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Final Report

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Reducing Heavy Truck Aggressiveness Moving Heavy Truck into a 1989 Ford Taurus 4-Door Sedan at 83.0 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 1989 Ford Taurus 4-door sedan, 1FABP52U9KG218701 at the Transportation Research Center Inc. on October 12, 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.

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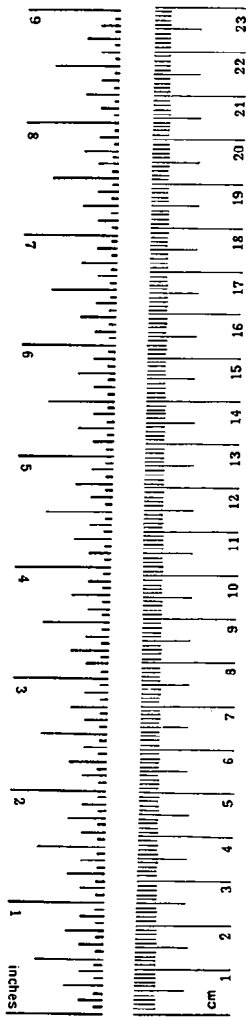
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

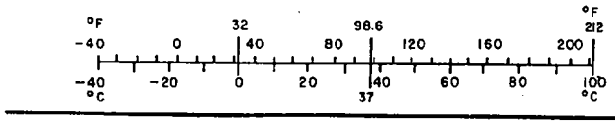
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2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

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



Approximate Conversions from Metric Measures

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



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SECTION 1.0

PURPOSE AND TEST SUMMARY

This test was conducted as research in support of reducing heavy truck aggressiveness. This test was conducted on October 12, 1992.

The stationary vehicle, a 1989 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 1584 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 340 degrees by a moving heavy truck at 83.0 kph. The intended impact engagement was the left front of the car with the right longitudinal frame rail of the truck.

The moving heavy truck's test weight was 11,748 kg. The truck was equipped with a standard truck bumper. The truck was instrumented with two (2) longitudinal and vertical axis accelerometers and one (1) lateral axis accelerometer.

The dummy's head injury criterion, HIC, was 1711. The dummy's chest deceleration with 3 milliseconds minimum duration was 58.3 g. The dummy's maximum left and right femur forces were 8711 N and 14801 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 the dummy calibration information. Appendix D contains miscellaneous test information.

SECTION 2.0

VEHICLE, DUMMY, TRUCK AND TEST DATA

TEST ANOMALIES

The engine bottom X-axis acceleration, ENGXG2, cable was cut by vehicle crush at 55 milliseconds.

The right brake caliper X-axis acceleration, BCRXG1, cable was cut by vehicle crush at 65 milliseconds.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE:	Heavy Truck into Stationary Vehicle	
TEST DATE: 10/12/92	TEST TIME: 1448	AMBIENT TEMP. (°C): 19
VEHICLE YEAR/MAKE/MODEL/BODY STYLE:	1989/Ford/Taurus/4-door sedan	
VEHICLE TEST WEIGHT (KG):	1584	
IMPACT ANGLE (DEG)*:	340	
IMPACT VELOCITY (KPH)**:	PRIMARY = 83.0	SECONDARY = 83.0
MAXIMUM STATIC CRUSH (MM):	497	
DUMMY:	Driver #048	
TYPE:	Part 572E	
LOCATION:	Left front	
RESTRAINT:	3-point unibelt	
NUMBER OF DATA CHANNELS:	36	
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 Co.

MAKE/MODEL: Ford/Taurus VIN: 1FABP52U9KG218701

BODY STYLE: 4-door sedan MODEL YEAR: 1989

COLOR: White

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: 64,994

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	Yes	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 Co. USA

DATE OF MANUFACTURE: 03/89 VIN: 1FABP52U9KG218701

GVWR: 4660 LBS

GAWR: FRONT: 2599 LBS., REAR: 2092 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Hercules, HP/4000, P205/70R14

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

SPARE TIRE (MFR., LINE, SIZE): Michelin, Tex, T135/80R14

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually-adjustable

MAXIMUM WIDTH: 1810 MILLIMETERS

WHEELBASE: 2690 MILLIMETERS

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on the interior of the glove box.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: PT205/70R14

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	675;	RF	695;	LR	648;	RR	658
PRE-TEST ATTITUDE:	LF	672;	RF	690;	LR	605;	RR	619
POST-TEST ATTITUDE:	LF	NA;	RF	582;	LR	588;	RR	618

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	471 KG	RIGHT REAR	215 KG
LEFT FRONT	457 KG	LEFT REAR	255 KG
TOTAL FRONT WEIGHT	928 KG	(66.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	470 KG	(33.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1398 KG		

TARGET TEST WEIGHT = 1581 KG*

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	479 KG	RIGHT REAR	294 KG
LEFT FRONT	461 KG	LEFT REAR	350 KG
TOTAL FRONT WEIGHT	940 KG	(59.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	644 KG	(40.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1584 KG		

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: None

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1094 MILLIMETERS REARWARD OF FRONT WHEEL CENTERLINE

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

TABLE 3 TRUCK INFORMATION

WEIGHT DISTRIBUTION

FRONT: 2214 KG

REAR: 9534 KG

AXLE SPACING

FRONT: 3835 MM

REAR: 1308 MM

DISTANCE OF C.G. BEHIND FRONT AXLE: 3343 MM

BUMPER DESCRIPTION: Stock truck bumper

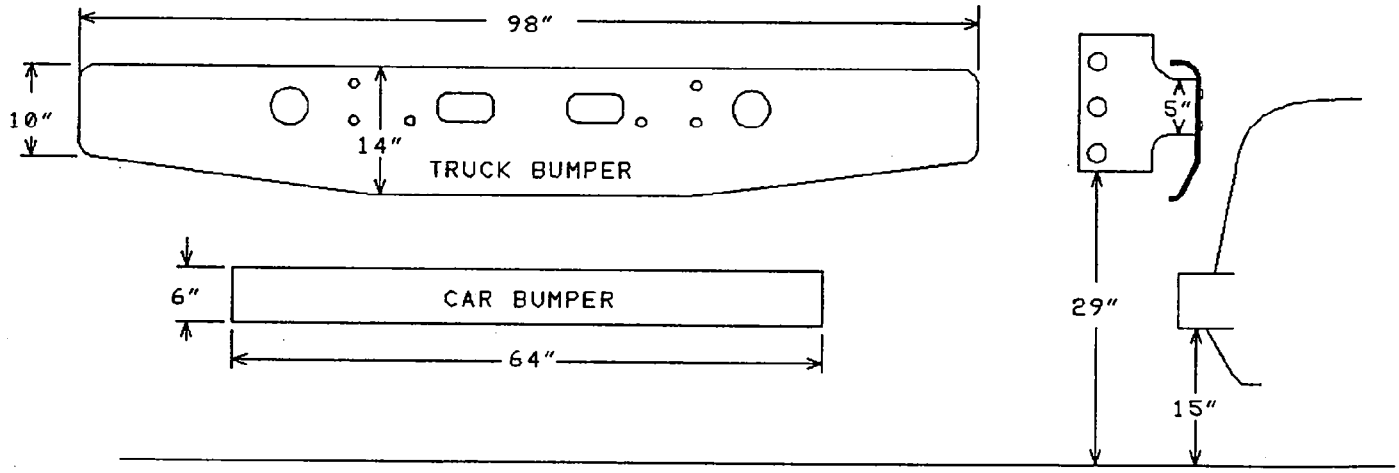


TABLE 4 POST-IMPACT DATA

TEST NUMBER: 921012

TEST DATE: 10/12/92 TEST TIME: 1448

TEST TYPE: Heavy Truck into Stationary Vehicle IMPACT ANGLE: 340°

AMBIENT TEMPERATURE AT IMPACT AREA: 19° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 19° C

IMPACT VELOCITY: PRIMARY = 83.0 KPH
SECONDARY = 83.0 KPH

(SPECIFIED RANGE = 78.9 TO 82.0 KPH)

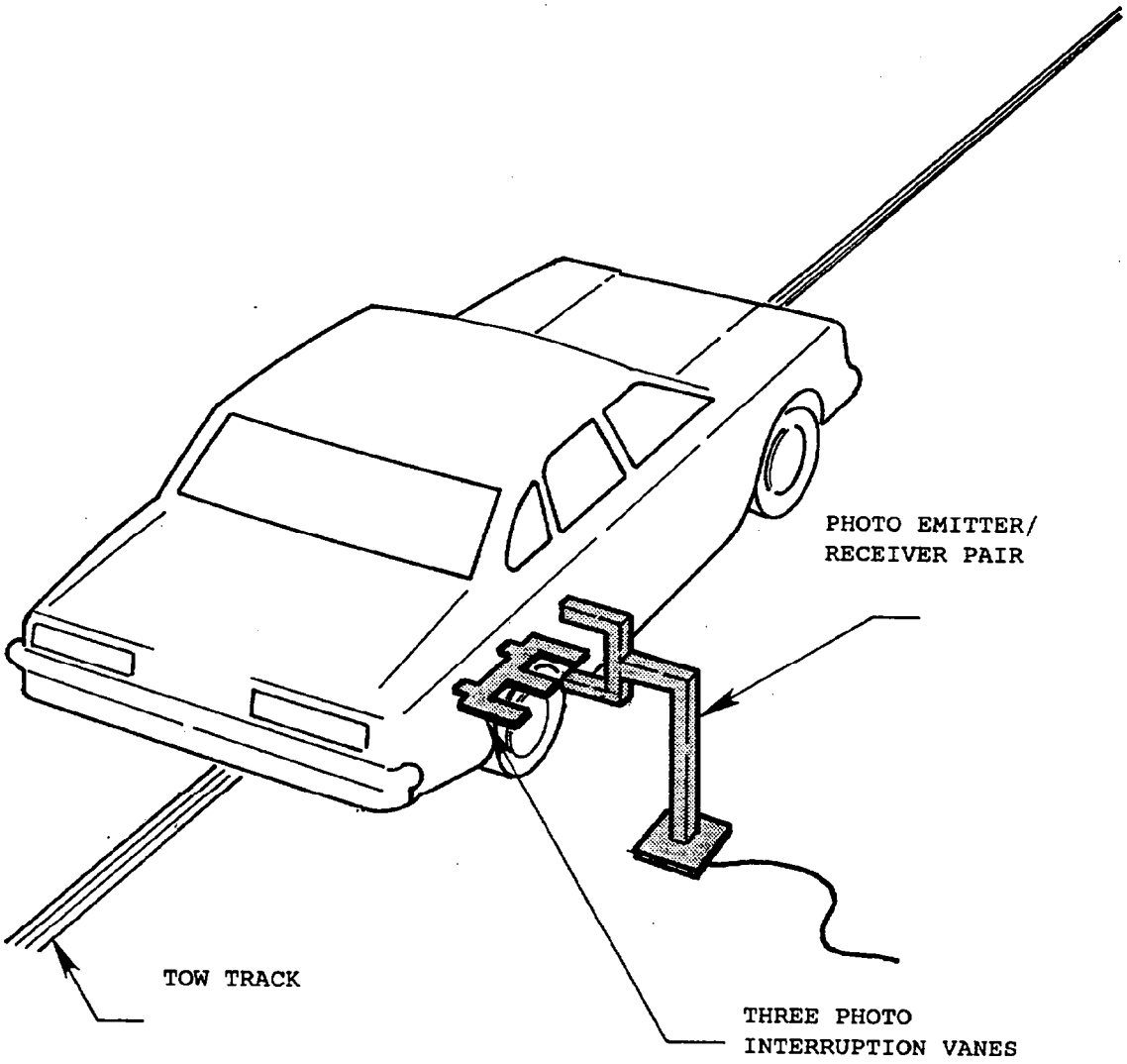
DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 660 MM

EXITING VELOCITY TRAP = 51 MM

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

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	L	4650;	C	4812;	R 4650
	POST-TEST:	L	4195;	C	4315;	R 4487
	TOTAL CRUSH:	L	455;	C	497;	R 163
	AVERAGE CRUSH:	372				

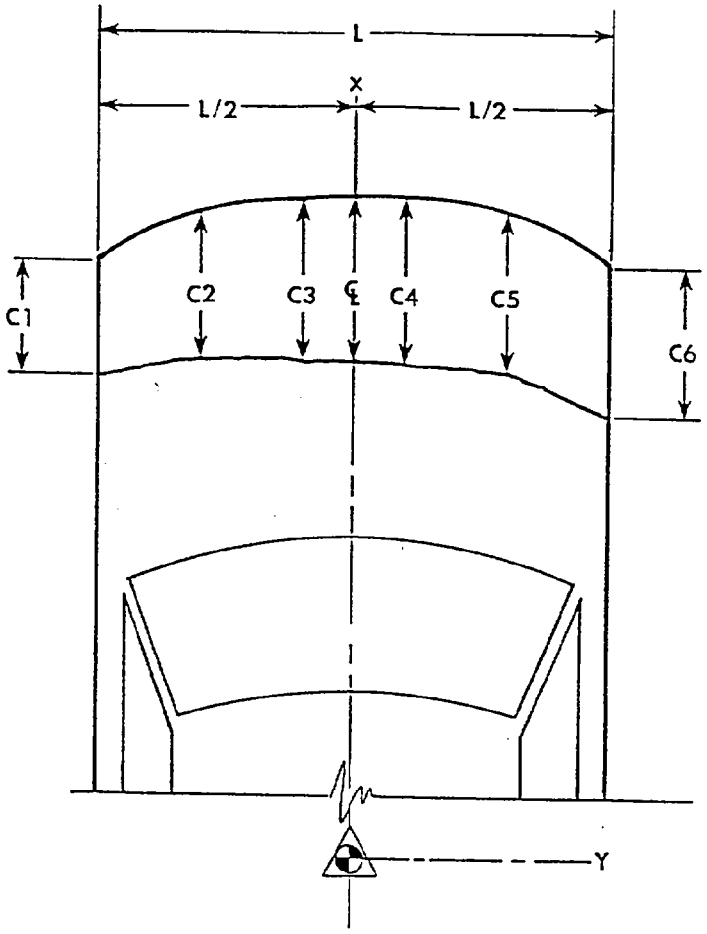
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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	4650	4195	455
C2	4743	4313	430
C3	4812	4325	487
C4	4812	4435	377
C5	4746	4556	190
C6	4650	4487	163
CL	4812	4315	497

FIGURE 3

PRE-TEST AND POST-TEST MEASUREMENT POINTS

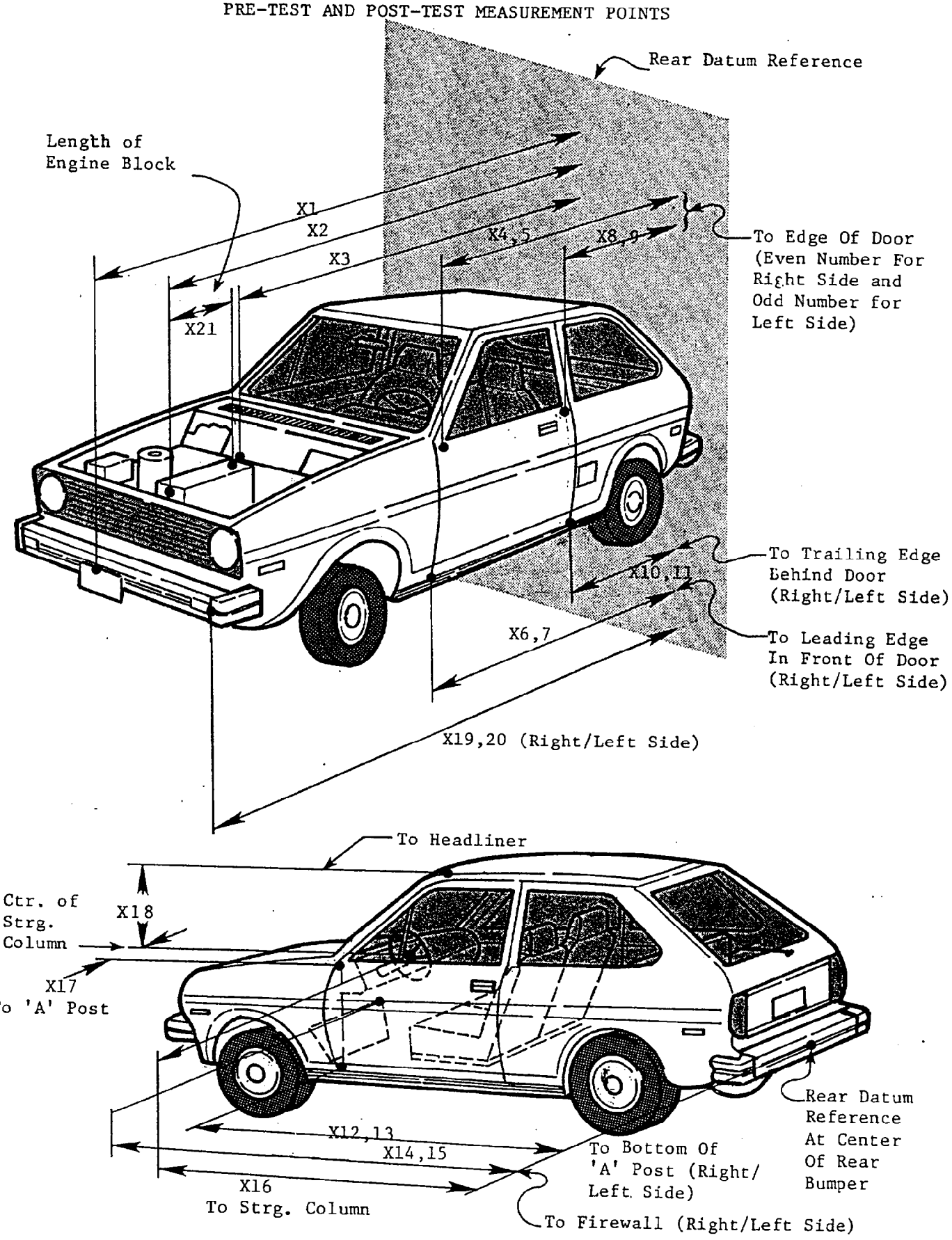


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Ford/Taurus

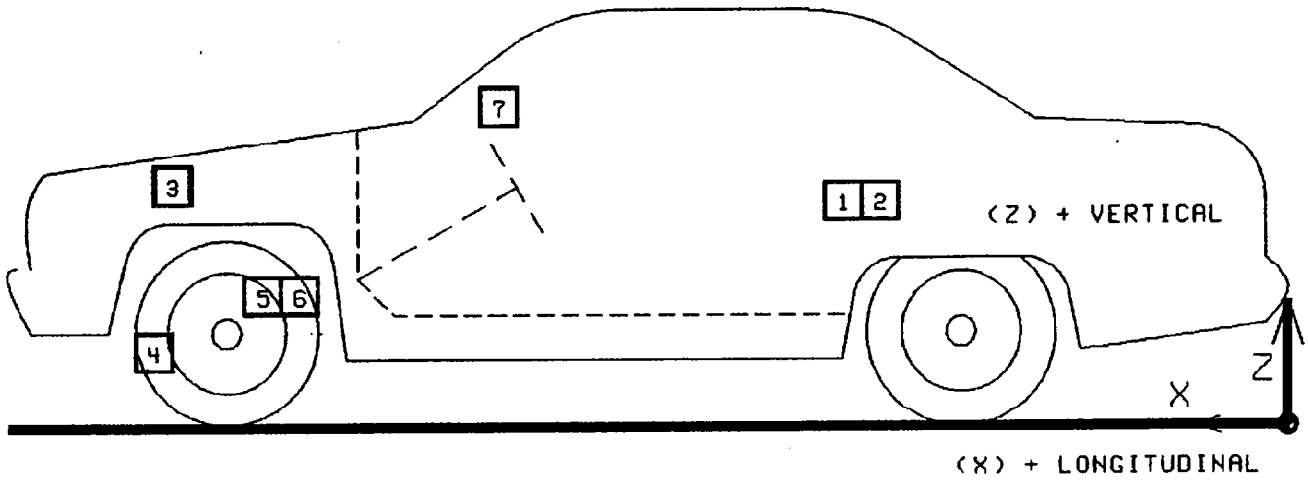
TEST NUMBER: 921012

ALL MEASUREMENTS ARE IN MILLIMETERS

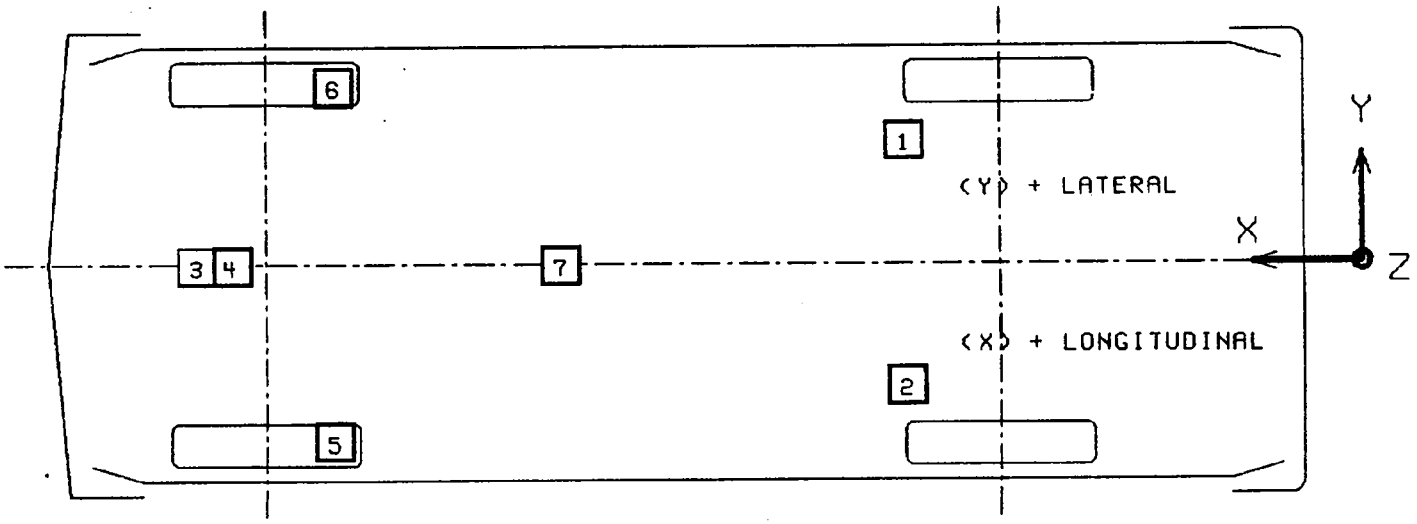
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4812	4315	497
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	4252	3810	442
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3612	3370	242
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	3312	3330	-18
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	3310	3123	187
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	3247	3224	23
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	3240	3200	40
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	2225	2252	-27
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	2225	2180	45
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	2210	2190	20
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	2210	2182	28
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	3208	3178	30
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	3206	3132	74
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3540	3476	64
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3540	3070	470
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2844	2575	269
X17	CENTER OF STEERING COLUMN TO "A" POST	262	345	-83
X18	CENTER OF STEERING COLUMN TO HEADLINER	448	790	-342
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4650	4487	163
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4650	4195	455
X21	LENGTH OF ENGINE BLOCK	350	350	0

FIGURE 4

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 6

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 921012

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	1850	673	350	2.1	243.5	25.7	40.8
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	1840	-673	362	1.6	235.9	30.5	39.6
3	ENGINE TOP LONGITUDINAL	4192	-130	742	105.0	65.0	272.4	24.8
4	ENGINE BOTTOM LONGITUDINAL	4024	10	151	---	--- γ	83.0	51.5
5	RIGHT BRAKE CALIPER LONGITUDINAL	3880	-673	315	---	--- γ	76.7	38.6
6	LEFT BRAKE CALIPER LONGITUDINAL	3880	673	315	21.1	69.5	98.0	40.3
7	INSTRUMENT PANEL CENTER LONGITUDINAL	3214	139	974	96.4	78.5	86.6	64.0
8	CENTER OF GRAVITY	2260	0	292				
	LONGITUDINAL				1.4	264.8	37.0	50.6
	LATERAL				4.6	150.0	11.7	65.5
	VERTICAL				16.8	89.5	19.6	48.8
	RESULTANT				41.0	50.5		

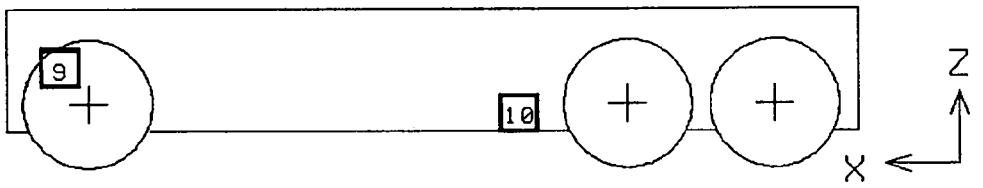
* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

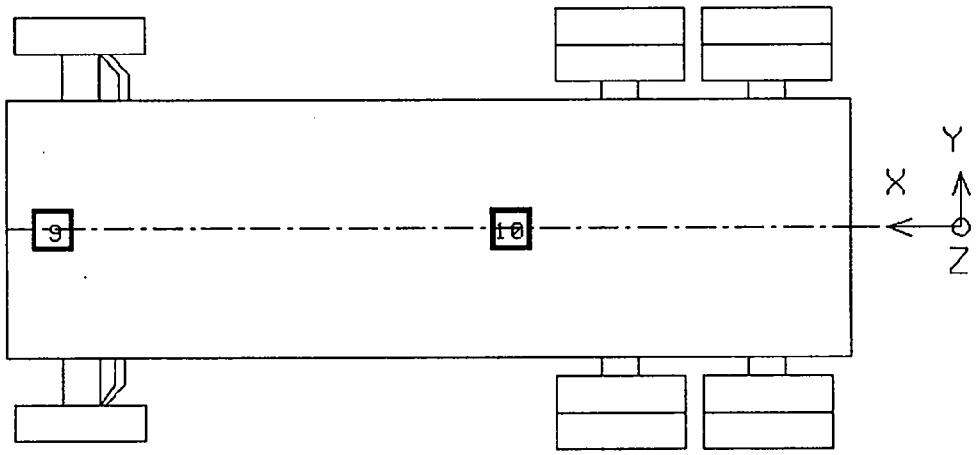
γ See TEST ANOMALIES

FIGURE 5

HEAVY TRUCK ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 7

HEAVY TRUCK ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 921012

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
9	FRONT FRAME CROSSMEMBER	2527	0	1050				
	LONGITUDINAL				18.5	14.6	20.7	32.4
	LATERAL				21.3	29.3	10.8	78.9
	VERTICAL				14.3	28.5	9.9	55.4
	RESULTANT				26.3	28.9		
10	CENTER OF GRAVITY	6160	0	658				
	LONGITUDINAL				2.2	60.6	6.1	54.8
	LATERAL				7.2	123.0	5.5	57.9

* 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 921012

	DRIVER DUMMY SN: 048			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
HEAD ACCELERATION (g)				
LONGITUDINAL	8.8	314.4	125.6	100.3
LATERAL	13.6	133.6	109.4	105.5
VERTICAL	8.6	130.8	79.0	98.9
RESULTANT	151.6	100.1		
HIC	1711 FROM 83.1 TO 116.1			
NECK FORCE (N)				
LONGITUDINAL	1250.9	84.6	63.6	36.3
LATERAL	818.0	102.8	616.0	113.8
VERTICAL	2636.7	98.1	2634.5	110.4
RESULTANT	2843.3	110.3		
NECK MOMENT (N-M)				
ABOUT X	39.3	103.1	61.7	112.9
ABOUT Y	72.2	123.4	79.0	83.4
ABOUT Z	26.6	123.0	7.3	185.6
RESULTANT	80.6	123.8		
CHEST ACCELERATION (g)				
LONGITUDINAL	3.2	290.9	56.2	70.8
LATERAL	7.9	65.0	36.6	111.9
VERTICAL	28.5	117.9	28.3	73.8
RESULTANT	61.7	71.0		
3 MSEC	58.3			
CHEST DEFLECTION (mm)				
LONGITUDINAL	0.2	16.5	59.1	74.8
PELVIS ACCELERATION (g)				
LONGITUDINAL	19.8	88.0	120.6	62.6
LATERAL	24.9	59.8	37.6	102.1
VERTICAL	21.9	69.6	14.3	59.5
RESULTANT	122.5	62.6		

TABLE 8

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 921012

	DRIVER DUMMY SN: 049			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
FEMUR LOAD (N)				
LEFT	457.6	54.9	8710.7	65.0
RIGHT	3604.1	115.9	14800.9	64.0

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

TABLE 9 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #048	PASSENGER # NA
HEAD	A-pillar, steering wheel & instr. panel	
CHEST	Steering wheel	
ABDOMEN	Steering wheel	
LEFT KNEE	Instrument panel	
RIGHT KNEE	Instrument panel	

DOOR OPENING:

	LEFT	RIGHT
FRONT	NA	Opened w/difficulty
REAR	NA	Opened easily

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	NA
REAR	NA	NA

GLAZING DAMAGE:

The entire windshield was cracked on impact.

The driver's side door glass broke on impact.

OTHER NOTABLE IMPACT EFFECTS:

Both of the drivers side doors opened after impact. The hood became detached after impact.

The right front tire deflated after impact.

DUMMY KINEMATIC SUMMARY

The dummy translated forward and to the left at impact. The dummy's head impacted the A-pillar and then the steering wheel rim and instrument panel. The dummy's torso impacted the steering wheel rim and hub. The dummy's knees then impacted the instrument panel. The dummy came to rest in the 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: 1989

COLOR: White

DATA FROM CERTIFICATION LABEL:

VEHICLE MANUFACTURER: Ford Motor Co., USA

DATE OF MANUFACTURE: 03/89 VIN: 1FABP52U9KG218701

GVWR: 4660 LBS.; GAWR: FRONT = 2599 LBS.; REAR = 2092 LBS.

POST-IMPACT DATA:

DATE OF TEST: 10/12/92 TIME: 1448 TEMPERATURE: 19° C

IMPACT VELOCITY: PRIMARY = 83.0 MPH SECONDARY = 83.0 MPH

REQUIRED IMPACT VELOCITY RANGE: 78.9 TO 82.0 MPH

SEAT TYPE: Split bench ADJUSTER TYPE: Manual

FRONT SEAT BACK TYPE: Manually adjustable

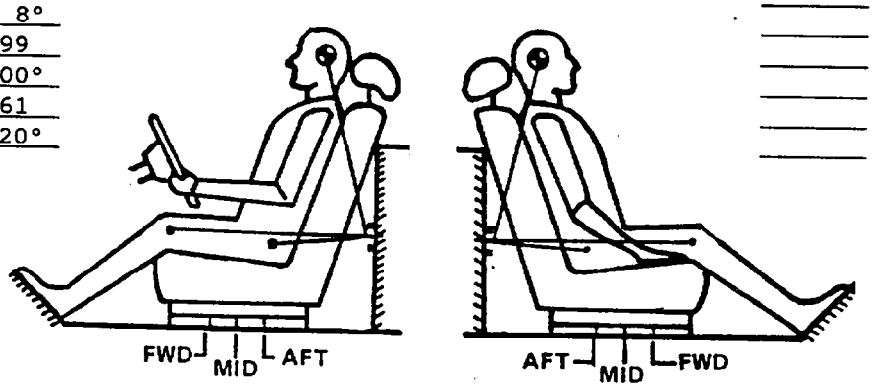
TECHNICIANS: R. Cribley, P. Cummins

DRIVER DUMMY # 048 TYPE: HIII

HEAD	452
TARGET	8°
KNEE	599
JOINT	100°
APPROX-IMATE "H" POINT	261 120°

PASSENGER DUMMY # NA TYPE: _____

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



A = 1440

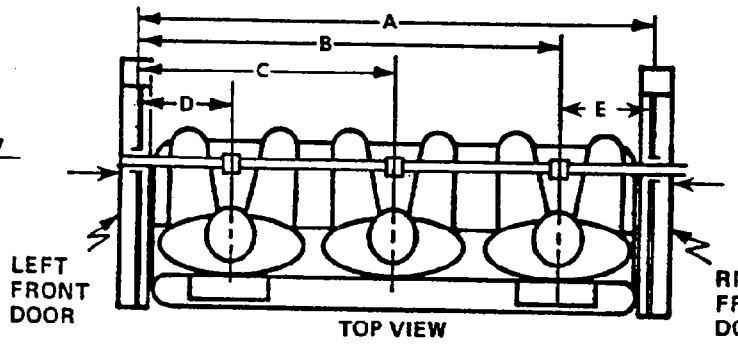
B = NA

C = NA

D = 360

E = NA

DOOR GLASS HEIGHT = 187



DOOR GLASS HEIGHT = _____

DRIVER DUMMY

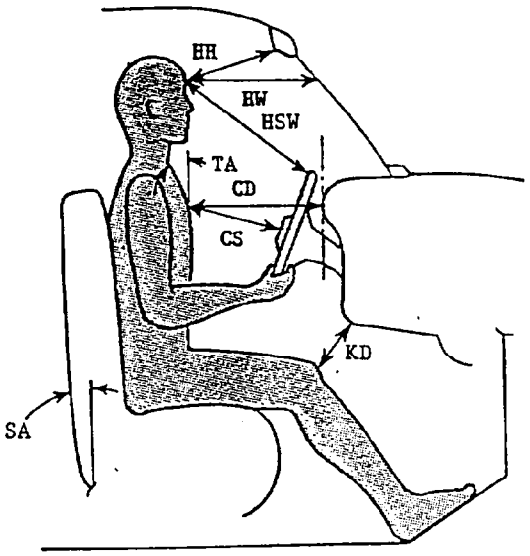
PASSENGER DUMMY

ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

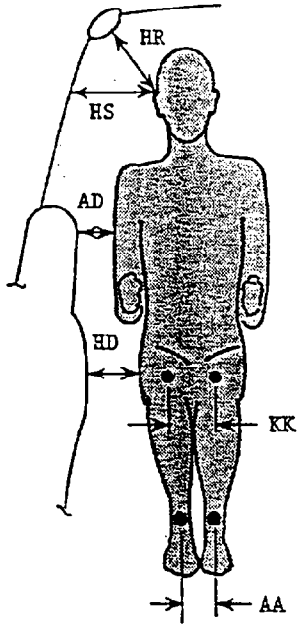
ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

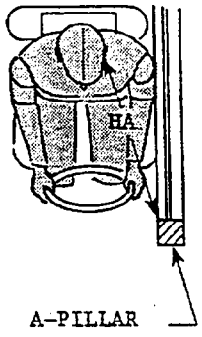
FIGURE 7 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
	048	NA
HH	368	
HW	576	
CD	568	
CS	362	
KDL	155	
KDR	155	
TA	13°	
SA	23°	
HSW	467	



	DRIVER	PASSENGER
	048	NA
HR	203	
HS	270	
AD	108	
HD	191	
KK	203	
AA	267	
HA	545	





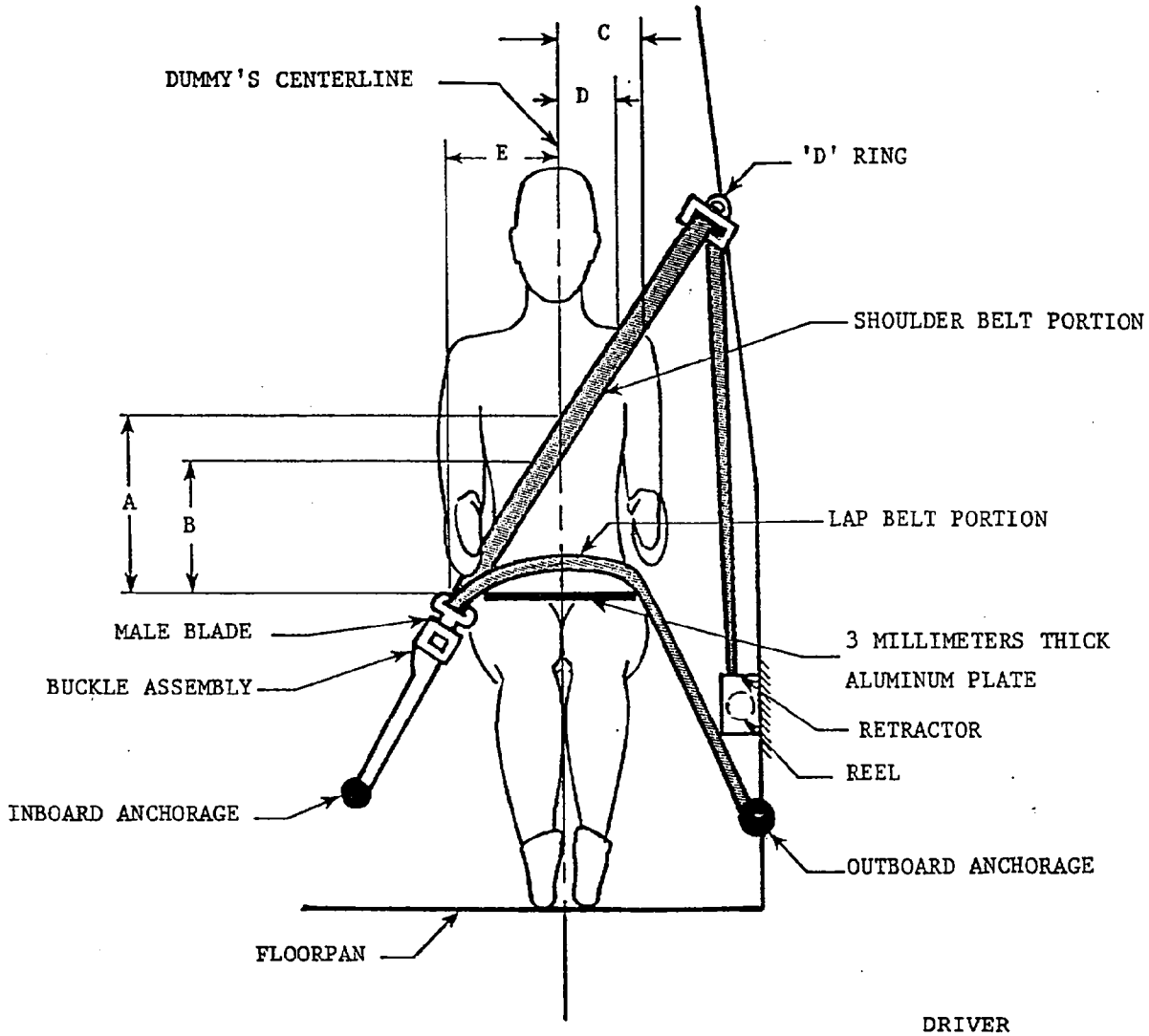
KNEE OUTER CLEVIS TO OUTER CLEVIS SPACING:
DRIVER = 270
PELVIS ANGLE:
DRIVER = 25°

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.

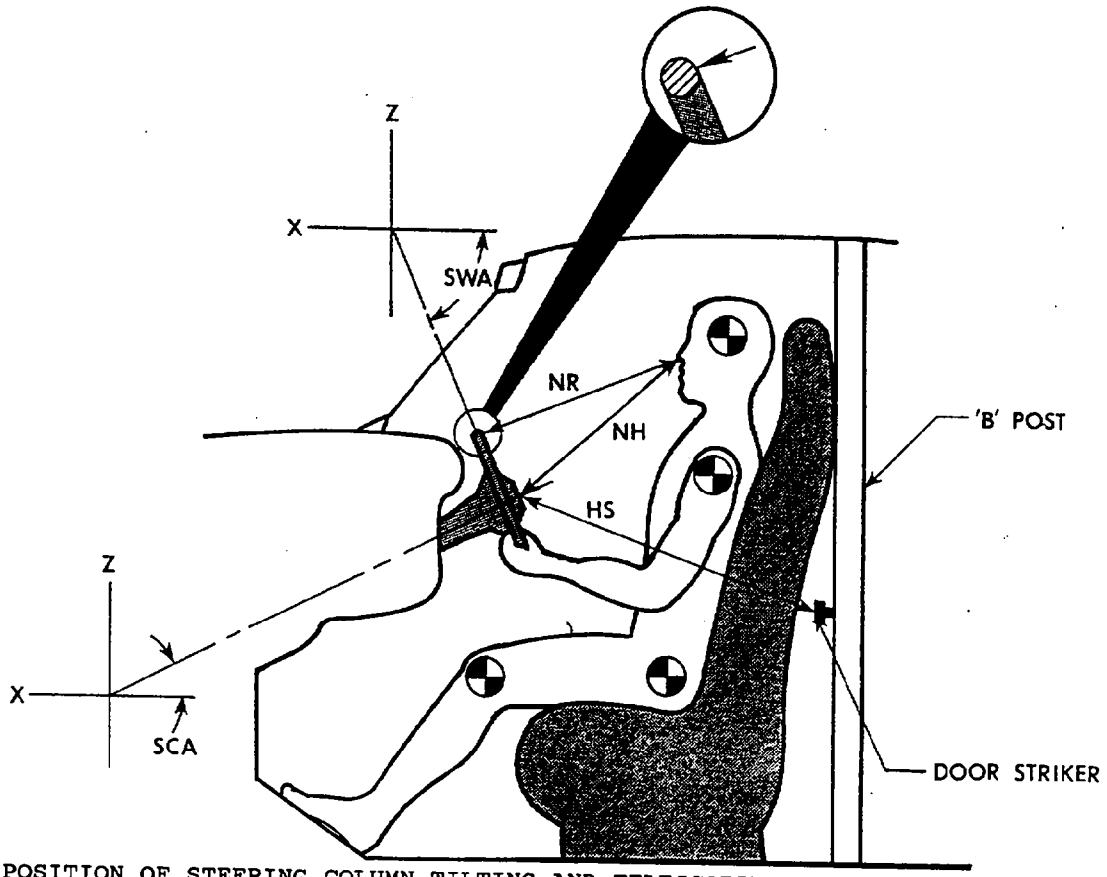
FIGURE 8 SEAT BELT POSITIONING DATA



	DRIVER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	355
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	265
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	92
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	33
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	180

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 from the bottom.

