V1965

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

DOT HS 808 037

December 1992

Final Report

Reducing Heavy Truck Aggressiveness Moving Heavy Truck into a 1987 Ford Taurus 4-Door Sedan at 75.0 KPH

NOTICE

The Transportation Research Center Inc. does not endorse or certify products of manufacturers. The manufacturer's name appears solely to identify the test article. The Transportation Research Center 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.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 808 037		

4. Title and Subtitle	5. Report Date
REDUCING HEAVY TRUCK AGGRESSIVENESS MOVING HEAVY TRUCK INTO A 1987 FORD TAURUS 4-DOOR SEDAN AT 75.0 KPH	DECEMBER 1992
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
S. A. Johnston, Project Engineer, TRC	921210
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Vehicle Research and Test Center 10820 State Route 347 East Liberty, Ohio 43319	11. Contract or Grant No. DTNH22-88-C-07292
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh St., S.W. Washington, D.C. 20590	FINAL REPORT DECEMBER 1992
	14. Sponsoring Agency Code DOT/NHTSA/VRTC

15. Supplementary Notes

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 1FABP53U7HG145299, at the Transportation Research Center Inc. on December 10, 1992. The test vehicle was impacted on the front left corner of the vehicle by the heavy truck. The struck vehicle contained ten (10) accelerometers and one instrumented Hybrid III driver dummy.

17. Key Words	18. Distribution Statement
Heavy Truck Aggressiveness Occupant Response	Available from: Document is available to the public from the National Technical Information Service, Springfield, VA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	115	

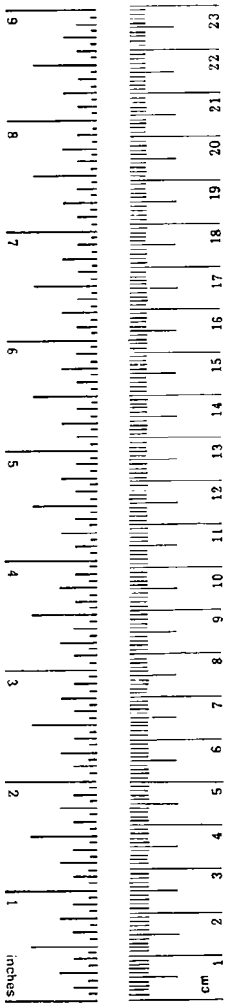
Form DOT F 1700.7 (8–72) Reproduction of completed page authorized

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

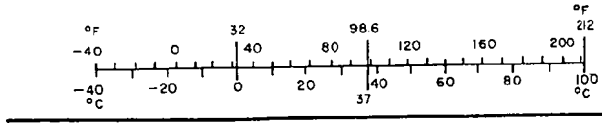


TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

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 December 10, 1992.

The stationary vehicle, a 1987 Ford Taurus 4-door sedan, was equipped with a 3.0 liter, 6-cylinder, transverse gasoline engine and a 4-speed automatic transmission. The test weight of the vehicle was 1598 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 20 degrees by a moving heavy truck at 75.0 kph. The intended impact engagement was the left front corner of the car with the left front corner of the truck.

The moving heavy truck's test weight was 12134 kg. The truck was equipped with a lowered flat bumper of 60 psi energy absorbing honeycomb. 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 979 (See TEST ANOMALIES). The dummy's chest deceleration with 3 milliseconds minimum duration was 45.2 g. The dummy's maximum left and right femur forces were 2577 N and 7692 N (See TEST ANOMALIES), 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 miscellaneous test information.

SECTION 2.0

VEHICLE, DUMMY, TRUCK AND TEST DATA

TEST ANOMALIES

The driver head X-axis acceleration, HEDXG1, recorded an anomalous spike at 90 milliseconds.

The driver head resultant acceleration, HEDRG1, velocity, HEDXV1, and HIC calculations were affected by the above anomaly.

The driver neck Y-axis force, NEKYF1, recorded an anomalous spike at 237 milliseconds.

The driver neck Z-axis force, NEKZF1, recorded anomalous spikes at 207 and 237 milliseconds.

The driver neck resultant force calculation, NEKRF1, was affected by the above anomalies.

The driver chest deflection, CSTXD1, recorded an anomalous spike at 237 milliseconds.

The driver pelvis X-axis acceleration, PEVXG1, recorded an anomalous spike at 237 milliseconds.

The driver pelvis Y-axis acceleration, PEVYG1, recorded an anomalous spike at 237 milliseconds.

The driver pelvis Z-axis acceleration, PEVZG1, recorded an anomalous spike at 237 milliseconds.

The driver pelvis resultant acceleration, PEVGR1, and the driver pelvis velocity; PEVXV1, PEVYV1, and PEVZV1; calculations were affected by the above anomalies.

The driver left femur force, LFMF1, recorded anomalous spikes at 206 and 237 milliseconds.

The driver right femur force, RFMF1, recorded anomalous spikes at 206 and 237 milliseconds.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Heavy Truck into Stationary Vehicle

TEST DATE: 12/10/92 TEST TIME: 1352 AMBIENT TEMP. (°C): 2

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

VEHICLE TEST WEIGHT (KG): 1598

IMPACT ANGLE (DEG)*: 20

IMPACT VELOCITY (KPH)**: PRIMARY = 75.0 SECONDARY = 75.0

MAXIMUM STATIC CRUSH (MM): 501

DUMMY: Driver #048

TYPE: Part 572E

LOCATION: Left front

RESTRAINT: 3-point unibelt

NUMBER OF DATA CHANNELS: 35

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

*With respect to tow track centerline.
**Speed trap measurement (± .08 kph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company

MAKE/MODEL: Ford/Taurus VIN: 1FABP53U7HG145299

BODY STYLE: 4-door sedan MODEL YEAR: 1987

COLOR: Silver

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

TRANSMISSION DATA: _4_ SPEED, ___ MANUAL, _X_ AUTOMATIC, _X_ FWD, ___ RWD, ___ 4WD

DATE VEHICLE RECEIVED: 11/24/92 ODOMETER READING: NA

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: 12/86 VIN: 1FABP53U7HG145299

GVWR: 4595 LBS

GAWR: FRONT: 2507 LBS., REAR: 2133 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Dean, Quasar, P205/70R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 35 PSI
REAR: 35 PSI

SPARE TIRE (MFR., LINE, SIZE): Firestone, Temp, 135/80D14

TYPE OF SEATS: FRONT: Spilt bench
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 1800 MILLIMETERS

WHEELBASE: 2692 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: P205/70R14

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

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 900 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE:	LF	692;	RF	697;	LR	629;	RR	629
PRE-TEST ATTITUDE:	LF	683;	RF	698;	LR	603;	RR	613
POST-TEST ATTITUDE:	LF	NA;	RF	676;	LR	527;	RR	683

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	447 KG	RIGHT REAR	279 KG
LEFT FRONT	463 KG	LEFT REAR	248 KG
TOTAL FRONT WEIGHT	910 KG	(63.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	527 KG	(36.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1437 KG		
TARGET TEST WEIGHT	1581 KG **		

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	459 KG	RIGHT REAR	317 KG
LEFT FRONT	505 KG	LEFT REAR	317 KG
TOTAL FRONT WEIGHT	964 KG	(60.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	634 KG	(39.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1598 KG		

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: None

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1067 MILLIMETERS REARWARD OF FRONT WHEEL CENTERLINE

*The vehicle was not weighed as delivered.
**The target test weight was established during Test 920507.

TABLE 3 TRUCK INFORMATION

WEIGHT DISTRIBUTION

FRONT: 2726 KG

REAR: 9408 KG

AXLE SPACING

FRONT: 3835 MM

REAR: 1308 MM

DISTANCE OF C.G. BEHIND FRONT AXLE: 3481 MM

BUMPER DESCRIPTION: Modified, lowered, flat bumper with a 60 psi aluminum honeycomb face.

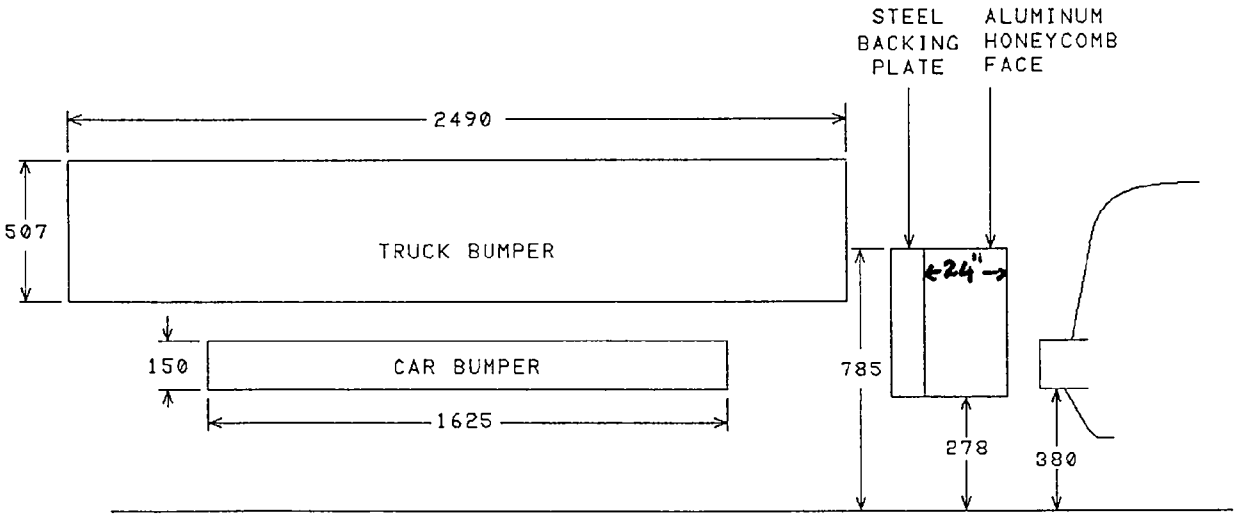


TABLE 4 POST-IMPACT DATA

TEST NUMBER: 921210

TEST DATE: 12/10/92 TEST TIME: 1352

TEST TYPE: Heavy Truck into Stationary Vehicle IMPACT ANGLE: 20

AMBIENT TEMPERATURE AT IMPACT AREA: 2° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 21° C

IMPACT VELOCITY: PRIMARY = 75.0 KPH
SECONDARY = 75.0 KPH

(SPECIFIED RANGE = 79.7 TO 81.3 KPH)

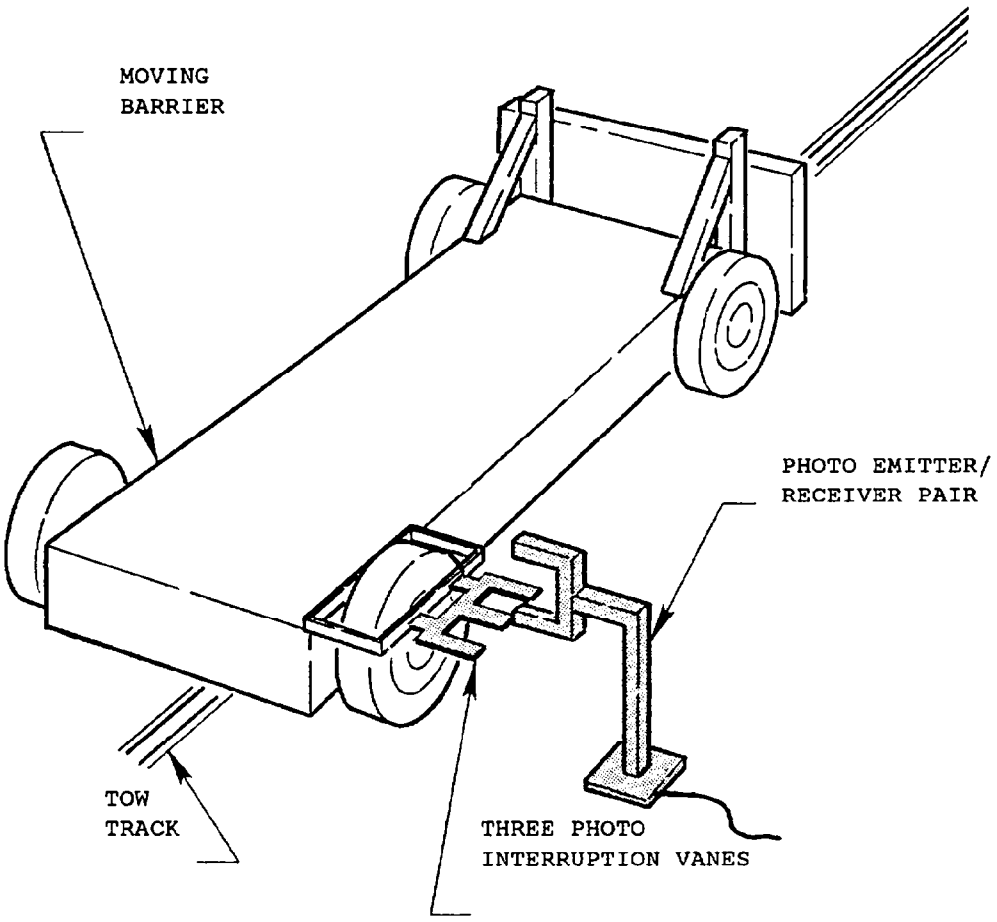
DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 660 MM

EXITING VELOCITY TRAP = 51 MM

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

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	L	4655;	C	4813;	R 4648
	POST-TEST:	L	4331;	C	4312;	R 4537
	TOTAL CRUSH:	L	324;	C	501;	R 111
	AVERAGE CRUSH:	312				

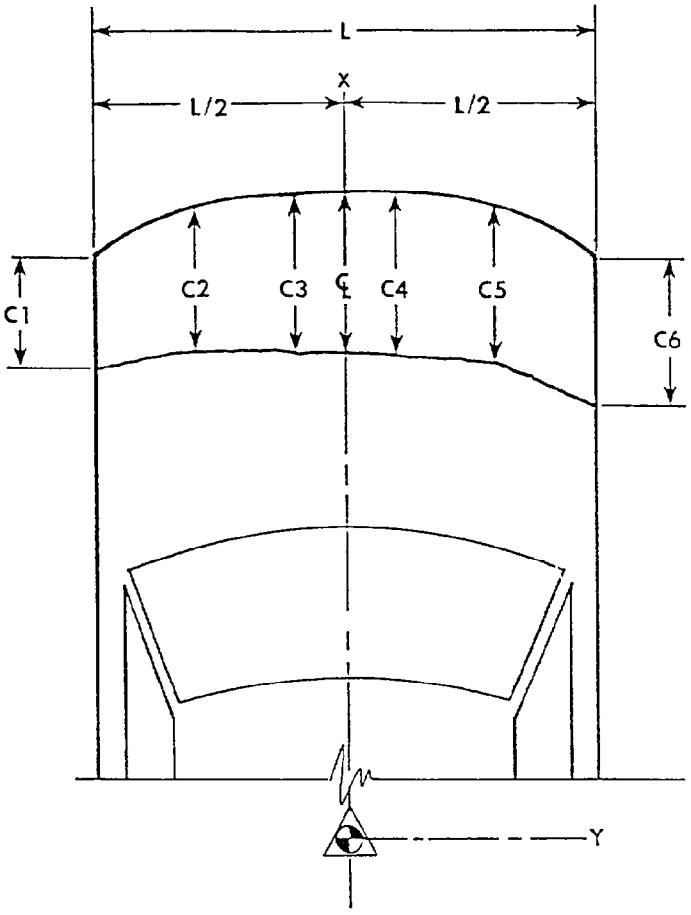
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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	1524		
C1	4655	4331	324
C2	4737	4369	368
C3	4783	4331	452
C4	4782	4426	356
C5	4750	4497	253
C6	4648	4537	111
CL	4813	4312	501

FIGURE 3

PRE-TEST AND POST-TEST MEASUREMENT POINTS

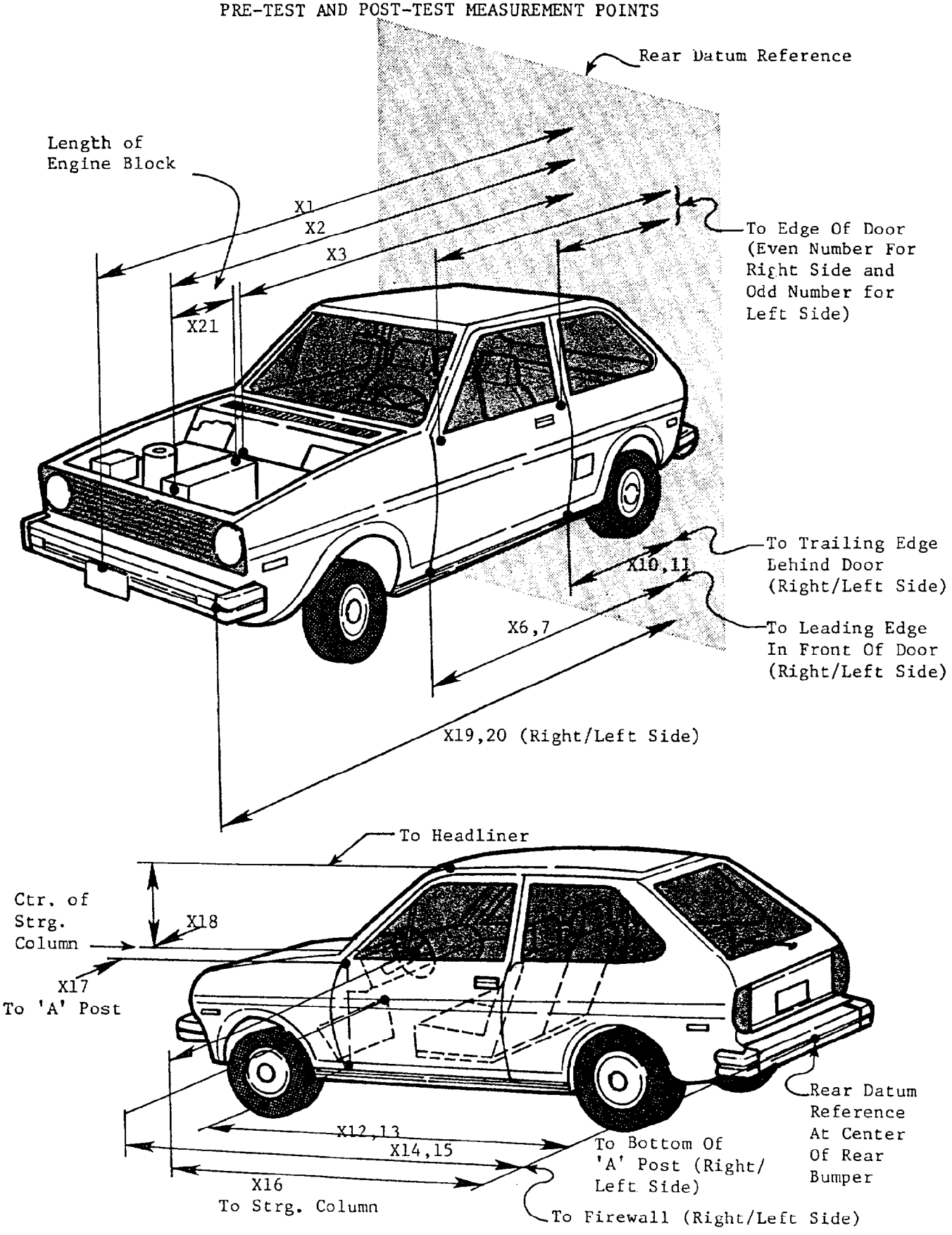


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

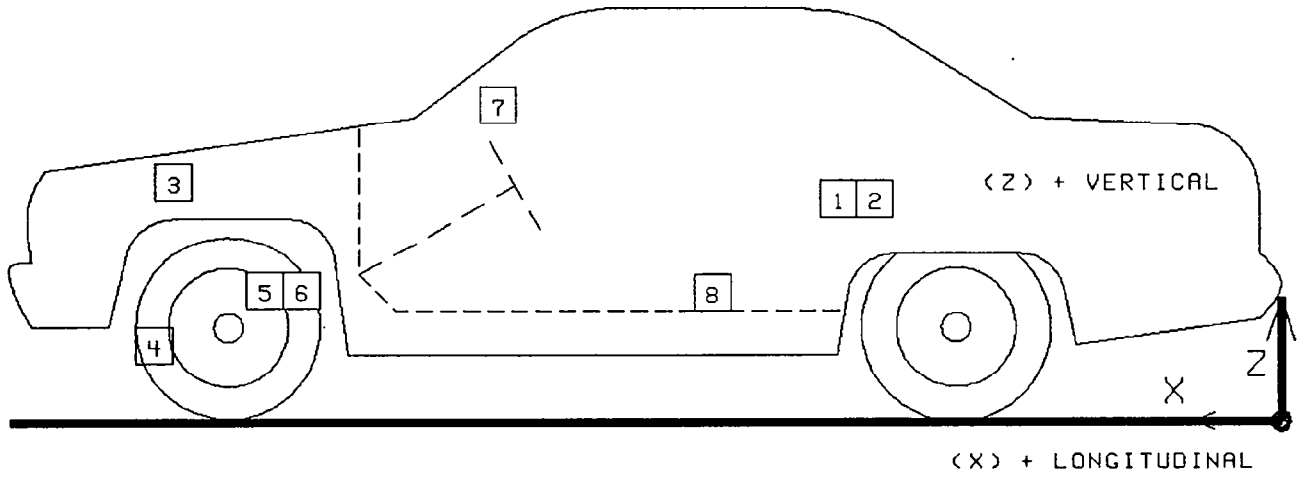
VEHICLE MAKE/MODEL: Ford/Taurus TEST NUMBER: 921210

ALL MEASUREMENTS ARE IN MILLIMETERS

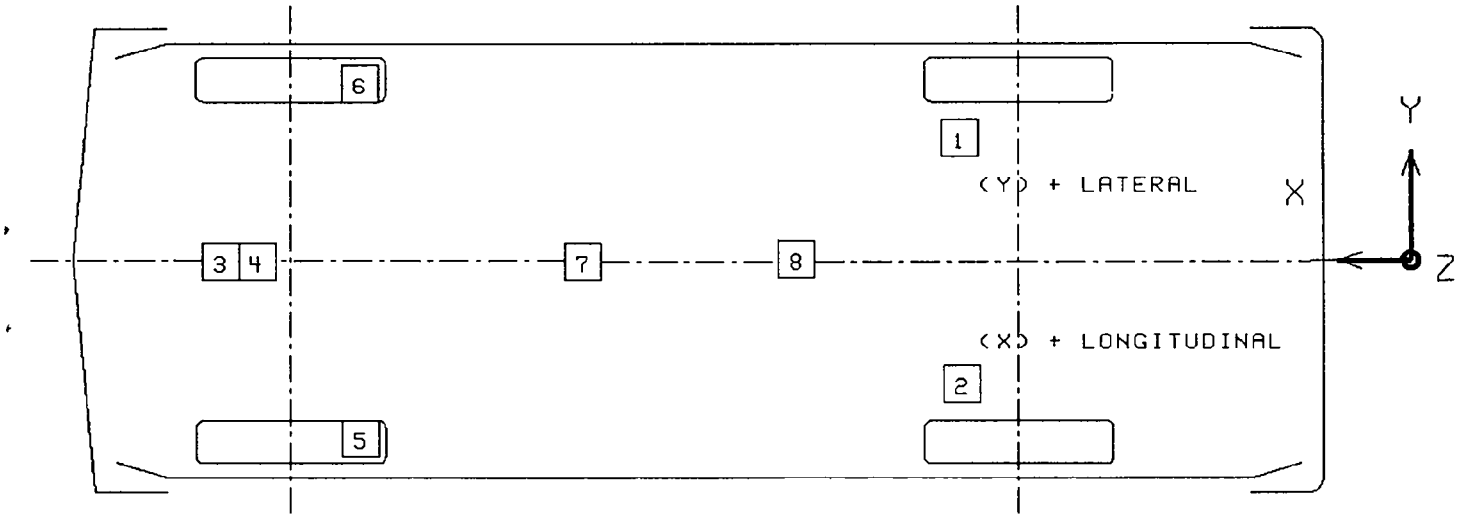
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4813	4312	501
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	4178	4121	57
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3613	3562	51
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	3312	3312	0
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	3302	3315	-13
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	3226	3204	22
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	3226	3200	26
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	2229	2226	3
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	2219	2248	-29
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	2191	2165	26
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	2191	2162	29
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	3229	3200	29
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	3229	3216	13
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3581	3626	-45
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3569	3467	102
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2807	2788	19
X17	CENTER OF STEERING COLUMN TO "A" POST	286	283	3
X18	CENTER OF STEERING COLUMN TO HEADLINER	413	483	-70
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4648	4537	111
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4655	4318	324
X21	LENGTH OF ENGINE BLOCK	381	381	0

FIGURE 4

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 6

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 921210

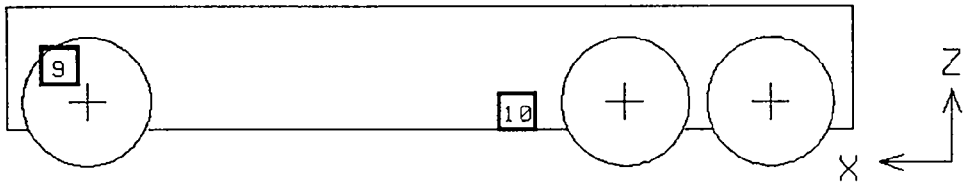
No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER	1835	375	425				
	LONGITUDINAL				2.6	141.9	33.9	65.5
2	RIGHT REAR SEAT CROSSMEMBER	1848	-375	435				
	LONGITUDINAL				3.1	162.1	37.6	64.5
3	ENGINE TOP	4128	-152	762				
	LONGITUDINAL				30.6	95.8	90.3	27.8
4	ENGINE BOTTOM	3931	22	210				
	LONGITUDINAL				5.5	105.3	45.5	27.9
5	RIGHT BRAKE CALIPER	3905	-698	310				
	LONGITUDINAL				21.5	93.1	57.6	44.6
6	LEFT BRAKE CALIPER	3905	698	308				
	LONGITUDINAL				5.6	100.4	79.5	32.4
7	INSTRUMENT PANEL CENTER	3175	0	972				
	LONGITUDINAL				17.3	101.4	47.5	75.3
8	CENTER OF GRAVITY	2188	0	302				
	LONGITUDINAL				2.8	106.0	32.8	89.8
	LATERAL				2.2	112.1	14.6	74.9
	VERTICAL				16.8	112.6	11.4	68.9
	RESULTANT				34.3	89.6		

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

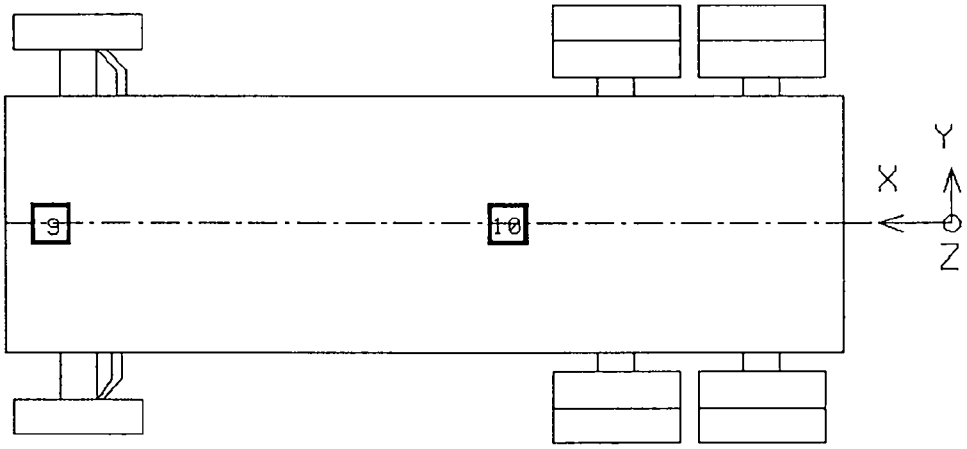
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

FIGURE 5

HEAVY TRUCK ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 7

HEAVY TRUCK ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 921210

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX	POSITIVE DIRECTION @ MSEC	NEGATIVE DIRECTION MAX	NEGATIVE DIRECTION @ MSEC
9	FRONT FRAME CROSSMEMBER	2527	0	1050				
	LONGITUDINAL				1.6	7.1	6.8	52.8
	LATERAL				5.3	28.1	2.3	76.6
	VERTICAL				6.4	44.5	6.3	50.6
	RESULTANT				8.2	44.3		
10	CENTER OF GRAVITY	6160	0	658				
	LONGITUDINAL				0.4	144.0	5.4	55.8
	LATERAL				4.3	38.8	3.7	68.4

* 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 921210

	DRIVER DUMMY SN: 048			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
HEAD ACCELERATION (g)				
LONGITUDINAL	29.1	214.1Y	113.9	89.9
LATERAL	25.8	213.9	27.6	129.4
VERTICAL	4.8	0.0	64.6	94.8
RESULTANT	125.2	89.9Y		
HIC	979 FROM 78.1 TO 114.1Y			
NECK FORCE (N)				
LONGITUDINAL	1588.7	130.0	187.3	225.6
LATERAL	1199.0	121.8	415.8	237.3 Y
VERTICAL	2373.1	94.8	590.0	237.3 Y
RESULTANT	2584.9	94.8 Y		
NECK MOMENT (N-M)				
ABOUT X	12.0	204.3	76.4	129.6
ABOUT Y	87.5	122.0	42.1	85.4
ABOUT Z	21.1	130.8	8.1	247.0
RESULTANT	114.6	125.9		
CHEST ACCELERATION (g)				
LONGITUDINAL	4.1	169.3	45.7	80.4
LATERAL	6.5	63.3	32.6	96.5
VERTICAL	14.0	103.9	9.8	90.6
RESULTANT	47.4	80.4		
3 MSEC	45.2			
CHEST DEFLECTION (mm)				
LONGITUDINAL	0.2	7.8	35.6	94.5 Y
PELVIS ACCELERATION (g)				
LONGITUDINAL	14.9	114.6 Y	71.4	69.1 Y
LATERAL	15.7	62.3 Y	119.3	237.3 Y
VERTICAL	21.5	72.0 Y	43.8	237.3
RESULTANT	127.5	237.3 Y		

TABLE 8

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 921210

	DRIVER DUMMY SN: 048			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
FEMUR LOAD (N)				
LEFT	1194.3	237.3[Y]	2577.2	64.4[Y]
RIGHT	2611.2	237.3[Y]	7691.9	68.8[Y]

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

[Y] See TEST ANOMALIES

TABLE 9 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #048	PASSENGER # NA
HEAD	Chest and upper steering wheel rim	
CHEST	Lower steering wheel rim	
ABDOMEN	None	
LEFT KNEE	Instrument panel	
RIGHT KNEE	Instrument panel	

DOOR OPENING:

	LEFT	RIGHT
FRONT	Opened, with difficulty	Easy
REAR	Opened, with difficulty	Easy

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	None
REAR	NA	NA

GLAZING DAMAGE:

The entire windshield was cracked on impact.

OTHER NOTABLE IMPACT EFFECTS:

A portion of the truck bumper face remained embedded in the front of the car after the test.

DUMMY KINEMATIC SUMMARY

Upon impact, the driver dummy translated forward impacting both knees into the instrument panel. The dummy's head rotated forward, impacting the upper steering wheel rim and the dummy's chest. The dummy's chest impacted the lower steering wheel rim as the dummy's torso was restrained by the three-point unibelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point unibelt.

FIGURE 6 DUMMY AND SEAT POSITIONING DATA

PRE-IMPACT DATA:

MAKE/MODEL: Ford/Taurus

BODY STYLE: 4-door sedan MODEL YEAR: 1987

COLOR: Silver

DATA FROM CERTIFICATION LABEL:

VEHICLE MANUFACTURER: Ford Motor Company

DATE OF MANUFACTURE: 12/86 VIN: 1FABP53U7HG145299

GVWR: 4595 LBS.; GAWR: FRONT = 2507 LBS.; REAR = 2133 LBS.

POST-IMPACT DATA:

DATE OF TEST: 12/10/92 TIME: 1352 TEMPERATURE: 2° C

IMPACT VELOCITY: PRIMARY = 75.0 MPH SECONDARY = 75.0 MPH

REQUIRED IMPACT VELOCITY RANGE: 78.7 TO 81.3 MPH

SEAT TYPE: Split bench ADJUSTER TYPE: Manual

FRONT SEAT BACK TYPE: Reclining

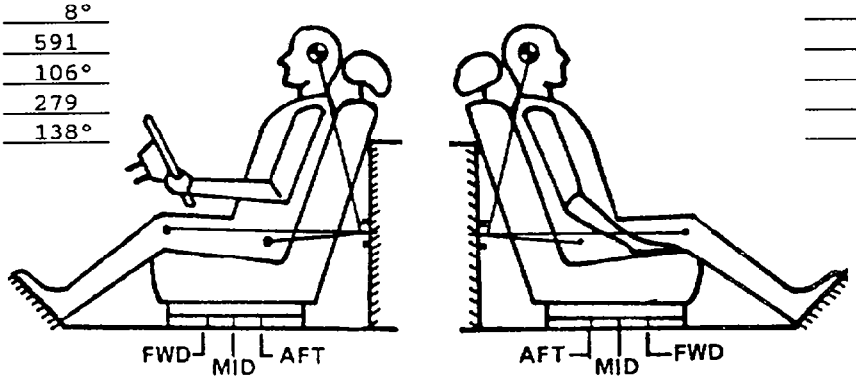
TECHNICIANS: B, Fishbaugh, B. Crabtree

DRIVER DUMMY # 048 TYPE: HIII

HEAD	433
TARGET	8°
KNEE	591
JOINT	106°
APPROX- IMATE "H" POINT	279 138°

PASSENGER DUMMY # NA TYPE: _____

_____	HEAD
_____	TARGET
_____	KNEE
_____	JOINT
_____	APPROX- IMATE "H" POINT



A = 1476

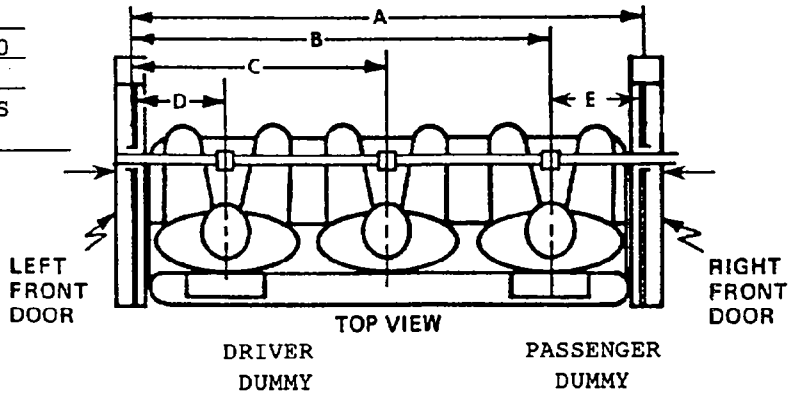
B = NA

C = NA

D = 330

E = NA

DOOR GLASS HEIGHT = _____



DOOR GLASS HEIGHT = _____

ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

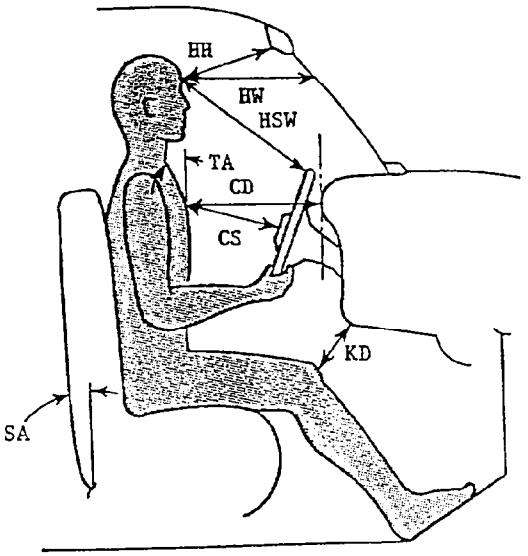
ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

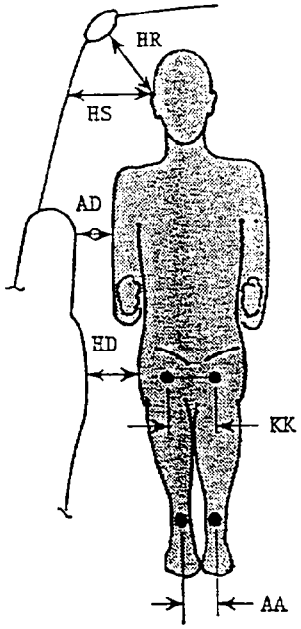
FIGURE 7 DUMMY IN VEHICLE POSITIONING DATA

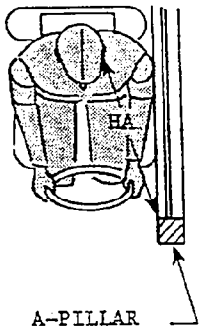
	DRIVER	PASSENGER
	048	NA
HH	391	
HW	559	
CD	568	
CS	330	
KDL	130	
KDR	129	
TA	19°	
SA	26°	
HSW	467	

	DRIVER	PASSENGER
	048	NA
HR	181	
HS	235	
AD	106	
HD	135	
KK	257	
AA	321	
HA	625	

KNEE OUTER CLEVIS TO OUTER CLEVIS SPACING:
DRIVER = 330
PELVIS ANGLE:
DRIVER = 24°





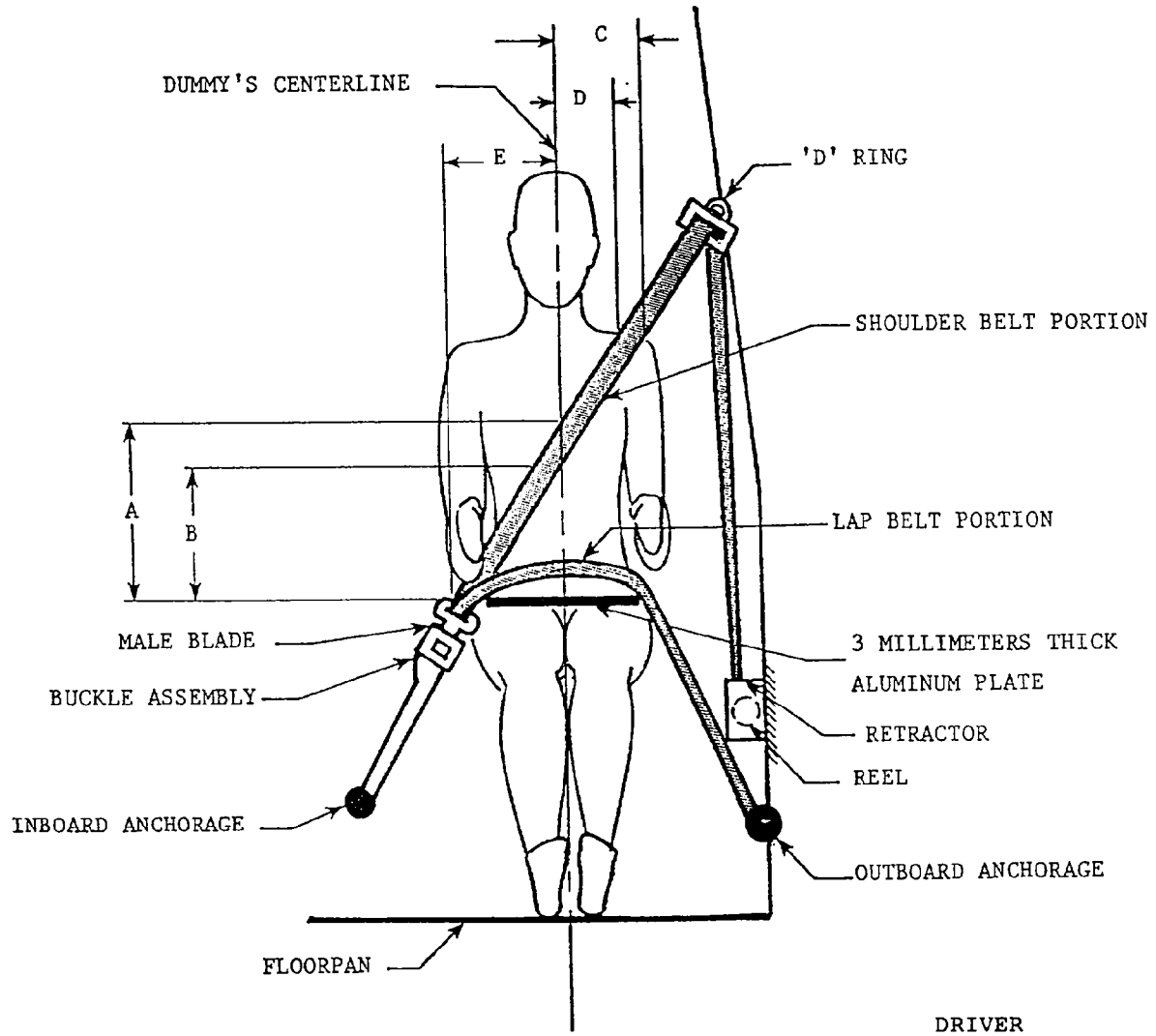


HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW= HEAD TO STEERING WHEEL

HR = HEAD C.G. TARGET TO SIDE ROOF HEADER
HS = HEAD C.G. TARGET TO SIDE WINDOW
AD = ARM TO DOOR
HD = HIP TO DOOR
KK = KNEE TO KNEE
AA = ANKLE TO ANKLE
HA = HEAD C.G. TARGET TO A-PILLAR

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

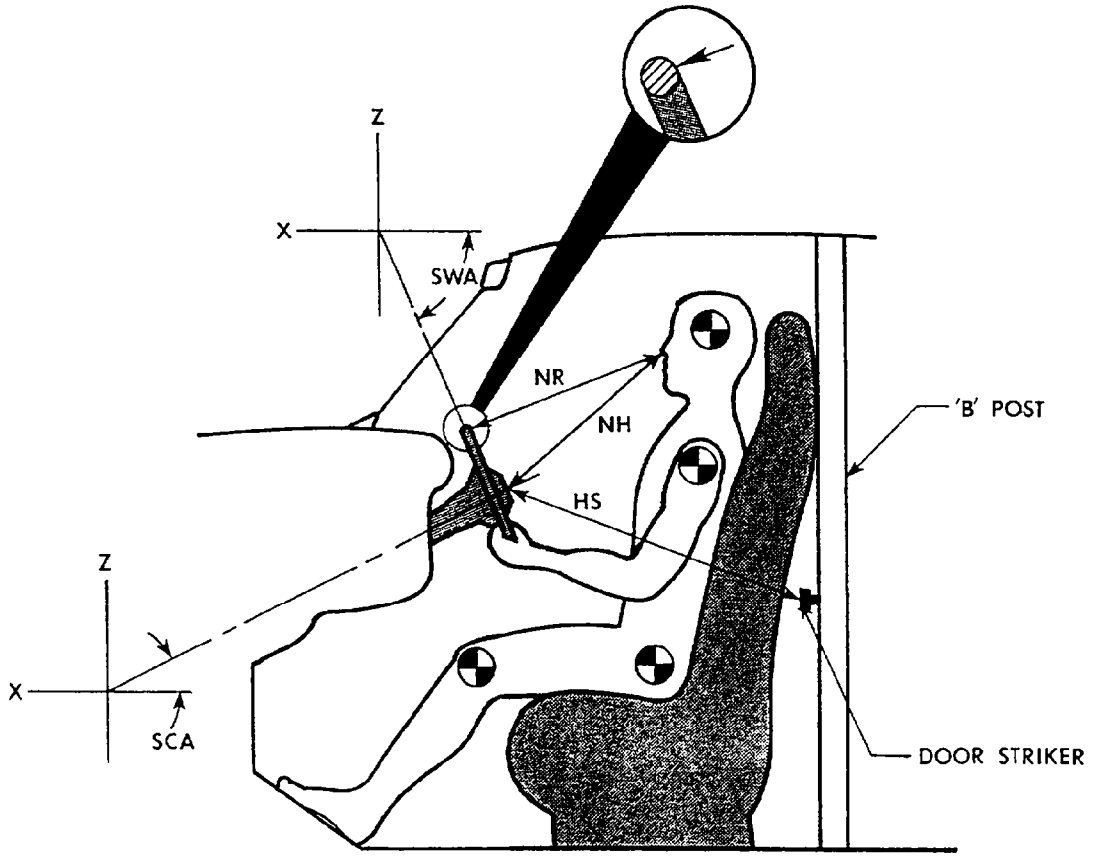
FIGURE 8 SEAT BELT POSITIONING DATA



	DRIVER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	368
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	279
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	79
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	25
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	171

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 latched in the third position with five positions possible. There was no telescoping adjustment.

