V2003

48/24 KPH 90° DRIVER'S SIDE IMPACT
(MOVING DEFORMABLE BARRIER)
1993 PLYMOUTH VOYAGER

PREPARED BY:
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FINAL REPORT
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PREPARED FOR:
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16. Abstract

This 48/24 kph 90° driver's side impact test was conducted at Transportation Research Center Inc. on November 9, 1993. The test vehicle was a 1993 Plymouth Voyager. This test was conducted to aid in the development of extending the test procedure for FMVSS No. 214, "Side Impact Protection - Passenger Cars," to include light trucks and vans.

The deformable barrier face was raised 235 millimeters above its standard height specified in the FMVSS No. 214 Laboratory Test Procedure and its test weight was 1633 kilograms. Energy absorbing padding (762 mm of Arcel 512, 2.5 pcf) was placed on the inside surface of the driver's door panel and the left rear passenger's side panel aligned with each dummy's pelvis and thorax. The impact velocity of the moving deformable barrier was 54.1 kph. The moving deformable barrier struck the vehicle 923 mm forward of the subject vehicle's wheelbase mid-point.
Results for the driver and passenger SIDs are:

	Driver SID	Passenger SID
Left upper rib acceleration	65.7 g's	61.0 g's
Left lower rib acceleration	68.2 g's	67.4 g's
Upper spine acceleration	92.2 g's	77.0 g's
Lower spine acceleration	73.7 g's	88.8 g's
Thoracic Trauma Index (TTI)	71	78
Pelvic acceleration	94.3 g's	81.5 g's

17. Key Words	18. Distribution Statement
48/24 kph 90° Driver's Side Impact Light Trucks and Vans 1993 Plymouth Voyager	

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METRIC CONVERSION FACTORS

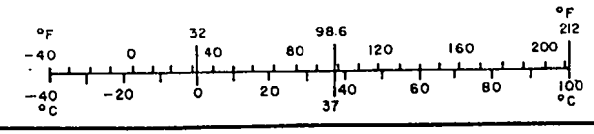
Approximate Conversions to Metric Measures

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 48/24 kph 90° driver's side impact test was conducted for Vehicle Research and Test Center by Transportation Research Center Inc. (TRC). The purpose of this test was to aid in the development of extending the test procedure for FMVSS 214, "Side Impact Protection - Passenger Cars," to include the testing of light trucks and vans.

TEST PROCEDURE

This test was conducted using NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-214D-02 as a guideline. Data was obtained relative to FMVSS 214, "Side Impact Protection - Passenger Cars," and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with ten (10) accelerometers oriented to measure longitudinal, lateral, and vertical axis accelerations. The test vehicle was positioned so that its longitudinal centerline was at an angle of 63° to the tow cable system.

The test vehicle contained two (2) Part 572 F side impact adult male anthropomorphic test devices (dummies). The dummies were positioned in the left front and rear outboard seating positions according to the dummy placement procedure specified as an attachment to the Laboratory Test Procedure. The dummies were instrumented with head, pelvis, upper spine, and lower spine accelerometers oriented to measure longitudinal, lateral, and vertical axis accelerations. Upper rib and lower rib accelerometers were oriented to measure lateral axis accelerations. Each dummy was restrained by a 3-point unibelt. Energy absorbing padding,(762mm of Arcel 512, 2.5 pcf), was placed on the inside surface of the driver's door panel and the left rear passenger's side panel aligned with each dummy's pelvis and thorax.

The moving deformable barrier was instrumented with five (5) accelerometers oriented to measure longitudinal, lateral, and vertical axis accelerations. The moving barrier was crabbed clockwise at a 27° angle to the tow cable system and its deformable barrier face was raised 235 mm above the standard barrier face height specified in the Laboratory Test Procedure. The bottom most edge of the deformable barrier face was 514 mm above the ground level. The moving deformable barrier's weight was 1633 kg and its specified velocity range was 53.1 to 54.7 kph.

The subject vehicle was monitored for fuel leakage immediately after the impact event and during a 360° post-impact static rollover test.

The fifty-one (51) data channels were multiplexed and recorded on a 14-track tape deck. The data was digitally sampled at 12500 samples per second and processed per Section 12.0 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and nine (9) high-speed motion picture cameras operating at approximately 1000 frames per second.

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 214 data are presented in Section 3.0. The FMVSS 301 data are presented in Section 4.0. The vehicle, occupant, and camera measurements are presented in Section 5.0. 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 90° driver's side impact test was conducted at TRC on November 9, 1993.

The test vehicle, a 1993 Plymouth Voyager, was equipped with a 2.5-liter, transverse engine, automatic transmission, and power brakes. Two Part 572 F dummies were seated in the left front and rear outboard seating position. The vehicle's test weight was 1757 kilograms. The moving deformable barrier's impact speed was 54.1 kph. The vehicle's maximum static crush was 565 millimeters.

The driver dummy's Thoracic Trauma Index (TTI(d)) and Head Injury Criteria (HIC) were 71 and 688, respectively. Maximum pelvis lateral acceleration was 94.3 g.

The left rear passenger dummy's Thoracic Trauma Index (TTI(d)) and Head Injury Criteria (HIC) were 78 and 784, respectively. Maximum pelvis lateral acceleration was 81.5 g.

The moving barrier's leading edge of contact was 923 mm forward of the subject vehicle's wheelbase mid-point.

The door on the struck side of the test vehicle did not separate from the vehicle's main body at the hinges or latch. The doors on the opposite side did not open during the crash event.

DATA ACQUISITION EXPLANATIONS

The subject vehicle's left front sill Y-axis acceleration data channel, LFSYG1, recorded anomalous data spikes between 40 and 50 milliseconds.

The subject vehicle's rear floorpan above rear axle Y-axis acceleration data channel, RDKYG1, stopped recording data after approximately 60 milliseconds because the accelerometer's cable was pulled from its connector by vehicle crush. This anomaly affected the computation of the subject vehicle's rear floorpan above rear axle resultant acceleration.

The driver dummy's lower spine Z-axis acceleration data channel, T12ZG1, exceeded its data channel full scale output at 32.5 milliseconds. This anomaly affected the computations of the driver dummy's lower spine resultant acceleration and resultant redundant acceleration.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Moving Deformable Barrier Left Side Impact

TEST DATE: 11/09/93 TEST TIME: 1448 AMBIENT TEMP. (°C): 10

VEHICLE: 1993 Plymouth Voyager

VEHICLE TEST WEIGHT (KG): 1757

MOVING BARRIER TEST WEIGHT (KG): 1633

IMPACT ANGLE[1] (DEG): 270

IMPACT VELOCITY[2] (KPH): PRIMARY = 54.1 SECONDARY = 54.1

DUMMIES:	DRIVER #903	PASSENGER #906
TYPE:	PART 572 F	PART 572 F
LOCATION:	LEFT FRONT	LEFT REAR
RESTRAINT:	3-POINT UNIBELT	3-POINT UNIBELT

NUMBER OF DATA CHANNELS: 51

NUMBER OF CAMERAS: HIGH-SPEED 9 REAL-TIME 1

[1]Measured clockwise from struck vehicle's front longitudinal centerline.
[2]Speed trap measurement (± .08 kph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation.

MAKE/MODEL/BODY STYLE: Plymouth/Voyager/Minivan

MODEL YEAR: 1993

VIN: 2P4FH25KXPR213817 COLOR: Red

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 2.5 liters

TRANSMISSION DATA: _3_SPEED, ___MANUAL, _X_AUTOMATIC, _X_FWD, ___RWD, ___4WD

DATE VEHICLE RECEIVED: 11/02/93 ODOMETER READING: 101

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	Yes	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	Yes
RADIO	Yes	ANTI-SKID BRAKE	Yes
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes
OTHER	None		

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Chrysler Corporation

DATE OF MANUFACTURE: 11/92 VIN: 2P4FH25KXPR213817

GVWR: 4650 LBS.

GAWR: FRONT: 2544 LBS., REAR: 2420 LBS.

TABLE 2 TEST VEHICLE INFORMATION, CONT'D.

TIRES ON VEHICLE (MFR., LINE, SIZE): Goodyear, Invicta GA, P195/75R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 241 kpa
REAR: 241 kpa

SPARE TIRE (MFR., LINE, SIZE): Goodyear, T115, 70D15

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 1835 MM

WHEELBASE: 2857 MM

LOCATION OF "RECOMMENDED TIRE PRESSURE" LABEL:

The label was located on the driver's door.

DATA FROM VEHICLE'S "RECOMMENDED TIRE PRESSURE" LABEL:

RECOMMENDED TIRE SIZE: P195/75R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 35 psi; REAR: 35 psi

DESIGNATED SEATING CAPACITY: NA FRONT NA REAR NA TOTAL

VEHICLE CAPACITY WEIGHT: NA LBS

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE:	LF	759;	RF	770;	LR	762;	RR 775
PRE-TEST ATTITUDE:	LF	715;	RF	723;	LR	735;	RR 745
POST-TEST ATTITUDE:	LF	720	RF	665	LR	716	RR 678

TABLE 2 TEST VEHICLE INFORMATION, CONT'D.

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

RIGHT FRONT	426 KG	RIGHT REAR	299 KG
LEFT FRONT	441 KG	LEFT REAR	301 KG
TOTAL FRONT WEIGHT	867 KG	(59.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	600 KG	(40.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1467 KG		

TARGET TEST WEIGHT[1] = 1757 KG

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 132 KG OF CARGO WEIGHT:

RIGHT FRONT	511 KG	RIGHT REAR	360 KG
LEFT FRONT	524 KG	LEFT REAR	362 KG
TOTAL FRONT WEIGHT	1035 KG	(58.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	722 KG	(41.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1757 KG	(0.0% UNDER/OVER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 0 KG

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Rear hatch

CG = 1174 MM REARWARD OF FRONT WHEEL CENTERLINE

[1]Provided by VRTC to match test performed on September 14, 1993.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 931109

TEST DATE: 11/09/93

TEST TIME: 1448

TEST TYPE: Moving Deformable Barrier Left Side Impact

IMPACT ANGLE[1] (DEG): 270

AMBIENT TEMPERATURE AT IMPACT AREA: 10° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 22° C

IMPACT VELOCITY: PRIMARY = 54.1 KPH
SECONDARY = 54.1 KPH
(SPECIFIED RANGE = 53.1 TO 54.7 KPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 356 MM

EXITING VELOCITY TRAP = 51 MM

[1]Measured clockwise from struck vehicle's front longitudinal centerline.

TABLE 4 TEST CONDITIONS

TEST NUMBER: 931109

DATE OF TEST: 11/09/93

TIME OF TEST: 1448

WIND VELOCITY: NA

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 10° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 20° C

VEHICLE DATA

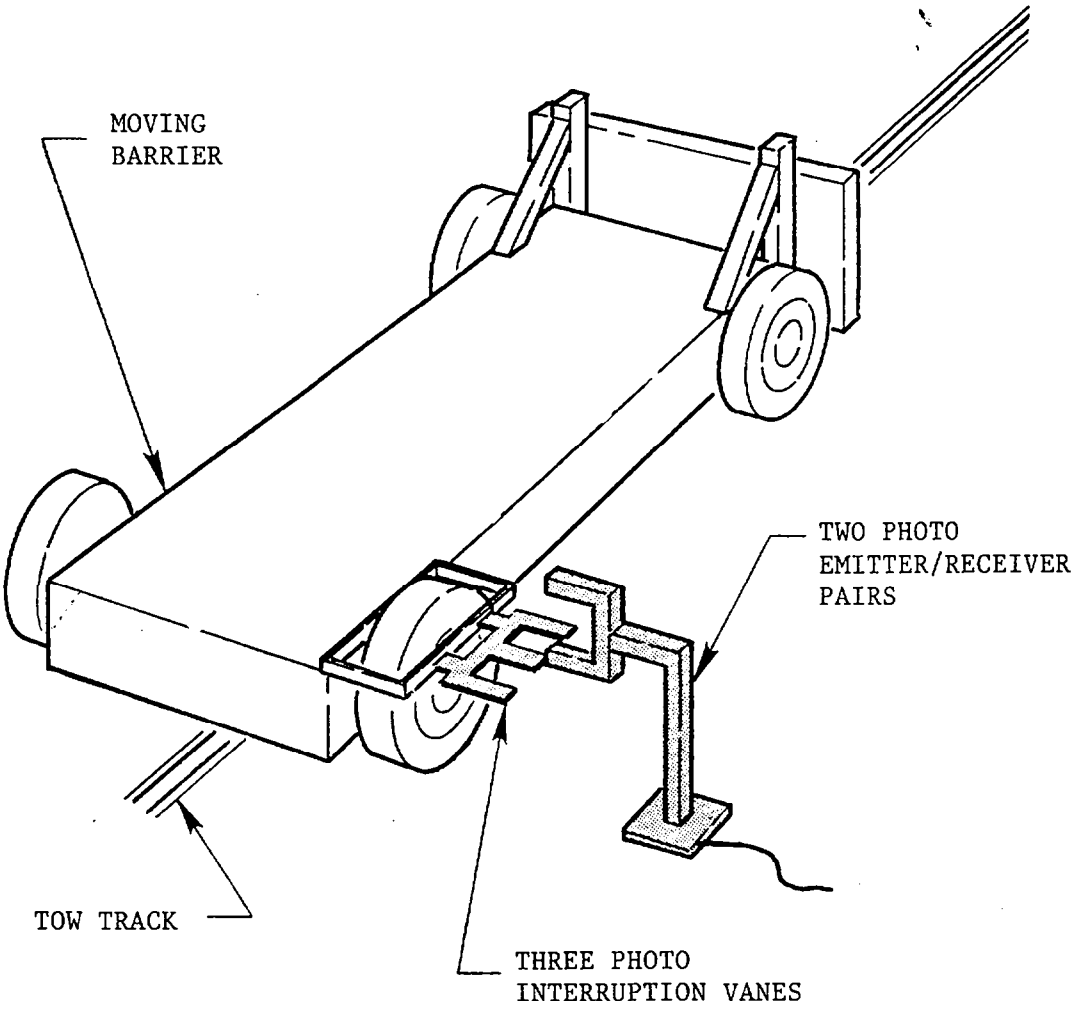
	ACTUAL	INTENDED
SUBJECT VEHICLE TEST WEIGHT (KG):	1757	1757
MOVING DEFORMABLE BARRIER TEST WEIGHT (KG):	1633	1633
MOVING DEFORMABLE BARRIER VELOCITY (KPH)[1]:	54.1	53.9
IMPACT POINT (MM)[2]:	923	940

DUMMY INFORMATION

	DRIVER	LEFT REAR PASSENGER
TYPE:	SID	SID
SERIAL NO.:	906	903
INSTRUMENTATION:		
HEAD ACCELEROMETERS:	3	3
UPPER SPINE ACCELEROMETERS:	4	4
UPPER RIB ACCELEROMETERS:	2	2
LOWER RIB ACCELEROMETERS:	2	2
LOWER SPINE ACCELEROMETERS:	4	4
PELVIS ACCELEROMETERS:	3	3
RESTRAINT SYSTEM:	3-POINT UNIBELT	3-POINT UNIBELT

[1]As measured over final 305 mm of travel.
[2]As measured forward of the subject vehicle's wheelbase mid-point.

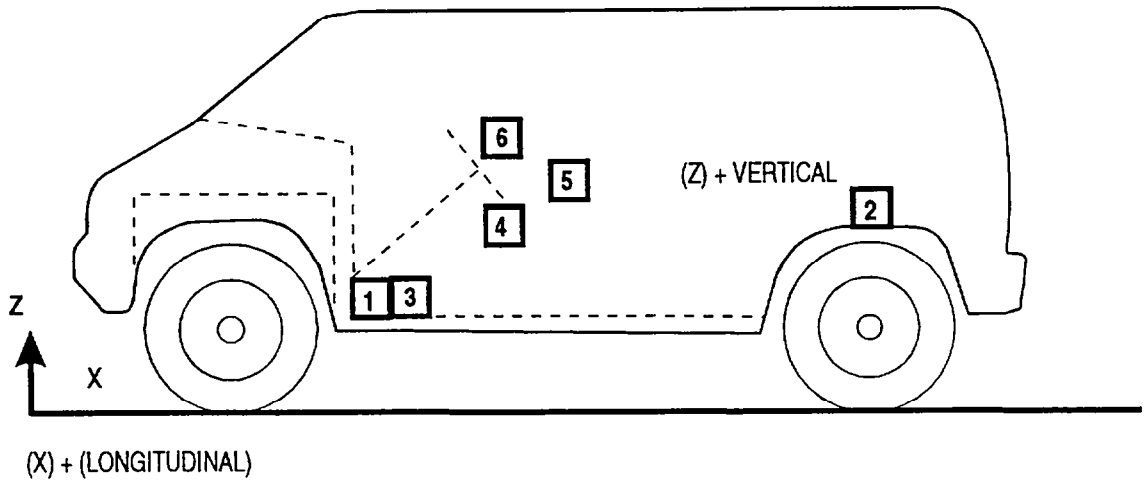
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



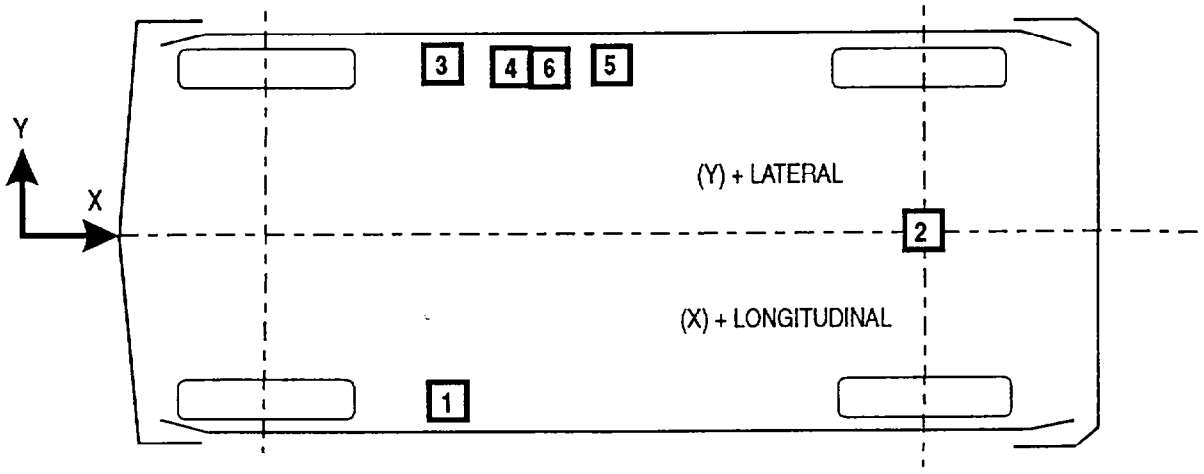
The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

FIGURE 2 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

GRV093347\0120

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931109

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	RIGHT FRONT SILL	2746	-635	376				
	LONGITUDINAL				2.8	76.9	4.2	29.3
	LATERAL				1.7	165.5	10.1	19.0
	VERTICAL				16.6	164.2	3.8	152.7
	RESULTANT				16.7	164.2		
2	REAR FLOORPAN OVER AXLE	762	0	490				
	LONGITUDINAL				1.6	160.6	5.7	27.9
	LATERAL[1]				1.6	58.2	14.3	47.4
	VERTICAL				5.9	59.4	10.3	24.0
	RESULTANT[1]				14.8	45.0		
3	LEFT FRONT SILL	2527	654	382				
	LATERAL[1]				---	---	---	---
4	LEFT FRONT DOOR CENTERLINE	2634	745	877				
	LATERAL				182.6	18.9	288.1	13.4

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

TEST NUMBER 931109

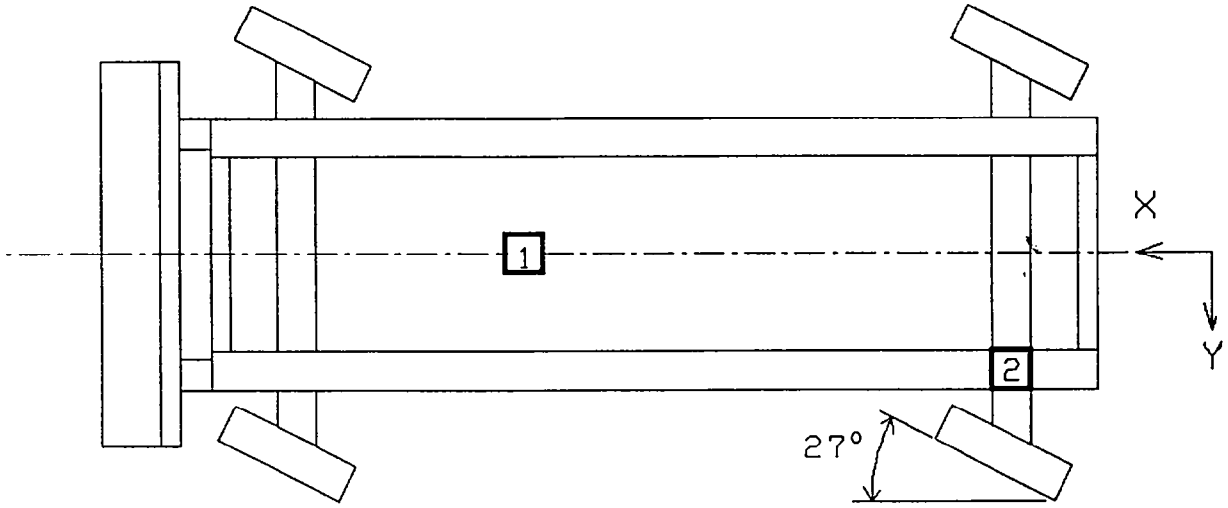
No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
5	LEFT FRONT DOOR MID-REAR LATERAL	2266	739	893	103.8	18.4	124.6	6.9
6	LEFT FRONT DOOR UPPER CENTERLINE LATERAL	2664	737	1055	134.6	21.8	215.6	16.2

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

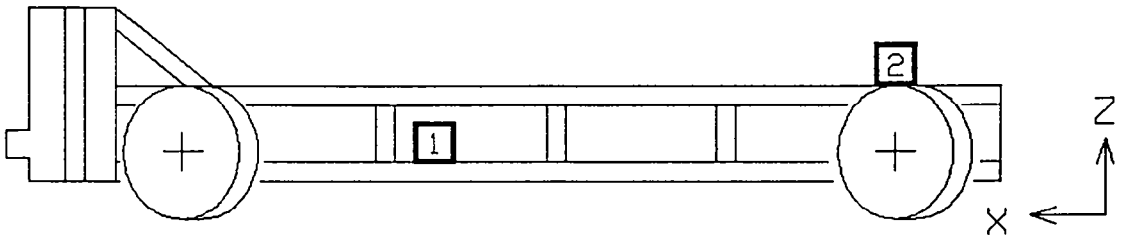
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

[1] See DATA ACQUISITION EXPLANATIONS

FIGURE 3 MOVING DEFORMABLE BARRIER ACCELEROMETER PLACEMENT



TOP VIEW



SIDE VIEW

TABLE 6

MOVING DEFORMABLE BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931109

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	CENTER OF GRAVITY	910	0	335				
	LONGITUDINAL				1.2	233.0	11.3	34.6
	LATERAL				3.6	119.7	7.7	33.4
	VERTICAL				4.0	29.7	4.6	171.8
	RESULTANT				13.7	34.2		
2	LEFT FRAME RAIL OVER REAR AXLE	385	639	635				
	LONGITUDINAL				2.6	167.2	15.4	35.0
	LATERAL				2.9	158.9	2.2	32.5

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

REFERENCE: X: + FORWARD FROM REAR POINT OF FRAME
Y: + LEFTWARD FROM BARRIER CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TABLE 7 VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

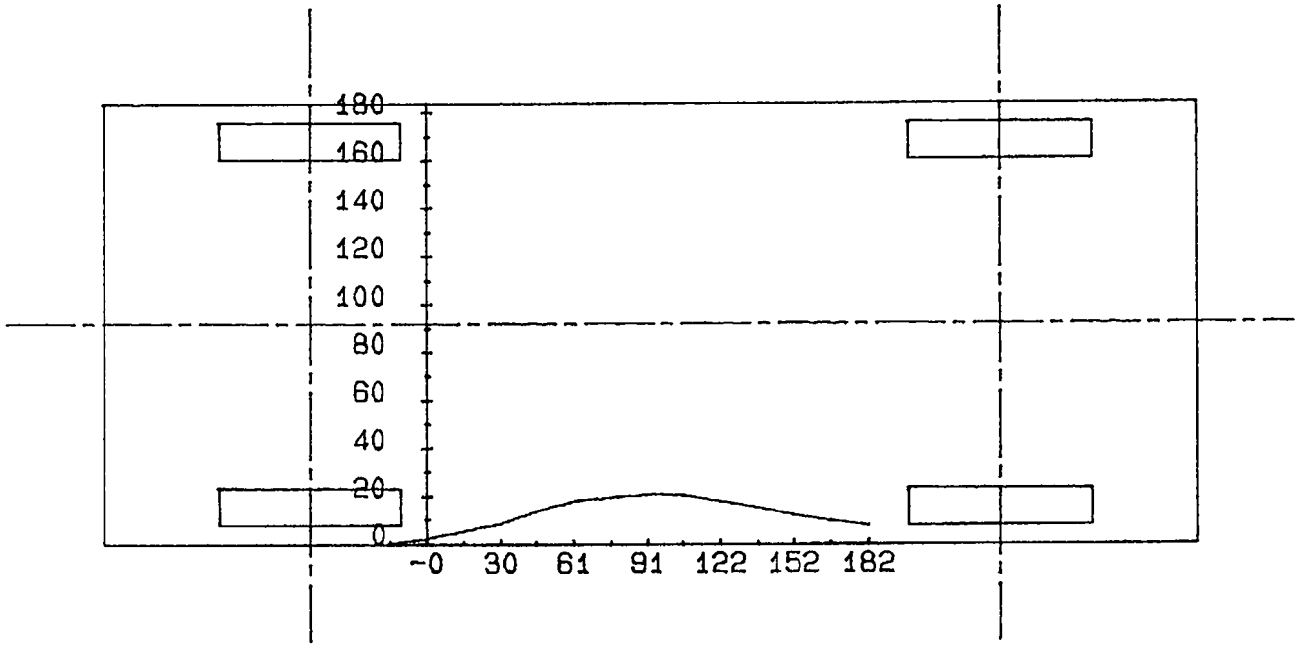
ZERO DISTANCE AT PROJECTED IMPACT POINT[1]

LOCATION	HEIGHT (DELIVERED)	HEIGHT (PRE-TEST)	-152	0	152	305	457	610	762	914	1067	1219	1372	1524	1676	182
			PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])													
Axle height	324	292	X	418	416	414	405	407	407	403	403	400	405	404	404	40
H-point	756	727	355	348	341	341	341	346	345	332	335	325	334	334	330	32
Mid-door	711	680	355	348	341	341	341	346	345	332	335	325	334	334	330	32
Window sill	1041	1011	391	376	367	374	374	370	373	366	367	352	362	362	355	35
Window top	1600	1568	X	X	X	X	557	563	551	556	559	541	554	558	550	55
			POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])													
Axle height	324	292	X	442	468	500	542	585	603	612	606	576	554	522	496	47
H-point	756	727	384	582	727	842	853	856	861	860	888	890	881	870	858	82
Mid-door	711	680	375	597	736	843	853	853	857	857	868	873	865	848	832	80
Window sill	1041	1011	410	496	627	732	740	750	754	772	811	808	795	787	786	78
Window top	1600	1568	X	X	X	X	573	600	613	646	650	640	618	607	598	58
			STATIC CRUSH (MM)													
Axle height	324	292	X	24	52	86	137	178	196	209	203	176	149	118	92	7
H-point	756	727	29	234	386	501	512	510	516	528	553	565	547	536	528	50
Mid-door	711	680	20	249	395	502	512	507	512	525	533	548	531	514	502	47
Window sill	1041	1011	19	120	260	358	366	380	381	406	444	456	433	425	431	43
Window top	1600	1568	X	X	X	X	16	37	62	90	91	99	64	49	48	2

[1]Projected impact point is 940 mm forward of the driver's side wheelbase mid-point.
[2]Reference plane is parallel to and 1219 mm from vehicle's longitudinal centerline.
Column readings are front to rear from left to right.
All measurements are in millimeters.

FIGURE 4

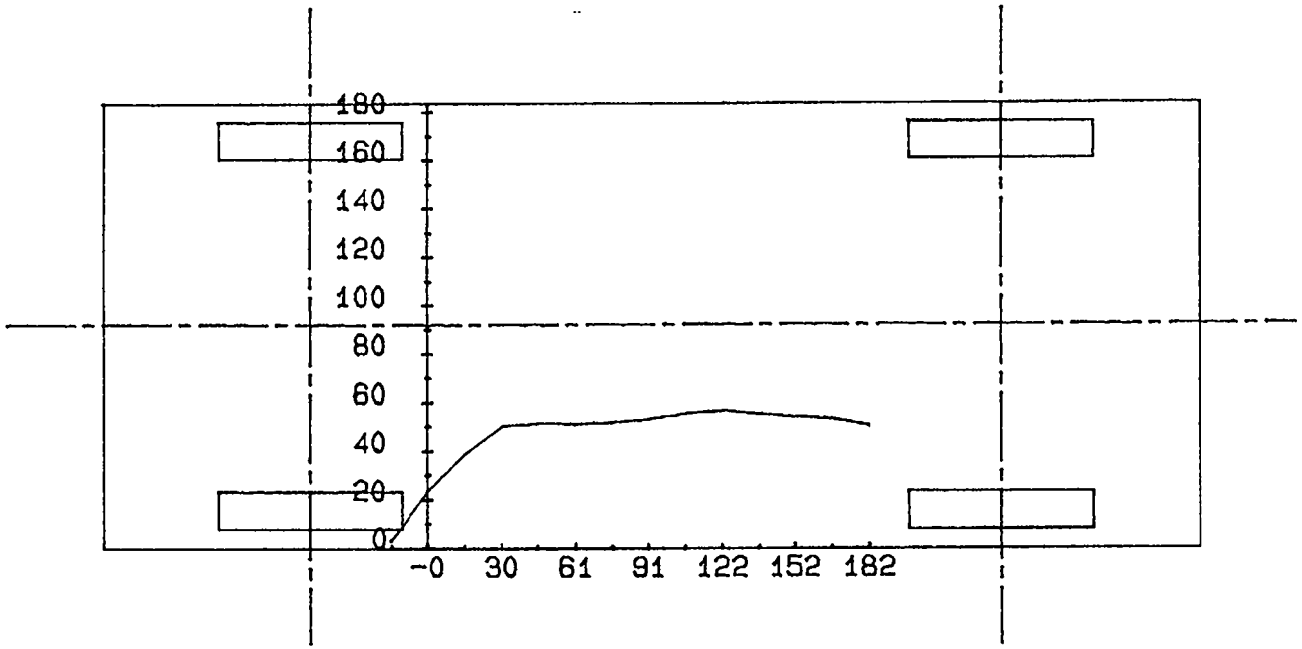
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 32.4 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

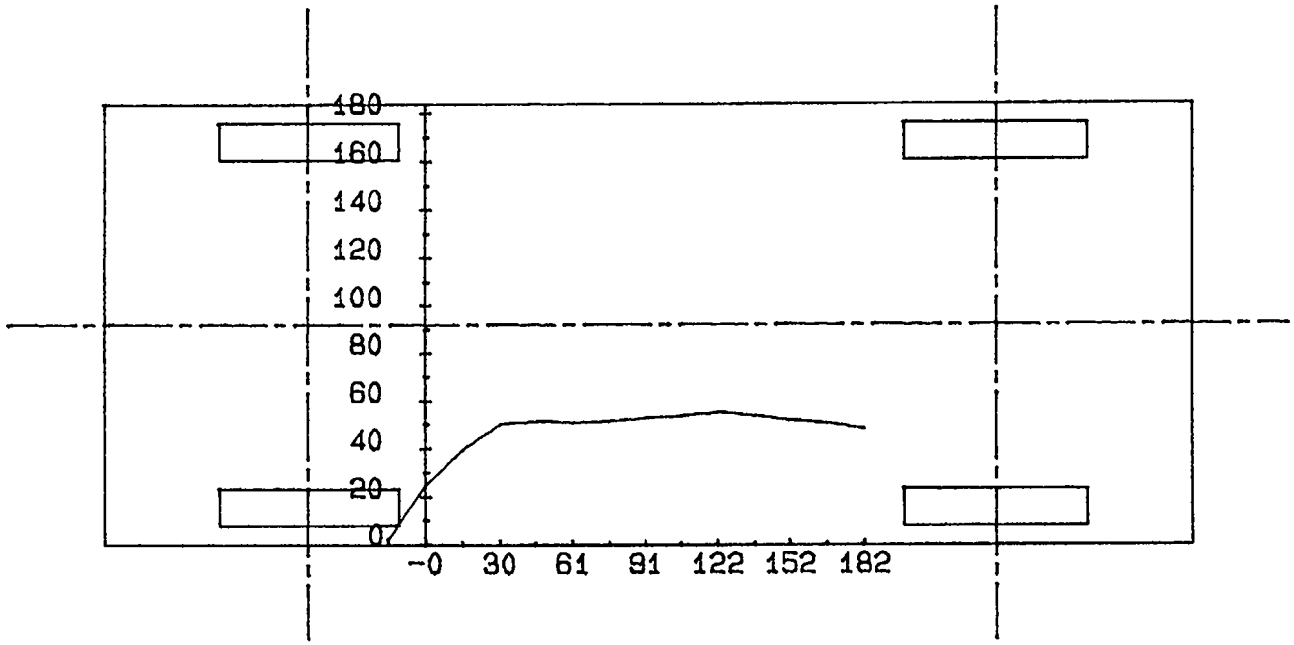
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 75.6 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

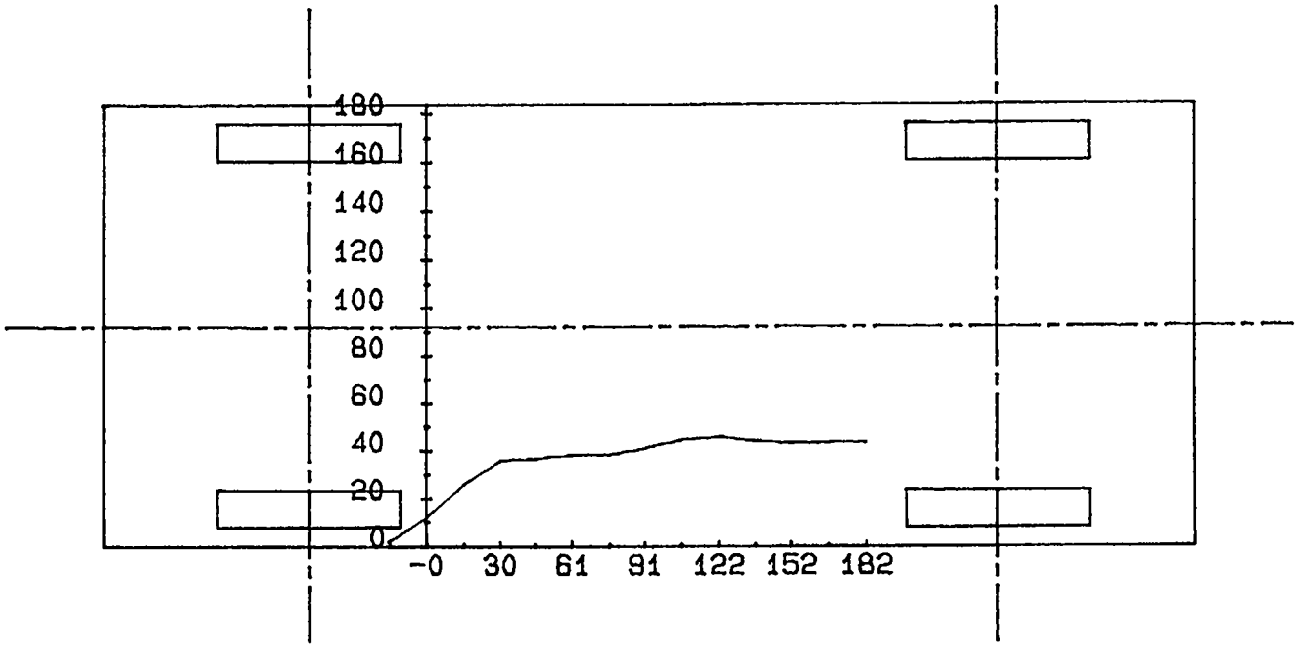
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 71.1 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

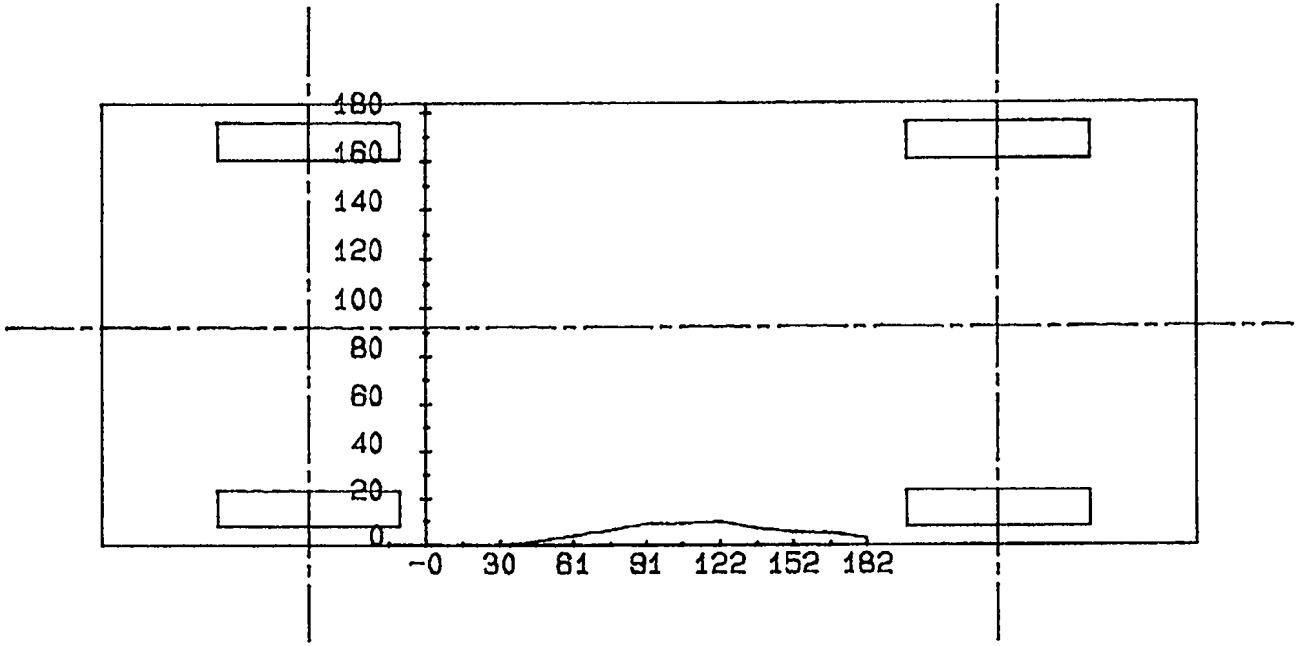
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 104.1 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

VEHICLE EXTERIOR STATIC CRUSH PROFILE

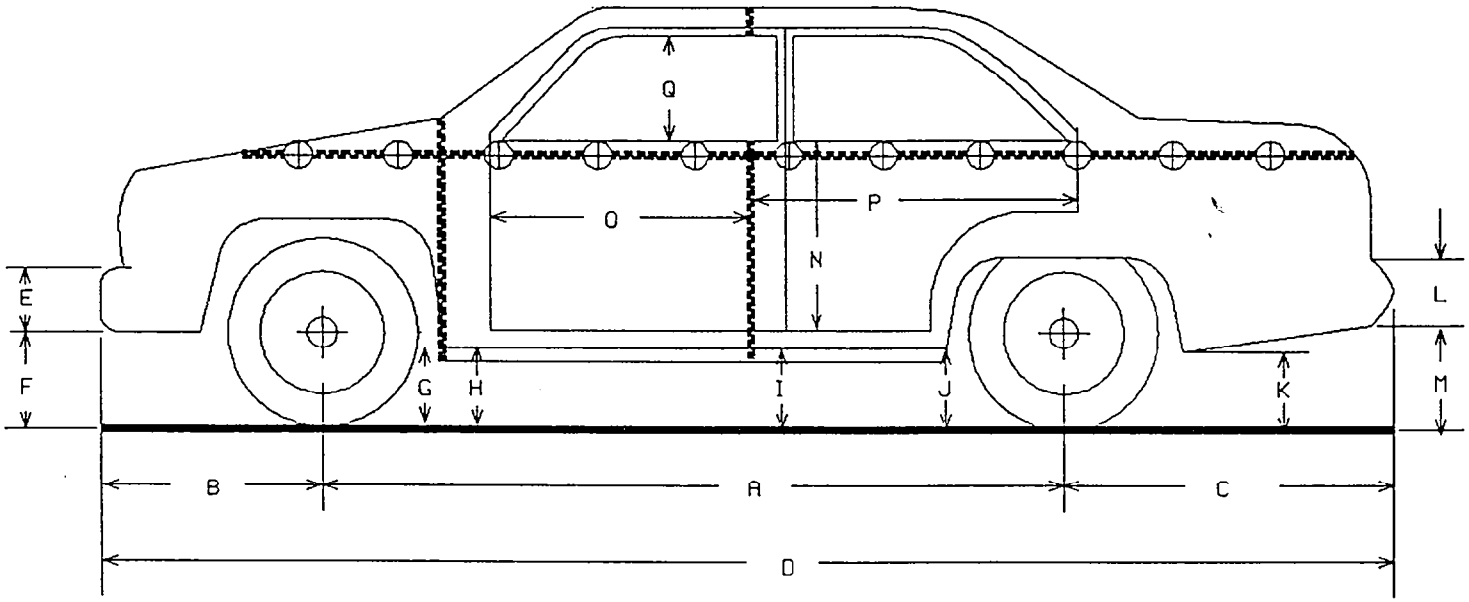


PROFILE LEVEL EQUALS WINDOW TOP HEIGHT WHICH IS 160.0 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 5 PRE-TEST AND POST-TEST MEASUREMENTS

VEHICLE: 1993 Plymouth Voyager

VIN: 2P4FH25KXPR213817 TEST DATE: 11/09/93

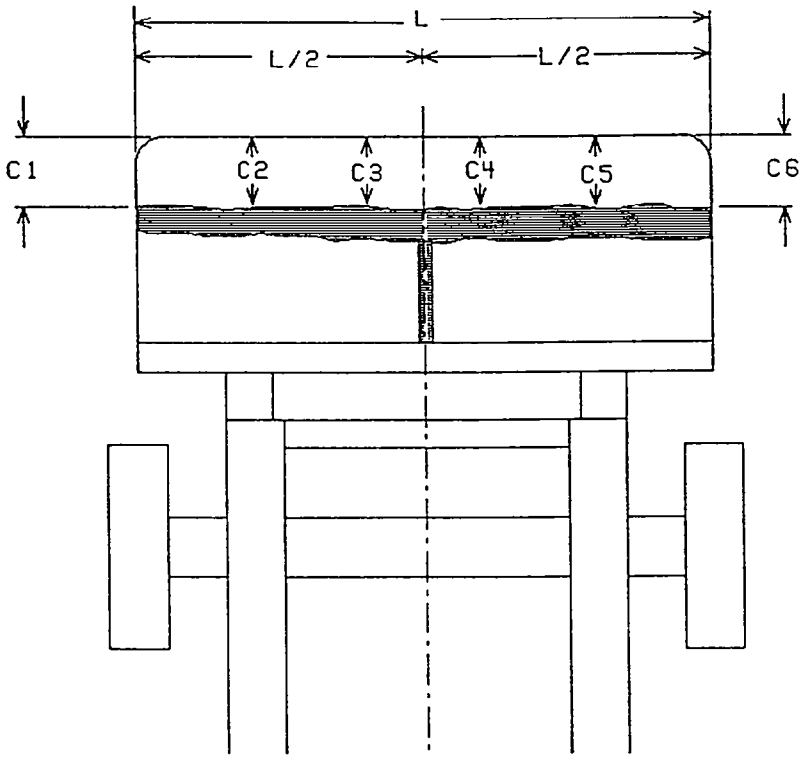


LEFT SIDE VIEW

	PRE-TEST	POST-TEST	CHANGE		PRE-TEST	POST-TEST	CHANGE
A	2857	2848	9	J	315	441	-126
B	855	790	65	K	302	274	28
C	814	805	9	L	170	170	0
D	4526	4443	83	M	345	346	-1
E	267	267	0	N	NA	NA	NA
F	327	380	-53	O	951	742	209
G	300	300	0	P	NA	NA	NA
H	270	302	-32	Q	455	461	-6
I	308	423	-115				

All distance measurements are in millimeters.

FIGURE 6 MOVING DEFORMABLE BARRIER FACE CRUSH



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

	PRE-TEST		POST-TEST		CRUSH
L	1630 (ACTUAL SHOULD BE 1676)				
C1	424	C1	485	C1	61
C2	413	C2	430	C2	17
C3	416	C3	411	C3	-5
C4	415	C4	417	C4	2
C5	418	C5	420	C5	2
C6	437	C6	451	C6	14
CL	415	CL	418	CL	3

TABLE 8 MOVING DEFORMABLE BARRIER FACE STATIC CRUSH
ZERO DISTANCE AT BARRIER CENTERLINE[1]

LOCATION	HEIGHT	813	711	610	508	406	305	203	102	0	102	203	305	406	508	610	711	81
PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])																		
Top of face	1048	507	514	512	515	519	518	520	518	520	518	517	519	522	522	522	523	5
Mid-face	794	508	515	516	515	516	517	520	519	518	518	517	520	521	520	521	522	5
Bumper	667	424	413	415	413	414	415	416	415	415	415	415	416	418	418	419	419	4
POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])																		
Top of face	1048	550	532	523	524	521	525	524	521	527	532	525	525	523	528	524	535	5
Mid-face	794	524	520	515	515	512	512	515	512	517	516	515	515	515	515	520	524	5
Bumper	667	485	448	436	430	421	414	411	415	418	421	417	420	420	420	423	427	4
STATIC CRUSH (MM)																		
Top of face	1048	43	18	11	9	2	7	4	3	7	14	8	6	1	6	2	12	
Mid-face	794	16	5	-1	0	-4	-5	-5	-7	-1	-2	-2	-5	-6	-5	-1	2	
Bumper	667	61	35	21	17	7	-1	-5	0	3	6	2	4	2	2	4	8	

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

[2]Reference plane is 61 mm forward of the rear surface of the deformable barrier face.

All measurements are in millimeters.

SECTION 3.0

FMVSS 214 DATA

TABLE 9

DUMMY DATA SUMMARY

TEST NUMBER 931109

	DRIVER DUMMY SN: 906				PASSENGER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC	MAX	MSEC	MAX	MSEC
HEAD								
LONGITUDINAL	28.8	53.8	26.2	72.4	10.9	179.9	47.3	80.1
LATERAL	14.6	145.8	66.7	50.5	11.5	158.0	48.1	53.7
VERTICAL	18.5	45.3	75.1	53.8	2.6	78.6	84.0	64.9
RESULTANT	89.8	53.8			85.3	64.9		
HIC	688 FROM 43.0 TO 63.4				784 FROM 49.4 TO 85.4			
UPPER SPINE								
LONGITUDINAL	11.7	96.9	23.8	46.3	19.0	216.9	25.8	62.5
LATERAL (P)	22.5	76.9	92.2	39.4	35.8	63.1	77.0	47.5
LATERAL (R)	23.0	76.9	91.6	39.4	36.9	63.1	75.8	47.5
VERTICAL	5.3	106.2	23.2	33.7	6.3	32.5	18.5	77.5
RESULTANT (P)	93.0	39.4			78.2	47.5		
RESULTANT (R)	92.4	39.4			77.0	47.5		

TABLE 9

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 931109

	DRIVER DUMMY SN: 906				PASSENGER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC	MAX	MSEC	MAX	MSEC
LOWER SPINE								
LONGITUDINAL	22.5	33.1	21.1	59.4	14.4	57.5	16.8	63.8
LATERAL (P)	19.0	50.6	73.7	34.4	32.2	62.5	88.8	42.5
LATERAL (R)	21.4	50.6	68.1	27.5	33.4	61.9	87.2	41.9
VERTICAL[1]	60.1	33.1	11.3	28.1	9.1	46.3	15.9	77.5
RESULTANT (P)[1]	94.3	33.1			89.1	42.5		
RESULTANT (R)[1]	72.5	33.1			87.7	41.9		
LEFT UPPER THORAX RIB								
LATERAL (P)	17.8	67.5	65.7	33.7	24.3	71.3	61.0	42.5
LATERAL (R)	18.2	67.5	64.8	33.7	24.8	71.3	60.5	42.5
LEFT LOWER THORAX RIB								
LATERAL (P)	14.8	68.1	68.2	31.3	40.8	67.5	67.4	41.2
LATERAL (R)	14.7	68.1	68.8	31.3	38.8	67.5	66.3	41.2
	TTI(d) (P) 71				TTI(d) (P) 78			
	TTI(d) (R) 68				TTI(d) (R) 77			

TABLE 9

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 931109

	DRIVER DUMMY SN: 906				PASSENGER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC	MAX	MSEC	MAX	MSEC
PELVIS								
LONGITUDINAL	27.5	28.1	39.1	40.0	12.8	127.5	22.6	42.5
LATERAL	32.9	58.1	94.3	28.1	25.2	75.6	81.5	38.8
VERTICAL	30.0	33.1	10.7	67.5	17.4	40.0	14.5	78.1
RESULTANT	98.3	28.1			83.9	38.8		

POSITIVE DIRECTION

LONGITUDINAL:	FORWARD
LATERAL:	LEFTWARD
VERTICAL:	UPWARD

NEGATIVE DIRECTION

LONGITUDINAL:	REARWARD
LATERAL:	RIGHTWARD
VERTICAL:	DOWNWARD

NOTES:

(P) Primary Sensor
(R) Redundant Sensor

[1] See DATA ACQUISITION EXPLANATIONS

TABLE 10 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #906	PASSENGER #903
HEAD	None SIDE HEADER	Barrier face top
CHEST	None	None
ABDOMEN	Door padding	Side padding
LEFT KNEE	Door padding	Side padding
RIGHT KNEE	Left knee	Left knee

DOOR OPENING:

	LEFT	RIGHT
FRONT	Tools required	Easy
REAR	NA	Easy

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	None
REAR	None	None

GLAZING DAMAGE:

The driver's door glass was broken out.

The left half of the windshield was cracked.

The left side mid-rear glass was broken out

OTHER NOTABLE IMPACT EFFECTS:

None

DUMMY KINEMATIC SUMMARY

Upon impact, the driver dummy translated to the left and its pelvis and upper body contacted the foam padding attached to the door panel. The dummy's upper body and head rotated to the left. The dummy's head contacted the side header and continued to rotate to the left. The dummy then rebounded and translated to the right before being restrained by the three-point unibelt. The dummy's pelvis rotated to the right and its legs contacted the steering column. The dummy's head and upper body rotated to the right then rearward into the seat back. The dummy rotated forward and came to rest sitting in the driver's seat, facing forward, leaning to the right, and restrained by the three-point unibelt.

Upon impact, the passenger dummy translated to the left and its pelvis and upper body contacted the foam padding that replaced the side panel. The dummy's head and upper body rotated to the left. The head passed through the broken out side mid-rear glass opening before contacting the top of the barrier face. The dummy rebounded and translated to the right before being restrained by the three-point unibelt. The dummy's head and upper body rotated to the right then rearward into the seat back. The dummy rotated forward and came to rest facing forward, leaning to the right, and restrained by the three-point unibelt.

SECTION 4.0

FMVSS 301 DATA

TABLE 11 FUEL SYSTEM DATA

MAKE/MODEL:	Plymouth/Voyager
USABLE CAPACITY:	75.7 LITERS (FURNISHED BY COTR)
TEST VOLUME RANGE:	69.6 LITERS TO 71.2 LITERS (92-94% OF USABLE)
ACTUAL TEST VOLUME:	70.4 LITERS (WITH ENTIRE FUEL SYSTEM FILLED)
TEST FLUID TYPE:	STODDARD SOLVENT
SPECIFIC GRAVITY:	0.764
KINEMATIC VISCOSITY:	0.99 CENTISTOKES
TEST FLUID COLOR:	PURPLE
ELECTRIC FUEL PUMP:	Yes
FUEL INJECTION:	Yes

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? No

TABLE 12 FMVSS 301 POST-IMPACT TEST DATA

TEST DATE: 11/09/93

VEHICLE MAKE/MODEL/BODY STYLE: Plymouth/Voyager/Minivan

TEST REQUIREMENTS:

Test vehicle fuel tank filled to 92 to 94% of manufacturer's usable capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

_____ FRONTAL (____ KPH)

_____ OBLIQUE (48 KPH) WITH ___° BARRIER FACE
FIRST CONTACTING _____ (DRIVER/PASS.) SIDE.

_____ REAR MOVING BARRIER (48 KPH)

_____ LATERAL MOVING BARRIER (32 KPH)

__X__ OTHER - 214 48/24 KPH LEFT SIDE IMPACT

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

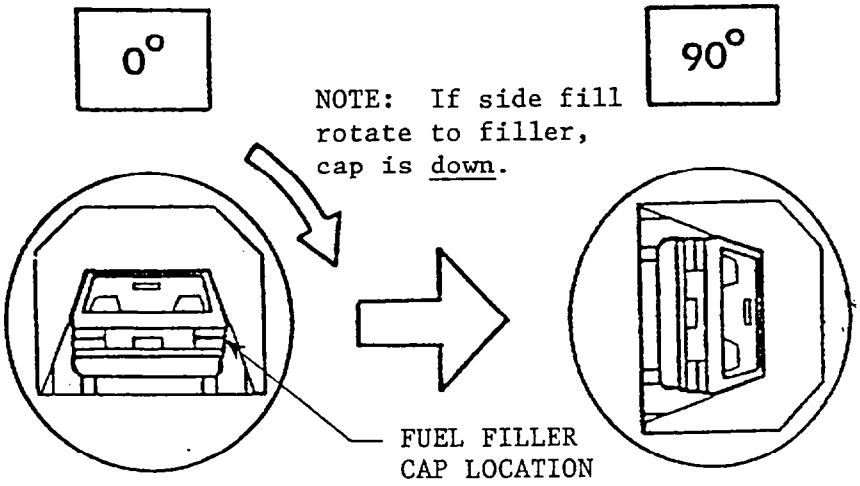
		TEST RESULTS	MAXIMUM ALLOWABLE
1.	FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 G	28 G
2.	5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 G	142 G
3.	NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 G	28 G/MN

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - = 7 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

0° TO 90° ROTATION (FUEL FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

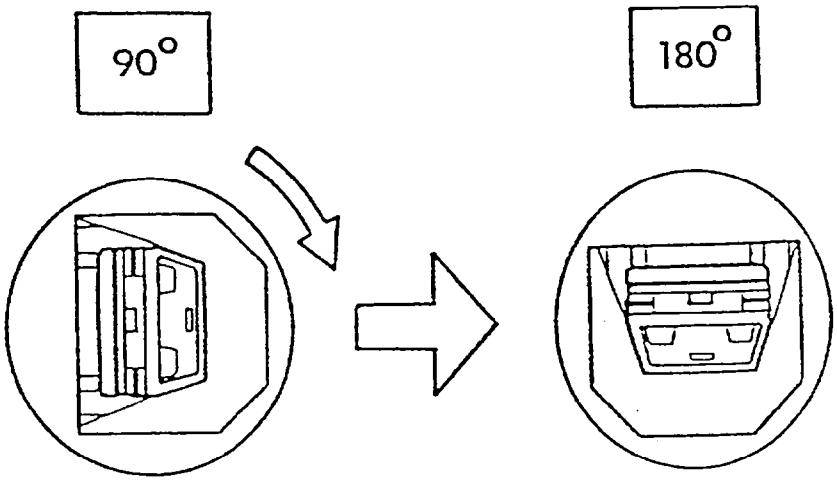
_____

_____

_____

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - = 14 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

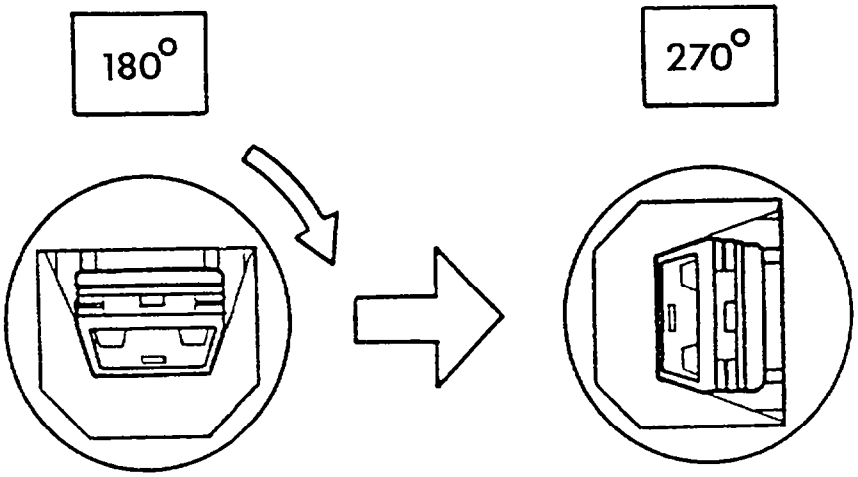
90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - = 21 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

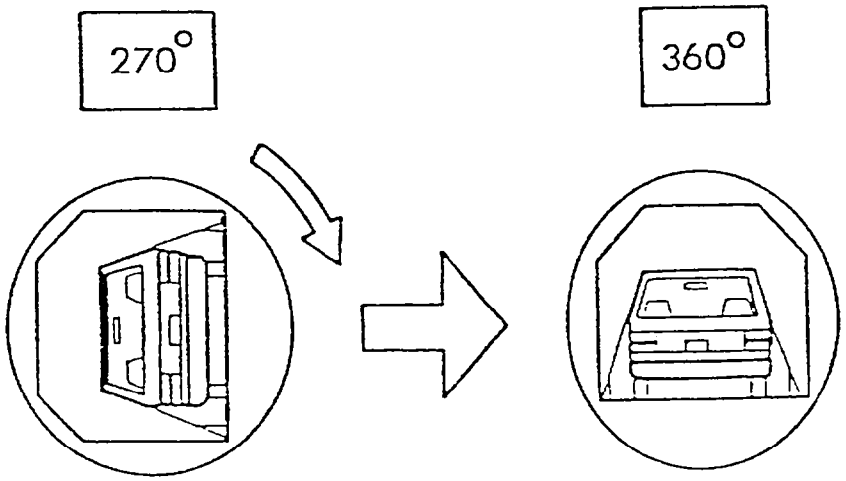
180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - = 28 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

270° TO 360° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

SECTION 5.0

VEHICLE, OCCUPANT, AND CAMERA MEASUREMENTS

FIGURE 8 DUMMY AND SEAT POSITIONING DATA

MAKE/MODEL/BODY STYLE: Plymouth/Voyager/Minivan

SEAT TYPE: X Bench-Rear
X Bucket-Front
_____ Split bench

ADJUSTER TYPE: X Manual-Front
_____ Power
X Non-adjustable-rear

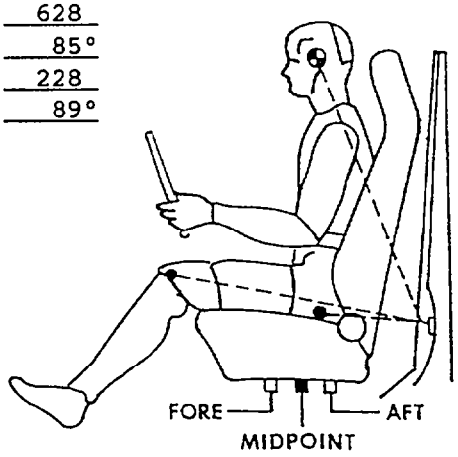
SEAT BACK TYPE: X Non-adjustable-Rear
X Adjustable reclining-Front

TECHNICIANS:
1. R. Branham
2. N. Echeverria
3. B. Crabtree

POSITIONING DATE: 11/09/93
TIME: 1040 TEMPERATURE: 24° C

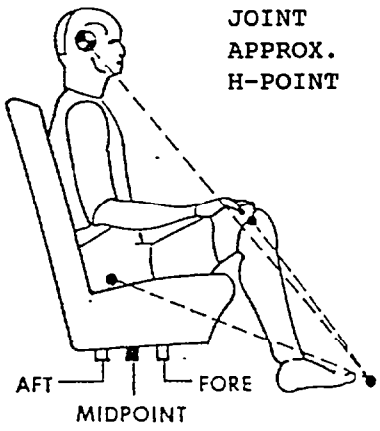
DRIVER DUMMY[1] # 906 TYPE: SID

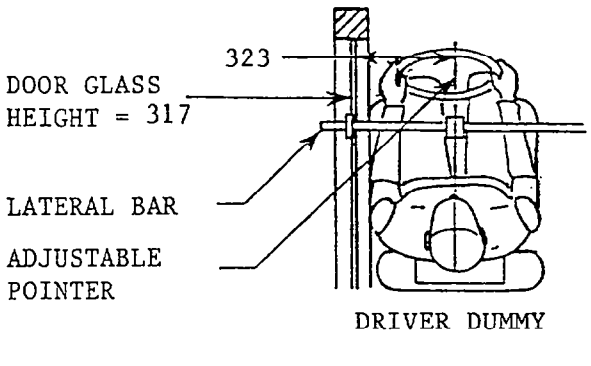
HEAD	652
TARGET	5°
KNEE	628
JOINT	85°
APPROX.	228
H-POINT	89°



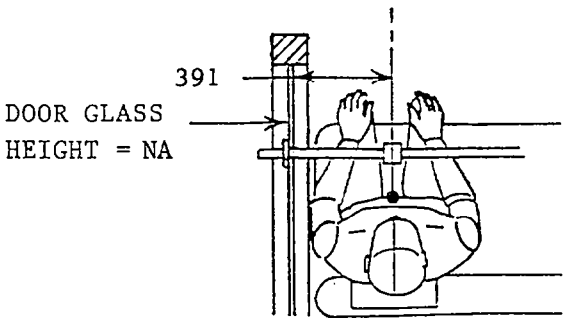
LEFT REAR
PASSENGER DUMMY[2] # 903 TYPE: SID

HEAD	1402
TARGET	40°
KNEE	562
JOINT	34°
APPROX.	815
H-POINT	61°





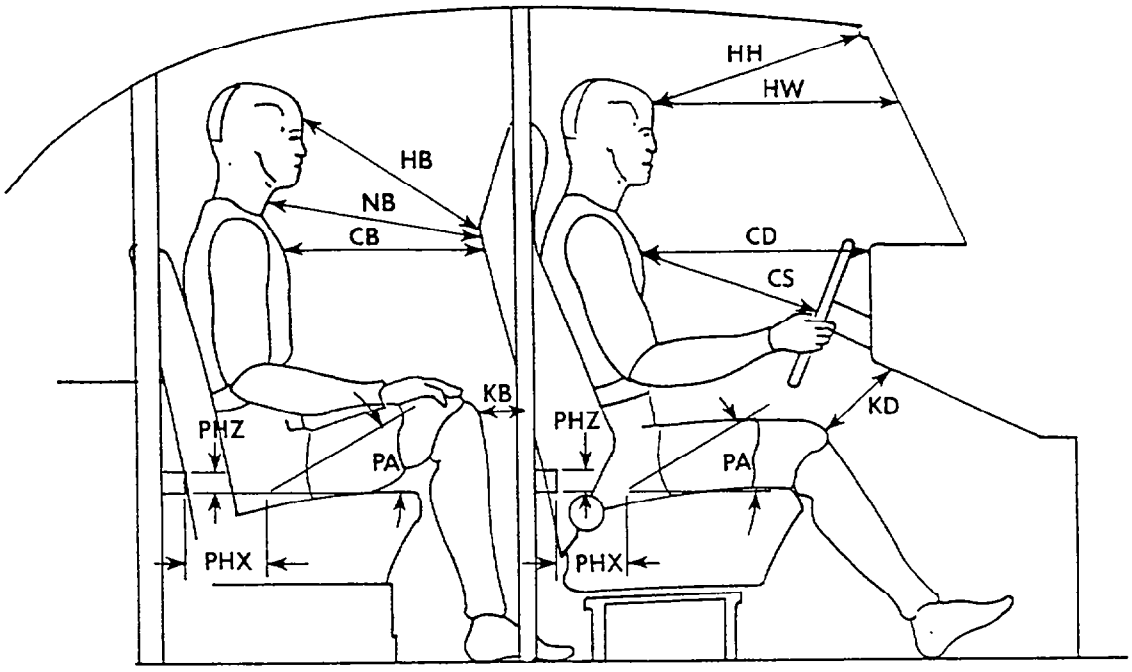
DRIVER DUMMY



LEFT REAR
PASSENGER DUMMY

[1]Driver dummy measurements are referenced to top of front door striker for 4-door vehicles.
[2]Passenger dummy measurements are referenced to the rear most point of the front seat tracks for 2-door vehicles.
All angles are referenced to vertical.
All distance measurements are in millimeters.

