

REPORT NO. TRC-91-N06

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

VOLVO
1992 VOLVO 240
4-DOOR SEDAN
NHTSA NO. MN5900
TRC TEST NO. 920212

PREPARED BY:
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FINAL REPORT

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16. Abstract A 35 mph frontal load cell barrier impact test was conducted on a 1992 Volvo 240 4-door sedan, NHTSA No. MN5900, at the Transportation Research Center Inc. on February 12, 1992. This test was conducted to obtain new car assessment and research data indicant of FMVSS No. 208 performance. The barrier impact velocity was 35.2 mph. The vehicle's maximum crush was 28.5 inches. The ambient temperature was 70° F. The driver's head injury criteria (HIC) was 282. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 36.6 g. The driver's chest maximum deflection was 1.8 inches. The driver's left and right femur maximum axial forces were 724 pounds and 759 pounds, respectively. (See DATA ACQUISITION EXPLANATIONS.) The passenger's head injury criteria (HIC) was 835. The passenger's chest maximum resultant accceleration with three (3) milliseconds minimum duration was 38.8 g. The passenger's left and right femur maximum axial forces were 974 pounds and 46 pounds, respectively.			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	tonnes	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
----	------------------------	----------------------------	---------------------	----

Approximate Conversions from Metric Measures

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

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
-40				-40
-20				-4
0				32
20				68
37				98.6
40				104
60				140
80				176
98.6				200
120				248
180				356
200				392
212				404

* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C 13.10286.

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SECTION 1.0

PURPOSE AND TEST PROCEDURE

PURPOSE

This 35 mph frontal barrier impact test is part of the New Car Assessment Program (NCAP) conducted for the National Highway Traffic Safety Administration's (NHTSA) Office of Market Incentives by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-90-D-22121.

The purpose of this test was to obtain new car assessment and research data for vehicle crashworthiness and occupant restraint system performance for the subject vehicle, a 1992 Volvo 240 4-door sedan, NHTSA No. MN5900, at an impact speed in excess of the current 30 mph FMVSS 208 requirements.

TEST PROCEDURE

This test was conducted in accordance with NHTSA's Laboratory Indicant Test Procedure, New Car Assessment Program, dated January 1, 1990. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection" performance.

The test vehicle was instrumented with seven (7) accelerometers to measure longitudinal axis accelerations and two (2) accelerometers to measure vertical axis accelerations. The driver's and passenger's restraint systems were instrumented with four (4) seat belt load cells to measure lap belt tension and shoulder belt tension, two (2) string potentiometers to measure shoulder belt displacement, and two (2) linear potentiometers to measure shoulder belt stretch. The vehicle impacted a frontal load cell barrier instrumented with thirty-six (36) barrier face load cells. The vehicle's specified impact velocity range was 34.5 to 35.5 mph.

The test vehicle contained two (2) 50th percentile adult male anthropomorphic test devices (dummies). One (1) Part 572E adult male dummy was seated in the left front outboard designated seating position. One (1) Part 572B adult male dummy was seated in the right front outboard designated seating position. The dummies were positioned according to the dummy placement procedures specified in Appendices VII and VIII of the Laboratory Indicant Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. The Part 572E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection and a six-axis neck load cell to measure longitudinal, lateral and vertical forces and moments.

The seventy-six (76) data channels were multiplexed and recorded on two (2) 14-track tape drives. The data was digitally sampled at 8000 samples per second and processed per section IP11 of the Laboratory Indicant Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and sixteen (16) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera.

The vehicle, occupant, and load cell barrier data are presented in Section 2.0. The occupant, camera, and vehicle measurements are presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the dummy, vehicle, and load cell barrier data plots. Appendix C contains the dummy certification data. Appendix D contains miscellaneous test information. Appendix E contains the restraint system instructions from the owner's manual.

SECTION 2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This frontal load cell barrier test was conducted at TRC on February 12, 1992.

The test vehicle, a 1992 Volvo 240 4-door sedan, NHTSA No. MN5900, was equipped with a 2.3 liter inline engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 3506 pounds. The vehicle's impact speed was 35.2 mph. The vehicle sustained 28.5 inches of static crush during the impact.

The driver's head injury criteria (HIC) was 282. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 36.6 g. The driver's chest maximum deflection was 1.8 inches. The driver's left and right femur maximum axial forces were 724 pounds and 759 pounds, respectively, (See DATA ACQUISITION EXPLANATIONS.)

The passenger's HIC was 835. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 38.8 g. The passenger's left and right femur maximum axial forces were 974 pounds and 46 pounds, respectively.

DATA ACQUISITION EXPLANATIONS

The driver's neck moment about Z-axis load cell, NEKZM1, recorded a spike at 332 milliseconds.

The driver's left femur force load cell, LFMF1, recorded a spike at 332 milliseconds.

The driver's right femur force load cell, RFMF1, recorded spikes from 10 to 15 milliseconds and at 332 milliseconds.

The engine top X-axis accelerometer, ENGXG1, lost data after 13 milliseconds due to the vehicle's crush cutting the accelerometer cable.

The engine bottom X-axis accelerometer, ENGXG2, lost data from 18 to 60 milliseconds due to the vehicle's crush pinching the accelerometer cable.

The brake caliper X-axis accelerometer, BCLXG1, did not return to zero following the crash test event.

TABLE 1 CRASH TEST SUMMARY

```

NHTSA NO.:  MN5900          TEST TYPE:  Frontal Load Cell Barrier

TEST DATE:   02/12/92        TEST TIME:   1744          AMBIENT TEMP. (°F):   70

VEHICLE YEAR/MAKE/MODEL/BODY STYLE:  1992/Volvo/240/4-door sedan

VEHICLE TEST WEIGHT (LBS):  3506

IMPACT ANGLE (DEG)*:  0

IMPACT VELOCITY (MPH)**:  PRIMARY = 35.2          SECONDARY = 35.2

MAXIMUM STATIC CRUSH (IN):  28.5

AVERAGE REBOUND (IN):  4.3

DUMMIES:           Driver  #142                  Passenger  #713

TYPE:              Part 572 E                    Part 572 B

LOCATION:            Left front                    Right front

RESTRAINT:         Airbag and 3-point            3-point Unibelt
                   Unibelt

NUMBER OF DATA CHANNELS:  76

NUMBER OF CAMERAS:  HIGH-SPEED  16              REAL-TIME  2

```

*With respect to tow track centerline.

****Speed trap measurement ($\pm .05$ mph accuracy)**

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Volvo

MAKE/MODEL: Volvo/240

VIN: YV1AS8809N1458360

BODY STYLE: 4-door sedan

MODEL YEAR: 1992

NHTSA NO.: MN5900

COLOR: White

ENGINE DATA: TYPE: inline CYLINDERS: 4 DISPLACEMENT: 2.3 liter

TRANSMISSION DATA: 3 SPEED, MANUAL, X AUTOMATIC, FWD, X RWD, 4WD

DATE VEHICLE RECEIVED: 01/13/92

ODOMETER READING: 70.0

DEALER'S NAME AND ADDRESS: Segna Motors Inc.
2265 W. Dublin - Granville Rd.
Columbus, OH 43085

ACCESSORIES:

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

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Volvo Gothenburg Sweden

DATE OF MANUFACTURE: 08/91 VIN: YV1AS8809N1458360

GVWR: 4030 LBS

GAWR: FRONT: 1885 LBS., REAR: 2180 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Michelin MXL 185/70R14 88T

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

SPARE TIRE (MFR., LINE, SIZE): Firestone, Radial Special Spare, 155/R1590Q

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 67.5 INCHES

WHEELBASE: 104.2 INCHES

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the passenger's door.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: 185/70R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 36 PSI; REAR: 36 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 945 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 26.2; RF 26.8; LR 25.8; RR 26.2

PRE-TEST ATTITUDE: LF 26.2; RF 26.1; LR 23.9; RR 24.6

POST-TEST ATTITUDE: LF 32.0; RF 34.0; LR 23.8; RR 23.2

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	768 LBS.	RIGHT REAR	687 LBS.
LEFT FRONT	812 LBS.	LEFT REAR	713 LBS.
TOTAL FRONT WEIGHT	1580 LBS.		(53.0% OF TOTAL VEHICLE WEIGHT)
TOTAL REAR WEIGHT	1400 LBS.		(47.0% OF TOTAL VEHICLE WEIGHT)
TOTAL DELIVERED WEIGHT 2980 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2980 LBS)

VCW = VEHICLE CAPACITY WEIGHT (750 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

RCLW* = VCW - 150 (DSC) = 945 - 150 (5) = 195

TARGET TEST WEIGHT = UDW + RCLW* + (NO. OF HYBRID II DUMMIES X 164 LBS/DUMMY)
+ (NO. OF HYBRID III DUMMIES X 167 LBS/DUMMY)

TARGET TEST WEIGHT = 2980 + 195 + 164 + 167

TARGET TEST WEIGHT = 3506 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 195 LBS. OF CARGO WEIGHT:

RIGHT FRONT	920 LBS.	RIGHT REAR	902 LBS.
LEFT FRONT	874 LBS.	LEFT REAR	810 LBS.
TOTAL FRONT WEIGHT	1794 LBS.		(51.2% OF TOTAL VEHICLE WEIGHT)
TOTAL REAR WEIGHT	1712 LBS.		(48.8% OF TOTAL VEHICLE WEIGHT)
TOTAL TEST WEIGHT	3506 LBS.		(0.0% UNDER TARGET TEST WEIGHT)

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

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Rear door inner trim, rear bumper, rear deck lid, taillights, and rear seat belts.

CG = 50.9 INCHES REARWARD OF FRONT WHEEL CENTERLINE

*Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

920212

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 920212	NHTSA NO.: MN5900
TEST DATE: 02/12/92	TEST TIME: 1744
TEST TYPE: Frontal load cell barrier	IMPACT ANGLE: 0°
AMBIENT TEMPERATURE AT IMPACT AREA:	70° F
TEMPERATURE IN OCCUPANT COMPARTMENT:	72° F
IMPACT VELOCITY: PRIMARY = 35.2 MPH	SECONDARY = 35.2 MPH

(SPECIFIED RANGE = 34.5 TO 35.5 MPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 26.0 IN.

EXITING VELOCITY TRAP = 2.0 IN.

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

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 186.8; C 190.0; R 186.6

POST-TEST: L 159.6; C 161.6; R 160.9

TOTAL CRUSH: L 27.2; C 28.4; R 25.7

AVERAGE CRUSH: 27.4

TEST VEHICLE REBOUND FROM FLAT BARRIER (ALL MEASUREMENTS ARE IN INCHES):

DISTANCE FROM TEST VEHICLE TO BARRIER: L 4.5; C 2.4; R 6.0; AVG. 4.3

TABLE 4 FUEL SYSTEM DATA

MAKE/MODEL: Volvo/240

NHTSA NO.: MN5900

FUEL SYSTEM CAPACITY: 15.8 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 15.85 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 14.6 GALLONS TO 14.9 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 14.75 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

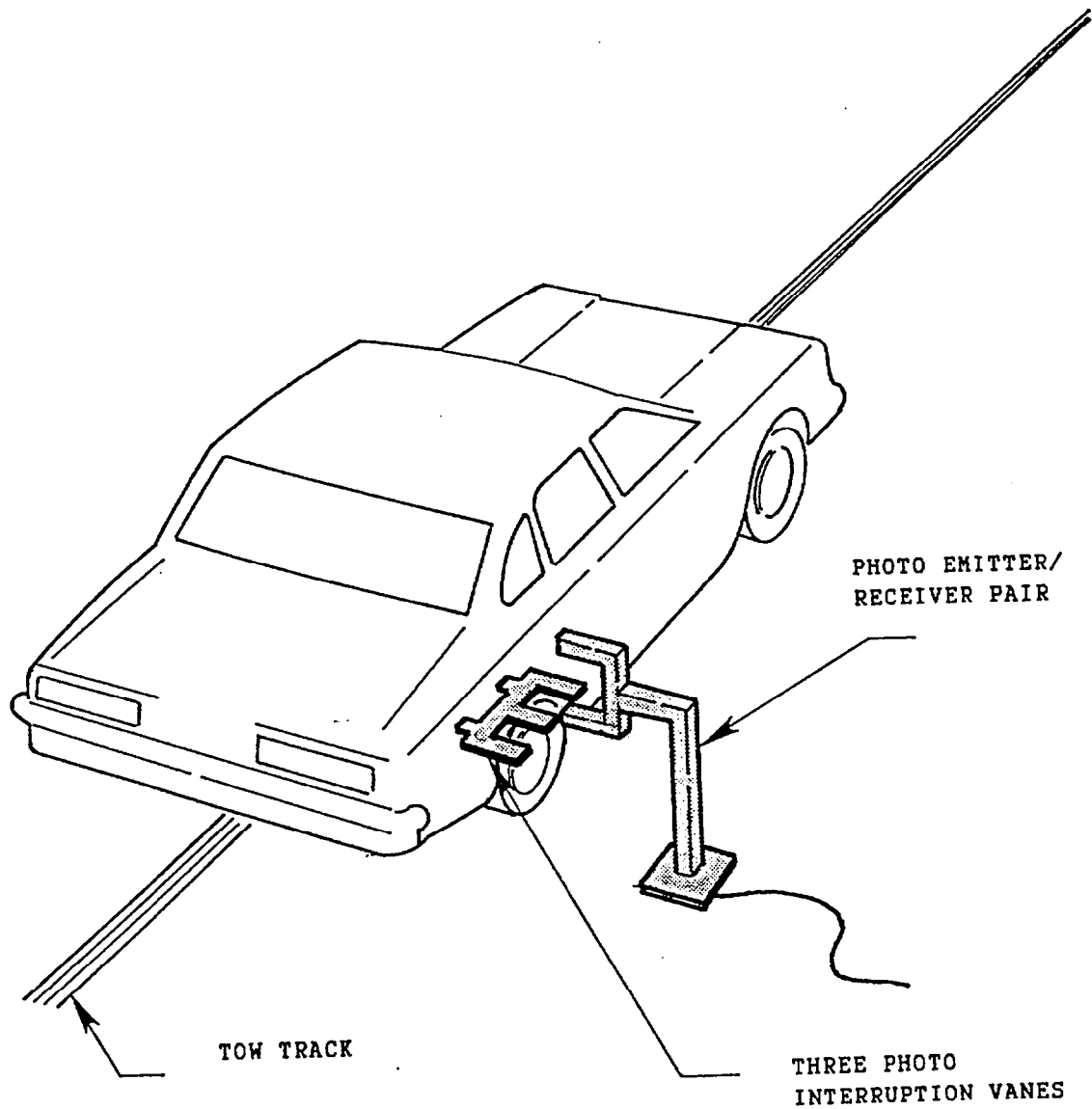
TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel tank was located behind the rear axle.
The fuel filler neck was located on the left side. The fuel lines ran
along the left side to the front.

ELECTRIC FUEL PUMP: Yes FUEL INJECTION: Yes

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

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane clears emitter/receiver two inches before impact.
The vanes have one foot spacing.

FIGURE 2 ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Volvo/240/4-door sedan

VEHICLE NHTSA NO.: MN5900; VIN: YV1AS8809N1458360

MODEL YEAR: 1992; BUILD DATE: 08/91; TEST DATE: 02/12/92

VEHICLE SIZE CATEGORY: Compact; TEST WEIGHT: 3506 LBS.

VEHICLE WHEELBASE: 104.2 INCHES

MAXIMUM WIDTH: 67.5 INCHES

FRONT OVERHANG: 38.0 INCHES

COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW2

CRUSH DEPTH
MEASUREMENTS:

C1 =	<u>27.2</u>	INCHES
C2 =	<u>28.1</u>	INCHES
C3 =	<u>28.5</u>	INCHES
C4 =	<u>28.3</u>	INCHES
C5 =	<u>27.9</u>	INCHES
C6 =	<u>25.7</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
REGION: L = 60.0 INCHES

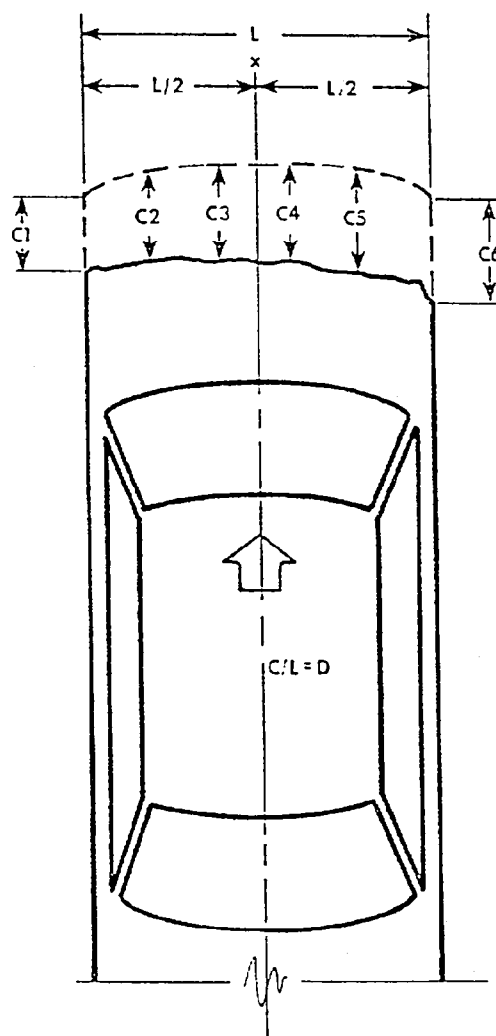
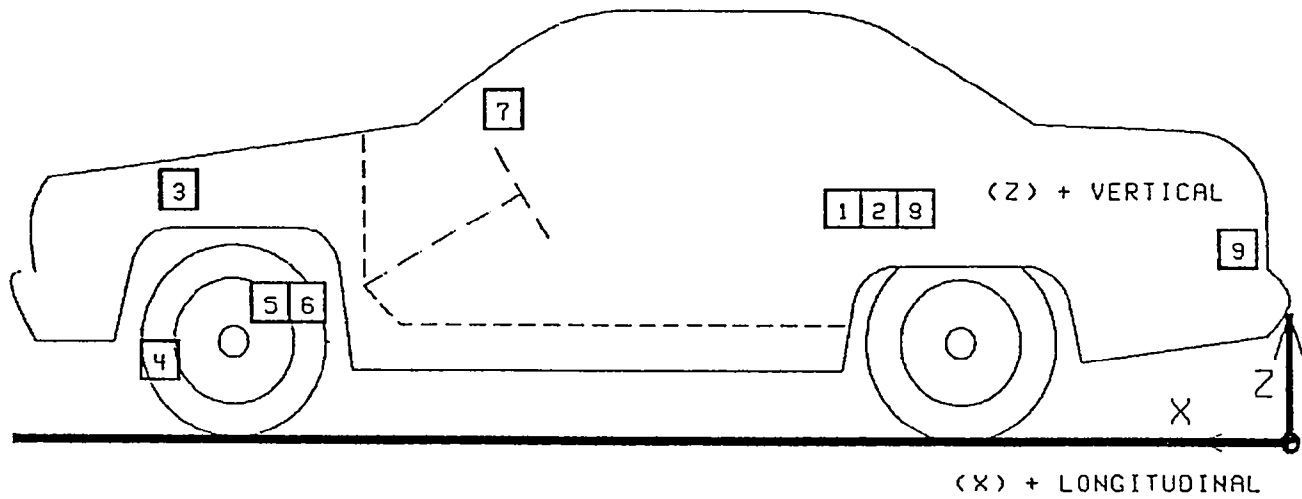
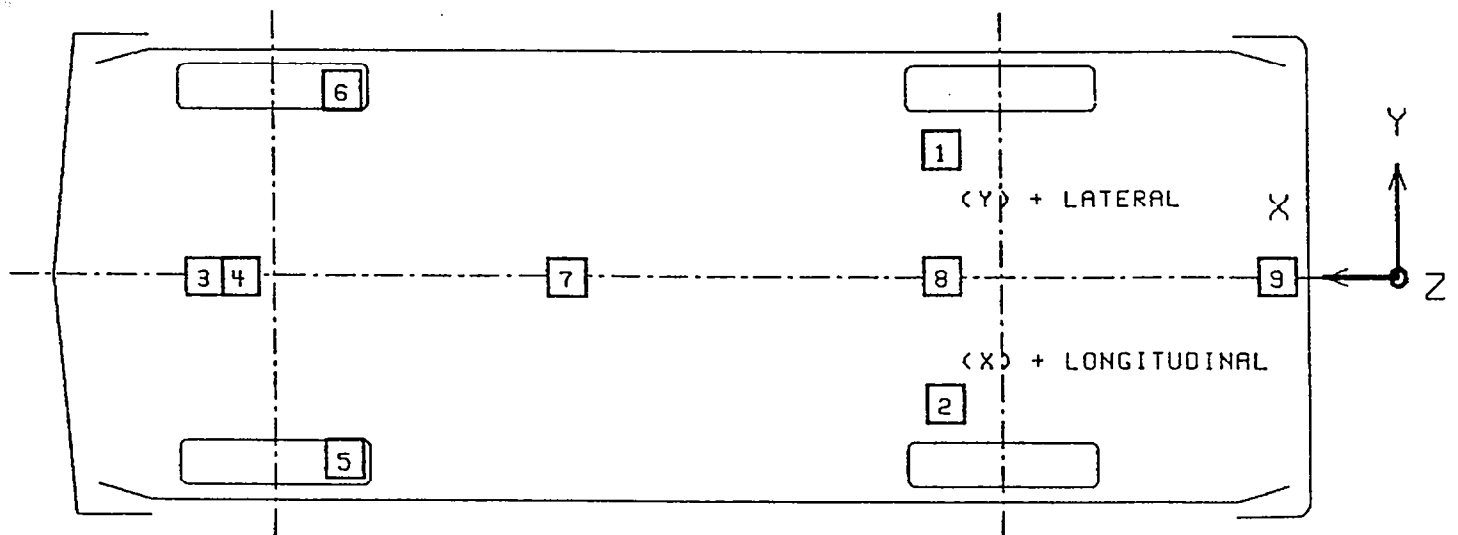


FIGURE 3
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 920212

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G MSEC		NEGATIVE DIRECTION MAX G MSEC	
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	114.3	24.2	14.1	3.1	151.0	35.7	52.8
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	114.1	-24.9	14.1	2.3	158.3	34.8	53.5
3	ENGINE TOP LONGITUDINAL	44.0	-5.1	32.2	---	---	Y	---
4	ENGINE BOTTOM LONGITUDINAL	52.2	4.2	6.2	---	---	Y	---
5	RIGHT BRAKE CALIPER LONGITUDINAL	42.5	-22.4	12.5	15.4	71.5	53.7	58.1
6	LEFT BRAKE CALIPER LONGITUDINAL	42.2	22.4	12.5	15.4	82.6Y	63.7	53.6Y
7	INSTRUMENT PANEL CENTER LONGITUDINAL	68.4	-1.3	41.5	41.9	33.0	60.3	45.1
8	REAR SEAT CROSSMEMBER CENTER VERTICAL	114.8	0.0	14.8	37.5	63.4	32.0	70.0
9	VEHICLE REAR CENTER VERTICAL	182.1	0.0	25.2	14.3	86.1	22.6	115.0

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES. X-AXIS LOCATIONS ARE MEASURED REARWARD FROM THE FRONT BUMPER.

REFERENCE: X: + FORWARD ACCELERATION
Y: + LEFT FROM VEHICLE CENTERLINE
Z: + UP FROM GROUND LEVEL

Y See DATA ACQUISITION EXPLANATIONS

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #142	PASSENGER #713
HEAD	<u>Airbag</u>	<u>Instrument panel and chest</u>
CHEST	<u>Airbag</u>	<u>None</u>
ABDOMEN	<u>None</u>	<u>None</u>
LEFT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>
RIGHT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
FRONT	<u>Torch and tools required</u>	<u>Tools required</u>
REAR	<u>Easy</u>	<u>Easy</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>None</u>
REAR	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

The entire windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

TABLE 7 FMVSS 208 DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1992/Volvo/240/4-door sedan

VEH. NHTSA NO.: MN5900; TEST DATE: 02/12/92

	DRIVER	PASSENGER
MAXIMUM ACCELERATIONS (G):	DUMMY #142	DUMMY #713
HEAD X-AXIS	-43.9	-55.5
HEAD Y-AXIS	-20.7	-28.8
HEAD Z-AXIS	-16.0	-67.1
HEAD RESULTANT	46.6	80.0
CHEST X-AXIS	-36.8	-39.6
CHEST Y-AXIS	-3.3	-12.5
CHEST Z-AXIS	-10.5	-20.8
CHEST RESULTANT*	36.6	38.8
CHEST RESULTANT TIME INTERVAL (SEC.)*	.003	.003

HEAD INJURY CRITERIA (HIC) VALUES:

HIC**	282	835
HIC STARTING TIME (SEC.)	.068	.087
HIC ENDING TIME (SEC.)	.104	.123
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	36.0	55.8

MAXIMUM CHEST DEFLECTIONS (IN):

CHEST X-AXIS	1.8	NA
MAXIMUM CHEST DEFLECTION TIME (SEC.)	.096	NA

MAXIMUM COMPRESSIVE FEMUR FORCES (LBS):

LEFT FEMUR	724	974
RIGHT FEMUR	759	46

MAXIMUM SEAT BELT FORCES (LBS):

LAP BELT	915	1391
SHOULDER BELT	1046	1638

NOTE: ALL VALUES LISTED MUST BE OCCURRING DURING PRIMARY IMPACT EVENT.
(HEAD ACCELERATIONS LISTED MUST BE DURING HIC TIME INTERVAL.)

*0.003 SEC. MINIMUM DURATION.

**THE MAXIMUM HIC TIME INTERVAL IS 36 MILLISECONDS.

TABLE 8 HYBRID III NECK DATA SUMMARY

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1992/Volvo/240/4-door sedan

VEHICLE NHTSA NO.: MN5900; TEST DATE: 02/12/92

	DRIVER DUMMY #142	PASSENGER DUMMY #713
MAXIMUM VALUES:		
NECK X-AXIS FORCE (LBS.)	-50	NA
NECK Y-AXIS FORCE (LBS.)	-52	NA
NECK Z-AXIS FORCE (LBS.)	309	NA
NECK MOMENT ABOUT X AXIS (IN.-LBS.)	-106	NA
NECK MOMENT ABOUT Y AXIS (IN.-LBS.)	-195	NA
NECK MOMENT ABOUT Z AXIS (IN.-LBS.)	-65	NA

NOTE: ALL VALUES LISTED MUST BE OCCURRING DURING PRIMARY IMPACT EVENT.

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated slightly forward as the dummy's head and chest were restrained by the driver's airbag. The dummy's torso was restrained by the three-point unbelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point unbelt.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward and impacted the instrument panel and the dummy's chest. The dummy's torso was restrained by the three-point unbelt. The dummy's head rotated rearward as the dummy rebounded into the seat back. The dummy came to rest seated in the right front passenger's seat, restrained by the three-point unbelt.

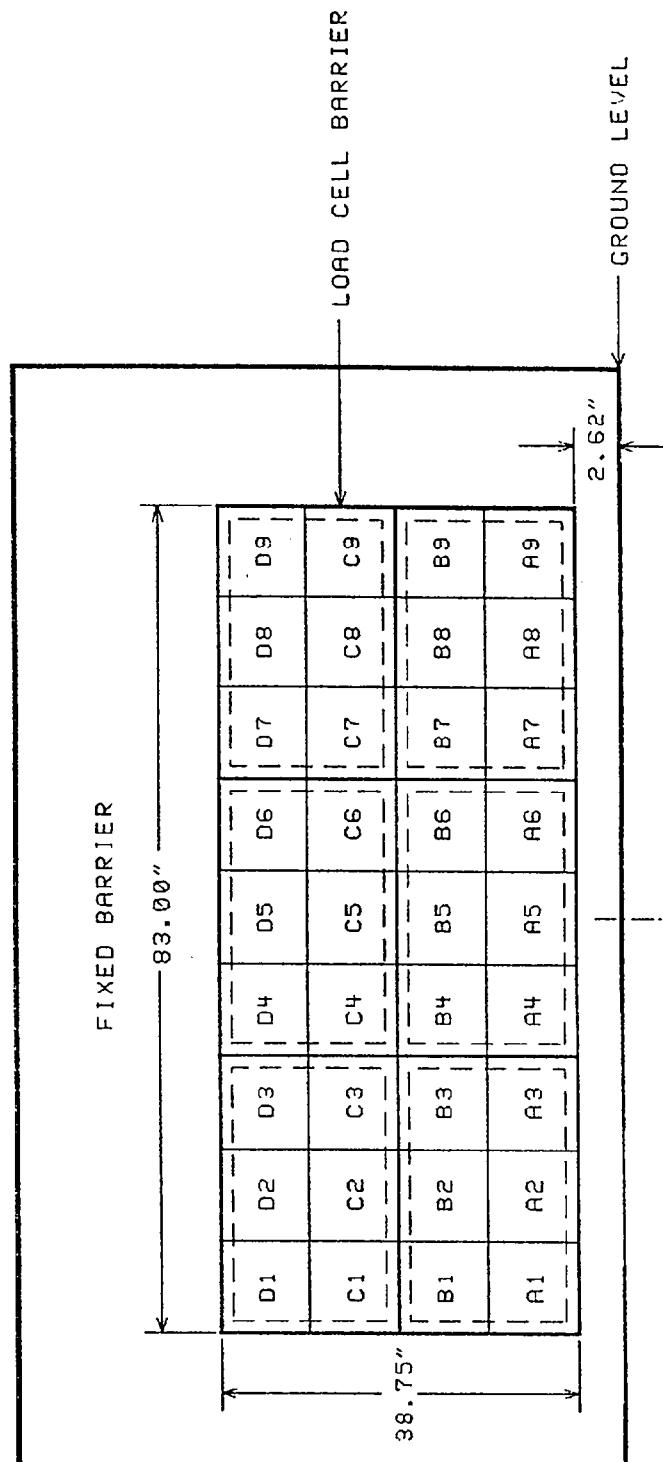
TABLE 9 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	DRIVER	PASSENGER
<u>BELT LENGTH DATA:</u>		
BELT LENGTH FROM TRIM PANEL EXIT TO BOLT HOLE ANCHOR POINT FOR CONTINUOUS WEBBING SYSTEMS.	96.2	91.0
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	34.2	32.5
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	36.0	35.0
<u>SHOULDER BELT SPOOL-OFF LENGTH:</u>		
AS DETERMINED BY FILM ANALYSIS	2.0	2.0
AS DETERMINED MECHANICALLY	1.9	2.9
AS DETERMINED ELECTRONICALLY	2.6	3.6
<u>BELT STRETCH LENGTH (IN/FT):</u>		
AS MEASURED MECHANICALLY	0.0	0.0
AS MEASURED ELECTRONICALLY	0.0	0.2
<u>RETRACTOR LOCK-UP TIME (MS):</u>		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	54	54

ALL MEASUREMENTS ARE IN INCHES UNLESS OTHERWISE NOTED.

FIGURE 4
LOAD CELL BARRIER CONFIGURATION
FRONT VIEW

36 LOAD CELLS
4 ROWS
9 COLUMNS



GROUP 1: A1 THRU B3
GROUP 2: A4 THRU B6
GROUP 3: A7 THRU B9
GROUP 4: C1 THRU D3
GROUP 5: C4 THRU D6
GROUP 6: C7 THRU D9

TABLE 10

LOAD CELL BARRIER DATA SUMMARY

TEST NUMBER 920212

LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	LB	MSEC	LB	MSEC
TOTAL GROUP 1	355	192.0	22982	23.0
TOTAL GROUP 2	429	192.4	43935	38.0
TOTAL GROUP 3	337	192.4	18699	20.1
TOTAL GROUP 4	309	291.5	13264	22.0
TOTAL GROUP 5	679	1.6	31501	43.1
TOTAL GROUP 6	353	291.5	9810	21.3
TOTAL LOAD CELL FORCE	1668	191.9	93677	42.9
TENSION IS POSITIVE				
COMPRESSION IS NEGATIVE				

SECTION 3.0

OCCUPANT, CAMERA, & VEHICLE MEASUREMENTS

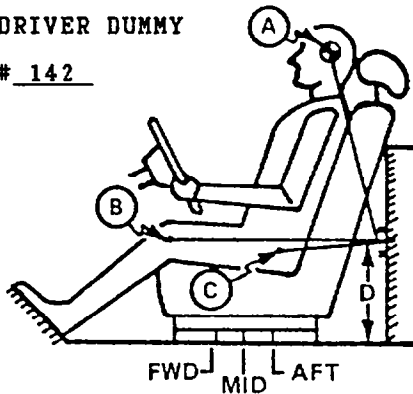
FIGURE 5 DUMMY AND SEAT POSITIONING DATA

TEST NO.: 920212; VEHICLE: 1992 Volvo 240

<u>SEAT TYPE:</u>	<u>ADJUSTER TYPE:</u>	<u>FRONT SEAT BACK TYPE:</u>
<u> </u> BENCH	<u> X </u> MANUAL	<u> </u> NON-ADJUSTABLE
<u> X </u> BUCKET	<u> </u> POWER	<u> X </u> ADJUSTABLE RECLINING
<u> </u> SPLIT BENCH		

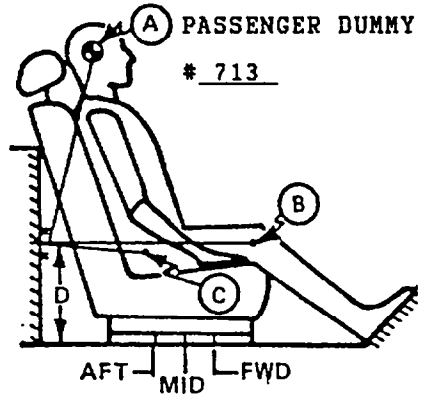
DRIVER DUMMY

142



**MEASUREMENT
LOCATION**

- A - HEAD TARGET
- B - KNEE JOINT
- C - APPROXIMATE 'H' POINT
- D - SILL TO DOOR STRIKER REFERENCE POINT



PASSENGER DUMMY

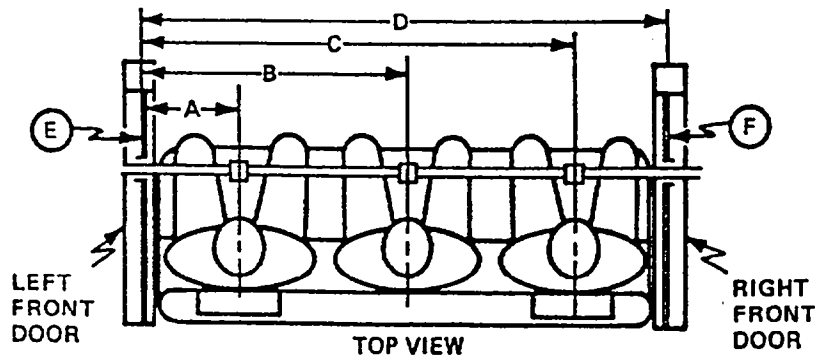
713

A = 18.6 IN. 8 DEGREES
 B = 24.1 IN. 95 DEGREES
 C = 11.8 IN. 135 DEGREES
 D = 13.9 IN.

A = 20.0 IN. -8 DEGREES
 B = 23.2 IN. 102 DEGREES
 C = 10.0 IN. 135 DEGREES
 D = 13.9 IN.

SEAT TRACK REARWARD: 8 NOTCHES

SEAT TRACK REARWARD: 5 NOTCHES



A = LEFT DOOR TO DRIVER CENTERLINE	<u>12.0</u> IN.
B = LEFT DOOR TO CENTER PASSENGER CENTERLINE	<u>NA</u> IN.
C = LEFT DOOR TO RIGHT PASSENGER CENTERLINE	<u>40.8</u> IN.
D = LEFT DOOR TO RIGHT DOOR	<u>51.5</u> IN.
E, F = WINDOW GLASS HEIGHT (RIGHT AND LEFT MUST BE EQUAL)	<u>9.8</u> IN.

ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

FIGURE 6 DUMMY IN-VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	15.2	19.7
HW	19.8	23.5
CD	18.6	23.1
CS	9.6	NA
KDL	3.4	5.1
KDR	2.8	6.0
TA	17°	25°
SA	16°	16°
HSW	15.4	NA

	DRIVER	PASSENGER
HR	7.3	6.6
HS	8.8	6.6
AD	2.5	4.1
HD	4.7	7.0
KK	8.2	8.0
AA	9.0	7.2
HA	20.1	26.2

KNEE OUTER BOLT HEAD TO OUTER
BOLT HEAD SPACING:

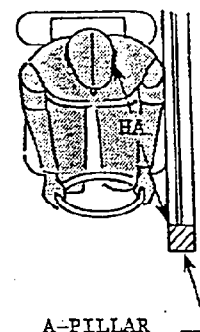
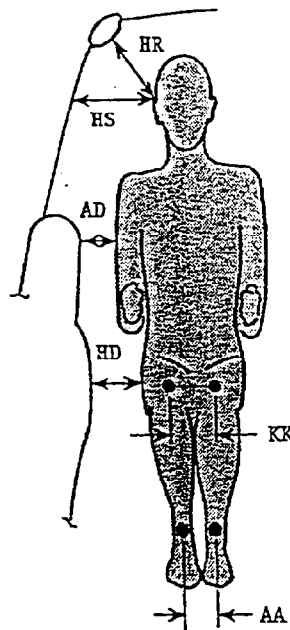
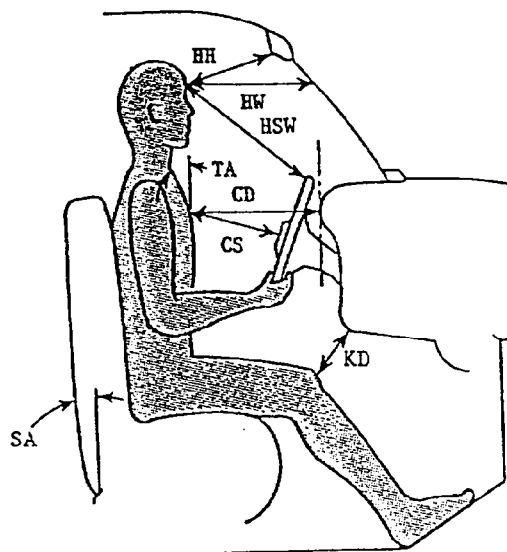
PASSENGER = 11.8

KNEE OUTER CLEVIS TO OUTER
CLEVIS SPACING:

DRIVER = 10.6

PELVIS ANGLE:

DRIVER = 23°

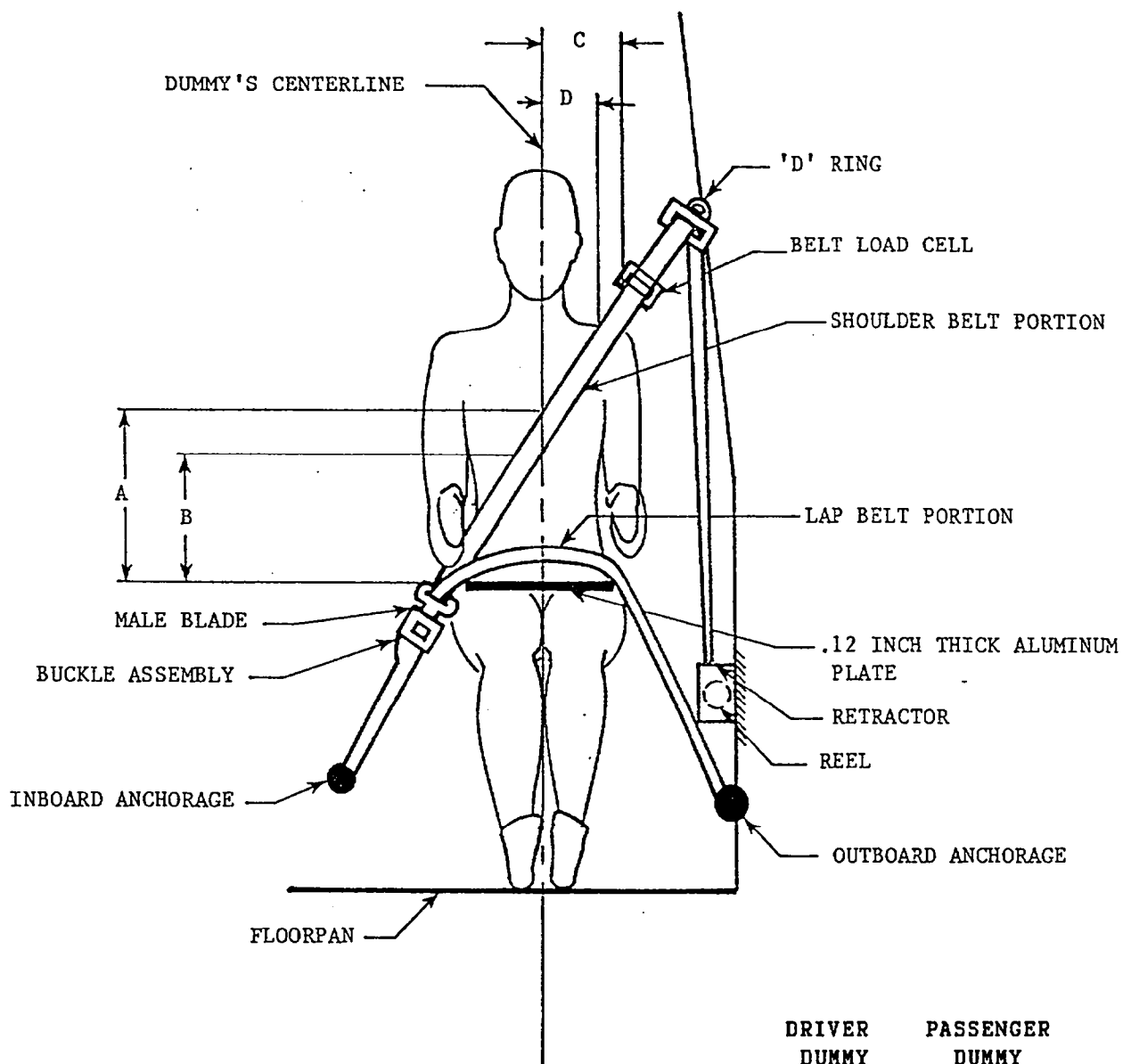


HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW = HEAD TO STEERING WHEEL

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

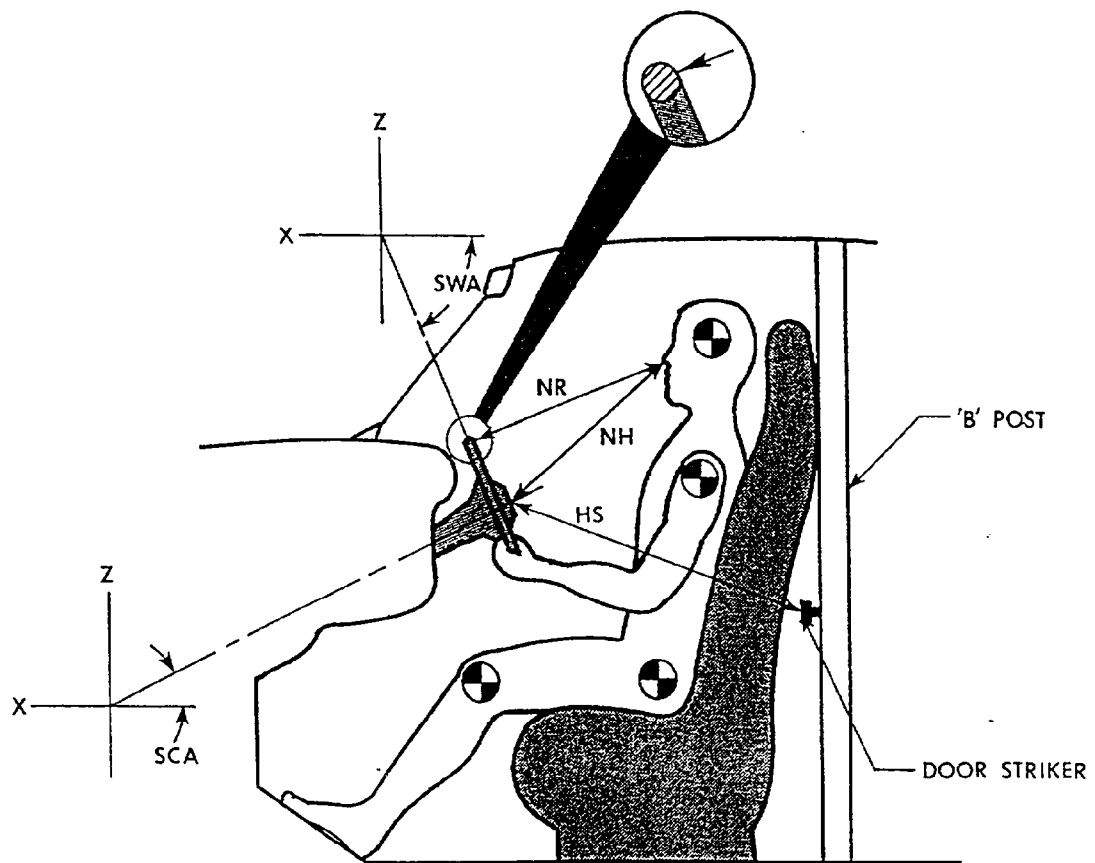
TORSO AND SEAT BACK ANGLES ARE RELATIVE TO VERTICAL.
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 7 SEAT BELT POSITIONING DATA



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 8 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY:
The steering column was not adjustable.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	13.8
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	14.5
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	22.4
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	22°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	68°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9
CAMERA POSITIONS

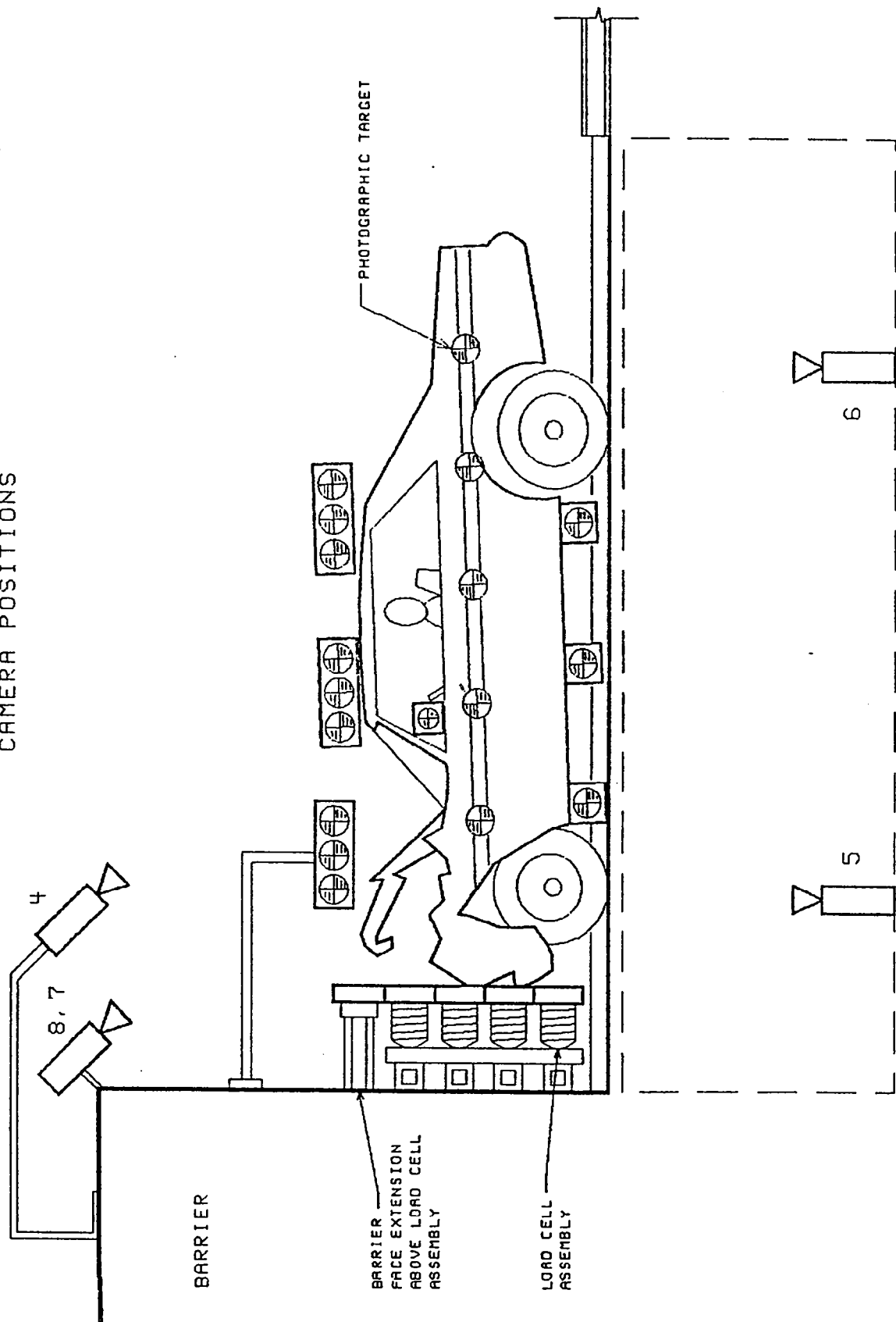


FIGURE 9
CAMERA POSITIONS, CONTINUED

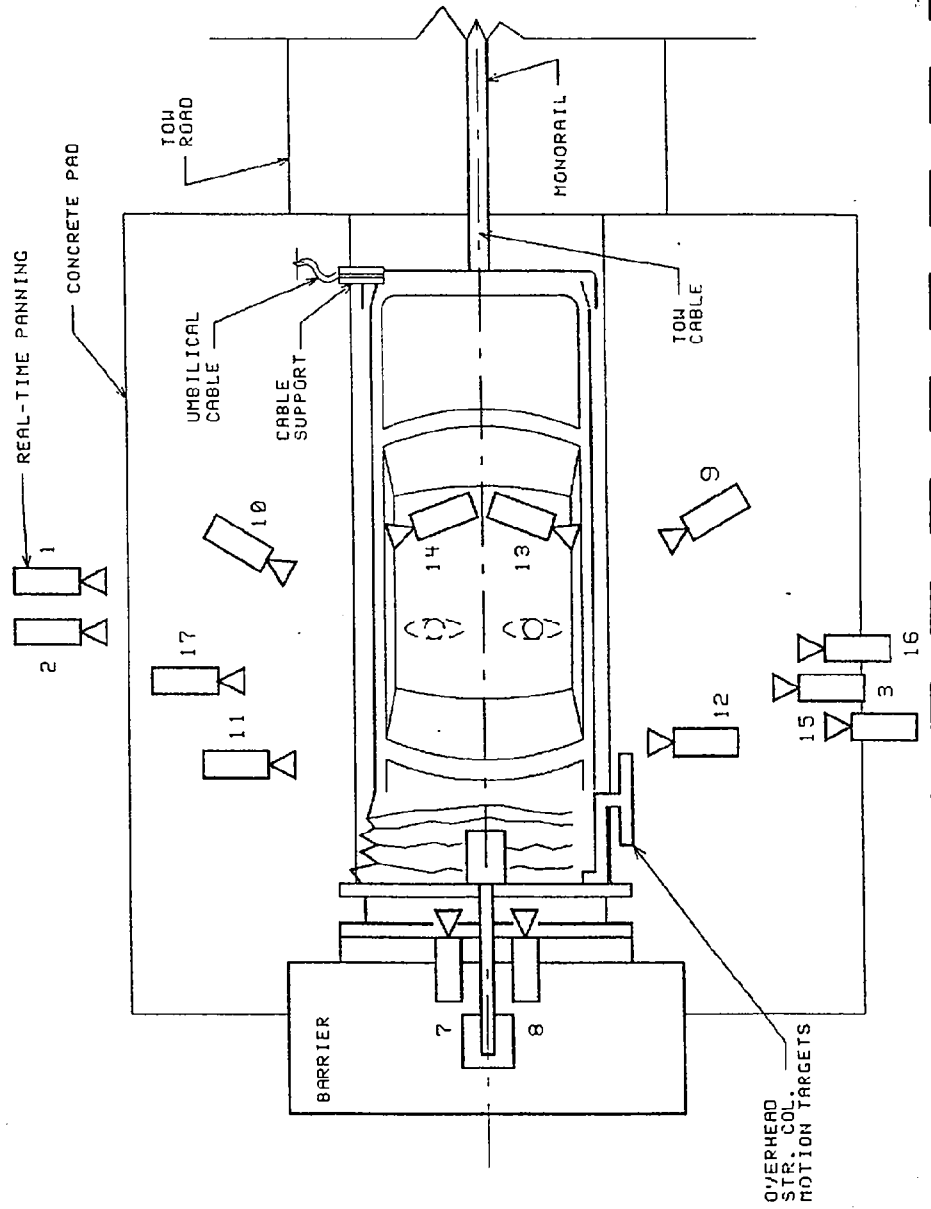


TABLE 11 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 920212		VEHICLE: Volvo 240 4-door sedan		CAMERA POSITIONS (IN)*			ANGLE** (DEG)	FILM PLANE TO HEAD TARGET (IN)		FILM SPEED (FPS)
CAMERA NO.	VIEW	X	Y	Z						
1	Real-time panning	-142.0	-504.0	61.0	NA	NA		NA	16	24
2	Vehicle crush	-81.3	-266.4	37.1	-2	-2		NA	13	500
3	Dummy kinematics	-41.5	295.0	44.0	-12	-12		210.0	25	475
4	Windshield damage	-36.4	0.0	98.0	-40	-40		NA	13	500
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	90		NA	13	1010
6	Fluid spillage	-99.3	0.0	-99.0	90	90		NA	13	1000
7	Passenger kinematics	-4.5	-13.8	85.0	-40	-40		NA	17	502
8	Driver kinematics	-6.8	14.5	85.0	-41	-41		NA	17	498
9	Driver kinematics	-180.0	73.0	102.0	-27	-27		99.0	25	500
10	Passenger kinematics	-184.0	-74.0	100.0	-26	-26		98.0	25	500
11	Windshield intrusion	-38.1	-306.1	44.0	0	0		NA	50	495
12	Windshield intrusion	-53.0	309.4	42.3	0	0		NA	50	508
13	Driver seatbelt movement	NA	NA	NA	NA	NA		NA	13	500
14	Passenger seatbelt movement	NA	NA	NA	NA	NA		NA	13	500
15	Column movement	-148.0	286.0	103.0	-14	-14		NA	25	505
16	Column movement	-148.0	286.0	75.1	-9	-9		NA	25	500
17	Passenger kinematics	-38.8	-210.8	45.3	7	7		227.0	25	517

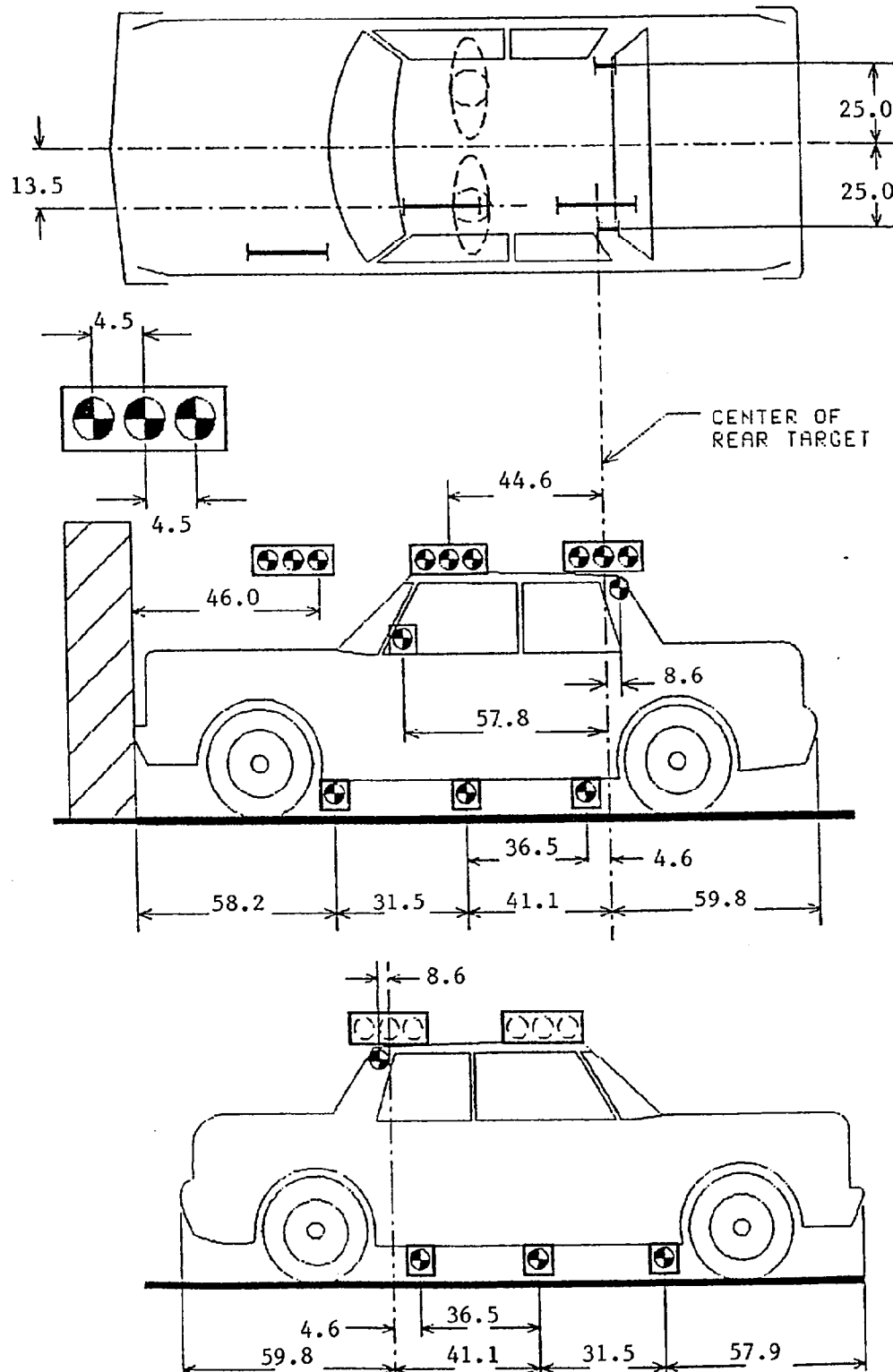
**X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

***Angle = Film plane angled upward from horizontal plane

FIGURE 10
VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 11

PRE-TEST AND POST-TEST MEASUREMENT POINTS

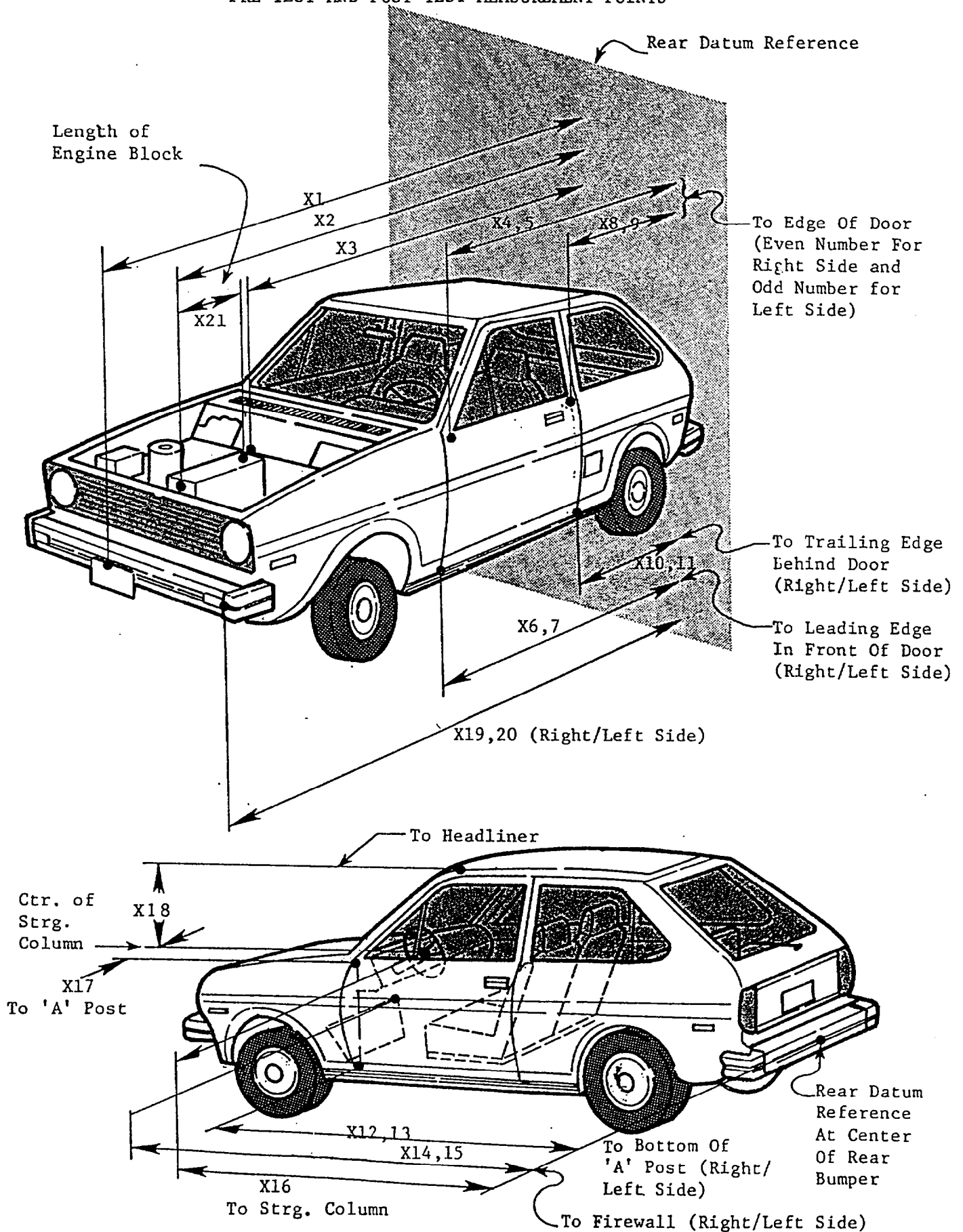


TABLE 12 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Volvo/240		TEST NUMBER: 920212		ALL MEASUREMENTS ARE IN INCHES		
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.		
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	190.0	161.6	28.4		
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	160.2	149.8	10.4		
X3	REAR SURFACE OF VEHICLE TO FIREWALL	138.8	133.8	5.0		
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	126.6	126.0	0.6		
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	126.1	125.8	0.3		
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	126.0	126.2	-0.2		
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	126.1	125.4	0.7		
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	90.9	90.5	0.4		
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	90.8	90.9	-0.1		
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	90.4	90.8	-0.4		
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	90.8	89.9	0.9		
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	125.2	124.1	1.1		
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	125.5	124.6	0.9		
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	136.2	132.6	3.6		
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	136.0	131.5	4.5		
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	109.8	109.5	0.3		
X17	CENTER OF STEERING COLUMN TO "A" POST	11.8	11.1	0.7		
X18	CENTER OF STEERING COLUMN TO HEADLINER	17.4	16.1	1.3		
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	186.6	160.9	25.7		
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	186.8	159.6	27.2		
X21	LENGTH OF ENGINE BLOCK	19.0	19.0	0.0		

APPENDIX A

PHOTOGRAPHS

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FIGURE A-1. PRE-TEST FRONT VIEW

