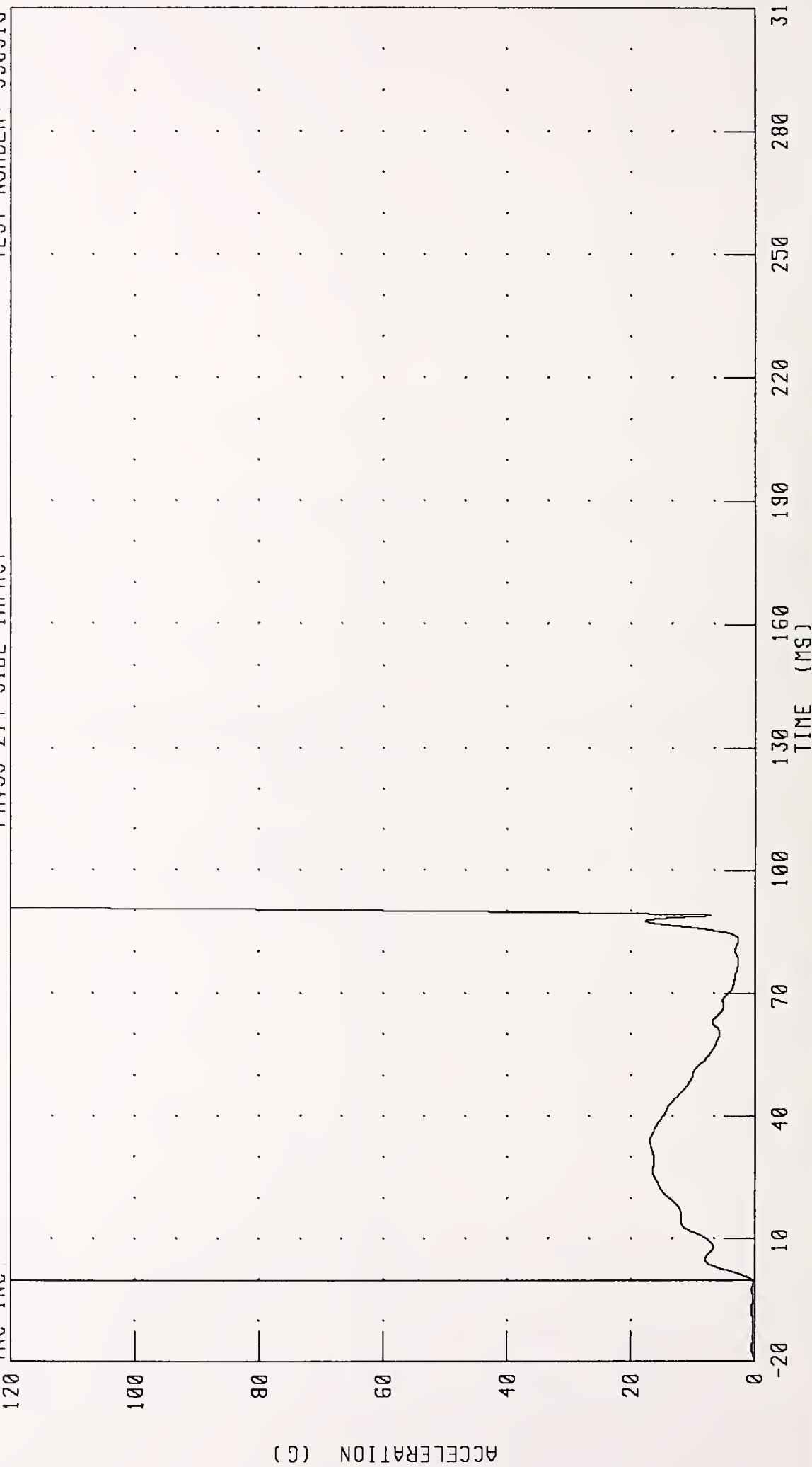
PEAK DATA: 325.11 G @ 141.04 MS; -143.52 G @ 134.32 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION

TEST NUMBER: 950516

FMVSS 214 SIDE IMPACT

TRC INC



CHANNEL: BCGRG FILTER: CH. CLASS 60

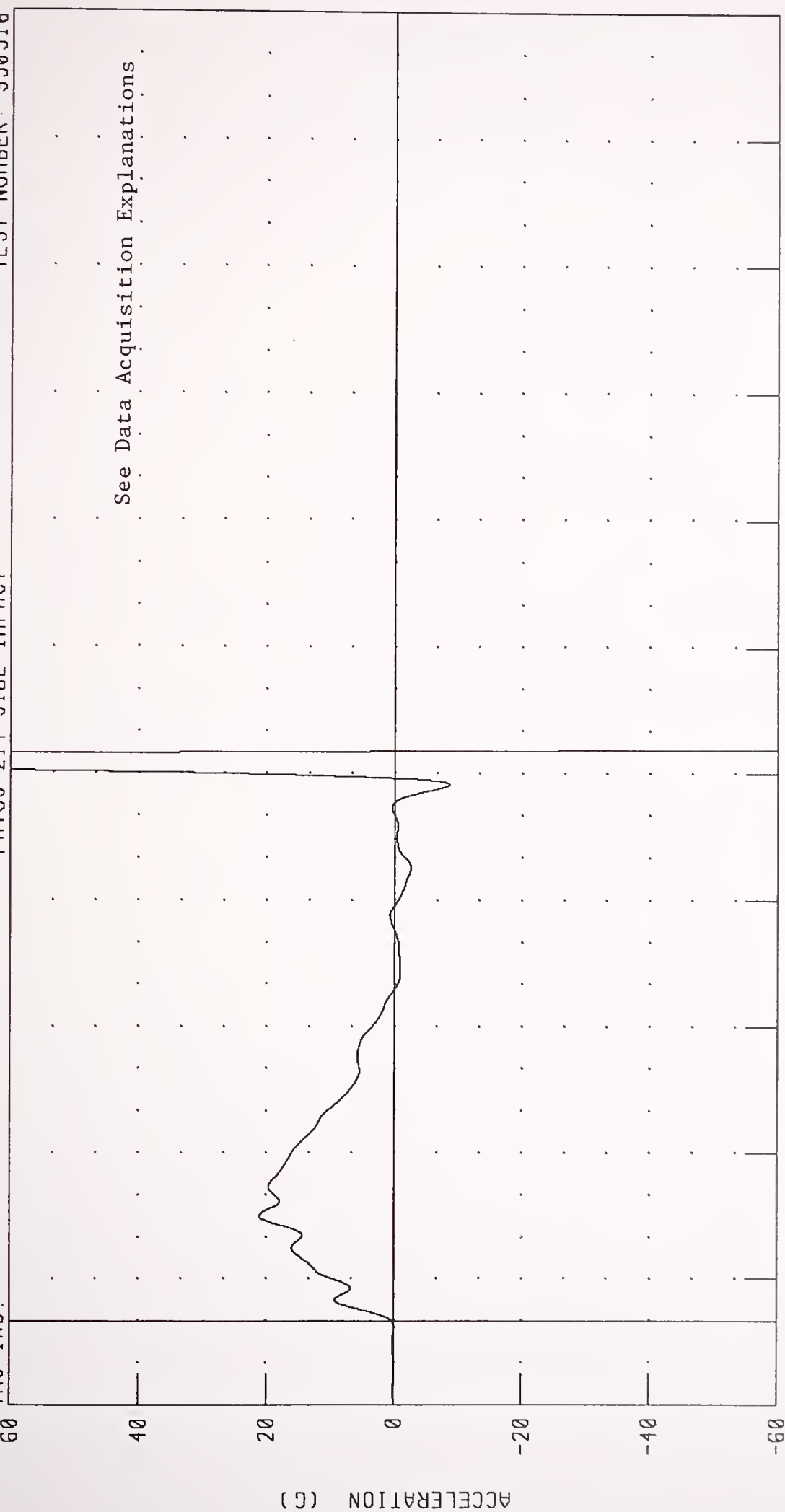
PEAK DATA: 606.03 G @ 140.48 MS; 0.02 G @ -19.92 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER LEFT REAR FRAME RAIL X-AXIS ACCELERATION