FIGURE 9 DUMMY LONGITUDINAL CLEARANCE MEASUREMENTS



	DRIVER	LEFT REAR PASSENGER
HH	495	NA
HW	632	NA
CD	537	NA
CS	328	NA
KDL[1]	174	NA
KDR[1]	158	NA
PA	24	24
PHX	227	NA
PHZ	8	NA
HB	NA	726
NB	NA	700
CB	NA	639
KBL	NA	242
KBR	NA	244

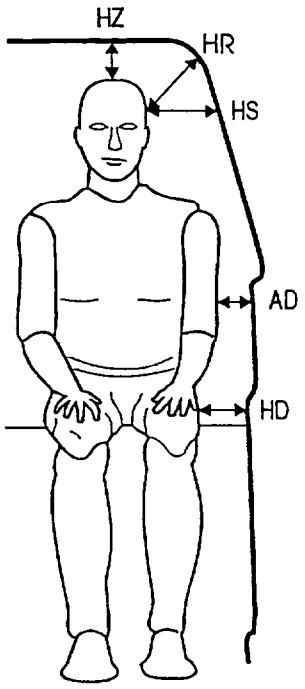
[1]Knee measurements taken parallel to the vehicle's longitudinal centerline.

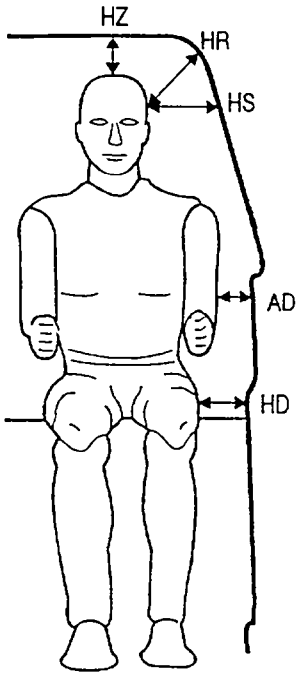
All distance measurements are in millimeters.

All angle measurements are in degrees.

NOTE: For 2-door vehicles, the rear passenger's PHX and PHZ measurements are referenced to the front door stiker.

FIGURE 10 DUMMY LATERAL CLEARANCE MEASUREMENTS





	DRIVER	LEFT REAR PASSENGER
HR	179	205
HS	242	291
AD[1]	13	96
HD[1]	86	153
HZ	105	101

[1]Measured to energy absorbing foam.

All distance measurements are in millimeters.

FIGURE 11 CAMERA POSITIONS

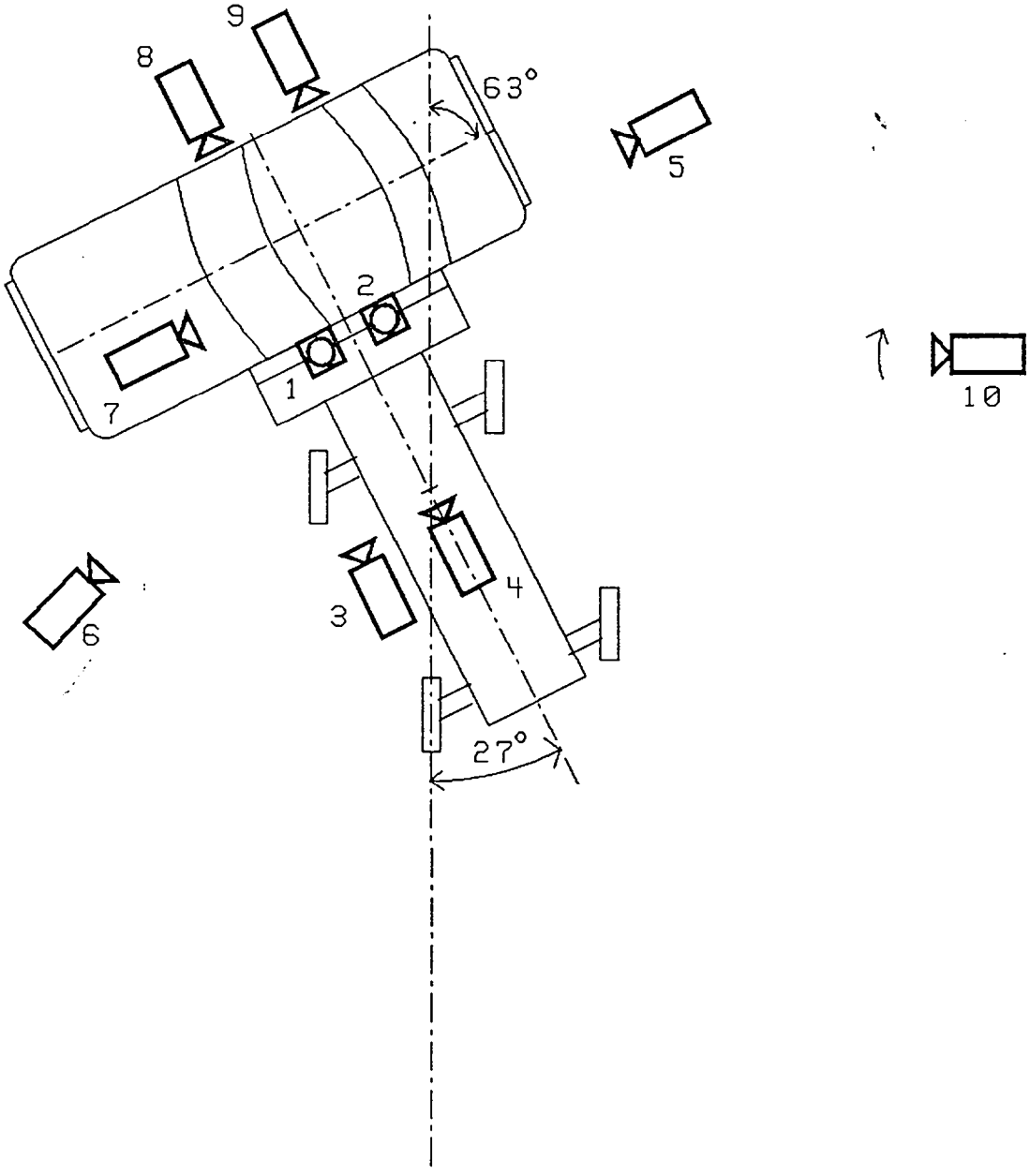


TABLE 13 CAMERA INFORMATION

TEST NO. 931109

VEHICLE: 1993 Plymouth Voyager

CAMERA NO.	VIEW	CAMERA POSITIONS (CM)[1] X	Y	Z	ANGLE[2] (DEG)	LENS (MM)	FILM SPEED (FPS)
1	Overhead overall	0	0	990	-90	8	770
2	Overhead close-up	-90	0	990	-90	25	1020
3	Onboard barrier side	NA	NA	NA	NA	25	1000
4	Onboard barrier center	NA	NA	NA	NA	13	1008
5	Right side	841	-439	91	0	13	995
6	Left side	-480	297	107	0	25	1018
7	Onboard vehicle front	NA	NA	NA	NA	8	998
8	Onboard vehicle side-front	NA	NA	NA	NA	8	1002
9	Onboard vehicle side-rear	NA	NA	NA	NA	8	1005
10	Real-time panning	NA	NA	NA	NA	16	24

[1] +X = Film plane forward of impact point on target vehicle's struck side
+Y = Film plane leftward of impact point on target vehicle's struck side
+Z = Film plane above ground level

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

APPENDIX A

PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

Figure A-2 POST-TEST FRONT VIEW

Figure A-3 POST-TEST LEFT FRONT VIEW

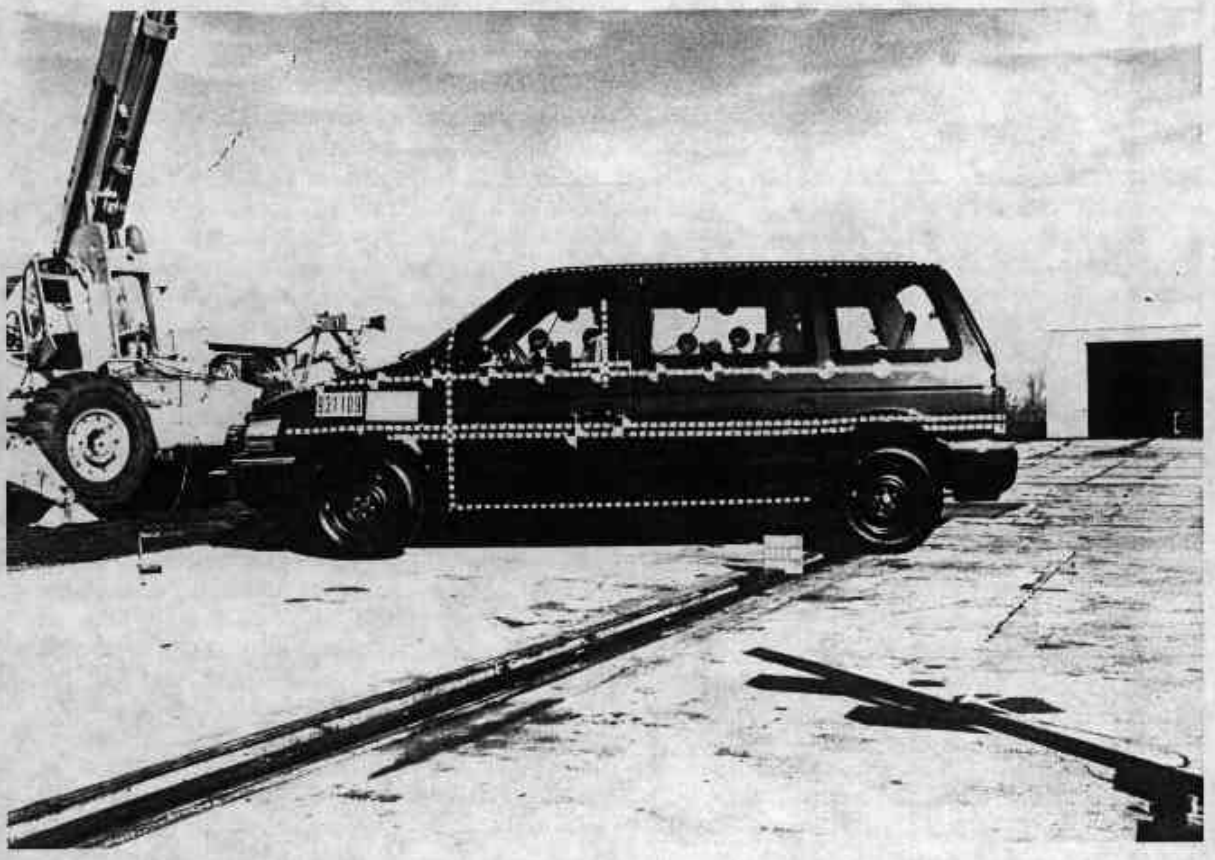


Figure A-4 PRE-TEST LEFT SIDE VIEW

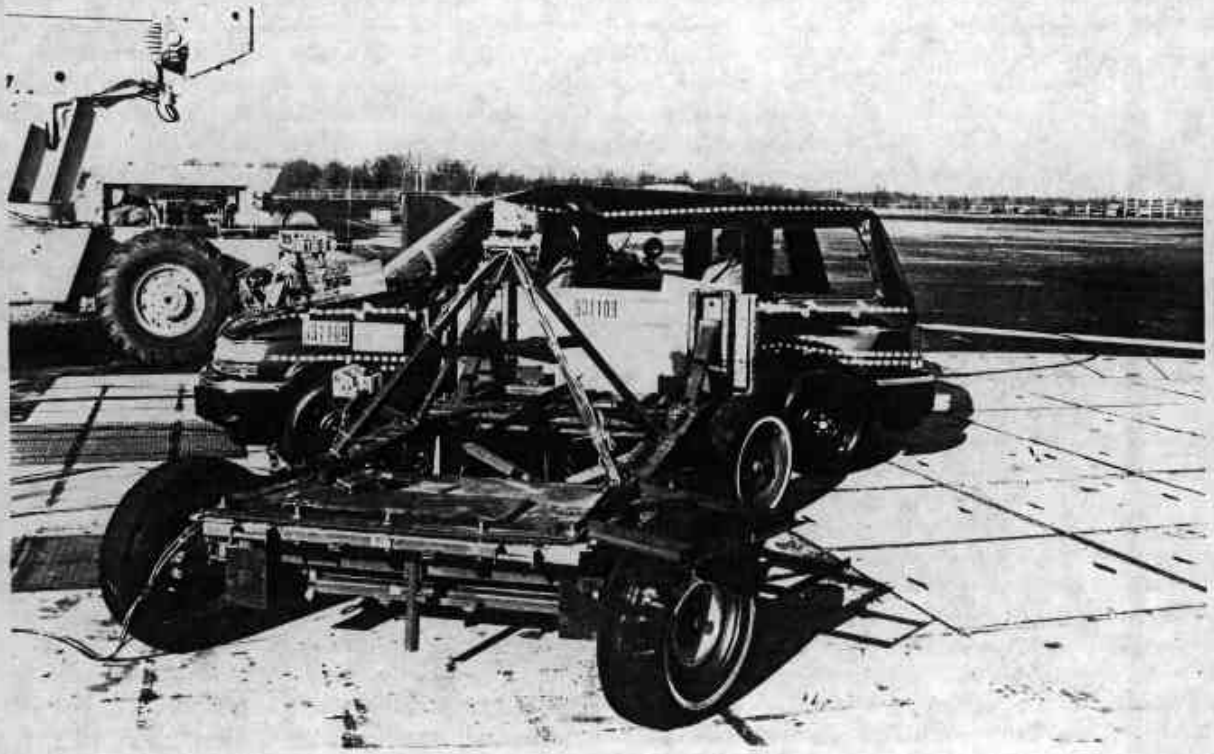


Figure A-5 POST-TEST LEFT SIDE - VIEW 1

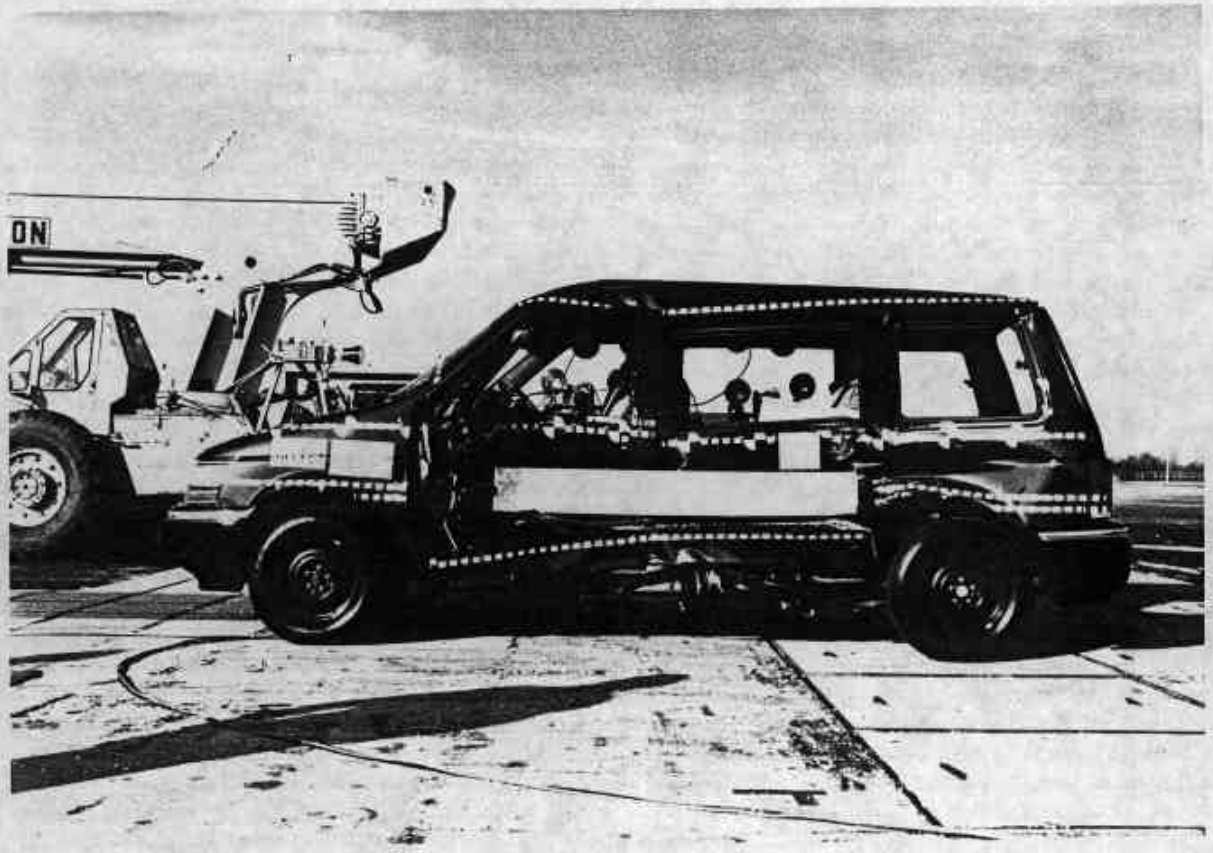


Figure A-6 POST-TEST LEFT SIDE - VIEW 2

Figure A-7 POST-TEST LEFT REAR VIEW

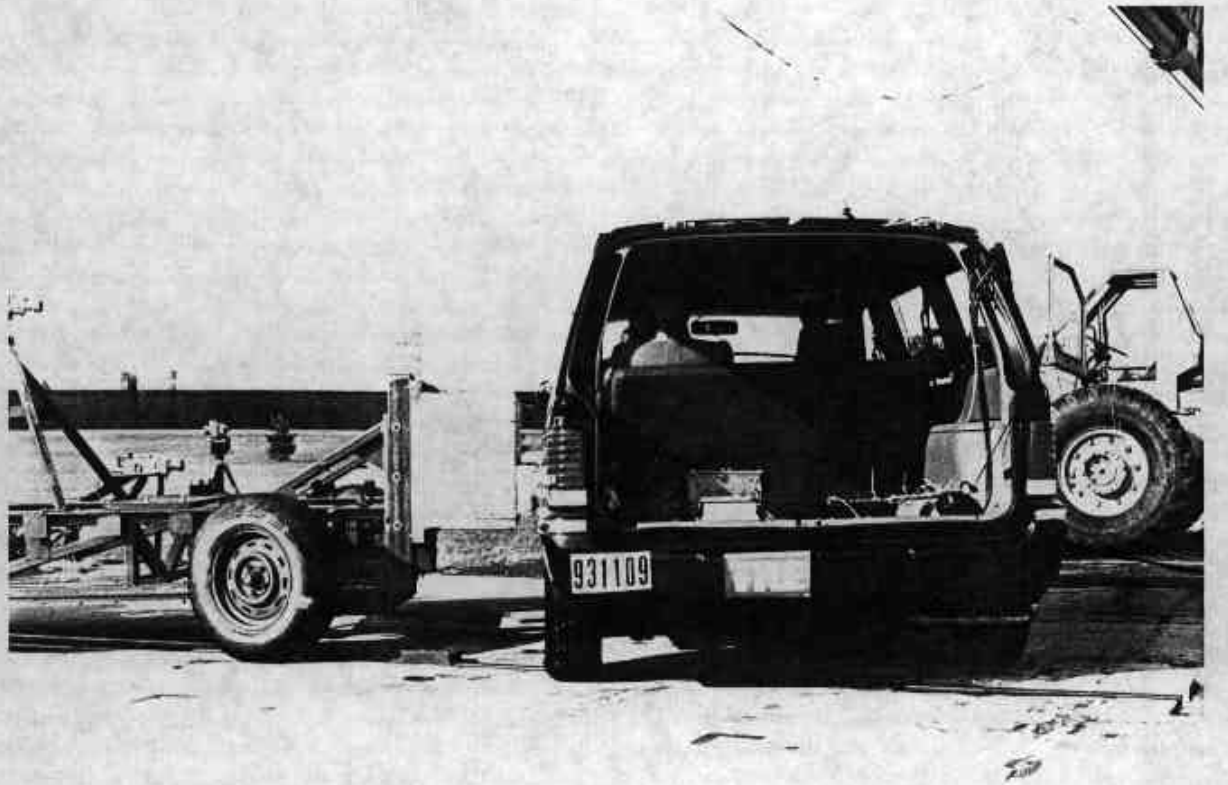


Figure A-8 PRE-TEST REAR VIEW

Figure A-9 POST-TEST REAR VIEW

Figure A-10 PRE-TEST RIGHT SIDE VIEW

Figure A-11 POST-TEST RIGHT SIDE VIEW

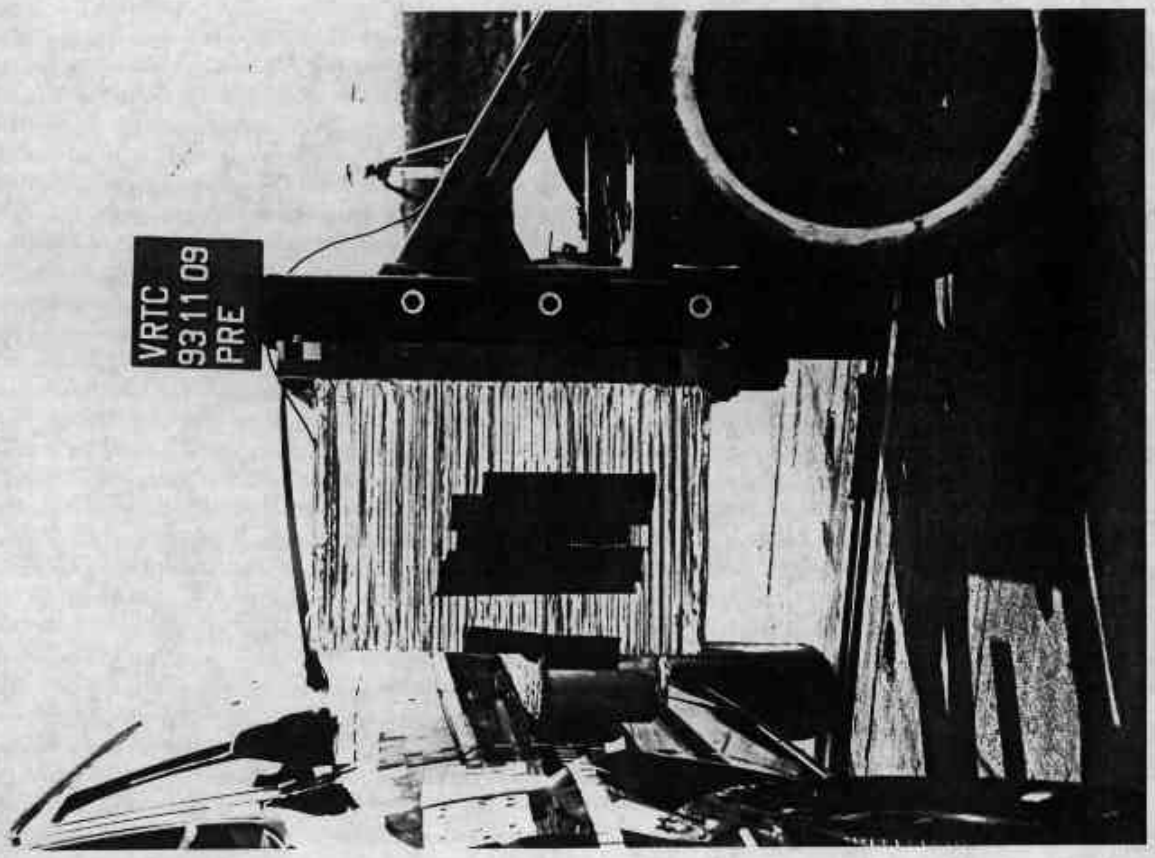


Figure A-12 PRE-TEST BARRIER VERTICAL ALIGNMENT FRONT VIEW

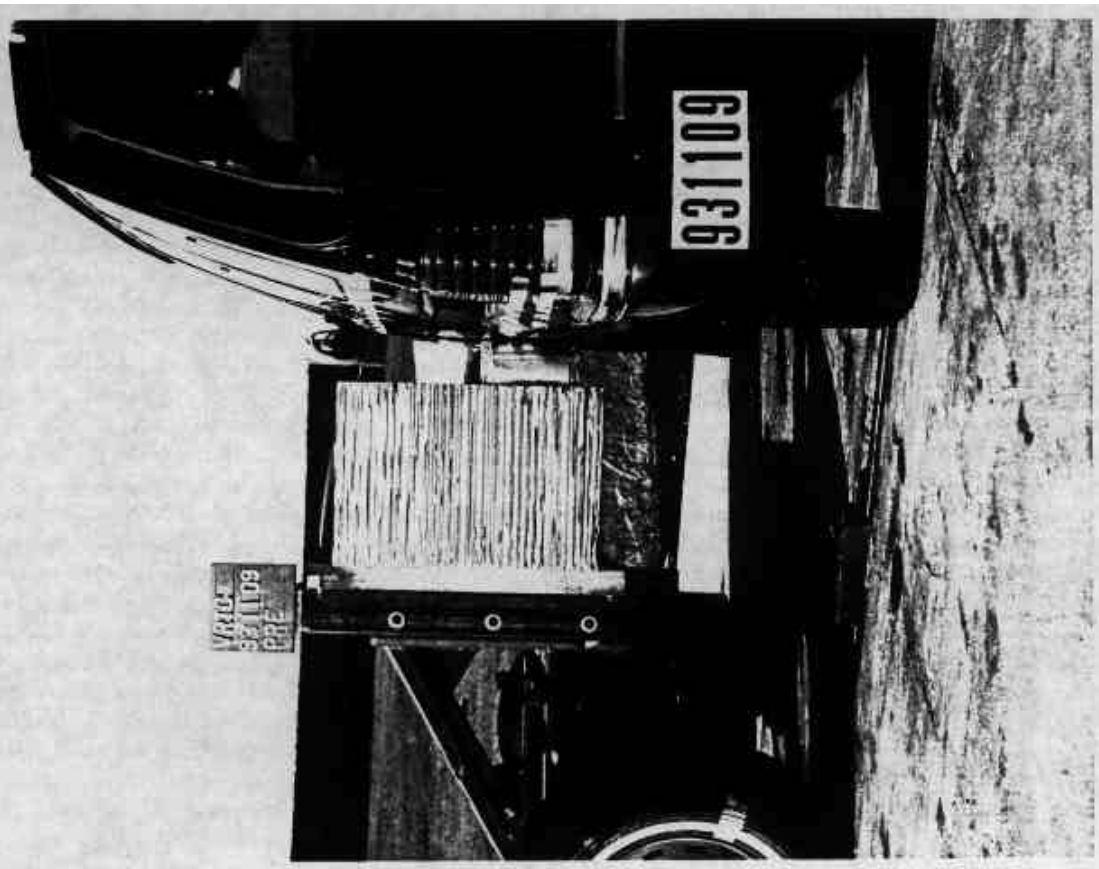


Figure A-13 PRE-TEST BARRIER VERTICAL ALIGNMENT REAR VIEW

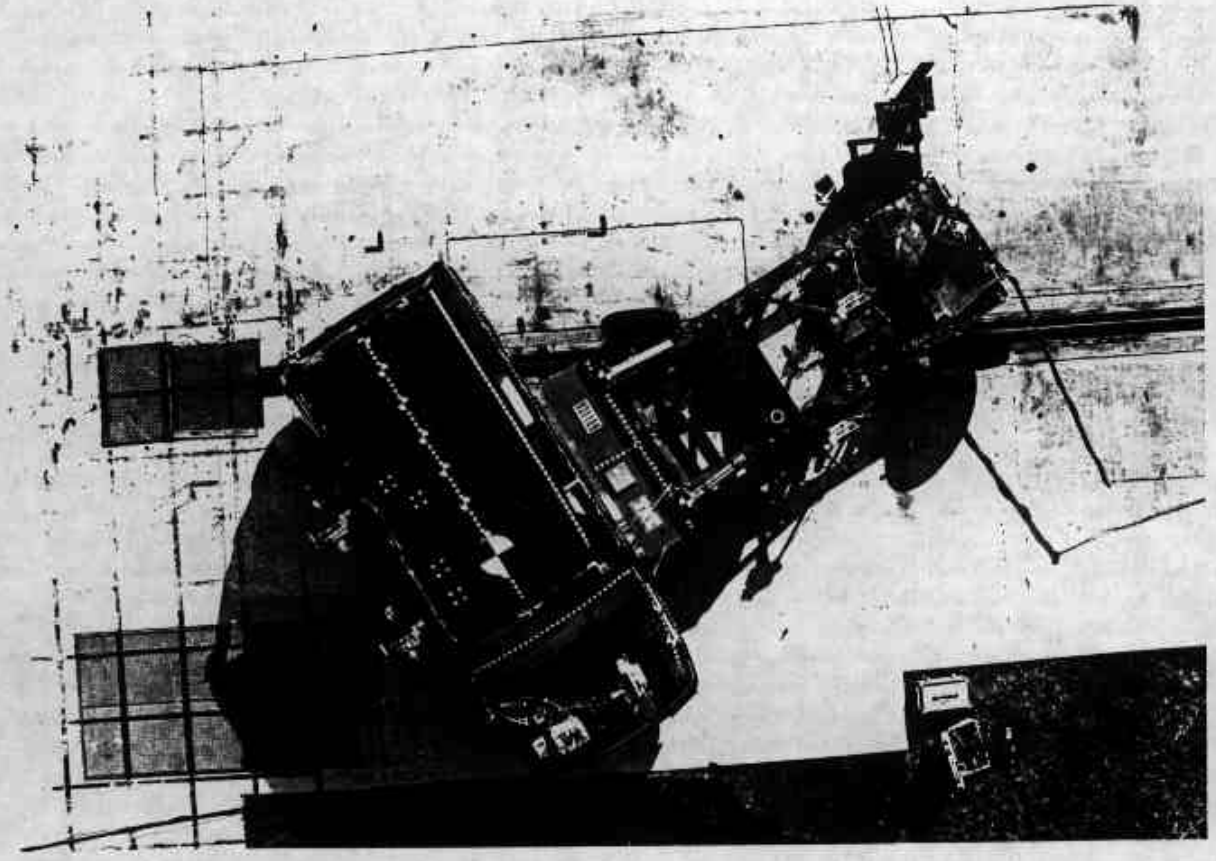


Figure A-14 PRE-TEST OVERHEAD VIEW

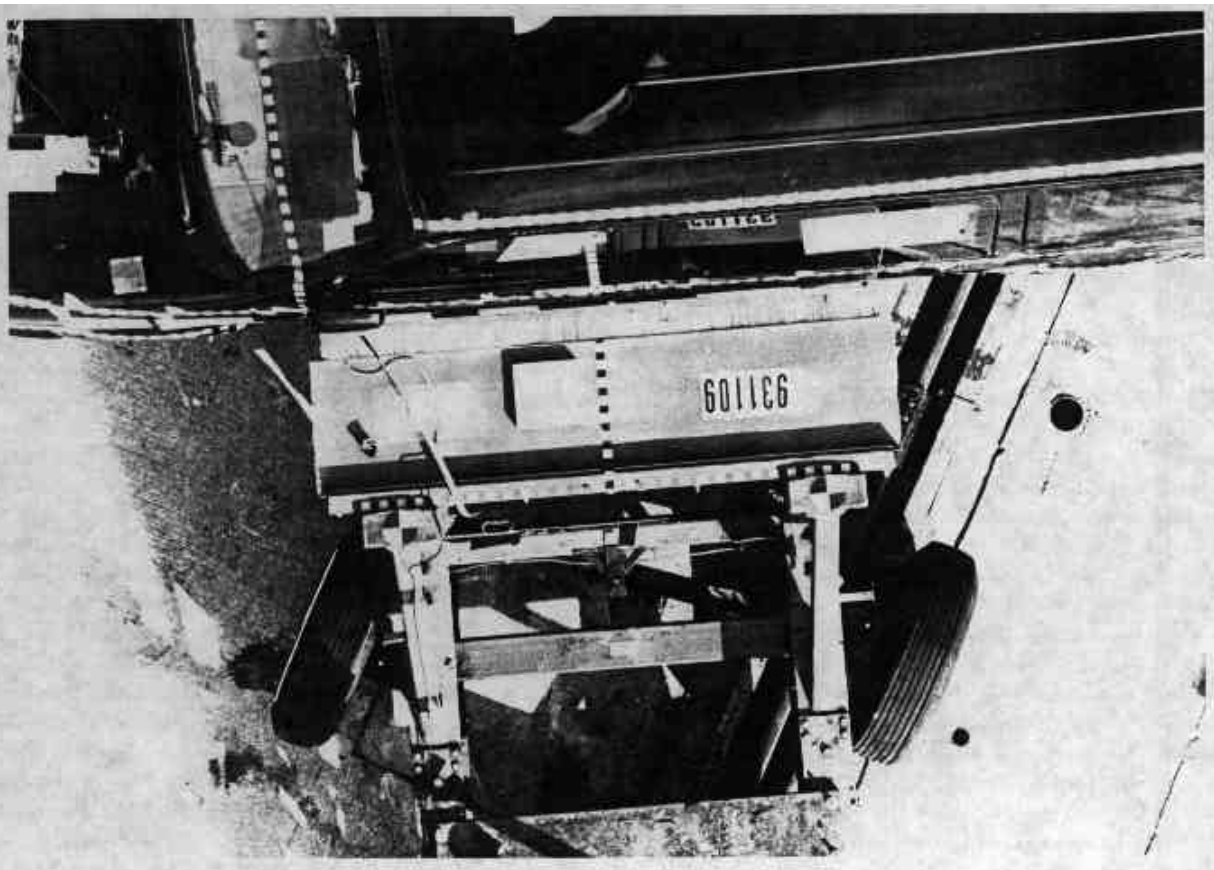


Figure A-15 PRE-TEST OVERHEAD CLOSE-UP VIEW

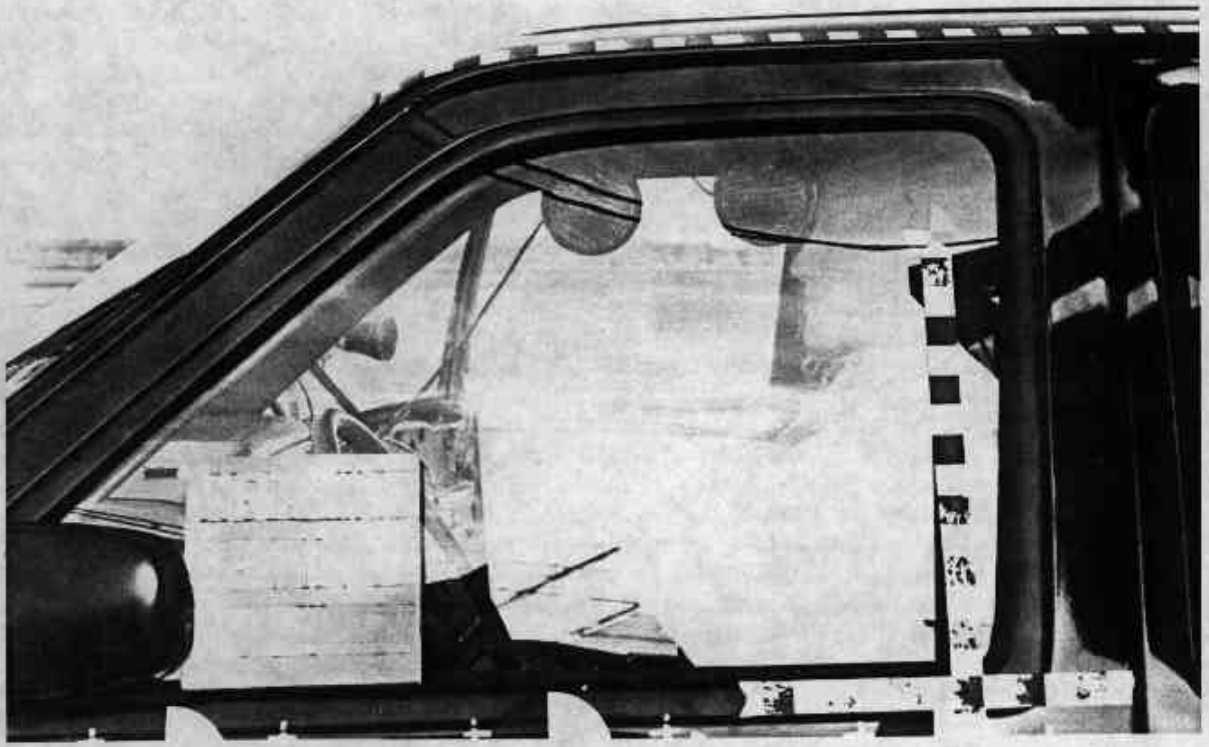


Figure A-16 PRE-TEST DRIVER DUMMY POSITION VIEW

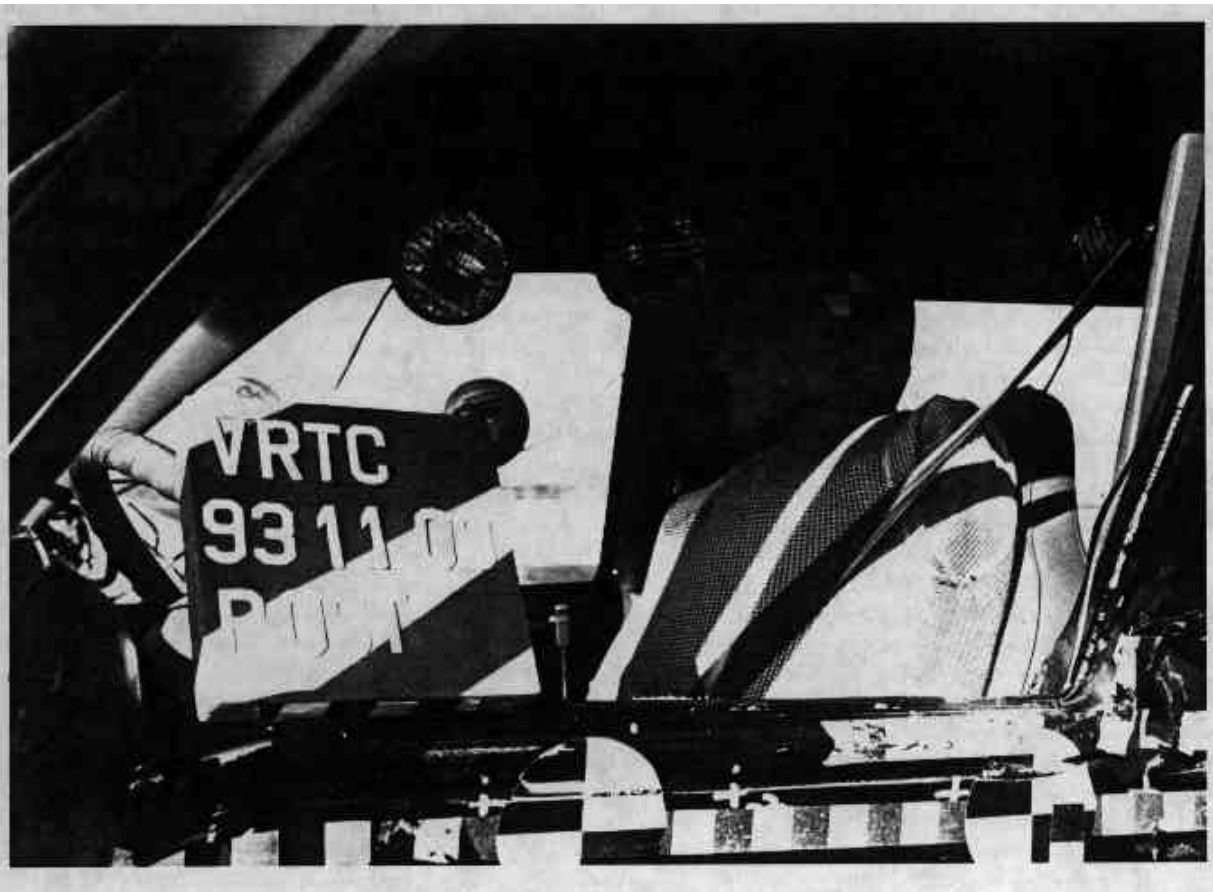


Figure A-17 POST-TEST DRIVER DUMMY POSITION VIEW

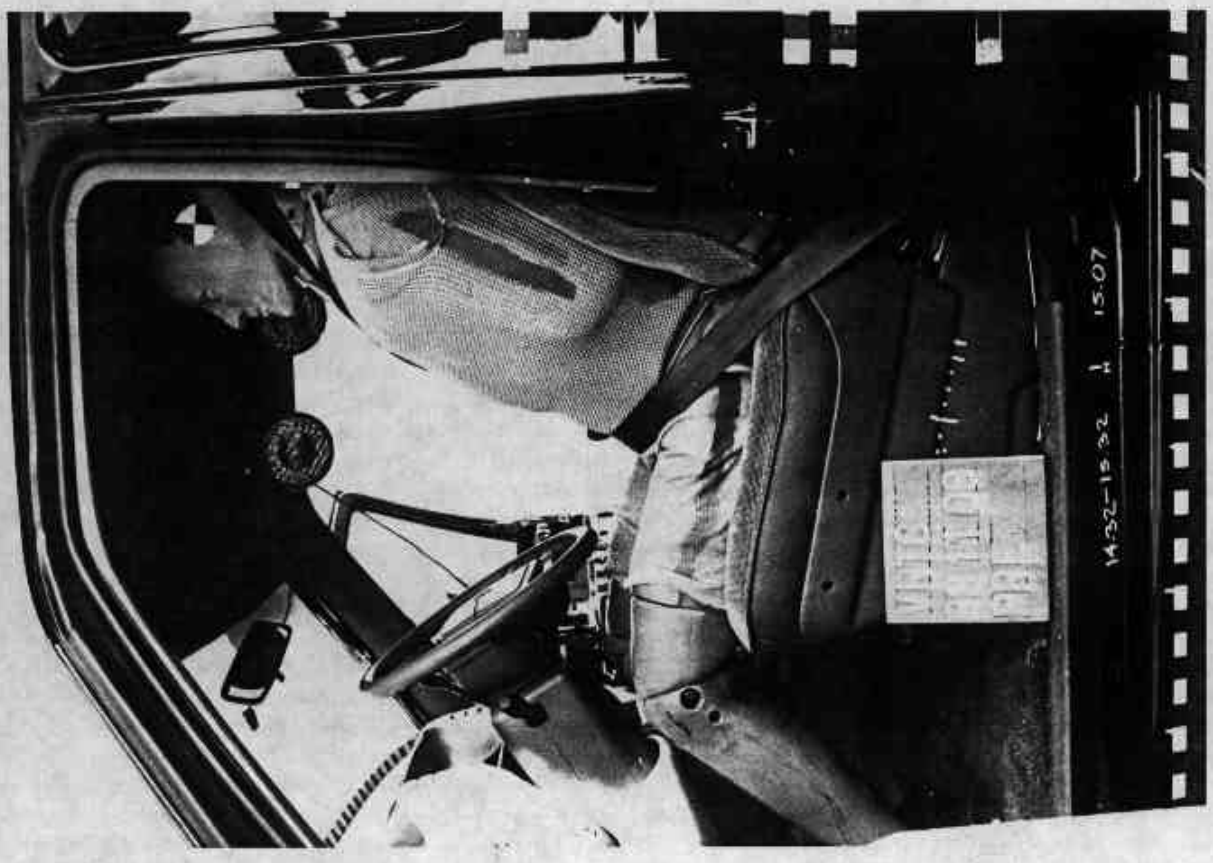


Figure A-18 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-19 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-20 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 3

