V1989

48/24 KPH 90° DRIVER'S SIDE IMPACT
(MOVING DEFORMABLE BARRIER)
1993 TOYOTA 4X2 PICKUP TRUCK

PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
10820 STATE ROUTE 347
EAST LIBERTY, OHIO 43319

FINAL REPORT
OCTOBER - NOVEMBER 1993

PREPARED FOR:
VEHICLE RESEARCH AND TEST CENTER
P.O. BOX 37
EAST LIBERTY, OH 43319

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16. Abstract

This 48/24 kph 90° driver's side impact test was conducted at Transportation Research Center Inc. on October 21, 1993. The test vehicle was a 1993 Toyota 4X2 pickup truck. 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 102 millimeters above its standard height specified in the FMVSS No. 214 Laboratory Test Procedure and its test weight was 1631 kilograms. Energy absorbing padding (762 mm of Arcel 512, 2.5 pcf) was placed on the inner surface of the driver's door panel aligned with the driver dummy's pelvis and thorax. The impact velocity of the moving deformable barrier was 53.8 kph. The moving deformable barrier struck the vehicle 955 millimeters forward of the subject vehicle's wheelbase mid-point.

Results for the driver SID are:

	DRIVER SID
Left upper rib acceleration	72.8 g's
Left lower rib acceleration	64.4 g's
Upper spine acceleration	71.1 g's
Lower spine acceleration	86.9 g's
Thoracic Trauma Index (TTI)	80
Pelvic acceleration	81.5 g's

17. Key Words	18. Distribution Statement
48/24 kph 90° Driver's Side Impact Light Trucks and Vans 1993 Toyota 4X2 Pickup Truck	

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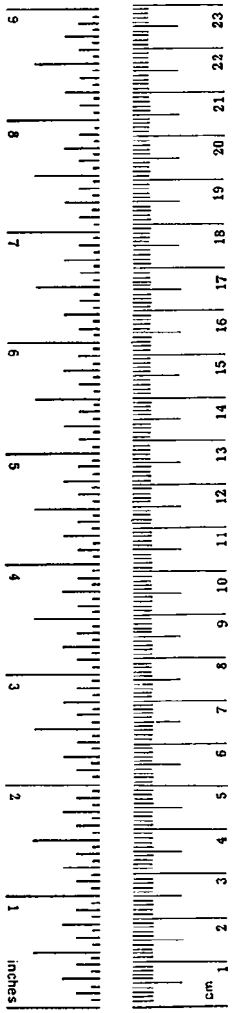
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

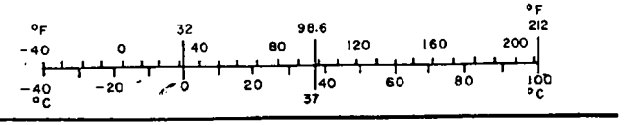
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	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 one (1) Part 572 F side impact adult male anthropomorphic test device (dummy). The dummy was positioned in the left front outboard seating position according to the dummy placement procedure specified as an attachment to the Laboratory Test Procedure. The dummy was 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. The dummy was restrained by a 3-point unibelt. Energy absorbing padding (762 mm of Arcel 512, 2.5 pcf) was placed on the inner surface of the driver's door panel aligned with the driver 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 102 mm above the standard barrier face height specified in the Laboratory Test Procedure. The bottom most edge of the deformable barrier face was 381 mm above the ground level. The moving deformable barrier's weight was 1631 kg and its specified velocity range was 53.1 to 54.7 kph.

The thirty-three (33) data channels were multiplexed and recorded on a 14-track tape deck. The data was digitally sampled at 12,500 samples per second and processed per Section 12.0 of the Laboratory Test Procedure.T h e crash event was recorded by one (1) real-time panning motion picture camera and eight (8) 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 October 21, 1993.

The test vehicle, a 1993 Toyota 4X2 pickup truck, was equipped with a 2.4-liter, inline engine, manual transmission, and power brakes. One Part 572 F dummy was seated in the left front outboard seating position. The vehicle's test weight was 1408 kilograms. The moving deformable barrier's impact speed was 53.8 kph. The vehicle's maximum static crush was ~~463~~ 305 millimeters.

The driver dummy's Thoracic Trauma Index (TTI(d)) and Head Injury Criteria (HIC) were 80 and 449, respectively. Maximum pelvis lateral acceleration was 81.5 g.

The moving barrier's leading edge of contact was 955 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 door on the opposite side did not open during the crash event. After impact the test vehicle rolled onto its right side and came to rest.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Moving Deformable Barrier Left Side Impact

TEST DATE: 10/21/93 TEST TIME: 1416 AMBIENT TEMP. (°C): 8

VEHICLE: 1993 Toyota 4X2 pickup truck

VEHICLE TEST WEIGHT (KG): 1408

MOVING BARRIER TEST WEIGHT (KG): 1631

IMPACT ANGLE[1] (DEG): 270

IMPACT VELOCITY[2] (KPH): PRIMARY = 53.8 SECONDARY = 53.8

DUMMIES: DRIVER #903

TYPE: PART 572 F

LOCATION: LEFT FRONT

RESTRAINT: 3-POINT UNIBELT

NUMBER OF DATA CHANNELS: 33

NUMBER OF CAMERAS: HIGH-SPEED 8 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: TABC, Inc.

MAKE/MODEL/BODY STYLE: Toyota/4X2/pickup truck MODEL YEAR: 1993

VIN: 4TARN81A2PZ128854 COLOR: Black

ENGINE DATA: TYPE: inline CYLINDERS: 4 DISPLACEMENT: 2.4 liters

TRANSMISSION DATA: _5_SPEED, _X_MANUAL, ___AUTOMATIC, ___FWD, _X_RWD, ___4WD

DATE VEHICLE RECEIVED: 10/15/93 ODOMETER READING: 96

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

DATE OF MANUFACTURE: 06/93 VIN:4TARN81A2PZ128854

GVWR: 4400 LBS.

GAWR: FRONT: 2025 LBS., REAR: 2545 LBS.

TABLE 2 TEST VEHICLE INFORMATION, CONT'D.

TIRES ON VEHICLE (MFR., LINE, SIZE): Dunlop, SP20, 195/75R14

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

SPARE TIRE (MFR., LINE, SIZE): NA

TYPE OF SEATS: FRONT: Bench
REAR: NA

TYPE OF FRONT SEAT BACKS: Fixed

MAXIMUM WIDTH: 1690 MM

WHEELBASE: 2616 MM

LOCATION OF "RECOMMENDED TIRE PRESSURE" LABEL:

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

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

RECOMMENDED TIRE SIZE: 195/75R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 29 psi; REAR: 35 psi

DESIGNATED SEATING CAPACITY: NA FRONT NA REAR NA TOTAL

VEHICLE CAPACITY WEIGHT: NA KG

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE:	LF	725;	RF	718;	LR	732;	RR	725
PRE-TEST ATTITUDE:	LF	701;	RF	678;	LR	712;	RR	686
POST-TEST ATTITUDE:	LF	NA;	RF	NA;	LR	NA;	RR	NA

TABLE 2 TEST VEHICLE INFORMATION, CONT'D.

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

RIGHT FRONT	337 KG	RIGHT REAR	242 KG
LEFT FRONT	332 KG	LEFT REAR	236 KG
TOTAL FRONT WEIGHT	669 KG	(58.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	478 KG	(41.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1147 KG		
TARGET TEST WEIGHT[1] =	1408 KG		

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 182 KG OF CARGO WEIGHT:

RIGHT FRONT	408 KG	RIGHT REAR	335 KG
LEFT FRONT	364 KG	LEFT REAR	301 KG
TOTAL FRONT WEIGHT	772 KG	(54.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	636 KG	(45.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1408 KG	(0.0% OVER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 68 KG

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1182 MM REARWARD OF FRONT WHEEL CENTERLINE

[1]Provided by VRTC to match test performed on August 25, 1992.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 931021

TEST DATE: 10/21/93

TEST TIME: 1416

TEST TYPE: Moving Deformable Barrier Side Impact

IMPACT ANGLE[1] (DEG): 270

AMBIENT TEMPERATURE AT IMPACT AREA: 8° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 24° C

IMPACT VELOCITY: PRIMARY = 53.8 KPH
SECONDARY = 53.8 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: 931021

DATE OF TEST: 10/21/93

TIME OF TEST: 1416

WIND VELOCITY: NA

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 8° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 24° C

VEHICLE DATA

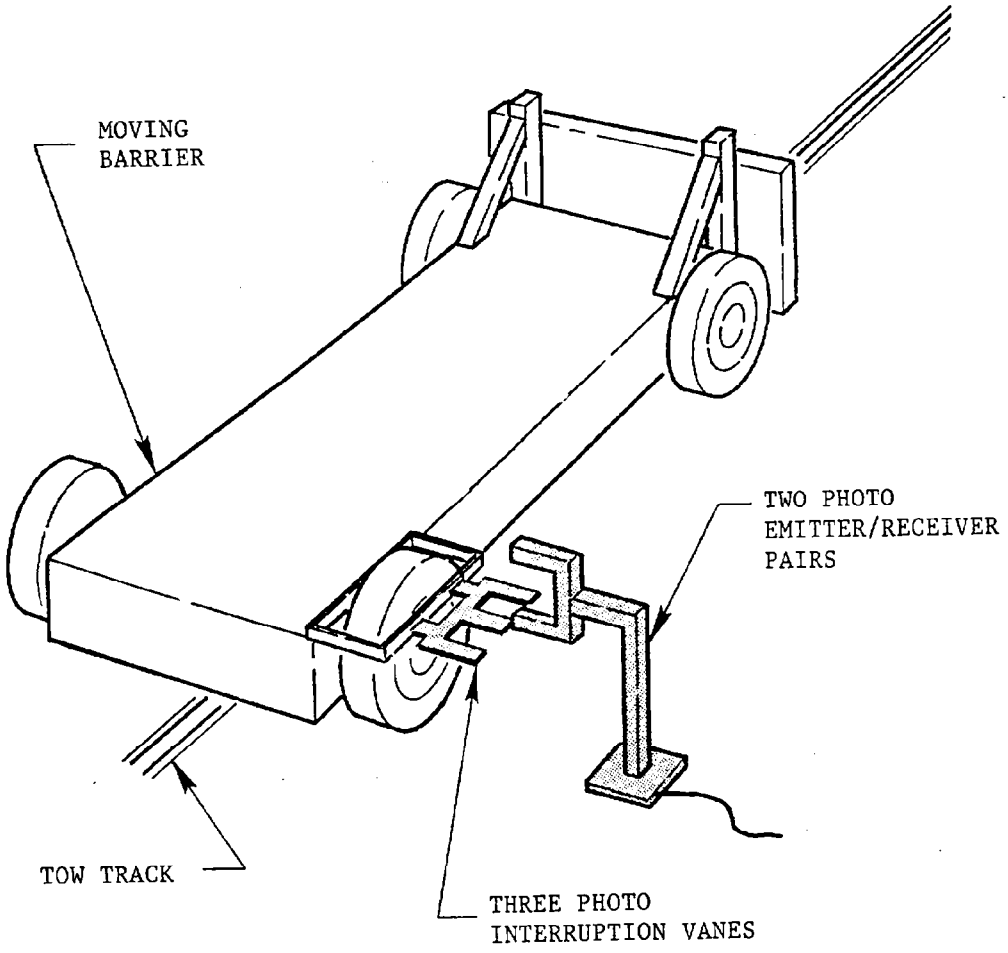
	ACTUAL	INTENDED
SUBJECT VEHICLE TEST WEIGHT (KG):	1408	1408
MOVING DEFORMABLE BARRIER TEST WEIGHT (KG):	1631	1633
MOVING DEFORMABLE BARRIER VELOCITY (KPH)[1]:	53.8	53.9
IMPACT POINT (MM)[2]:	955	940

DUMMY INFORMATION

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

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

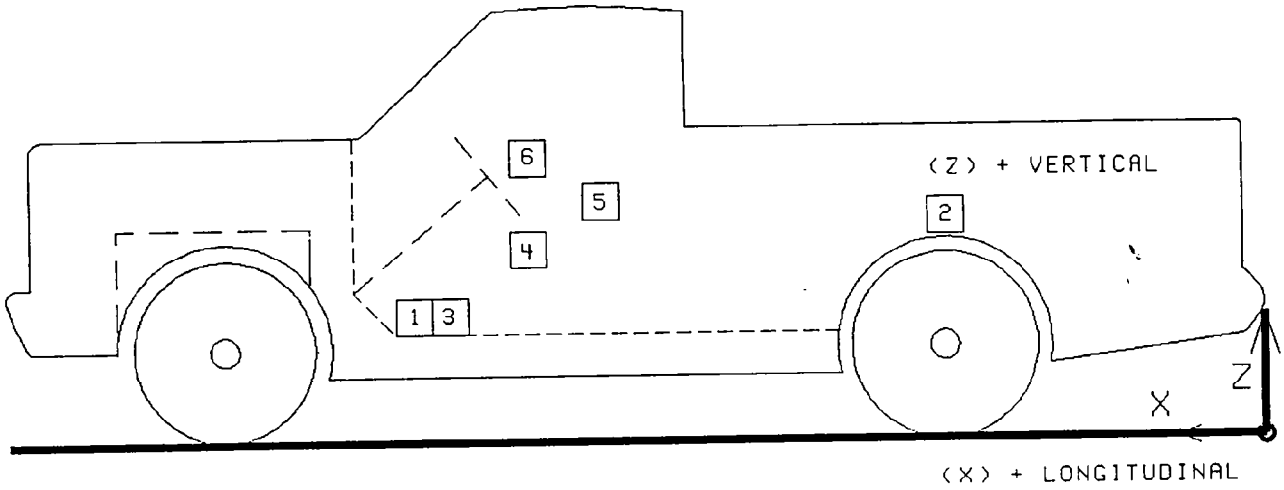
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



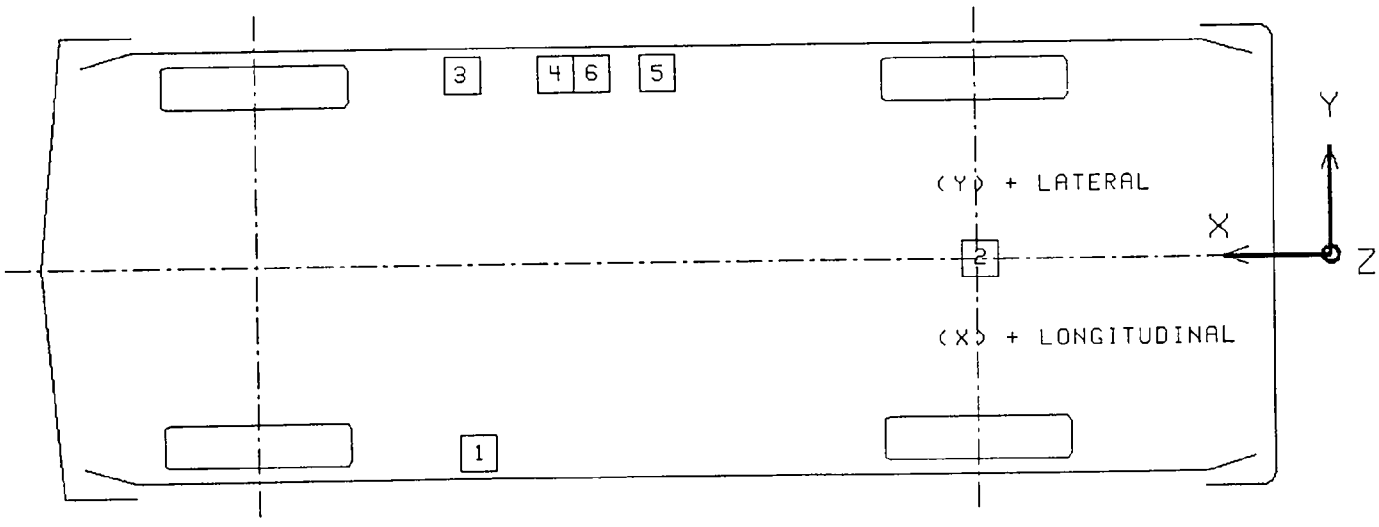
The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

FIGURE 2 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931021

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	RIGHT FRONT SILL	3073	-616	370				
	LONGITUDINAL				20.4	28.2	18.6	21.9
	LATERAL				8.3	29.5	42.4	23.3
	VERTICAL				13.5	33.3	10.0	26.0
	RESULTANT				44.8	23.0		
2	REAR TRUCK BED OVER AXLE	1473	0	600				
	LONGITUDINAL				3.8	60.9	7.5	48.3
	LATERAL				3.7	206.5	38.3	10.6
	VERTICAL				25.4	14.4	26.0	20.2
	RESULTANT				40.7	11.3		
3	LEFT FRONT SILL	3023	645	387				
	LATERAL				20.0	16.2	52.9	5.7
4	LEFT FRONT DOOR CENTERLINE	2819	692	597				
	LATERAL				114.3	17.3	190.7	10.3

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

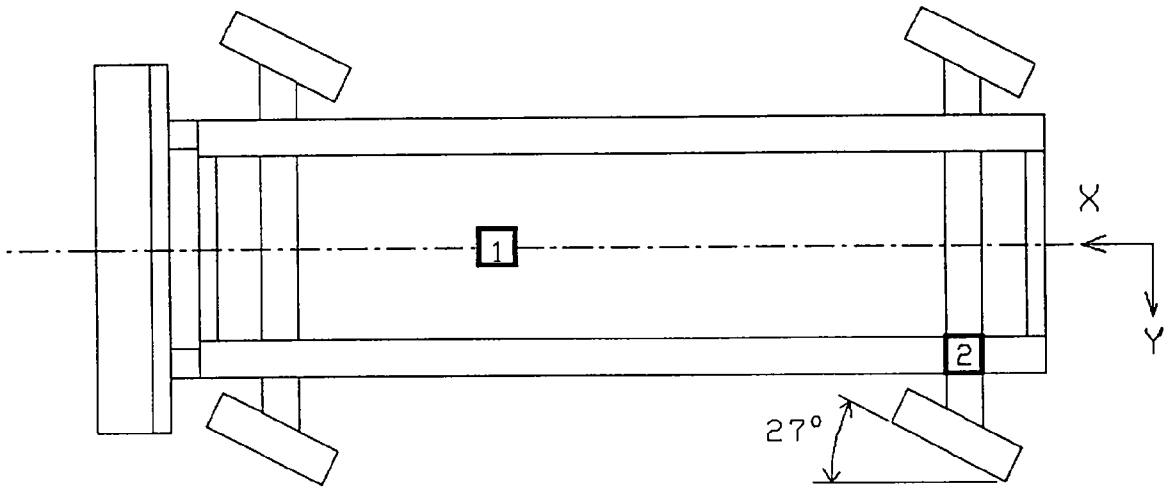
TEST NUMBER 931021

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	2184	703	645	76.0	11.0	138.8	5.8
6	LEFT FRONT DOOR UPPER CENTERLINE LATERAL	2743	695	820	87.5	28.0	104.4	18.3

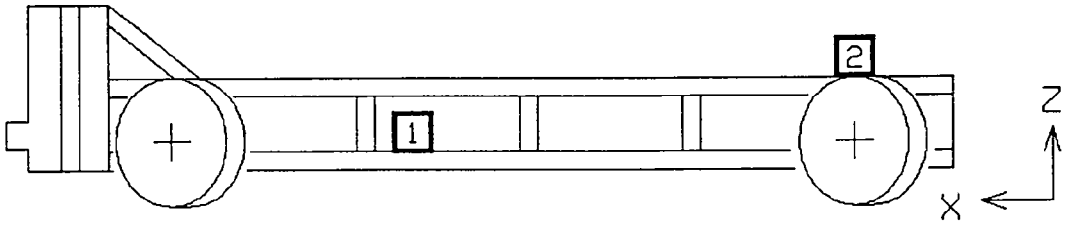
* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

FIGURE 3 MOVING DEFORMABLE BARRIER ACCELEROMETER PLACEMENT



TOP VIEW



SIDE VIEW

TABLE 6

MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931021

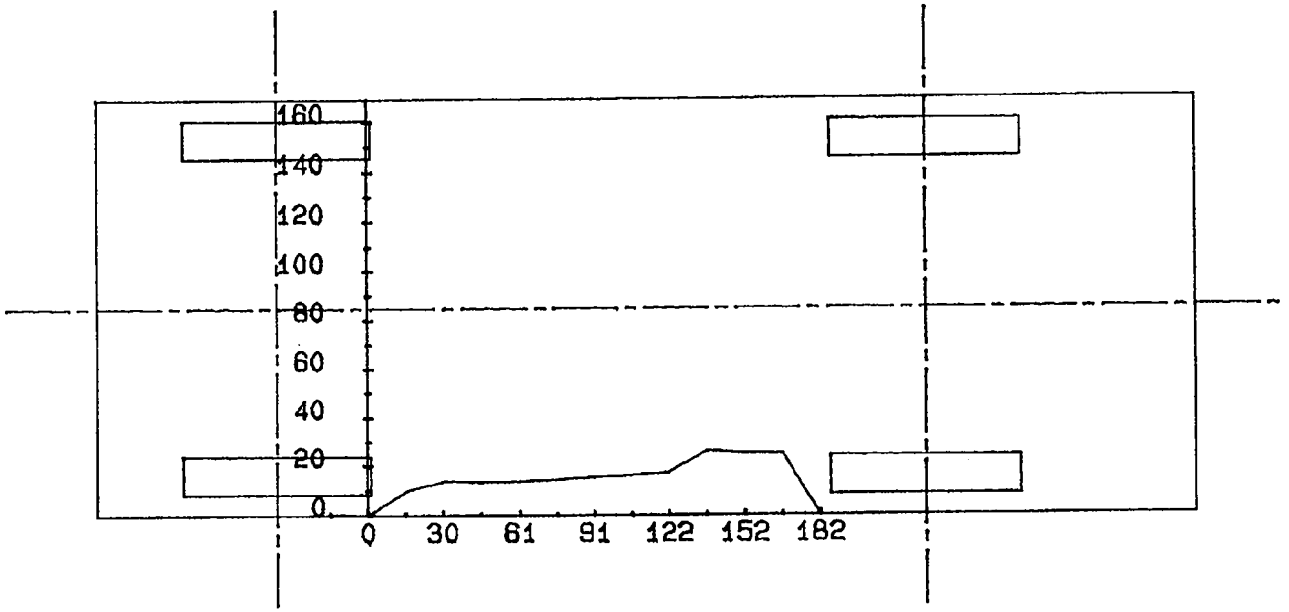
No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	CENTER OF GRAVITY	1900	0	320				
	LONGITUDINAL				0.8	124.8	15.5	29.9
	LATERAL				7.4	34.6	1.8	219.8
	VERTICAL				8.0	34.2	5.4	41.0
	RESULTANT				17.3	33.8		
2	LEFT FRAME RAIL OVER REAR AXLE	385	633	620				
	LONGITUDINAL				2.5	120.2	19.6	27.8
	LATERAL				2.4	167.3	3.8	31.4

* 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

FIGURE 4

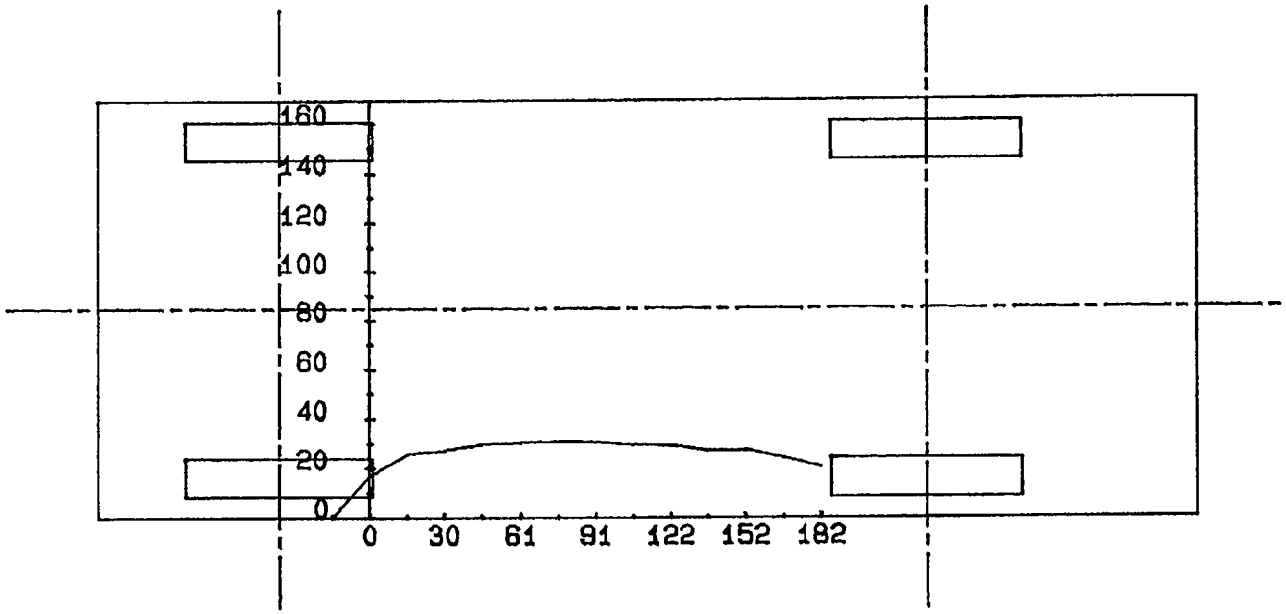
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 37.9 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

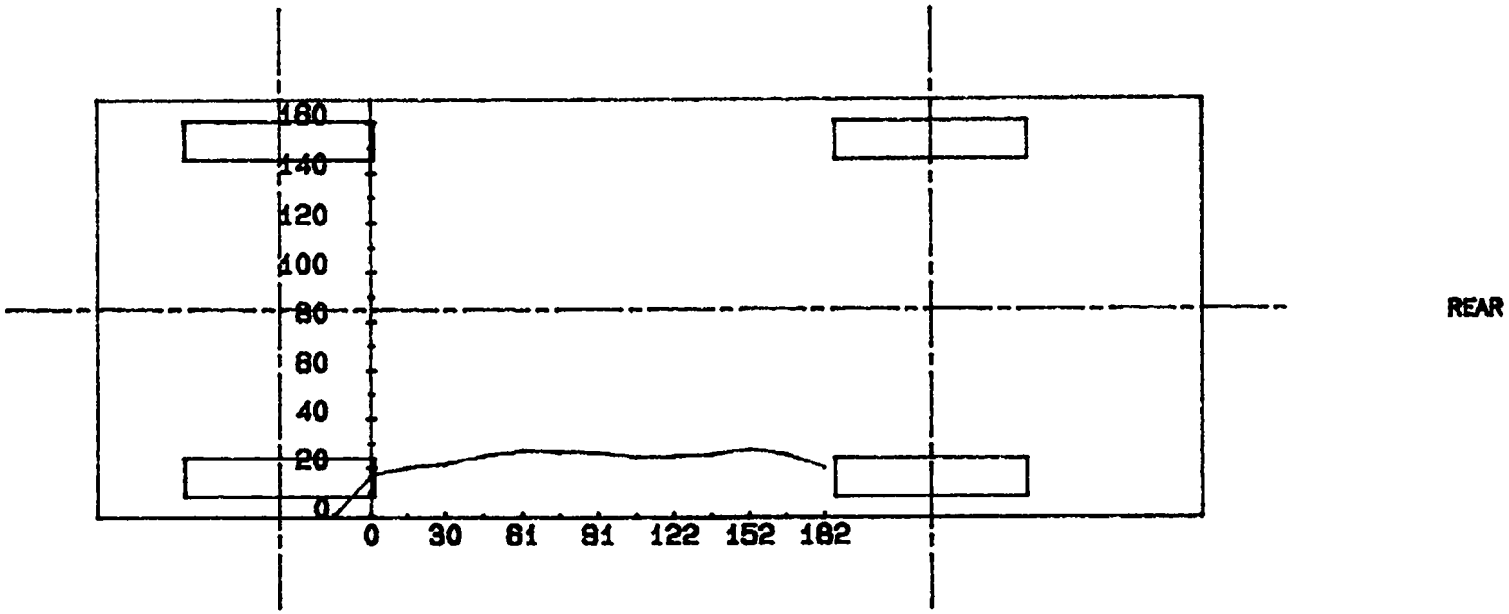
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 64.8 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

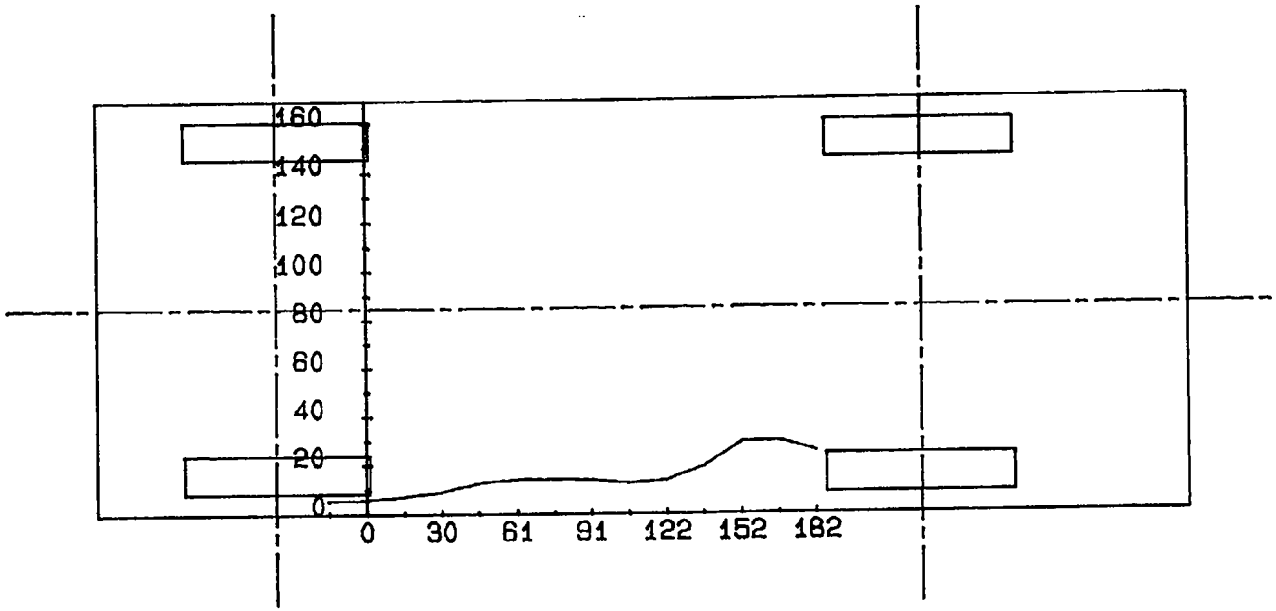
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 69.7 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

FIGURE 4, CONT'D.

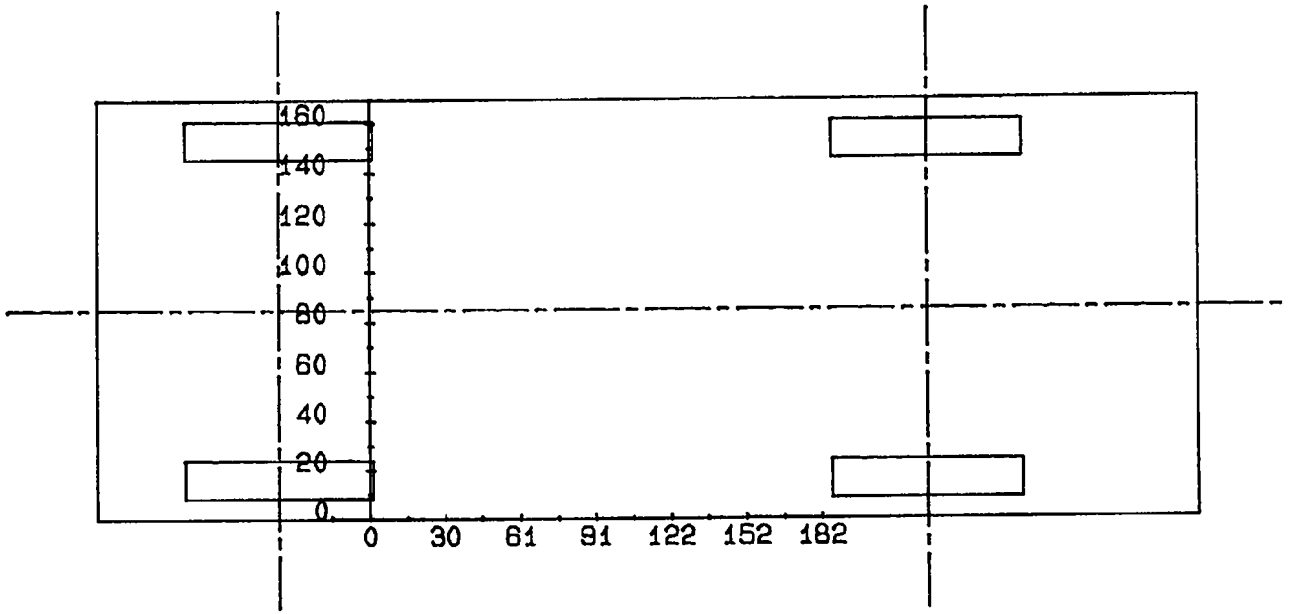
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 101.6 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 149.9 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

TABLE 7 VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

ZERO DISTANCE AT PROJECTED IMPACT POINT[1]

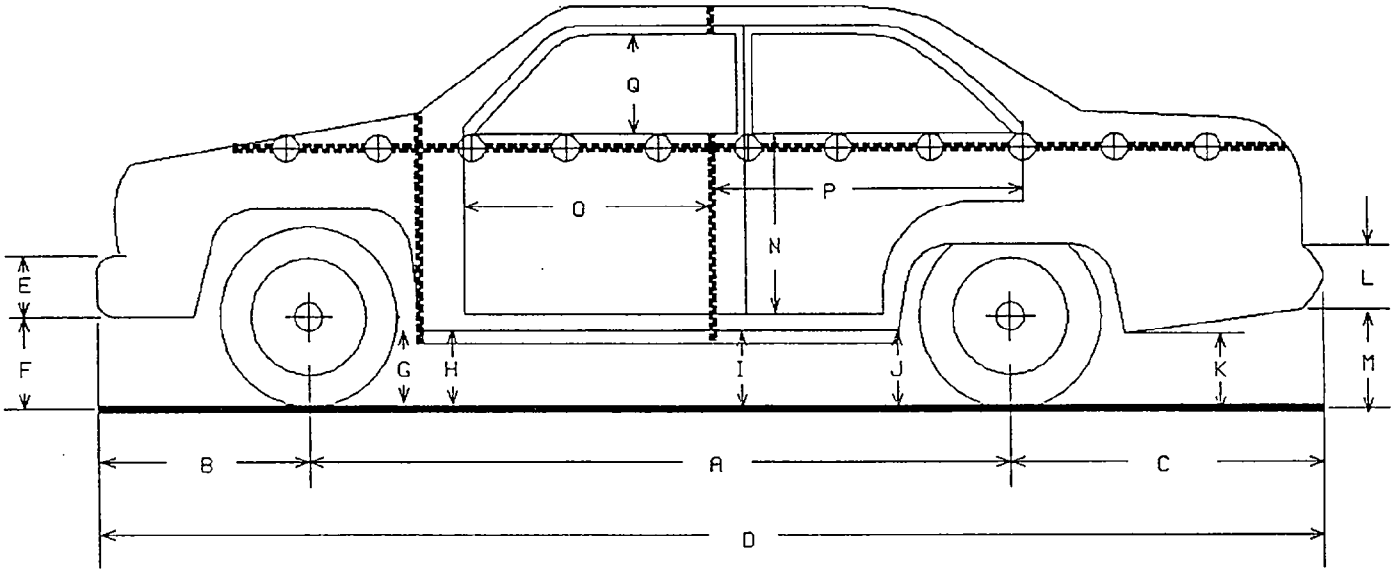
LOCATION	HEIGHT (DELIVERED)	HEIGHT (PRE-TEST)	-152	0	152	305	457	610	762	914	1067	1219	1372	1524	1676	1829
			PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])													
Axle height	379	367	X	X	480	475	475	474	475	475	475	473	480	475	465	X
H-point	648	637	X	403	409	411	410	413	415	412	417	412	415	400	409	388
Mid-door	697	687	X	402	400	405	405	405	405	404	408	405	405	391	402	393
Window sill	1016	979	480	475	470	475	468	463	460	459	460	453	458	448	458	458
Window top	1499	1453	X	X	X	X	X	X	643	645	650	638	X	X	X	X
			POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])													
Axle height	379	367	X	X	576	610	609	612	620	630	638	644	741	725	712	X
H-point	648	637	X	572	666	683	705	715	720	714	710	701	681	670	645	588
Mid-door	697	687	X	570	601	621	654	677	668	664	651	650	656	666	655	592
Window sill	1016	979	532	532	540	566	595	602	600	595	582	589	649	735	751	705
Window top	1499	1453	X	X	X	X	X	X	500	498	500	540	X	X	X	X
			STATIC CRUSH (MM)													
Axle height	379	367	X	X	96	135	134	138	145	155	163	171	261	250	247	X
H-point	648	637	X	169	257	272	295	302	305	302	293	289	266	270	236	200
Mid-door	697	687	X	168	201	216	249	272	263	260	243	245	251	275	253	199
Window sill	1016	979	52	57	70	91	127	139	140	136	122	136	191	287	293	247
Window top	1499	1453	X	X	X	X	X	X	-143	-147	-150	-98	X	X	X	X

[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 5 PRE-TEST AND POST-TEST MEASUREMENTS

VEHICLE: 1993 Toyota 4X2 pickup truck

VIN: 4TARN81A2PZ128854 TEST DATE: 10/21/93



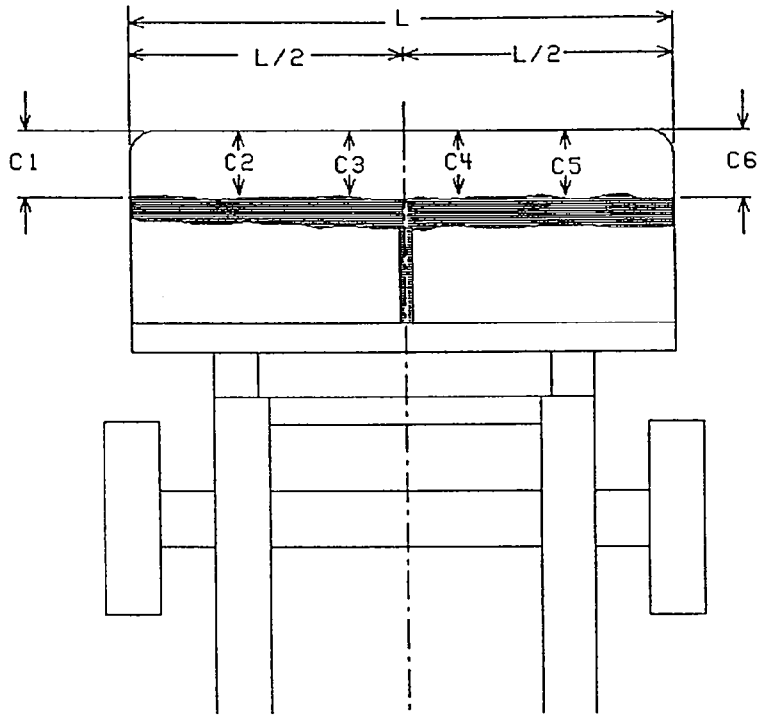
LEFT SIDE VIEW

	PRE-TEST	POST-TEST	CHANGE		PRE-TEST	POST-TEST	CHANGE
A	2616	2630	-14	J	349	538	-189
B	730	634	96	K	429	489	-60
C	1085	994	91	L[1]	---	---	---
D	4428	4406	22	M[1]	---	---	---
E	125	125	0	N	---	---	---
F	468	341	127	O	698	675	23
G	307	310	-3	P	---	---	---
H	322	340	-18	Q	432	420	12
I[1]	336	342	-6				

[1]Vehicle did not have a rear bumper.

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	~~1626~~ 1676				
C1	90	C1	178	C1	88
C2	70	C2	126	C2	56
C3	75	C3	101	C3	26
C4	72	C4	103	C4	31
C5	68	C5	130	C5	62
C6	90	C6	164	C6	74
CL	72	CL	95	CL	23

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	813
PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])																		
Top of face	914	170	170	173	173	174	177	173	174	174	175	180	175	177	174	180	170	177
Mid-face	660	172	171	173	170	174	178	174	175	175	174	180	174	176	173	177	172	175
Bumper	533	90	70	72	68	72	72	72	73	72	72	75	70	70	70	72	68	90
POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])																		
Top of face	914	295	267	232	210	188	179	176	172	177	189	203	219	232	204	177	164	165
Mid-face	660	199	200	180	173	171	175	174	173	173	172	175	179	195	203	213	224	233
Bumper	533	178	148	126	109	102	104	101	100	95	97	103	110	120	130	132	142	164
STATIC CRUSH (MM)																		
Top of face	914	125	97	59	37	14	2	3	-2	3	14	23	44	55	30	-3	-6	-12
Mid-face	660	27	29	7	3	-3	-3	0	-2	-2	-2	-5	5	19	30	36	52	58
Bumper	533	88	78	54	41	30	32	29	27	23	25	28	40	50	60	60	74	74

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

[2]Reference plane is 610mm 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 931021

	DRIVER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
HEAD				
LONGITUDINAL	54.0	223.8	31.2	75.4
LATERAL	21.5	224.1	33.0	48.2
VERTICAL	8.9	45.3	66.8	56.7
RESULTANT	67.4	56.7		
HIC	449 FROM 47.5 TO 83.5			
UPPER SPINE				
LONGITUDINAL	8.9	56.3	16.3	36.3
LATERAL (P)	48.1	61.9	71.1	38.1
LATERAL (R)	50.5	61.9	68.3	38.1
VERTICAL	12.5	25.6	11.1	74.4
RESULTANT (P)	72.4	38.1		
RESULTANT (R)	69.6	38.1		

TABLE 9

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 931021

	DRIVER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
LOWER SPINE				
LONGITUDINAL	15.1	48.8	18.7	63.1
LATERAL (P)	22.1	61.9	86.9	30.6
LATERAL (R)	22.6	61.9	85.6	30.6
VERTICAL	13.1	39.4	9.6	75.0
RESULTANT (P)	88.4	30.6		
RESULTANT (R)	87.1	30.6		
LEFT UPPER THORAX RIB				
LATERAL (P)	10.1	154.4	72.8	26.9
LATERAL (R)	9.5	75.0	74.6	26.3
LEFT LOWER THORAX RIB				
LATERAL (P)	12.5	83.7	64.4	25.6
LATERAL (R)	12.1	84.4	67.7	25.6
	TTI(d) (P) 80			
	TTI(d) (R) 80			

TABLE 9

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 931021

	DRIVER DUMMY SN: 903			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
PELVIS				
LONGITUDINAL	5.2	143.8	11.9	43.1
LATERAL	11.8	53.7	81.5	30.0
VERTICAL	16.7	31.3	9.3	75.0
RESULTANT	83.1	30.0		

POSITIVE DIRECTION

LONGITUDINAL:	FORWARD
LATERAL:	LEFTWARD
VERTICAL:	UPWARD

NEGATIVE DIRECTION

LONGITUDINAL:	REARWARD
LATERAL:	RIGHTWARD
VERTICAL:	DOWNWARD

NOTES:

(P) Primary Sensor
(R) Redundant Sensor

TABLE 10 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #903	PASSENGER #NA
HEAD	Side header	NA
CHEST	None	NA
ABDOMEN	Door panel	NA
LEFT KNEE	Door panel	NA
RIGHT KNEE	Left leg	NA

DOOR OPENING:

	LEFT	RIGHT
FRONT	Tools required	Easy
REAR	NA	NA

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	NA
REAR	NA	NA

GLAZING DAMAGE:

The driver's side door glass was broken out.

The lower left corner of the windshield cracked.