TEST NUMBER: 950516

FNVSS 214 SIDE IMPACT

TRC INC.



TIME (MS)

PEAK DATA: 171.48 G @ 133.04 MS; -401.60 G @ 141.12 MS

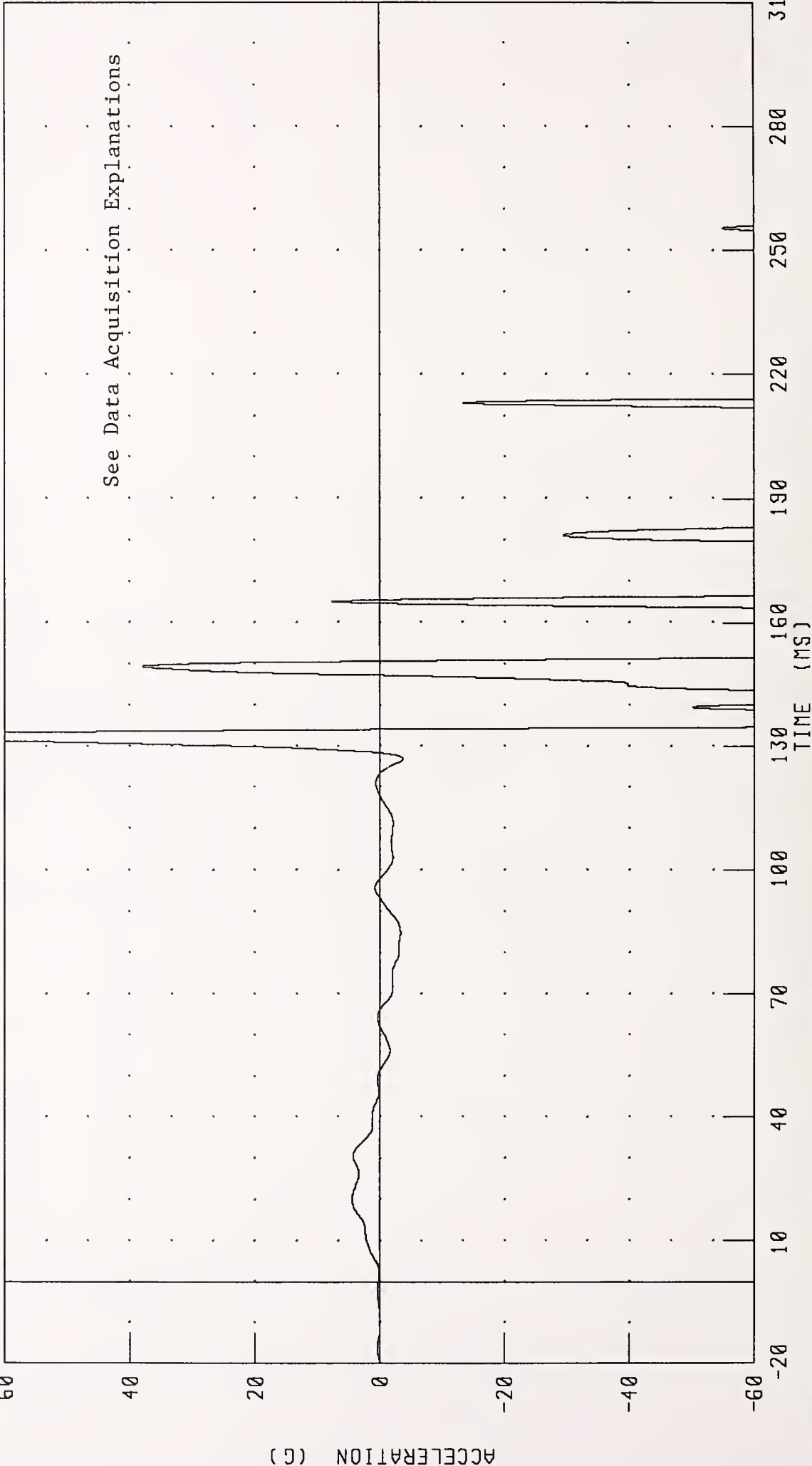
CHANNEL: BSRXG FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE MOVING BARRIER LEFT REAR FRAME RAIL Y-AXIS ACCELERATION

TEST NUMBER: 950516

FNVS 214 SIDE IMPACT

TRC INC.



CHANNEL: BSRYG FILTER: CH CLASS 60

PEAK DATA: 84.07 G @ 132.56 MS; -405.62 G @ 269.04 MS

Appendix C

Dummy Calibration Data

Pre-test Certification Data

Driver Dummy Serial Number: 199

TRANSPORTATION RESEARCH CENTER INC.
 SIDE IMPACT DUMMY
 EXTERNAL DIMENSIONS
 LEFT SIDE CONFIGURATION
 SN 199 FIRST TECHNOLOGY

12-MAY-95

TRC INC. TEST NO: ED19925 572F SN199 EXT.DIMENSION CAL25

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		21.1 DEG. C
	RELATIVE HUMIDITY		50.0 %
SH	SEATED HEIGHT	889 - 909 MM	894.1 MM
HP	HIP PIVOT HEIGHT	99 MM	REFERENCE
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	520.7 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	490.2 MM
HW	HIP WIDTH	356 - 391 MM	386.1 MM
DIMENSIONS WITH CHEST JACKET REMOVED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
RH	RIB HEIGHT	501 - 520 MM	508.0 MM
RD	RIB FROM BACKLINE	229 - 241 MM	241.3 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	175.3 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	175.3 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	≤ 2.5 MM	0.0 MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Pete R. A.