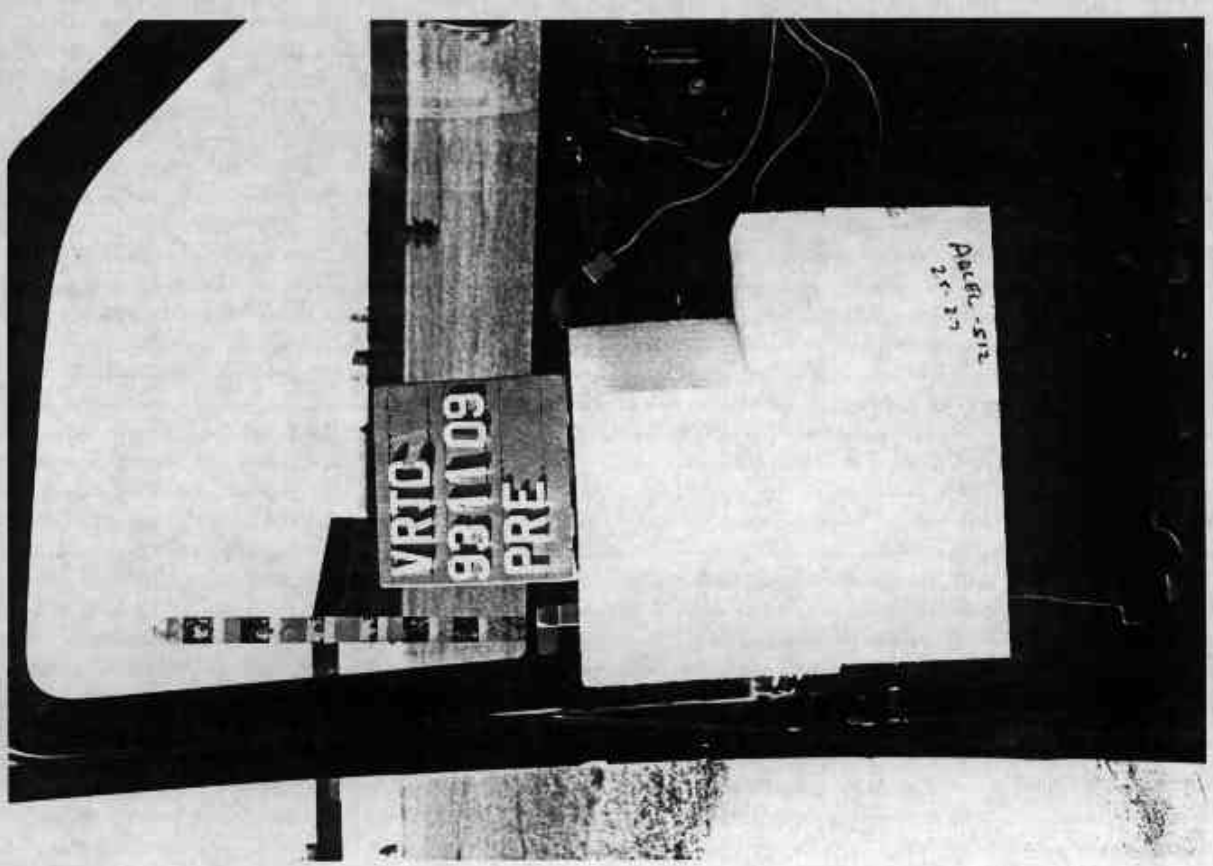


Figure A-21 PRE-TEST DRIVER DOOR PADDING - VIEW 1

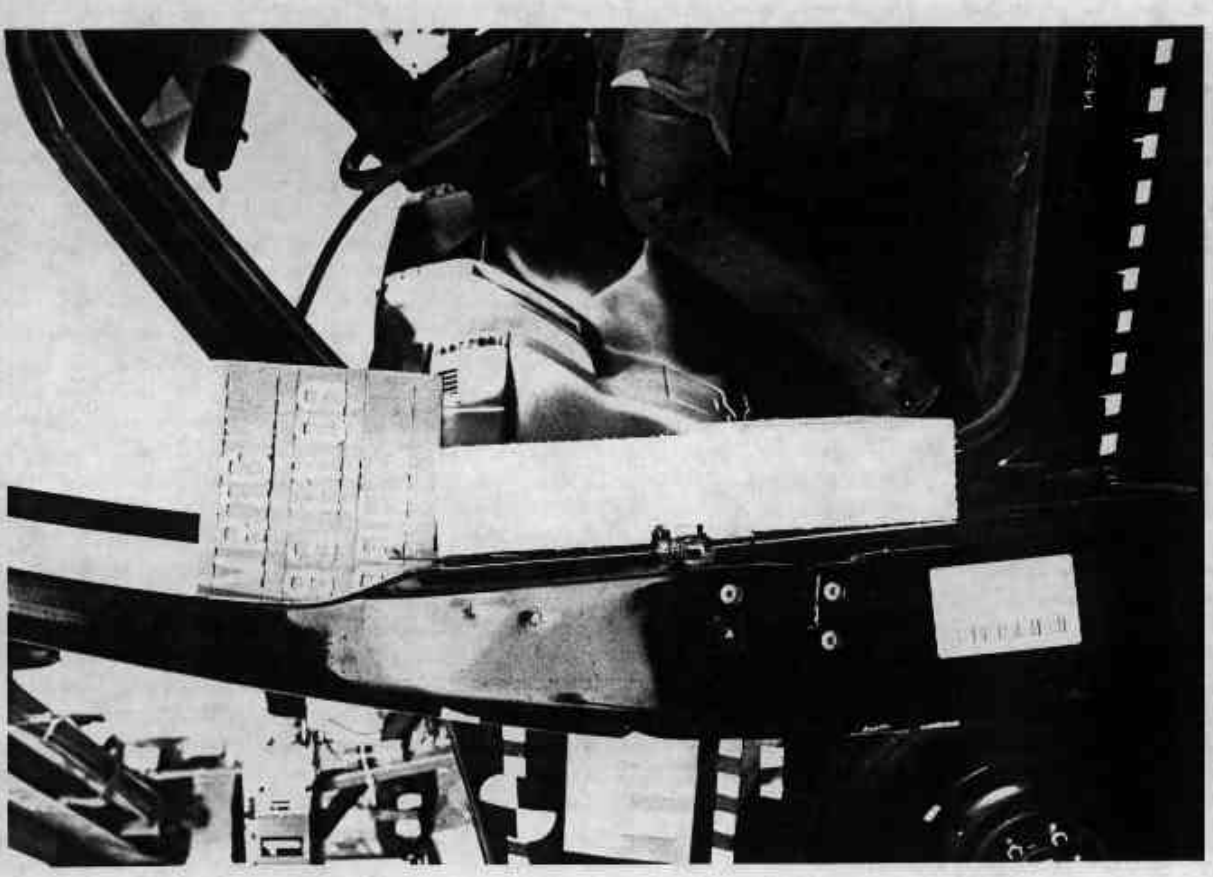


Figure A-22 PRE-TEST DRIVER DOOR PADDING - VIEW 2

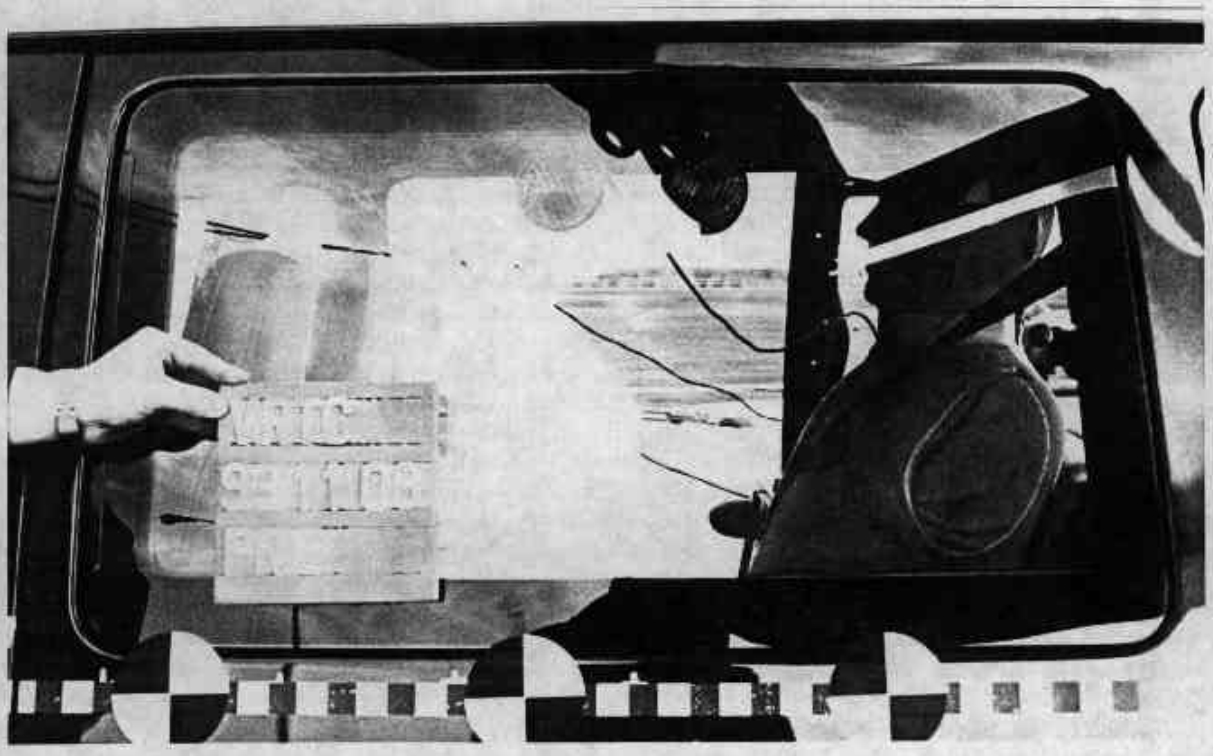


Figure A-23 PRE-TEST PASSENGER DUMMY POSITION VIEW

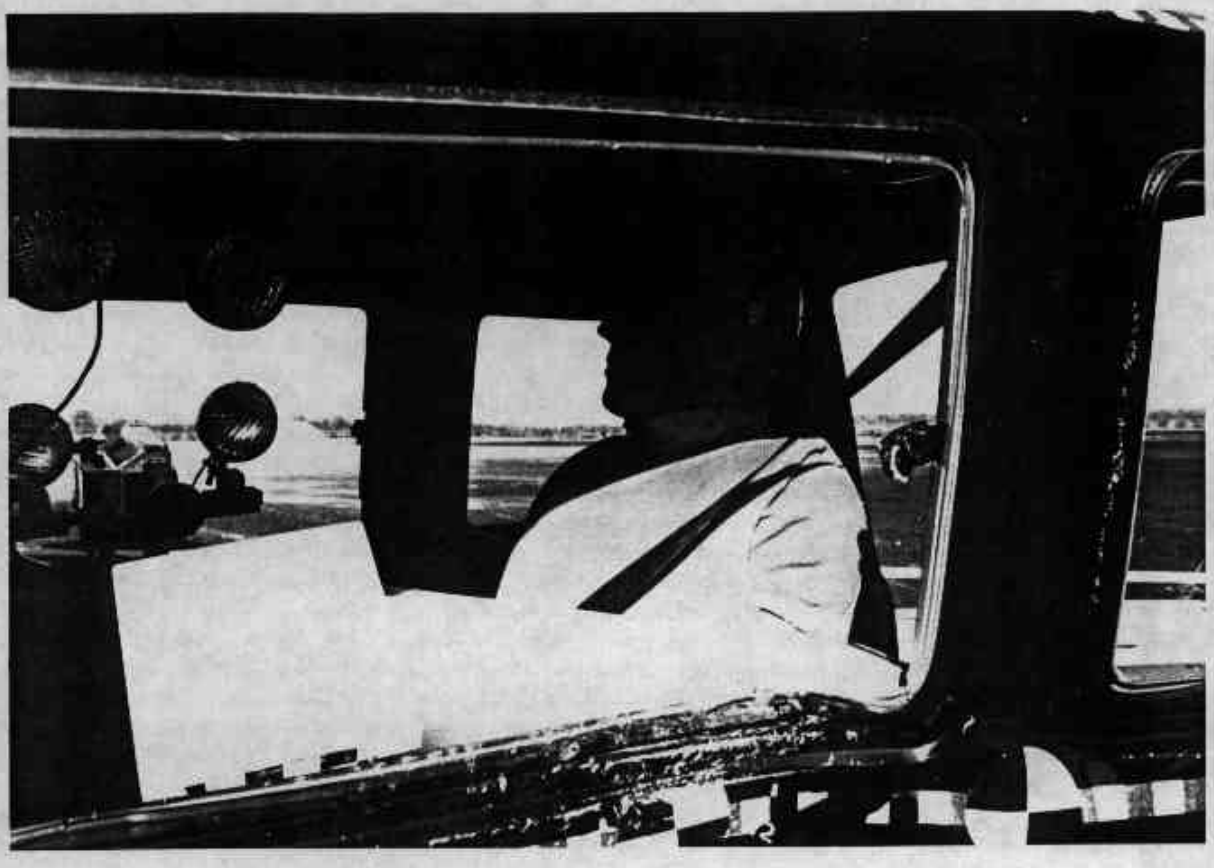


Figure A-24 POST-TEST PASSENGER DUMMY POSITION VIEW

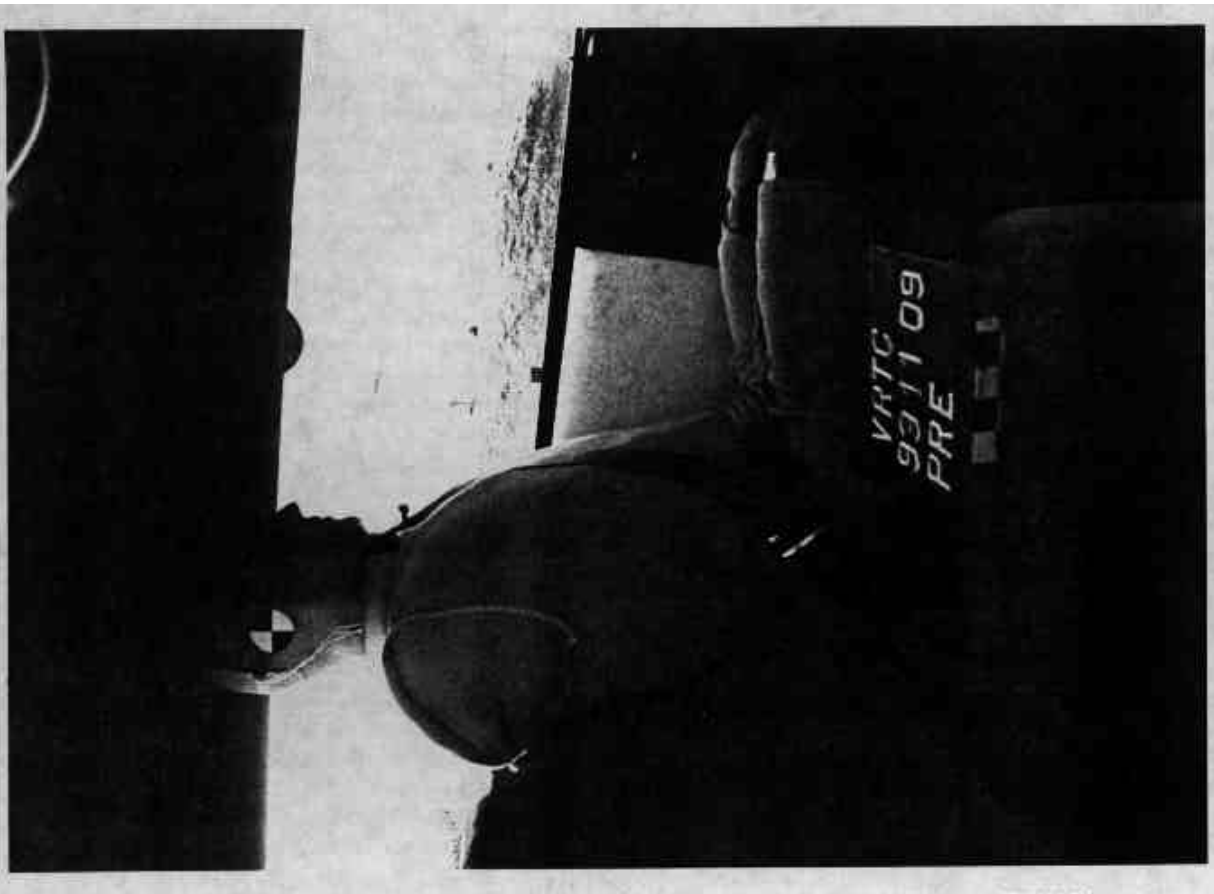


Figure A-25 PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

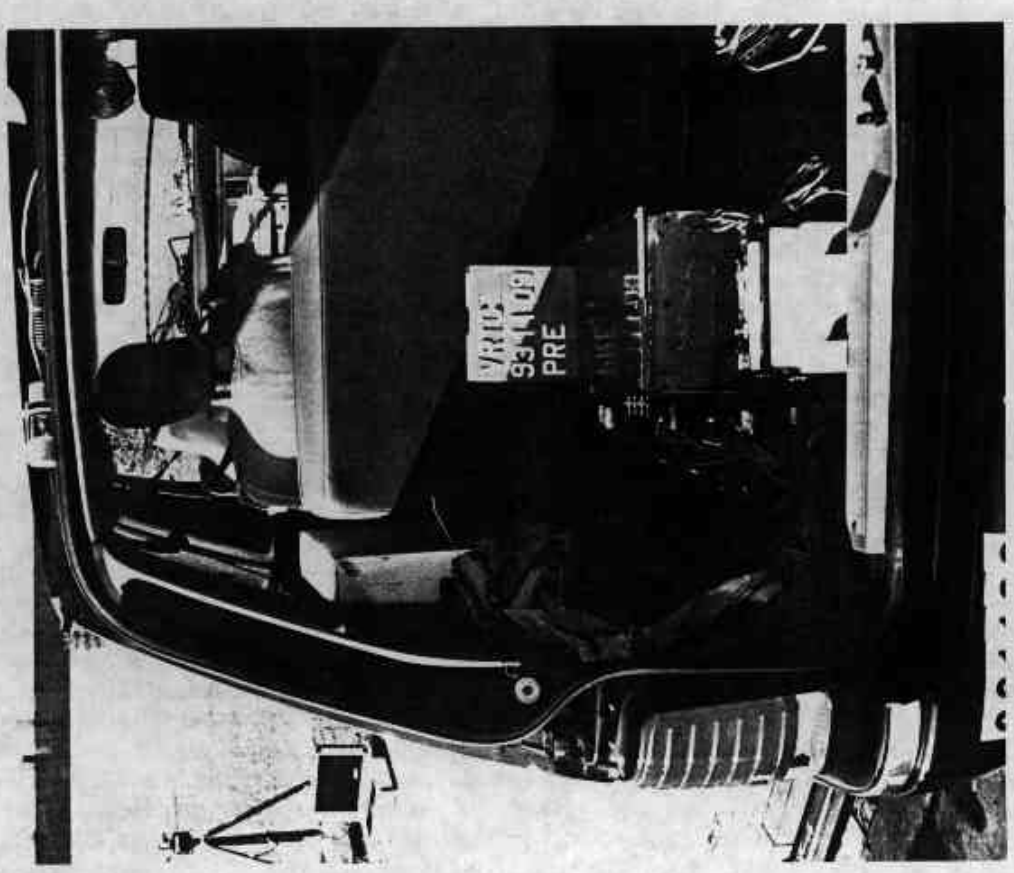


Figure A-26 PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

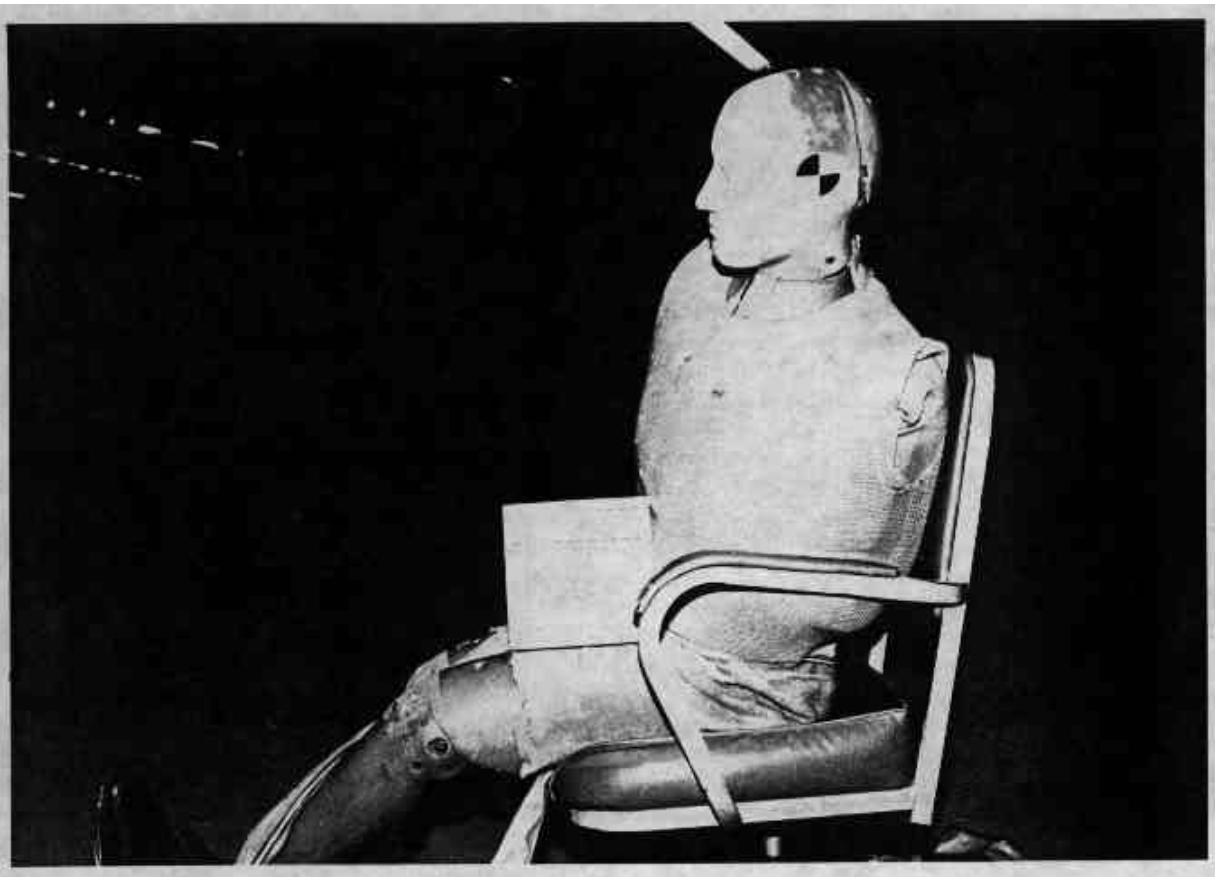


Figure A-27 POST-TEST DRIVER DUMMY CONTACT - VIEW 1

Figure A-28 POST-TEST DRIVER DUMMY CONTACT - VIEW 2

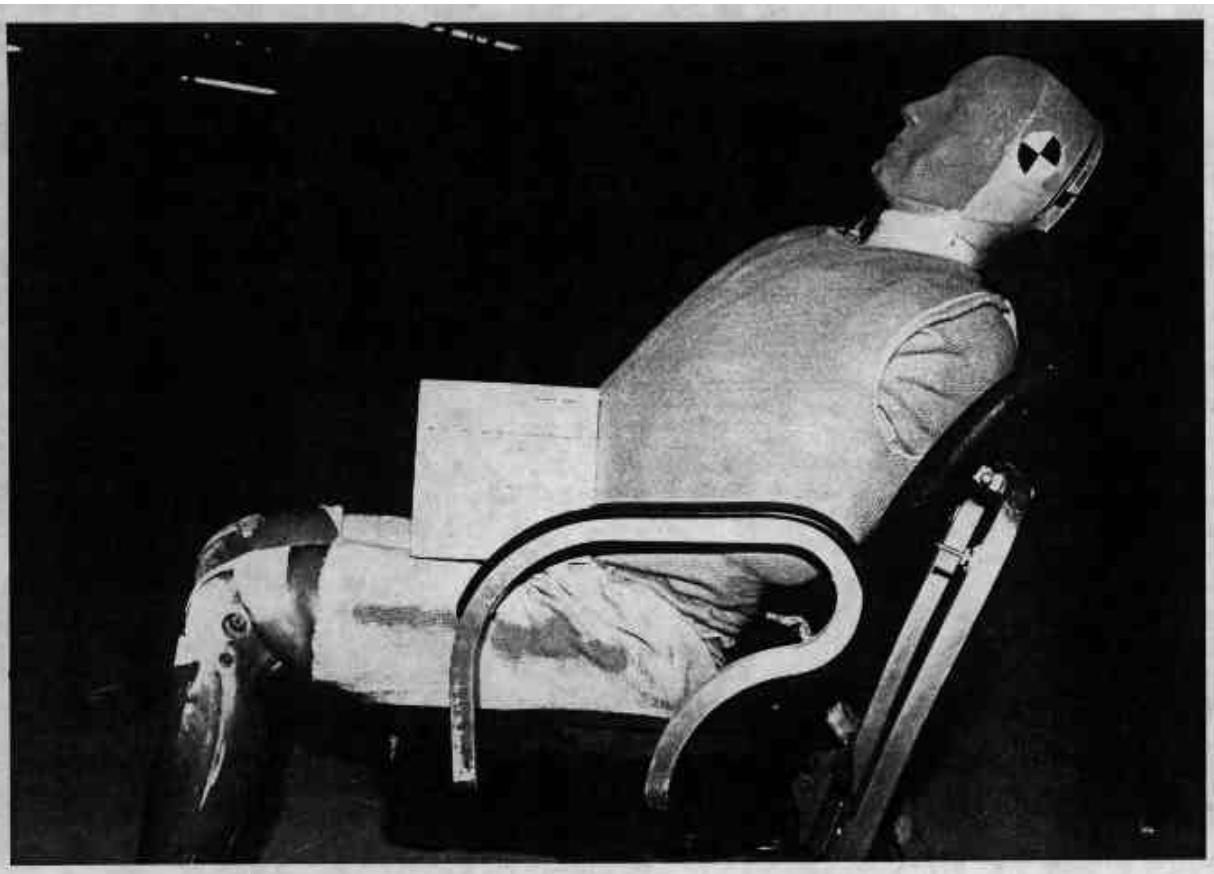


Figure A-29 POST-TEST PASSENGER DUMMY CONTACT - VIEW 1

Figure A-30 POST-TEST PASSENGER DUMMY CONTACT - VIEW 2

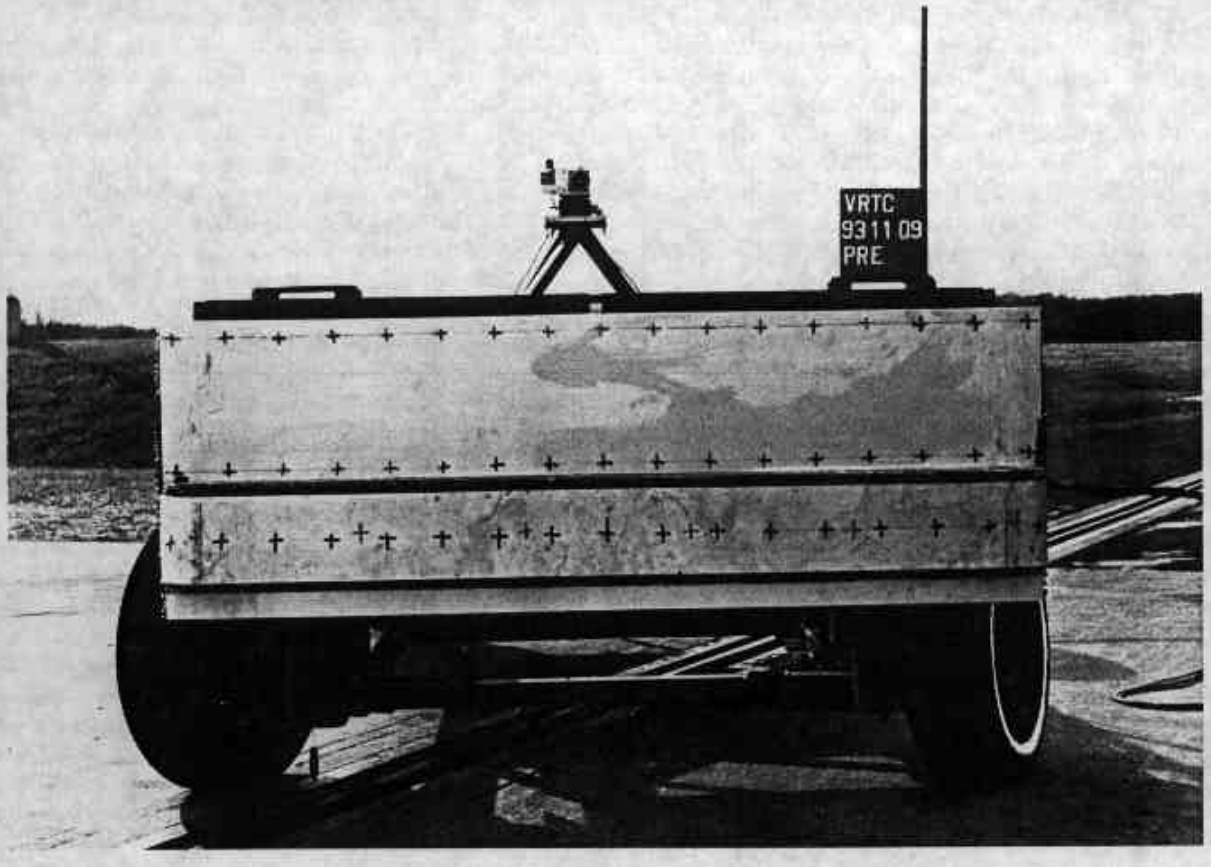


Figure A-31 PRE-TEST VEHICLE IMPACTOR FACE - FRONT VIEW

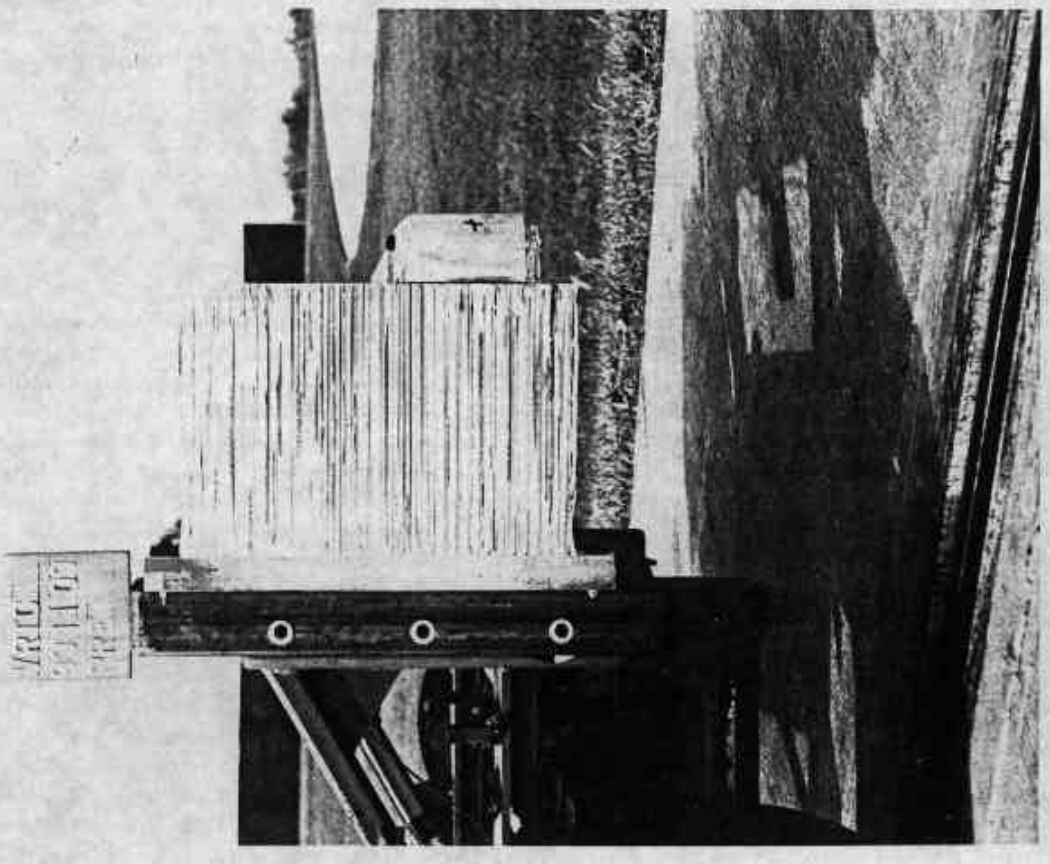


Figure A-32 PRE-TEST VEHICLE IMPACTOR FACE - RIGHT SIDE VIEW

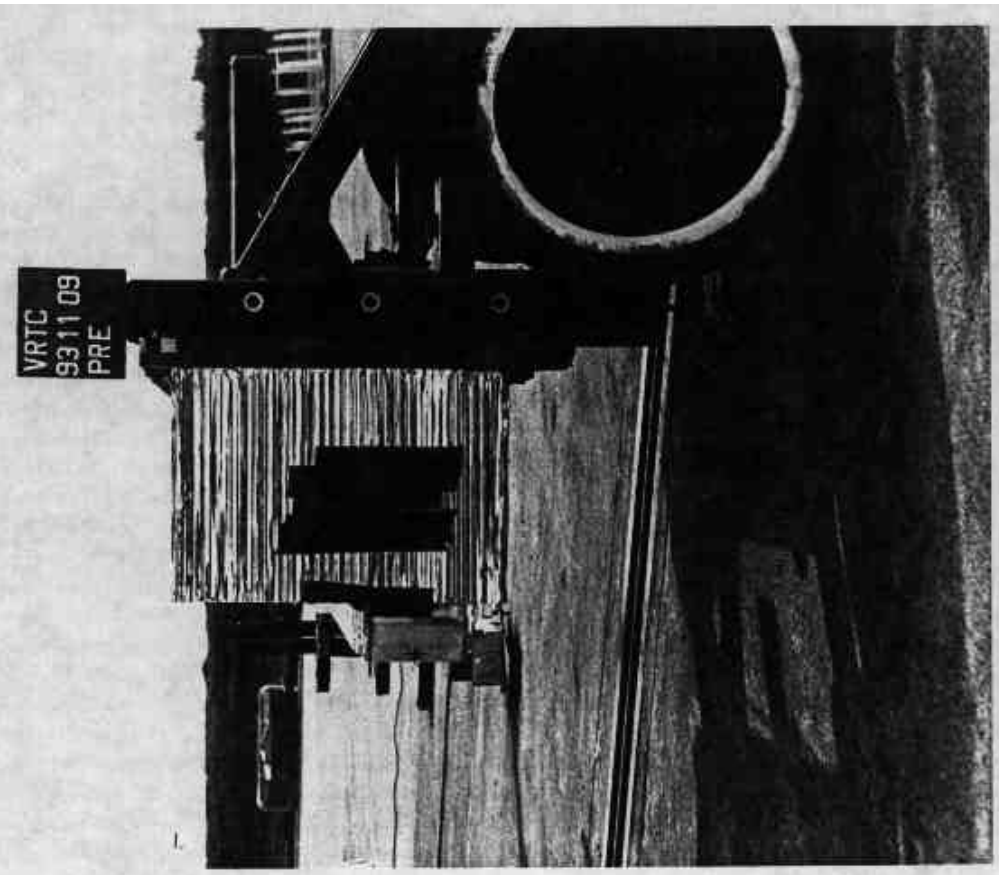


Figure A-33 PRE-TEST VEHICLE IMPACTOR FACE - LEFT SIDE VIEW

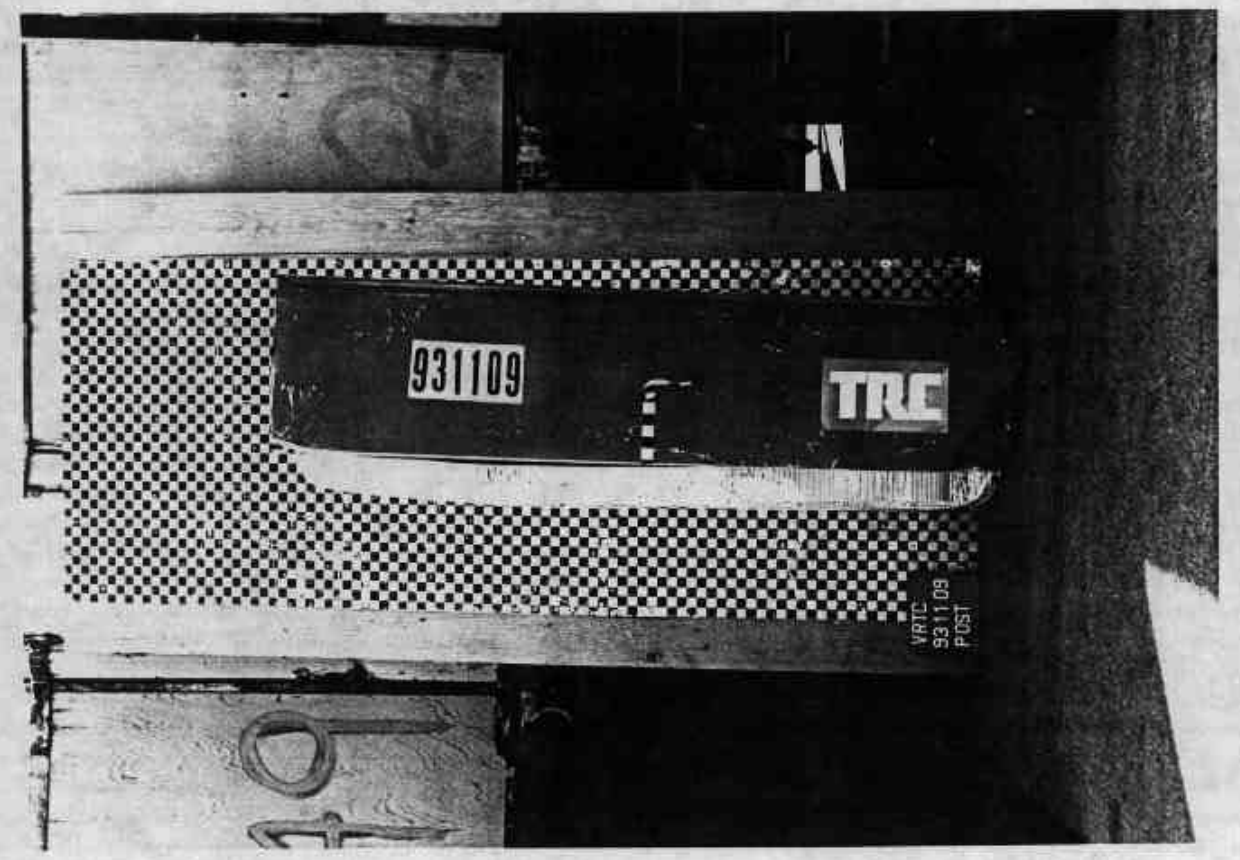


Figure A-34 POST-TEST VEHICLE IMPACTOR FACE - TOP VIEW

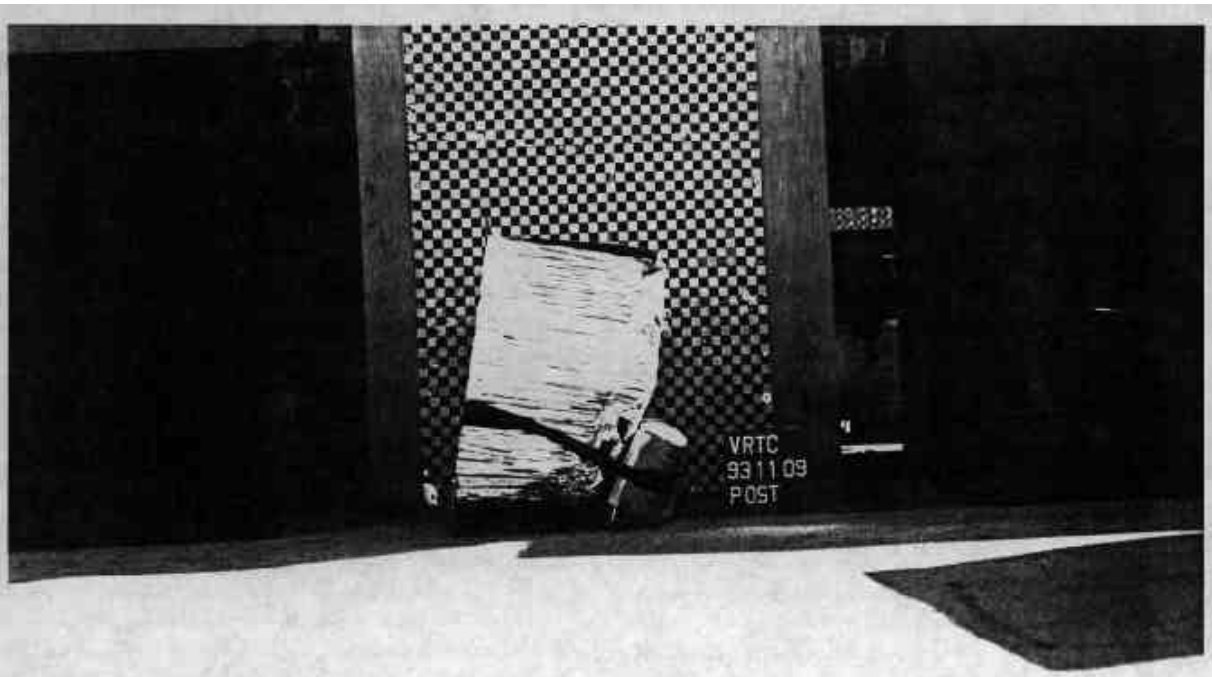


Figure A-35 POST-TEST VEHICLE IMPACTOR FACE - RIGHT SIDE VIEW

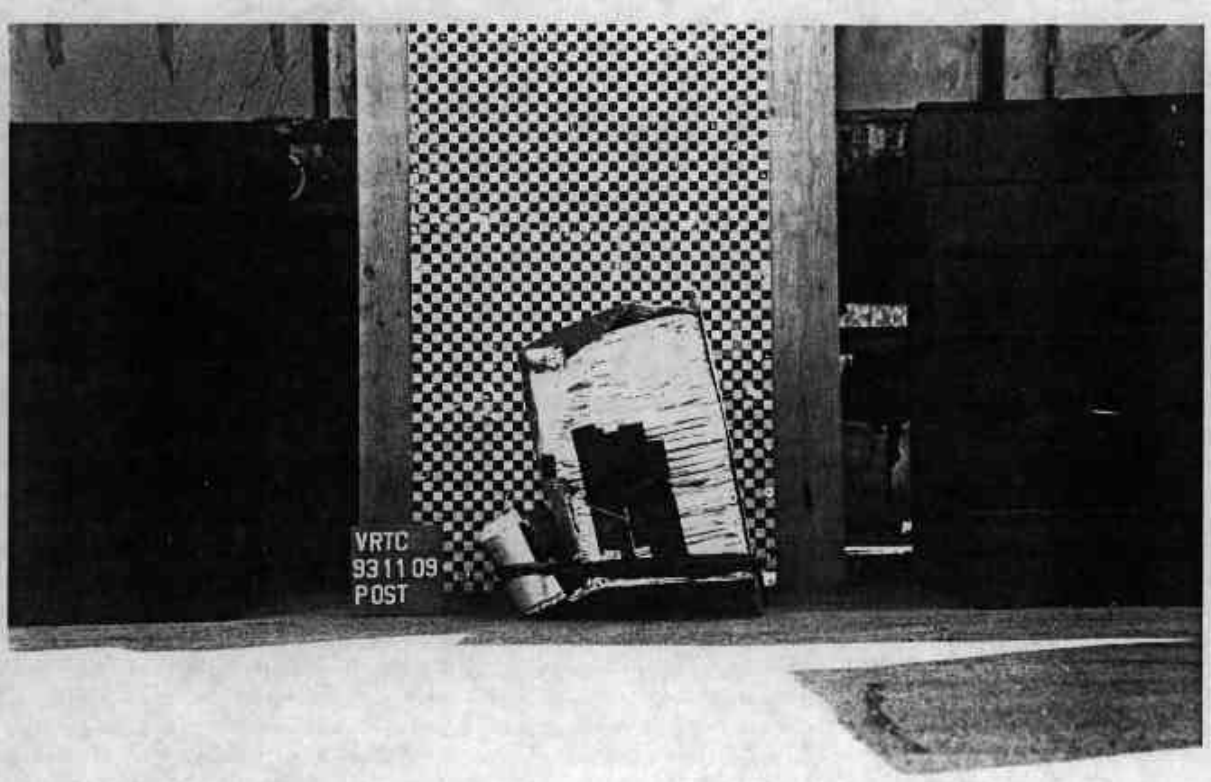


Figure A-36 POST-TEST VEHICLE IMPACTOR FACE - LEFT SIDE VIEW

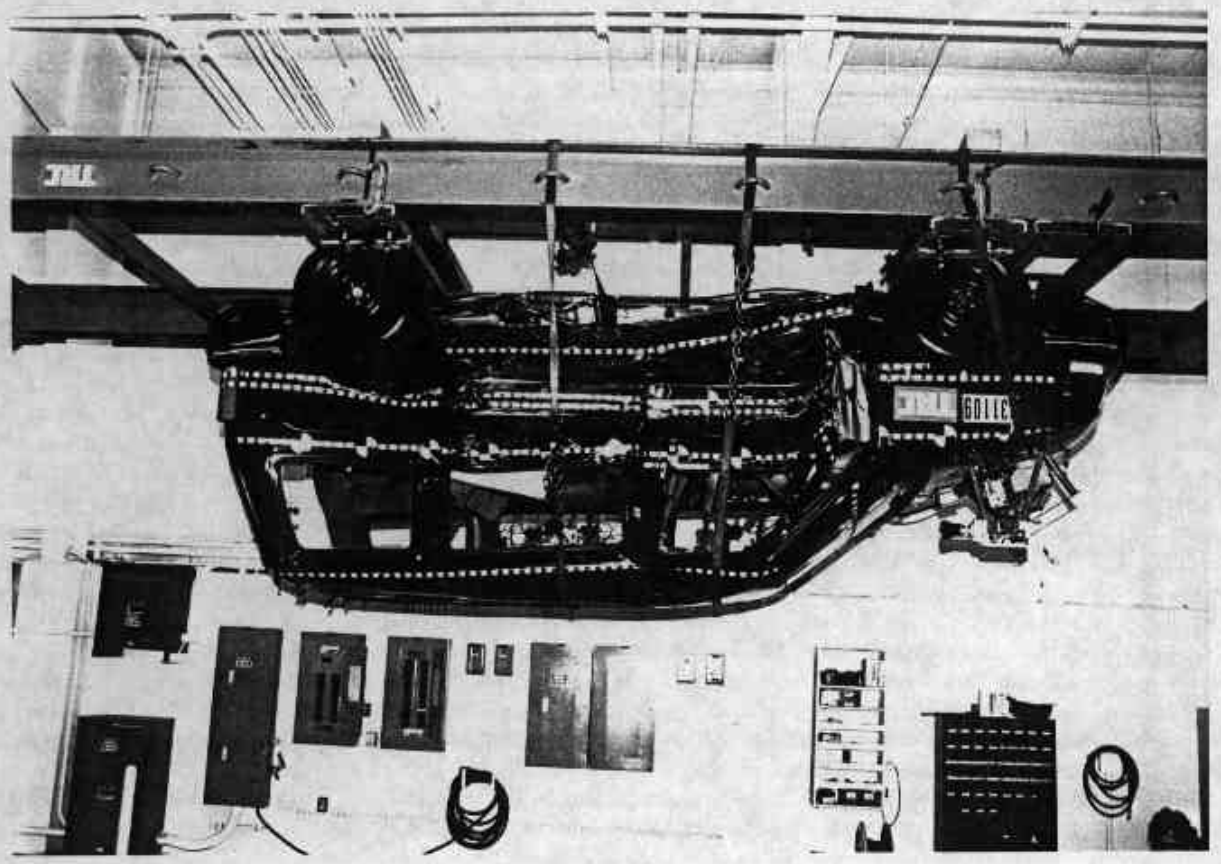


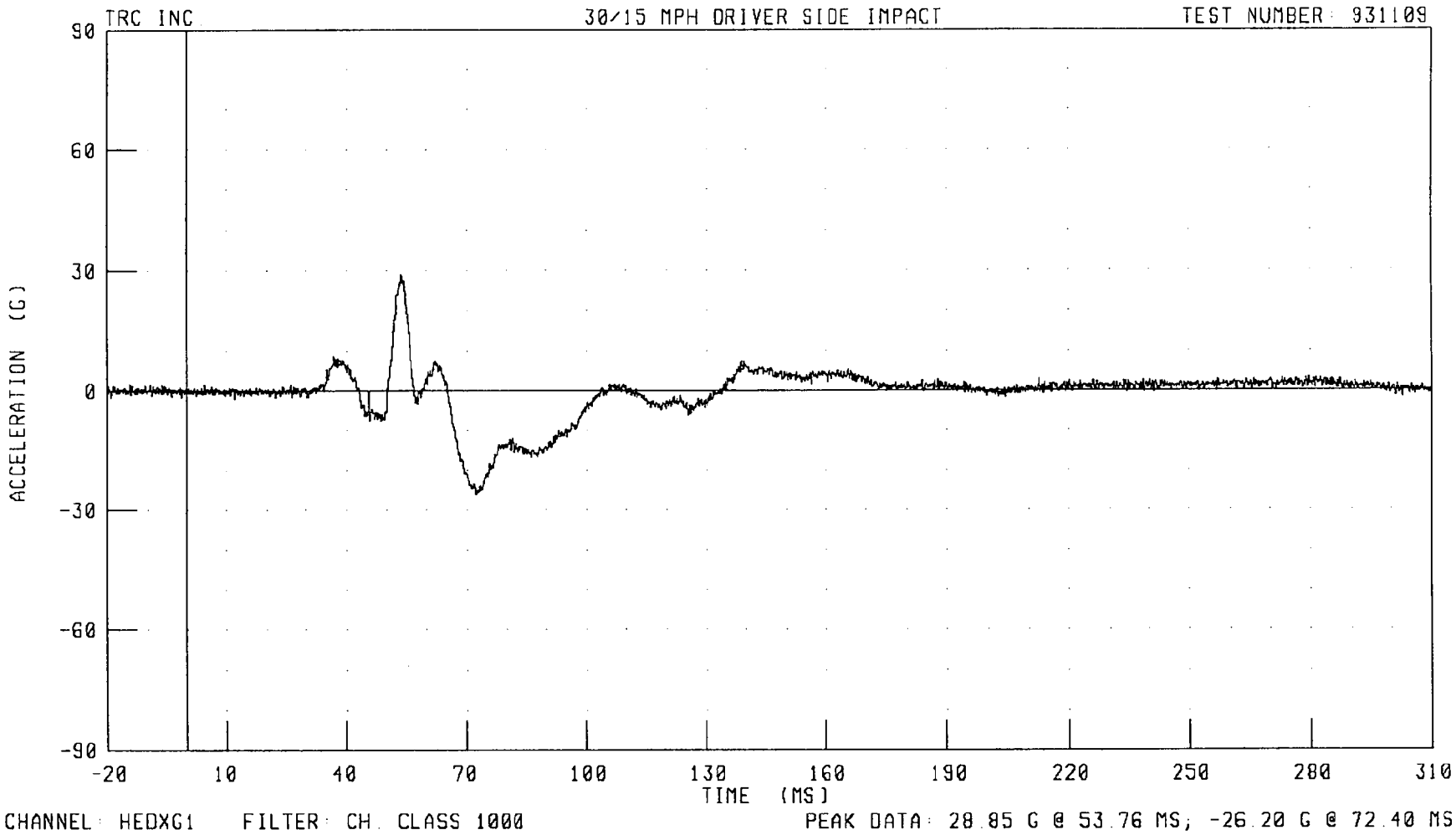
Figure A-37 POST-TEST VEHICLE ON STATIC ROLLOVER DEVICE

APPENDIX B

DATA PLOTS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

DRIVER HEAD X-AXIS ACCELERATION

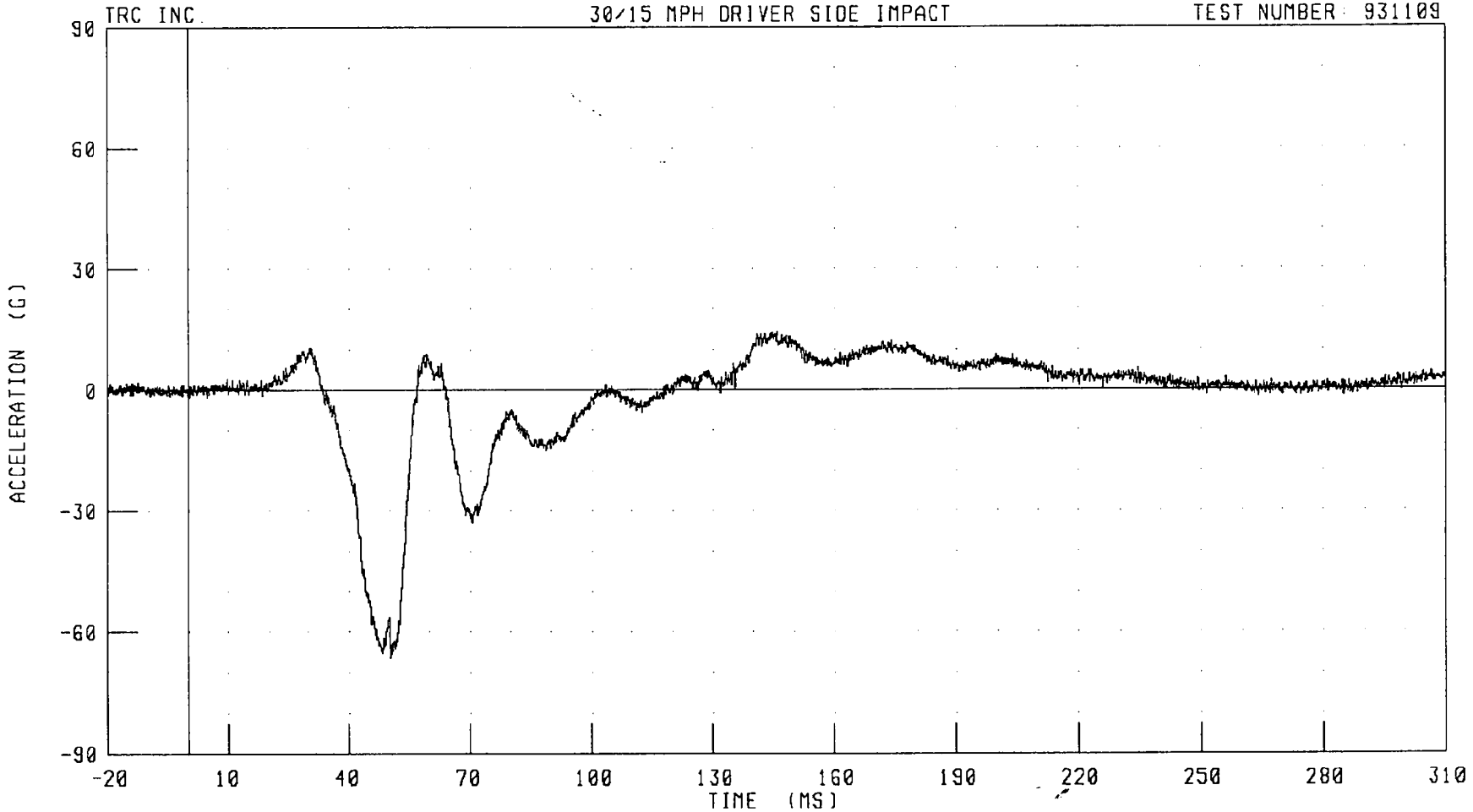


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000 PEAK DATA: 28.85 G @ 53.76 MS; -26.20 G @ 72.40 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

DRIVER HEAD Y-AXIS ACCELERATION

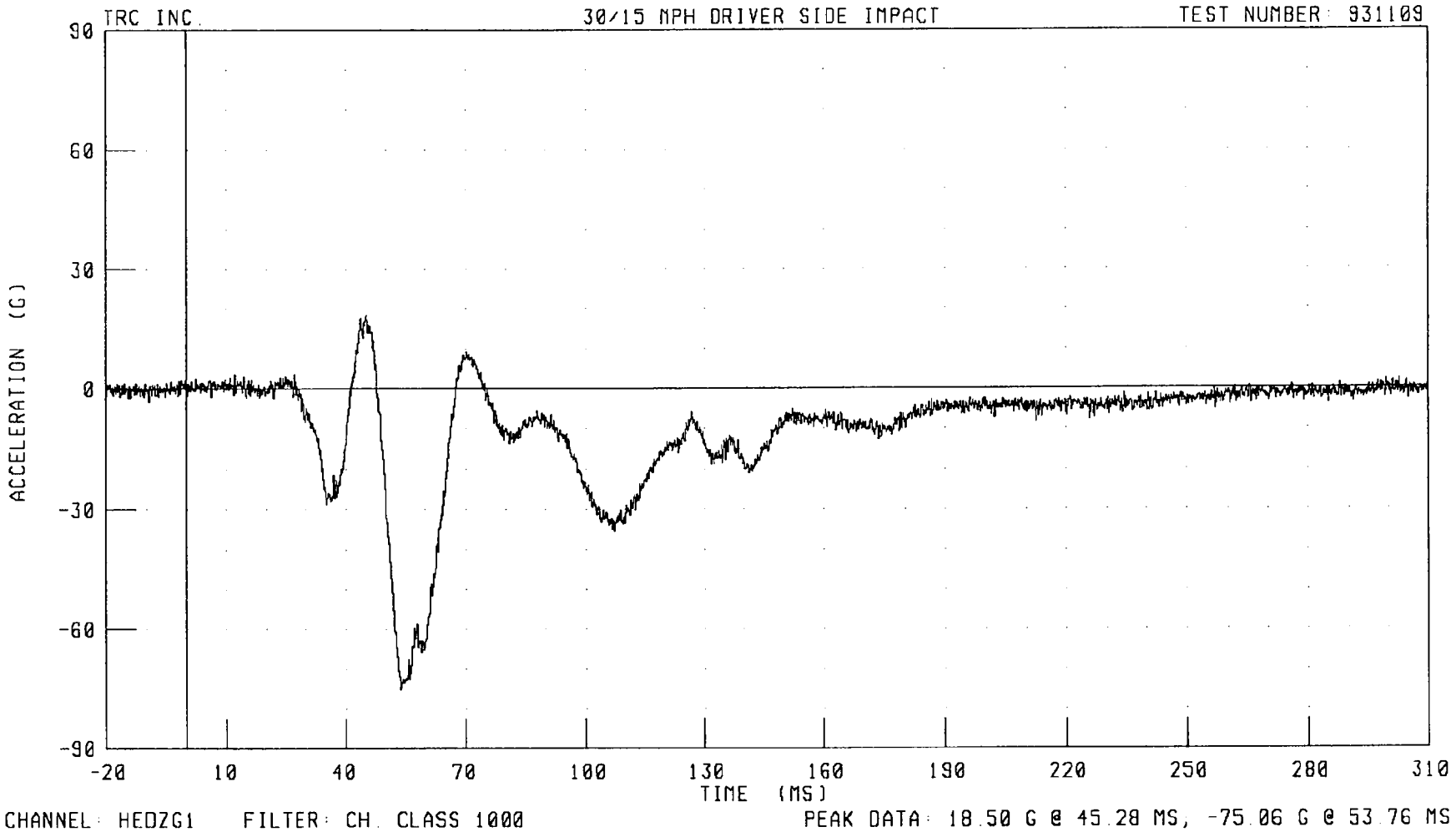
TRC INC. 30/15 MPH DRIVER SIDE IMPACT TEST NUMBER: 931109



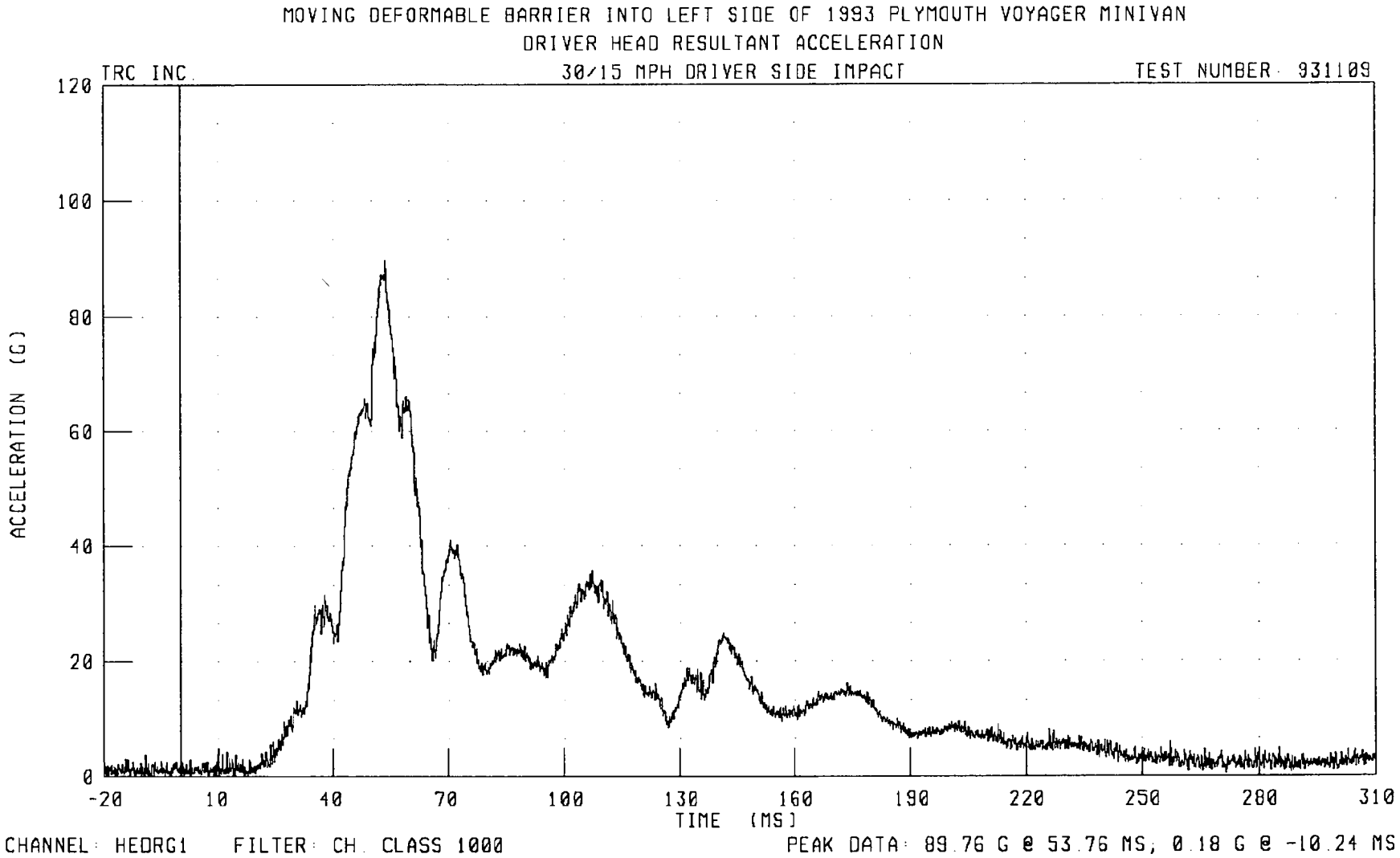
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000 PEAK DATA: 14.62 G @ 145.84 MS; -66.66 G @ 50.48 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

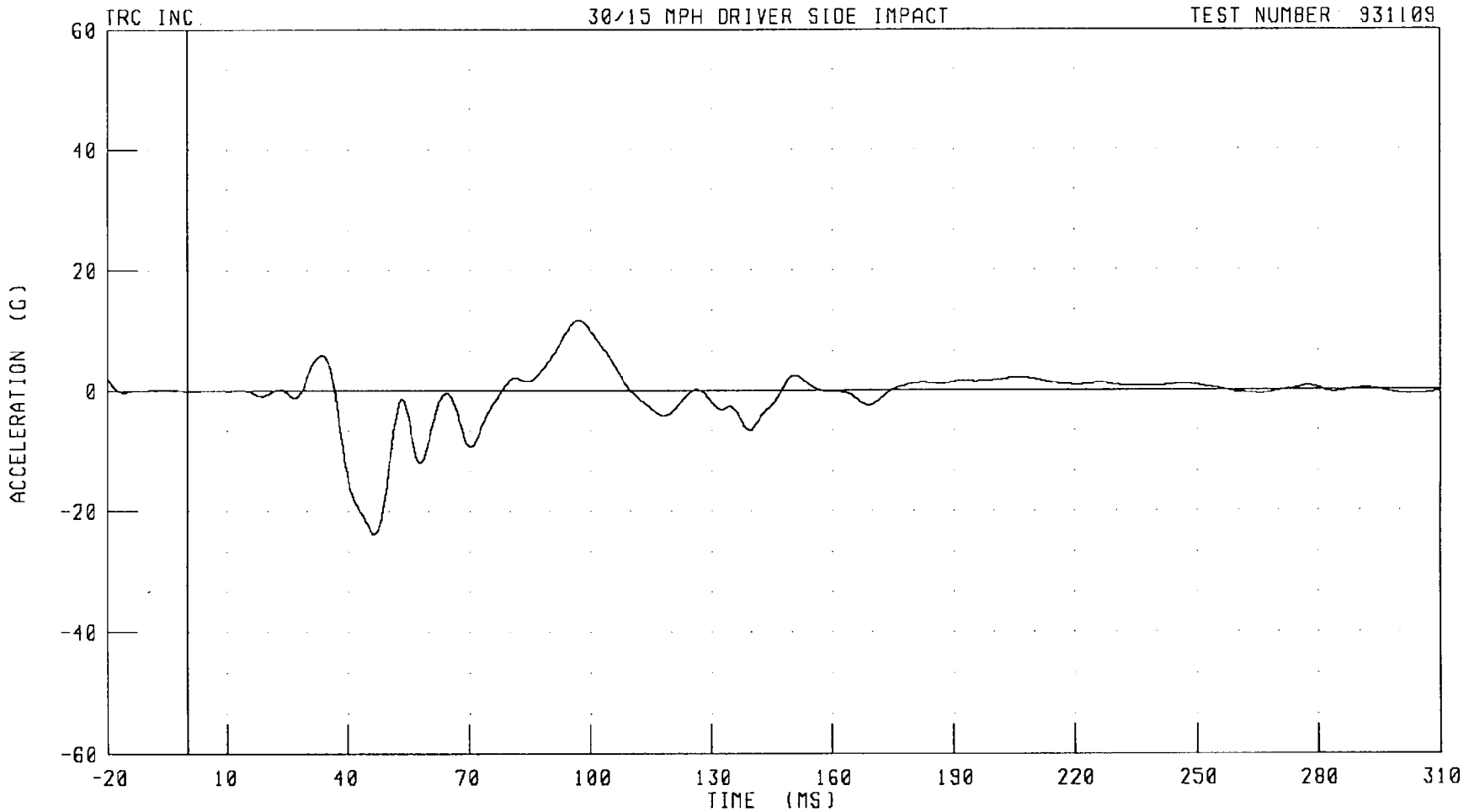
DRIVER HEAD Z-AXIS ACCELERATION



CHANNEL: HEDZG1 FILTER: CH. CLASS 1000 PEAK DATA: 18.50 G @ 45.28 MS, -75.06 G @ 53.76 MS

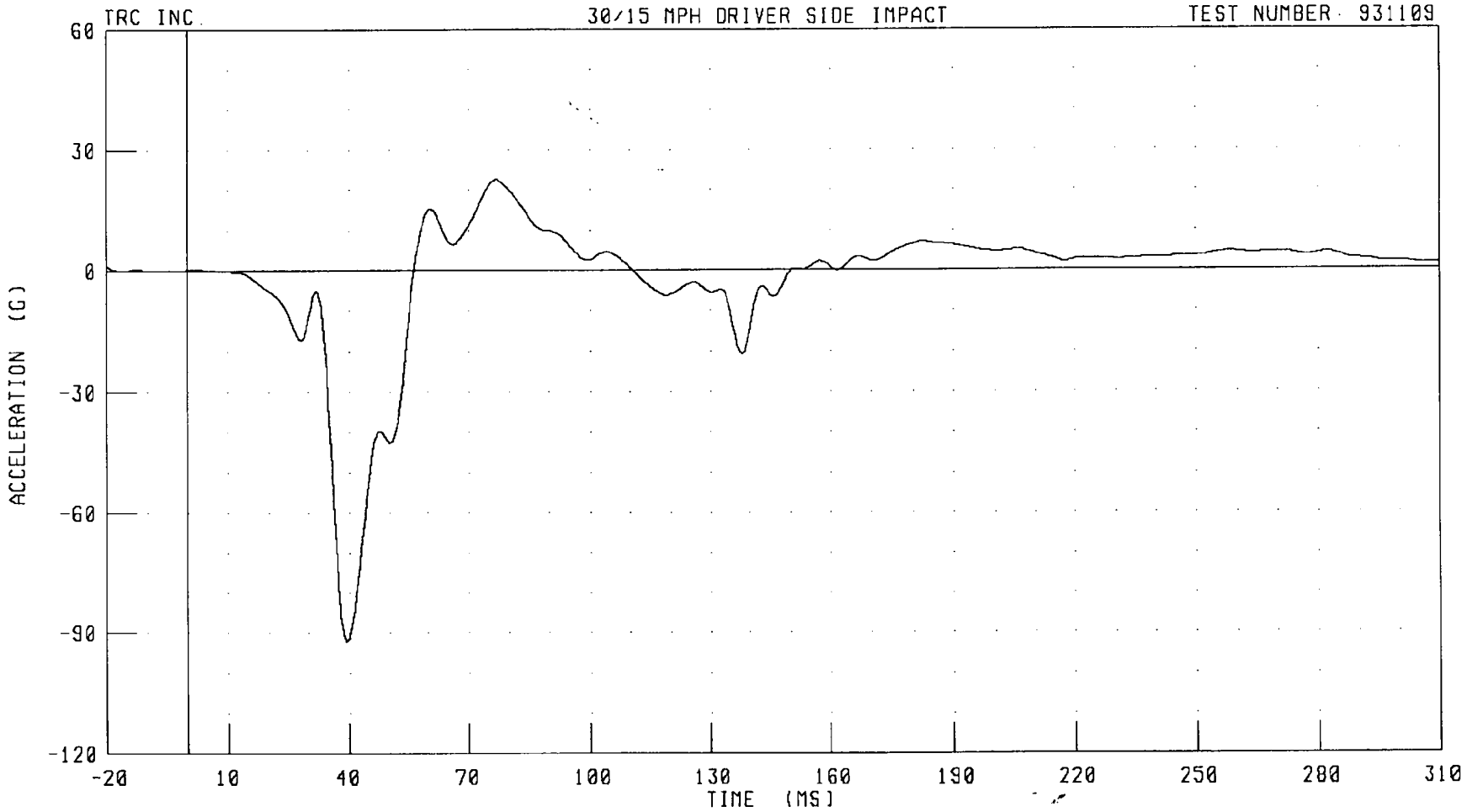

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER HEAD RESULTANT ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG1
FILTER: CH. CLASS 1000
PEAK DATA: 89.76 G @ 53.76 MS, 0.18 G @ -10.24 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE X-AXIS ACCELERATION



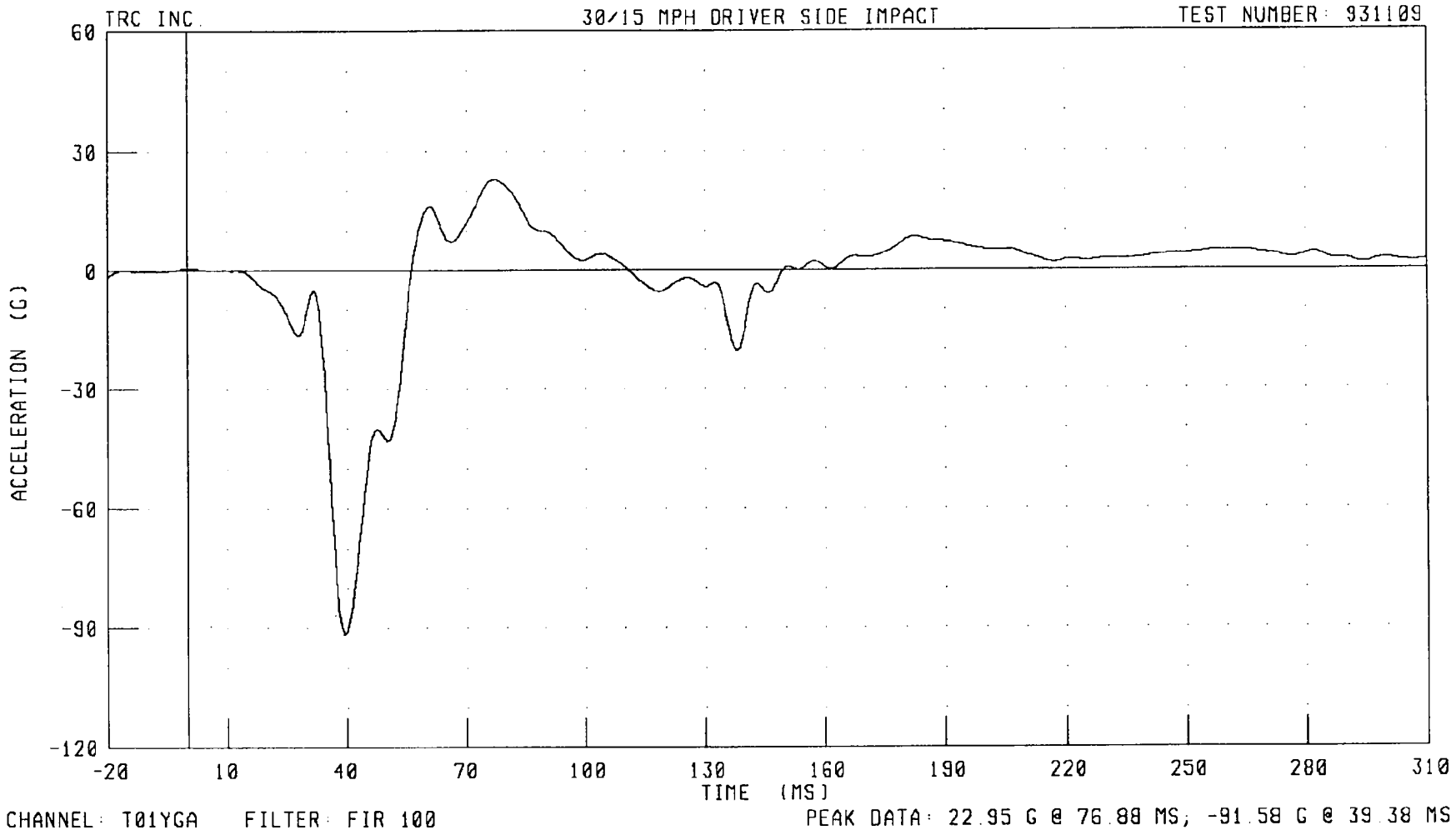
CHANNEL: T01XG1 FILTER: FIR 100 PEAK DATA: 11.72 G @ 96.88 MS; -23.81 G @ 46.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE Y-AXIS ACCELERATION



