

201711

FRONTAL CRASH RESPONSES

A FULL FRONTAL CRASH TEST  
OF TWO 1983 DODGE OMNIS WITH  
A CLOSING VELOCITY OF 60.0 MPH

PREPARED BY:  
VEHICLE RESEARCH AND TEST CENTER  
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EAST LIBERTY, OHIO 43319



TEST REPORT  
MARCH 1985

PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
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16. Abstract  This test report documents one of a series of crash tests conducted to evaluate Part 572 and Hybrid III dummy responses in the unrestrained environment, and to catalog vehicle structural responses from a variety of crash configurations. Testing was conducted with 2 1983 Dodge Omnis at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicles were towed together at 0° with a closing velocity of 60.0 mph. One Hybrid III dummy was located in the driver's designated seating position and one Part 572 dummy was located in the right front seating position in the subject vehicle. One Part 572 dummy was located in the driver's designated seating position and one Hybrid III dummy was located in the right front seating position in the partner vehicle. The test date was December 18, 1984 and the ambient temperature was 37° F.					
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# METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures  
When You Know Multiply by To Find Symbol

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
acres	acres	0.4	hectares	ha
<b>MASS (weight)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml.
Tbsp	tablespoons	15	milliliters	ml.
in <sup>3</sup>	cubic inches	16	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 <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions from Metric Measures  
When You Know Multiply by To Find Symbol

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares	2.5	acres	
	(10 000 m <sup>2</sup> )			
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton	1.1	short tons	
	(1000 kg)			
<b>VOLUME</b>				
ml.	milliliters	0.03	fluid ounces	fl oz
ml.	milliliters	0.06	cubic inches	in <sup>3</sup>
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit	°F

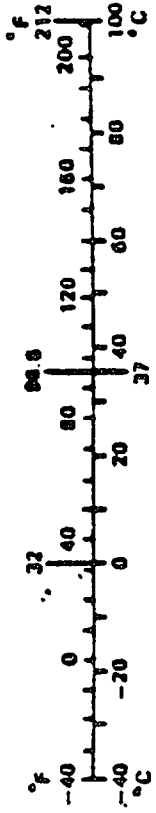


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SECTION 1.0  
PURPOSE AND INTRODUCTION

PURPOSE

This test was conducted as part of an overall test matrix with the purpose of evaluating Part 572 and Hybrid III dummies in unrestrained crash environments. Vehicle structural responses from a variety of crash configurations are also being cataloged.

INTRODUCTION

Two 1983 Dodge Omnis were used in a full frontal impact with a closing velocity of 60.0 mph on December 18, 1984. The intended impact speed of each vehicle was 30.0 mph. The actual test speed of the subject vehicle was 30.1 mph and the actual test speed of the partner vehicle was 29.9 mph.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains vehicle crush and dummy response data. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains data plots. Appendix C contains dummy certification. Appendix D contains miscellaneous test information.

SECTION 2  
GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

SUBJECT VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge Omni

VIN: 1B3BZ18CXDD284793

BODY STYLE: 4-door

MODEL YEAR: 1983

NHTSA NO.: R & D

COLOR: Light Blue

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 135 in<sup>3</sup>

TRANSMISSION DATA: Manual 5-speed

DATE VEHICLE RECEIVED: 12/5/84

ODOMETER READING: 49.8

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

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? Yes; gas tank leaks
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Chrysler Corporation

DATE OF MANUFACTURE: 6/83

GVWR: 3305 LBS.,

GAWR: FRONT 1770 LBS., REAR 1585 LBS.

SUBJECT VEHICLE TIRE DATA

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

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Goodyear Viva P175-75R13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	730	LBS.	RIGHT REAR	410	LBS.
LEFT FRONT	715	LBS.	LEFT REAR	410	LBS.
TOTAL FRONT WEIGHT	1445	LBS.	(63.8 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	820	LBS.	(36.2 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	2265	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 24 3/8	;LF 24 1/4	;RR 24 7/8	;LR 24 3/4
PRE-TEST ATTITUDE:	RF 23 3/4	;LF 23 3/4	;RR 23 3/8	;LR 23 1/8
POST-TEST ATTITUDE:	RF 26 3/8	;LF 23 3/8	;RR 22 11/16	;LR 23 3/8

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 115 LBS. CARGO:

RIGHT FRONT	820	LBS.	RIGHT REAR	535	LBS.
LEFT FRONT	810	LBS.	LEFT REAR	585	LBS.
TOTAL FRONT WEIGHT	1630	LBS.	(59.6 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1120	LBS.	(40.4 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	2750	LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

SUBJECT VEHICLE TEST WEIGHT CALCULATION

Test Weight = Unloaded Delivered Weight +  
                  Number of Part 572 Dummies X 164 lbs. +  
                  Number of Hybrid III Dummies X 167 lbs. +  
                  Cargo Weight  
                  = 2265 + 1 X 164 + 1 X 167 + 115 lbs.  
                  = 2711 lbs.  
Target Weight = 2755 lbs.\*

To achieve test weight, the muffler was removed. The weight of the test vehicle was measured by placing each wheel on a Loadmeter Corporation Hiway Loadometer.

\*Target weight based on the weight of a Honda Accord.

SUBJECT VEHICLE TEST FLUID DATA

TEST FLUID TYPE: RED STODDARD SOLVENT #2; SPEC. GRAVITY: 0.764  
KINEMATIC VISCOSITY: 0.99 CENTISTOKES  
"USEABLE" CAPACITY\*: NA GALLONS (FURNISHED BY CTM)  
TEST VOLUME: 0 GALLONS (92-94% OF USEABLE)  
FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 13 GALLONS  
DETAILS OF FUEL SYSTEM: DNA

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ELECTRIC FUEL PUMP: No FUEL INJECTION: No  
DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? DNA

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 35 psi; REAR 35 psi  
RECOMMENDED TIRE SIZE: P175-75R13 LOAD RANGE B, C, X A  
VEHICLE CAPACITY: TYPES OF SEATS: Front - Bucket  
Rear - Bench  
NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT  
3 REAR  
CARGO LOAD 115 LBS. 5 TOTAL  
TOTAL 865 LBS.

\*WITH ENTIRE FUEL SYSTEM FILLED WITH FUEL THROUGH CARBURETOR BOWL.

SUBJECT VEHICLE TEST CONDITIONS

TEST NUMBER: 841218

DATE OF TEST: December 18, 1984

TIME OF TEST: 14:10

WIND VELOCITY: 2-4 mph 351°

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA:

37°F

TEMPERATURE IN OCCUPANT COMPARTMENT:

70°F

DRIVER DUMMY TEMPERATURE:

70°F

PASSENGER DUMMY TEMPERATURE:

70°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	2750	2755**
VEHICLE ORIENTATION (DEGREES)	0	0
VEHICLE VELOCITY (MPH)	30.1	30.0
MAXIMUM CRUSH (INCHES)	21 3/16	DNA
STEERING COLUMN:* PRE-TEST HORI. 15 1/2"	;POST-TEST HORI.	14 3/4"
PRE-TEST VERT. 22 5/16"	;POST-TEST VERT.	26 5/8"

DUMMIES

	<u>DRIVER</u>	<u>MIDDLE PASSENGER</u>	<u>RT. FRONT PASSENGER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	HIII		P572		
SERIAL NO.:	43		826		
INSTRUMENTATION:					
HEAD ACCEL.:	3		3		
CHEST ACCEL.:	3		3		
FEMUR L.C.'S:	2		2		
OTHER:	3 Neck Channels				
	1 Chest Disp.				

RESTRAINT SYSTEM: Both dummies unrestrained

REMARKS: Chamois on dummy heads per chamois procedure in Appendix D.

\*MEASUREMENTS TAKEN FROM REFERENCE MARKS ON STEERING COLUMN.

\*\*INTENDED TEST WEIGHT IS BASED ON THE WEIGHT OF A HONDA ACCORD.

PARTNER VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge Omni

VIN: 1B3BZ18C1DD284791

BODY STYLE: 4-door

MODEL YEAR: 1983

NHTSA NO.: R & D

COLOR: Light Blue

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 135 in<sup>3</sup>

TRANSMISSION DATA: Manual 5-speed

DATE VEHICLE RECEIVED: 12/5/84

ODOMETER READING: 60

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

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

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Chrysler Corporation

DATE OF MANUFACTURE: 6/83

GVWR: 3305 LBS.,

GAWR: FRONT 1770 LBS., REAR 1585 LBS.

PARTNER VEHICLE TIRE DATA

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

TIRES ON VEHICLE (MFG. & LINE, SIZE): Firestone Delux Champions P175-75R13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	730	LBS.	RIGHT REAR	410	LBS.
LEFT FRONT	715	LBS.	LEFT REAR	410	LBS.
TOTAL FRONT WEIGHT	1445	LBS.	(63.2 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	820	LBS.	(36.8 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	2265	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 24 1/4	;LF 24 1/4	;RR 24 1/8	;LR 24 1/16
PRE-TEST ATTITUDE:	RF 23 7/8	;LF 23 7/8	;RR 23	;LR 23
POST-TEST ATTITUDE:	RF 23 3/4	;LF 23	;RR 21 13/16	;LR 24

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 115 LBS. CARGO:

RIGHT FRONT	810	LBS.	RIGHT REAR	575	LBS.
LEFT FRONT	810	LBS.	LEFT REAR	560	LBS.
TOTAL FRONT WEIGHT	1620	LBS.	(58.4 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1135	LBS.	(41.6 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	2755	LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

PARTNER VEHICLE TEST WEIGHT CALCULATION

Test Weight = Unloaded Delivered Weight +  
                  Number of Part 572 Dummies X 164 lbs. +  
                  Number of Hybrid III Dummies X 167 lbs. +  
                  Cargo Weight  
                  = 2265 + 1 X 164 + 1 X 167 + 115 lbs.  
                  = 2711 lbs.  
Target Weight = 2755 lbs.\*

To achieve test weight, the muffler was removed and no Stoddard Solvent was added to the fuel tank. The weight of the test vehicle was measured by placing each wheel on a Loadmeter Corporation Hiway Loadometer.

\*Target weight based on the weight of a Honda Accord.

PARTNER VEHICLE TEST FLUID DATA

TEST FLUID TYPE: RED STODDARD SOLVENT #2; SPEC. GRAVITY: 0.764  
KINEMATIC VISCOSITY: 0.99 CENTISTOKES  
"USEABLE" CAPACITY\*: NA GALLONS (FURNISHED BY CTM)  
TEST VOLUME: 0 GALLONS (92-94% OF USEABLE)  
FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 13 GALLONS  
DETAILS OF FUEL SYSTEM: DNA

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ELECTRIC FUEL PUMP: No FUEL INJECTION: No  
DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? DNA

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 35 psi; REAR 35 psi

RECOMMENDED TIRE SIZE: P175/75R13 LOAD RANGE X B,    C,    A

VEHICLE CAPACITY: TYPES OF SEATS: Front - Bucket  
Rear - Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY):    2 FRONT

CARGO LOAD    115    LBS.    3 REAR

TOTAL    865    LBS.    5 TOTAL

TOTAL    865    LBS.

\*WITH ENTIRE FUEL SYSTEM FILLED WITH FUEL THROUGH CARBURETOR BOWL.

PARTNER VEHICLE TEST CONDITIONS

TEST NUMBER: 841218

DATE OF TEST: December 18, 1984

TIME OF TEST: 14:10

WIND VELOCITY: 2-4 mph 351°

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA:

37°F

TEMPERATURE IN OCCUPANT COMPARTMENT:

70°F

DRIVER DUMMY TEMPERATURE:

72°F

PASSENGER DUMMY TEMPERATURE:

70°F

PARTNER VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	2755	2755**
VEHICLE ORIENTATION (DEGREES)	0	0
VEHICLE VELOCITY (MPH)	29.9	30.0
MAXIMUM CRUSH (INCHES)	23 7/8	DNA
STEERING COLUMN:* PRE-TEST HORI. 15 1/4"		POST-TEST HORI. 15 1/4"
PRE-TEST VERT. 20 3/4"		POST-TEST VERT. 27 15/16"

DUMMIES

	<u>DRIVER</u>	<u>MIDDLE PASSENGER</u>	<u>RT. FRONT PASSENGER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	P572		HIII		
SERIAL NO.:	A09		45		
INSTRUMENTATION:					
HEAD ACCEL.:	3		3		
CHEST ACCEL.:	3		3		
FEMUR L.C.'S:	2		2		
OTHER:			3 Neck Channels		
			1 Chest Disp.		
			14 Lower Leg		

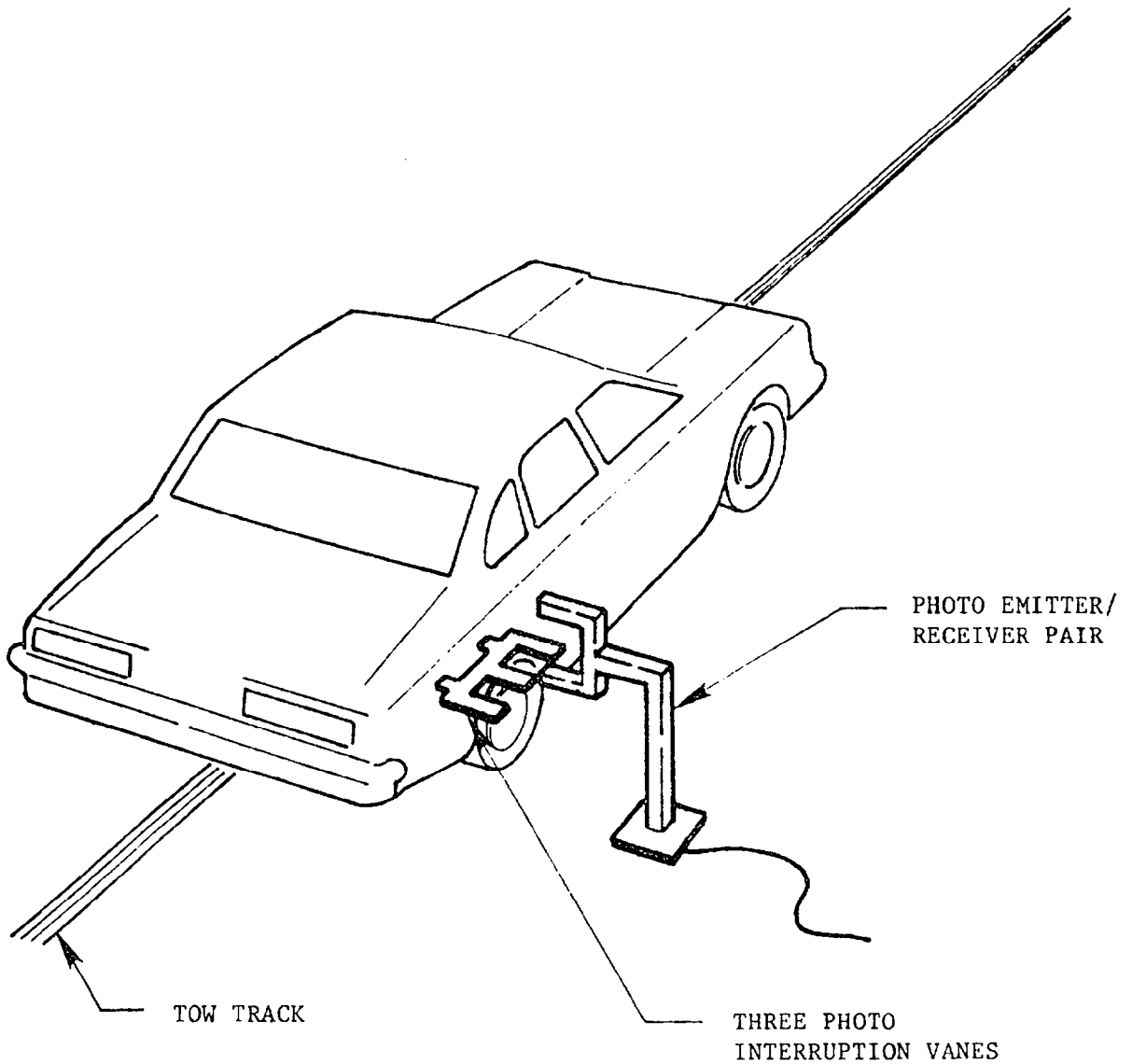
RESTRAINT SYSTEM: Both dummies unrestrained

REMARKS: Chamois on dummy heads per chamois procedure in Appendix D.

\*MEASUREMENTS TAKEN FROM REFERENCE MARKS ON STEERING COLUMN.

\*\*INTENDED TEST WEIGHT IS BASED ON THE WEIGHT OF A HONDA ACCORD.

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane clears emitter/receiver 24 inches before impact.

The vanes have one foot spacing.

SECTION 3.0  
DATA REQUIRED BY R & D

The following pages are included in this section:

1. Dummy temperature control and position data
2. Dummy kinematic summary
3. Vehicle crush data
4. Dummy and vehicle accelerometer location and data summary
5. High speed camera information

SUBJECT VEHICLE DUMMY DATA SUMMARY

	DRIVER DUMMY SN: 43				PASSENGER DUMMY SN: 826			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME	MAX	TIME	MAX	TIME	MAX	TIME
HEAD ACCELERATION (g)								
LONGITUDINAL	---	---	---	---	---	---	---	---
LATERAL	30.08	102.25	37.05	230.50	19.46	246.25	270.46	246.00
VERTICAL	---	---	---	---	---	---	---	---
RESULTANT	---	---	---	---	---	---	---	---
HIC	---				---			
NECK LOADS (lb)								
SHEAR	47.50	128.00	106.54	89.88	---	---	---	---
AXIAL	271.16	109.00	34.00	172.00	---	---	---	---
NECK MOMENTS (lb-ft)								
ABOUT LATERAL	28.73	91.13	15.19	131.63	---	---	---	---
CHEST ACCELERATION (g)								
LONGITUDINAL	5.99	186.38	45.79	98.13	9.02	174.75	170.82	113.00
LATERAL	---	---	---	---	5.20	95.75	16.46	108.38
VERTICAL	6.74	122.63	15.52	90.25	31.88	113.25	46.85	110.13
RESULTANT	---		@ ---		173.91 @		113.00	
CHEST DISPLACEMENT (in)								
	1.37 @		107.88		---		---	
FEMUR LOADS (lb)								
LEFT	162.36	131.38	1117.62	62.88	247.06	48.75	1525.27	88.00
RIGHT	327.50	125.75	1488.51	65.63	168.83	246.50	1859.56	84.50

\* LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD

\*\*LONGITUDINAL: REARWARD  
 LATERAL: RIGHTWARD  
 VERTICAL: DOWNWARD

Y See TEST ANOMALIES

α There was no instrumentation at this location.

PARTNER VEHICLE DUMMY DATA SUMMARY

	DRIVER DUMMY				PASSENGER DUMMY			
	SN: A09				SN: 45			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME	MAX	TIME	MAX	TIME	MAX	TIME
HEAD ACCELERATION (g)								
LONGITUDINAL	10.89	278.75	96.61	97.75	117.82	238.25	90.63	78.63
LATERAL	14.75	180.63	17.77	82.63	32.33	239.13	9.43	108.38
VERTICAL	---	---	---	---	132.97	106.38	57.26	78.83
RESULTANT		---	@	---		141.79 @	106.38	
HIC		---	from	---	1498.27	from	80.63	to 112.00
NECK LOADS (lb)								
SHEAR	---	---	α	---	102.54	95.38	435.82	111.63
AXIAL	---	---	α	---	623.79	94.88	815.88	110.88
NECK MOMENTS (lb-ft)								
ABOUT LATERAL	---	---	α	---	27.86	188.75	216.97	110.88
CHEST ACCELERATION (g)								
LONGITUDINAL	4.80	177.25	41.83	85.13	4.83	58.50	40.72	86.75
LATERAL	35.47	116.38	4.91	77.38	5.59	82.13	8.98	114.50
VERTICAL	5.15	139.63	18.27	105.50	4.27	191.63	65.47	101.13
RESULTANT		41.96 @	85.13					
CHEST DISPLACEMENT (in)	---	@	---	α		1.84 @	108.50	
FEMUR LOADS (lb)								
LEFT	102.31	340.00	1118.40	68.50	141.78	52.00	1102.00	81.63
RIGHT	180.56	59.00	1278.78	68.38	210.46	118.63	1983.52	87.75

\* LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD

\*\*LONGITUDINAL: REARWARD  
 LATERAL: RIGHTWARD  
 VERTICAL: DOWNWARD

γ See TEST ANOMALIES

α There was no instrumentation at this location.

## PARTNER VEHICLE DUMMY DATA SUMMARY CONTD

## PASSENGER DUMMY

SN: 45

	POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME	MAX	TIME
KNEE LOADS (lb)				
LEFT LEG				
LEFT SENSOR	617.07	102.25	334.17	43.25
RIGHT SENSOR	405.24	87.88	380.76	42.00
RIGHT LEG				
LEFT SENSOR	360.16	96.75	380.36	67.63
RIGHT SENSOR	274.07	68.25	444.75	105.88

## TIBIA MOMENTS (lb-ft)

LEFT LEG				
ABOUT LONGITUDINAL	101.93	104.13	62.84	87.00
ABOUT LATERAL	273.49	82.50	111.56	65.88
RIGHT LEG				
ABOUT LONGITUDINAL	96.35	102.38	62.35	69.50
ABOUT LATERAL	275.94	89.13	69.16	58.00

## ANKLE LOADS (lb)

LEFT LEG				
LATERAL	139.51	104.00	147.15	86.25
VERTICAL	905.31	41.88	232.13	68.63
RIGHT LEG				
LATERAL	109.79	82.25	47.47	62.75
VERTICAL	614.08	46.13	289.12	74.38

## ANKLE MOMENTS (lb-ft)

LEFT LEG				
ABOUT LONGITUDINAL	69.36	50.63	32.87	99.63
RIGHT LEG				
ABOUT LONGITUDINAL	35.60	101.13	108.41	62.13

\* LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD

\*\*LONGITUDINAL: REARWARD  
 LATERAL: RIGHTWARD  
 VERTICAL: DOWNWARD

SUBJECT VEHICLE

VISIBLE DUMMY CONTACT POINTS:

	DRIVER 43	PASSENGER 826
Head	<u>Windshield</u>	<u>Windshield</u>
Chest	<u>Steering Wheel</u>	<u>Dash, Knees</u>
Abdomen	<u>Steering Wheel</u>	<u>Dash</u>
Left Knee	<u>Lower Dash</u>	<u>Lower Dash, Glove Box</u>
Right Knee	<u>Lower Dash</u>	<u>Lower Dash, Glove Box</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Easy</u>	<u>Easy</u>
Rear	<u>Easy</u>	<u>Easy</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>Moved Forward</u>	<u>Moved Forward</u>
Rear	<u>DNA</u>	<u>DNA</u>

GLAZING DAMAGE:

Windshield broken  
   
   
 

OTHER NOTABLE IMPACT EFFECTS:

PARTNER VEHICLE

VISIBLE DUMMY CONTACT POINTS:

	DRIVER A09	PASSENGER 45
Head	<u>Windshield</u>	<u>Windshield</u>
Chest	<u>Steering Wheel</u>	<u>Dash</u>
Abdomen	<u>Steering Wheel</u>	<u>None</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash</u>	<u>Dash</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Difficult</u>	<u>Easy</u>
Rear	<u>Easy</u>	<u>Easy</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>No</u>	<u>No</u>
Rear	<u>DNA</u>	<u>DNA</u>

GLAZING DAMAGE:

Winshield shattered  
   
   
 

OTHER NOTABLE IMPACT EFFECTS:

## SUBJECT VEHICLE DUMMY KINEMATIC SUMMARY

### DRIVER

Upon impact the driver moved forward in the seat, his knees impacting the lower instrument panel in the glove box area. As the dummy continued forward movement the dummy's abdomen contacted the lower rim of the steering wheel. As the steering wheel bent, the face of the dummy, just below the nose, impacted the upper rim of the steering wheel. Further forward motion resulted in the head impacting the windshield. On rebound, the dummy rotated facing the driver's door with his knees wedged between the floor and the steering column. Final resting position has the dummy's pelvis off the front edge of the seat, his arms at his sides, and his upper body facing the driver's door resting on the seat cushion.

### PASSENGER

During impact, the passenger moved forward in the seat, his knees impacting the lower instrument panel in the glove box area and then rotated toward the windshield. As the dummy continued forward movement, the face of the dummy impacted the windshield and caused the head to rotate backward. The thorax then impacted the upper part of the instrument panel. The head of the dummy continued to rotate rearward until the rear of the head came in contact with the spine of the dummy. During rebound, the dummy's torso rotated rearward and the back of the dummy's head impacted the headrest. The dummy came to rest in an upright position with his pelvis on the edge of the seat with the knees still in contact with the glove box.

## PARTNER VEHICLE DUMMY KINEMATIC SUMMARY

### DRIVER

Upon impact the driver moved forward, his knees contacted the lower part of the instrument panel. As the dummy continued forward movement, his abdomen made contact with the lower rim of the steering wheel and his neck then made contact with the upper part of the steering wheel. The dummy's further movement forward let the head impact the top of the instrument panel and the windshield. As the steering wheel bent to the right the dummy rotated toward the driver's door. During rebound, the dummy rotated backward with his left knee wedged between the steering column and the car floor. Final resting position showed the dummy seated forward on the seat with both arms down at his sides leaning inward toward the center of the car.

### PASSENGER

During impact, the passenger moved forward impacting his knees into the lower instrument panel in the glove box area. The dummy continued forward movement impacting his head against the windshield causing his head to rotate rearward. The forward motion continued with the thorax impacting the upper instrument panel and the head rotated until the back of the head contacted the spine. On rebound, the dummy's upper torso moved backward with the passenger coming to rest seated at the front edge of the seat, the head resting below the headrest on the seatback and the knees still contacting the dash.

## DUMMY TEMPERATURE CONTROL AND POSITIONING

Both vehicles were taken outside to the impact area between 11:00 and 11:30 AM the day of the test. At this point heaters were placed inside the vehicles to maintain the temperature. The vehicles remained in this position until approximately 13:30. The subject vehicle was then moved back into the barrier building to be hooked to the tow track. The partner vehicle was moved out to the end of the remote track until the test at 14:10.

The procedure used to position the Part 572 dummies was per FMVSS 208 seating procedure which is summarized in the following table. The Hybrid III dummies were seated per the General Motors Procedure but no coordinates for the H-point were used to seat the dummy because the H-point coordinates are unique to General Motors testing. The GM seating procedure is in Appendix D of this report.

DUMMY PLACEMENT AND POSITIONING

PART 572

DUMMY

DRIVER DSP

PASSENGER DSP

HEAD Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.

UPPER TORSO Placed against seat back. Midsagittal plane is vertical & longitudinal & passes through center point of steering wheel rim.

UPPER ARMS Initially placed against seat back & tangent to side of upper torso. Push arms rearward into seat back with bending at elbows.

LOWER ARMS Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.

HAND PALMS Palms contact outer part of steering wheel rim at horizontal centerline.

HAND THUMBS Placed over steering wheel rim.

HAND LITTLE FINGERS

LOWER TORSO Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical & longitudinal & passes through center point of plane described by steering wheel rim.

UPPER LEGS (thighs or femurs) Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.

RIGHT KNEE Knees initially set 14.5" apart between pivot bolt head outer surfaces.

Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.

Placed against seat back. Midsagittal plane is vertical, longitudinal, & the same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.

Initially placed against seat back & tangent to side of upper torso. Push arms rearward into seat back with bending at elbows. Remains tangent.

Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.

Palms contact the outsides of the thighs.

Barely in contact with the seat cushion.

Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical, and same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.

Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.

Located so that plane defined by femur and tibia centerlines is as close as possible to vertical.

DUMMY PLACEMENT AND POSITIONING (CONTINUED)

PART 572  
DUMMY

DRIVER DSP

PASSENGER DSP

LEFT KNEE Outer surface of pivot bolt head is 5.9" from midsagittal plane of dummy.

Located as above.

LOWER LEGS Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.

Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.

RIGHT FOOT Placed on undepressed accelerometer pedal -- rearmost point of heel on floorpan in plane of pedal.

Centerline falls in vertical longitudinal plane. Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.

LEFT FOOT Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan. Centerline falls in vertical longitudinal plane.

Centerline falls in vertical longitudinal plane. Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.

SUBJECT VEHICLE  
DUMMY IN-VEHICLE POSITION  
RECORDING SHEET

VEHICLE NHTSA NO. R & D

MFR./MAKE/MODEL: Dodge Omni

SEAT TYPE:    Bench  
    Bucket  
   Split Bench

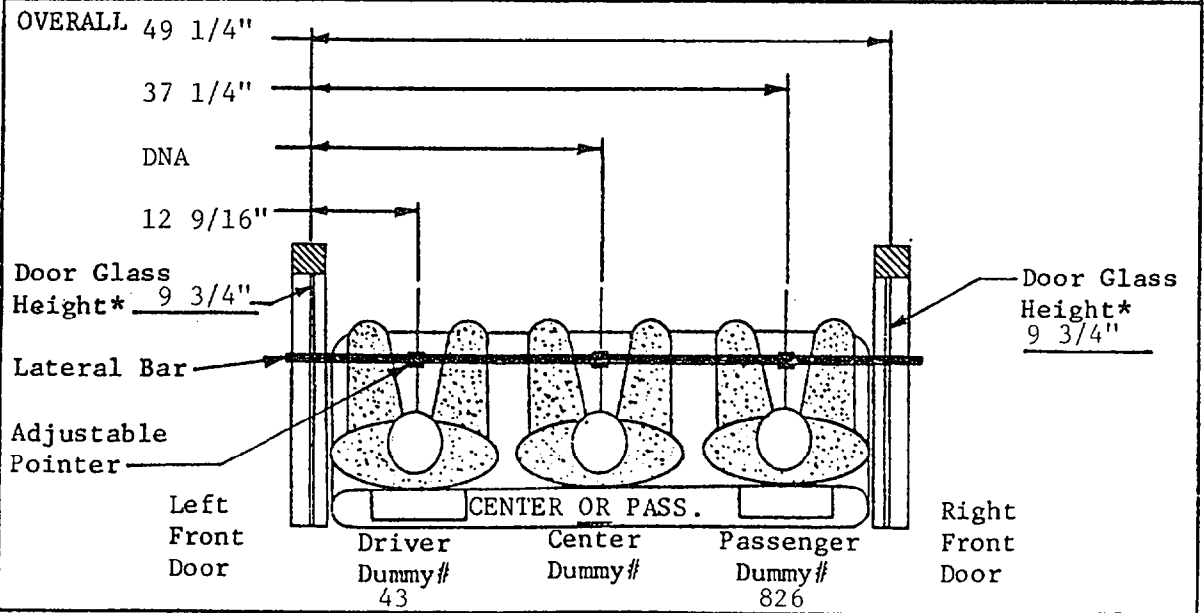
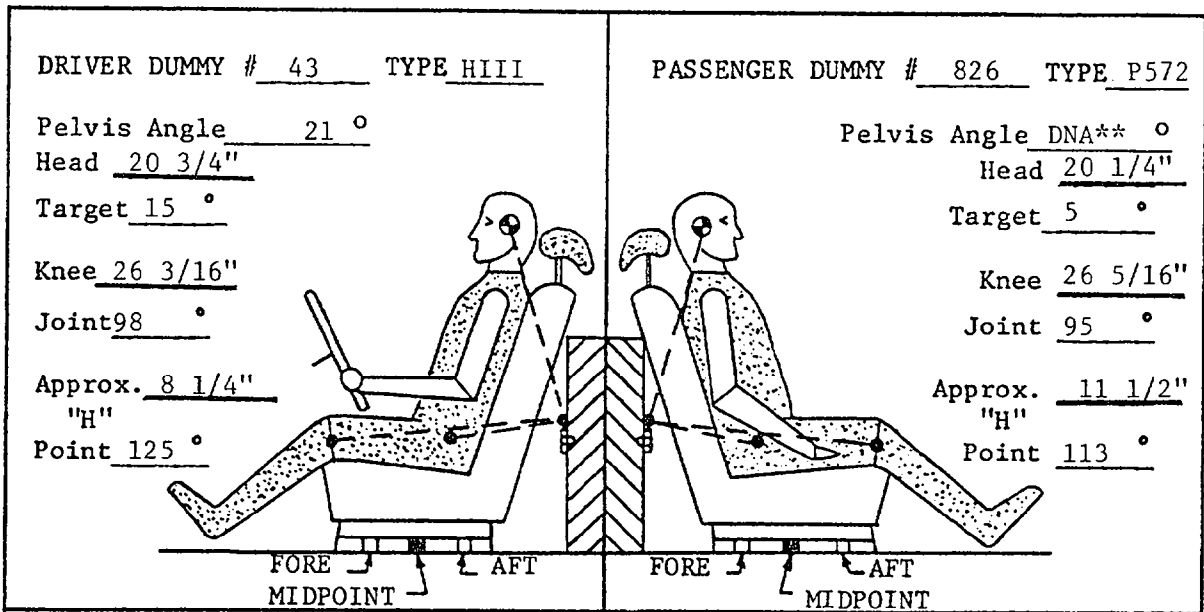
ADJUSTER TYPE:     Manual  
   Power

BUCKET SEAT BACK TYPE:    Fixed  
    Adjustable Reclining

TECHNICIANS:  
1. D. LeVally  
2. B. Miller  
3. \_\_\_\_\_  
4. \_\_\_\_\_

POSITIONING DATE: 12/18/84

AMBIENT TEMP.: 70° F. TIME: 6:30



\* Door glass height is equal on the right and left side of vehicle.  
\*\* Pelvis angle recorded only on Hybrid III test dummies.

PARTNER VEHICLE  
 DUMMY IN-VEHICLE POSITION  
 RECORDING SHEET

VEHICLE NHTSA NO.  R & D

MFR./MAKE/MODEL:  Dodge Omni

SEAT TYPE:  Bench   
  Bucket   
  Split Bench

ADJUSTER TYPE:   Manual   
  Power

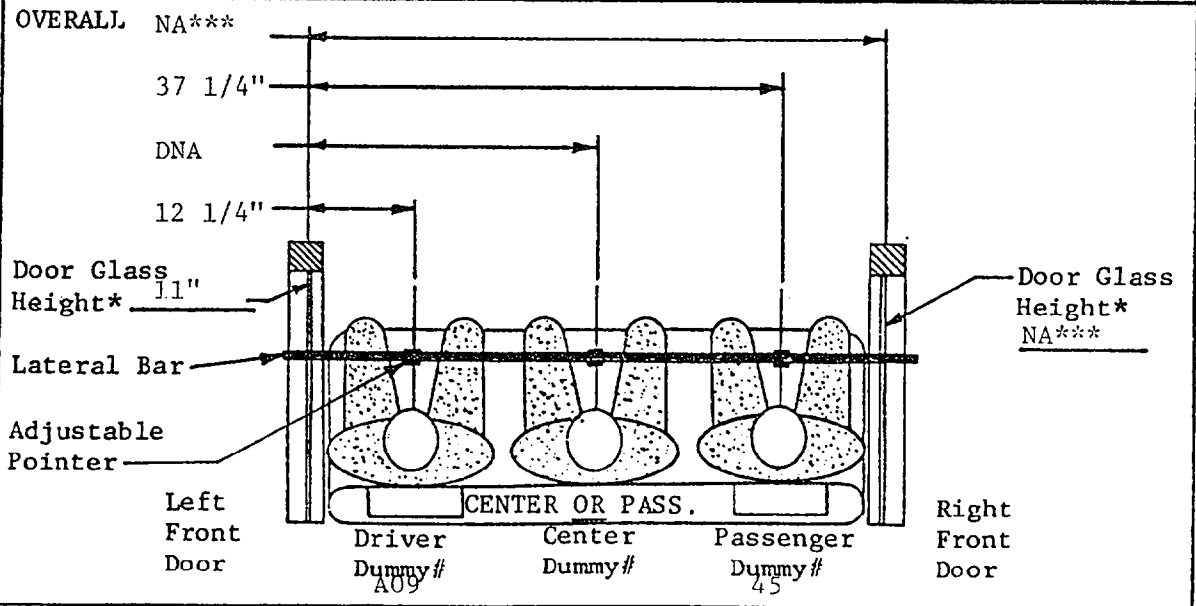
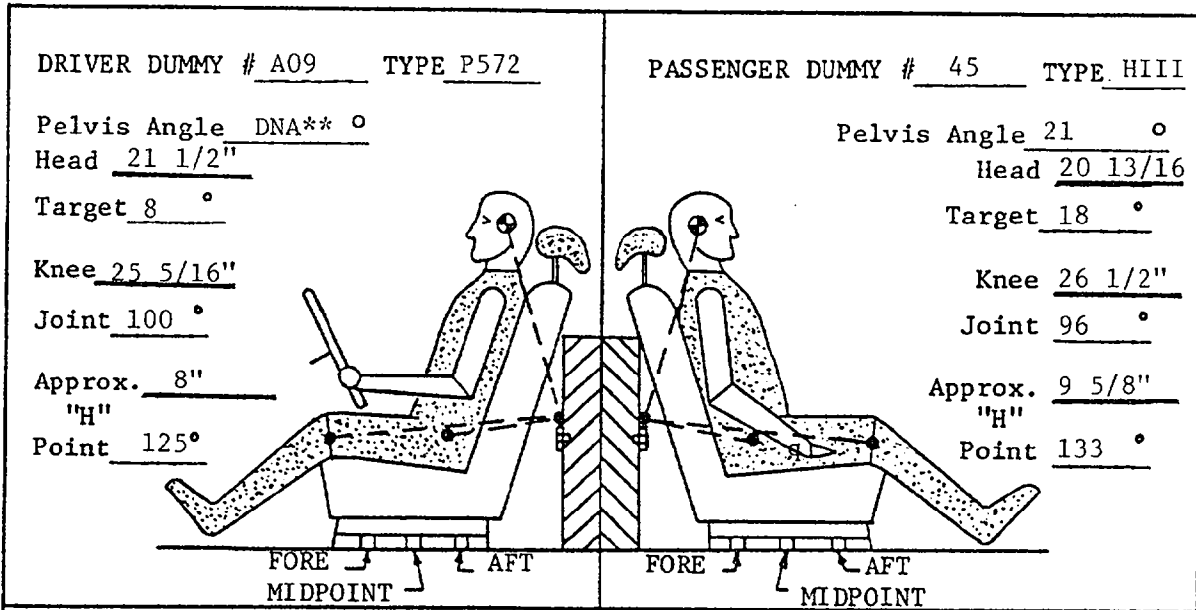
BUCKET SEAT BACK TYPE:  Fixed   
  Adjustable Reclining

TECHNICIANS:

1.  N. Echeverria
2.  R. Benavides
3.  J. Clarridge
4.

POSITIONING DATE:  12/18/84

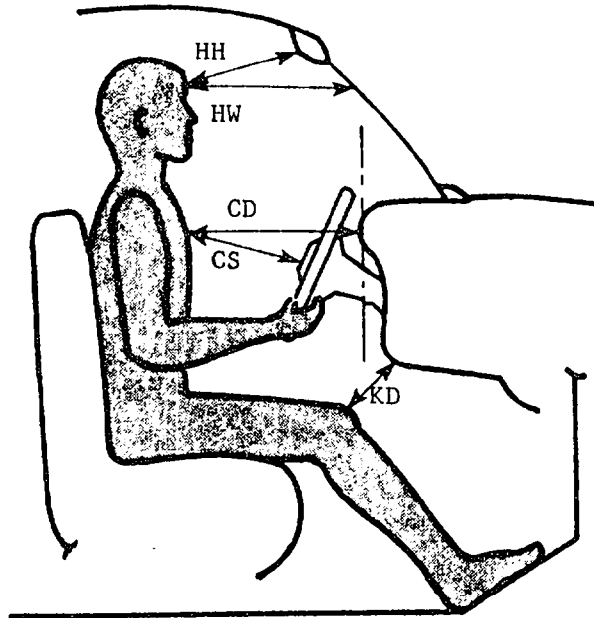
AMBIENT TEMP.:  70°  F. TIME:  7:00



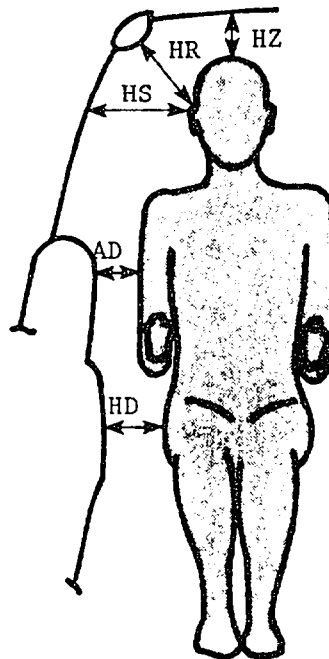
\* Door glass height is equal on the right and left side of vehicle.  
 \*\* Pelvis angle taken only on Hybrid III test dummies.  
 \*\*\* Passenger door glass broken.

SUBJECT VEHICLE  
DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER 43	PASSENGER 826
HH	10 3/8	13 9/16
HW	15 7/16	17 3/4
CD	18 13/16	25 1/8
CS	15 3/8	DNA
KDL	6 5/8	6 5/8
KDR	6 7/16	6 1/8



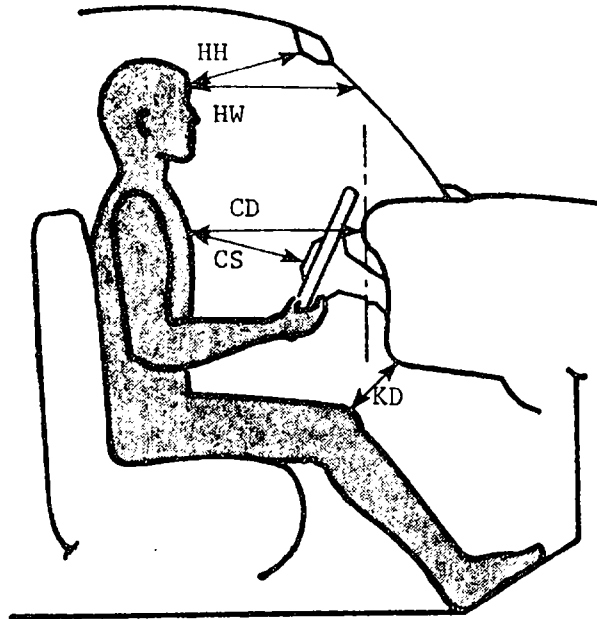
	DRIVER 43	PASSENGER 826
HR	7 3/4	6 1/4
HS	9	8 5/8
AD	3 15/16	3 9/16
HD	7 3/8	6 11/16
HZ	4 1/4	3 1/4



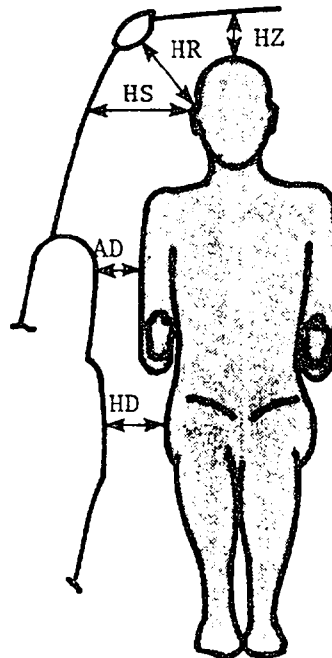
ALL MEASUREMENTS IN INCHES

PARTNER VEHICLE  
DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER A09	PASSENGER 45
HH	11 7/8	9 1/4
HW	15 7/8	14 7/16
CD	20 15/16	22 11/16
CS	18 5/8	DNA
KDL	7 9/16	6 1/4
KDR	7 1/2	5 7/16



	DRIVER A09	PASSENGER 45
HR	6 5/8	7 1/8
HS	8 13/16	NA*
AD	4 3/16	3 5/8
HD	8 1/8	6 1/2
HZ	2	3 5/8



ALL MEASUREMENTS IN INCHES

\*Passenger side window broken.

SUBJECT VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION***		NEGATIVE DIRECTION***	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	FORWARD FRAME RAIL (LONGITUDINAL)	152.6	-19.8	19.3	94.71	92.00	143.52	18.38
2	FRONT FRAME CROSSMEMBER (LONGITUDINAL)	127.4	0.0	4.9	8.22	50.00	93.23	43.00
3	BRAKE CALIPER; FRONT RIGHT (LONGITUDINAL)	137.4	-25.8	8.7	23.81	66.63	77.35	52.25
4	ENGINE BOTTOM (LONGITUDINAL)	139.9	0.0	6.2	54.43	44.38	105.35	35.25
5	ENGINE BLOCK TOP (LONGITUDINAL)	143.9	-2.4	31.3	17.03	77.13	78.11	44.25
6	STEERING COLUMN; LOWER (A-P AXIS)	121.3	14.3	21.5	11.99	68.13	96.21	43.13
7	STEERING WHEEL HUB (A-P AXIS) (I-S AXIS)	103.3	13.1	31.8	14.21 33.82	68.13 84.00	67.29 63.21	43.13 59.25
8	STEERING COLUMN DISPLACEMENT (A-P AXIS)				---	--- α	---	--- α
9	DASH PANEL (LONGITUDINAL) (VERTICAL)	106.3	0.0	32.0	41.90 70.99	66.00 75.13	81.95 ---	52.38 --- Y
10	PITCH RATE GYRO	109.5	0.0	15.5	673.97	60.63	124.14	40.88
11	B-PILLAR SILL - LEFT (LONGITUDINAL) (VERTICAL)	74.8	23.7	11.0	1.74 22.15	123.13 57.88	33.19 20.83	60.25 19.25
		ΔV = 32.4 mph @ 114.13 msec						
12	B-PILLAR SILL - RIGHT (LONGITUDINAL) (VERTICAL)	74.5	-23.6	11.3	4.06	157.25	35.43	45.13
		ΔV = 34.5 mph @ 123.78 msec						
13	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)P** (VERTICAL)	58.6	24.3	14.1	1.48 10.93	121.88 68.88	32.91 6.39	60.38 29.25
		ΔV = 32.1 mph @ 115.20 msec						
14	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)R**	55.3	24.1	14.0	1.26	122.38	32.63	60.38

SUBJECT VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTD

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION***		NEGATIVE DIRECTION***	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
15	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)P**	58.6	-24.6	14.0	2.93	158.00	31.84	45.00
Δ V = 33.9 mph @ 111.40 msec								
16	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)R**	54.8	-24.3	14.8	2.65	154.63	31.77	45.25
17	REAR AXLE CENTERLINE (LONGITUDINAL)	42.5	0.0	6.1	15.03	122.88	95.10	50.38

\* REFERENCE: X - REAR BUMPER (+ FORWARD), Y - VEHICLE CENTERLINE (+ TO LEFT),  
Z - GROUND LEVEL (+ UP)

\*\* (P) = PRIMARY SENSOR, (R) = REDUNDANT SENSOR

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

ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES.

<sup>α</sup> There was no instrumentation at this location.

<sup>γ</sup> See TEST ANOMALIES

## PARTNER VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION***		NEGATIVE DIRECTION***	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	FORWARD FRAME RAIL (LONGITUDINAL)	150.6	19.5	20.0	32.94	24.50	87.69	14.63
2	FRONT FRAME CROSSMEMBER (LONGITUDINAL)	127.4	-0.6	4.8	---	--- Y	---	--- Y
3	BRAKE CALIPER; FRONT RIGHT (LONGITUDINAL)	133.8	25.5	8.8	50.94	61.00	158.89	88.88
4	ENGINE BOTTOM (LONGITUDINAL)	139.8	4.3	5.8	---	--- Y	---	--- Y
5	ENGINE BLOCK TOP (LONGITUDINAL)	138.9	1.5	31.3	10.15	68.63	106.13	42.25
6	STEERING COLUMN; LOWER (A-P AXIS)	116.3	-14.0	21.1	15.96	145.63	54.53	55.75
7	STEERING WHEEL HUB (A-P AXIS) (I-S AXIS)	101.4	13.0	32.5	19.04 22.04	86.63 44.25	55.65 53.02	56.00 61.38
8	STEERING COLUMN DISPLACEMENT (A-P AXIS)				---	--- $\alpha$	---	--- $\alpha$
9	DASH PANEL (LONGITUDINAL) (VERTICAL)	106.6	-0.5	33.5	71.05 88.89	118.13 119.69	94.92 97.28	124.63 114.00
10	PITCH RATE GYRO	109.3	0.0	16.0	---	--- Y	---	--- Y
11	B-PILLAR SILL - LEFT (LONGITUDINAL) (VERTICAL) $\Delta V = 34.1 \text{ mph @ } 110.13 \text{ msec}$	73.6	-23.4	9.4	1.65 15.39	120.00 76.75	38.03 9.01	43.88 8.13
12	B-PILLAR SILL - RIGHT (LONGITUDINAL) $\Delta V = 34.6 \text{ mph @ } 122.65 \text{ msec}$	74.1	23.5	9.1	2.73	128.00	29.80	60.75
13	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)P** (VERTICAL) $\Delta V = 33.4 \text{ mph @ } 112.65 \text{ msec}$	59.6	-22.8	15.0	2.16 11.29	121.00 57.75	33.10 5.84	43.13 44.13
14	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)R**	55.8	-22.6	15.0	1.69	119.88	31.23	43.13

PARTNER VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTD

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION***		NEGATIVE DIRECTION***	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
15	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)P**	59.3	22.9	13.9	2.36	150.75	30.91	61.13
ΔV = 35.8 mph @ 112.68 msec								
16	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)R**	55.5	22.9	14.1	2.53	144.38	30.81	61.38
17	REAR AXLE CENTERLINE (LONGITUDINAL)	42.8	-0.3	5.5	5.98	2.13	88.53	49.00

\* REFERENCE: X - REAR BUMPER (+ FORWARD), Y - VEHICLE CENTERLINE (+ TO LEFT),  
Z - GROUND LEVEL (+ UP)

\*\* (P) = PRIMARY SENSOR, (R) = REDUNDANT SENSOR

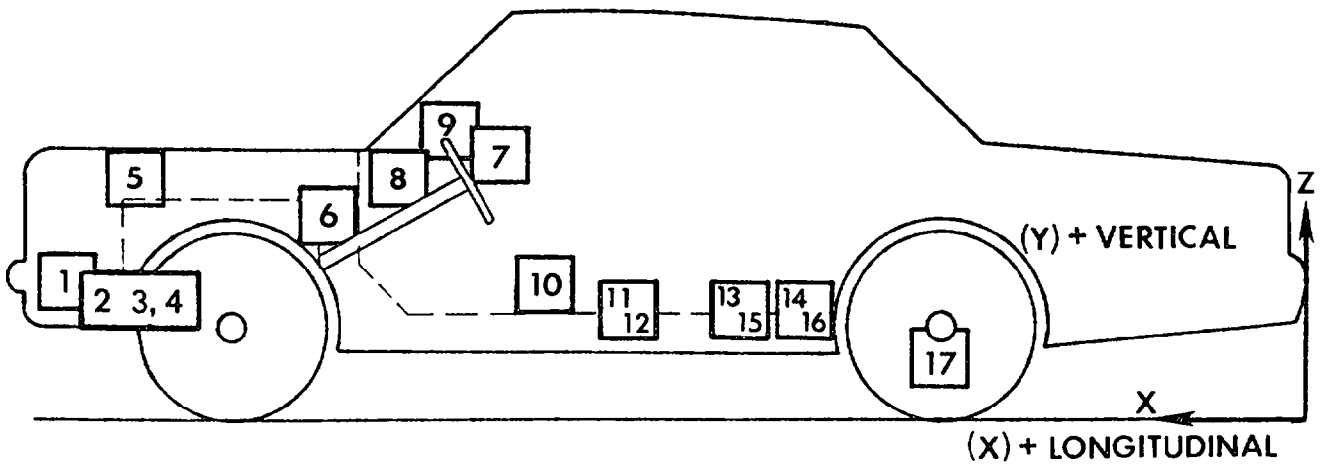
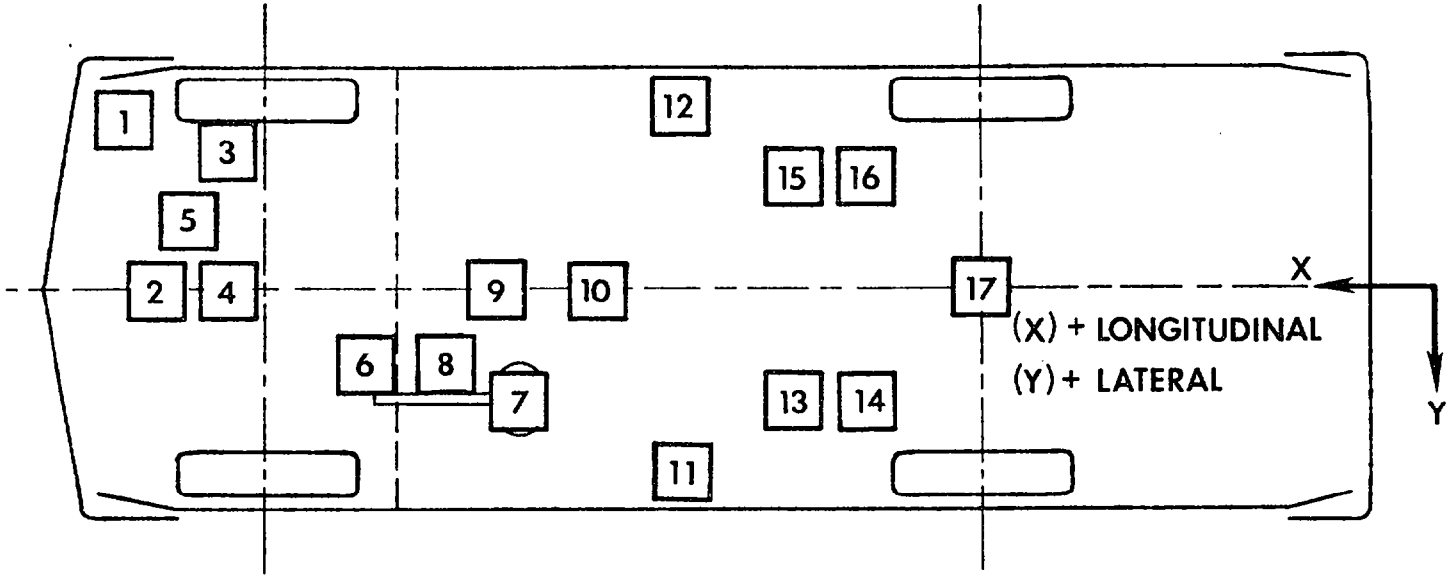
\*\*\* POSITIVE DIRECTION LONGITUDINAL: FORWARD  
LATERAL: LEFTWARD  
VERTICAL: UPWARD  
NEGATIVE DIRECTION LONGITUDINAL: REARWARD  
LATERAL: RIGHTWARD  
VERTICAL: DOWNWARD

ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES.

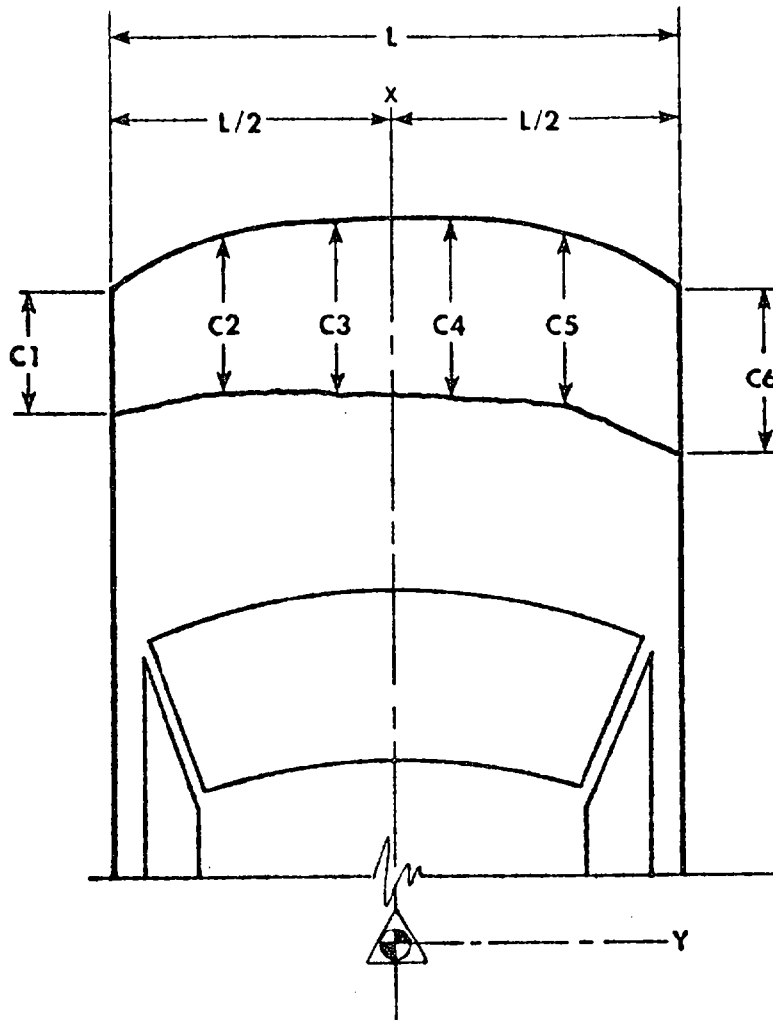
γ See TEST ANOMALIES

α There was no instrumentation at this location.

# VEHICLE ACCELEROMETER LOCATIONS



SUBJECT VEHICLE



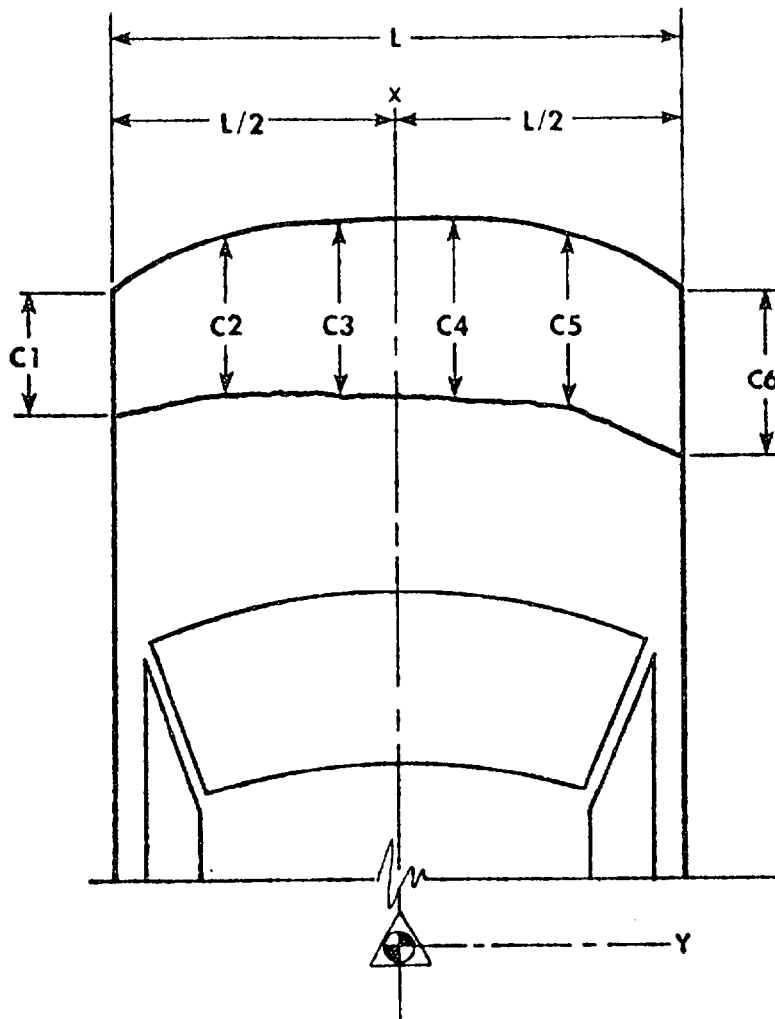
NOTE: C1 through C6 are spaced equally apart  
All measurements in inches

VEHICLE Dodge Omni

<u>PRE-TEST</u>	<u>POST-TEST</u>	<u>CRUSH</u>
L <u>55 11/16</u>	L <u>53 1/8</u>	L <u>2 9/16</u>
C1 <u>18 5/8</u>	C1 <u>26 13/16</u>	C1 <u>8 3/16</u>
C2 <u>17 5/8</u>	C2 <u>32 5/8</u>	C2 <u>15</u>
C3 <u>17 1/4</u>	C3 <u>36 3/4</u>	C3 <u>19 1/2</u>
C4 <u>17 1/8</u>	C4 <u>36 3/4</u>	C4 <u>19 5/8</u>
C5 <u>17 3/4</u>	C5 <u>36 1/4</u>	C5 <u>18 1/2</u>
C6 <u>18 5/8</u>	C6 <u>39 13/16</u>	C6 <u>21 3/16</u>
D <u>0</u>	D <u>0</u>	D <u>0</u>

Reference point is 15 feet forward of rear bumper.

PARTNER VEHICLE



NOTE: C1 through C6 are spaced equally apart  
All measurements in inches

VEHICLE Dodge Omni

<u>PRE-TEST</u>	<u>POST-TEST</u>	<u>CRUSH</u>
L <u>52 5/8</u>	L <u>51 7/8</u>	L <u>3/4</u>
C1 <u>6 1/4</u>	C1 <u>18 1/8</u>	C1 <u>11 7/8</u>
C2 <u>5 1/8</u>	C2 <u>26 11/16</u>	C2 <u>21 9/16</u>
C3 <u>4 3/4</u>	C3 <u>28 5/8</u>	C3 <u>23 7/8</u>
C4 <u>4 11/16</u>	C4 <u>27 1/2</u>	C4 <u>22 13/16</u>
C5 <u>5 1/8</u>	C5 <u>26 1/2</u>	C5 <u>21 3/8</u>
C6 <u>6 1/8</u>	C6 <u>28 13/16</u>	C6 <u>22 11/16</u>
D <u>0</u>	D <u>0</u>	D <u>0</u>

Reference point is 14 feet forward of rear bumper.

## IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Dodge Omni

TEST NUMBER 841218

		DIMENSIONS IN INCHES	
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST
X 1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	163 3/4	144 3/16
X 2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	144 1/2	140 5/8
X 3	REAR SURFACE OF VEHICLE TO FIREWALL	124 3/4	126 3/8
X 4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	108 5/8	108 1/8
X 5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	108 3/8	108 7/8
X 6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	110	109 7/8
X 7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	110 1/8	110 7/8
X 8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	71 1/8	71 3/8
X 9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	71 1/4	71 3/4
X 10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	71 3/16	71 1/4
X 11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	71 3/16	72
X 12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF RIGHT SIDE	109 3/4	110 3/8
X 13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF LEFT SIDE	109 7/8	111 1/4
X 14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	125	117
X 15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	123	123 3/8
X 16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	103 1/4	98 7/8
X 17	STEERING COLUMN TO "A" POST	14	14 1/8

## SUBJECT VEHICLE

Page 2 of 2

## IMPACTED VEHICLE MEASUREMENTS CONTD

VEHICLE MAKE/MODEL Dodge Omni

TEST NUMBER 841218

		DIMENSIONS IN INCHES	
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST
Z18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	21 1/2	18 1/2
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	161 1/4	140 1/16
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	161 1/4	153 1/16
X21	WIDTH OF ENGINE BLOCK	4 1/4	4 1/4
Z22	RIGHT FRONT SILL TO GROUND PLANE	9 1/4	7
Z23	LEFT FRONT SILL TO GROUND PLANE	8 7/8	8 7/16
Z24	RIGHT REAR SILL TO GROUND PLANE	9 1/4	8 7/16
Z25	LEFT REAR SILL TO GROUND PLANE	9 1/4	9 3/16
X26	FIREWALL TO ENGINE OR TRANSAXLE	10 9/16	10 1/4
Z27	VERTICAL DIMENSION FROM DOOR SILL TO CENTERLINE OF STEERING COLUMN	15 5/8	22
X28	WHEELBASE OF VEHICLE	99	93 1/2
Z29	WIDTH OF VEHICLE AT MAXIMUM WIDTH POINT	66 1/2	66 1/2
X30	REAR SURFACE OF VEHICLE TO ENGINE TARGET	139 11/16	130 1/4
X31	REAR SURFACE OF VEHICLE TO COMPARTMENT TARGET	112 5/16	112
X32	REAR SURFACE OF VEHICLE TO BUMPER TARGET	161 7/8	142
X33	REAR SURFACE OF VEHICLE TO FRAME CROSSMEMBER	125 1/2	123 7/8



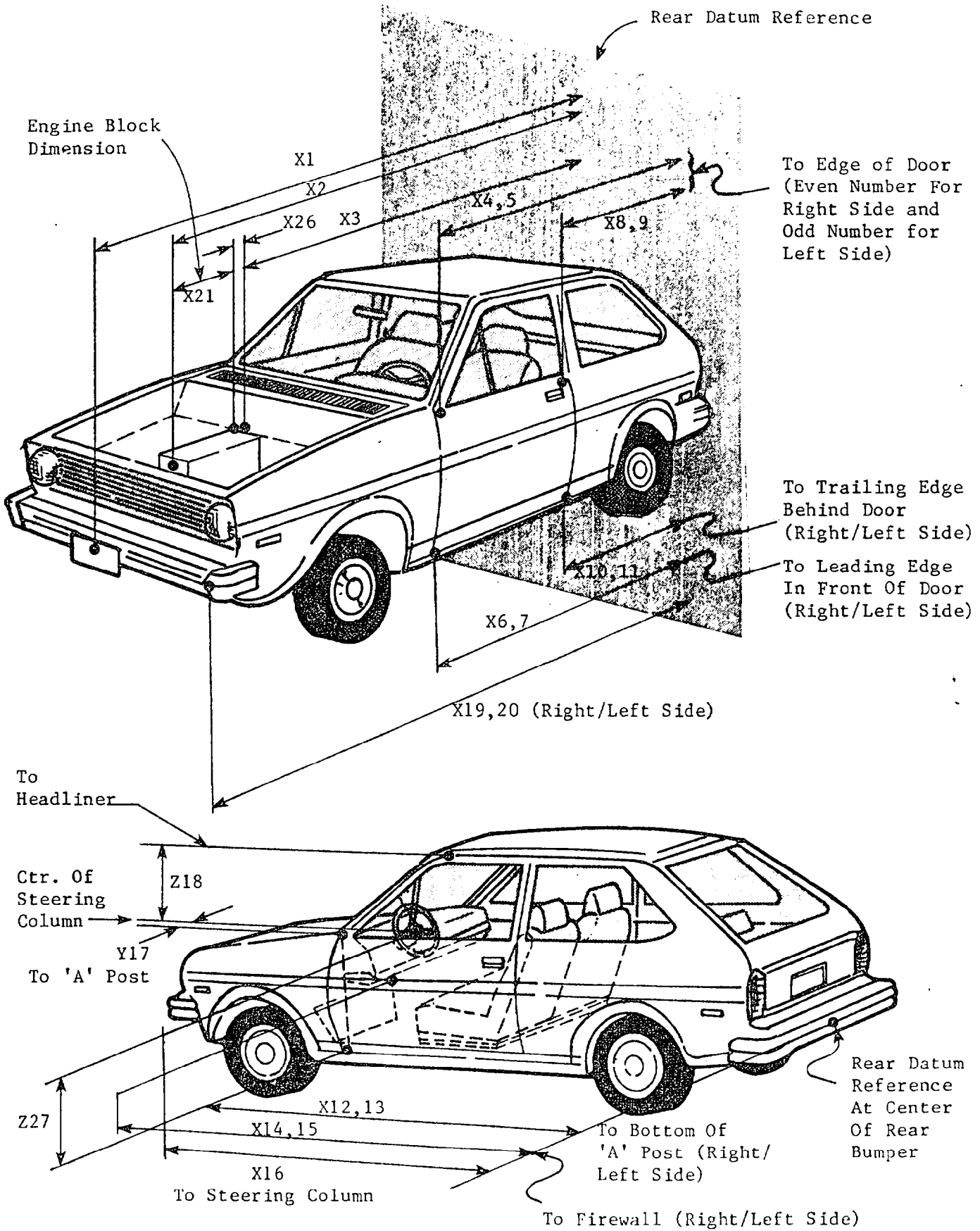
## IMPACTED VEHICLE MEASUREMENTS CONTD

VEHICLE MAKE/MODEL Dodge Omni TEST NUMBER 841218

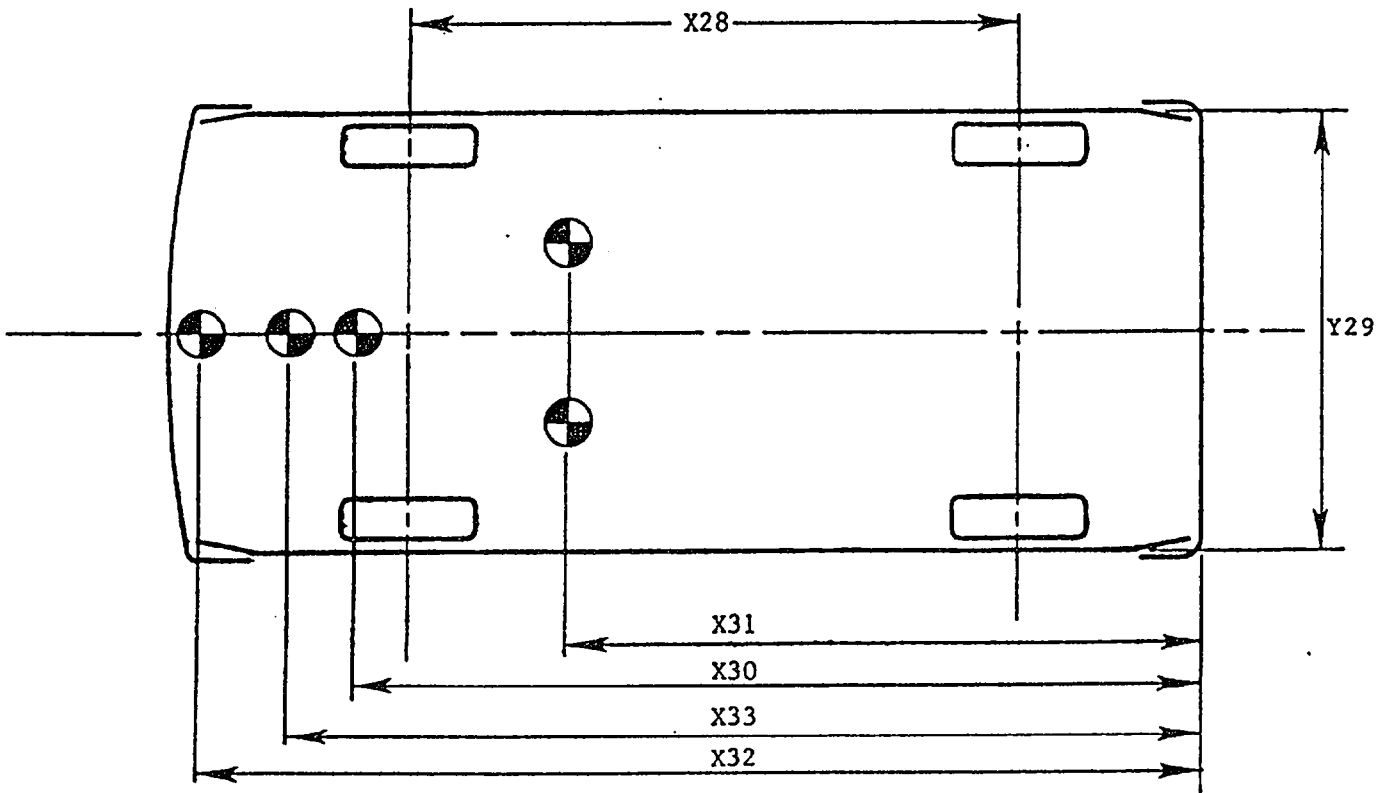
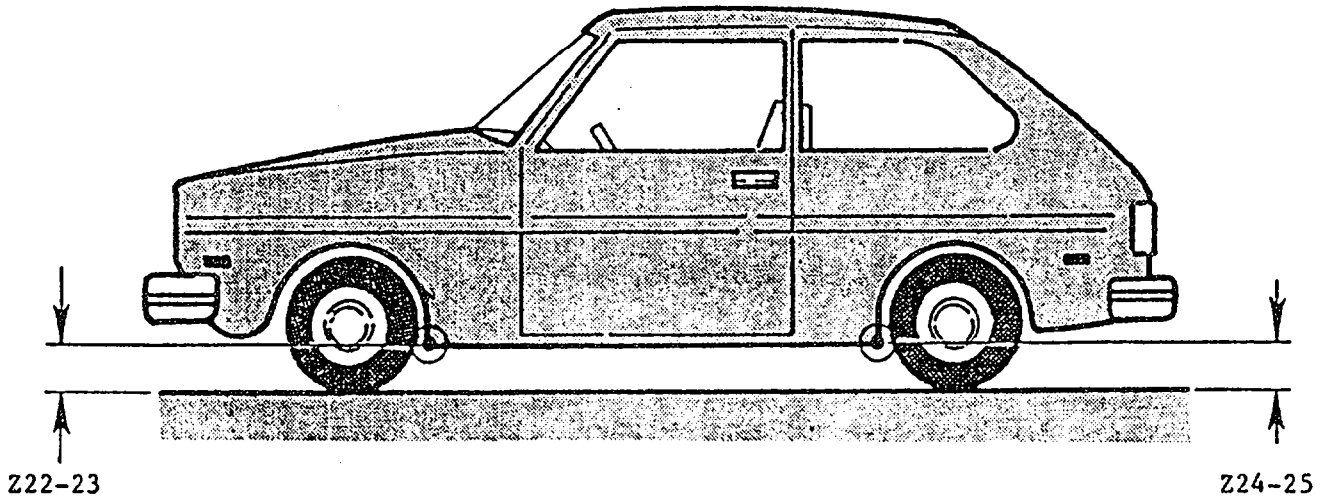
NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES	
		PRE-TEST	POST-TEST
Z18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	20 3/4	18 1/2
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	162 1/8	139 7/16
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	162	150 1/8
X21	WIDTH OF ENGINE BLOCK	4 3/8	4 3/8
Z22	RIGHT FRONT SILL TO GROUND PLANE	9 1/8	5 3/4
Z23	LEFT FRONT SILL TO GROUND PLANE	9	7 3/4
Z24	RIGHT REAR SILL TO GROUND PLANE	9 1/16	9 3/4
Z25	LEFT REAR SILL TO GROUND PLANE	9 1/4	8 5/8
X26	FIREWALL TO ENGINE OR TRANSAXLE	11 1/4	10 9/16
Z27	VERTICAL DIMENSION FROM DOOR SILL TO CENTERLINE OF STEERING COLUMN	18 7/8	20 5/8
X28	WHEELBASE OF VEHICLE	99 1/4	93 1/4
Y29	WIDTH OF VEHICLE AT MAXIMUM WIDTH POINT	66 3/8	66 3/8
X30	REAR SURFACE OF VEHICLE TO ENGINE TARGET	NR*	NR*
X31	REAR SURFACE OF VEHICLE TO COMPARTMENT TARGET	NR*	NR*
X32	REAR SURFACE OF VEHICLE TO BUMPER TARGET	161 1/2	142 1/4
X33	REAR SURFACE OF VEHICLE TO FRAME CROSSMEMBER	NR*	NR*

\*The Partner vehicle did not have targets at this location.

PRE-TEST AND POST-TEST MEASUREMENT POINTS



PRE-TEST AND POST-TEST MEASUREMENT POINTS CONTD.



CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Left Closeup	Photosonic 1B	25	502	Bumper Engagement
2	Left	Photosonic 1B	17	502	Vehicle Crush
3	Left Closeup - Subject	Photosonic 1B	25	432	Dummy Kinematics
4	Onboard Subject - Driver	Photosonic 1B	8	995	Dummy Kinematics
5	Right	Photosonic 1B	17	407	Bumper Engagement
6	Onboard Partner - Pass.	Photosonic 1B	8	1000	Dummy Kinematics
7	Right Overall	Hycam	16	512	Vehicle Dynamics
8	Right Closeup - Subject	Photosonic 1B	50	522	Dummy Kinematics
9	Onboard Subject - Pass.	Photosonic 1B	8	1003	Dummy Kinematics
10	Right Closeup - Partner	Hycam	50	498	Dummy Kinematics
11	Onboard Partner - Driver	Photosonic 1B	8	998	Dummy Kinematics
12	Left Closeup - Partner	Photosonic 1B	50	507	Dummy Kinematics
13	Overhead	Photosonic 1B	13	462	Vehicle Crush
14	Pit	Photosonic 1B	13	1005	Vehicle Dynamics
15	Right	Kodak	16	24	Real Time

Camera orientation is referenced to dummy positions in the subject vehicle.

NOTE: See page D-14 for camera LED information.

HIGH SPEED CAMERA INFORMATION

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CAMERA NO.	X*	Y*	Z*
1	0	-17'11"	31"
2	4'6"	-24'	32"
3	-12'5"	-14'4"	64"
5	-4'6"	24'	32"
7	0	47'	45"
8	-14'4"	24'2"	72"
10	-15'9"	32'	71"
12	14'5"	-24'4"	75"
13	0	0	18'
14	-27"	0	-12'2"

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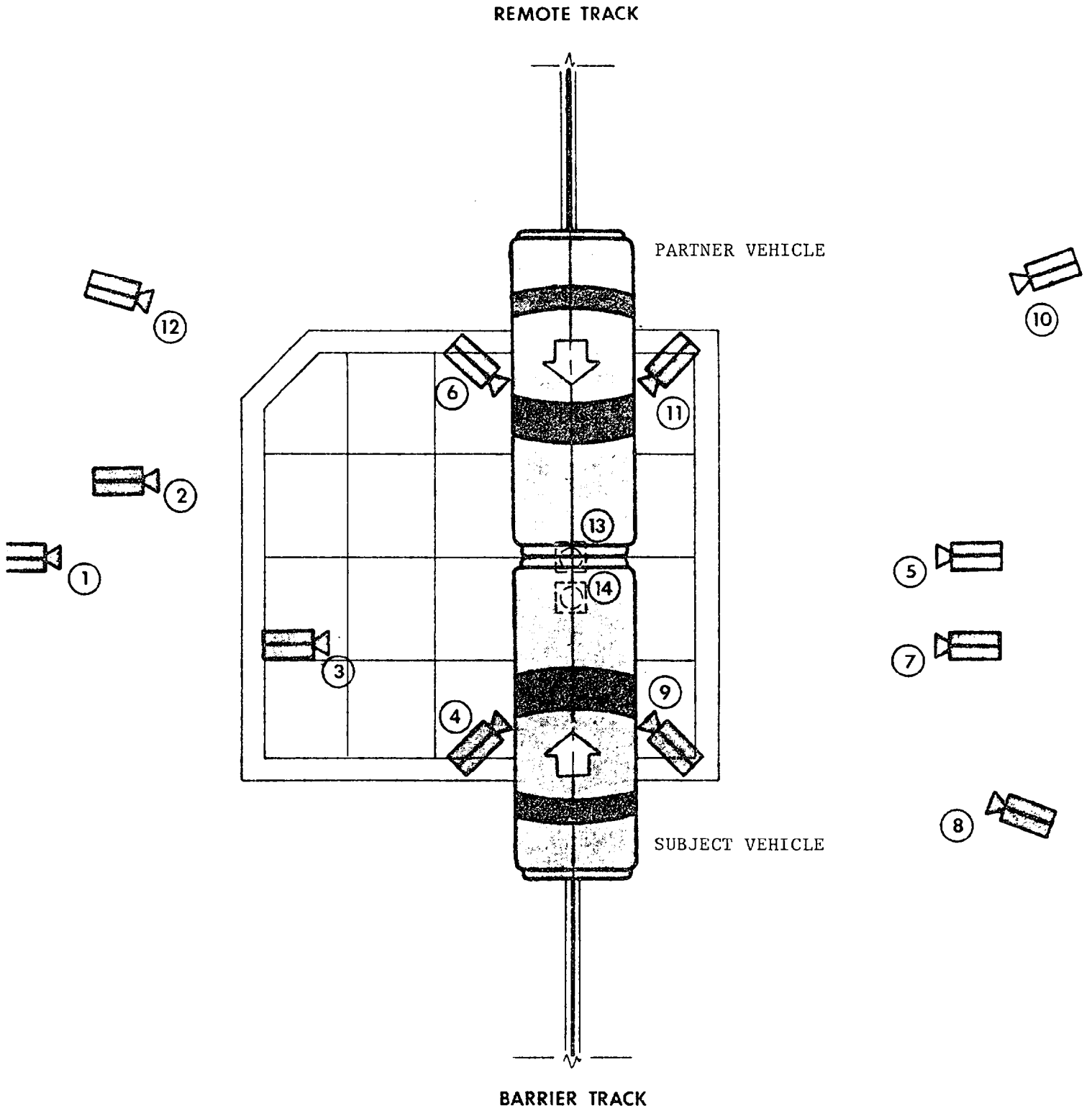
\*Reference

+X = Forward with respect to the subject vehicle impact point.

+Y = Rightward from intended vehicle centerlines.

+Z = Upward from ground level

CAMERA POSITION DIAGRAM



## TEST ANOMALIES

### GENERAL

The two vehicle centerlines, in the lateral axis, mismatched by eight (8) inches.