	MEASUREMENTS
NR - DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	426
NH - DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	426
HS - DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	576
SCA - ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	24°
SWA - ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	57°

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10

CAMERA POSITIONS

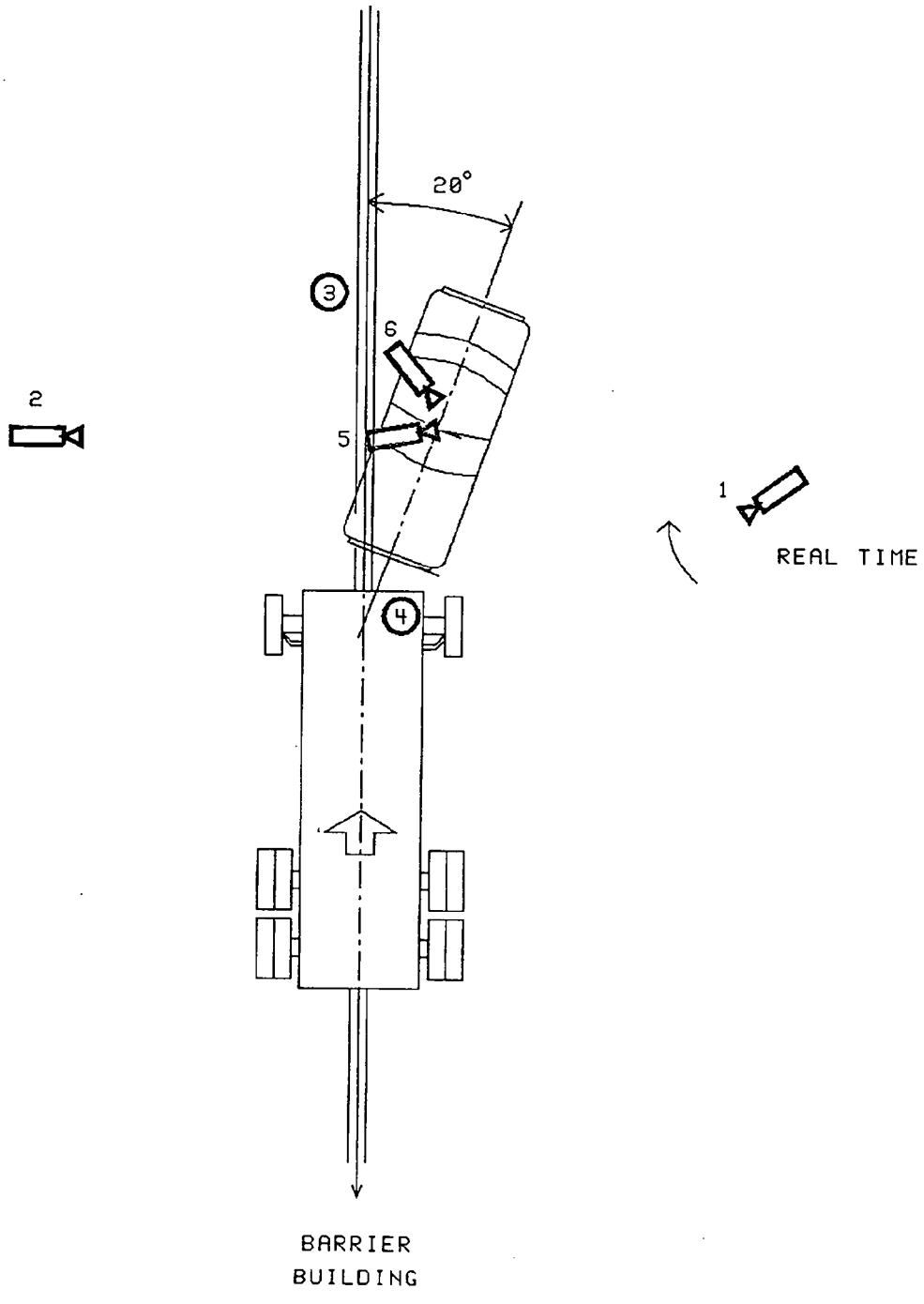


TABLE 10 MOTION PICTURE CAMERA INFORMATION

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	505	Vehicle dynamics
3	Overhead wide	Photosonic	8.5	535	Vehicle dynamics
4	Onboard truck	Photosonic	8	502	Dummy kinematics
5	Onboard car front	Photosonic	8	495	Dummy kinematics
6	Onboard car rear	Photosonic	8	495	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

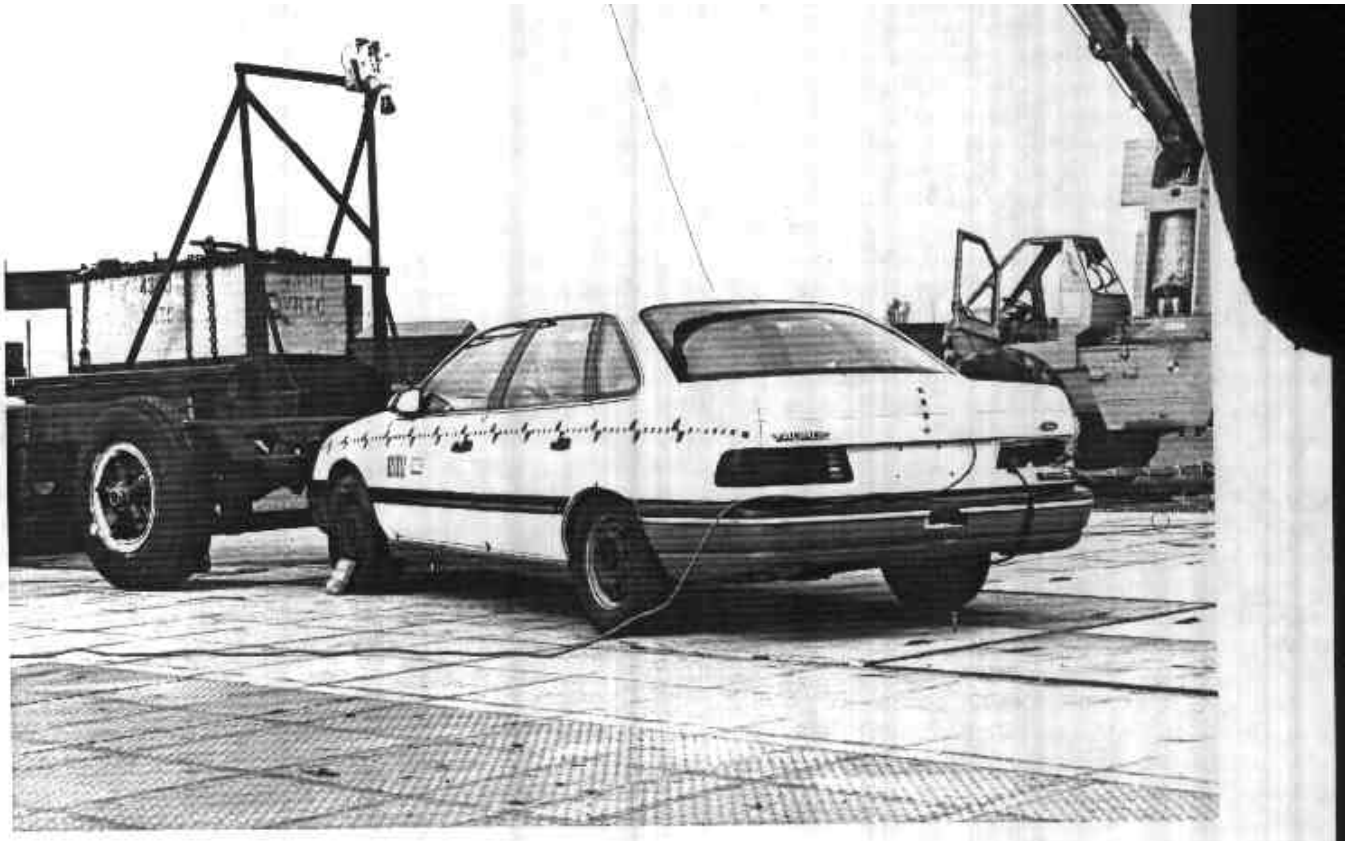


Figure A-5. PRE-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-6. POST-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-7. PRE-TEST REAR VIEW