OTHER NOTABLE IMPACT EFFECTS:

None

DUMMY KINEMATIC SUMMARY

Upon impact, the driver dummy translated toward the left and impacted the door panel. The dummy's upper body rotated toward the left and its head struck the side header before passing through the broken door glass opening. The dummy rebounded then laterally translated and rotated toward the right while rising out of the seat. The dummy's head struck the truck's headliner and the dummy turned toward the right before being restrained by the three-point unibelt. The dummy turned back to the left 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:	Toyota/4X2 pickup truck
USABLE CAPACITY:	51.9 LITERS (FURNISHED BY COTR)
TEST VOLUME RANGE:	47.7 LITERS TO 48.8 LITERS (92-94% OF USABLE)
ACTUAL TEST VOLUME:	48.3 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: 10/21/93

VEHICLE MAKE/MODEL/BODY STYLE: Toyota/4X2/pickup truck

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:

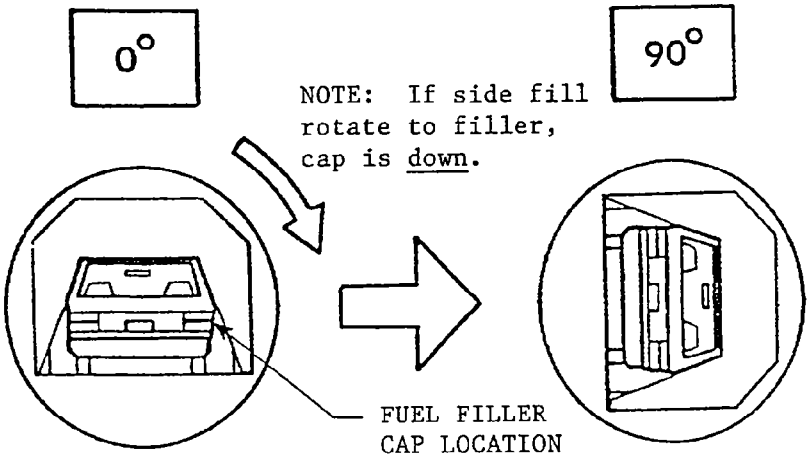
	TEST RESULTS	MAXIMUM ALLOWABLE
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 G	28 G
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 G	142 G
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 G	28 G/MN

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:

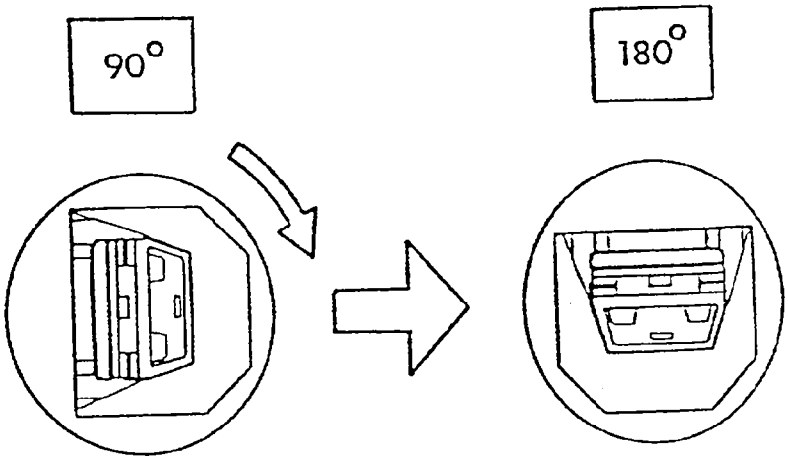
0° TO 90° ROTATION (FUEL FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

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 - - - - = 14 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

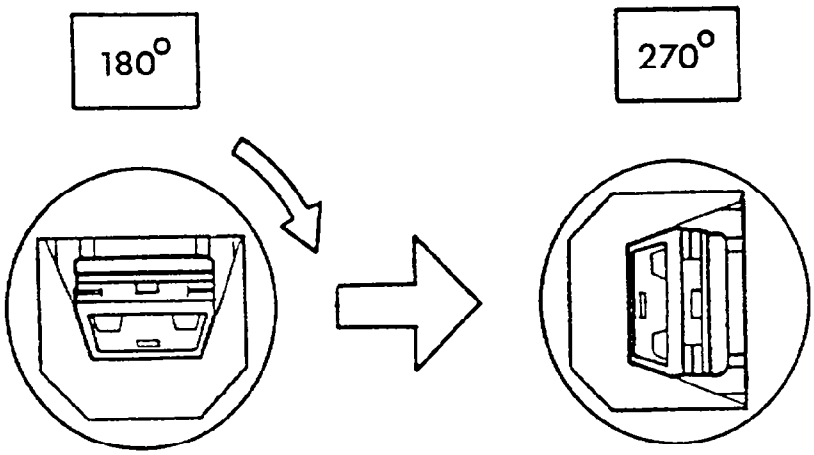
90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

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:

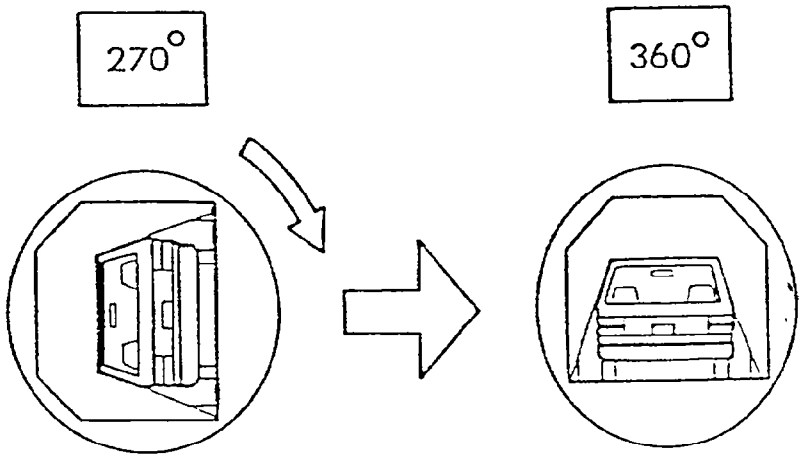
180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - - - - - -	0 G	28 G

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: Toyota/4X2/Pickup Truck

SEAT TYPE: X Bench
_____Bucket
_____Split bench

ADJUSTER TYPE: X Manual
_____Power
_____Non-adjustable

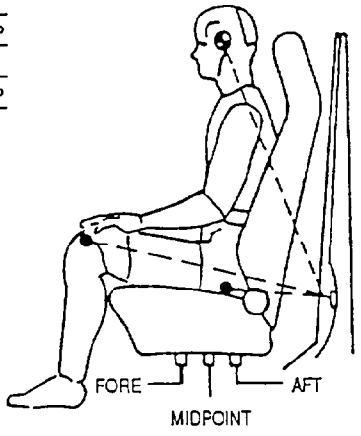
SEAT BACK TYPE: X Non-adjustable
___ Adjustable reclining

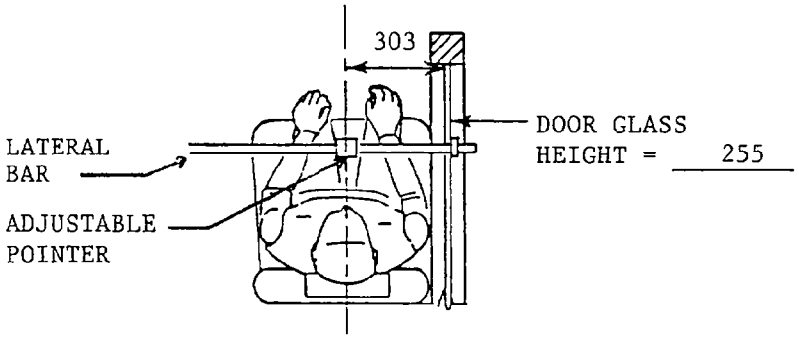
TECHNICIANS:
1. R. Branham
2. R. Cribley
3. _____

POSITIONING DATE: 10/21/93
TIME: 1035 TEMPERATURE: 21° C

DRIVER DUMMY[1] # 903 TYPE: SID

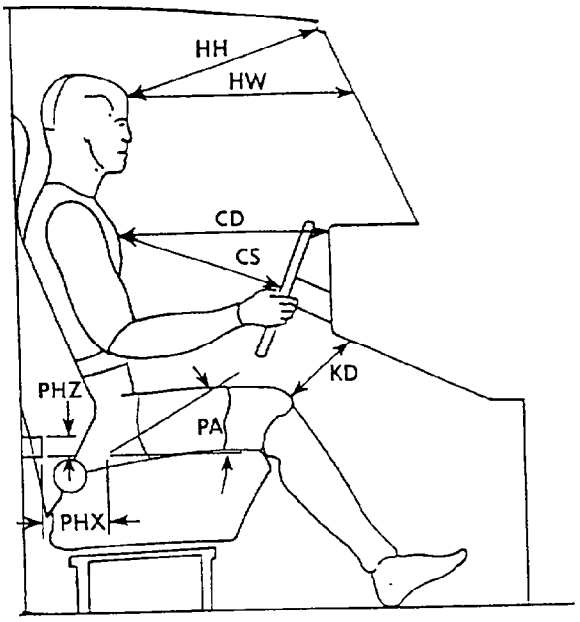
HEAD	539
TARGET	14°
KNEE	694
JOINT	92°
APPROX-	352
IMATE	113°
"H" POINT	





[1]Driver dummy measurements are referenced to top of front door striker for 4-door vehicles.
All angles are referenced to vertical.
All distance measurements are in millimeters.

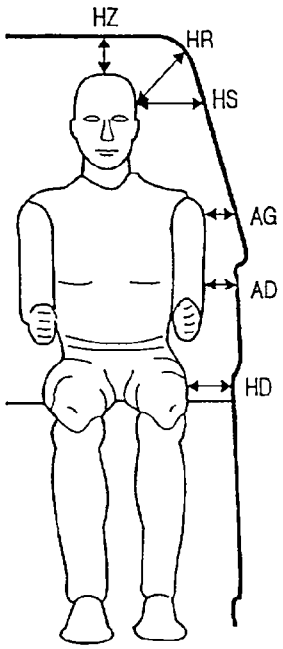
FIGURE 9 DUMMY LONGITUDINAL CLEARANCE MEASUREMENTS



HH	458
HW	568
CD	589
CS[1]	359
KDL[2]	168
KDR[2]	172
PA	23
PHX	323
PHZ	151

[1]Measured to center of steering wheel hub.
[2]Measured parallel to vehicle's longitudinal axis.
All distance measurements are in millimeters.
All angle measurements are in degrees.

FIGURE 10 DUMMY LATERAL CLEARANCE MEASUREMENTS



HR	170
HS	228
AD[1]	37
HD[1]	95
HZ	90

[1]Measured to energy absorbing padding.

All distance measurements are in millimeters.

FIGURE 10 CAMERA POSITIONS

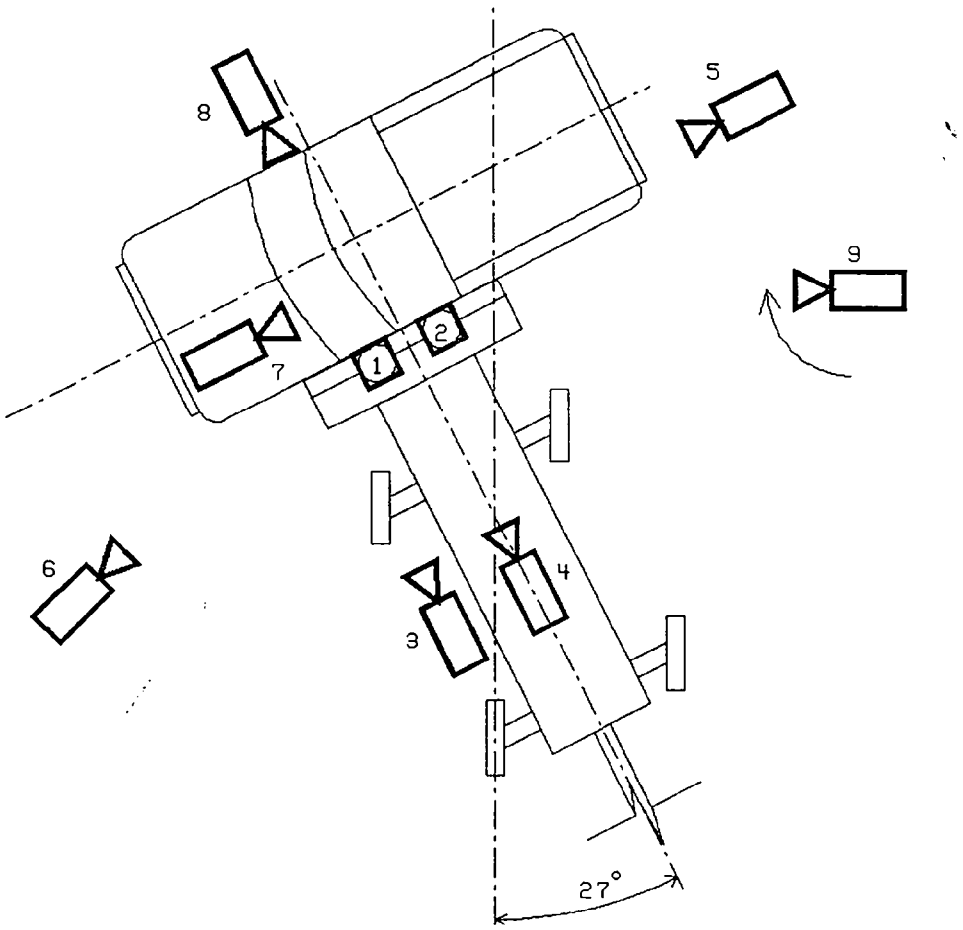


TABLE 13 CAMERA INFORMATION

TEST NO. 931021

VEHICLE: 1993 Toyota 4X2 pickup truck

CAMERA NO.	VIEW	CAMERA POSITIONS (CM)[1] X	Y	Z	ANGLE[2] (DEG)	LENS (MM)	FILM SPEED (FPS)
1	Overhead overall	0	0	1067	-90	8.5	998
2	Overhead close-up	-91	0	1067	-90	25	1072
3	Onboard barrier side	NA	NA	NA	NA	25	885
4	Onboard barrier center	NA	NA	NA	NA	13	1000
5	Right side	521	-996	91	0	13	798
6	Left side	-297	485	102	0	25	970
7	Onboard vehicle front	NA	NA	NA	NA	8	998
8	Onboard vehicle side-front	NA	NA	NA	NA	8	1002
9	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 1