### SUBJECT VEHICLE

There were two instrumentation failures in the driver's head. The accelerometer in the "X" axis, HEDXG1, had an offset shift during the test which could be a signal conditioner or accelerometer problem, HEDZG1, had a cable cut at 75 msec.

The accelerometer in the driver's chest "Y" axis, CSTYG1, experienced a crushed cable at approximately 75 msec.

The passenger dummy also lost the head "X" and "Z" axis channels; the X-channel, HEDXG2, had a pinched cable at 77 msec while the cable to the Z-channel, HEDZG2, was crushed at approximately 109 msec.

Failures occurred in the passenger's left femur force transducer at both 120 and 130 msec.

The cable to the accelerometer on the center of the vehicle's dash panel in the "Z" axis, DPCZG, was crushed at 105 msec.

### PARTNER VEHICLE

The cable to the accelerometer in the driver's head "Z" axis, HEDZG1, was cut at approximately 70 msec.

The passenger's left and right lateral tibia channels, TBLYM2 and TBRYM2, both exceeded full scale values which were set from manufacturer's specification for full scale.

Possible cause of failure of the accelerometer on the vehicle's front frame crossmember, FFCXG, was a pinched cable occurring at 70 msec.

The vehicle's pitch rate gyro, VCGV, also failed due to a crushed cable.

The cable to the accelerometer mounted on the vehicle's lower engine block, ENGXG2, was severed at the time of skate release.

APPENDIX A  
PHOTOGRAPHS

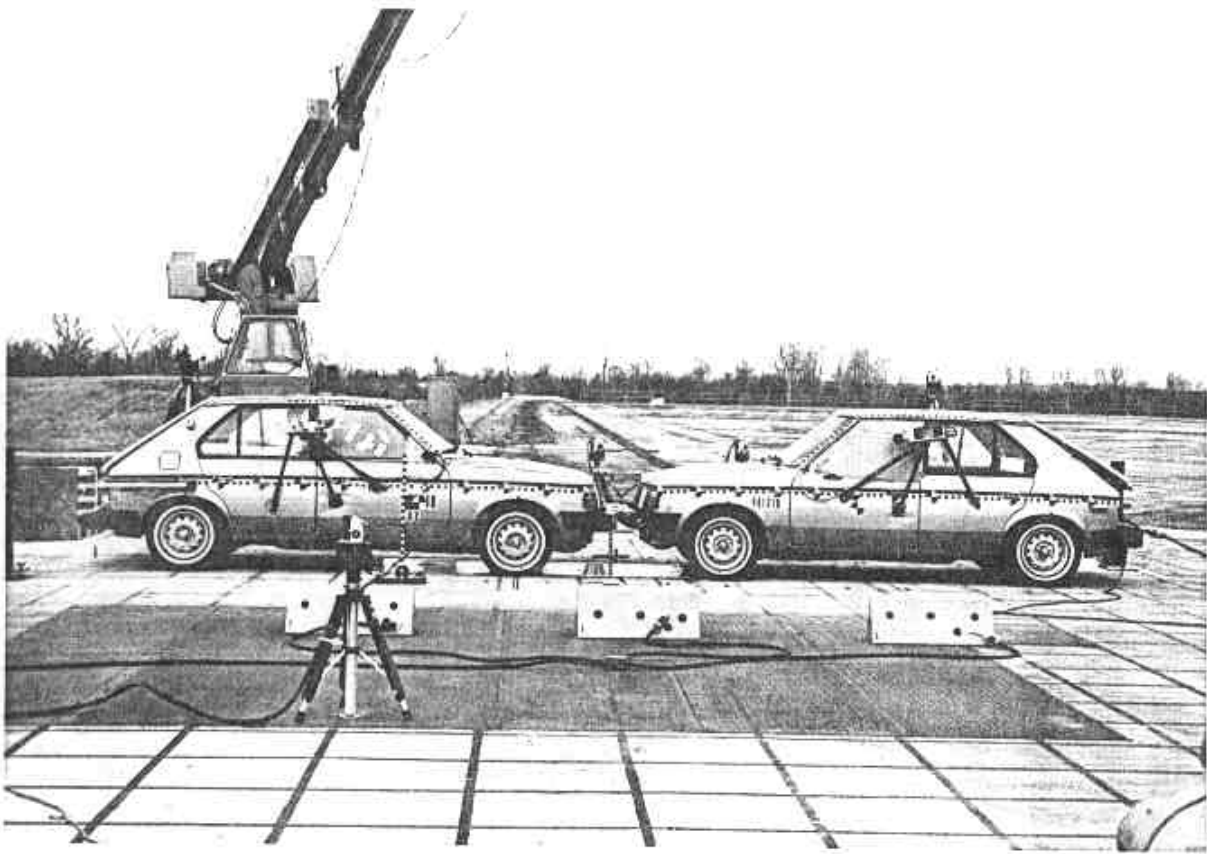


Figure A-1. PRE-TEST GENERAL OVERALL - VIEW 1

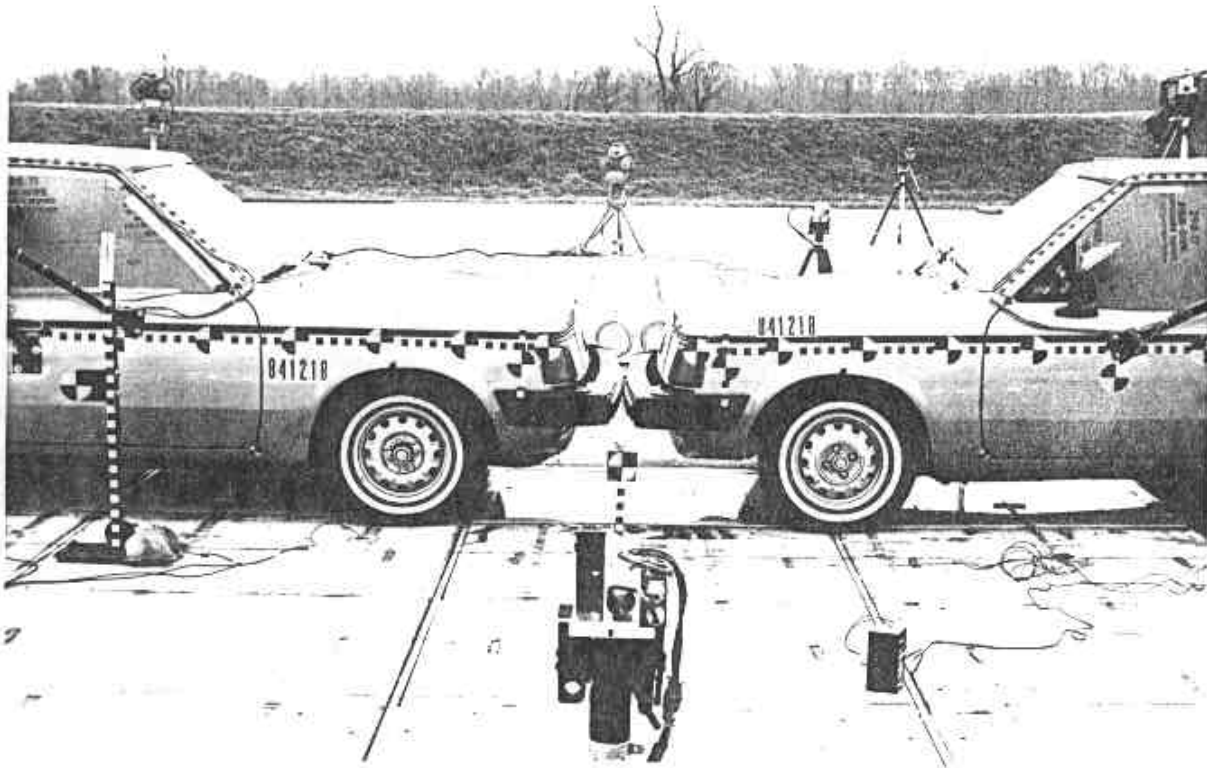


Figure A-2. PRE-TEST GENERAL OVERALL - VIEW 2.  
A-2

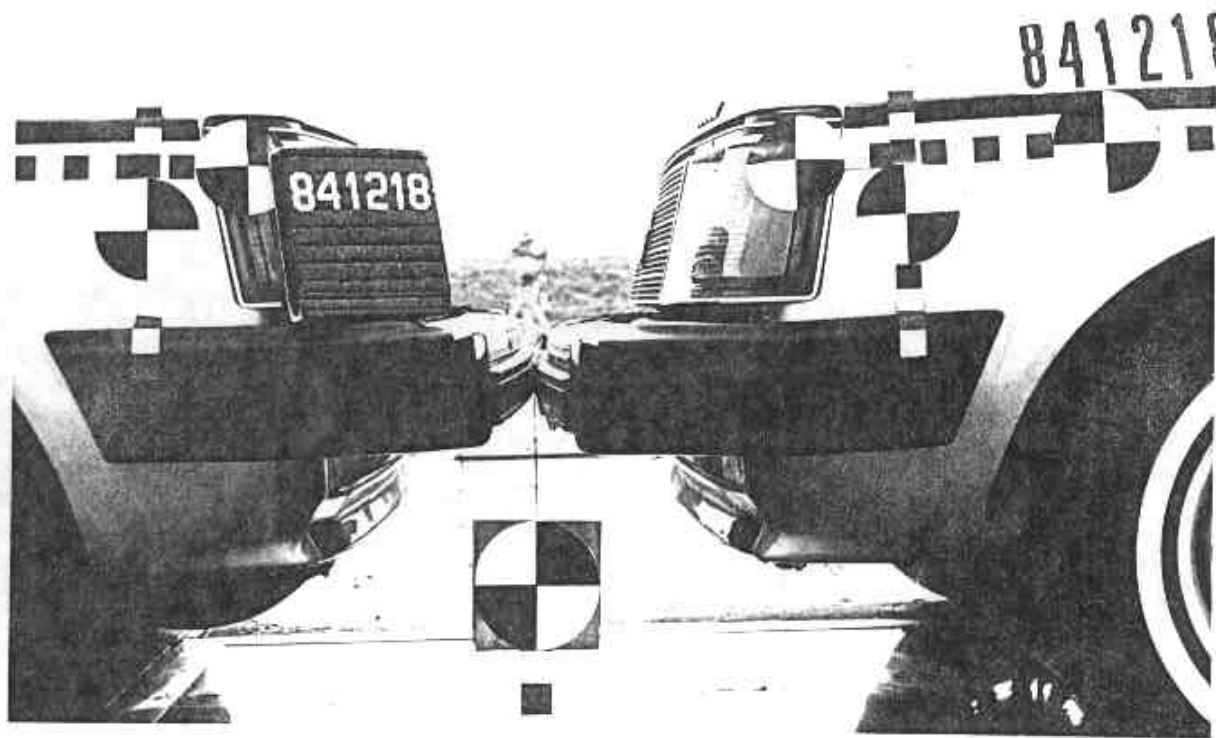


Figure A-3. PRE-TEST GENERAL CLOSEUP



Figure A-4. CRASH EVENT PHOTOGRAPH  
A-3

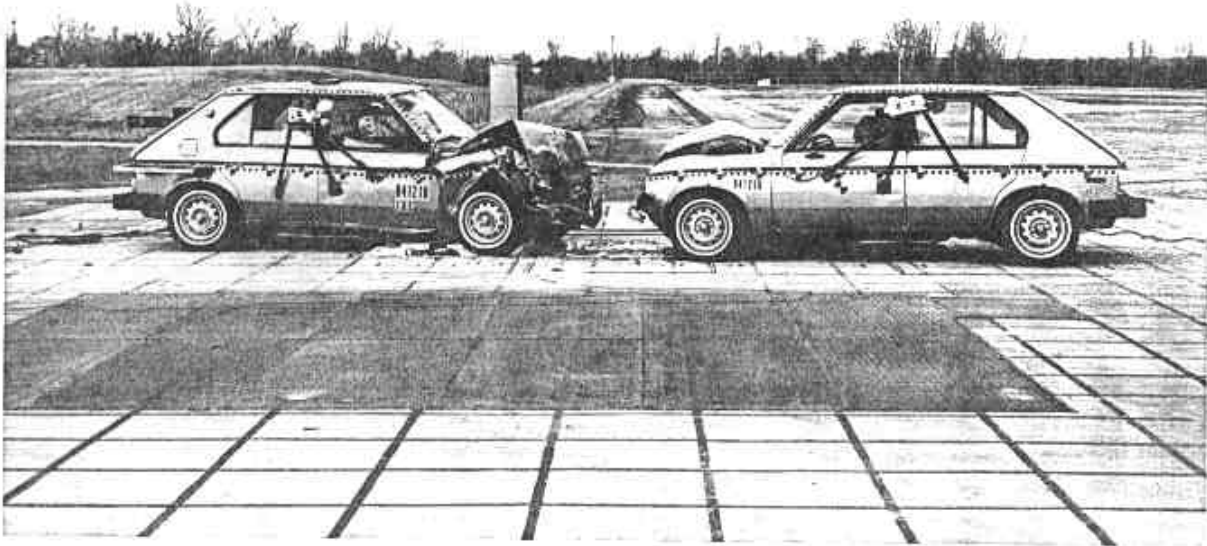


Figure A-5. POST-TEST GENERAL OVERALL - VIEW 1

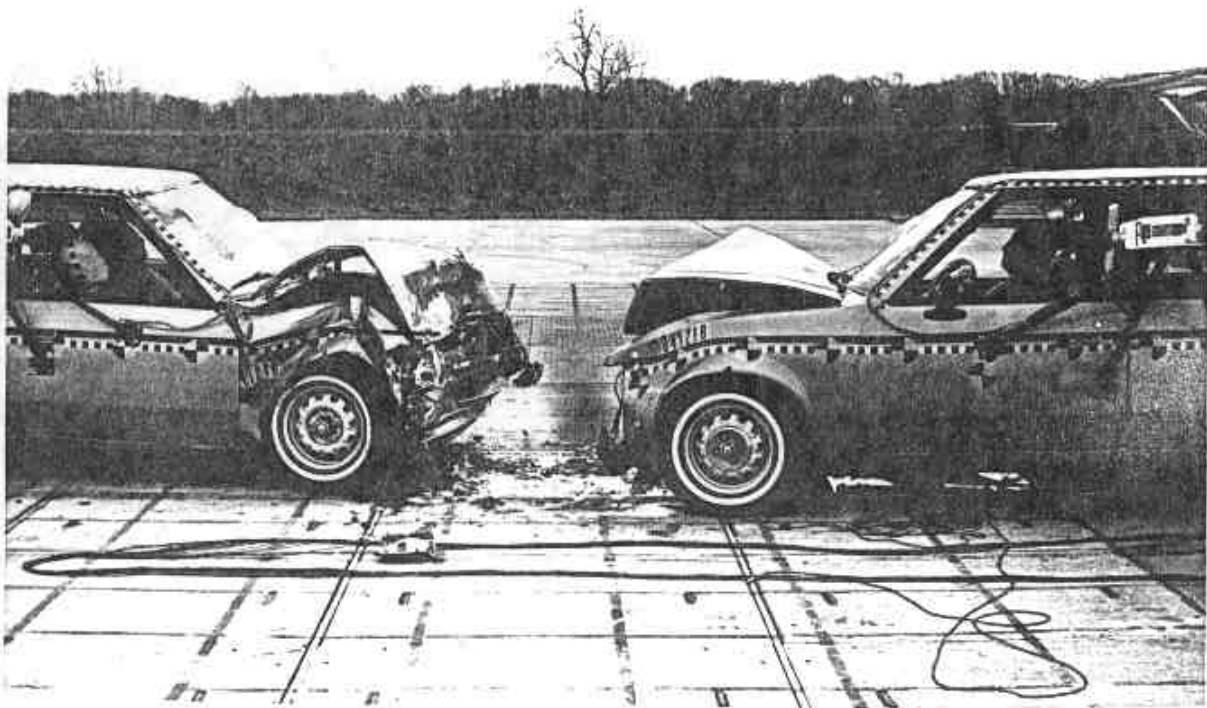


Figure A-6. POST-TEST GENERAL OVERALL - VIEW 2

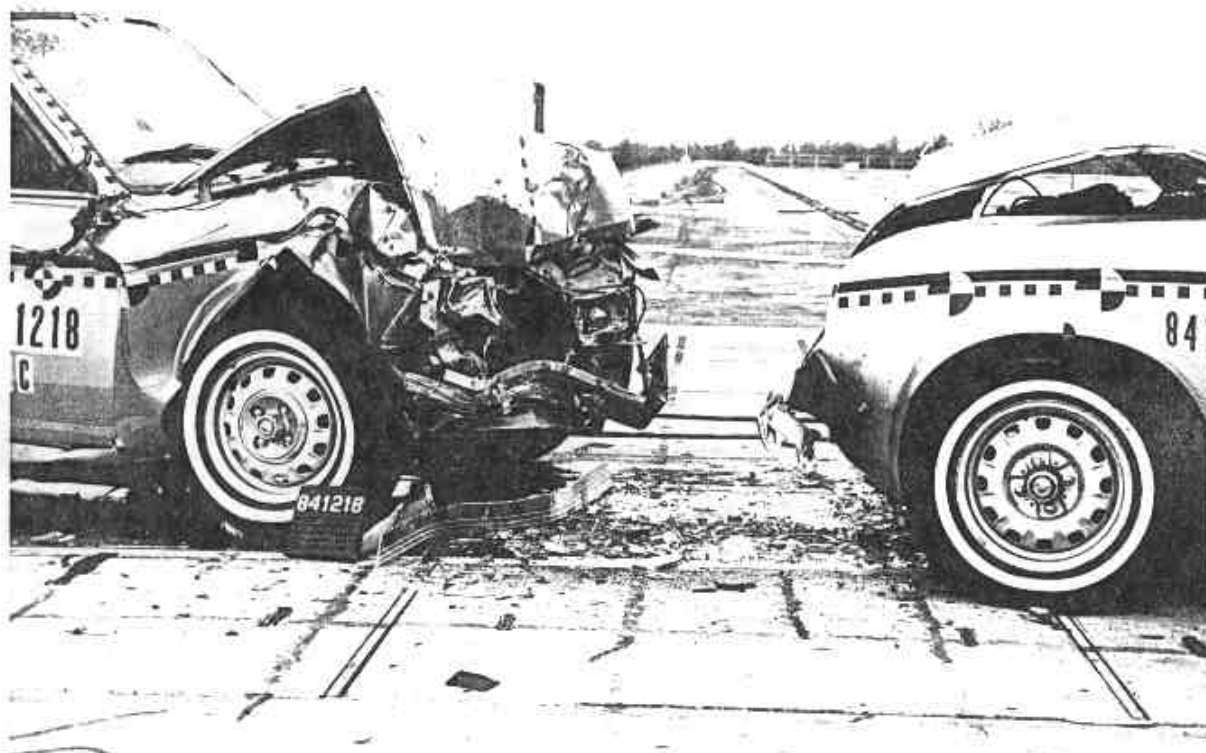


Figure A-7. POST-TEST GENERAL CLOSUP



Figure A-8. PRE-TEST SUBJECT VEHICLE REAR VIEW  
A-5

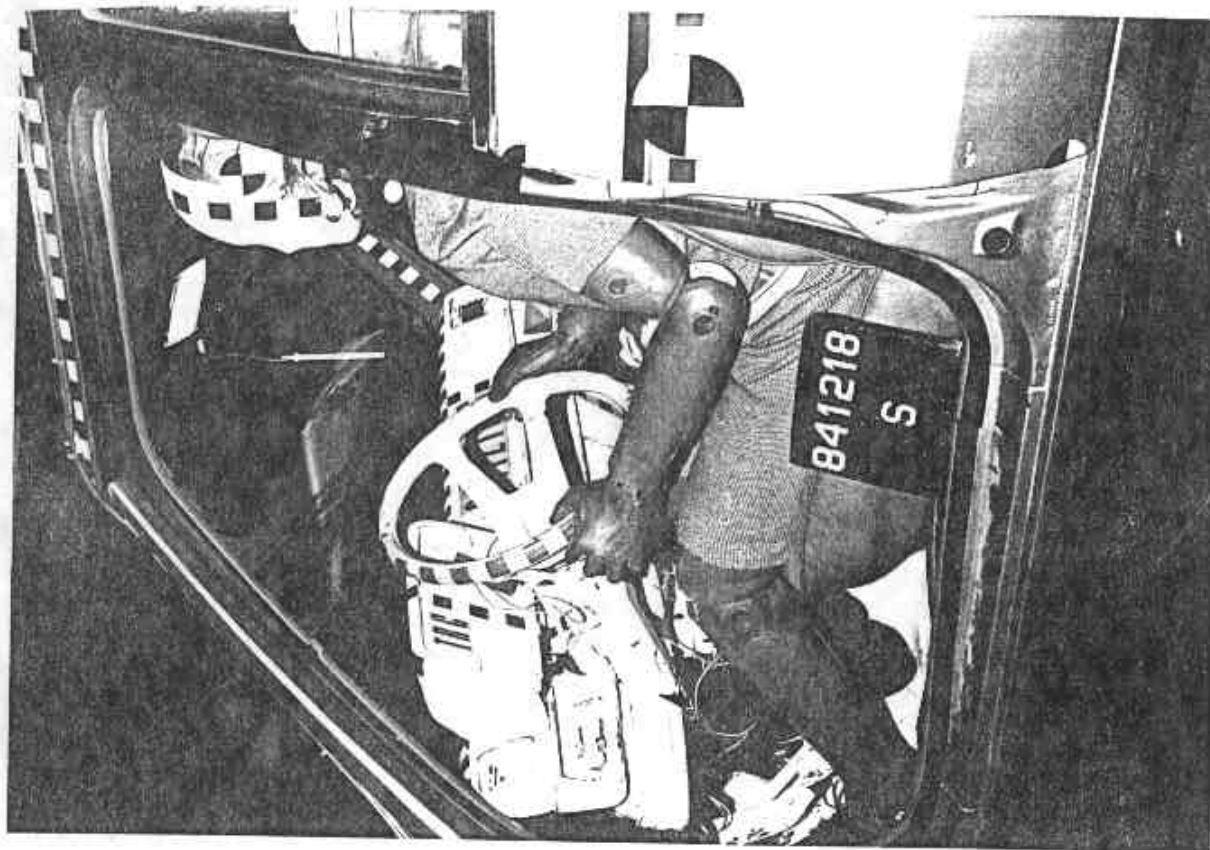


Figure A-9. PRE-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 1

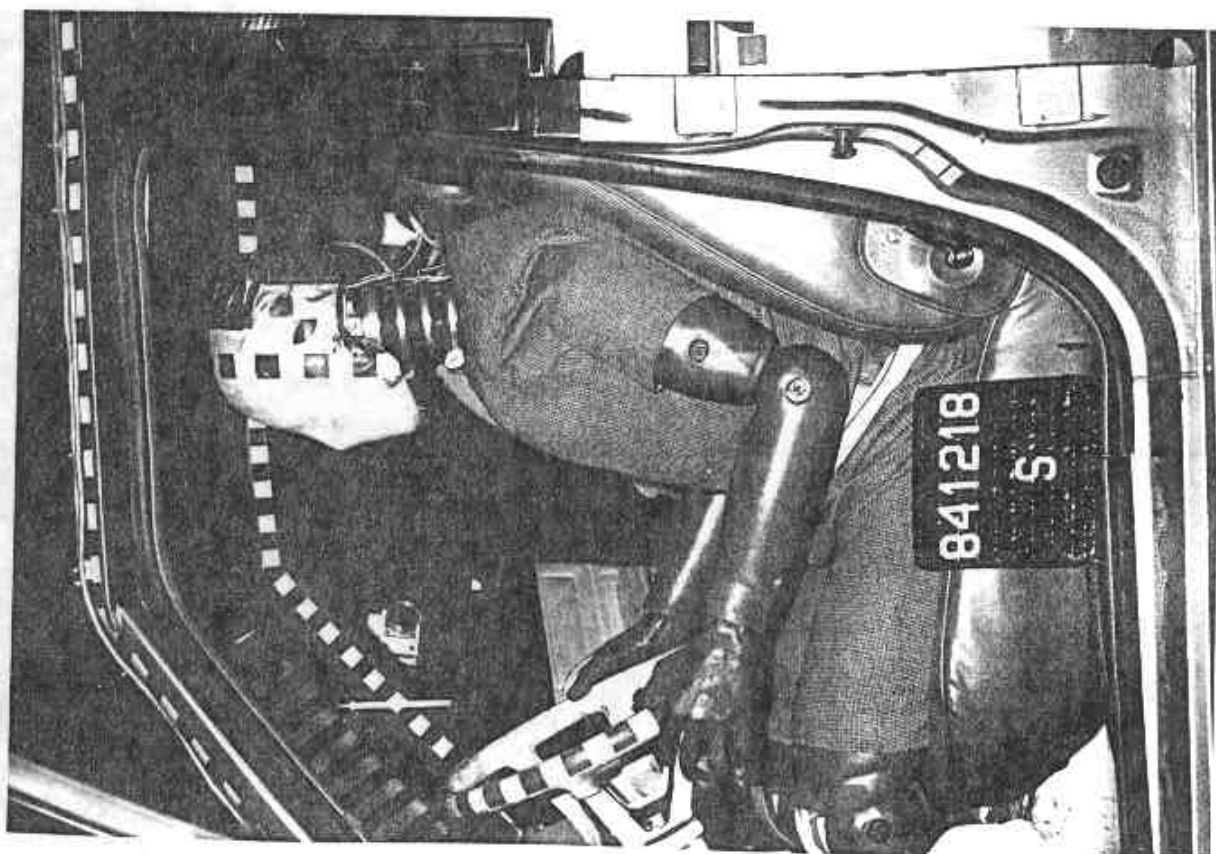


Figure A-10. PRE-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 2

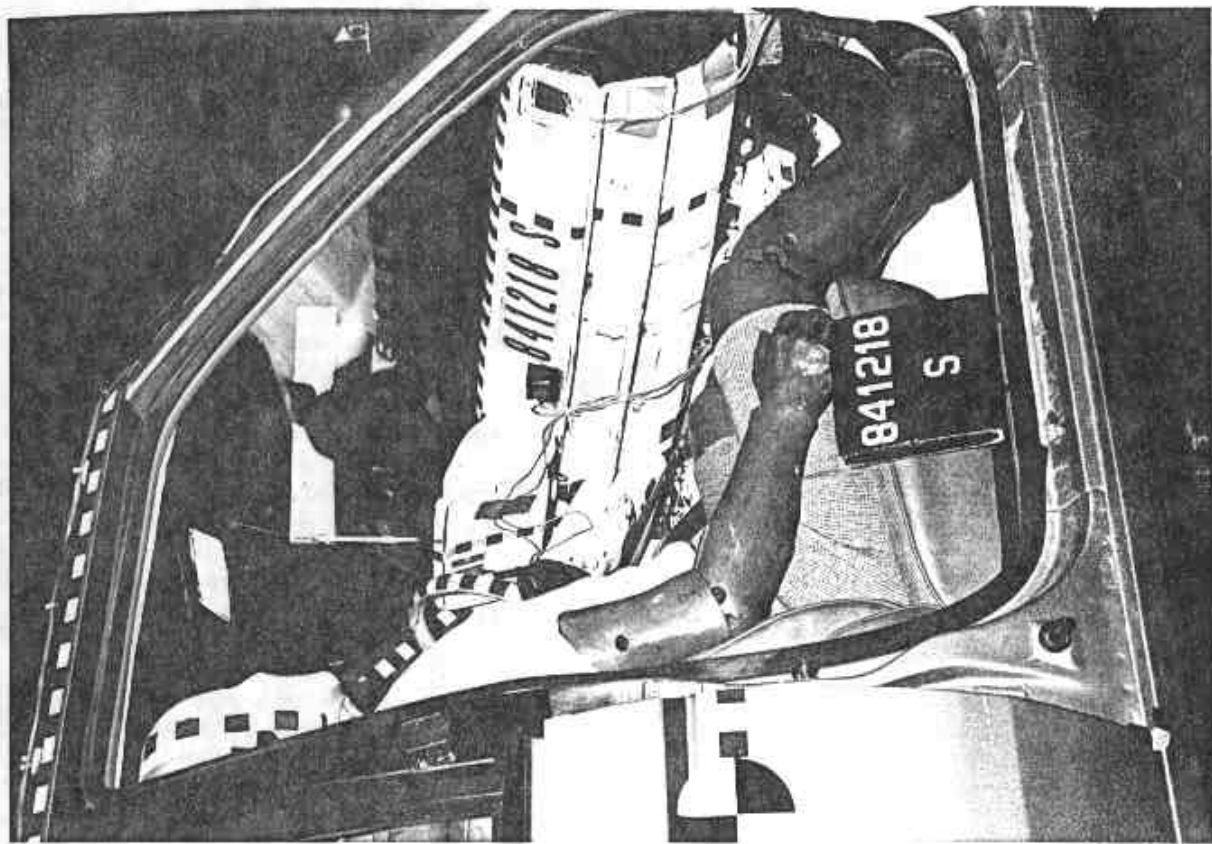


Figure A-11. PRE-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 1

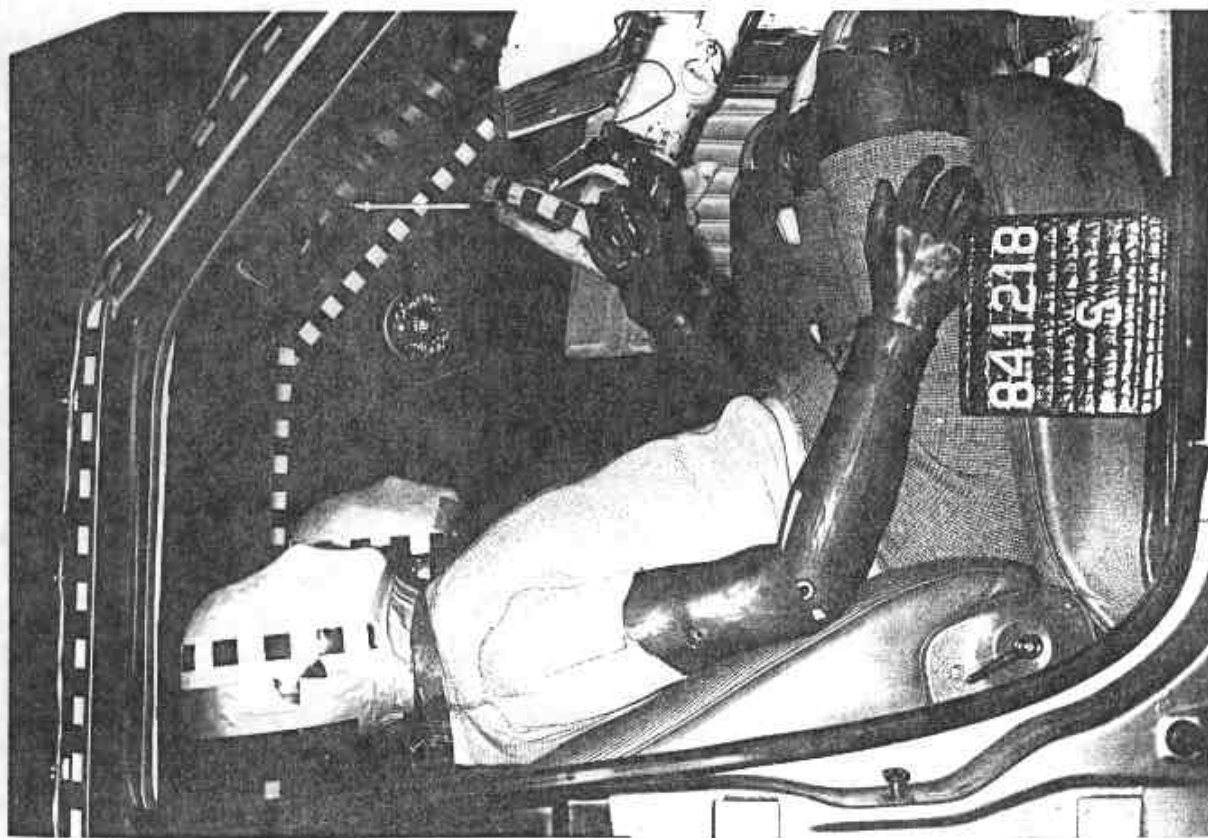


Figure A-12. PRE-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 2

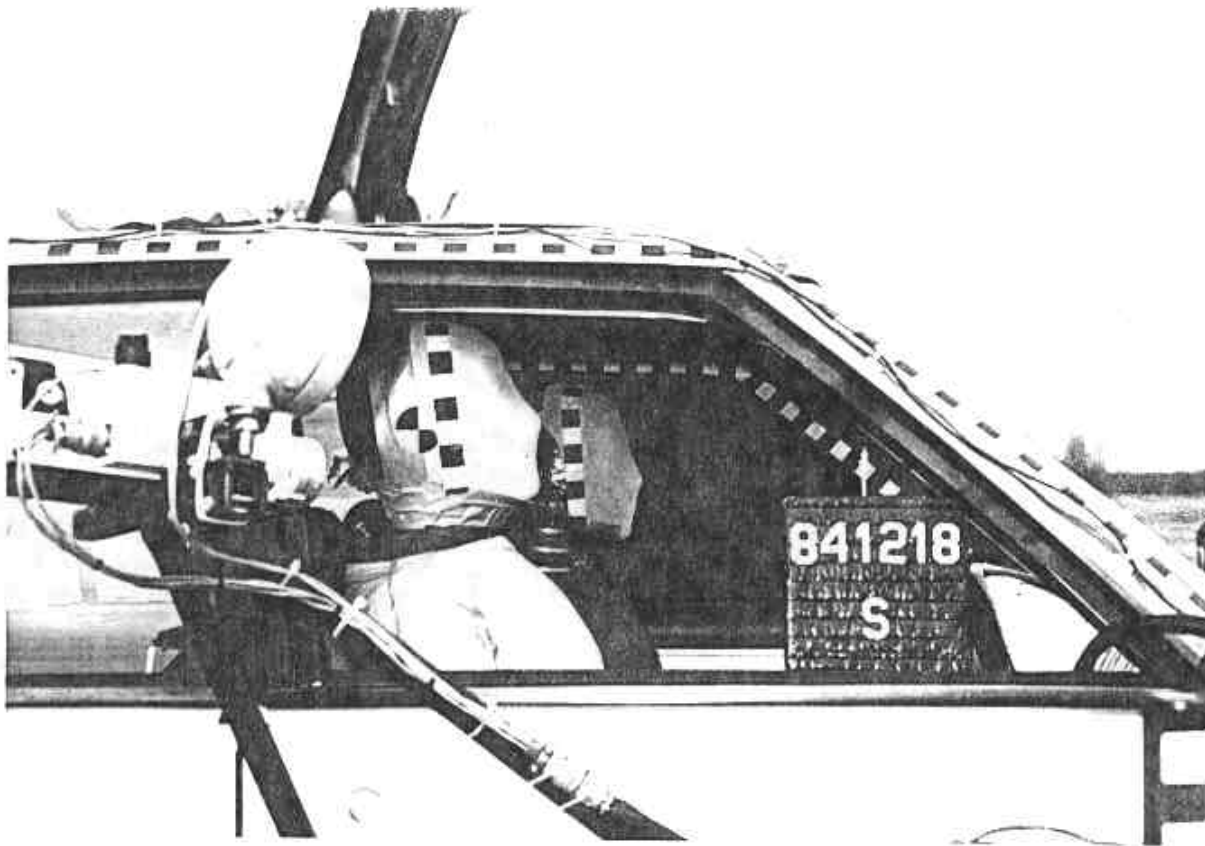


Figure A-13. PRE-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 3

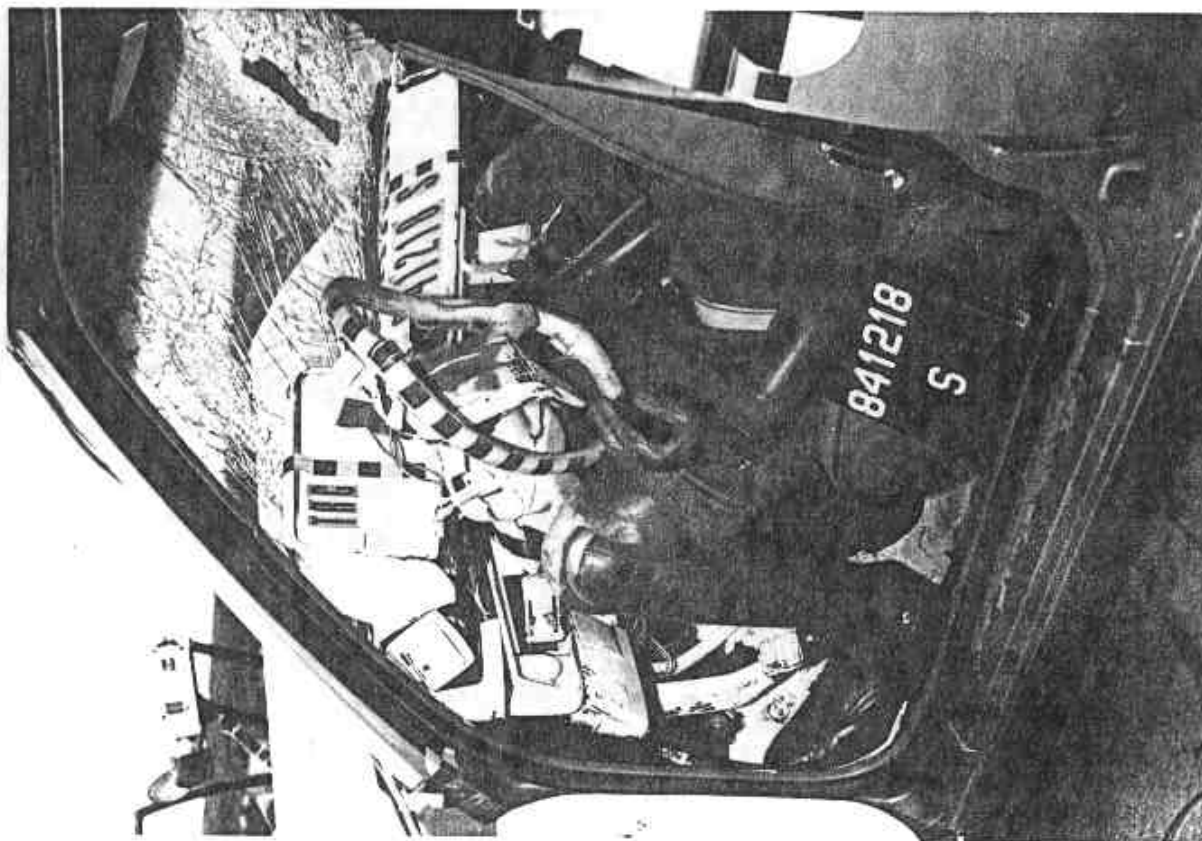


Figure A-14. POST-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 1

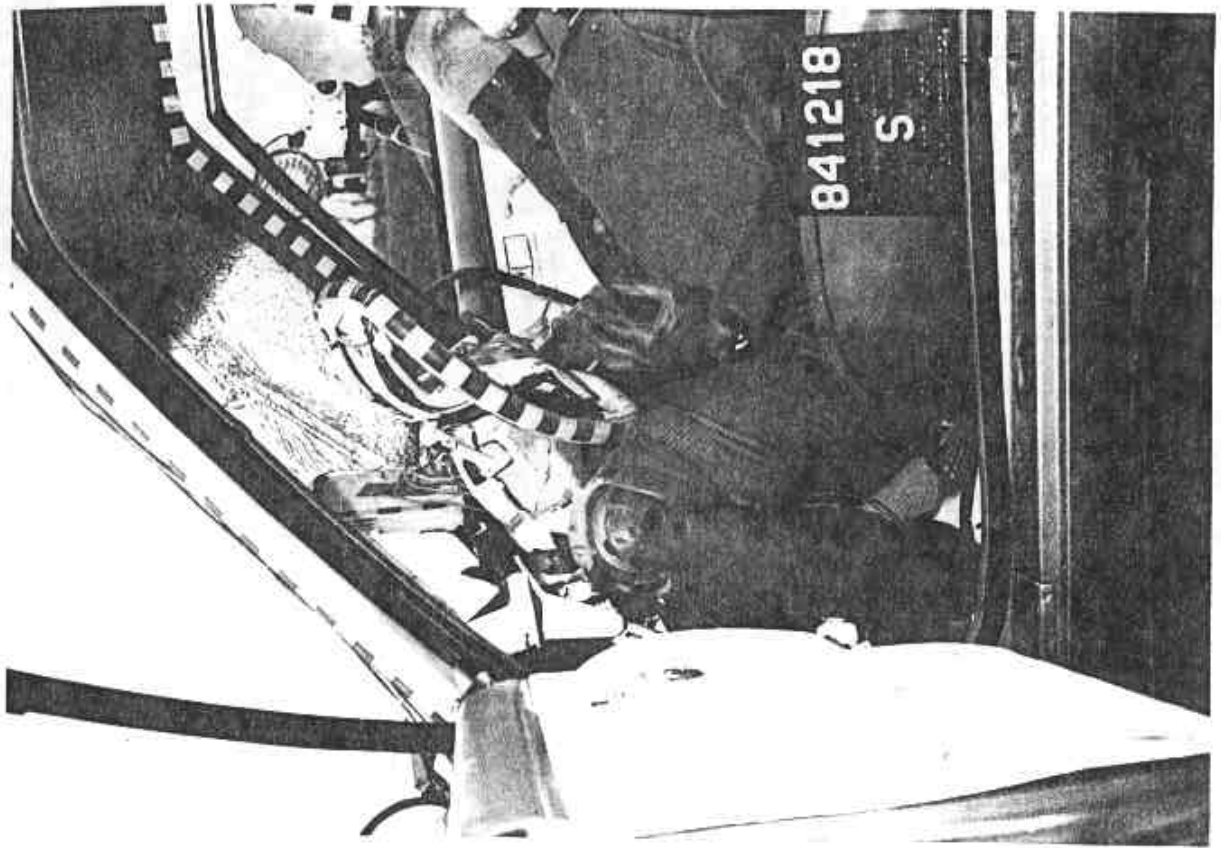


Figure A-15. POST-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 2



Figure A-16. POST-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 3



Figure A-17. POST-TEST SUBJECT VEHICLE DRIVER DUMMY - VIEW 4

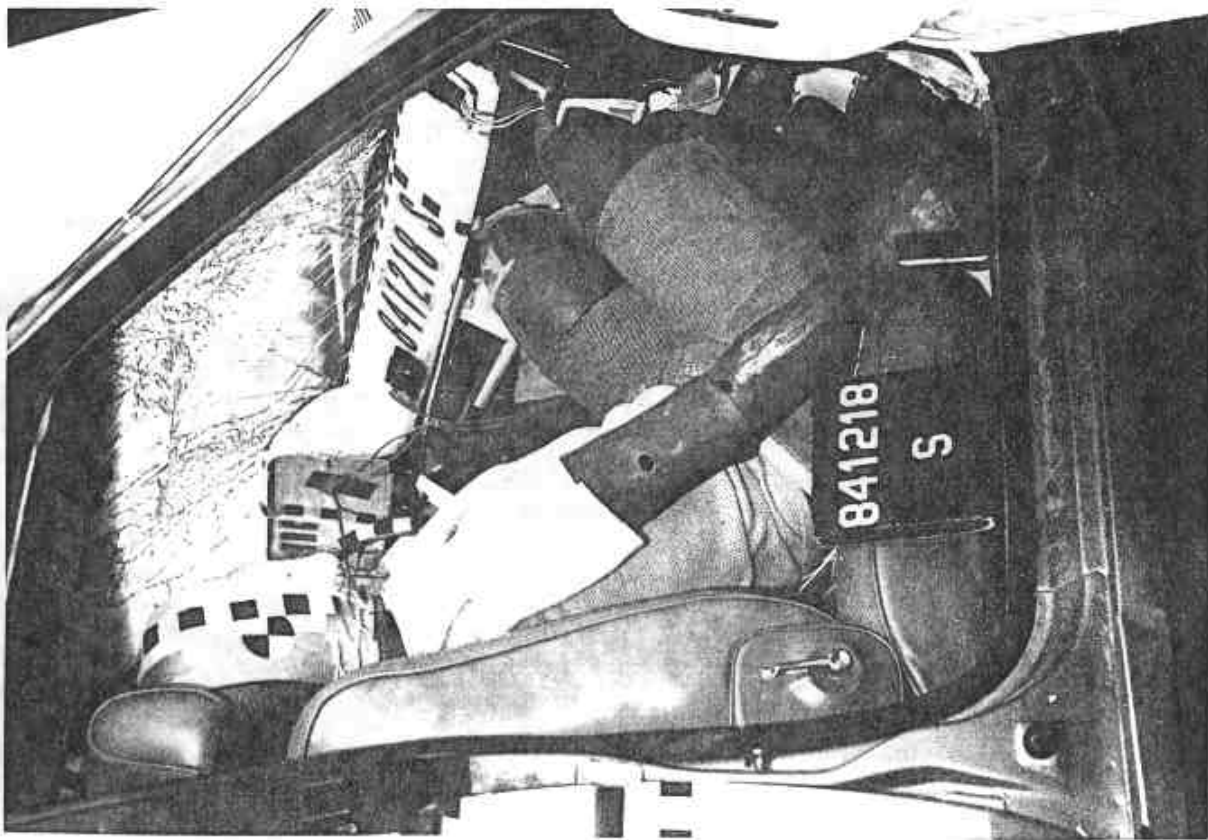


Figure A-18. POST-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 1

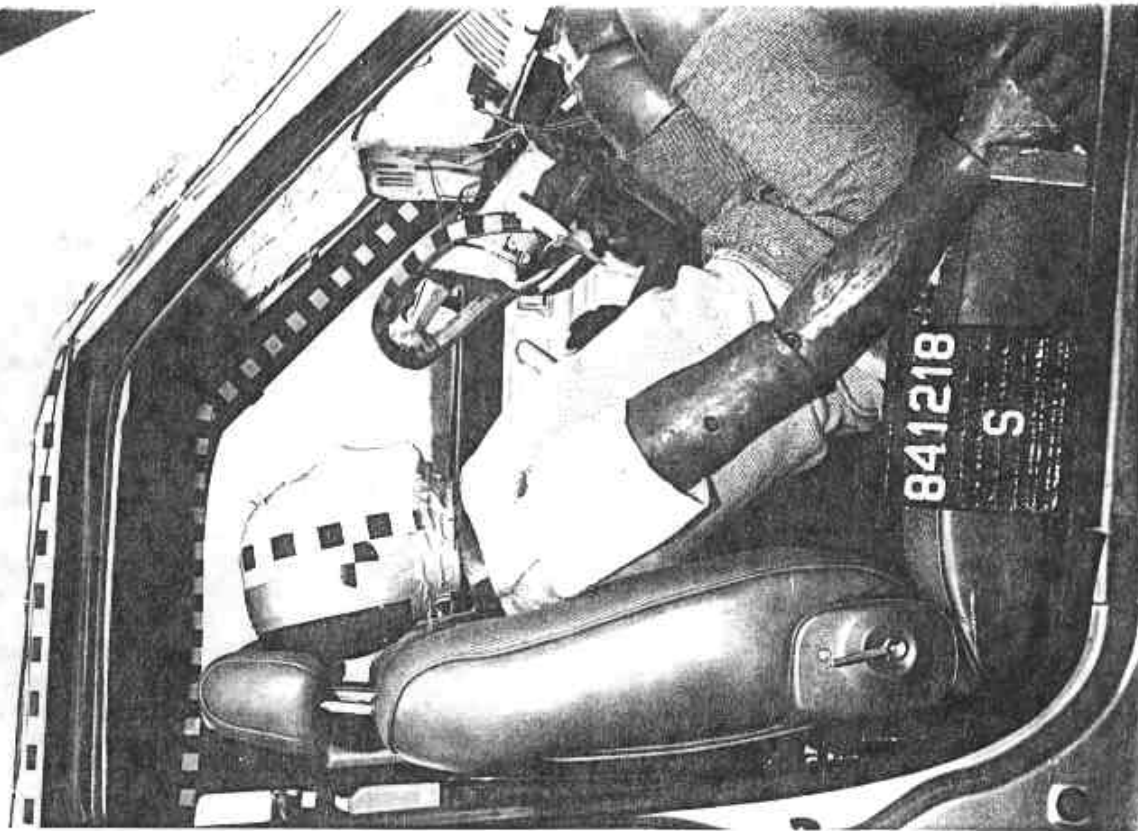


Figure A-19. POST-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 2



Figure A-20. POST-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 3

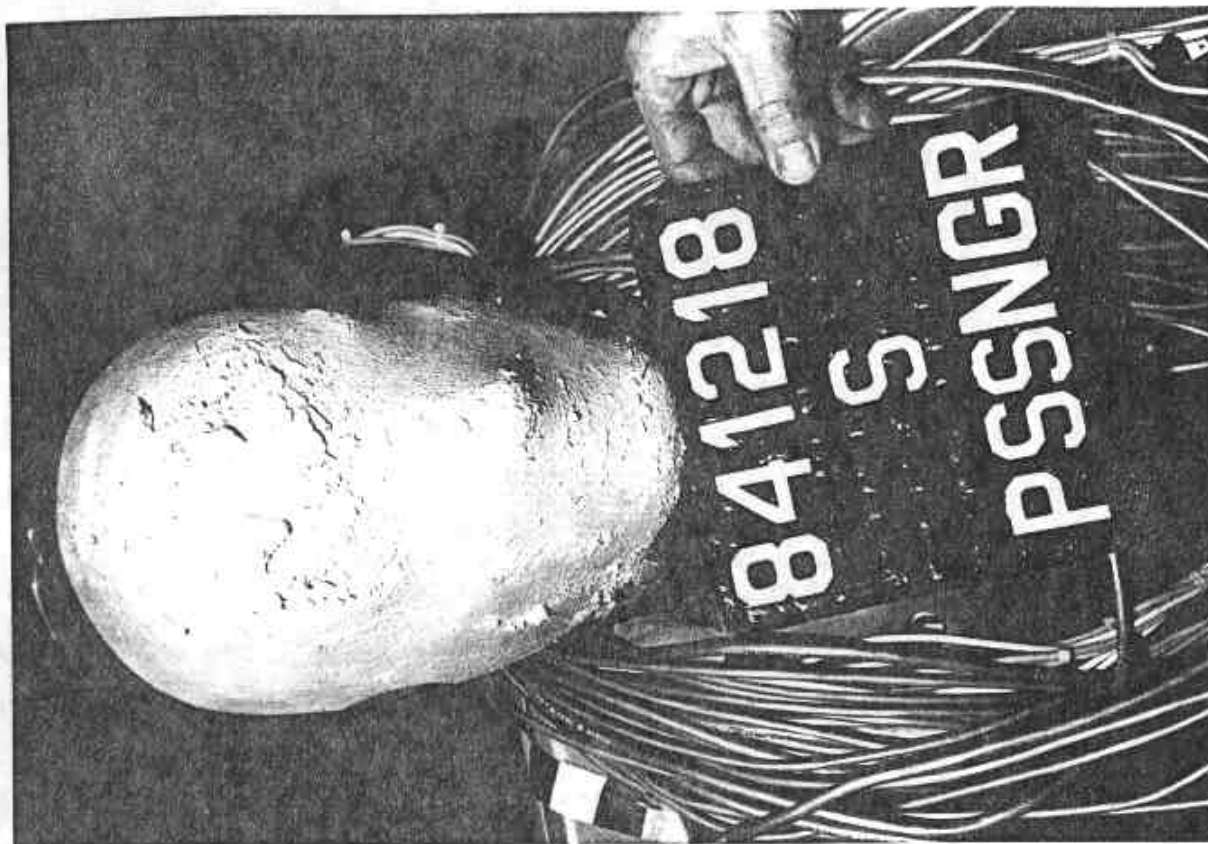


Figure A-21. POST-TEST SUBJECT VEHICLE PASSENGER DUMMY - VIEW 4

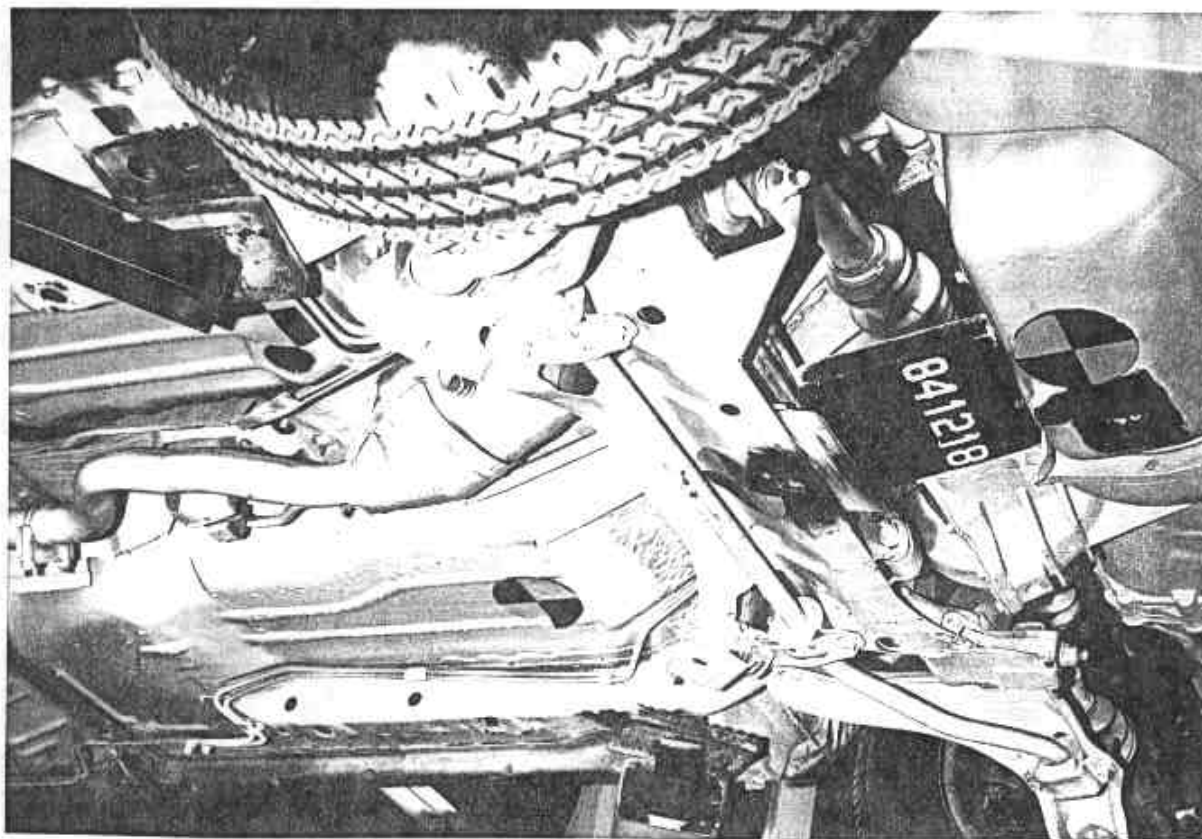


Figure A-22. PRE-TEST SUBJECT VEHICLE UNDERBODY VIEW  
A-12

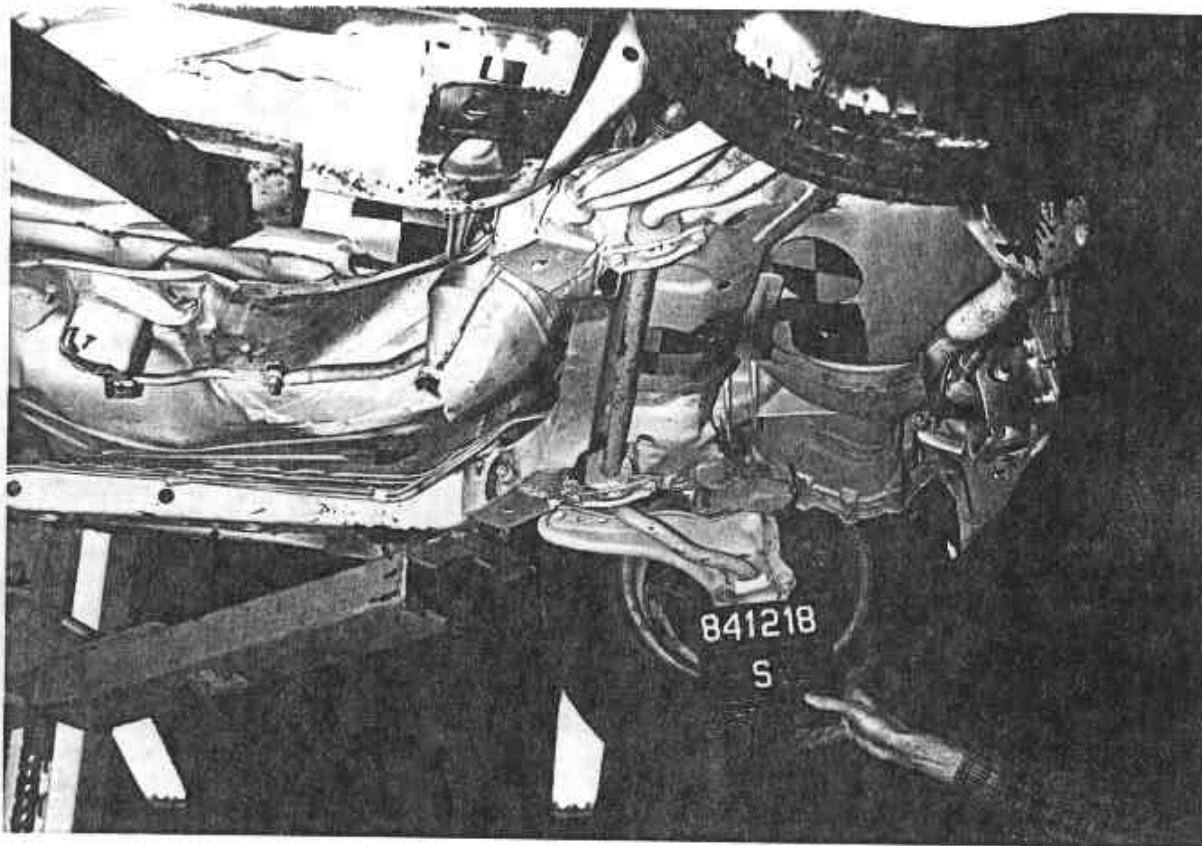


Figure A-23. POST-TEST SUBJECT VEHICLE UNDERBODY VIEW



Figure A-24. PRE-TEST PARTNER VEHICLE REAR VIEW  
A-13

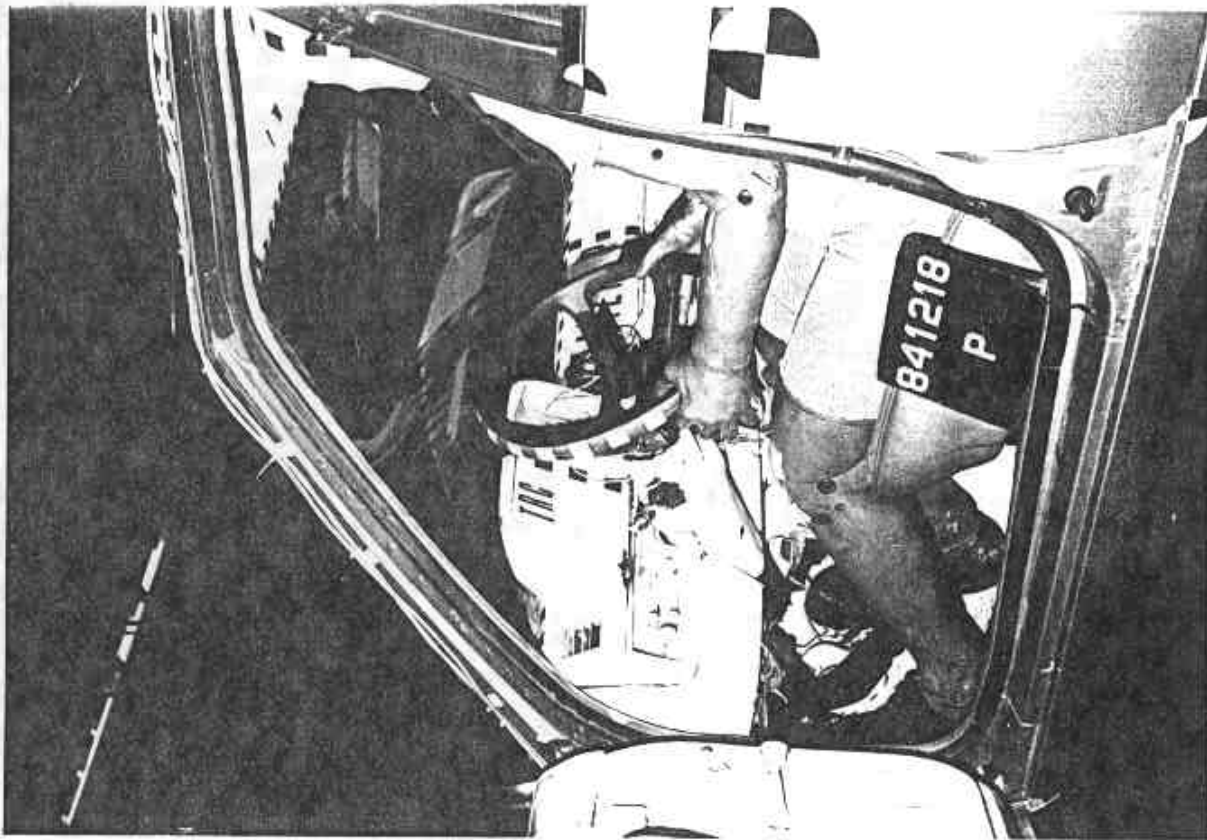


Figure A-25. PRE-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 1

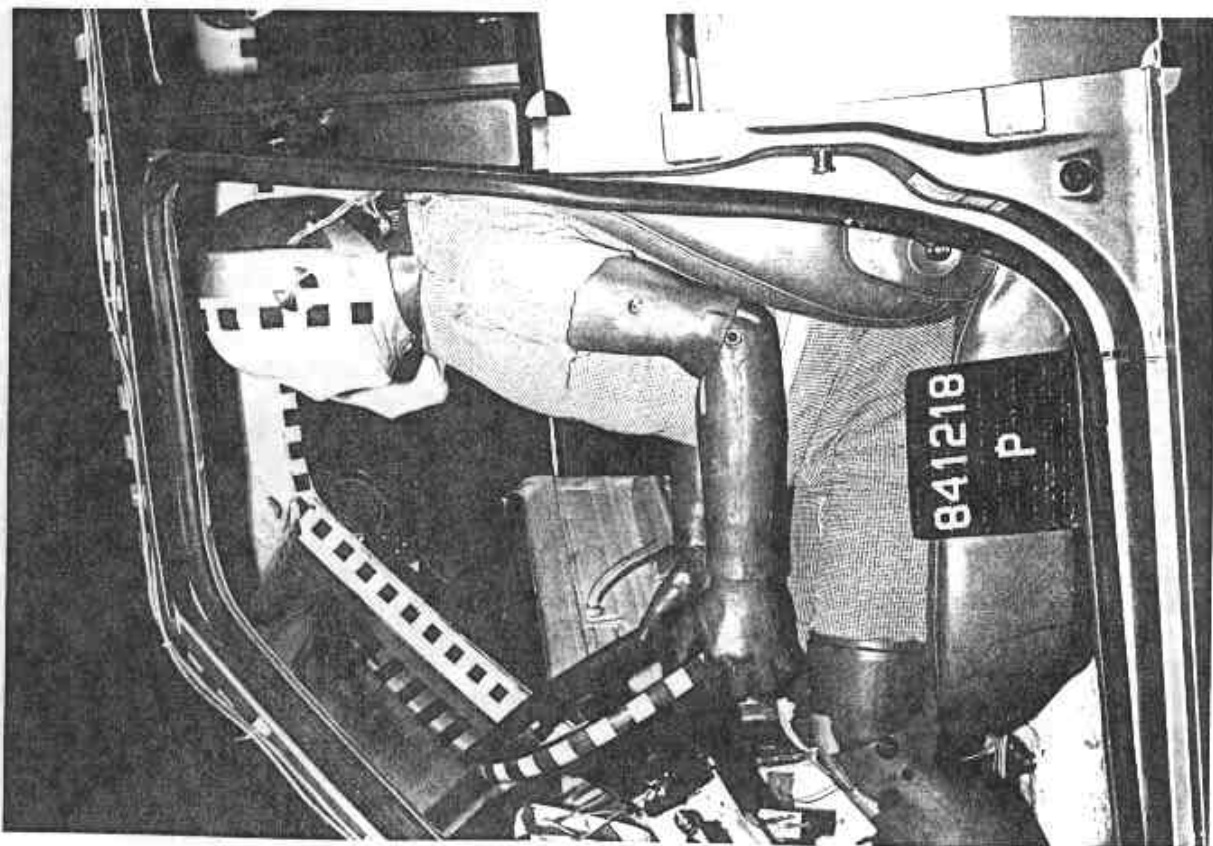


Figure A-26. PRE-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 2



Figure A-27. PRE-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 3



Figure A-28. PRE-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 1

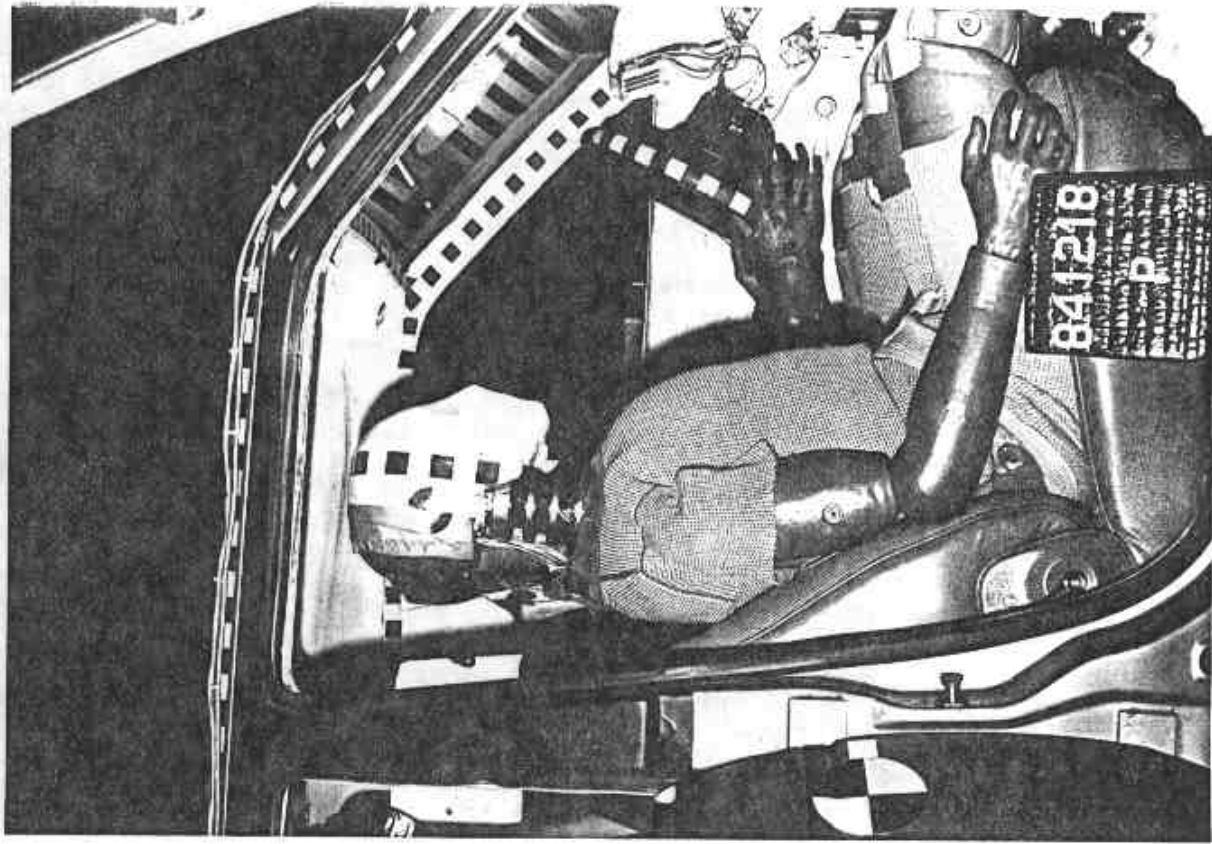


Figure A-29. PRE-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 2



Figure A-30. POST-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 1

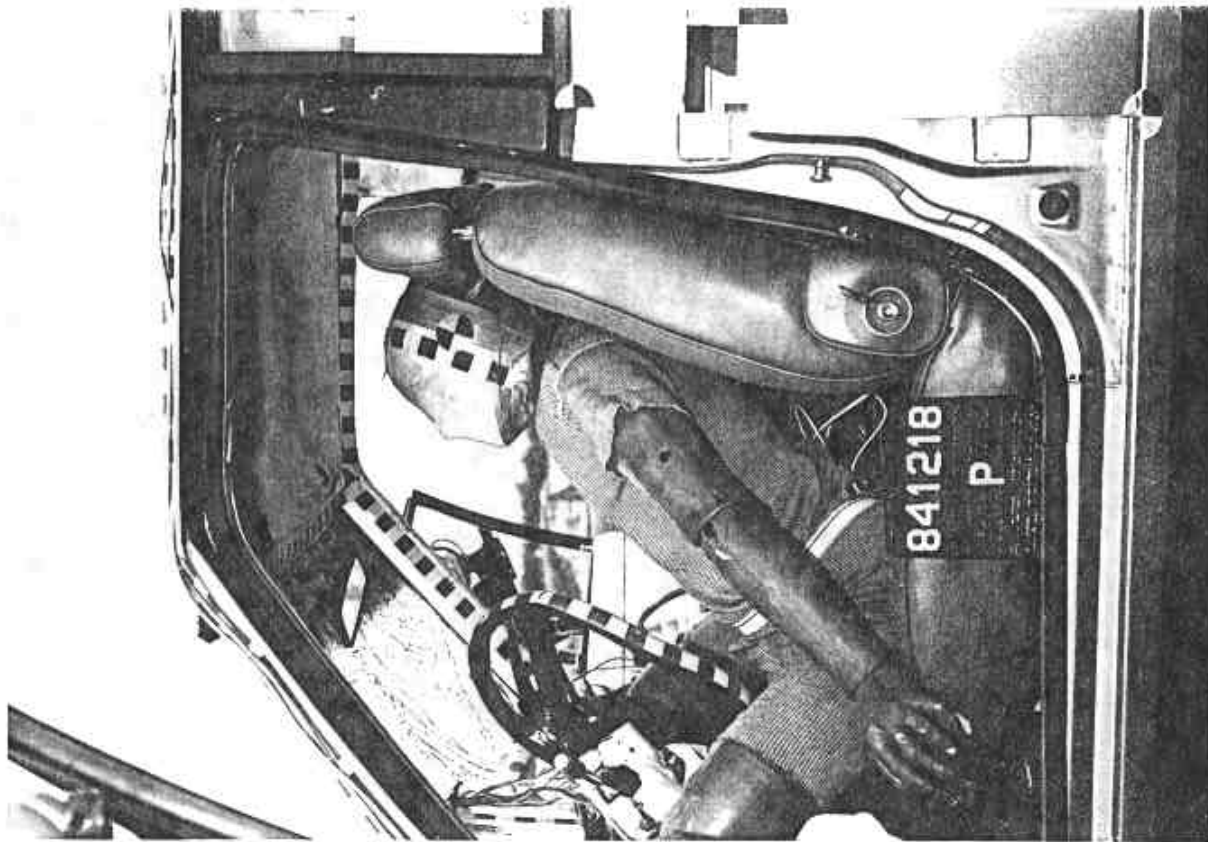


Figure A-31. POST-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 2



Figure A-32. POST-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 3

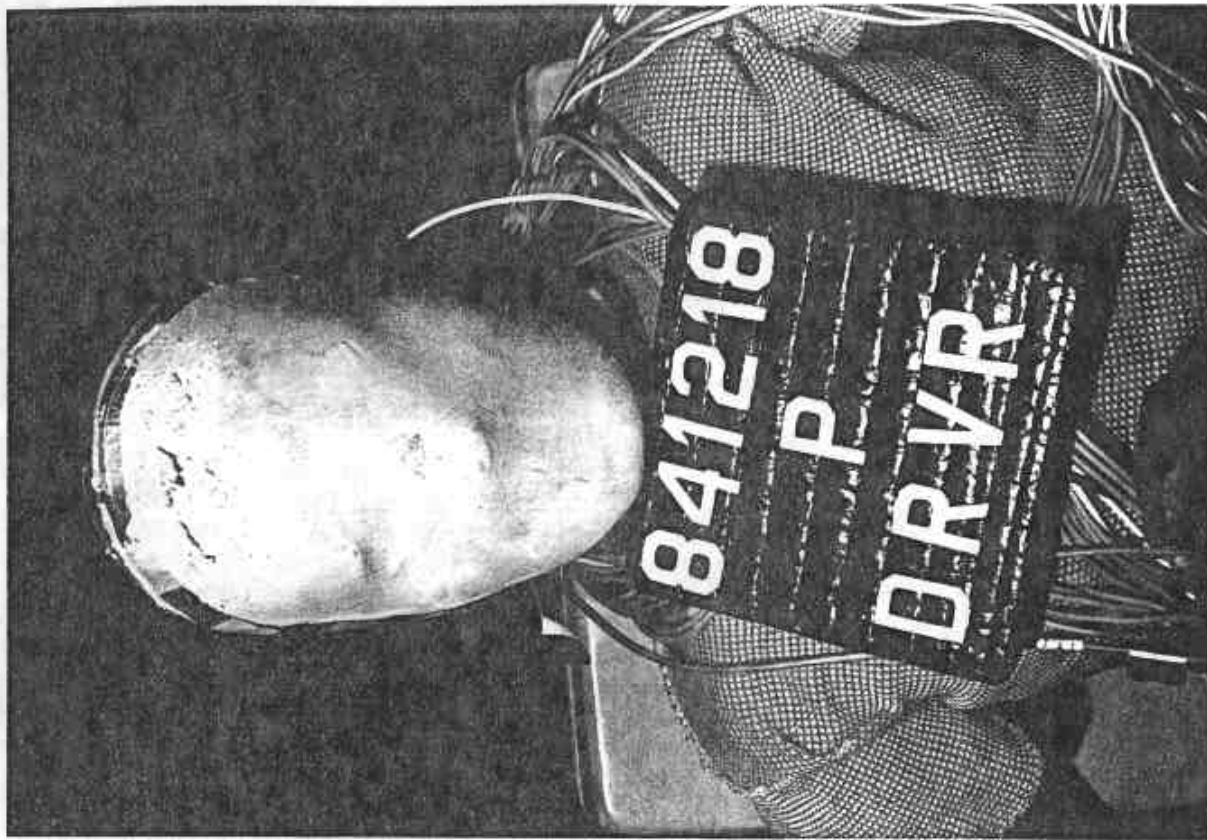


Figure A-33. POST-TEST PARTNER VEHICLE DRIVER DUMMY - VIEW 4



Figure A-34. POST-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 1

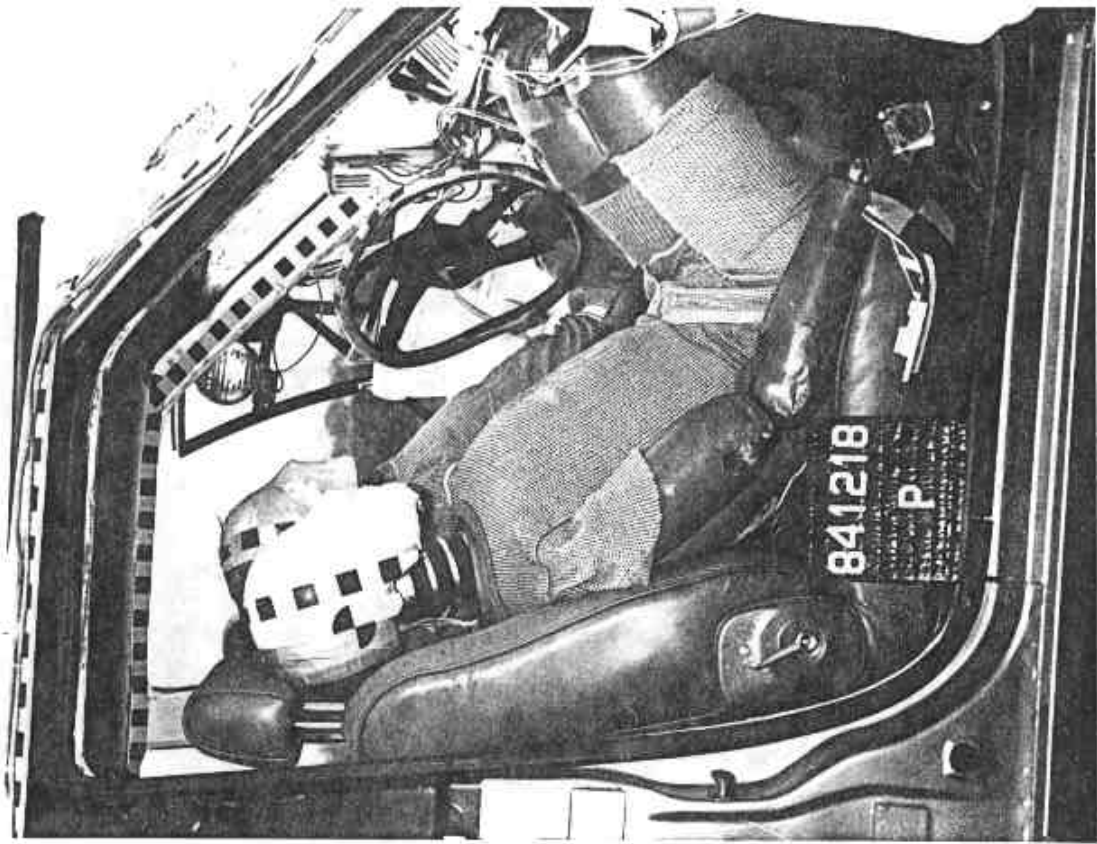


Figure A-35. POST-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 2



Figure A-36. POST-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 3

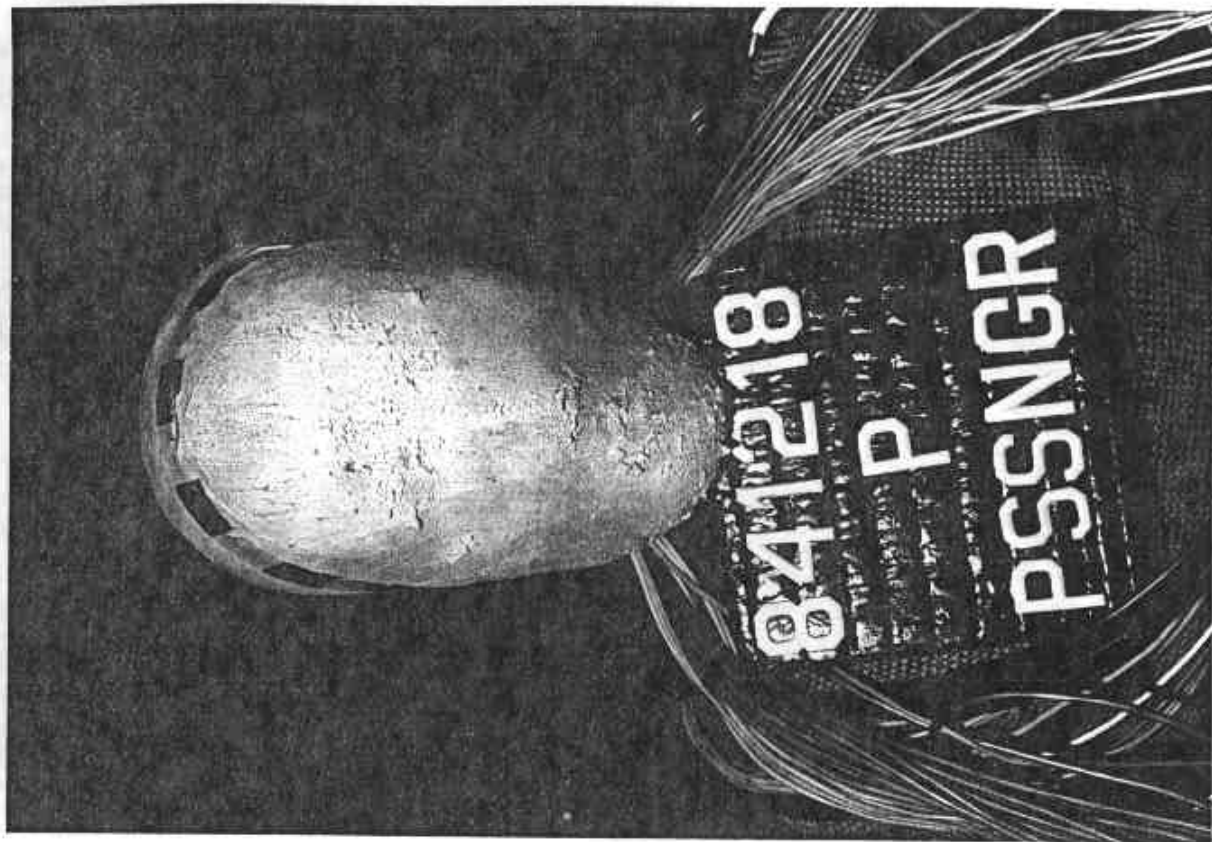


Figure A-37. POST-TEST PARTNER VEHICLE PASSENGER DUMMY - VIEW 4

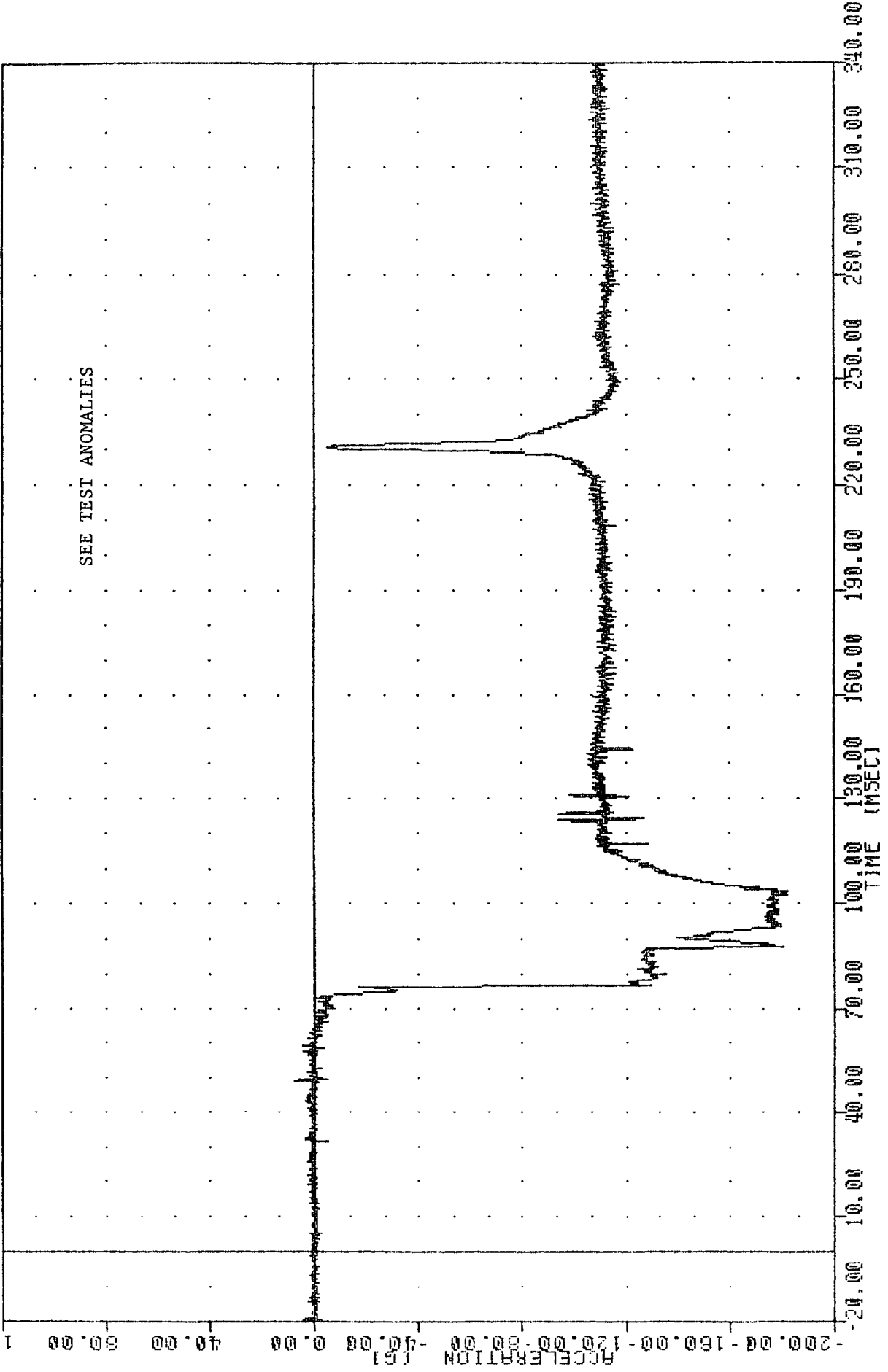
APPENDIX B  
DATA PLOT PRESENTATION

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. The data was filtered according to SAE J211.