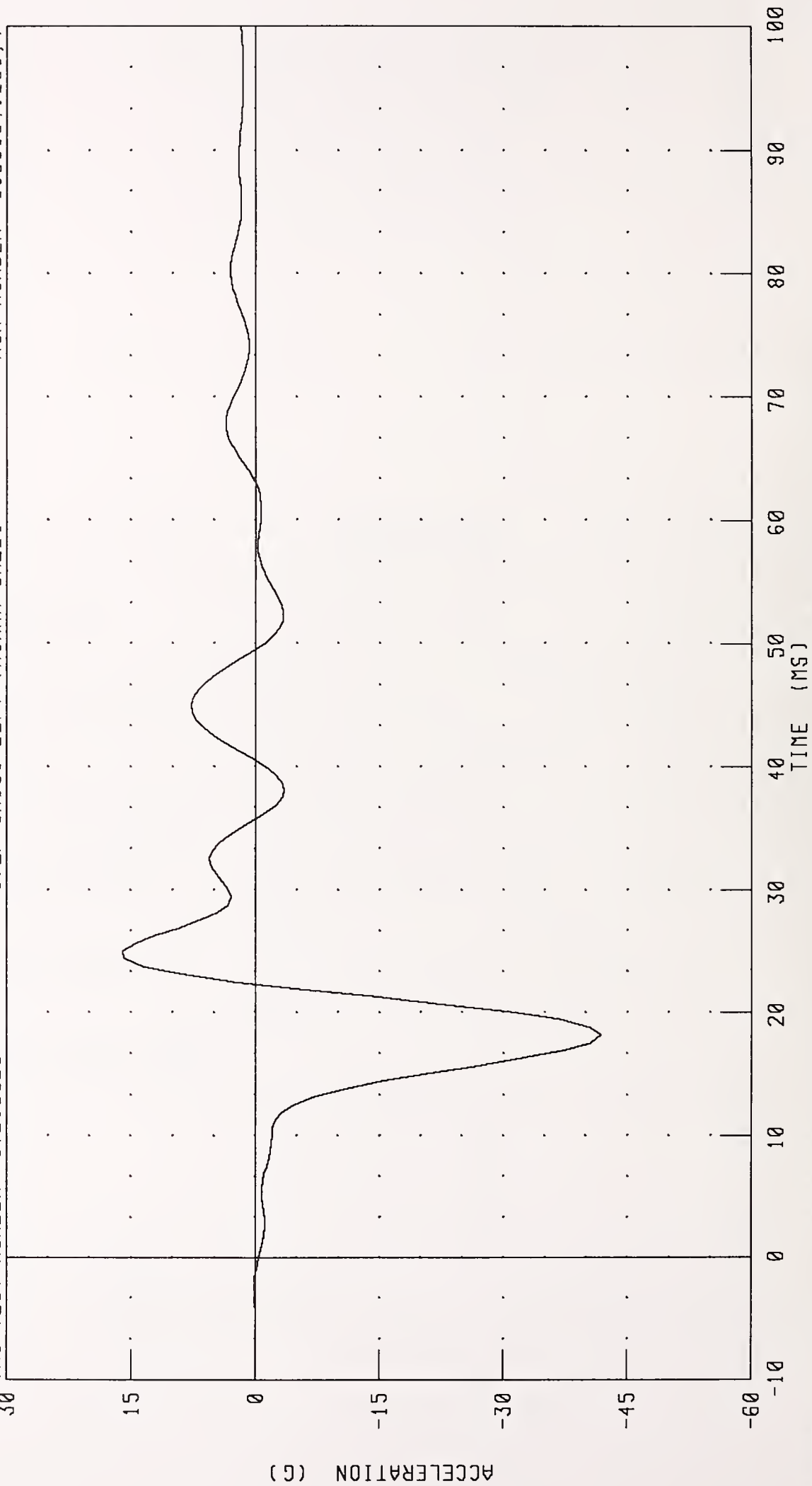
RUN NUMBER: 051795.1243

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
 LEFT LOWER RIB ACCELERATION Y AXIS