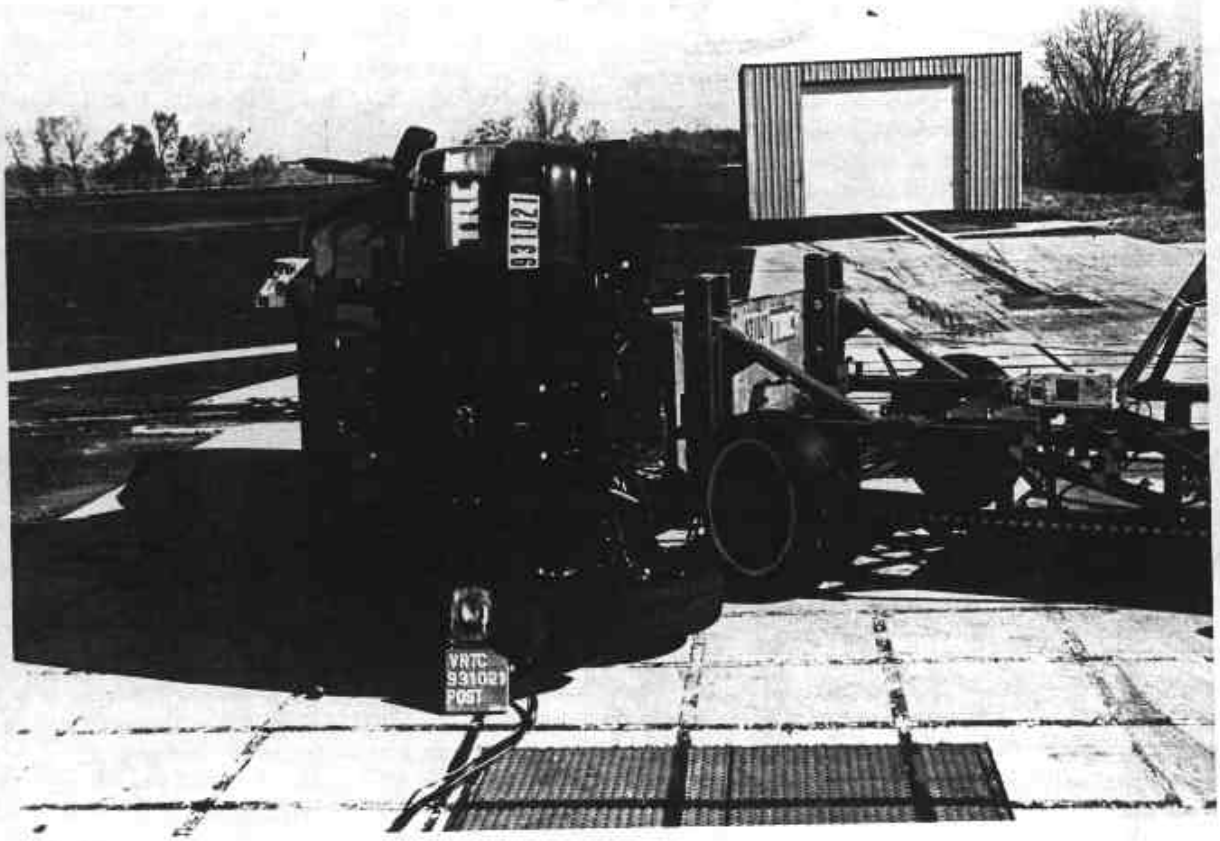


Figure A-2 POST-TEST FRONT - VIEW 1

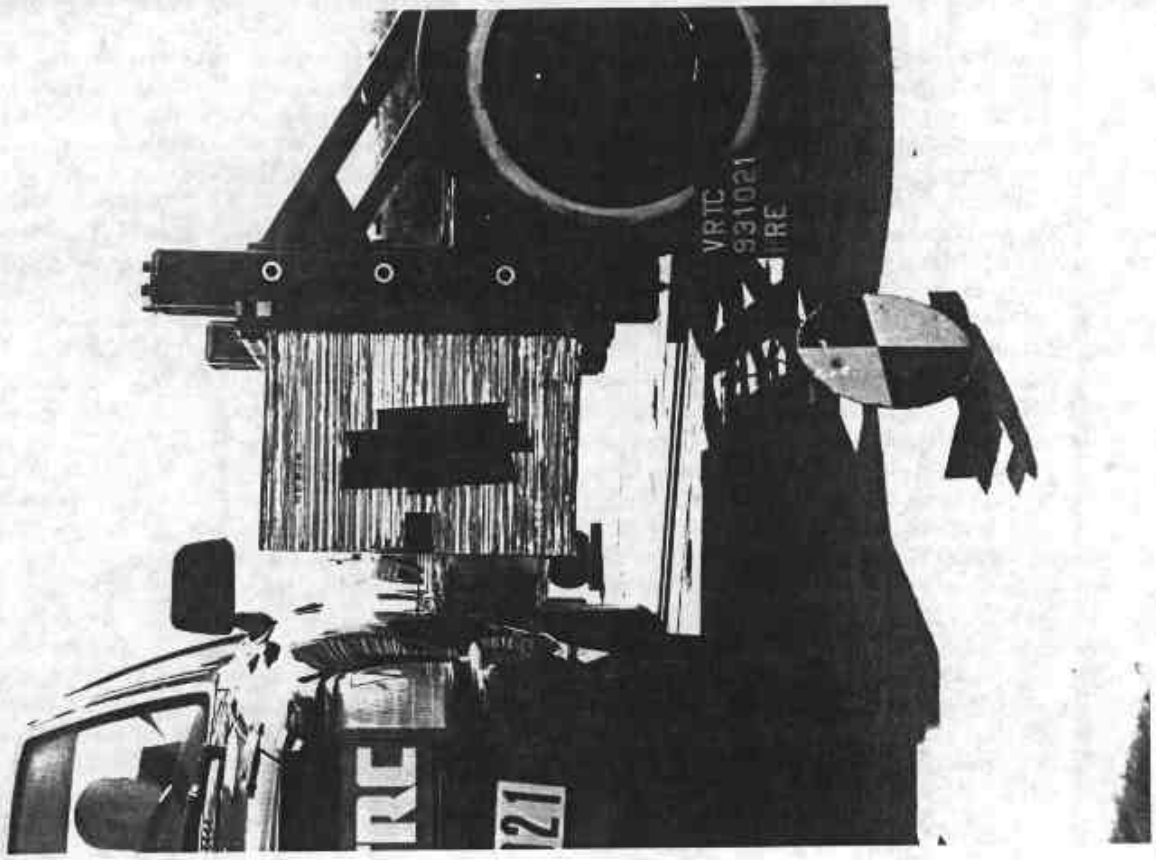


Figure A-3 PRE-TEST FRONT - VIEW 2

Figure A-4 POST-TEST LEFT FRONT VIEW

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

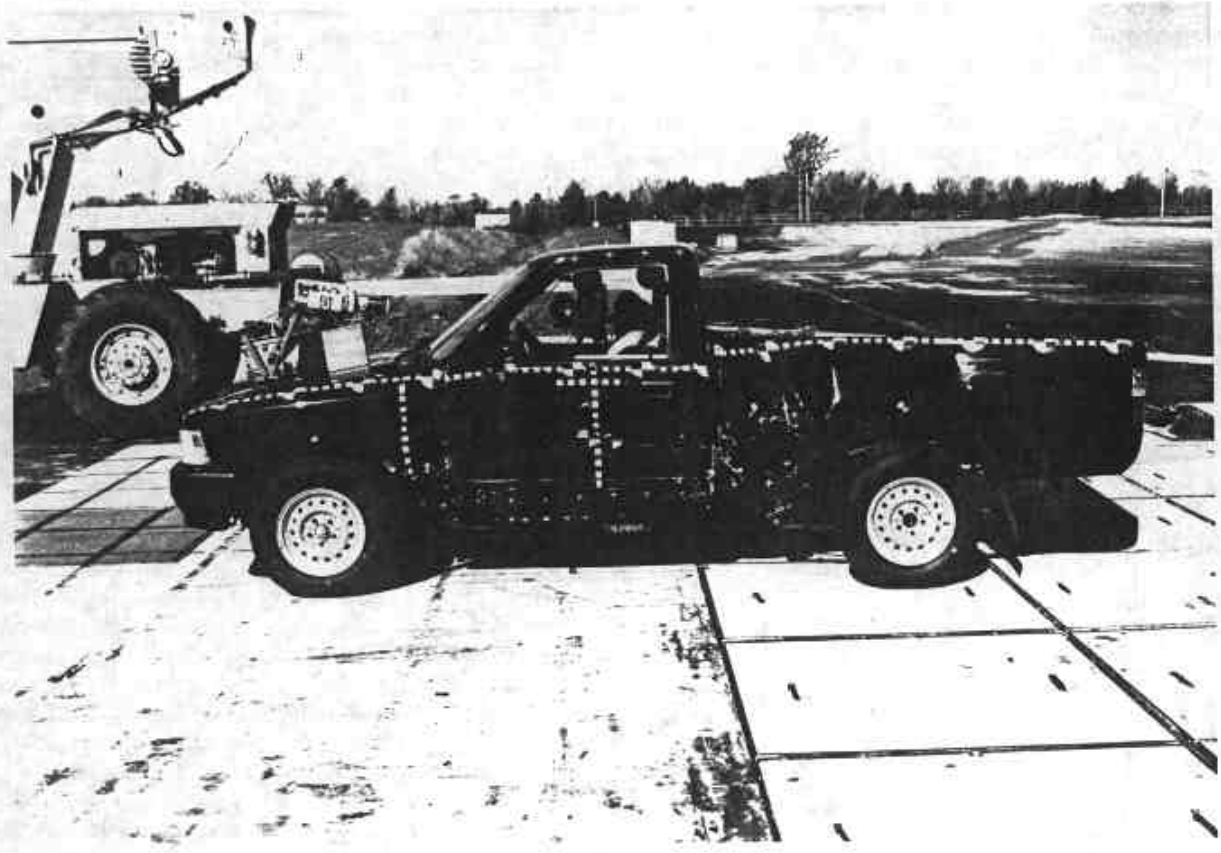


Figure A-6 POST-TEST LEFT SIDE - VIEW 2

Figure A-7 PRE-TEST RIGHT SIDE VIEW

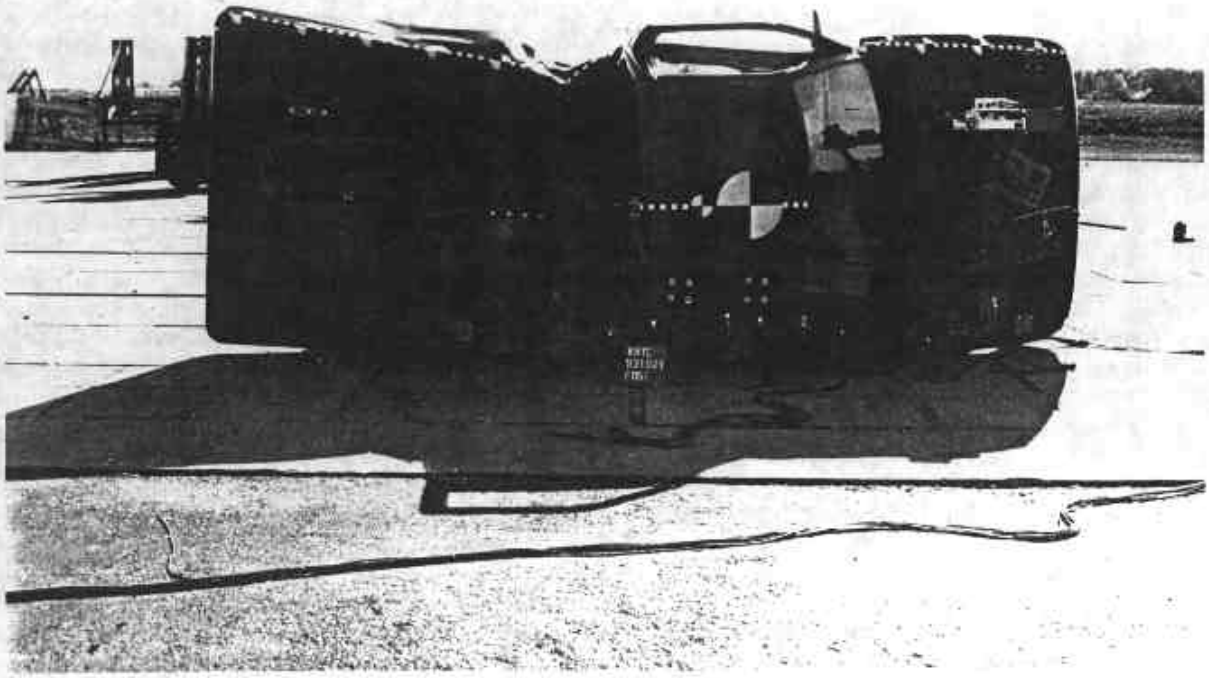


Figure A-8 POST-TEST RIGHT SIDE VIEW

Figure A-9 PRE-TEST REAR - VIEW 1

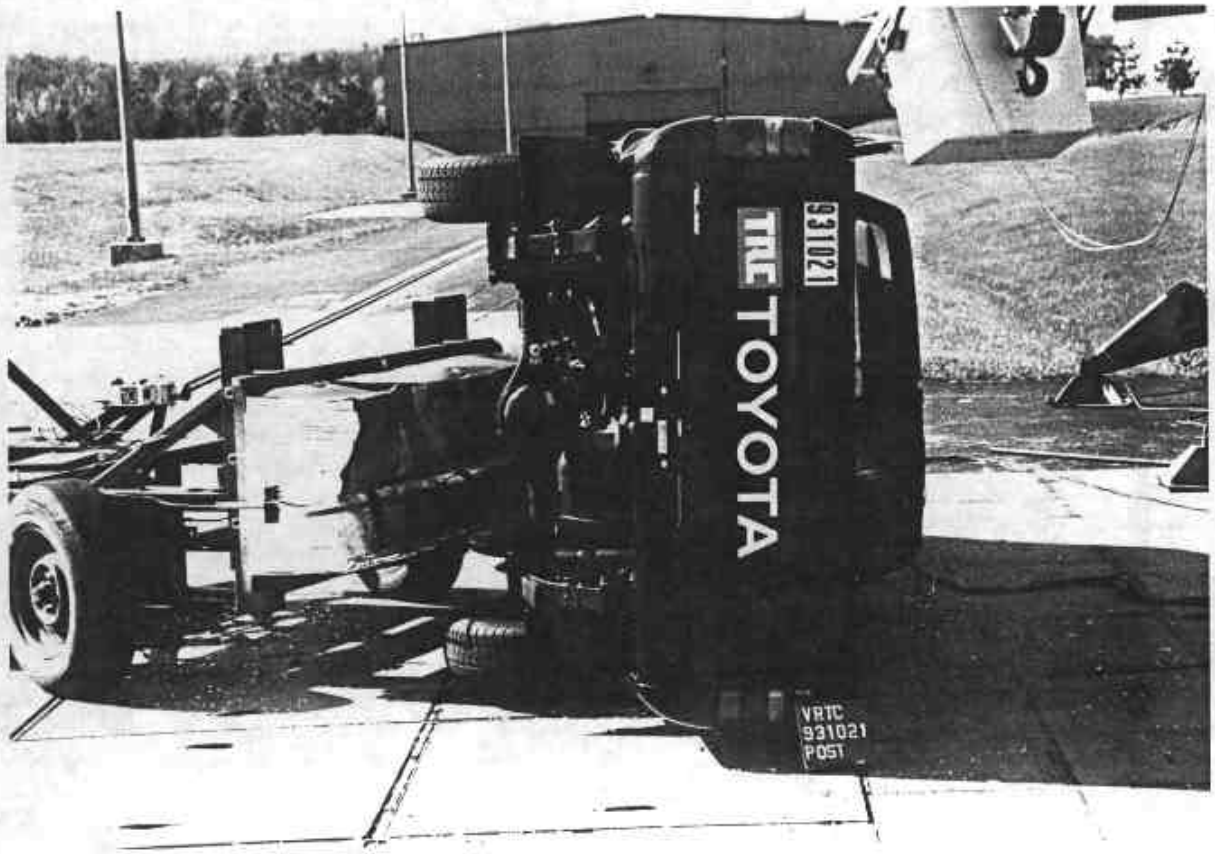


Figure A-10 POST-TEST REAR - VIEW 1

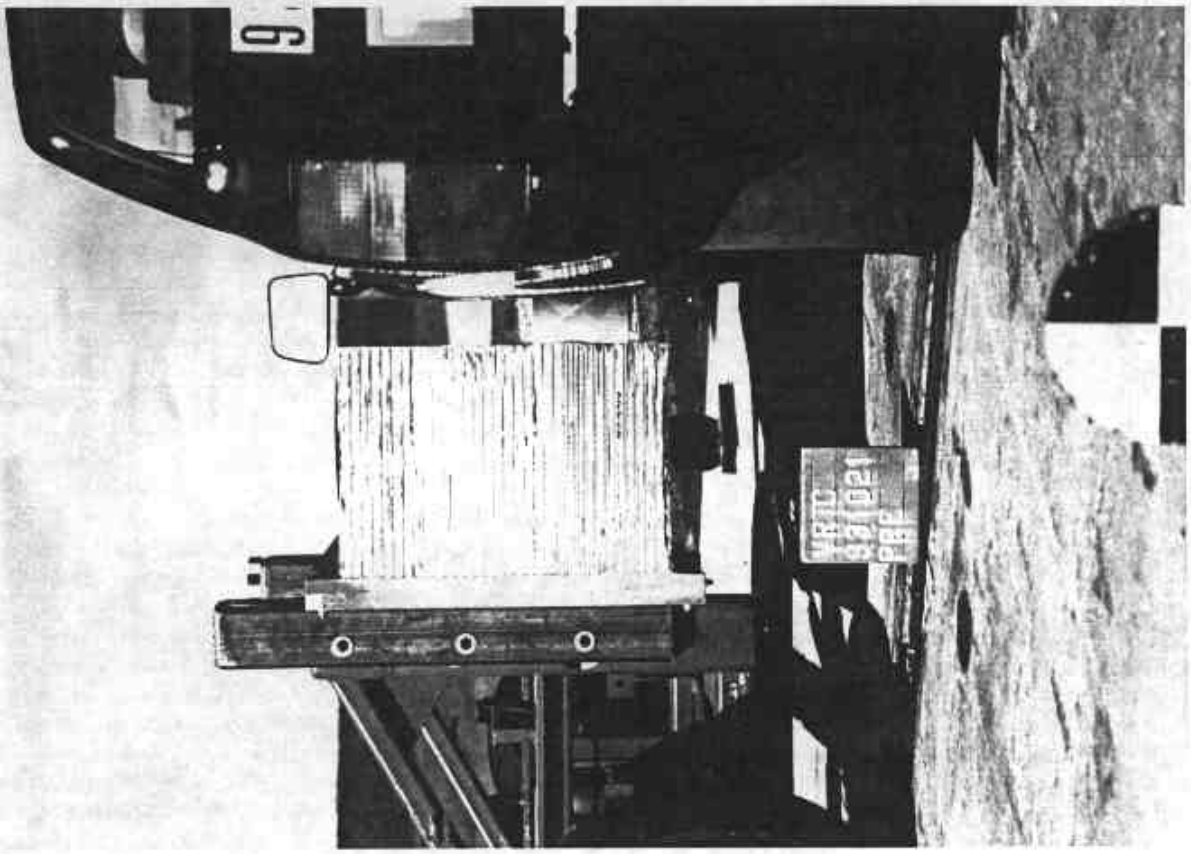


Figure A-11 PRE-TEST REAR - VIEW 2

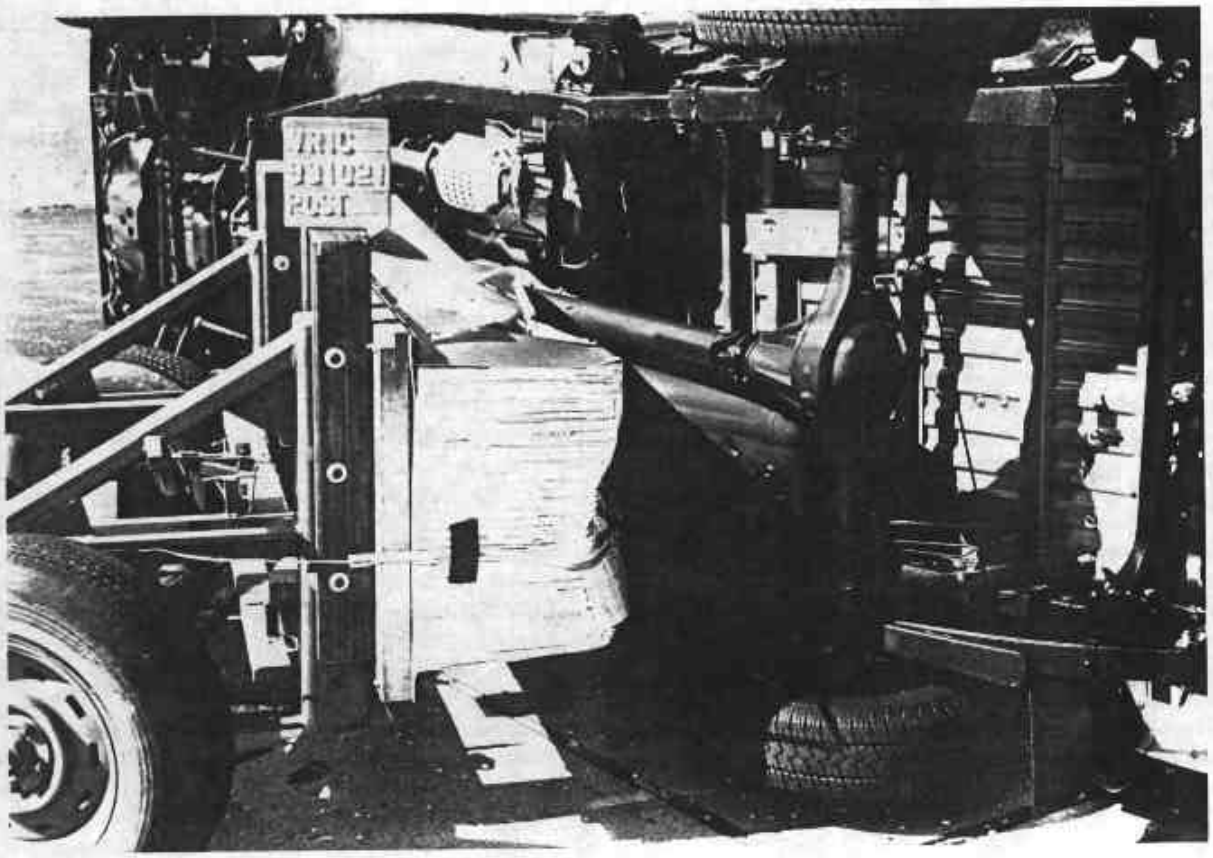


Figure A-12 POST-TEST LEFT REAR - VIEW 1

Figure A-13 POST-TEST LEFT REAR - VIEW 2

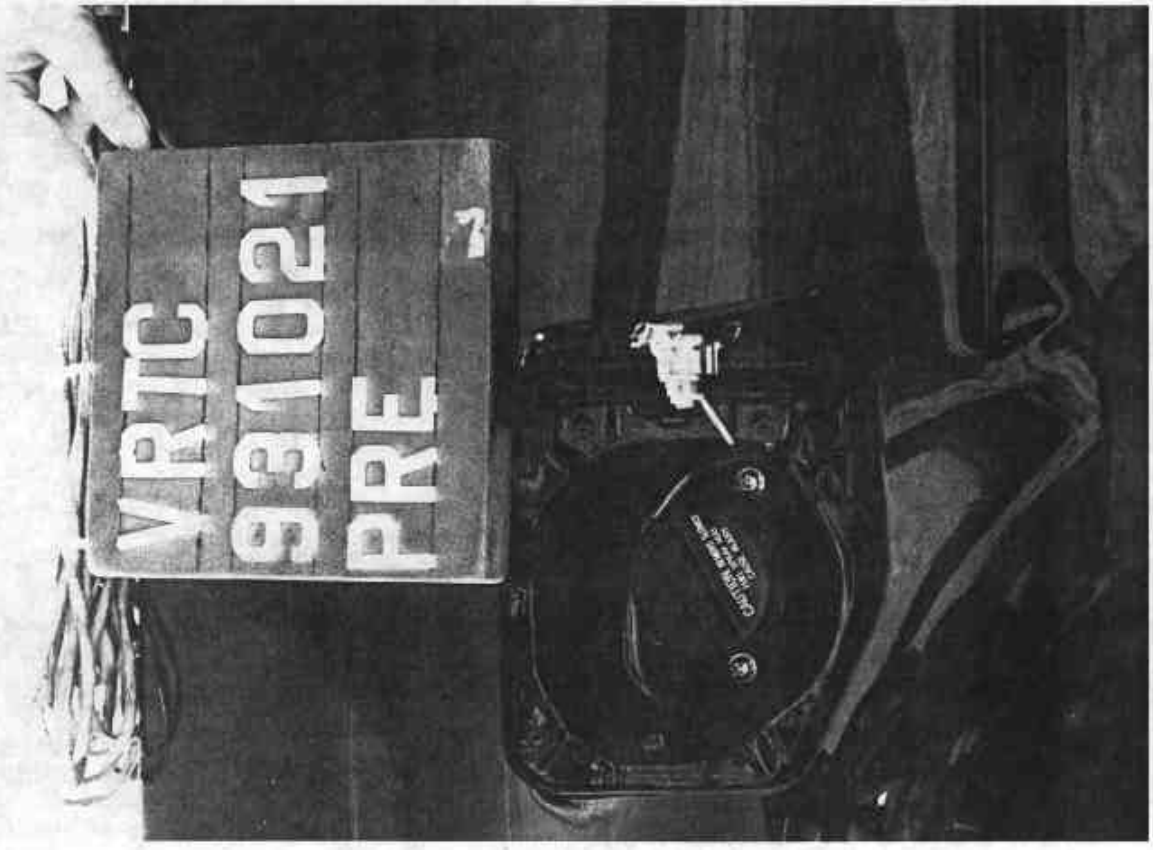


Figure A-14 PRE-TEST FUEL FILLER CAP VIEW

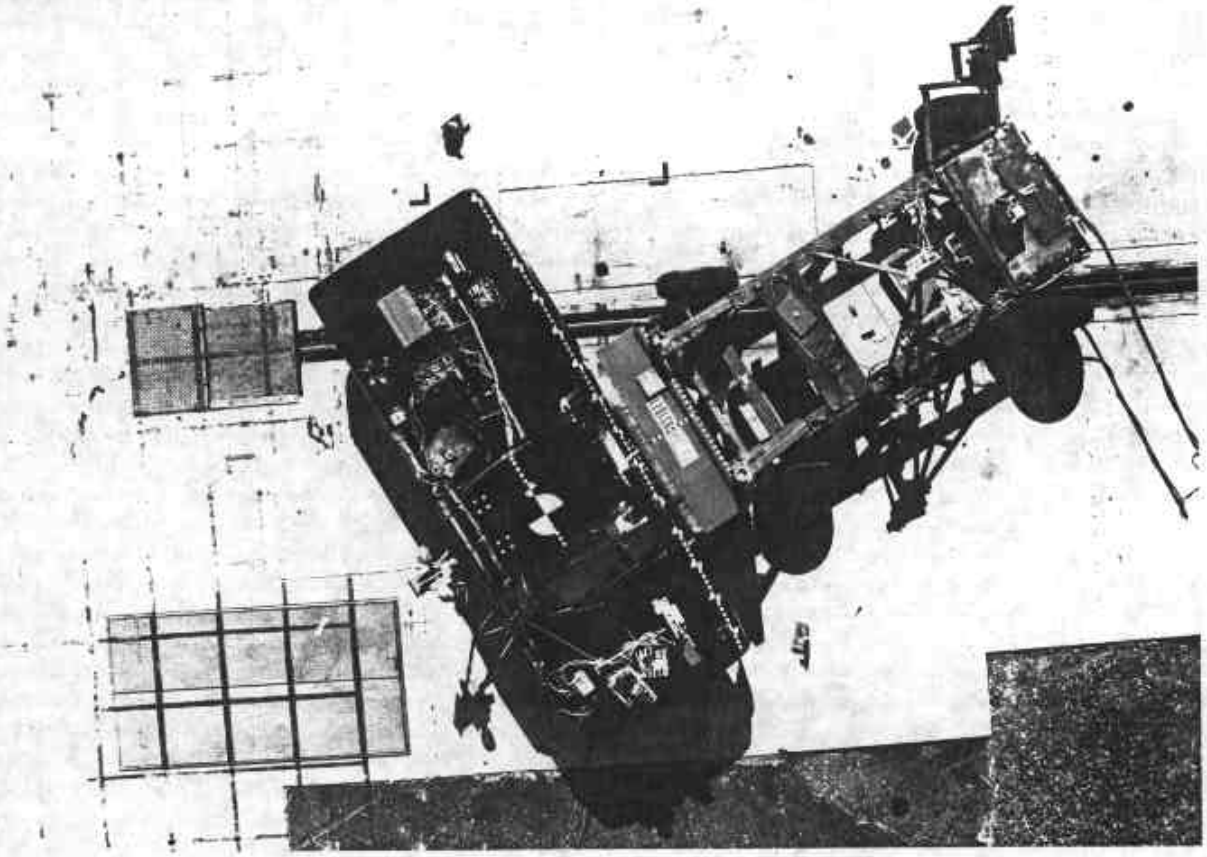


Figure A-15 PRE-TEST OVERHEAD VIEW

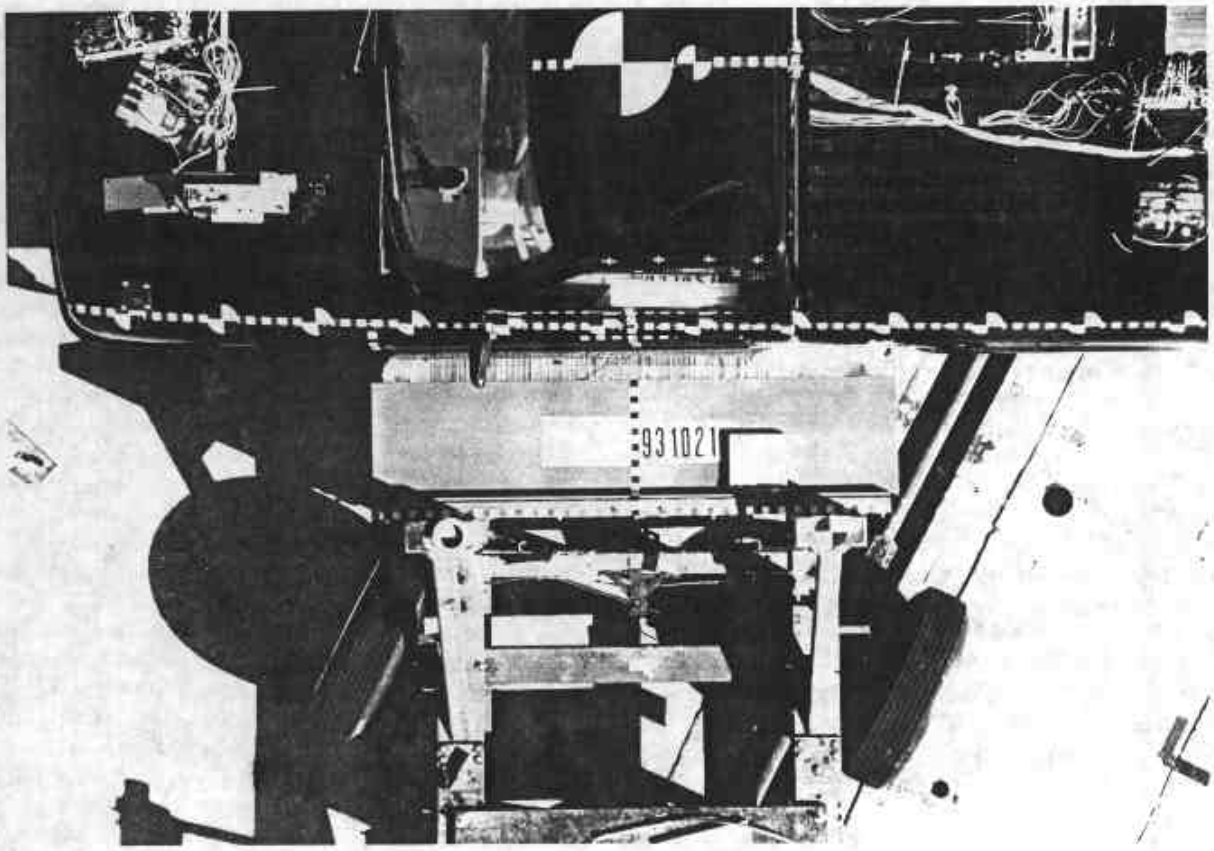


Figure A-16 PRE-TEST OVERHEAD CLOSE-UP VIEW

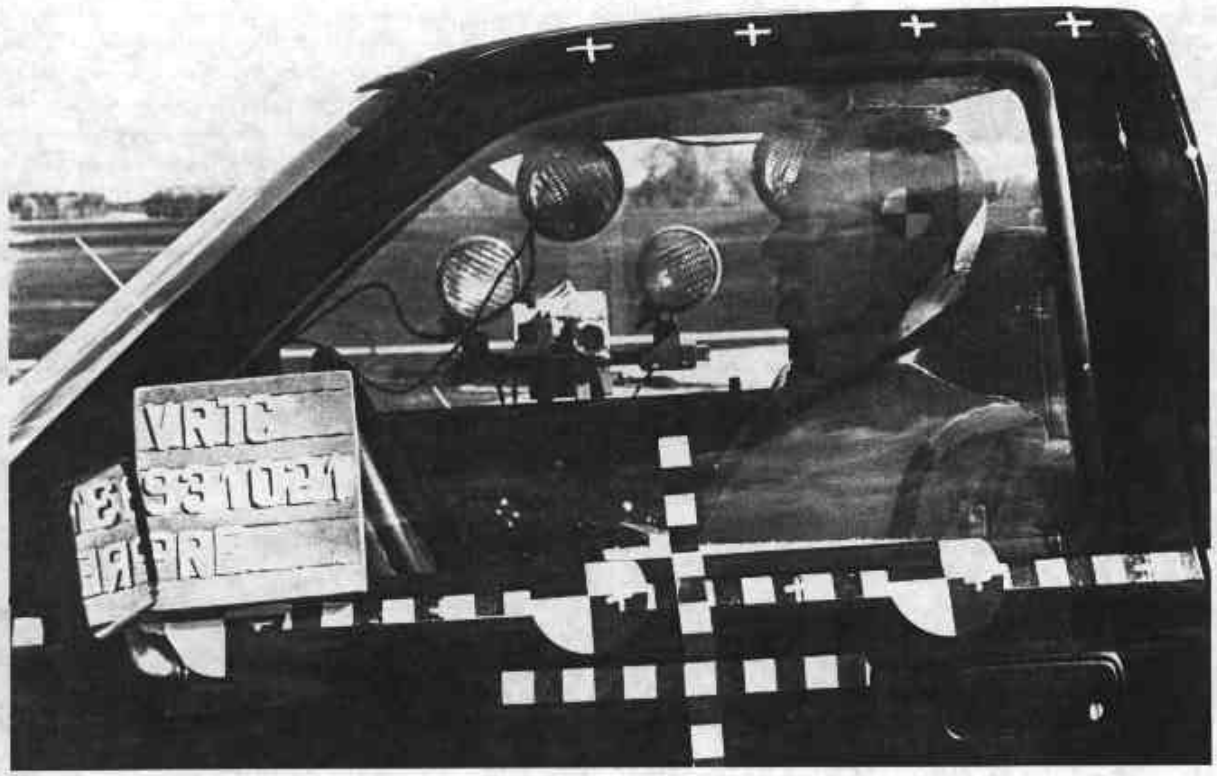


Figure A-17 PRE-TEST DRIVER DUMMY POSITION VIEW

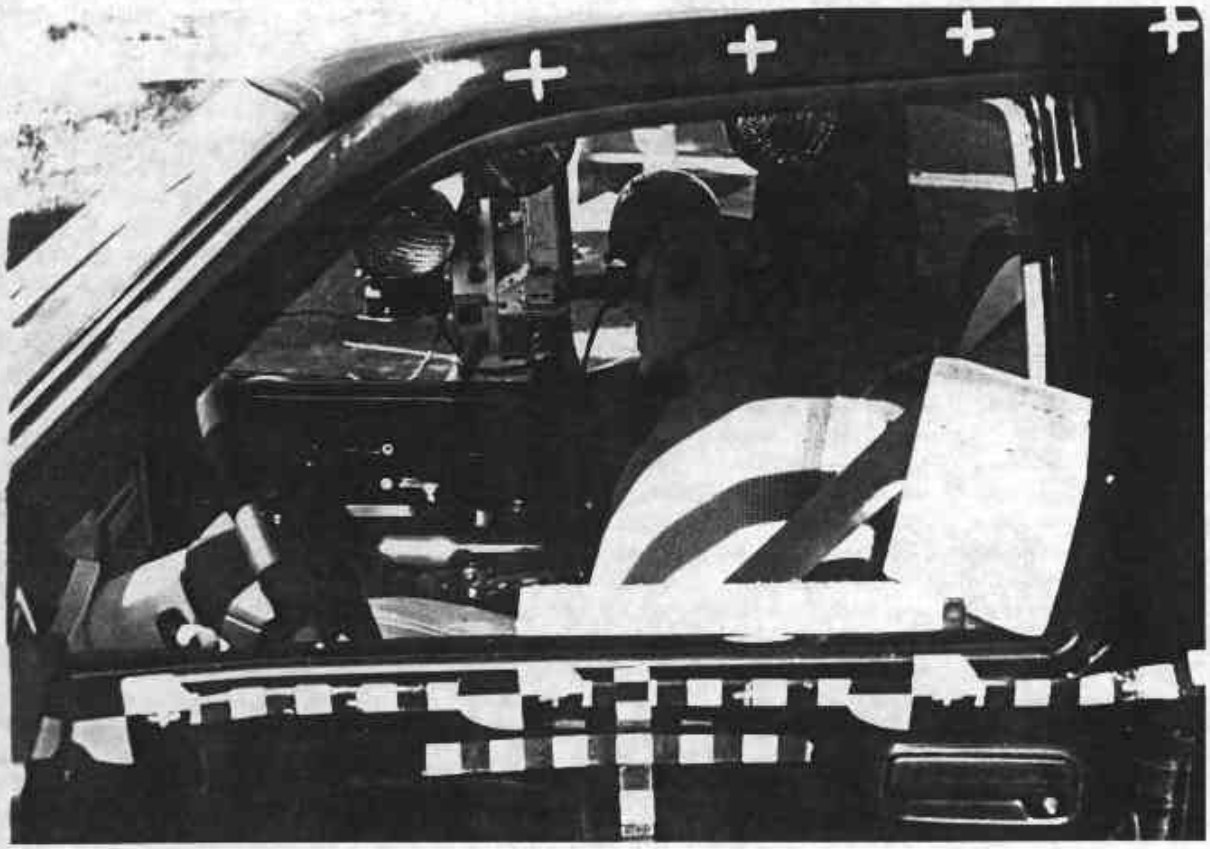


Figure A-18 POST-TEST DRIVER DUMMY POSITION VIEW

Figure A-19 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

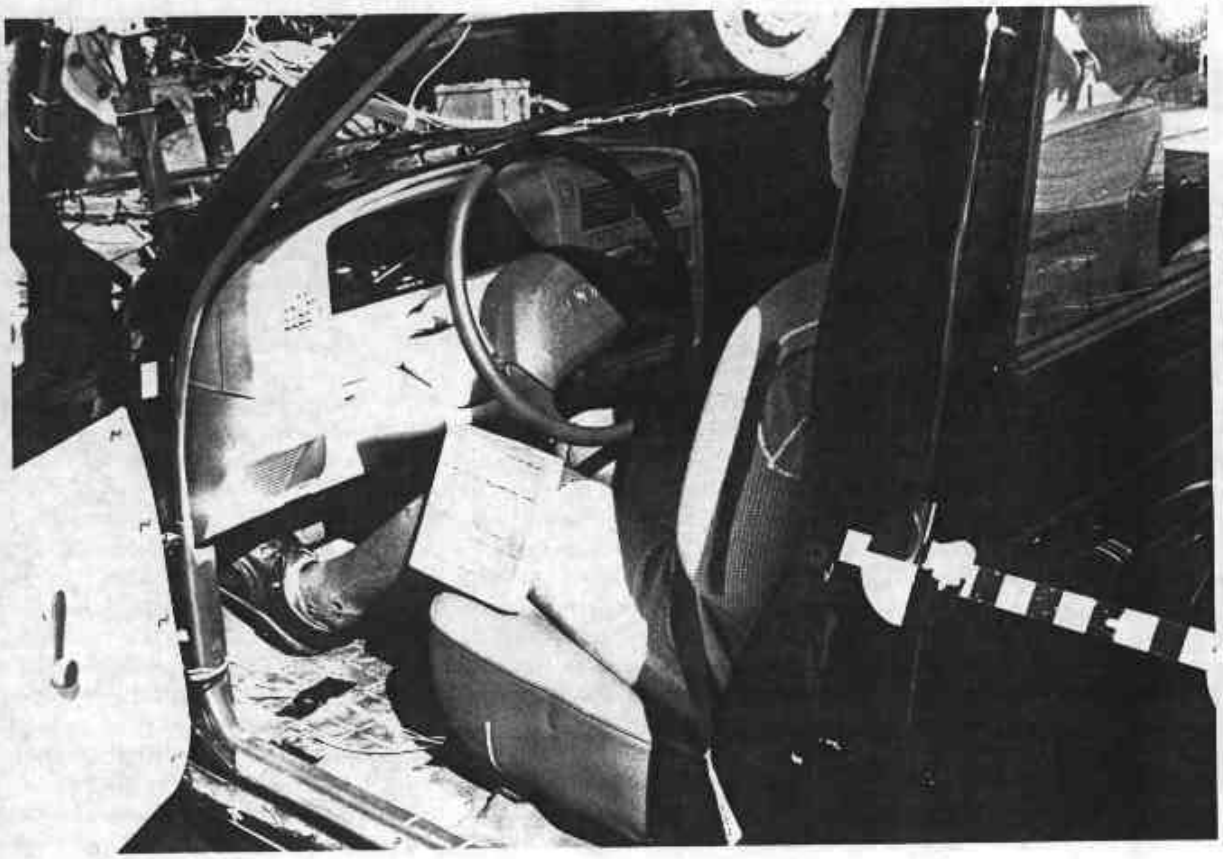


Figure A-20 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-21 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 3