	MEASUREMENTS
NR - DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	429
NH - DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	430
HS - DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	568
SCA - ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	23°
SWA - ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	67°

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10

CAMERA POSITIONS

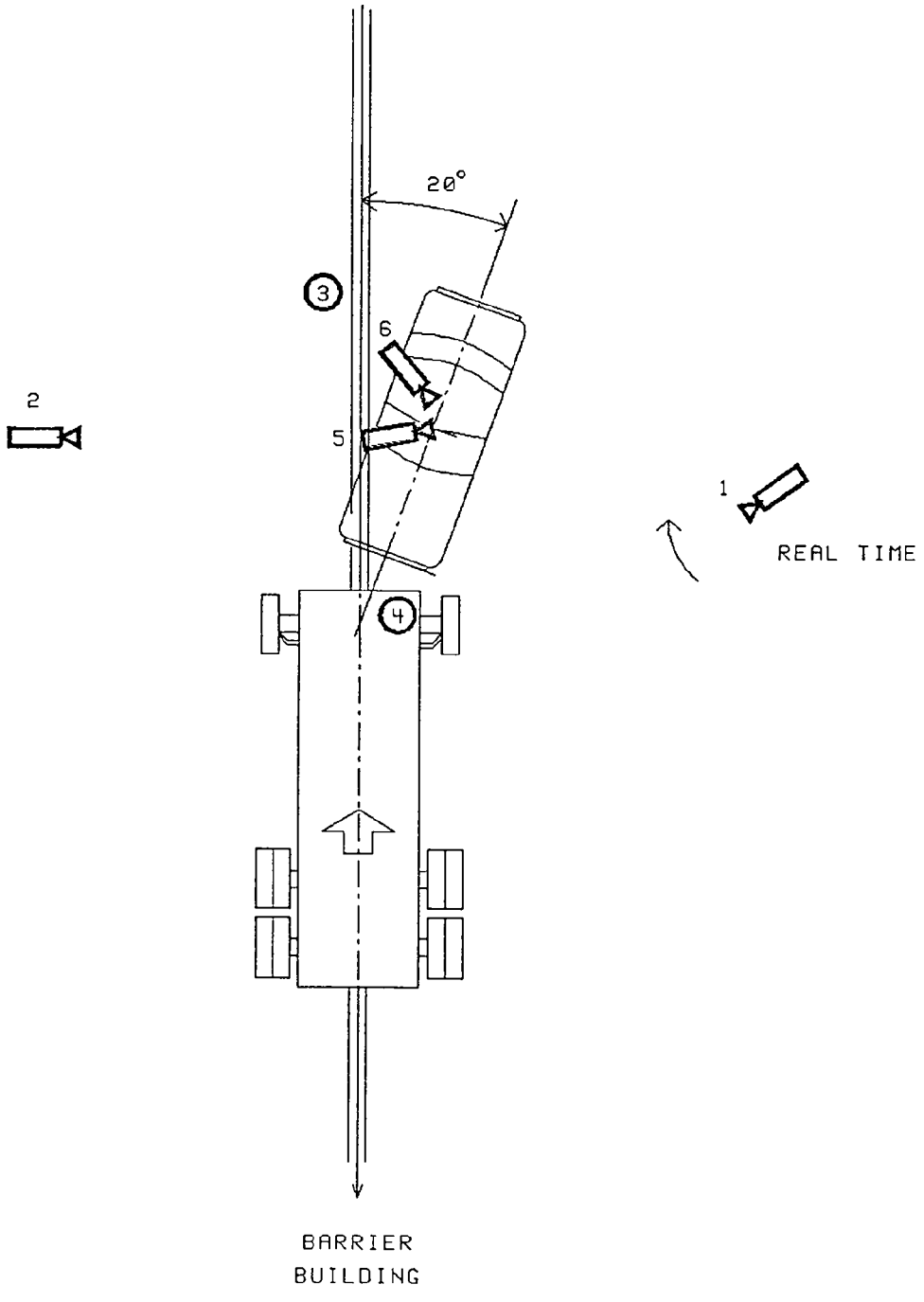


TABLE 10 MOTION PICTURE CAMERA INFORMATION

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

Figure A-6. PRE-TEST REAR VIEW

Figure A-7. POST-TEST REAR VIEW

Figure A-8. PRE-TEST RIGHT SIDE VIEW

Figure A-9. POST-TEST RIGHT SIDE VIEW

Figure A-10. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

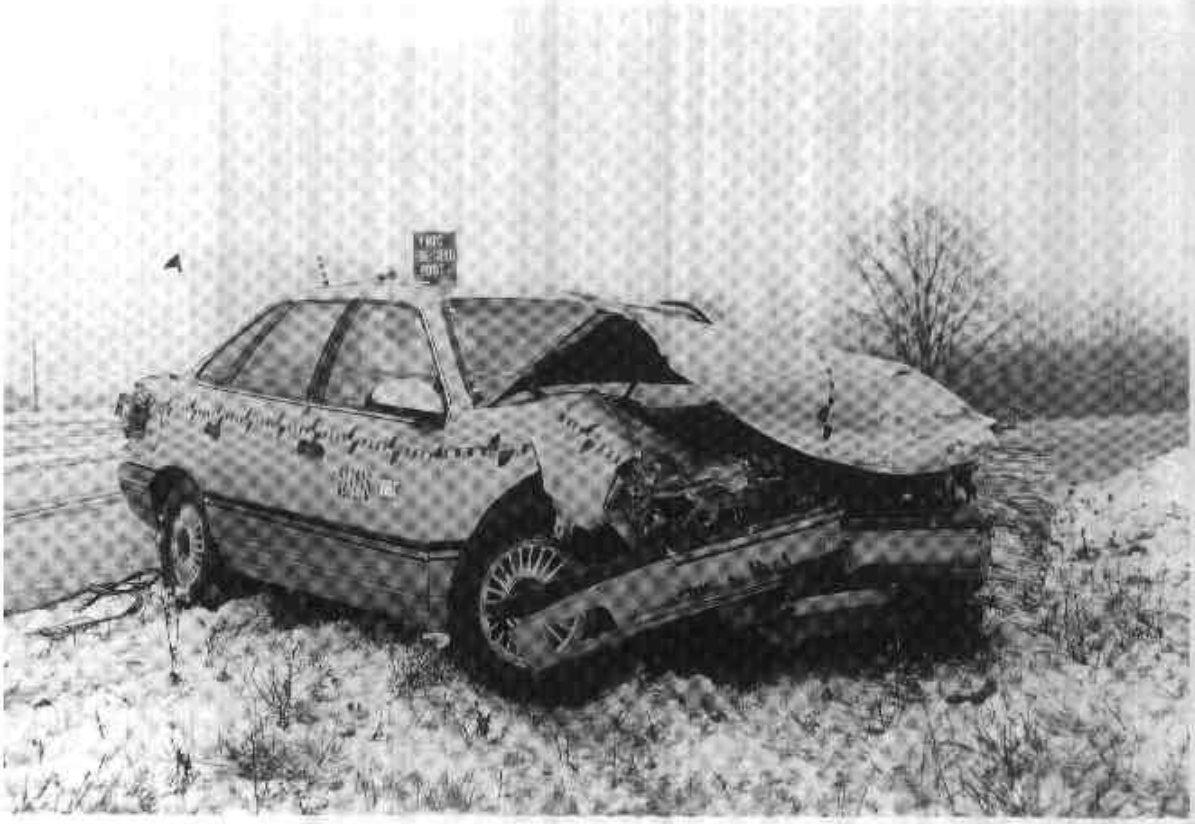


Figure A-11. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

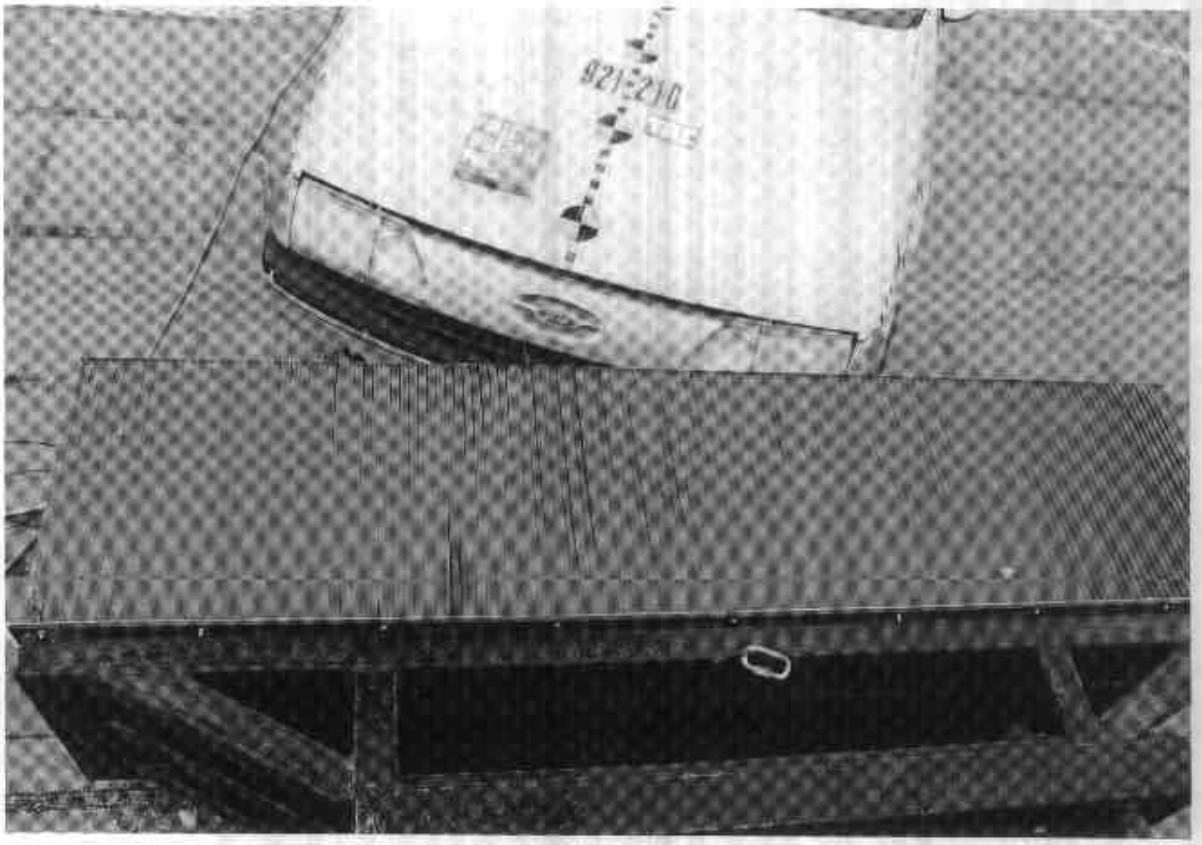


Figure A-12. PRE-TEST BUMPER ENGAGEMENT VIEW

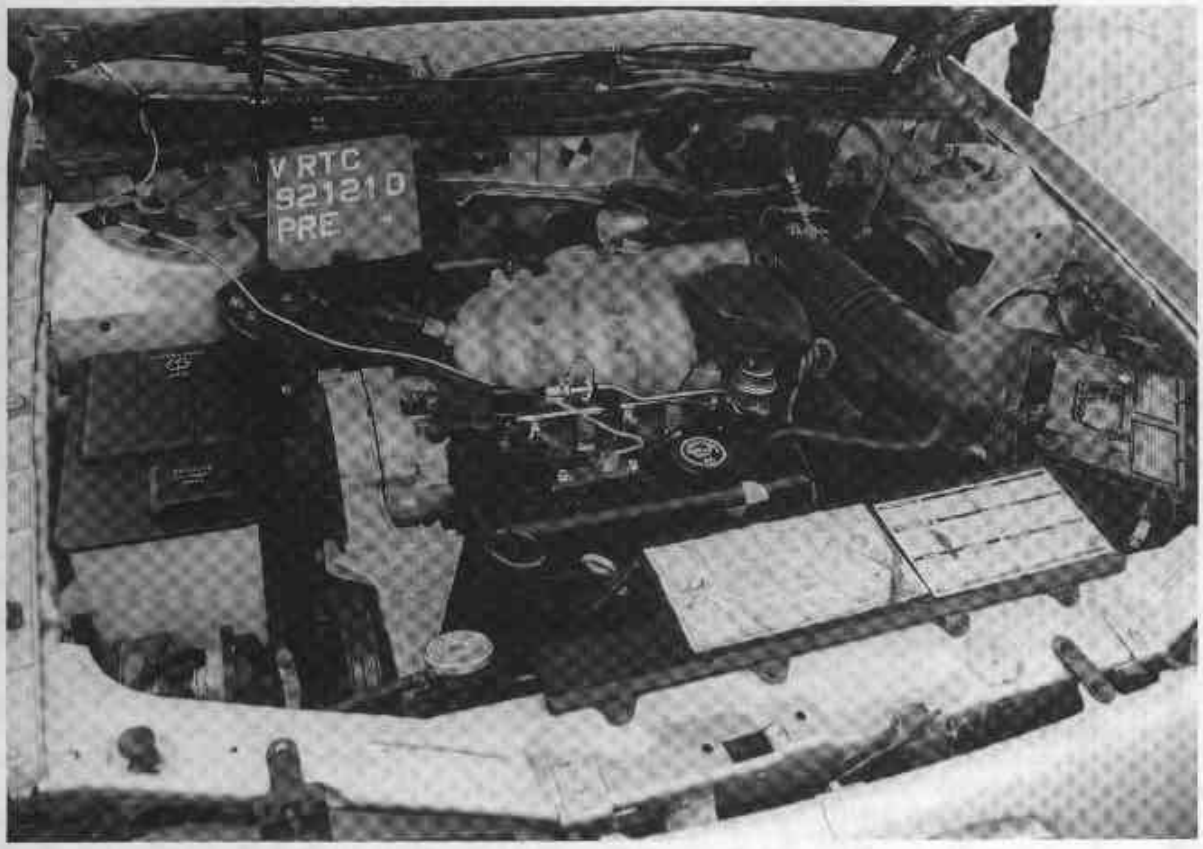


Figure A-13. PRE-TEST ENGINE COMPARTMENT VIEW

Figure A-14. POST-TEST ENGINE COMPARTMENT VIEW

Figure A-15. PRE-TEST WINDSHIELD VIEW

Figure A-16. POST-TEST WINDSHIELD VIEW

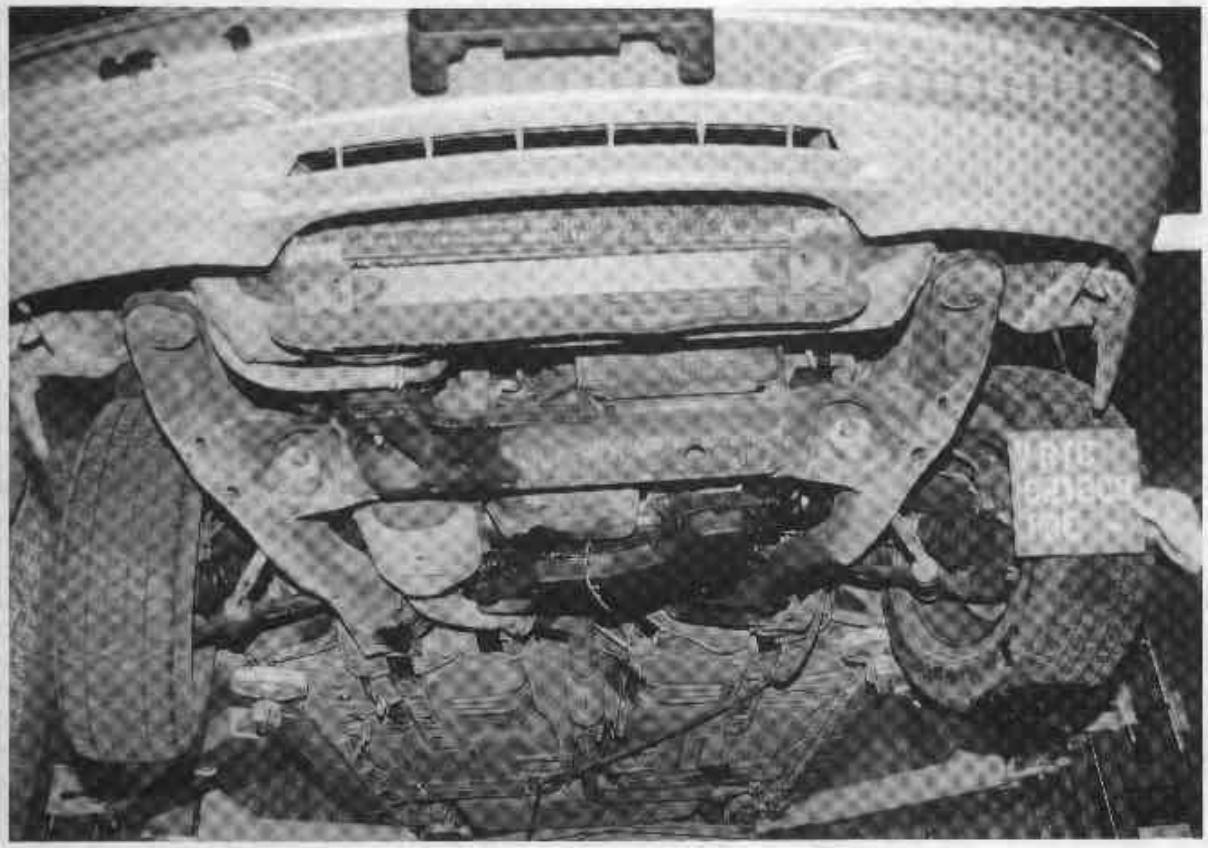


Figure A-17. PRE-TEST FRONT UNDERBODY VIEW

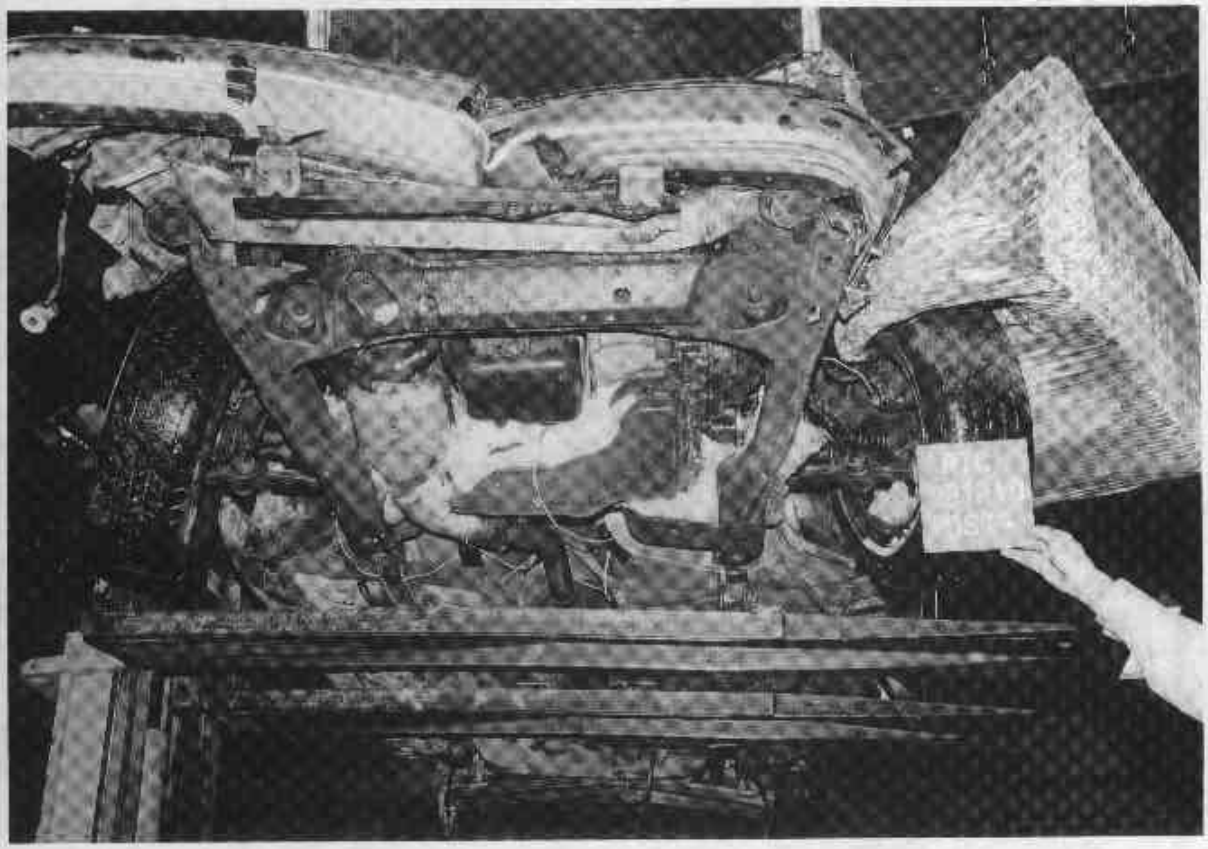


Figure A-18. POST-TEST FRONT UNDERBODY VIEW

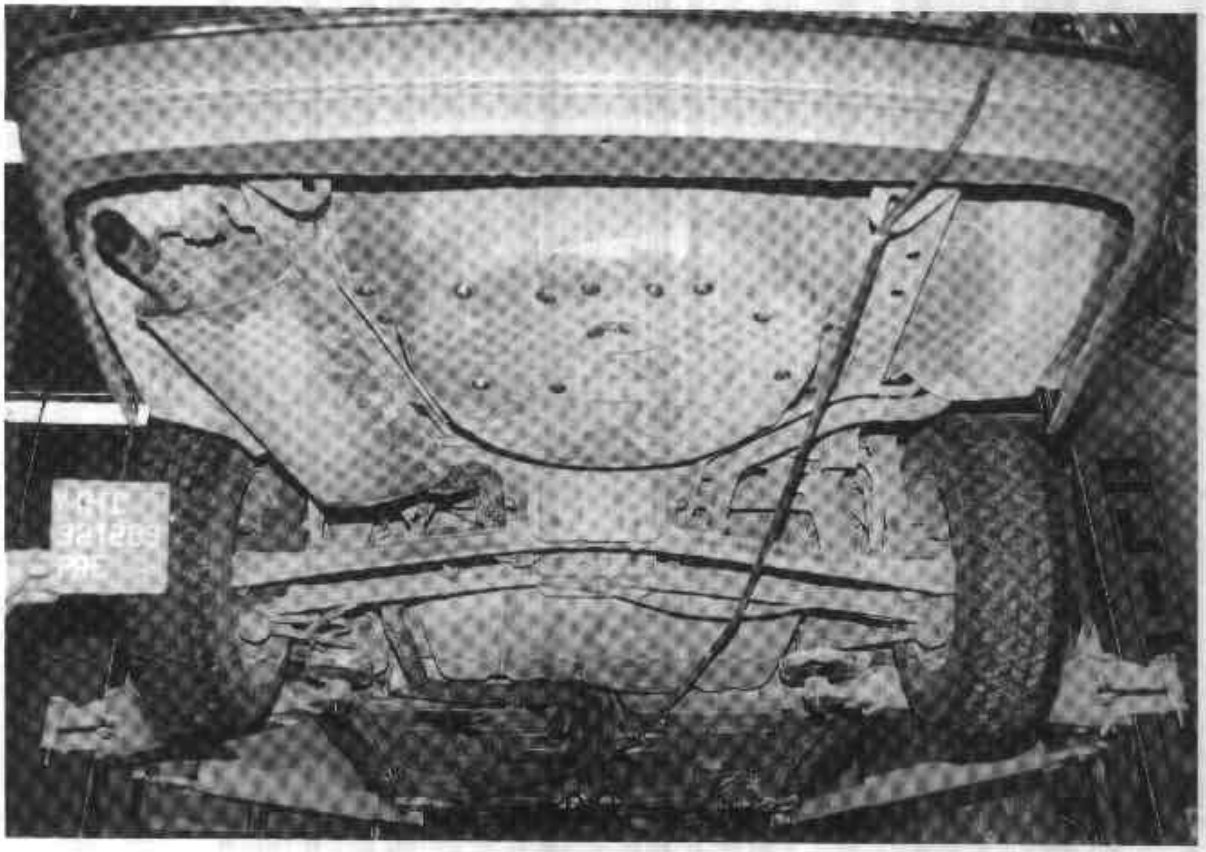


Figure A-19. PRE-TEST REAR UNDERBODY VIEW

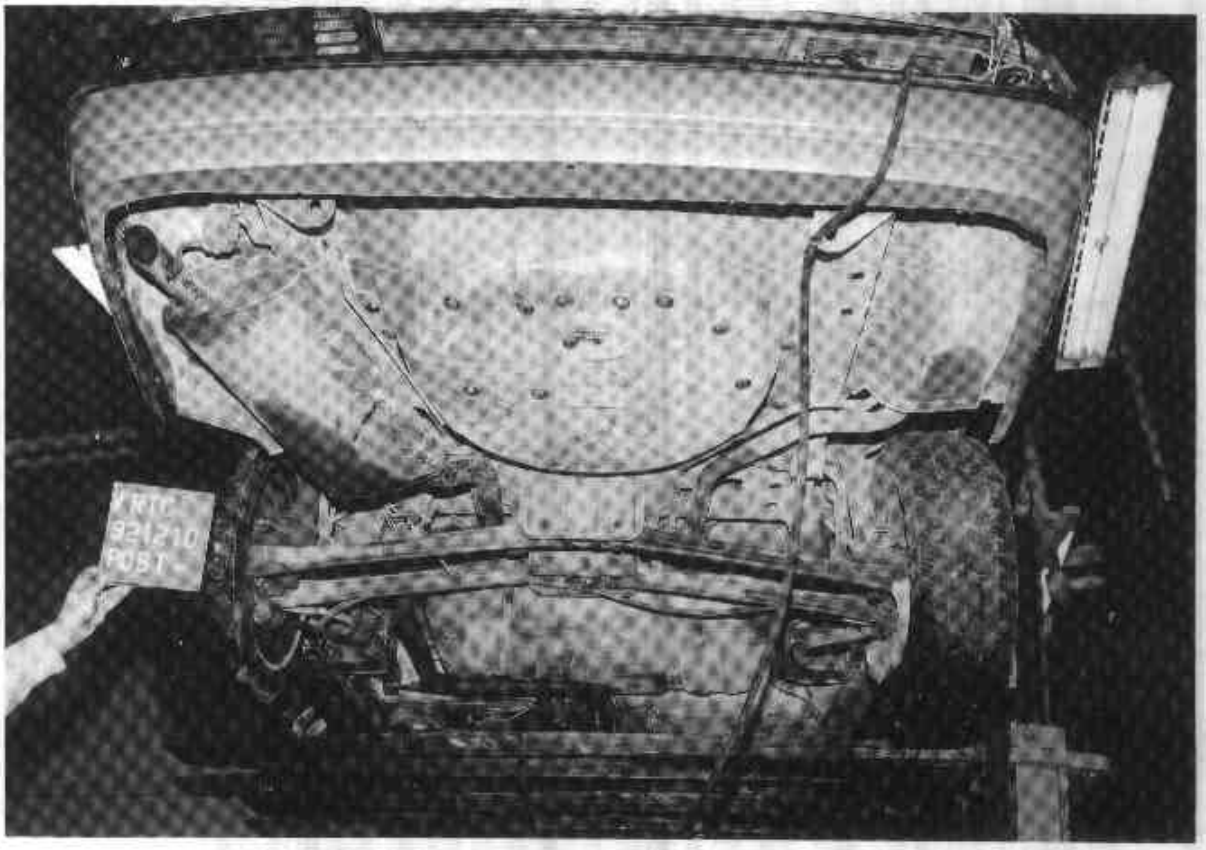


Figure A-20. POST-TEST REAR UNDERBODY VIEW

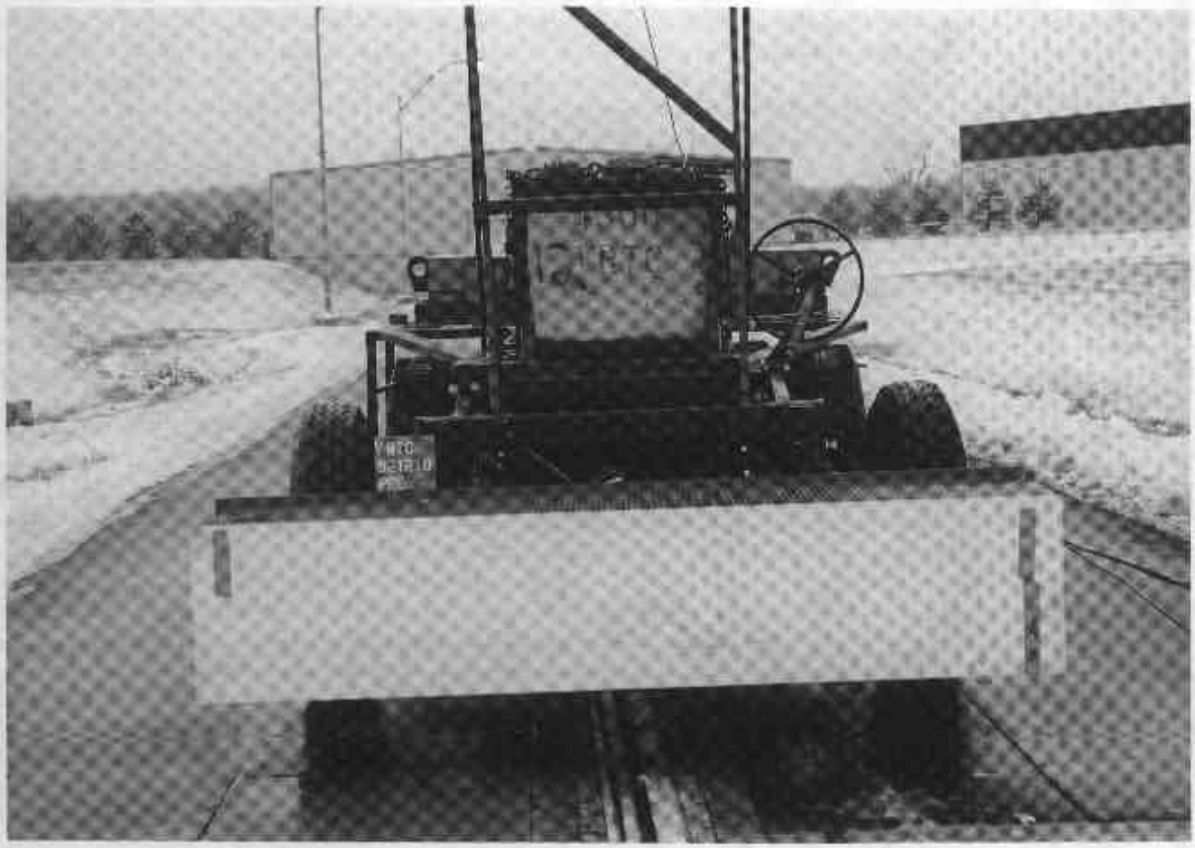


Figure A-21. PRE-TEST TRUCK FRONT VIEW

Figure A-22. POST-TEST TRUCK FRONT VIEW

Figure A-23. PRE-TEST DUMMY VIEW

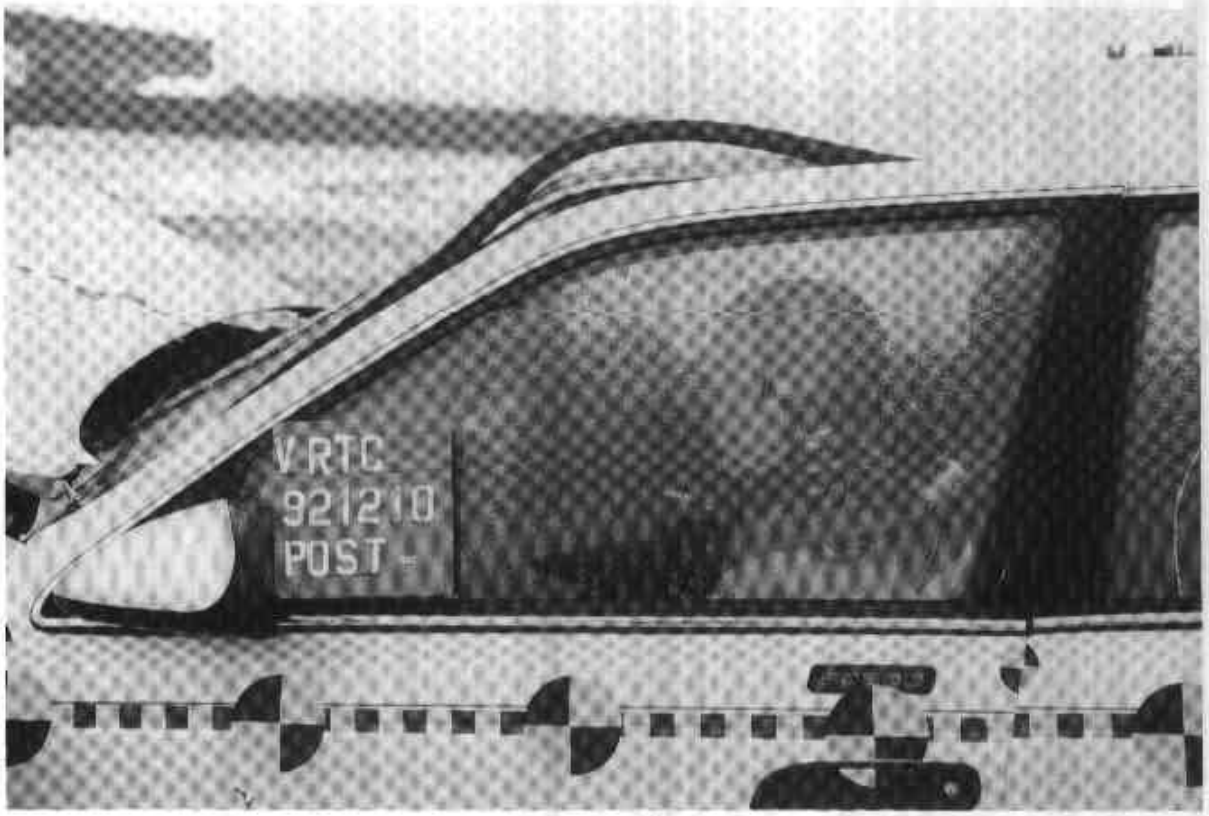


Figure A-24. POST-TEST DUMMY VIEW

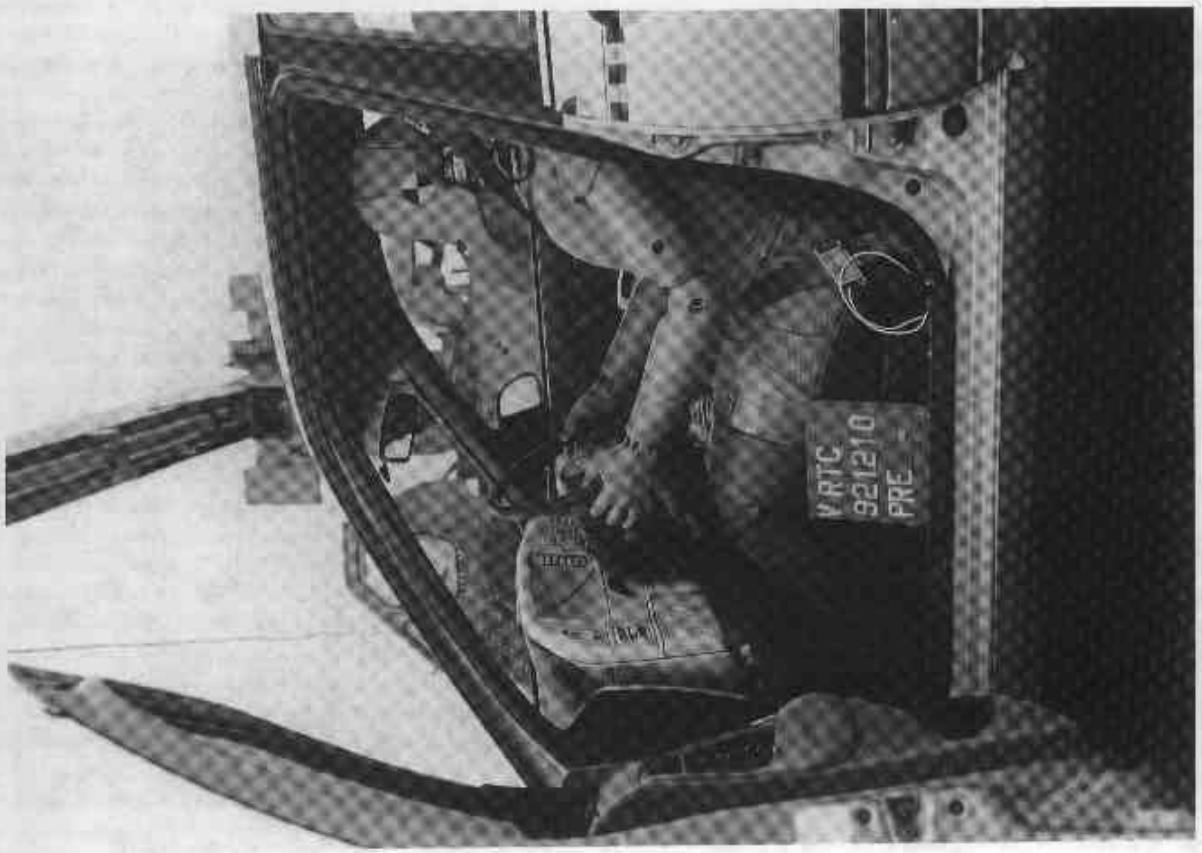


Figure A-25. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 1