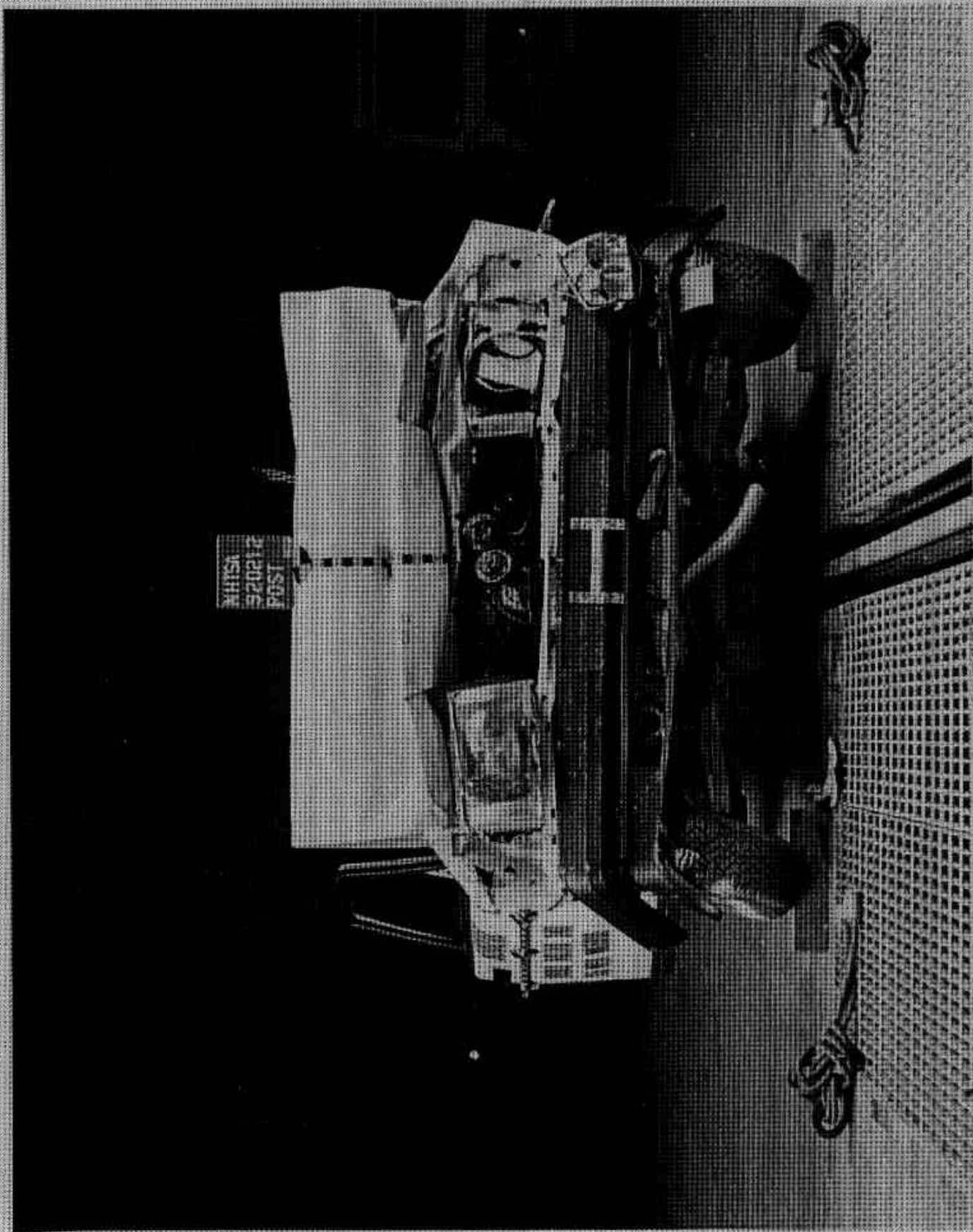


FIGURE A-2. POST-TEST FRONT VIEW

A-3

920212

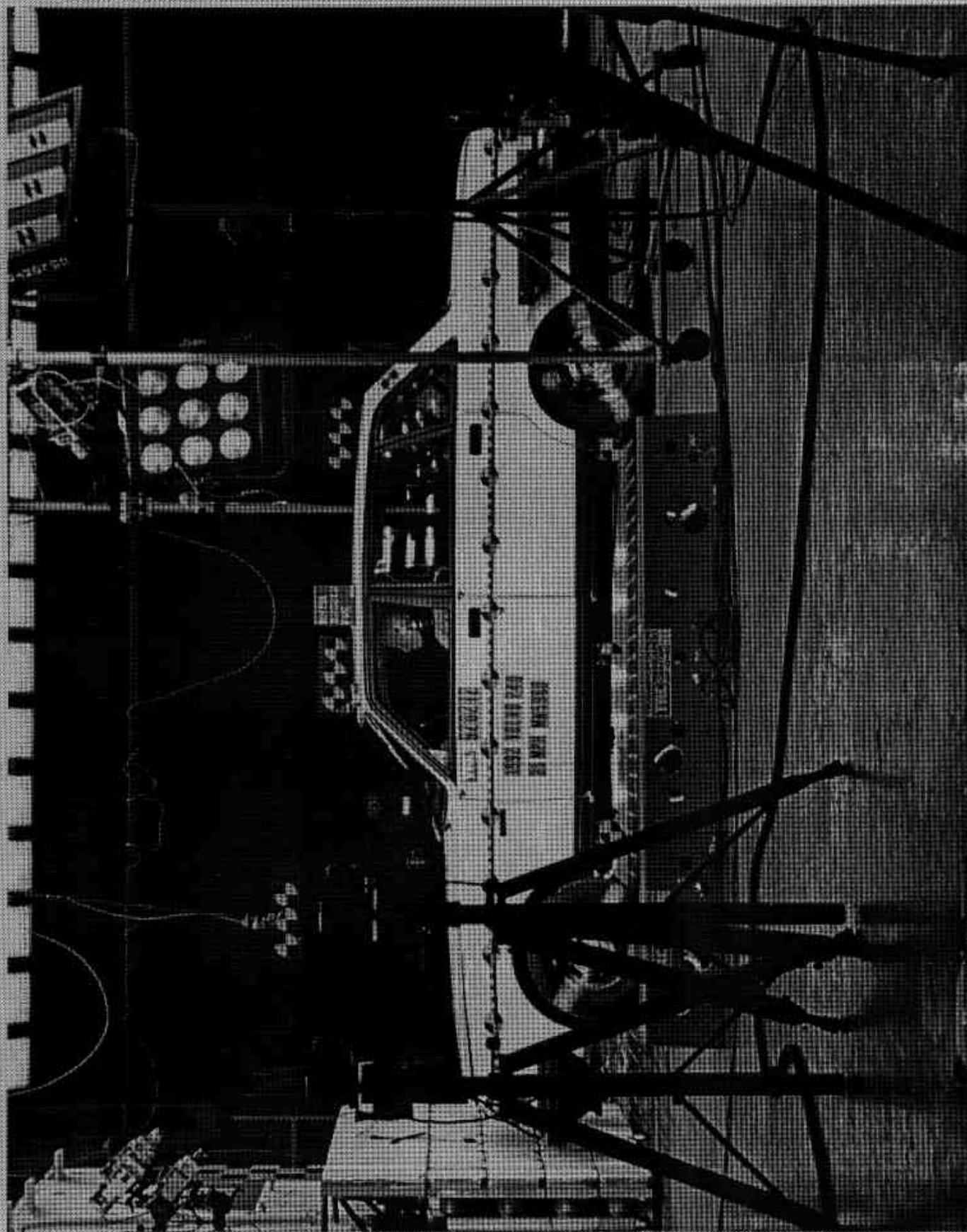


FIGURE A-3. PRE-TEST LEFT SIDE VIEW

A-4

920212

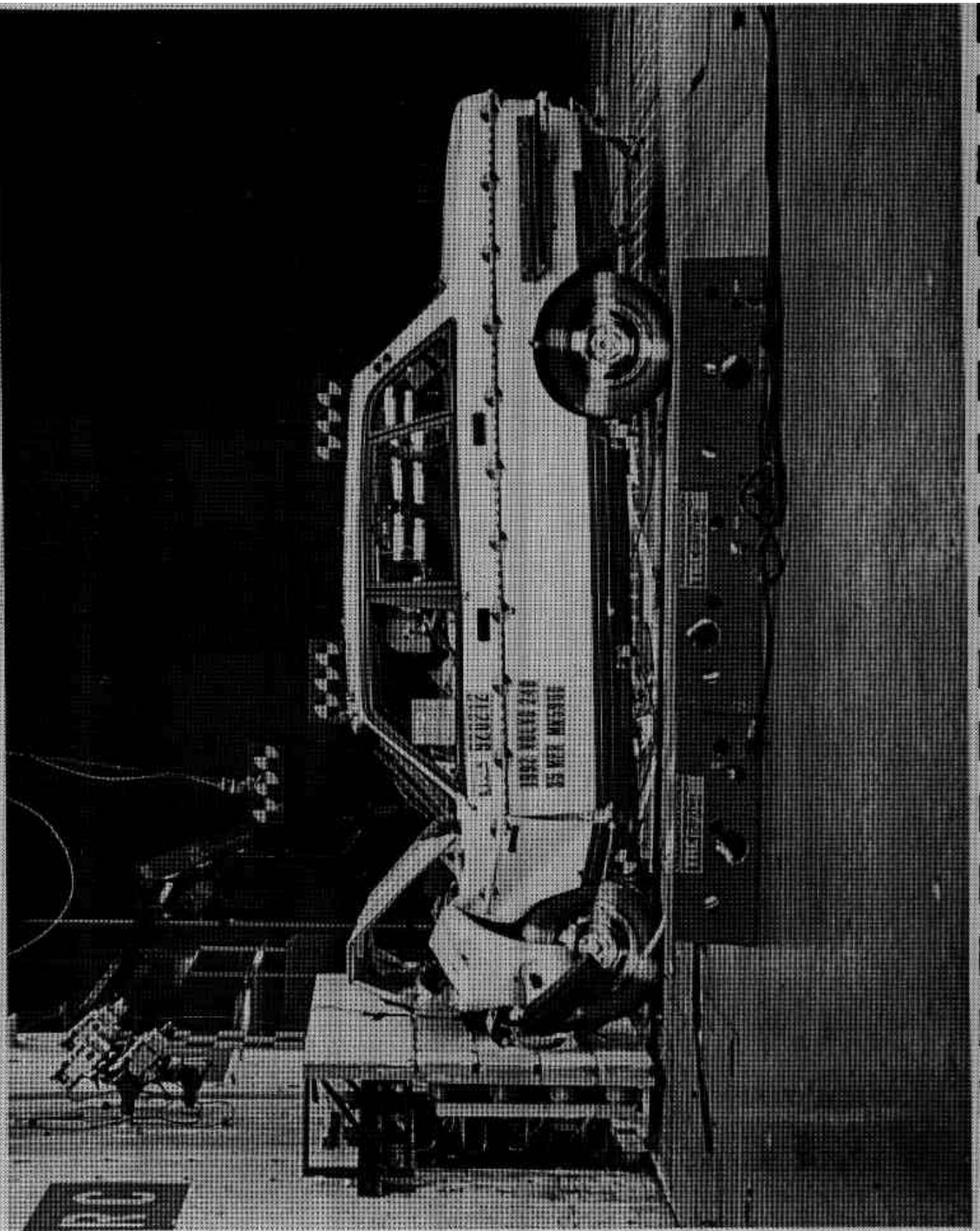


FIGURE A-4. POST-TEST LEFT SIDE VIEW
A-5

920212

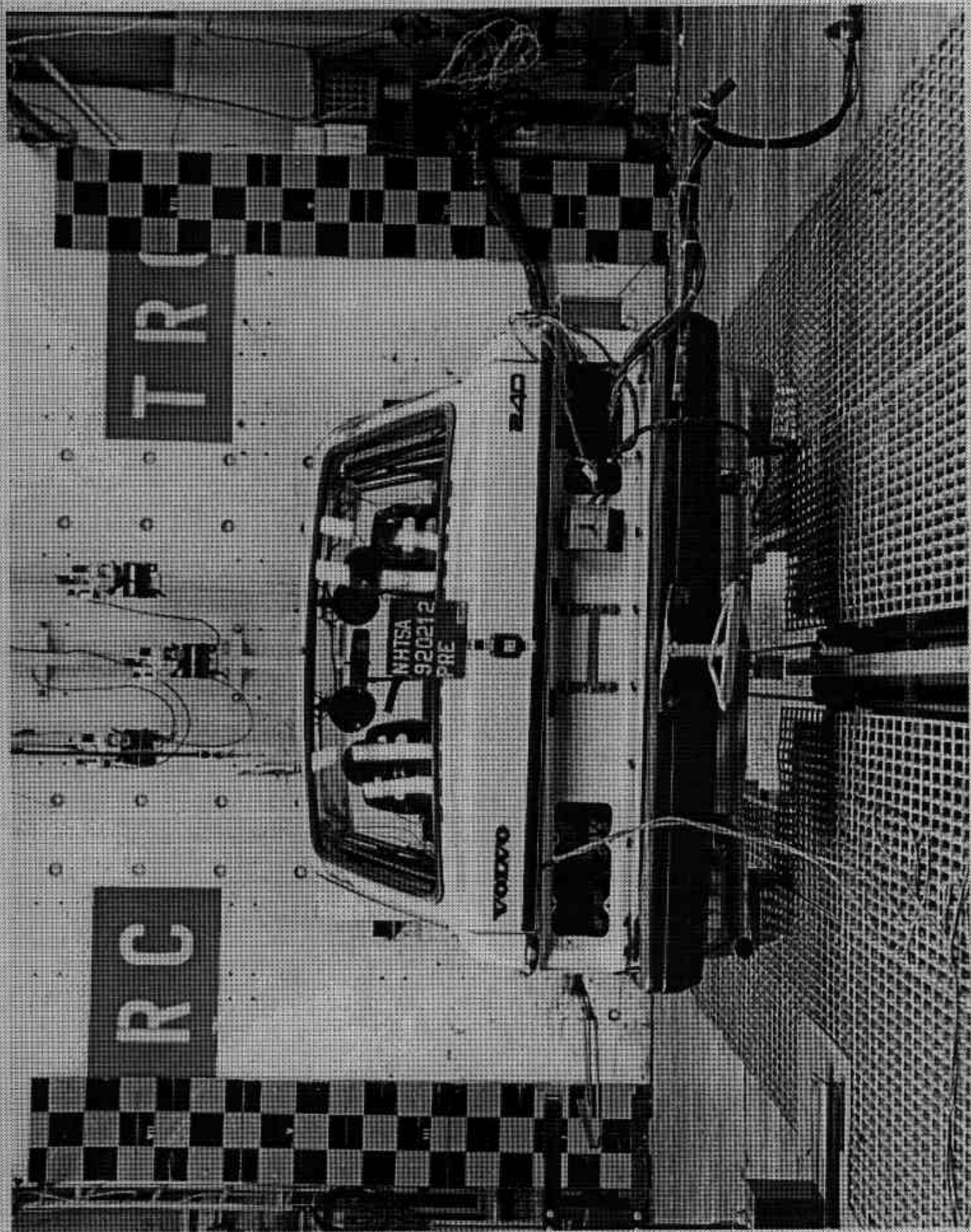


FIGURE A-5. PRE-TEST REAR VIEW

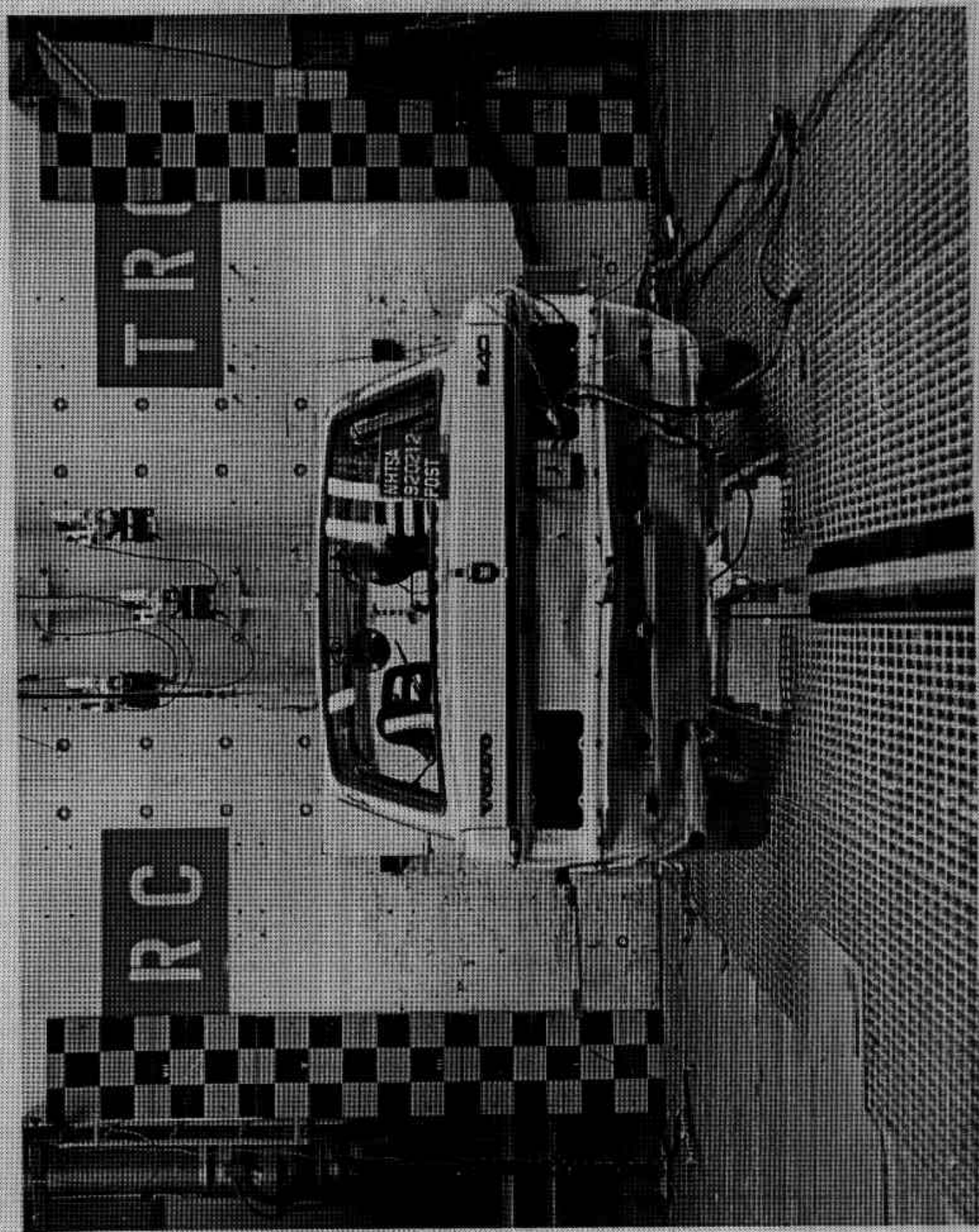


FIGURE A-6. POST-TEST REAR VIEW

A-7

920212

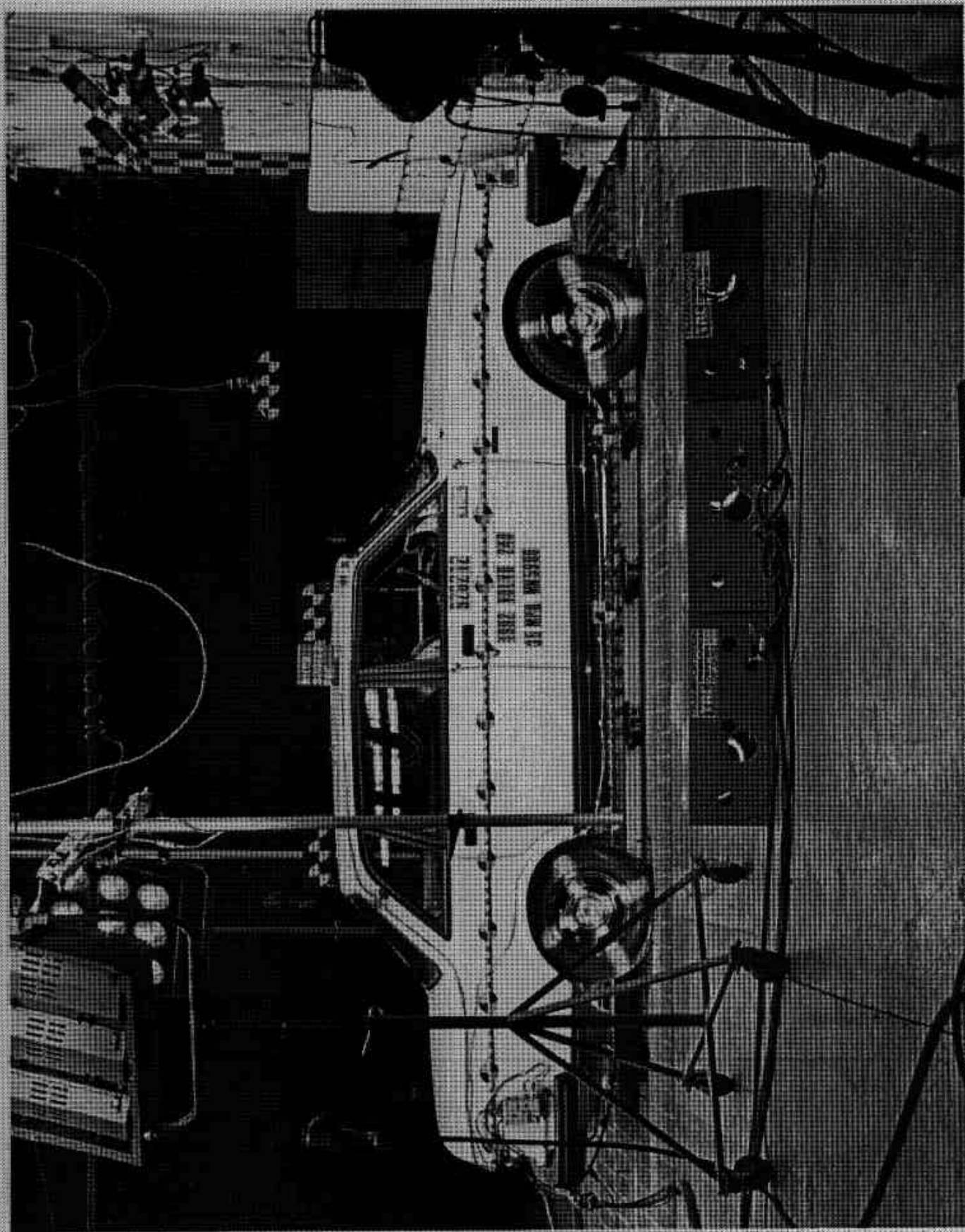


FIGURE A-7. PRE-TEST RIGHT SIDE VIEW
A-8

920212

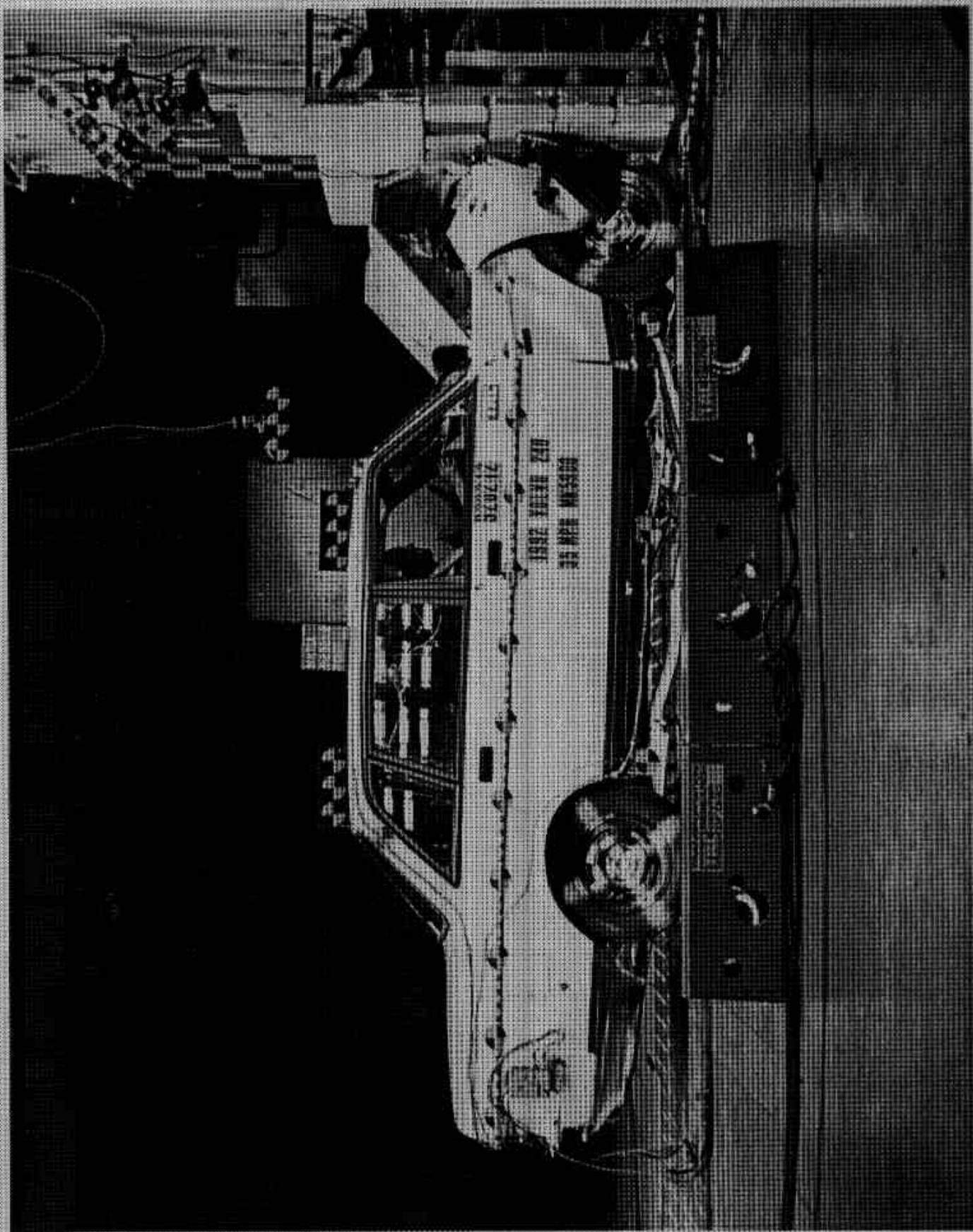


FIGURE A-8. POST-TEST RIGHT SIDE VIEW

A-9

920212

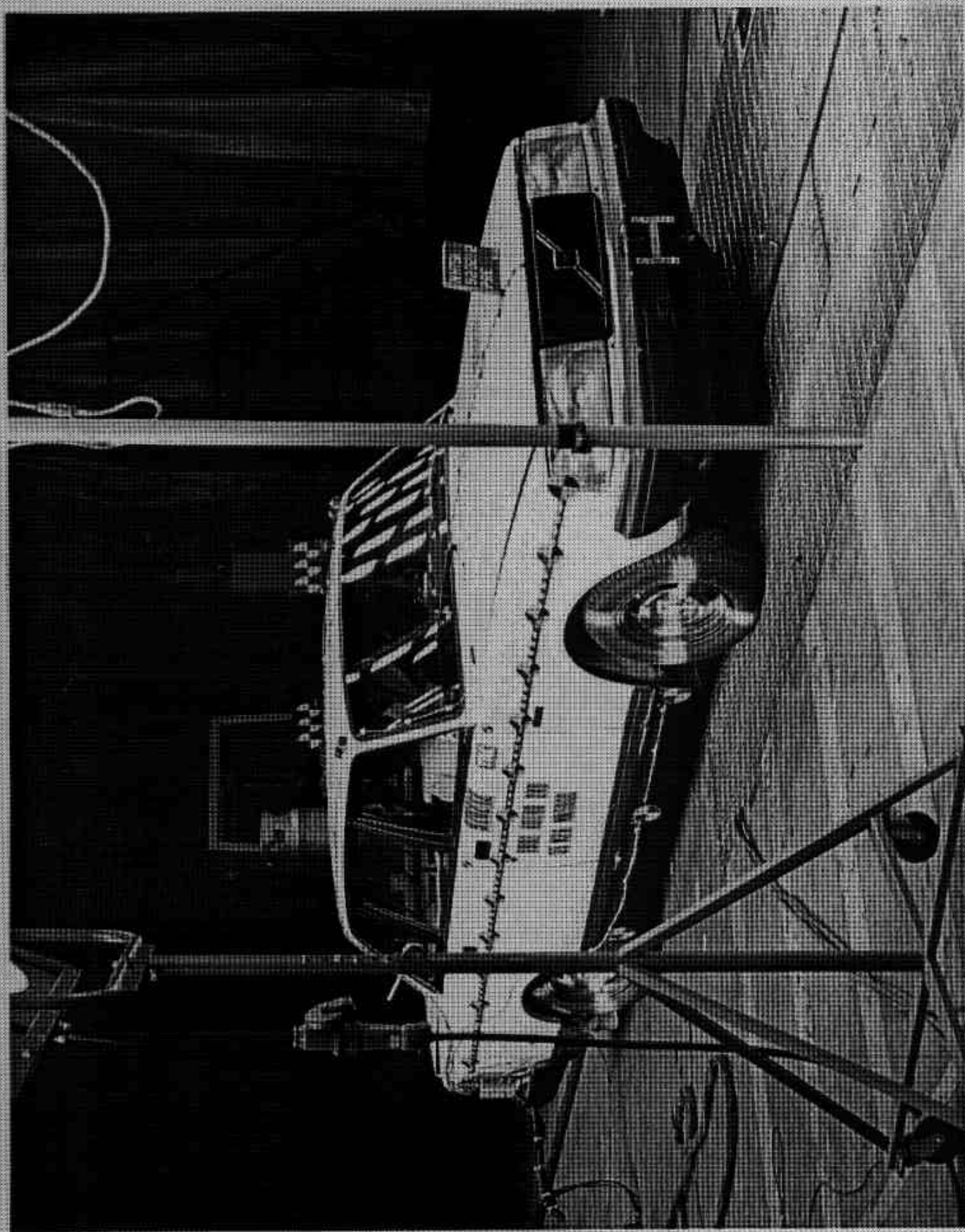


FIGURE A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

920212

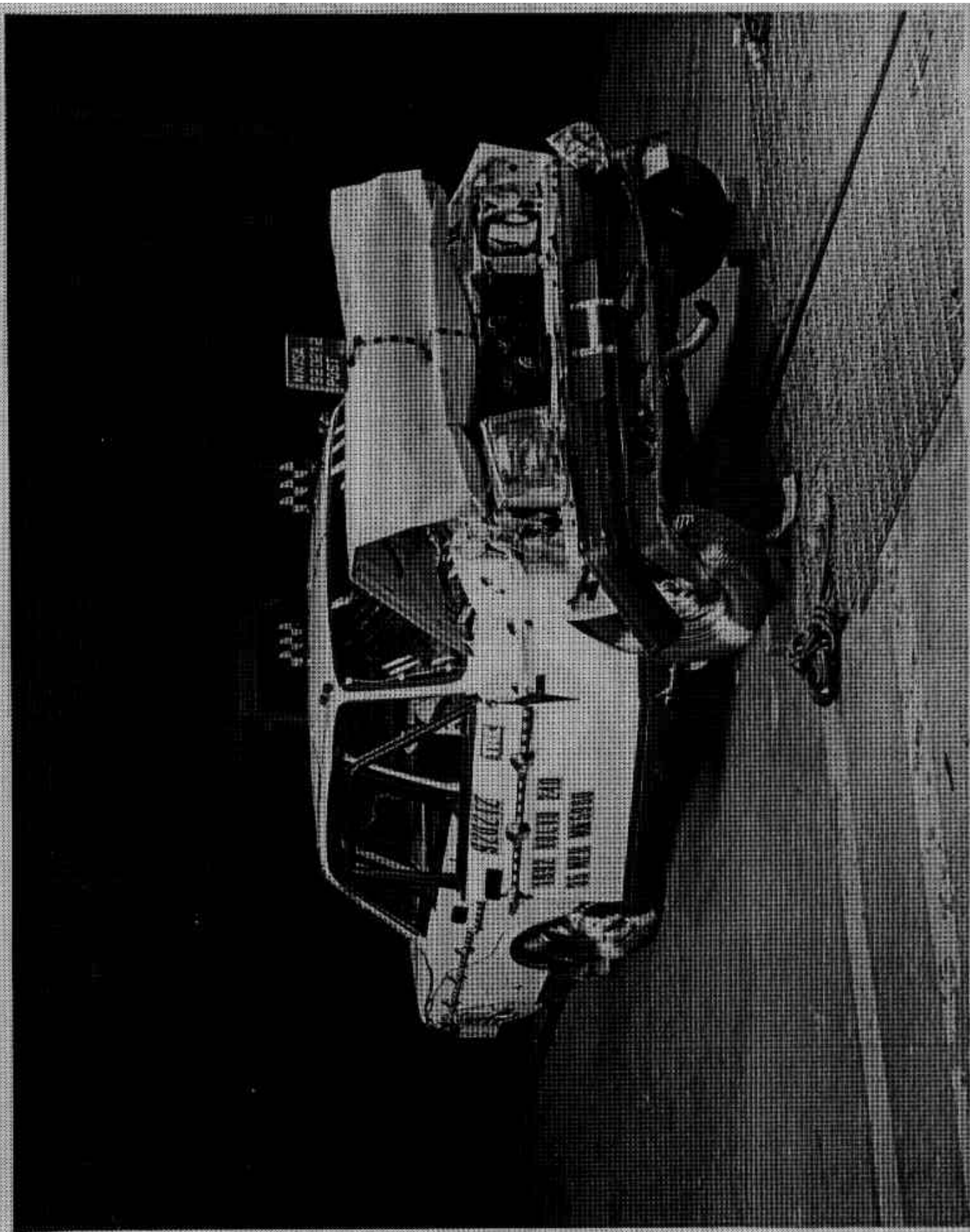


FIGURE A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

920212

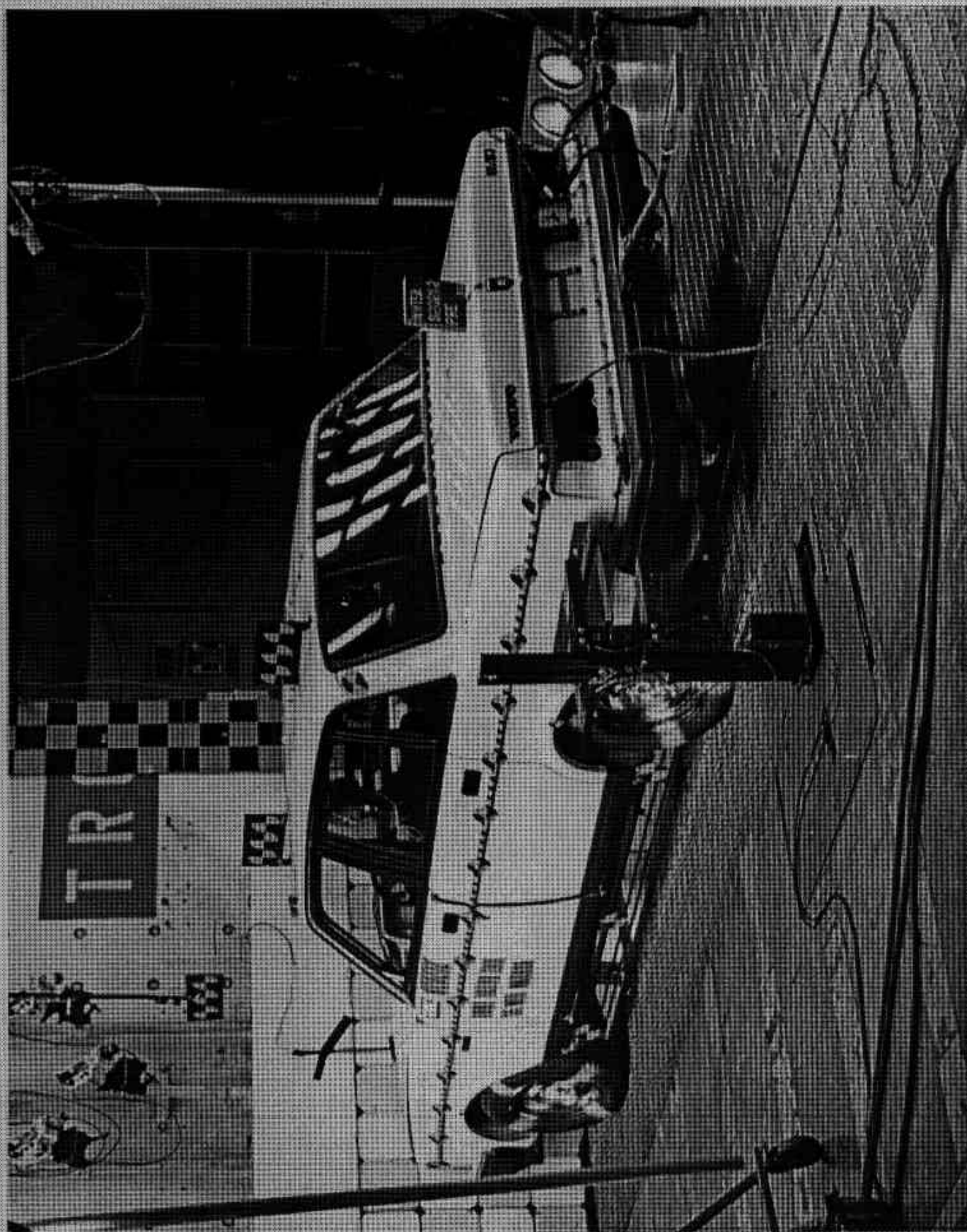


FIGURE A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-12

920212

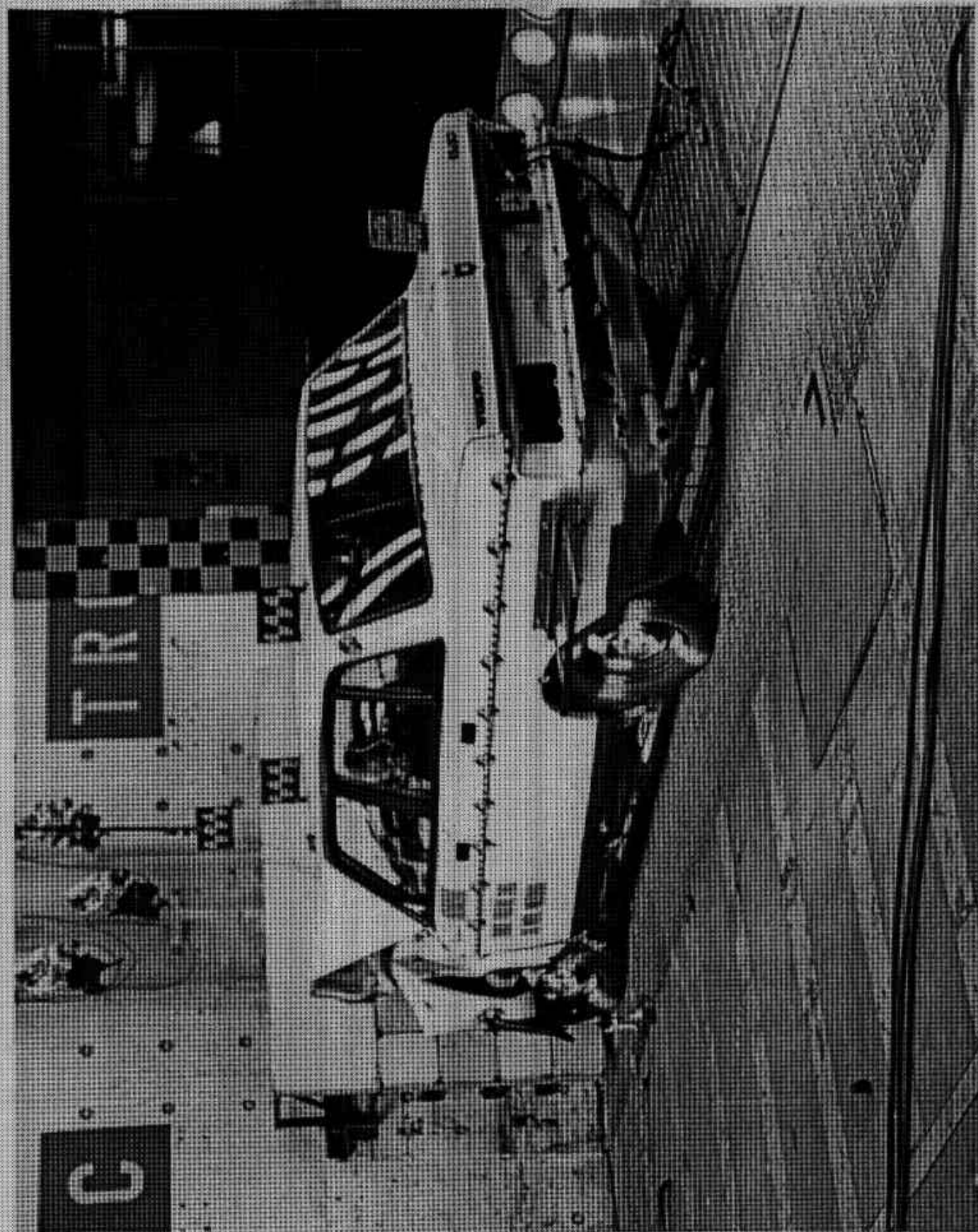


FIGURE A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

A-13

920212

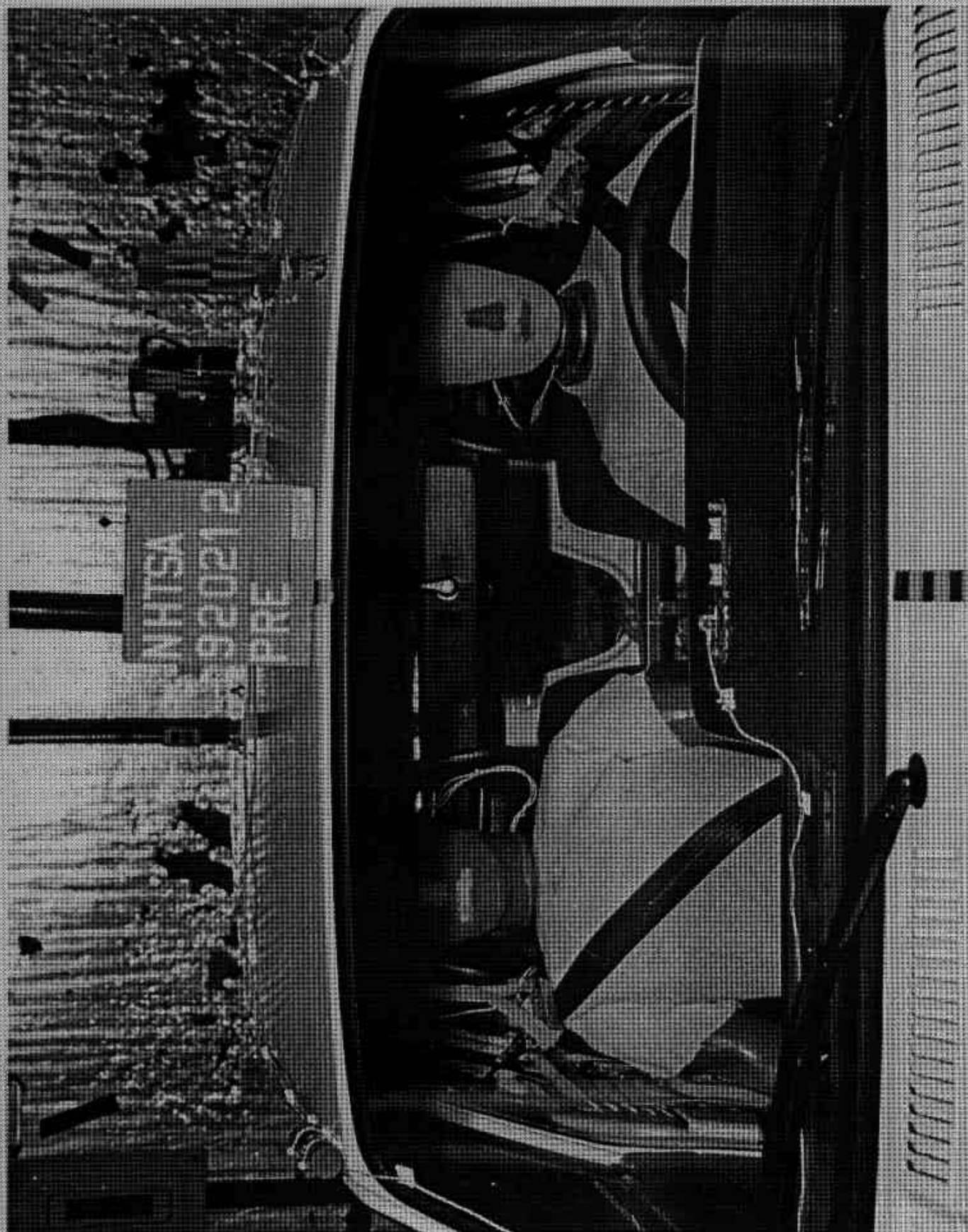


FIGURE A-13. PRE-TEST WINDSHIELD VIEW

A-14

920212

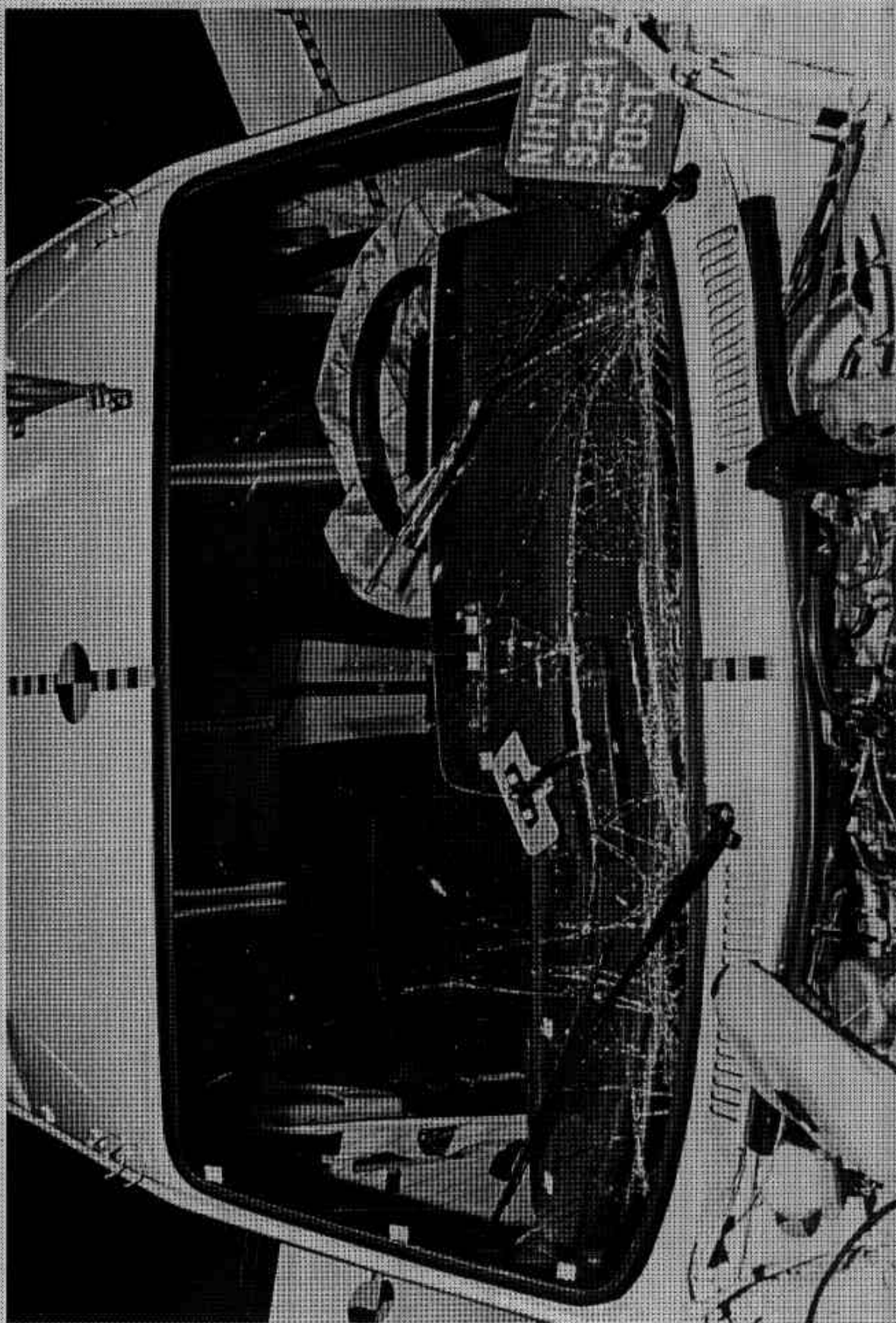


FIGURE A-14. POST-TEST WINDSHIELD VIEW
A-15

920212

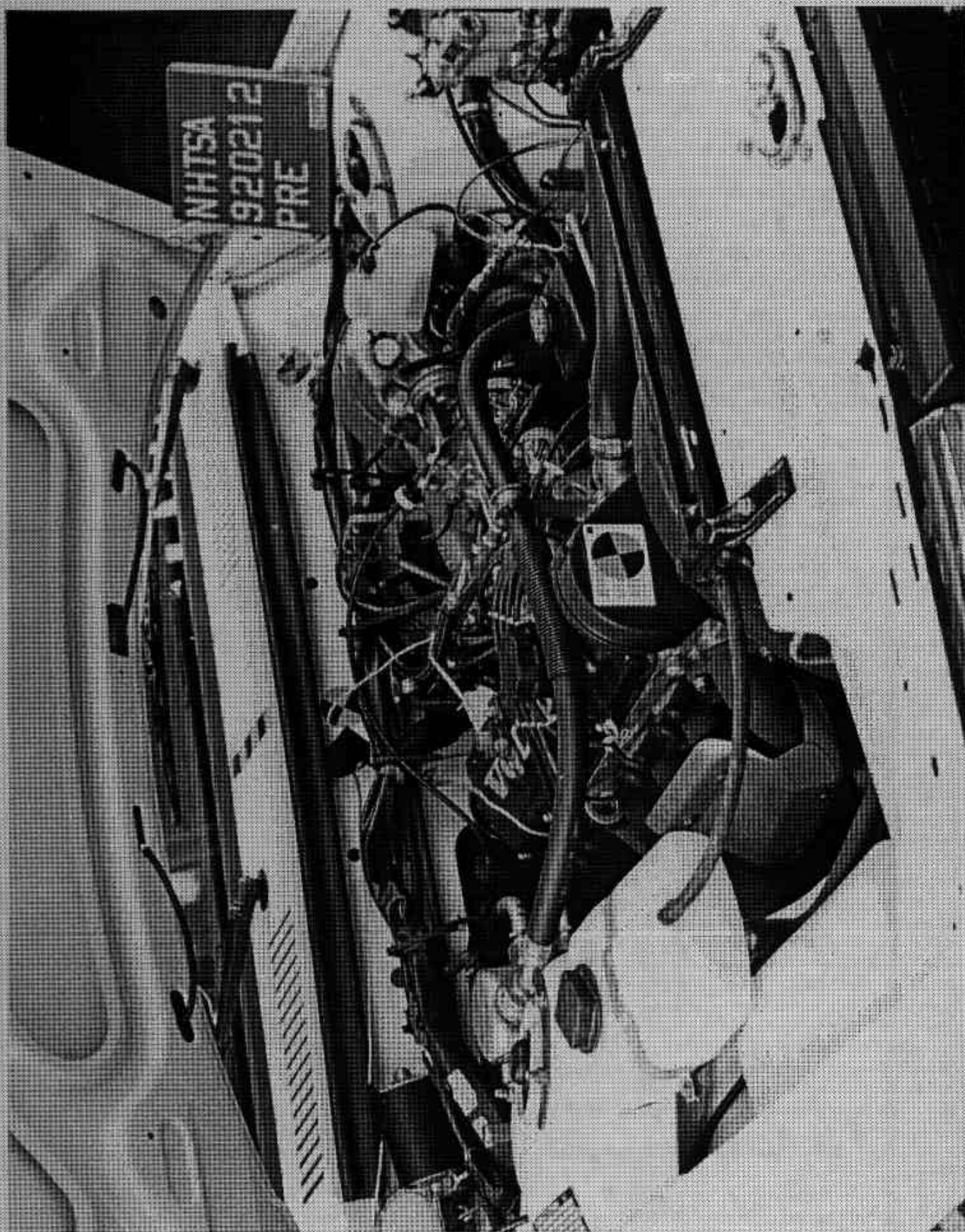


FIGURE A-15. PRE-TEST ENGINE COMPARTMENT VIEW

A-16

920212

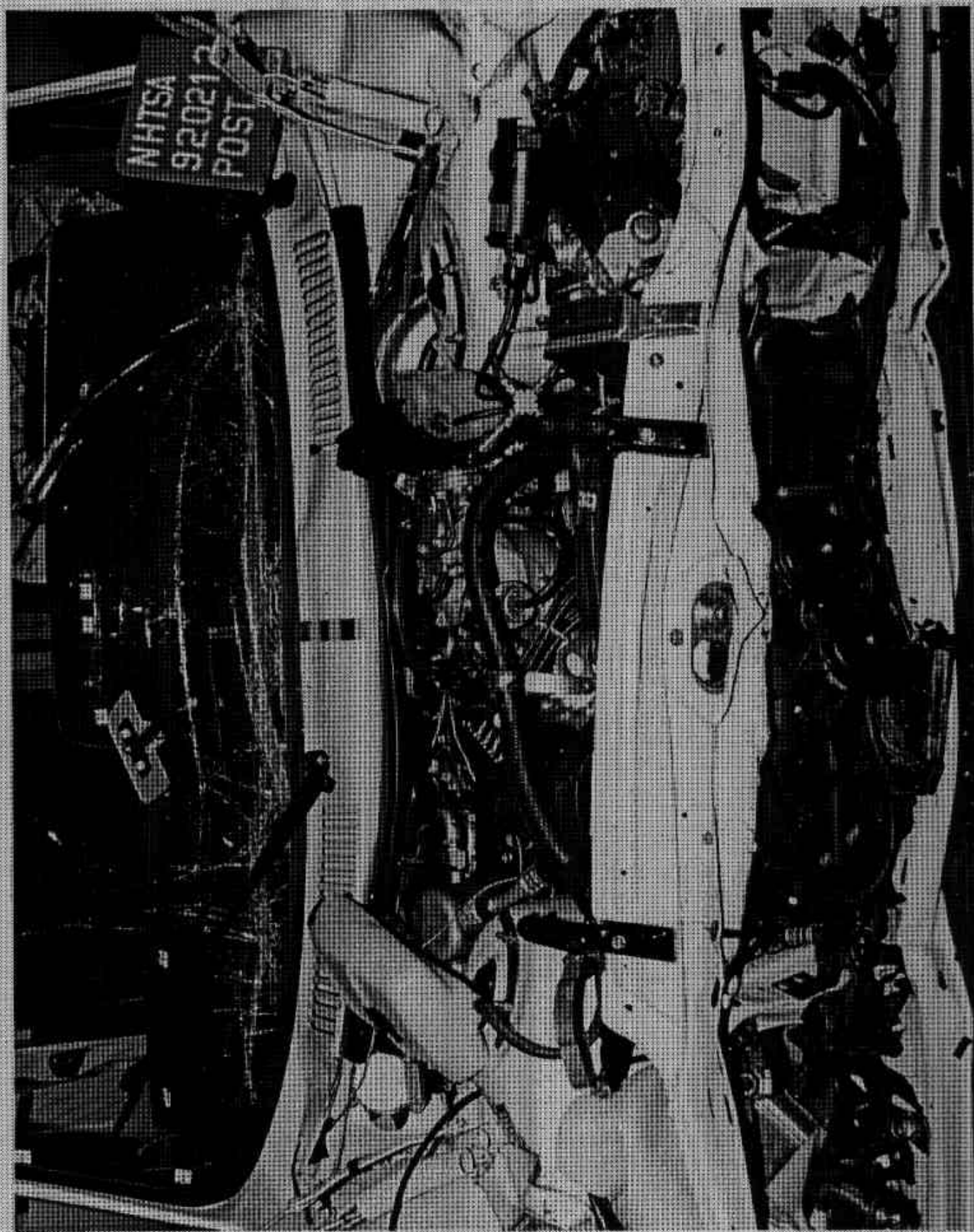


FIGURE A-16. POST-TEST ENGINE COMPARTMENT VIEW

A-17

920212



FIGURE A-17. PRE-TEST FUEL FILLER CAP VIEW

A-18

920212



FIGURE A-18. POST-TEST FUEL FILLER CAP VIEW

A-19

920212

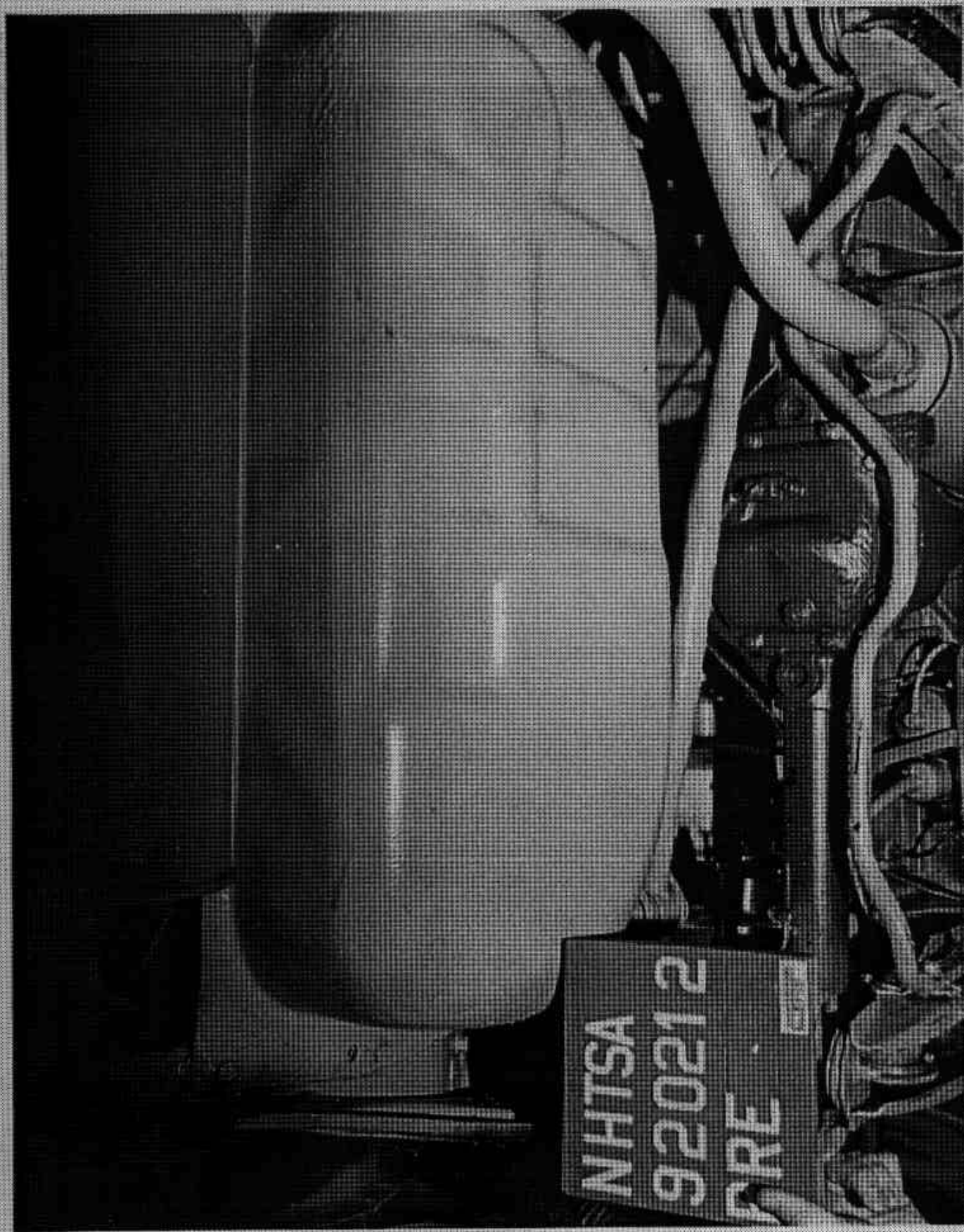


FIGURE A-19. PRE-TEST FUEL TANK VIEW
A-20

920212

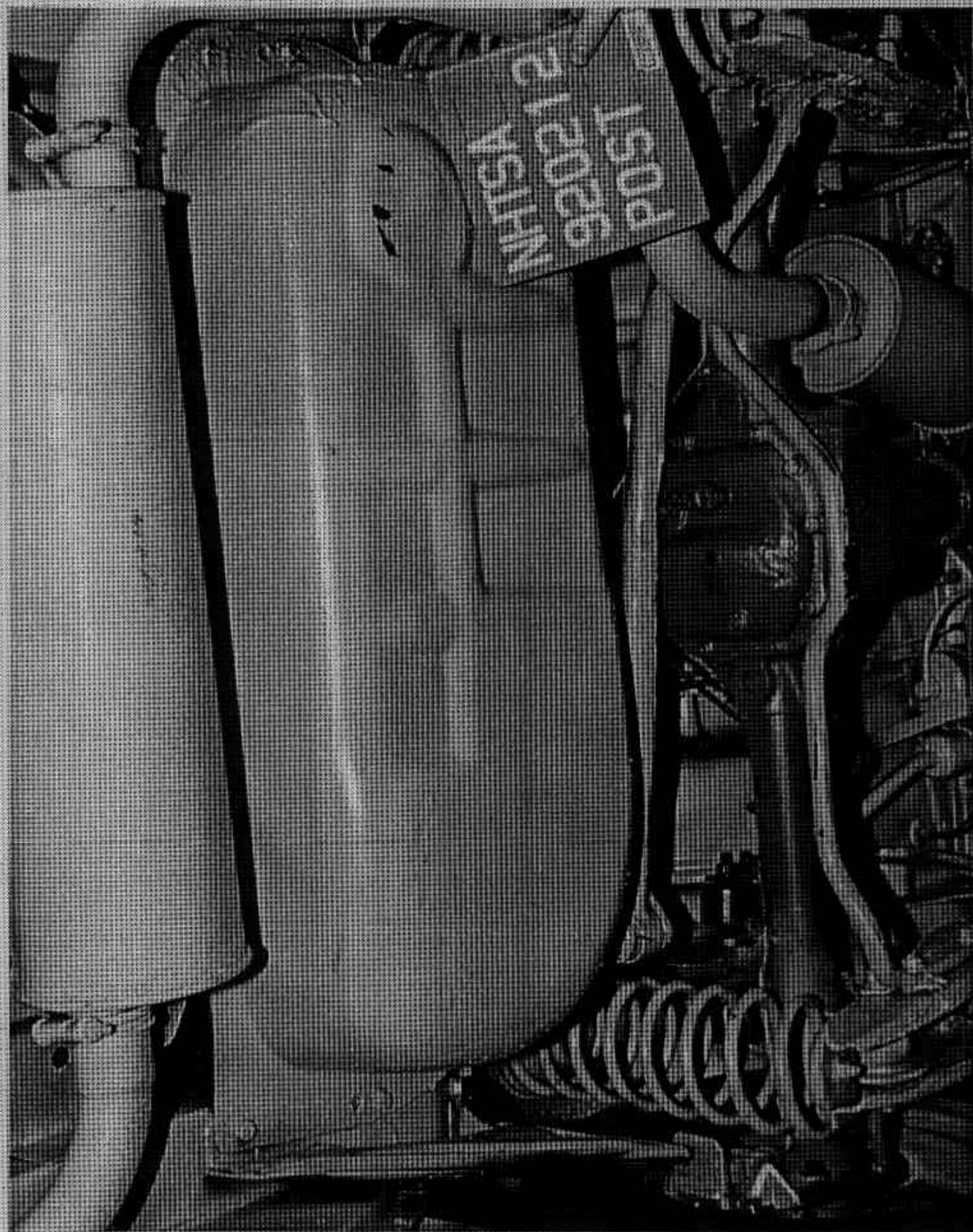


FIGURE A-20. POST-TEST FUEL TANK VIEW
A-21

920212

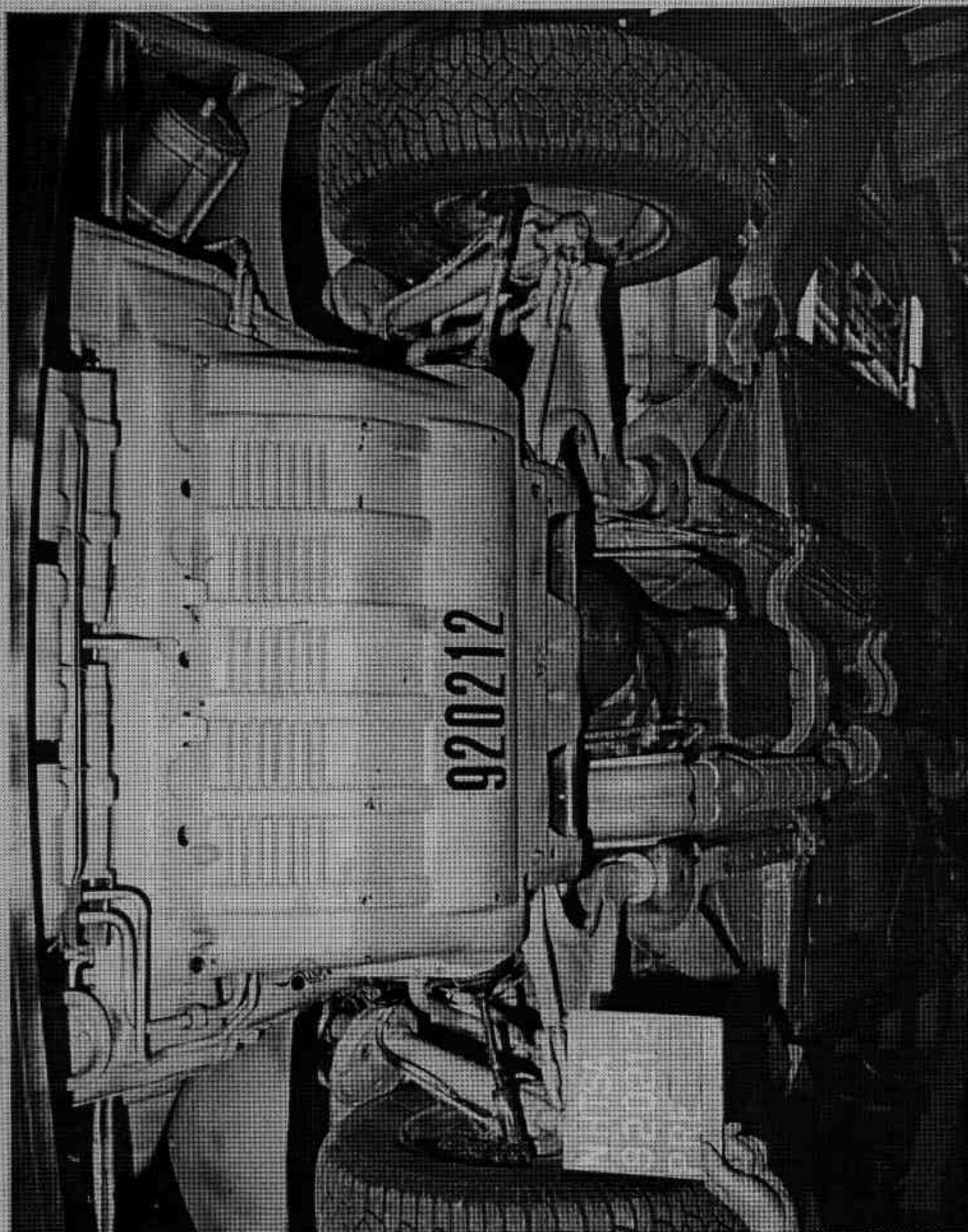


FIGURE A-21. PRE-TEST FRONT UNDERBODY VIEW

A-22

920212

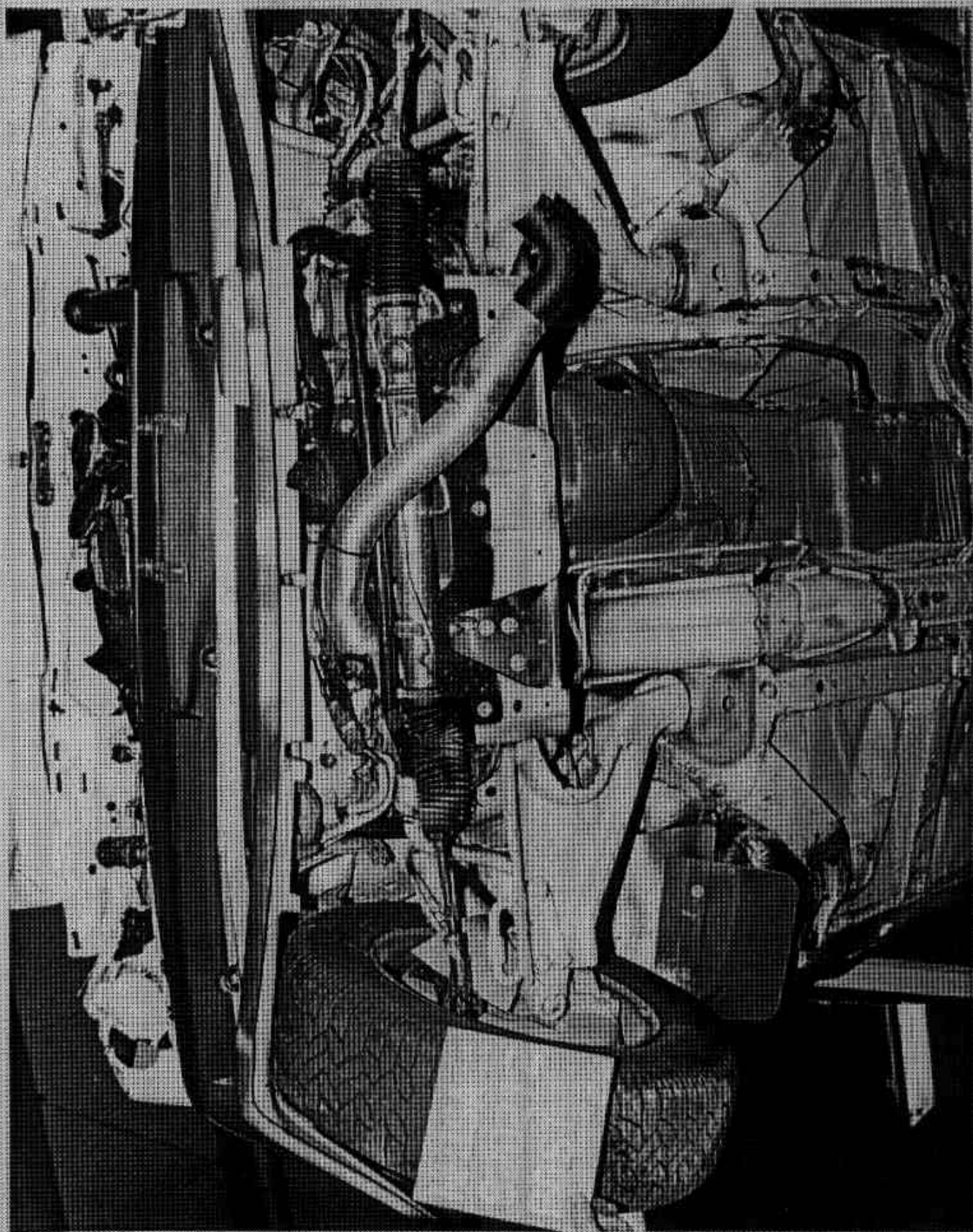


FIGURE A-22. POST-TEST FRONT UNDERBODY VIEW

A-23

920212

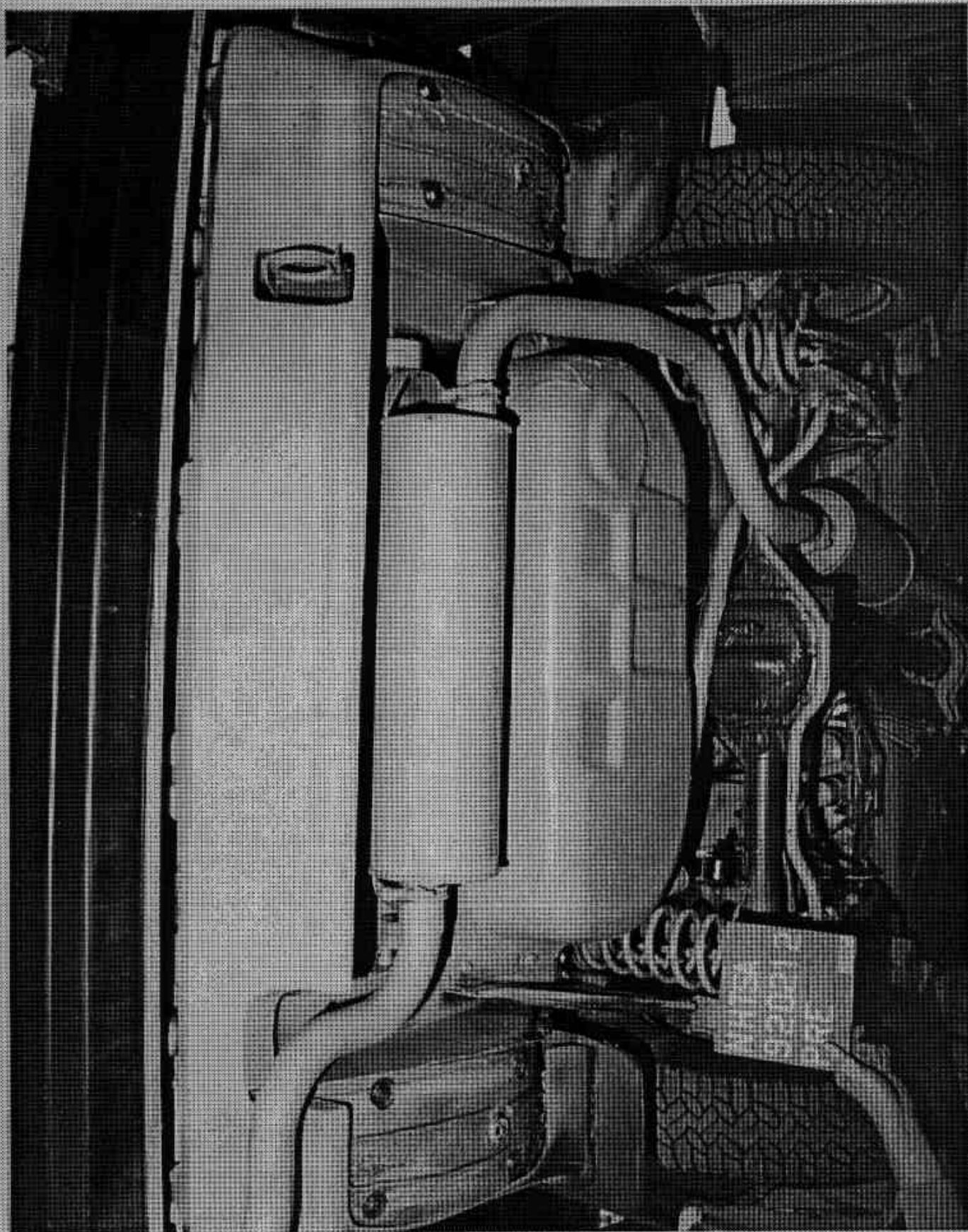


FIGURE A-23. PRE-TEST REAR UNDERBODY VIEW

