

RC
1042
.L66
1996h



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



DOT HS 808 361

March 1996

Final Report

Heavy Truck with Cab and Baseline Bumper into 1987 Ford Taurus 4-Door Sedan

Notice

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

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

1. Report No. DOT HS 808 361 01	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Heavy Truck with Cab and Baseline Bumper into 1987 Ford Taurus 4-door Sedan	5. Report Date June - August 1995	6. Performing Organization Code TRC
	8. Performing Organization Report No. 950616	
9. Performing Organization Name and Address National Highway Traffic Safety Administration Vehicle Research and Test Center P. O. Box 37, East Liberty, OH 43319	10. Work Unit No. (TRAIS)	11. Contract or Grant No. DTNH22-88-C-07292
	13. Type of Report and Period Covered Final Report June - August 1995	14. Sponsoring Agency Code
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590		
15. Supplemental Notes		
16. Abstract This report documents a crash test that was conducted for research and development in support of reducing heavy truck aggressiveness. This test was conducted with a 1987 Ford Taurus 4-door sedan, VIN 1FABP52U6HA162809, at Transportation Research Center Inc. on June 16, 1995. The left front 50% of the test vehicle was impacted by a heavy truck with cab and baseline bumper. The vehicle contained seventeen (17) accelerometers, two (2) seat belt load cells, and one (1) instrumented Hybrid III driver dummy.		
17. Key Words Heavy Truck Aggressiveness Occupant Response 1987 Ford Taurus 4-door Sedan Heavy Truck with Cab and Baseline Bumper	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division Nassif Building, Room 5108 400 Seventh Street, S.W. Washington, DC 20590 MAY 13 1998	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. Number of Pages 130
22. NASSIF BRANCH FILE 100-100000		

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
m	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

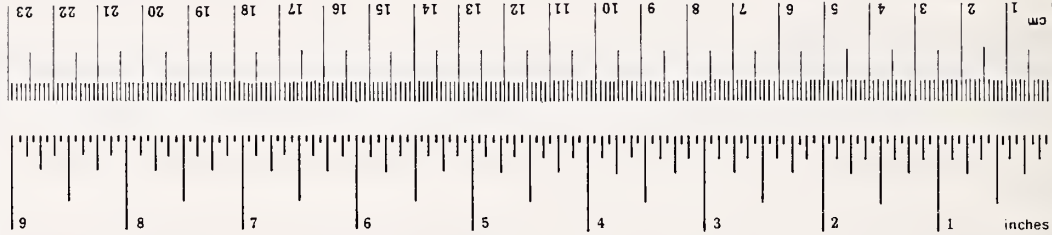
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha

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



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
mi	kilometers	1.1	yards	yd
km	kilometers	0.6	miles	mi

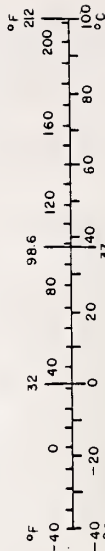
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	ac

MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	st

VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
----	---------------------	-------------------	------------------------	----



* 1 m = 2.54 (exact). For other exact conversions and more detailed tables, see RRS Basic, Publ. 236, Units of Weights and Measures, Price \$2.25, SD Catalog No. C1110-236.

Table of Contents

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	Purpose and Test Summary	1-1
2.0	Vehicle, Dummy, and Test Data	2-1
Appendix A	Photographs	A-1
Appendix B	Data Plots	B-1
Appendix C	Miscellaneous Test Information	C-1

List of Tables

<u>No.</u>	<u>Title</u>	<u>Page</u>
1	Crash Test Summary	2-2
2	Test Vehicle Information	2-3
3	Heavy Truck Information	2-6
4	Post-Impact Data	2-7
5	Impacted Vehicle Measurements	2-11
6	Vehicle Accelerometer Locations and Data Summary	2-14
7	Heavy Truck Accelerometer Locations and Data Summary	2-17
8	Dummy Data Summary	2-18
9	Post-Impact Dummy/Vehicle Data	2-19
10	Dummy Measurement Data for Front Seat Occupants	2-22
11	Motion Picture Camera Information	2-26

List of Figures

<u>No.</u>	<u>Titles</u>	<u>Page</u>
1	Impact Velocity Measurement System	2-8
2	Vehicle Crush	2-9
3	Pre-Test and Post-Test Measurement Points	2-10
4	Heavy Truck Crush	2-12
5	Vehicle Accelerometer Placement	2-13
6	Heavy Truck Accelerometer Placement	2-16
7	Dummy Measurement Locations for Front Seat Occupants	2-21
8	Seat Belt Positioning Data	2-23
9	Driver Dummy To Steering Column/Wheel Assembly Data	2-24
10	Camera Positions	2-25

List of Photographs

<u>Description</u>	<u>Figure</u>
Pre-Test Front View	A-1
Post-Test Front View	A-2
Pre-Test Left Side View	A-3
Post-Test Left Side View	A-4
Pre-Test Rear View	A-5
Post-Test Rear View	A-6
Pre-Test Right Side View	A-7
Post-Test Right Side View	A-8
Pre-Test Engine Compartment View	A-9
Pre-Test Vehicle Truck Alignment - View 1	A-10
Pre-Test Vehicle Truck Alignment - View 2	A-11
Pre-Test Vehicle Truck Alignment - View 3	A-12
Pre-Test Vehicle Truck Alignment - View 4	A-13
Pre-Test Vehicle Truck Alignment - View 5	A-14
Pre-Test Driver Dummy Frontal View	A-15
Post-Test Driver Dummy Frontal View	A-16
Pre-Test Driver Dummy Left Side View	A-17
Post-Test Driver Dummy Left Side View	A-18
Pre-Test Driver Dummy and Vehicle Interior - View 1	A-19
Pre-Test Driver Dummy and Vehicle Interior - View 2	A-20
Post-Test Driver Dummy Over Shoulder View	A-21
Post-Test Driver Dummy Right Side View	A-22
Post-Test Heavy Truck Frontal View	A-23
Post-Test Heavy Truck Left Side - View 1	A-24
Post-Test Heavy Truck Left Side - View 2	A-25
Post-Test Heavy Truck Left Side - View 3	A-26

List of Photographs, Cont'd.

<u>Description</u>	<u>Figure</u>
Post-Test Heavy Truck Right Side - View 1	A-27
Post-Test Heavy Truck Right Side - View 2	A-28
Post-Test Heavy Truck Bumper - View 1	A-29
Post-Test Heavy Truck Bumper - View 2	A-30
Post-Test Heavy Truck Bumper - View 3	A-31
Pre-Test Vehicle Ballast Location View	A-32
Impact Event Still	A-33

Section 1.0

Purpose and Test Summary

Purpose and Test Summary

This test was conducted as research in support of reducing heavy truck aggressiveness. This test was conducted on June 16, 1995.

The test vehicle, a 1987 Ford Taurus 4-door sedan, was equipped with a 3.0-liter, 6-cylinder, transverse gasoline engine and a 3-speed automatic transmission. The test weight of the vehicle was 1582 kg. The vehicle was instrumented with seven (7) longitudinal axis accelerometers, five (5) lateral axis accelerometers, five (5) vertical axis accelerometer and two (2) seat belt force load cells. One (1) Part 572E dummy was seated in the left front outboard seating position according to the dummy placement procedure specified in Appendix B and Optional Appendix C of Laboratory Test Procedure TP-208-09. The dummy was instrumented in the head, chest, and pelvis with longitudinal, lateral, and vertical accelerometers. The dummy was also instrumented with two (2) femur load cells, and a chest deflection potentiometer.

The vehicle was impacted by a Peterbilt Model 352ST heavy truck with cab and baseline bumper at 92.1 kph. The intended impact engagement was the left front 50% of the car with the left front of the truck bumper. The Taurus sustained 489 mm of static crush.

The dummy's head injury criterion, HIC, was 4609 (See Data Acquisition Explanations). The dummy's chest deceleration with 3 milliseconds minimum duration was 46.9 g. The dummy's maximum chest deflection was 28.7 mm. The dummy's maximum left femur force was 6650 N. The dummy's maximum right femur force was 7854 N.

The vehicle and dummy data were digitally sampled at 12,500 samples per second. The data was digitally filtered as per SAE J211 OCT88.

The test was filmed by one (1) real-time panning motion picture camera and seven (7) high-speed motion picture cameras operating at approximately 1000 frames per second.

Section 2.0 contains the vehicle, dummy, and test data. Appendix A contains the pre- and post-test still photographs. Appendix B contains the final test data plots. Appendix C contains miscellaneous test information.

Table 1 Crash Test Summary

Test type:	Heavy Truck with Cab and Baseline Bumper into Vehicle
Test date:	06/16/95
Test time:	1540
Ambient temperature:	28° C
Vehicle:	1987 Ford Taurus 4-door sedan
Vehicle test weight:	1582 kg
Offset:	Left front 50% of vehicle
Impact angle: ¹	0°
Impact velocity: ²	Primary = 92.1 kph Secondary = 92.1 kph
Heavy Truck:	Peterbilt Model 352ST with Cab
Truck Bumper:	Baseline
Truck Test Weight:	9725 kg
Vehicle Maximum static crush:	489 mm
Truck Maximum static crush:	316 mm
Dummies:	Driver #043
Type:	Part 572 E
Location:	Left front
Restraint:	3-point unibelt
Number of data channels:	37
Number of cameras:	
High-speed	7
Real-time	1

¹ With respect to two track centerline.

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

Table 2 Test Vehicle Information

Vehicle manufacturer:	Ford Motor Company
Make/model:	Ford/Taurus
VIN:	1FABP52U6HA162809
Model year:	1987
Body style:	4-door sedan
Color:	Blue
Engine data:	
Type:	Transverse
Cylinders:	6
Displacement:	3.0-liter
Transmission data:	<u>3</u> Speed, <u> </u> Manual, <u>X</u> Automatic, <u>X</u> FWD, <u> </u> RWD, <u> </u> 4WD
Date vehicle received:	06/09/95
Odometer reading:	6,806
Dealer's name and address:	NA

Accessories:

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

Certification data from vehicle's label:

Vehicle manufactured by:	Ford Motor Company
Date of manufacture:	01/87
VIN:	1FABP52U6HA162809
GVWR:	4595 lbs.
GAWR: Front:	2507 lbs.
Rear:	2133 lbs.

Table 2 Test Vehicle Information, Cont'd.

Tires on vehicle (mfr., line, size): Goodyear, Invicta, P205/70R14

Tire pressure with maximum
capacity vehicle load: Front: 241 kPa
Rear: 241 kPa

Spare tire (mfr., line, size): Michelin, Tex, T135/80R14

Type of seats: Front: Split bench
Rear: Bench

Type of front seat backs: Manually adjustable

Maximum width: 1818 mm

Wheelbase: 2689 mm

Location of "Recommended Tire Pressure" label:

The label was located on the passenger's rear door jam.

Data from vehicle's "Recommended Tire Pressure" label:

Recommended tire size: P195/70R14
P205/70R14
P205/65R15

Recommended cold
tire pressure: Front: 35 psi
Rear: 35 psi

Seating capacity: Front: 3
Rear: 3
Total: 6

Vehicle capacity load: 1100 lbs.

Test vehicle attitude:

Delivered attitude: LF 702 mm; RF 700 mm; LR 648 mm; RR 649 mm

Pre-test attitude: LF 698 mm; RF 694 mm; LR 611 mm; RR 609 mm

Post-test attitude¹: LF NA; RF 608 mm; LR 543 mm; RR 550 mm

¹ Left front fender was destroyed during the impact event.

Table 2 Test Vehicle Information, Cont'd.

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

Right front	465 kg	Right rear	240 kg
Left front	450 kg	Left rear	264 kg
Total front weight	915 kg	(64.4% of total vehicle weight)	
Total rear weight	504 kg	(35.6% of total vehicle weight)	
Total test weight	1419 kg		
Target test weight ¹	1581 kg		

Weight of test vehicle with required dummies and 87 kg of cargo weight:

Right front	476 kg	Right rear	308 kg
Left front	468 kg	Left rear	330 kg
Total front weight	944 kg	(59.7% of total vehicle weight)	
Total rear weight	638 kg	(40.3% of total vehicle weight)	
Total test weight	1582 kg	(1 kg over target test weight)	
Weight of ballast secured in vehicle cargo area:		28 kg	
Components removed to meet target test weight:		None	
CG rearward of front wheel centerline:		1085 mm	

¹ Provided by Vehicle Research and Test Center.

Table 3 Heavy Truck Information

Vehicle manufacturer:	Peterbilt Motors Co.
Model:	352ST
Serial No.:	34256
Chassis/body type:	Cab-over with sleeper
Wheelbase:	3945 mm
Chassis weight:	6169 kg
Gross weight:	22,226 kg
Test weight:	
Front:	3502 kg
Rear:	6223 kg
Total:	9725 kg

Table 4 Post-Impact Data

Test number:	950616
Date of test:	06/16/95
Time of test:	1540
Type of test: Vehicle	Heavy Truck with Cab and Baseline bumper into
Impact angle: ¹	0°
Offset:	Left Front 50% of Vehicle
Ambient temperature at impact area:	28° C
Temperature in occupant compartment:	22° C
Impact velocity:	
Primary	92.1 kph
Secondary	92.1 kph
Distance from heavy truck to vehicle:	
Entering trap	381 mm
Exiting trap	51 mm

Test vehicle static crush:

Overall length of test vehicle:

Pre-test:	L	4644 mm;	C	4775 mm;	R	4655 mm
Post-test:	L	4155 mm;	C	4457 mm;	R	4660 mm
Total crush:	L	489 mm;	C	318 mm;	R	-5 mm
Average crush:	267 mm					

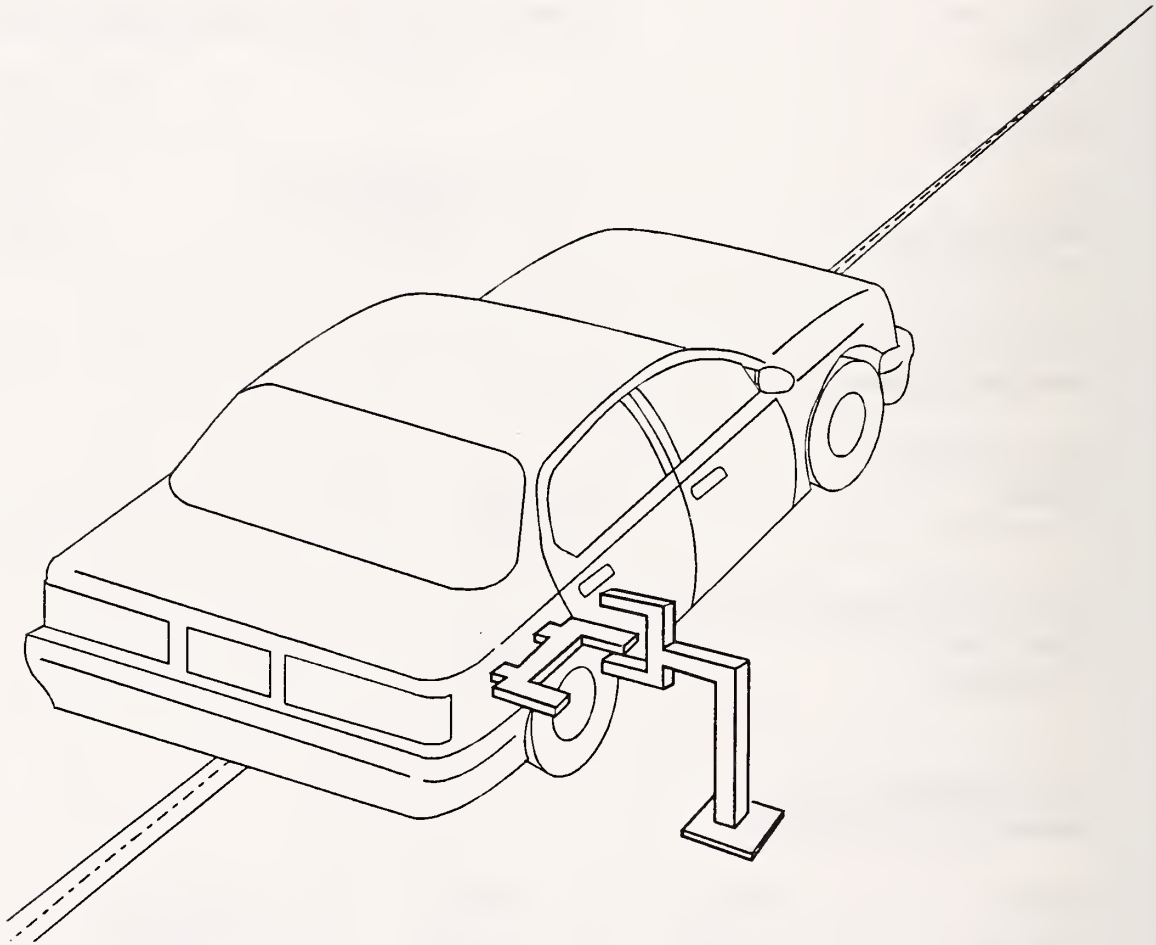
Heavy truck static crush:

Overall length of test vehicle:

Pre-test:	L	6145 mm;	C	6225 mm;	R	6148 mm
Post-test:	L	5829 mm;	C	6215 mm;	R	6268 mm
Total crush:	L	316 mm;	C	10 mm;	R	-120 mm
Average crush:	69 mm					

¹ As measured clockwise from the subject vehicle's front longitudinal centerline.

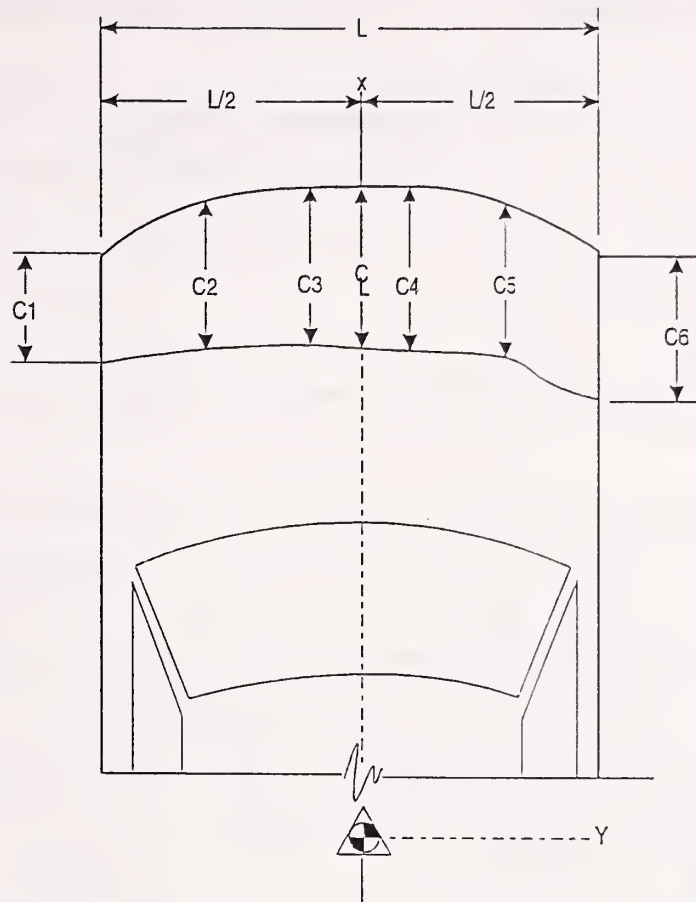
Figure 1 Impact Velocity Measurement System



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

The vanes have 305-millimeter spacing.

Figure 2 Vehicle Crush



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

Vehicle: 1987 Ford Taurus

	Pre-test	Post-test ¹	Crush
L	1524 mm		
C1	4644 mm	4155 mm	489 mm
C2	4735 mm	4296 mm	439 mm
C3	4769 mm	4380 mm	389 mm
C4	4771 mm	4536 mm	235 mm
C5	4737 mm	4630 mm	107 mm
C6	4655 mm	4660 mm	-5 mm
CL	4775 mm	4457 mm	318 mm

¹ Post-test measurements taken to plane of front bumper mounting flanges because the front bumper was destroyed during the impact event.

Figure 3 Pre-Test and Post-Test Measurement Points

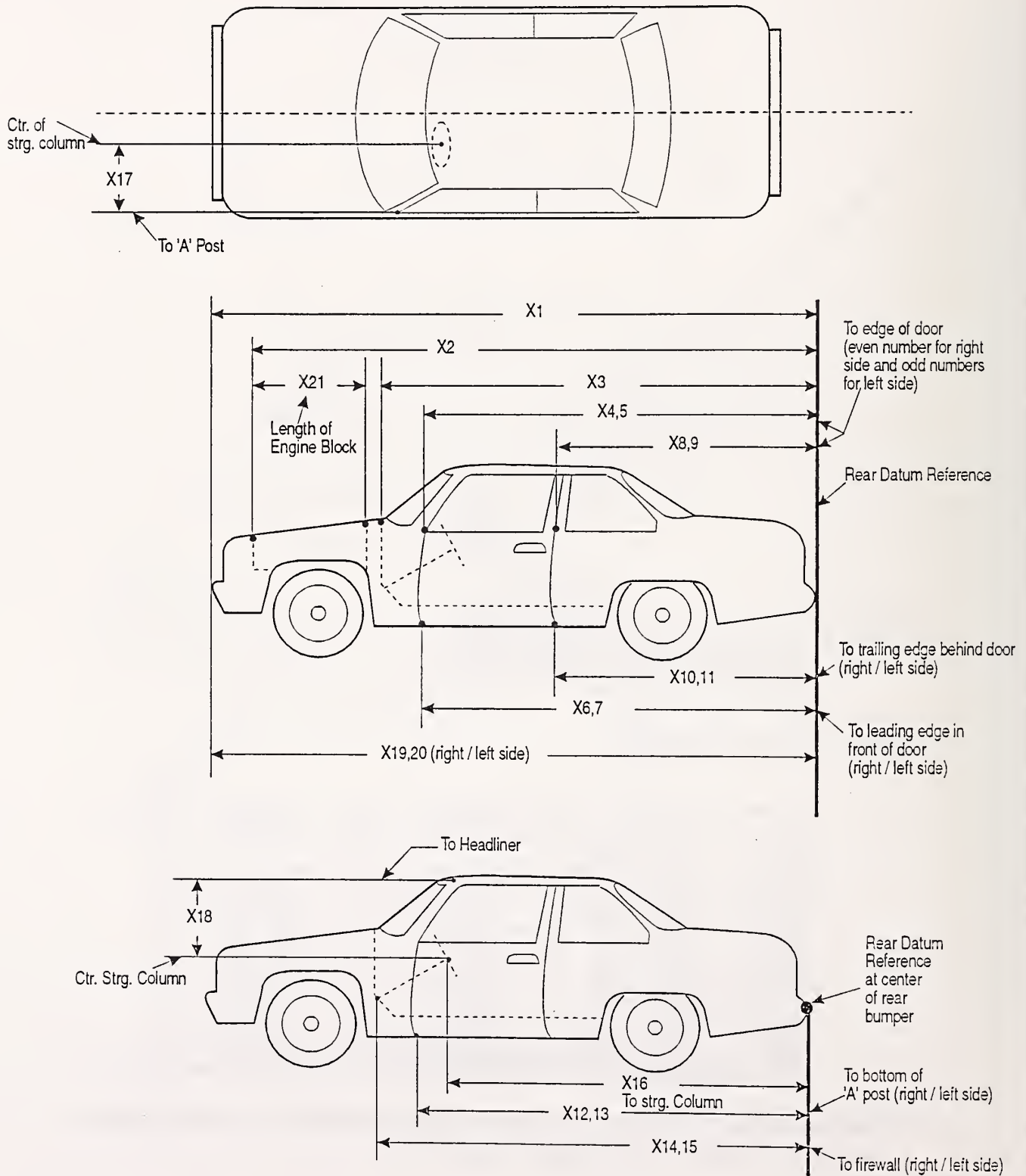


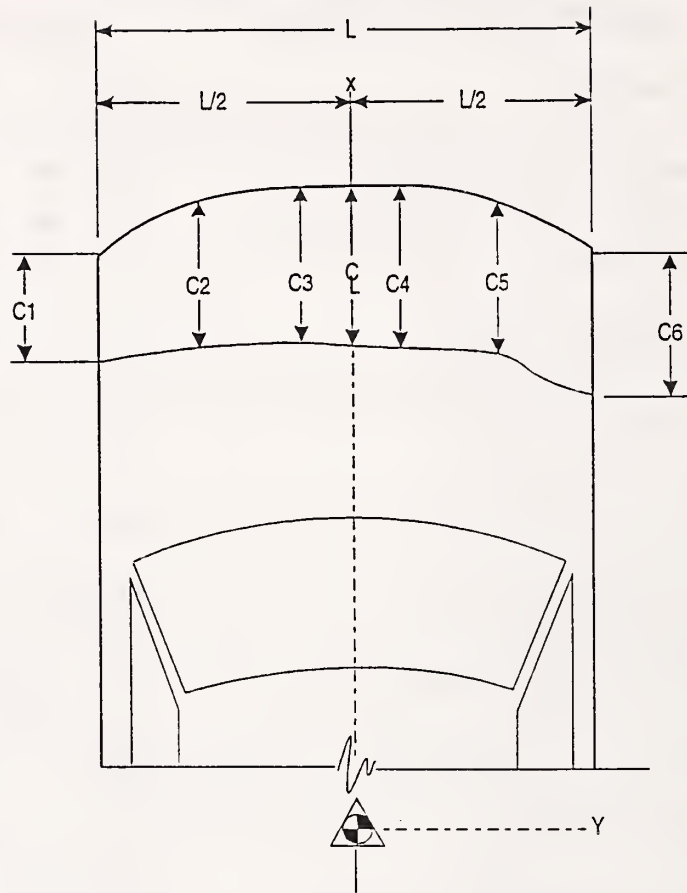
Table 5 Impacted Vehicle Measurements

Vehicle Make/Model: Ford/Taurus

Test Number: 950616

No.	Type of measurement	Pre-test		Post-test		Diff.
X1	Total length of vehicle at centerline	4775	mm	4457	mm	318 mm
X2	Rear surface of vehicle to front of engine block	4233	mm	3922	mm	311 mm
X3	Rear surface of vehicle to firewall	3604	mm	3375	mm	229 mm
X4	Rear surface of vehicle to upper leading edge of right door	3308	mm	3322	mm	-14 mm
X5	Rear surface of vehicle to upper leading edge of left door	3305	mm	2920	mm	385 mm
X6	Rear surface of vehicle to lower leading edge of right door	3254	mm	3325	mm	-71 mm
X7	Rear surface of vehicle to lower leading edge of left door	3254	mm	3175	mm	79 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2226	mm	2235	mm	-9 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2219	mm	2205	mm	14 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2205	mm	2202	mm	3 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2208	mm	2135	mm	73 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3208	mm	3216	mm	-8 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3213	mm	2920	mm	293 mm
X14	Rear surface of vehicle to firewall - right side	3581	mm	2985	mm	596 mm
X15	Rear surface of vehicle to firewall - left side	3549	mm	3485	mm	64 mm
X16	Rear surface of vehicle to steering wheel center	2818	mm	2585	mm	233 mm
X17	Center of steering column to "A" post	262	mm	430	mm	-168 mm
X18	Center of steering column to headliner	424	mm	586	mm	-162 mm
X19	Rear surface of vehicle to right side of front bumper	4655	mm	4660	mm	-5 mm
X20	Rear surface of vehicle to left side of front bumper	4644	mm	4155	mm	489 mm
X21	Length of engine block	400	mm	400	mm	0 mm

Figure 4 Heavy Truck Crush

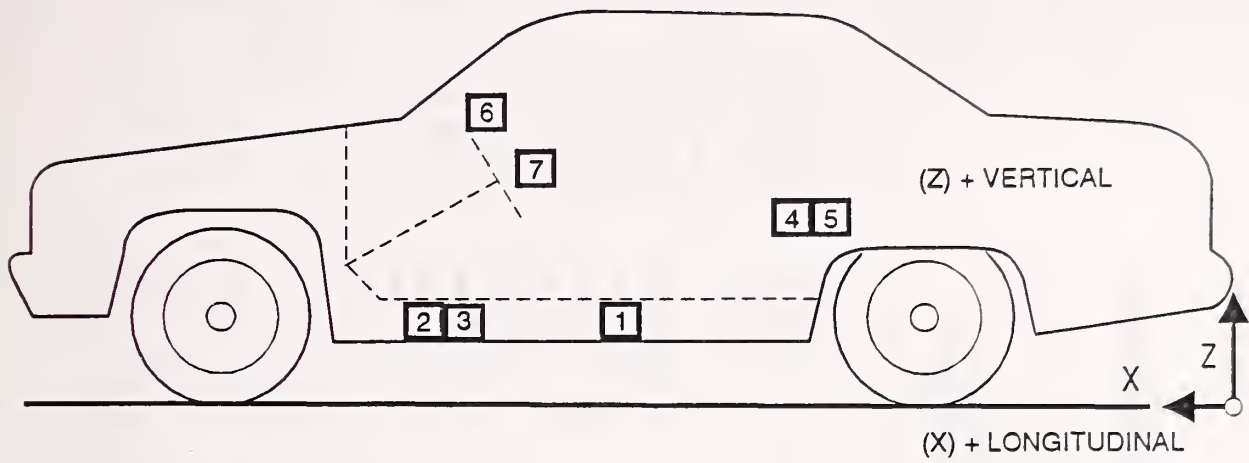


NOTES: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is truck centerline.

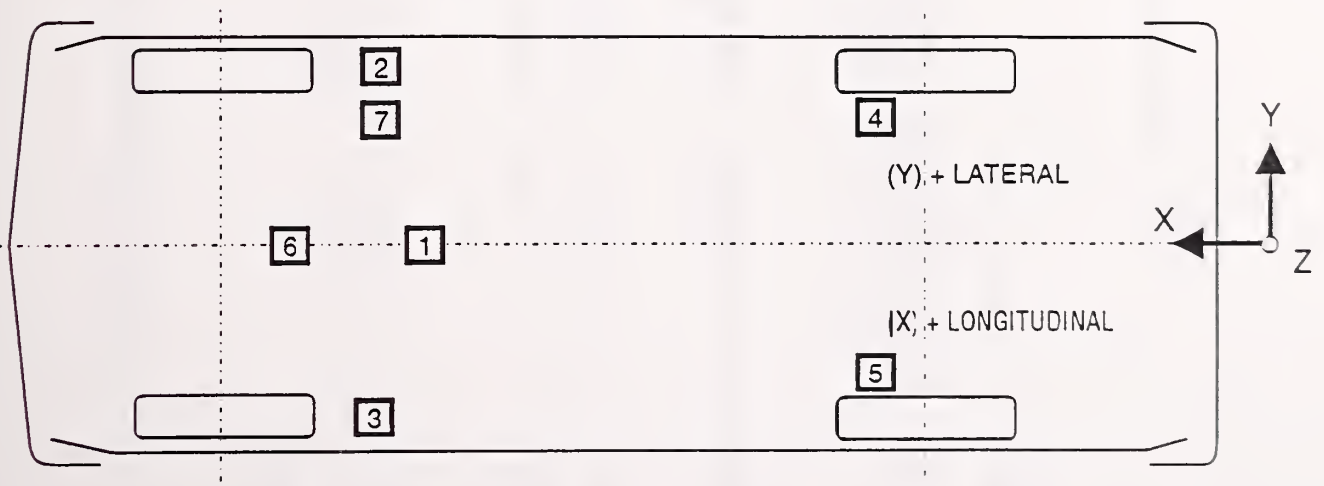
Vehicle: Heavy truck

	Pre-test	Post-test ¹	Crush
L	2235 mm		
C1	6145 mm	5829 mm	316 mm
C2	6198 mm	6085 mm	113 mm
C3	6225 mm	6218 mm	7 mm
C4	6225 mm	6208 mm	17 mm
C5	6202 mm	6228 mm	-26 mm
C6	6148 mm	6268 mm	-120 mm
CL	6225 mm	6215 mm	10 mm

Figure 5 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 6 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 950616 No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 CENTER OF GRAVITY	2515 mm	0 mm	355 mm				
LONGITUDINAL			1.4 g	@ 246.4 ms	33.3 g	@ 57.0 ms	
LATERAL			6.4 g	@ 69.7 ms	10.6 g	@ 56.2 ms	
VERTICAL			28.5 g	@ 57.3 ms	28.9 g	@ 52.2 ms	
RESULTANT			44.9 g	@ 57.1 ms			
2 LEFT FRONT SILL	2932 mm	692 mm	279 mm				
LONGITUDINAL			1.8 g	@ 284.4 ms	28.6 g	@ 52.2 ms	
LATERAL			26.7 g	@ 70.7 ms	20.7 g	@ 55.8 ms	
VERTICAL ¹			107.1 g	@ 68.9 ms	25.8 g	@ 53.1 ms	
RESULTANT ¹			109.6 g	@ 68.9 ms			
3 RIGHT FRONT SILL	2912 mm	-675 mm	276 mm				
LONGITUDINAL			1.1 g	@ 278.8 ms	22.1 g	@ 57.2 ms	
LATERAL			13.2 g	@ 57.3 ms	18.7 g	@ 47.3 ms	
VERTICAL			14.3 g	@ 73.6 ms	18.1 g	@ 48.8 ms	
RESULTANT			29.4 g	@ 47.9 ms			
4 LEFT REAR SEAT CROSSMEMBER	1724 mm	682 mm	359 mm				
LONGITUDINAL			2.1 g	@ 284.9 ms	24.5 g	@ 52.4 ms	
LATERAL			8.4 g	@ 69.9 ms	13.3 g	@ 64.1 ms	
VERTICAL			19.0 g	@ 84.2 ms	21.5 g	@ 103.7 ms	
RESULTANT			27.9 g	@ 103.3 ms			

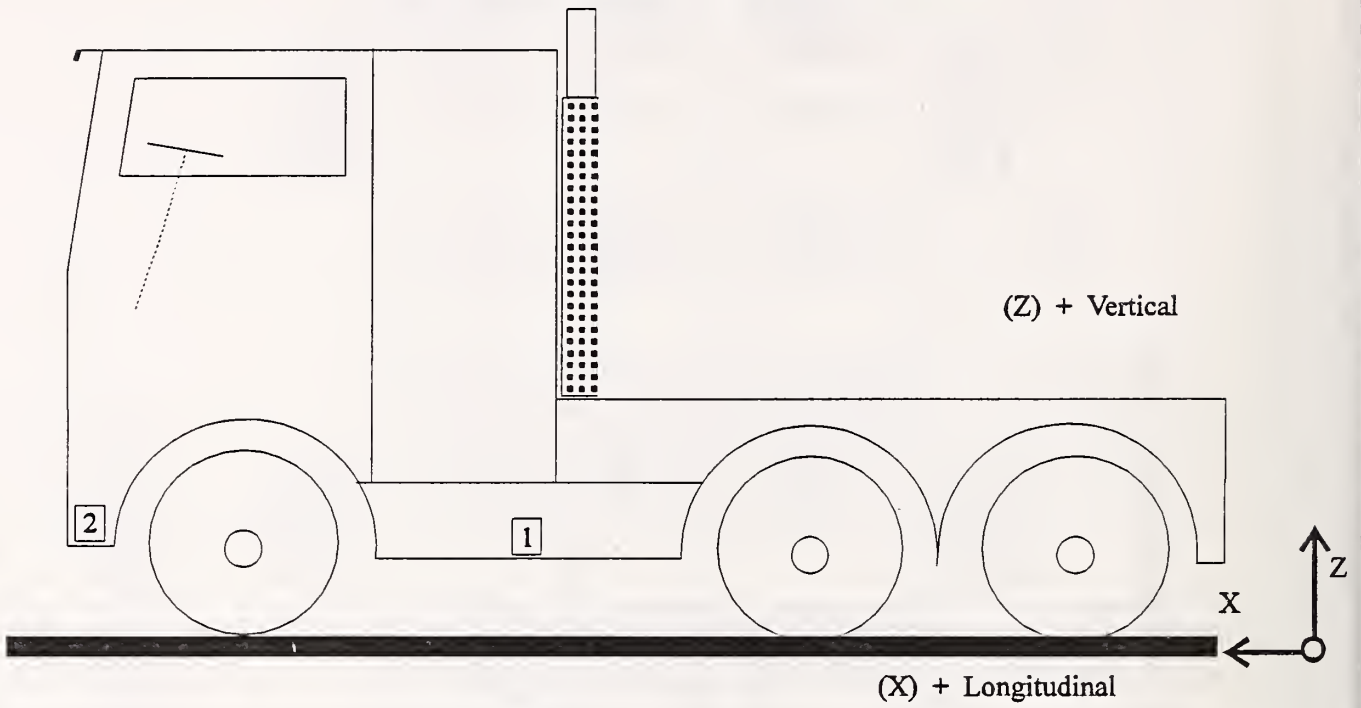
Table 6 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 950616 No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
5 RIGHT REAR SEAT CROSSMEMBER	2024 mm	-688 mm	318 mm				
LONGITUDINAL				1.9 g	@ 279.1 ms	17.8 g	@ 43.1 ms
LATERAL				1.6 g	@ 125.1 ms	9.2 g	@ 77.4 ms
VERTICAL				6.3 g	@ 92.2 ms	13.3 g	@ 71.8 ms
RESULTANT				20.6 g	@ 72.0 ms		
6 INSTRUMENT PANEL CENTER	3281 mm	-14 mm	952 mm				
LONGITUDINAL				22.6 g	@ 132.5 ms	69.6 g	@ 55.6 ms
7 STEERING WHEEL HUB LONGITUDINAL ¹	3018 mm	288 mm	737 mm				
				19.2 g	@ 69.2 ms	120.6 g	@ 57.9 ms

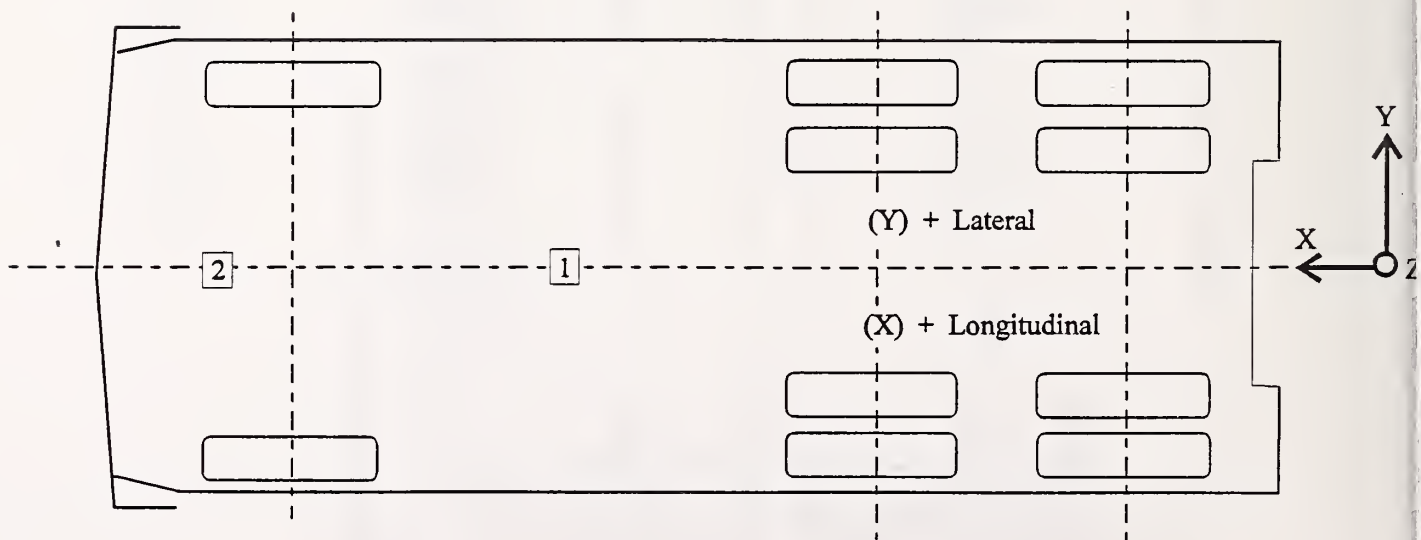
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

¹ See DATA ACQUISITION EXPLANATIONS

Figure 6 Heavy Truck Accelerometer Placement



Side View



Bottom View

Table 7 Heavy Truck Accelerometer Locations and Data Summary

TEST NUMBER: 950616									
No. LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION		
1 CENTER OF GRAVITY		2995 mm	0 mm	678 mm					
LONGITUDINAL					3.6 g	@ 102.0 ms	7.8 g	@ 51.8 ms	
LATERAL					4.8 g	@ 190.6 ms	6.5 g	@ 109.4 ms	
VERTICAL					8.0 g	@ 63.1 ms	6.8 g	@ 121.4 ms	
RESULTANT					9.5 g	@ 63.0 ms			
2 FRONT FRAME		5782 mm	0 mm	383 mm					
CROSSMEMBER									
LONGITUDINAL					8.3 g	@ 131.7 ms	25.0 g	@ 111.8 ms	
LATERAL					66.6 g	@ 112.7 ms	10.9 g	@ 135.7 ms	
VERTICAL					30.6 g	@ 111.2 ms	19.3 g	@ 15.1 ms	
RESULTANT					72.6 g	@ 112.5 ms			

REFERENCE: X: + FORWARD FROM TRAILING EDGE OF TRUCK
Y: + LEFT FROM TRUCK CENTERLINE
Z: + UP FROM GROUND LEVEL

Table 8 Dummy Data Summary

TEST NUMBER: 950616

DRIVER DUMMY SERIAL NUMBER: 043

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

HEAD ACCELERATION

LONGITUDINAL ¹	12.2 g	@ 138.6 ms	402.1 g	@ 99.4 ms
LATERAL	25.4 g	@ 166.7 ms	317.4 g	@ 102.6 ms
VERTICAL	64.7 g	@ 100.0 ms	70.8 g	@ 103.2 ms
RESULTANT ¹	479.4 g	@ 99.5 ms		
HIC ¹	4609 from 98.6 to 103.4			

CHEST ACCELERATION

LONGITUDINAL	2.5 g	@ 115.0 ms	45.0 g	@ 94.5 ms
LATERAL	6.8 g	@ 65.8 ms	22.0 g	@ 111.8 ms
VERTICAL	19.6 g	@ 118.9 ms	24.3 g	@ 77.8 ms
RESULTANT	47.9 g	@ 94.5 ms		
3 MSEC	46.9			

CHEST DEFLECTION

LONGITUDINAL	28.7 mm	@ 93.0 ms	0.3 mm	@ 232.0 ms
--------------	---------	-----------	--------	------------

PELVIS ACCELERATION

LONGITUDINAL	8.1 g	@ 82.9 ms	76.7 g	@ 65.4 ms
LATERAL	31.4 g	@ 61.3 ms	25.1 g	@ 111.1 ms
VERTICAL	16.3 g	@ 120.9 ms	12.7 g	@ 61.9 ms
RESULTANT	77.3 g	@ 65.4 ms		

FEMUR LOAD

LEFT	464.5 N	@ 52.7 ms	6650.2 N	@ 73.9 ms
RIGHT	3986.7 N	@ 82.6 ms	7853.7 N	@ 67.2 ms

POSITIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD
FORCE: TENSION

NEGATIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD
FORCE: COMPRESSION

¹ See DATA ACQUISITION EXPLANATIONS

Table 9 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	<u>Driver #043</u>	<u>Passenger #NA</u>
Head	Visor	
Chest	None	
Abdomen	None	
Left knee	Instrument panel	
Right knee	Instrument panel	

Door Opening:

	<u>Left</u>	<u>Right</u>
Front	Tools required	Easy
Rear	Tools required	Easy

Seat Movement:

	<u>Seat Back Failure</u>	<u>Seat Shift</u>
Front	None	None
Rear	NA	NA

Glazing Damage:

The entire windshield cracked and retention was lost for the left half. The driver side door glass was broken out.

Other Notable Impact Effects:

The left front fender was destroyed.

