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May 1993

Final Report

Reducing Heavy Truck Aggressiveness  
Moving Heavy Truck into a 1987 Ford  
Taurus 4-Door Sedan at 80.3 KPH

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16. Abstract  This test 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 1FABP53U4HG128556, at the Transportation Research Center Inc. on April 9, 1993. The test vehicle was impacted on the front right by the heavy truck. The struck vehicle contained ten (10) accelerometers and one instrumented Hybrid III driver dummy.					
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## METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures			Approximate Conversions from Metric Measures		
Symbol	When You Know	Multiply by	To Find	Symbol	Symbol
<b>LENGTH</b>					
in	inches	2.5	centimeters	mm	millimeters
ft	feet	30	centimeters	cm	centimeters
yd	yards	0.9	meters	m	meters
mi	miles	1.6	kilometers	km	kilometers
<b>AREA</b>					
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>	square centimeters
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>	square meters
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>	square meters
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>	square kilometers
	acres	0.4	hectares	ha	hectares (10,000 m <sup>2</sup> )
<b>MASS (weight)</b>					
oz	ounces	28	grams	g	grams
lb	pounds	0.45	kilograms	kg	kilograms
	short tons	0.9	tonnes	t	tonnes ('000 kg)
	(2000 lb)				
<b>VOLUME</b>					
tsp	teaspoons	5	milliliters	ml	milliliters
Tbsp	tablespoons	15	milliliters	ml	milliliters
fl oz	fluid ounces	30	milliliters	ml	milliliters
c	cups	0.24	liters	l	liters
pt	pints	0.47	liters	l	liters
qt	quarts	0.95	liters	l	liters
gal	gallons	3.8	liters	l	liters
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>	cubic meters
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>	cubic meters
<b>TEMPERATURE (exact)</b>					
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C	Celsius temperature
					9/5 (then add 32)
					Fahrenheit temperature

\*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. C-3.10-286.

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
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
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	acres
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes ('000 kg)	1.1	short tons	short tons
<b>VOLUME</b>				
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 <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

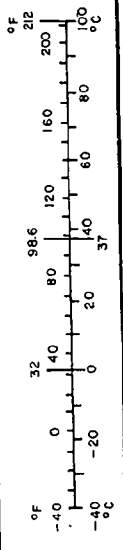


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## SECTION 1.0

### PURPOSE AND TEST SUMMARY

This test was conducted as research in support of reducing heavy truck aggressiveness. This test was conducted on April 9, 1993.

The stationary 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 eight (8) longitudinal axis accelerometers, one (1) lateral axis accelerometer, one (1) 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 Procedure TP-208-08. The dummy was instrumented in the head, chest, and pelvis with longitudinal, lateral, and vertical accelerometers. The dummy was also instrumented with a 6-axis neck load cell, two (2) femur load cells, and a chest deflection potentiometer.

The stationary vehicle was impacted in the left front at 0 degrees by a moving heavy truck at 80.3 kph. The intended impact engagement was the right front of the car with the left front of the truck.

The moving heavy truck's test weight was 11,426 kg. The truck was equipped with a lowered and curved bumper of 1/2-inch thick steel plate. The truck was instrumented with two (2) longitudinal and vertical axis accelerometers and one (1) vertical axis accelerometer.

The dummy's head injury criterion, HIC, was 4,675. The dummy's chest deceleration with 3 milliseconds minimum duration was 70.6 g. The dummy's maximum left and right femur forces were 3090 N and 8970 N, respectively.

The vehicle, dummy, and heavy truck data were multiplexed and recorded on a 14-channel analog tape deck. The analog data was digitally sampled at 8000 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 five (5) high-speed motion picture cameras operating at approximately 500 frames per second.

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

SECTION 2.0

VEHICLE, DUMMY, TRUCK AND TEST DATA

DATA ACQUISITION EXPLANATION

The car center of gravity X-axis and Z-axis acceleration, VCGXG1 and VCGZG1, data exceeded the full-scale of the data channel.

The engine bottom X-axis acceleration, ENGXG1, data channel was lost at 42 milliseconds when vehicle crush destroyed the accelerometer.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Heavy Truck into Stationary Vehicle

TEST DATE: 04/09/93      TEST TIME: 1215      AMBIENT TEMP. (°C): 14

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987/Ford/Taurus/4-door sedan

VEHICLE TEST WEIGHT (KG): 1582

IMPACT ANGLE (DEG)\*: 0

IMPACT VELOCITY (KPH)\*\*:      PRIMARY = 80.3      SECONDARY = 80.3

MAXIMUM STATIC CRUSH (MM): 920

DUMMY:                              Driver #048

TYPE:                                Part 572E

LOCATION:                             Left front

RESTRAINT:                         3-point unbelt

NUMBER OF DATA CHANNELS: 35

NUMBER OF CAMERAS:                HIGH-SPEED 5      REAL-TIME 1

\*With respect to tow track centerline.

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company

MAKE/MODEL: Ford/Taurus

VIN: 1FABP53U4HG128556

BODY STYLE: 4-door sedan

MODEL YEAR: 1987

COLOR: Red

ENGINE DATA: TYPE: transverse CYLINDERS: 6 DISPLACEMENT: 3.0 liters

TRANSMISSION DATA: 3 SPEED, \_\_\_MANUAL, X AUTOMATIC, X FWD, \_\_\_RWD, \_\_\_4WD

DATE VEHICLE RECEIVED: NA

ODOMETER READING: 83,051

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	Yes
POWER SEATS	Yes	TILTING STEERING WHEEL	Yes
POWER WINDOWS	Yes	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	Yes
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes
OTHER	None		

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Ford Motor Company

DATE OF MANUFACTURE: 11/86 VIN: 1FABP53U4HG128556

GVWR: 4559 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: 35 PSI  
REAR: 35 PSI

SPARE TIRE (MFR., LINE, SIZE): Michelin, Temporary, 135/80D14

TYPE OF SEATS: FRONT: Bucket  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 1822 MILLIMETERS

WHEELBASE: 2673 MILLIMETERS

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on the passenger's side C-pillar.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P205/70R15

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

DESIGNATED SEATING CAPACITY: 3 FRONT 3 REAR 6 TOTAL

VEHICLE CAPACITY WEIGHT: 1100 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE: LF 683; RF 692; LR 643; RR 648

PRE-TEST ATTITUDE: LF 680; RF 690; LR 595; RR 600

POST-TEST ATTITUDE: LF 895; RF 710; LR 603; RR 618

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	461 KG	RIGHT REAR	246 KG
LEFT FRONT	476 KG	LEFT REAR	246 KG
TOTAL FRONT WEIGHT	937 KG	(65.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	492 KG	(34.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1429 KG		
TARGET TEST WEIGHT	1581 KG *		

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	467 KG	RIGHT REAR	307 KG
LEFT FRONT	483 KG	LEFT REAR	325 KG
TOTAL FRONT WEIGHT	950 KG	(60.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	632 KG	(40.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1582 KG		

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: None

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1068 MILLIMETERS REARWARD OF FRONT WHEEL CENTERLINE

\*The target test weight was established during Test 920507.

TABLE 3 TRUCK INFORMATION

WEIGHT DISTRIBUTION

FRONT: 3783 KG

REAR: 7643 KG

AXLE SPACING

FRONT: 3835 MM

REAR: 1308 MM

DISTANCE OF C.G. BEHIND FRONT AXLE: 3003 MM

BUMPER DESCRIPTION: Modified, lowered, and curved bumper of 1/2-inch thick steel plate.

TRUCK DAMAGE: The supporting structure of the truck bumper deformed.

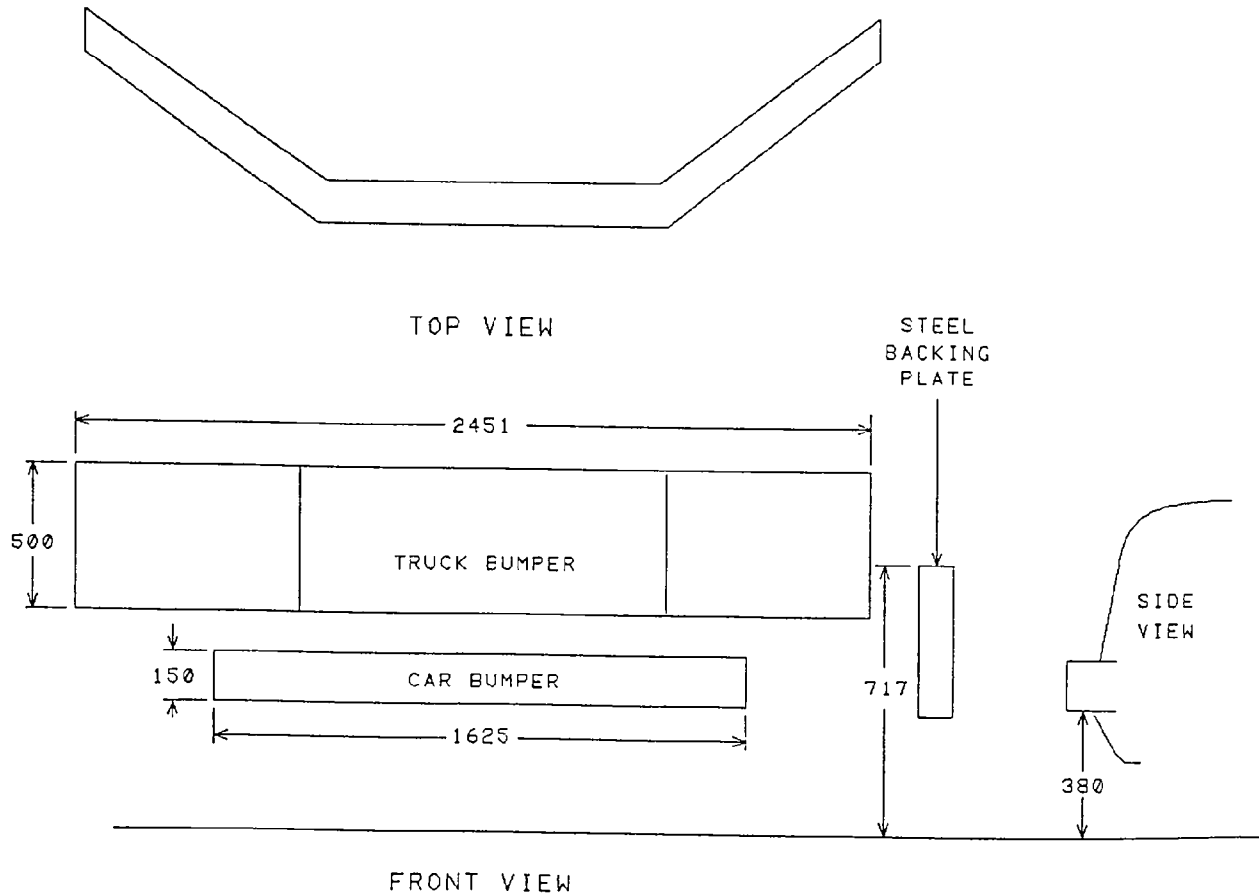


TABLE 4 POST-IMPACT DATA

TEST NUMBER: 930409

TEST DATE: 04/09/93

TEST TIME: 1215

TEST TYPE: Heavy Truck into Stationary Vehicle

IMPACT ANGLE: 0

AMBIENT TEMPERATURE AT IMPACT AREA: 14° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 14° C

IMPACT VELOCITY: PRIMARY = 80.3 KPH  
SECONDARY = 80.3 KPH

(SPECIFIED RANGE = 79.7 TO 81.3 KPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 381 MM

EXITING VELOCITY TRAP = 51 MM

TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN MILLIMETERS):

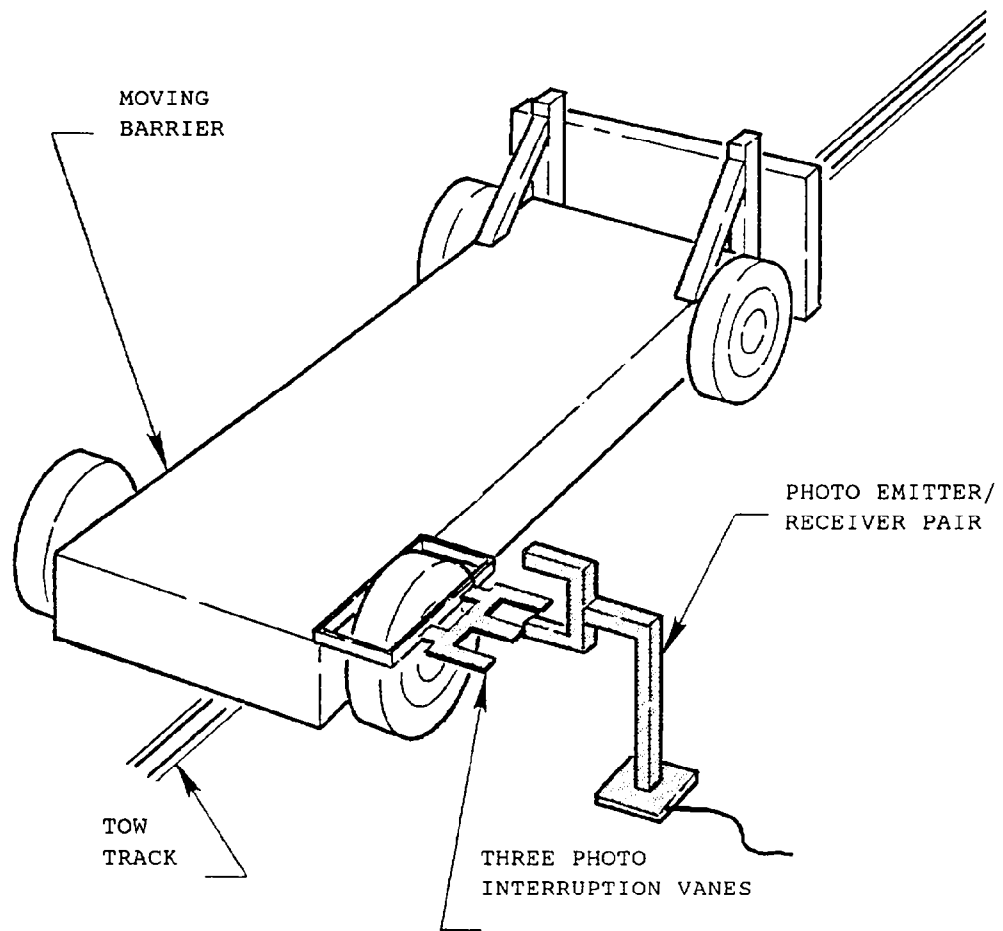
OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 4664; C 4794; R 4661

POST-TEST: L 3791; C 3874; R 4362

TOTAL CRUSH: L 873; C 920; R 299

AVERAGE CRUSH: 697

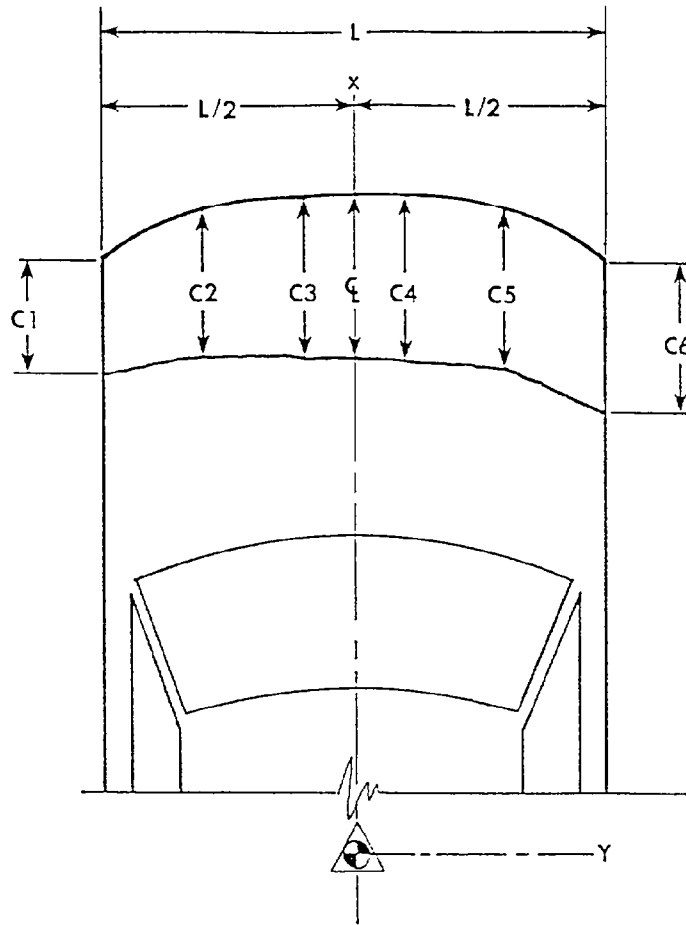
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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.  
 All measurements are in millimeters.

Vehicle Ford Taurus

	PRE-TEST	POST-TEST	CRUSH
L	<u>1549</u>		
C1	<u>4664</u>	C1 <u>3791</u>	C1 <u>873</u>
C2	<u>4750</u>	C2 <u>3832</u>	C2 <u>918</u>
C3	<u>4788</u>	C3 <u>3874</u>	C3 <u>914</u>
C4	<u>4788</u>	C4 <u>4005</u>	C4 <u>783</u>
C5	<u>4750</u>	C5 <u>4210</u>	C5 <u>540</u>
C6	<u>4661</u>	C6 <u>4362</u>	C6 <u>299</u>
CL	<u>4794</u>	CL <u>3874</u>	CL <u>920</u>

FIGURE 3  
 PRE-TEST AND POST-TEST MEASUREMENT POINTS

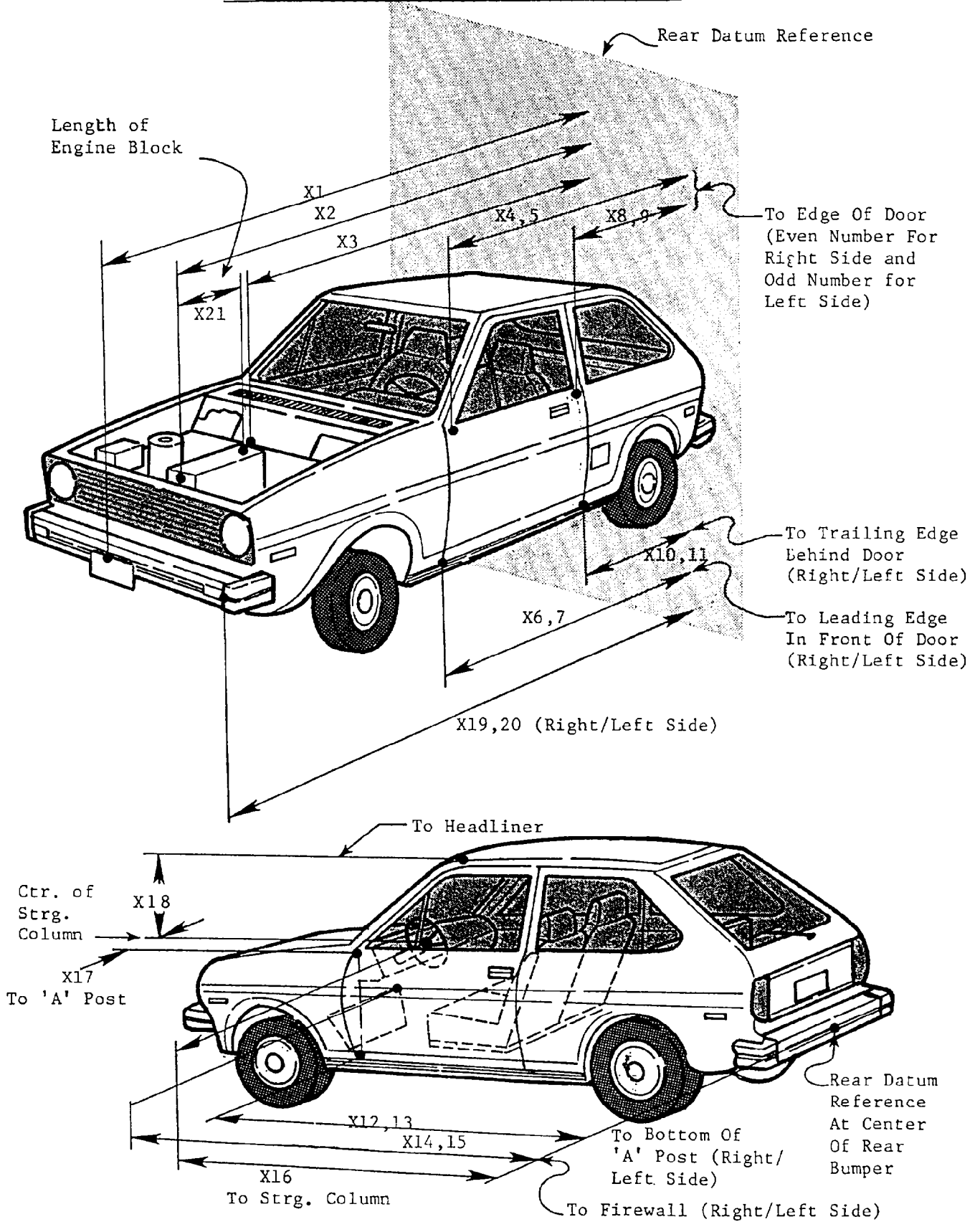


TABLE 4 IMPACTED VEHICLE MEASUREMENTS

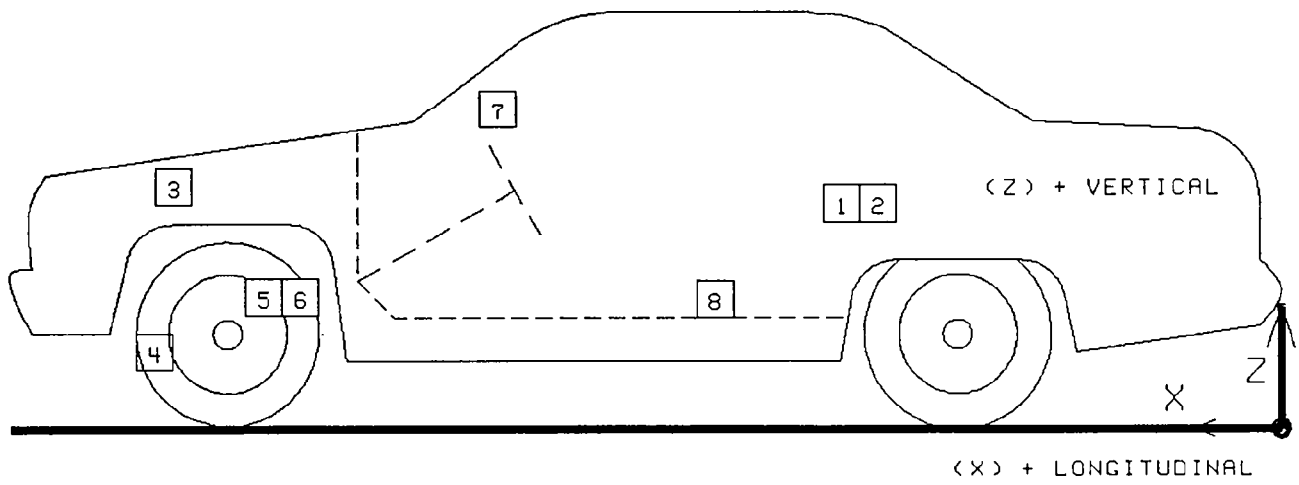
VEHICLE MAKE/MODEL: Ford/Taurus

TEST NUMBER: 930409

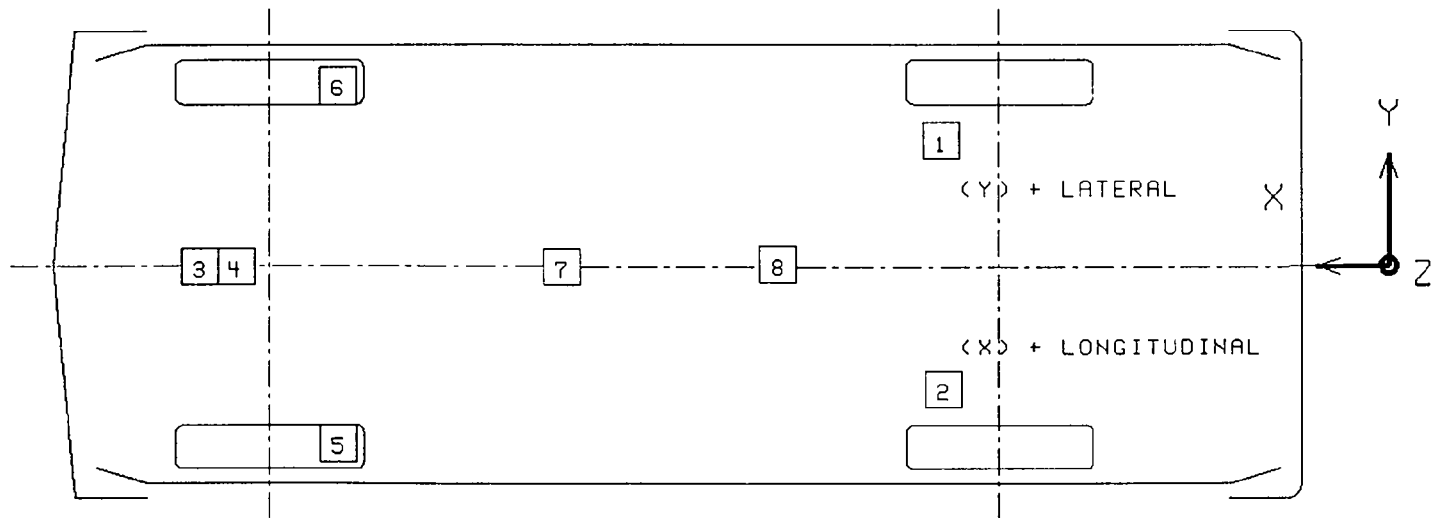
ALL MEASUREMENTS ARE IN MILLIMETERS

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4794	3874	920
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	4235	3743	492
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3607	3308	299
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	3312	3292	20
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	3304	3238	66
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	3219	3185	34
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	3221	3175	46
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	2229	2200	29
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	2221	2193	28
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	2186	2157	29
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	2191	2143	48
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	3219	3232	-13
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	3207	3197	10
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3569	3429	140
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3569	3340	229
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2826	2648	178
X17	CENTER OF STEERING COLUMN TO "A" POST	267	305	-38
X18	CENTER OF STEERING COLUMN TO HEADLINER	438	400	38
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4661	4362	299
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4664	3791	873
X21	LENGTH OF ENGINE BLOCK	432	432	0

FIGURE 4  
 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 6

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930409

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G MSEC	NEGATIVE DIRECTION MAX G MSEC
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	1807	679	356	2.1 179.4	36.7 66.9
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	1816	-698	368	1.8 148.6	40.9 69.5
3 ENGINE TOP LONGITUDINAL	4188	-95	749	20.0 49.4	138.8 26.3
4 ENGINE BOTTOM LONGITUDINAL	3943	-76	216	---	---
5 RIGHT BRAKE CALIPER LONGITUDINAL	3842	-673	314	72.6 61.5	124.3 41.0
6 LEFT BRAKE CALIPER LONGITUDINAL	3842	673	298	29.4 56.1	108.1 20.8
7 INSTRUMENT PANEL CENTER LONGITUDINAL	3295	0	978	94.2 63.6	150.9 58.3

TABLE 6

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

TEST NUMBER 930409

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G MSEC	NEGATIVE DIRECTION MAX G MSEC
8 CENTER OF GRAVITY	2921	13	330		
LONGITUDINAL			43.4	37.8 $\gamma$	118.5
LATERAL			112.9	42.5	54.5
VERTICAL			131.2	42.4 $\gamma$	201.8
RESULTANT			209.7	46.8 $\gamma$	46.6 $\gamma$

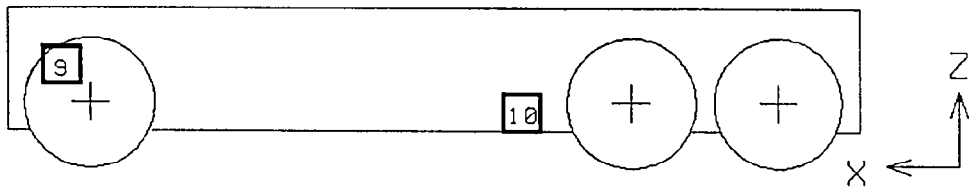
\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

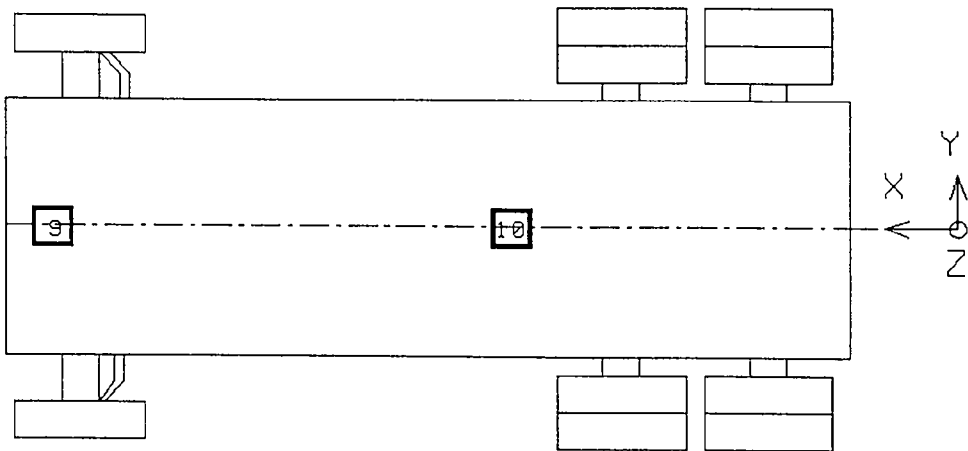
$\gamma$  See DATA ACQUISITION EXPLANATIONS

FIGURE 5

HEAVY TRUCK ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 7

HEAVY TRUCK ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930409

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G MSEC	NEGATIVE DIRECTION MAX G MSEC
9 FRONT FRAME CROSSMEMBER	6160	0.0	658		
LONGITUDINAL				8.9 33.6	15.1 27.5
LATERAL				21.3 35.4	12.9 29.9
VERTICAL				4.1 40.3	17.1 33.3
RESULTANT				24.7 34.0	
10 CENTER OF GRAVITY	2527	0.0	1050		
LONGITUDINAL				4.9 35.4	12.0 40.6
LATERAL				2.3 54.1	2.4 31.9

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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 930409

DRIVER DUMMY

SN: 048

POSITIVE DIRECTION MAX	NEGATIVE DIRECTION MAX	MSEC	MSEC
------------------------------	------------------------------	------	------

HEAD ACCELERATION (g)

LONGITUDINAL	18.5	184.8	282.3	71.9
LATERAL	31.9	69.8	23.4	83.9
VERTICAL	81.0	68.1	66.8	75.6
RESULTANT	286.9	71.9		
HIC	4675 FROM 67.9 TO 75.0			

NECK FORCE (N)

LONGITUDINAL	1302.9	70.3	1689.6	79.6
LATERAL	279.0	159.3	370.0	70.8
VERTICAL	8496.9	70.3	397.0	106.0
RESULTANT	8597.1	70.3		

NECK MOMENT (N-M)

ABOUT X	5.1	56.9	32.2	87.9
ABOUT Y	113.3	80.0	67.4	70.3
ABOUT Z	8.8	164.3	25.8	101.5
RESULTANT	113.3	80.0		

TABLE 8

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 930409

DRIVER DUMMY  
SN: 048

POSITIVE	NEGATIVE
DIRECTION	DIRECTION
MAX MSEC	MAX MSEC

CHEST ACCELERATION (g)	
LONGITUDINAL	5.2 142.0 72.9 76.9
LATERAL	8.4 52.5 15.1 87.6
VERTICAL	25.9 69.5 15.7 61.3
RESULTANT	74.0 76.9
3 MSEC	70.6

CHEST DEFLECTION (mm)	
LONGITUDINAL	0.2 4.9 38.5 65.6

PELVIS ACCELERATION (g)	
LONGITUDINAL	17.9 44.9 84.2 51.0
LATERAL	43.4 51.0 21.1 56.5
VERTICAL	47.8 70.5 20.1 43.8
RESULTANT	95.0 51.0

FEMUR LOAD (N)	
LEFT	2493.9 81.3 3089.5 62.6
RIGHT	2455.9 66.6 8969.9 50.6

POSITIVE DIRECTION	NEGATIVE DIRECTION
LONGITUDINAL: FORWARD	LONGITUDINAL: REARWARD
LATERAL: LEFTWARD	LATERAL: RIGHTWARD
VERTICAL: UPWARD	VERTICAL: DOWNWARD



DUMMY KINEMATIC SUMMARY

The dummy translated forward at impact. The dummy's knees and hands impacted the instrument panel. The dummy's head impacted the steering wheel hub. The dummy rebounded into the seat. The dummy was pinned in the seat by vehicle crush.

FIGURE 6 DUMMY AND SEAT POSITIONING DATA

PRE-IMPACT DATA:

MAKE/MODEL: Ford/Taurus  
 BODY STYLE: 4-door sedan MODEL YEAR: 1987  
 COLOR: Red

DATA FROM CERTIFICATION LABEL:

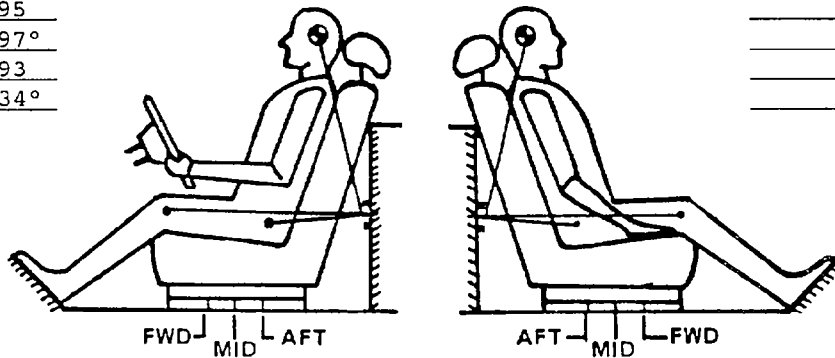
VEHICLE MANUFACTURER: Ford Motor Company  
 DATE OF MANUFACTURE: 11/86 VIN: 1FABP53U4HG128556  
 GVWR: 4559 LBS.; GAWR: FRONT = 2507 LBS.; REAR = 2133 LBS.

POST-IMPACT DATA:

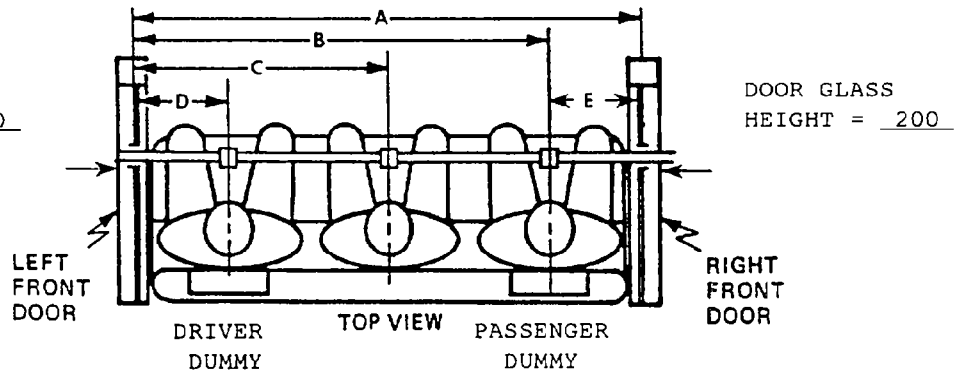
DATE OF TEST: 04/09/93 TIME: 1215 TEMPERATURE: 14° C  
 IMPACT VELOCITY: PRIMARY = 80.3 MPH SECONDARY = 80.3 MPH  
 REQUIRED IMPACT VELOCITY RANGE: 79.7 TO 81.3 MPH  
 SEAT TYPE: Bucket ADJUSTER TYPE: Manual  
 FRONT SEAT BACK TYPE: Manually-adjustable  
 TECHNICIANS: J. Taylor

DRIVER DUMMY # 048 TYPE: HIII  
 HEAD 446  
 TARGET 5°  
 KNEE 595  
 JOINT 97°  
 APPROX-  
 IMATE 293  
134°  
 "H"  
 POINT

PASSENGER DUMMY # NA TYPE: \_\_\_\_\_  
 \_\_\_\_\_ HEAD  
 \_\_\_\_\_ TARGET  
 \_\_\_\_\_ KNEE  
 \_\_\_\_\_ JOINT  
 \_\_\_\_\_ APPROX-  
 \_\_\_\_\_ IMATE  
 \_\_\_\_\_ "H"  
 \_\_\_\_\_ POINT



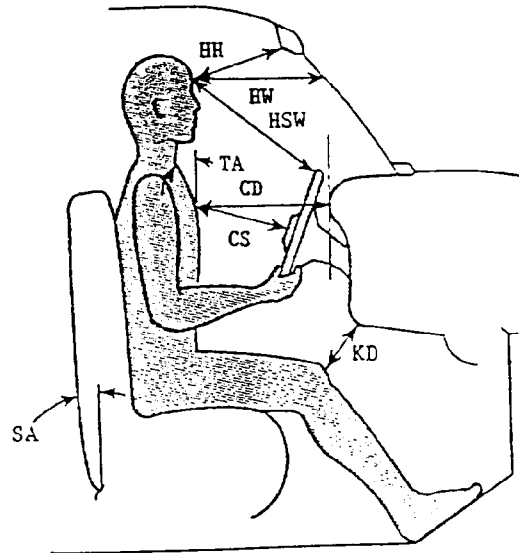
A = 1460  
 B = NA  
 C = 730  
 D = 365  
 E = NA  
 DOOR GLASS  
 HEIGHT = 170



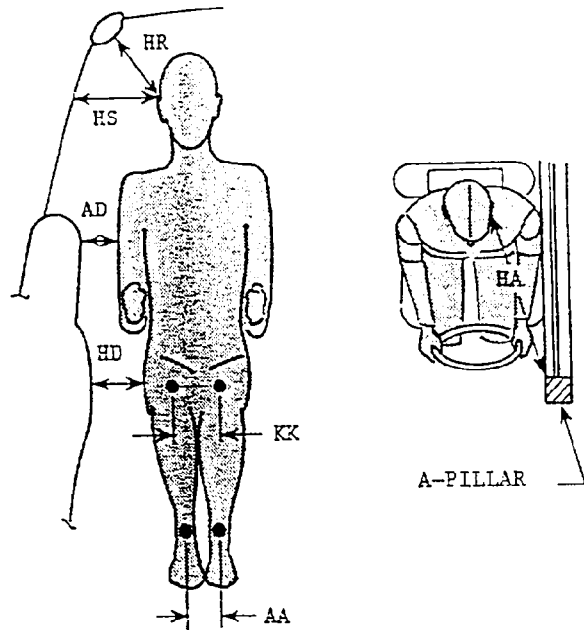
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.  
 ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 7 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
	048	NA
HH	385	
HW	620	
CD	580	
CS	360	
KDL	129	
KDR	120	
TA	22°	
SA	23°	
HSW	460	



	DRIVER	PASSENGER
	048	NA
HR	202	
HS	275	
AD	115	
HD	201	
KK	208	
AA	275	
HA	650	

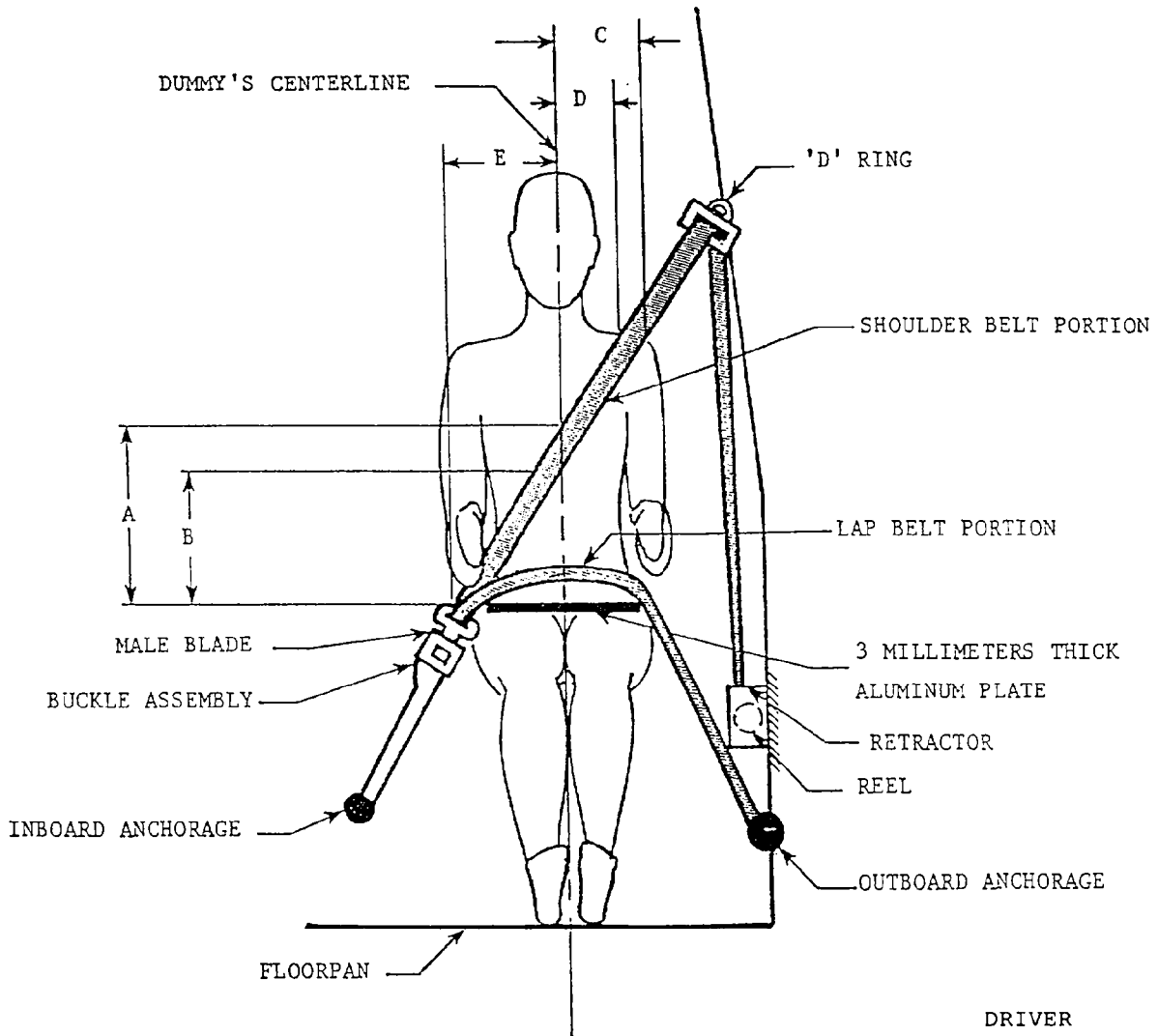


KNEE OUTER BOLT HEAD TO  
OUTER BOLT HEAD SPACING:  
DRIVER = 295  
PELVIS ANGLE:  
DRIVER = 25°

HH = HEAD TO WINDSHIELD HEADER	HR = HEAD C.G. TARGET TO SIDE ROOF HEADER
HW = HEAD TO WINDSHIELD	HS = HEAD C.G. TARGET TO SIDE WINDOW
CD = CHEST TO DASH	AD = ARM TO DOOR
CS = CHEST TO STEERING WHEEL	HD = HIP TO DOOR
KD = KNEE TO DASH	KK = KNEE TO KNEE
TA = TORSO ANGLE	AA = ANKLE TO ANKLE
SA = SEAT BACK ANGLE	HA = HEAD C.G. TARGET TO A-PILLAR
HSW = HEAD TO STEERING WHEEL	

TORSO AND SEAT BACK ANGLES ARE RELATIVE TO VERTICAL.  
ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

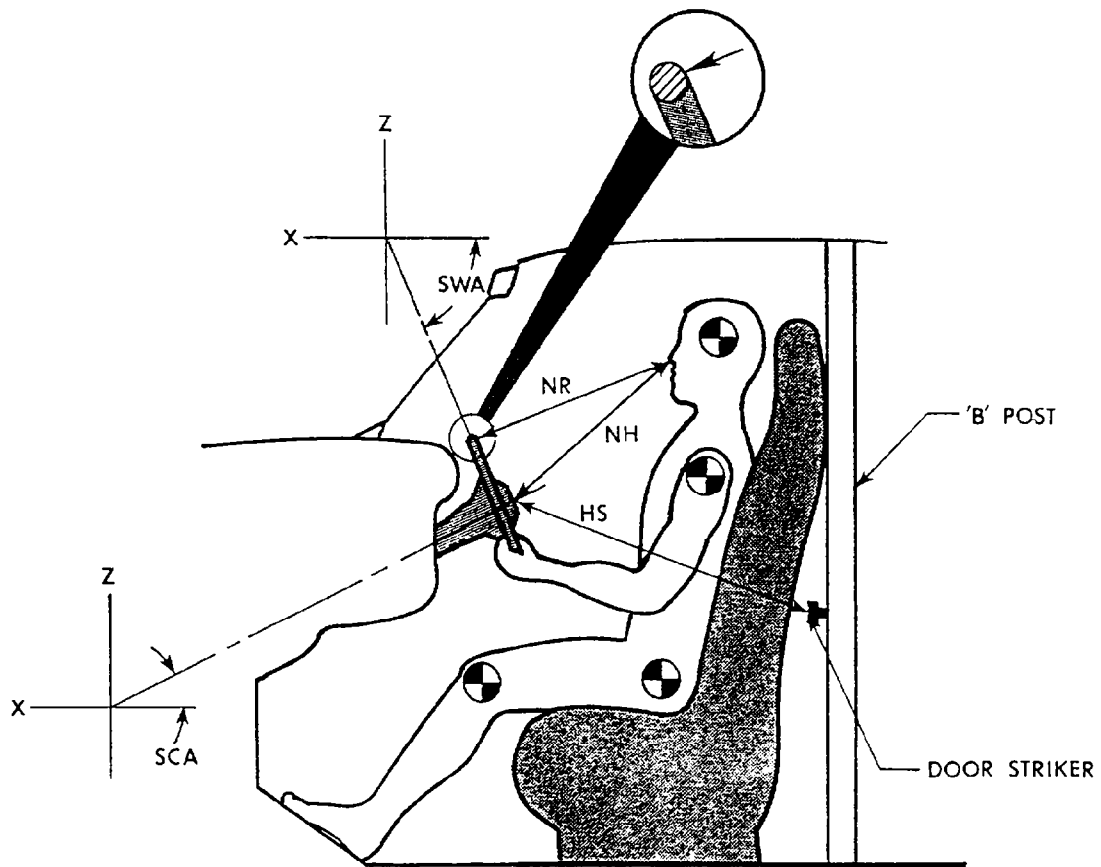
FIGURE 8 SEAT BELT POSITIONING DATA



	DRIVER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	342
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	246
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	80
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	20
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	162

ALL MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 9 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY:  
The steering column was fastened in the third of five positions.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	428
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	425
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	580
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	24°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	67°

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10  
CAMERA POSITIONS

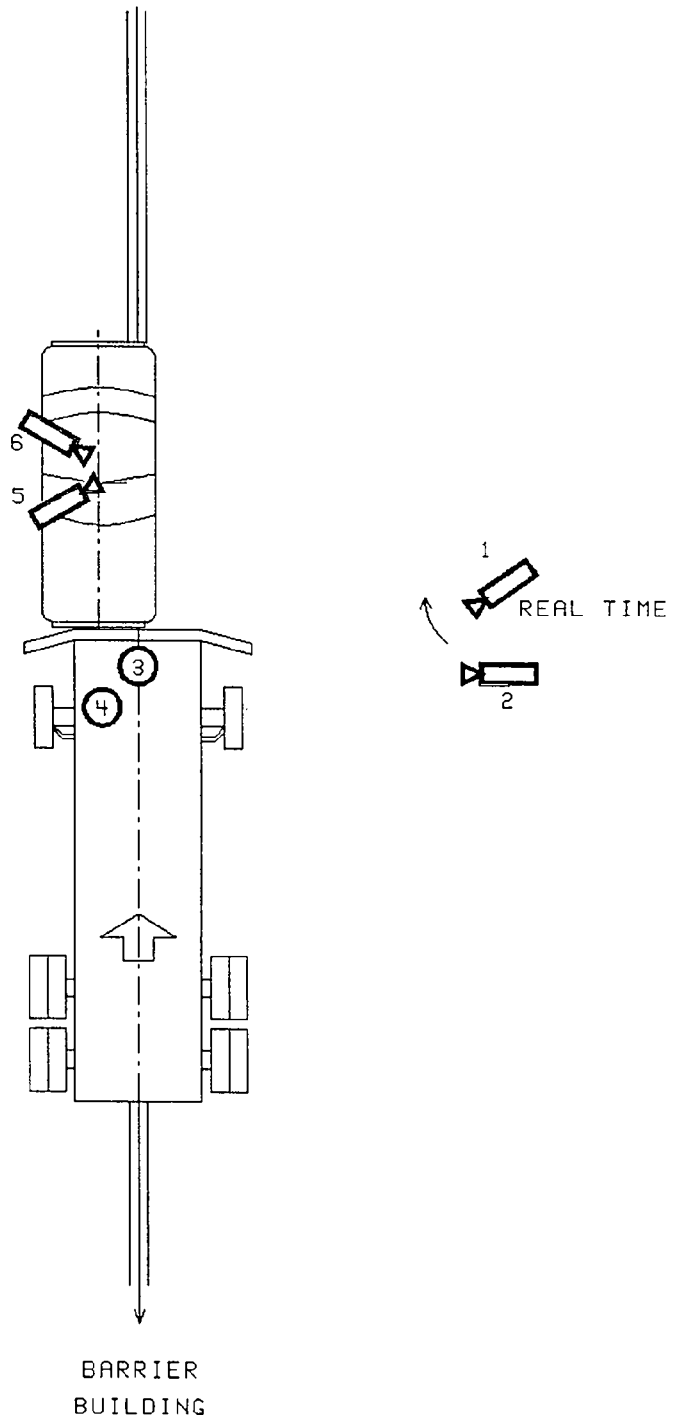


TABLE 9 MOTION PICTURE CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Left panning			24	Real-time documentation
2	Left wide	Photosonic	13	498	Vehicle crush
3	Overhead wide	Photosonic	8	498	Vehicle crush
4	Onboard truck	Photosonic	8	500	Vehicle crush
5	Onboard car front	Photosonic	8	500	Dummy kinematics
6	Onboard car rear	Photosonic	8	500	Dummy kinematics