A-24

920212

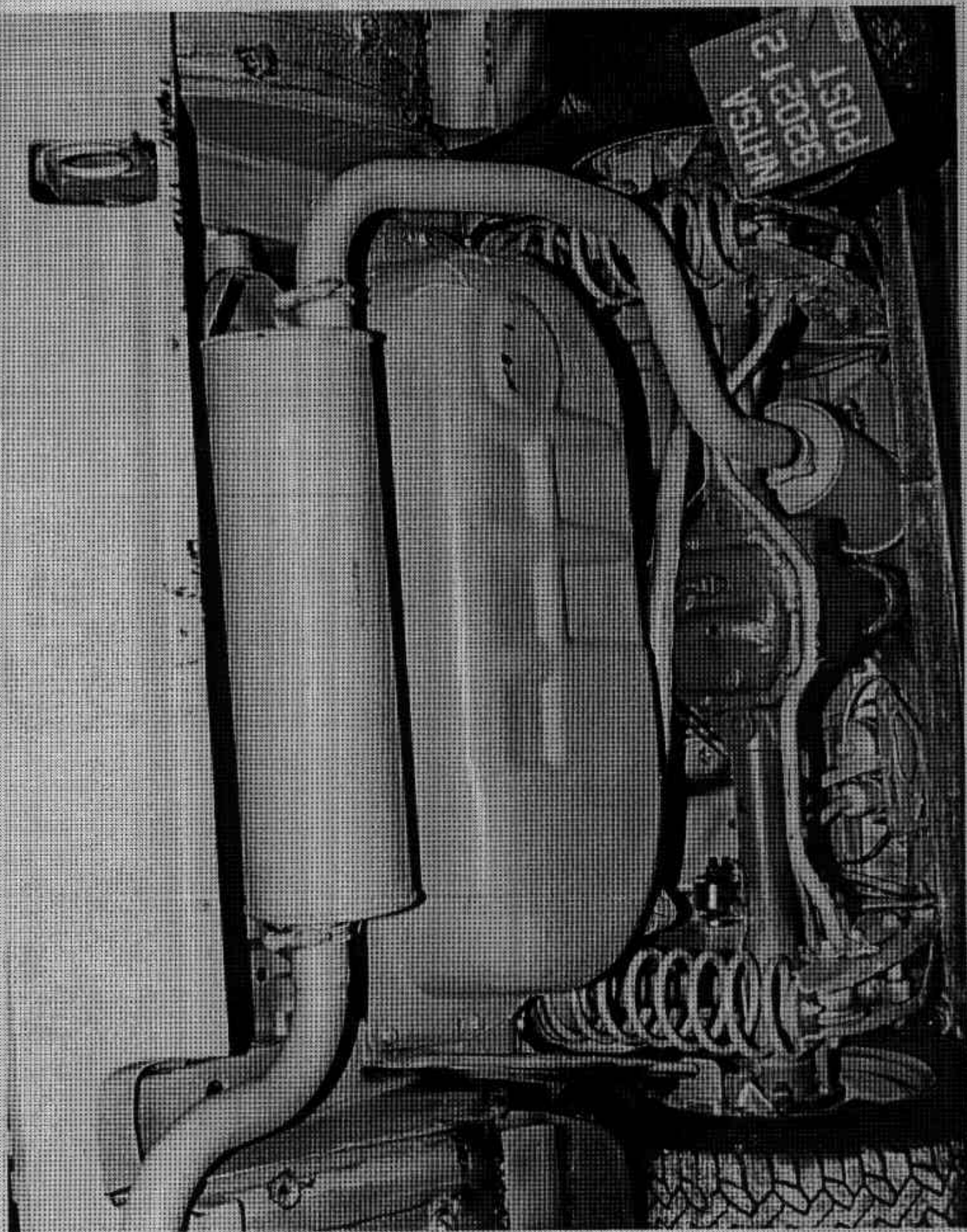


FIGURE A-24. POST-TEST REAR UNDERBODY VIEW
A-25

920212



FIGURE A-25. PRE-TEST DRIVER DUMMY POSITION VIEW



FIGURE A-26. POST-TEST DRIVER DUMMY POSITION VIEW

A-27

920212

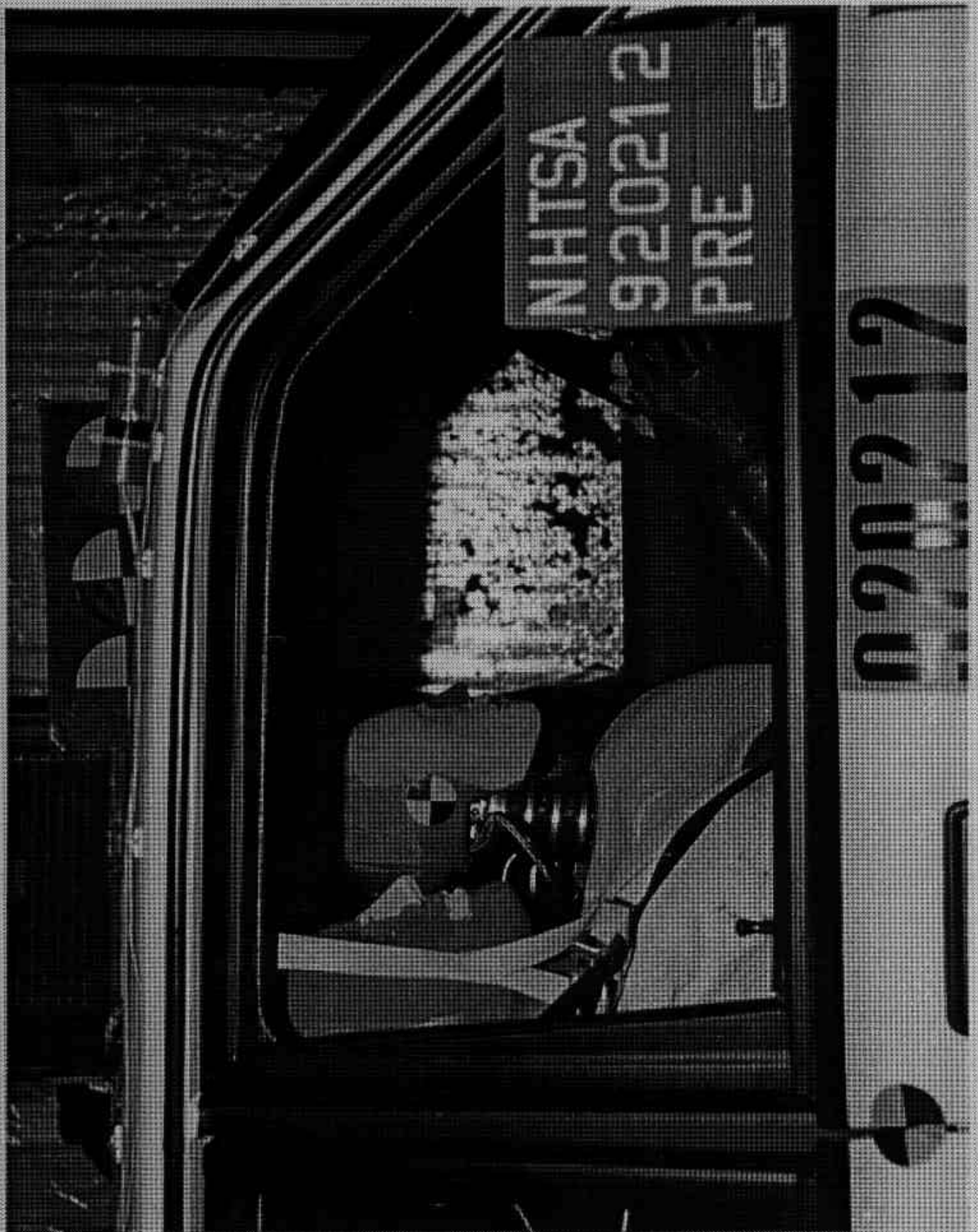


FIGURE A-27. PRE-TEST PASSENGER DUMMY POSITION VIEW

A-28

920212



FIGURE A-29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-30

920212



FIGURE A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-31

920212



FIGURE A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2



FIGURE A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-33

920212



FIGURE A-33. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

A-34

920212



FIGURE A-34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-35 920212



FIGURE A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-36 920212



FIGURE A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-37 920212

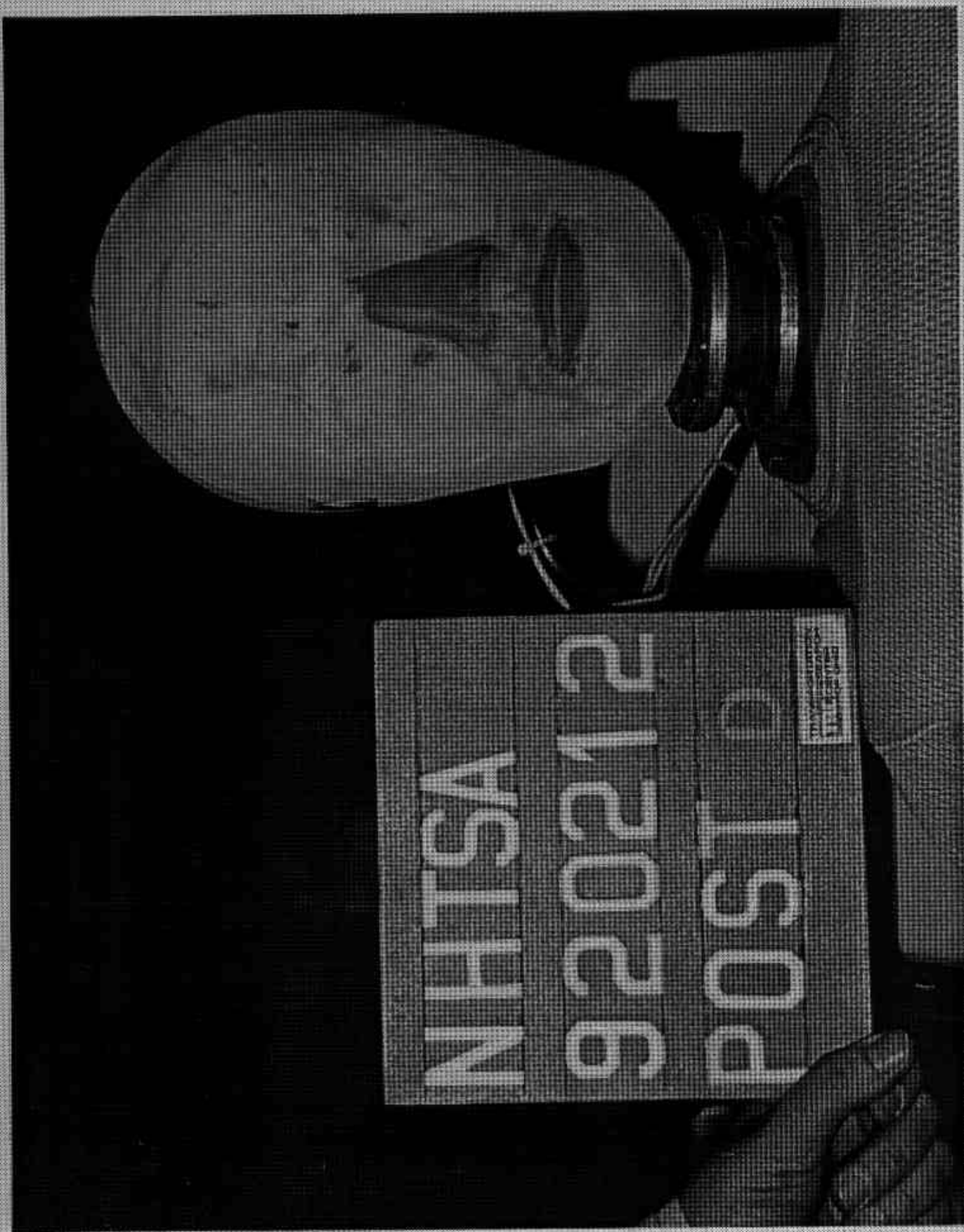


FIGURE A-37. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1



FIGURE A-38. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

A-39

920212

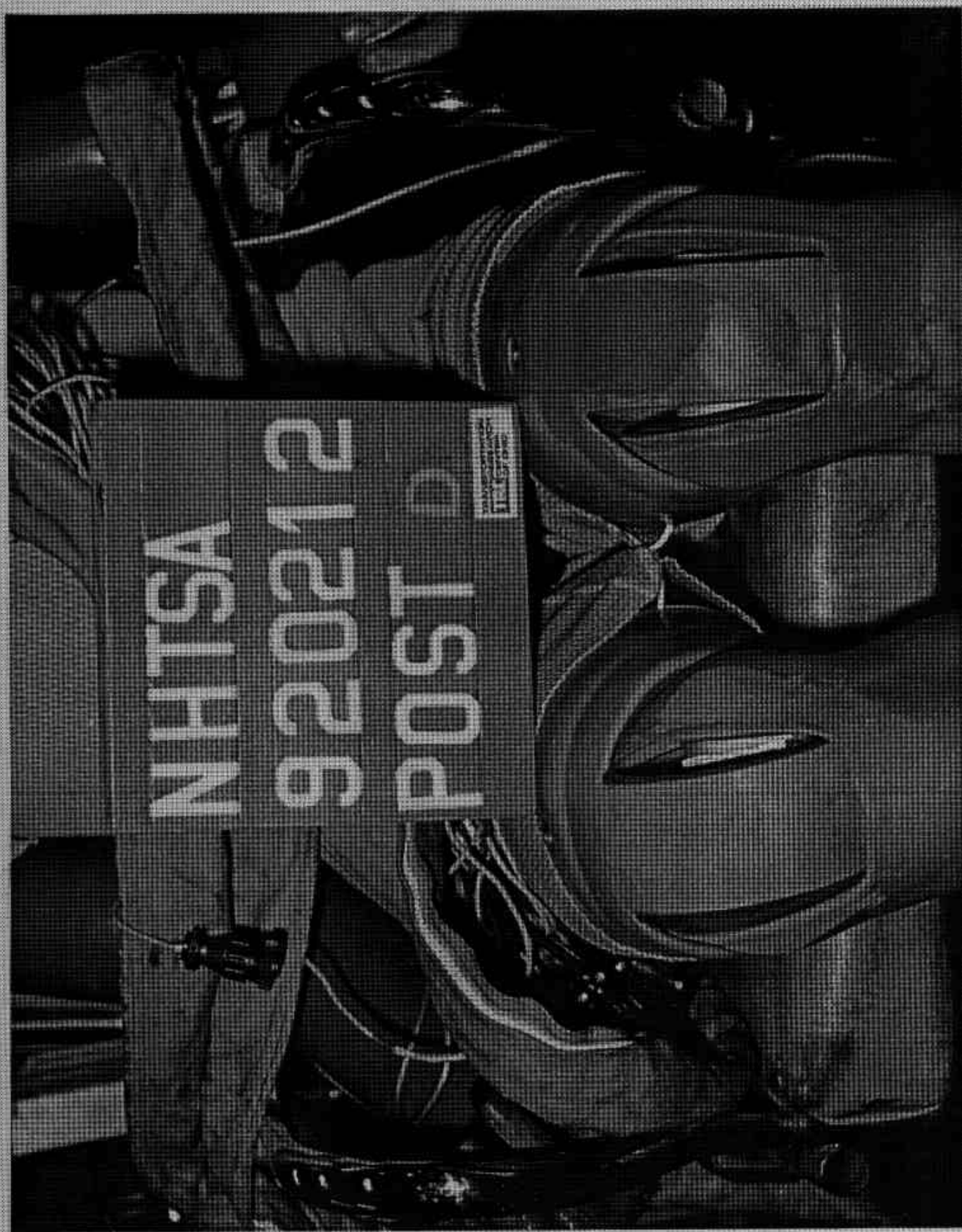


FIGURE A-39. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1



FIGURE A-40. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

A-41

920212

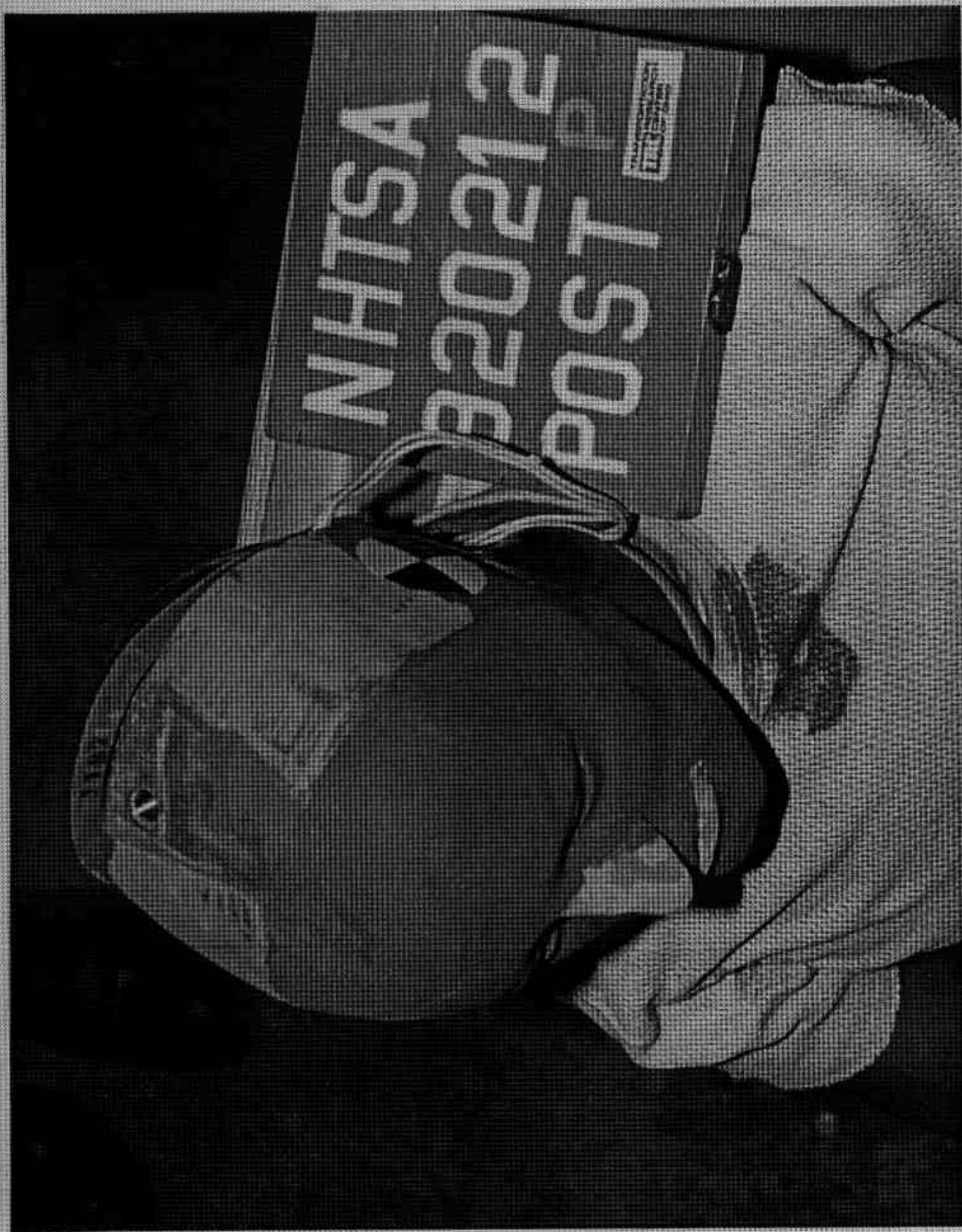


FIGURE A-41. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

A-42

920212



FIGURE A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT VIEW

A-43

920212

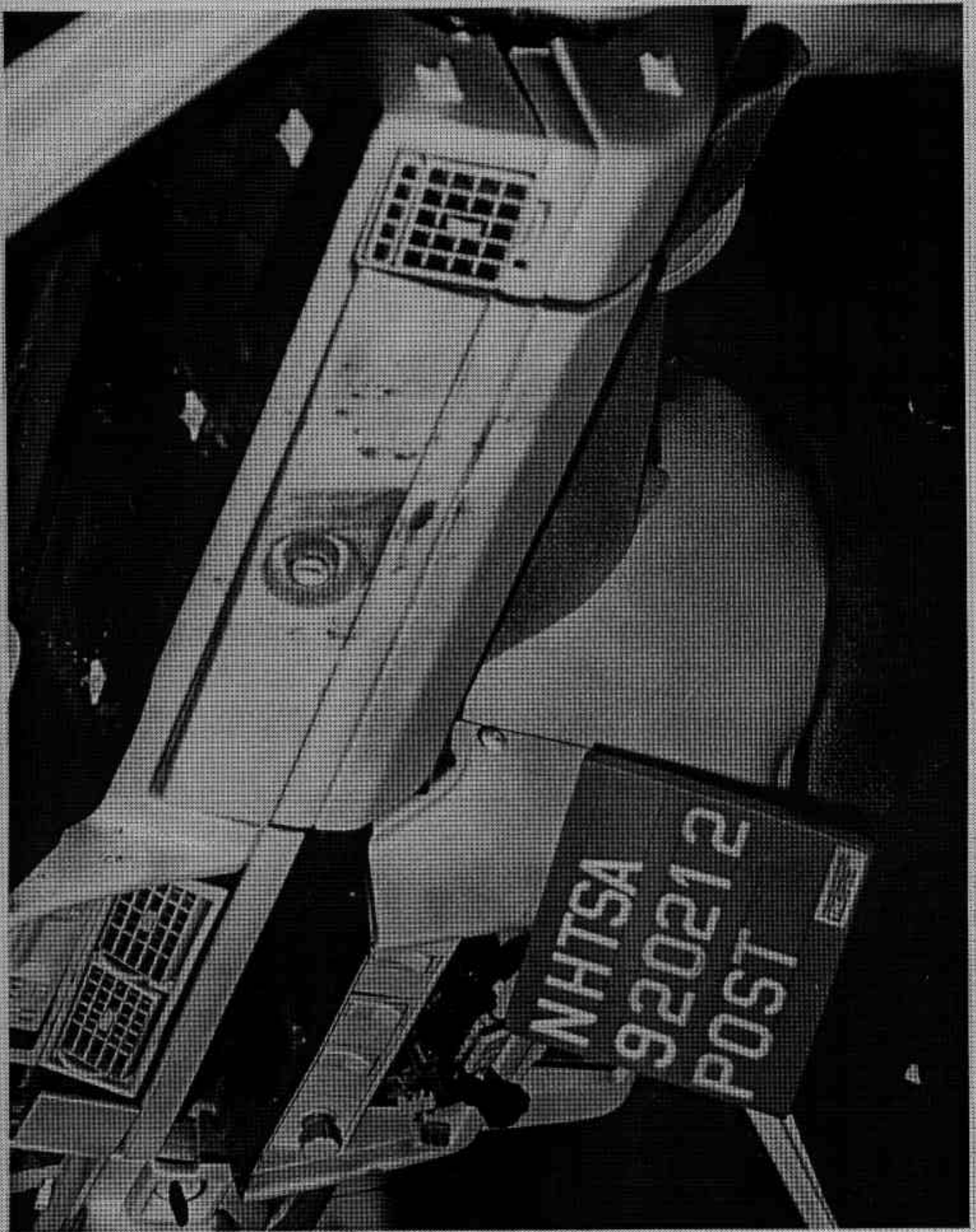


FIGURE A-43. POST-TEST PASSENGER DUMMY HEAD & KNEE CONTACT VIEW

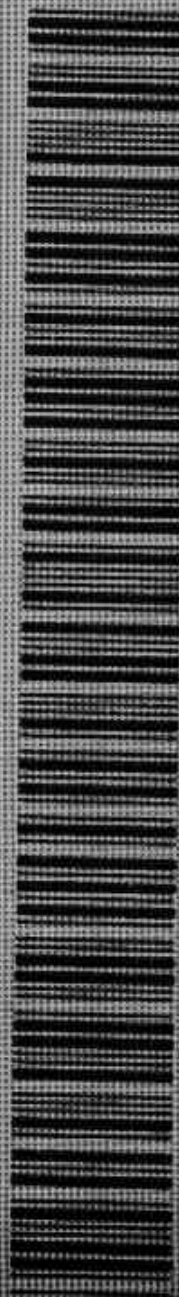
MFD. BY VOLVO GOTHENBURG SWEDEN

DATE: GV.W.R. G.A.W.R. FRONT G.A.W.R. REAR

8/91 4030 1885 2180 LB

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY, BUMPER AND THEFT PROTEC-
TION STANDARDS IN EFFECT ON THE DATE OF MANUFAC-
TURE SHOWN ABOVE.

VIN YV1AS8809N1458360 PASS. CAR



B

VOLVO

3514635

FIGURE A-44. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