---

SUBJECT VEHICLE DATA PLOTS

IDL TO [REDACTED] 0412103 FLUT UNIT 20 JUN 03 10:10:02 [REDACTED]  
 84353000000 FILTER = ALPF 1650/ 5217/ -40 [REDACTED]  
 HEDXG1 MIN, MAX VALUES = -182.09 103.63, 8.03 e 49.25 [REDACTED]

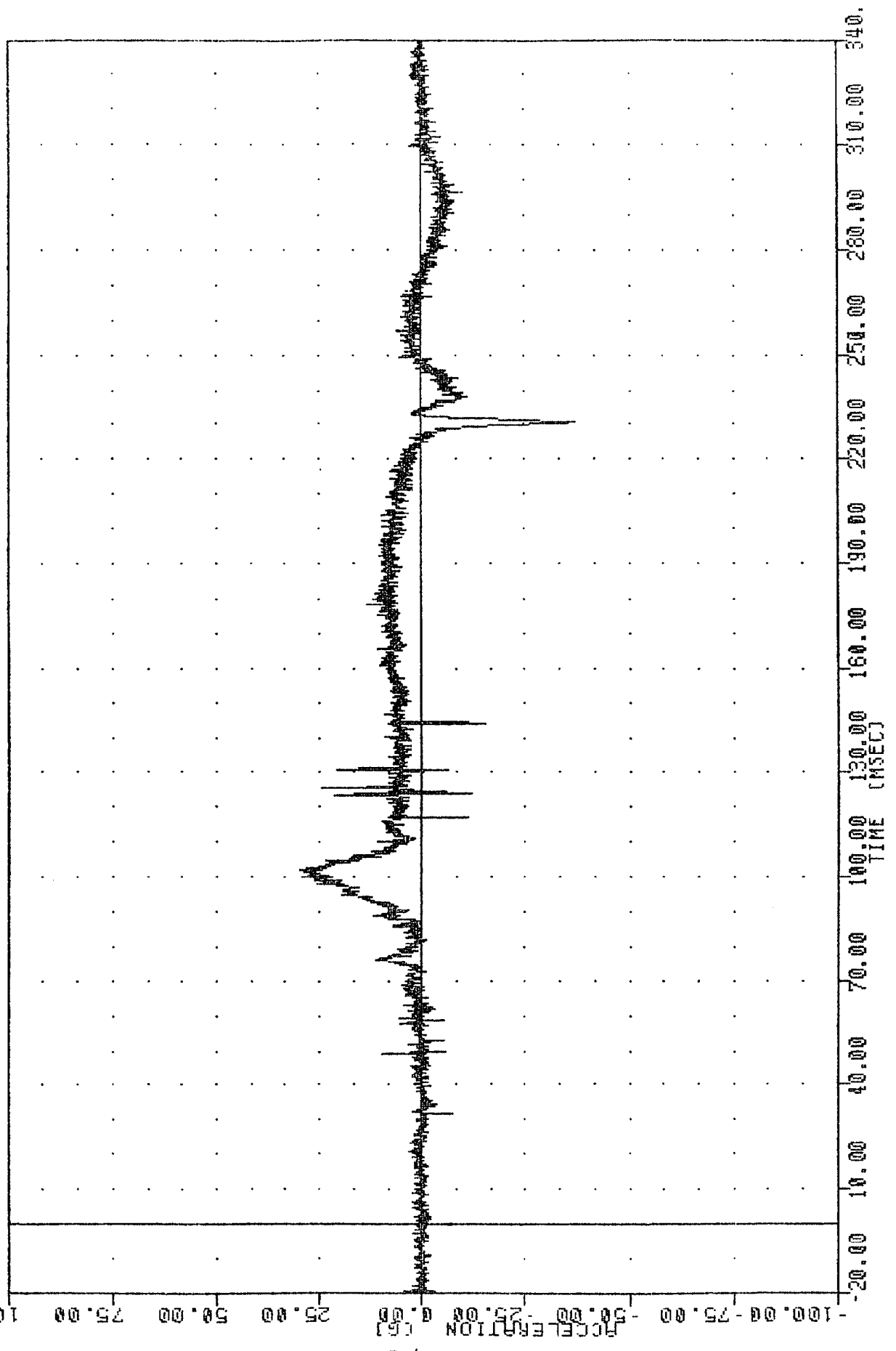


DRIVER HEAD ACCELERATION X AXIS

TRC  
84353000000  
HEDY61  
CAR TO CAR FRONTAL IMPACT

PLOT DATE 15-JAN-85 13:52:28

FILTER = ALPF 1650/ 5217/ -40  
MIN. MAX VALUES = -37.05g 230.50g 30.08g 102.25g



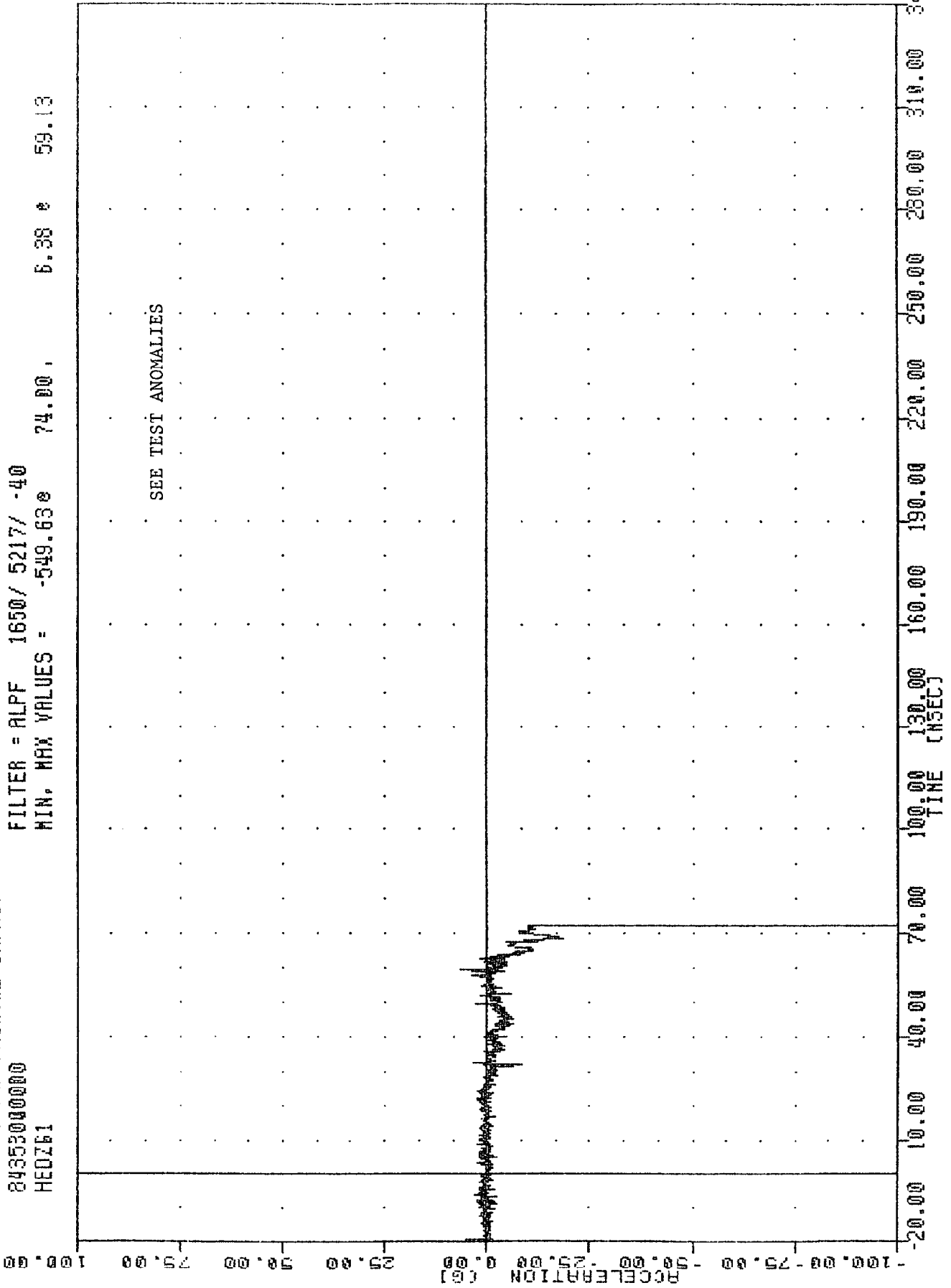
B-4

DRIVER HEAD ACCELERATION Y AXIS

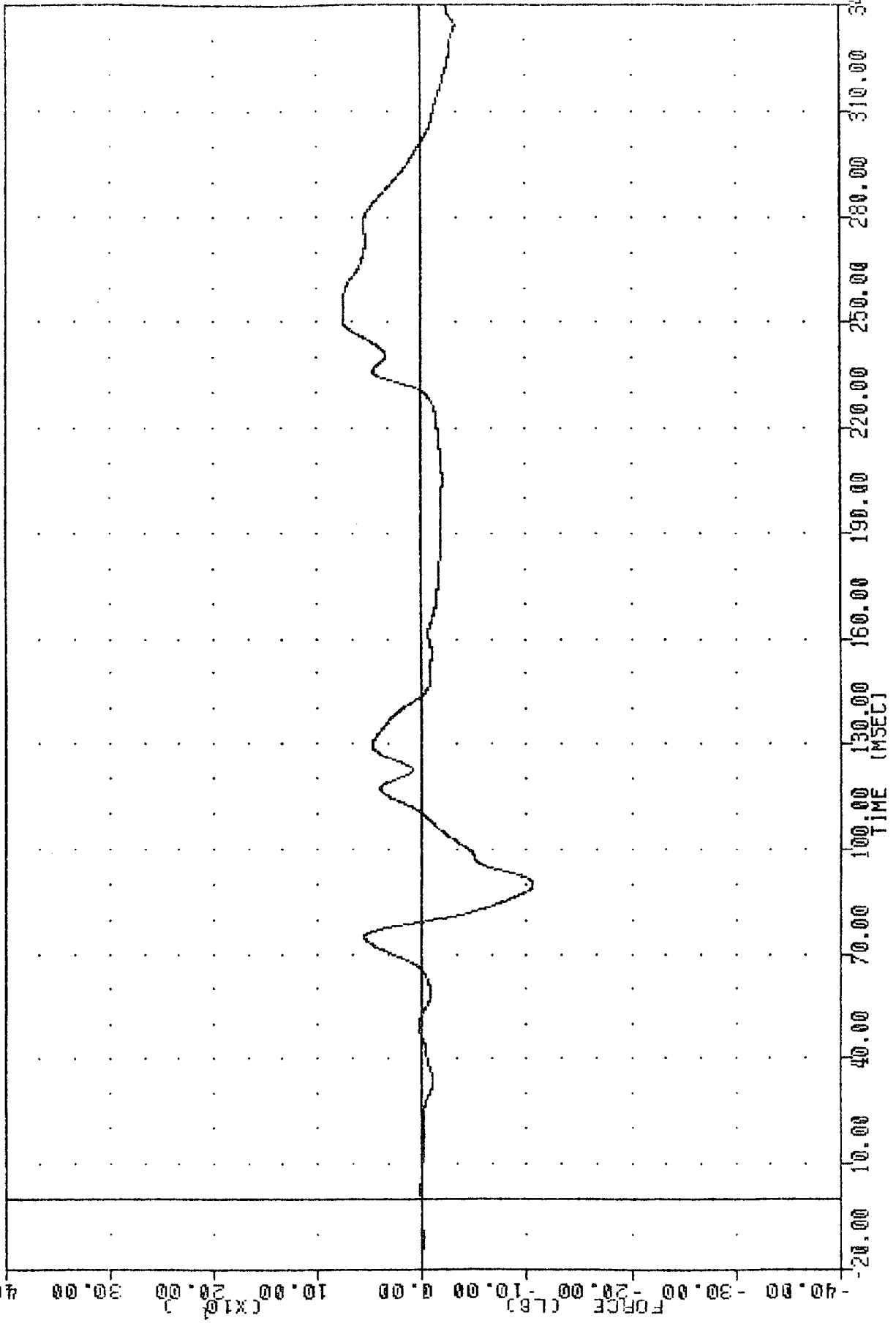
TAC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEAD161

PLOT DATE 15-JAN-85 13:52:26

FILTER = ALPF 1650 / 5217 / -40  
MIN. MAX VALUES = -549.63 74.00, 5.38 59.13

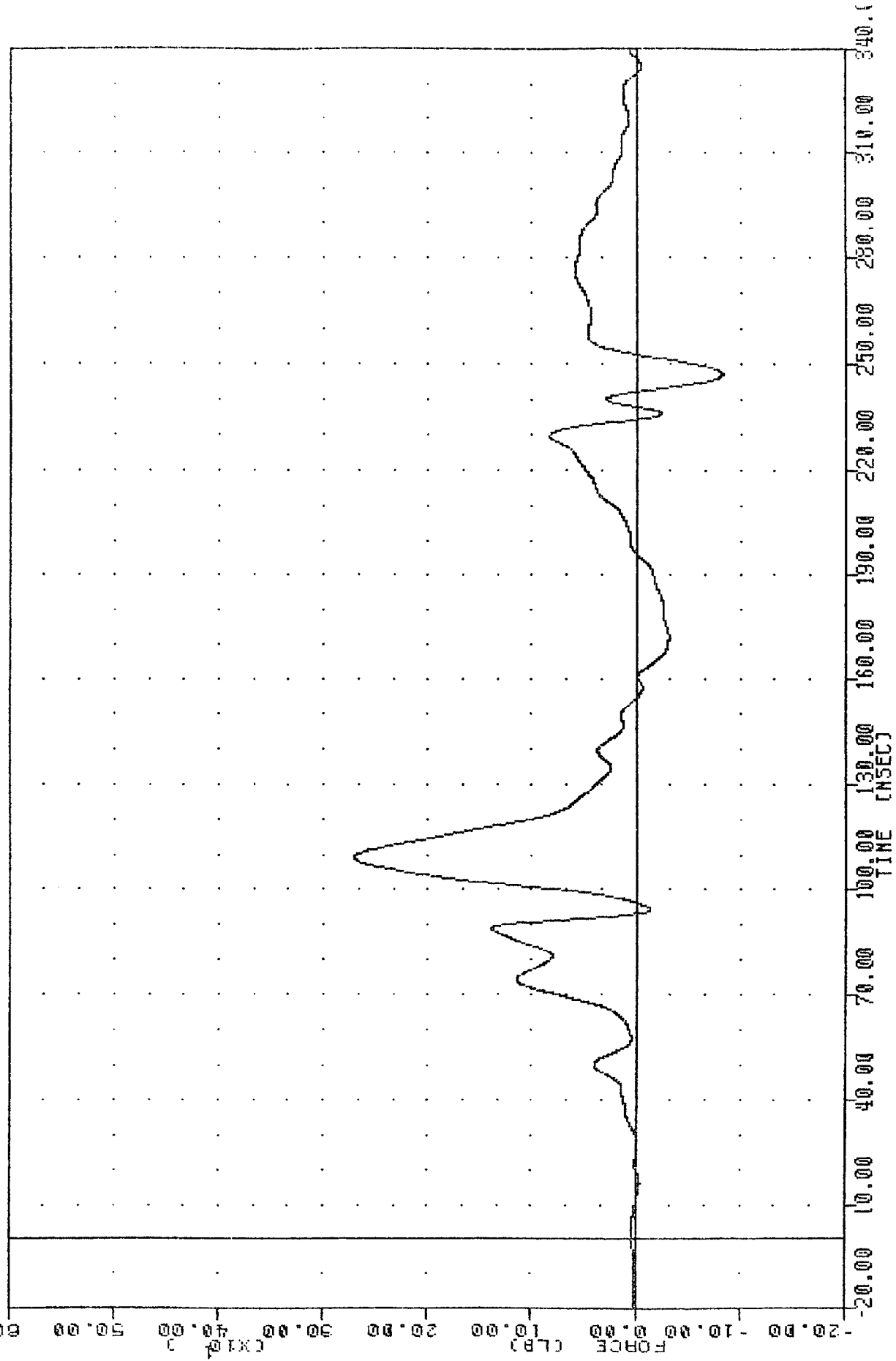


TRC 8412183  
 CAR TO CAR FRONTAL IMPACT  
 843530000000  
 NEKXF1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -106.54 89.88, 75.77 e 251.63  
 PLOT DATE 13-JAN-83 13:52:26



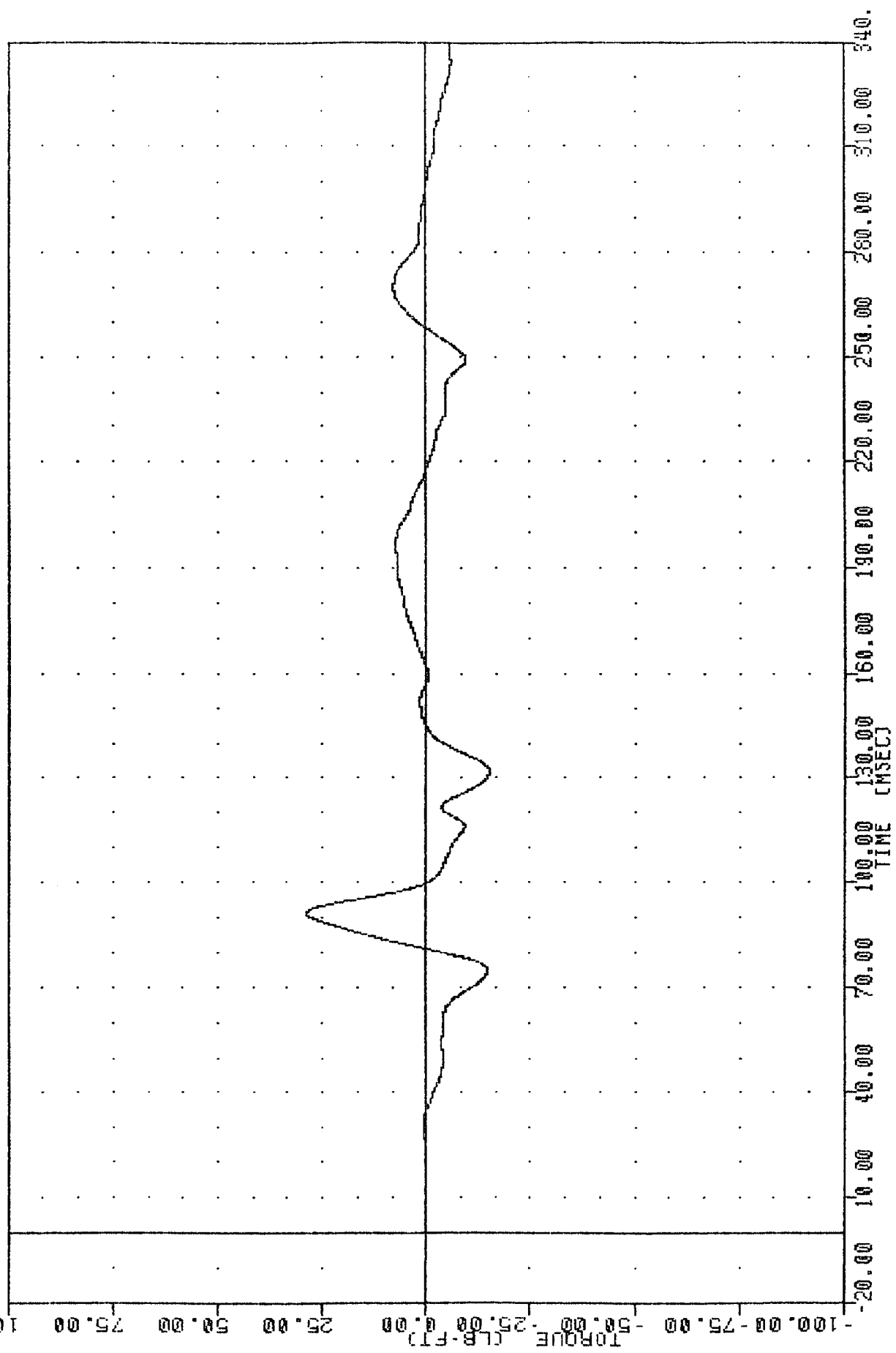
DRIVER NECK FORCE X AXIS LBS (SHEAR)

TAC 8412185  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 NEKZF1  
 PUT DATE 15-JAN-85 13:52:25  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -83.49e 247.00, 271.16 e 109.00



DRIVER NECK FORCE Z AXIS LBS (AXIAL)

TRC ██████████, 8412185 ██████████ PLOT DATE 15-JAN-85 13:52:26 ██████████  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 MEKYM1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -15.13e 131.63. 26.73 e 91.13

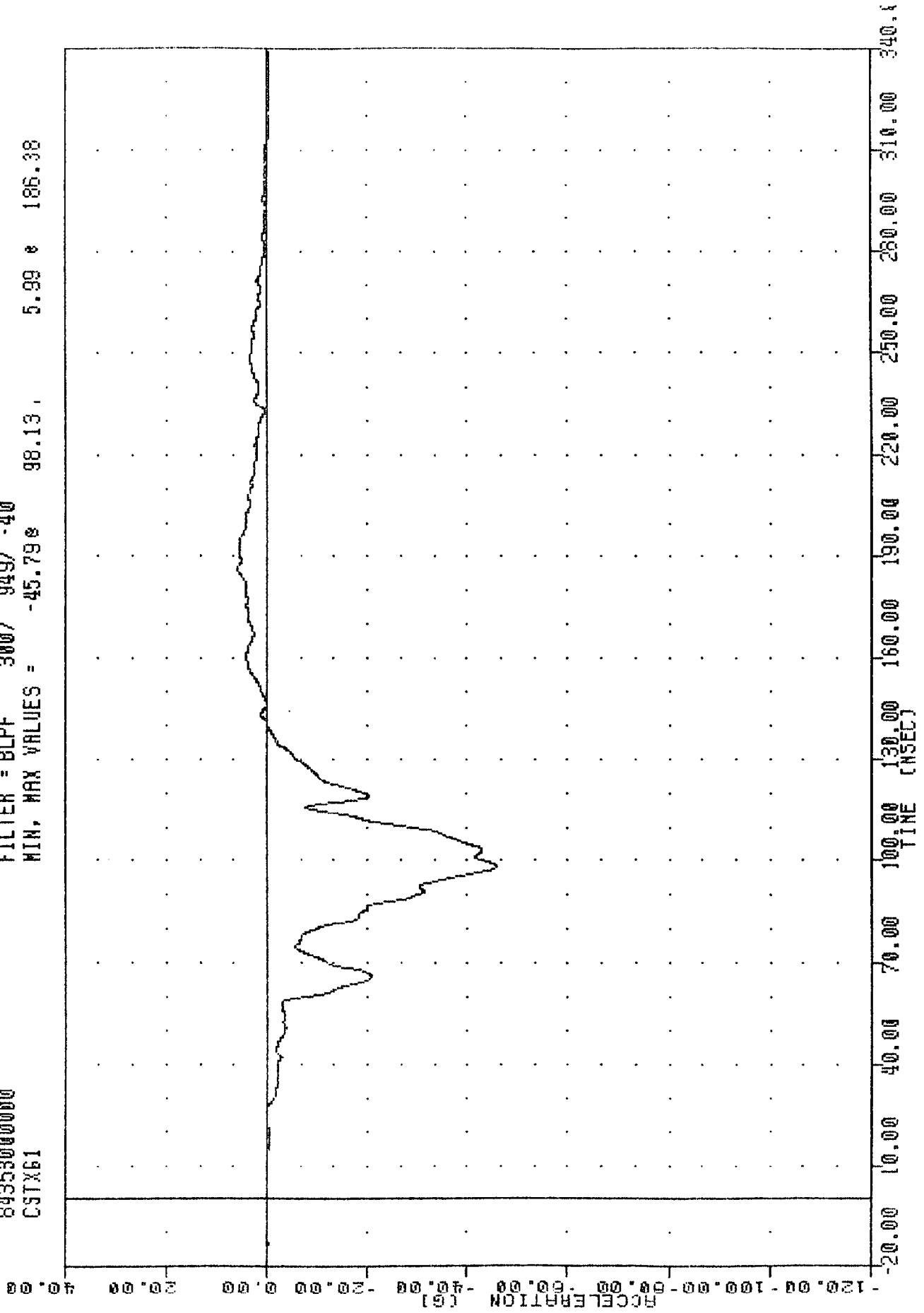


DRIVER NECK MOMENT Y AXIS FT-LBS

TAC  
8412185  
CAR TO CAR FRONTAL IMPACT  
8435300000  
CSTX61

PLOT DATE 15-JAN-85 13:52:26

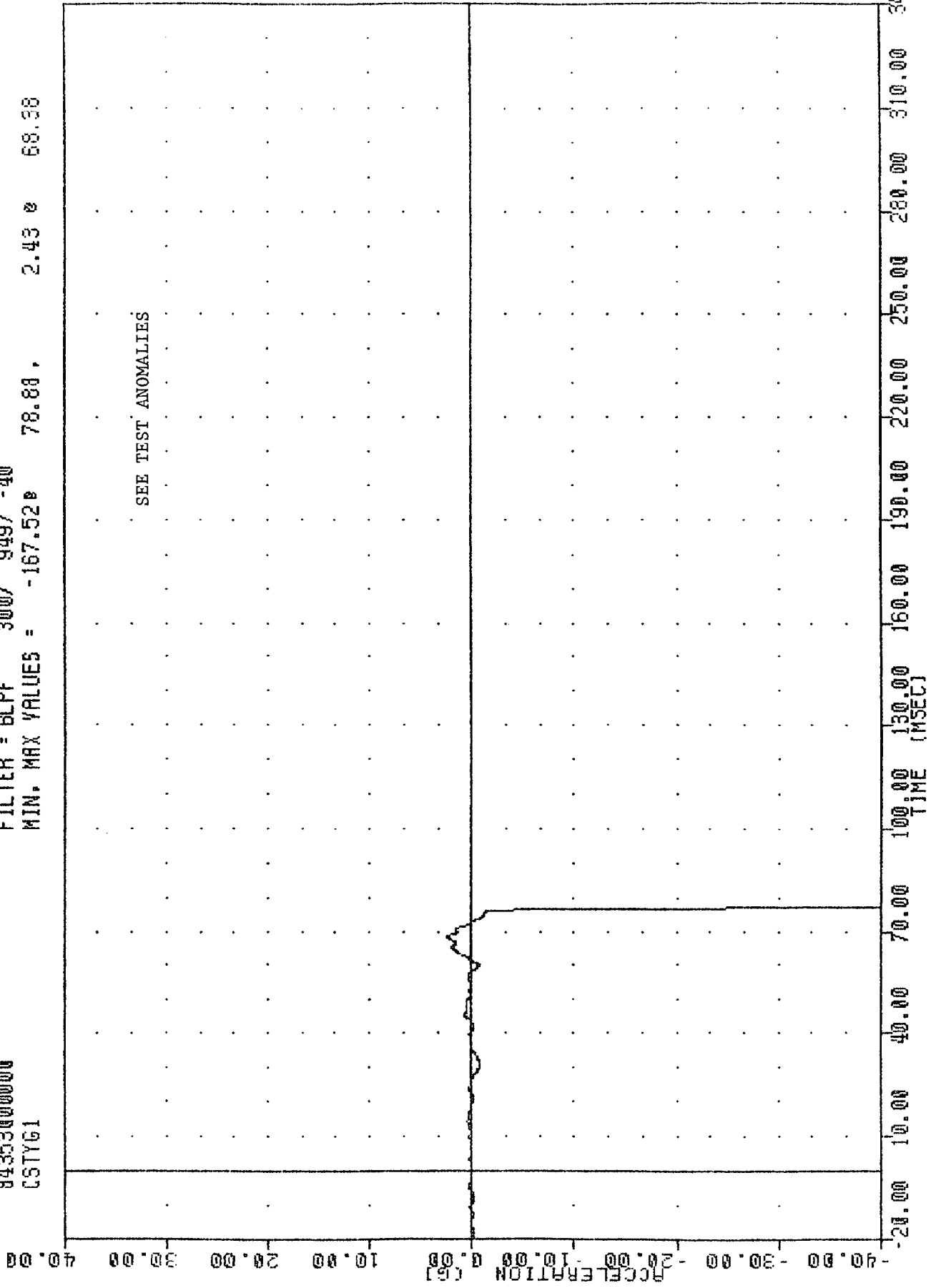
FILTER = BLPF 300/ 949/ -40  
MIN, MAX VALUES = -45.79 98.13, 5.99 186.38



TRC  
84353000000  
CAR TO CAR FRONTAL IMPACT  
841218S  
CSTYGI

PLOT DATE 15-JAN-85 13:52:26

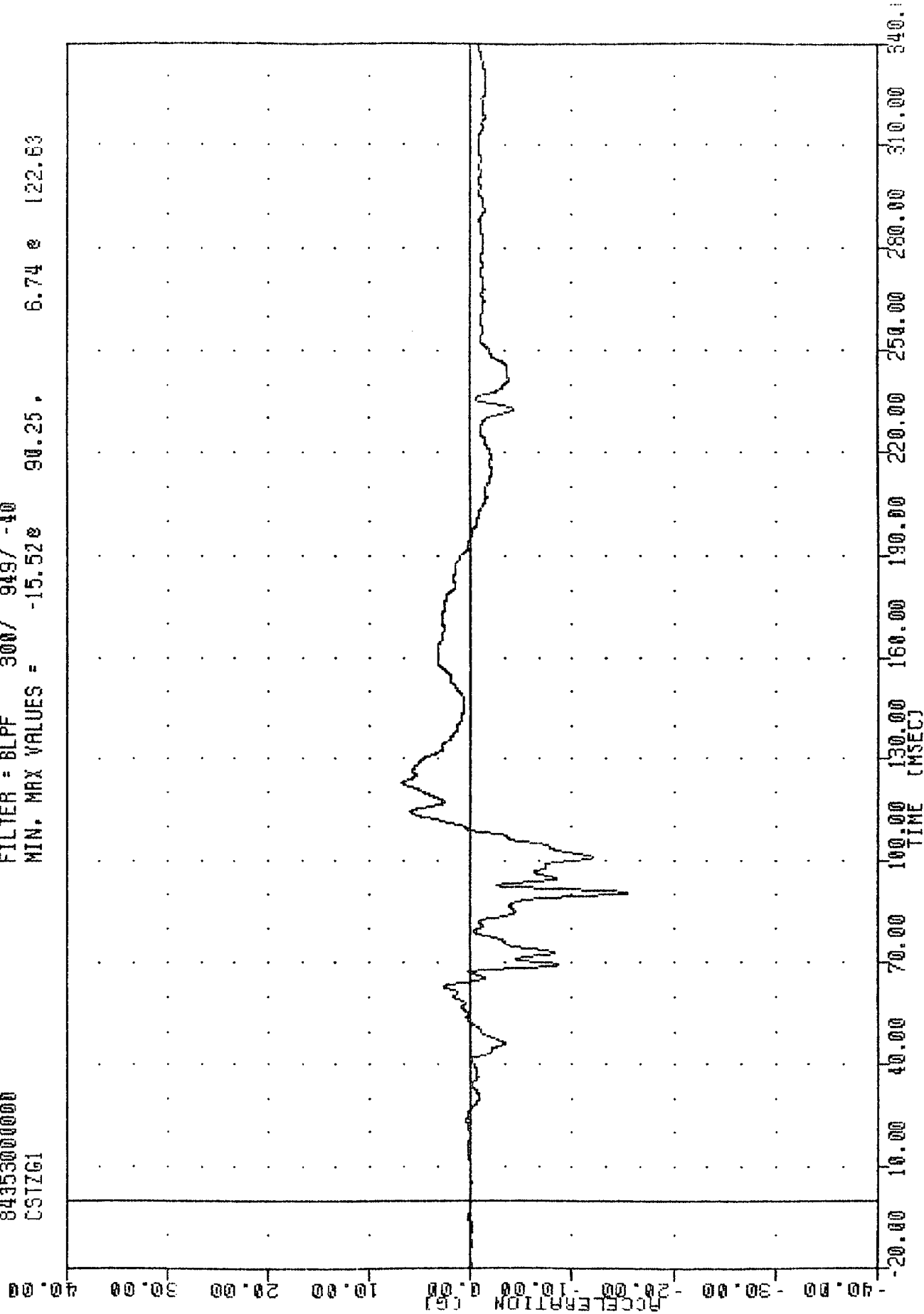
FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -167.528 78.88, 2.43 0 68.38



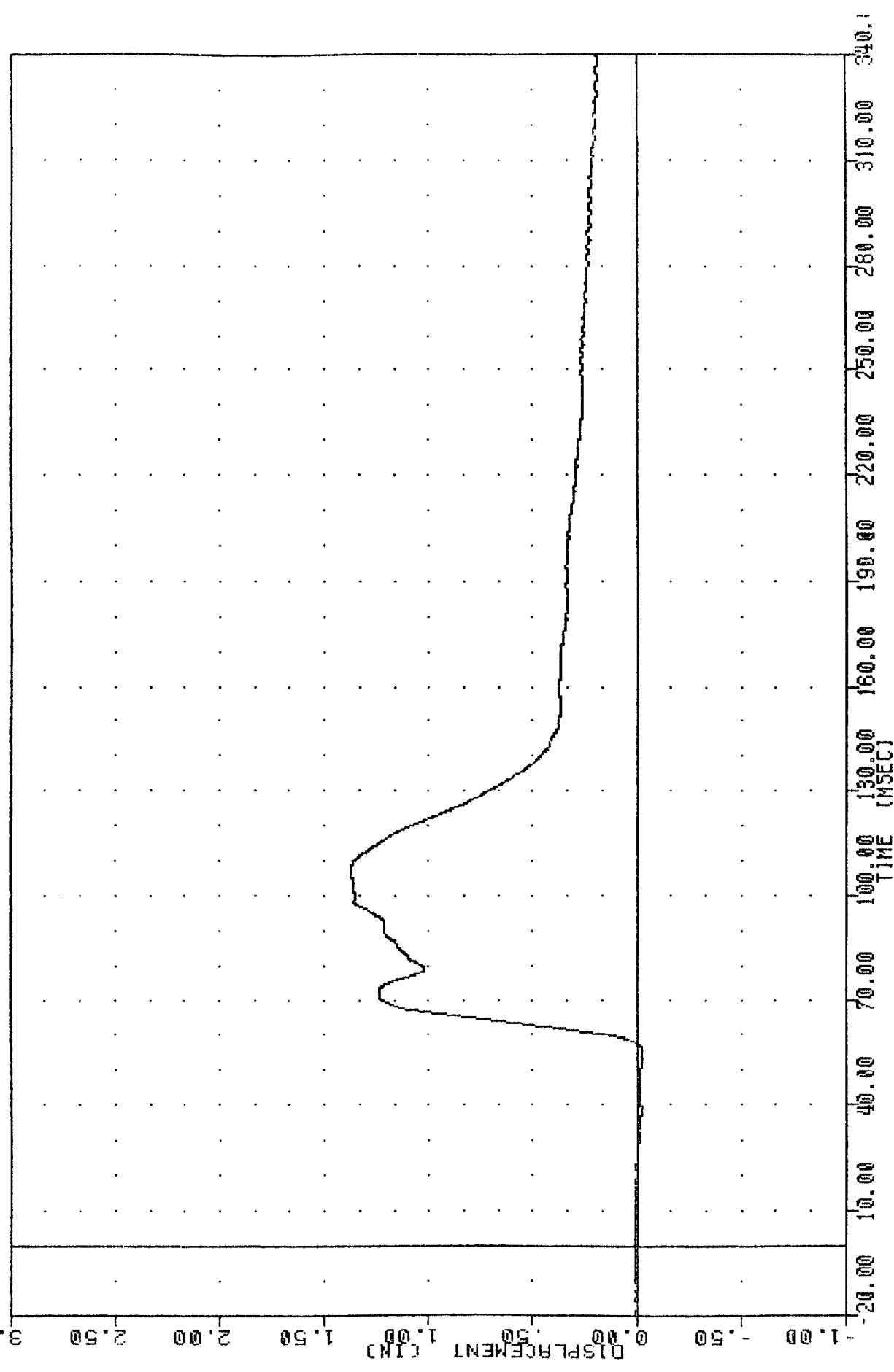
TRC  
8412183  
CAR TO CAR FRONTAL IMPACT  
84353000000  
CSTZG1

PLOT DATE 15-JAN-85 13:52:26

FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -15.52e 90.25, 6.74 e 122.63

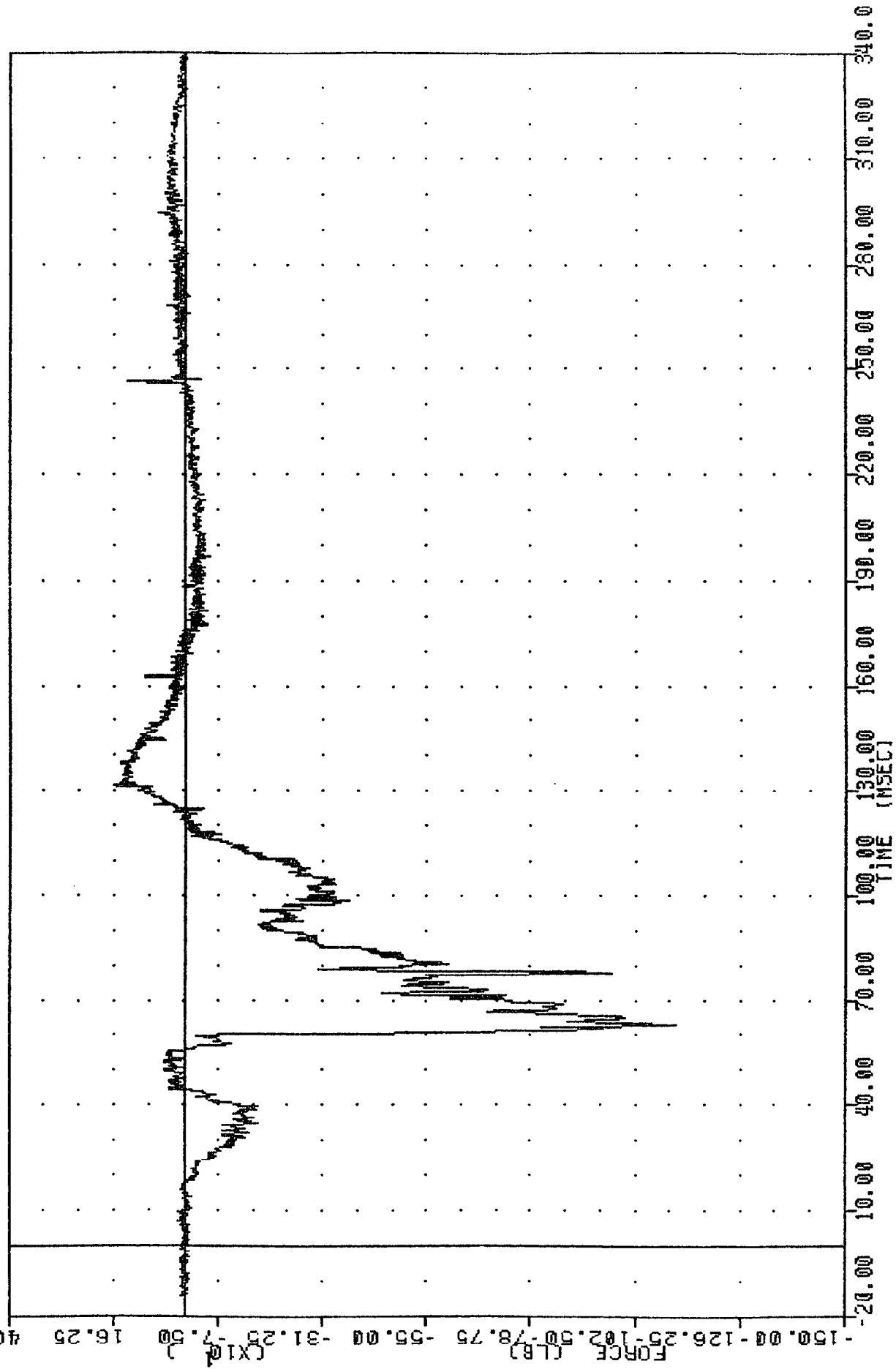


THC  
 8412183  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTXD1  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -0.038 53.13, 1.37 e 107.88  
 PLOT DATE 14-MAR-85 16:04:21



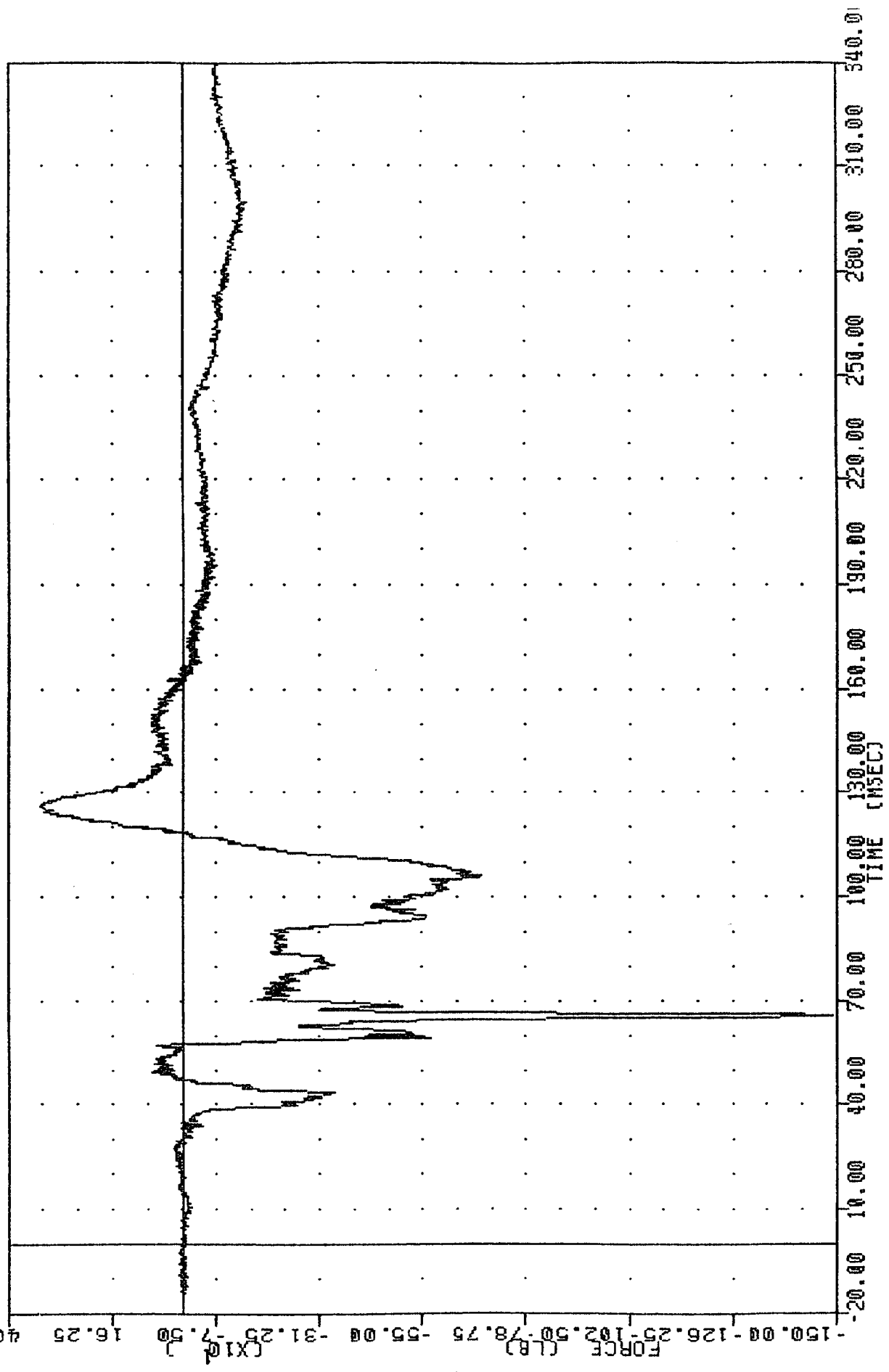
DRIVER CHEST DISPLACEMENT INCHES

12:00 PLU DRT 2 00:00  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 LFMF1  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -1117.62e 62.88, 162.36 e 131.38



DRIVER LEFT FEMUR FORCE LBS

T 12100  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 RFNF1  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -1488.51e 65.63, 327.50 e 125.75  
 21 JAN 85 10:40

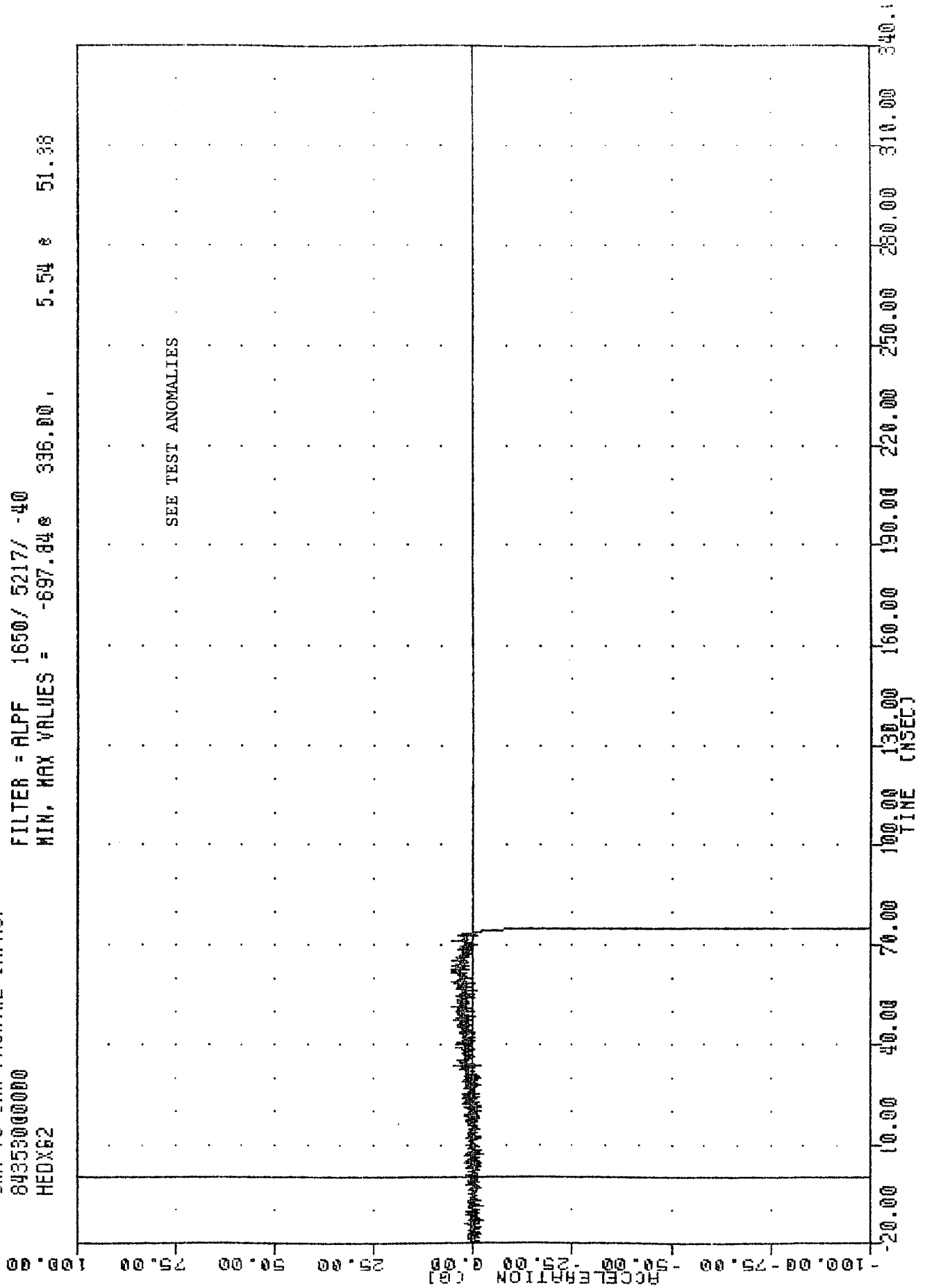


DRIVER RIGHT FEMUR FORCE LBS

TRC , 8412183  
 CAR TO CAR FRONTAL IMPACT  
 84355000000  
 HEDX62

PLOT DATE 15-JAN-85 13:52:26

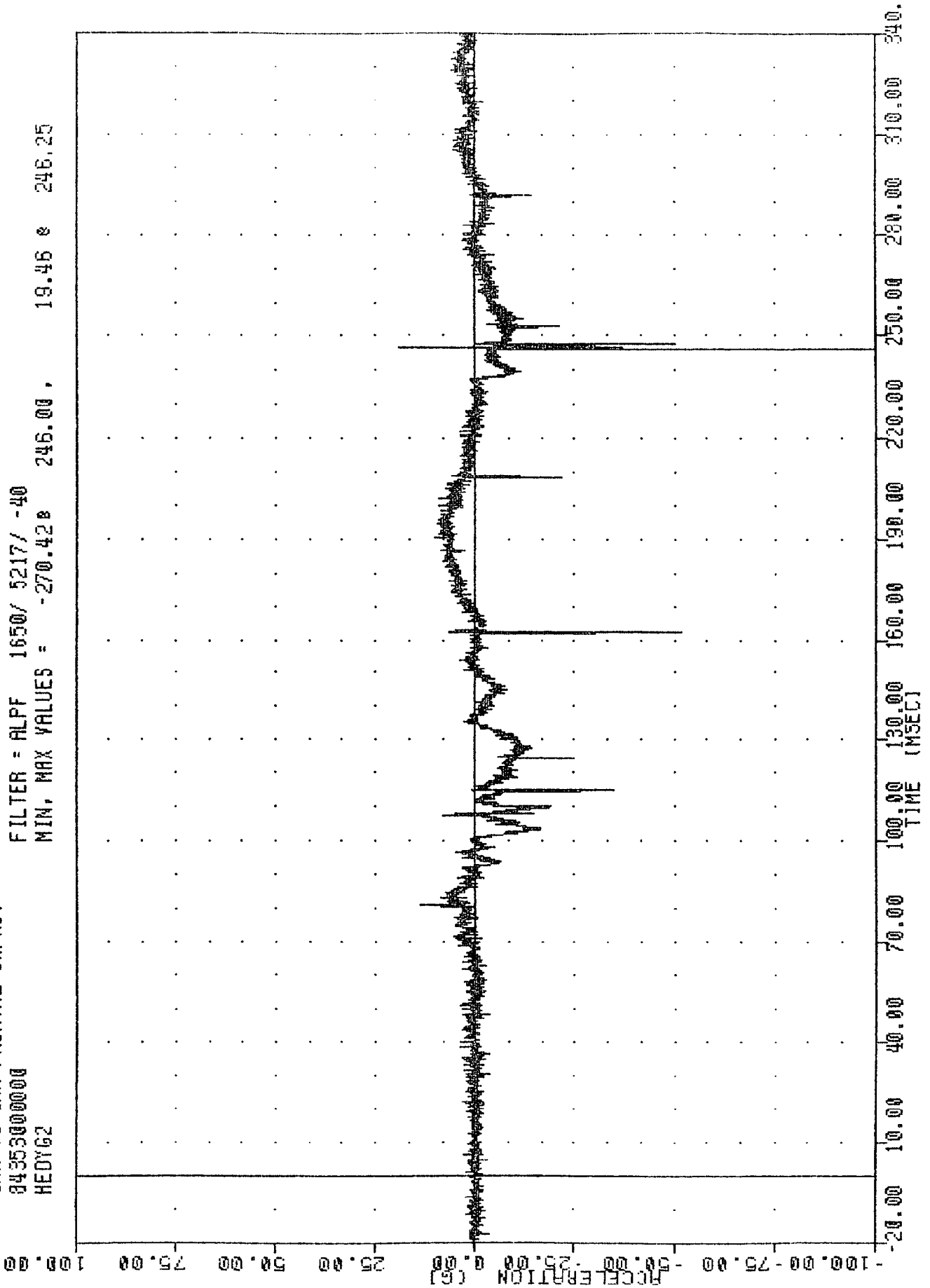
FILTER = ALPF 1650/ 5217/ -40  
 MIN. MAX VALUES = -697.84 336.80 5.54 51.38



TRC 841218S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEDYG2

PLOT DATE 15-JAN-85 13:52:26

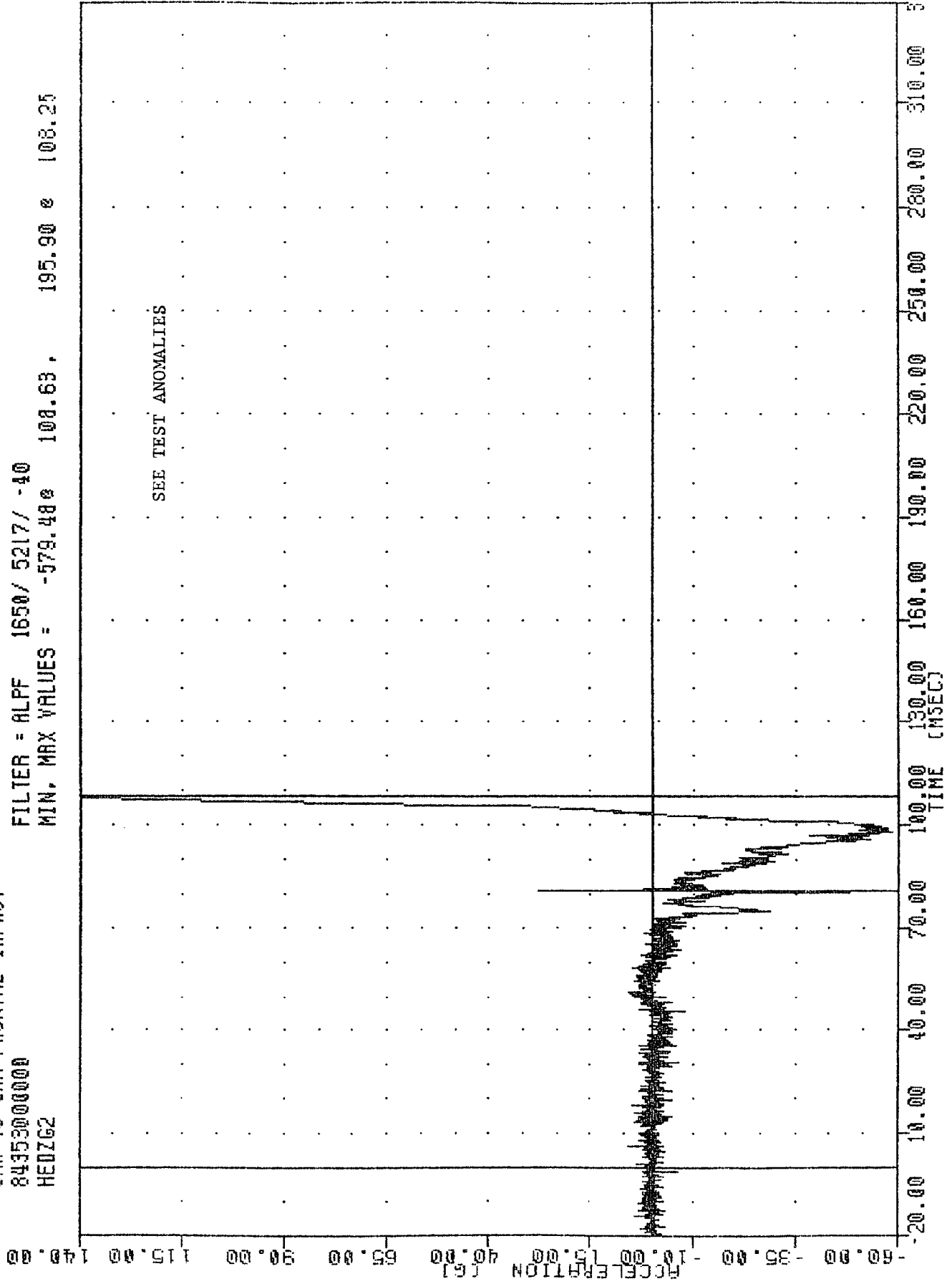
FILTER = ALPF 1650/ 5217/ -40  
MIN, MAX VALUES = -270.428 246.000, 19.46 e 246.25



TAC  
8412188  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEDZ62

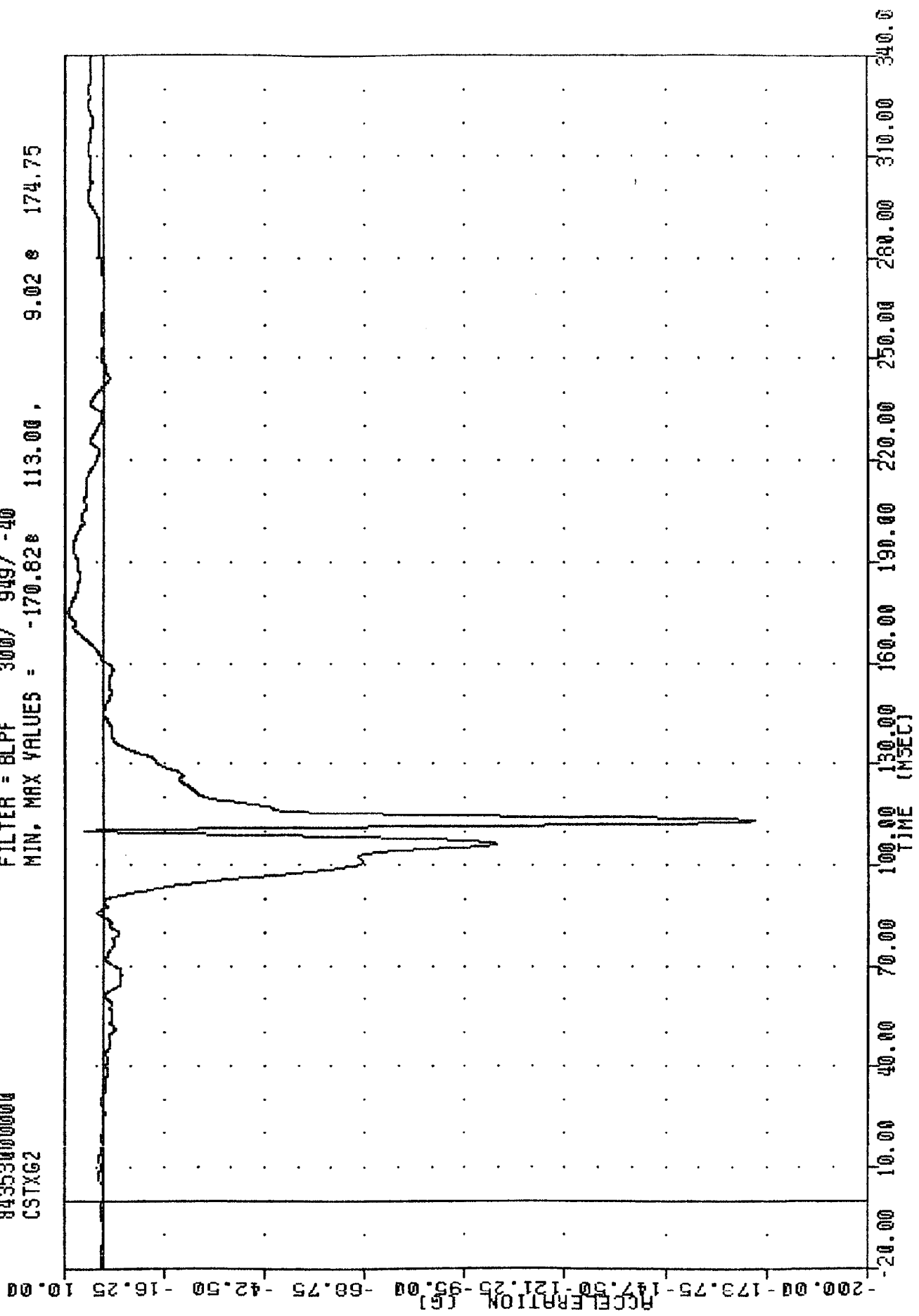
PLOT DATE 15-JAN-85 13:52:26

FILTER = ALPF 1650 / 5217 / -40  
MIN. MAX VALUES = -579.48 108.63 , 195.90 103.25



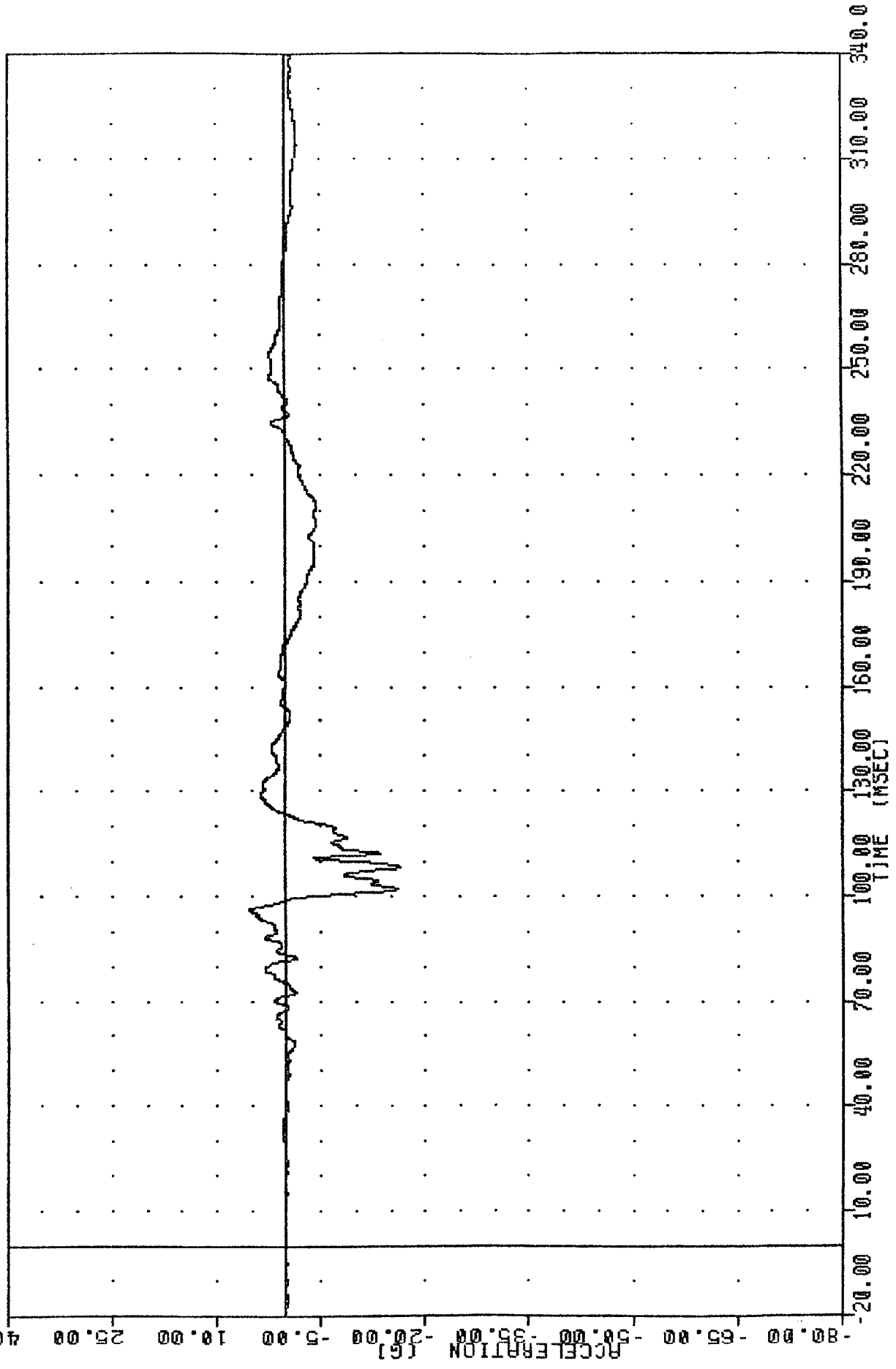
TIME 21.00 PULSATION 2 MIN-8 1:08:00  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTXG2

FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -170.82g 113.00g 9.02g 174.75g



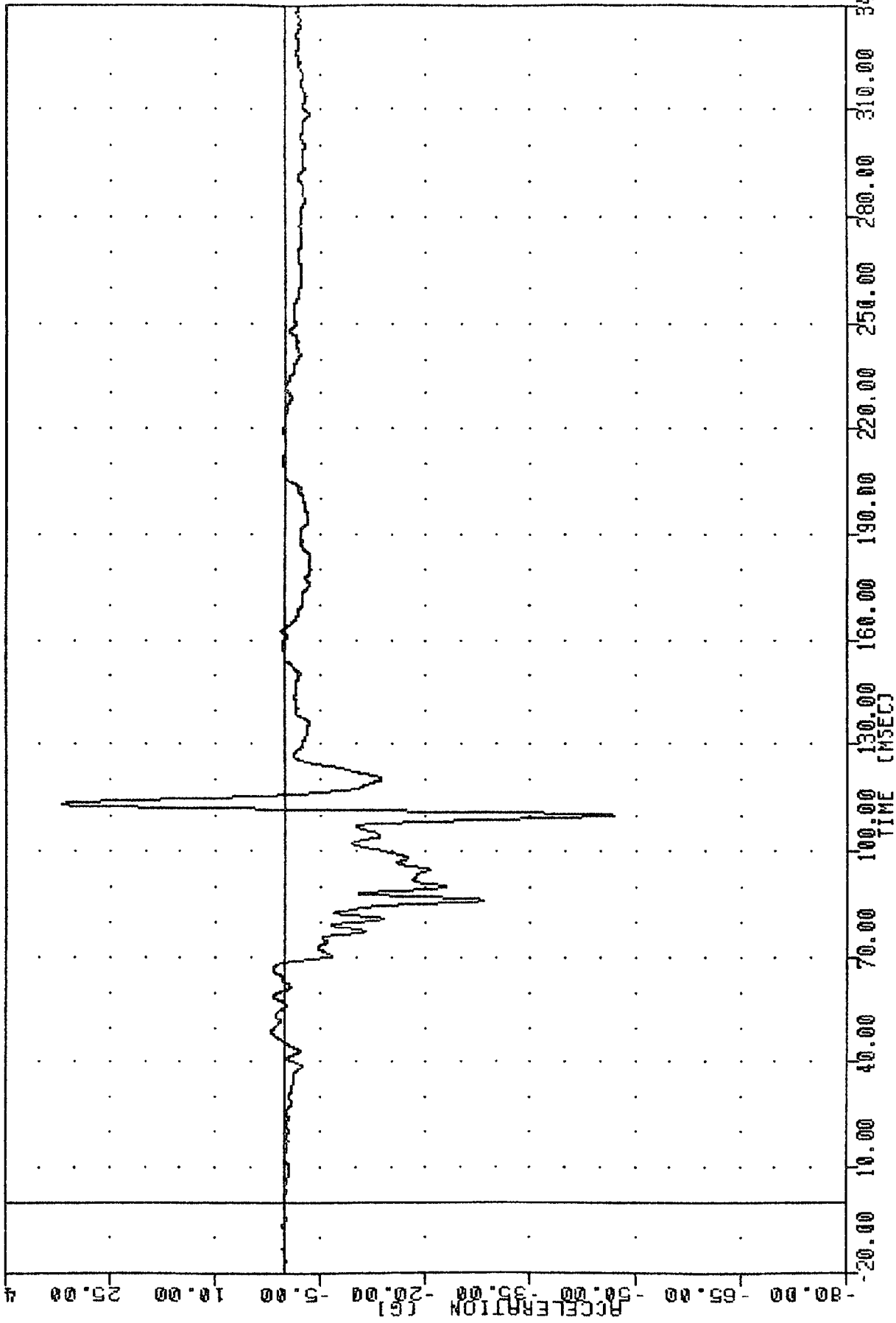
PASSENGER CHEST ACCELERATION X AXIS

TRC 8412185 PLOT DATE 21 JAN 83 10:36:02  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTYG2  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -16.468 108.38, 5.20 e 95.75



PASSENGER CHEST ACCELERATION Y AXIS

21  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTZG2  
 FILTER = BLPF 300/ 919/ -40  
 MIN, MAX VALUES = -46.85e 110.13, 31.88 e 113.25



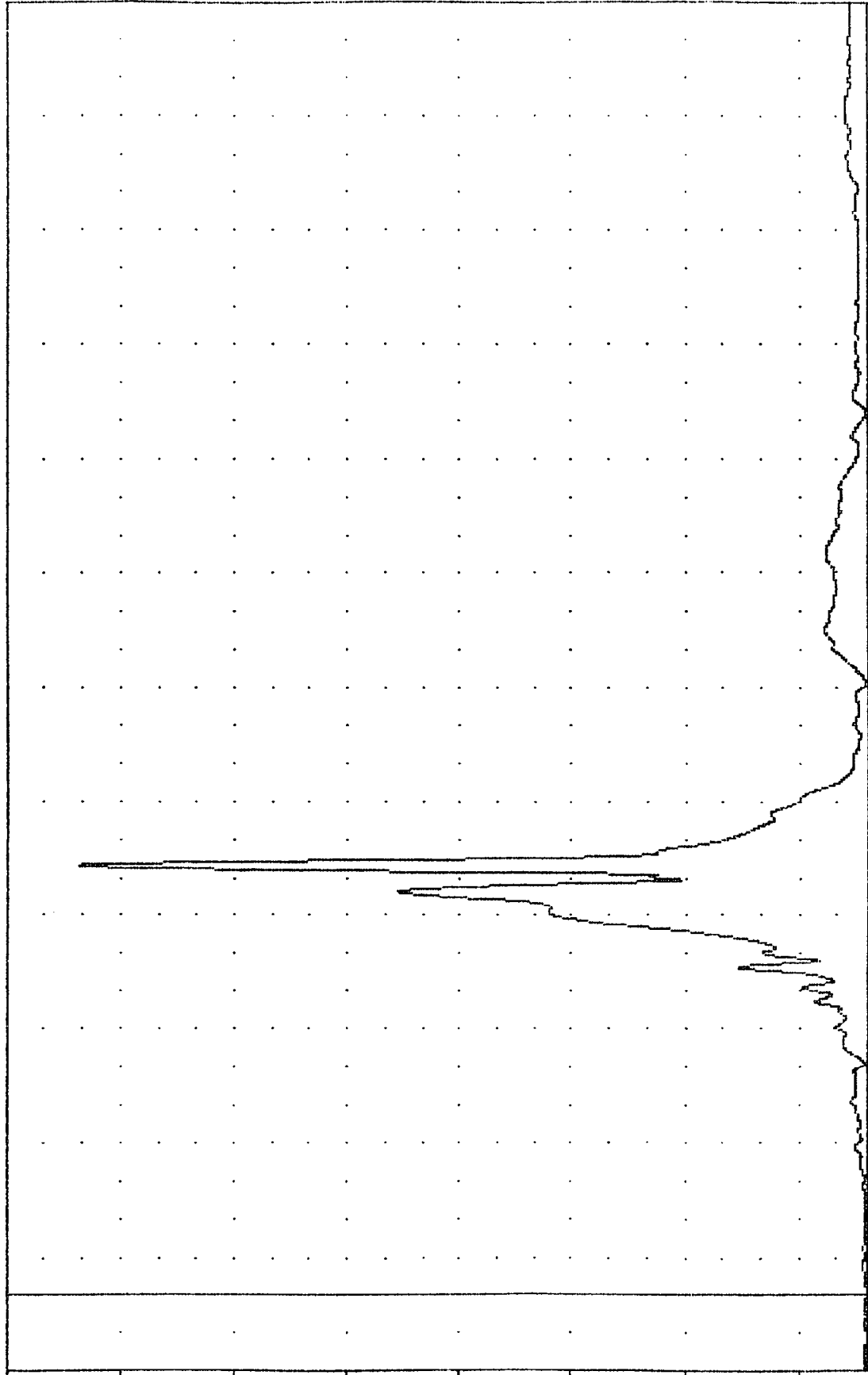
PASSENGER CHEST ACCELERATION Z AXIS

TAC 84J218S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
CSTR62

PLOT DATE 15-JAN-85 13:52:26

FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = 0.17e 5.00, 173.91 e 113.00

ACCELERATION (G)  
-10.00 15.00 40.00 65.00 90.00 115.00 140.00 165.00 190.00



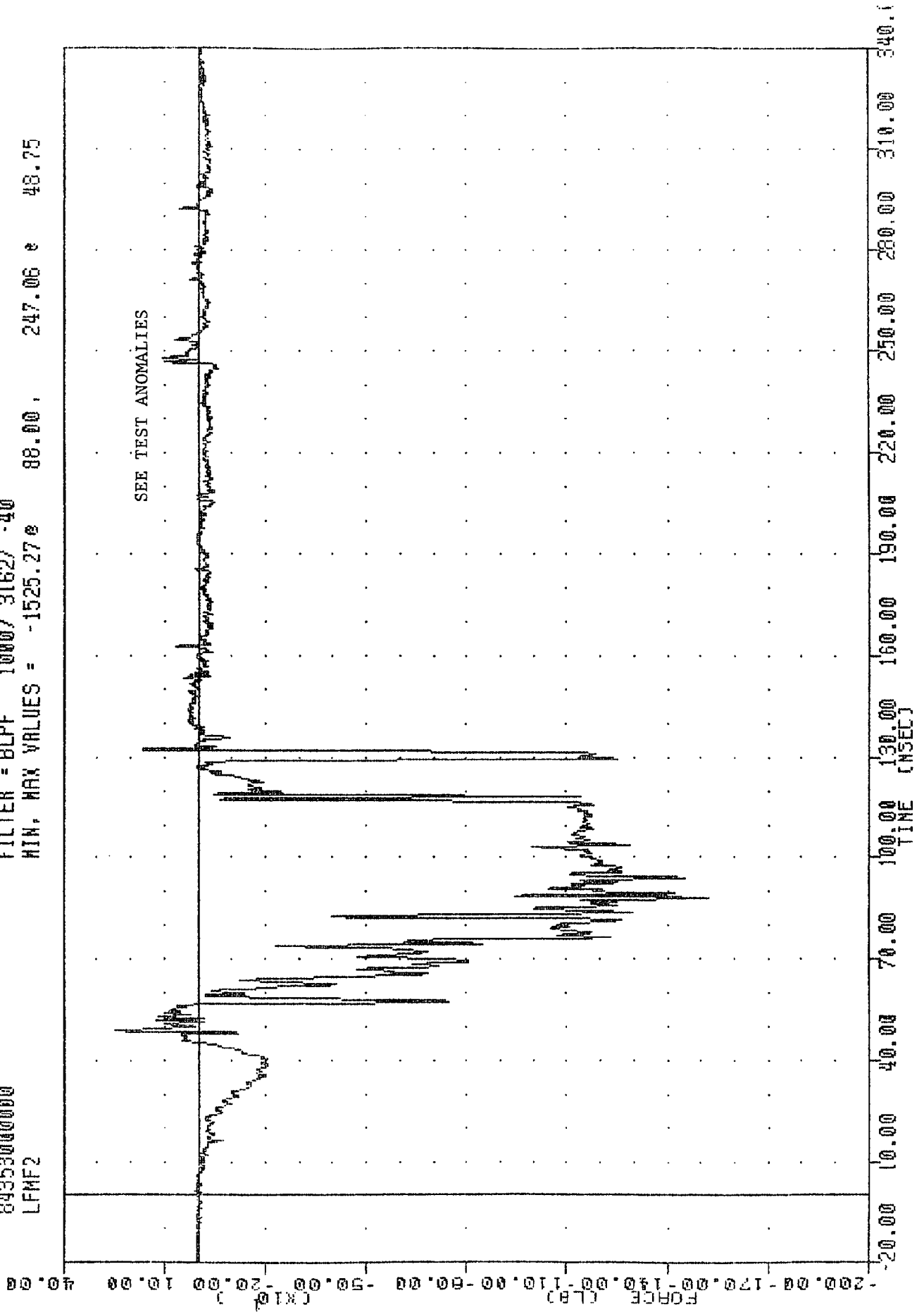
TIME (MSEC)  
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