APPENDIX A

PHOTOGRAPHS



Figure A-1. POST-TEST FRONT VIEW



Figure A-2. PRE-TEST LEFT SIDE VIEW

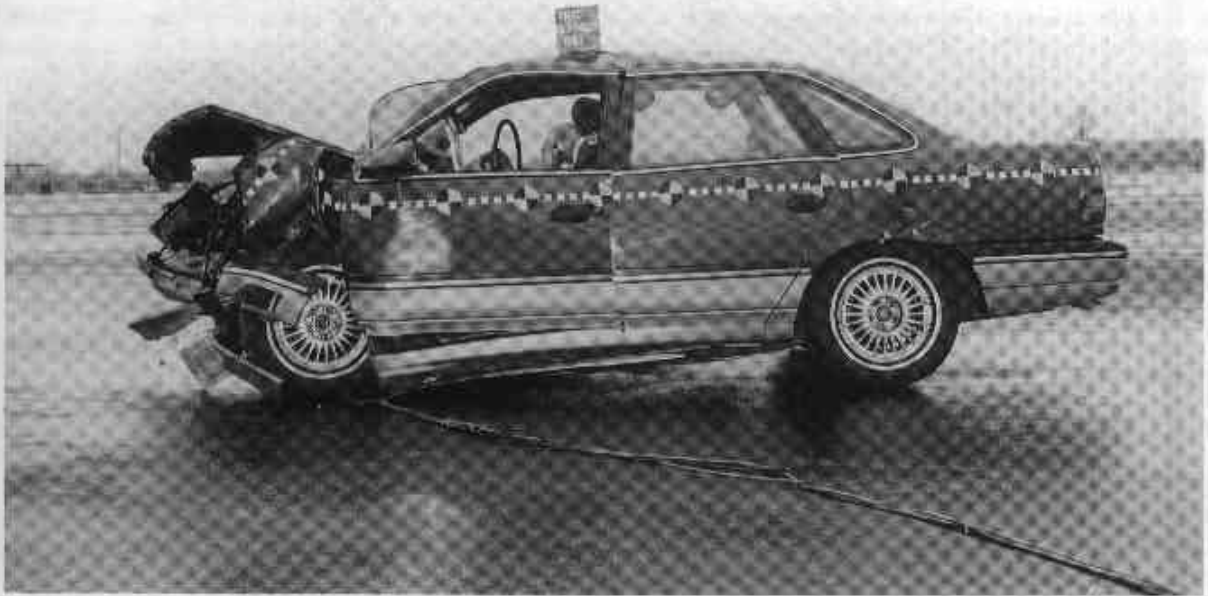


Figure A-3. POST-TEST LEFT SIDE VIEW



Figure A-4. PRE-TEST REAR VIEW



Figure A-5. POST-TEST REAR VIEW



Figure A-6. PRE-TEST RIGHT SIDE VIEW



Figure A-7. POST-TEST RIGHT SIDE VIEW

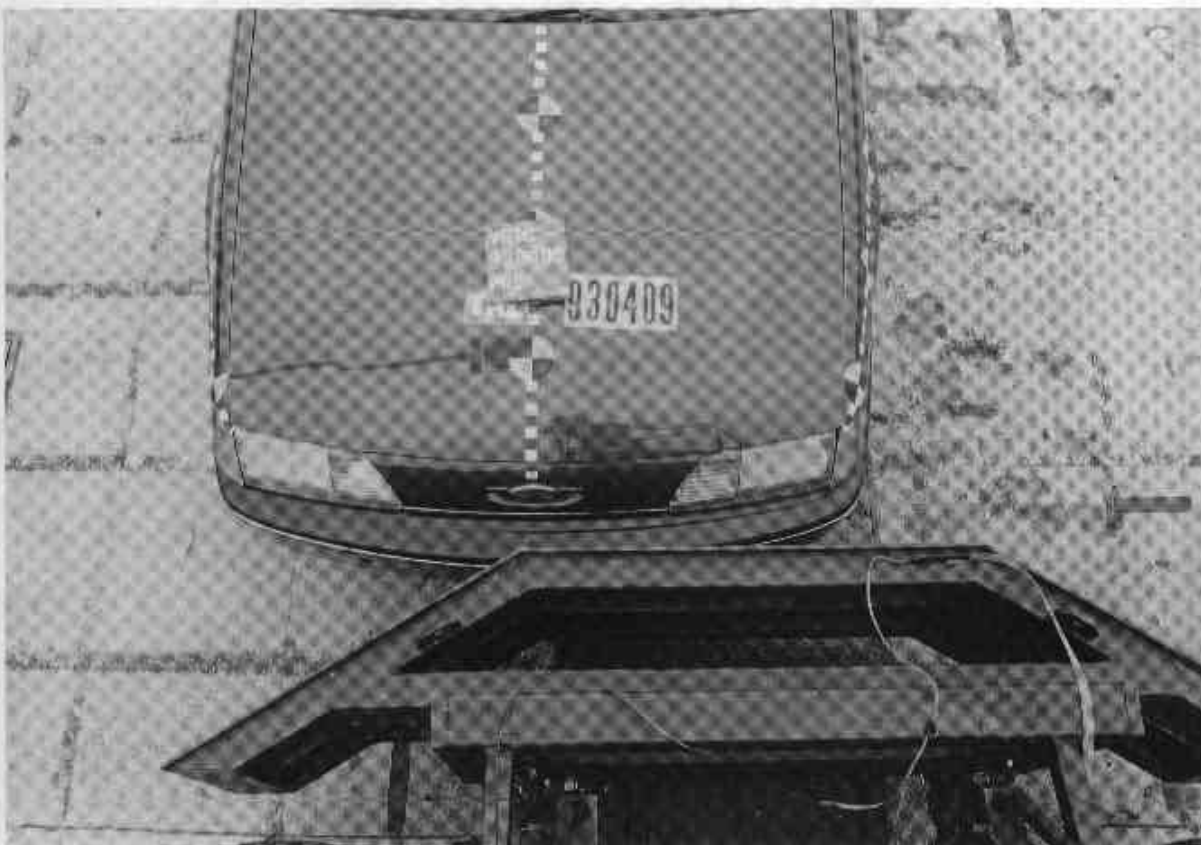


Figure A-8. PRE-TEST BUMPER ENGAGEMENT VIEW



Figure A-9. PRE-TEST ENGINE COMPARTMENT VIEW

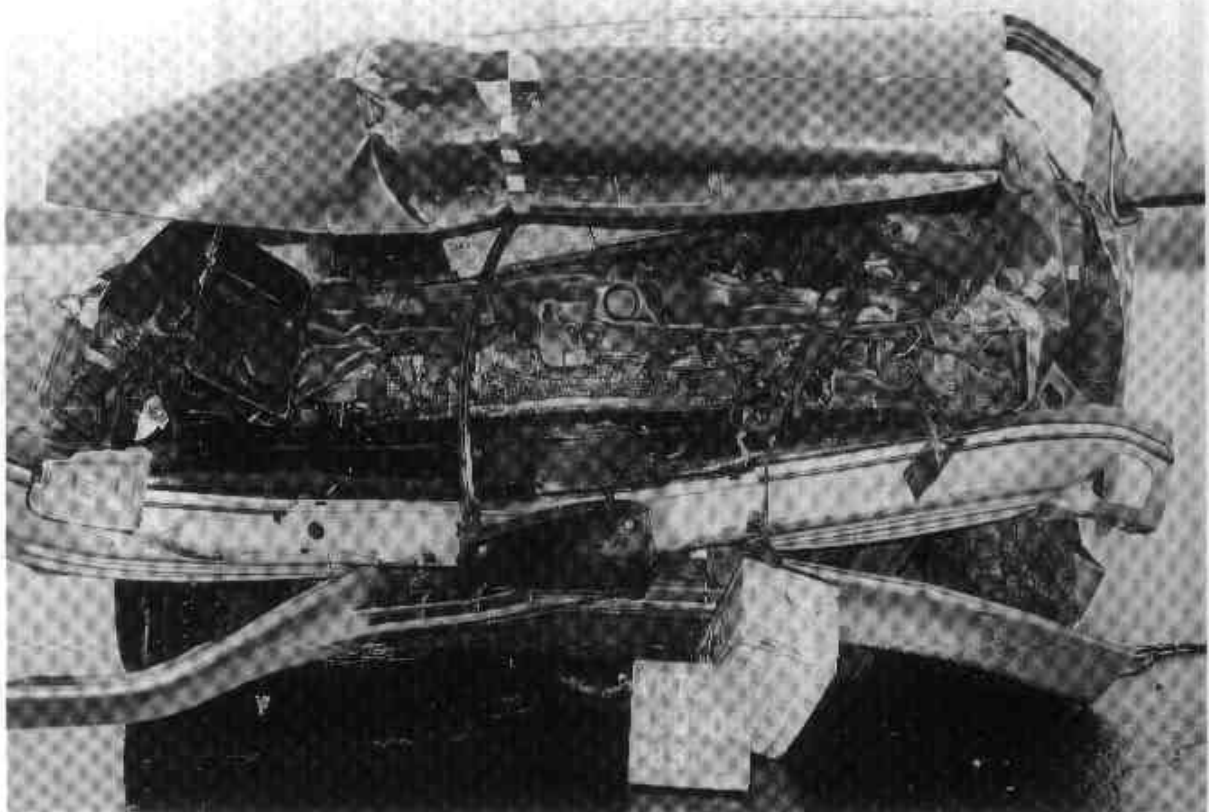


Figure A-10. POST-TEST ENGINE COMPARTMENT VIEW



Figure A-11. PRE-TEST WINDSHIELD VIEW



Figure A-12. POST-TEST WINDSHIELD VIEW

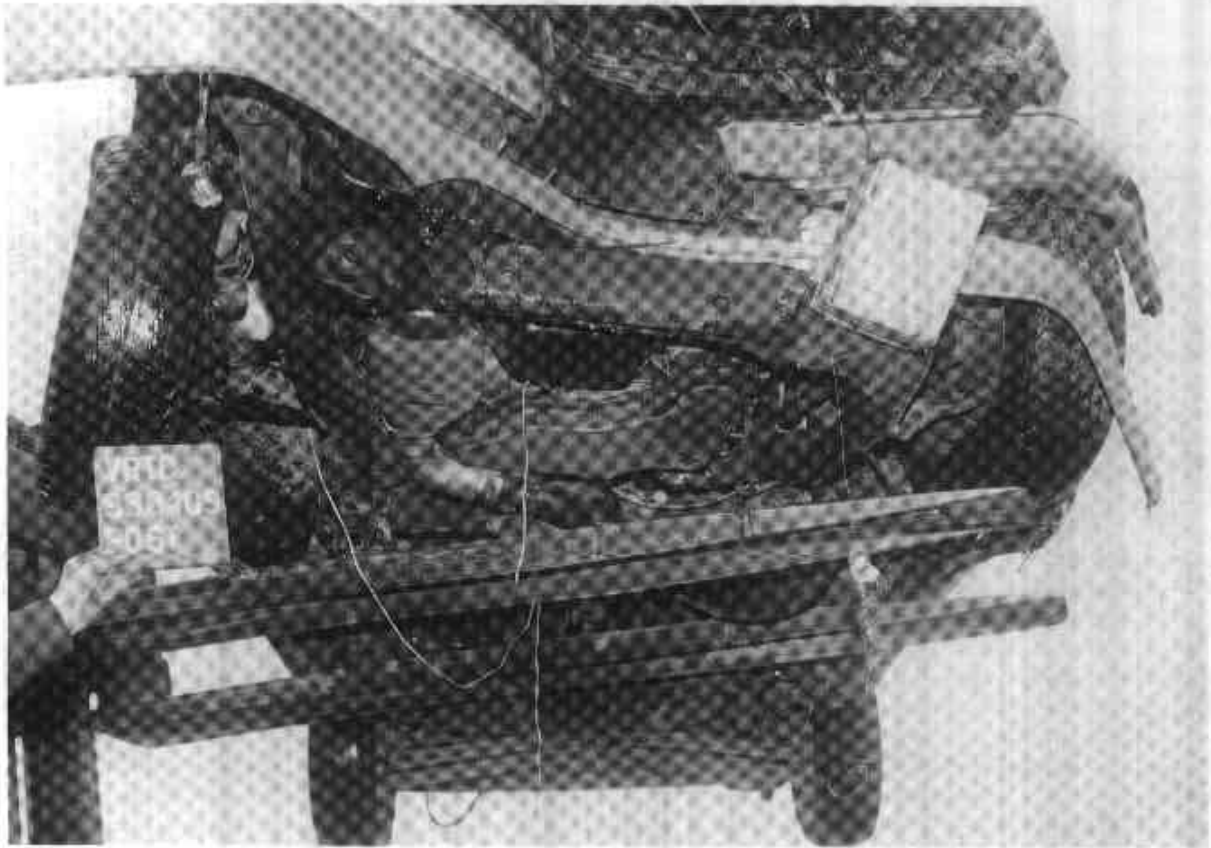


Figure A-13. POST-TEST FRONT UNDERBODY VIEW

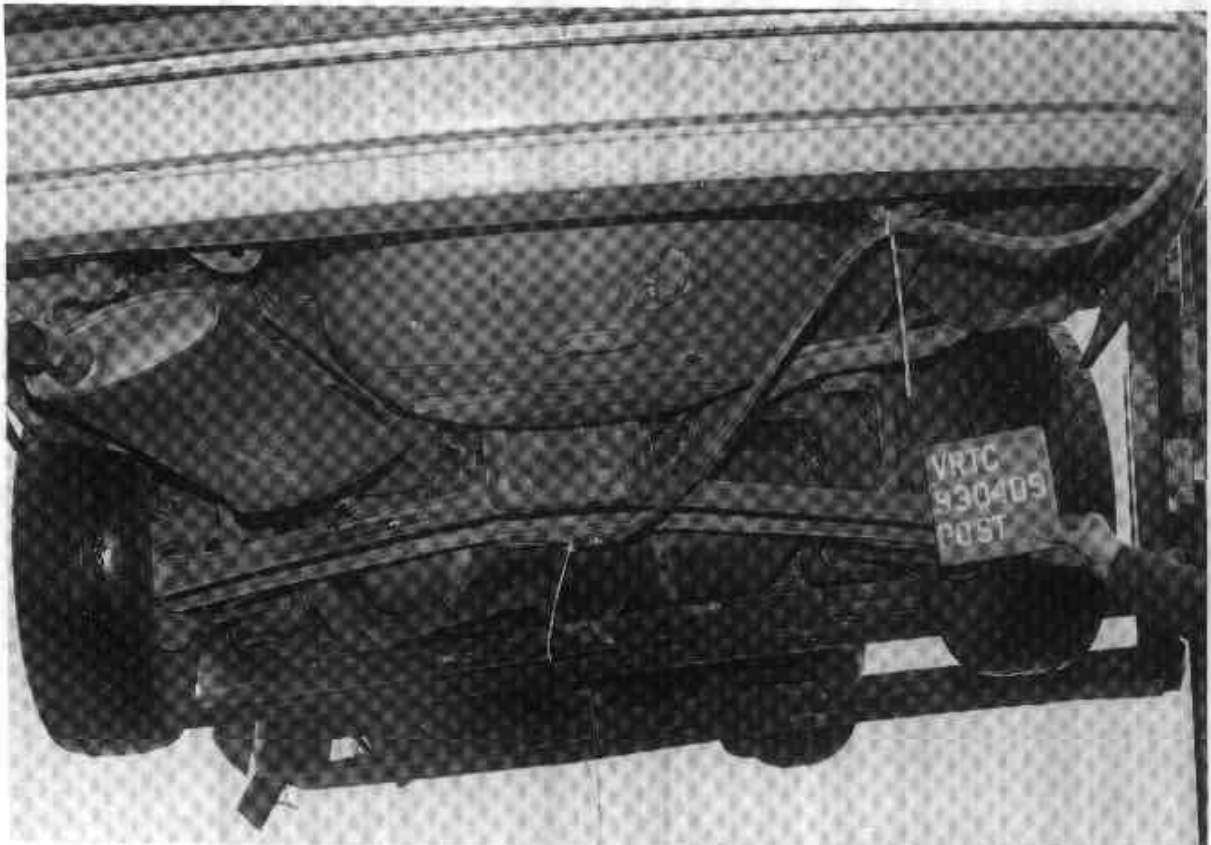


Figure A-14. POST-TEST REAR UNDERBODY VIEW

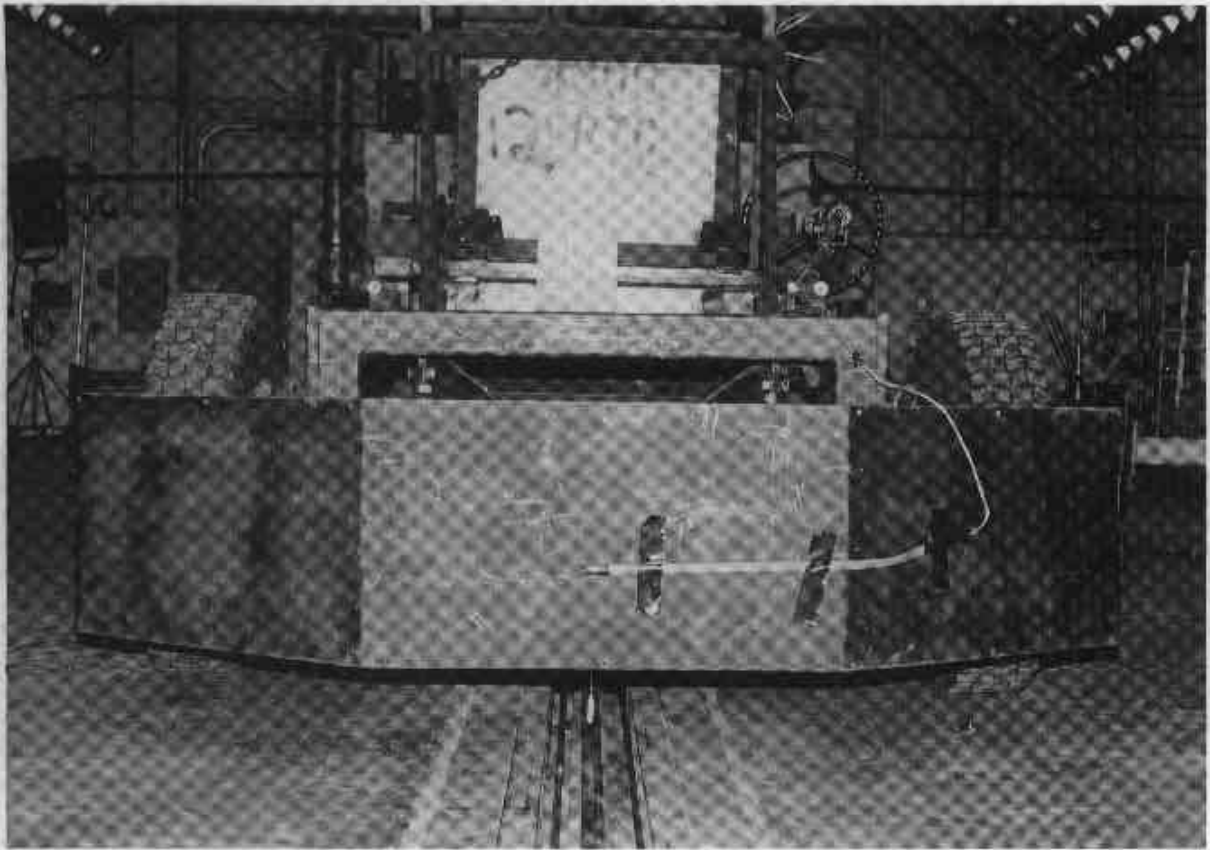


Figure A-15. PRE-TEST TRUCK FRONT VIEW

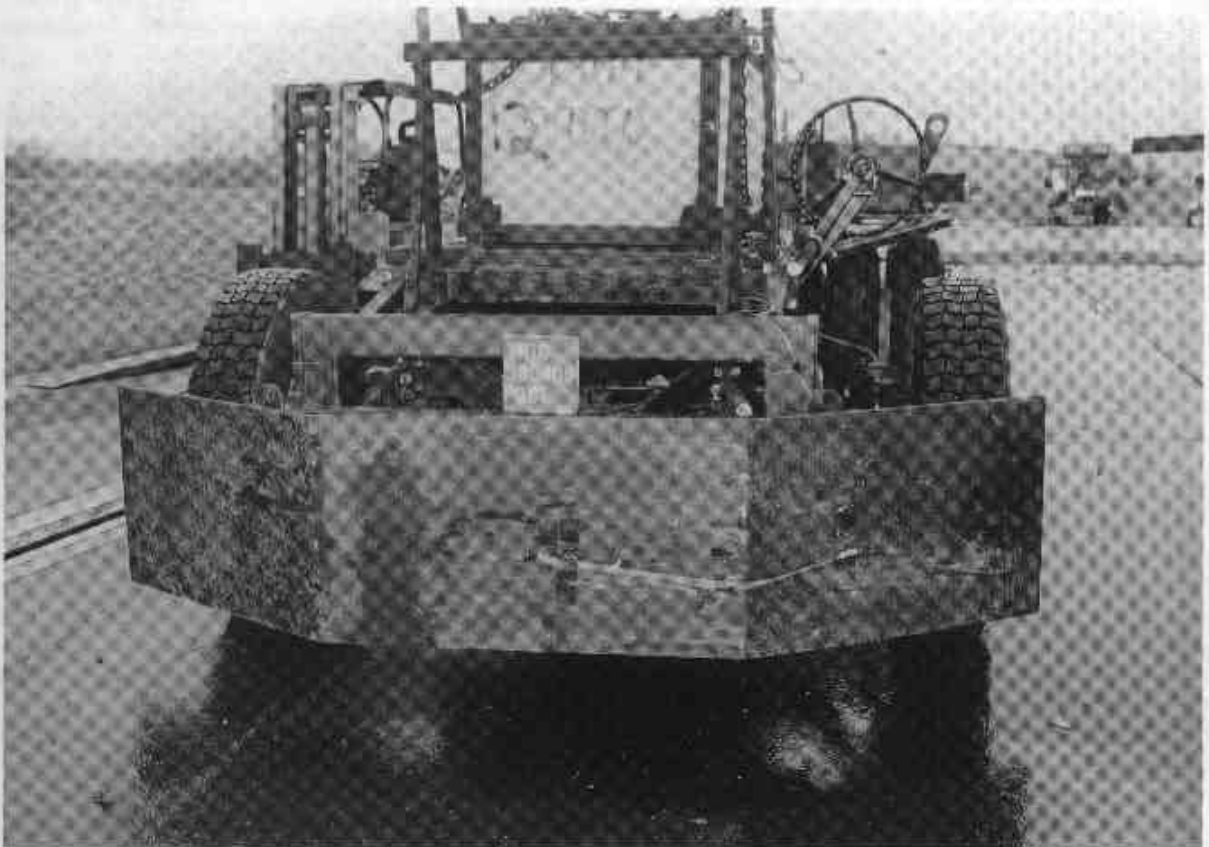


Figure A-16. POST-TEST TRUCK FRONT VIEW

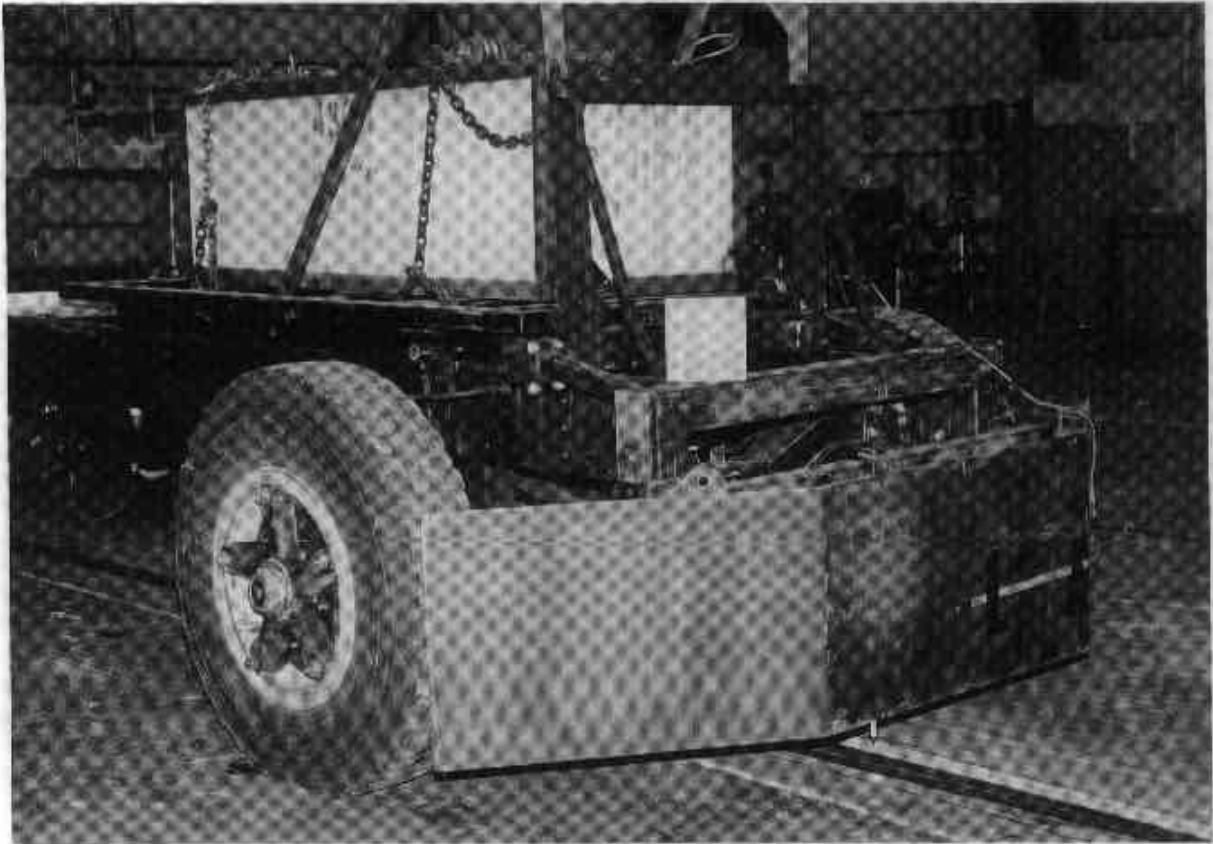


Figure A-17. PRE-TEST TRUCK RIGHT FRONT THREE-QUARTER VIEW

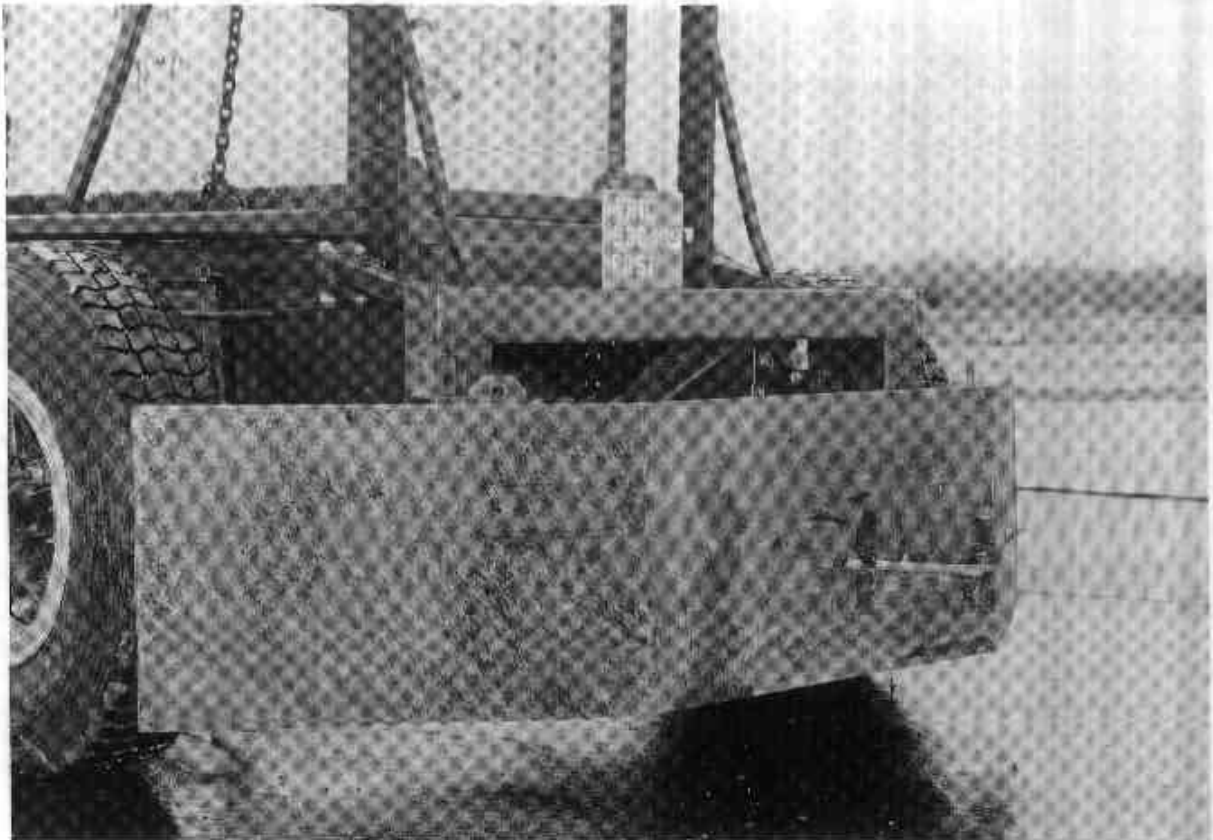


Figure A-18. POST-TEST TRUCK RIGHT FRONT THREE-QUARTER VIEW

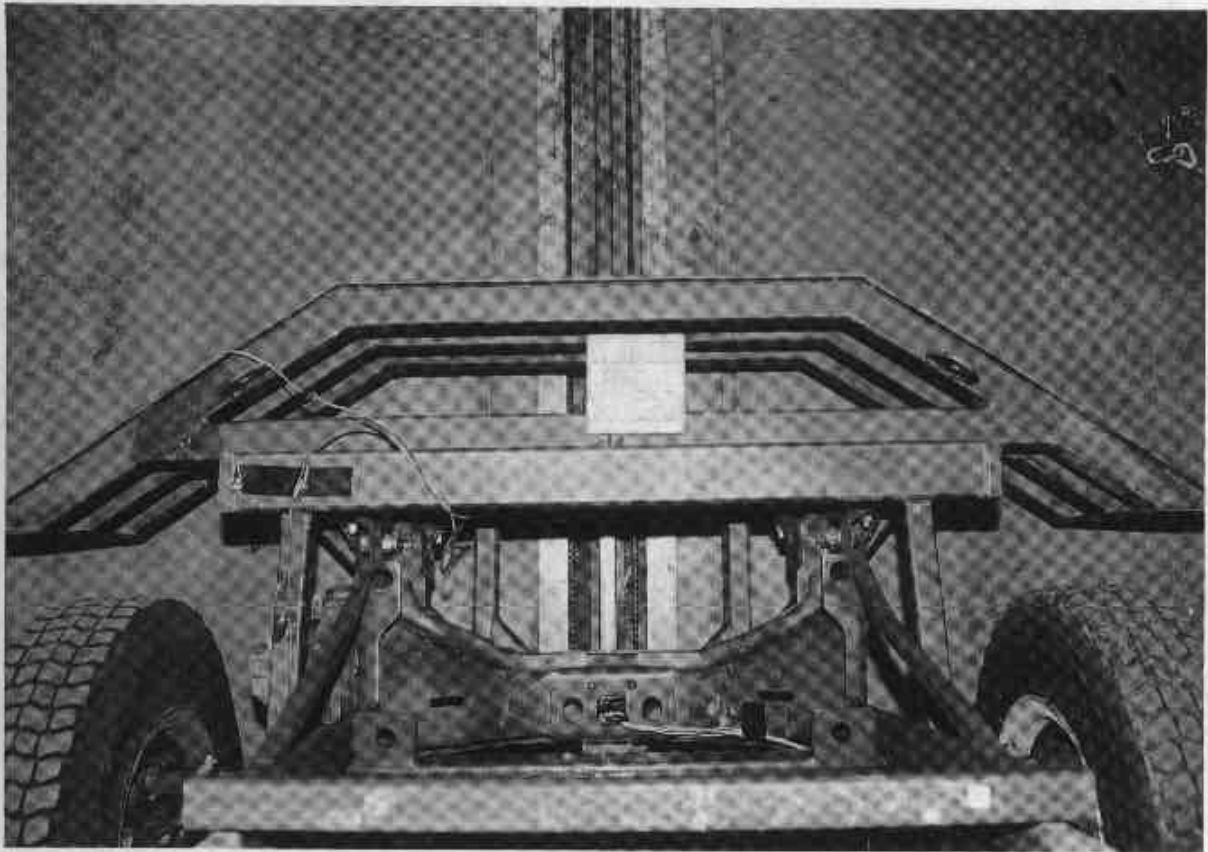


Figure A-19. PRE-TEST TRUCK FRONT TOP VIEW



Figure A-20. POST-TEST TRUCK FRONT TOP VIEW

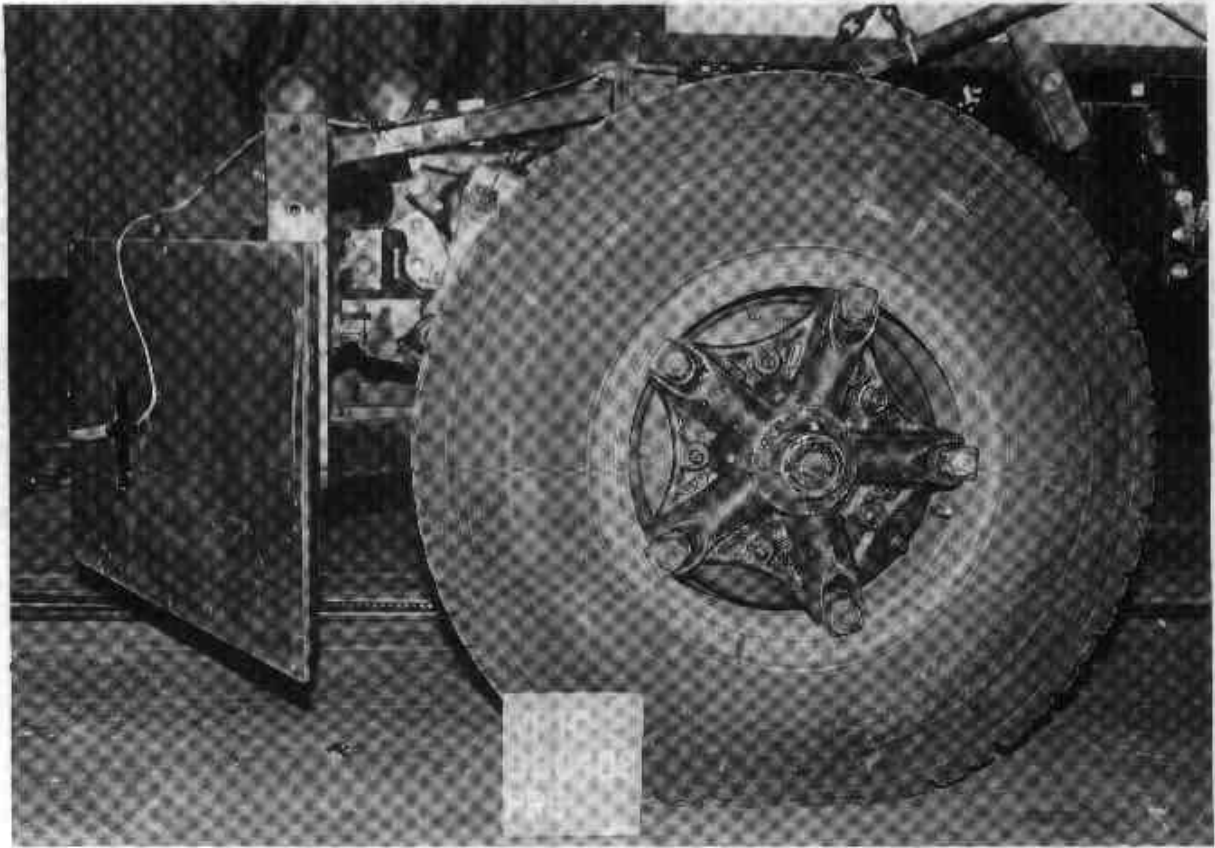


Figure A-21. PRE-TEST TRUCK SIDE CLOSE-UP

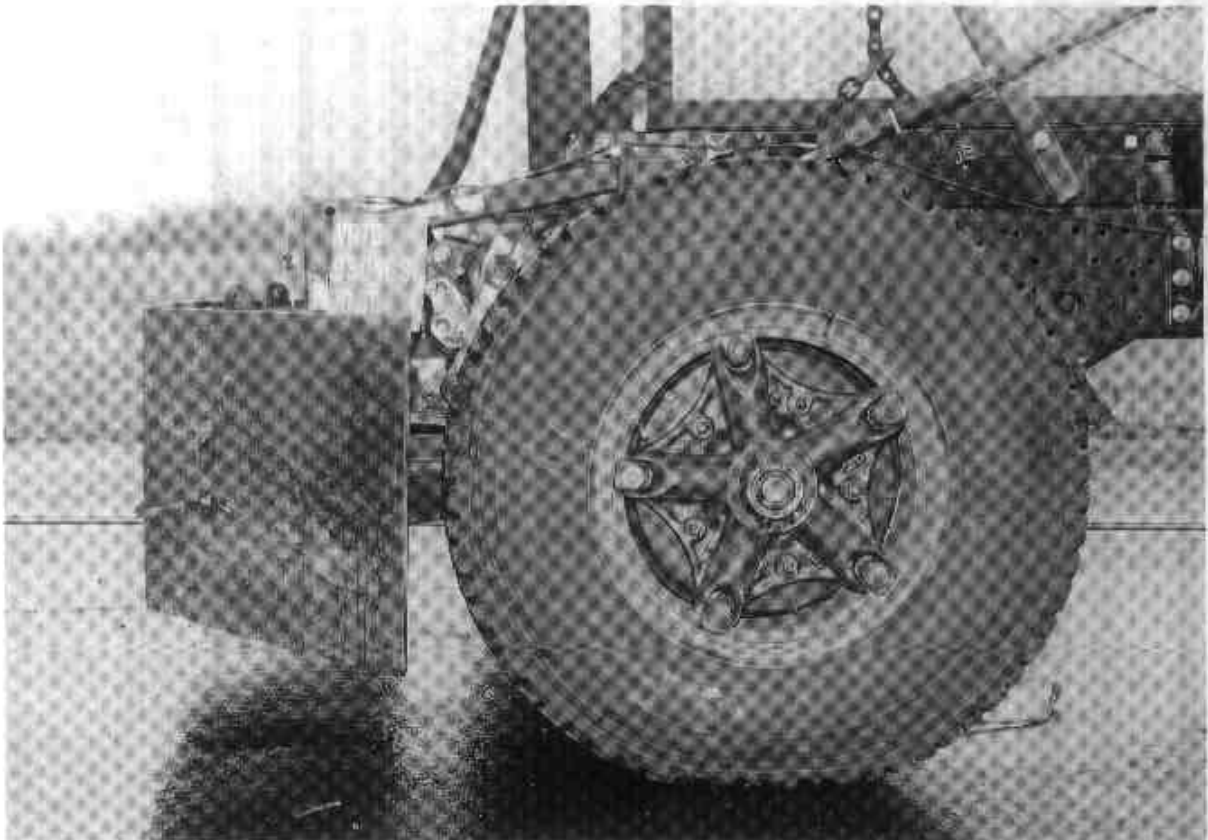


Figure A-22. POST-TEST TRUCK SIDE CLOSE-UP



Figure A-23. POST-TEST TRUCK DAMAGE CLOSE-UP VIEW



Figure A-24. PRE-TEST DUMMY VIEW



Figure A-25. POST-TEST DUMMY VIEW



Figure A-26. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 1



Figure A-27. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 2



Figure A-28. POST-TEST DUMMY HEAD CONTACT - VIEW 1



Figure A-29. POST-TEST DUMMY HEAD CONTACT - VIEW 2

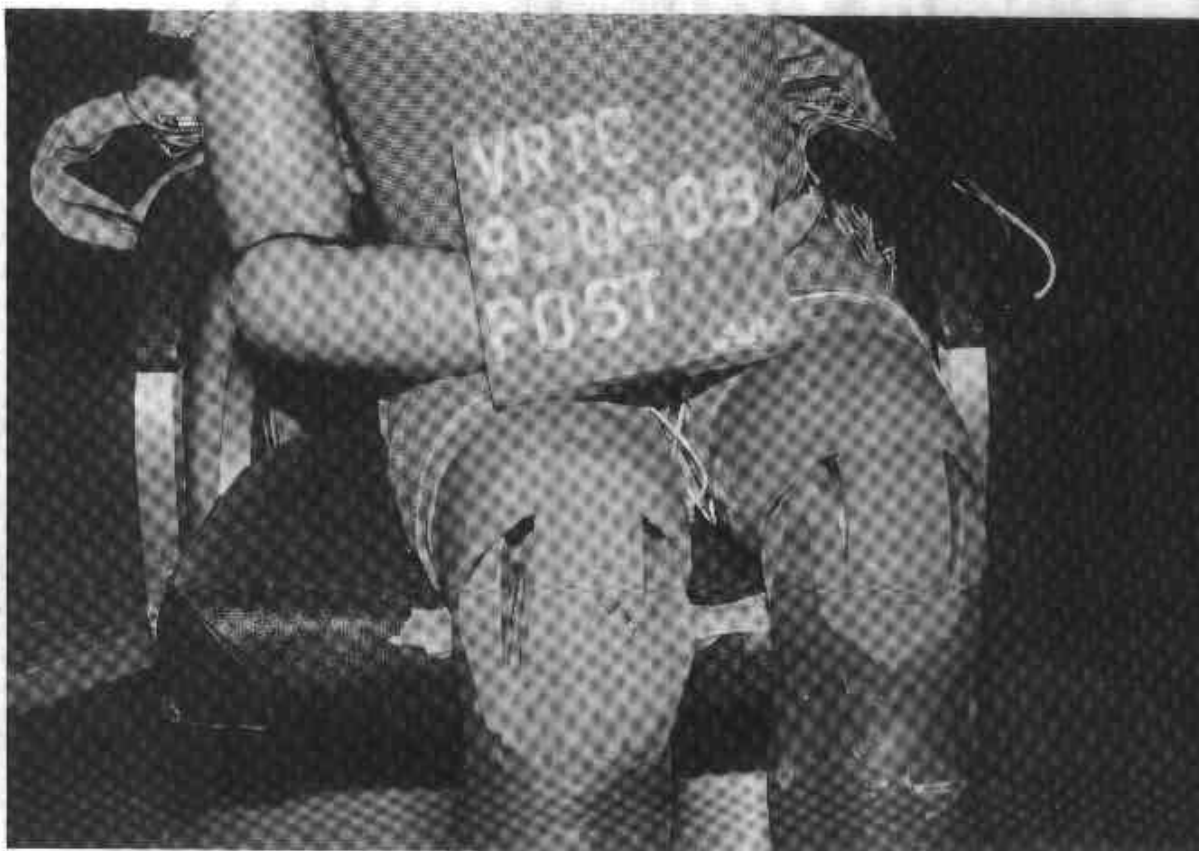


Figure A-30. POST-TEST DUMMY KNEE CONTACT - VIEW 1



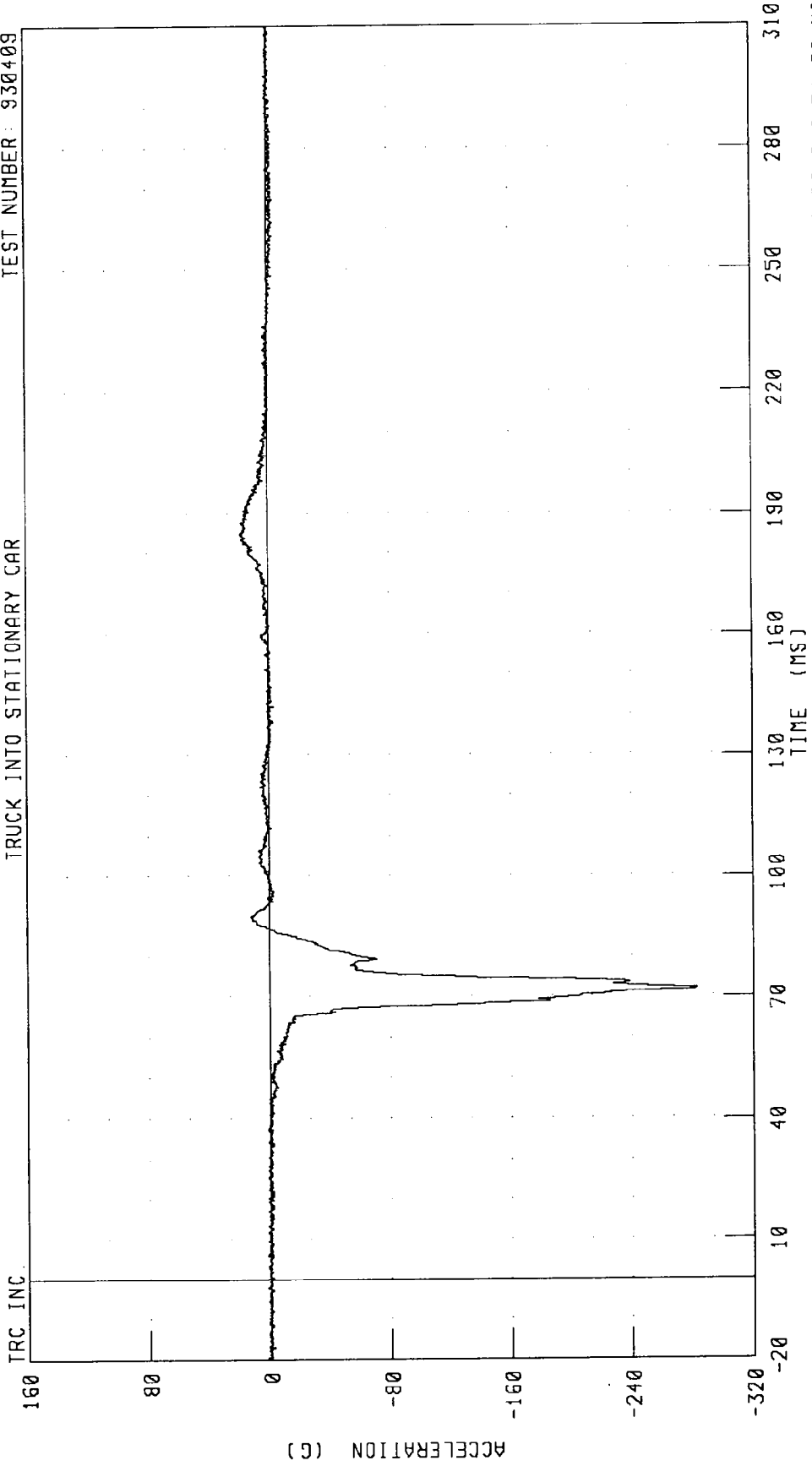
Figure A-31. POST-TEST DUMMY KNEE CONTACT - VIEW 2

APPENDIX B

DATA PLOTS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

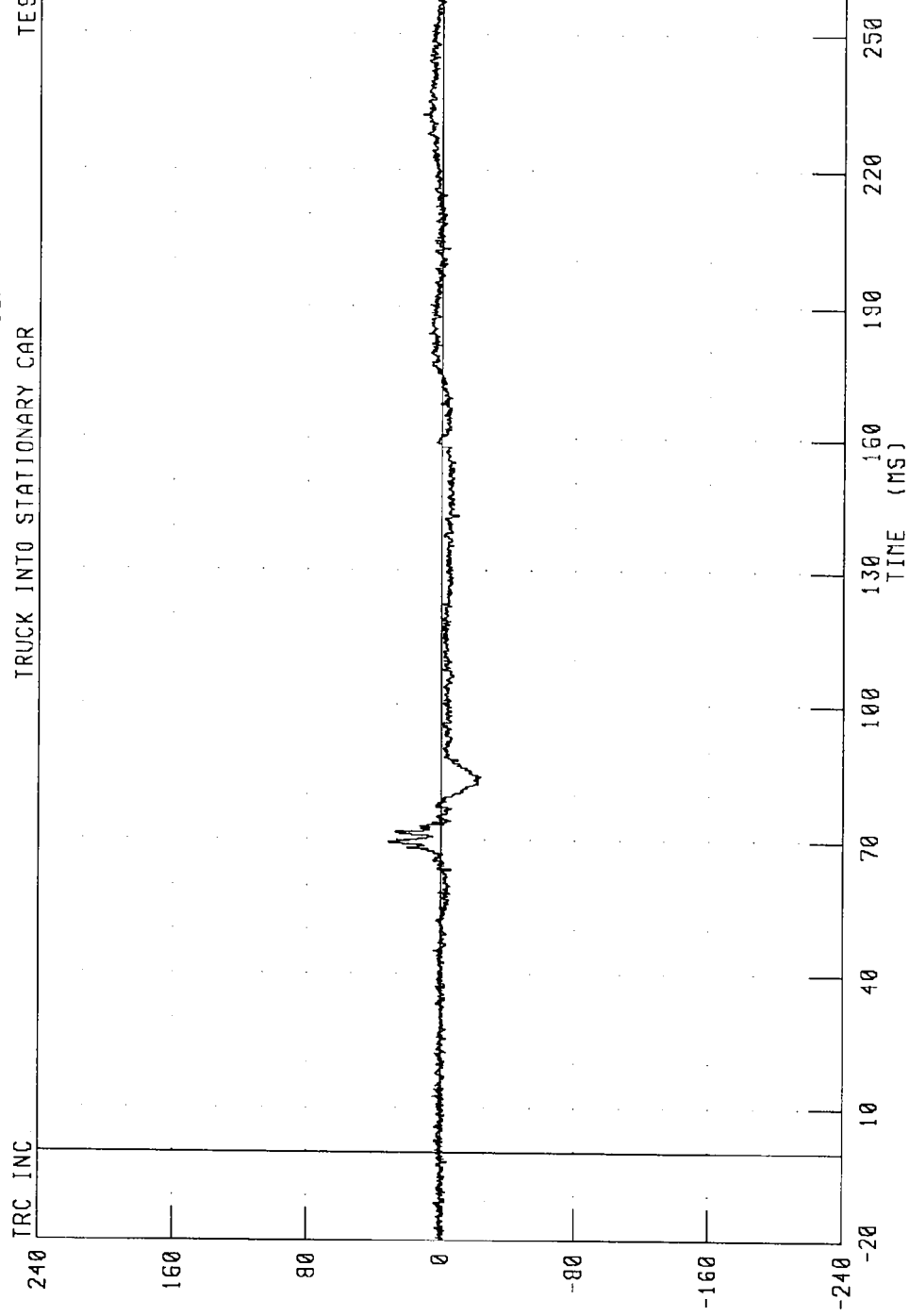


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 18.51 G @ 184.75 MS, -282.29 G @ 71.88 MS

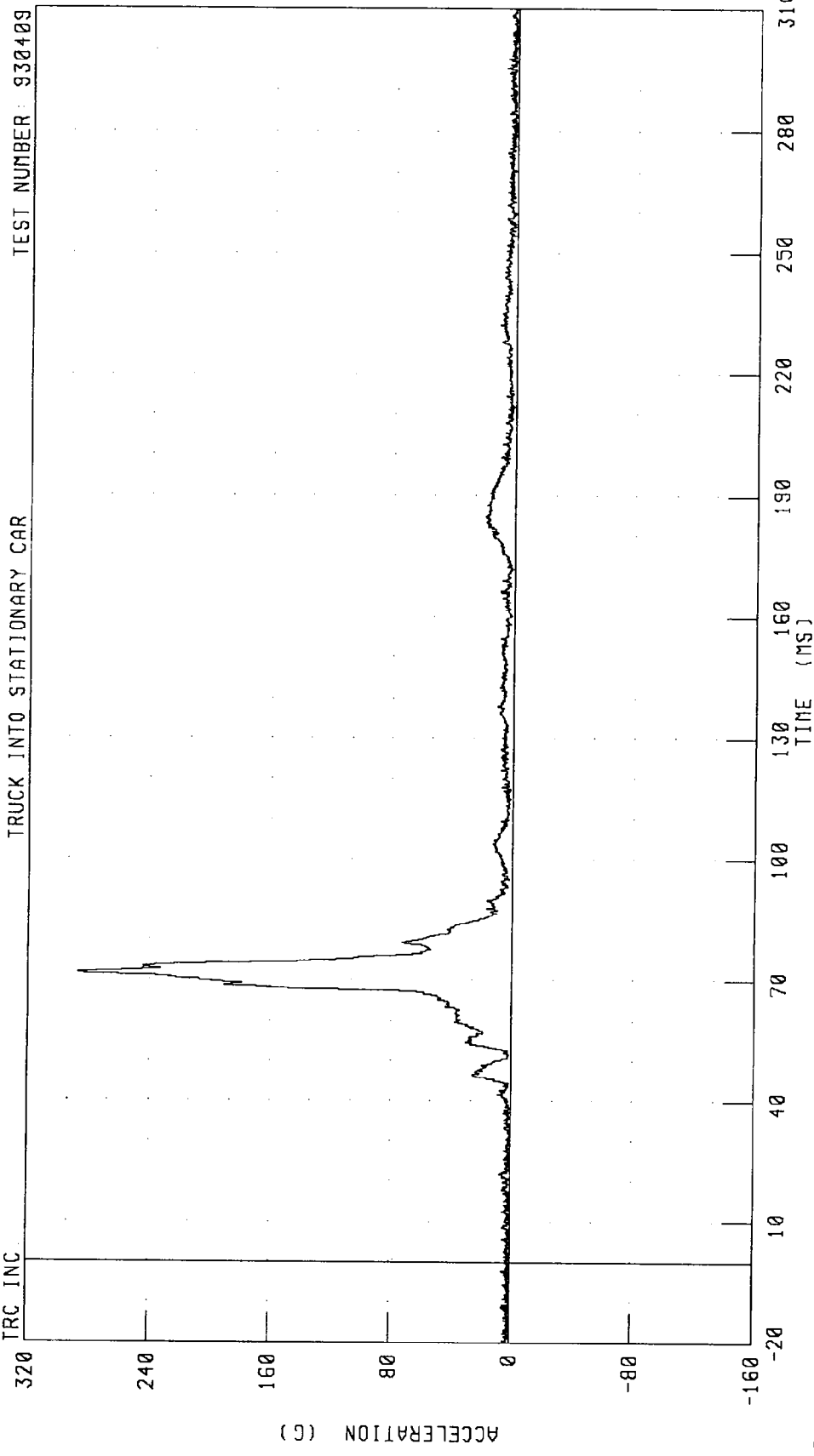
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000  
PEAK DATA: 31.92 G @ 69.75 MS, -23.38 G @ 83.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD RESULTANT ACCELERATION  
TRUCK INTO STATIONARY CAR



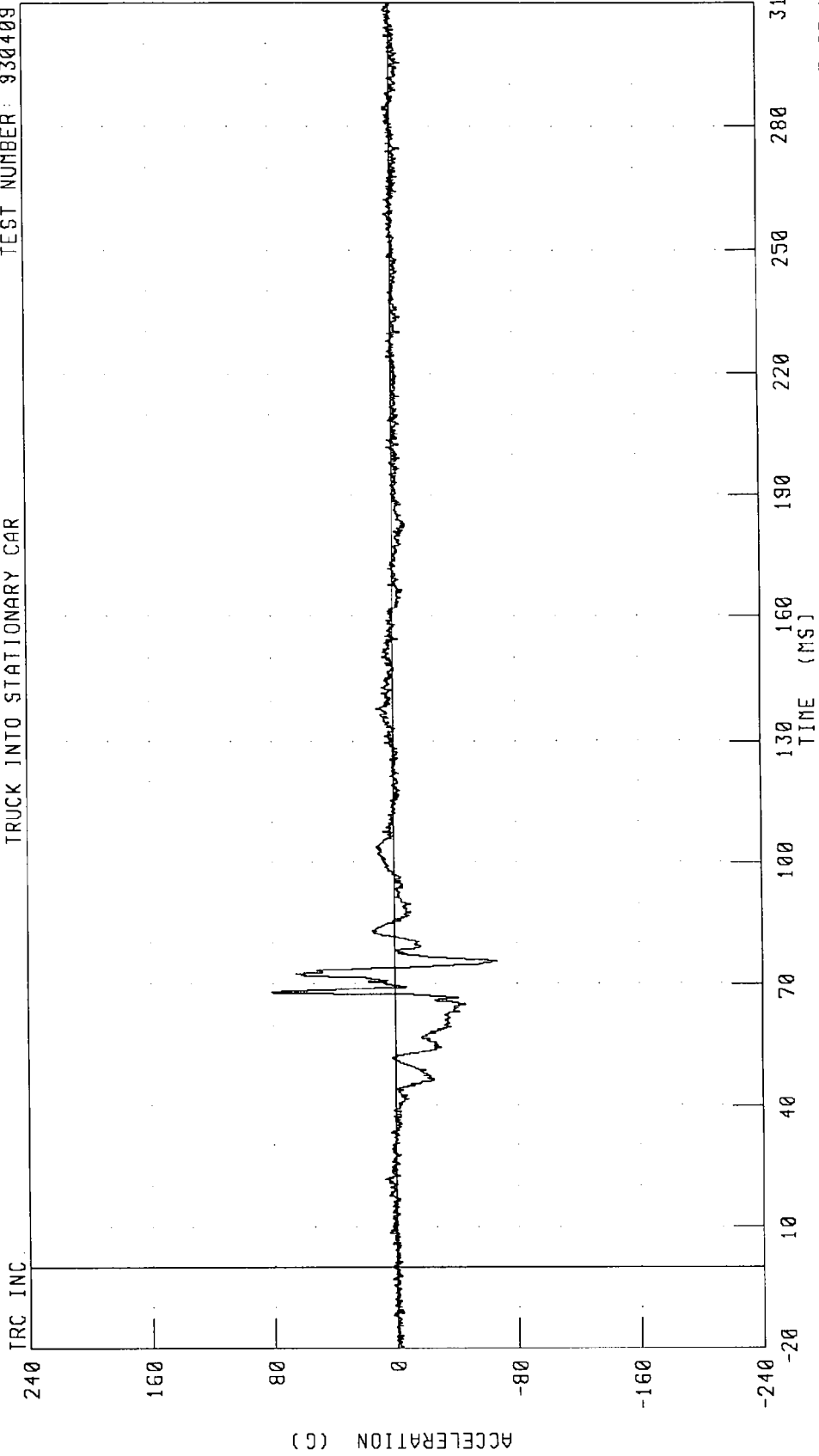
TRC\_INC  
320

TEST NUMBER: 930409

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000  
PEAK DATA: 286.91 G @ 71.88 MS, 0.30 G @ 30.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD Z-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



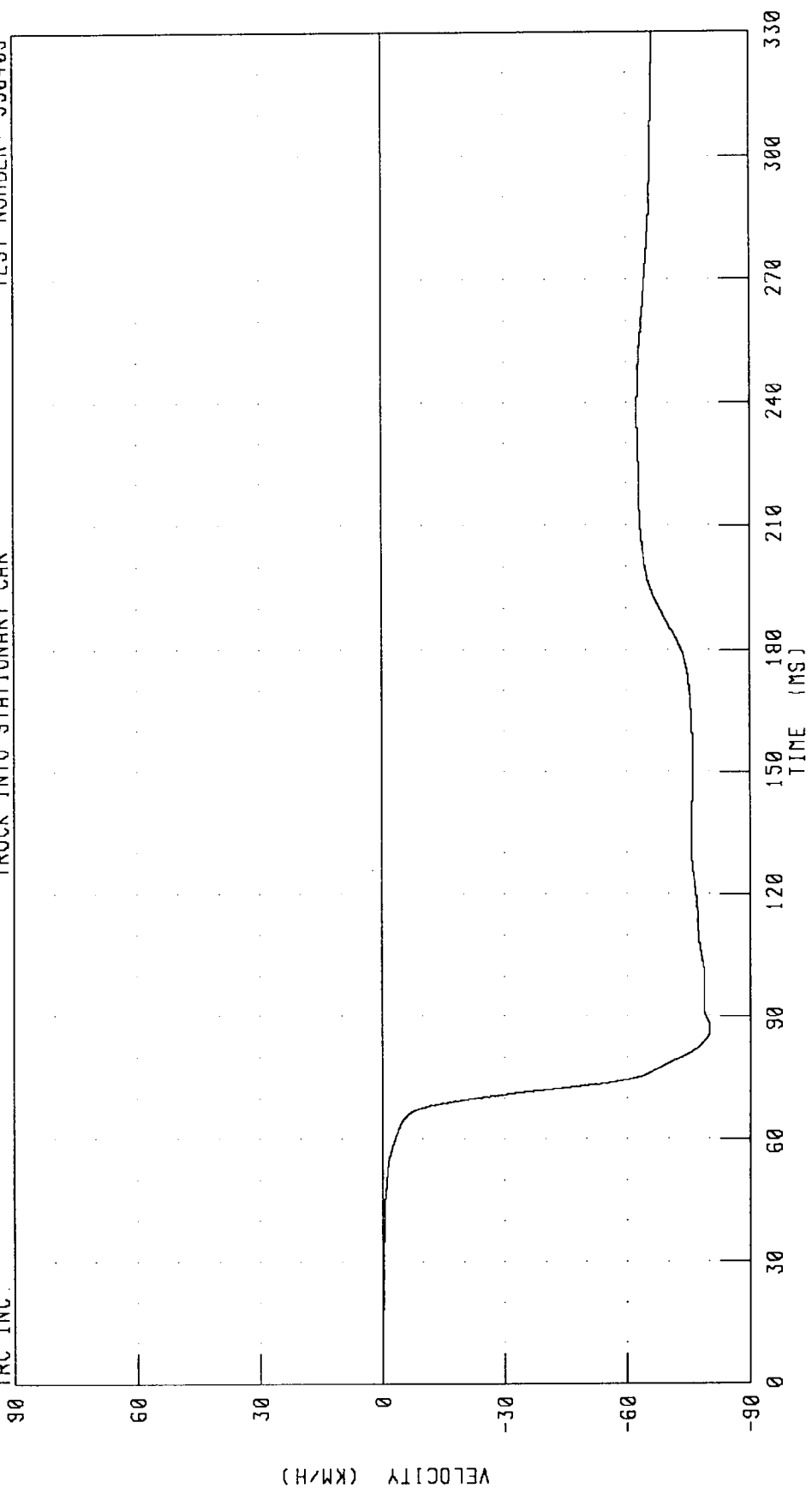
CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 81.01 G @ 68.13 MS; -66.77 G @ 75.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

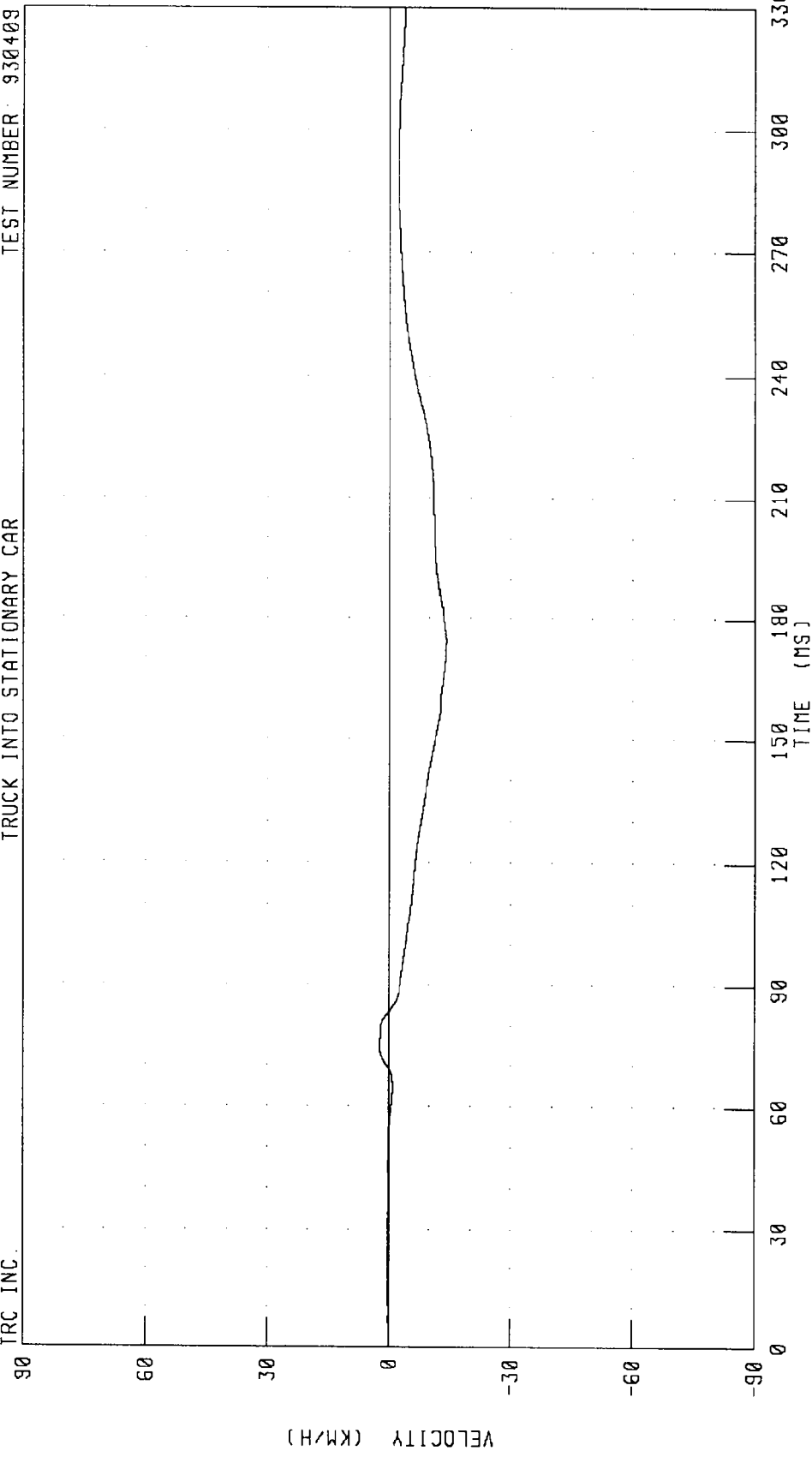


CHANNEL: HEDXV1 FILTER: CH. CLASS 180 PEAK DATA: 0.00 KM/H @ 1.38 MS; -80.10 KM/H @ 86.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