VEHICLE CAPACITY		OCCUPANTS		COLD TIRE PRESSURE	
WEIGHT		FRT	RR	TOTAL	FRONT REAR
MAX LOAD	0945 LB	2	3	5	36 36 PSI

RECOMMENDED FOR FUEL ECONOMY

OPTIONAL PRESSURE					
TIRE SIZE	185/70R14	2	1	3	26 28 PSI

IF TIRES ARE HOT FROM DRIVING ADD 4 PSI (28kPa) TO THESE RECOMMENDED PRESSURES

155R15	SIZE	SPARE TIRE	INFLATION PRESSURE	40 40 PSI
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SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION.

VOLVO

3514949

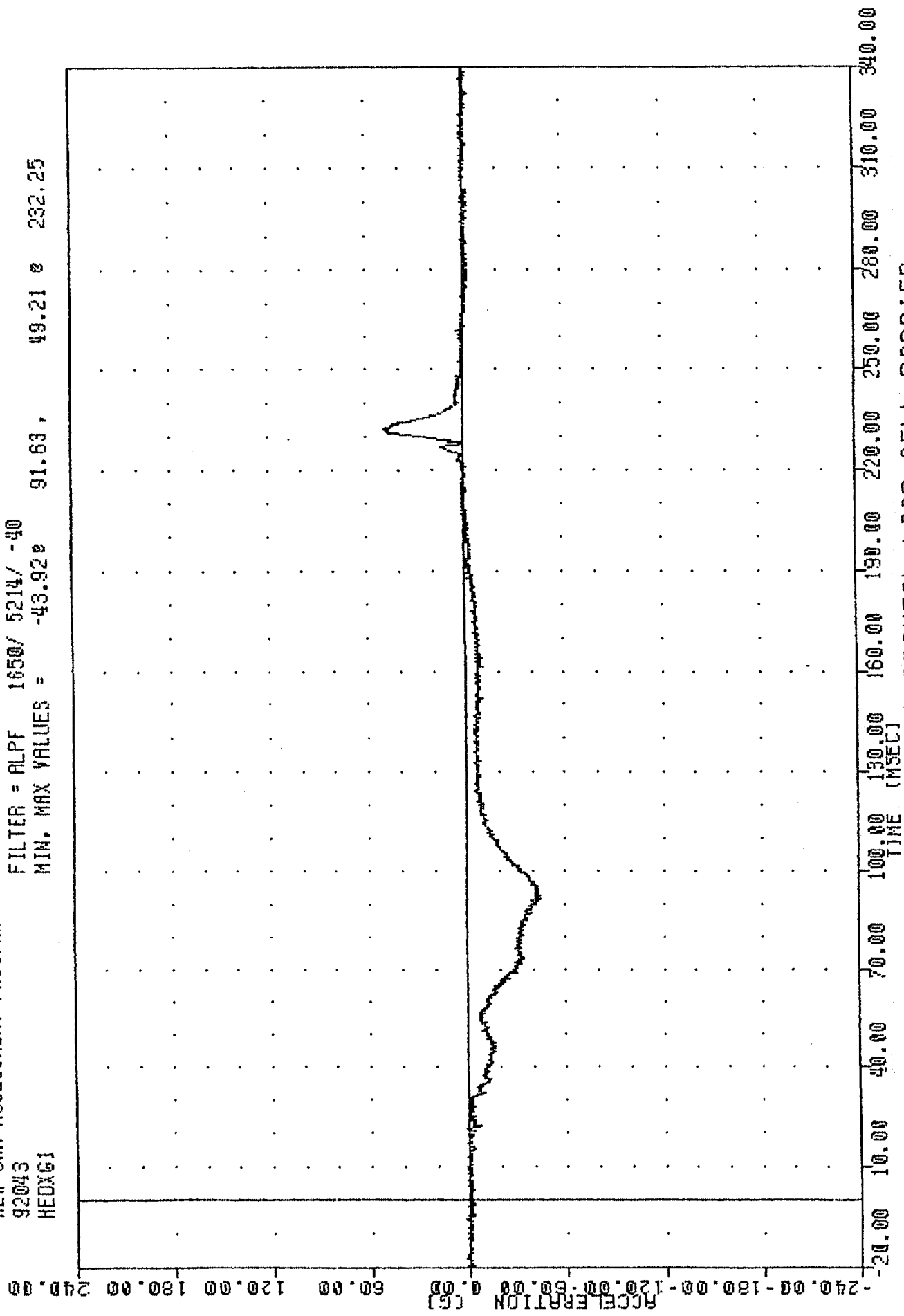
FIGURE A-45. PRE-TEST VEHICLE RECOMMENDED TIRE PRESSURE LABEL VIEW

APPENDIX B

DATA PLOTS

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEDXG1

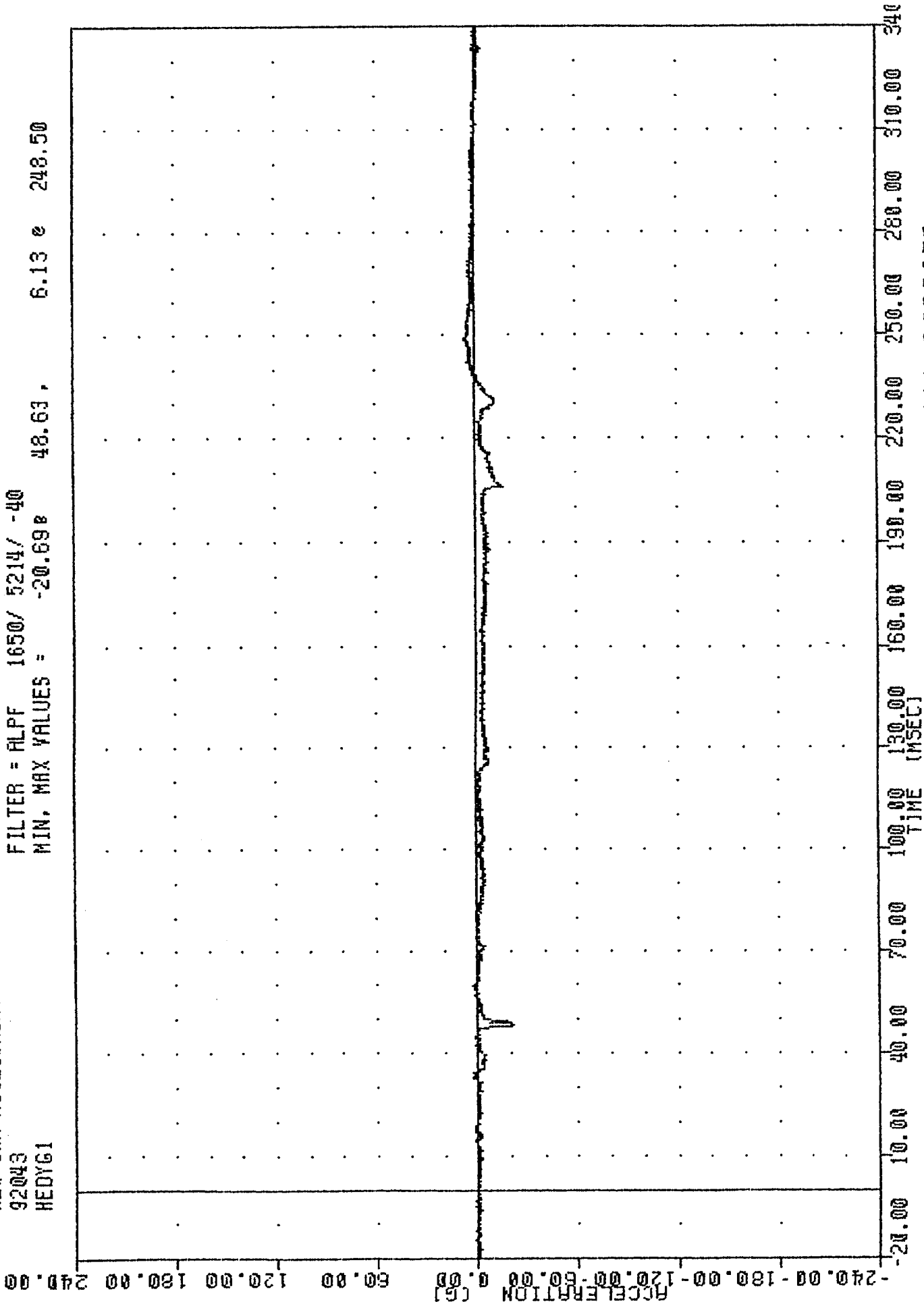
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -43.920 91.63, 49.21 0 232.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION

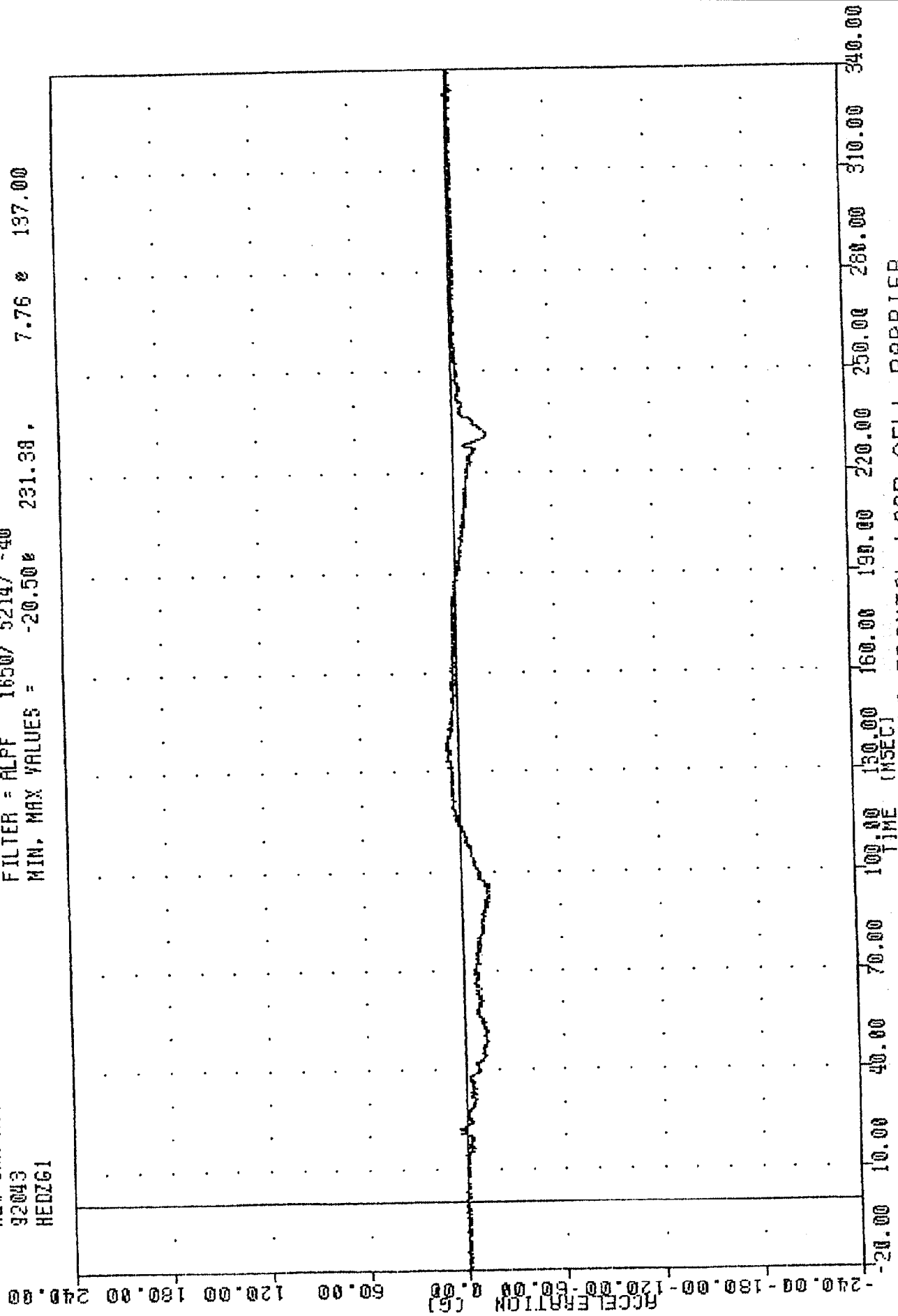
NEW CAR ASSESSMENT PROGRAM
 92043
 HEDY61

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -20.698 48.63, 6.13 e 248.50



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEDZG1

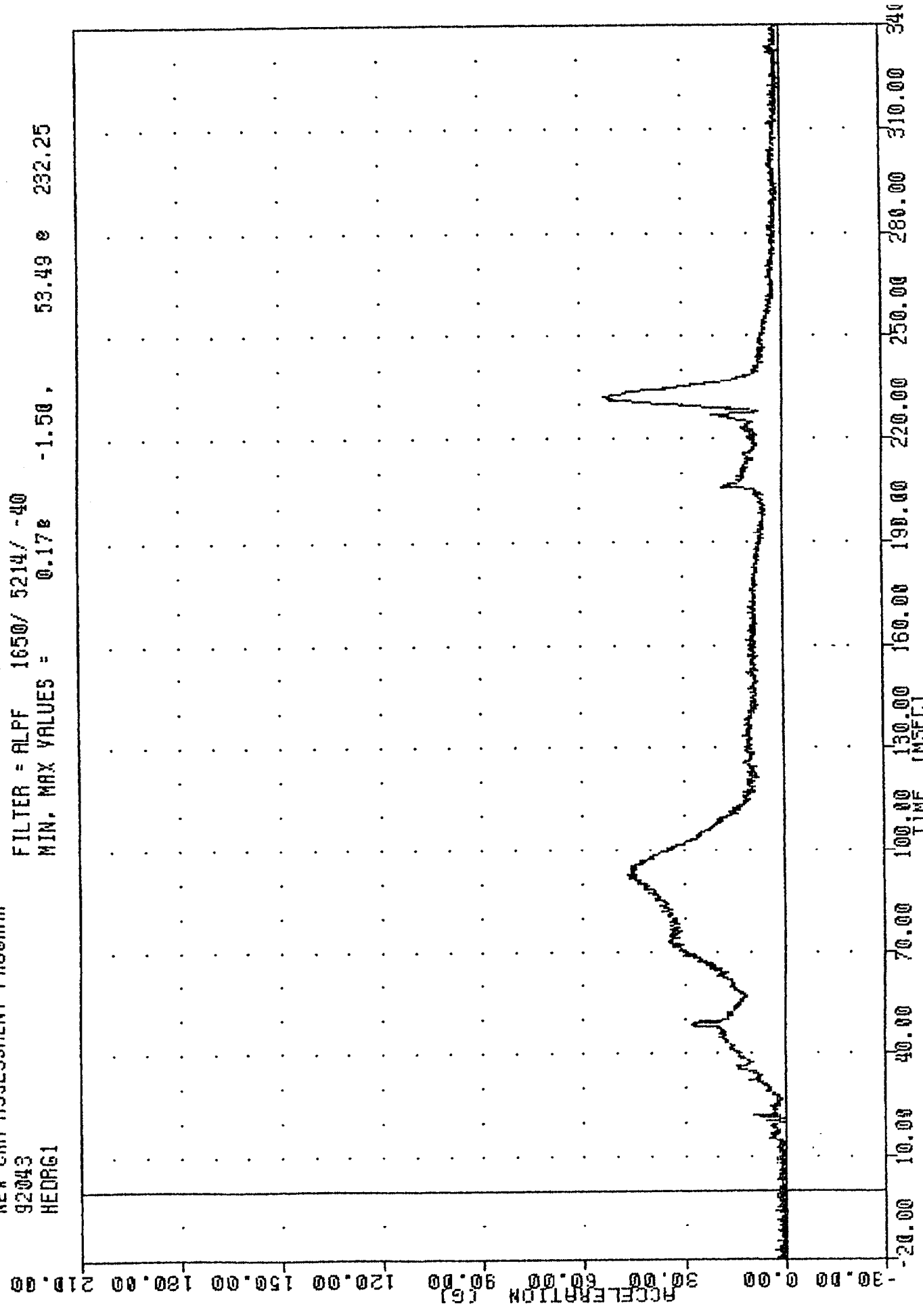
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -20.50% 231.38, 7.76 @ 137.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRAWER HEAD - AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM
 92043
 HEDRG1

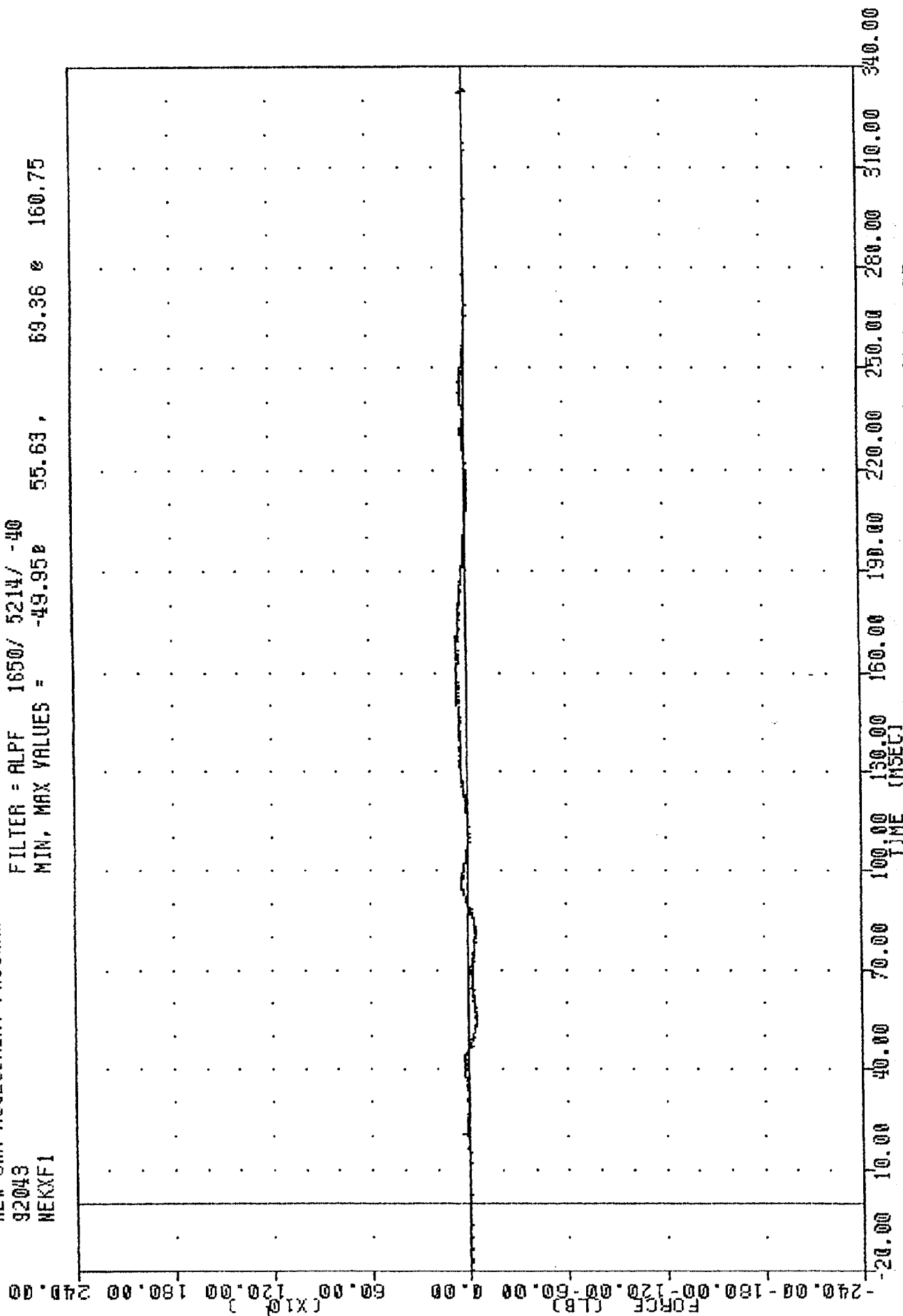
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.17g -1.50g 53.49g 232.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION

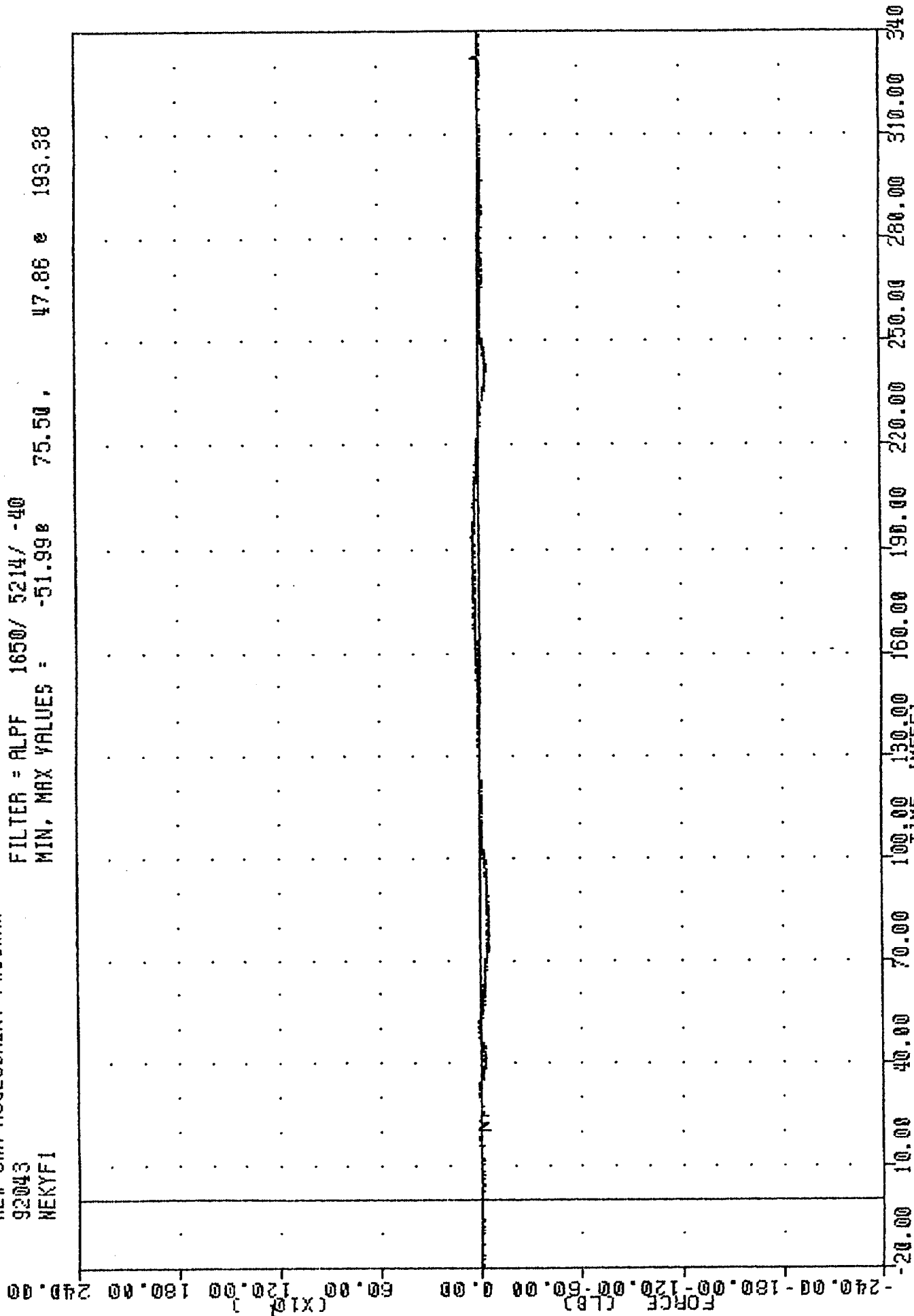
TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 NEKXF1

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 55.63 , 69.36 e 160.75



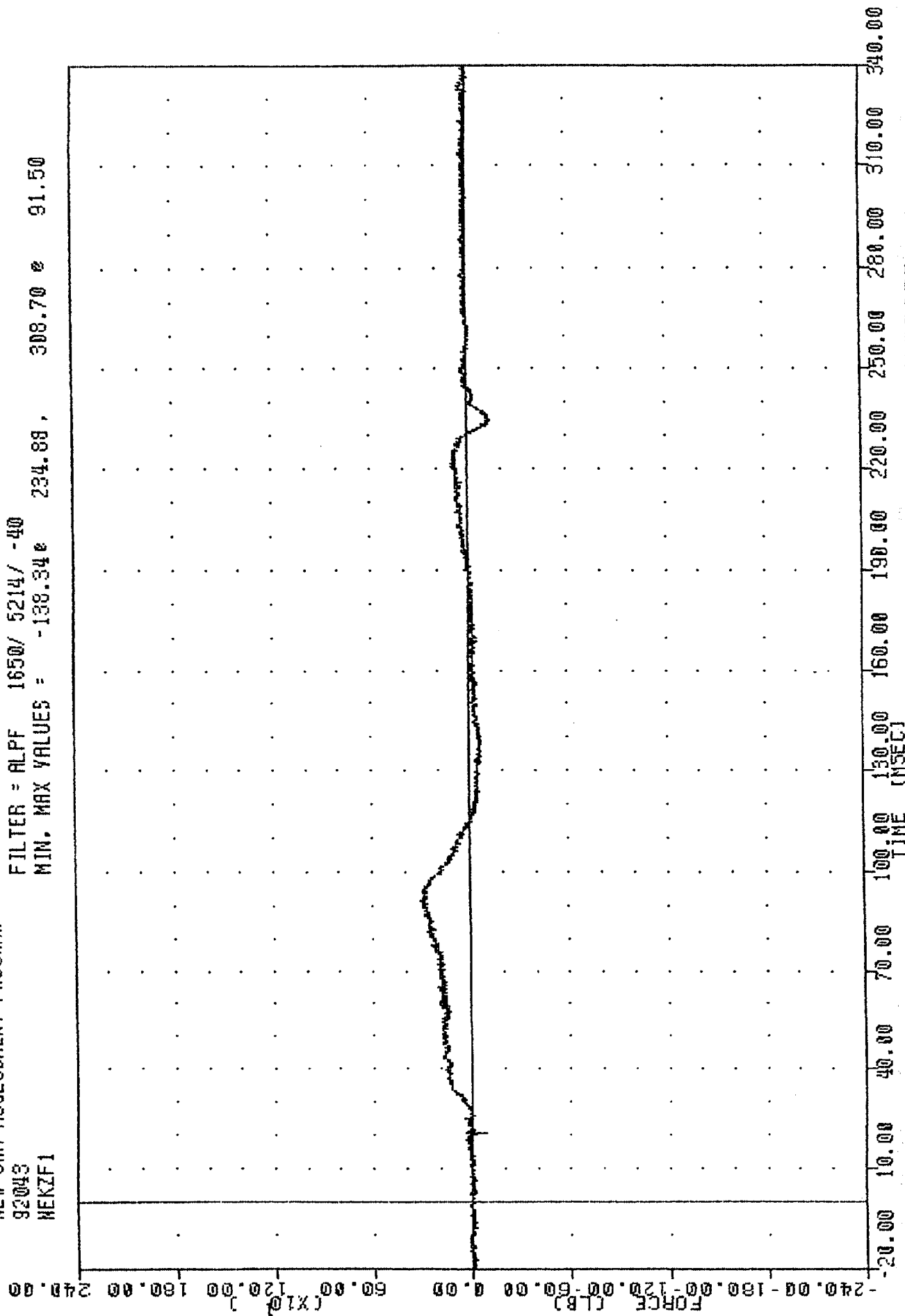
NEW CAR ASSESSMENT PROGRAM
 92043
 NEKYF1

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -51.998 75.50, 47.86 193.38



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEKZF1

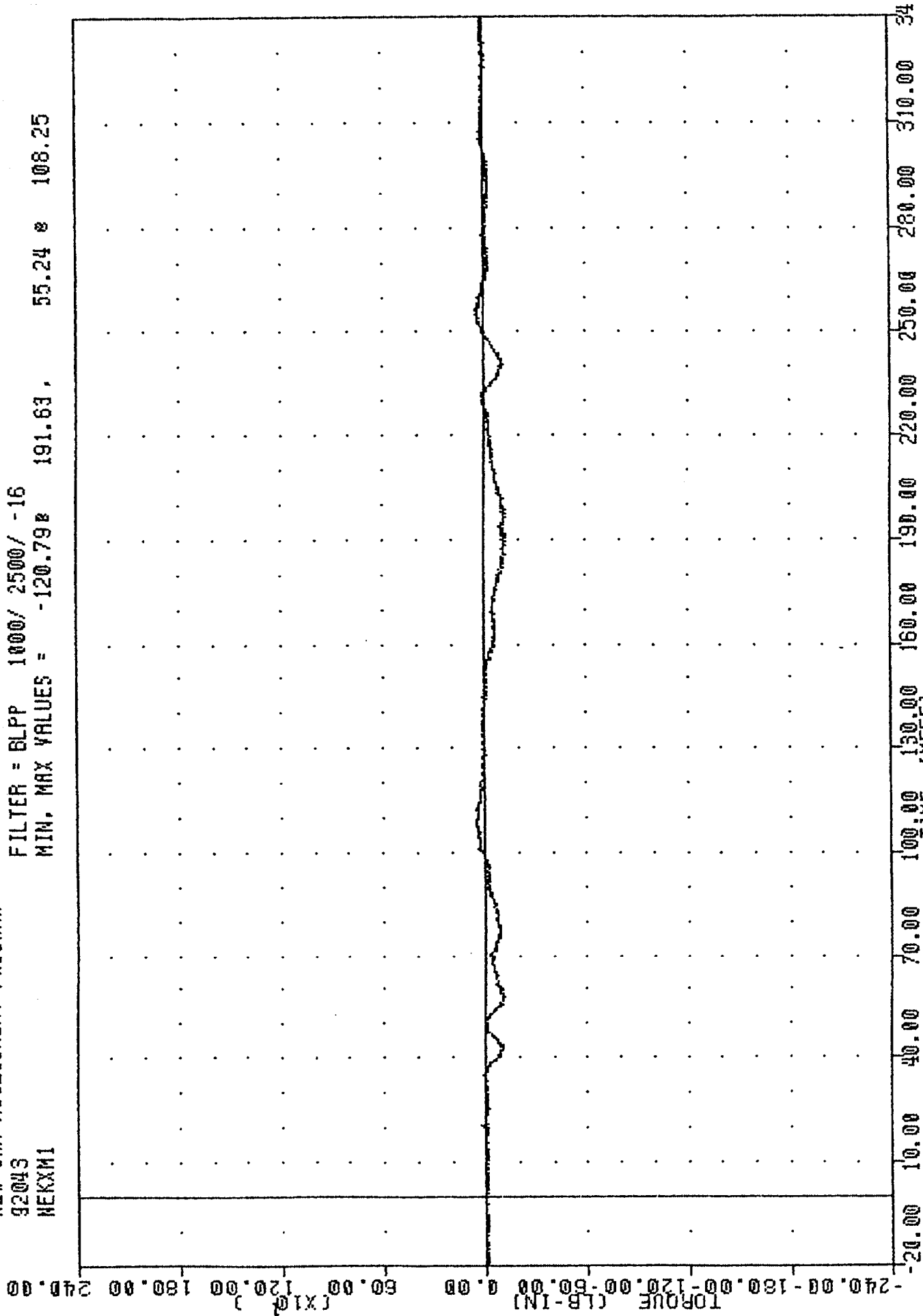
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -138.34e 234.88, 308.70 e 91.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Z-AXIS AXIAL FORCE