TRC TEST NUMBER: STL19925

572F SN199 LEFT THORAX CAL25

RUN NUMBER: 060895.1238;4



CHANNEL: LLRYG FILTER: FIR 100

PEAK DATA: 15.97 G @ 25 00 MS; -41.75 G @ 18.13 MS

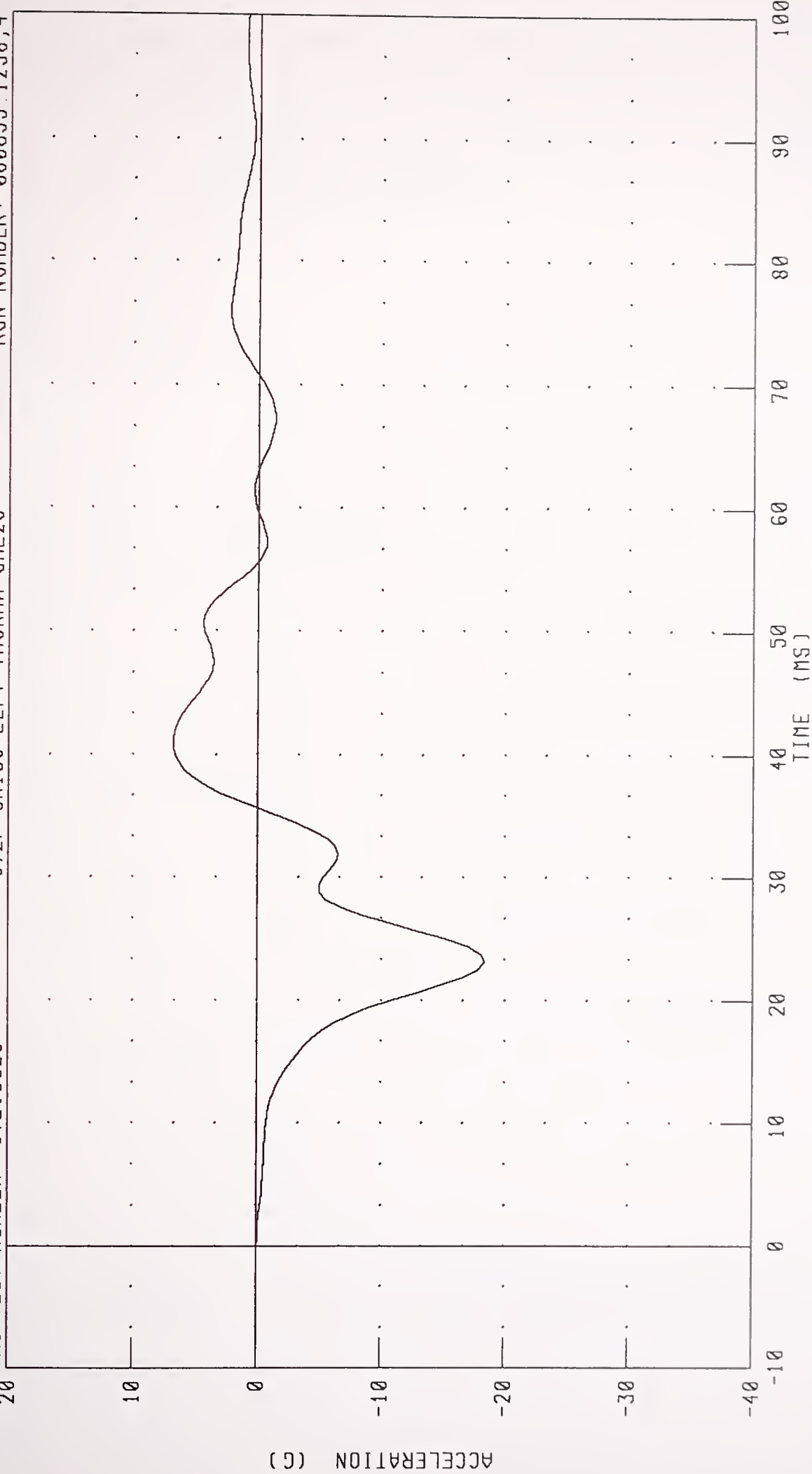
PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)

LOWER SPINE ACCELERATION Y AXIS

TRC TEST NUMBER: STL19925

572F SN199 LEFT THORAX CAL25

RUN NUMBER: 060895.1238,4



CHANNEL: T12YC FILTER: FIR 100

PEAK DATA: 6.78 G @ 41.25 MS; -18.38 G @ 23.13 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY

12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC.

TEST NO: SPL19925

572F SN199 LEFT PELVIS CAL25

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.28 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-51.7 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.6 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

Pete F. St

RUN NUMBER: 051295.1331;1

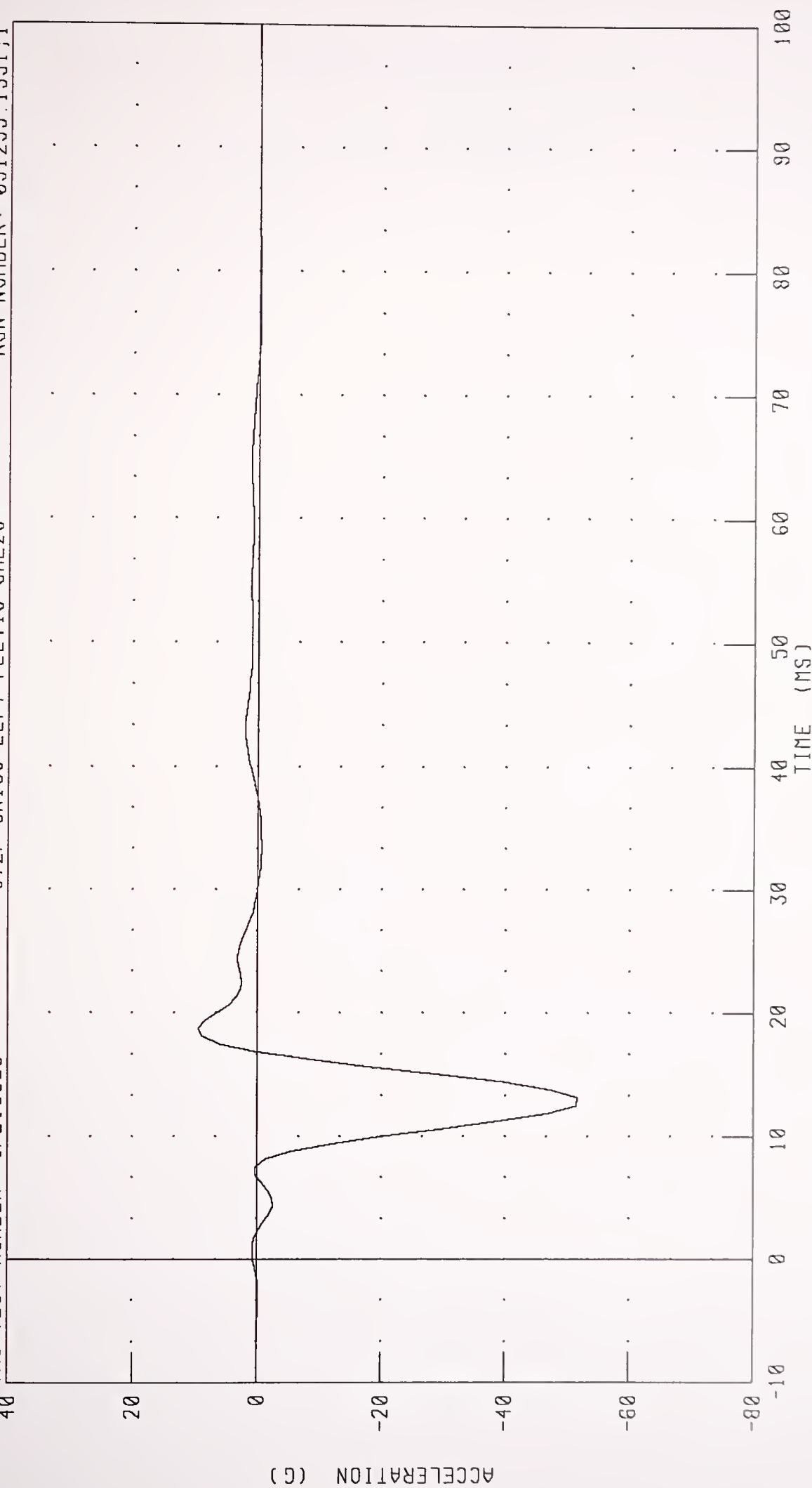
PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)