Figure A-26. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 2

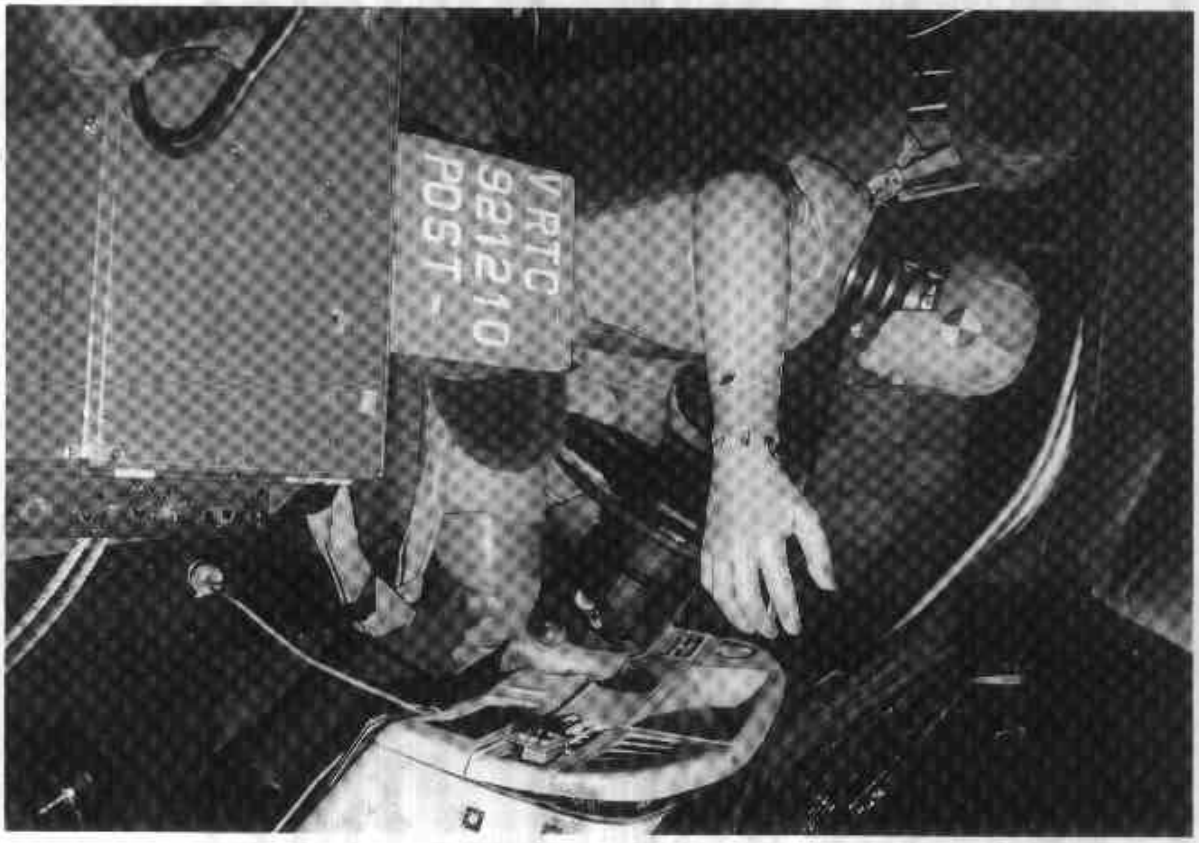


Figure A-27. POST-TEST VEHICLE INTERIOR AND DUMMY VIEW

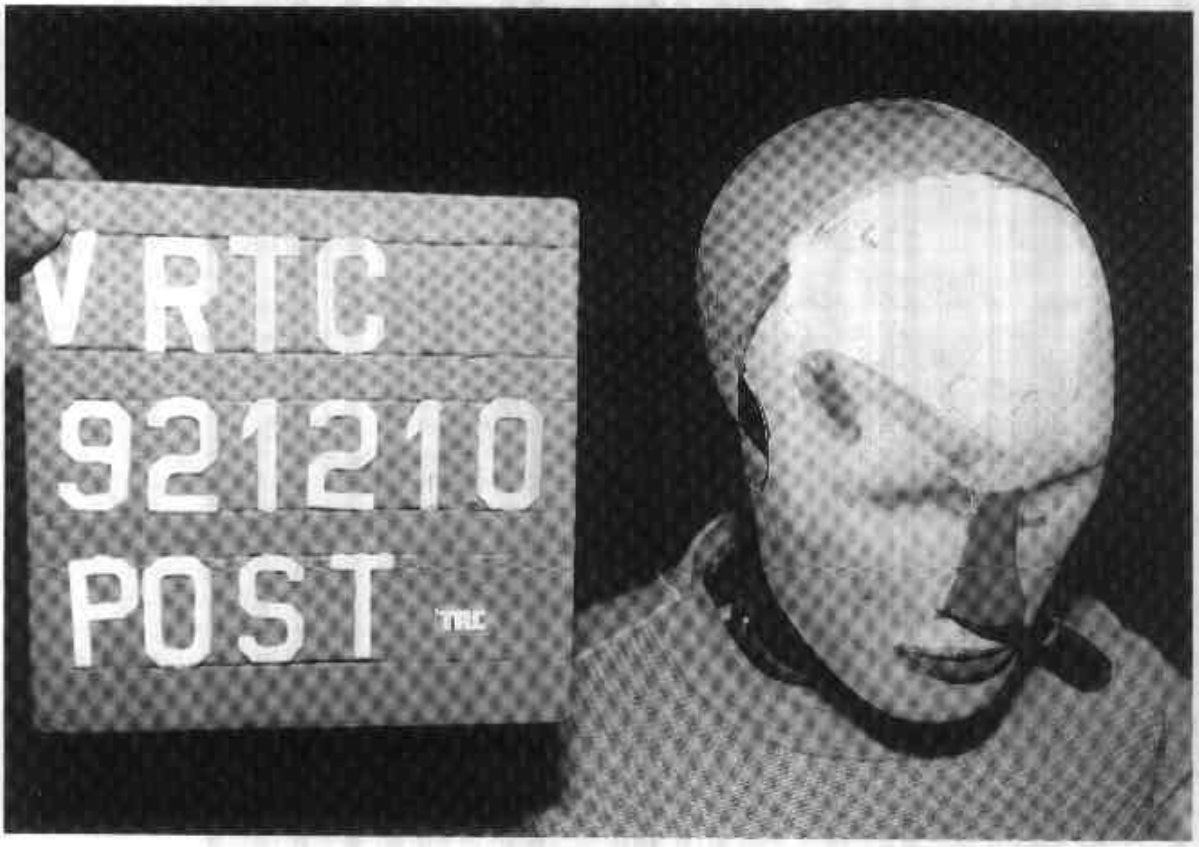


Figure A-28. POST-TEST DUMMY HEAD CONTACT - VIEW 1

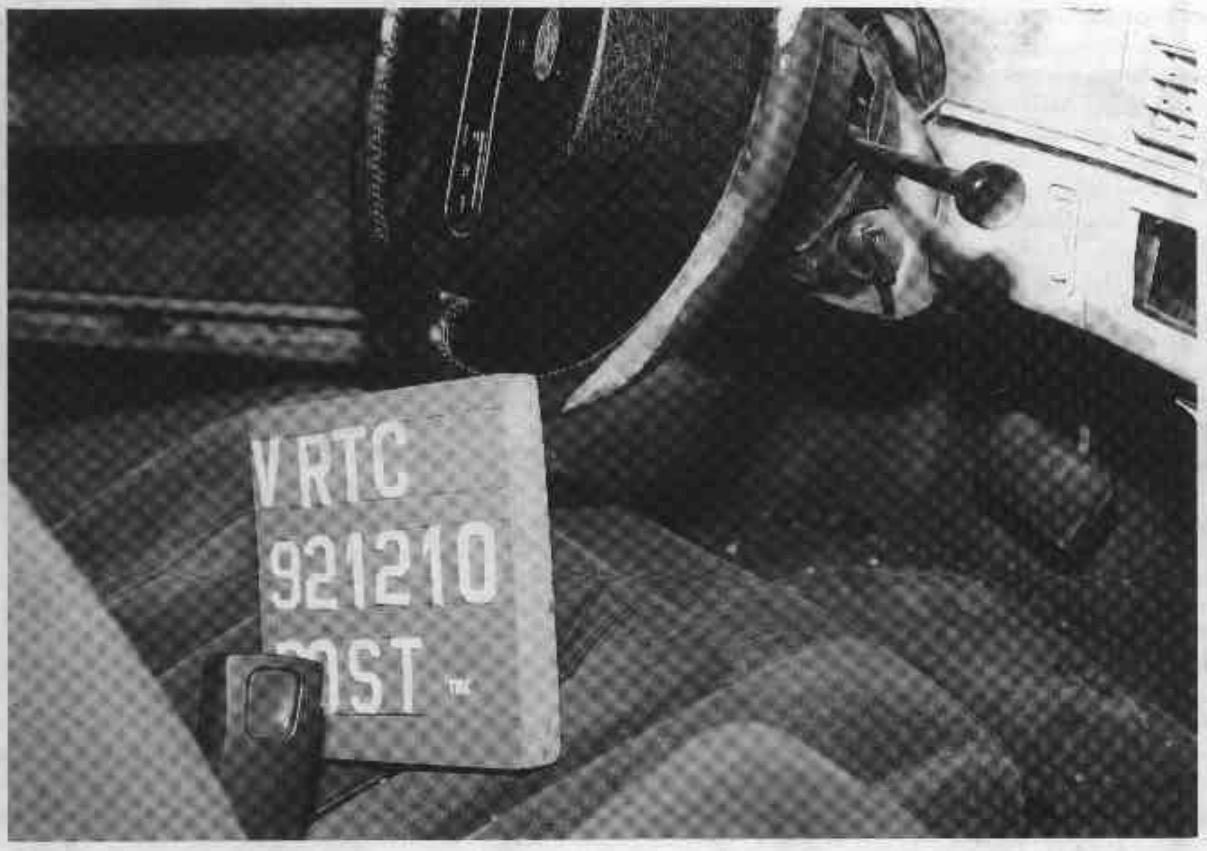


Figure A-29. POST-TEST DUMMY HEAD CONTACT - VIEW 2

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

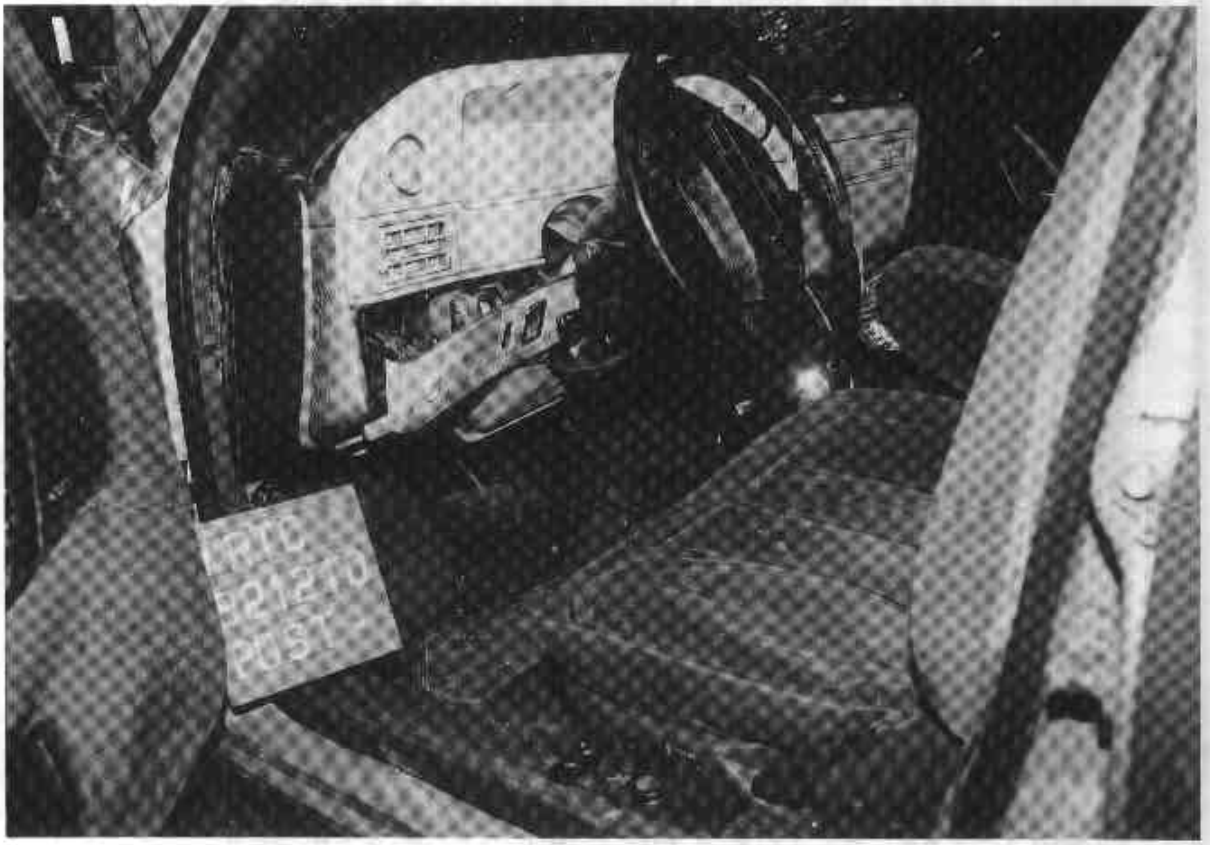


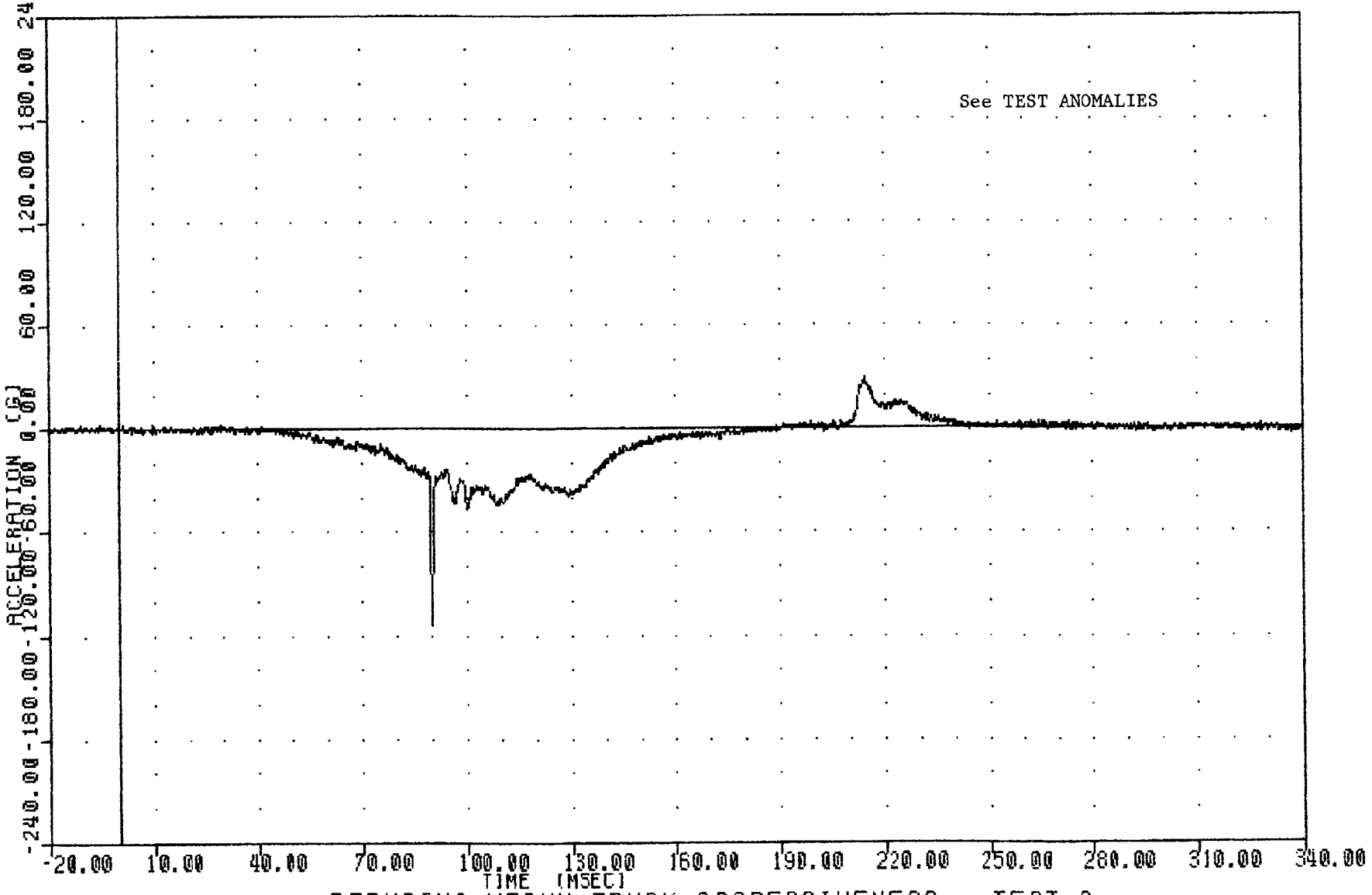
Figure A-31. POST-TEST DUMMY KNEE CONTACT - VIEW 2

APPENDIX B

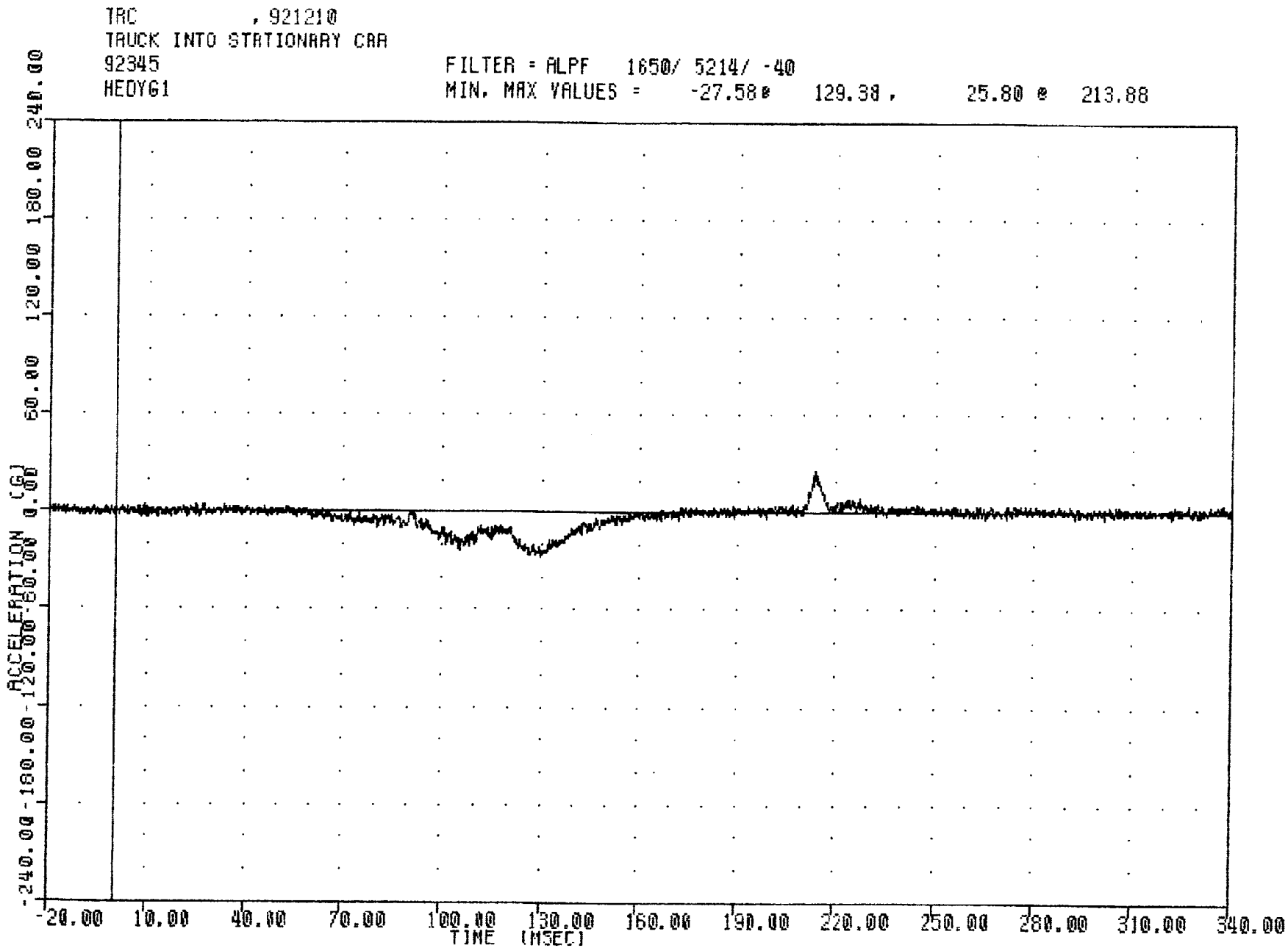
DATA PLOTS

TRC , 921210
TRUCK INTO STATIONARY CAR
92345
HEDXG1

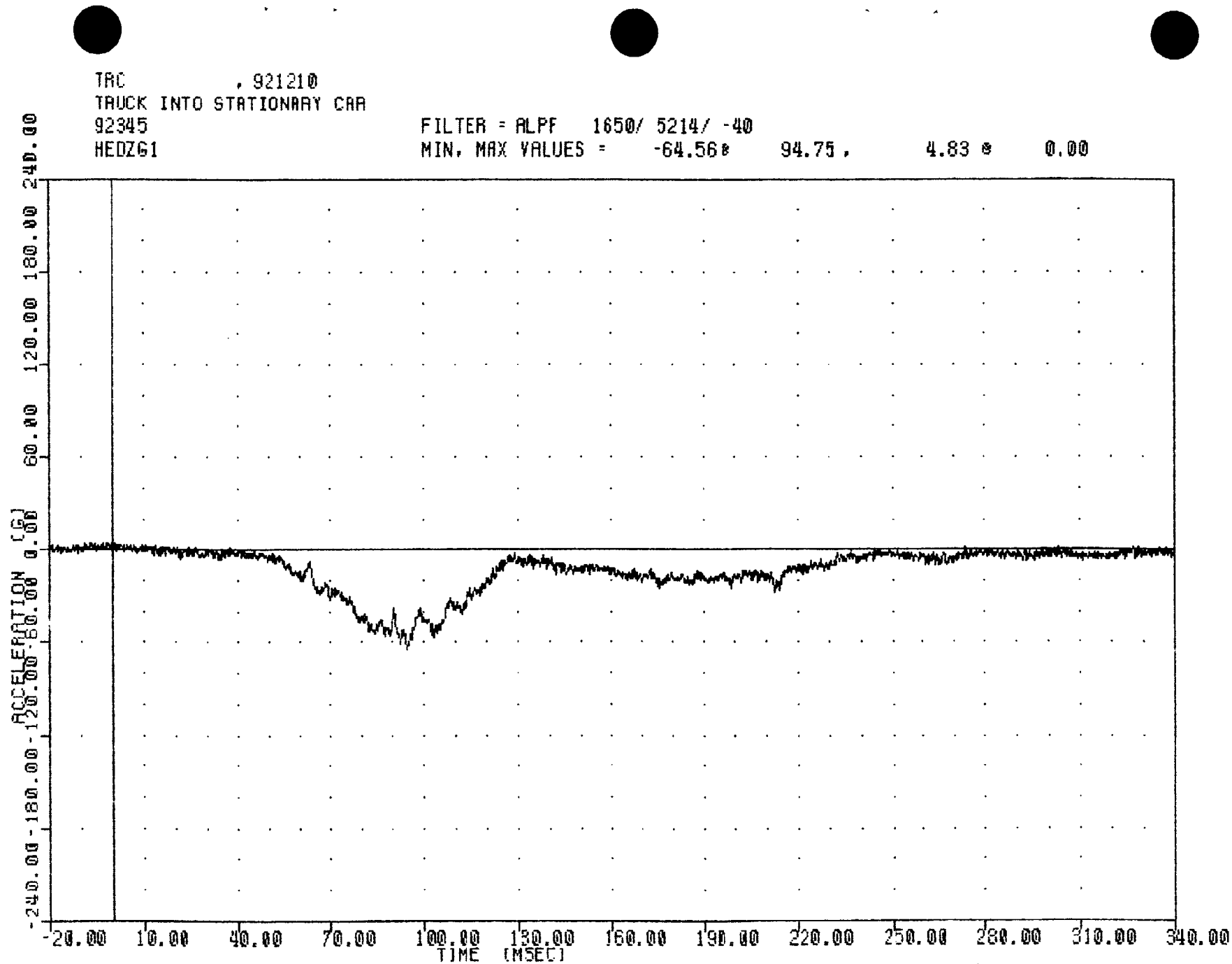
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -113.93@ 89.88, 29.08@ 214.13



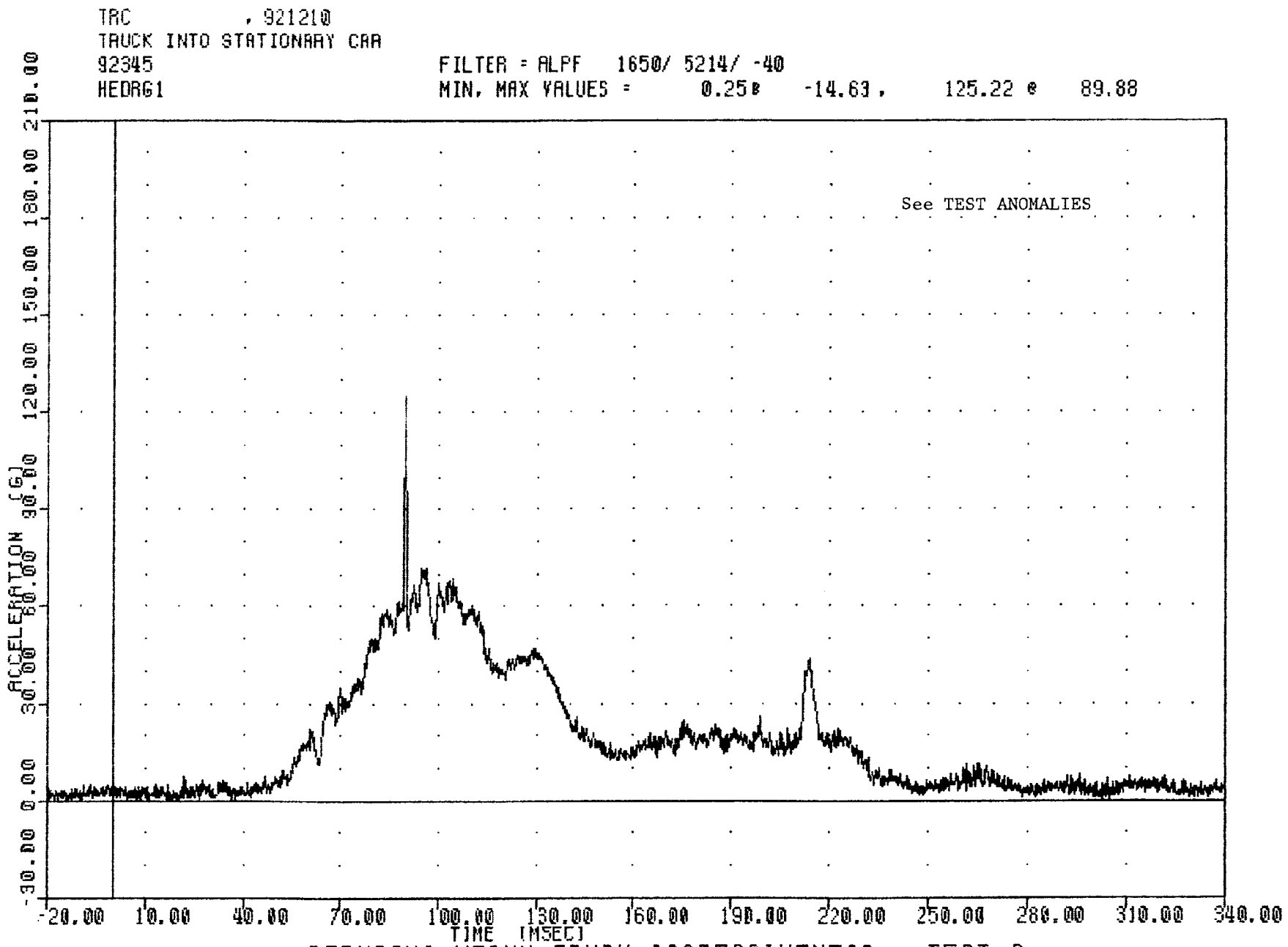
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD X-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD Y-AXIS ACCELERATION

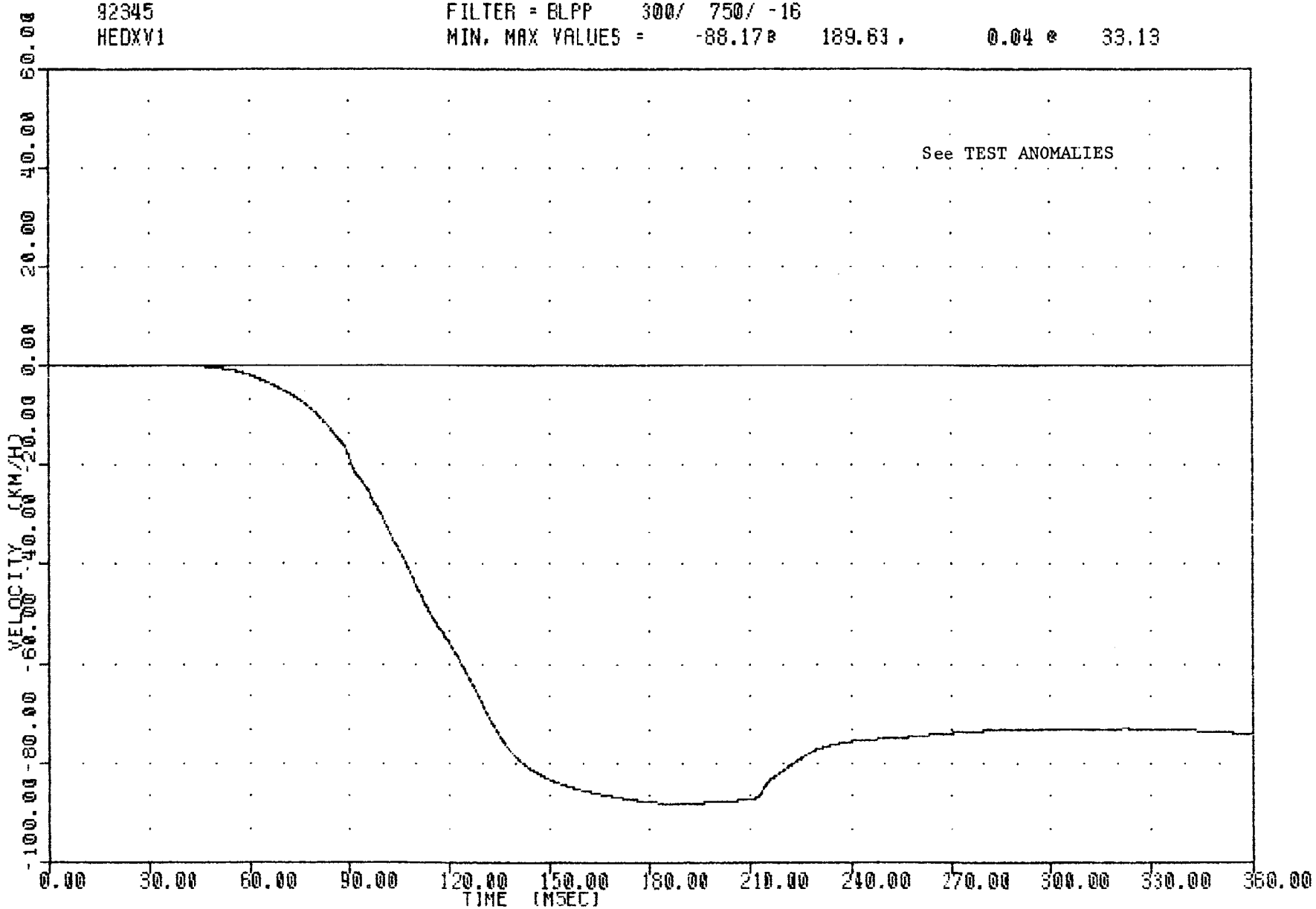


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD Z-AXIS ACCELERATION

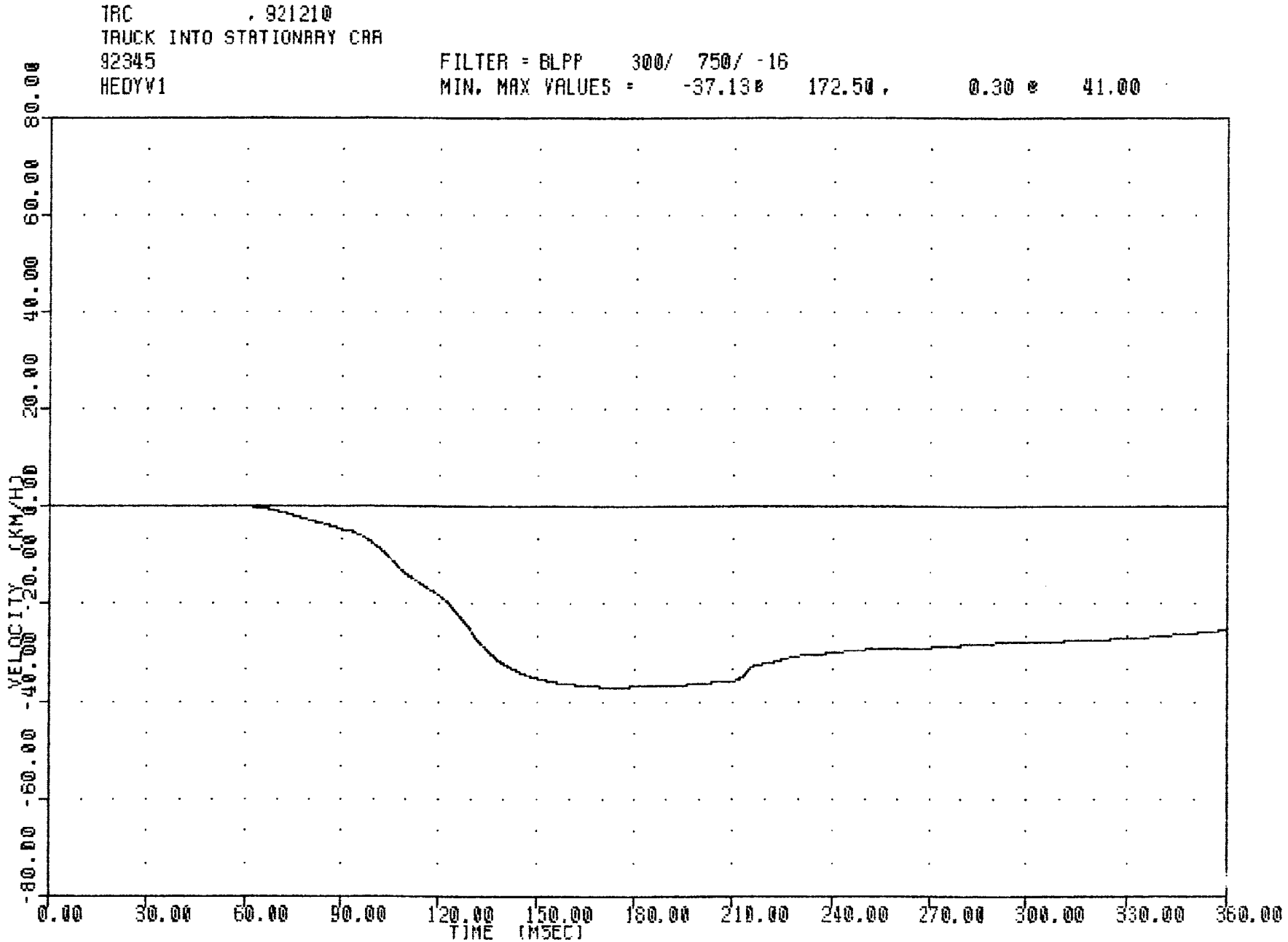


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD RESULTANT ACCELERATION

TRC , 921210
TRUCK INTO STATIONARY CAR
92345 FILTER = BLPP 300/ 750/ -16
HEDXV1 MIN, MAX VALUES = -88.17 @ 189.63 , 0.04 @ 33.13

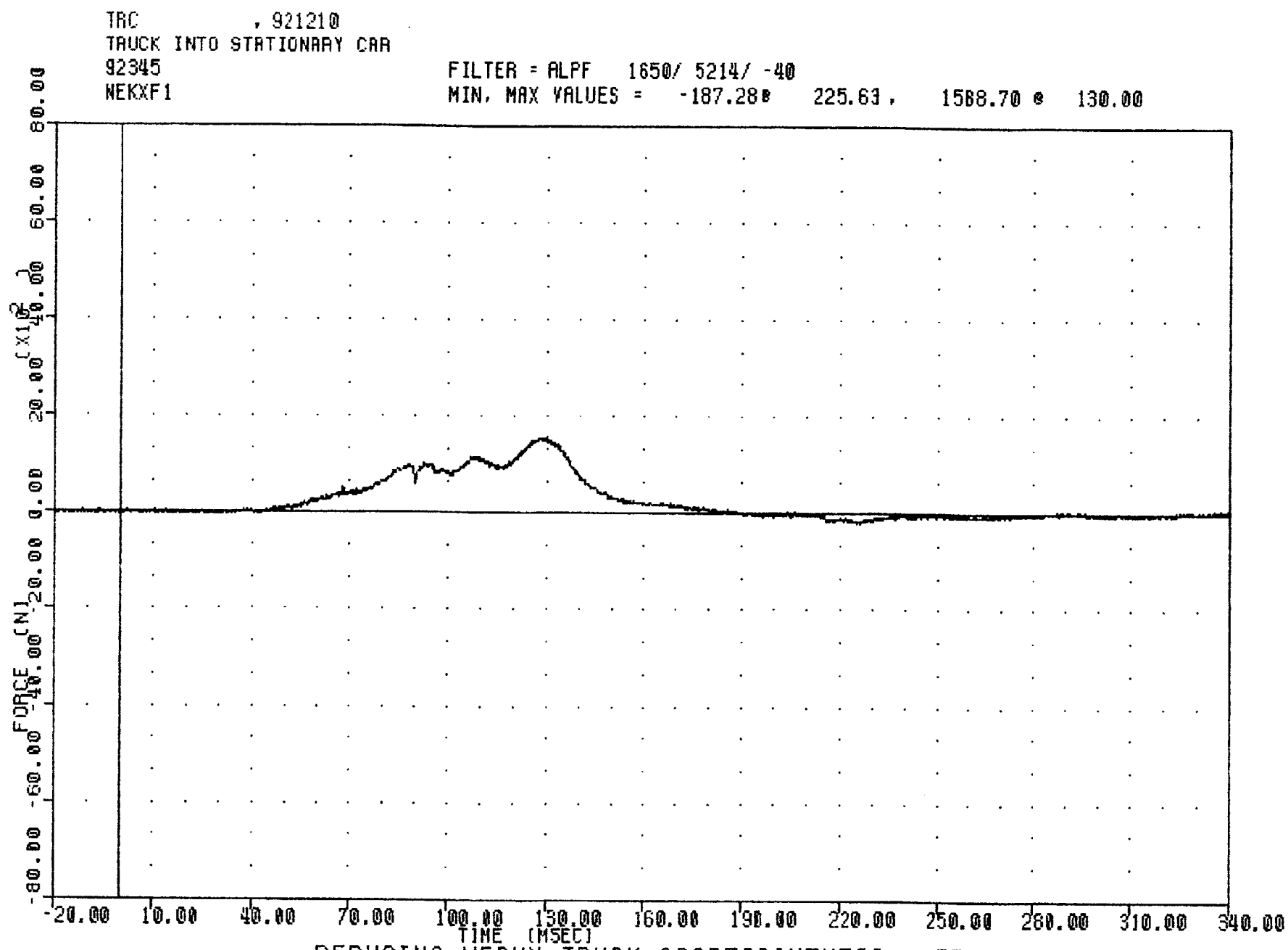


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD X-AXIS VELOCITY



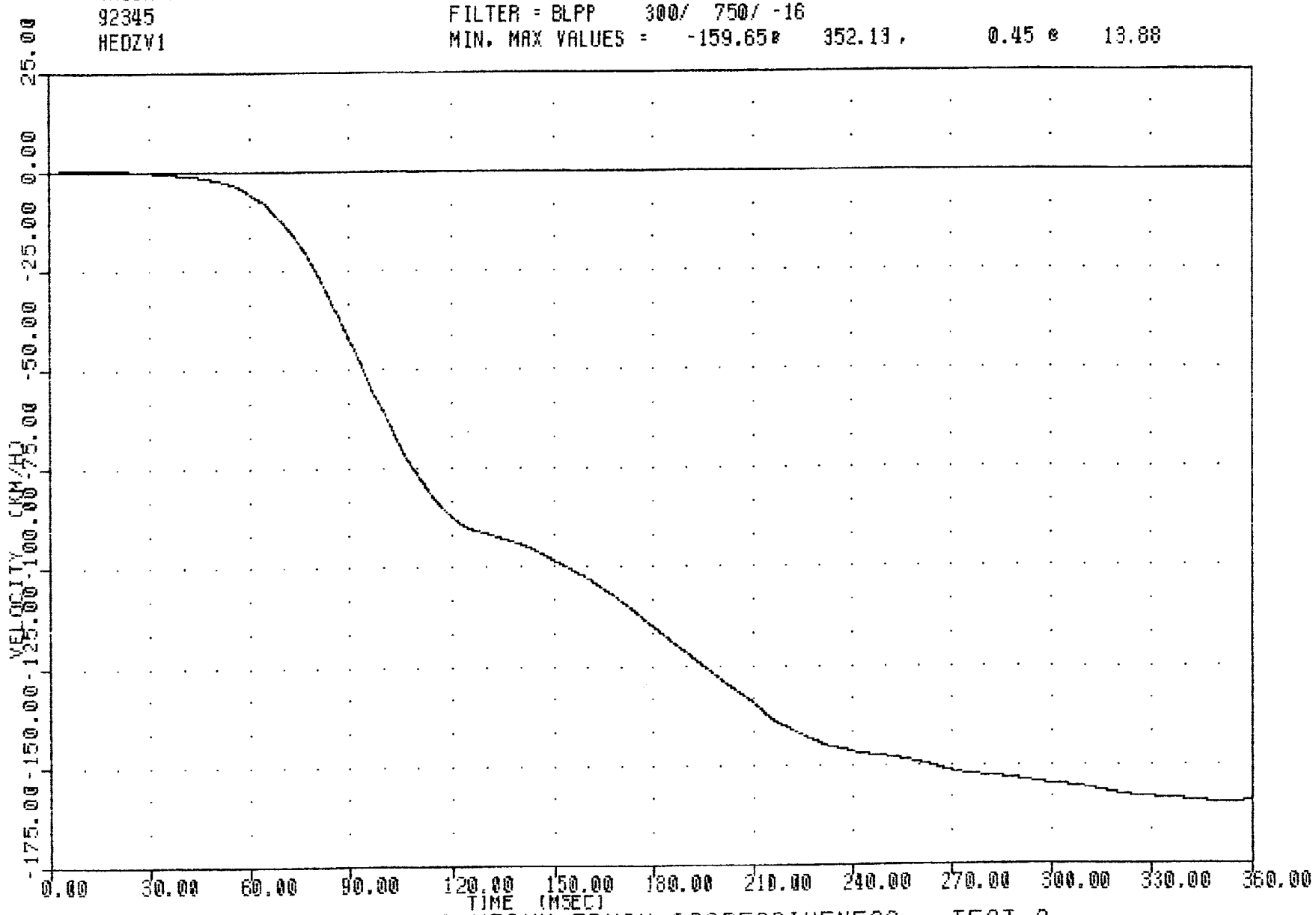
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

DRIVER HEAD Y-AXIS VELOCITY

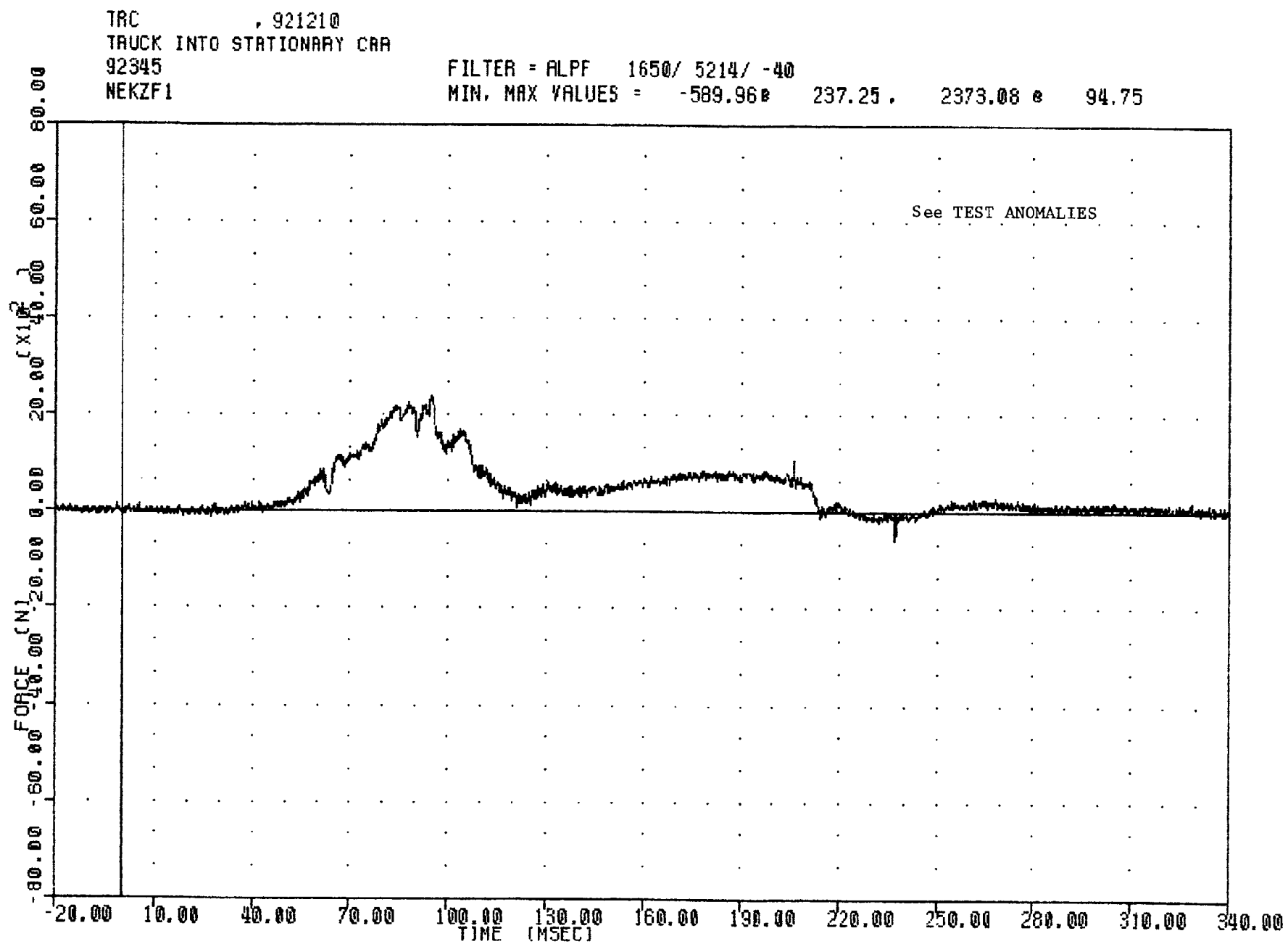


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

DRIVER NECK X-AXIS SHEAR FORCE



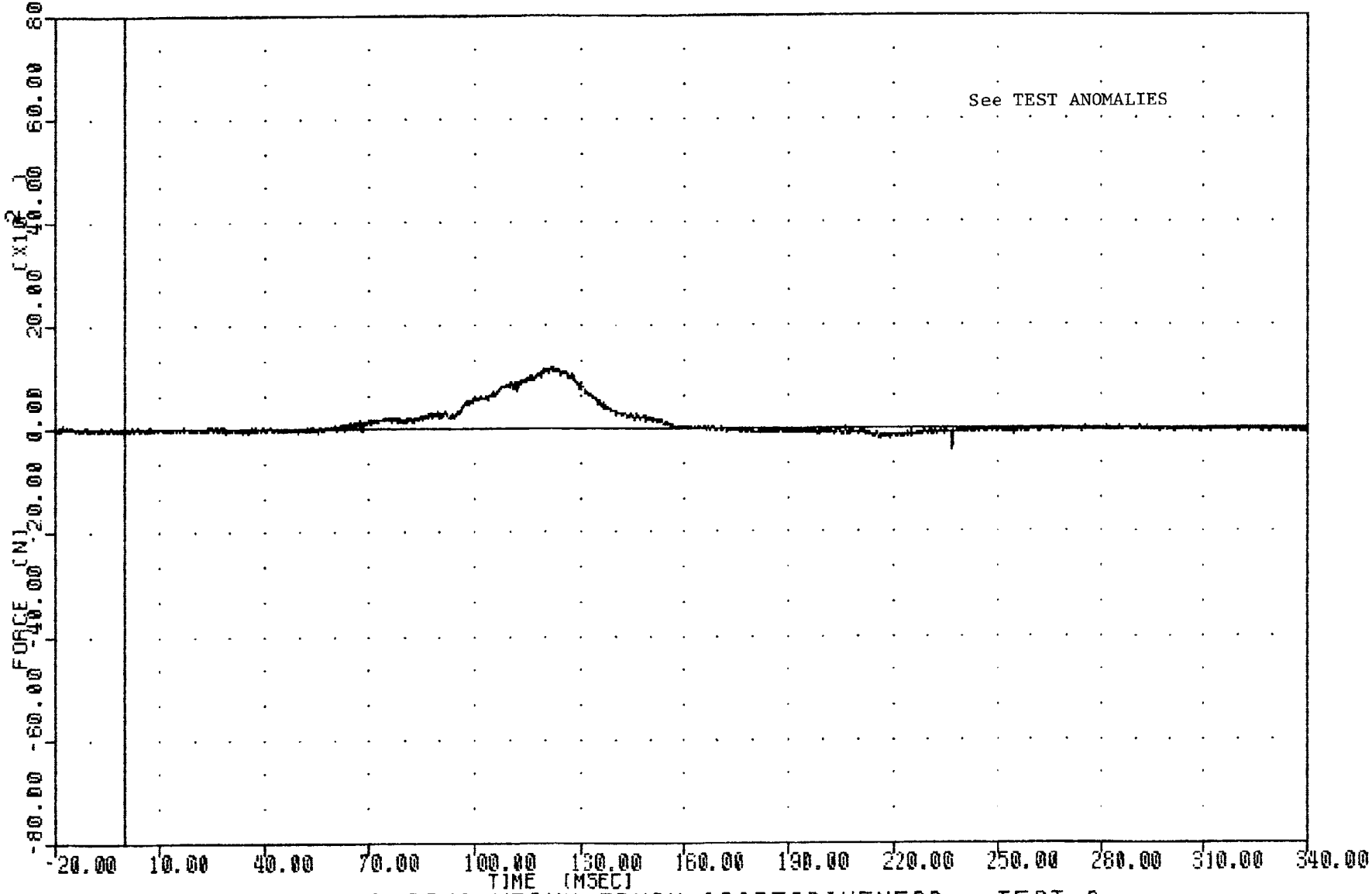
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER HEAD Z-AXIS VELOCITY