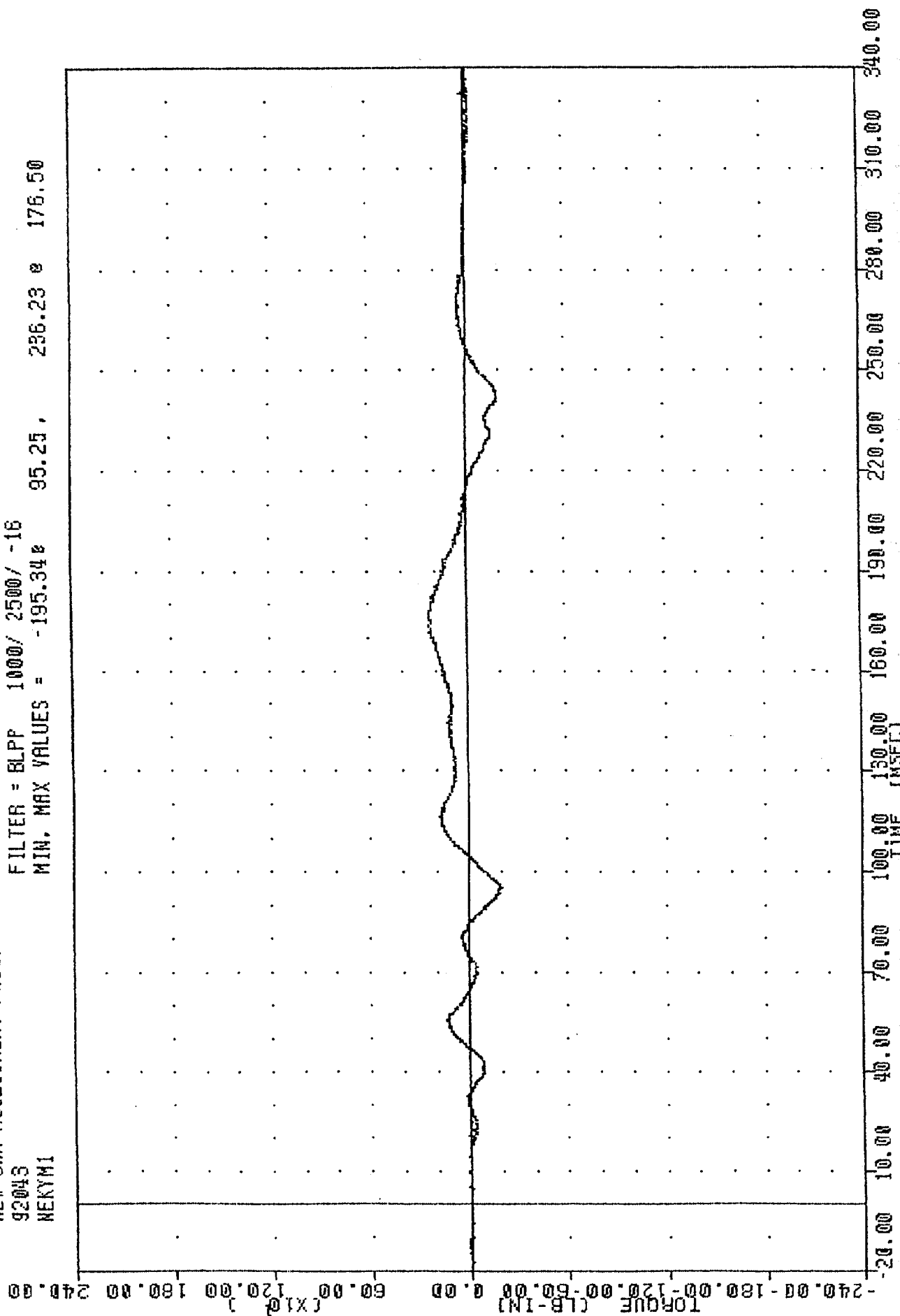
NEW CAR ASSESSMENT PROGRAM
 92043
 NEKXM1

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -120.798 191.63, 55.24 @ 108.25



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEKYM1

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -195.34 95.25 , 236.23 176.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS

92043

WEKZM1

FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -179.05e 258.88e

66.27 e 337.75

240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00

(X10⁴)

TORQUE (LB-IN)

See DATA ACQUISITION EXPLANATIONS

-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

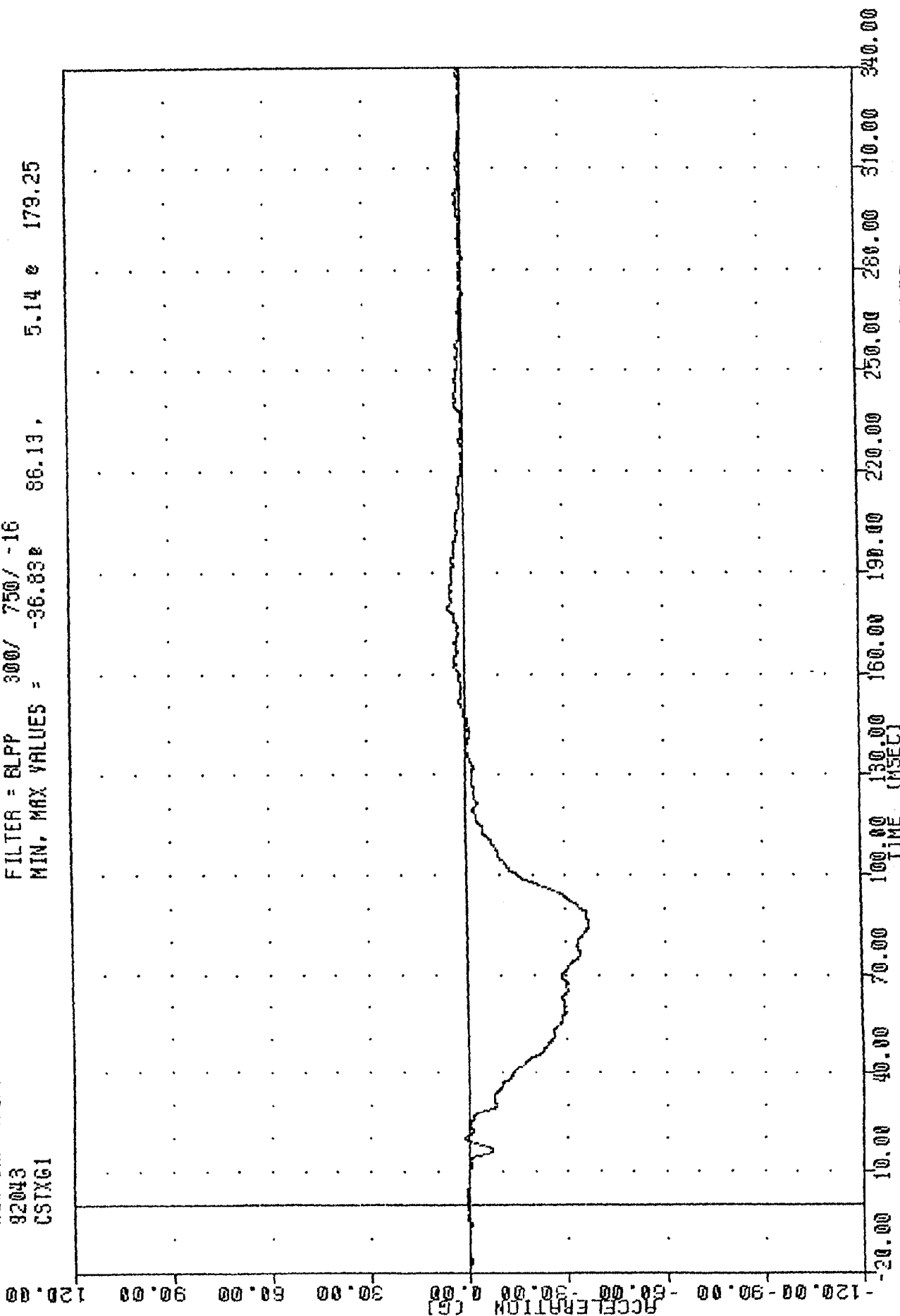
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS

920212

B-11

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 CSTX61

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -36.83 86.13, 5.14 179.25



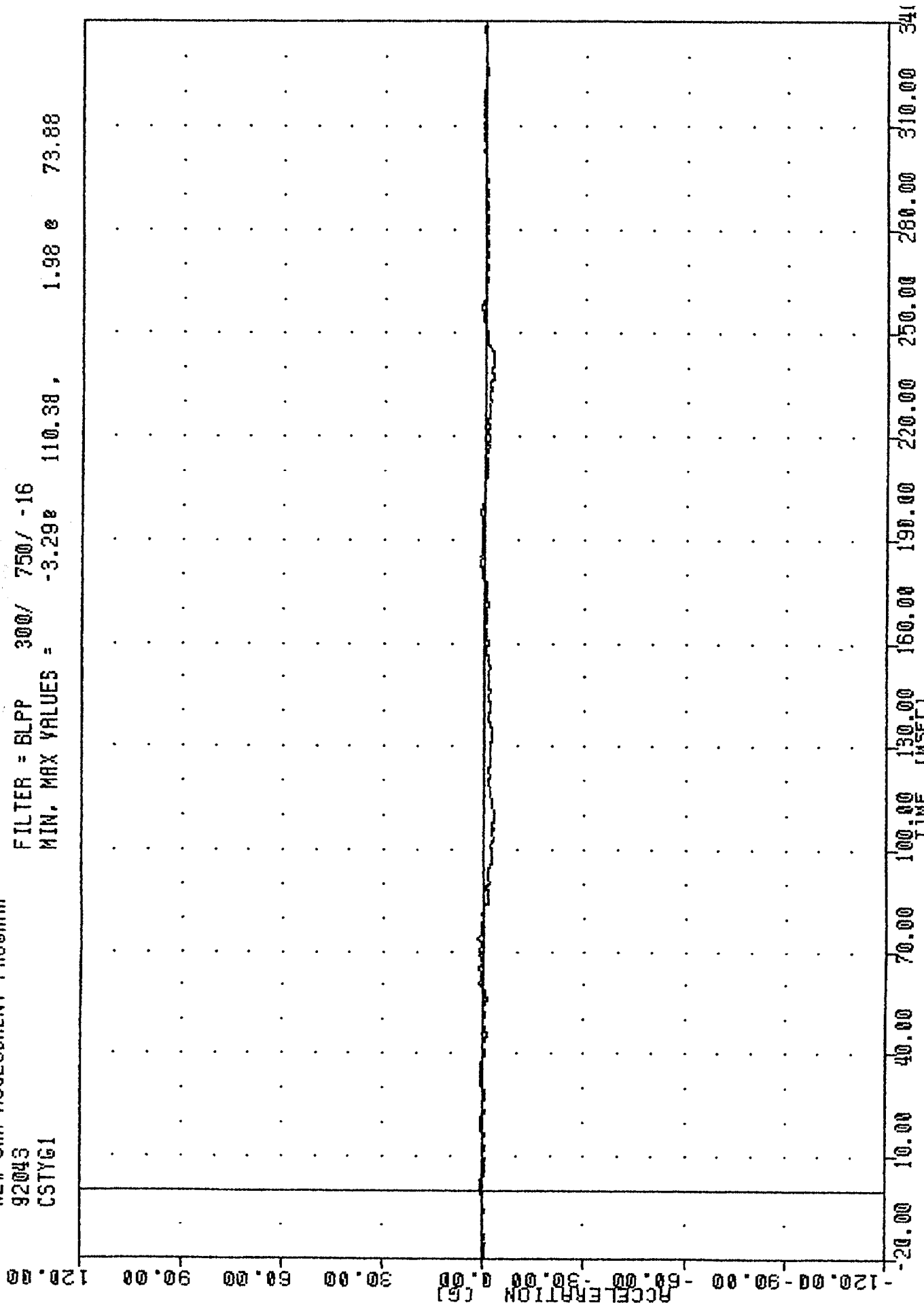
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM

92043
CSTY61

FILTER = BLPP 300/ 750/ -16

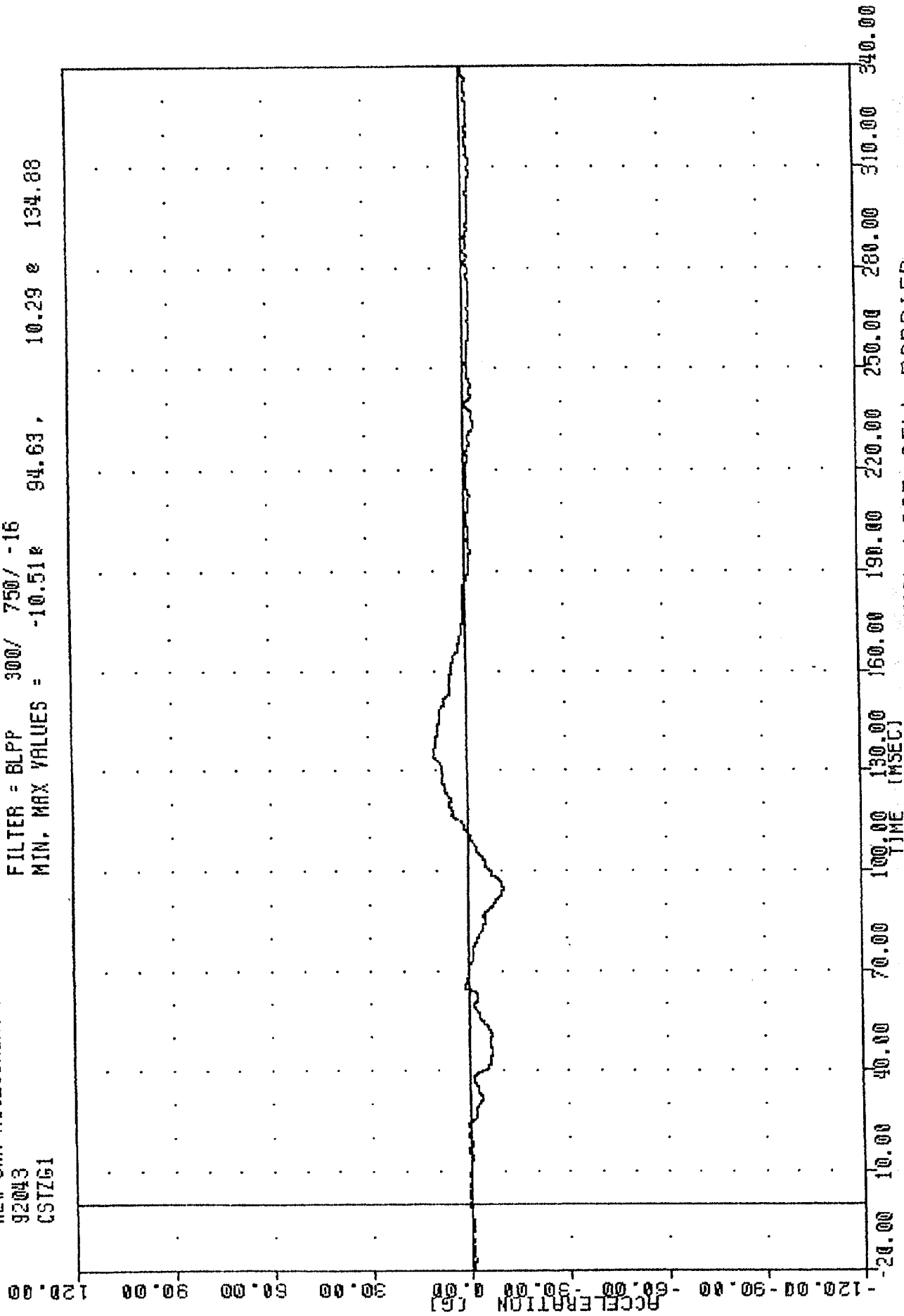
MIN. MAX VALUES = -3.29e 110.38, 1.98 e 73.88



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 CSTZG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -10.51 94.63 , 10.29 e 134.88



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION

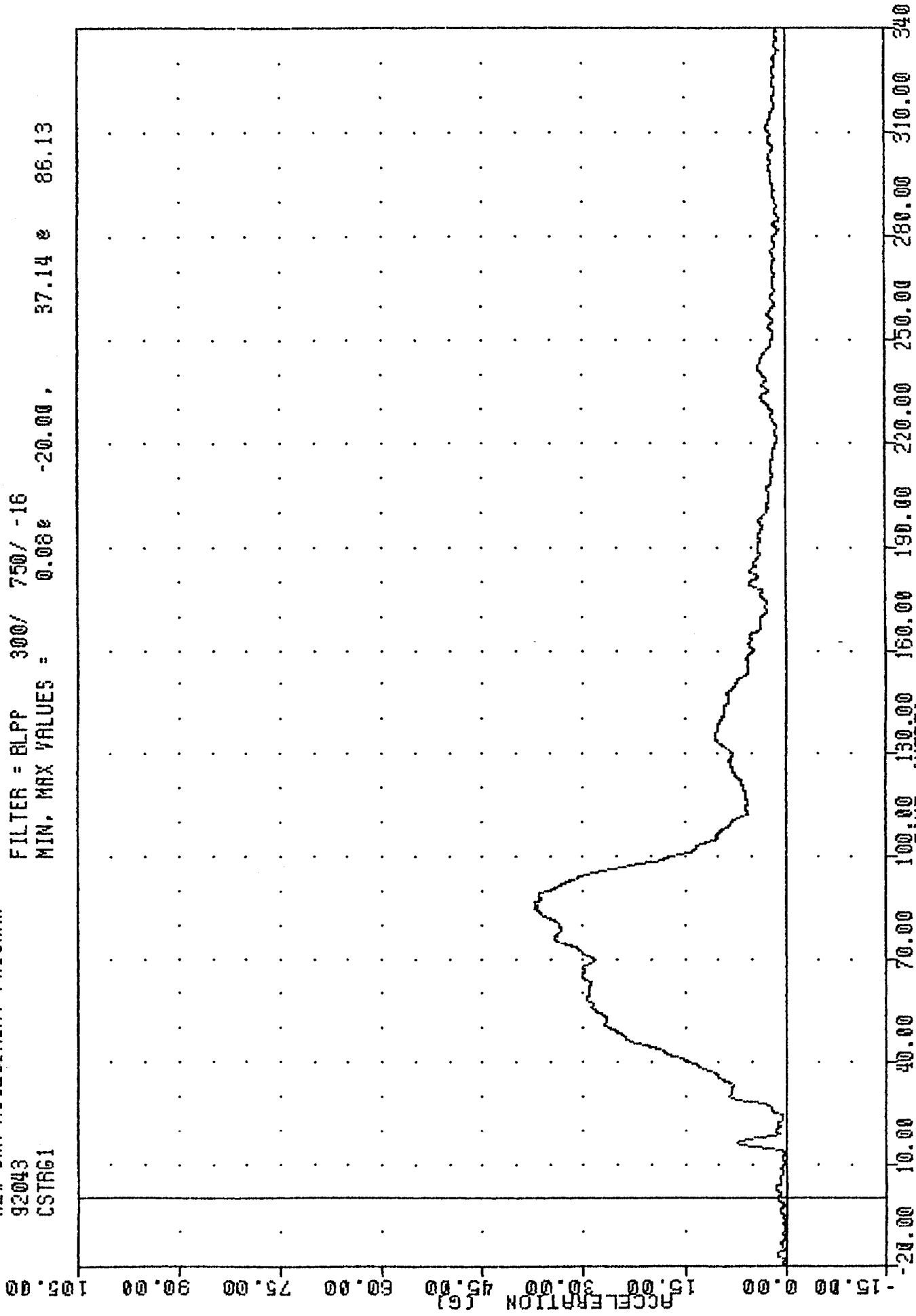
NEW CAR ASSESSMENT PROGRAM

92043

CSTR61

FILTER = BLPP 300/ 750/ -16

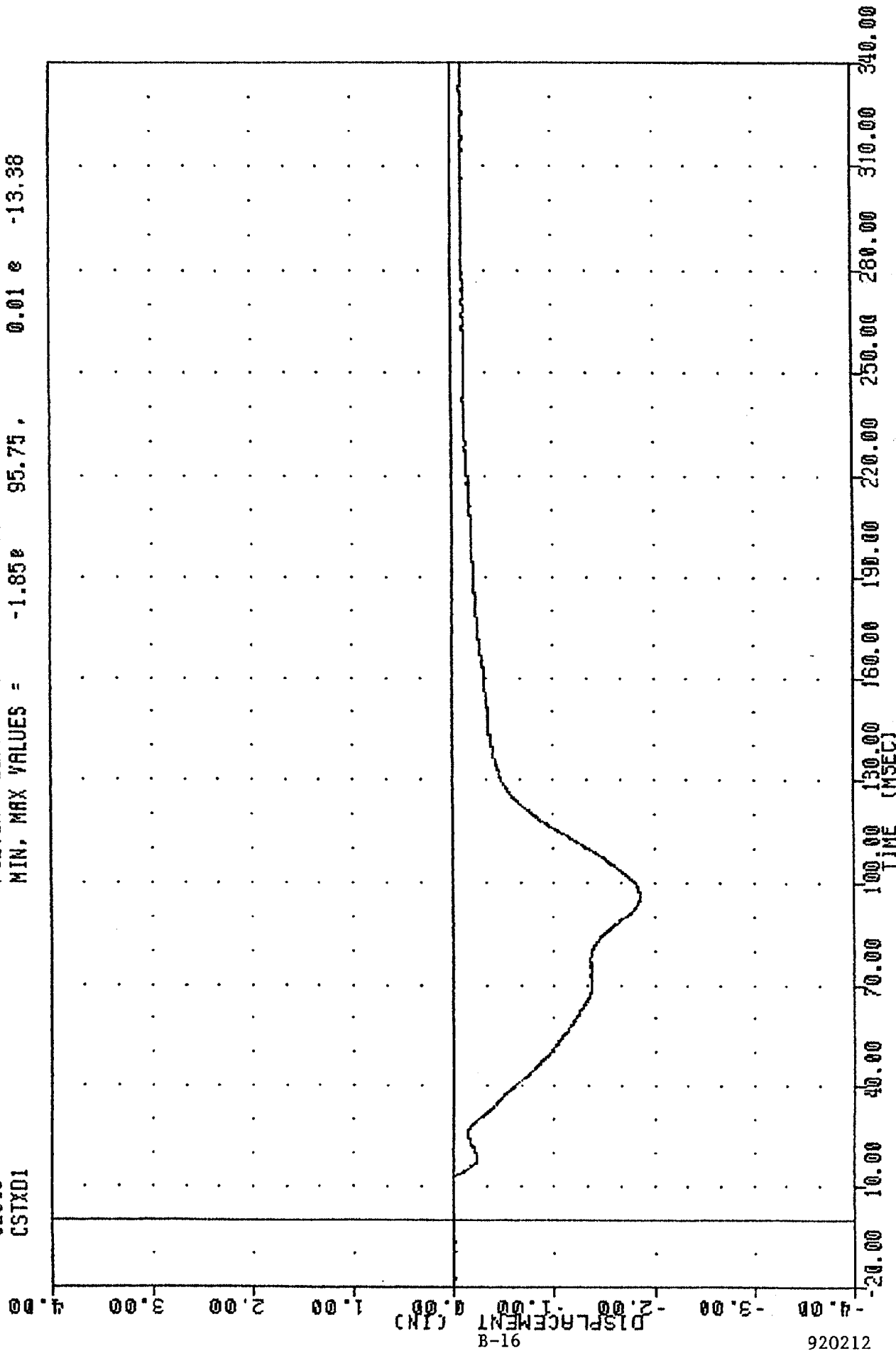
MIN. MAX VALUES = 0.08e -20.00, 37.14 e 86.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 CSTXD1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -1.85e 0.01 e -13.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST DEFLECTION

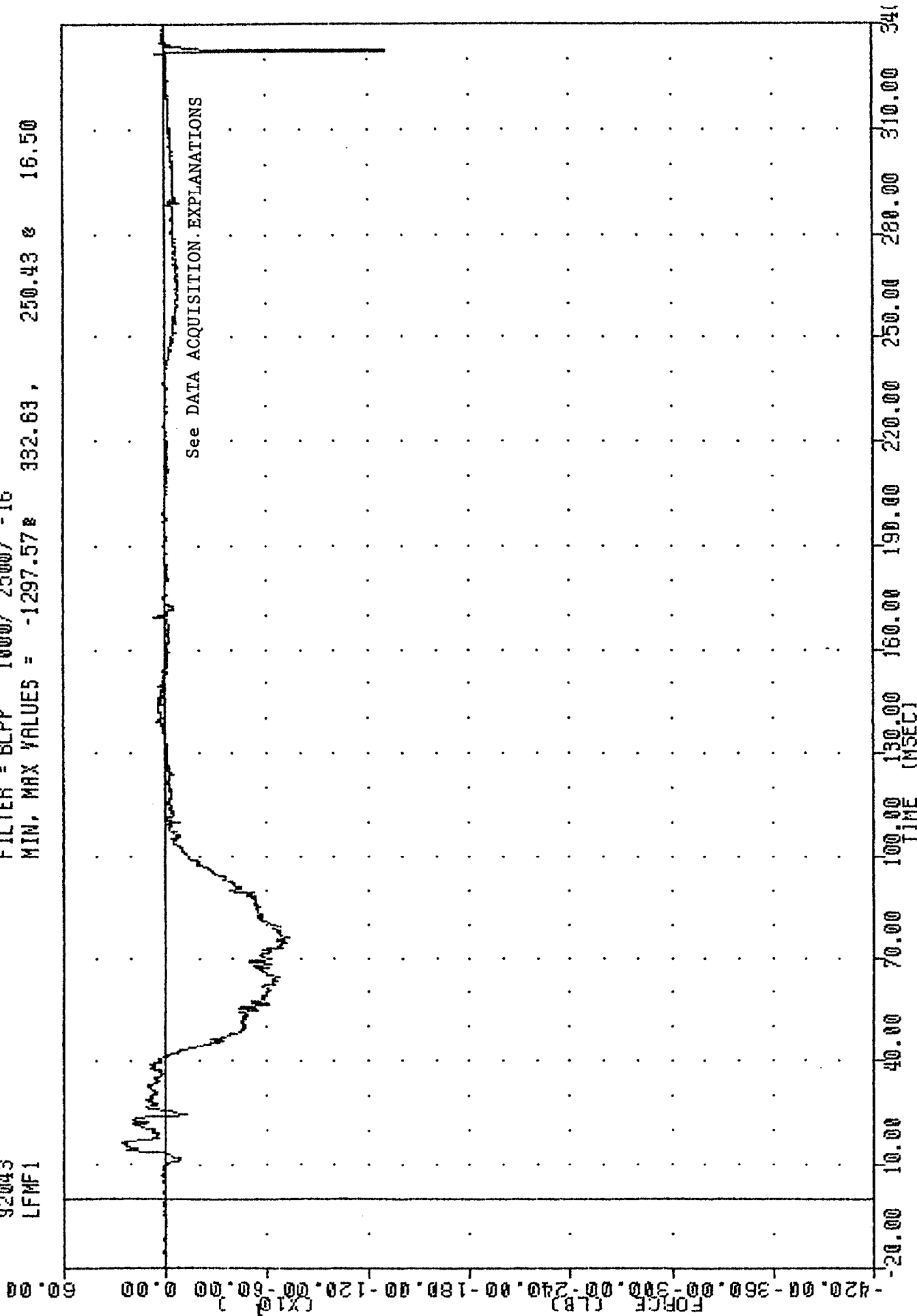
NEW CAR ASSESSMENT PROGRAM

92043

LFMF1

FILTER = BLPP 1000/ 2500/ -16

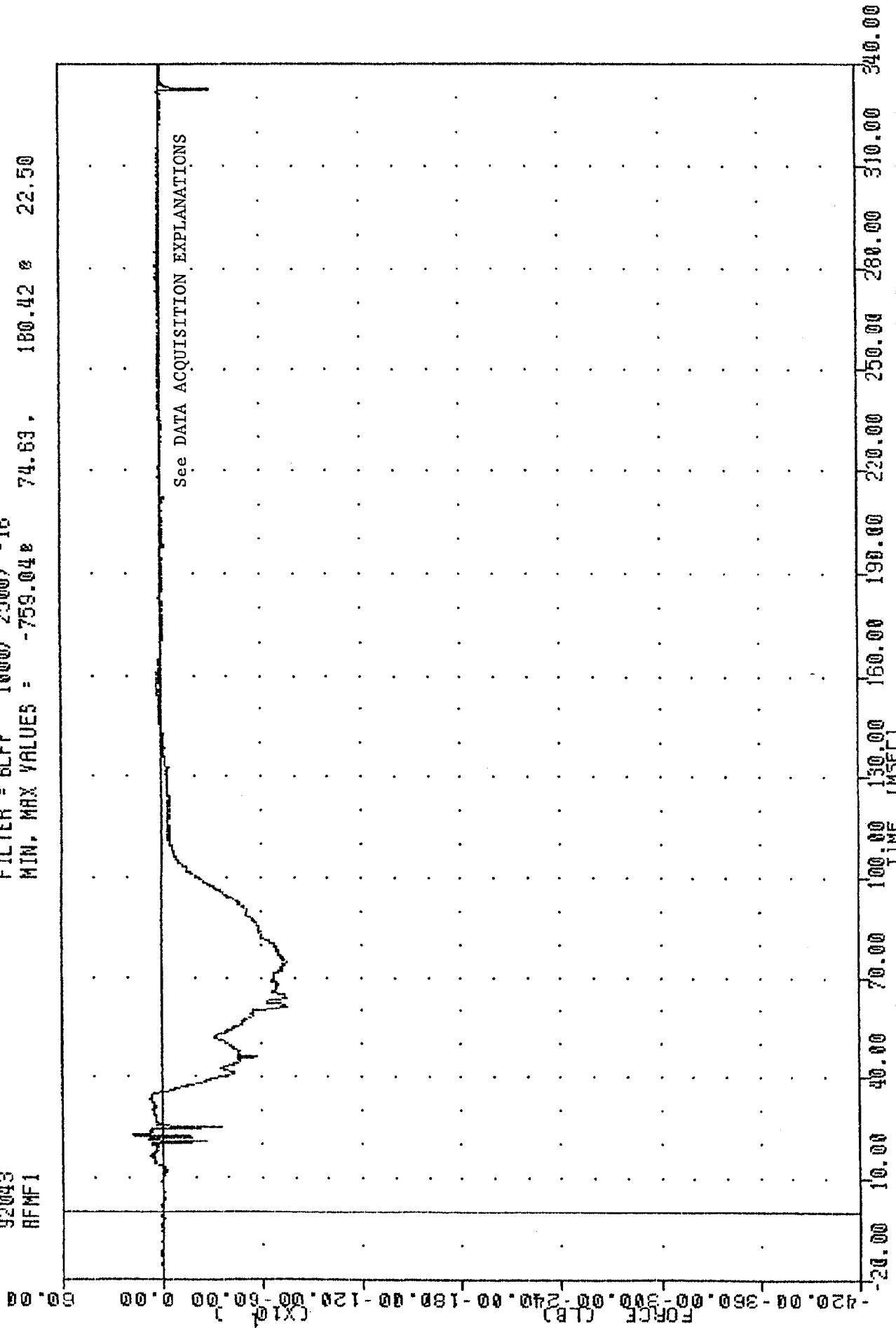
MIN, MAX VALUES = -1297.57# 332.63, 250.43 @ 16.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 AFMF1

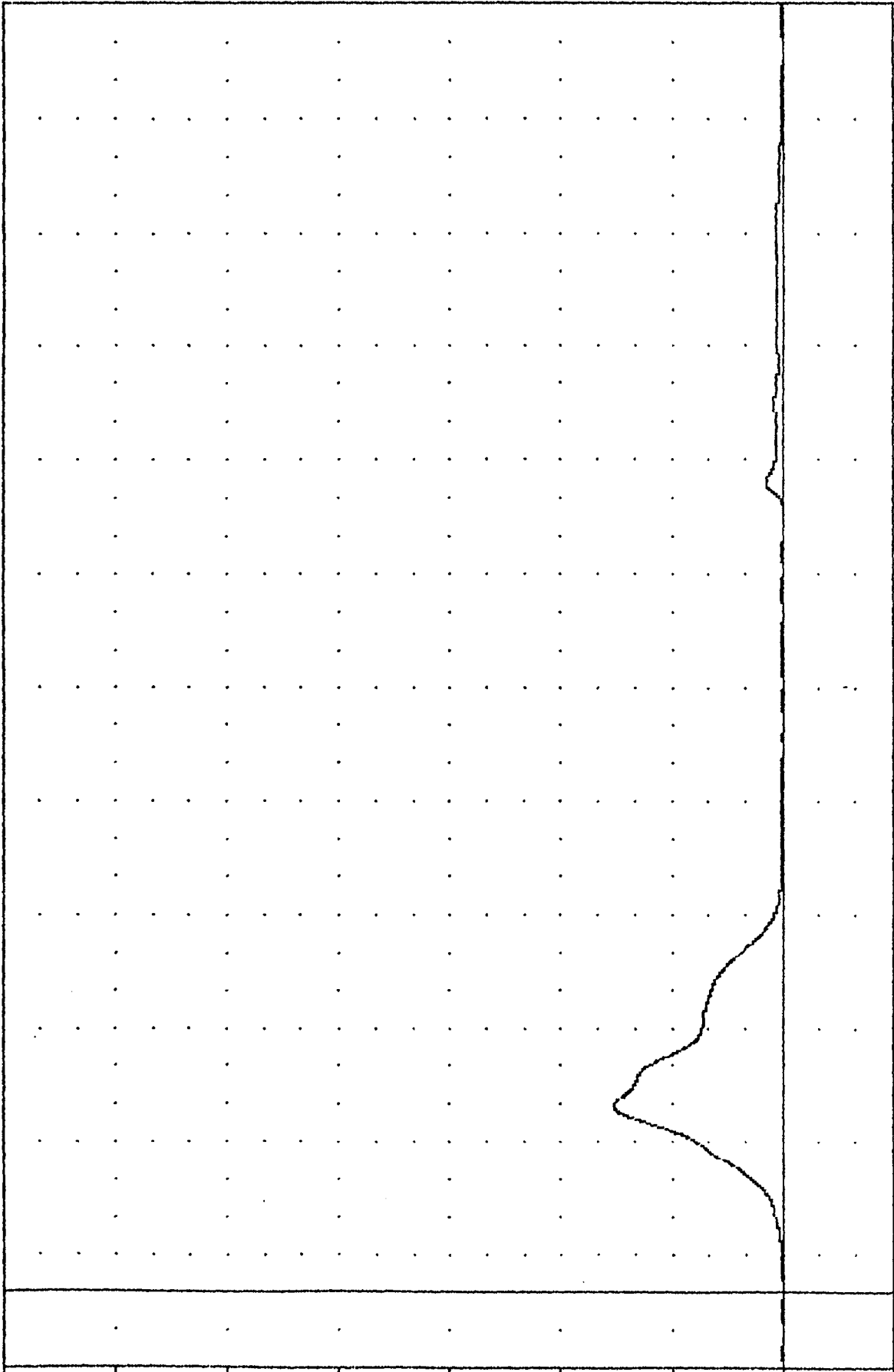
FILTER = 8LPP 1000/ 2500/ -16
 MIN, MAX VALUES = -759.04 74.63, 180.42 22.50



92043 LB0F1

FILTER = ELPP 100/ 250/ -16
MIN. MAX VALUES = -1.73 151.38 915.42 49.50

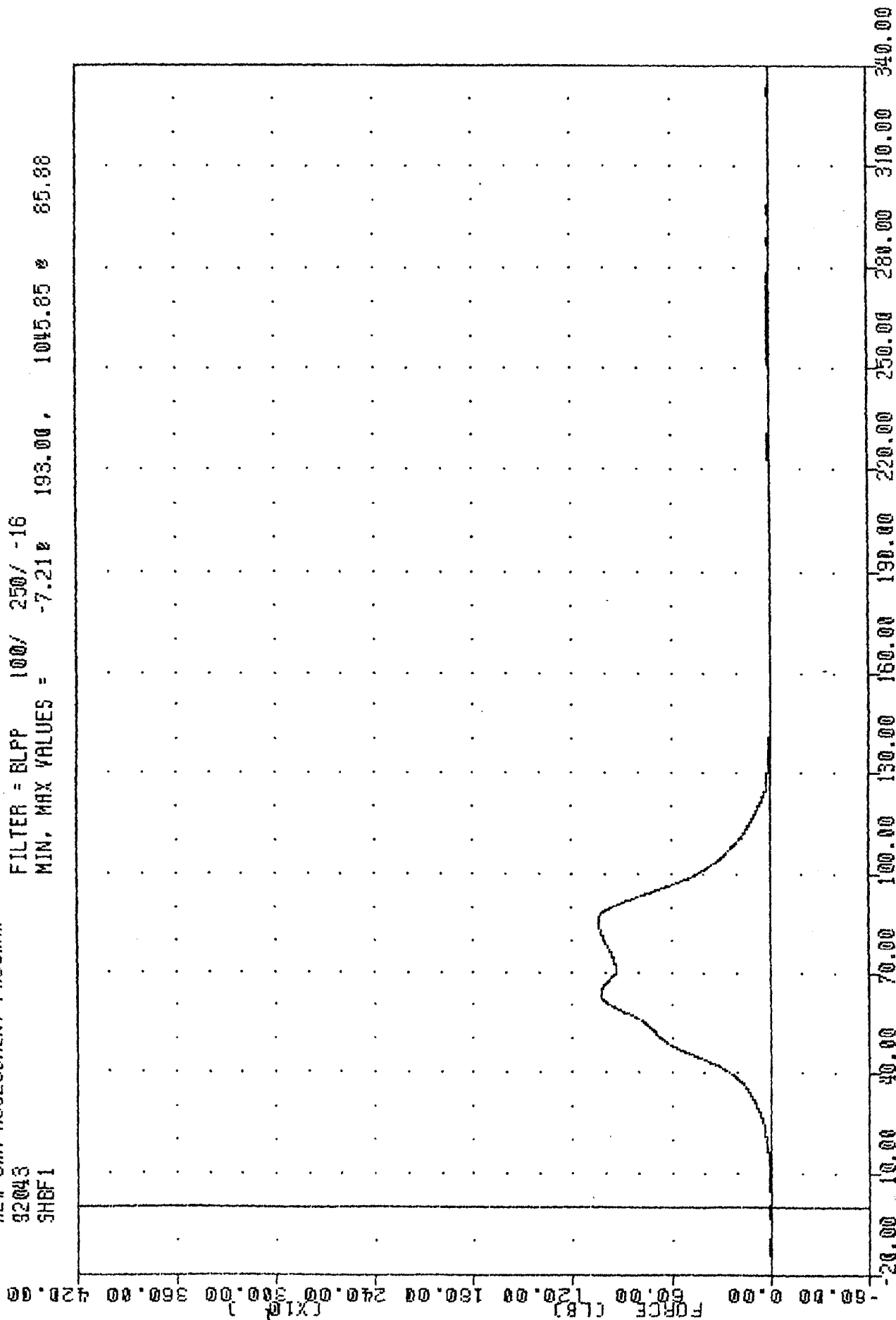
FORCE (LB)
(X10³)