PASSENGER CHEST RESILIENT

TRC  
8412185  
CAR TO CAR FRONTAL IMPACT  
84353000000  
LFMF2

PLUT DATE 15-JAN-85 13:52:26

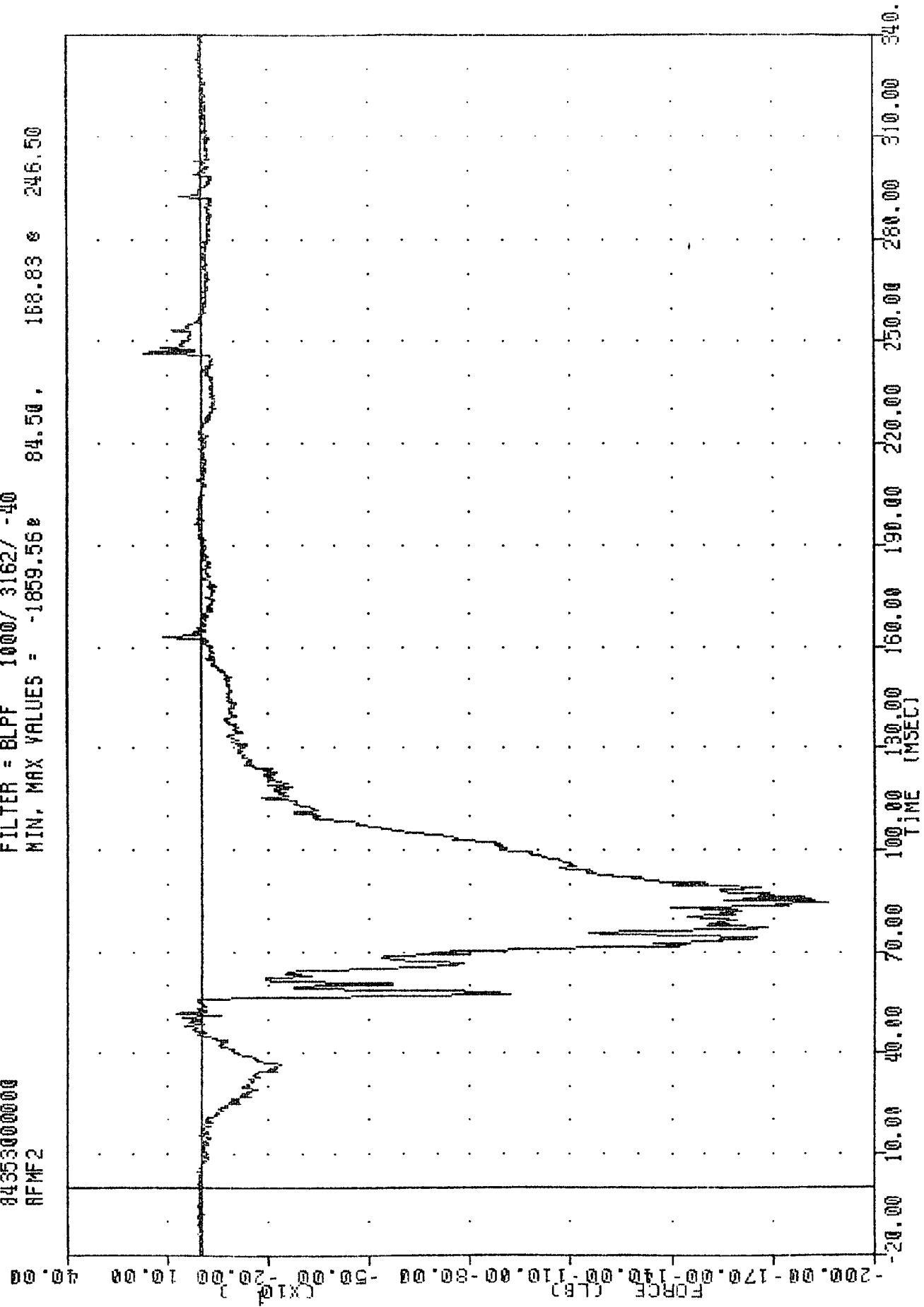
FILTER = BLPF 1000 / 3162 / .40  
MIN. MAX VALUES = -1525.27 e 88.00 , 247.06 e 48.75



TRC 841218S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
AFMF2

PLOT DATE 15-JAN-85 13:52:26

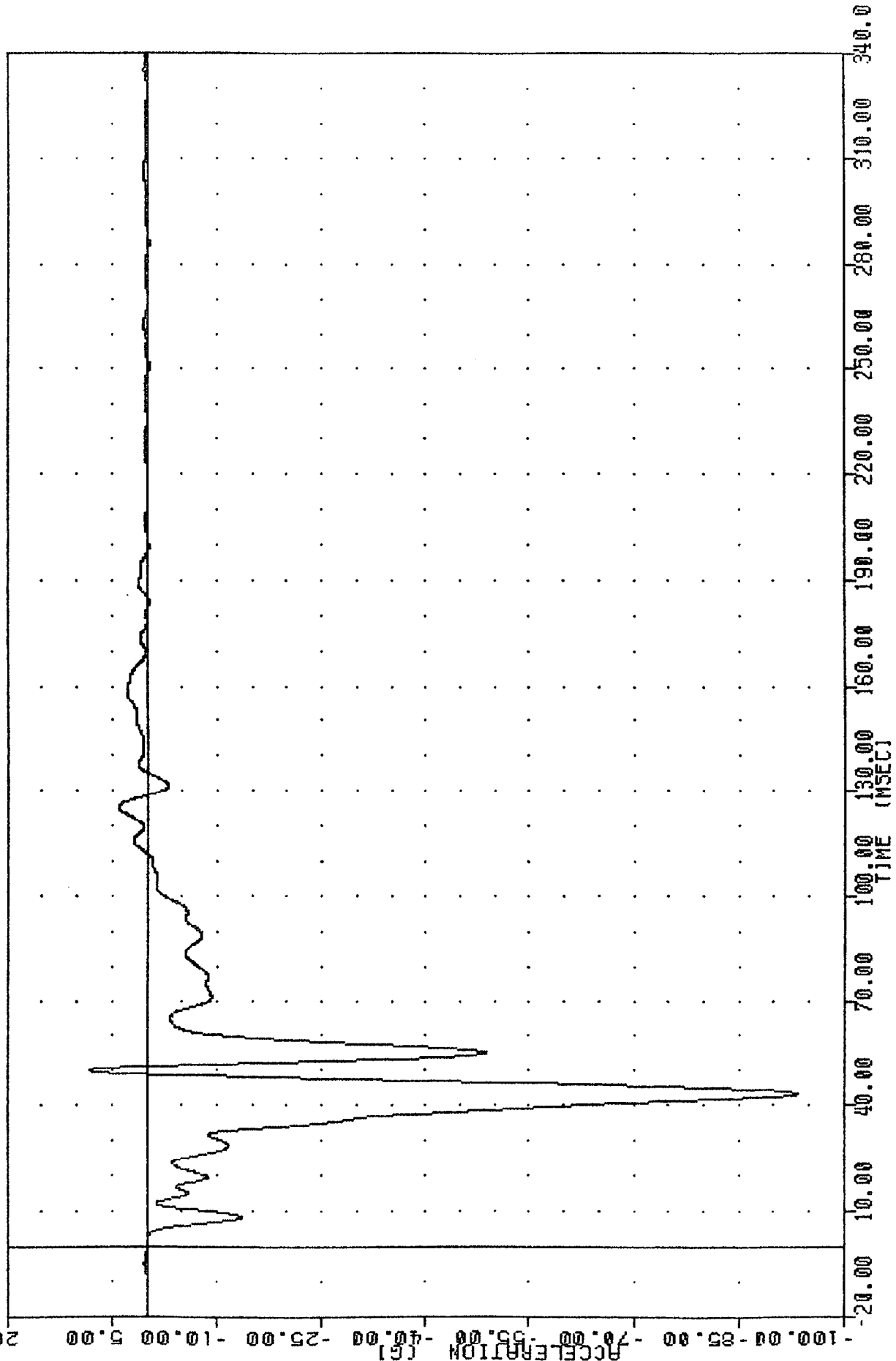
FILTER = BLPF 1000/ 3162/ -40  
MIN, MAX VALUES = -1859.56e 84.50, 168.83 e 246.50



PASSENGER RIGHT FEMUR FORCE LBS



THE PLOT DATE 2 JAN 89 11:00  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 FFCXG  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -93.23 43.00 8.22 50.00

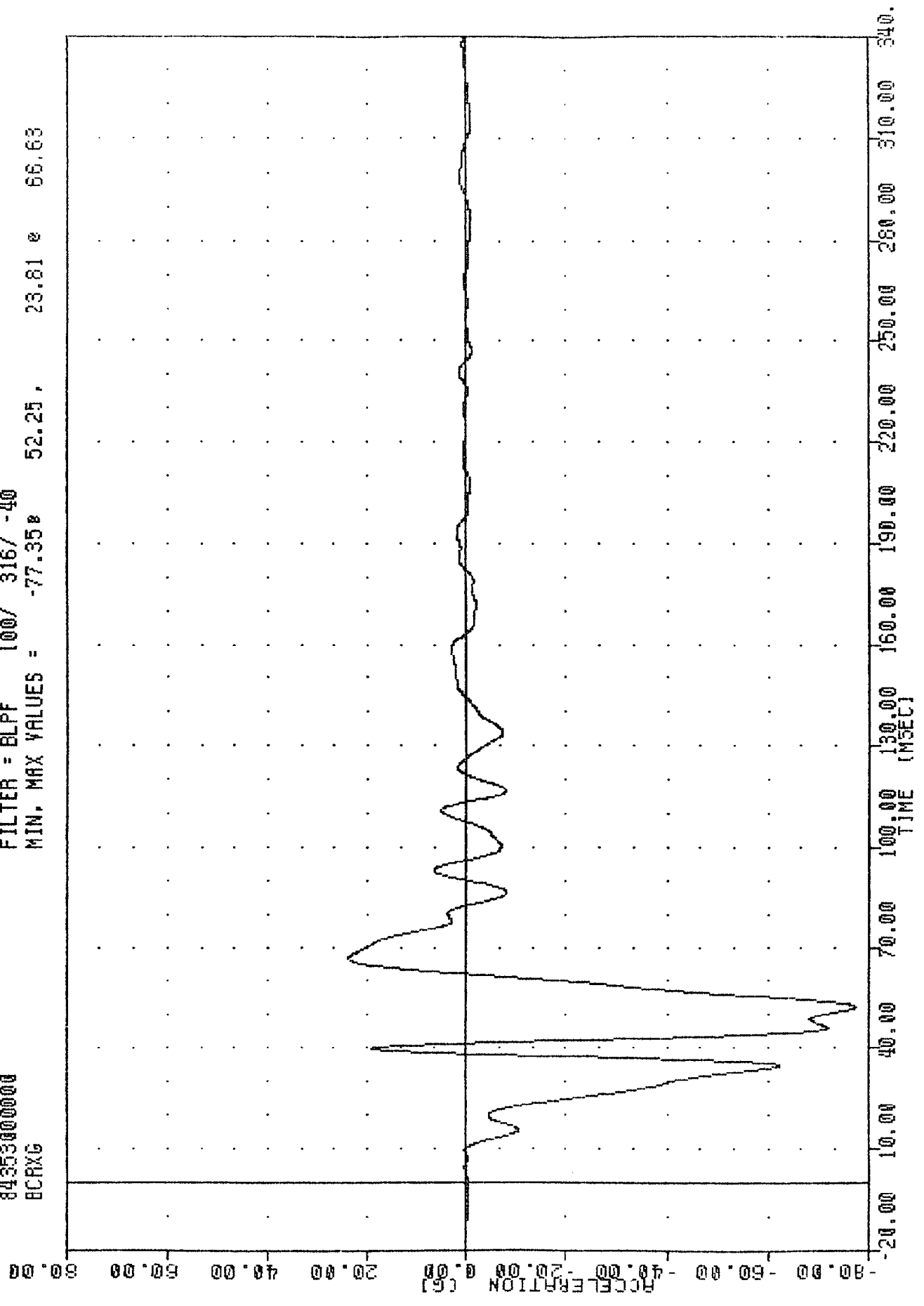


FRONT FRAME CROSSMEMBER ACCELERATION X AXIS

TRC 841218S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
BCRXG

PLOT DATE 15-JAN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -77.358 52.25 , 23.81 e 66.63

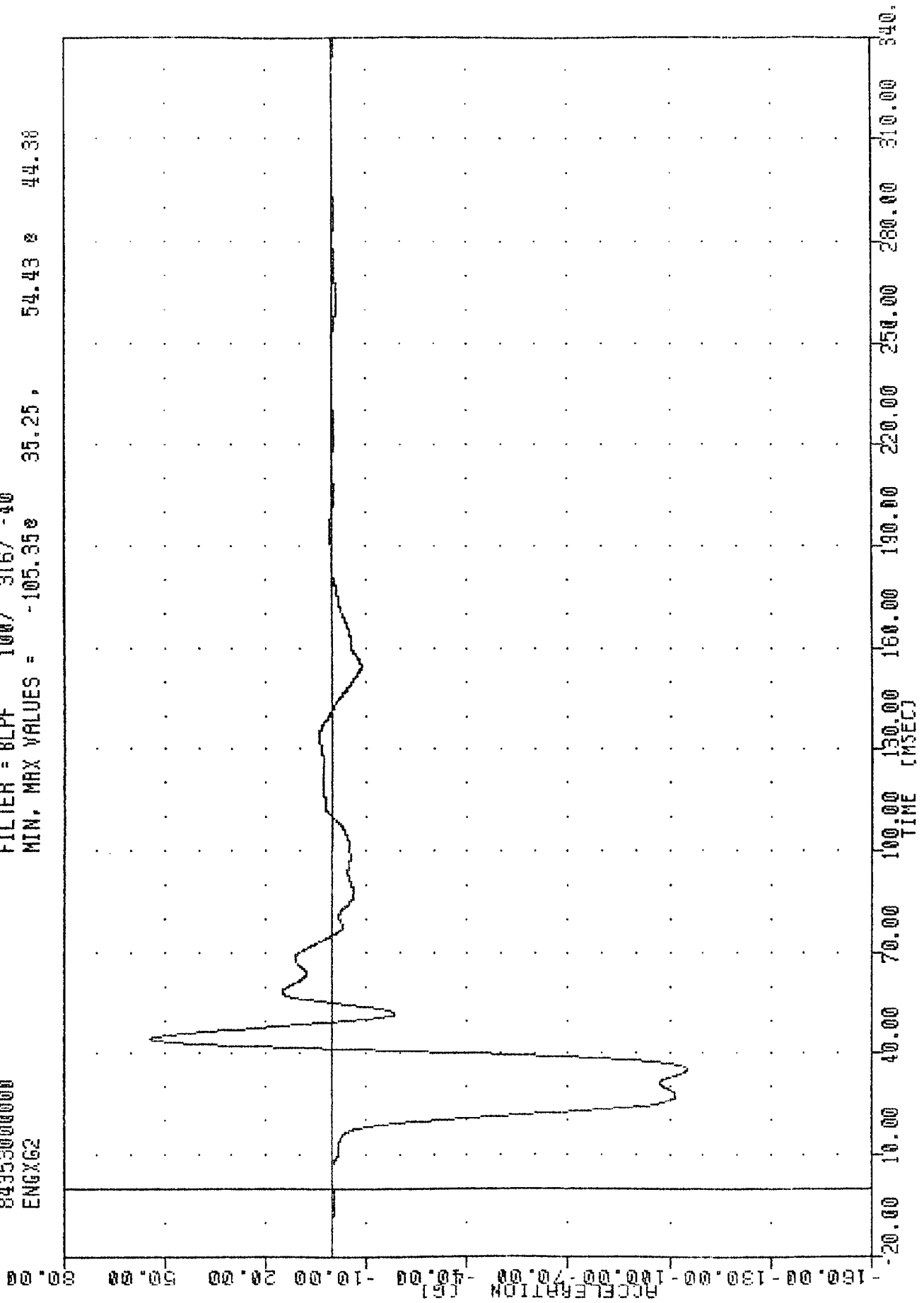


RIGHT BRAKE CALIPER ACCELERATION X AXIS

TAC 8412185  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ENGX62

PLOT DATE 15-JAN-85 13:55:17

FILTER = 8LPF 100/ 316/ -40  
MIN. MAX VALUES = -105.35 54.43 44.38

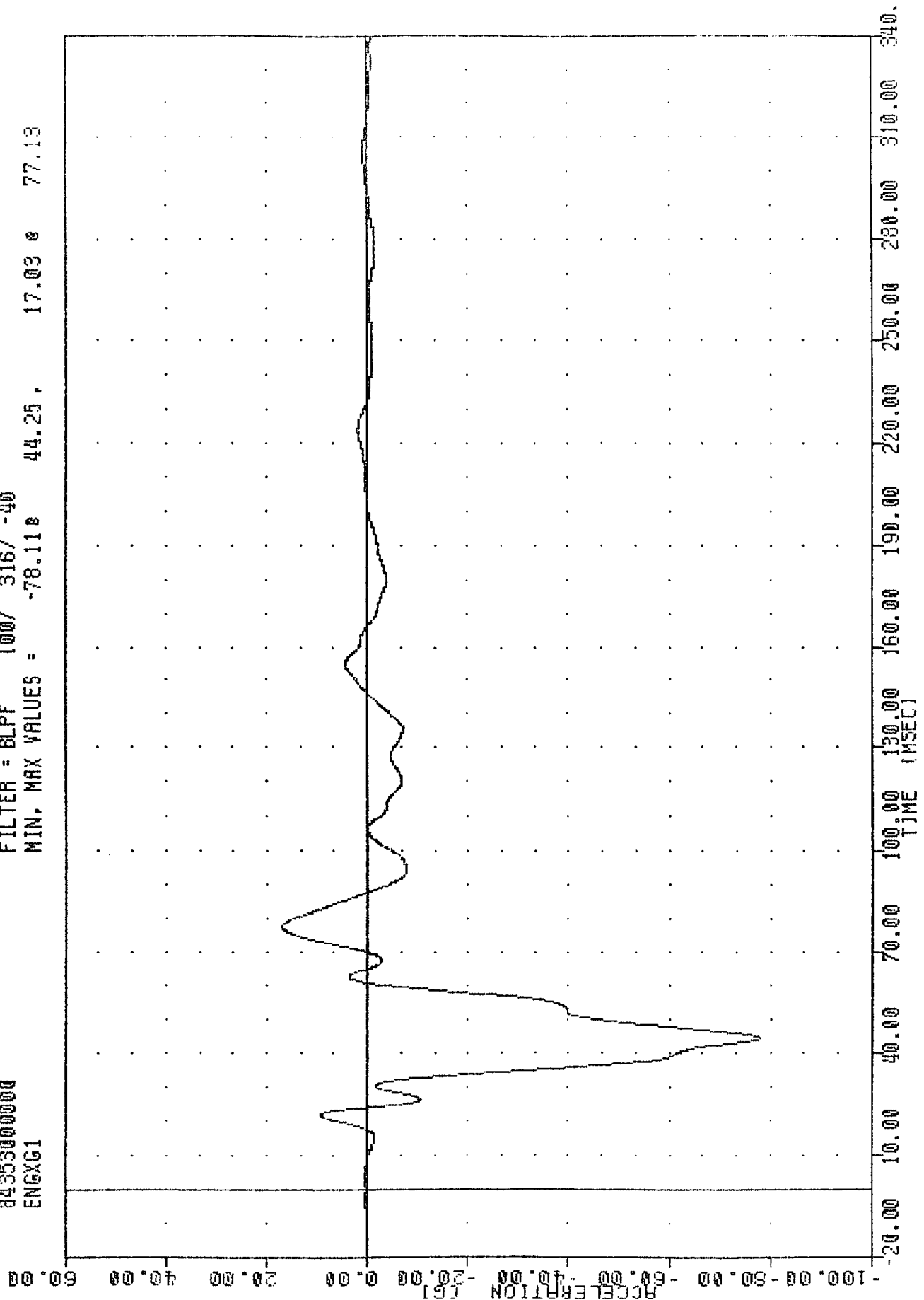


ENGINE BLOCK LOWER ACCELERATION X AXIS

TRC 841218S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ENXG1

PLOT DATE 15-JUN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -78.11e 44.25, 17.03 e 77.13

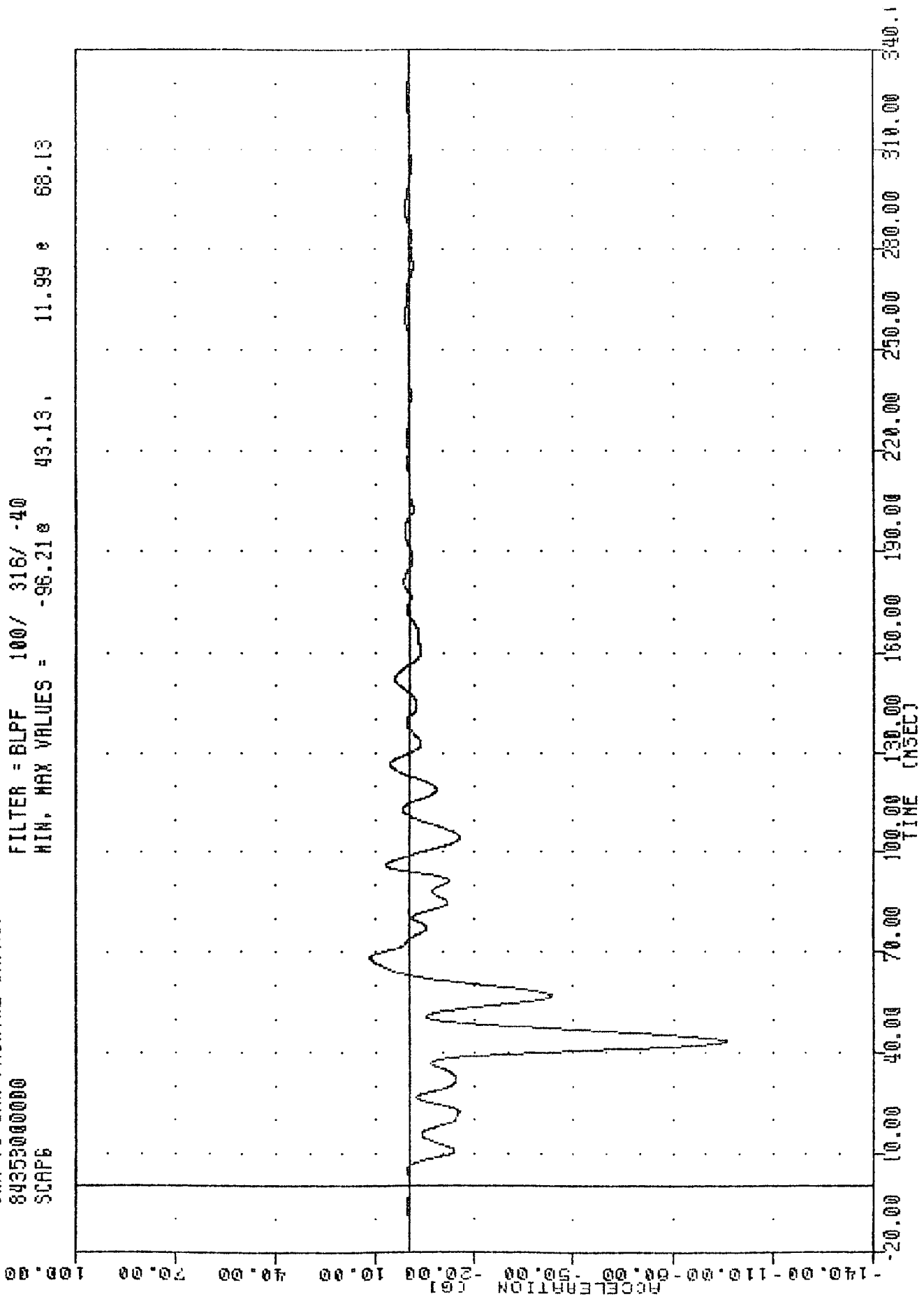


ENGINE BLOCK UPPER ACCELERATION X AXIS

TAC 8412183  
CAR TO CAR FRONTAL IMPACT  
84353000000  
SCAPE

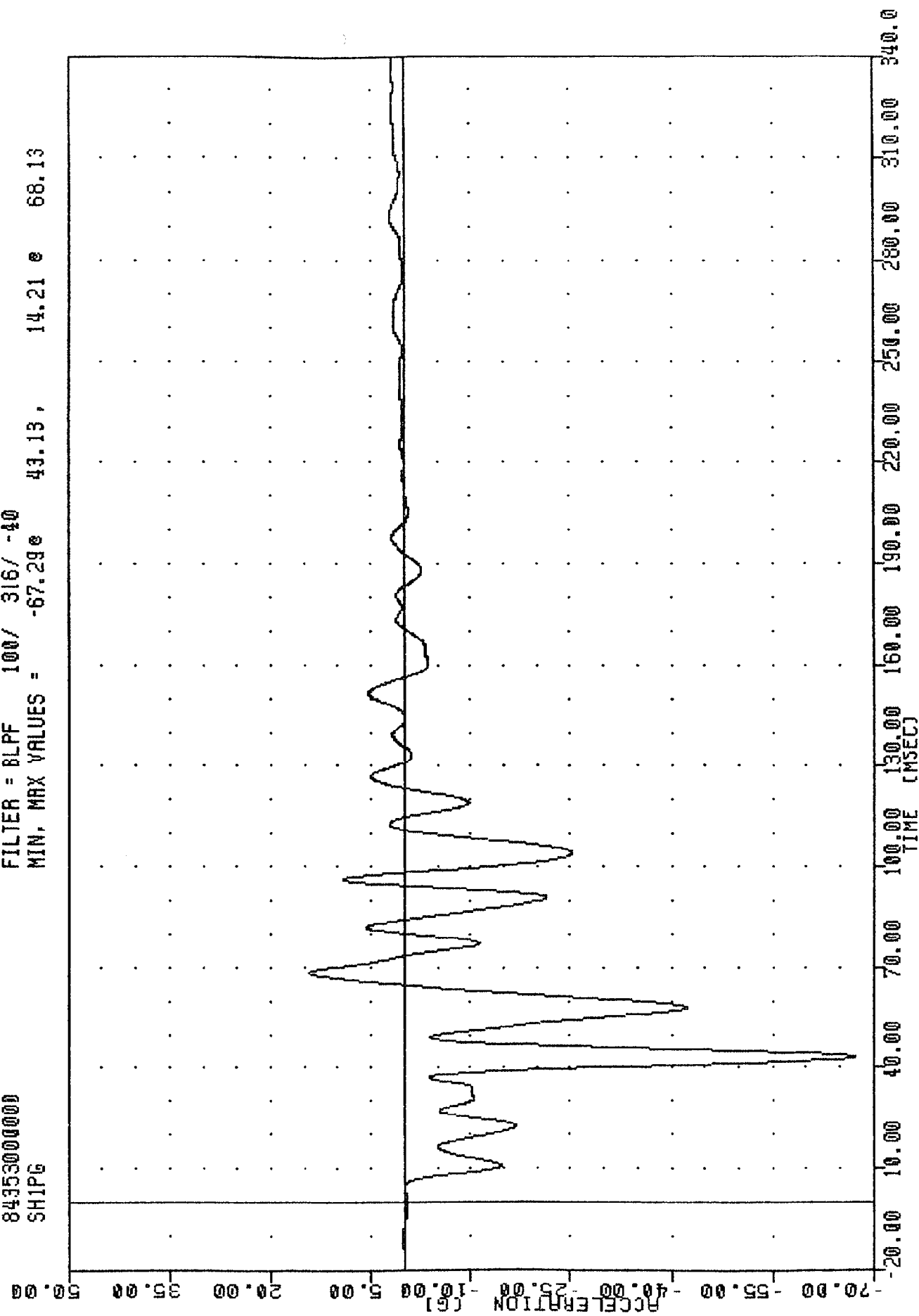
PLOT DATE 15-JAN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -96.21e 43.13 . 11.99 e 68.13



STEERING COLUMN ACCELERATION A-P AXIS

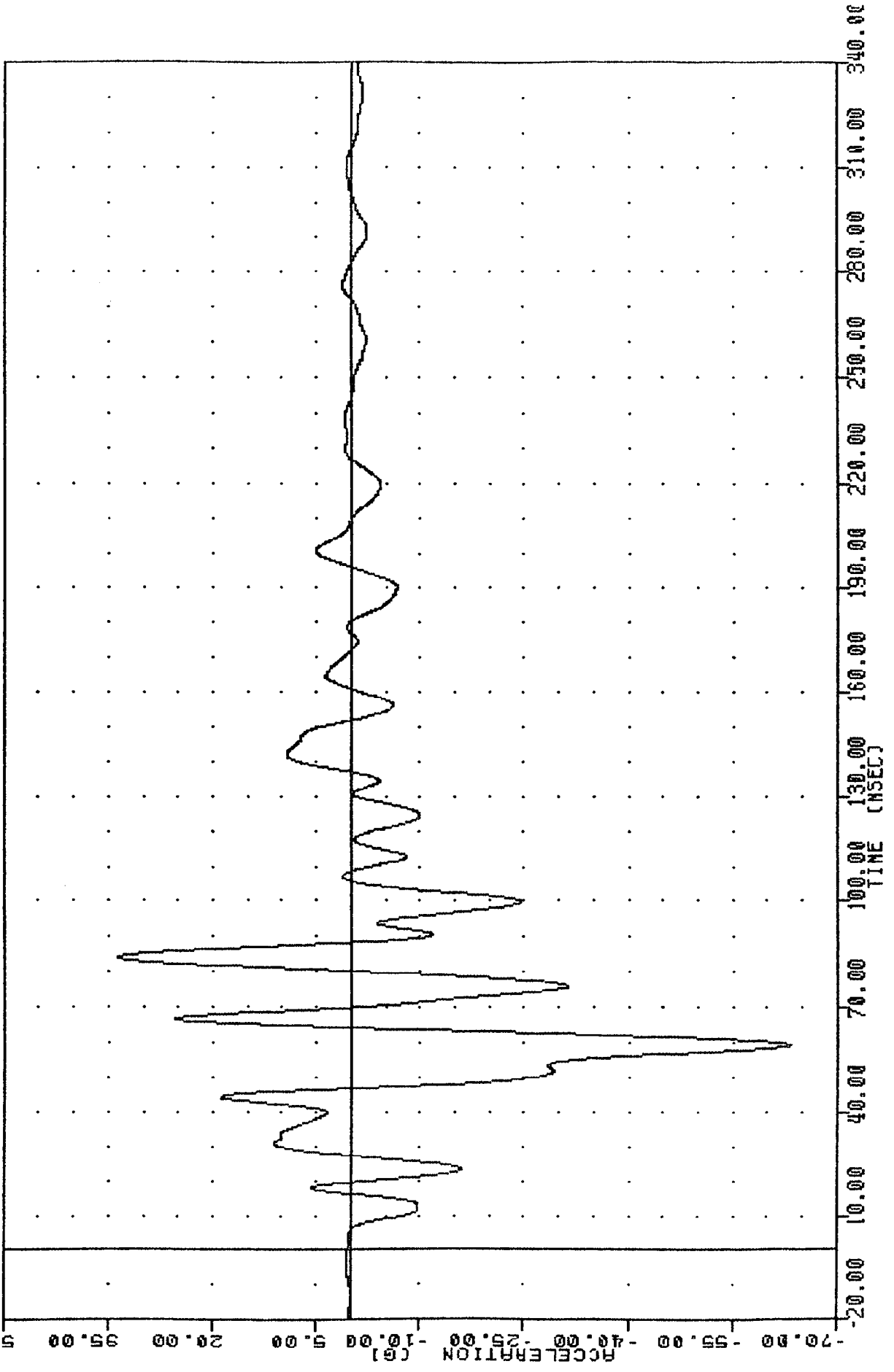
TRC 0412160 PLOT DATE 21 JUN 80 10:11:00  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 SHIPC  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -67.29e 43.13, 14.21 e 68.13



STEERING WHEEL HUB ACCELERATION A-P AXIS

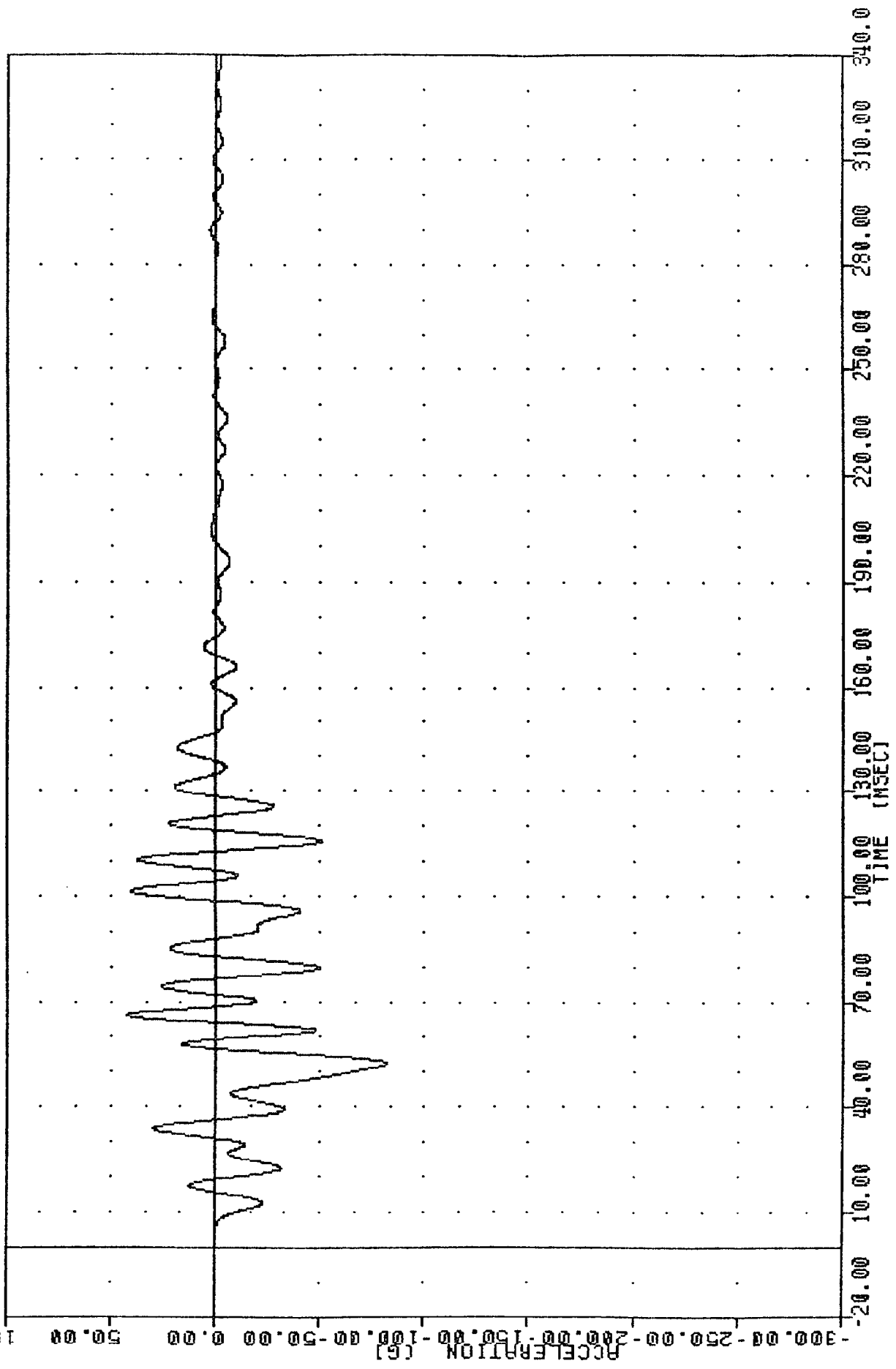
TRAILER, 218, PLATE 21-N-8, :08  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 SH116

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -63.21e 59.25, 33.82 e 84.00



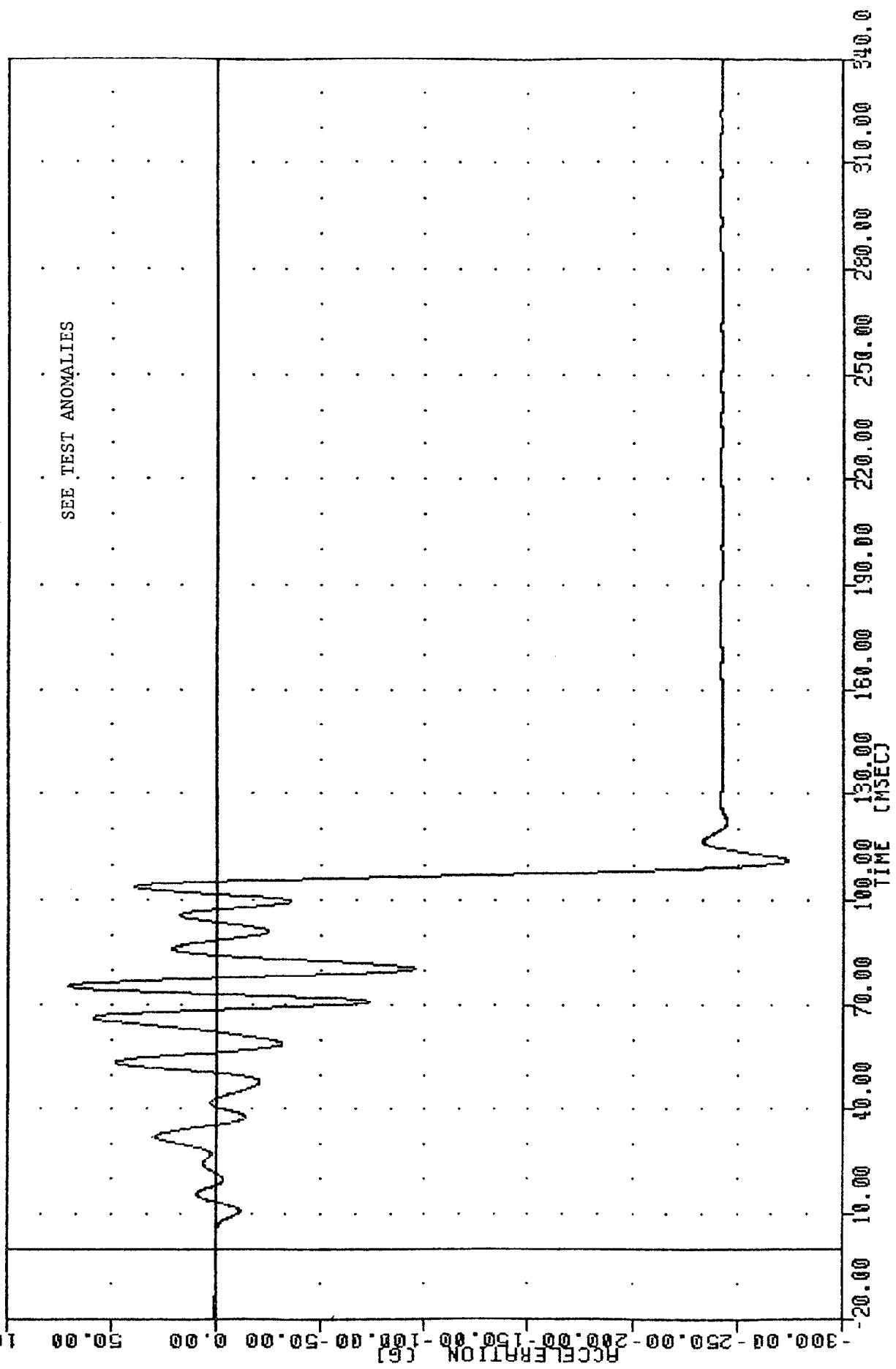
STEERING WHEEL HUB ACCELERATION I-S AXIS

THEC 8412163 PLOT DATE 21 JAN 83 10:11:08  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 DPCXG  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -81.958 52.38, 41.90 & 66.00



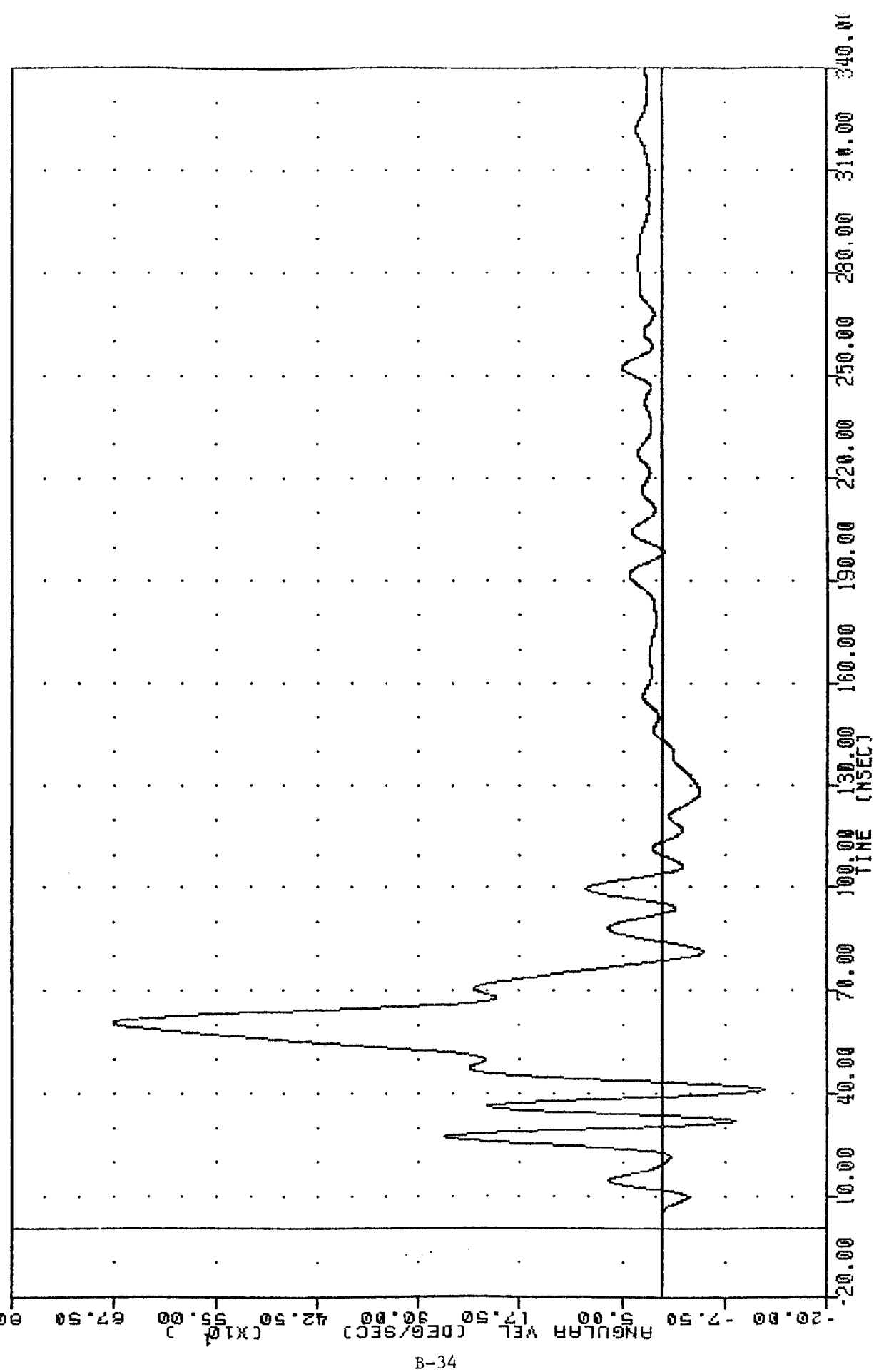
DASH PANEL CENTER ACCELERATION X AXIS

T. 21 PL. DATE 2 N-8 1:00  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 DPCZ6  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -274.06e 111.25. 70.99 e 75.13



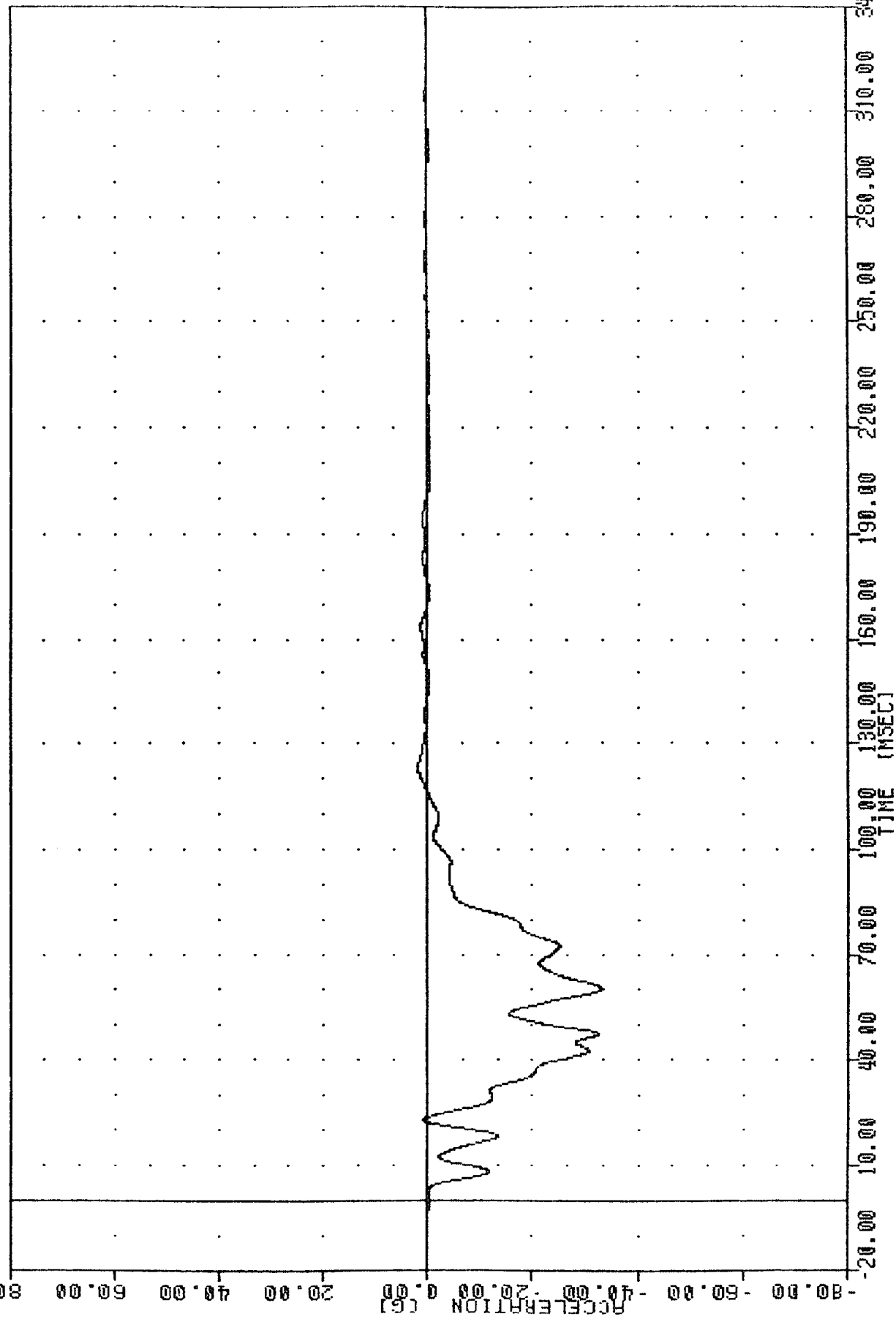
DASH PANEL CENTER ACCELERATION Z AXIS

TRC 218, 218-89 10:11:08  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 VCGY  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -124.14e 40.88, 673.97 e 60.63



VEHICLE PITCH RATE DEGREES/SECOND

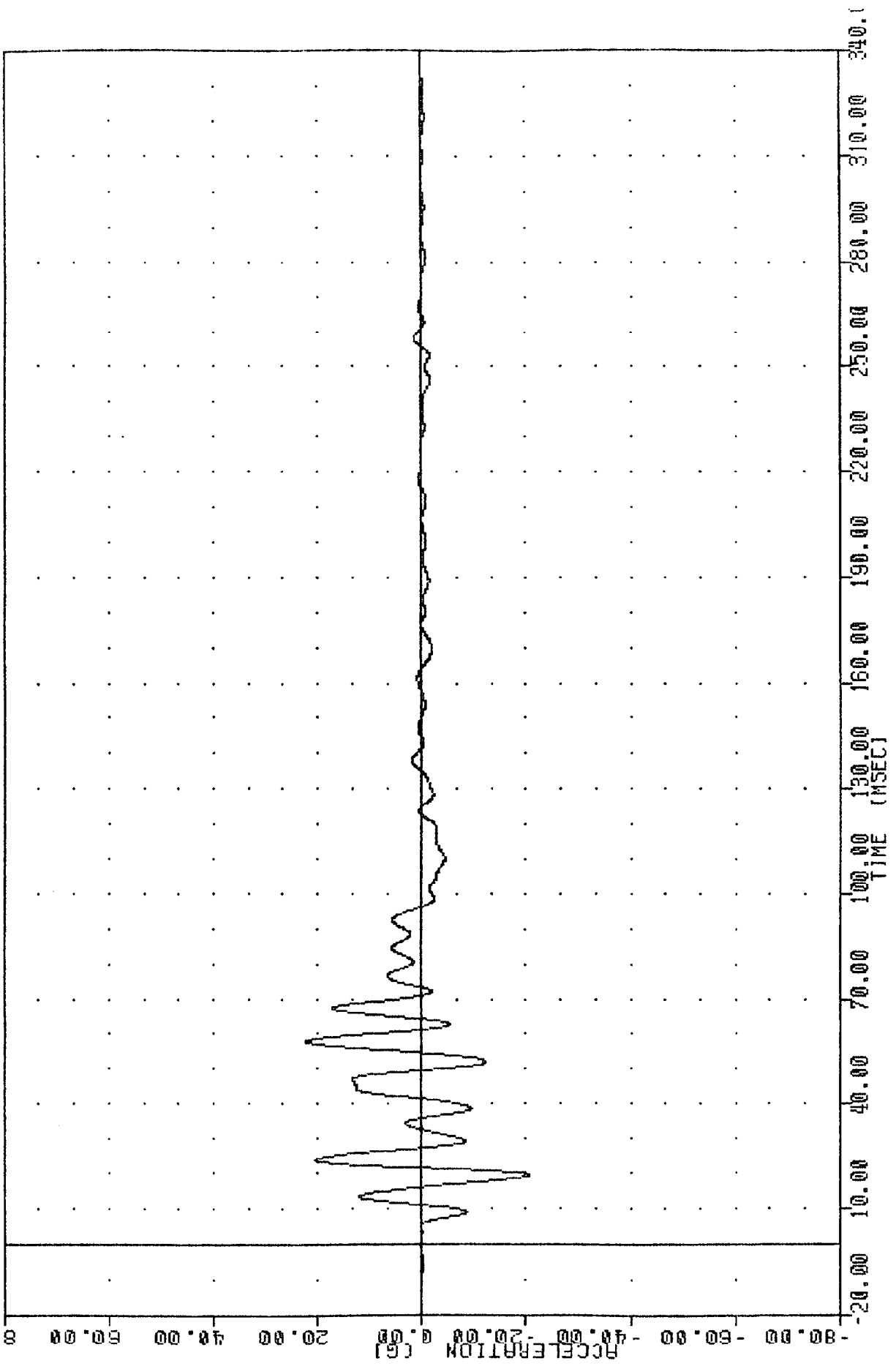
TRC [REDACTED], 841218S [REDACTED] PLOT DATE 14-MAR-85 16:04:21  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 LPBXG  
 FILTER = 6LPF 100/ 316/ -40  
 MIN, MAX VALUES = -33.19g 60.25, 1.74g 123.13



B-35

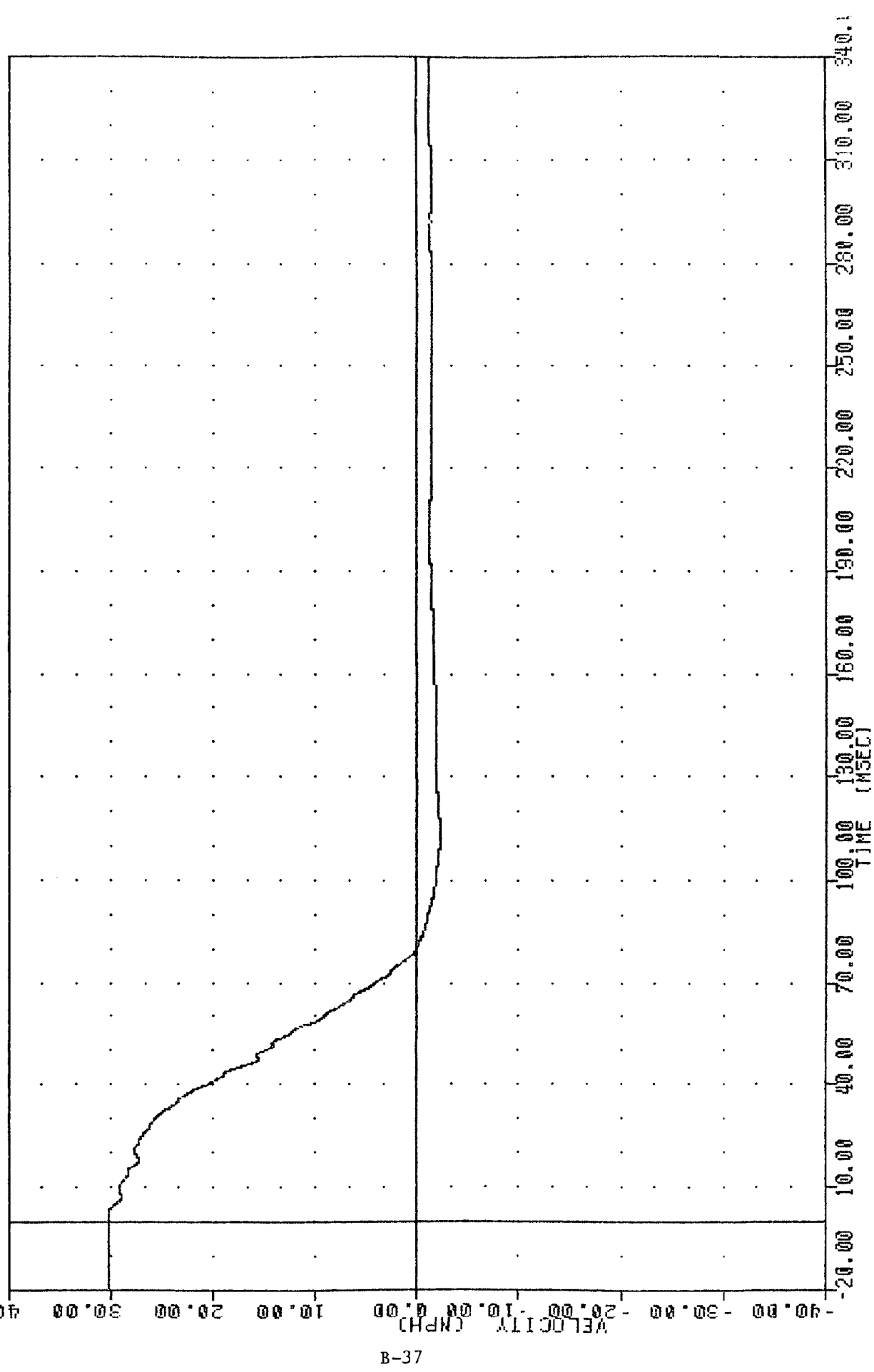
LEFT B PILLAR ACCELERATION X AXIS

TRC 8412183 15-MAR-83 08:58:17  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 LPBZG  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -20.83e 19.25. 22.15 e 57.68



LEFT B PILLAR ACCELERATION Z AXIS

TRC 8412185  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 LPBXV  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -2.258 114.13, 30.14 8 -6.38  
 PLOT DATE 14-MAR-85 16:04:21

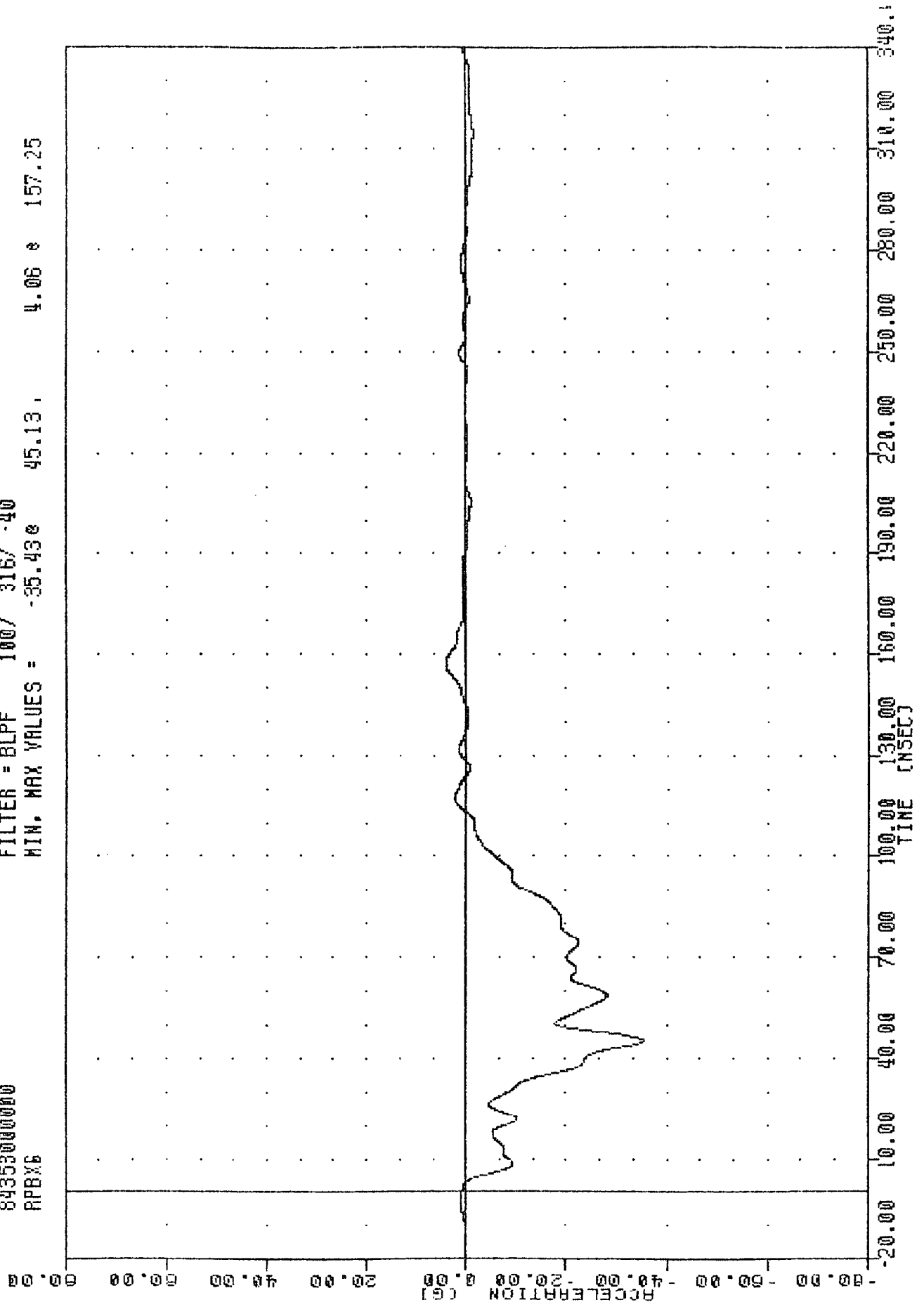


DELTA V USING LPBXG

TAC  
841216S  
CAR TO CAR FRONTAL IMPACT  
84353000000  
RFBXB

PLOT DATE 15-JAN-85 13:55:17

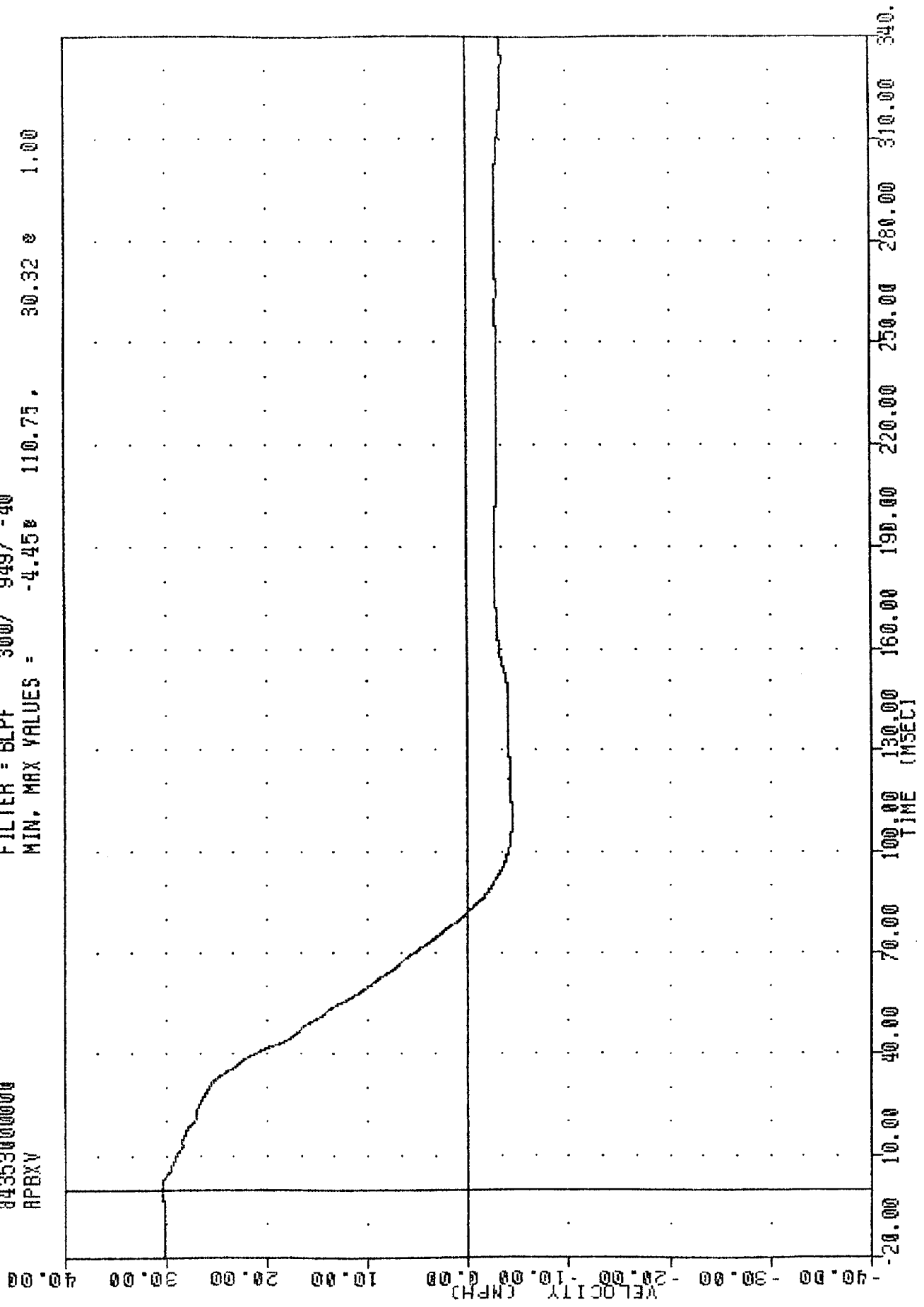
FILTER = BLPF 100/ 316/ .40  
MIN. MAX VALUES = -35.43e 45.13, 4.06 e 157.25



TRC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
APBXV

PLOT DATE 15-JAN-85 13:56:19

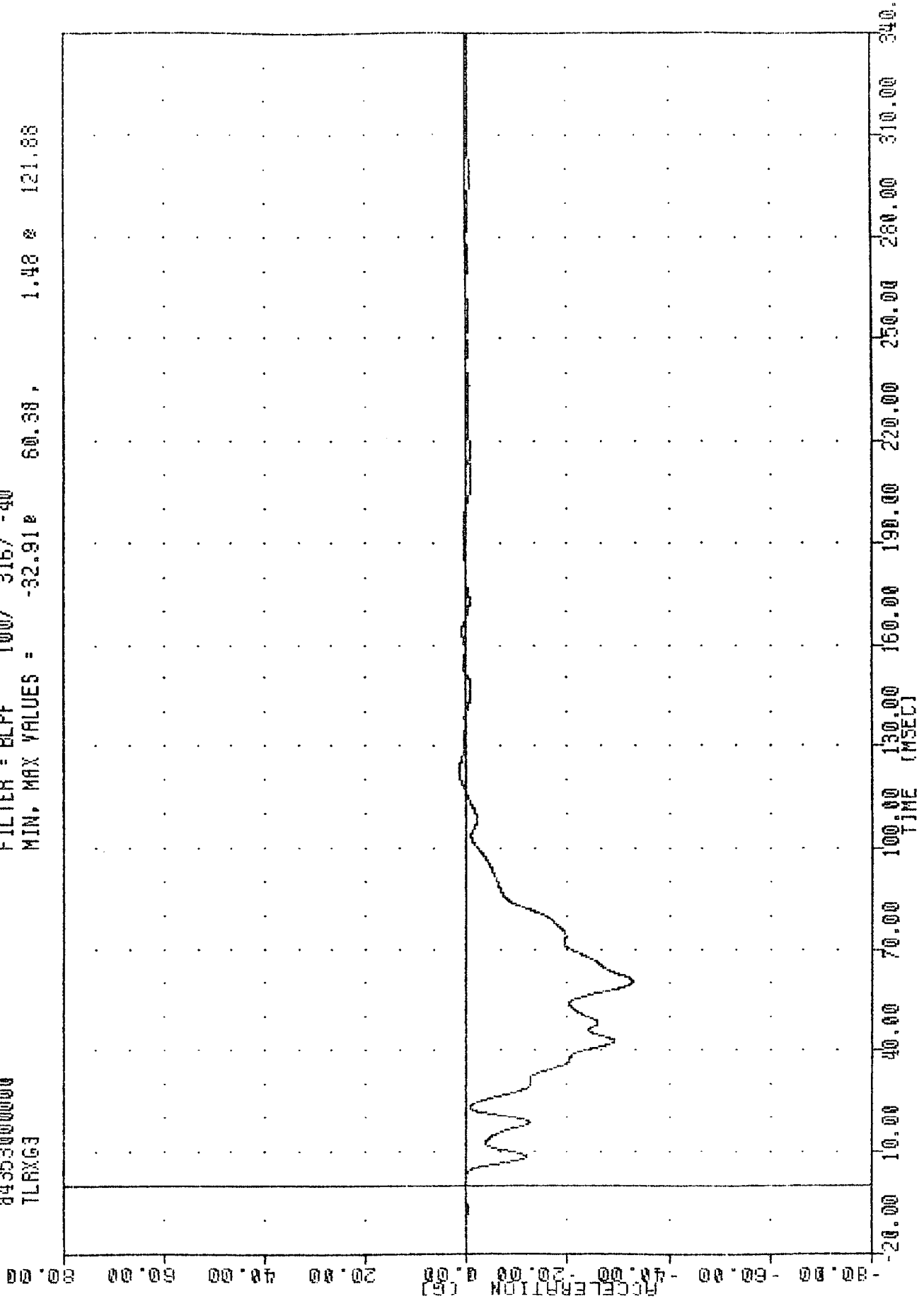
FILTER = 6LPF 300/ 949/ -40  
MIN, MAX VALUES = -4.45% 110.75, 30.32 @ 1.00



TRC , 8412188  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TLRXG3

PLOT DATE 15-JAN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -32.91e 60.38e 1.48e 121.88

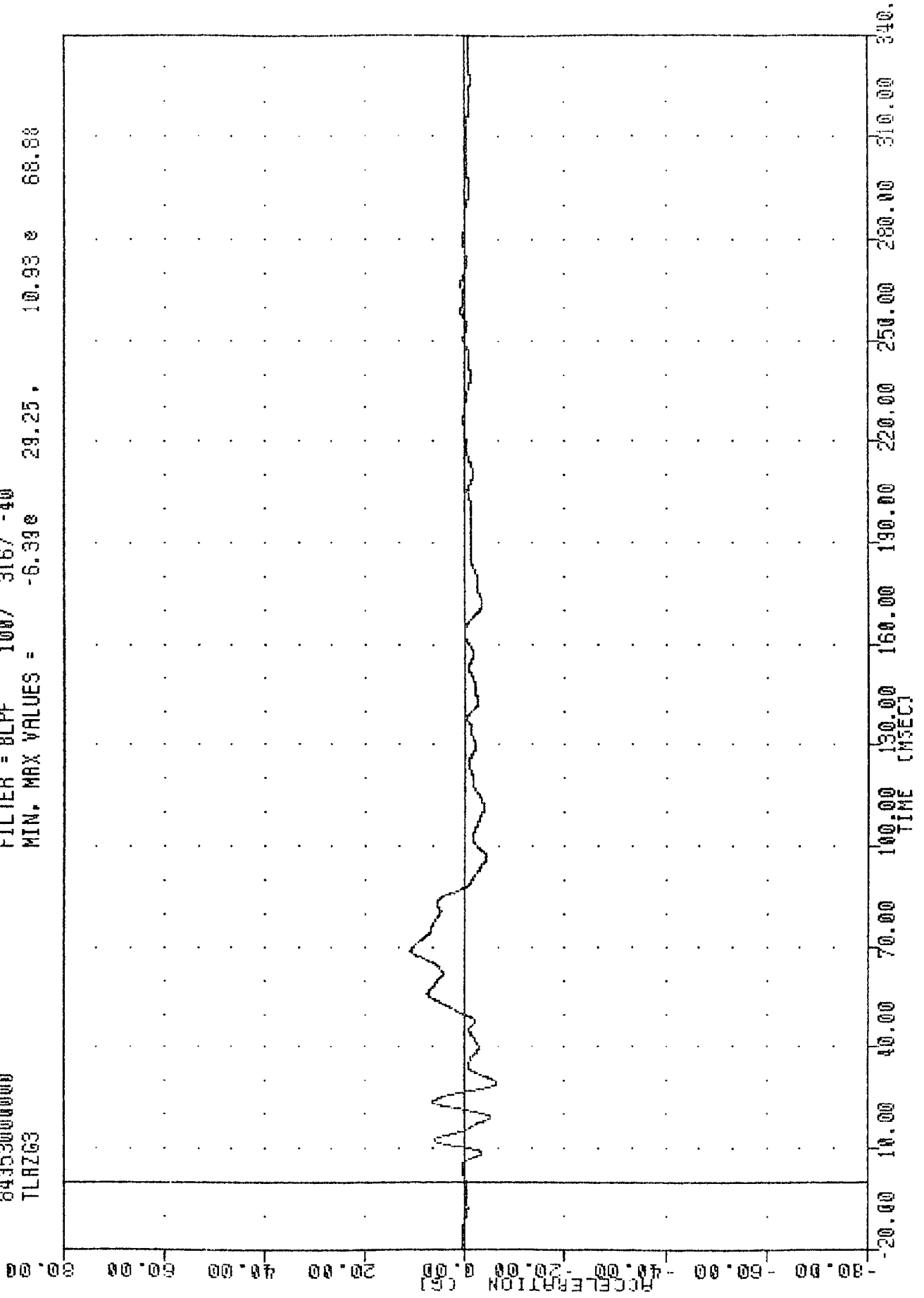


LEFT REAR SEAT ACCELERATION Y AXYS

TAC 8412185  
CAR TO CAR FRONTAL IMPACT  
04353000000  
TLRZG3

PLOT DATE 15-JAN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -6.39e 29.25, 10.93 e 68.68



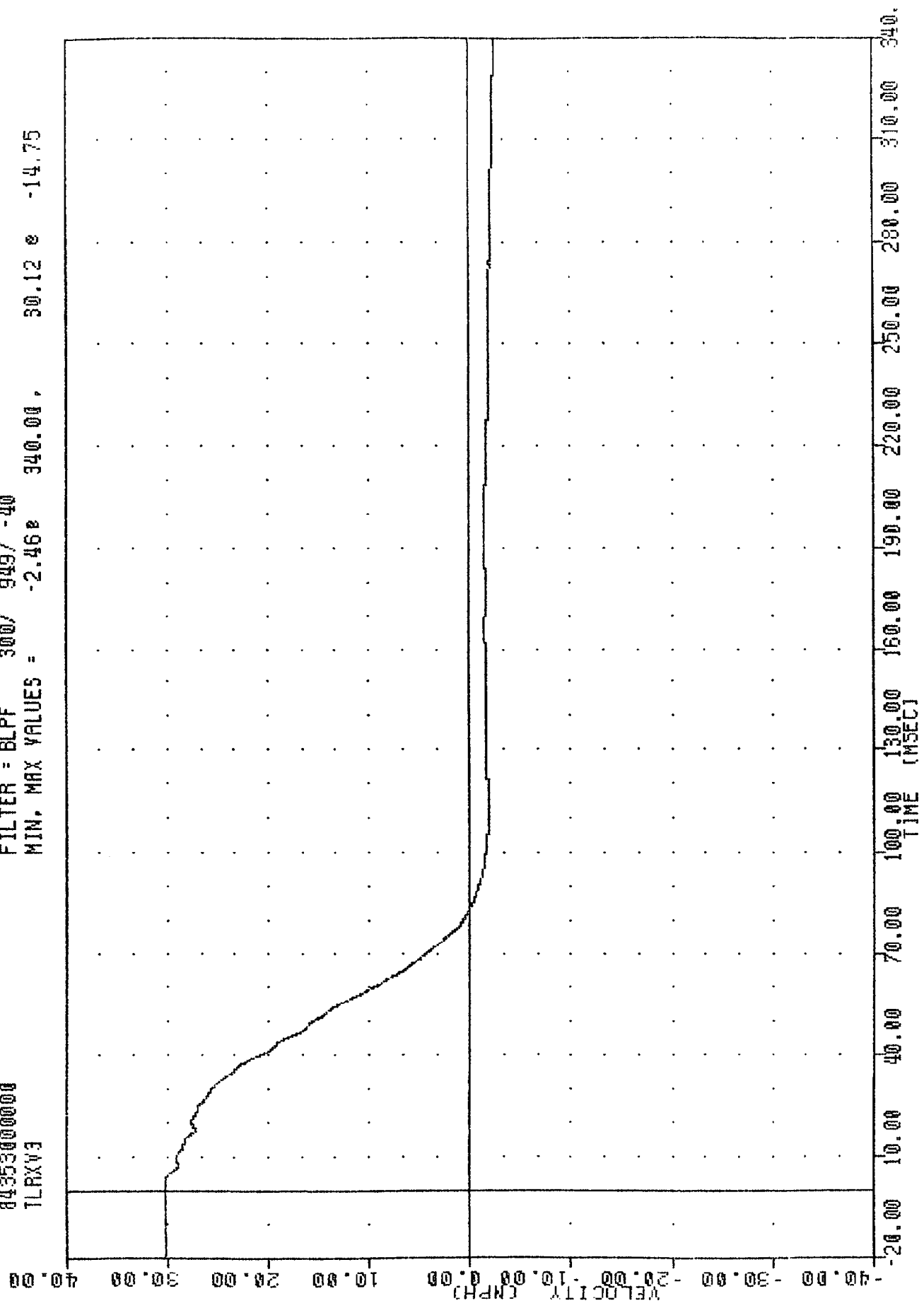
B-41

LEFT REAR SEAT ACCELERATION 7 AXIS

TRC  
84353000000  
CAR TO CAR FADNTAL IMPACT  
TLRXV3

PLOT DATE 15-JAN-85 13:56:19

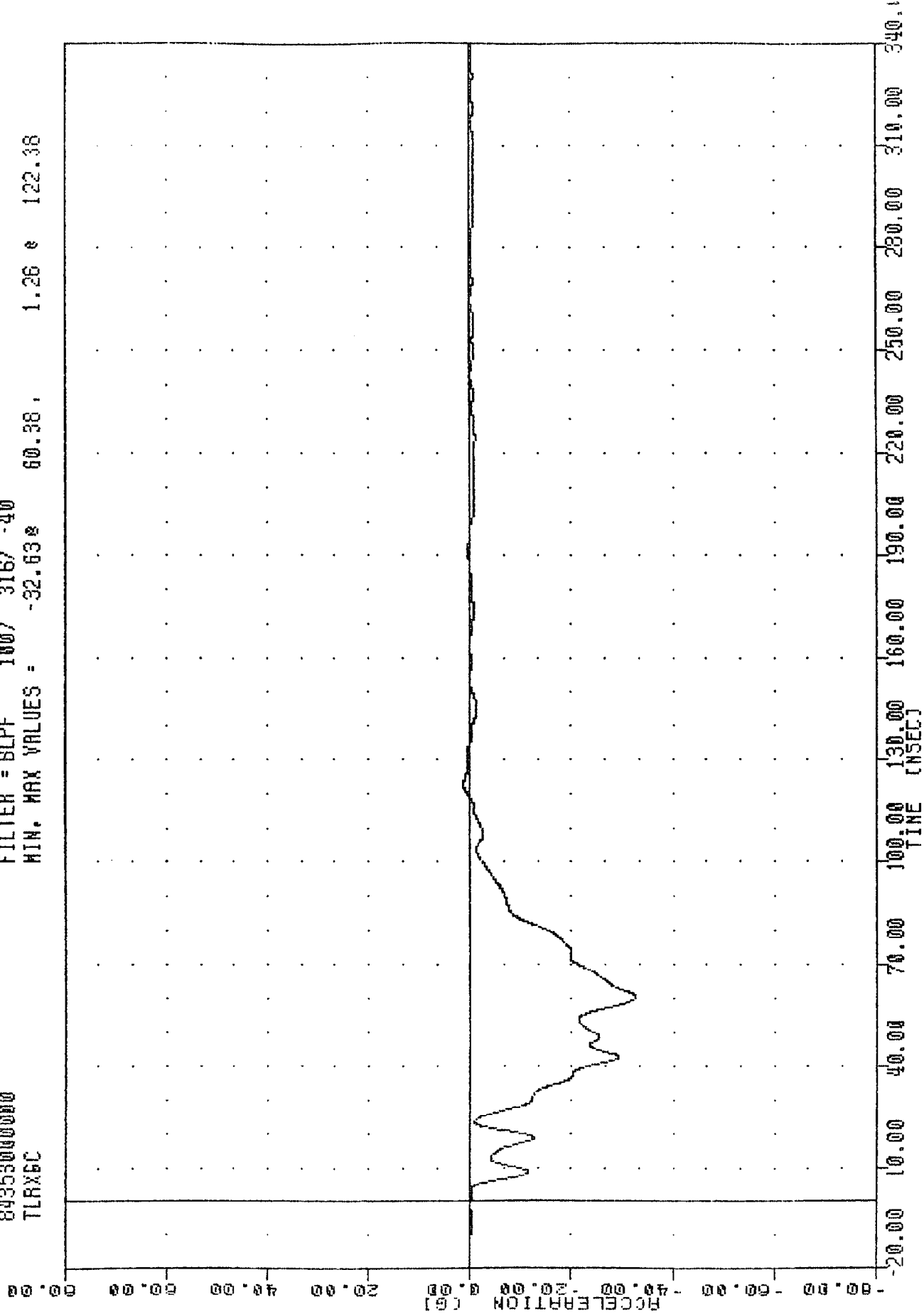
FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -2.46e 340.00, 30.12 e -14.75



TRC 8412185  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TLRX6C

PLUT DATE 15-JAN-85 13:55:17

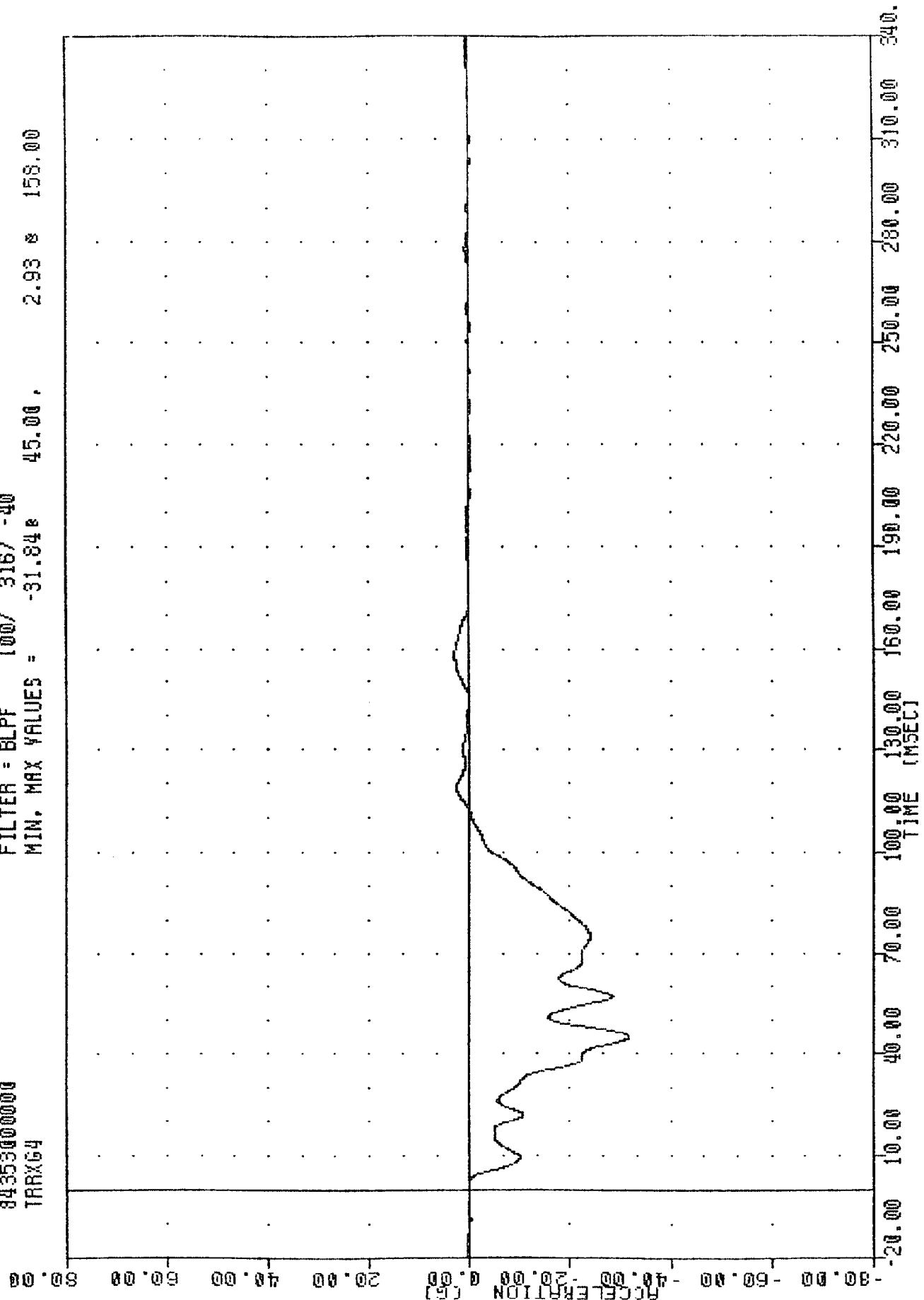
FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -32.63g 60.38g 1.26 e 122.38