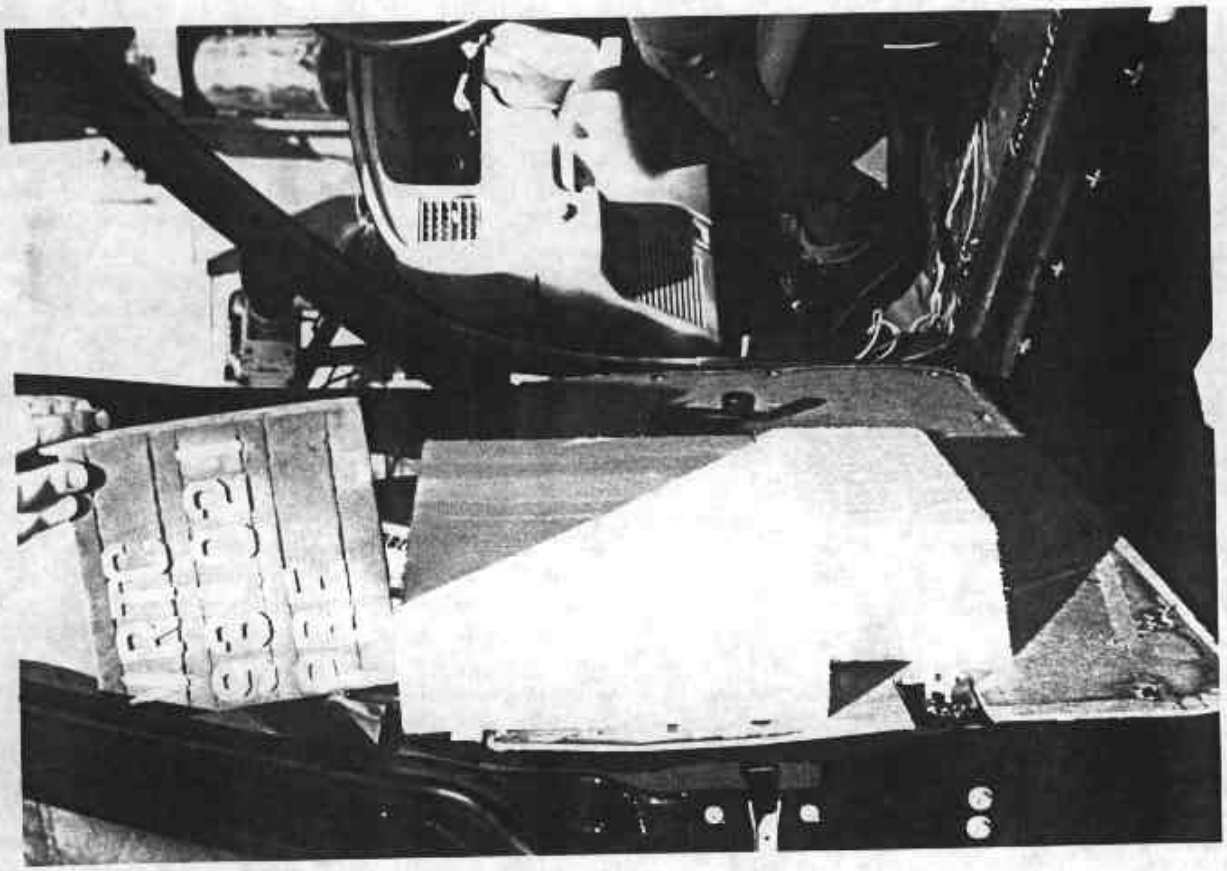


Figure A-22 PRE-TEST DRIVER DOOR PANEL - VIEW 1

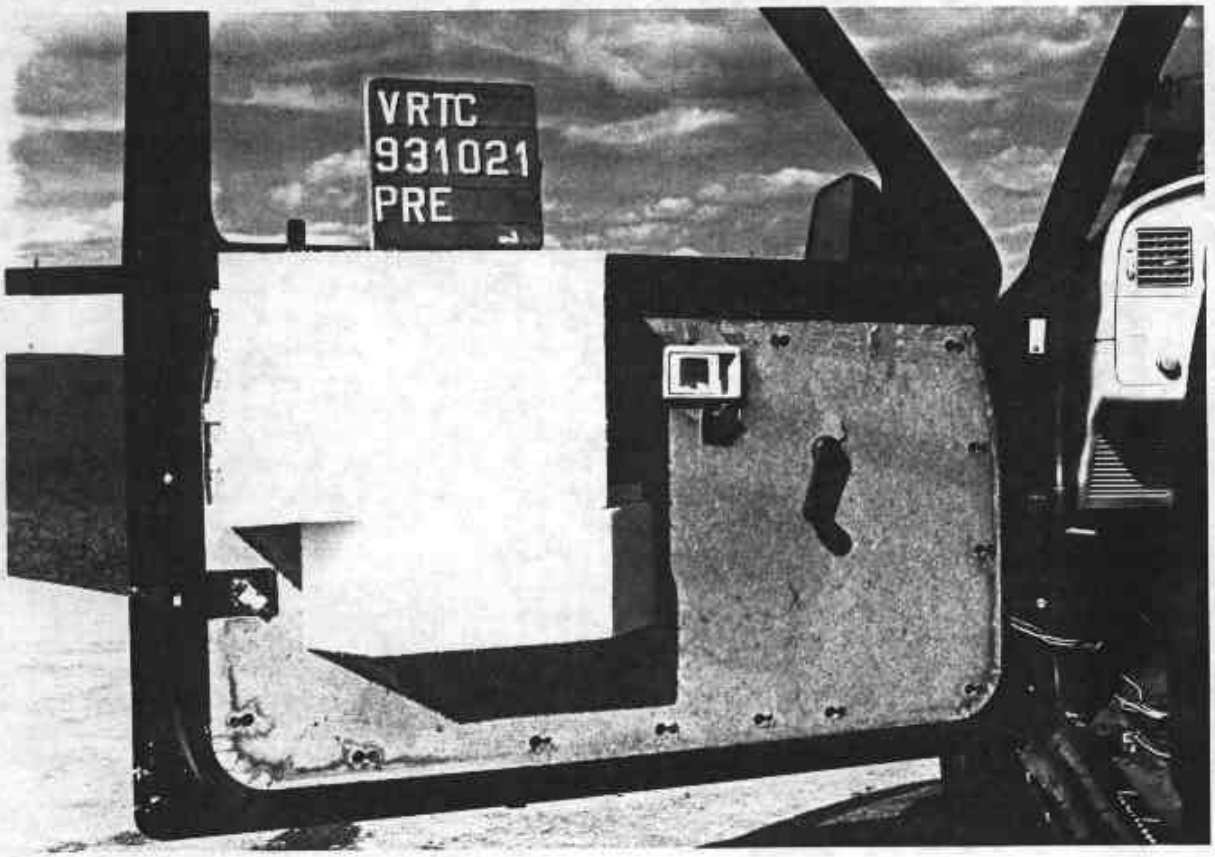


Figure A-23 PRE-TEST DRIVER DOOR PANEL - VIEW 2

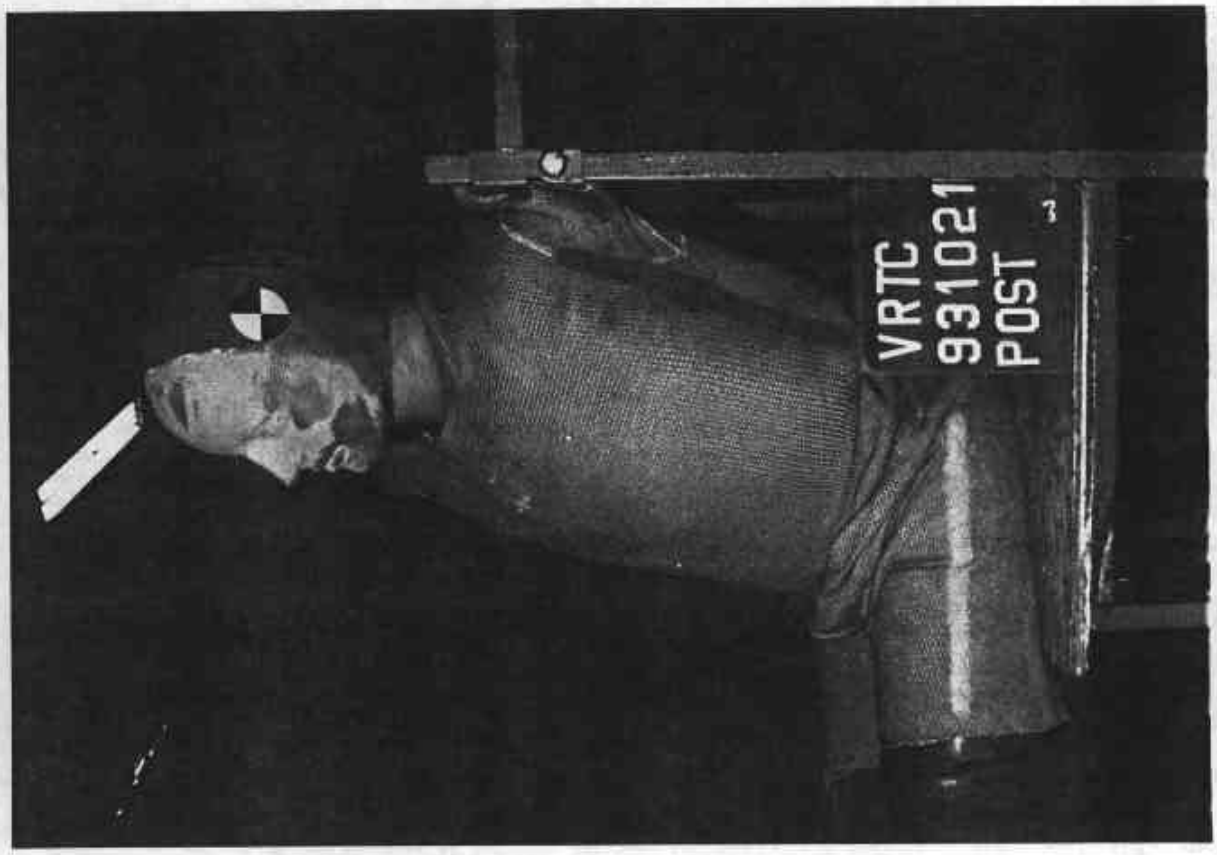


Figure A-24 POST-TEST DRIVER DUMMY CONTACT - VIEW 1

Figure A-25 POST-TEST DRIVER DUMMY CONTACT - VIEW 2

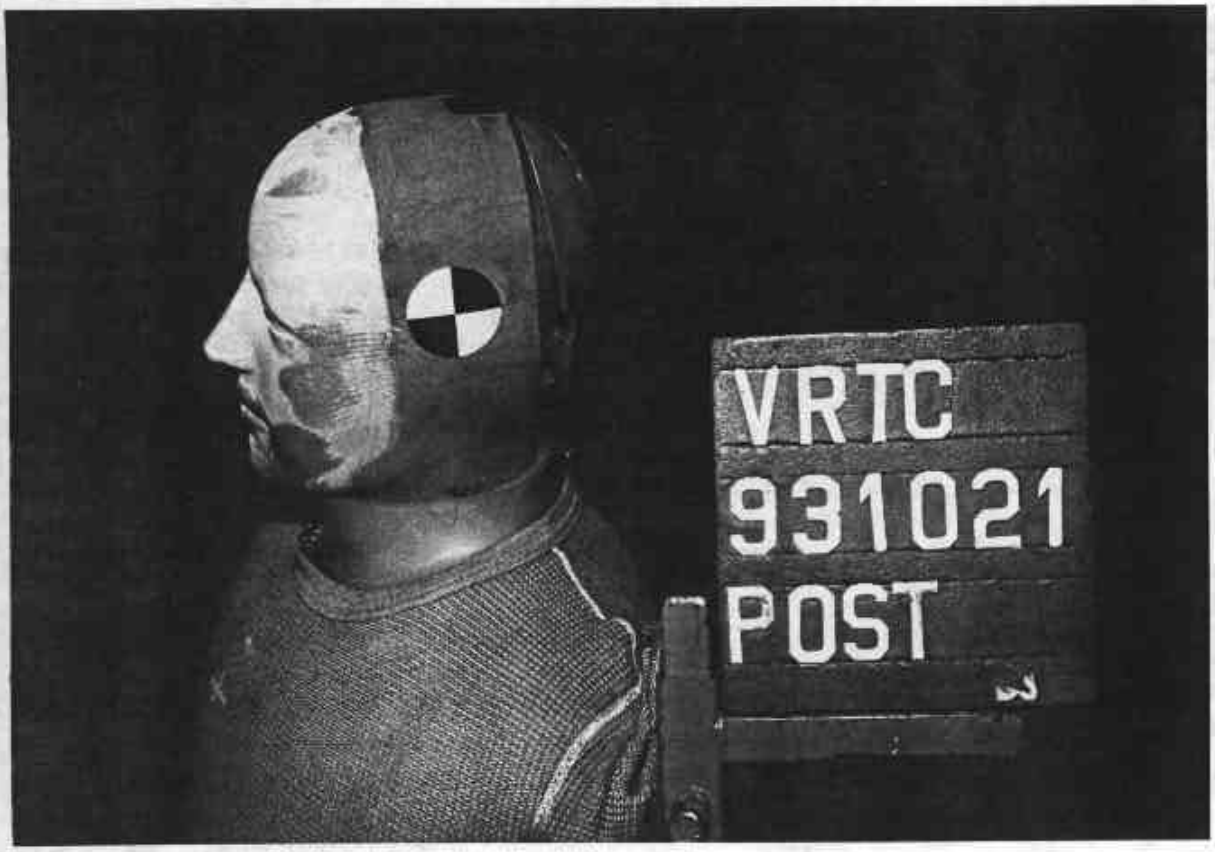


Figure A-26 POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

Figure A-27 POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

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

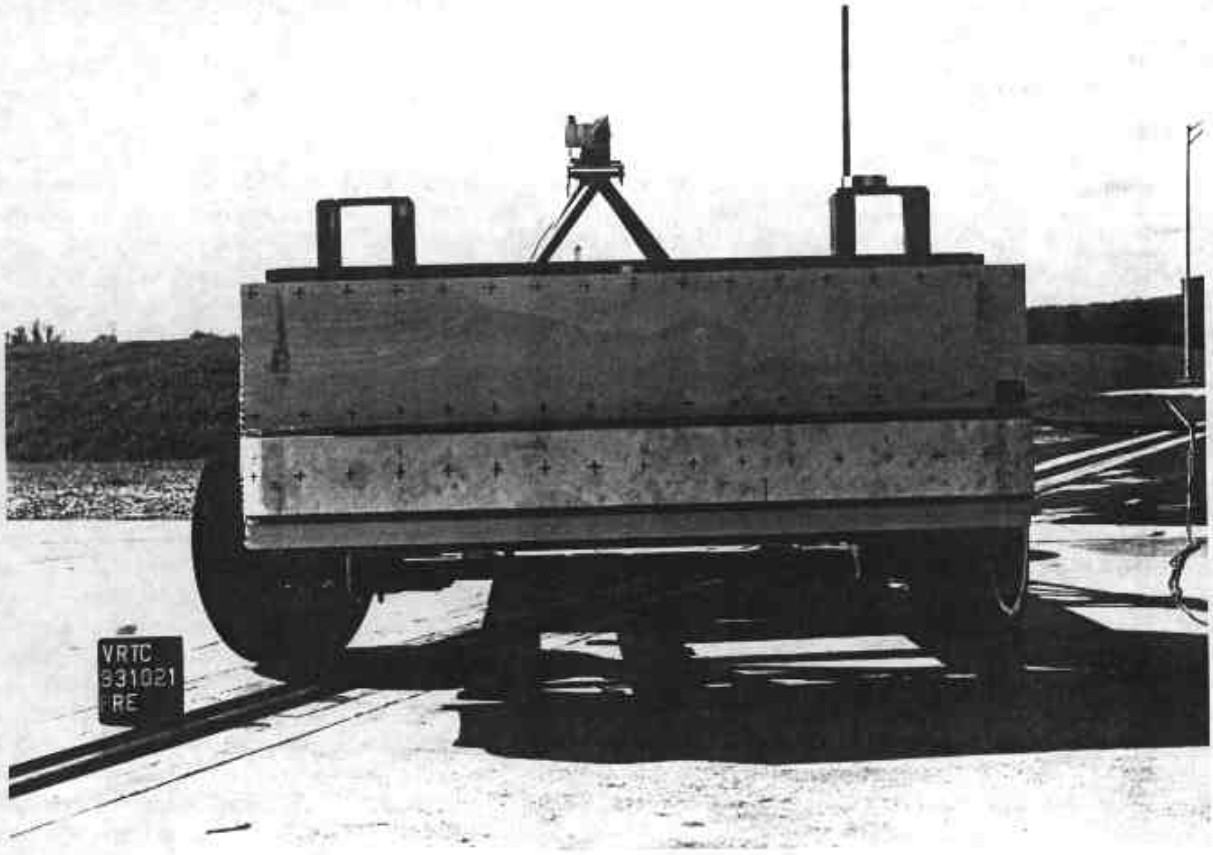


Figure A-29 PRE-TEST VEHICLE IMPACTOR FACE - FRONT VIEW

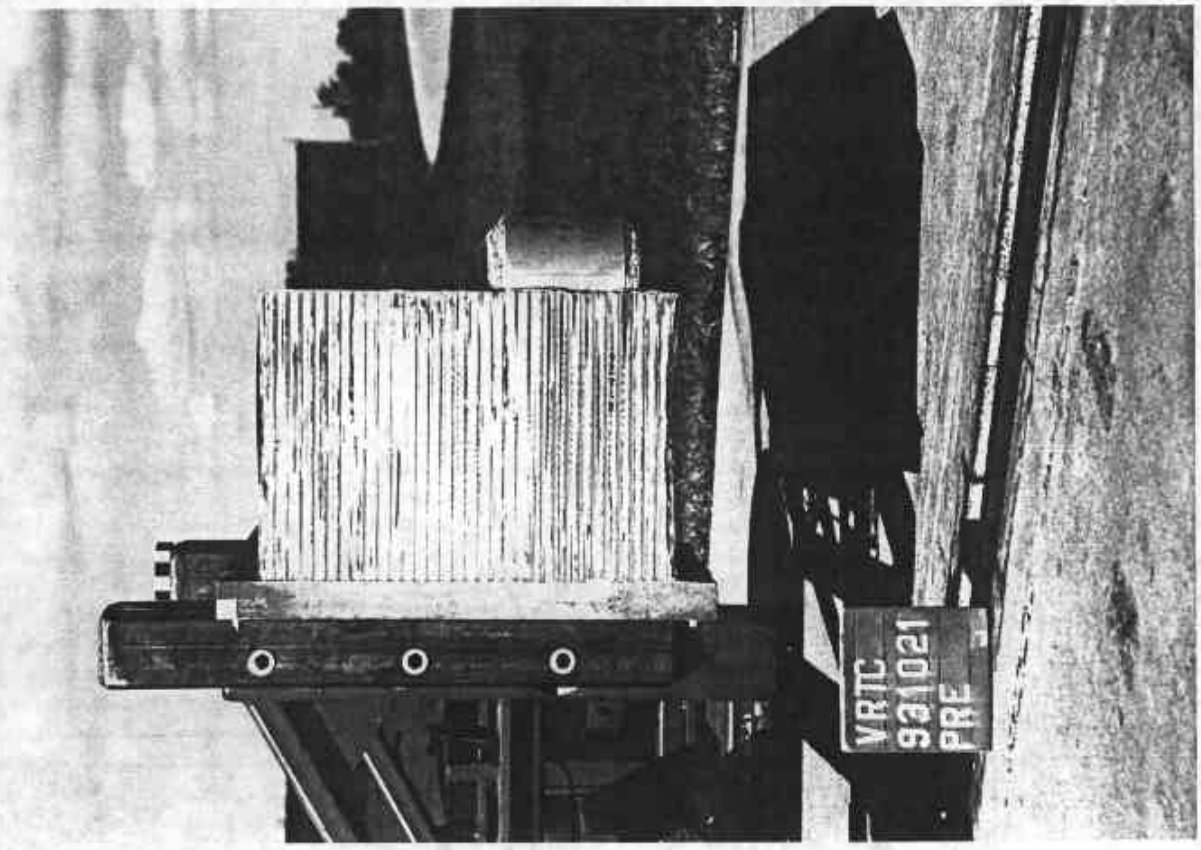


Figure A-30 PRE-TEST VEHICLE IMPACTOR FACE - RIGHT SIDE VIEW

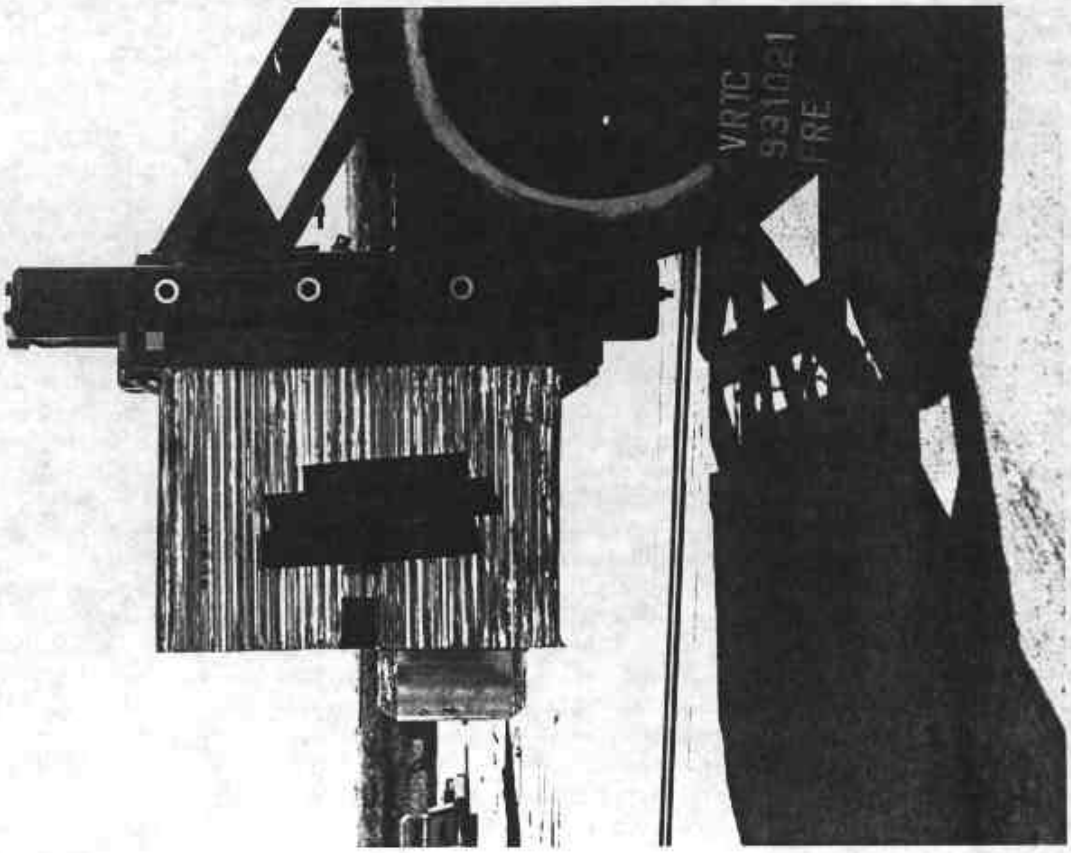


Figure A-31 PRE-TEST VEHICLE IMPACTOR FACE - LEFT SIDE VIEW

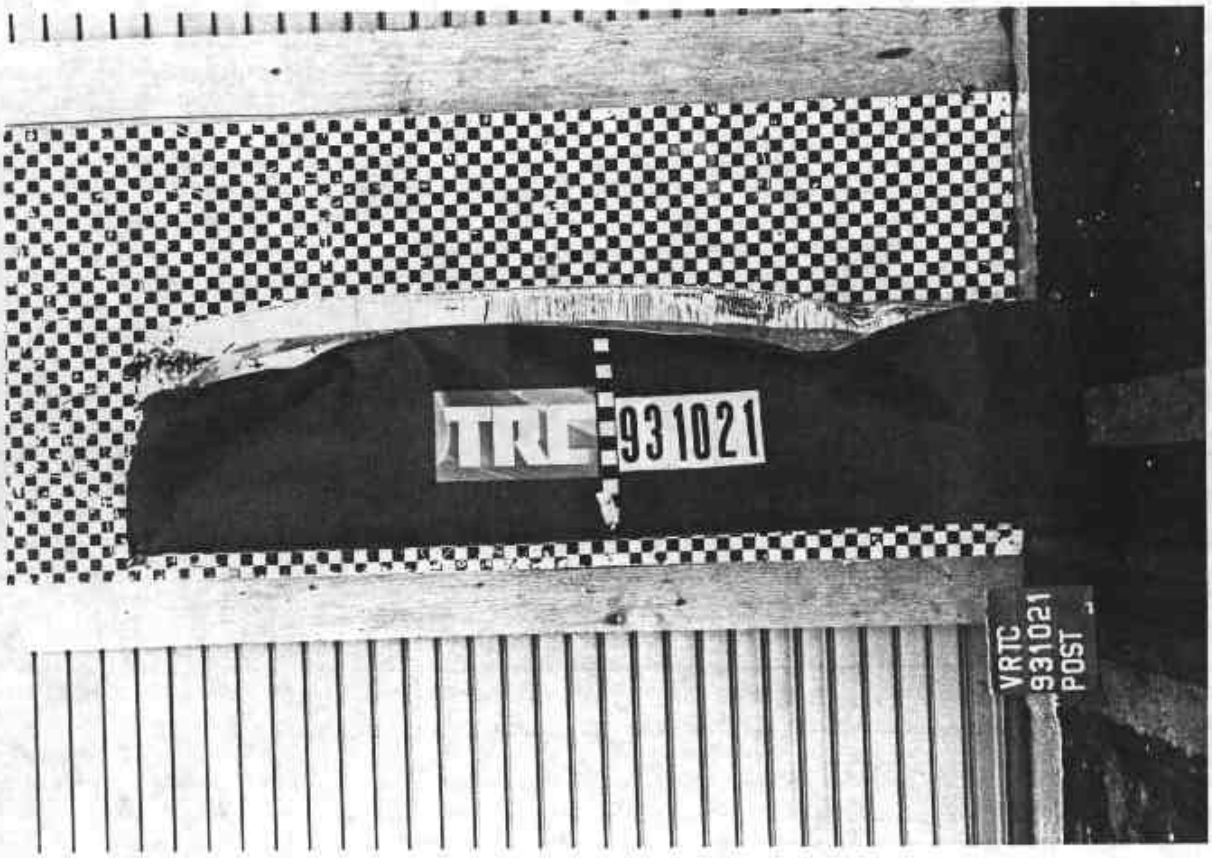


Figure A-32 POST-TEST VEHICLE IMPACTOR FACE - TOP VIEW

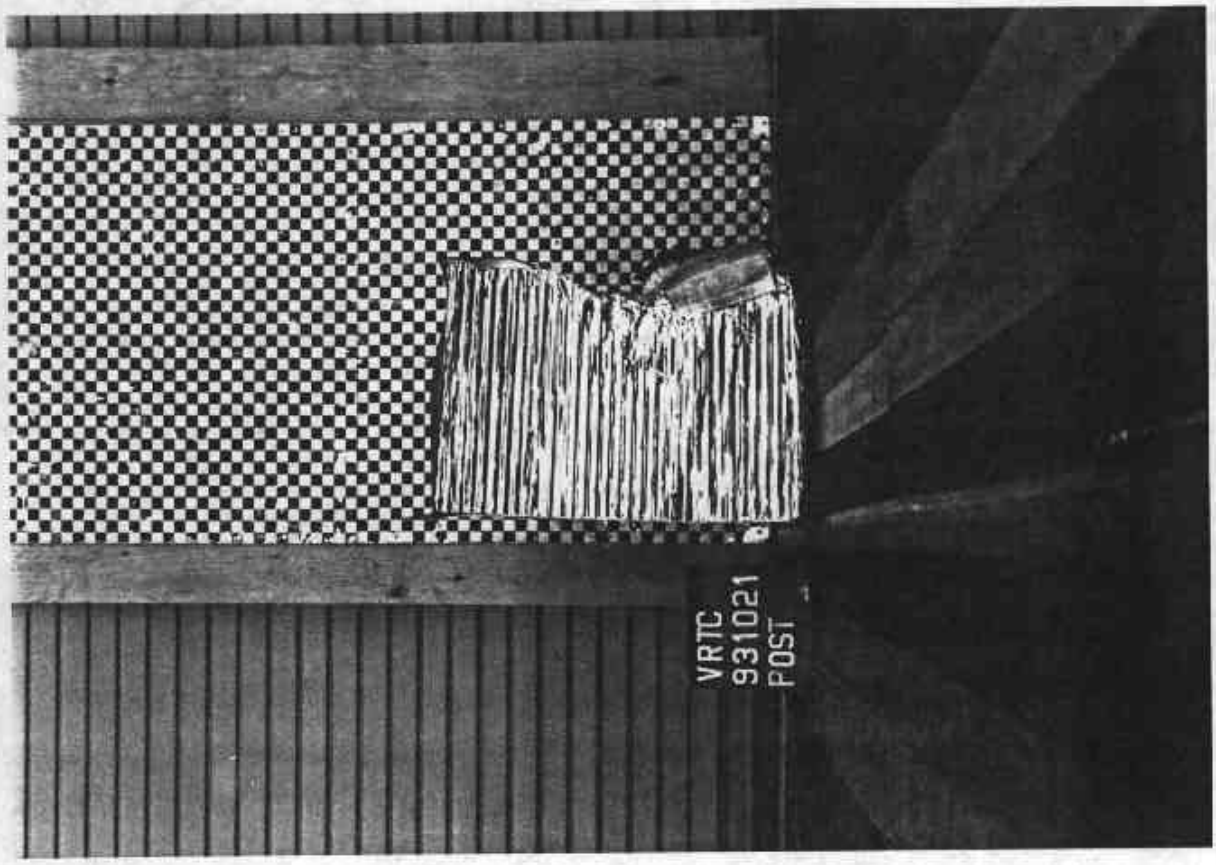


Figure A-33 POST-TEST VEHICLE IMPACTOR FACE - RIGHT SIDE VIEW

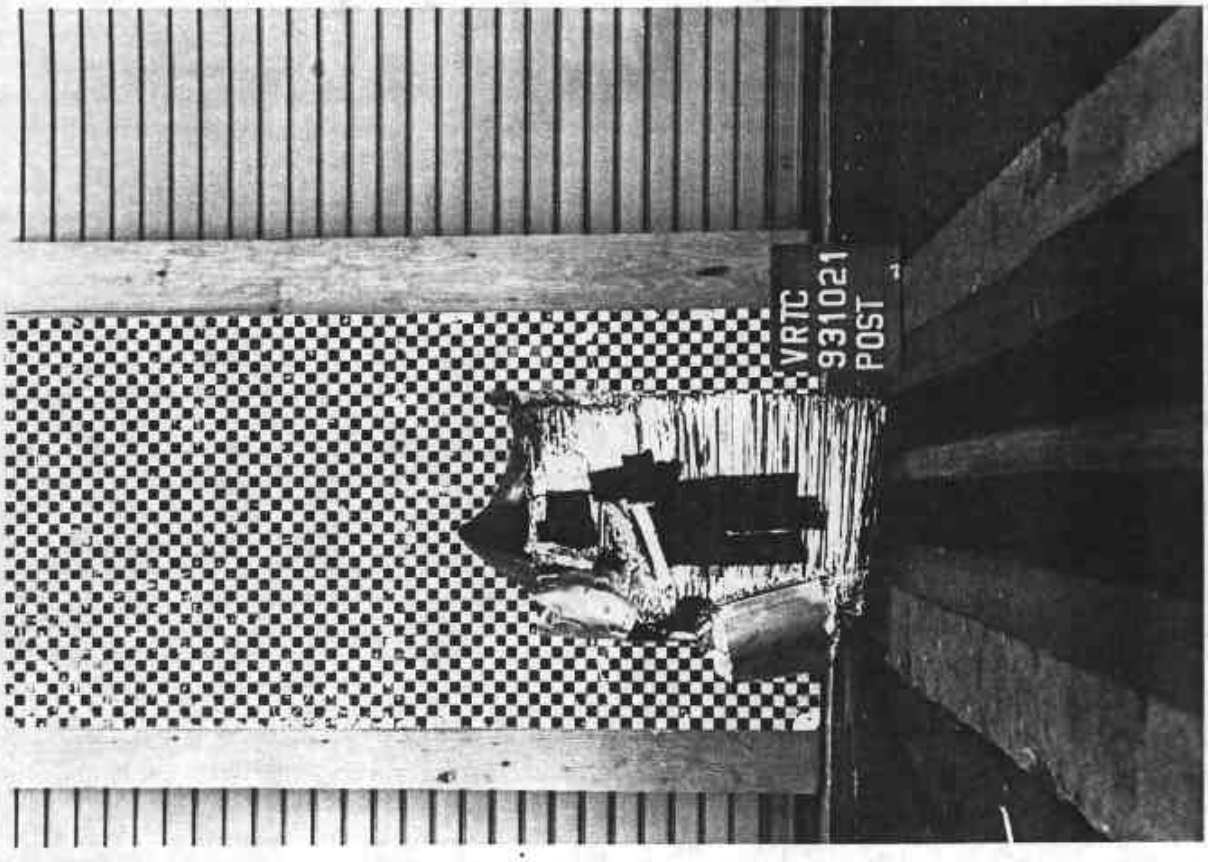


Figure A-34 POST-TEST VEHICLE IMPACTOR FACE - LEFT SIDE VIEW

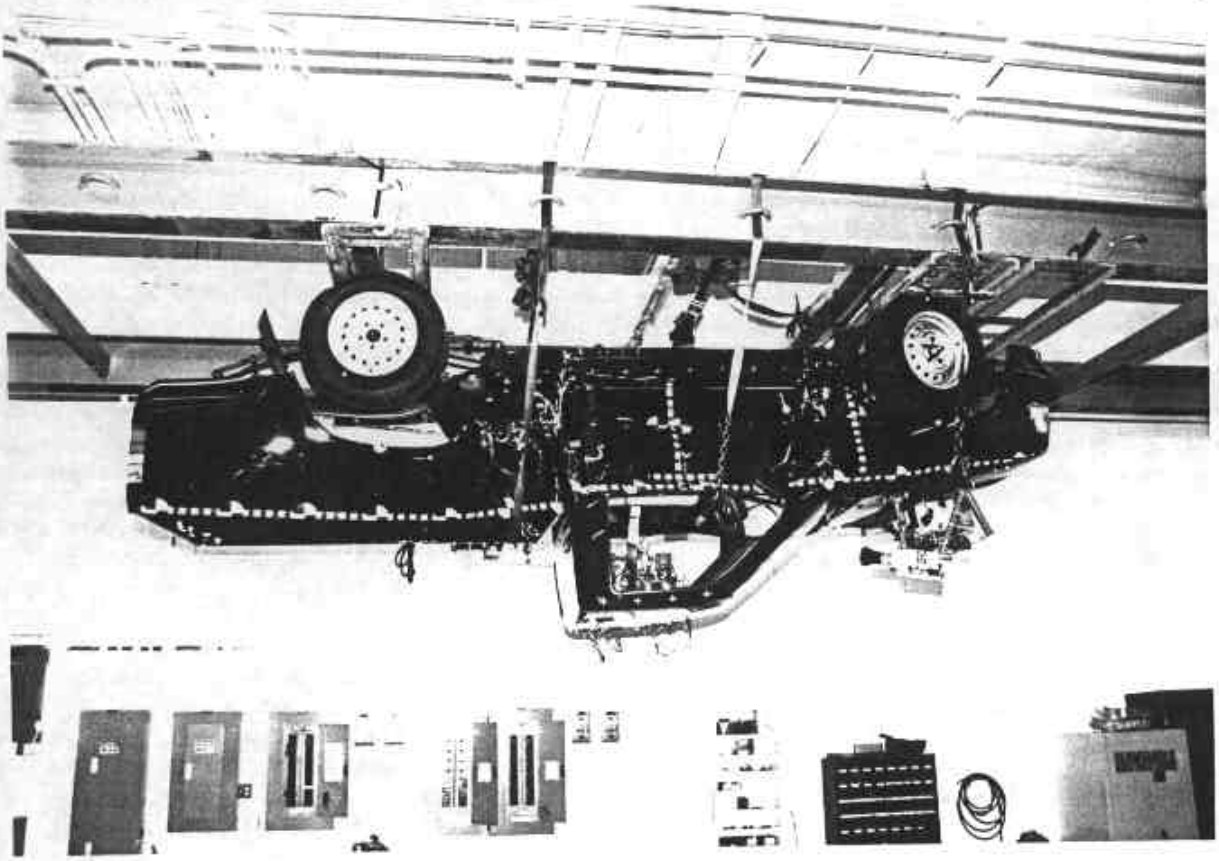
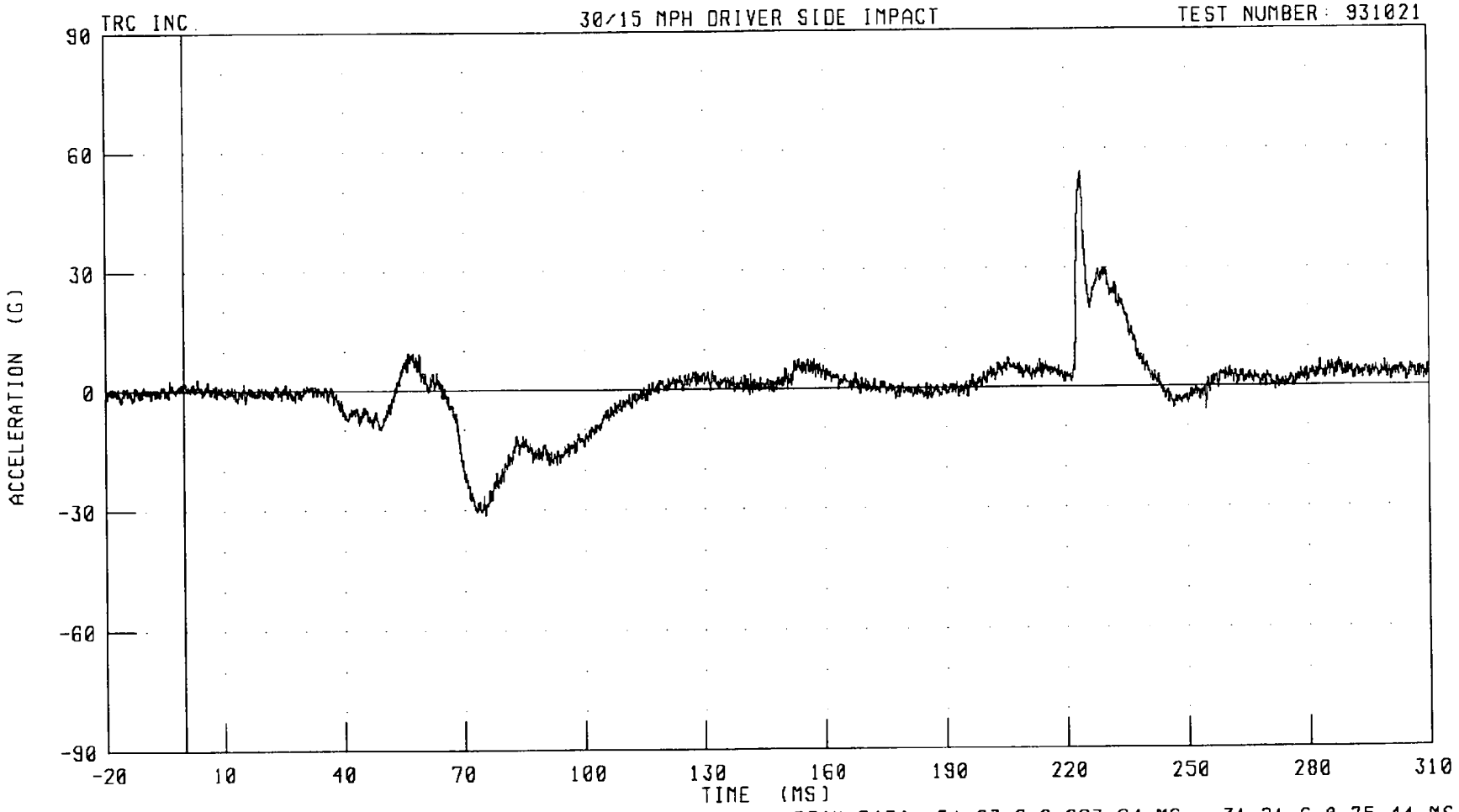


Figure A-35 POST-TEST VEHICLE ON STATIC ROLLOVER DEVICE

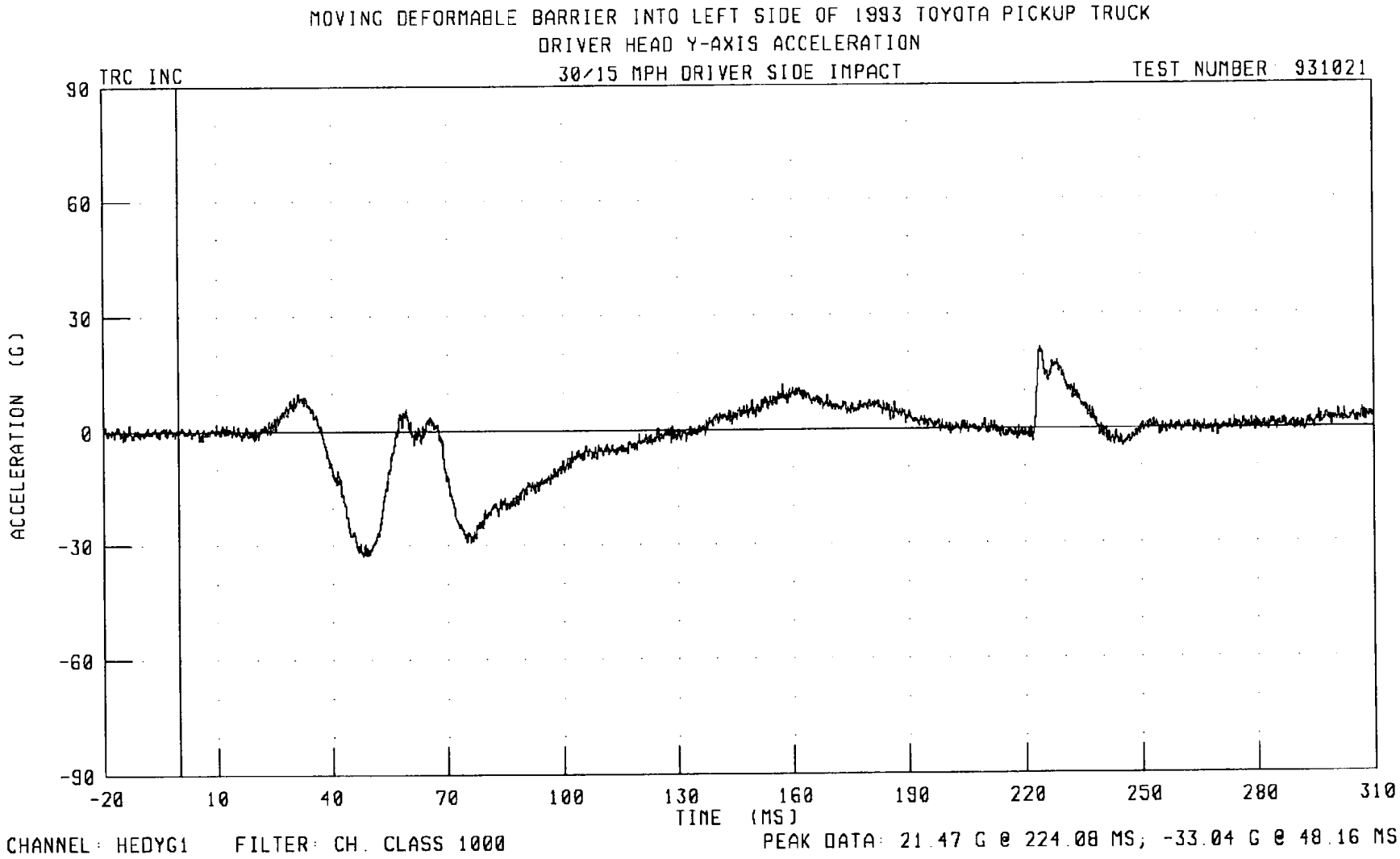
APPENDIX B

DATA PLOTS

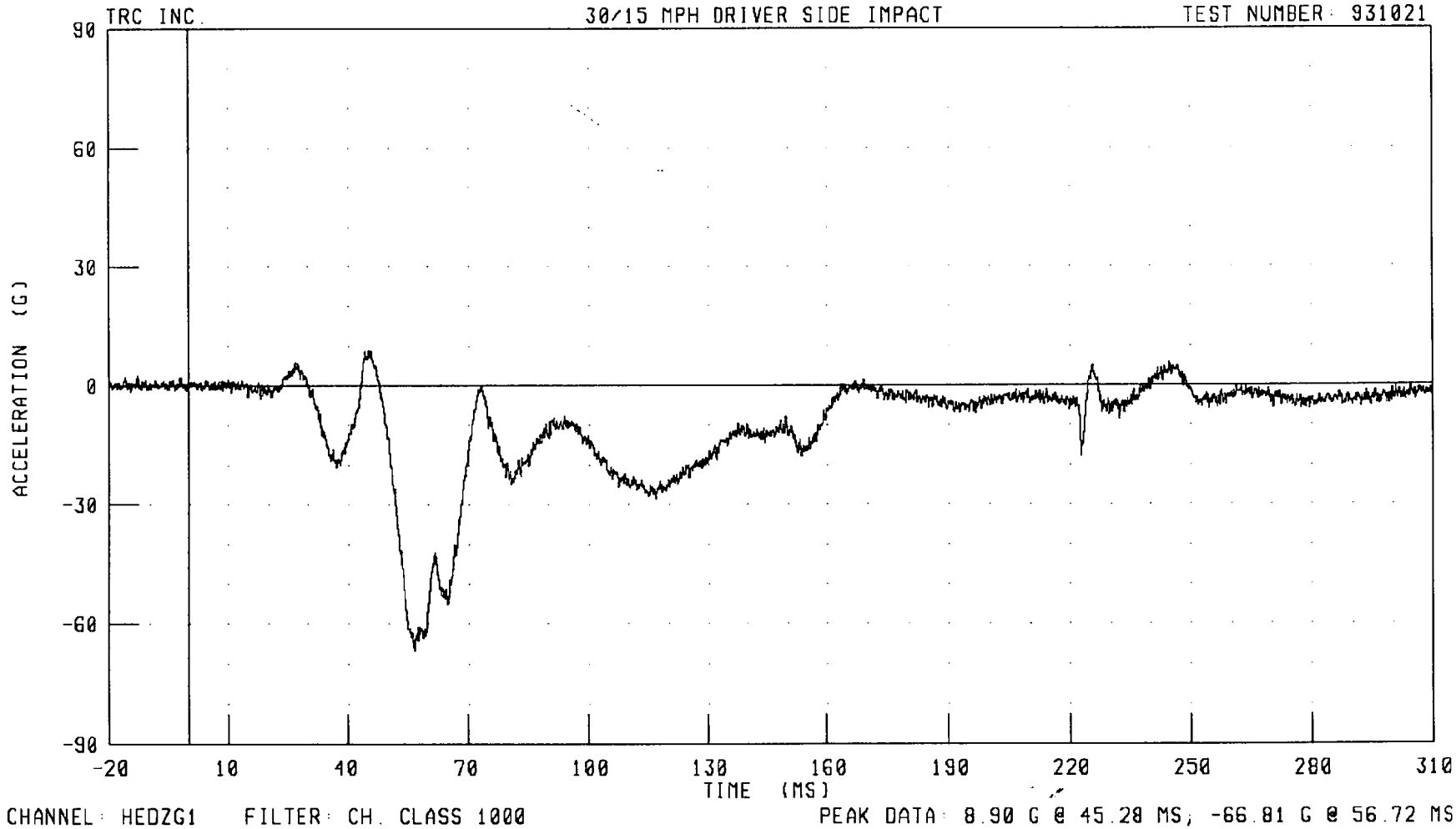
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER HEAD X-AXIS ACCELERATION
30/15 MPH DRIVER SIDE IMPACT



CHANNEL: HEDXG1 FILTER: CH. CLASS 1000 PEAK DATA: 54.03 G @ 223.84 MS; -31.21 G @ 75.44 MS

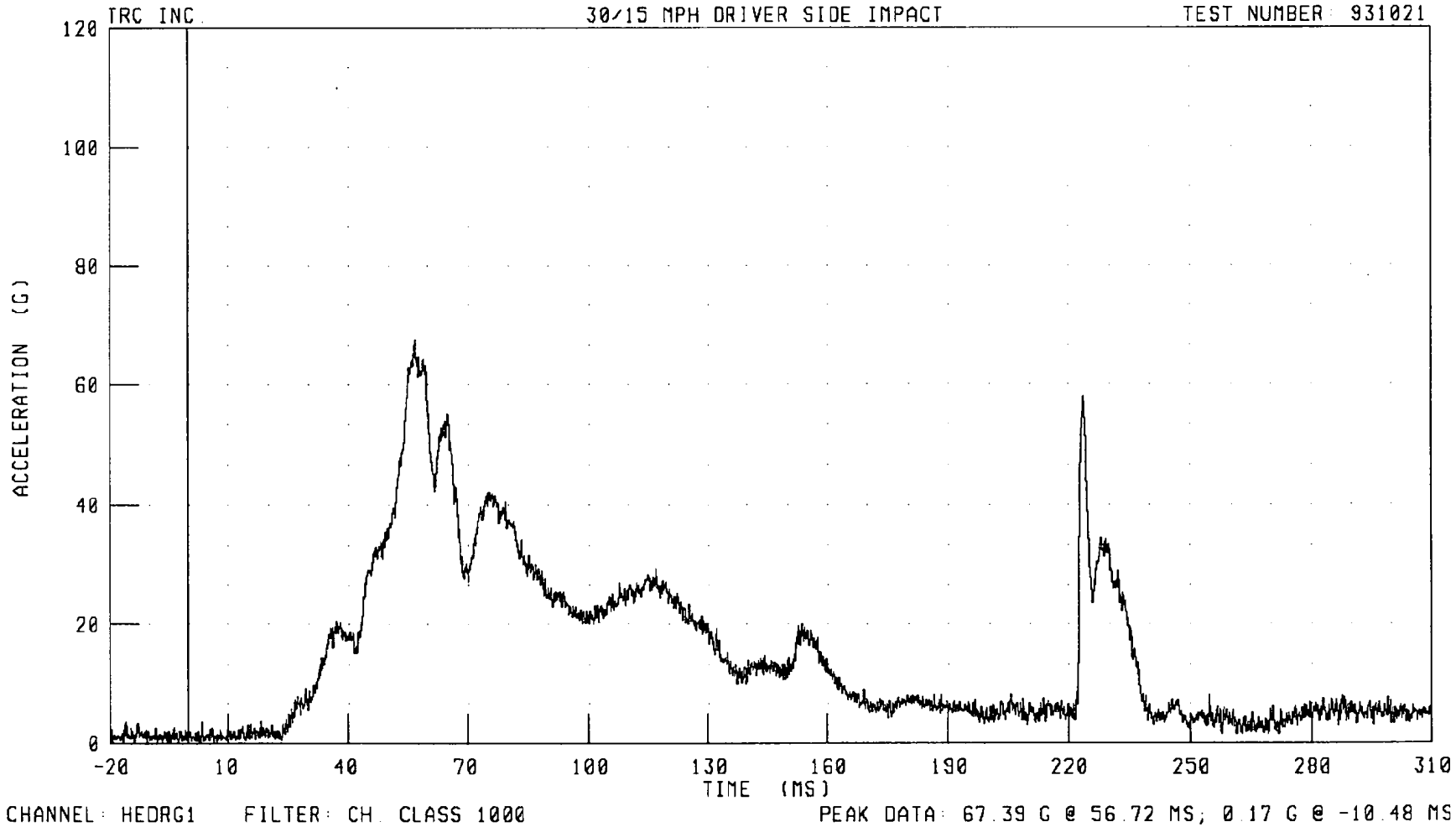

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER HEAD Y-AXIS ACCELERATION
30/15 MPH DRIVER SIDE IMPACT
TRC INC
TEST NUMBER: 931021
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG1
FILTER: CH. CLASS 1000
PEAK DATA: 21.47 G @ 224.08 MS; -33.04 G @ 48.16 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER HEAD Z-AXIS ACCELERATION

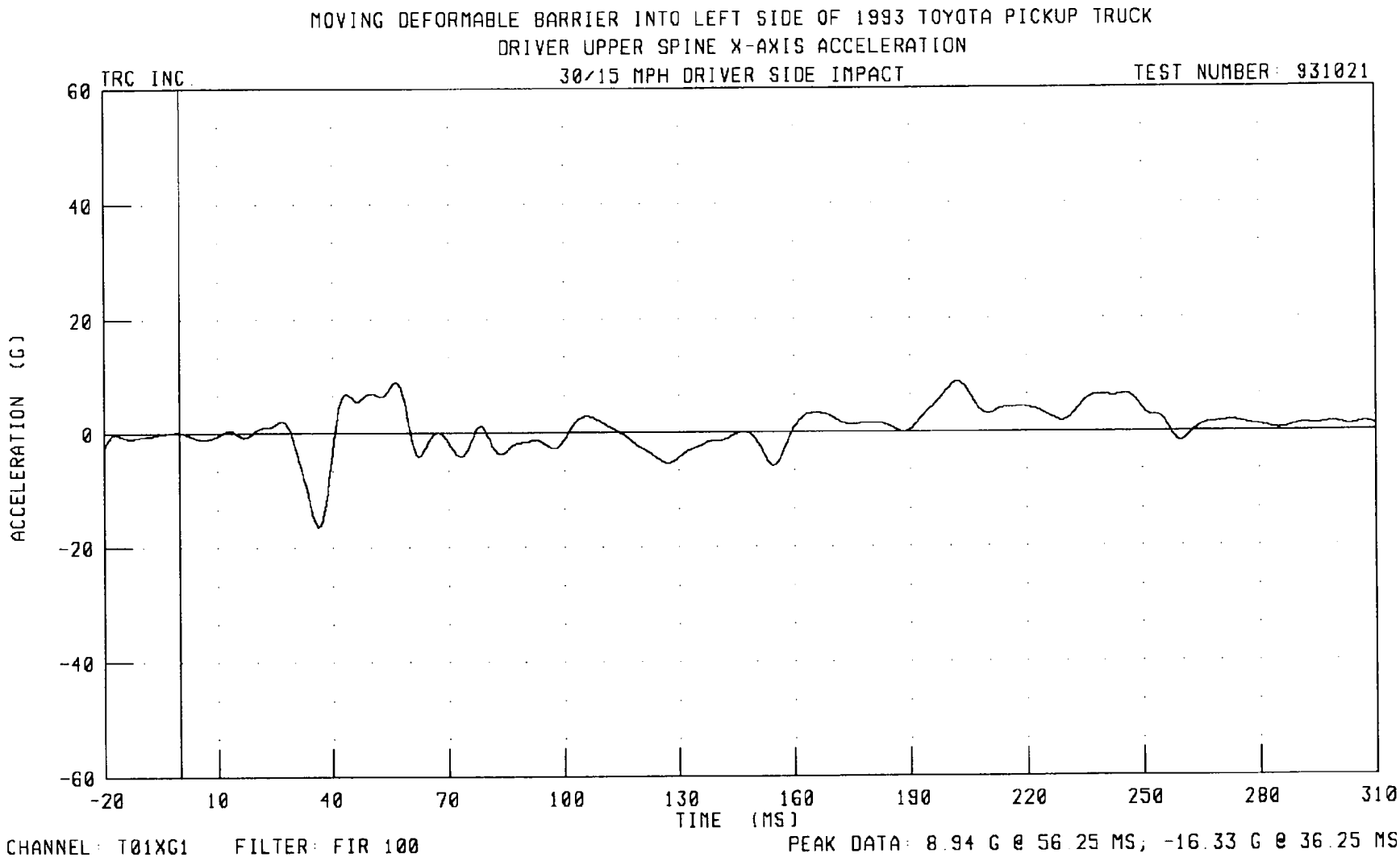


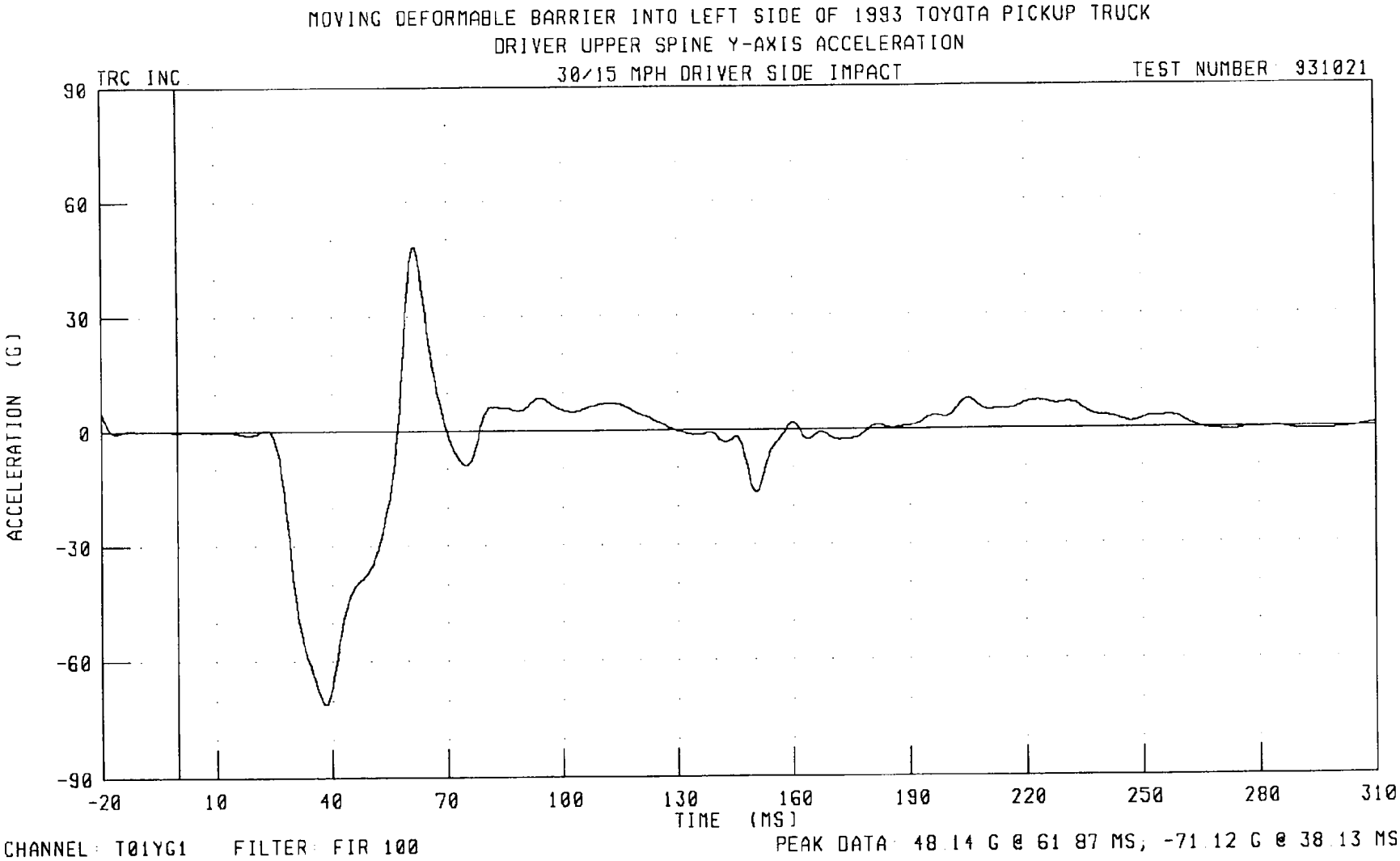
CHANNEL: HEDZG1 FILTER: CH. CLASS 1000 PEAK DATA: 8.90 G @ 45.28 MS; -66.81 G @ 56.72 MS

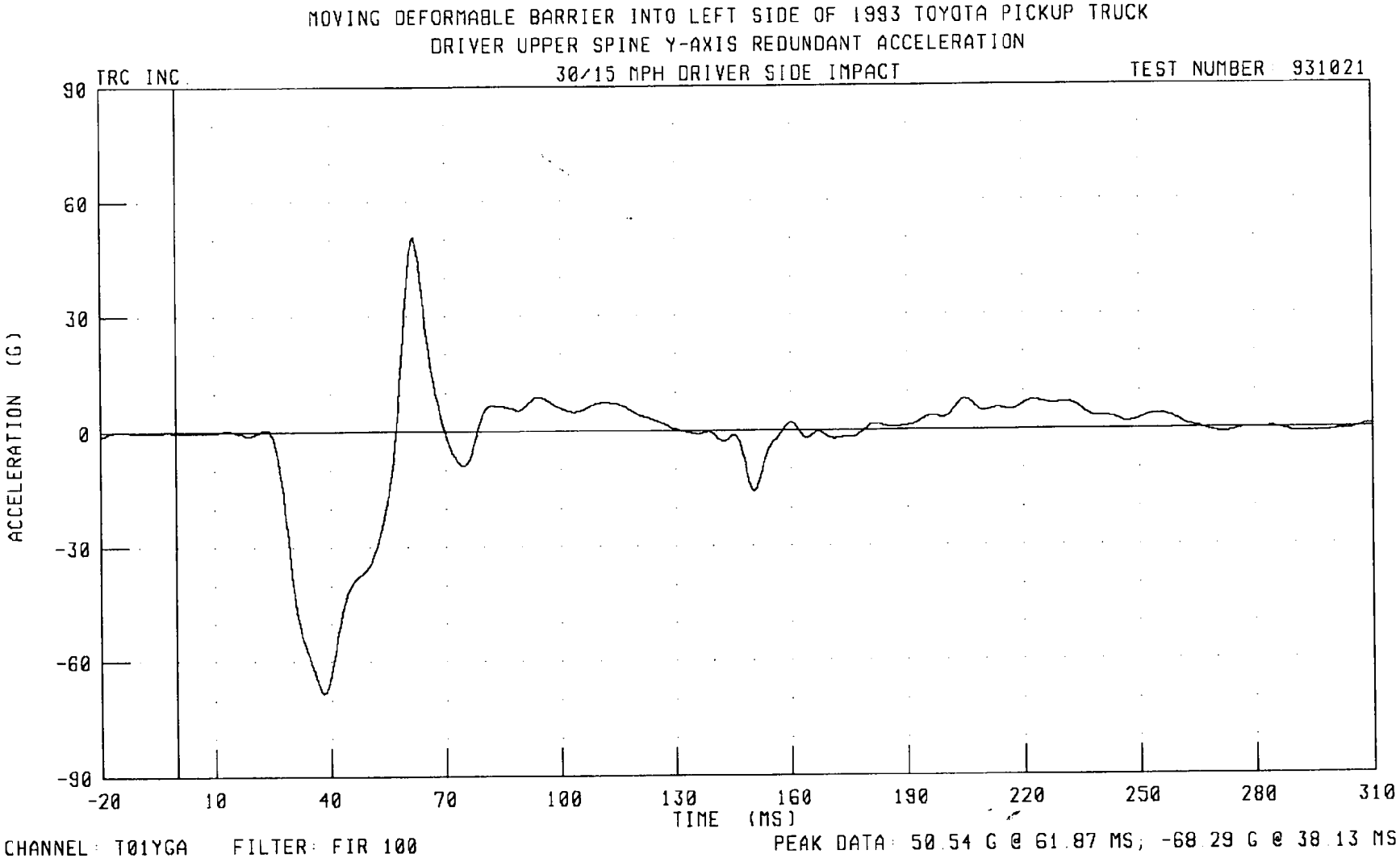
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER HEAD RESULTANT ACCELERATION



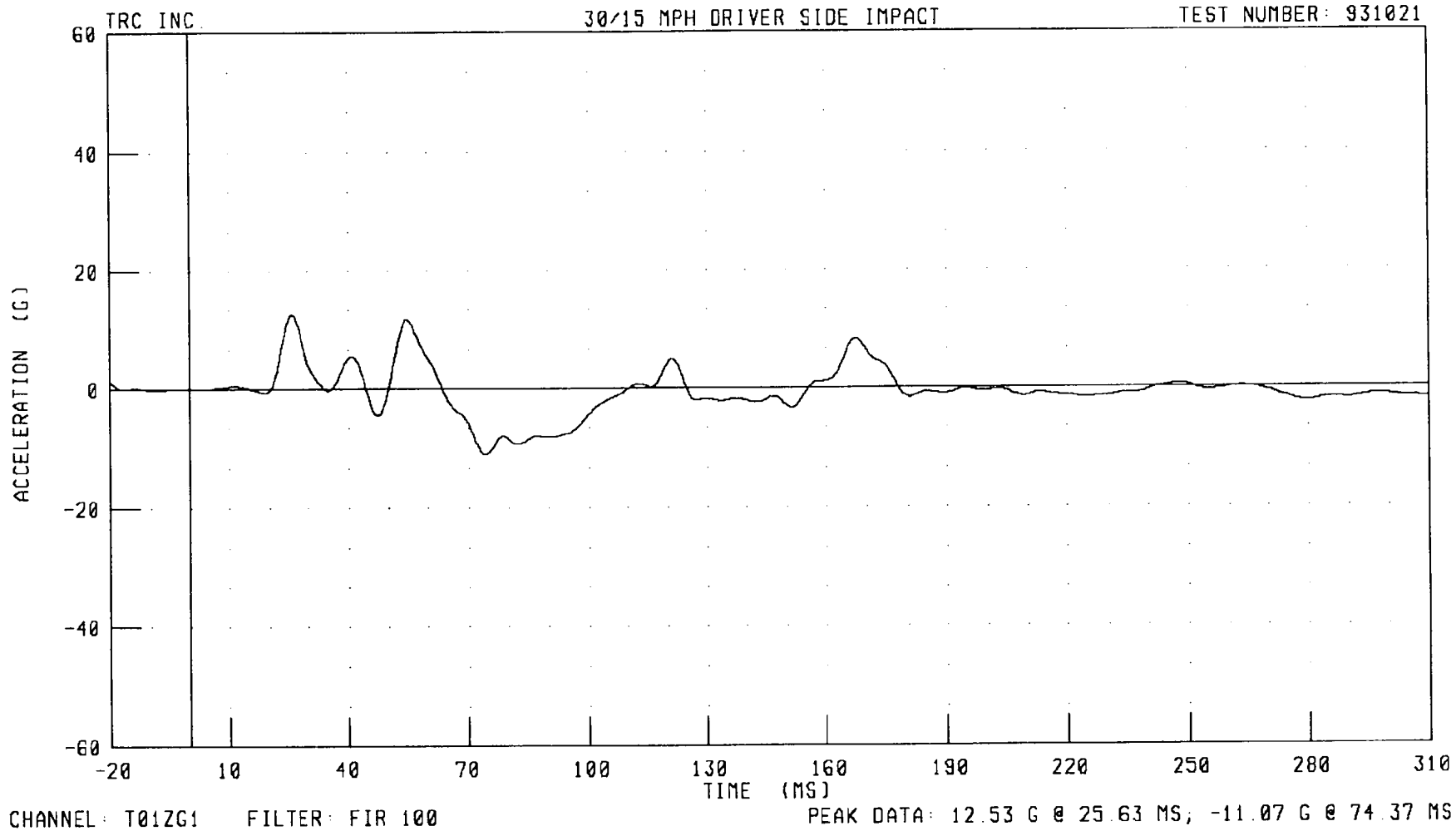
CHANNEL: HEDRG1 FILTER: CH CLASS 1000 PEAK DATA: 67.39 G @ 56.72 MS; 0.17 G @ -10.48 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE X-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: T01XG1
FILTER: FIR 100
PEAK DATA: 8.94 G @ 56.25 MS; -16.33 G @ 36.25 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL T01YG1
FILTER FIR 100
PEAK DATA 48.14 G @ 61.87 MS, -71.12 G @ 38.13 MS

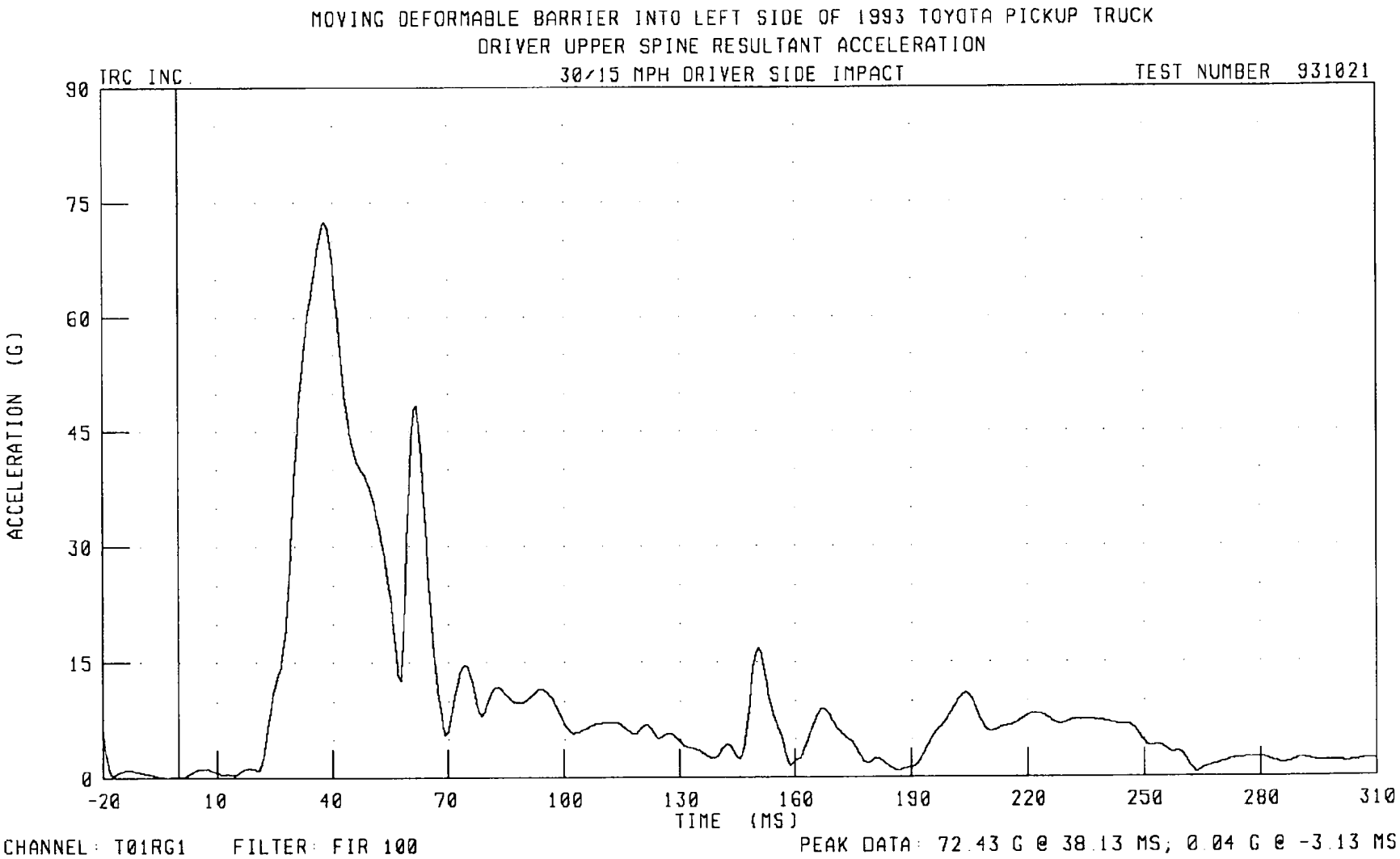

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE Y-AXIS REDUNDANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL T01YGA
FILTER FIR 100
PEAK DATA 50.54 G @ 61.87 MS; -68.29 G @ 38.13 MS

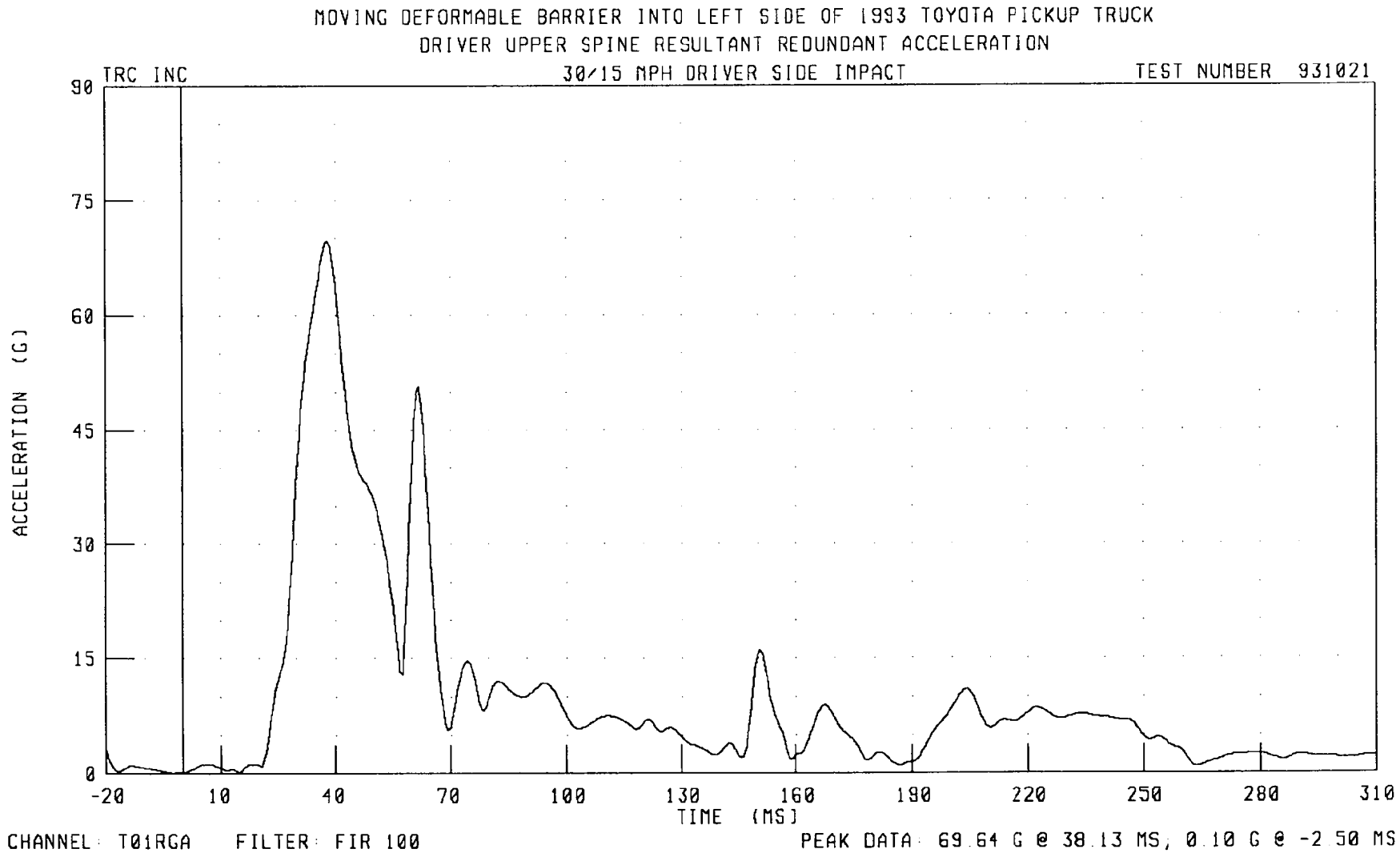
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE Z-AXIS ACCELERATION