PELVIS ACCELERATION Y AXIS

TRC TEST NUMBER: SPL19925

572F SN199 LEFT PELVIS CAL25

RUN NUMBER: 051295.1331;1



CHANNEL PEVYG FILTER FIR 100

PEAK DATA: 9 45 G @ 18 75 MS; -51 67 G @ 13 13 MS



Pre-test Certification Data

Passenger Dummy Serial Number: 191



TRANSPORTATION RESEARCH CENTER INC.
 SIDE IMPACT DUMMY
 EXTERNAL DIMENSIONS
 LEFT SIDE CONFIGURATION
 SN 191 FIRST TECHNOLOGY

12-MAY-95

TRC INC. TEST NO: ED19127 572F SN191 EXT.DIMENSION CAL27

=====			
DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
=====			
	TEMPERATURE		21.1 DEG. C
	RELATIVE HUMIDITY		50.0 %
SH	SEATED HEIGHT	889 - 909 MM	899.2 MM
HP	HIP PIVOT HEIGHT	99 MM	REFERENCE
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	525.8 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	495.3 MM
HW	HIP WIDTH	356 - 391 MM	363.2 MM
=====			
DIMENSIONS WITH CHEST JACKET REMOVED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
=====			
RH	RIB HEIGHT	501 - 520 MM	515.6 MM
RD	RIB FROM BACKLINE	229 - 241 MM	236.2 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	172.7 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	172.7 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	≤ 2.5 MM	0.0 MM
=====			

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Pete F. SA

RUN NUMBER: 051795.1245

TRANSPORTATION RESEARCH CENTER INC.

LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY

12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC.

TEST NO: STL19127

572F SN191 LEFT THORAX CAL27

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.22 M/S
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-41.4 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-40.6 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-17.3 G

TEST MEETS SPECIFICATIONS

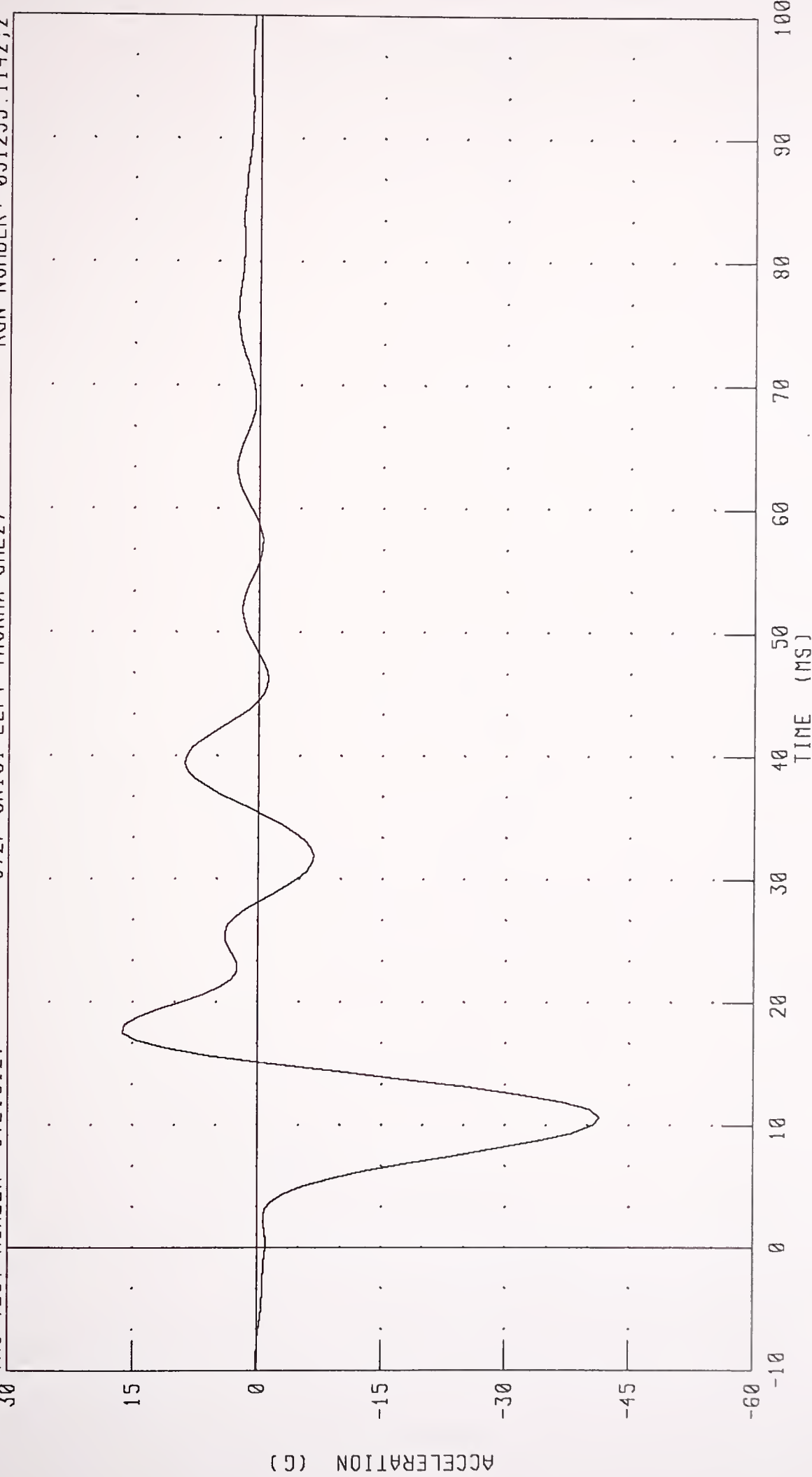
TECHNICIAN

Rita F. J.