TRC  
8412183  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TRRX64

PLOT DATE 15-JAN-85 13:55:17

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -31.84g 45.00g 2.93 s 158.00

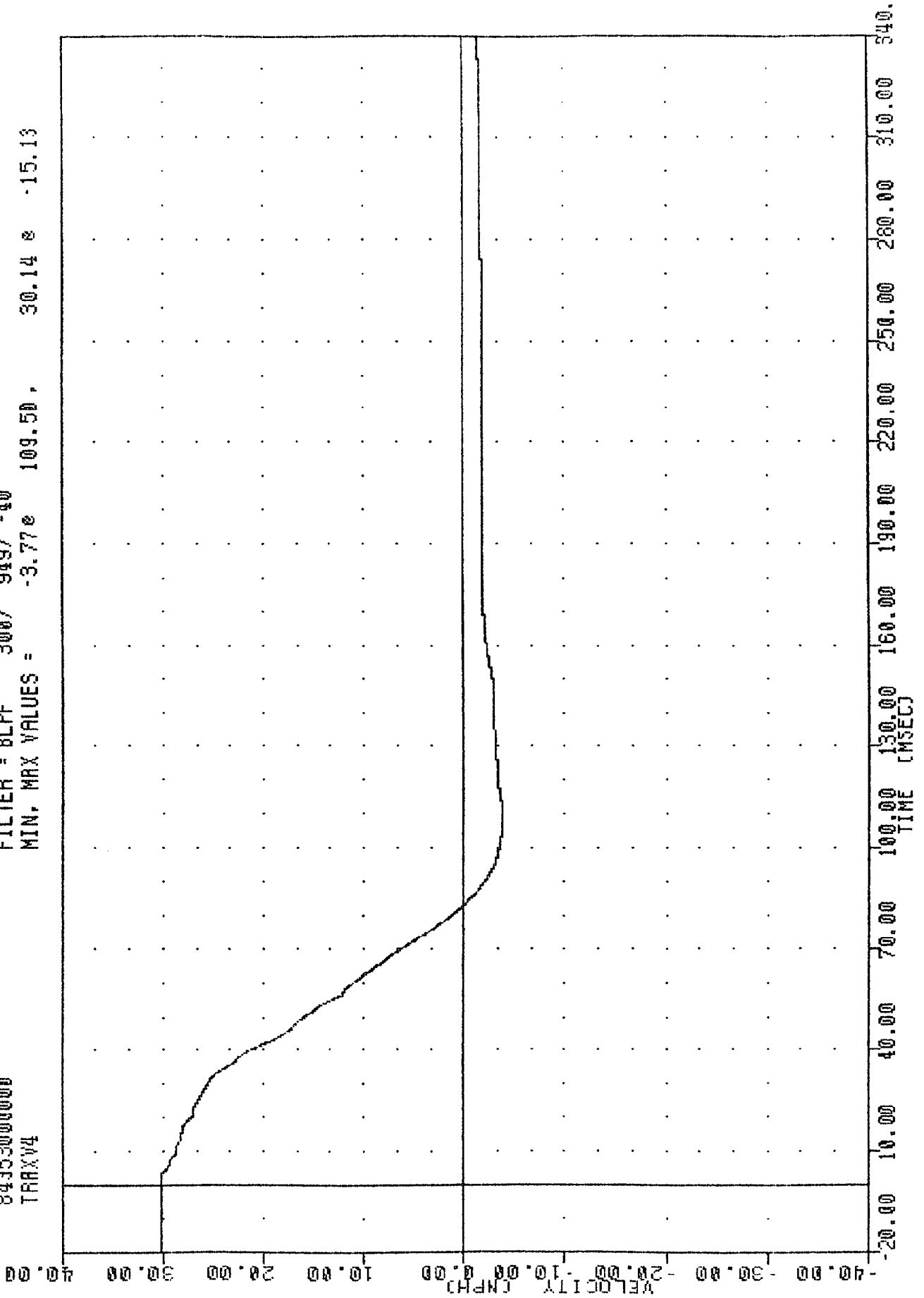


RIGHT REAR SEAT ACCELERATION X AXIS

TRC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TRAXV4

PLOT DATE 15-JAN-85 13:56:19

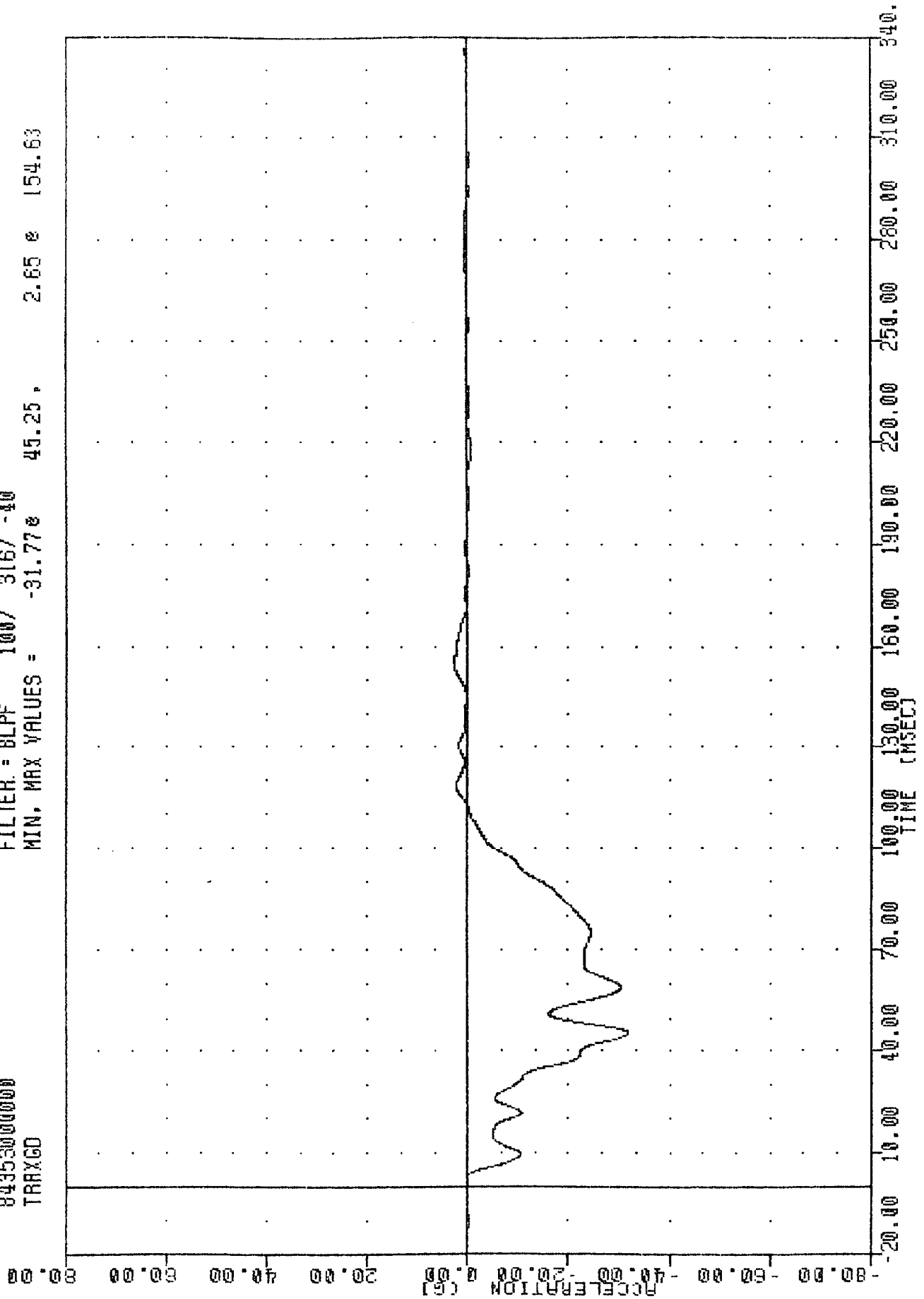
FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -3.77e 109.50, 30.14 e -15.13



TRC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TRAXGD

PLOT DATE 15-JAN-85 13:55:17

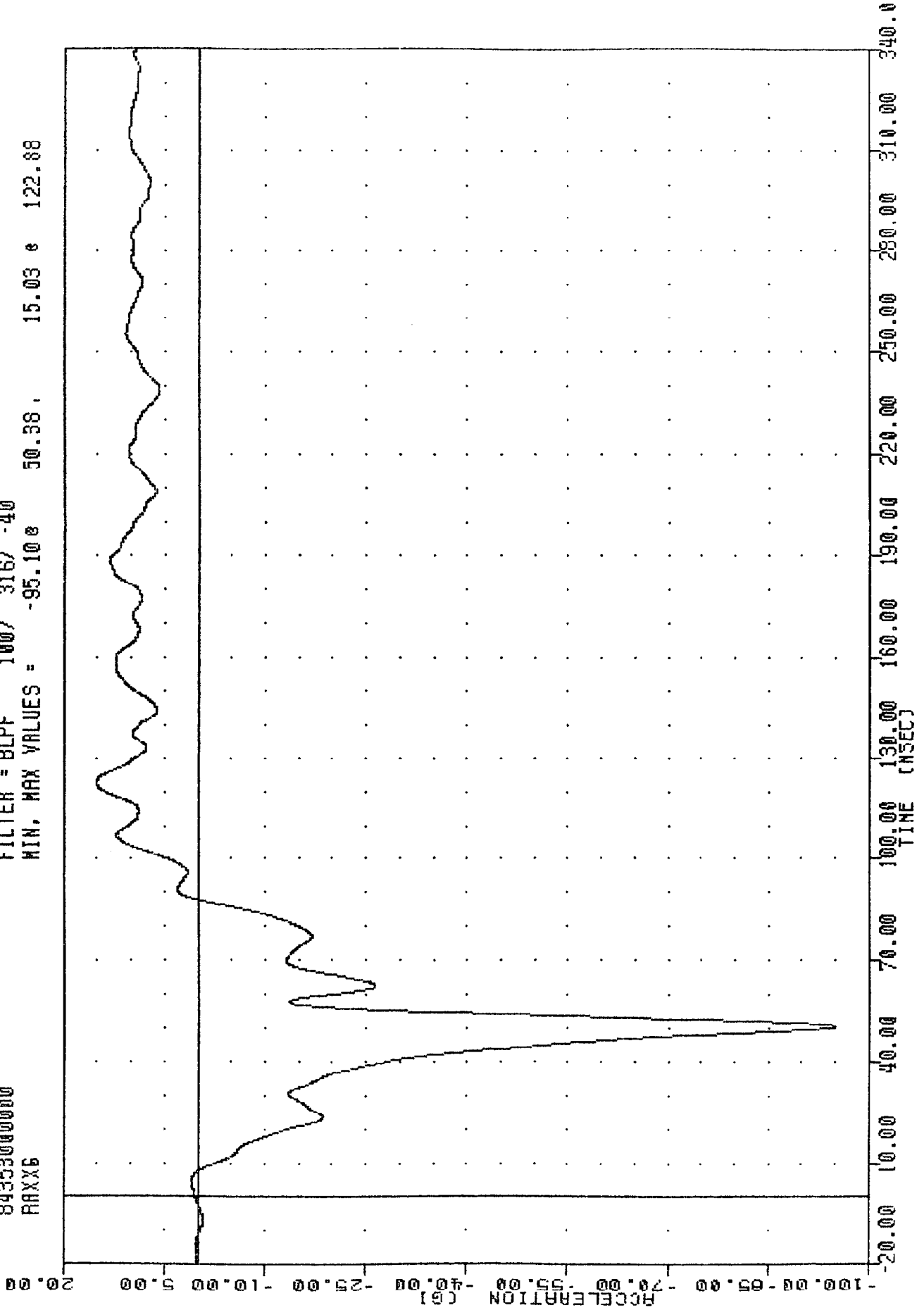
FILTER = 8LPF 100/ 316/ -40  
MIN, MAX VALUES = -31.77g 45.25g 2.65g 154.63



THC 8412185  
CAR TO CAR FRONTAL IMPACT  
84353000000  
RAXX6

PLOT DATE 14-MAR-85 16:04:21

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -95.10 50.36 15.03 122.88

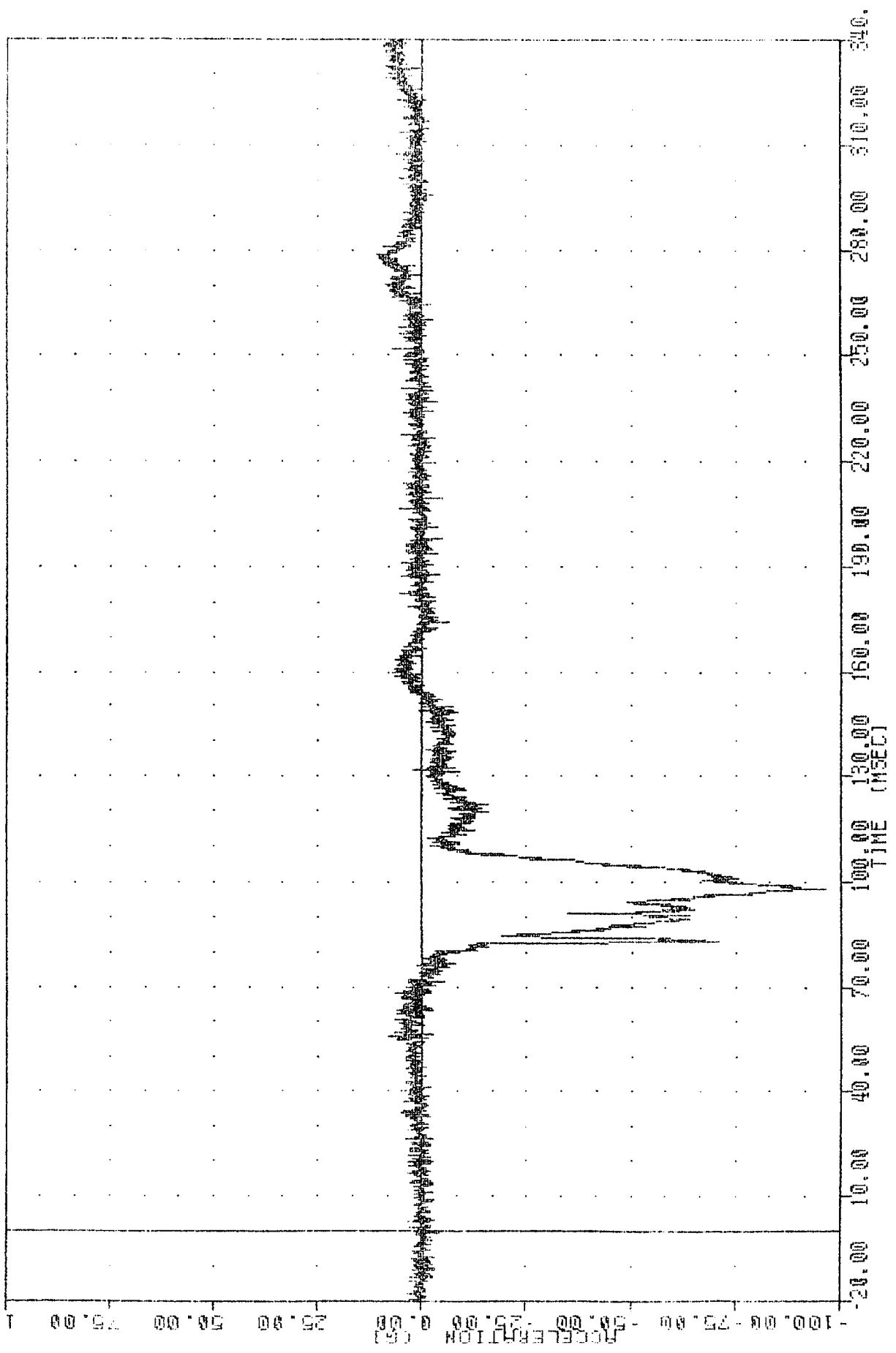


PARTNER VEHICLE DATA PLOTS

TRC  
841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEDX61

PLOT DATE 15-JAN-85 13:46:52

FILTER = ALPF 1650/ 5217/ -40  
MIN, MAX VALUES = -96.61 e 97.75, 10.69 e 278.75



DRIVER HEAD ACCELERATION X AXIS

TRC 841218P 15-JAN-85 13:46:52

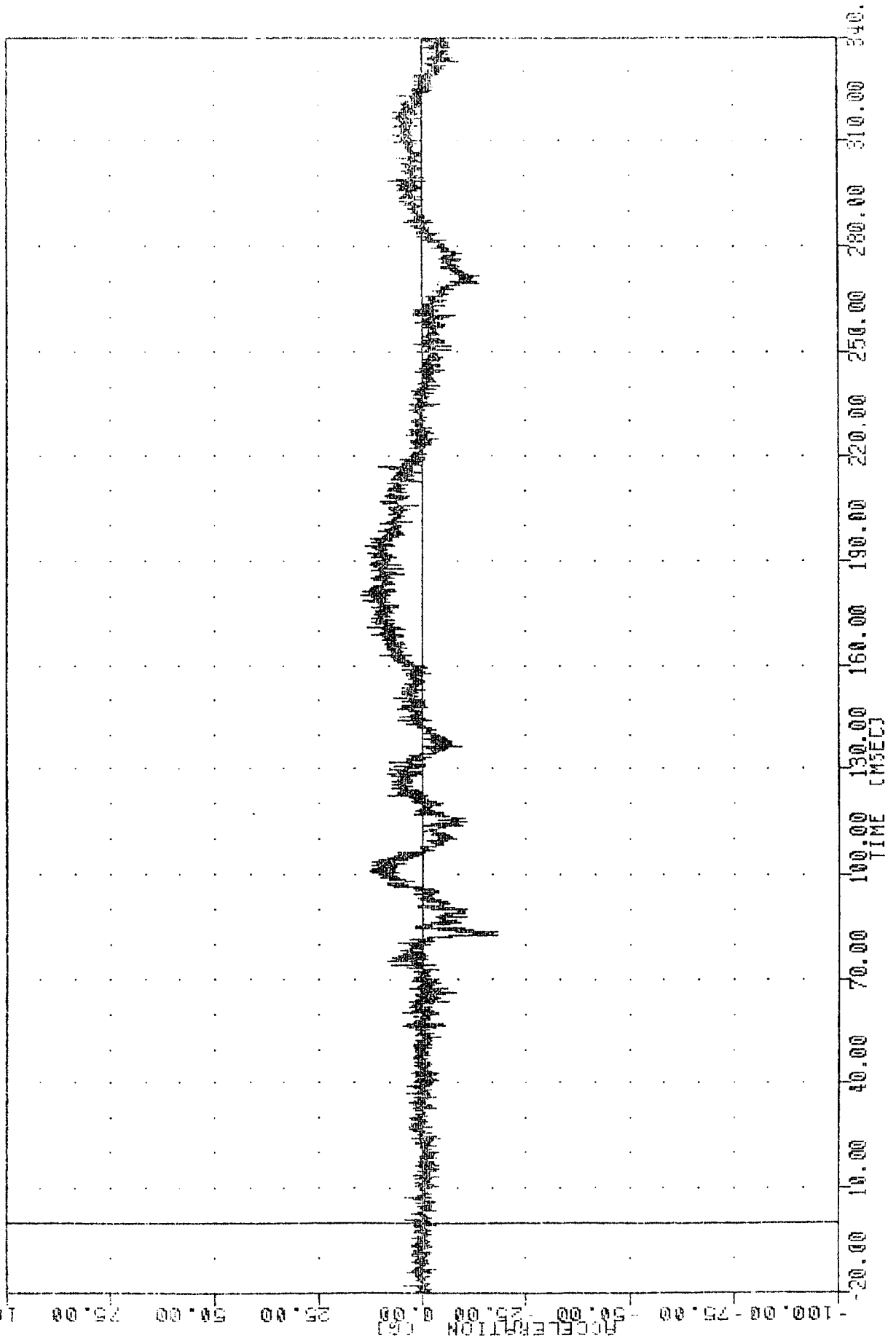
CAR TO CAR FRONTAL IMPACT

84353000000

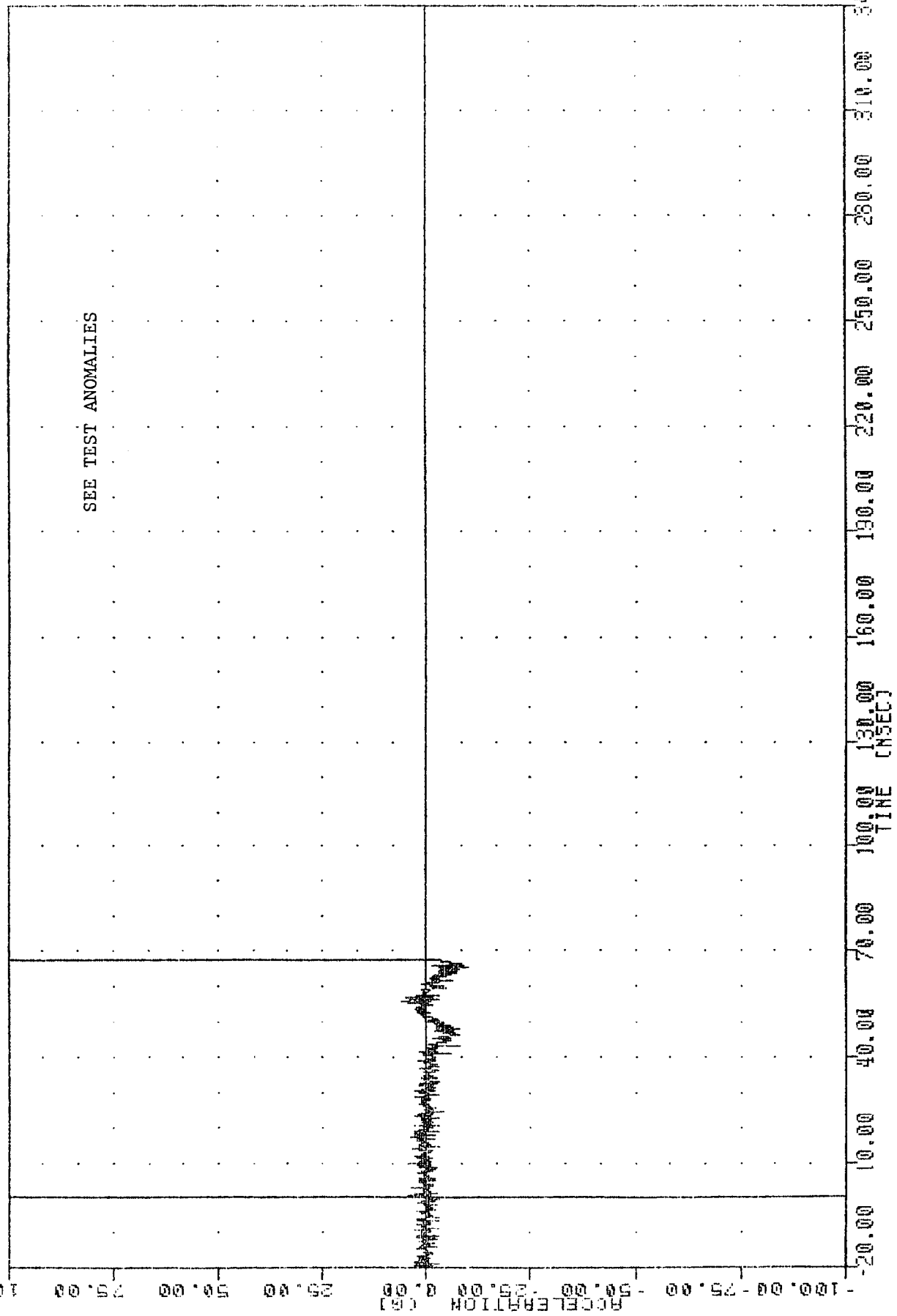
HEDY61

FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = -17.77e 82.63, 14.75 e 180.63



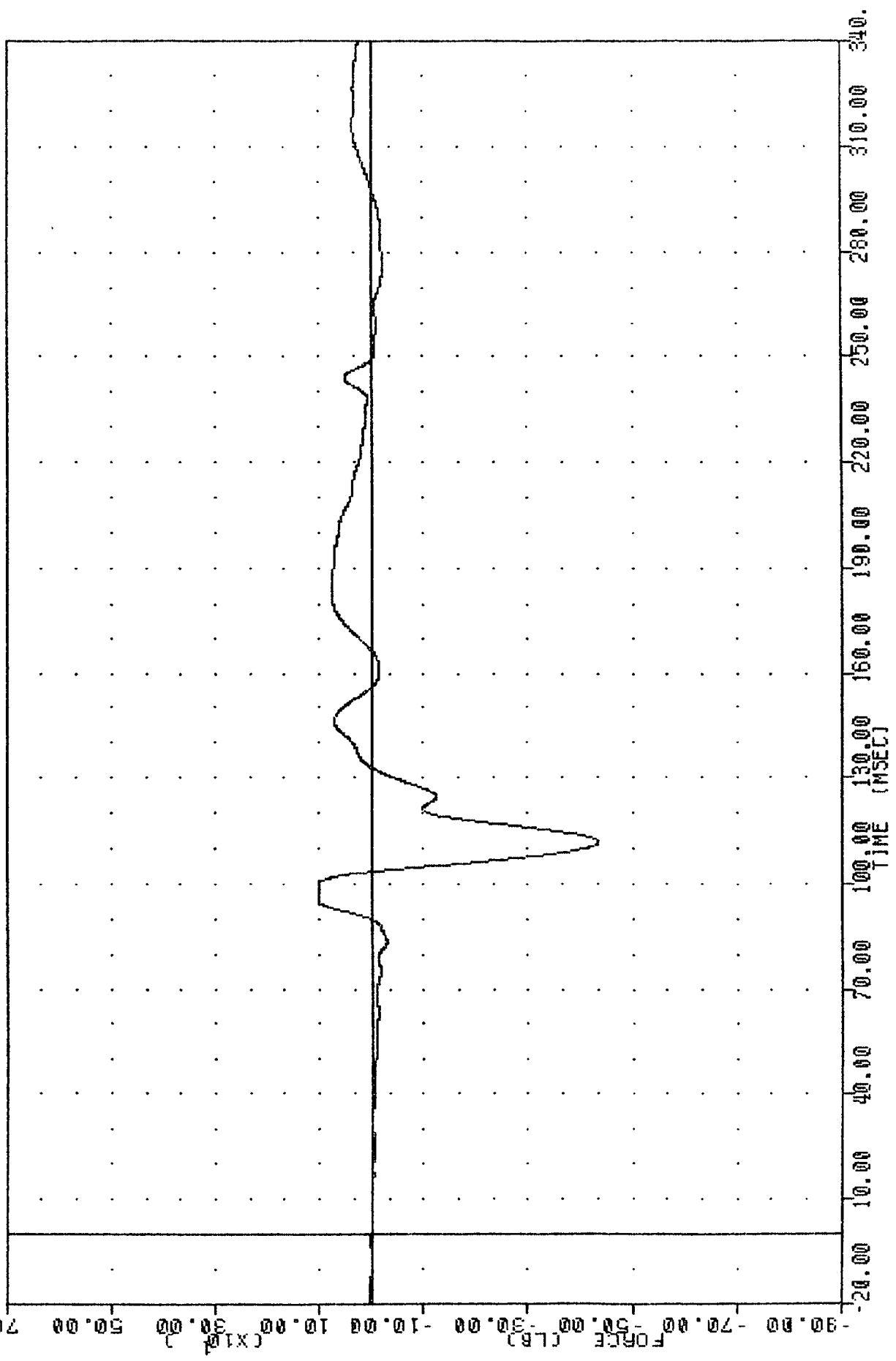
TRL 841218F  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 HEAD61  
 PLOT DATE 19-JAN-83 13:46:32  
 FILTER = ALPF 1650/ 5217/ .40  
 MIN, MAX VALUES = -9.81g 65.38, 841.11 g 67.63



DRIVER HEAD ACCELERATION Z AXIS

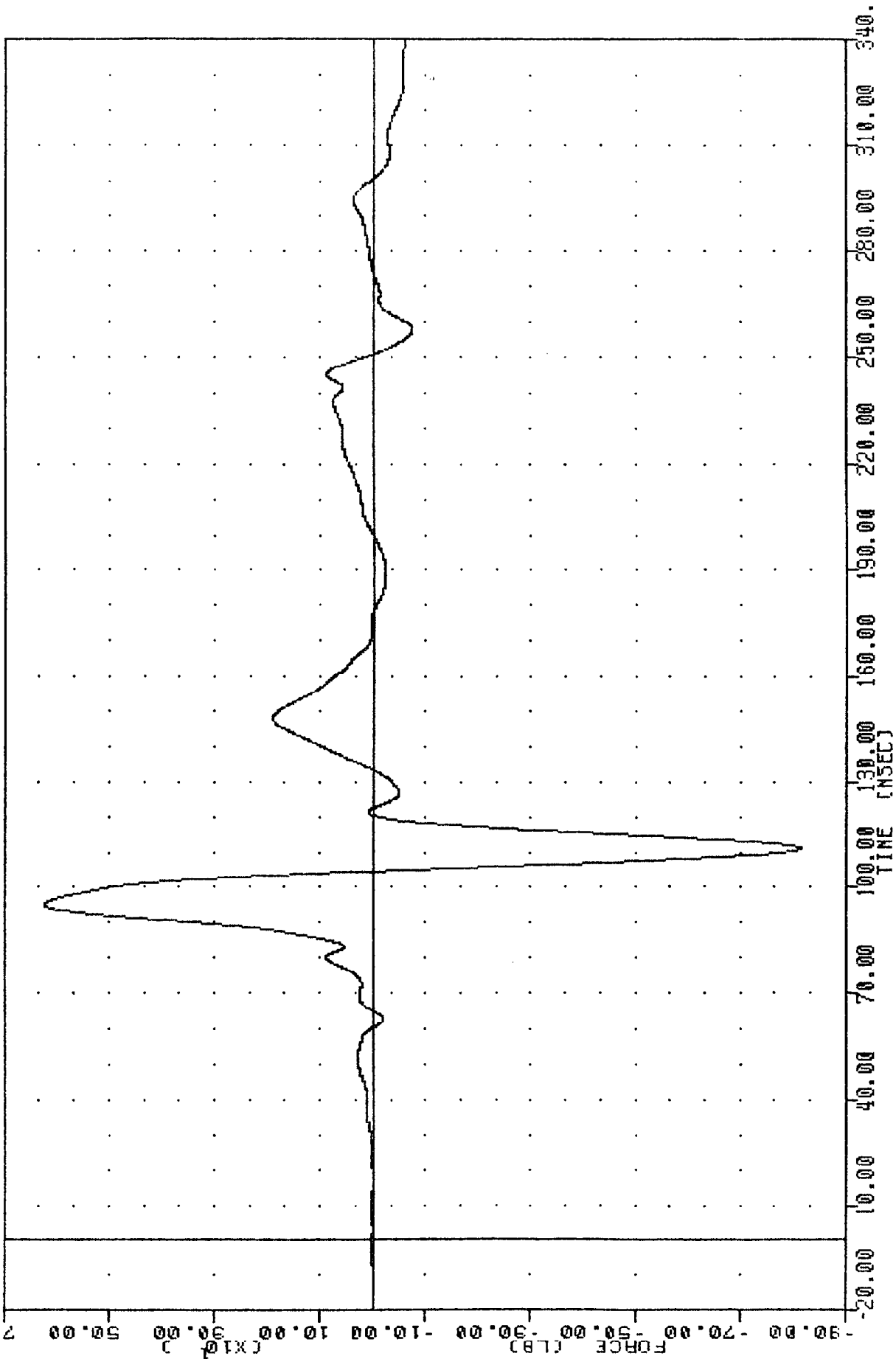
786 412459 24 JAN 85 10:07:50  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 NEKXF2

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -435.82 111.63, 102.54 95.38



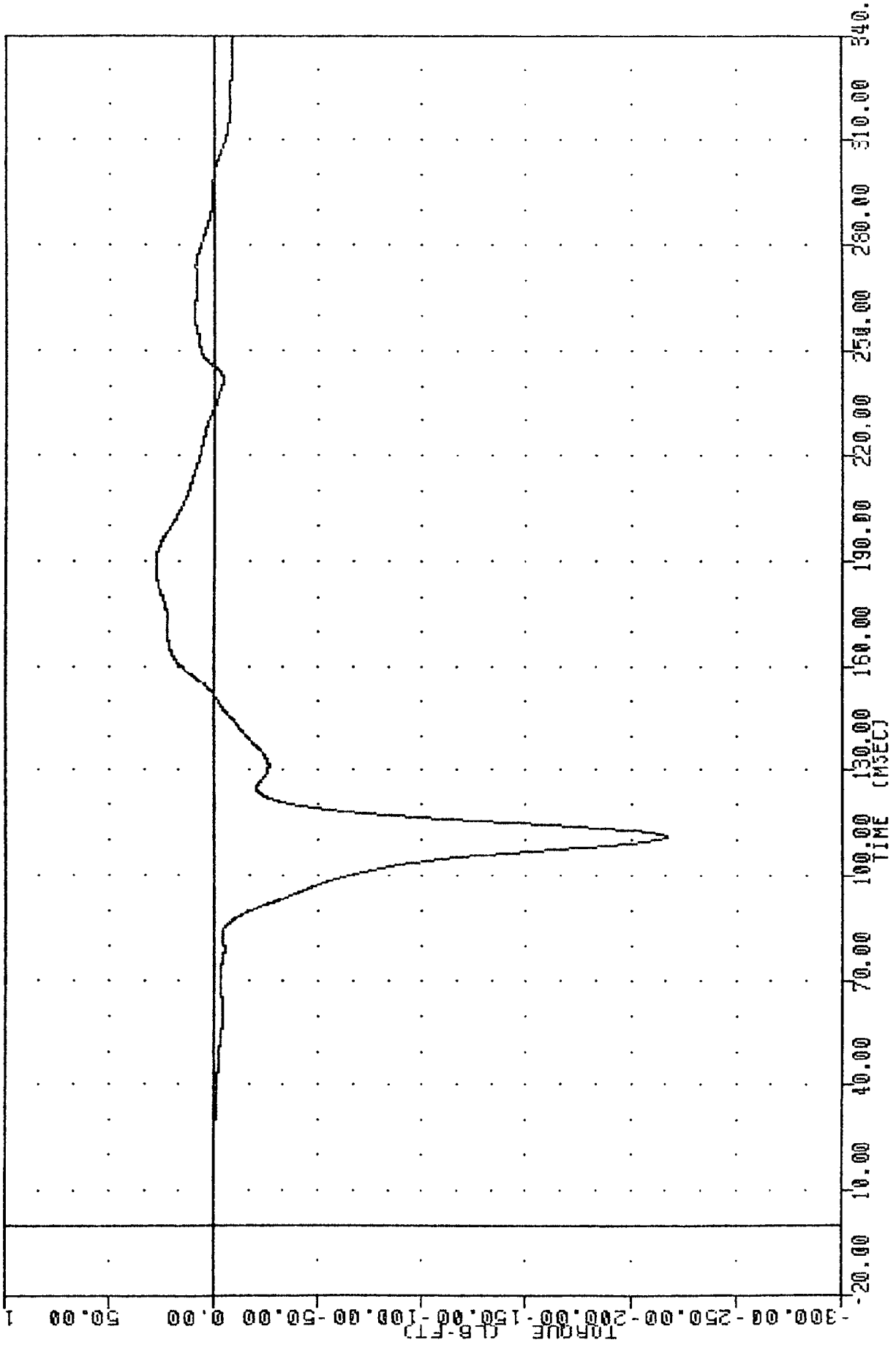
PASSENGER NECK FORCE X AXIS LBS (SHEAR)

TAC 841218P PLOT DATE 21-JAN-85 10:07:50  
 CHA TO CAR FRONTAL IMPACT  
 84353000000  
 NEKZF2  
 FILTER = BLPF 100/ 316/ .40  
 MIN, MAX VALUES = -815.88e 110.88, 623.79 e 94.88



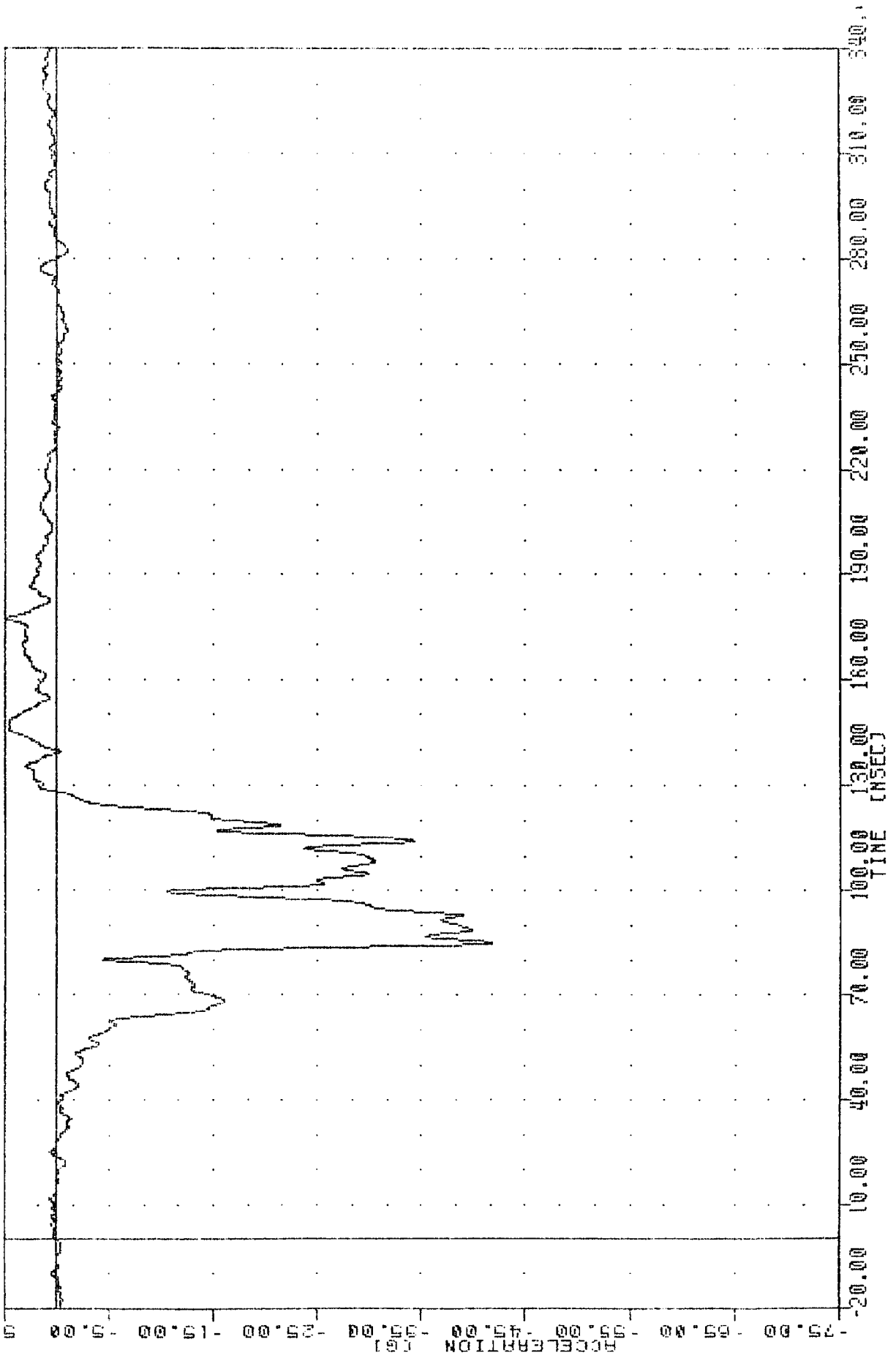
PASSENGER NECK FORCE Z AXIS LBS (AXIAL)

TRC [REDACTED] 0412198 [REDACTED] PLOT DATE 21 JAN 85 10:07:50 [REDACTED]  
 CAR TO CAR FRONTAL IMPACT [REDACTED]  
 84353000000  
 NEKYM2  
 FILTER = 8LPF 100/ 316/ -40  
 MIN, MAX VALUES = -216.97e 110.88, 27.86 e 188.75



PASSENGER NECK MOMENT Y AXIS FT-LBS

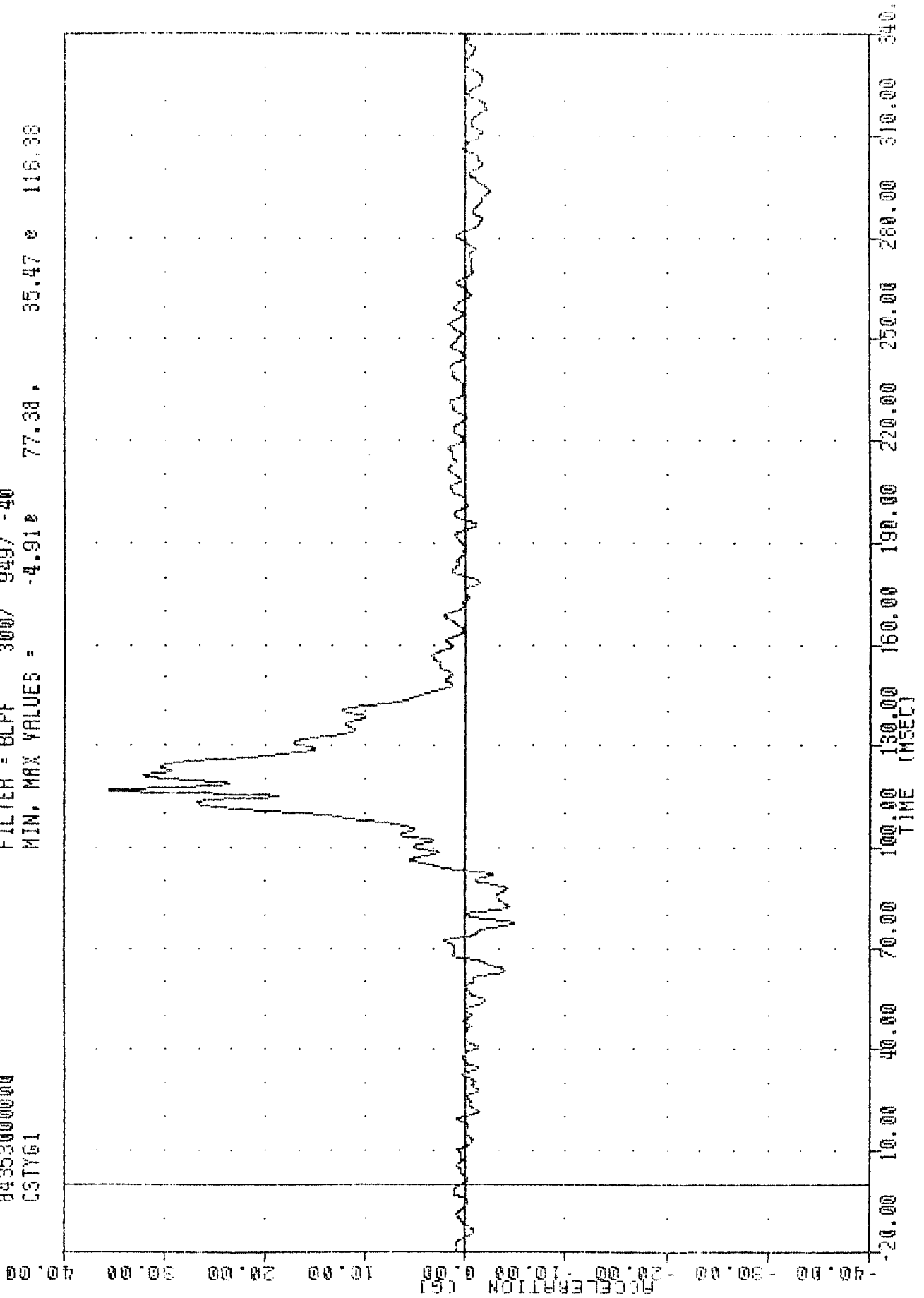
TRC 841218P 15-JAN-85 13:46:52  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTX51  
 FILTER = BLPF 300 / 949 / -40  
 MIN. MAX VALUES = -41.83e 85.13, 4.80 e 177.25



TAC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
CSTYG1

PLOT DATE 15-JAN-85 13:46:52

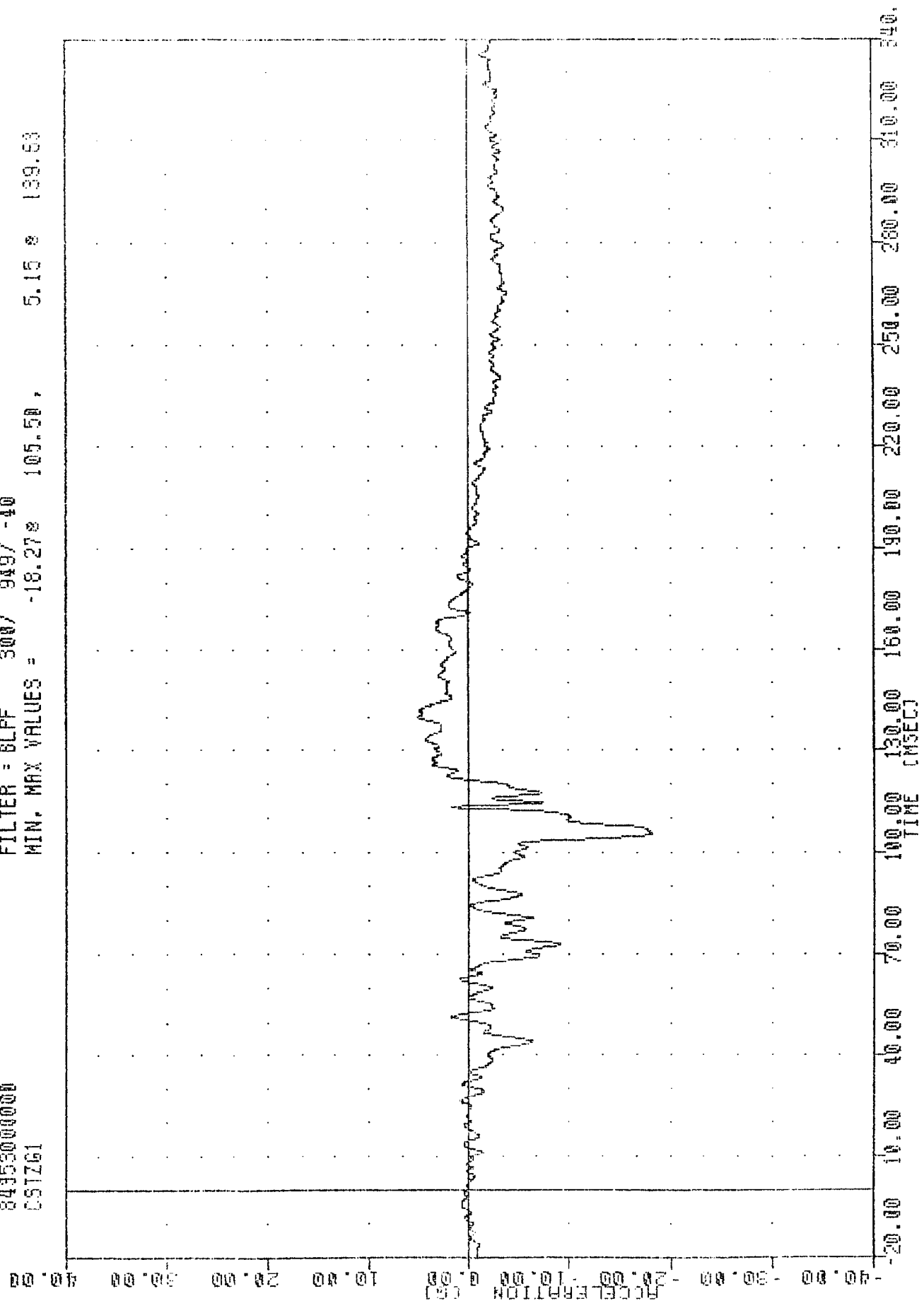
FILTER = BLPF 300/ 949/ -40  
MIN, MAX VALUES = -4.91e 77.38, 35.47 e 116.38



TRC  
84353000000  
ESTZ61  
CAR TO CAR FRONTAL IMPACT  
, 841218P

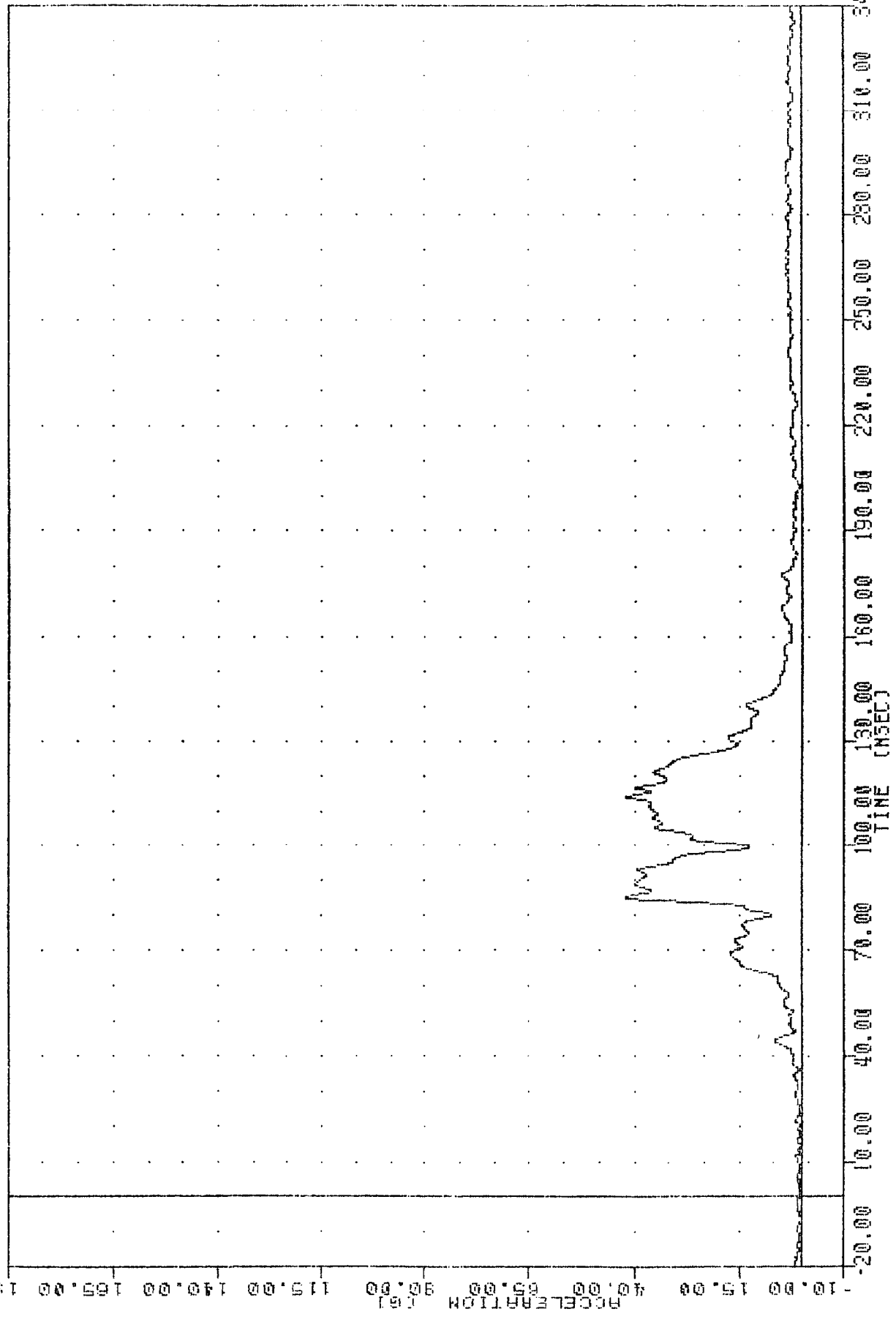
PLOT DATE 15-JAN-85 13:46:52

FILTER = 8LFF 300/ 949/ -40  
MIN. MAX VALUES = -18.27% 105.50, 5.15% 139.63



DRIVER CHEST ACCELERATION Z AXIS

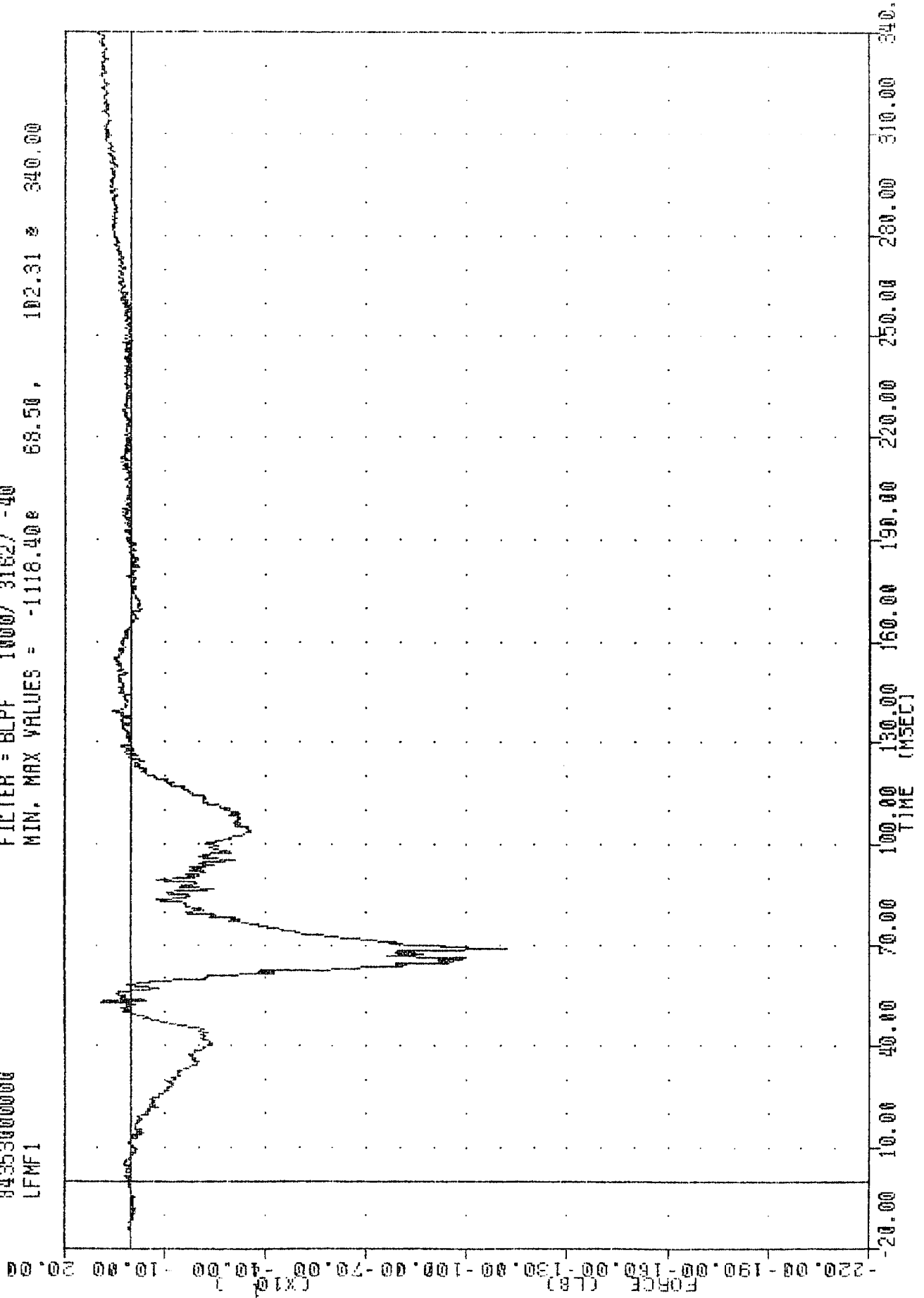
TAC 841218P  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTR61  
 PLOT DATE 15-JAN-85 13:46:52  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = 0.01e -6.38 , 41.96 e 85.13



TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
LFMF1

PLOT DATE 15-JAN-85 13:46:52

FILTER = BLPF 1000/ 3162/ -40  
MIN. MAX VALUES = -1118.40e 68.50, 102.31 e 340.00

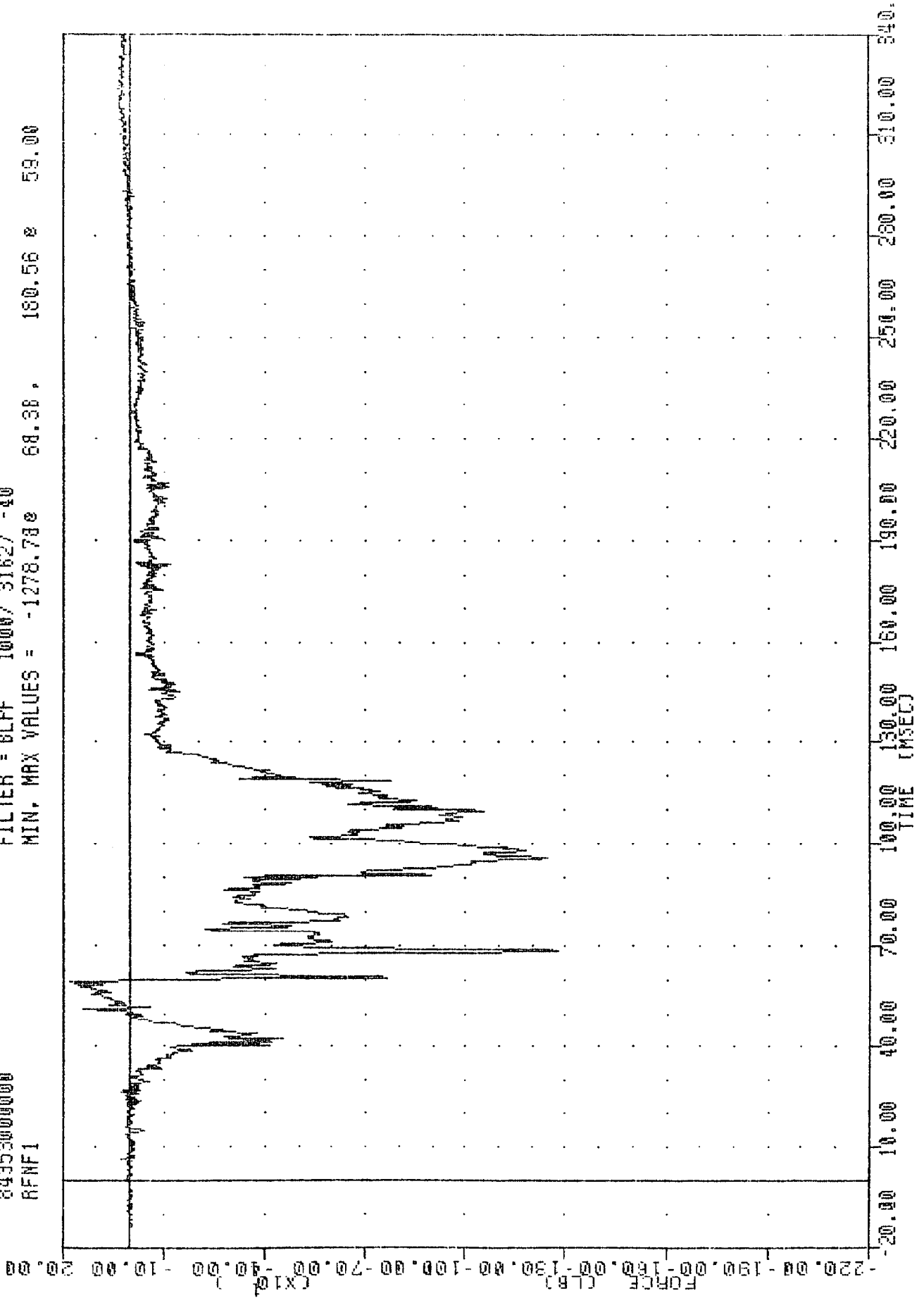


DRIVER LEFT FEMUR FORCE LBS

TRC  
841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
RFNF1

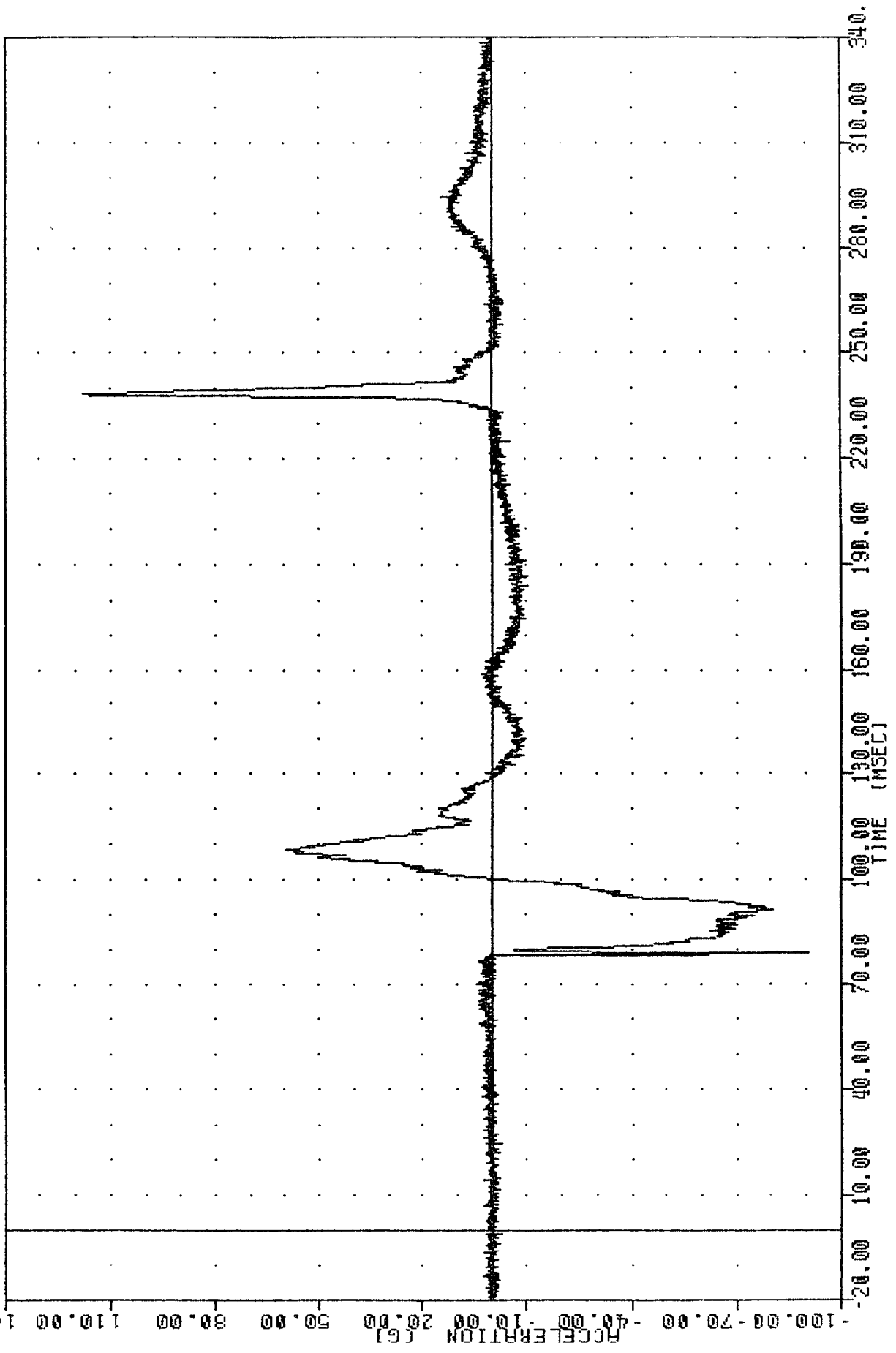
PLOT DATE 15-JAN-85 13:46:52

FILTER = BLFF 1000/ 3162/ -40  
MIN. MAX VALUES = -1278.730 68.38 , 180.56 59.00



REC 841218P 21 JAN 85 10:07:50  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEDX62

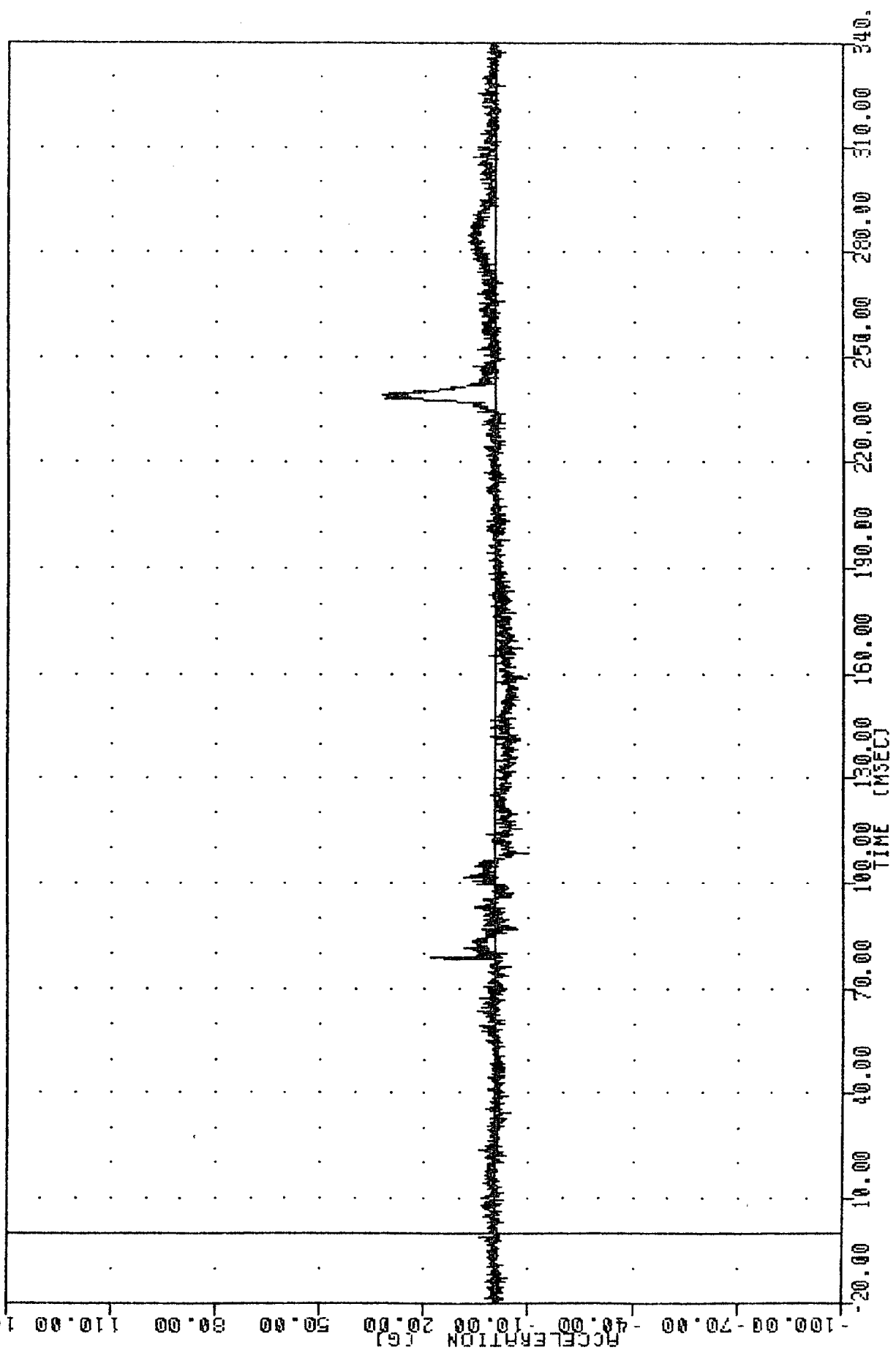
FILTER = ALPF 1650/ 5217/ -40  
MIN. MAX VALUES = -90.63B 78.69, 117.82 e 238.25



PASSENGER HEAD ACCELERATION X AXIS

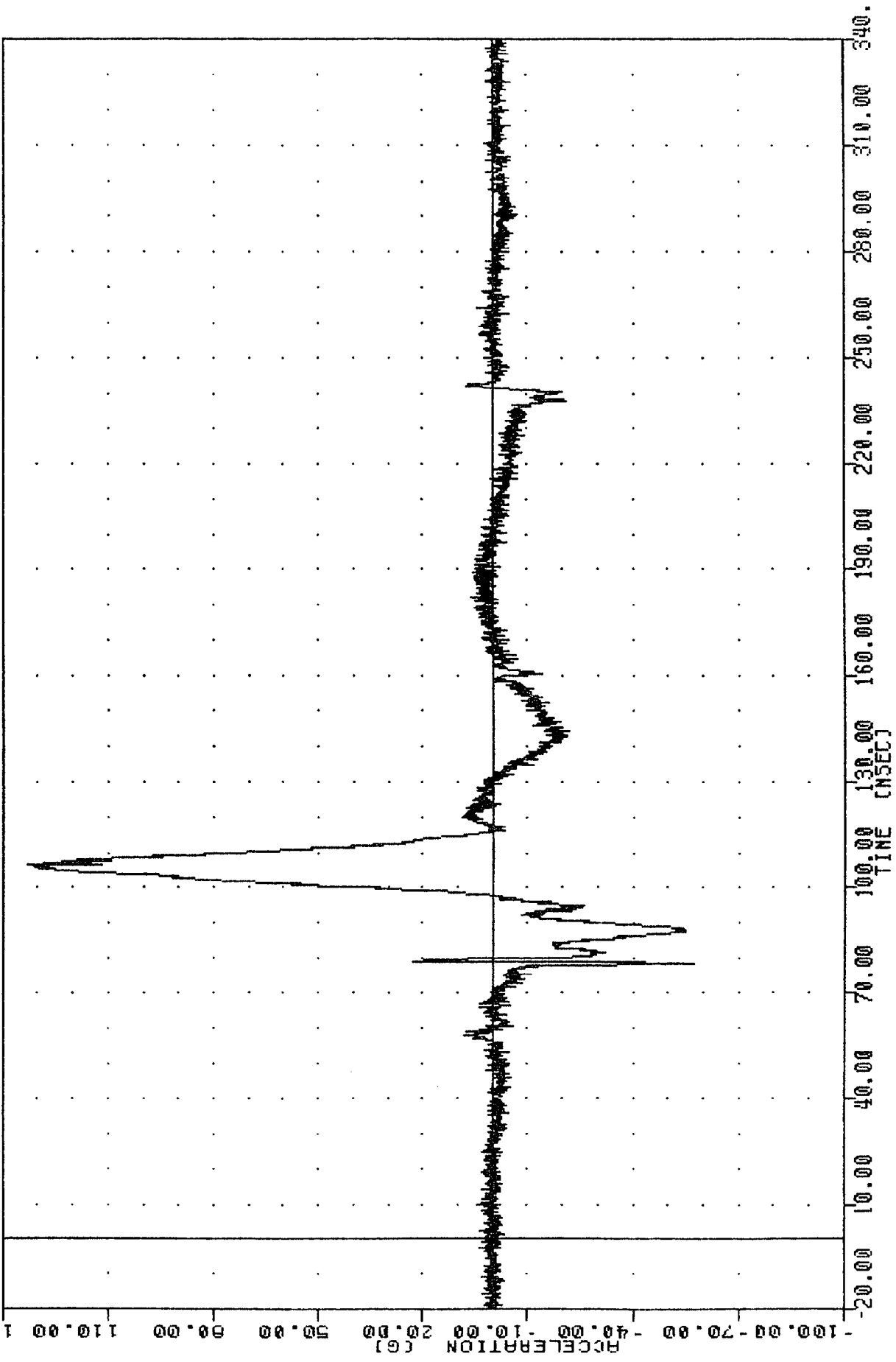
TRC [REDACTED] 0412100 [REDACTED] 07:50 [REDACTED]  
CAR TO CAR FRONTAL IMPACT  
84353000000  
HEDYG2

PLOT DATE 21 JAN 86  
FILTER = ALPF 1650 / 5217 / -40  
MIN, MAX VALUES = -9.43g 108.38g 32.33g 239.13g



PASSENGER HEAD ACCELERATION Y AXIS

IBC 841218P 21-JAN-85 10:07:50  
 CHH TO CHH FRONTAL IMPACT  
 84353000000  
 HEDZ62  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN. MAX VALUES = -57.26e 78.63, 132.97 e 106.38



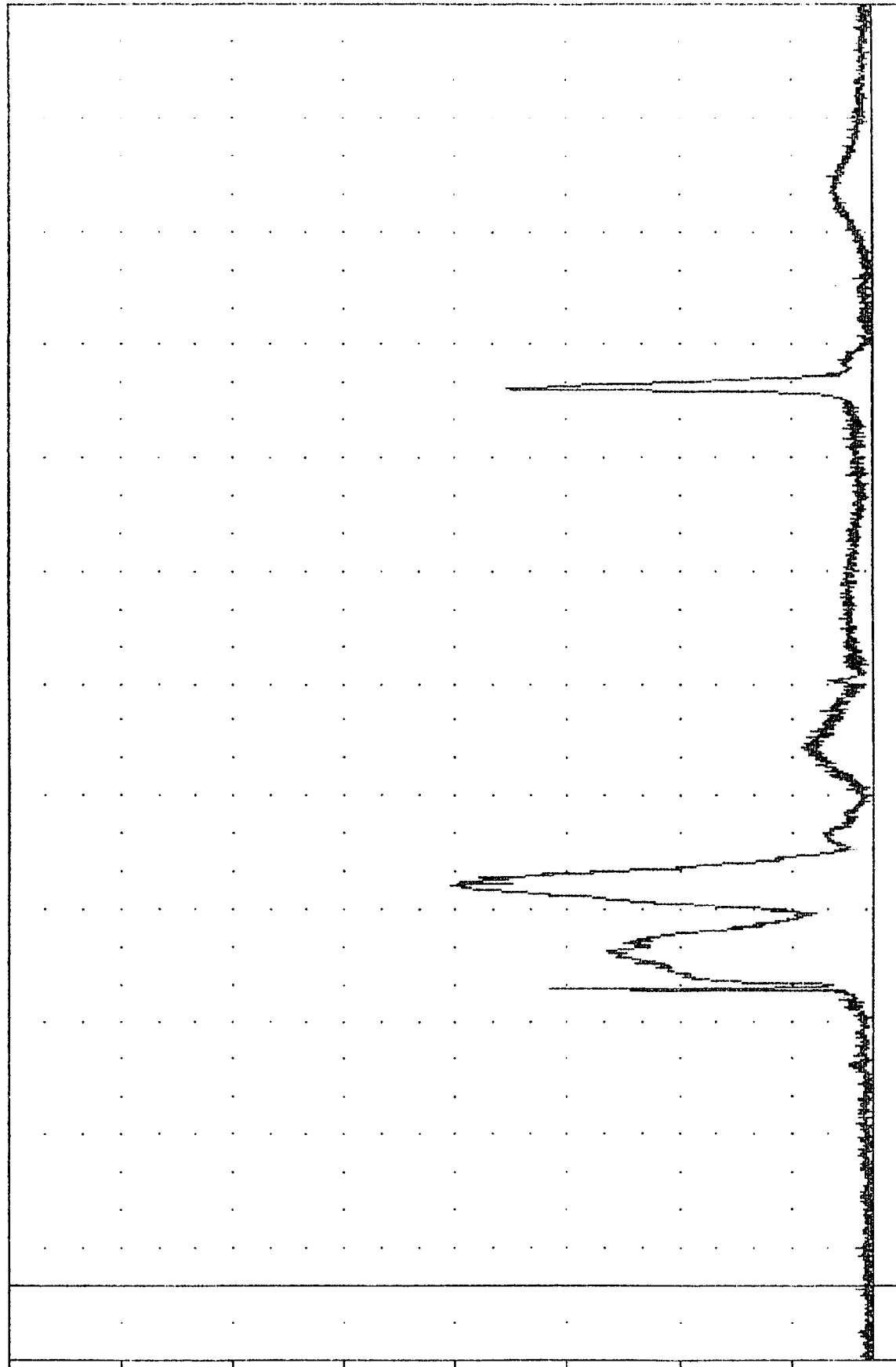
PASSENGER HEAD ACCELERATION Z AXIS

TRC 841218F 15-JAN-85 13:46:52

CAR TO CAR FRONTAL IMPACT  
84353000000  
HEAD62

FILTER = ALPF 1650/ 5217/ -40  
MIN. MAX VALUES = 0.25e 10.38 , 141.79 e 106.38

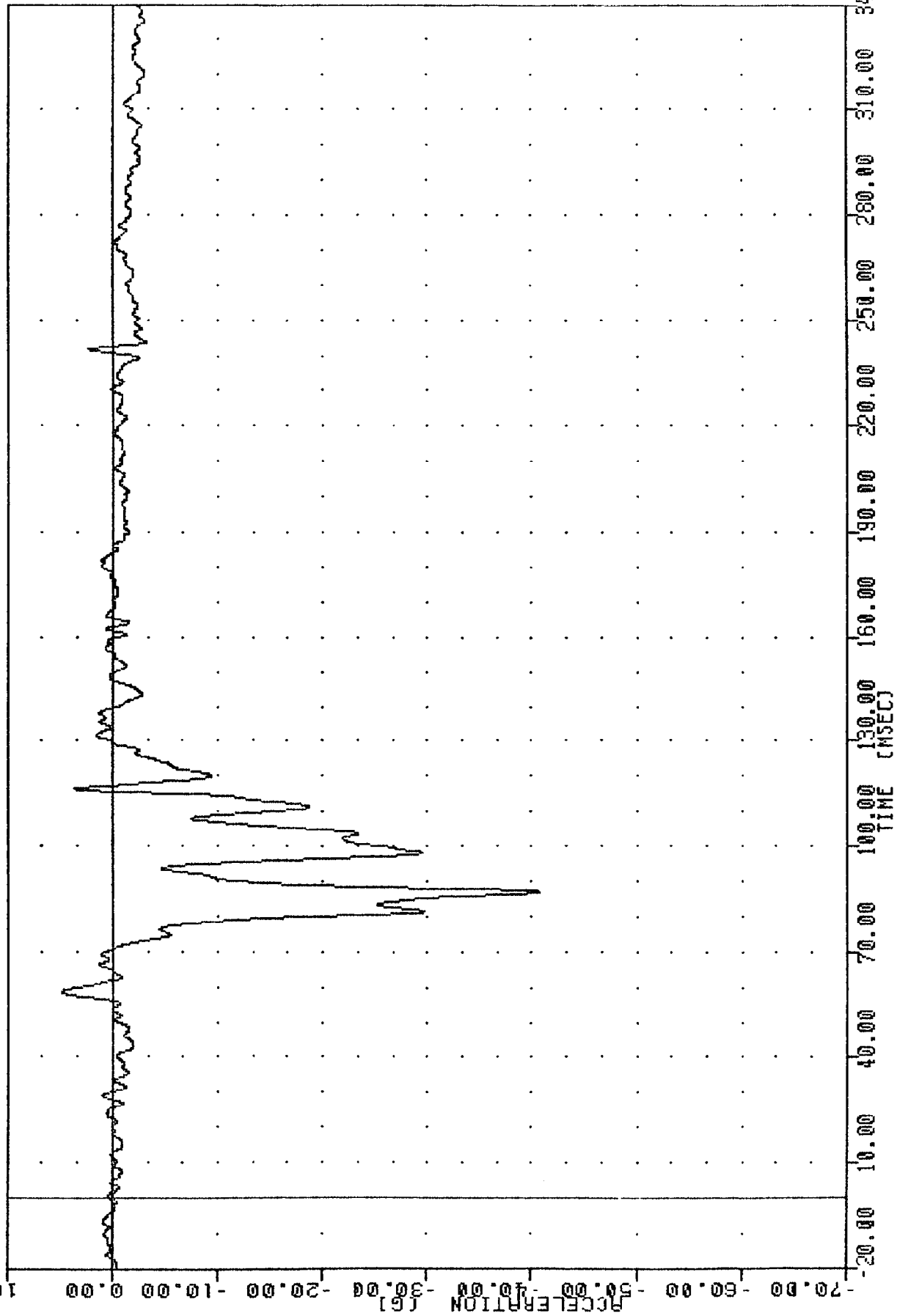
ACCELERATION [G] 10.00 27.50 65.00 102.50 140.00 177.50 215.00 252.50 290.00



TIME (MSEC) -20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.