CHANNEL: T01ZG1 FILTER: FIR 100

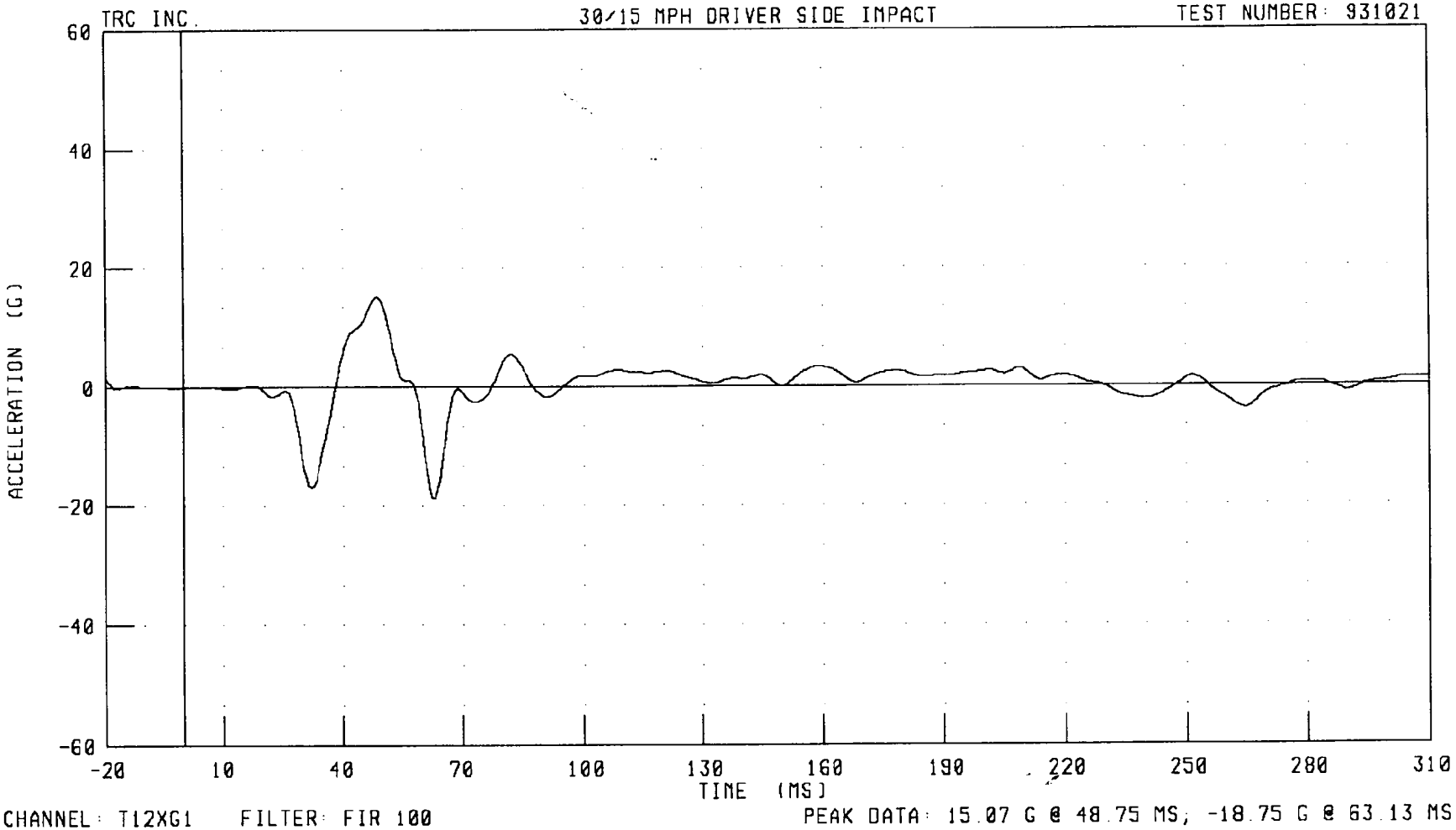
PEAK DATA: 12.53 G @ 25.63 MS; -11.07 G @ 74.37 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE RESULTANT ACCELERATION
IRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
ACCELERATION (G)
90
75
60
45
30
15
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: T01RG1
FILTER: FIR 100
PEAK DATA: 72.43 G @ 38.13 MS; 0.04 G @ -3.13 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER UPPER SPINE RESULTANT REDUNDANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
ACCELERATION (G)
90
75
60
45
30
15
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL T01RGA
FILTER FIR 100
PEAK DATA 69.64 G @ 38.13 MS, 0.10 G @ -2.50 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK

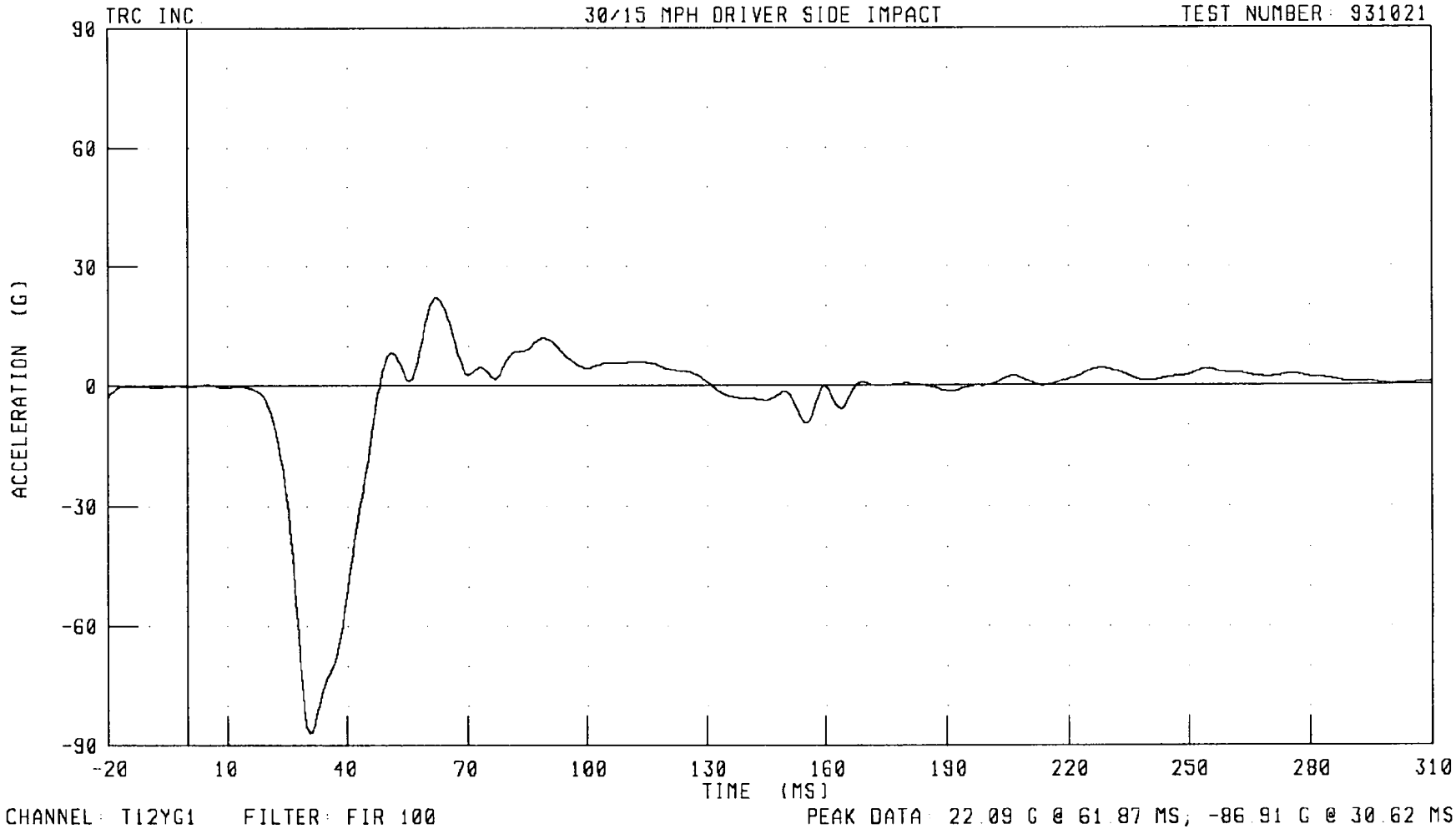
DRIVER LOWER SPINE X-AXIS ACCELERATION



CHANNEL: T12XG1 FILTER: FIR 100

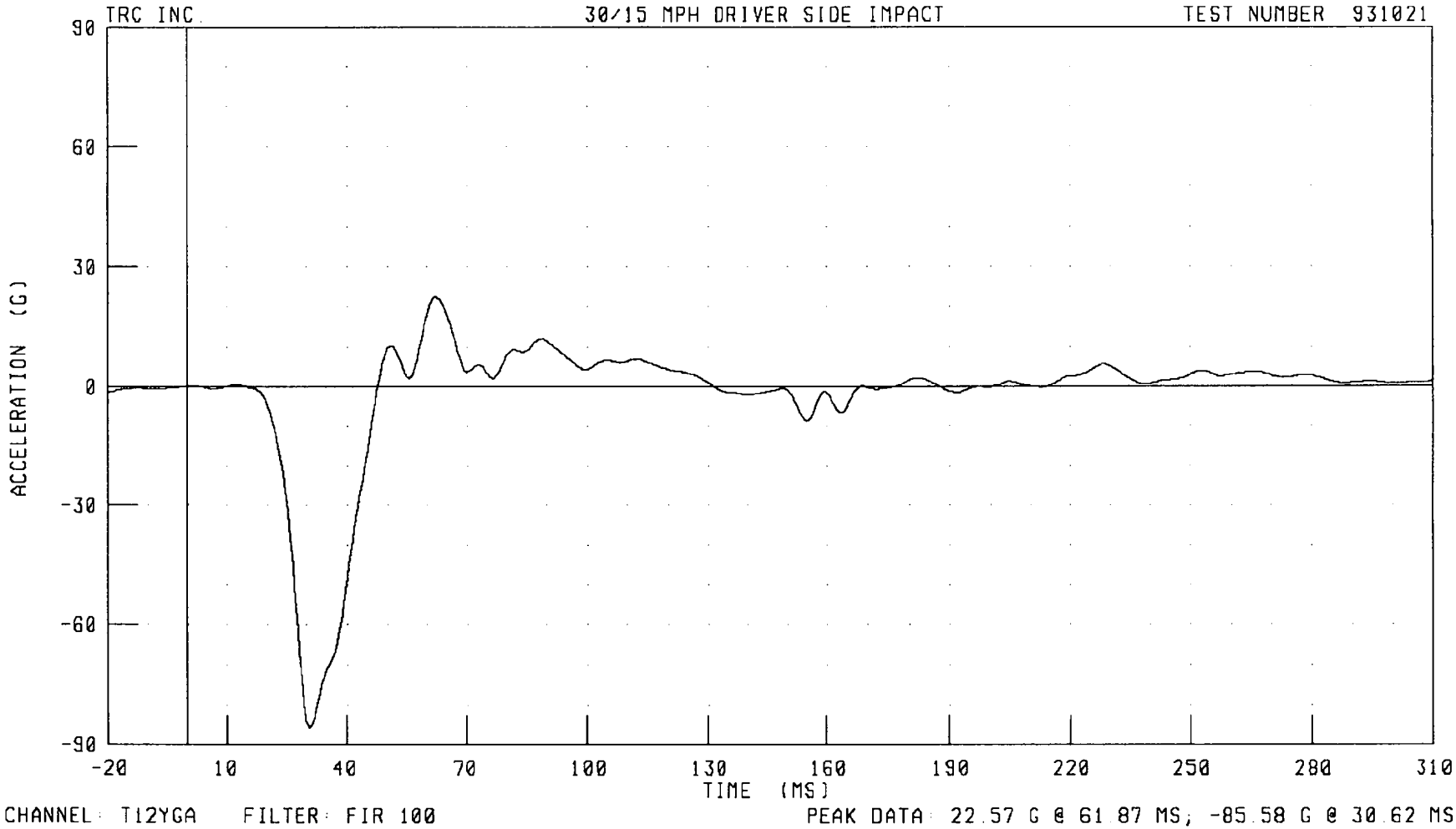
PEAK DATA: 15.07 G @ 48.75 MS; -18.75 G @ 63.13 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LOWER SPINE Y-AXIS ACCELERATION

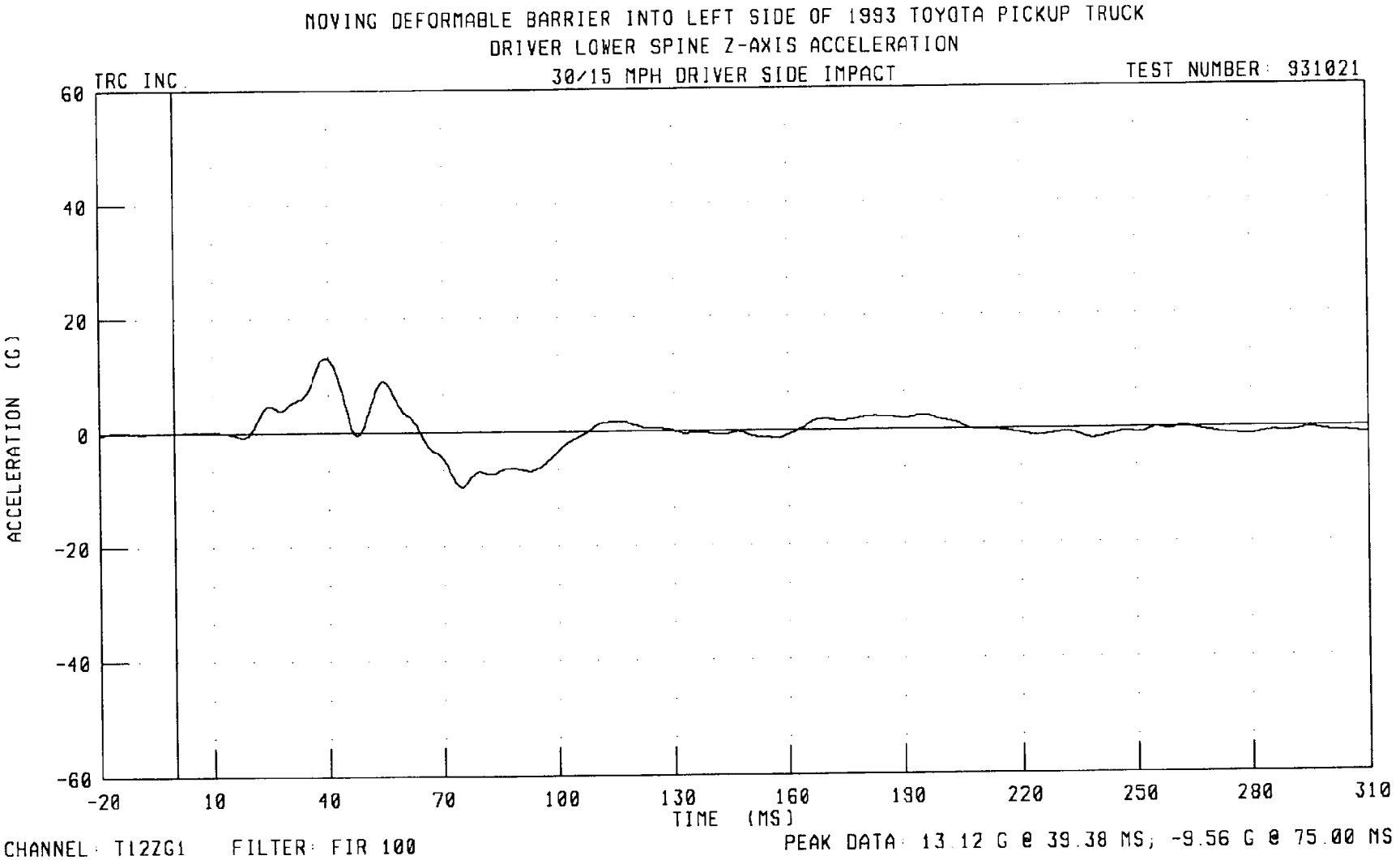


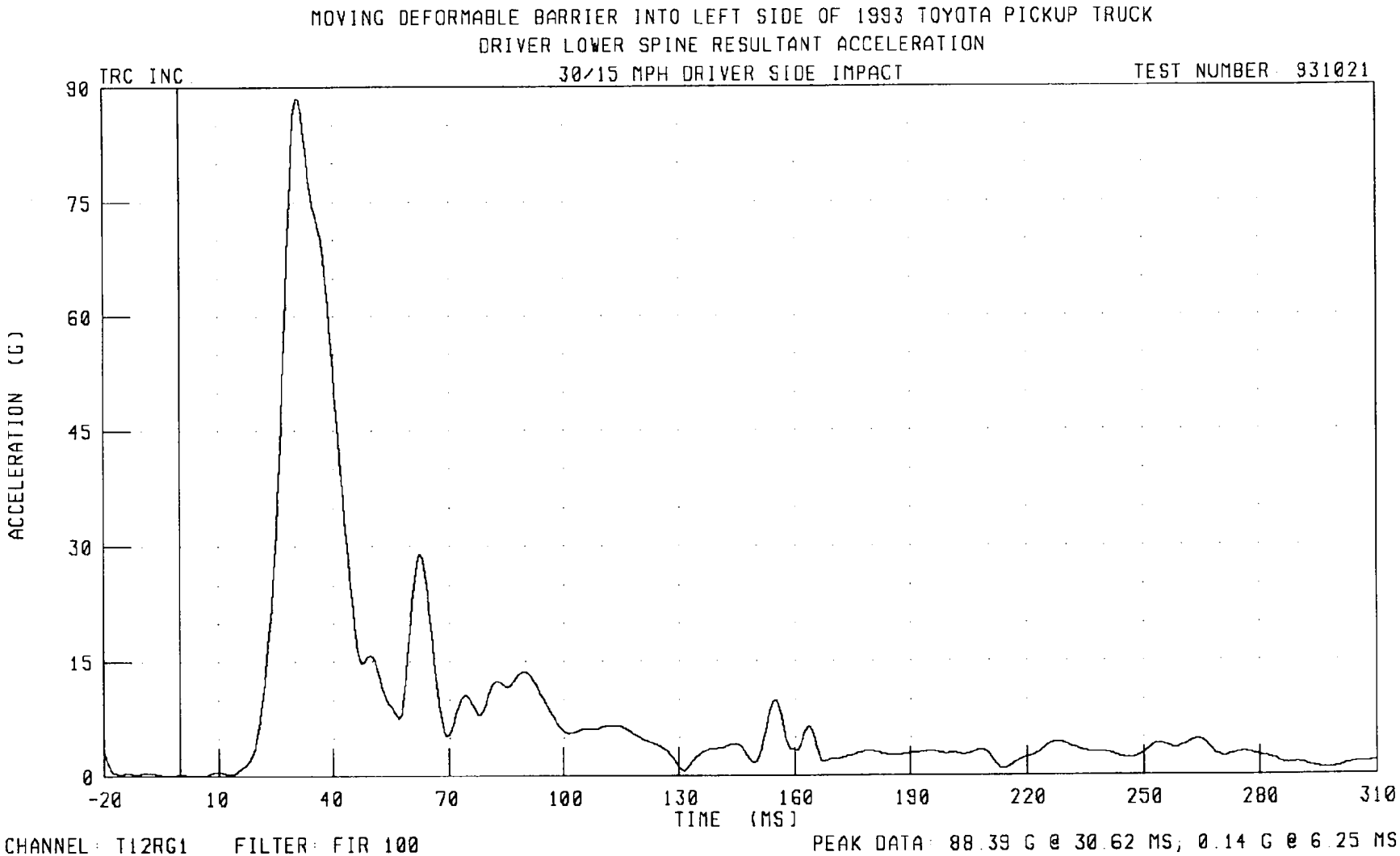
CHANNEL: T12YG1 FILTER: FIR 100 PEAK DATA: 22.09 G @ 61.87 MS; -86.91 G @ 30.62 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION

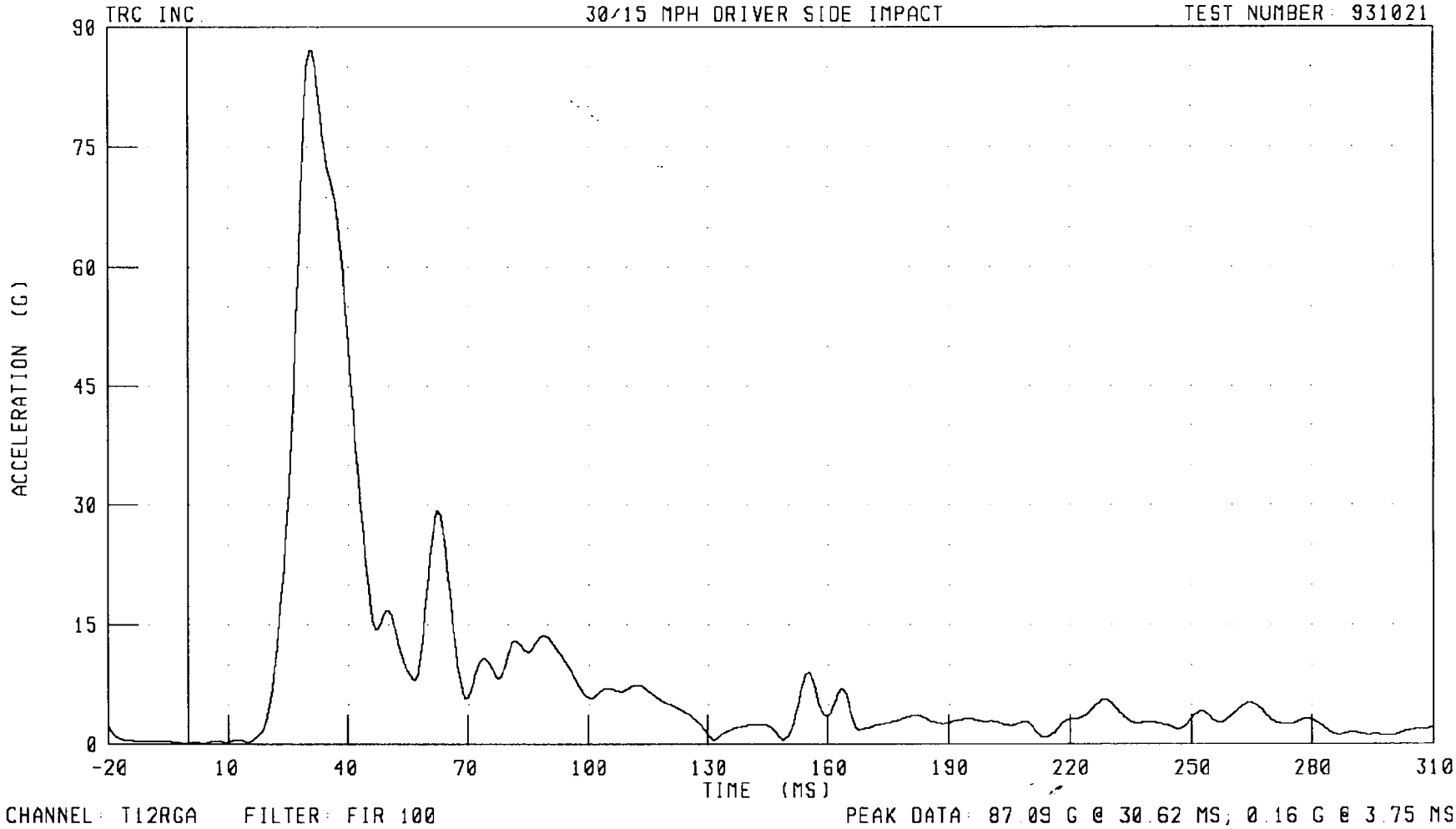


CHANNEL: T12YGA FILTER: FIR 100 PEAK DATA: 22.57 G @ 61.87 MS; -85.58 G @ 30.62 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LOWER SPINE Z-AXIS ACCELERATION
30/15 MPH DRIVER SIDE IMPACT
TRC INC.
TEST NUMBER: 931021
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: T12ZG1
FILTER: FIR 100
PEAK DATA: 13.12 G @ 39.38 MS; -9.56 G @ 75.00 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LOWER SPINE RESULTANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
ACCELERATION (G)
90
75
60
45
30
15
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL T12RG1
FILTER FIR 100
PEAK DATA 88.39 G @ 30.62 MS, 0.14 G @ 6.25 MS

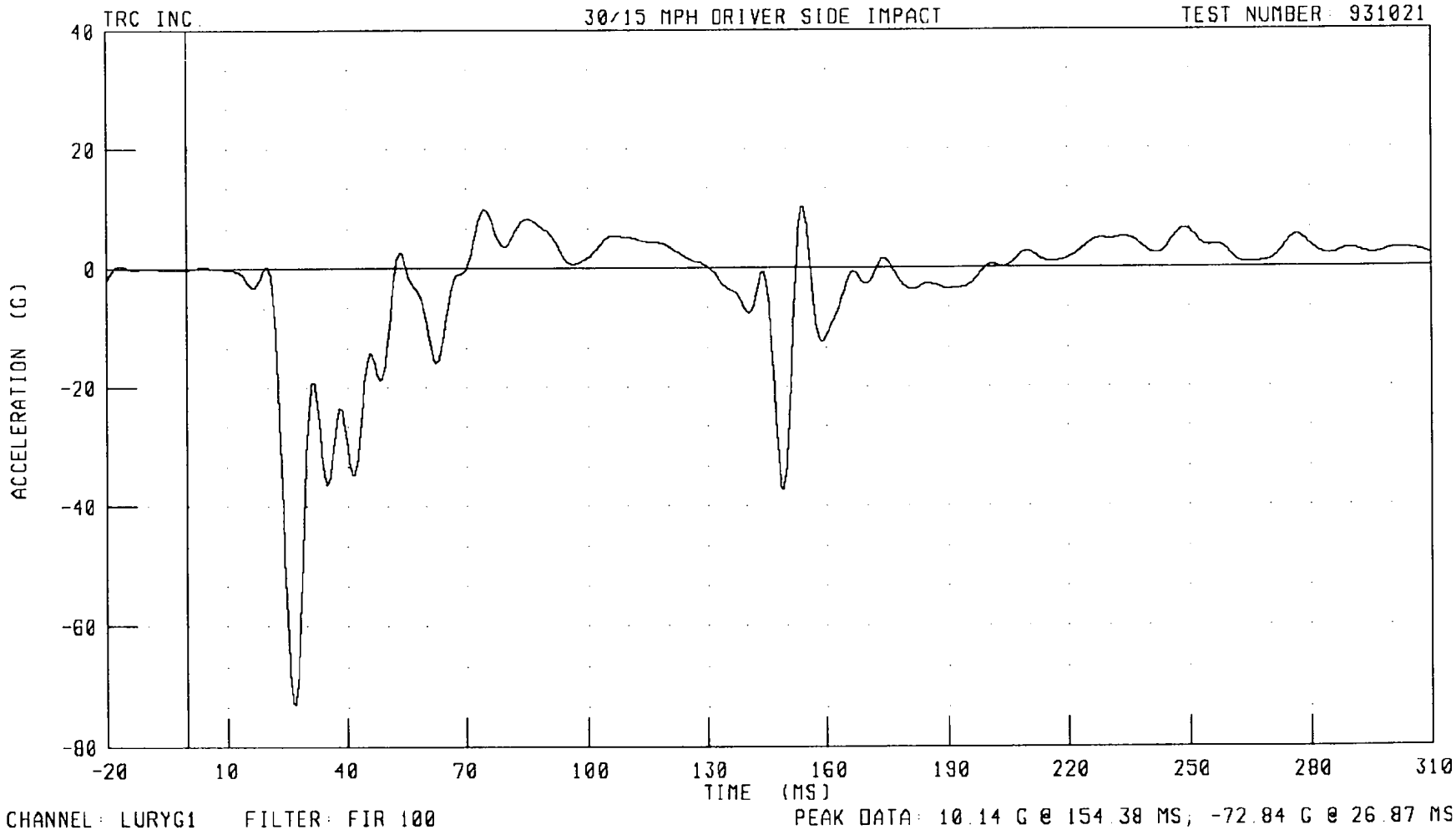
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LOWER SPINE RESULTANT REDUNDANT ACCELERATION



CHANNEL: T12RGA FILTER: FIR 100

PEAK DATA: 87.09 G @ 30.62 MS; 0.16 G @ 3.75 MS

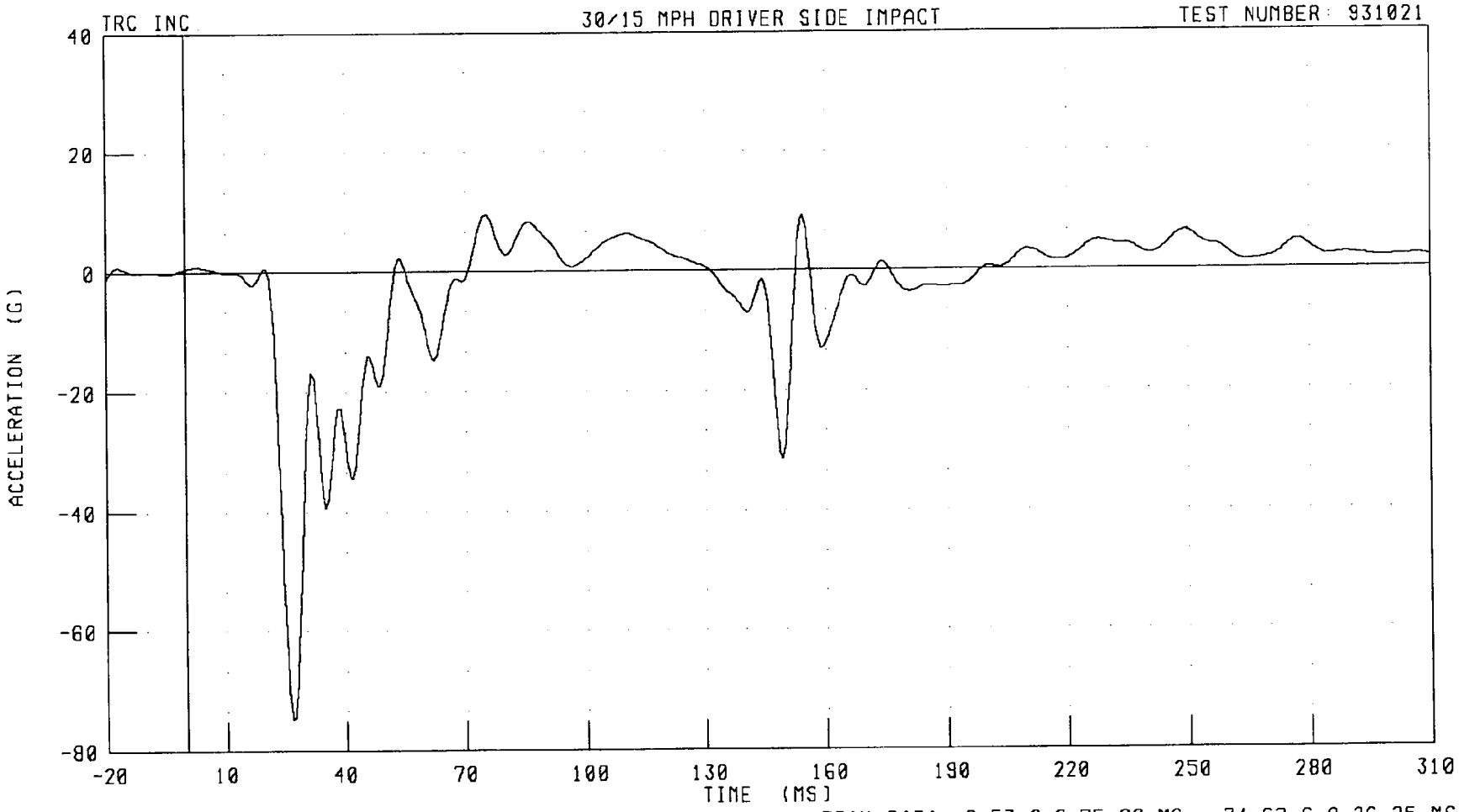
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LEFT UPPER THORAX RIB Y-AXIS ACCELERATION



CHANNEL: LURYG1 FILTER: FIR 100

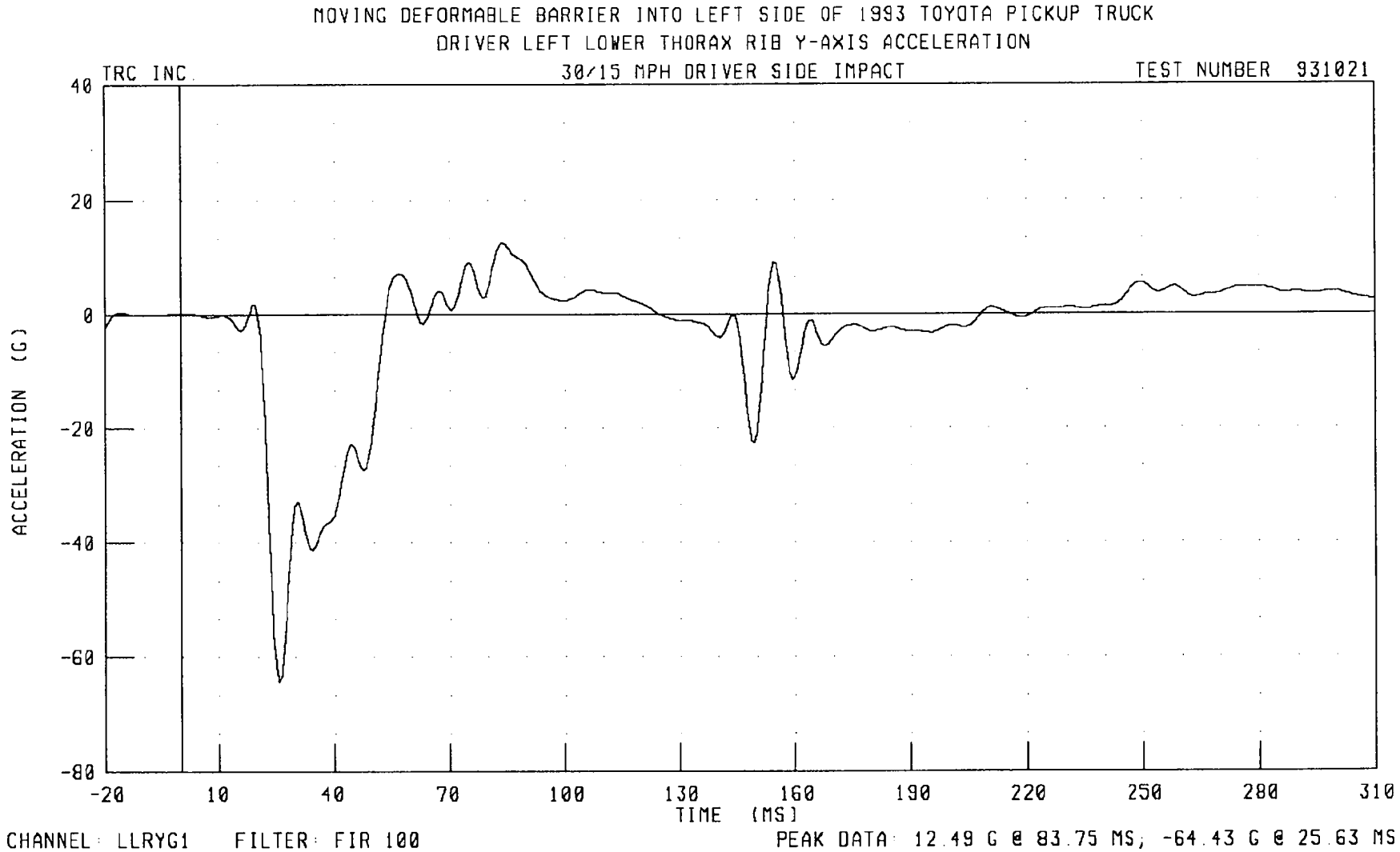
PEAK DATA: 10.14 G @ 154.38 MS; -72.84 G @ 26.87 MS

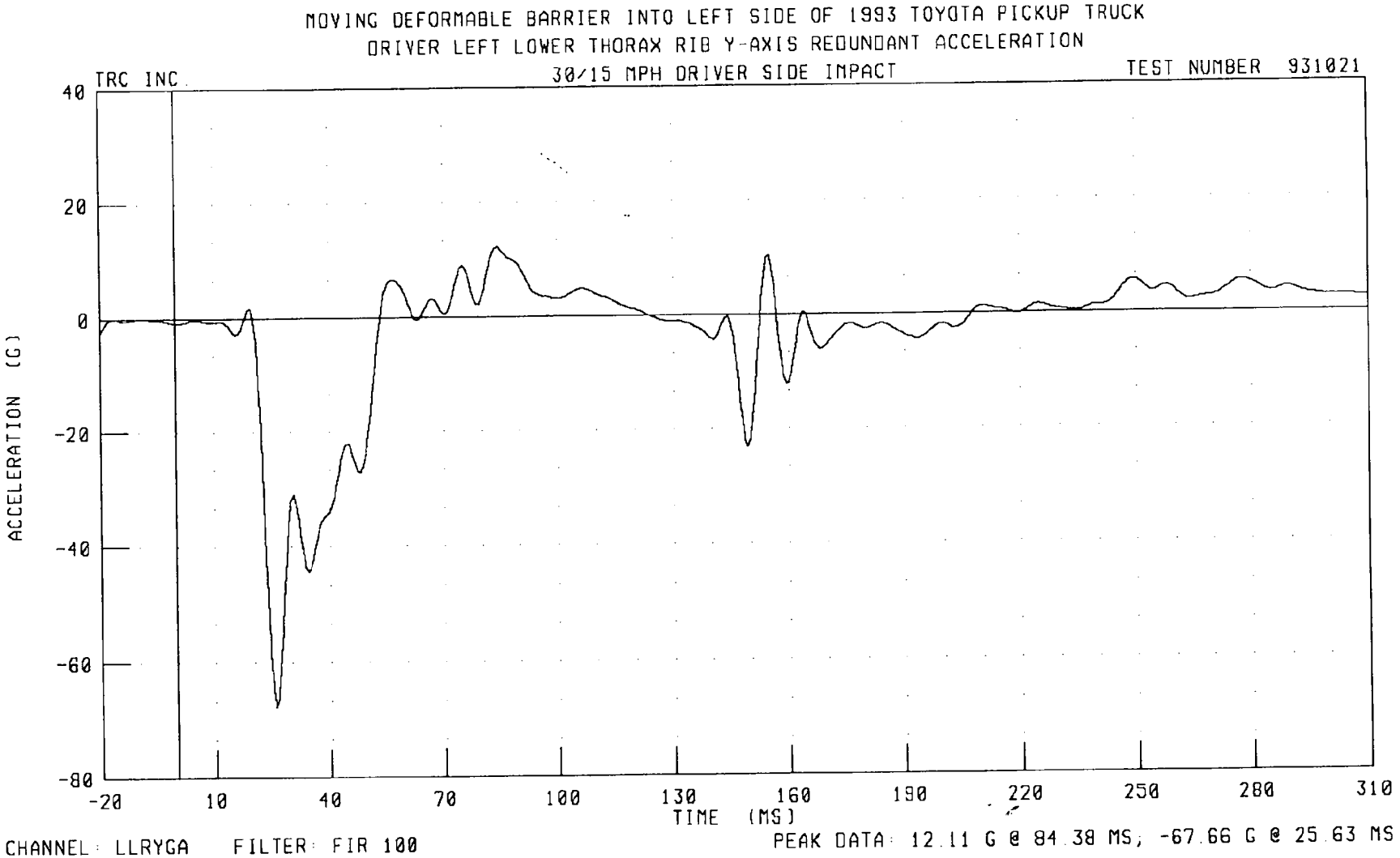
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT ACCELERATION



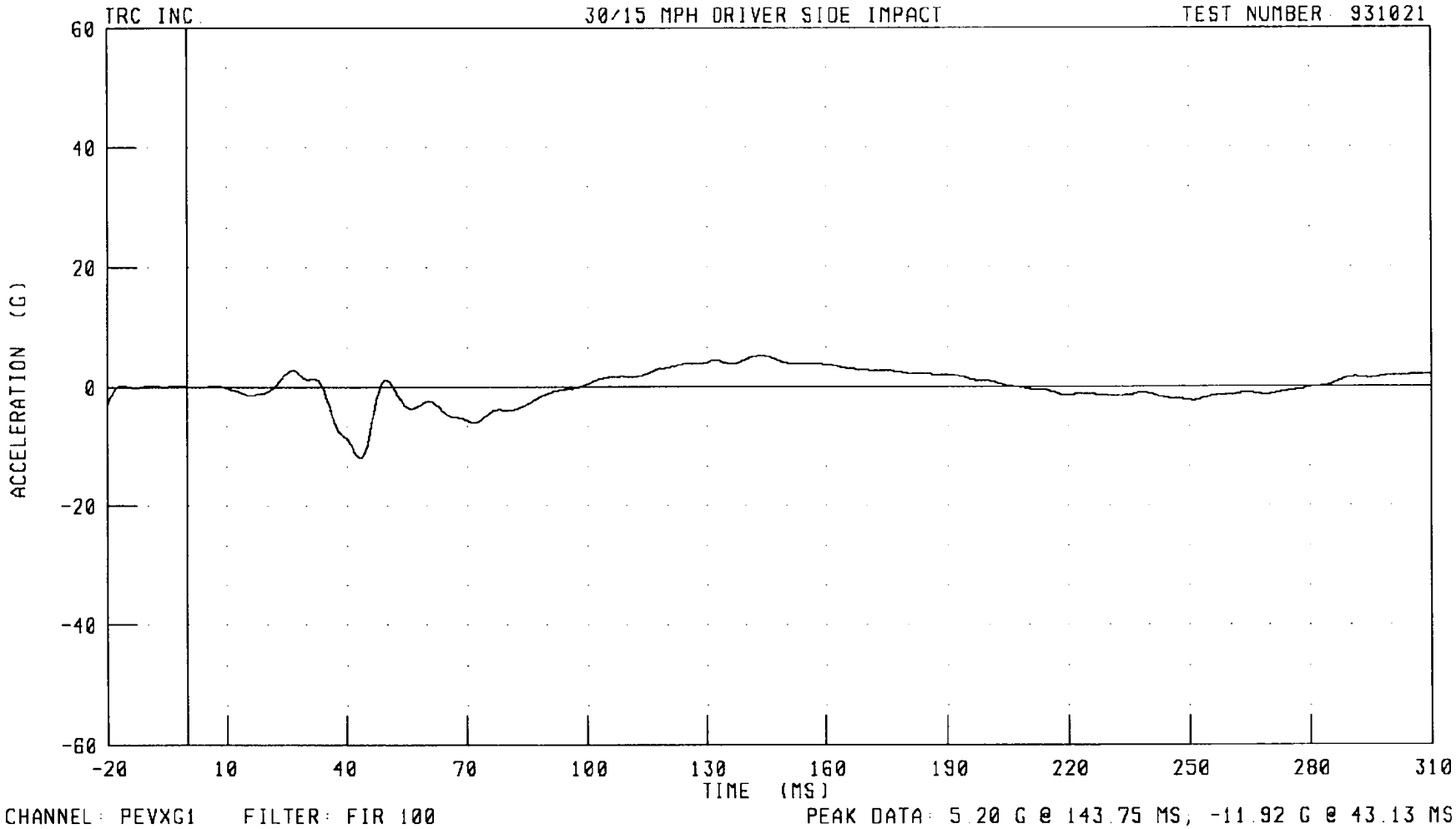
CHANNEL: LURYGA FILTER: FIR 100

PEAK DATA: 9.53 G @ 75.00 MS; -74.62 G @ 26.25 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LEFT LOWER THORAX RIB Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
ACCELERATION (G)
40
20
0
-20
-40
-60
-80
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LLRYG1
FILTER: FIR 100
PEAK DATA: 12.49 G @ 83.75 MS; -64.43 G @ 25.63 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT ACCELERATION
30/15 MPH DRIVER SIDE IMPACT
TRC INC
TEST NUMBER 931021
ACCELERATION (G)
40
20
0
-20
-40
-60
-80
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LLRYGA FILTER: FIR 100
PEAK DATA: 12.11 G @ 84.38 MS, -67.66 G @ 25.63 MS