Figure A-8. POST-TEST REAR VIEW

Figure A-9. PRE-TEST RIGHT SIDE VIEW

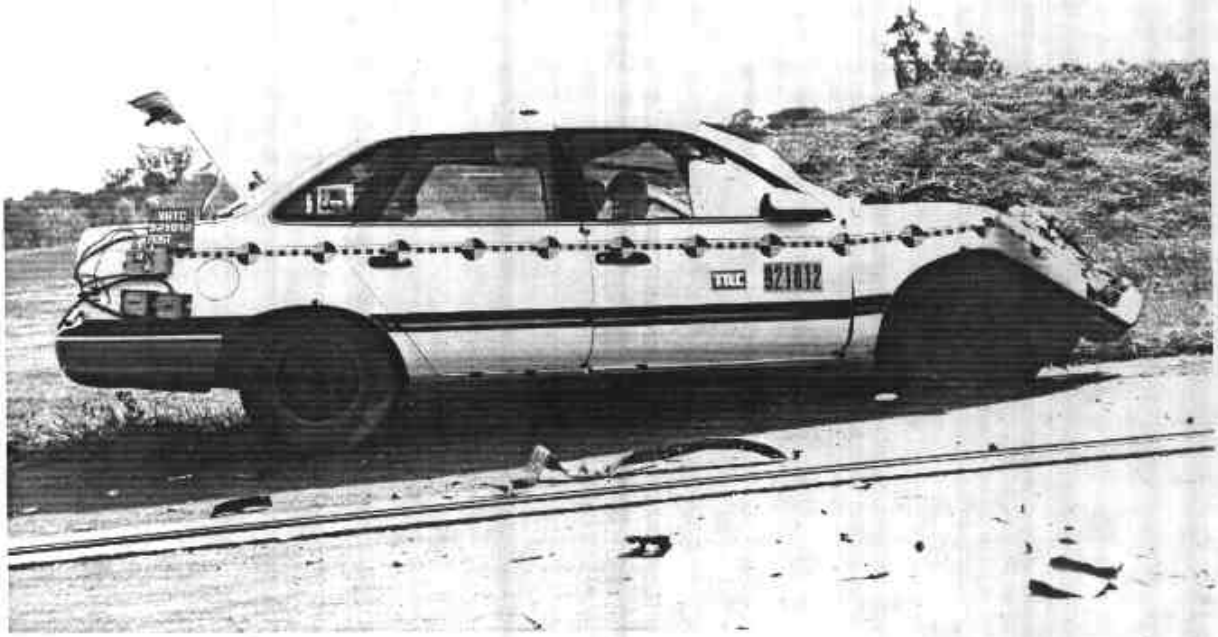


Figure A-10. POST-TEST RIGHT SIDE VIEW

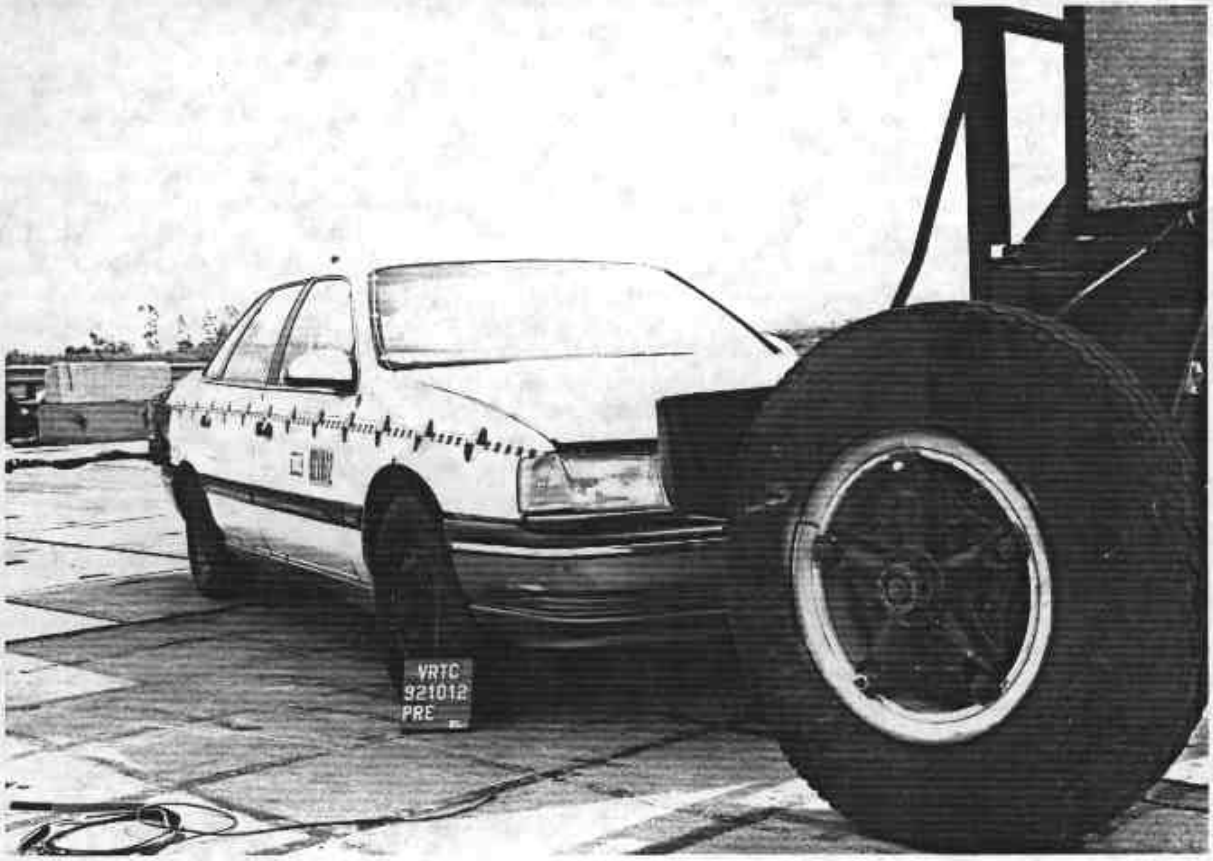


Figure A-11. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

Figure A-12. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

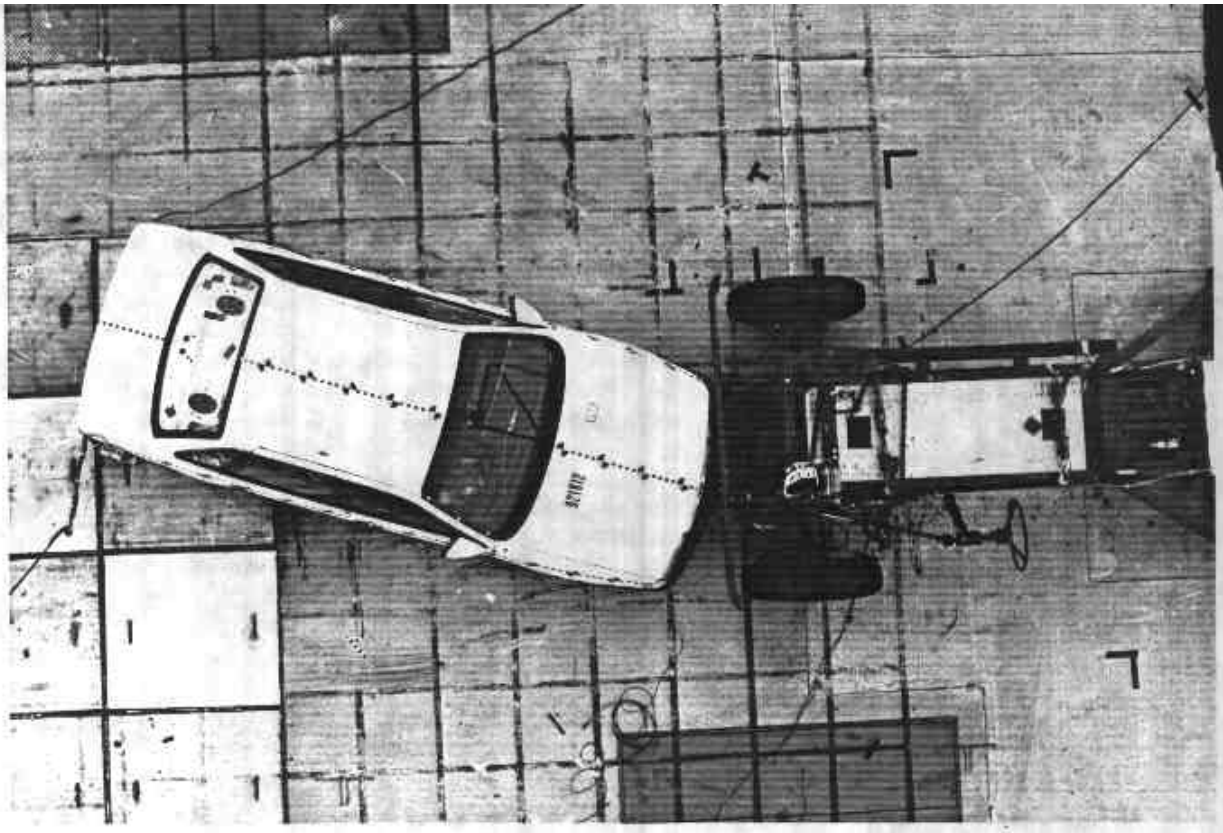


Figure A-13. PRE-TEST BUMPER ENGAGEMENT - VIEW 1

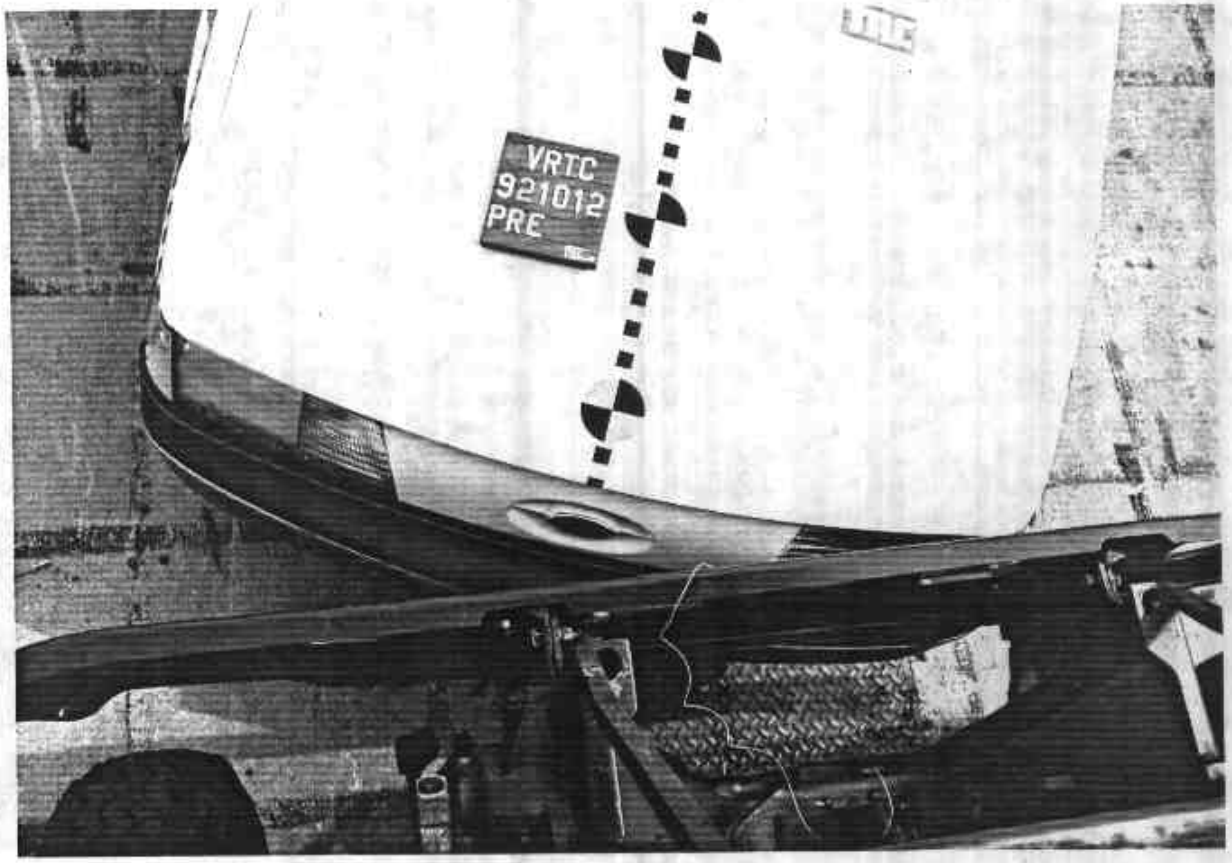


Figure A-14. PRE-TEST BUMPER ENGAGEMENT - VIEW 2

Figure A-15. PRE-TEST BUMPER ENGAGEMENT - VIEW 3

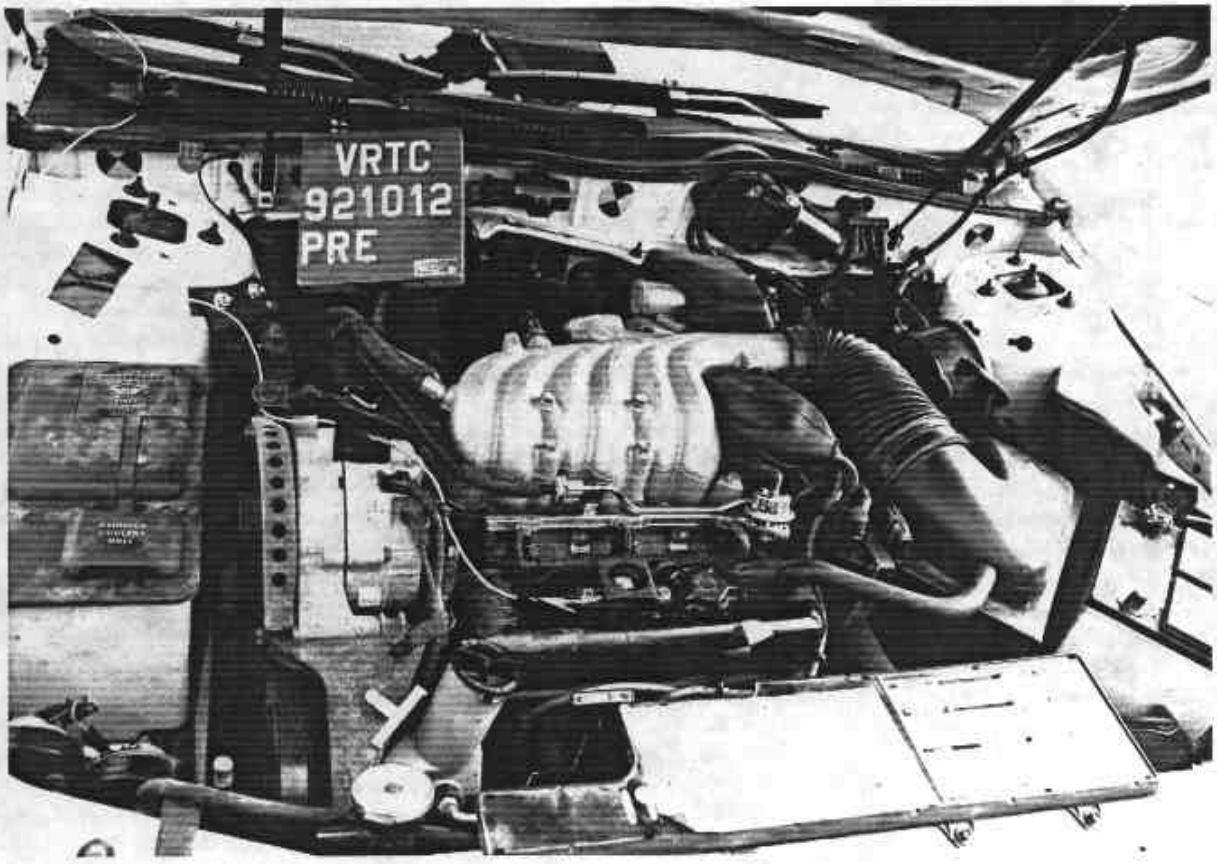


Figure A-16. PRE-TEST ENGINE COMPARTMENT VIEW

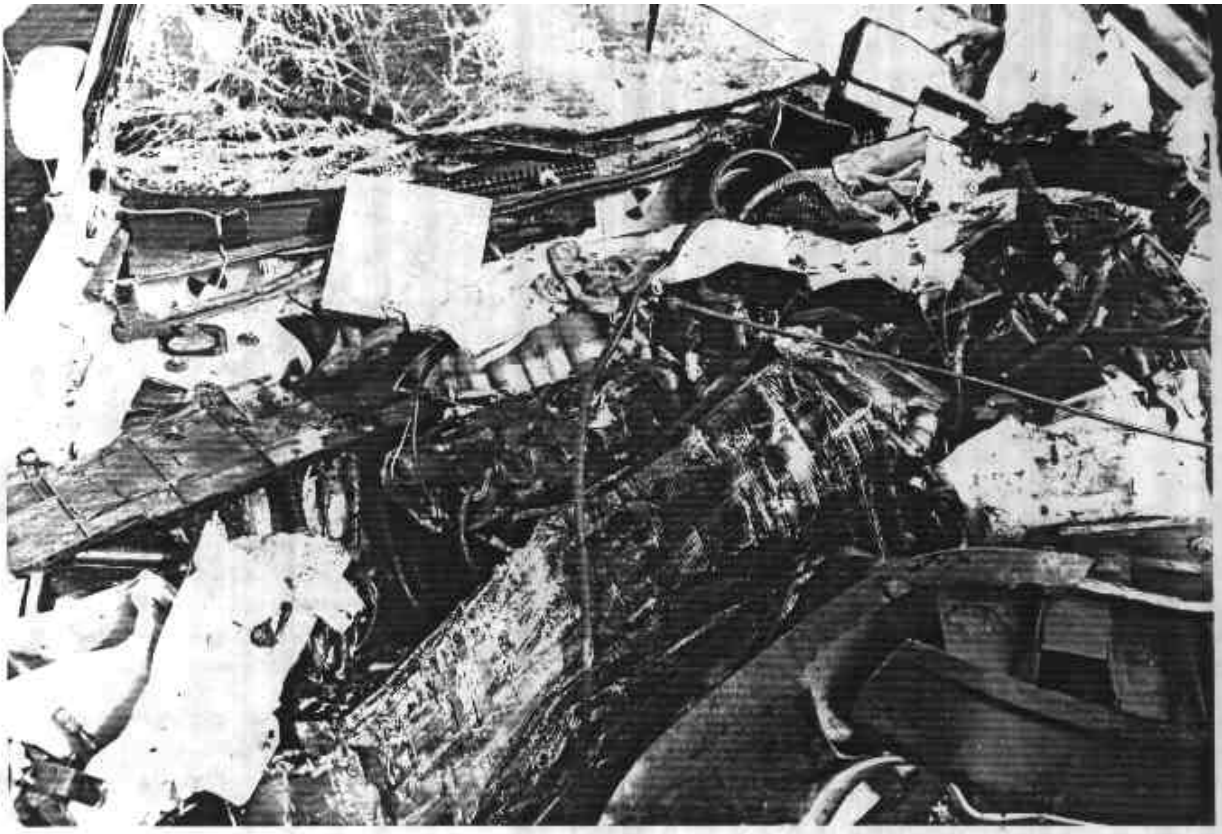


Figure A-17. POST-TEST ENGINE COMPARTMENT VIEW

Figure A-18. PRE-TEST WINDSHIELD VIEW

Figure A-19. POST-TEST WINDSHIELD VIEW

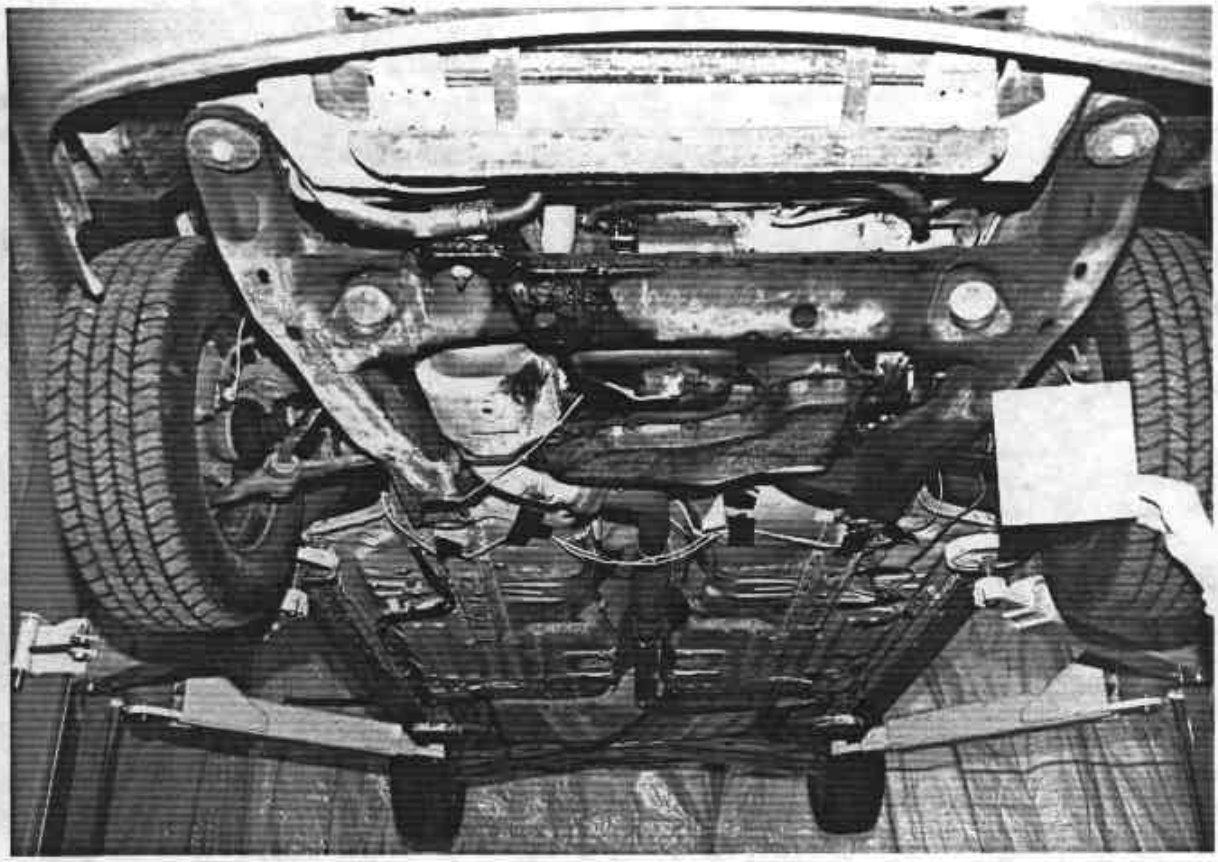


Figure A-20. PRE-TEST FRONT UNDERBODY VIEW

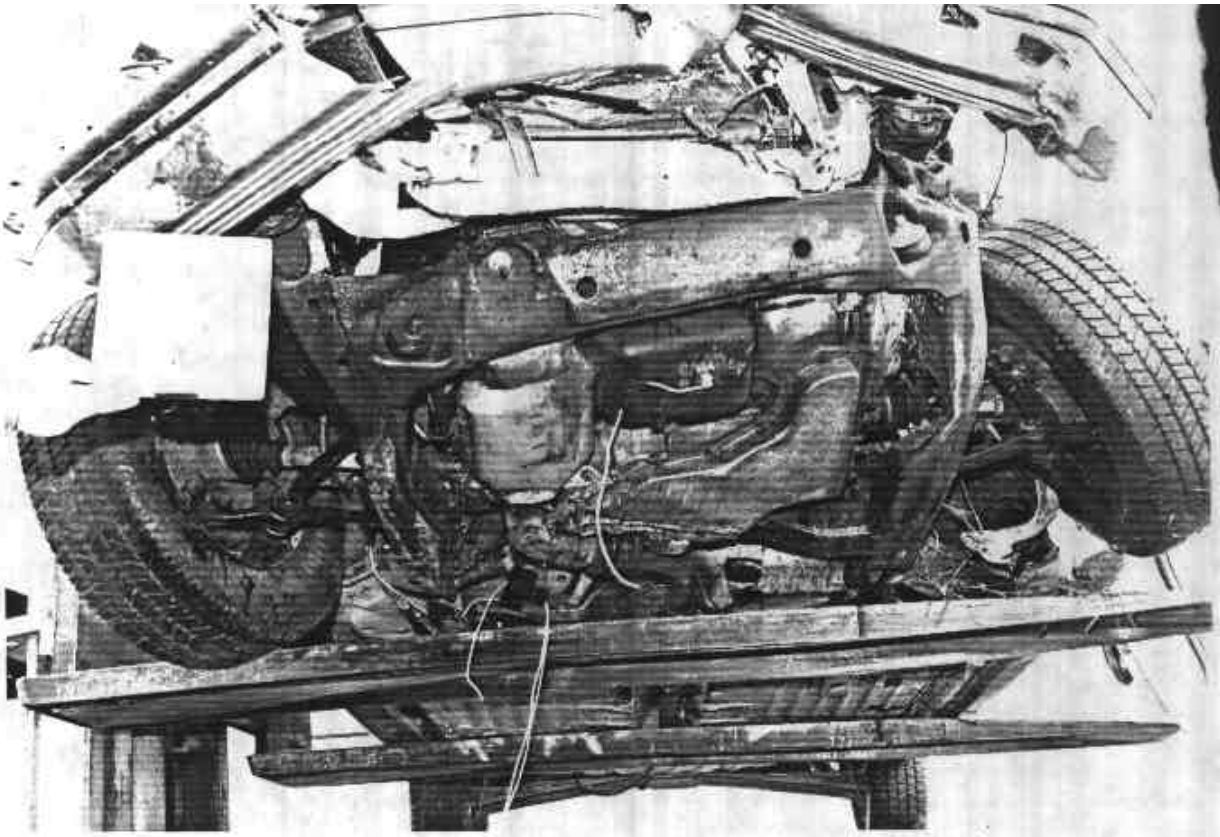


Figure A-21. POST-TEST FRONT UNDERBODY VIEW

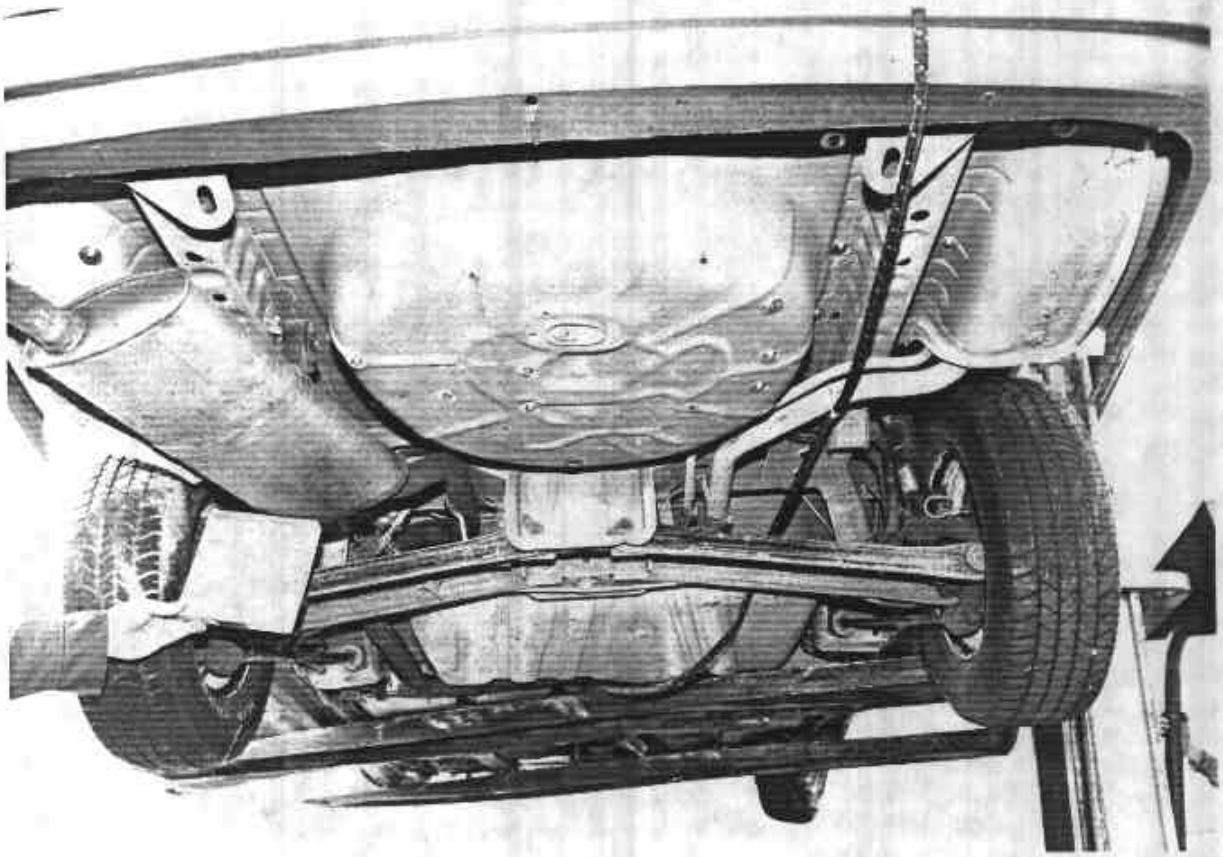


Figure A-22. POST-TEST REAR UNDERBODY VIEW

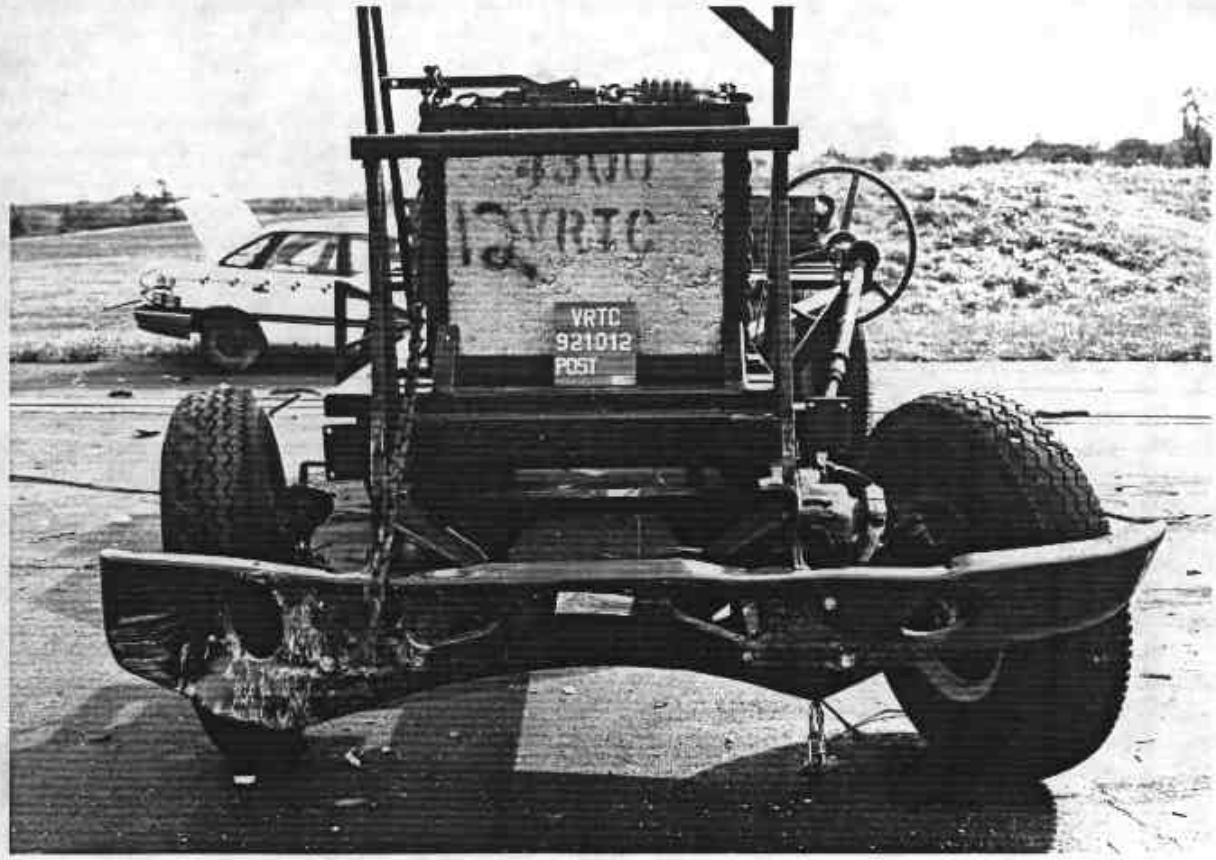


Figure A-23. POST-TEST TRUCK FRONT VIEW

Figure A-24. PRE-TEST DUMMY VIEW

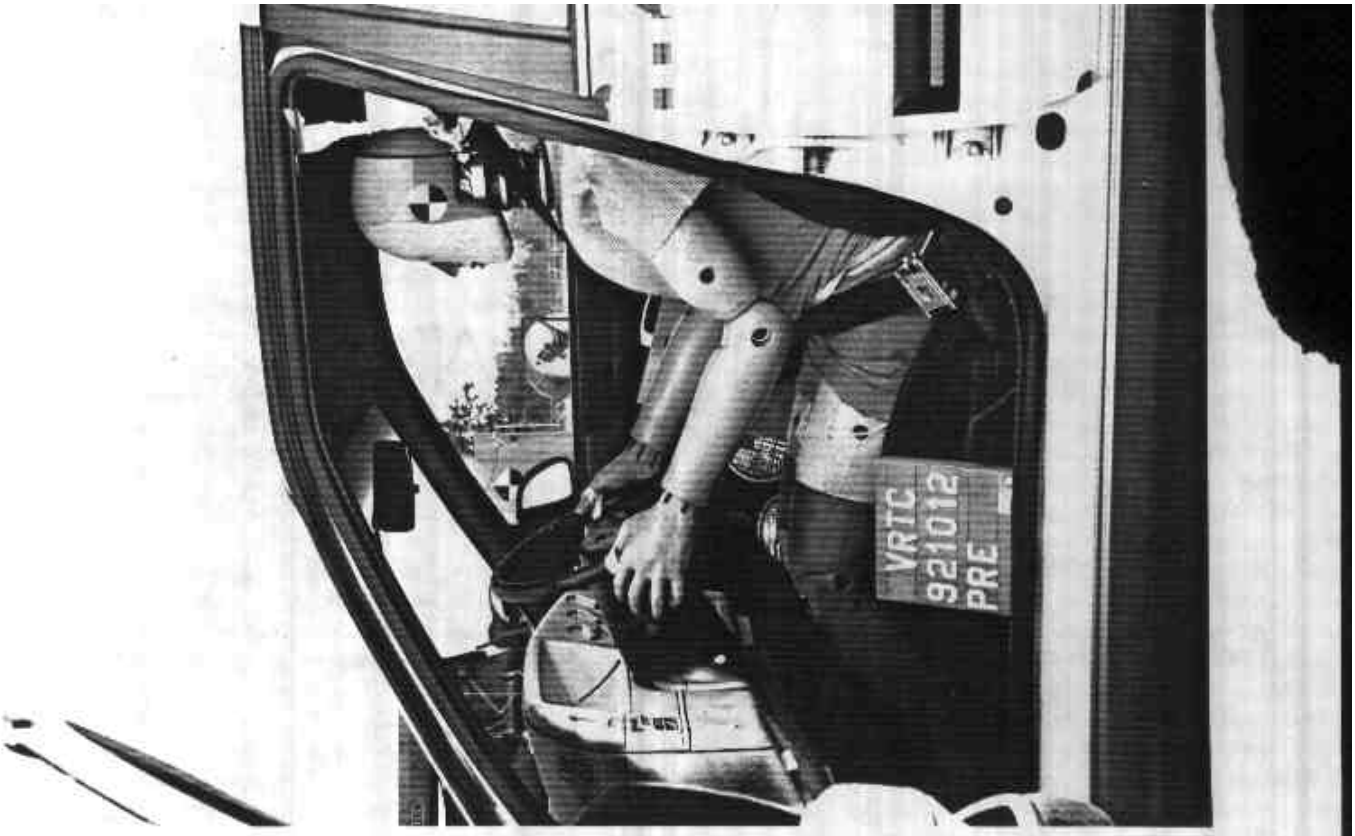


Figure A-25. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 1

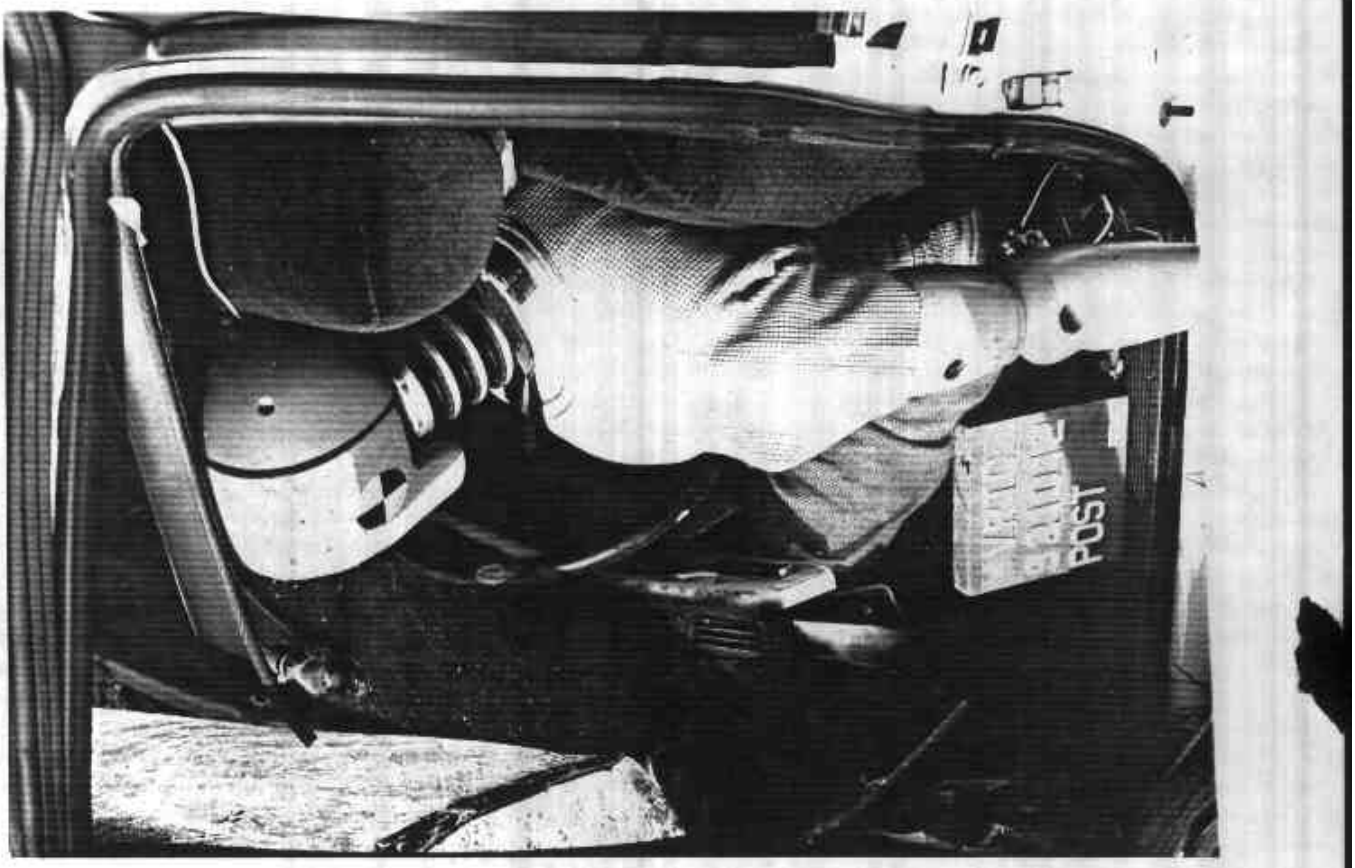


Figure A-26. POST-TEST VEHICLE INTERIOR AND DUMMY - VIEW 1

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

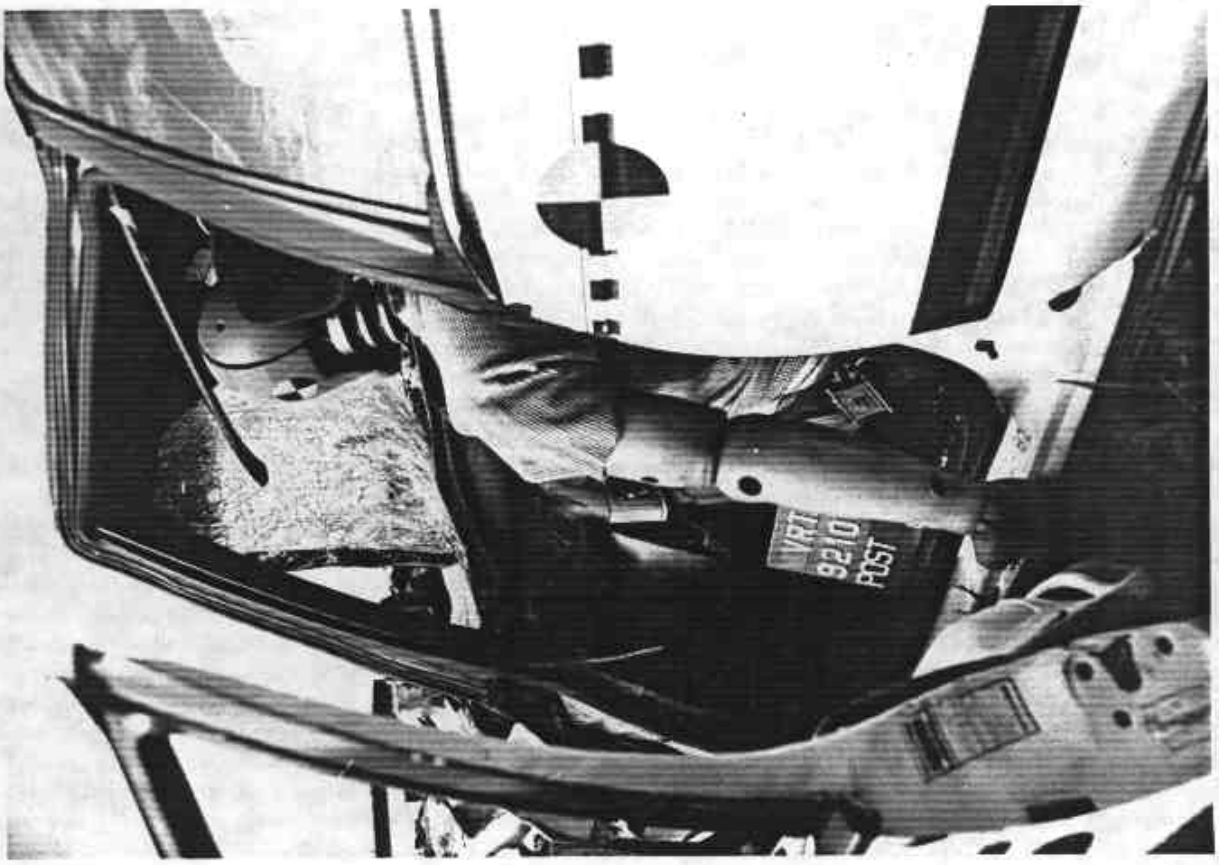


Figure A-28. POST-TEST VEHICLE INTERIOR AND DUMMY - VIEW 2

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

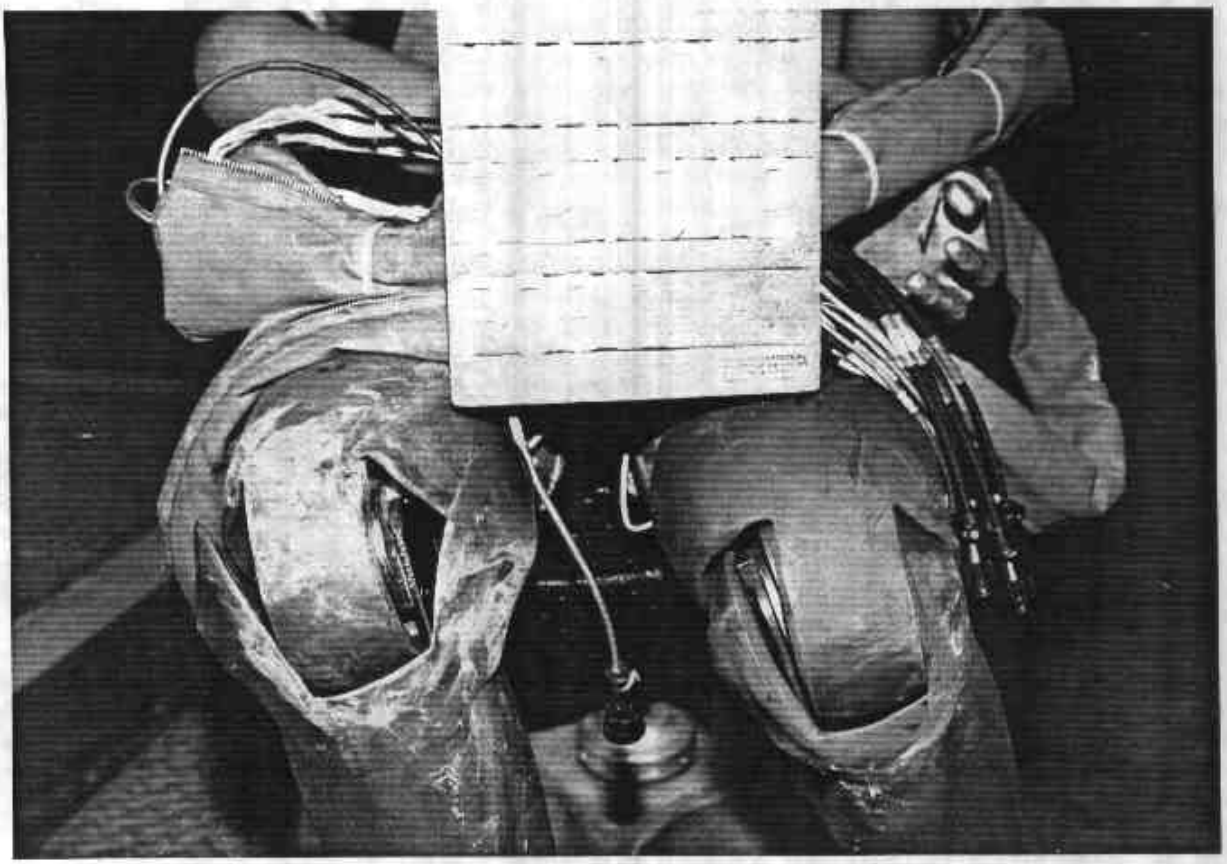
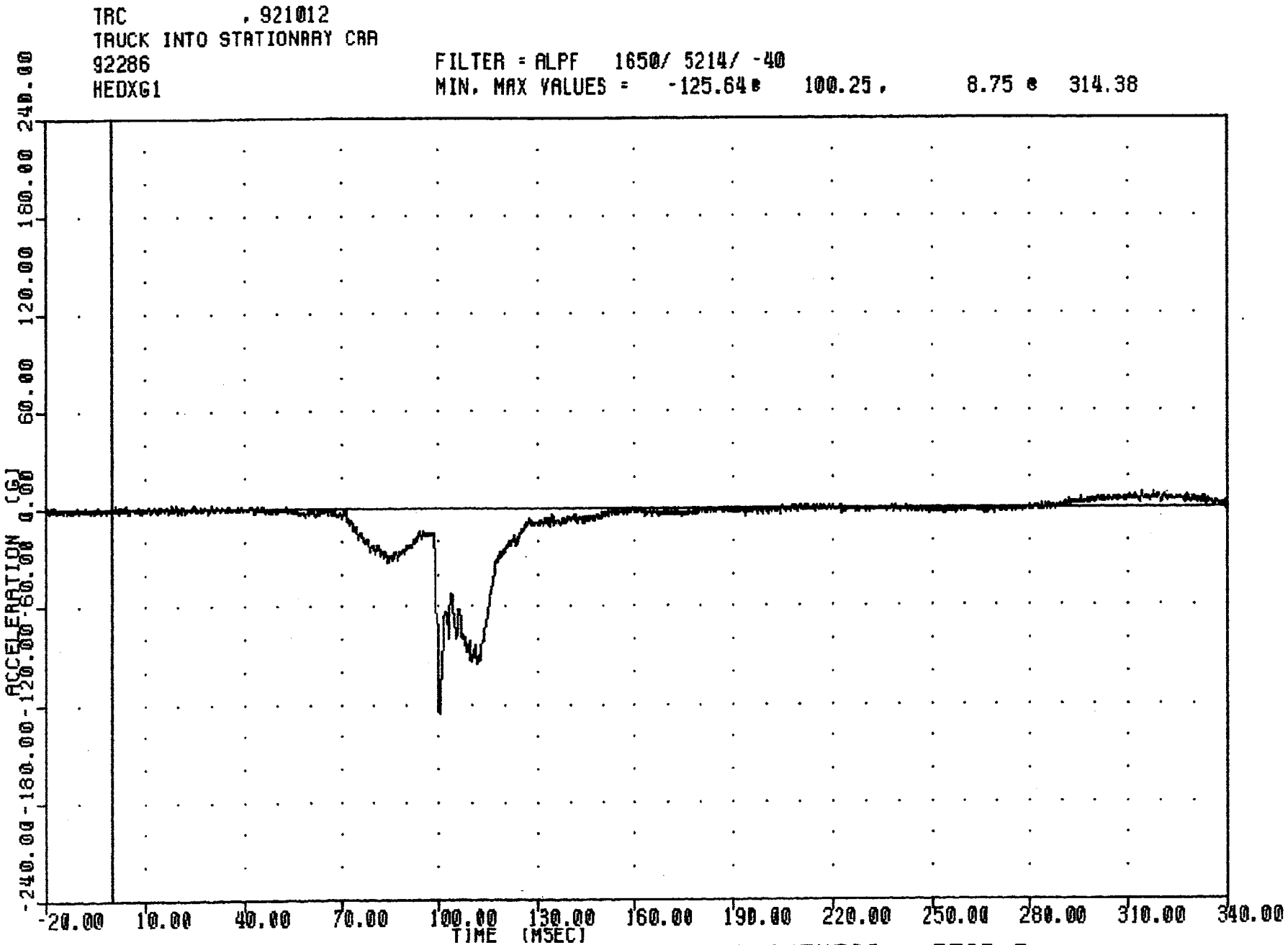


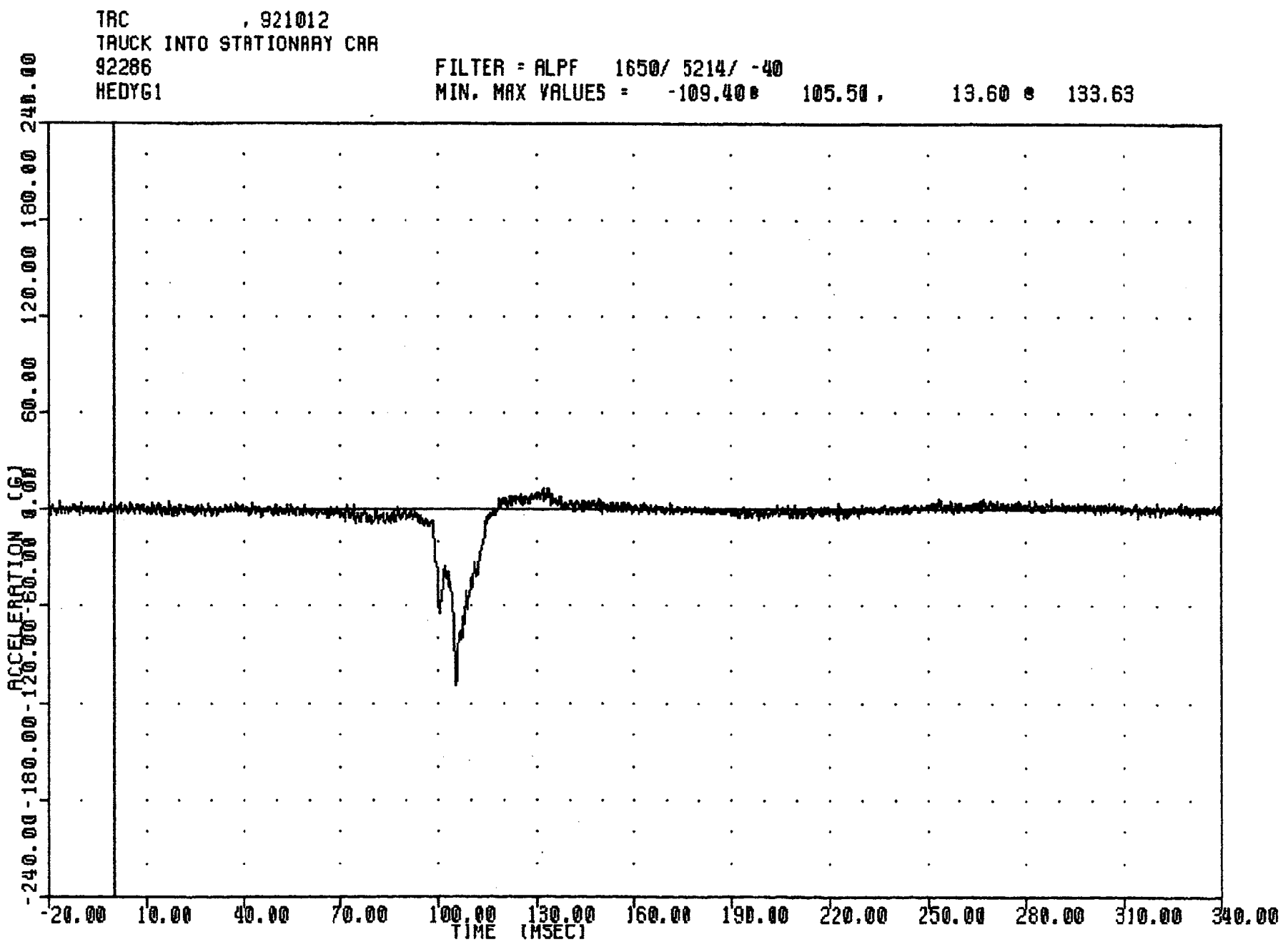
Figure A-30. POST-TEST DUMMY KNEE CONTACT VIEW

APPENDIX B

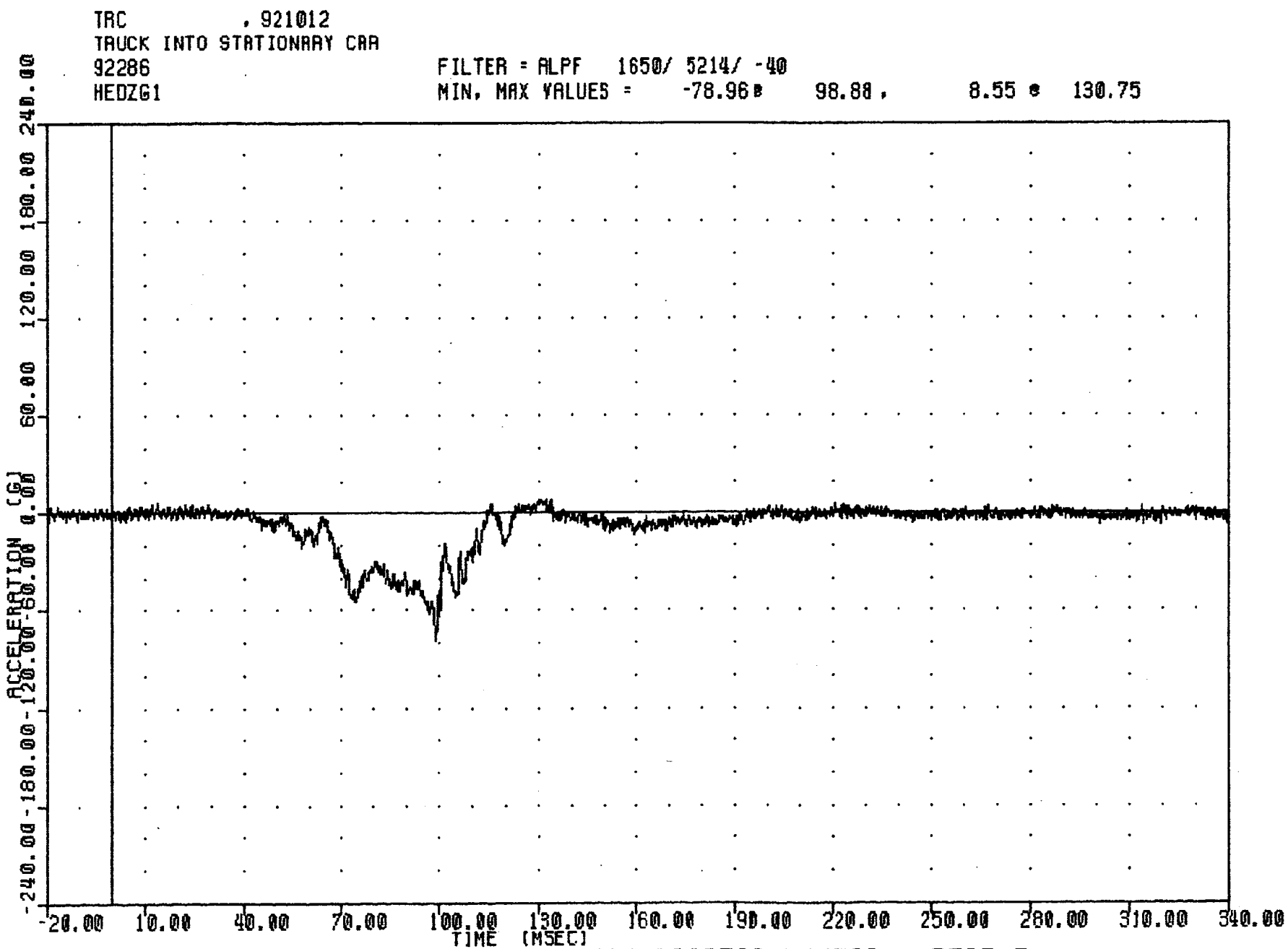
DATA PLOTS



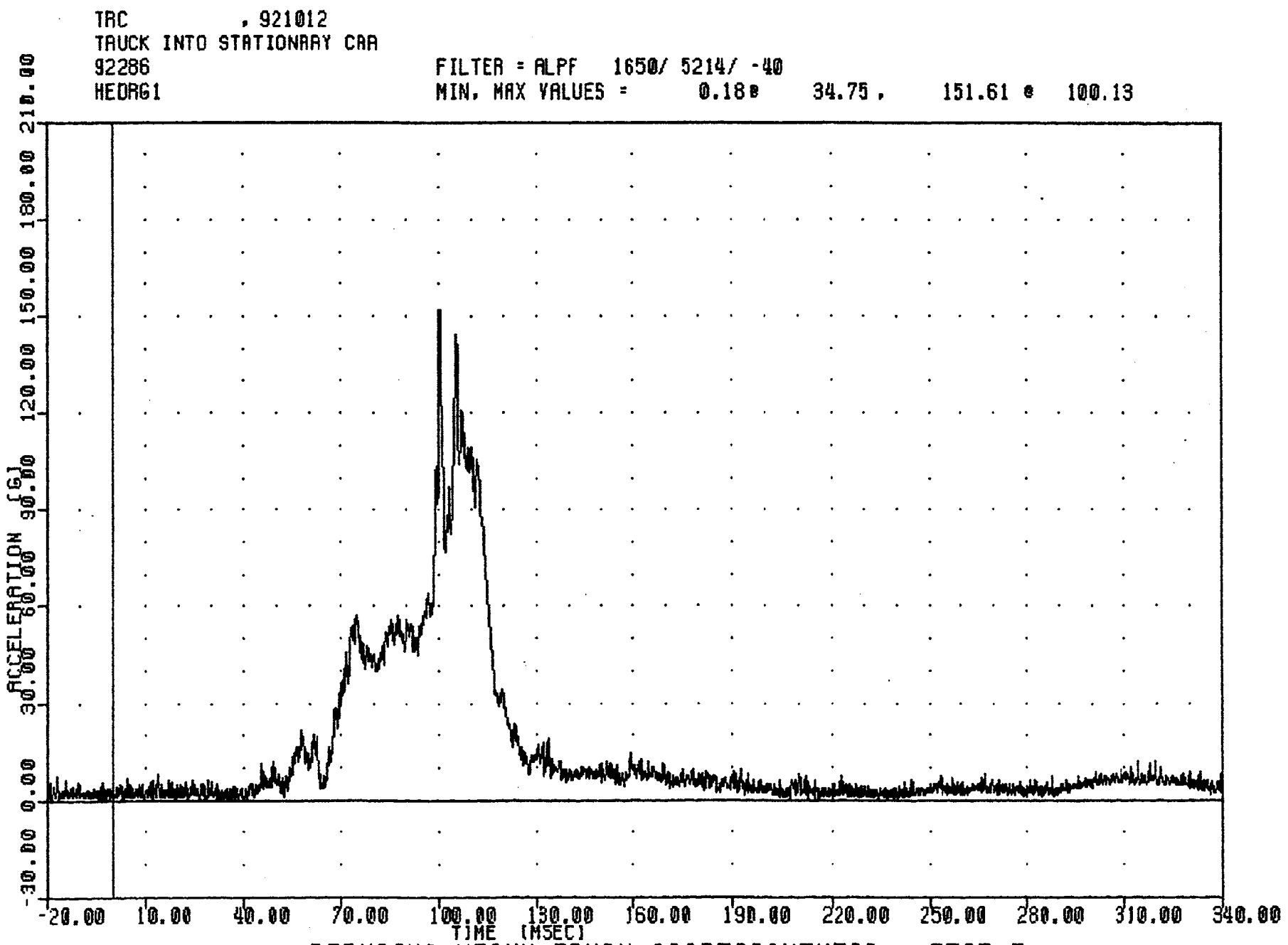
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER HEAD X-AXIS ACCELERATION



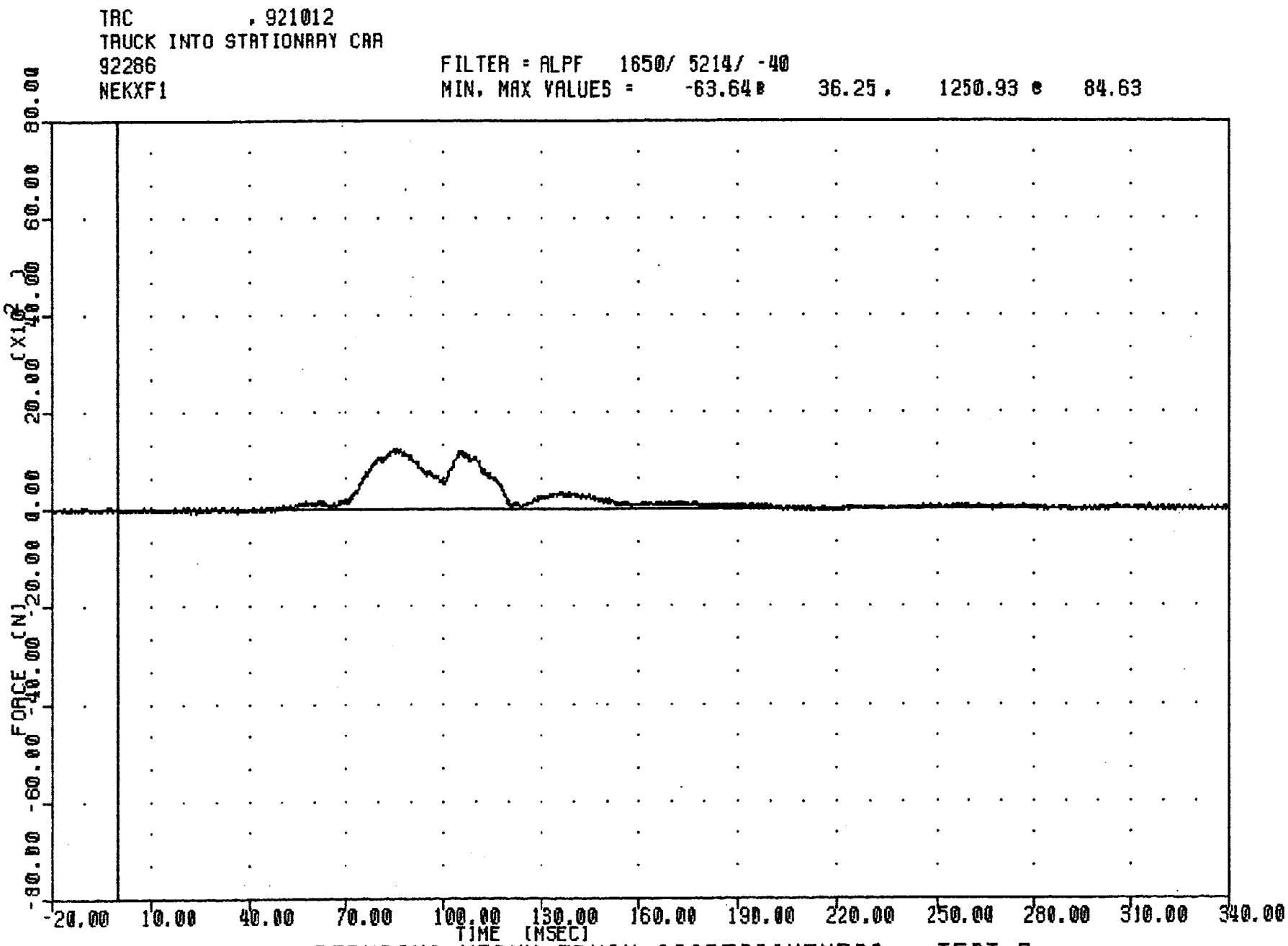
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER HEAD Y-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER HEAD Z-AXIS ACCELERATION

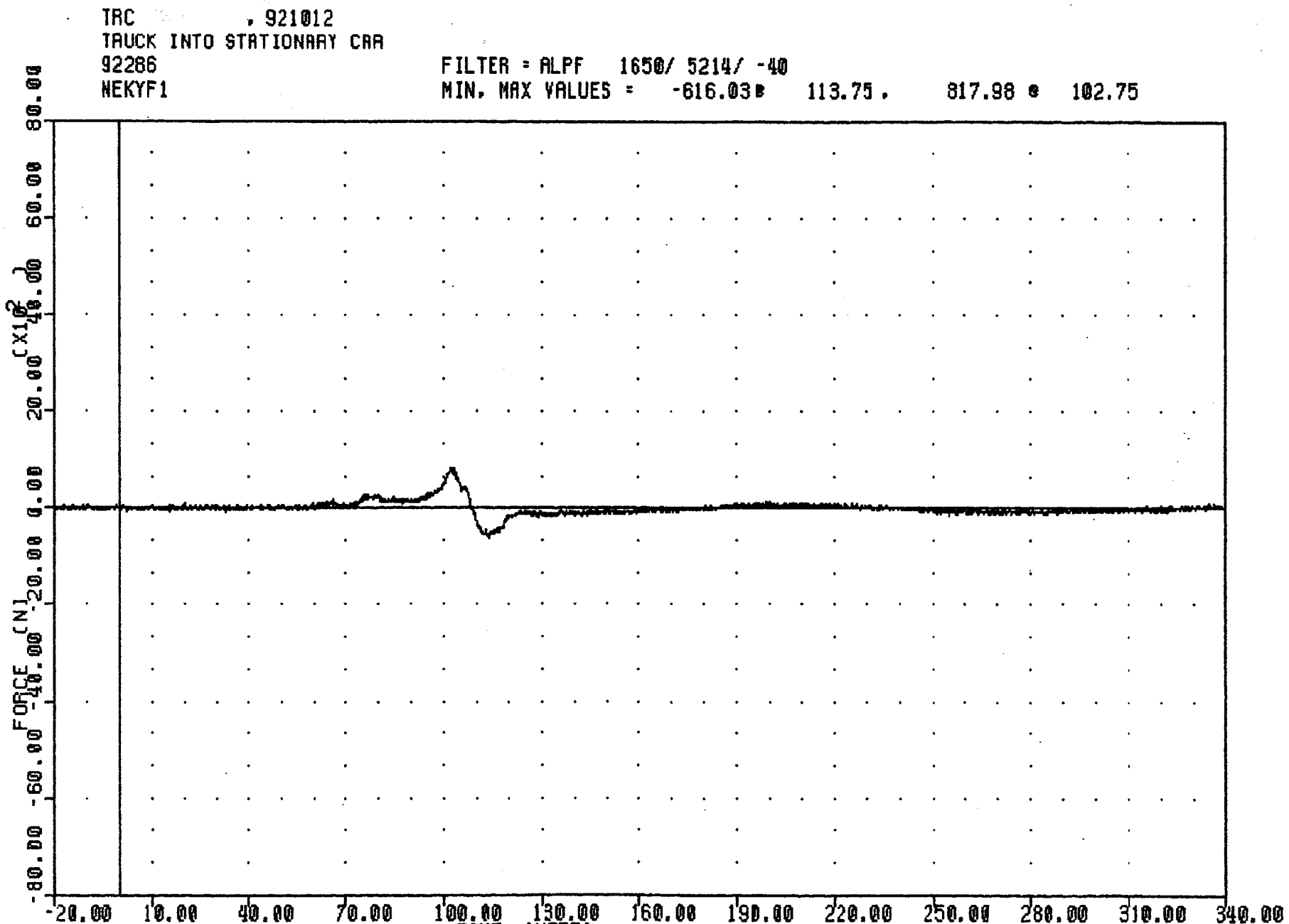


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER HEAD RESULTANT ACCELERATION



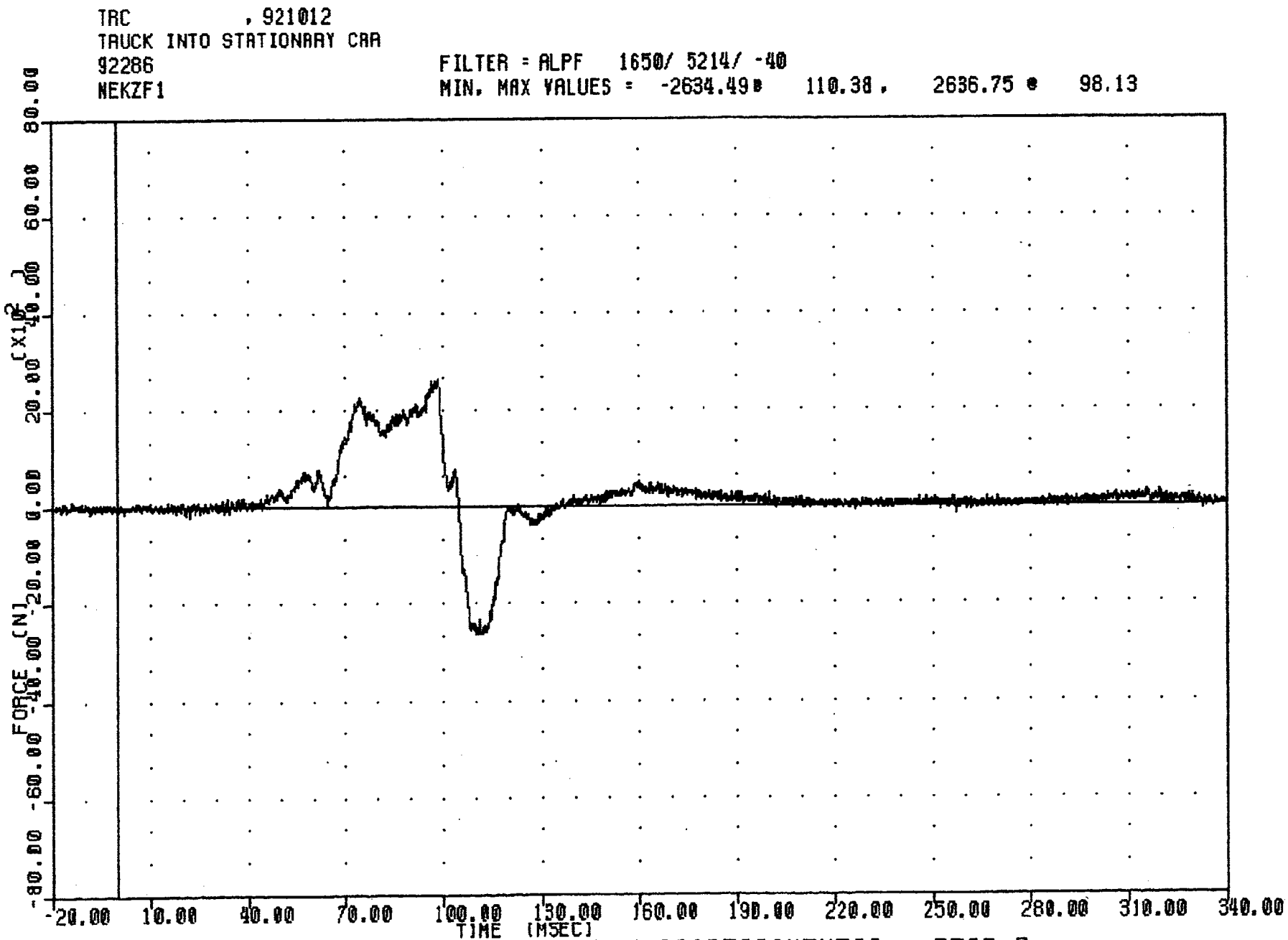
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7

DRIVER NECK X-AXIS SHEAR FORCE

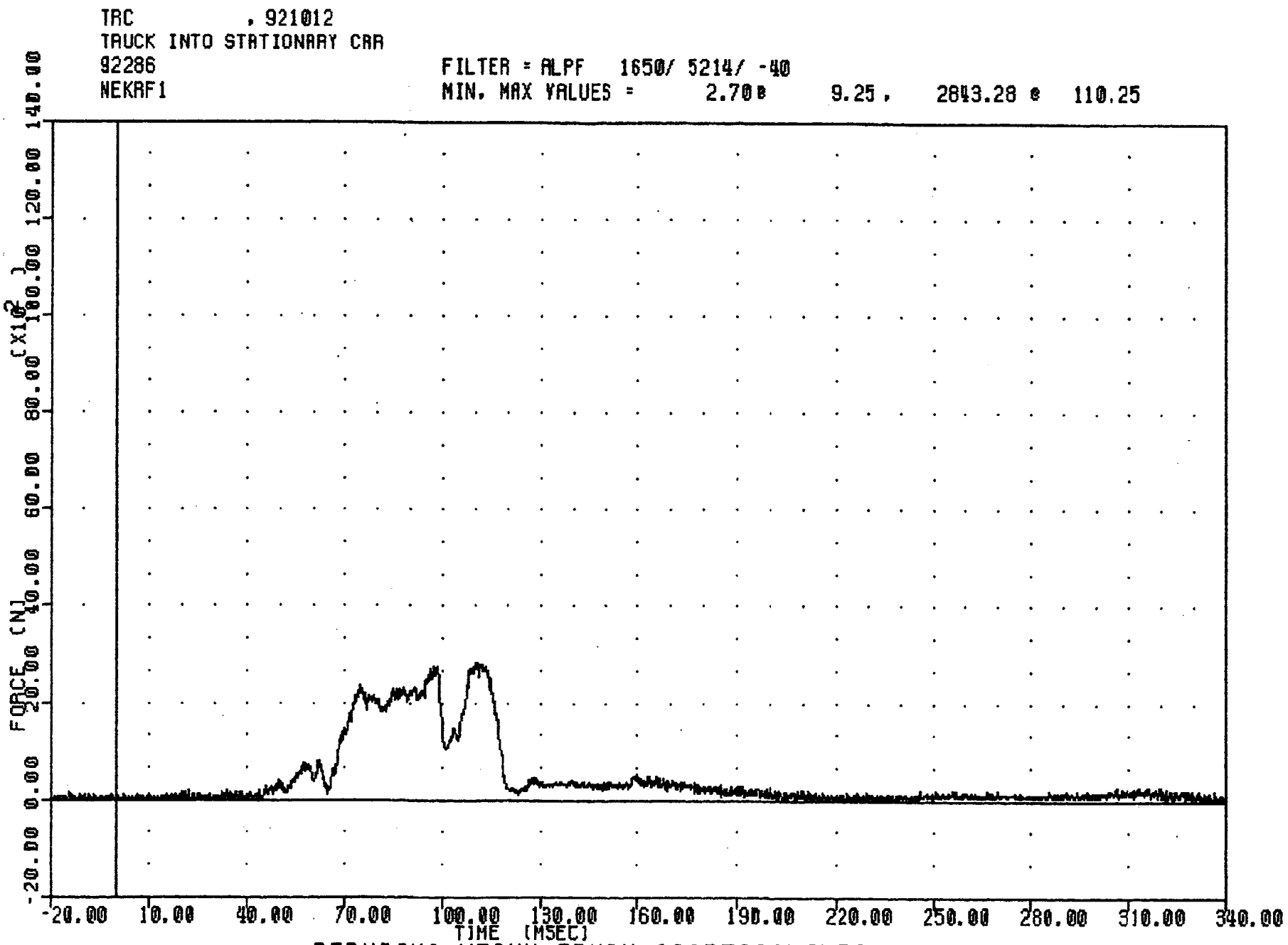


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7

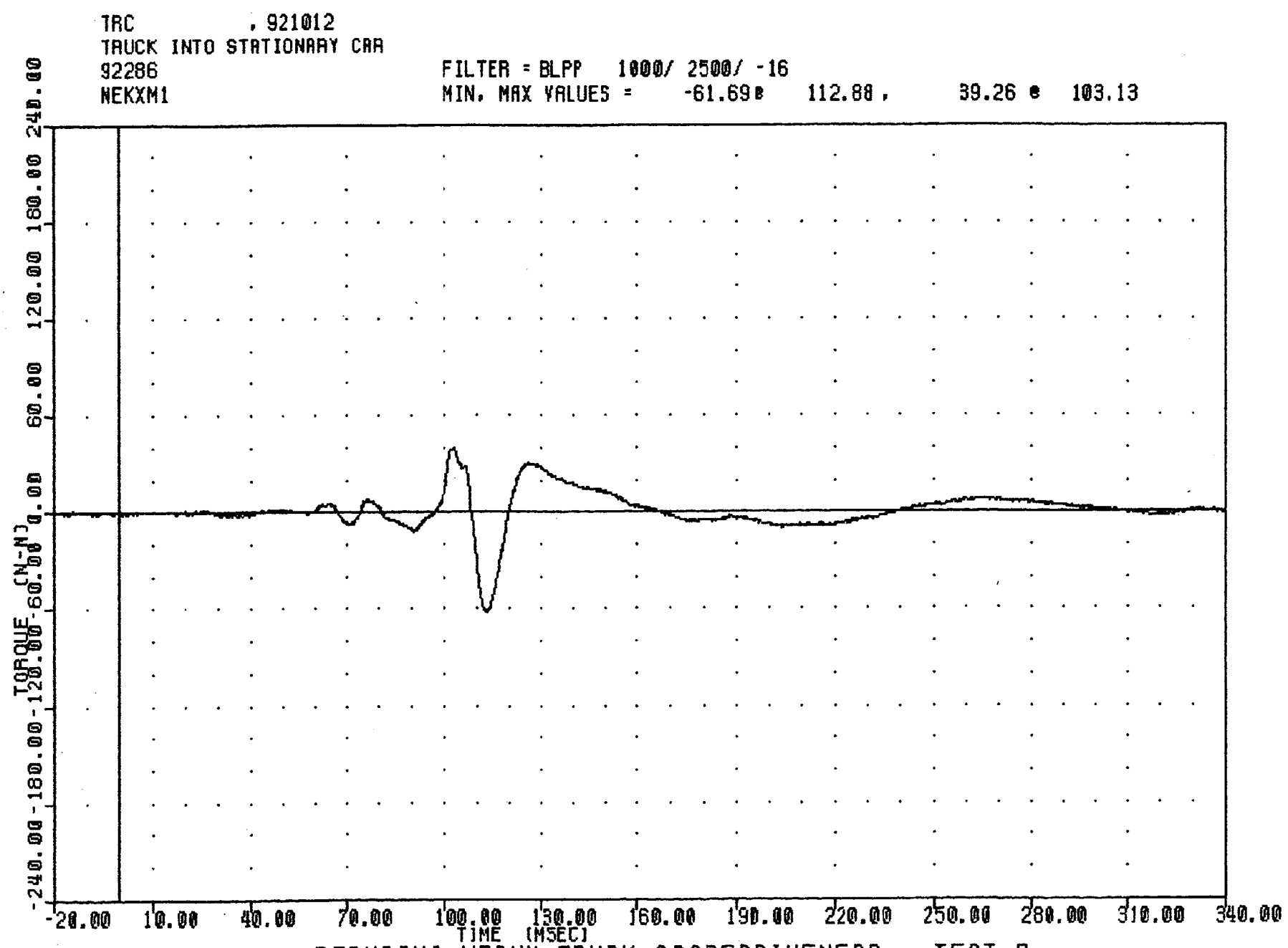
DRIVER NECK Y-AXIS SHEAR FORCE



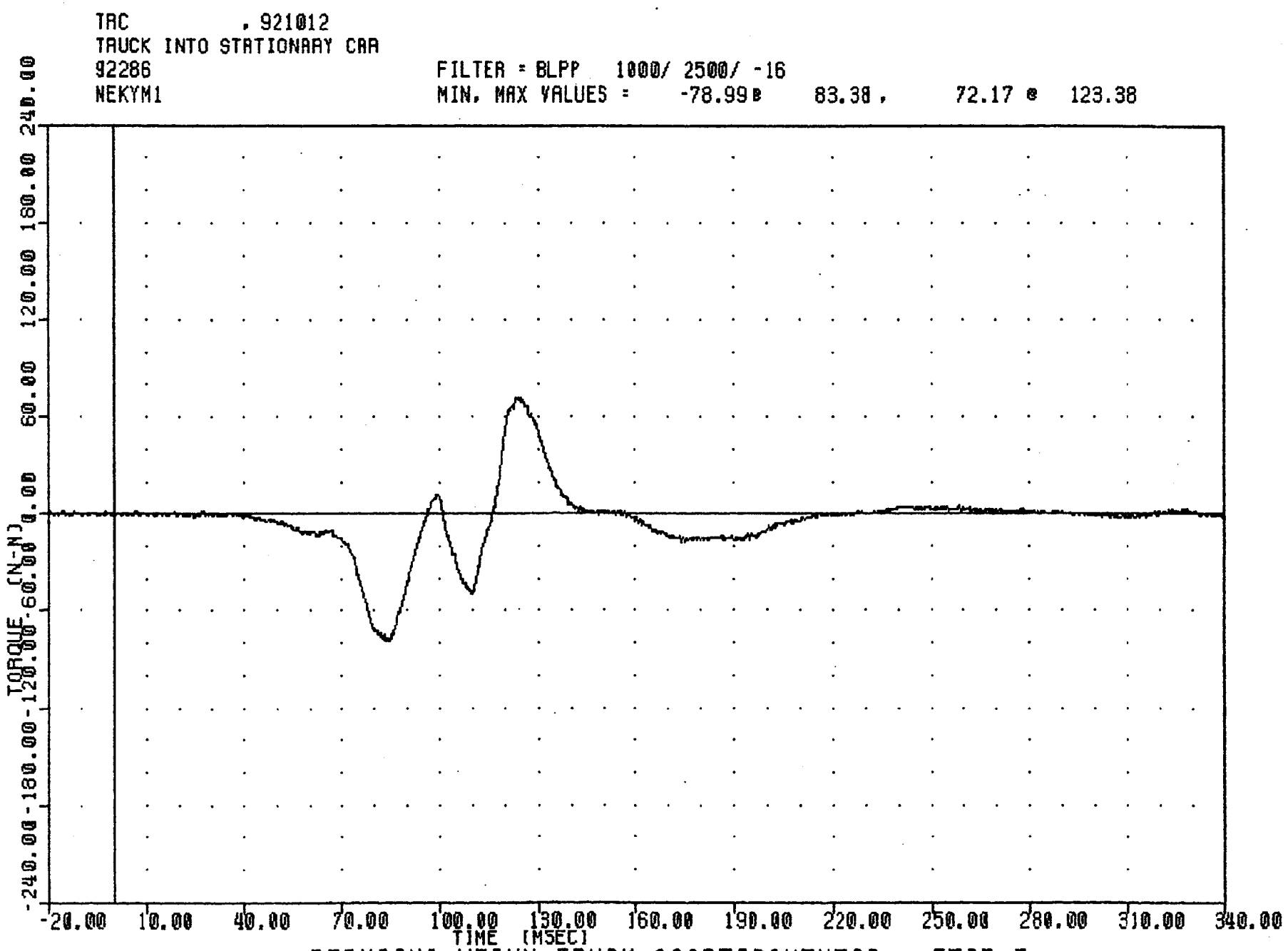
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK Z-AXIS AXIAL FORCE



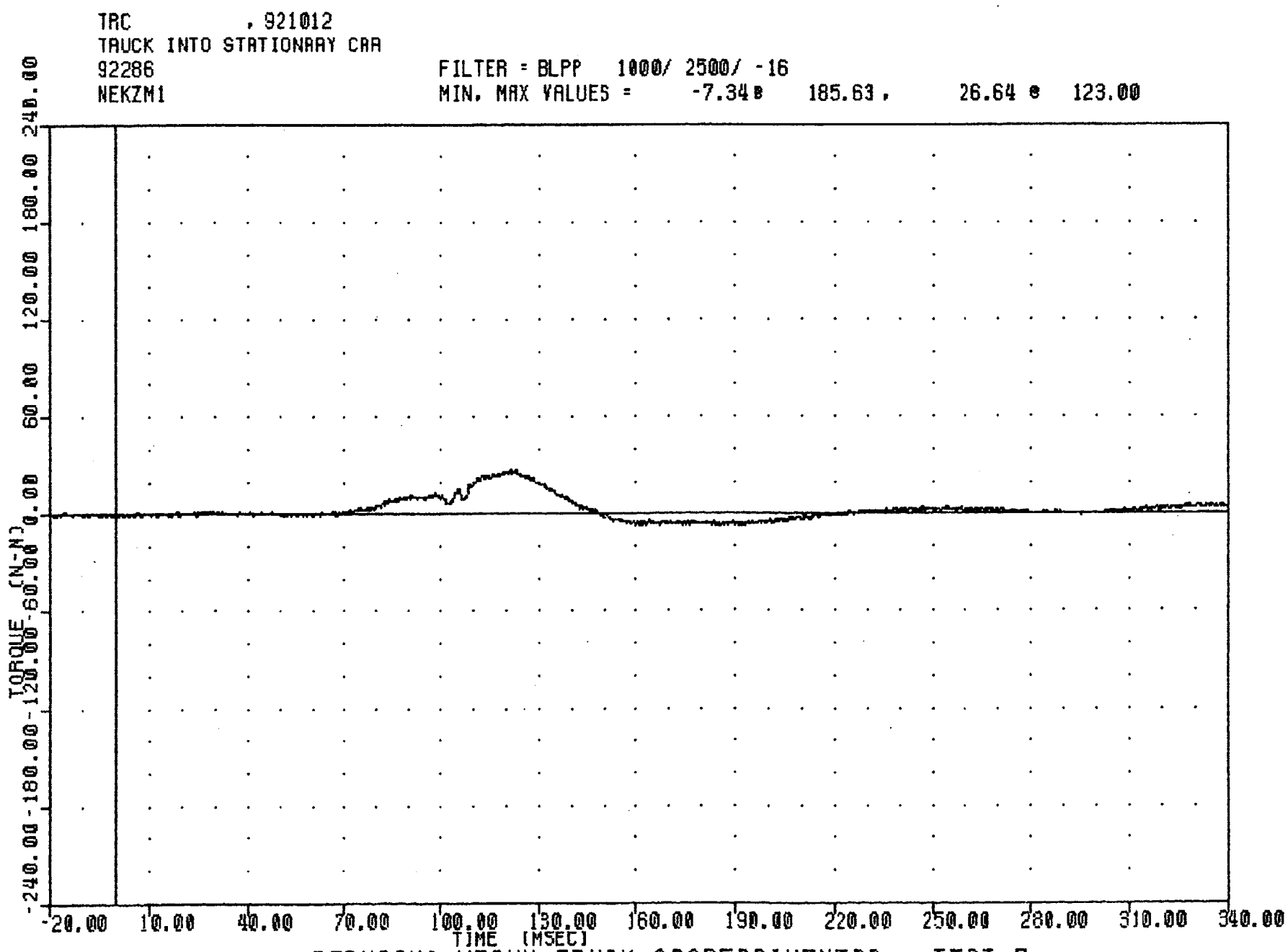
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK RESULTANT FORCE