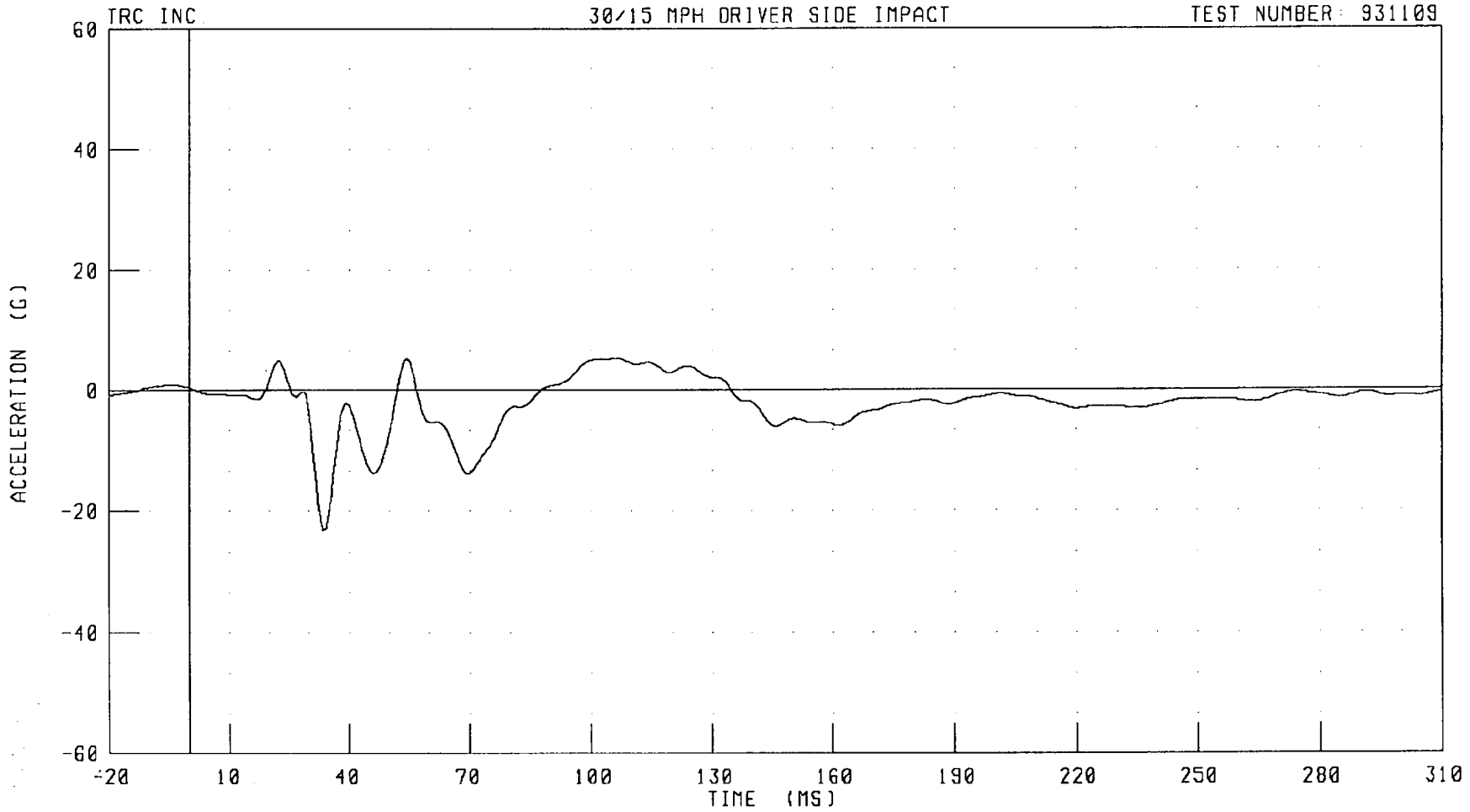
CHANNEL: T01YG1 FILTER: FIR 100 PEAK DATA: 22.48 G @ 76.88 MS; -92.24 G @ 39.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE Y-AXIS REDUNDANT ACCELERATION



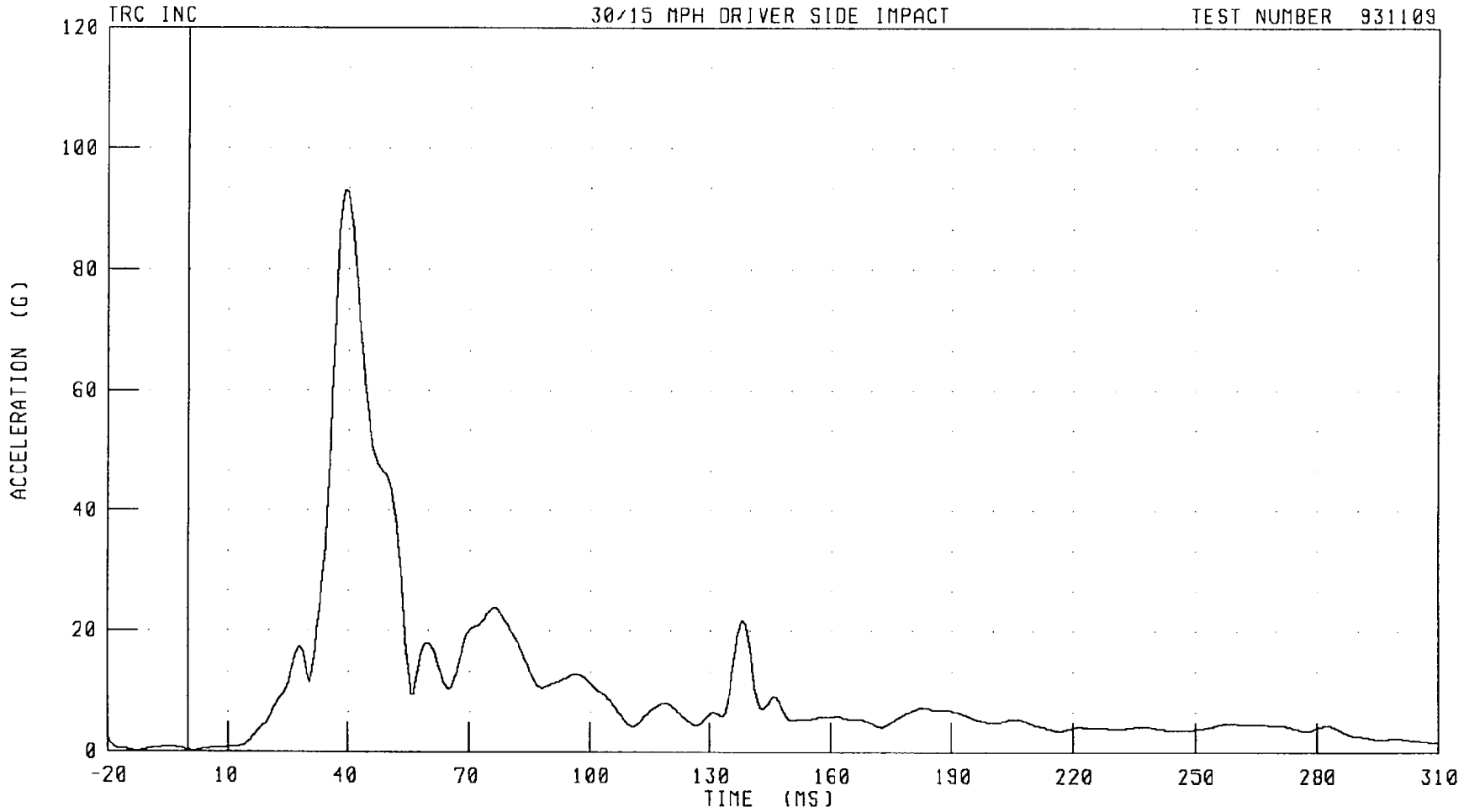
CHANNEL: T01YGA FILTER: FIR 100 PEAK DATA: 22.95 G @ 76.88 MS; -91.58 G @ 39.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE Z-AXIS ACCELERATION



CHANNEL: T01ZG1 FILTER: FIR 100 PEAK DATA: 5.27 G @ 106.25 MS; -23.24 G @ 33.75 MS

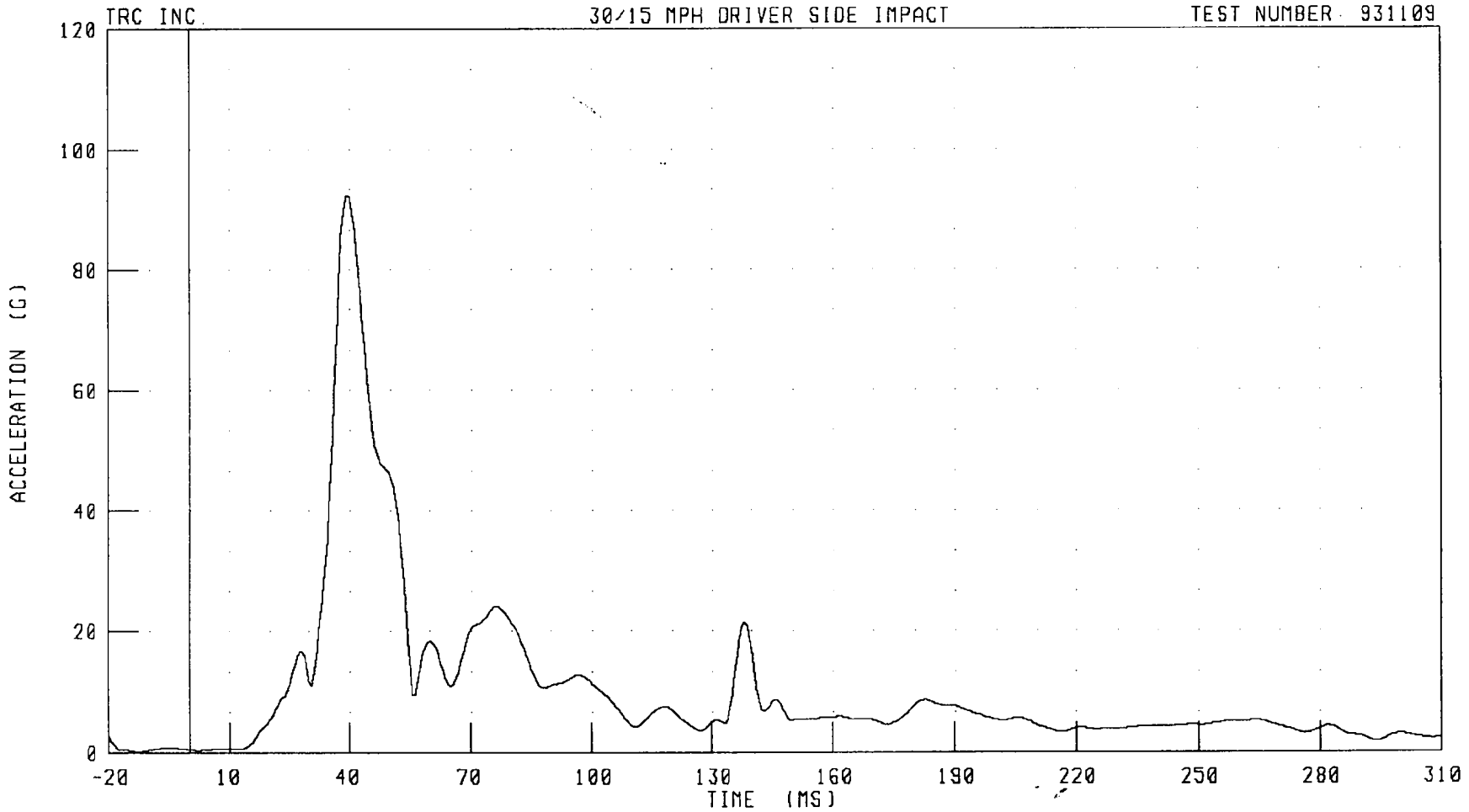
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE RESULTANT ACCELERATION



CHANNEL: T01RG1 FILTER: FIR 100

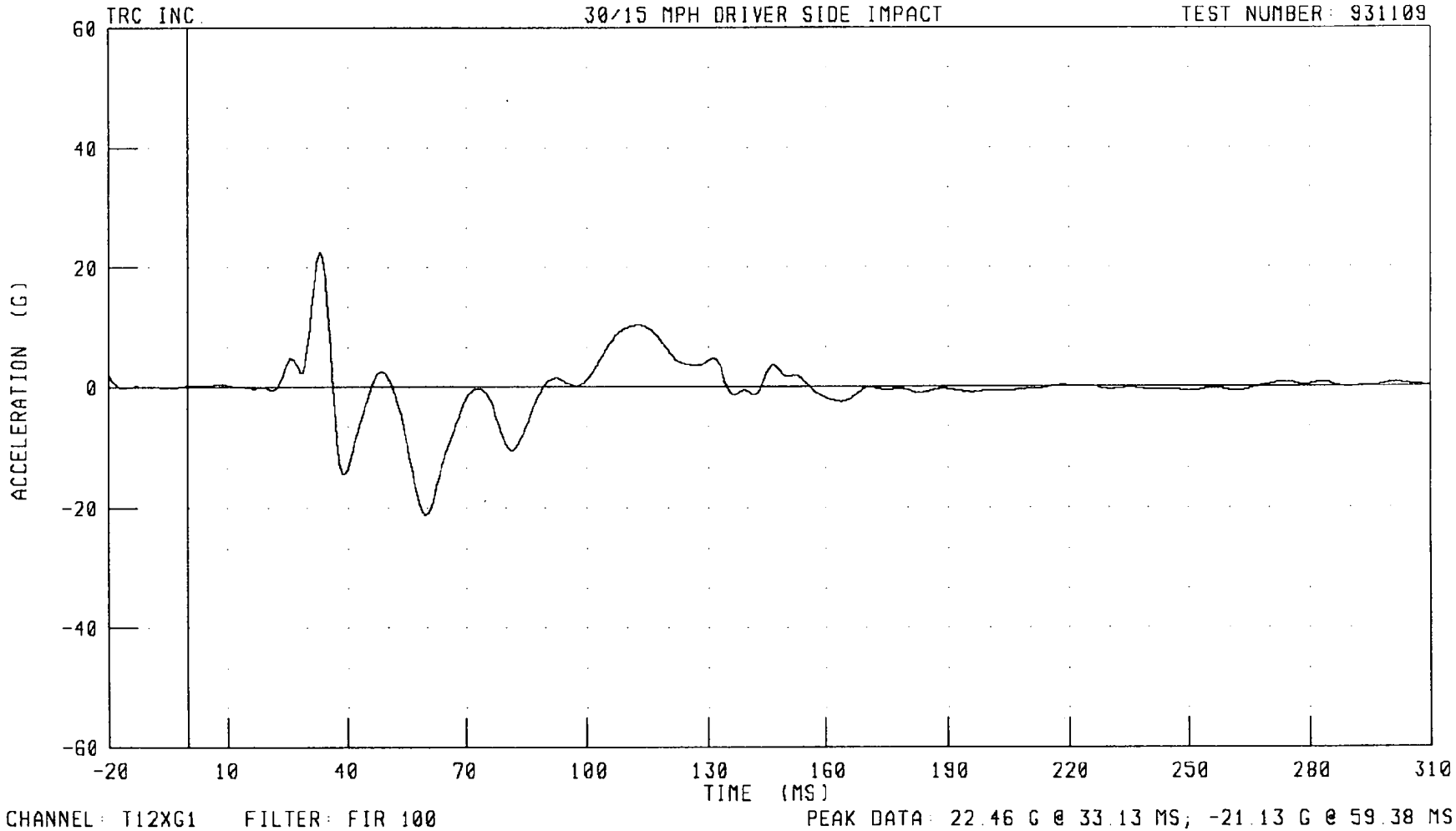
PEAK DATA: 93.01 G @ 39.38 MS; 0.16 G @ -12.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER UPPER SPINE RESULTANT REDUNDANT ACCELERATION

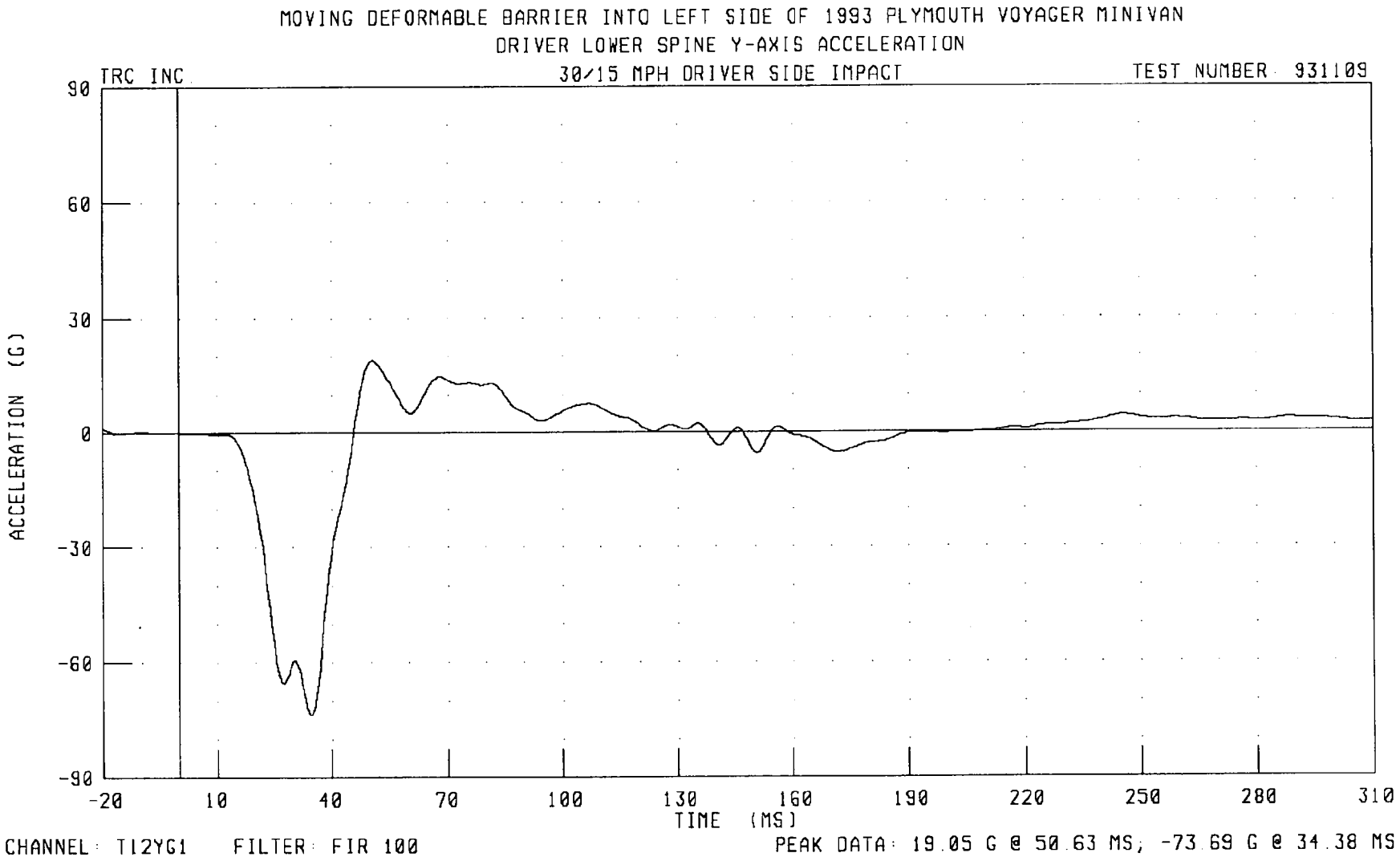


CHANNEL: T01RGA FILTER: FIR 100 PEAK DATA: 92.37 G @ 39.38 MS; 0.25 G @ -13.13 MS

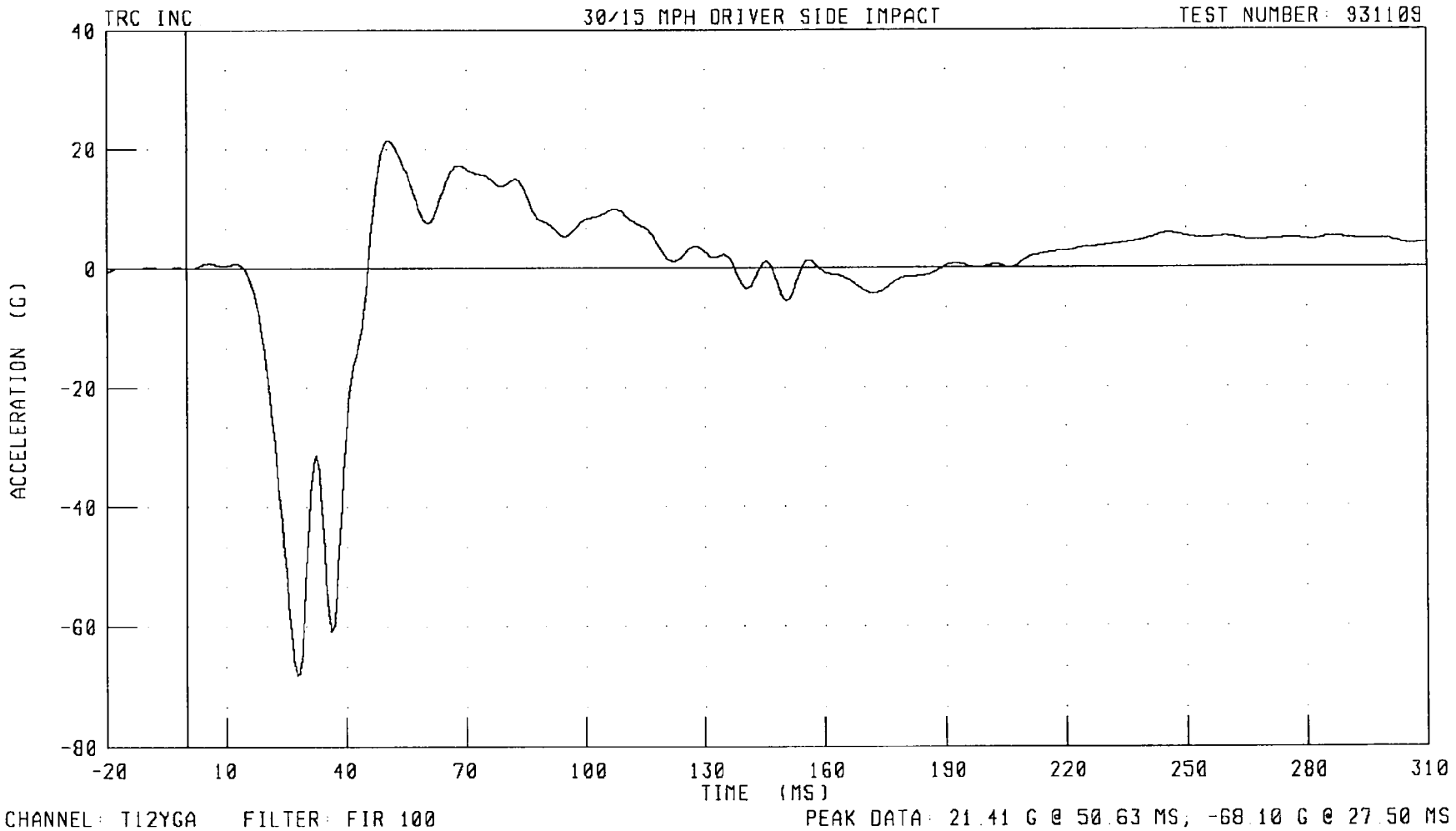
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE X-AXIS ACCELERATION



CHANNEL: T12XG1 FILTER: FIR 100 PEAK DATA: 22.46 G @ 33.13 MS; -21.13 G @ 59.38 MS

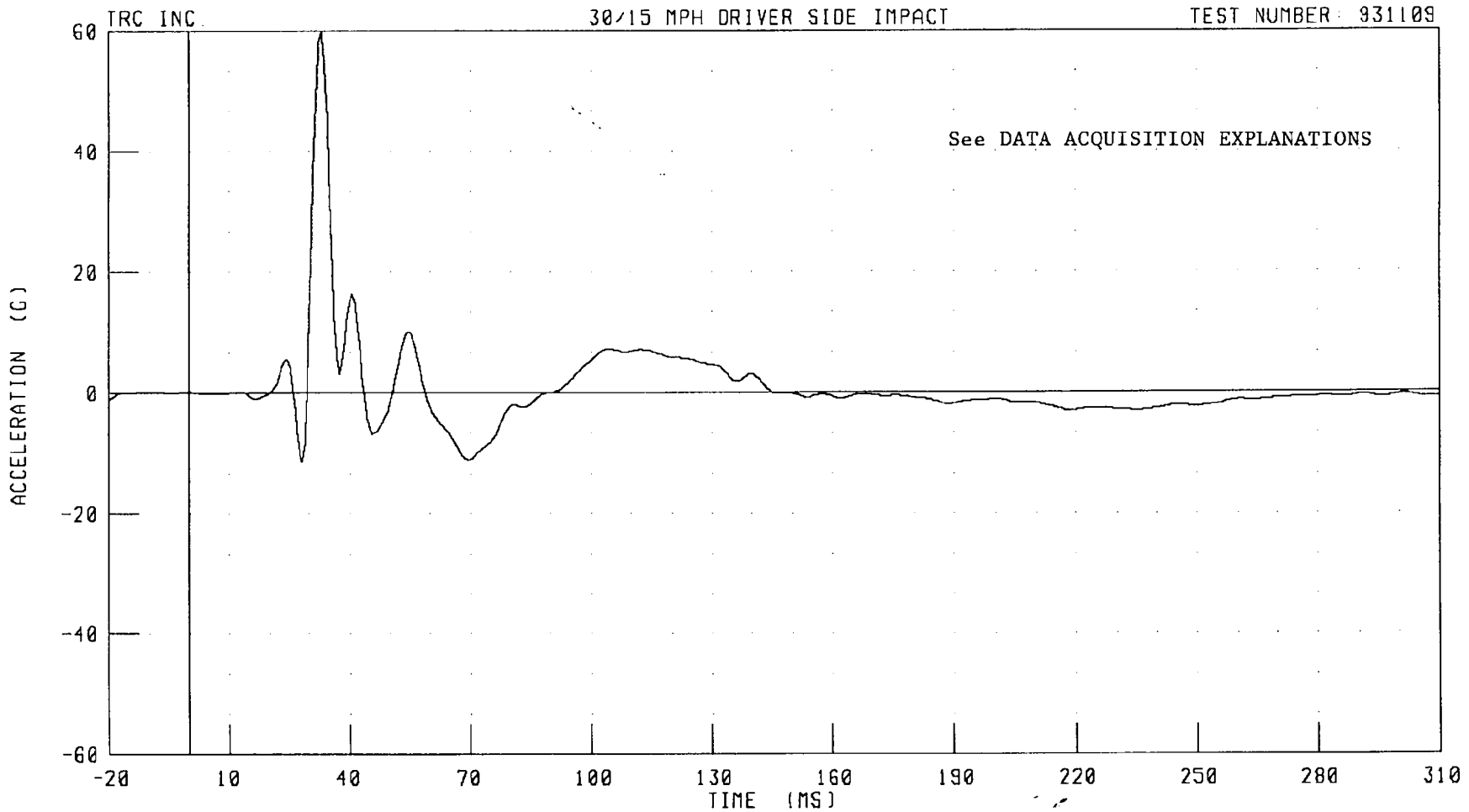

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931109
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL T12YG1
FILTER FIR 100
PEAK DATA 19.05 G @ 50.63 MS, -73.69 G @ 34.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION



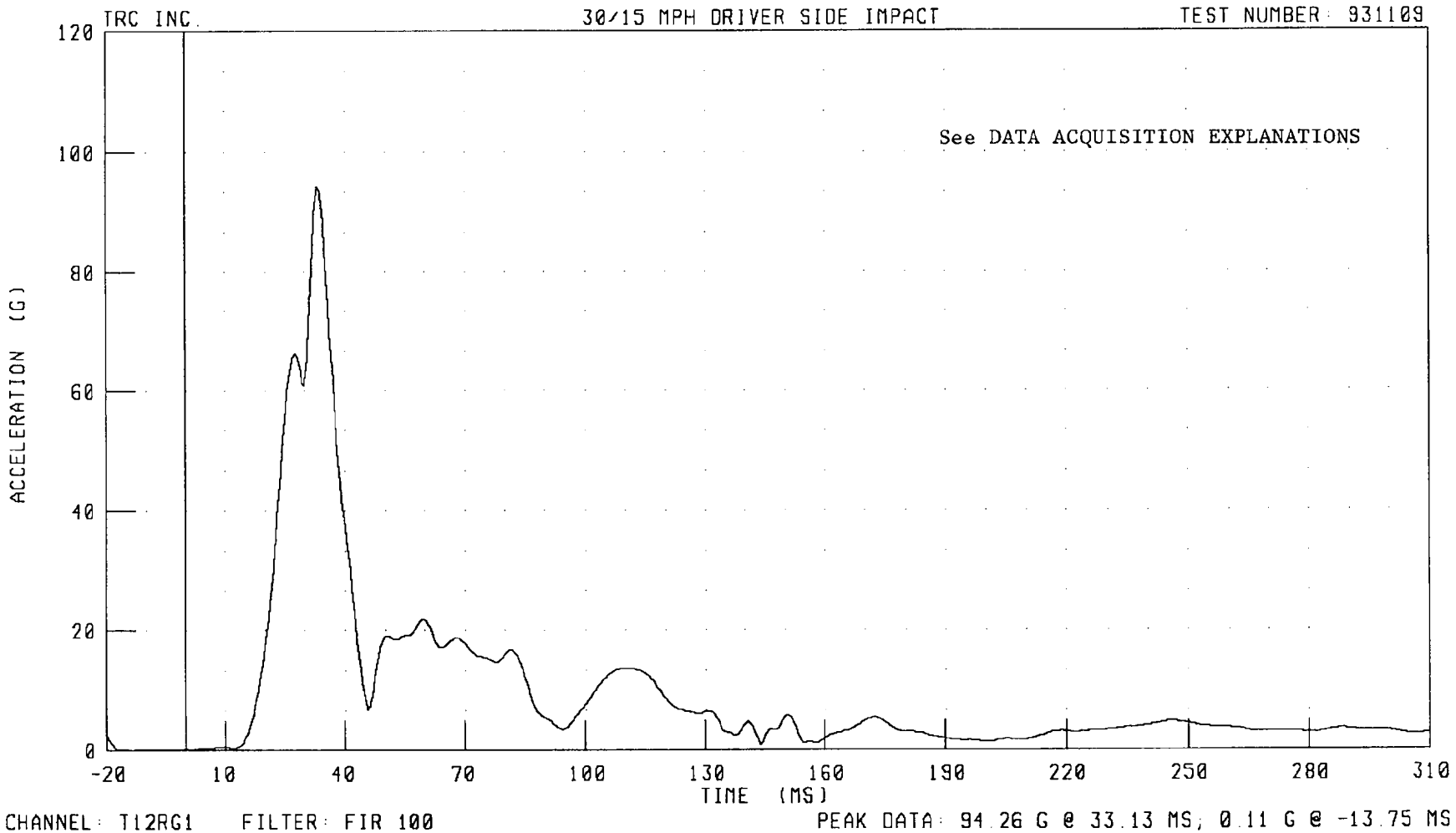
CHANNEL: T12YGA FILTER: FIR 100 PEAK DATA: 21.41 G @ 50.63 MS, -68.10 G @ 27.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE Z-AXIS ACCELERATION



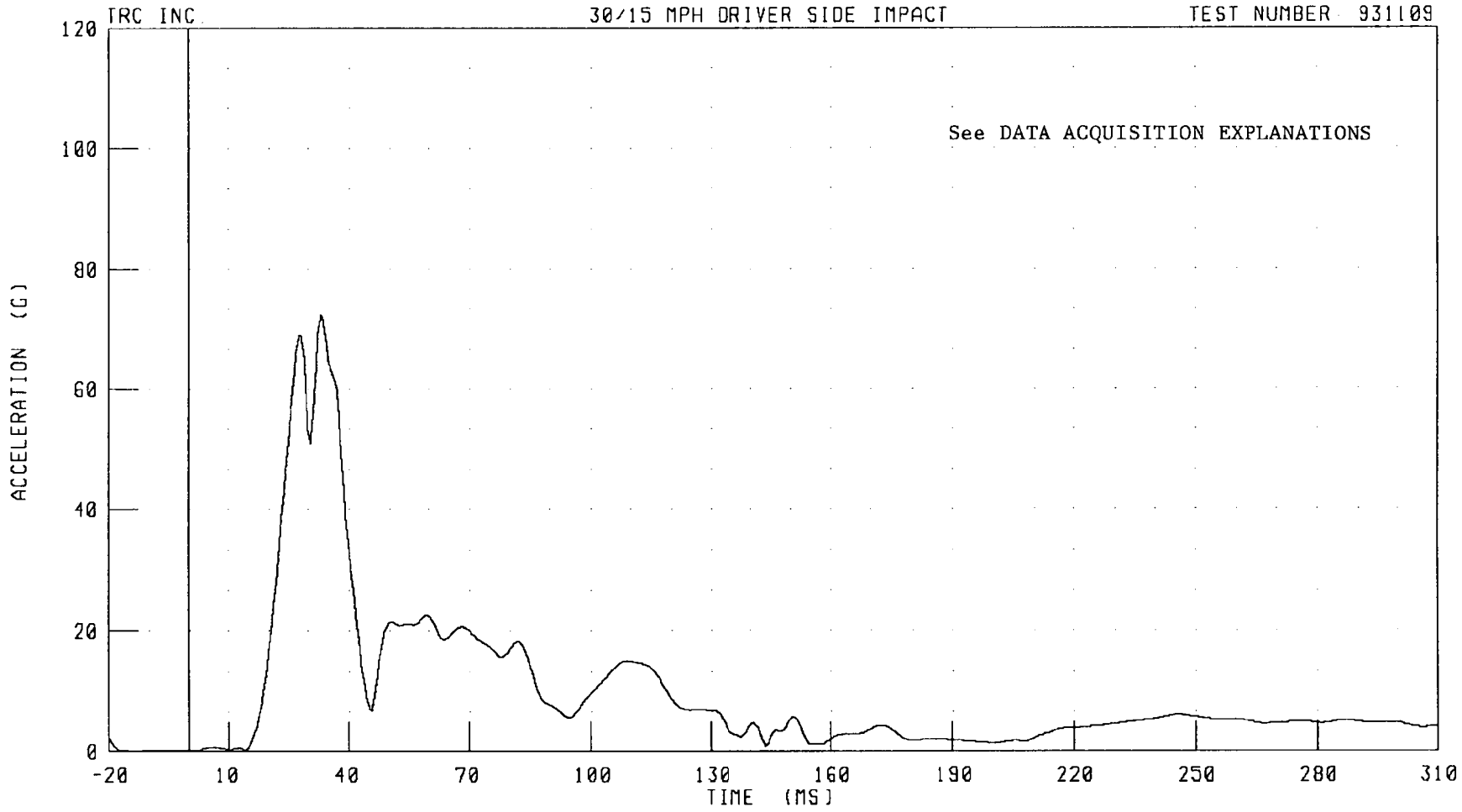
CHANNEL: T12ZG1 FILTER: FIR 100 PEAK DATA: 60.10 G @ 33.13 MS; -11.34 G @ 28.13 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE RESULTANT ACCELERATION



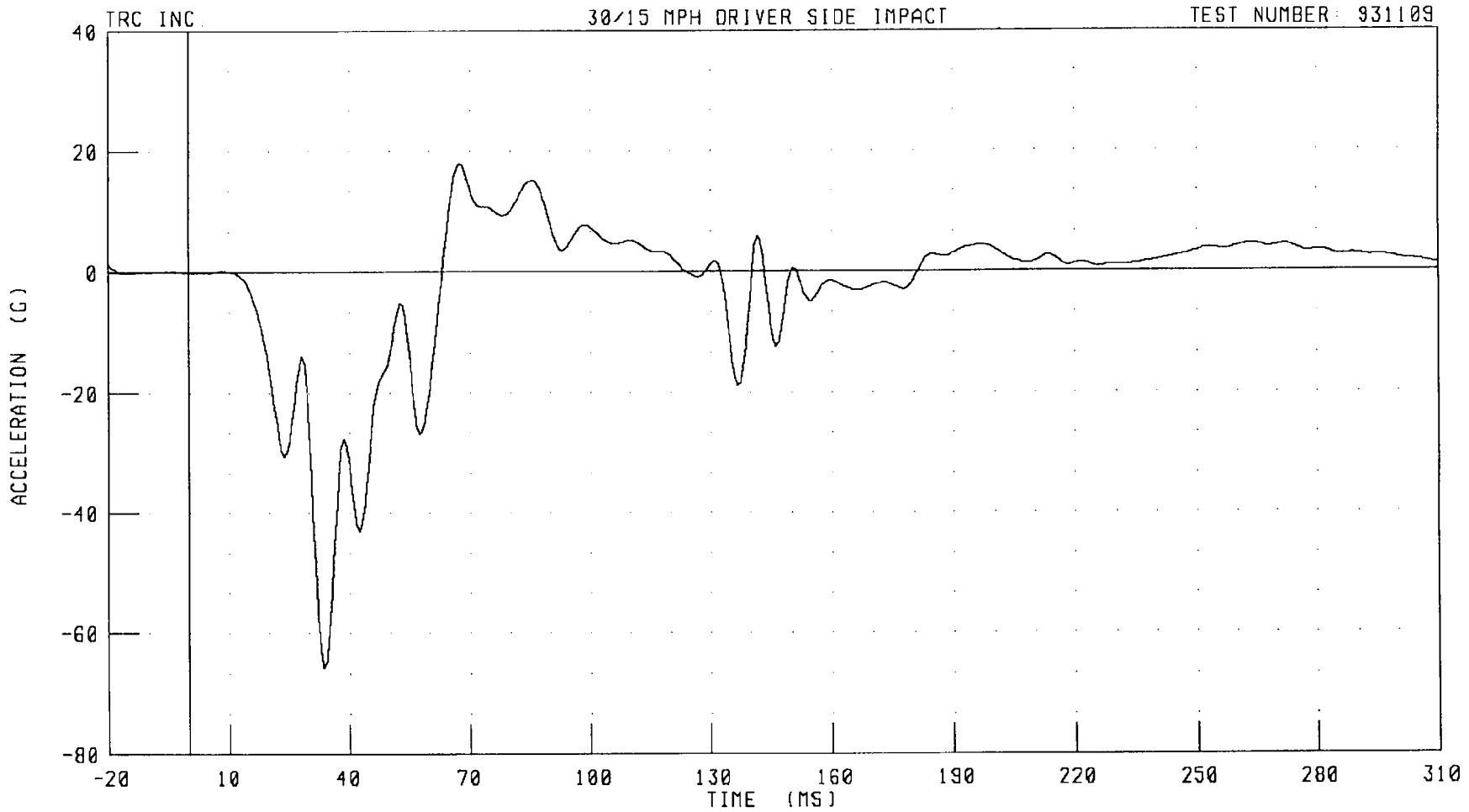
CHANNEL: T12RG1 FILTER: FIR 100 PEAK DATA: 94.26 G @ 33.13 MS, 0.11 G @ -13.75 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LOWER SPINE RESULTANT REDUNDANT ACCELERATION



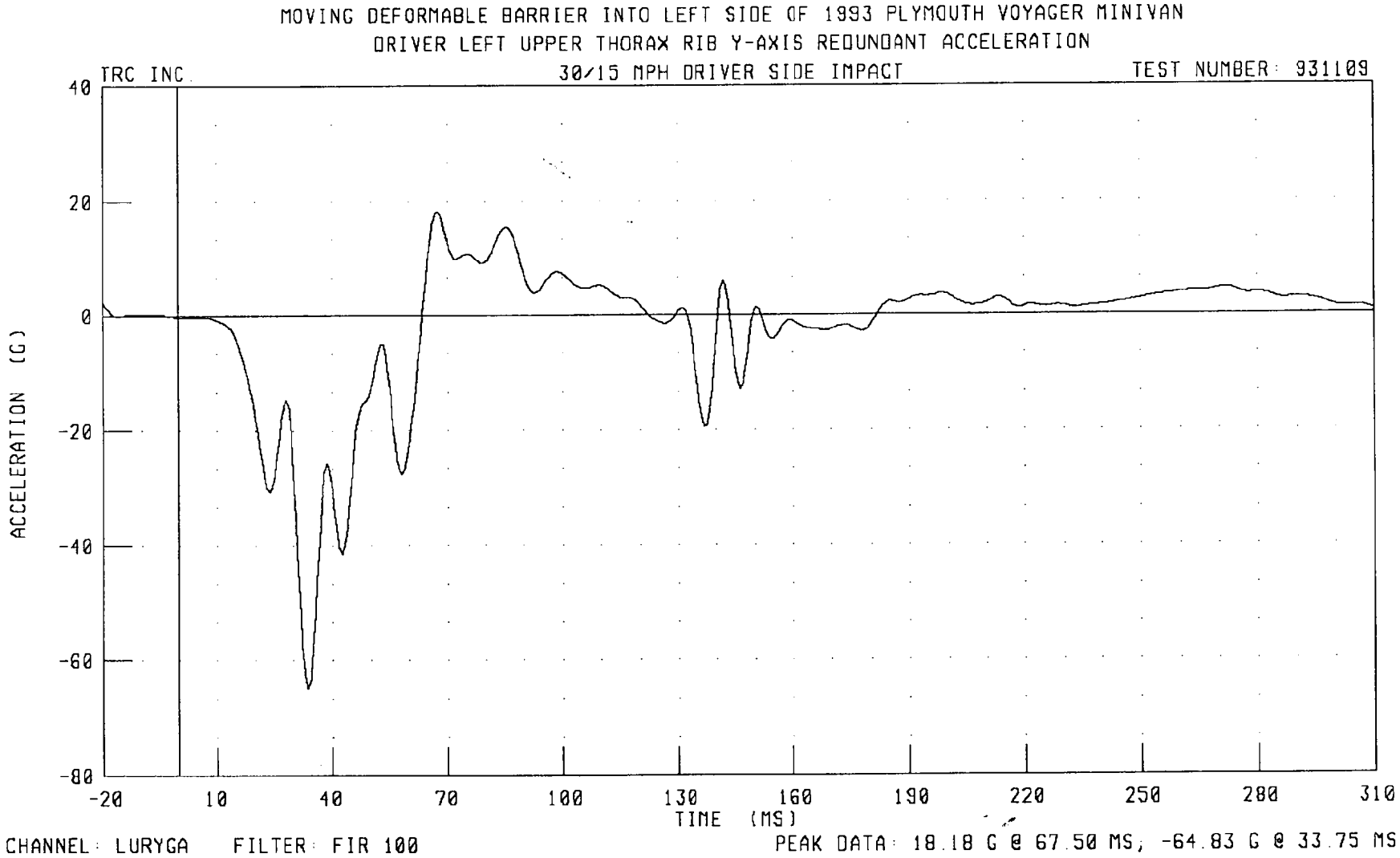
CHANNEL: T12RGA FILTER: FIR 100 PEAK DATA: 72.45 G @ 33.13 MS, 0.10 G @ -15.00 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LEFT UPPER THORAX RIB Y-AXIS ACCELERATION

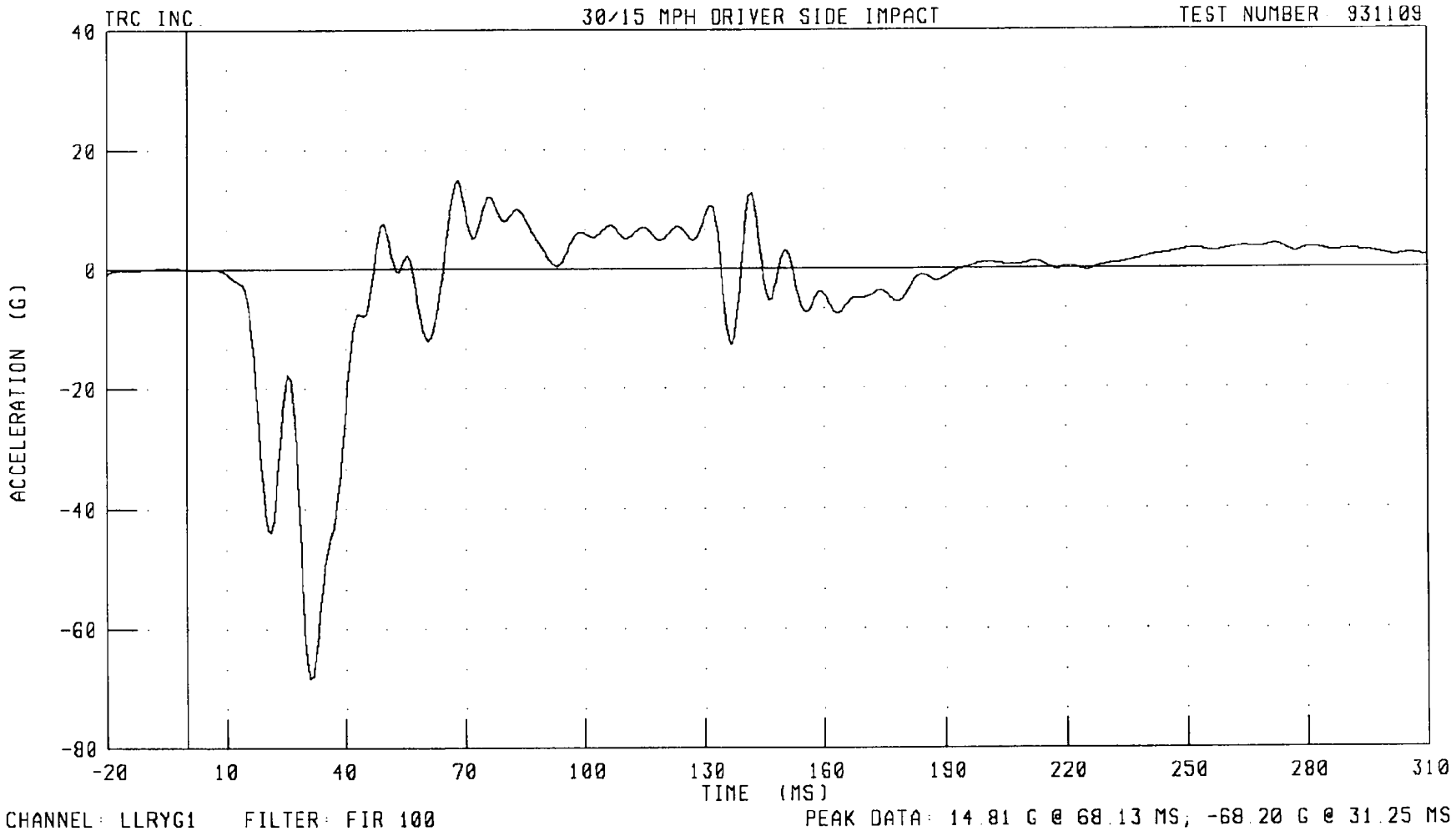


CHANNEL: LURYG1 FILTER: FIR 100

PEAK DATA: 17.85 G @ 67.50 MS, -65.66 G @ 33.75 MS

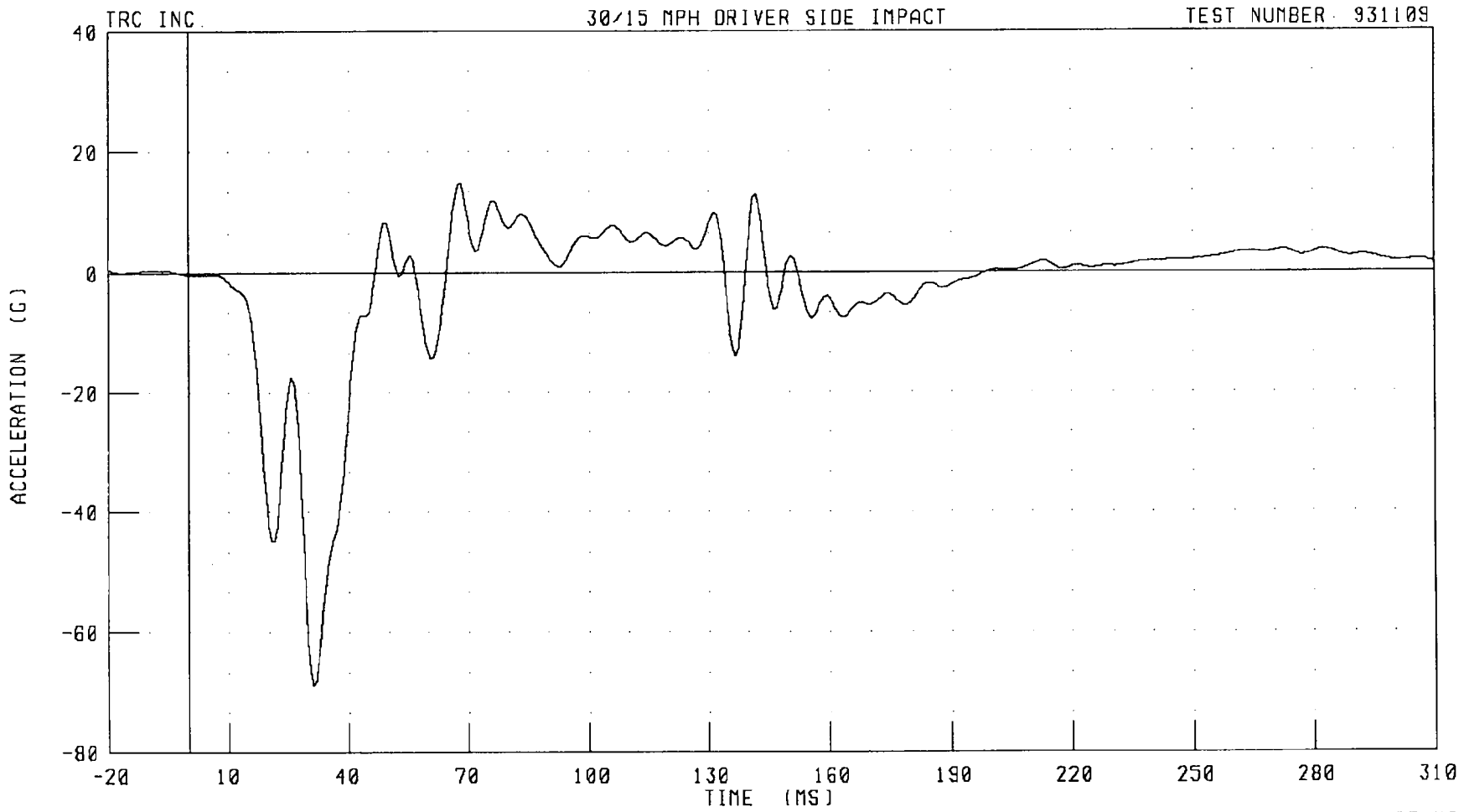

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
40
20
0
-20
-40
-60
-80
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LURYGA
FILTER: FIR 100
PEAK DATA: 18.18 G @ 67.50 MS, -64.83 G @ 33.75 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LEFT LOWER THORAX RIB Y-AXIS ACCELERATION

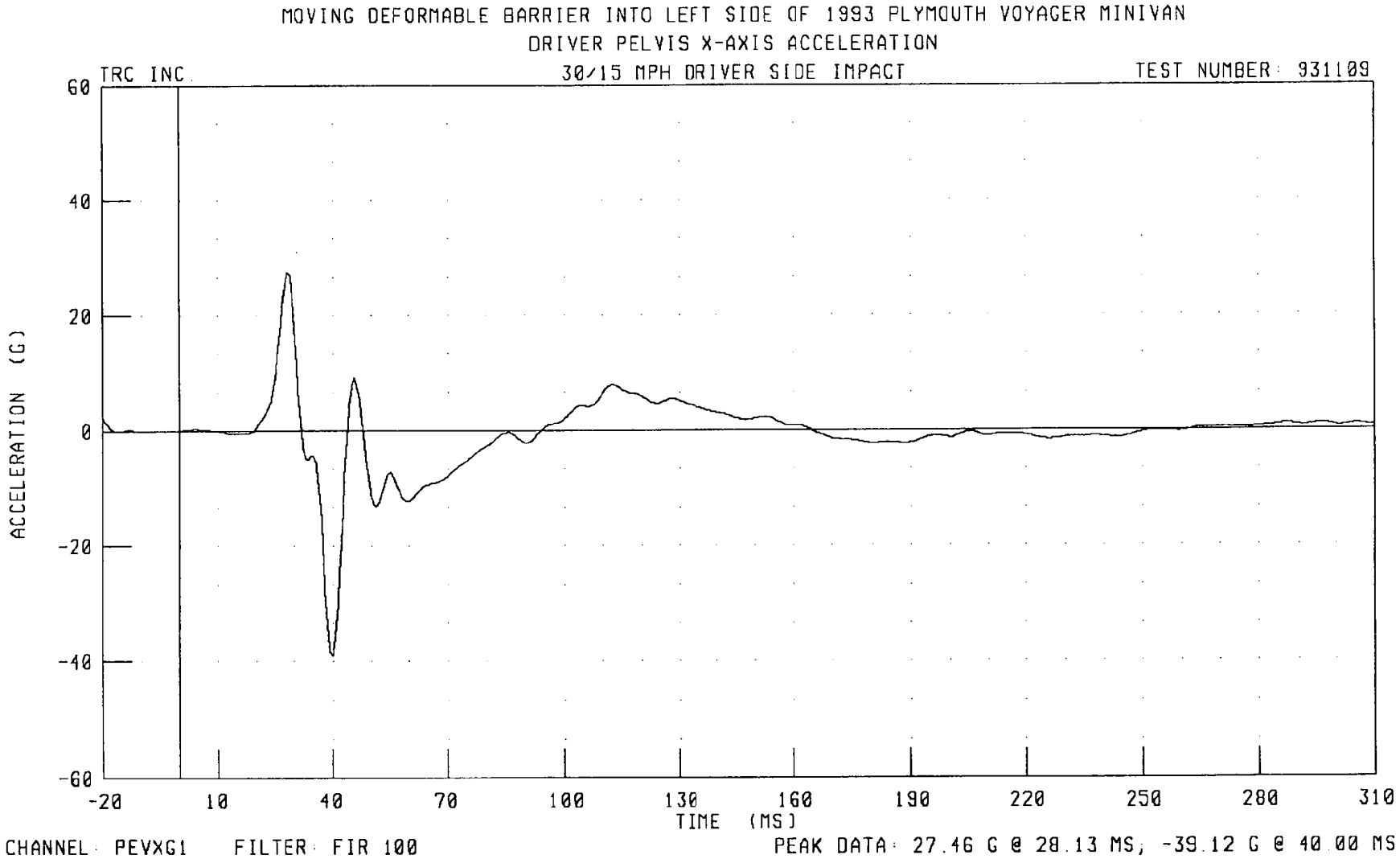


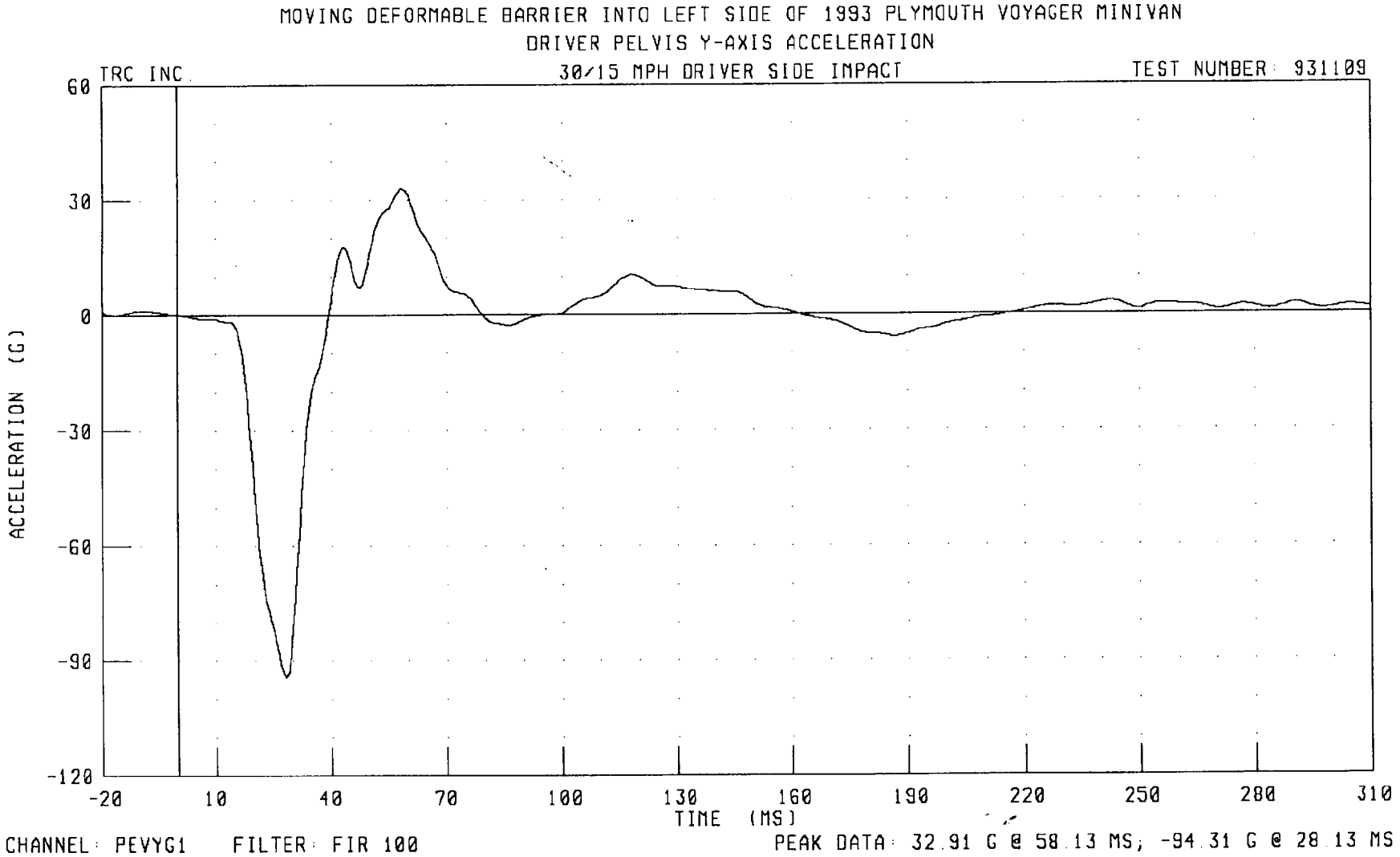
CHANNEL: LLRYG1 FILTER: FIR 100 PEAK DATA: 14.81 G @ 68.13 MS; -68.20 G @ 31.25 MS