RUN NUMBER: 051295.1142;2

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT UPPER RIB ACCELERATION Y AXIS

TRC TEST NUMBER: STL19127 572F SN191 LEFT THORAX CAL27 RUN NUMBER: 051295.1142,2



CHANNEL: LURYG FILTER: FIR 100

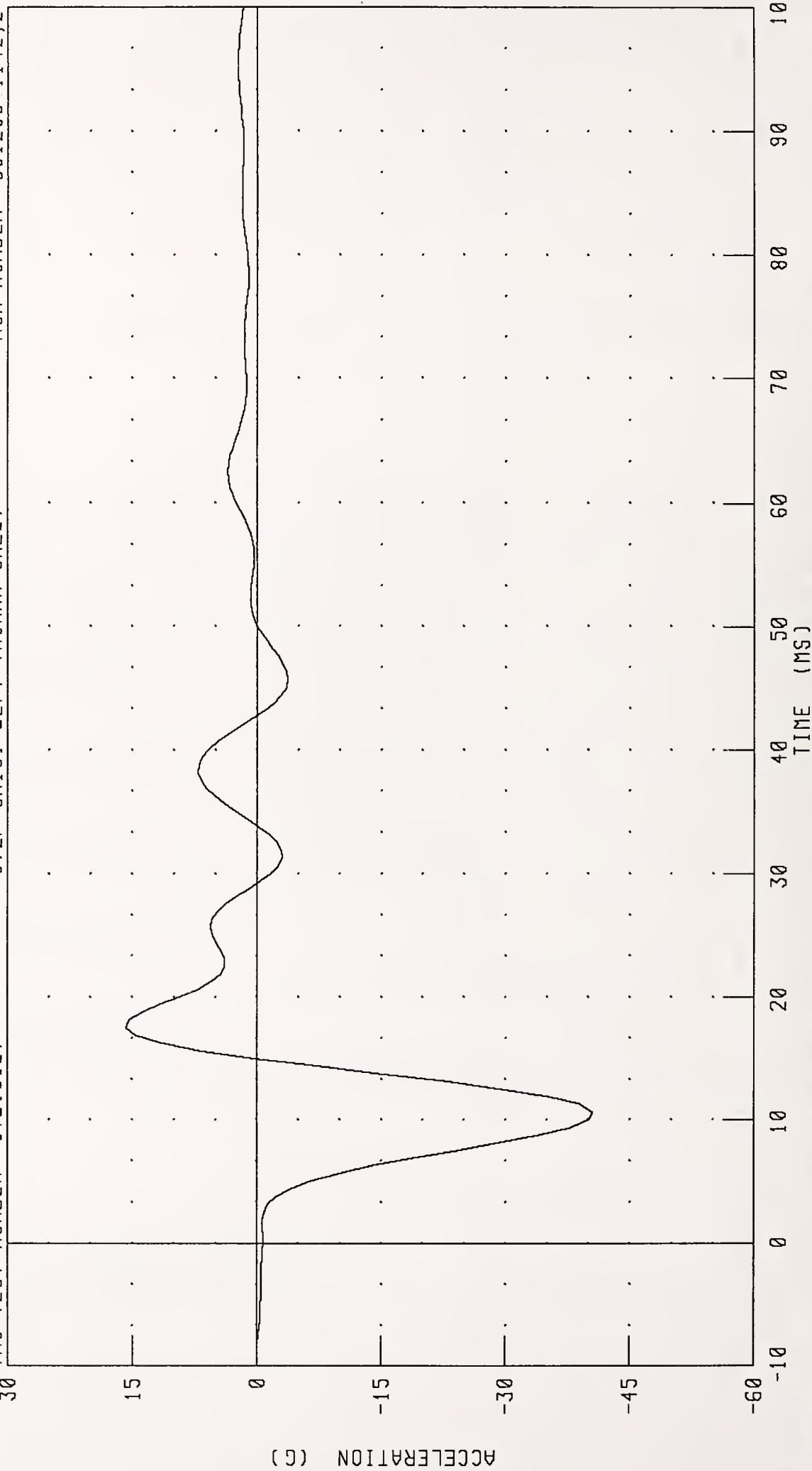
PEAK DATA: 16.24 G @ 17.50 MS; -41.44 G @ 10.63 MS