Dummy Kinematic Summary

Upon impact the driver dummy translated forward and to the left across the seat. Both knees impacted the lower instrument panel. The dummy was restrained by the three-point unbelt. The dummy rebounded rearward and to the right. The dummy then came to rest facing forward and slightly leaning toward the right in the driver's seating position.

Figure 7 Dummy Measurement Locations for Front Seat Occupants

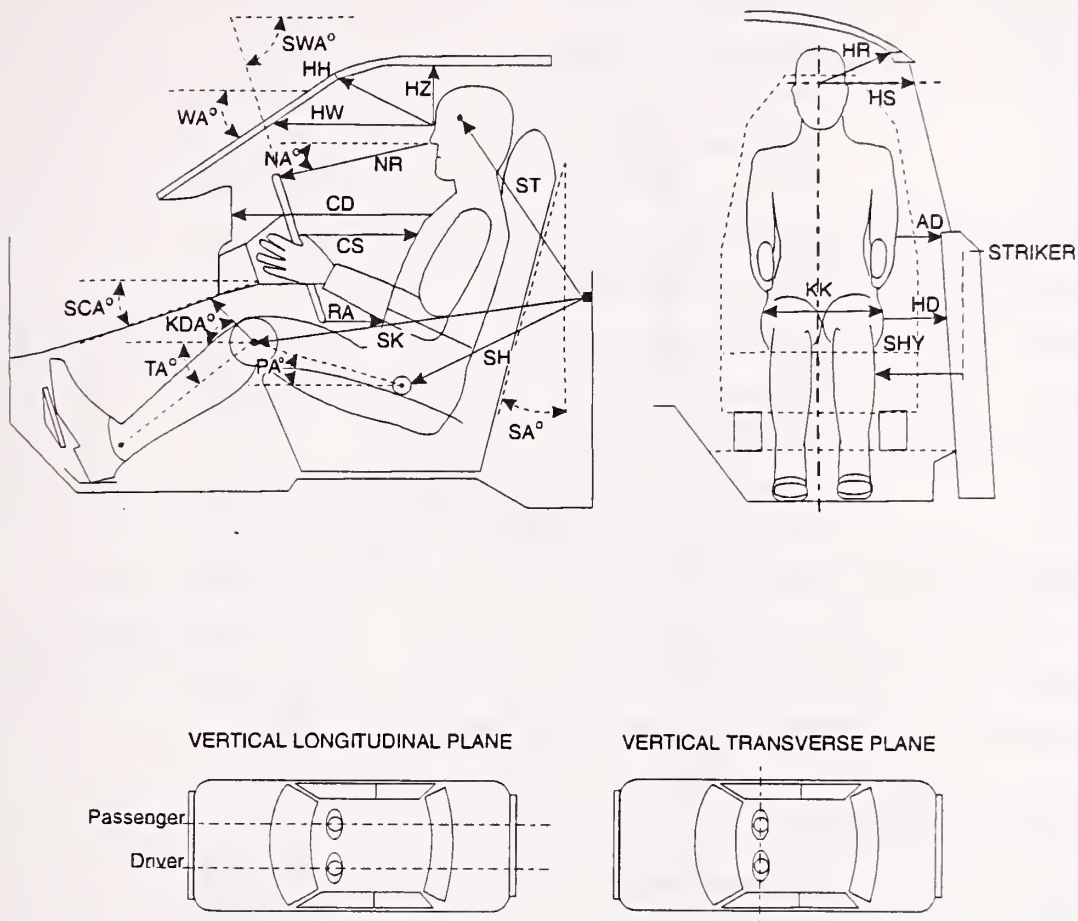


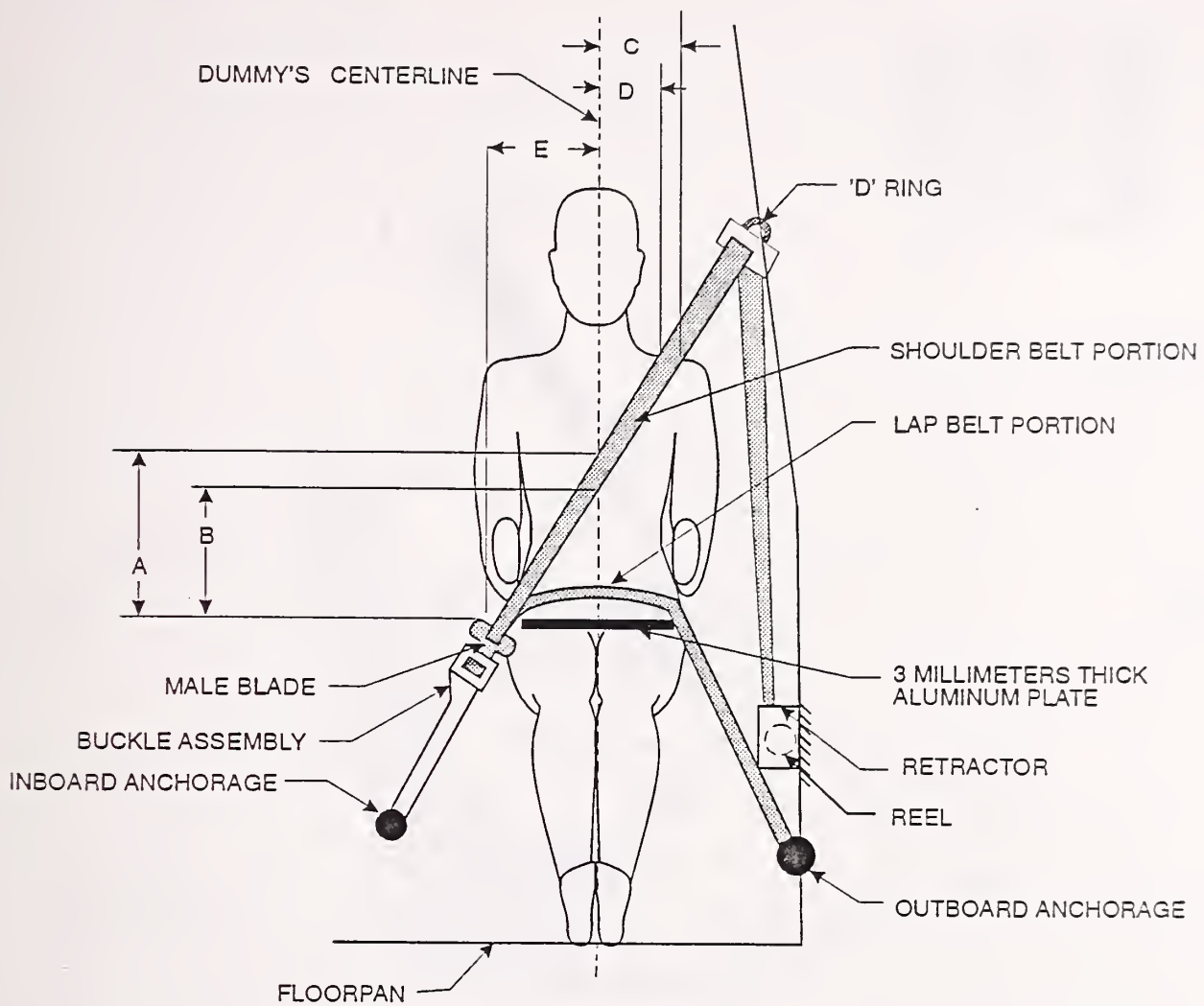
Table 10 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #043)	Passenger (Serial #NA)
WA	Windshield angle	29°	
SWA	Steering wheel angle	68°	
SCA	Steering column angle	22°	
SA	Seat back angle	23°	
HZ	Head to roof	190 mm	
HH	Head to header	352 mm	
HW	Head to windshield	556 mm	
HR	Head to side header	NA mm	
NR	Nose to rim	651 mm	
NA	Nose to rim angle	12°	
CD	Chest to dash	560 mm	
CS	Steering wheel to chest	331 mm	
RA	Rim to abdomen	209 mm	
KDL	Left knee to dash	194 mm	
KDR	Right knee to dash	193 mm	
KDA	Outboard knee to dash angle	28°	
PA	Pelvic angle	24°	
TA	Tibial angle	37°	
KK	Knee to knee	269 mm	
ST ¹	Striker to head	451 mm	
	Striker to head angle	-80°	
SK ¹	Striker to knee	582 mm	
	Striker to knee angle	9°	
SH ¹	Striker to H-point	263 mm	
	Striker to H-point angle	46°	
SHY	Striker to H-point (Y dir.)	247 mm	
HS	Head to side window	341 mm	
HD	H-point to door	168 mm	
AD	Arm to door	111 mm	

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

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

Figure 8 Seat Belt Positioning Data

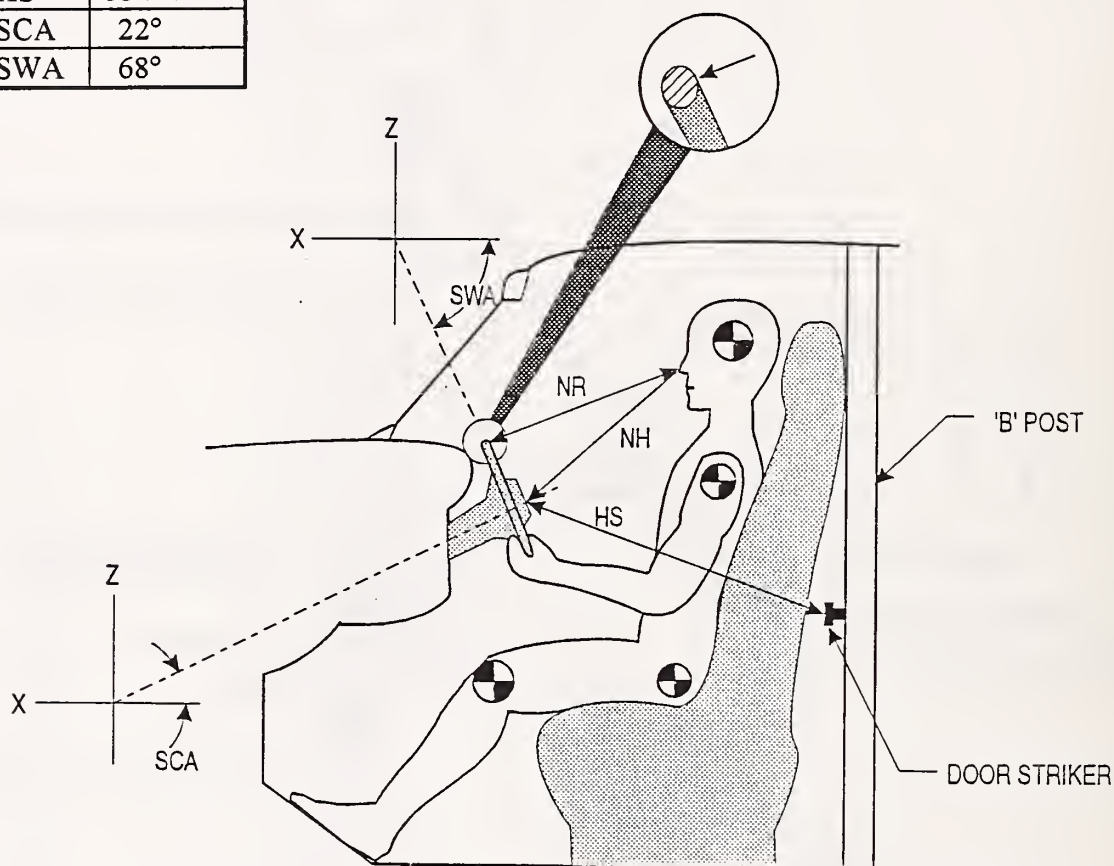


		Driver	Passenger
A	Top surface of aluminum plate to belt upper edge	361	NA
B	Top surface of aluminum plate to belt lower edge	281	NA
C	Dummy centerline to outer edge of belt at chest flesh top	55	NA
D	Dummy centerline to inner edge of belt at chest flesh top	112	NA
E	Dummy centerline to intersection of upper torso belt and lap belt	225	NA

All distance measurements are in millimeters.

Figure 9 Driver Dummy To Steering Column/Wheel Assembly Data

NR	407 mm
NH	428 mm
HS	534 mm
SCA	22°
SWA	68°



Position of steering column tilting and telescoping adjustments, if any:

The steering column was fastened in the middle of the adjustment range.

- NR = Distance from tip of dummy's nose to top rear surface of steering wheel rim.
- NH = Distance from tip of dummy's nose to center of steering column hub.
- HS = Distance from center of steering column hub to the forward surface of the door lock striker pin.
- SCA = Angle of steering column relative to horizontal.
- SWA = Angle of steering wheel relative to horizontal.

Figure 10 Camera Positions

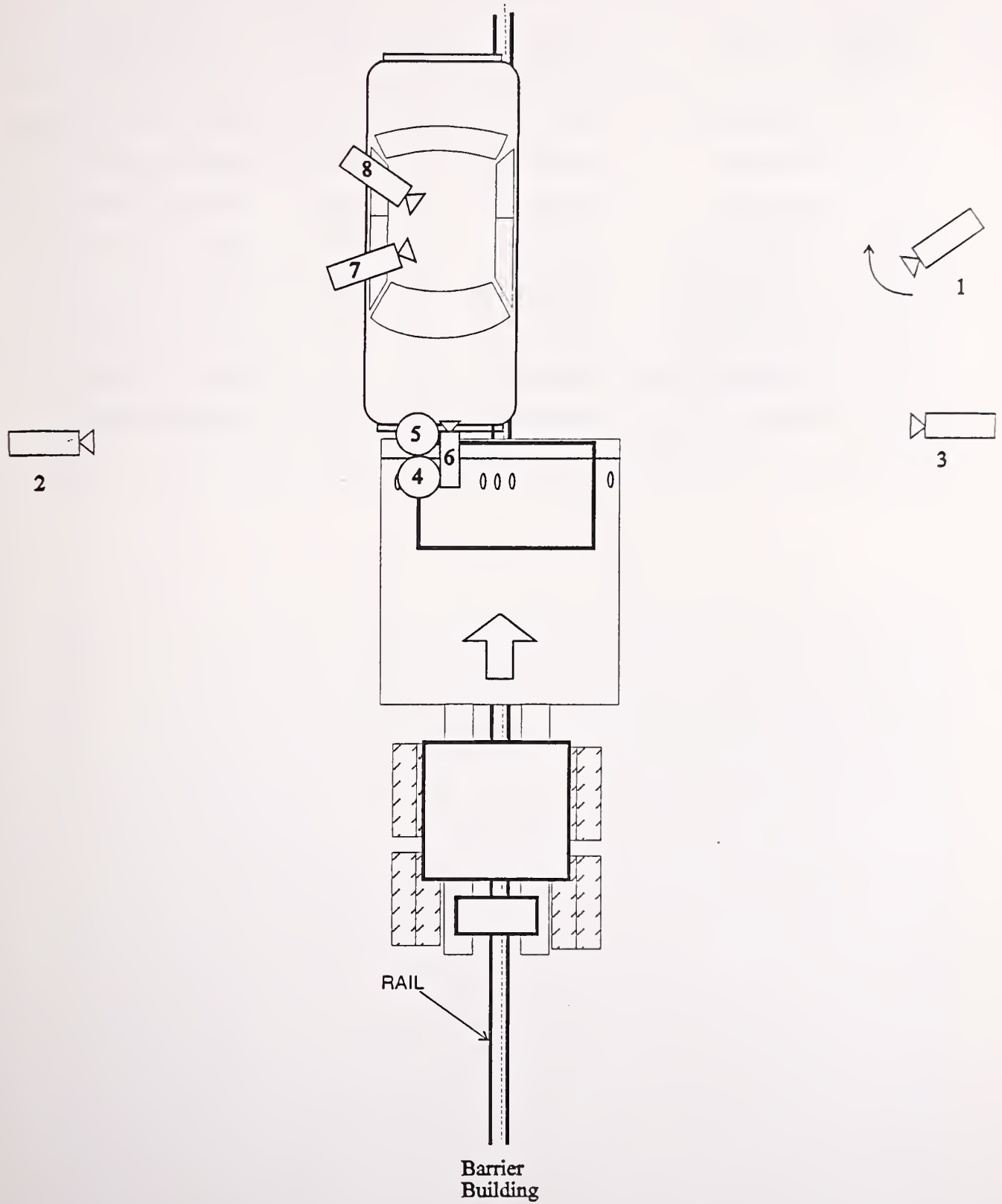


Table 11 Motion Picture Camera Information

Camera Number	Location	Type	Lens (mm)	Speed (Fps)	Purpose of Camera Data
1	Left panning	Bolex	16	24	Real-time documentation
2	Left wide	Photosonic	13	998	Vehicle dynamics
3	Right wide	Photosonic	13	1002	Vehicle dynamics
4	Overhead wide	Photosonic	8.5	1025	Vehicle dynamics
5	Overhead tight	Photosonic	35	998	Vehicle dynamics
6	Onboard truck	Photosonic	8	1000	Dummy kinematics
7	Onboard car front	Photosonic	8	725	Dummy kinematics
8	Onboard car rear	Photosonic	8	800	Dummy kinematics

Appendix A

Photographs



Figure A-1 Pre-Test Front View



Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Side View



Figure A-4 Post-Test Left Side View



Figure A-5 Pre-Test Rear View



Figure A-6 Post-Test Rear View



Figure A-7 Pre-Test Right Side View



Figure A-8 Post-Test Right Side View

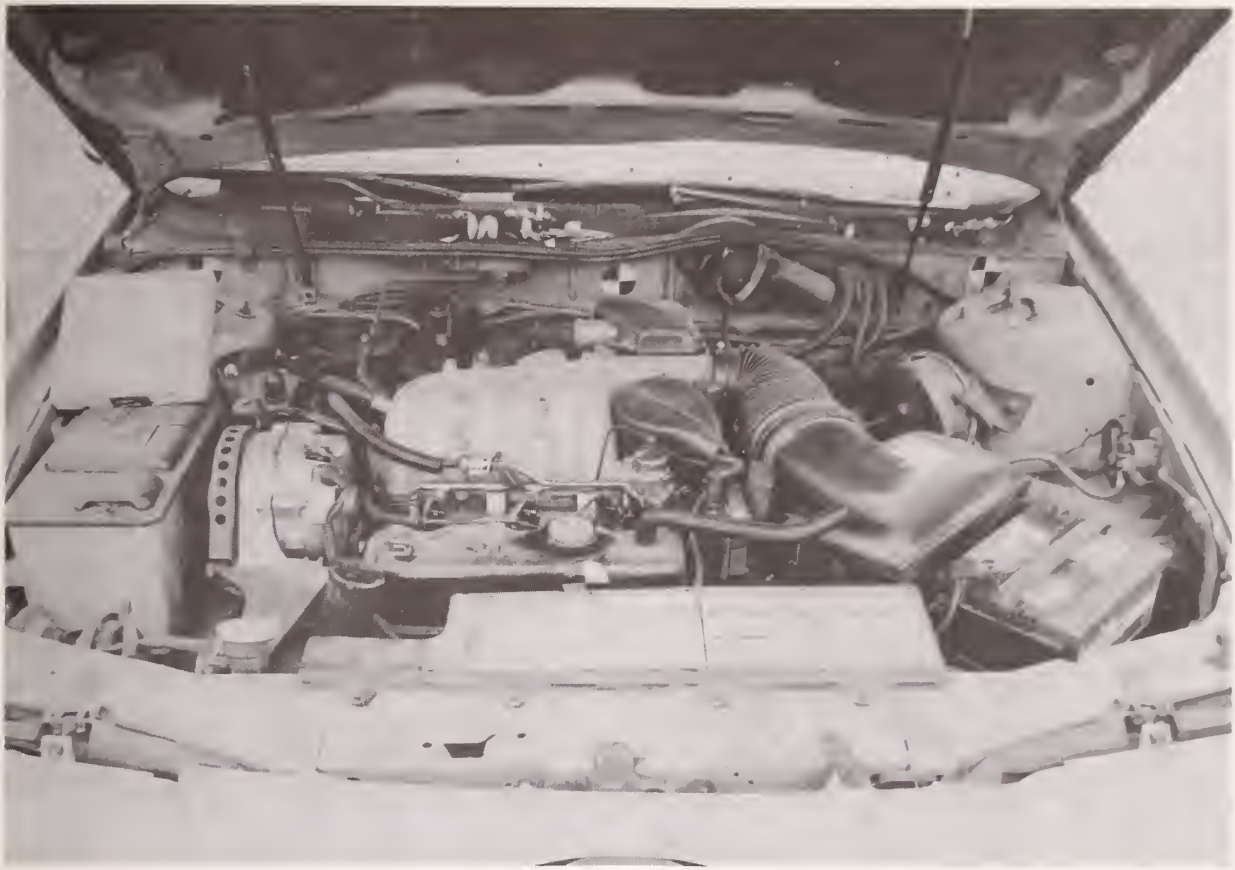


Figure A-9 Pre-Test Engine Compartment View



Figure A-10 Pre-Test Vehicle Truck Alignment - View 1



Figure A-11 Pre-Test Vehicle Truck Alignment - View 2



Figure A-12 Pre-Test Vehicle Truck Alignment - View 3



Figure A-13 Pre-Test Vehicle Truck Alignment - View 4

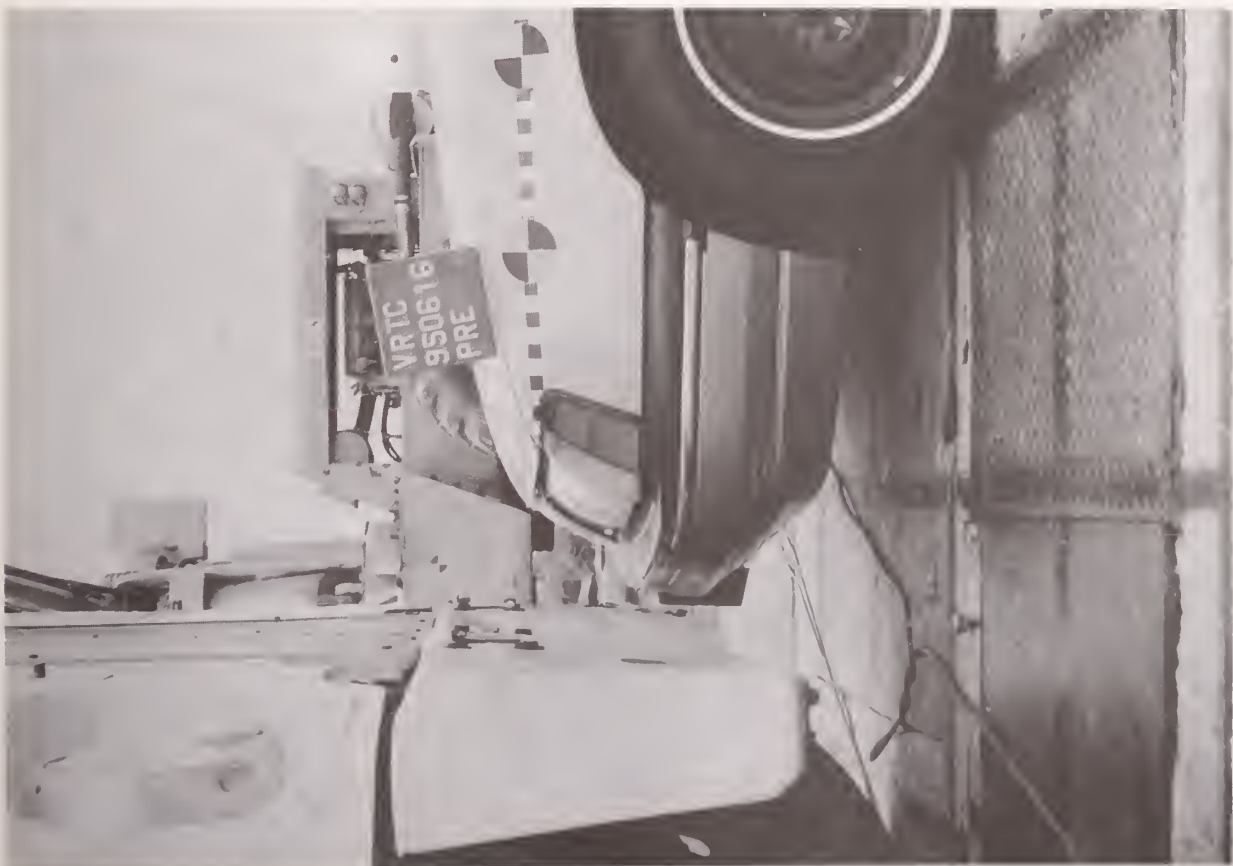


Figure A-14 Pre-Test Vehicle Truck Alignment - View 5



Figure A-15 Pre-Test Driver Dummy Frontal View



Figure A-16 Post-Test Driver Dummy Frontal View

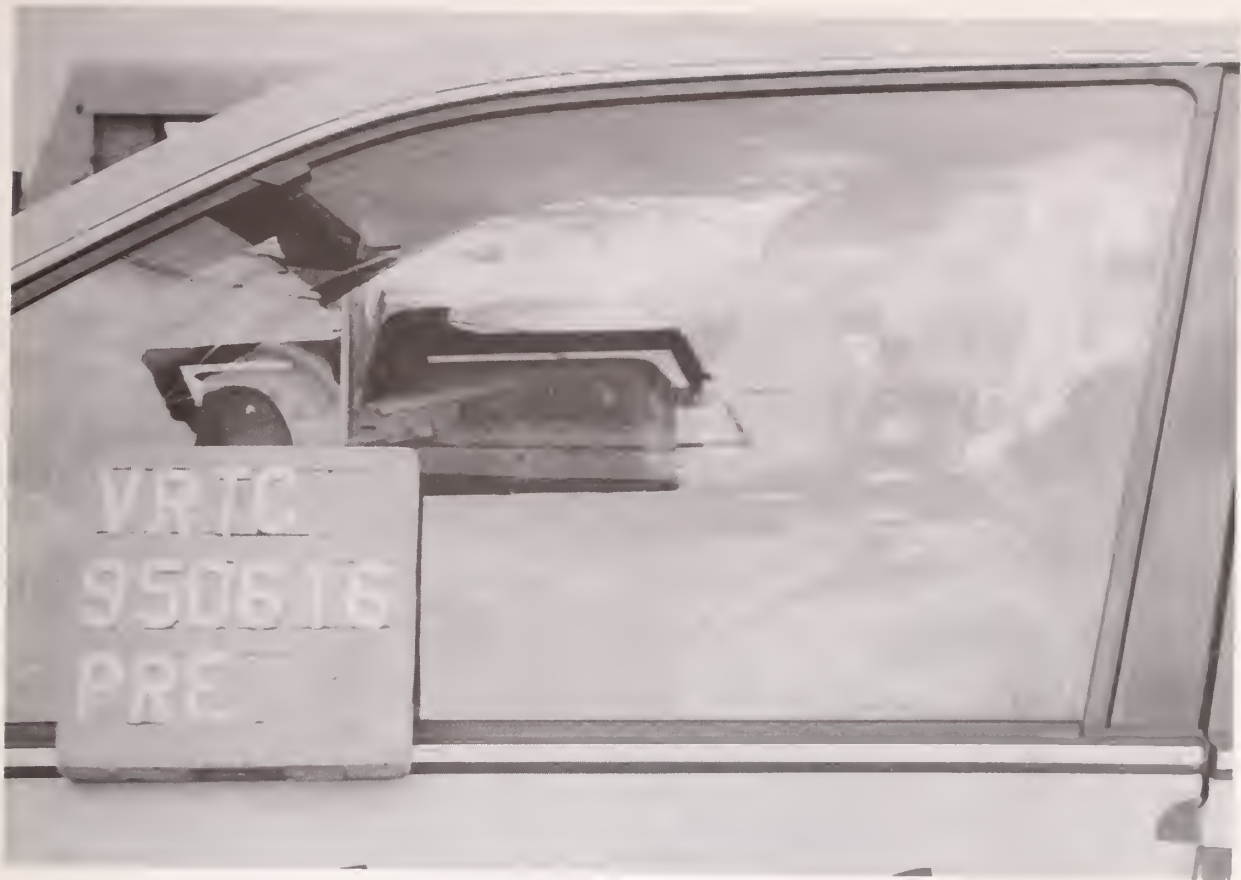


Figure A-17 Pre-Test Driver Dummy Left Side View



Figure A-18 Post-Test Driver Dummy Left Side View



Figure A-19 Pre-Test Driver Dummy and Vehicle Interior - View 1

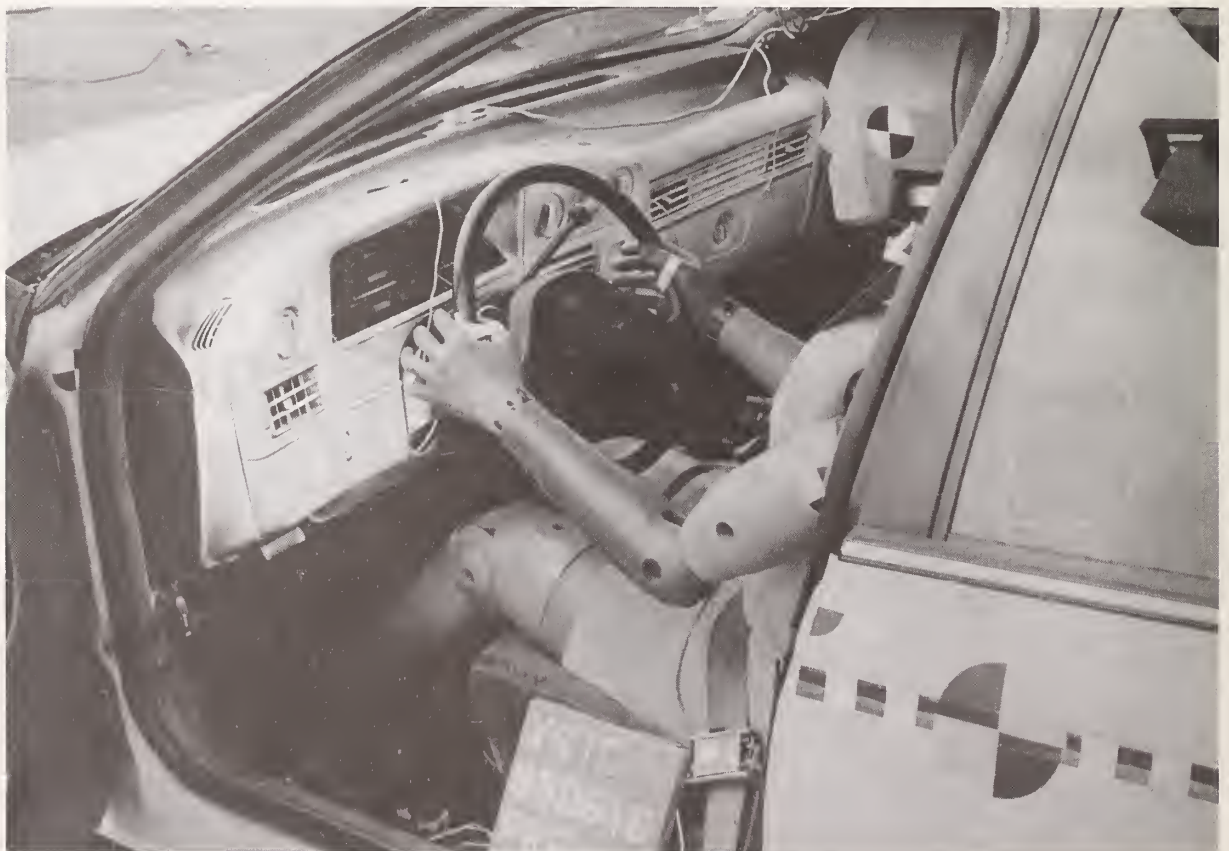


Figure A-20 Pre-Test Driver Dummy and Vehicle Interior - View 2



Figure A-21 Post-Test Driver Dummy Over Shoulder View



Figure A-22 Post-Test Driver Dummy Right Side View



Figure A-23 Post-Test Heavy Truck Frontal View

Intentionally Left Blank



Figure A-24 Post-Test Heavy Truck Left Side - View 1



Figure A-25 Post-Test Heavy Truck Left Side - View 2

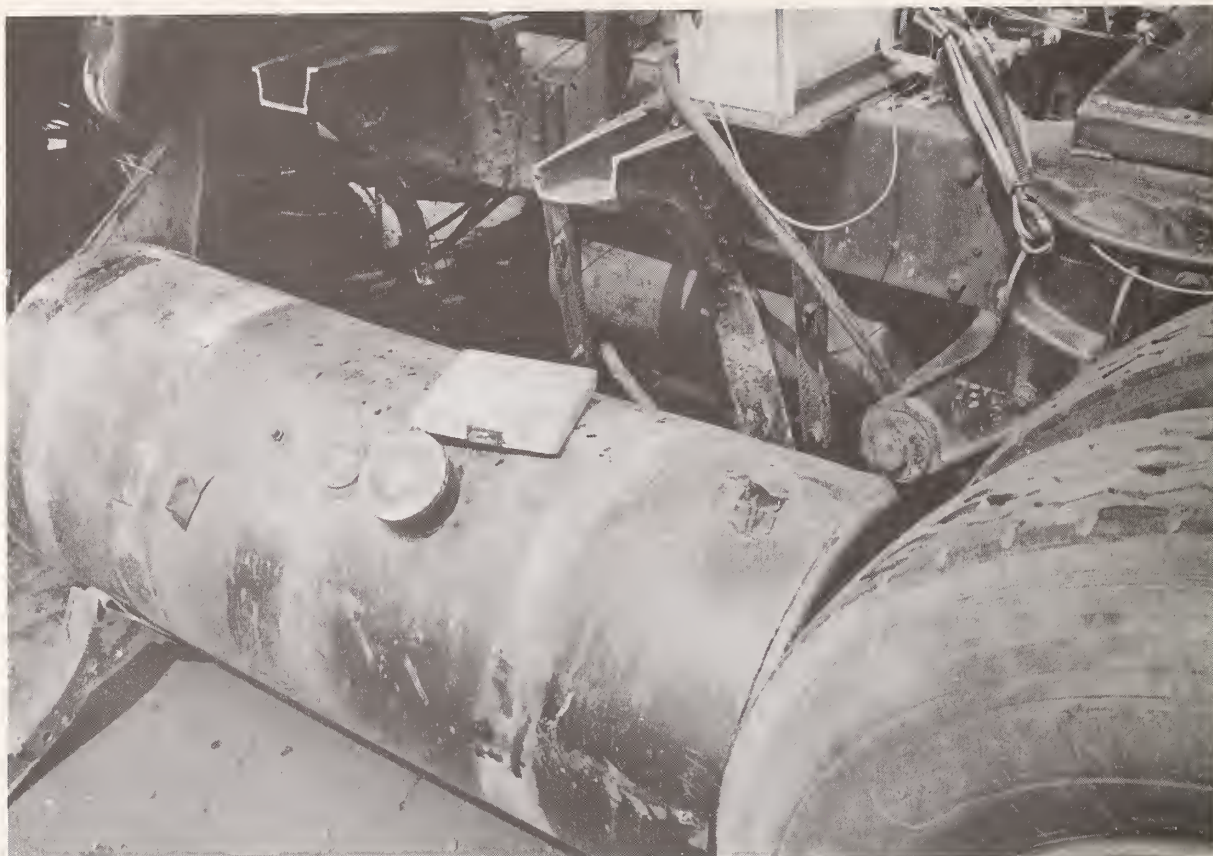


Figure A-26 Post-Test Heavy Truck Left Side - View 3

Intentionally Left Blank



Figure A-27 Post-Test Heavy Truck Right Side - View 1



Figure A-28 Post-Test Heavy Truck Right Side - View 2

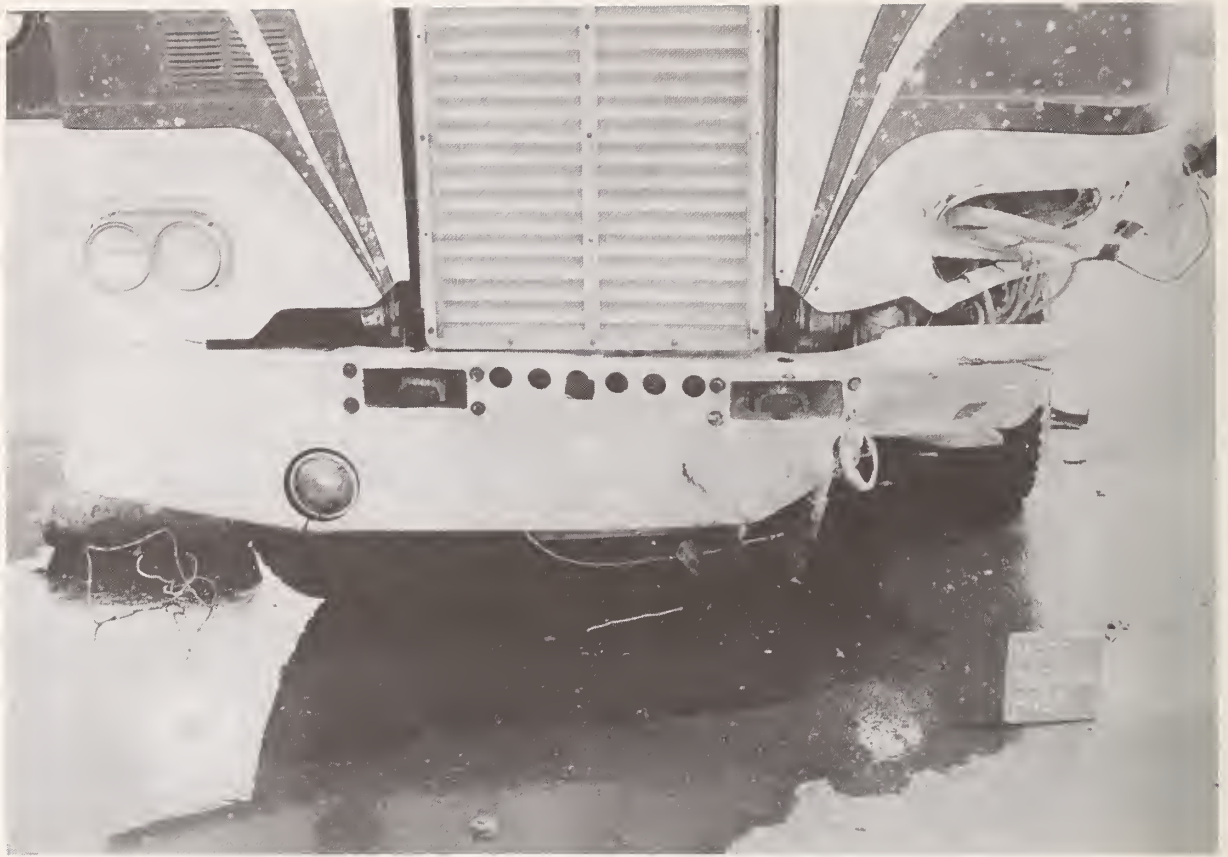


Figure A-29 Post-Test Heavy Truck Bumper - View 1

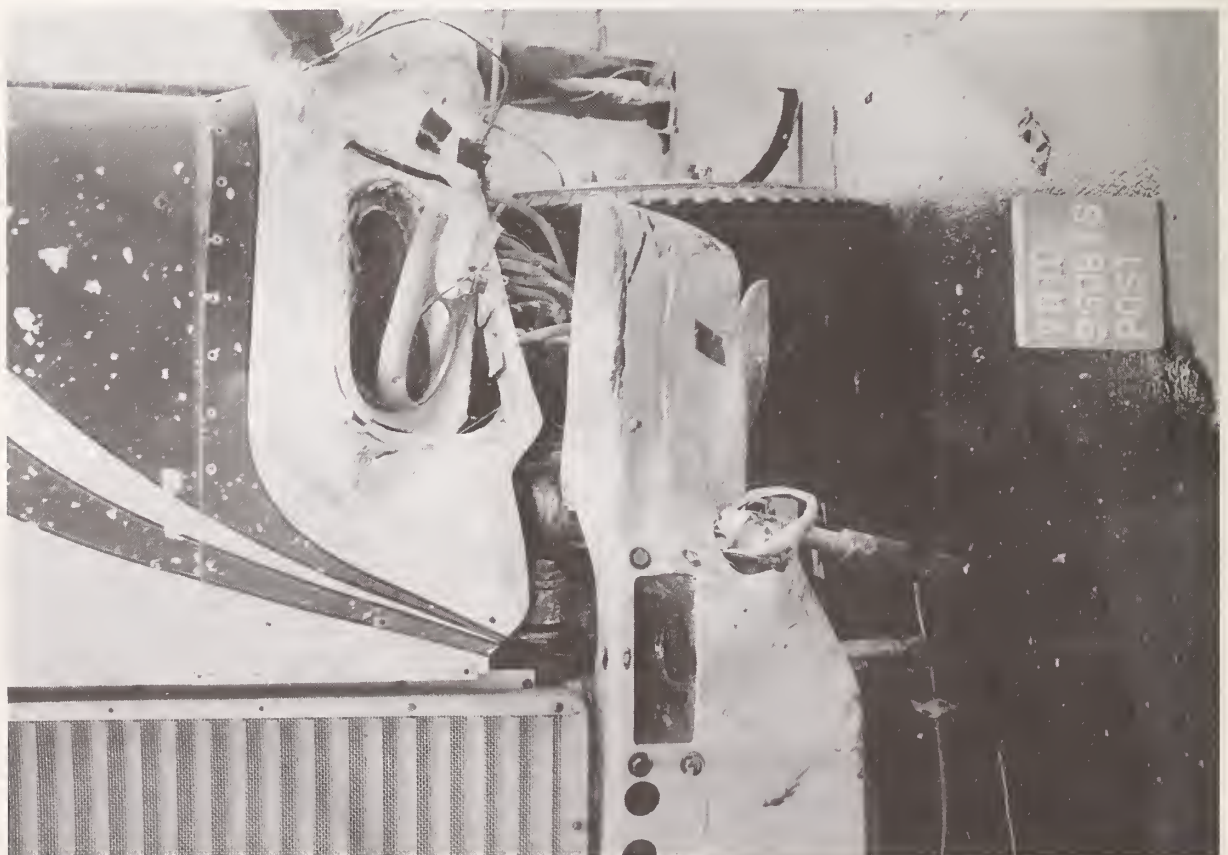


Figure A-30 Post-Test Heavy Truck Bumper - View 2



Figure A-31 Post-Test Heavy Truck Bumper - View 3



Figure A-32 Pre-Test Vehicle Ballast Location View



Figure A-33 Impact Event Still

Appendix B

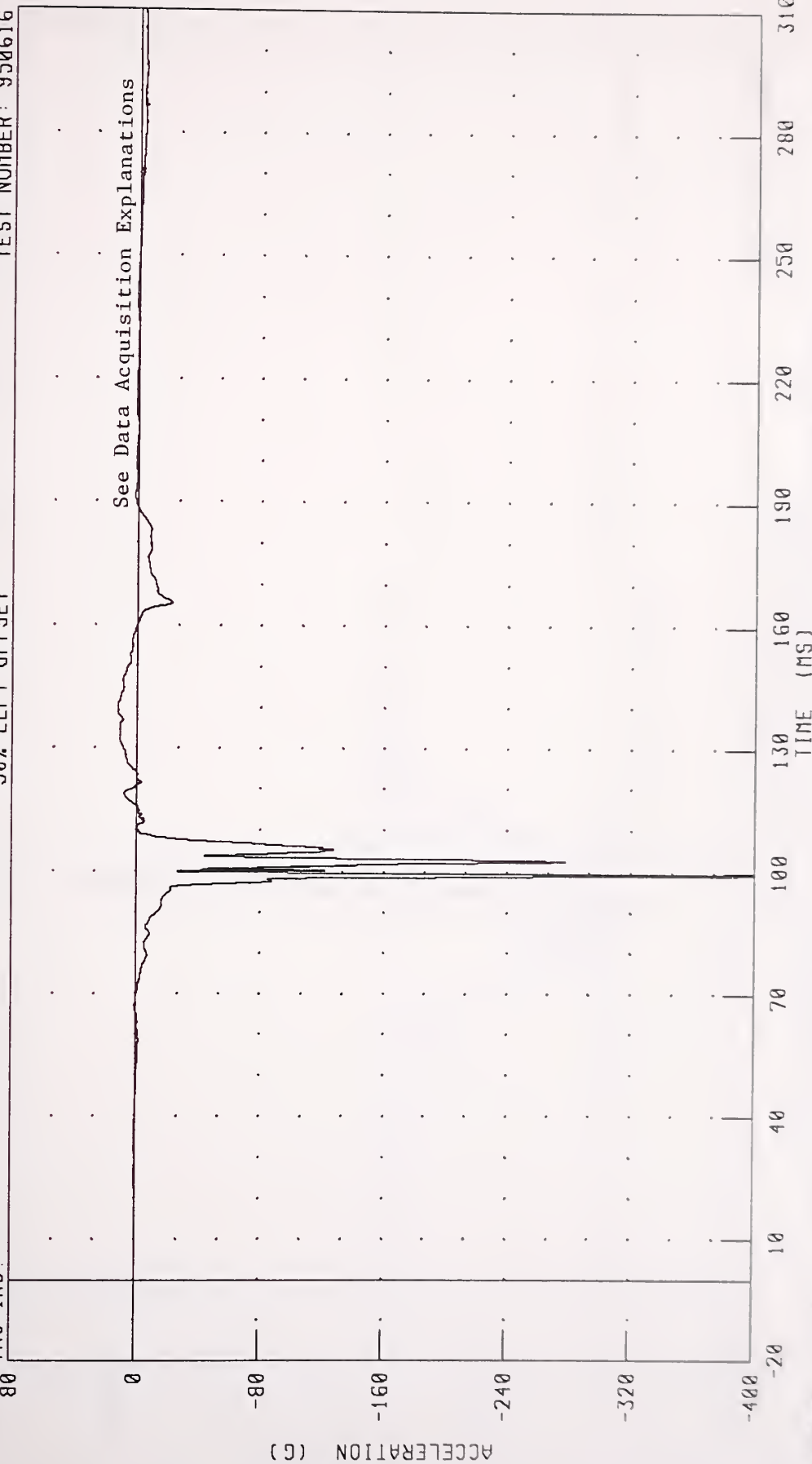
Data Plots

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS DRIVER HEAD X-AXIS ACCELERATION

50% LEFT OFFSET

TEST NUMBER: 950616

TRC INC.