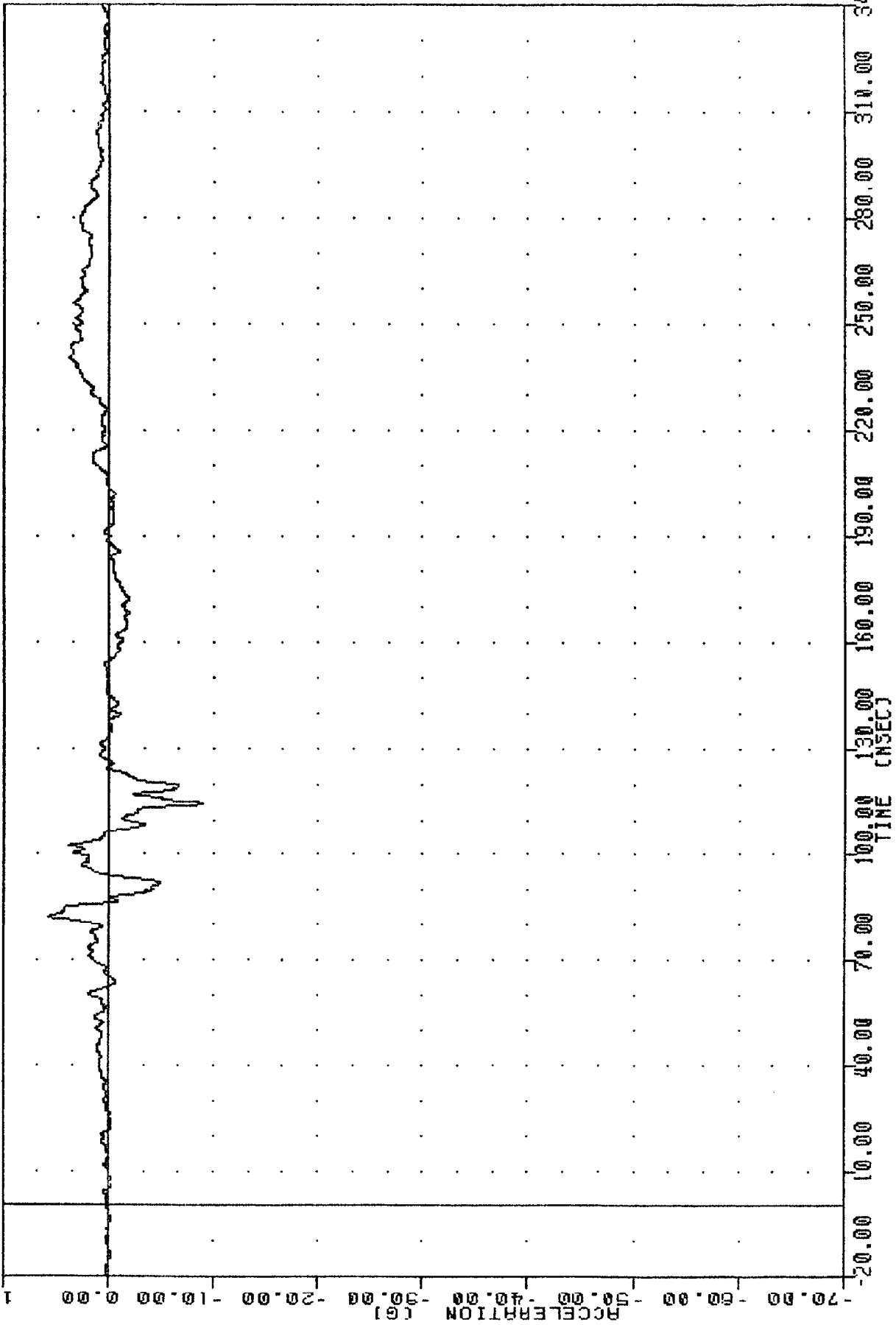
PASSENGER HEAD RESULTANT

TRIP # 2100  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CSTXG2  
 PLOT DATE 21 JAN 85 10:07:58  
 FILTER = 8LPF 300/ 949/ -40  
 MIN. MAX VALUES = -40.72e 86.75, 4.83 e 58.50

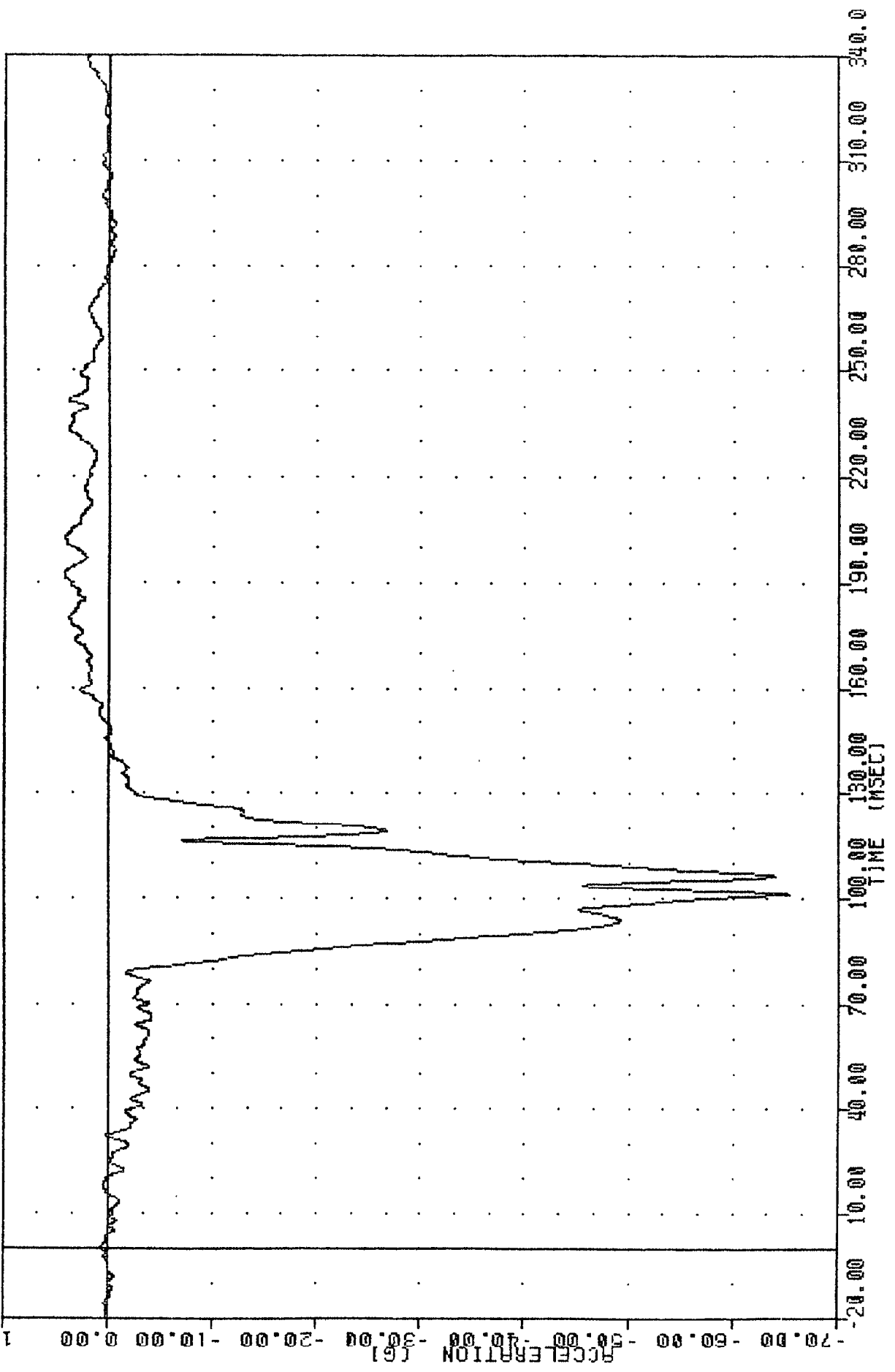


PASSENGER CHEST ACCELERATION X AXIS

TRC 841218P 21-JAN-85 10:07:50  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 CTYPE2  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -8.98e 114.50 , 5.59 e 82.13



TRC [REDACTED] 21-JAN-85 10:07:50 [REDACTED]  
 CAR TO CAR FRONTAL IMPACT [REDACTED]  
 84353000000  
 CSTZ62  
 FILTER = BLPF 300/ 949/ -40  
 MIN, MAX VALUES = -65.47g 101.13, 4.27 e 191.63

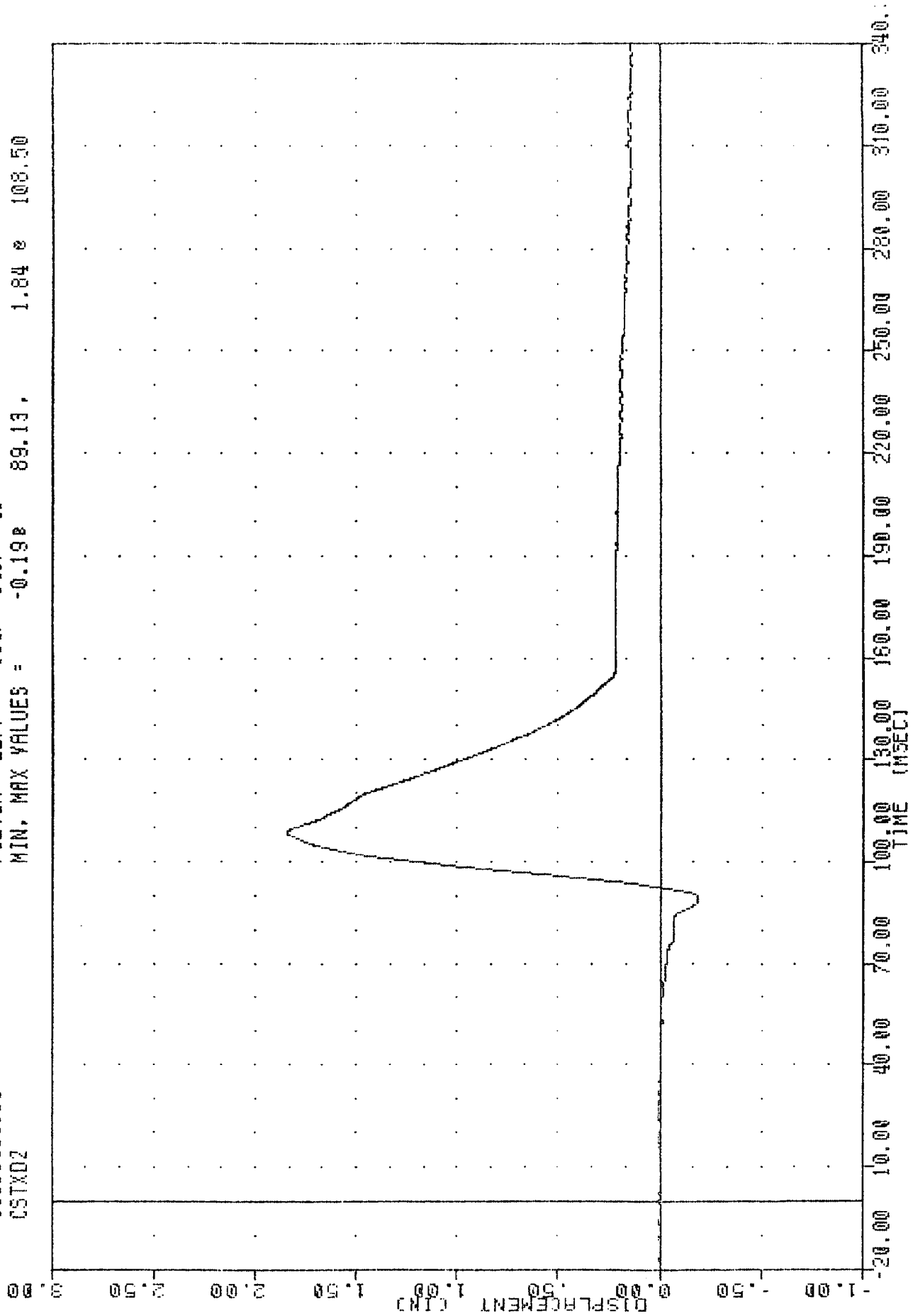


PASSENGER CHEST ACCELERATION Z AXIS

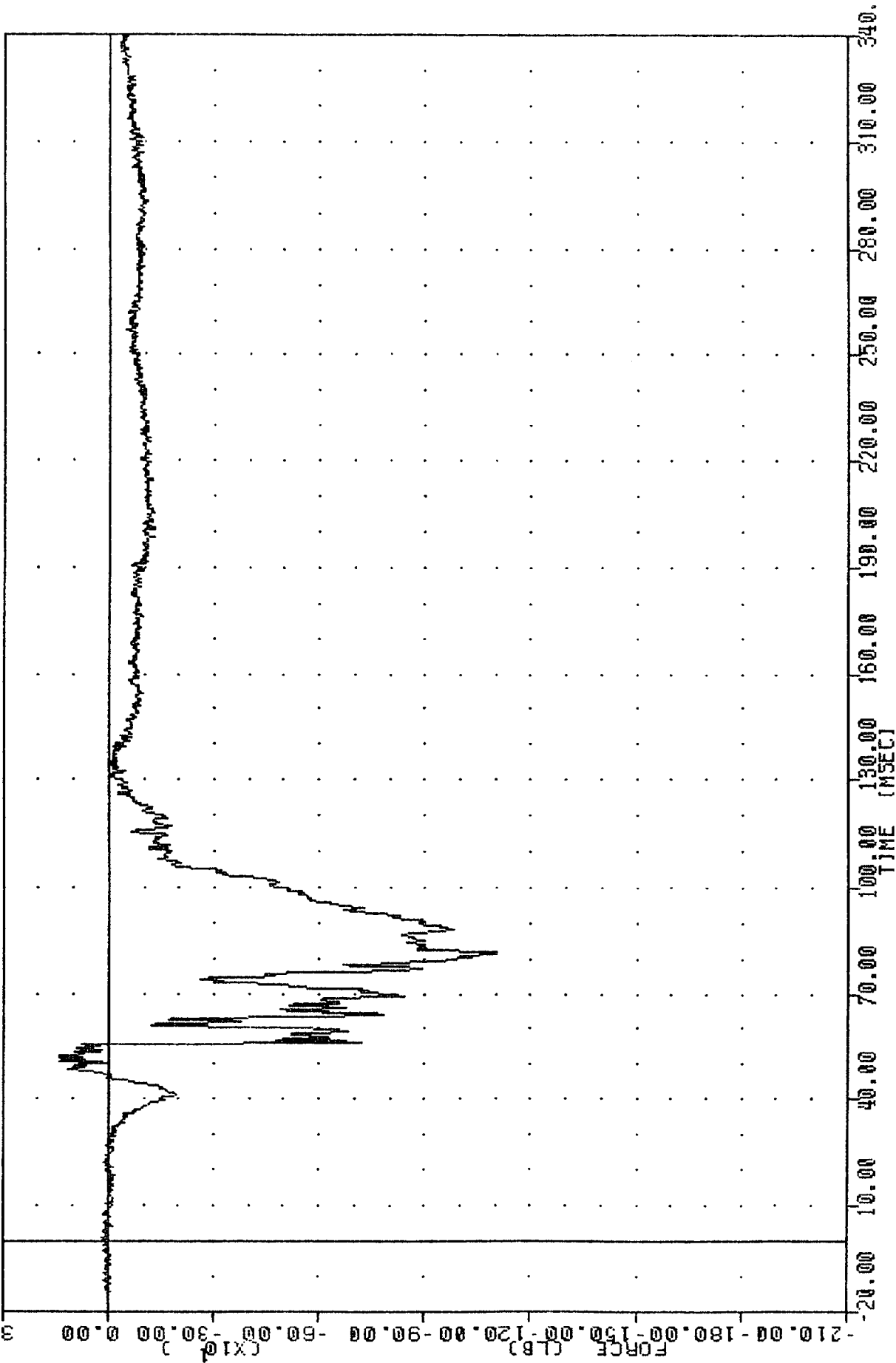
TAC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
CSTXDZ

PLOT DATE 14-MAR-85 16:04:21

FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -0.198 89.13, 1.84 e 108.50

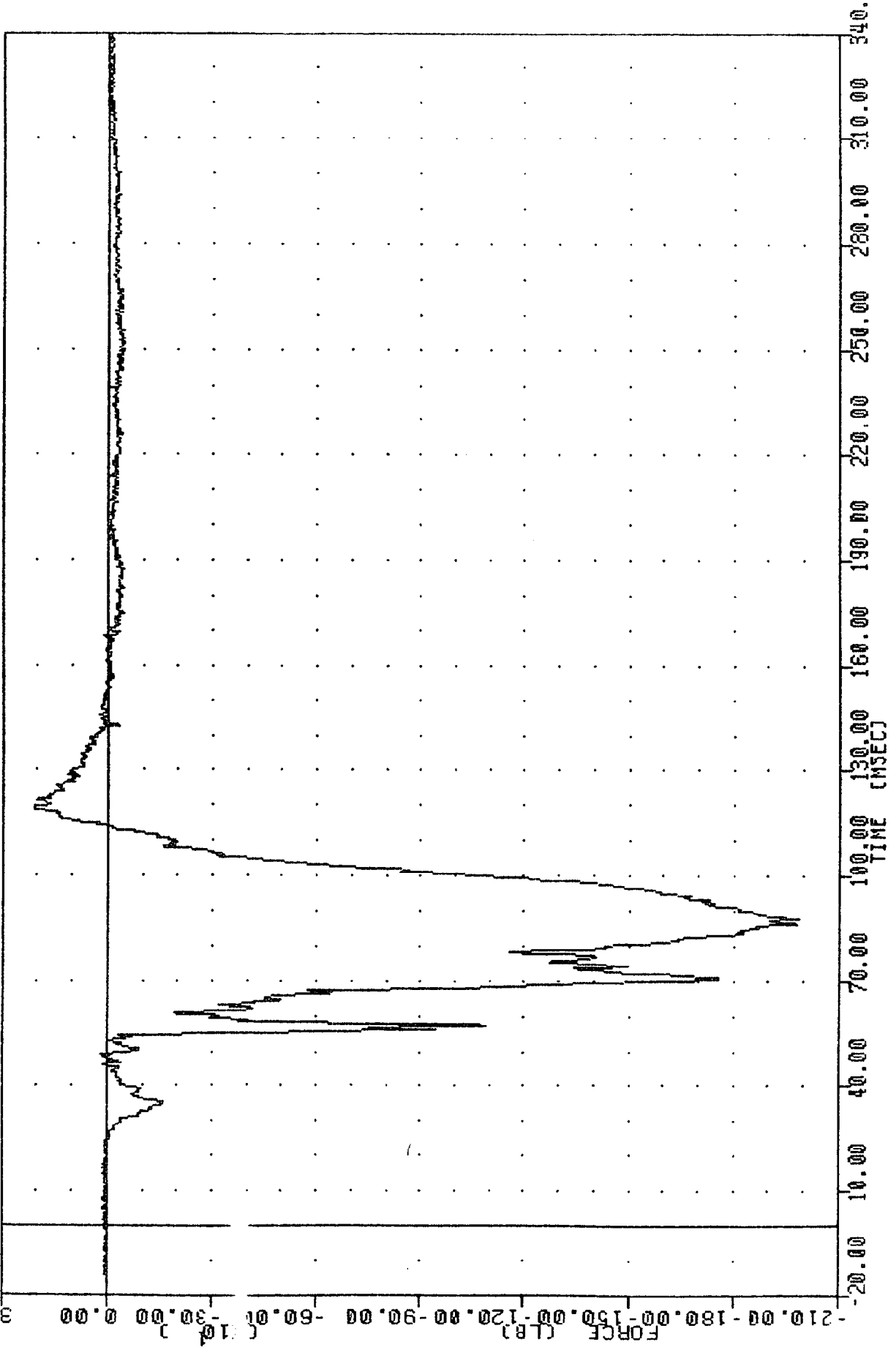


REC 8412188 21-JAN-85 10:07:50  
 CHR TO CHR FRONTAL IMPACT  
 84353000000  
 LFMF2  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN, MAX VALUES = -1102.00 81.63, 141.78 52.00



PASSENGER LEFT FEMUR FORCE LBS

TBC 841218P PLOT DATE 21-JAN-85 10:07:50  
 CHH TO CAR FRONTAL IMPACT  
 84353000000  
 RFNF2  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -1983.52e 87.75, 210.46 e 118.63

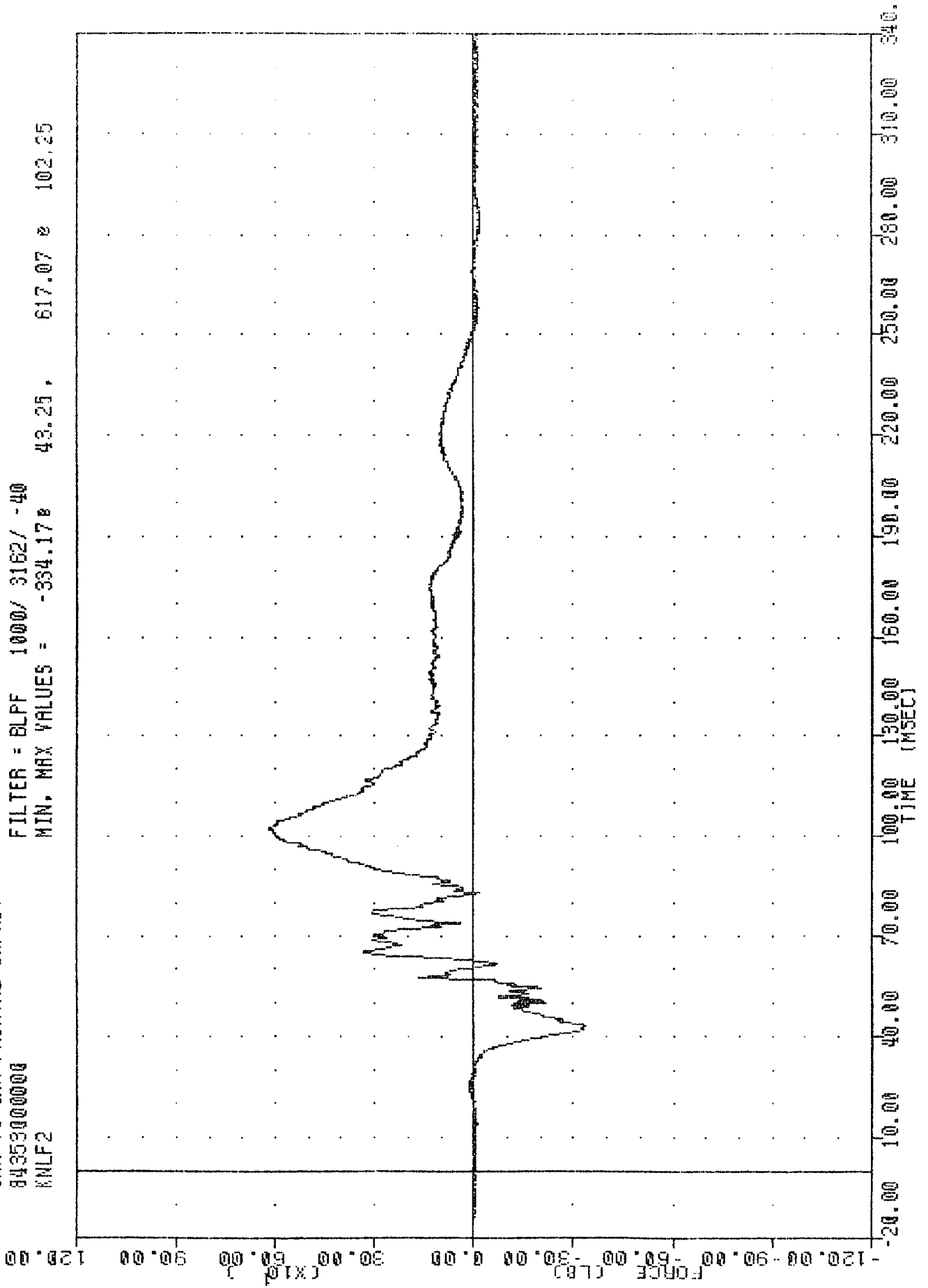


PASSENGER RIGHT FEMUR FORCE LBS

TRC  
841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
KNLF2

PLOT DATE 15-JAN-85 13:46:52

FILTER = BLPF 1000/ 3162/ -40  
MIN. MAX VALUES = -334.17 617.07 e 102.25



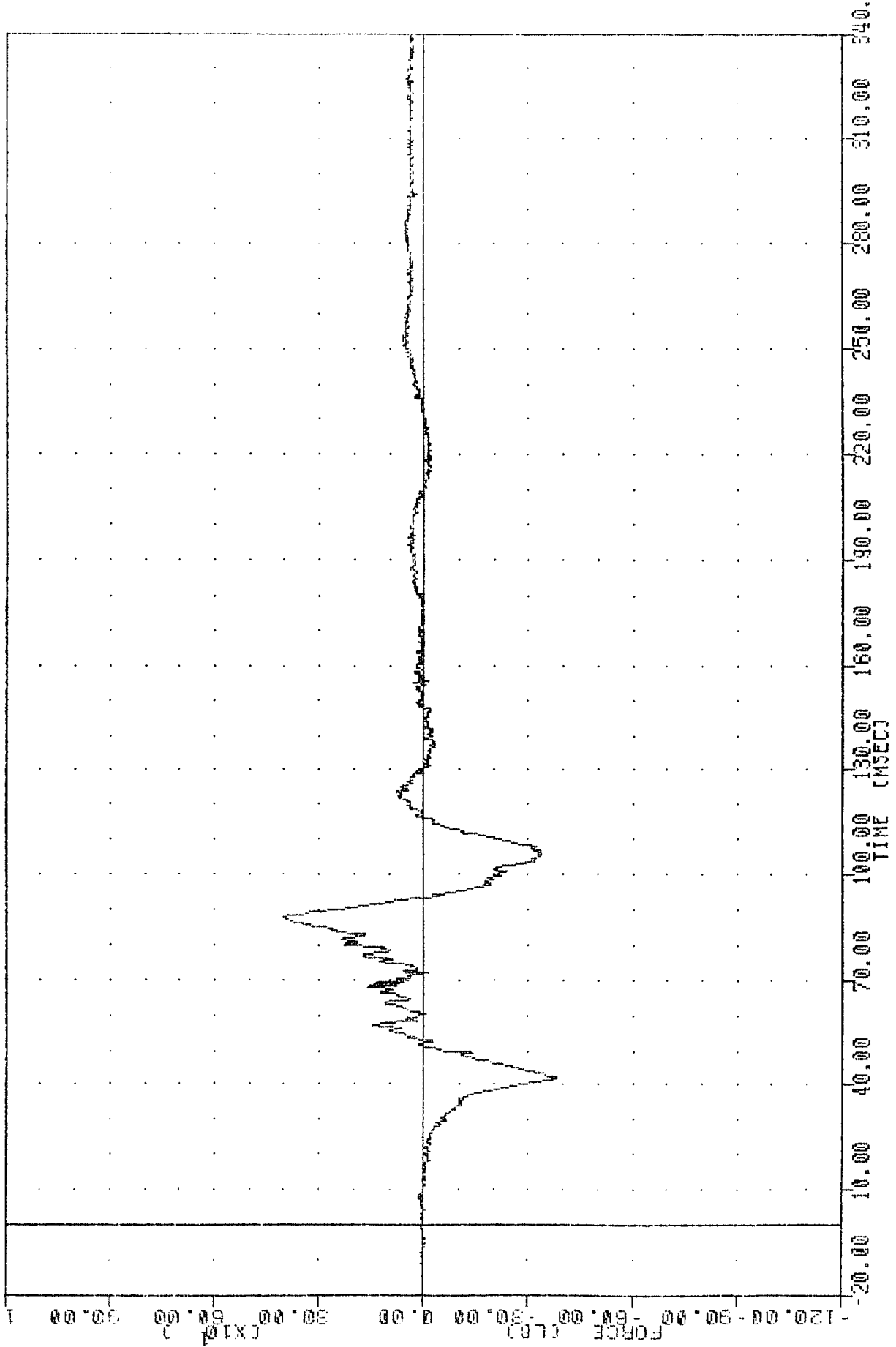
B-71

PASSENGER LEFT KNIFE / OFFSET SENSOR IRS

TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
843530000000  
KNLFB

PLOT DATE 15-JAN-85 13:46:52

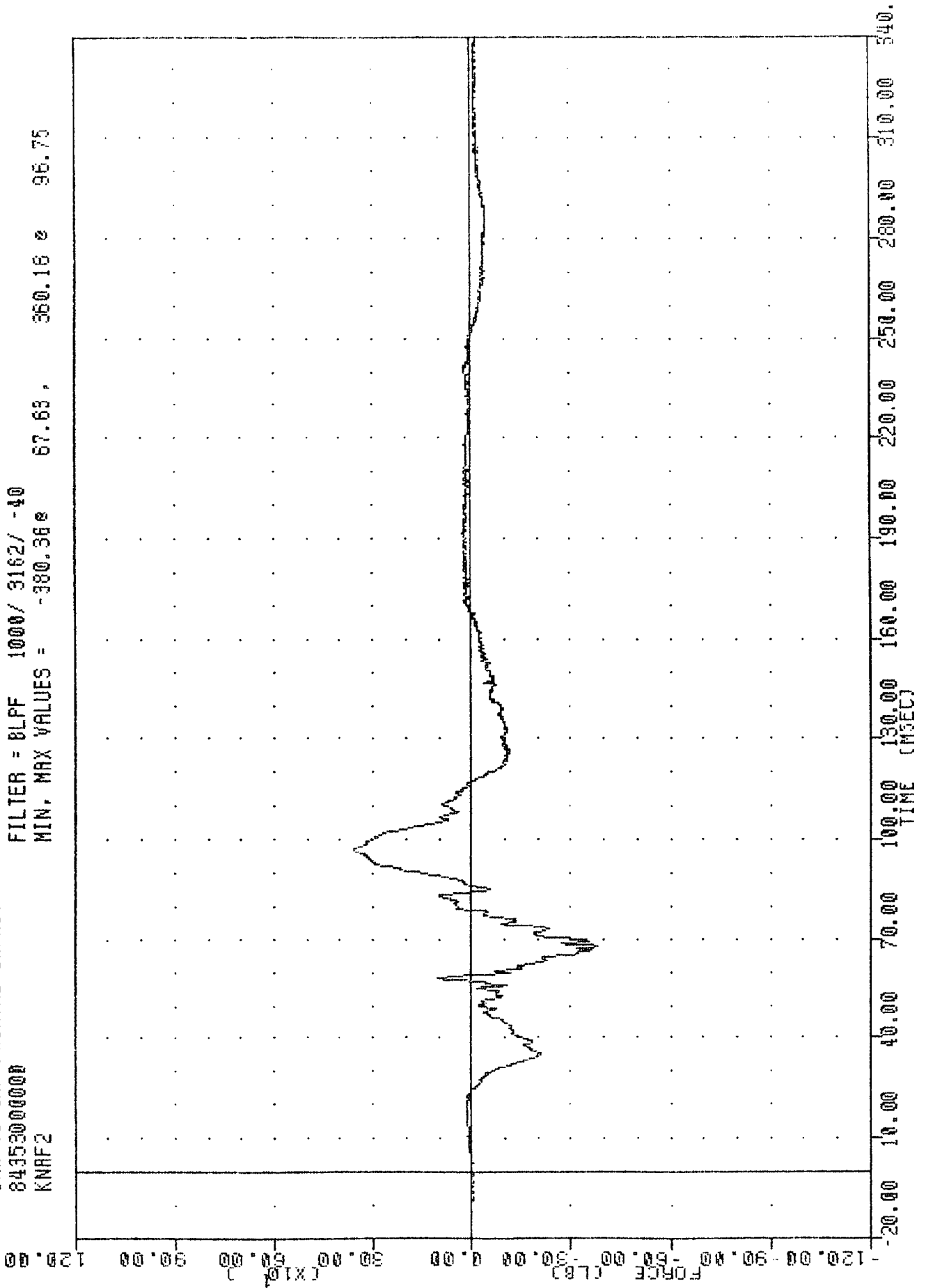
FILTER = BLPF 1000/ 3162/ -40  
MIN. MAX VALUES = -380.76e 42.00, 405.24 e 87.88



TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
KNRF2

PLOT DATE 15-JAN-85 13:46:52

FILTER = 8LFF 1000/ 3162/ -40  
MIN. MAX VALUES = -380.36e 67.68e 360.16e 96.75



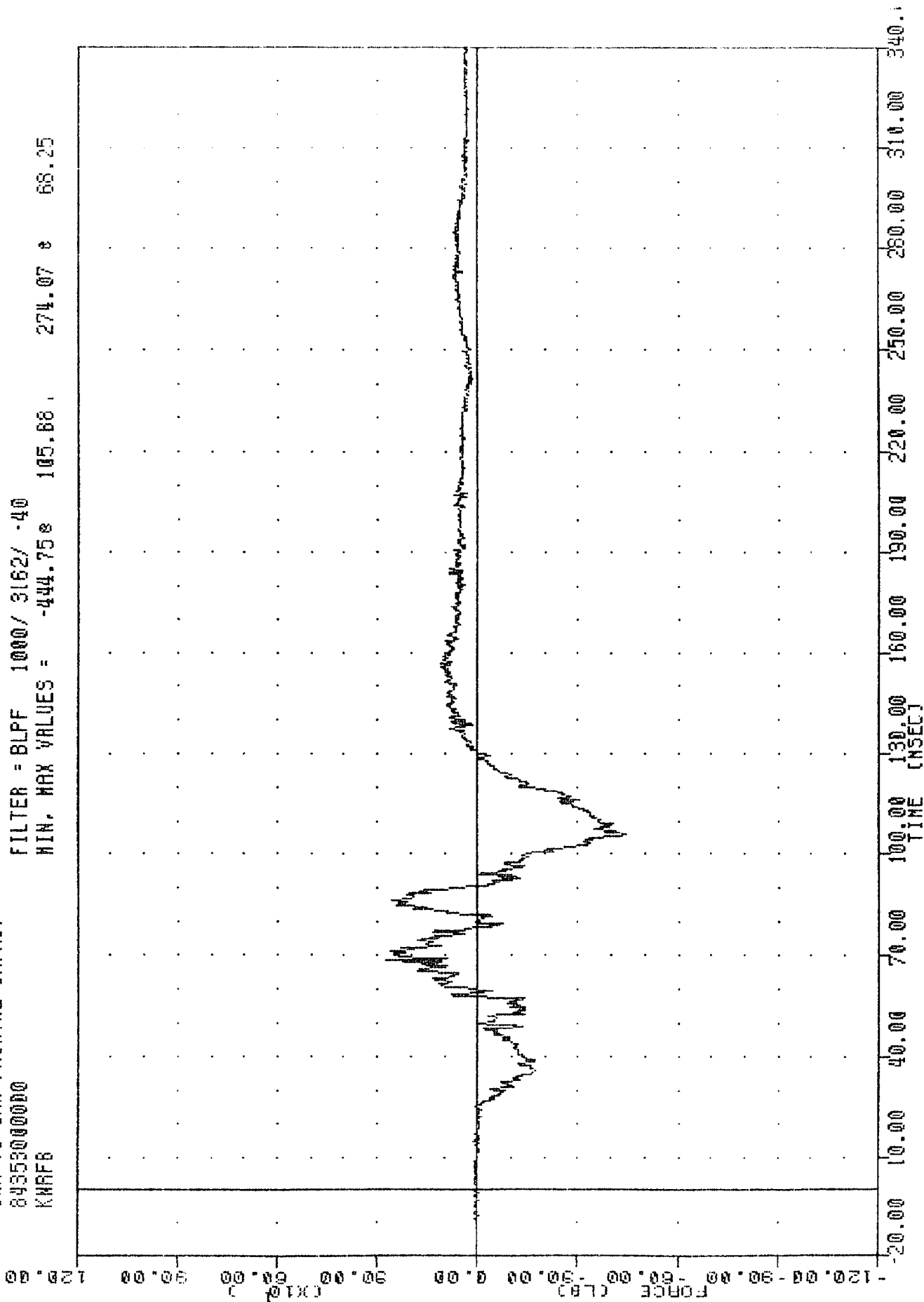
B-73

PASSENGER RIGHT KNEE / LEFT SENSOR LBS

TAC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
KNRFB

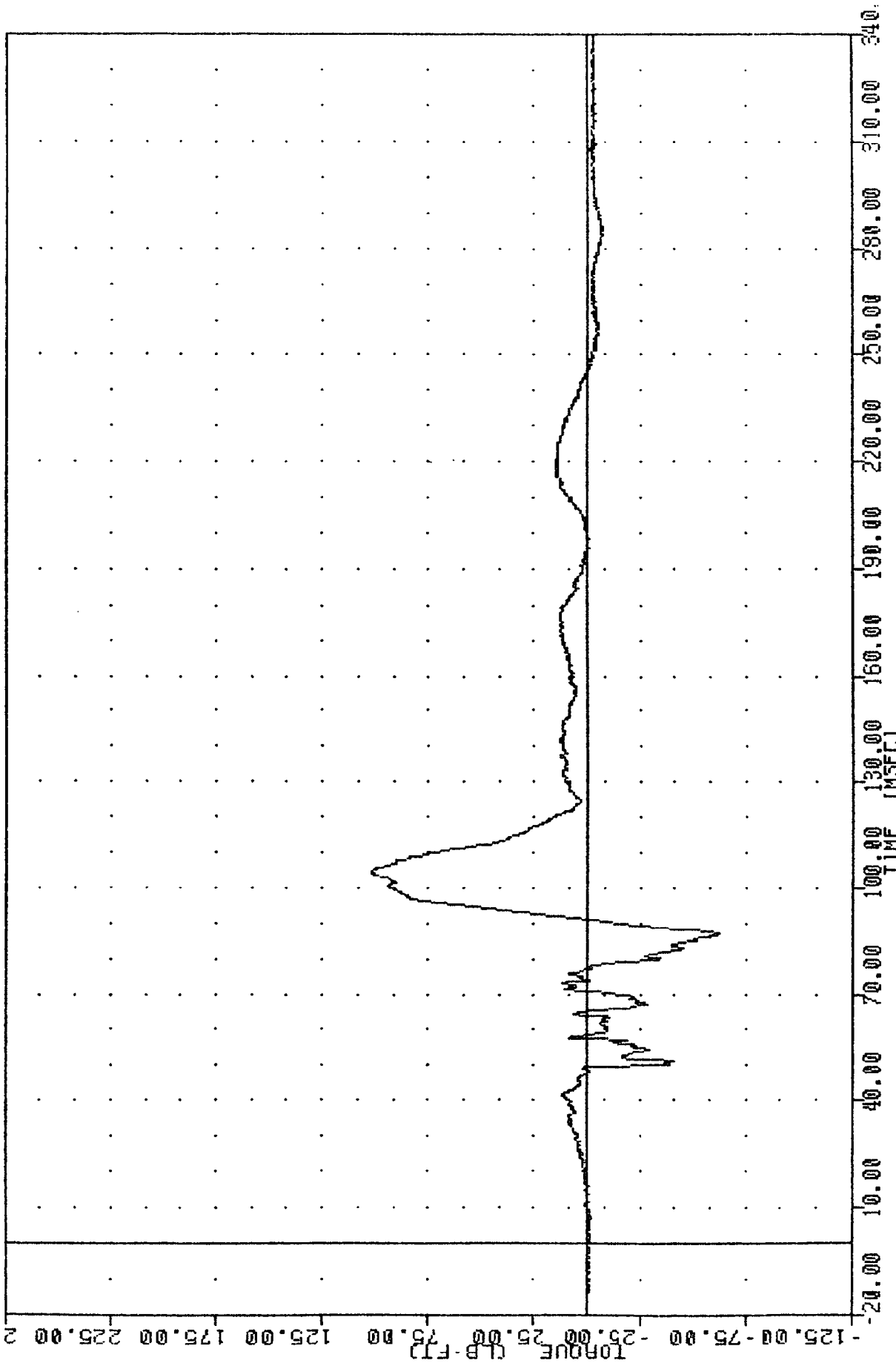
PLOT DATE 15-JAN-85 13:46:52

FILTER = BLPF 1000/ 3162/ -40  
MIN. MAX VALUES = -444.75s 105.88s 274.07 e 68.25



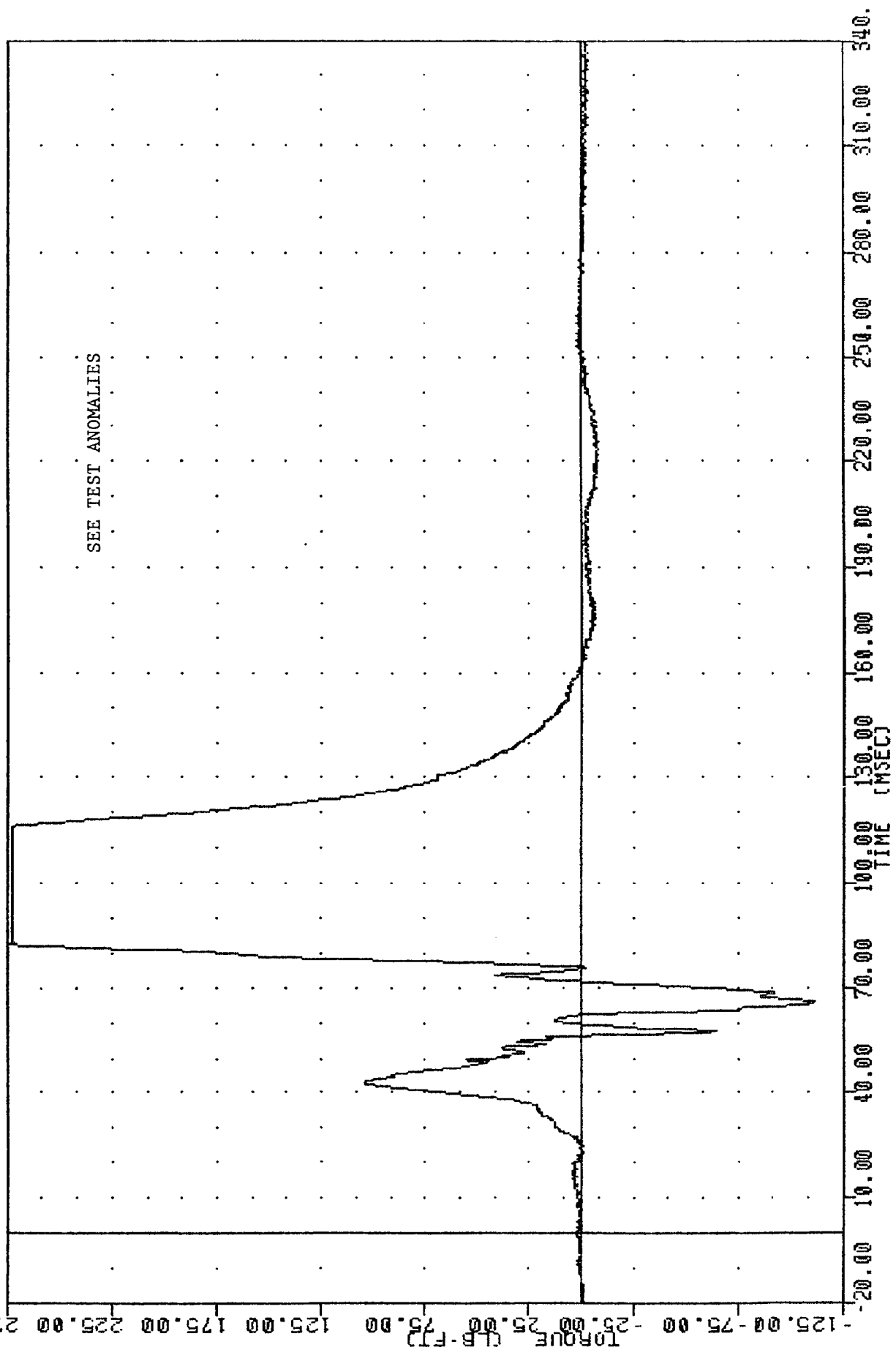
TBC 841218P 21-JAN-85 10:07:50  
 CHH TO CHH FRONTAL IMPACT  
 84353000000  
 TBLXM2

FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -62.848 87.00, 101.93 @ 104.13



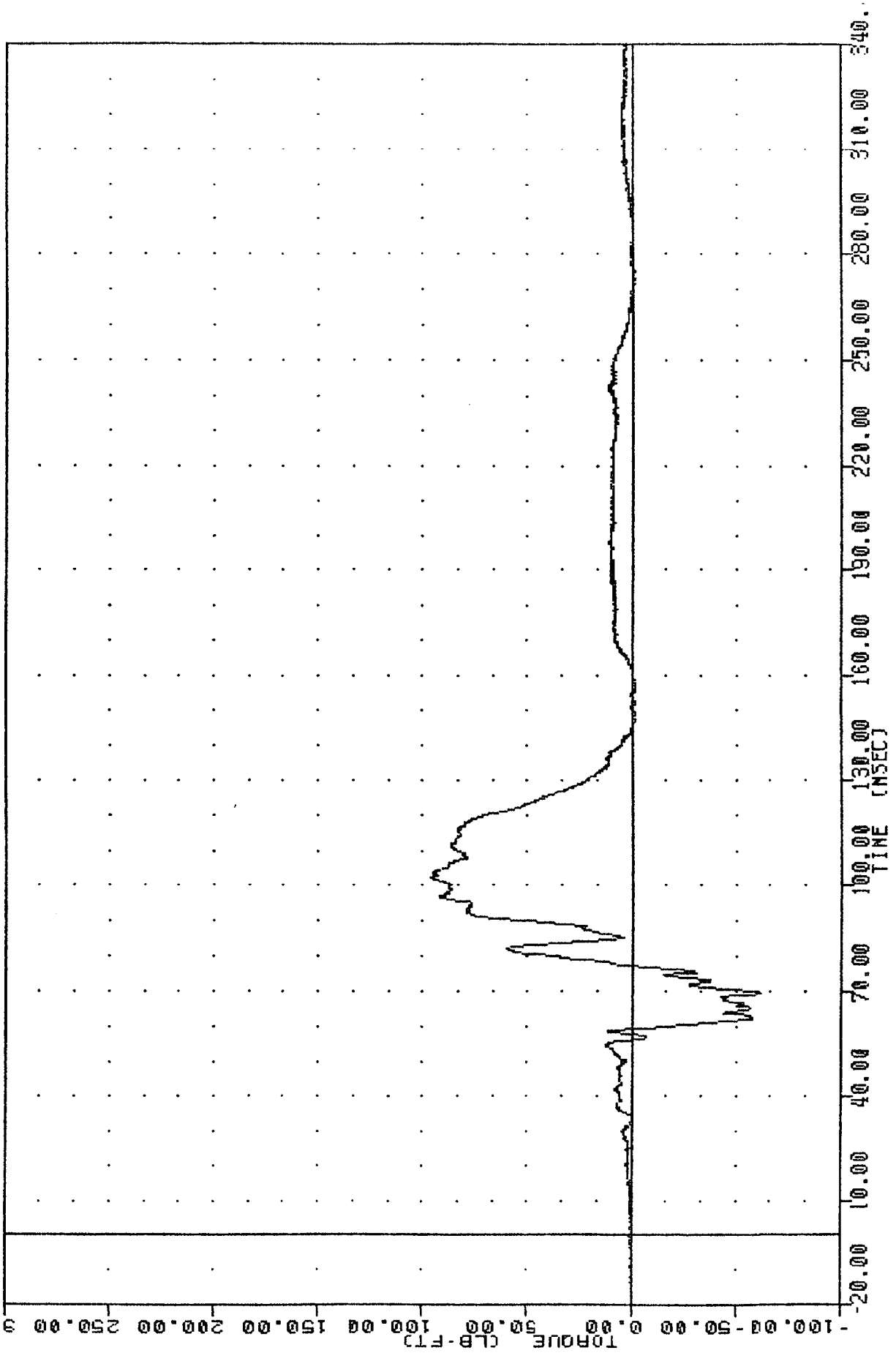
PASSENGER LEFT UPPER TIBIA MOMENT X AXIS LB-FT

TRC TO 841218P 841218P  
 84353000000 FRONTAL IMPACT  
 TBLYM2  
 PLOT DATE 21-JAN-85 10:07:50  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -111.56 65.86 273.49 82.50



PASSENGER LEFT UPPER TIBIA MOMENT Y AXIS LB-FT

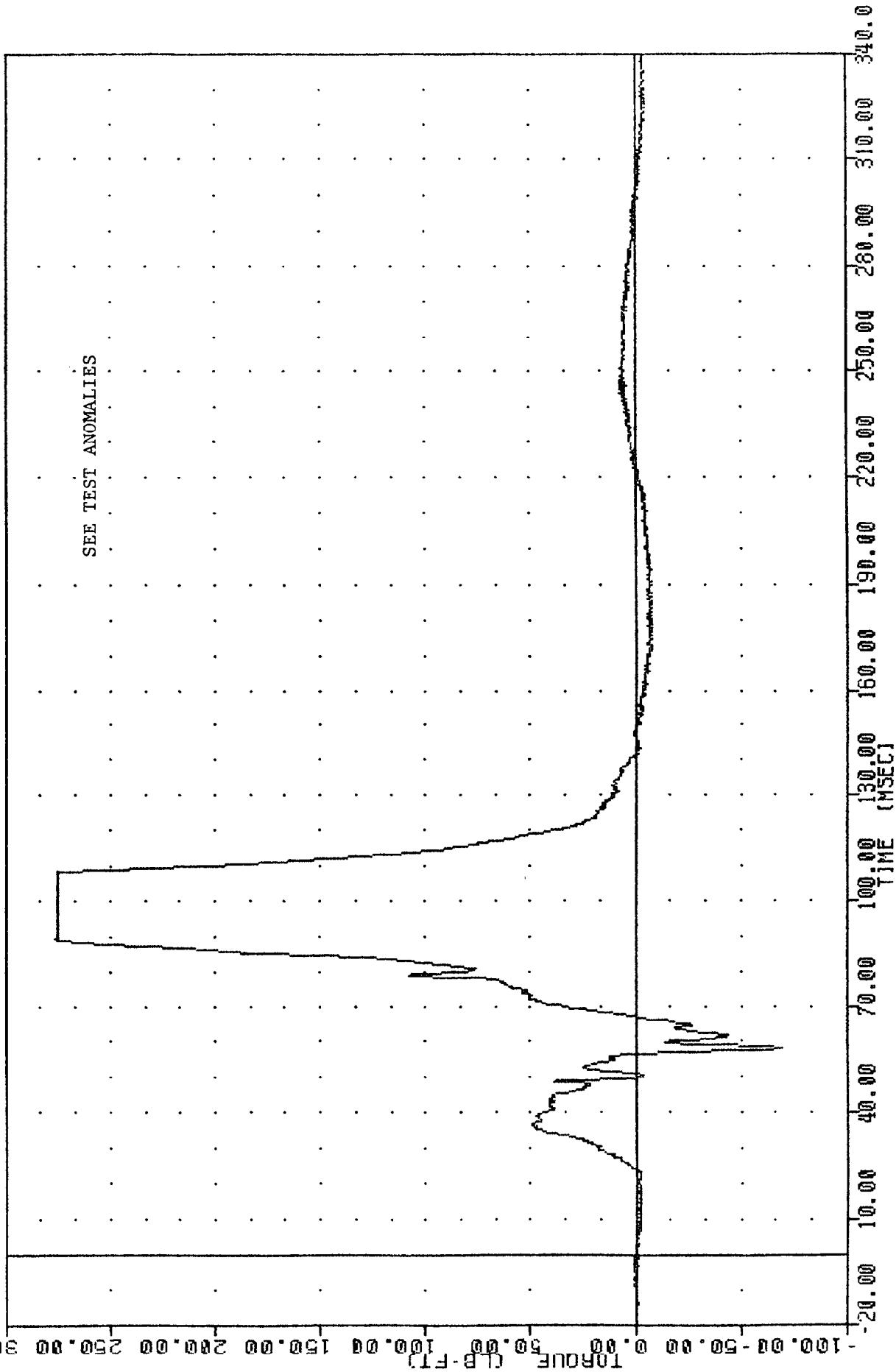
IBC 8412188 21 JAN 85 10:07:50  
 CAR TO CAR FRONTAL IMPACT  
 843530000000  
 TBRXN2  
 FILTER = BLPF 1000/ 3162/ .40  
 MIN. MAX VALUES = -62.35 e 69.50 . 96.35 e 102.38



PASSENGER RIGHT UPPER TIBIA MOMENT X AXIS LB-FT

TRC 841218P 21-JAN-85 10:07:50  
 CAR 10 CAR FRONTAL IMPACT  
 84353000000  
 T8RYM2

FILTER = BLPF 1000/ 3162/ -40  
 MIN, MAX VALUES = -69.16e 58.00, 275.94 e 89.13

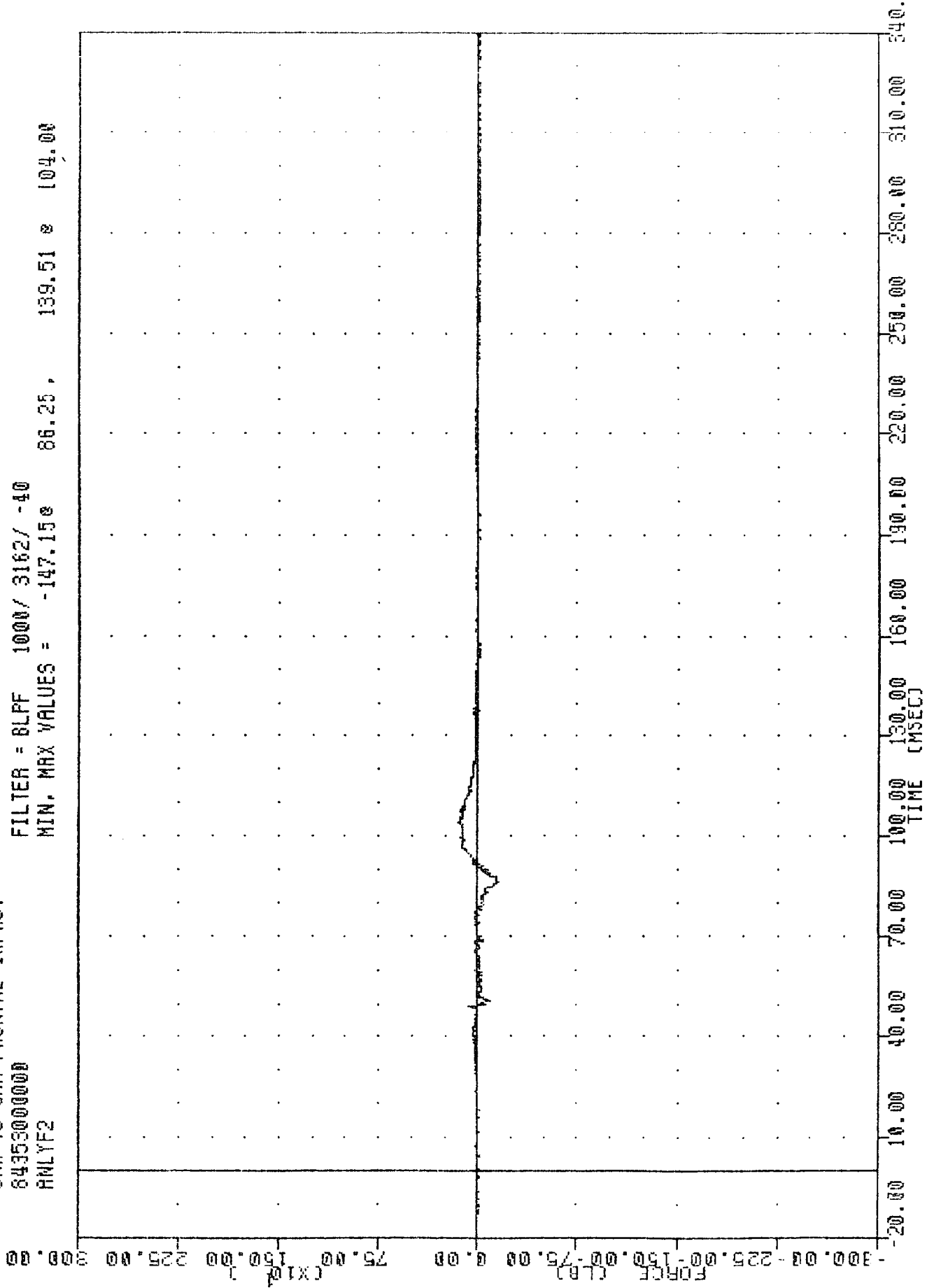


PASSENGER RIGHT UPPER TIBIA MOMENT Y AXIS LB-FT

TRC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ANLYF2

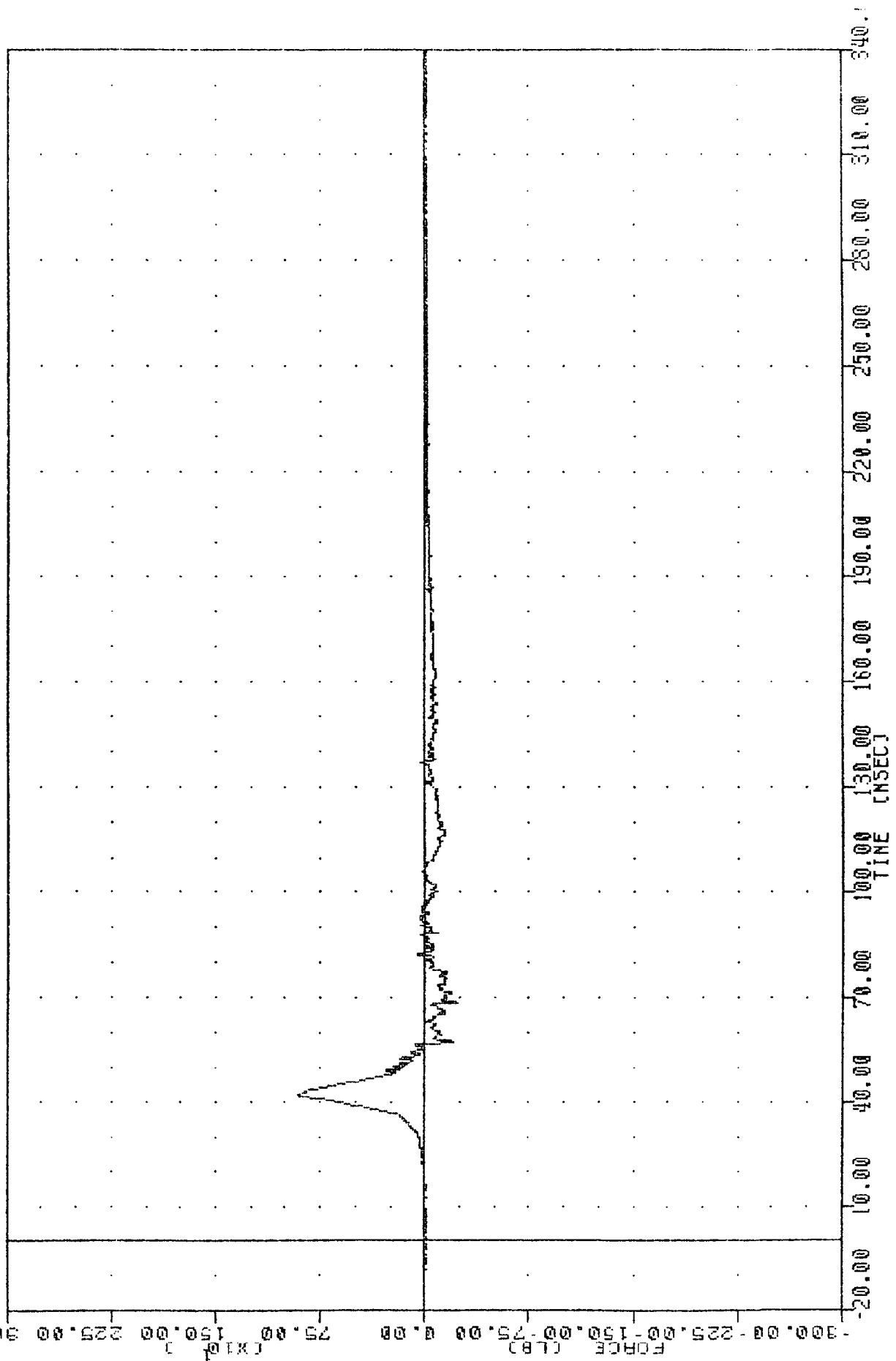
PLOT DATE 15-JAN-85 13:46:52

FILTER = 8LFF 1000/ 3162/ -40  
MIN. MAX VALUES = -147.150 86.25 , 139.51 @ 104.00



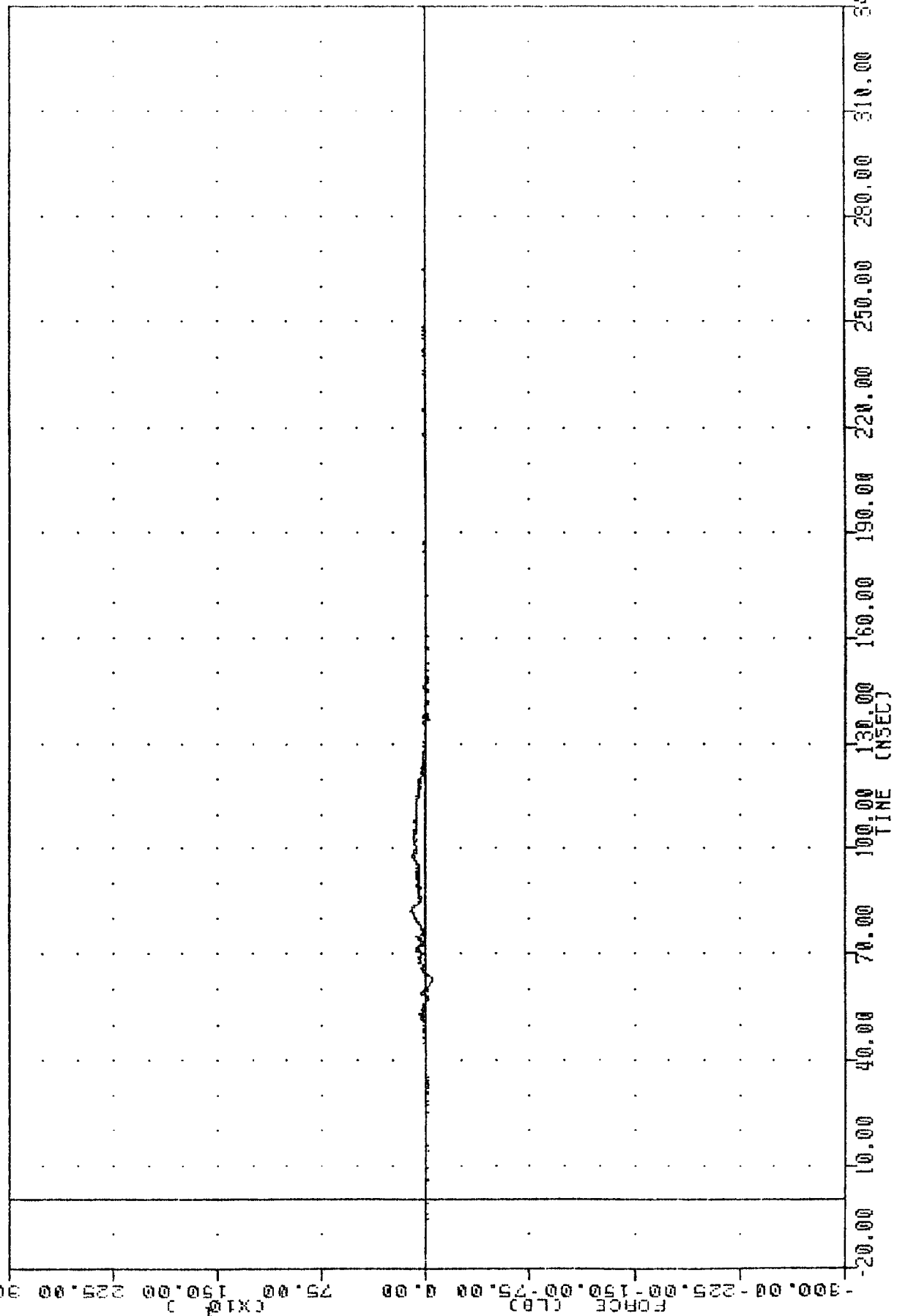
TRL 841216F 13-JAN-68 13:46:52  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 ANLZF2

FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -232.13e 68.63, 905.31 e 41.68



PASSENGER LEFT LOWER TIBIA FORCE Z AXIS LBS

TRL 841218P  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 ANRYF2  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN. MAX VALUES = -47.47 e 109.79 e 82.25  
 PLUT DATE 15-JAN-85 13:46:52

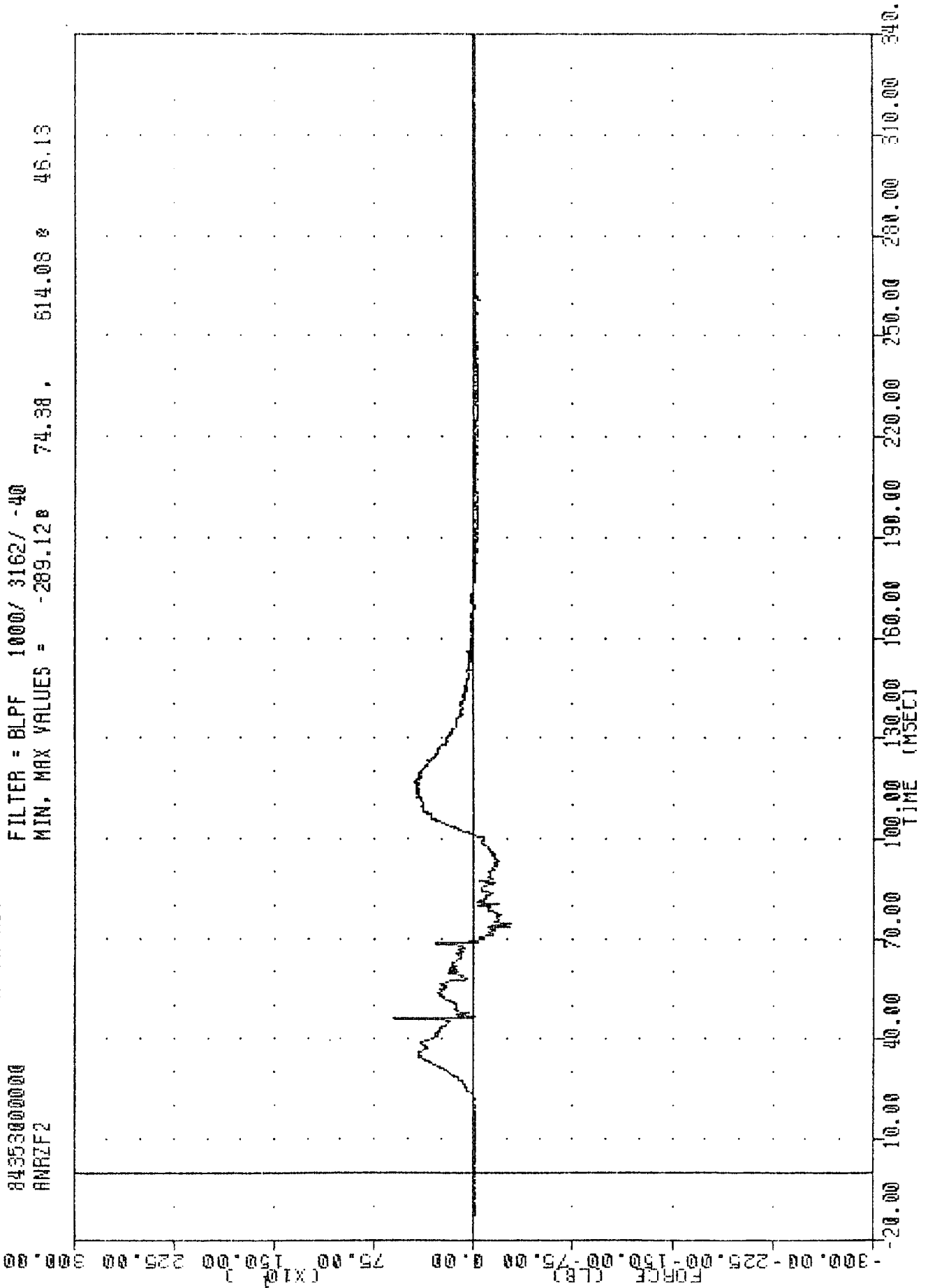


PASSENGER RIGHT LOWER TIBIA FORCE Y AXIS LBS

TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ANRZF2

PLOT DATE 15-JAN-85 13:46:52

FILTER = BLPF 1000/ 3162/ -40  
MIN. MAX VALUES = -289.12 614.08 74.38 46.13

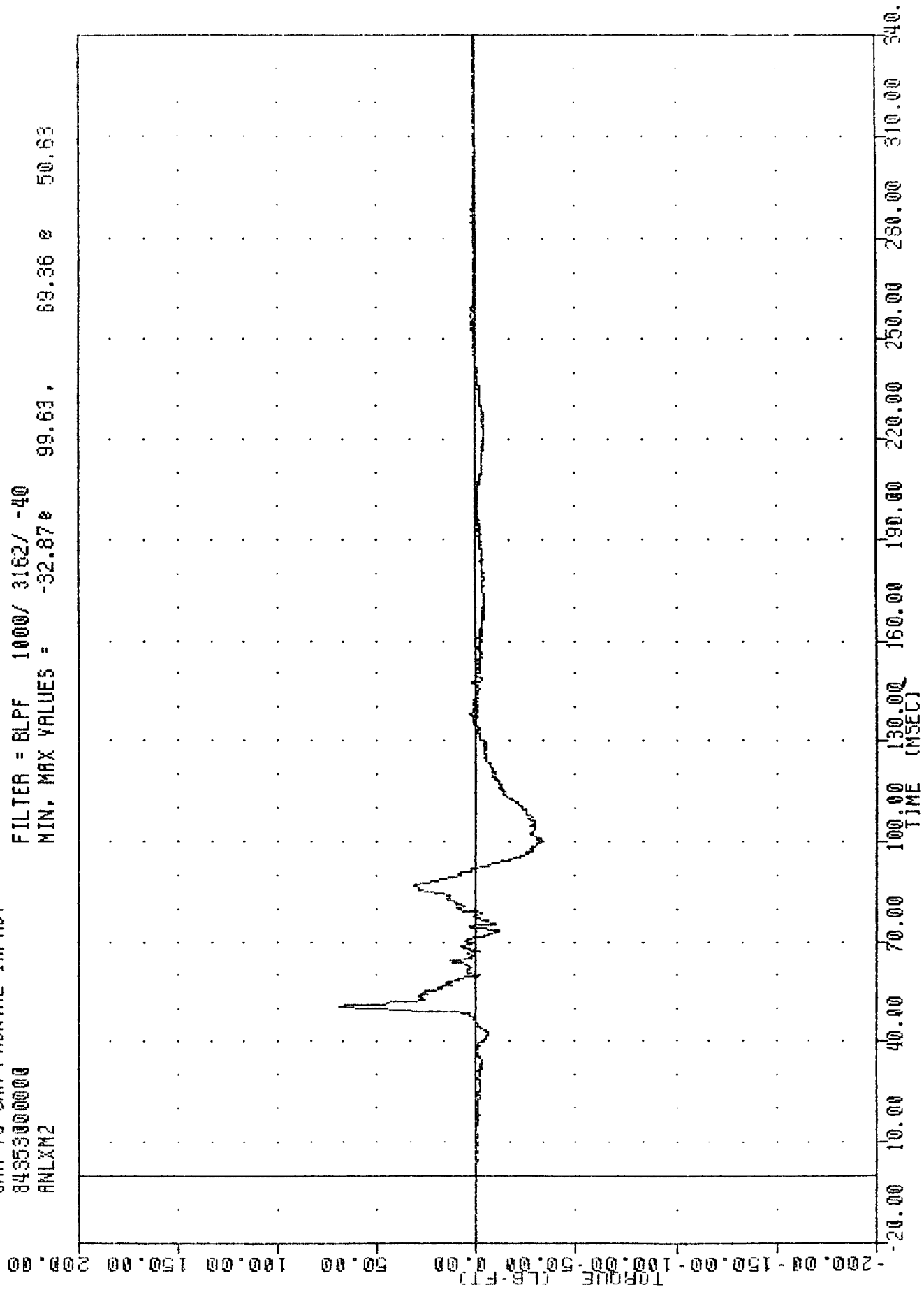


PASSENGER RIGHT LOWER TIBIA FORCE Z AXIS LBS

TRC 841218F  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ANLXM2

PLOT DATE 15-JAN-85 13:46:52

FILTER = BLPF 1000/ 3162/ -40  
MIN, MAX VALUES = -32.87e 99.63e 89.36e 50.63

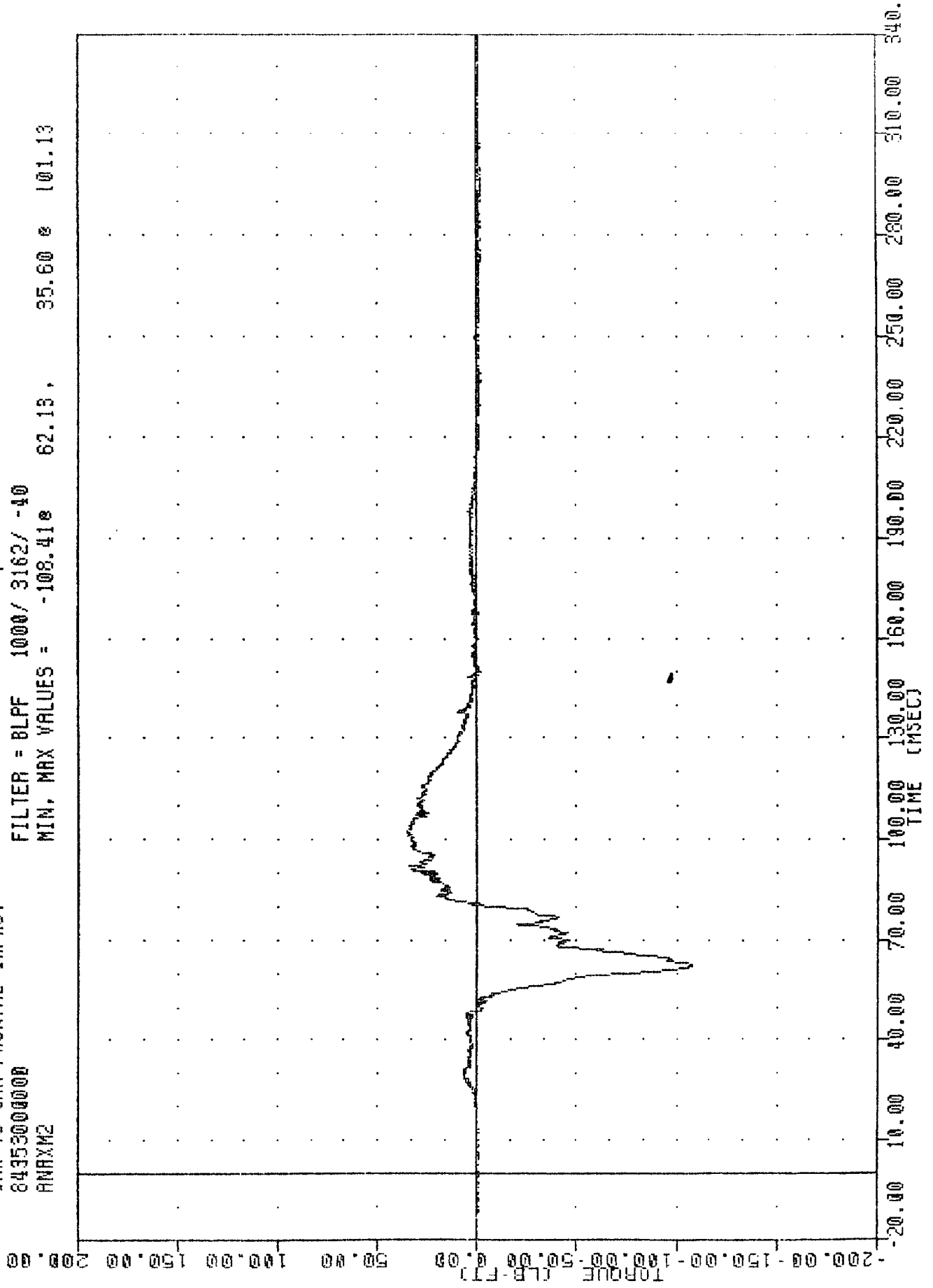


PASSENGER LEFT LOWER TIBIA MOMENT X AXIS LB-FT

TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
ANR XM2

PLOT DATE 15-JAN-85 13:46:52

FILTER = 8LFF 1000/ 3162/ -10  
MIN. MAX VALUES = -108.41e 62.13, 35.60 e 101.13

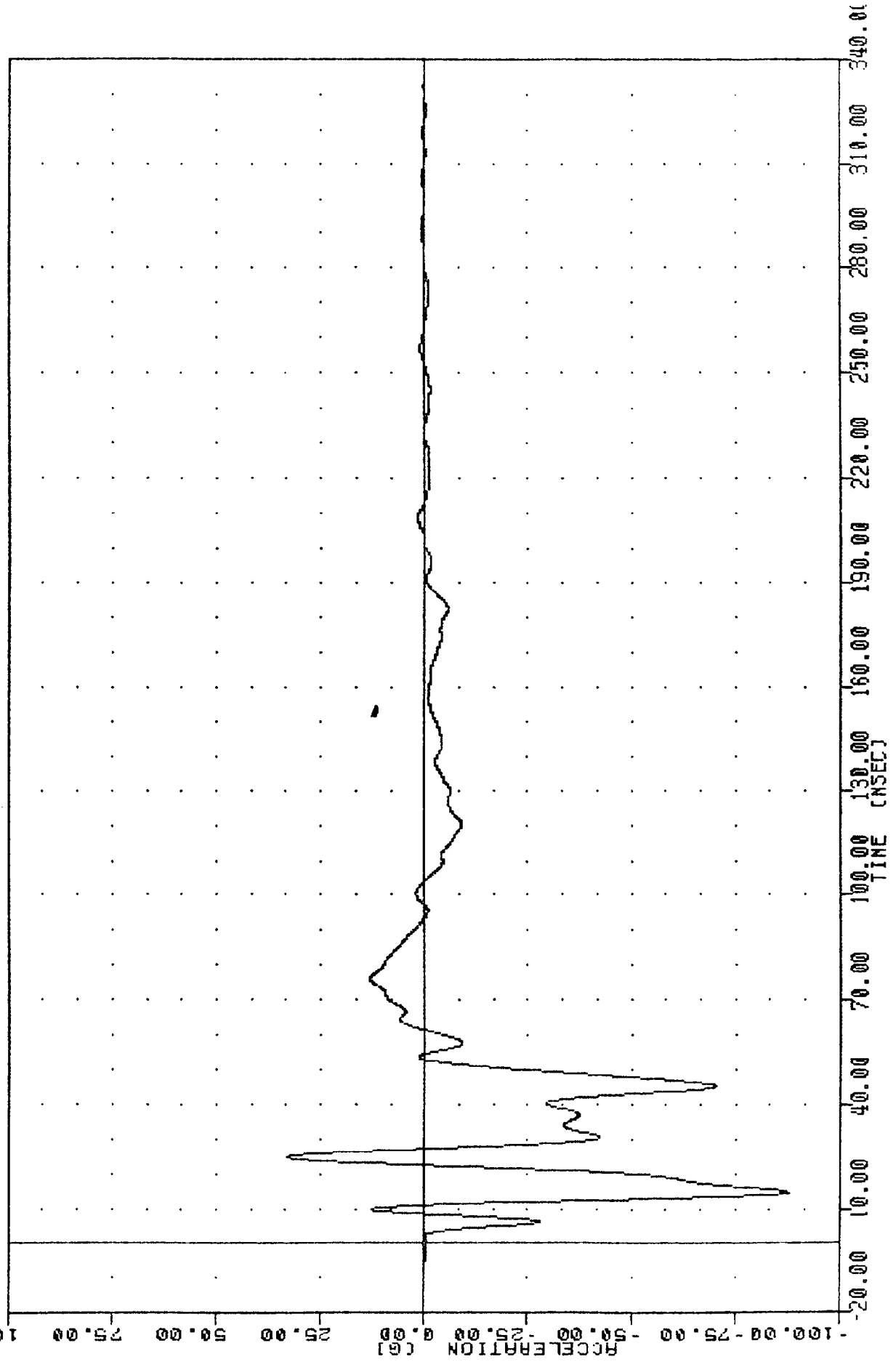


B-84

PASSENGER RIGHT LOWER TIBIA MOMENT X AXIS LB-FT

TRC [REDACTED] 041210 [REDACTED] 21 JAN 85 [REDACTED] 10:08:54 [REDACTED]  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 FFRX6