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE

TRC 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 SHBF1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -7.21% 193.00, 1045.85 % 85.88

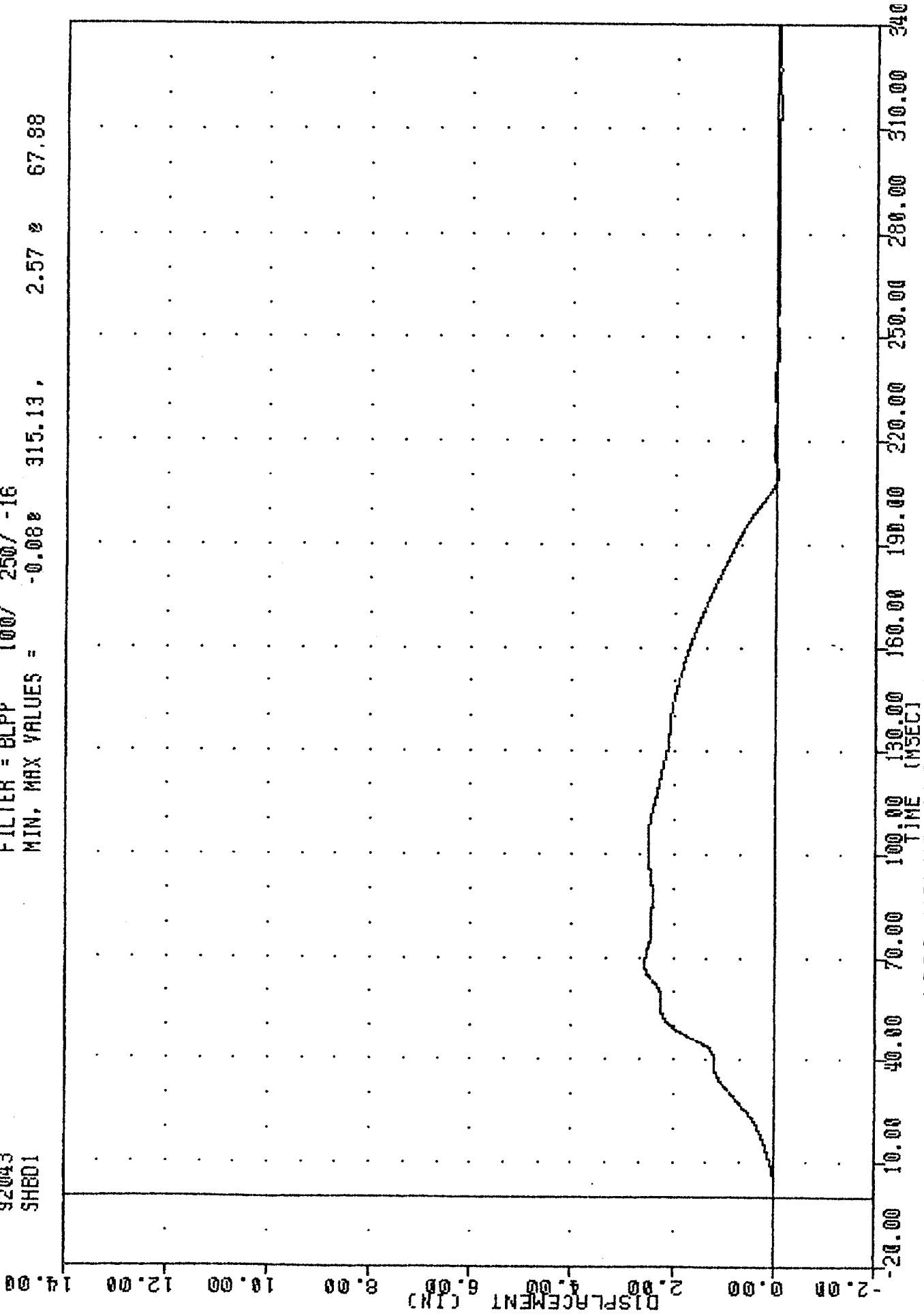


NEW CAR ASSESSMENT PROGRAM

92043
SHED1

FILTER = BLPP 100/ 250/ -16

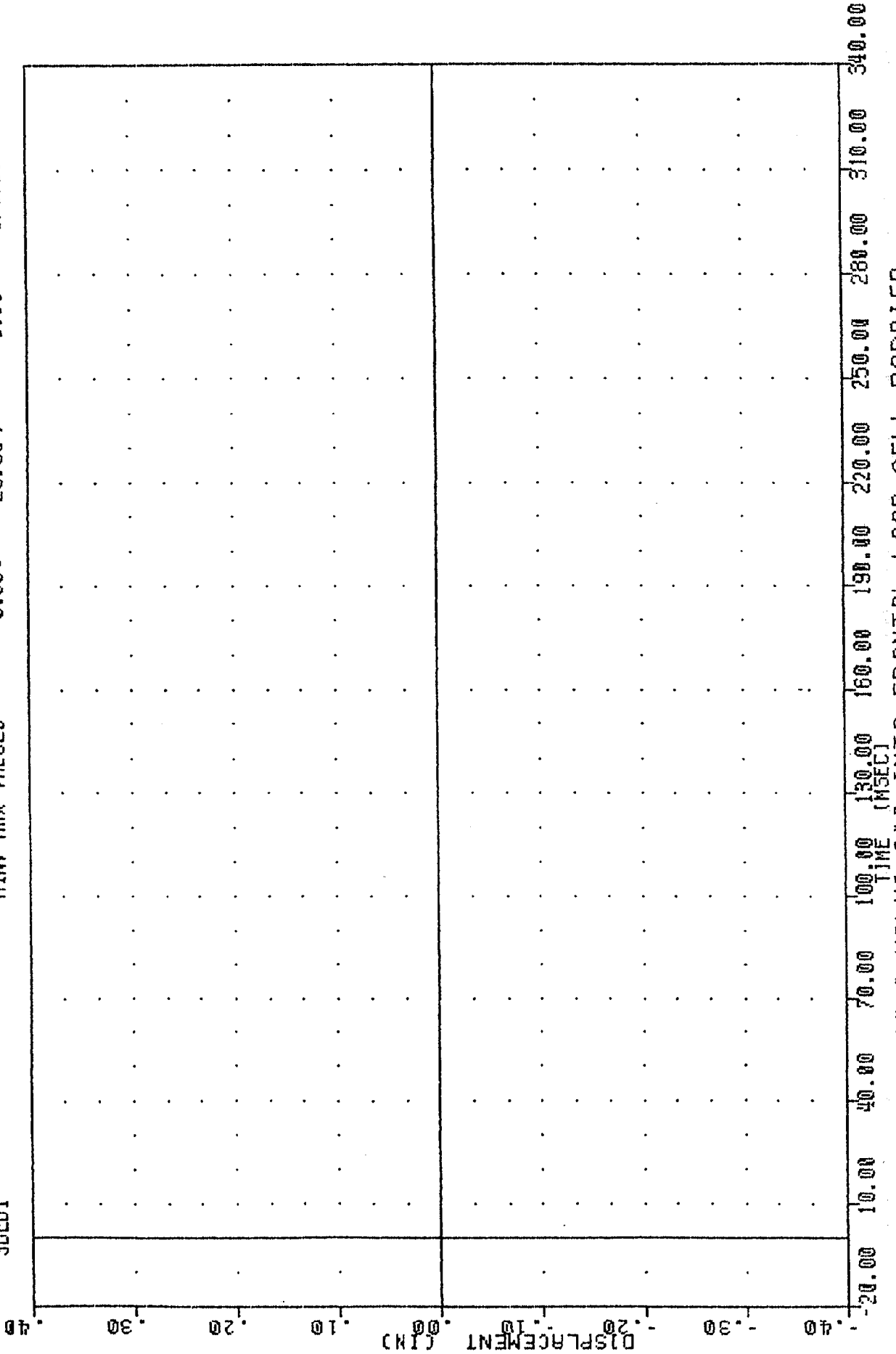
MIN, MAX VALUES = -0.088 315.13, 2.57 2 67.98



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT

TRC . 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 SBED1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.000 25.38 , 0.00 174.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT BELT EXTENSION

NEW CAR ASSESSMENT PROGRAM

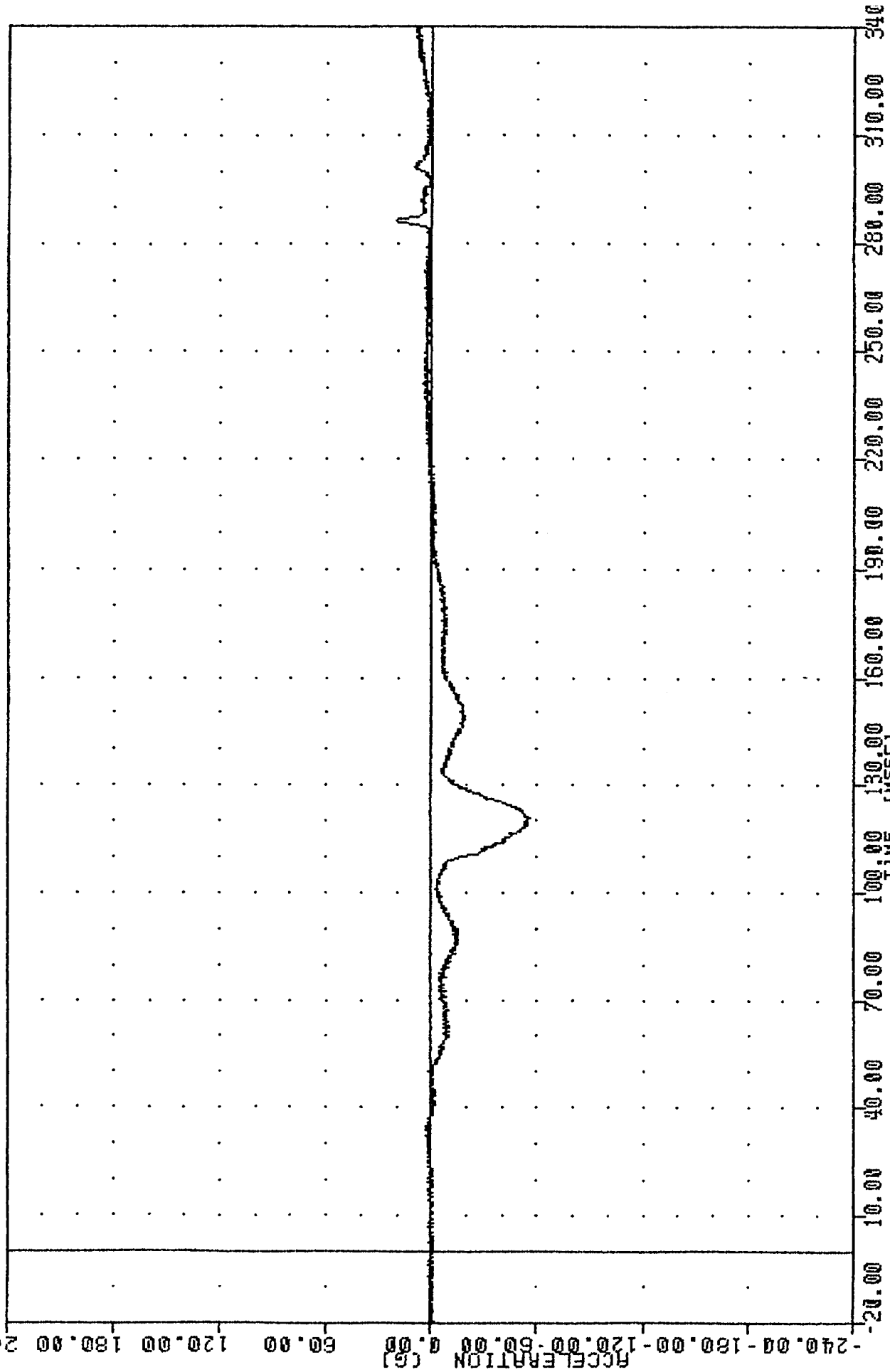
92043

HEDX62

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -55.48 e

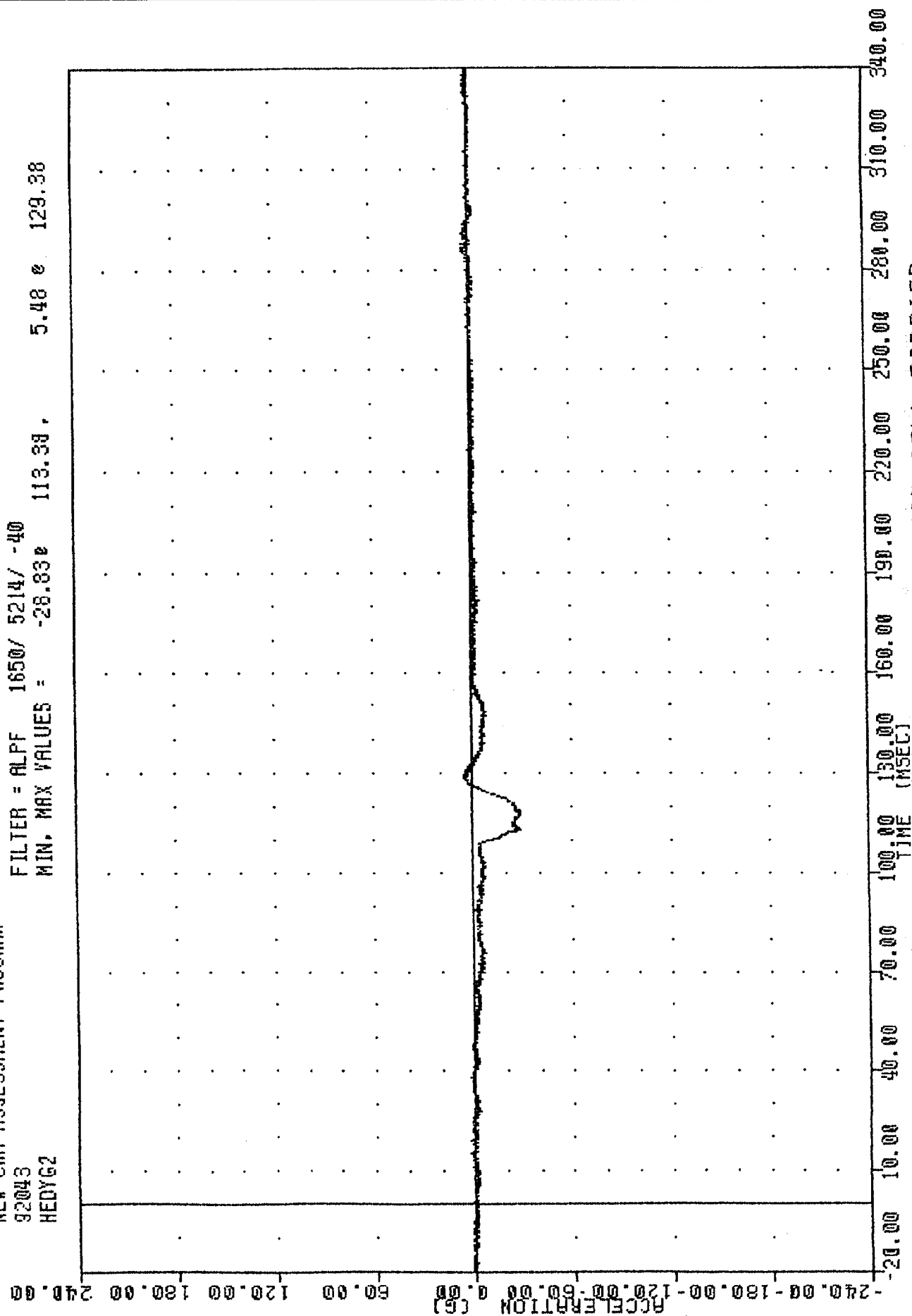
20.83 e 286.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEDYG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -26.83e 113.38, 5.48 e 129.38



NEW CAR ASSESSMENT PROGRAM

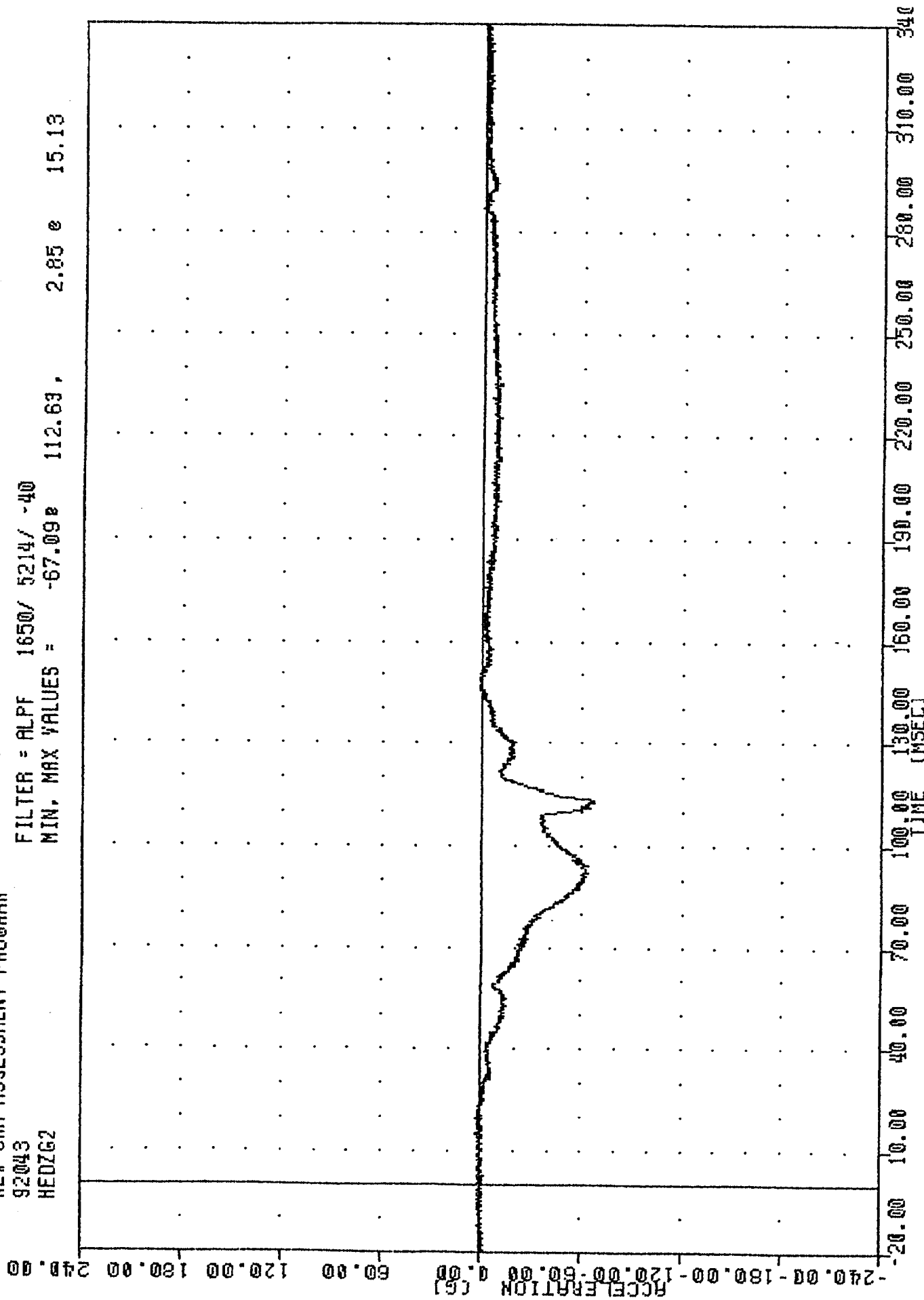
92043

HEDZG2

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -67.09 112.63

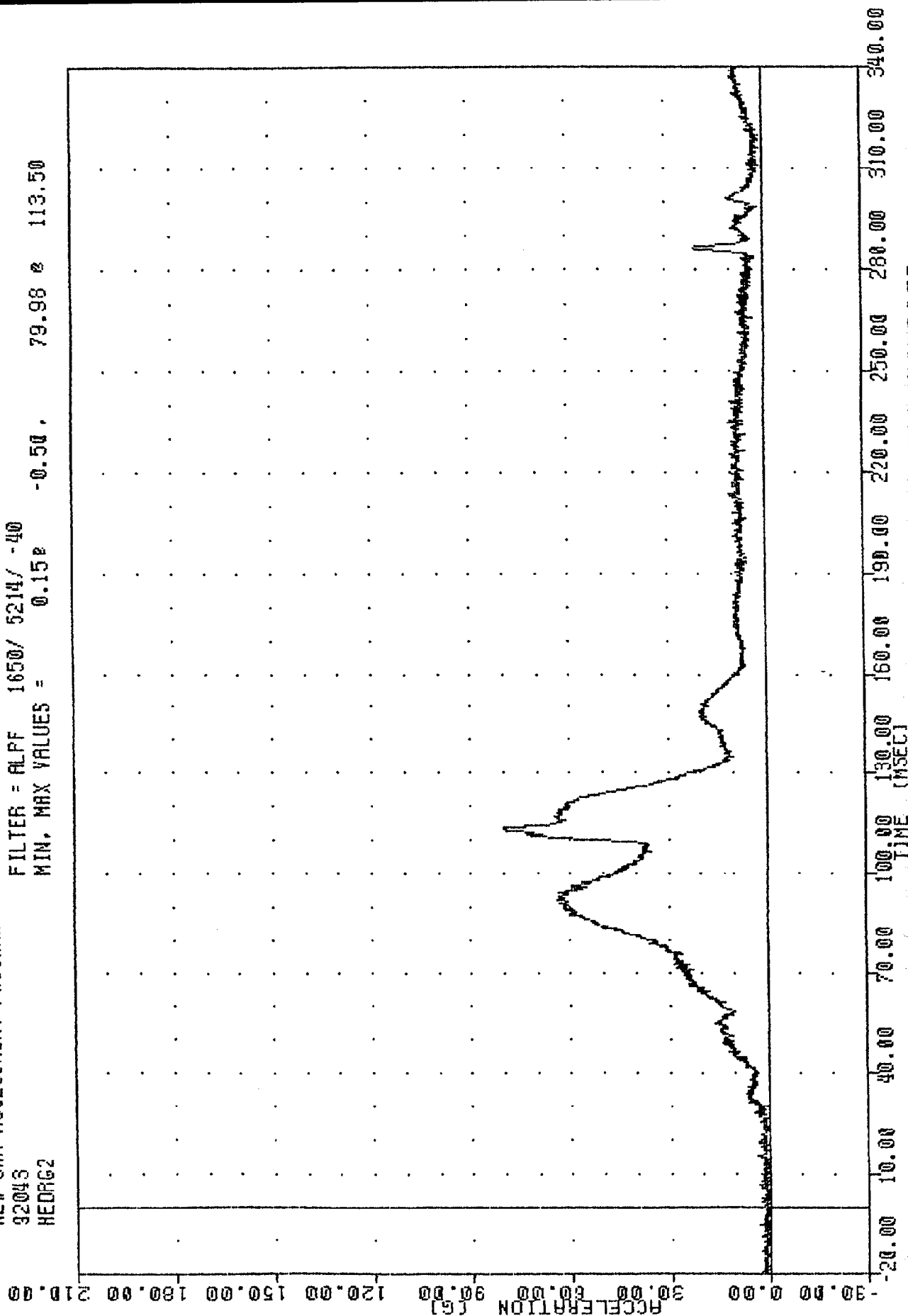
2.85 15.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 HEDRG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.15e -0.50 , 79.98 e 113.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD RESULTANT ACCELERATION

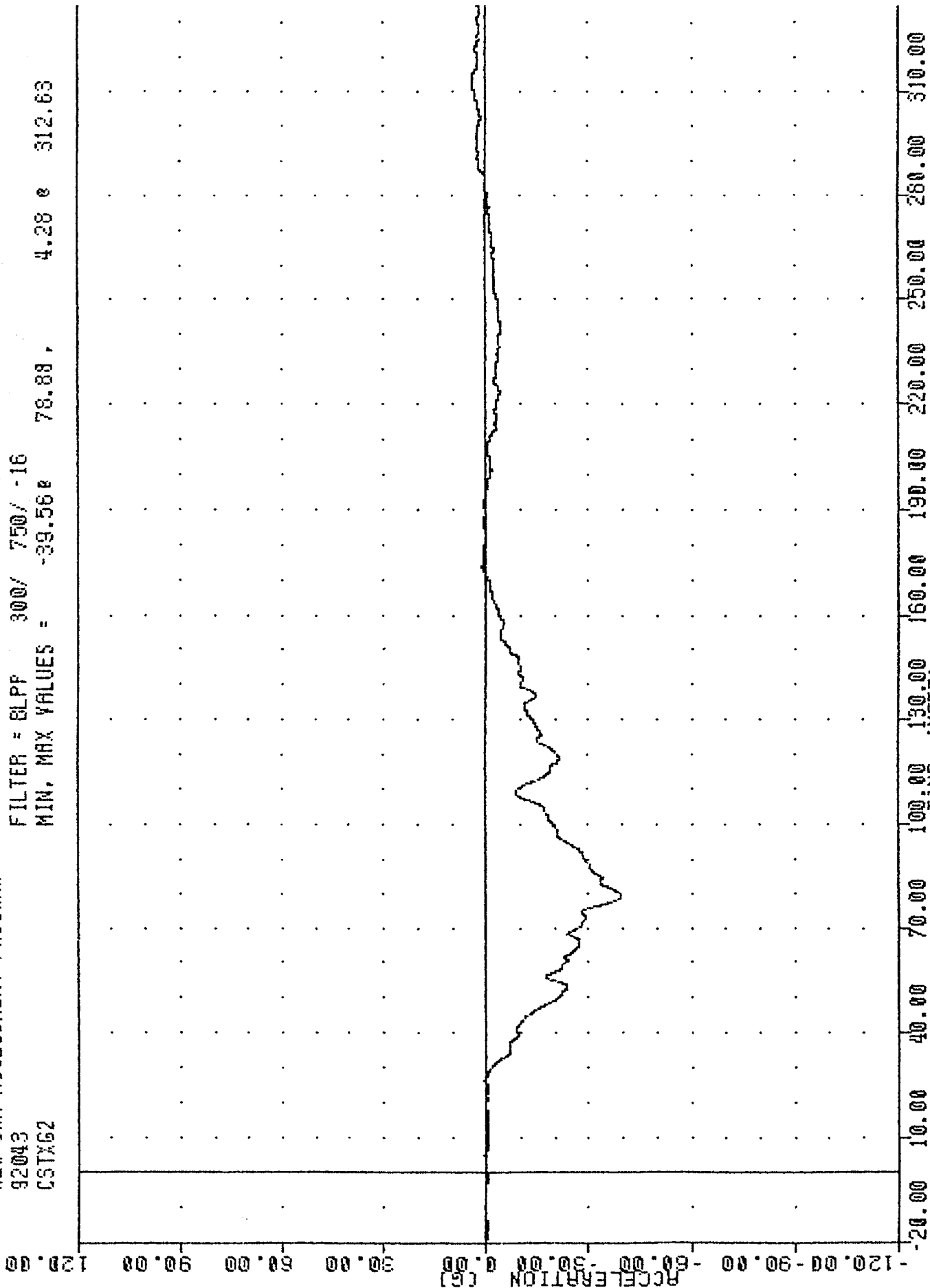
NEW CAR ASSESSMENT PROGRAM

92043

CSTXG2

FILTER = BLPP 300/ 750/ -16

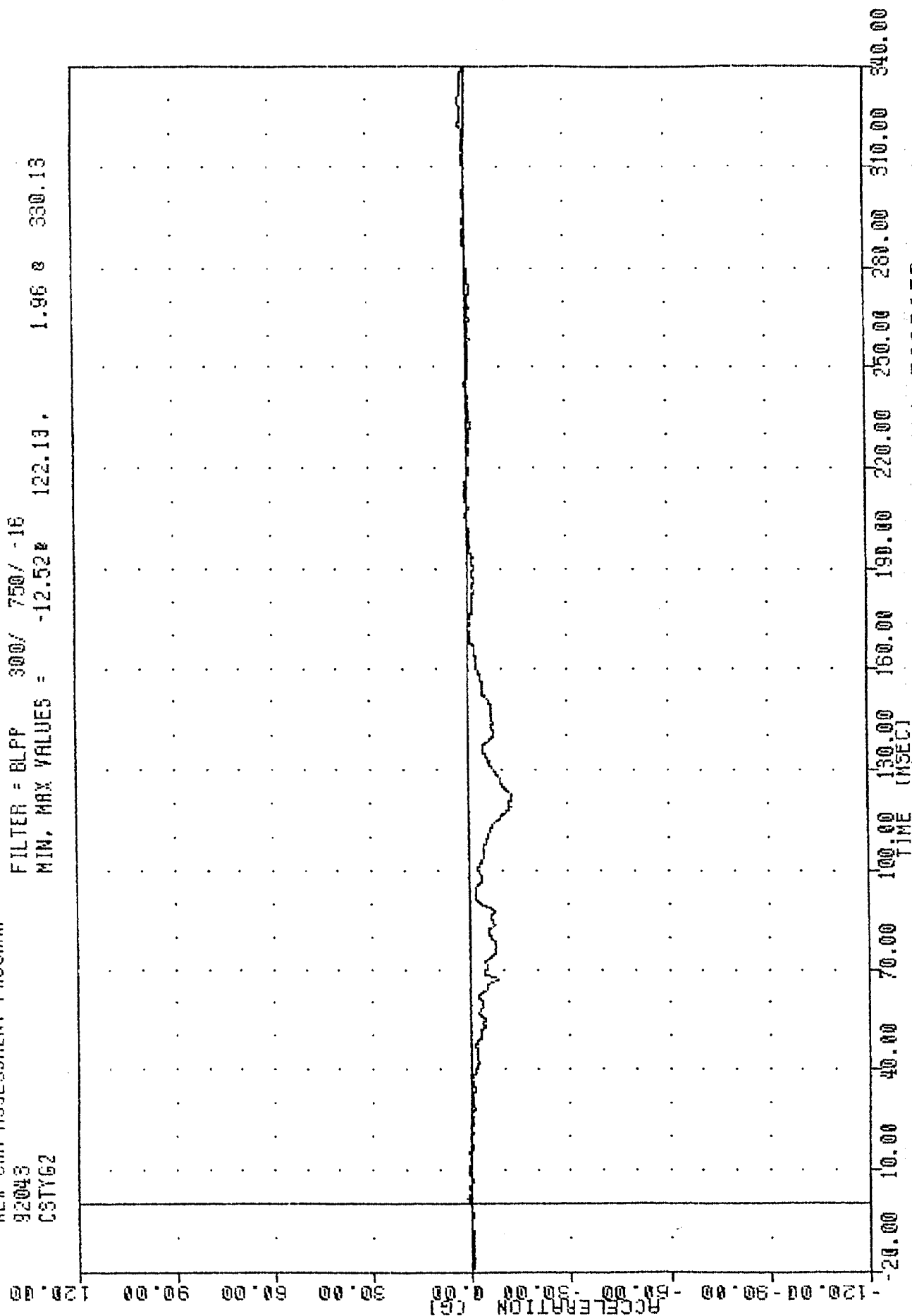
MIN, MAX VALUES = -39.56 78.88 , 4.28 312.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 CSTY62

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -12.520 122.13, 1.96 8 330.13



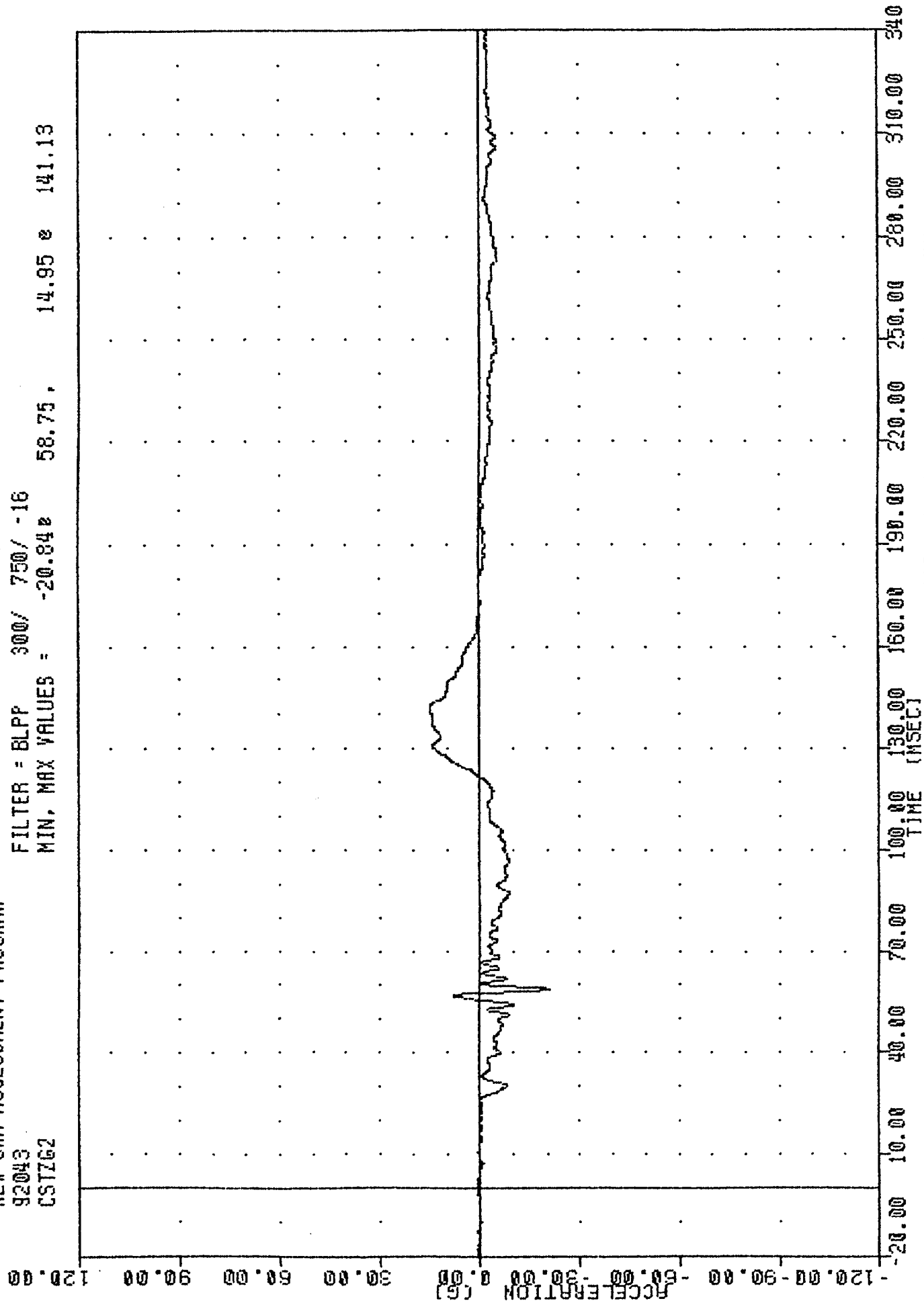
NEW CAR ASSESSMENT PROGRAM

92043

CSTZG2

FILTER = BLPP 300/ 750/ -16

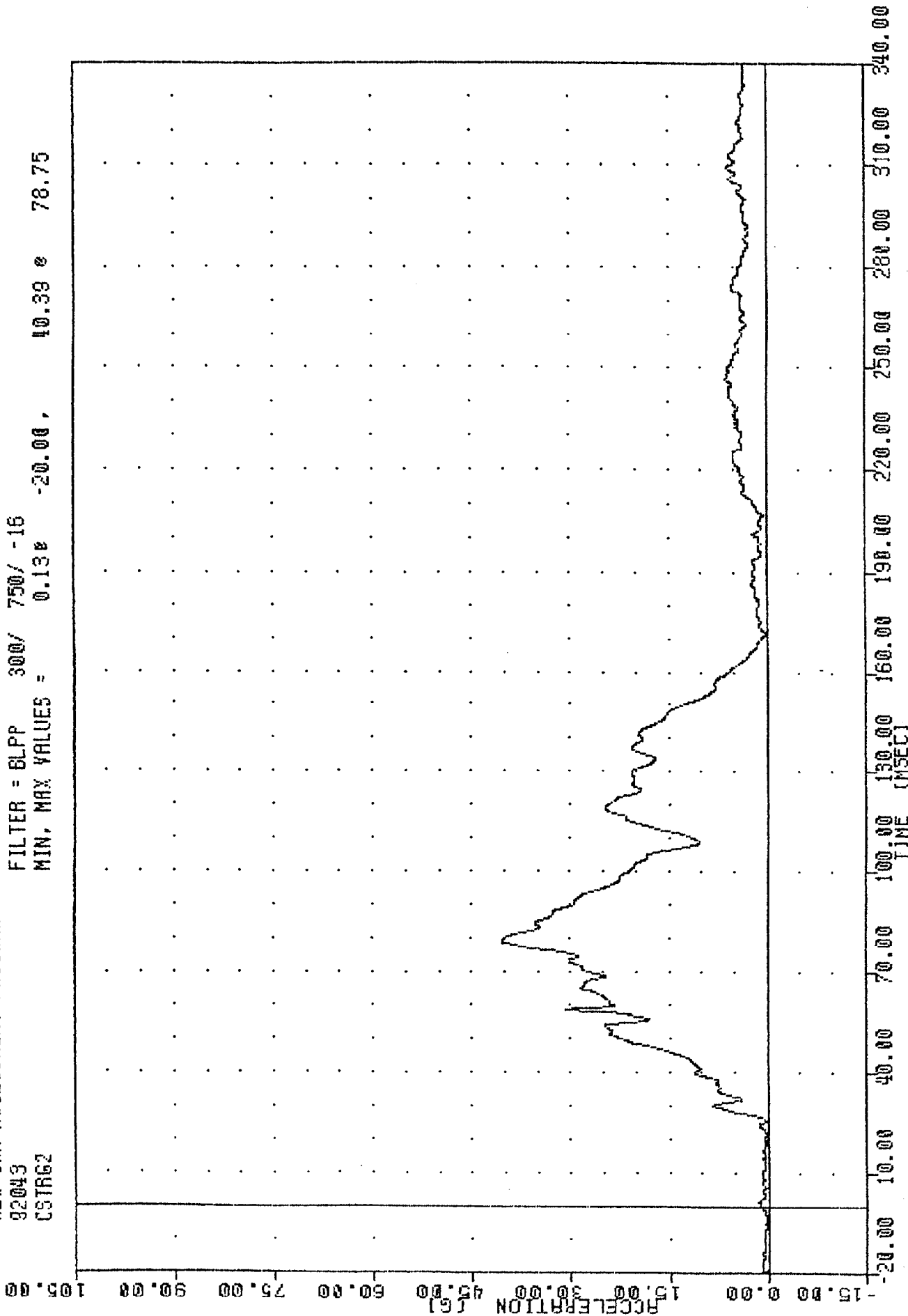
MIN, MAX VALUES = -20.84 58.75, 14.95 @ 141.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 CSTR62