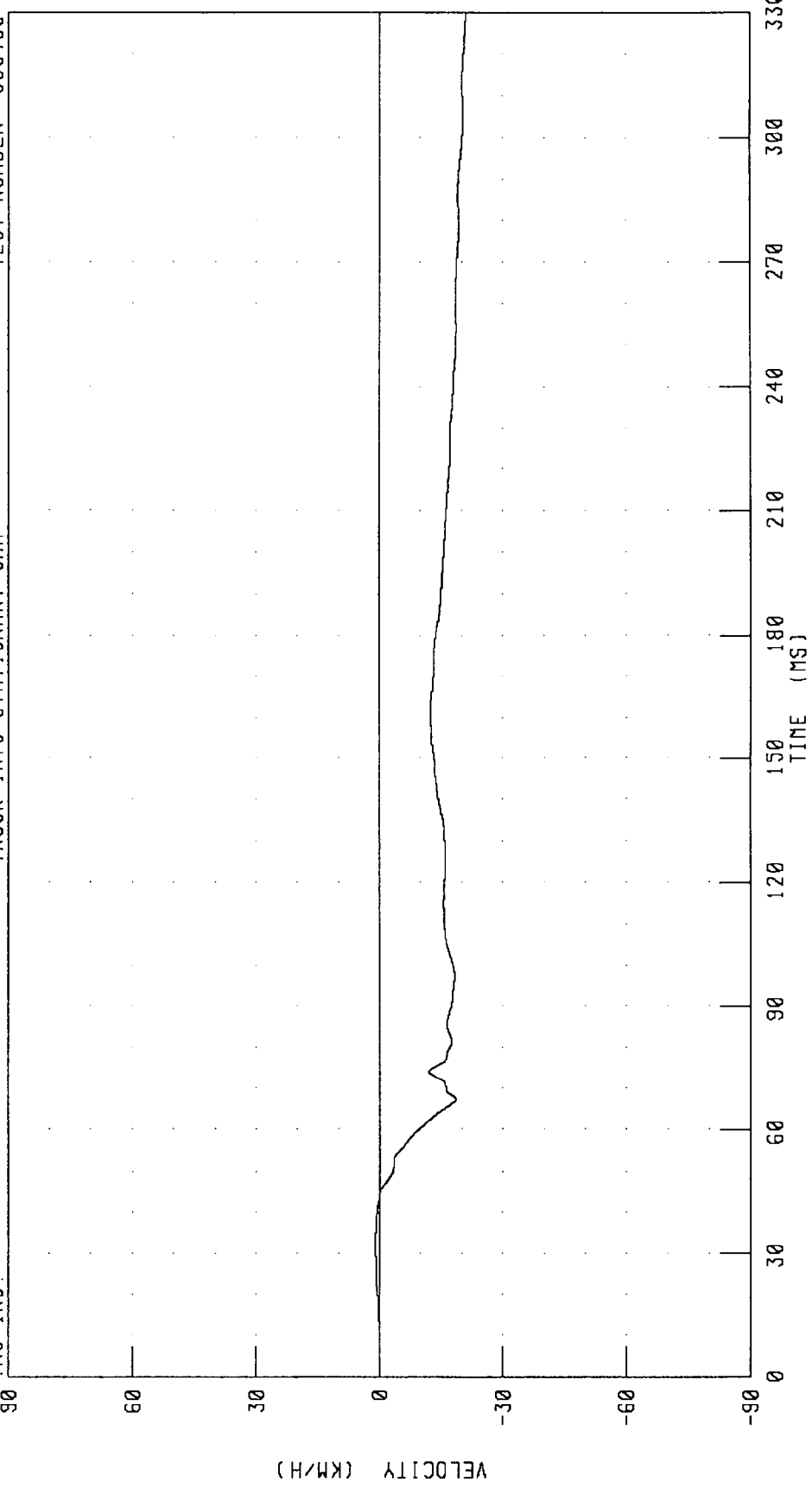


CHANNEL: HEDYV1 FILTER: CH. CLASS 180 PEAK DATA: 2 30 KM/H @ 74.13 MS, -14.08 KM/H @ 174.38 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER HEAD Z-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

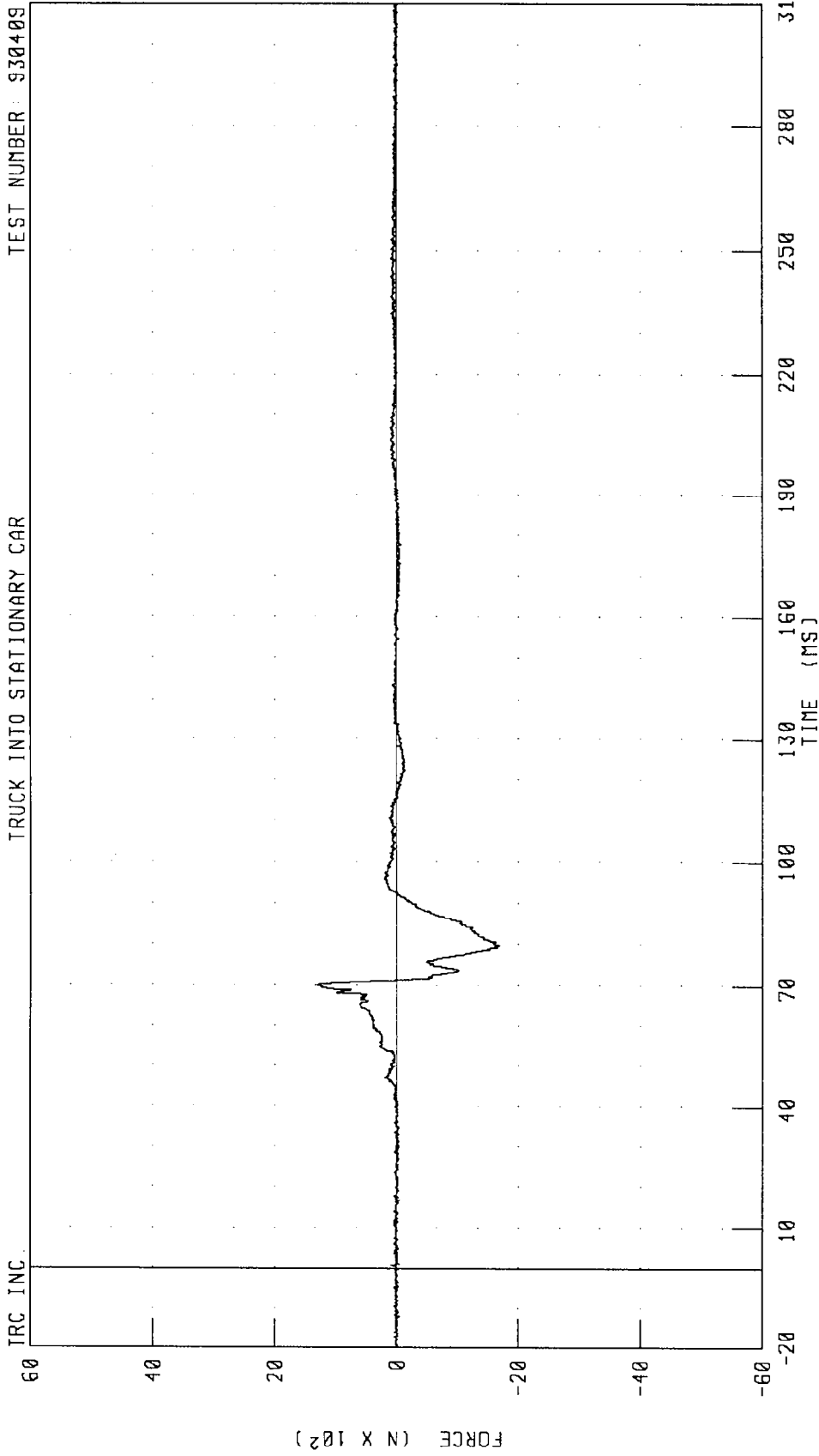


CHANNEL: HEDZV1 FILTER: CH. CLASS 180

PEAK DATA: 0.95 KM/H @ 30.75 MS; -21.03 KM/H @ 330.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK X-AXIS SHEAR FORCE  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

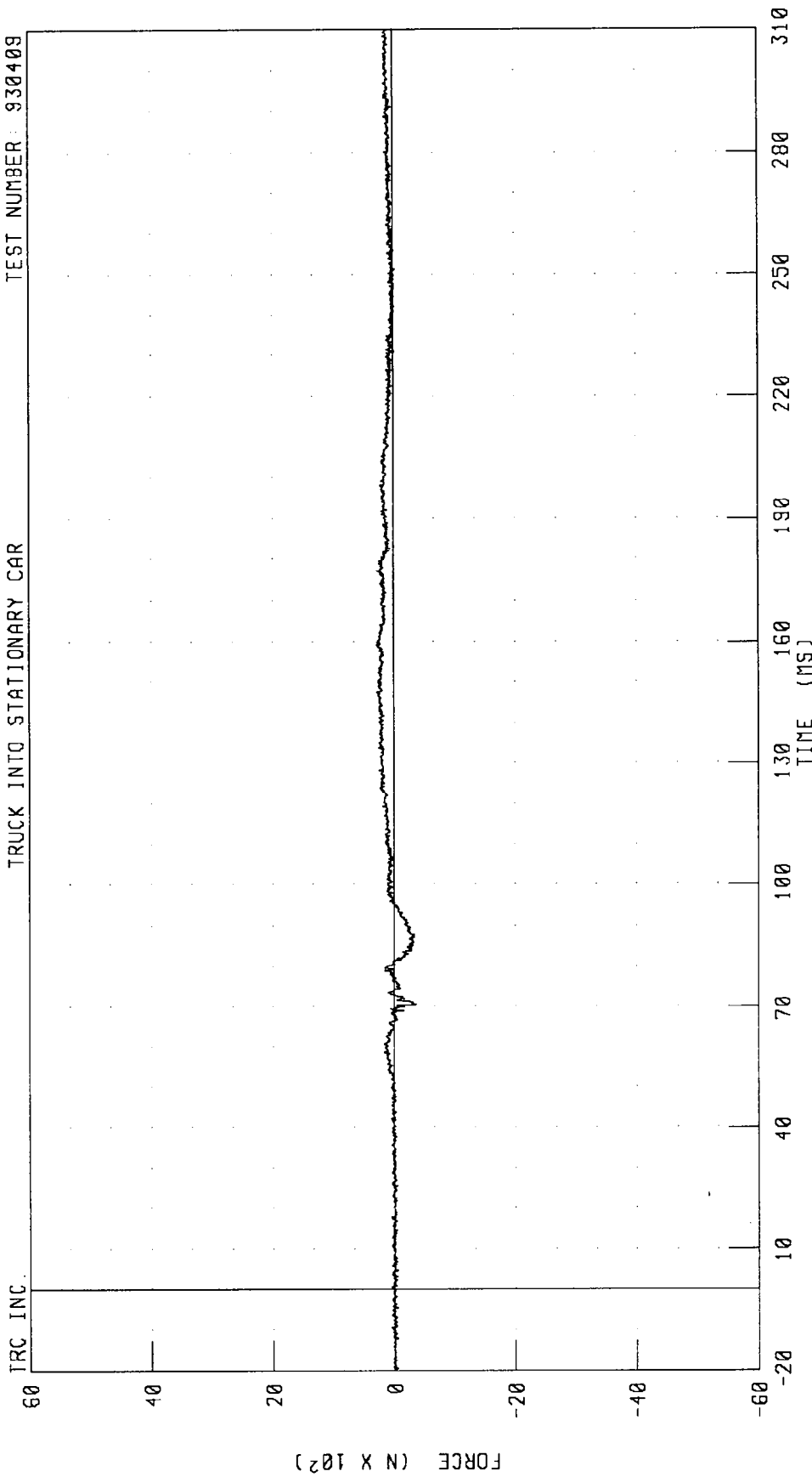


CHANNEL: NEXF1 FILTER: CH. CLASS 1000

PEAK DATA: 1302.86 N @ 70.25 MS; -1689.64 N @ 79.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK Y-AXIS SHEAR FORCE  
TRUCK INTO STATIONARY CAR

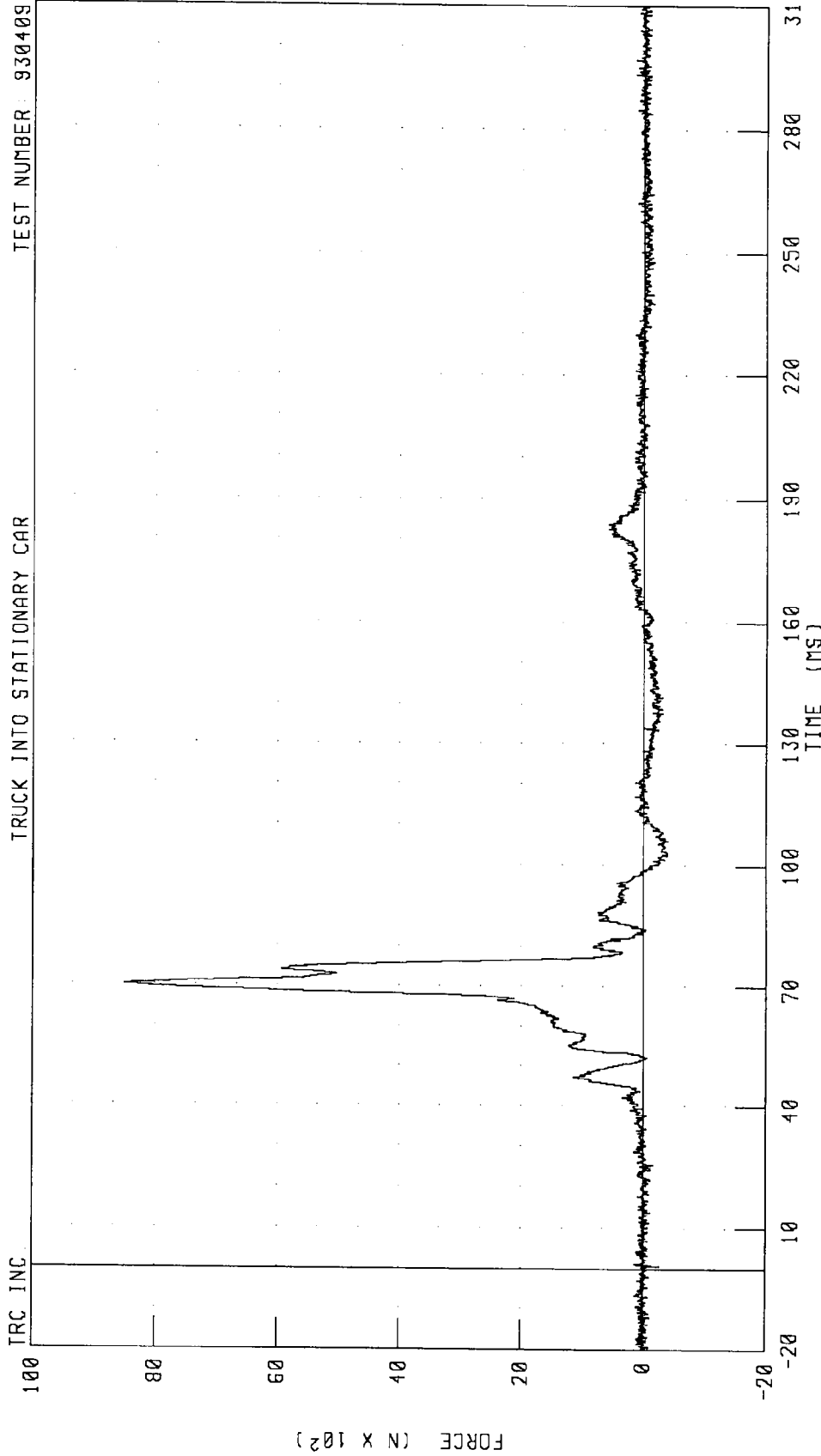
TEST NUMBER: 930409



CHANNEL: NEKYFI FILTER: CH. CLASS 1000  
PEAK DATA: 278.96 N @ 159.25 MS; -370.02 N @ 70.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK Z-AXIS AXIAL FORCE  
TRUCK INTO STATIONARY CAR

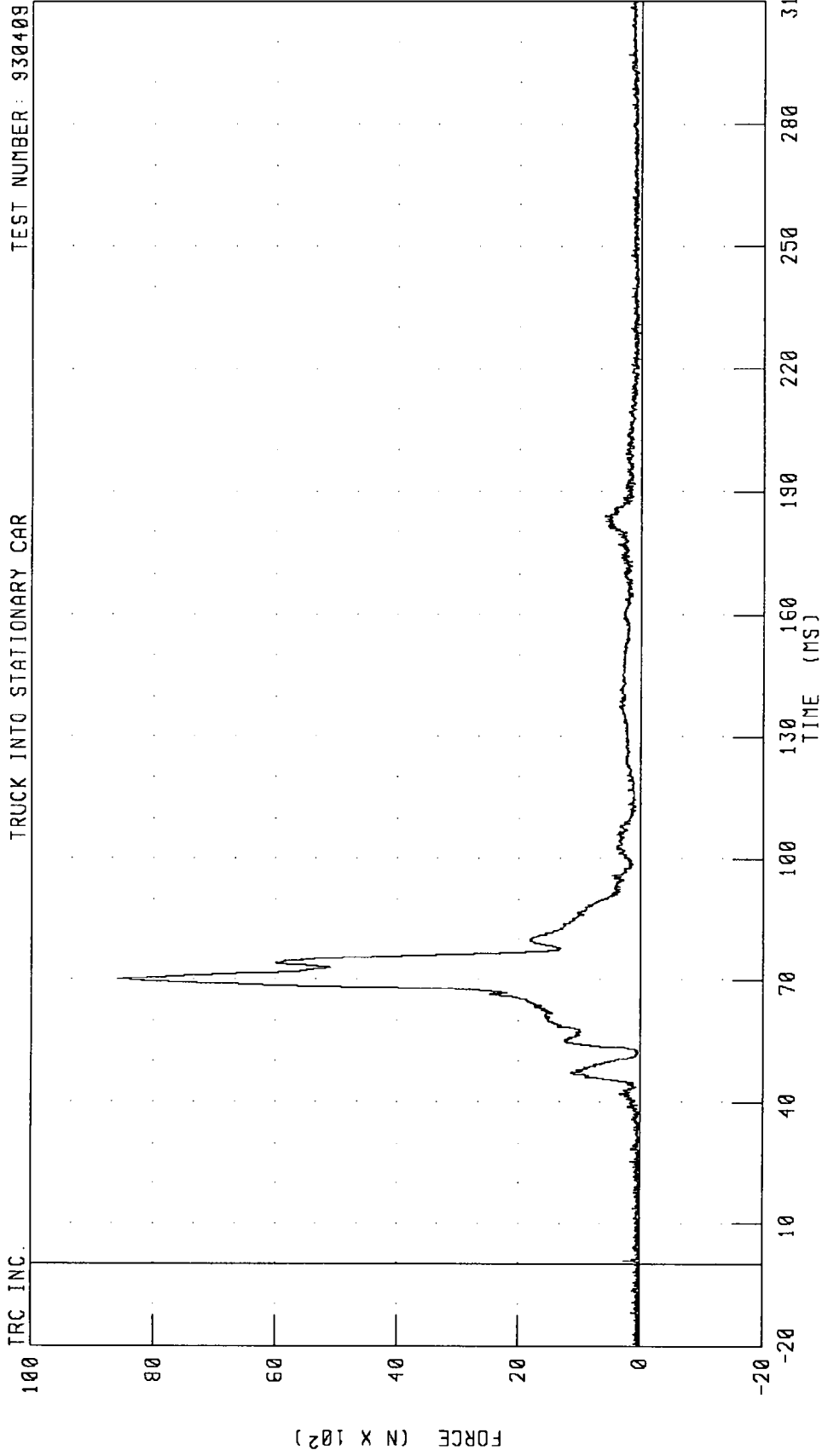
TEST NUMBER: 930409



CHANNEL: NEKZF1 FILTER: CH. CLASS 1000  
PEAK DATA: 8496.91 N @ 70.25 MS; -397.03 N @ 106.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK RESULTANT FORCE  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



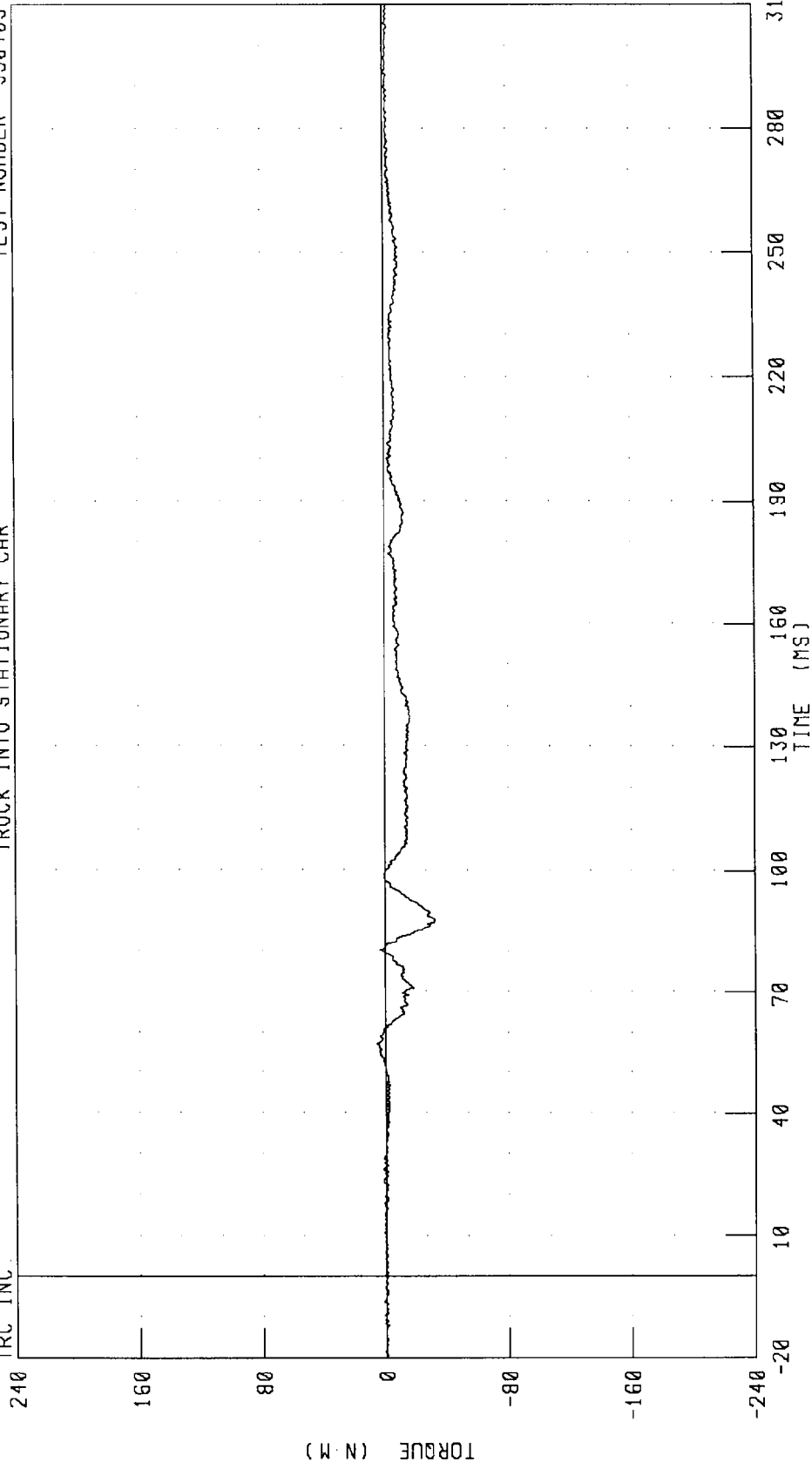
CHANNEL: NEKRF1 FILTER: CH. CLASS 1000

PEAK DATA: 8597.14 N @ 70.25 MS; 3.69 N @ -1.38 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK MOMENT ABOUT X AXIS  
TRUCK INTO STATIONARY CAR

TEST NUMBER 930409

TRC INC

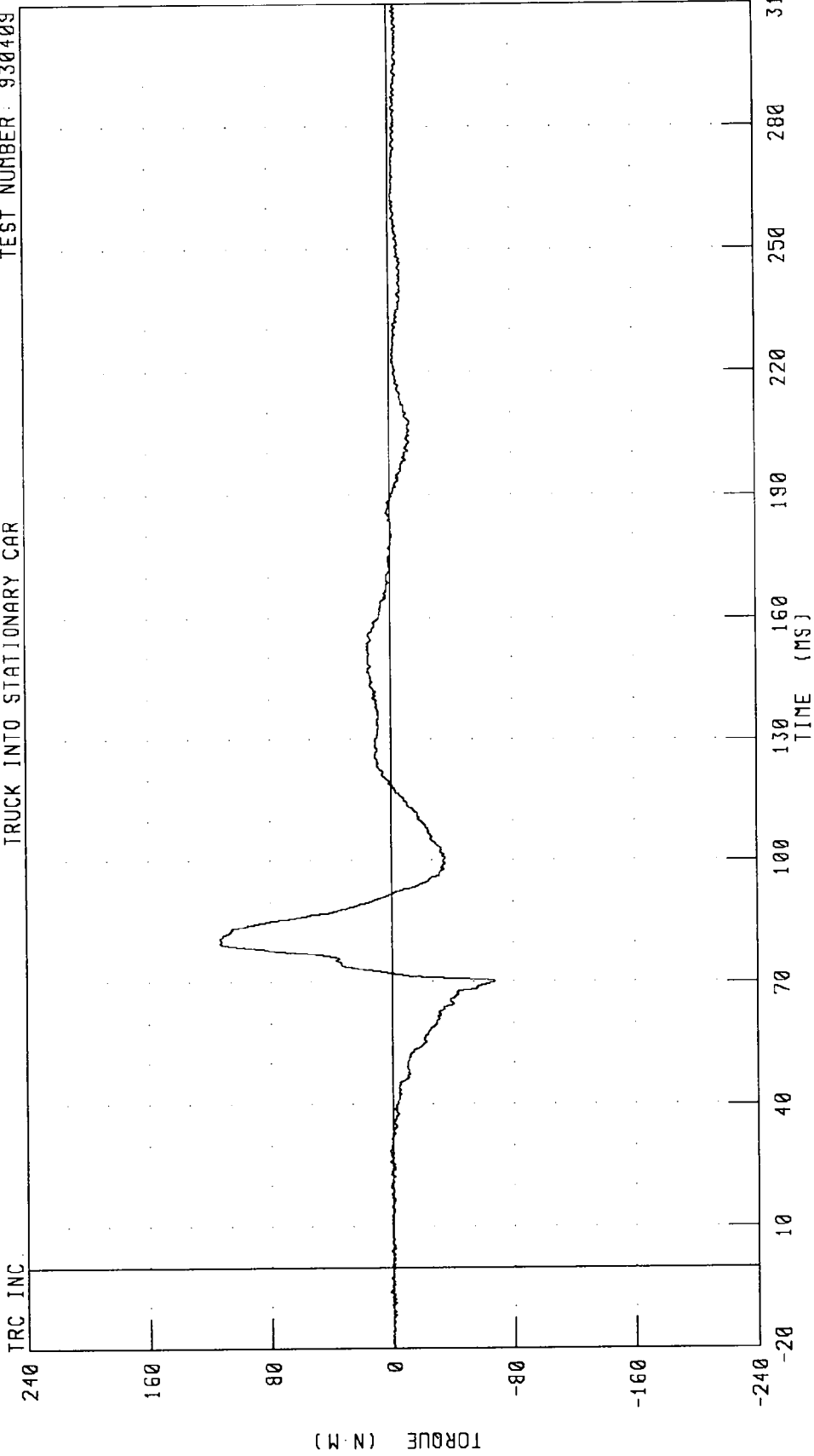


CHANNEL: NEKXMI FILTER: CH. CLASS 600

PEAK DATA: 5.14 N·M @ 56.88 MS; -32.17 N·M @ 87.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK MOMENT ABOUT Y AXIS  
TRUCK INTO STATIONARY CAR

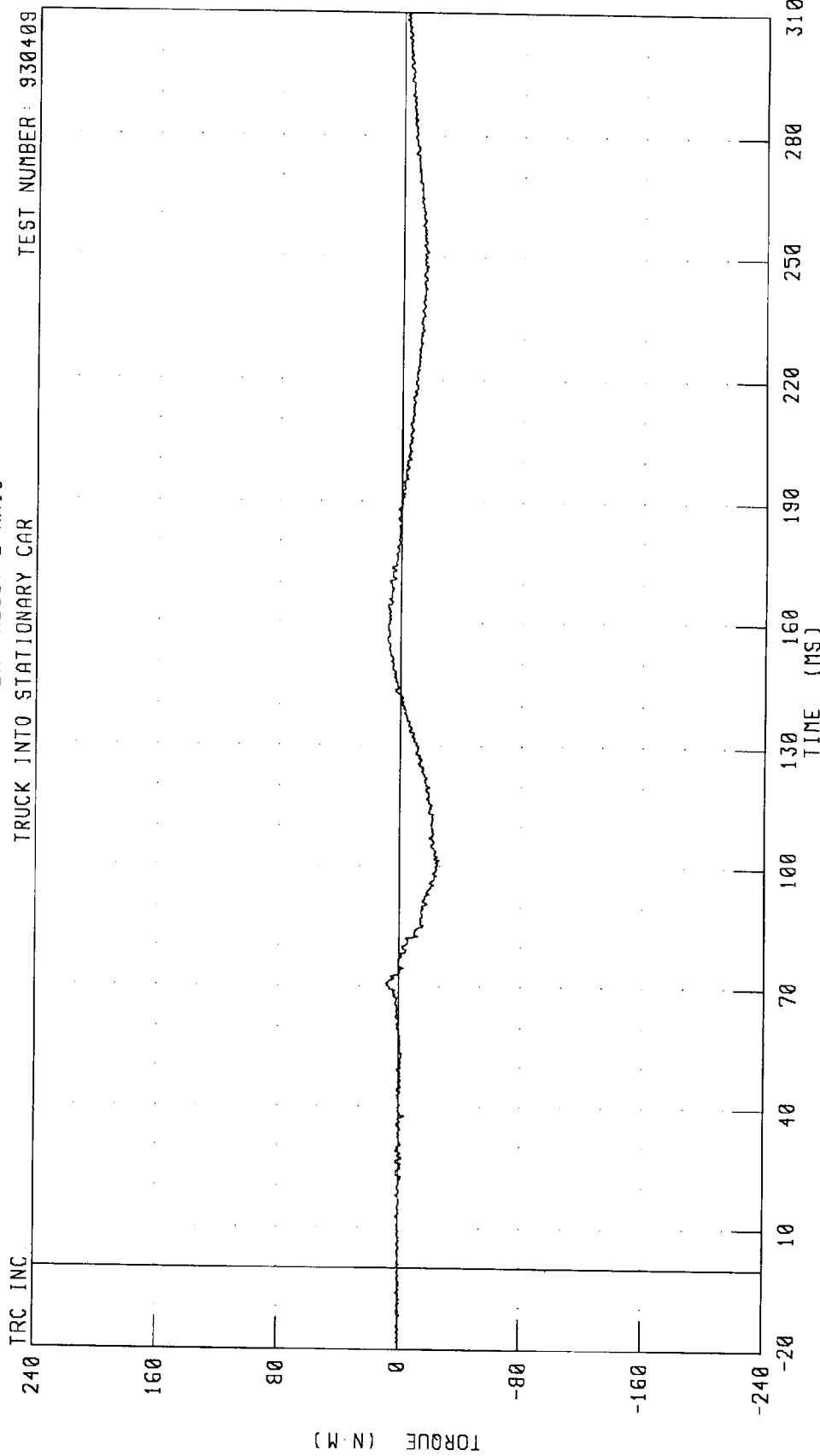
TEST NUMBER: 930409



CHANNEL: NEKYM1 FILTER: CH. CLASS 600  
PEAK DATA: 113.30 N·M @ 80.00 MS, -67.40 N·M @ 130.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK MOMENT ABOUT Z AXIS  
TRUCK INTO STATIONARY CAR

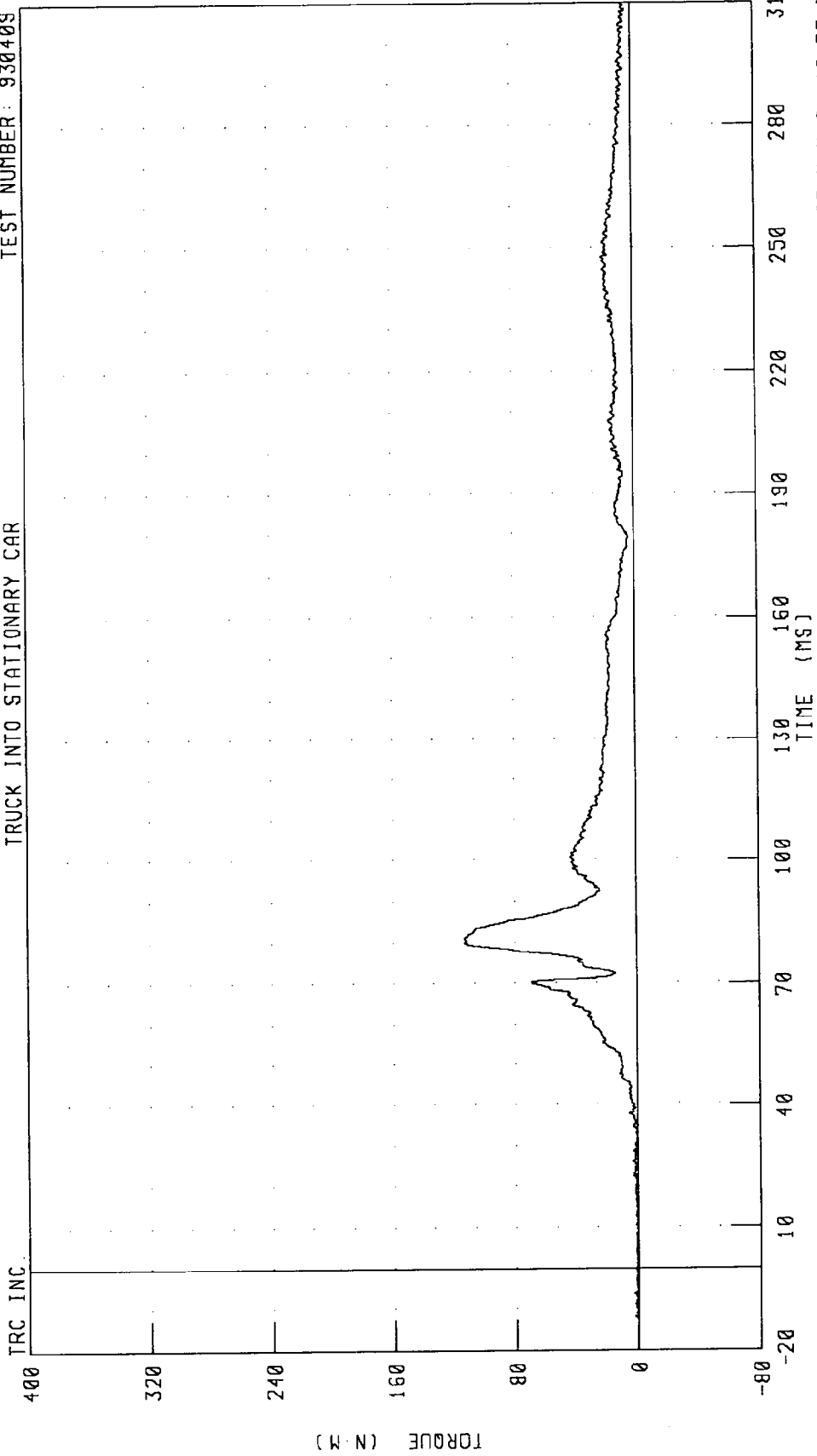
TEST NUMBER: 930408



CHANNEL: NEKZM1 FILTER: CH. CLASS 600 PEAK DATA: 8.76 N.M @ 164.25 MS, -25.77 N.M @ 101.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER NECK MOMENT RESULTANT  
TRUCK INTO STATIONARY CAR

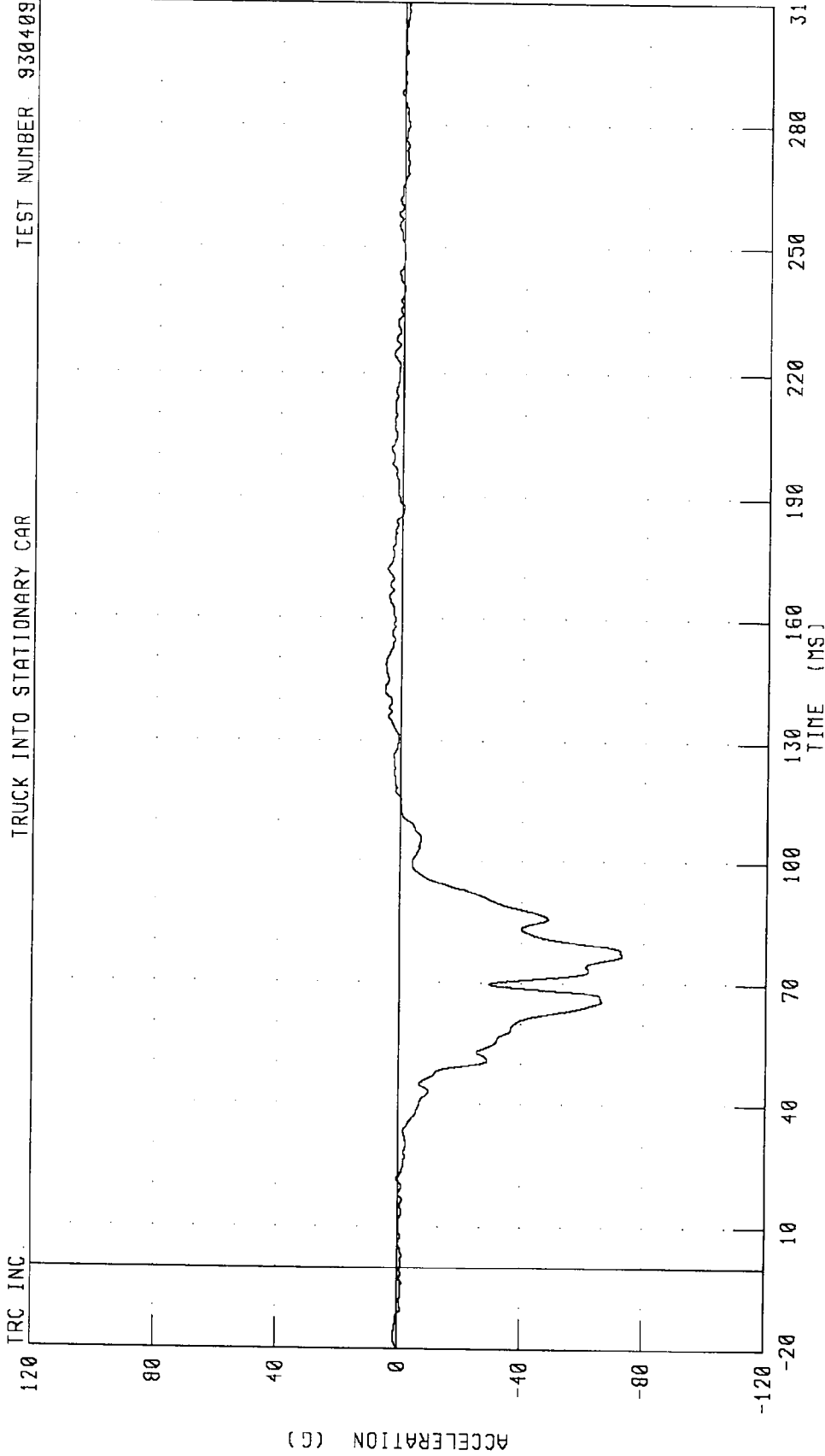
TEST NUMBER: 930409



CHANNEL: NEKRM1 FILTER: CH CLASS 600

PEAK DATA: 113.34 N M @ 80.00 MS; 0.03 N M @ -13.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR



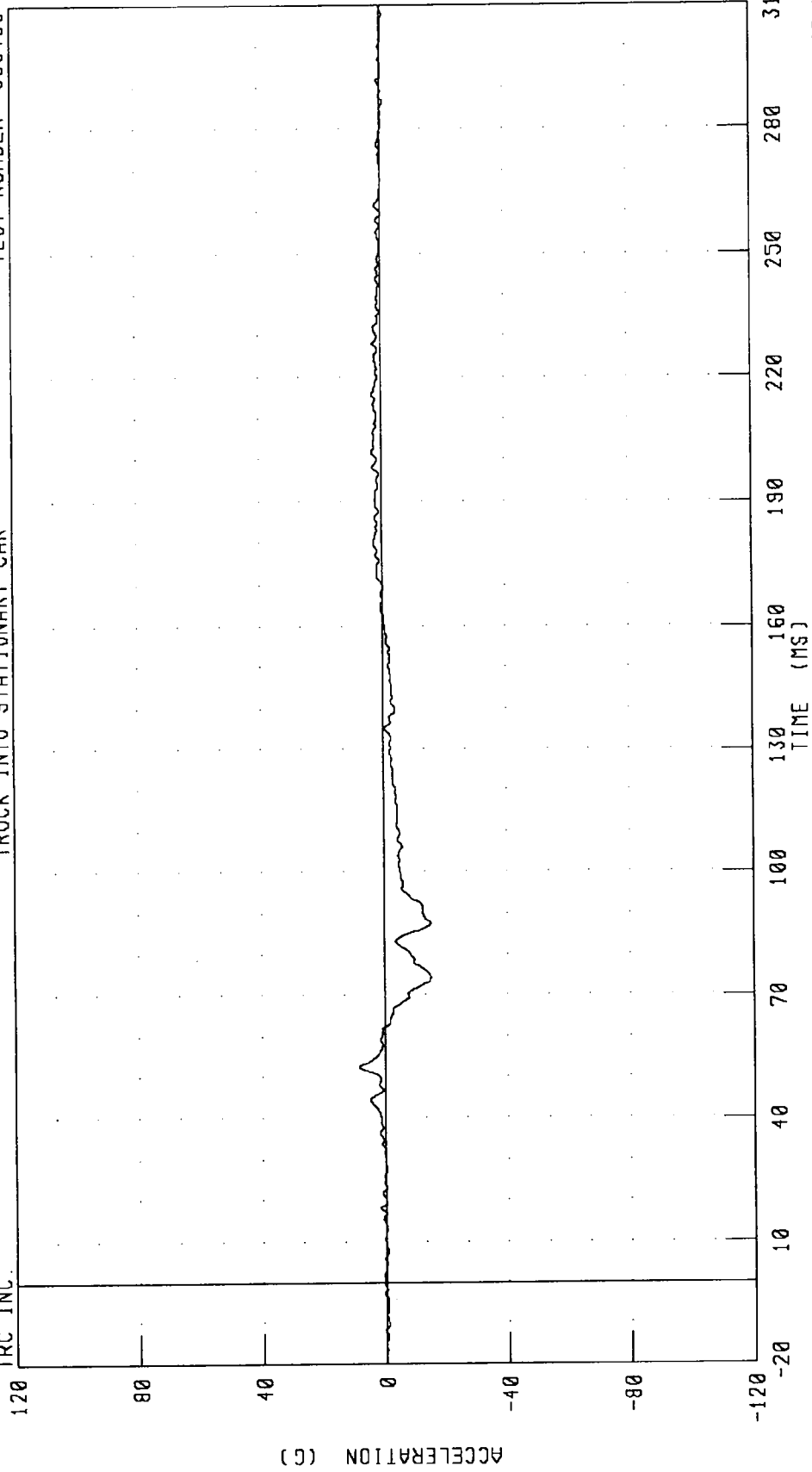
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

PEAK DATA: 5.24 G @ 142.00 MS; -72.95 G @ 76.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

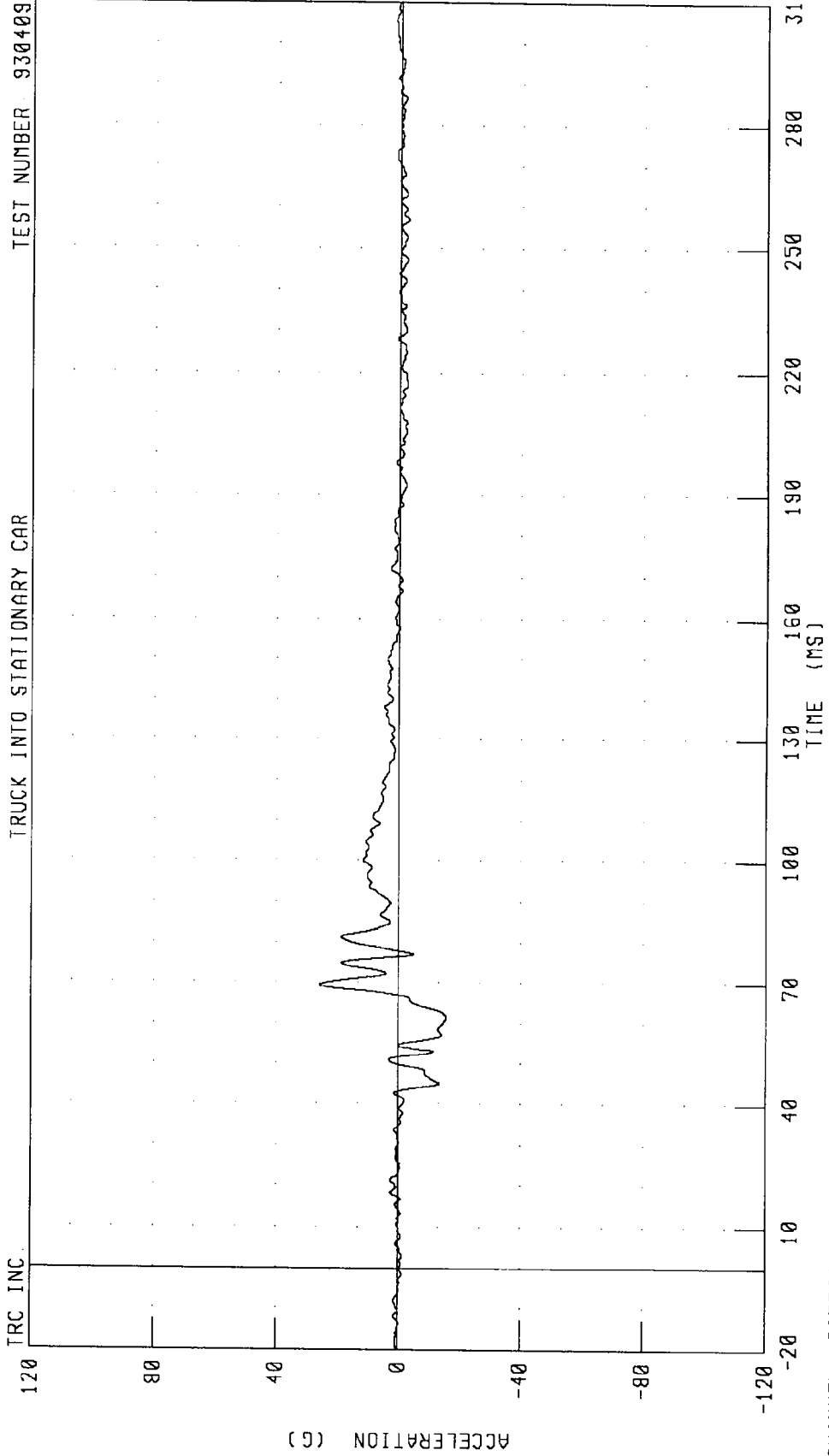
TRC INC.



CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 8.36 G @ 52.50 MS; -15.11 G @ 87.63 MS

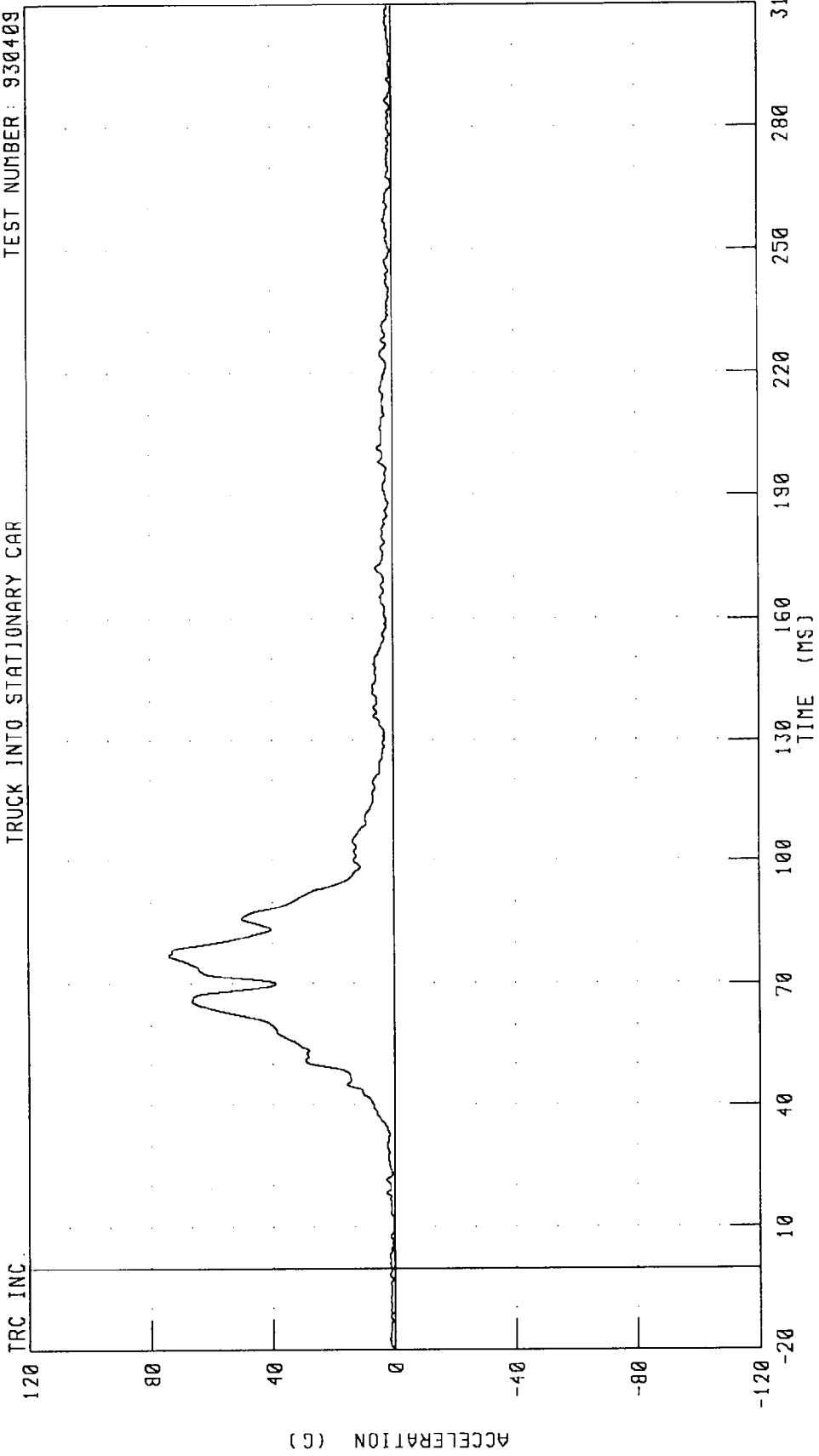
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST Z-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR



CHANNEL: CSTZG1 FILTER: CH. CLASS 180 PEAK DATA: 25.88 G @ 69.50 MS; -15.70 G @ 61.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST RESULTANT ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



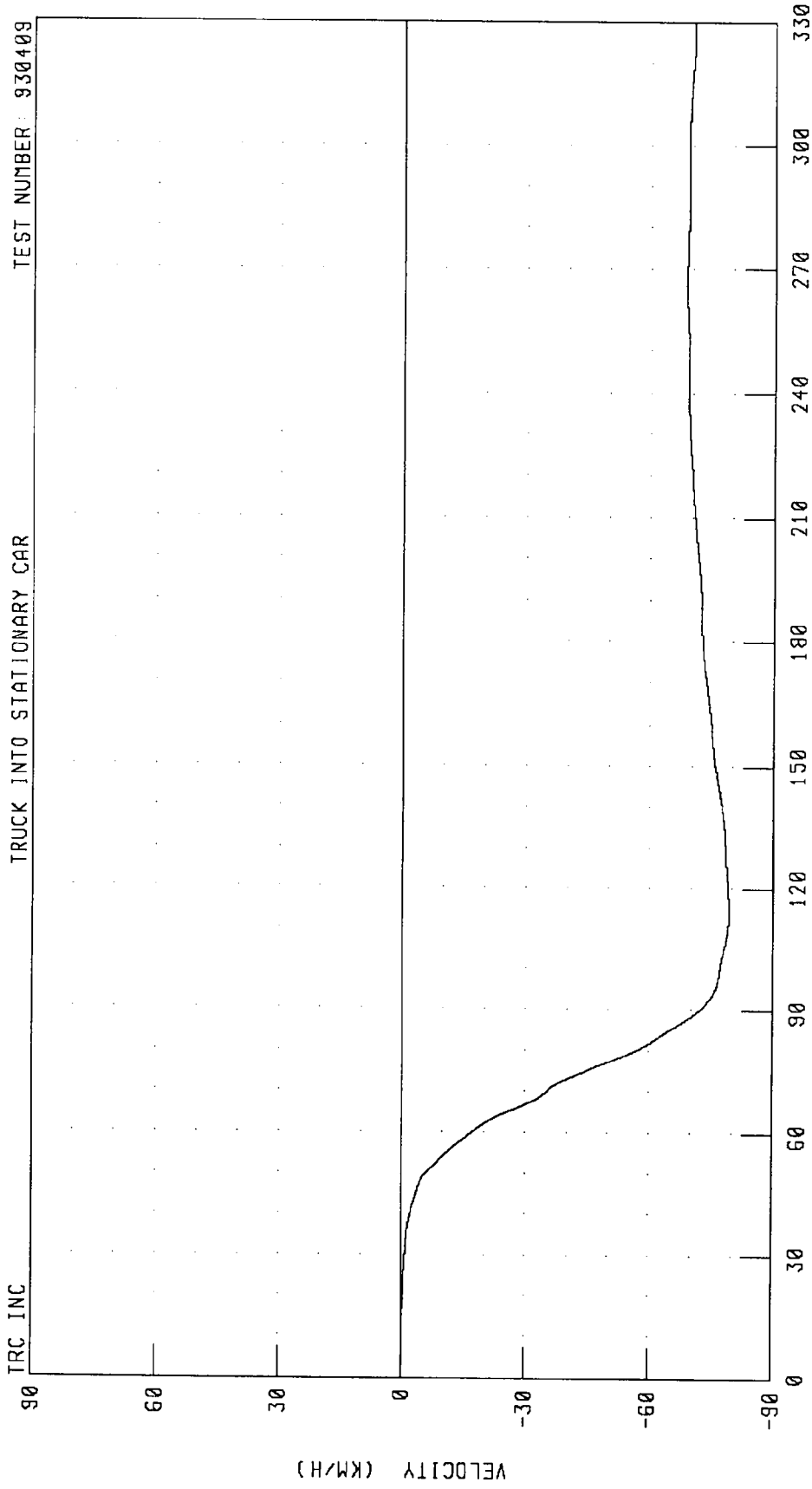
PEAK DATA: 74.02 G @ 76.88 MS; 0.04 G @ 265.88 MS