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -87.69e 14.63e 32.94e 24.50

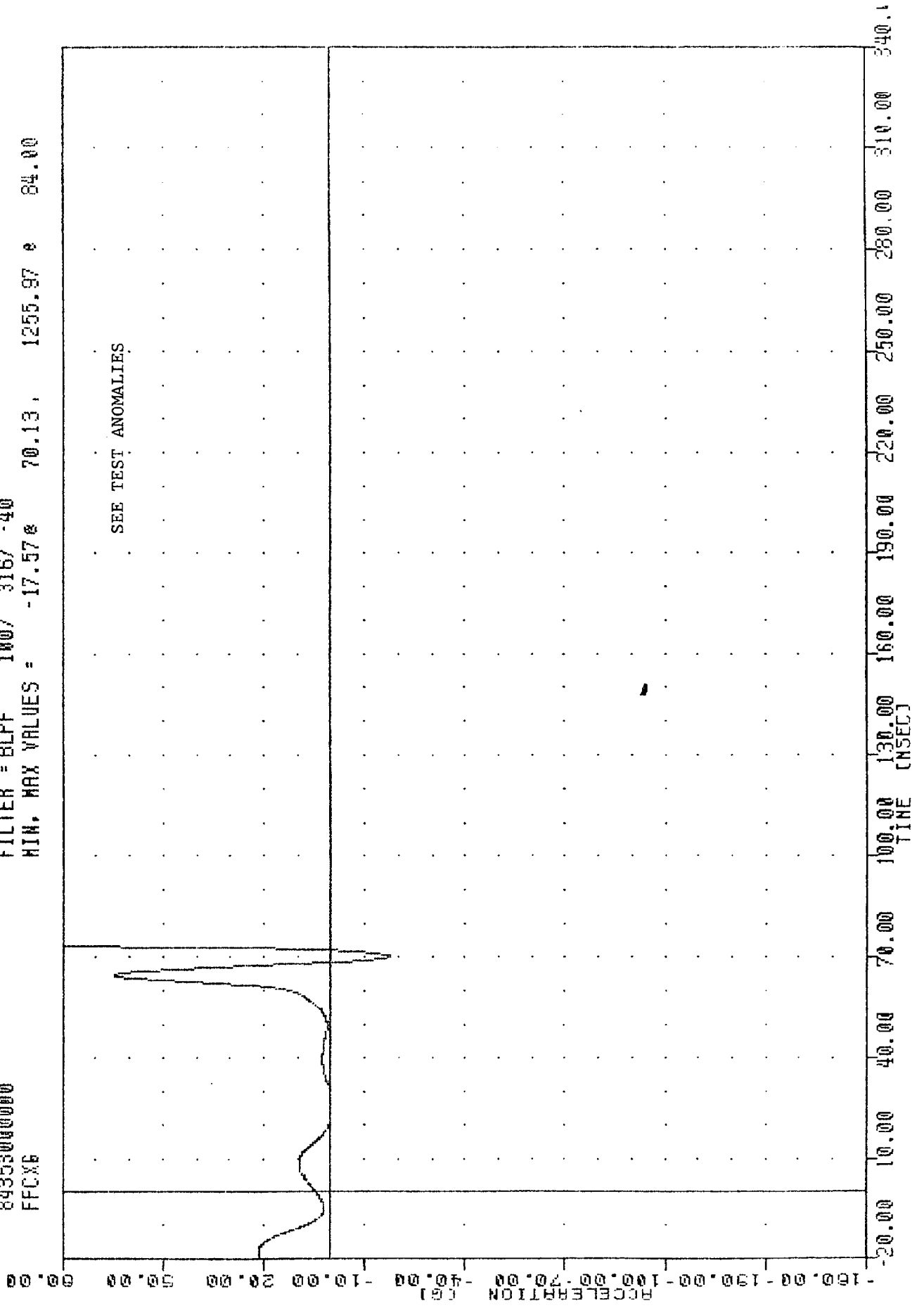


RIGHT FRONT FRAME RAIL ACCELERATION X AXIS

TAC  
84J218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
FFCX6

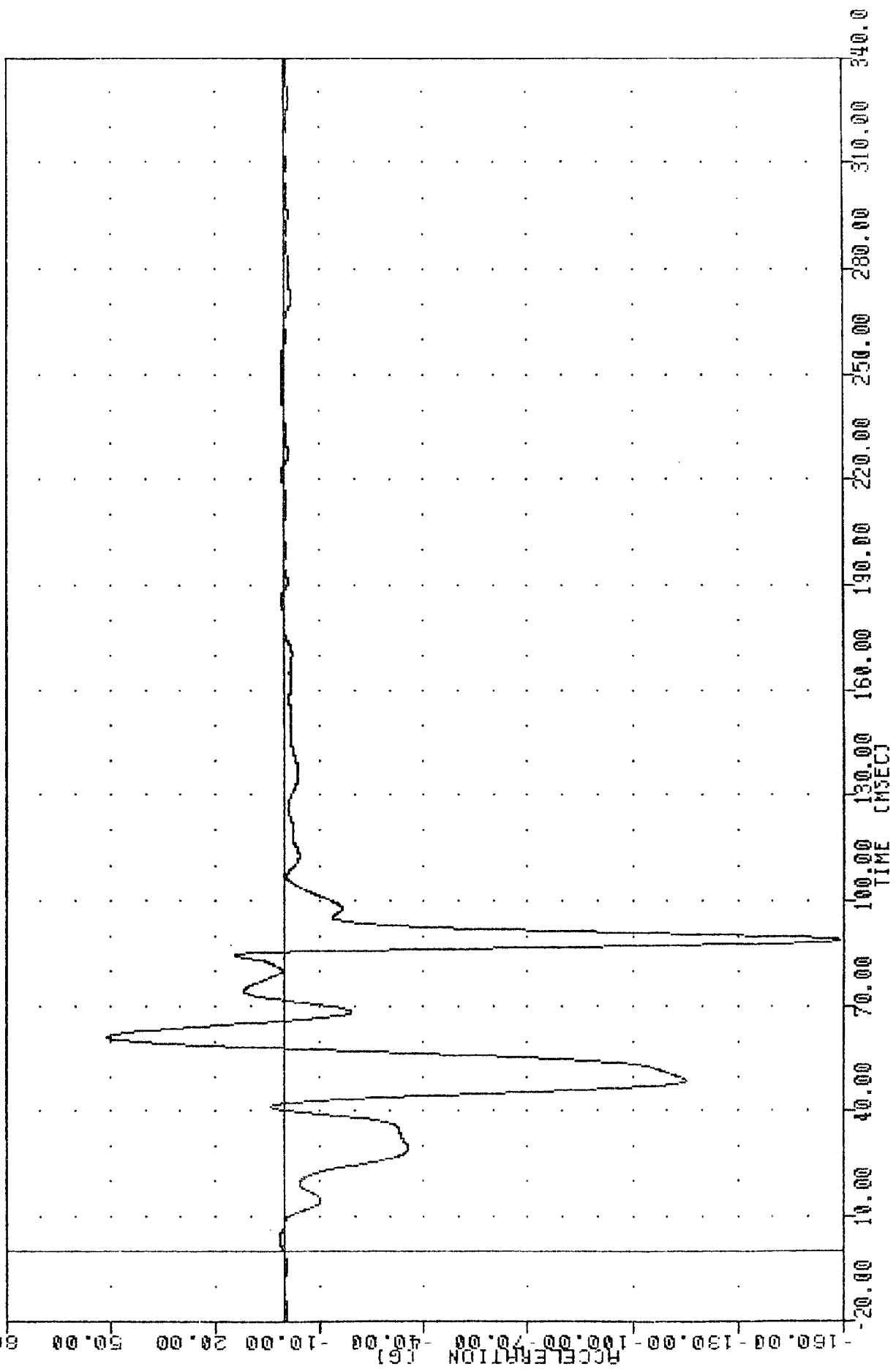
PLOT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -17.57g 70.13, 1255.97 g 84.00



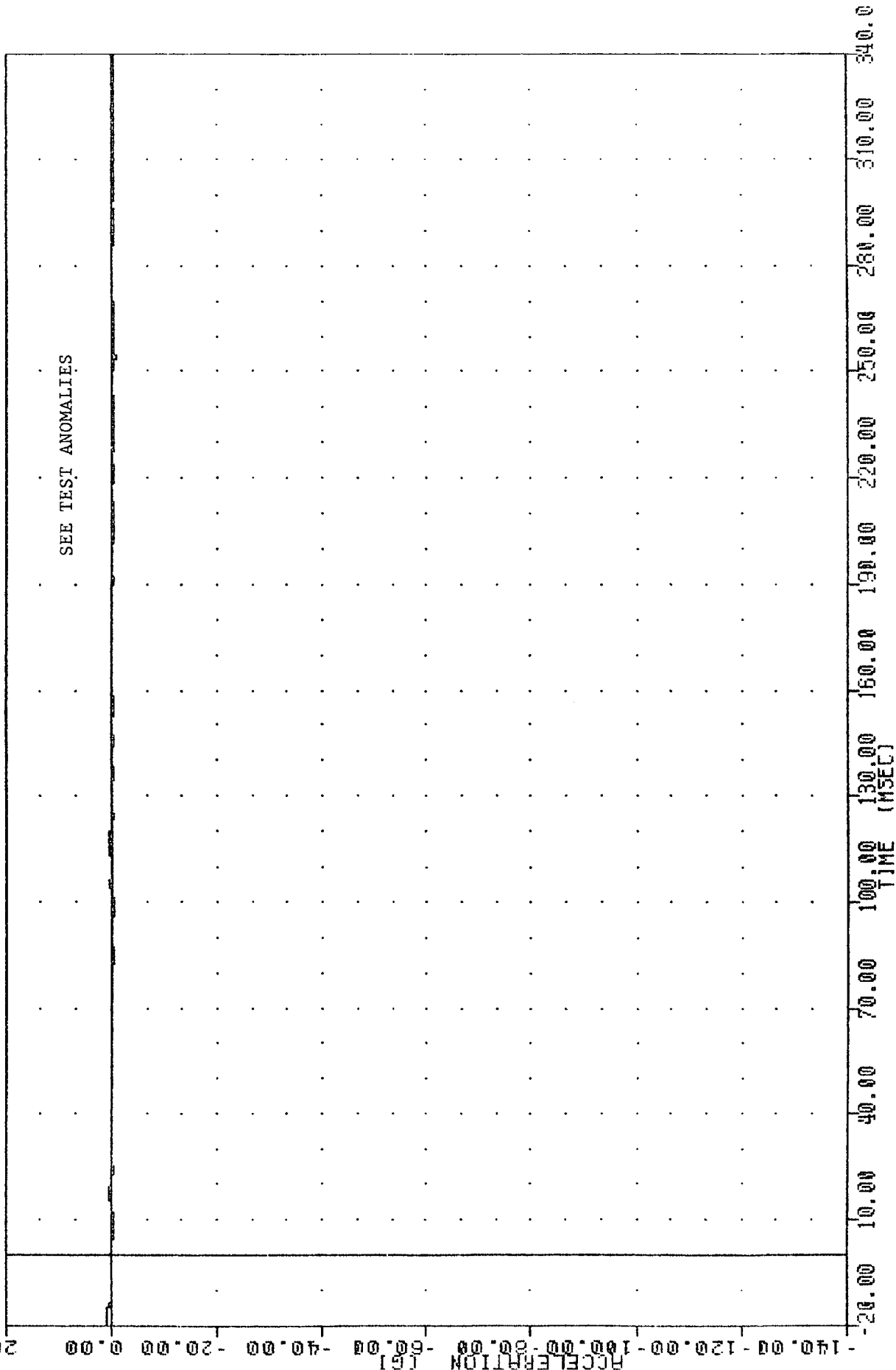
FRONT FRAME CROSSMEMBER ACCELERATION X AXIS

T 21 PL ORT 2 N-8 1 6:50  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 BCXG  
 FILTER = 8LPF 100/ 316/ -40  
 MIN, MAX VALUES = -158.89e 88.88, 50.94 e 61.00



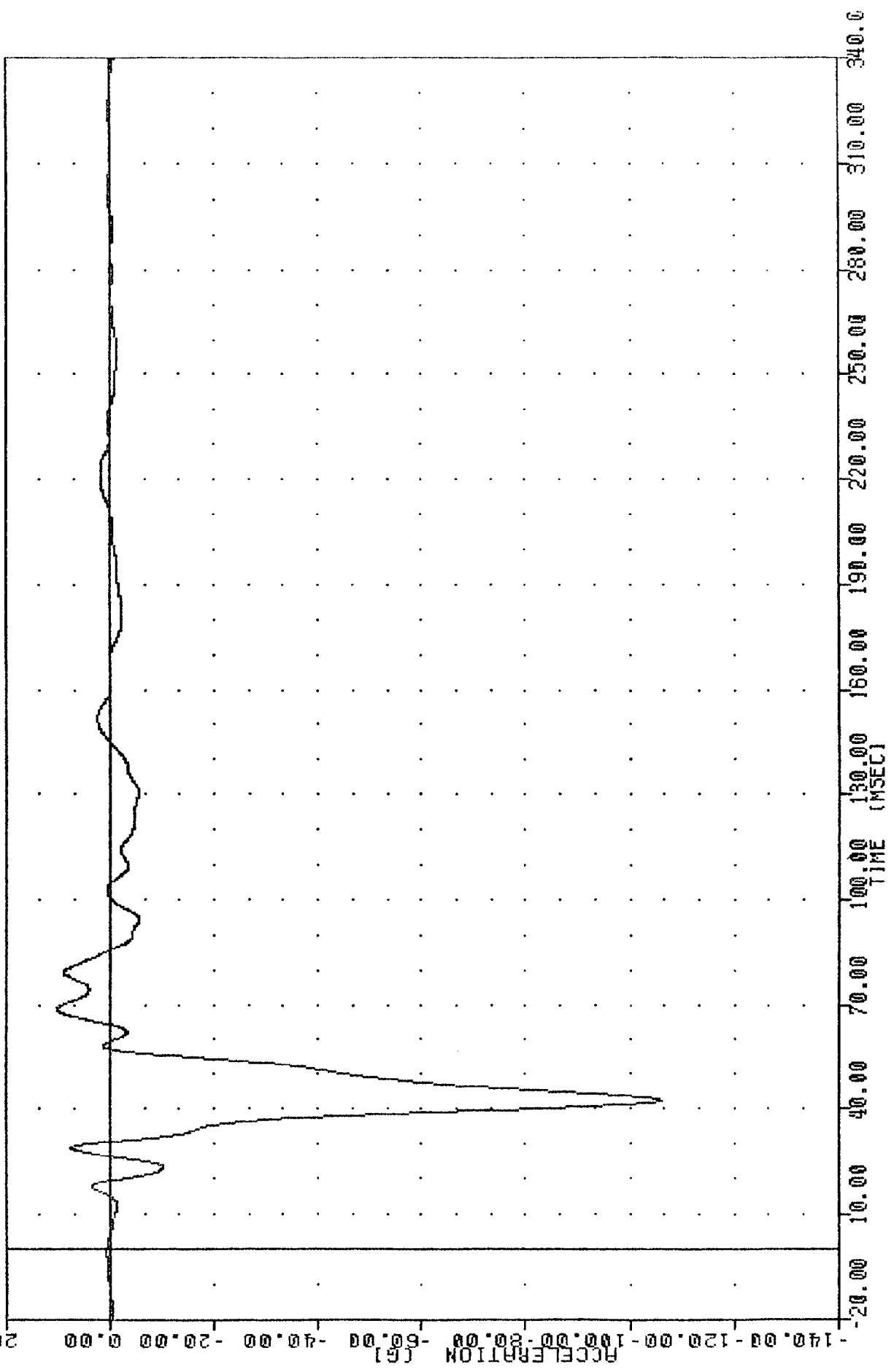
RIGHT BRAKE CALIPER ACCELERATION X AXIS

TRC [REDACTED] 8M1218P [REDACTED] PLOT DATE 21-JAN-85 [REDACTED] 10:08:54 [REDACTED]  
 CHA TO CHA FRONTAL IMPACT [REDACTED]  
 84353000000  
 ENG62  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -0.738 253.88, 0.97 e -20.00



ENGINE BLOCK LOWER ACCELERATION X AXIS

TPE 2412168 24 JAN 85 10:19:33  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 ENG XG1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -106.13e 42.25, 10.15 e 68.63

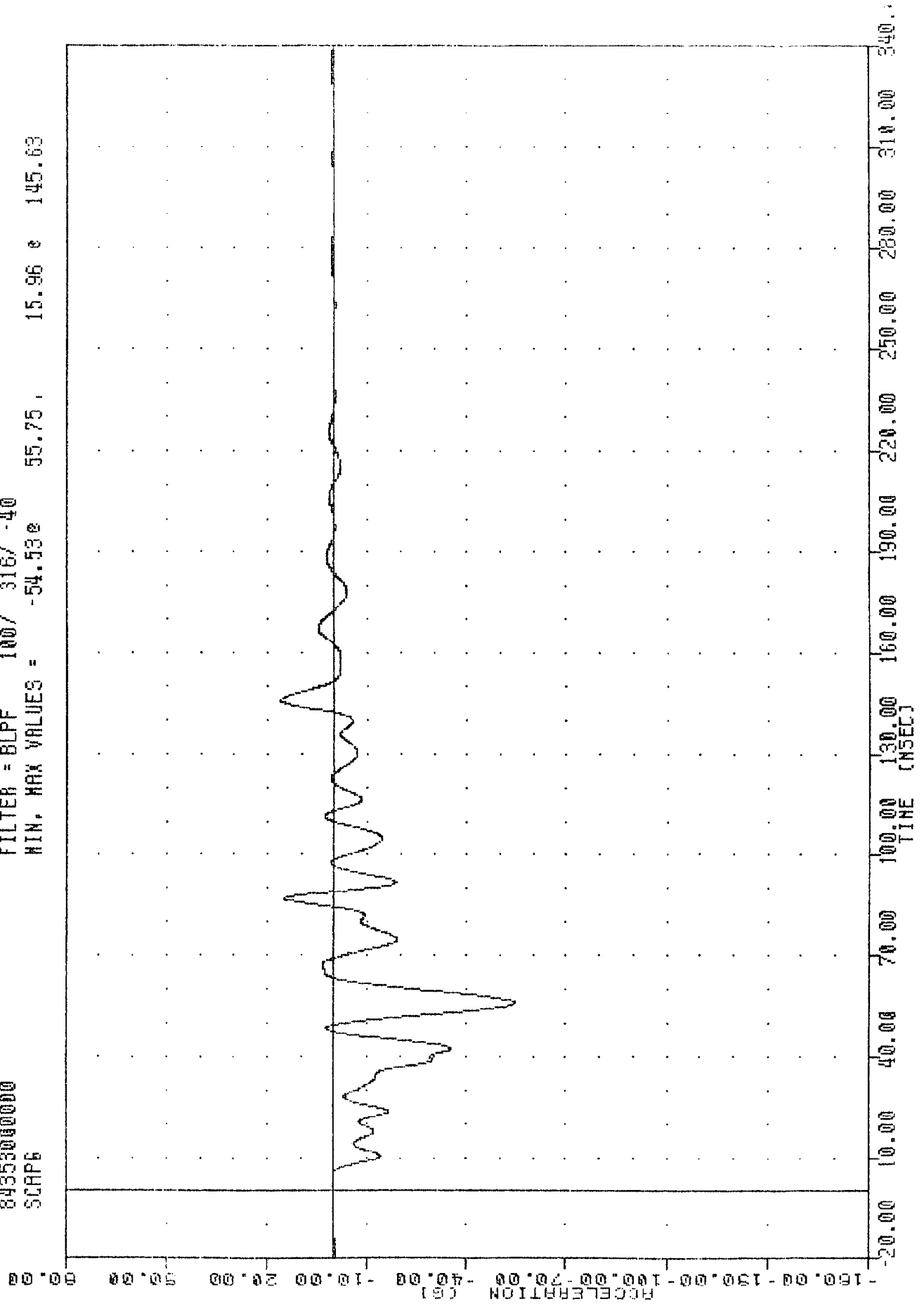


ENGINE BLOCK UPPER ACCELERATION X AXIS

TAC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
SCAPE

PLOT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -54.53e 55.75 , 15.96 e 145.63



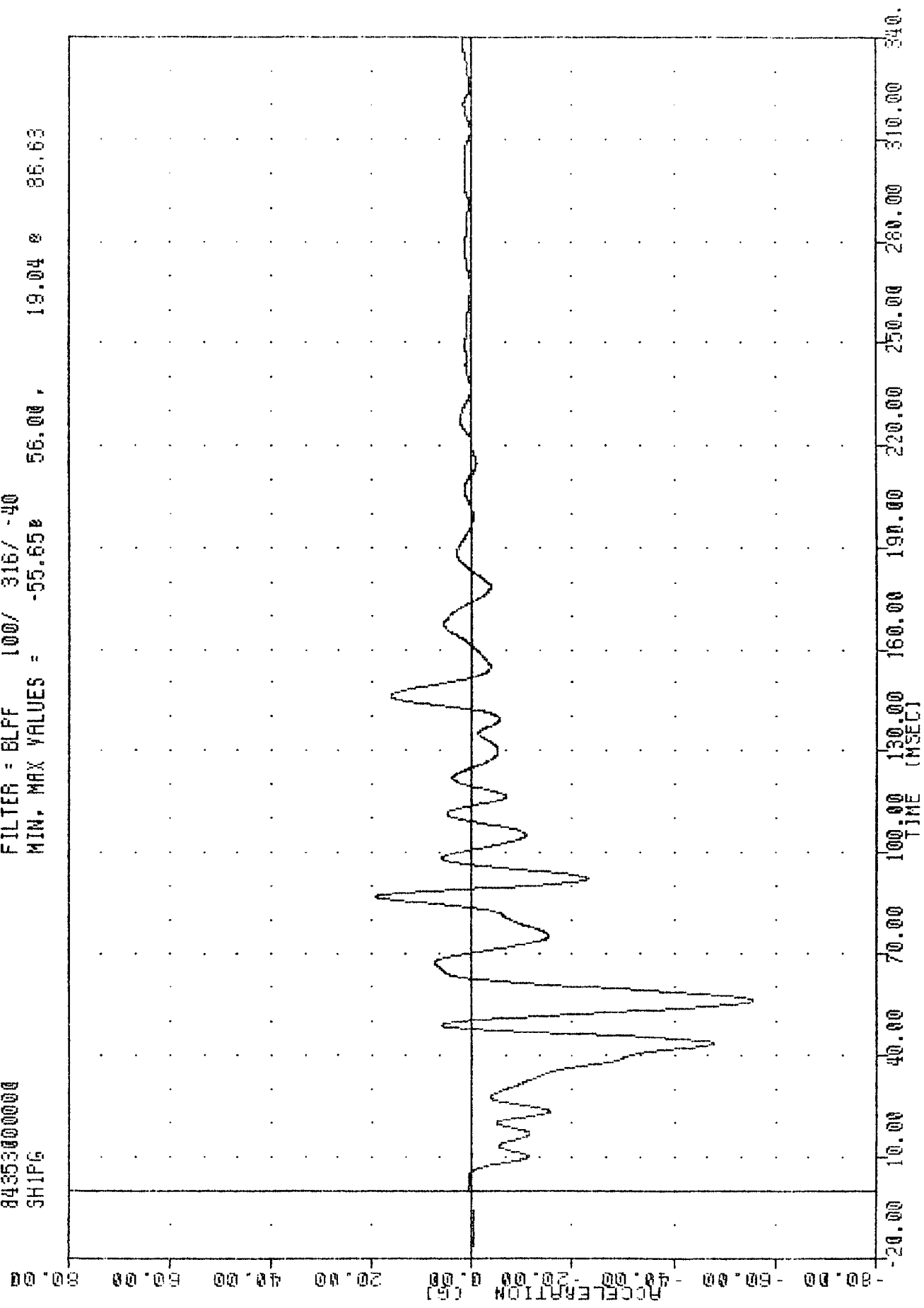
B-90

STEERING COLUMN ACCELERATION A-P AXIS

TRC  
84353000000  
SH1FG  
CAR TO CAR FRONTAL IMPACT  
841218P  
841218P

PLOT DATE 15-JAN-85 13:50:36

FILTER = BLFF 100/ 316/ -40  
MIN, MAX VALUES = -55.65% 56.00, 19.04 @ 86.63

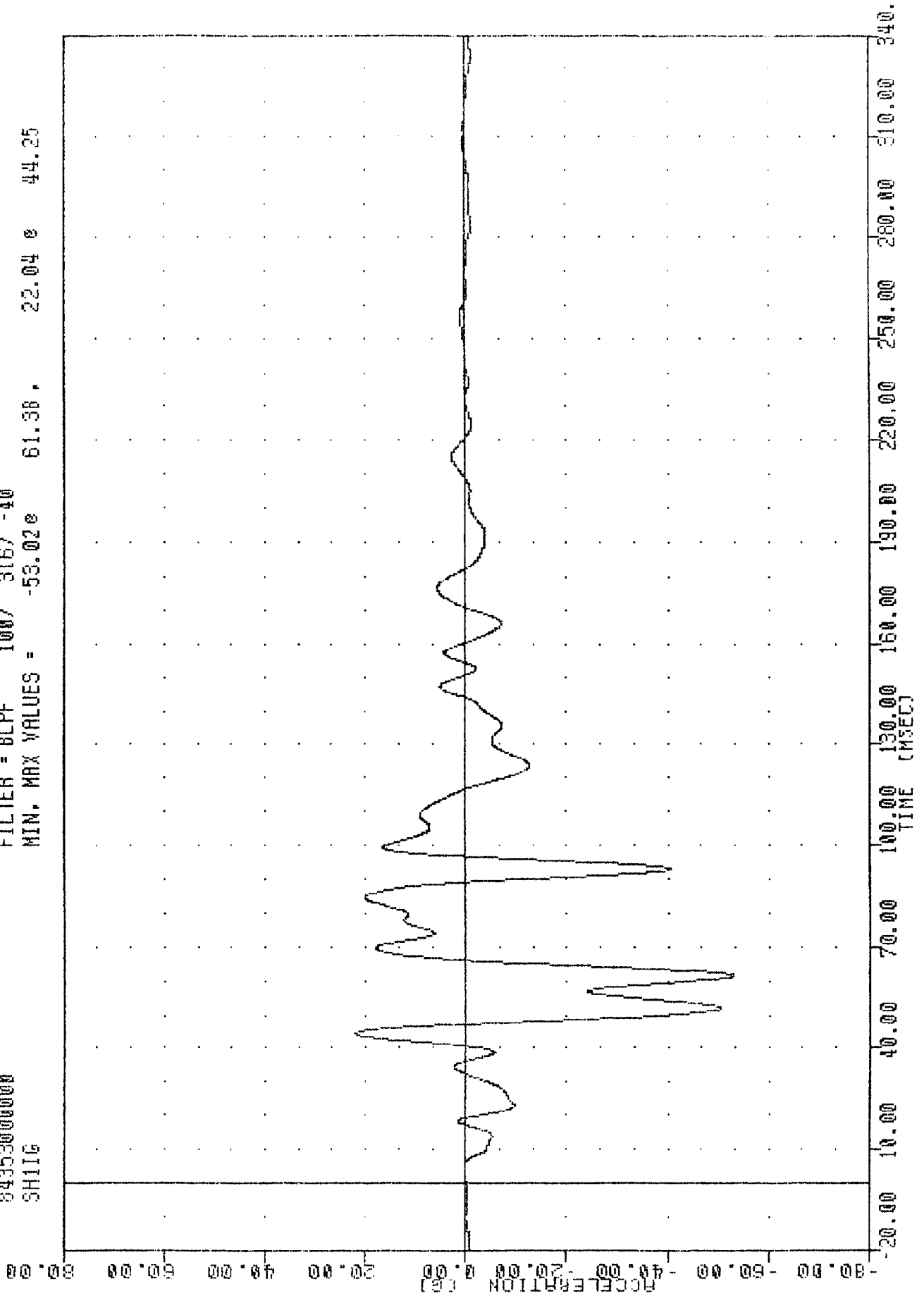


STEERING WHEEL HUB ACCELERATION A-P AXIS

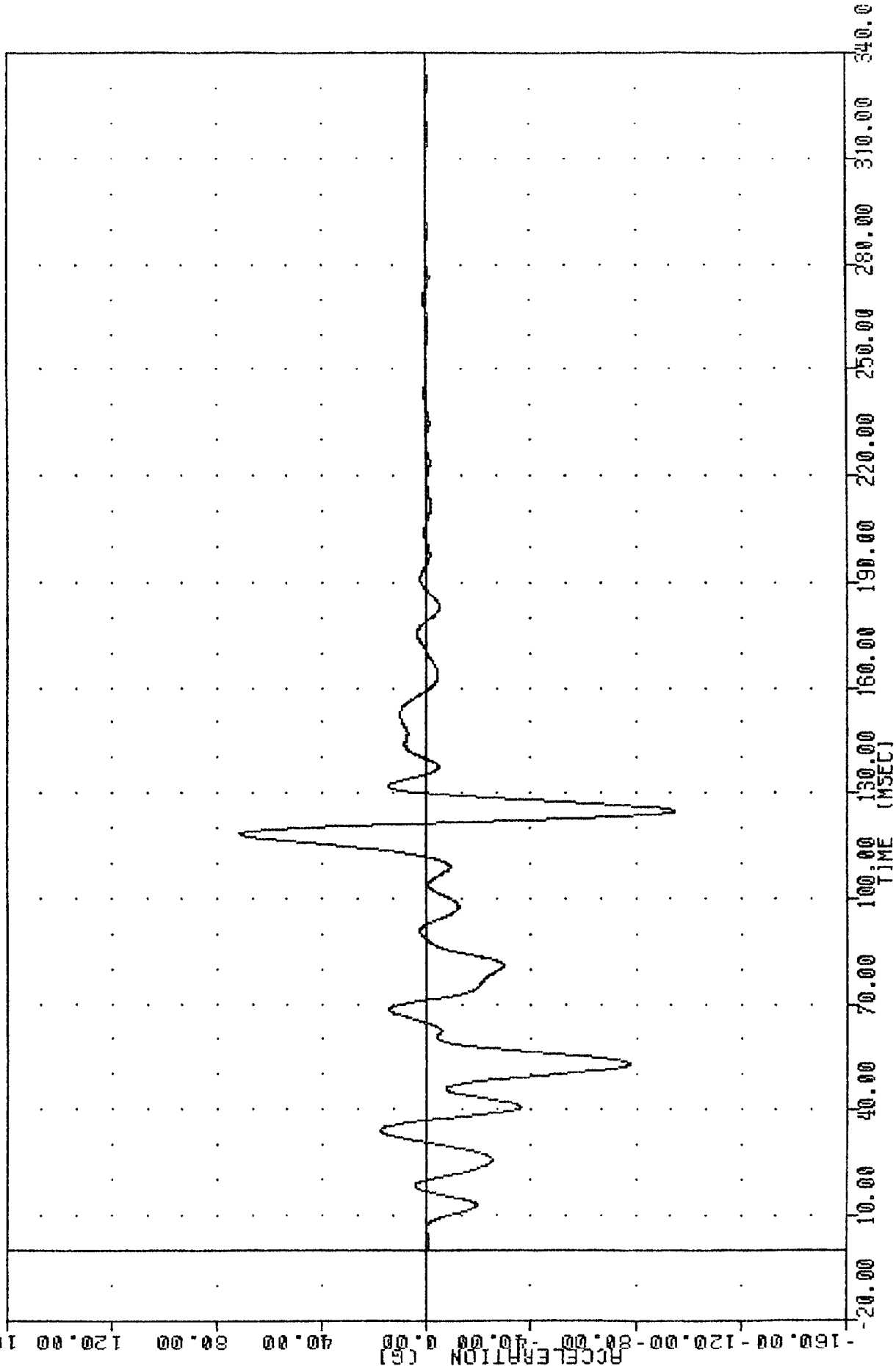
TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
SH11G

PLOT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -53.02e 61.36 . 22.04 e 44.25

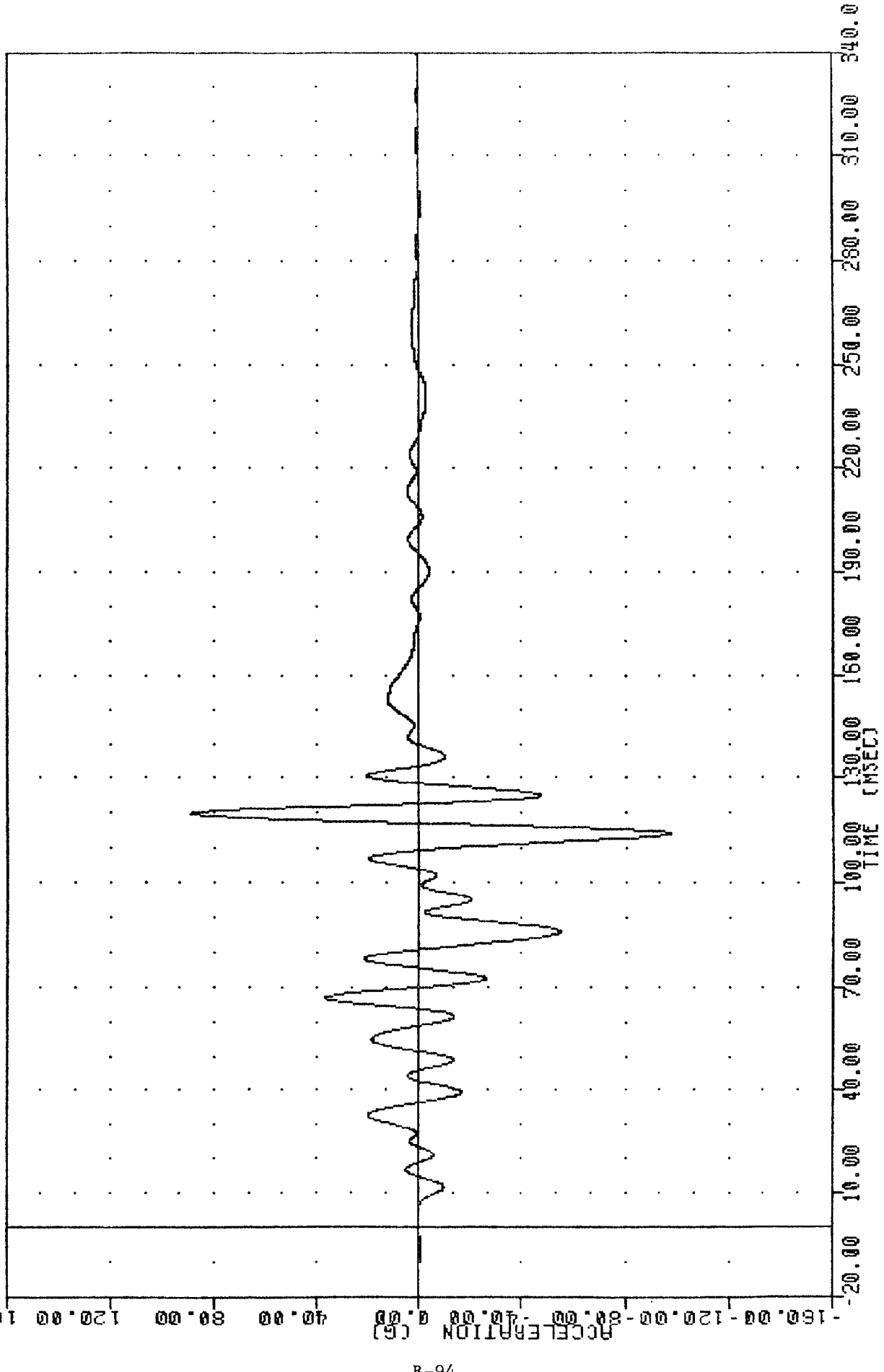


T 121121  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 OPCXG  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -94.92 124.63, 71.05 118.13  
 P 2 8:5



DASH PANEL CENTER ACCELERATION X AXIS

T 12:00 P 08:58  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 DPCZG  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -97.28e 114.00, 88.89 e 119.63

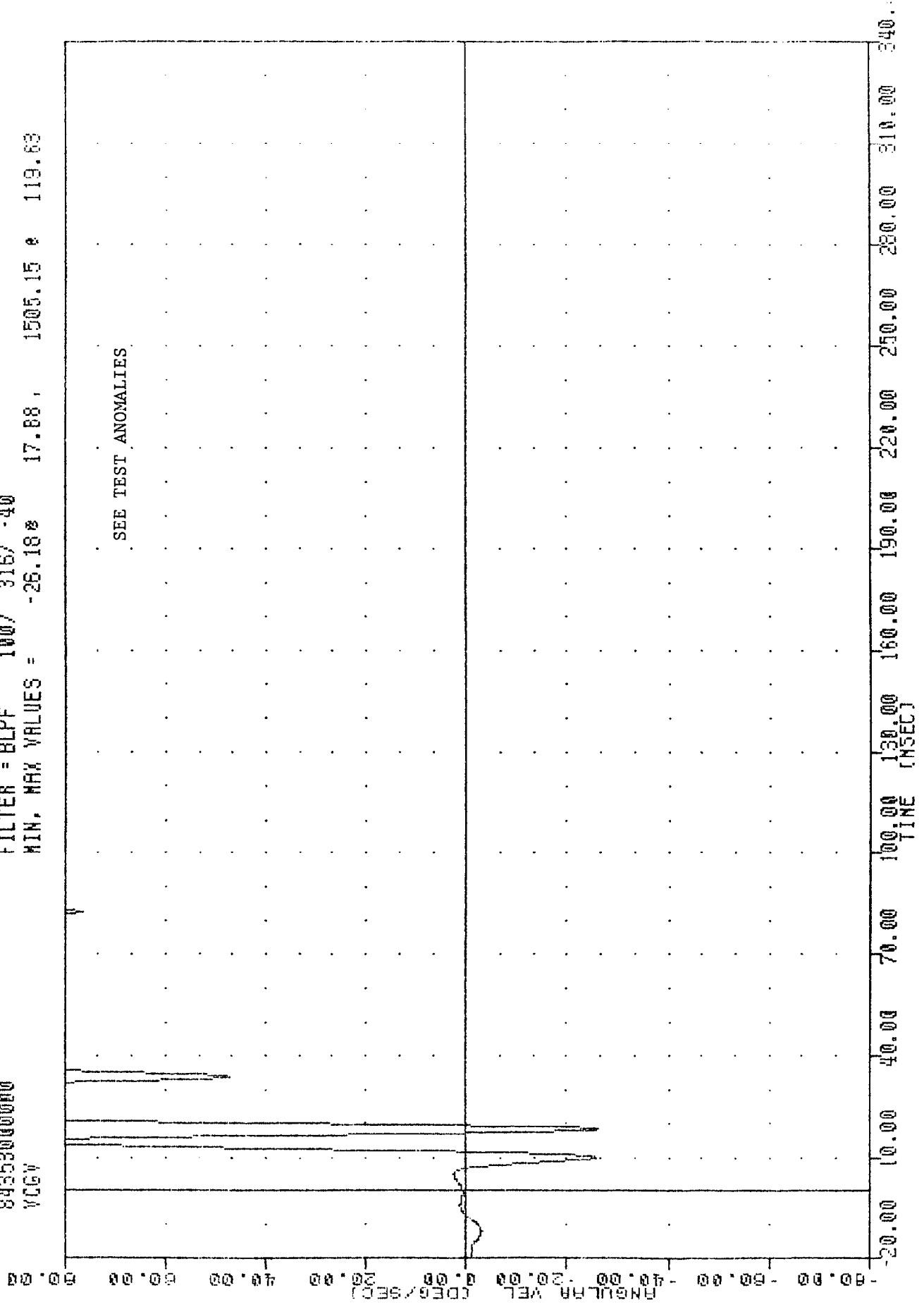


DASH PANEL CENTER ACCELERATION Z AXIS

TAC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
YCCV

PLOT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -26.18% 17.88, 1505.15 \* 119.63



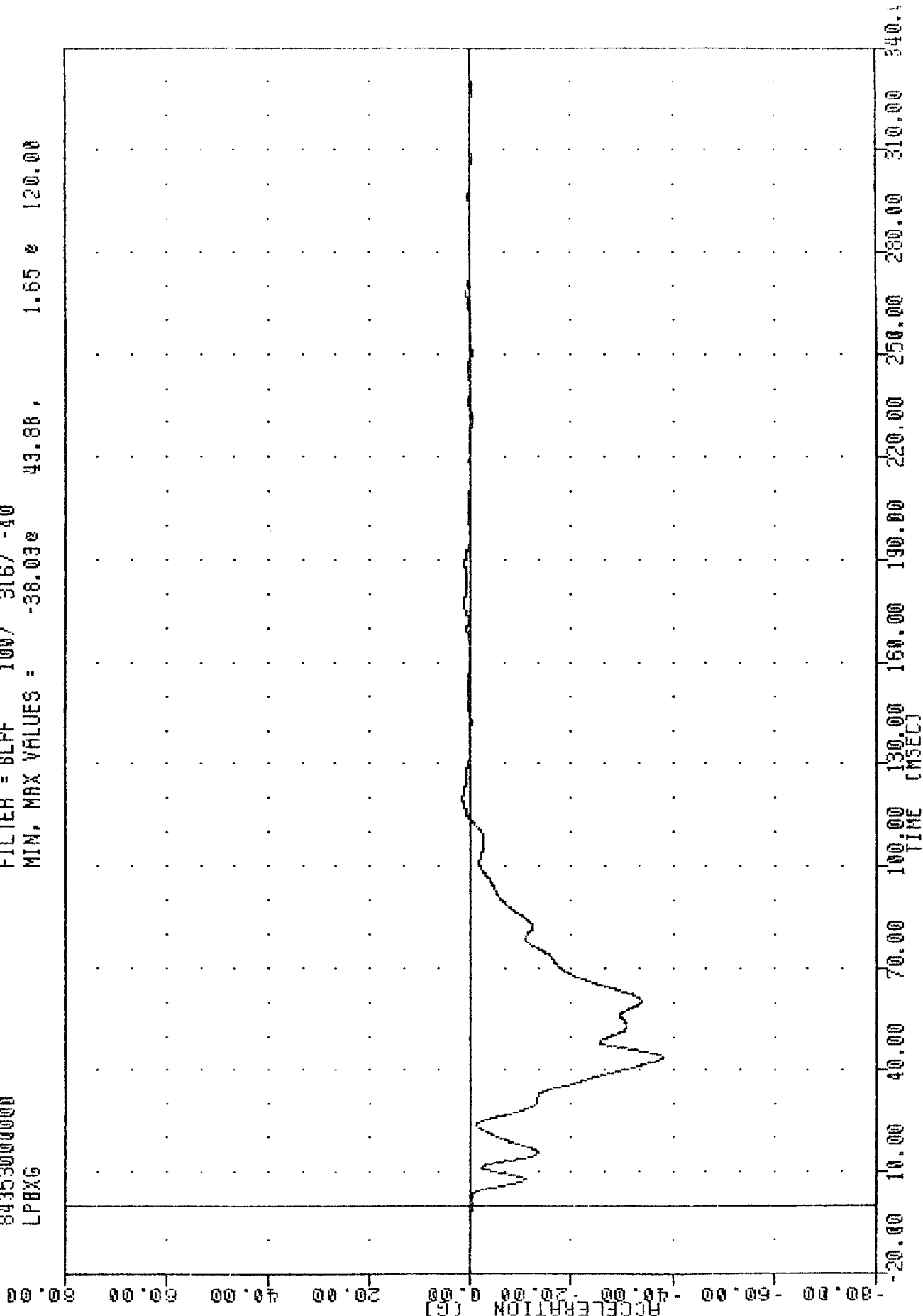
B-95

VEHICLE PITCH RATE DEGREES/SECOND

TRC  
841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
LPBXG

PLOT DATE 14-MAR-85 16:04:21

FILTER = 8LFF 100/ 316/ -40  
MIN. MAX VALUES = -38.03e 43.88, 1.65 e 120.00



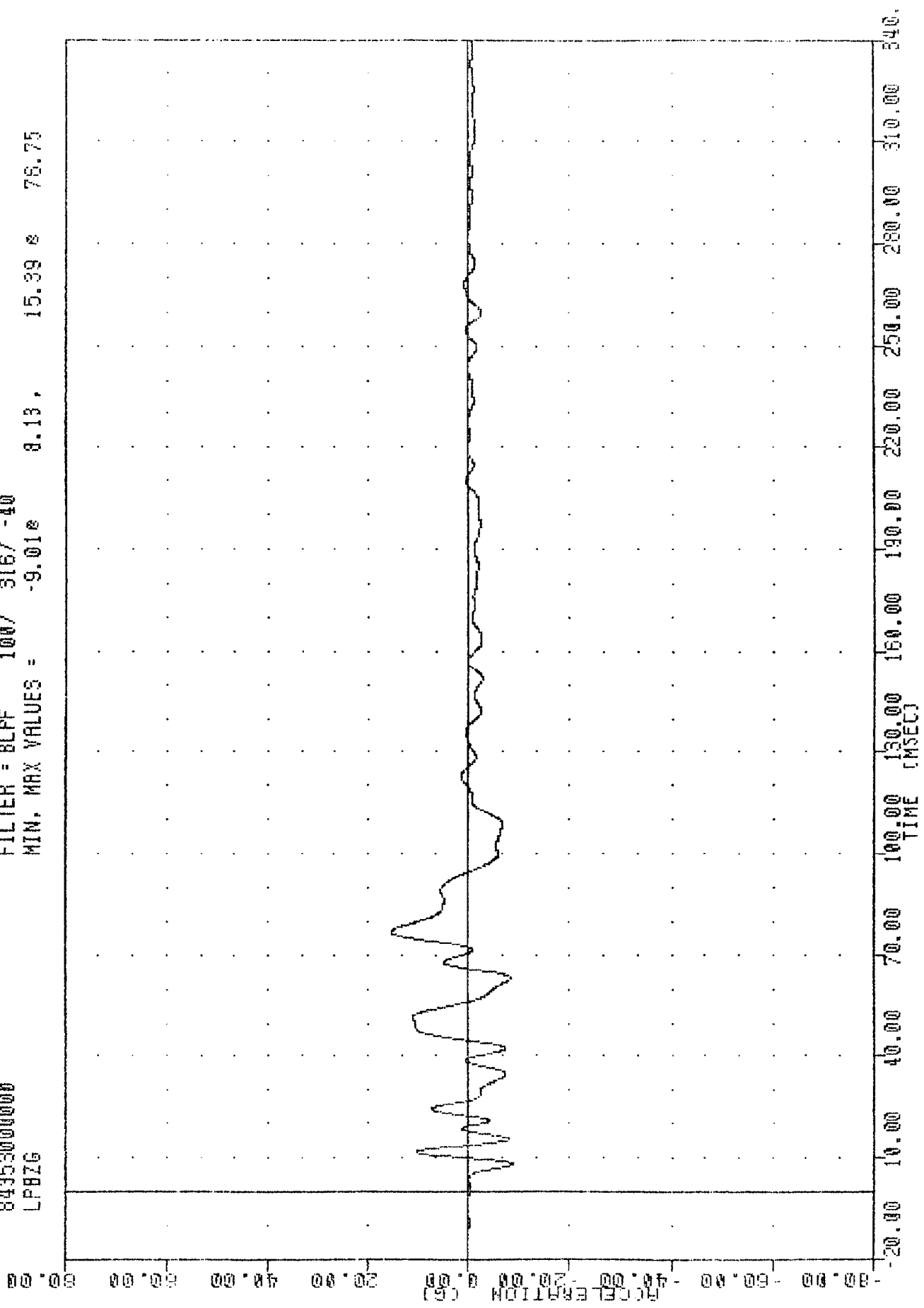
B-96

LEFT B PILLAR ACCELERATION X AXIS

TAC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
LPBZG

PLOT DATE 15-JAN-85 13:50:36

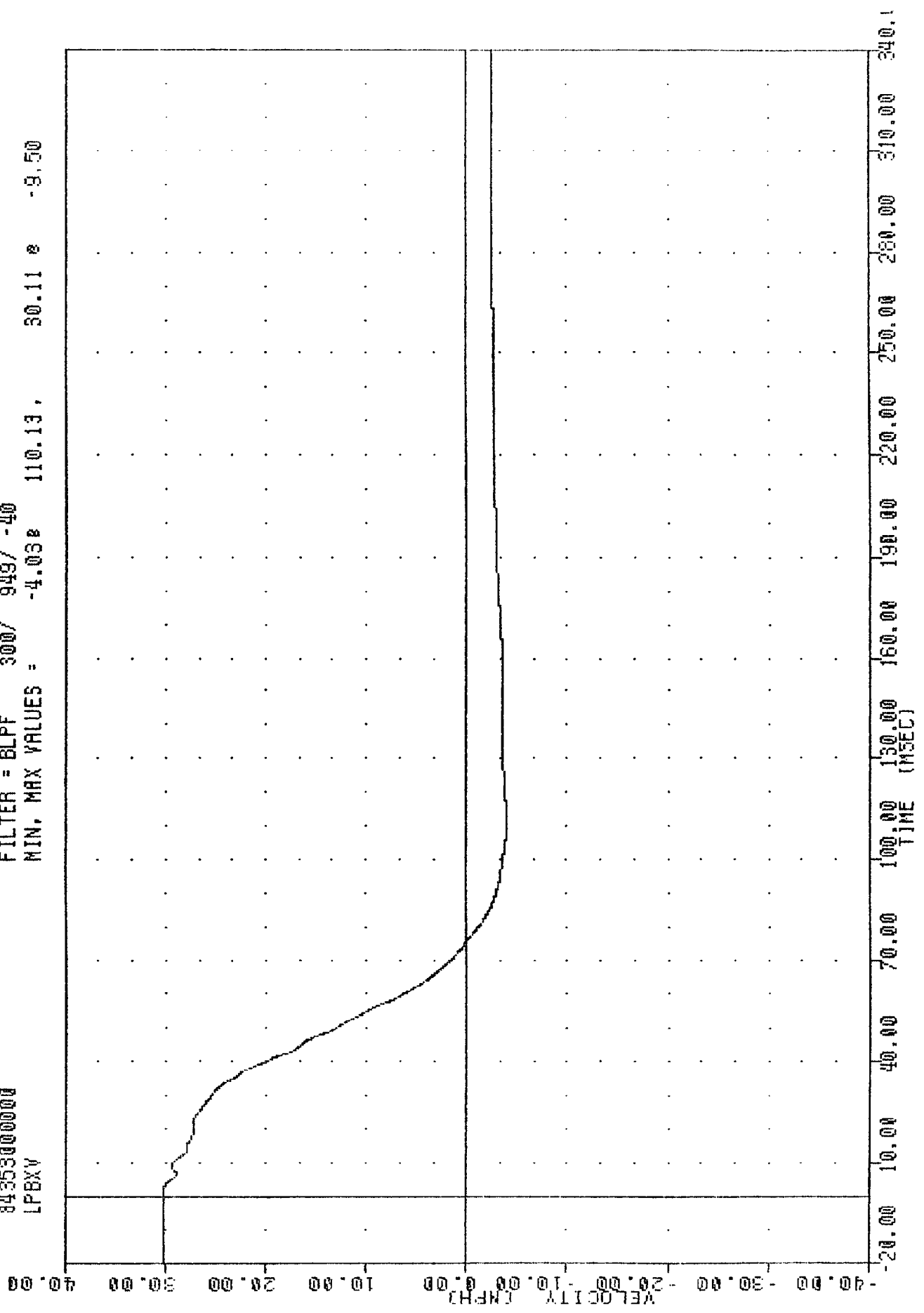
FILTER = 8LPF 100/ 316/ -40  
MIN. MAX VALUES = -9.01e 8.13, 15.39 e 78.75



LEFT B PILLAR ACCELERATION Z AXIS

TRC 841218P 14-MAR-85 16:31:43

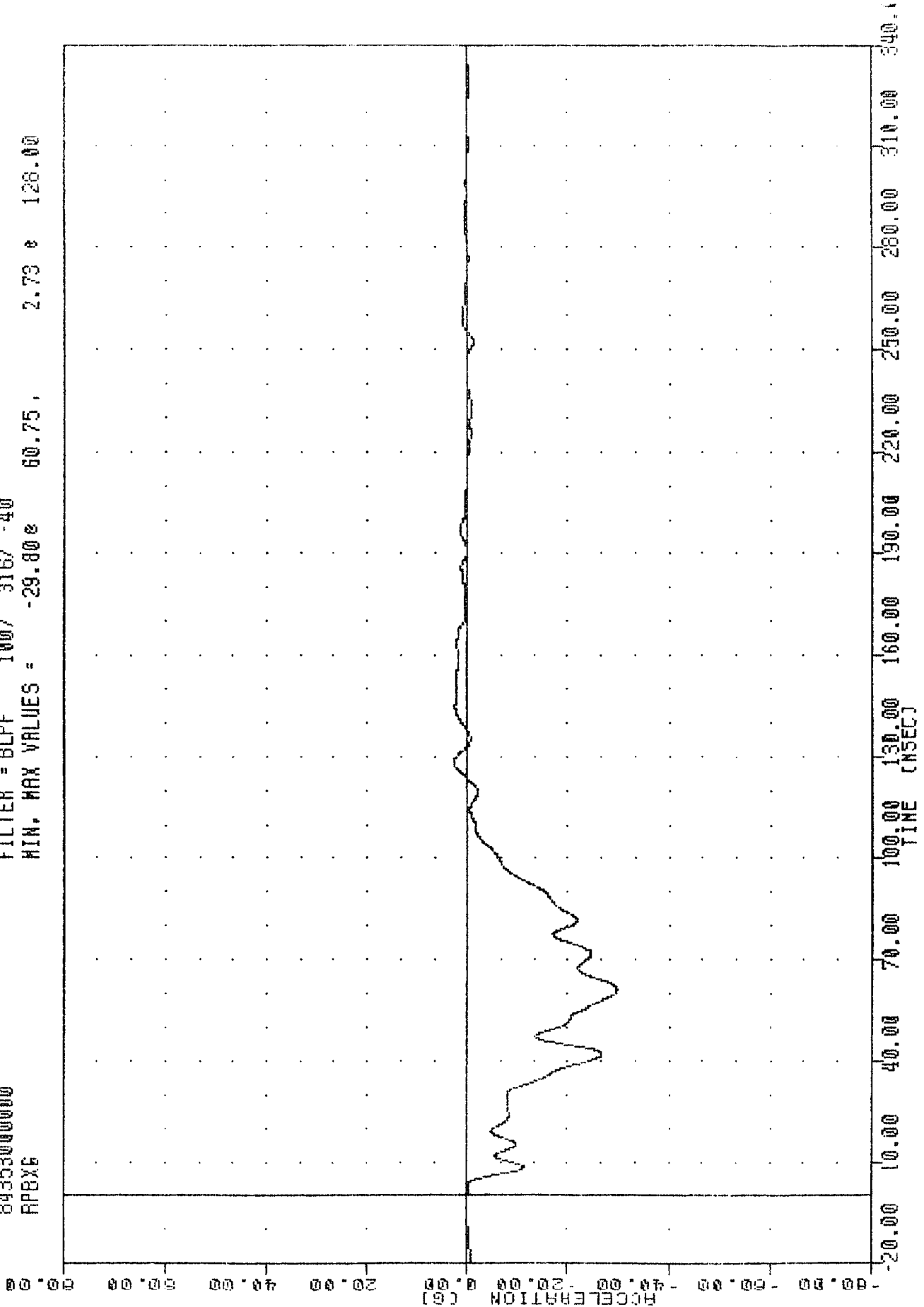
CAR TO CAR FRONTAL IMPACT  
84353000000  
LPBXV  
FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -4.03E 110.13, 30.11 e -9.50



THC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
RFBX6

PLOT DATE 15-JAN-85 13:50:36

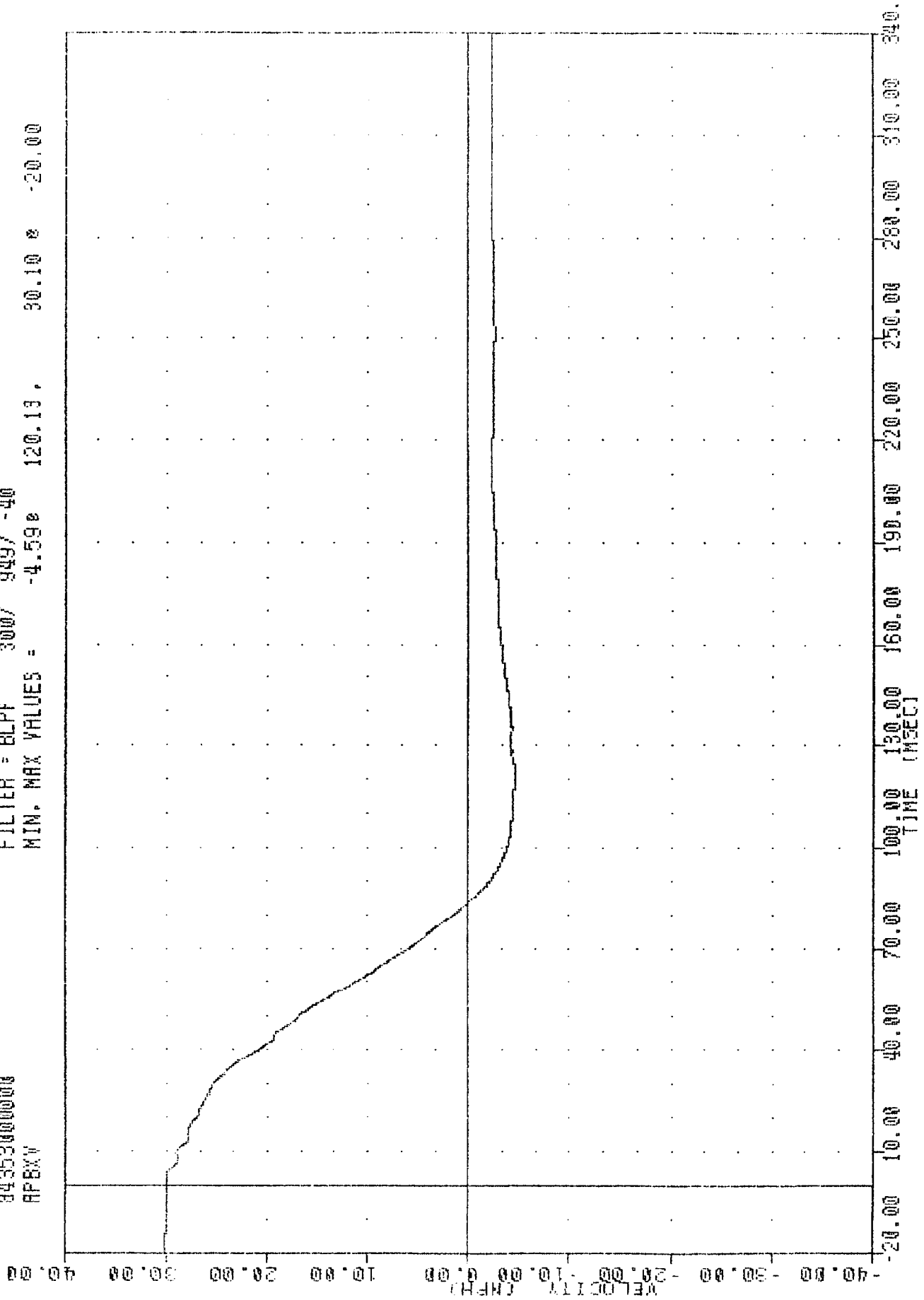
FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -29.80e 60.75, 2.73 e 128.00



TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
APEXY

PLOT DATE 15-JAN-85 13:51:54

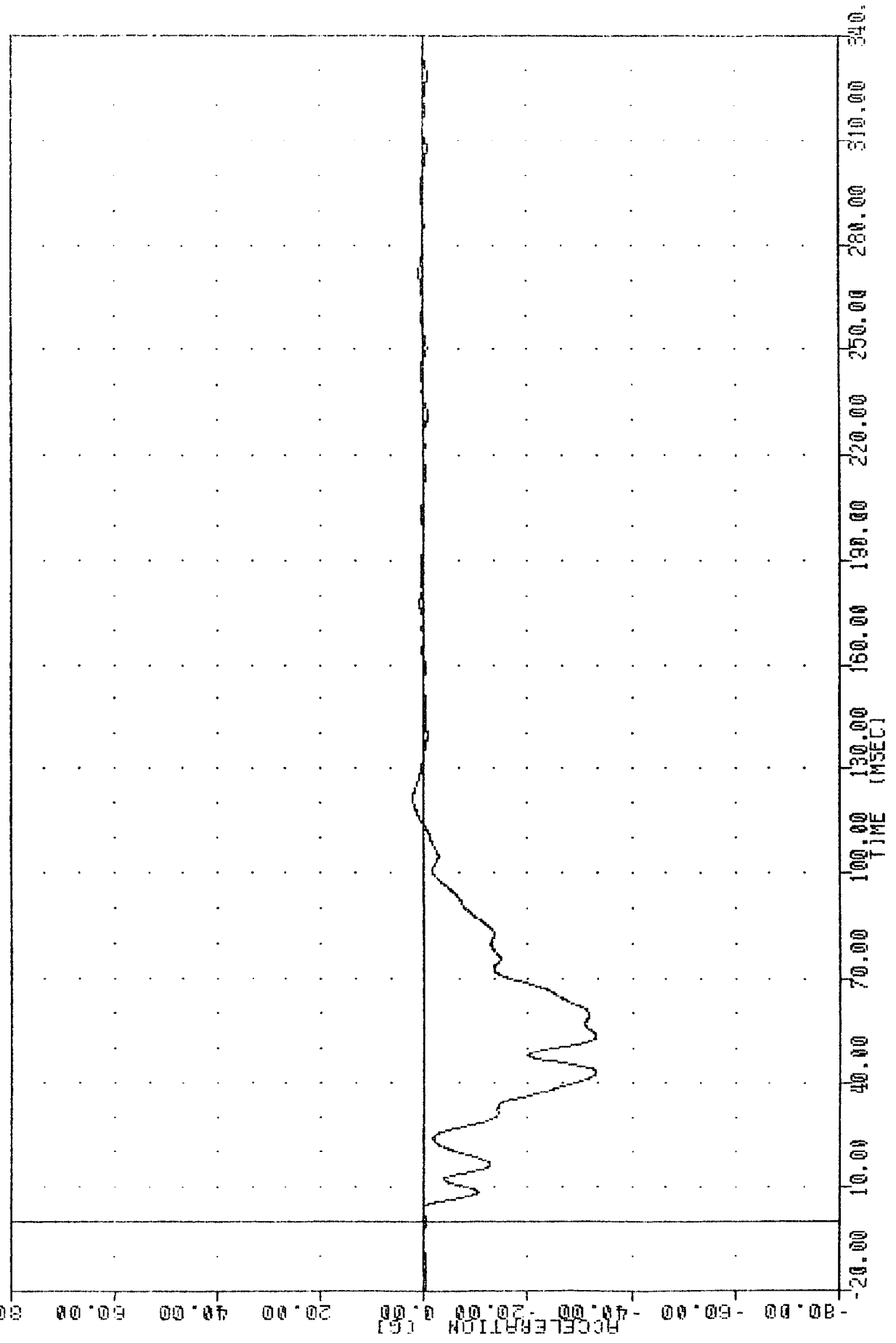
FILTER = BLPF 300/ 949/ -40  
MIN. MAX VALUES = -4.59e 120.19, 30.10 e -20.00



B-100

DELTA W USING RPBXG

TRC 841218F  
 CAR TO CAR FRONTAL IMPACT  
 84253000000  
 TLRXG3  
 PLOT DATE 15-JAN-85 13:50:36  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -33.100 43.13, 2.16 121.00

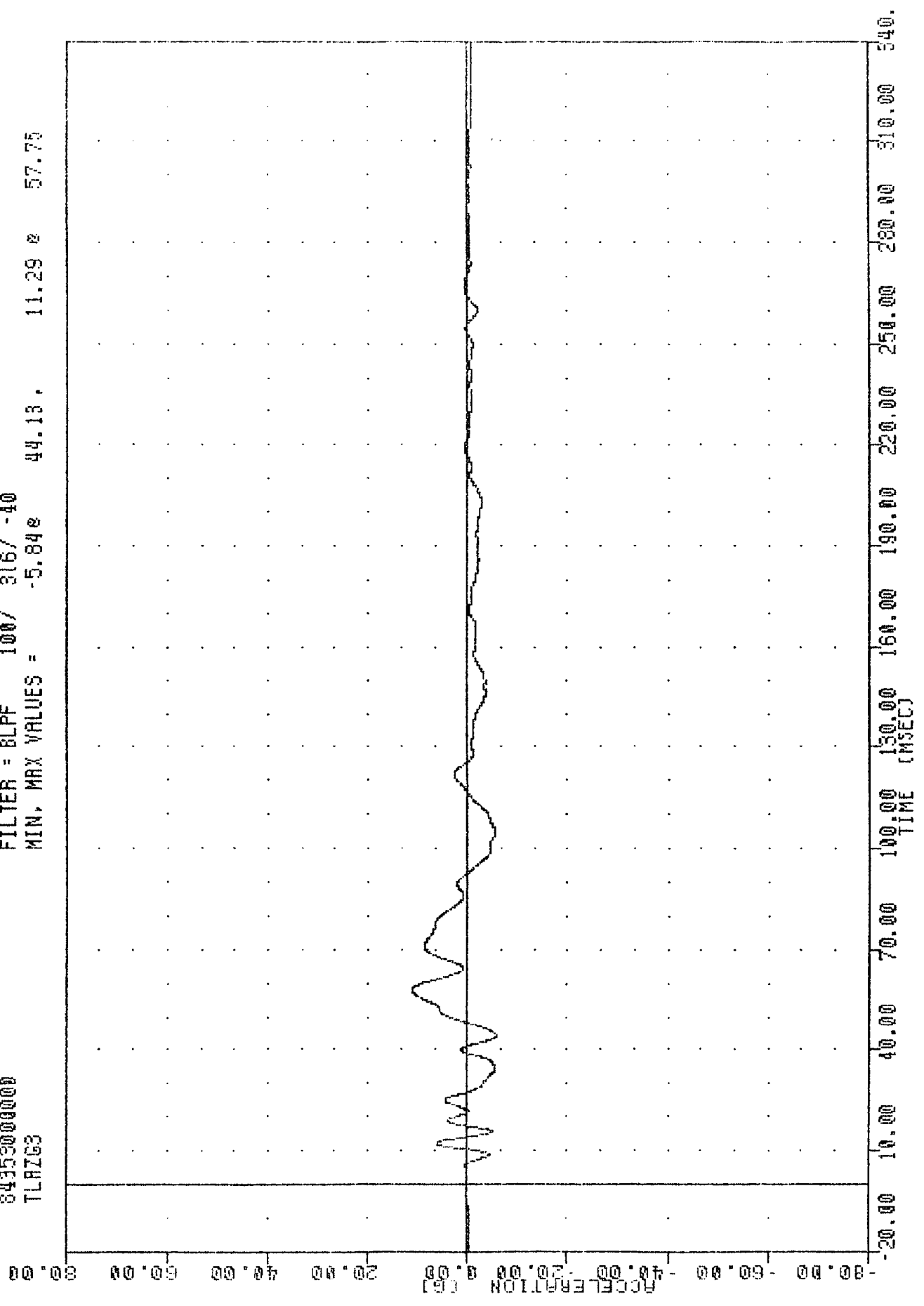


LEFT REAR SEAT ACCELERATION X AXIS

TRC  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TLRZ63

PLOT DATE 15-JAN-85 13:50:36

FILTER = 8LPF 100/ 316/ -40  
MIN, MAX VALUES = -5.84g 44.13, 11.29g 57.75

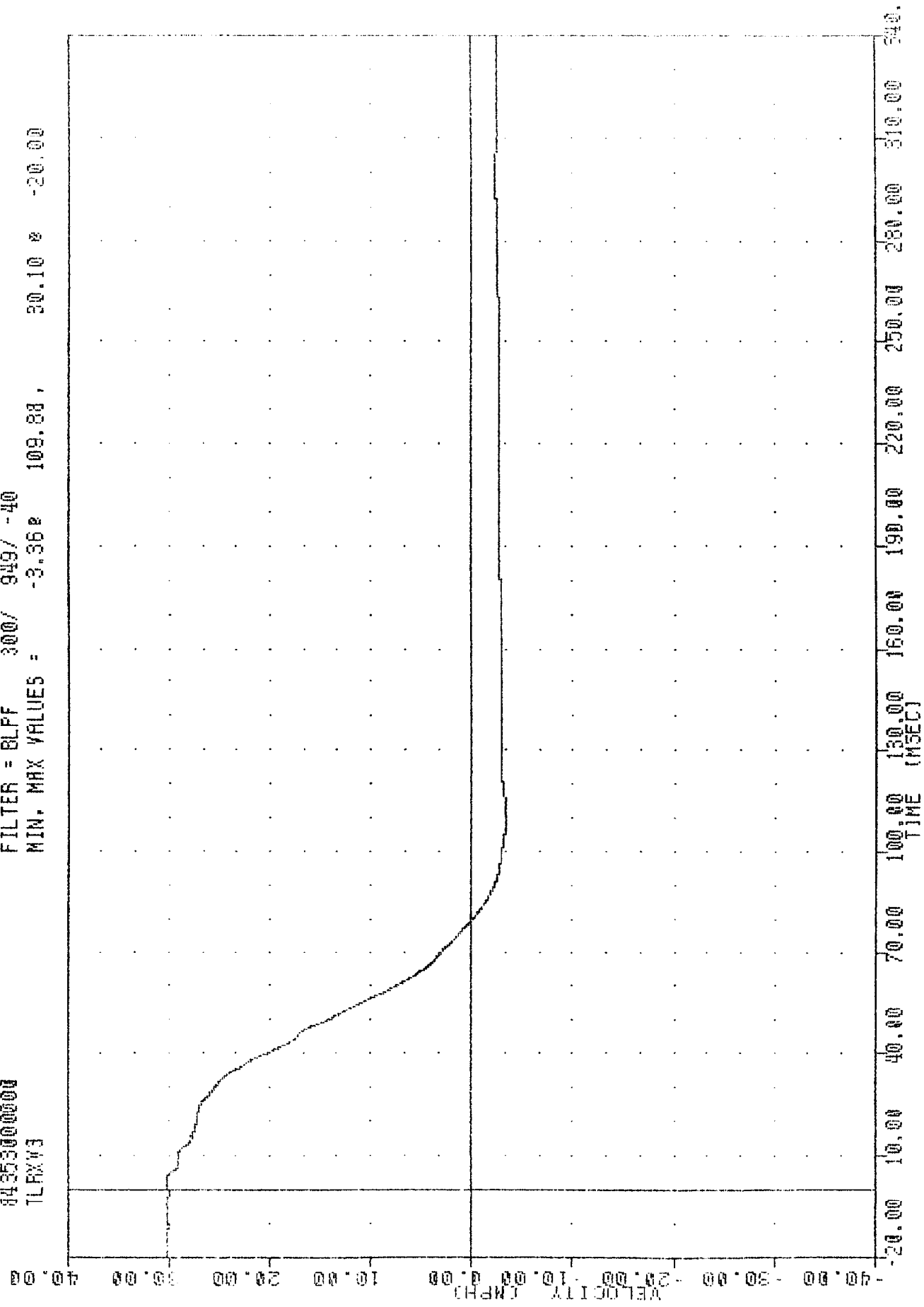


LEFT REAR SEAT ACCELERATION Z AXIS

TAC , 841218F  
 CAR TO CAR FRONTAL IMPACT  
 84353000000  
 TLRX73

PLOT DATE 15-JAN-85 13:51:54

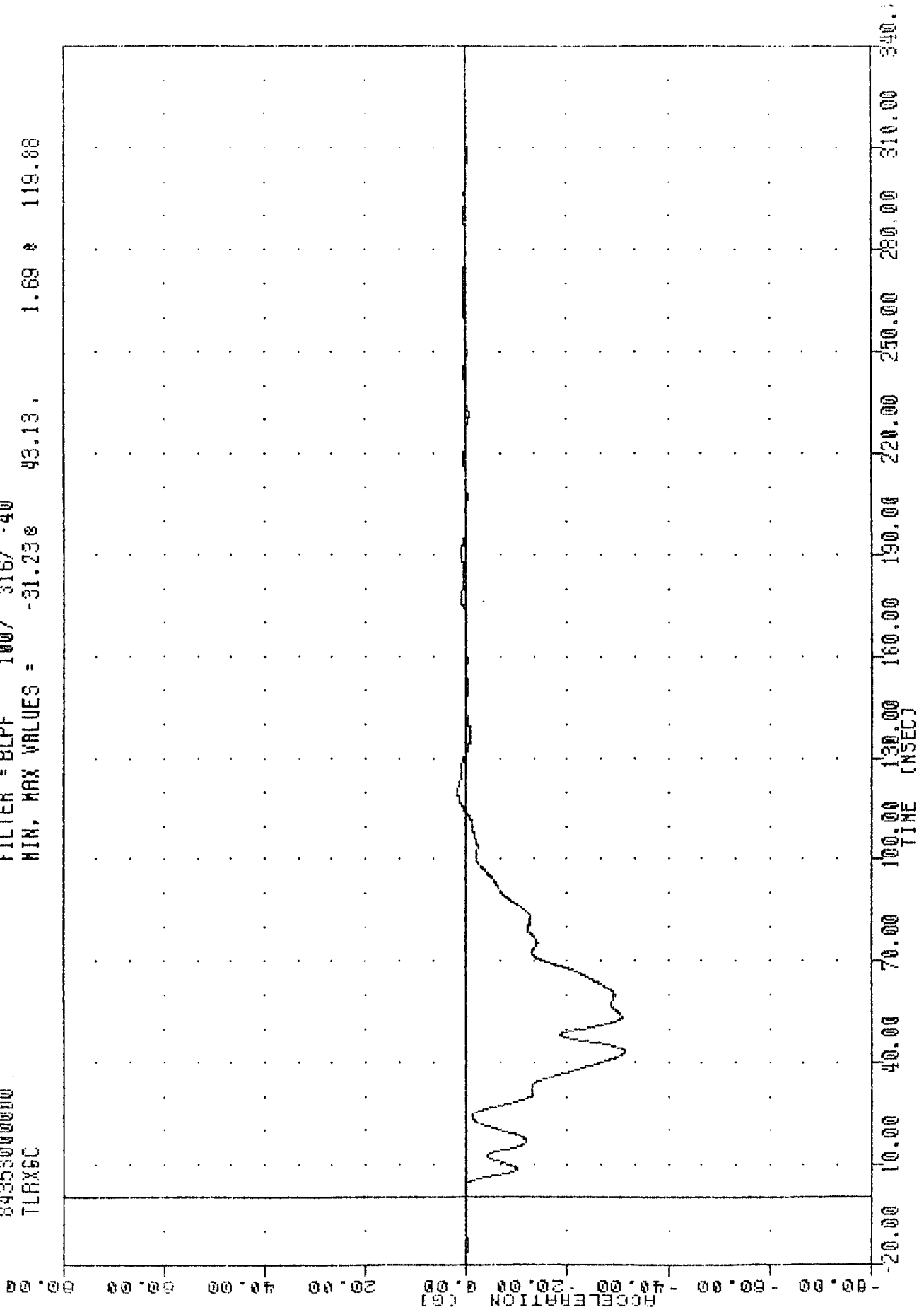
FILTER = BLFF 300/ 949/ -40  
 MIN, MAX VALUES = -3.36E 109.88, 30.10 \* -20.00



TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TLRX5C

PLUT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -31.23g 43.13 1.69g 119.88

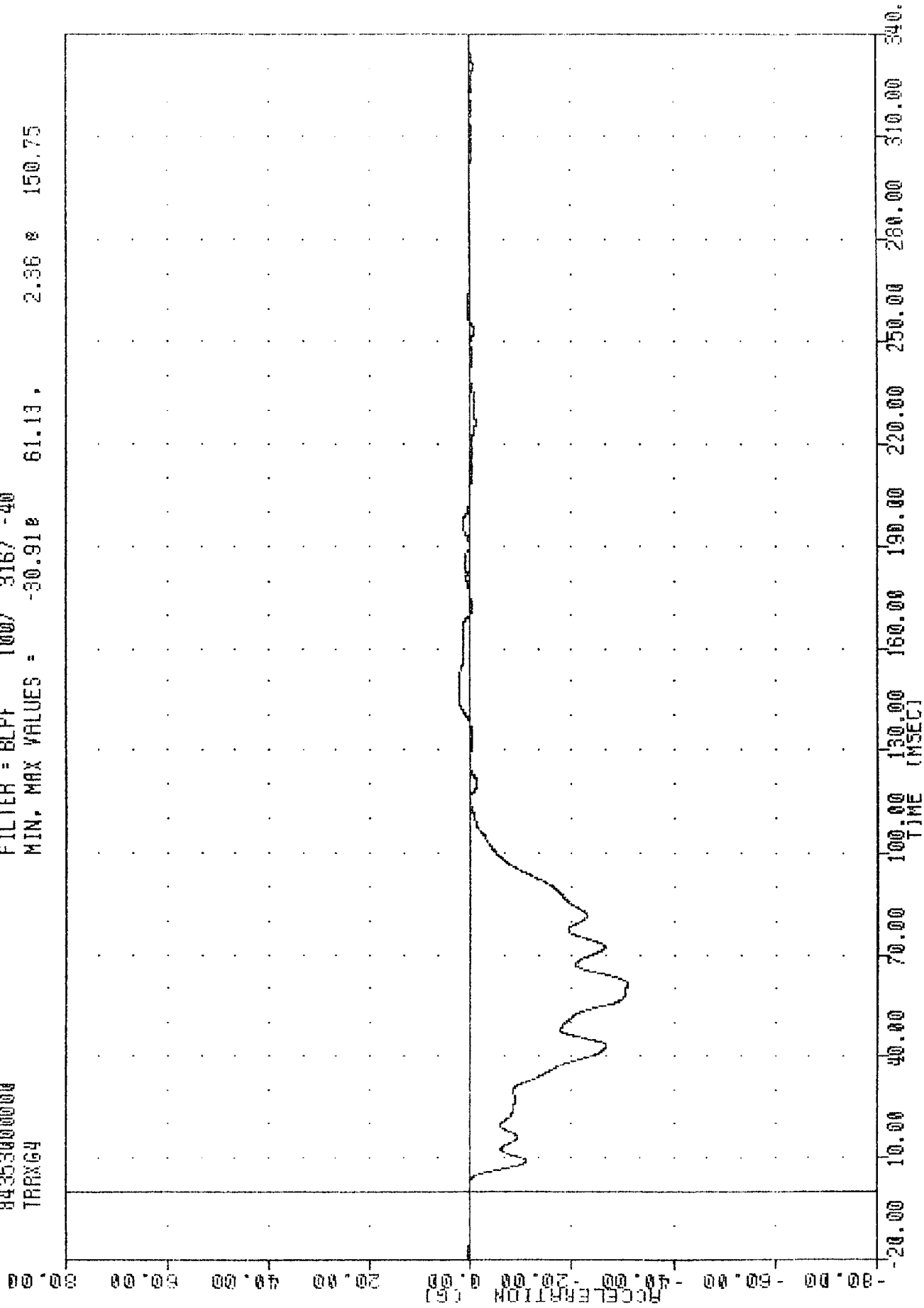


LEFT REAR SEAT ACCELERATION -2 X AXIS

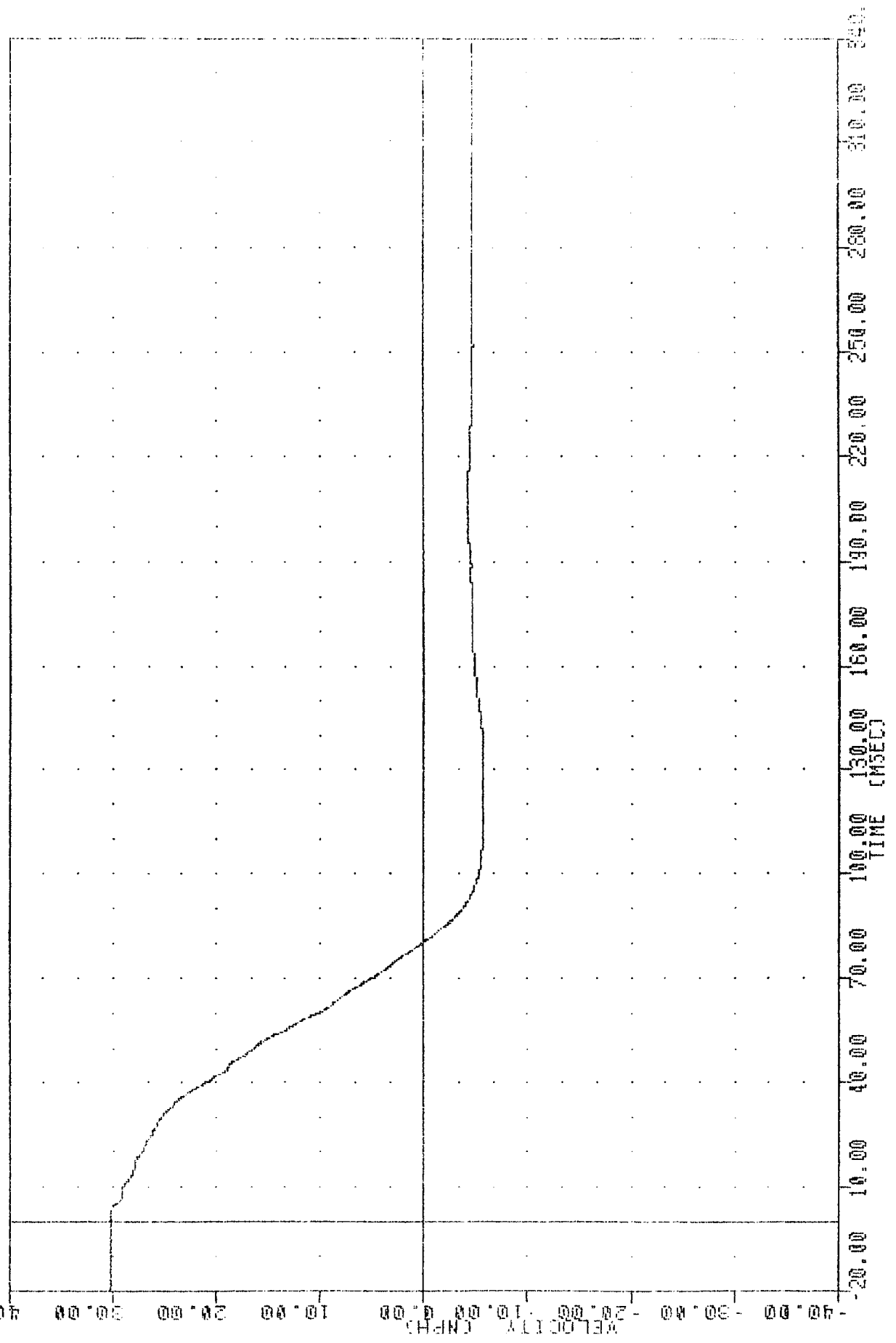
TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84353000000  
TRAX64