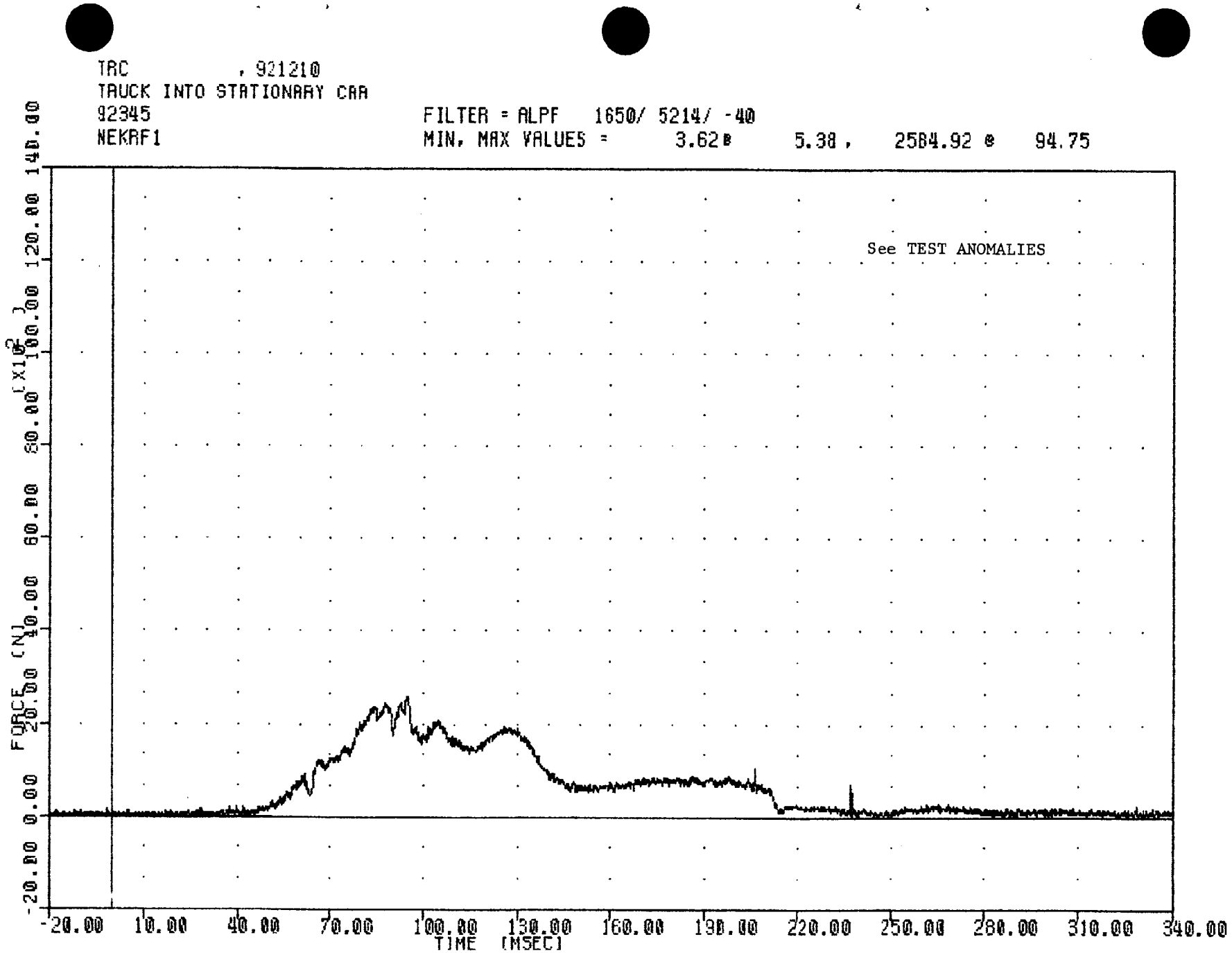
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK Z-AXIS AXIAL FORCE

TRC , 921210
TRUCK INTO STATIONARY CAR
92345
NEKYF1

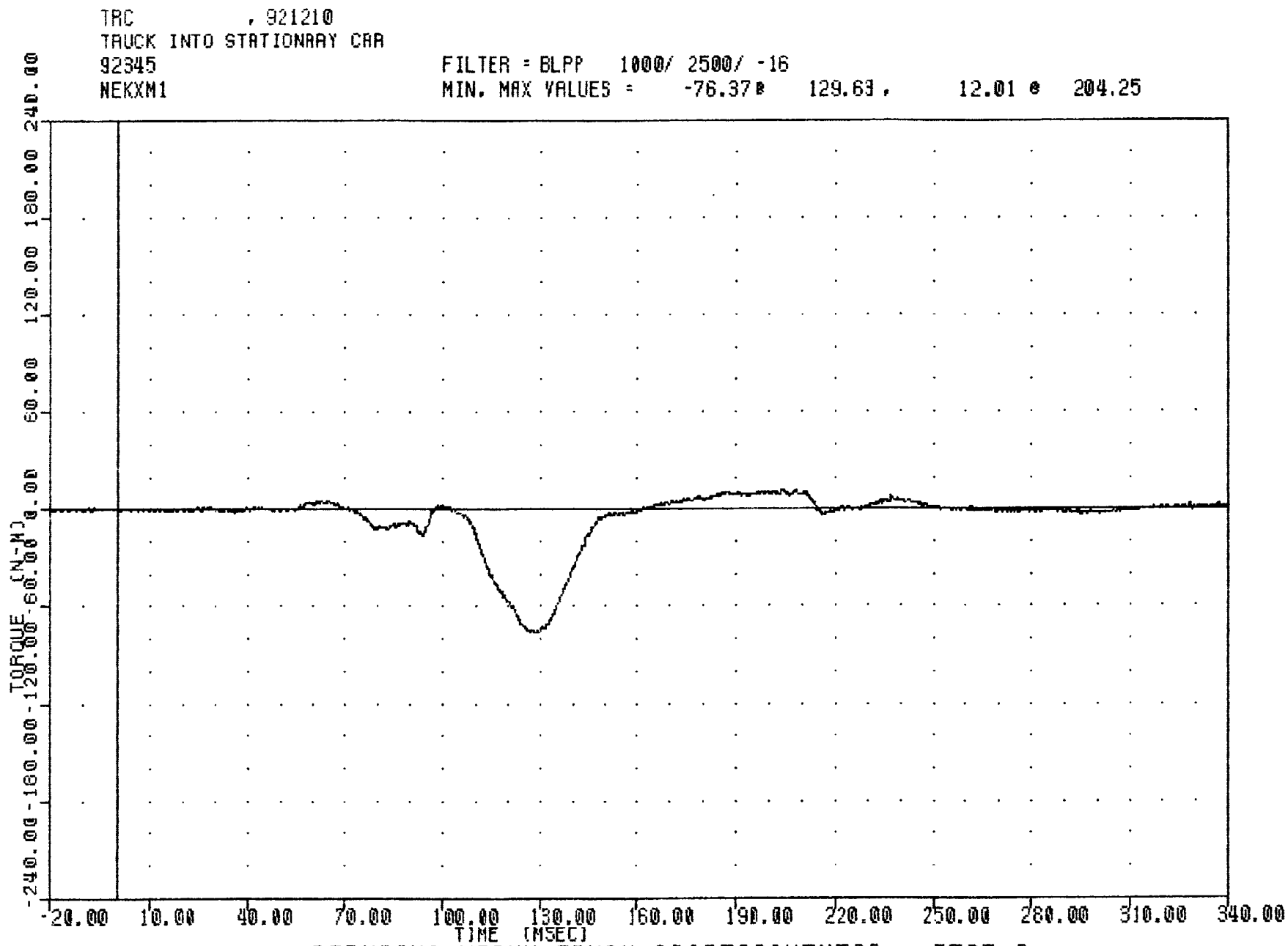
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -415.79@ 237.25, 1198.95 @ 121.75



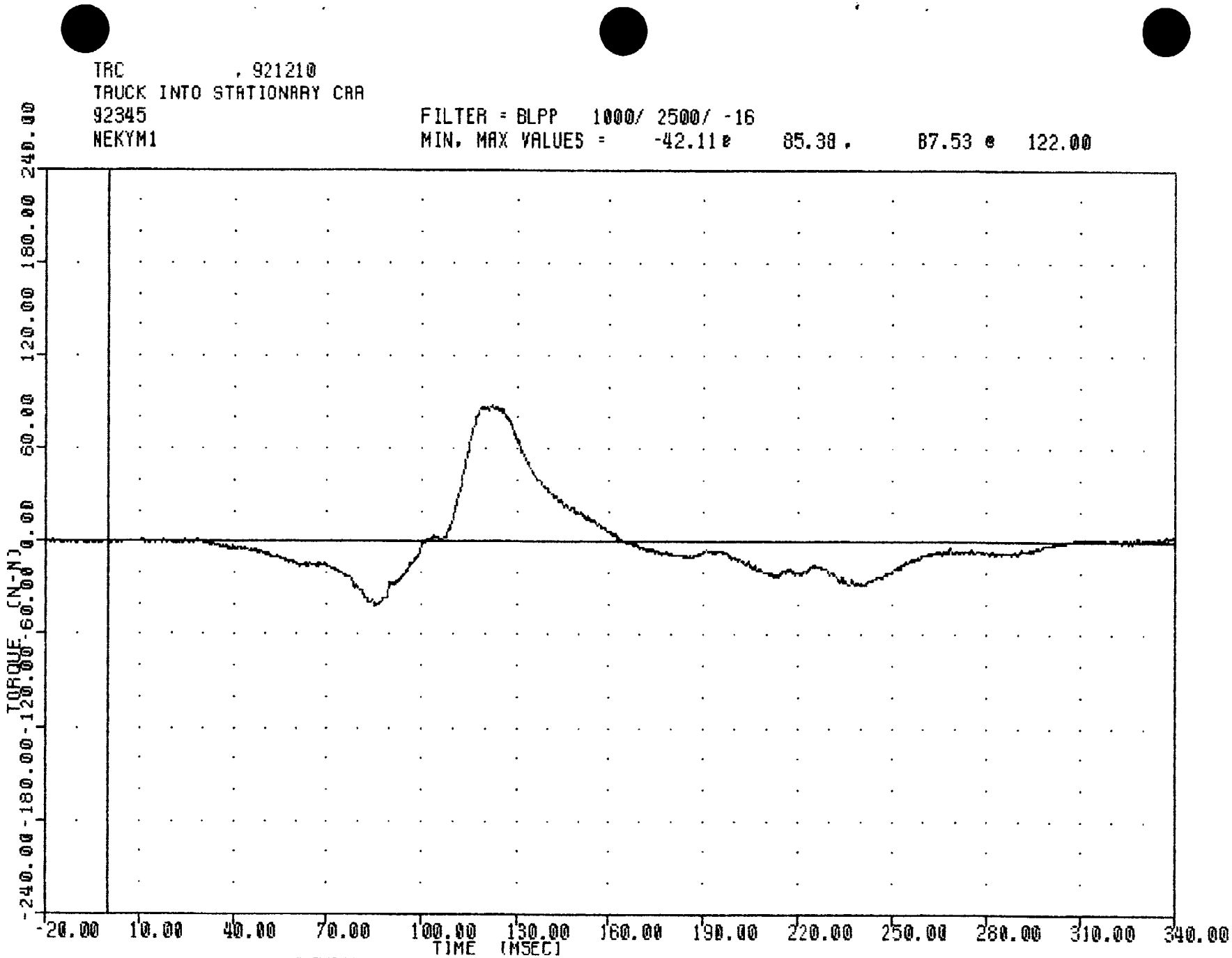
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK Y-AXIS SHEAR FORCE



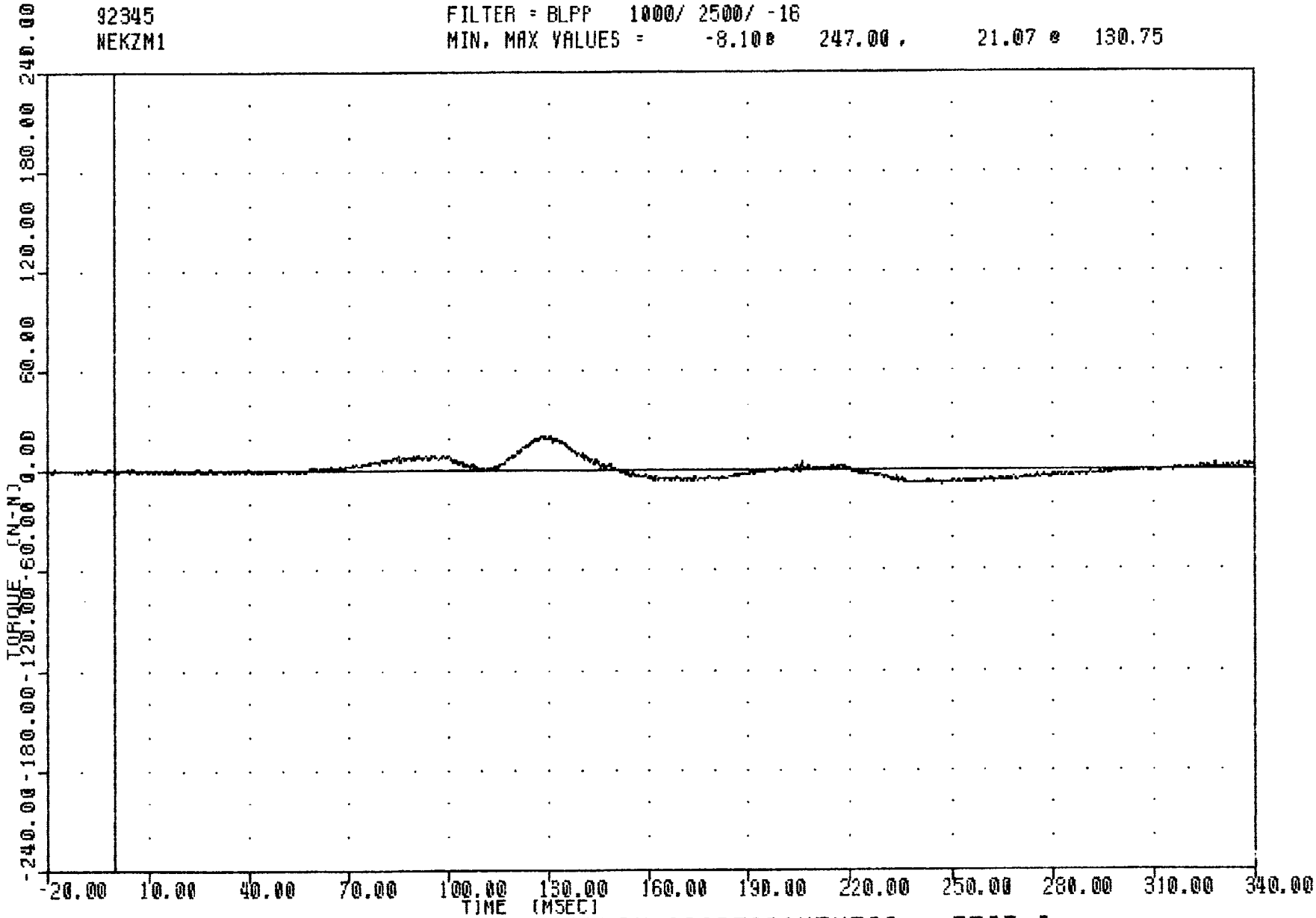
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK RESULTANT FORCE



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK MOMENT ABOUT X AXIS

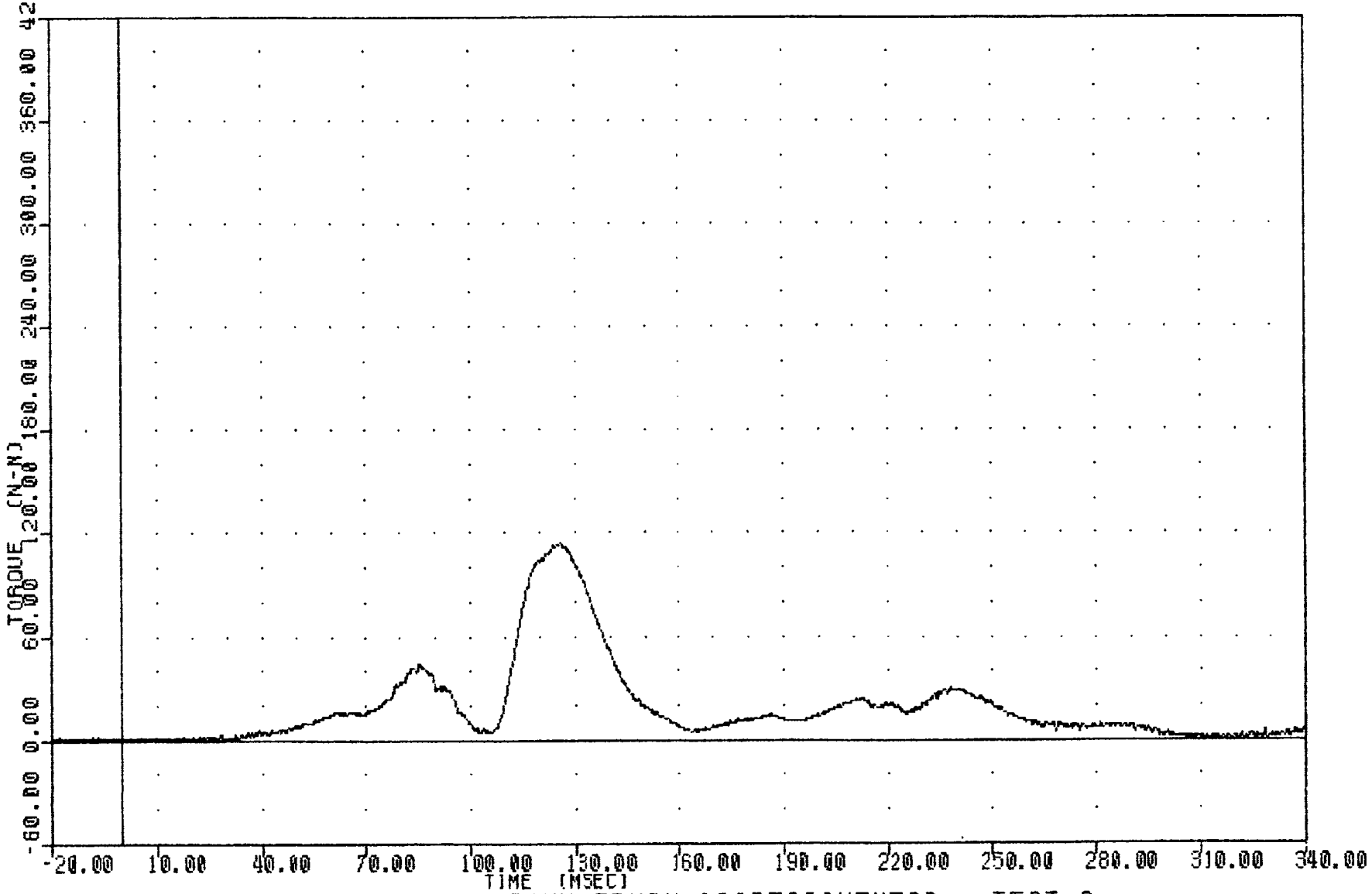


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK MOMENT ABOUT Y AXIS

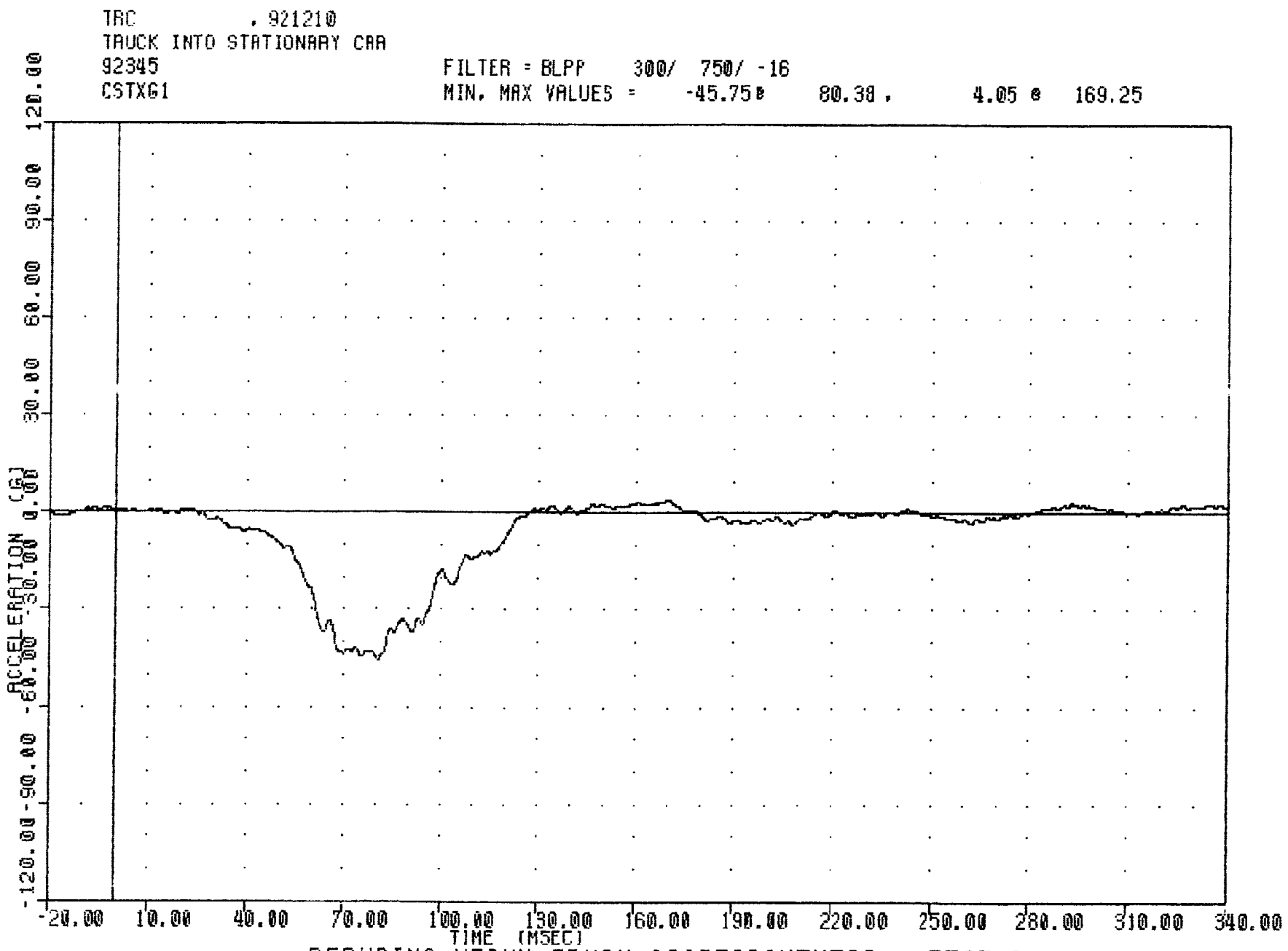


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK MOMENT ABOUT Z AXIS

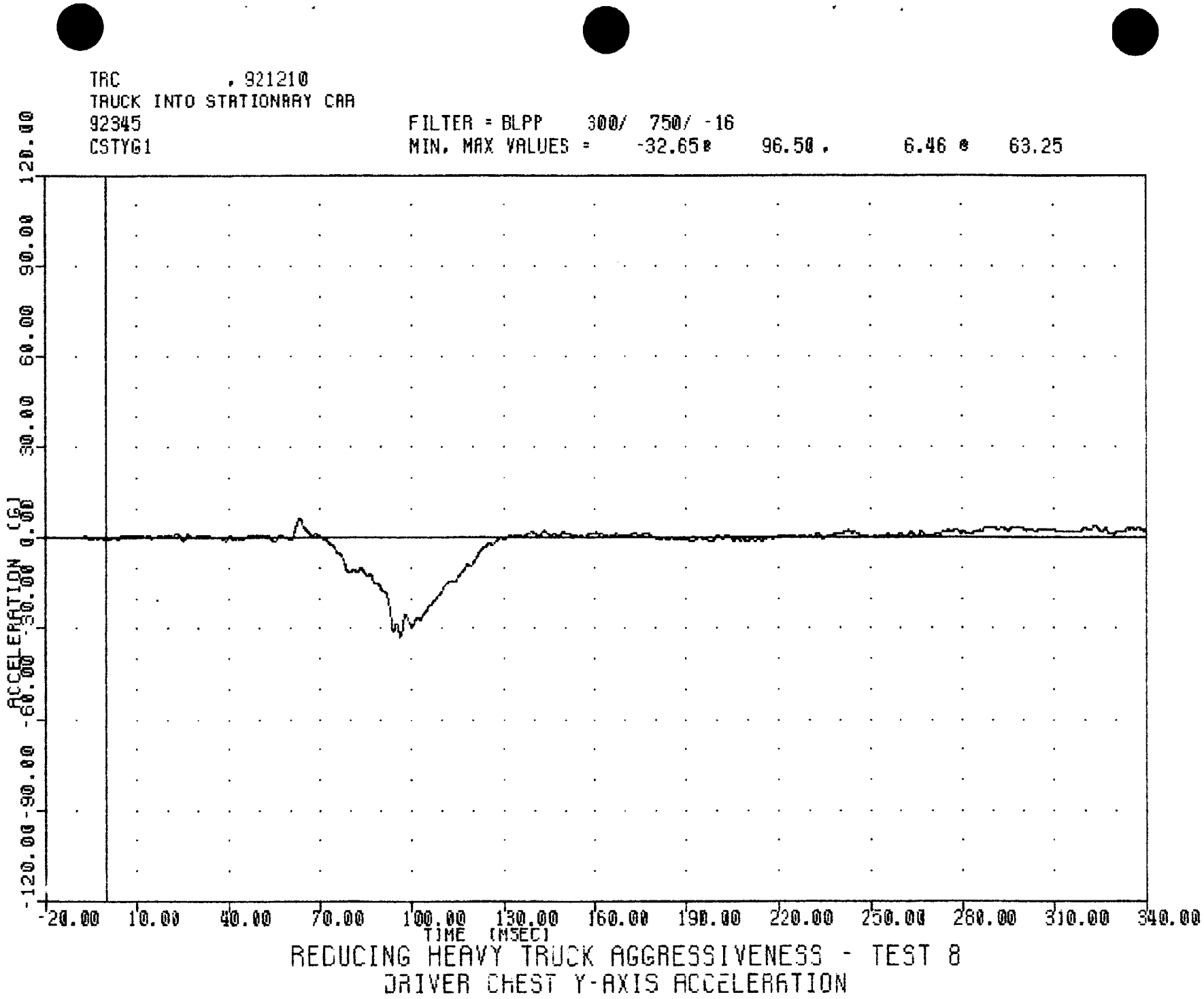
TRC , 921210
TRUCK INTO STATIONARY CAR
92345
NEKRM1
FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = 0.07 @ -10.75 , 114.62 @ 125.88



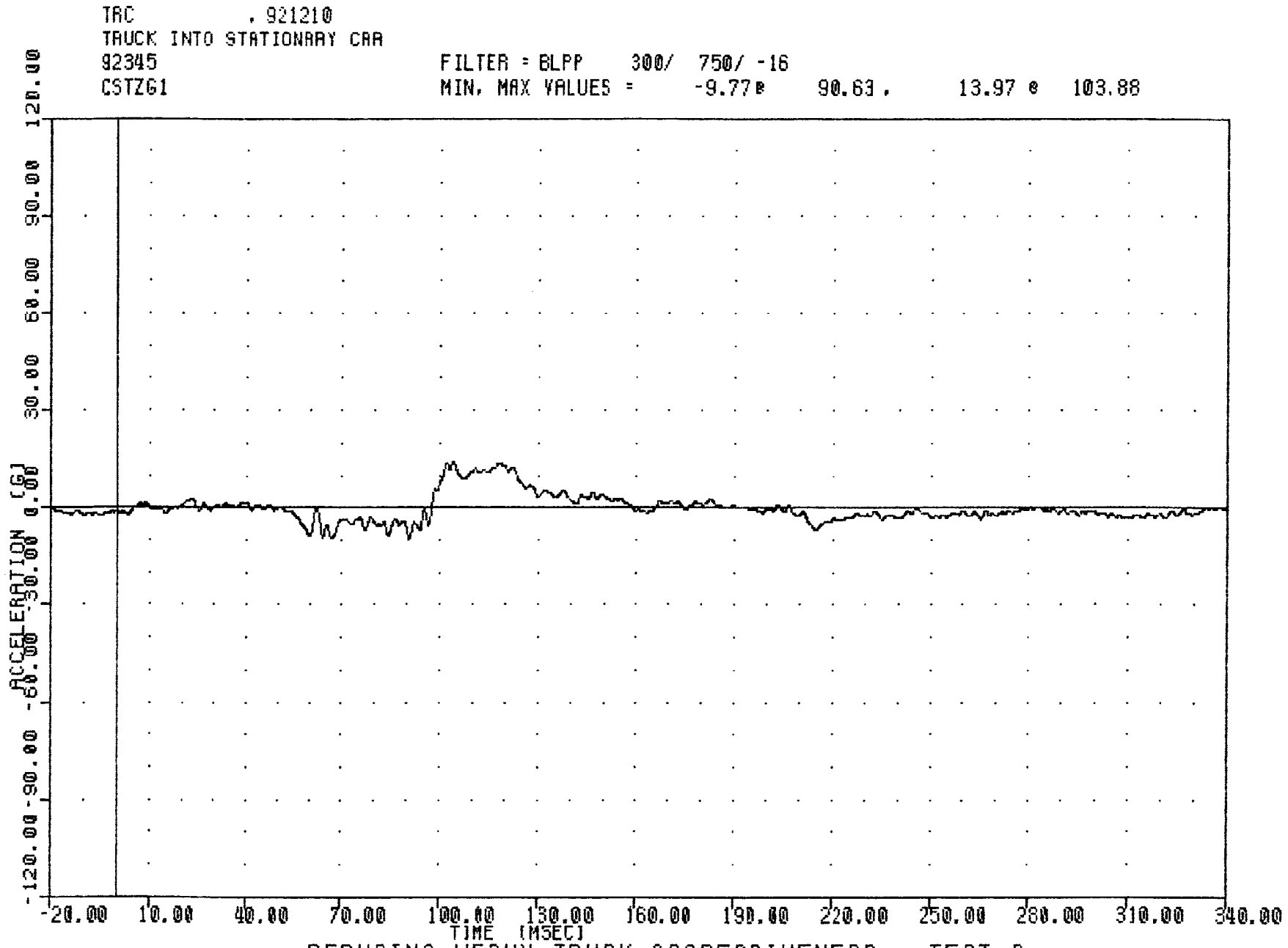
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER NECK MOMENT RESULTANT



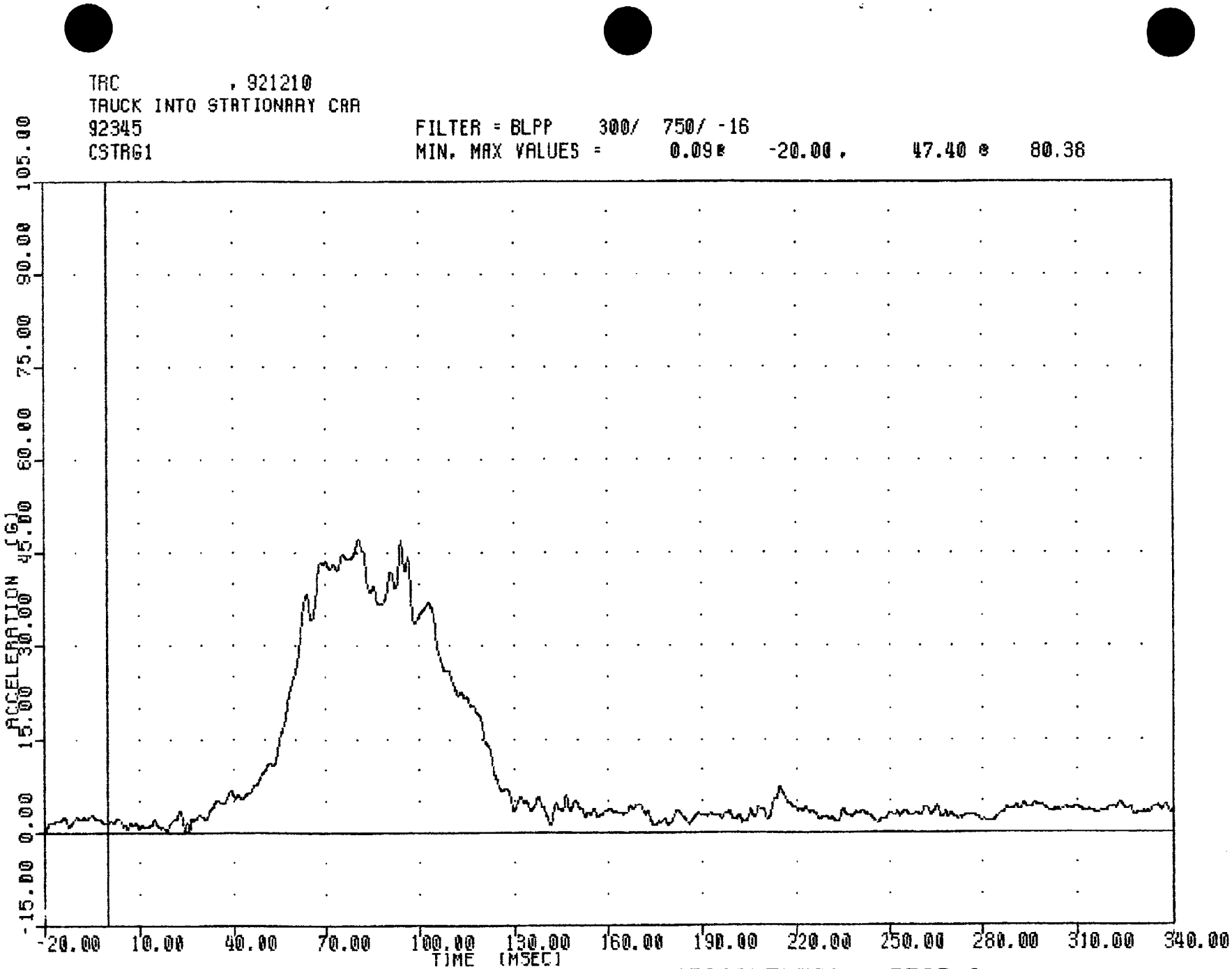
RECUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST X-AXIS ACCELERATION



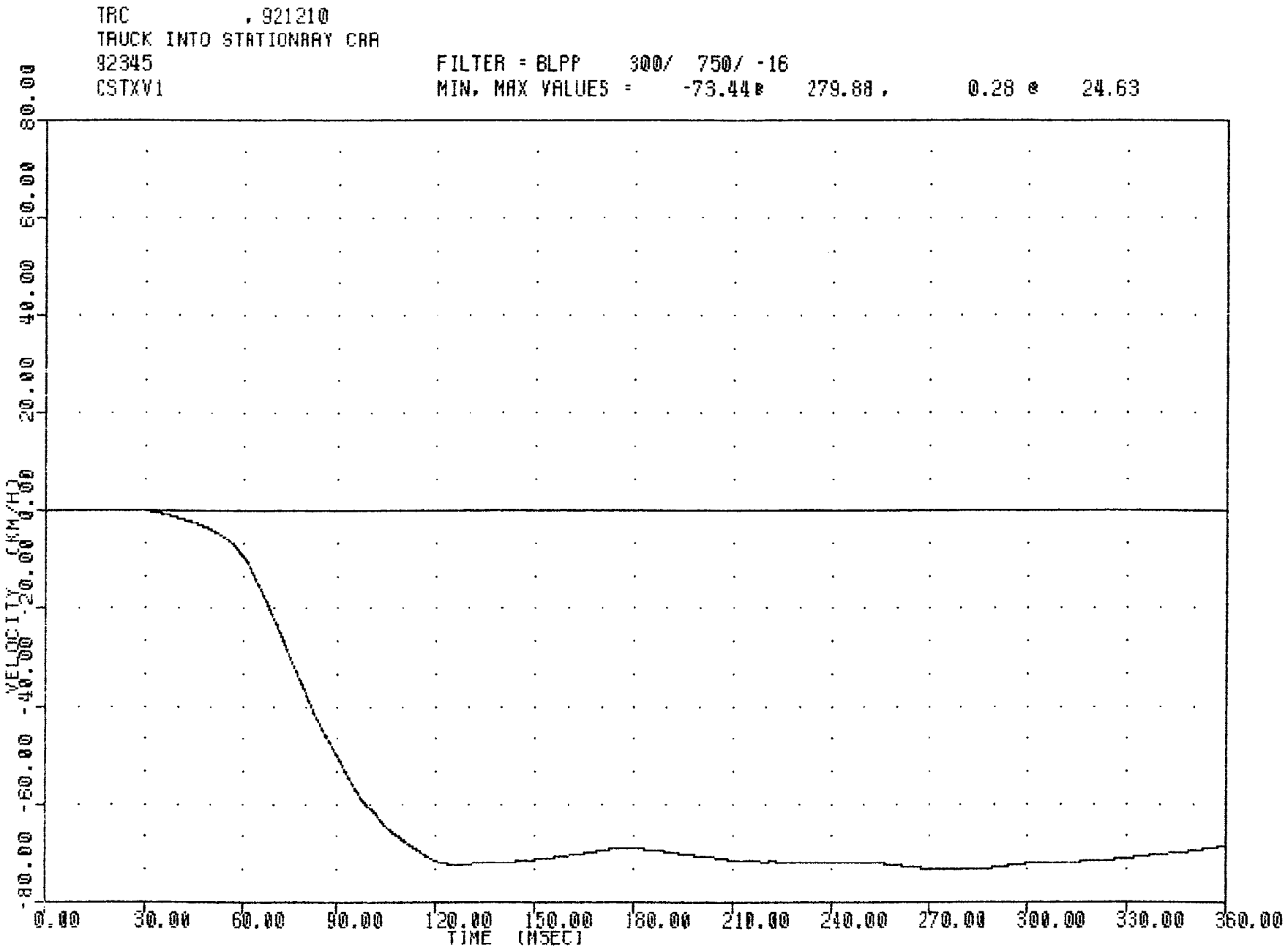
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST Y-AXIS ACCELERATION



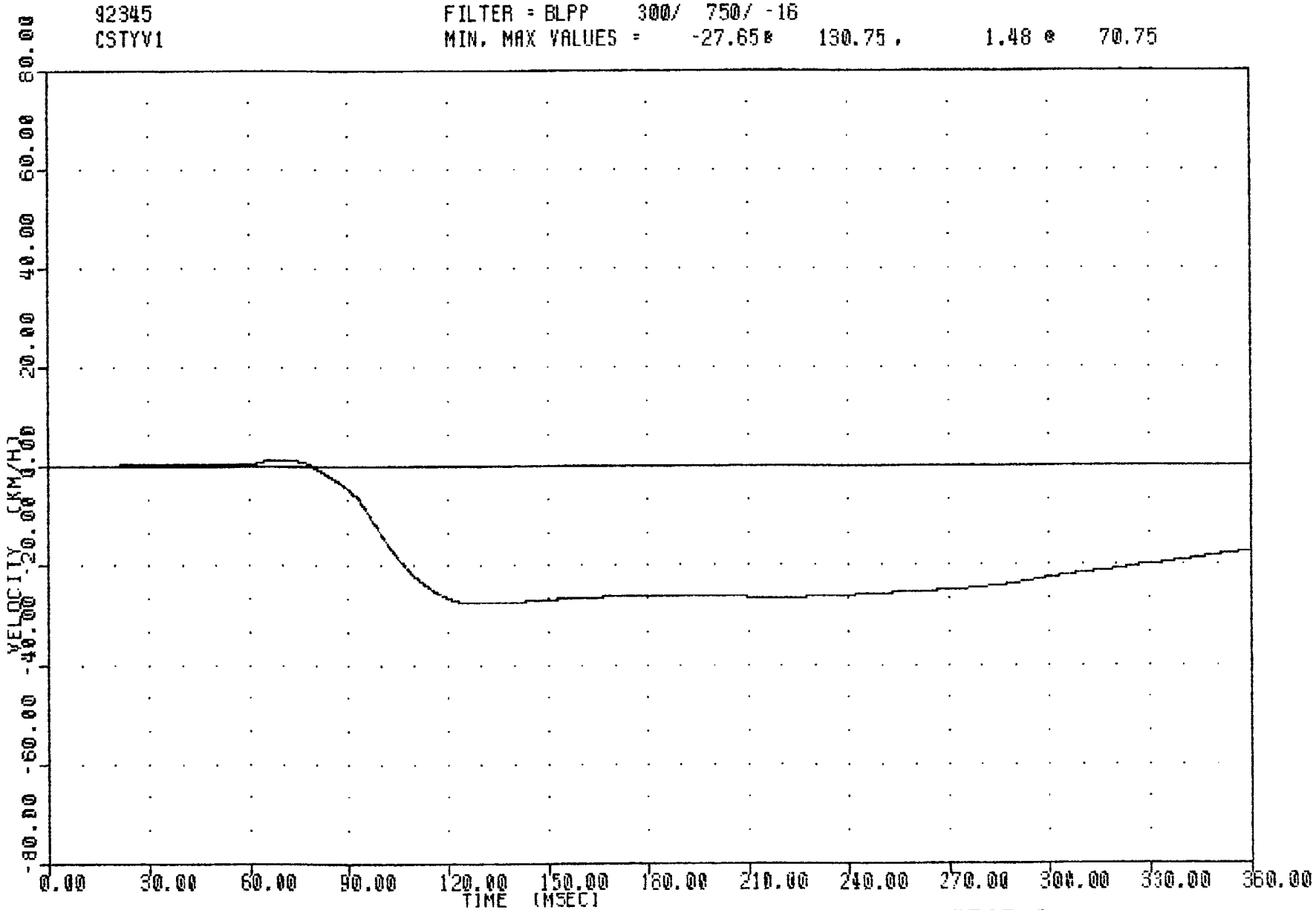
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST Z-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST RESULTANT ACCELERATION

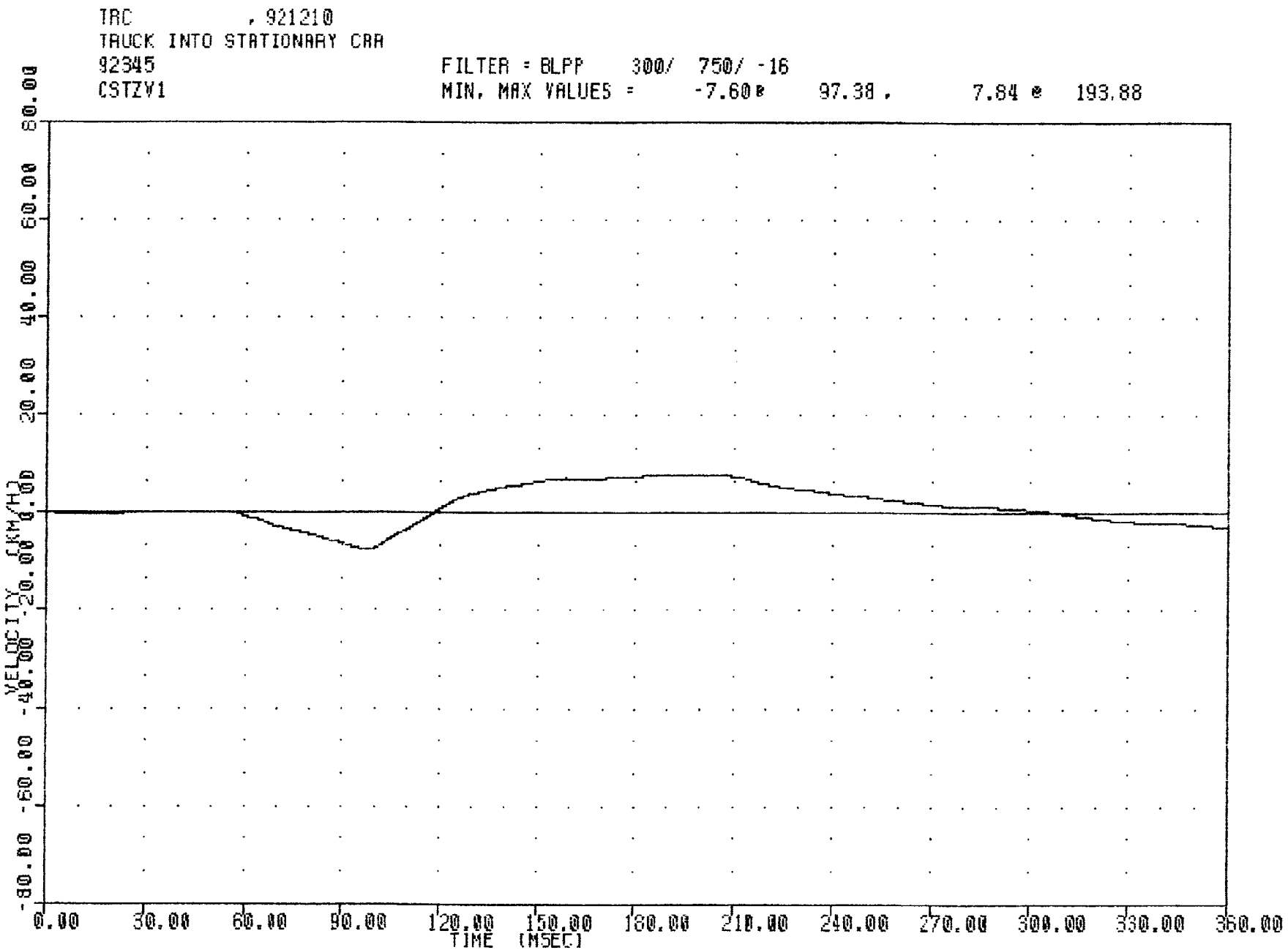


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST X-AXIS VELOCITY



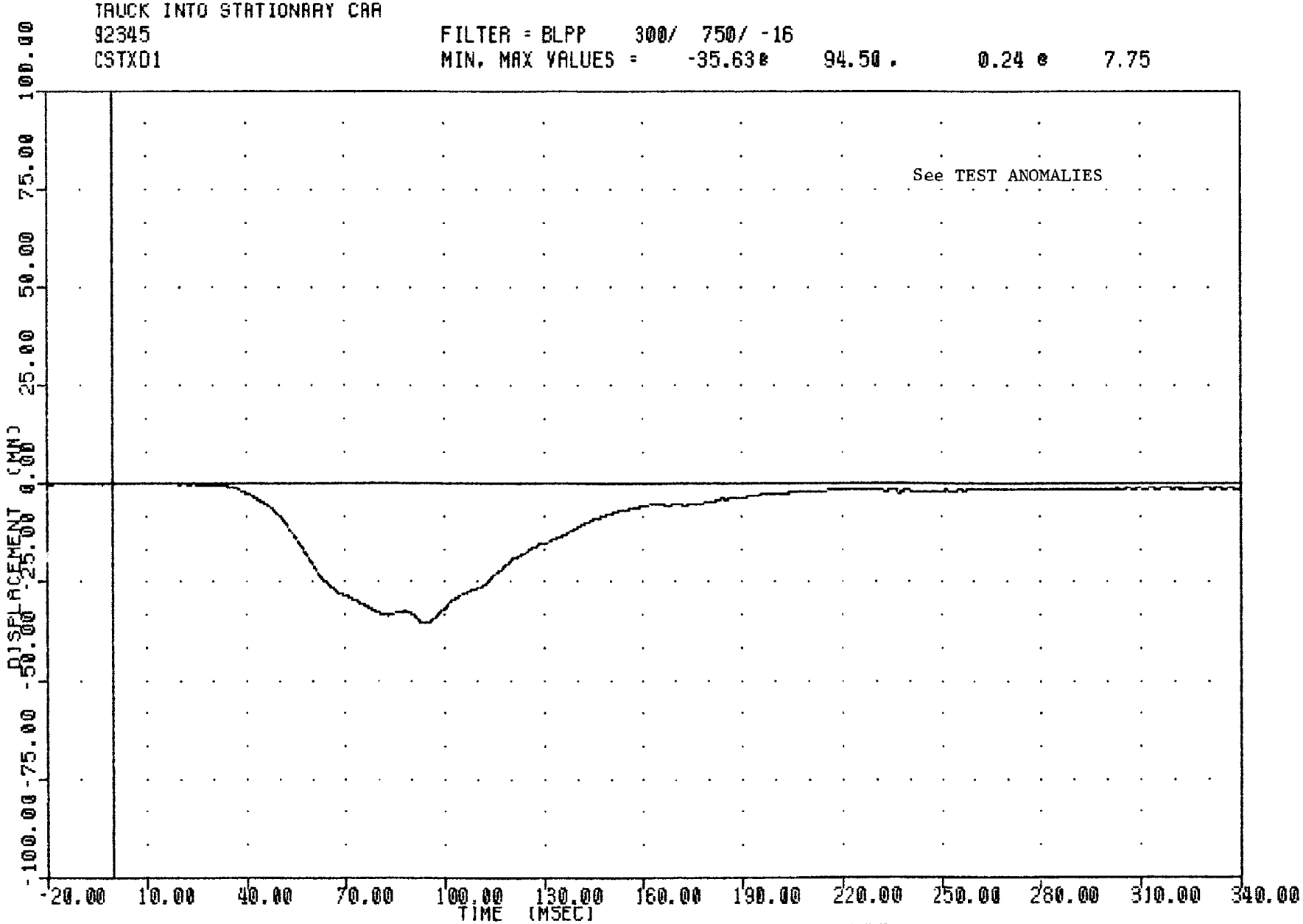
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