CHANNEL: CSTRG1 FILTER: CH. CLASS 180

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC



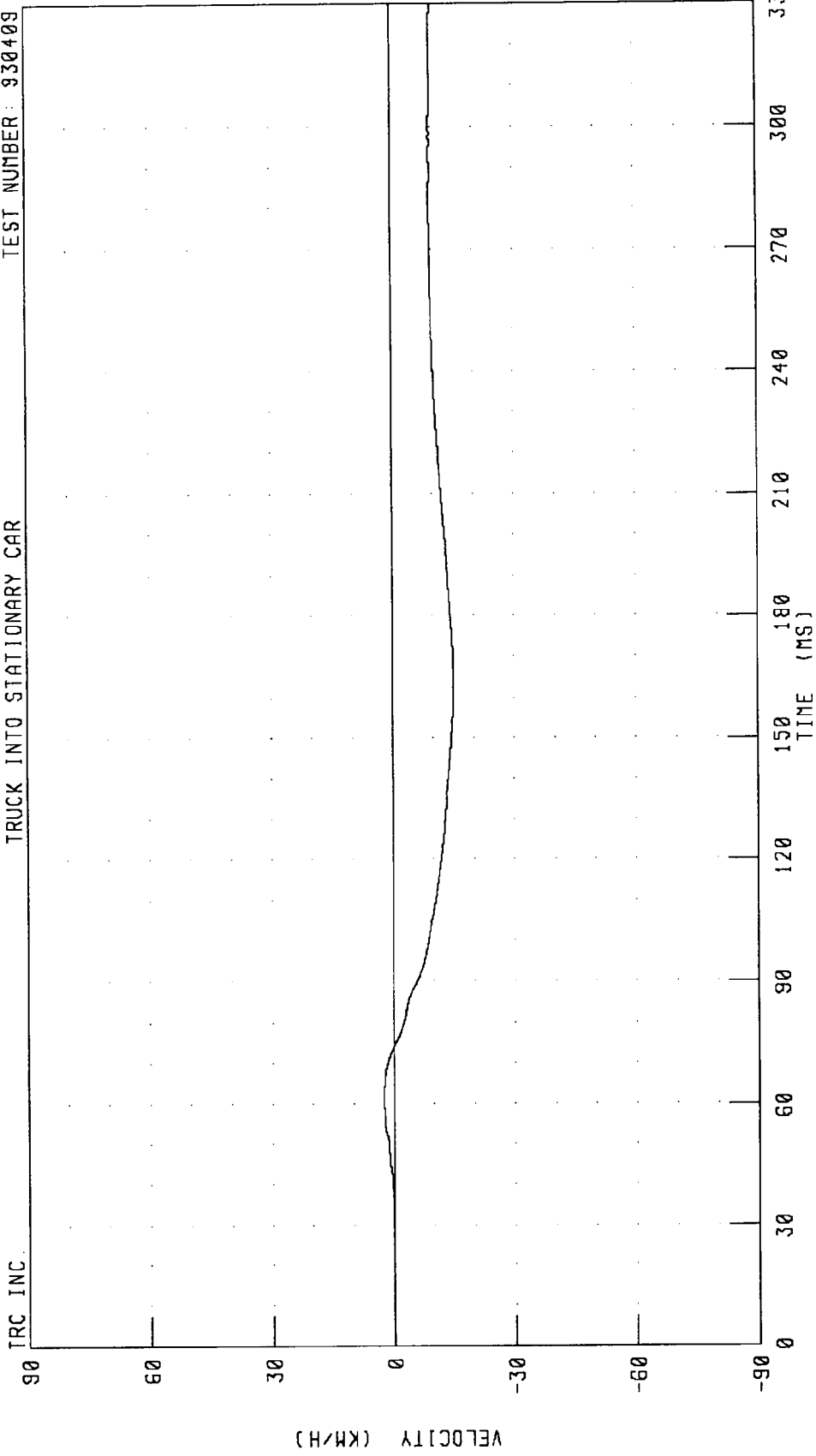
CHANNEL: CSTXV1 FILTER: CH. CLASS 180  
PEAK DATA: 0.00 KM/H @ 0.00 MS; -79.15 KM/H @ 116.00 MS

TIME (MS)

VELOCITY (KM/H)

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



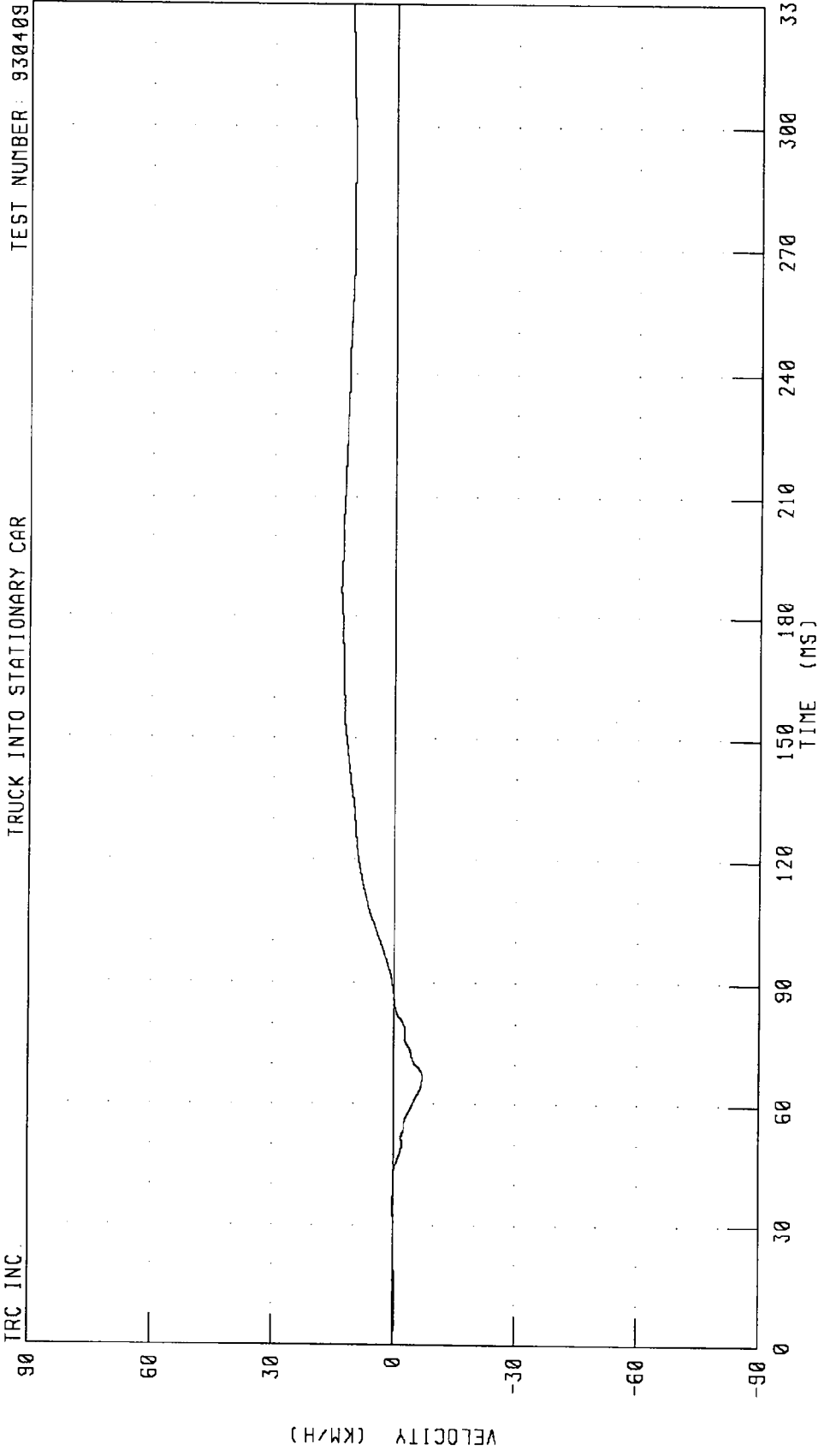
CHANNEL: CSTYV1 FILTER: CH. CLASS 180

PEAK DATA: 2.53 KM/H @ 62.25 MS, -15.02 KM/H @ 163.13 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER CHEST Z-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



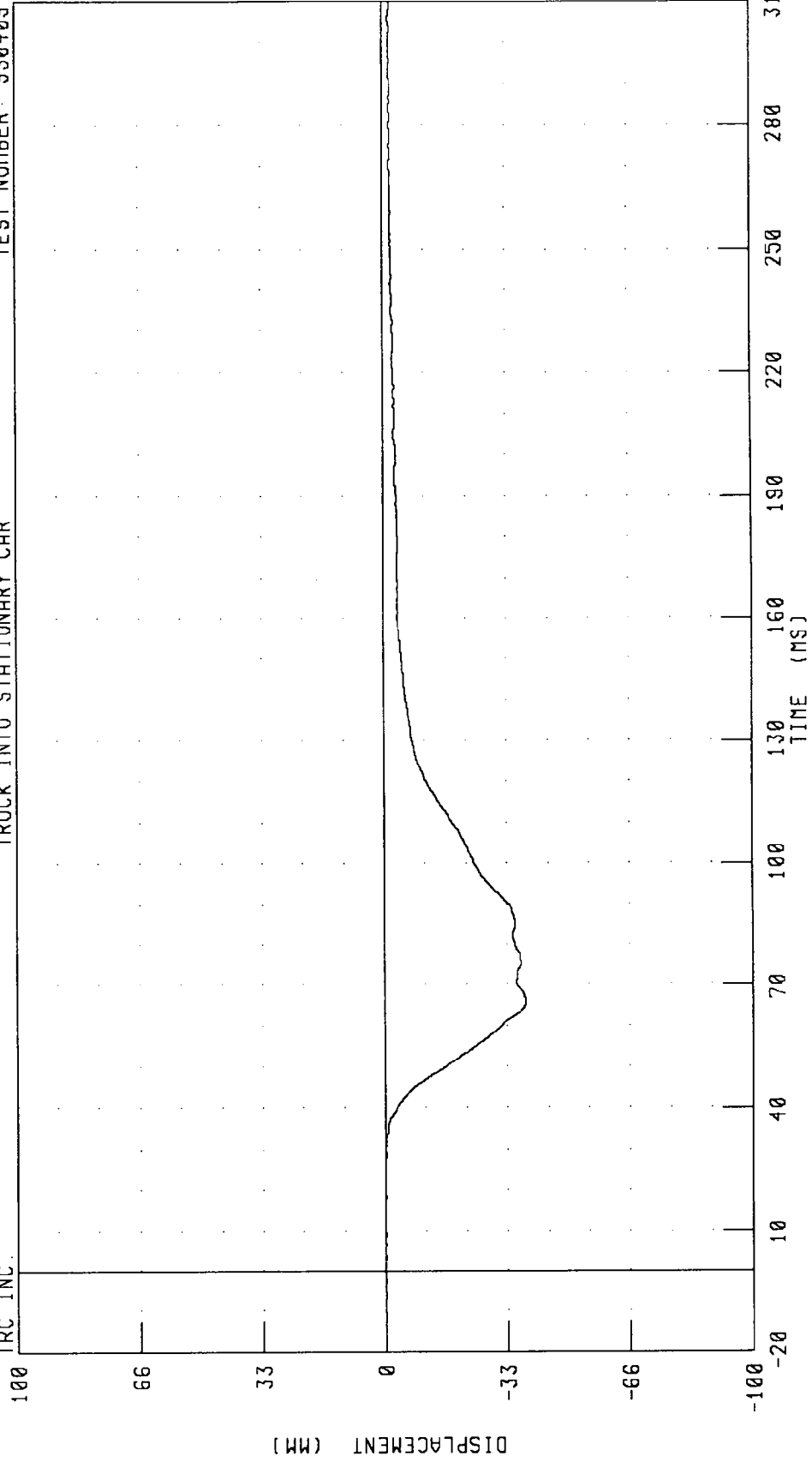
CHANNEL: CSTZV1 FILTER: CH. CLASS 180

PEAK DATA: 13.36 KM/H @ 186.88 MS, -7.04 KM/H @ 67.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST L1  
DRIVER CHEST DEFLECTION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



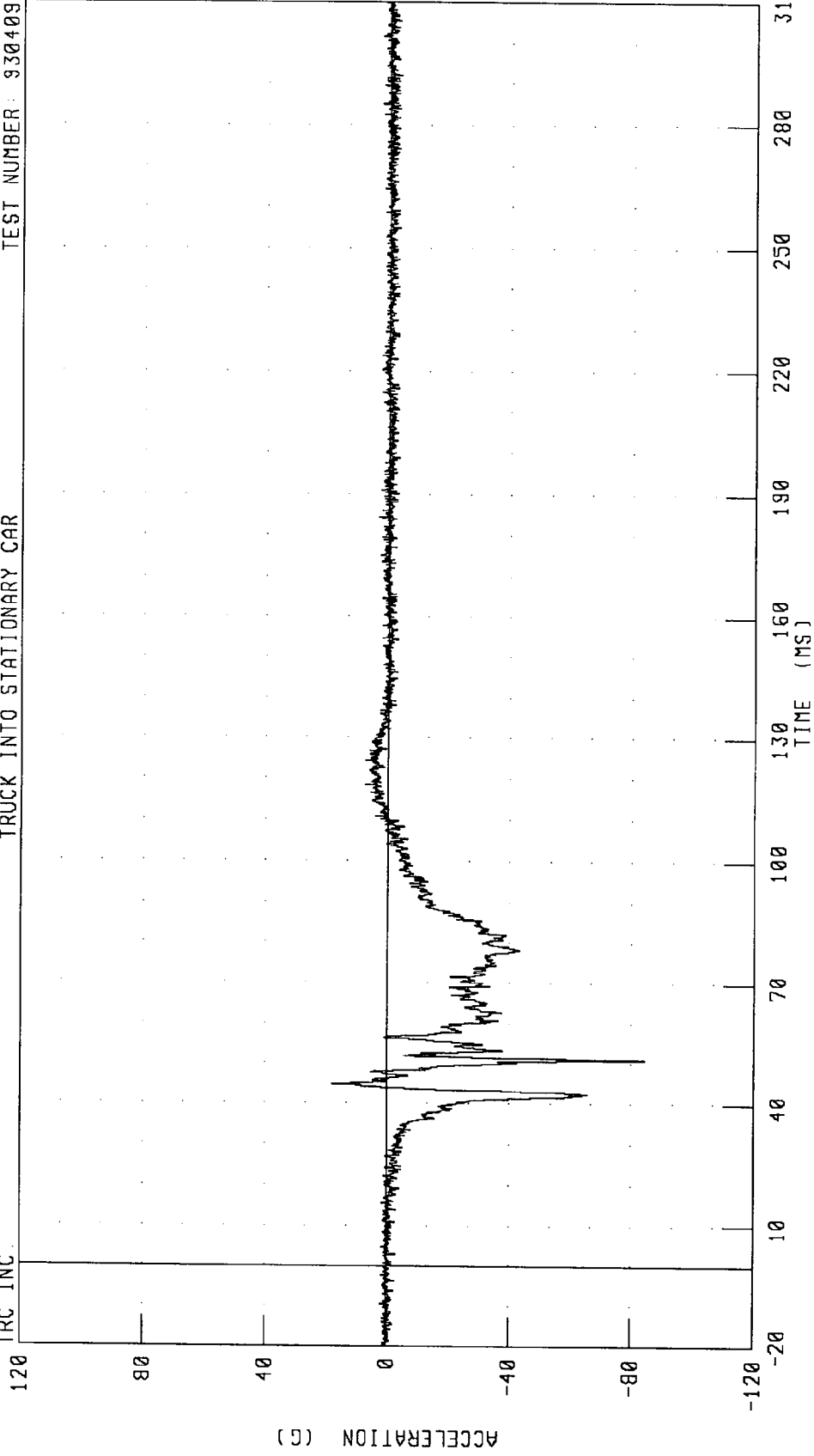
CHANNEL: CSTXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.16 MM @ -17.88 MS; -38.47 MM @ 65.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 330409

TRC INC.

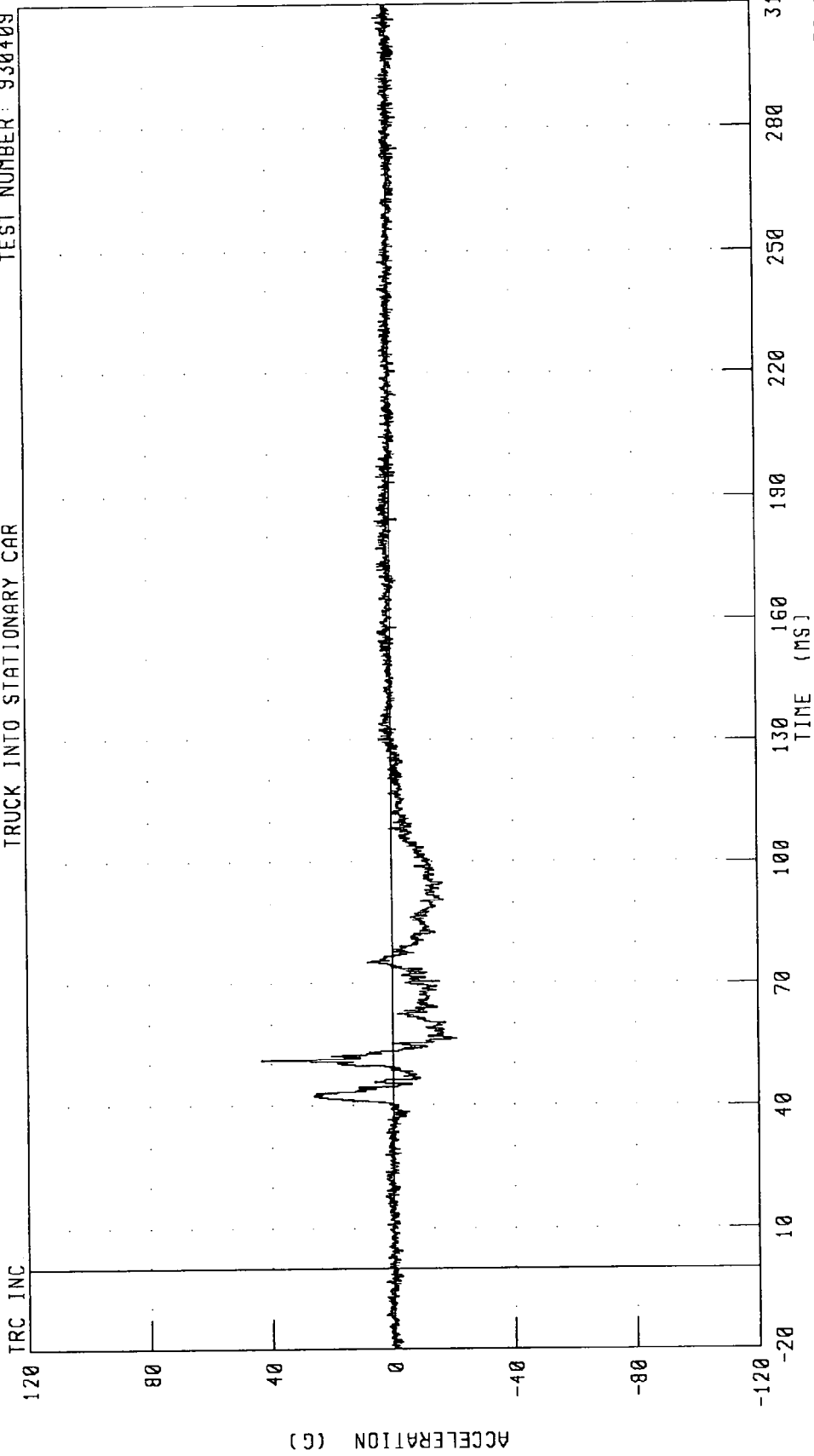


CHANNEL: PEYXG1 FILTER: CH. CLASS 1000

PEAK DATA: 17.94 G @ 44.88 MS, -84.16 G @ 51.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

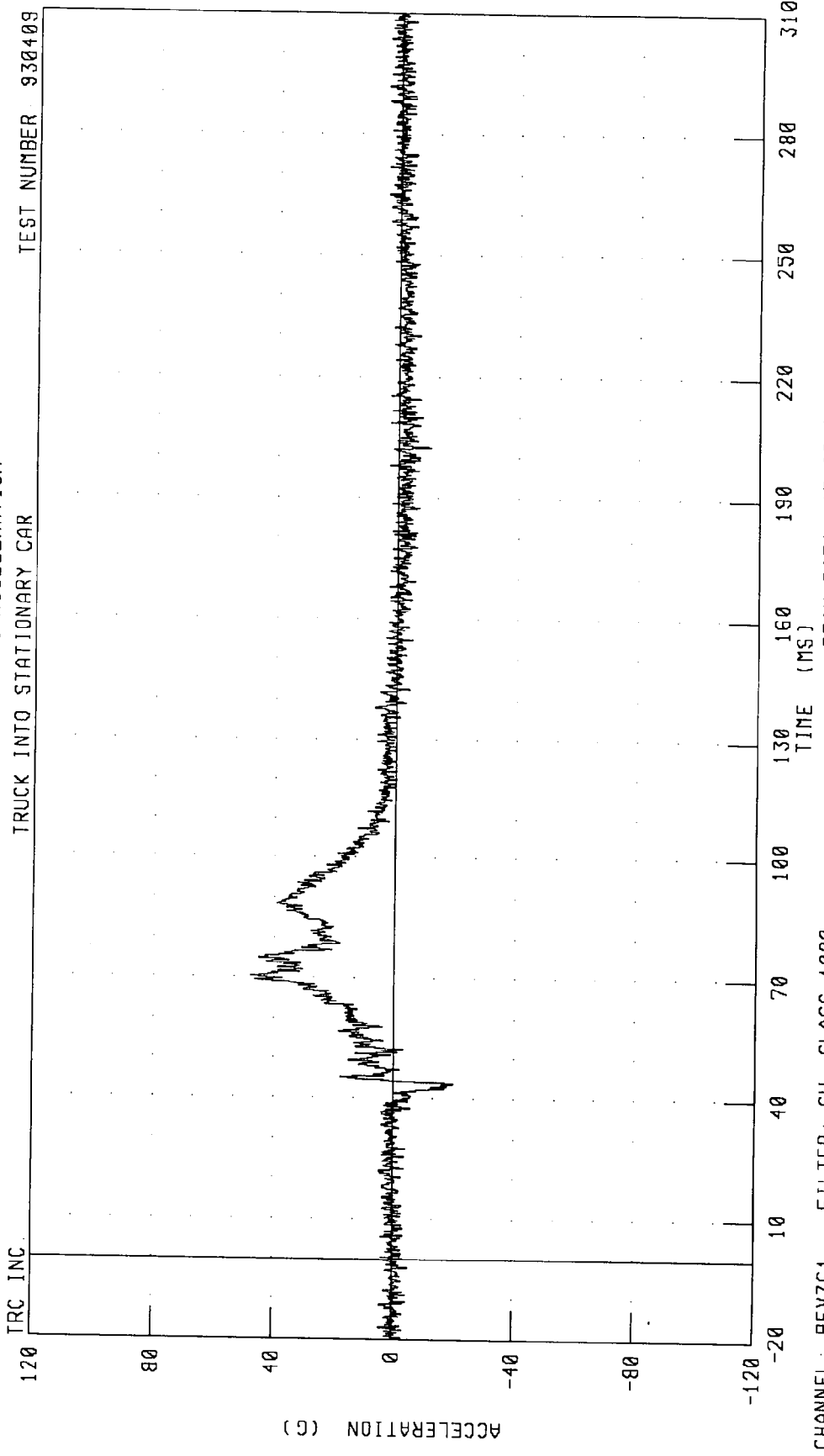
TEST NUMBER: 930409



CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

PEAK DATA: 43.38 G @ 51.00 MS; -21.09 G @ 56.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS Z-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

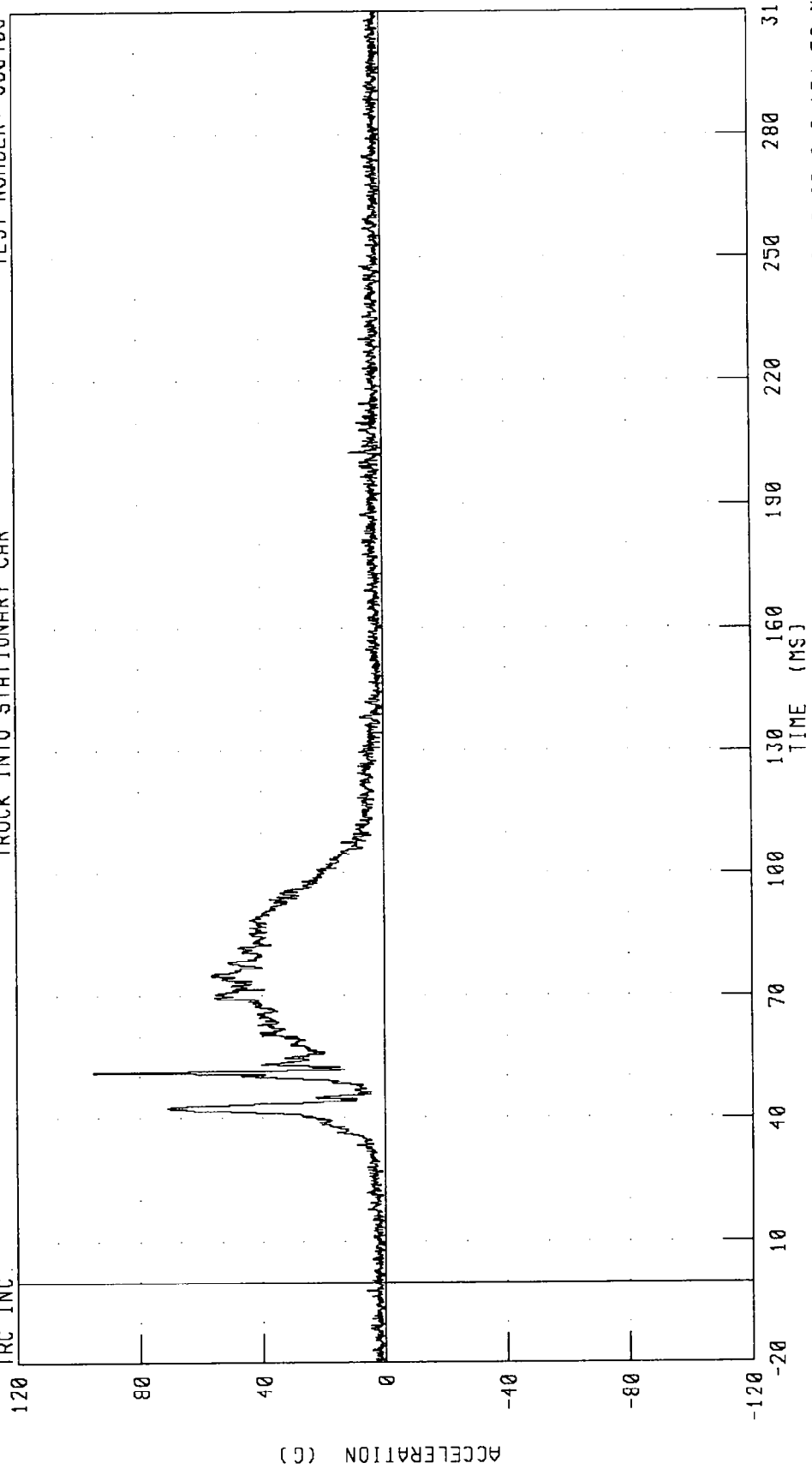


CHANNEL: PEVZG1 FILTER: CH. CLASS 1000 PEAK DATA: 47.80 G @ 70.50 MS; -20.07 G @ 43.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS RESULTANT ACCELERATION  
TRUCK INTO STATIONARY CAR

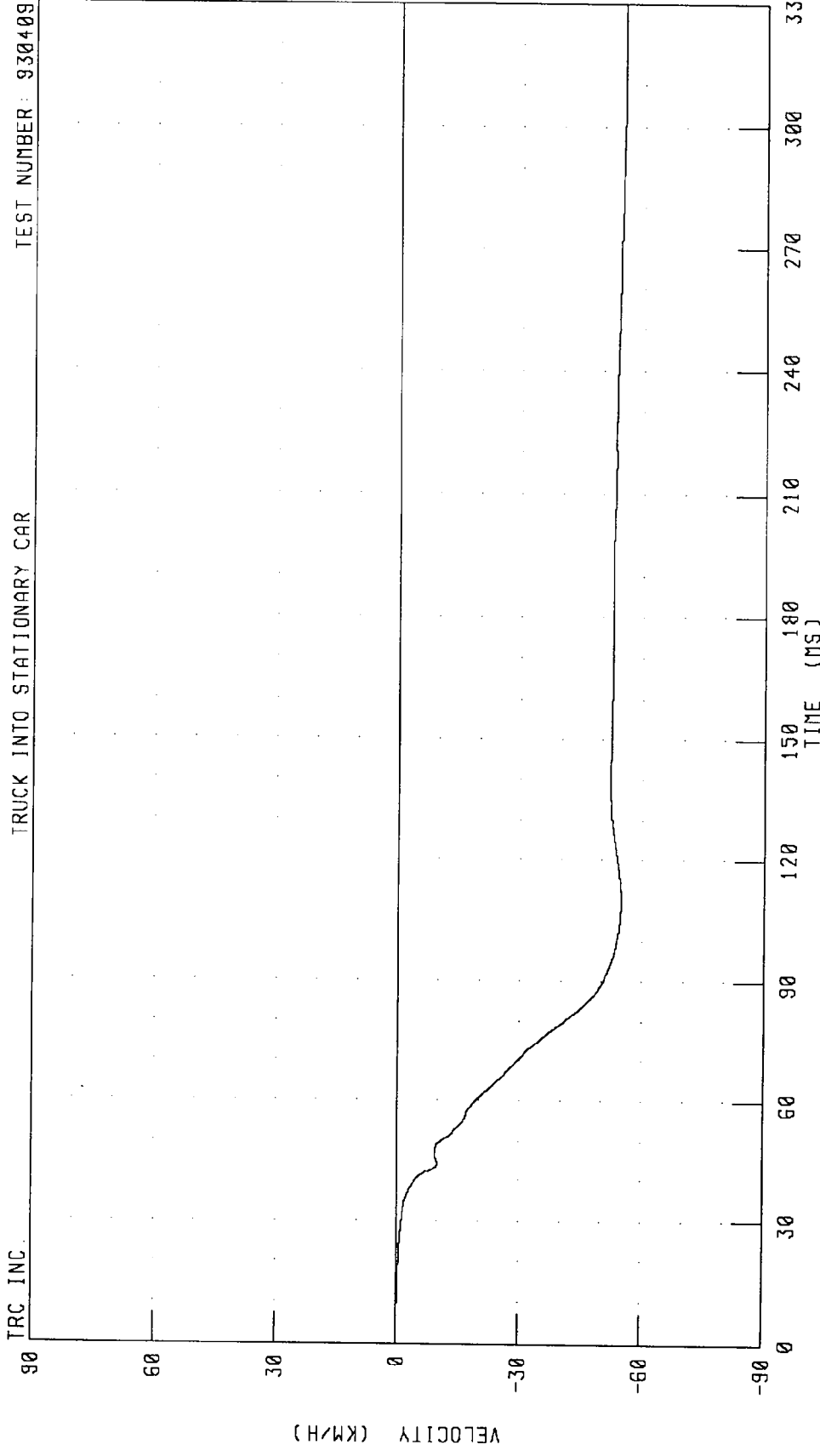
TEST NUMBER: 930409

TRC INC.



CHANNEL: PEVRG1 FILTER: CH CLASS 1000 PEAK DATA: 95.01 G @ 51.00 MS; 0 20 G @ 134.50 MS

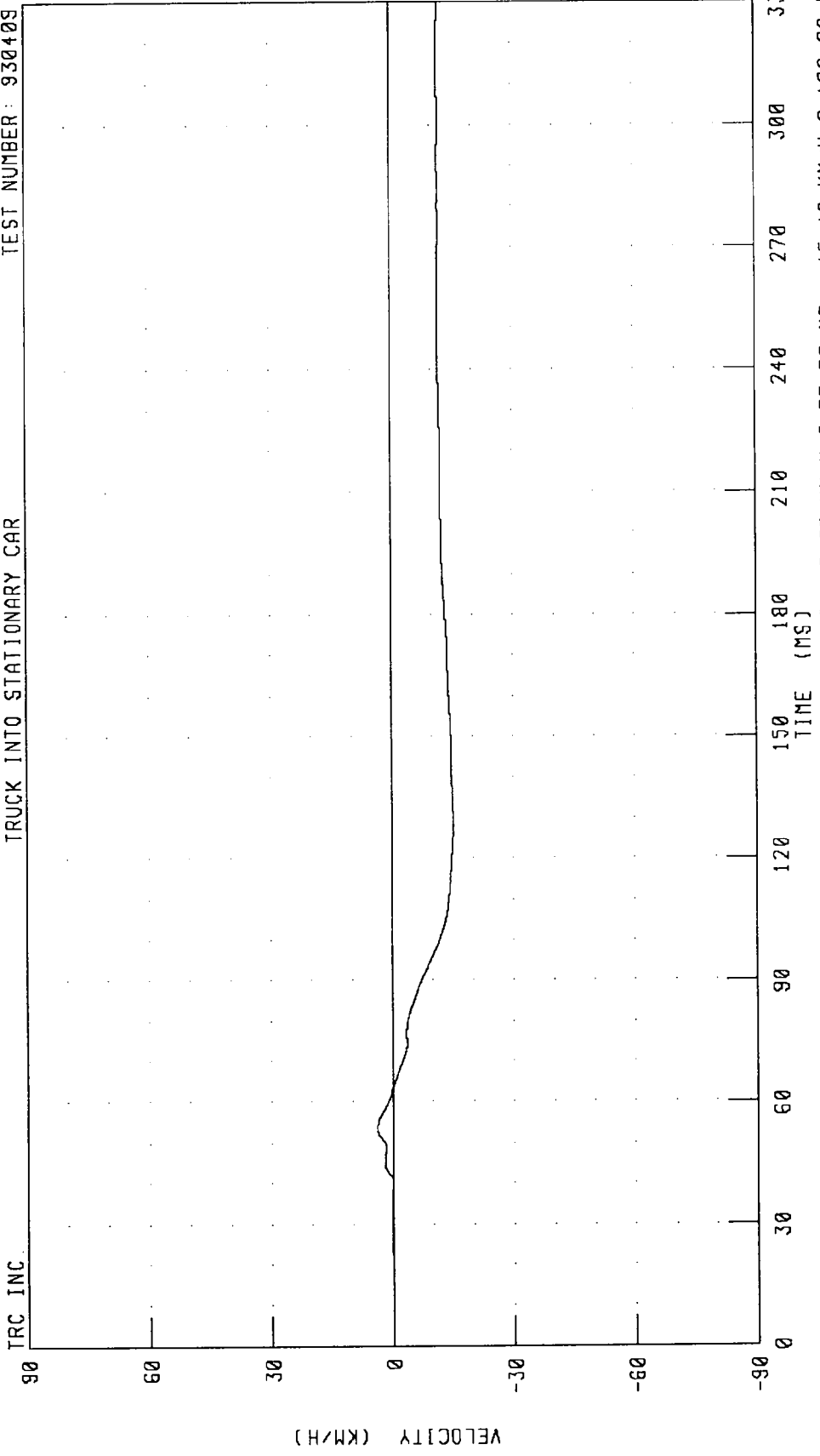
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR



CHANNEL: PEVXV1 FILTER: CH. CLASS 180  
PEAK DATA: 0.00 KM/H @ 0.00 MS; -55.20 KM/H @ 319.38 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

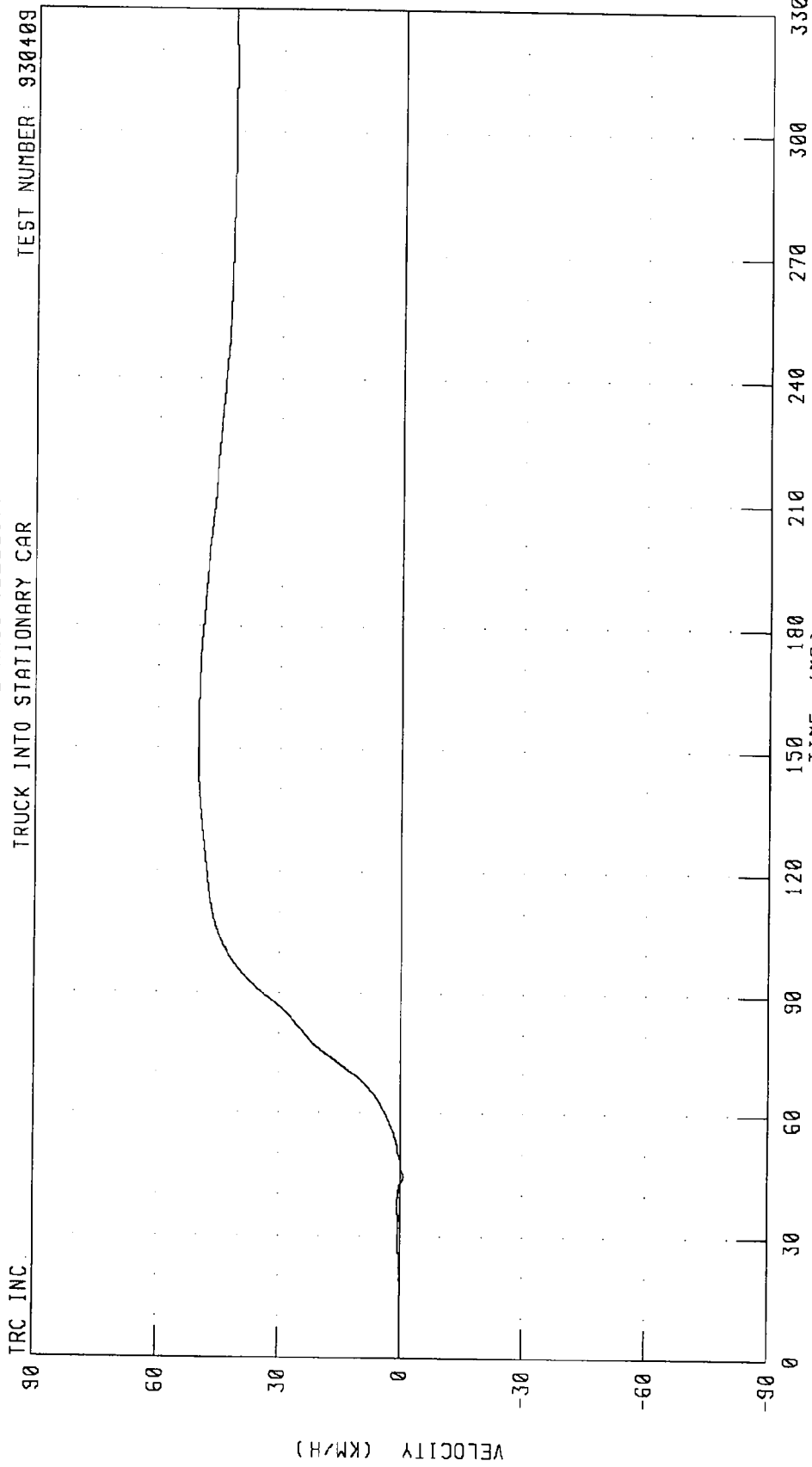
TEST NUMBER: 930409



CHANNEL: PEVYV1 FILTER: CH. CLASS 180  
PEAK DATA: 3.85 KM/H @ 53.50 MS; -15.19 KM/H @ 128.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER PELVIS Z-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

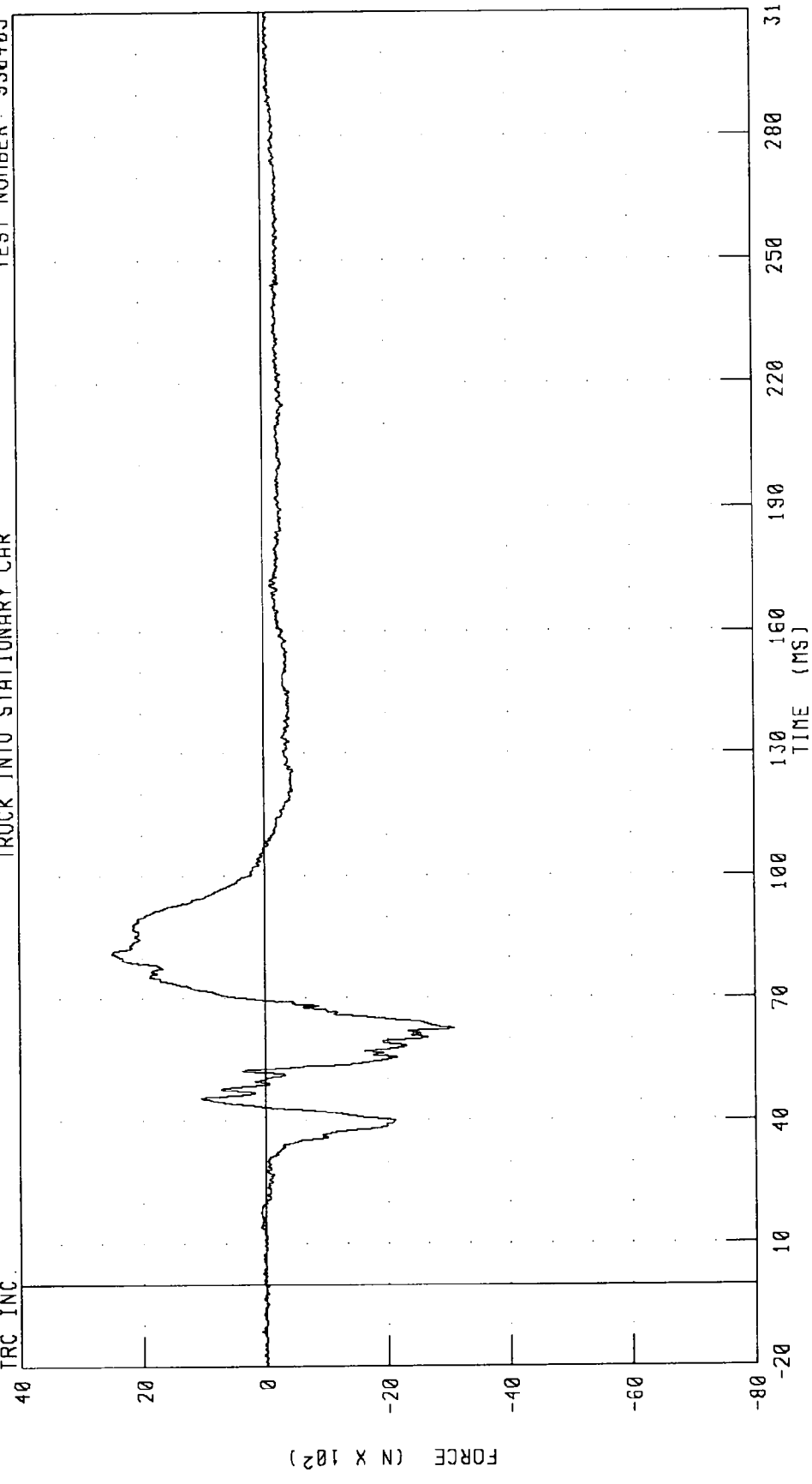


TRC INC. CHANNEL: PEVZV1 FILTER: CH. CLASS 180  
PEAK DATA: 50.07 KM/H @ 151.88 MS; -0.76 KM/H @ 44.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER LEFT FEMUR FORCE  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

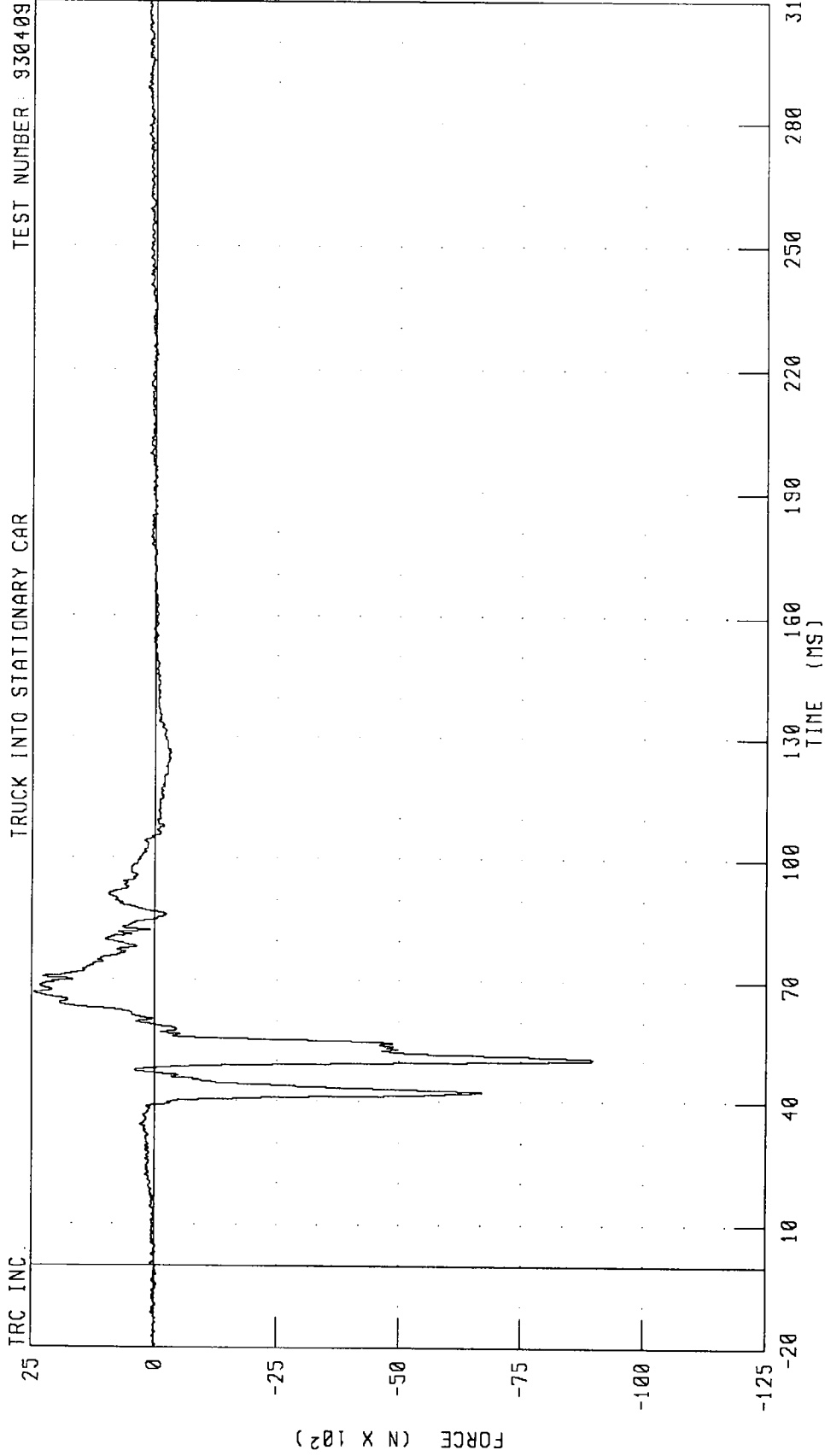


PEAK DATA 2493 86 N @ 81 25 MS, -3089.51 N @ 62.63 MS

CHANNEL LFMF1 FILTER: CH. CLASS 600

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER RIGHT FEMUR FORCE  
TRUCK INTO STATIONARY CAR

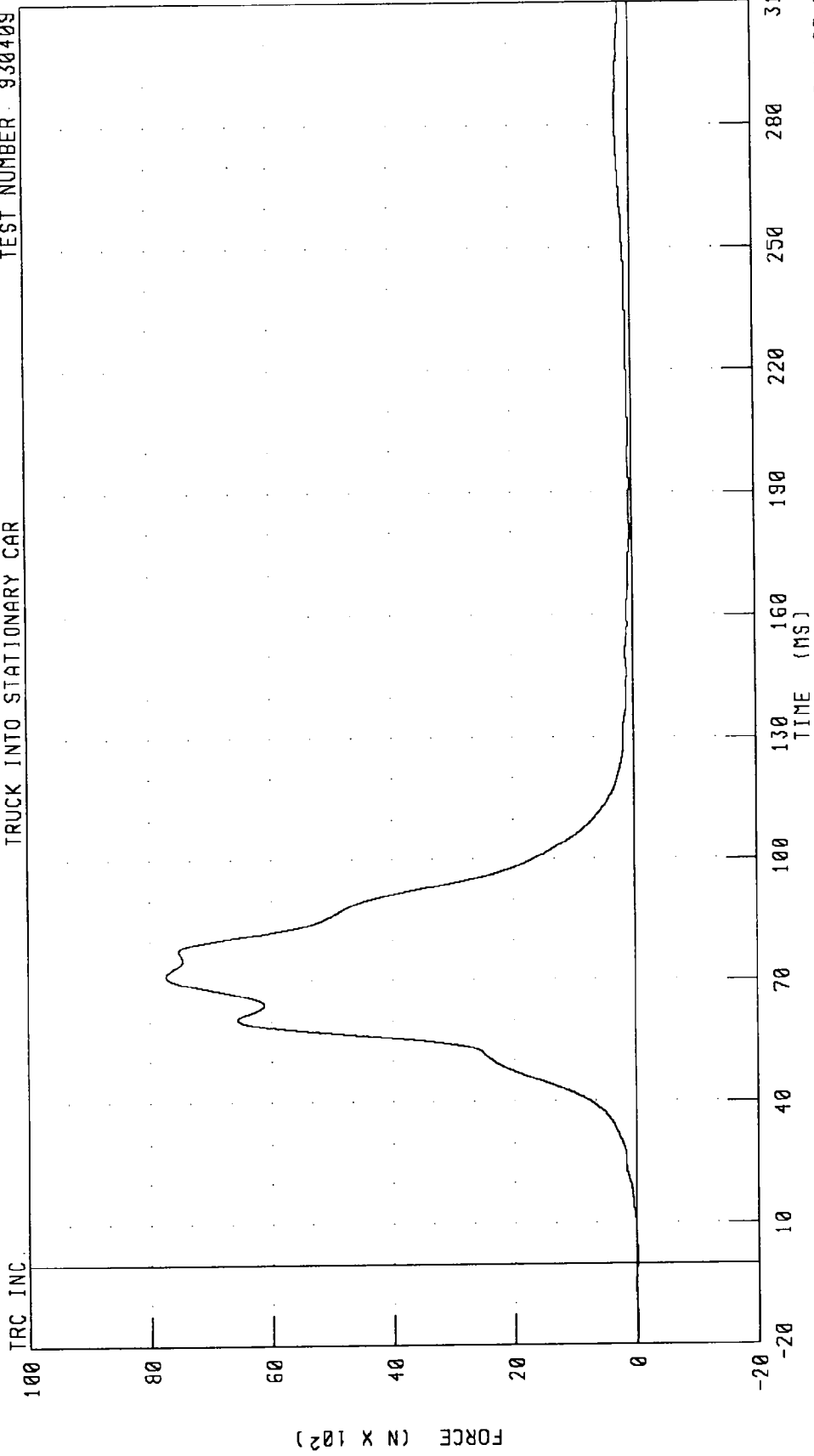
TEST NUMBER: 930409



CHANNEL: RFMF1 FILTER: CH CLASS 600 PEAK DATA: 2455 86 N @ 66.63 MS; -8969 92 N @ 50.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER LAP BELT OUTBOARD FORCE  
TRUCK INTO STATIONARY CAR

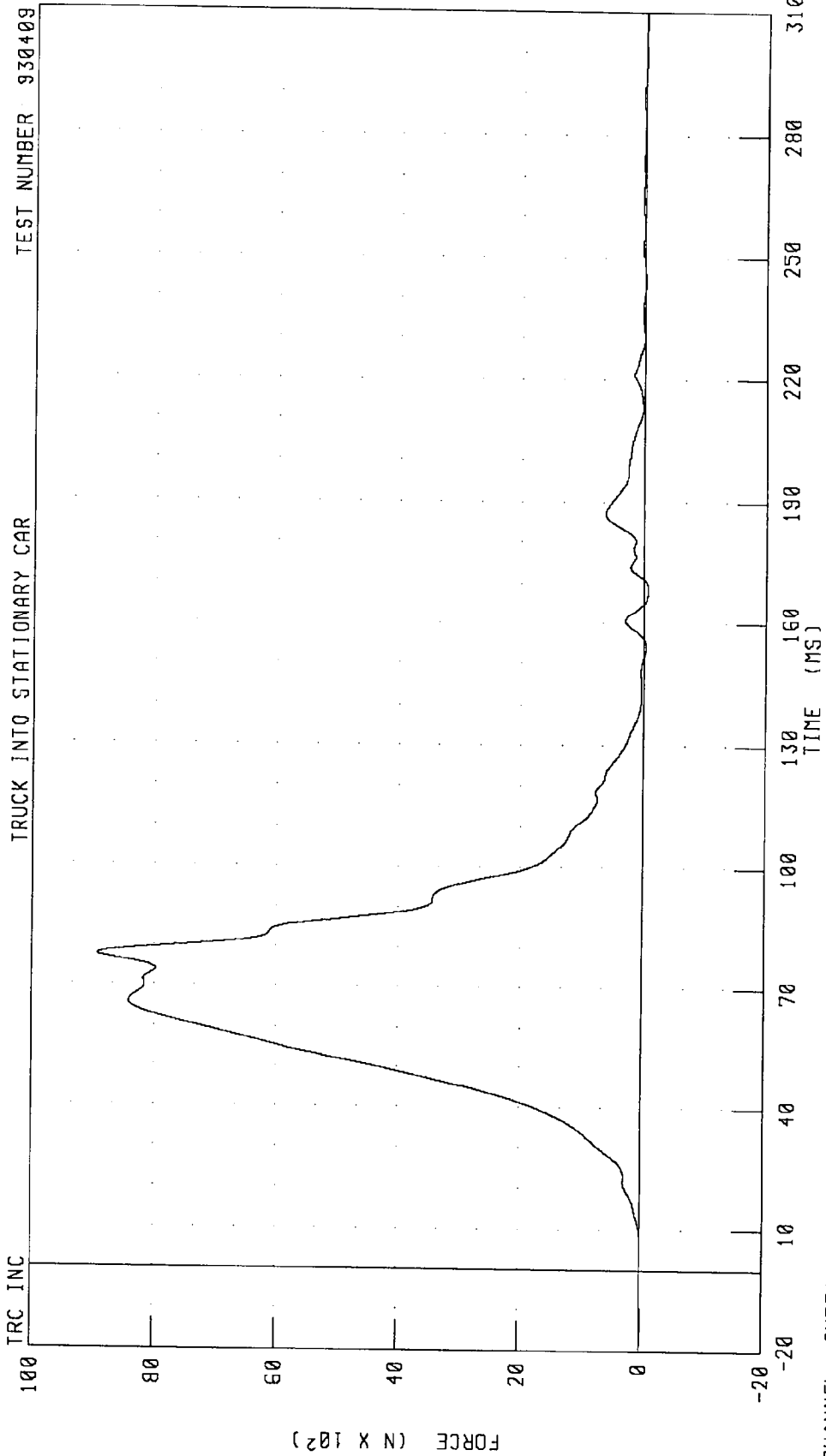
TEST NUMBER: 930409



CHANNEL: LBOFI FILTER: CH. CLASS 60 PEAK DATA: 7735.09 N @ 71.38 MS; -9.62 N @ 1.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
DRIVER SHOULDER BELT FORCE  
TRUCK INTO STATIONARY CAR

TEST NUMBER 930409

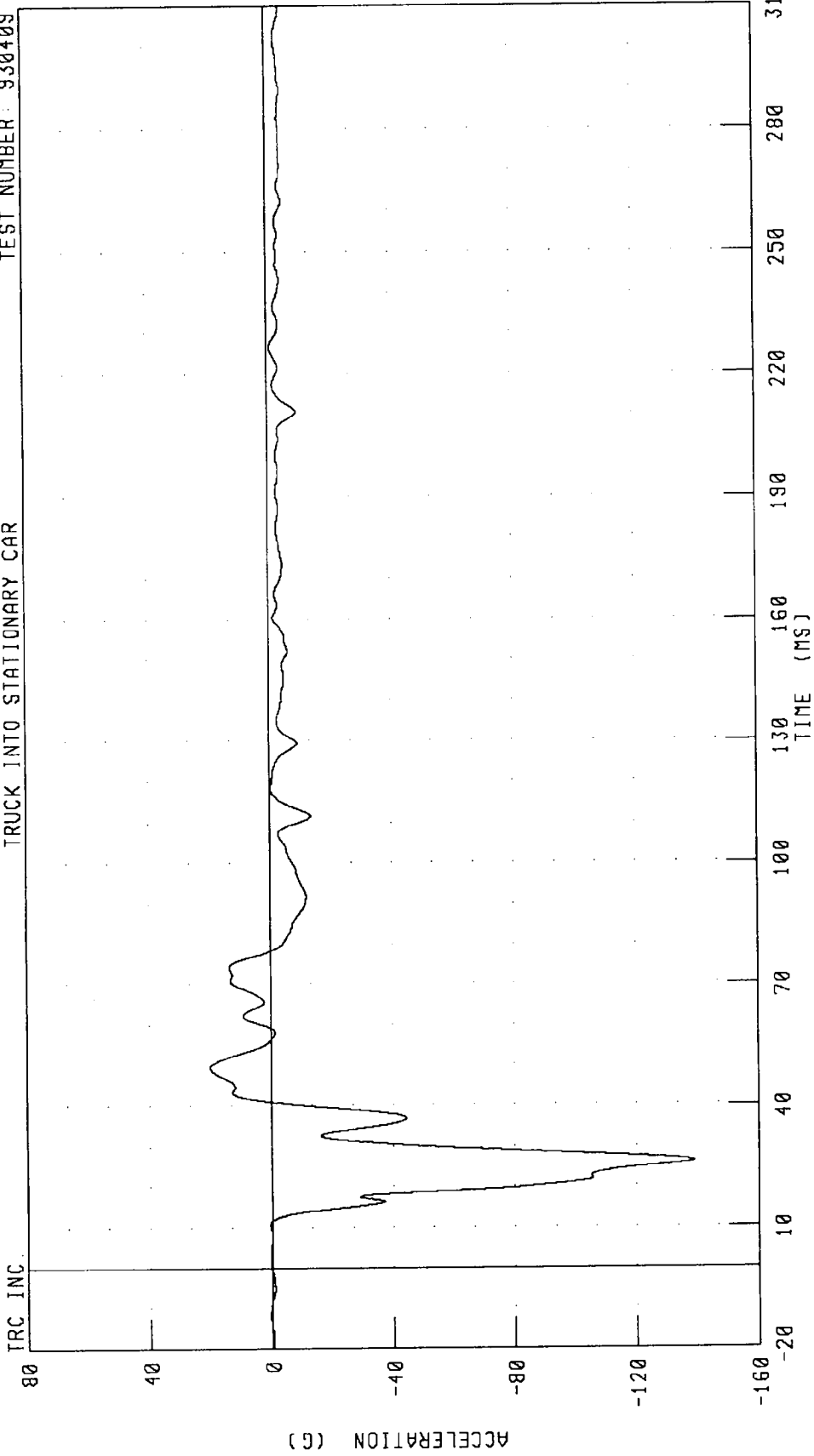


CHANNEL: SHBF1 FILTER: CH. CLASS 60

PEAK DATA 8927.81 N @ 77.75 MS, -69.67 N @ 169.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
ENGINE TOP X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