PLOT DATE 15-JAN-85 13:50:36

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -30.91e 61.13, 2.36 e 150.75



TRC 841218P  
 CAR TO CAR FRONTAL IMPACT  
 8435300000  
 TRAXV4  
 PLOT DATE 15-JAN-85 13:51:54  
 FILTER = BLPF 300/ 949/ -10  
 MIN. MAX VALUES = -5.77e 134.63, 30.15 e 0.38



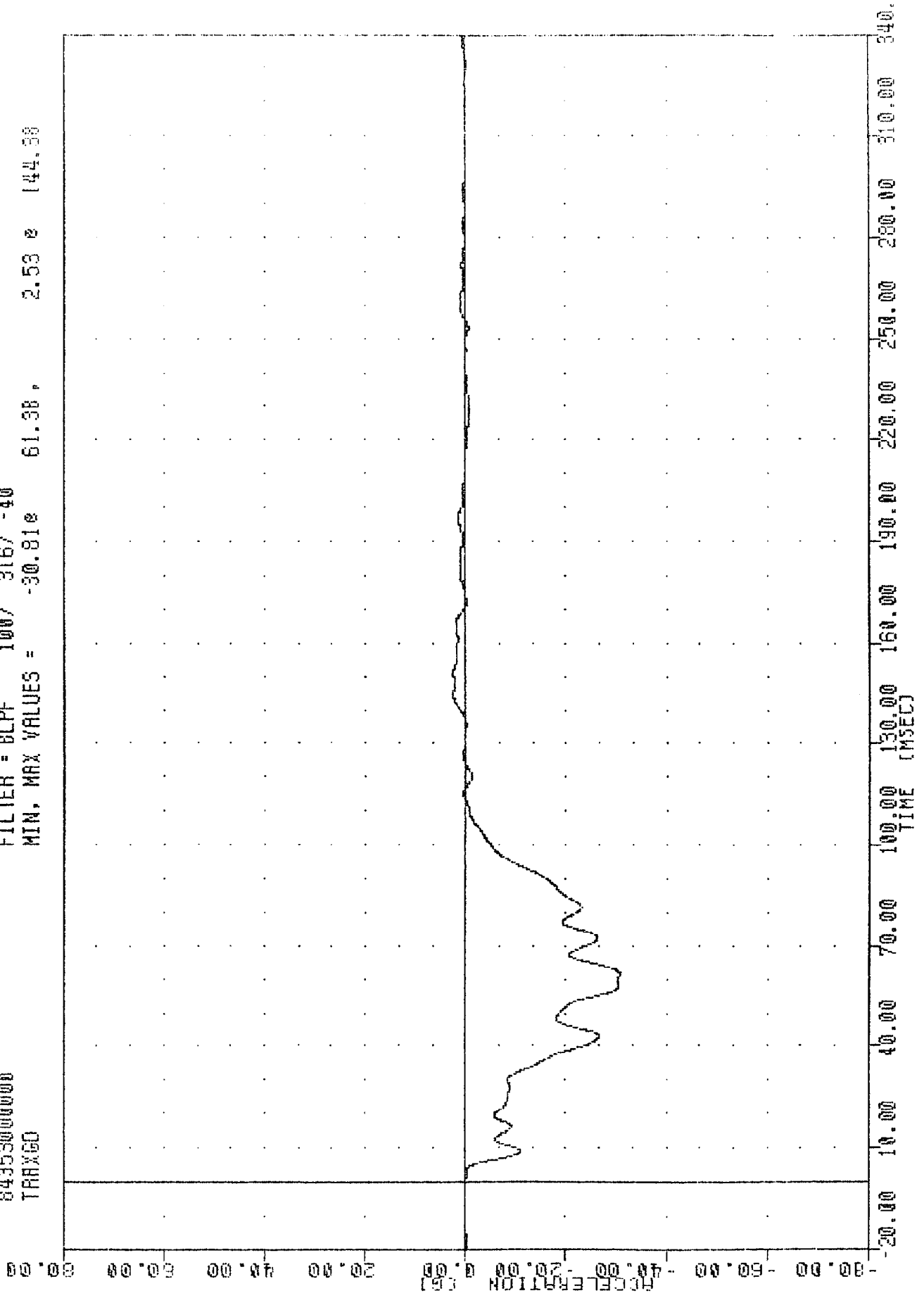
B-106

DELTA V USING TRAX64

TRC 841218P  
CAR TO CAR FRONTAL IMPACT  
84355000000  
TRAX60

PLOT DATE 15-JAN-85 13:50:36

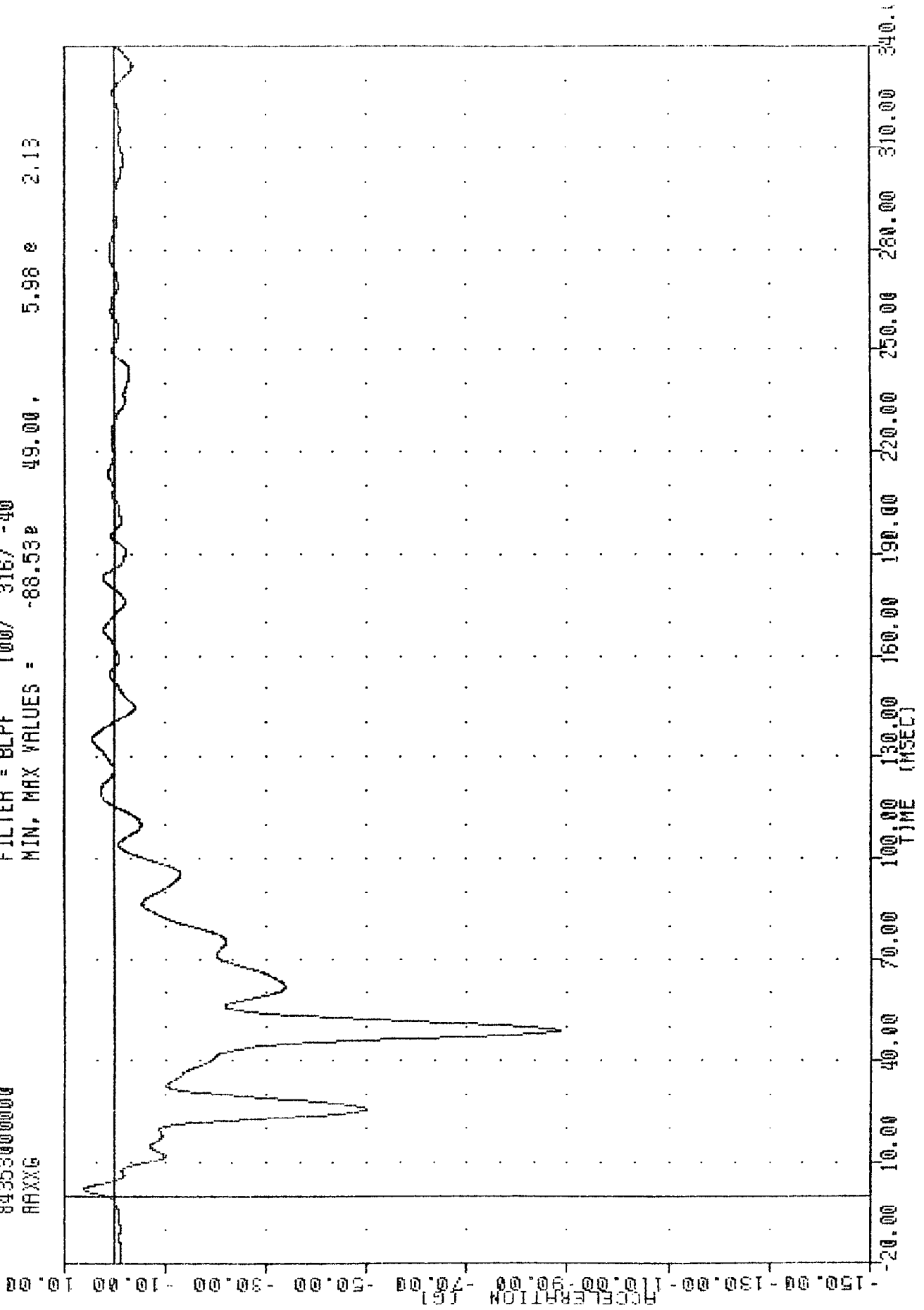
FILTER = 6LPF 100/ 316/ -40  
MIN. MAX VALUES = -30.81e 61.38, 2.53 e 144.38



TRC , 84121SP  
CAR TO CAR FRONTAL IMPACT  
84353000000  
RAXXG

PLOT DATE 14-MAR-85 16:04:21

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -88.53e 49.00, 5.98 e 2.13



REAR AXLE ACCELERATION X AXIS

---

APPENDIX C  
DUMMY CERTIFICATION

PRE-TEST CALIBRATION

SUBJECT VEHICLE

10/25/98 10:00 AM 10/25/98 10:00 AM 10/25/98

10/25/98 10:00 AM

10/25/98 10:00 AM

10/25/98 10:00 AM

NRTO 08198 4804H00

BY: SN43/NER0143 GRL 04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	36.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	252.11 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.18 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V.J. Watters  
TEST SUPERVISOR R.E. LeVan

UNITED STATES GOVERNMENT

OFFICE OF THE SECRETARY

MEMPHIS, TENN

3 AXIS WEEP TRANSDUCER

13-DEC-84 1011540

VRTC SNL98 4304RF1

HYA SN43 CAL4 WEEP FLEXION 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	70.00 degrees
RELATIVE HUMIDITY	10% - 70%	51.00 %
IMPACT VELOCITY	22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G
	20 MS	17.40 - 22.60 G
	30 MS	12.50 - 18.50 G
MAXIMUM PENDULUM G	29 G MAX	27.61 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	34 - 46 MS	39.25 MS
D PLANE ROTATION	MAX	67 - 79 degrees
	TIME	54 - 64 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	70 - 90 FT.LBS
	TIME	46 - 56 MS
	MIN	-22.2/-14.0 FT.LBS
	TIME	12 - 16 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	109 - 117 MS	123.68 MS **
POSITIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	75 - 105 MS	103.00 MS

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN

TEST SUPERVISOR

*H. J. Winters*  
*R. E. LeVan*

REPORT OF TEST RESULTS FOR THE

TEST PERFORMED BY

DATE

3 AXIS NECK TRANSDUCER

14-001-00-1918712a

VRTC SRL98

93CANE1

HY3 BR43 CAL4 NECK EXTEN. 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	55.00 %
IMPACT VELOCITY	19.50 - 19.90 FPS	19.51 FPS
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	19.80 G
	20 MS   14.00 - 19.00 G	17.18 G
	30 MS   11.00 - 16.00 G	15.94 G
MAXIMUM PENDULUM G	22 G MAX	20.17 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 50 MS	40.63 MS
D PLANE ROTATION	MAX   94 - 106 degrees	100.09 degrees
	TIME   72 - 82 MS	77.75 MS
MOMENT ABOUT OCCIPITAL	MAX   111.75 - 17.75 FT.-LBS	14.95 FT.-LBS
	TIME   12 - 18 MS	16.13 MS
CONDYLES	MIN   -61.2/-50.5 FT.-LBS	-56.51 FT.-LBS
	TIME   69 - 77 MS	75.35 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	151 - 167 MS	162.75 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	100 - 149 MS	141.25 MS

DUMMY COMPONENT TEST SPECIFICATIONS

TECHNICAL OFFICER *A. J. Williams*  
 TEST SUPERVISOR *D. E. DeVan*

THE AIR FORCE TEST CENTER - WRIGHT-PATTERSON AFB, OHIO

INCHES 37-001 TEST

ITEM NO. 111

COMPLETION DATE 10/1/51

UNIT SERIAL NO. 4304701

WACATMI

HYF 5043 ORLO-4 H.P. THORAX 01

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	43.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.819 INCHES *
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1131.8 POUNDS *
INTERNAL HYSTERESIS	75% - 85%	75.1%

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN V. J. Watters

TEST SUPERVISOR R. E. LeVan

PROBATIONARY DUMMIES RESEARCH CENTER OF DAVID

KNEE IMPACT TEST

HYBRID III

14-DFC-89 19157.00

LEFT KNEE

URTC SRL98 4304LR1

HTS 8043 L.KNEE 11LB CAL 04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	52.00 %
PROBE VELOCITY	6.93 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1309.60 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V.J. Watts

TEST SUPERVISOR R.E. Linton

model 101100-110 part 10110-10-110

OPER IMPACT TEST

WORK ORDER

14-DEC-69 15110135

RIGHT KNEE

VRTC SRLY8 4304MB1

HY3 8M43 R.KNEE 11LB CAL 04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	54.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1546.38 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN K. J. Walters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

6-DEC-84 15:21:23

TEMPERATURE 69.00 F  
VRTC SRL98 ED82616

RELATIVE HUMIDITY 23.00 %  
572 SN 826 EXT. DIMENSIONS 16

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN ALDERSON RESEARCH LAB 826		
Sitting Height	35.6 - 35.8 IN	35.8 INS
Shoulder Pivot Height	21.8 - 22.4 IN	22.4 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7 IN	20.6 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6 IN	9.4 INS
Shoulder Width	17.8 - 18.4 IN	18.0 INS
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.6 INS
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.5 INS
Hip Width	14.0 - 15.4 IN	14.8 INS
Knee Pivot From Floor	19.3 - 19.9 IN	19.6 INS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters

TEST SUPERVISOR A. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

6-DEC-84 11:34:30

TEMPERATURE 70.00 F  
VRTC SRL98 ABB2616

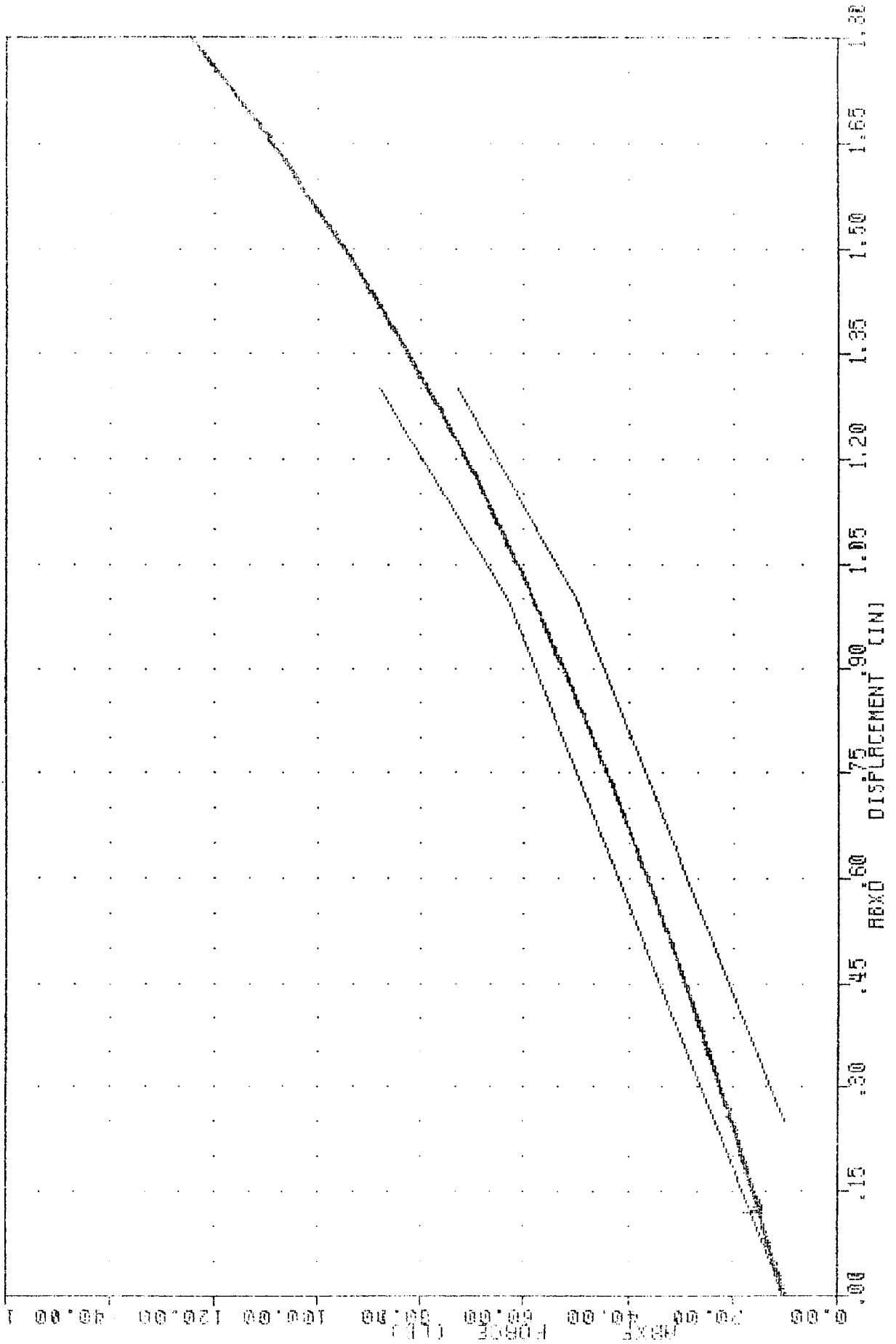
RELATIVE HUMIDITY 23.00 %  
572 SN 826 ABDOM COMPRESS CAL 16

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0 IN.	10 LBS	10 LBS
.25 IN.	10.00 - 23.25 LBS	20.07 LBS
1.00 IN.	50.00 - 63.00 LBS	58.44 LBS
1.30 IN.	73.00 - 88.00 LBS	78.51 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Watkins  
TEST SUPERVISOR R. E. Sevan

VARI SPREAD: [REDACTED] 16300616  
 ADX0 163007 52147 -40  
 RBXF 16507 52147 -40  
 FILTER = ALFF  
 FILTER = ALPF  
 CONV C 16  
 MIN, MAX  
 MIN, MAX = 9.82 \*  
 0.00 \*  
 0.00 \*  
 0.00 \*  
 0.00 \*  
 124.84 \*  
 1.00 \*  
 124.84 \*  
 1.00 \*  
 1.60



ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF UNIC

NECK PENDULUM TEST

PART 177

S-010-84 15117.31

TEMPERATURE 71.00 F  
VRTC SPL98 HNS2616

RELATIVE HUMIDITY 20.00 %  
572 BN 826 HEAD/NECK CAL 16

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.53 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	1.68 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	25.59 ms.
T3 - T4: 20 - 5 G	10 ms. max	9.23 ms.
Ava. G level T2 - T3	20 - 24 G	23.20 G
Maximum Rotation Angle	63 - 73 deg.	71.27 deg.
Peak Head Resultant Accel	26 G max	23.22 G

Test Parameter		Specification		Test Results	
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)	Time (ms.)	Chordal Disp. (in.)	
0	0	-0.5 - +0.5	0.13	0.00	
30	25.6 - 34.4	2.1 - 3.1	29.98	2.50	
60	40.3 - 51.7	4.3 - 5.5	43.93	4.72	
max	53.2 - 66.8	5.0 - 6.0	62.25	5.73	
60	67.0 - 83.0	4.3 - 5.3	77.41	4.86	
30	85.4 - 109.6	2.1 - 3.1	96.70	2.29	
0	101.0 - 123.0	-0.5 - +0.5	109.98	0.17	

\* DUMMY NEETS SPECIFICATIONS

TECHNICIAN *V. J. Watters*

TEST SUPERVISOR *R. E. LeVan*

CRANFORD RESEARCH CENTER OF ONTO

THORAX IMPACT TEST

PART 572

7-DEC-84 1413123

TEMPERATURE 71 F  
 UNTC 8RL98 TL82618

RELATIVE HUMIDITY 14 %  
 572 SN 826 L.S. THORAX CAL 16

LOW SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.14 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.82 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1333. POUNDS
INTERNAL HYSTERESIS	50% - 70%	45.0% *

\* DUMMY DOES NOT MEET SPECIFICATIONS

TECHNICIAN V.J. Waters  
 TEST SUPERVISOR R.E. Lellan

TRANSPIRATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 022

7-DEC-84 13:25:10

TEMPERATURE 71 F  
 MKTC 3RLPB IHS2618

RELATIVE HUMIDITY 16.2  
 572 SN 826 H.S. THORAX CAL 16

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.18 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.38 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2116. POUNDS
INTERNAL HYSTERESIS	50% - 70%	51.8%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters  
 TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF DHTC

HEEL IMPACT TEST

PART 572

7-DEC-84 10:54:20

TEMPERATURE 71 F  
 RIGHT KNEE  
 VRTC SRL98 RKB2616

RELATIVE HUMIDITY 13 %  
 572 SN 826 R.KNEE IMP CAL 16

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1916.62 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.83 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.L. Walters  
 TEST SUPERVISOR R.E. LeVan

TEST NUMBER: 1100

DATE: 07/22

TEST CENTER: 67104-100

TEMPERATURE 71 F  
LEFT KNEE  
VRTC 8RL98 LKB2616B

RELATIVE HUMIDITY 35 %  
572 SN 826 L.KNEE IMP CAL 16B

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	2325.67 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.71 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V.A. Watts*  
TEST SUPERVISOR *D.E. L. Van*

NOTE: This test performed with a new left knee skin installed.

PRE-TEST CALIBRATION

PARTNER VEHICLE

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

6-DEC-84 15:19:22

TEMPERATURE 69.00 F  
VRTC SRL98 EDA0908

RELATIVE HUMIDITY 22.00 %  
572 SN A09 EXT. DIMENSIONS 08

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN ALDERSON RESEARCH LAB A09		
Sitting Height	35.6 - 35.8IN	35.6 INS
Shoulder Pivot Height	21.8 - 22.4IN	22.3 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7IN	20.5 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6IN	9.4 INS
Shoulder Width	17.8 - 18.4IN	17.9 INS
Chest Circumference Over Nipples	36.8 - 40.0IN	37.5 INS
Waist Circumference at Min. Girth	31.4 - 32.6IN	32.0 INS
Hip Width	14.0 - 15.4IN	15.2 INS
Knee Pivot From Floor	19.3 - 19.9IN	19.5 INS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.F. Watters

TEST SUPERVISOR R.E. LeVan

SAFETY TEST REPORT - DUMMIES

TEST NO. 100-1000

TEST DATE

TEST TIME

TEMPERATURE 69.00 F  
VRIC 8RL98 LFA0908

RELATIVE HUMIDITY 25.00 %  
D72 8N 409 LURBAR -LEX 68

DEFLECTION	SPECIFICATION	TEST RESULTS
0 Deg.	0 LBS	0.00 LBS
20 Deg	22.00 - 34.00 LBS	32.00 LBS
30 Deg	34.00 - 46.00 LBS	43.00 LBS
40 Deg	46.00 - 58.00 LBS	56.00 LBS
NET RETURN ANGLE	< 12 DEG	8.10 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Winters  
TEST SUPERVISOR R. E. DeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

6-DEC-84 10 05:31

TEMPERATURE 71.00 F  
VRTC SRL98 ABA0908

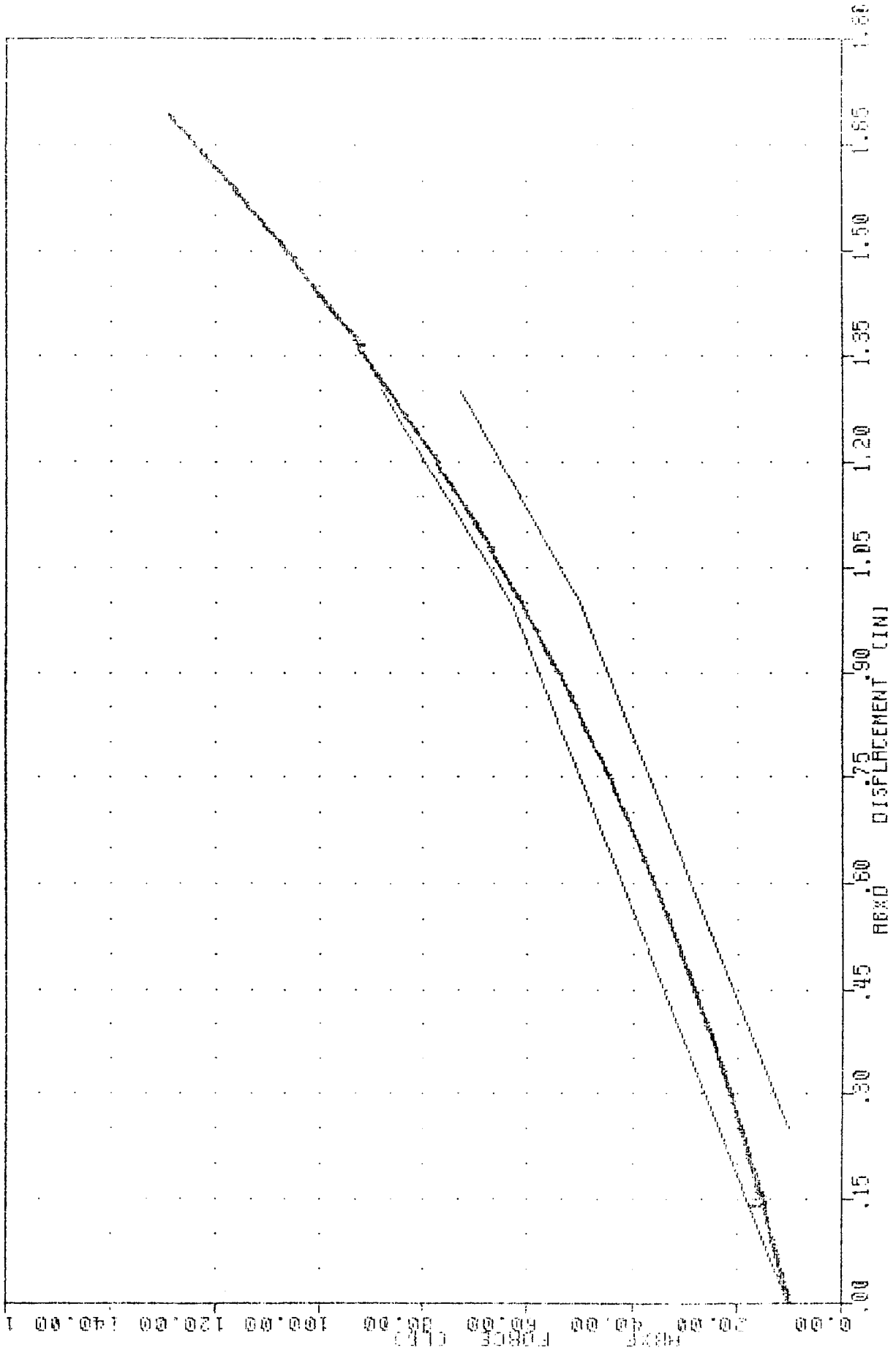
RELATIVE HUMIDITY 21.00 %  
572 SN A09 ABDOM COMPR CAL 08

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0 IN.	10 LBS	10 LBS
.25 IN.	10.00 - 23.25 LBS	18.88 LBS
1.00 IN.	50.00 - 63.00 LBS	61.32 LBS
1.30 IN.	73.00 - 88.00 LBS	87.08 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Wittig  
TEST SUPERVISOR R. E. DeVan

VPIG SFLOS, READS09, 879 SN-859 ABNOY, 21341, 12:05:51  
 ABXD 16307 52147 -40, MIN, MAX = 0.00, 1.03%  
 ABXF 18500/ 52147 -40, MIN, MAX = 9.51, 129.89%  
 FILTER = ALFF, 0.00, 0.00, 1.03%  
 FILTER = ALFF, 0.00, 0.00, 1.03%



ABDOMINAL COMPRESSION VS DISPLACEMENT

HEAD DROP TEST

PAGE 1/1

4-080084 001717

TEMPERATURE 69 F  
VRTC SRL98 HDA0908

RELATIVE HUMIDITY 21 %  
573 SN 109 HEAD DROP CAL 08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	223.28 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MS	1.27 MS
PEAK LATERAL ACCELERATION	10 G MAX	-4.63 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMKY MEETS SPECIFICATIONS

TECHNICIAN V. J. Winters  
TEST SUPERVISOR H. E. DeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD PENDULUM TEST

PART 075

6-950-64 (1/25/64)

TEMPERATURE 71.00 F  
VRTC SRL98 HNA0908

RELATIVE HUMIDITY 20.00 %  
072 SN A09 HEAD/NECK CAL CR

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.53 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	1.71 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	27.84 ms.
T3 - T4: 20 - 5 G	10 ms. max	5.86 ms.
Avg. G level T2 - T3	20 - 24 G	23.53 G
Maximum Rotation Angle	63 - 73 deg.	66.23 deg.
Peak Head Resultant Accel	26 G max	23.43 G

Test Parameter	Specification	Test Results		
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)	Time (ms.)	Chordal Disp. (in.)
0	0	-0.5 - +0.5	0.00	0.01
30	25.6 - 34.4	2.1 - 3.1	30.05	2.31
60	40.3 - 51.7	4.3 - 5.3	45.86	4.56
max	53.2 - 66.8	5.0 - 6.0	57.50	5.20
60	67.0 - 83.0	4.3 - 5.3	69.39	4.71
30	85.4 - 104.6	2.1 - 3.1	90.17	2.29
0	101.0 - 123.0	-0.5 - +0.5	105.12	0.15

\* DUNNY REETS SPECIFICATIONS

TECHNICAL *V. F. Matthews*

TEST SUPERVISOR *D. E. LeVan*

UNCLASSIFIED//FOR OFFICIAL USE ONLY

Standard of Performance Test

Part 573

Product Model 1000

TEMPERATURE 71 °F  
VRTC SRL98 FLA0908

RELATIVE HUMIDITY 16 %  
373 SN 409 L.S. THORAX CAL 08

LOW SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.04 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.74 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1375. POUNDS
INTERNAL HYSTERESIS	50% - 70%	53.7%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.A. Walters  
TEST SUPERVISOR R.E. LeVan

UNITED STATES GOVERNMENT

TEST REPORT

REPORT NO.

ORDER NO. 19 0219

TEMPERATURE 70 ±  
WTC ORLEN 18A0908

RELATIVE HUMIDITY 18 ±  
572 5H 609 H.S. HORAX CAL 78

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.78 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.20 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2116. POUNDS
INTERNAL HYSTERESIS	50% - 70%	55.7%

DUMMY SEETS SPECIFICATIONS

TECHNICIAN V. F. W. Atter  
TEST SUPERVISOR R. E. LeVan

Temperature and Humidity Test Report - 10/10/00

REF: 10970 - 11

REF: 073

07300000000000000000

TEMPERATURE 71.1  
RIGHT KNEE  
VRTC SPL98 RKA0908

RELATIVE HUMIDITY 51.3  
072 AM 107 F. KNEE IMP. CAL. CR

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1950 - 2500 LBS.	2074.56 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.74 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Walters  
TEST SUPERVISOR R. E. LeVan

Journal Entry Form - Form 1000-10-10-10

DATE: 10/10/10

TIME: 10:00

LOCATION: 1000-10-10-10

TEMPERATURE 70 F

RELATIVE HUMIDITY 50%

LEFT KNEE

VRIC SRL98 LKA0798B

072 SN 409 LKNEE IMP CAL 45

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1923.09 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.76 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. H. Walters

TEST SUPERVISOR R. E. DeVan

NOTE: This test performed with a new knee casting installed.

CONSUMER ELECTRONICS CORPORATION

Model 8500-111

UNIT 111

11-25-68 10115140

VRTC SRL98 45C3H01

TY: SHAS HPFH DROM CA 00

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	34.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	227.41 G
PEAK LATERAL ACCELERATION	15 G MAX	2.97 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V. J. Walters

TEST SUPERVISOR R. E. DeVan

Impact Analysis Report of Data of Data

REF: 71-105 (P)

HY3 3N45

3 GALS NECK TRANSDUCER

12-DEC-84 141215Z

ORTC SRLYS ASCRPT

HY3 3N45 GALS NECK FLEXION 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	41.00 %
IMPACT VELOCITY	22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G
	20 MS	17.40 - 22.60 G
	30 MS	12.50 - 18.50 G
MAXIMUM PENDULUM G	29 G MAX	26.55 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 46 MS	41.50 MS
PLANE	MAX 67 - 79 degrees	73.54 degrees
ROTATION	TIME 54 - 64 MS	59.63 MS
MOMENT ABOUT OCCIPITAL	MAX	70 - 90 FT.LBS
	TIME	46 - 56 MS
CONDYLES	MIN	-32.27/-14.0 FT.LBS
	TIME	12 - 16 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	109 - 119 MS	120.13 MS **
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	95 - 105 MS	101.40 MS

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICAL *V. E. Watters*  
TEST SUPERVISOR *R. E. DeVan*



UNITED STATES GOVERNMENT

TEST REPORT

TEST ID:

DATE: 10/10/68

UNIT: 68190 400343

BY: 68190 68190 H.S. THORNTON

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	41.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.78 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.482 INCHES *
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1193.1 POUNDS
INTERNAL HYSTERESIS	75% - 85%	76.9%

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN V.L. Watter  
TEST SUPERVISOR R.E. DeLoan

Manufacturing Department - Safety - 2012-01-10

REF: 10001-111

WIP: 111

Impact on 111

LEFT ANKLE

WRLD SKI/98 4003641

HY3 9N40 LYNDEE 1118 CAL 95

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	52.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1288.77 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters

TEST SUPERVISOR A. E. Lavan

HEADPHONE CALIBRATION REPORT

DATE: 08/09/03

BY: 510 JLT

INSTRUMENT: 140W111

RIGHT KNEE

VR10 5RL98 4503RKL

NY3 5H47 R.KNEE 11LB CAL 93

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 degrees	71.00 degrees
RELATIVE HUMIDITY	10% - 70%	56.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1355.43 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V.L. Watters

TEST SUPERVISOR R.E. Levan

POST-TEST CALIBRATION

SUBJECT VEHICLE

43 HUB III

OK	Damaged	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Outer skin on entire dummy (gashes, rips, etc.)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Head - Gashes, rips, general appearance, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Neck - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Spine - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ribs - check all ribs for damage (bent or broken), damping material separation.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pourins Pot. - electrical discontinuity
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Leads - torn cables
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

If upon visual examination, damage is apparent in any of these areas, a VRTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

\_\_\_\_\_  
 Signature Date

Comments on repair or replacement of parts:

ALL OK - USG...  
 \_\_\_\_\_  
 \_\_\_\_\_

TRC Personnel

Checked By:

Brian White                      26 Dec 87  
 Signature Date

VRTC Personnel

Checked and Approved for Testing BY:

\_\_\_\_\_  
 Signature Date

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD CRASH TEST

HYBRID 011

31 JAN 83 15:54:34

VRTC SRL98 4305HD1

HY3 SN43/HEAD142 CAL 05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	23.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	243.05 G
PEAK LATERAL ACCELERATION	15 G MAX	-2.75 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*D. Witter*

TEST SUPERVISOR

*R. E. LeVan*

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

4-JAN-85 08:59:14

VRTC SRL98 4305NF1

HY3 SN43 CALS NECK FLEXION 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	68.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	24.00 %
IMPACT VELOCITY	22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS   22.50 - 27.50 G	25.78 G
	20 MS   17.40 - 22.60 G	19.17 G
	30 MS   12.50 - 18.50 G	16.24 G
MAXIMUM PENDULUM G	29 G MAX	25.78 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 46 MS	42.63 MS
D PLANE ROTATION	MAX   67 - 79 DEGREES	71.96 DEGREES
	TIME   54 - 64 MS	60.63 MS
MOMENT ABOUT OCCIPITAL	MAX   70 - 90 FT.LBS	71.82 FT.LBS
	TIME   46 - 56 MS	55.75 MS
CONDYLES	MIN   -22.27 - -14.0 FT.LBS	-16.34 FT.LBS
	TIME   12 - 16 MS	14.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	109 - 119 MS	125.50 MS **
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	95 - 105 MS	104.88 MS

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN *P. J. Wittler*

TEST SUPERVISOR *R. E. Larson*

TRANSPORTATION RESEARCH CENTER OF DHTO

NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

4-JAN-85 13:16:04

VRIC SRL98 4705DEL

HY3 SN43 CAL5 NECK EXTEN. 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	71.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	24.00 %
IMPACT VELOCITY	19.50 - 19.90 FPS	19.51 FPS
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	21.19 G
	20 MS   14.00 - 19.00 G	18.03 G
	30 MS   11.00 - 16.00 G	15.99 G
MAXIMUM PENDULUM G	22 G MAX	21.72 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 50 MS	38.75 MS
D PLANE ROTATION	MAX   94 - 106 DEGREES	96.98 DEGREES
	TIME   72 - 82 MS	78.13 MS
MOMENT ABOUT OCCIPITAL	MAX   11.75 - 17.75 FT.LBS	15.22 FT.LBS
	TIME   12 - 18 MS	16.13 MS
CONDYLES	MIN   -61.2/-50.8 FT.LBS	-55.74 FT.LBS
	TIME   69 - 77 MS	74.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	151 - 167 MS	166.50 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 144 MS	142.50 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *V.L. Williams*

TEST SUPERVISOR *R.E. LeVan*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

7-JAN-85 10:36:13

VRTC SRL98 4305TH1

HY3 BRAC CALOS H.S. THORAX 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	29.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.704 INCHES
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1141.8 POUNDS *
INTERNAL HYSTERESIS	75% - 85%	76.5%

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN V. J. Winters

TEST SUPERVISOR R. E. Loken

TRANSFORMATION RESEARCH CENTER OF OHIO

FACE IMPACT TEST

HYPER 111

8-JAN-85 11:12

LEFT KNEE  
URIC SRL98 43CULK1

HY3 5943 L.KNEE 111B 10-10

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	25.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1266.15 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *V. A. Walters*

TEST SUPERVISOR *R. E. L. L.*

TRANSPORTATION RESEARCH CENTER OF OHIO

SEED IMPACT TEST

HYBRID III

8-JAN-85 11:41 AM

RIGHT KNEE  
VRTE SRL98

43CSRK1

HY3 SN43 R.KNEE 11LB CAL 45

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	25.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1482.63 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *V.H. Watters*

TEST SUPERVISOR *R.E. Loken*

OK	Damaged	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Outer skin on entire dummy (cracks, rips, etc.)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Head - Gashes, rips, general appearance, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Neck - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Spine - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ribs - check all ribs for damage (bent or broken), damping material separation.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pourins Pot. - electrical discontinuity
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Leads - torn cables
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

If upon visual examination, damage is apparent in any of these areas, a VRTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

\_\_\_\_\_  
Signature Date

Comments on repair or replacement of parts:

ALL OK  
Note: ribs failed calibration and were replaced  
following post-test calibration.

TRC Personnel

Checked By: [Signature] Date: 26 Dec 80

VRTC Personnel

Checked and Approved for Testing BY: \_\_\_\_\_  
Signature Date: C-44

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

27-DEC-84 08:54:24

TEMPERATURE 71.00 F  
VRTC SRL98 ED82617

RELATIVE HUMIDITY 28.00 %  
572 SN 826 EXT. DIMENSIONS 17

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN ALDERSON RESEARCH LAB 826		
Sitting Height	35.6 - 35.8IN	35.7 INS
Shoulder Pivot Height	21.8 - 22.4IN	22.3 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7IN	20.4 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6IN	9.4 INS
Shoulder Width	17.8 - 18.4IN	17.9 INS
Chest Circumference Over Nipples	36.8 - 40.0IN	37.5 INS
Waist Circumference at Min. Girth	31.4 - 32.6IN	32.4 INS
Hip Width	14.0 - 15.4IN	15.2 INS
Knee Pivot From Floor	19.3 - 19.9IN	19.5 INS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V.L. Walters*

TEST SUPERVISOR *A.E. LeVan*

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

26-DEC-84 17:00:41

TEMPERATURE 71.00 F  
VRTC SRL98 LF82617

RELATIVE HUMIDITY 19.00 %  
572 SN826 LUMBAR FLEX CAL17

DEFLECTION	SPECIFICATION	TEST RESULTS
0 Deg.	0 LBS	0.00 LBS
20 Deg	22.00 - 34.00 LBS	30.00 LBS
30 Deg	34.00 - 46.00 LBS	40.00 LBS
40 Deg	46.00 - 58.00 LBS	52.00 LBS
NET RETURN ANGLE	< 12 DEG	7.00 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. L. Watters  
TEST SUPERVISOR R. E. DeVan

TEMPERATURE 71.00  
METRIC SPEC 93 ABC 1000

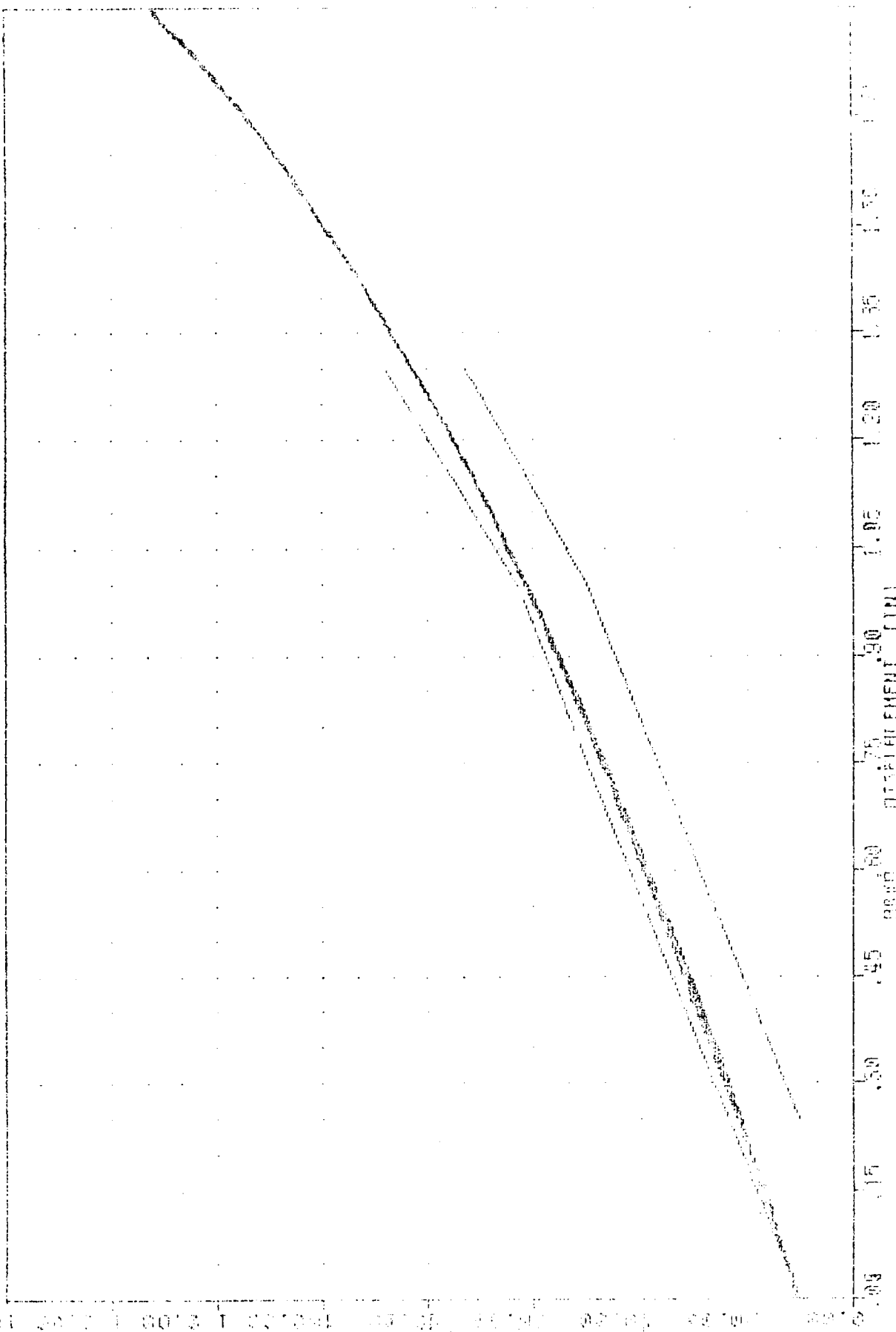
TEST CONDITION 1000  
MILITARY SPEC ABLEIN 1000

DISPLACEMENT	FORCE	TEST RESULT
0 IN.	10 LBS	10 LBS
25 IN.	15 00 - 23.25 LBS	21.35 LBS
1.00 IN.	50 00 - 53 00 LBS	61.99 LBS
1.30 IN.	73 00 - 79 00 LBS	82.75 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *J. L. Walter*  
TEST SUPERVISOR *H. C. LeVan*

REV. FILTER = HLPF 18507 52147 -40 MIN. MAX = 0.00 132.32 1.23



DISPLACEMENT COMPENSATION

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

26-DEC-84 20:33:08

TEMPERATURE 71 F  
VRTC SRL98 HB82617

RELATIVE HUMIDITY 20 %  
572 SN 826 HEAD DROP CAL 17

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	222.63 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MS	1.29 MS
PEAK LATERAL ACCELERATION	10 G MAX	-5.09 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.L. Watters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

27-DEC-84 08:43:37

TEMPERATURE 71.00 F  
VRTC SRL98 HN82617

RELATIVE HUMIDITY 20.00 %  
572 SN 826 HEAD/NECK COL 17

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.53 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	1.83 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	28.42 ms.
T3 - T4: 20 - 5 G	10 ms. max	5.88 ms.
Avg. G level T2 - T3	20 - 24 G	22.50 G
Maximum Rotation Angle	63 - 73 deg.	72.24 deg.
Peak Head Resultant Accel	26 G max	24.03 G

Test Parameter		Specification		Test Results	
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)	Time (ms.)	Chordal Disp. (in.)	
0	0	-0.5 - +0.5	0.13	0.00	
30	25.6 - 34.4	2.1 - 3.1	29.64	2.54	
60	40.3 - 51.7	4.3 - 5.3	44.08	4.65	
max	53.2 - 66.8	5.0 - 6.0	61.88	5.76	
60	67.0 - 83.0	4.3 - 5.3	77.93	4.83	
30	85.4 - 104.6	2.1 - 3.1	95.67	2.35	
0	101.0 - 123.0	-0.5 - +0.5	109.23	0.16	

\* DUMMY MEETS SPECIFICATIONS

TECHNICIAN *K. L. ...*

TEST SUPERVISOR *A. E. ...*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

28-DEC-84 13:47:41

TEMPERATURE 71 F  
VRTC SRL98 TL82617A

RELATIVE HUMIDITY 41 %  
572 SN B26 L.S.THORAX CAL 17A

LOW SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.03 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.96 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1306. POUNDS
INTERNAL HYSTERESIS	50% - 70%	48.4% *

\* DUMMY DOES NOT MEET SPECIFICATIONS

TECHNICIAN *V.L. Walters*

TEST SUPERVISOR *R.E. Leck*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

28-DEC-84 13:43:42

TEMPERATURE 71 F  
 QRTC SRL98 TH82617A

RELATIVE HUMIDITY 41 %  
 572 SN 826 H.S.THORAX CAL 17A

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.46 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2083. POUNDS
INTERNAL HYSTERESIS	50% - 70%	47.1% *

\* DUMMY DOES NOT MEET SPECIFICATIONS

TECHNICIAN K.L. Watters

TEST SUPERVISOR R.E. L. Lee

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

3-JAN-80 10:35:34

TEMPERATURE 72 F  
RIGHT KNEE  
VRTC SRL98 KR92A17

RELATIVE HUMIDITY 54 %  
572 SN 826 R.KNEE IMP CAL 17

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1932.87 LBS.
DURATION ABOVE 1000 LBS.	$\geq 1.7$ MS.	1.84 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V. L. Wistner*

TEST SUPERVISOR *D. E. Levan*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

3-JAN-85 10:38:25

TEMPERATURE 72 F  
LEFT KNEE  
VRTC SRL98 LK82617

RELATIVE HUMIDITY 54 %  
572 SN 826 L.KNEE IMP CAL 17

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1877.20 LBS.
DURATION ABOVE 1000 LBS.	$\geq 1.7$ MS.	1.88 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters

TEST SUPERVISOR R. E. Lelan

AUG

OK	Damaged	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Outer skin on entire dummy (scratches, rips, etc.)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Head - Gashes, rips, general appearance, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Neck - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Spine - broken or cracks in rubber
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ribs - check all ribs for damage (bent or broken), damping material separation.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Bourns Pot. - electrical discontinuity
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Leads - torn cables
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

If upon visual examination, damage is apparent in any of these areas, a VRTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

\_\_\_\_\_  
Signature Date

Comments on repair or replacement of parts:

AU OK  
Note: Dummy no longer meets sitting height requirement.  
Two spacers added following post test calibrations.

VRTC Personnel

Checked By: \_\_\_\_\_  
[Signature] 26 6 81  
Signature Date

VRTC Personnel

Checked and Approved for Testing BY: \_\_\_\_\_  
Signature Date

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

27-DEC-84 12:39:41

TEMPERATURE 70.00 F  
VRTC SRL98 EIA0909A

RELATIVE HUMIDITY 30.00 %  
572 SN A09 EXT. DIMENSIONS 09A

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN ALDERSON RESEARCH LAB A09		
Sitting Height	35.6 - 35.8IN	35.4 INS *
Shoulder Pivot Height	21.8 - 22.4IN	22.0 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7IN	20.7 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6IN	9.3 INS
Shoulder Width	17.8 - 18.4IN	17.9 INS
Chest Circumference Over Nipples	36.8 - 40.0IN	37.7 INS
Waist Circumference at Min. Girth	31.4 - 32.6IN	32.5 INS
Hip Width	14.0 - 15.4IN	14.8 INS
Knee Pivot From Floor	19.3 - 19.9IN	19.6 INS

\* DUMMY DOES NOT MEET SPECIFICATIONS

TECHNICIAN *V.L. Watters*

TEST SUPERVISOR *R.E. LeVine*

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

27-DEC-84 16:21:34

TEMPERATURE 71.00 F  
VRTC SRL98 LFA0909A

RELATIVE HUMIDITY 27.00 %  
572 SNA09 LUMBAR FLEX CAL9A

DEFLECTION	SPECIFICATION	TEST RESULTS
0 Deg.	0 LBS	0.00 LBS
20 Deg	22.00 - 34.00 LBS	33.00 LBS
30 Deg	34.00 - 46.00 LBS	46.00 LBS
40 Deg	46.00 - 58.00 LBS	57.00 LBS
NET RETURN ANGLE	< 12 DEG	8.50 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Victor W. Stetter*  
TEST SUPERVISOR *R. E. LeVan*

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

27-DEC-84 15:32:15

TEMPERATURE 70.00 F  
VRTC SRL98 ABA0909A

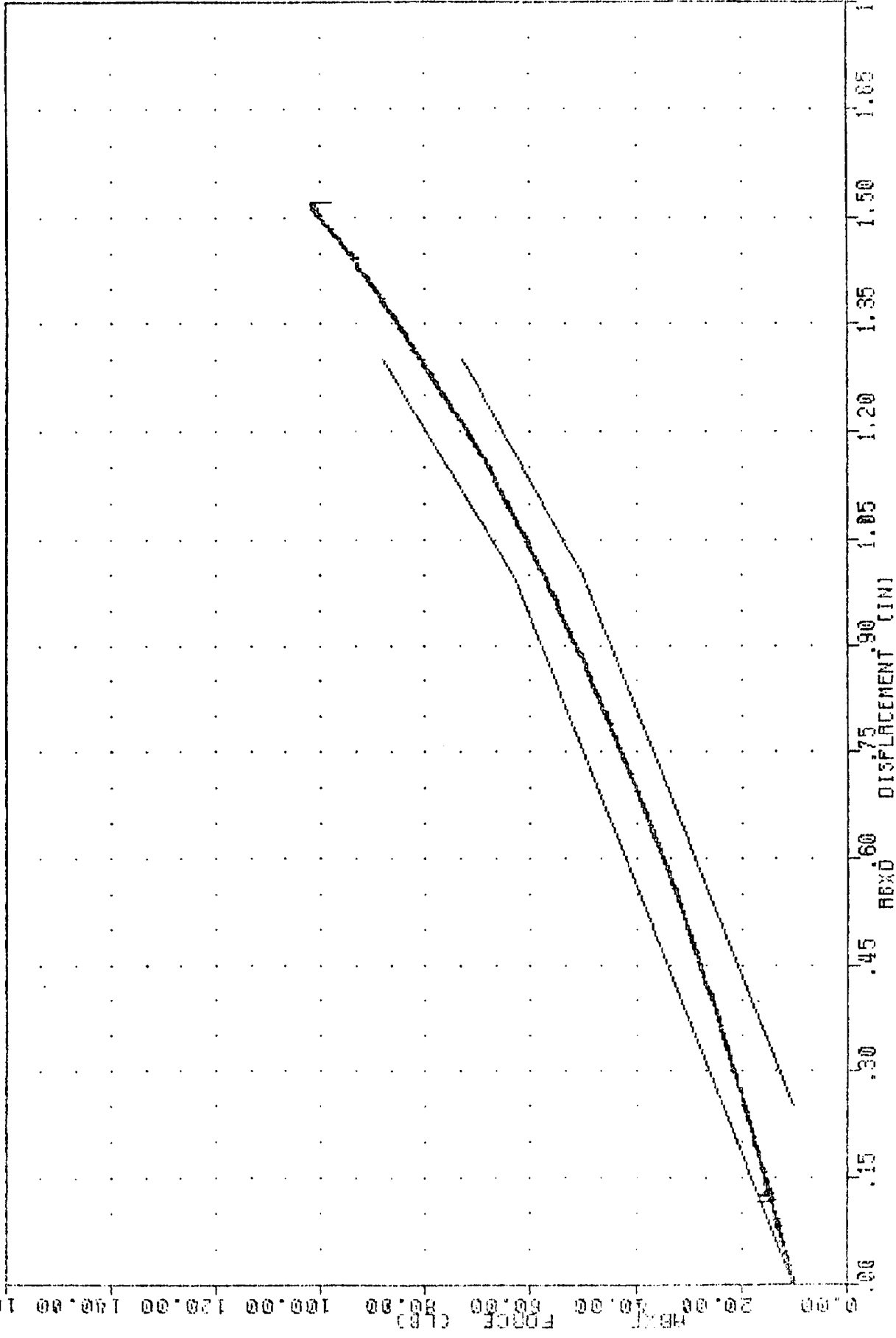
RELATIVE HUMIDITY 39.00 %  
572 SN A09 ABDOM COMPR CAL 9A

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0 IN.	10 LBS	10 LBS
.25 IN.	10.00 - 23.25 LBS	19.45 LBS
1.00 IN.	50.00 - 63.00 LBS	57.46 LBS
1.30 IN.	73.00 - 88.00 LBS	80.71 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V. J. Wittgen*  
TEST SUPERVISOR *R. E. Jordan*

48XF 1650/ 5214/ -40 101.01 0.00 9.80 1.51  
 FILTER = ALPF 1000 5214/ -40 MIN. MAX.



ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

26-DEC-84 22:47:56

TEMPERATURE 71 F  
VRTC SRL98 HDA0909

RELATIVE HUMIDITY 20 %  
572 SN A09 HEAD DROP CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	231.92 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MS	1.24 MS
PEAK LATERAL ACCELERATION	10 G MAX	-9.92 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. A. Watters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

27-DEC-84 10:21:12

TEMPERATURE 71.00 F  
VRTC SRL98 HNA0909

RELATIVE HUMIDITY 28.00 %  
572 SN A09 HEAD/NECK CAL 09

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.53 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	1.89 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	27.04 ms.
T3 - T4: 20 - 5 G	10 ms. max	6.63 ms.
Avg. G level T2 - T3	20 - 24 G	23.68 G
Maximum Rotation Angle	63 - 73 deg.	68.80 deg.
Peak Head Resultant Accel	26 G max	23.36 G

Test Parameter	Specification	Test Results
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)
0	0	-0.5 - +0.5
30	25.6 - 34.4	2.1 - 3.1
60	40.3 - 51.7	4.3 - 5.3
max	53.2 - 66.8	5.0 - 6.0
60	67.0 - 83.0	4.3 - 5.3
30	85.4 - 104.6	2.1 - 3.1
0	101.0 - 123.0	-0.5 - +0.5

\* DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.L. Walters

TEST SUPERVISOR R.E. L...

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

27-DEC-84 17:31:49

TEMPERATURE 71 F  
VRTC SRL98 TLA0909

RELATIVE HUMIDITY 41 %  
572 SN A09 L.S.THORAX CAL 09

LOW SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.04 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.78 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1358. POUNDS
INTERNAL HYSTERESIS	50% - 70%	51.9%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.L. Waters

TEST SUPERVISOR R.E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

27-DEC-84 17:00:43

TEMPERATURE 71 F  
VRTC SRL98 THA0909

RELATIVE HUMIDITY 40 %  
572 SN A09 H.S.THORAX CAL 09

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.29 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2065. POUNDS
INTERNAL HYSTERESIS	50% - 70%	52.9%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V.L. Waters*

TEST SUPERVISOR *R.E. Sedon*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

3-JAN-85 10:41:56

TEMPERATURE 72 F  
LEFT KNEE  
VRTC SRL98 LKA0909

RELATIVE HUMIDITY 54 %  
572 SN A09 L.KNEE IMP CAL 9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1922.75 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.74 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *V. J. Winters*

TEST SUPERVISOR *R. E. Livan*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

3-JAN-95 10:40:07

TEMPERATURE 72 F  
RIGHT KNEE  
VRTC SRL98 RKA0909

RELATIVE HUMIDITY 54 %  
572 SN 009 R.KNEE IMP CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	2221.02 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.79 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *K.H. Watter*

TEST SUPERVISOR *R.E. LeVan*

1-2  
K...

OK	Damaged	
✓		Outer skin on entire dummy (cracks, rips, etc.)
✓		Head - Gashes, rips, general appearance, etc.
✓		Neck - broken or cracks in rubber
✓		Spine - broken or cracks in rubber
	✓	Ribs - check all ribs for damage (bent or broken), damping material separation.
✓		Fourns Pot. - electrical discontinuity
✓		Accelerometer Leads - torn cables
✓		Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting.

If upon visual examination, damage is apparent in any of these areas, a VBTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

\_\_\_\_\_  
Signature Date

Comments on repair or replacement of parts:

RIBS # 6 DAMAGE & REPLACED  
FOLLOWING POST-TEST CALIBRATION

VBTC Personnel

Checked By:

Henry Wilber \_\_\_\_\_ 26 Dec 67  
Signature Date

VBTC Personnel

Checked and Approved for Testing BY:

\_\_\_\_\_  
Signature Date  
C-67

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

3-JAN-85 16139:10

VRTC SRL98 45C4HD1

HY3 8N45 HEAD DROP CAL 04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	23.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	244.96 G
PEAK LATERAL ACCELERATION	15 G MAX	3.58 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSducer

4-JAN-85 13:32:52

VRTC SRL98 45C4NF1

HY3 SN45 CAL4 NECK FLEXION 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	24.00 %
IMPACT VELOCITY	22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS   22.50 - 27.50 G	25.09 G
	20 MS   17.40 - 22.60 G	18.91 G
	30 MS   12.50 - 18.50 G	16.62 G
MAXIMUM PENDULUM G	29 G MAX	27.76 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 46 MS	41.63 MS
D PLANE ROTATION	MAX   67 - 79 DEGREES	74.66 DEGREES
	TIME   54 - 64 MS	59.50 MS
MOMENT ABOUT OCCIPITAL	MAX   70 - 90 FT.LBS	74.00 FT.LBS
	TIME   46 - 56 MS	54.13 MS
CONDYLES	MIN   -22.2/-14.0 FT.LBS	-15.58 FT.LBS
	TIME   12 - 16 MS	14.50 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	109 - 119 MS	119.13 MS **
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	95 - 105 MS	101.13 MS

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN *V. L. W. [Signature]*

TEST SUPERVISOR *R. E. [Signature]*

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

7-JAN-85 09:13:14

URIC 88198 45C4MEL

HY3 SN45 CAL4 NECK EXTEN. 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	71.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	27.00 %
IMPACT VELOCITY	19.50 - 19.90 FPS	19.90 FPS
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	20.49 G
	20 MS   14.00 - 19.00 G	17.43 G
	30 MS   11.00 - 16.00 G	14.34 G
MAXIMUM PENDULUM G	22 G MAX	21.48 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 50 MS	42.63 MS
D PLANE ROTATION	MAX   94 - 106 DEGREES	86.49 DEGREES **
	TIME   72 - 82 MS	72.75 MS
MOMENT ABOUT OCCIPITAL	MAX   11.75 - 17.75 FT.LBS	14.50 FT.LBS
	TIME   12 - 18 MS	14.13 MS
CONDYLES	MIN   -61.2/-50.8 FT.LBS	-47.04 FT.LBS **
	TIME   69 - 77 MS	71.50 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	151 - 167 MS	154.38 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 144 MS	131.38 MS

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN V. J. Walters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF UTD

THORAX IMPACT TEST

HYSPIC III

10-JAN-85 11:55:51

VRTC SRL98 4504TH1

HY3 SN45 CAL04 H.S. THORAX 03

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	29.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.594 INCHES
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1165.3 POUNDS *
INTERNAL HYSTERESIS	75% - 85%	75.5%

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN V.L. Winters

TEST SUPERVISOR R. E. LeVan

CRASHWORTHINESS RESEARCH CENTER REPORT

FREE IMPACT TEST

HYBRID TEST

8-JUL-85 12:37:15

RIGHT KNEE

URTC SRL99

4504RK1

HY3 SN45 R.KNEE LILR CAL 94

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	24.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1277.55 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN V. L. Walters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBELD 003

8-JAN-85 11:58:38

LEFT KNEE

VRTC SRL98 45C4LK1

HYS 8N45 L.KNEE 11LB CAL 00

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	25.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1365.75 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *V.L. Watters*

TEST SUPERVISOR *R.E. LeVan*

APPENDIX D  
MISCELLANEOUS TEST INFORMATION

## GM HYBRID III DUMMY POSITIONING

The following procedure was used for positioning a Hybrid III dummy (GM50H) in the vehicle seat for impact testing. The procedure utilizes seat parameters for a specific vehicle body style, and if available, parameters for the individual seat being used in the test. The dummy head is positioned to keep the longitudinal accelerometers horizontal.

### 1. Preliminary Data

1.1 Obtain the body coordinates for the S.A.E. three dimensional manikin (Oscar) H-point at the specific seat travel location used for the test. Typically when using the Hybrid III dummy, this will be the manual seat adjuster mid travel position. If no detent is available at mid travel, use the position which would lock the seat adjuster one notch rear of mid.

1.2 If specific Oscar data is not available, design drawing information will be used to determine the design H-point location at a specified seat adjuster position.

### 2. Initial Dummy Placement

2.1 The Hybrid III dummies are placed in the seats of the test buck or vehicle. The pelvis is positioned such that a lateral line passing through the dummy H-point is perpendicular to the longitudinal centerplane of the vehicle.

2.1.1 Vehicle equipped with front bucket seats. The dummy is centered on the seat cushion of the bucket seat and its midsagittal plane is vertical and longitudinal.

2.1.1.1 Driver position placement. At the driver's position, the knees of the dummy are initially set 370 mm apart, measured between the outer surfaces of the knee pivot bolt heads, with the left outer surface 150 mm from the midsagittal plane of the dummy.

2.1.1.2 Passenger position placement. At the right front designated seating position, the femur, tibia, and foot centerlines of each of the dummy's legs fall in a vertical longitudinal plane. The knees are spaced 215 mm centerline to centerline.

2.1.2 Vehicle equipped with bench seating.

2.1.2.1 Driver position placement. The dummy is placed at the left front outboard designated seating position so that its midsagittal plane is vertical and longitudinal, and passes through the center point of the plane described by the steering wheel rim.

2.1.2.2 Passenger position placement. The dummy is placed at the right front outboard designated seating position as specified in 2.1.1.2, except that the midsagittal plane of the dummy is vertical, longitudinal, and the same distance from the longitudinal centerline as the midsagittal plane of the dummy at the driver's position.

2.2 Measure the seat back angle by placing an inclinometer against the rear of the seat back cushion. Measure the angle at a point midway up the cushion and supported by a rigid portion of the seat back pan.

### 3. Initial Dummy Positioning

3.1 H-point positioning.

3.1.1 With the dummy laterally positioned as described in Section 2, insert the pelvis angle indicator bar in the hole provided above, and to the rear of the dummy H-point. Position the longitudinal pelvis angle between  $20^{\circ}$  and  $25^{\circ}$  to the horizontal. This may be accomplished by raising the legs or flexing the upper torso forward and allowing the pelvis to rotate. The lateral pelvis angle should be horizontal.

3.1.2 Apply sufficient force on the lower torso in a horizontal and vertical direction to place the dummy H-point at the coordinates obtained in Section 1.

3.1.3 If the H-point cannot be placed at the desired coordinates, adjust the pelvis angle within the  $5^{\circ}$  band and reposition to the coordinates. After repositioning the H-point, any deviation from the desired coordinates should be recorded and used to indicate actual H-point locations.

3.2 Head CG positioning. While maintaining the H-point location, adjust the Hybrid III upper torso so as to place the head accelerometer mounting surface level.

3.2.1 Remove the rear skull cap to expose the machined surface of the head. Place an inclinometer on this surface. The skull surface should be within  $.5^{\circ}$  of vertical to maintain a proper head orientation.

#### 4. Final Positioning

4.1 Place the dummy feet in contact with the toe pan with the heel placed at the intersection of the toe pan and floor pan. The driver right foot should be placed on the undepressed accelerator pedal, with the heel in contact with the floor pan.

If the feet cannot be placed against the toe pan without causing hip and head movement, the knee will have to be positioned first. Press down on the knees until the underside of knee joint contacts the seat cushion, or the thighs behind the joint depress the seat cushion. Place the foot perpendicular to the tibia and allow the lower leg to pivot at the knee until the heel rests on the floor pan.

4.2 The driver dummy hands are raised from the seat and, without moving the dummy are placed on the steering wheel. The hands are placed at the horizontal centerline of the steering wheel with the thumbs over the wheel rim. The wrists are outside of the steering wheel plane. Planes described by each upper and lower arm should be at or near vertical.

4.3 Prior to conducting the test, the dummy is visually checked to make certain the dummy midsagittal plane is vertical and longitudinal, the desired head, hip and knee coordinates have been maintained, the pelvis is laterally horizontal and longitudinally within the pelvis angle range, and the engineer responsible for the test is satisfied with the dummy position.

#### HEAD CHAMOIS USE PROCEDURE

1. Using the GM template, two 0.125 inch thick chamois from Hydra-Sponge, St. Louis, MO. were cut.
2. The chamois were soaked in water to make them soft and pliable.
3. The chamois were molded around the facial features of the dummy head and pulled taut. Both pieces of chamois were placed in the same manner.
4. Periphery of chamios were taped to the dummy's head.
5. Both chamois were allowed to dry prior to the test.

SUBJECT VEHICLE ACCELEROMETER PLACEMENT

Dummy Chest Humanoid 43, in Body Humanoid 43  
 (MFR) (S/N) (MFR) (S/N)

<u>Mnemonic</u>	<u>Label No.</u>	<u>Location</u>	<u>Orientation (+Sensing)</u>	<u>Serial No.</u>	<u>Mfr/Model</u>
<u>LFMF1</u>	<u>732</u>	Left Femur	Tension	<u>732</u>	<u>5184</u>
<u>RFMF1</u>	<u>610</u>	Right Femur	Tension	<u>610</u>	<u>2430</u>
<u>CSTXG1</u>	<u>B</u>	Chest (X)	Front	<u>AR17</u>	<u>7264</u>
<u>CSTYG1</u>	<u>C</u>	Chest (Y)	Right	<u>AA65</u>	<u>7264</u>
<u>CSTZG1</u>	<u>E</u>	Chest (Z)	Up	<u>AP62</u>	<u>7264</u>
<u>HEDXG1</u>	<u>13</u>	Head (X)	Front	<u>AB67</u>	<u>7264</u>
<u>HEDYG1</u>	<u>14</u>	Head (Y)	Left	<u>AA05</u>	<u>7264</u>
<u>HEDZG1</u>	<u>15</u>	Head (Z)	Up	<u>AK96</u>	<u>7264</u>
<u>NEKXF1</u>	<u>FX</u>	Neck (X)	Tension	<u>050</u>	<u>186</u>
<u>NEKYF1</u>	<u>YM</u>	Neck (Y)	Front	<u>050</u>	<u>186</u>
<u>NEKZF1</u>	<u>FZ</u>	Neck (Z)	Down	<u>050</u>	<u>186</u>
<u>CSTXD1</u>	<u>CP1</u>	Chest		<u>CP1</u>	<u>Bournes</u>

\*With 10 Vdc input (2000 g range).

SUBJECT VEHICLE ACCELEROMETER PLACEMENT

Dummy Chest ARL 826, in Body ARL 826  
 (MFR) (S/N) (MFR) (S/N)

Mnemonic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
<u>LFMF2</u>	<u>723</u>	Left Femur	Tension	<u>723</u>	<u>2430</u>
<u>RFMF2</u>	<u>729</u>	Right Femur	Tension	<u>729</u>	<u>2430</u>
<u>CSTXG2</u>	<u>D</u>	Chest (X)	Front	<u>AT55</u>	<u>2264</u>
<u>CSTYG2</u>	<u>E</u>	Chest (Y)	Right	<u>AR52</u>	<u>2264</u>
<u>CSTZG2</u>	<u>F</u>	Chest (Z)	Up	<u>AU89</u>	<u>2264</u>
<u>HEDXG2</u>	<u>G</u>	Head (X)	Front	<u>AU41</u>	<u>2264</u>
<u>HEDYG2</u>	<u>H</u>	Head (Y)	Left	<u>AT72</u>	<u>2264</u>
<u>HEDZG2</u>	<u>I</u>	Head (Z)	Up	<u>BC57</u>	<u>2264</u>

---

\*With 10 Vdc input (2000 g range).

PARTNER VEHICLE ACCELEROMETER PLACEMENT

Dummy Chest     $\frac{\text{ARL}}{\text{(MFR)}}$      $\frac{\text{A09}}{\text{(S/N)}}$  , in Body     $\frac{\text{ARL}}{\text{(MFR)}}$      $\frac{\text{A09}}{\text{(S/N)}}$

Mnemonic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
<u>LFMF1</u>	<u>742</u>	Left Femur	Tension	<u>742</u>	<u>2430</u>
<u>RFMF1</u>	<u>744</u>	Right Femur	Tension	<u>744</u>	<u>2430</u>
<u>CSTXG1</u>	<u>J</u>	Chest (X)	Front	<u>AR69</u>	<u>2264</u>
<u>CSTYG1</u>	<u>K</u>	Chest (Y)	Right	<u>AS60</u>	<u>2264</u>
<u>CSTZG1</u>	<u>L</u>	Chest (Z)	Up	<u>AT16</u>	<u>2264</u>
<u>HEDXG1</u>	<u>M</u>	Head (X)	Front	<u>AS58</u>	<u>2264</u>
<u>HEDYG1</u>	<u>N</u>	Head (Y)	Left	<u>BB24</u>	<u>2264</u>
<u>HEDZG1</u>	<u>O</u>	Head (Z)	Up	<u>AR68</u>	<u>2264</u>

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\*With 10 Vdc input (2000 g range).

PARTNER VEHICLE ACCELEROMETER PLACEMENT

Dummy Chest Humanoid 45, in Body Humanoid 45  
 (MFR) (S/N) (MFR) (S/N)

Mnemonic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
<u>LFMF2</u>	<u>716</u>	Left Femur	Tension	<u>716</u>	<u>2430</u>
<u>RFMF2</u>	<u>726</u>	Right Femur	Tension	<u>726</u>	<u>2430</u>
<u>CSTXG2</u>	<u>U</u>	Chest (X)	Front	<u>AN03</u>	<u>7264</u>
<u>CSTYG2</u>	<u>V</u>	Chest (Y)	Right	<u>AP96</u>	<u>7264</u>
<u>CSTZG2</u>	<u>W</u>	Chest (Z)	Up	<u>AK12</u>	<u>7264</u>
<u>HEDXG2</u>	<u>X</u>	Head (X)	Front	<u>AP48</u>	<u>7264</u>
<u>HEDYG2</u>	<u>Y</u>	Head (Y)	Left	<u>AN71</u>	<u>2264</u>
<u>HEDZG2</u>	<u>Z</u>	Head (Z)	Up	<u>AN92</u>	<u>7264</u>
<u>NEKXF2</u>	<u>XF</u>	Neck (X)	Front	<u>037</u>	<u>186</u>
<u>NEKYM2</u>	<u>YM</u>	Neck (Y)	Left	<u>037</u>	<u>186</u>
<u>NEKZF2</u>	<u>ZF</u>	Neck (Z)	Up	<u>037</u>	<u>186</u>
<u>KNLF2</u>	<u>13L</u>	Left Knee	Tension	<u>13-L</u>	<u>1587</u>
<u>KNLFB</u>	<u>13R</u>	Left Knee	Tension	<u>13-R</u>	<u>1587</u>
<u>KNRF2</u>	<u>21L</u>	Right Knee	Tension	<u>21-L</u>	<u>1587</u>
<u>KNRFB</u>	<u>21R</u>	Right Knee	Tension	<u>21-R</u>	<u>1587</u>
<u>TBLXM2</u>	<u>15X</u>	Left Tibia	Left	<u>15-X</u>	<u>1583</u>
<u>TBLYM2</u>	<u>15Y</u>	Left Tibia	Rear	<u>15-Y</u>	<u>1583</u>
<u>TBRXM2</u>	<u>24X</u>	Right Tibia	Left	<u>24-X</u>	<u>1583</u>
<u>TBRYM2</u>	<u>24Y</u>	Right Tibia	Rear	<u>24-Y</u>	<u>1583</u>

\*With 10 Vdc input (2000 g range).

PARTNER VEHICLE ACCELEROMETER PLACEMENT CONTD

Dummy Chest Humanoid 45, in Body Humanoid 45  
(MFR) (S/N) (MFR) (S/N)

Mnemonic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
<u>ANLYF2</u>	<u>11Y</u>	Left Ankle	Left	<u>11-Y</u>	<u>1584</u>
<u>ANLZF2</u>	<u>11Z</u>	Left Ankle	Tension	<u>11-Z</u>	<u>1584</u>
<u>ANLXM2</u>	<u>11X</u>	Left Ankle	Left	<u>11-X</u>	<u>1584</u>
<u>ANRYF2</u>	<u>20Y</u>	Right Ankle	Left	<u>20-Y</u>	<u>1584</u>
<u>ANRZF2</u>	<u>20Z</u>	Right Ankle	Tension	<u>20-Z</u>	<u>1584</u>
<u>ANRXM2</u>	<u>20X</u>	Right Ankle	Left	<u>20-X</u>	<u>1584</u>
<u>CSTXD2</u>	<u>CP2</u>	Chest		<u>CP2</u>	<u>Bournes</u>

\*With 10 Vdc input (2000 g range).

SUBJECT VEHICLE ACCELEROMETER INFORMATION

<u>MNEMONIC</u>	<u>DESCRIPTION</u>	<u>SERIAL NO.</u>	<u>MODEL NO.</u>
FFRXG	FRONT FRAME RAIL X-DIR	AL31	2264
FFCXG	FRONT CROSS MEMBER X-DIR	AL43	2264
BCRXG	BRAKE CALIPER; RIGHT X-DIR	AN78	2264
ENGXG2	ENGINE BOTTOM X-DIR	AN02	2264
ENGXG1	ENGINE BLOCK TOP X-DIR	AK87	7264
SCAPG	STEERING COLUMN LOWER A-P AXIS	AJ02	2264
SH1PG	STEERING WHEEL HUB A-P AXIS	AJ92	2264
SH1IG	STEERING WHEEL HUB I-S AXIS	BA33	2264
DPCXG	DASH PANEL X-DIR	AZ68	2264
DPCZG	DASH PANEL Z-DIR	AU98	2264
VCGV	PITCH RATE GYRO	H19	
LPBXG	LEFT B-PILLAR X-DIR	BA99	2264
LPBZG	LEFT B-PILLAR Z-DIR	AS86	2264
RPBXG	RIGHT B-PILLAR X-DIR	AJ45	2264
TLRXG3	LEFT REAR CROSS MEMBER X-DIR	AR87	2264
TLRZG3	LEFT REAR CROSS MEMBER Z-DIR	AF22	2264
TLRXGC	LEFT REAR CROSS MEMBER RED.	AG05	2264
TRRXG4	RIGHT REAR CROSS MEMBER X-DIR	AT75	2264
TRRXGD	RIGHT REAR CROSS MEMBER RED.	BA51	2264
RAXXG	REAR AXLE X-DIR	AJ97	2264

PARTNER VEHICLE ACCELEROMETER INFORMATION

<u>MNEMONIC</u>	<u>DESCRIPTION</u>	<u>SERIAL NO.</u>	<u>MODEL NO.</u>
FFRXG	FRONT FRAME RAIL X-DIR	BK30	2264
FFCXG	FRONT CROSS MEMBER X-DIR	AS44	2264
BCRXG	BRAKE CALIPER; RIGHT X-DIR	AN36	2264
ENGXG2	ENGINE BOTTOM X-DIR	AL17	7264
ENGXG1	ENGINE BLOCK TOP X-DIR	AA34	7264
SCAPG	STEERING COLUMN LOWER A-P AXIS	AN83	2264
SH1PG	STEERING WHEEL HUB A-P AXIS	AJ19	2264
SH1IP	STEERING WHEEL HUB I-S AXIS	AY80	2264
DPCXG	DASH PANEL X-DIR	AL38	7264
DPCZG	DASH PANEL Z-DIR	AT11	2264
VCV	PITCH RATE GYRO	H24	
LPBXG	LEFT B-PILLAR X-DIR	AK66	2264
LPBZG	LEFT B-PILLAR Z-DIR	AL14	7264
RPBXG	RIGHT B-PILLAR X-DIR	AS36	2264
TLRXG3	LEFT REAR CROSS MEMBER X-DIR	AK78	7264
TLRZG3	LEFT REAR CROSS MEMBER Z-DIR	AJ31	7264
TLRXGC	LEFT REAR CROSS MEMBER RED.	AA32	7264
TRRXG4	RIGHT REAR CROSS MEMBER X-DIR	AJ90	2264
TRRXGD	RIGHT REAR CROSS MEMBER RED.	AS95	2264
RAXXG	REAR AXLE X-DIR	AM61	2264

CAMERA INFORMATION

CAMERA IDENTIFICATION

TIME ZERO ON HIGH SPEED FILM

Photosonics

Circular timing pulses on one side, verticle event bar on other side.

Back 4 frames from frame where verticle event bar stops.

Hycam

Square shaped timing pulses on one side, verticle event bar on other side.

Back 5 frames from frame where vertical event bar stops.

Stalex

Square shaped timing pulses on one side, verticle event bar on other side.

Back 2 frames from frame where vertical event bar stops.

## SIGN CONVENTION

Sign convention for SRL 98 neck load cells and transducers.

Compression (-) on femur load cells and load cells in barrier face.

### Neck Transducer Notation

#### 3 channel neck transducer

$F_x$ (shear force)	(+) head translating forward
	(-) head translating rearward
$F_z$ (axial force)	(+) tension on neck
	(-) compression on neck
$M_y$ (moment)	(+) forward rotation about neck (chin to thorax, flexion)
	(-) rearward rotation about neck (back of head to spine, extension)

#### 6 channel neck transducers

$F_x$ (shear force)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
$F_y$ (latereal force)	(+) head translating to left relative to top of neck
	(-) head translating to right relative to top of neck
$F_z$ (axial force)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
$M_x$ (moment)	(+) head rotation toward right shoulder
	(-) head rotation toward left shoulder
$M_y$ (moment)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
$M_z$ (moment)	(+) chin rotation to left shoulder
	(-) chin rotation to right shoulder

All other channels in dummies or vehicle are to follow right hand rule.

(+) Forward	X
(+) Left	Y
(+) Up	Z
(+) Pitch Rate (nose down)	

SIGN CONVENTION CONTD

Knee loads are measured along a line between the knee pivot and the ankle pivot.

$F_z$  (axial force) (+) tension  
(-) compression

Tibia Moments

$M_x$  (moment about X) (+) tibia rotation to dummy's left  
(-) tibia rotation to dummy's right

$M_y$  (moment about Y) (+) tibia rotation rearward  
(-) tibia rotation forward

Ankle Loads

$F_y$  (force in Y dir.) (+) ankle translation to dummy's left  
(-) ankle translation to dummy's right

$F_z$  (force in Z dir.) (+) tension  
(-) compression

Ankle Moments

$M_x$  (moment about X) (+) ankle rotation to dummy's left  
(-) ankle rotation to dummy's right

FILTERING DATA

J211 SAE

Vehicle structural accelerations Class 60

Occupant

Head Accelerometer Class 1000

Chest Accelerometer Class 180

Chest Deflection Class 180

Femur Force Class 600

Pelvis Accelerometer Class 180

Lower Leg Class 600