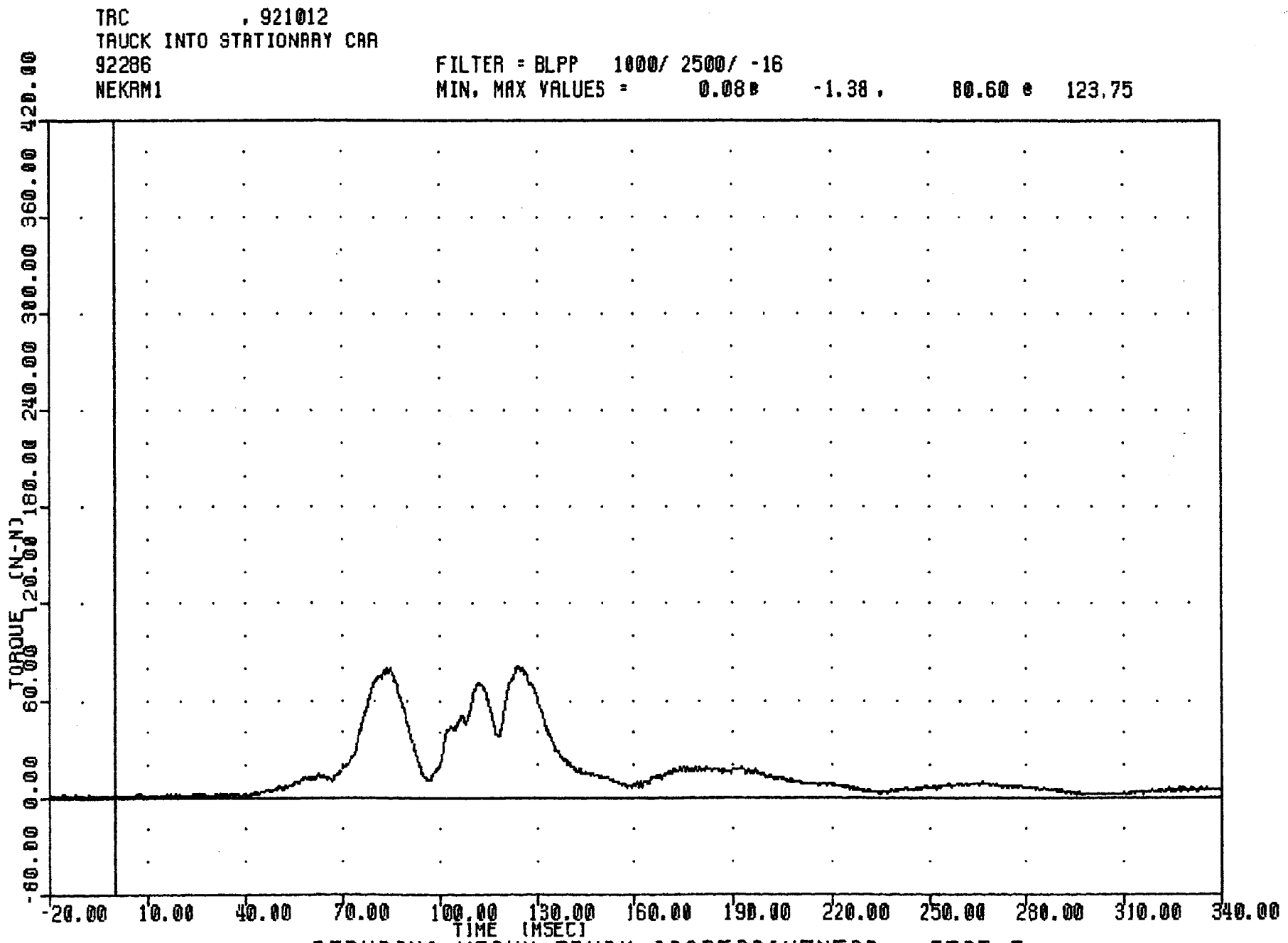
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK MOMENT ABOUT X AXIS



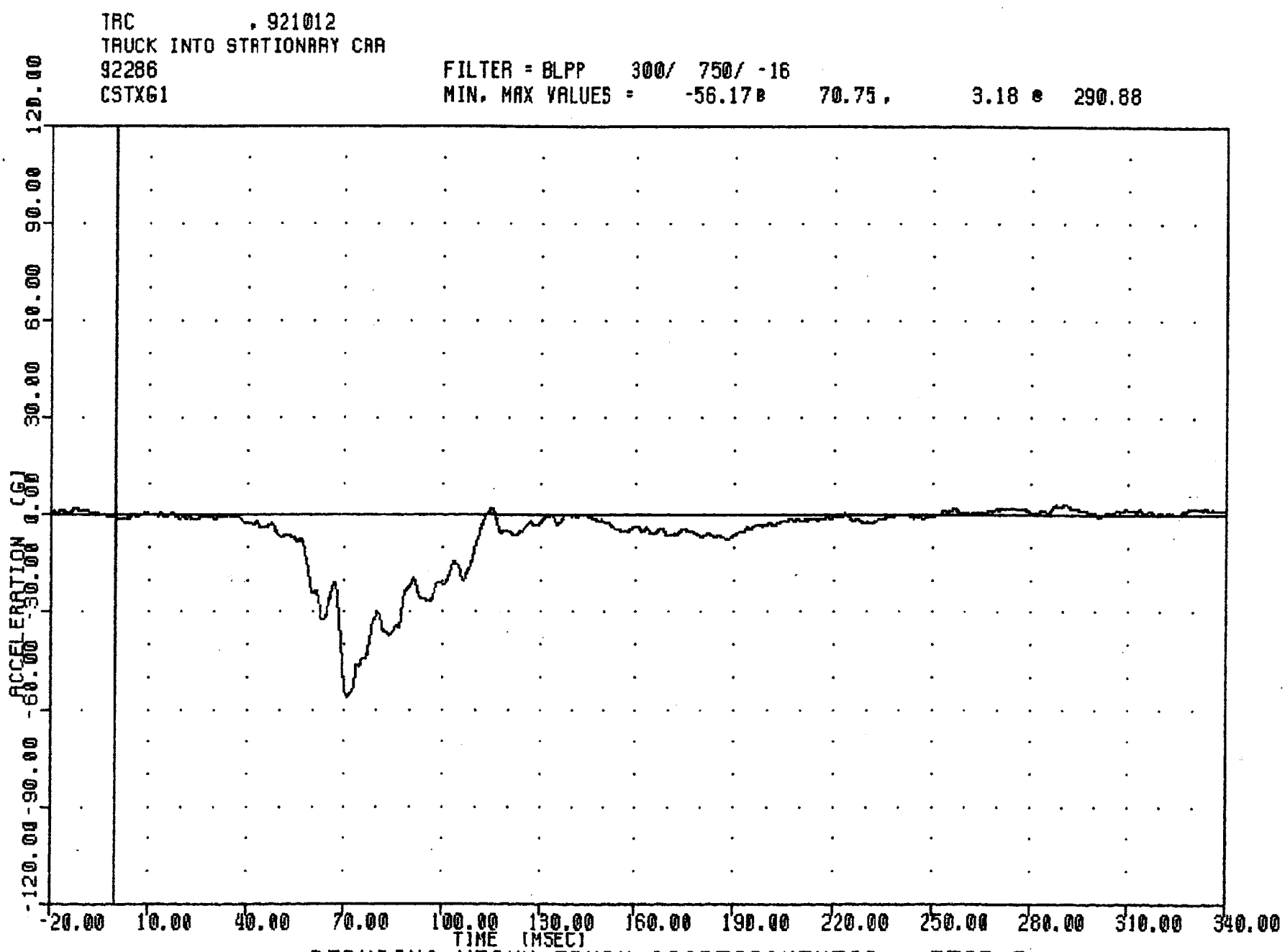
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK MOMENT ABOUT Y AXIS



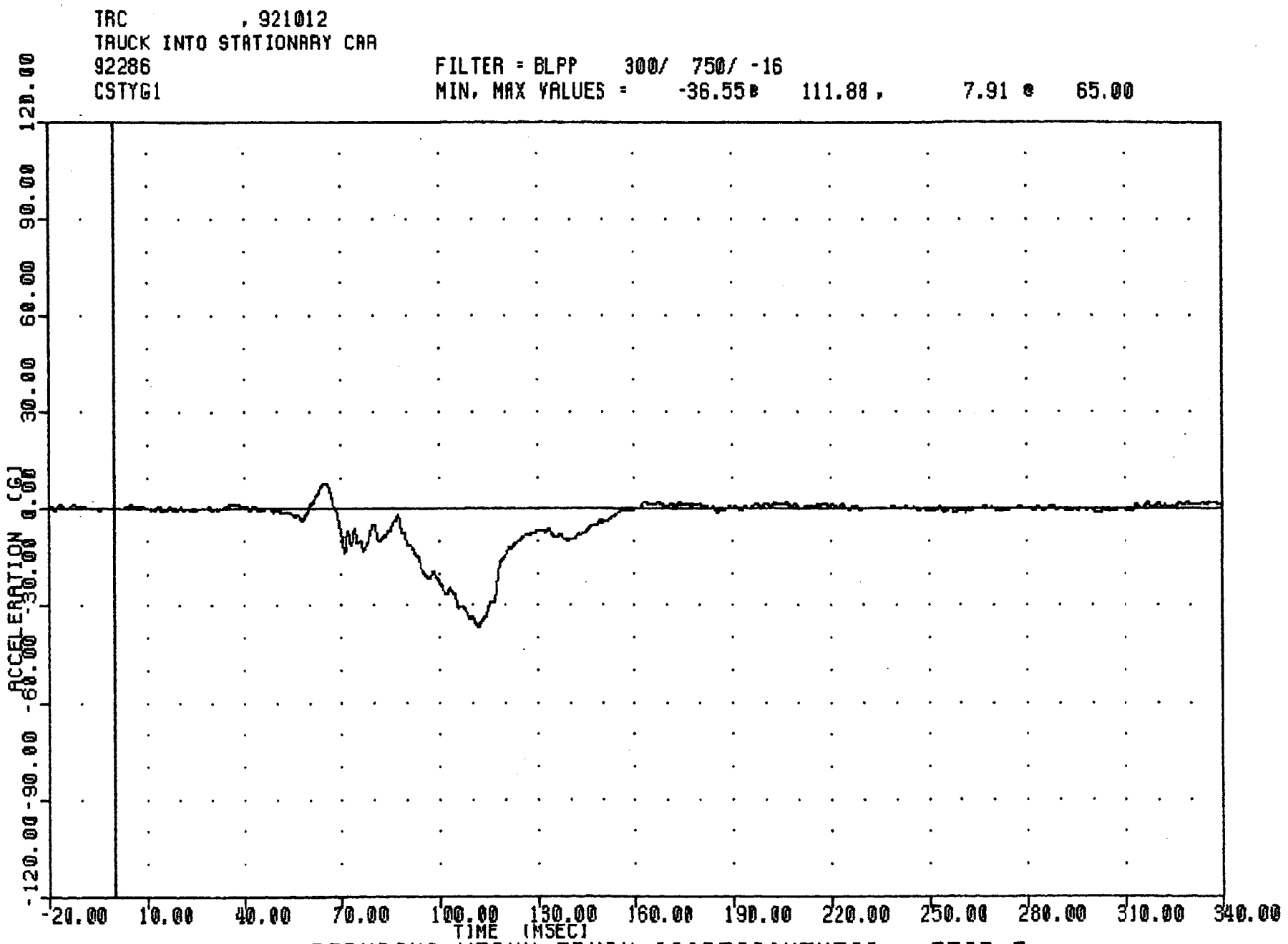
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK MOMENT ABOUT Z AXIS



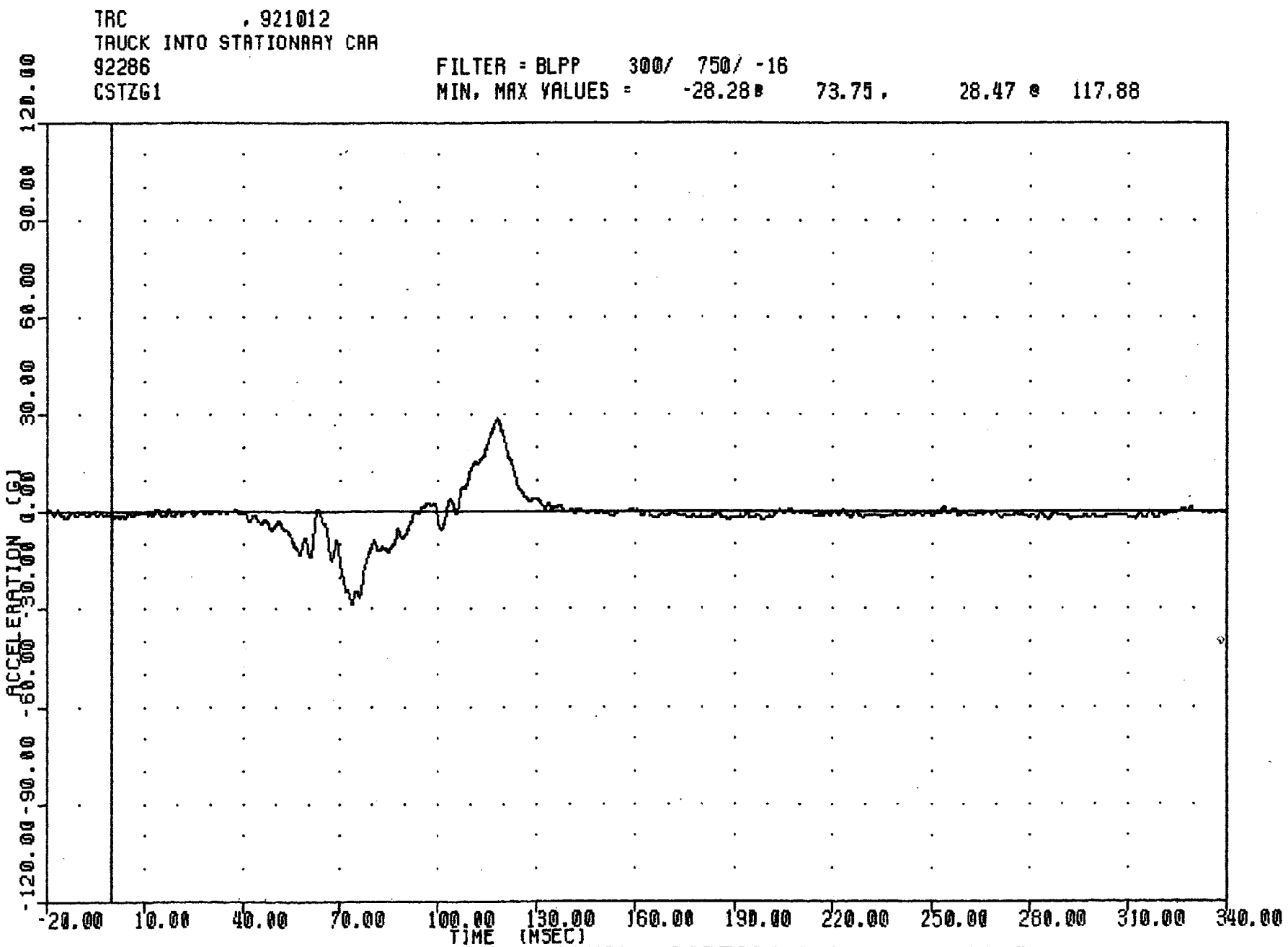
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER NECK MOMENT RESULTANT



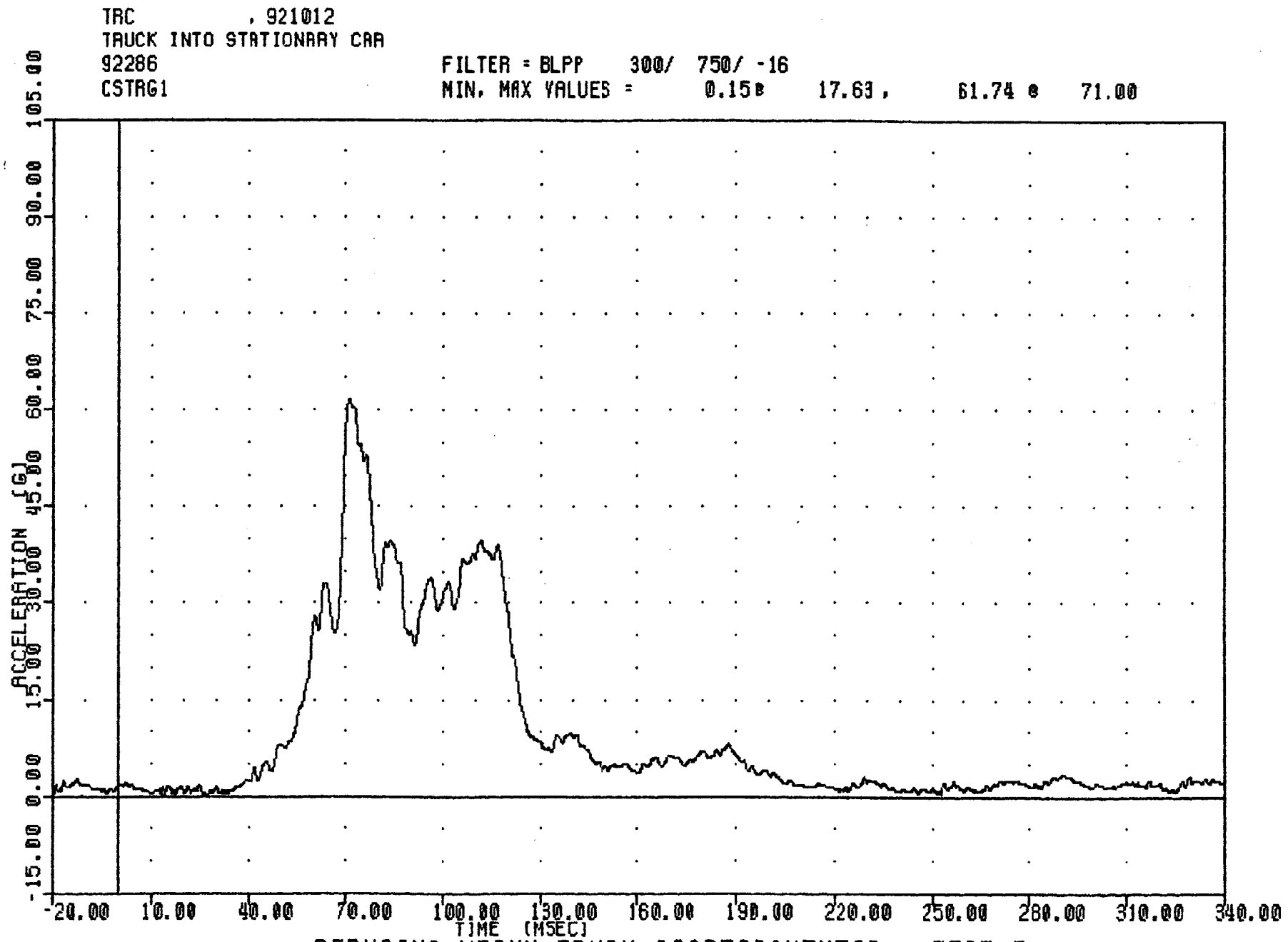
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER CHEST X-AXIS ACCELERATION



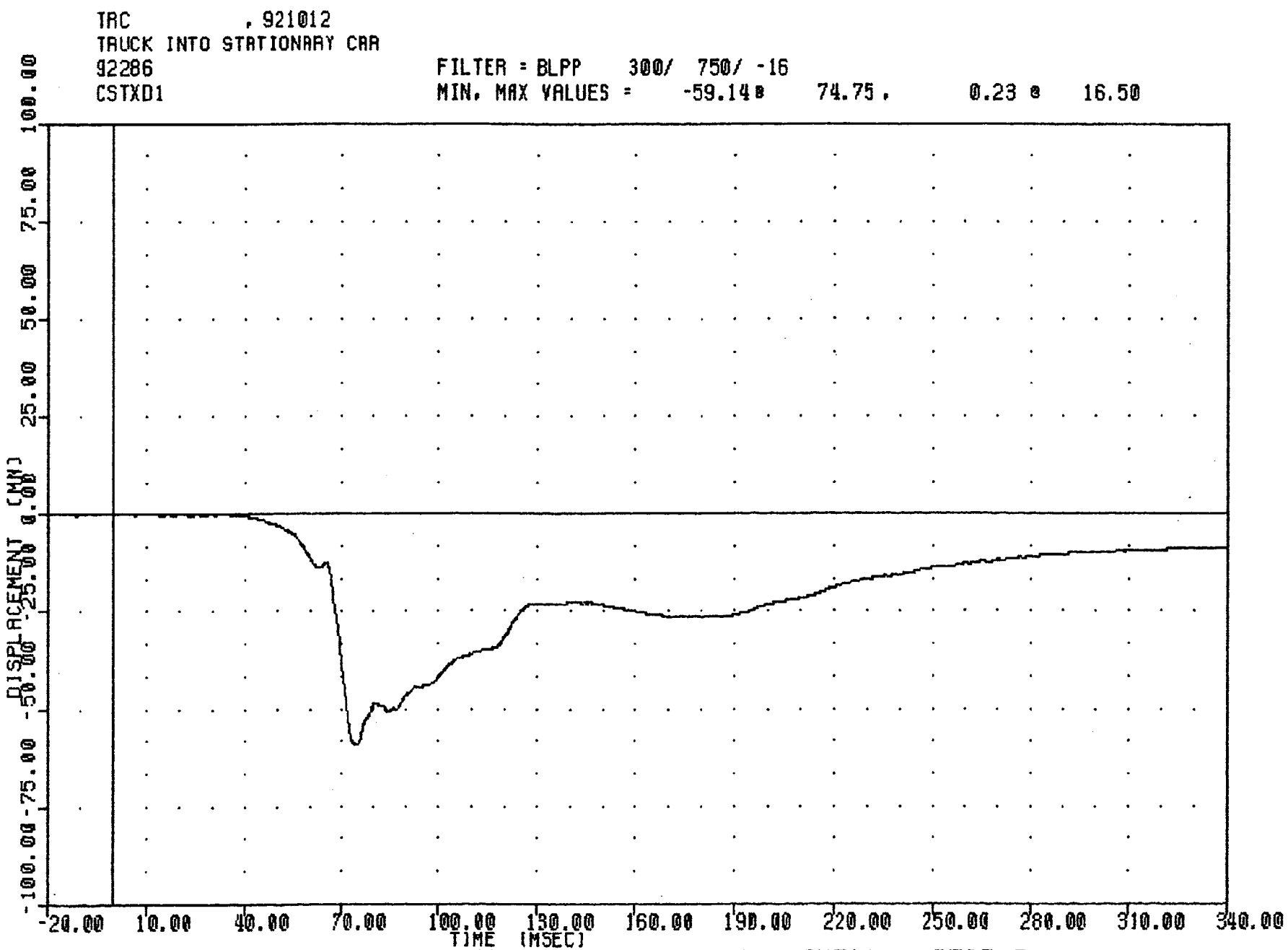
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER CHEST Y-AXIS ACCELERATION



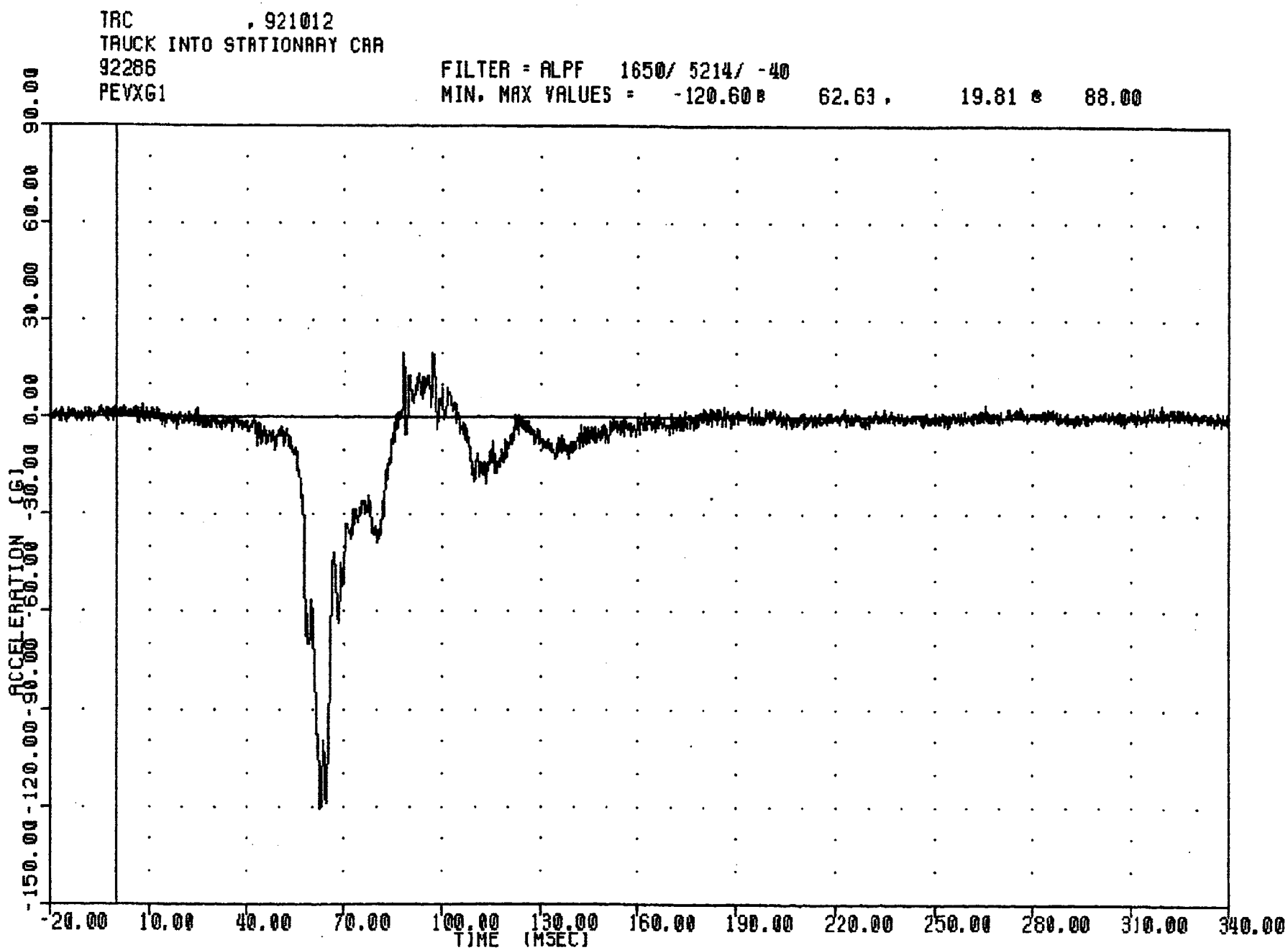
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER CHEST Z-AXIS ACCELERATION



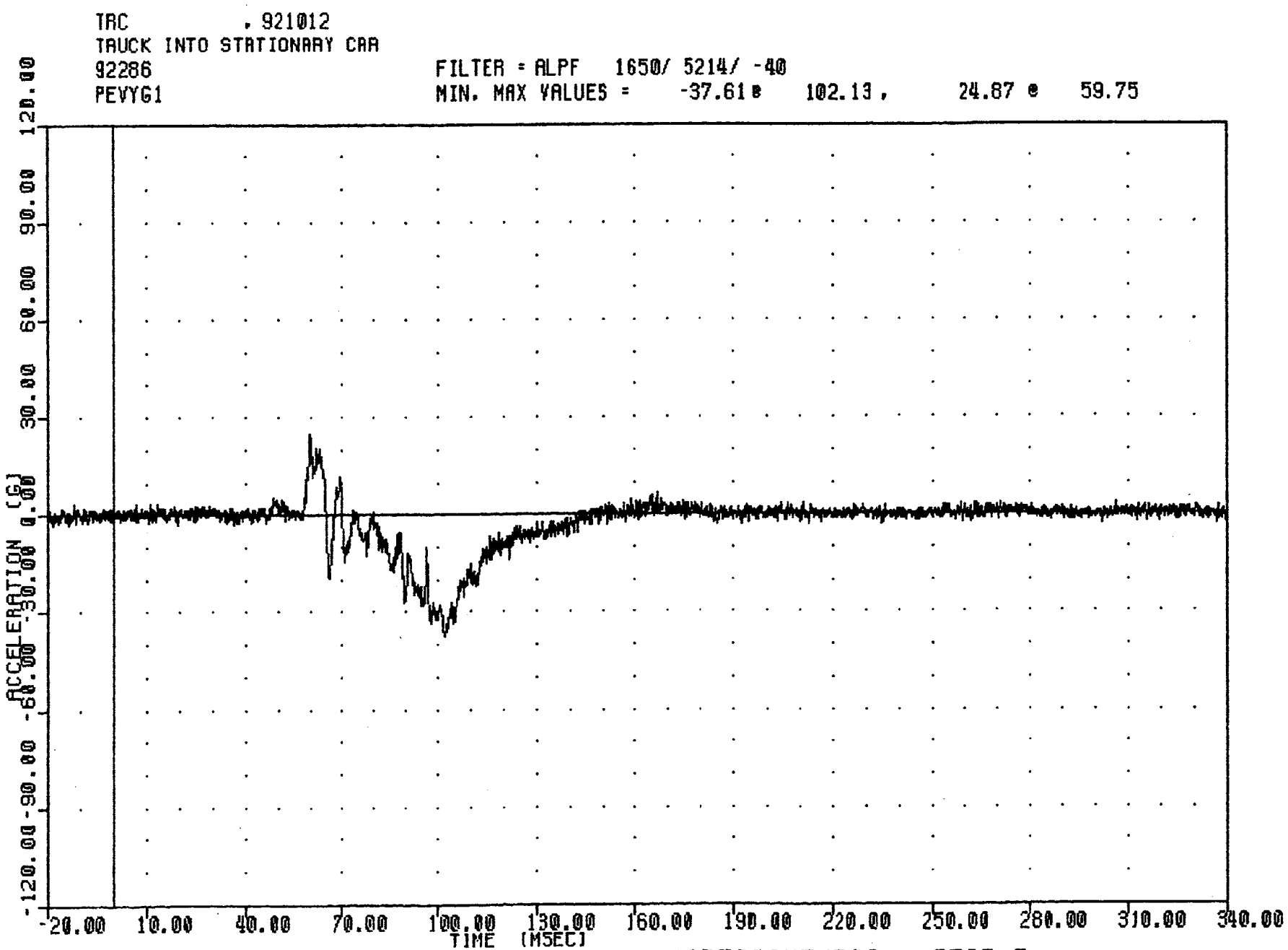
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER CHEST RESULTANT ACCELERATION



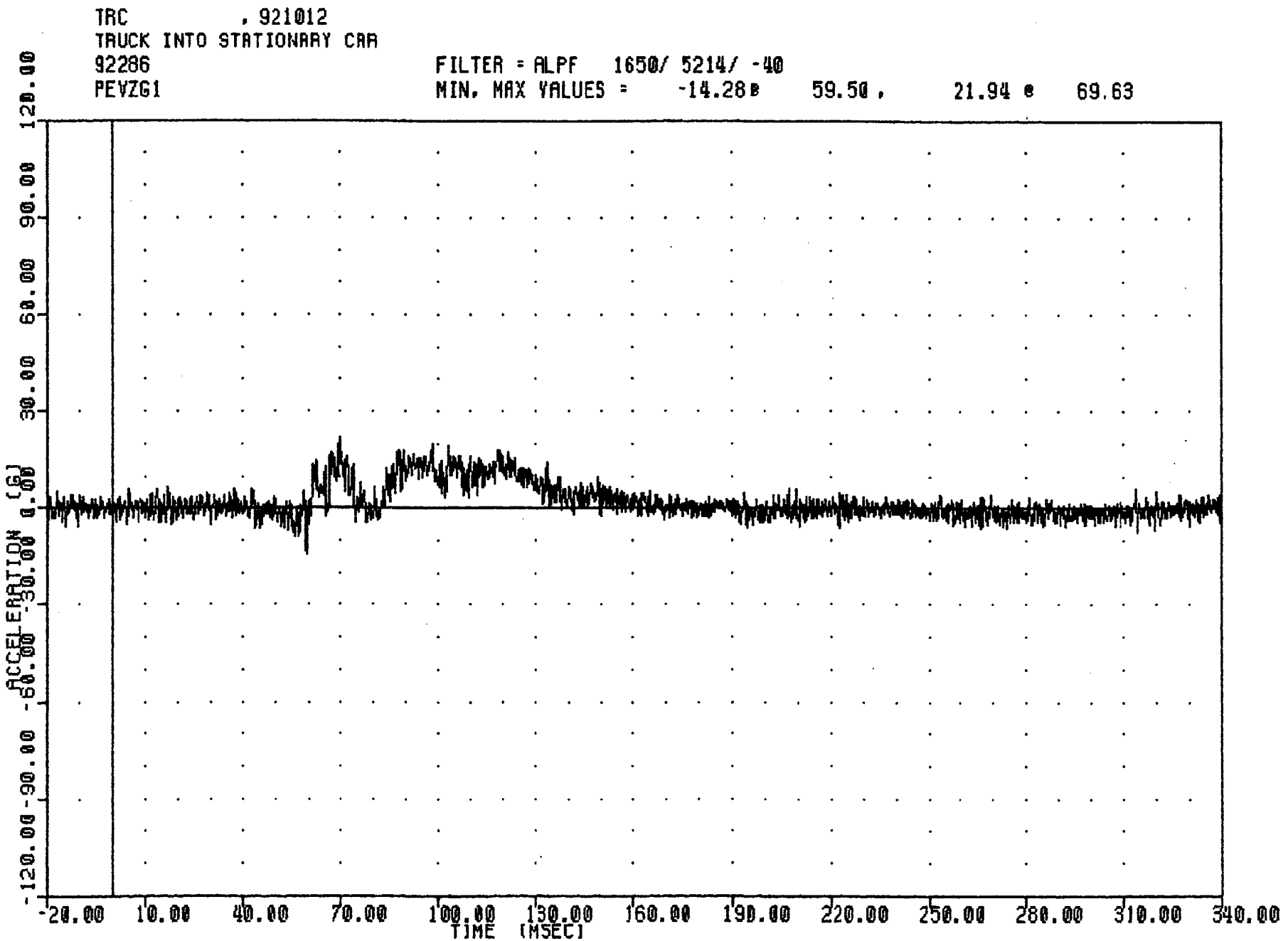
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER CHEST DEFLECTION



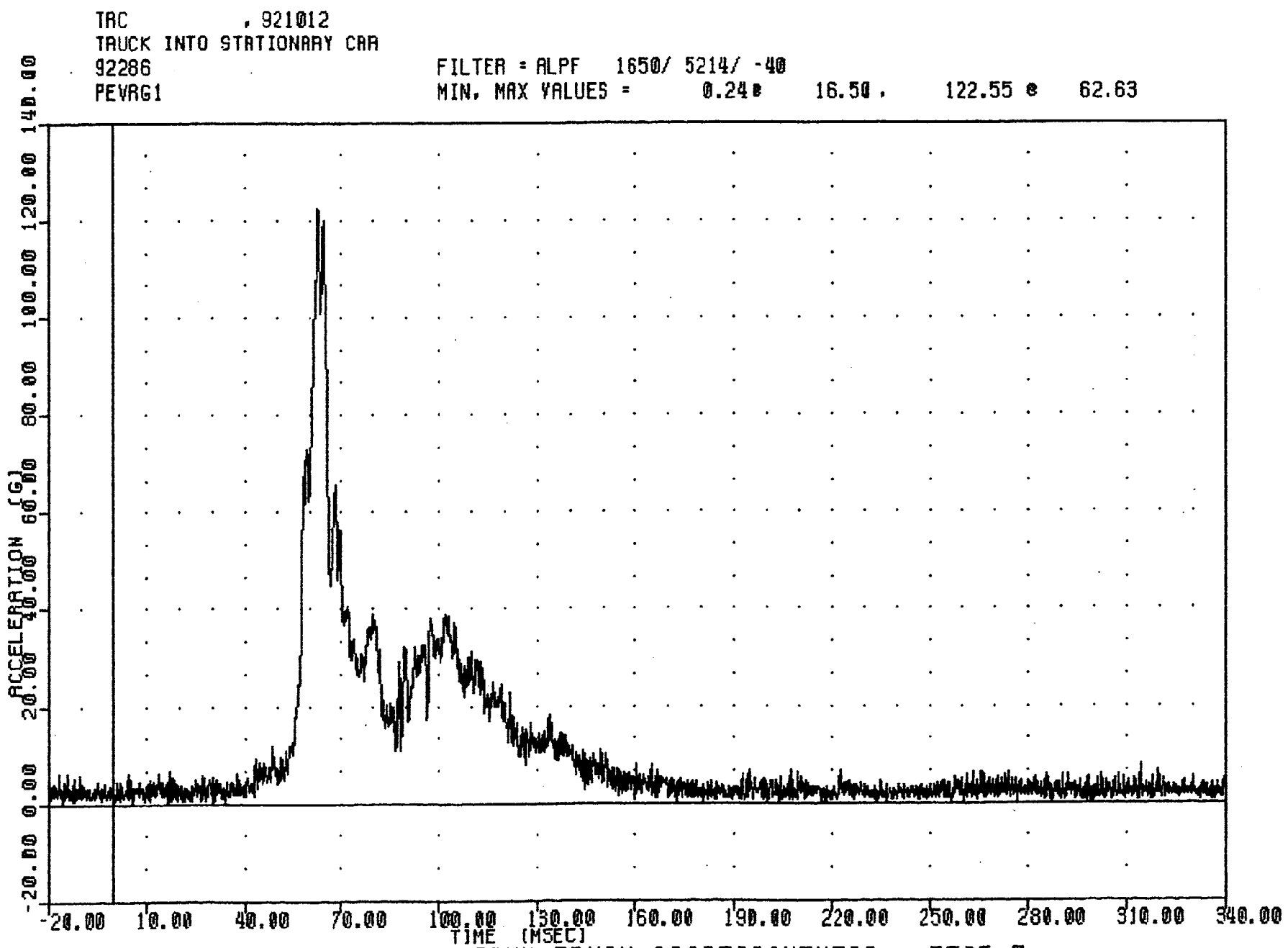
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER PELVIS X-AXIS ACCELERATION



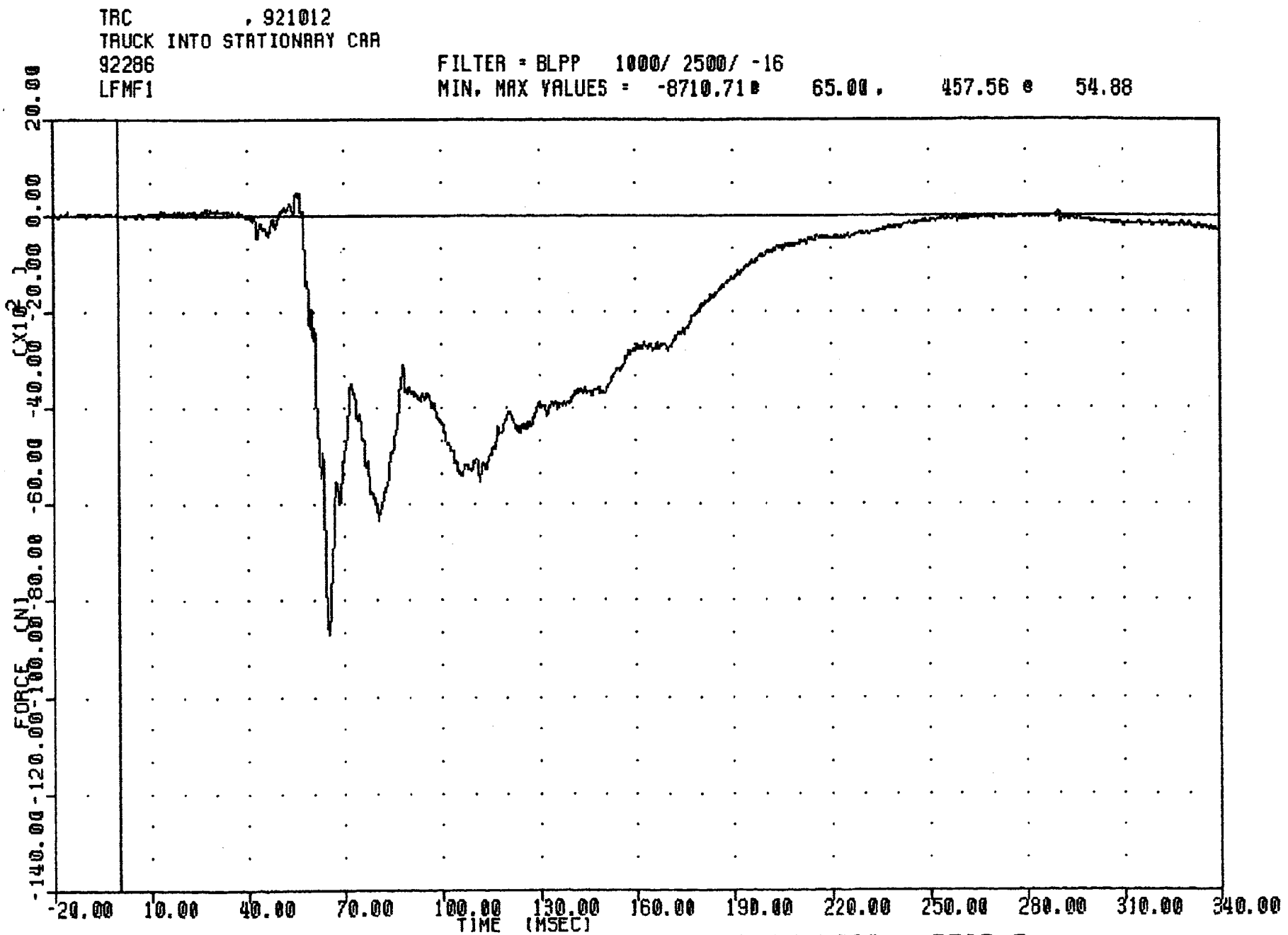
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER PELVIS Y-AXIS ACCELERATION



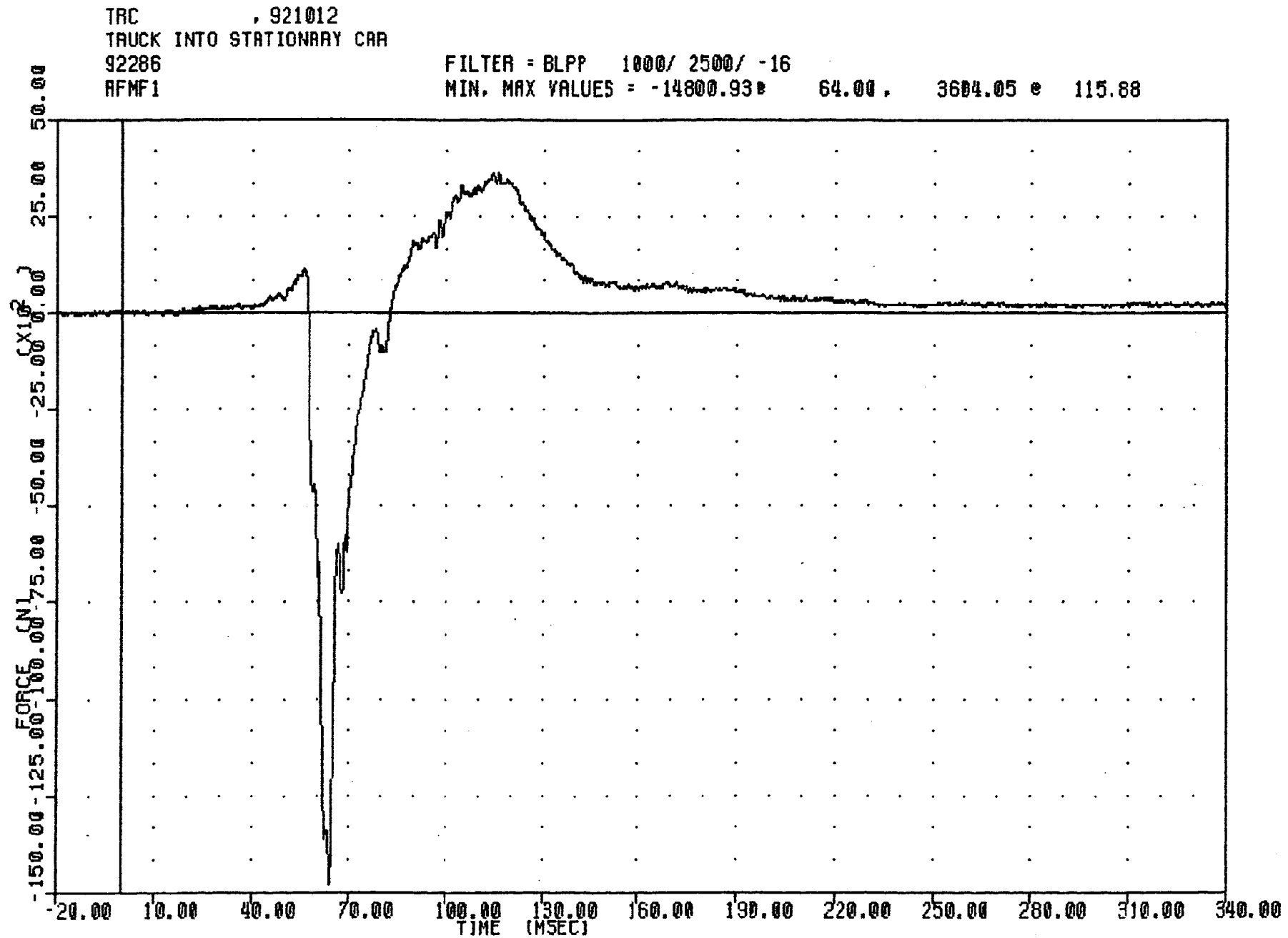
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER PELVIS Z-AXIS ACCELERATION