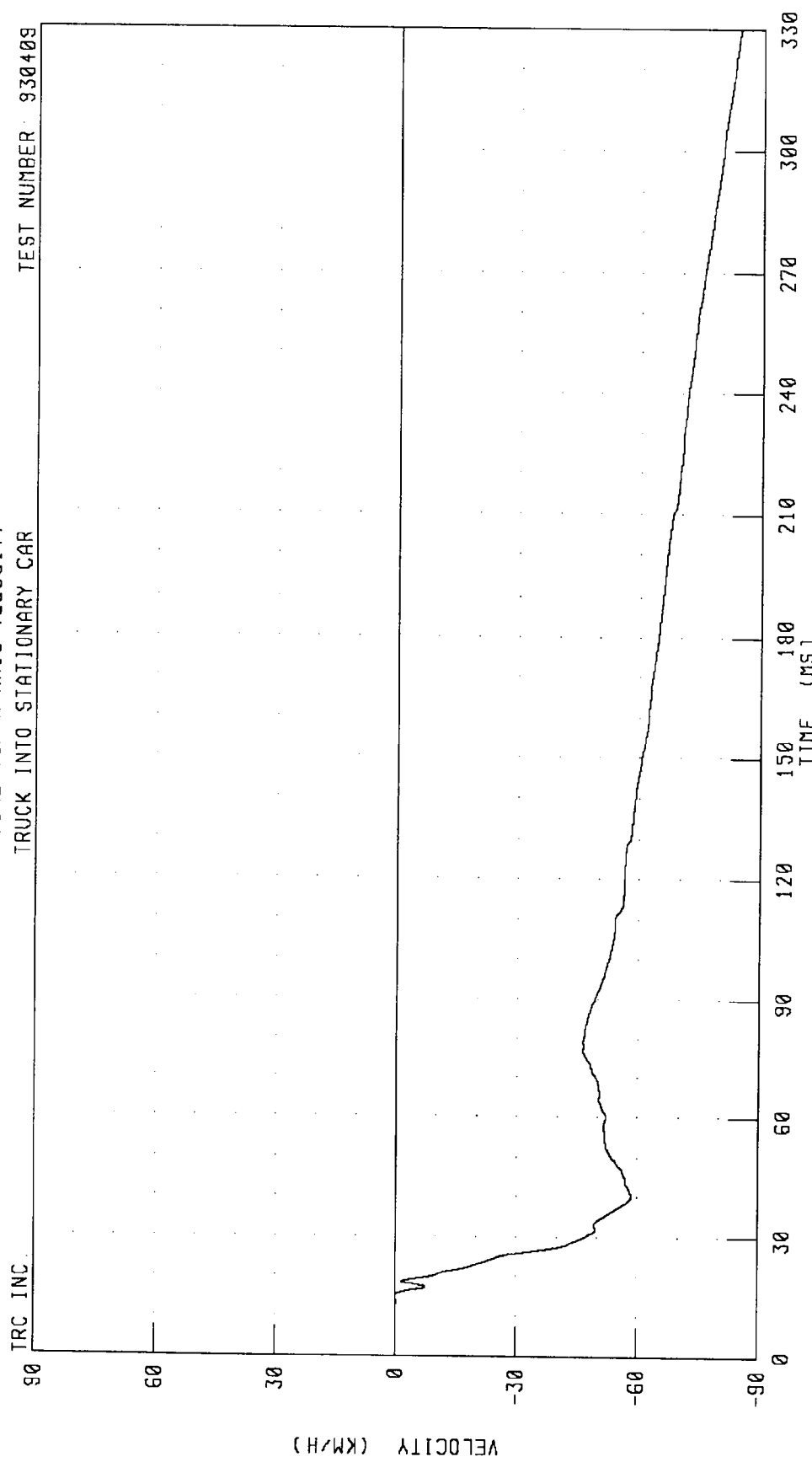
TEST NUMBER: 930409



CHANNEL: ENG01 FILTER: CH CLASS 60 PEAK DATA: 20.01 G @ 49.38 MS, -138.80 G @ 26.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
ENGINE TOP X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

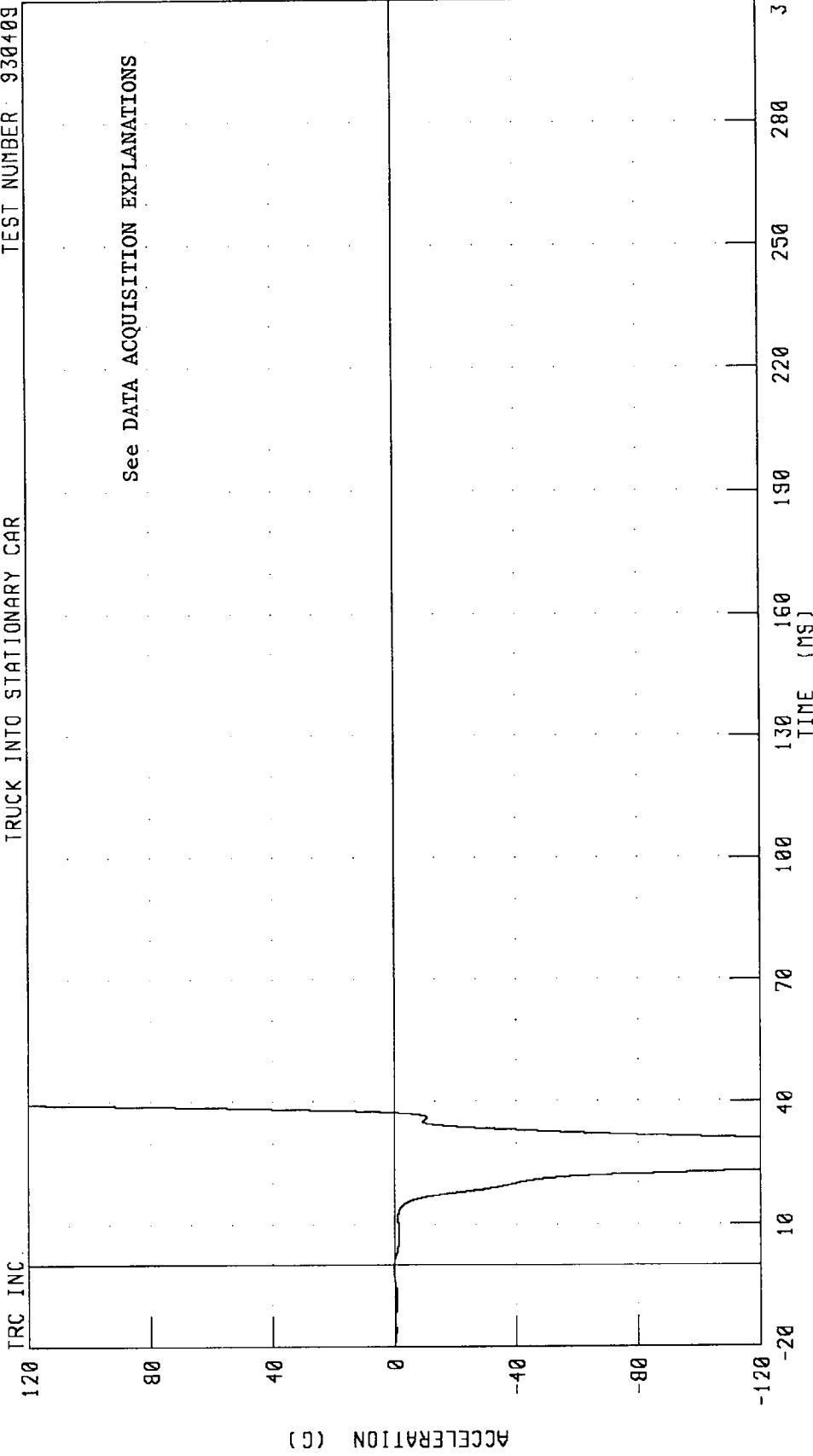
TRC INC.  
TEST NUMBER: 930409



CHANNEL: ENGXV1 FILTER: CH. CLASS 180  
PEAK DATA: 0.08 KM/H @ 8.00 MS; -84.24 KM/H @ 330.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
ENGINE BOTTOM X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

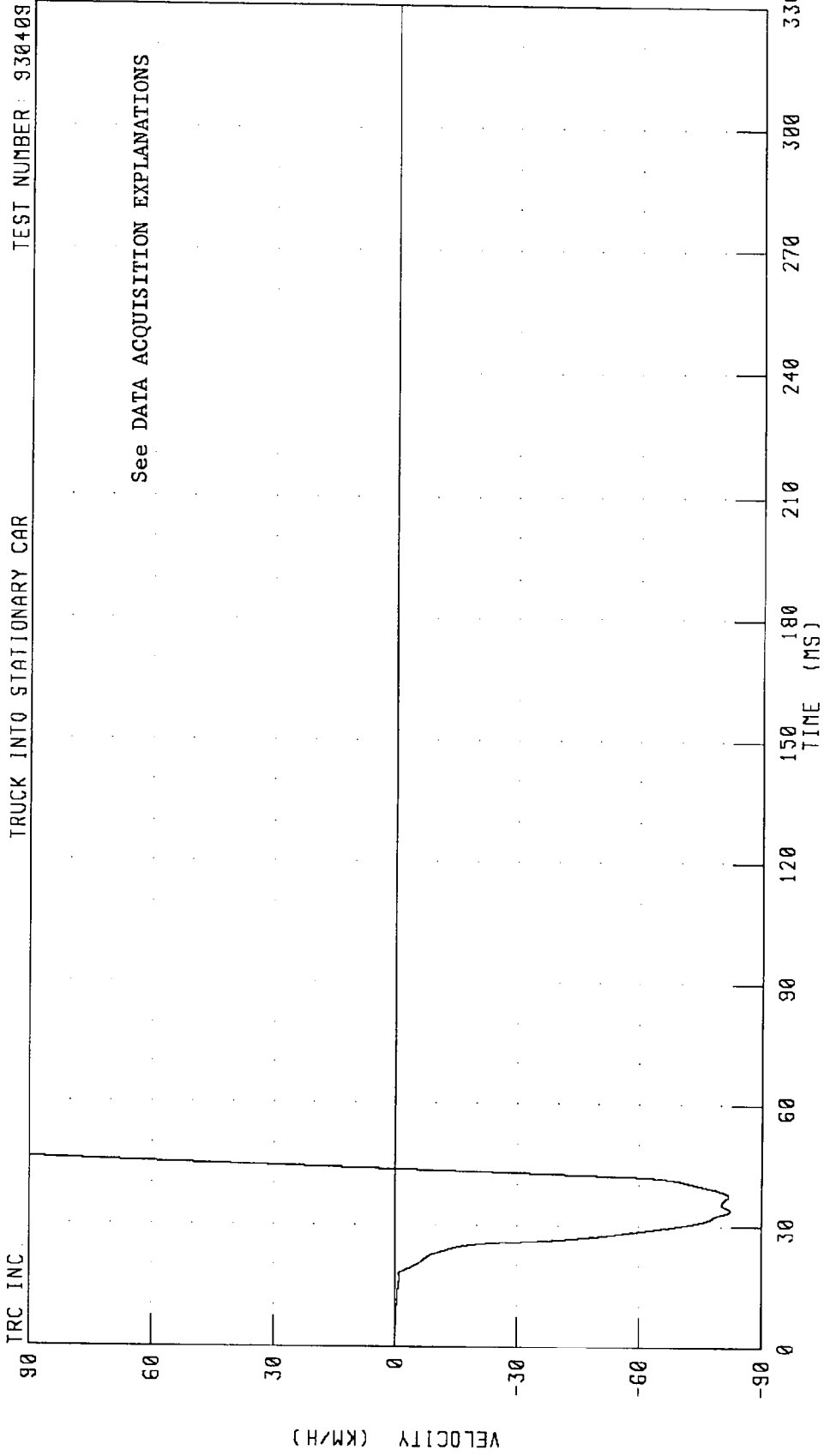


CHANNEL: ENGXC2 FILTER: CH. CLASS 60

PEAK DATA: 1059.75 G @ 46.25 MS, -301.91 G @ 26.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
ENGINE BOTTOM X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



See DATA ACQUISITION EXPLANATIONS

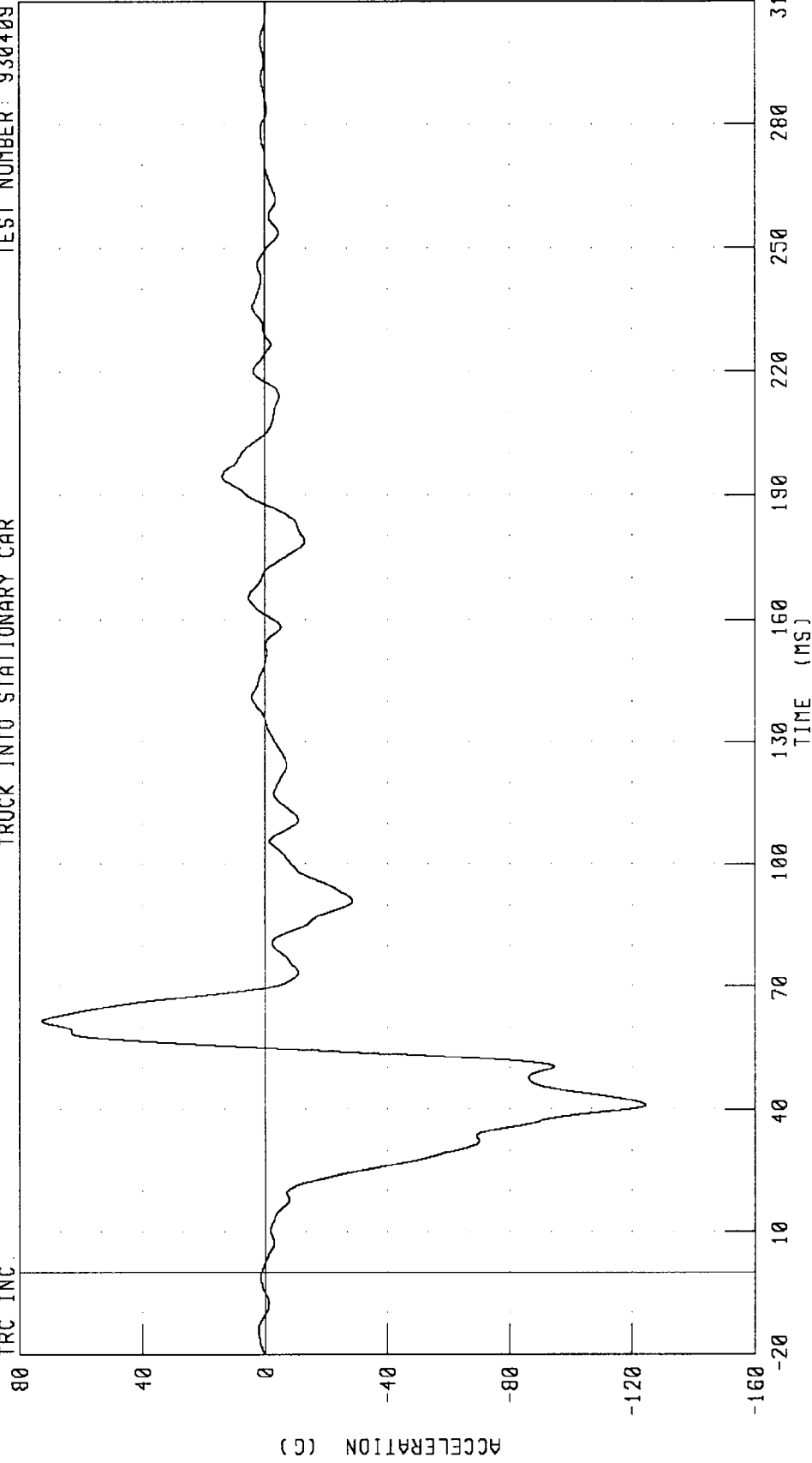
CHANNEL: ENGXY2 FILTER: CH. CLASS 180

PEAK DATA: 10396.06 KM/H @ 330.00 MS, -82.29 KM/H @ 33.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
RIGHT BRAKE CALIPER X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



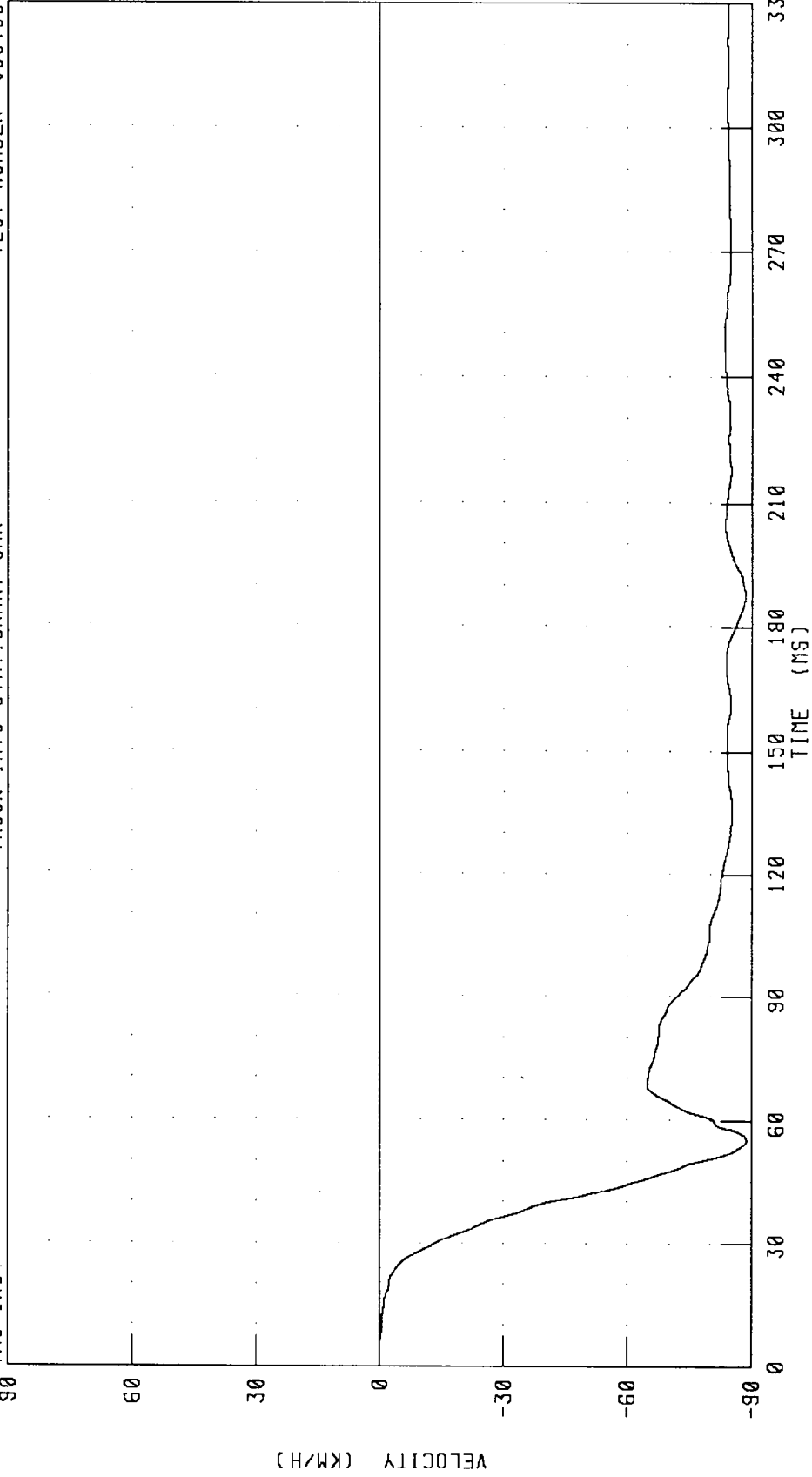
CHANNEL: BCRXG1 FILTER: CH: CLASS 60

PEAK DATA: 72.58 G @ 61.50 MS, -124.33 G @ 41.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
RIGHT BRAKE CALIPER X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



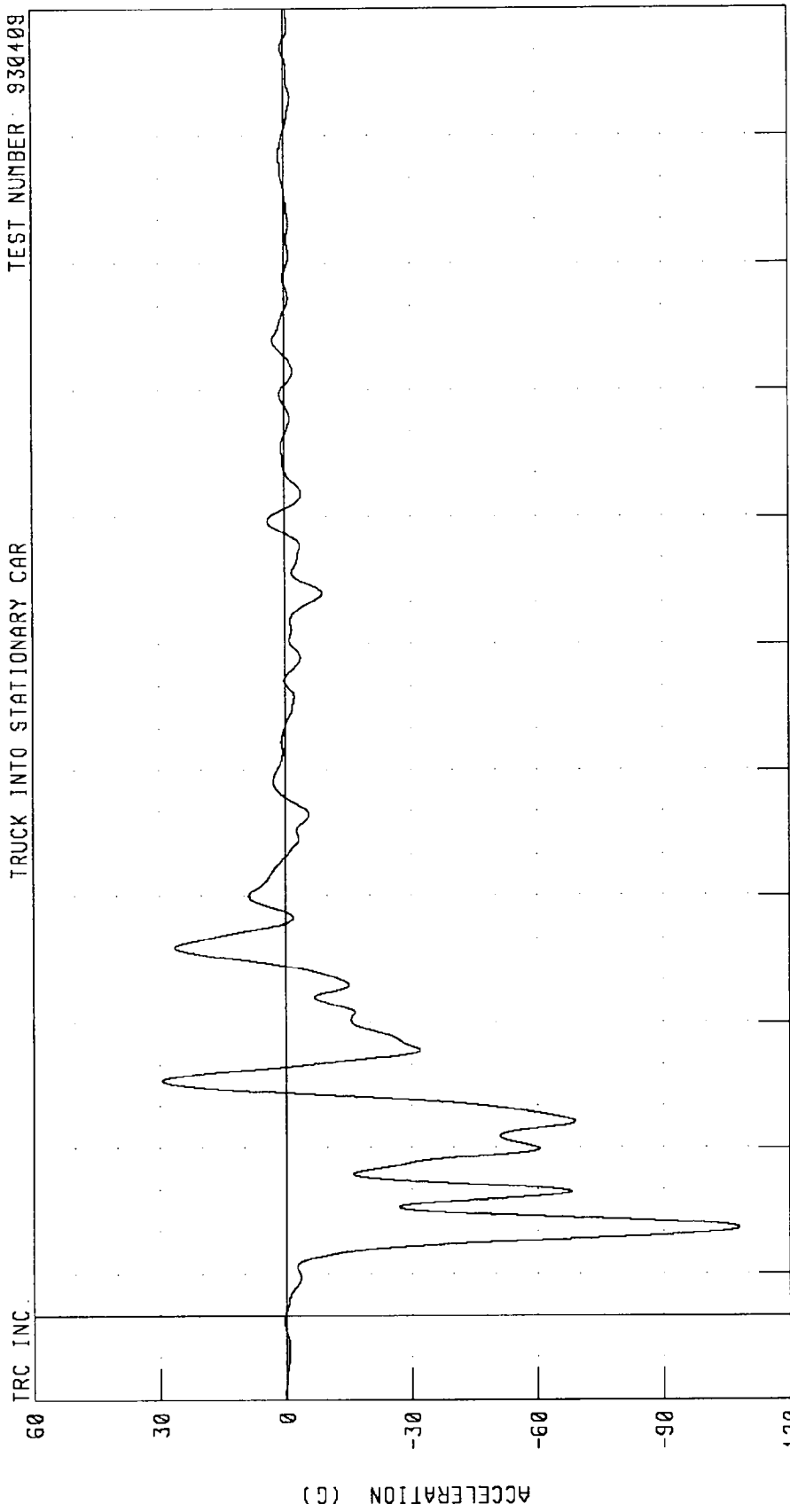
CHANNEL: BCRXV1 FILTER: CH. CLASS 180

PEAK DATA: 0.05 KM/H @ 1.88 MS, -88.77 KM/H @ 55.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
LEFT BRAKE CALIPER X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

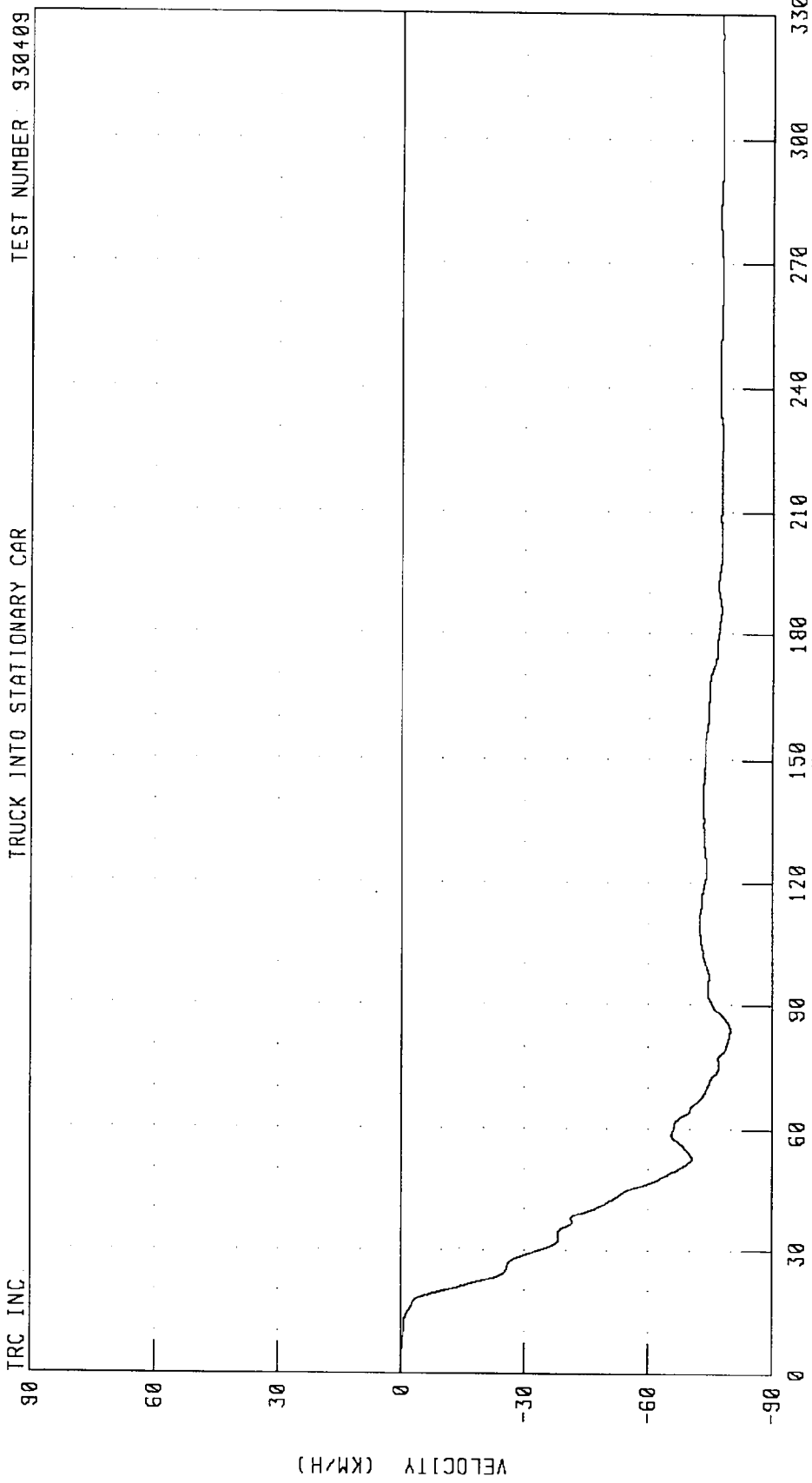


CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 29 44 G @ 56.13 MS, -100.06 G @ 20 75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
LEFT BRAKE CALIPER X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

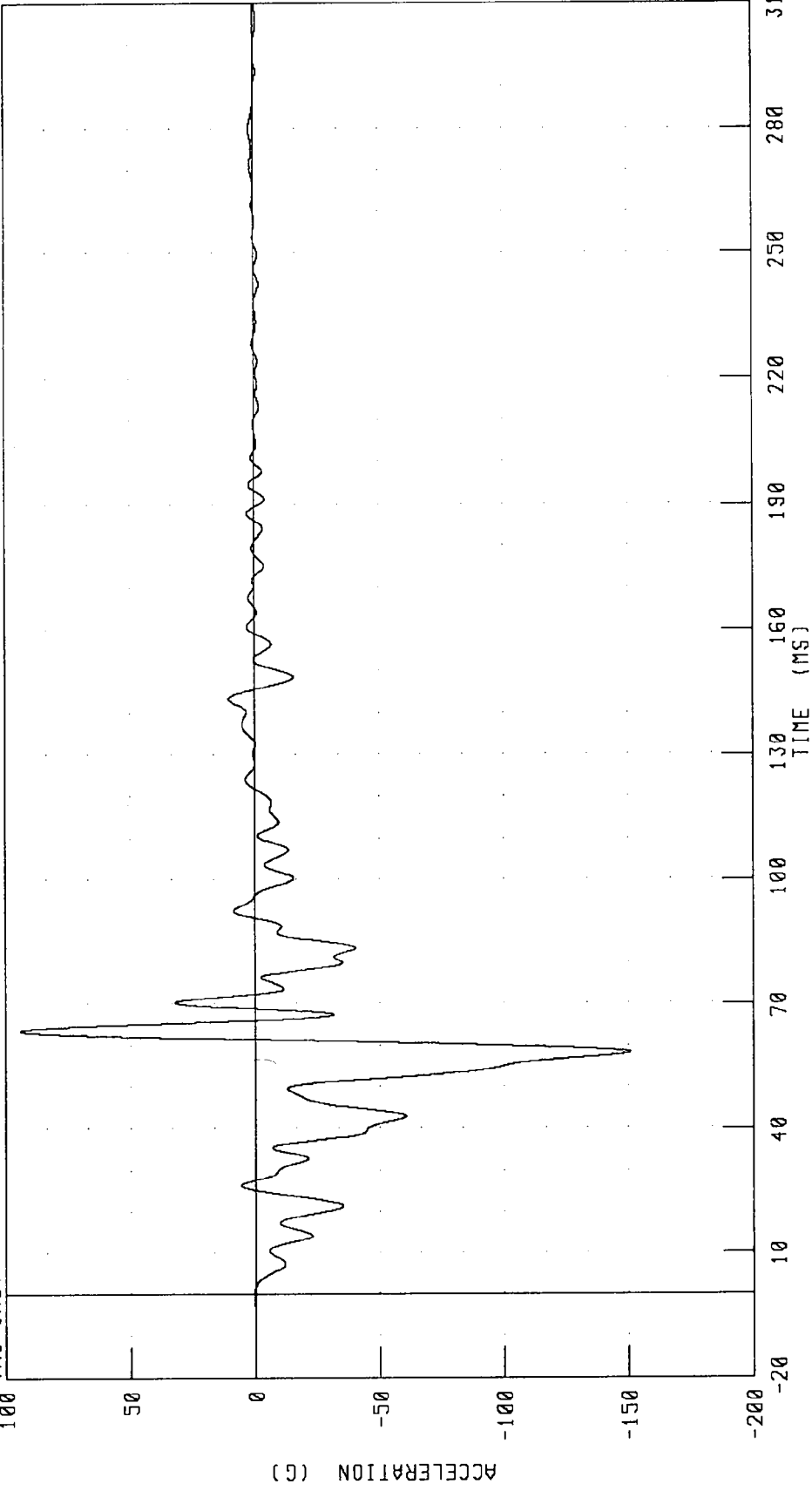


CHANNEL: BCLXV1 FILTER: CH. CLASS 180  
PEAK DATA: 0 02 KM/H @ 1.25 MS; -79.67 KM/H @ 84.13 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC

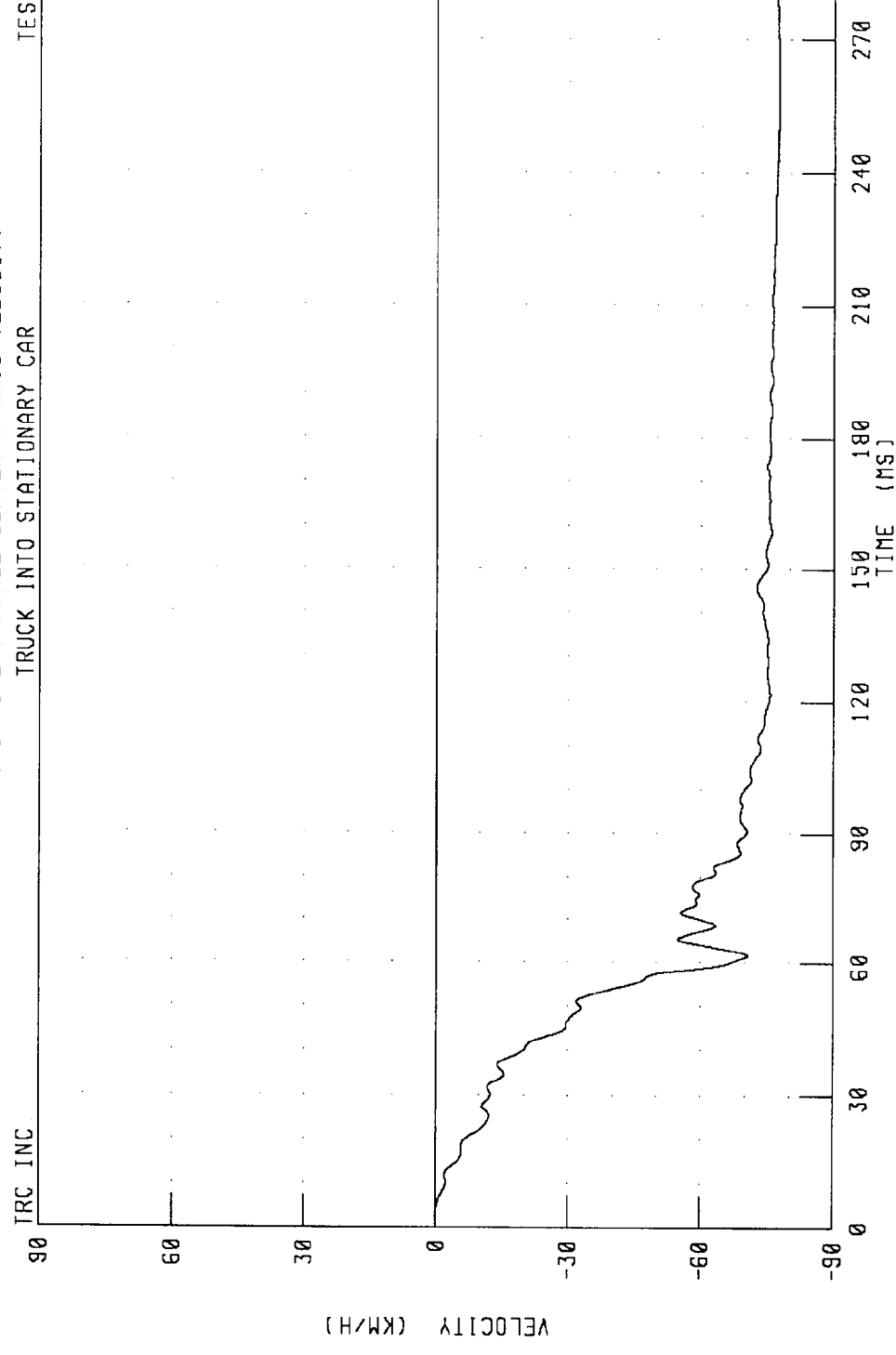


CHANNEL: DPCXG1 FILTER: CH. CLASS 60

PEAK DATA: 94.17 G @ 63.63 MS, -150.90 G @ 58.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
INSTRUMENT PANEL CENTER X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

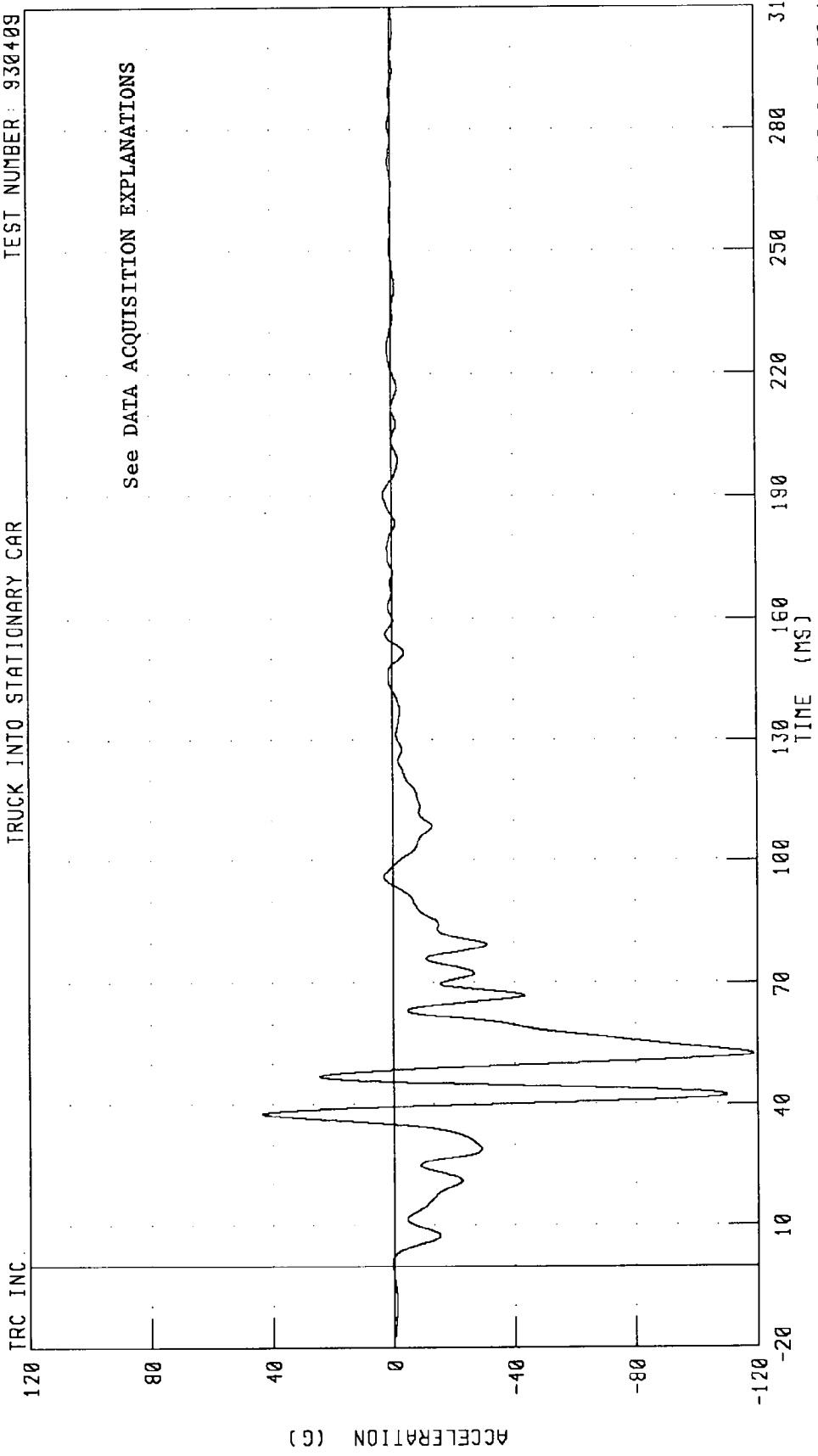
TEST NUMBER: 930408



CHANNEL: DPCXV1 FILTER: CH. CLASS 180 PEAK DATA: 0 00 KM/H @ 1.00 MS; -77.71 KM/H @ 327.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

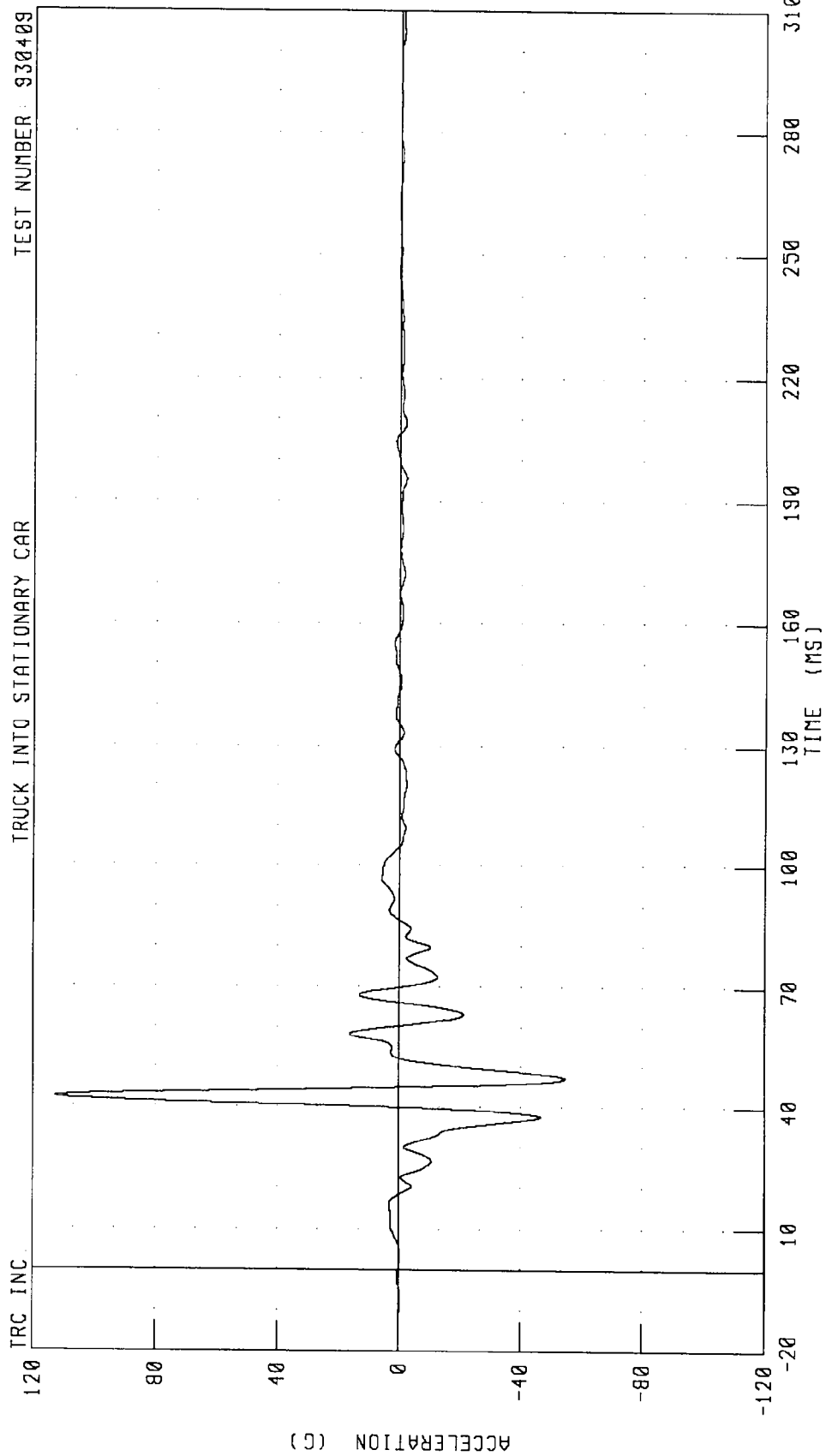
TEST NUMBER: 930409



TRC INC. CHANNEL: VCGXG1 FILTER: CH. CLASS 60  
PEAK DATA: 43.43 G @ 37.75 MS; -118.49 G @ 52.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

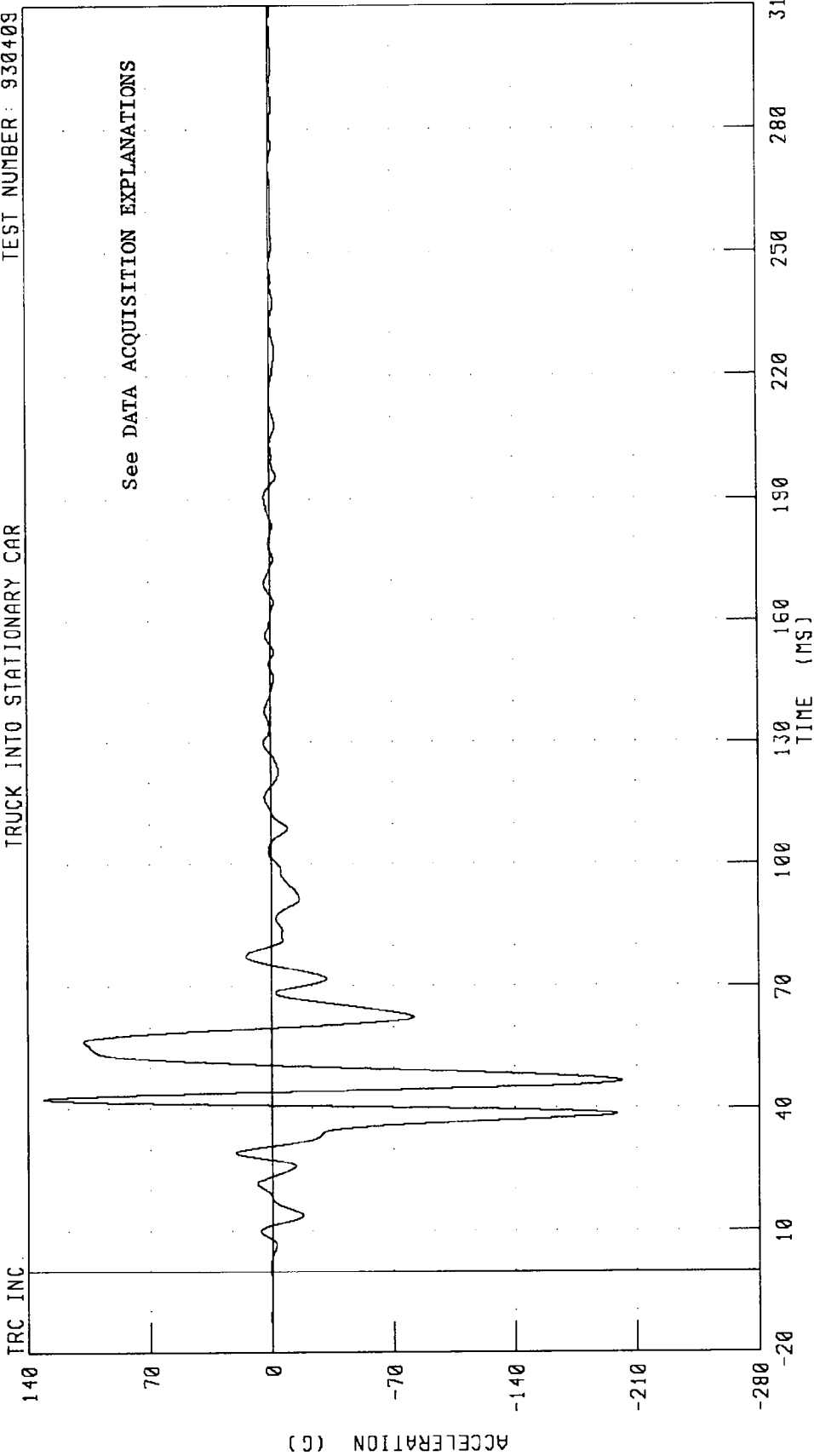


CHANNEL: YCGYGI FILTER: CH. CLASS 60

PEAK DATA: 112.85 G @ 42.50 MS, -54.45 G @ 47.13 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY Z-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

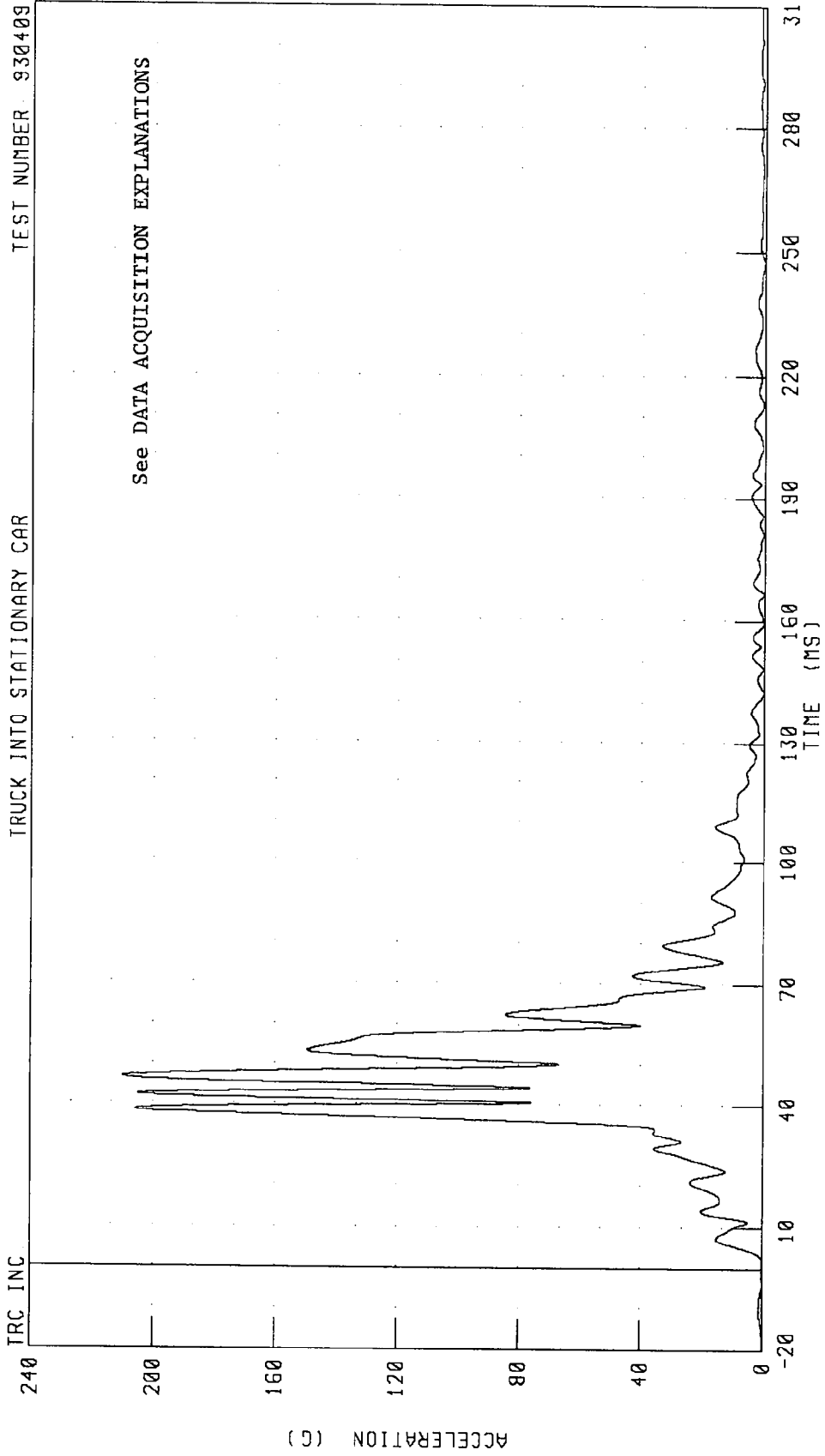
TEST NUMBER: 930409



CHANNEL: VCGZG1 FILTER: CH. CLASS 60  
PEAK DATA: 131.16 G @ 42.38 MS, -201.76 G @ 46.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY RESULTANT ACCELERATION  
TRUCK INTO STATIONARY CAR

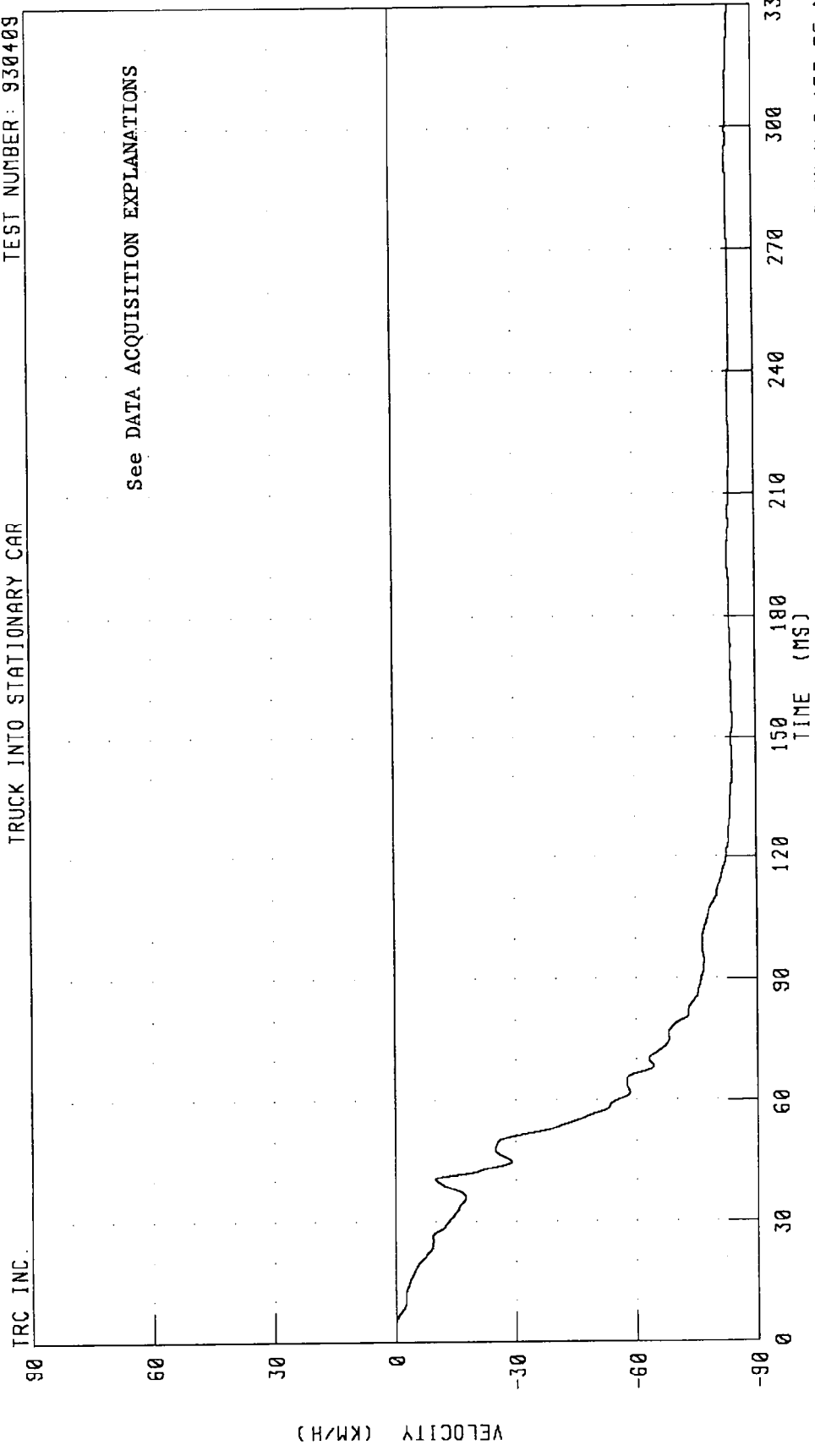
TEST NUMBER: 930409



CHANNEL: VCGRG1 FILTER: CH. CLASS 60 PEAK DATA: 209.68 G @ 46.75 MS, 0.11 G @ -19.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



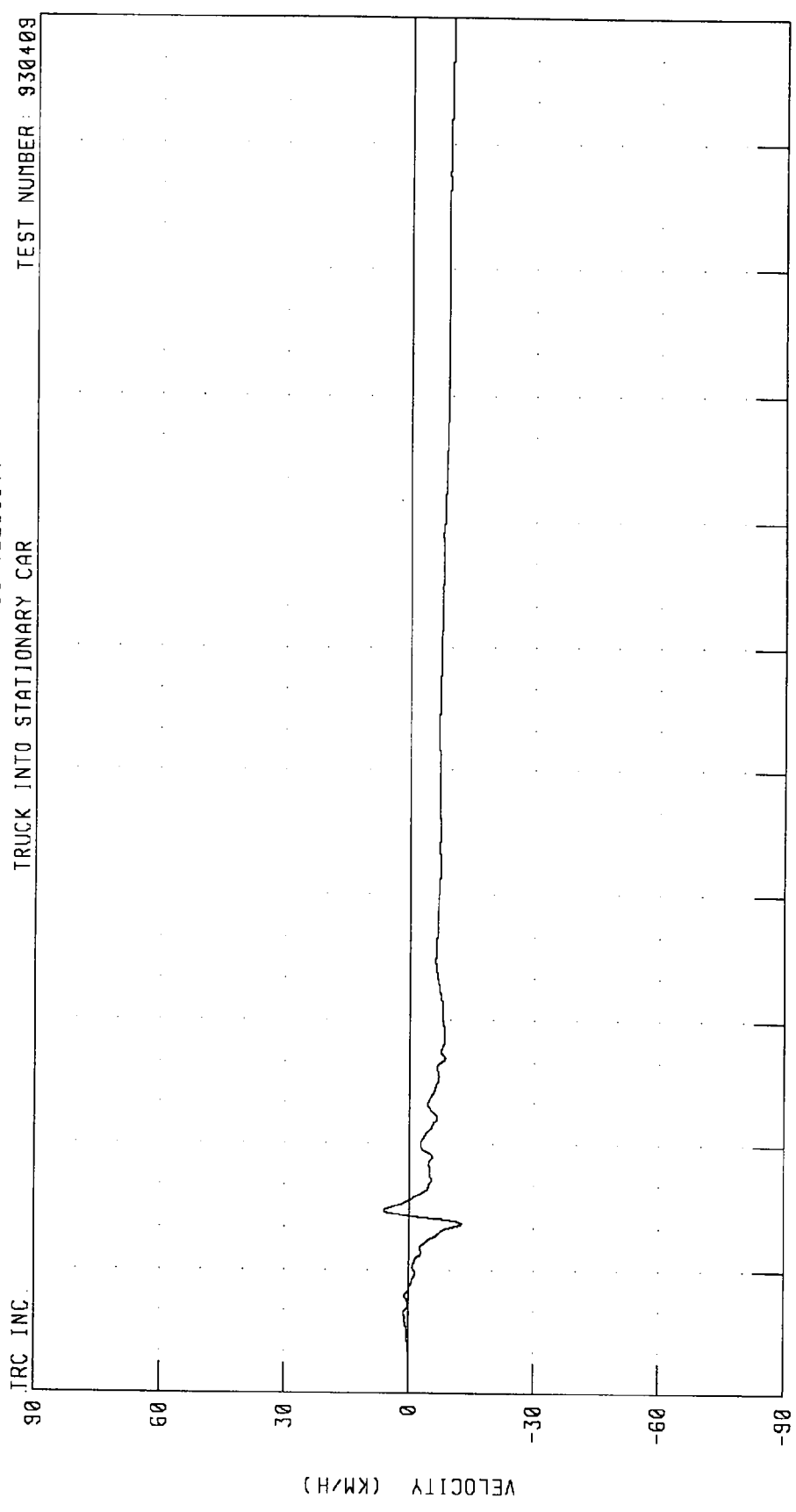
See DATA ACQUISITION EXPLANATIONS

TRC INC.