DRIVER CHEST Y-AXIS VELOCITY

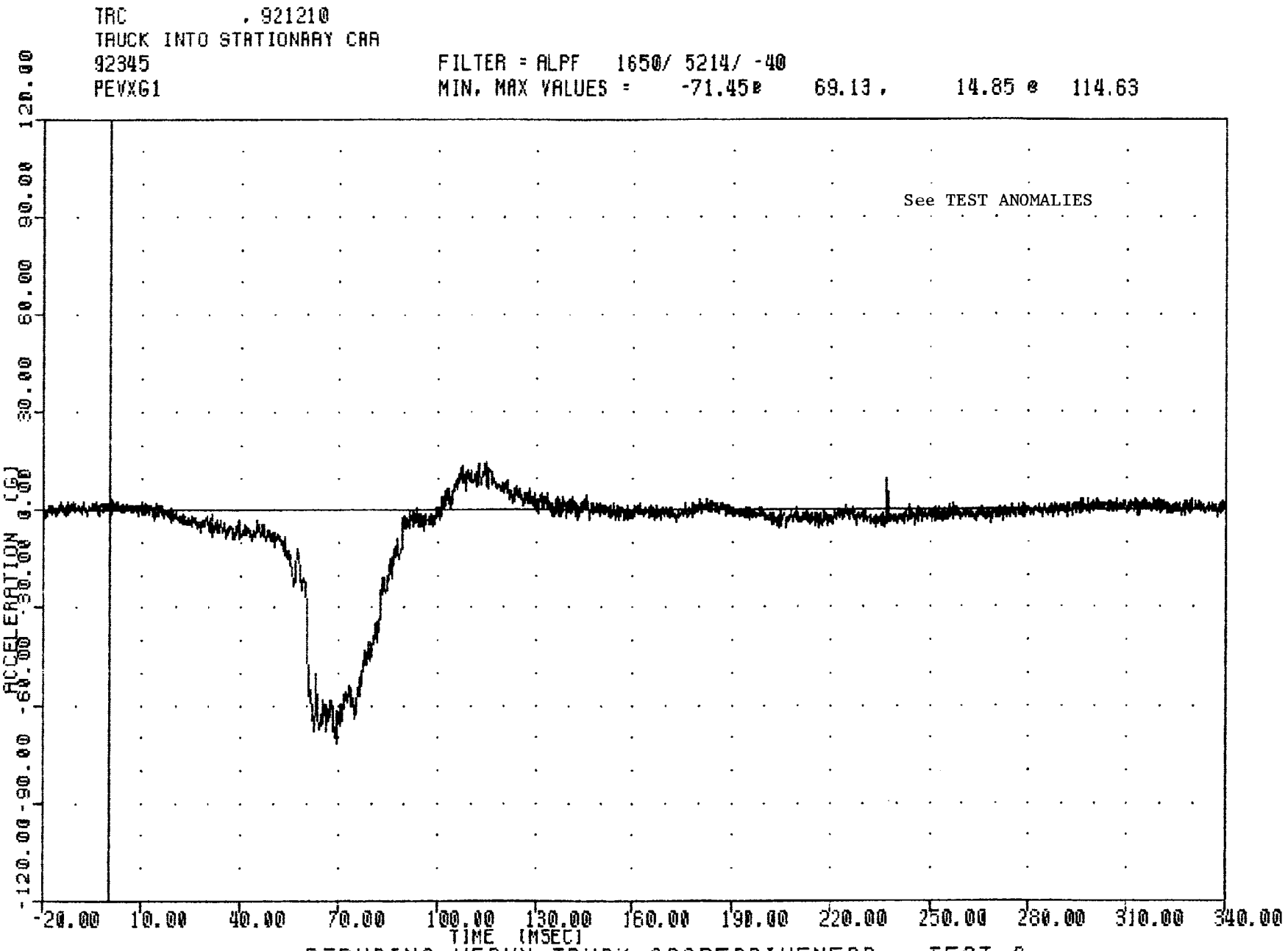


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

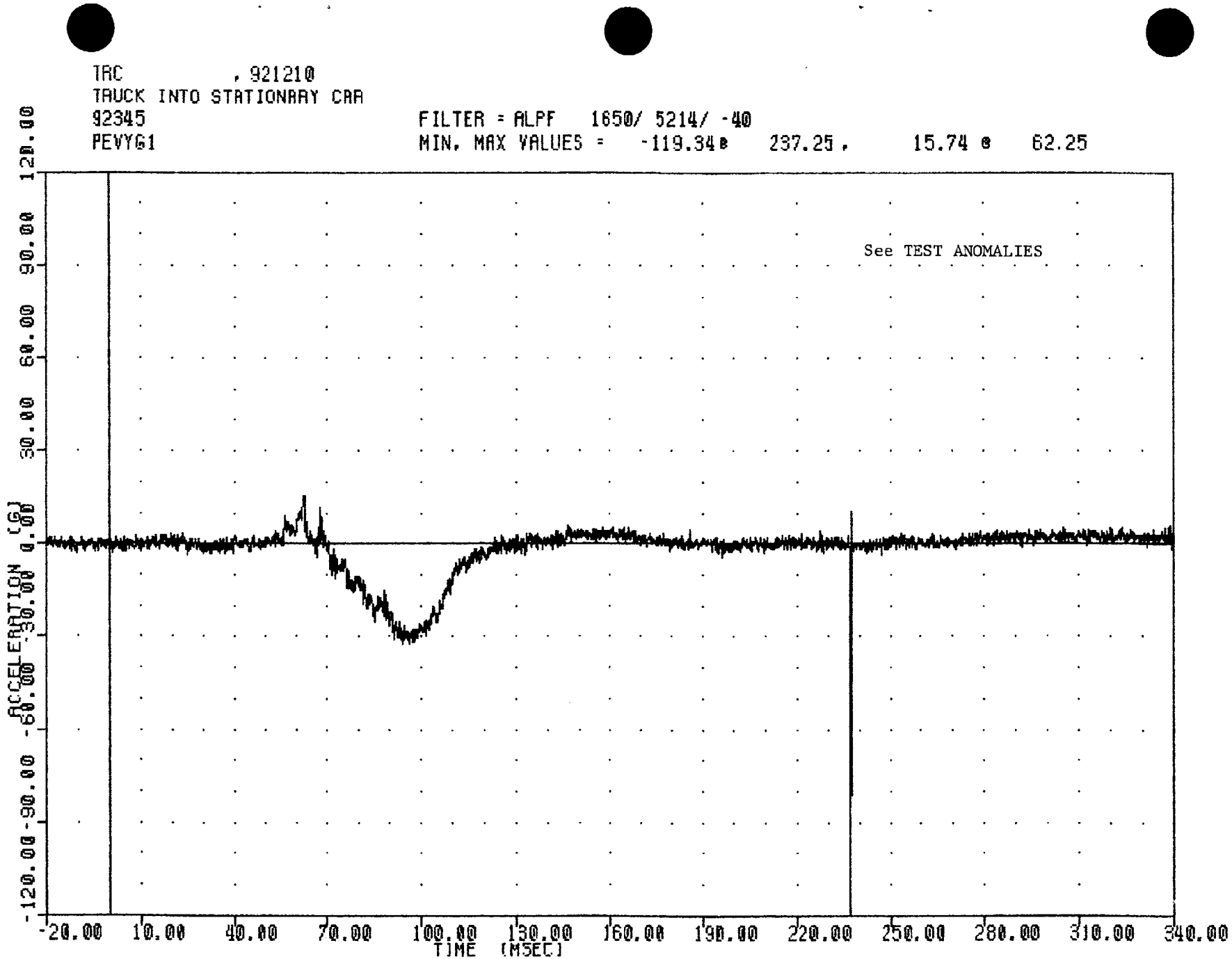
DRIVER CHEST Z-AXIS VELOCITY



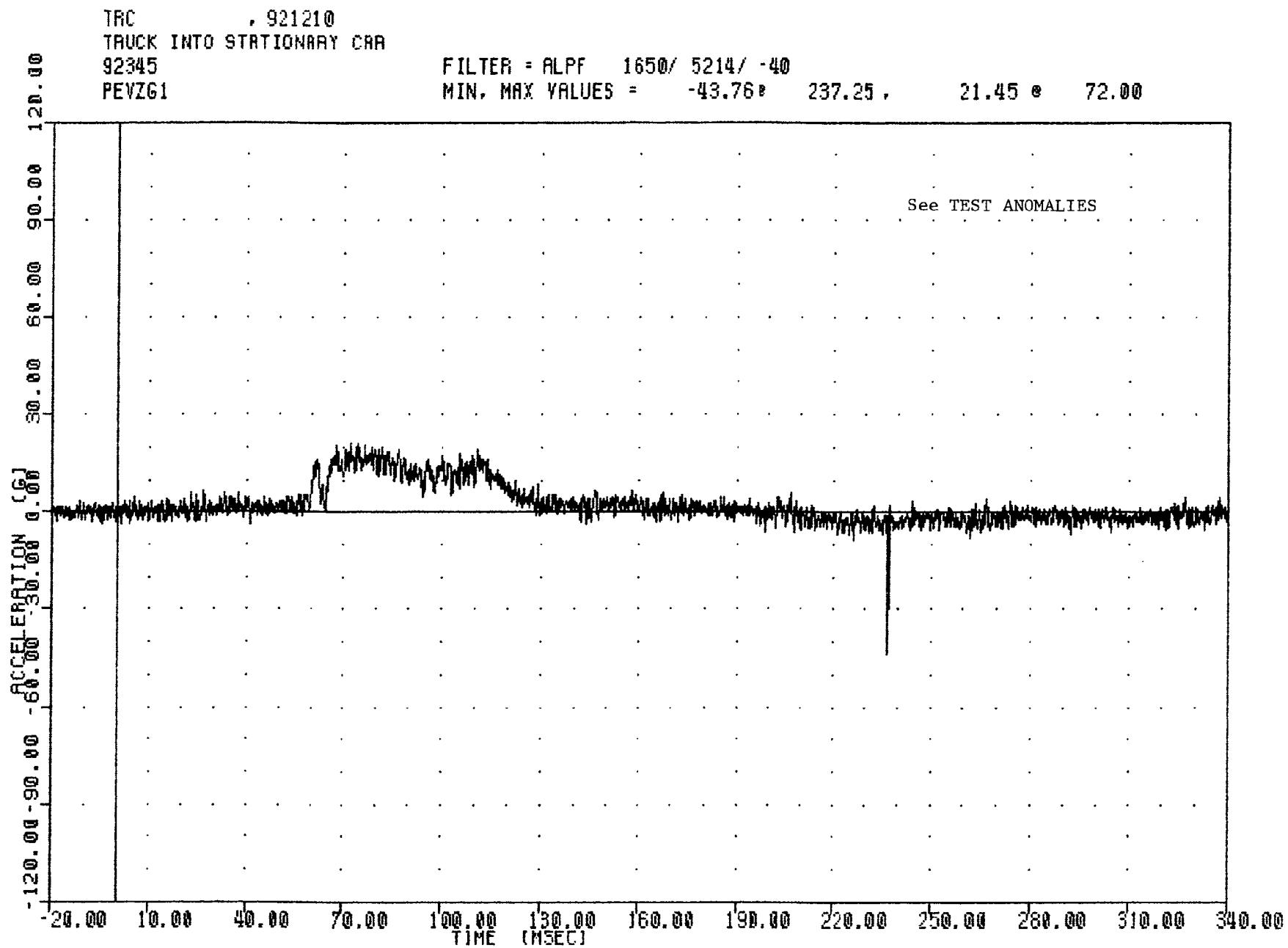
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER CHEST DEFLECTION



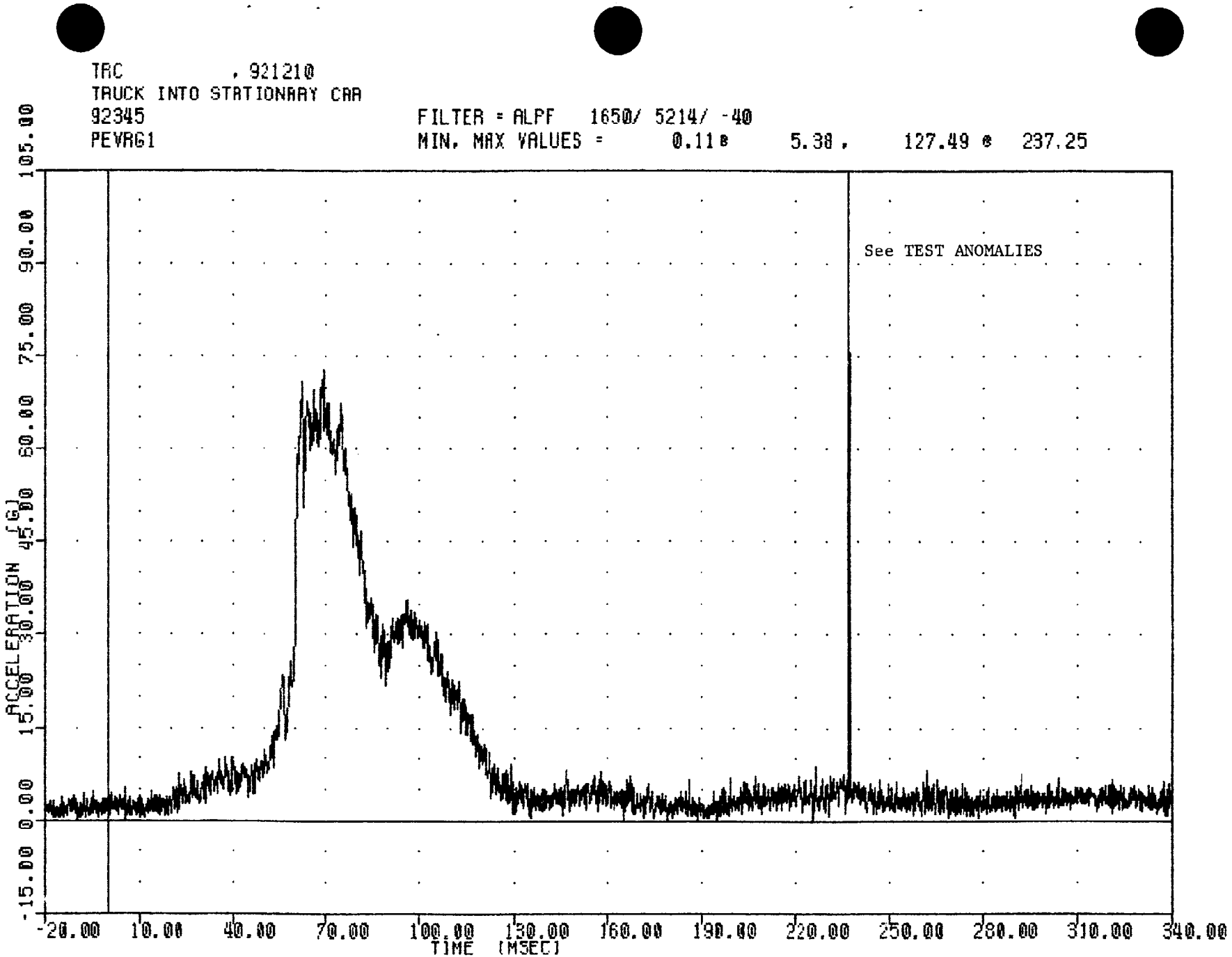
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS X-AXIS ACCELERATION



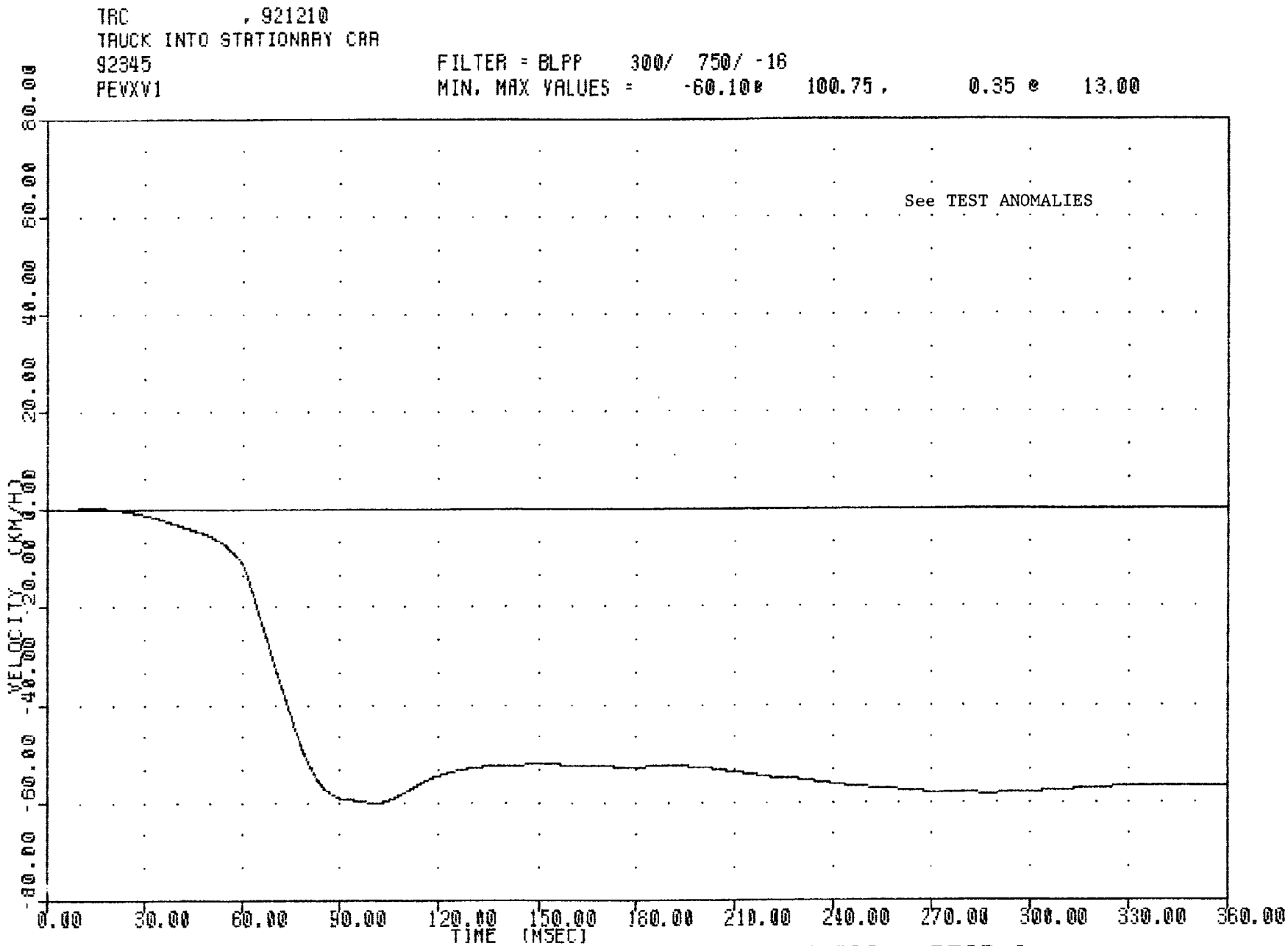
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS Y-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS Z-AXIS ACCELERATION



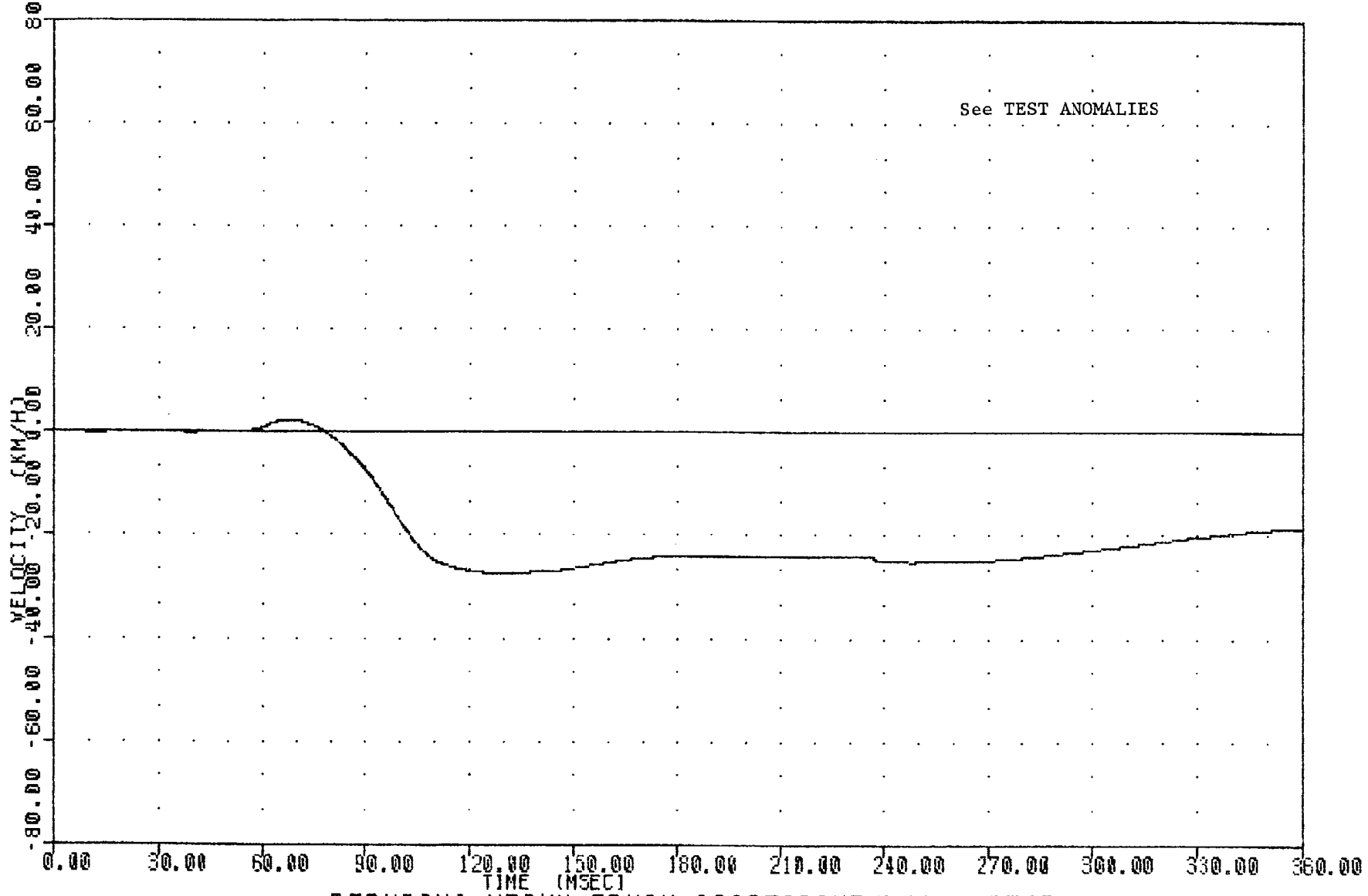
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS RESULTANT ACCELERATION



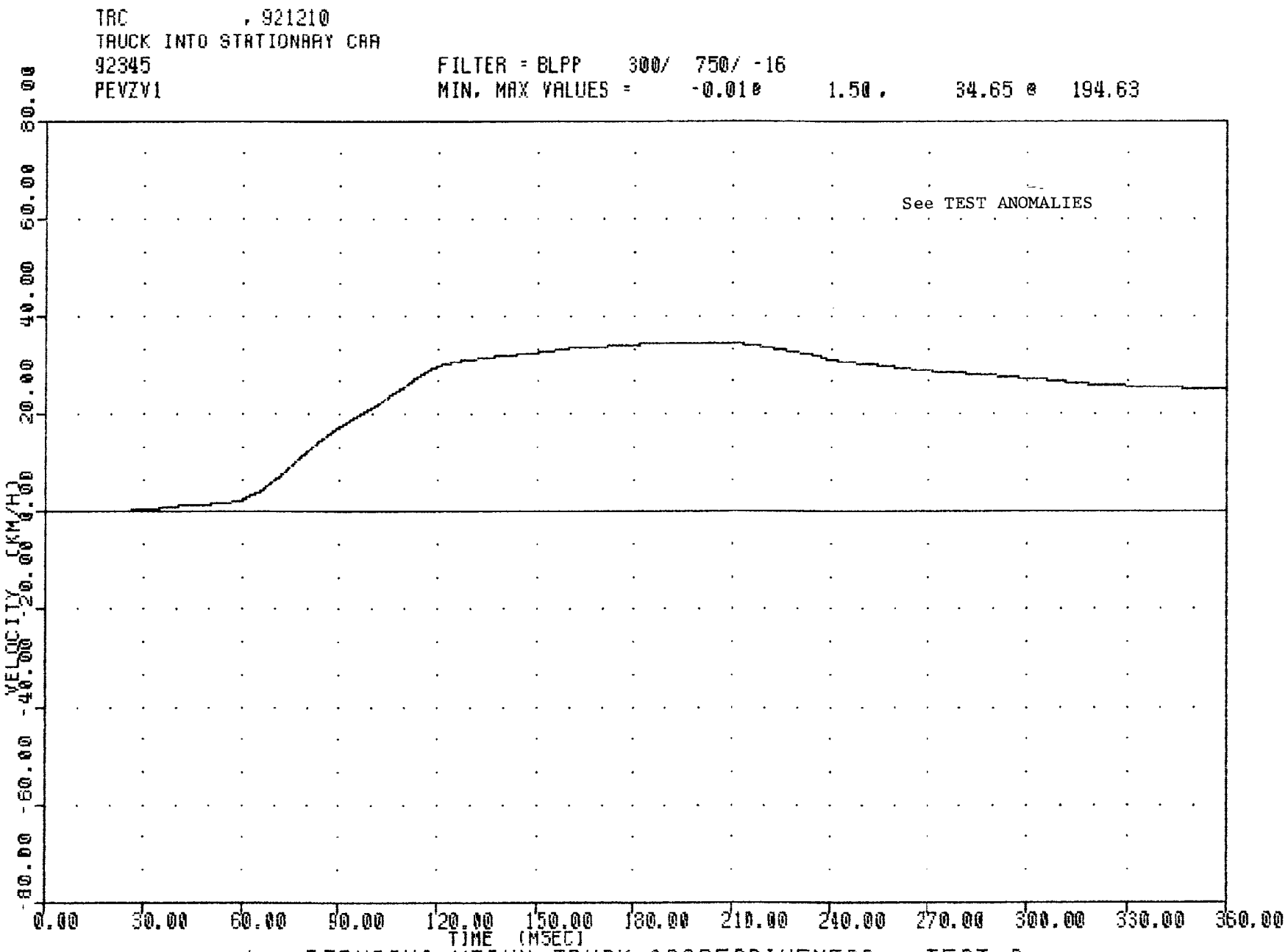
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS X-AXIS VELOCITY

TRC , 921210
TRUCK INTO STATIONARY CAR
92345
PEVYV1

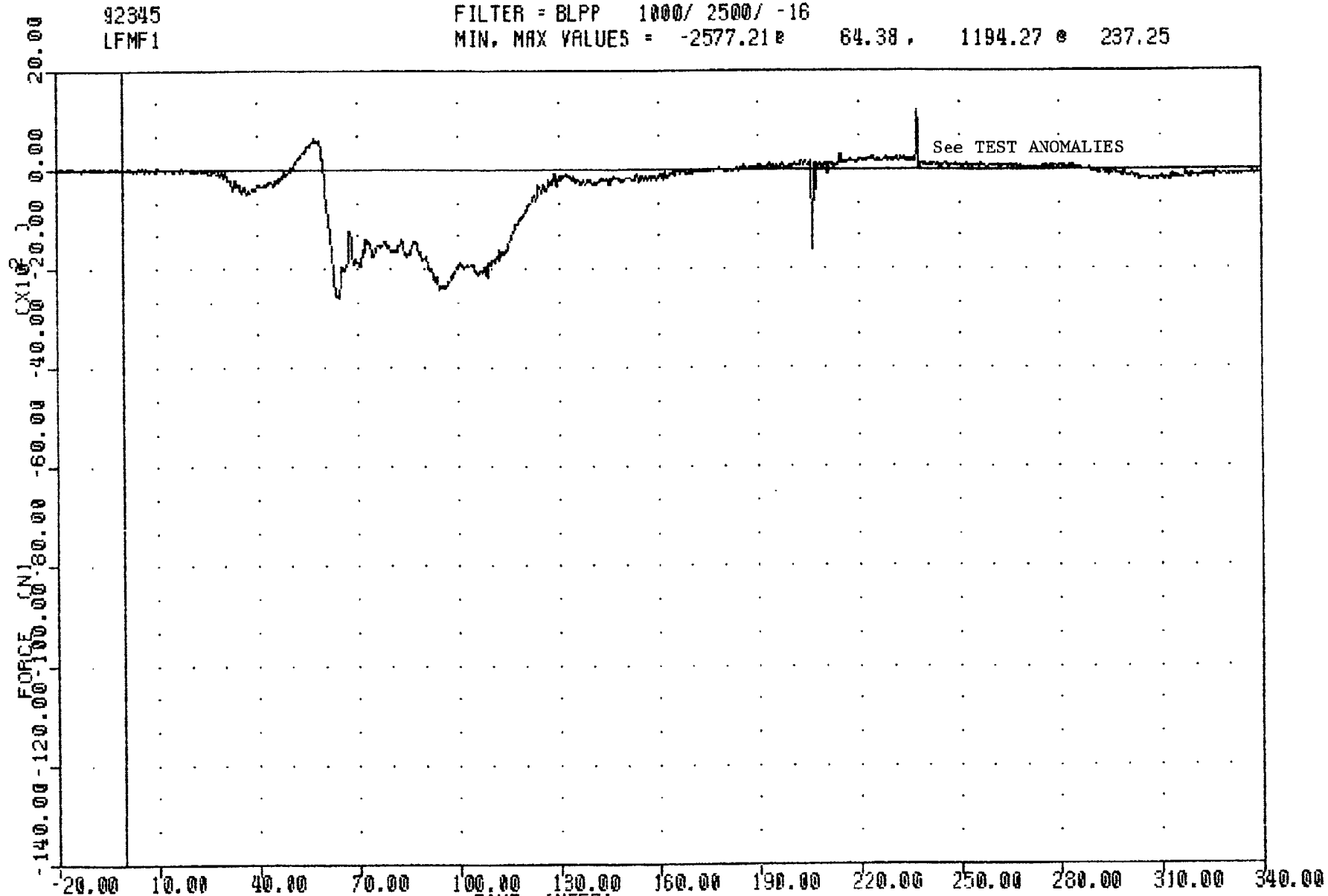
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -27.41 @ 133.00 , 2.29 @ 69.50



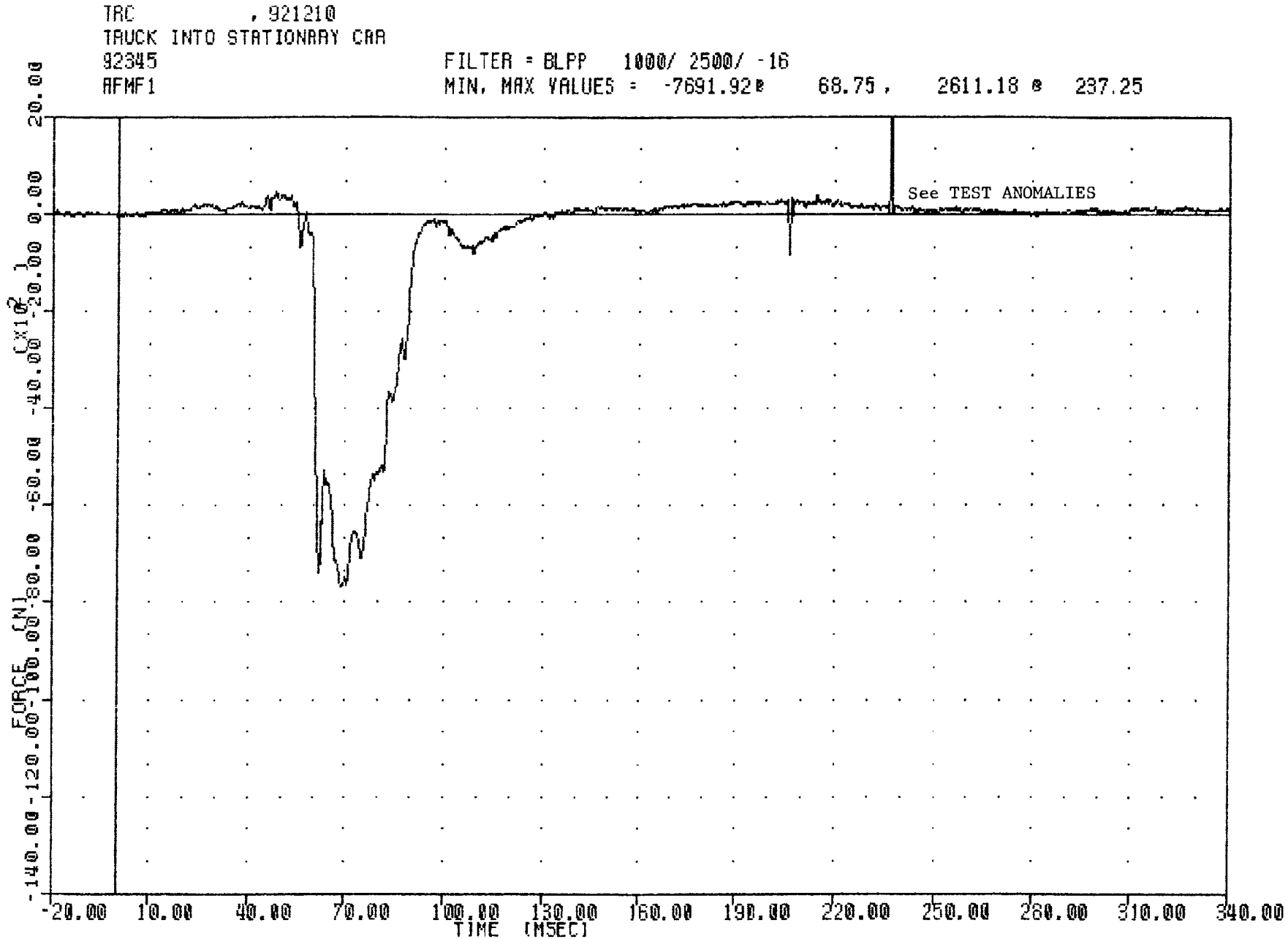
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS Y-AXIS VELOCITY



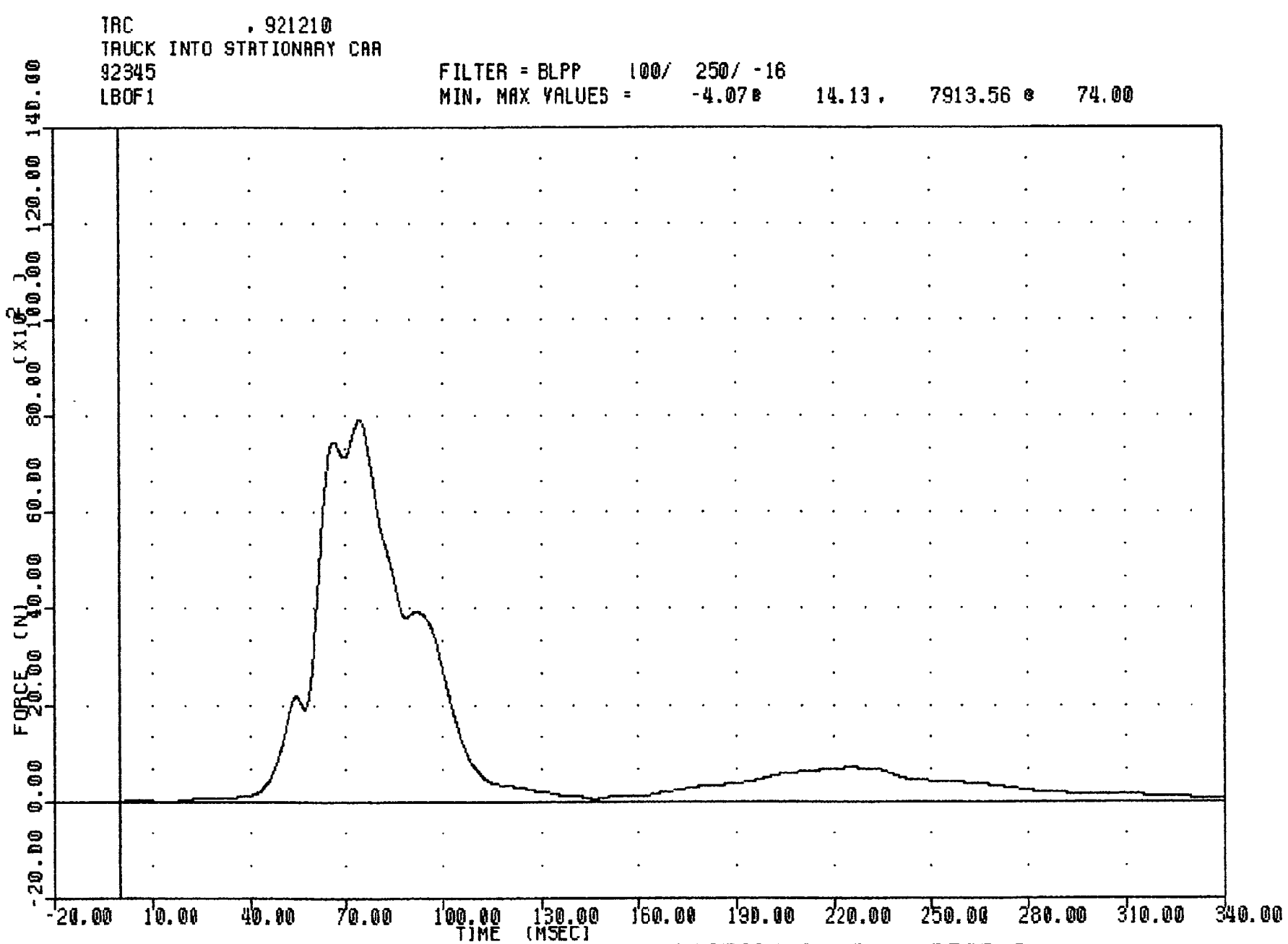
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER PELVIS Z-AXIS VELOCITY



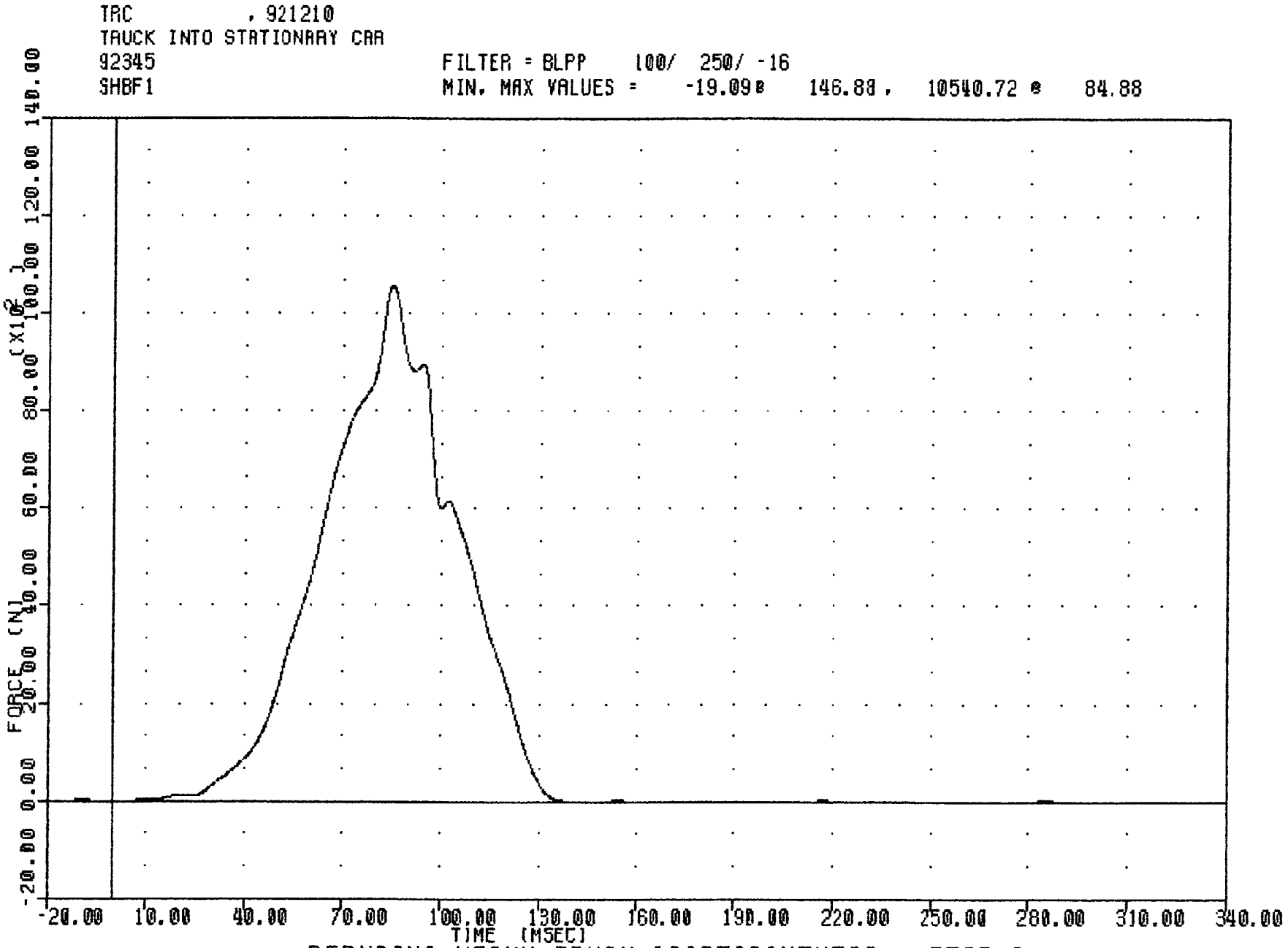
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER LEFT FEMUR FORCE