CHANNEL HEXC1 FILTER CH CLASS 1000

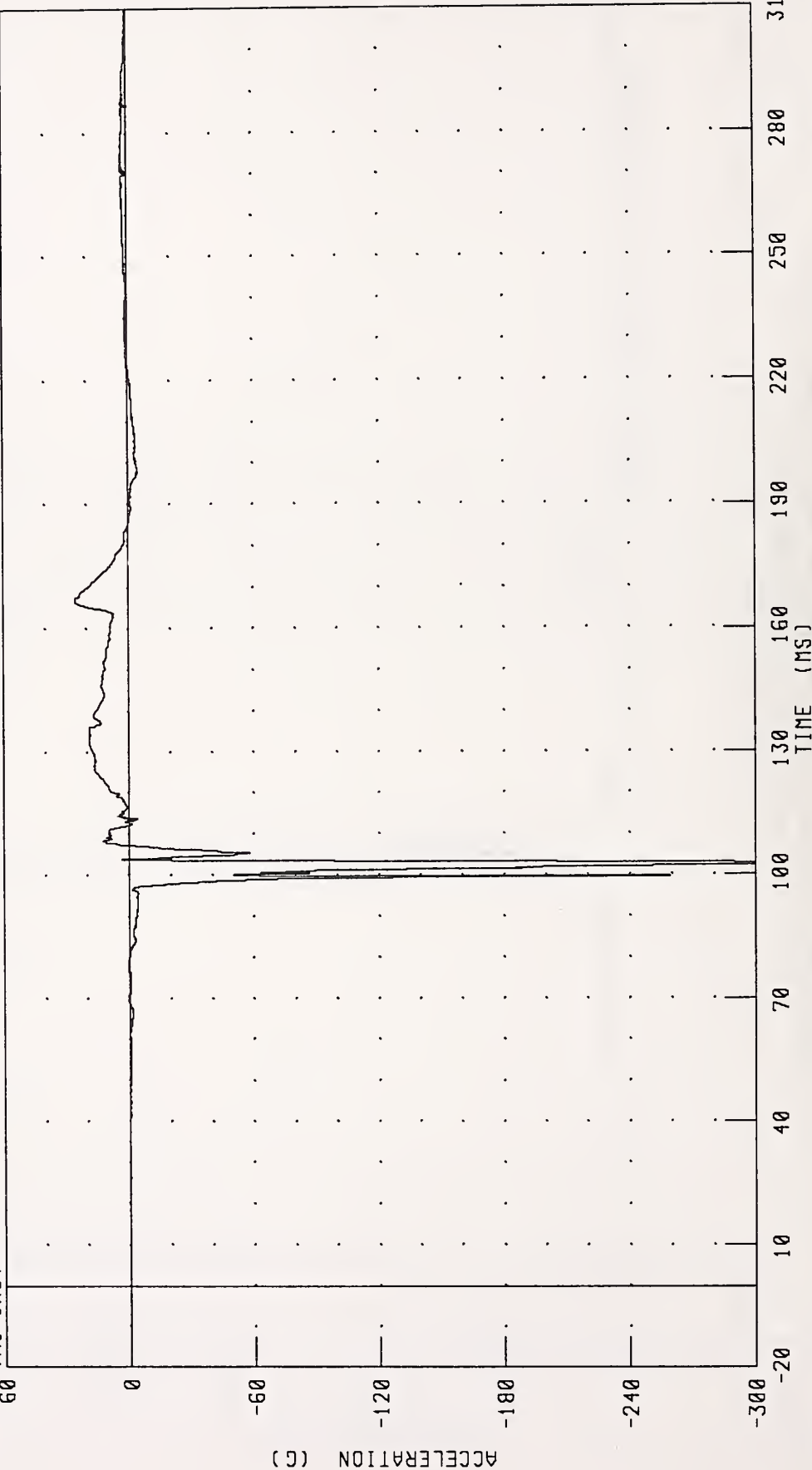
PEAK DATA 12 18 G @ 138 64 MS, -402 13 G @ 99 36 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

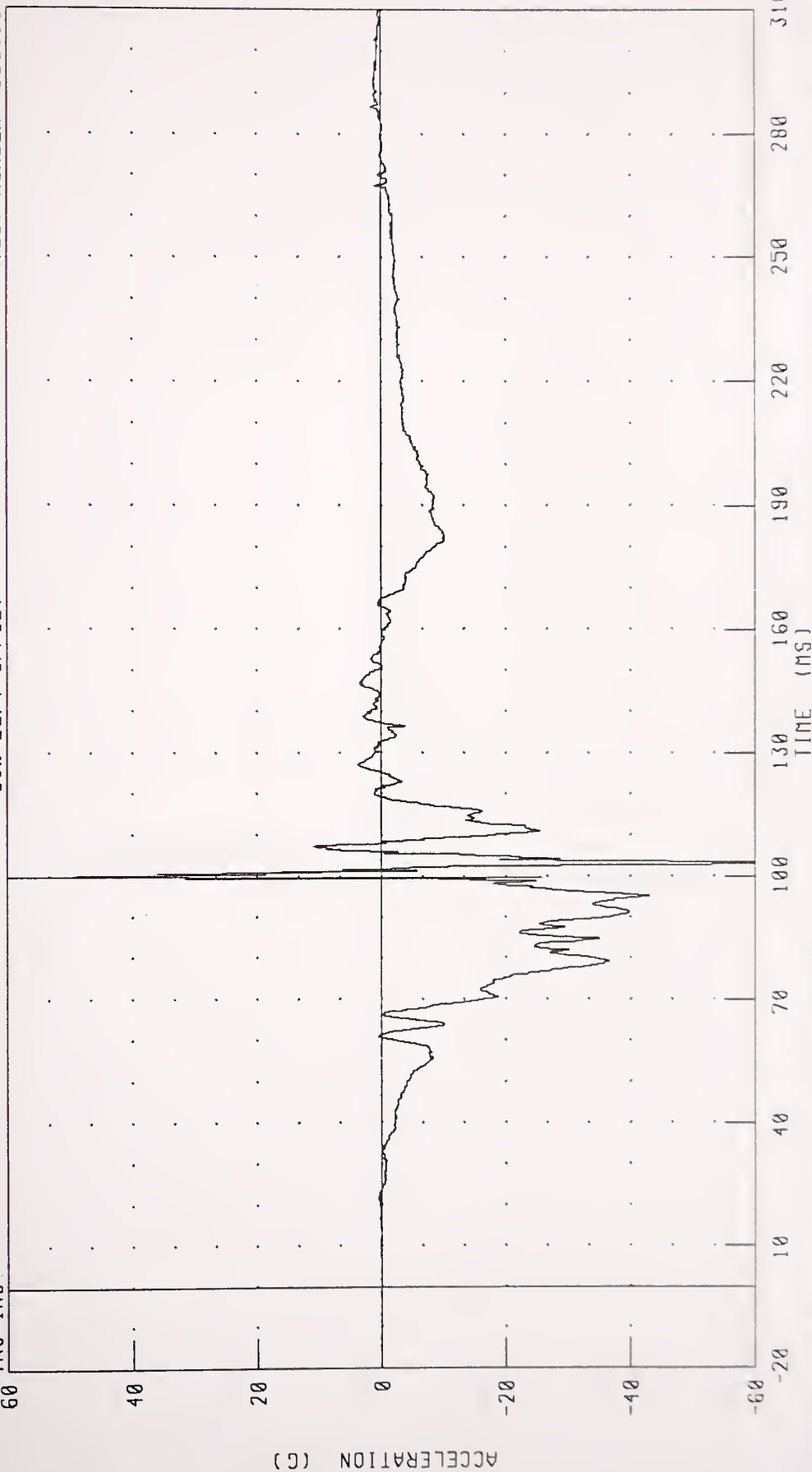
PEAK DATA: 25.39 G @ 166.72 MS; -317.40 G @ 102.64 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS DRIVER HEAD Z-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

TRC INC



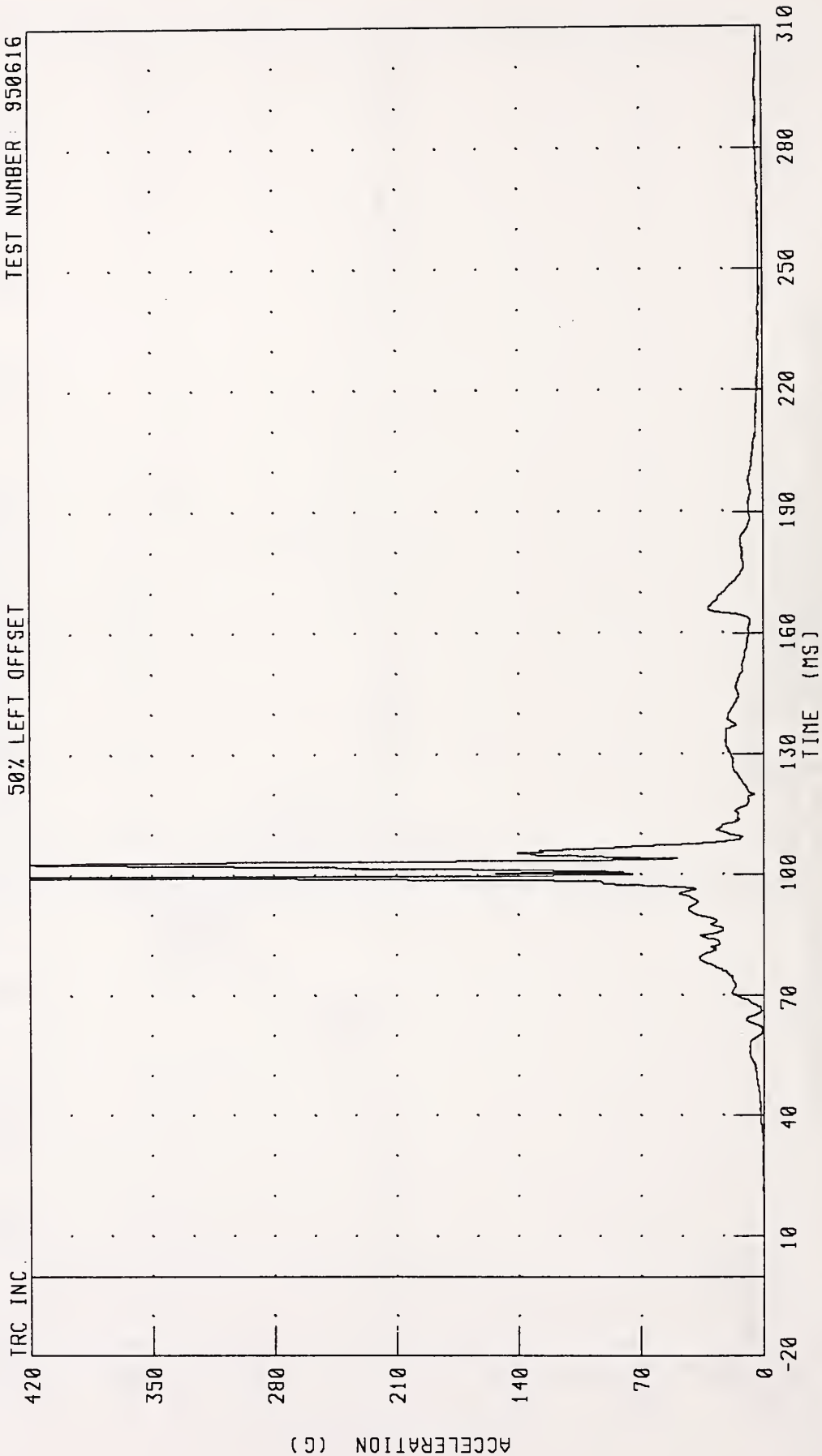
CHANNEL HEADZC1 FILTER CH CLASS 1000

PEAK DATA 64 68 G @ 100 00 MS, -70 79 G @ 103 20 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: HEDRG1 FILTER: CH CLASS 1000

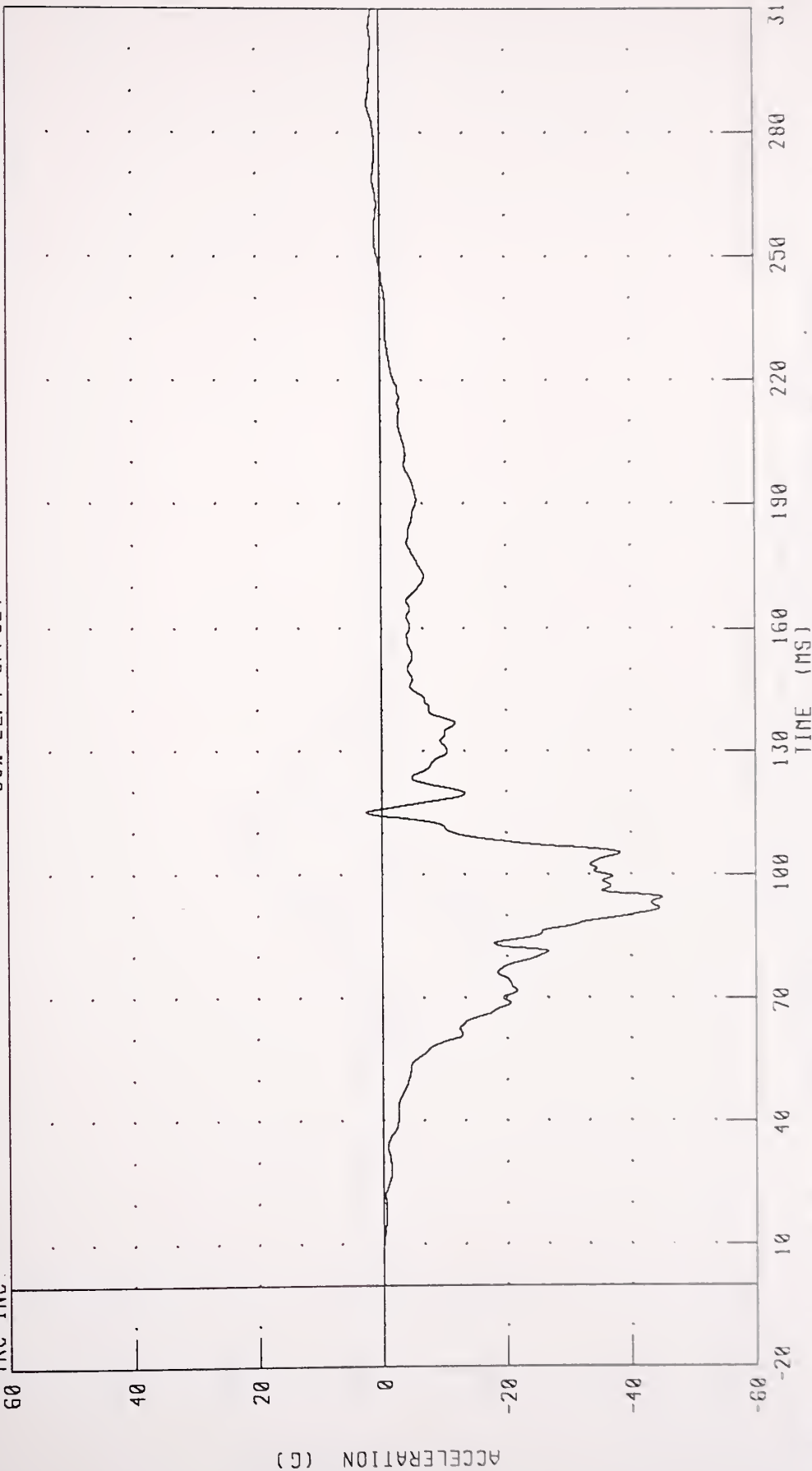
PEAK DATA: 479.36 G @ 99.52 MS, 0.02 G @ -19.92 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER CHEST X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC



CHANNEL CSTXG1 FILTER CH CLASS 180

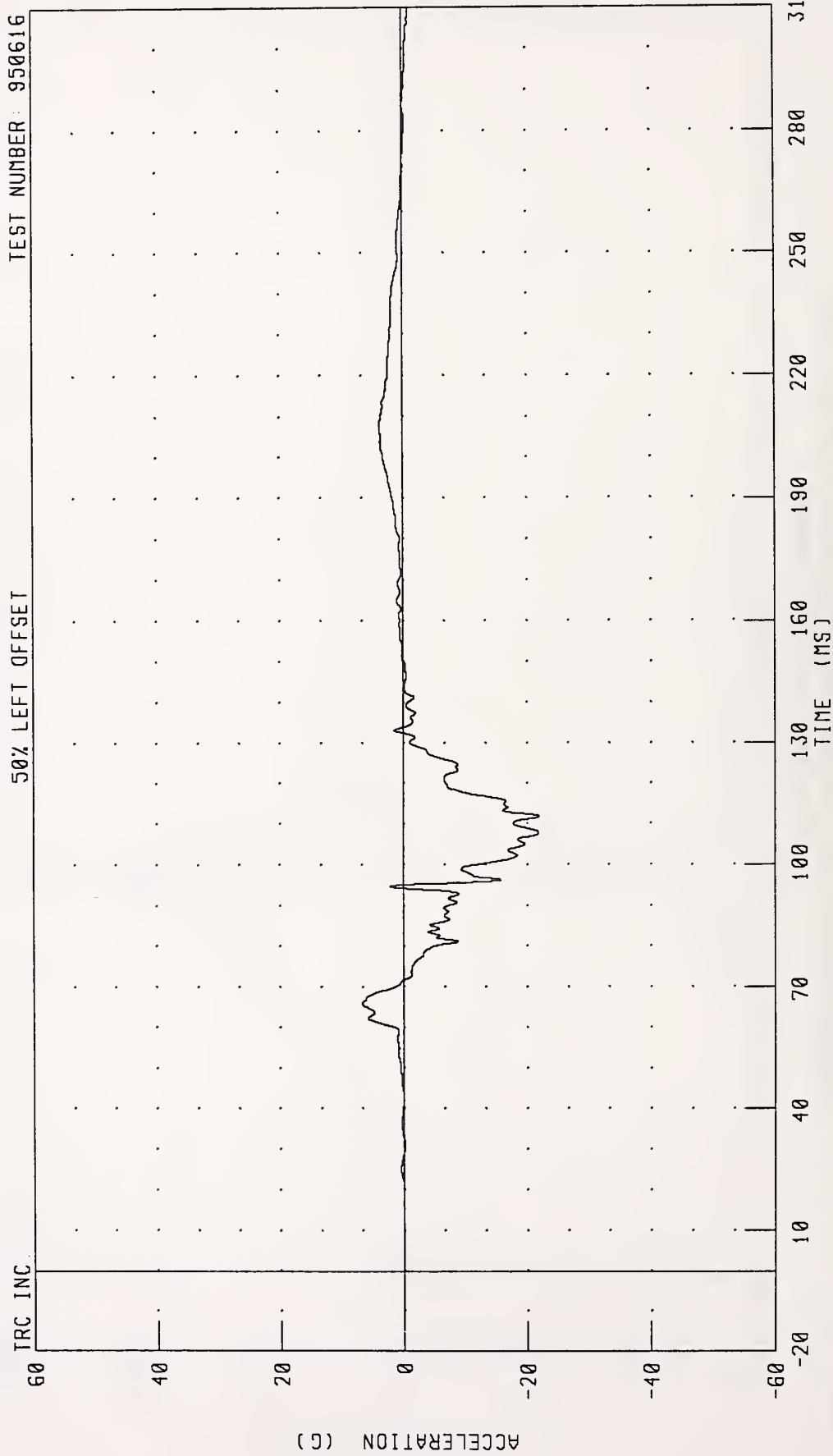
TIME (MS)

PEAK DATA 2 48 G @ 115 04 MS, -44 98 G @ 94 48 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: CSTYG1 FILTER: CH CLASS 180

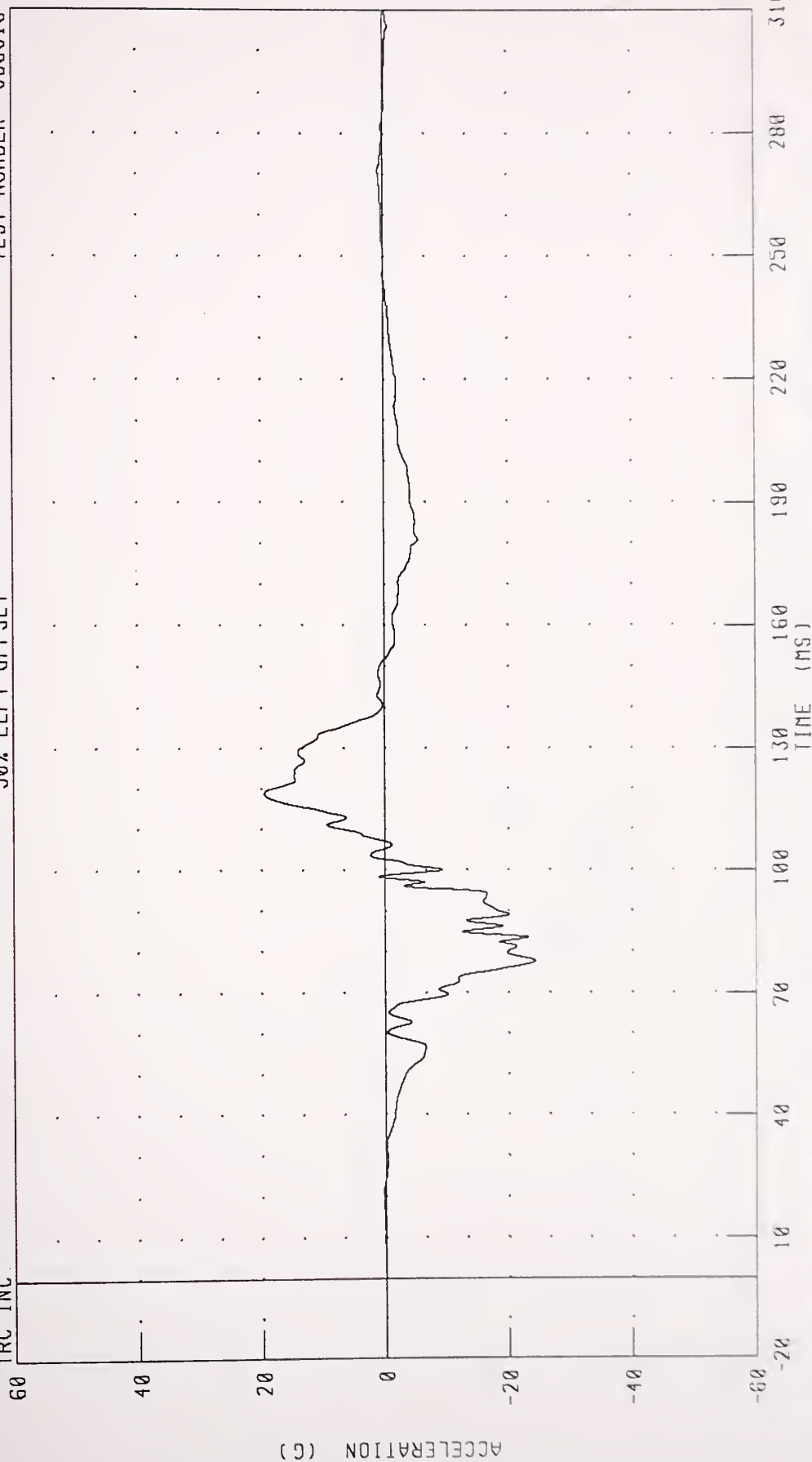
PEAK DATA: 6.80 G @ 65.84 MS; -21.98 G @ 111.84 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER CHEST Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC



CHANNEL CSTZC1 FILTER CH CLASS 180

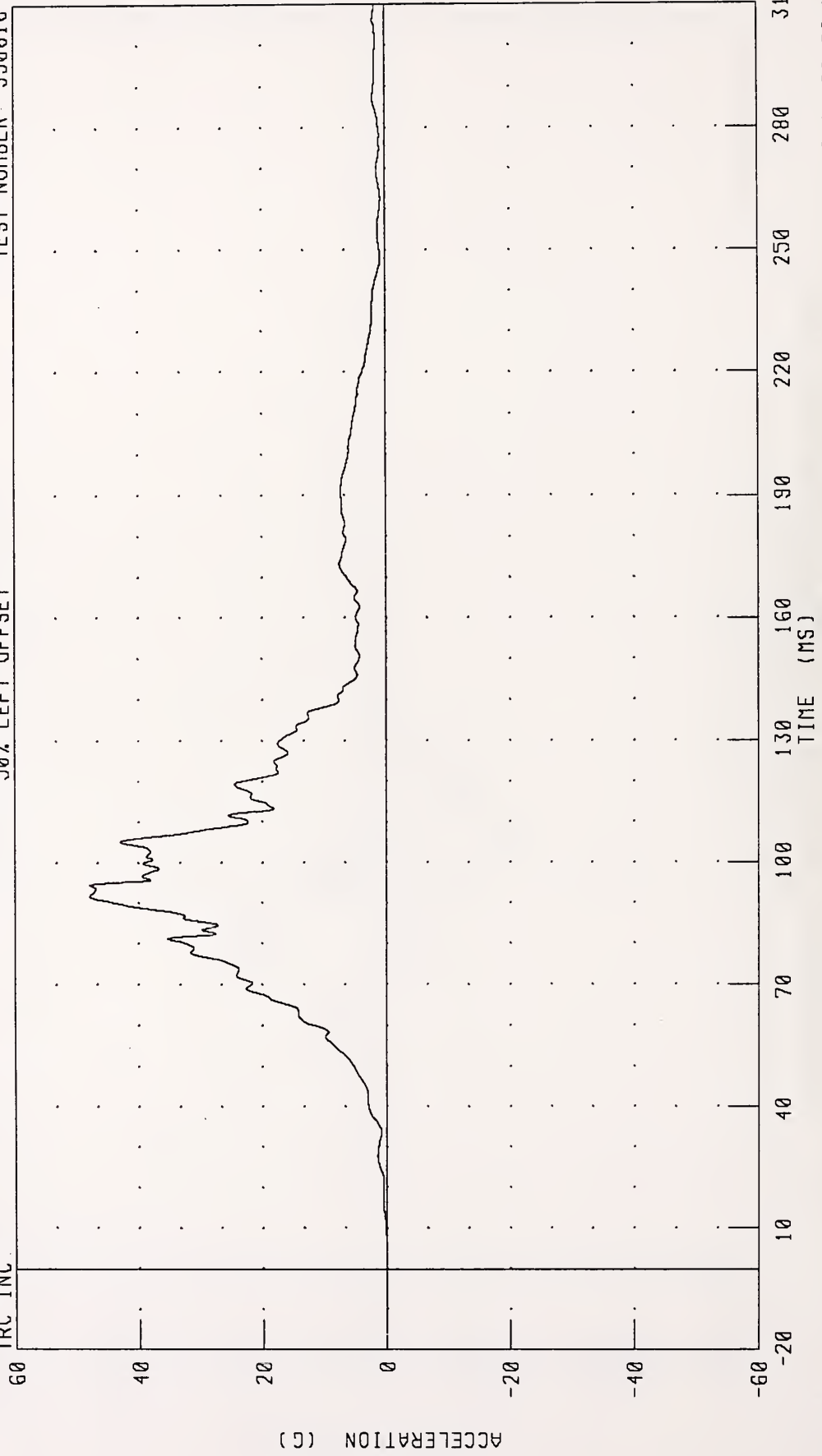
PEAK DATA 19 59 G @ 118 88 MS, -24 33 G @ 77 76 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER CHEST RESULTANT ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

IRC INC



CHANNEL: CSTRG1 FILTER: CH CLASS 180

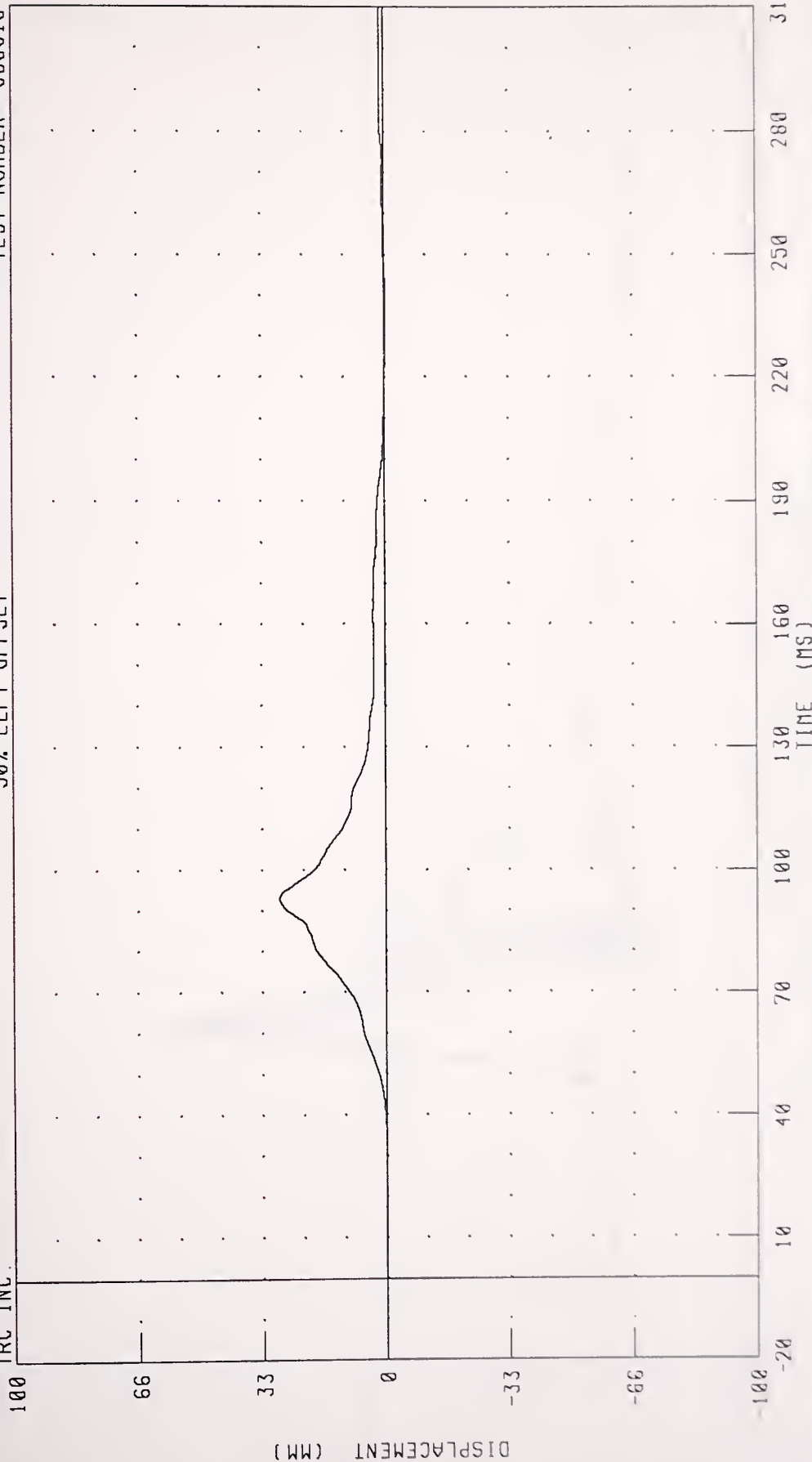
PEAK DATA 47.92 G @ 94.48 MS; 0 00 G @ -20 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS DRIVER CHEST DEFLECTION

TEST NUMBER 950616

50% LEFT OFFSET

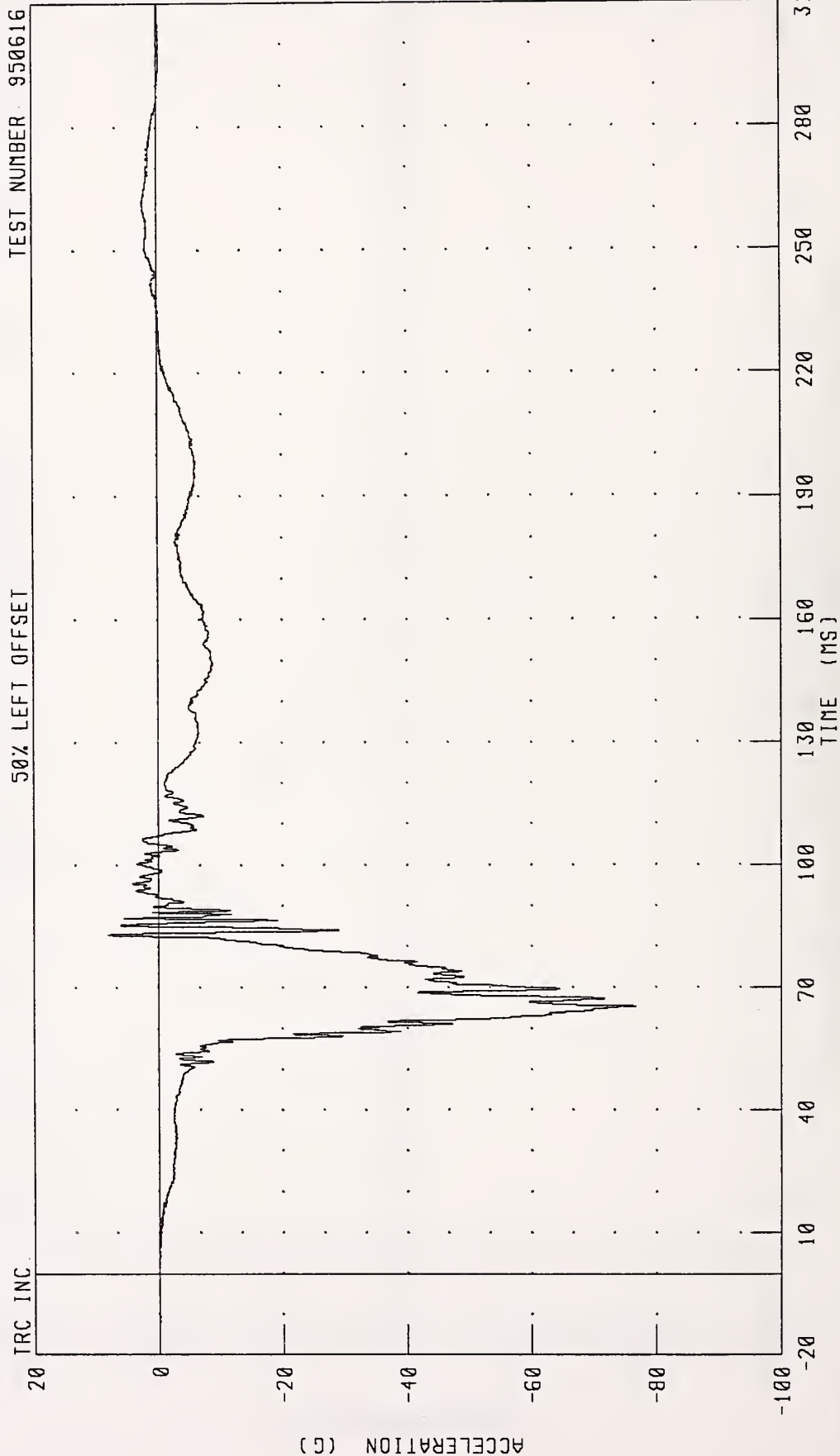
TRC INC.



PEAK DATA 28 71 MM @ 92 96 MS, -0 29 MM @ 232 00 MS

CHANNEL CSTX01 FILTER CH CLASS 180

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
 DRIVER PELVIS X-AXIS ACCELERATION
 50% LEFT OFFSET



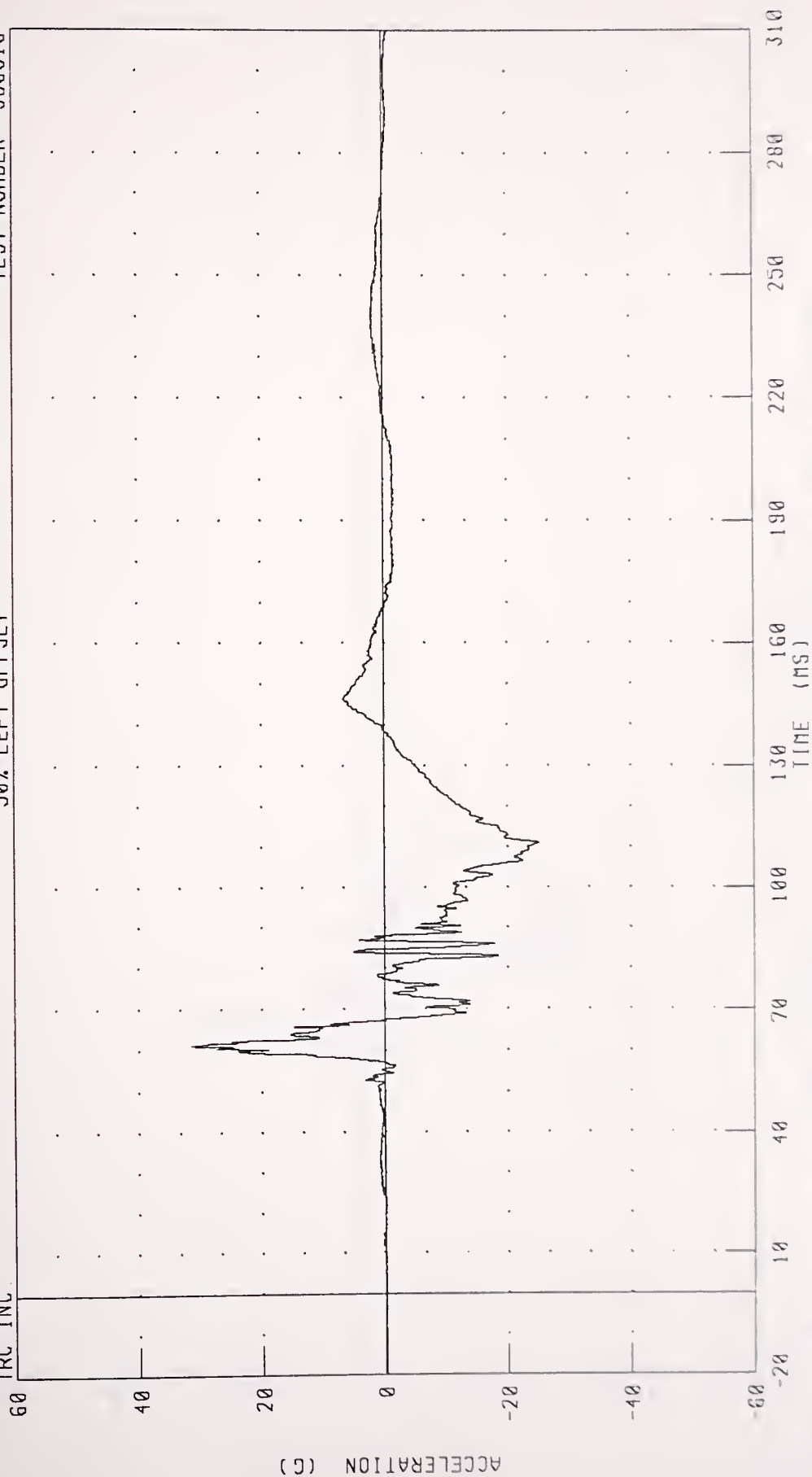
CHANNEL: PEVXG1 FILTER: CH CLASS 1000

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS DRIVER PELVIS Y-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

TRC INC.