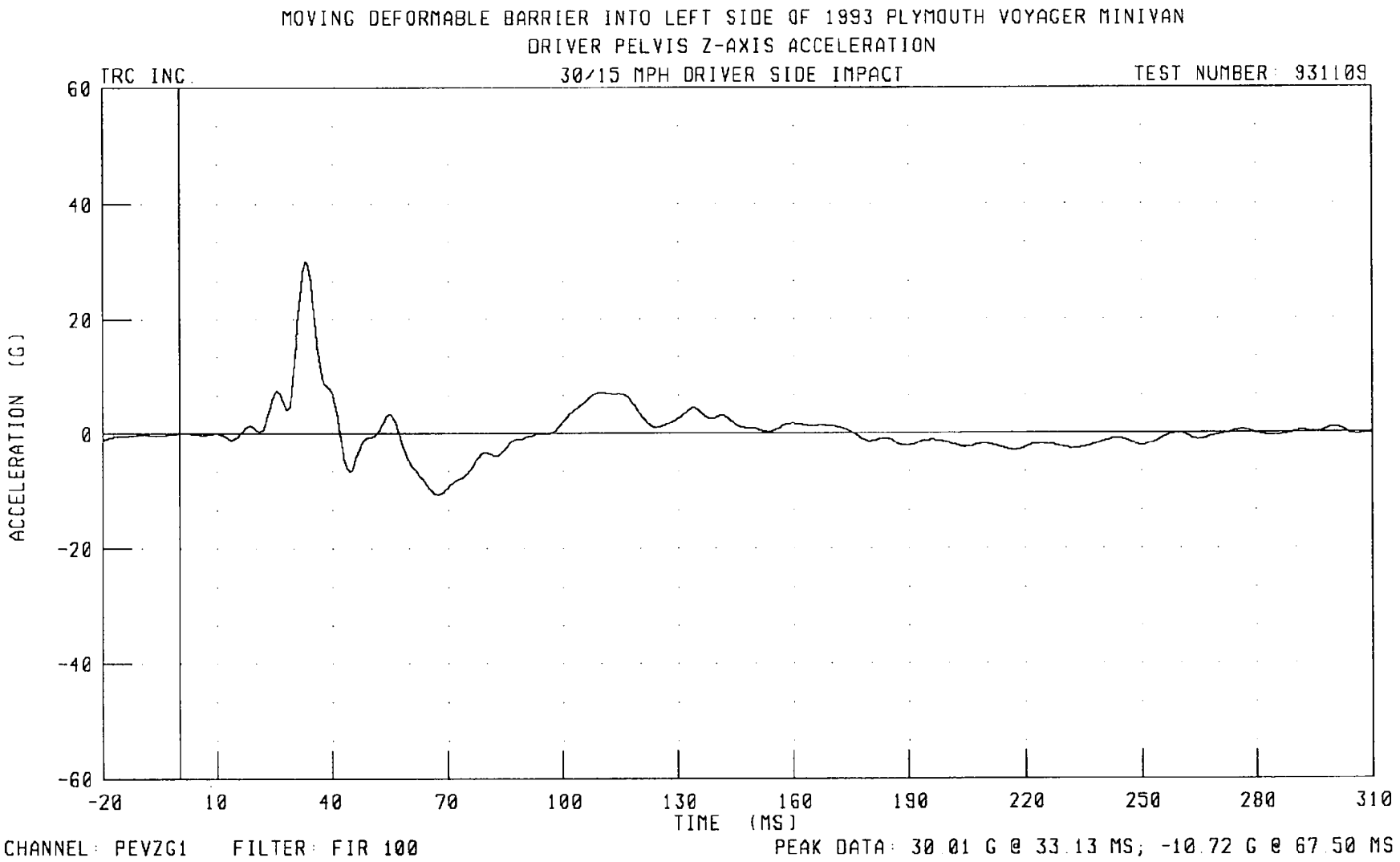
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT ACCELERATION



CHANNEL: LLRYGA FILTER: FIR 100 PEAK DATA: 14.67 G @ 68.13 MS; -68.77 G @ 31.25 MS

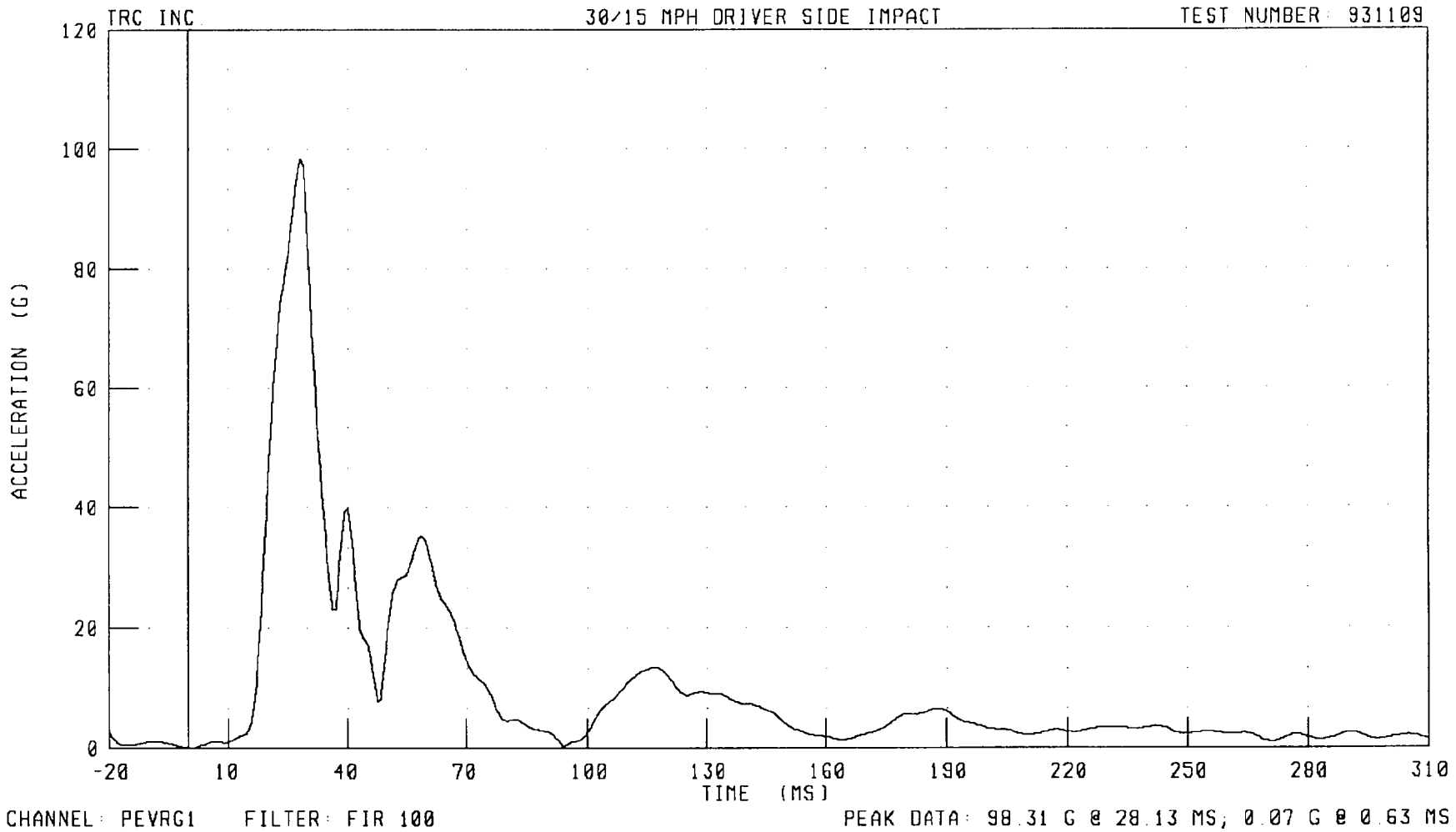

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER PELVIS X-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVXG1
FILTER: FIR 100
PEAK DATA: 27.46 G @ 28.13 MS; -39.12 G @ 40.00 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER PELVIS Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
60
30
0
-30
-60
-90
-120
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVYG1
FILTER: FIR 100
PEAK DATA: 32.91 G @ 58.13 MS; -94.31 G @ 28.13 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
DRIVER PELVIS Z-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVZG1
FILTER: FIR 100
PEAK DATA: 30.01 G @ 33.13 MS; -10.72 G @ 67.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

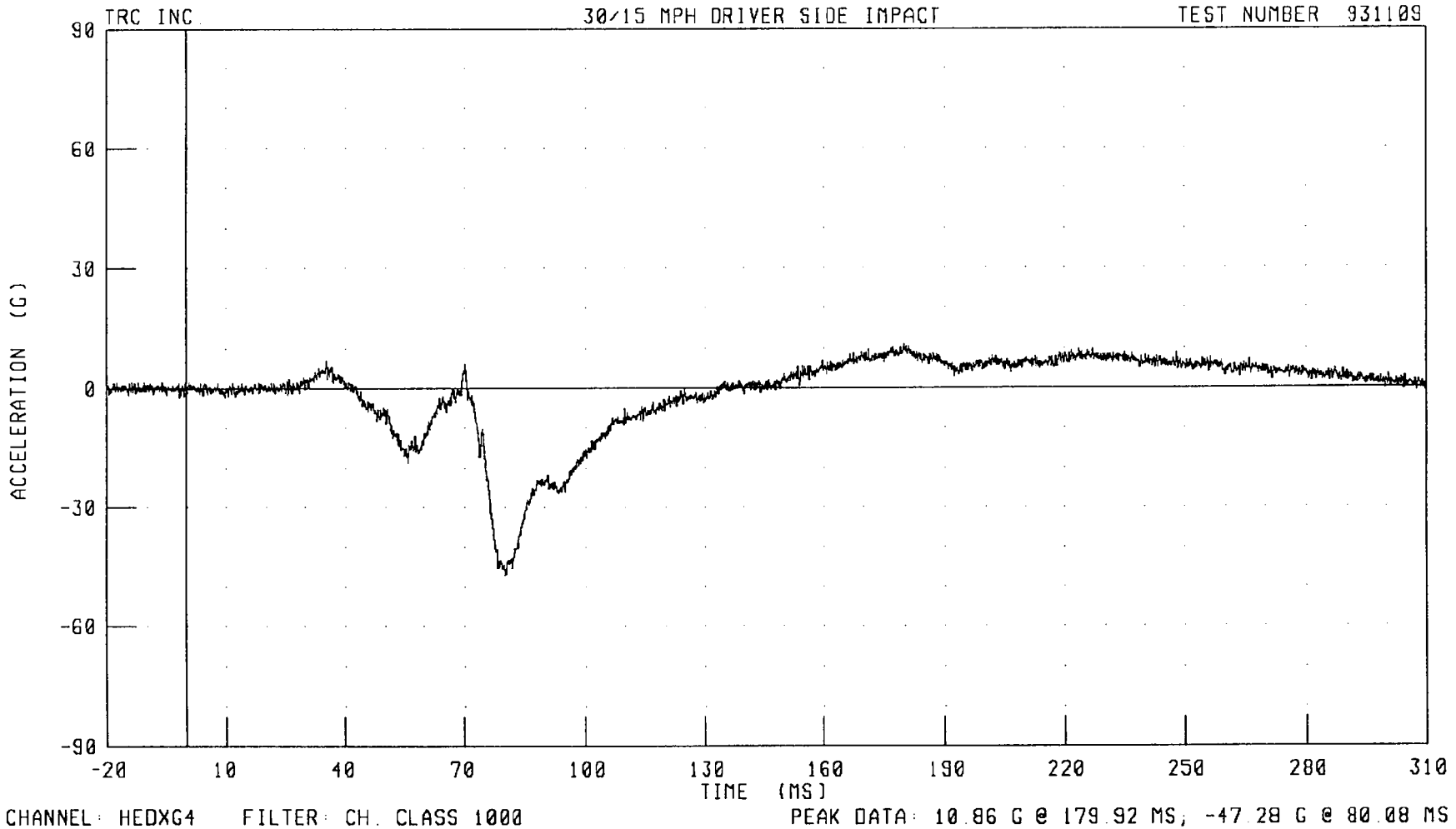
DRIVER PELVIS RESULTANT ACCELERATION



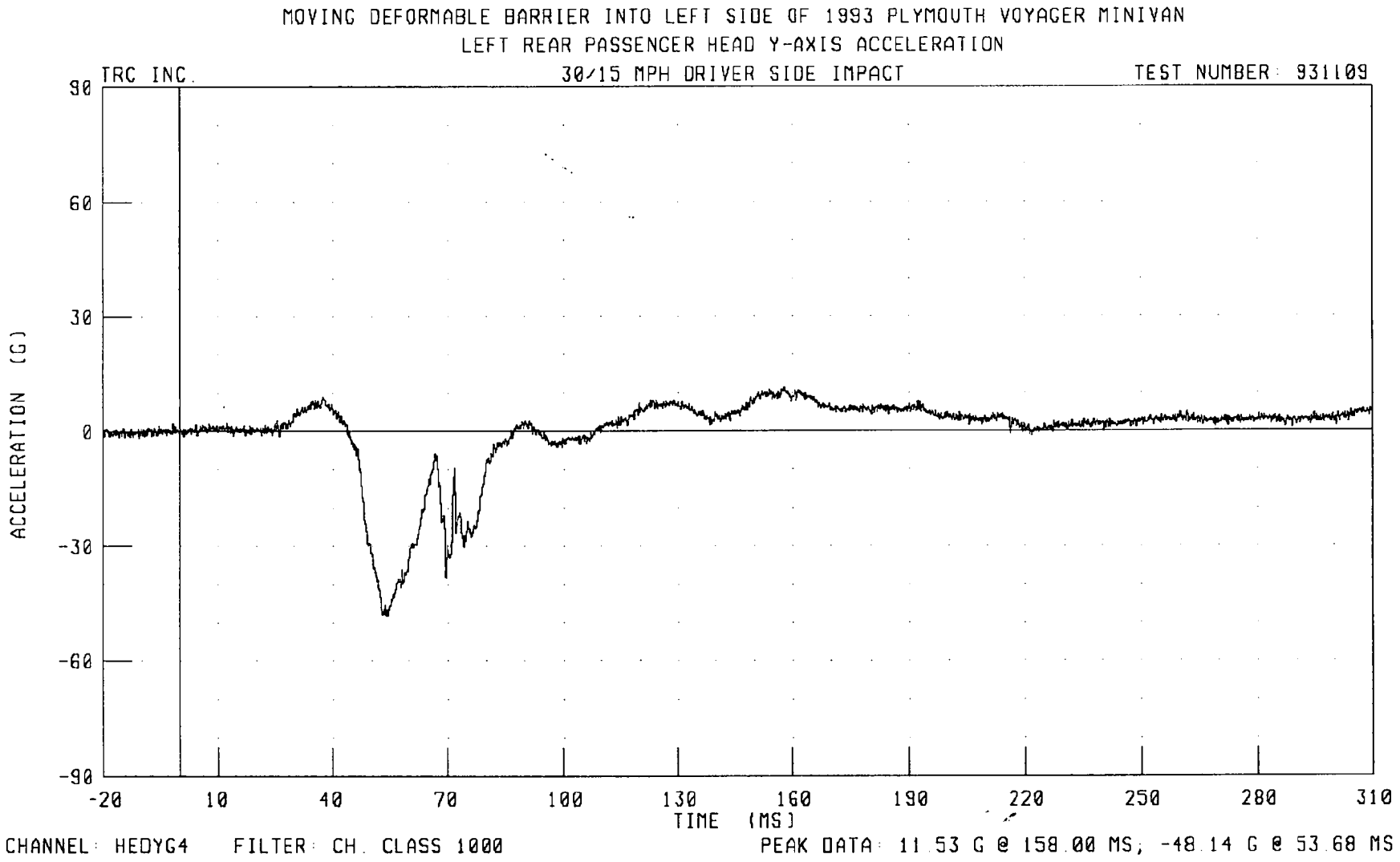
CHANNEL: PEVRG1 FILTER: FIR 100 PEAK DATA: 98.31 G @ 28.13 MS; 0.07 G @ 0.63 MS

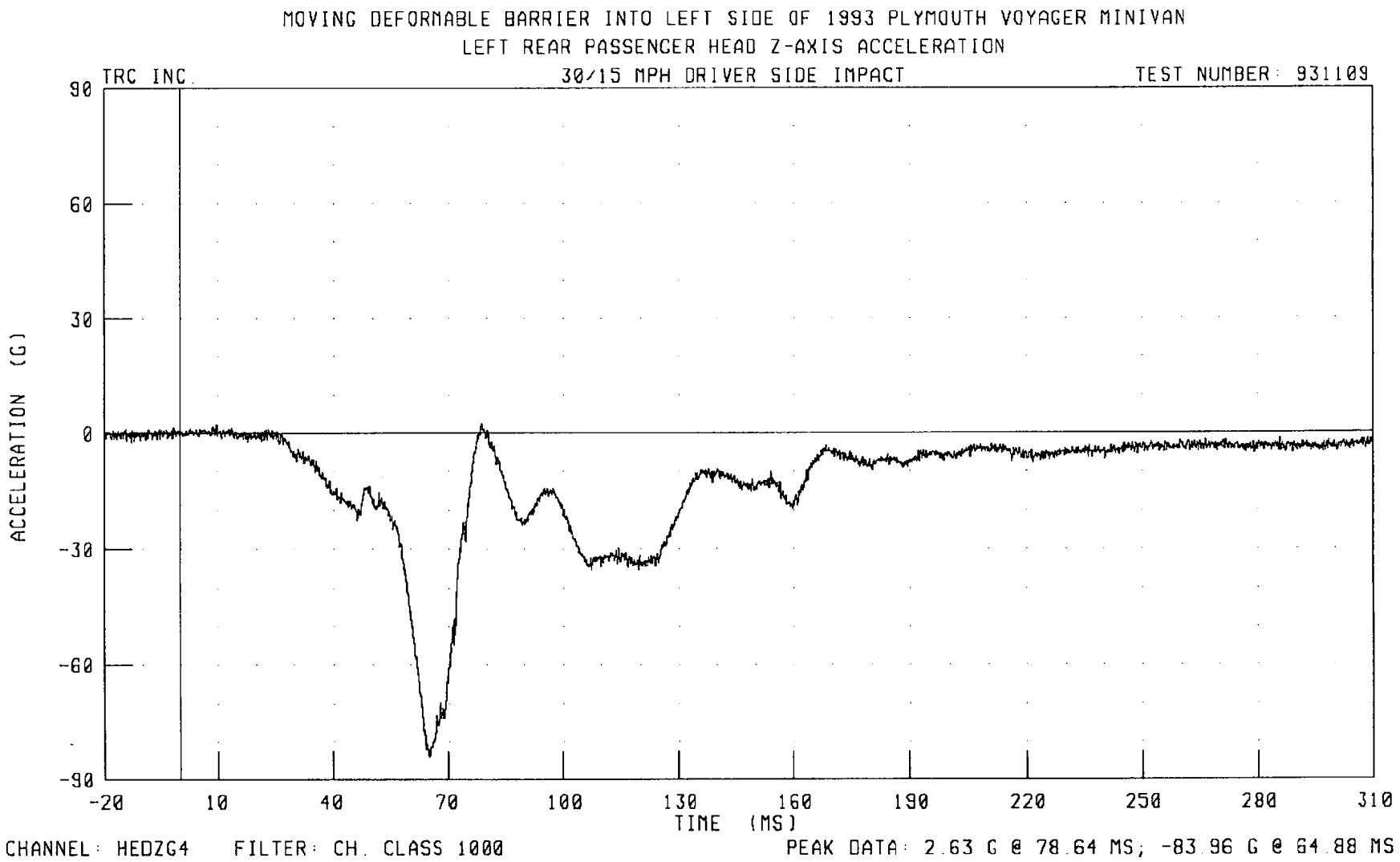
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

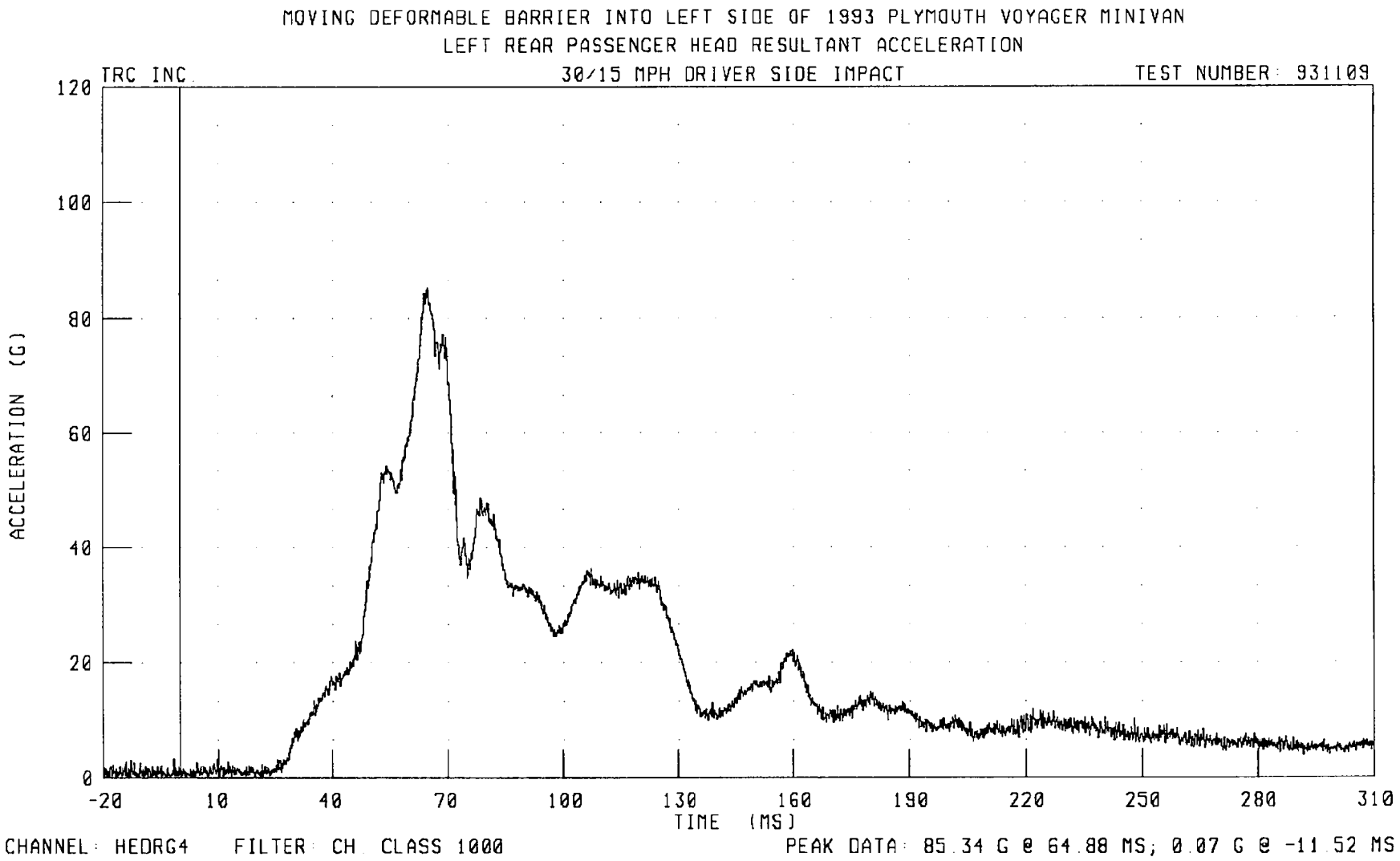
LEFT REAR PASSENGER HEAD X-AXIS ACCELERATION



CHANNEL: HEDXG4 FILTER: CH. CLASS 1000 PEAK DATA: 10.86 G @ 179.92 MS; -47.28 G @ 80.08 MS

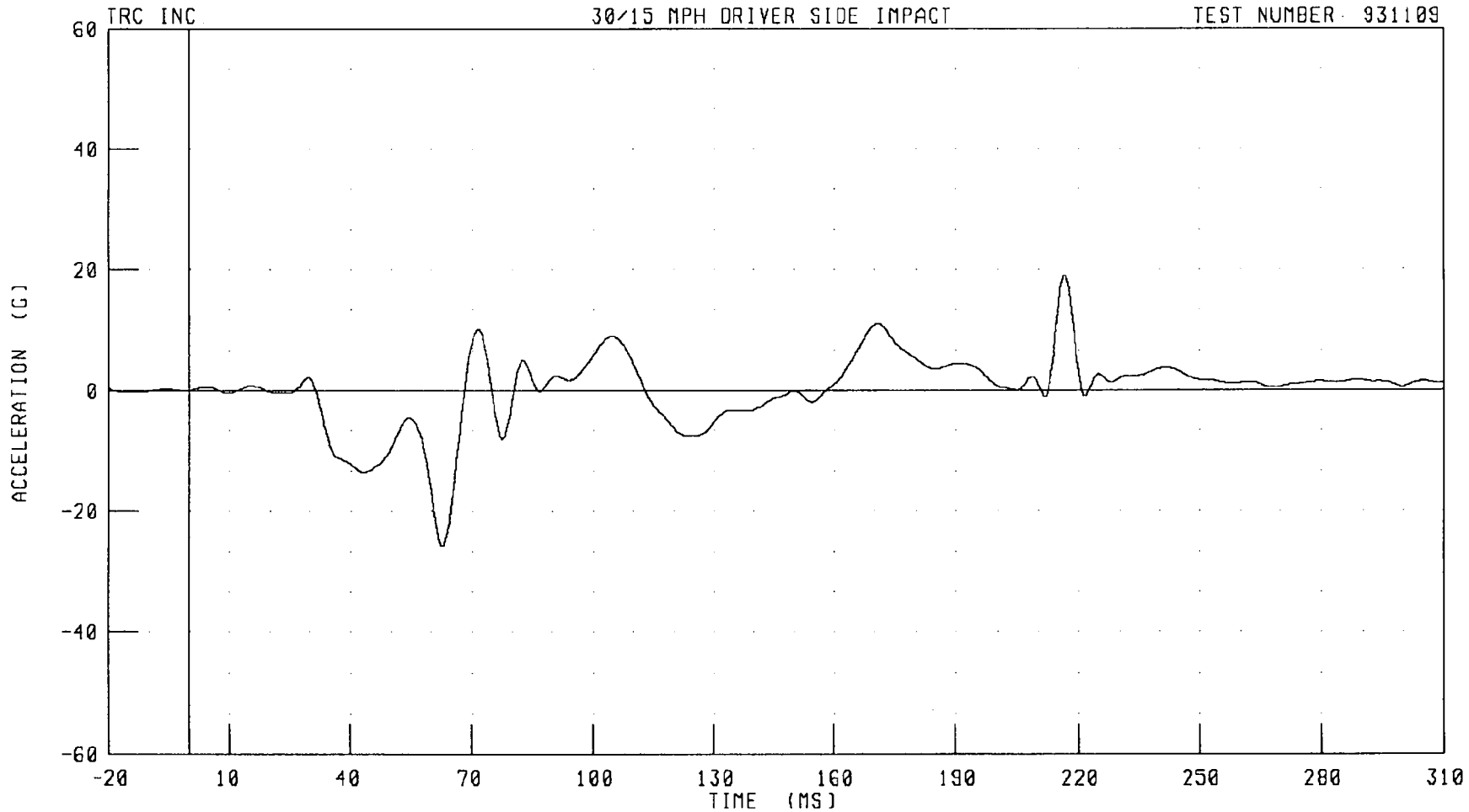

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER HEAD Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG4
FILTER: CH. CLASS 1000
PEAK DATA: 11.53 G @ 158.00 MS; -48.14 G @ 53.68 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER HEAD Z-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZG4
FILTER: CH. CLASS 1000
PEAK DATA: 2.63 G @ 78.64 MS; -83.96 G @ 64.88 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER HEAD RESULTANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG4 FILTER: CH CLASS 1000
PEAK DATA: 85.34 G @ 64.88 MS; 0.07 G @ -11.52 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

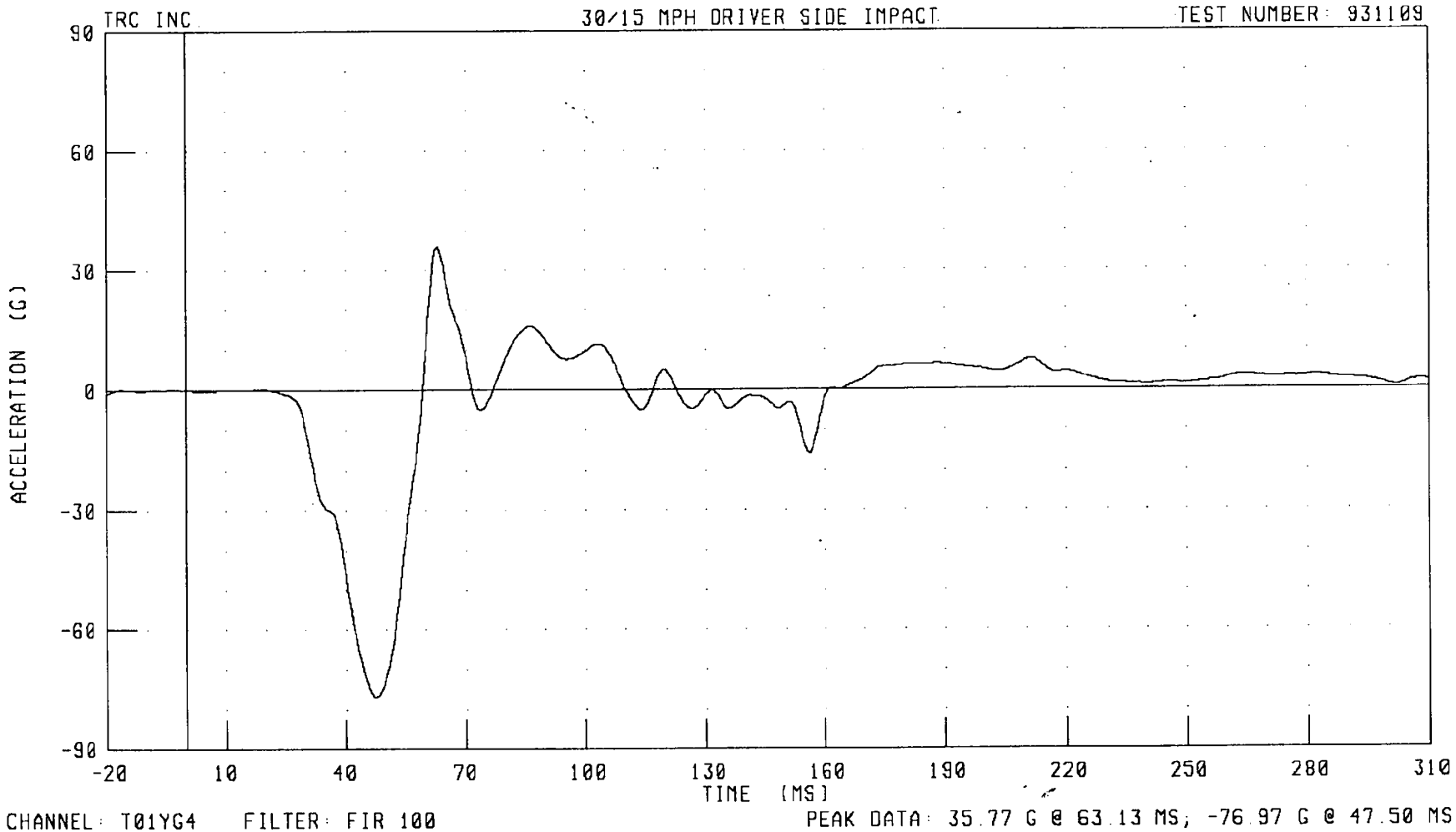
LEFT REAR PASSENGER UPPER SPINE X-AXIS ACCELERATION



CHANNEL: T01XG4 FILTER: FIR 100

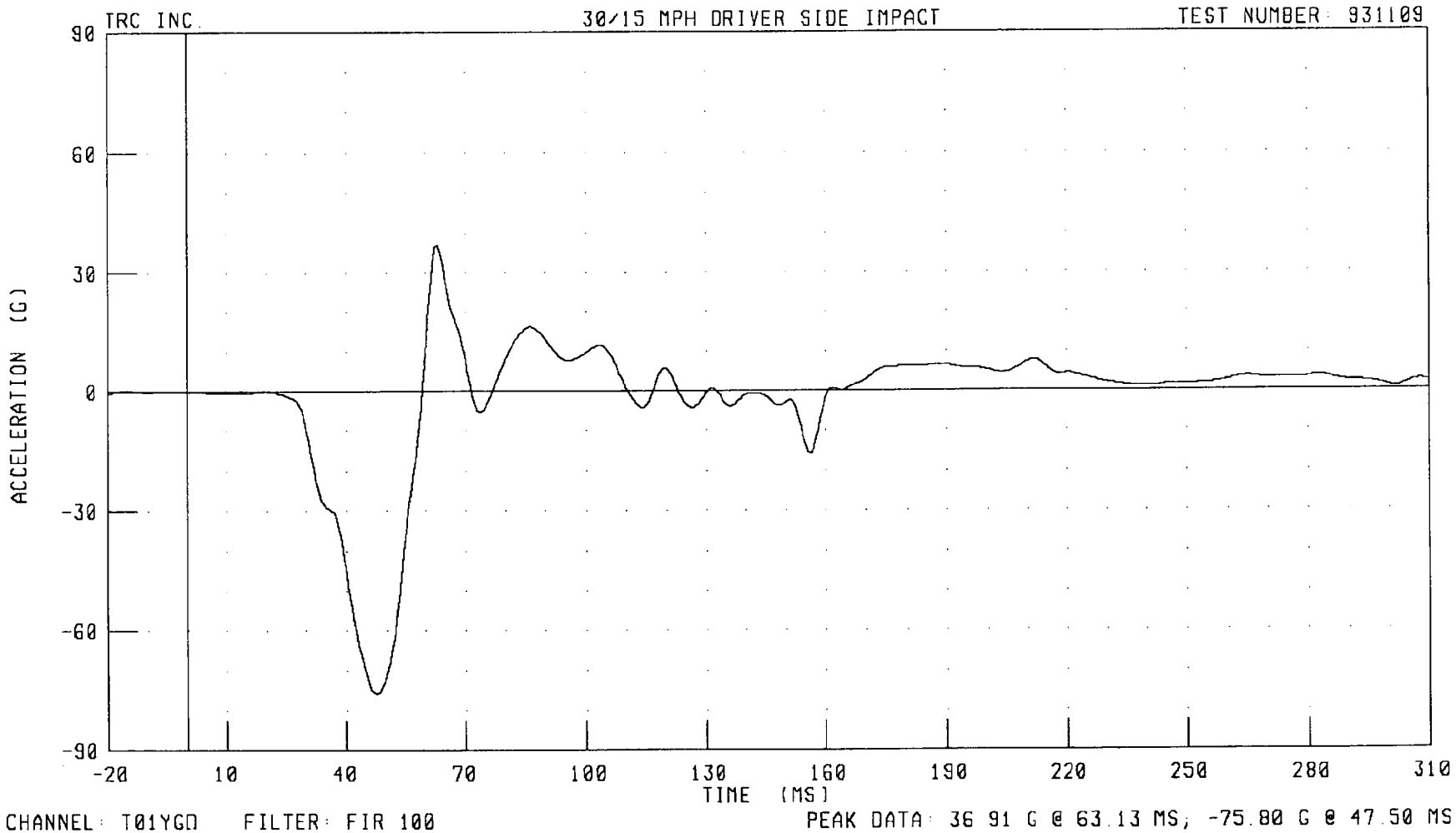
PEAK DATA: 18.96 G @ 216.88 MS; -25.78 G @ 62.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER UPPER SPINE Y-AXIS ACCELERATION



CHANNEL: T01YG4 FILTER: FIR 100 PEAK DATA: 35.77 G @ 63.13 MS; -76.97 G @ 47.50 MS

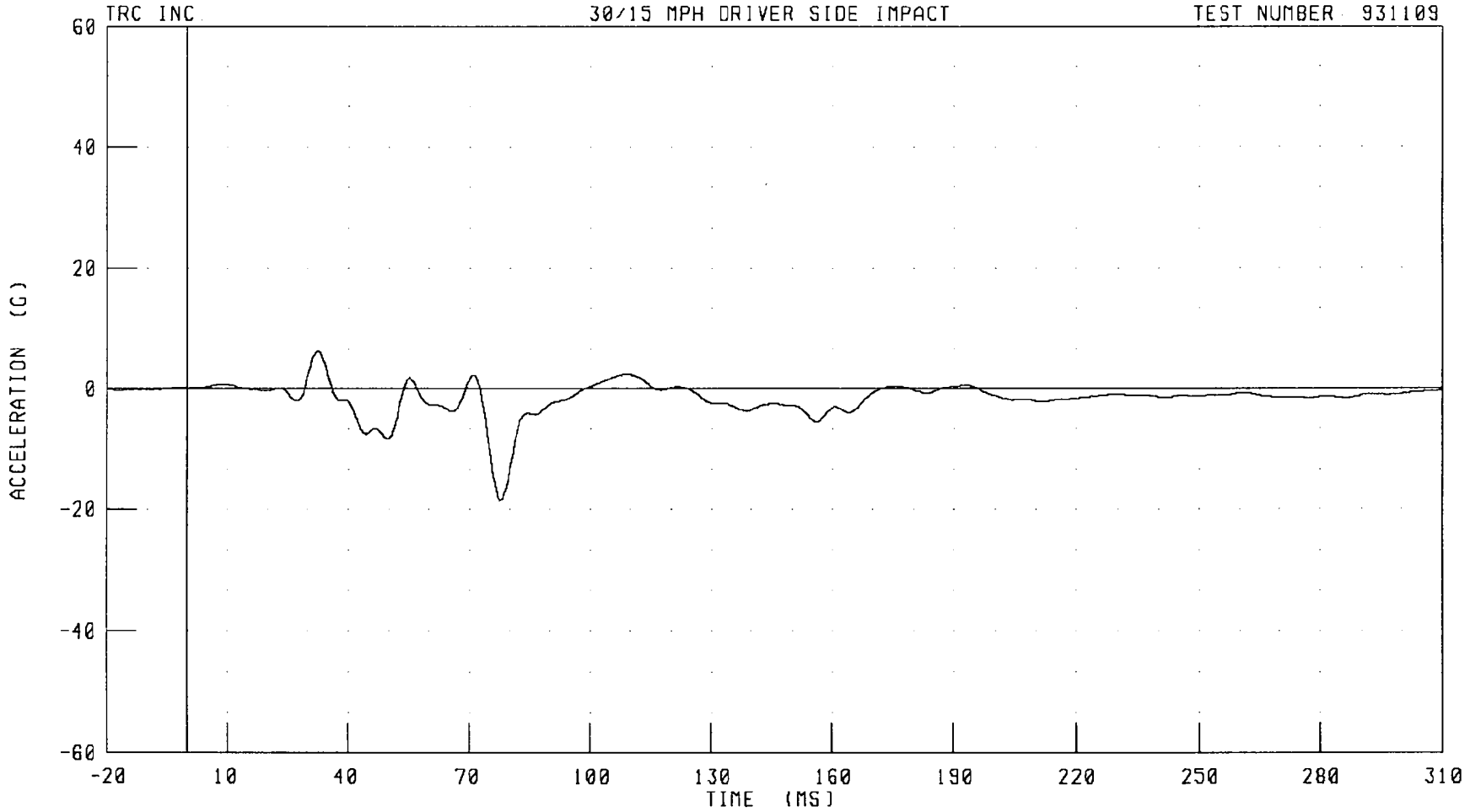
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER UPPER SPINE Y-AXIS REDUNDANT ACCELERATION



CHANNEL: T01YGD FILTER: FIR 100

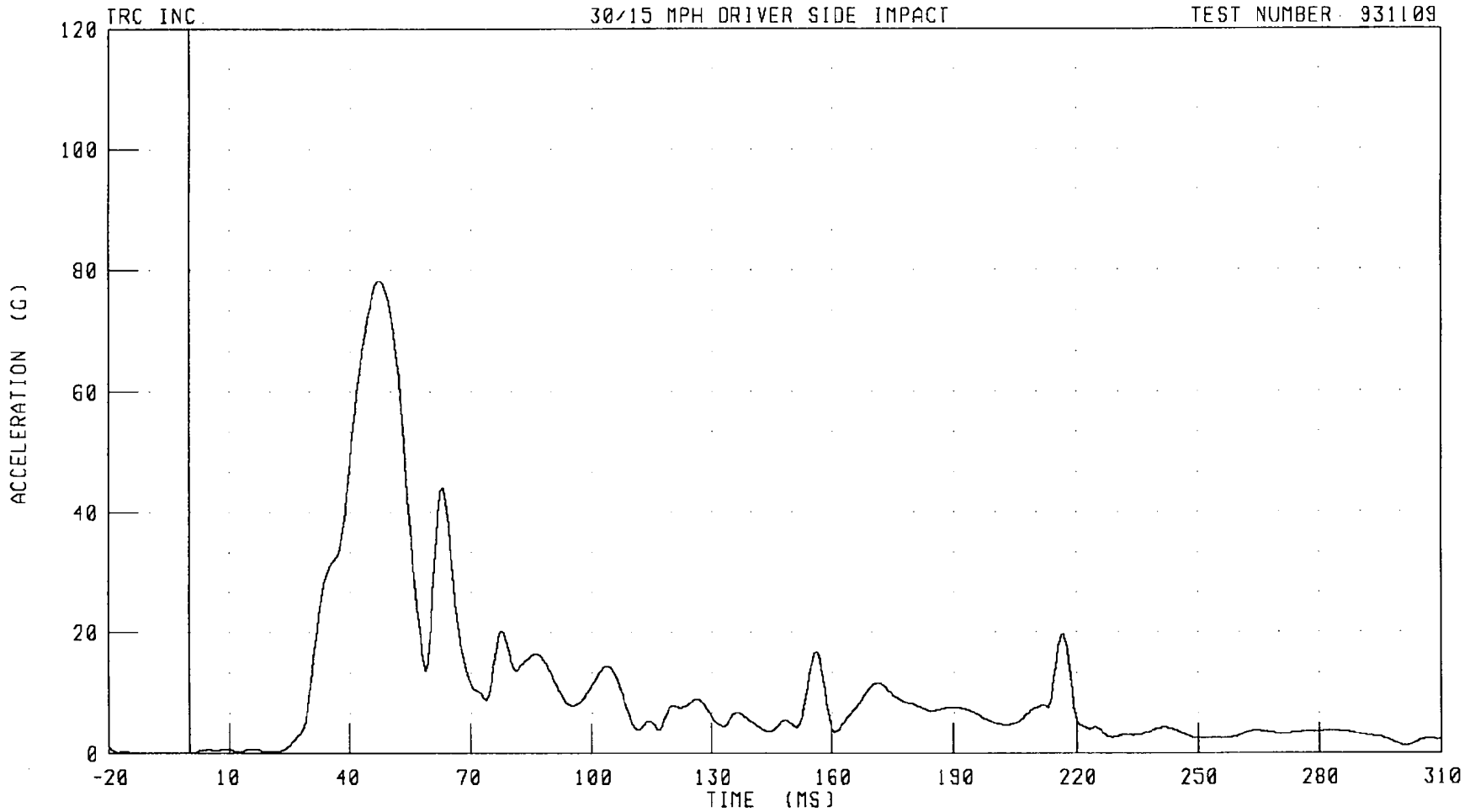
PEAK DATA: 36.91 G @ 63.13 MS; -75.80 G @ 47.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER UPPER SPINE Z-AXIS ACCELERATION

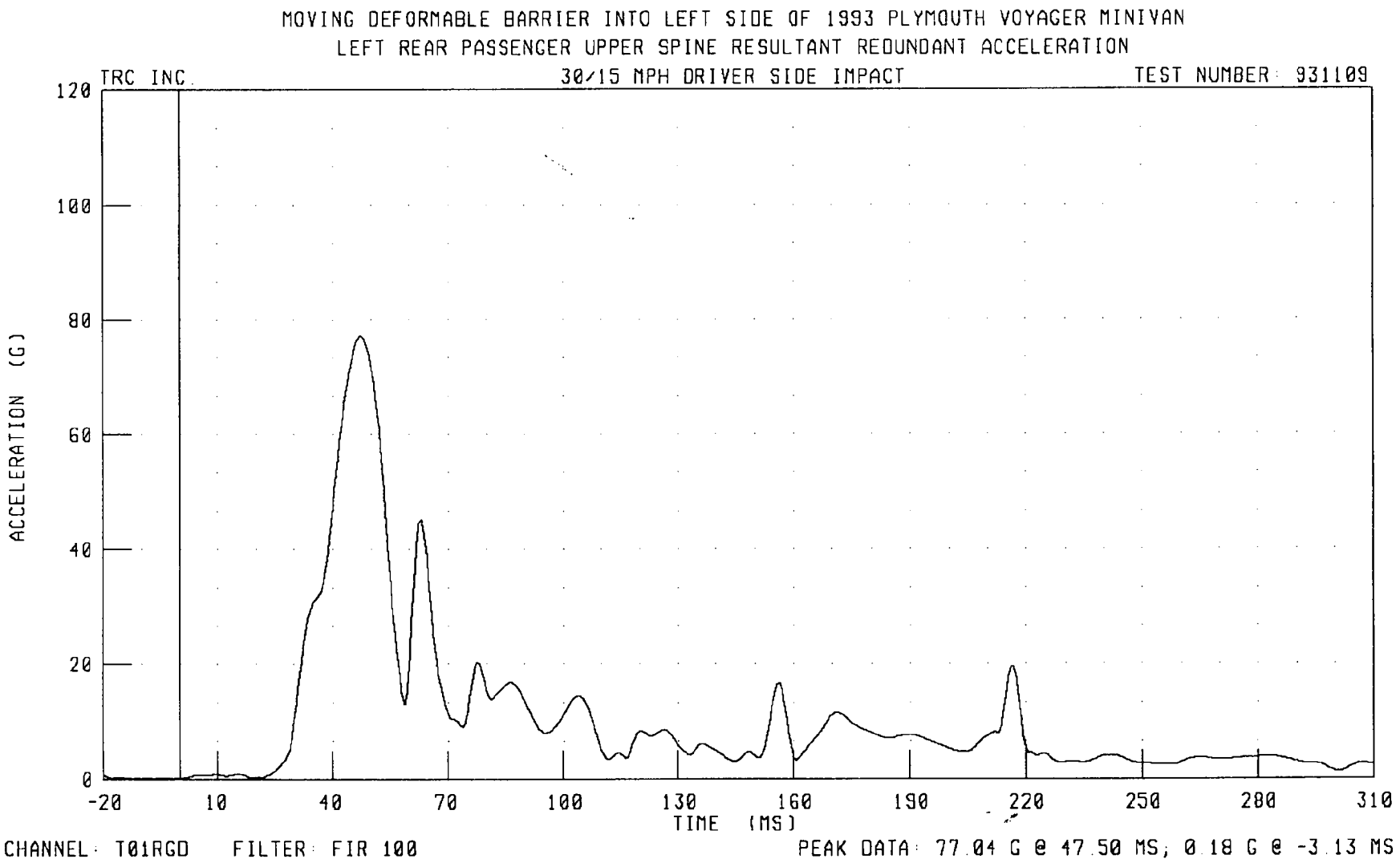


CHANNEL T01ZG4 FILTER FIR 100 PEAK DATA 6.34 G @ 32.50 MS, -18.54 G @ 77.50 MS

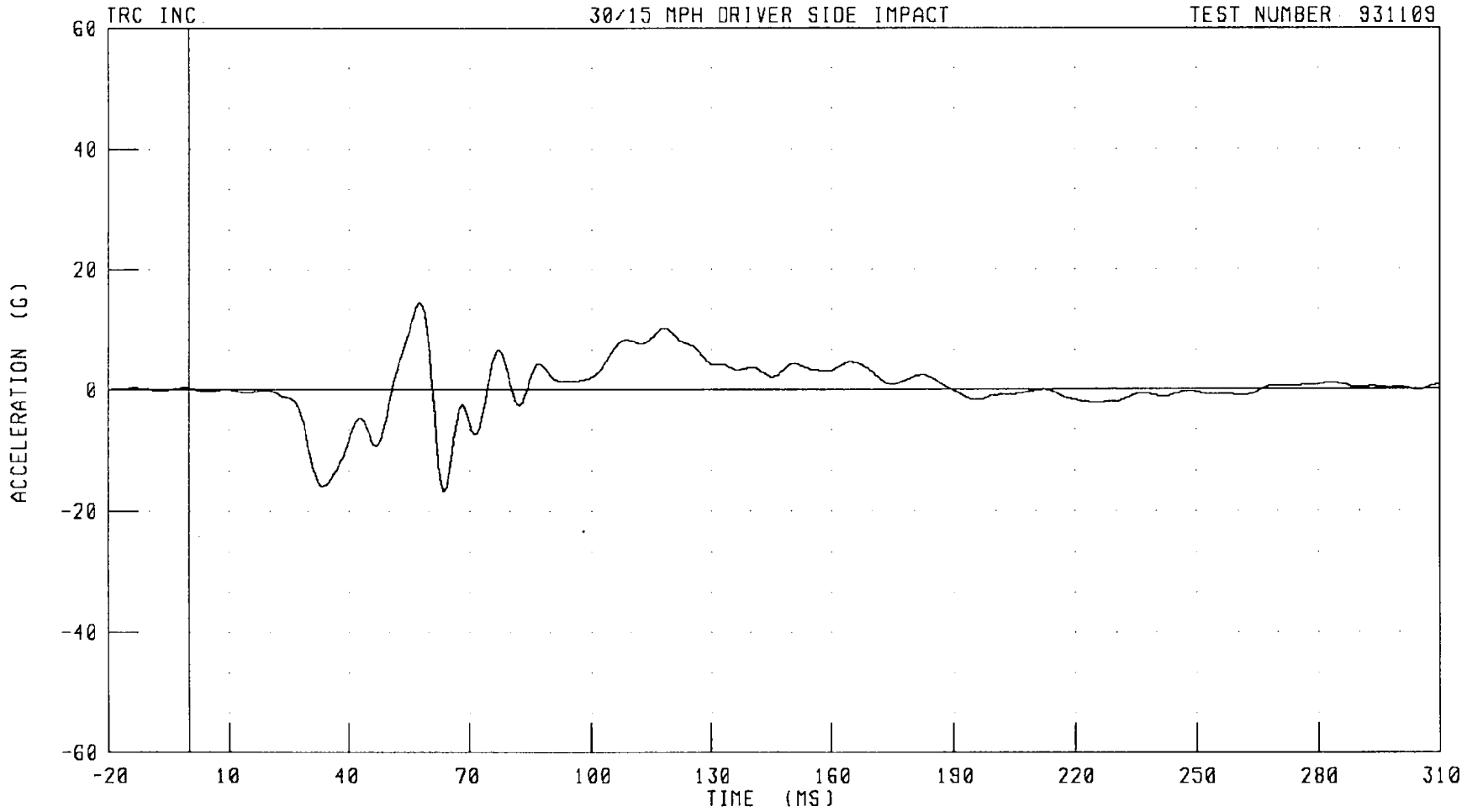
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER UPPER SPINE RESULTANT ACCELERATION



CHANNEL: T01RG4 FILTER: FIR 100 PEAK DATA: 78.19 G @ 47.50 MS; 0.20 G @ 0.00 MS

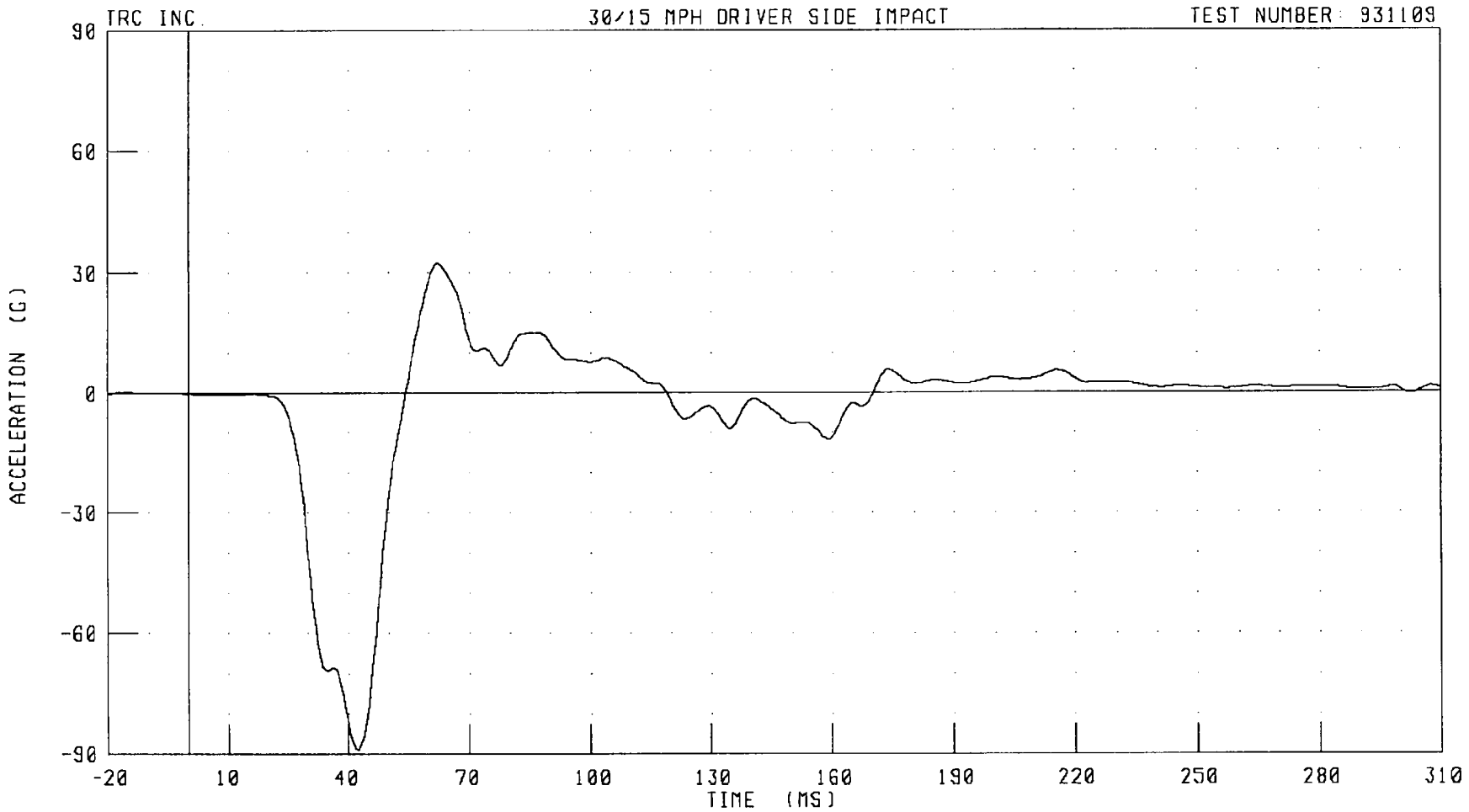

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER UPPER SPINE RESULTANT REDUNDANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: T01RGD
FILTER: FIR 100
PEAK DATA: 77.04 G @ 47.50 MS; 0.18 G @ -3.13 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LOWER SPINE X-AXIS ACCELERATION



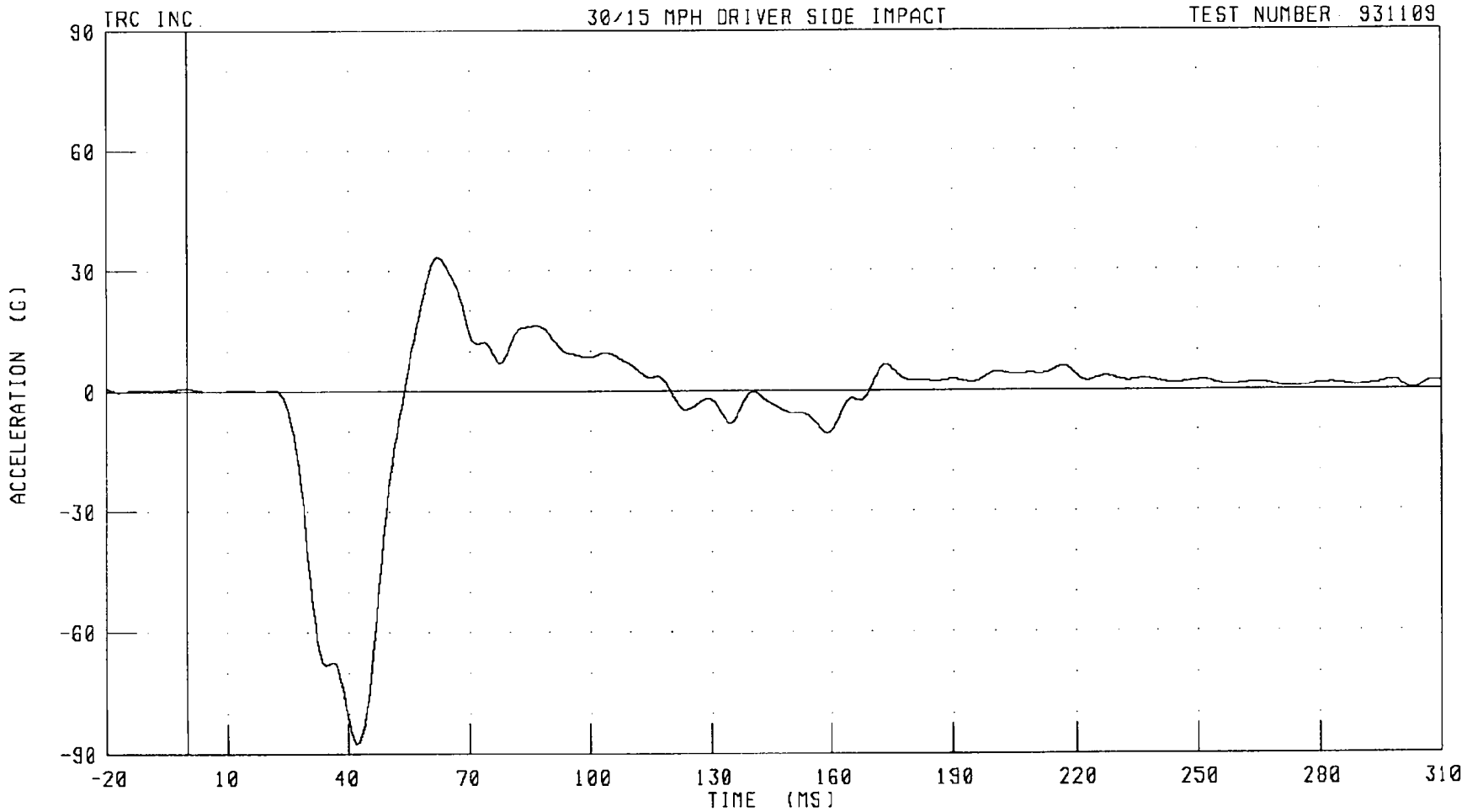
CHANNEL: T12XG4 FILTER: FIR 100 PEAK DATA: 14.40 G @ 57.50 MS, -16.82 G @ 63.75 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION



CHANNEL: T12YG4 FILTER: FIR 100 PEAK DATA: 32.21 G @ 62.50 MS; -88.76 G @ 42.50 MS

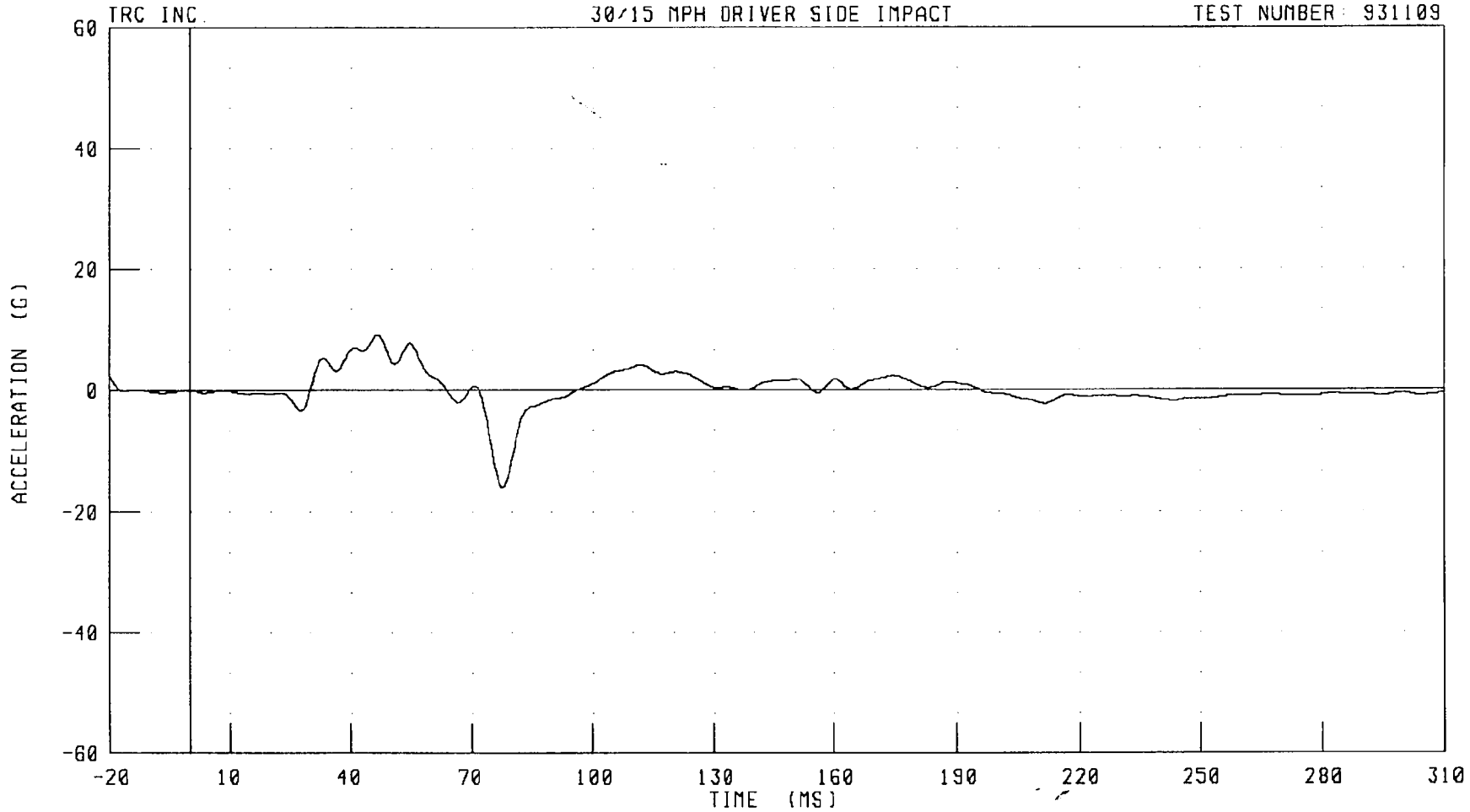
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION



CHANNEL: T12YGD FILTER: FIR 100

PEAK DATA: 33.39 G @ 61.87 MS; -87.24 G @ 41.87 MS

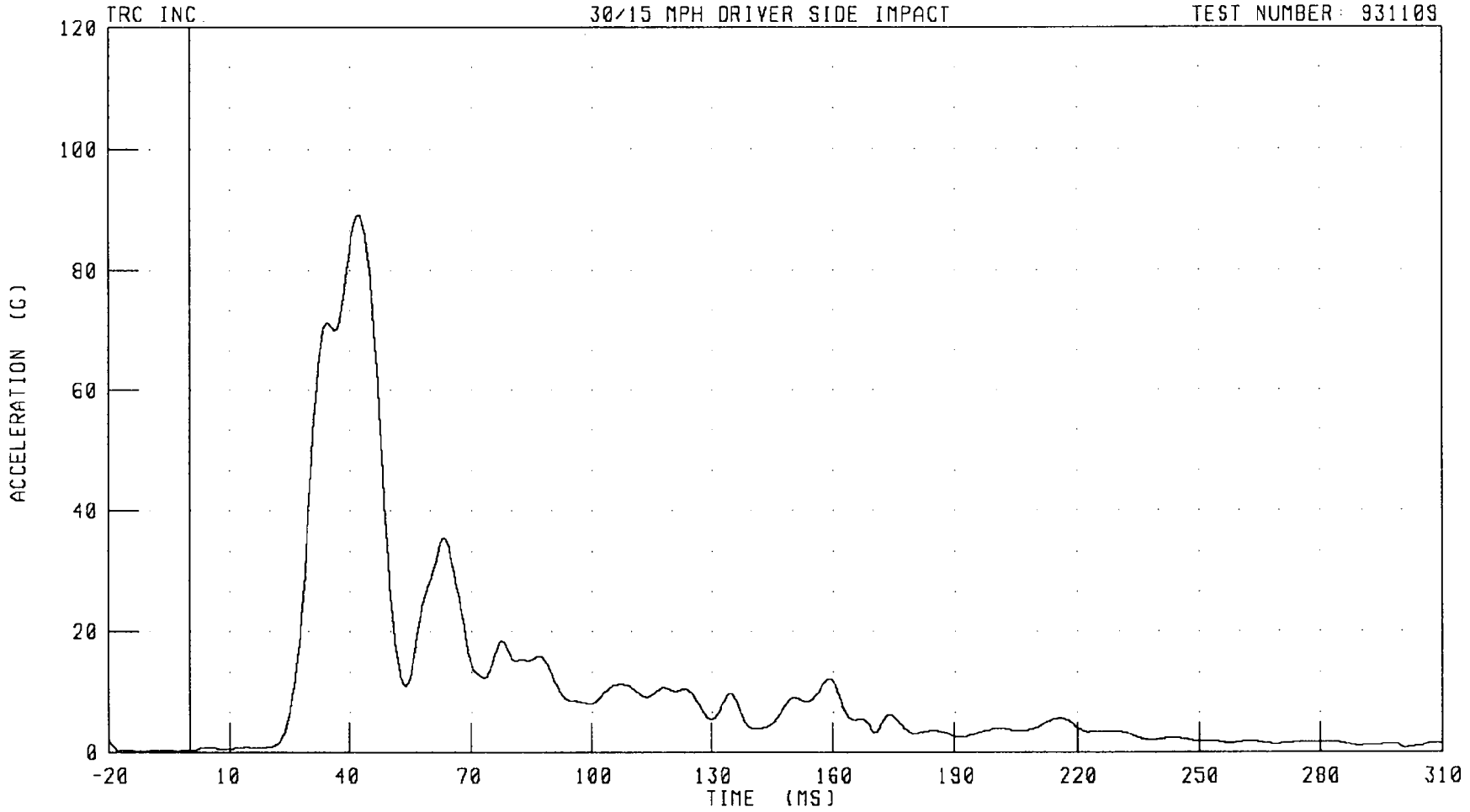
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LOWER SPINE Z-AXIS ACCELERATION



CHANNEL: T12ZG4 FILTER: FIR 100 PEAK DATA: 9.15 G @ 46.25 MS; -15.86 G @ 77.50 MS

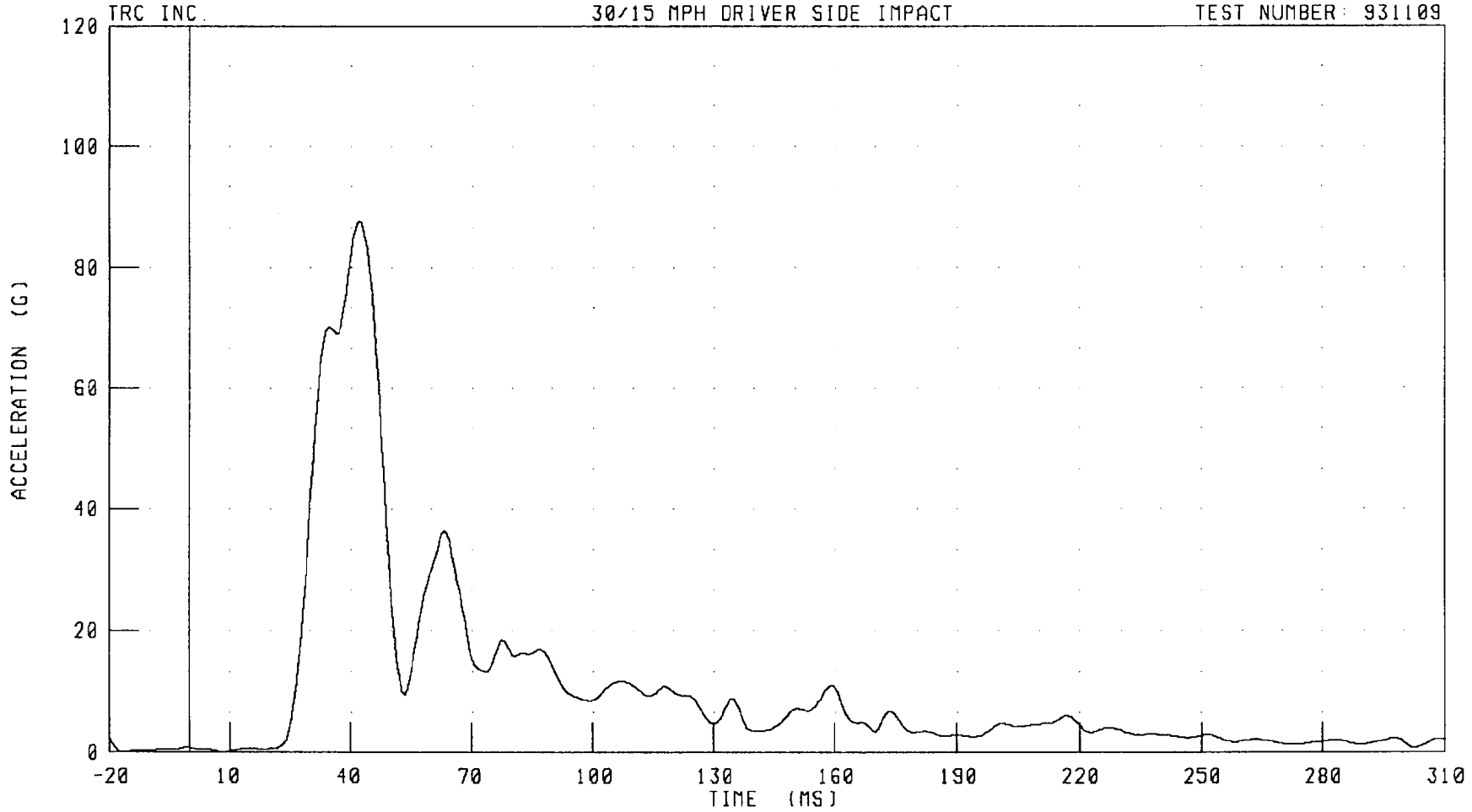
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

LEFT REAR PASSENGER LOWER SPINE RESULTANT ACCELERATION



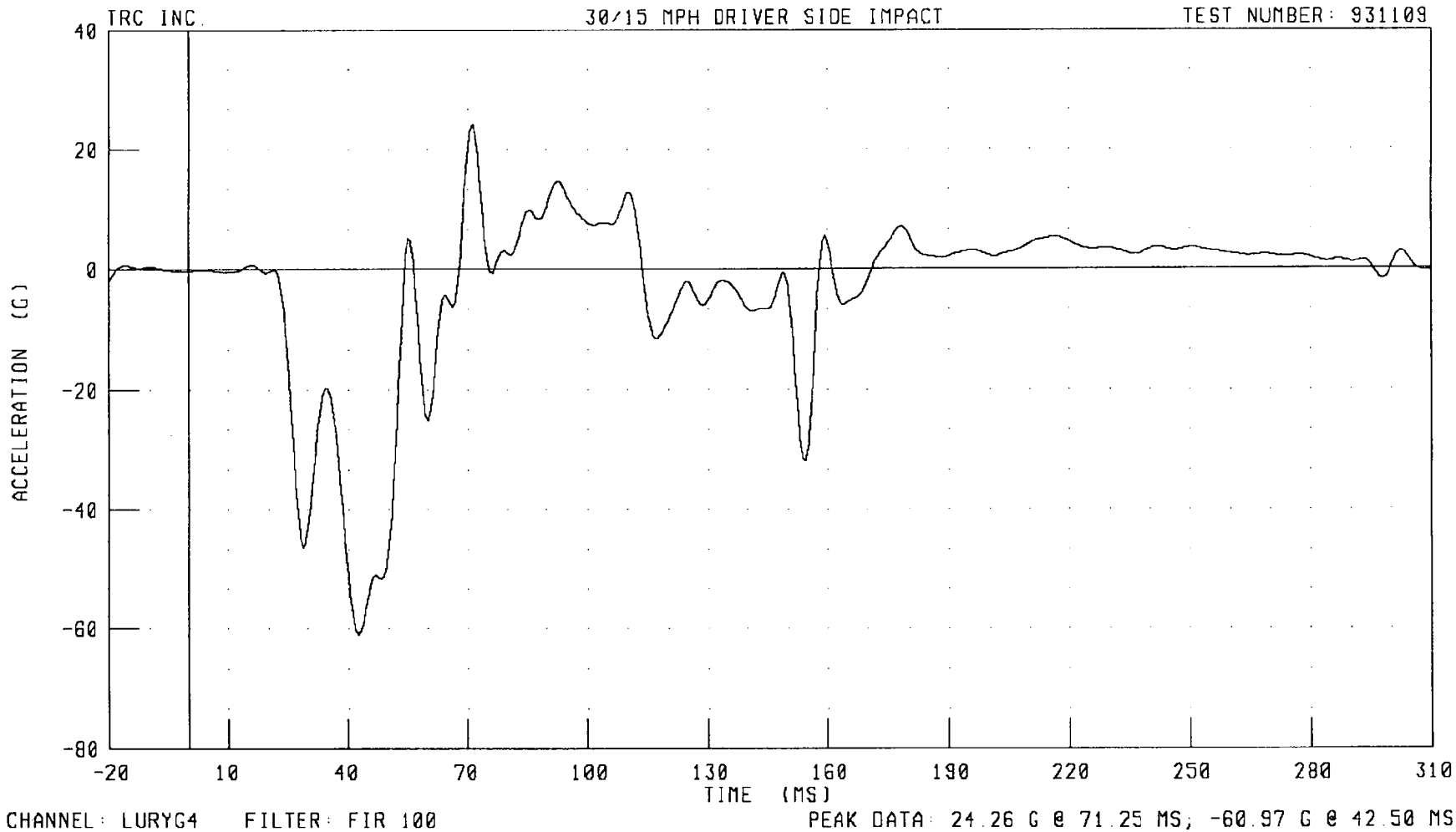
CHANNEL: T12RG4 FILTER: FIR 100 PEAK DATA: 89.12 G @ 42.50 MS, 0.20 G @ -11.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LOWER SPINE RESULTANT REDUNDANT ACCELERATION



CHANNEL: T12RGD FILTER: FIR 100 PEAK DATA: 87.65 G @ 41.87 MS; 0.11 G @ 8.13 MS

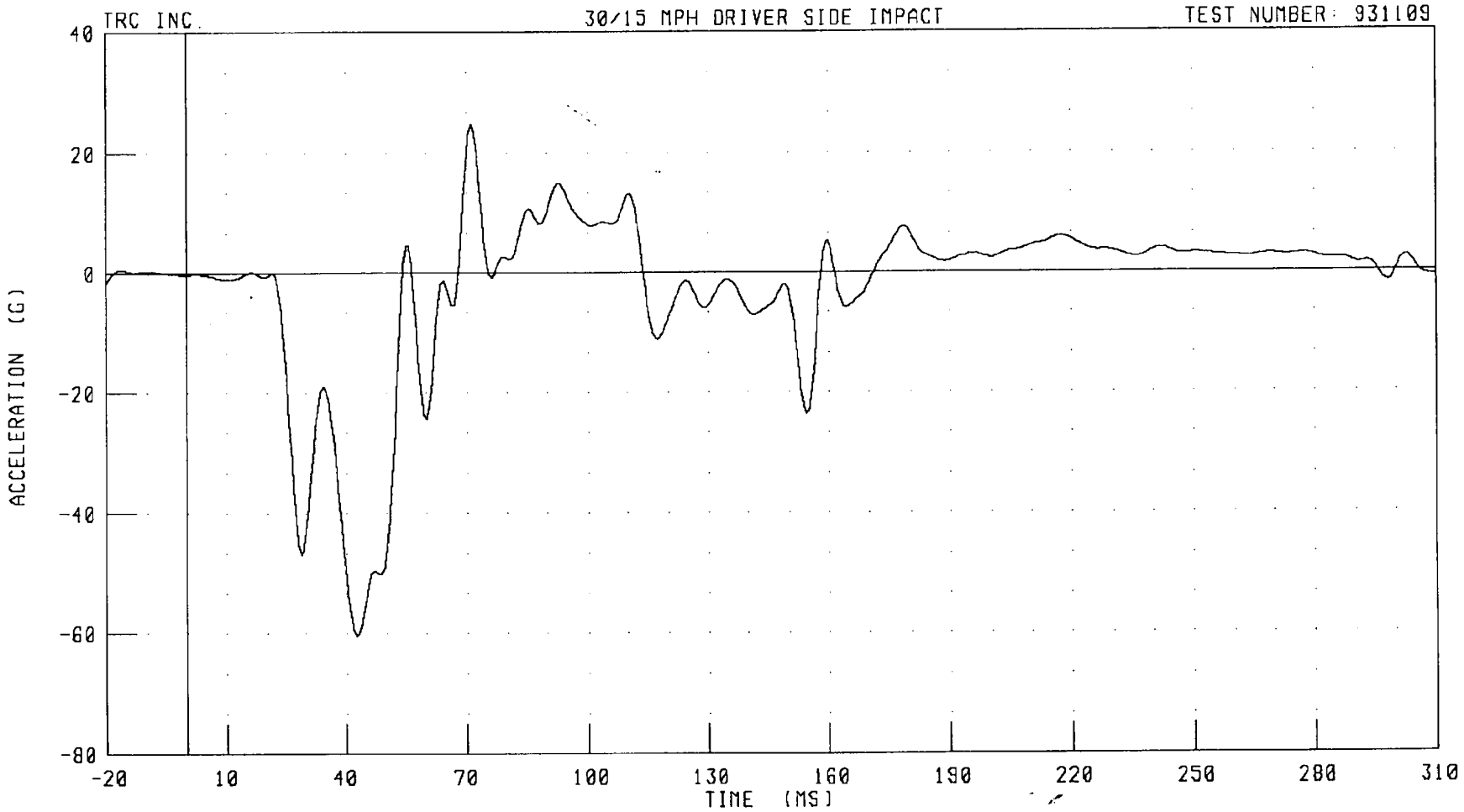
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS ACCELERATION



CHANNEL: LURYG4 FILTER: FIR 100

PEAK DATA: 24.26 G @ 71.25 MS; -60.97 G @ 42.50 MS

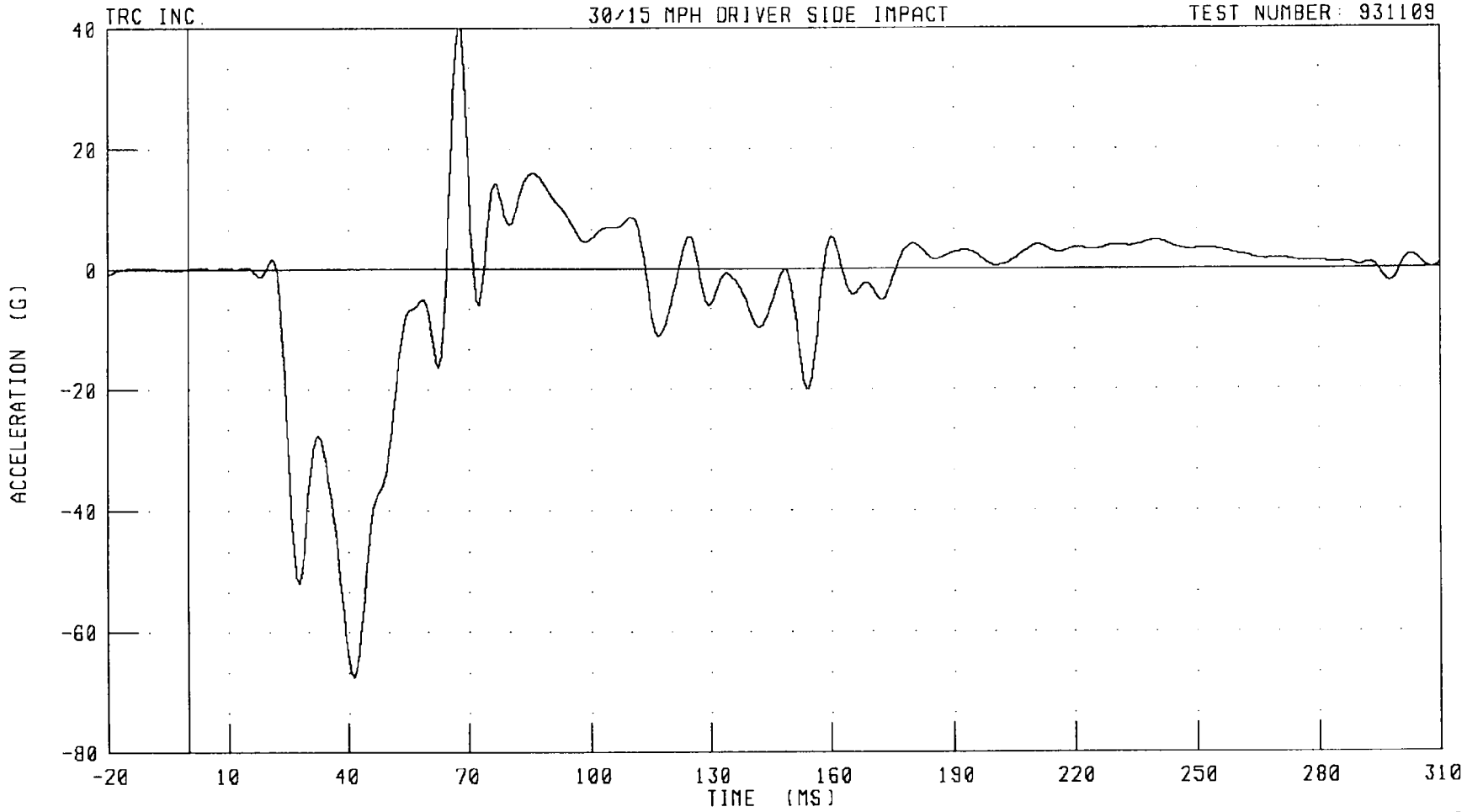
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT ACCELERATION



CHANNEL: LURYGD FILTER: FIR 100

PEAK DATA: 24.76 G @ 71.25 MS; -60.49 G @ 42.50 MS

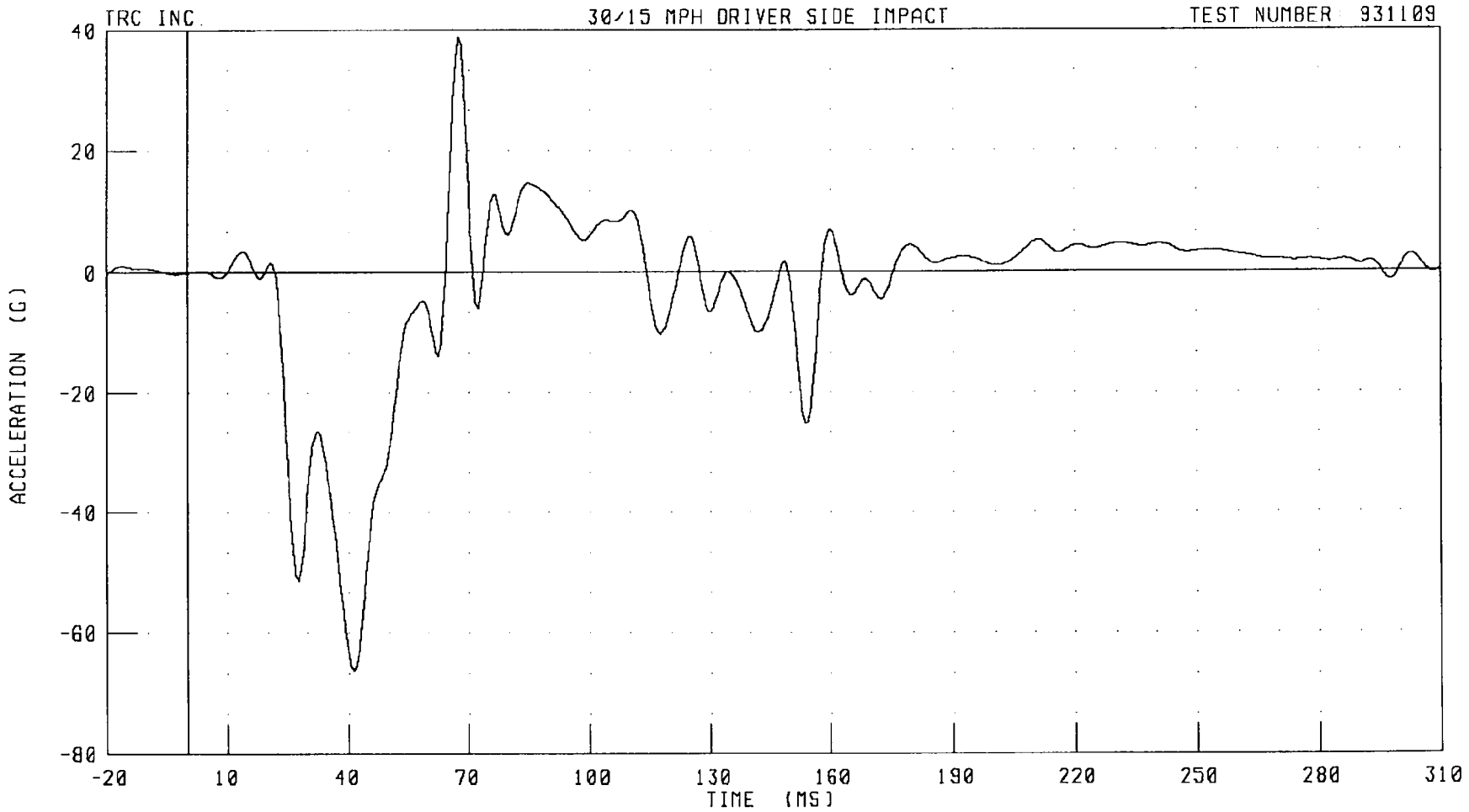
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LEFT LOWER THORAX RIB Y-AXIS ACCELERATION



CHANNEL: LLRYG4 FILTER: FIR 100

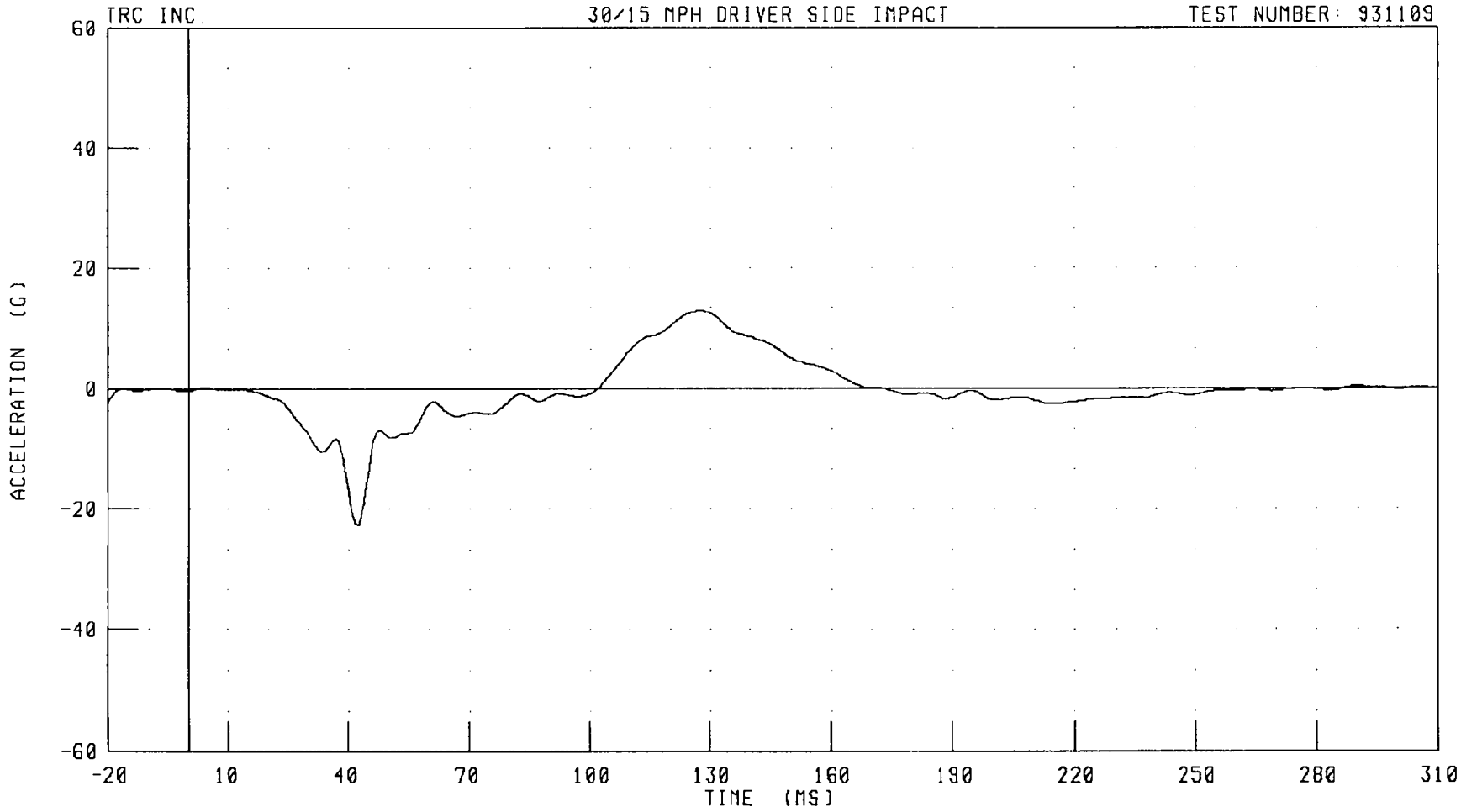
PEAK DATA: 40.85 G @ 67.50 MS; -67.39 G @ 41.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT ACCELERATION



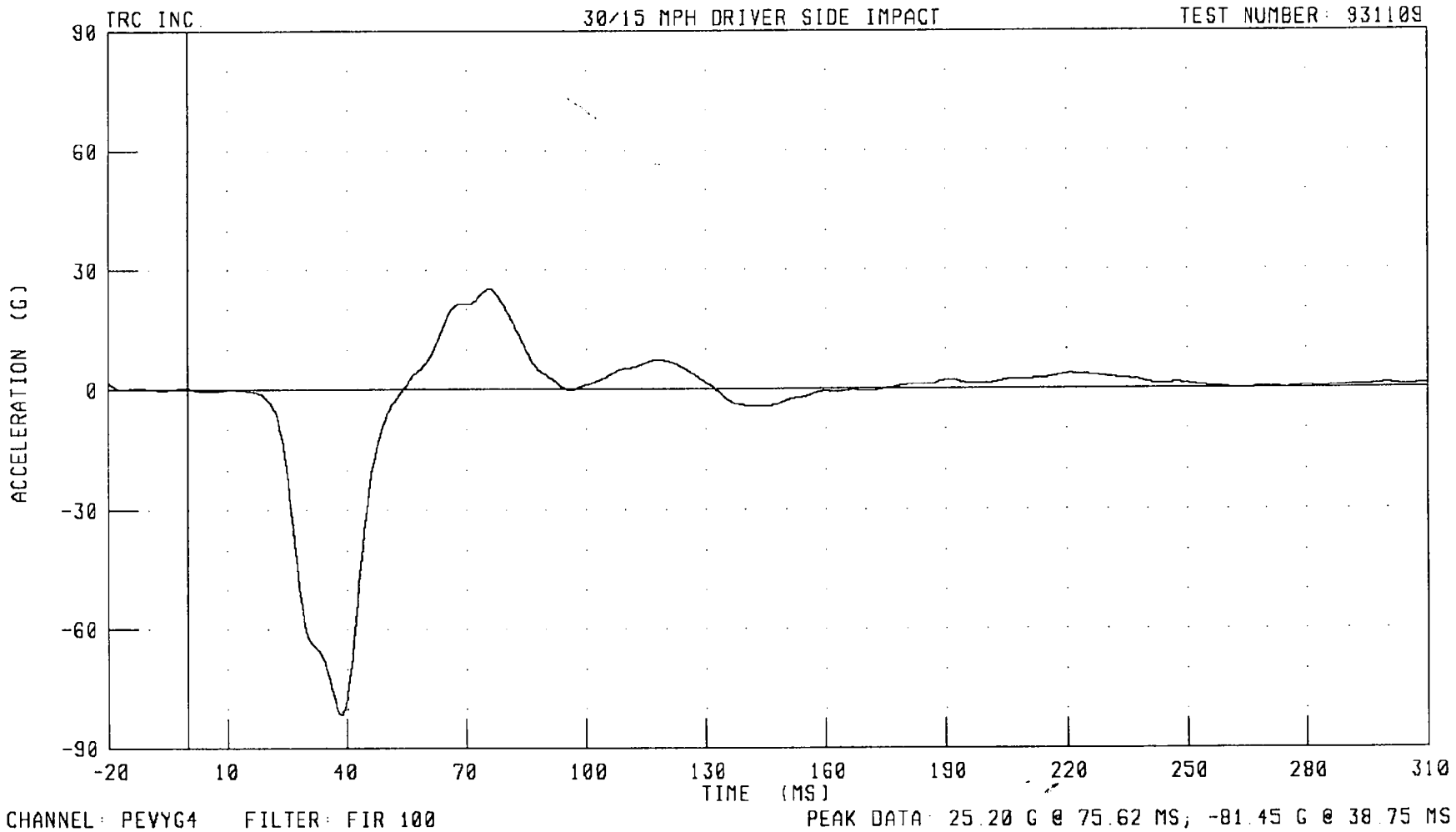
CHANNEL: LLRYGD FILTER: FIR 100 PEAK DATA: 38.84 G @ 67.50 MS, -66.29 G @ 41.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER PELVIS X-AXIS ACCELERATION

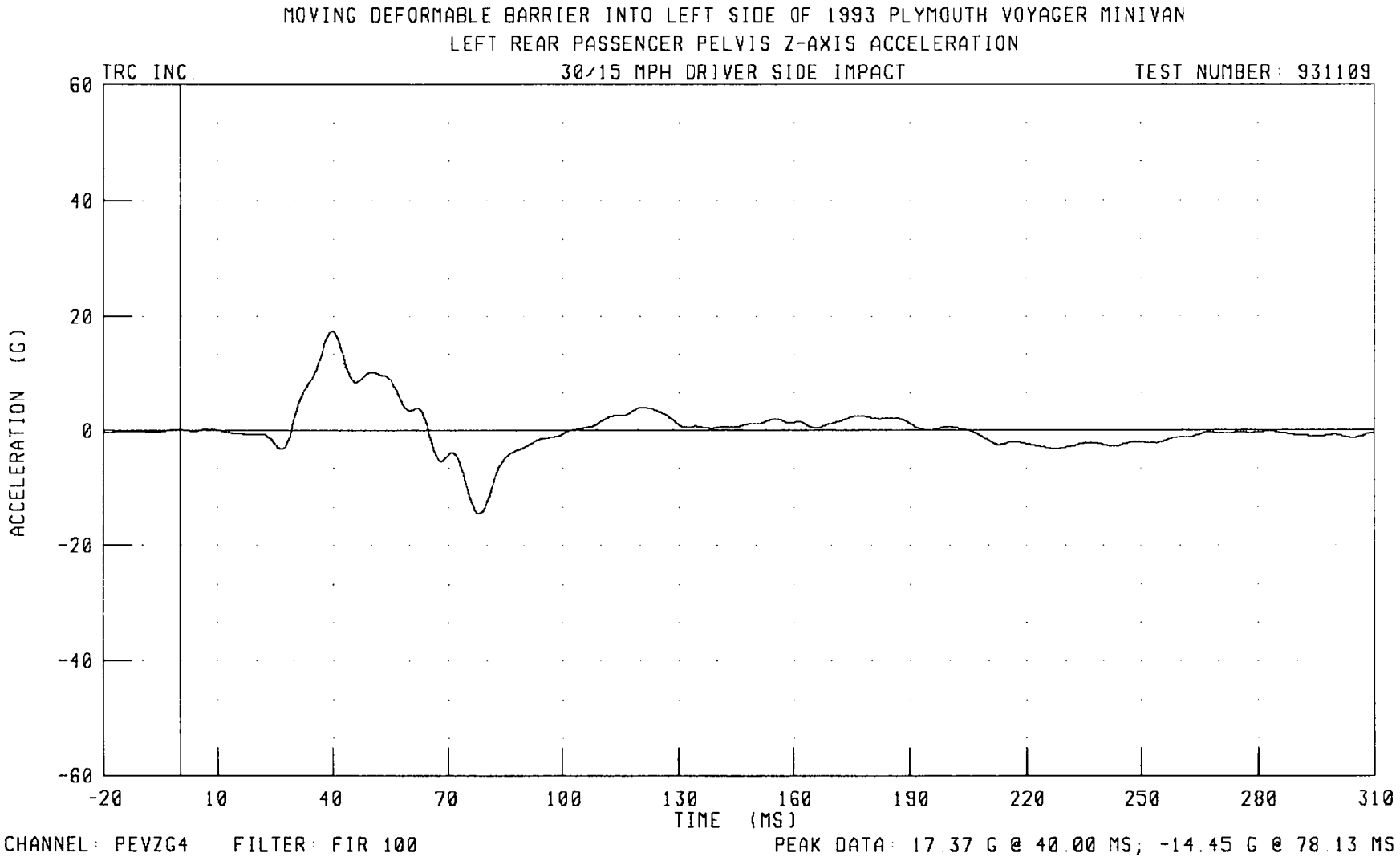


CHANNEL: PEVXG4 FILTER: FIR 100 PEAK DATA: 12.83 G @ 127.50 MS, -22.61 G @ 42.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION

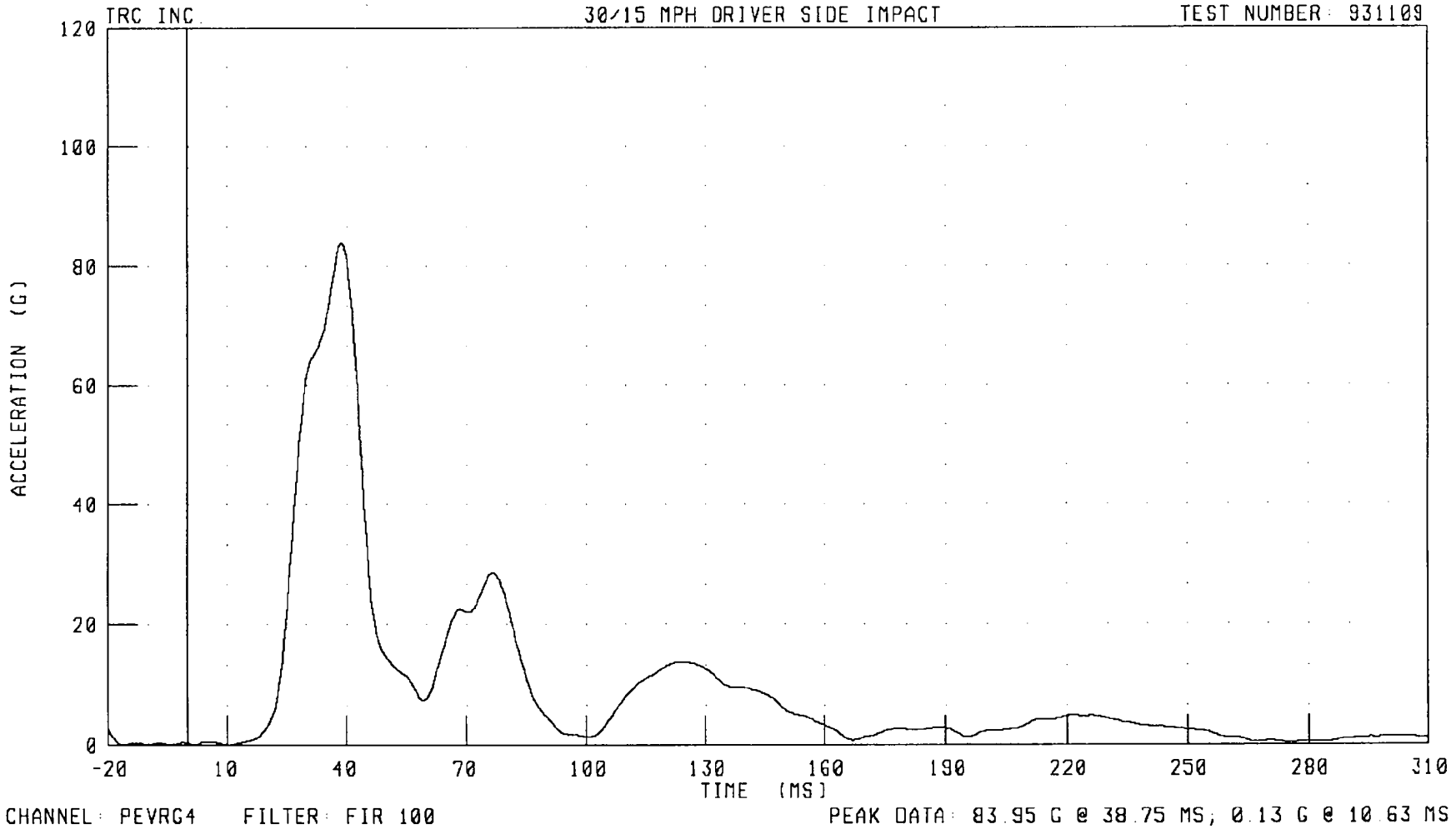


CHANNEL: PEVYG4 FILTER: FIR 100 PEAK DATA: 25.20 G @ 75.62 MS; -81.45 G @ 38.75 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT REAR PASSENGER PELVIS Z-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVZG4
FILTER: FIR 100
PEAK DATA: 17.37 G @ 40.00 MS; -14.45 G @ 78.13 MS

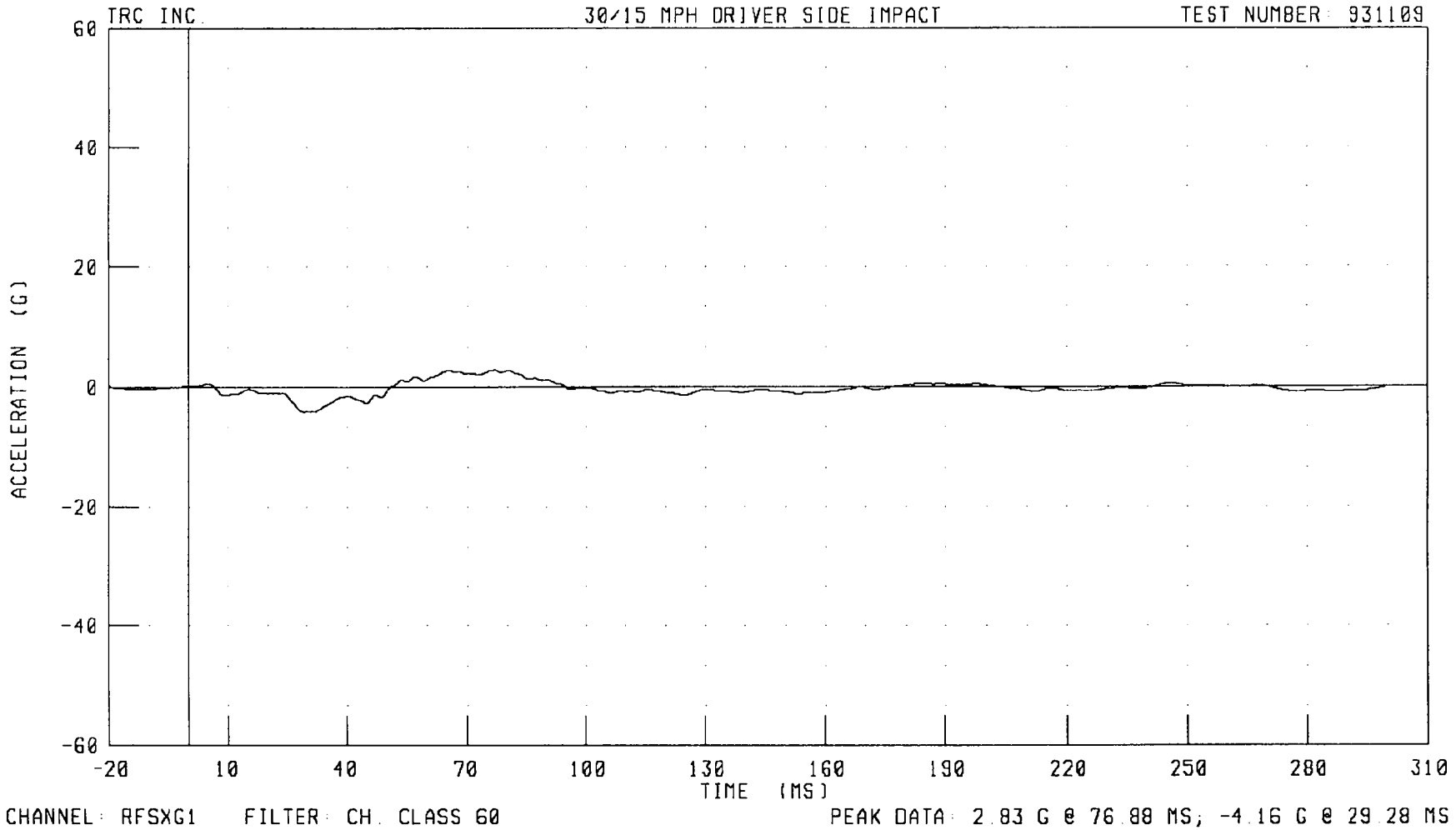
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

LEFT REAR PASSENGER PELVIS RESULTANT ACCELERATION



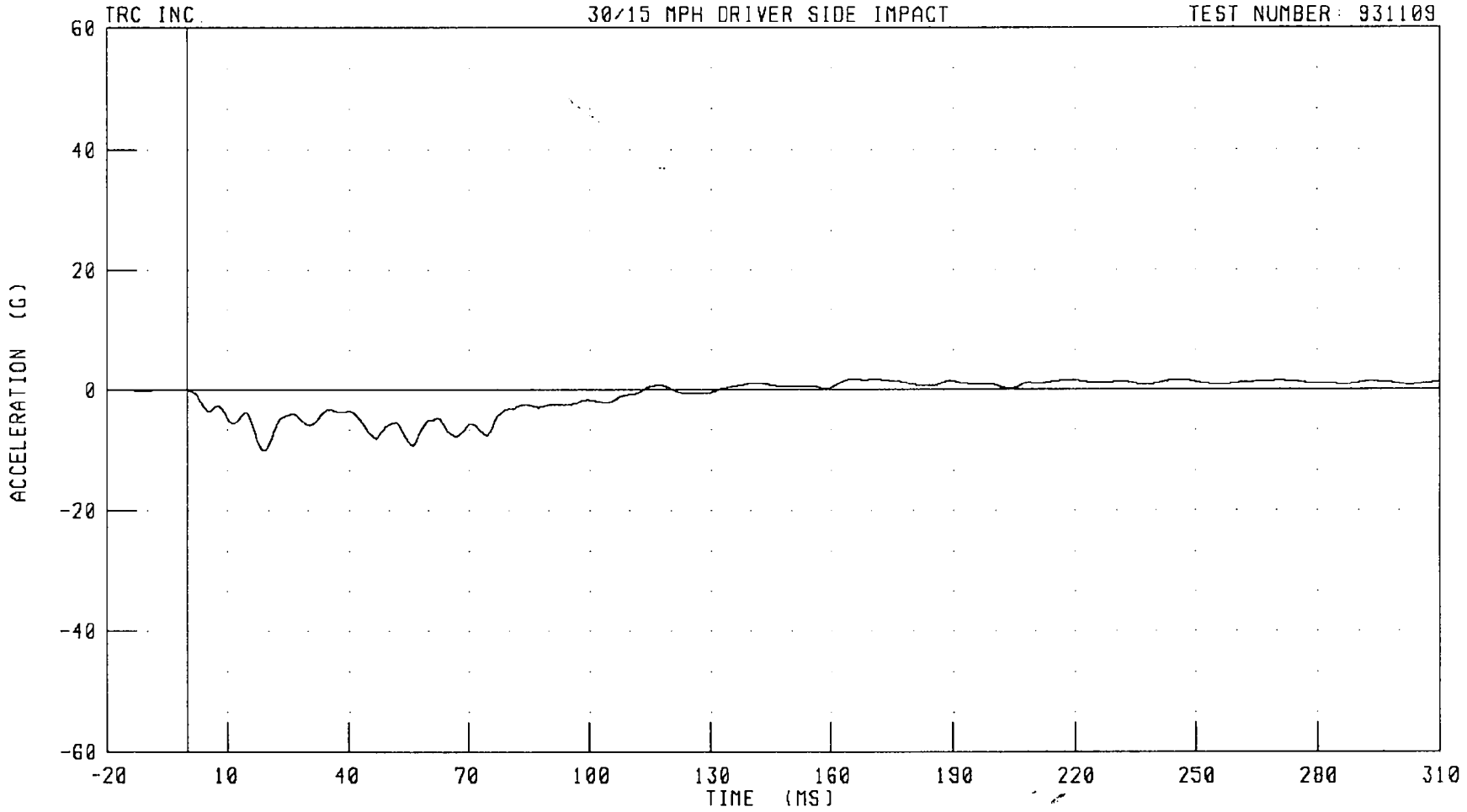
CHANNEL: PEVRG4 FILTER: FIR 100 PEAK DATA: 83.95 G @ 38.75 MS; 0.13 G @ 10.63 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
VEHICLE RIGHT FRONT SILL X-AXIS ACCELERATION



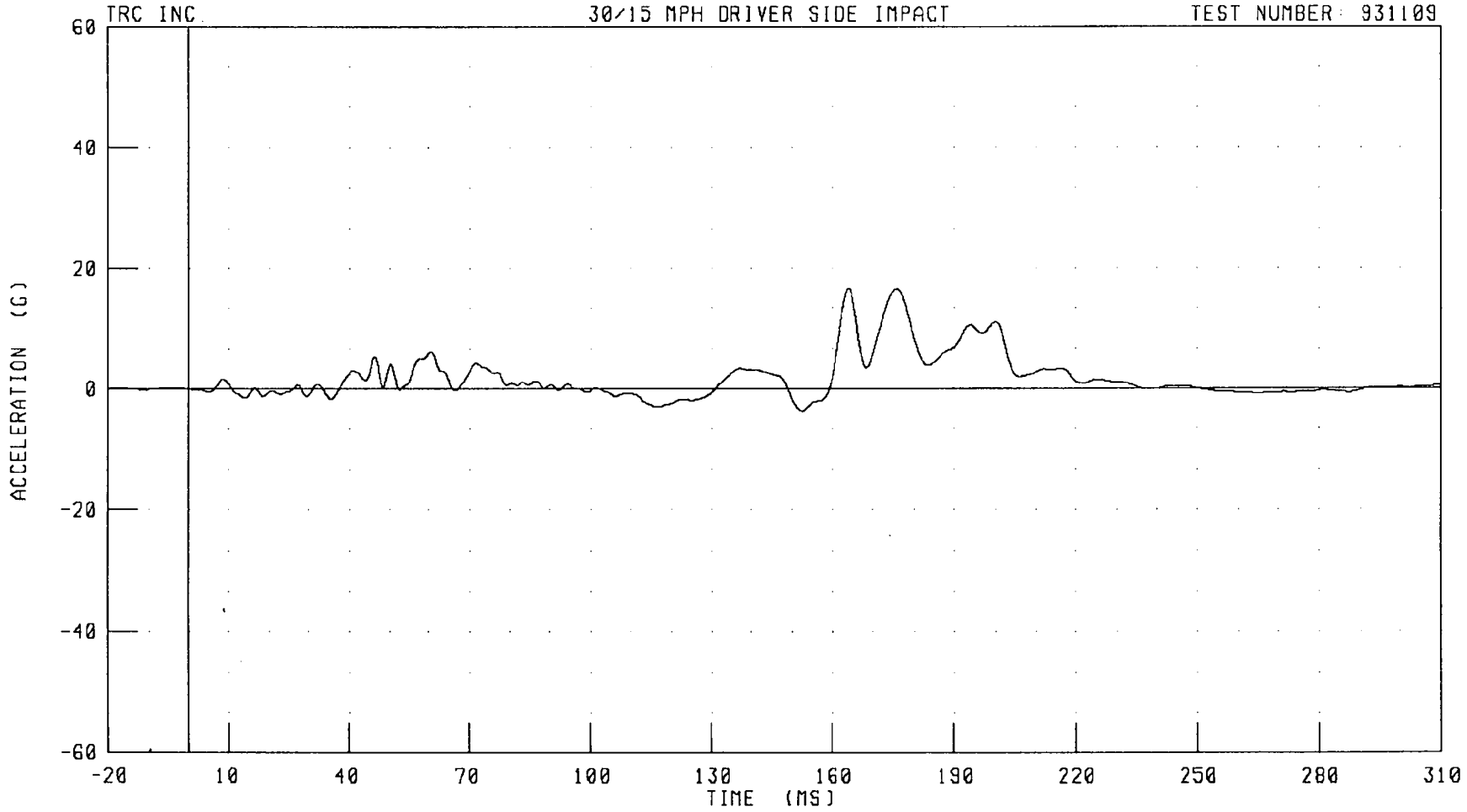
CHANNEL: RFSXG1 FILTER: CH. CLASS 60 PEAK DATA: 2.83 G @ 76.88 MS; -4.16 G @ 29.28 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
VEHICLE RIGHT FRONT SILL Y-AXIS ACCELERATION



CHANNEL: RFSYG1 FILTER: CH. CLASS 60 PEAK DATA: 1.71 G @ 165.52 MS, -10.06 G @ 18.96 MS

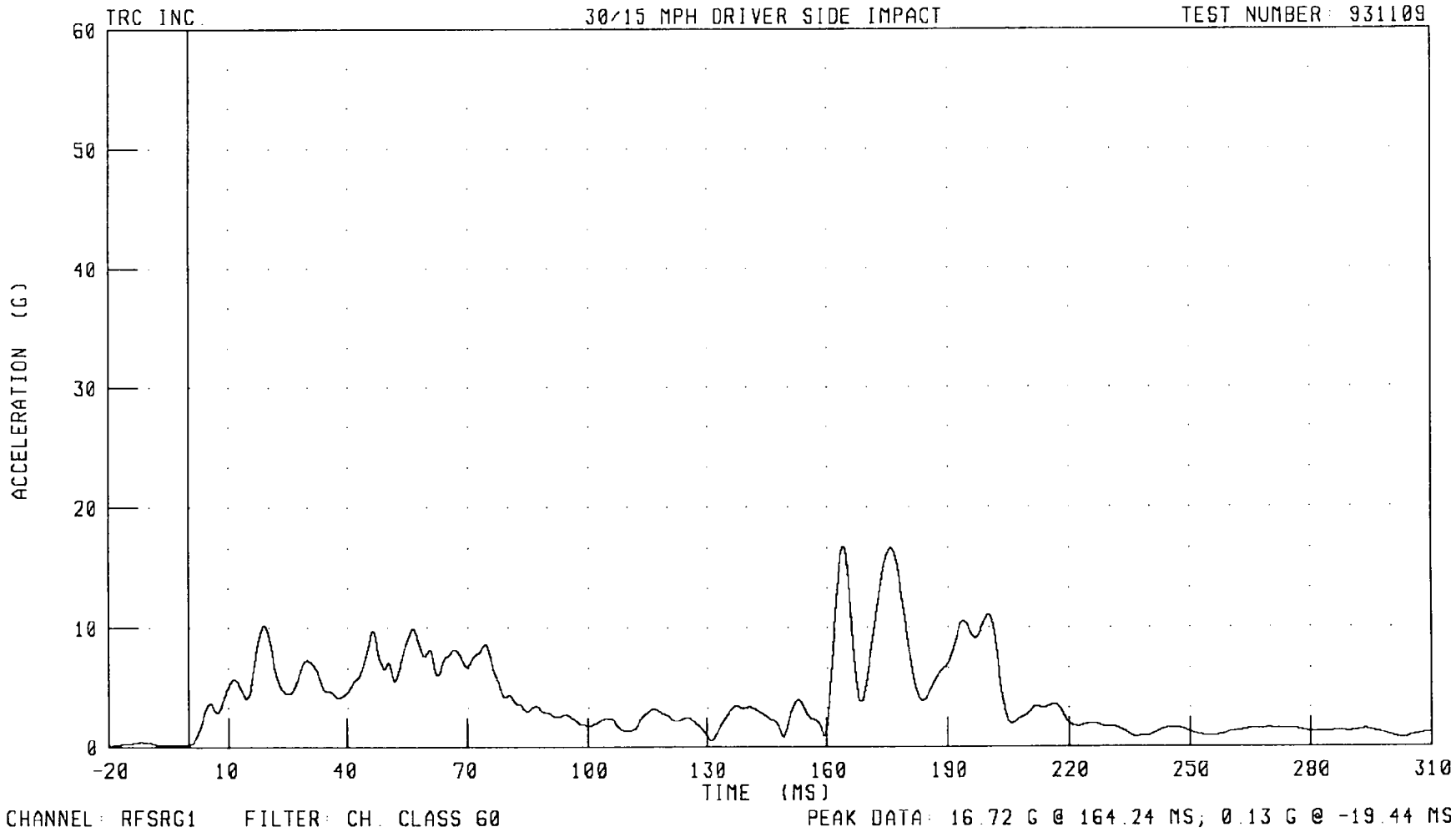
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
VEHICLE RIGHT FRONT SILL Z-AXIS ACCELERATION



CHANNEL: RFSZG1 FILTER: CH. CLASS 60 PEAK DATA: 16.64 G @ 164.24 MS, -3.80 G @ 152.72 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

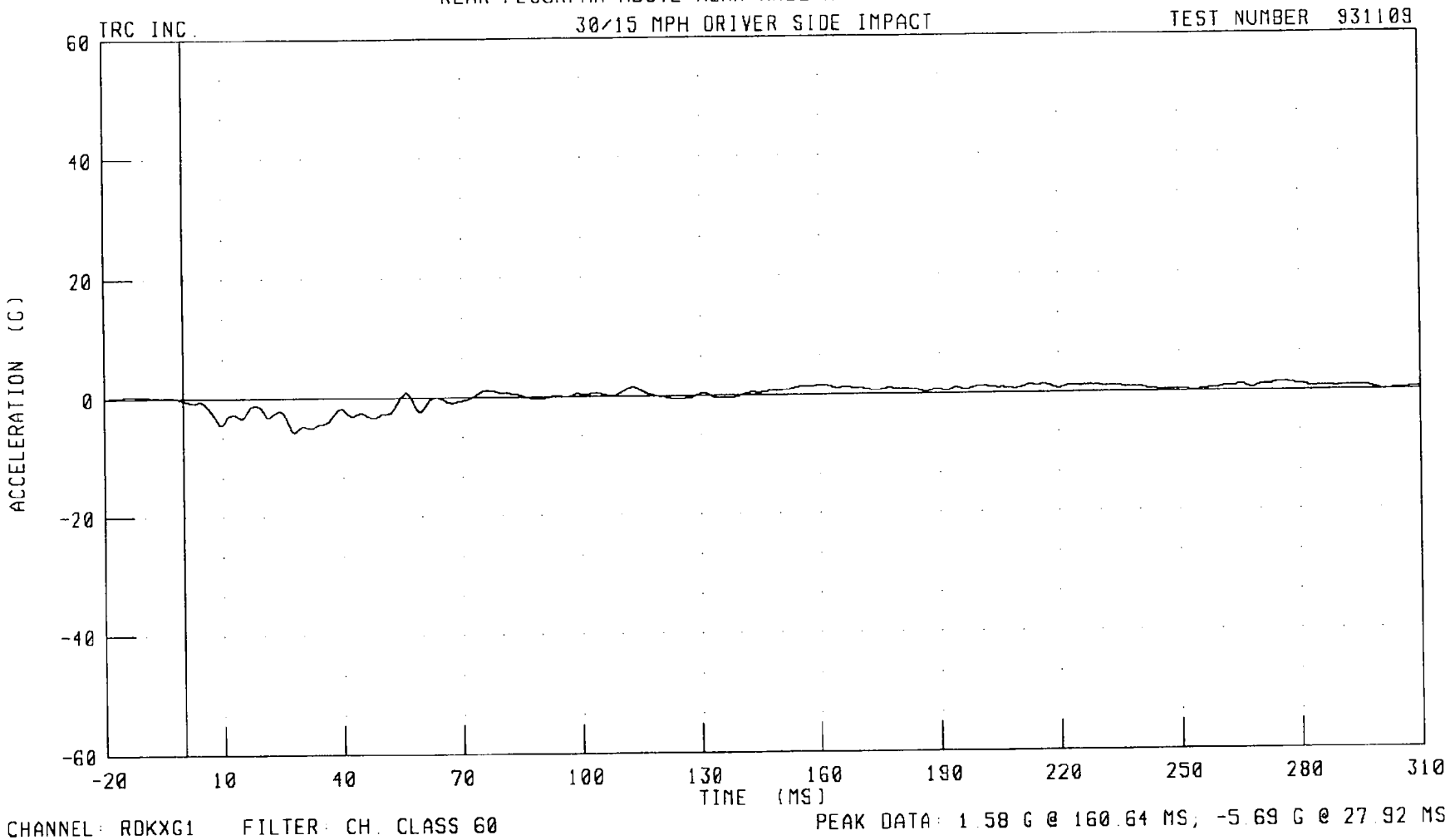
VEHICLE RIGHT FRONT SILL RESULTANT ACCELERATION