CHANNEL: VCGXV1 FILTER: CH. CLASS 180 PEAK DATA: 0.00 KM/H @ 0.00 MS; -84.43 KM/H @ 153.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



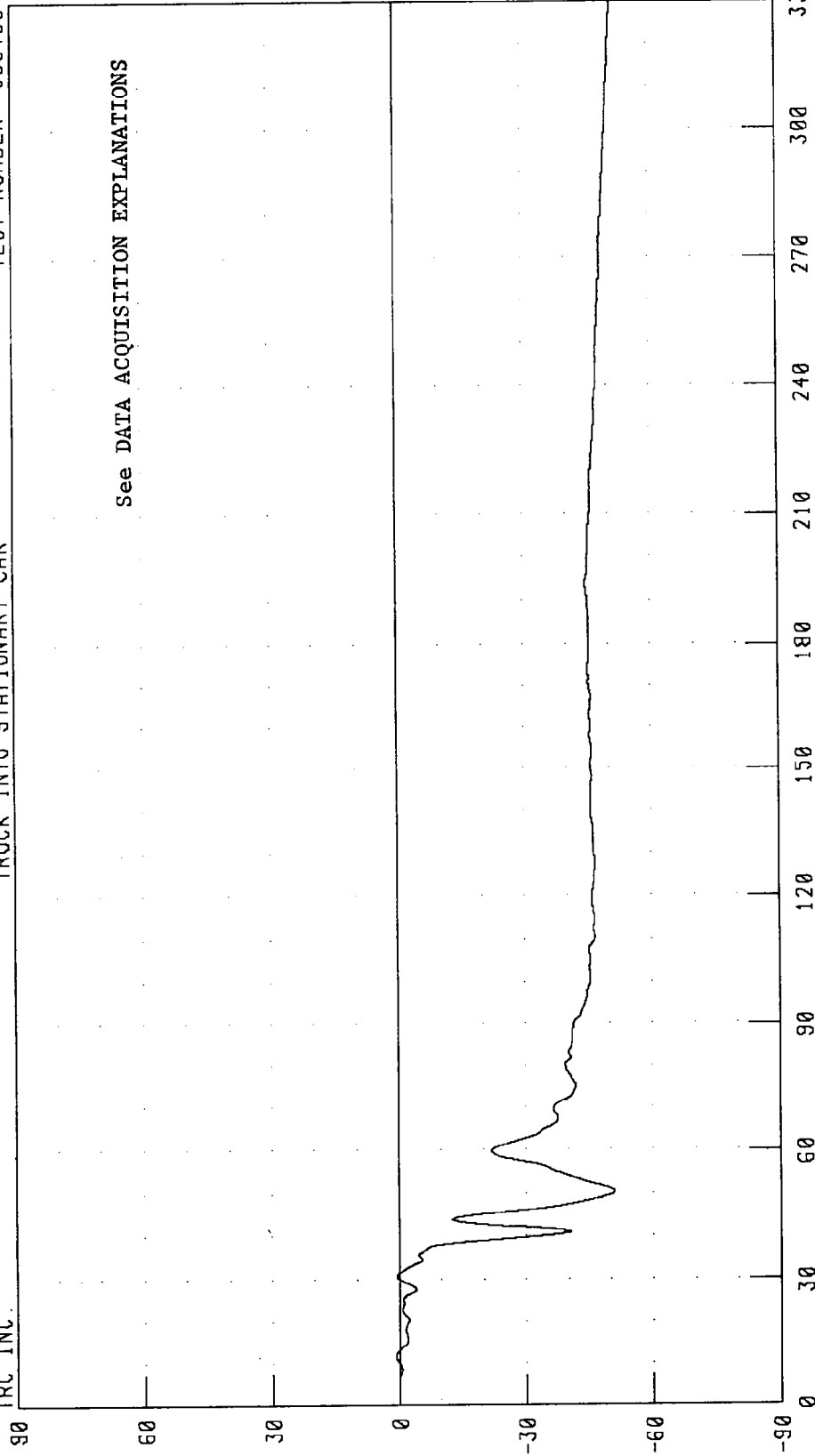
CHANNEL: VCGYV1 FILTER: CH. CLASS 180

PEAK DATA: 6.17 KM/H @ 44.00 MS; -12.66 KM/H @ 41.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
CAR CENTER OF GRAVITY Z-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



VELOCITY (KM/H)

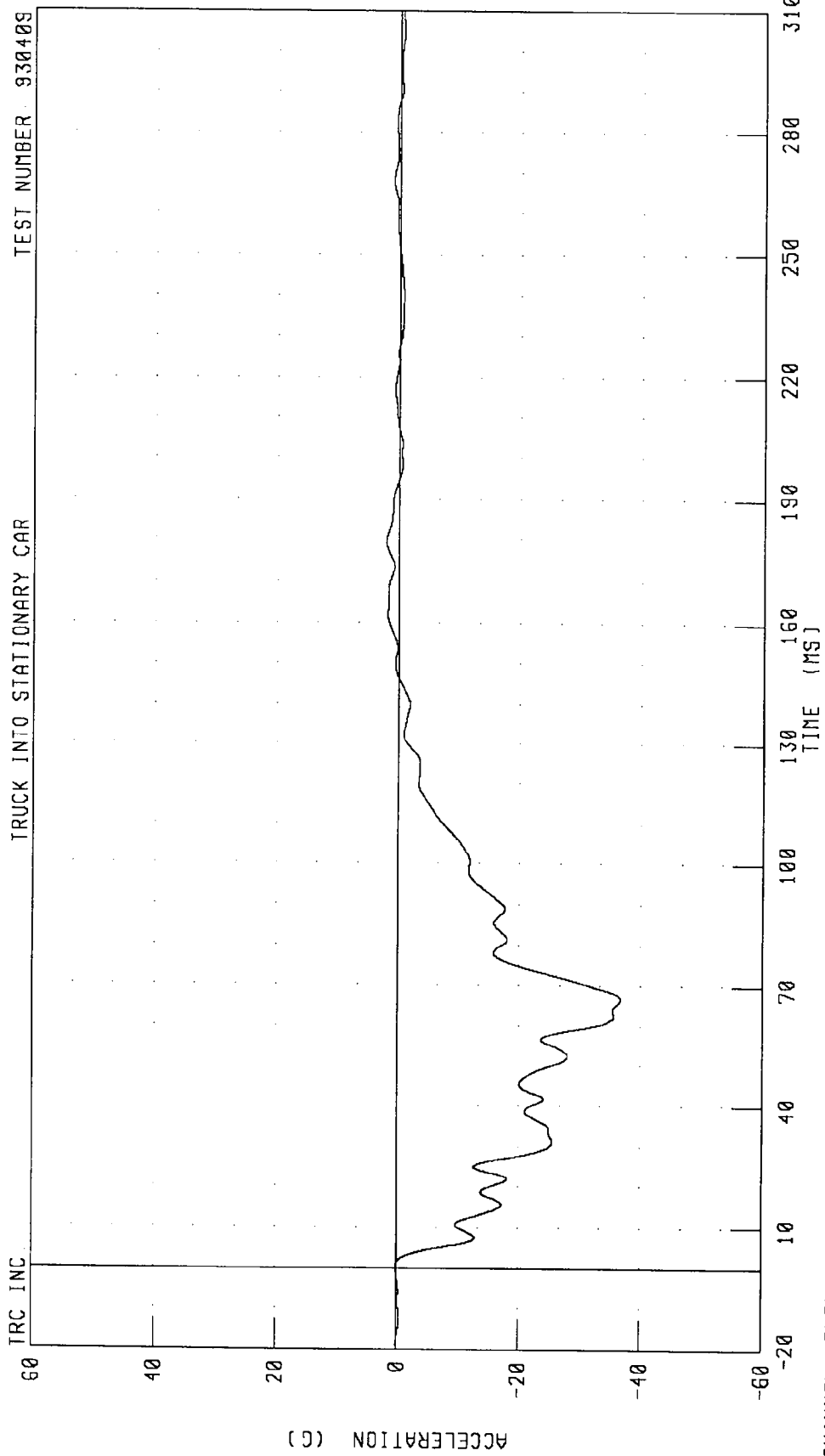
90 60 30 0 -30 -60 -90  
0 30 60 90 120 150 180 210 240 270 300 330  
TIME (MS)

PEAK DATA: 0.85 KM/H @ 11.75 MS; -51.31 KM/H @ 330.00 MS

CHANNEL: YCGZV1 FILTER: CH. CLASS 180

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
LEFT REAR SEAT X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER 930409



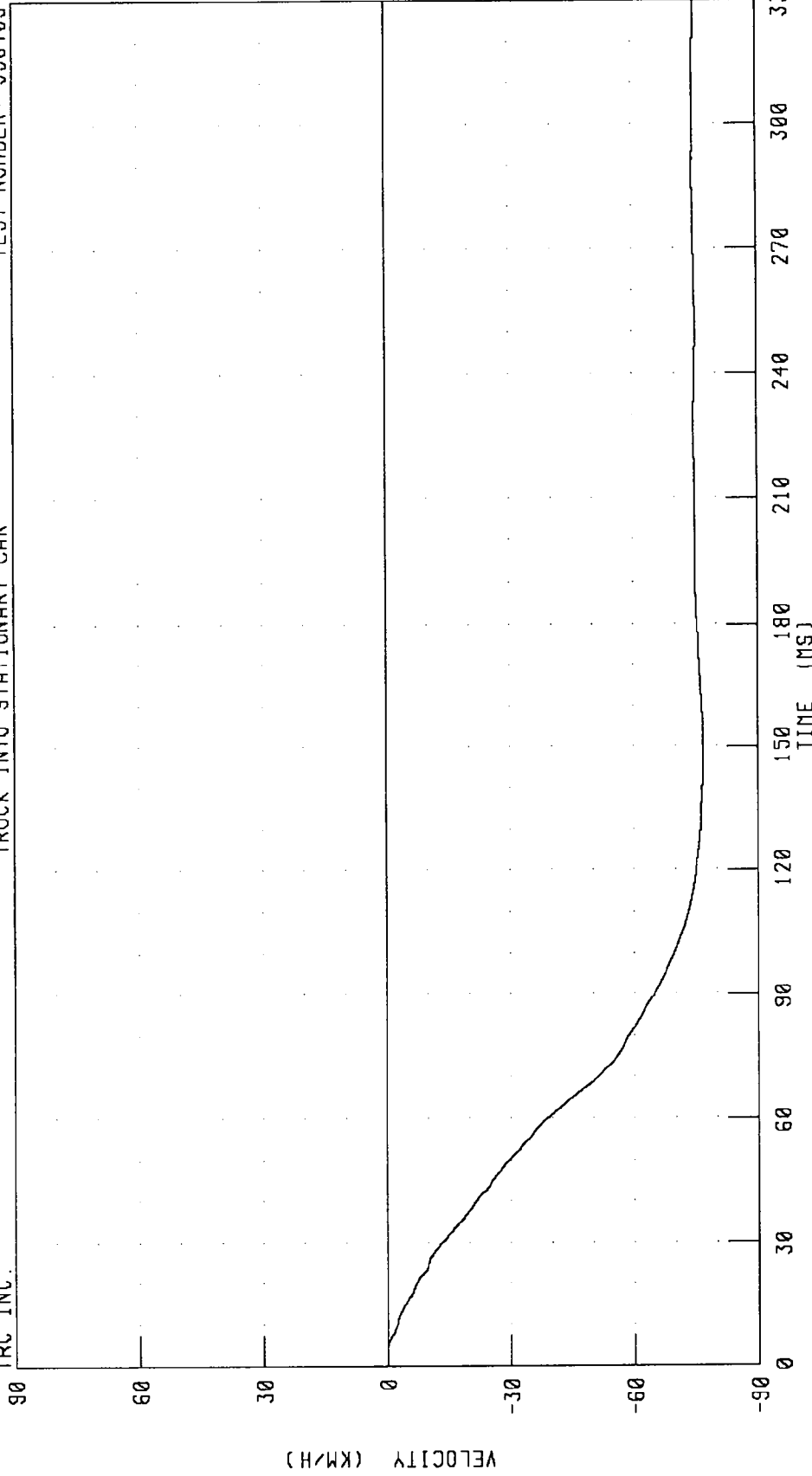
CHANNEL: TLRXG1 FILTER: CH. CLASS 60

PEAK DATA: 2.08 G @ 179.38 MS; -36.70 G @ 66.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
LEFT REAR SEAT X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

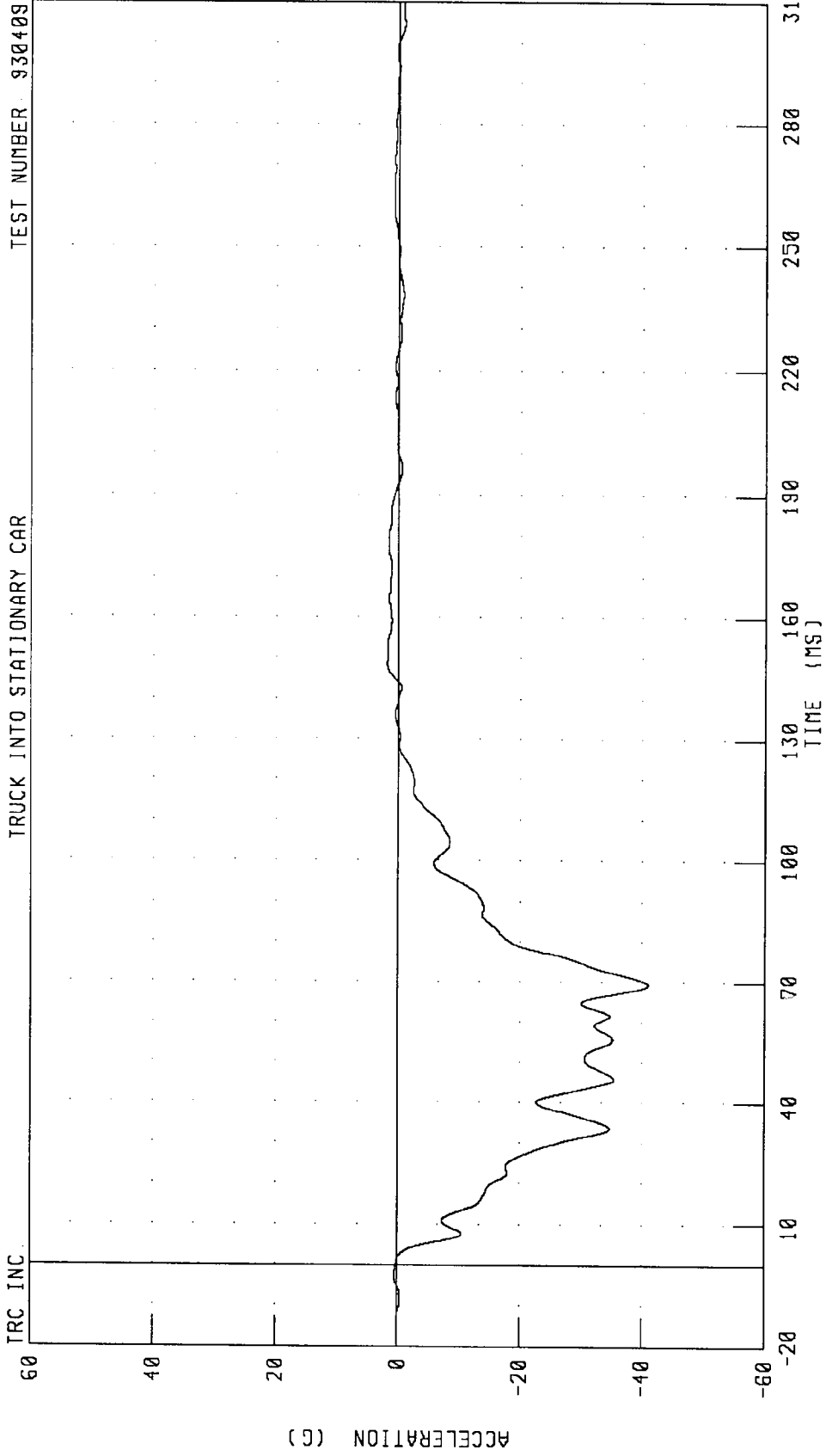
TRC INC.



CHANNEL: TLRXV1 FILTER: CH: CLASS 180

PEAK DATA: 0.00 KM/H @ 0.50 MS, -76.76 KM/H @ 146.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
RIGHT REAR SEAT X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

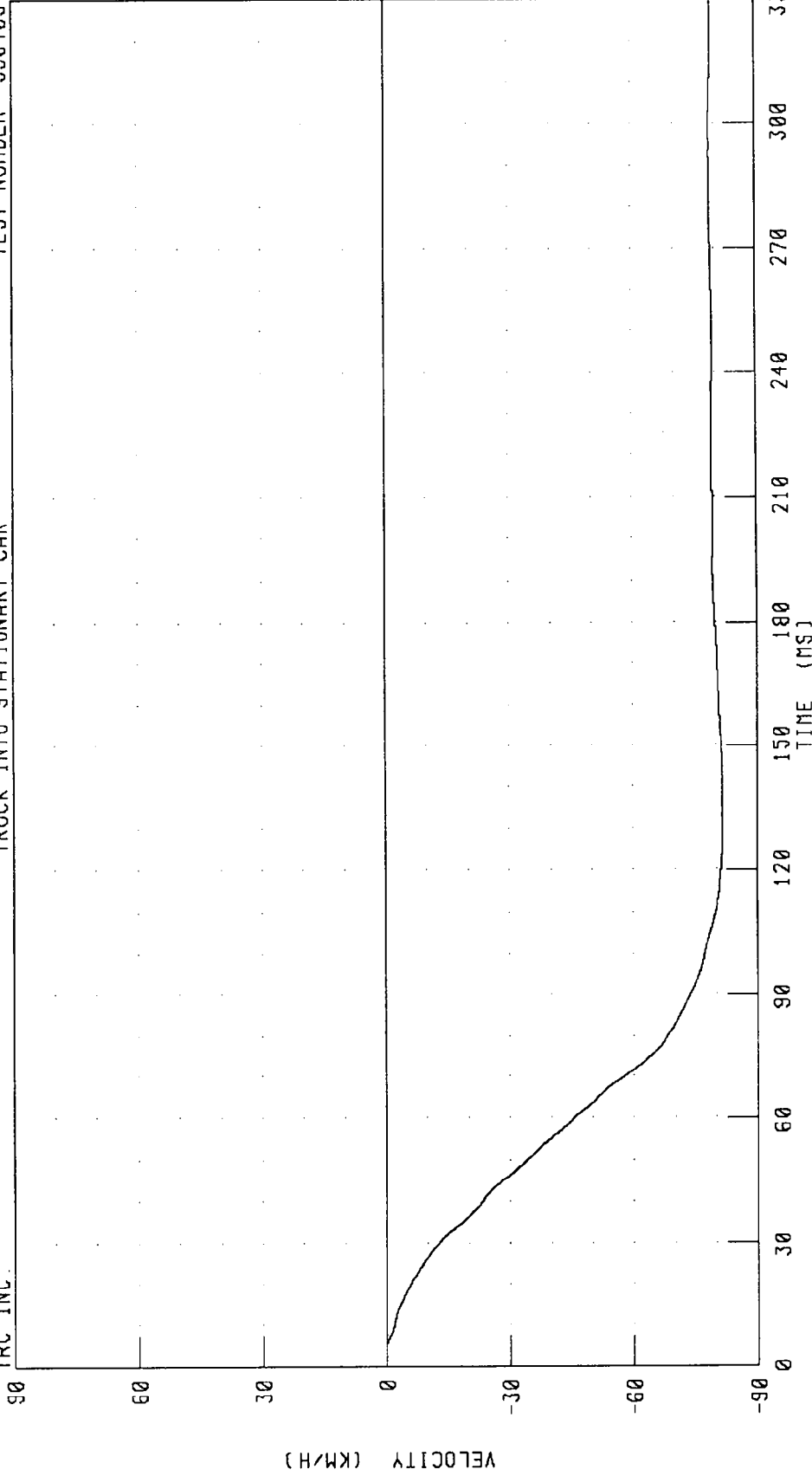


CHANNEL: TRRXG1 FILTER: CH. CLASS 60 PEAK DATA: 1.81 G @ 148.63 MS; -40.94 G @ 69.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
RIGHT REAR SEAT X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

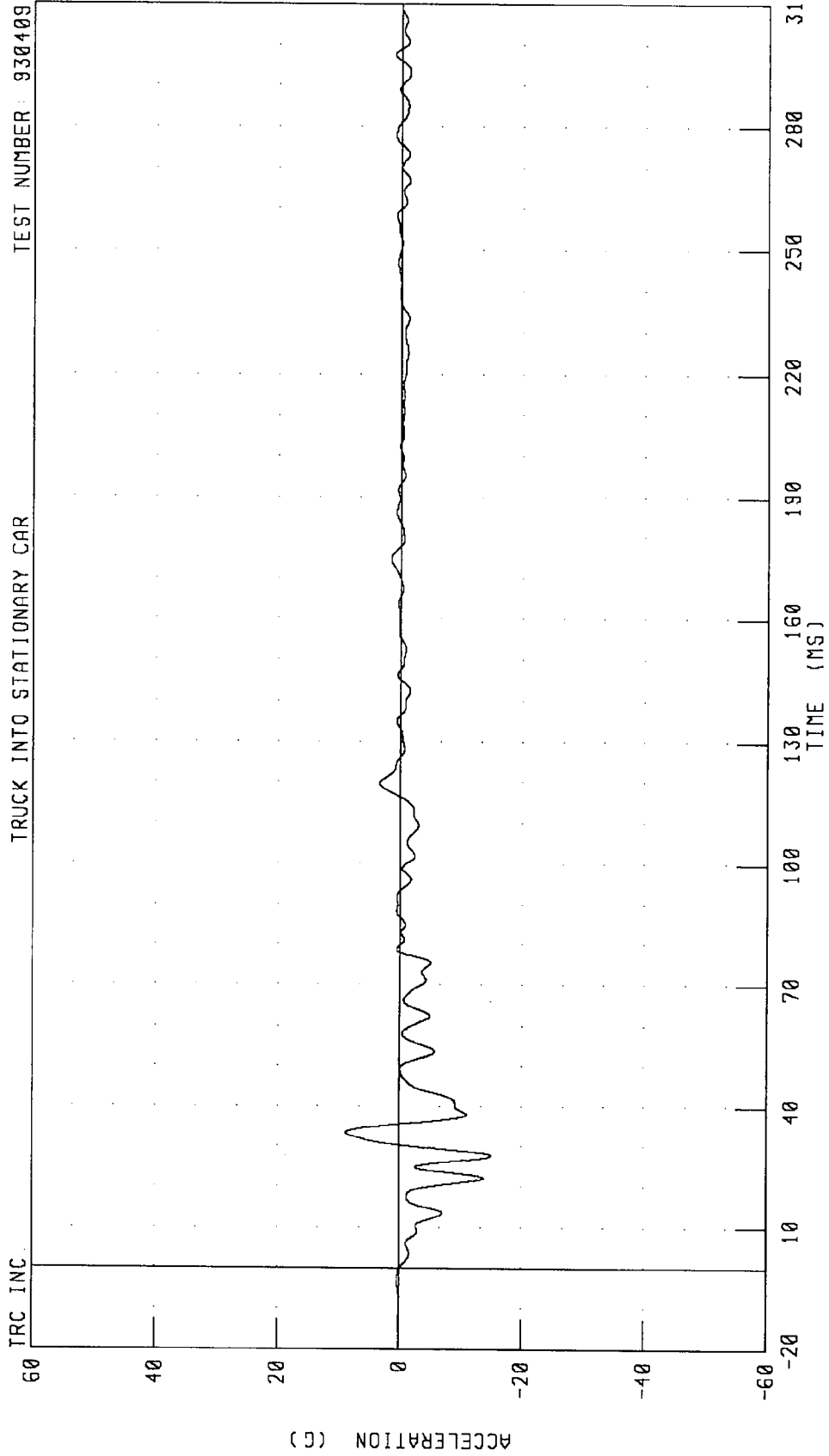


CHANNEL: TRRXV1 FILTER: CH. CLASS 180

PEAK DATA: 0.00 KM/H @ 0 38 MS; -81.58 KM/H @ 132.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

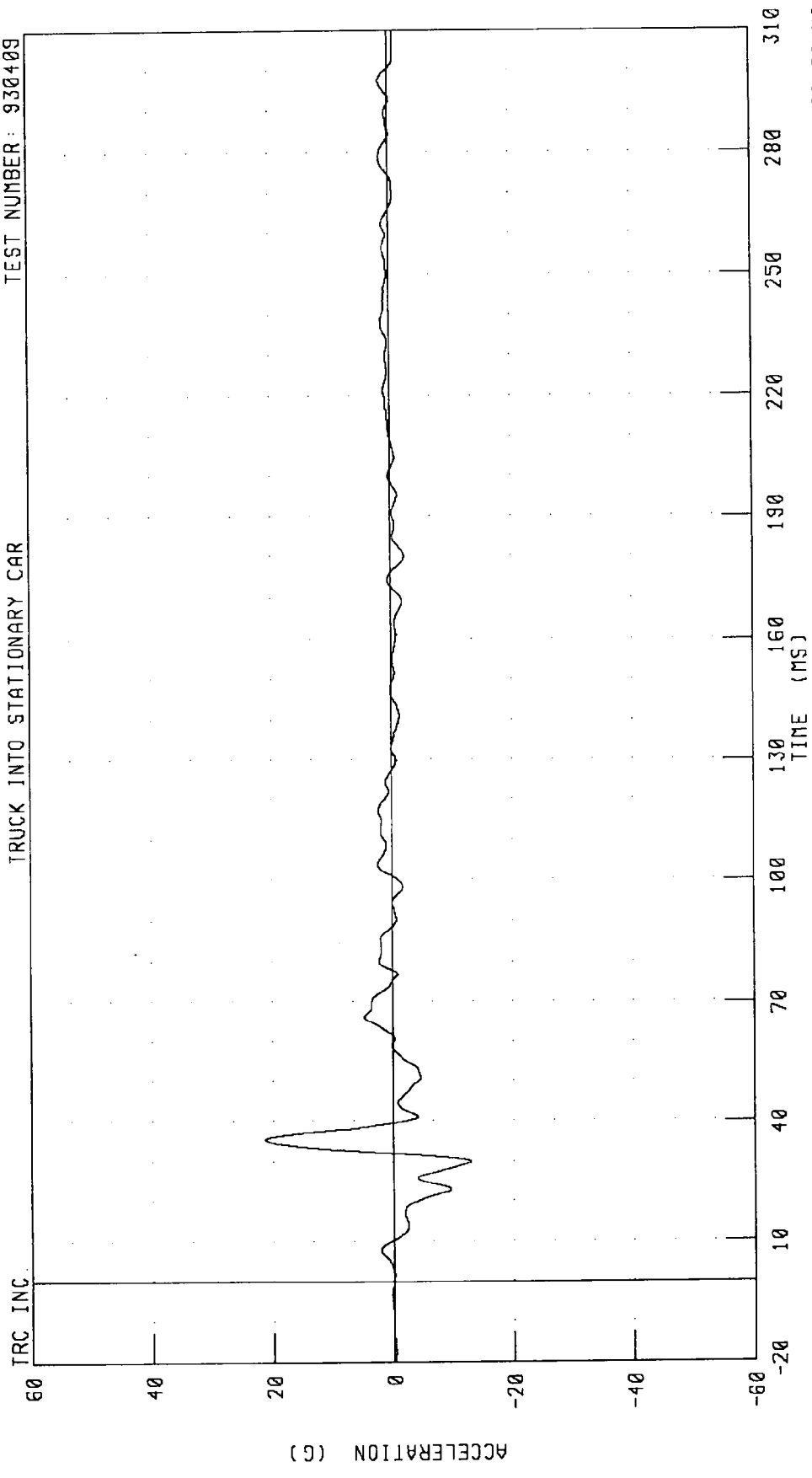


CHANNEL: FFCXGA FILTER: CH. CLASS 60

PEAK DATA: 8.86 G @ 33.63 MS, -15.00 G @ 27.50 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



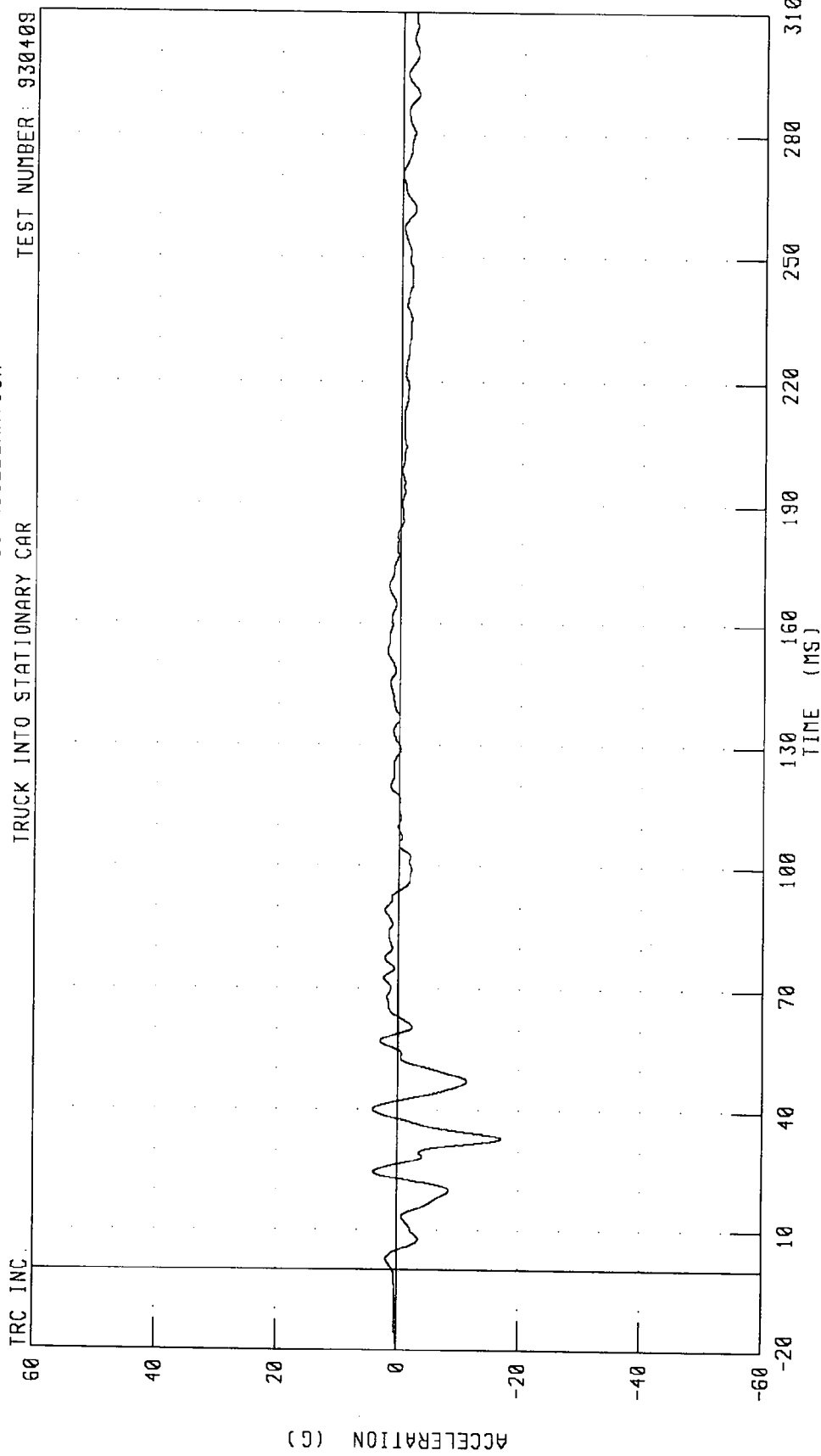
TRC INC.

CHANNEL: FFCYGA FILTER: CH. CLASS 60

PEAK DATA: 21.32 G @ 35.38 MS, -12.86 G @ 29.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



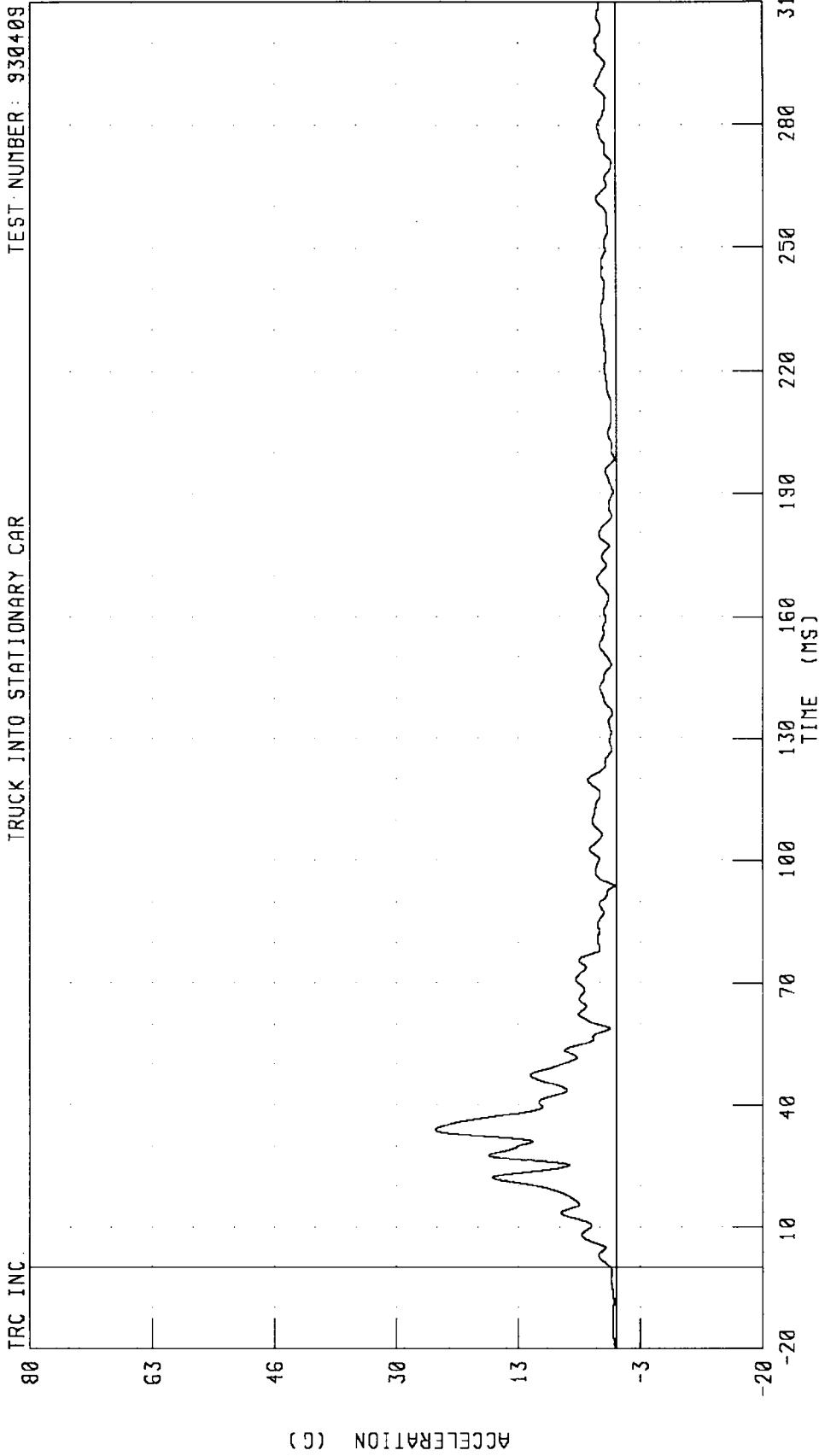
CHANNEL: FFCZGA FILTER: CH. CLASS 60

PEAK DATA: 4.10 G @ 40.25 MS; -17.09 G @ 33.25 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER RESULTANT ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

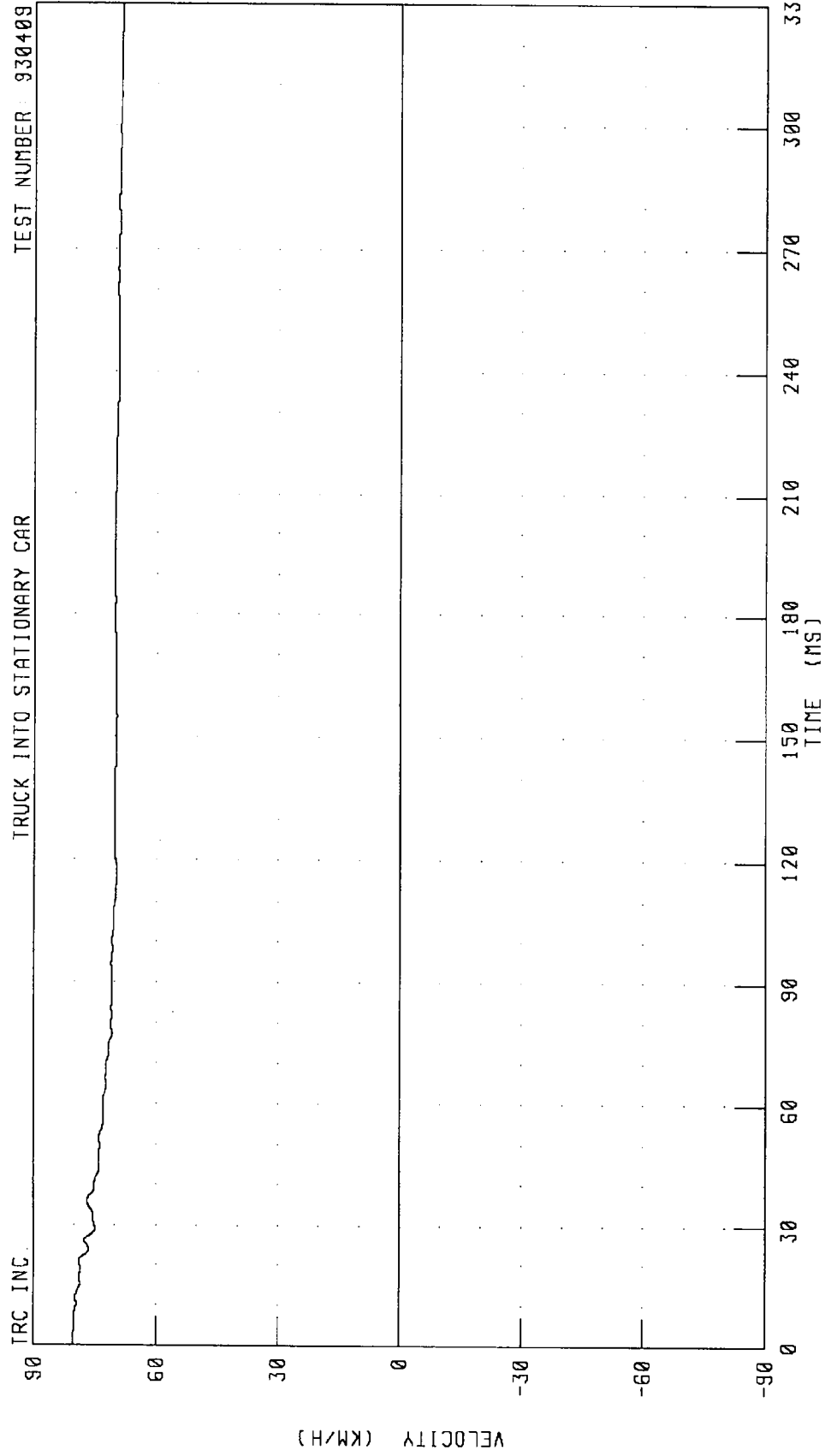


CHANNEL: FFCRGA FILTER: CH. CLASS 60

PEAK DATA: 24.66 G @ 34.00 MS; 0.03 G @ -20.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TRC INC. TEST NUMBER: 930409

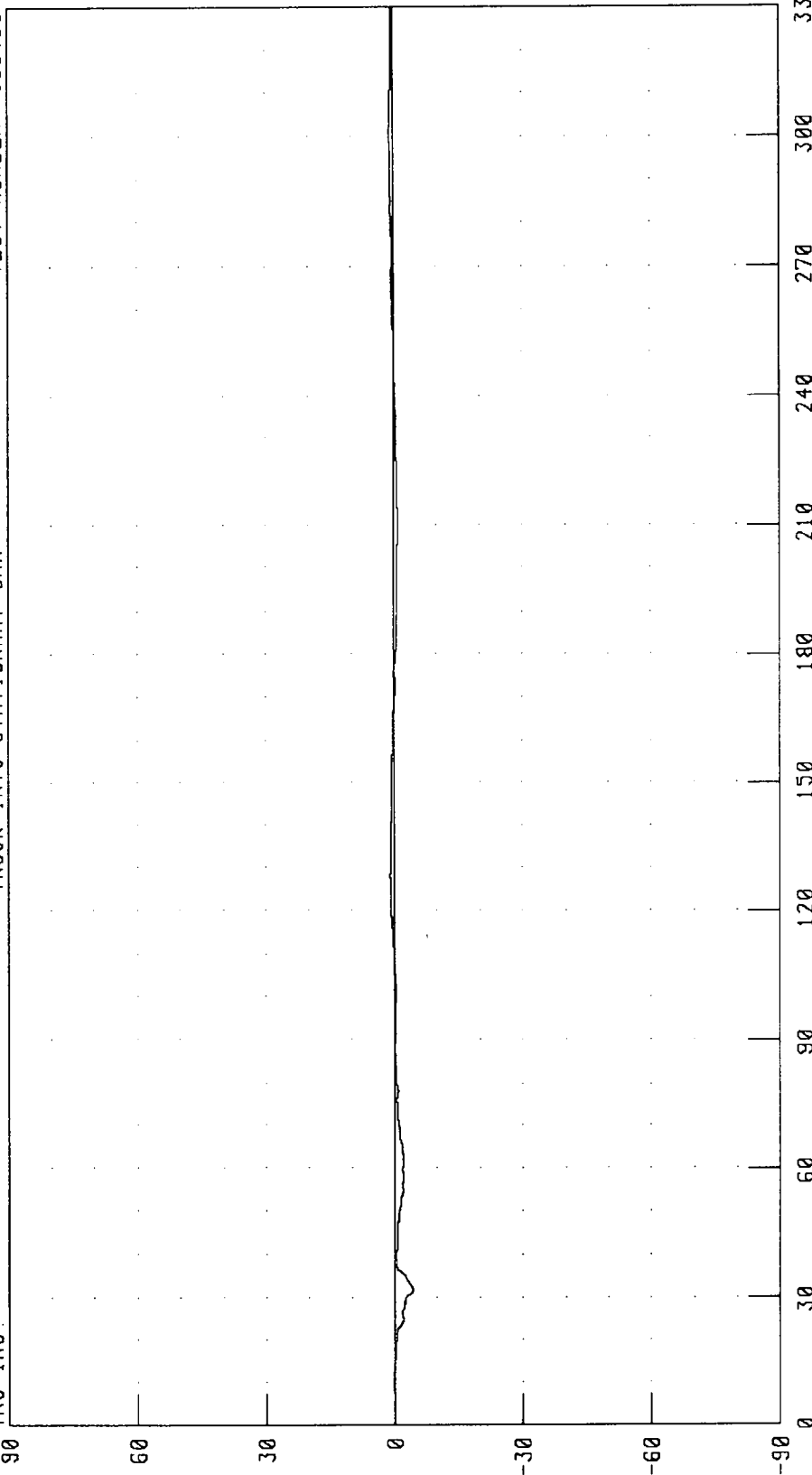


CHANNEL: FFCXVA FILTER: CH. CLASS 180 PEAK DATA: 80.31 KM/H @ 1.00 MS, 68.40 KM/H @ 324.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

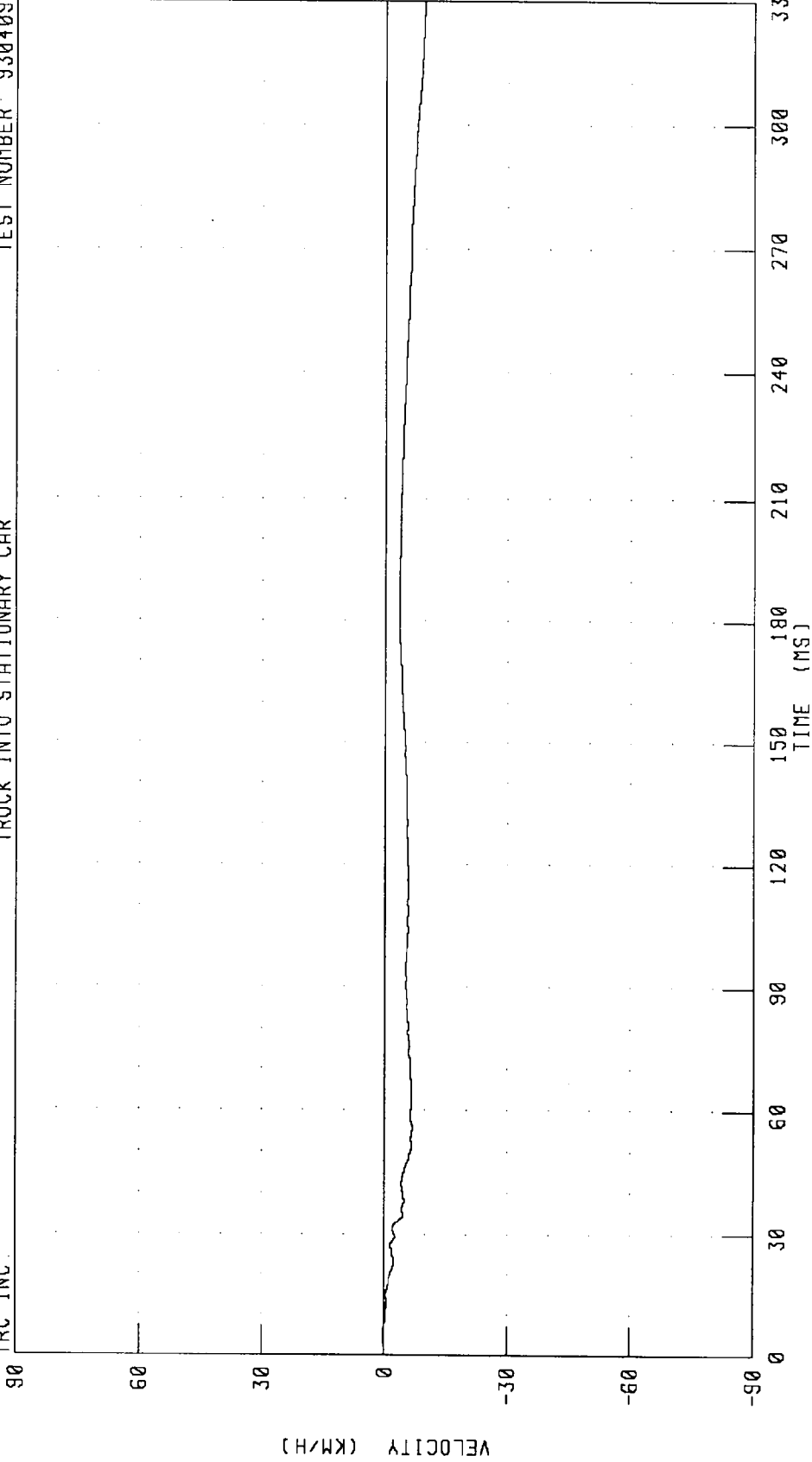


CHANNEL: FFCYVA FILTER: CH. CLASS 180  
PEAK DATA: 0.96 KM/H @ 300.00 MS; -4.19 KM/H @ 31.75 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



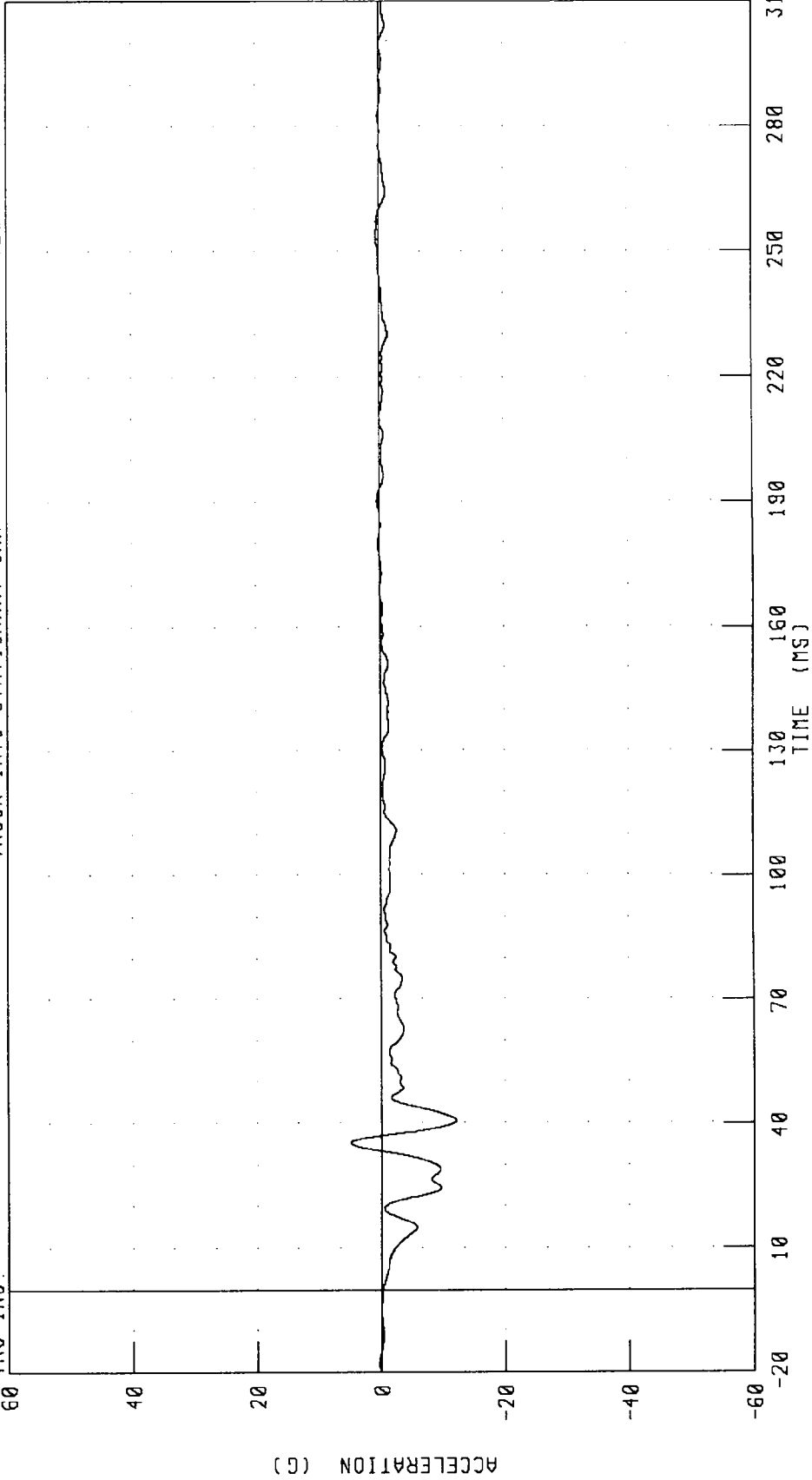
CHANNEL: FFCZVA FILTER: CH. CLASS 180

PEAK DATA: 0.29 KM/H @ 5.50 MS; -9.63 KM/H @ 330.00 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK CENTER OF GRAVITY X-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.



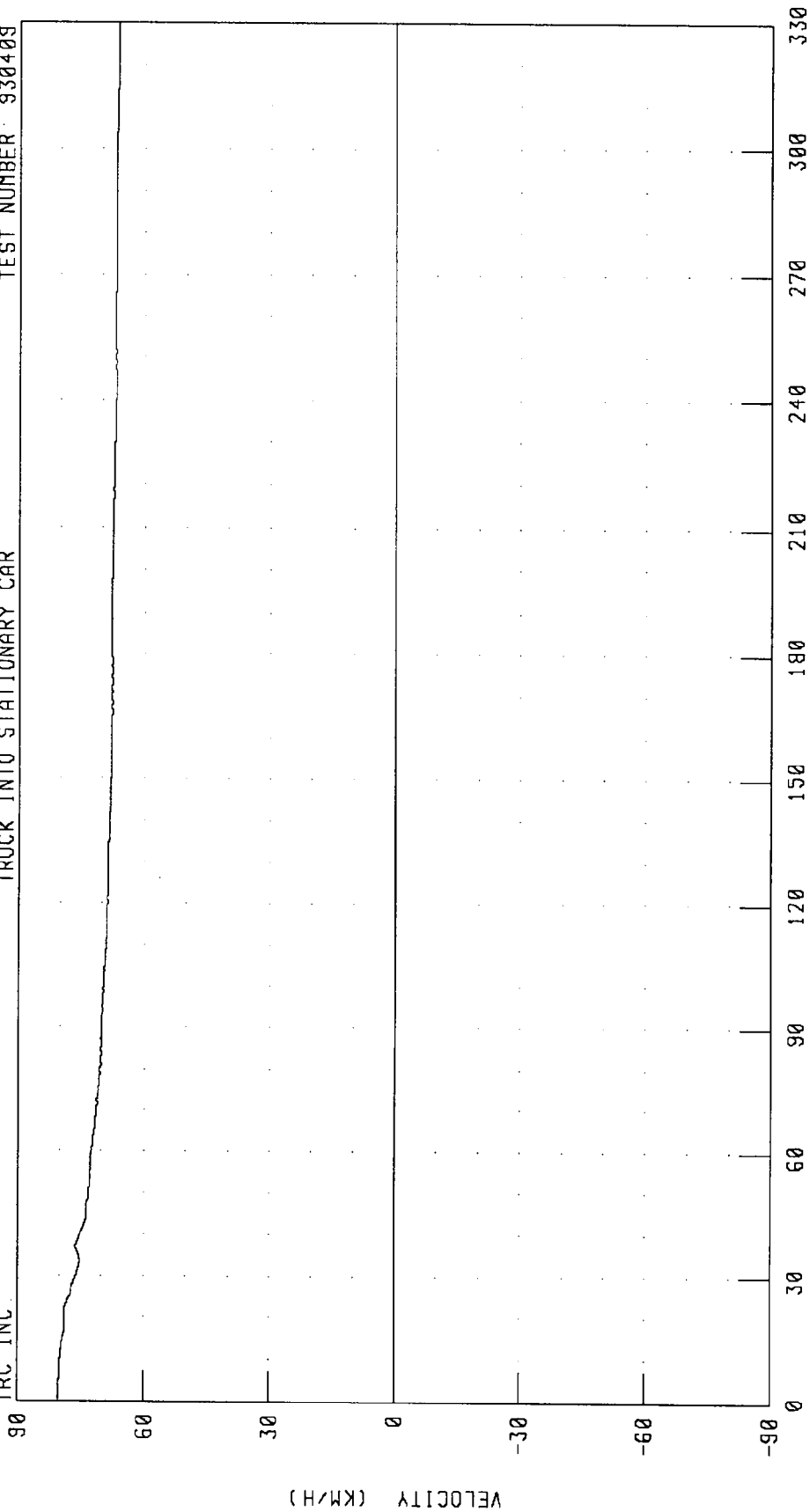
CHANNEL: VCGXGA FILTER: CH. CLASS 60

PEAK DATA: 4.89 G @ 35.38 MS; -12.02 G @ 40.63 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK CENTER OF GRAVITY X-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

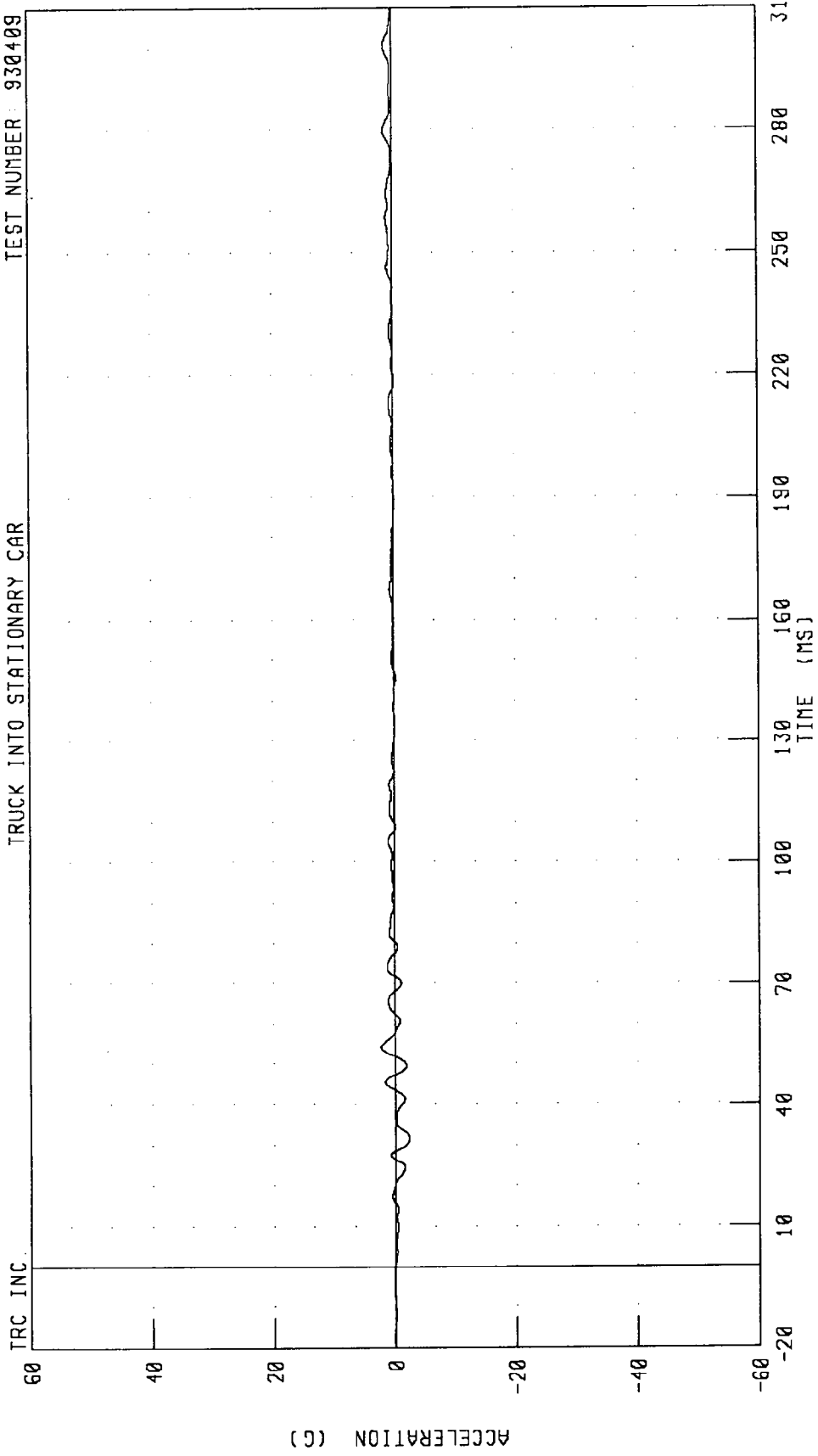


CHANNEL: VCGXVA FILTER: CH. CLASS 180

PEAK DATA: 80.30 KM/H @ 0.00 MS, 66.25 KM/H @ 326.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK CENTER OF GRAVITY Y-AXIS ACCELERATION  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409



TRC INC.