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS

TRC TEST NUMBER: STL19127

572F SN191 LEFT THORAX CAL27

RUN NUMBER: 051295 1142,2

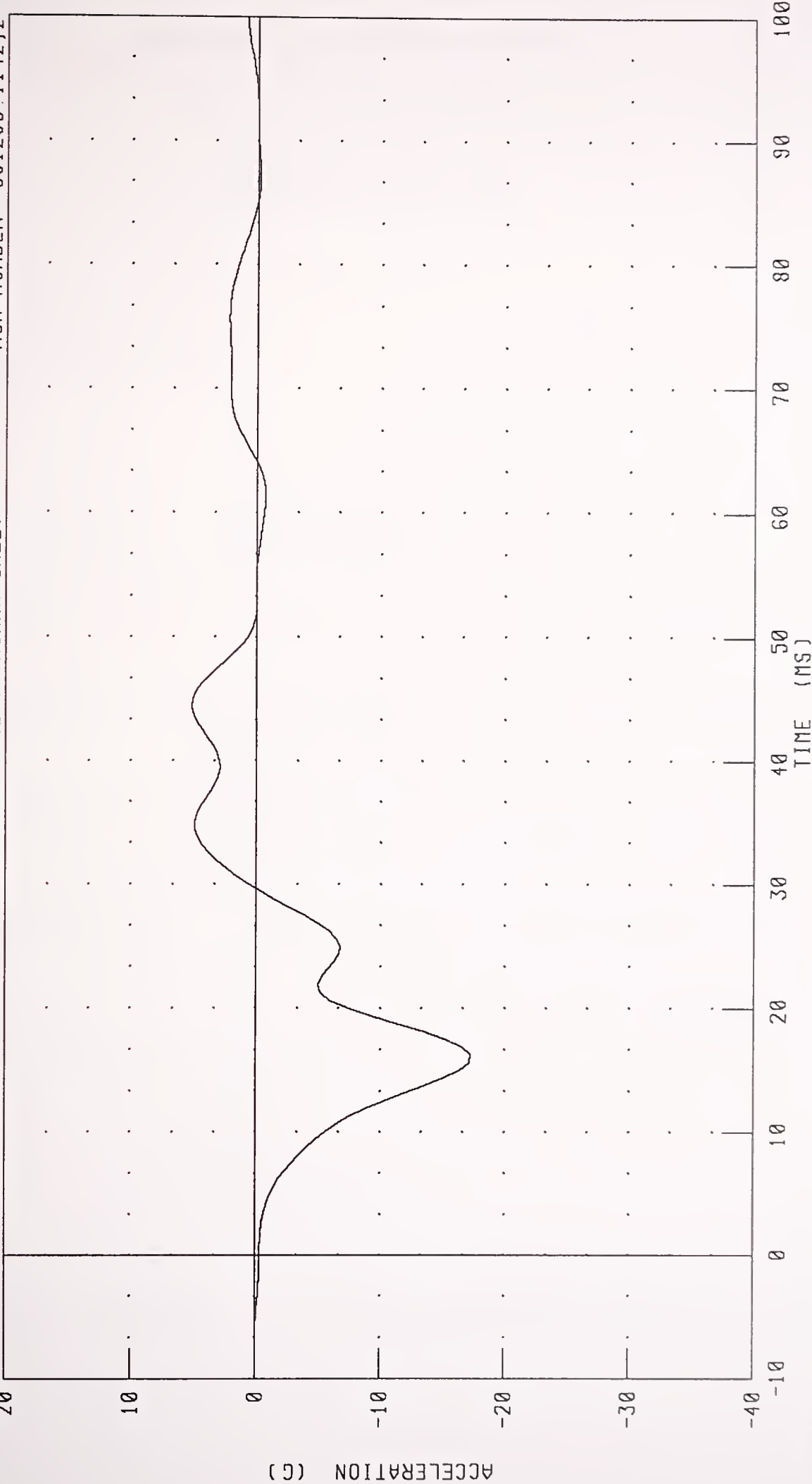


CHANNEL: LLRYG FILTER: FIR 100

PEAK DATA: 15.73 G @ 17.50 MS; -40.58 G @ 10.63 MS

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
 LOWER SPINE ACCELERATION Y AXIS

TRC TEST NUMBER: STL19127 572F SN191 LEFT THORAX CAL27 RUN NUMBER: 051295.1142;2



CHANNEL T12YC FILTER FIR 100

PEAK DATA: 5 16 G @ 44.38 MS; -17 26 G @ 16.25 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY

12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC. TEST NO: SPL19127

572F SN191 LEFT PELVIS CAL27

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.29 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-43.8 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.8 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

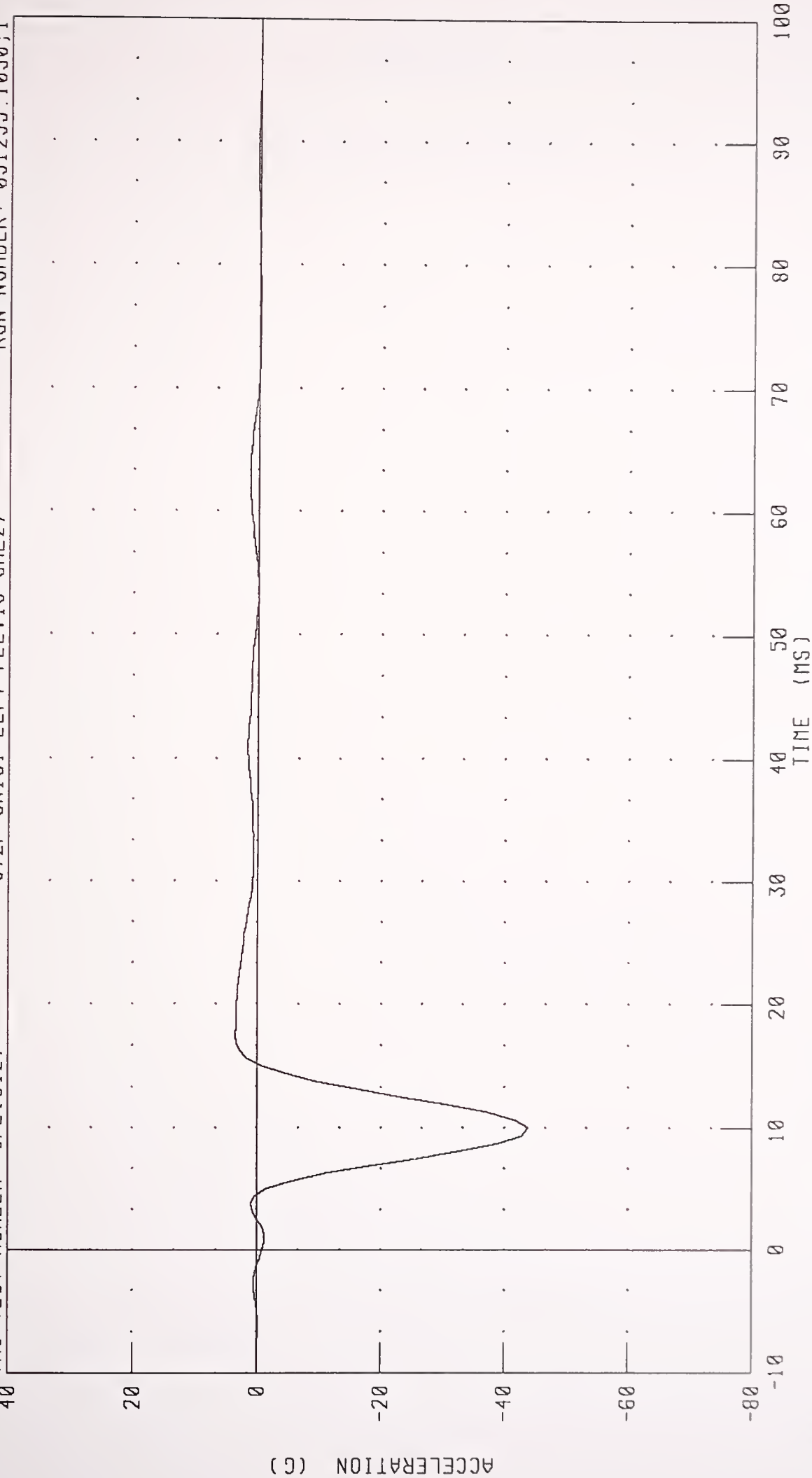
TECHNICIAN

Pete F. S.

RUN NUMBER: 051295.1015;1

PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)
 PELVIS ACCELERATION Y AXIS

TRC TEST NUMBER: SPL19127 572F SN191 LEFT PELVIS CAL27 RUN NUMBER: 051295.1030;1



CHANNEL PEVYG FILTER FIR 100 PEAK DATA: 3.47 G @ 17.50 MS, -43.82 G @ 10.00 MS



Appendix D

Miscellaneous Test Information



Dummy Instrumentation Placement

Dummy Manufacturer & S/N: First Technology #199

Seating Position: Driver

Description	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
Left lower spine acceleration	Y	Endevco	7264	CR21H	Left
Left lower spine acceleration Redundant	Y	Endevco	7264	AGRG8	Left
Left upper rib acceleration	Y	Endevco	7264	EA78J	Right
Left upper rib acceleration Redundant	Y	Endevco	7264	CY39H	Right
Left lower rib acceleration	Y	Endevco	7264	CY62H	Right
Left lower rib acceleration Redundant	Y	Endevco	7264	CC91H	Right
Pelvis acceleration	Y	Endevco	7264	CY92H	Left
Pelvis acceleration Redundant	Y	Endevco	7264	CC11H	Right