CHANNEL PEVYG1 FILTER CH CLASS 1000

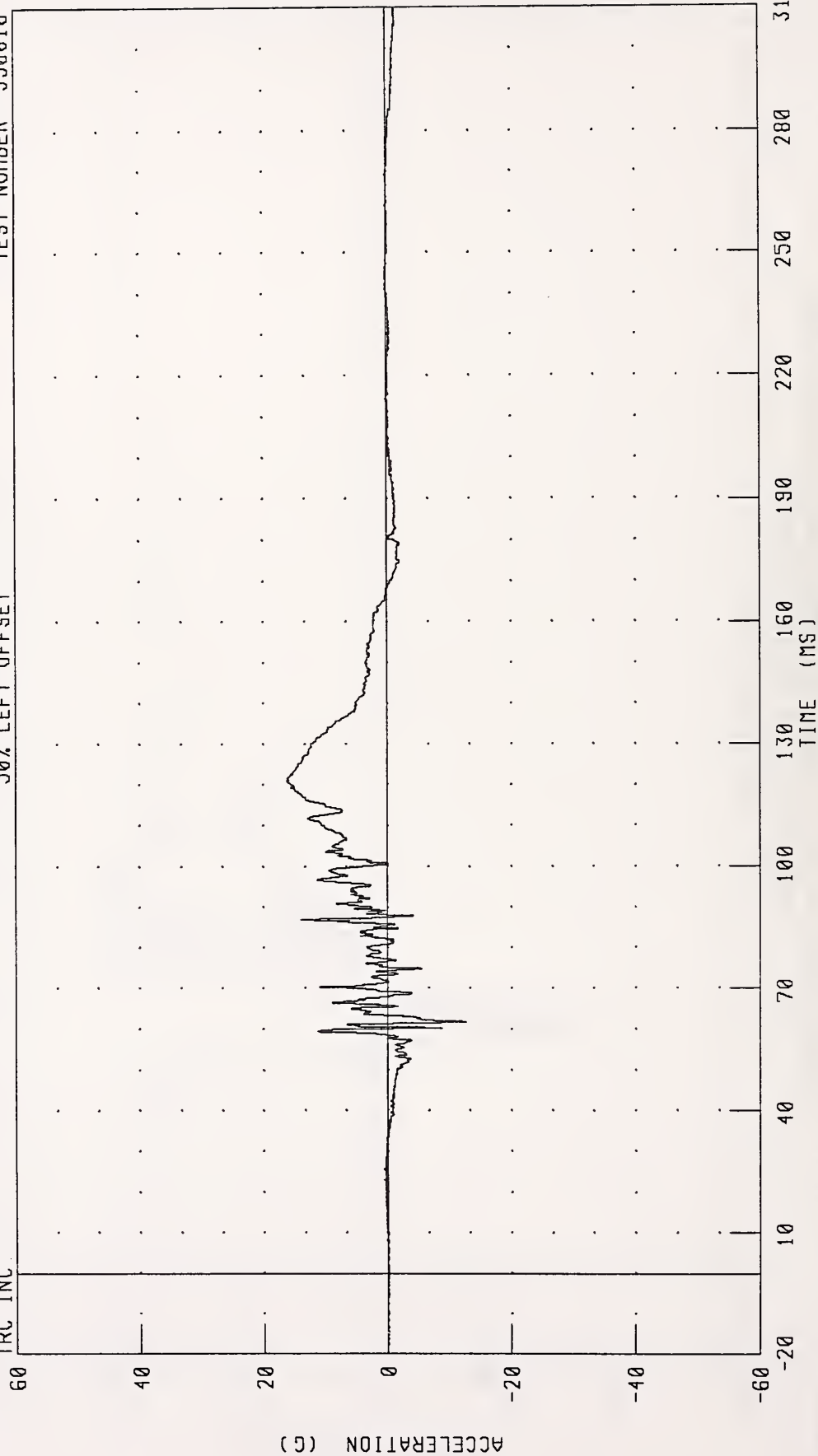
PEAK DATA 31 44 G @ 61 28 MS, -25 15 G @ 111 12 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



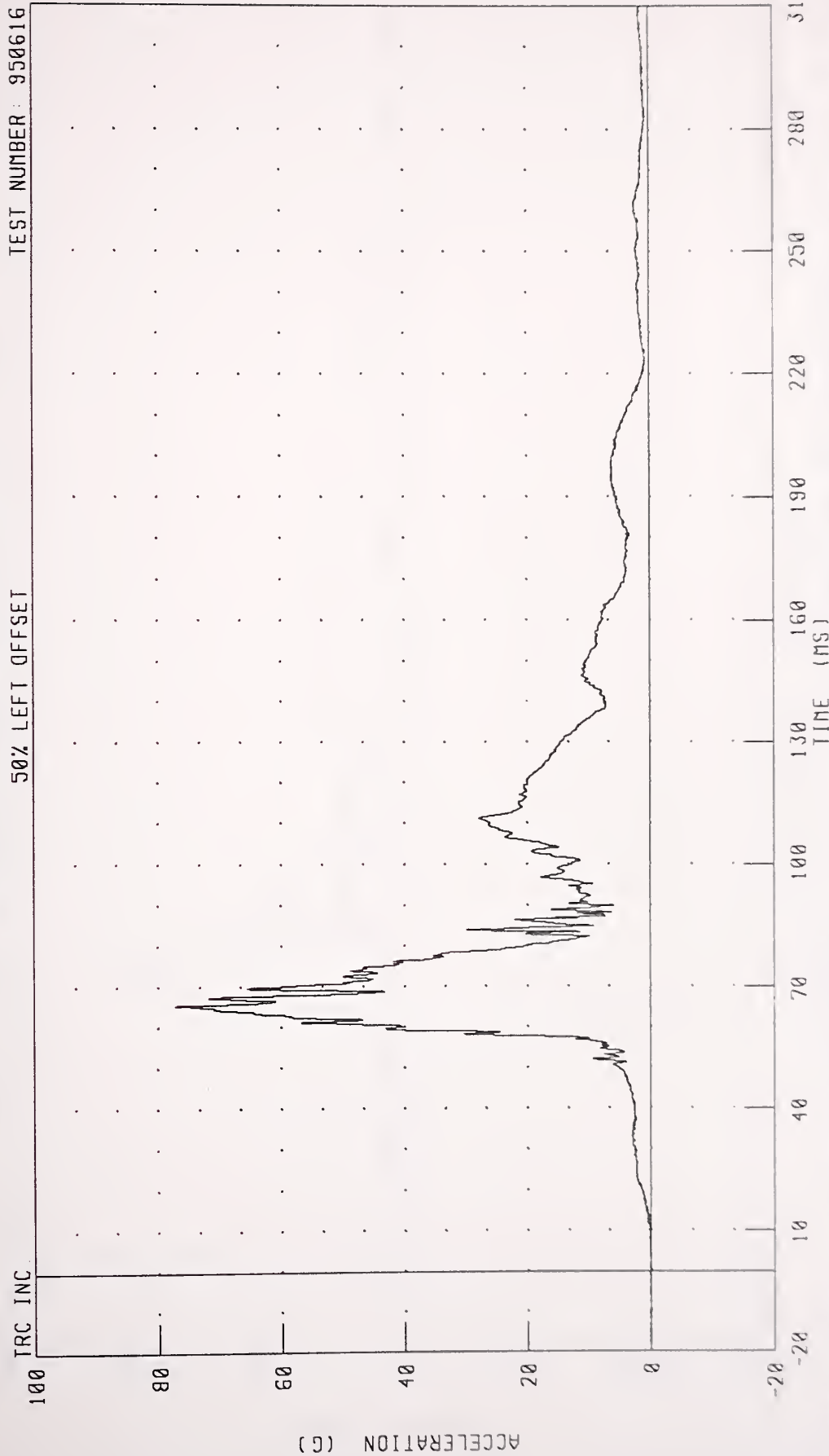
CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

PEAK DATA: 16.29 G @ 120.88 MS, -12.72 G @ 61.92 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

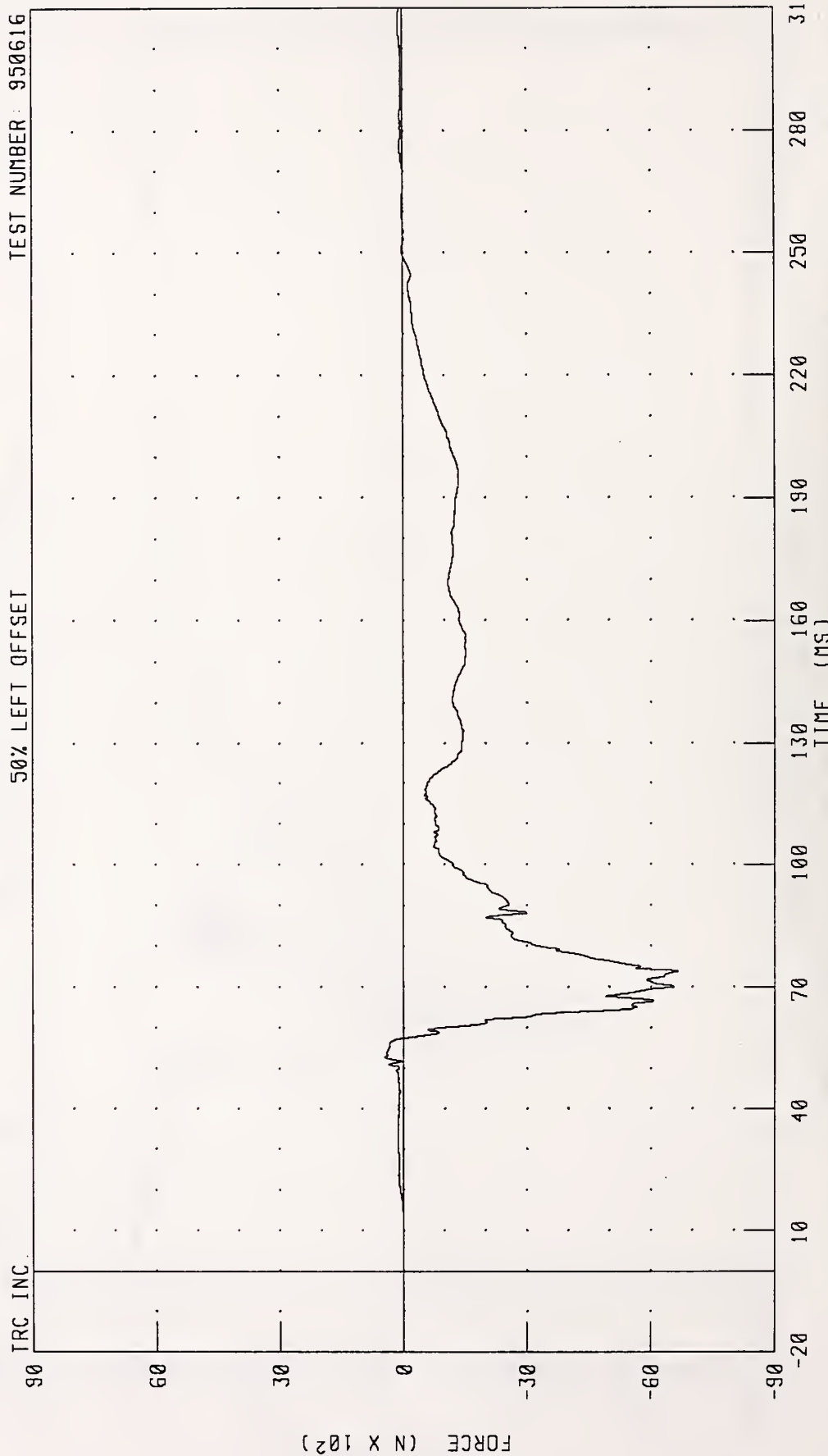


CHANNEL PEV001 FILTER CH CLASS 1000 PEAK DATA 77 34 G @ 65 44 MS, 0 09 G @ -20 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER LEFT FEMUR FORCE

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: LFMF1 FILTER: CH CLASS 600

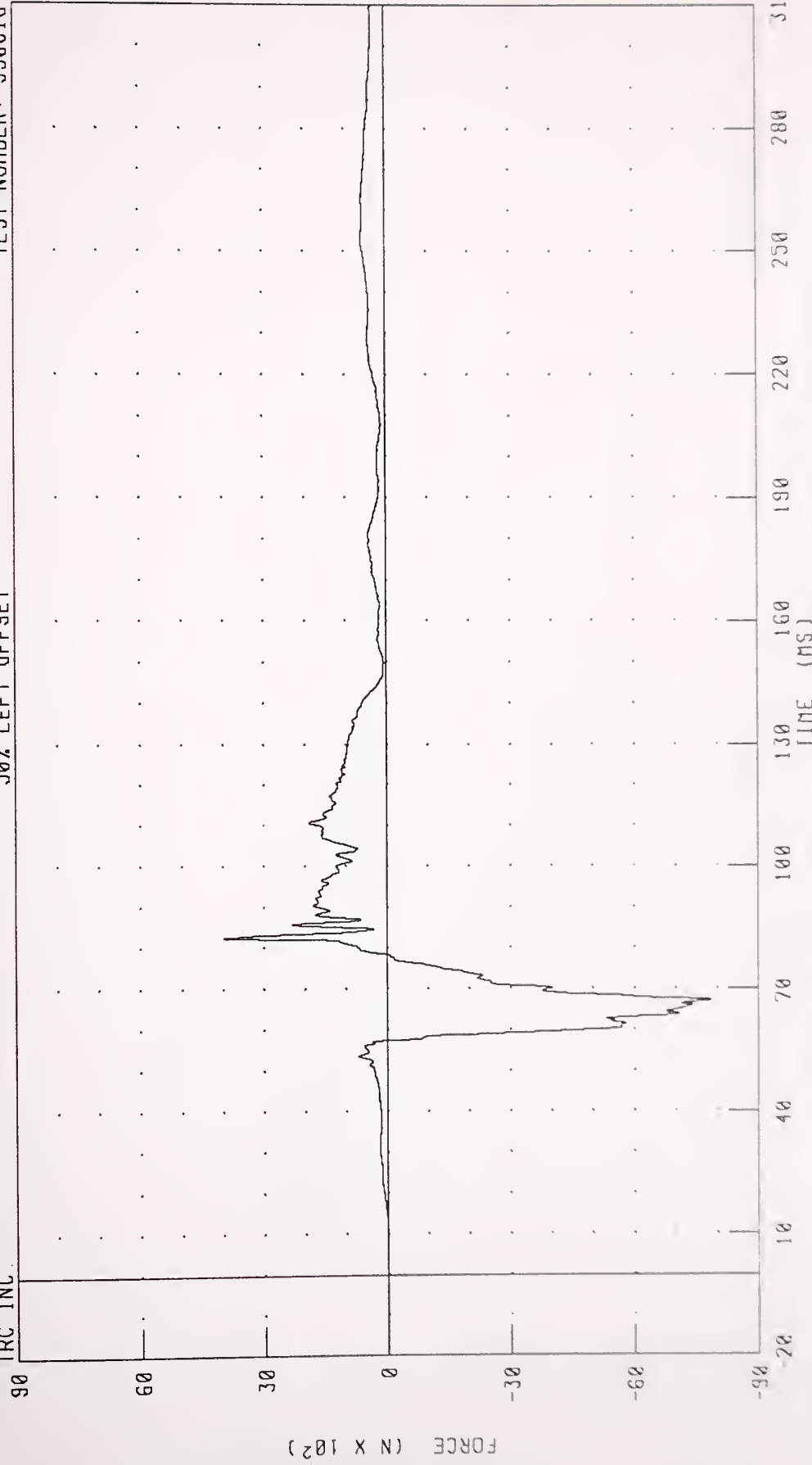
PEAK DATA: 464.46 N @ 52.72 MS; -6650.24 N @ 73.92 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS DRIVER RIGHT FEMUR FORCE

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL RFMFI FILTER CH CLASS 600

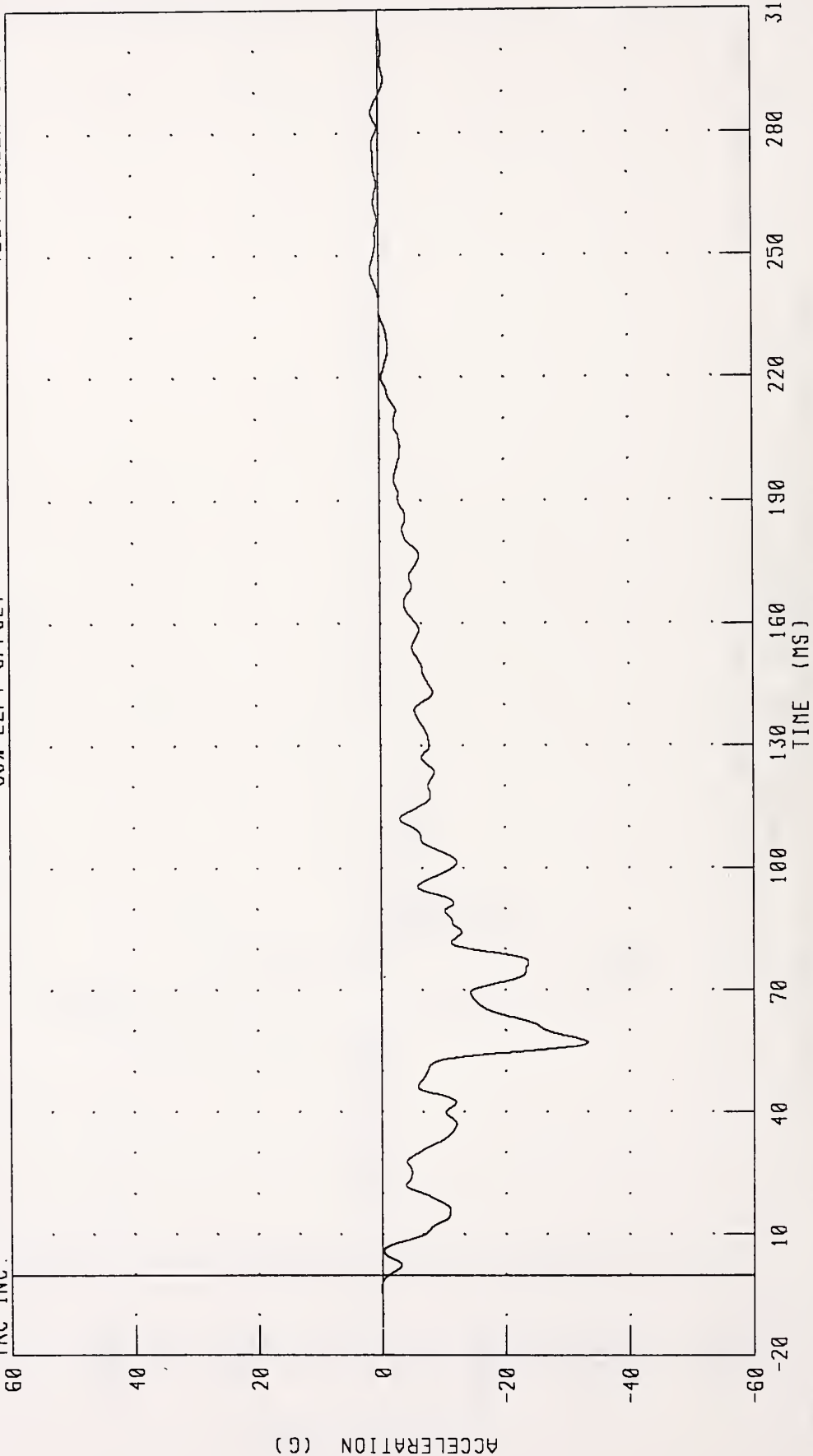
PEAK DATA 3986 69 N @ 82 56 MS, 7853 67 N @ 67 20 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
CAR CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL: VCGXG2 FILTER: CH CLASS 60

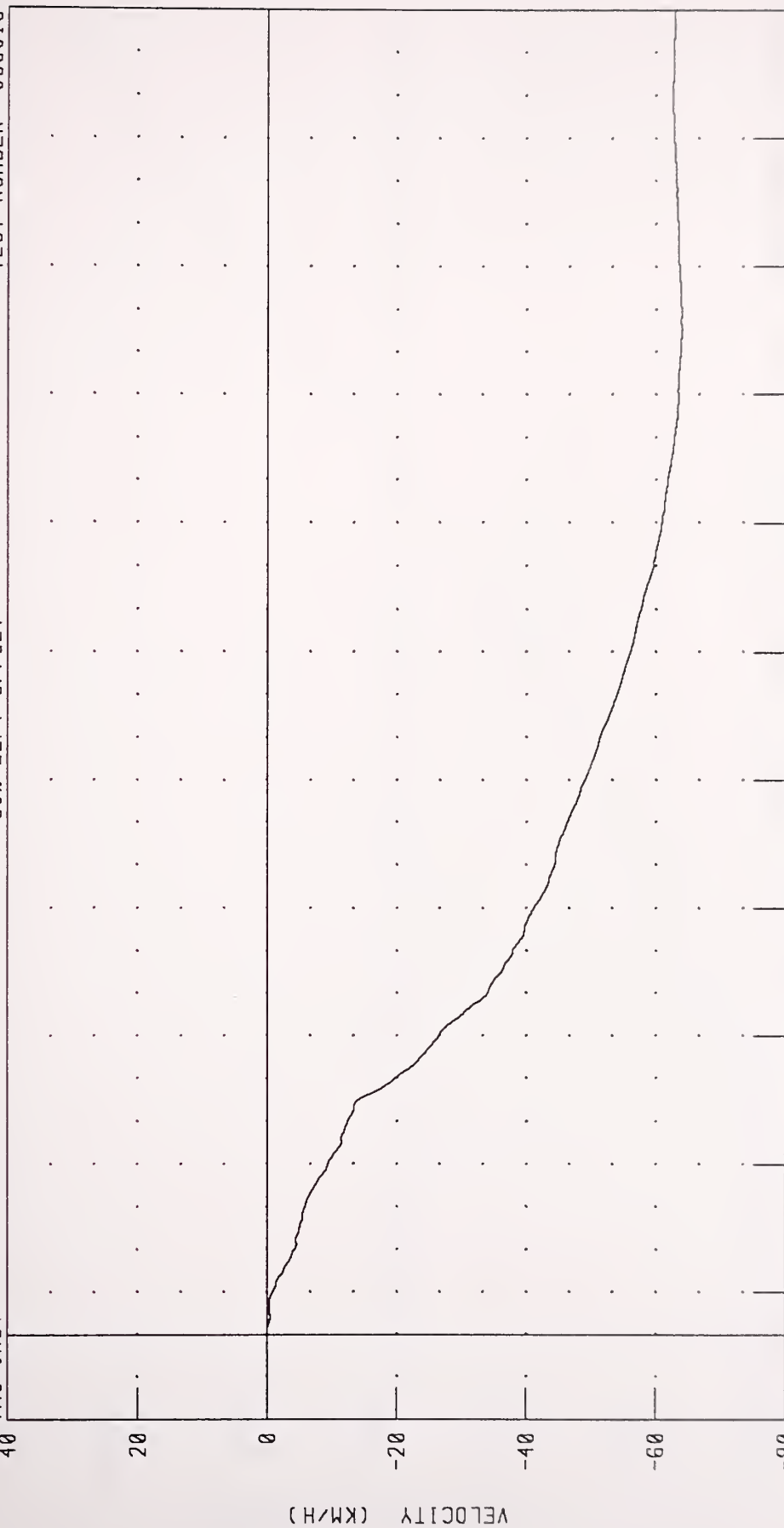
PEAK DATA: 1 44 G @ 246.40 MS, -33.27 G @ 57.04 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS CAR CENTER OF GRAVITY X-AXIS VELOCITY

50% LEFT OFFSET

TEST NUMBER: 950616

TRC INC.



TIME (MS)

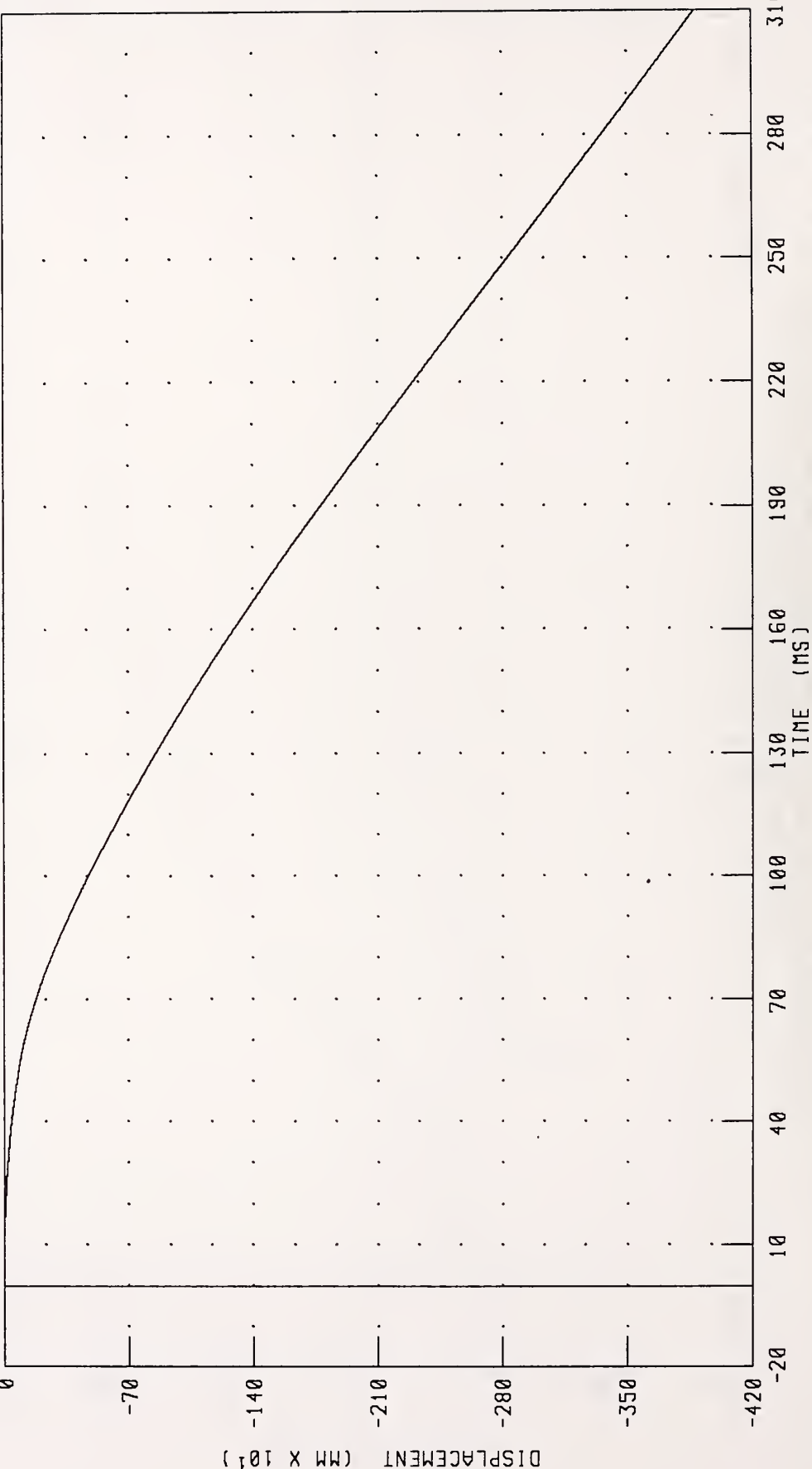
CHANNEL VCGXV2 FILTER CH CLASS 180 PEAK DATA 0.01 KM/H @ 0.80 MS, -63.94 KM/H @ 235.92 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
CAR CENTER OF GRAVITY X-AXIS DISPLACEMENT

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL: VCGX02 FILTER: CH. CLASS 180

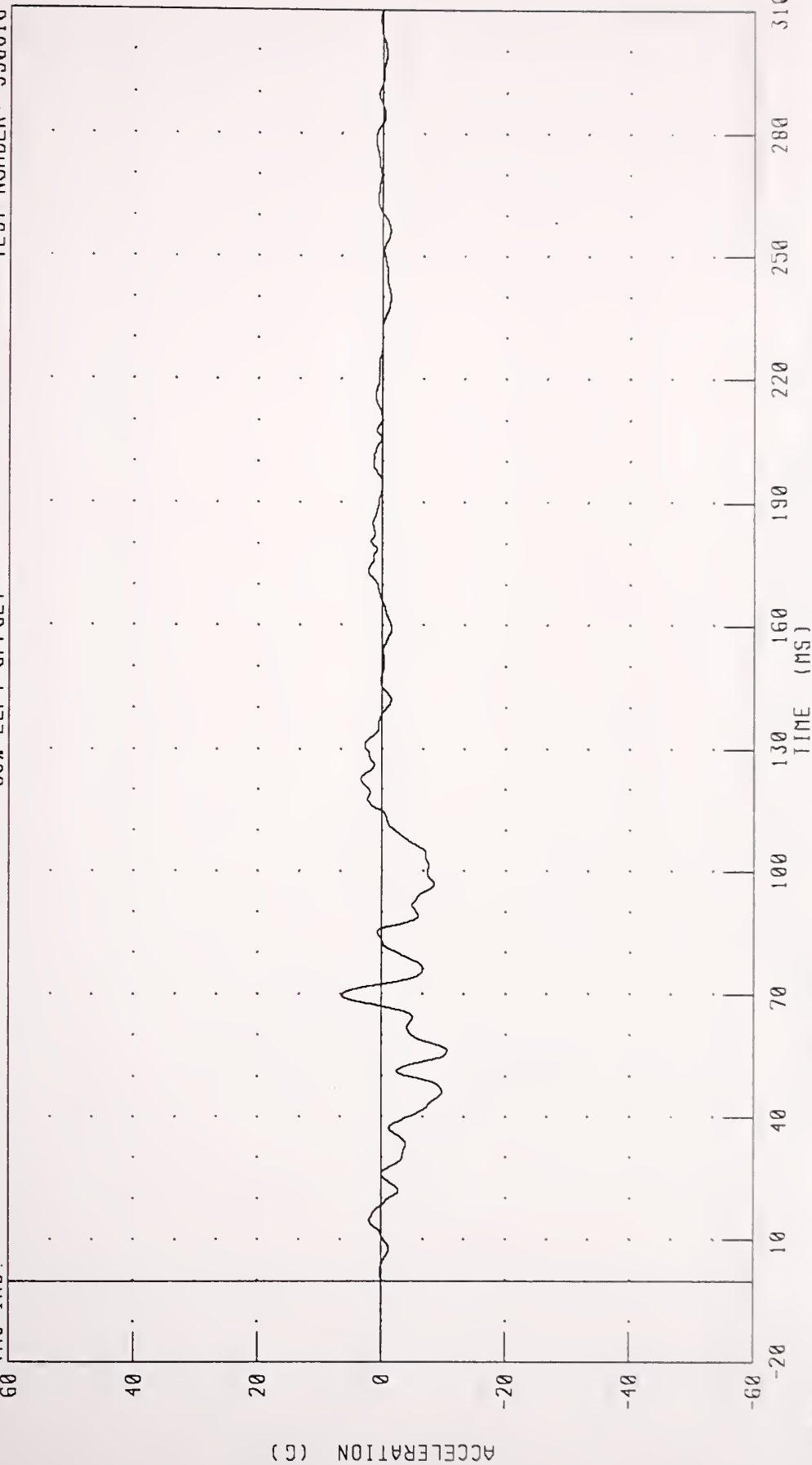
PEAK DATA: 0.00 MM @ 1.20 MS, -3880.43 MM @ 310.00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS CAR CENTER OF GRAVITY Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

IRC INC.



CHANNEL VCCYG2 FILTER CH CLASS 60

TIME (MS)

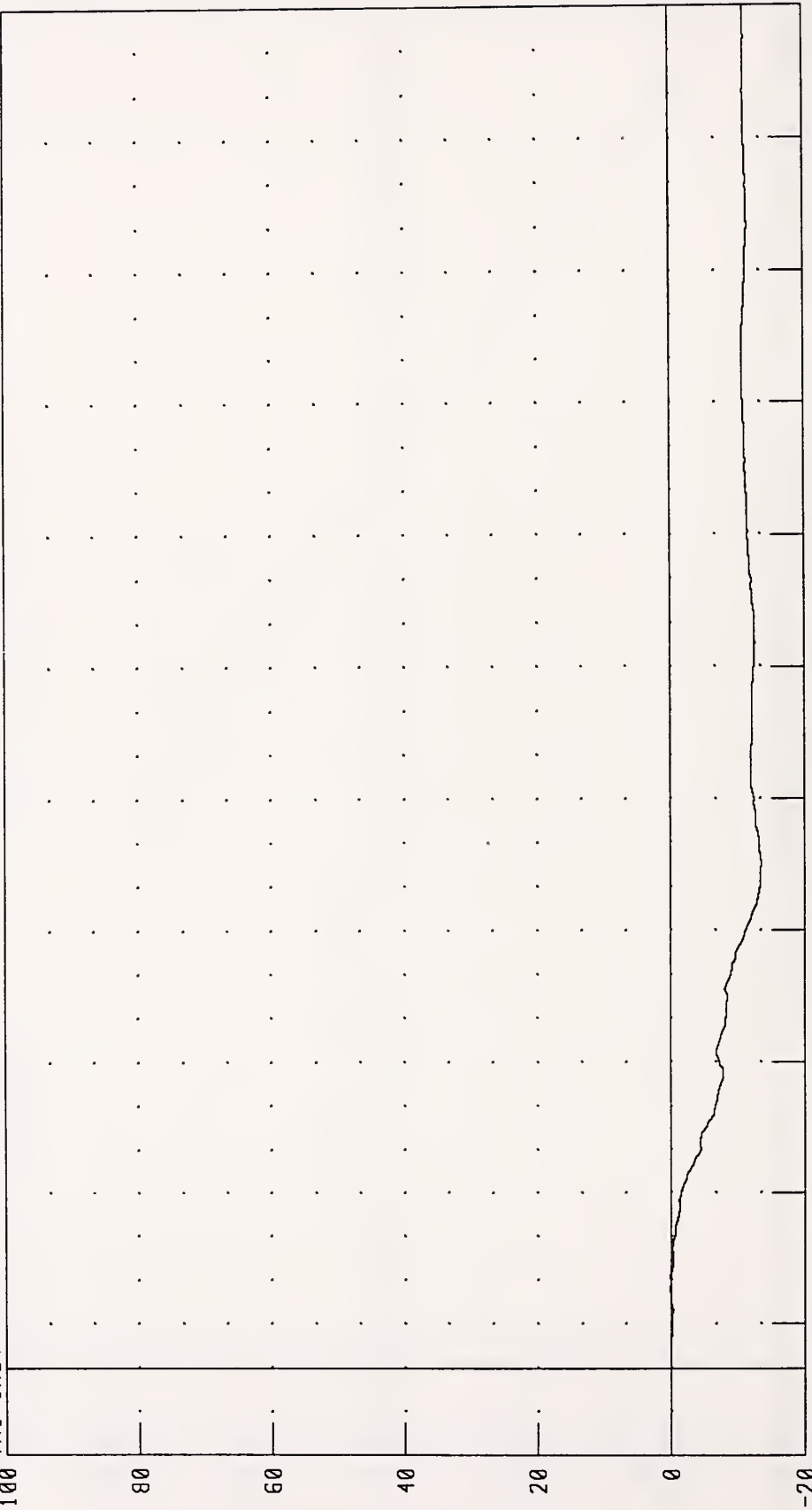
PEAK DATA 6 38 G @ 69 MS, -10 63 G @ 56 16 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS CAR CENTER OF GRAVITY Y-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC



CHANNEL: VCGYV2 FILTER: CH. CLASS 180

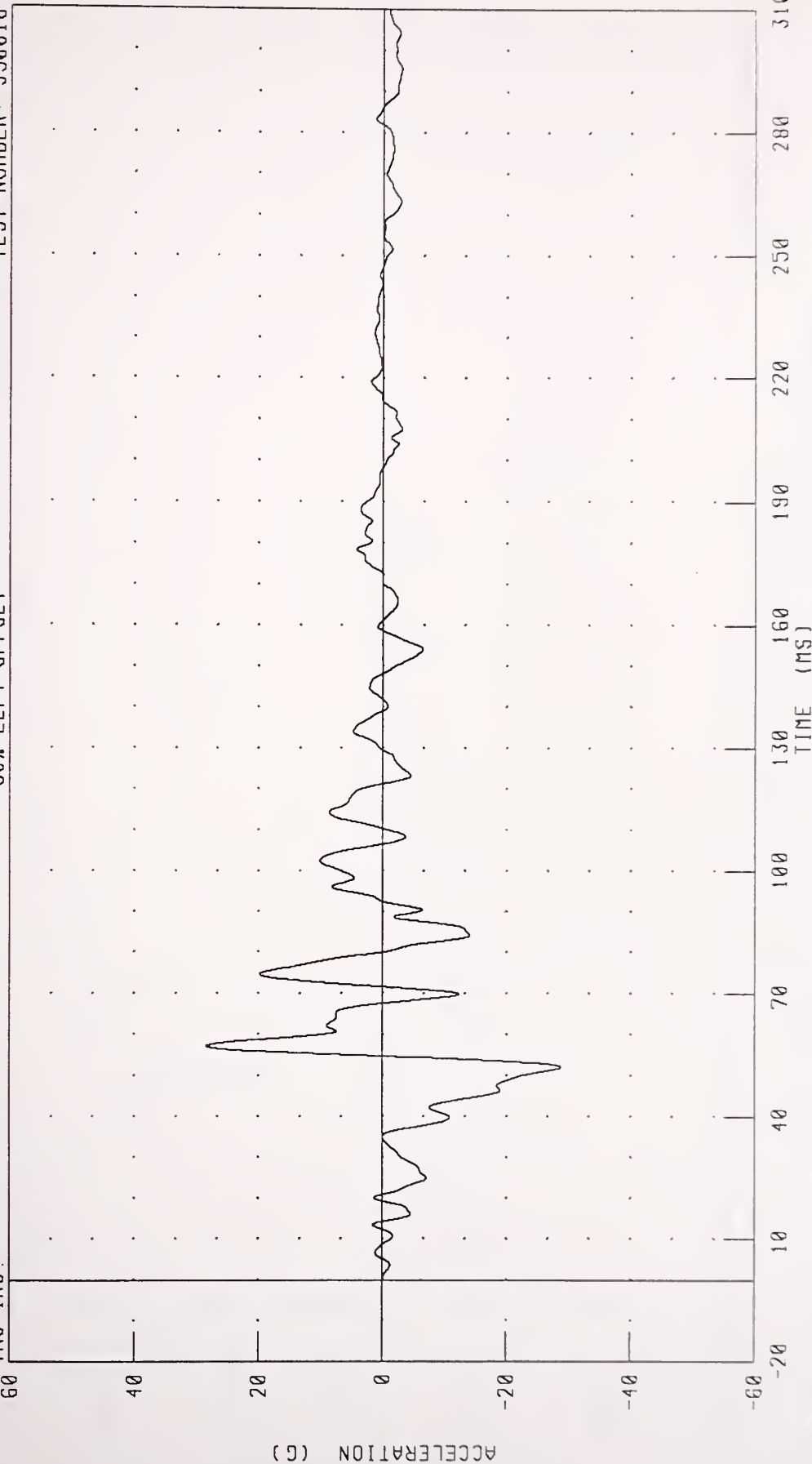
PEAK DATA: 0.21 KM/H @ 17.76 MS, -13.55 KM/H @ 115.20 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS CAR CENTER OF GRAVITY Z-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

TRC INC.

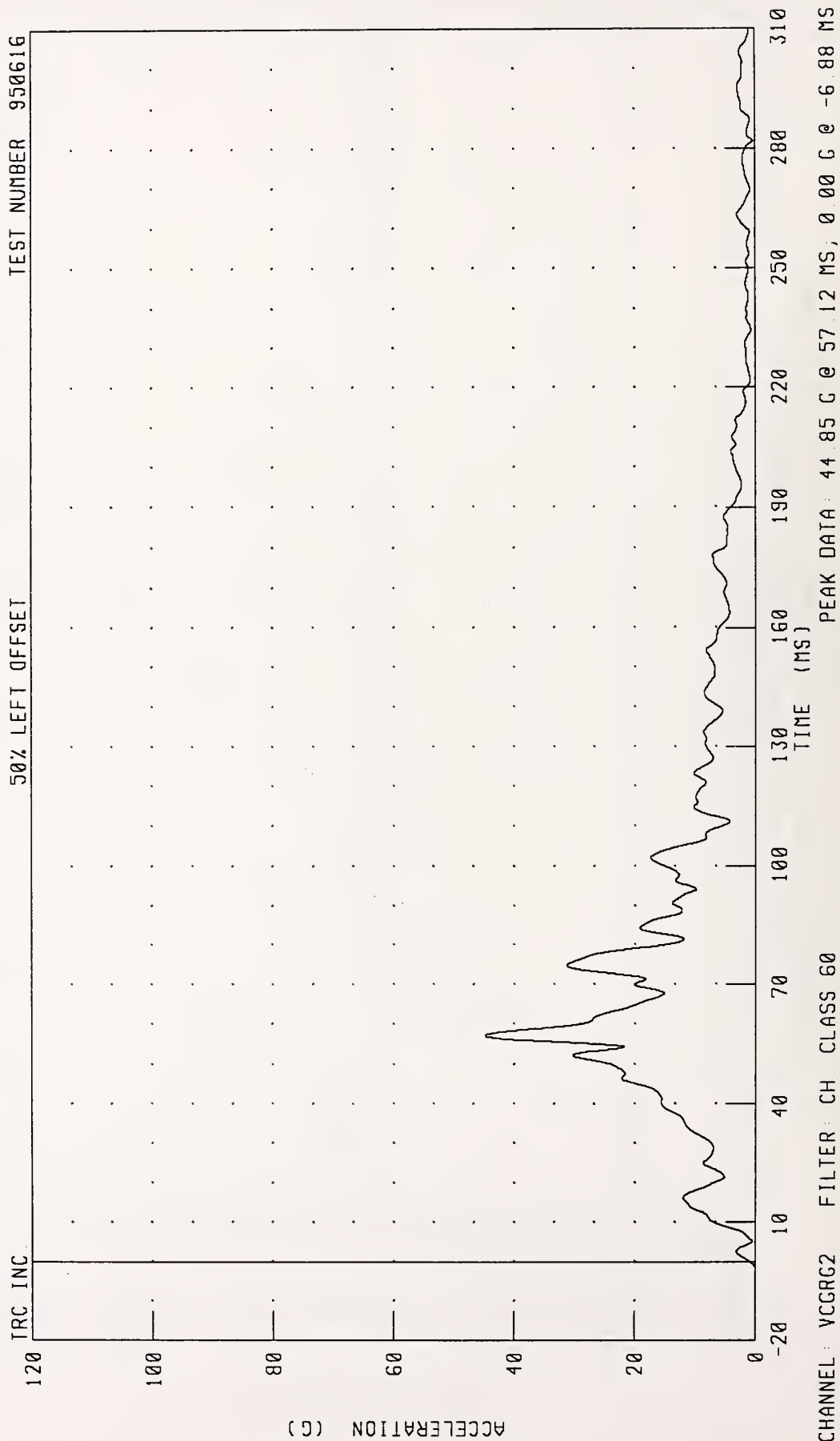


CHANNEL VCG7C2 FILTER CH CLASS 60

TIME (MS)

PEAK DATA 28 54 G @ 57 28 MS, -28 85 G @ 52 16 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
CAR CENTER OF GRAVITY RESULTANT ACCELERATION

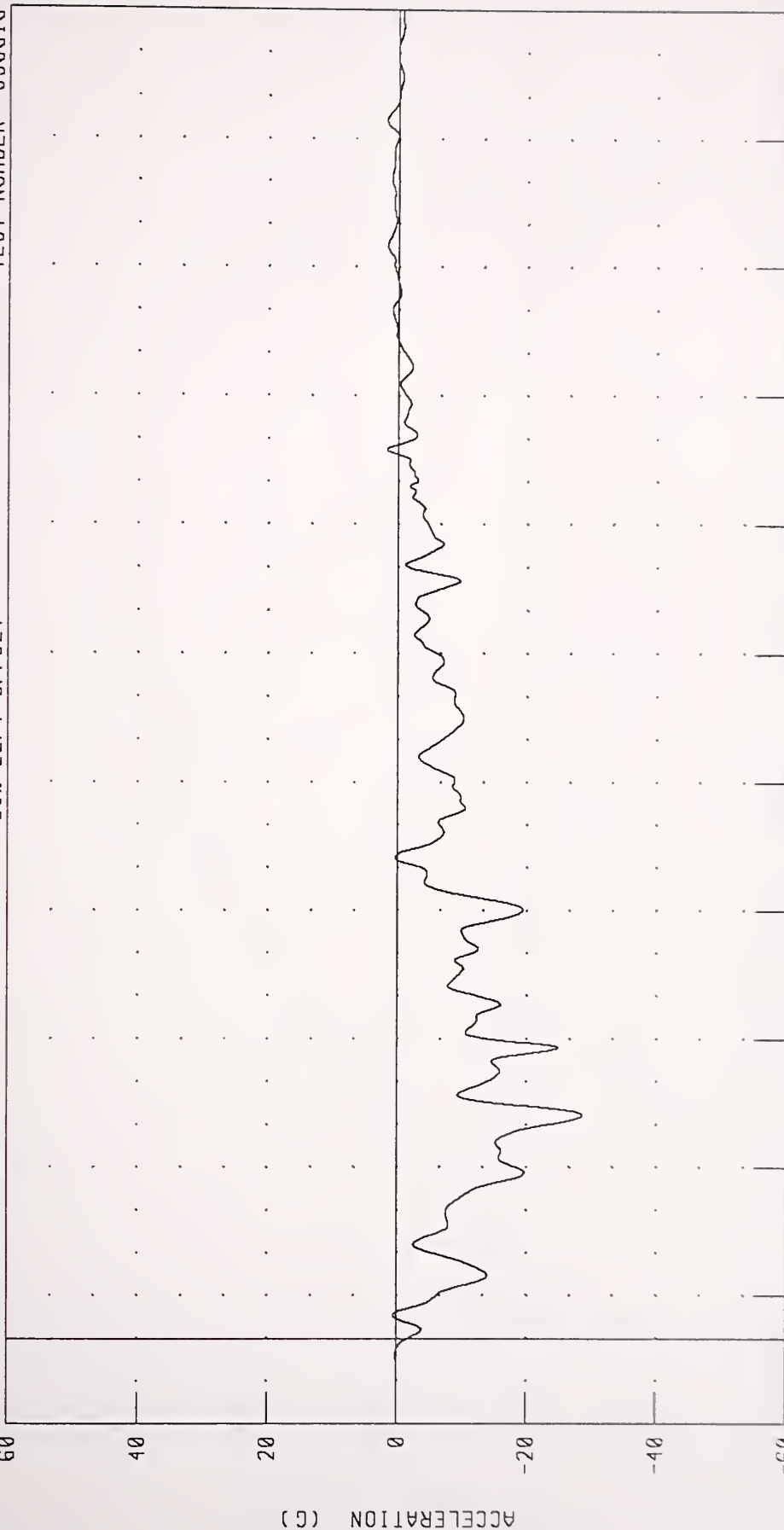


HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS LEFT FRONT SILL X-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