CHANNEL: VCGYGA FILTER: CH. CLASS 60 PEAK DATA: 2.31 G @ 54.13 MS, -2.35 G @ 31.88 MS

REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 11  
TRUCK CENTER OF GRAVITY Y-AXIS VELOCITY  
TRUCK INTO STATIONARY CAR

TEST NUMBER: 930409

TRC INC.

90

60

30

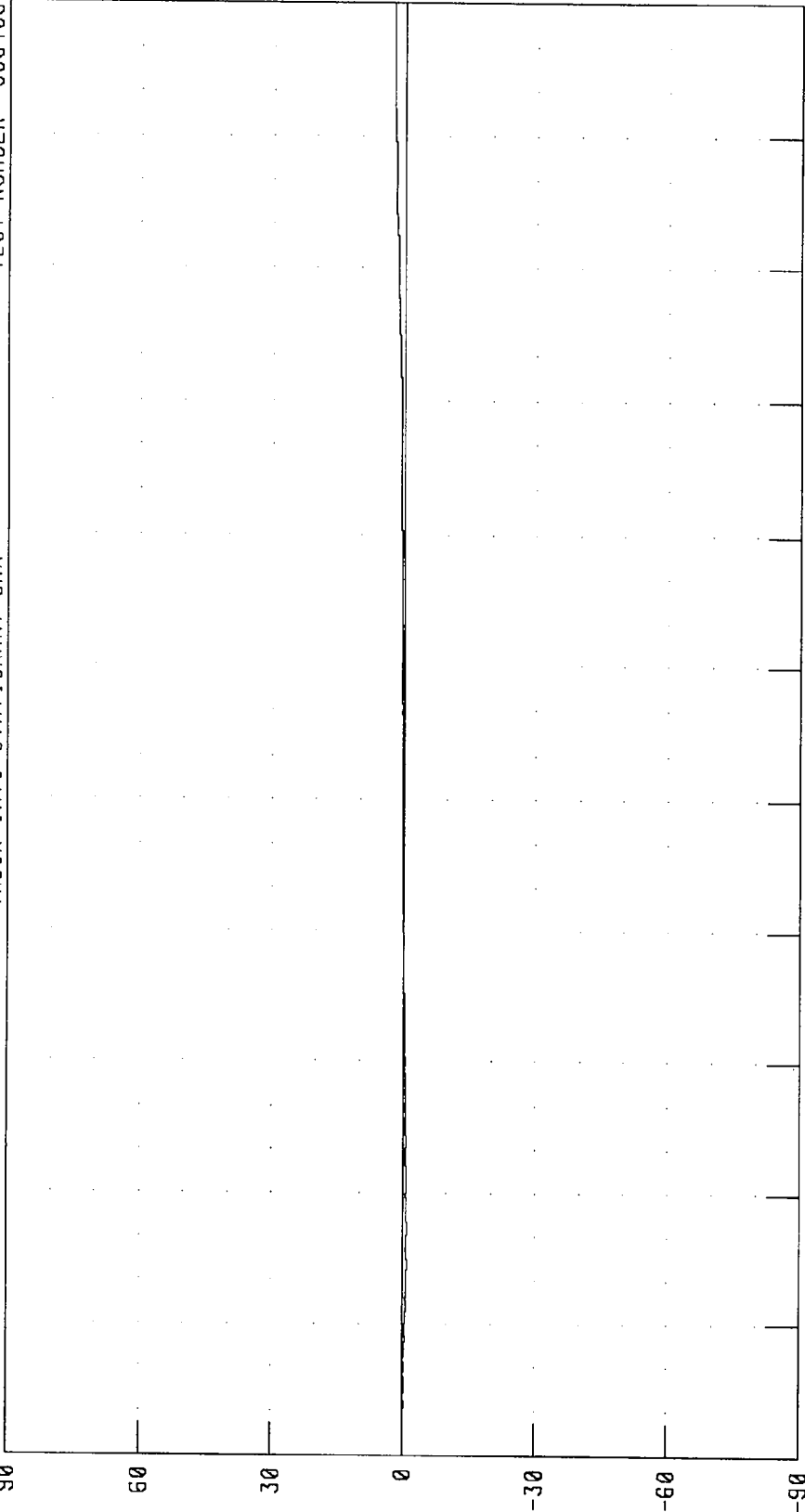
0

-30

-60

-90

VELOCITY (KM/H)



CHANNEL: VCGYVA FILTER: CH. CLASS 180  
PEAK DATA: 2.65 KM/H @ 330.00 MS; -1.02 KM/H @ 51.75 MS

APPENDIX C

DUMMY CERTIFICATION

TRANSPORTATION RESEARCH CENTER INC.  
HYBRID III EXTERNAL DIMENSIONS  
HUMANOID 48

24-MAR-93

TRC                      48C7ED1                                      572E SN48 EXT. DIMENSION CAL 07

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429- 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226- 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)		970-1001 MM	986. MM
WAIST CIRCUMFERENCE (Z)		836- 866 MM	851. MM
CHEST DEPTH (O)		213- 229 MM	218. MM
H-POINT HEIGHT (C)		84- 89 MM	86. MM
H-POINT FROM SEATBACK (D)		135- 140 MM	137. MM
SKULL CAP TO BACKLINE (H)		41- 46 MM	43. MM
TOTAL SITTING HEIGHT (A)		879- 889 MM	884. MM
THIGH CLEARANCE (F)		140- 155 MM	155. MM
BUTTOCK KNEE LENGTH (K)		579- 605 MM	597. MM
BUTTOCK POPLITEAL LENGTH (N)		452- 478 MM	470. MM
POPLITEAL HEIGHT (L)		429- 455 MM	432. MM
KNEE PIVOT HEIGHT (M)		485- 500 MM	493. MM
FOOT LENGTH (P)		252- 267 MM	259. MM
FOOT BREADTH (W)		91- 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE (E)		84- 94 MM	91. MM
SHOULDER BREADTH (V)		422- 437 MM	427. MM
SHOULDER PIVOT HEIGHT (B)		506- 521 MM	511. MM
ELBOW REST HEIGHT (J)		191- 211 MM	201. MM
SHOULDER-ELBOW LENGTH (I)		330- 345 MM	343. MM
BACK OF ELBOW TO WRIST PIVOT (G)		290- 305 MM	295. MM

TEST MEETS SPECIFICATIONS

TECHNICIAN E. E. Le Van

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

25-MAR-93

TRC

48C7HD1

572E SN48 HEAD DROP CAL 07

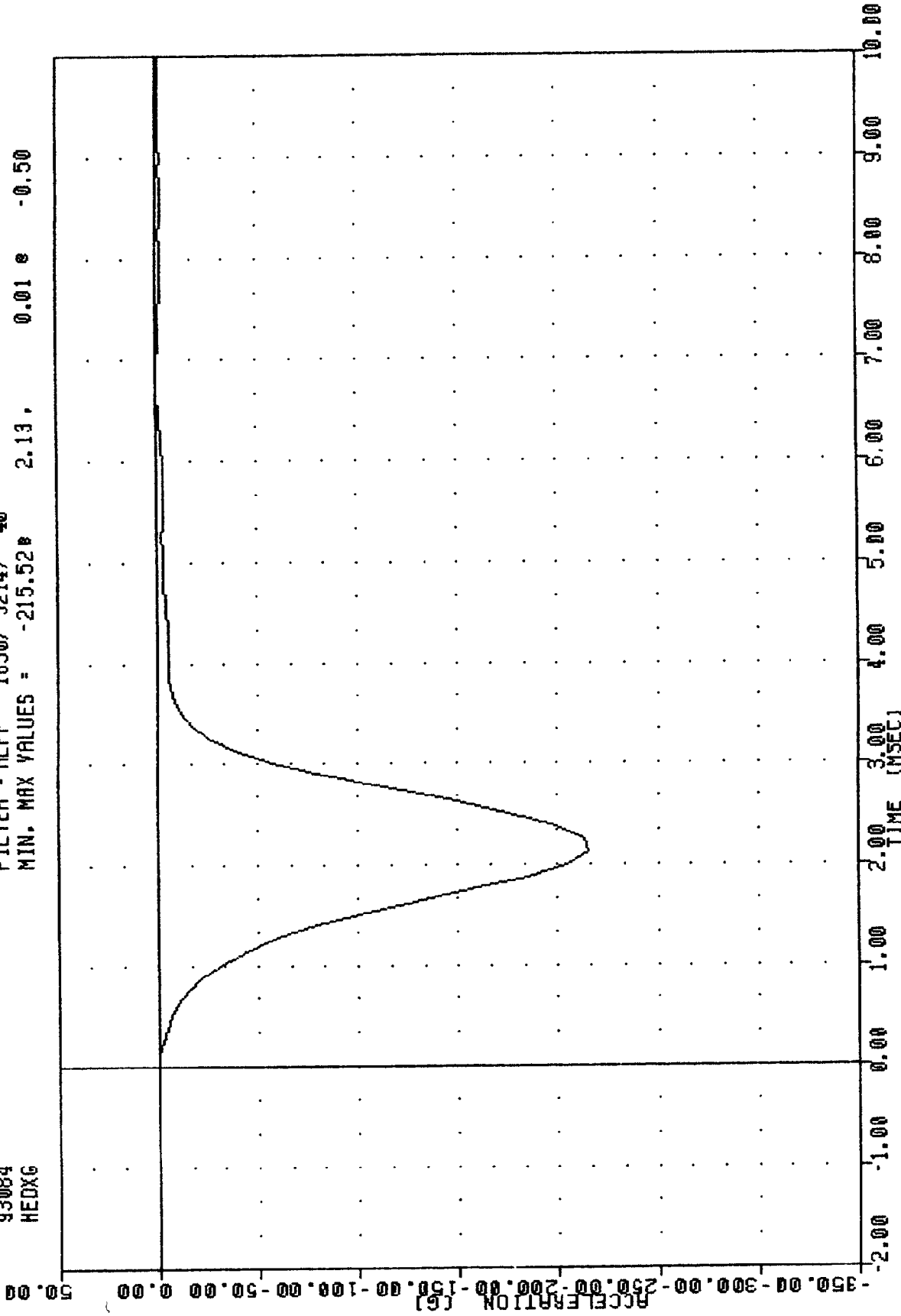
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	246.01 G
PEAK LATERAL ACCELERATION	15 G MAX	-6.20 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. To Van

TAC 4807HD1  
572E SN48 HEAD DROP CAL 07  
93084  
HEDXG

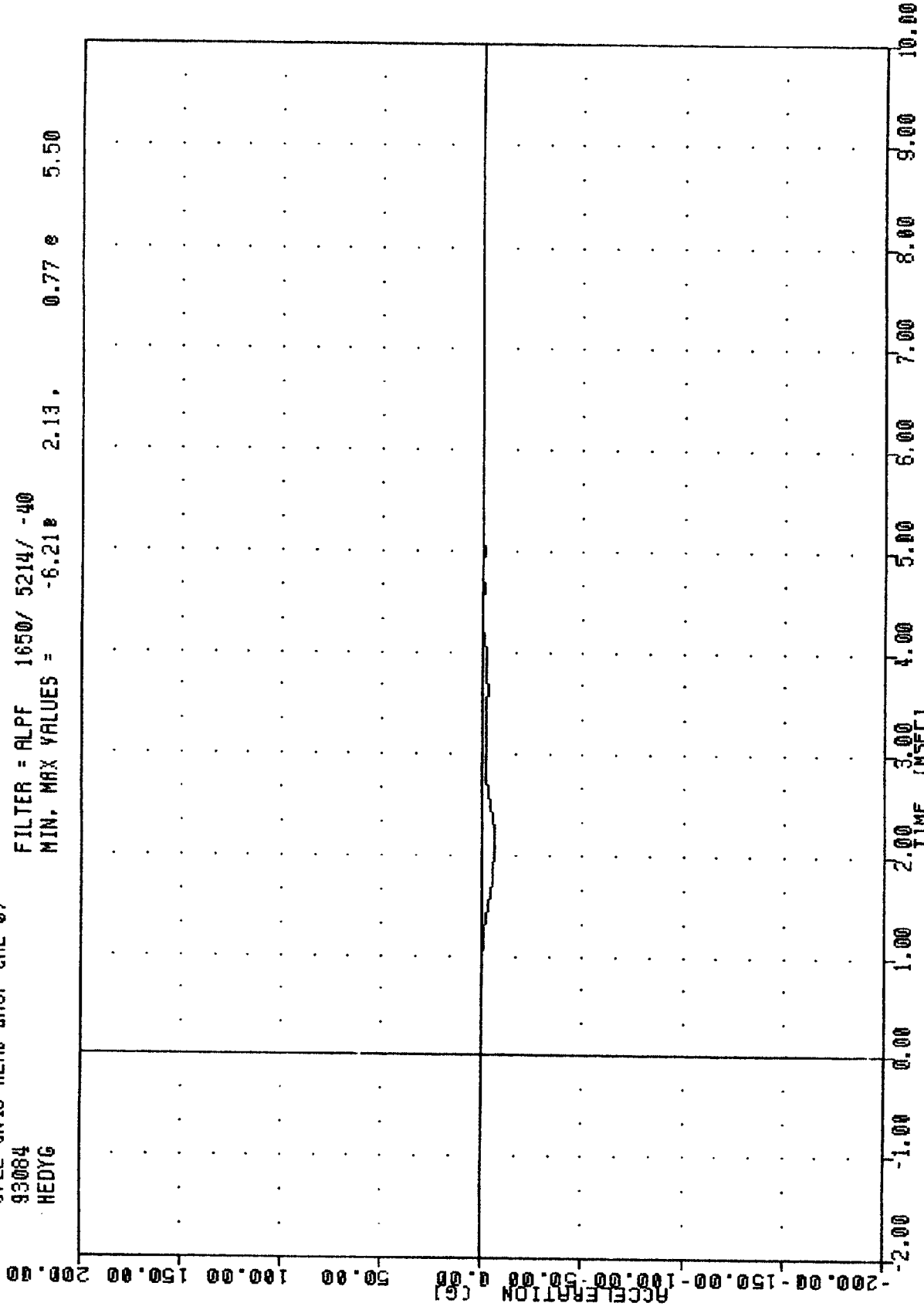
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -215.52 2.13 0.01 e -0.50



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

TRC  
572E SN48 HEAD DROP CAL 07  
93084  
HEDYG

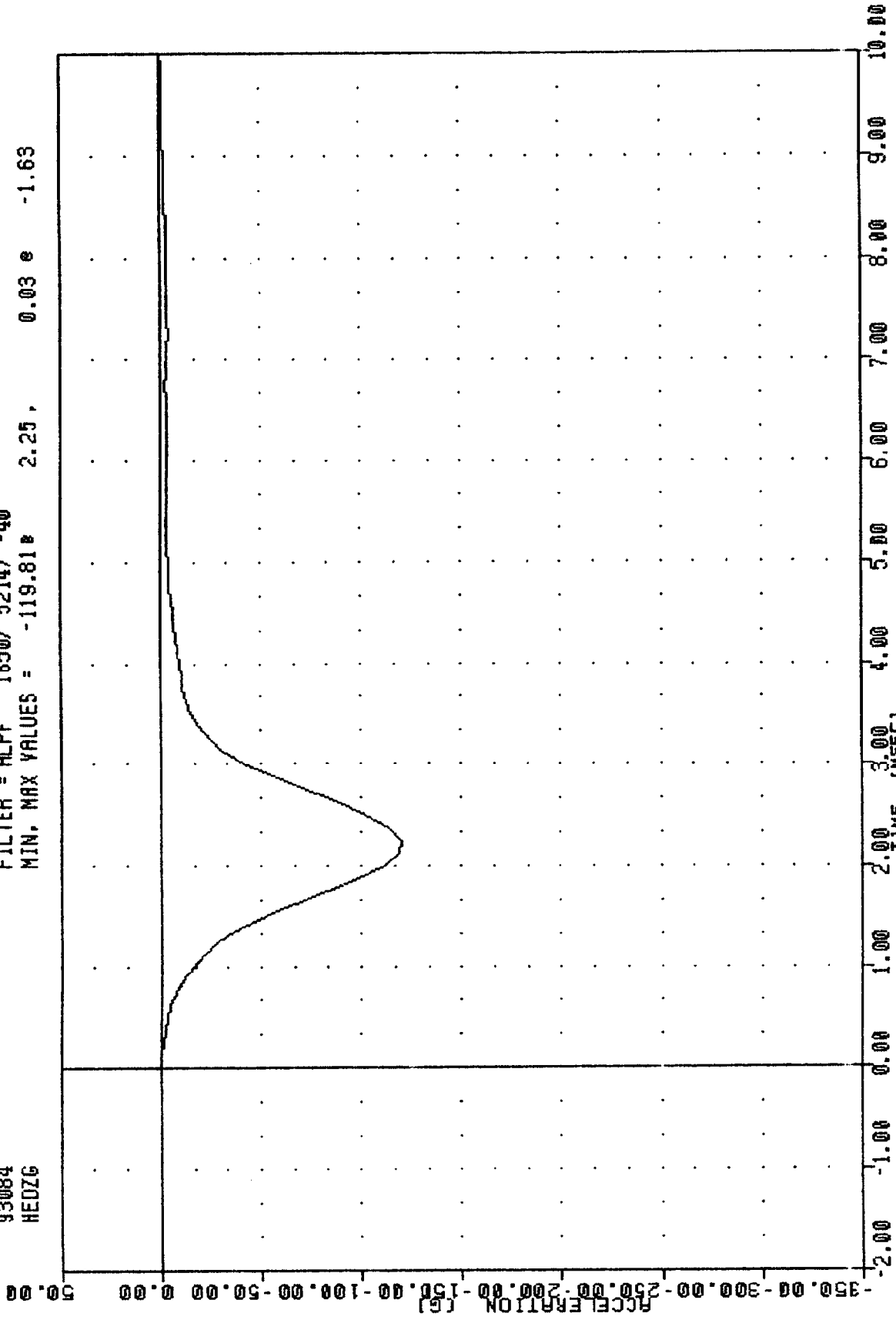
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -6.21e 2.13, 0.77 e 5.50



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

TRC  
572E SN48 HEAD DROP CAL 07  
93084  
HEDZG

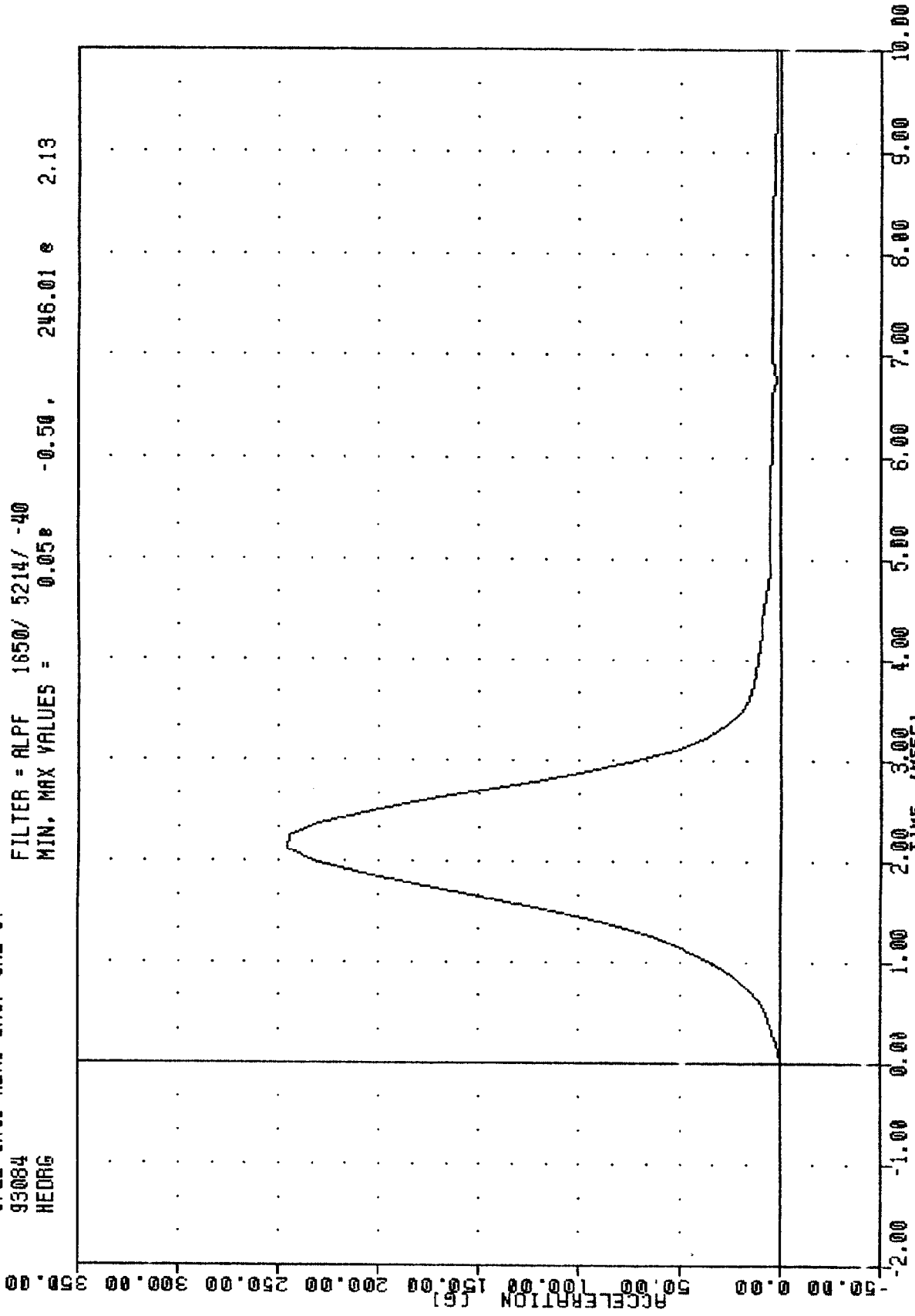
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -119.81e 2.25, 0.03 e -1.63



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

TAC , 48C7HD1  
572E SN48 HEAD DROP CAL 07  
93084  
HEADG

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.058 -0.50 , 246.01 e 2.13



PART 572-E HYBRID III HEAD CALIBRATION  
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST

HYBRID III

24-MAR-93

6 AXIS NECK TRANSDUCER  
TRC 48C7NF1

572E SN048 NECK FLEXION CAL07

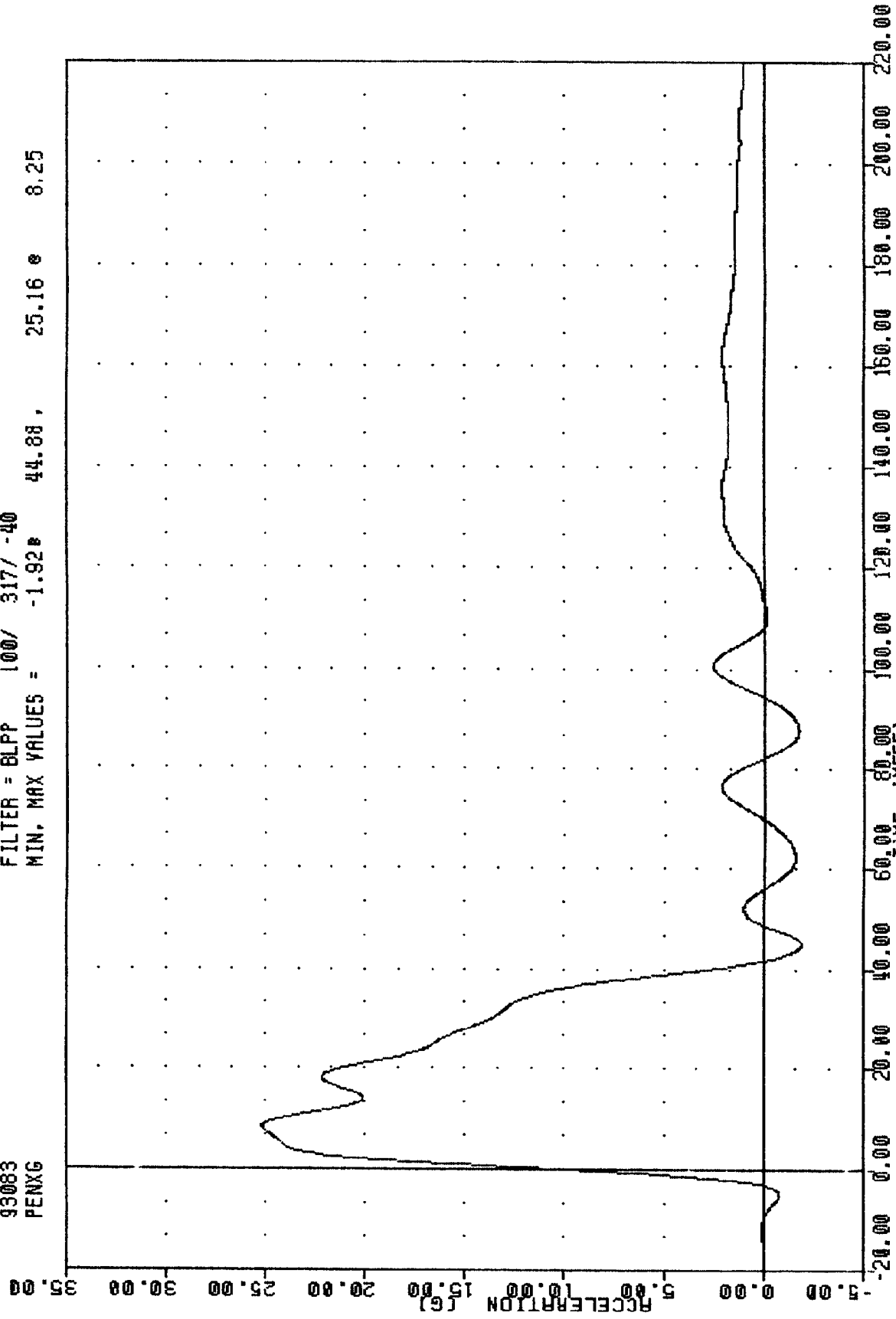
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
IMPACT VELOCITY	6.89 - 7.13 M/SEC	7.10 M/SEC
PENDULUM DECELERATION	10 MS   22.50 - 27.50 G	24.15 G
	20 MS   17.60 - 22.60 G	21.11 G
	30 MS   12.50 - 18.50 G	13.72 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	13.66 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	38.75 MS
D PLANE	MAX   64 - 78 DEG.	73.16 DEG.
ROTATION	TIME   57 - 64 MS	59.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX   88.2 - 108.5 NM	89.73 NM
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	TIME   47 - 58 MS	52.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	118.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	100.25 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. L. V...

TRC  
572E SN048 NECK FLEXION CAL07  
93083  
PENXG

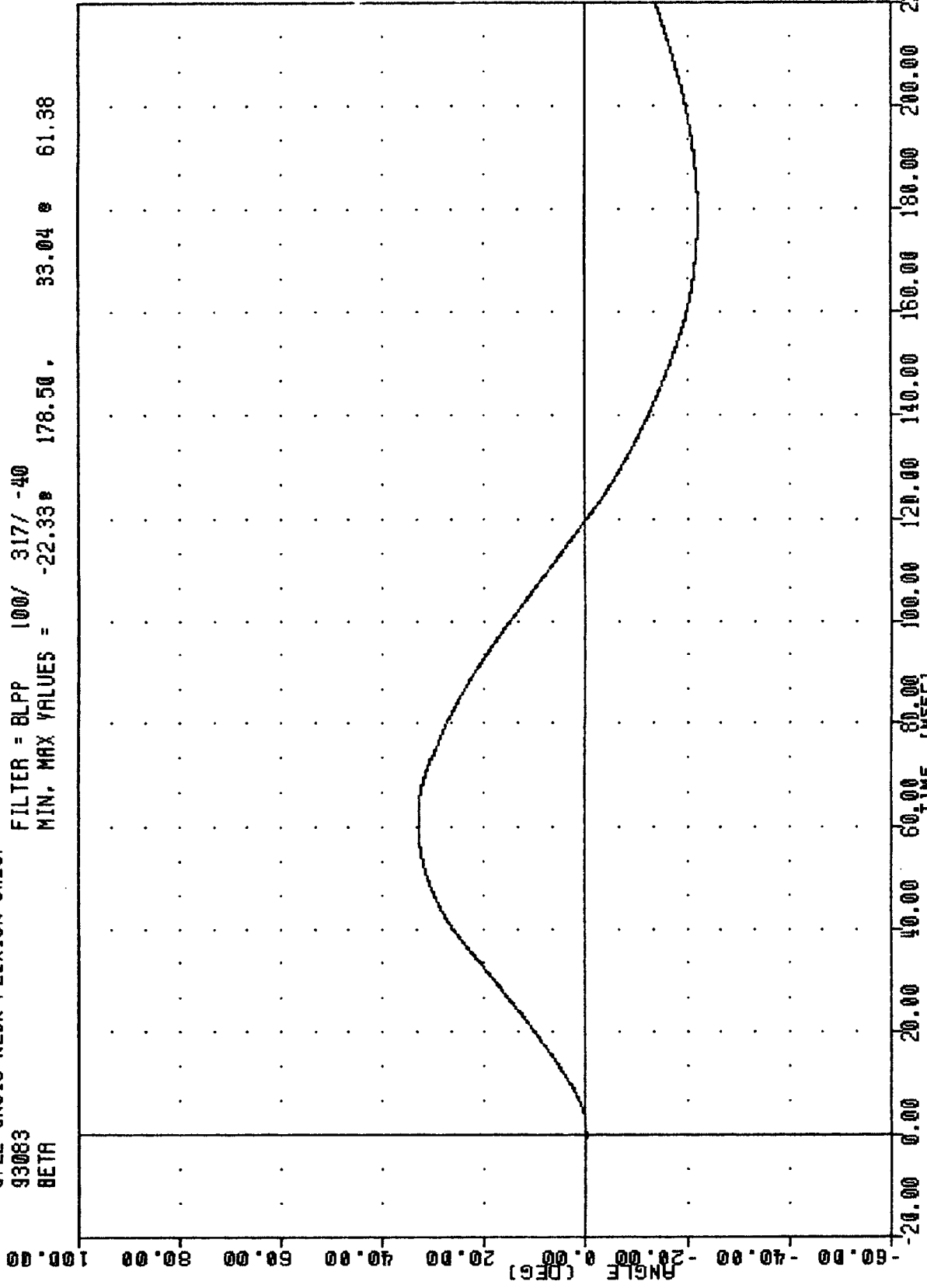
48C7NF1  
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -1.92 25.16 44.88 8.25



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
PENDULUM DECELERATION

TRC , 48C7NF1  
 572E SN048 NECK FLEXION CAL07  
 93083  
 BETA

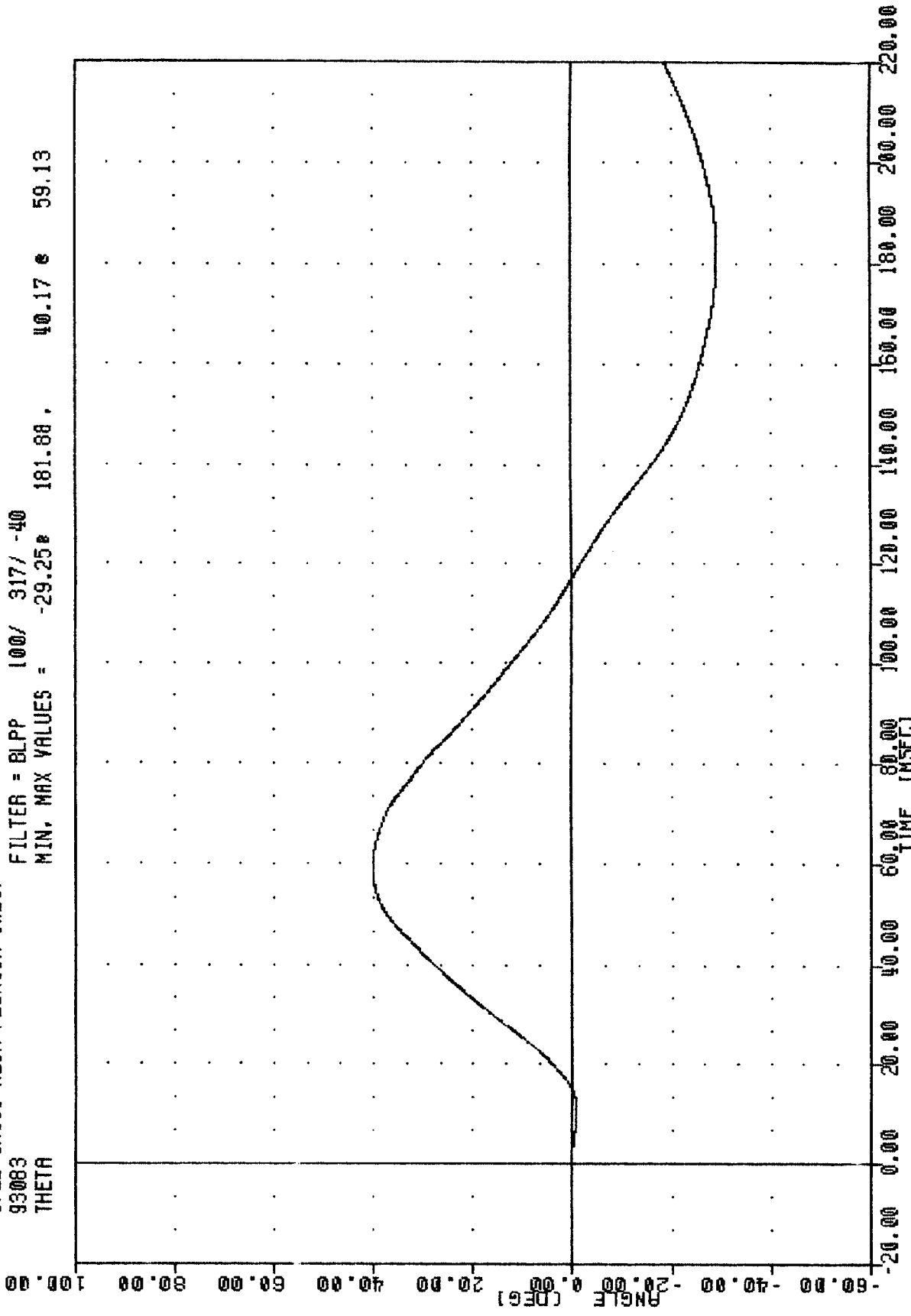
FILTER = BLPP 100/ 317/ -40  
 MIN, MAX VALUES = -22.33 178.50 33.04 61.38



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

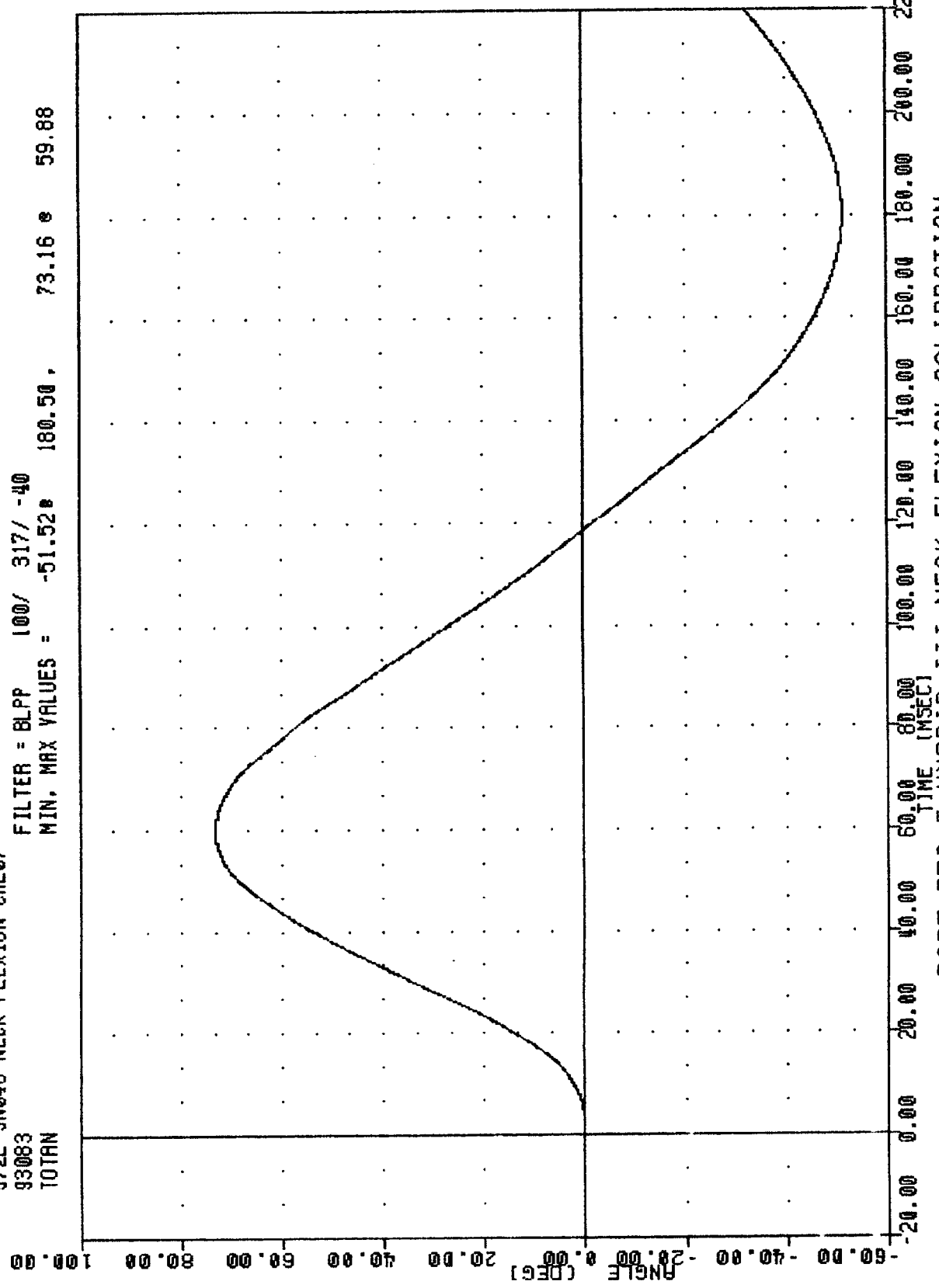
TRC  
572E SN048 NECK FLEXION CAL07  
93083  
THETA

FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -29.25 181.88 40.17 e 59.13



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

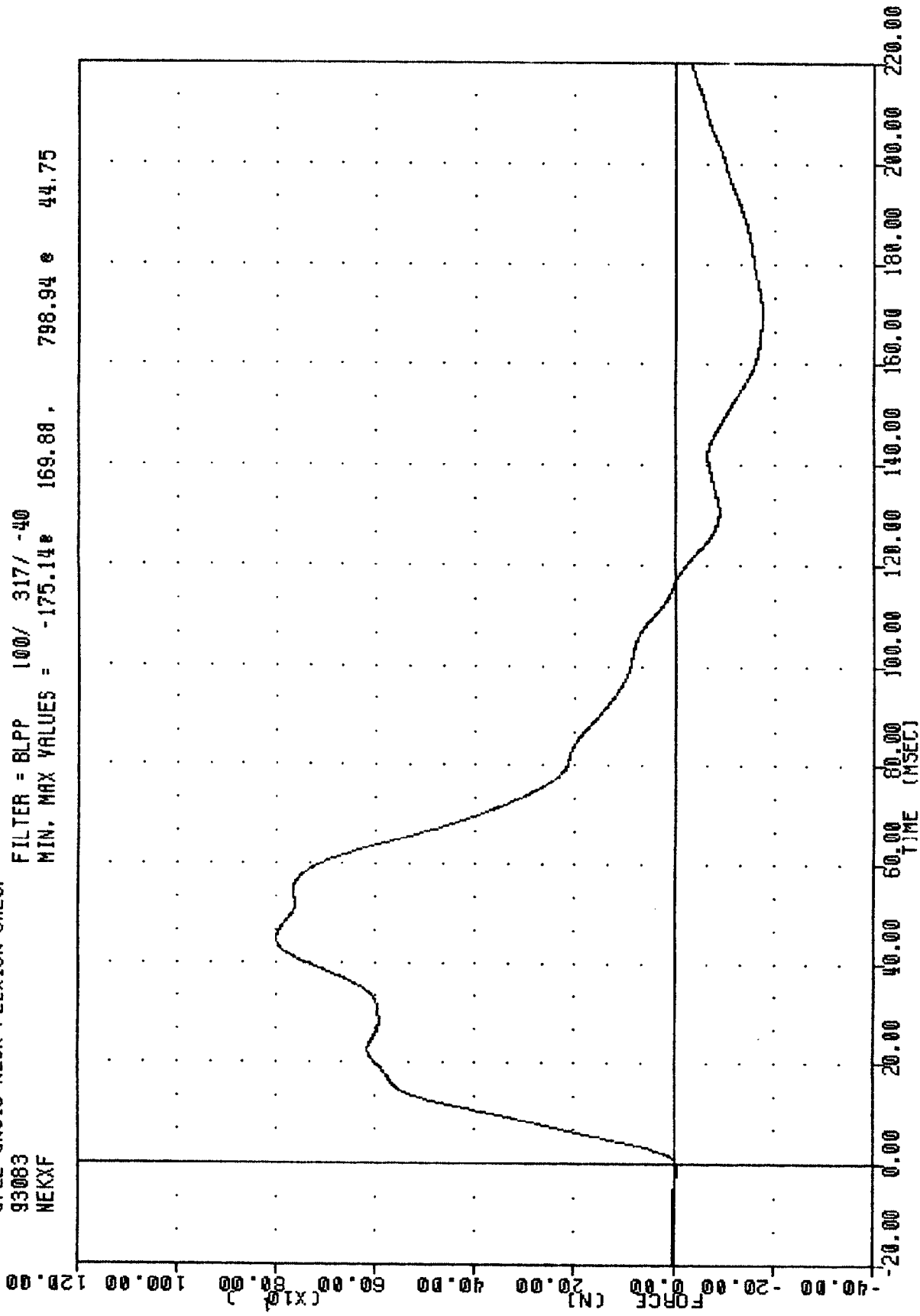
TRC , 48C7NF1  
 572E SN04B NECK FLEXION CAL07  
 93083 FILTER = BLPP 100/ 317/ -40  
 TOTAL MIN. MAX VALUES = -51.52 180.50 73.16 59.88



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
 TOTAL ROTATION

TRC , 48C7NF1  
572E SN048 NECK FLEXION CAL07  
93063  
MEKXF

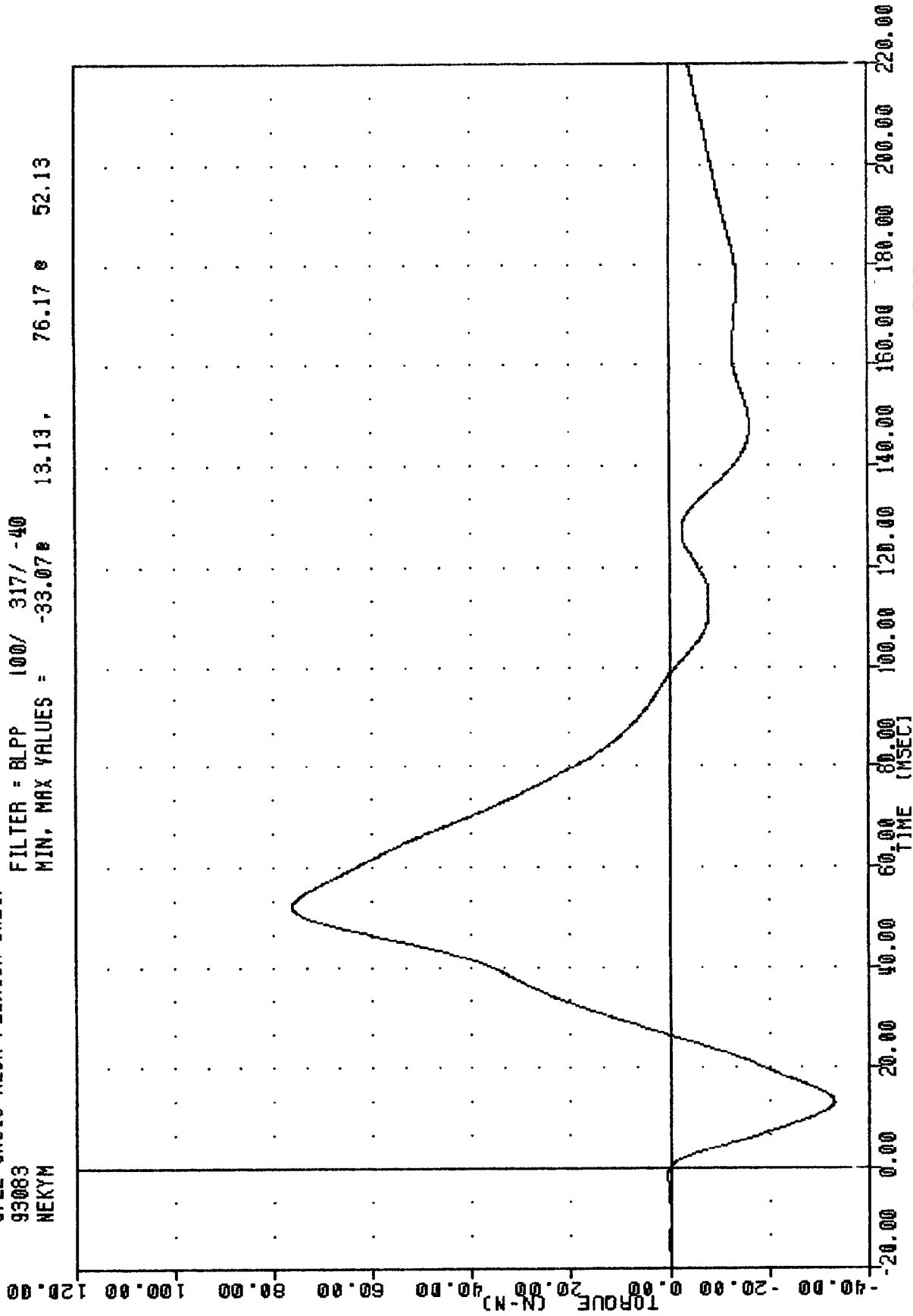
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -175.14 \* 798.94 \* 44.75



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
NECK FORCE X AXIS

TRC , 48C7NF1  
572E SN040 NECK FLEXION CAL07  
93083  
NEKYM

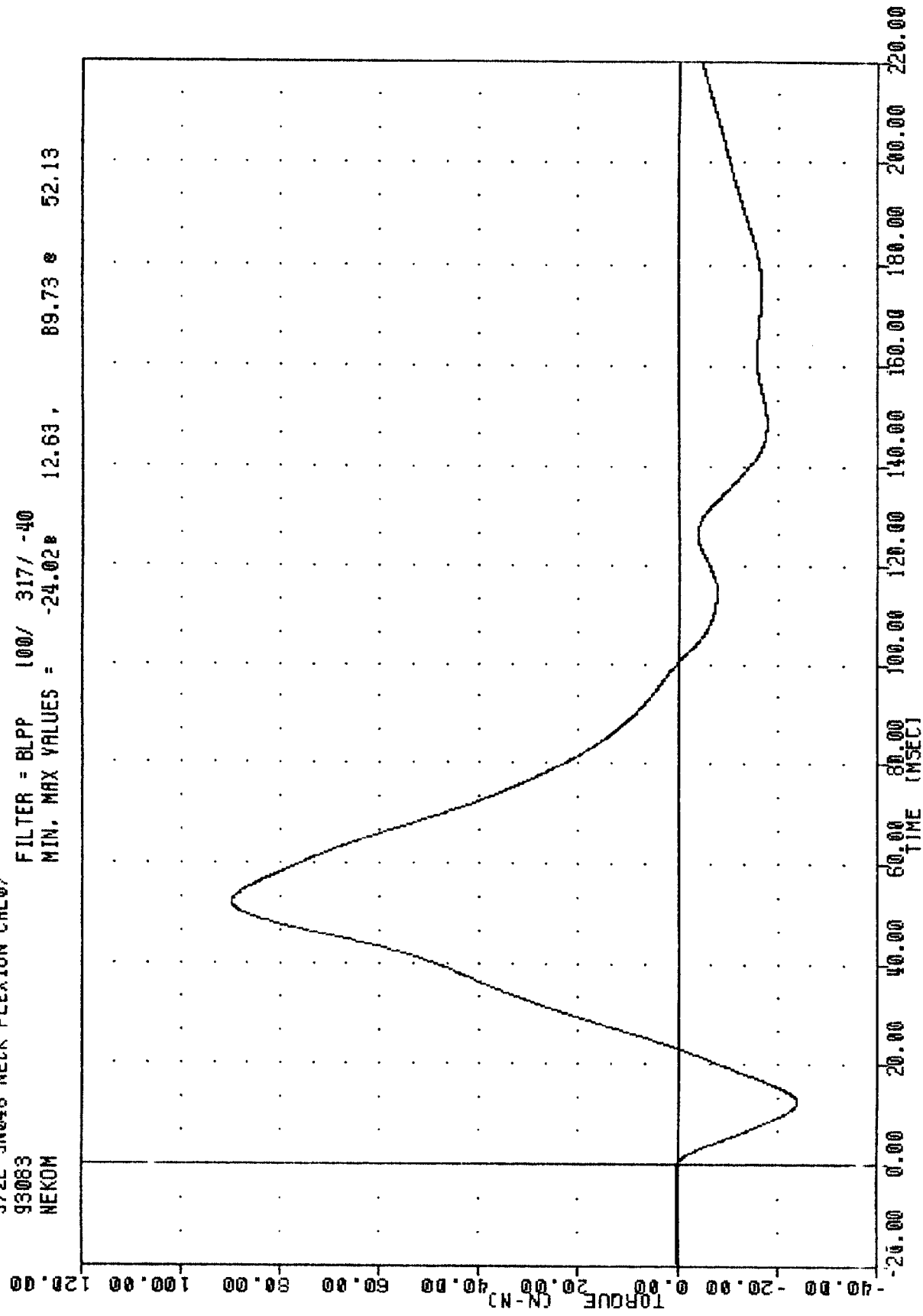
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -33.07e 13.13, 76.17 e 52.13



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
NECK MOMENT Y AXIS

TRC  
572E SN048 NECK FLEXION CAL07  
93083  
NEKOM

FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -24.02 12.63 89.73 52.13



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

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST

HYBRID III

24-MAR-93

6 AXIS NECK TRANSDUCER  
TRC 48C7NE1

572E SN048 NECK EXT. CAL07

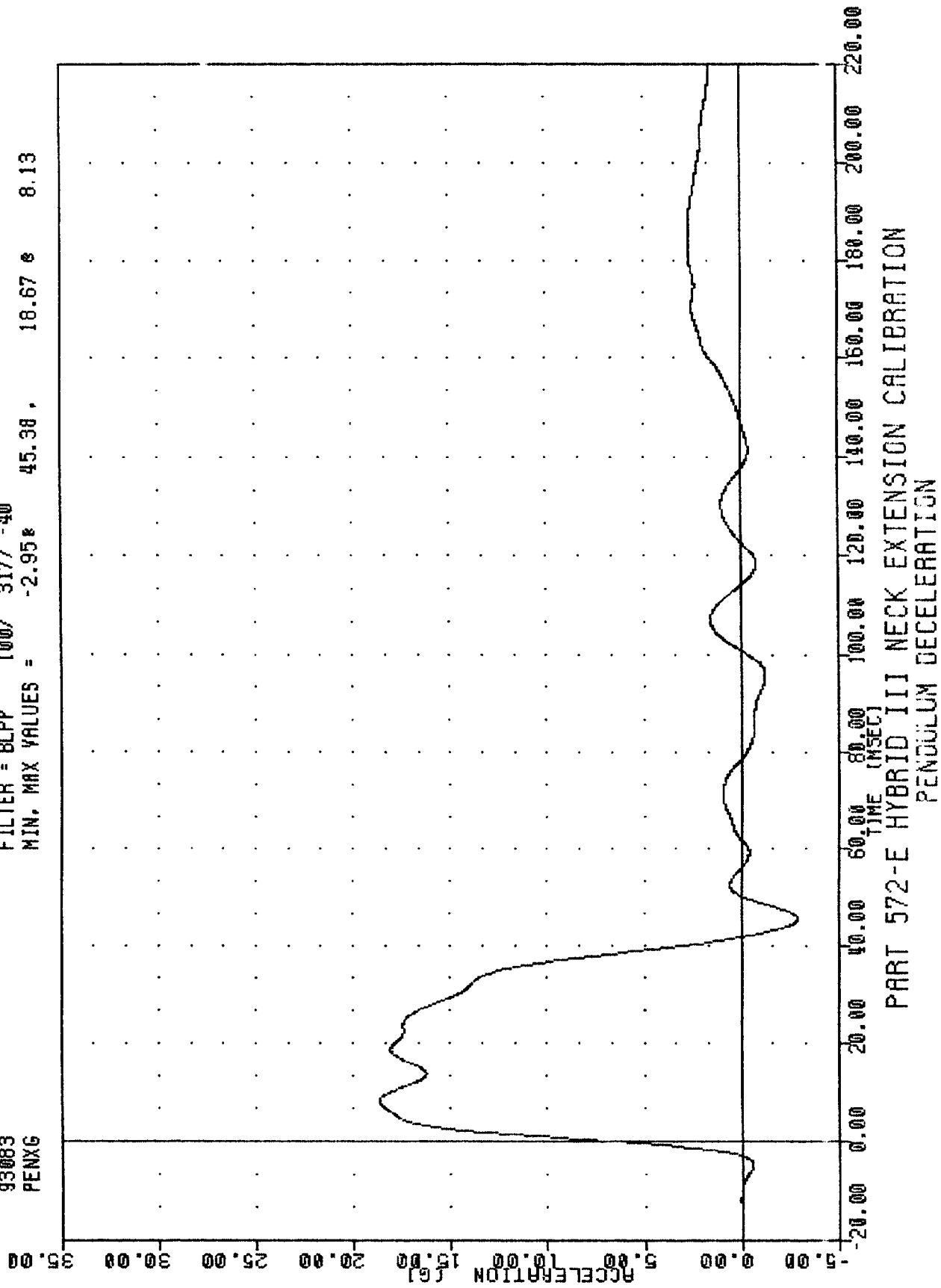
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
IMPACT VELOCITY	5.95 - 6.19 M/SEC	6.05 M/SEC
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	18.12 G
	20 MS   14.00 - 19.00 G	17.84 G
	30 MS   11.00 - 16.00 G	14.69 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	14.62 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	38.88 MS
D PLANE ROTATION	MAX   81 - 106 DEG. TIME   72 - 82 MS	101.53 DEG. 75.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN   -80.0/-52.9 NM TIME   65 - 79 MS	-71.07 NM 70.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	157.88 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	146.63 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. LaV...