CHANNEL: RFSRG1 FILTER: CH. CLASS 60

PEAK DATA: 16.72 G @ 164.24 MS; 0.13 G @ -19.44 MS

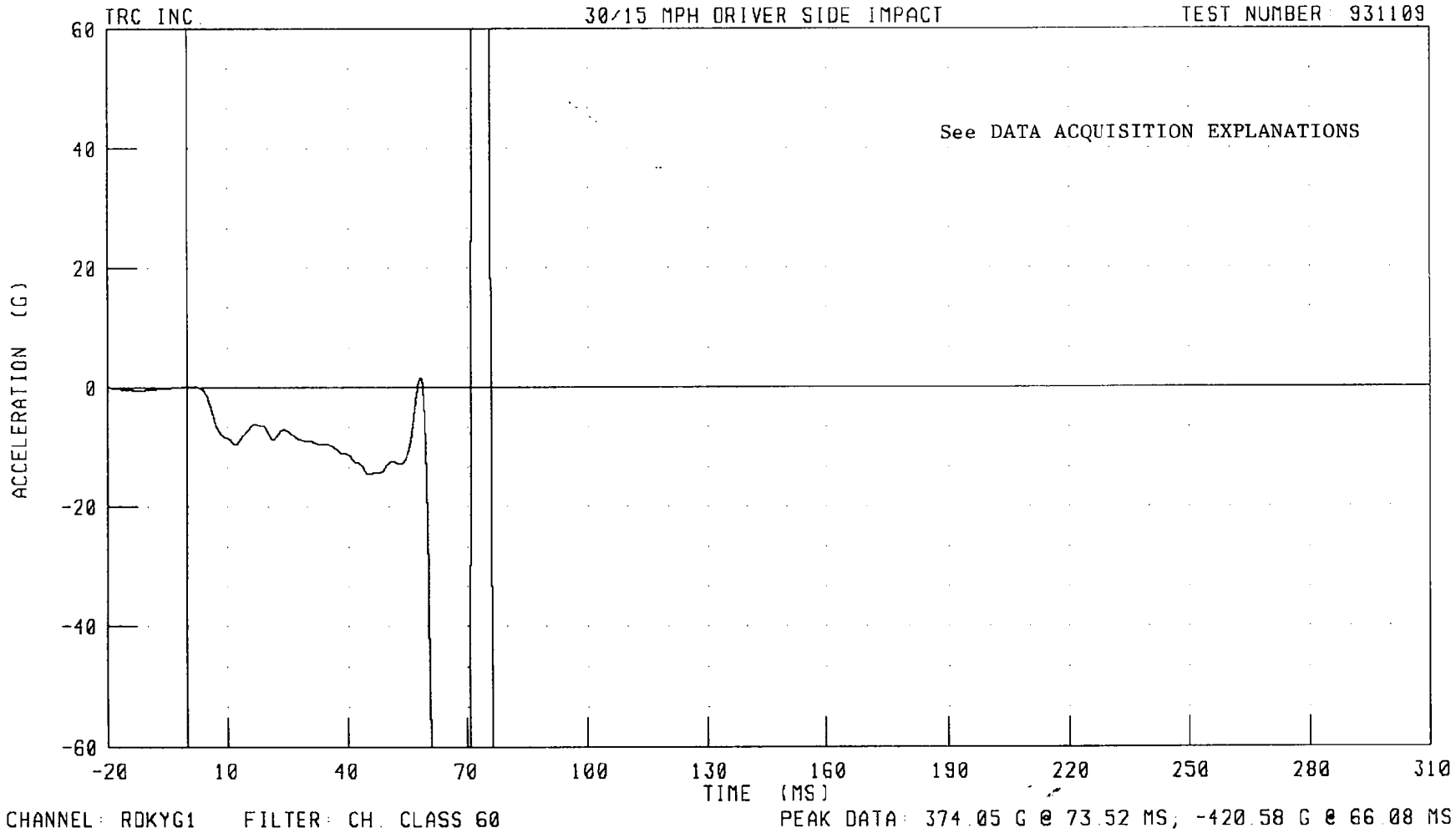
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
REAR FLOORPAN ABOVE REAR AXLE X-AXIS ACCELERATION
30/15 MPH DRIVER SIDE IMPACT



CHANNEL: RDKXG1 FILTER: CH. CLASS 60

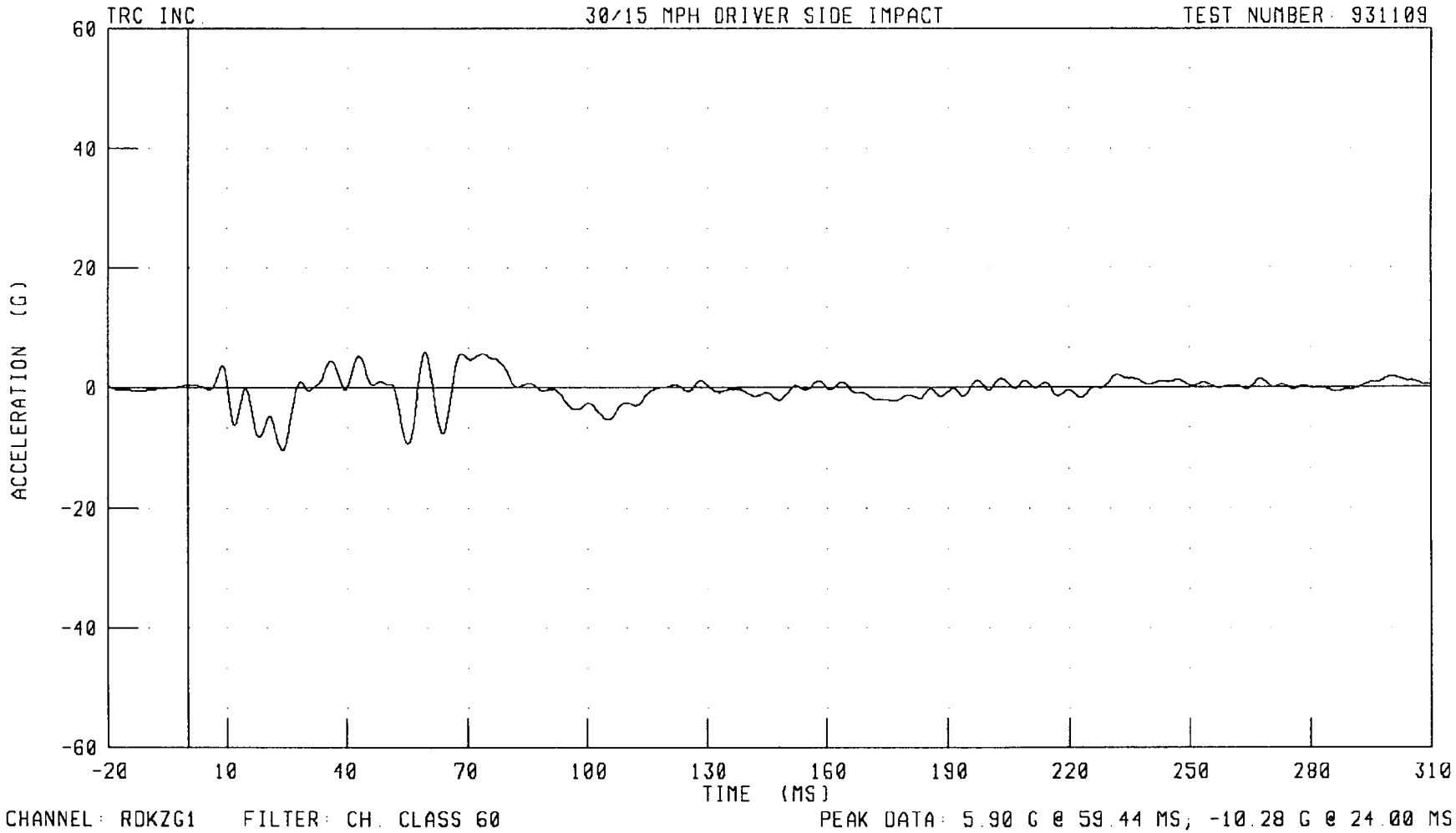
PEAK DATA: 1.58 G @ 160.64 MS; -5.69 G @ 27.92 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
REAR FLOORPAN ABOVE REAR AXLE Y-AXIS ACCELERATION



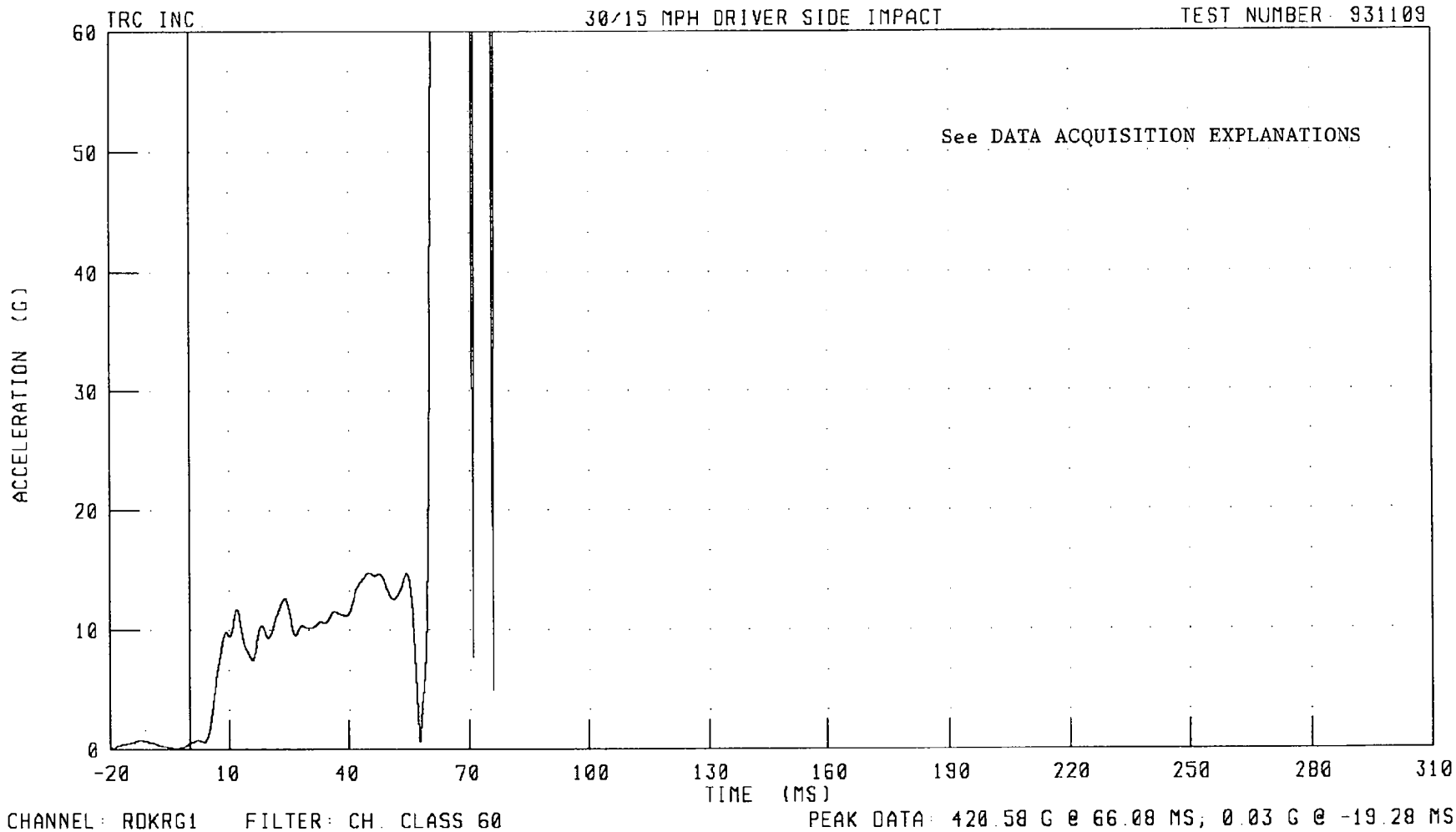
CHANNEL: R0KYG1 FILTER: CH. CLASS 60 PEAK DATA: 374.05 G @ 73.52 MS, -420.58 G @ 66.08 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
REAR FLOORPAN ABOVE REAR AXLE Z-AXIS ACCELERATION



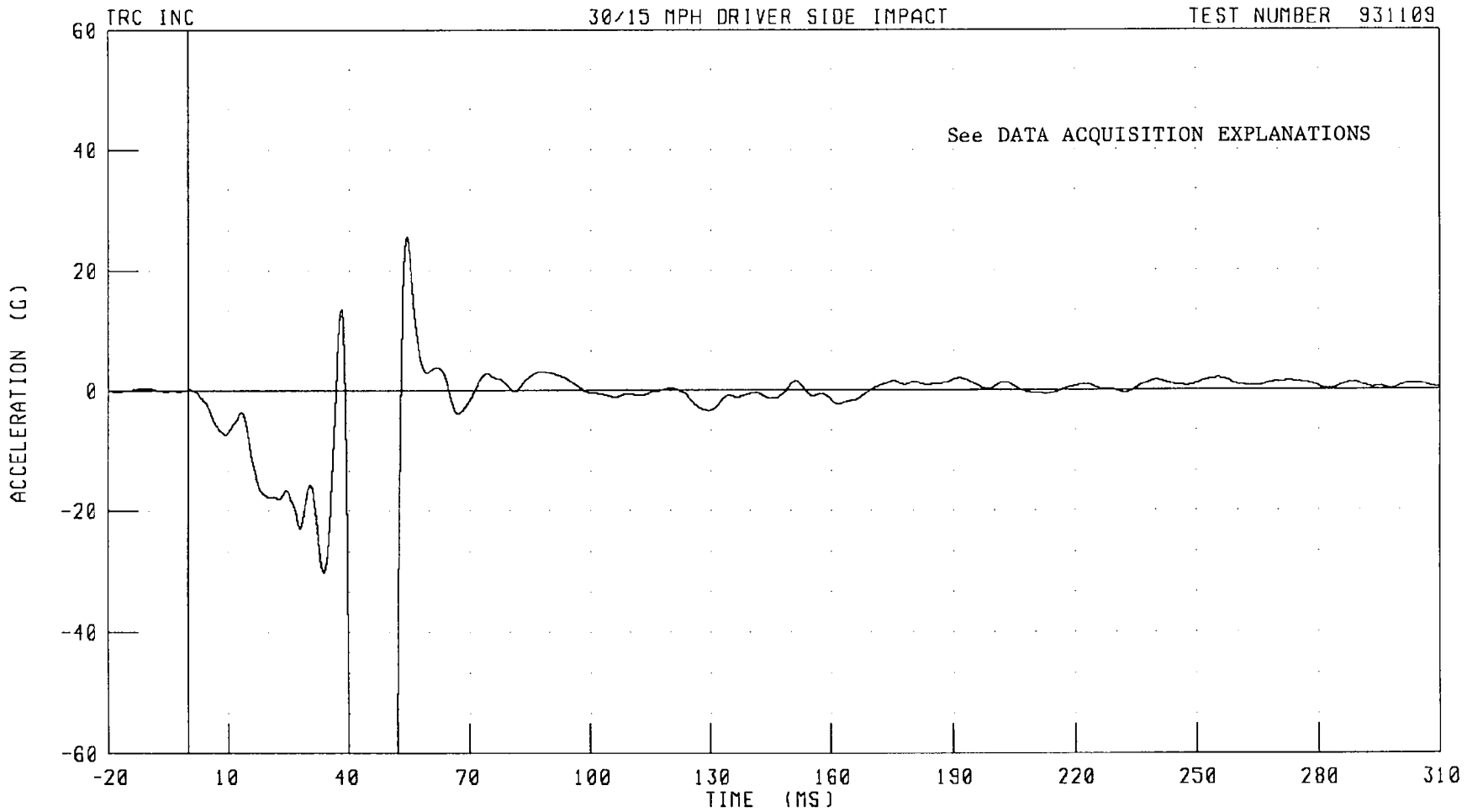
CHANNEL: RDKZG1 FILTER: CH. CLASS 60 PEAK DATA: 5.90 G @ 59.44 MS; -10.28 G @ 24.00 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
REAR FLOORPAN ABOVE REAR AXLE RESULTANT ACCELERATION

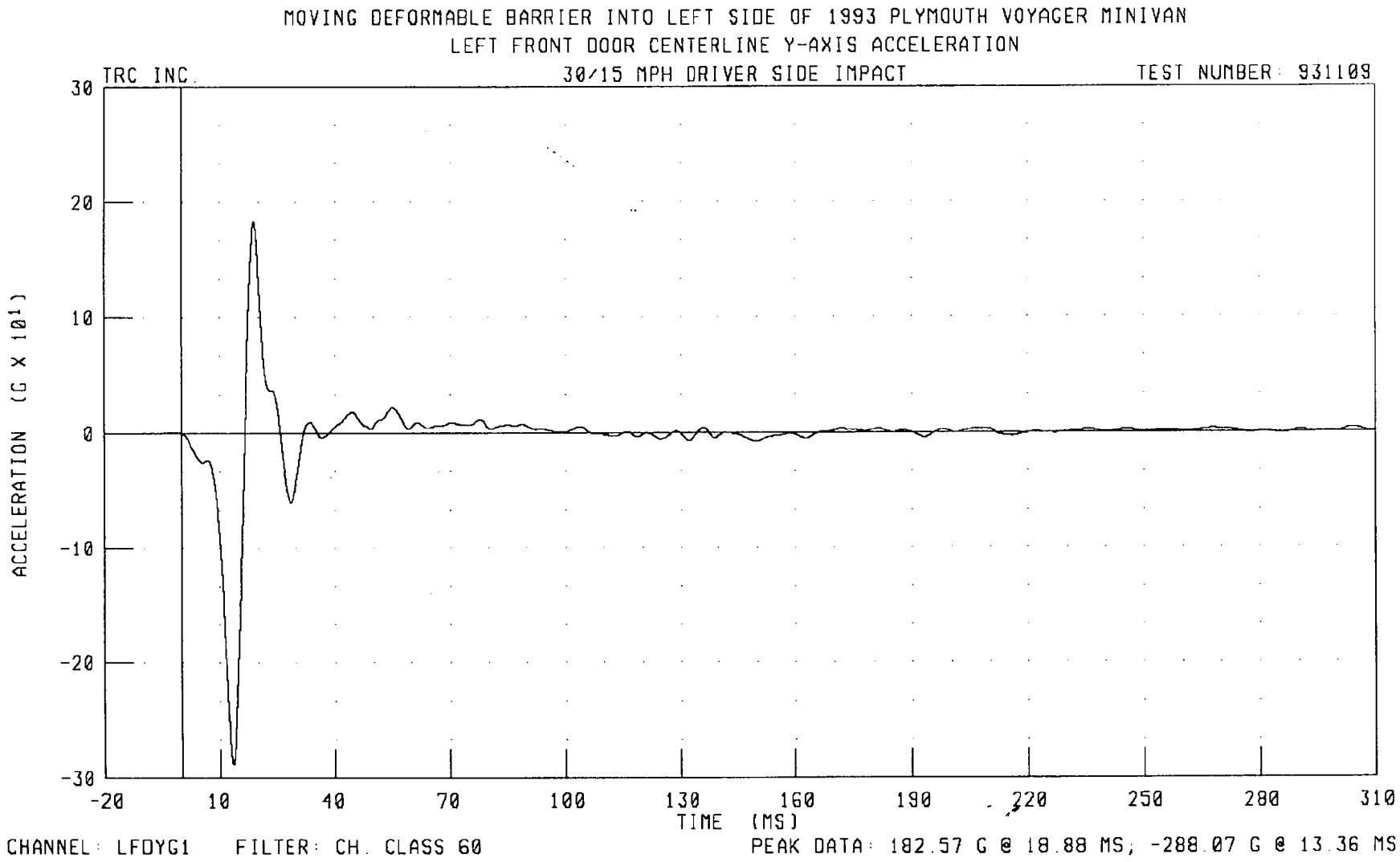


CHANNEL: RDKRG1 FILTER: CH. CLASS 60 PEAK DATA: 420.58 G @ 66.08 MS; 0.03 G @ -19.28 MS

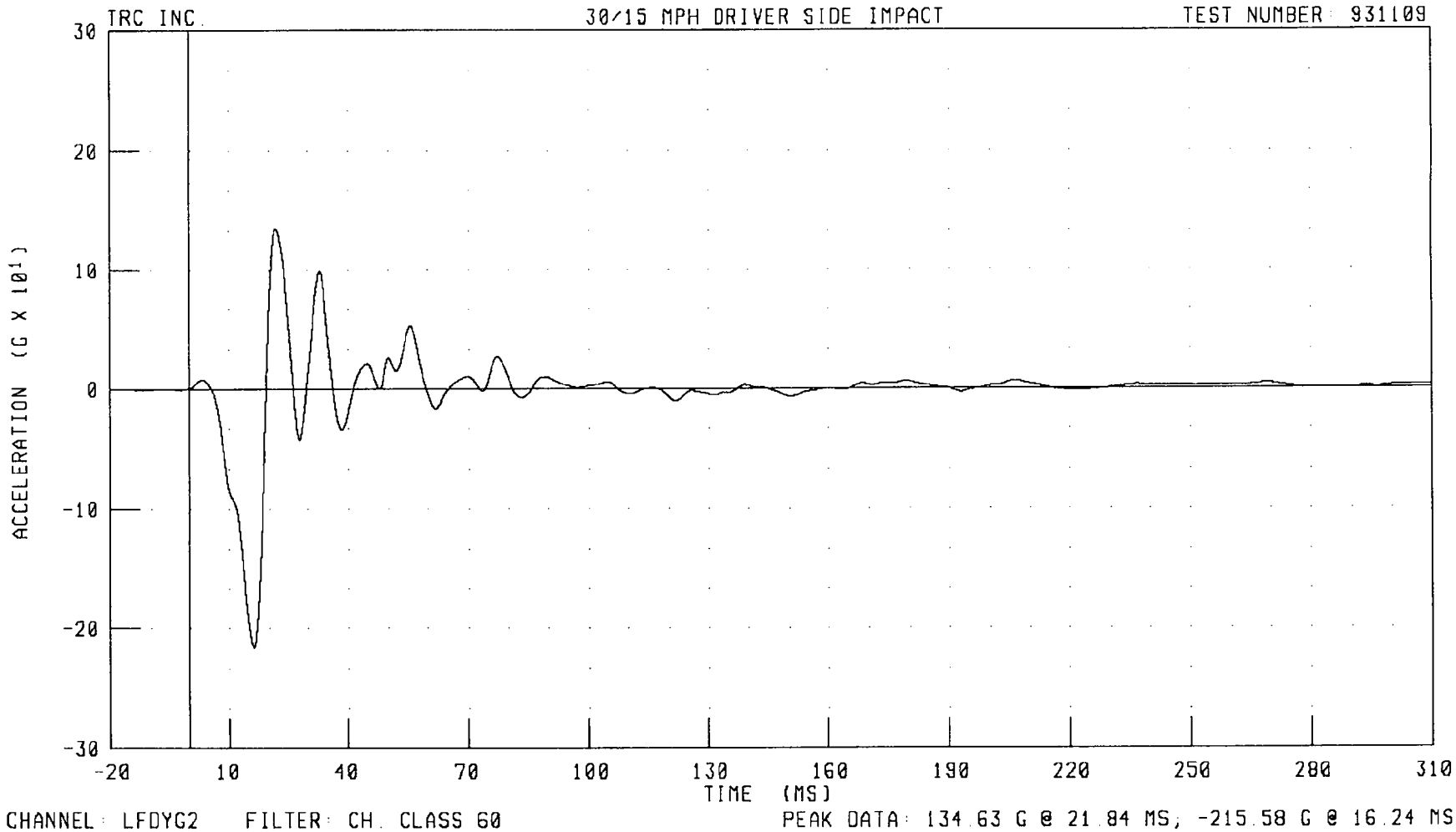
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT FRONT SILL Y-AXIS ACCELERATION



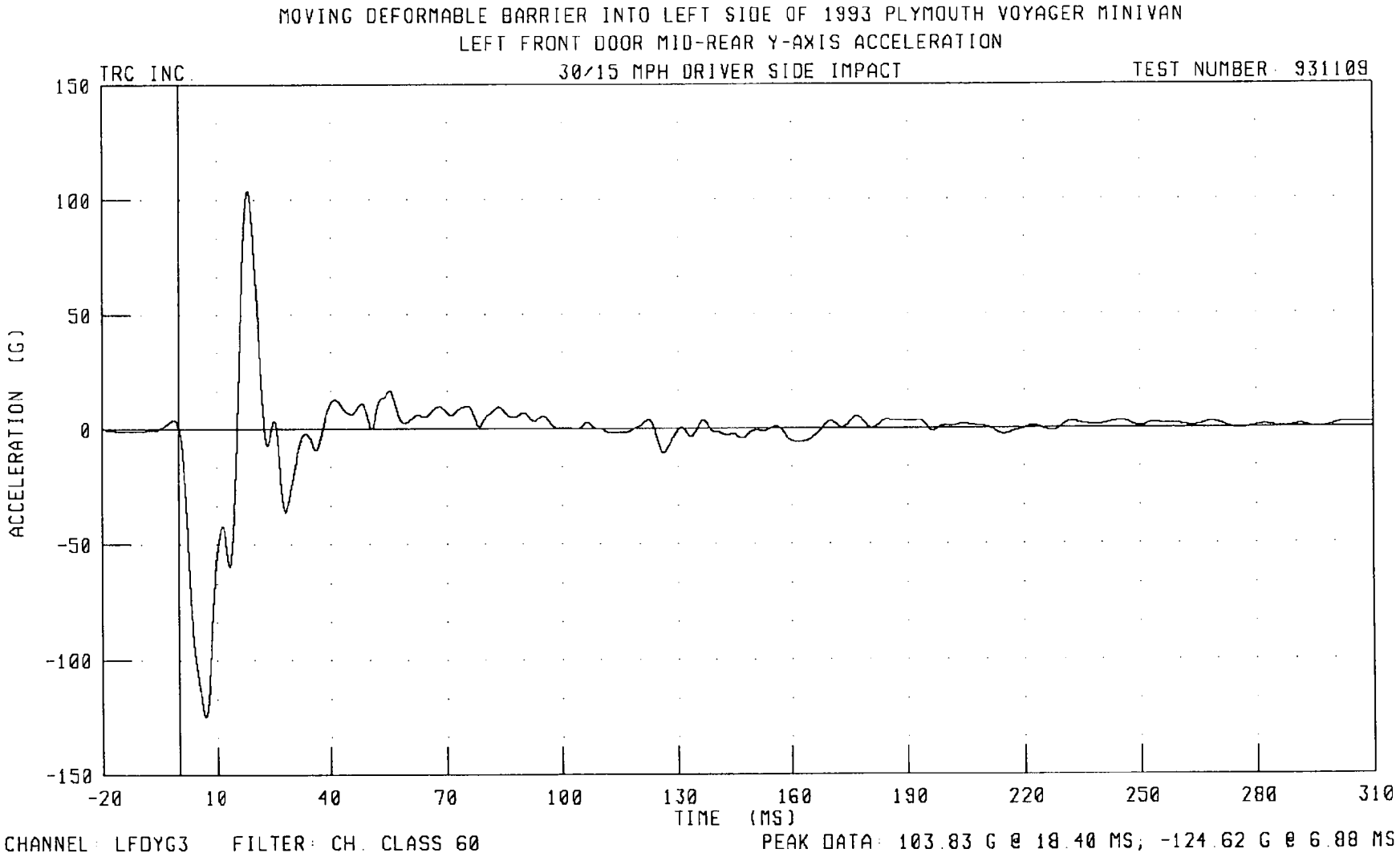
CHANNEL: LFSYG1 FILTER: CH. CLASS 60 PEAK DATA: 25.56 G @ 54.24 MS, -944.75 G @ 46.08 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT FRONT DOOR CENTERLINE Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G X 10¹)
30
20
10
0
-10
-20
-30
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFDYG1
FILTER: CH. CLASS 60
PEAK DATA: 182.57 G @ 18.88 MS; -288.07 G @ 13.36 MS

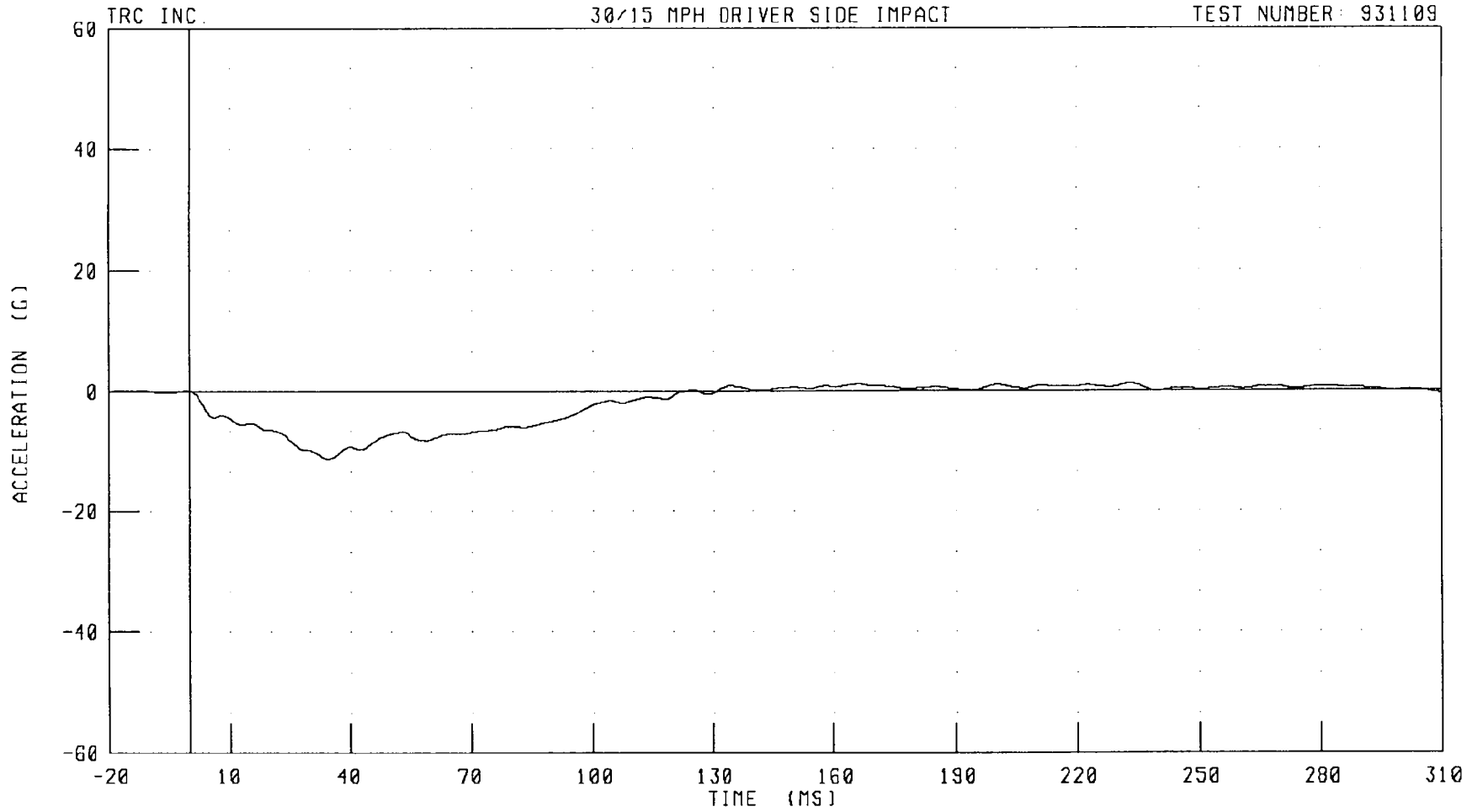
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT FRONT DOOR UPPER CENTERLINE Y-AXIS ACCELERATION



CHANNEL: LFDYG2 FILTER: CH. CLASS 60 PEAK DATA: 134.63 G @ 21.84 MS; -215.58 G @ 16.24 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
LEFT FRONT DOOR MID-REAR Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931109
150
100
50
0
-50
-100
-150
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL LFDYG3 FILTER CH CLASS 60
PEAK DATA 103.83 G @ 18.40 MS; -124.62 G @ 6.88 MS

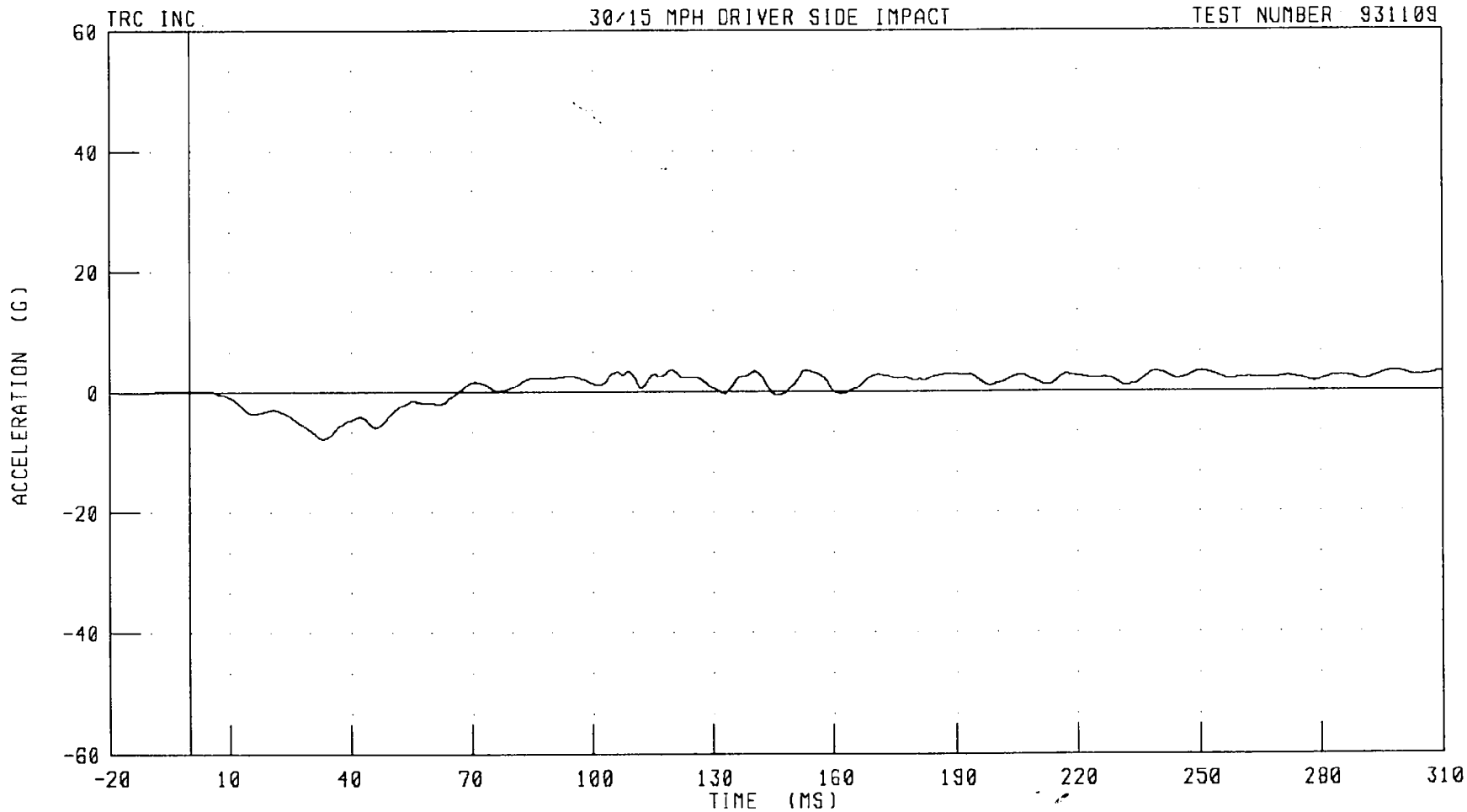
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION



CHANNEL: BCGXG FILTER: CH. CLASS 60 PEAK DATA: 1.18 G @ 233.04 MS, -11.28 G @ 34.56 MS

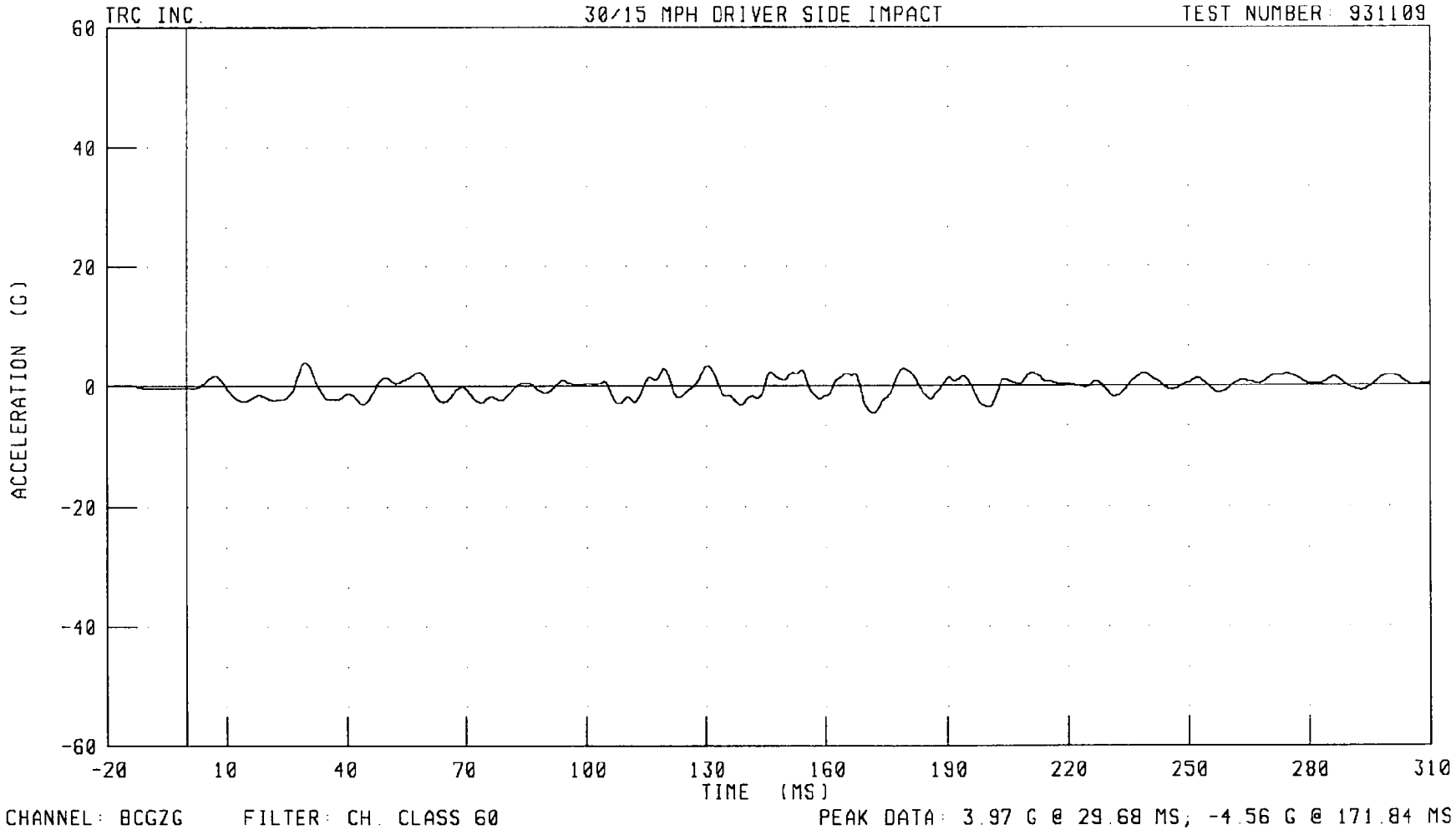
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION

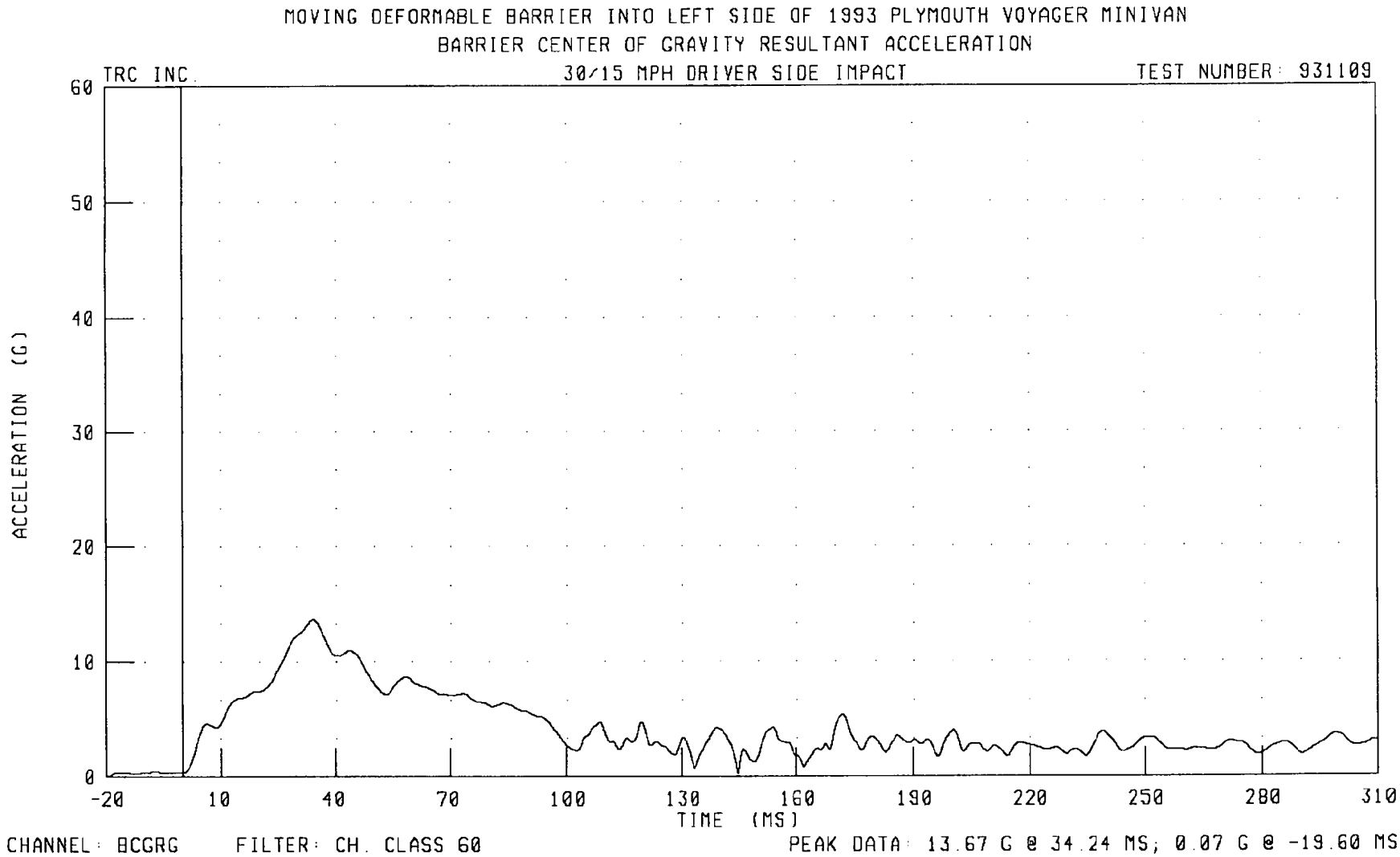


CHANNEL: BCGYG FILTER: CH. CLASS 60 PEAK DATA: 3.60 G @ 119.68 MS, -7.73 G @ 33.36 MS

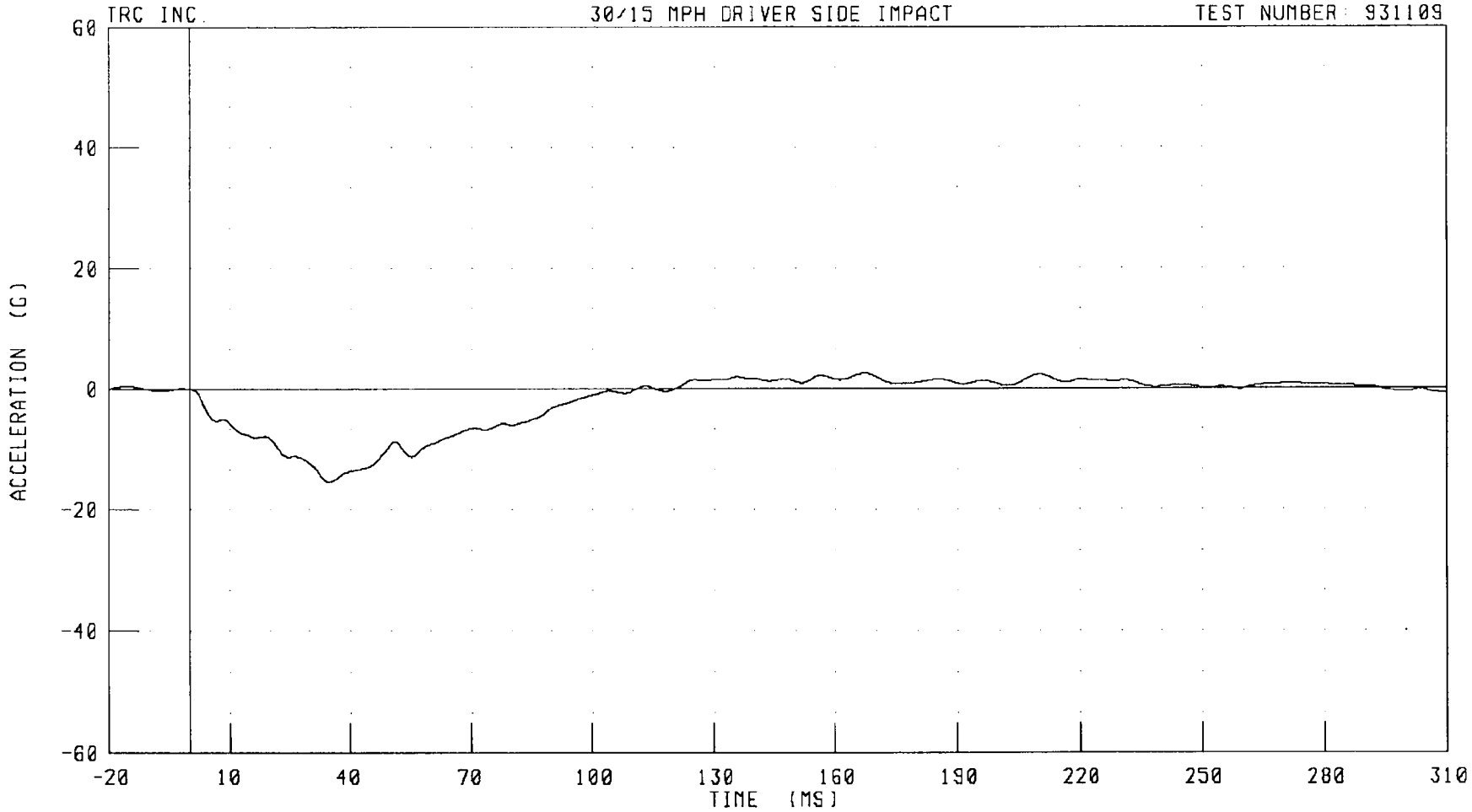
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION



CHANNEL: BCGZG FILTER: CH. CLASS 60 PEAK DATA: 3.97 G @ 29.68 MS; -4.56 G @ 171.84 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931109
ACCELERATION (G)
60
50
40
30
20
10
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCGRG
FILTER: CH. CLASS 60
PEAK DATA: 13.67 G @ 34.24 MS; 0.07 G @ -19.60 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN
BARRIER LEFT FRAME RAIL X-AXIS ACCELERATION

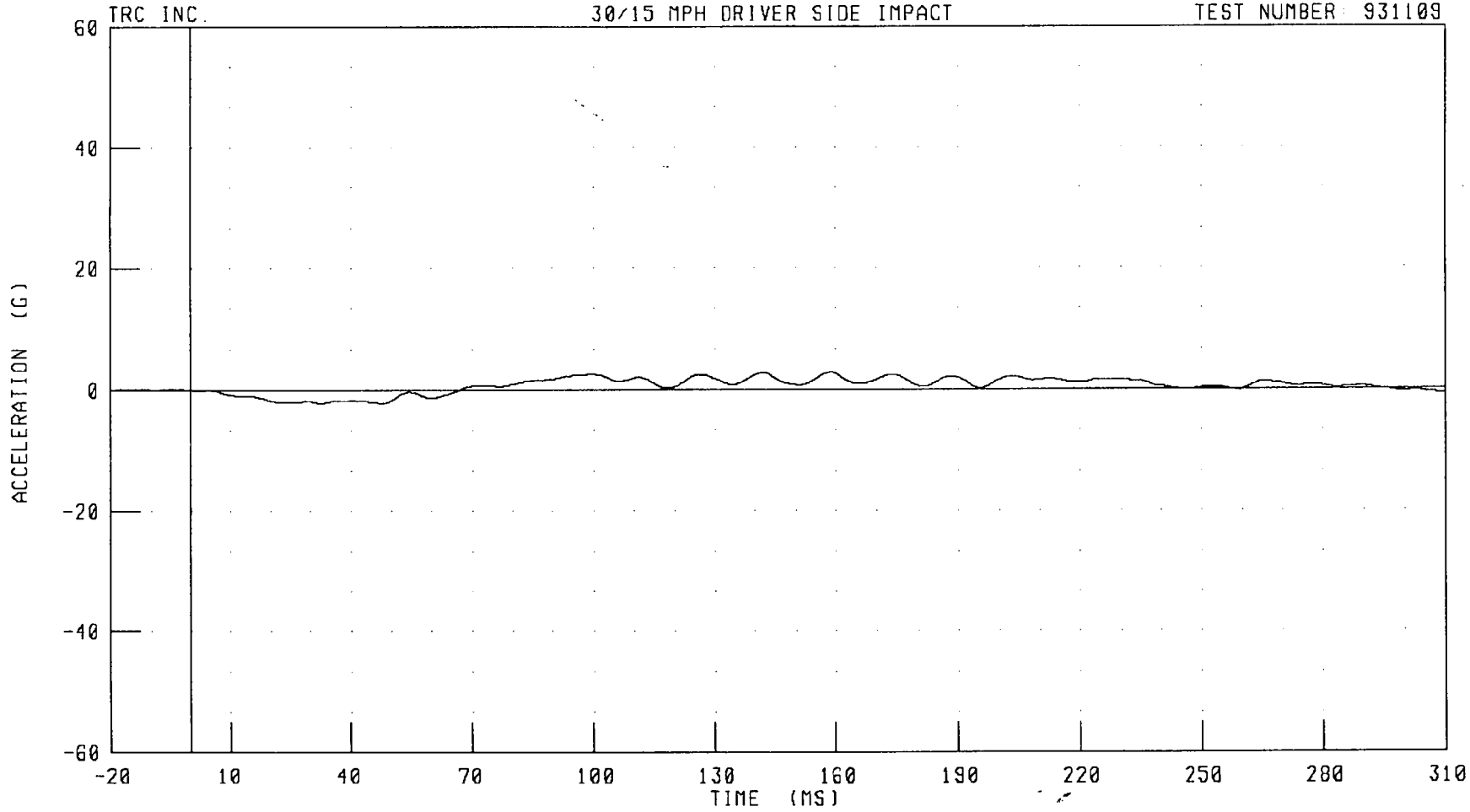


CHANNEL: BSRXG FILTER: CH. CLASS 60 PEAK DATA: 2.55 G @ 167.20 MS; -15.40 G @ 35.04 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 PLYMOUTH VOYAGER MINIVAN

BARRIER LEFT FRAME RAIL Y-AXIS ACCELERATION

TRC INC. 30/15 MPH DRIVER SIDE IMPACT TEST NUMBER: 931109



CHANNEL: BSRYG FILTER: CH. CLASS 60 PEAK DATA: 2.85 G @ 158.88 MS; -2.18 G @ 32.48 MS

APPENDIX C

DUMMY CALIBRATION INFORMATION

PRE-TEST CALIBRATION

DRIVER DUMMY S/N 906

TRANSPORTATION RESEARCH CENTER INC.
SIDE IMPACT DUMMY
EXTERNAL DIMENSIONS
LEFT SIDE CONFIGURATION
SN 906 FIRST TECH

10-NOV-93

TRC TEST NO: ED90604 572F SN906 EXT.DIMENSION CAL04

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		21.7 DEG. C
	RELATIVE HUMIDITY		44.0 %
SH	SEATED HEIGHT	889 - 909 MM	894.1 MM
HP	HIP PIVOT HEIGHT	99 MM REF.	94.0 MM
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	525.8 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	490.2 MM
HW	HIP WIDTH	356 - 391 MM	370.8 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	236.2 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	168.9 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	168.9 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	$\leq$ 2.5 MM	0.0 MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Peter Foust

RUN NUMBER: 111093.0815

TRANSPORTATION RESEARCH CENTER INC.

THORACIC SHOCK ABSORBER TESTS

SIDE IMPACT DUMMY 08-NOV-93

TRC INC. 572F SN906 DAMPER TEST CAL04

TEST NUMBERS: DP90604A,DP90604B,DP90604C

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
VELOCITY	FORCE	856 - 1146 N	998 N
3.07 M/S	DISPLACEMENT	31.2 - 35.2 MM	32.7 MM
VELOCITY	FORCE	1733 - 2100 N	2046 N
4.28 M/S	DISPLACEMENT	32.7 - 37.2 MM	35.4 MM
VELOCITY	FORCE	3784 - 4495 N	4477 N
6.13 M/S	DISPLACEMENT	34.5 - 39.6 MM	37.5 MM

DAMPER SETTING = 7.8

DAMPER SN 00X

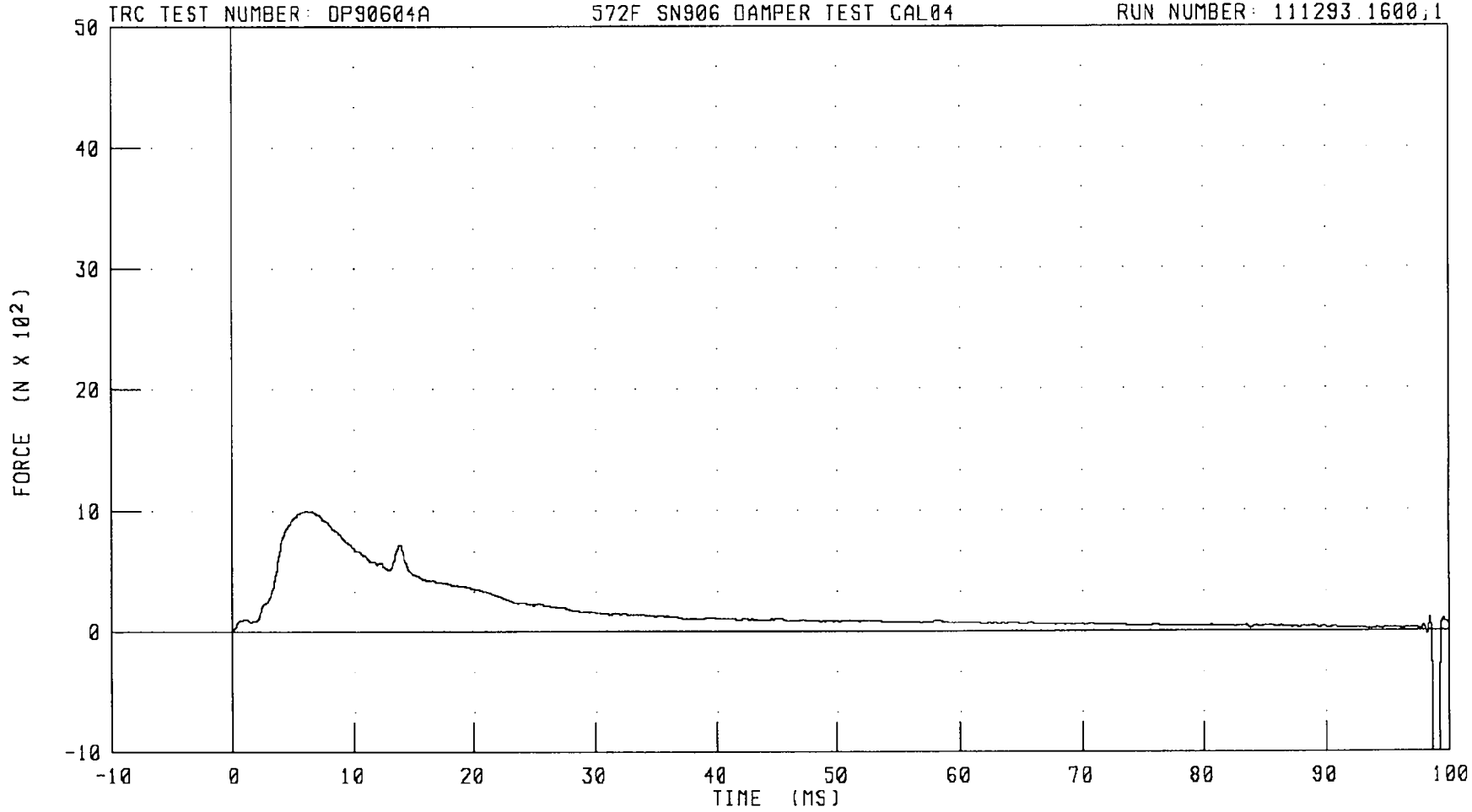
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foust RUN NUMBER: 111293.1557;1

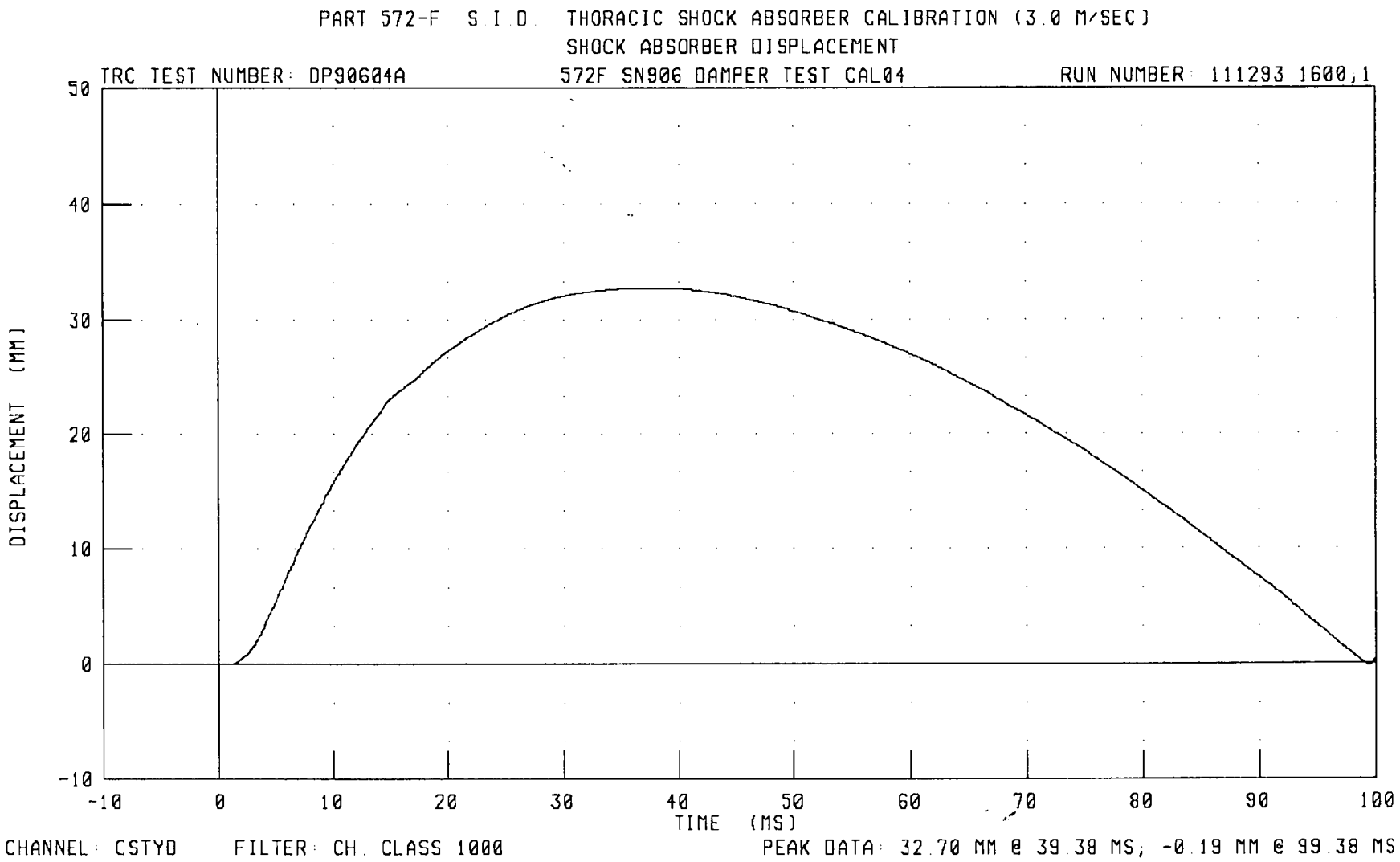
PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (3.0 M/SEC)