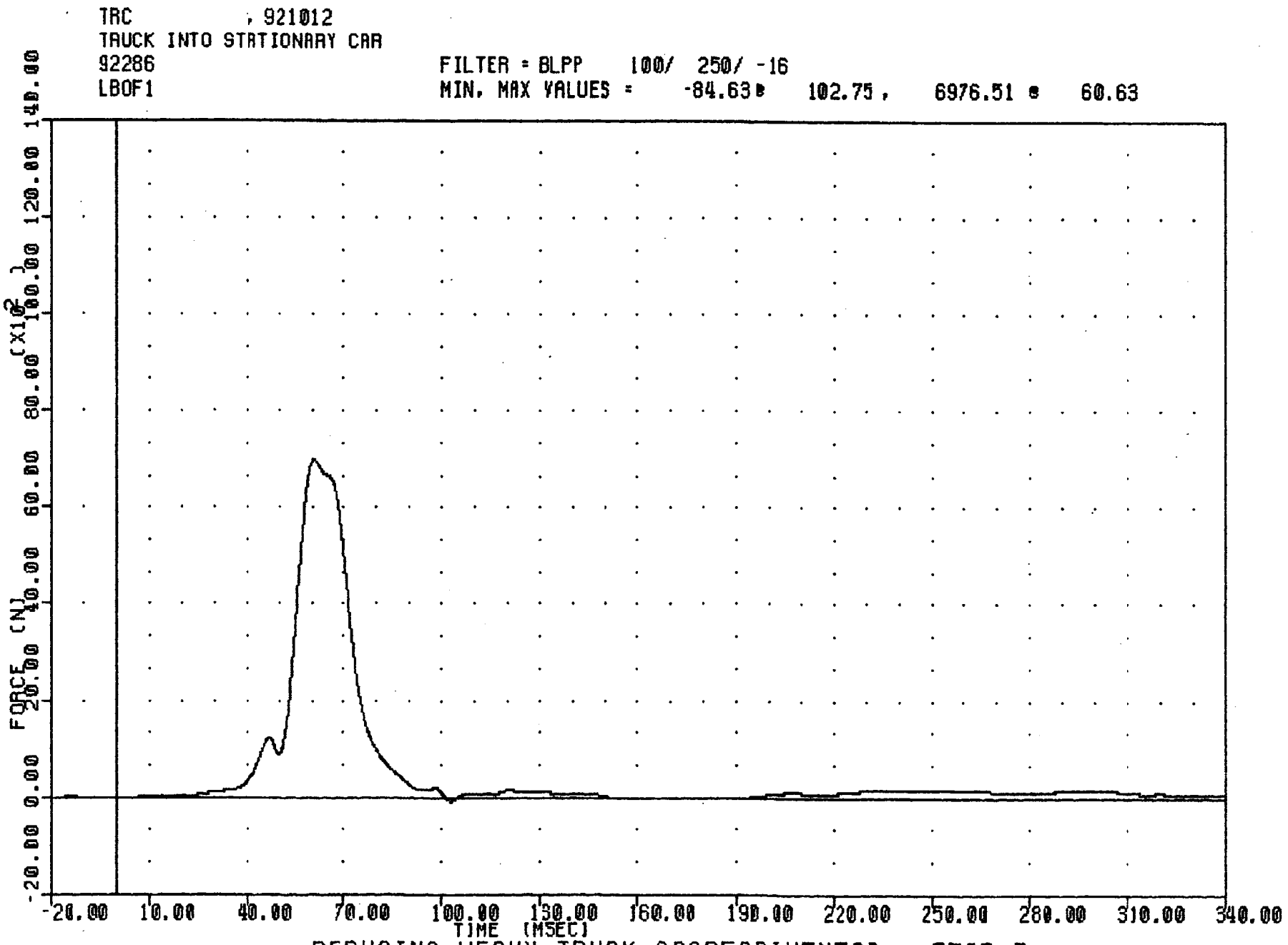
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER PELVIS RESULTANT ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER LEFT FEMUR FORCE

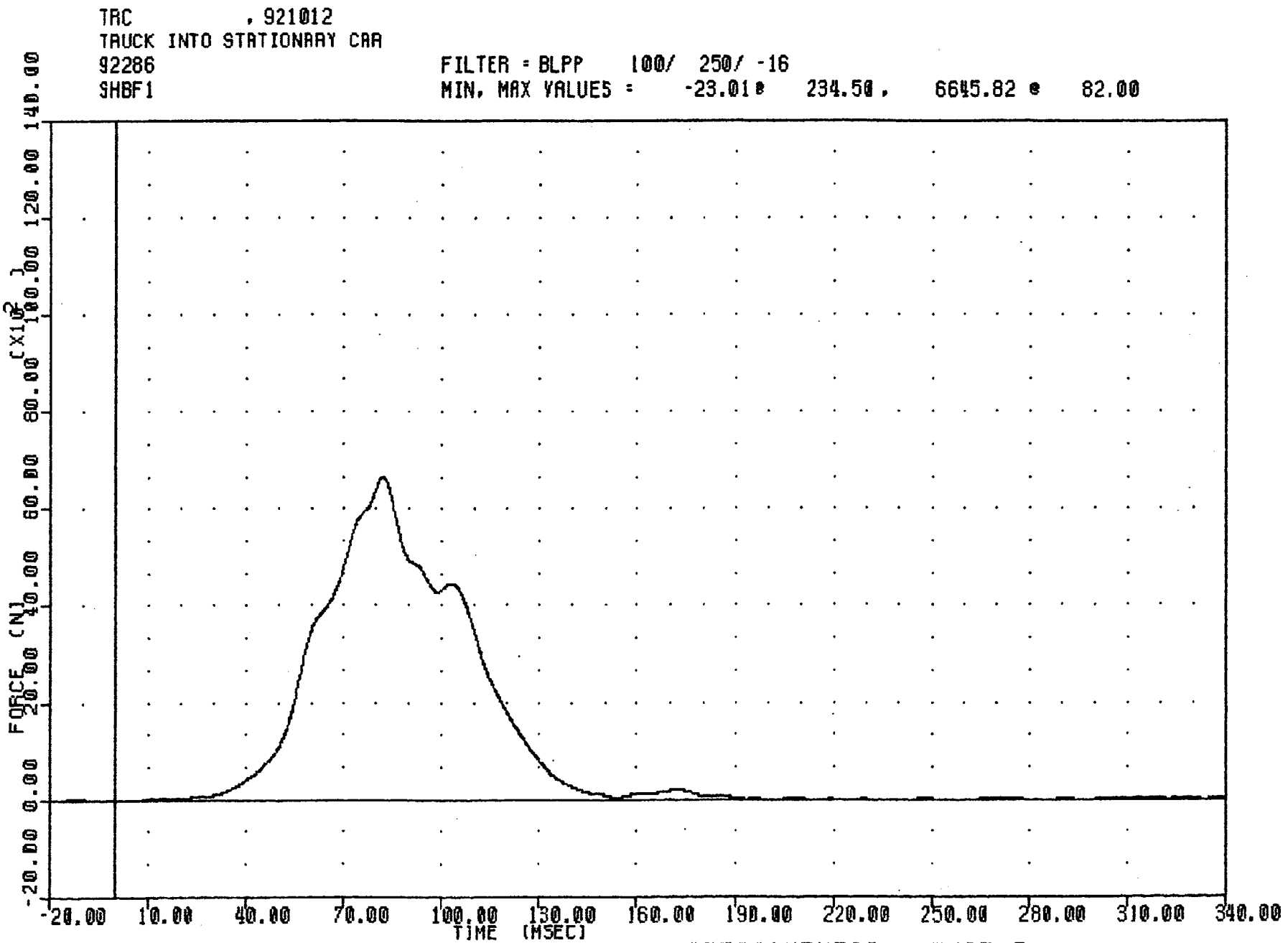


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER RIGHT FEMUR FORCE

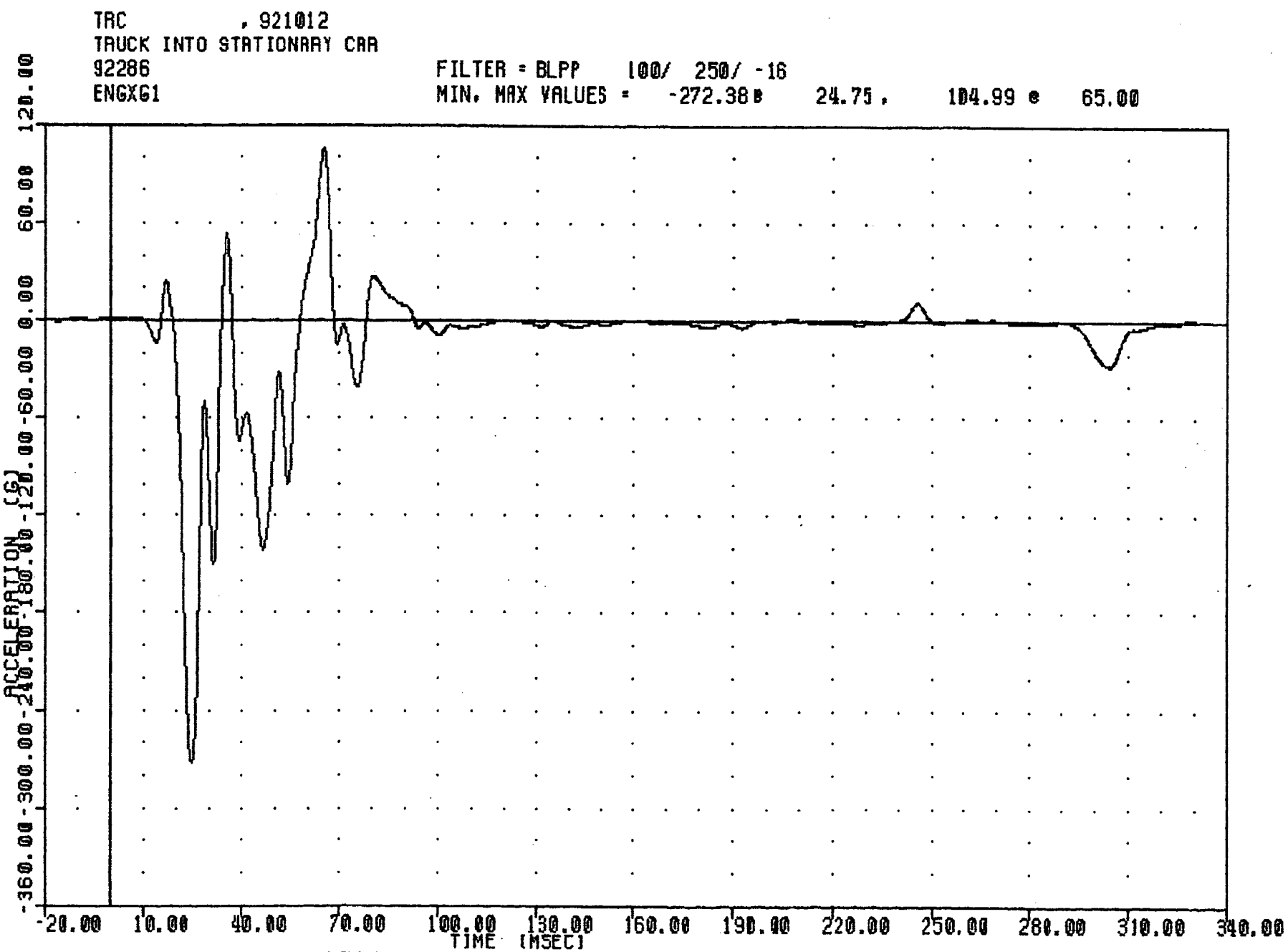


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7

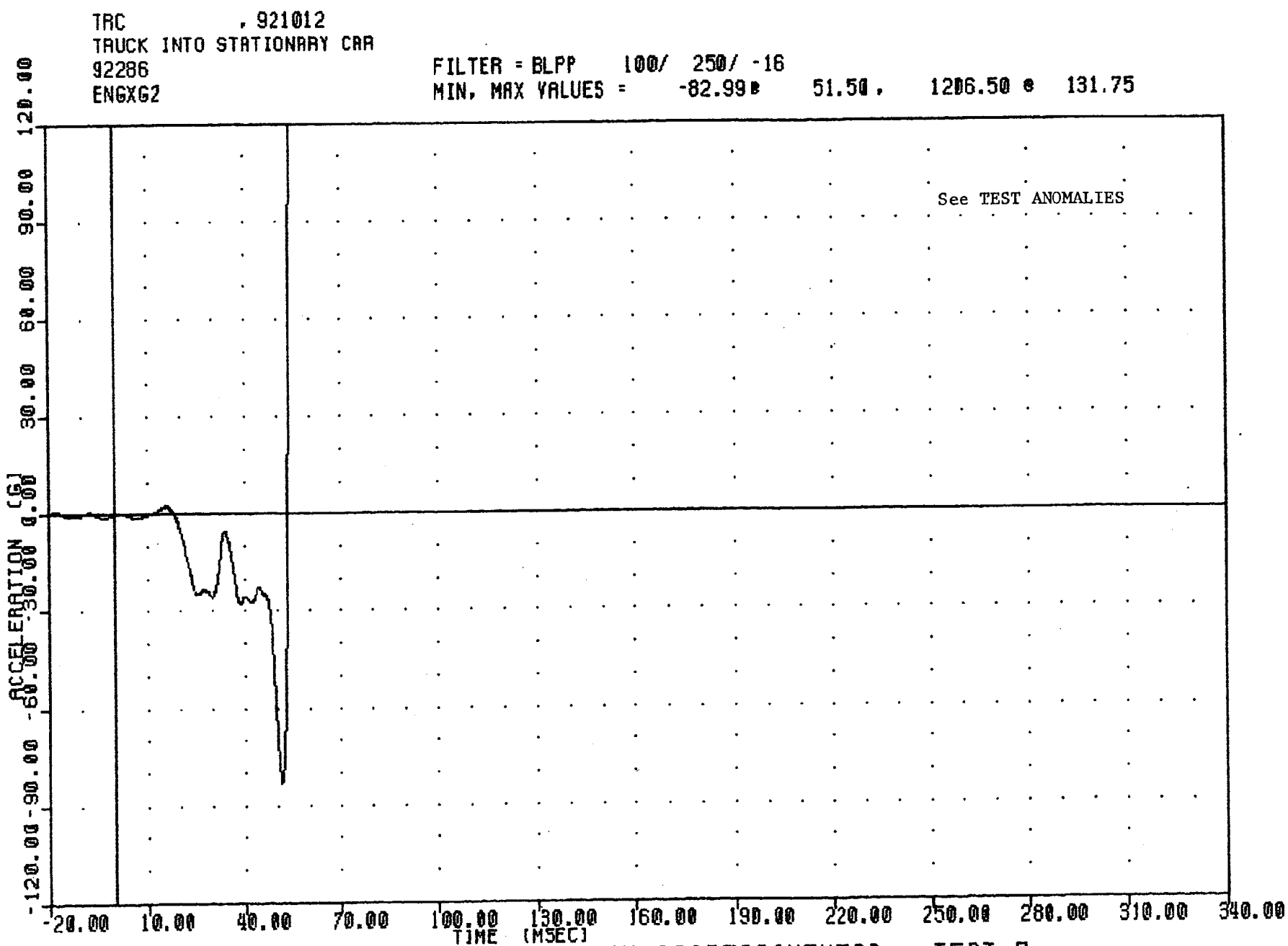
DRIVER LAP BELT OUTBOARD FORCE



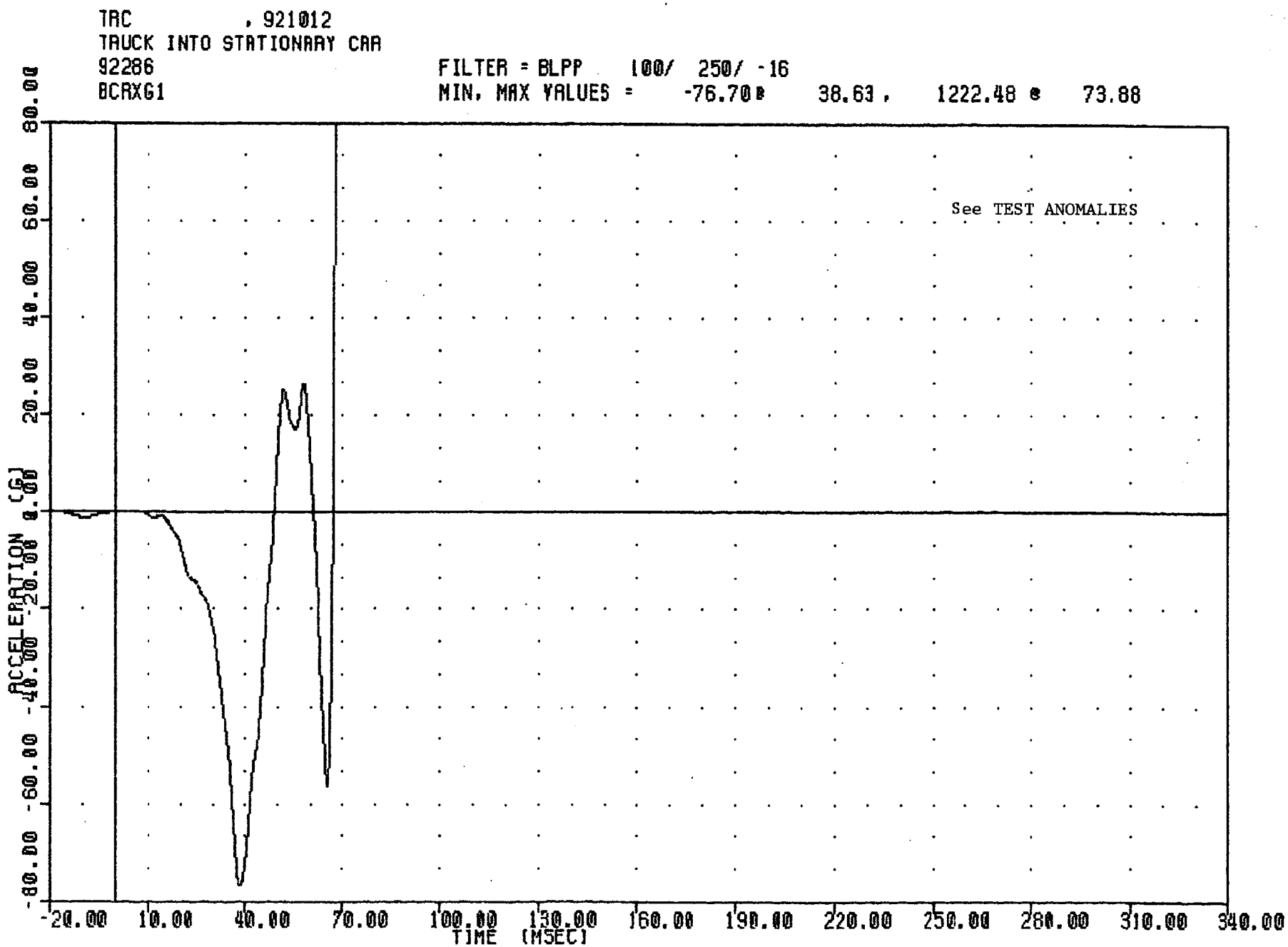
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
DRIVER SHOULDER BELT FORCE



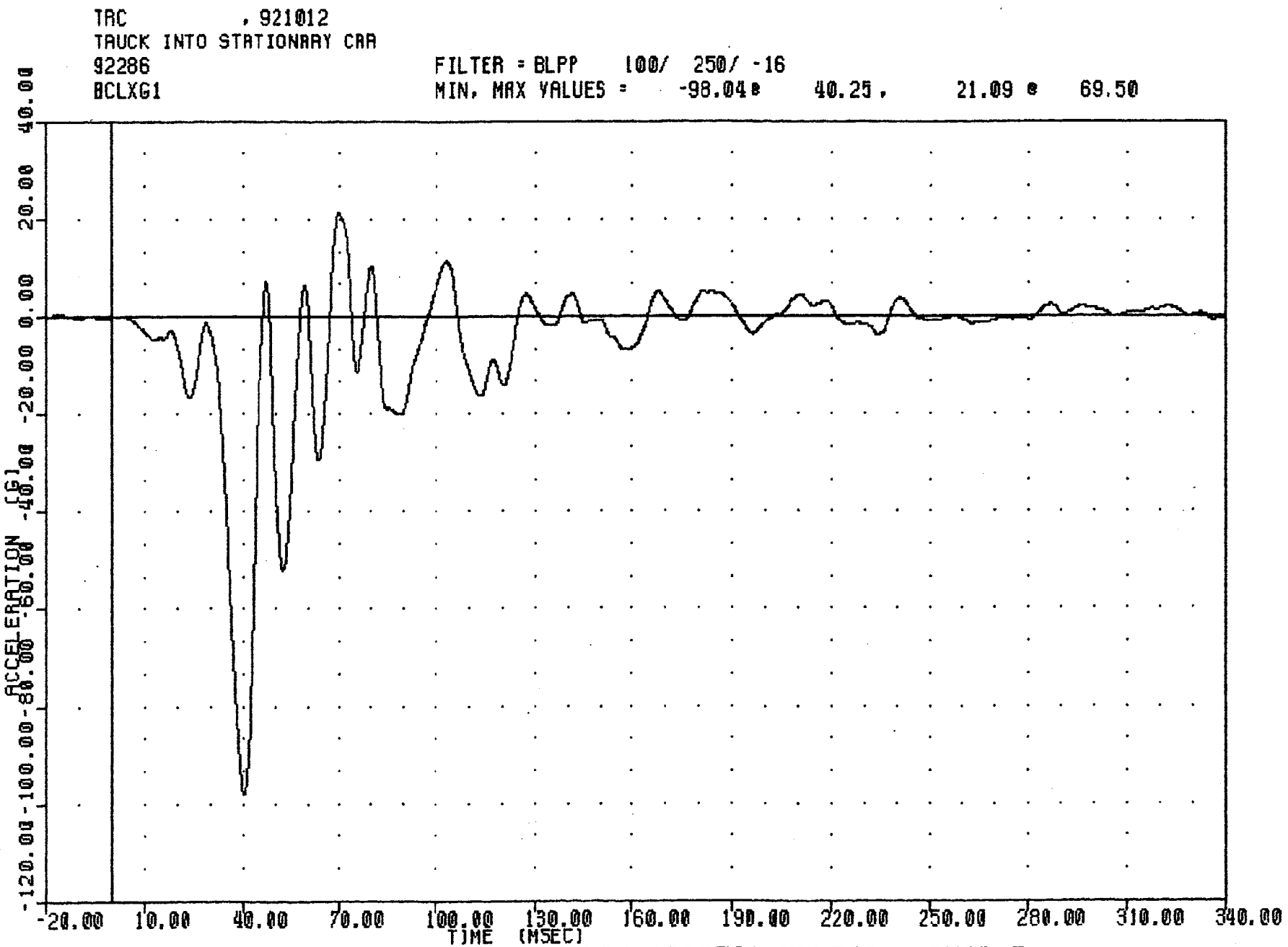
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
ENGINE TOP X-AXIS ACCELERATION



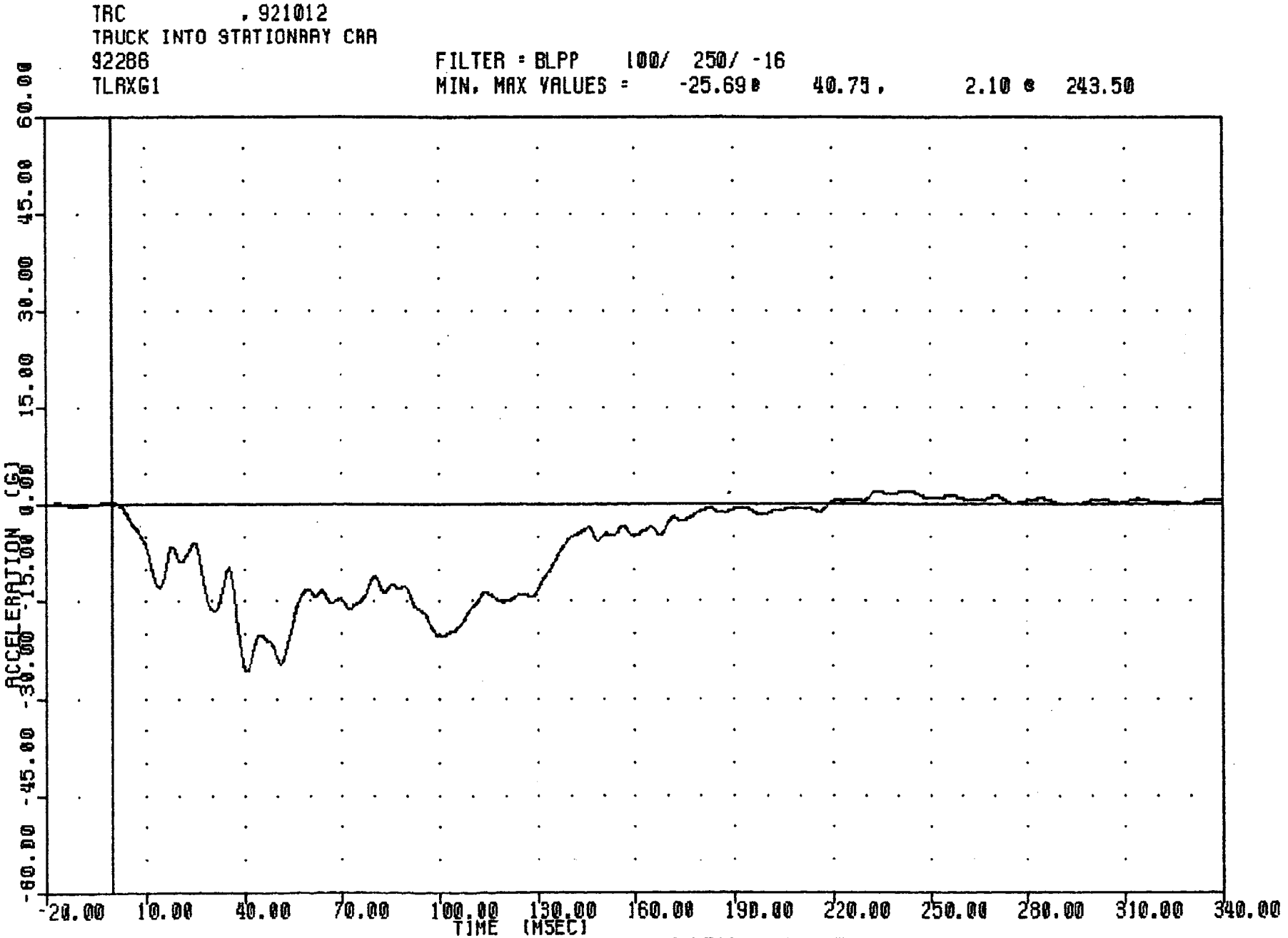
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
ENGINE BOTTOM X-AXIS ACCELERATION



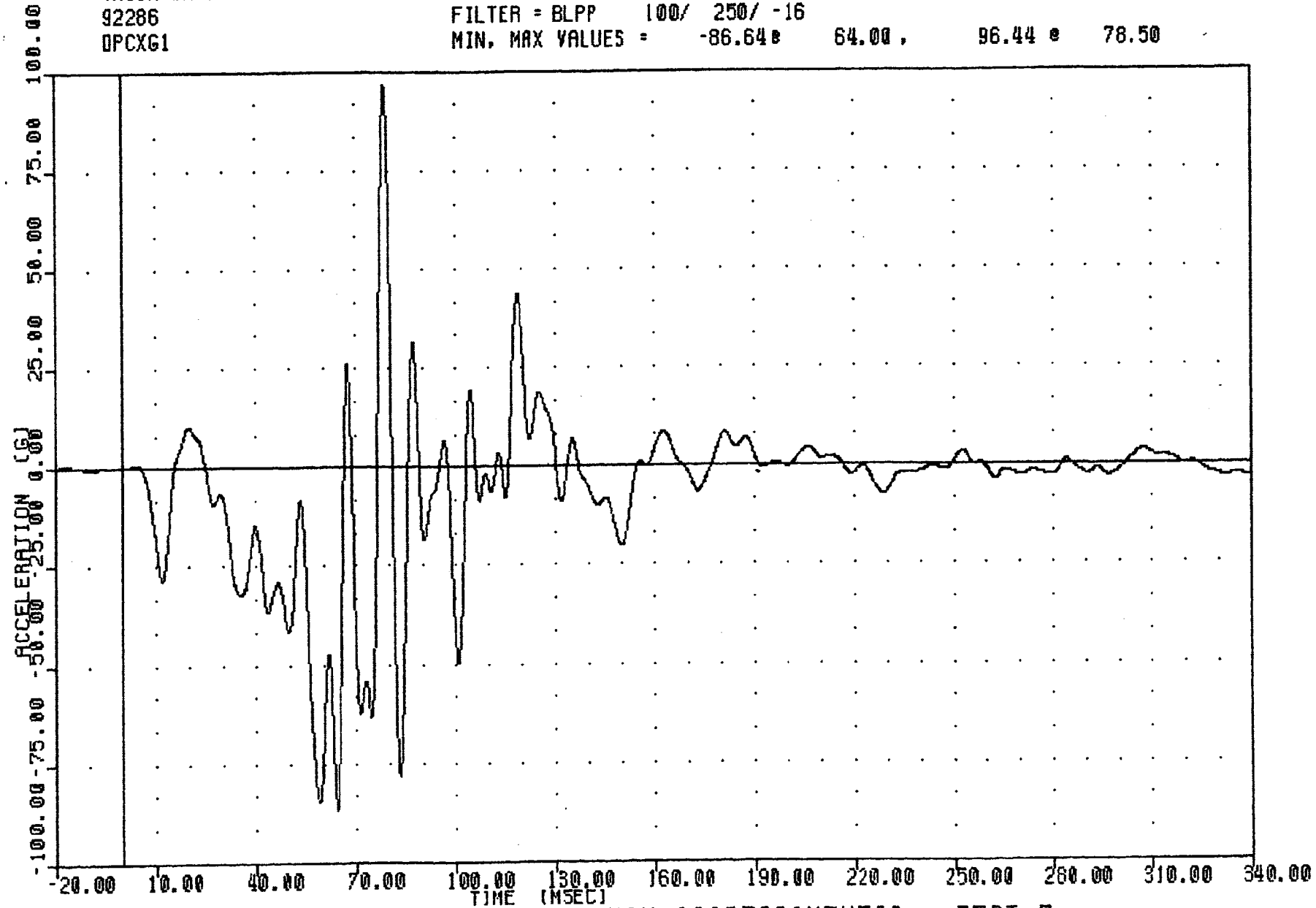
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
RIGHT BRAKE CALIPER X-AXIS ACCELERATION



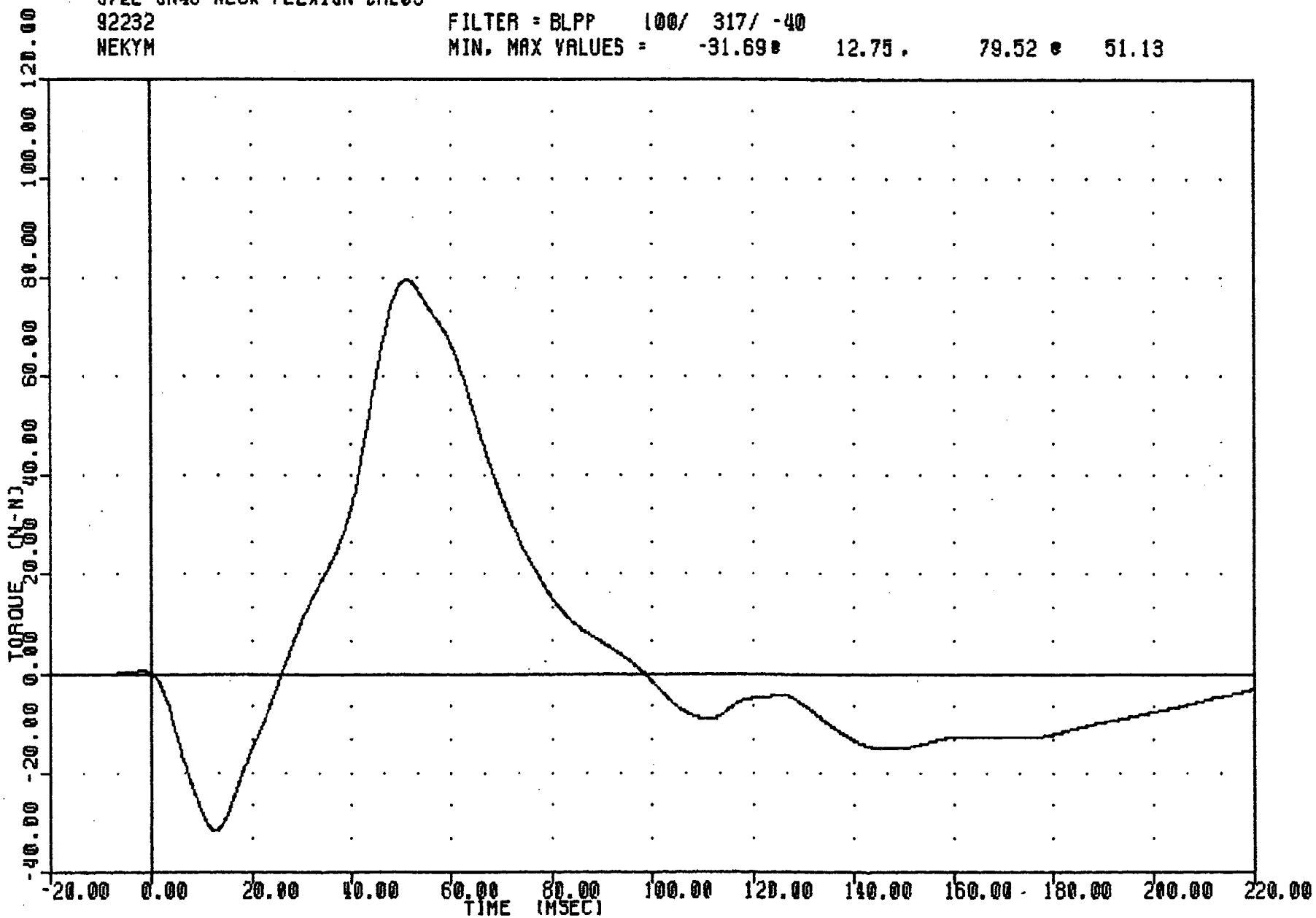
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
LEFT BRAKE CALIPER X-AXIS ACCELERATION



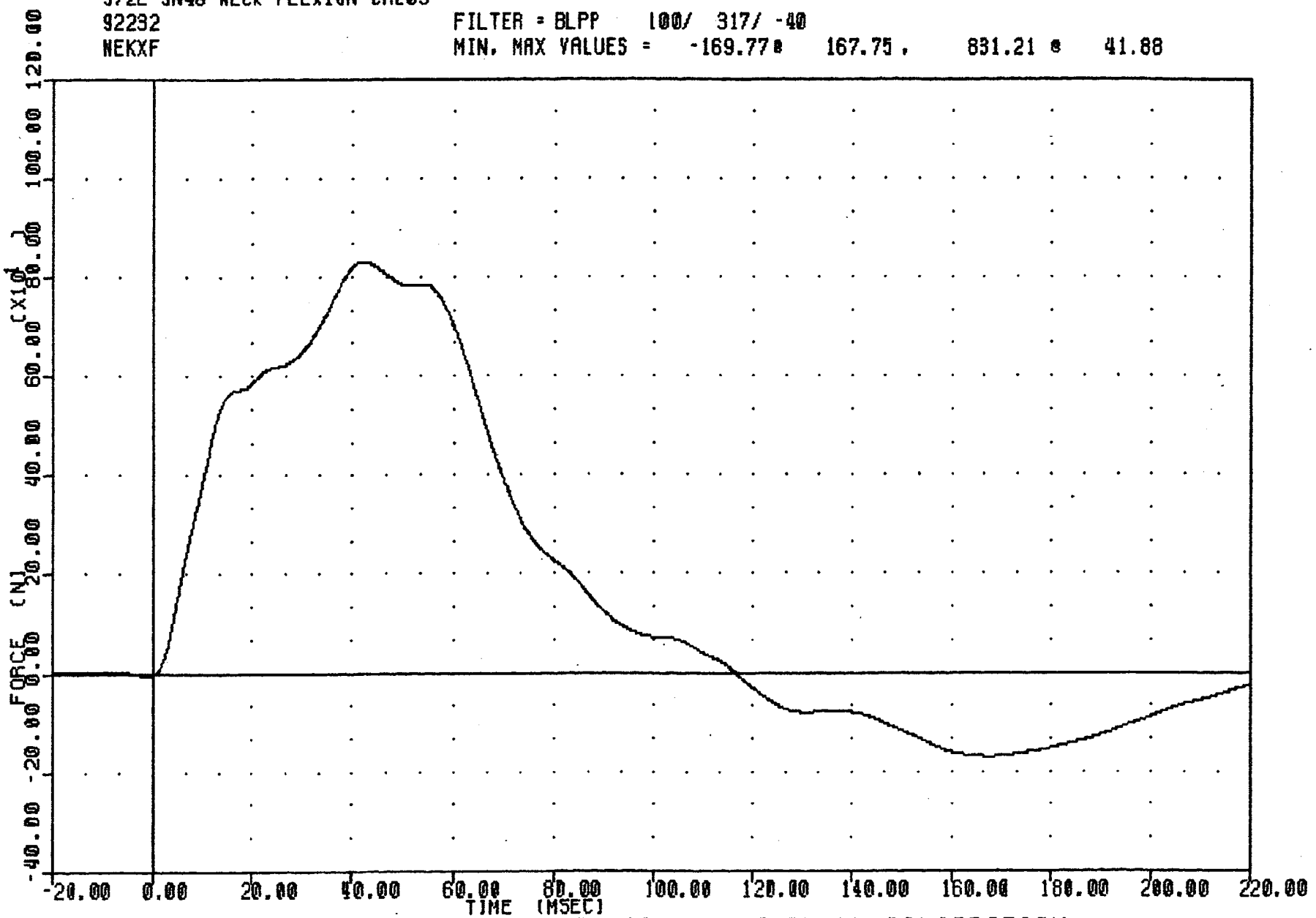
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
LEFT REAR SEAT X-AXIS ACCELERATION



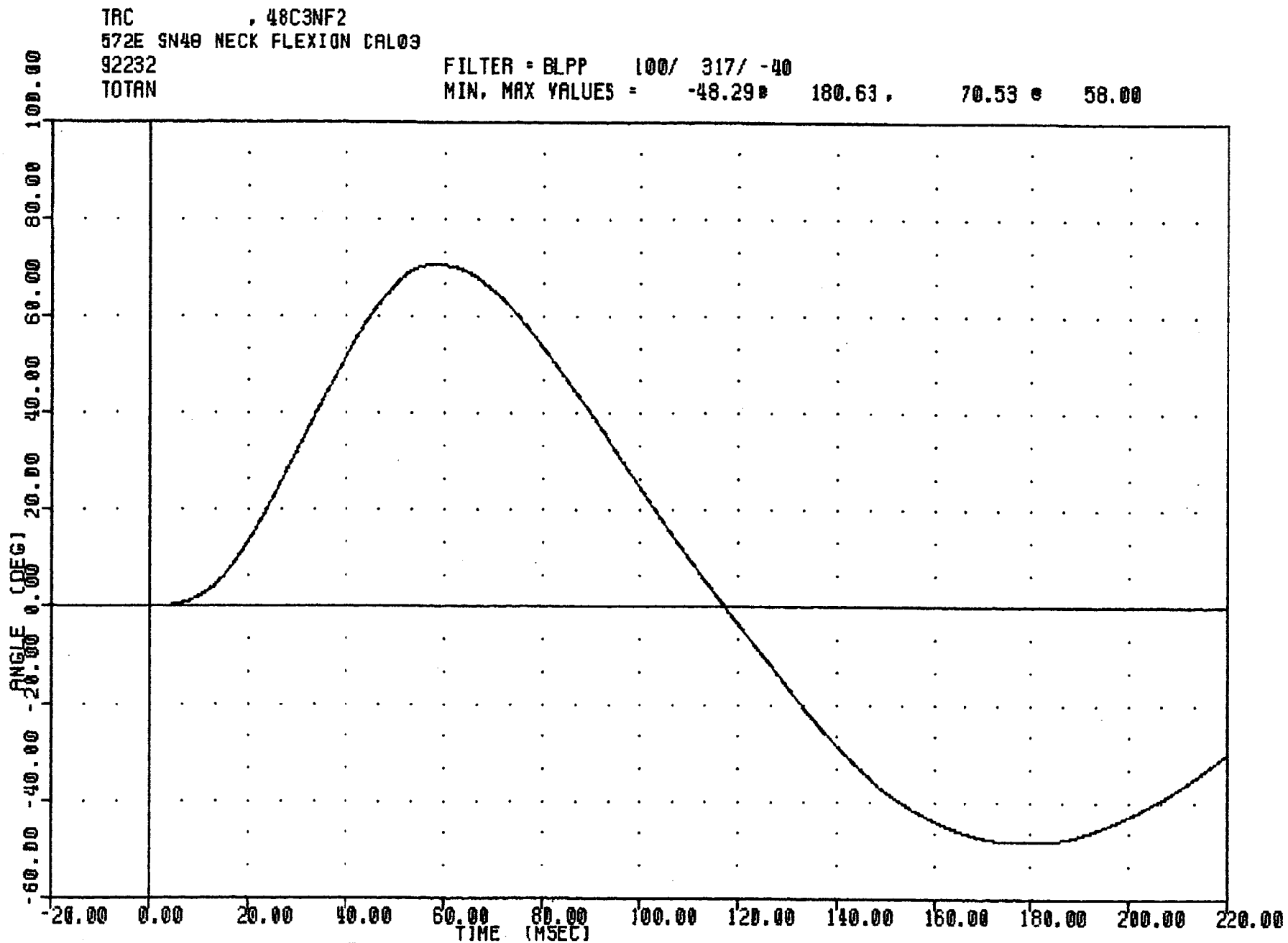
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION



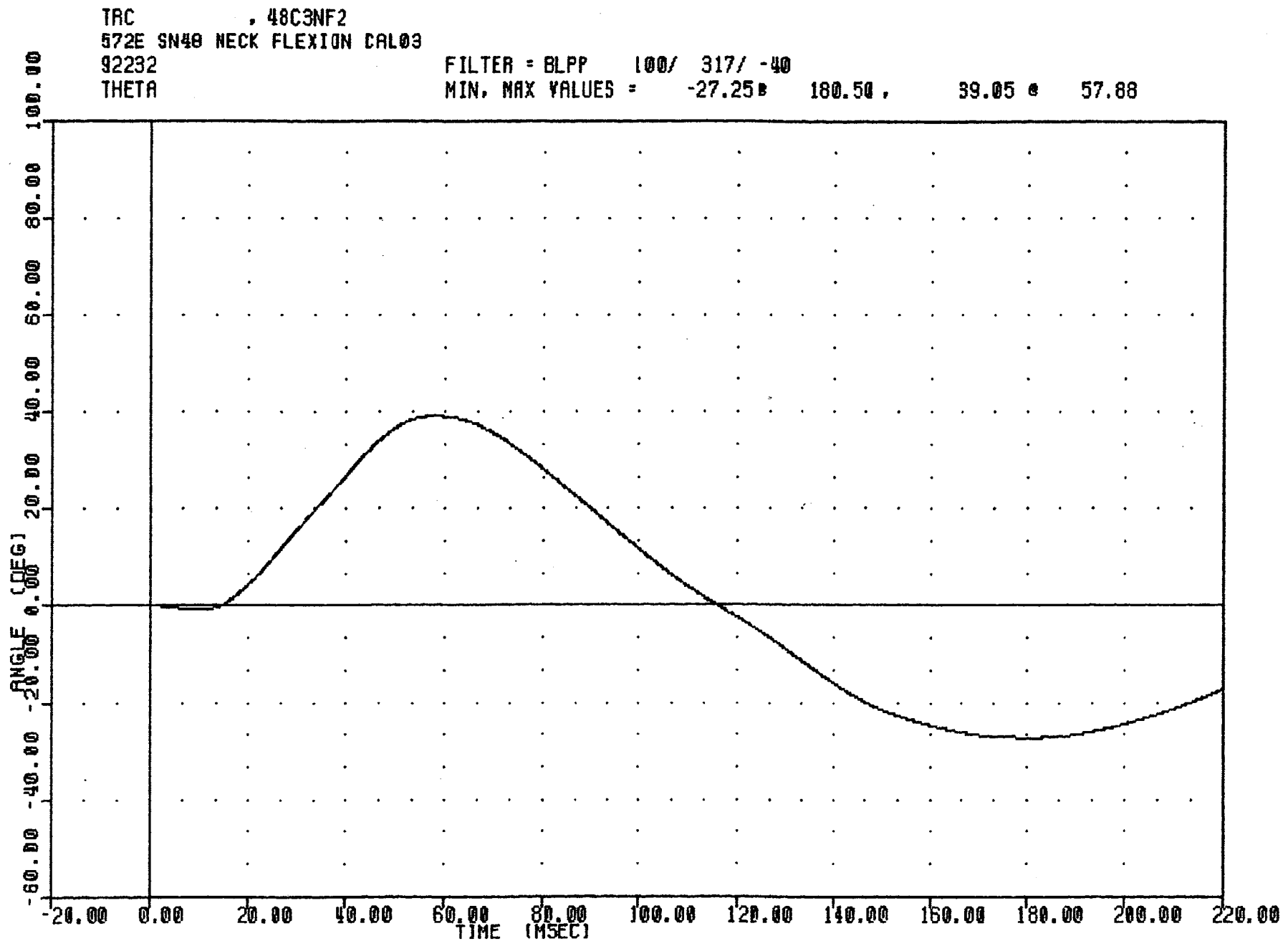
PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS



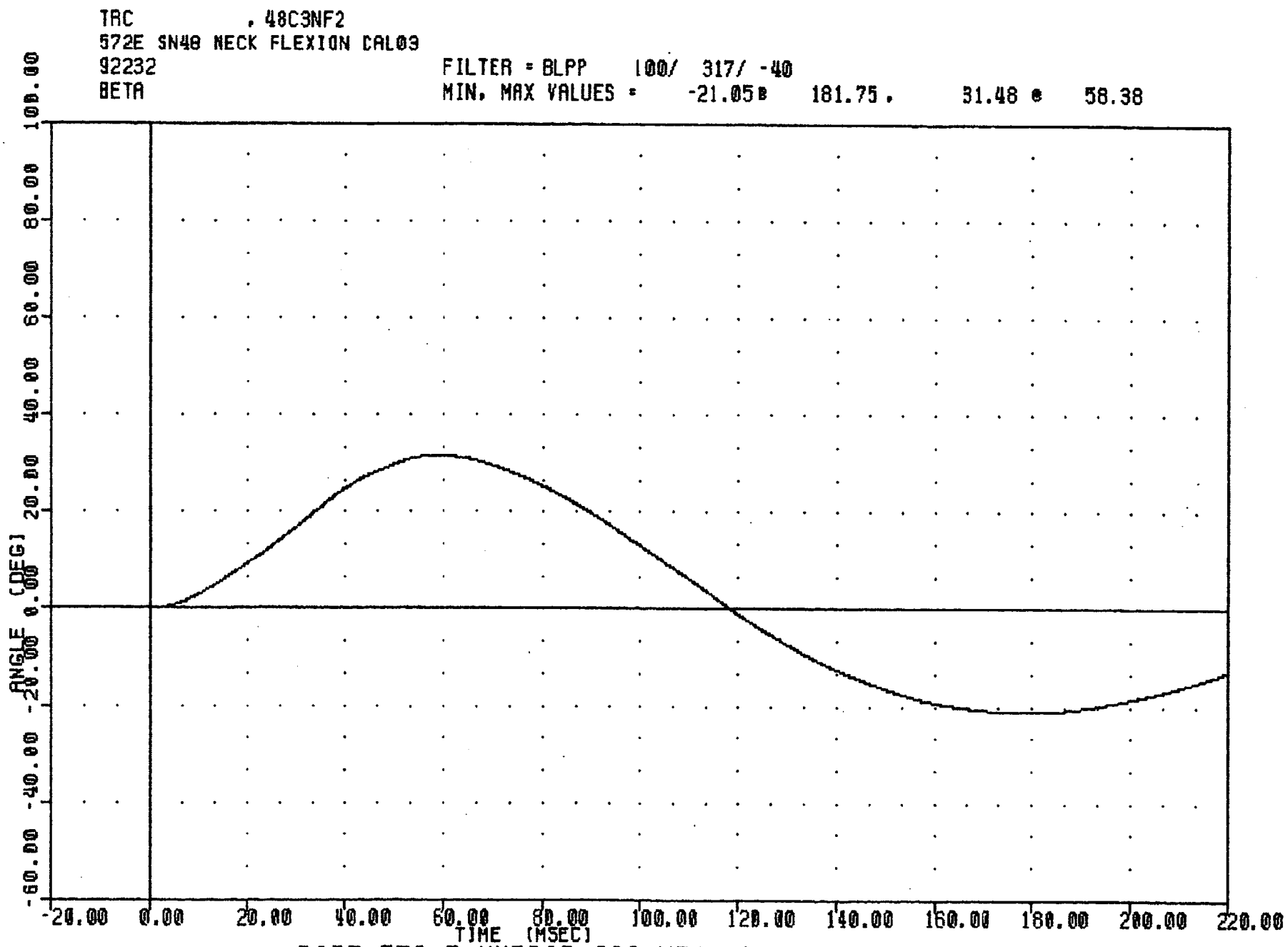
PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS



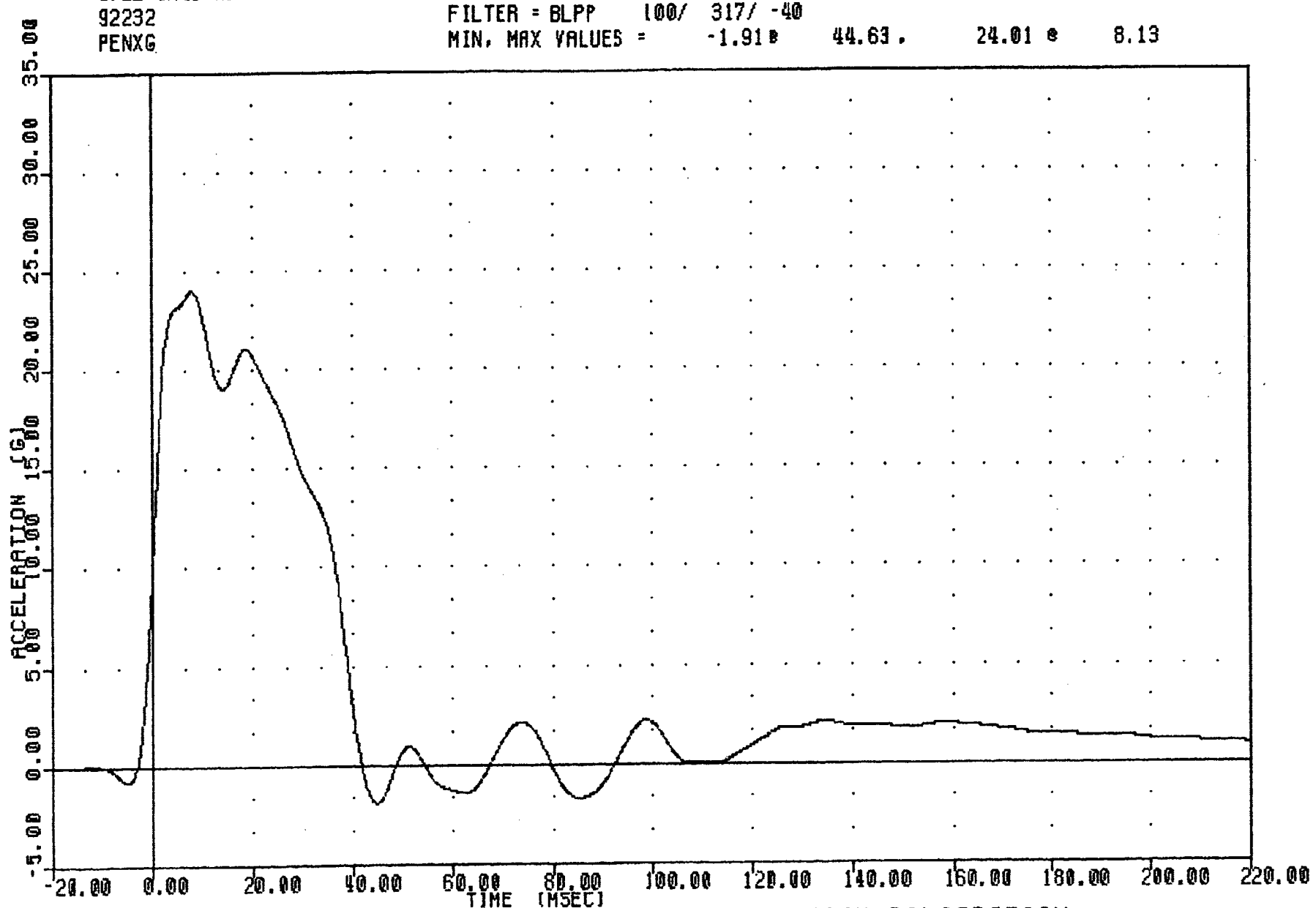
PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION



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



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



PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

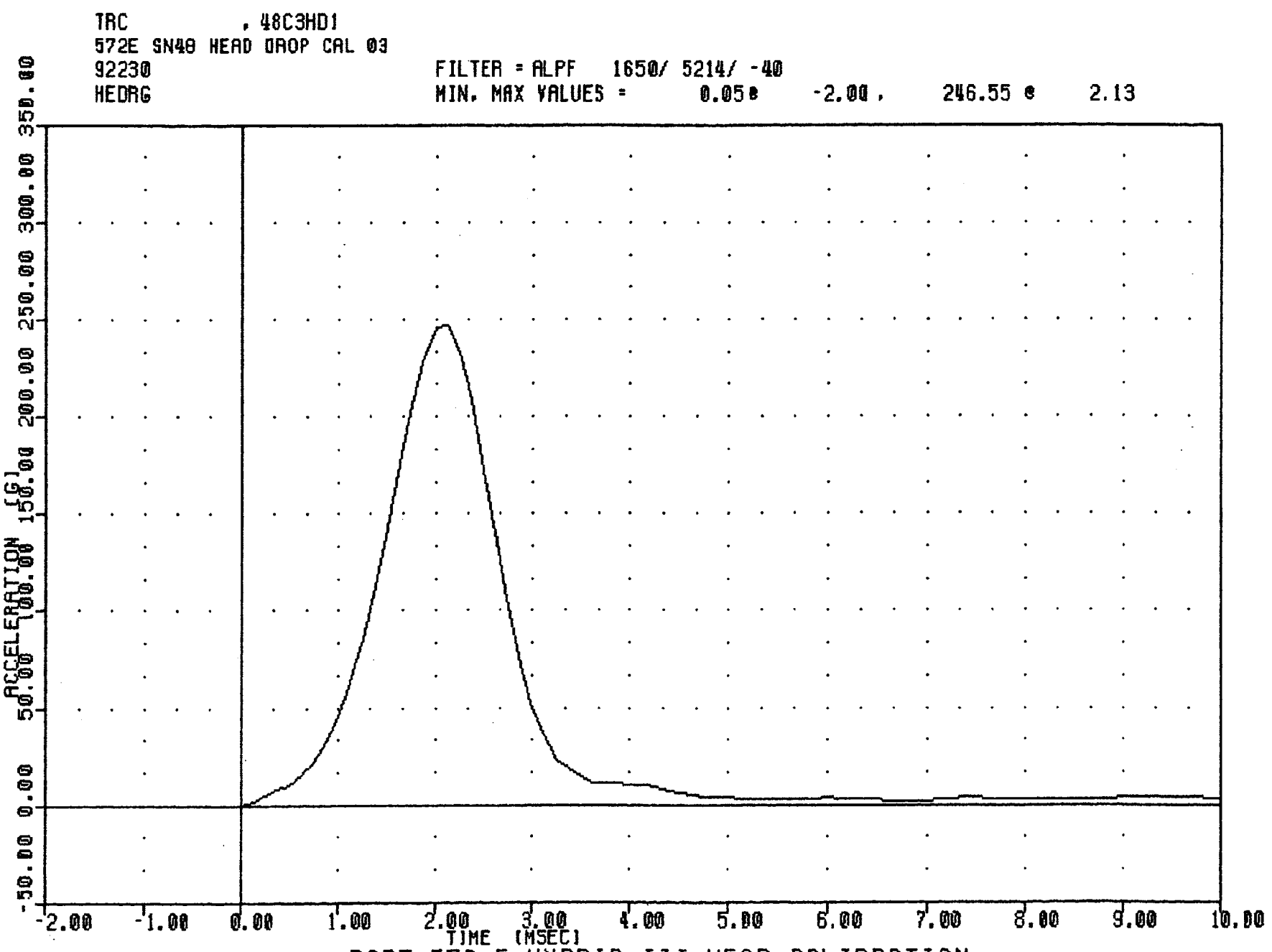
HYBRID III 19-AUG-92

6 AXIS NECK TRANSDUCER
TRC 48C3NF2 572E SN48 NECK FLEXION CAL03

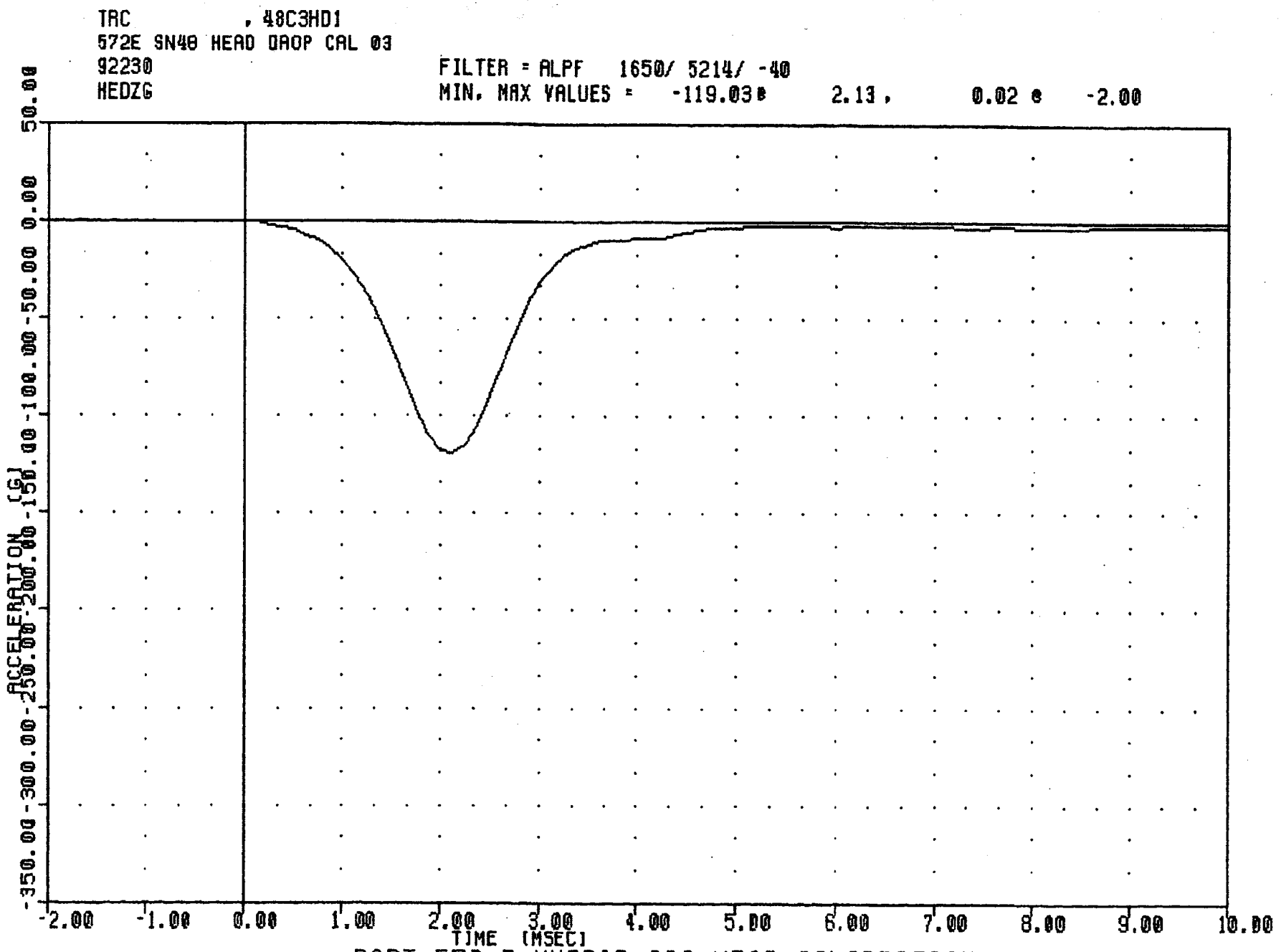
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10% - 70%	56.0 %
IMPACT VELOCITY		6.89 - 7.13 M/SEC	7.03 M/SEC
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.86 G
	20 MS	17.60 - 22.60 G	20.74 G
	30 MS	12.50 - 18.50 G	14.62 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	14.55 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	38.75 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	70.53 DEG.
	TIME	57 - 64 MS	58.00 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	93.40 NM
	TIME	47 - 58 MS	51.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.38 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99.63 MS

TEST MEETS SPECIFICATIONS

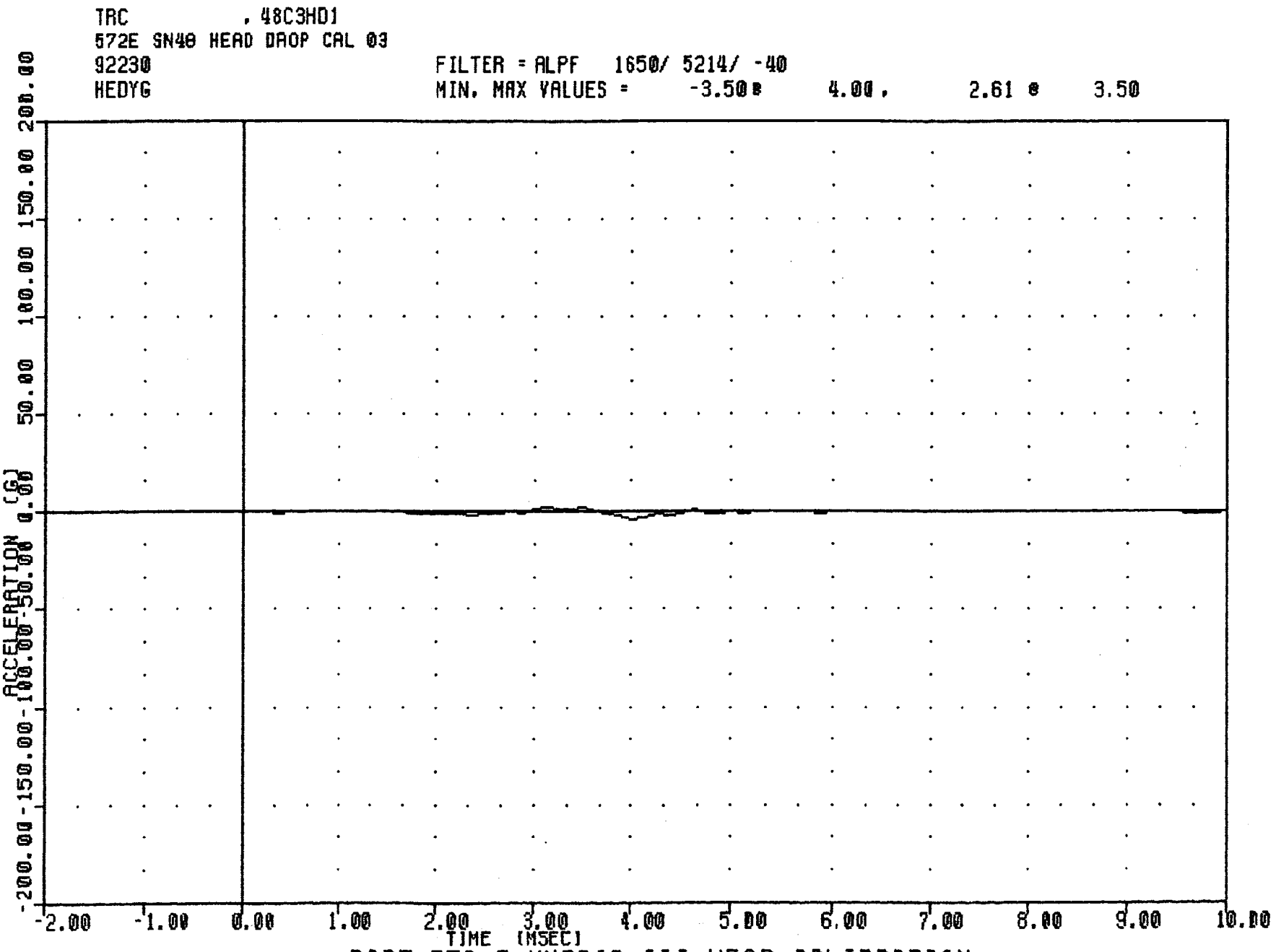
TECHNICIAN R.E. LeVan



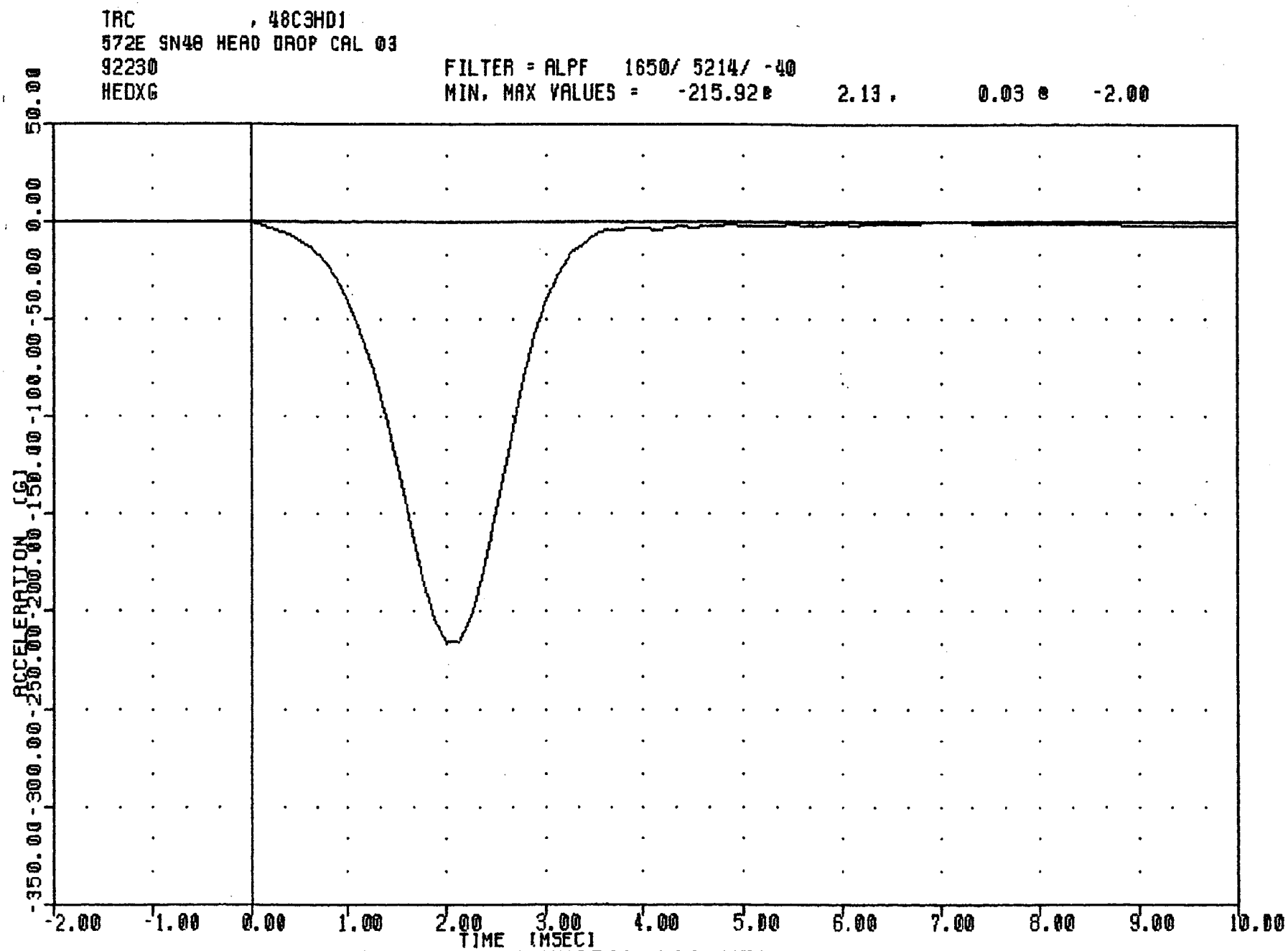
PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION



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



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



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

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III 17-AUG-92

TRC 48C3HD1 572E SN48 HEAD DROP CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	57.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	246.55 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.49 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. LeVan

APPENDIX C

DUMMY CALIBRATION INFORMATION

TRANSPORTATION RESEARCH CENTER OF OHIO
HYBRID III EXTERNAL DIMENSIONS
HUMANOID 048

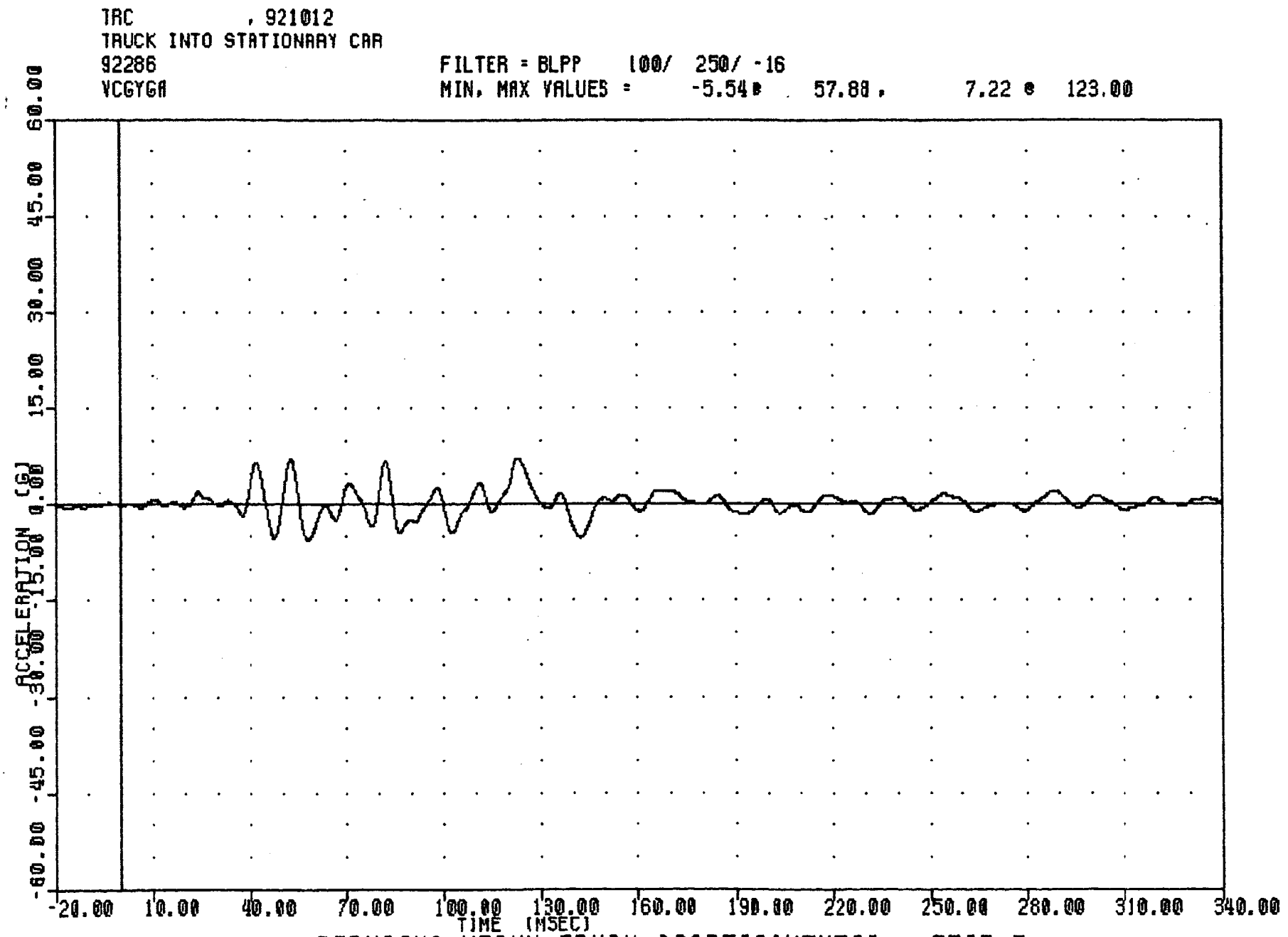
19-AUG-92

TRC 48C3ED1 572E SN048 EXT. DIMENSION CAL03

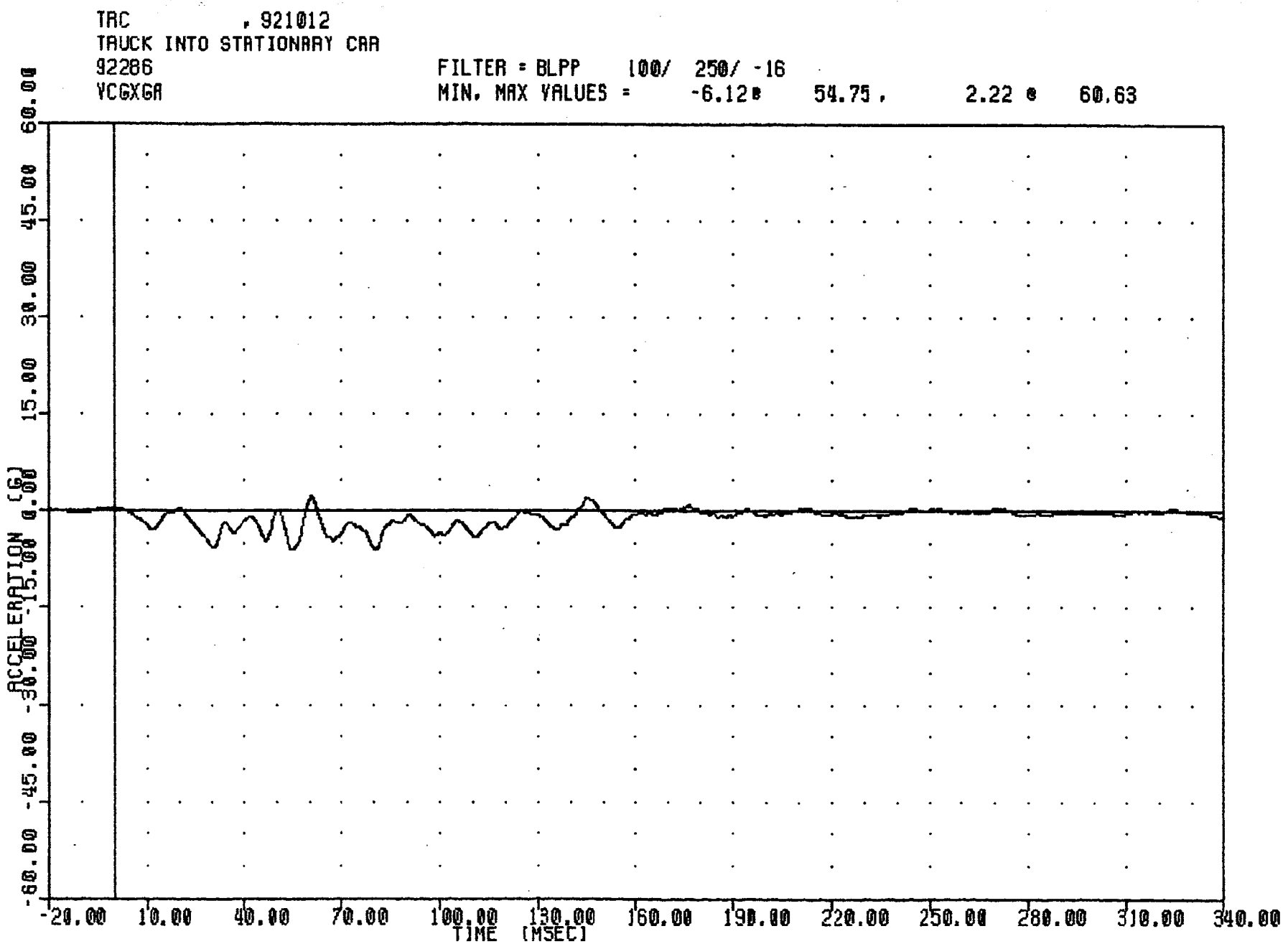
TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			21.1 DEG. C
RELATIVE HUMIDITY			56.0 %
LOCATION FOR CHEST CIRCUMFERENCE	(AA)	429- 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE	(BB)	226- 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970-1001 MM	986. MM
WAIST CIRCUMFERENCE	(Z)	836- 866 MM	851. 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	202. 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

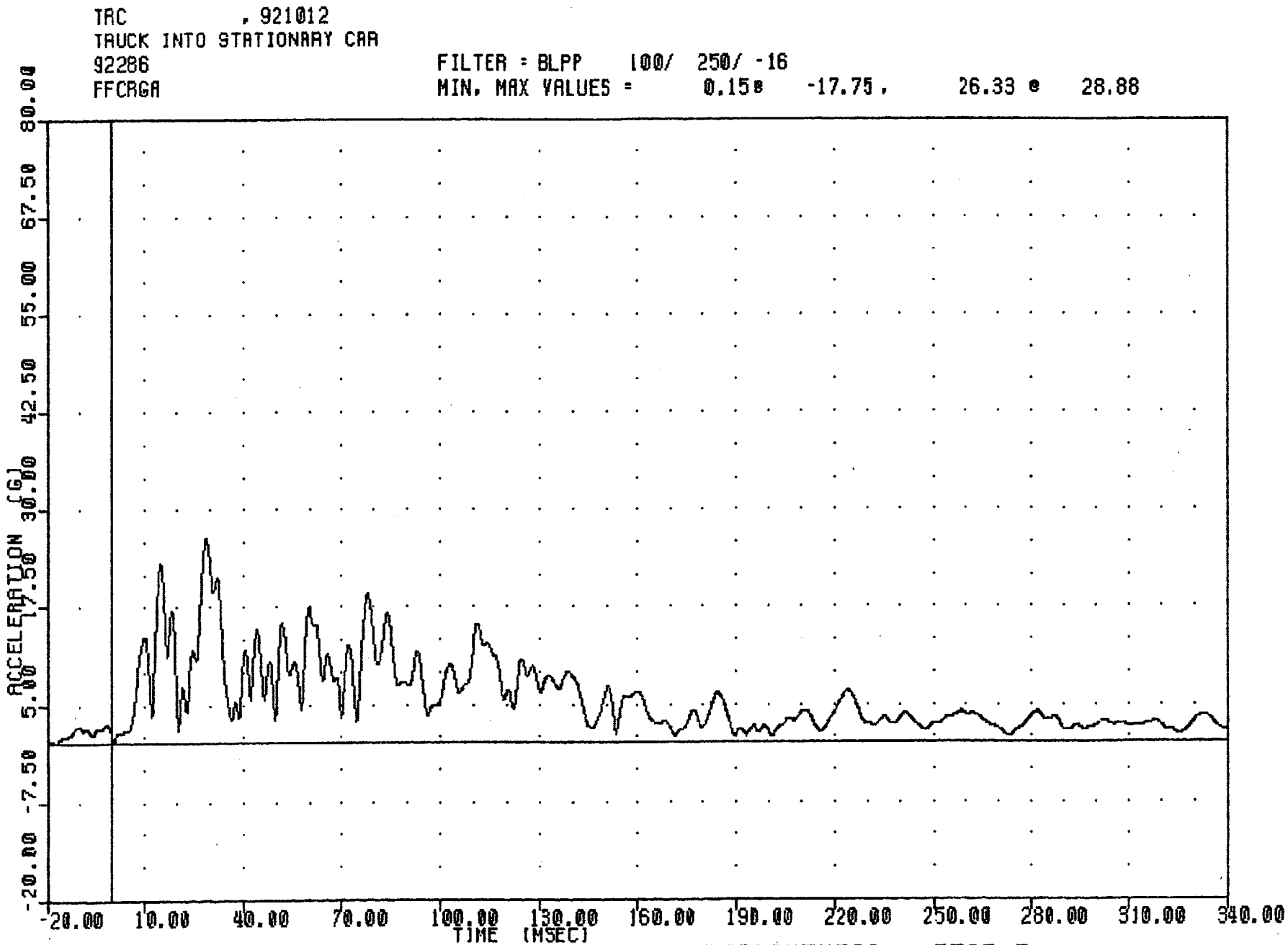
TECHNICIAN R. E. LeVan



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
TRUCK CENTER OF GRAVITY Y-AXIS ACCELERATION

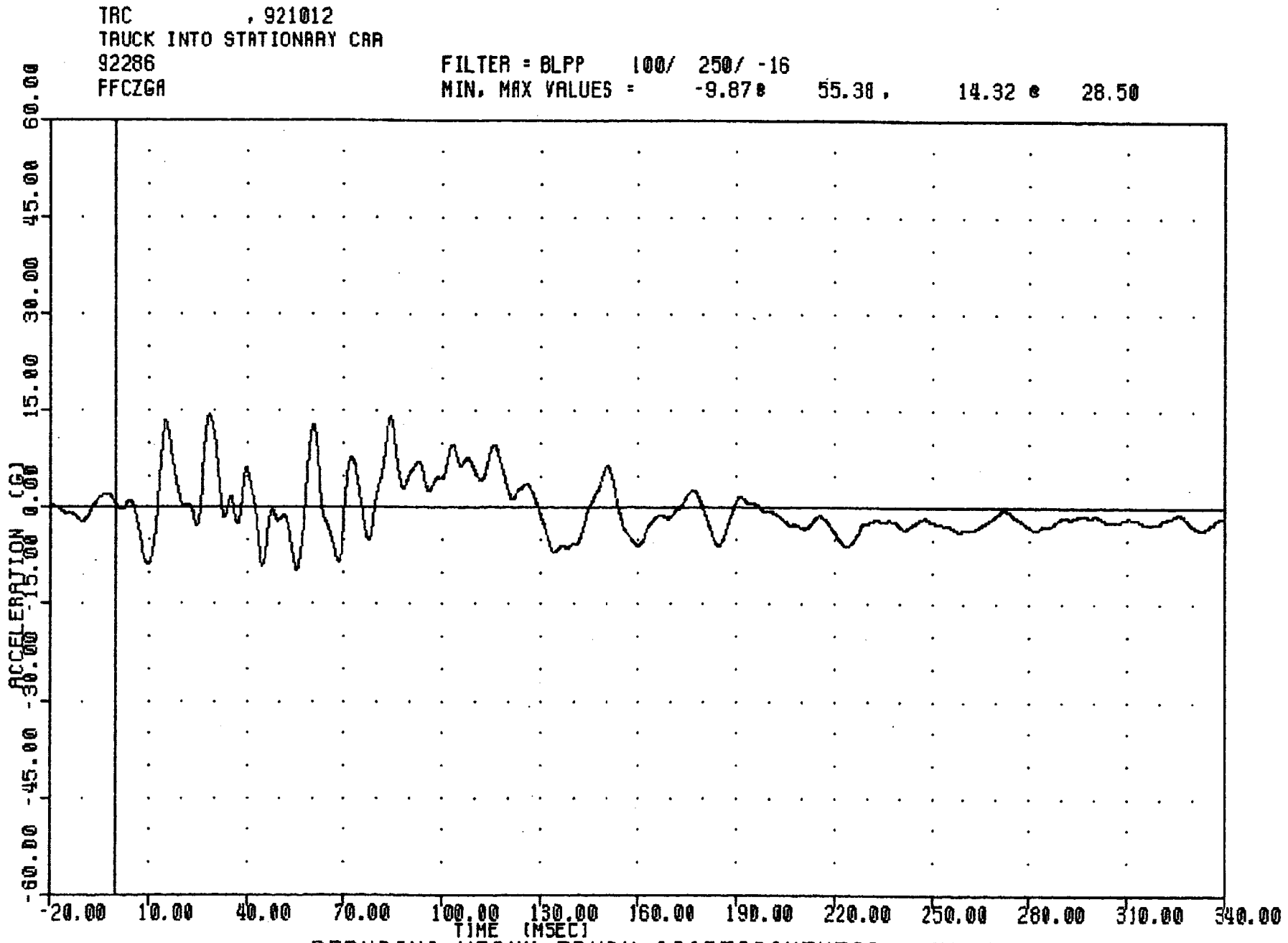


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
TRUCK CENTER OF GRAVITY X-AXIS ACCELERATION

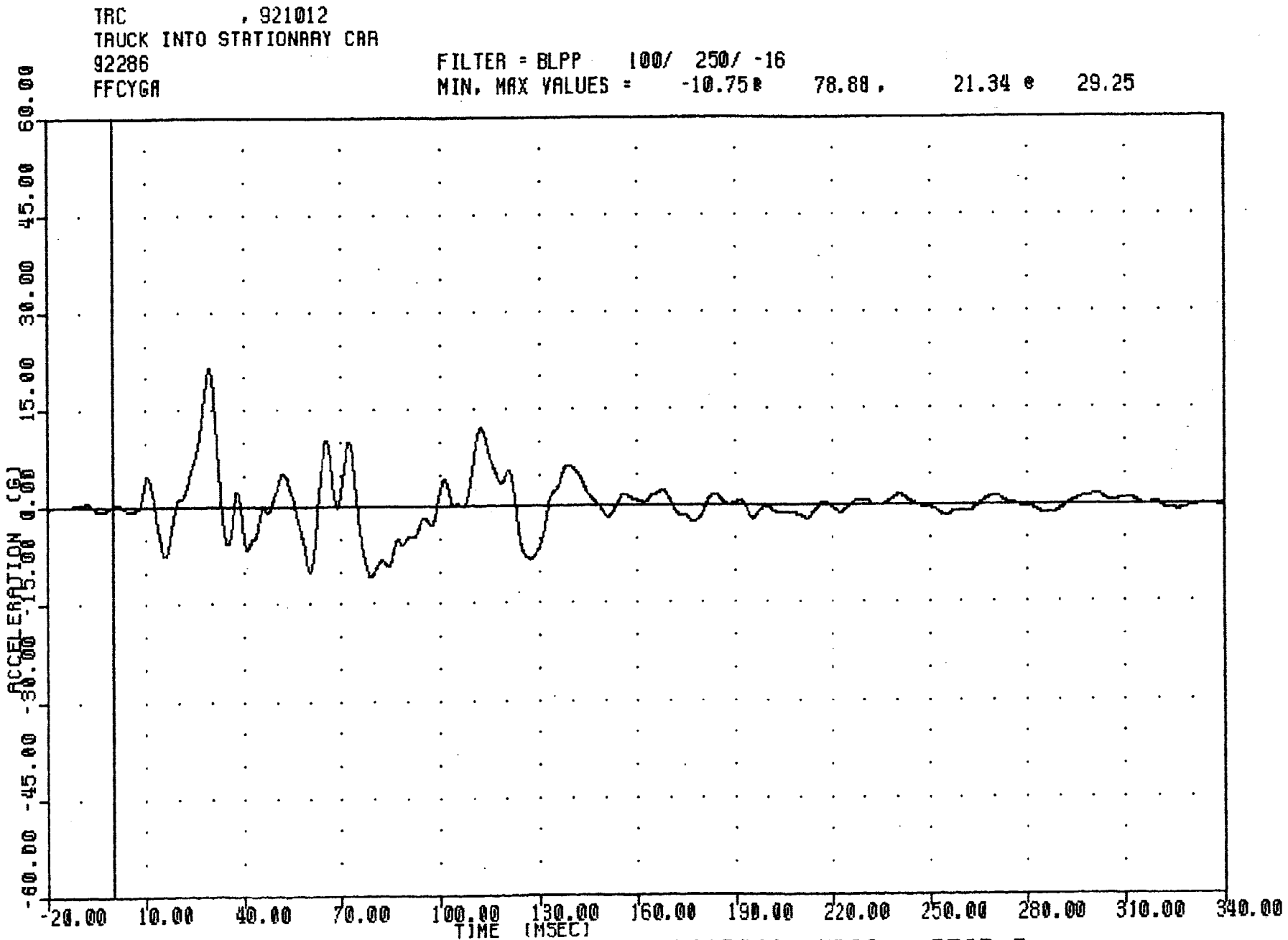


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7

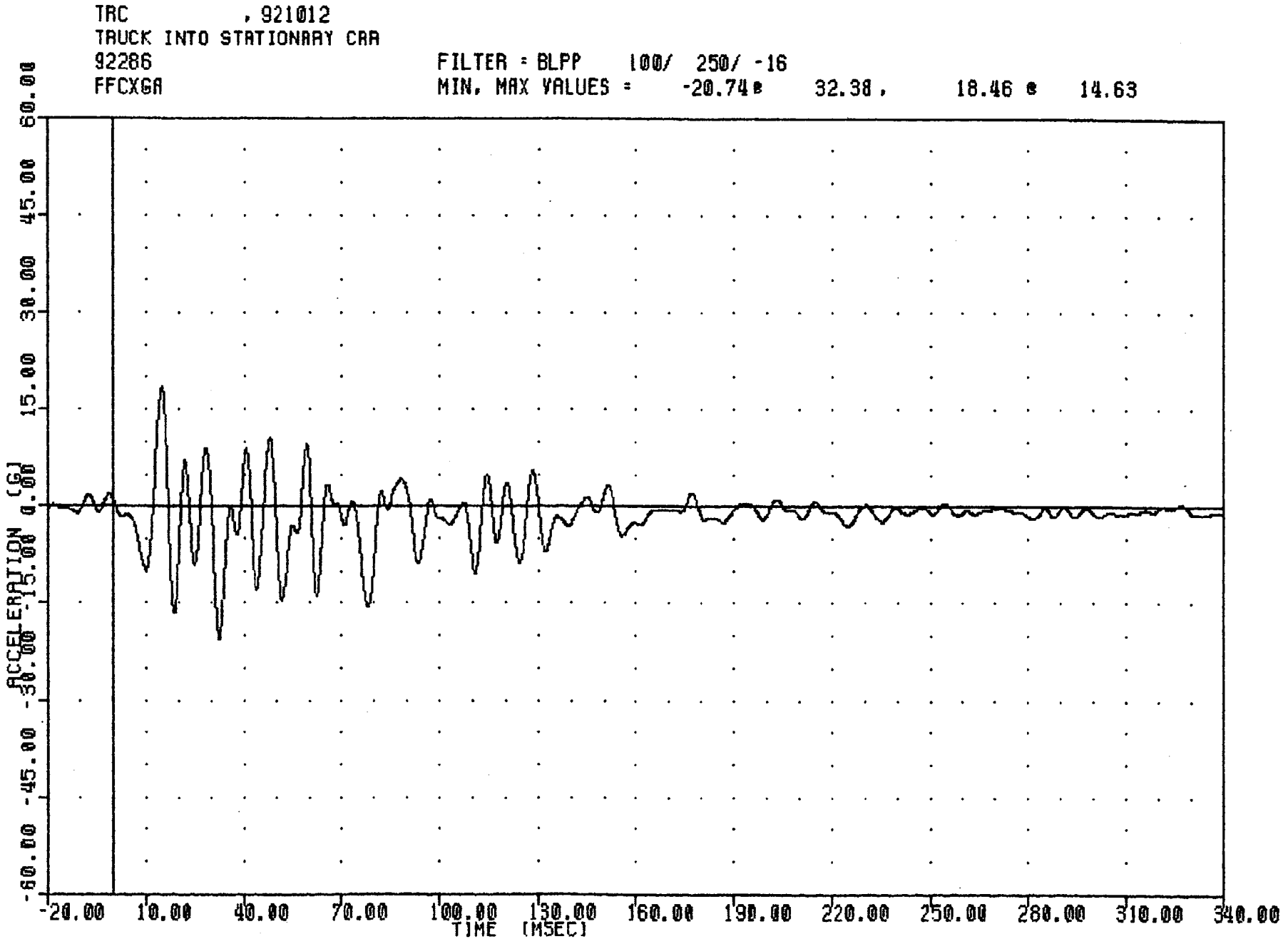
TRUCK FRONT FRAME CROSSMEMBER RESULTANT ACCELERATION