TRC INC



310

280

250

220

190

160

130

100

70

40

10

-20

-40

-60

TIME (MS)

CHANNEL LFSXC2 FILTER CH CLASS 60

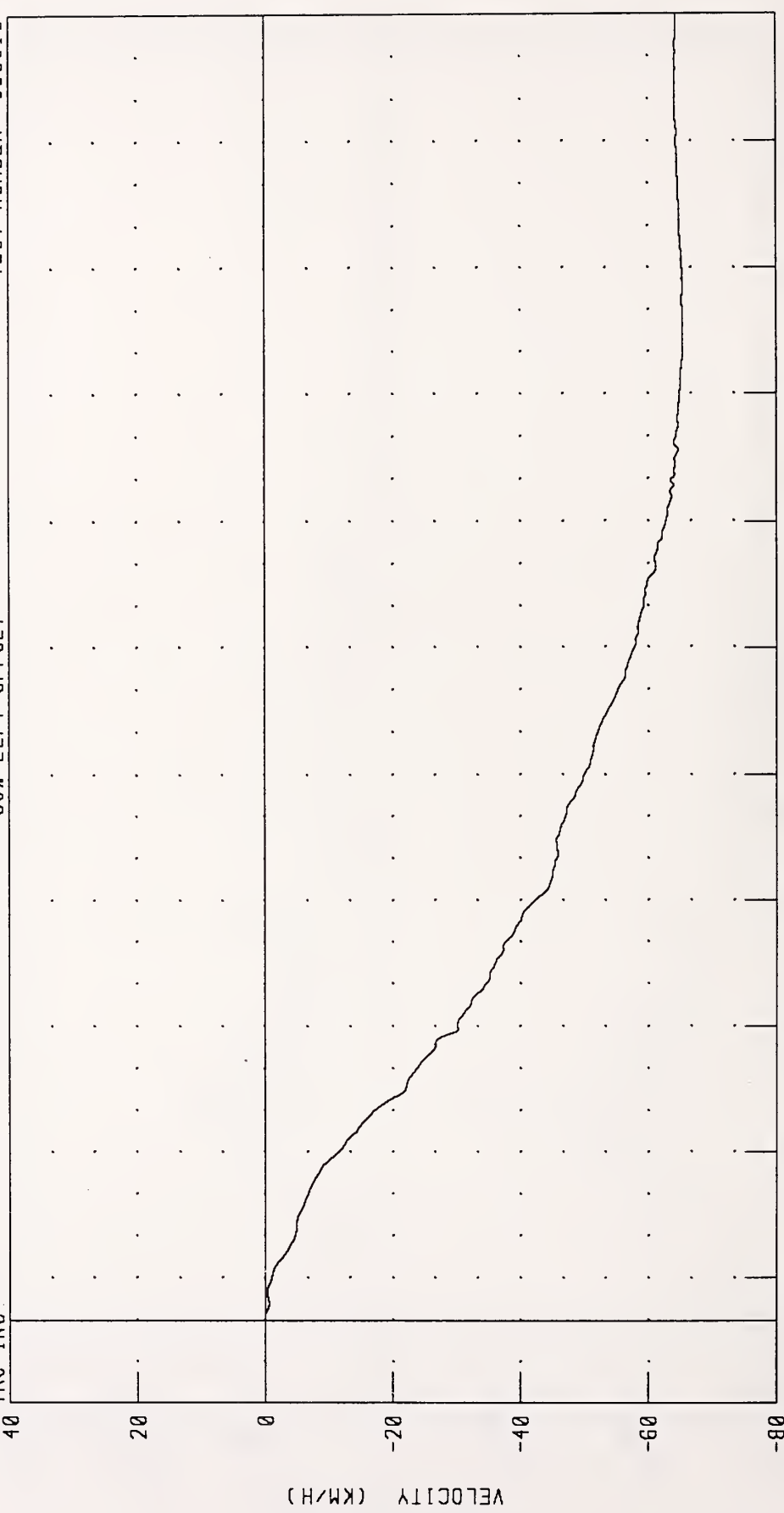
PEAK DATA 1 81 G @ 284 40 MS, -28 61 G @ 52 24 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT FRONT SILL X-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC

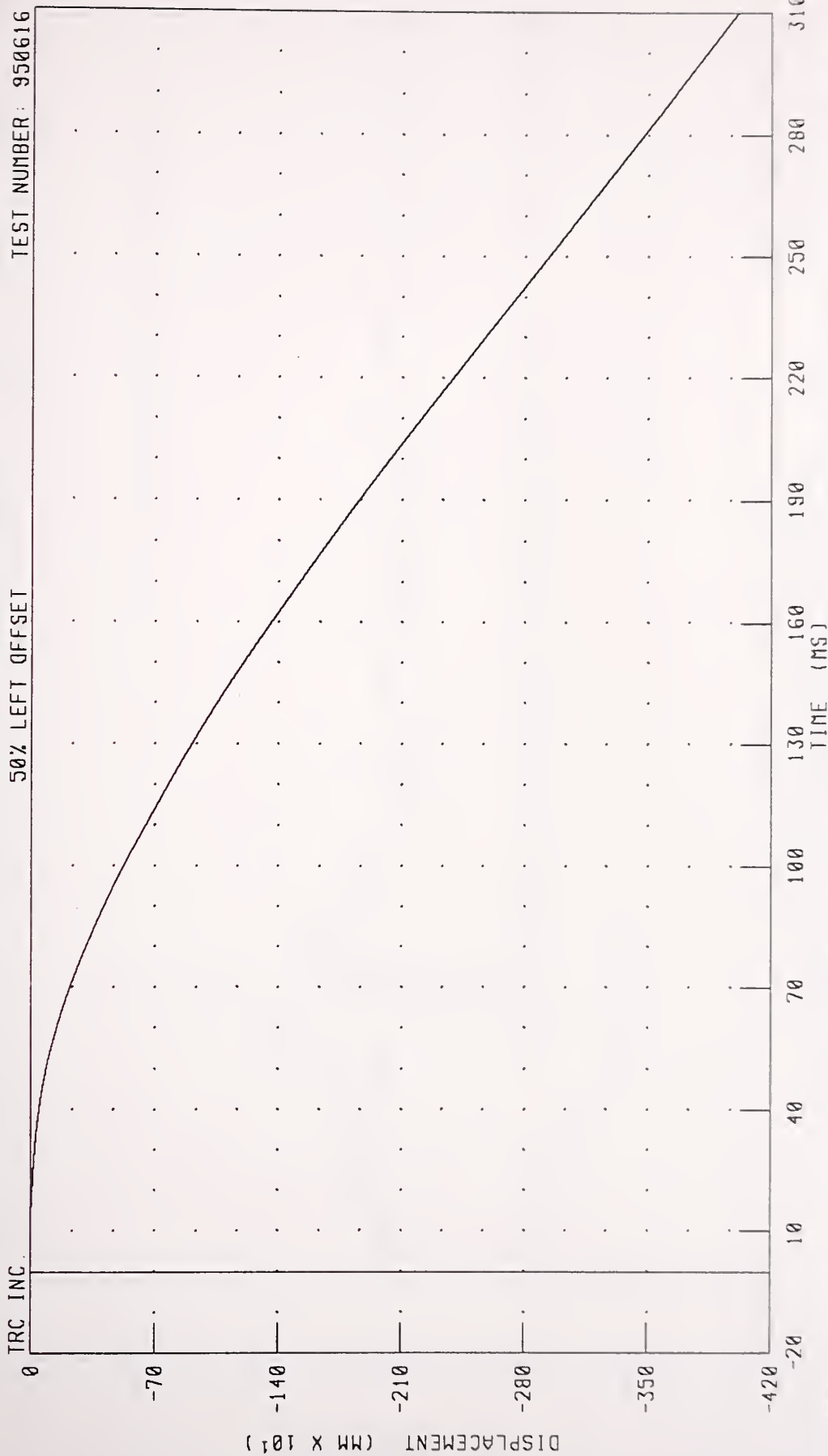


CHANNEL: LFSXV2 FILTER: CH. CLASS 180

TIME (MS)

PEAK DATA: 0.00 KM/H @ 0.24 MS, -65.45 KM/H @ 233.20 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT FRONT SILL X-AXIS DISPLACEMENT

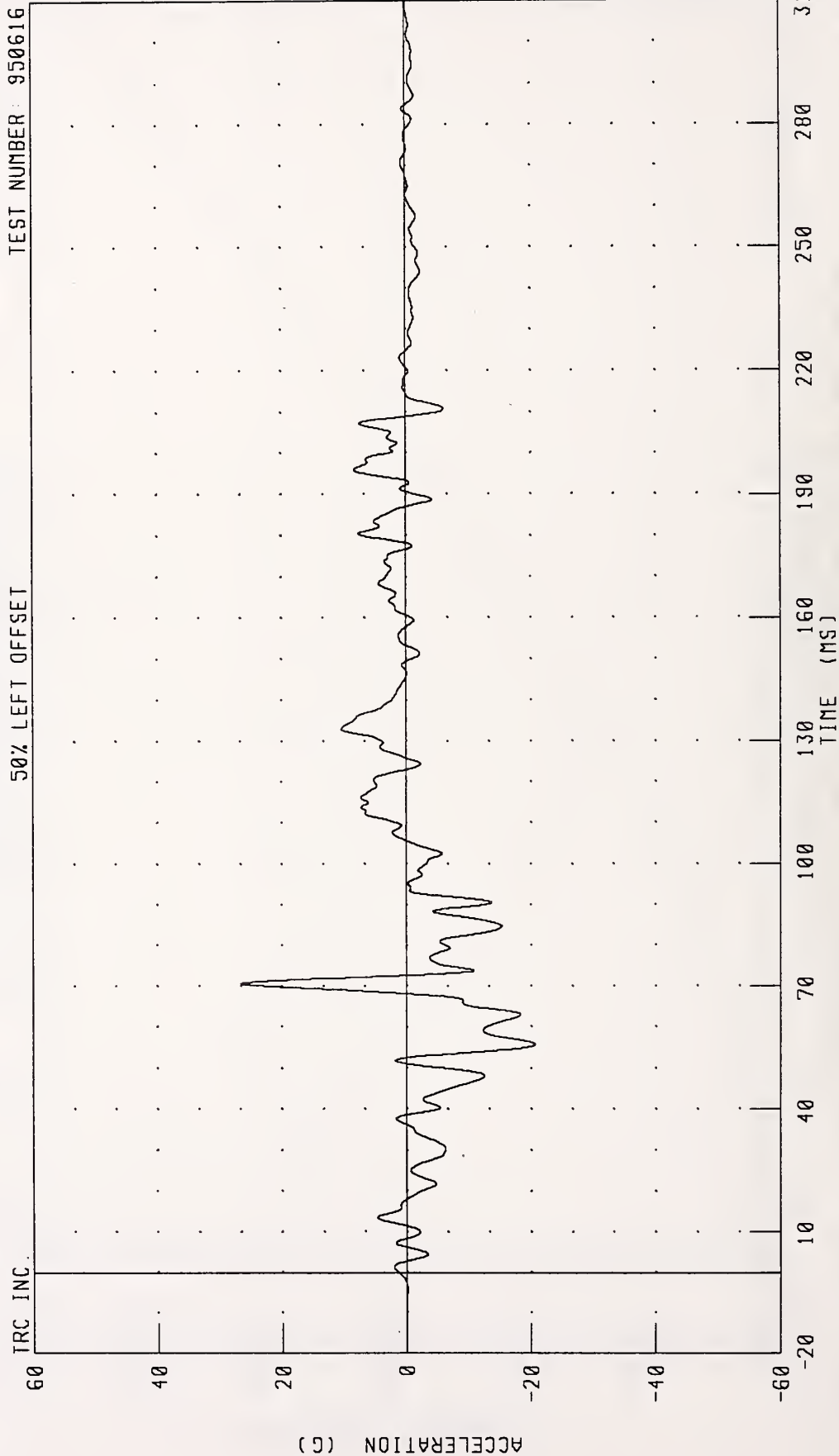


CHANNEL LFSXD2 FILTER CH CLASS 180 PEAK DATA 0 00 NM @ 0 40 MS, -4009 42 MM @ 310 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT FRONT SILL Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



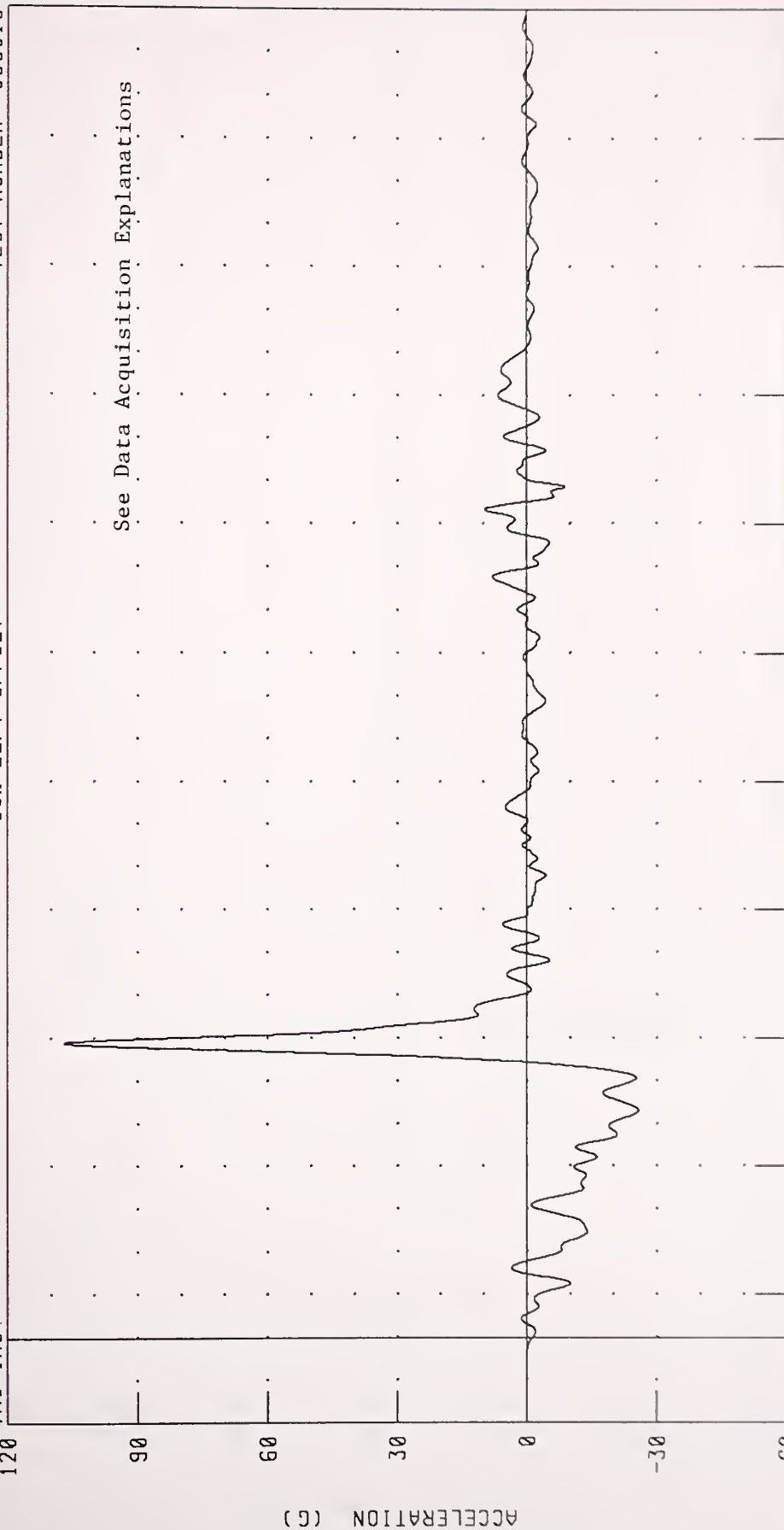
CHANNEL: LFSYG2 FILTER: CH. CLASS 60

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS LEFT FRONT SILL Z-AXIS ACCELERATION

50% LEFT OFFSET

TEST NUMBER: 950616

TRC INC.



TIME (MS)

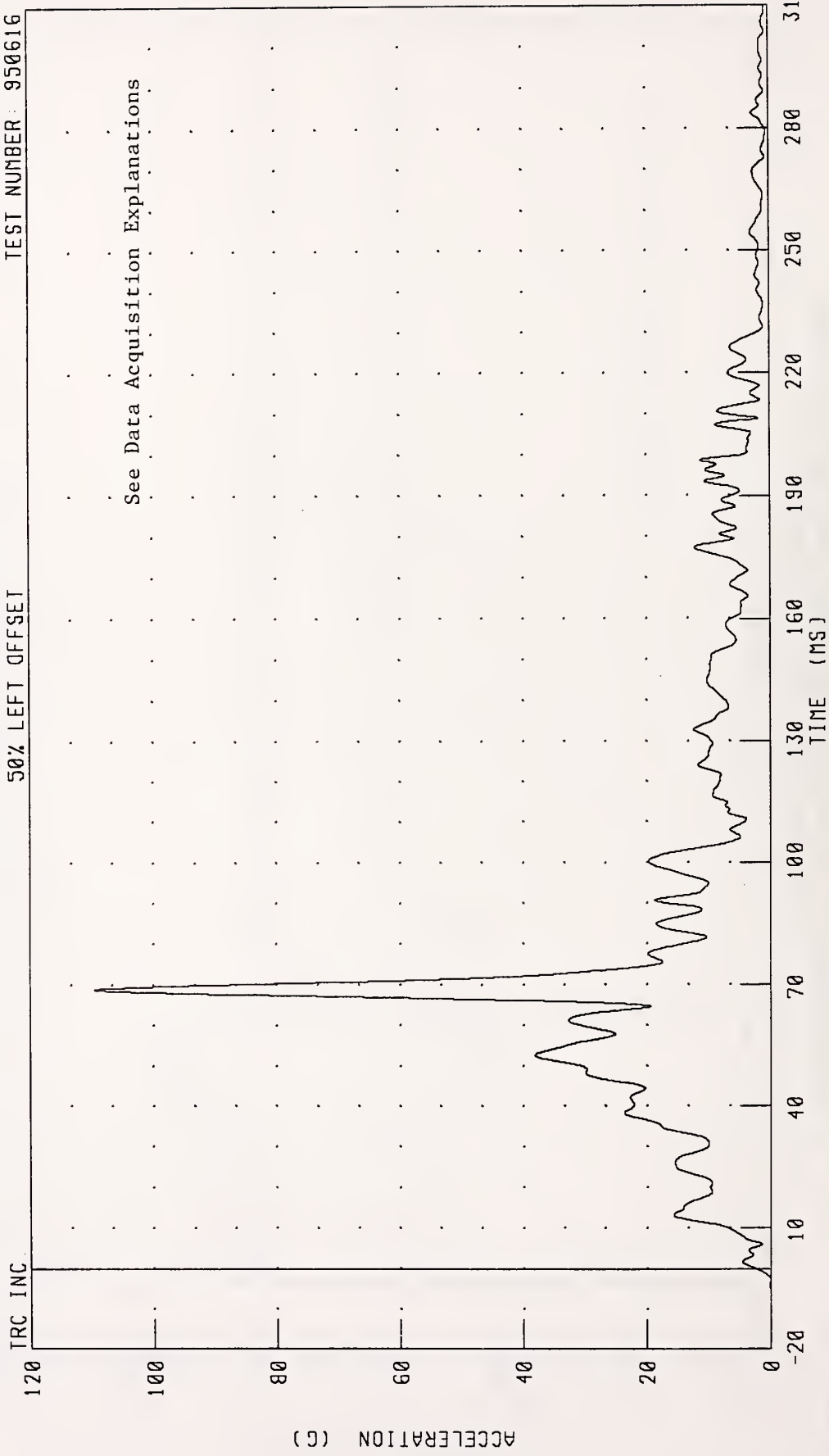
PEAK DATA 107 08 G @ 68 88 MS, -25 79 G @ 53 12 MS

CHANNEL LFS7G2 FILTER CH CLASS 60

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT FRONT SILL RESULTANT ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: LFSRG2 FILTER: CH. CLASS 60

PEAK DATA: 109 58 G @ 68 88 MS, 0 01 G @ -14 32 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT FRONT SILL X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC

60

40

20

0

-20

-40

-60

ACCELERATION (G)

TIME (MS)

10 40 70 100 130 160 190 220 250 280 310

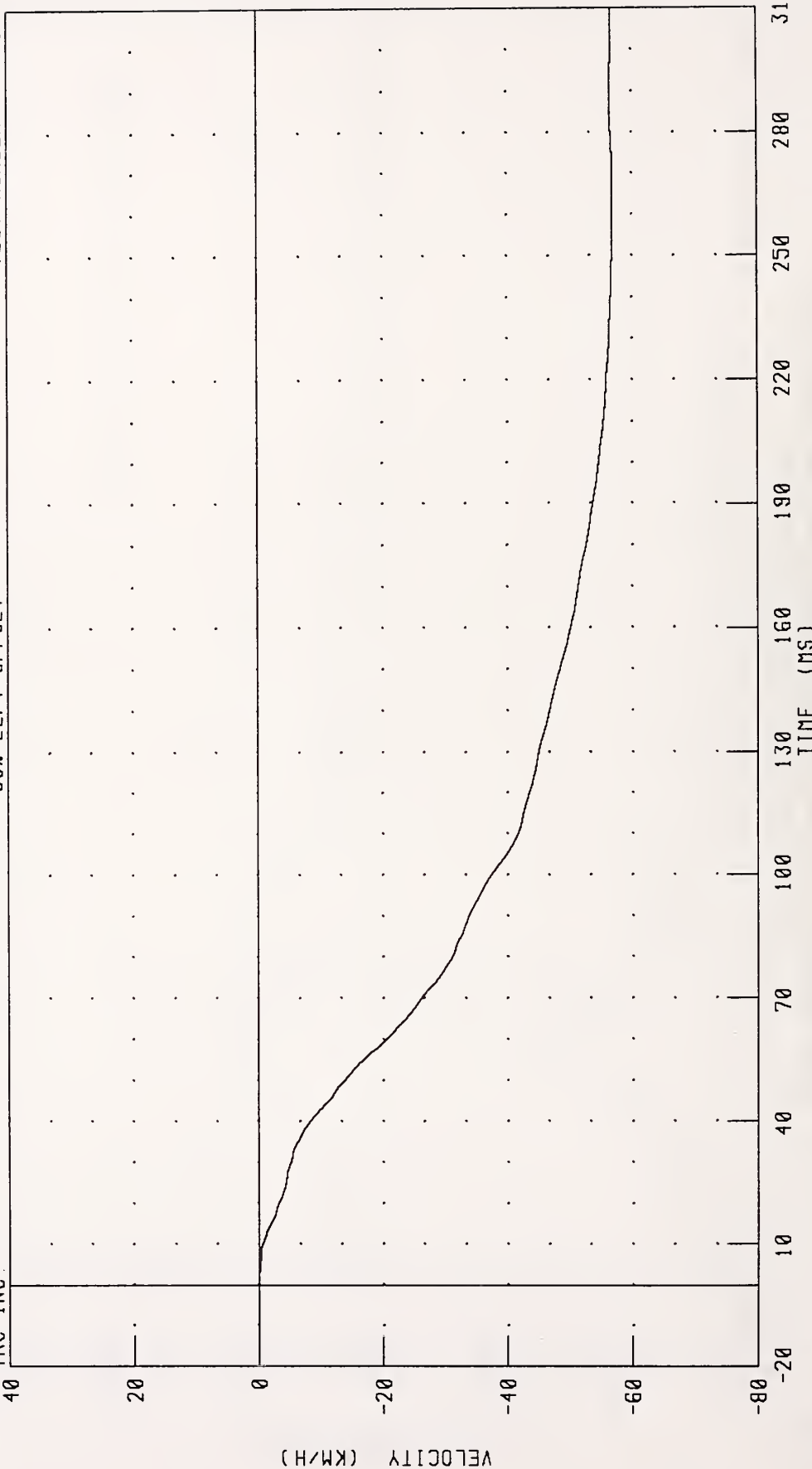
CHANNEL RFSXC2 FILTER CH CLASS 60 PEAK DATA 1 07 G @ 278 80 MS, -22 13 G @ 57 20 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT FRONT SILL X-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC



CHANNEL: RFSXV2 FILTER: CH CLASS 180

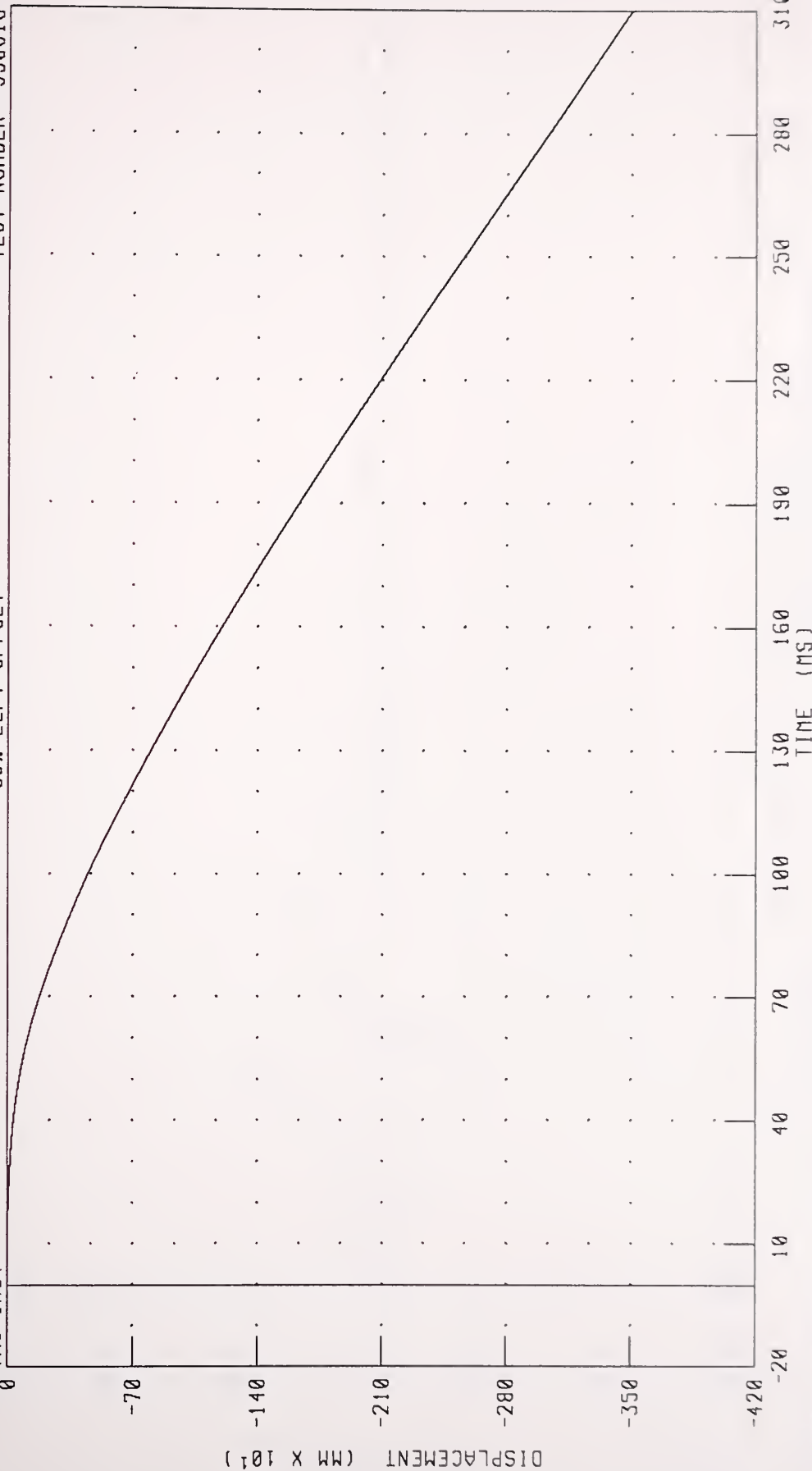
PEAK DATA: 0.01 KM/H @ 1.44 MS; -56.93 KM/H @ 261.84 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT FRONT SILL X-AXIS DISPLACEMENT

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



PEAK DATA: 0 00 MM @ 2 00 MS, -3503 87 MM @ 310 00 MS

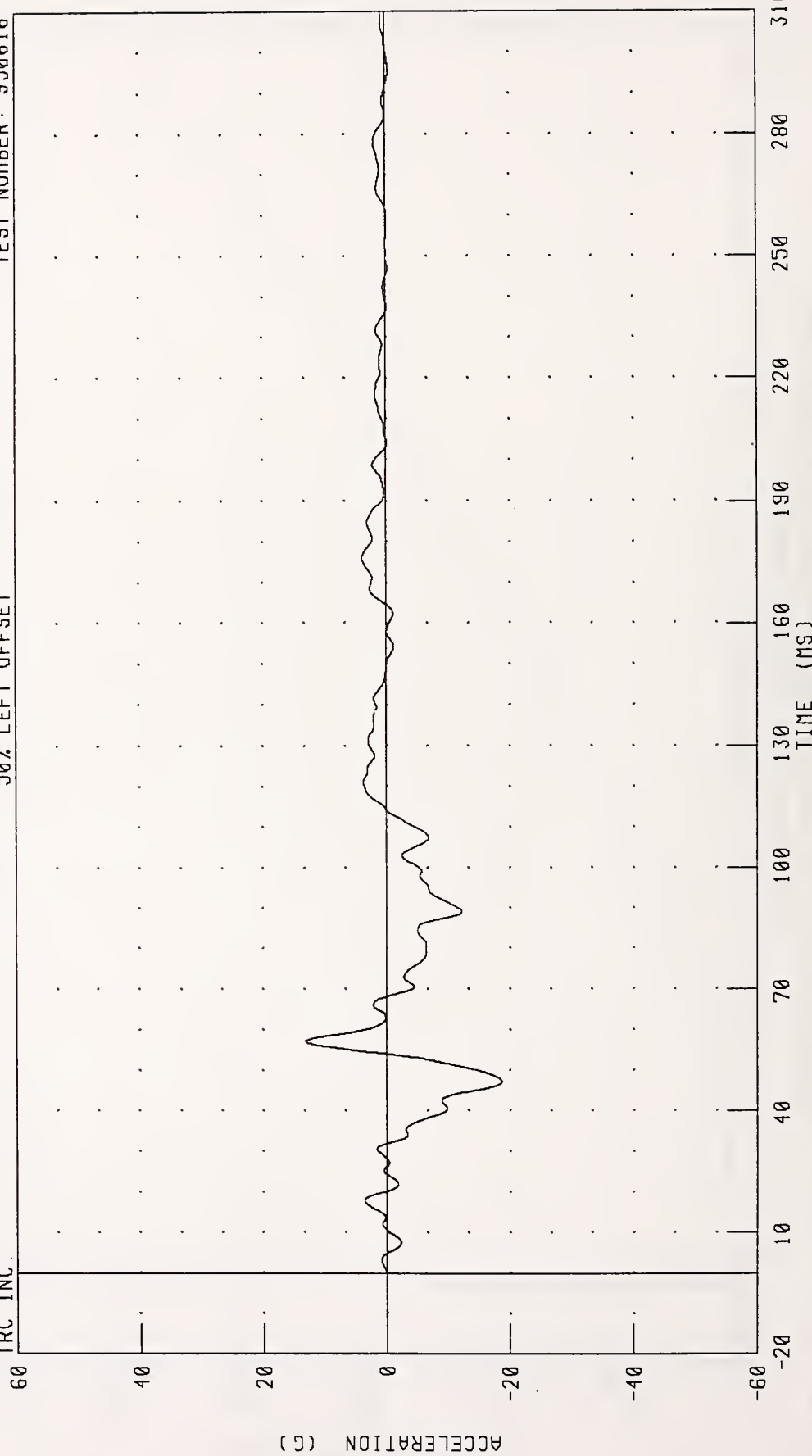
CHANNEL RFSX02 FILTER CH CLASS 180

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT FRONT SILL Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC



CHANNEL RFSYG2 FILTER CH CLASS 60

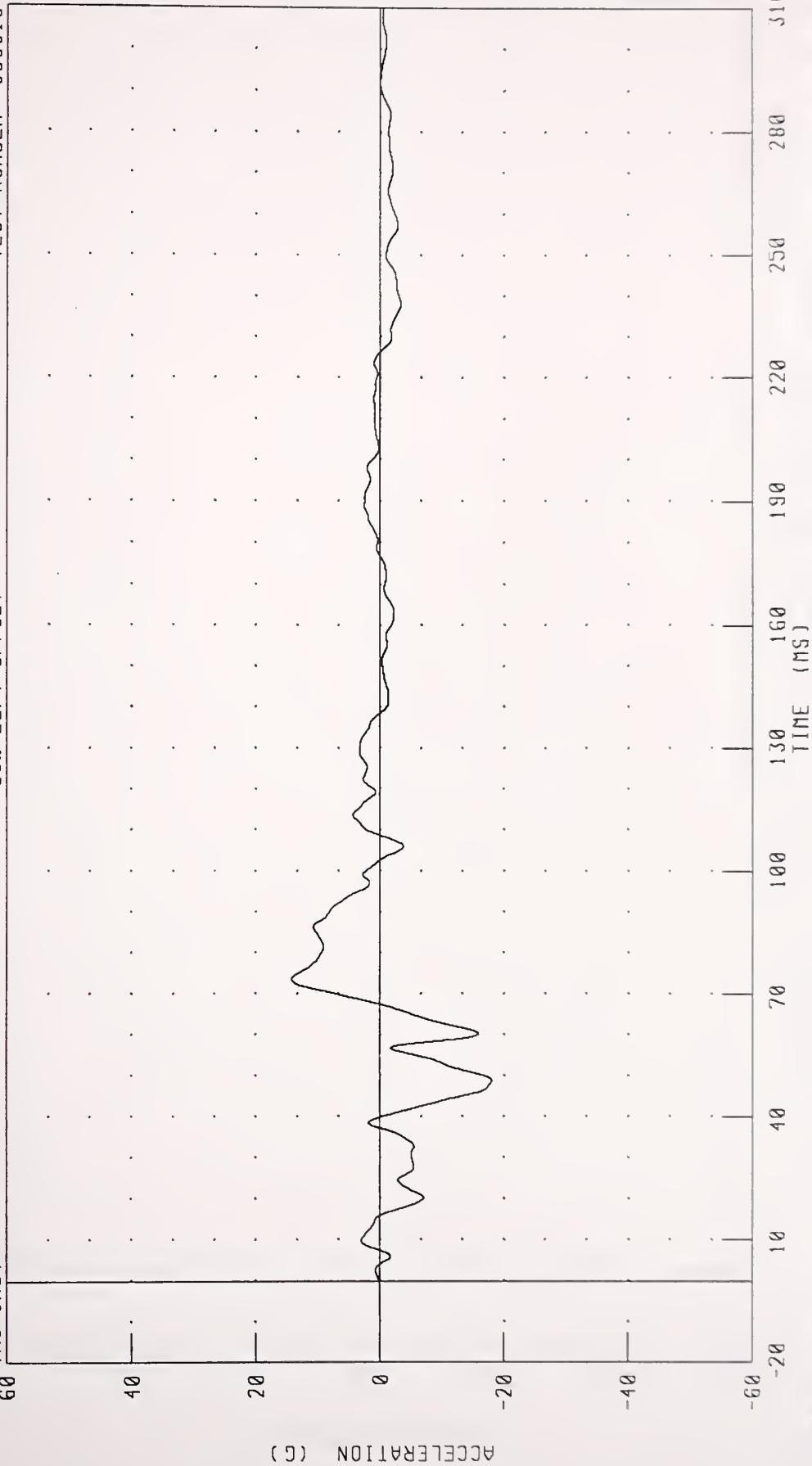
PEAK DATA 13.20 G @ 57.28 MS, -18.70 G @ 47.28 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS RIGHT FRONT SILL Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL RFSZC2 FILTER CH CLASS 60

TIME (MS)

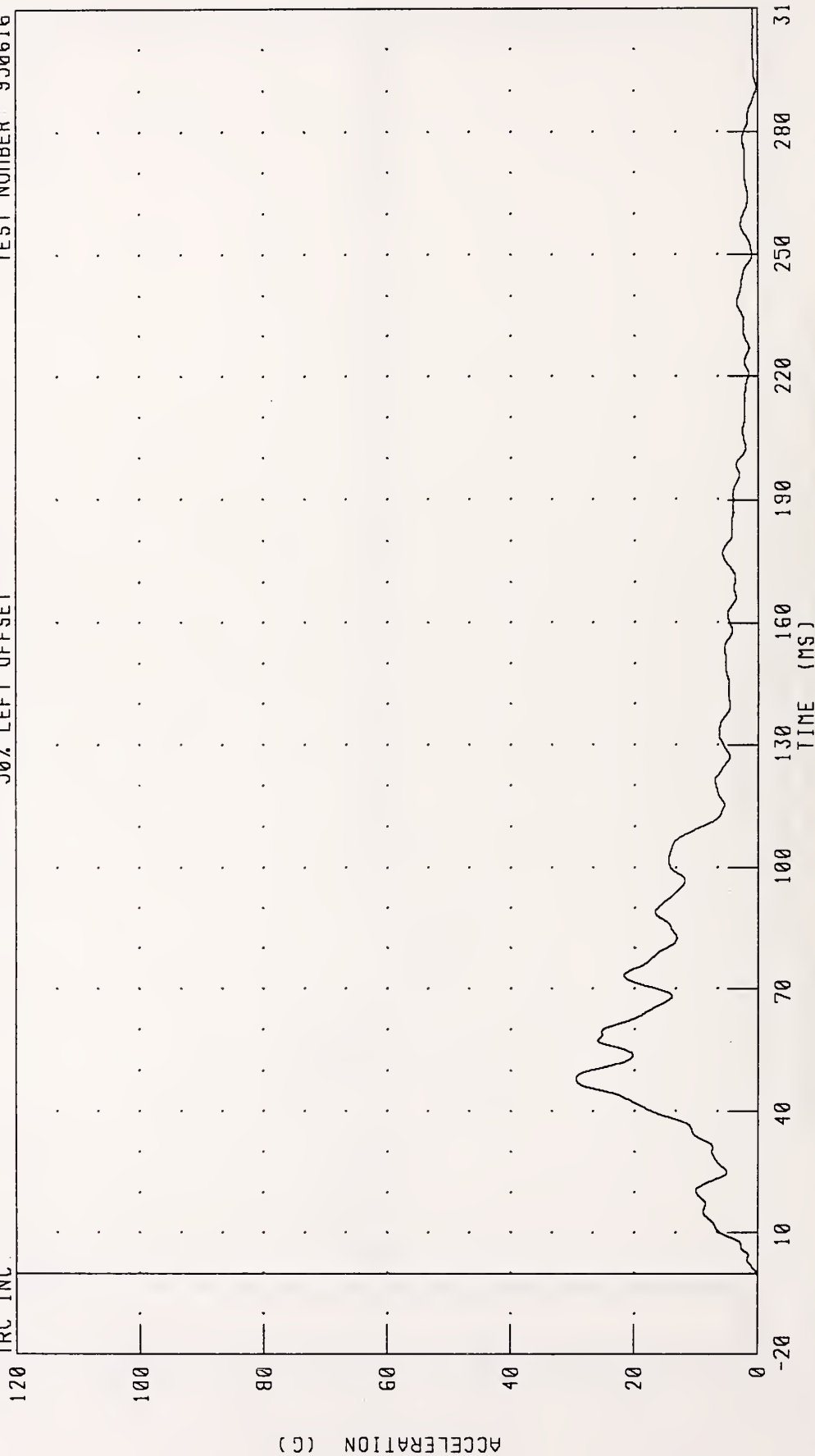
PEAK DATA 14 27 G @ 73 60 MS, -18 06 G @ 48 80 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT FRONT SILL RESULTANT ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

IRC INC



CHANNEL: RFSRG2 FILTER: CH CLASS 60

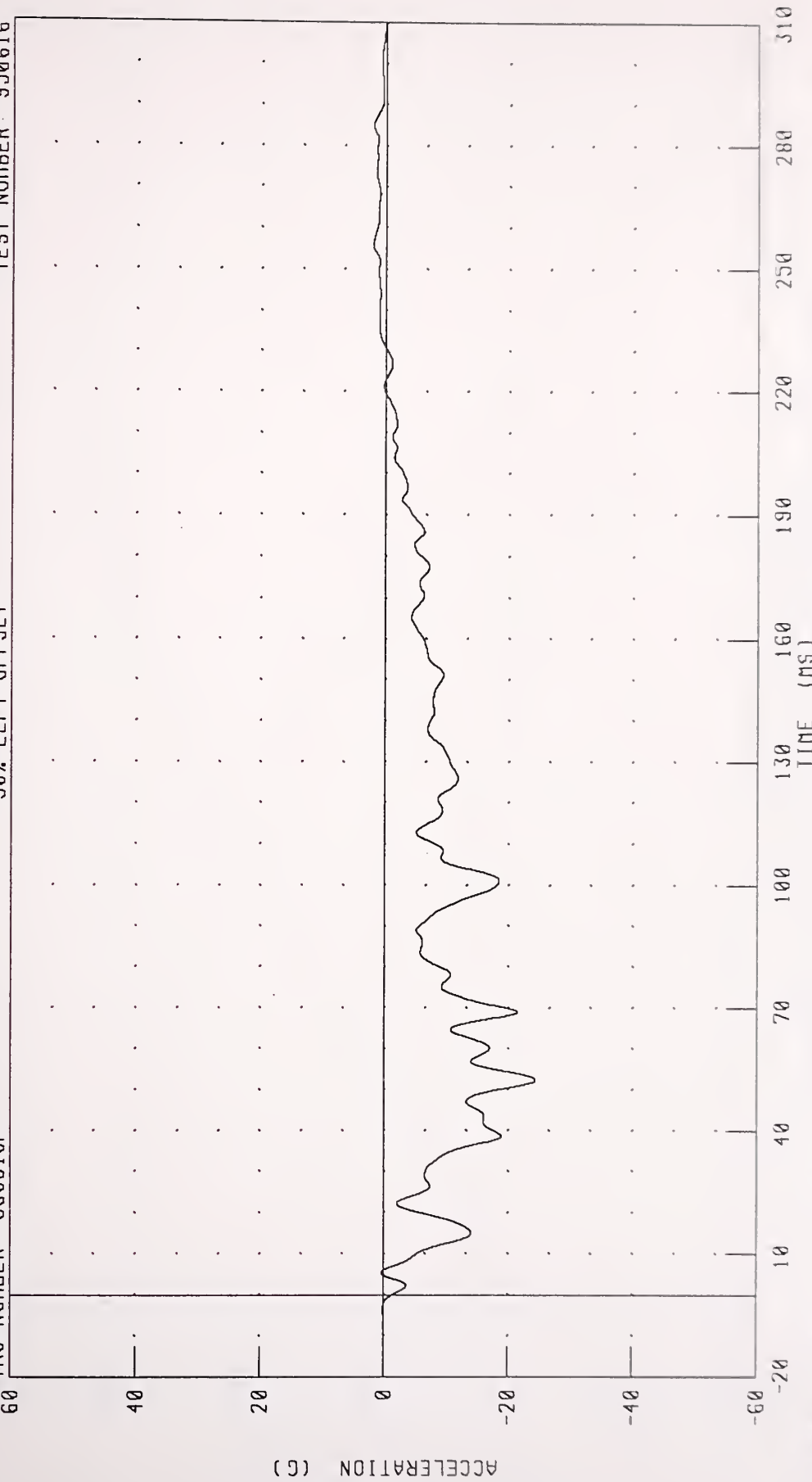
PEAK DATA: 29.40 G @ 47.92 MS, 0.01 G @ -10.40 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS LEFT REAR SEAT X-AXIS ACCELERATION