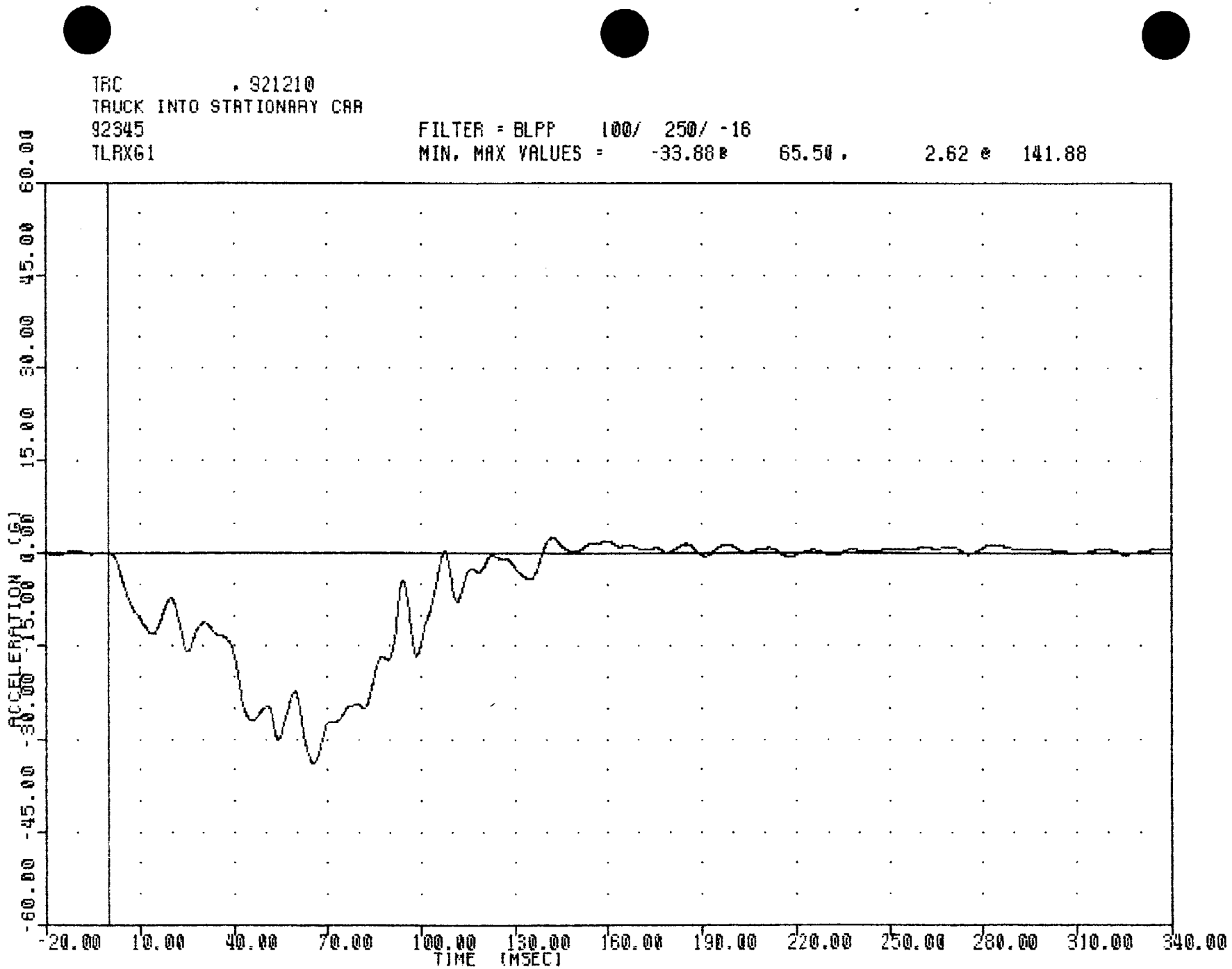
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER RIGHT FEMUR FORCE



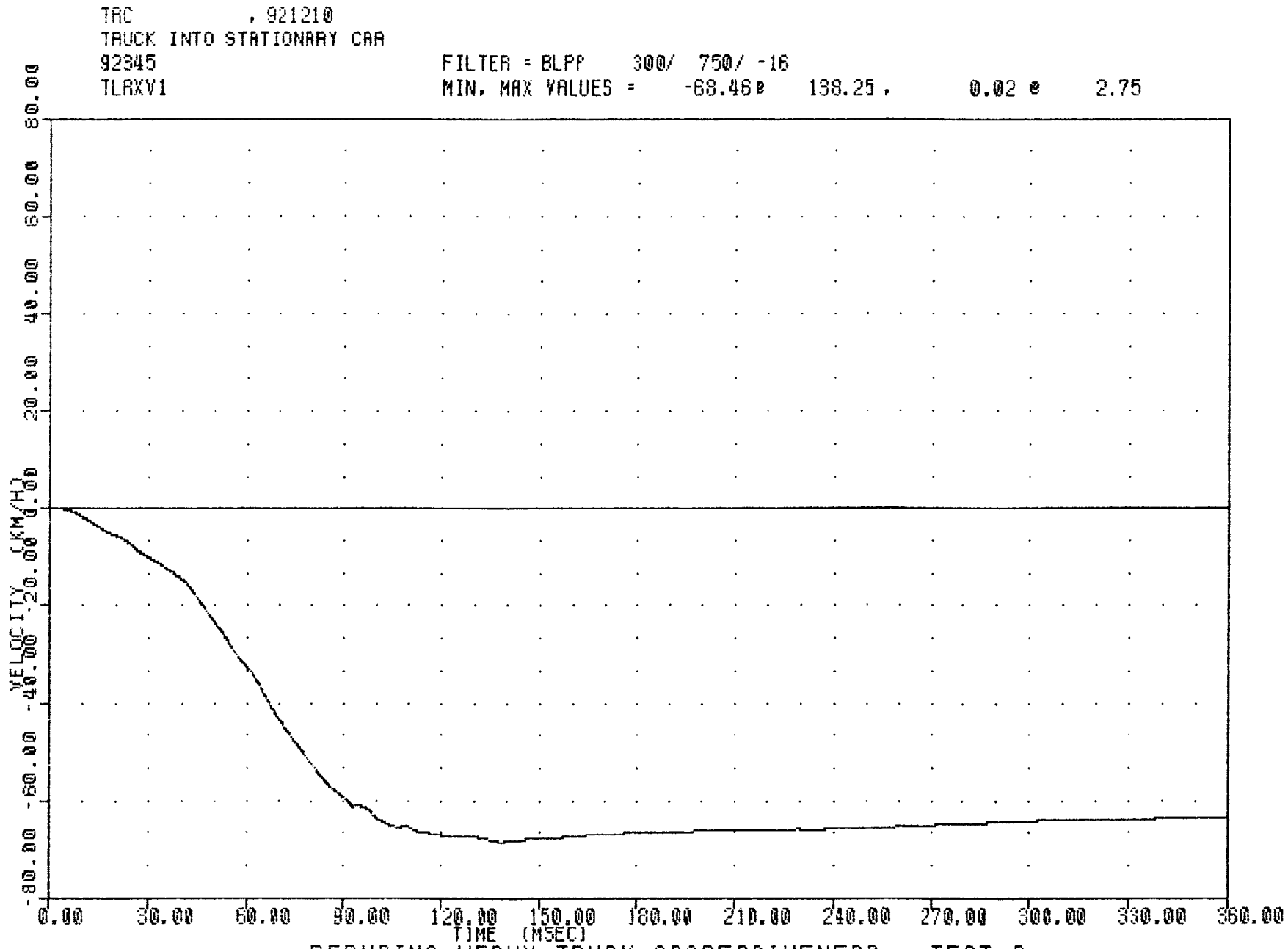
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER LAP BELT OUTBOARD FORCE



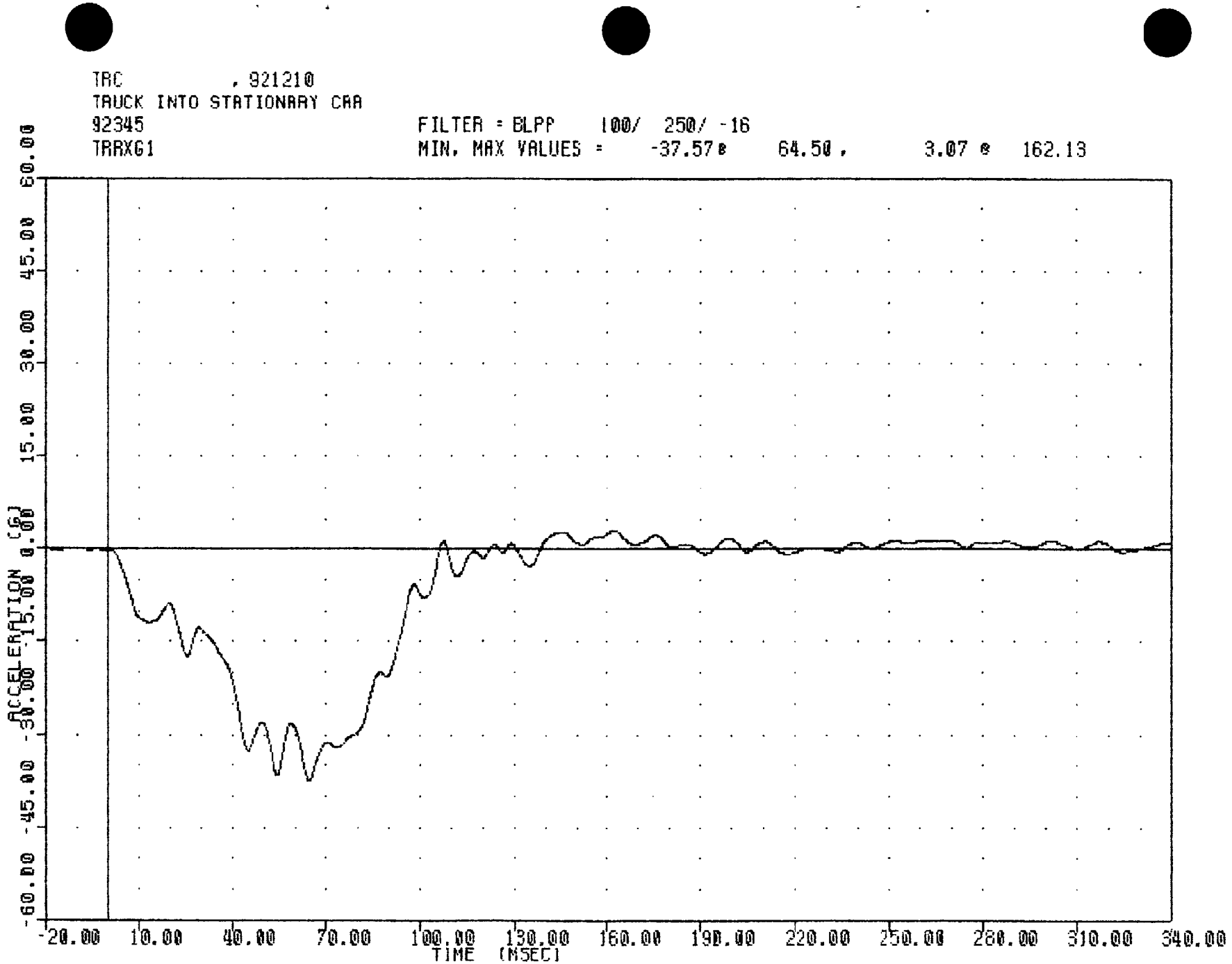
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
DRIVER SHOULDER BELT FORCE



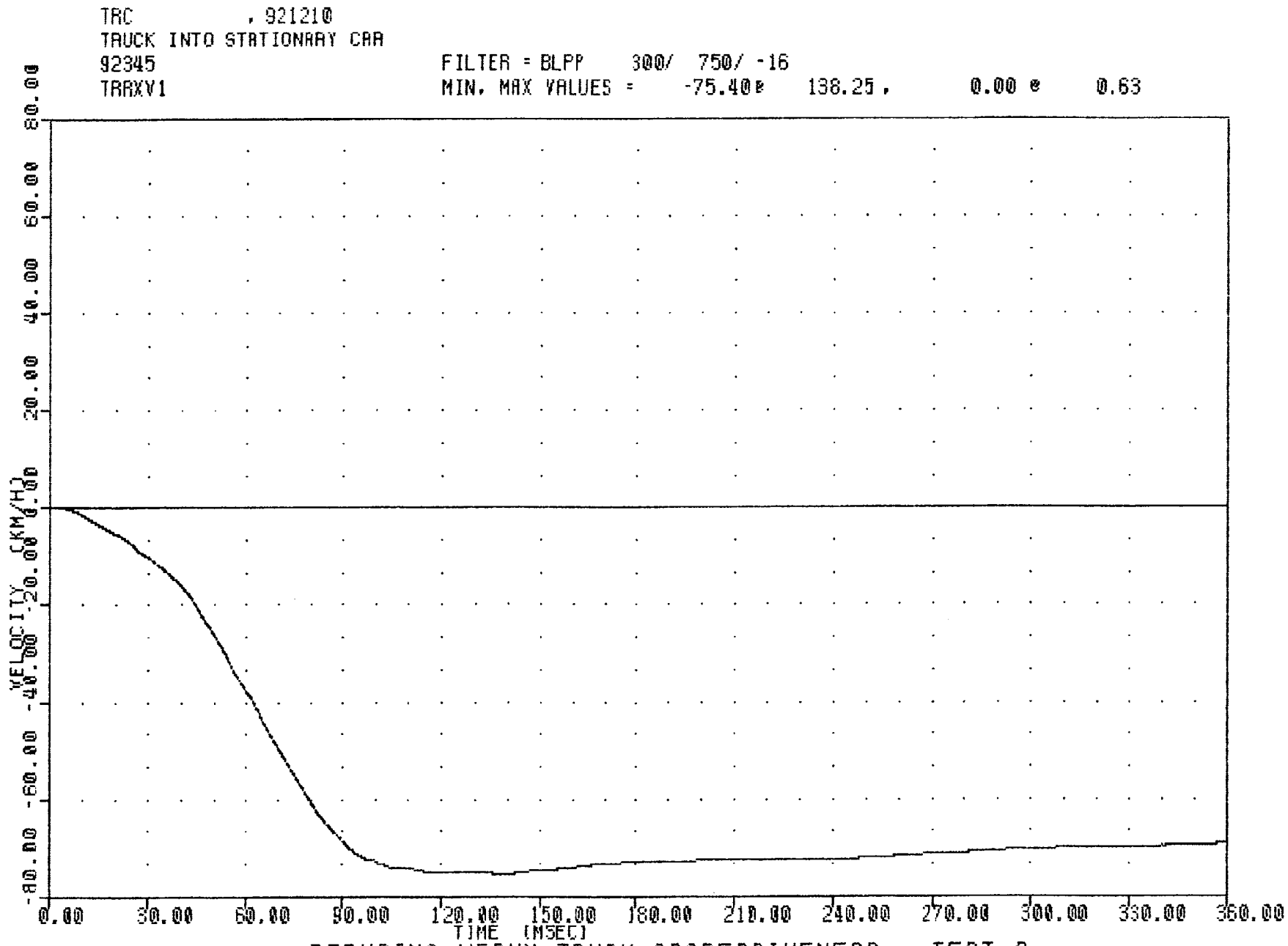
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
LEFT REAR SEAT X-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
LEFT REAR SEAT X-AXIS VELOCITY

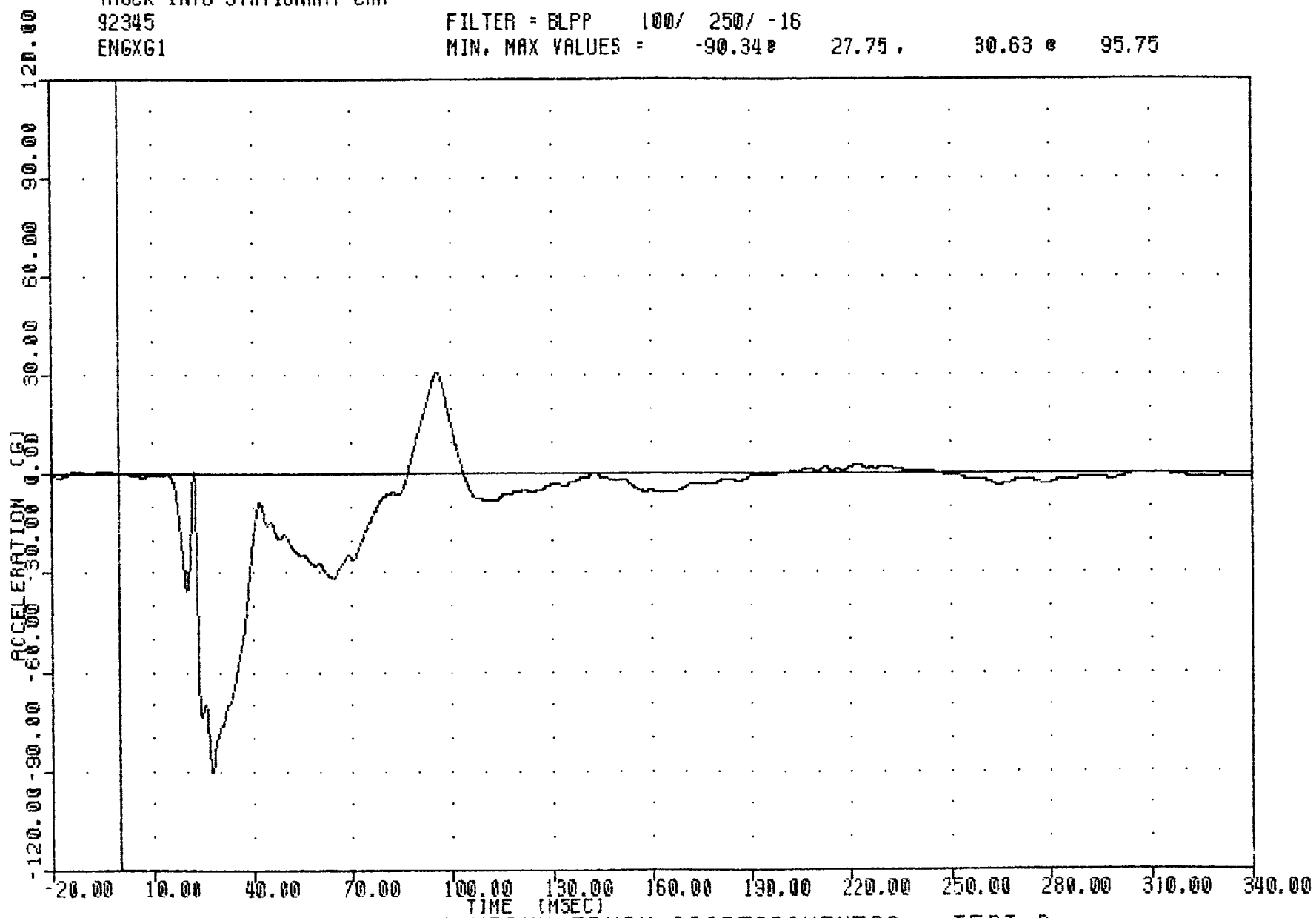


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
RIGHT REAR SEAT X-AXIS ACCELERATION

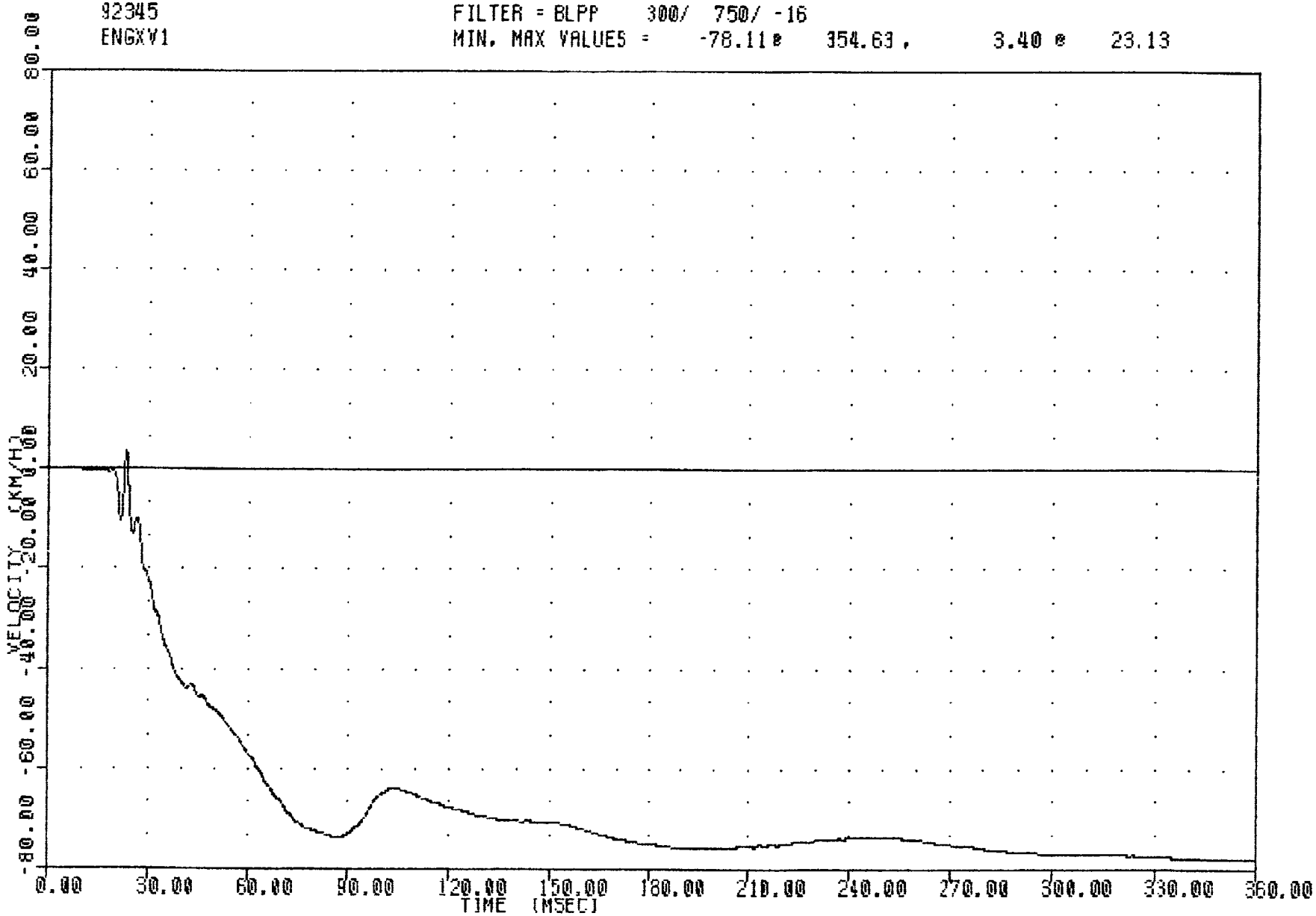


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

RIGHT REAR SEAT X-AXIS VELOCITY

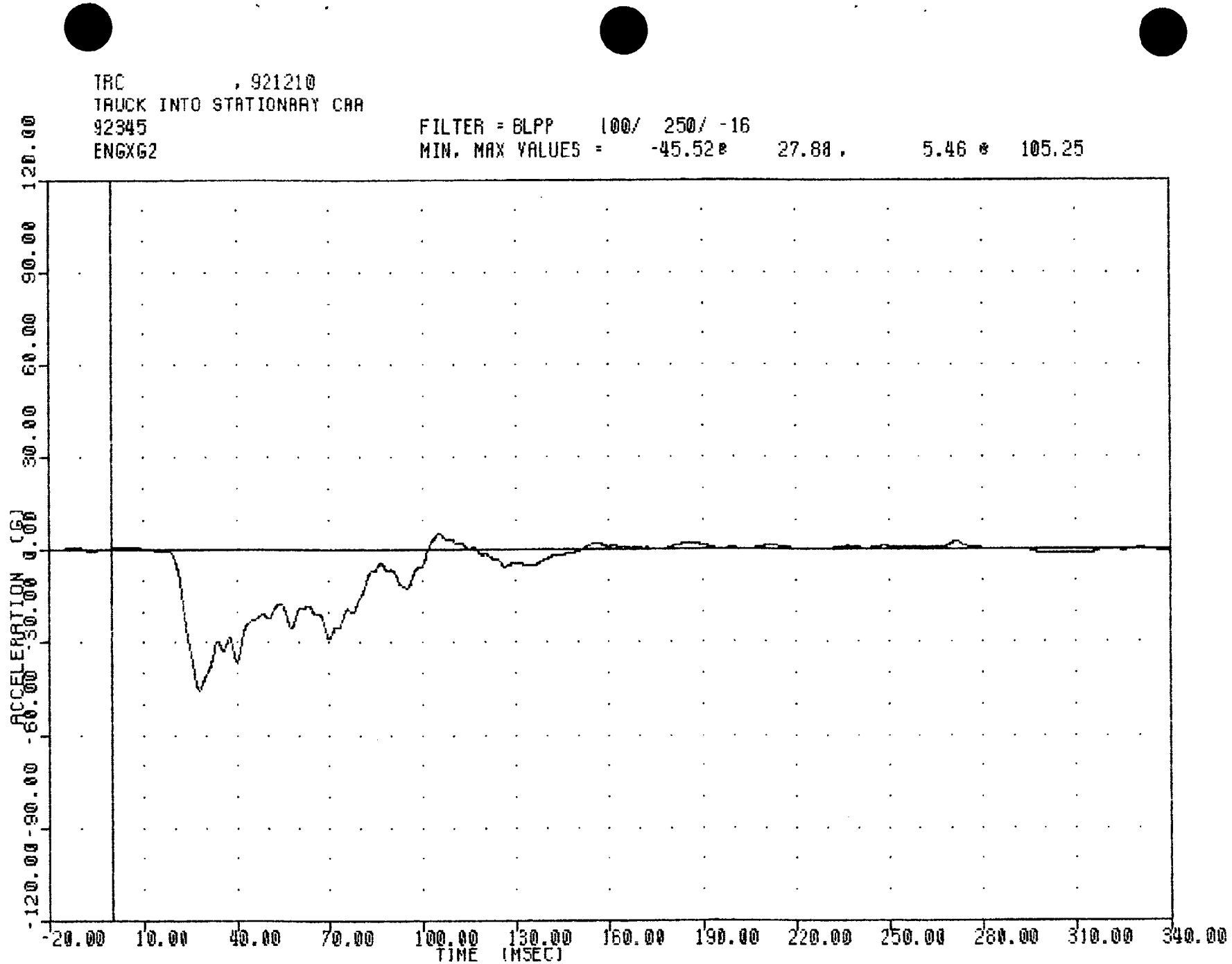


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
ENGINE TOP X-AXIS ACCELERATION

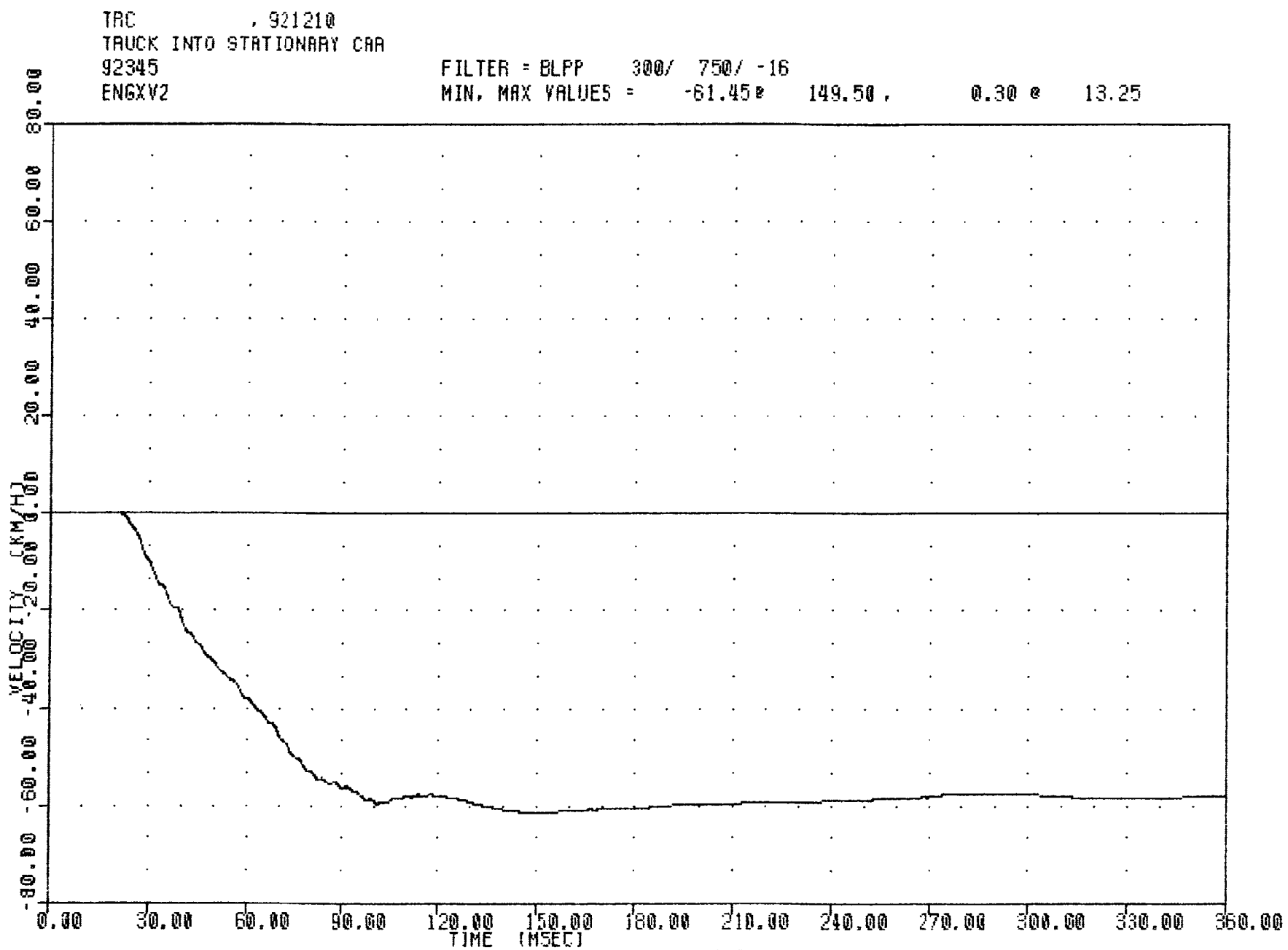


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

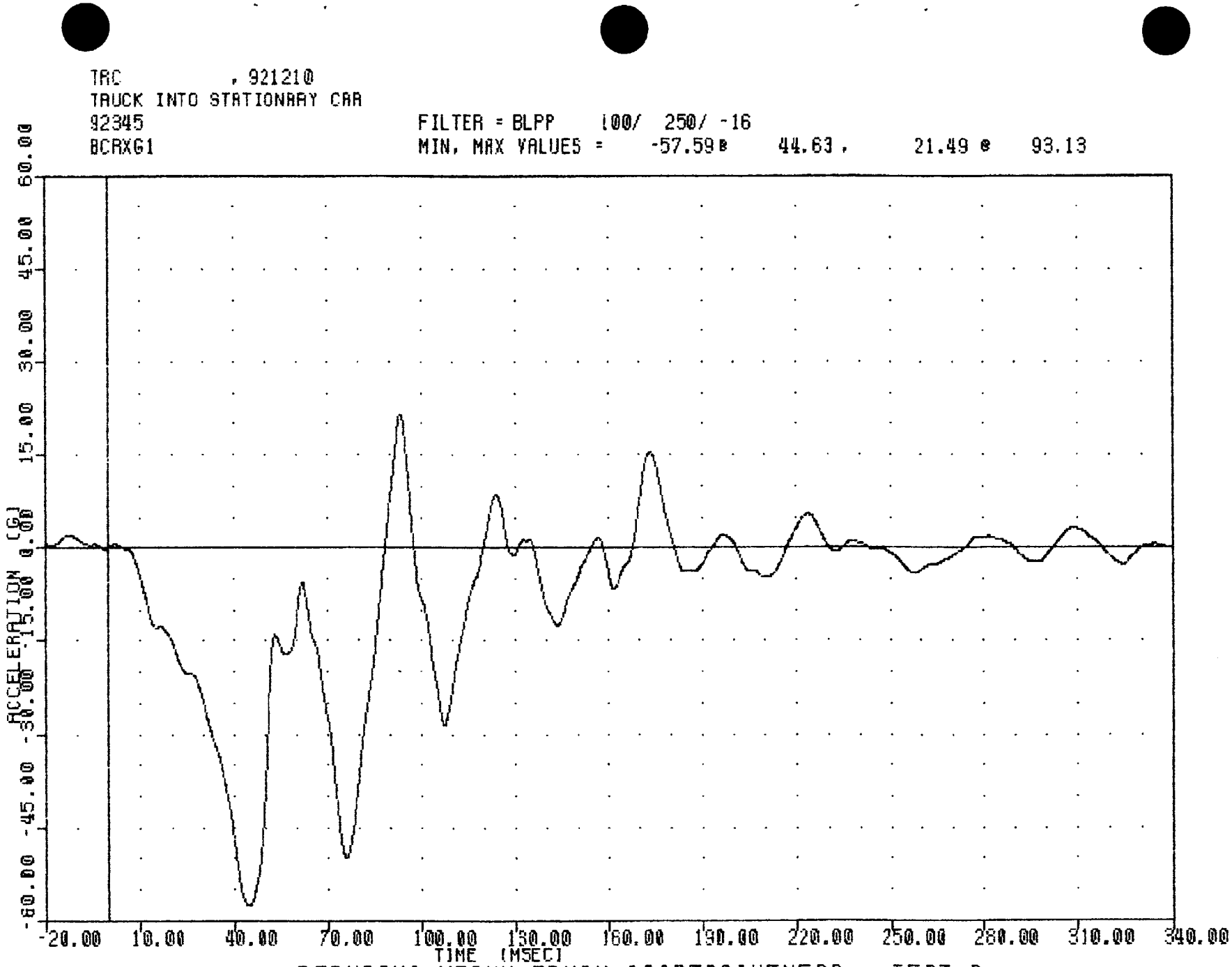
ENGINE TOP X-AXIS VELOCITY



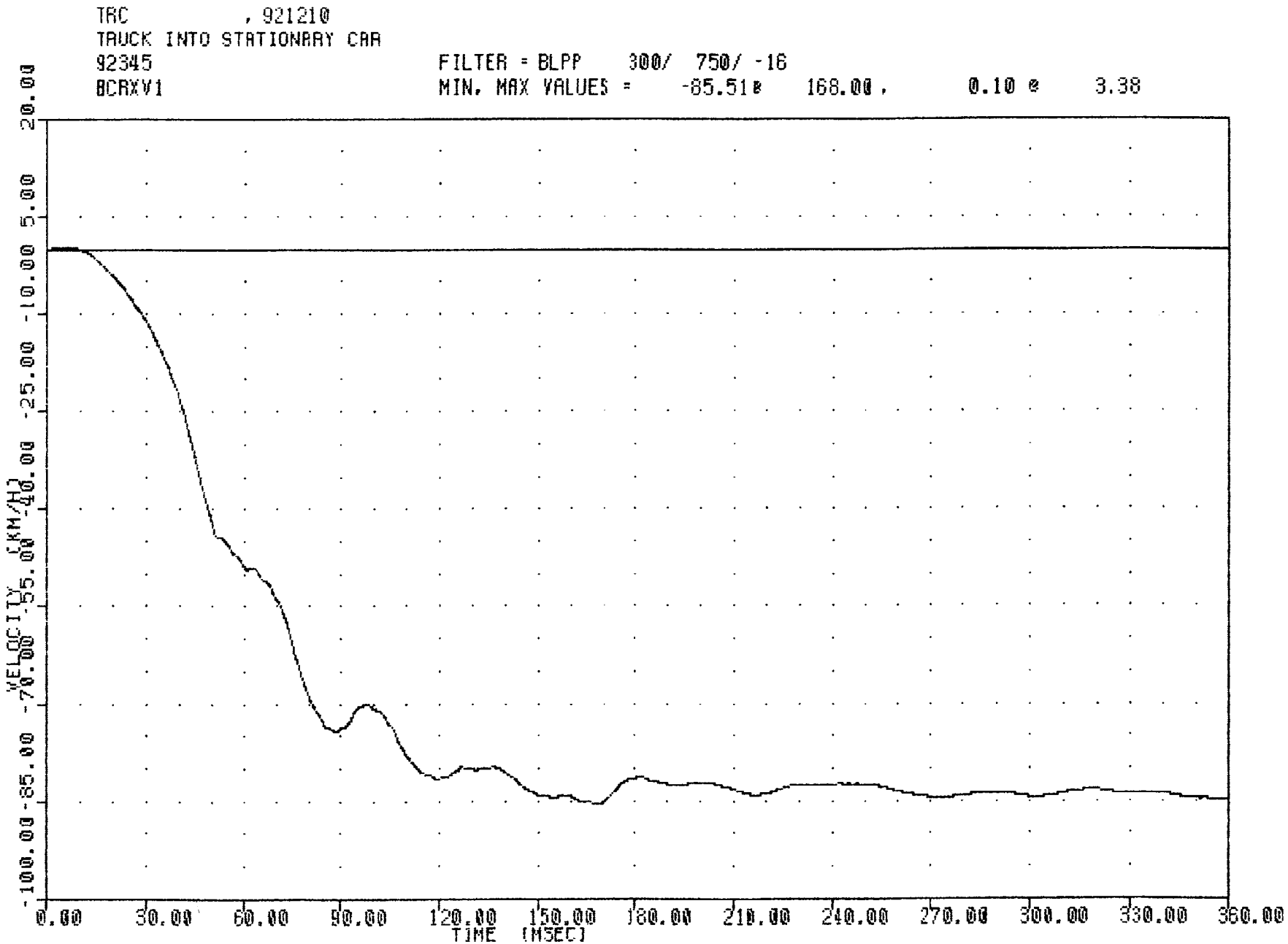
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
ENGINE BOTTOM X-AXIS ACCELERATION



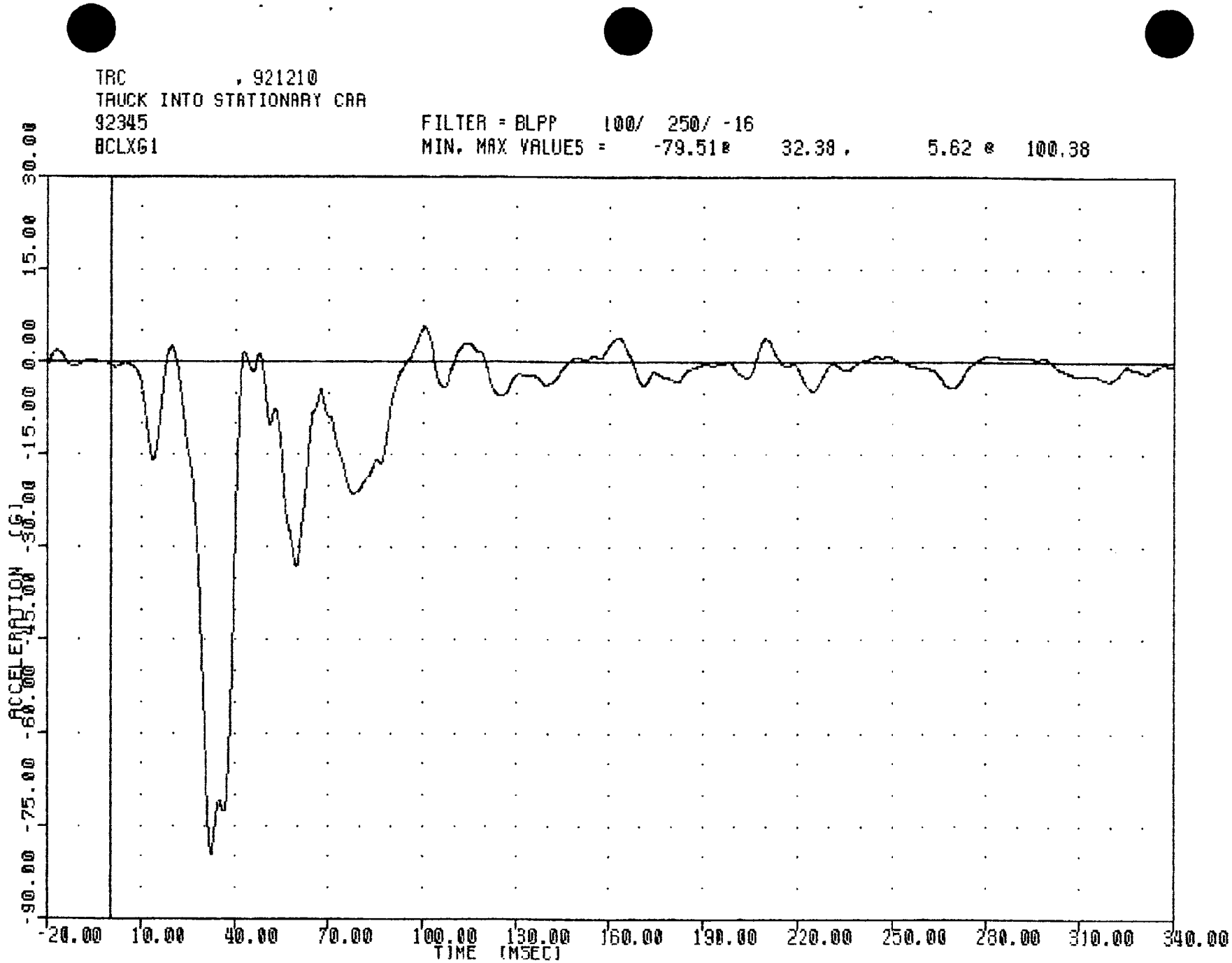
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
ENGINE BOTTOM X-AXIS VELOCITY



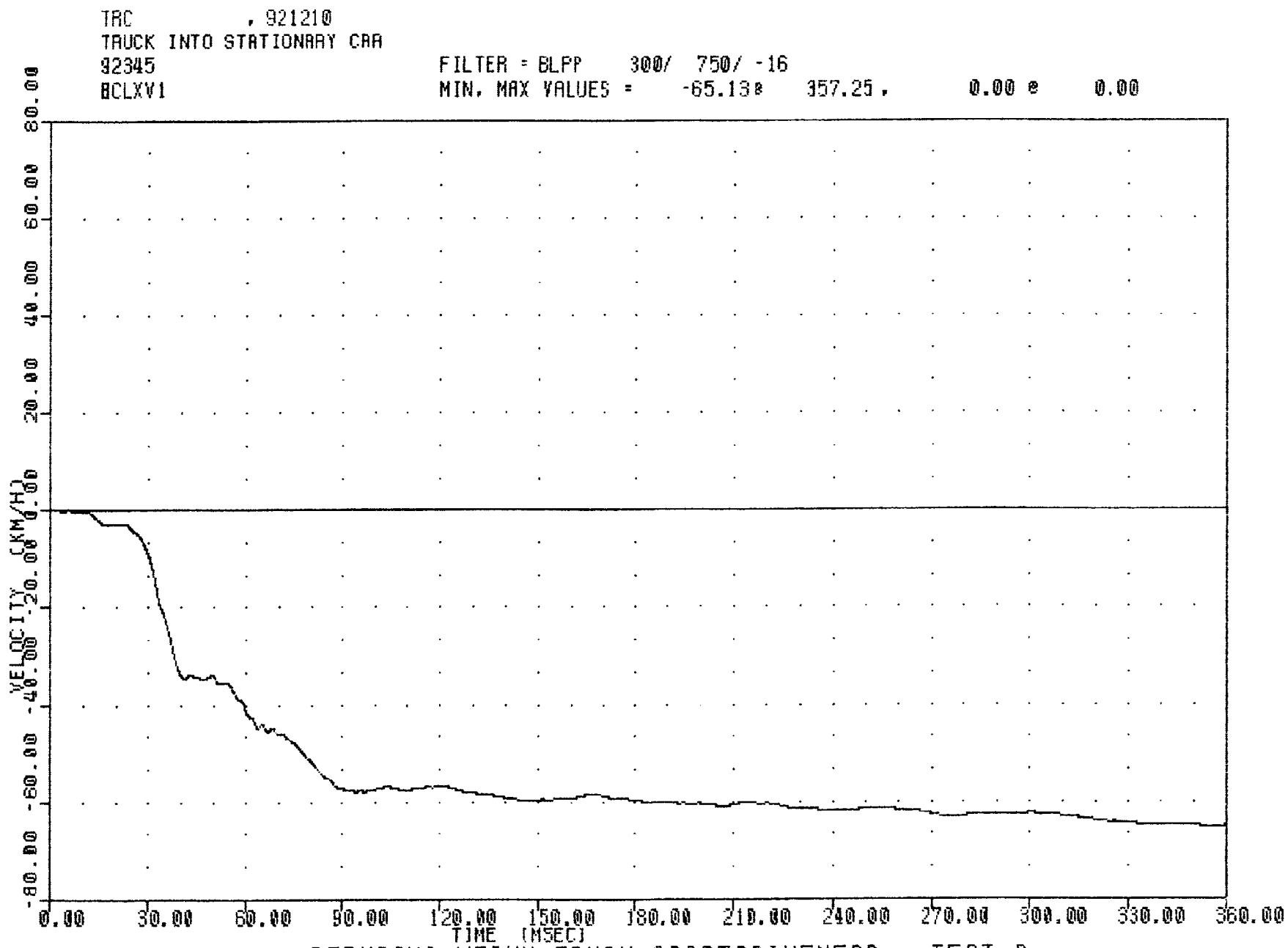
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
RIGHT BRAKE CALIPER X-AXIS ACCELERATION