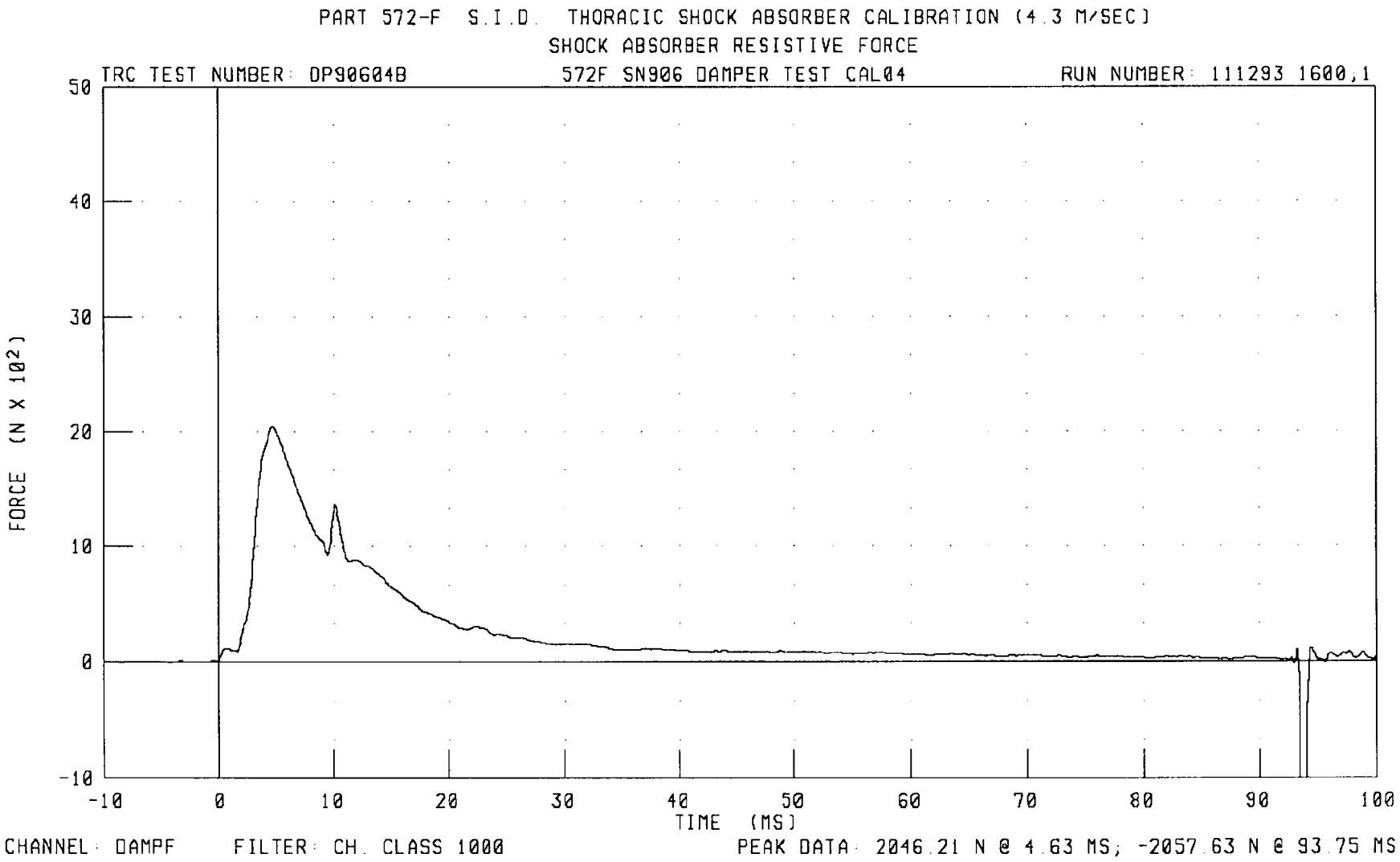
SHOCK ABSORBER RESISTIVE FORCE

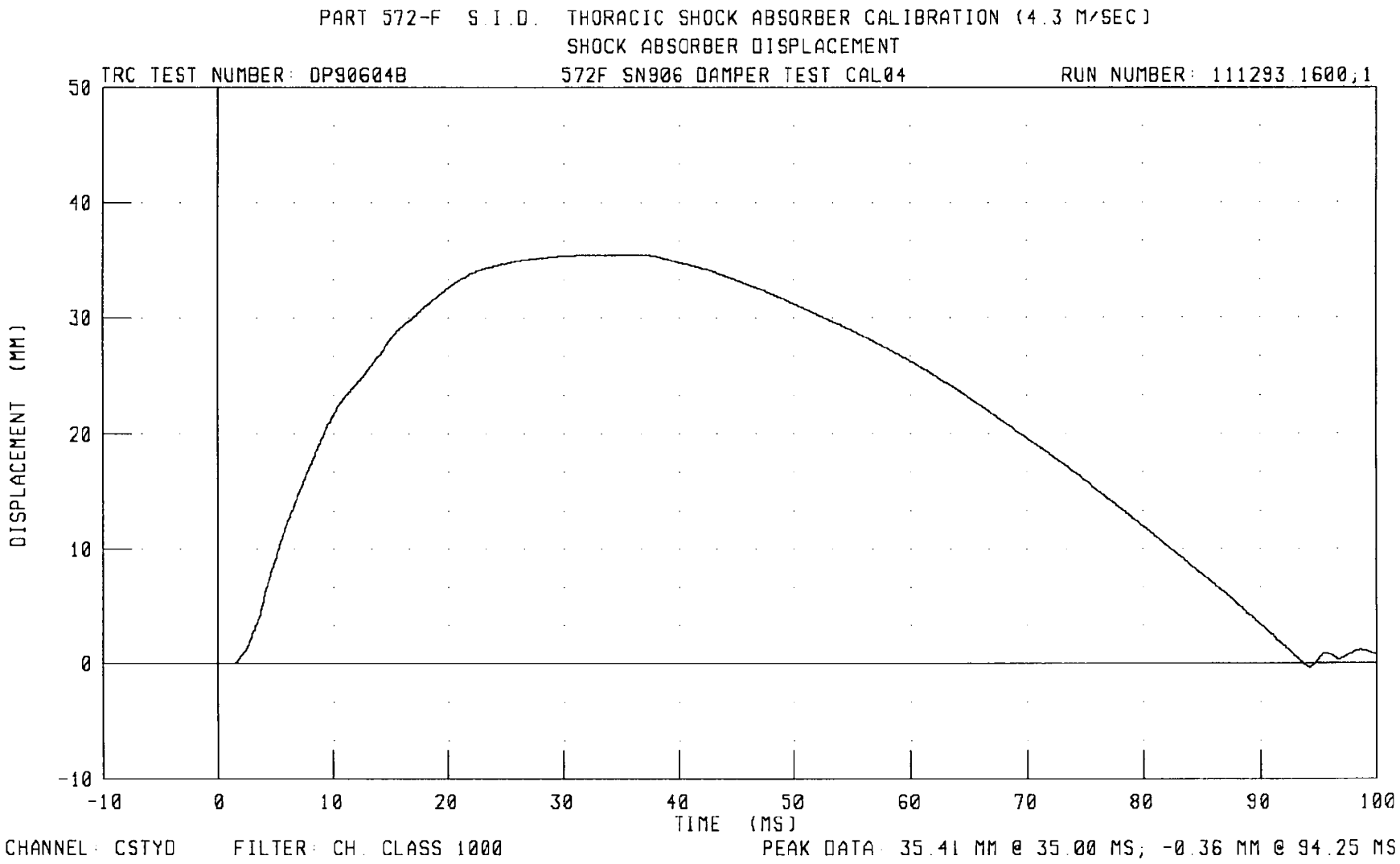
TRC TEST NUMBER: DP90604A 572F SN906 DAMPER TEST CAL04 RUN NUMBER: 111293.1600,1

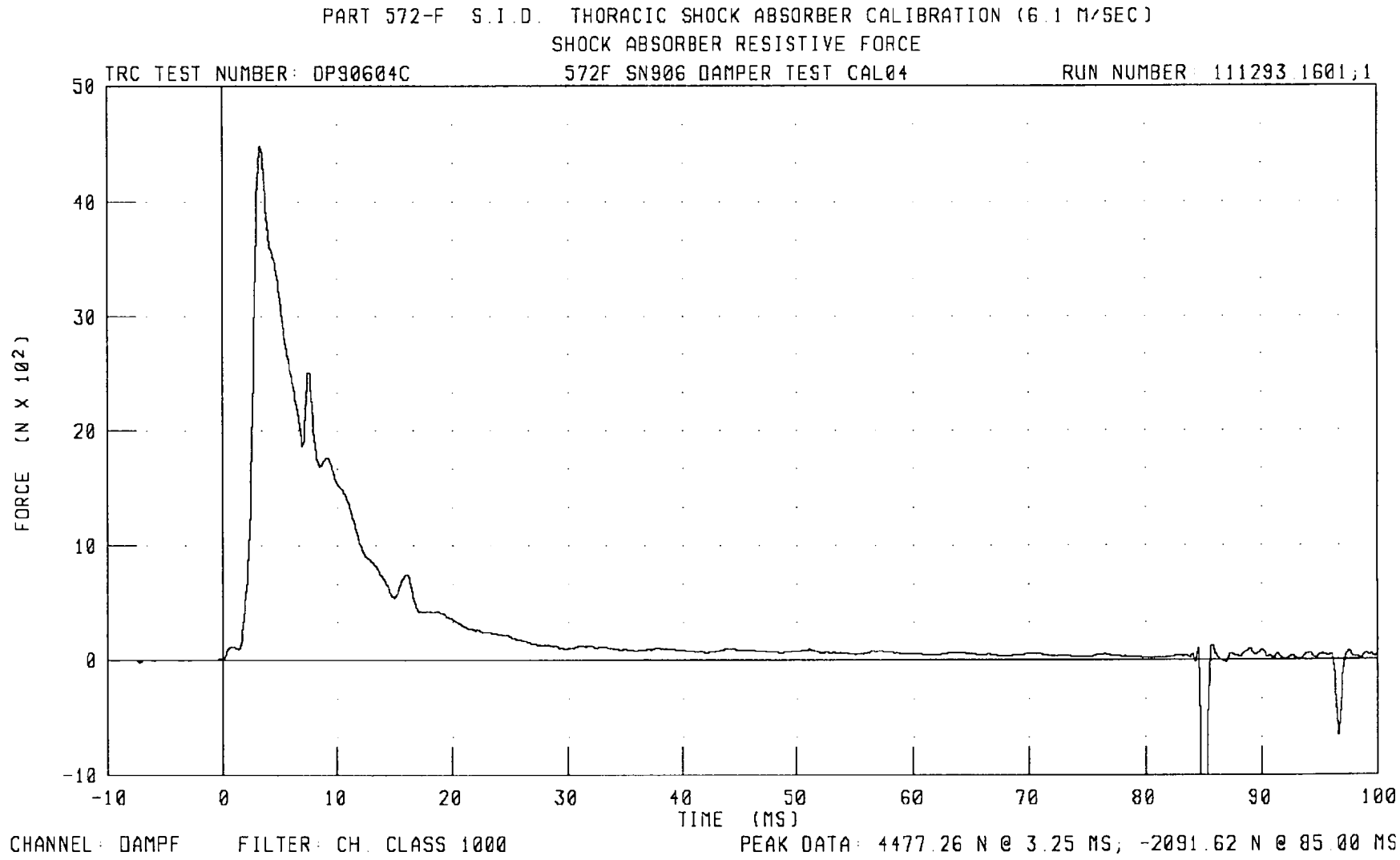


CHANNEL: DAMPF FILTER: CH. CLASS 1000 PEAK DATA: 998.42 N @ 6.13 MS; -2255.69 N @ 98.88 MS


PART 572-F S I D THORACIC SHOCK ABSORBER CALIBRATION (3.0 M/SEC)
SHOCK ABSORBER DISPLACEMENT
TRC TEST NUMBER: DP90604A
572F SN906 DAMPER TEST CAL04
RUN NUMBER: 111293.1600,1
DISPLACEMENT (MM)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: CSTYD
FILTER: CH. CLASS 1000
PEAK DATA: 32.70 MM @ 39.38 MS; -0.19 MM @ 99.38 MS

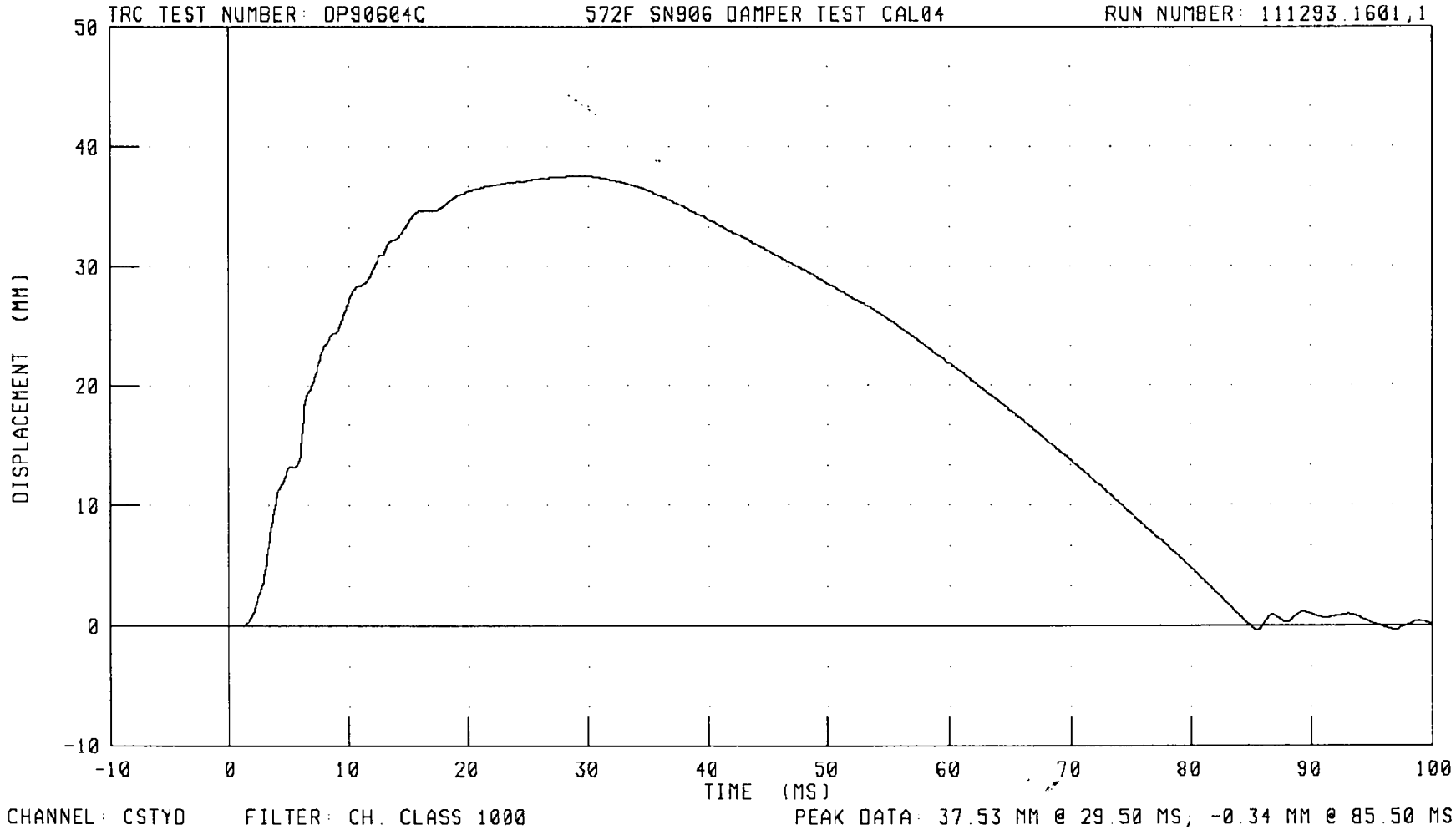

PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (4.3 M/SEC)
SHOCK ABSORBER RESISTIVE FORCE
TRC TEST NUMBER: DP90604B
572F SN906 DAMPER TEST CAL04
RUN NUMBER: 111293 1600,1
FORCE (N X 10²)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: DAMPF
FILTER: CH. CLASS 1000
PEAK DATA: 2046.21 N @ 4.63 MS; -2057.63 N @ 93.75 MS


PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (4.3 M/SEC)
SHOCK ABSORBER DISPLACEMENT
TRC TEST NUMBER: DP90604B
572F SN906 DAMPER TEST CAL04
RUN NUMBER: 111293 1600;1
DISPLACEMENT (MM)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: CSTYD
FILTER: CH. CLASS 1000
PEAK DATA: 35.41 MM @ 35.00 MS; -0.36 MM @ 94.25 MS


PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (6.1 M/SEC)
SHOCK ABSORBER RESISTIVE FORCE
TRC TEST NUMBER: DP90604C
572F SN906 DAMPER TEST CAL04
RUN NUMBER: 111293.1601;1
FORCE (N X 10²)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: DAMPF
FILTER: CH. CLASS 1000
PEAK DATA: 4477.26 N @ 3.25 MS; -2091.62 N @ 85.00 MS

PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (6.1 M/SEC)

SHOCK ABSORBER DISPLACEMENT



CHANNEL: CSTYD FILTER: CH. CLASS 1000 PEAK DATA: 37.53 MM @ 29.50 MS, -0.34 MM @ 85.50 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY 09-NOV-93

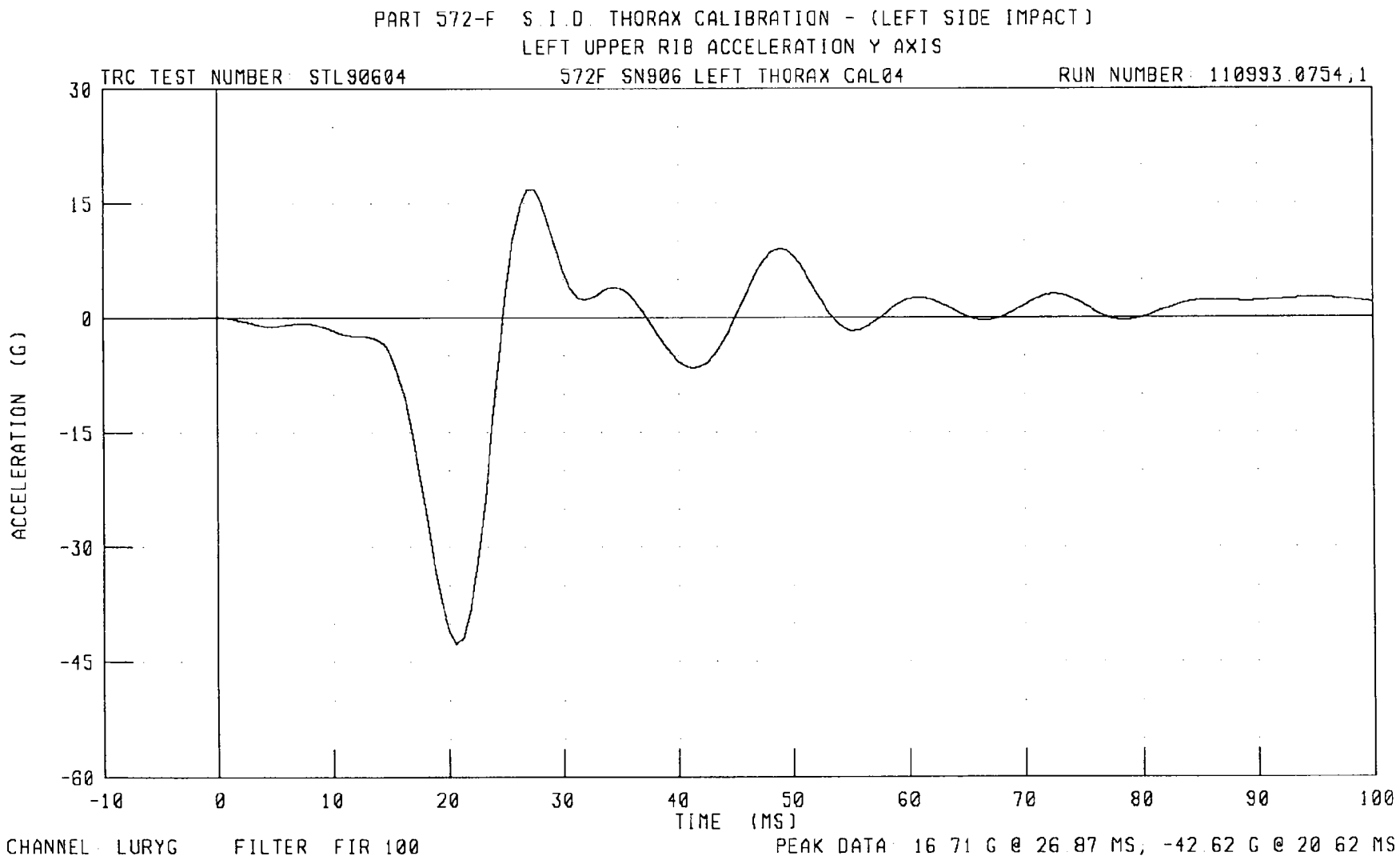
LEFT SIDE CONFIGURATION

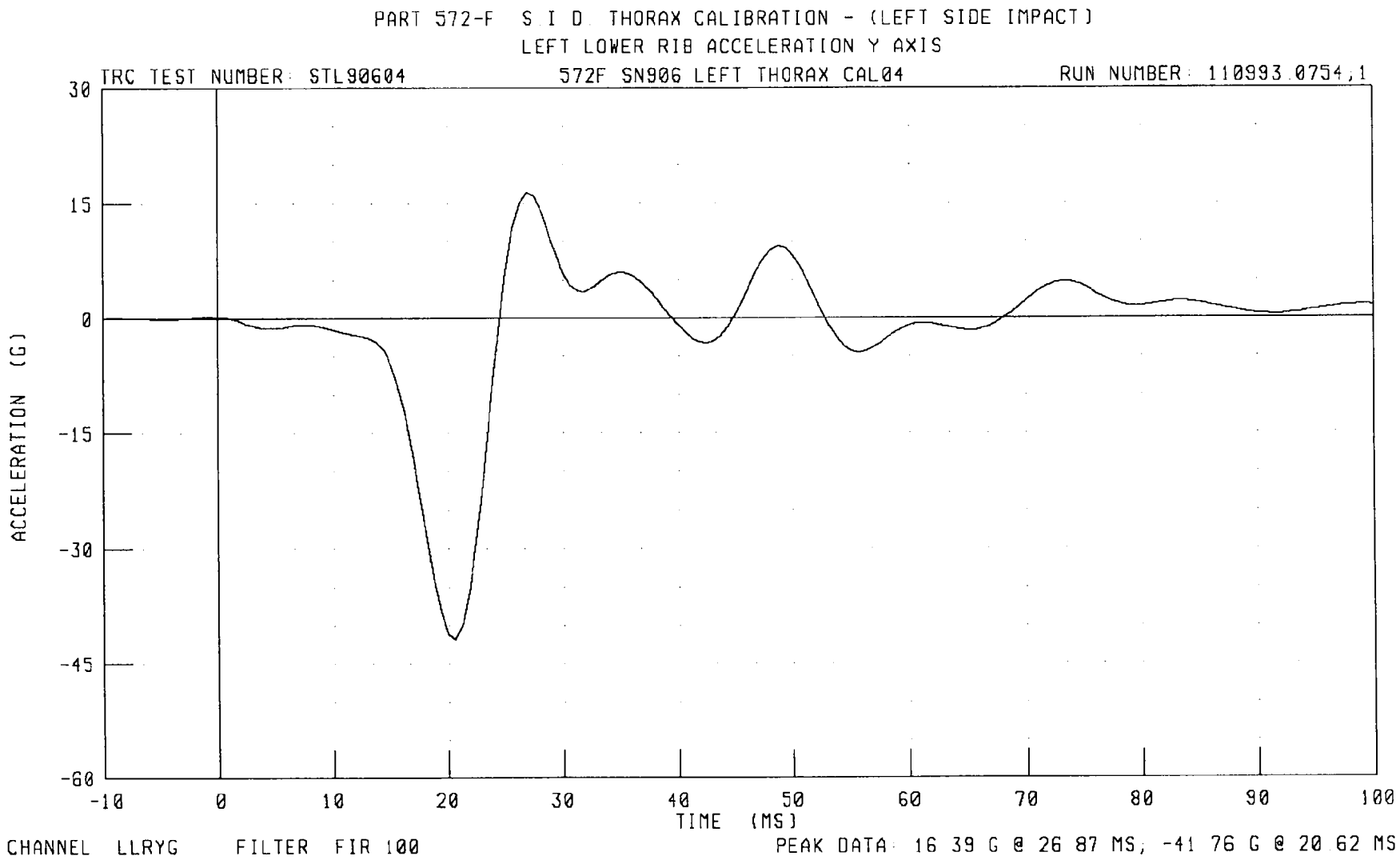
TRC INC. TEST NO: STL90604 572F SN906 LEFT THORAX CAL04

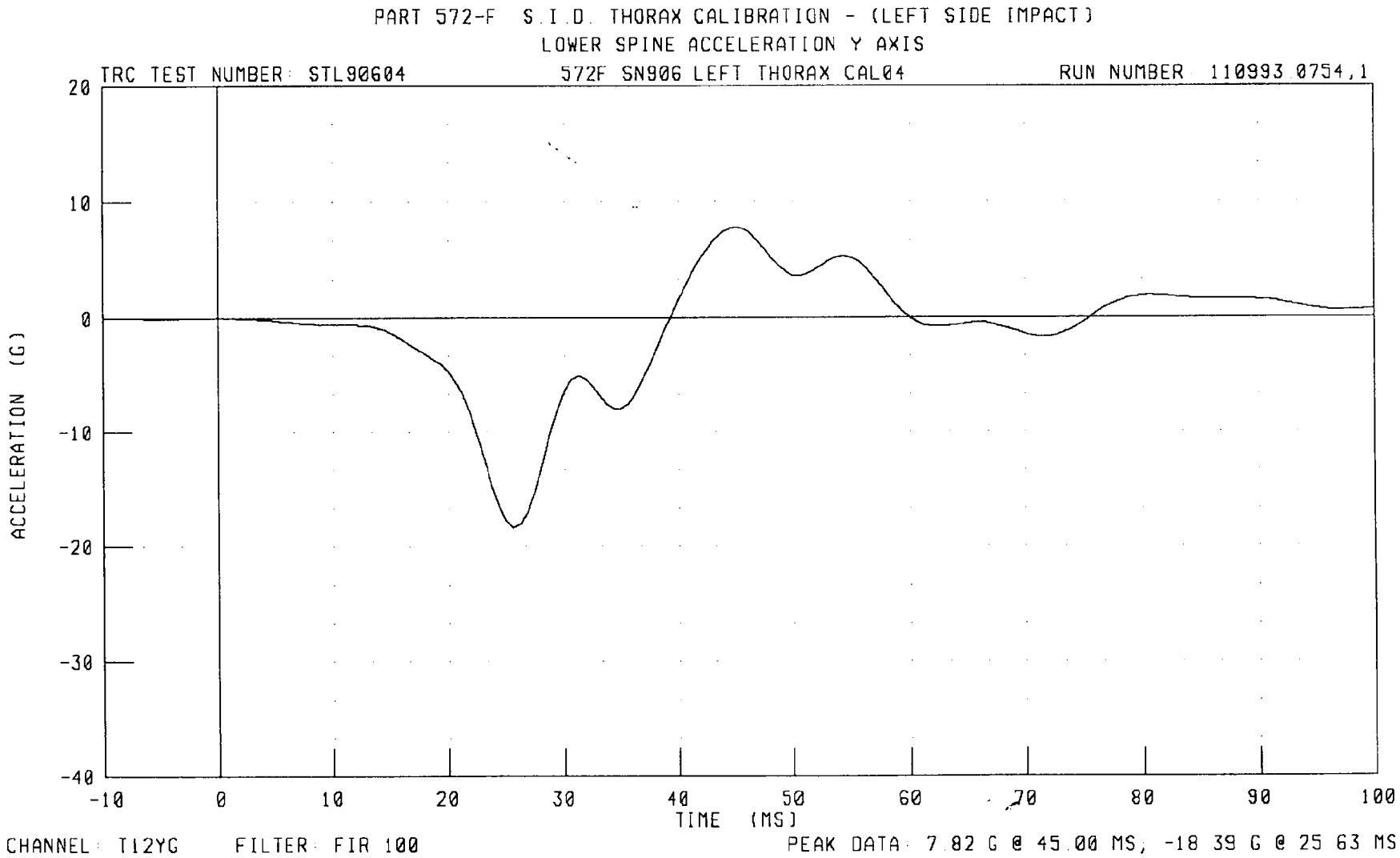
TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PISTON VELOCITY	4.21 - 4.32 M/S	4.23 M/S
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-42.6 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-41.8 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-18.4 G

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Faut RUN NUMBER: 111593.0928;1


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT UPPER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: STL90604
572F SN906 LEFT THORAX CAL04
RUN NUMBER: 110993.0754,1
ACCELERATION (G)
30
15
0
-15
-30
-45
-60
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: LURYG
FILTER: FIR 100
PEAK DATA: 16.71 G @ 26.87 MS, -42.62 G @ 20.62 MS


PART 572-F S I D THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: STL90604
572F SN906 LEFT THORAX CAL04
RUN NUMBER: 110993.0754,1
ACCELERATION (G)
30
15
0
-15
-30
-45
-60
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL LLRYG
FILTER FIR 100
PEAK DATA: 16.39 G @ 26.87 MS; -41.76 G @ 20.62 MS


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LOWER SPINE ACCELERATION Y AXIS
TRC TEST NUMBER: STL90604
572F SN906 LEFT THORAX CAL04
RUN NUMBER 110993 0754,1
ACCELERATION (G)
20
10
0
-10
-20
-30
-40
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: T12YG
FILTER: FIR 100
PEAK DATA: 7.82 G @ 45.00 MS, -18.39 G @ 25.63 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY 15-OCT-93

LEFT SIDE CONFIGURATION

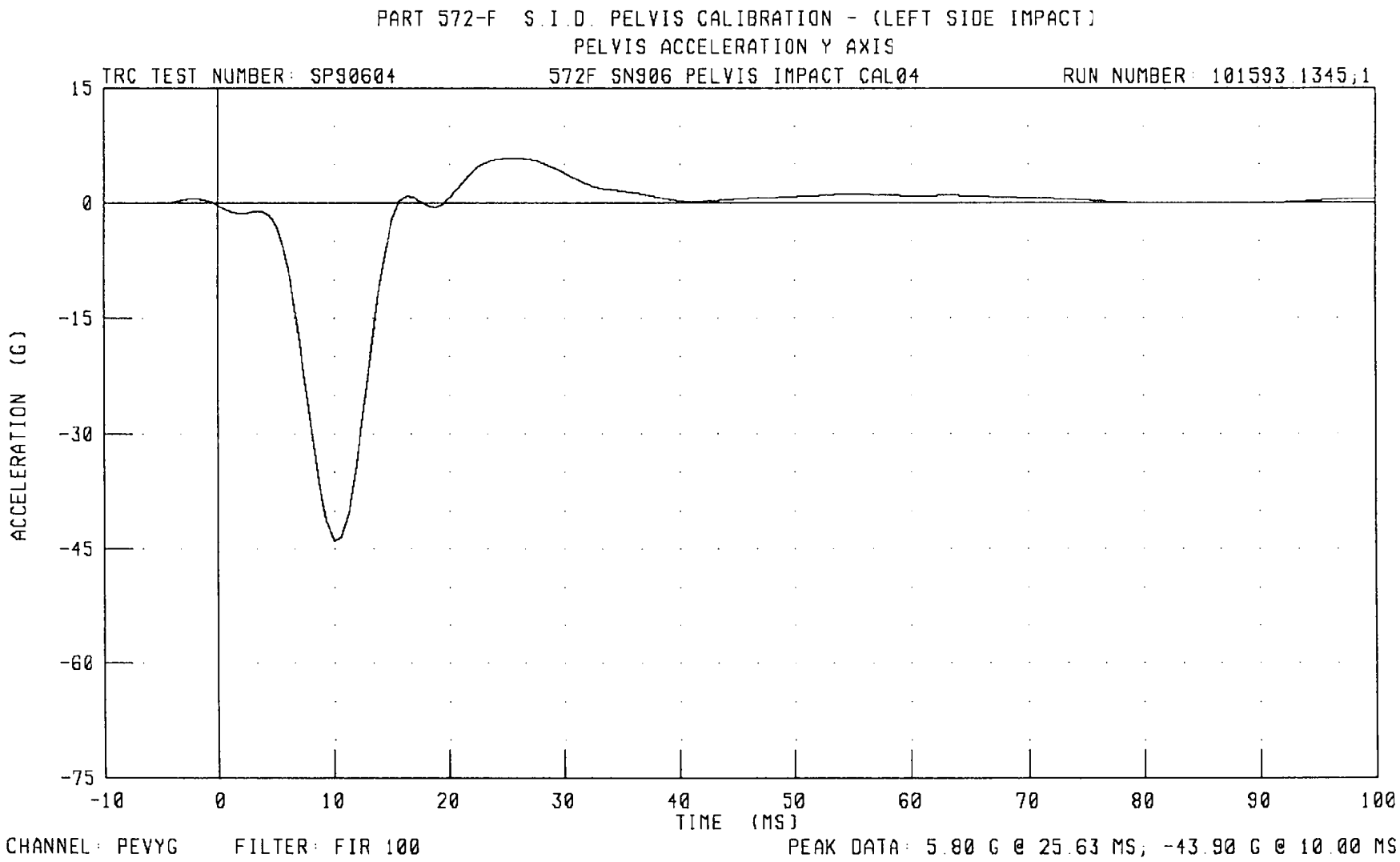
TRC INC. TEST NO: SP90604 572F SN906 PELVIS IMPACT CAL04

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	45.0 %
PISTON VELOCITY	4.21 - 4.32 M/S	4.29 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-43.9 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.8 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foust

RUN NUMBER: 111593.1013;1


PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)
PELVIS ACCELERATION Y AXIS
TRC TEST NUMBER: SP90604
572F SN906 PELVIS IMPACT CAL04
RUN NUMBER: 101593.1345;1
15
0
-15
-30
-45
-60
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PEVYG
FILTER: FIR 100
PEAK DATA: 5.80 G @ 25.63 MS; -43.90 G @ 10.00 MS

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: NHTSA/906

SEATING POSITION: DRIVER

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
HEDXG1	HEAD	X	ENDEVCO	7264	BH72J	REAR
HEDYG1	HEAD	Y	ENDEVCO	7264	AAMB4	LEFT
HEDZG1	HEAD	Z	ENDEVCO	7264	EH65J	UP
T01XG1	UPPER SPINE	X	ENDEVCO	7264	BE39J	REAR
T01YG1	UPPER SPINE	Y	ENDEVCO	7264	BE68J	LEFT
T01YGA	UPPER SPINE REDUNDANT	Y	ENDEVCO	7264	EJ94J	LEFT
T01ZG1	UPPER SPINE	Z	ENDEVCO	7264	BE56J	UP
T12XG1	LOWER SPINE	X	ENDEVCO	7264	BD91J	FORWARD
T12YG1	LOWER SPINE	Y	ENDEVCO	7264	ET59J	LEFT
T12YGA	LOWER SPINE REDUNDANT	Y	ENDEVCO	7264	CB70H	LEFT
T12ZG1	LOWER SPINE	Z	ENDEVCO	7264	DC20J	UP
LURYG1	LEFT UPPER RIB	Y	ENDEVCO	7264	CR39H	RIGHT
LURYGA	LEFT UPPER RIB REDUNDANT	Y	ENDEVCO	7264	DD92J	RIGHT
LLRYG1	LEFT LOWER RIB	Y	ENDEVCO	7264	BT29J	RIGHT
LLRYGA	LEFT LOWER RIB REDUNDANT	Y	ENDEVCO	7264	FG97J	RIGHT
PEVXG1	PELVIS	X	ENDEVCO	7264	BH95J	REAR
PEVYG1	PELVIS	Y	ENDEVCO	7264	DM66J	LEFT
PEVZG1	PELVIS	Z	ENDEVCO	7264	EH85J	UP

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: NHTSA/903

SEATING POSITION: LEFT REAR PASSENGER

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
HEDXG1	HEAD	X	ENDEVCO	7264	DC72J	REAR
HEDYG1	HEAD	Y	ENDEVCO	7264	BF42J	LEFT
HEDZG1	HEAD	Z	ENDEVCO	7264	EH75J	UP
T01XG1	UPPER SPINE	X	ENDEVCO	7264	DE99J	REAR
T01YG1	UPPER SPINE	Y	ENDEVCO	7264	FG43J	LEFT
T01YGA	UPPER SPINE REDUNDANT	Y	ENDEVCO	7264	EJ62J	LEFT
T01ZG1	UPPER SPINE	Z	ENDEVCO	7264	BE02J	UP
T12XG1	LOWER SPINE	X	ENDEVCO	7264	BF65J	FORWARD
T12YG1	LOWER SPINE	Y	ENDEVCO	7264	EJ59J	LEFT
T12YGA	LOWER SPINE REDUNDANT	Y	ENDEVCO	7264	BE24J	LEFT
T12ZG1	LOWER SPINE	Z	ENDEVCO	7264	BH31J	UP
LURYG1	LEFT UPPER RIB	Y	ENDEVCO	7264	EY99J	RIGHT
LURYGA	LEFT UPPER RIB REDUNDANT	Y	ENDEVCO	7264	DC54J	RIGHT
LLRYG1	LEFT LOWER RIB	Y	ENDEVCO	7264	FJ66J	RIGHT
LLRYGA	LEFT LOWER RIB REDUNDANT	Y	ENDEVCO	7264	FC60J	RIGHT
PEVXG1	PELVIS	X	ENDEVCO	7264	FB67J	REAR
PEVYG1	PELVIS	Y	ENDEVCO	7264	DF92J	LEFT
PEVZG1	PELVIS	Z	ENDEVCO	7264	BE50J	UP

VEHICLE INSTRUMENTATION PLACEMENT

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
RFSXG1	RIGHT FRONT SILL	X	ENDEVCO	2264	AG24	FRONT
RFSYG1	RIGHT FRONT SILL	Y	ENDEVCO	2264	AT38	LEFT
RFSZG1	RIGHT FRONT SILL	Z	ENDEVCO	2264	AU31	UP
LFSYG1	LEFT FRONT SILL	Y	ENDEVCO	7264	BP85J	RIGHT
LFDYG1	LEFT FRONT DOOR CENTERLINE	Y	ENDEVCO	7264	BD41J	LEFT
LFDYG3	LEFT FRONT DOOR MID-REAR	Y	ENDEVCO	7264	BJ86J	LEFT
LFDYG2	LEFT FRONT DOOR UPPER CENTERLINE	Y	ENDEVCO	7264	BD48J	LEFT
RDKXG1	REAR FLOORPAN OVER AXLE	X	ENDEVCO	2264	AS95	REAR
RDKYG1	REAR FLOORPAN OVER AXLE	Y	ENDEVCO	2264	AU09	LEFT
RDKZG1	REAR FLOORPAN OVER AXLE	Z	ENDEVCO	2264	BA46	UP

MOVING DEFORMABLE BARRIER INSTRUMENTATION PLACEMENT

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
BCGXG	CENTER OF GRAVITY	X	ENDEVCO	2264	AK21	REAR
BCGYG	CENTER OF GRAVITY	Y	ENDEVCO	2264	AY66	RIGHT
BCGZG	CENTER OF GRAVITY	Z	ENDEVCO	2264	AZ67	UP
BSRXG	LEFT FRAME RAIL OVER REAR AXLE	X	ENDEVCO	2264	AY89	REAR
BSRYG	LEFT FRAME RAIL	Y	ENDEVCO	7264	AL42	RIGHT

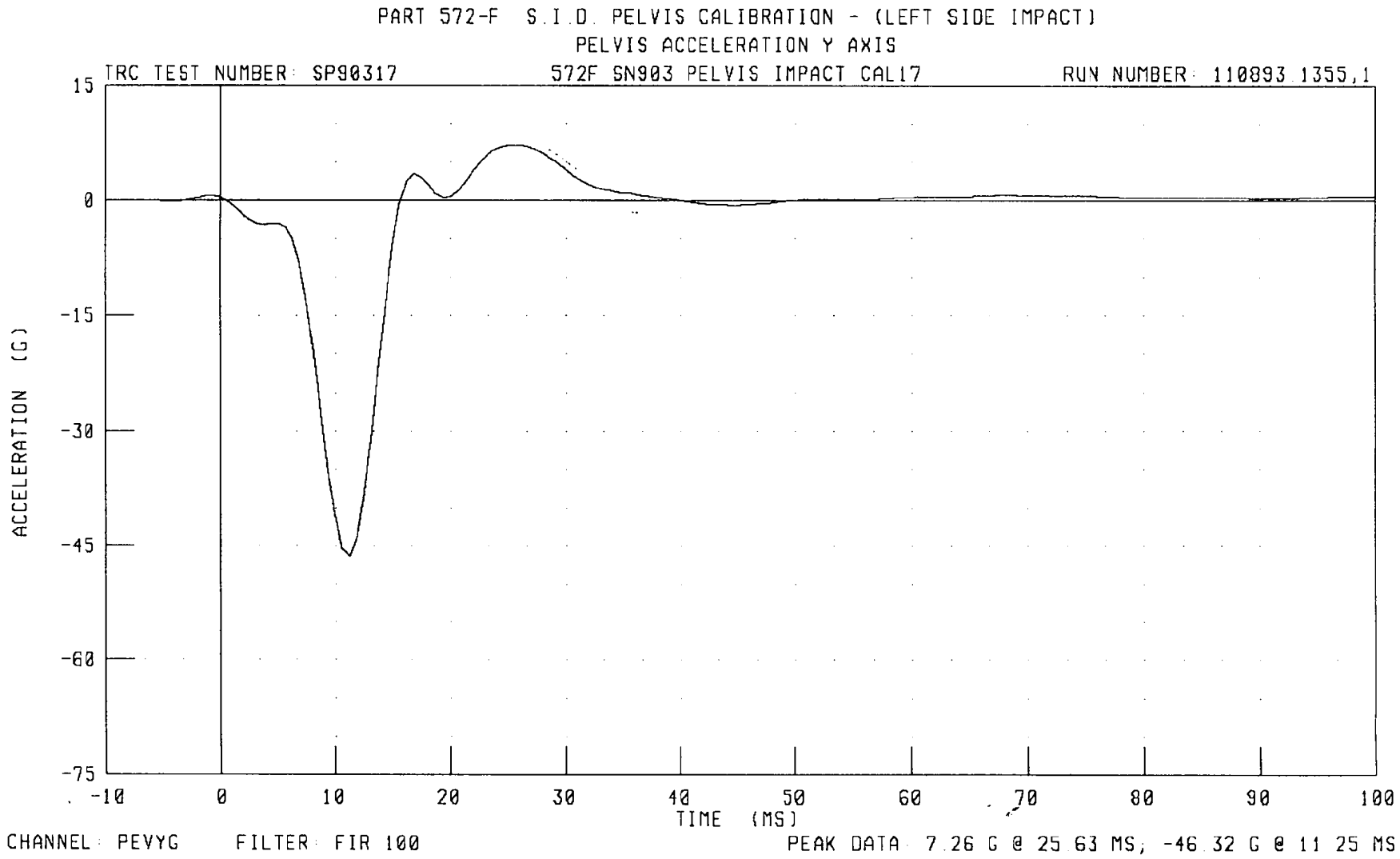
FREQUENCY RESPONSE CLASSES
NHTSA LABORATORY PROCEDURE TP-214D-01

TYPICAL TEST MEASUREMENTS	CHANNEL CLASS
Vehicle structural acceleration for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Anthropomorphic test device	
Head accelerations (linear and angular)	1000
Thorax	
Spine acceleration	180*
Rib accelerations	180*
Deflections	180
Pelvis	
Accelerations	180*

*The Channel Class 180 data is further processed by subsampling to a 1600 Hz sample rate, removing bias, and filtering with the Finite Impulse Response (FIR100) filter program.

PRE-TEST CALIBRATION

PASSENGER DUMMY S/N 903


PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)
PELVIS ACCELERATION Y AXIS
TRC TEST NUMBER: SP90317
572F SN903 PELVIS IMPACT CAL17
RUN NUMBER: 110893.1355,1
15
0
-15
-30
-45
-60
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PEVYG
FILTER: FIR 100
PEAK DATA: 7.26 G @ 25.63 MS; -46.32 G @ 11.25 MS

APPENDIX D

MISCELLANEOUS TEST INFORMATION

TRANSPORTATION RESEARCH CENTER INC.
SIDE IMPACT DUMMY
EXTERNAL DIMENSIONS
LEFT SIDE CONFIGURATION
SN 903 FIRST TECH

08-NOV-93

TRC TEST NO: ED90317 572F SN903 EXT.DIMENSION CAL17

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		21.1 DEG. C
	RELATIVE HUMIDITY		55.0 %
SH	SEATED HEIGHT	889 - 909 MM	894.1 MM
HP	HIP PIVOT HEIGHT	99 MM REF.	99.1 MM
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	523.2 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	490.2 MM
HW	HIP WIDTH	356 - 391 MM	378.5 MM

DIMENSIONS WITH CHEST JACKET REMOVED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
RH	RIB HEIGHT	501 - 520 MM	513.1 MM
RD	RIB FROM BACKLINE	229 - 241 MM	236.2 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	167.6 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	167.6 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	$\leq$ 2.5 MM	0.0 MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Pete Foss

RUN NUMBER: 111093.0819

TRANSPORTATION RESEARCH CENTER INC.

LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY 08-NOV-93

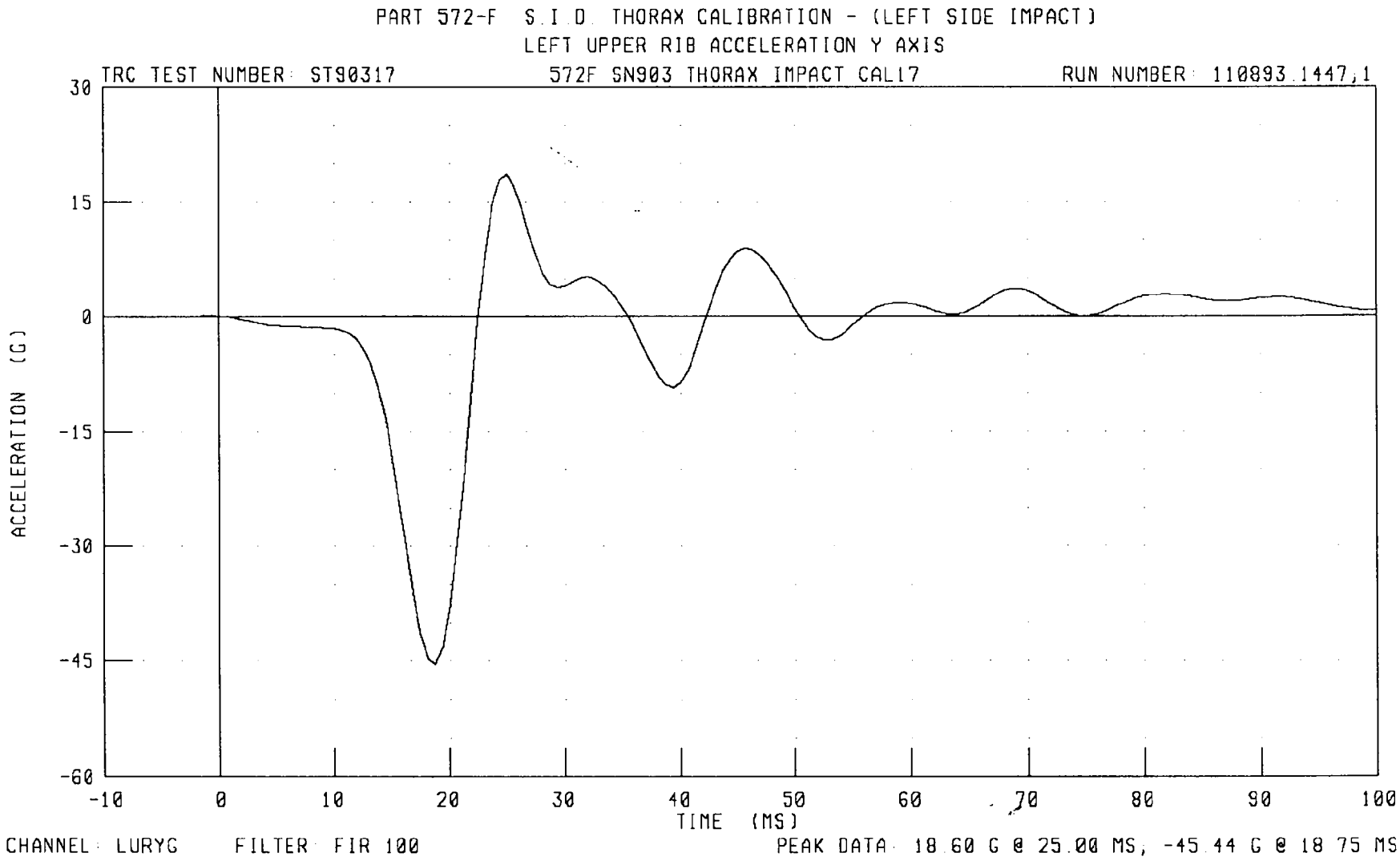
LEFT SIDE CONFIGURATION

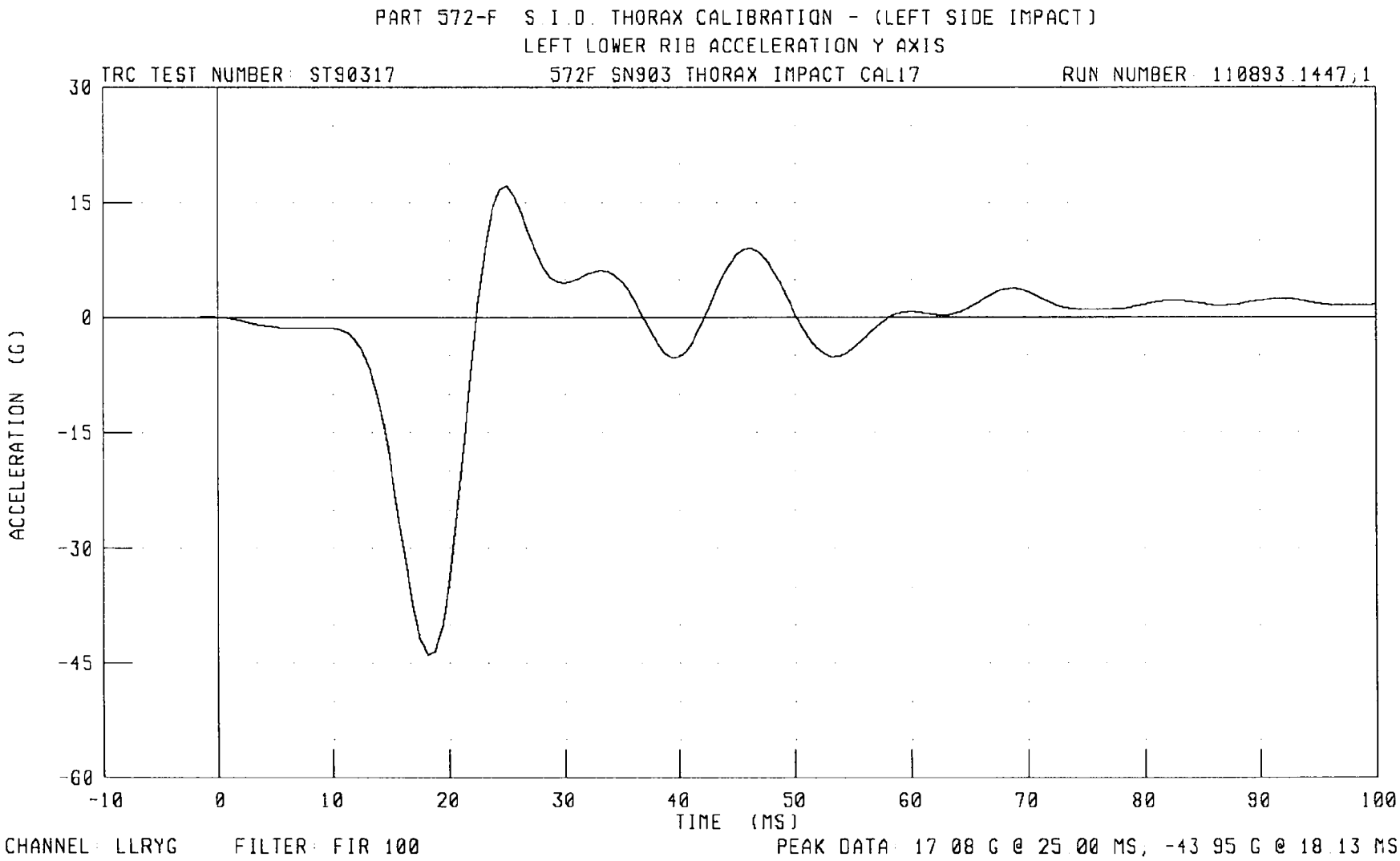
TRC TEST NO: ST90317 572F SN903 THORAX IMPACT CAL17

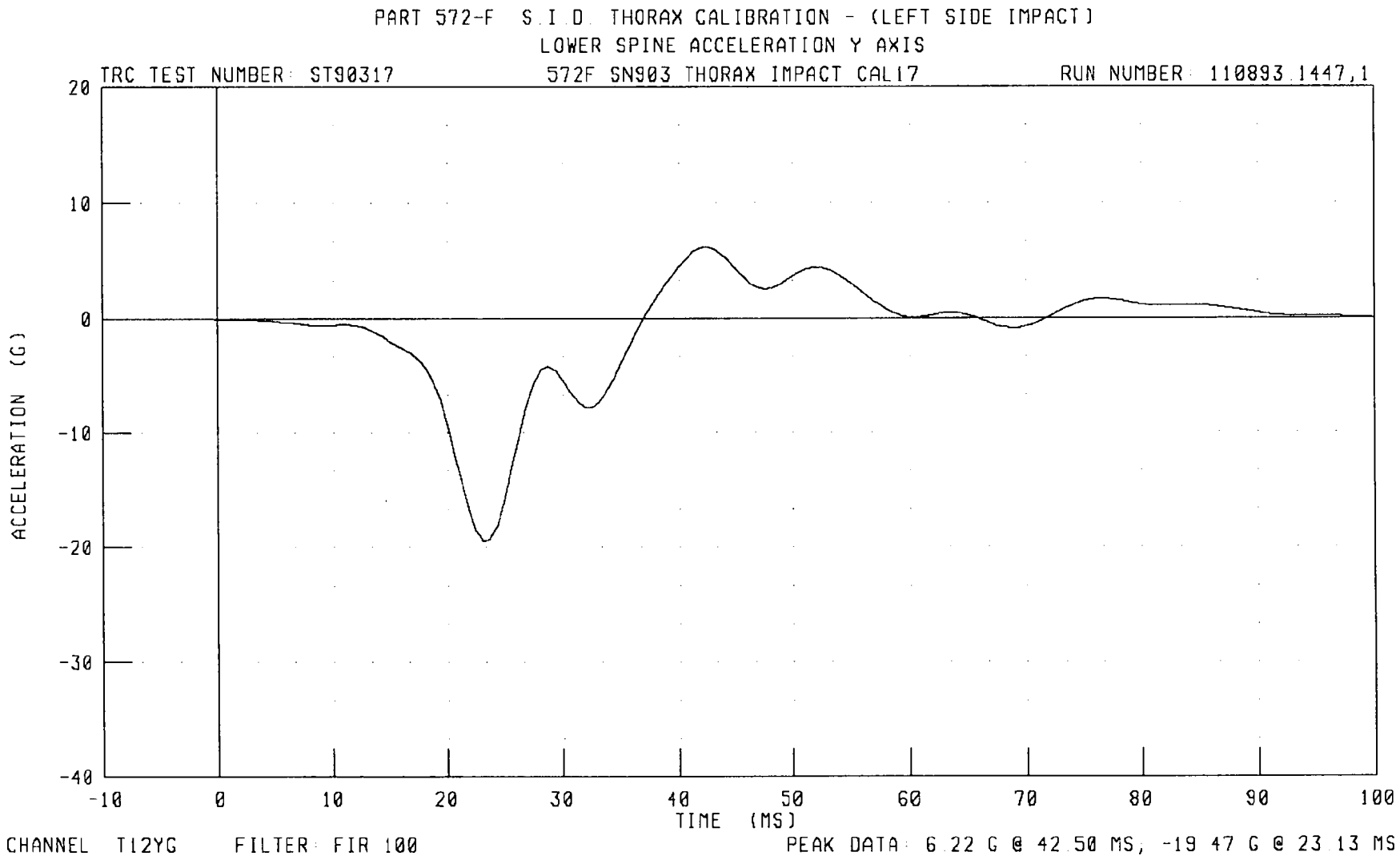
TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PISTON VELOCITY	4.21 - 4.32 M/S	4.27 M/S
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-45.4 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-44.0 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-19.5 G

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Ford RUN NUMBER: 111293.1100;1


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT UPPER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: ST90317
572F SN903 THORAX IMPACT CAL17
RUN NUMBER: 110893.1447;1
ACCELERATION (G)
30
15
0
-15
-30
-45
-60
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: LURYG
FILTER: FIR 100
PEAK DATA: 18.60 G @ 25.00 MS, -45.44 G @ 18.75 MS


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: ST90317
572F SN903 THORAX IMPACT CAL17
RUN NUMBER: 110893.1447,1
ACCELERATION (G)
30
15
0
-15
-30
-45
-60
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: LLRYG
FILTER: FIR 100
PEAK DATA: 17.08 G @ 25.00 MS, -43.95 G @ 18.13 MS


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LOWER SPINE ACCELERATION Y AXIS
TRC TEST NUMBER: ST90317
572F SN903 THORAX IMPACT CAL17
RUN NUMBER: 110893.1447,1
ACCELERATION (G)
20
10
0
-10
-20
-30
-40
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL T12YG
FILTER: FIR 100
PEAK DATA: 6.22 G @ 42.50 MS, -19.47 G @ 23.13 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY 08-NOV-93

LEFT SIDE CONFIGURATION

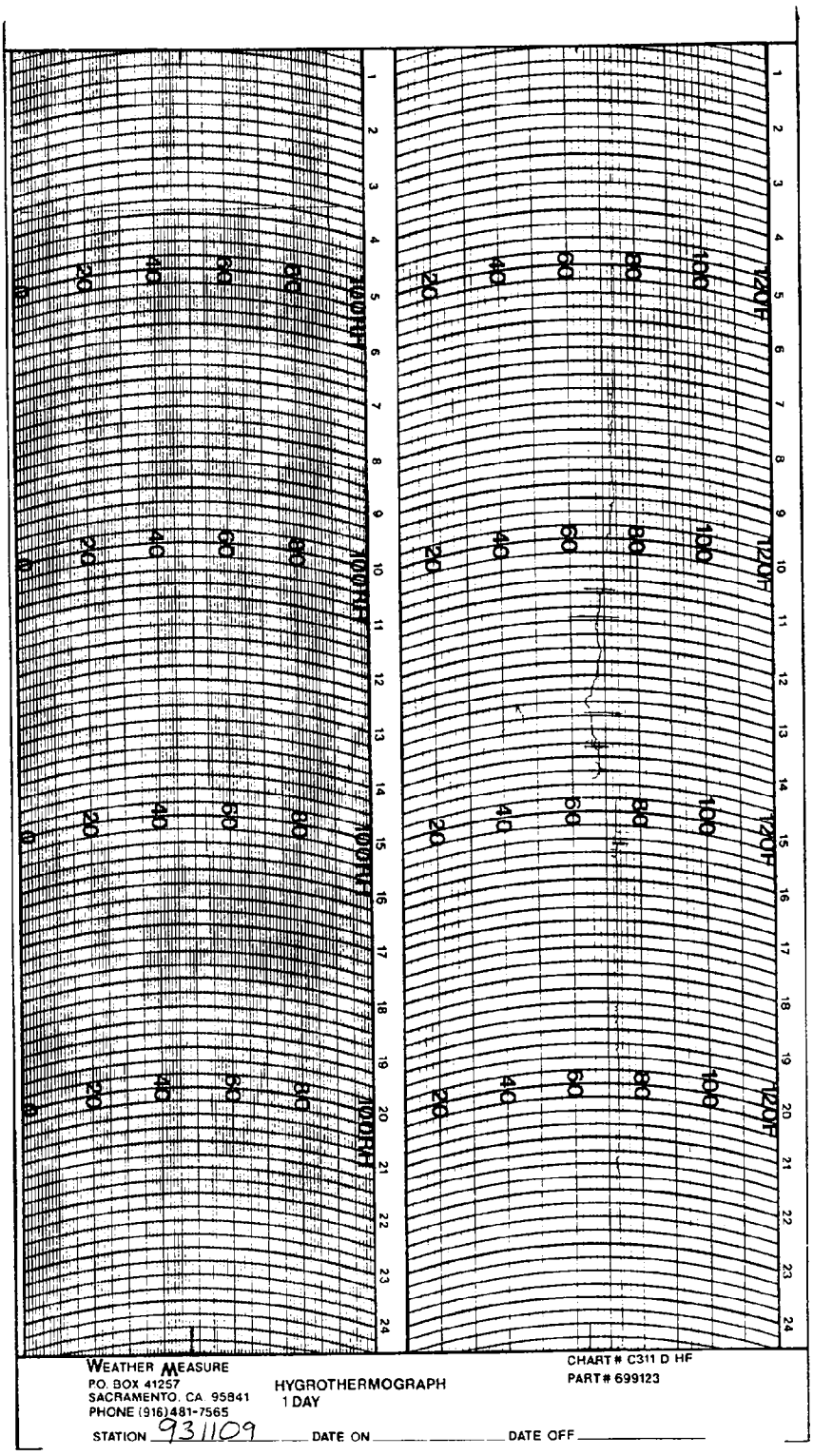
TRC TEST NO: SP90317 572F SN903 PELVIS IMPACT CAL17

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PISTON VELOCITY	4.21 - 4.32 M/S	4.27 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-46.3 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.7 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foust

RUN NUMBER: 111293.1101;1



OCCUPANT COMPARTMENT THERMOGRAPH