50% LEFT OFFSET

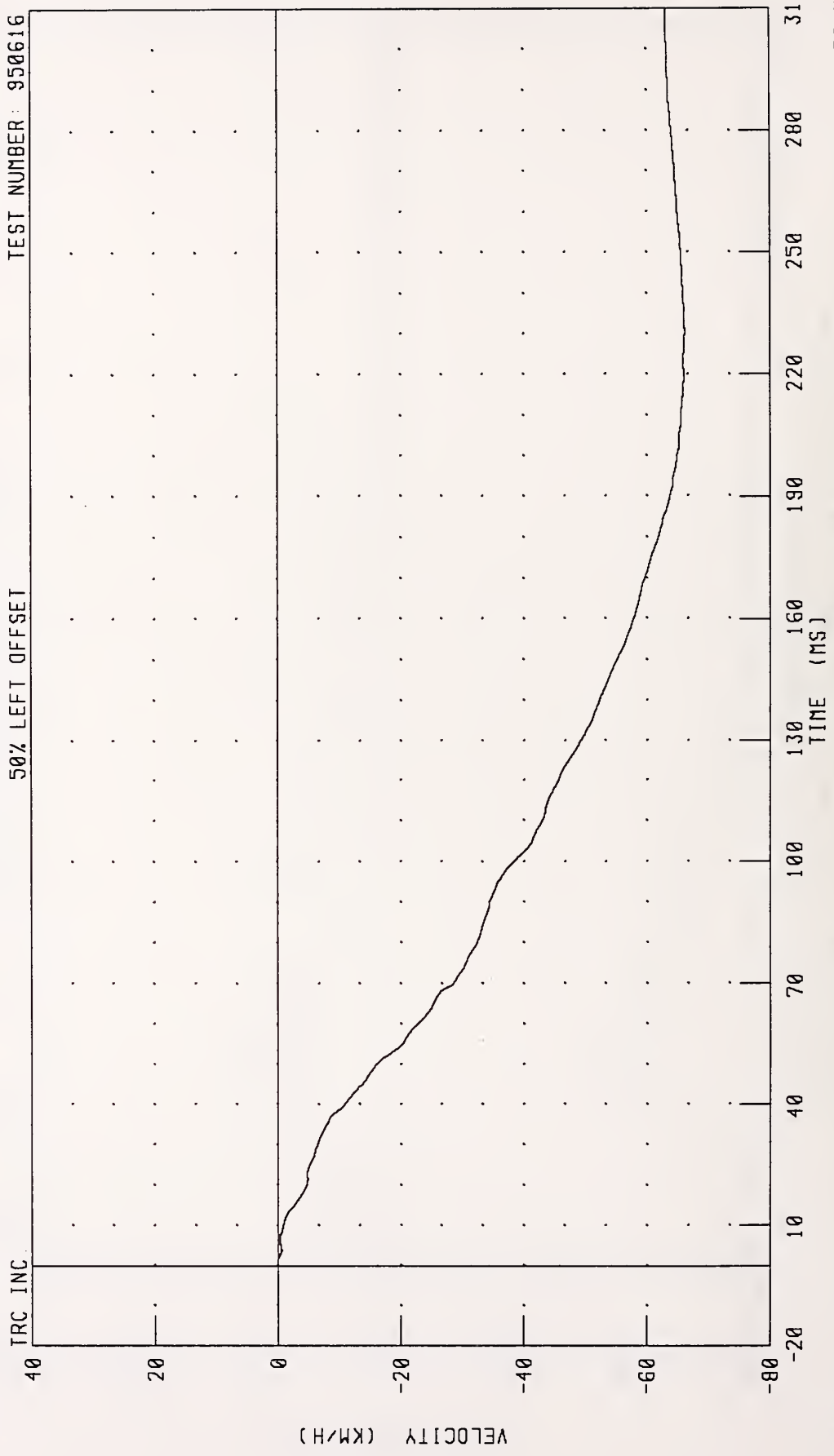
TEST NUMBER: 950616

TRC NUMBER: 950616F



CHANNEL TLRXC2 FILTER CH CLASS 60 PEAK DATA 2 07 G @ 284 88 MS, -24 46 G @ 52 40 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT REAR SEAT X-AXIS VELOCITY



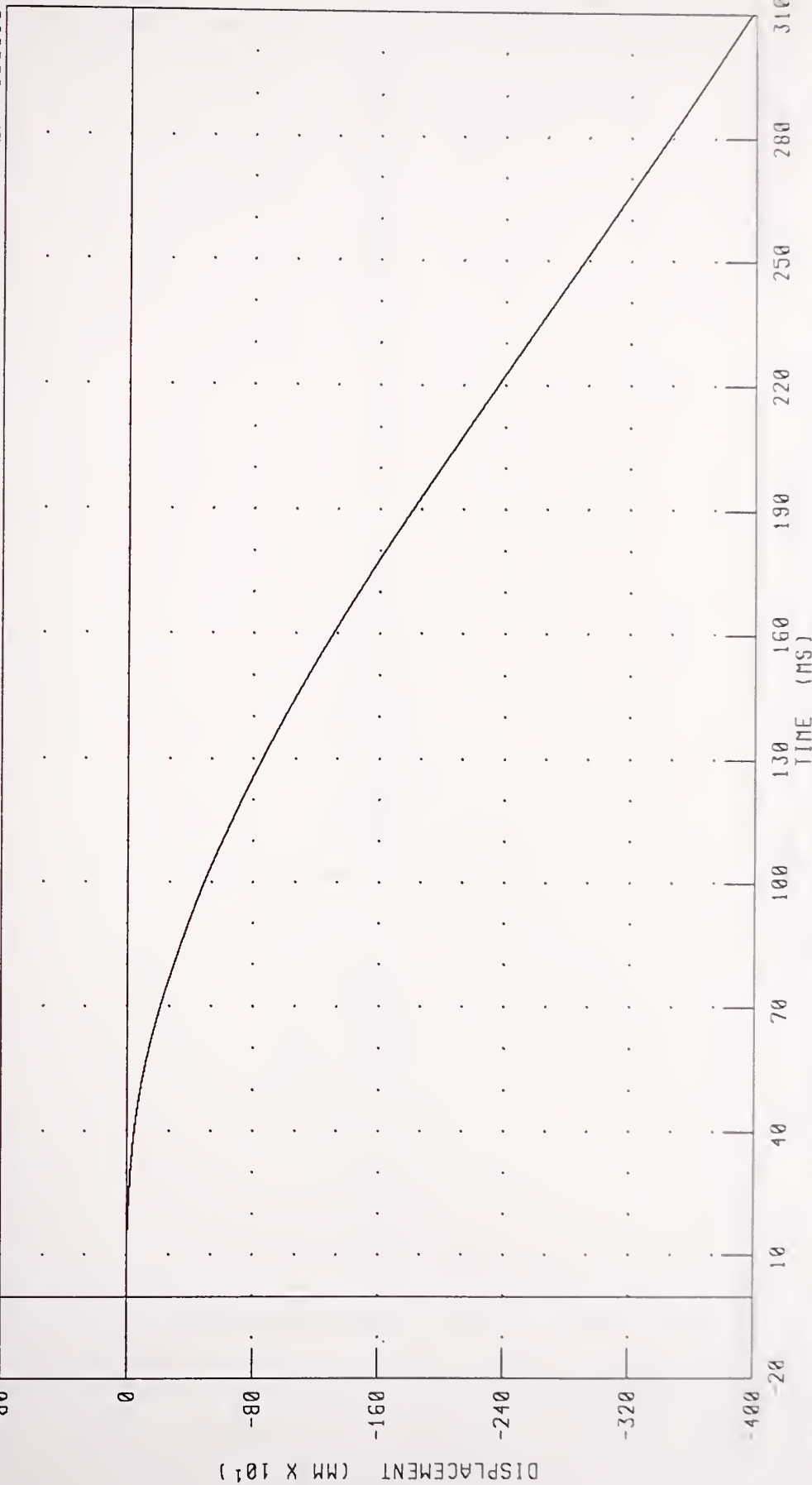
CHANNEL: TLRXV2 FILTER: CH. CLASS 180 PEAK DATA: 0.01 KM/H @ 0.72 MS, -66.14 KM/H @ 230.56 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS LEFT REAR SEAT X-AXIS DISPLACEMENT

TEST NUMBER: 950616

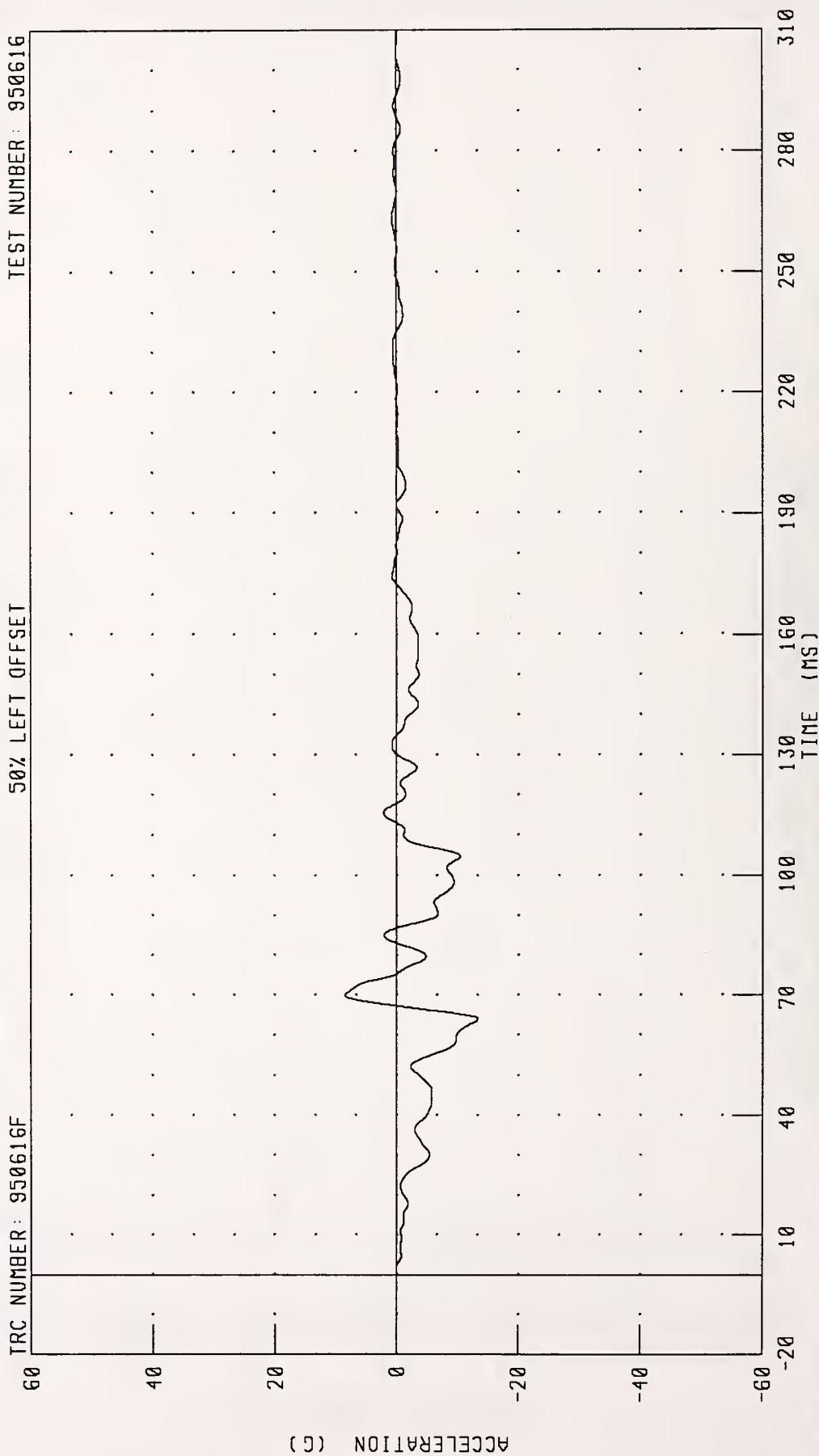
50% LEFT OFFSET

TRC INC.



CHANNEL TLRX02 FILTER CH CLASS 180 PEAK DATA 0 00 MM @ 1 04 MS, -3969 09 MM @ 310 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT REAR SEAT Y-AXIS ACCELERATION



CHANNEL: TLRYG2 FILTER: CH. CLASS 60

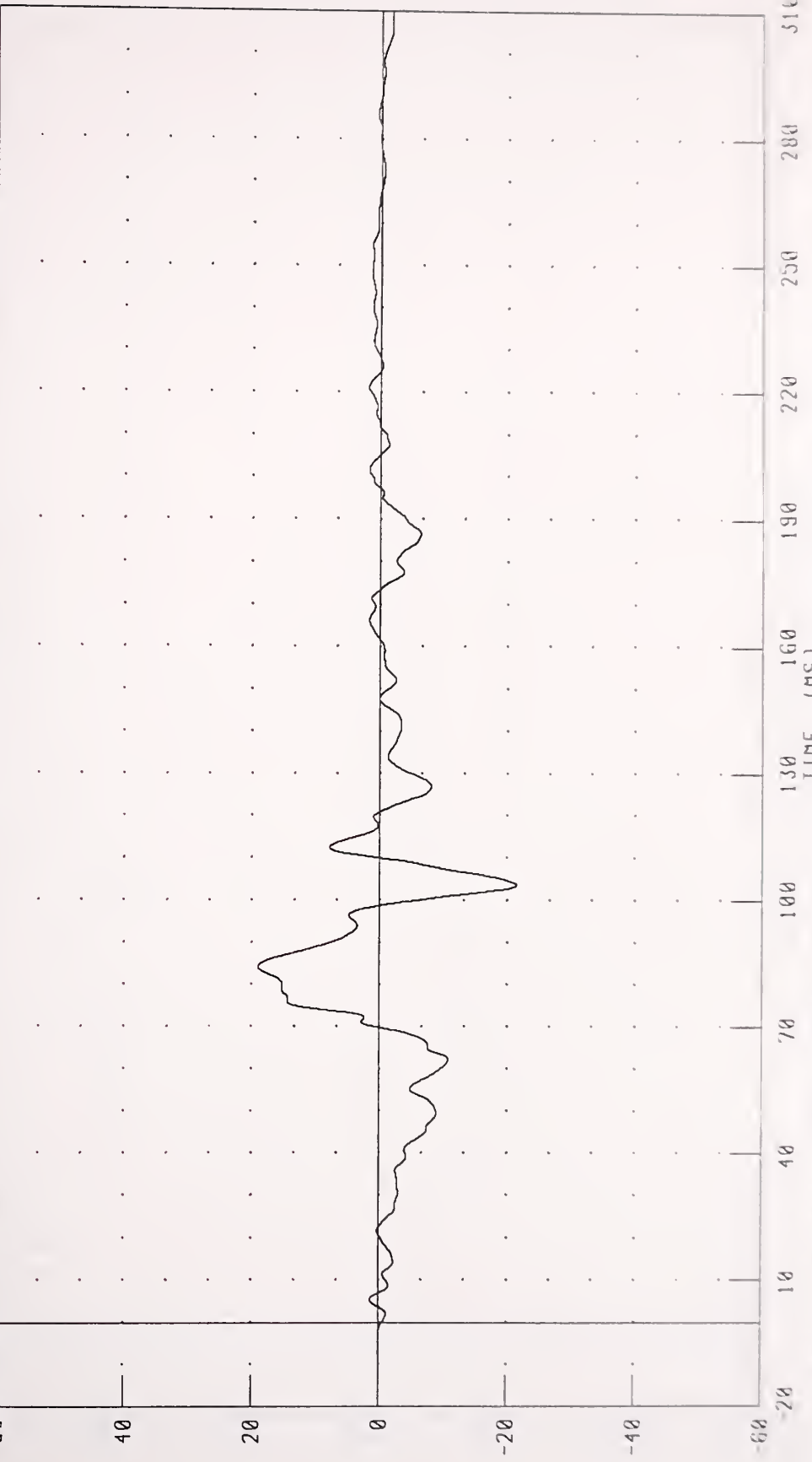
PEAK DATA: 8.43 G @ 69.92 MS, -13.34 G @ 64.08 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS LEFT REAR SEAT Z-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

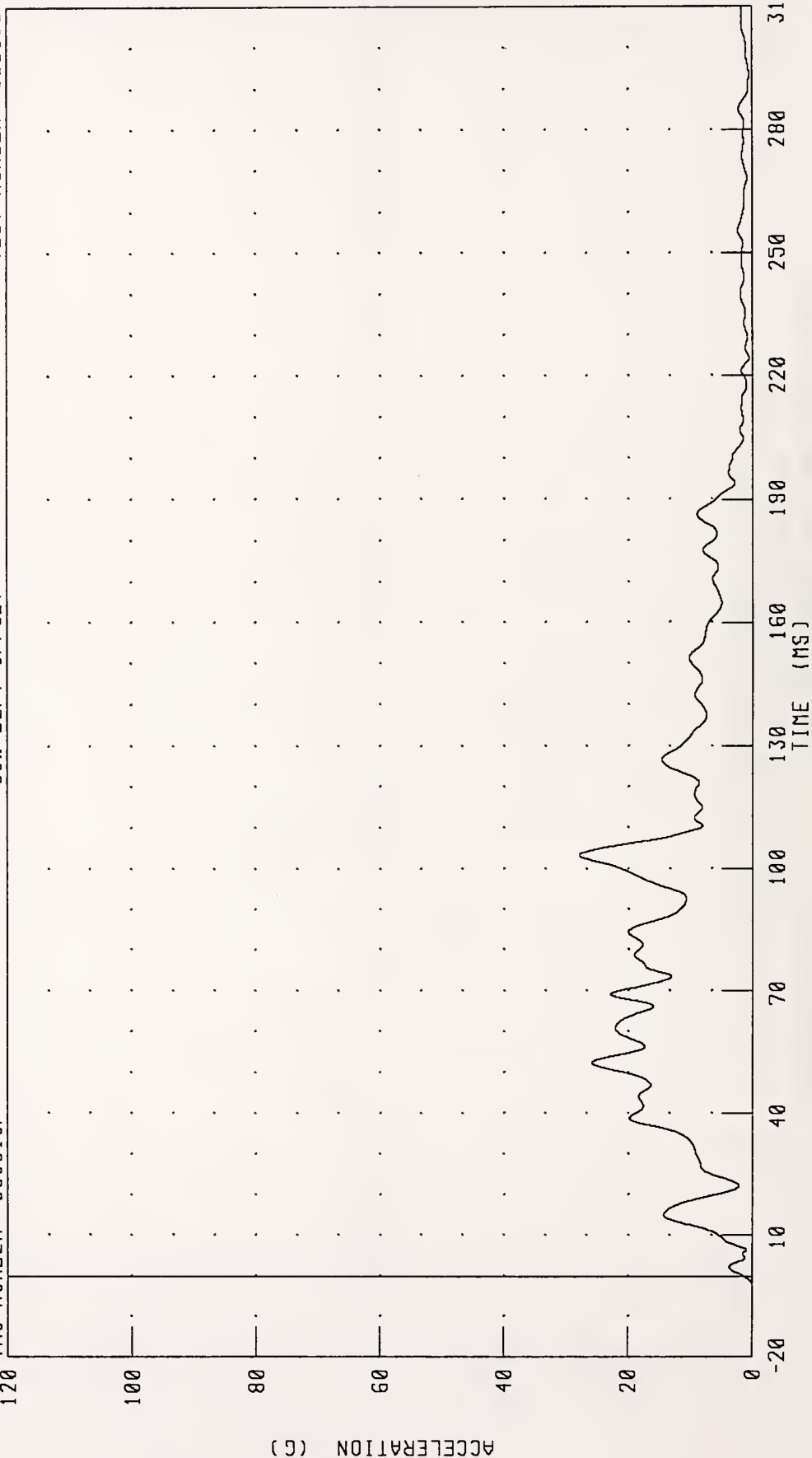
TRC INC.



CHANNEL 1LRZG2 FILTER CH CLASS 60 PEAK DATA 19 04 G @ 84 24 MS, -21 54 G @ 103 60 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
LEFT REAR SEAT RESULTANT ACCELERATION

TRC NUMBER: 950616F 50% LEFT OFFSET TEST NUMBER: 950616



CHANNEL: TLRRG2 FILTER: CH. CLASS 60

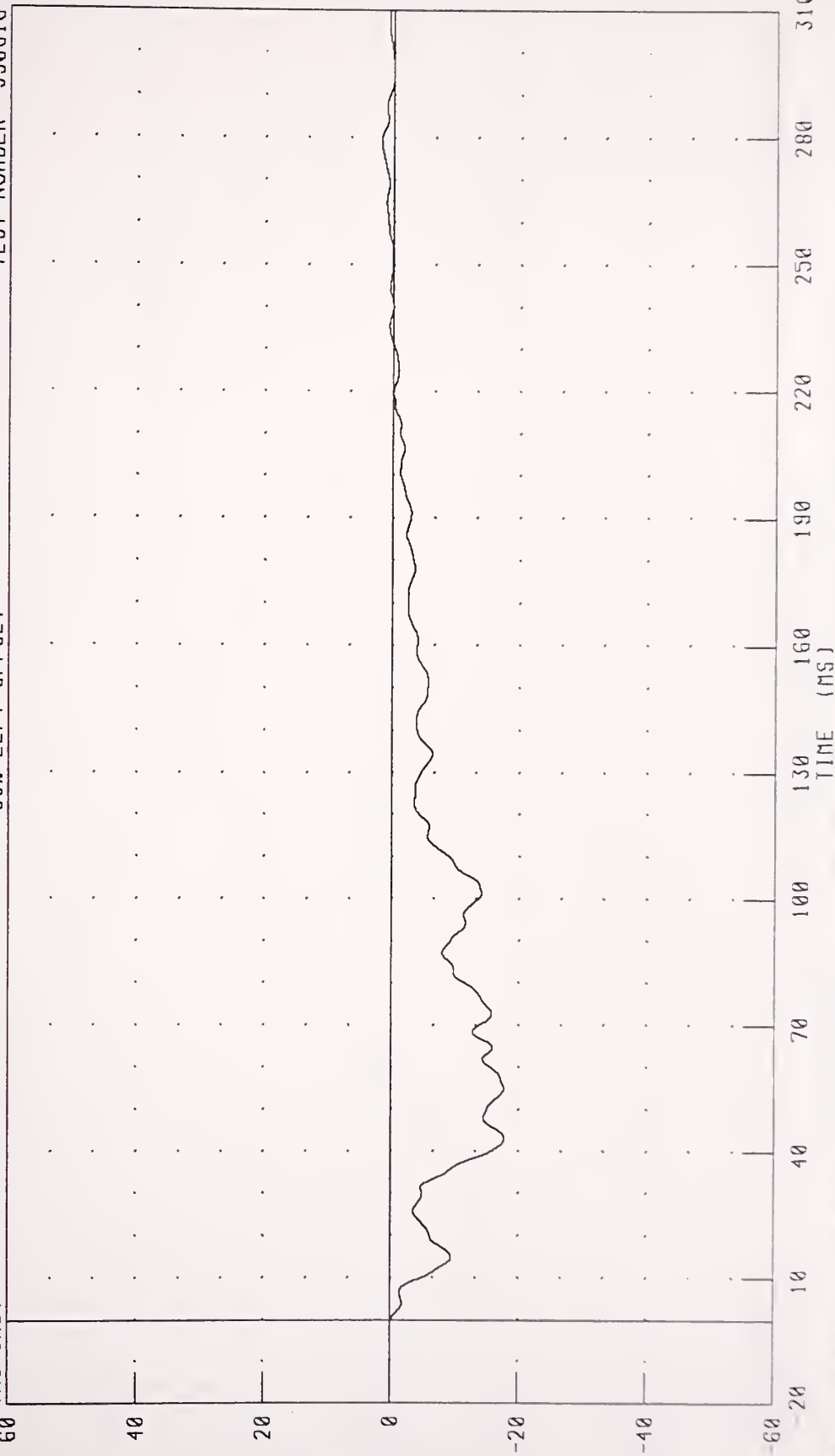
PEAK DATA: 27.88 G @ 103.28 MS, 0.01 G @ -11.44 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS RIGHT REAR SEAT X-AXIS ACCELERATION

50% LEFT OFFSET

TEST NUMBER 950616

TRC INC.



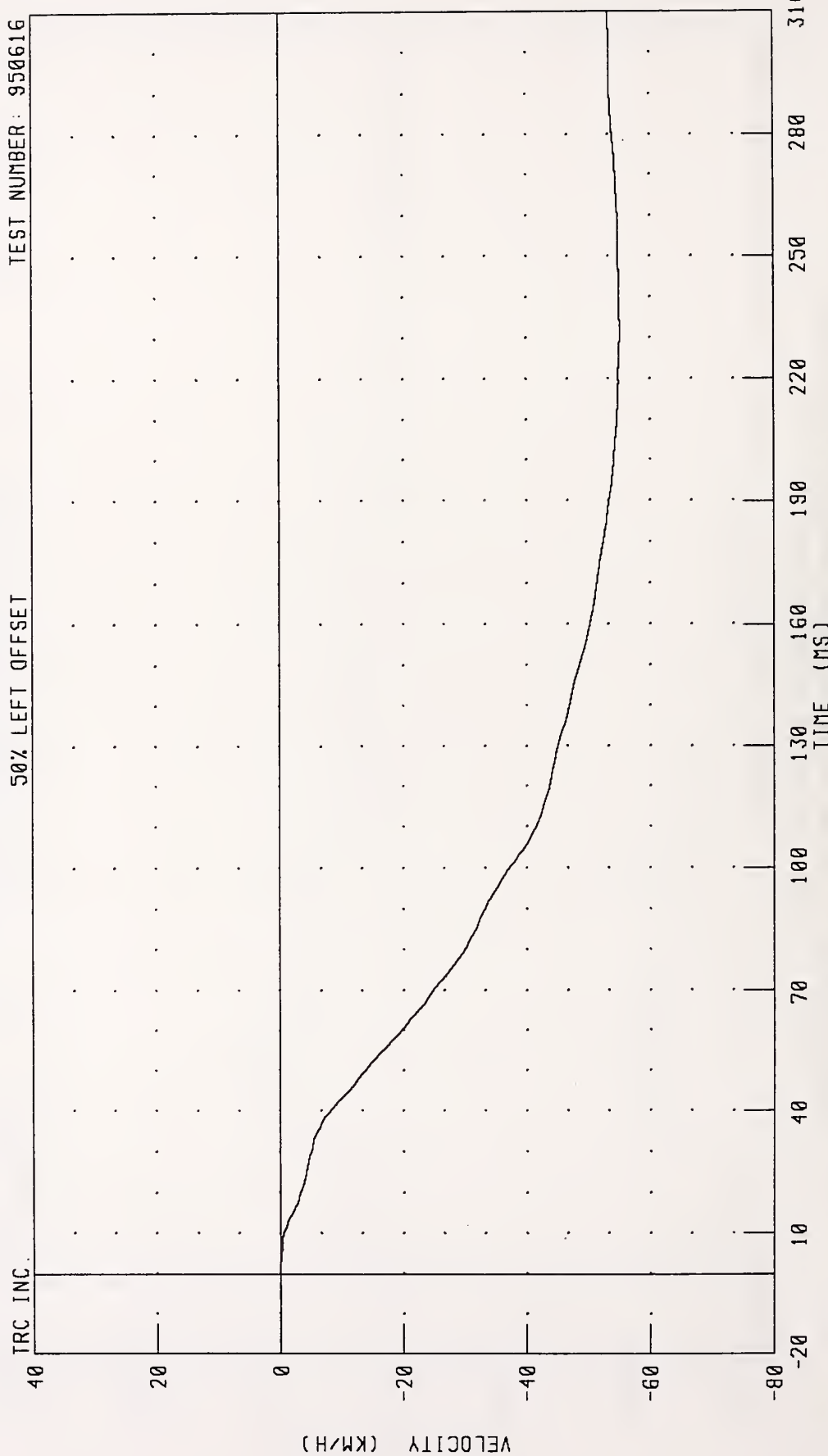
CHANNEL TRRXG2 FILTER CH CLASS 60

PEAK DATA 1 94 G @ 279 12 MS, -17 83 G @ 43 12 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT REAR SEAT X-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: TRRXV2 FILTER: CH. CLASS 180

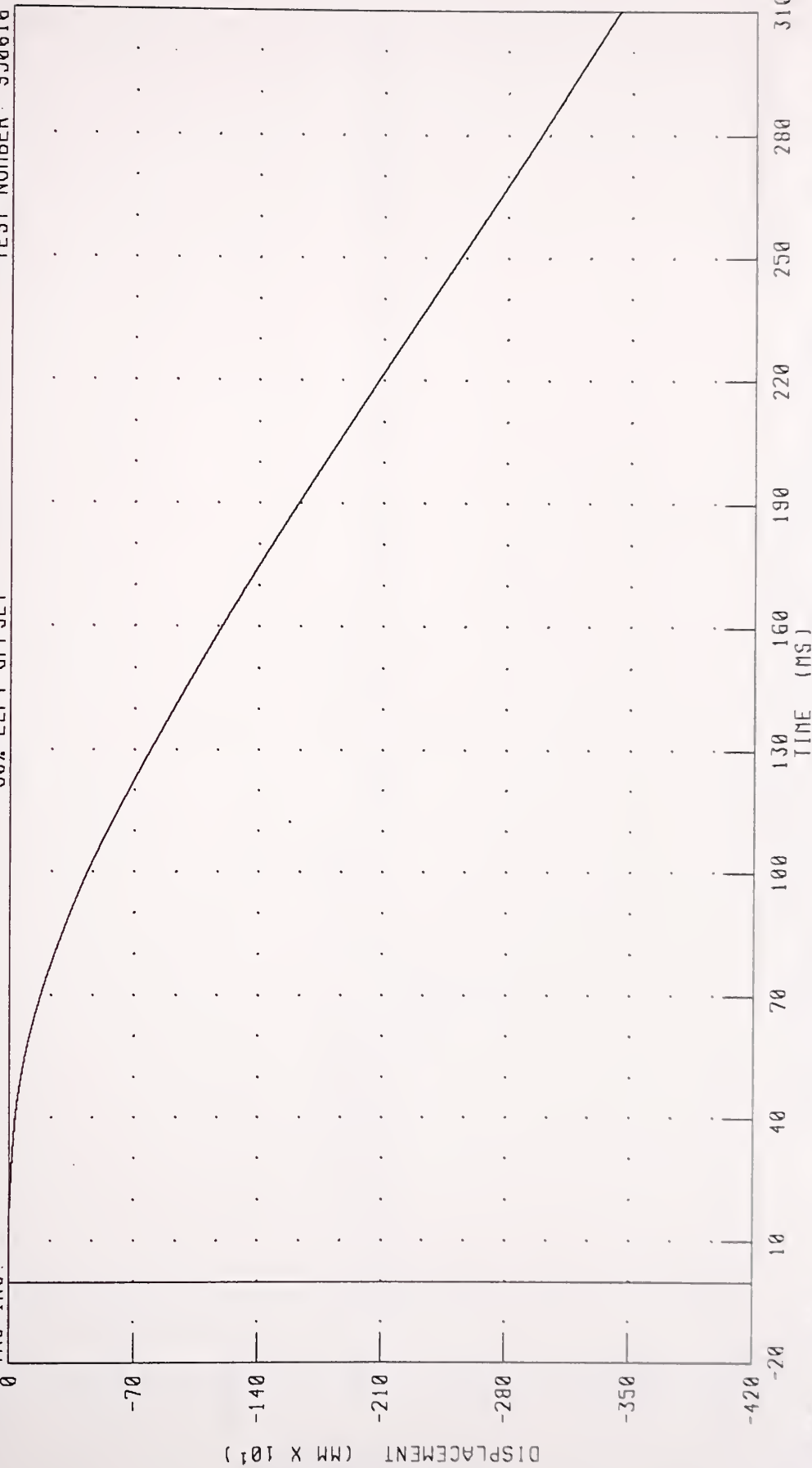
PEAK DATA: 0.00 KM/H @ 1.68 MS; -55.17 KM/H @ 230.72 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS RIGHT REAR SEAT X-AXIS DISPLACEMENT

50% LEFT OFFSET

TEST NUMBER: 950616

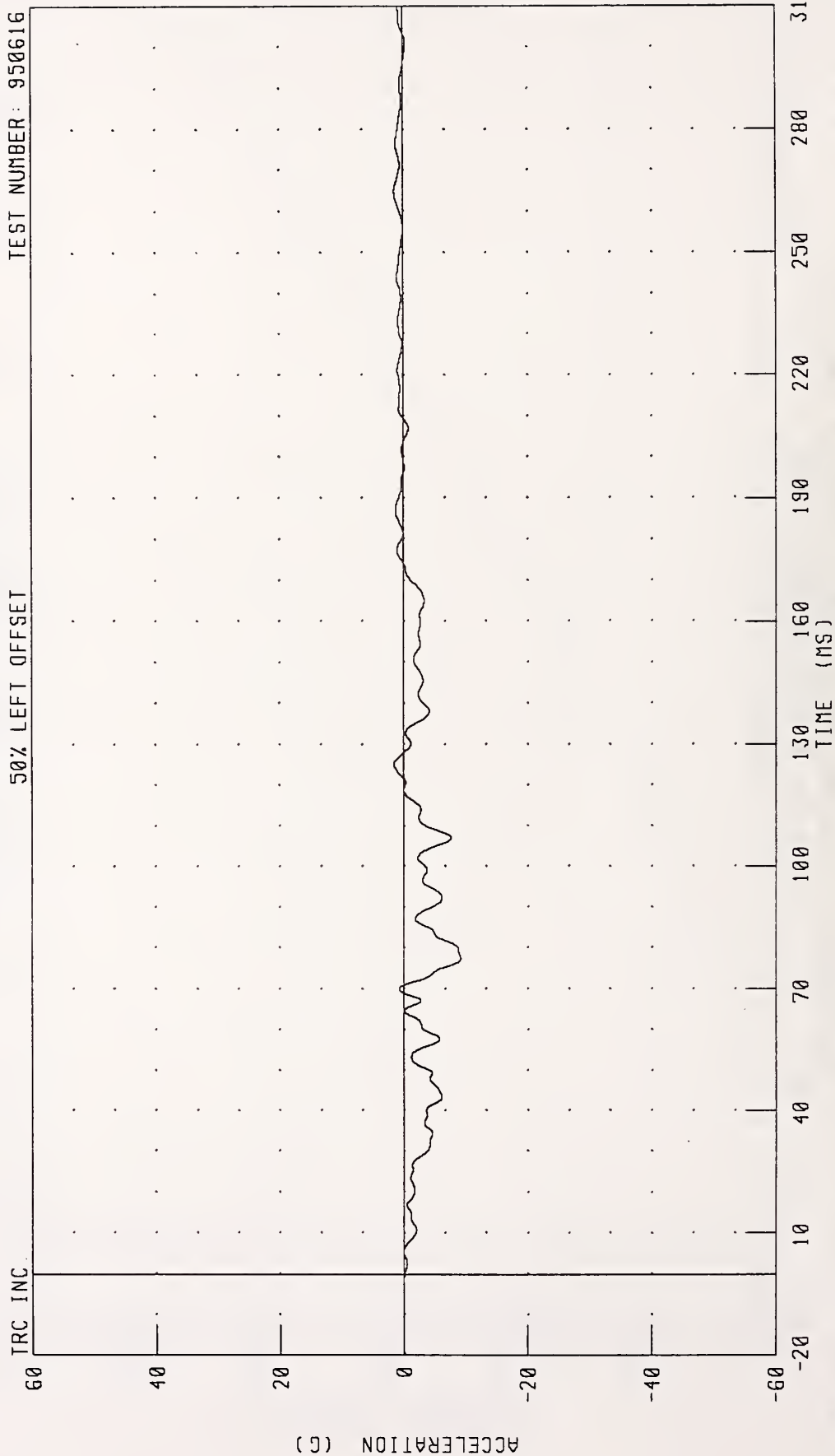
TRC INC.



CHANNEL TBRXD2 FILTER CH CLASS 180

PEAK DATA 0 00 MM @ 2 08 MS, -3431 20 MM @ 310 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT REAR SEAT Y-AXIS ACCELERATION



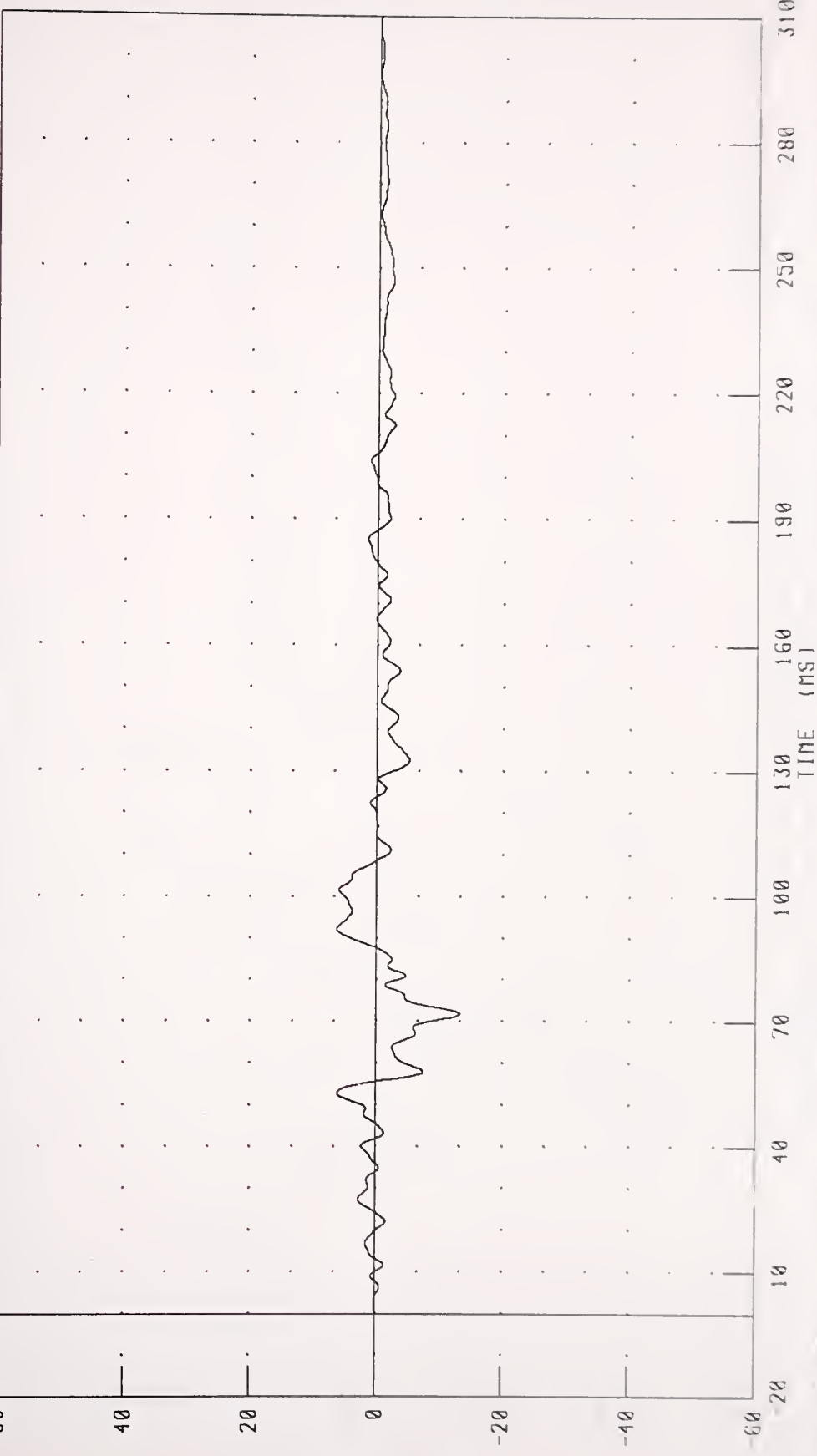
PEAK DATA: 1.60 G @ 125 12 MS, -9 22 G @ 77 36 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS RIGHT REAR SEAT Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC

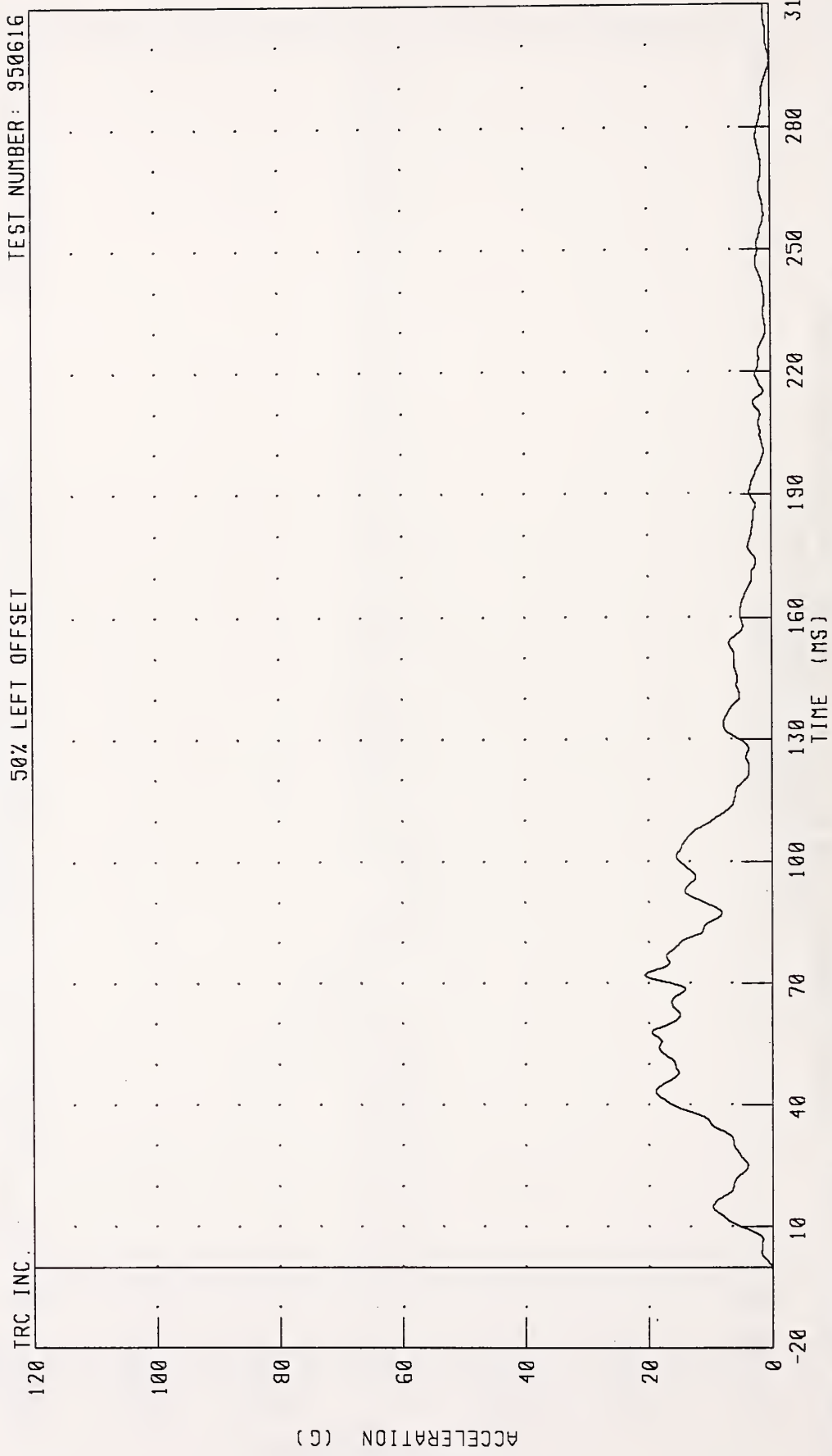


CHANNEL TRR2G2 FILTER CH CLASS 60 PEAK DATA 6 30 G @ 92 16 MS, -13 28 G @ 71 84 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
RIGHT REAR SEAT RESULTANT ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: TRRRG2 FILTER: CH CLASS 60