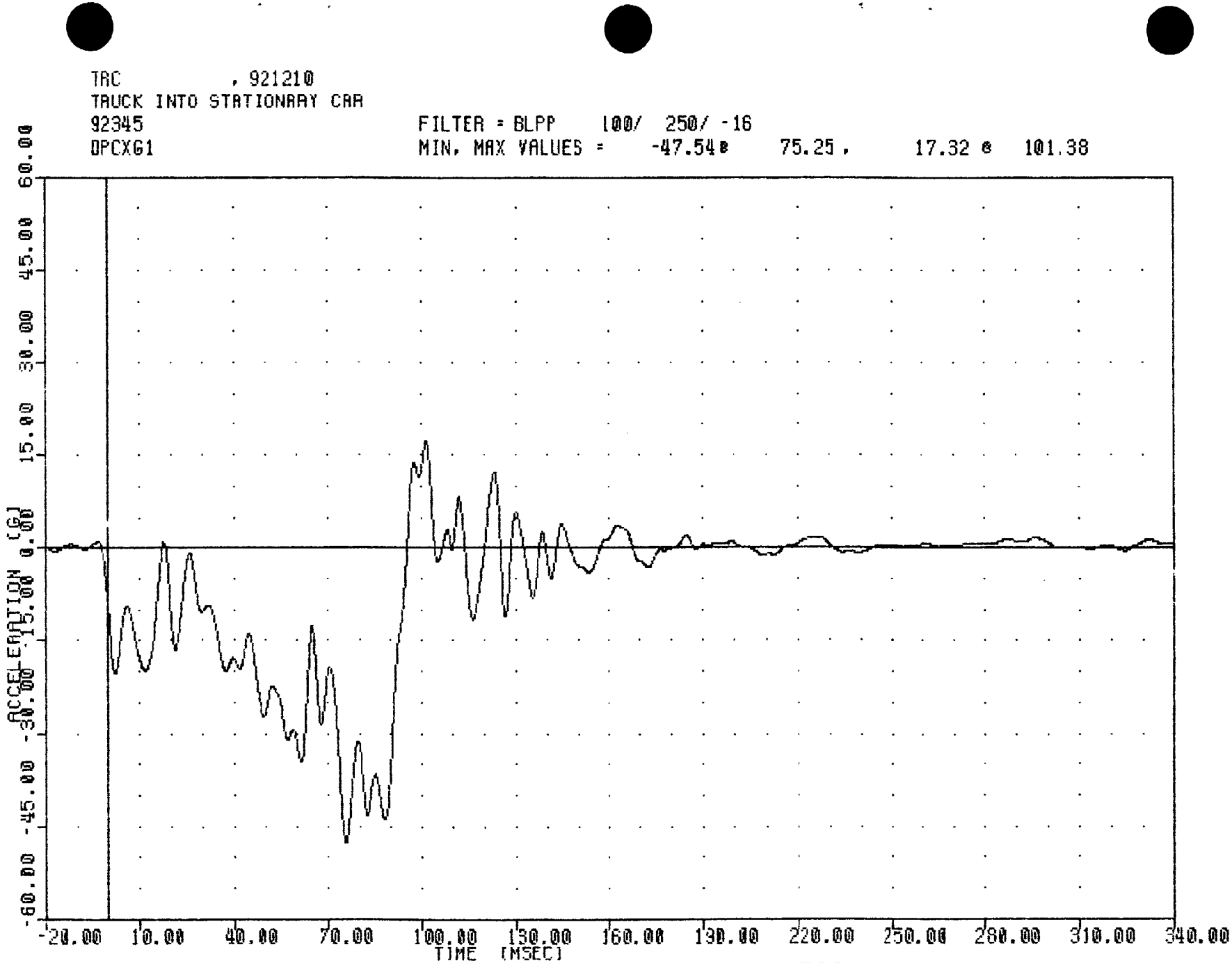
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
RIGHT BRAKE CALIPER X-AXIS VELOCITY



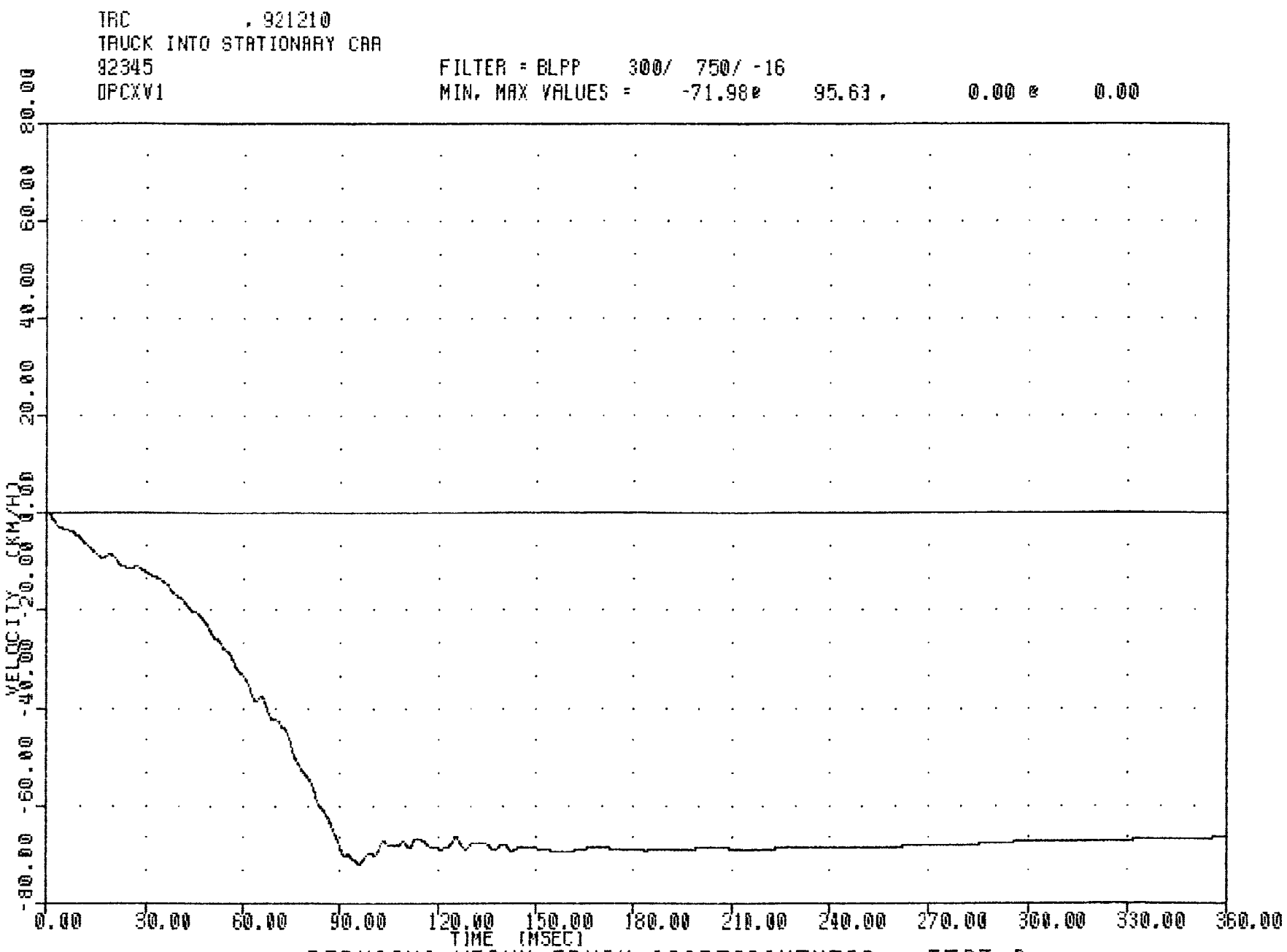
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
LEFT BRAKE CALIPER X-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
LEFT BRAKE CALIPER X-AXIS VELOCITY

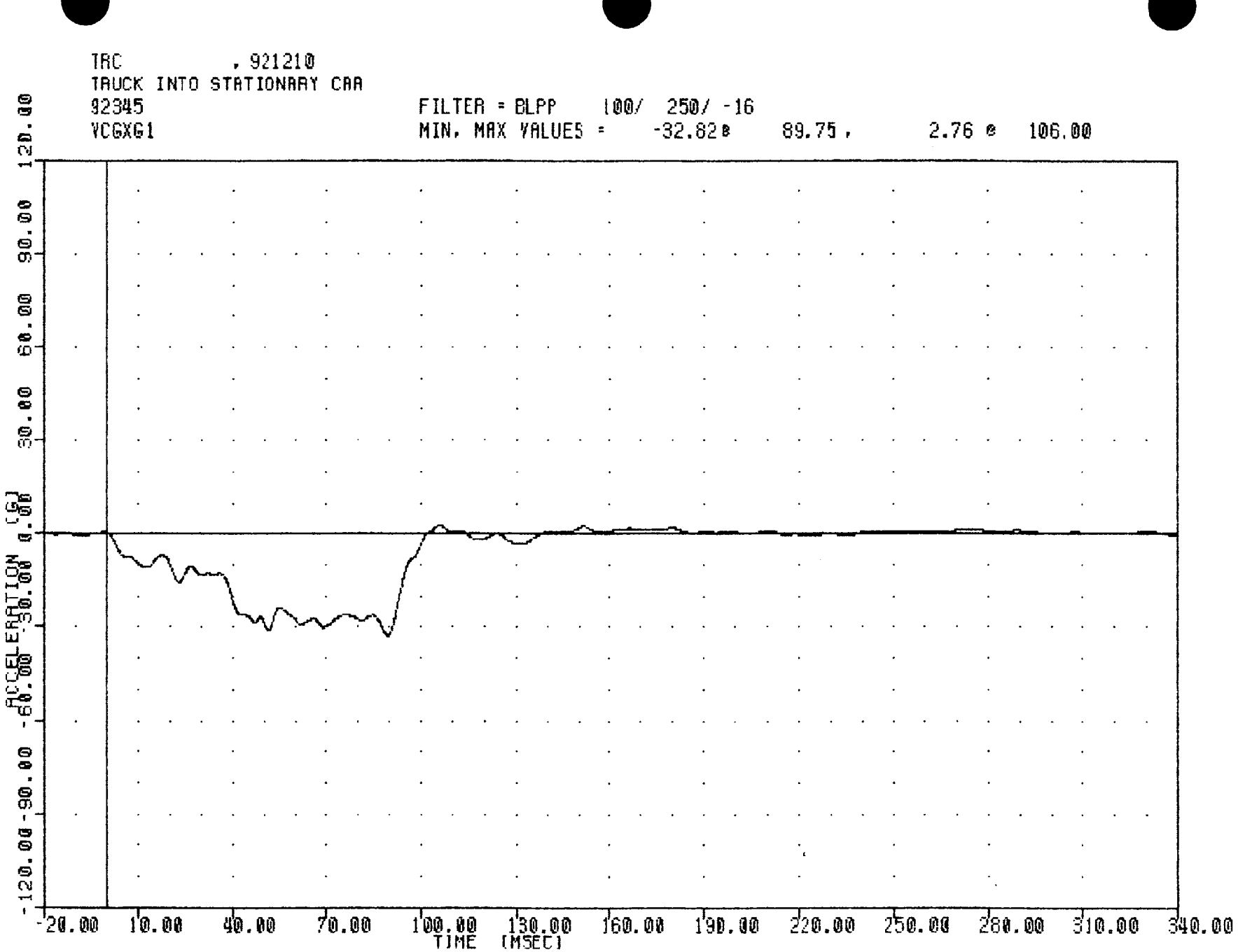


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

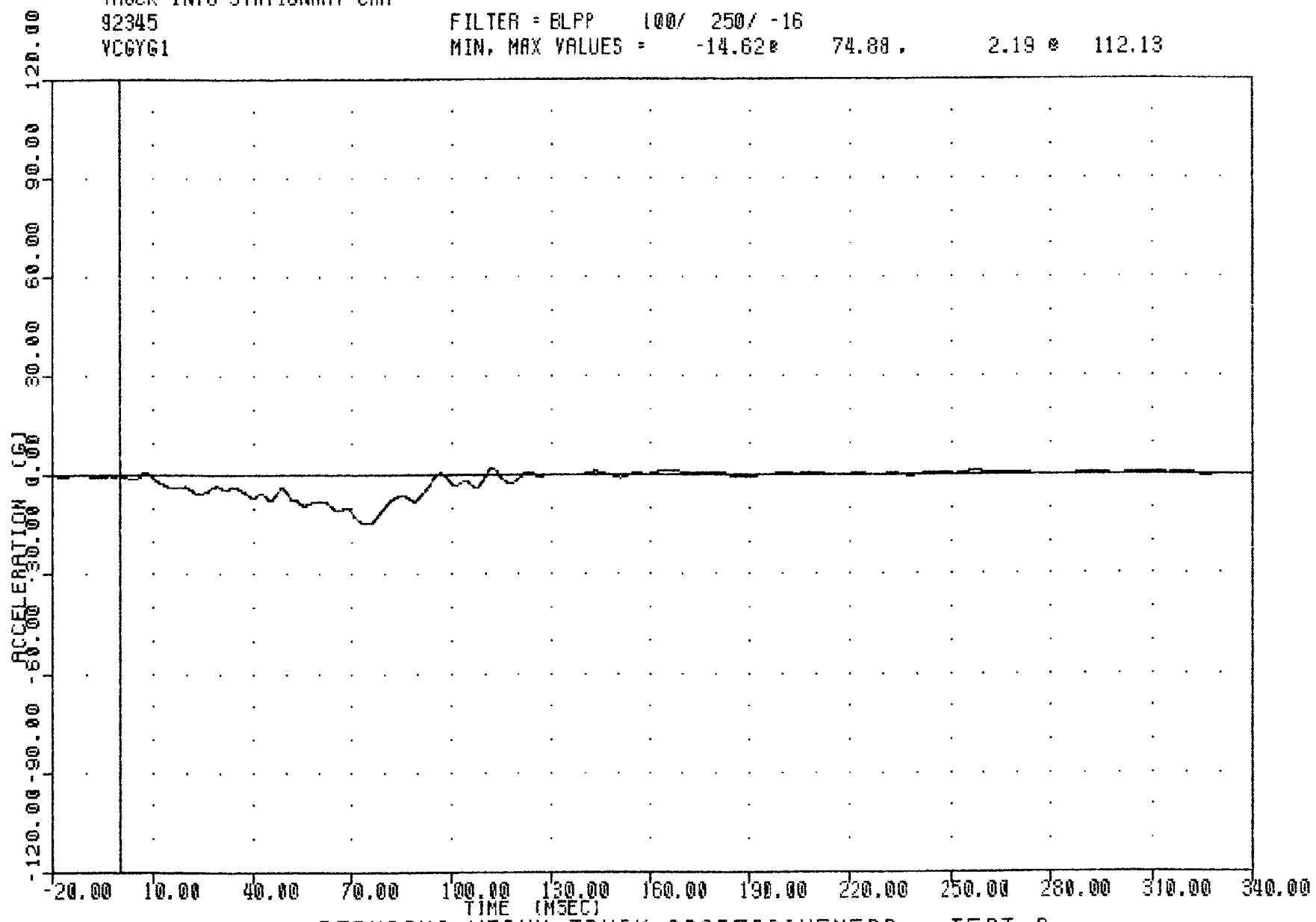


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

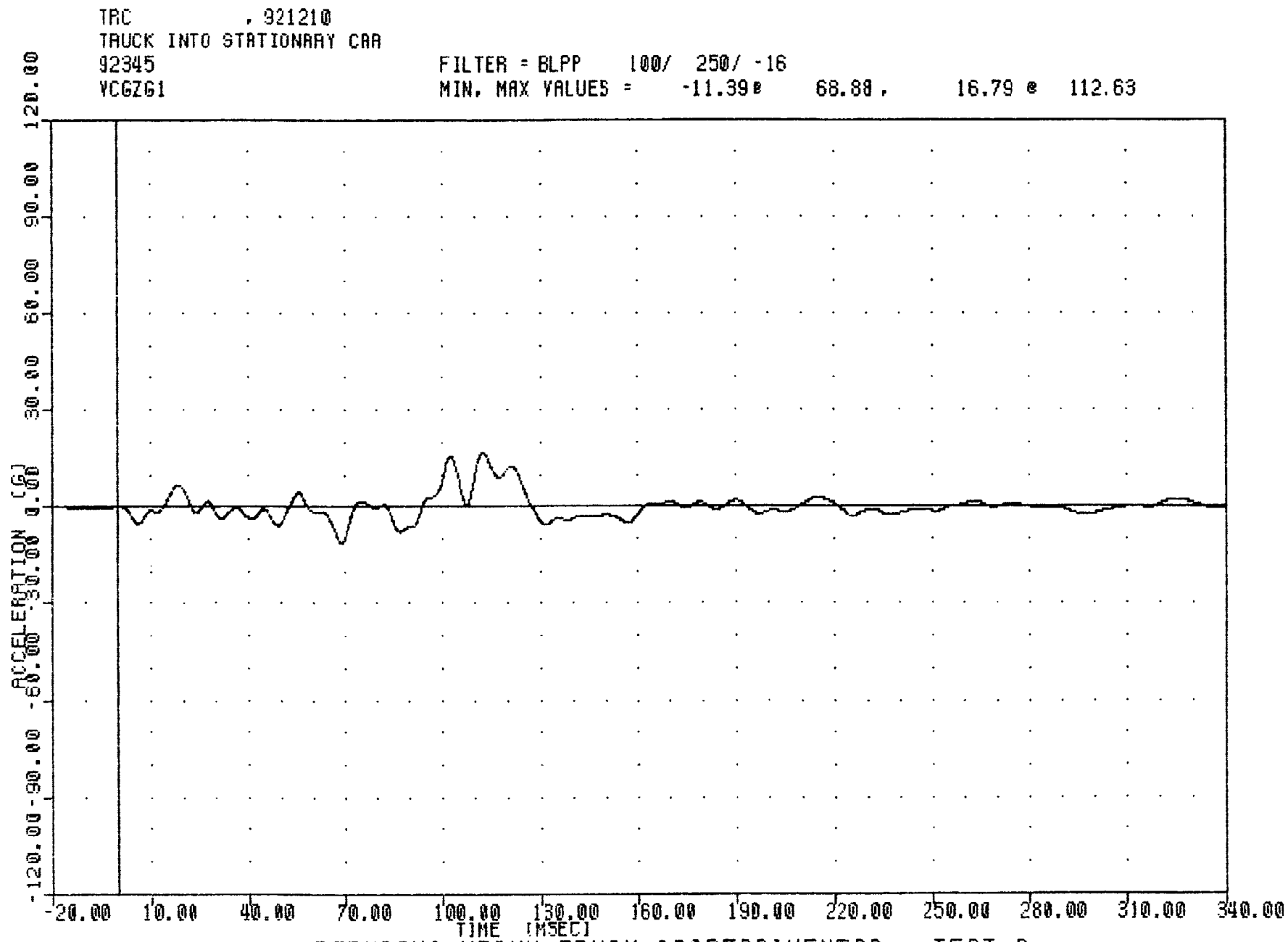
INSTRUMENT PANEL CENTER X-AXIS VELOCITY



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY X-AXIS ACCELERATION

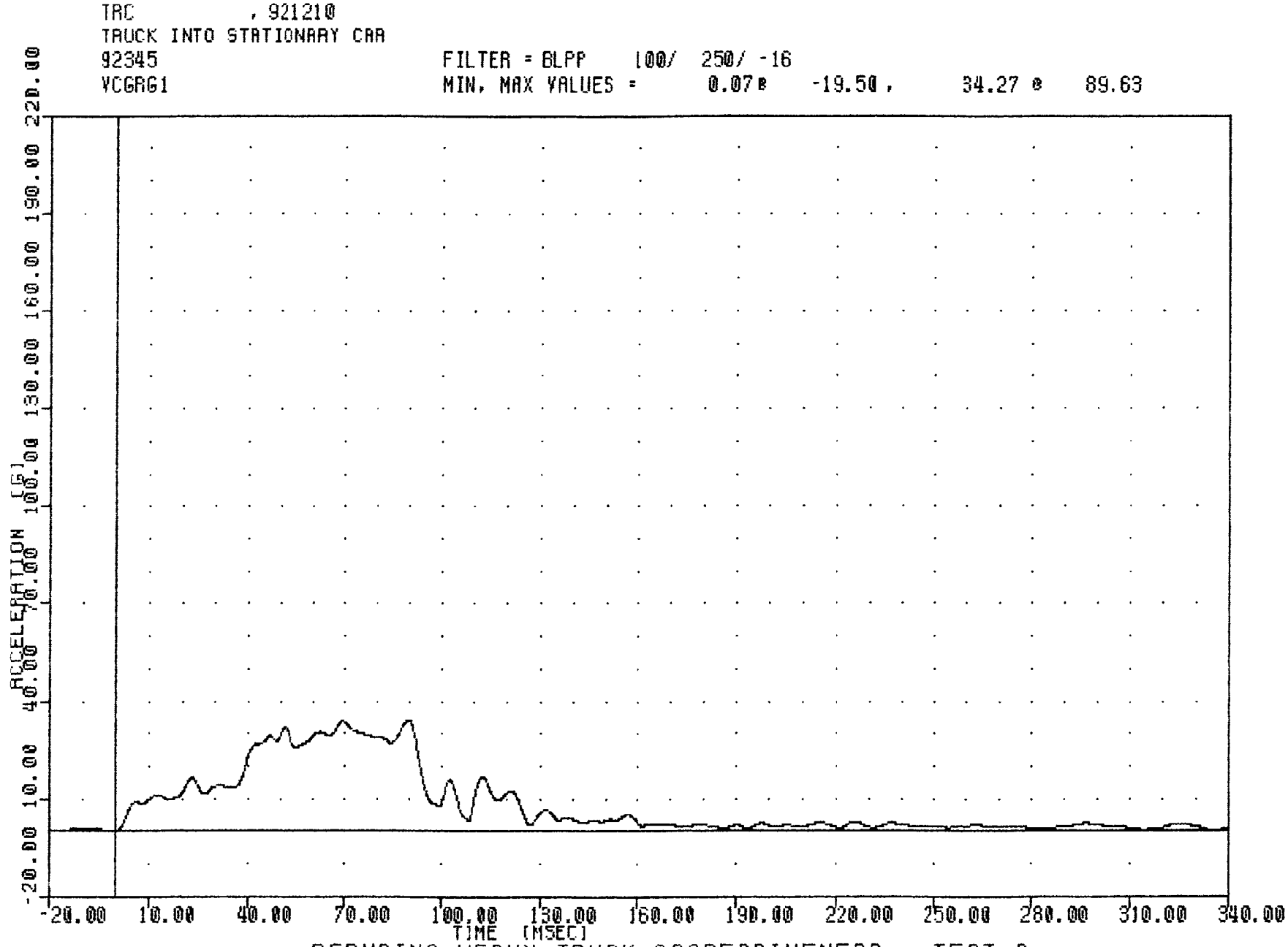


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY Y-AXIS ACCELERATION

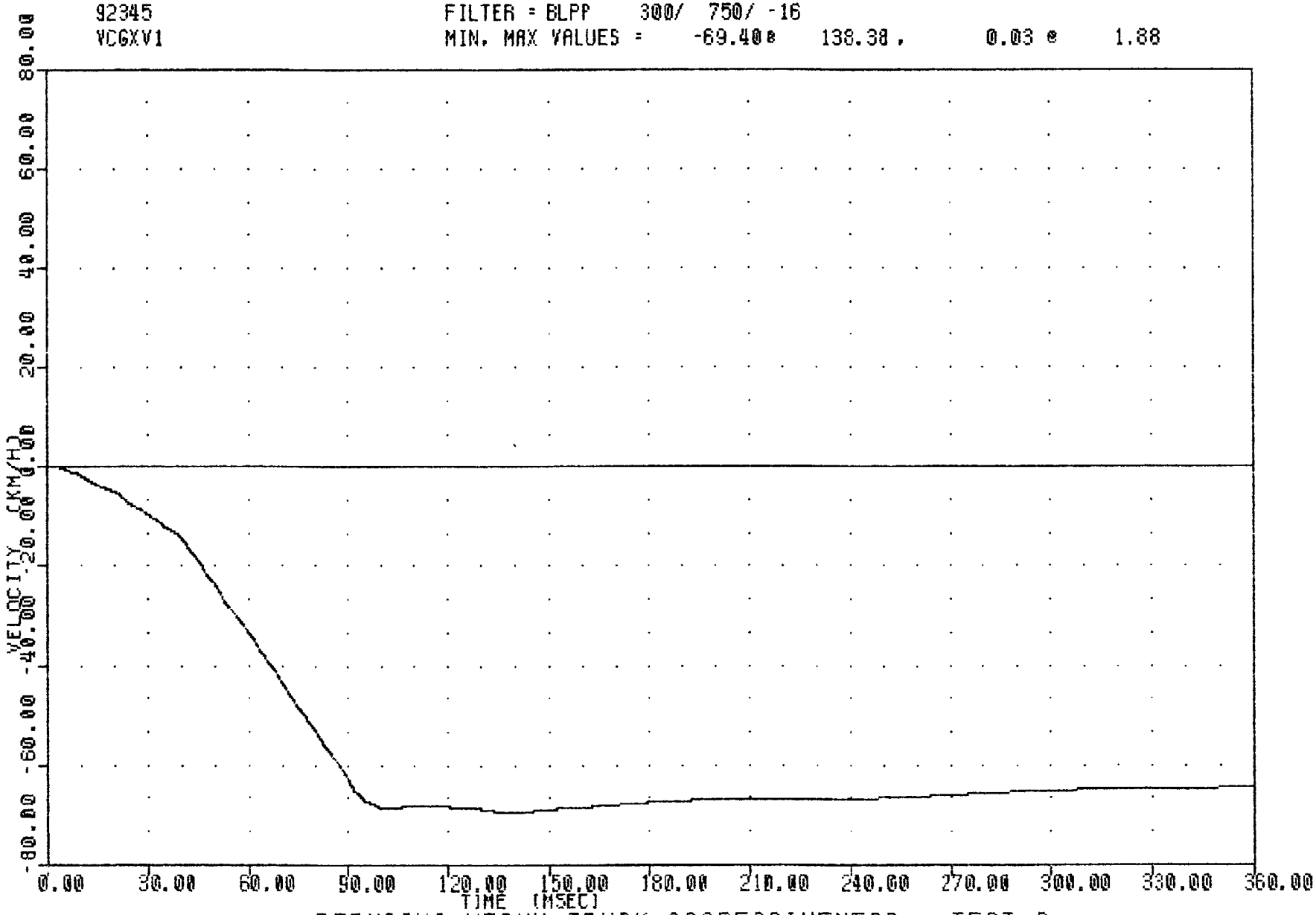


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

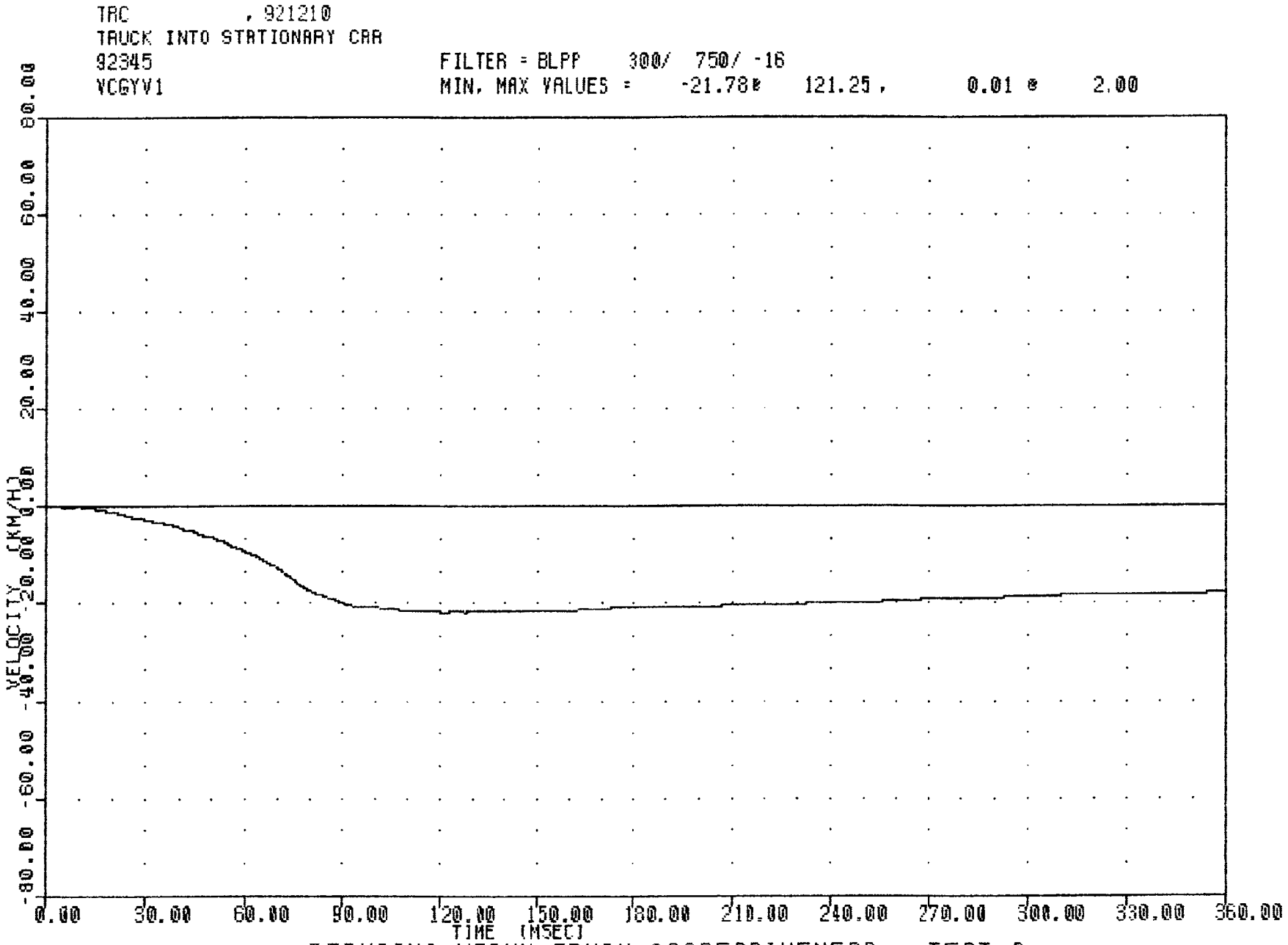
CAR CENTER OF GRAVITY Z-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY RESULTANT ACCELERATION

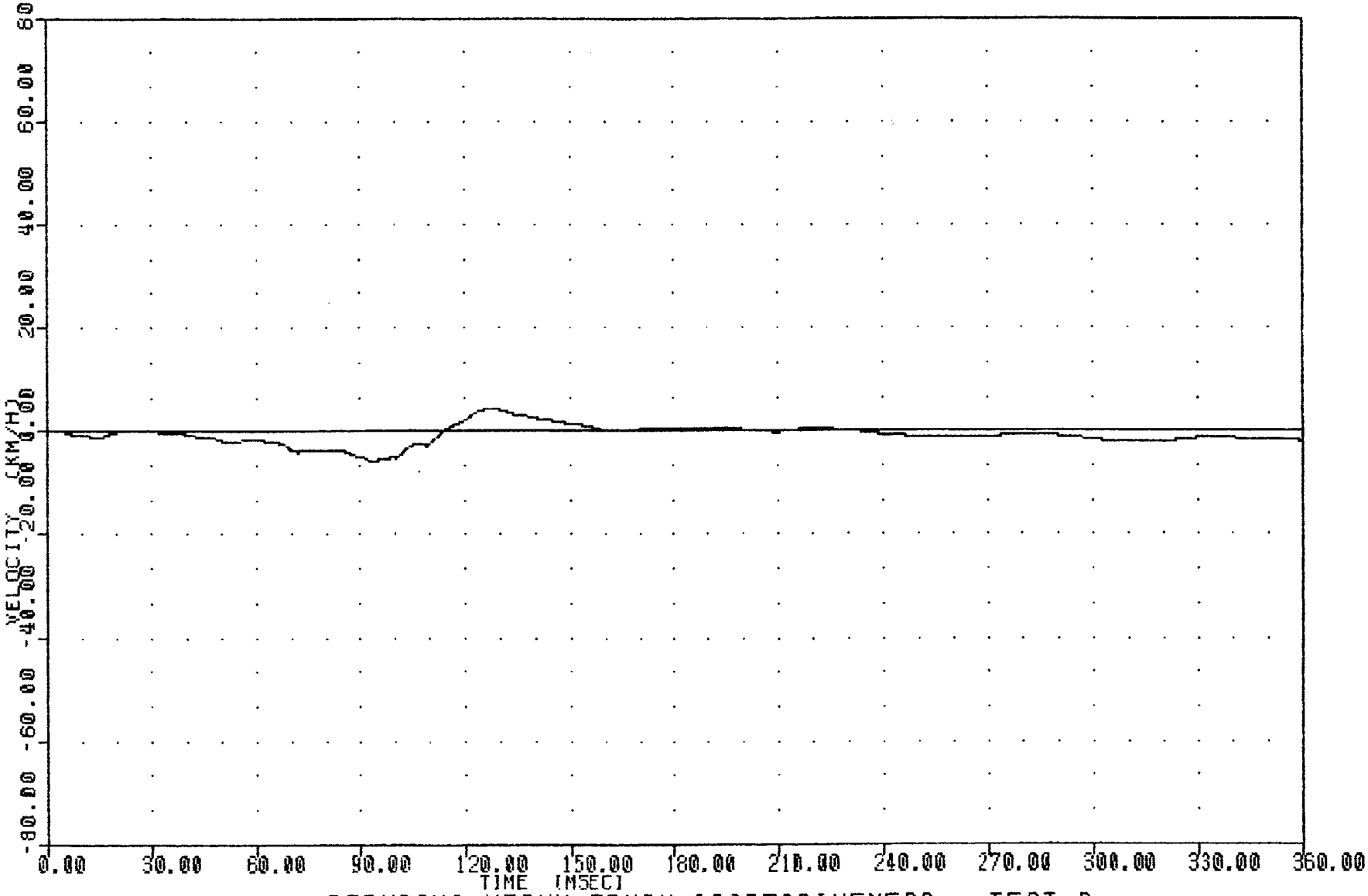


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY X-AXIS VELOCITY

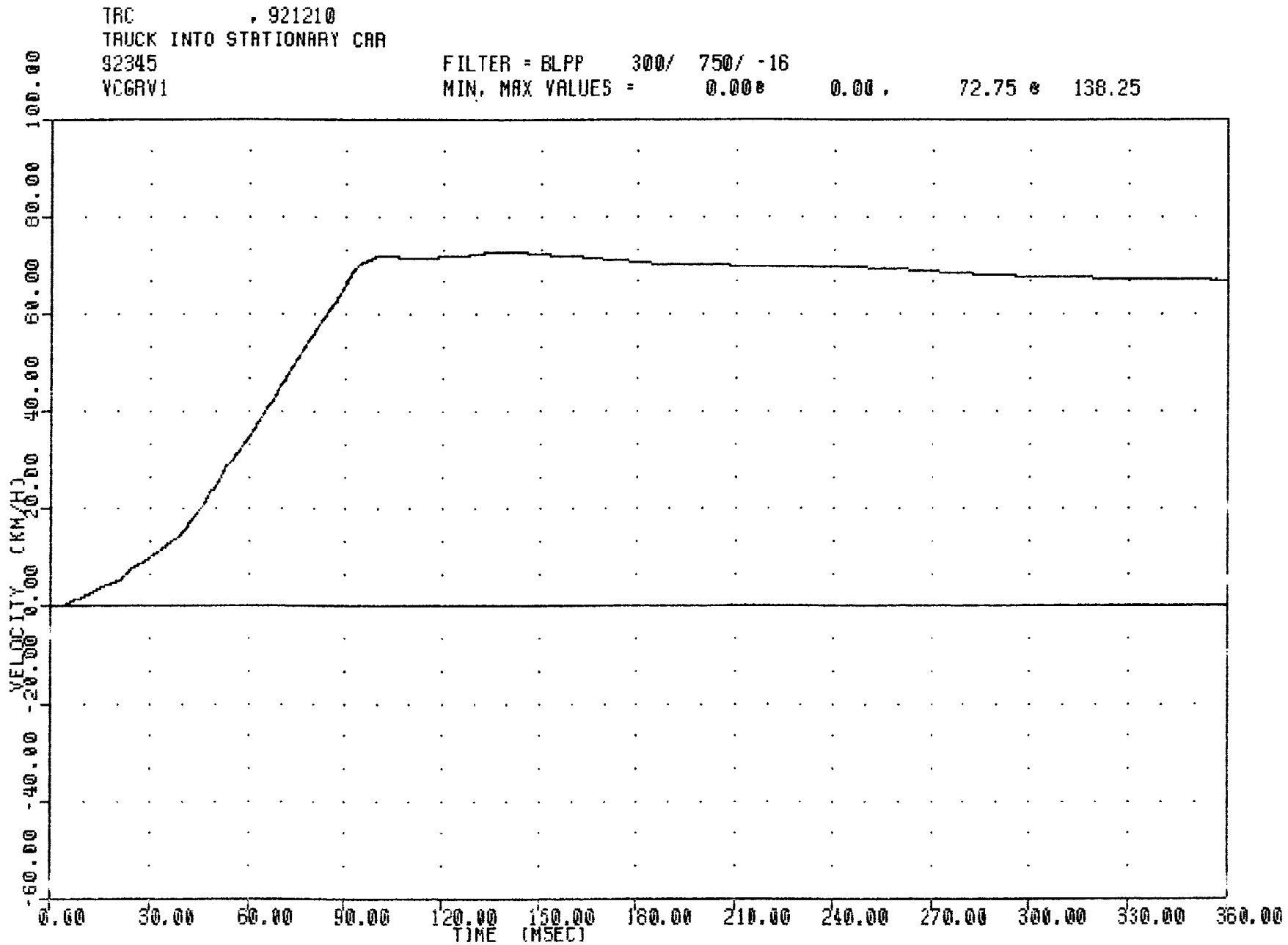


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY Y-AXIS VELOCITY

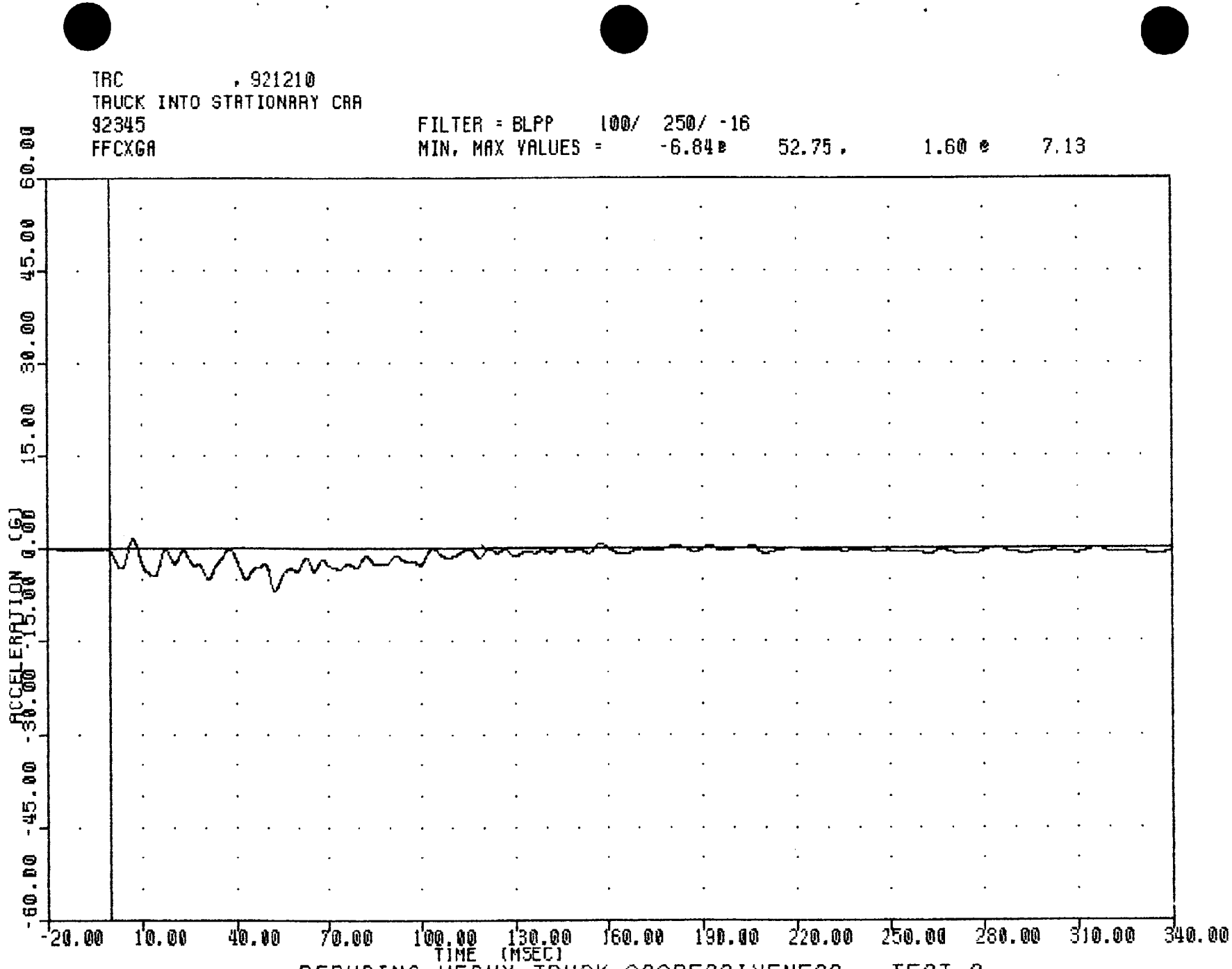
TRC , 921210
TRUCK INTO STATIONARY CAR
92345 FILTER = BLPP 300/ 750/ -16
VCGZV1 MIN, MAX VALUES = -5.89 @ 93.38 , 4.33 @ 128.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY Z-AXIS VELOCITY

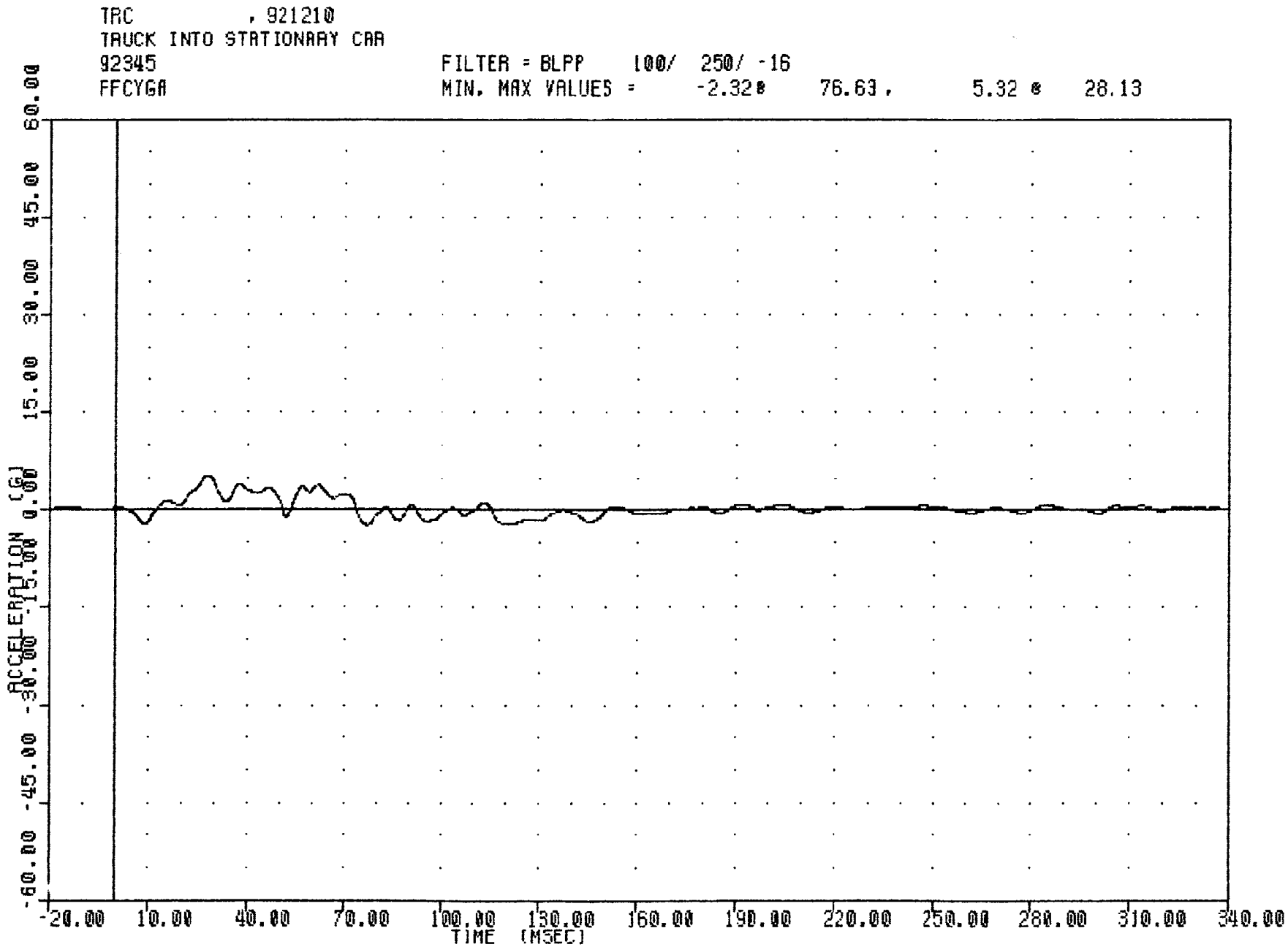


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
CAR CENTER OF GRAVITY VELOCITY RESULTANT