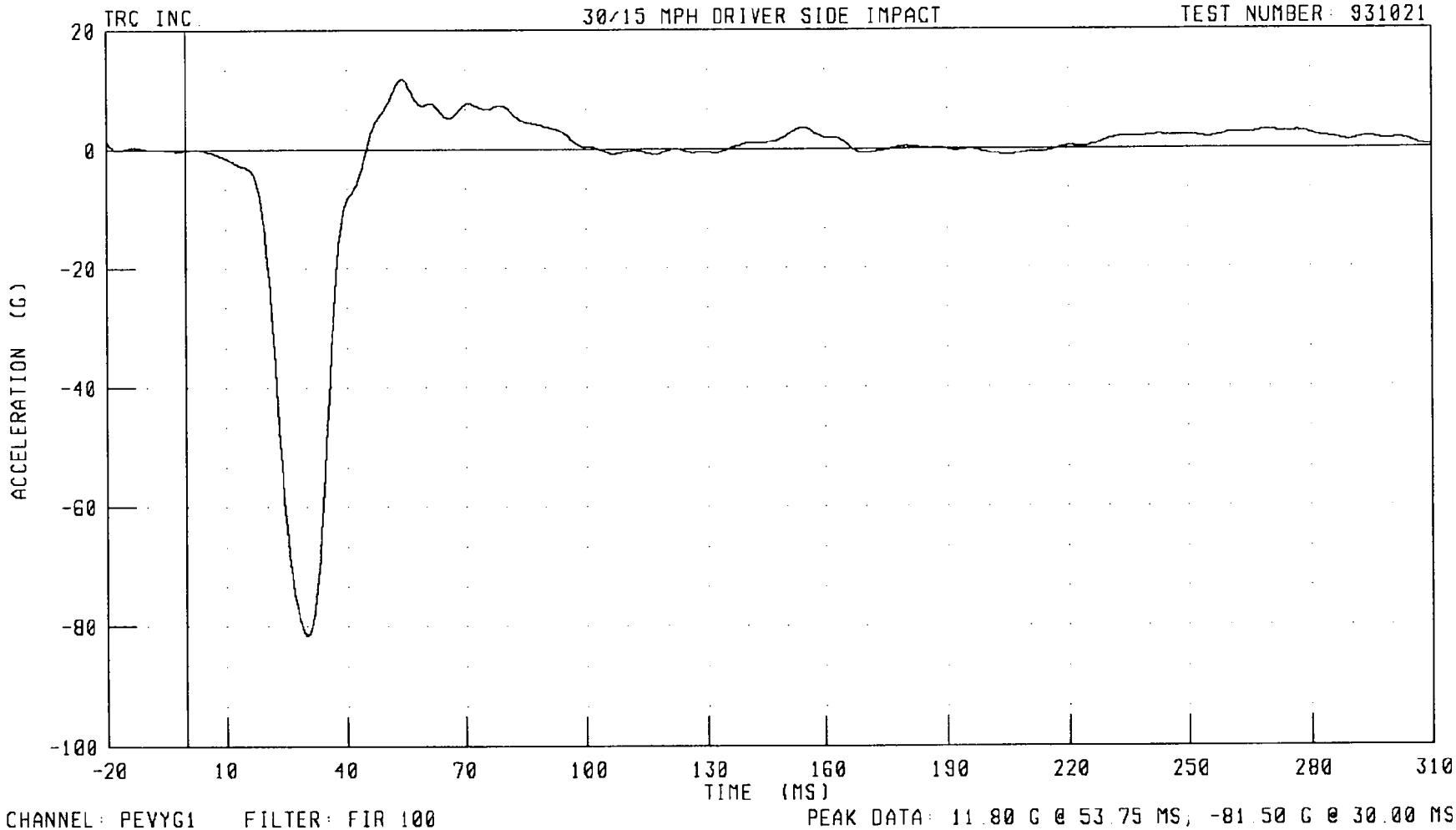
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER PELVIS X-AXIS ACCELERATION



CHANNEL: PEVXG1 FILTER: FIR 100

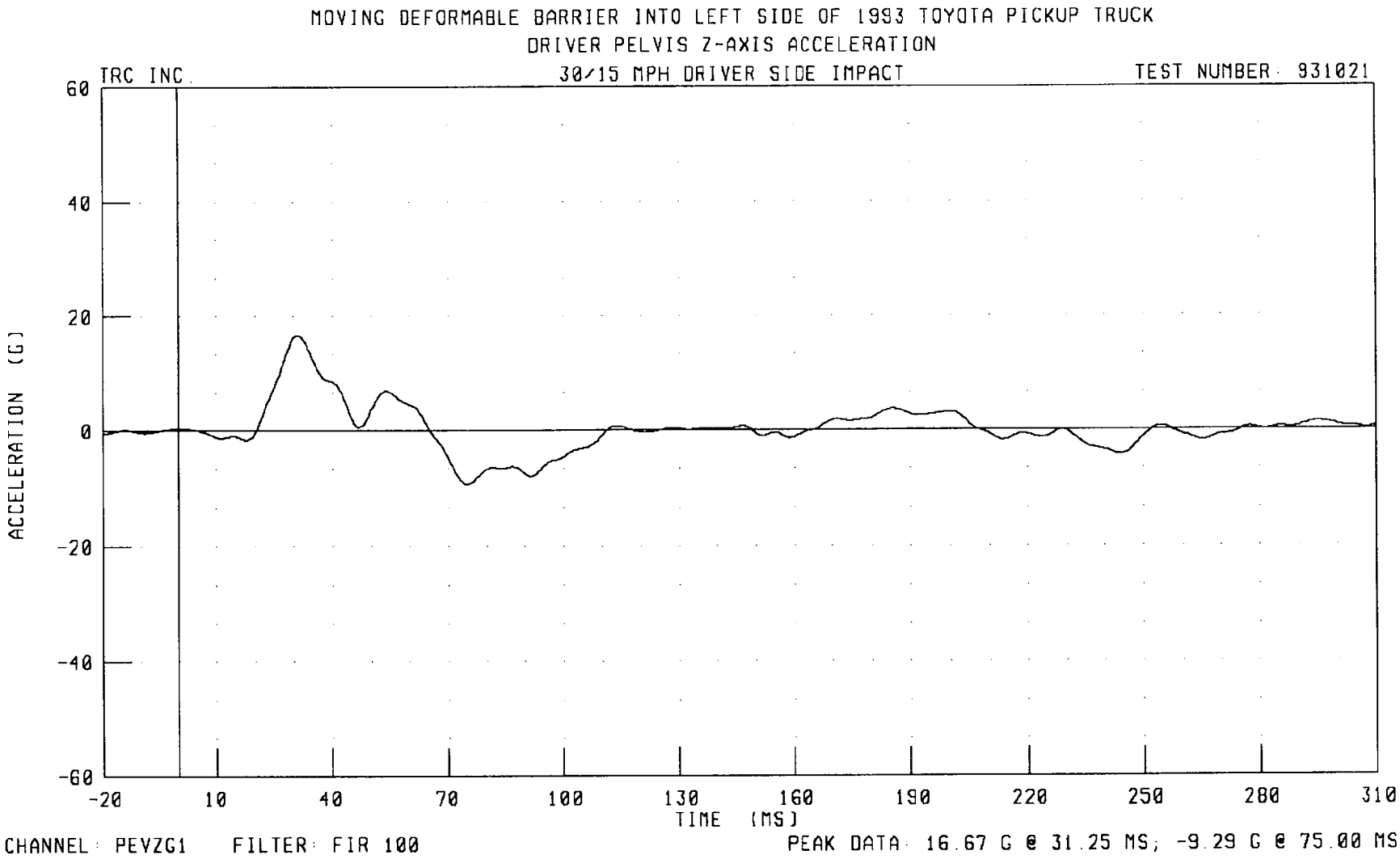
PEAK DATA: 5.20 G @ 143.75 MS, -11.92 G @ 43.13 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER PELVIS Y-AXIS ACCELERATION

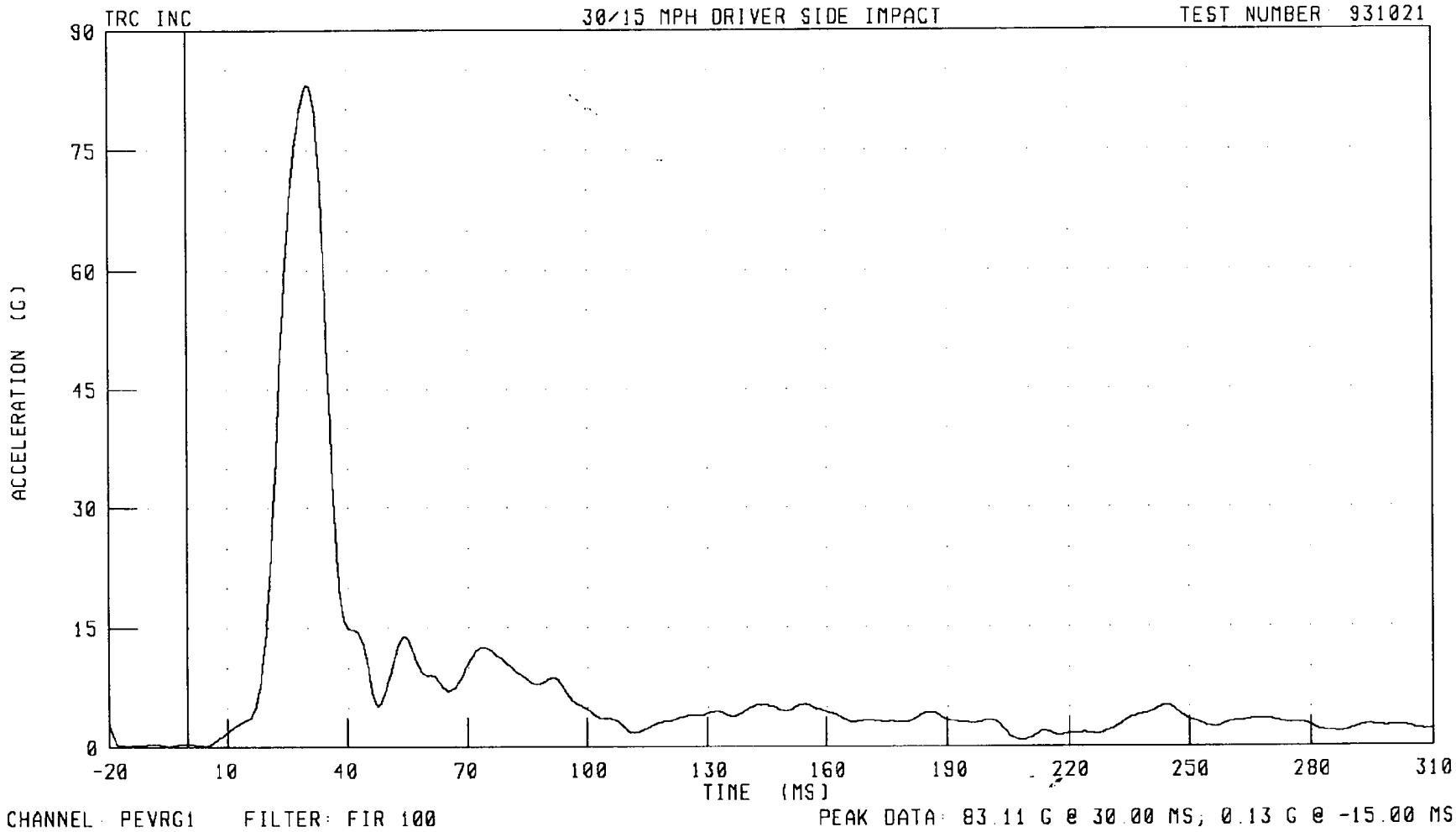


CHANNEL: PEVYG1 FILTER: FIR 100

PEAK DATA: 11.80 G @ 53.75 MS, -81.50 G @ 30.00 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER PELVIS Z-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
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: 16.67 G @ 31.25 MS; -9.29 G @ 75.00 MS

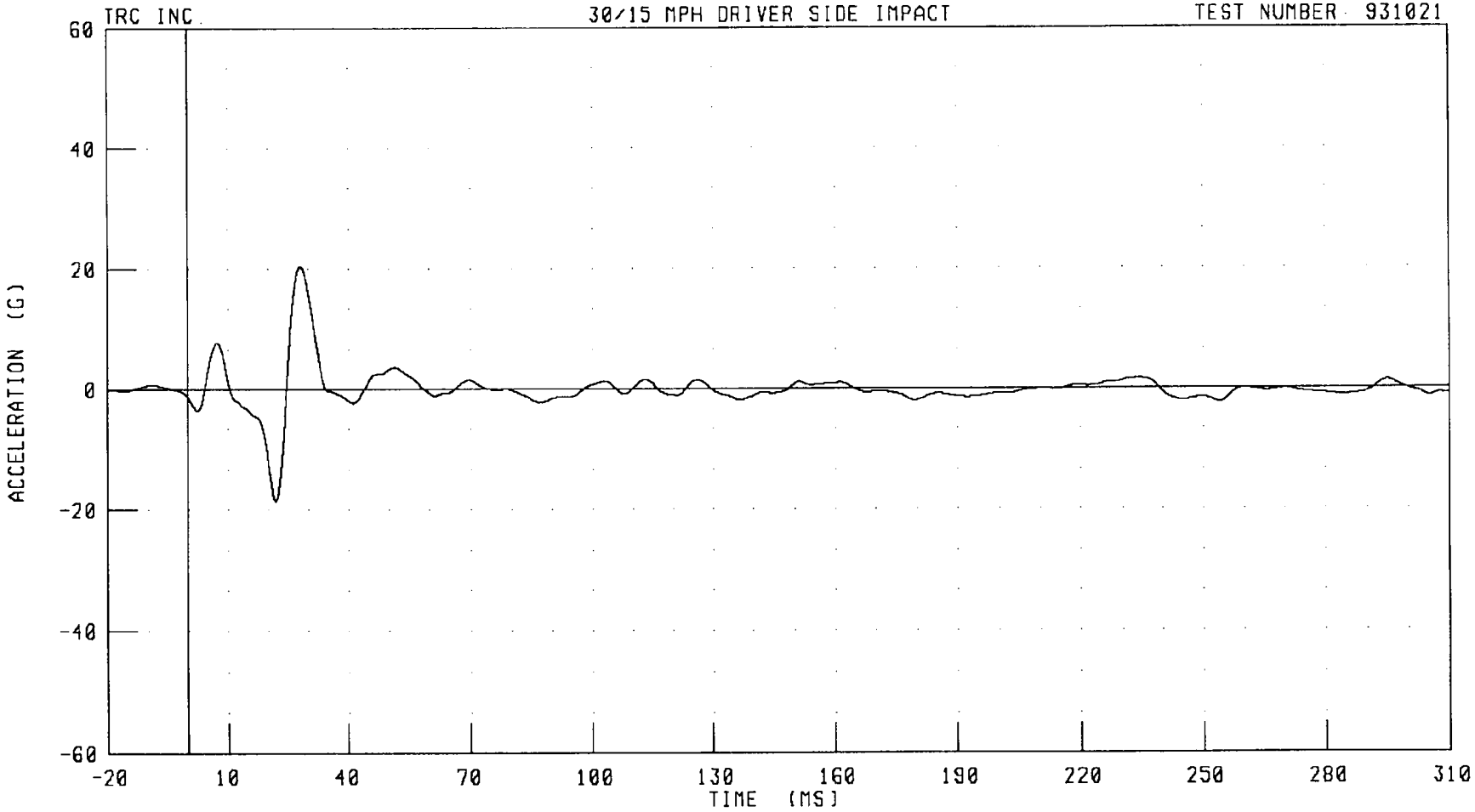
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
DRIVER PELVIS RESULTANT ACCELERATION



CHANNEL PEVRG1 FILTER: FIR 100

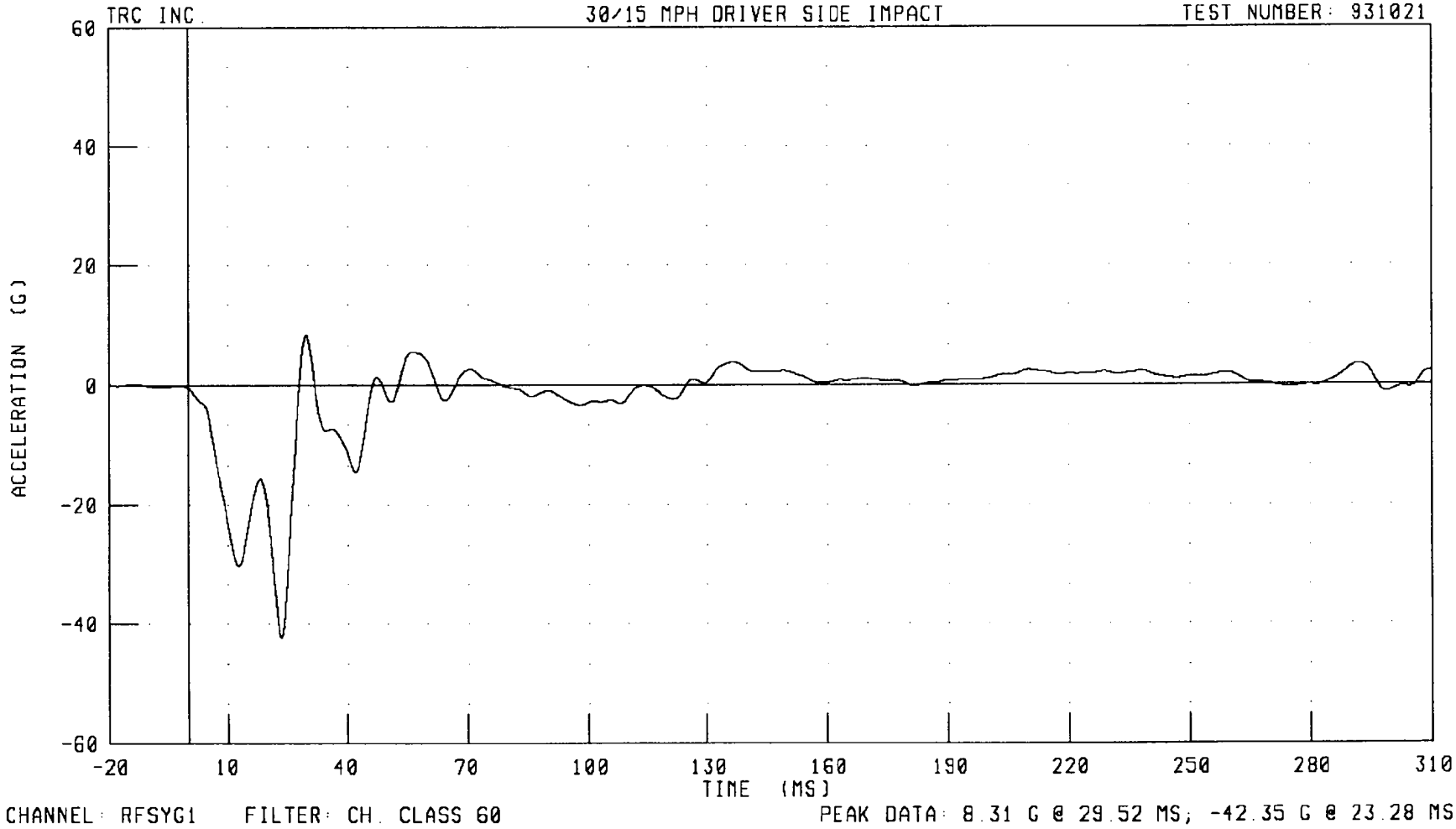
PEAK DATA: 83.11 G @ 30.00 MS; 0.13 G @ -15.00 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
VEHICLE RIGHT FRONT SILL X-AXIS ACCELERATION

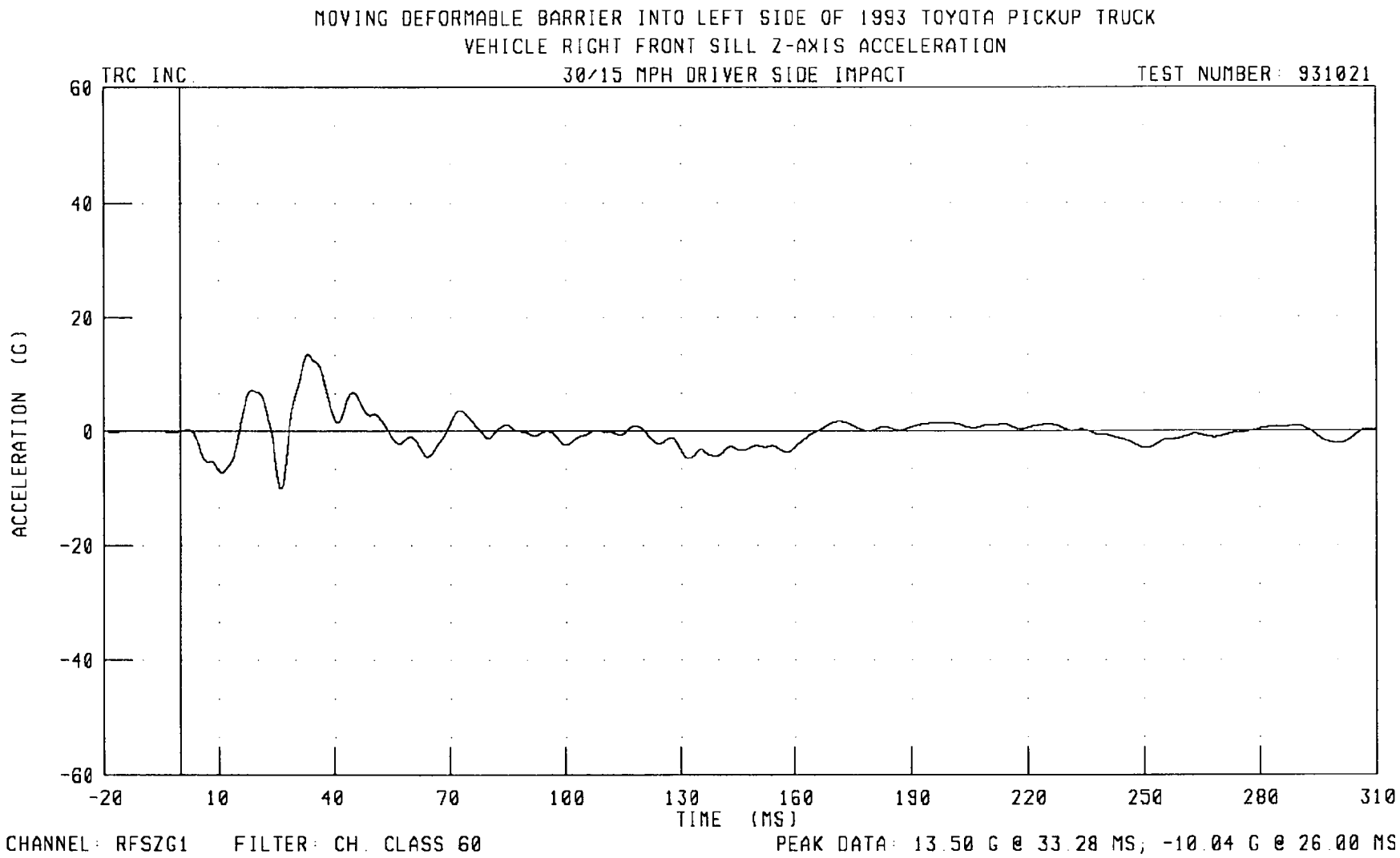


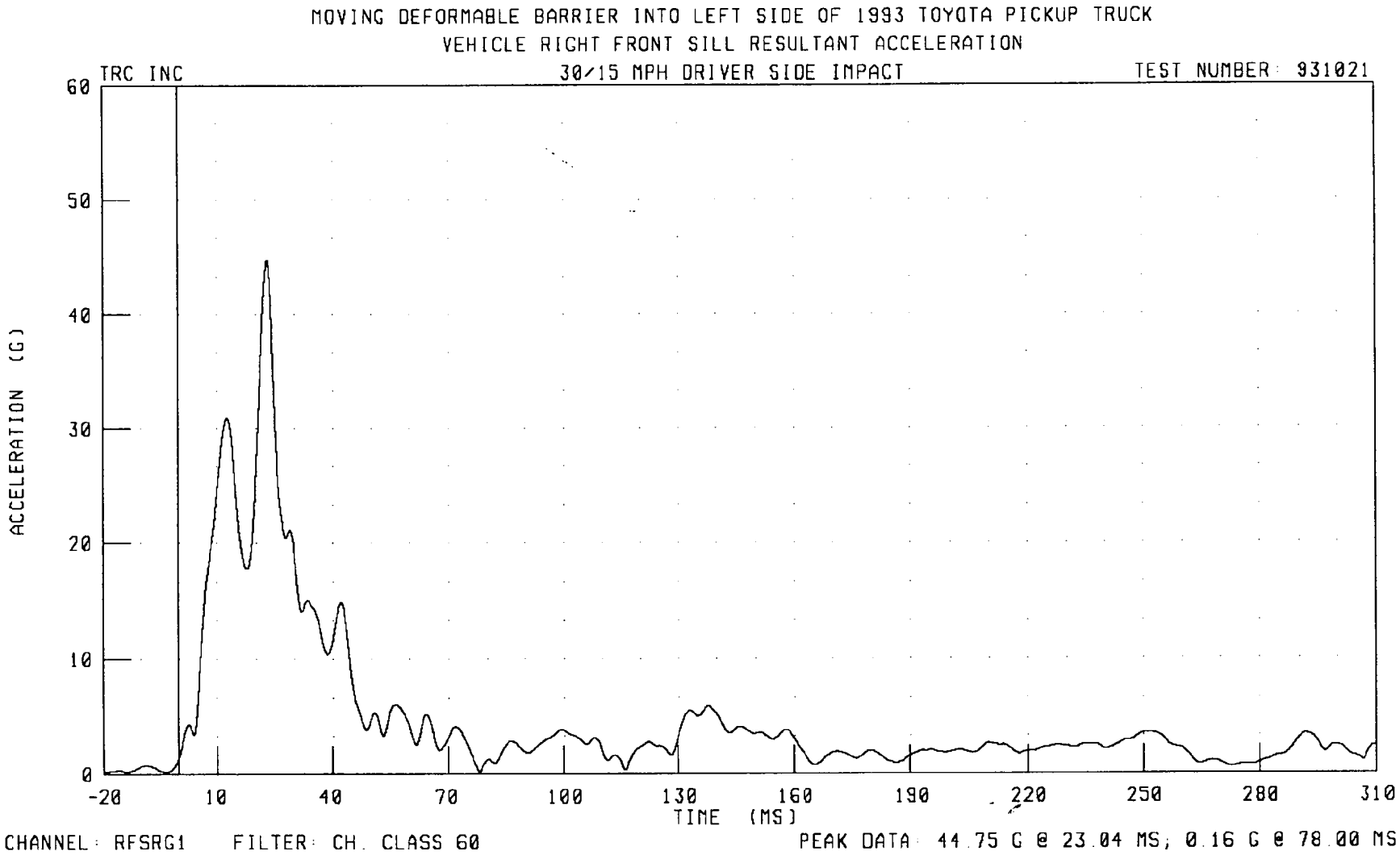
CHANNEL RFSXG1 FILTER CH CLASS 60 PEAK DATA 20.38 G @ 28.16 MS; -18.56 G @ 21.92 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
VEHICLE RIGHT FRONT SILL Y-AXIS ACCELERATION

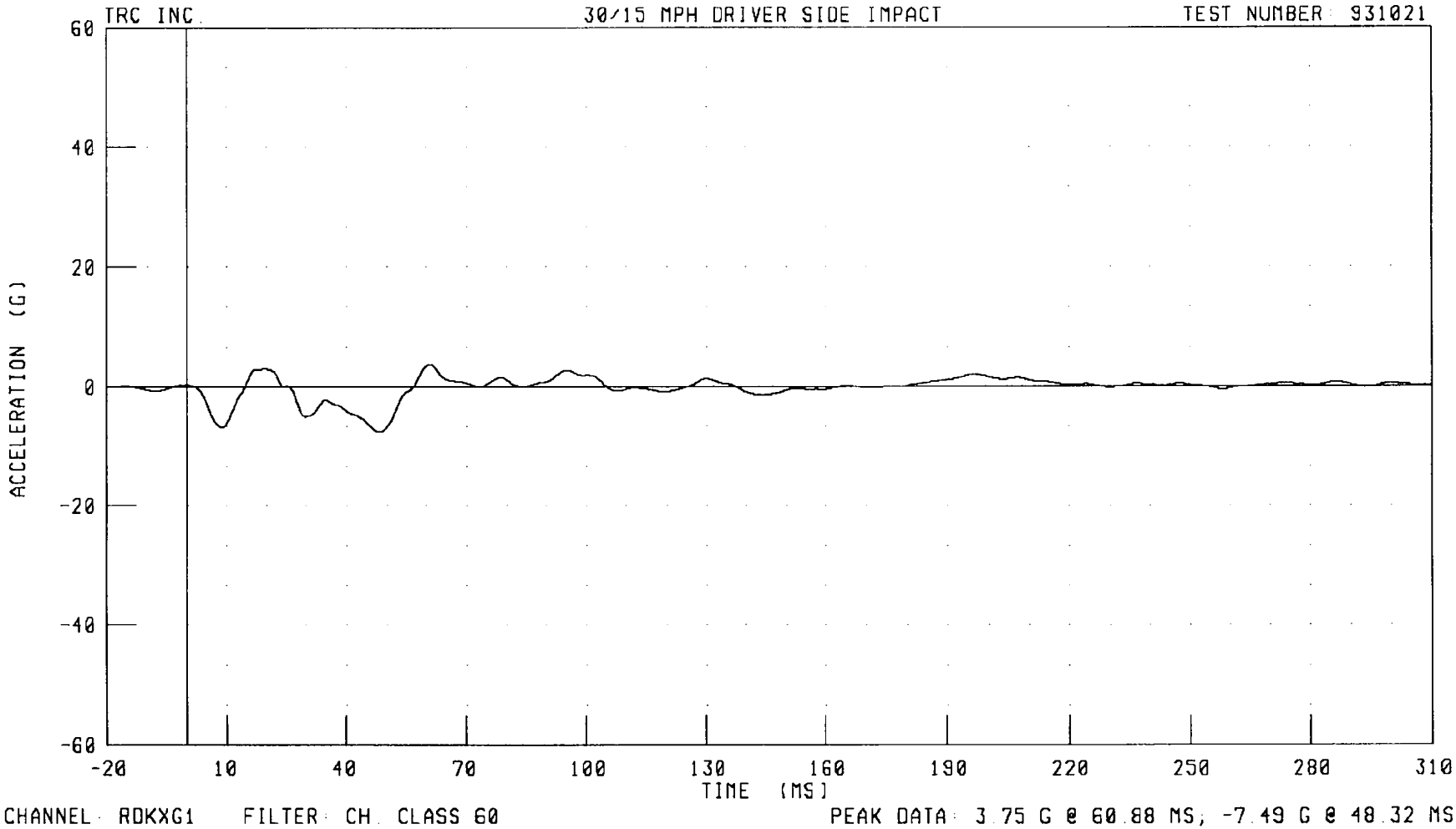


CHANNEL: RFSYG1 FILTER: CH. CLASS 60 PEAK DATA: 8.31 G @ 29.52 MS; -42.35 G @ 23.28 MS

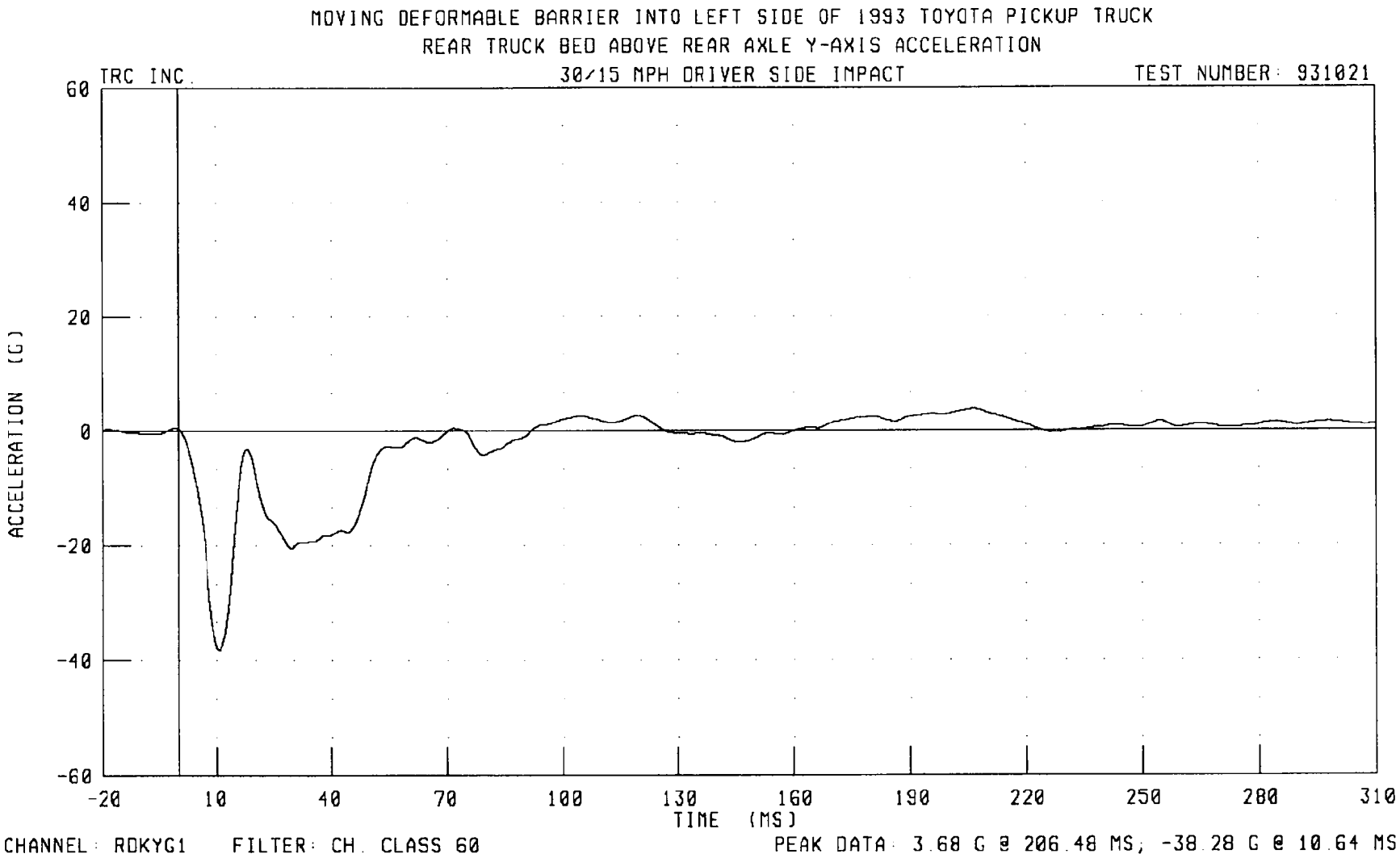

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
VEHICLE RIGHT FRONT SILL Z-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFSZG1
FILTER: CH. CLASS 60
PEAK DATA: 13.50 G @ 33.28 MS; -10.04 G @ 26.00 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
VEHICLE RIGHT FRONT SILL RESULTANT ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
ACCELERATION (G)
60
50
40
30
20
10
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFSRG1
FILTER: CH. CLASS 60
PEAK DATA: 44.75 G @ 23.04 MS; 0.16 G @ 78.00 MS

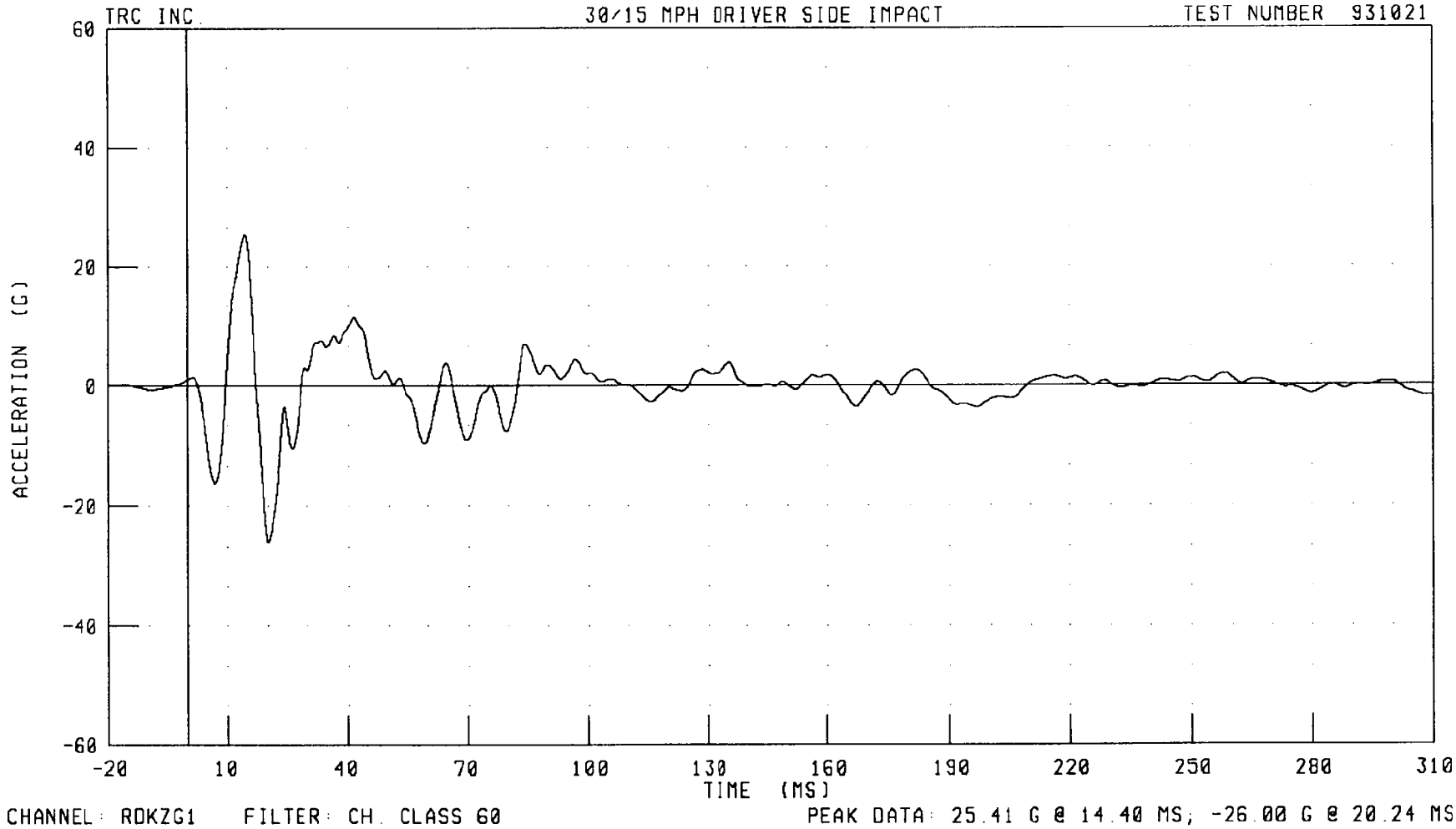
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
REAR TRUCK BED ABOVE REAR AXLE X-AXIS ACCELERATION



CHANNEL: RDKXG1 FILTER: CH. CLASS 60 PEAK DATA: 3.75 G @ 60.88 MS, -7.49 G @ 48.32 MS

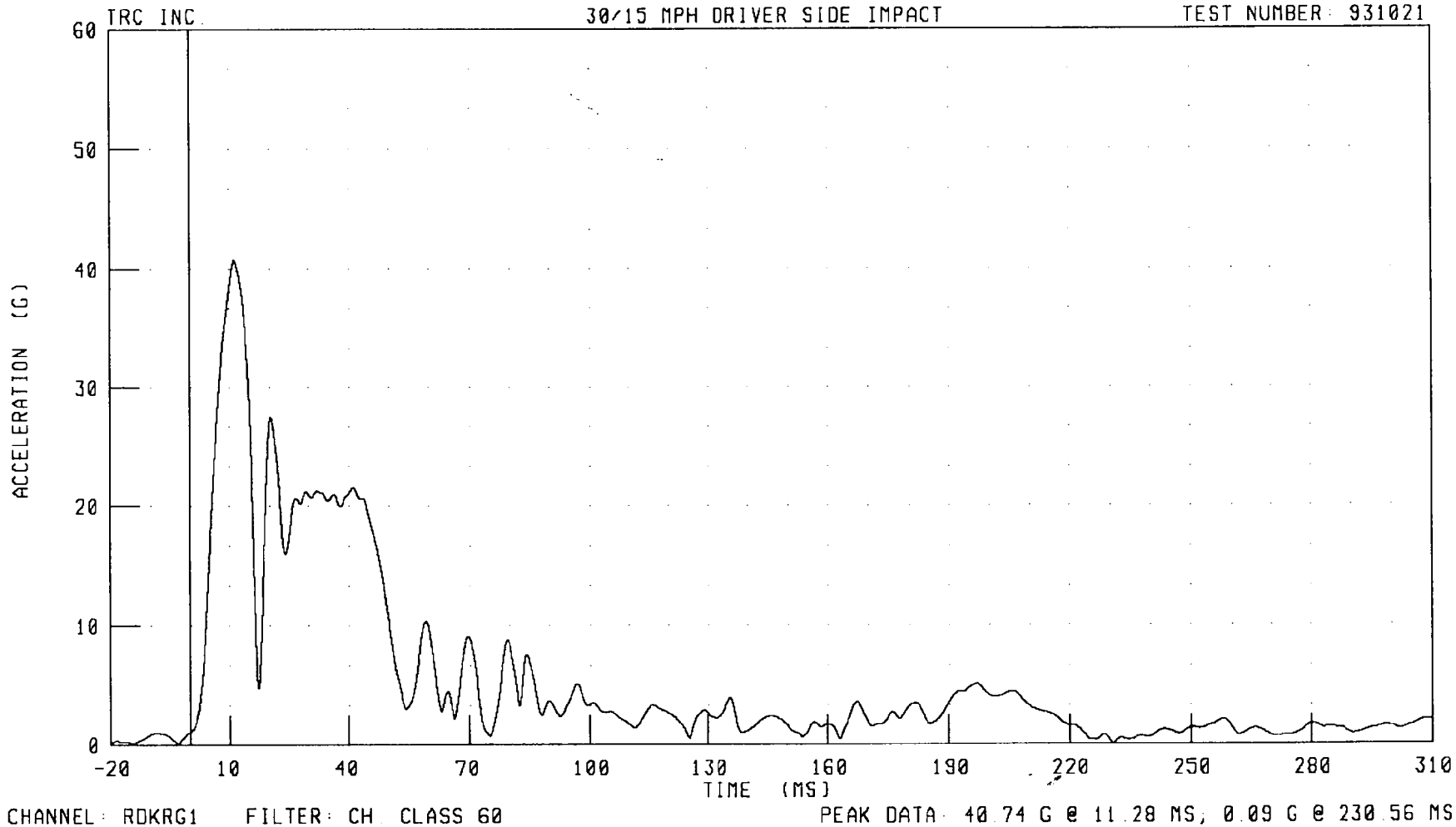

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
REAR TRUCK BED ABOVE REAR AXLE Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RDKYG1
FILTER: CH. CLASS 60
PEAK DATA: 3.68 G @ 206.48 MS; -38.28 G @ 10.64 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
REAR TRUCK BED ABOVE REAR AXLE Z-AXIS ACCELERATION