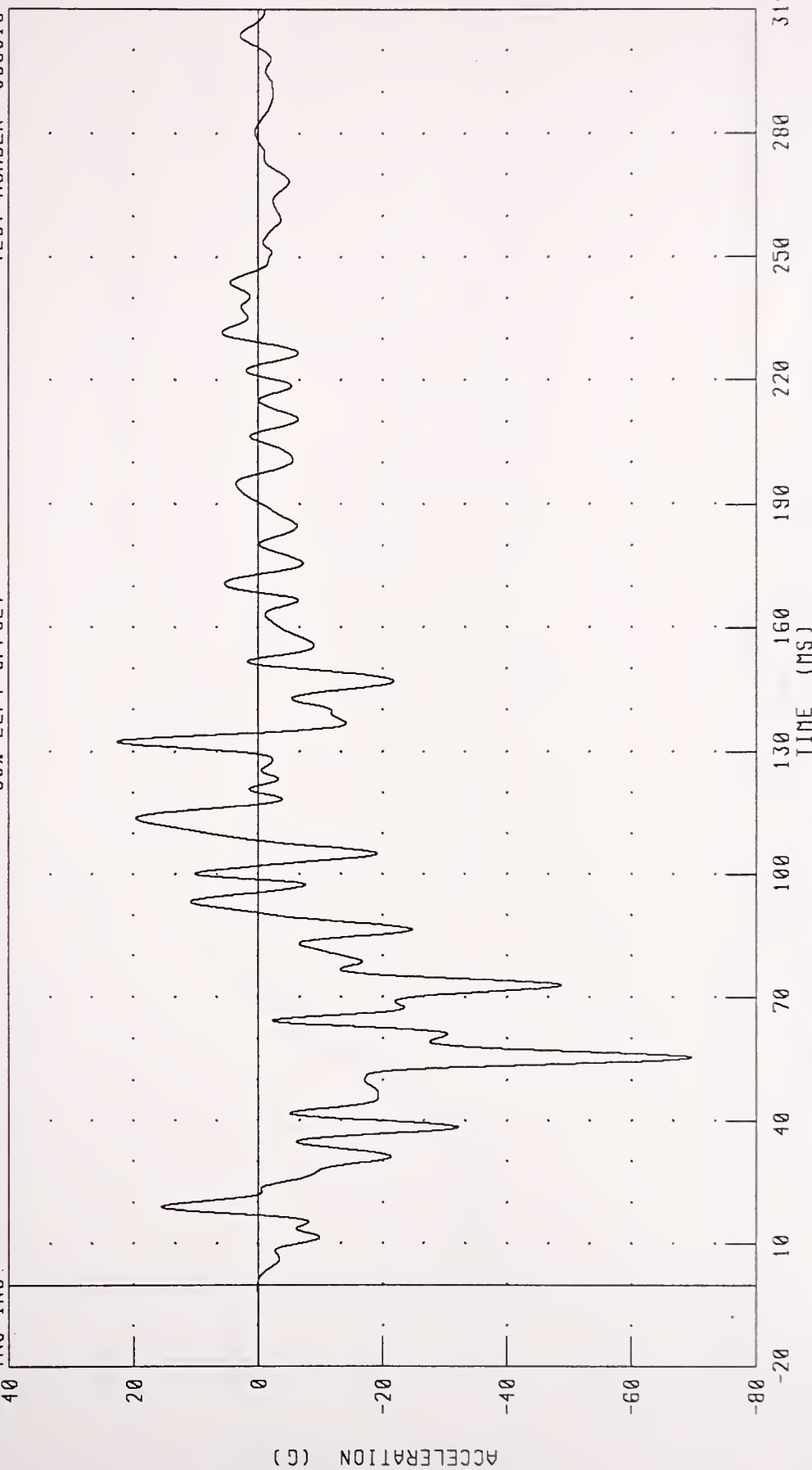
PEAK DATA: 20.64 G @ 72.00 MS; 0.01 G @ -10.00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



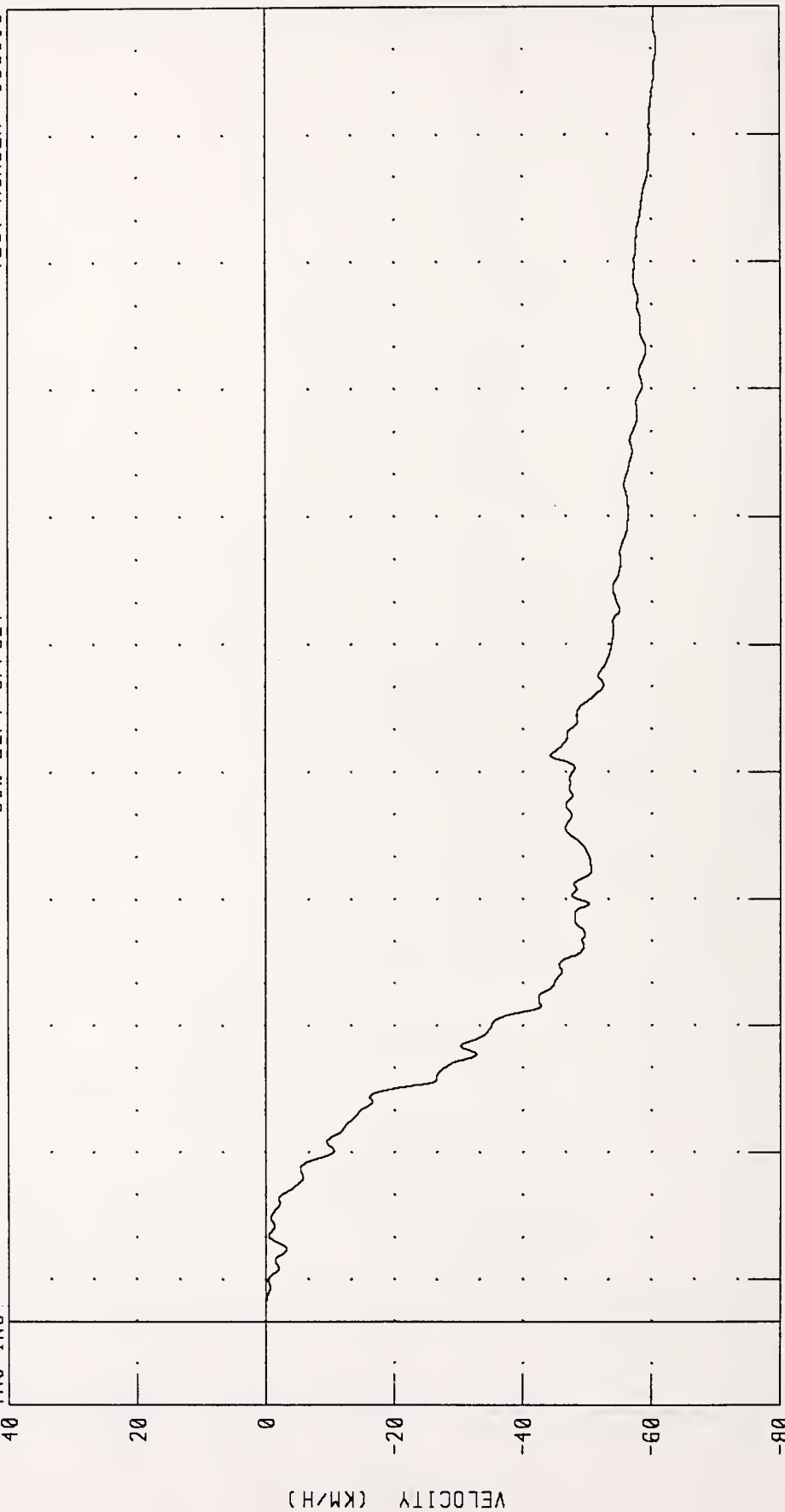
CHANNEL OPCXG2 FILTER CH CLASS 60 PEAK DATA: 22 60 G @ 132 48 MS, -69 59 G @ 55 60 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
INSTRUMENT PANEL CENTER X-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



CHANNEL: OPCXV2 FILTER: CH. CLASS 180

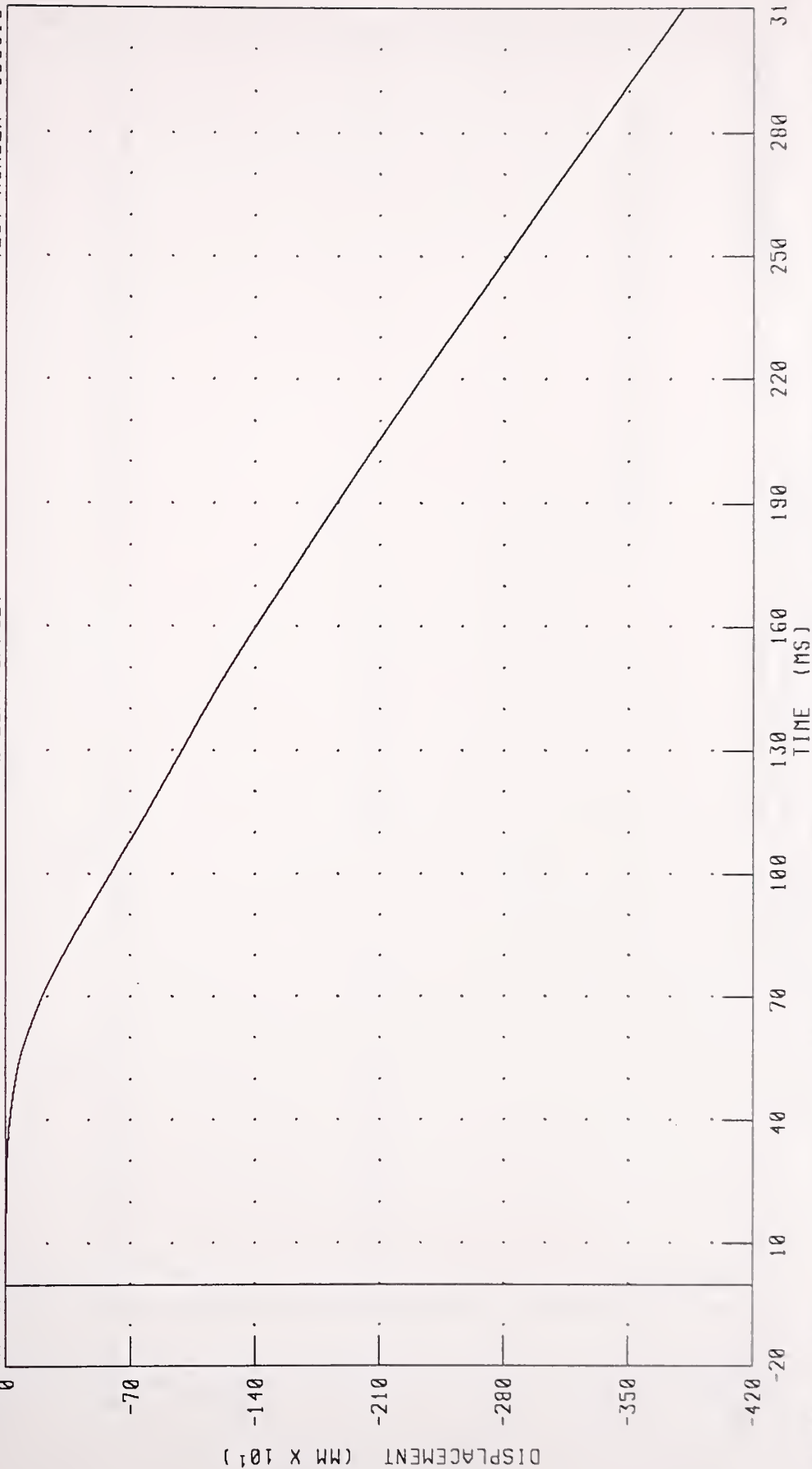
PEAK DATA: 0.00 KM/H @ 0.16 MS, -60.80 KM/H @ 301.68 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
INSTRUMENT PANEL CENTER X-AXIS DISPLACEMENT

50% LEFT OFFSET

TEST NUMBER: 950616

TRC INC.



CHANNEL OPCX02 FILTER CH CLASS 180

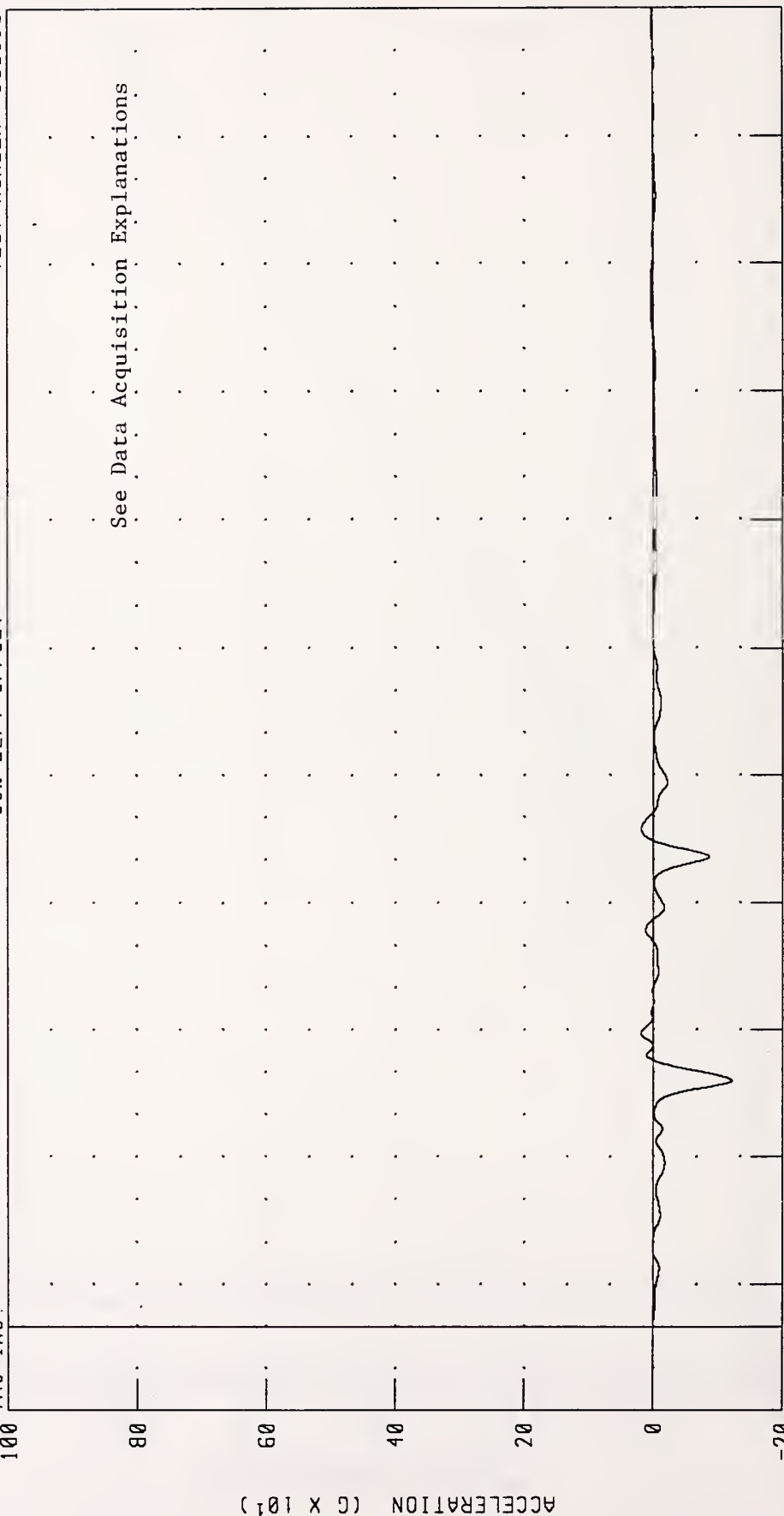
PEAK DATA 0 00 NM @ 0 24 MS; -3806 08 MM @ 310 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS STEERING WHEEL HUB X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

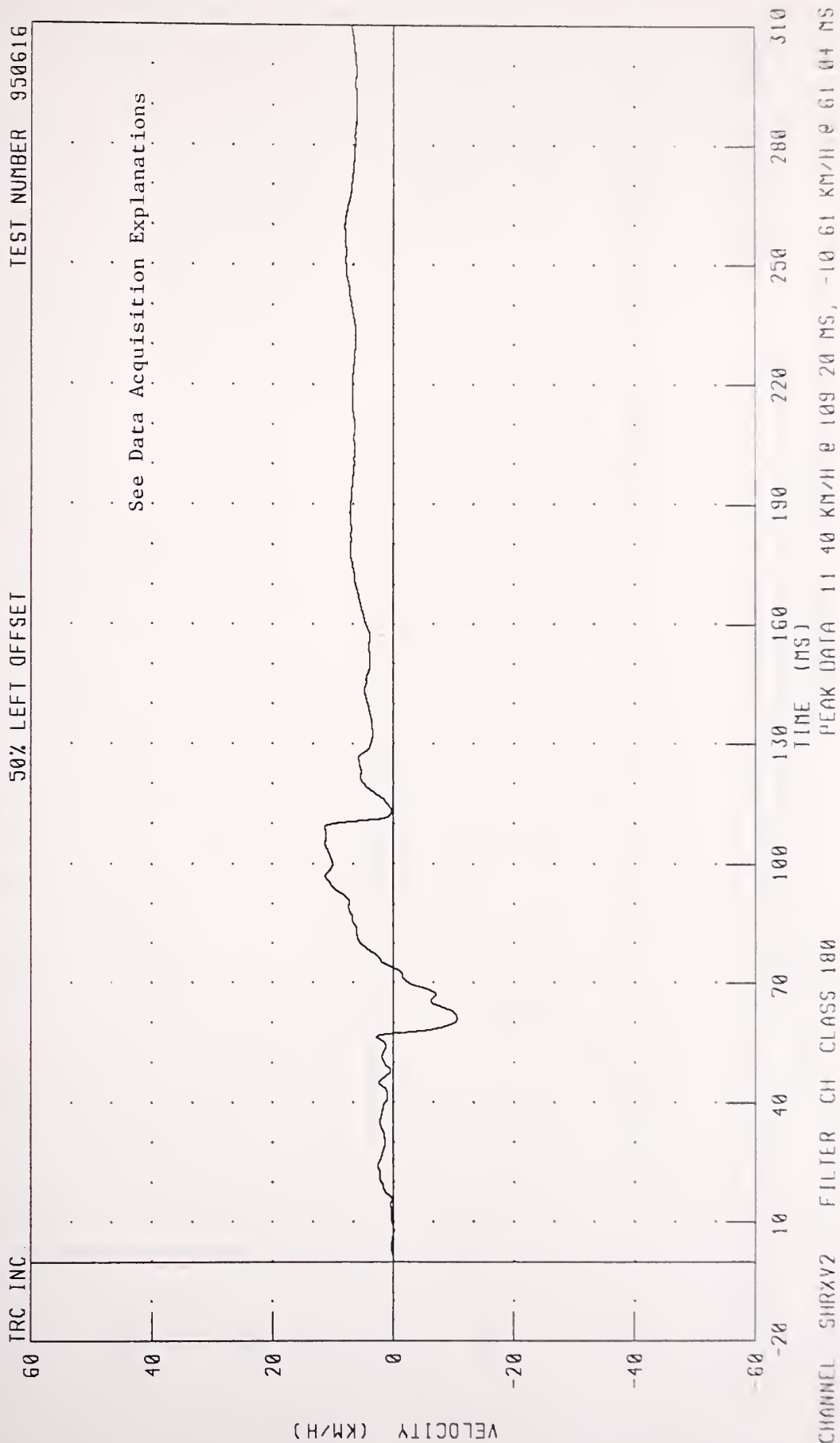
TRC INC.



CHANNEL: SH1XG2 FILTER: CH CLASS 60

PEAK DATA: 19.20 G @ 69.20 MS, -120.60 G @ 57.92 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS STEERING COLUMN X-AXIS VELOCITY RELATIVE TO VEHICLE

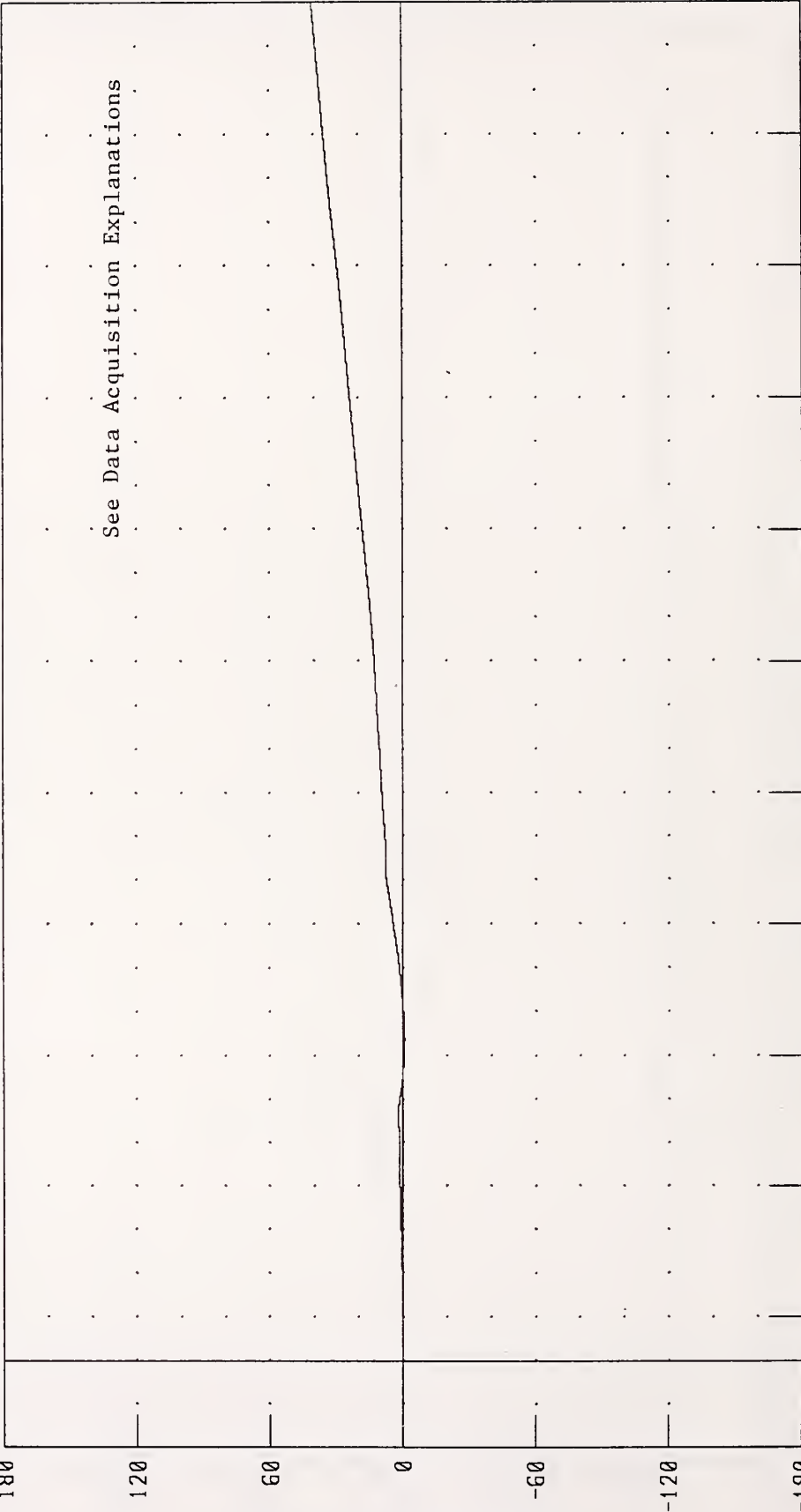


HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS STEERING COLUMN X-AXIS DISPLACEMENT RELATIVE TO VEHICLE

TEST NUMBER 950616

50% LEFT OFFSET

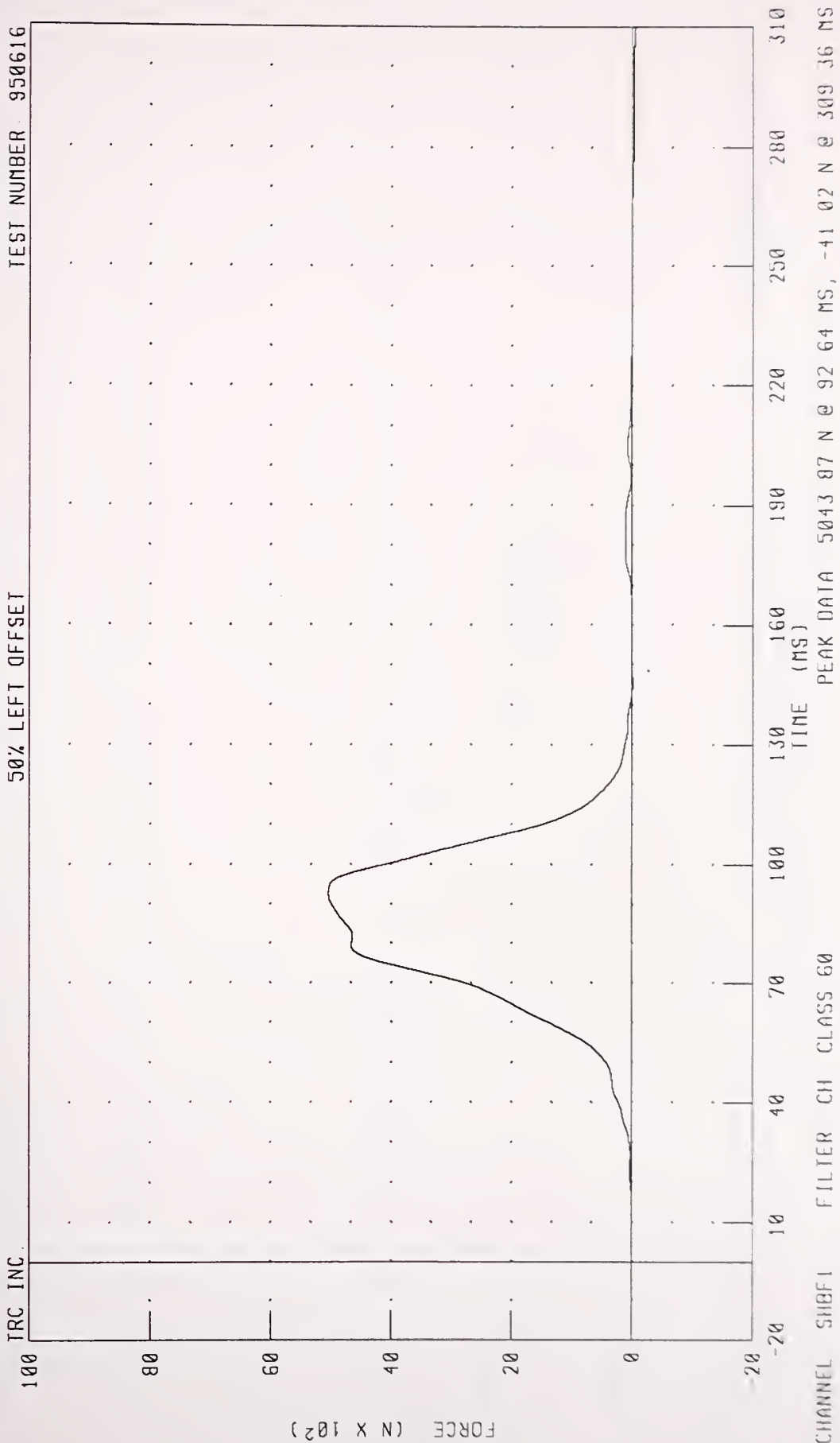
TRC INC.



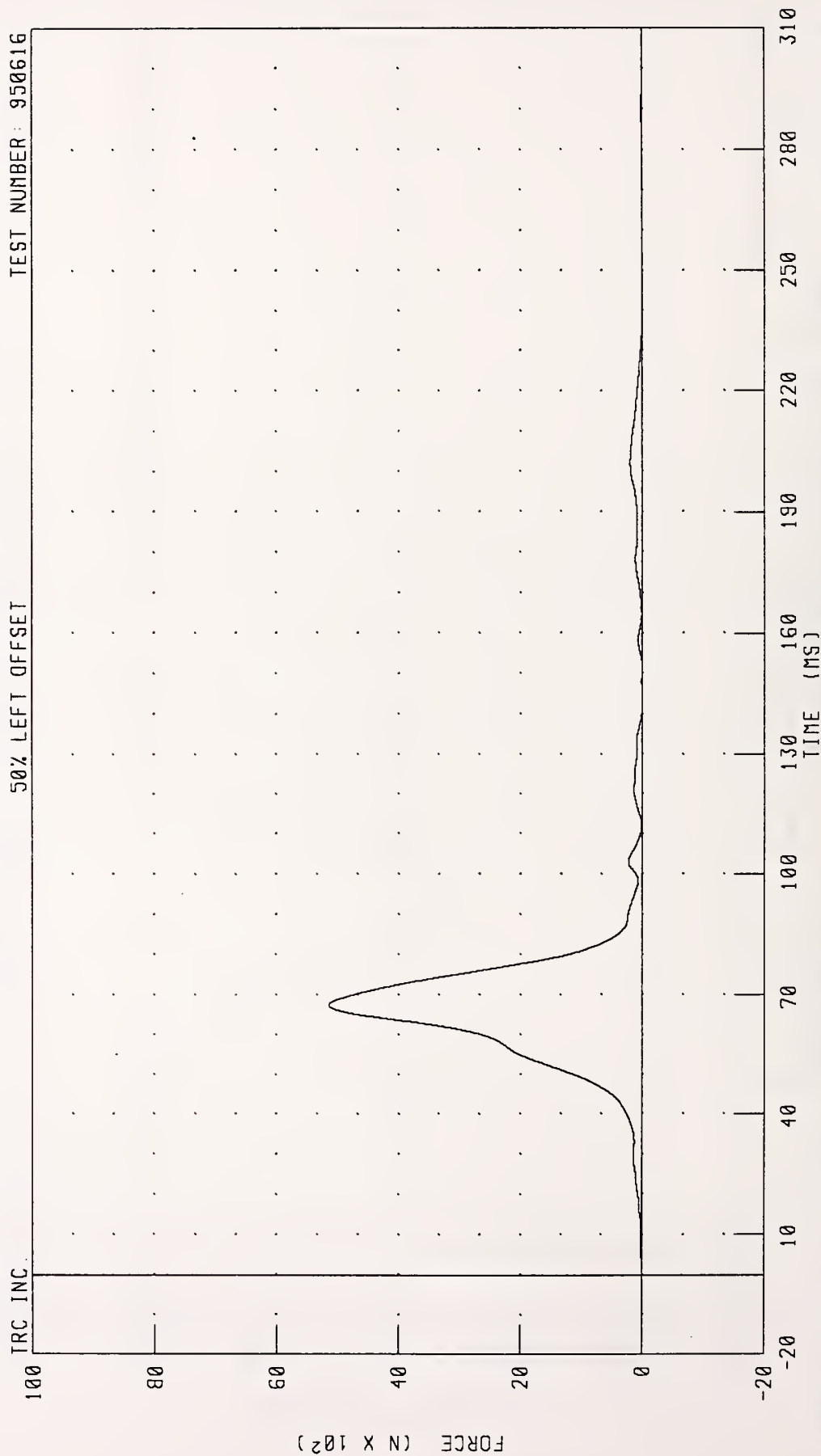
CHANNEL: SHRXD2 FILTER: CH CLASS 180

PEAK DATA: 407.71 MM @ 310.00 MS, -7.33 MM @ 73.84 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER SHOULDER BELT FORCE



HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
DRIVER LAP BELT OUTBOARD FORCE

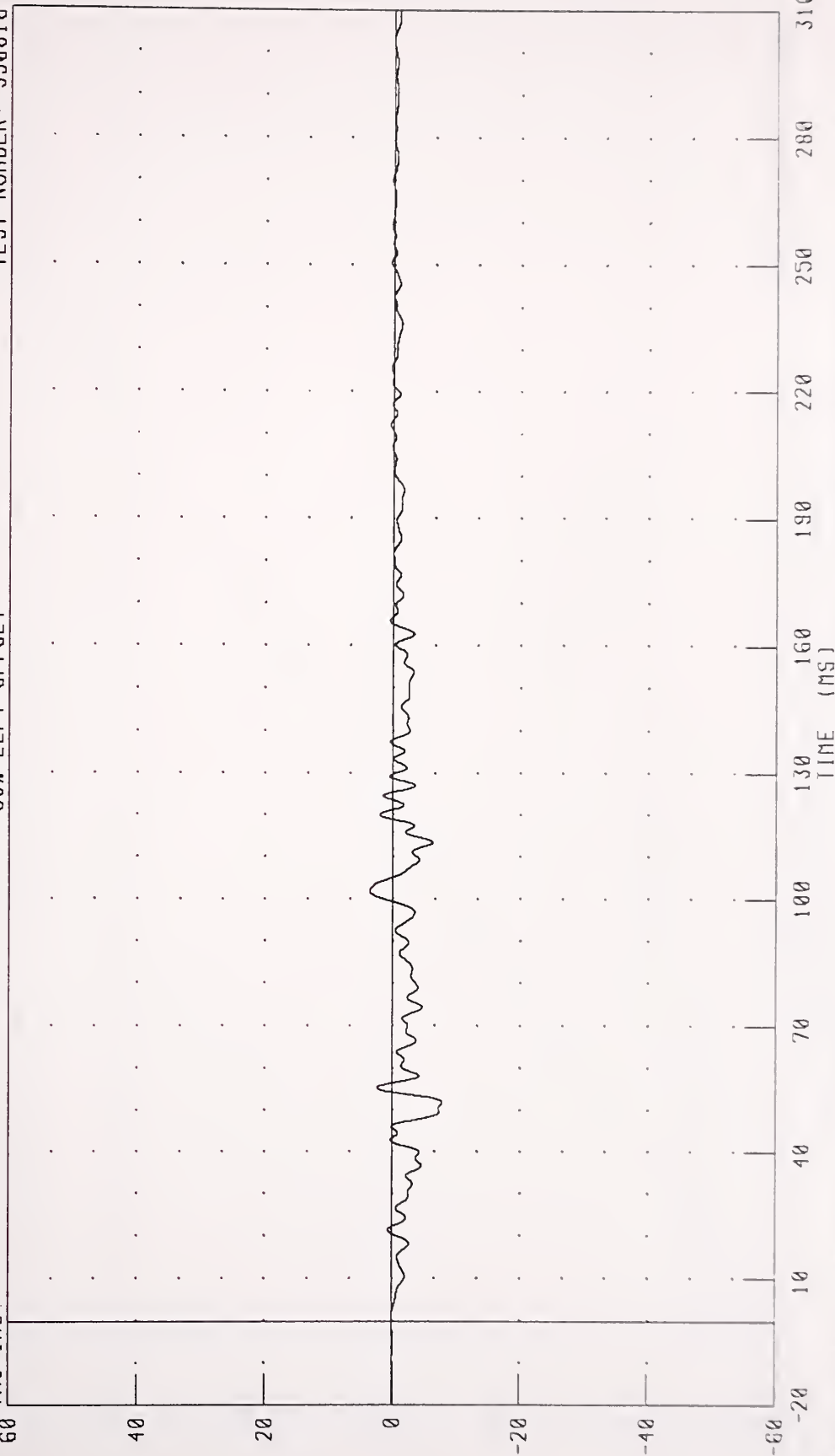


HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER 950616

50% LEFT OFFSET

TRC INC



CHANNEL VCCXG1 FILTER CH CLASS 60

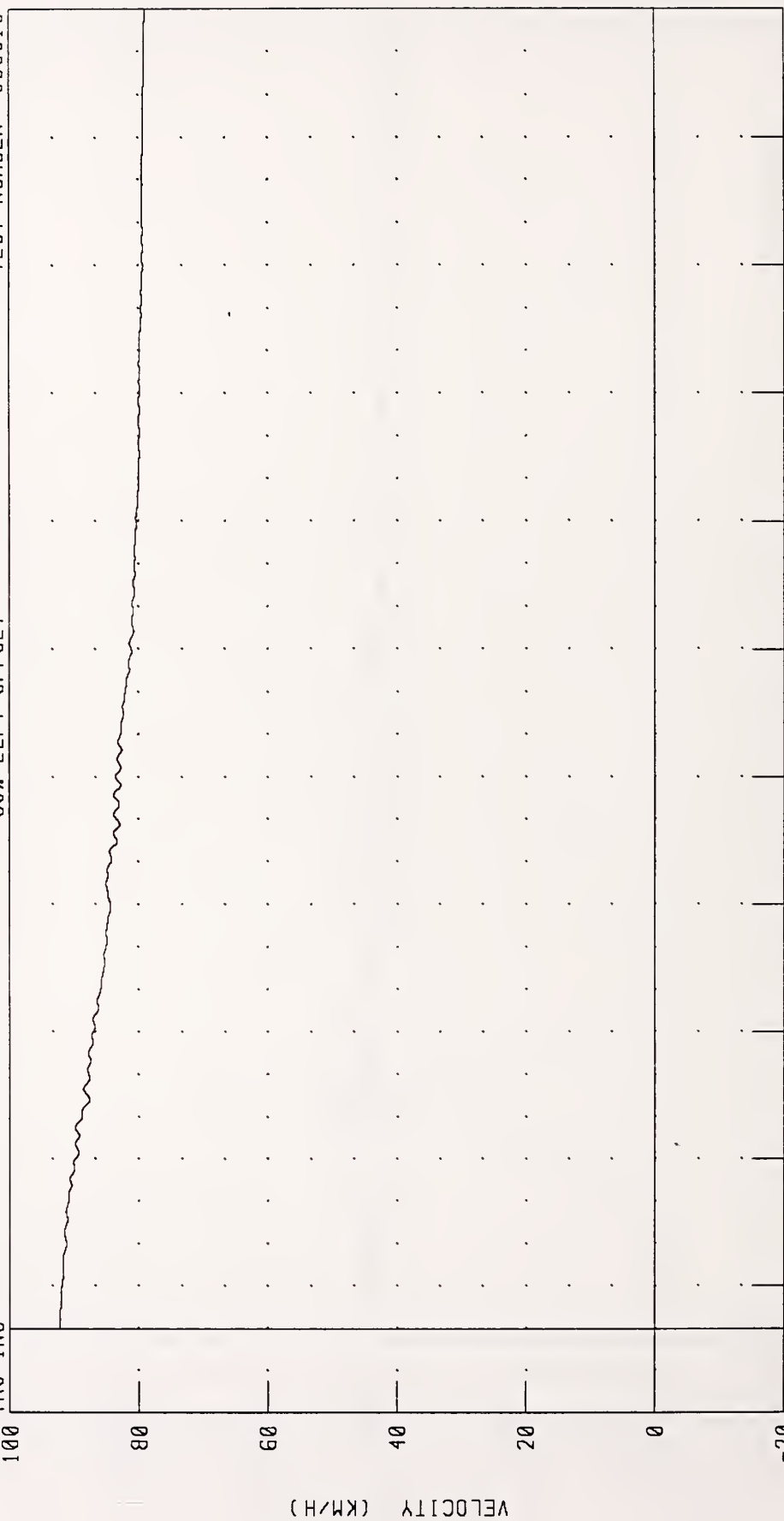
PEAK DATA 3 56 G @ 102 00 MS, -7 79 G @ 51 84 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY X-AXIS VELOCITY

TEST NUMBER: 950616

50% LEFT OFFSET

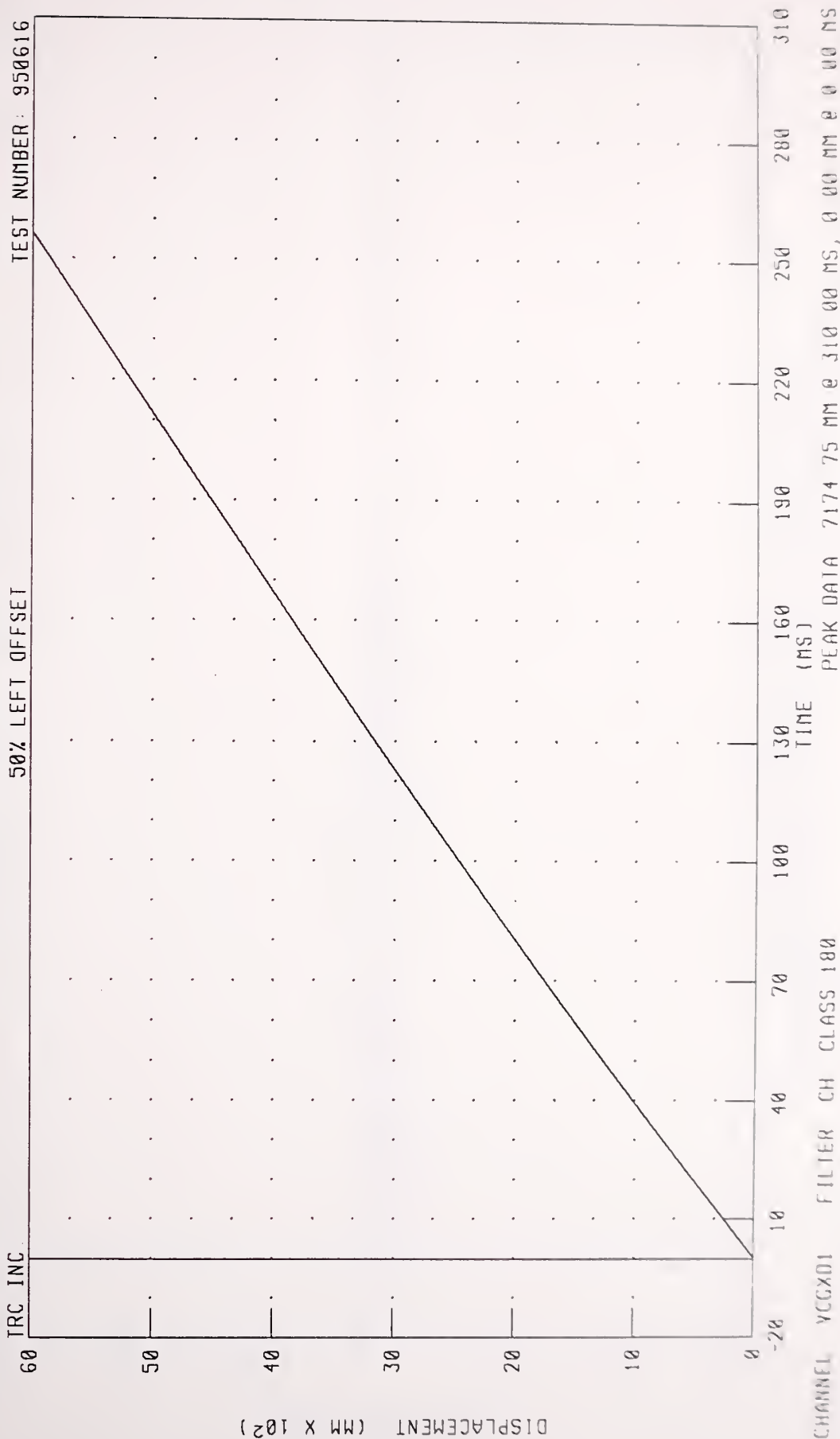
TRC INC



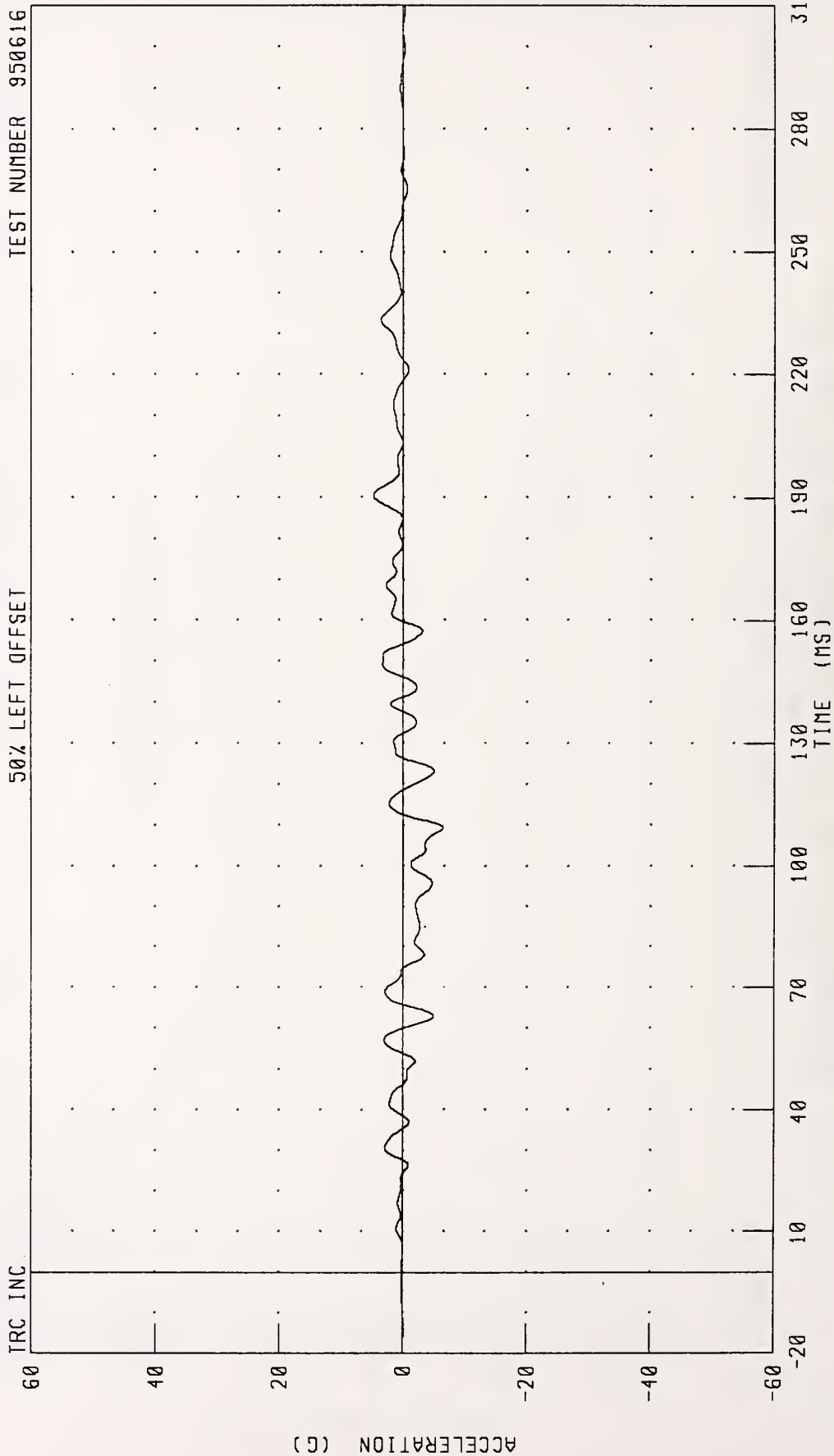
CHANNEL: VCGXV1 FILTER: CH CLASS 180

PEAK DATA: 92 10 KM/H @ 3 36 MS, 78 97 KM/H @ 308 88 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY X-AXIS DISPLACEMENT



HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY Y-AXIS ACCELERATION



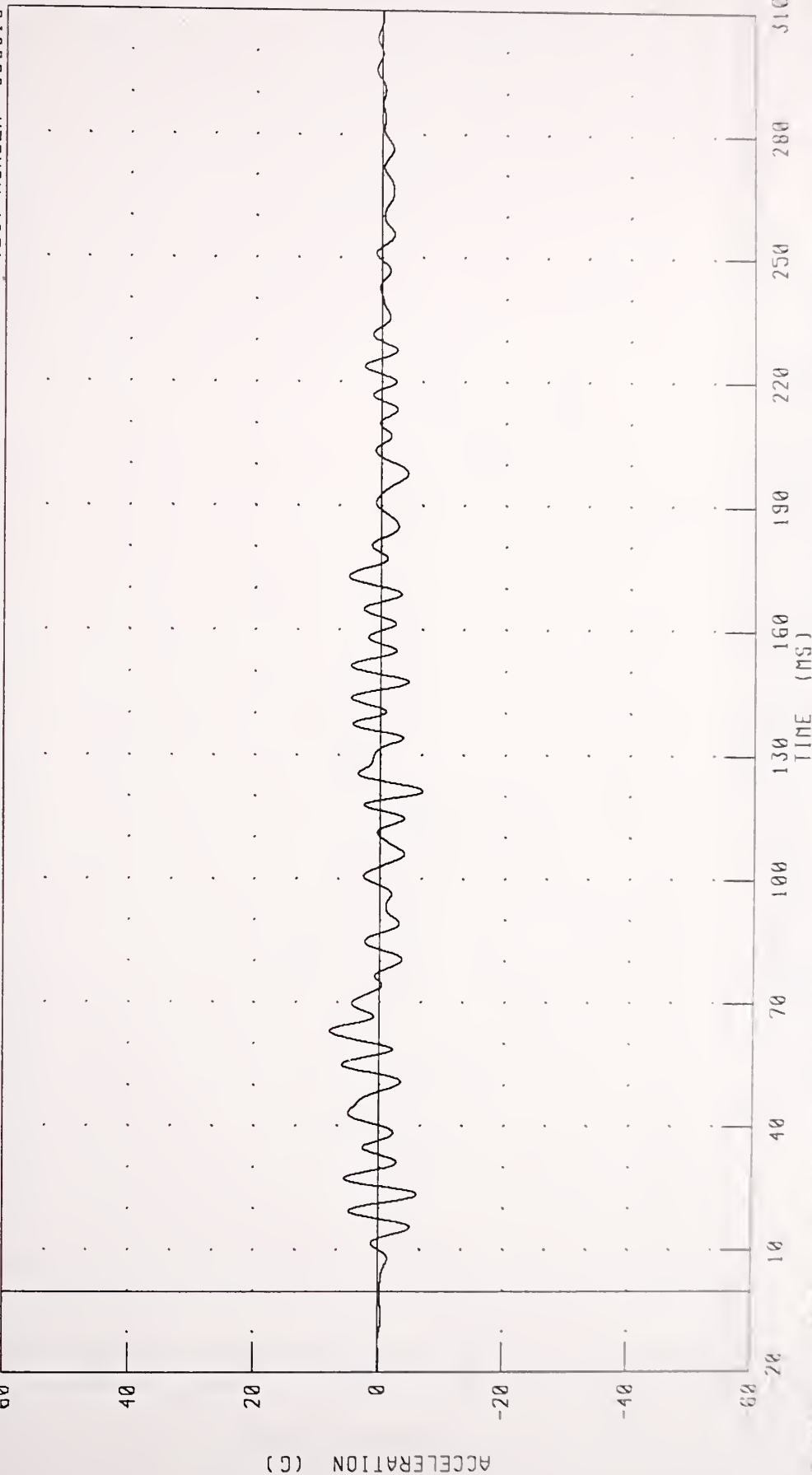
CHANNEL: VCCYG1 FILTER: CH. CLASS 60

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.

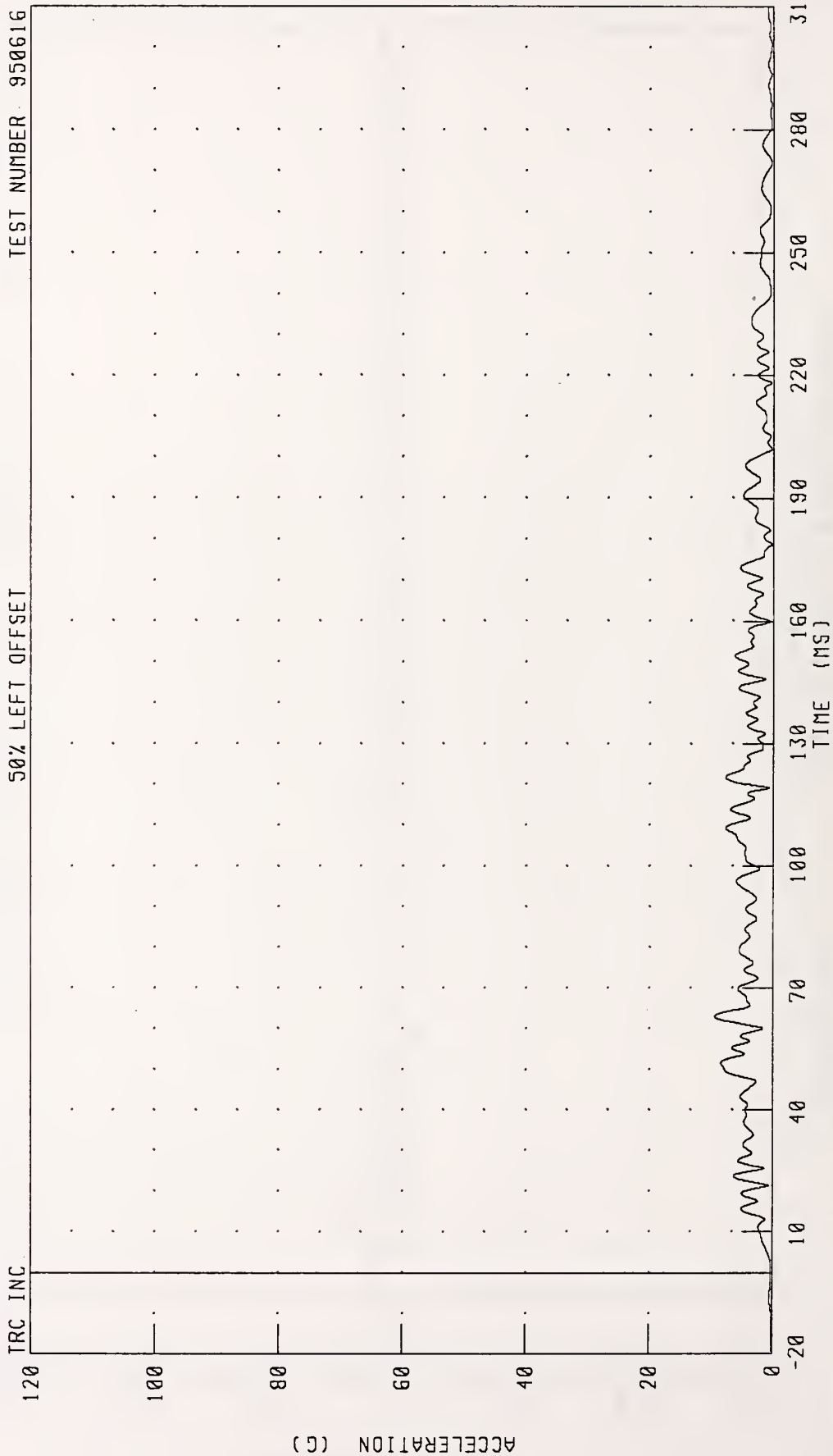


CHANNEL VCCZC1 FILTER CH CLASS 60

TIME (MS)

PEAK DATA 8 00 G @ 63 12 MS, 6 82 G @ 121 36 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK CENTER OF GRAVITY RESULTANT ACCELERATION



CHANNEL: VCGRG1 FILTER: CH CLASS 60

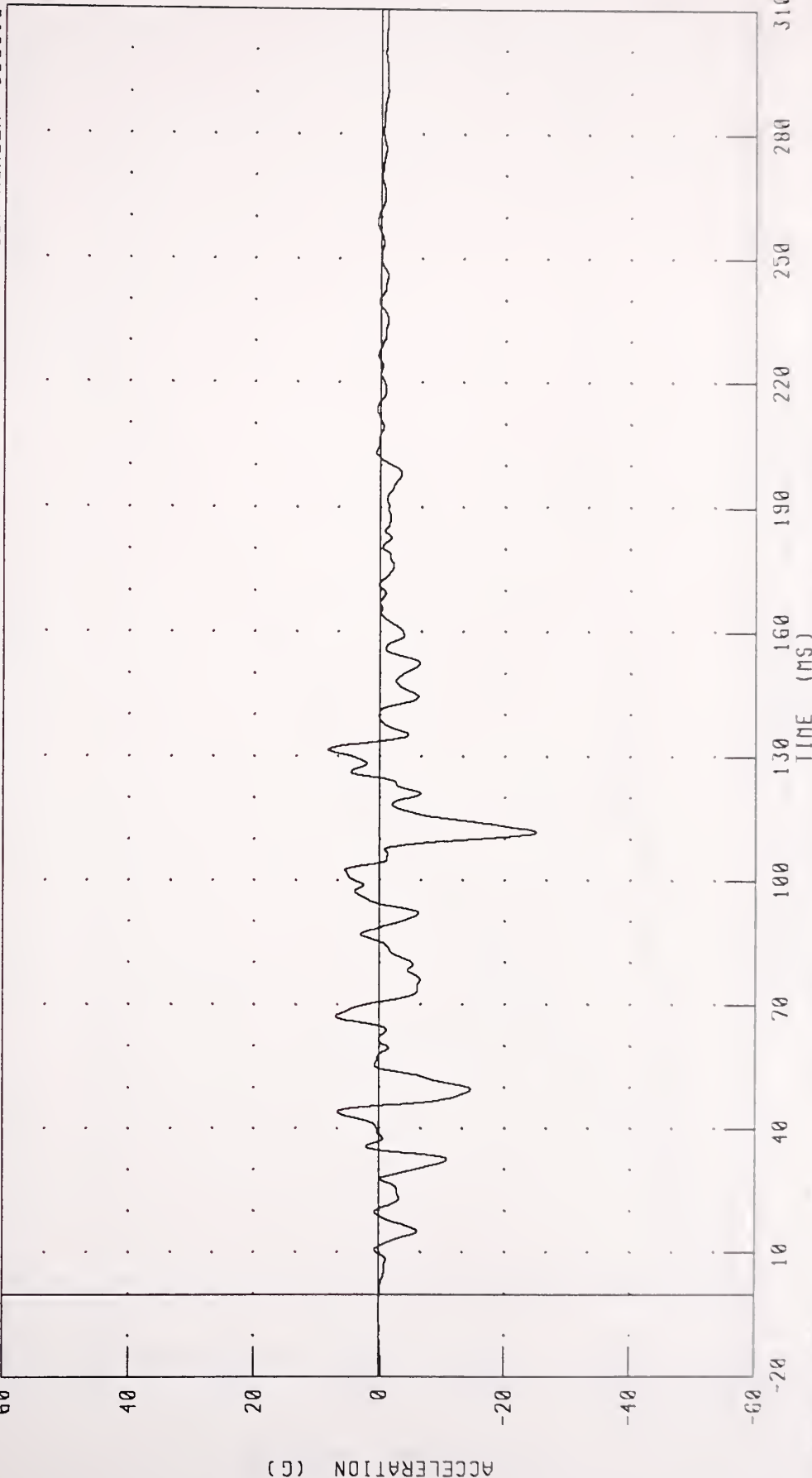
PEAK DATA: 9 48 G @ 63 04 MS, 0 05 G @ -20 00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
TRUCK FRONT FRAME CROSSMEMBER X-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

TRC INC.



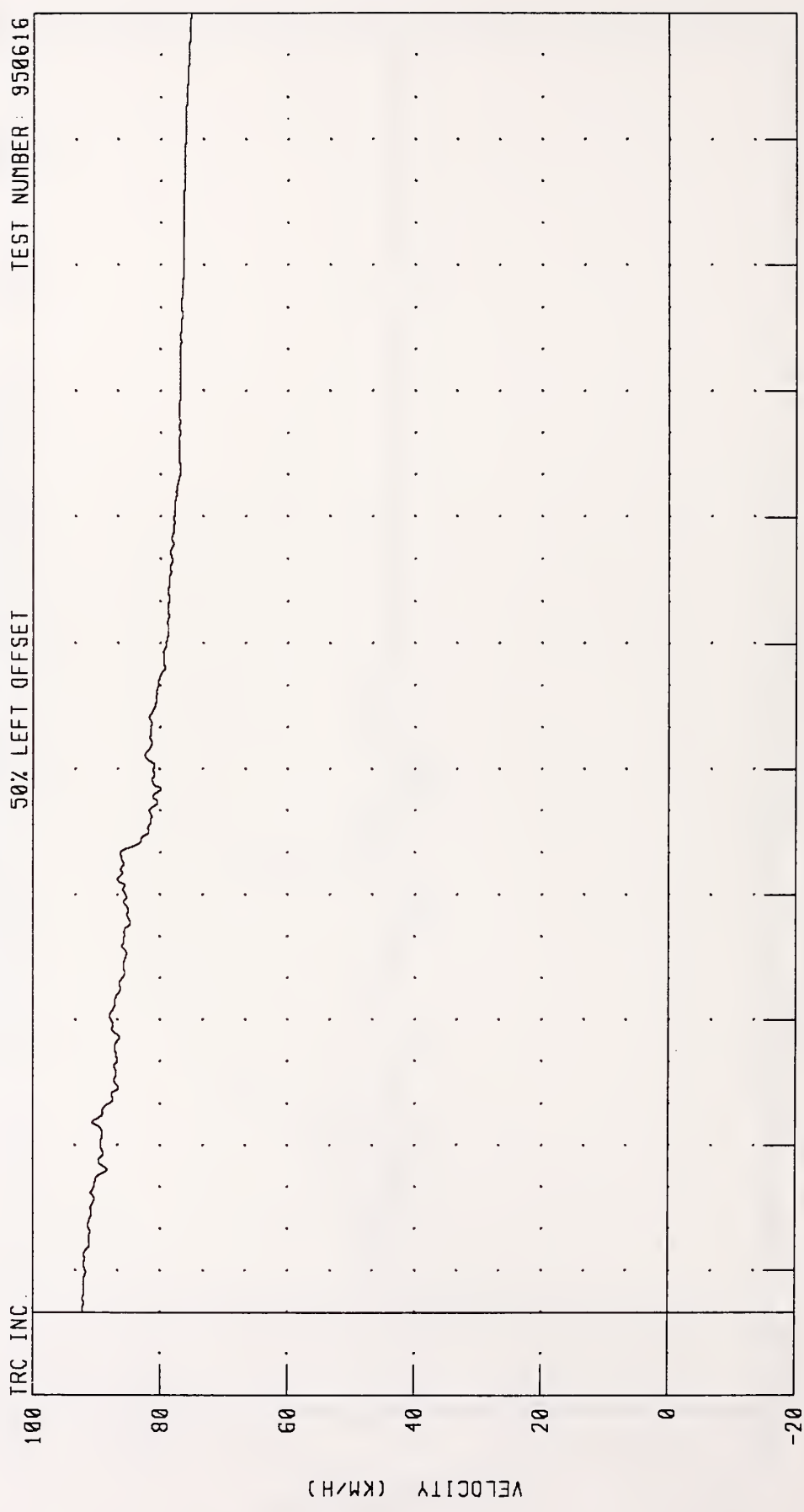
CHANNEL FFCXG1 FILTER CH CLASS 60

PEAK DATA 8 25 G @ 131 68 MS, -25 05 G @ 111 76 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK FRONT FRAME CROSSMEMBER Z-AXIS VELOCITY

TEST NUMBER: 950616

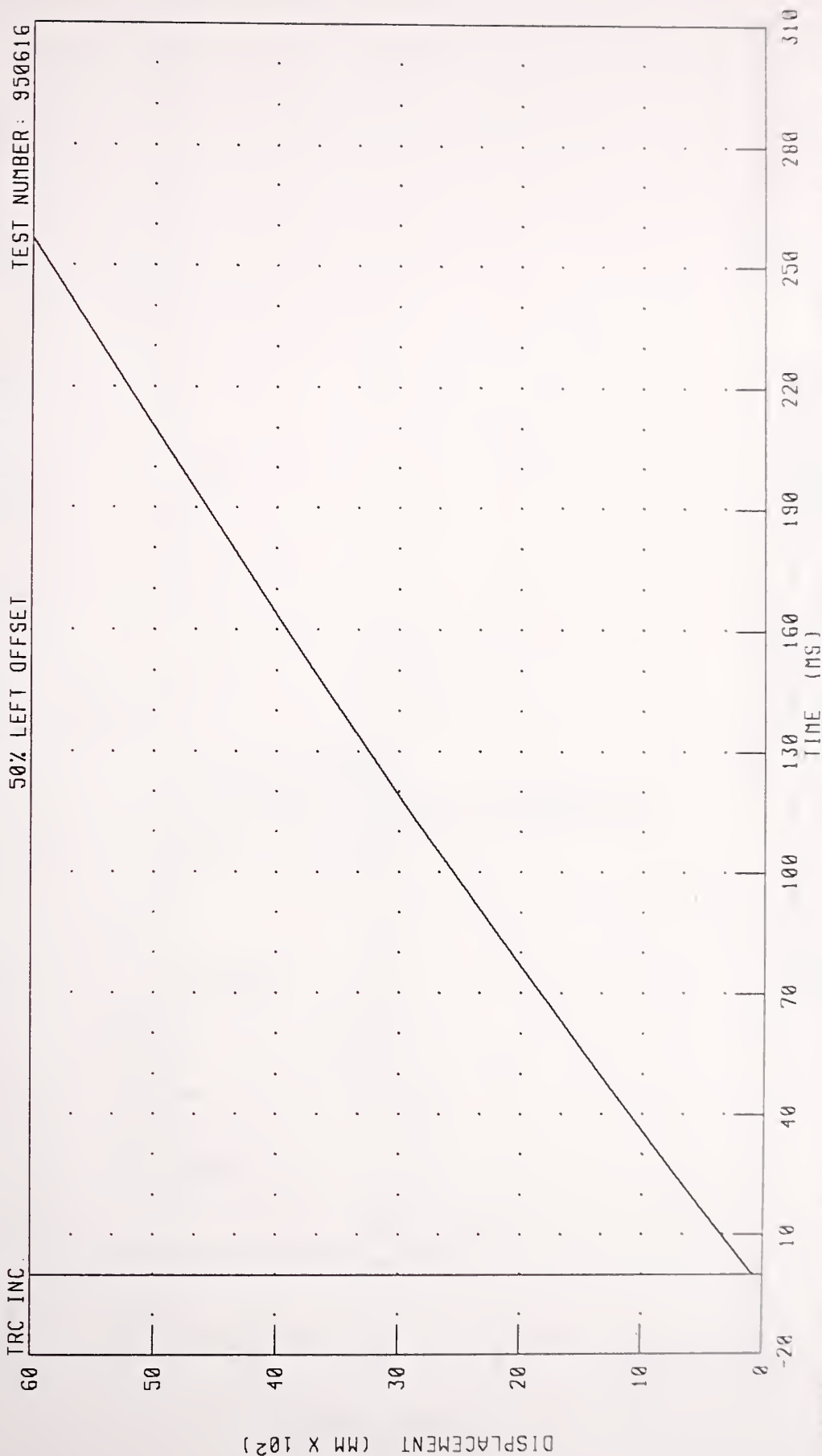
50% LEFT OFFSET



CHANNEL: FFCXV1 FILTER: CH CLASS 180

PEAK DATA: 92.10 KM/H @ 0.00 MS; 75.29 KM/H @ 310.00 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK FRONT FRAME CROSSMEMBER Z-AXIS DISPLACEMENT

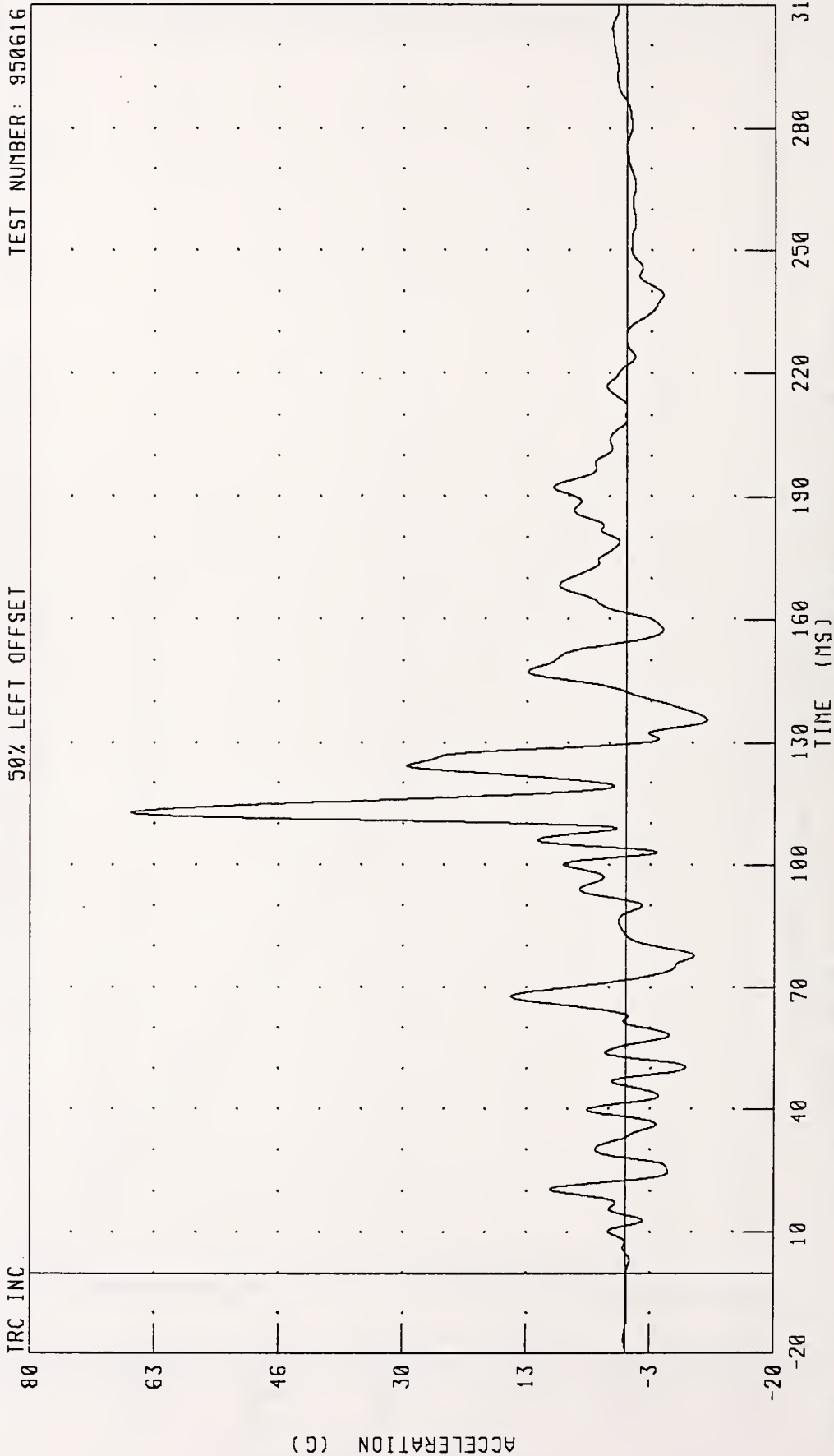


CHANNEL FFCX01 FILTER CH CLASS 180 PEAK DATA 7122 18 MM @ 310 00 MS, 92 10 MM @ 0 00 NS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET



CHANNEL: FFCYG1 FILTER: CH. CLASS 60

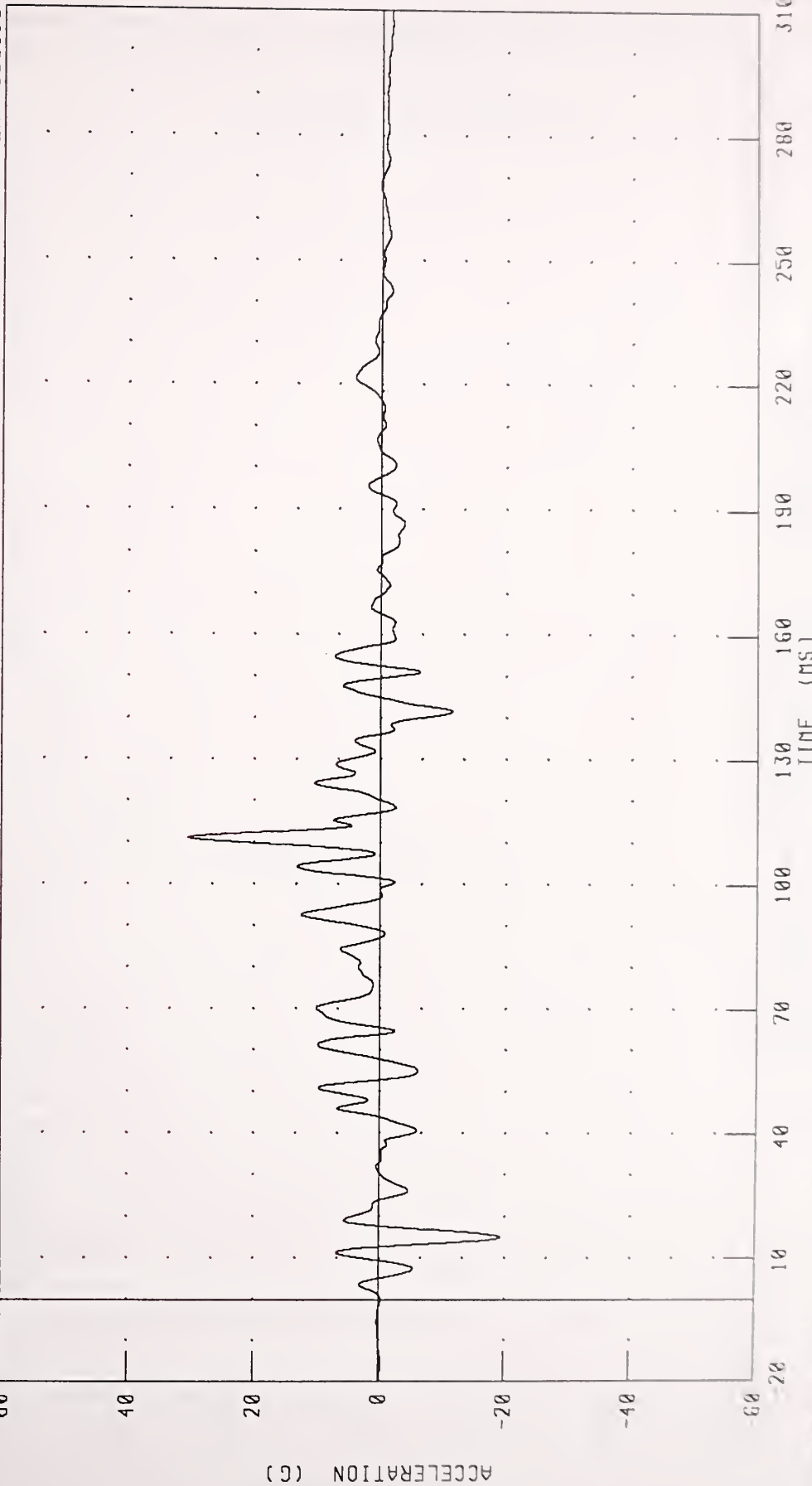
PEAK DATA: 66.62 G @ 112.72 MS, -10.88 G @ 135.68 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS TRUCK FRONT FRAME CROSSMEMBER Z-AXIS ACCELERATION

TEST NUMBER: 950616

50% LEFT OFFSET

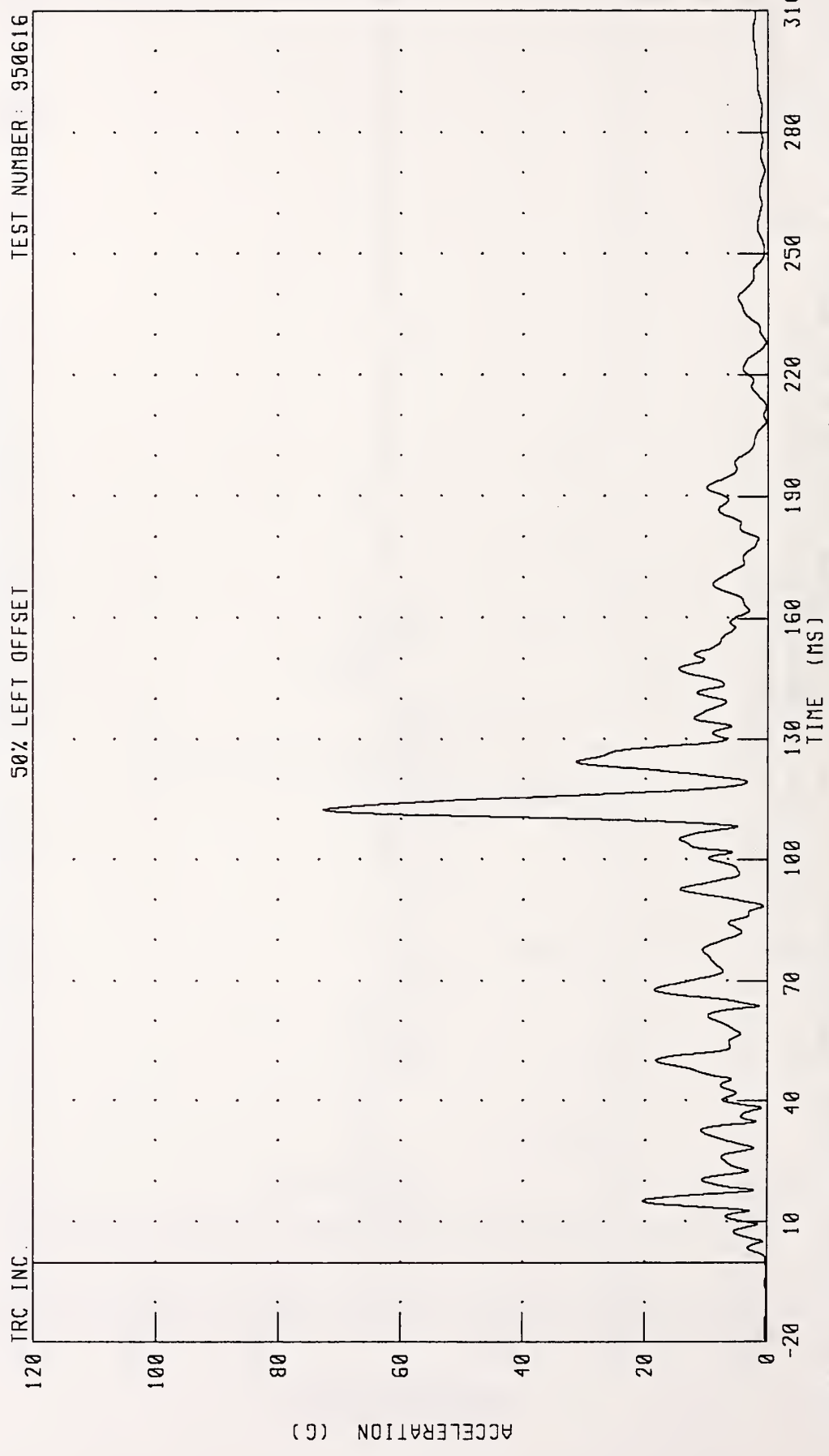
TRC INC.



CHANNEL FFC/G1 FILTER CH CLASS 60

PEAK DATA 30 58 G @ 111 20 MS, -19 31 G @ 15 12 MS

HEAVY TRUCK WITH CAB AND BASELINE BUMPER INTO 1987 FORD TAURUS
TRUCK FRONT FRAME CROSSMEMBER RESULTANT ACCELERATION



Appendix C

Miscellaneous Test Information

Dummy Instrumentation Placement

Dummy Mfr. & S/N: Humanoid/043

Seating Position: Driver

Location	Axis	Mfr.	Model	S/N	Orientation (+ Sensing)
Head Acceleration	X	Endevco	7264	DC54J	Rear
Head Acceleration	Y	Endevco	7264	EY99J	Left
Head Acceleration	Z	Endevco	7264	EH75J	Up
Chest Acceleration	X	Endevco	7264	DC72J	Front
Chest Acceleration	Y	Endevco	7264	BC26J	Left
Chest Acceleration	Z	Endevco	7264	DG50J	Up
Chest Deflection	X	Servo	14CB1-2897	CP043	Outward
Pelvis Acceleration	X	Endevco	7264	BF42J	Rear
Pelvis Acceleration	Y	Endevco	7264	FJ66J	Left
Pelvis Acceleration	Z	Endevco	7264	DG56J	Up
Left Femur Force		GSE	2435	739	Tension
Right Femur Force		GSE	2430	741	Tension

Vehicle Instrumentation Information

Test No. 950616

No.	Location	Axis	Mfr.	Model	S/N	Orientation (+ Sensing)
1	Vehicle Center of Gravity					
	Longitudinal	X	Endevco	7264	AW52	Front
	Lateral	Y	Endevco	7264	AP87J	Right
	Vertical	Z	Endevco	7264	DM66J	Up
2	Left Front Sill					
	Longitudinal	X	Endevco	7264	BF24J	Front
	Lateral	Y	Endevco	7264	BT29J	Right
	Vertical	Z	Endevco	7264	BE24J	Up
3	Right Front Sill					
	Longitudinal	X	Endevco	7264	FB67J	Front
	Lateral	Y	Endevco	7264	BE02J	Left
	Vertical	Z	Endevco	7264	DF92J	Down
4	Left Rear Seat					
	Longitudinal	X	Endevco	7264	BH95J	Front
	Lateral	Y	Endevco	7264	AP87	Right
	Vertical	Z	Endevco	7264	BD41J	Up
5	Right Rear Seat					
	Longitudinal	X	Endevco	7264	AL40	Front
	Lateral	Y	Endevco	7264	BF04	Right
	Vertical	Z	Endevco	7264	EH78J	Up
6	Instrument Panel Center					
	Longitudinal	X	Endevco	7264	BD75J	Front
7	Steering Wheel Hub					
	Longitudinal	X	Endevco	7264	BC41J	Rear
	Lap Belt Outboard Force		Lebow	3419	234	Tension
	Shoulder Belt Outboard Force		Lebow	3419	236	Tension

Heavy Truck Instrumentation Information

Test No. 950616

No.	Location	Axis	Mfr.	Model	S/N	Orientation (+ Sensing)
1	Center of Gravity					
	Longitudinal	X	Endevco	7264	BH91J	Front
	Lateral	Y	Endevco	7264	BC75J	Left
	Vertical	Z	Endevco	7264	BF99J	Up
2	Front Frame Crossmember					
	Longitudinal	X	Endevco	7264	BG38J	Rear
	Lateral	Y	Endevco	7264	BH32J	Left
	Vertical	Z	Endevco	7264	AU31	Up

Sign Convention
NHTSA Data Tape Reference Guide

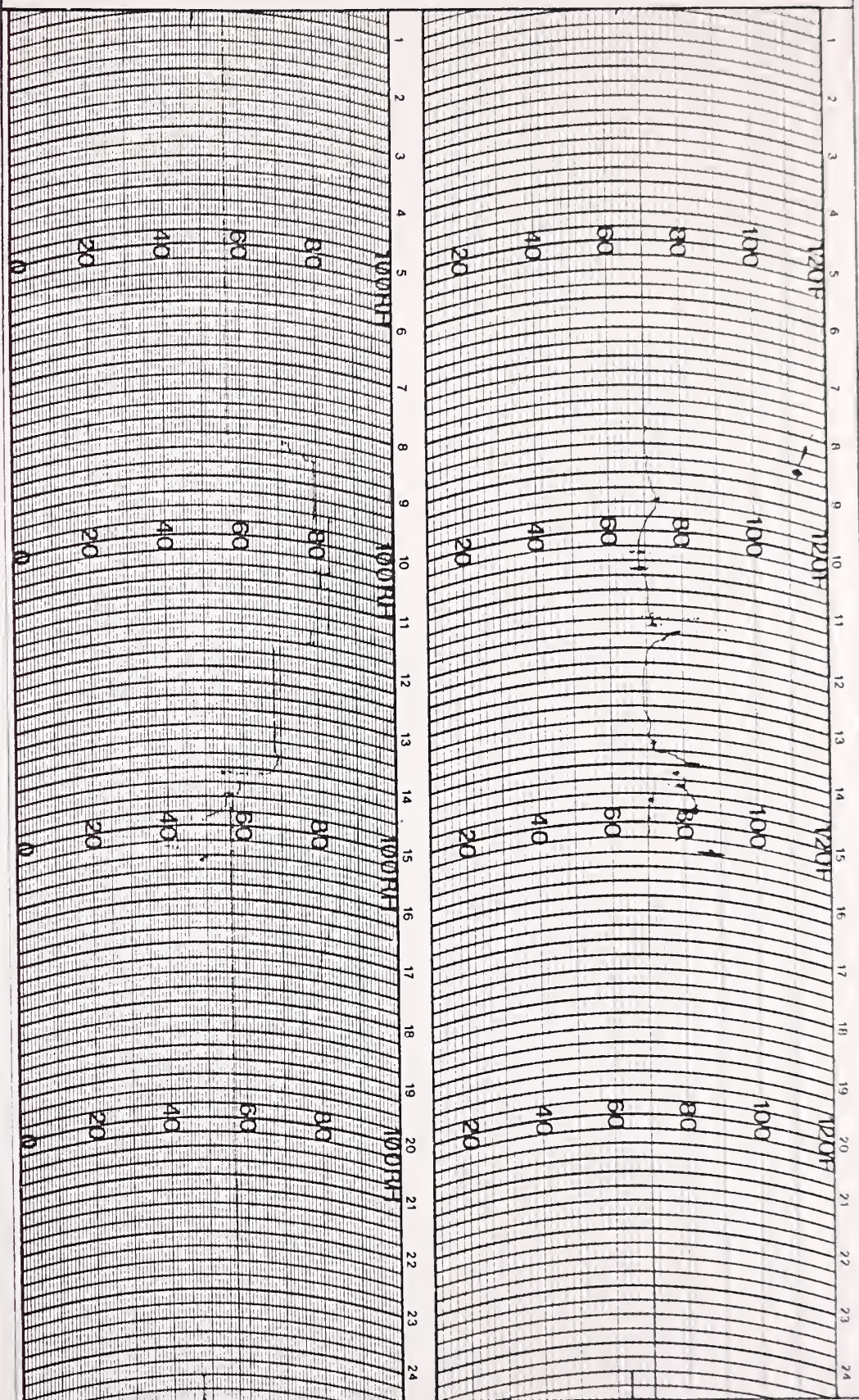
Accelerometers: +X: Forward
+Y: Leftward
+Z: Upward

Potentiometers: +Chest Longitudinal Deflection: outward
+Chest Lateral Deflection: leftward
+Seat Belt Displacement: outward
+Seat Belt Extension: elongation
+Knee Slider Displacement: distance between femur and tibia
increased (in relation to a seated dummy)

Load Cells: +Femur Force: tension
+Seat Belt Force: tension
+Barrier Force: tension

Neck Load Cells: +X Force: head pushed forward
+Y Force: head pushed leftward
+Z Force: head pulled upward (tension on neck)
+X Moment: right ear rotating toward right shoulder
+Y Moment: chin rotating toward chest
+Z Moment: chin rotating toward left shoulder

Tibia Load Cells: +X Force: tension
+Y Force: tension
+Z Force: tension
+X Moment: bottom of tibia moving leftward
+Y Moment: bottom of tibia moving rearward



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

HYGROTHERMOGRAPH
 1 DAY

CHART # C311 D HF
 PART # 699123

STATION 950616

DATE ON

DATE OFF

Occupant Compartment Thermograph

DOT LIBRARY



00302595