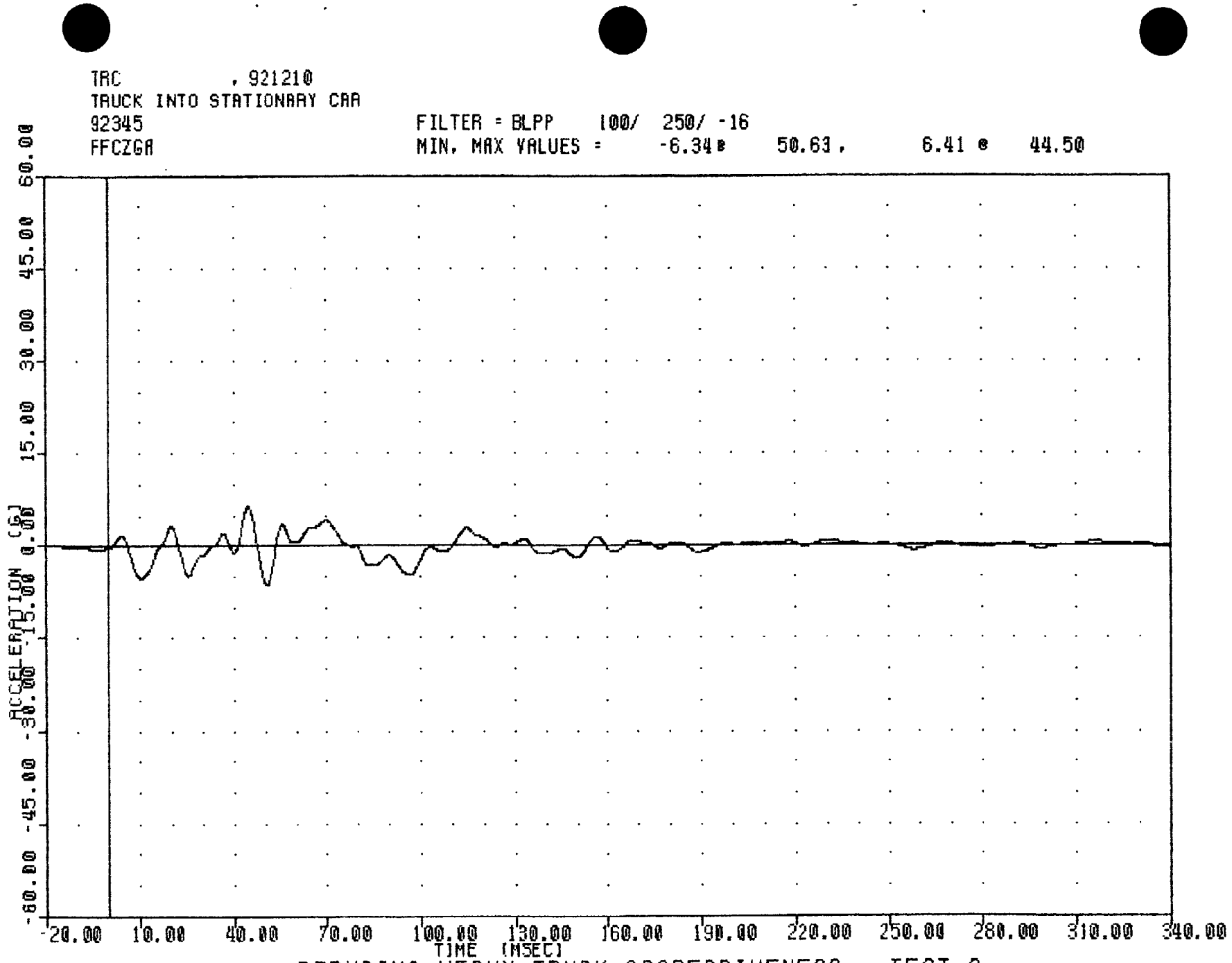


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8

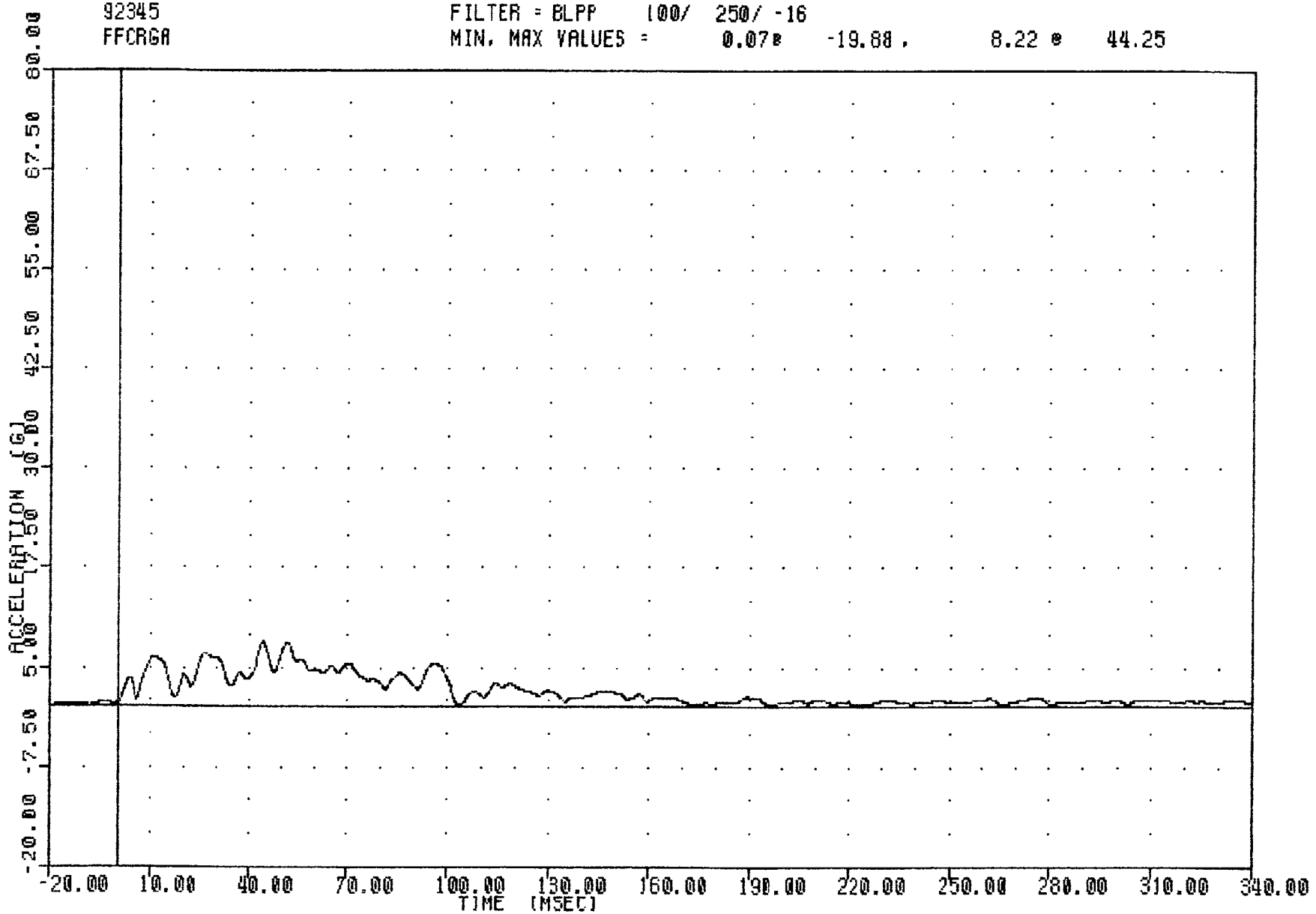
TRUCK FRONT FRAME CROSSMEMBER X-AXIS ACCELERATION



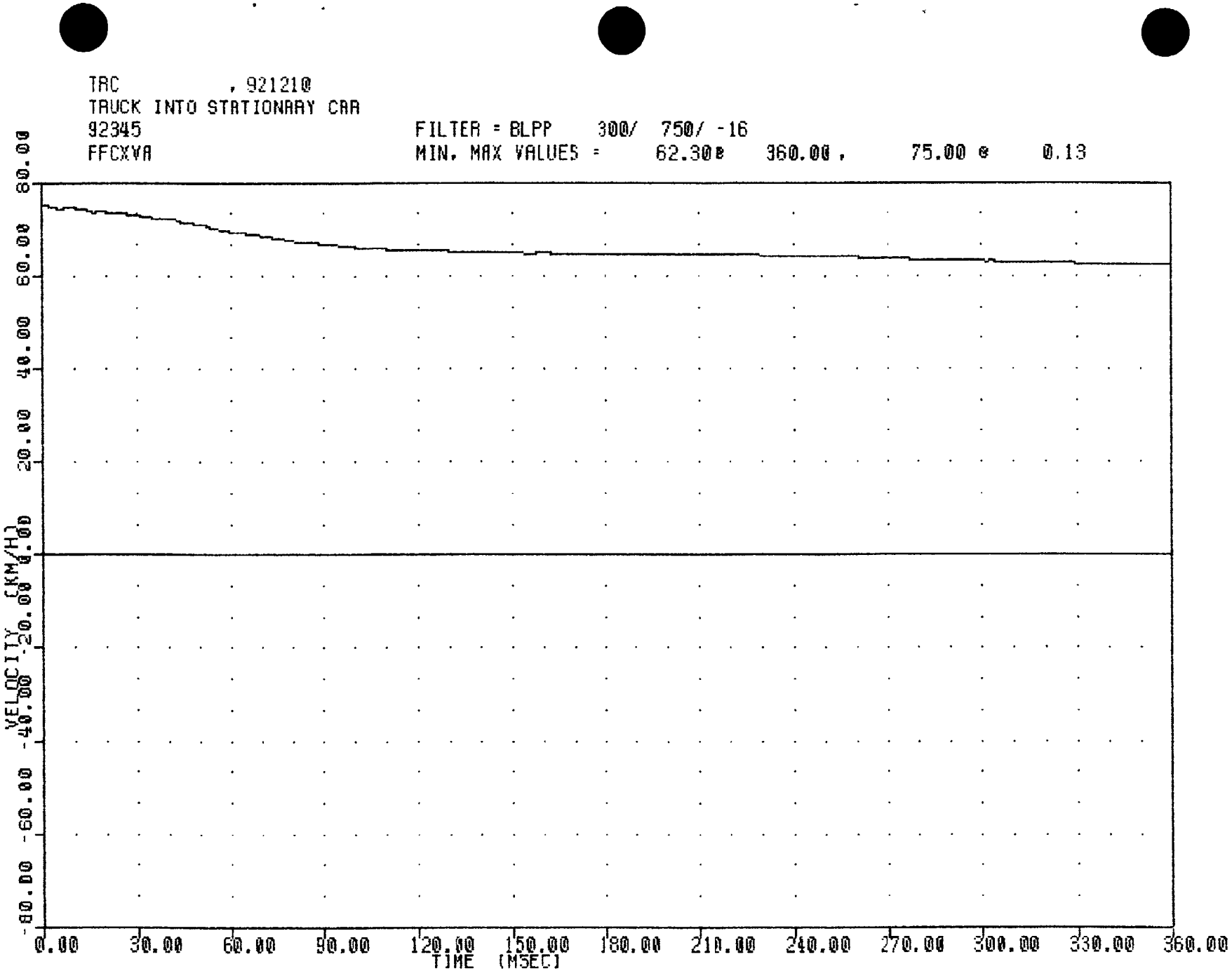
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS ACCELERATION



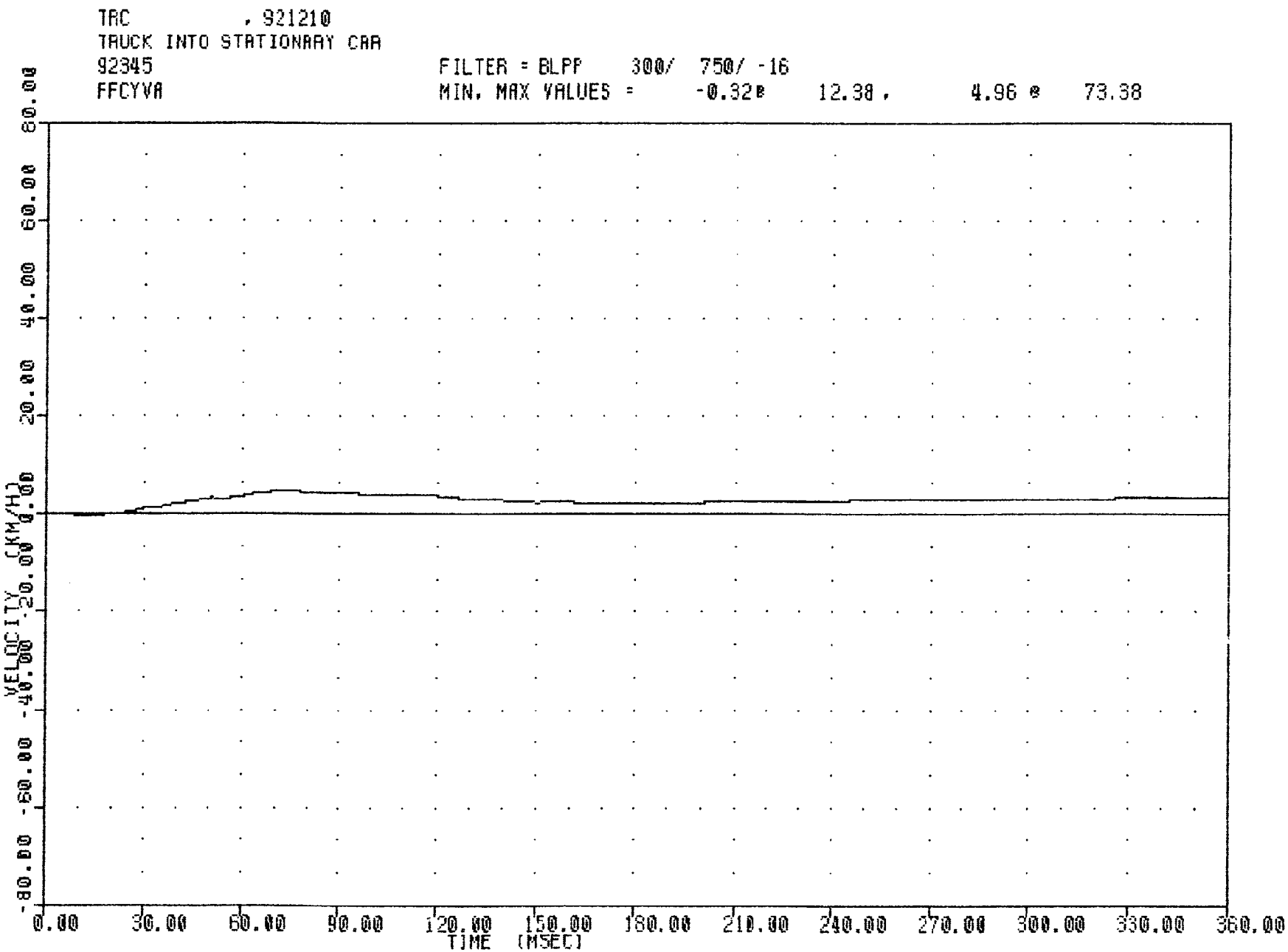
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER RESULTANT ACCELERATION

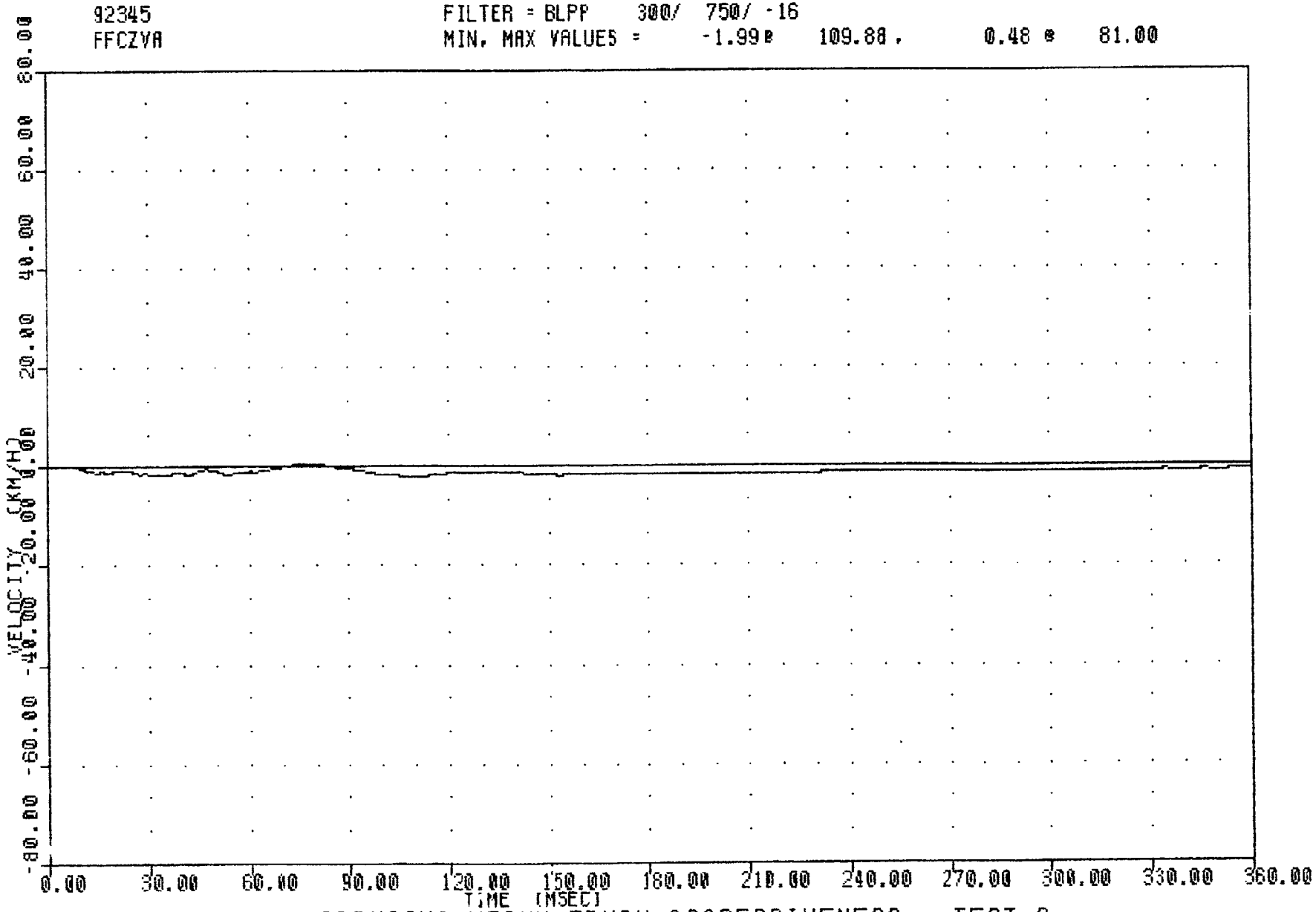


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER X-AXIS VELOCITY

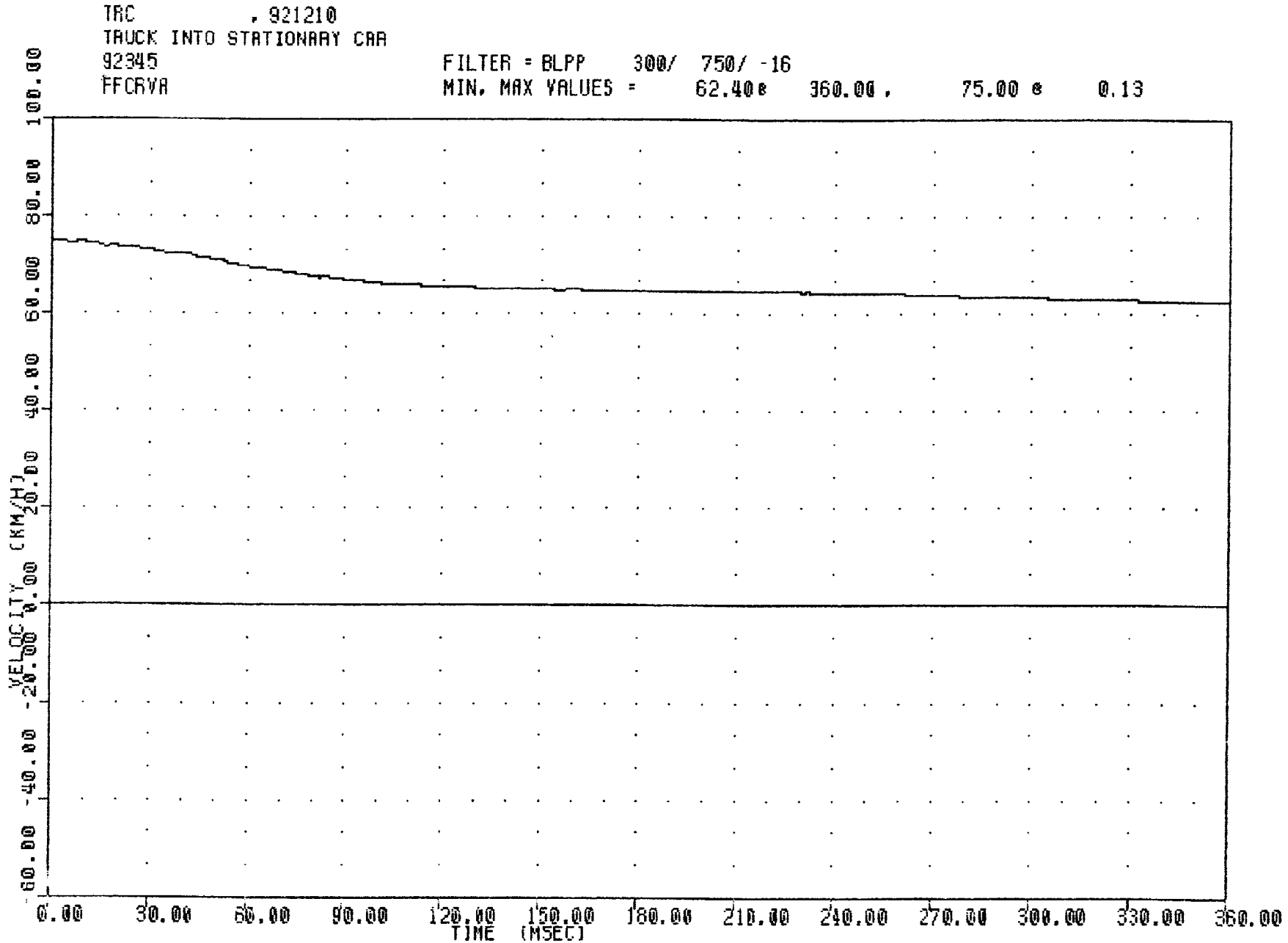


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS VELOCITY

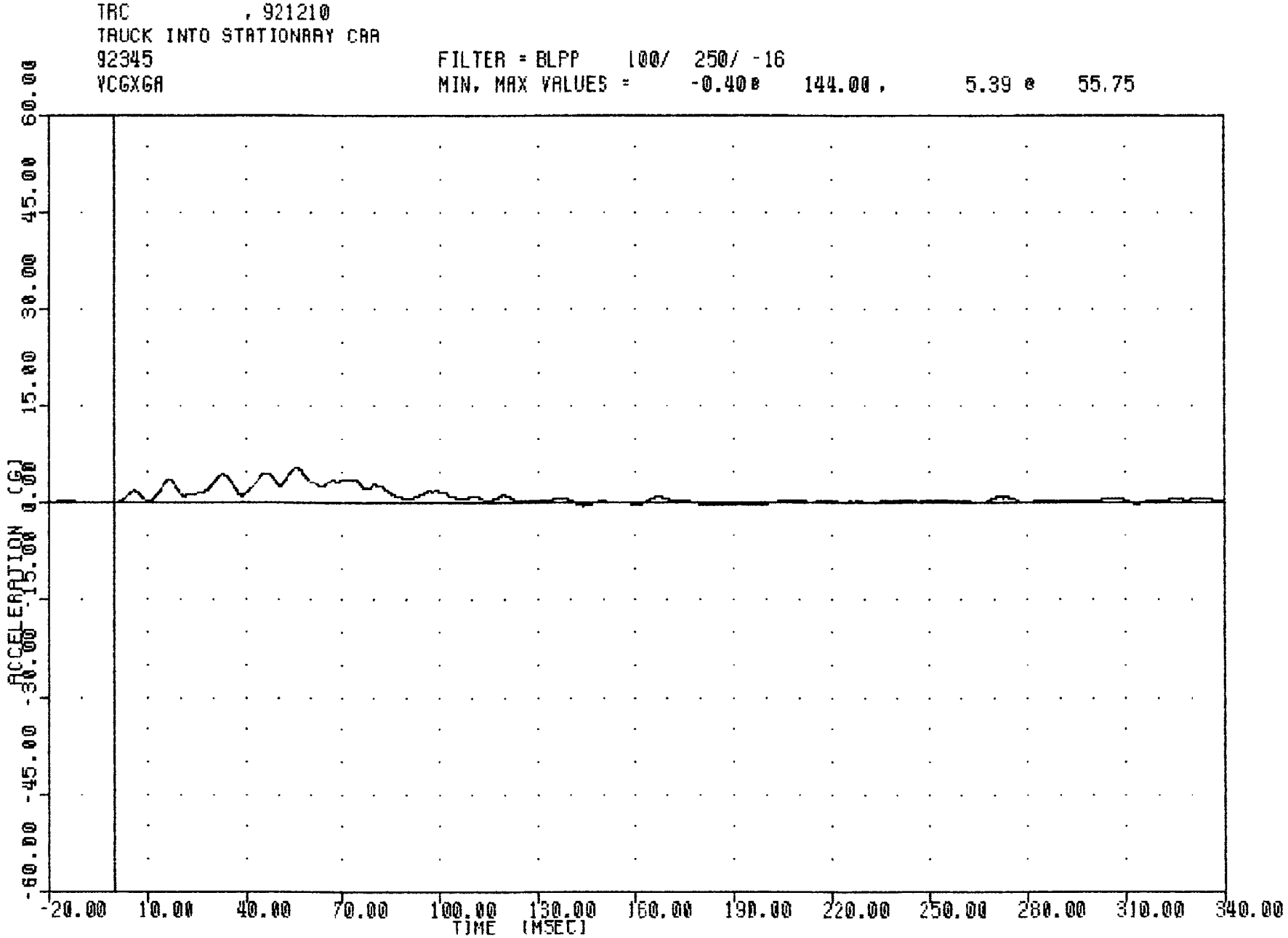
TRC , 921210
TRUCK INTO STATIONARY CAR
92345 FILTER = BLPP 300/ 750/ -16
FFCZVR MIN, MAX VALUES = -1.99 @ 109.88 , 0.48 @ 81.00



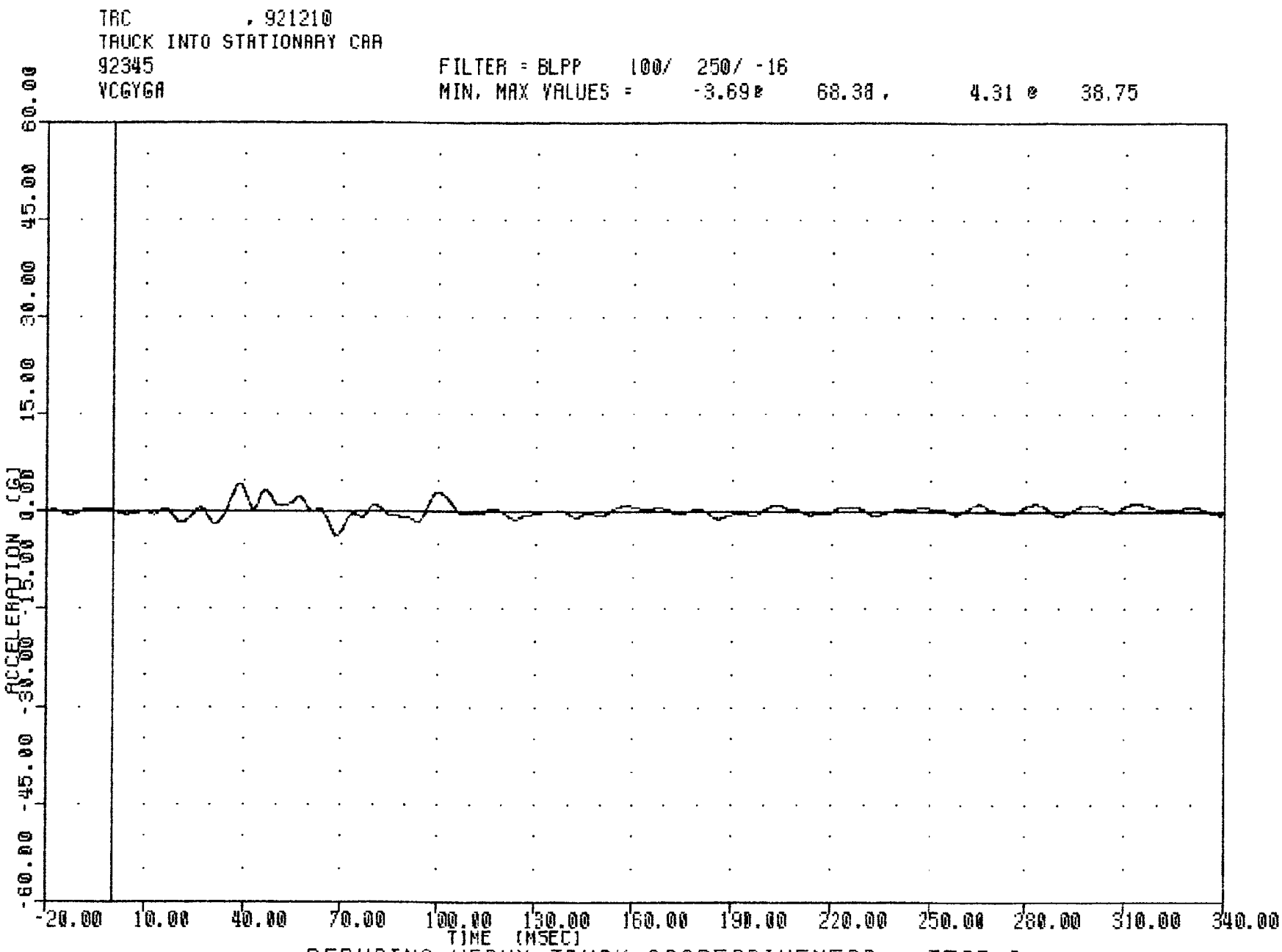
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS VELOCITY



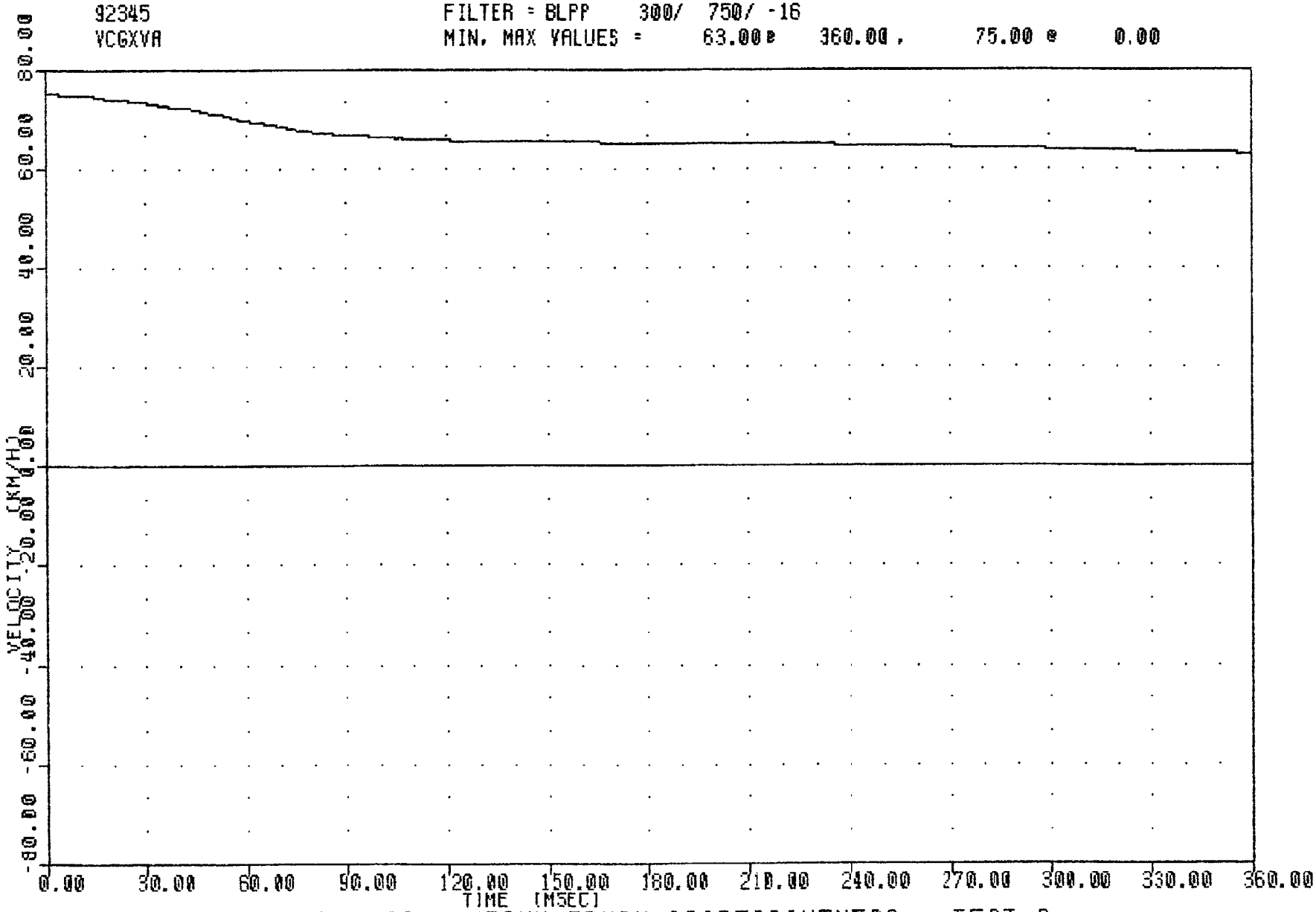
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK FRONT FRAME CROSSMEMBER VELOCITY RESULTANT



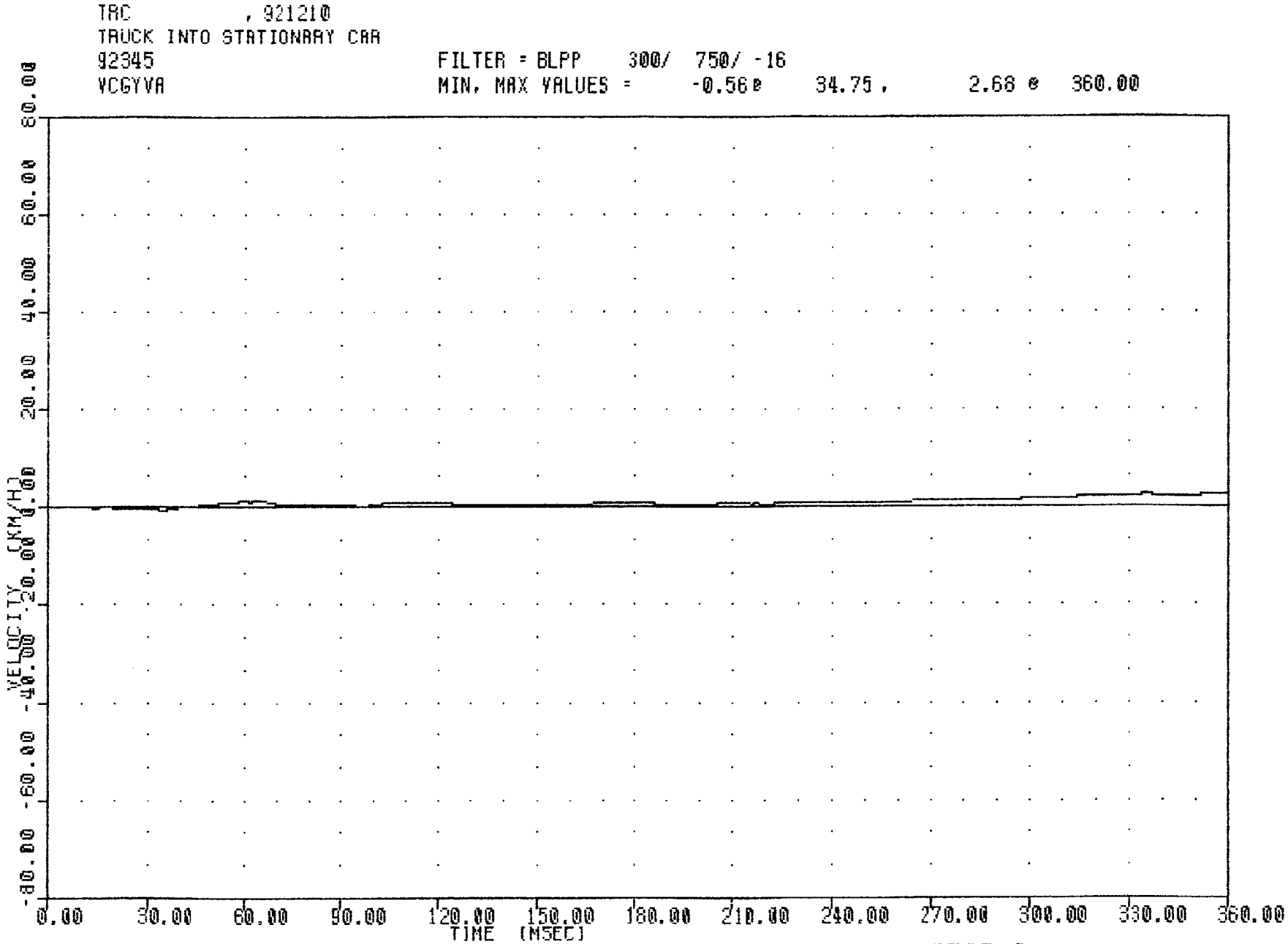
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK CENTER OF GRAVITY X-AXIS ACCELERATION



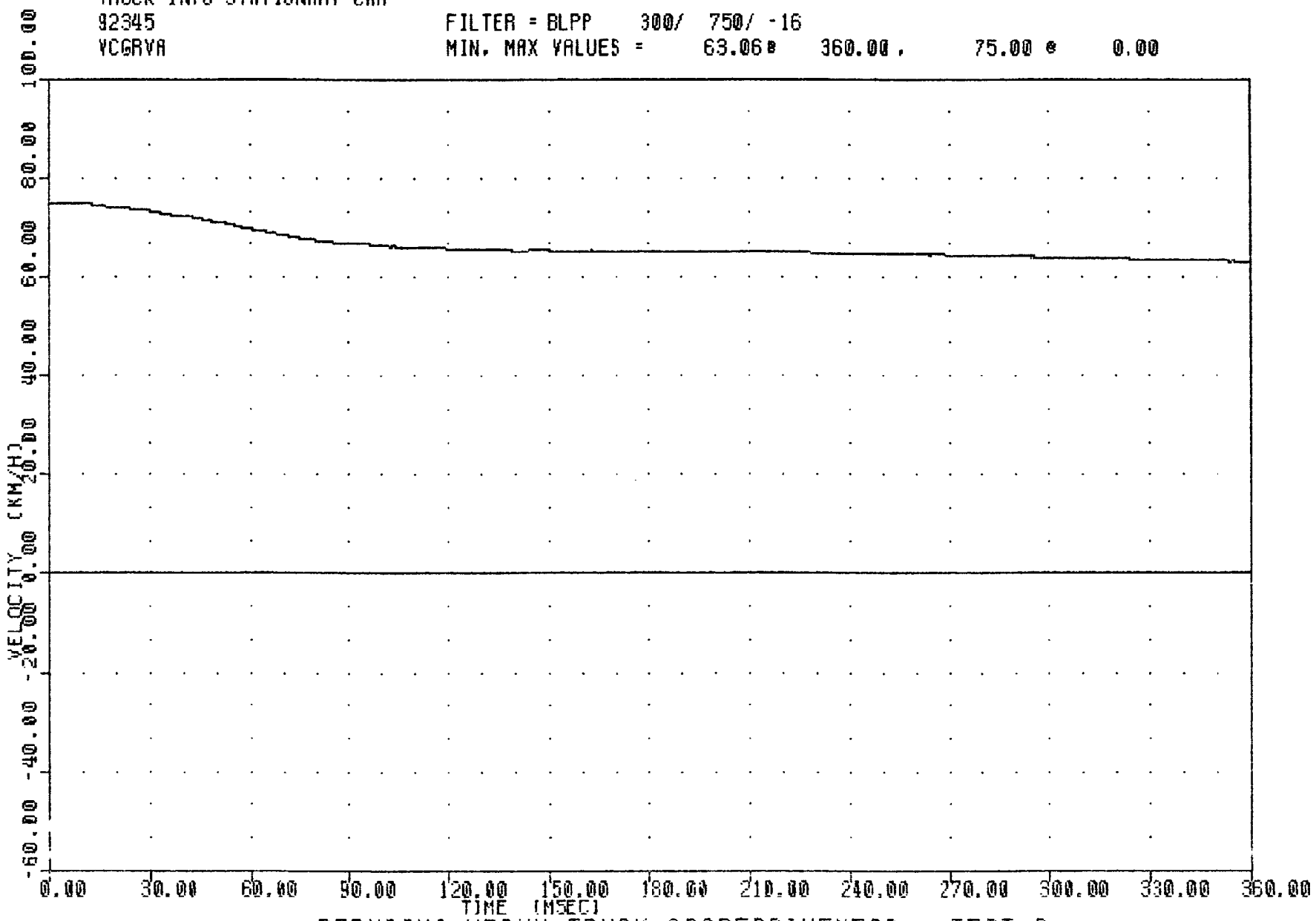
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK CENTER OF GRAVITY Y-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK CENTER OF GRAVITY X-AXIS VELOCITY



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK CENTER OF GRAVITY Y-AXIS VELOCITY



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 8
TRUCK CENTER OF GRAVITY VELOCITY RESULTANT

APPENDIX C

MISCELLANEOUS TEST INFORMATION

VEHICLE INSTRUMENTATION INFORMATION

TEST NO. 921210

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	LEFT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	BA46	REAR
2	RIGHT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	AZ83	REAR
3	ENGINE TOP LONGITUDINAL	X	ENDEVCO	2264	AR24	REAR
4	ENGINE BOTTOM LONGITUDINAL	X	ENDEVCO	2264	AW40	REAR
5	RIGHT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AR89	REAR
6	LEFT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AS29	REAR
7	INSTRUMENT PANEL CENTER					
	LONGITUDINAL	X	ENDEVCO	2264	AK03	REAR
	LAP BELT OUTBOARD FORCE		LEBOW	3419	127	TENSION
	SHOULDER BELT OUTBOARD FORCE		LEBOW	3419	571	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. 921210

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
9	FRONT FRAME CROSSMEMBER	X	ENDEVCO	7264	DA94H	FRONT
		Y	ENDEVCO	7264	BY88J	LEFT
		Z	ENDEVCO	7264	CW83H	UP
10	TRUCK CENTER OF GRAVITY	X	ENDEVCO	7264	CJ66H	REAR
		Y	ENDEVCO	7264	CJ16H	LEFT

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.

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

*U.S. G.P.O.:1993-301-717:80382