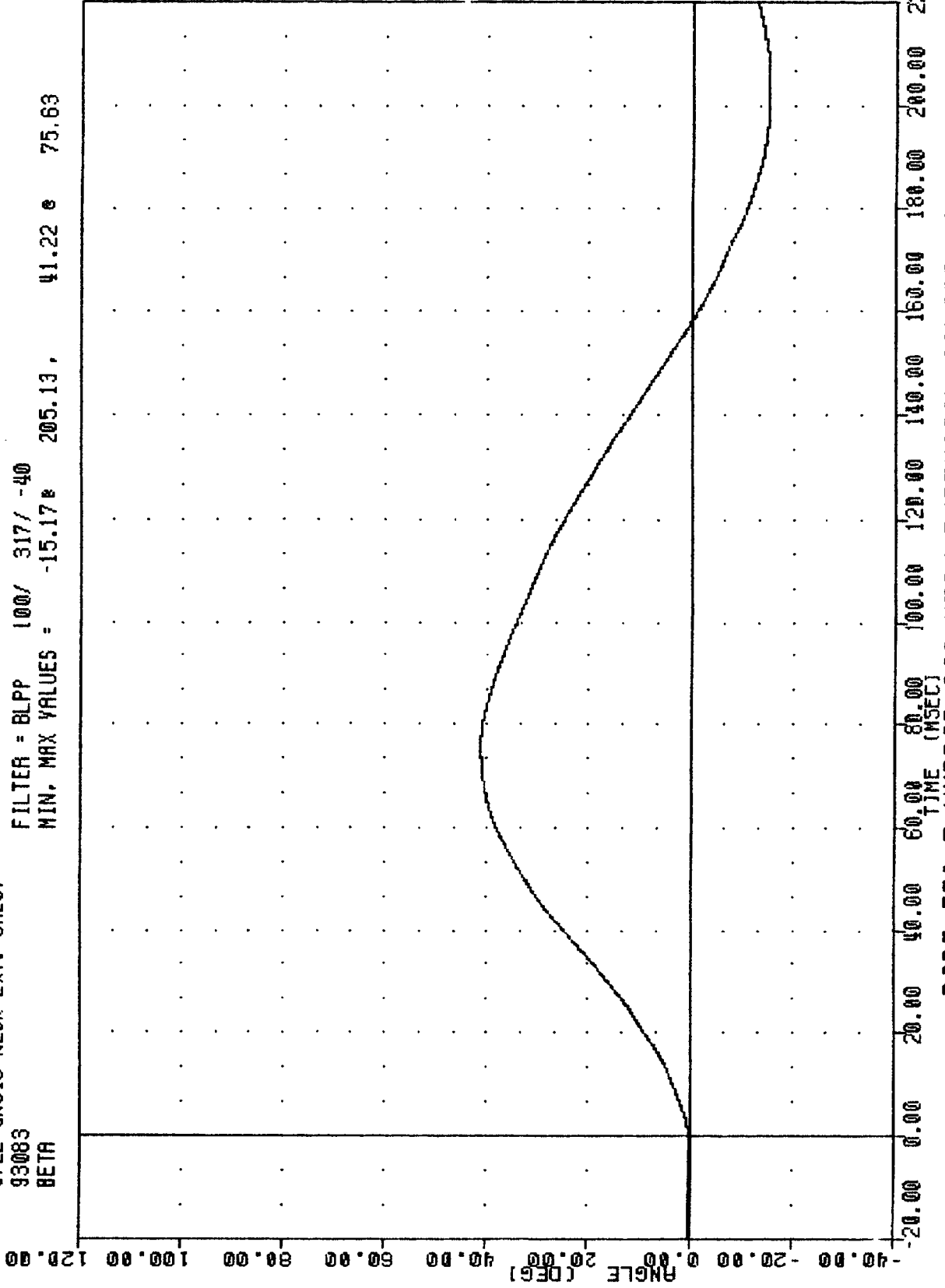
TRC  
572E SN048 NECK EXT. CAL07  
93083  
PENXG

FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -2.95 8.13  
45.38 18.67 8.13



TRC , 48C7NE1  
572E SN046 NECK EXT. CAL07  
93083  
BETA

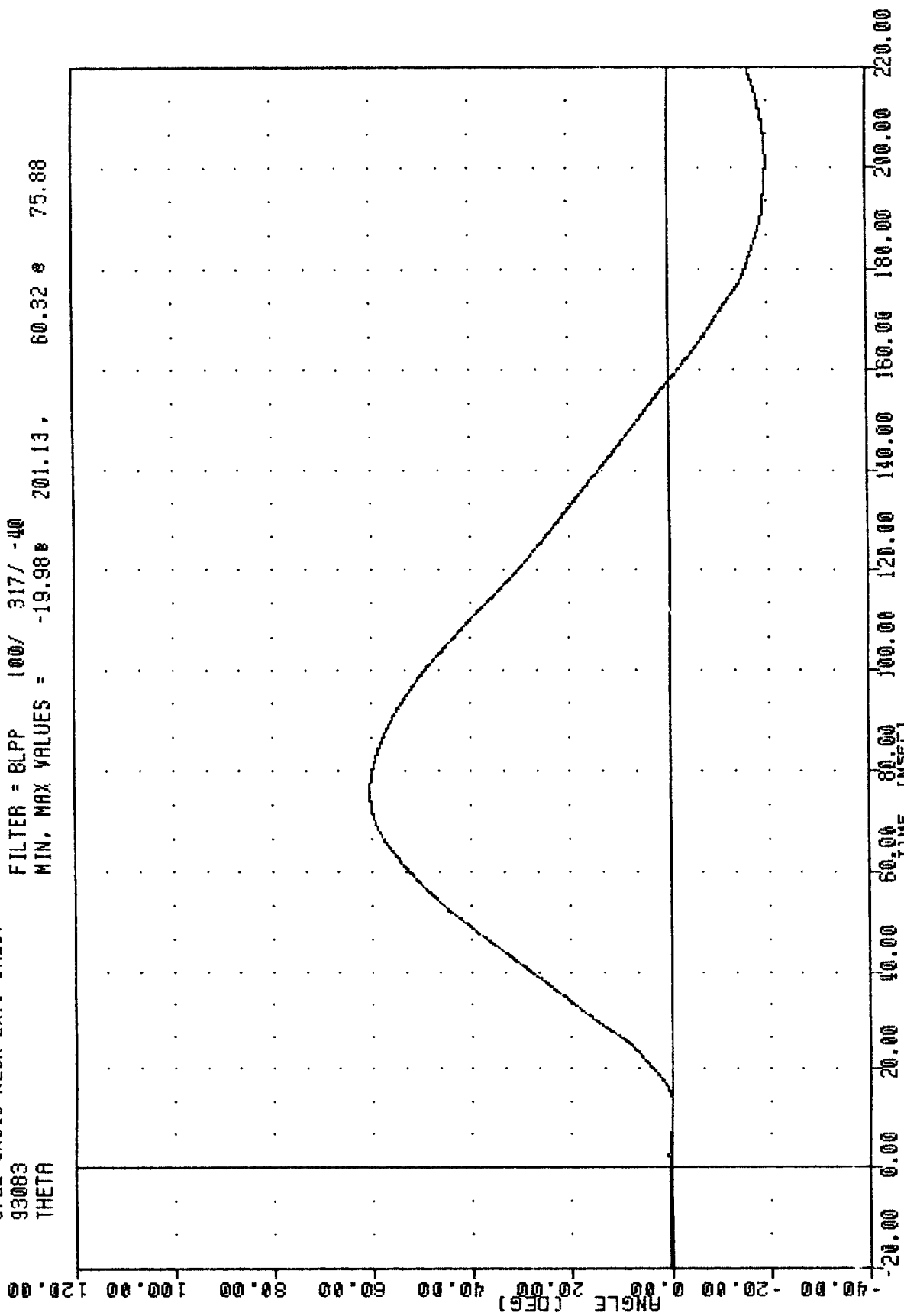
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -15.17e 205.13, 41.22 e 75.63



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

TRC , 48C7NE1  
572E SN048 NECK EXT. CAL07  
93083  
THETA

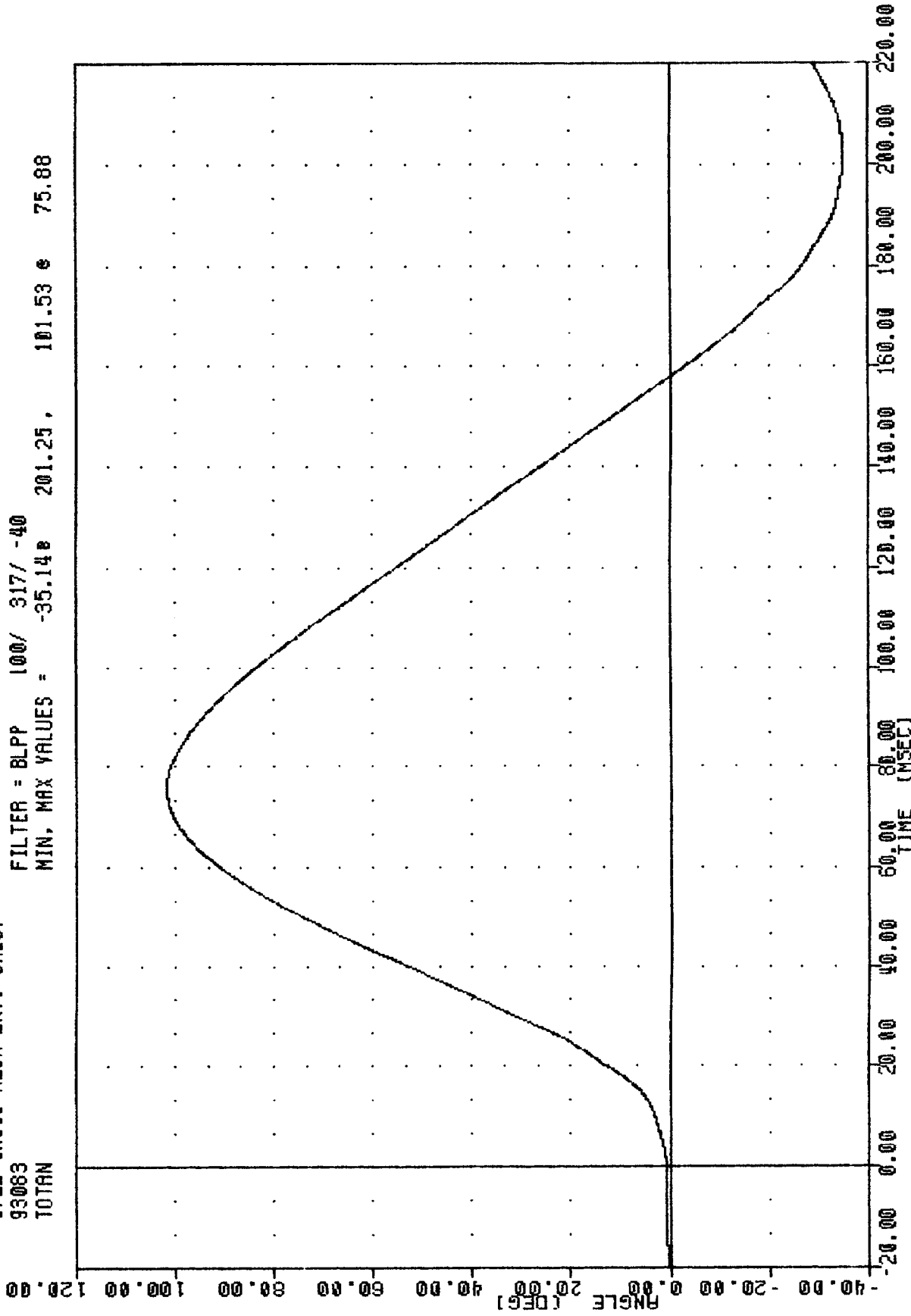
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -19.988 201.13, 60.32 e 75.88



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

TAC , 48C7NE1  
572E SN040 NECK EXT. CAL07  
93063  
TOTAN

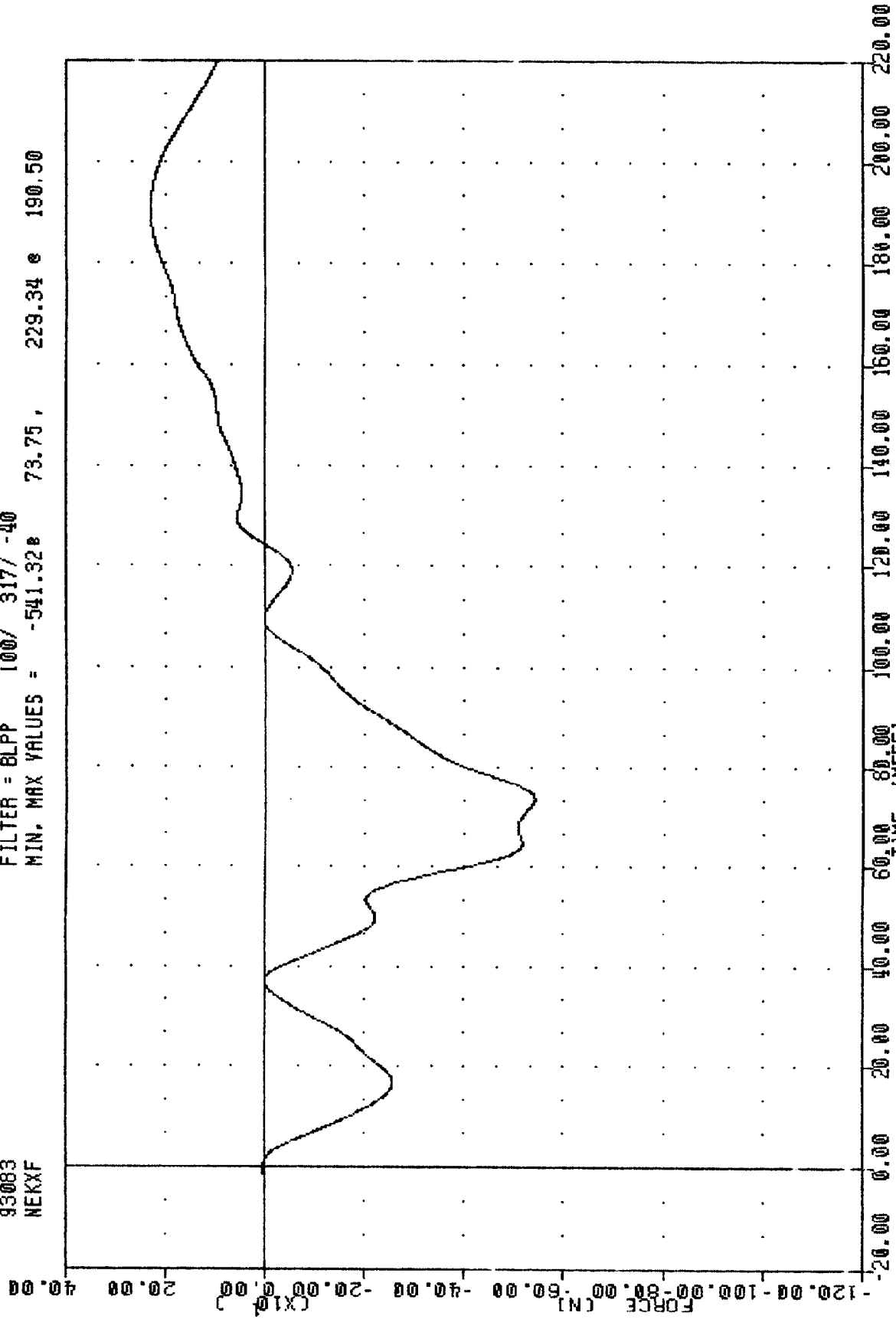
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -35.14e 201.25, 101.53 e 75.88



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
TOTAL ROTATION

TRC , 48C7NE1  
572E SN048 NECK EXT. CAL07  
93083  
NEKXF

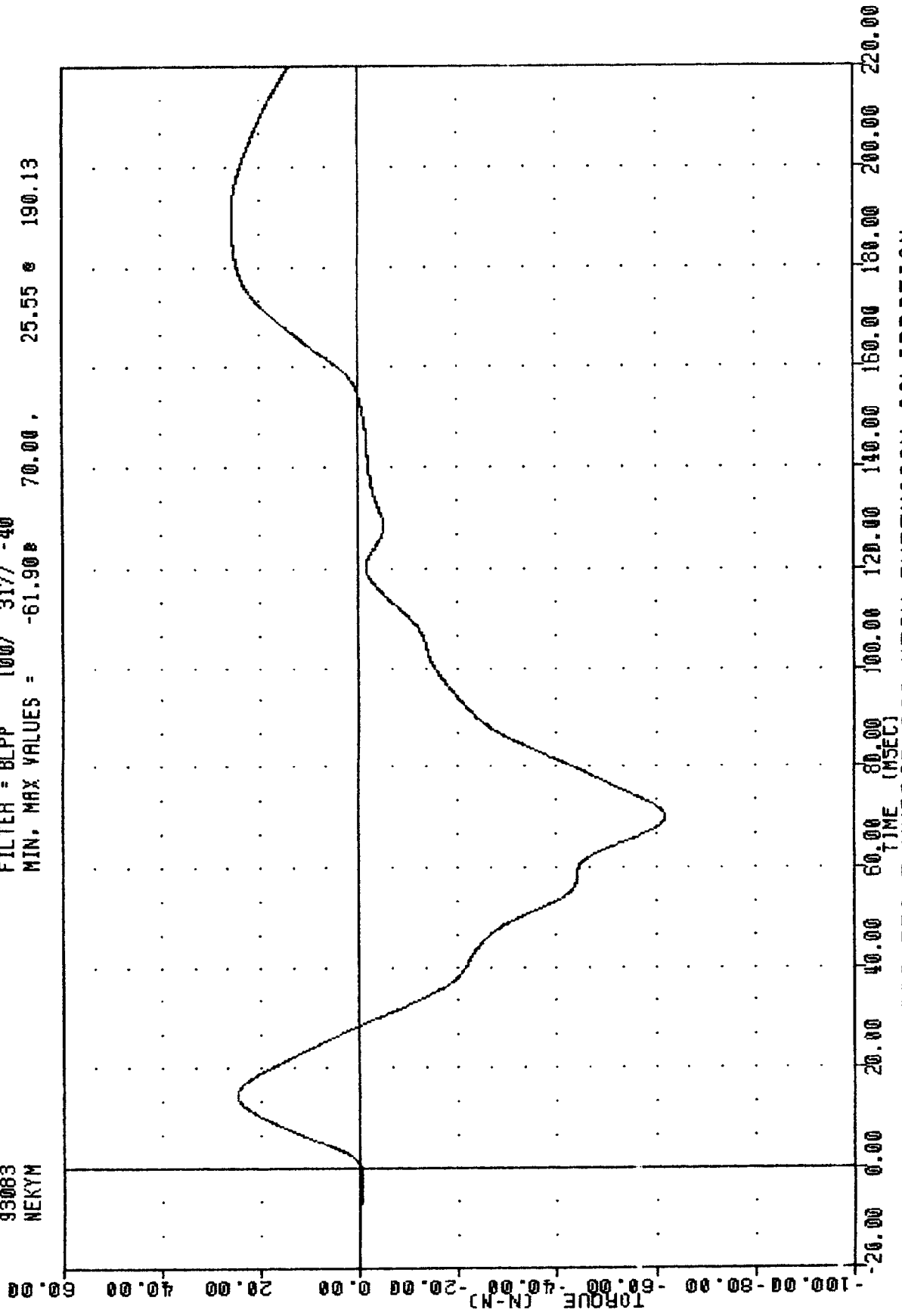
FILTER = 8LPP 100/ 317/ -40  
MIN. MAX VALUES = -541.32e 73.75, 229.34 e 190.50



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
NECK FORCE X AXIS

TRC  
572E SN048 NECK EXT. CAL07  
93083  
NEKYM

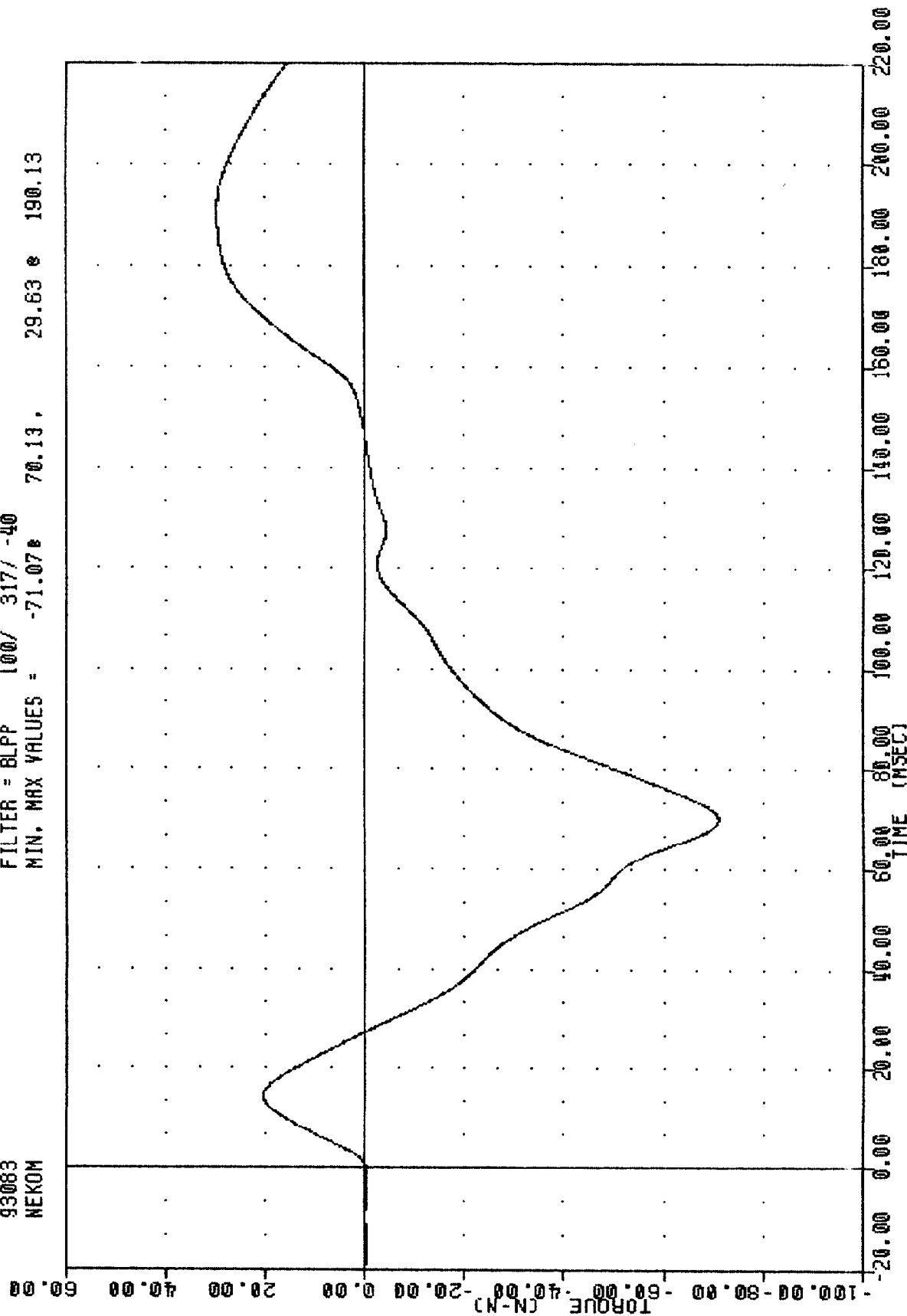
48C7NE1  
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -61.90 70.00 25.55 190.13



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
NECK MOMENT Y AXIS

TRC , 48C7NE1  
572E SN048 NECK EXT. CAL07  
93063  
NEKOM

FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -71.07 70.13 29.63 190.13



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

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

25-MAR-93

TRC

48C7TH1

572E SN048 H. S. THORAX CAL07

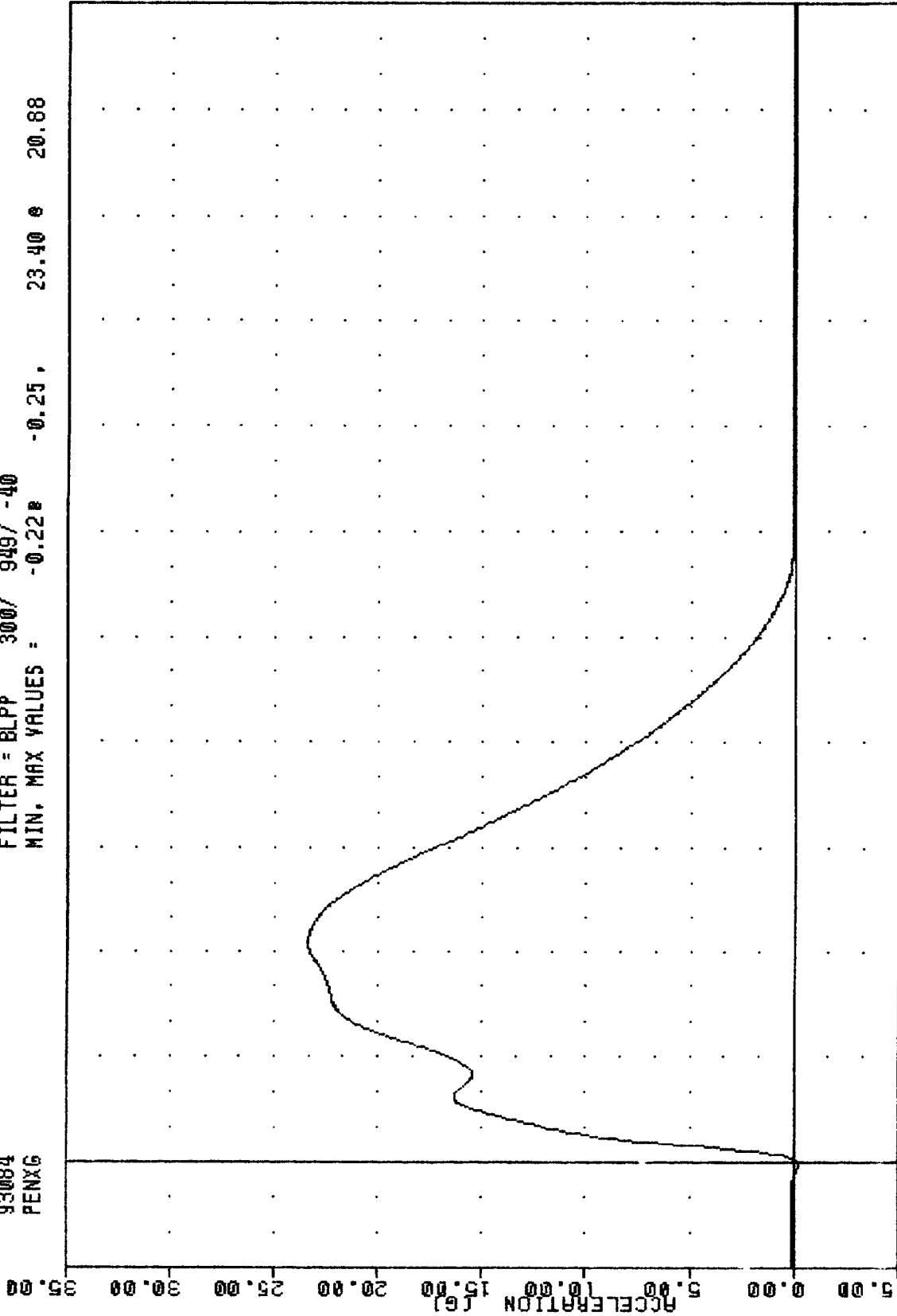
HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/SEC	6.68 M/SEC
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.2 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5361. N
INTERNAL HYSTERESIS	69% - 85%	72.0%

TEST MEETS SPECIFICATIONS

TECHNICIAN A. E. De Vries

TFC , 48C7THJ  
572E SN046 H.S. THORAX CAL07  
93084  
PENXG

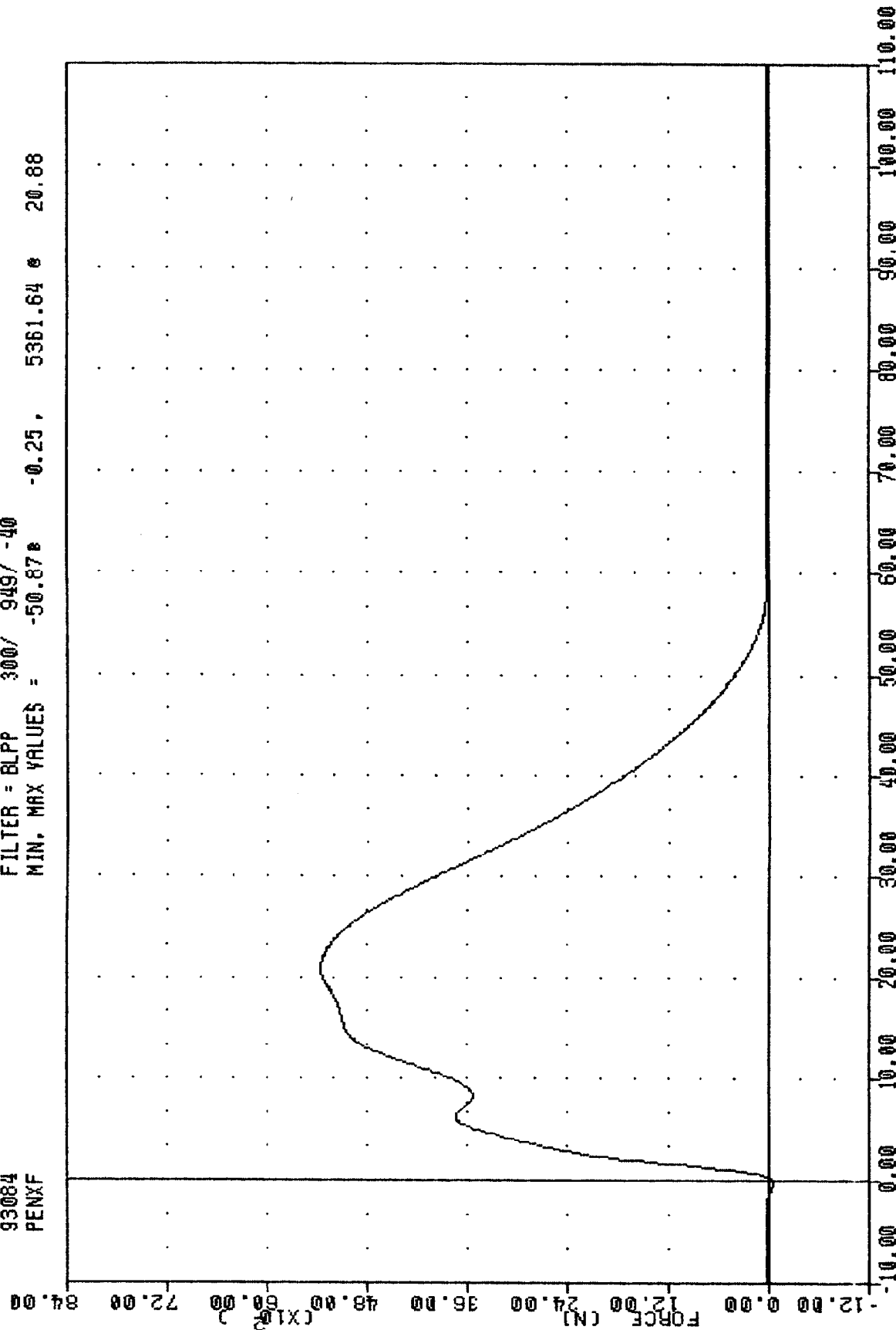
FILTER = BLPP 300/ 949/ -40  
MIN, MAX VALUES = -0.22 23.40 20.88



-10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00  
TIME (MSEC)  
PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM DECELERATION

TRC , 48C7TH1  
572E SN040 H.S. THORAX CAL07  
93084  
PENXF

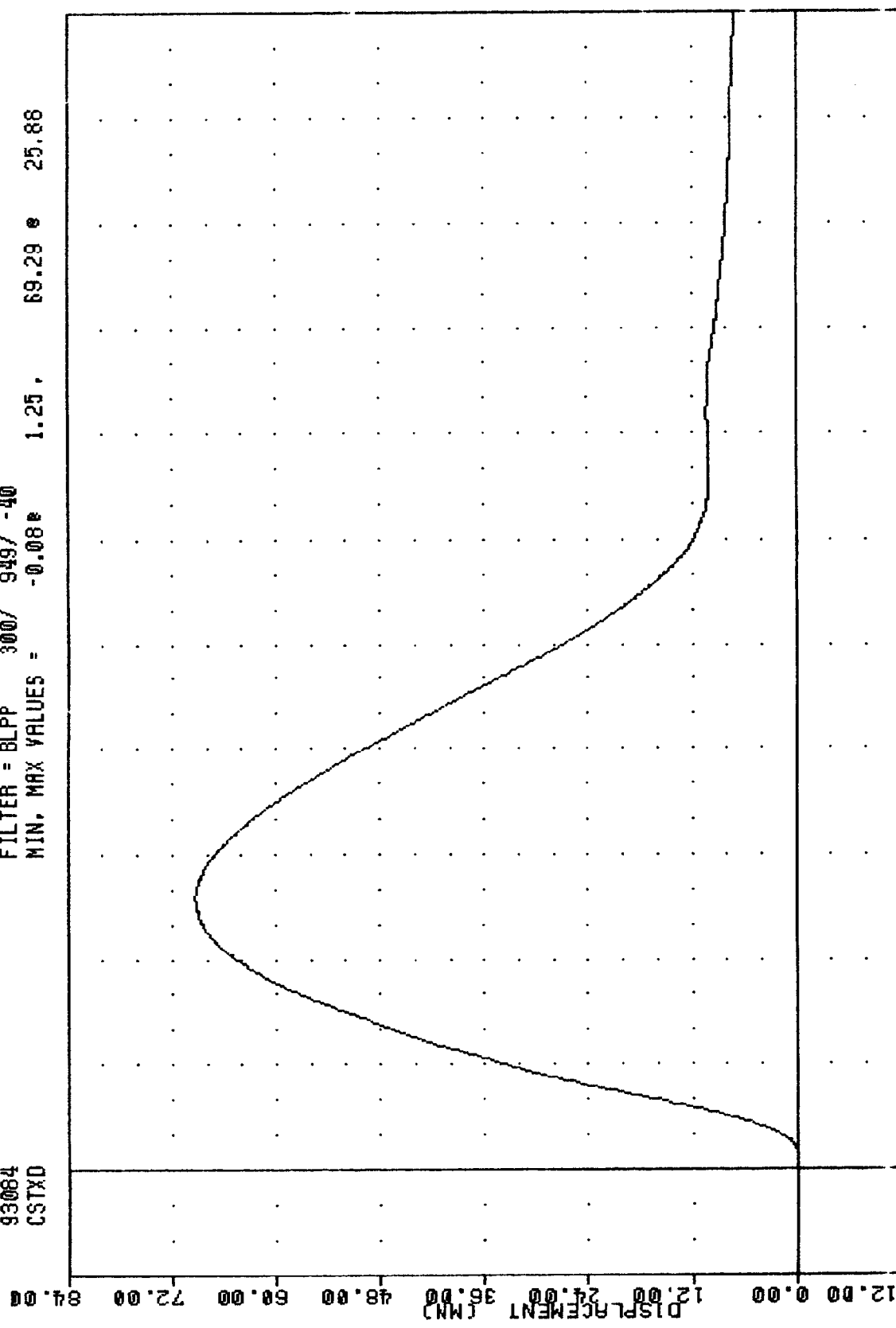
FILTER = BLPP 300/ 949/ -40  
MIN, MAX VALUES = -50.87 e -0.25, 5361.64 e 20.88



PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM FORCE

TRC 48C7TH1  
572E SN048 H.S. THORAX CAL07  
93084  
CSTXD

FILTER = BLPP 300/ 949/ -40  
MIN, MAX VALUES = -0.08 1.25, 69.29 25.88



PART 572-E HYBRID III THORAX CALIBRATION  
STERNUM DISPLACEMENT

TRC  
 CSTXD  
 PENXF

48C7TH1  
 FILTER = 8LPP  
 FILTER = 8LPP

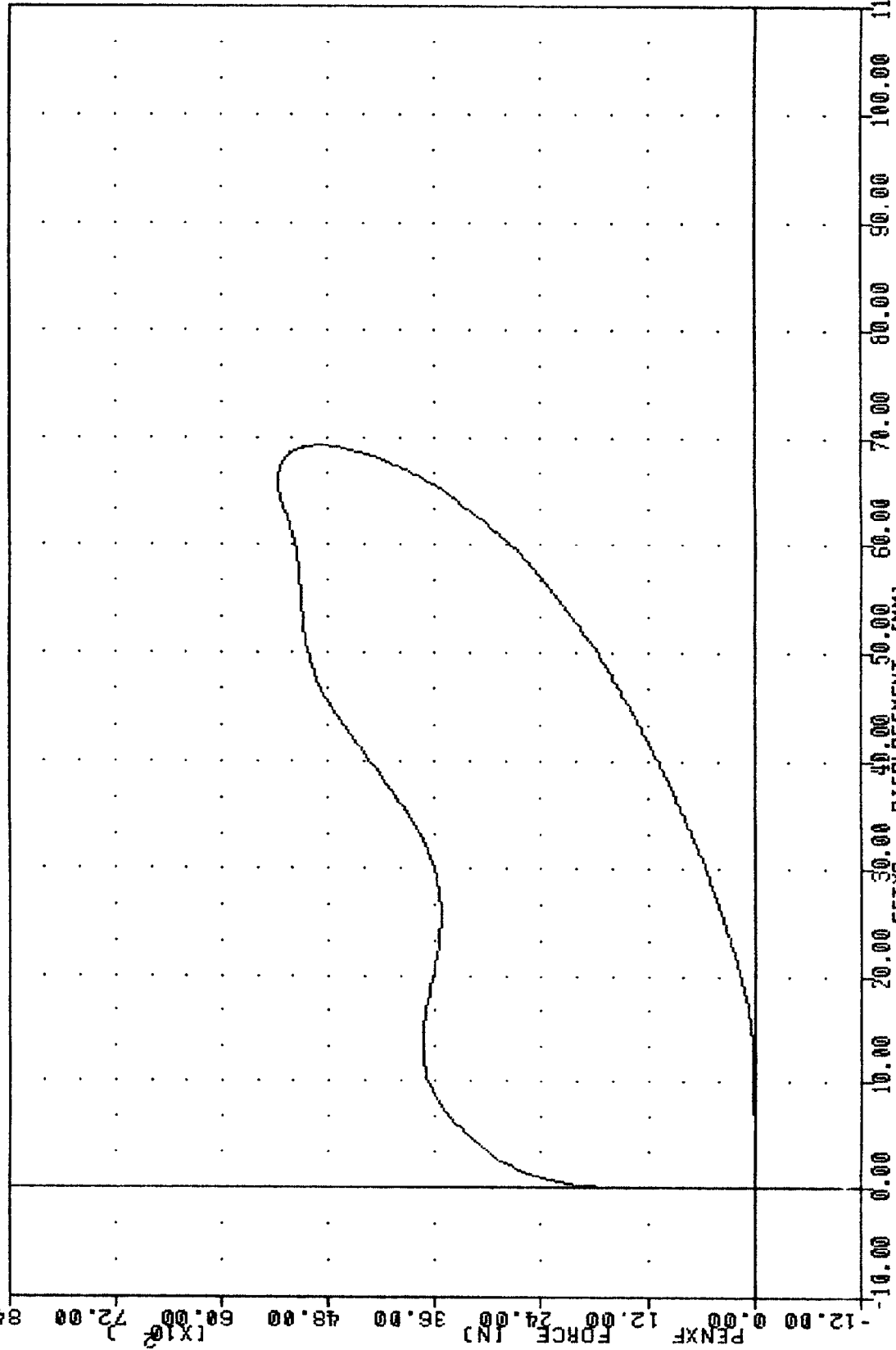
572E SNO48 H.S. THORAX CAL07  
 300/ 949/ -40 MIN, MAX =  
 300/ 949/ -40 MIN, MAX =

93084  
 -0.08 B  
 -50.87 B

1.25 ;  
 -0.25 ;

69.29 \*  
 5361.64 \*

25.88  
 20.88



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

TRANSPORTATION RESEARCH CENTER INC.

KNEE IMPACT TEST

HYBRID III

24-MAR-93

RIGHT KNEE  
TRC

48C7RK1

572E SN04B RIGHT KNEE CAL 07

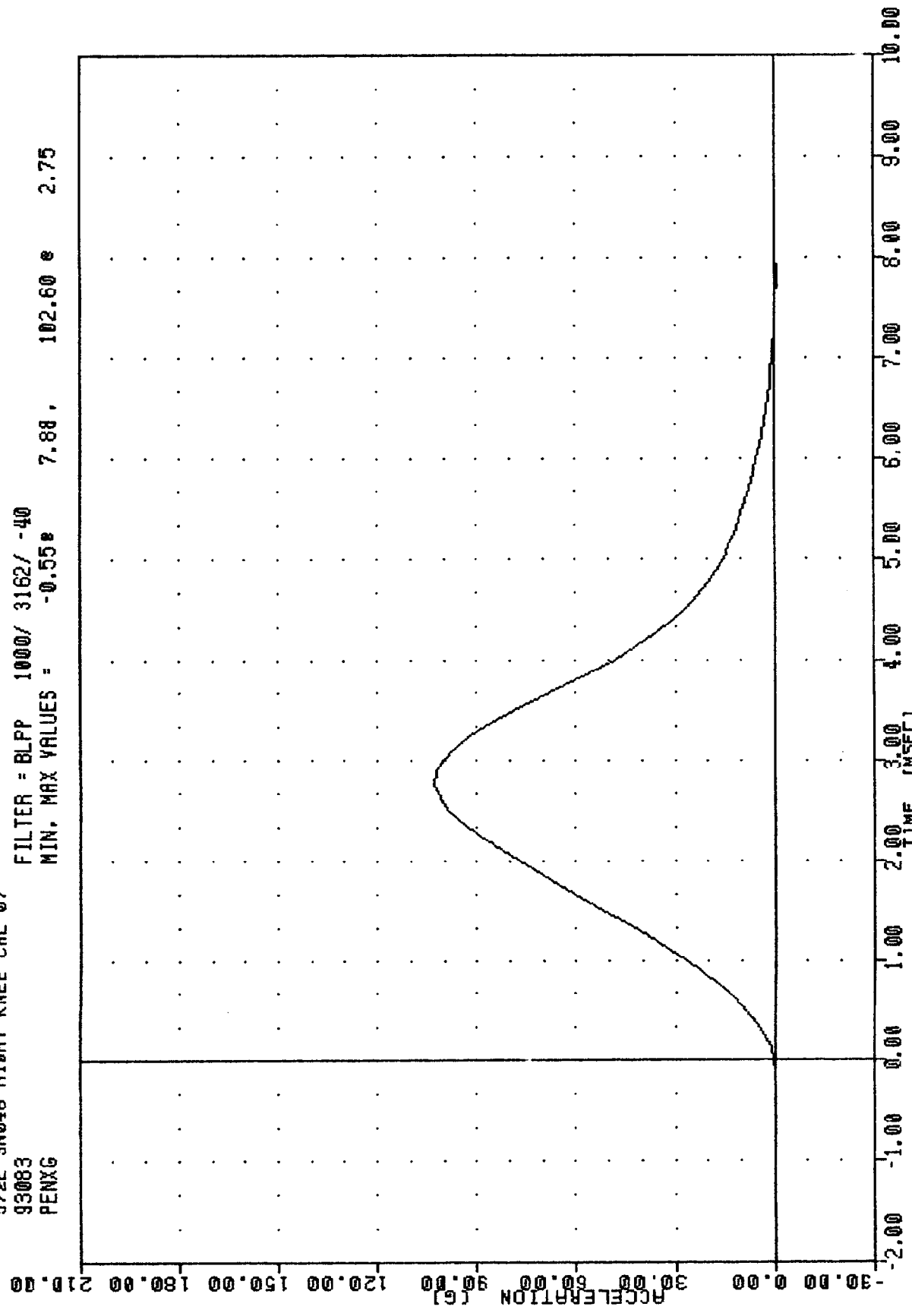
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.09 M/SEC
PEAK KNEE IMPACT FORCE	4714 - 5783 N	5019.8 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. To...

TRC 48C7RK1  
 572E SN048 RIGHT KNEE CAL 07  
 93083  
 PENXG

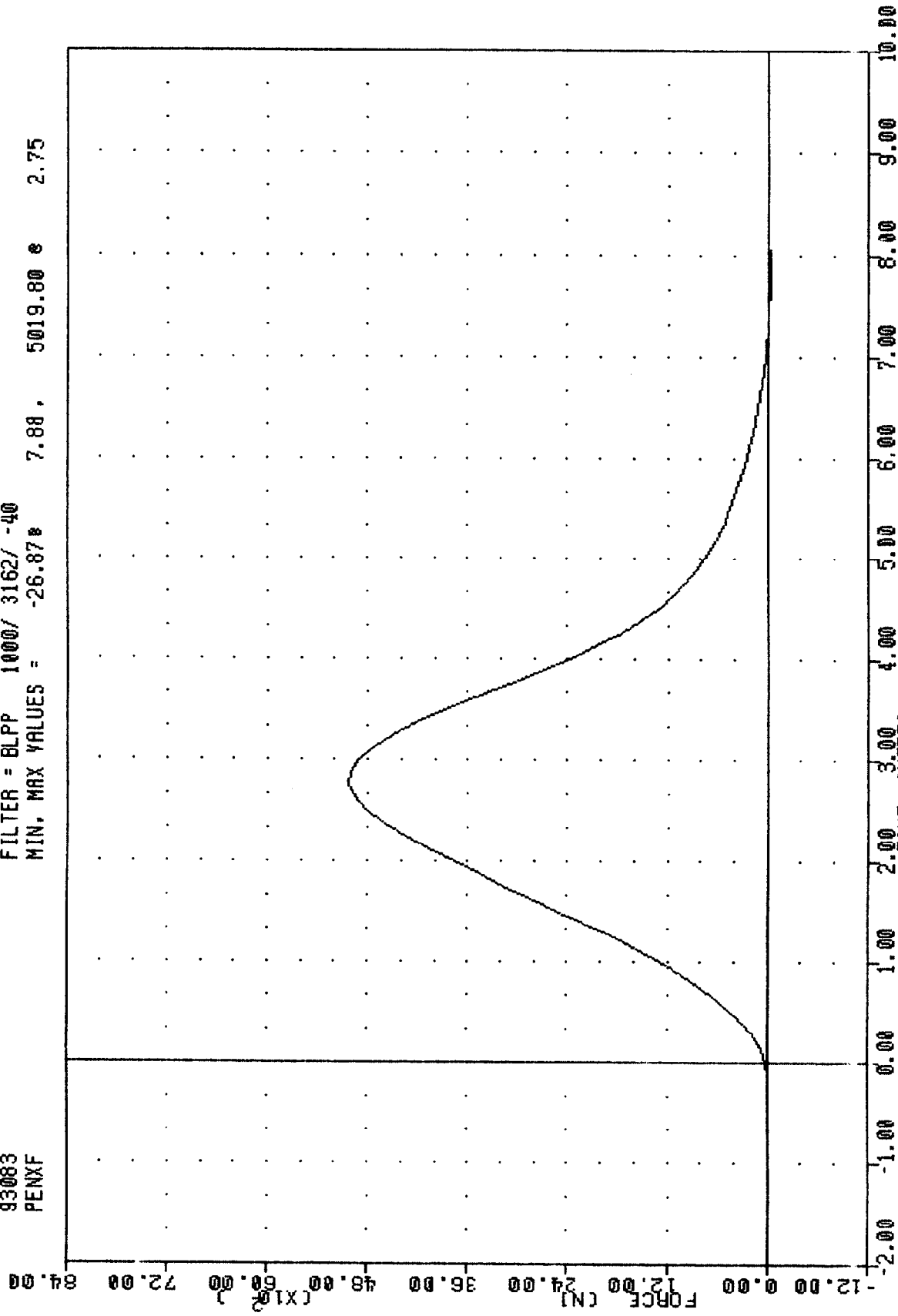
FILTER = BLPP 1000/ 3162/ -40  
 MIN. MAX VALUES = -0.55 e 102.60 e 2.75



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

TRC , 48C7RK1  
 572E SN049 RIGHT KNEE CAL 07  
 93083  
 PENXF

FILTER = BLPP 1000/ 3162/ -40  
 MIN, MAX VALUES = -26.87e 7.88, 5019.80 e 2.75



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

TRANSPORTATION RESEARCH CENTER INC.

KNEE IMPACT TEST

HYBRID III

24-MAR-93

LEFT KNEE  
TRC

48C7LK1

572E SNO48 LEFT KNEE CAL 07

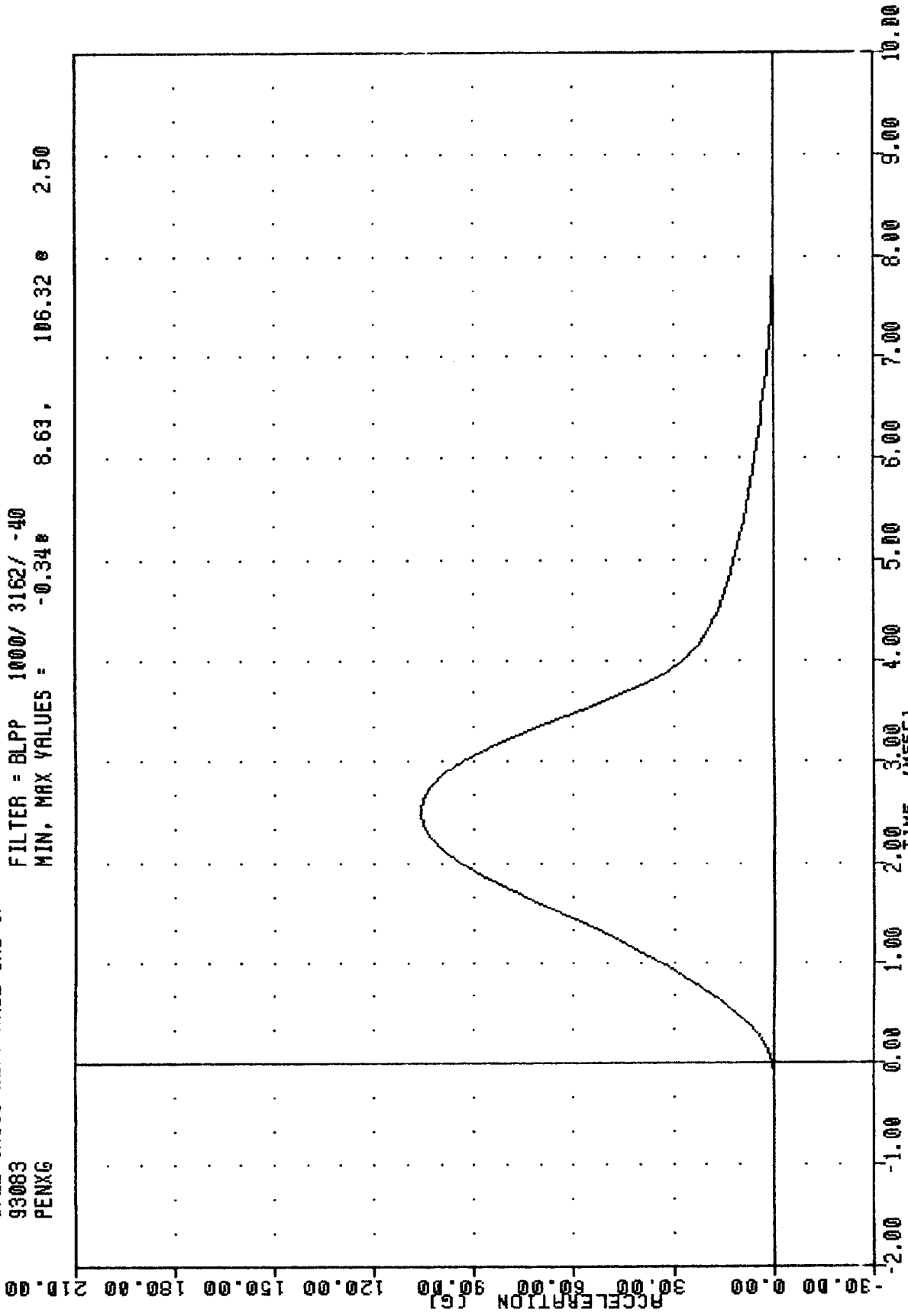
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10% - 70%	50.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.09 M/SEC
PEAK KNEE IMPACT FORCE	4714 - 5783 N	5201.8 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. L. L.

TRC , 48C7LK1  
572E SN048 LEFT KNEE CAL 07  
93083  
PENXG

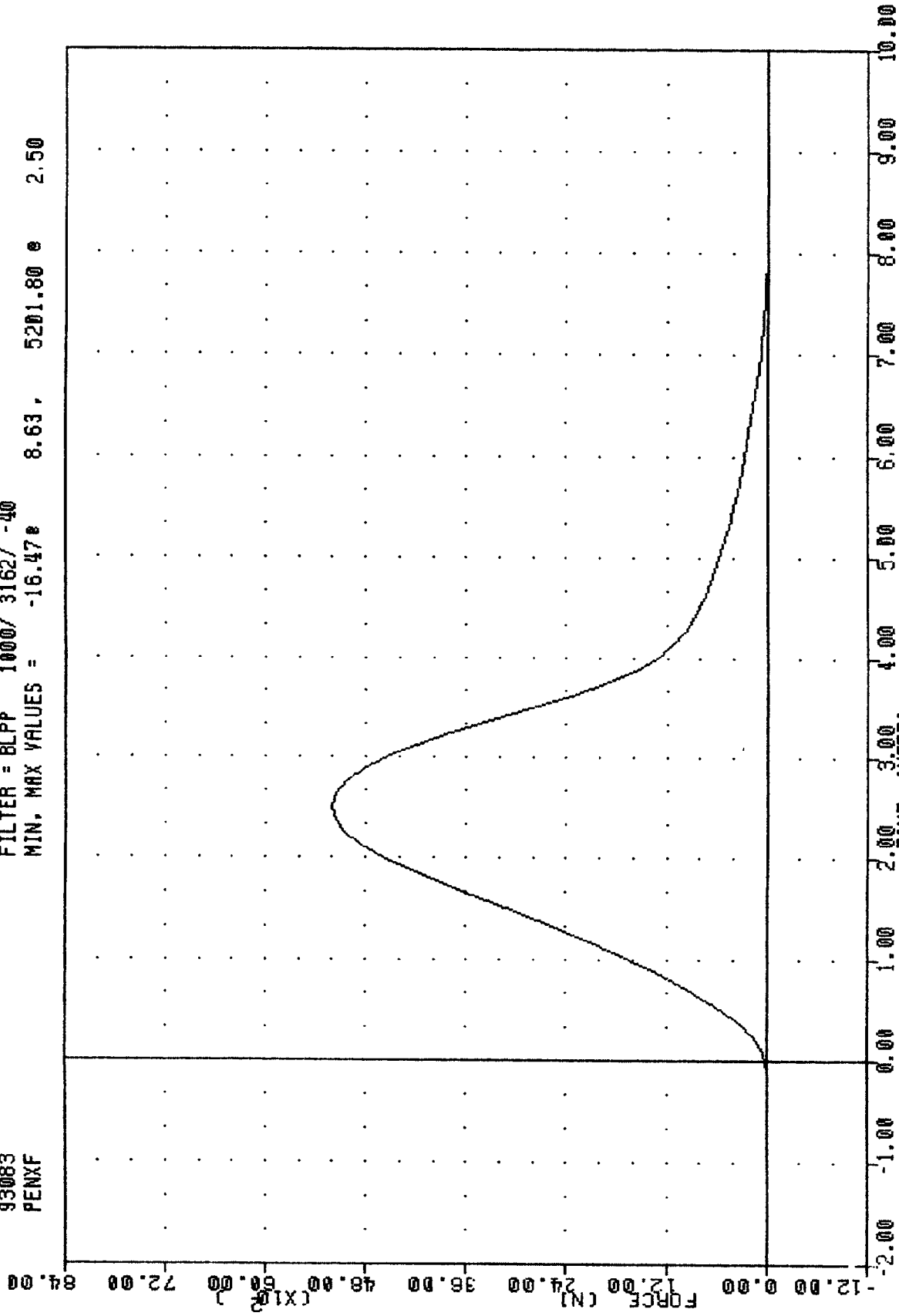
FILTER = BLPP 1000/ 3162/ -40  
MIN, MAX VALUES = -0.34 8.63, 106.32 2.50



PART 572-E HYBRID III LEFT KNEE CALIBRATION  
PENDULUM DECELERATION (5 KG PEND.)

TAC , 48C7LK1  
572E SN040 LEFT KNEE CAL 07  
93083  
PENXF

FILTER = BLPP 1000/ 3162/ -40  
MIN. MAX VALUES = -16.47e 8.63 , 5201.80 e 2.50



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

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MFR. & S/N: HUMANOID/048

SEATING POSITION: DRIVER

LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
HEAD ACCELERATION	X	ENDEVCO	7264	EH78J	REAR
HEAD ACCELERATION	Y	ENDEVCO	7264	DH37J	LEFT
HEAD ACCELERATION	Z	ENDEVCO	7264	DD17J	UP
NECK FORCE	X	DENTON	1716	0106	*
NECK FORCE	Y	DENTON	1716	0106	*
NECK FORCE	Z	DENTON	1716	0106	*
NECK MOMENT	X	DENTON	1716	0106	*
NECK MOMENT	Y	DENTON	1716	0106	*
NECK MOMENT	Z	DENTON	1716	0106	*
CHEST ACCELERATION	X	ENDEVCO	7264	EH92J	FRONT
CHEST ACCELERATION	Y	ENDEVCO	7264	CC24H	LEFT
CHEST ACCELERATION	Z	ENDEVCO	7264	FG28J	UP
CHEST DEFLECTION	X	VERNITECH	81422A	9041	OUTWARD
PELVIS ACCELERATION	X	ENDEVCO	7264	BC75J	REAR
PELVIS ACCELERATION	Y	ENDEVCO	7264	FC43J	LEFT
PELVIS ACCELERATION	Z	ENDEVCO	7264	AP87	UP
LEFT FEMUR FORCE		GSE	2435	014	TENSION
RIGHT FEMUR FORCE		GSE	2430	756	TENSION

\*See SIGN CONVENTION sheet for positive sensing orientation of neck load channels.

VEHICLE INSTRUMENTATION INFORMATION

TEST NO. 930409

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	LEFT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	AV09	REAR
2	RIGHT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	AS95	REAR
3	ENGINE TOP LONGITUDINAL	X	ENDEVCO	2264	AN06	REAR
4	ENGINE BOTTOM LONGITUDINAL	X	ENDEVCO	2264	BA46	REAR
5	RIGHT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AZ88	REAR
6	LEFT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AY72	REAR
7	INSTRUMENT PANEL CENTER					
	LONGITUDINAL	X	ENDEVCO	2264	AR38	REAR
	LAP BELT OUTBOARD FORCE		LEBOW	2264	590	TENSION
	SHOULDER BELT OUTBOARD FORCE		LEBOW	2264	613	TENSION
8	VEHICLE CENTER OF GRAVITY					
	LONGITUDINAL	X	ENDEVCO	2264	AS53	REAR
	LATERAL	Y	ENDEVCO	2264	AS70	RIGHT
	VERTICAL	Z	ENDEVCO	2264	AS03	UP

HEAVY TRUCK ACCELEROMETER INFORMATION

TEST NO. 930409

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
9	FRONT FRAME CROSSMEMBER	X	ENDEVCO	7264	CF27H	FRONT
		Y	ENDEVCO	7264	CW11H	LEFT
		Z	ENDEVCO	7264	CK01H	UP
10	TRUCK CENTER OF GRAVITY	X	ENDEVCO	7264	CH22H	REAR
		Y	ENDEVCO	7264	CR84H	RIGHT

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