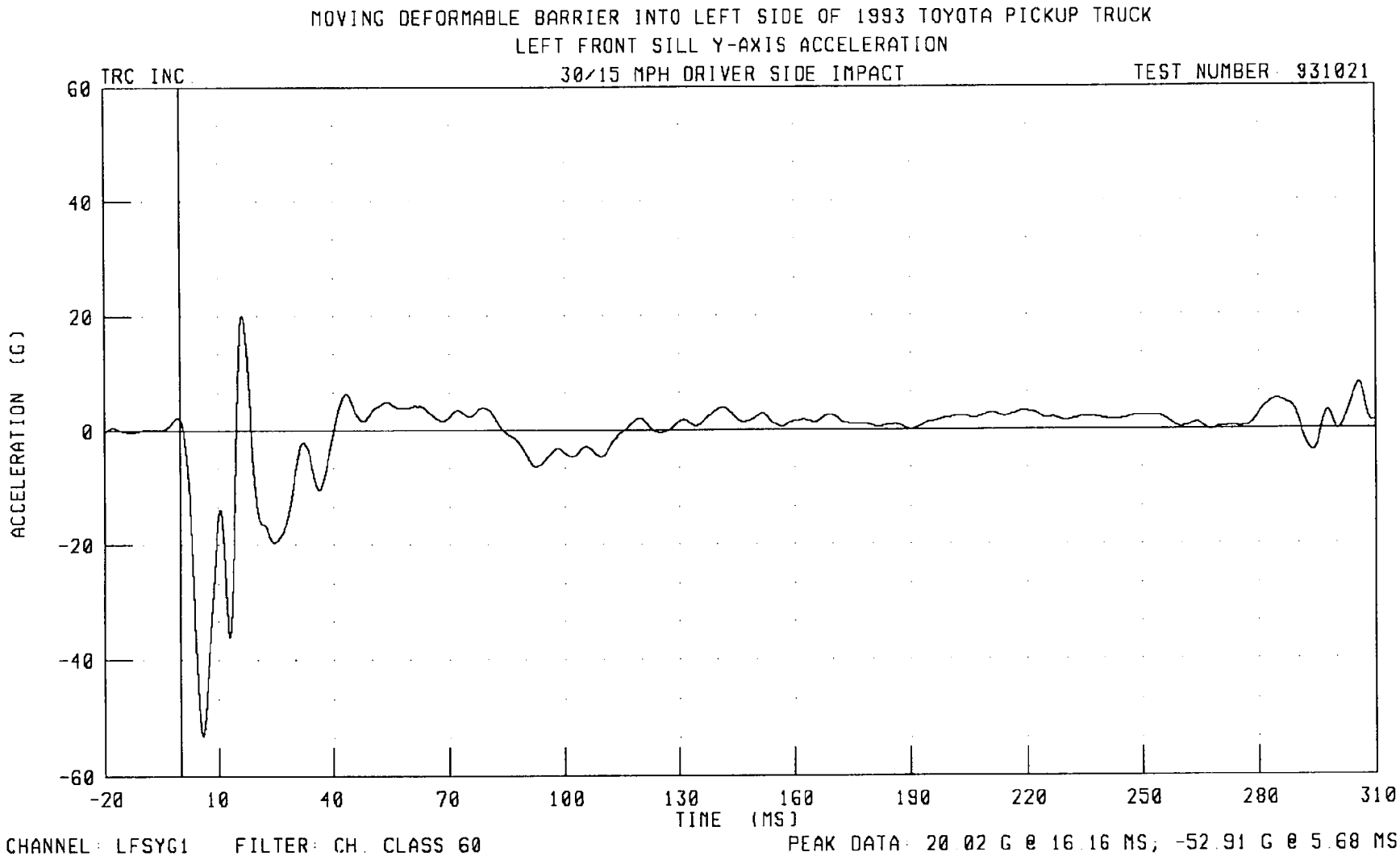
CHANNEL: RDKZG1 FILTER: CH. CLASS 60 PEAK DATA: 25.41 G @ 14.40 MS; -26.00 G @ 20.24 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
REAR TRUCK BED ABOVE REAR AXLE RESULTANT ACCELERATION

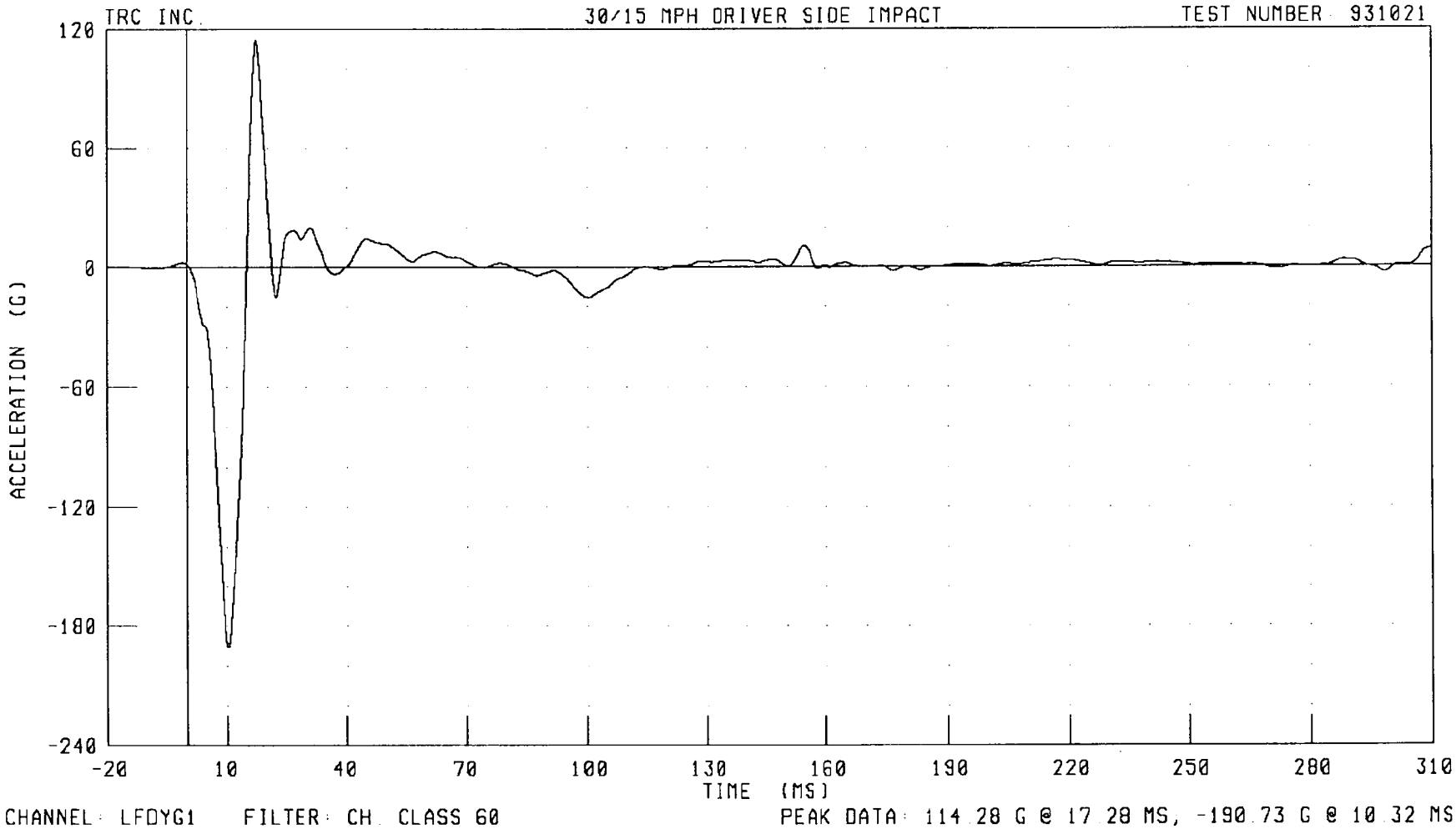


CHANNEL: RDKRG1 FILTER: CH CLASS 60

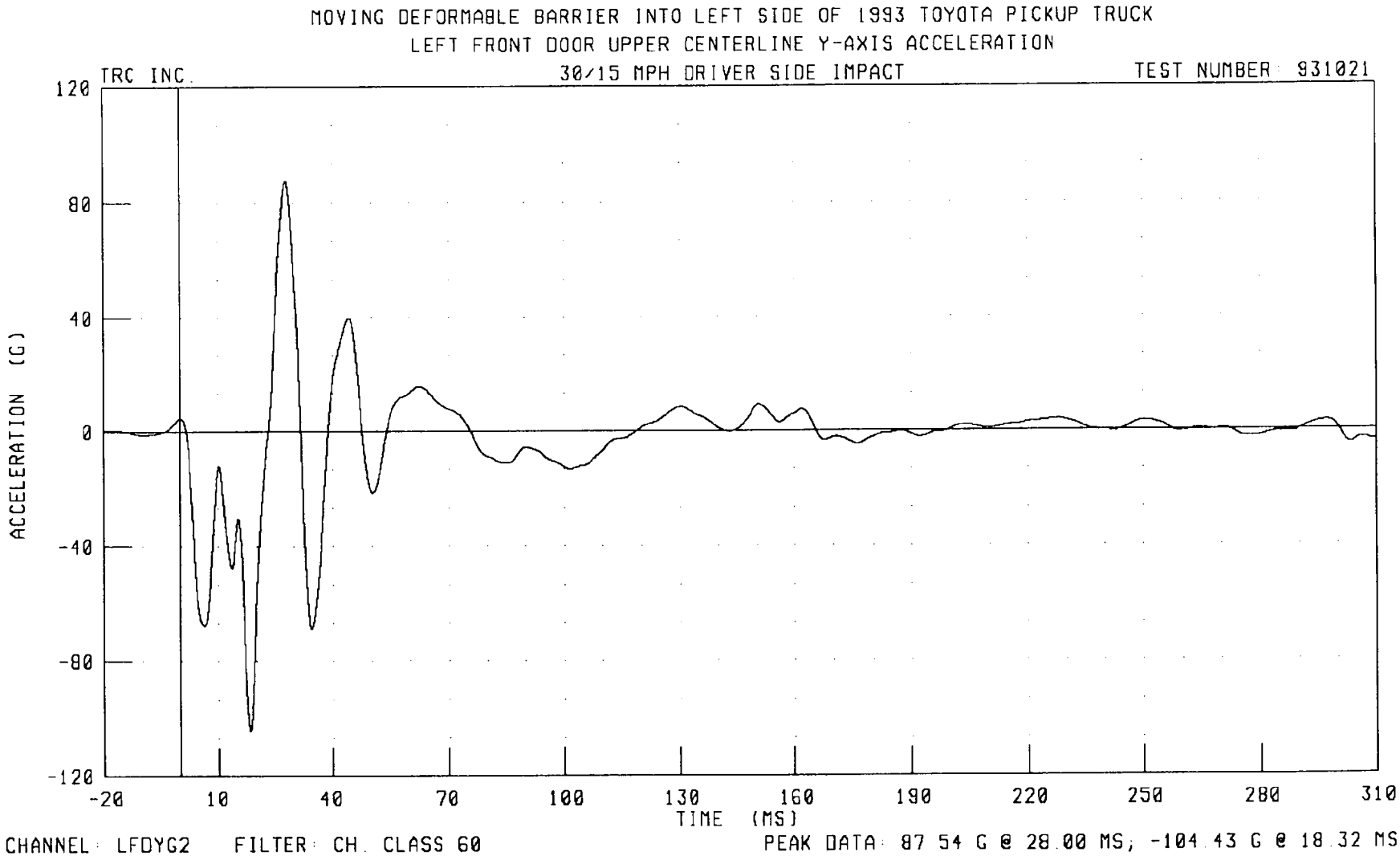
PEAK DATA: 40.74 G @ 11.28 MS, 0.09 G @ 230.56 MS

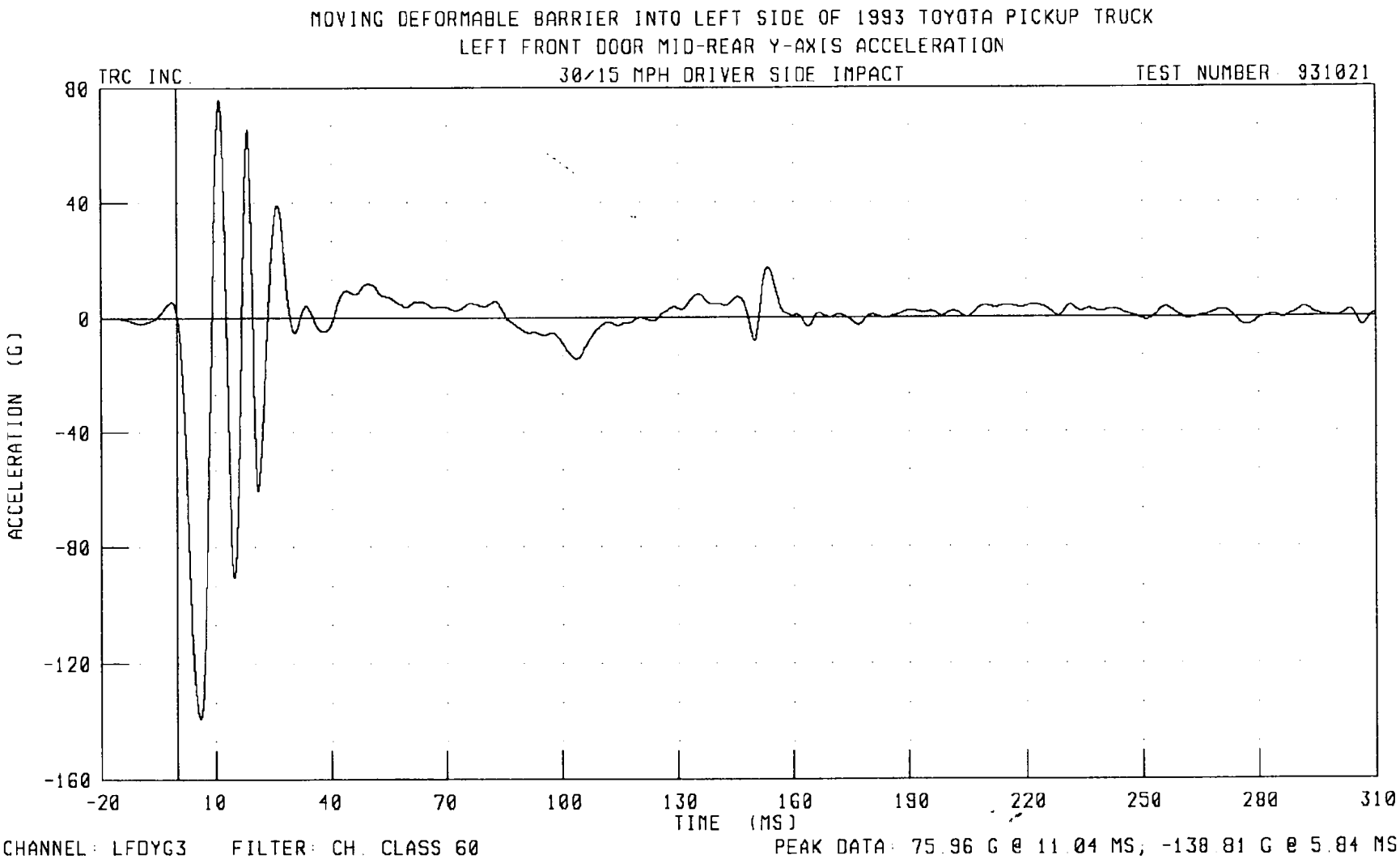

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
LEFT FRONT SILL Y-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER 931021
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL LFSYG1
FILTER CH CLASS 60
PEAK DATA 20.02 G @ 16.16 MS; -52.91 G @ 5.68 MS

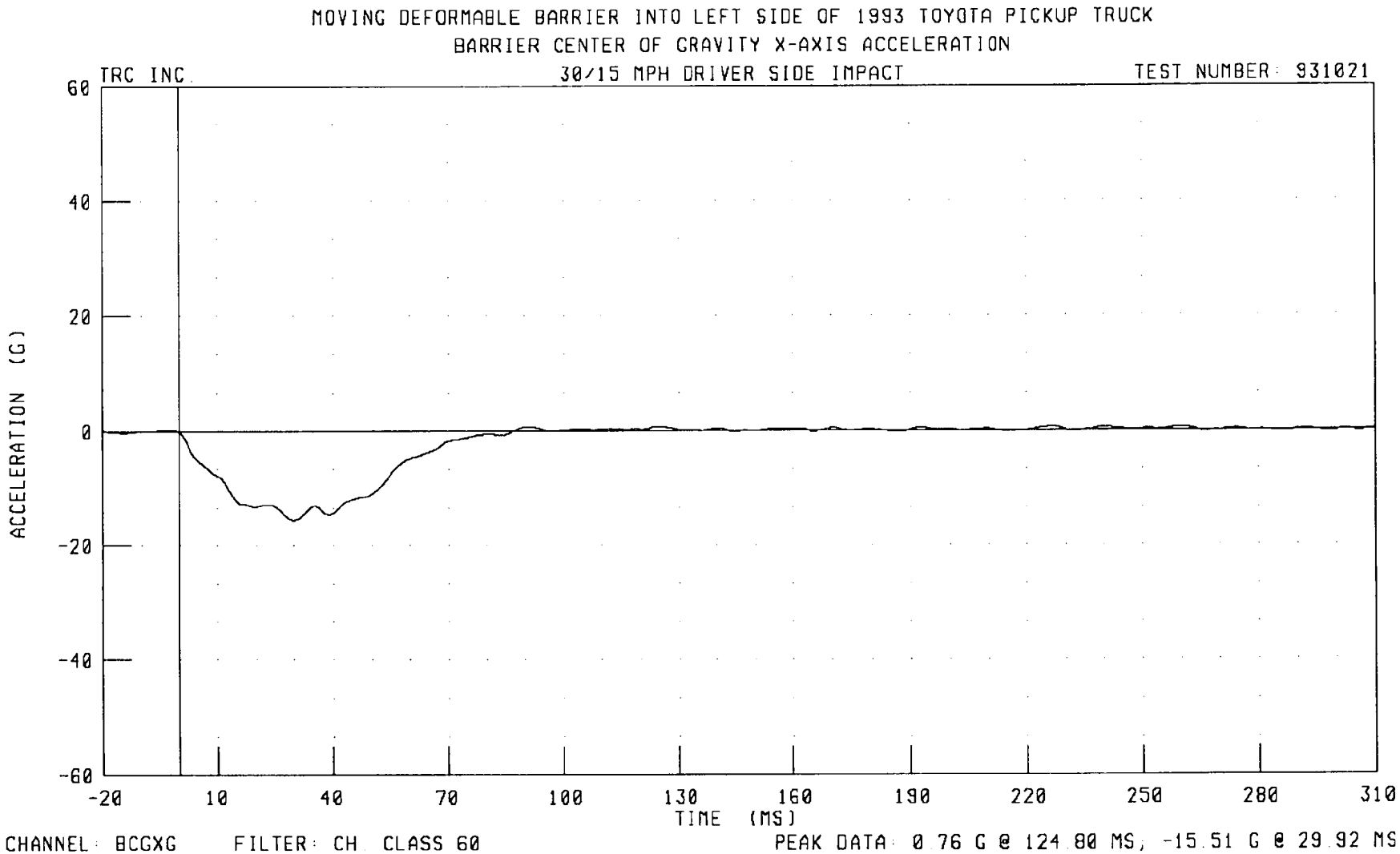
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
LEFT FRONT DOOR CENTERLINE Y-AXIS ACCELERATION

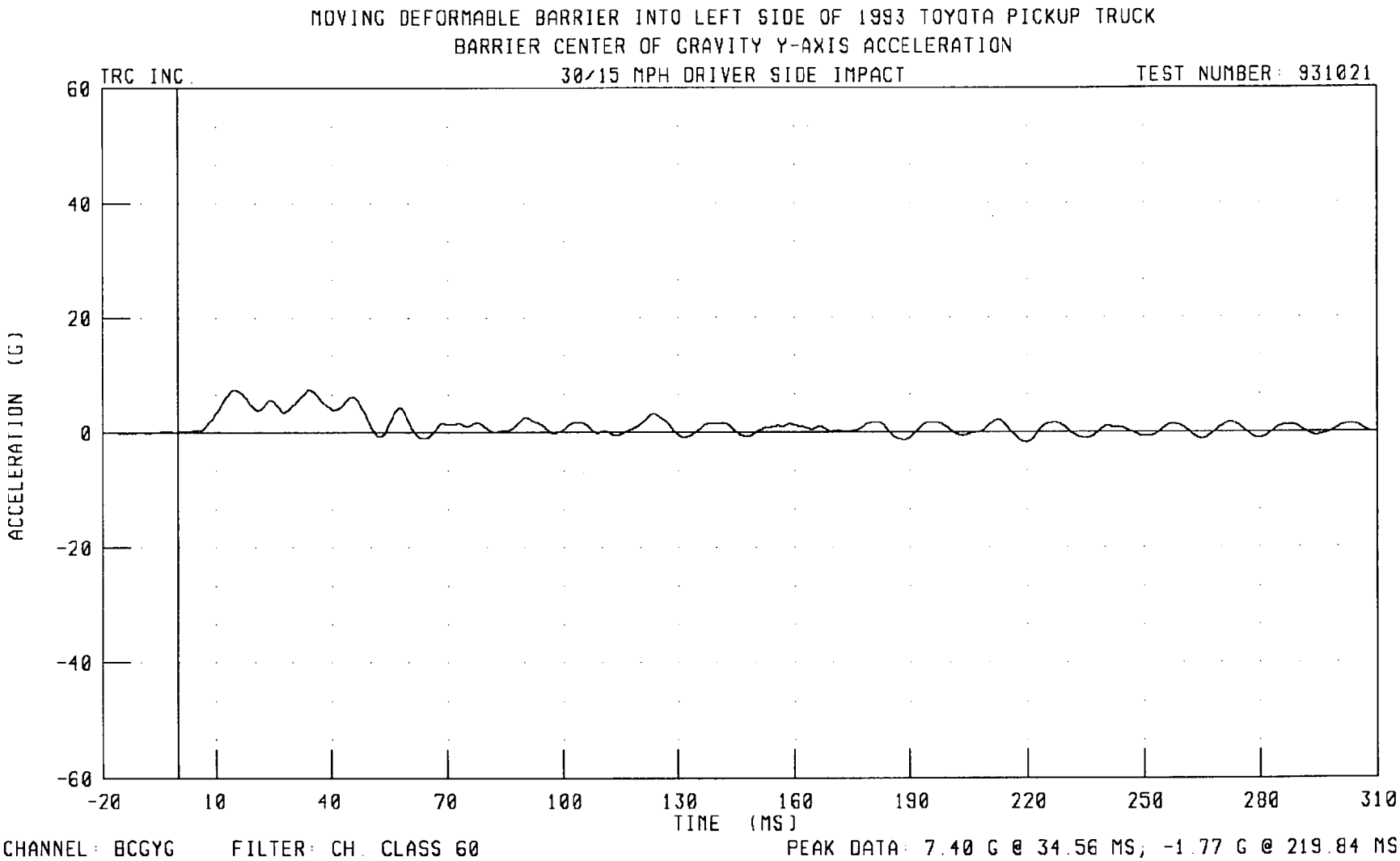


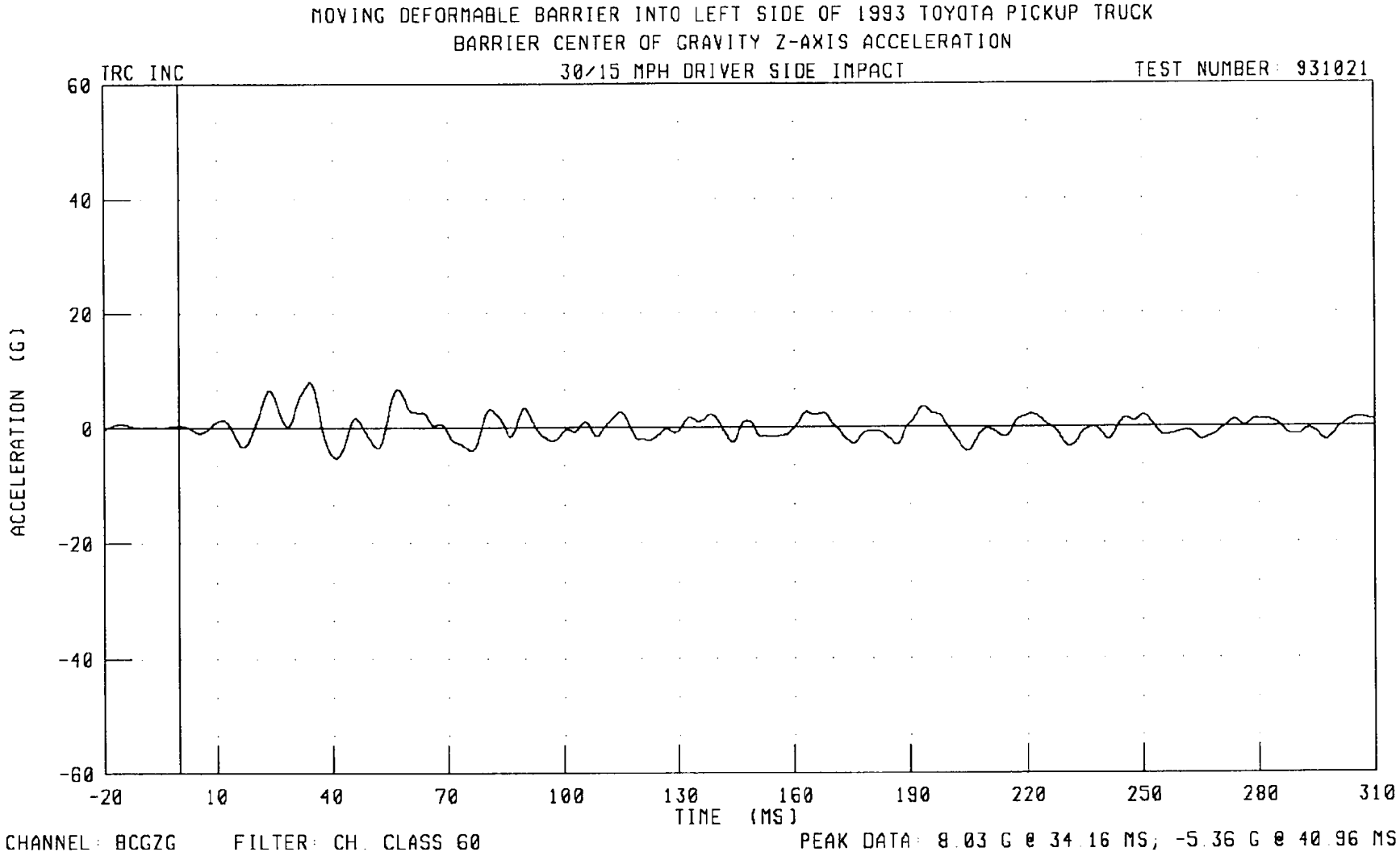
CHANNEL: LFDYG1 FILTER: CH CLASS 60 PEAK DATA: 114.28 G @ 17.28 MS, -190.73 G @ 10.32 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
LEFT FRONT DOOR UPPER CENTERLINE Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
120
80
40
0
-40
-80
-120
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFDYG2
FILTER: CH. CLASS 60
PEAK DATA: 87.54 G @ 28.00 MS; -104.43 G @ 18.32 MS

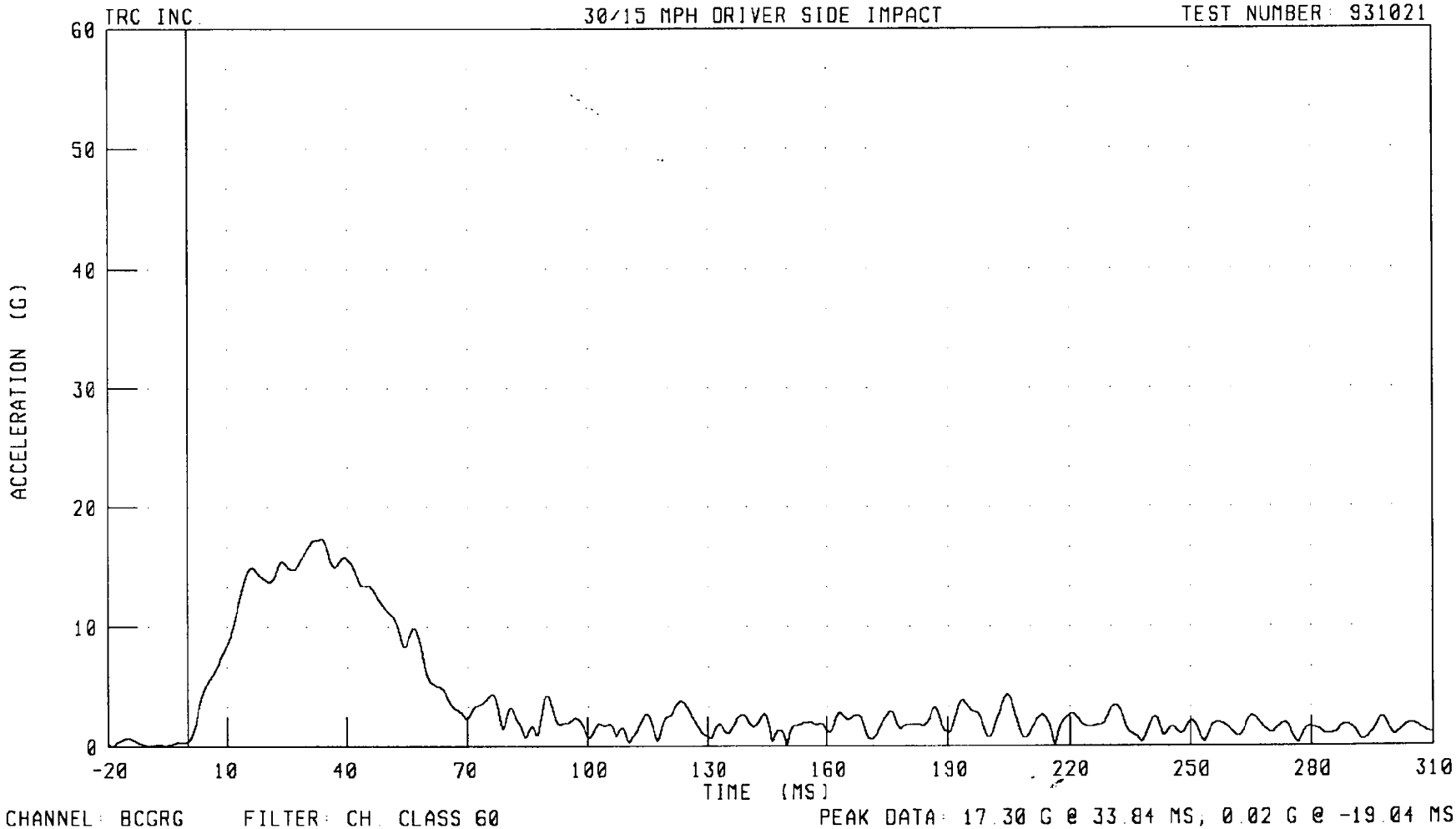

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
LEFT FRONT DOOR MID-REAR Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
80
40
0
-40
-80
-120
-160
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFDYG3
FILTER: CH. CLASS 60
PEAK DATA: 75.96 G @ 11.04 MS; -138.81 G @ 5.84 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCGXG
FILTER: CH CLASS 60
PEAK DATA: 0.76 G @ 124.80 MS, -15.51 G @ 29.92 MS


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION
TRC INC.
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCGYG
FILTER: CH. CLASS 60
PEAK DATA: 7.40 G @ 34.56 MS; -1.77 G @ 219.84 MS

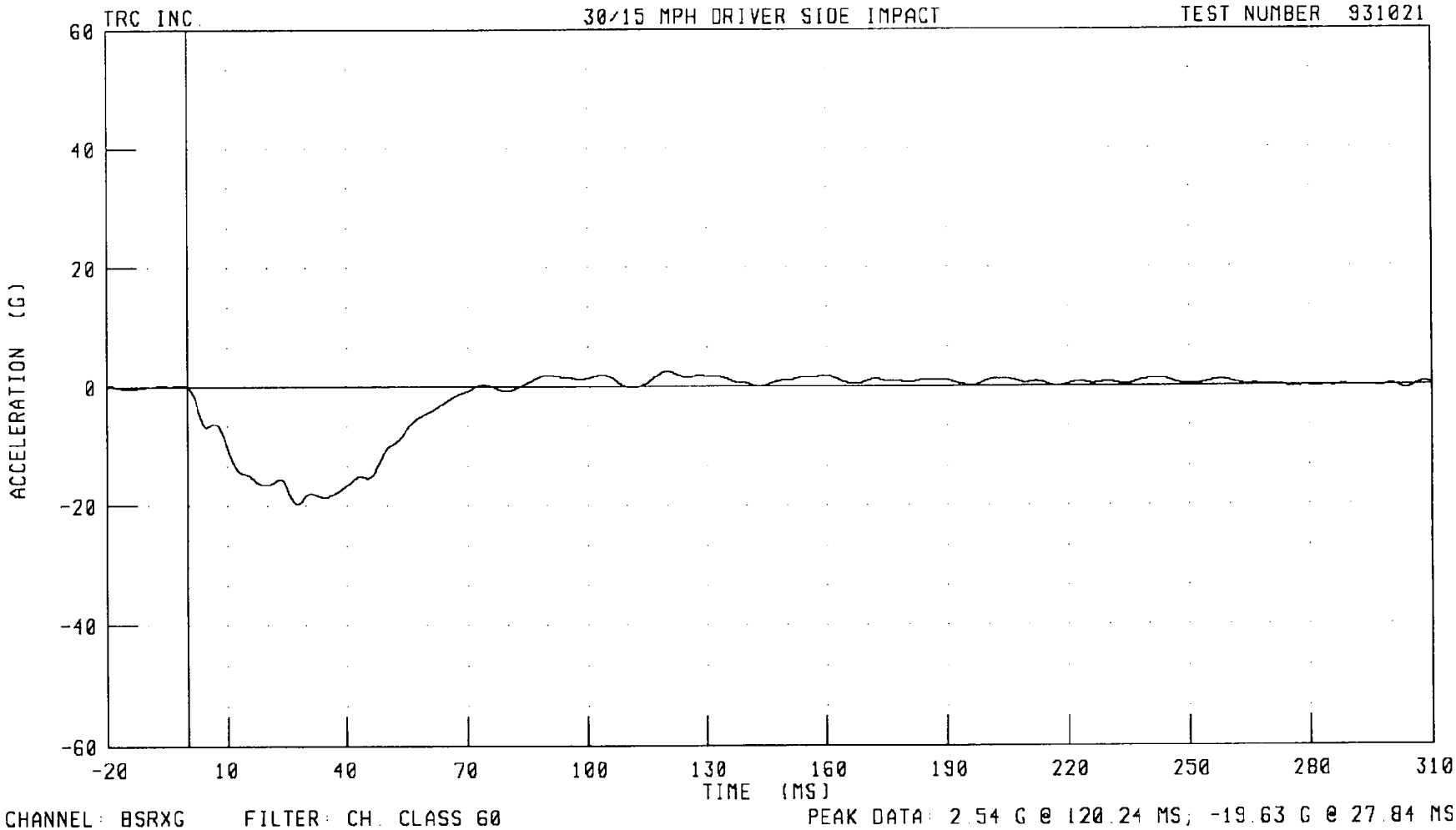

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION
TRC INC
30/15 MPH DRIVER SIDE IMPACT
TEST NUMBER: 931021
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCGZG
FILTER: CH. CLASS 60
PEAK DATA: 8.03 G @ 34.16 MS; -5.36 G @ 40.96 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION



CHANNEL: BCGRG FILTER: CH CLASS 60 PEAK DATA: 17.30 G @ 33.84 MS, 0.02 G @ -19.04 MS

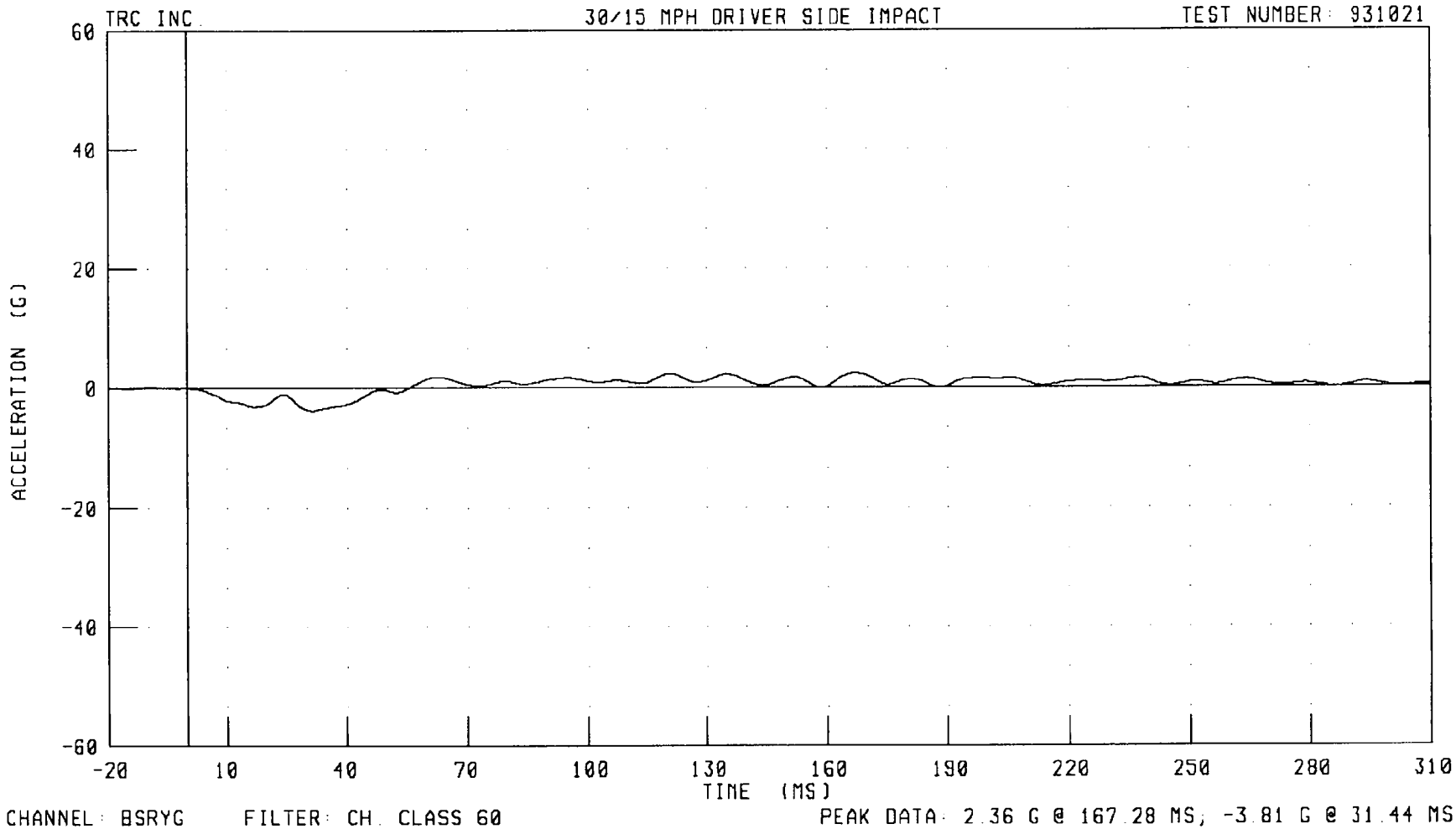
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK
BARRIER LEFT FRAME RAIL X-AXIS ACCELERATION



CHANNEL: BSRXG FILTER: CH. CLASS 60 PEAK DATA: 2.54 G @ 120.24 MS; -19.63 G @ 27.84 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF 1993 TOYOTA PICKUP TRUCK

BARRIER LEFT FRAME RAIL Y-AXIS ACCELERATION



CHANNEL: BSRYG FILTER: CH. CLASS 60 PEAK DATA: 2.36 G @ 167.28 MS; -3.81 G @ 31.44 MS

APPENDIX C

DUMMY CALIBRATION INFORMATION

PRE-TEST CALIBRATION

DRIVER DUMMY S/N 903

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

15-OCT-93

TRC TEST NO: ED90316 572F SN903 EXT.DIMENSION CAL16

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		20.6 DEG. C
	RELATIVE HUMIDITY		44.0 %
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 Fout

TRANSPORTATION RESEARCH CENTER INC.