Dummy Instrumentation Placement

Dummy Manufacturer & S/N: First Technology #191

Seating Position: Left rear passenger

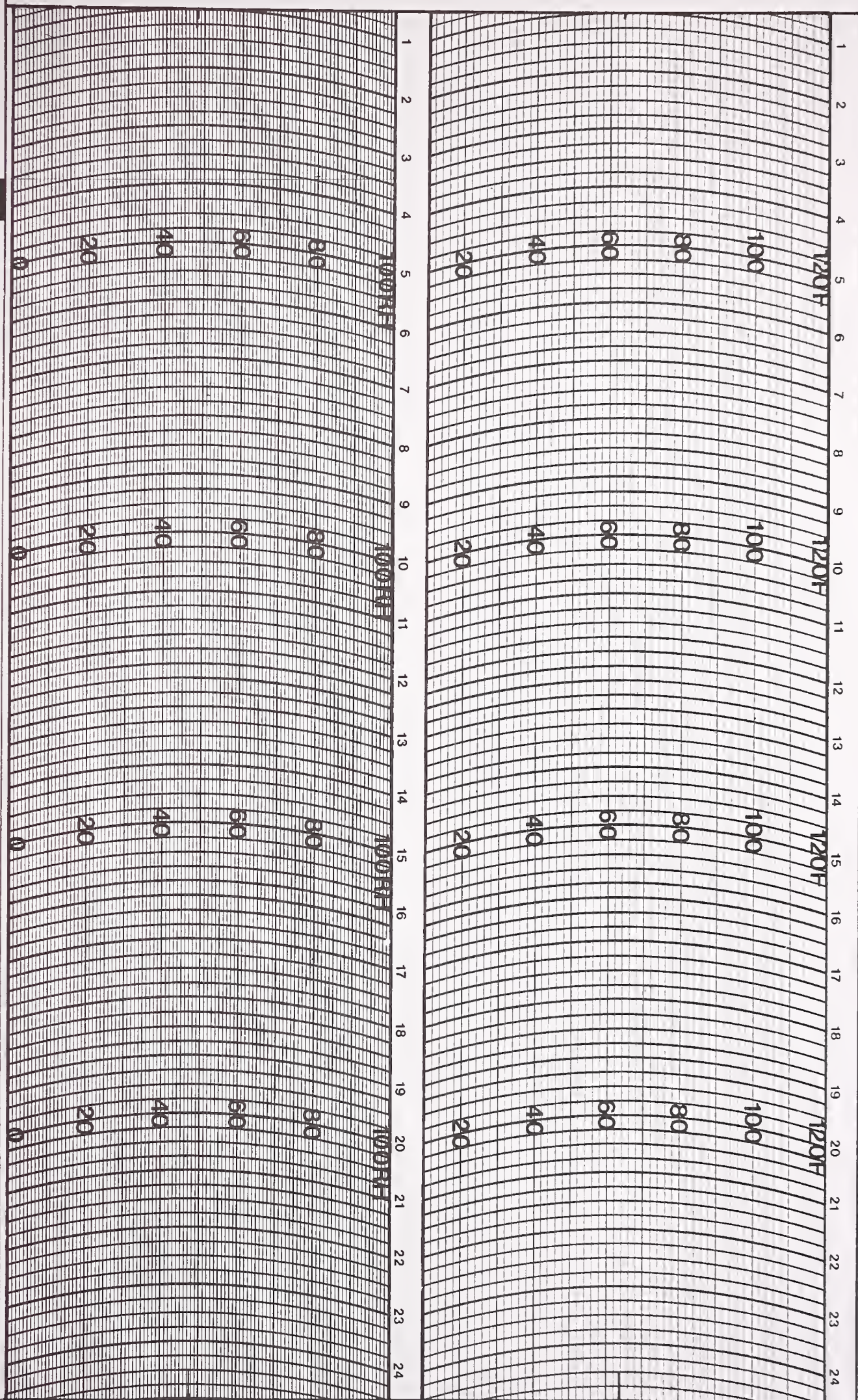
Description	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
Left lower spine acceleration	Y	Endevco	7264	A81JJ	Left
Left lower spine acceleration Redundant	Y	Endevco	7264	A56JJ	Left
Left upper rib acceleration	Y	Endevco	7264	A20FJ	Right
Left upper rib acceleration Redundant	Y	Endevco	7264	AGRG5	Right
Left lower rib acceleration	Y	Endevco	7264	A31FJ	Right
Left lower rib acceleration Redundant	Y	Endevco	7264	AGRH9	Right
Pelvis acceleration	Y	Endevco	7264	A85JJ	Left
Pelvis acceleration Redundant	Y	Endevco	7264	CH67H	Right

Vehicle Instrumentation Placement

No.	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Right front sill	X	Endevco	7264	AJ790	Rear
		Y	Endevco	7264	AJ7J9	Left
		Z	Endevco	7264	AJ7F8	Up
2	Right rear sill	X	Endevco	7264	AJ8C5	Front
		Y	Endevco	7264	AJ798	Left
		Z	Endevco	7264	AJ454	Up
3	Rear battery box	Y	Endevco	7264	BE69J	Right
		Z	Endevco	7264	EJ69J	Up
4	Left rear sill	Y	Endevco	7264	AJ708	Right
5	Left front sill	Y	Endevco	7264	AJ7W3	Right
6	Left front door centerline	Y	Endevco	7264	AJ452	Left
7	Right rear seat	Y	Endevco	7264	AJ5P2	Right
8	Left front door mid - rear	Y	Endevco	7264	AJ7Y4	Left
9	Left front door upper centerline	Y	Endevco	7264	AJ455	Left
10	Left rear door mid - rear	Y	Endevco	7264	AJ7W9	Left
11	Left rear door upper centerline	Y	Endevco	7264	AJ7K0	Left
12	Front battery box	Y	Endevco	7264	AJ5P0	Right
		Z	Endevco	7264	AE9B7	Up

Moving Deformable Barrier Instrumentation Placement

No.	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Center of gravity	X	Endevco	7264	AC9H1	Rear
		Y	Endevco	7264	ADAW3	Right
		Z	Endevco	7264	AF9J0	Up
2	Left frame rail over rear axle	X	Endevco	7264	AGAC4	Front
		Y	Endevco	7264	BF11J	Left



WEATHER MEASURE
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SACRAMENTO, CA. 95841
PHONE (916) 481-7565

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PART # 699123

STATION _____ DATE ON _____ DATE OFF _____



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