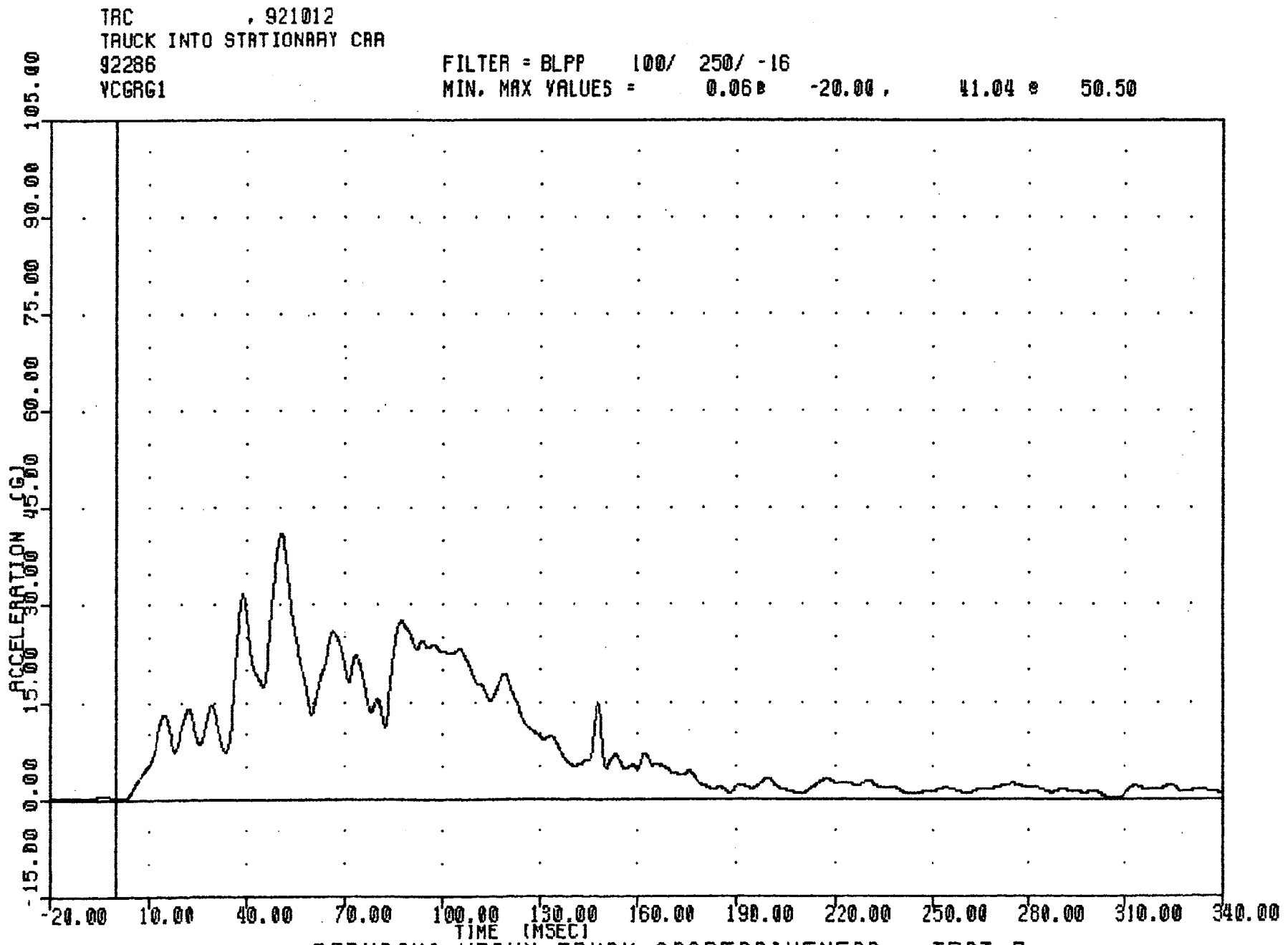
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS ACCELERATION



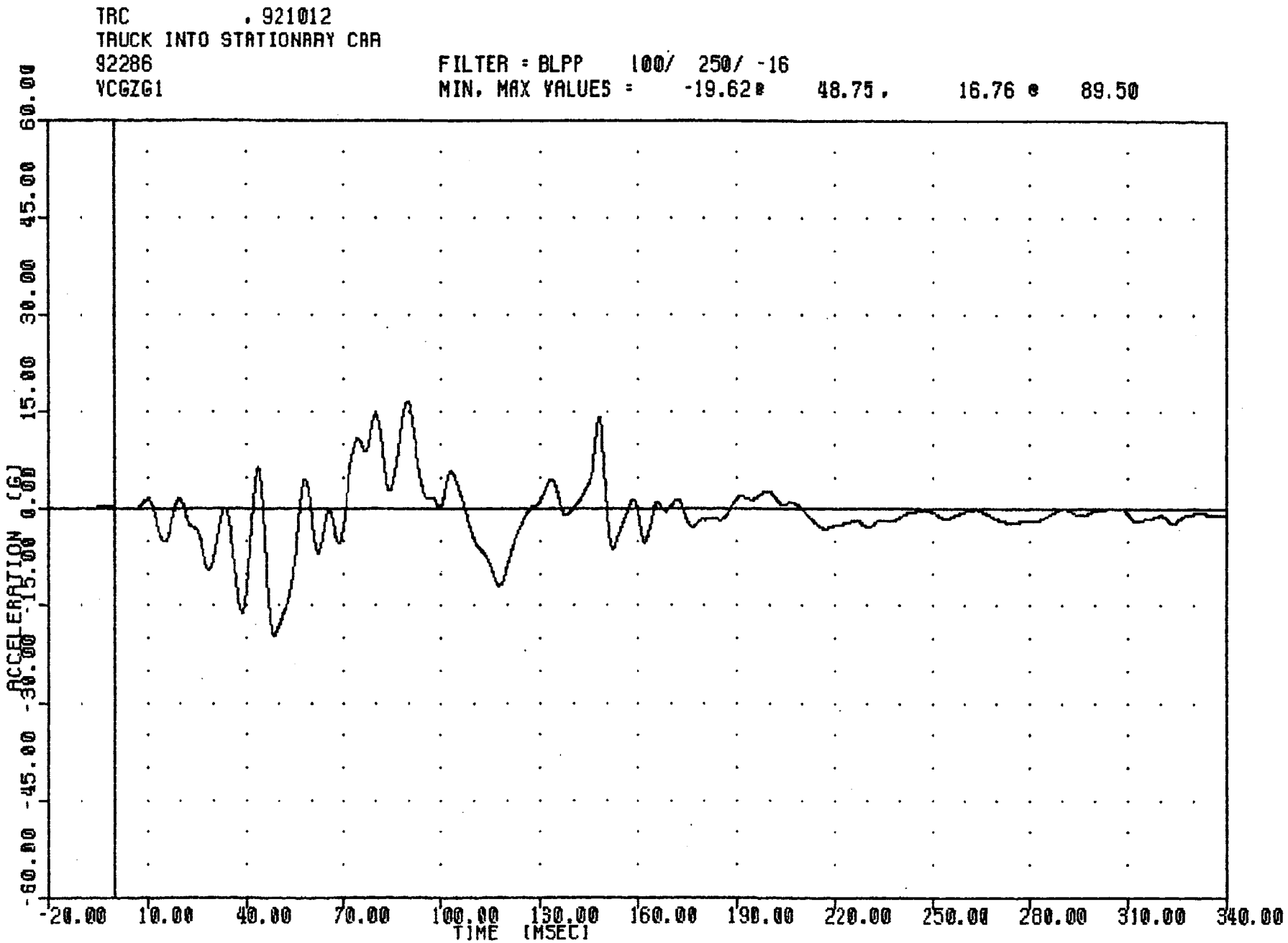
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS ACCELERATION



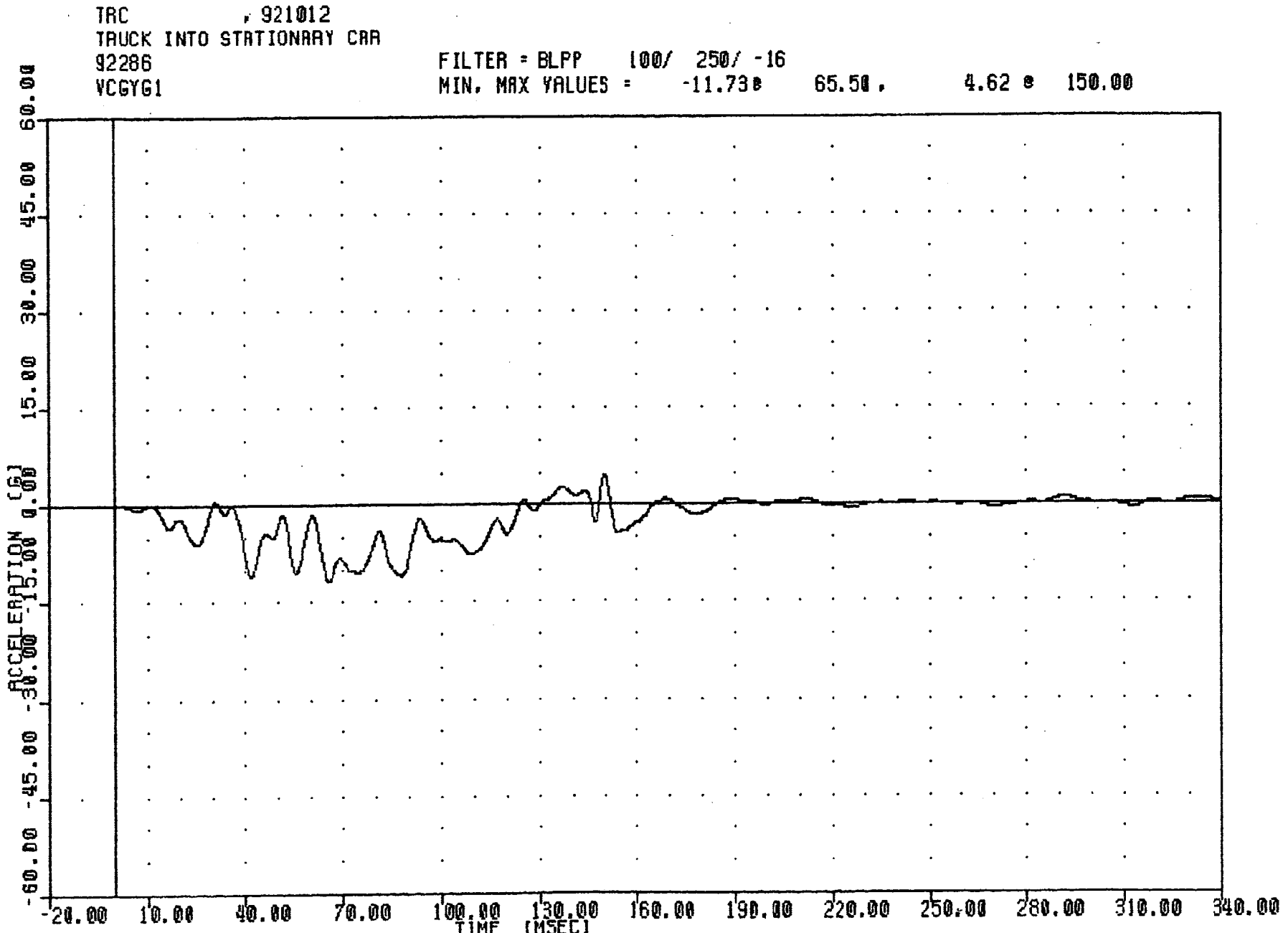
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
TRUCK FRONT FRAME CROSSMEMBER X-AXIS ACCELERATION



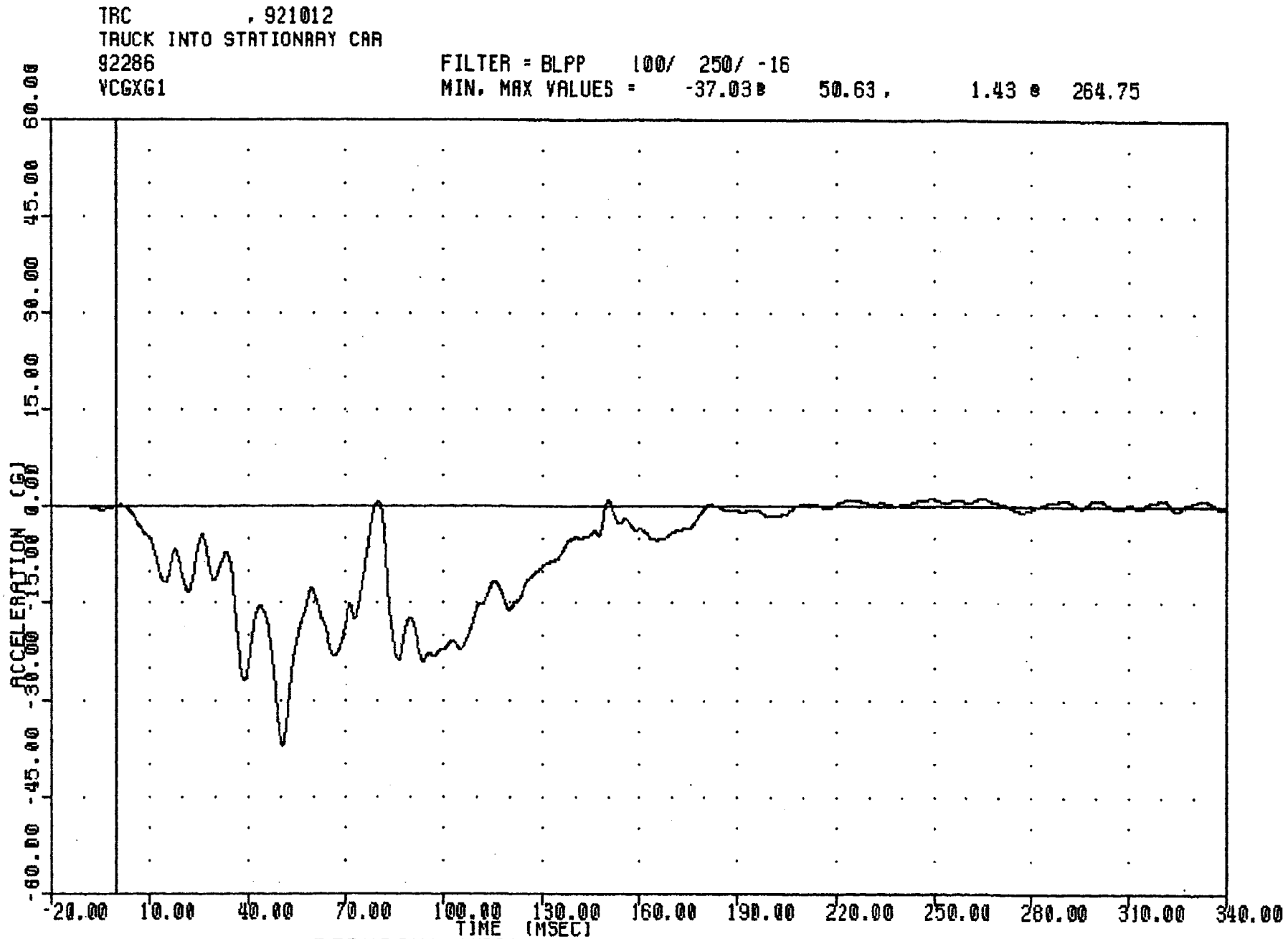
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
CAR CENTER OF GRAVITY RESULTANT ACCELERATION



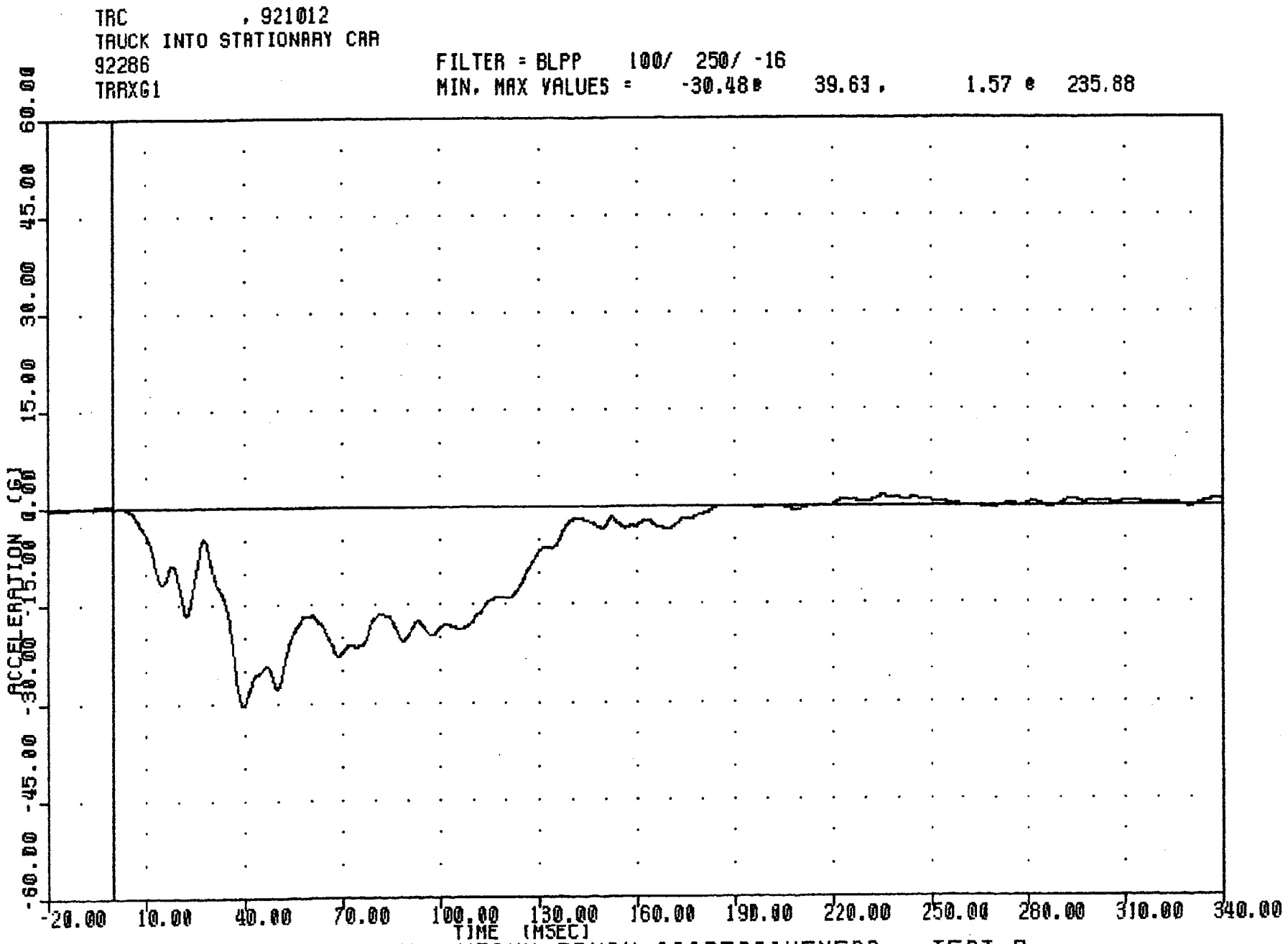
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
CAR CENTER OF GRAVITY Z-AXIS ACCELERATION



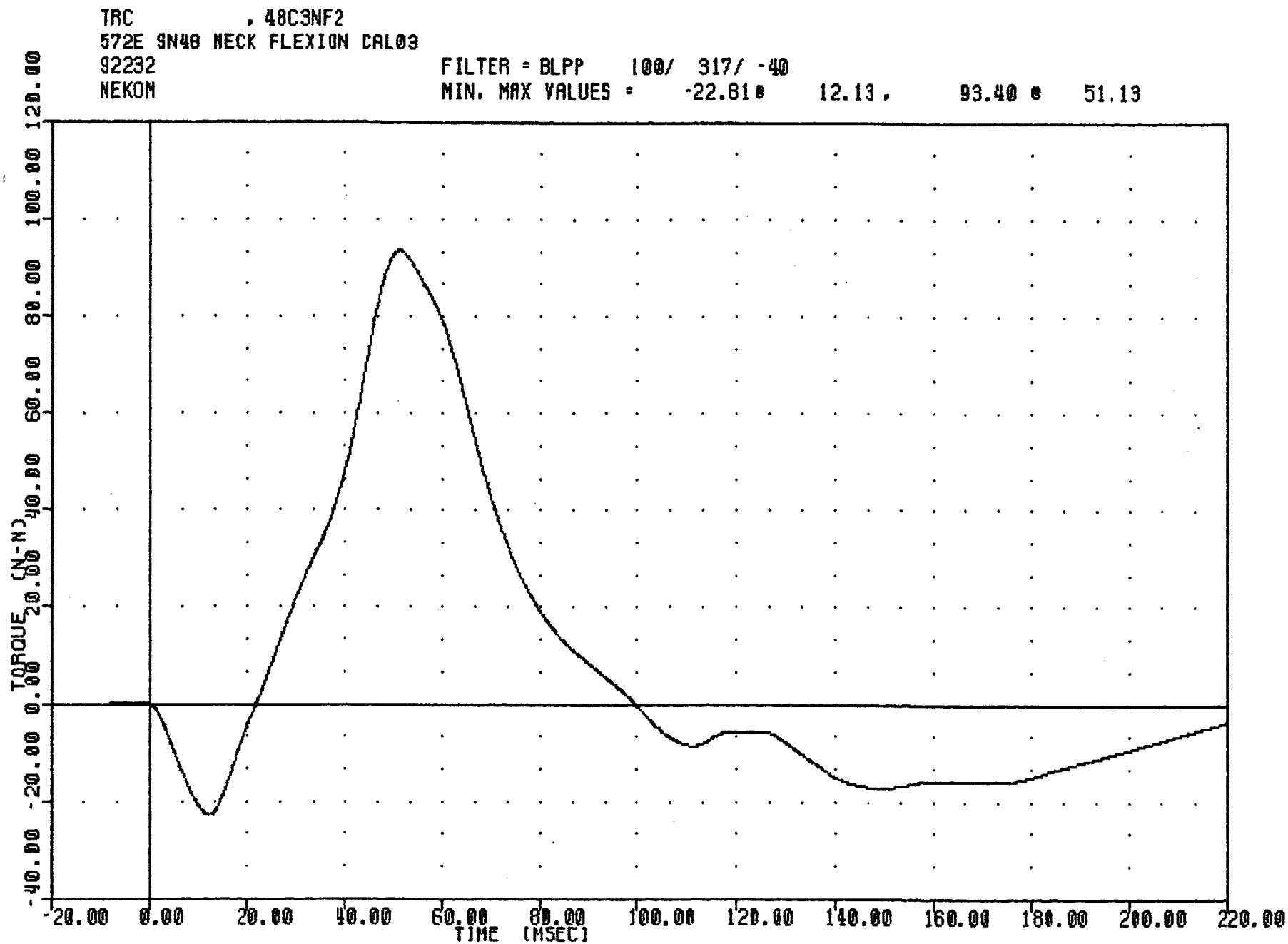
REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
CAR CENTER OF GRAVITY Y-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
CAR CENTER OF GRAVITY X-AXIS ACCELERATION



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 7
RIGHT REAR SEAT X-AXIS ACCELERATION



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

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

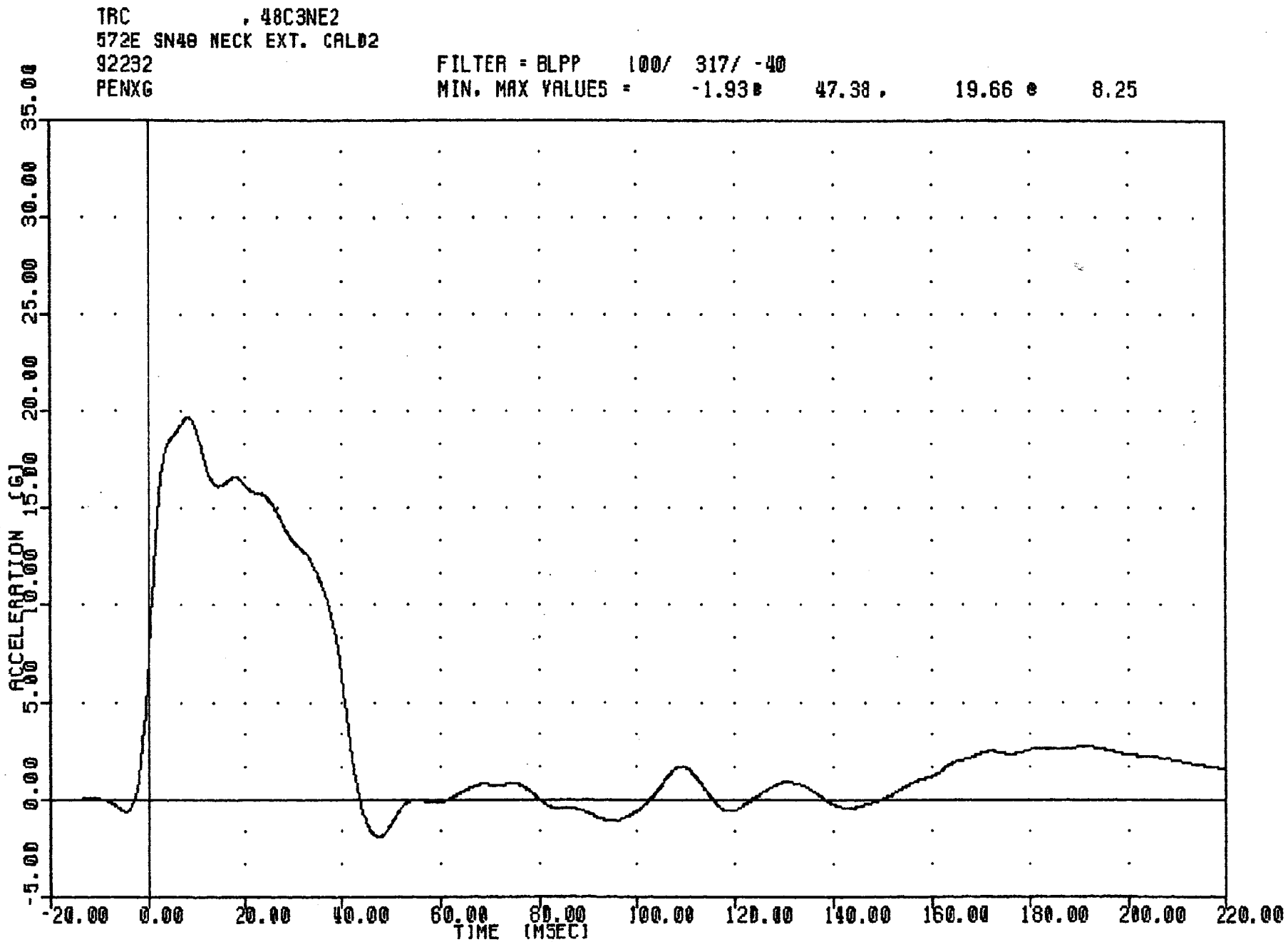
HYBRID III 19-AUG-92

6 AXIS NECK TRANSDUCER
TRC 48C3NE2 572E SN48 NECK EXT. CAL02

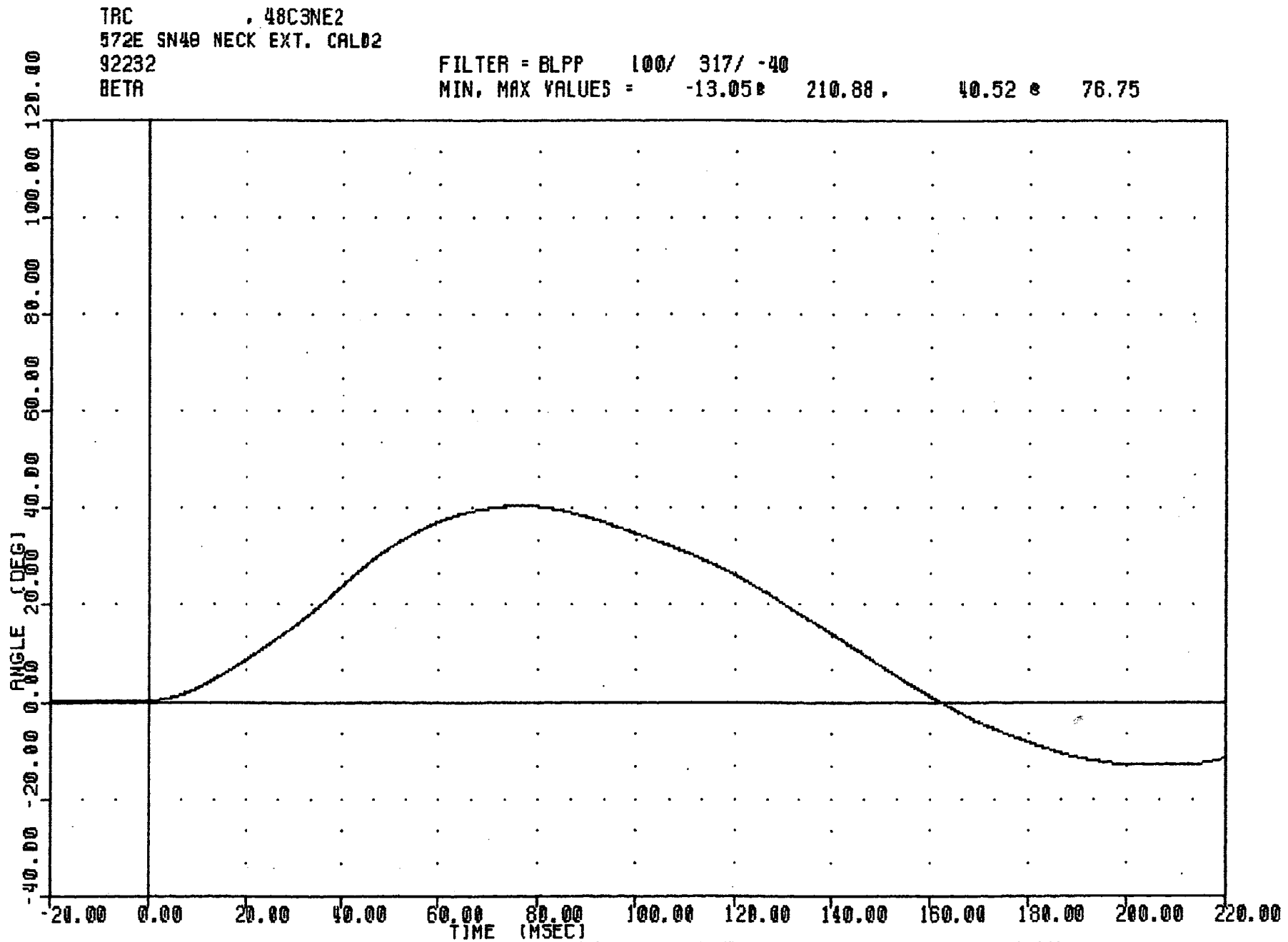
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10% - 70%	57.0 %
IMPACT VELOCITY		5.95 - 6.19 M/SEC	6.00 M/SEC
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.85 G
	20 MS	14.00 - 19.00 G	16.23 G
	30 MS	11.00 - 16.00 G	13.25 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	13.21 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.50 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	98.61 DEG.
	TIME	72 - 82 MS	77.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-67.40 NM
	TIME	65 - 79 MS	70.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	161.38 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	147.50 MS

TEST MEETS SPECIFICATIONS

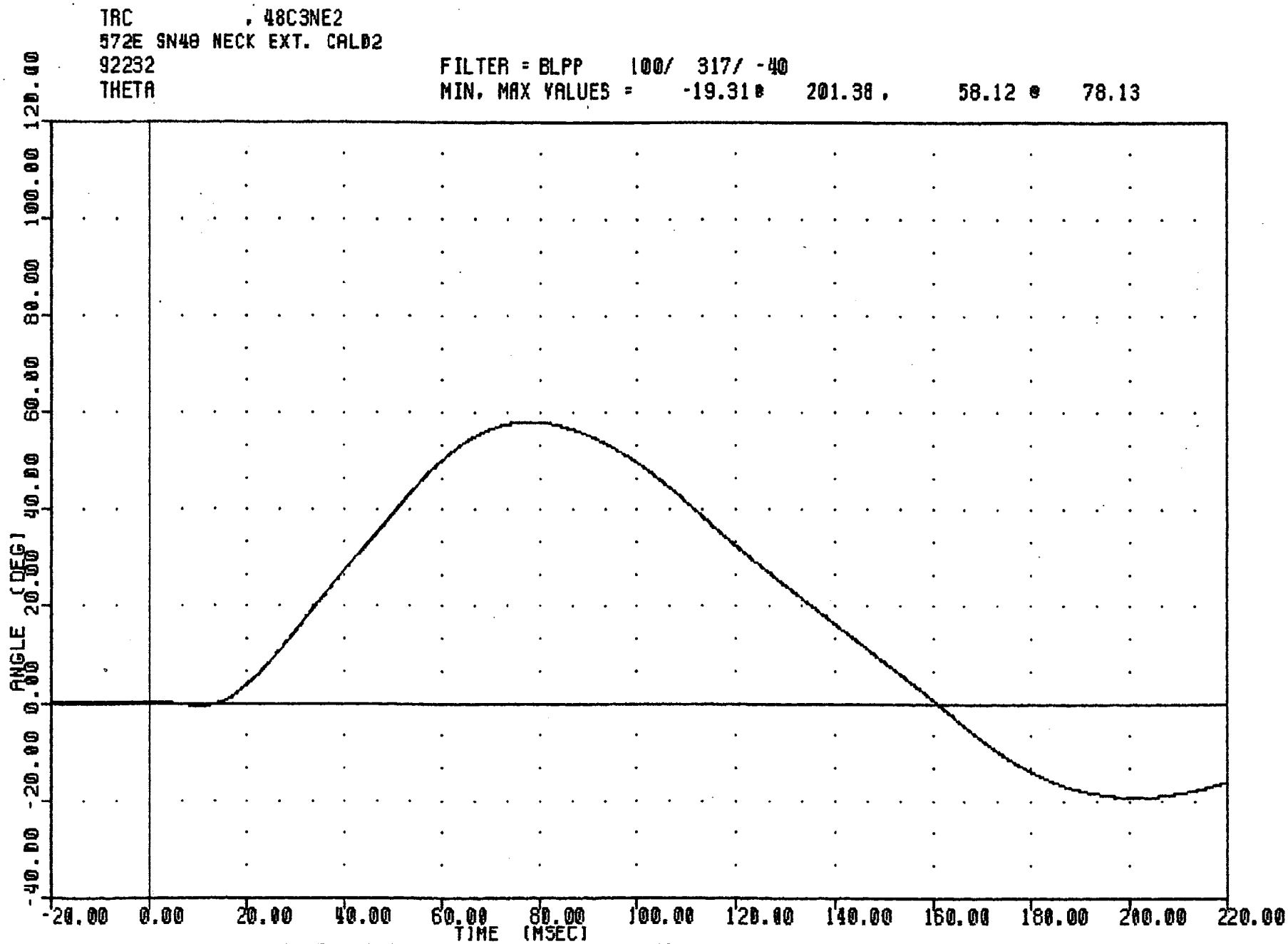
TECHNICIAN R. E. Falk



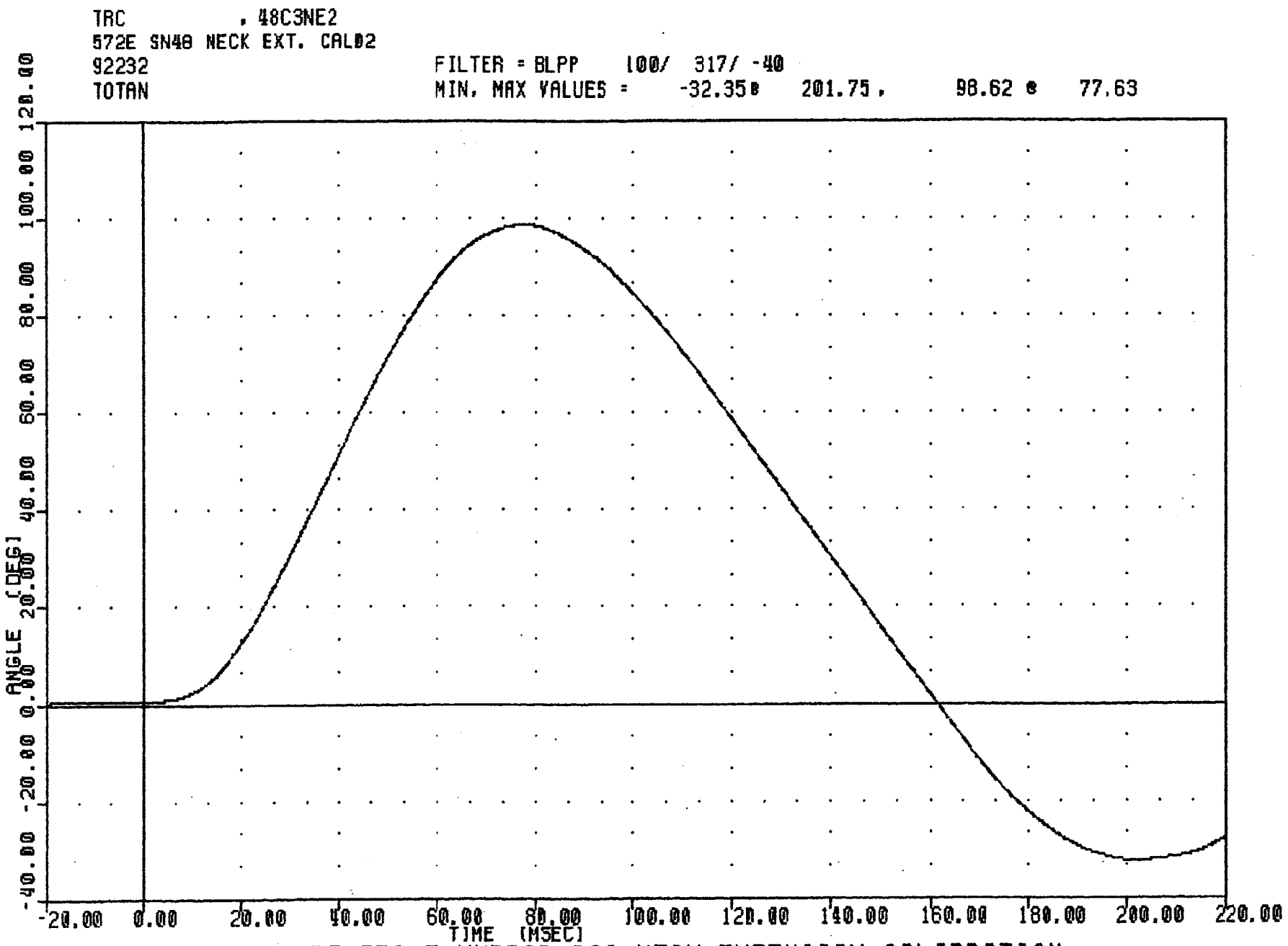
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION



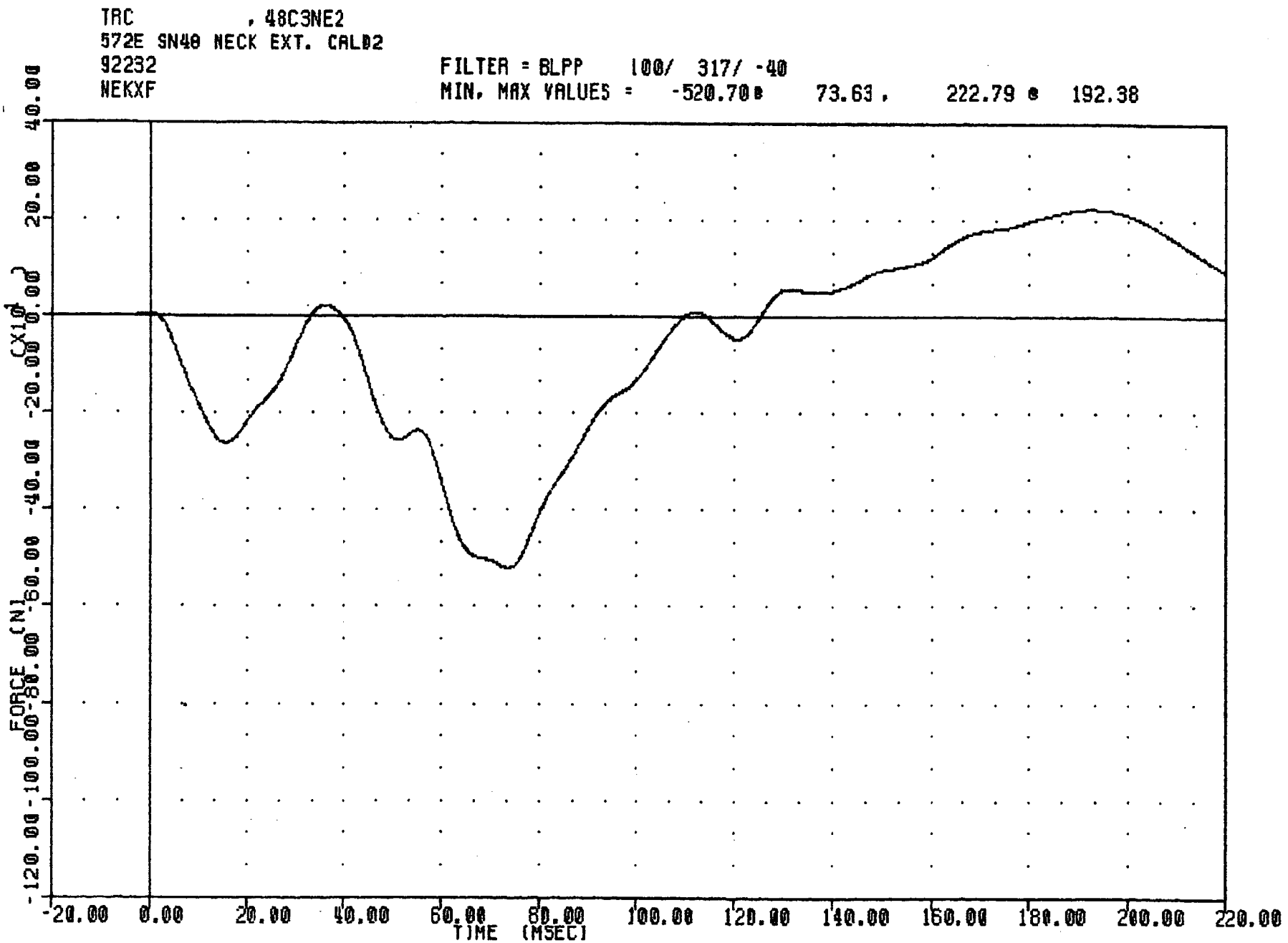
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK



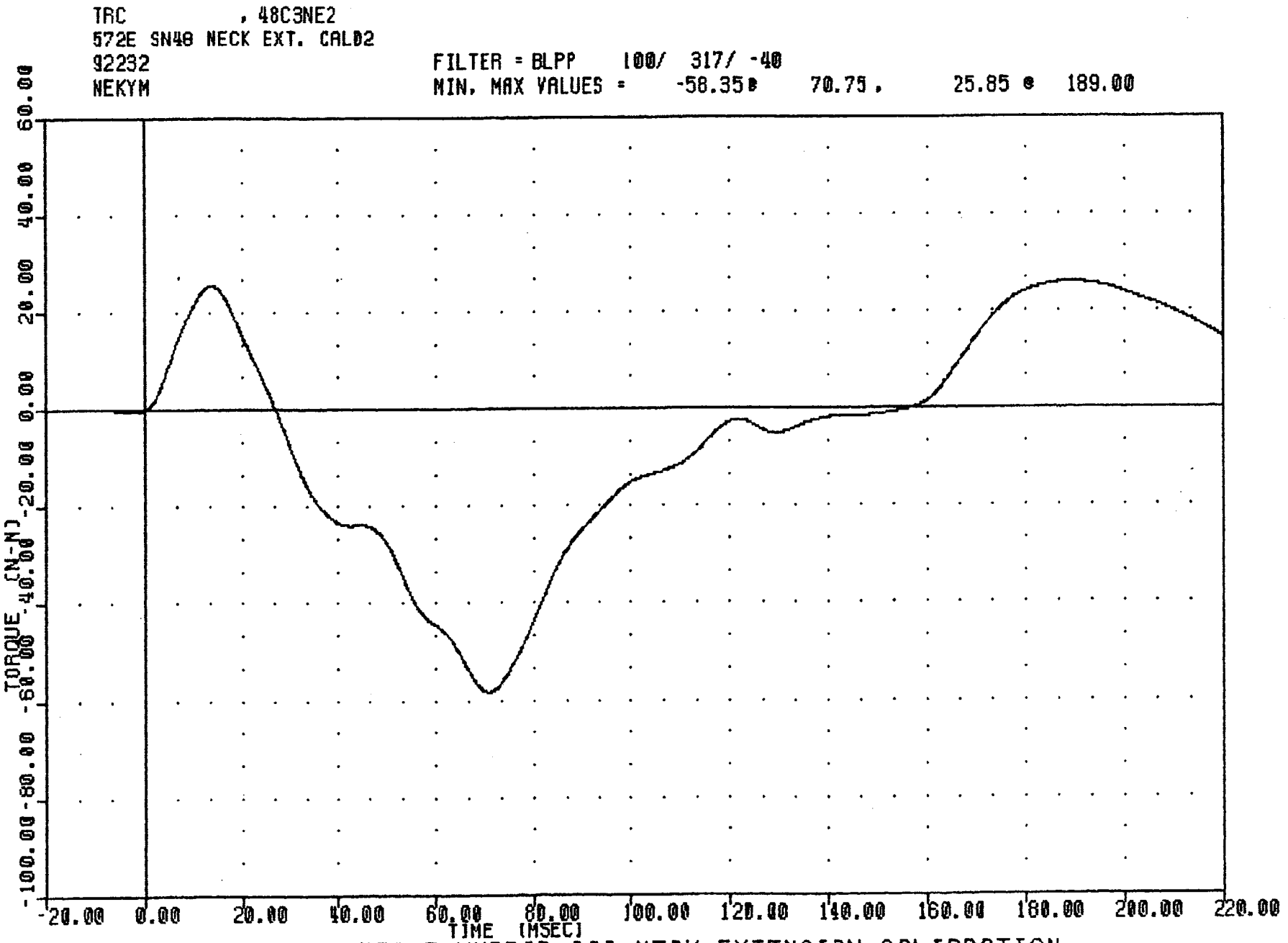
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE



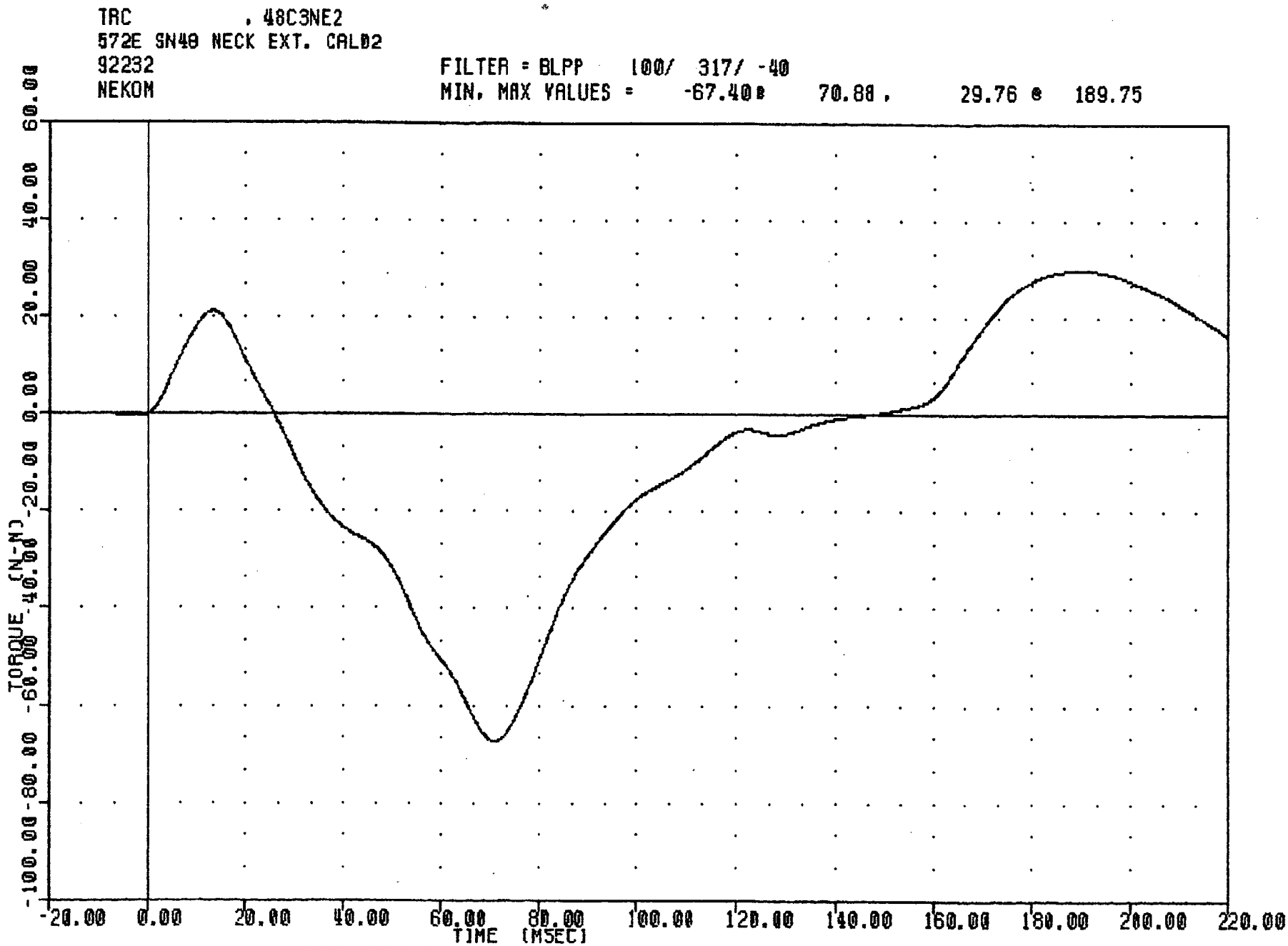
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION



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



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



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

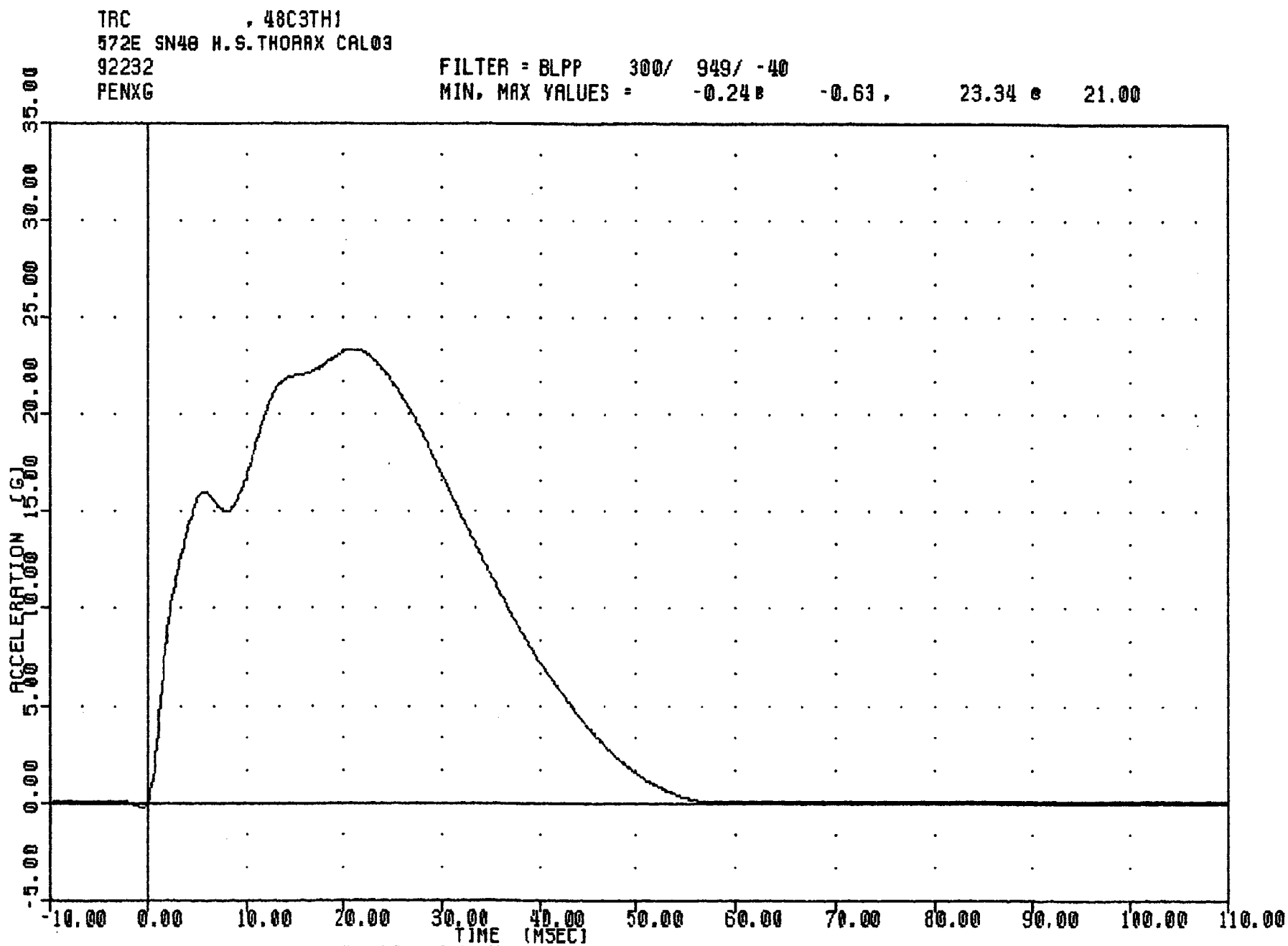
HYBRID III 19-AUG-92

TRC 48C3TH1 572E SN48 H.S. THORAX CAL03

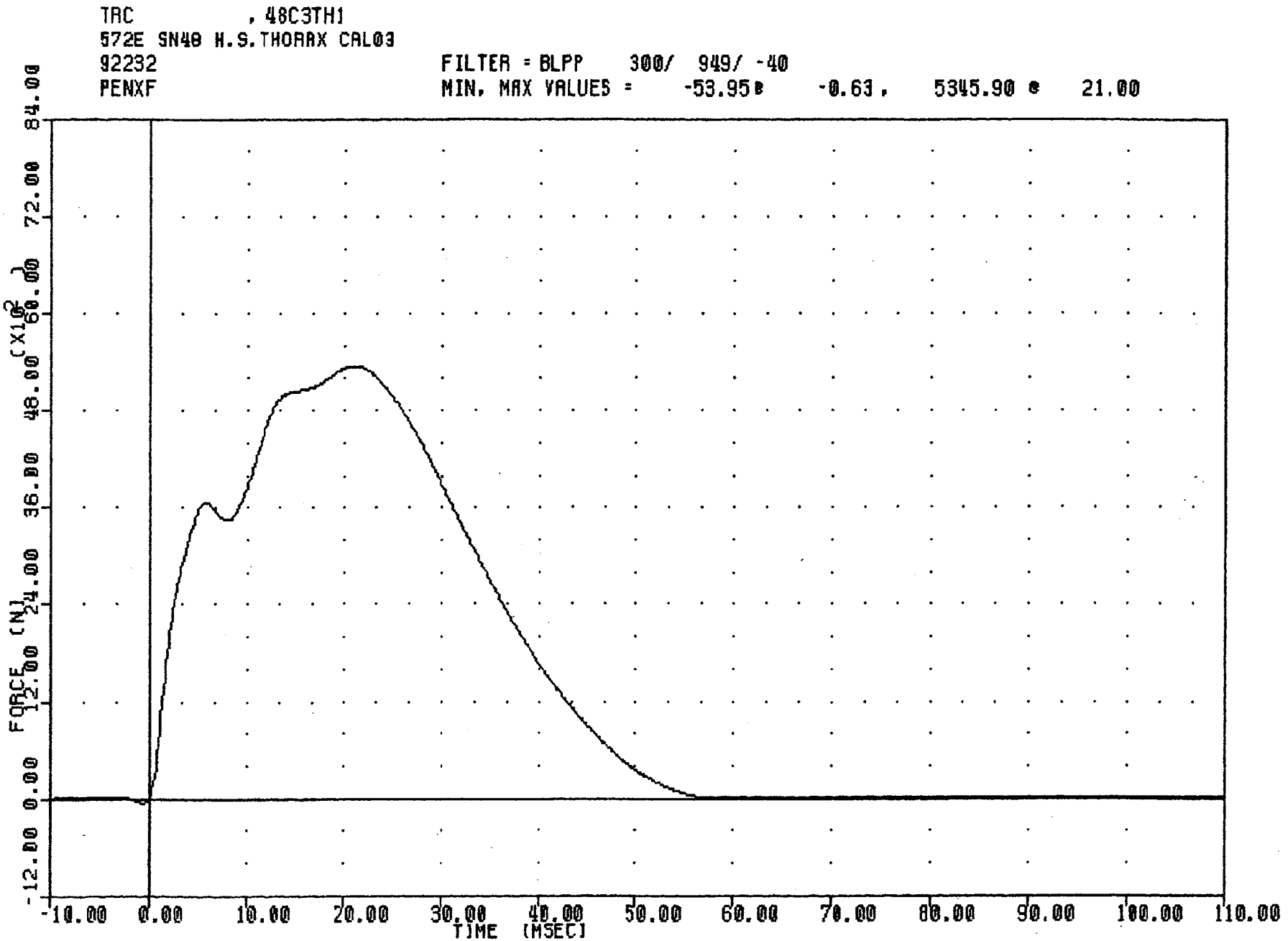
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	57.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/SEC	6.68 M/SEC
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.8 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5345. N
INTERNAL HYSTERESIS	69% - 85%	72.5%

TEST MEETS SPECIFICATIONS

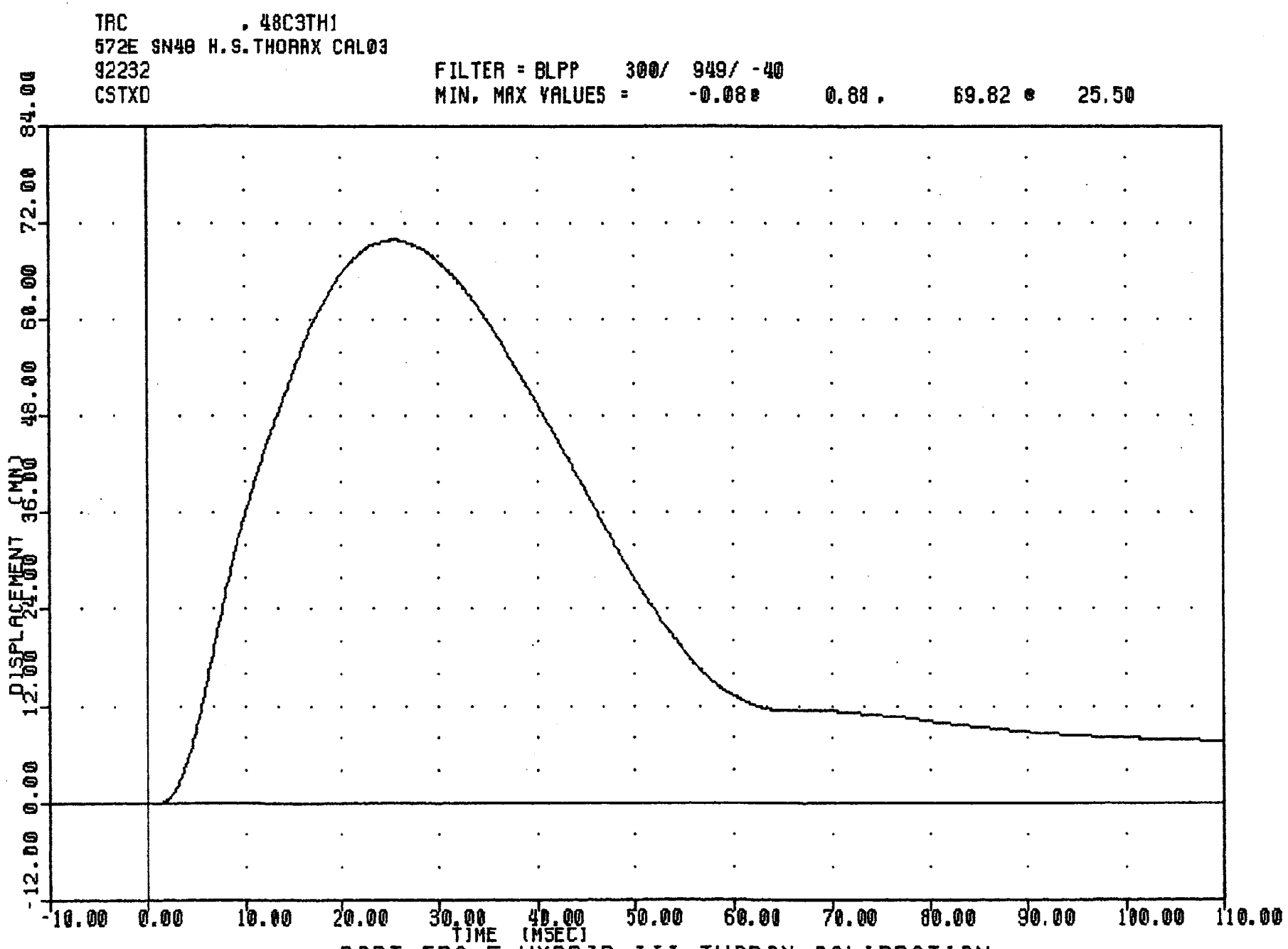
TECHNICIAN R. E. LeVan



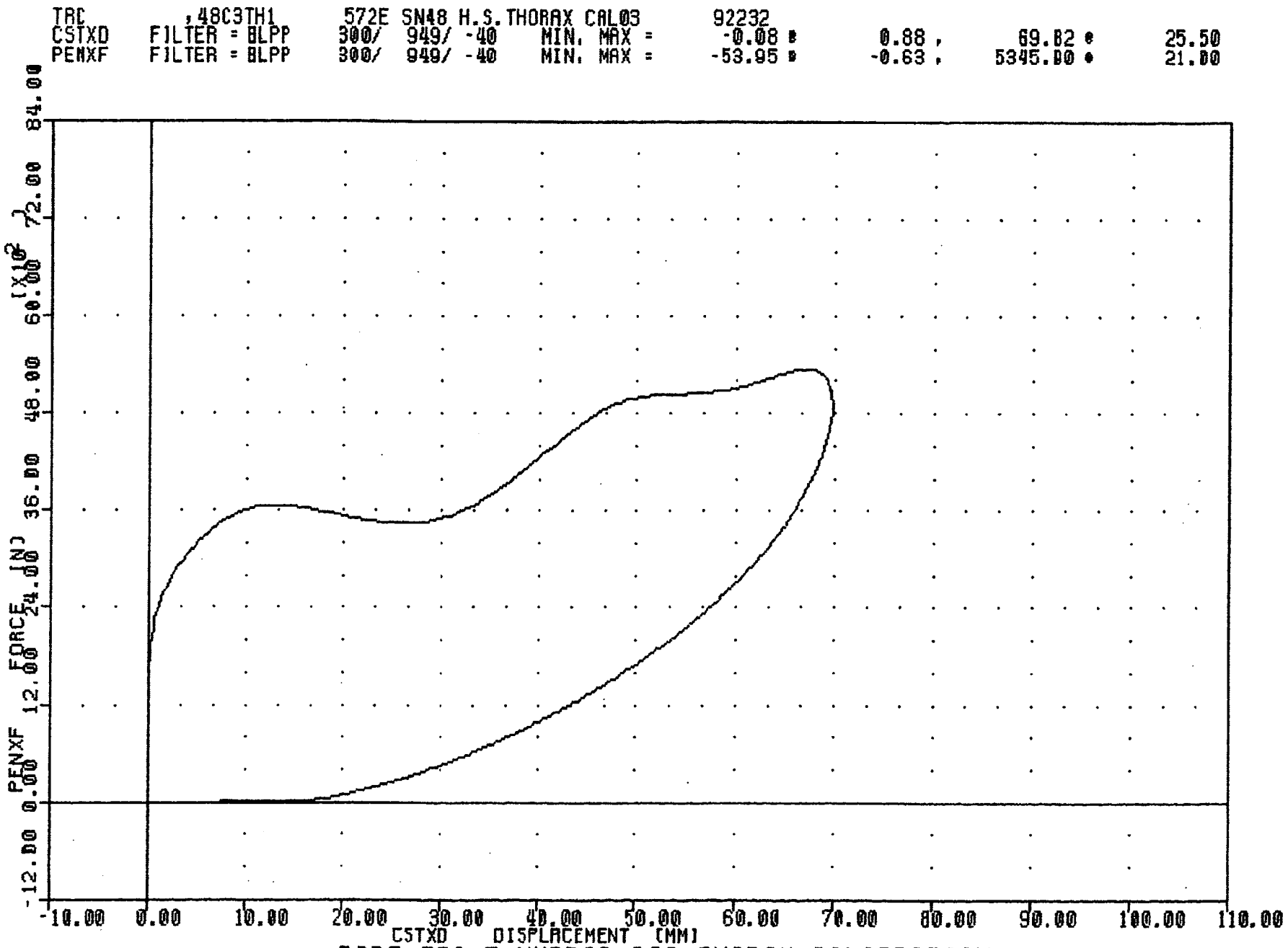
PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION



PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE



PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT



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

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

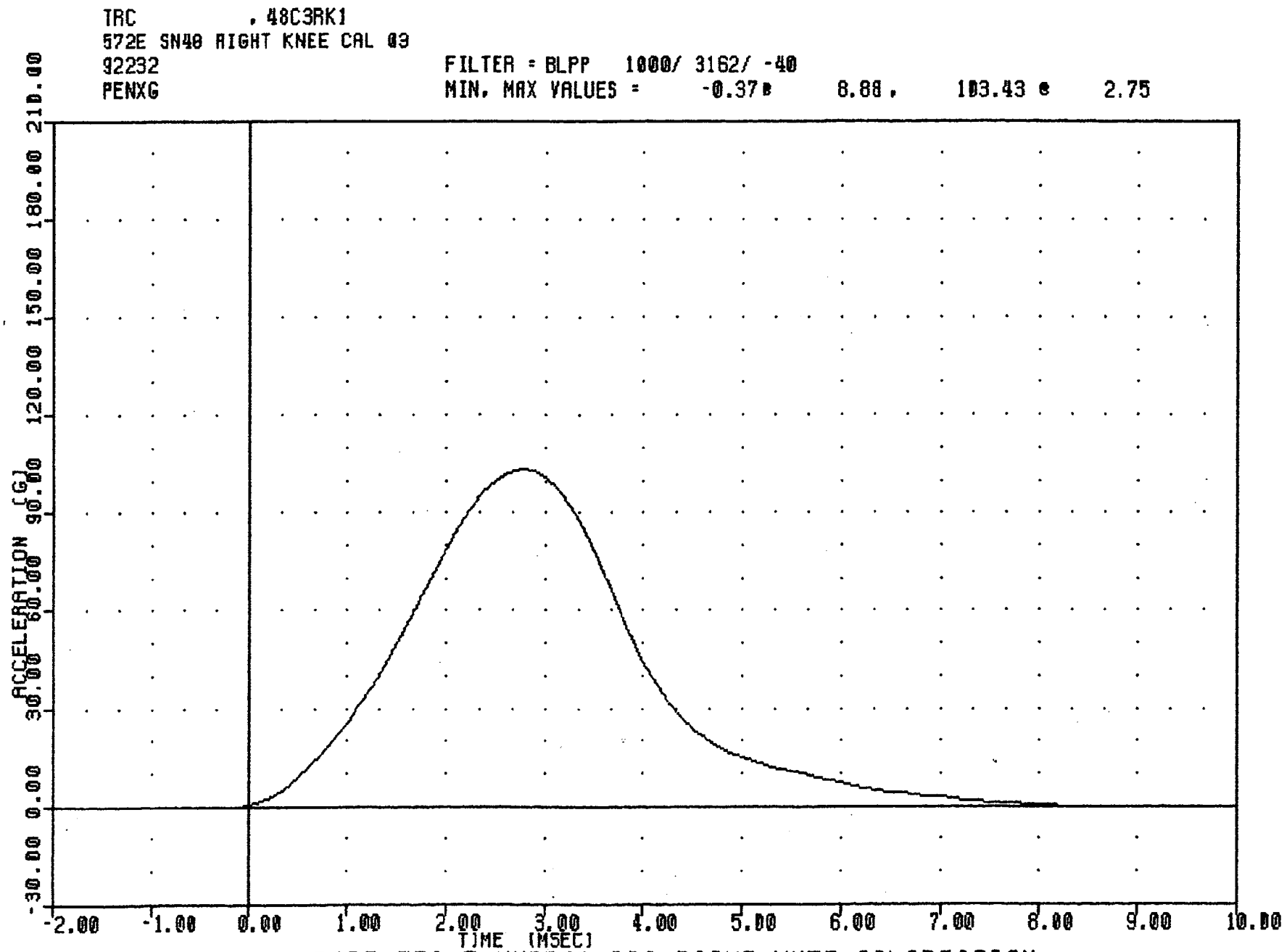
HYBRID III 19-AUG-92

RIGHT KNEE
TRC 48C3RK1 572E SN48 RIGHT KNEE CAL 03

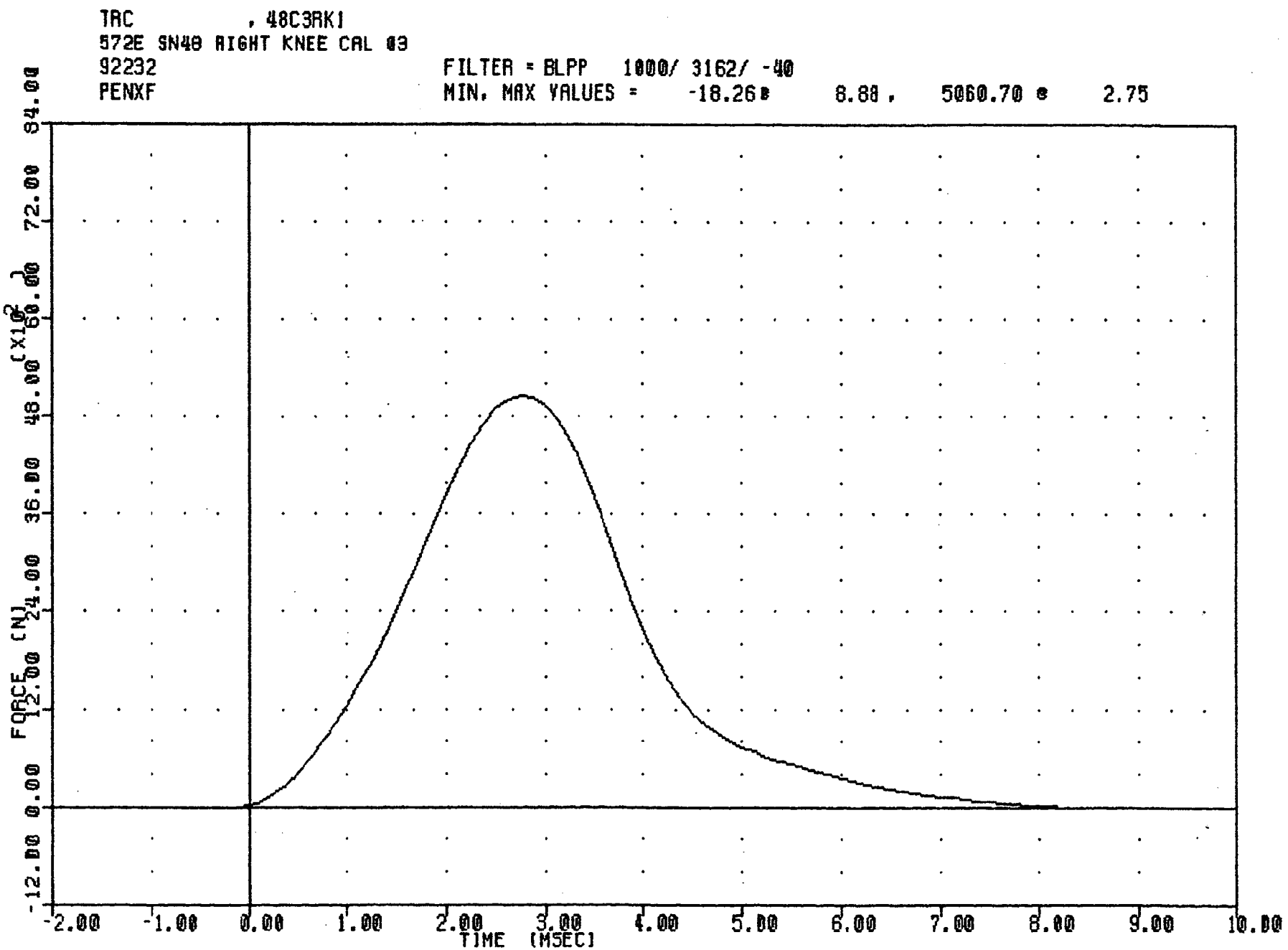
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	57.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.10 M/SEC
PEAK KNEE IMPACT FORCE PROBE WEIGHT	4714-5783 N 5.0 KG	5060.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. LeVan



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



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

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

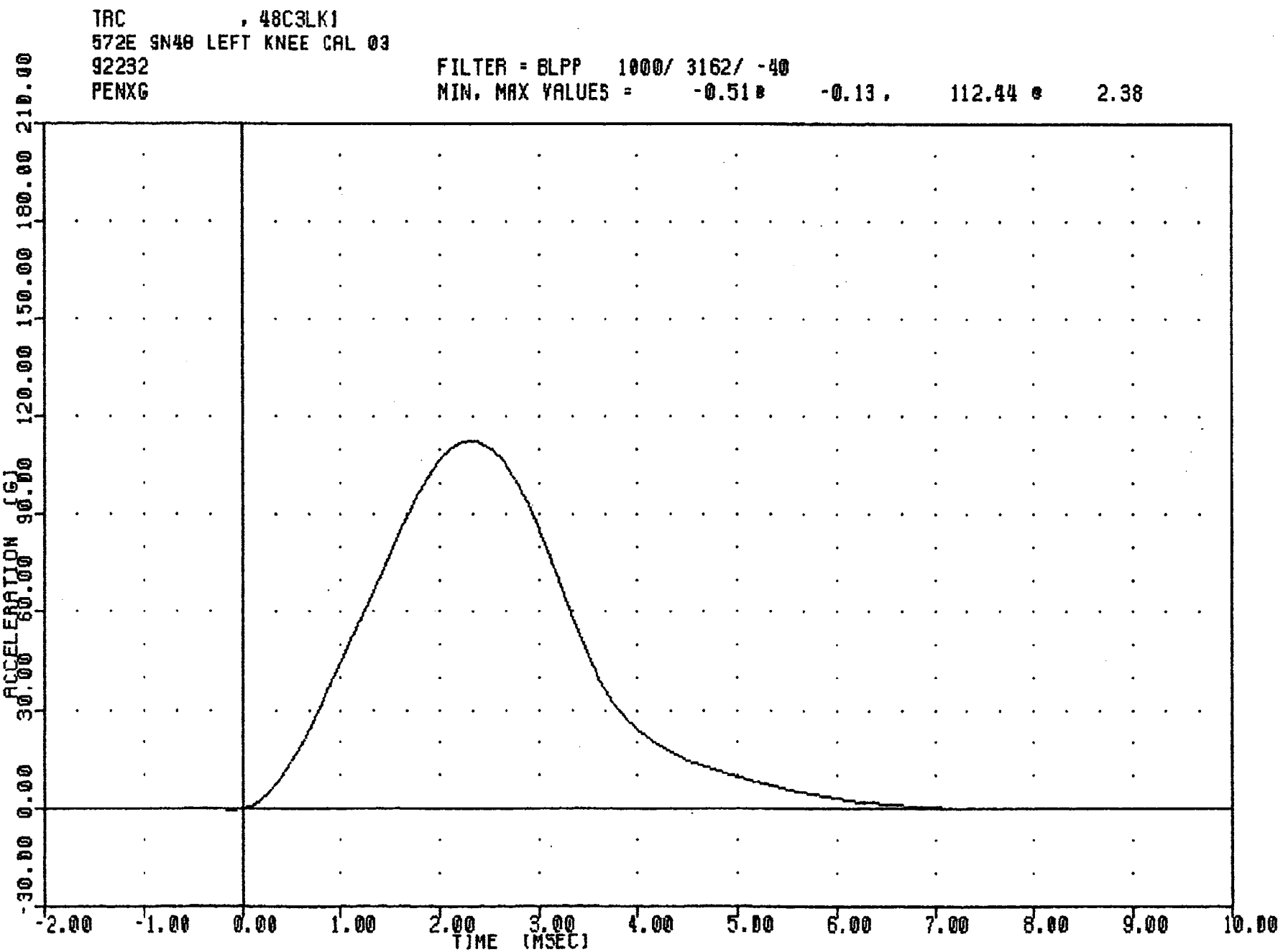
HYBRID III 19-AUG-92

LEFT KNEE
TRC 48C3LK1 572E SN48 LEFT KNEE CAL 03

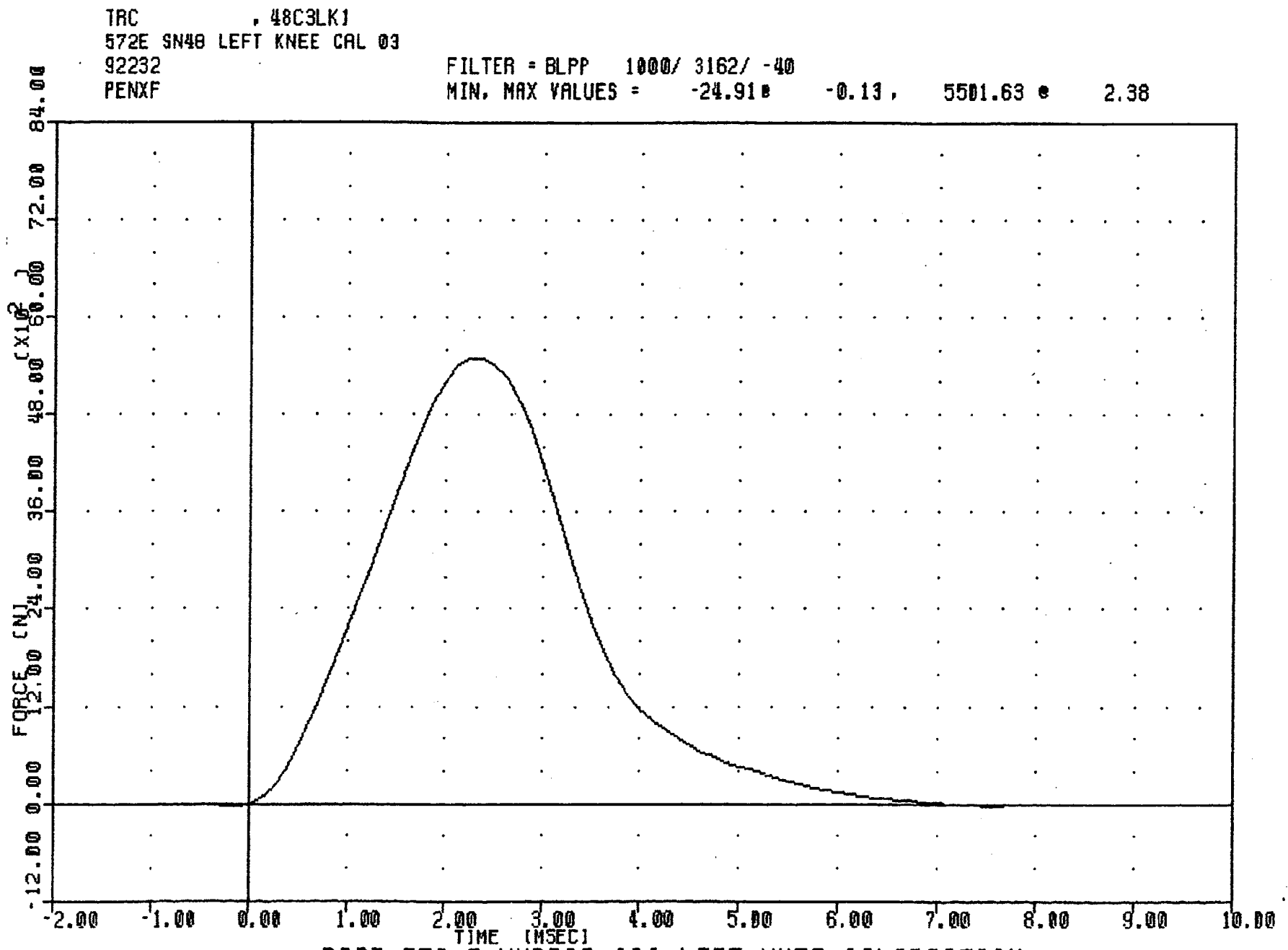
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	57.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.10 M/SEC
PEAK KNEE IMPACT FORCE	4714-5783 N	5501.6 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

TECHNICIAN R. E. LeVan



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



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

APPENDIX D

MISCELLANEOUS TEST INFORMATION

VEHICLE INSTRUMENTATION INFORMATION

TEST NO. 920825

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	LEFT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	7264	AS53	REAR
2	RIGHT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	7264	AR24	REAR
3	ENGINE TOP LONGITUDINAL	X	ENDEVCO	7264	AS76	FRONT
4	ENGINE BOTTOM LONGITUDINAL	X	ENDEVCO	7264	AR16	REAR
5	RIGHT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	7264	AY59	REAR
6	LEFT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	7264	AZ31	REAR
7	INSTRUMENT PANEL CENTER					
	LONGITUDINAL	X	ENDEVCO	7264	AS44	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	7264	AS70	FRONT
	LATERAL	Y	ENDEVCO	7264	AS03	LEFT
	VERTICAL	Z	ENDEVCO	7264	AG24	UP

HEAVY TRUCK ACCELEROMETER INFORMATION

TEST NO. 921012

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
9	FRONT FRAME CROSSMEMBER	X	ENDEVCO	7264	DA99H	FRONT
		Y	ENDEVCO	7264	CK16H	LEFT
		Z	ENDEVCO	7264	CW83H	UP
10	TRUCK CENTER OF GRAVITY	X	ENDEVCO	7264	CJ37H	REAR
		Y	ENDEVCO	7264	CL83H	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

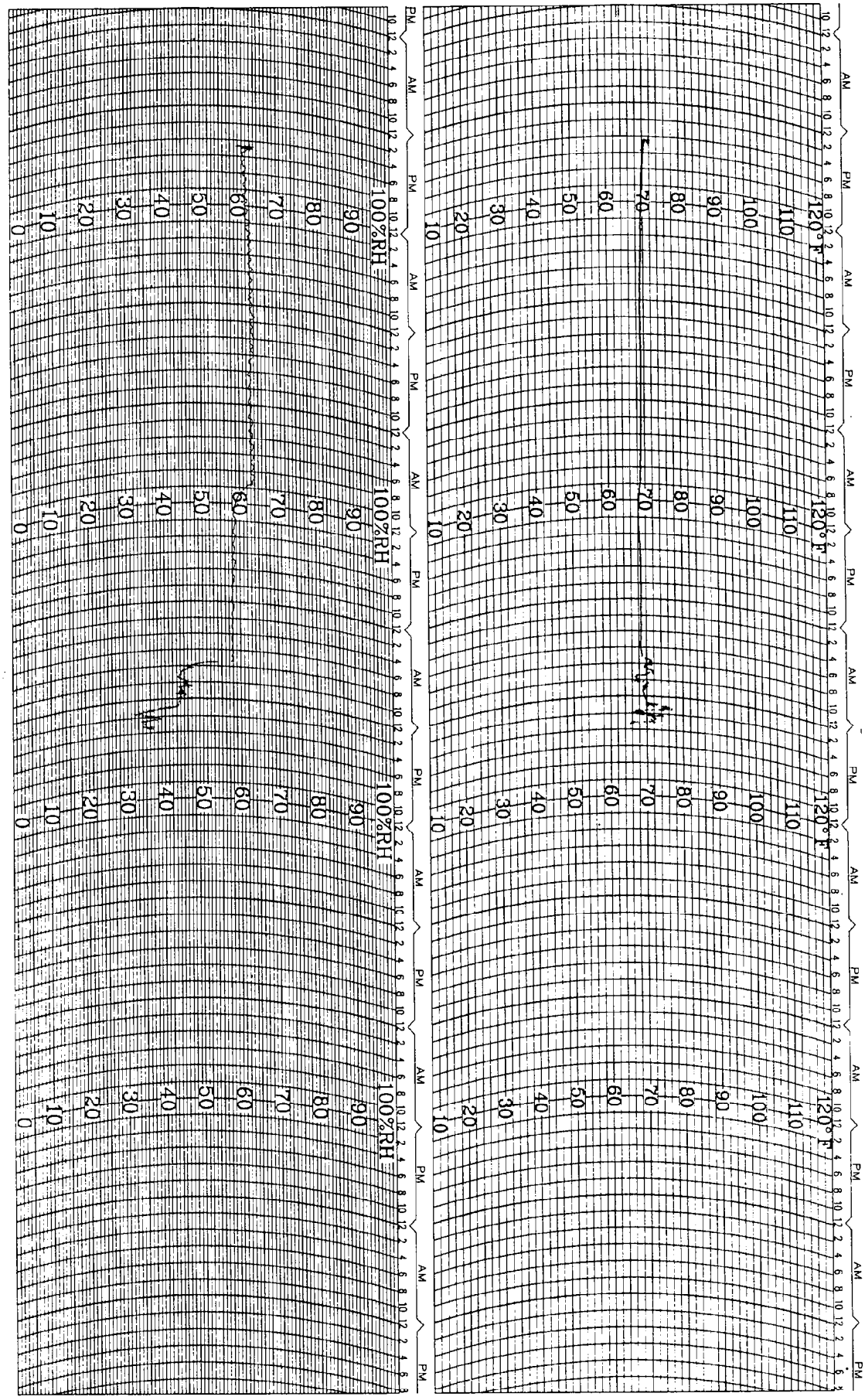
ACCELEROMETERS:	+X:	FORWARD
	+Y:	LEFTWARD
	+Z:	UPWARD

POTENTIOMETERS:	+CHEST LONGITUDINAL DEFLECTION:	OUTWARD
	+CHEST LATERAL DEFLECTION:	LEFTWARD
	+SEAT BELT DISPLACEMENT:	OUTWARD
	+SEAT BELT EXTENSION:	ENLONGATION
	+KNEE SLIDER DISPLACEMENT:	DISTANCE BETWEEN FEMUR AND TIBIA INCREASED (IN RELATION TO A SEATED DUMMY)

LOAD CELLS:	+FEMUR FORCE:	TENSION
	+SEAT BELT FORCE:	TENSION
	+BARRIER FORCE:	TENSION

NECK LOAD CELLS:	+X FORCE:	HEAD PUSHED FORWARD
	+Y FORCE:	HEAD PUSHED LEFTWARD
	+Z FORCE:	HEAD PULLED UPWARD (TENSION ON NECK)
	+X MOMENT:	RIGHT EAR ROTATING TOWARD RIGHT SHOULDER
	+Y MOMENT:	CHIN ROTATING TOWARD CHEST
	+Z MOMENT:	CHIN ROTATING TOWARD LEFT SHOULDER

TIBIA LOAD CELLS:	+X FORCE:	TENSION
	+Y FORCE:	TENSION
	+Z FORCE:	TENSION
	+X MOMENT:	BOTTOM OF TIBIA MOVING LEFTWARD
	+Y MOMENT:	BOTTOM OF TIBIA MOVING REARWARD



Weather Measure
WEATHERtronics
Division of QUALIMETRICS, Inc.

P.O. BOX 41039
SACRAMENTO, CA 95841
TELEPHONE: (916) 481-7565

HYGROTHERMOGRAPH
7 DAY

CHART NO M699124
C311-W-HF
ECN 2563

STATION_____ DATE ON_____ DATE OFF_____