THORACIC SHOCK ABSORBER TESTS

SIDE IMPACT DUMMY 15-Oct-93

TRC 572F SN903 DAMPER TEST CAL16

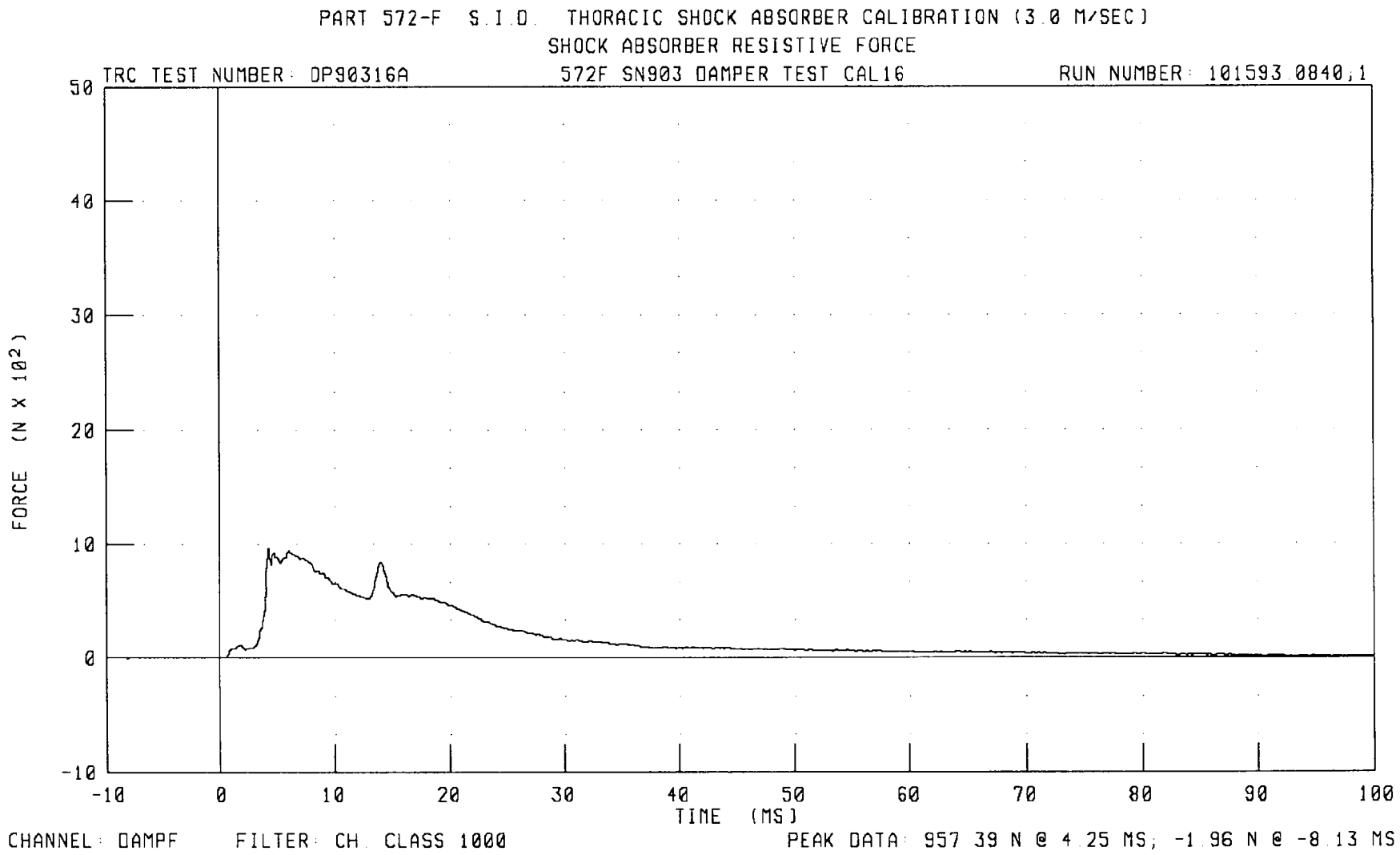
TEST NOS. DP90316A,DP90316B,DP90316C

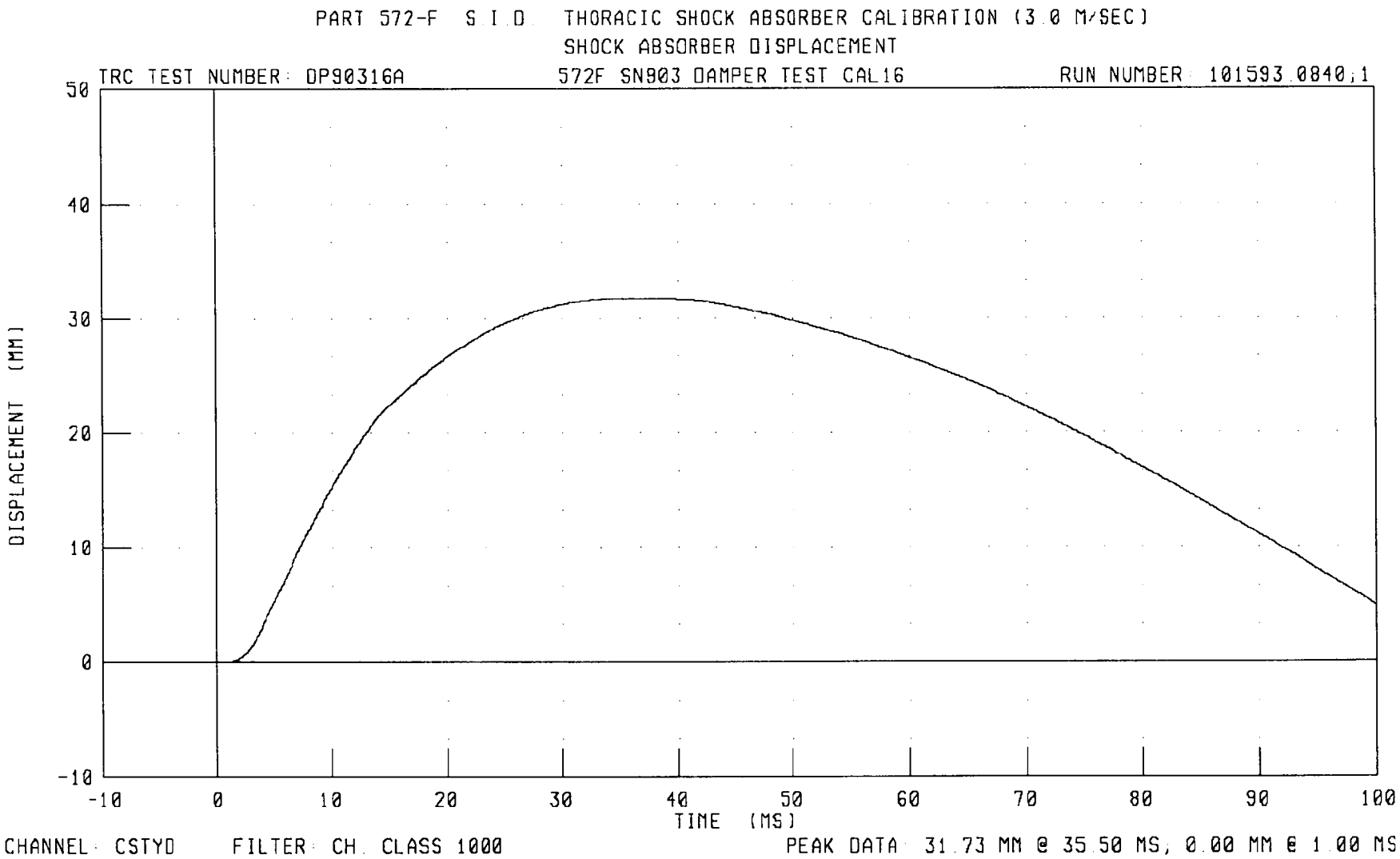
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		18.9 - 25.5 C	20.6 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
VELOCITY	FORCE	838 - 1125 N	957 N
3.06 M/S	DISPLACEMENT	31.2 - 35.2 MM	31.7 MM
VELOCITY	FORCE	1733 - 2100 N	1846 N
4.28 M/S	DISPLACEMENT	32.7 - 37.2 MM	34.7 MM
VELOCITY	FORCE	3743 - 4448 N	4432 N
6.10 M/S	DISPLACEMENT	34.4 - 39.5 MM	36.5 MM

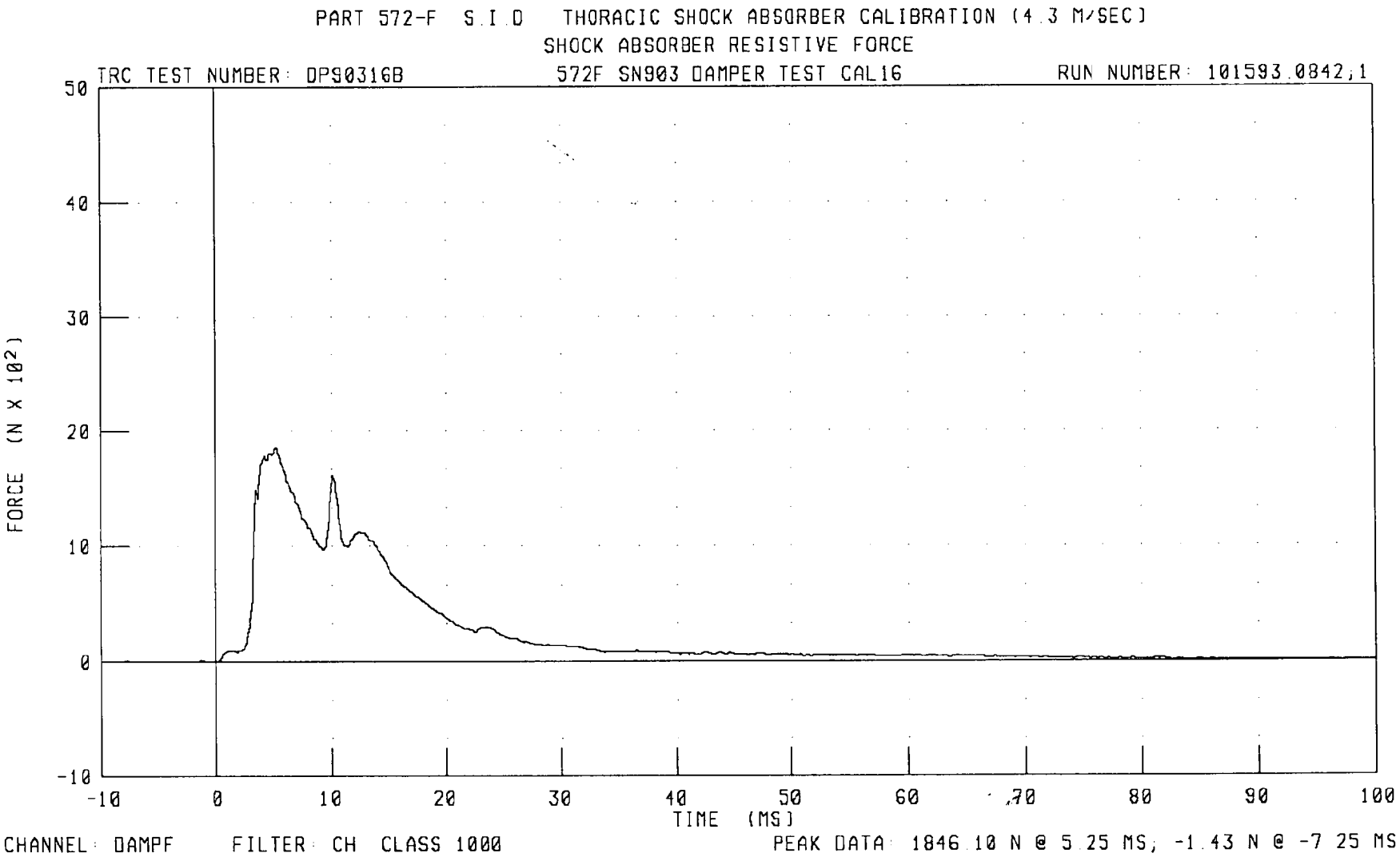
DAMPER SETTING = 5.5

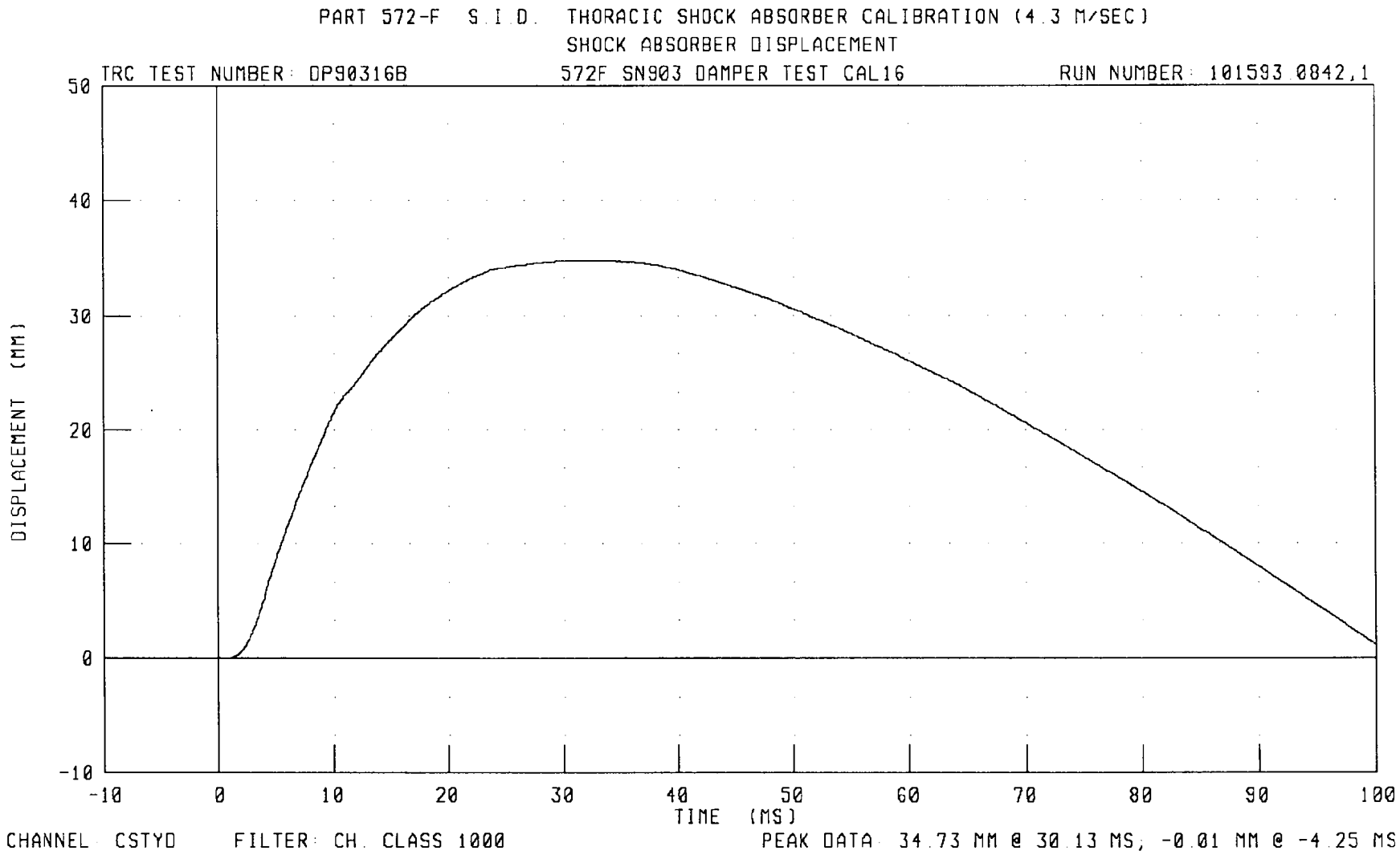
TEST MEETS SPECIFICATIONS

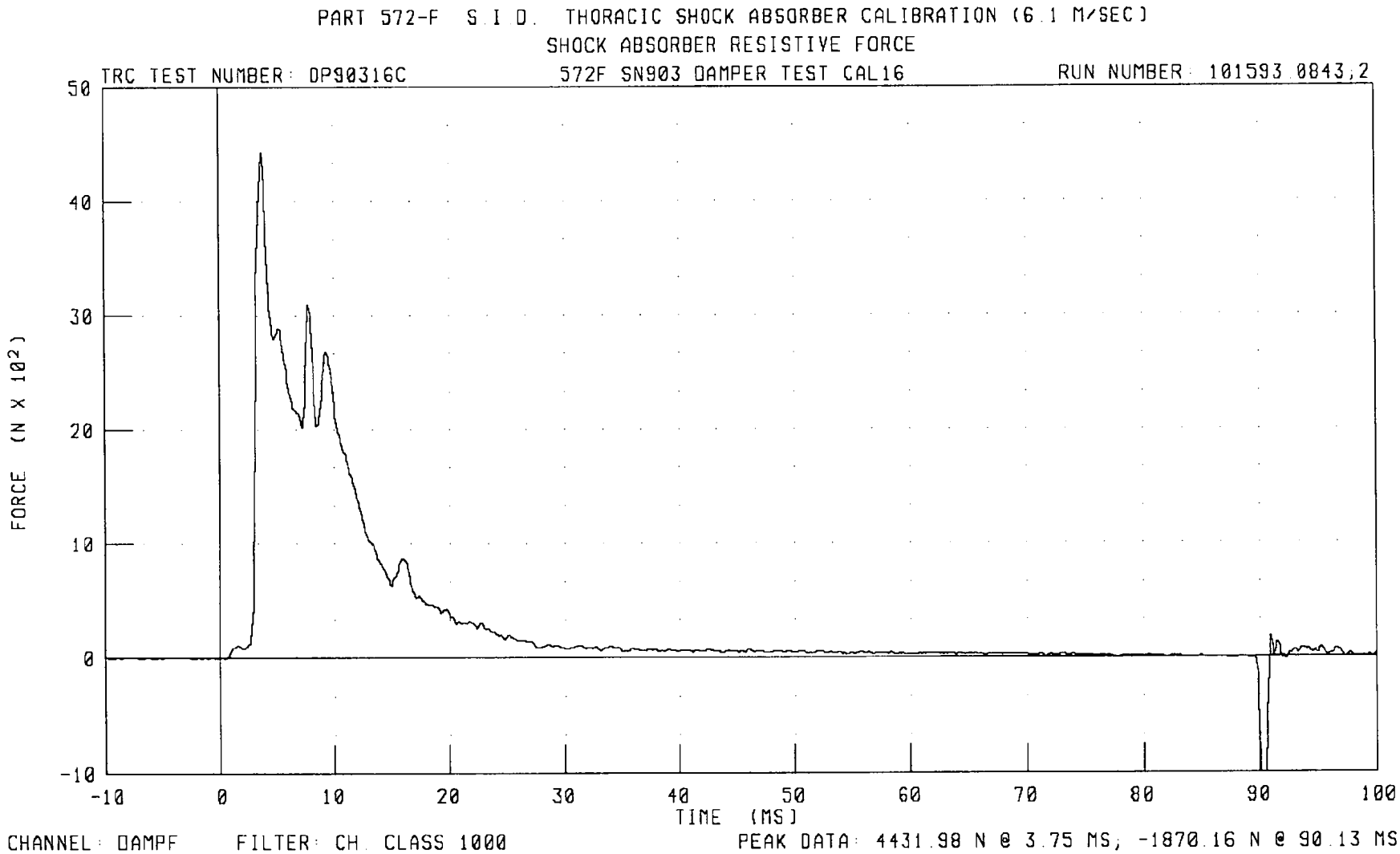
TECHNICIAN Pete Foust


PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (3.0 M/SEC)
SHOCK ABSORBER RESISTIVE FORCE
TRC TEST NUMBER: DP90316A
572F SN903 DAMPER TEST CAL16
RUN NUMBER: 101593 0840,1
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: 957.39 N @ 4.25 MS; -1.96 N @ -8.13 MS


PART 572-F S I D THORACIC SHOCK ABSORBER CALIBRATION (3.0 M/SEC)
SHOCK ABSORBER DISPLACEMENT
TRC TEST NUMBER: DP90316A
572F SN903 DAMPER TEST CAL16
RUN NUMBER: 101593.0840;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: 31.73 MM @ 35.50 MS, 0.00 MM @ 1.00 MS


PART 572-F S.I.D THORACIC SHOCK ABSORBER CALIBRATION (4.3 M/SEC)
SHOCK ABSORBER RESISTIVE FORCE
TRC TEST NUMBER: DPS0316B
572F SN903 DAMPER TEST CAL16
RUN NUMBER: 101593.0842;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: 1846.10 N @ 5.25 MS; -1.43 N @ -7.25 MS

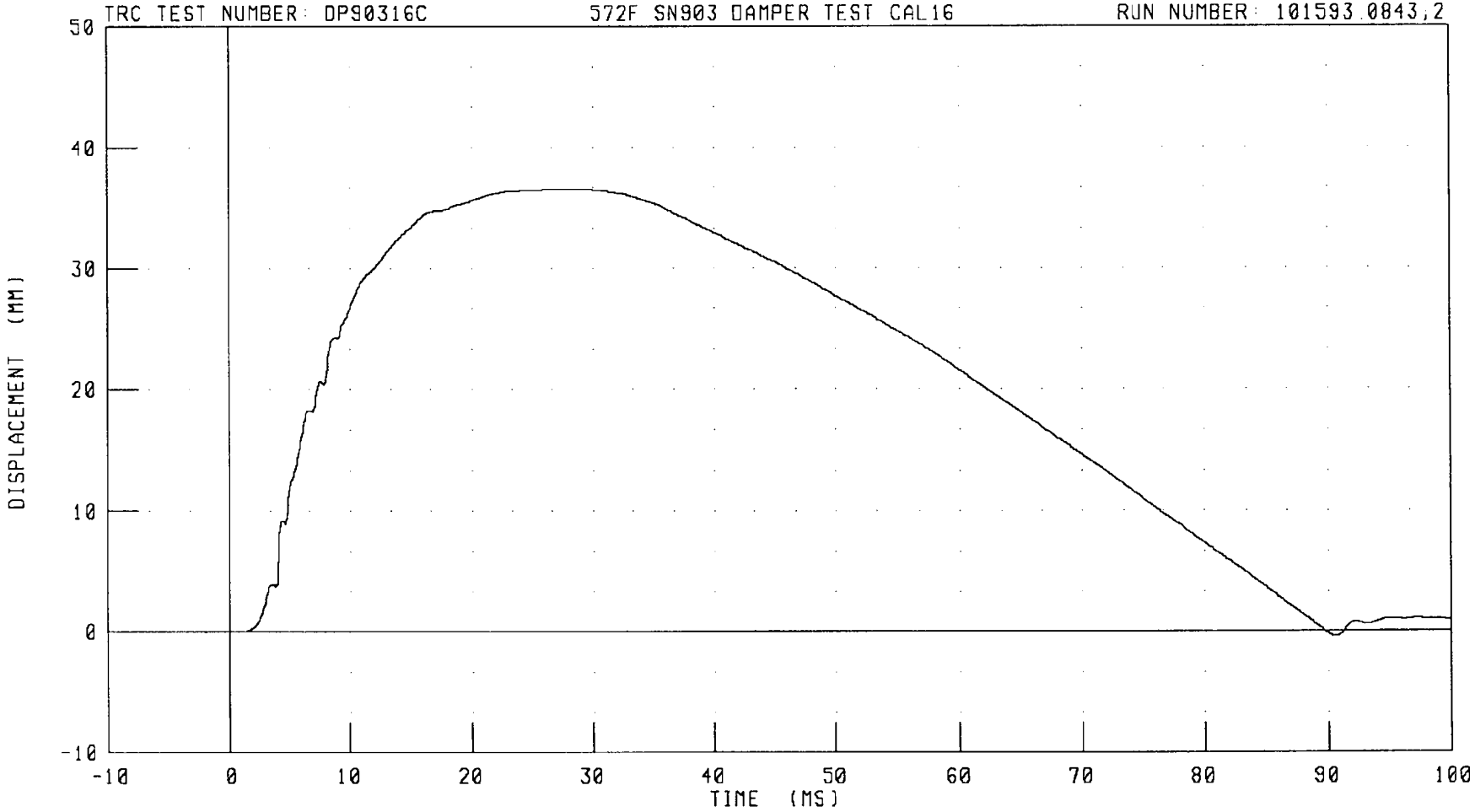

PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (4.3 M/SEC)
SHOCK ABSORBER DISPLACEMENT
TRC TEST NUMBER: DP90316B
572F SN903 DAMPER TEST CAL16
RUN NUMBER: 101593.0842,1
DISPLACEMENT (MM)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: CSTYD
FILTER: CH. CLASS 1000
PEAK DATA: 34.73 MM @ 30.13 MS, -0.01 MM @ -4.25 MS


PART 572-F S.I.D. THORACIC SHOCK ABSORBER CALIBRATION (6.1 M/SEC)
SHOCK ABSORBER RESISTIVE FORCE
TRC TEST NUMBER: DP90316C
572F SN903 DAMPER TEST CAL16
RUN NUMBER: 101593.0843;2
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: 4431.98 N @ 3.75 MS, -1870.16 N @ 90.13 MS

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

SHOCK ABSORBER DISPLACEMENT

TRC TEST NUMBER: DP90316C 572F SN903 DAMPER TEST CAL16 RUN NUMBER: 101593.0843,2



CHANNEL: CSTYD FILTER: CH. CLASS 1000 PEAK DATA: 36.54 MM @ 28.50 MS, -0.43 MM @ 90.63 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY 15-Oct-93

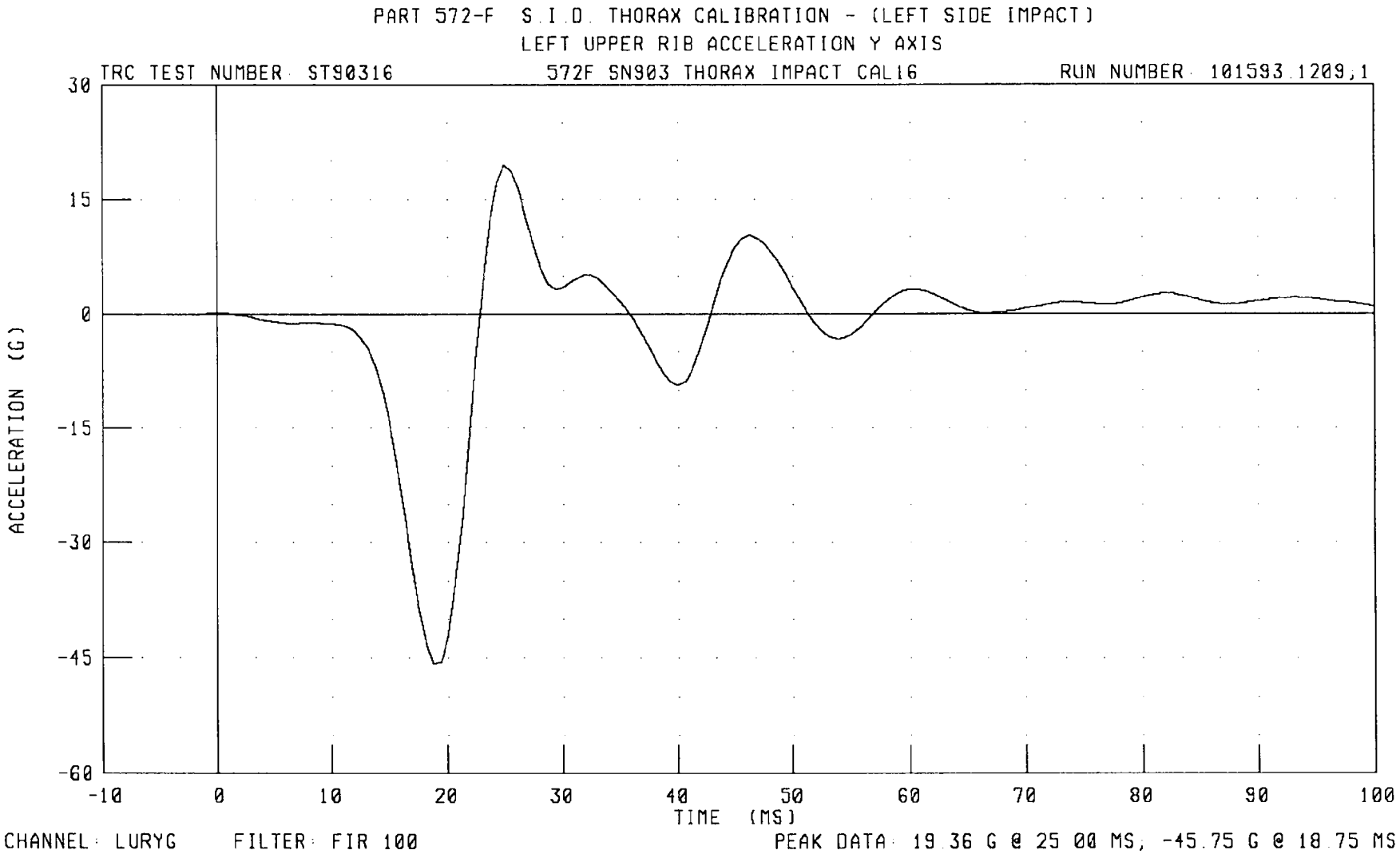
LEFT SIDE CONFIGURATION

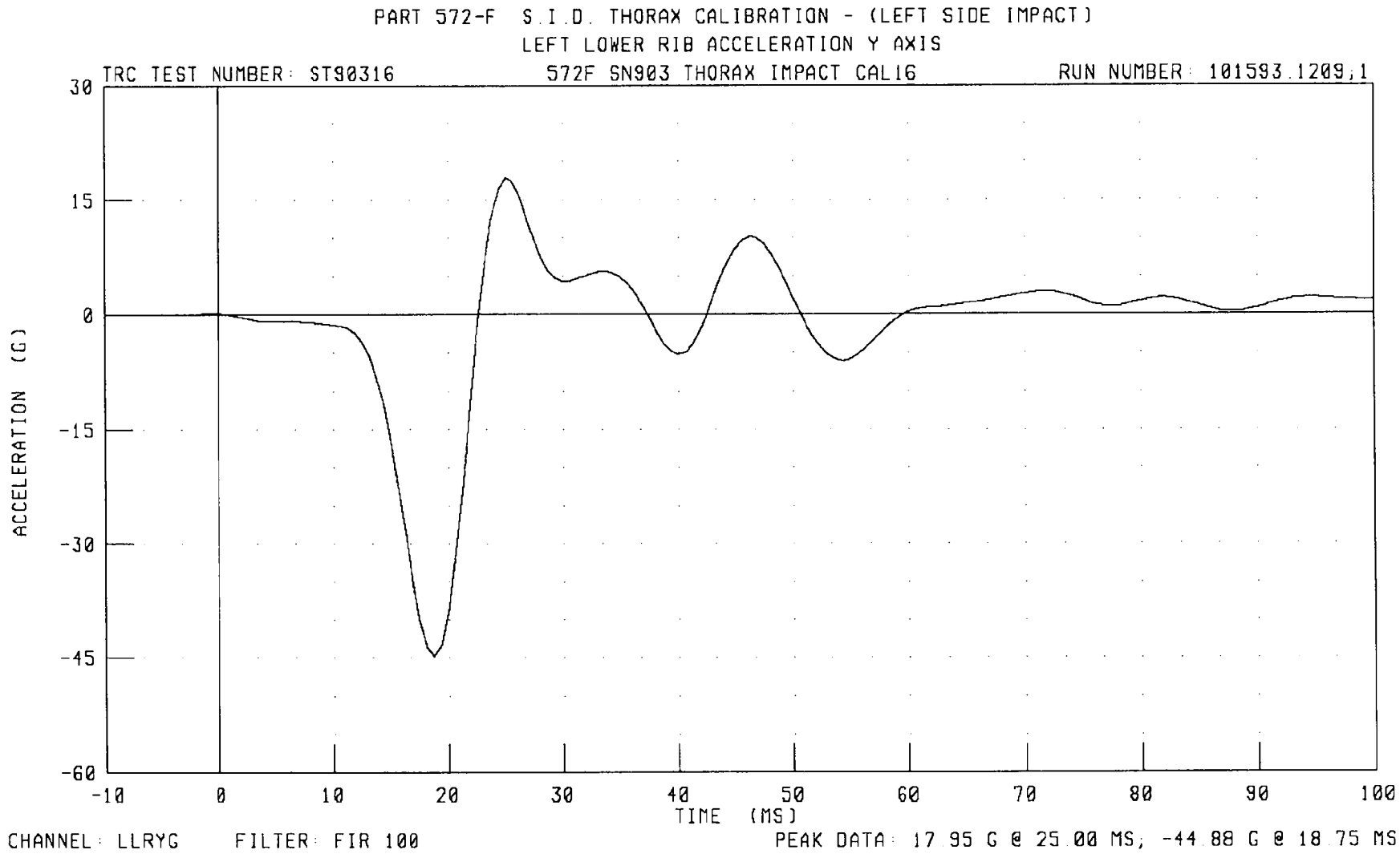
TRC ST90316 572F SN903 THORAX IMPACT CAL16

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	45.0 %
PISTON VELOCITY	4.21 - 4.32 M/SEC	4.27 M/SEC
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-45.8 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-44.9 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-21.3 G

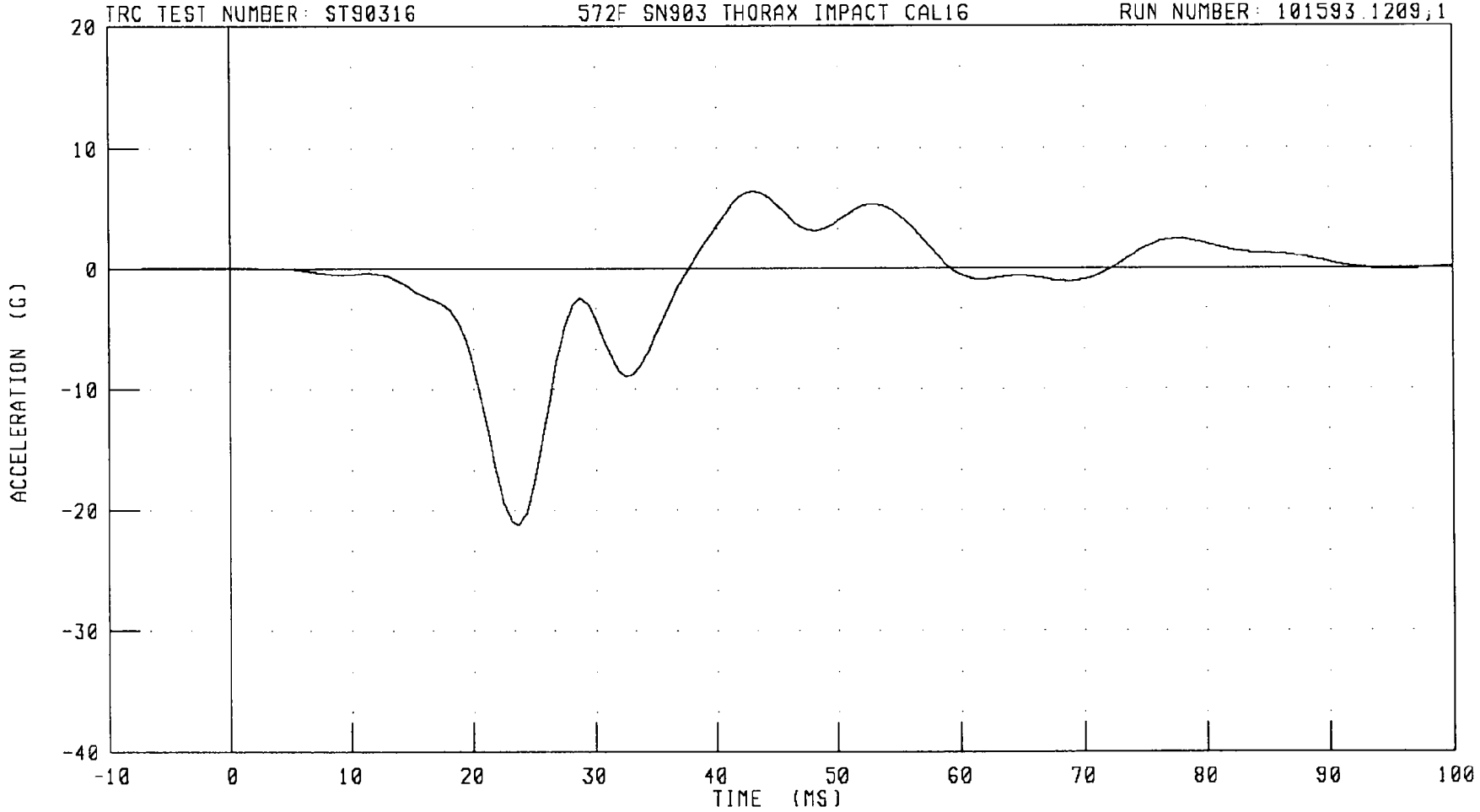
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foust


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT UPPER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: ST90316
572F SN903 THORAX IMPACT CAL16
RUN NUMBER: 101593.1209,1
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: 19.36 G @ 25.00 MS, -45.75 G @ 18.75 MS


PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS
TRC TEST NUMBER: ST90316
572F SN903 THORAX IMPACT CAL16
RUN NUMBER: 101593.1209;1
30
15
0
-15
-30
-45
-60
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: LLRYG
FILTER: FIR 100
PEAK DATA: 17.95 G @ 25.00 MS; -44.88 G @ 18.75 MS

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



CHANNEL: T12YG FILTER: FIR 100

PEAK DATA: 6.43 G @ 43.13 MS; -21.27 G @ 23.75 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY 15-Oct-93

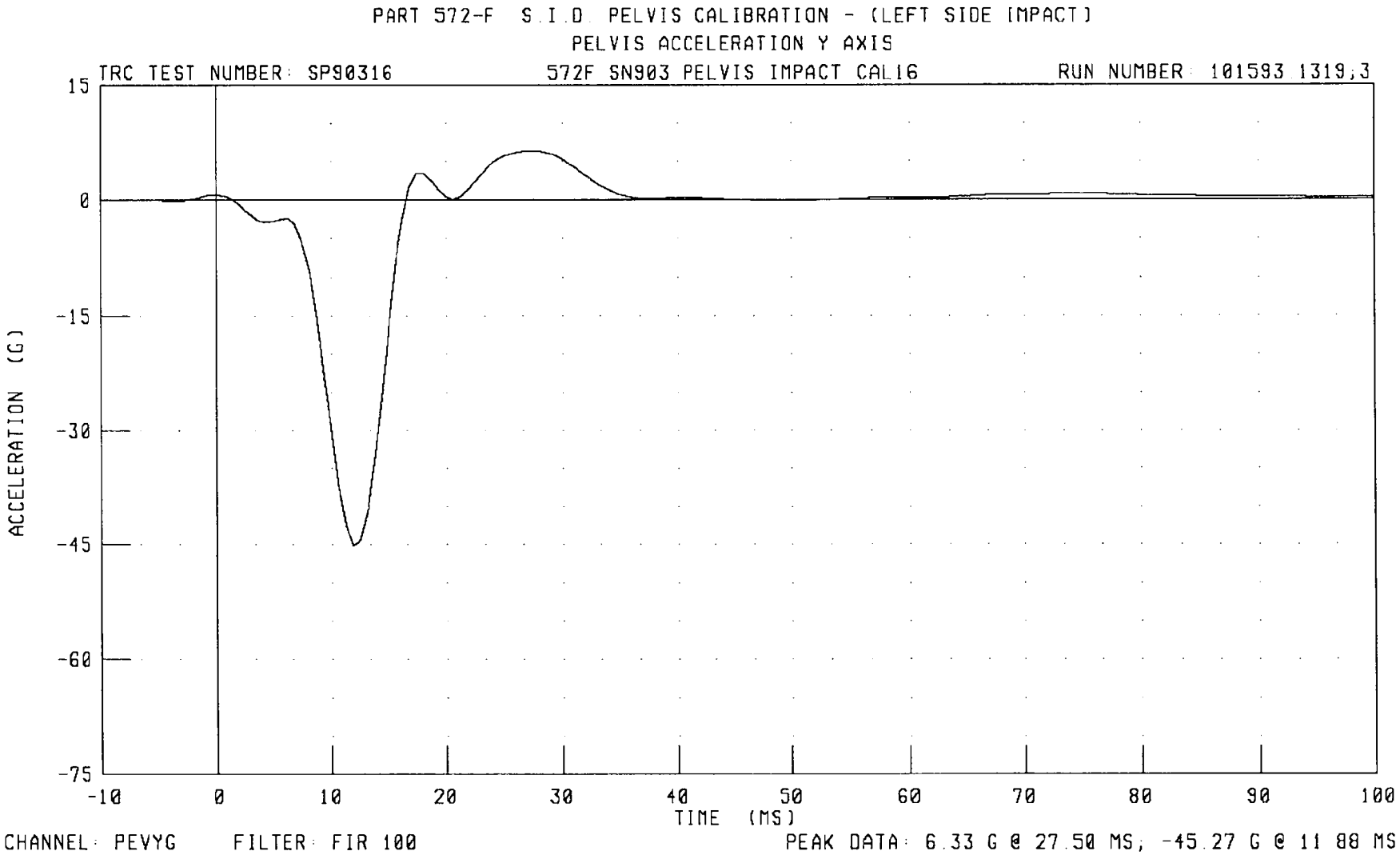
LEFT SIDE CONFIGURATION

TRC SP90316 572F SN903 PELVIS IMPACT CAL16

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	22.2 DEG. C
RELATIVE HUMIDITY	10 - 70 %	45.0 %
PISTON VELOCITY	4.21 - 4.32 M/SEC	4.22 M/SEC
PEAK PELVIC ACCELERATION	40 - 60 G	-45.3 G
TIME ABOVE 20 G LEVEL	3 - 7 MSEC	5.6 MSEC
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Fouts


PART 572-F S.I.D PELVIS CALIBRATION - (LEFT SIDE IMPACT)
PELVIS ACCELERATION Y AXIS
TRC TEST NUMBER: SP90316
572F SN903 PELVIS IMPACT CAL16
RUN NUMBER: 101593 1319,3
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: 6.33 G @ 27.50 MS; -45.27 G @ 11.88 MS

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: NHTSA/903

SEATING POSITION: DRIVER

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

ORIENTATION MNEMONIC SENSING)	LOCATION	AXIS	MFR	MODEL	S/N	(+
RFSXG1	RIGHT FRONT SILL	X	ENDEVCO	2264	AG24	REAR
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	AC44	RIGHT
LFDYG1	LEFT FRONT DOOR CENTERLINE	Y	ENDEVCO	7264	BK12J	LEFT
LFDYG3	LEFT FRONT DOOR MID-REAR	Y	ENDEVCO	2264	BA68	LEFT
LFDYG2	LEFT FRONT DOOR UPPER CENTERLINE	Y	ENDEVCO	2264	AA05	LEFT
RDKXG1	REAR TRUCKBED OVER AXLE	X	ENDEVCO	2264	AS95	
FORWARD						
RDKYG1	REAR TRUCKBED OVER AXLE	Y	ENDEVCO	2264	AU09	LEFT
RDKZG1	REAR TRUCKBED OVER AXLE	Z	ENDEVCO	2264	BA46	UP

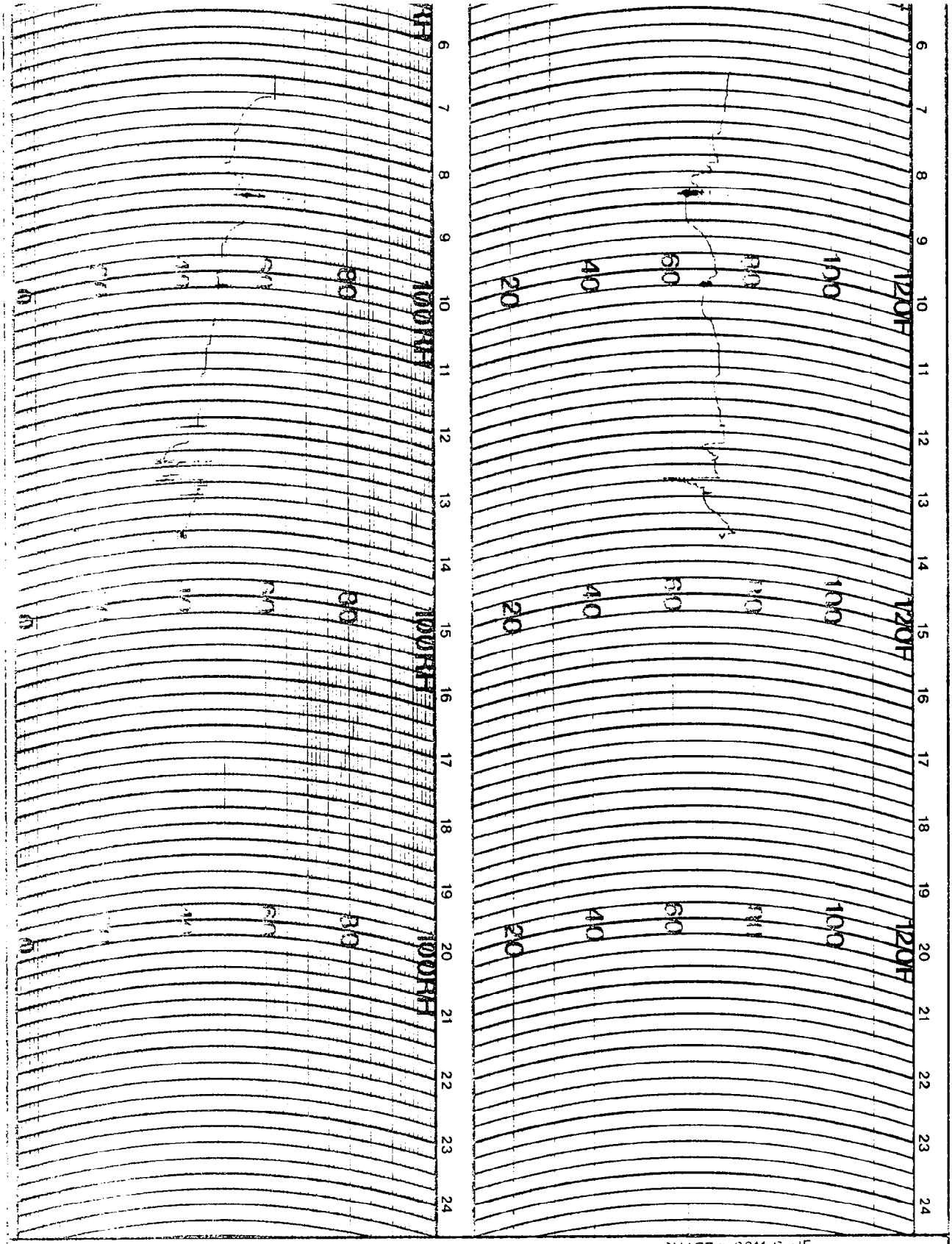
MOVING DEFORMABLE BARRIER INSTRUMENTATION PLACEMENT

ORIENTATION MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	(+ 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 OVER REAR AXLE	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.



WEATHER MEASURE
P.O. BOX 13257
SACRAMENTO, CA. 95841
PHONE (916)481-7555

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # 599120

STATION 93102I DATE ON _____ DATE OFF _____

OCCUPANT COMPARTMENT THERMOGRAPH