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.13% -20.00, 10.39 @ 78.75



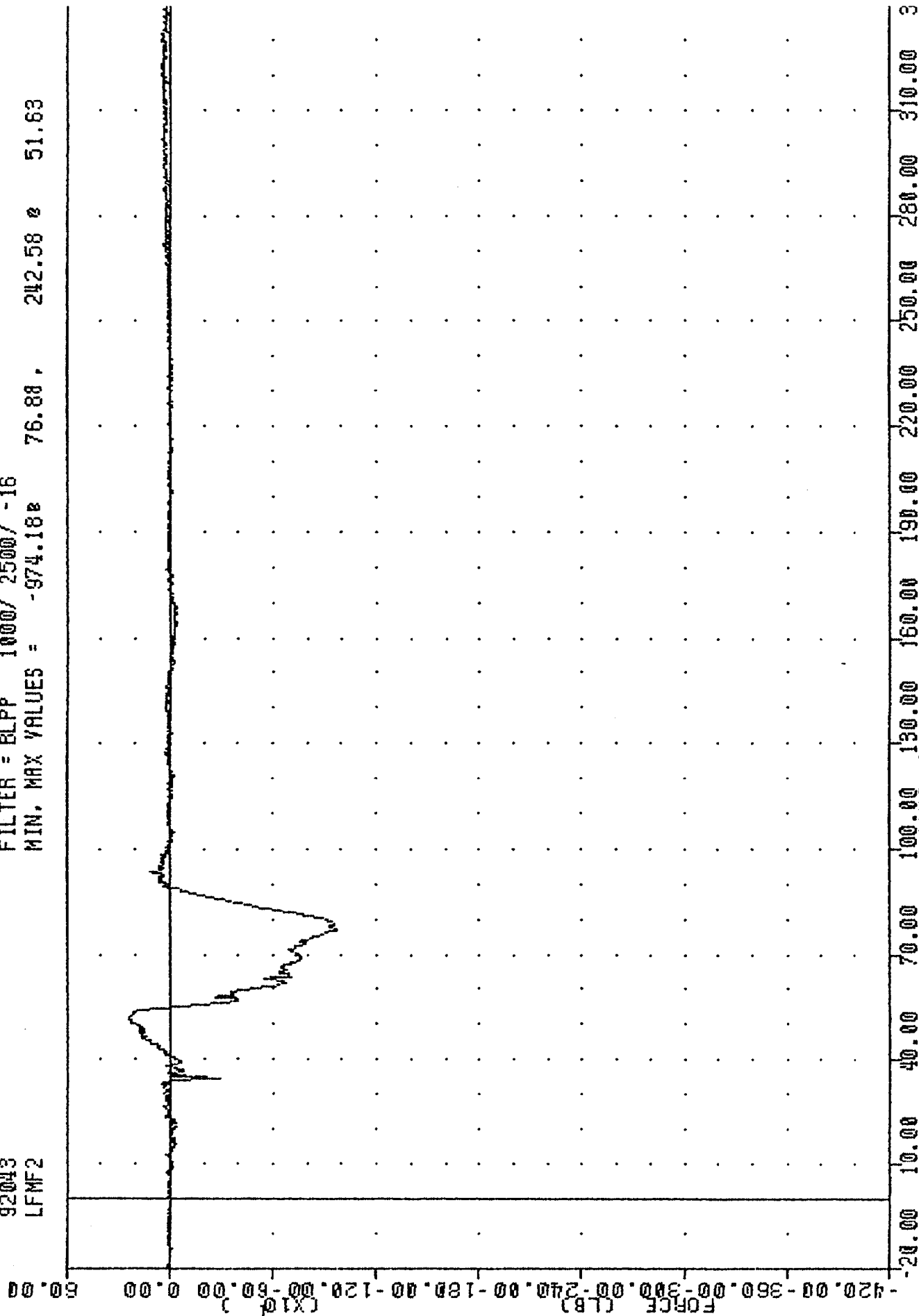
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST RESULTANT ACCELERATION

NEW CAR ASSESSMENT PROGRAM

92043
LFMF2

FILTER = BLPP 1000/ 2500/ -16

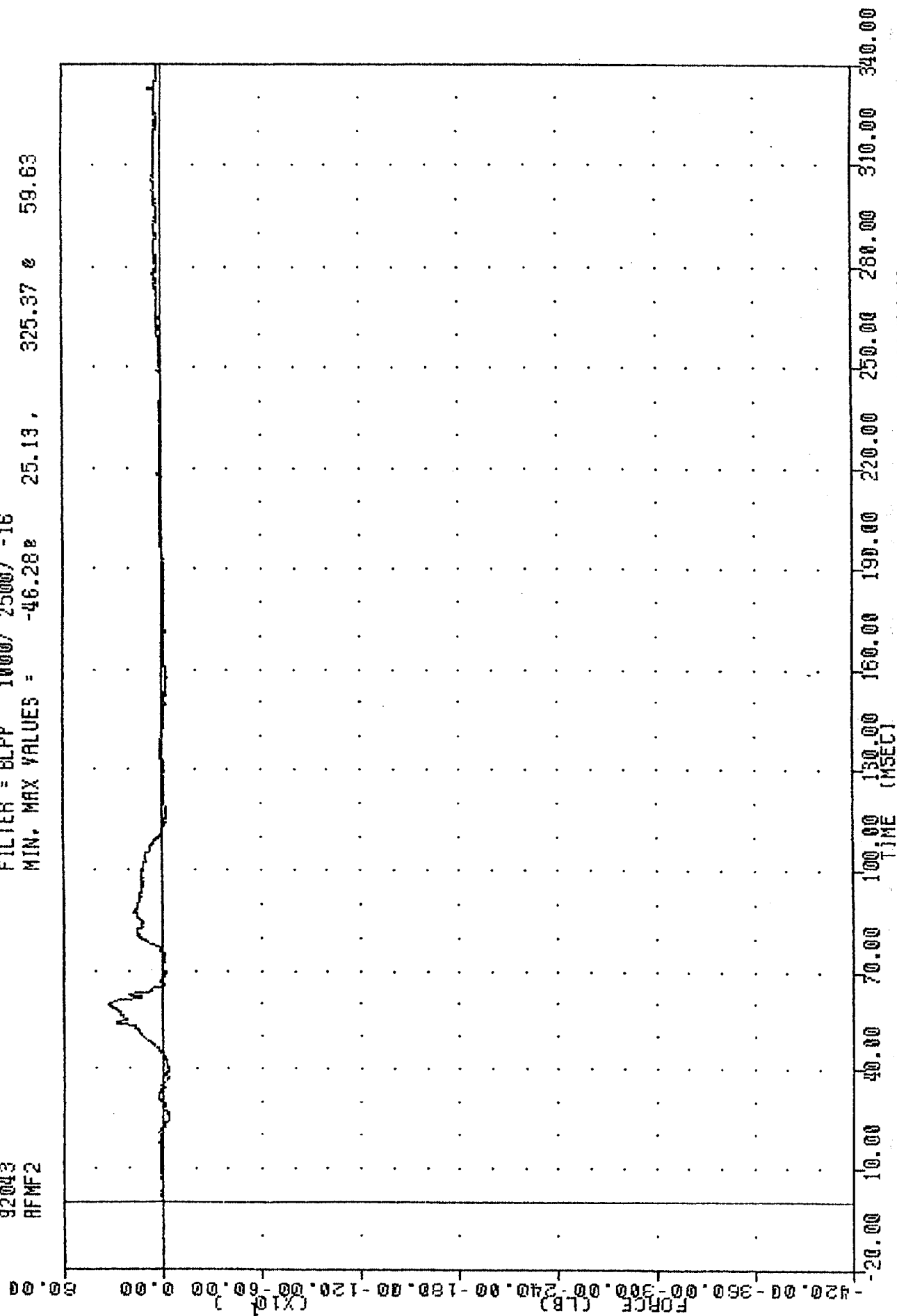
MIN, MAX VALUES = -974.18 76.88 242.58 51.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 AFMF2

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -46.28% 25.13, 325.37 & 59.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER RIGHT FEMUR FORCE

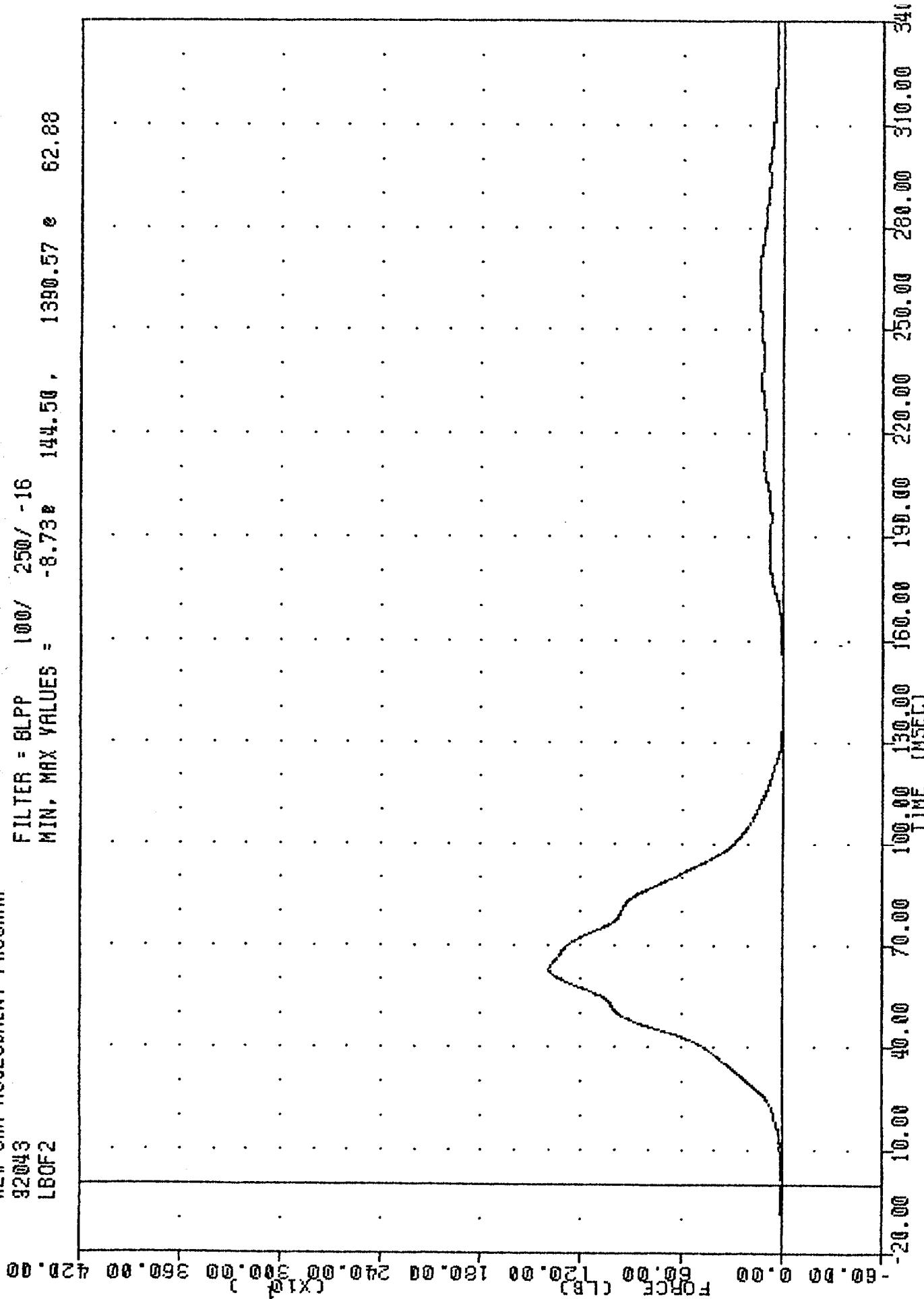
NEW CAR ASSESSMENT PROGRAM

32043

LB0F2

FILTER = BLPP 100/ 250/ -16

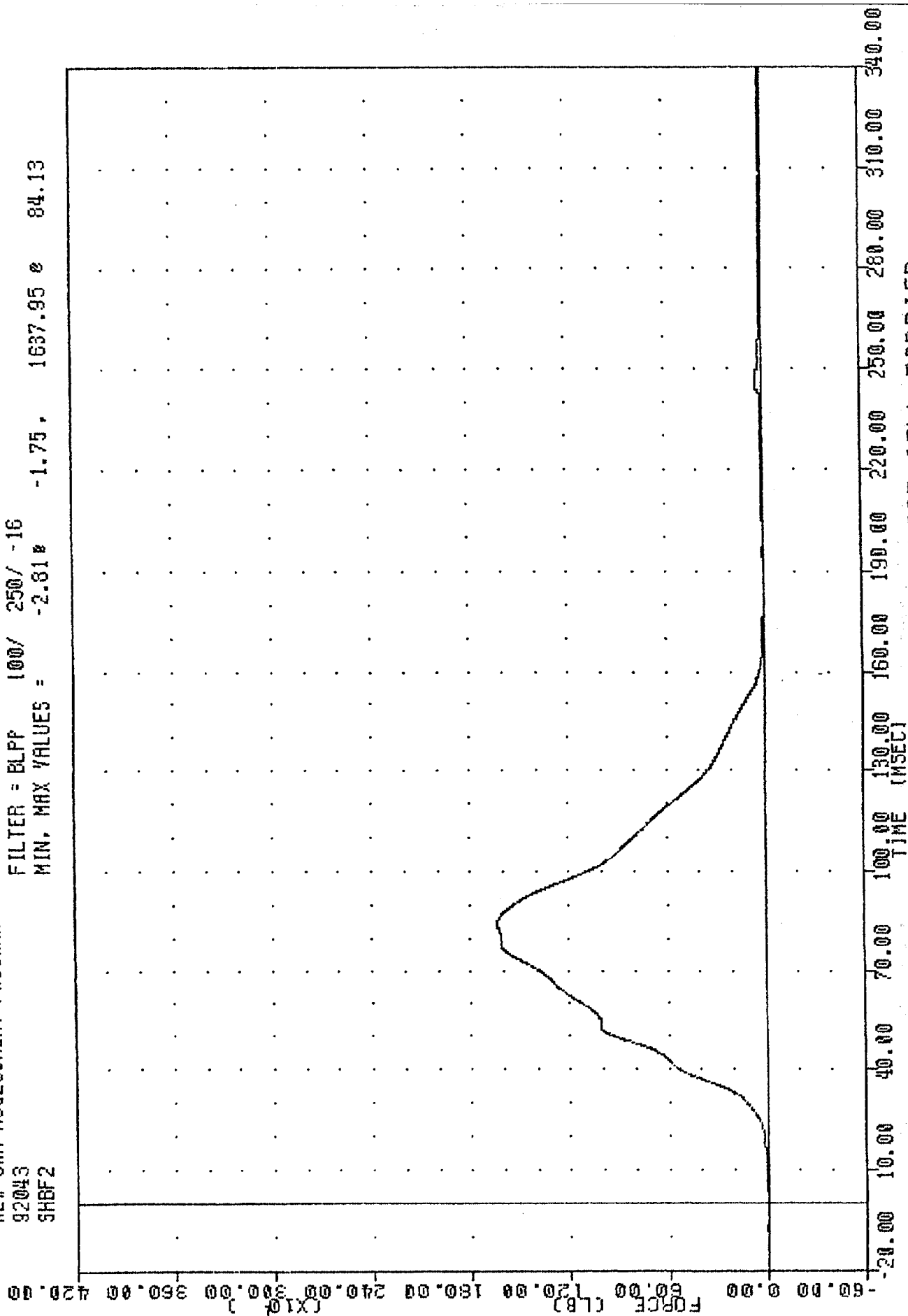
MIN. MAX VALUES = -8.73 144.50 , 1390.57 62.88



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 5HBF2

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2.81 1637.95 84.13



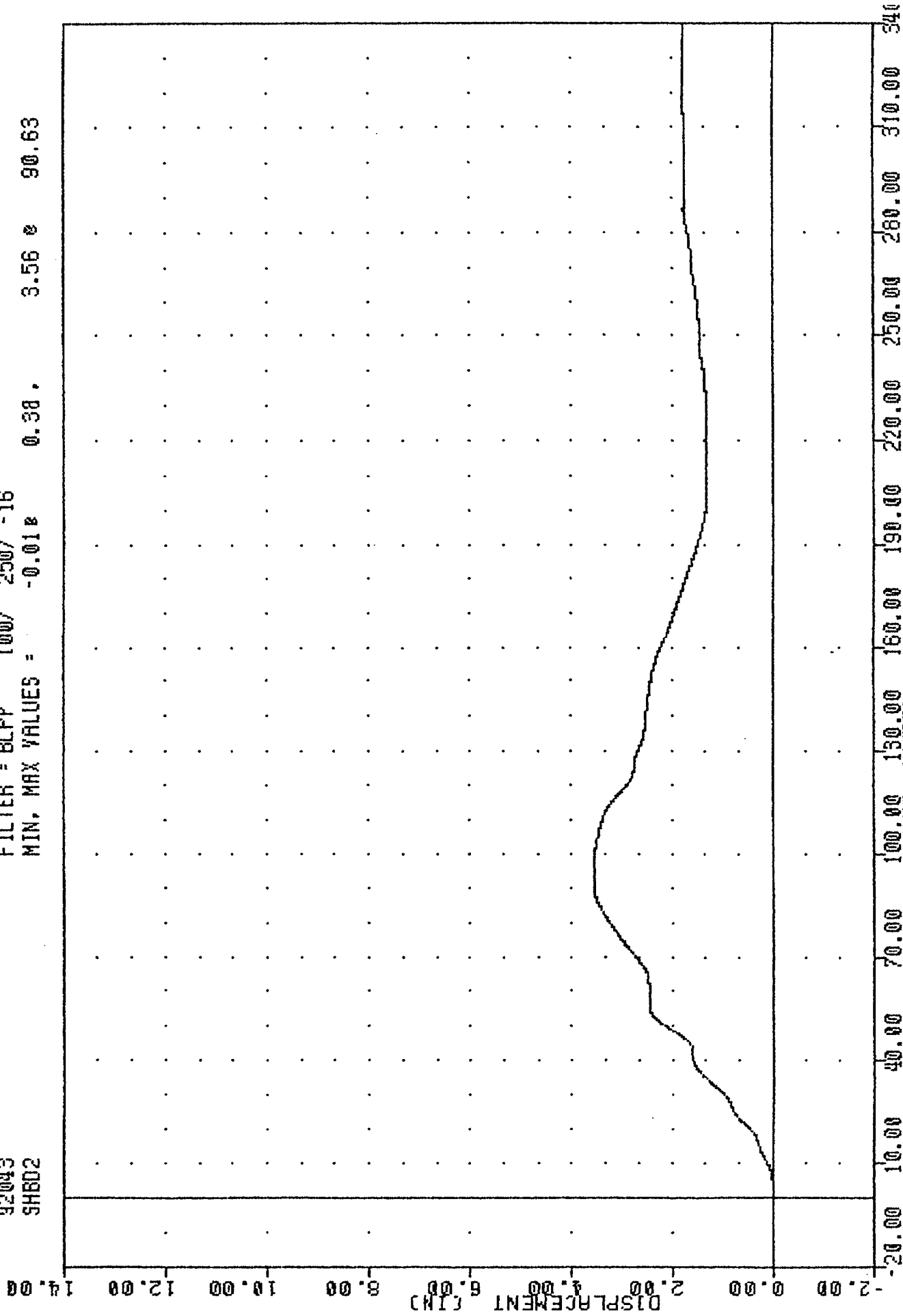
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER SHOULDER BELT FORCE

NEW CAR ASSESSMENT PROGRAM

92043
SHED2

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -0.018 0.38

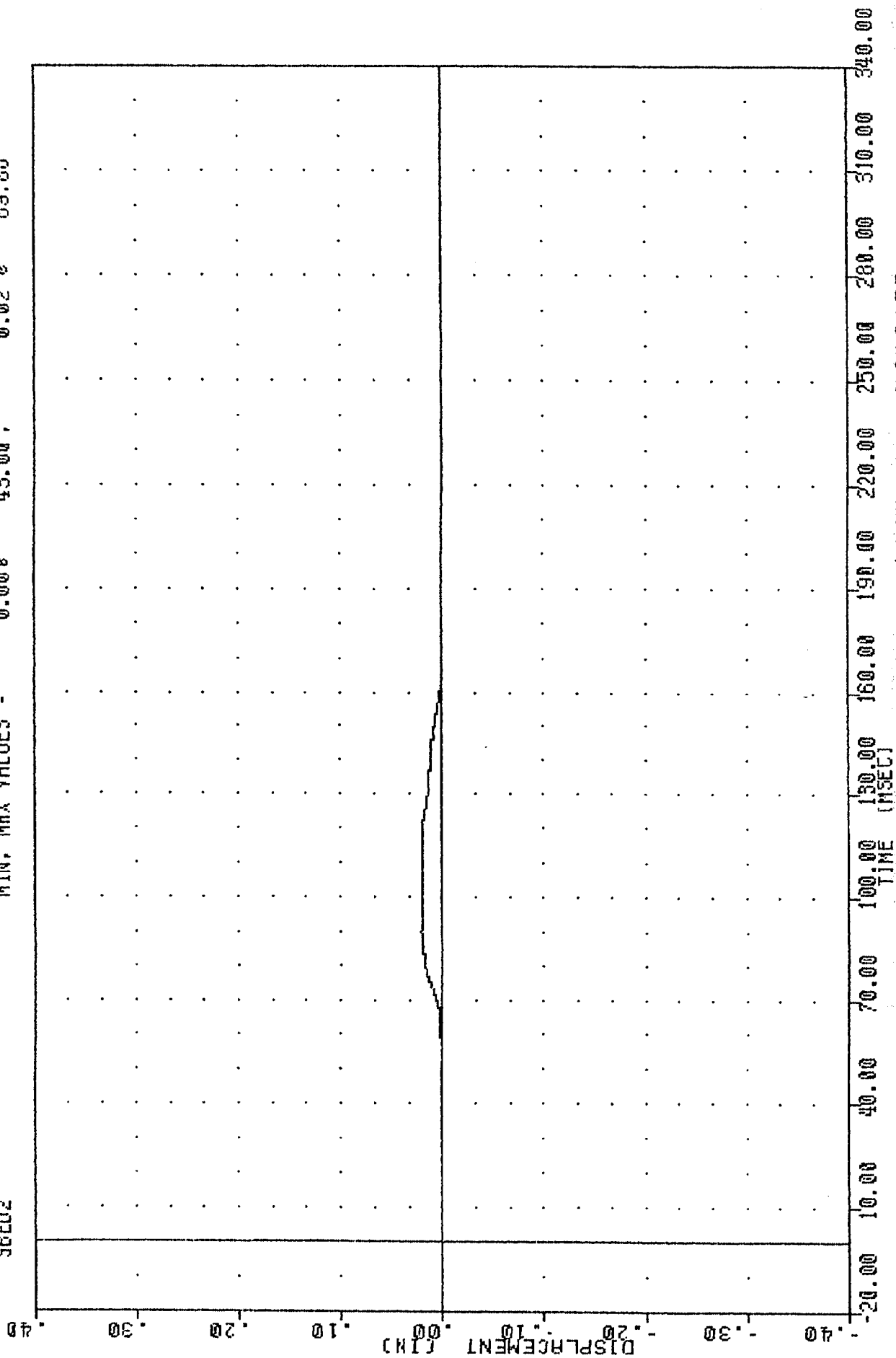
3.56 90.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 SEED2

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.000 43.00 , 0.02 e 89.88



B-36

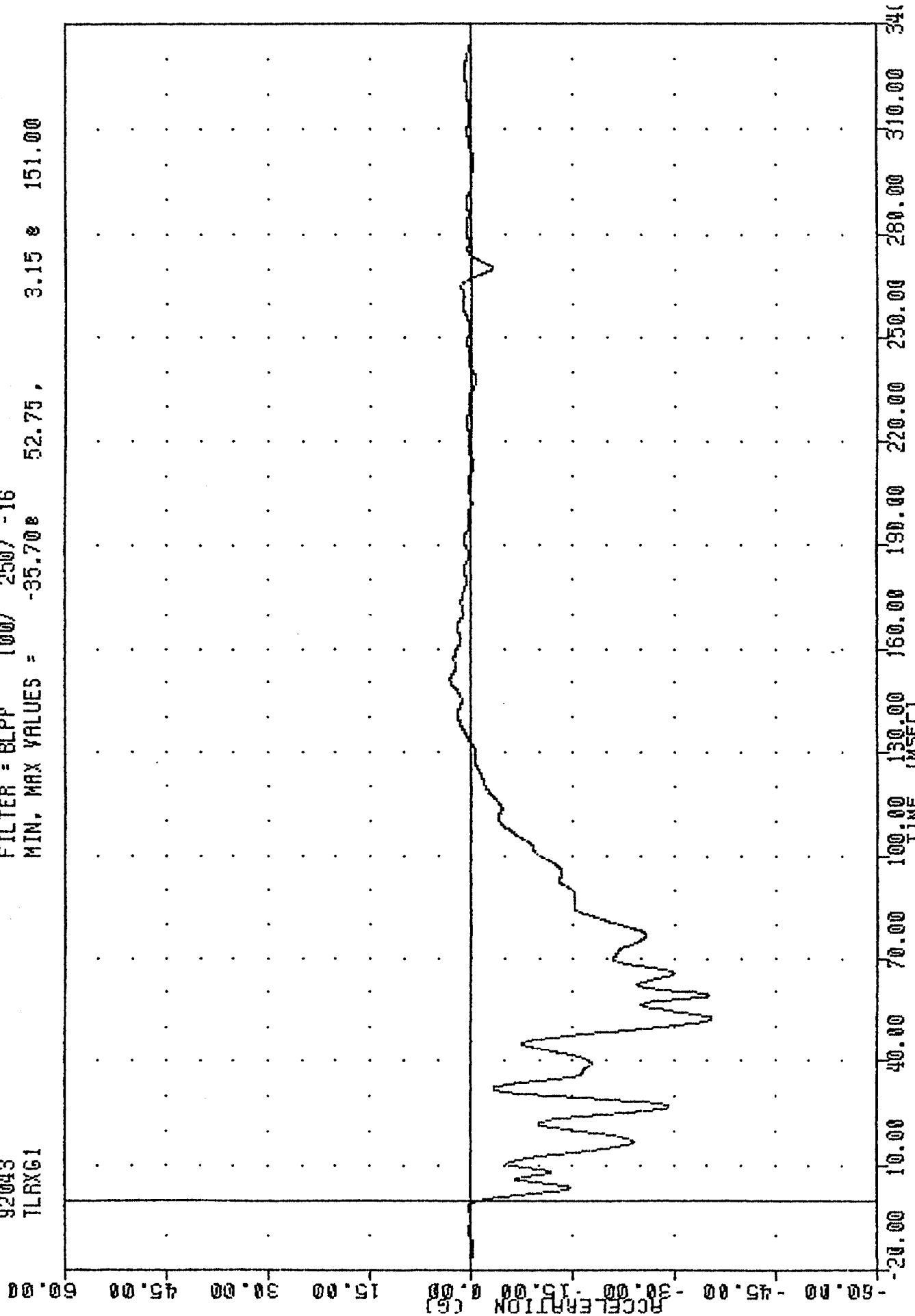
920212

1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER SEAT BELT EXTENSION

NEW CAR ASSESSMENT PROGRAM

92043
TLRXG1

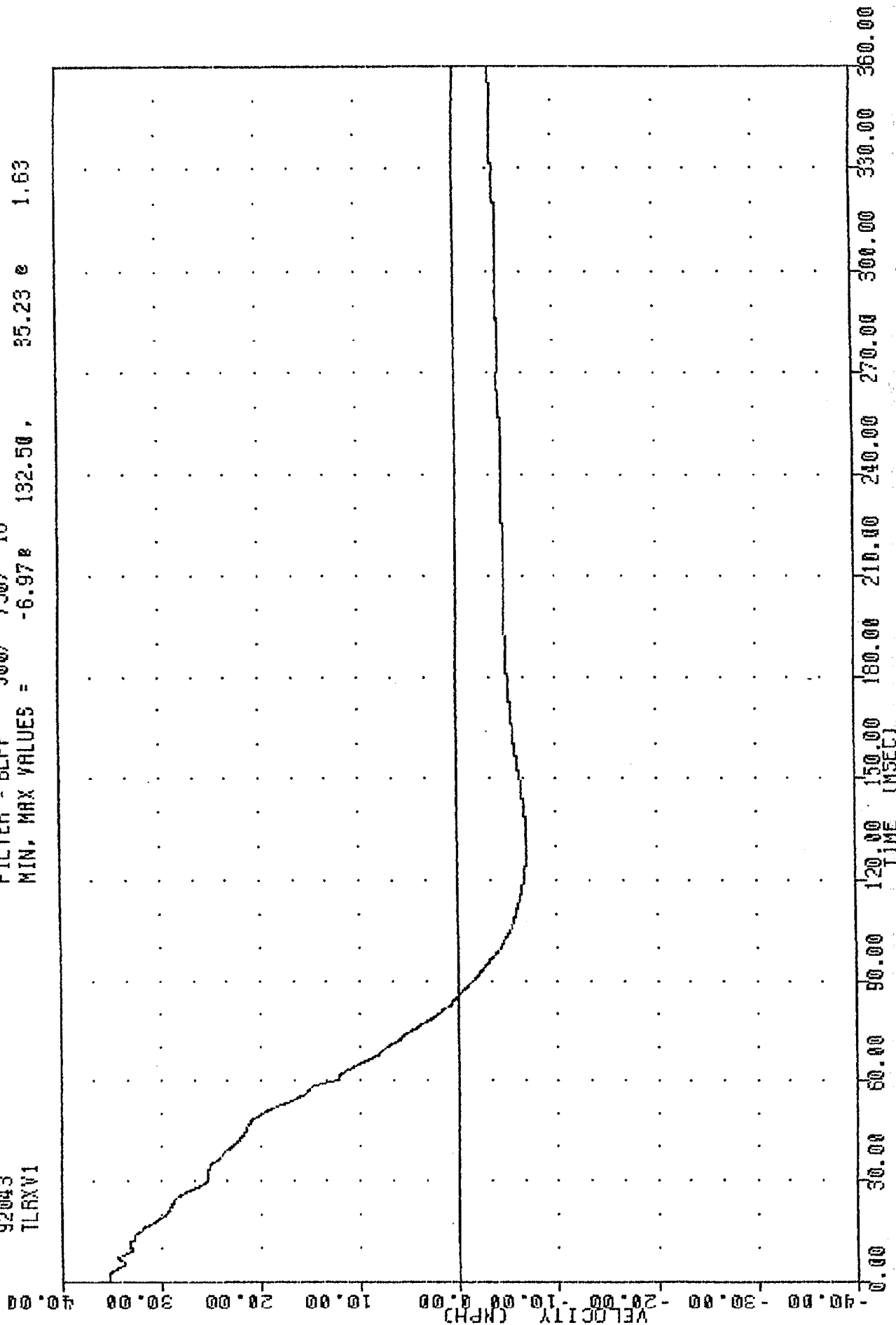
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -35.70 52.75, 3.15 151.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 TLRXV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -6.97 132.50, 35.23 1.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LEFT REAR SEAT X-AXIS VELOCITY

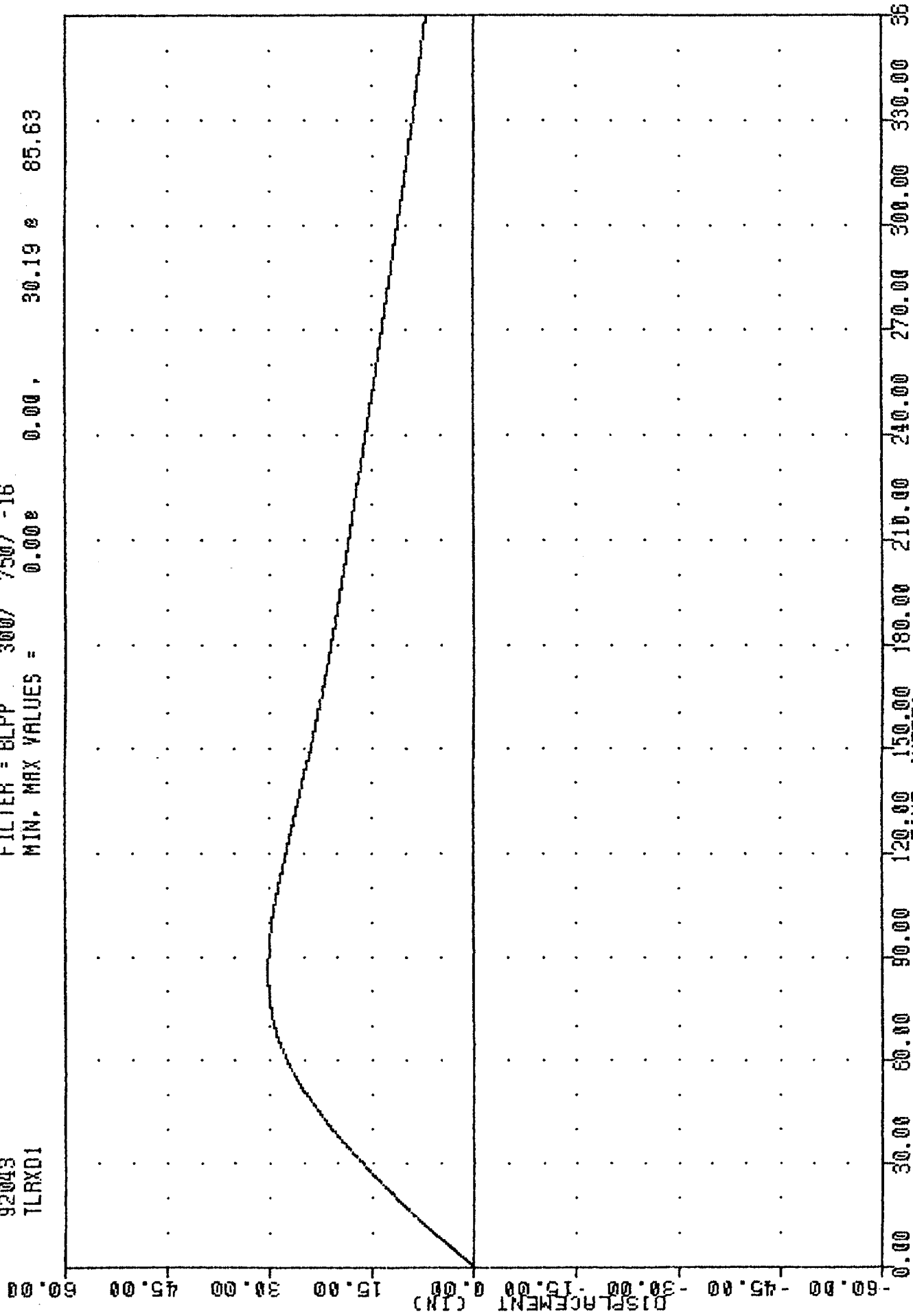
NEW CAR ASSESSMENT PROGRAM

92043

TLRXD1

FILTER = BLPP 300/ 750/ -16

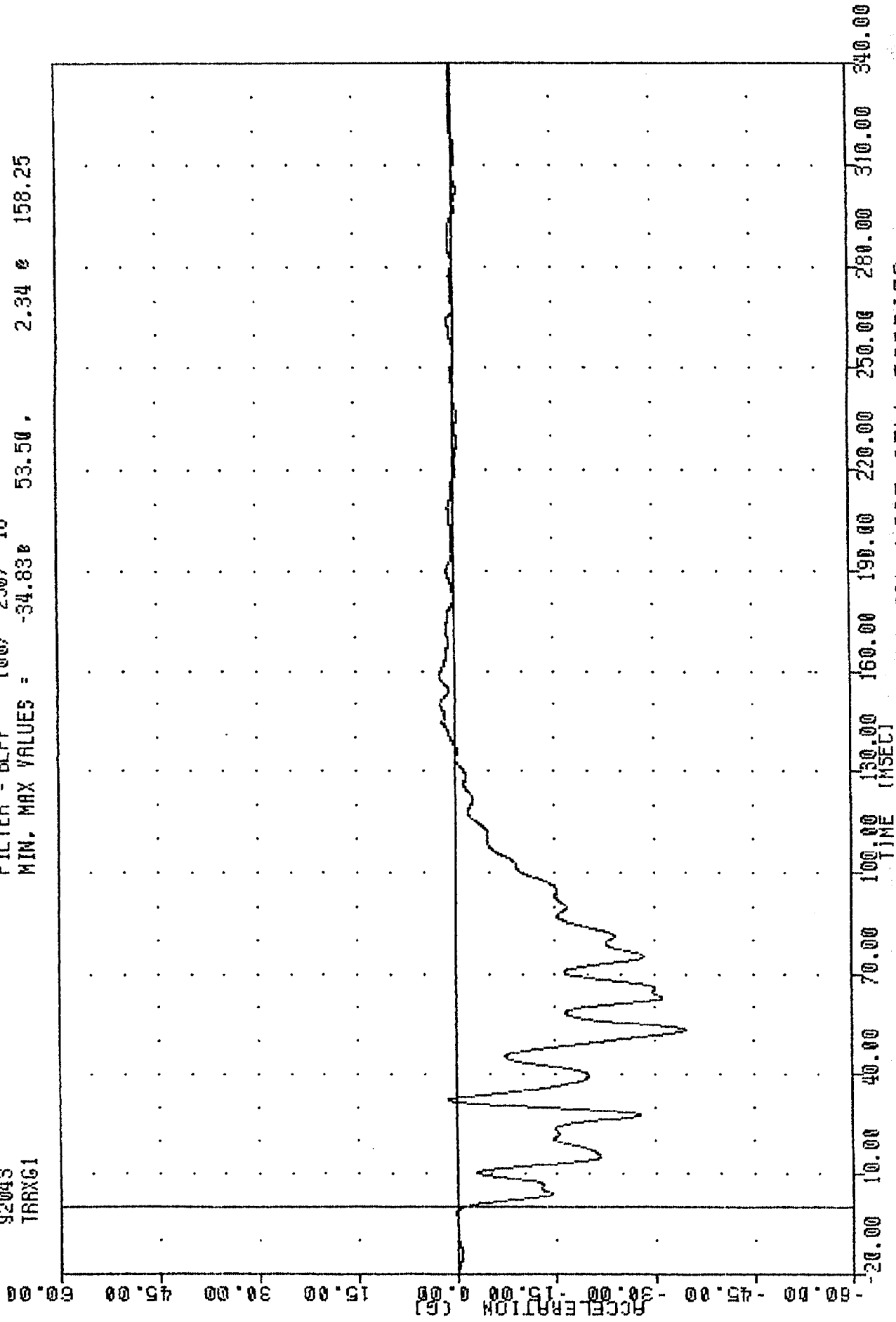
MIN. MAX VALUES = 0.00e 0.00, 30.19 e 85.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS DISPLACEMENT

TRC , 920212
NEW CAR ASSESSMENT PROGRAM
92043
TRAXG1

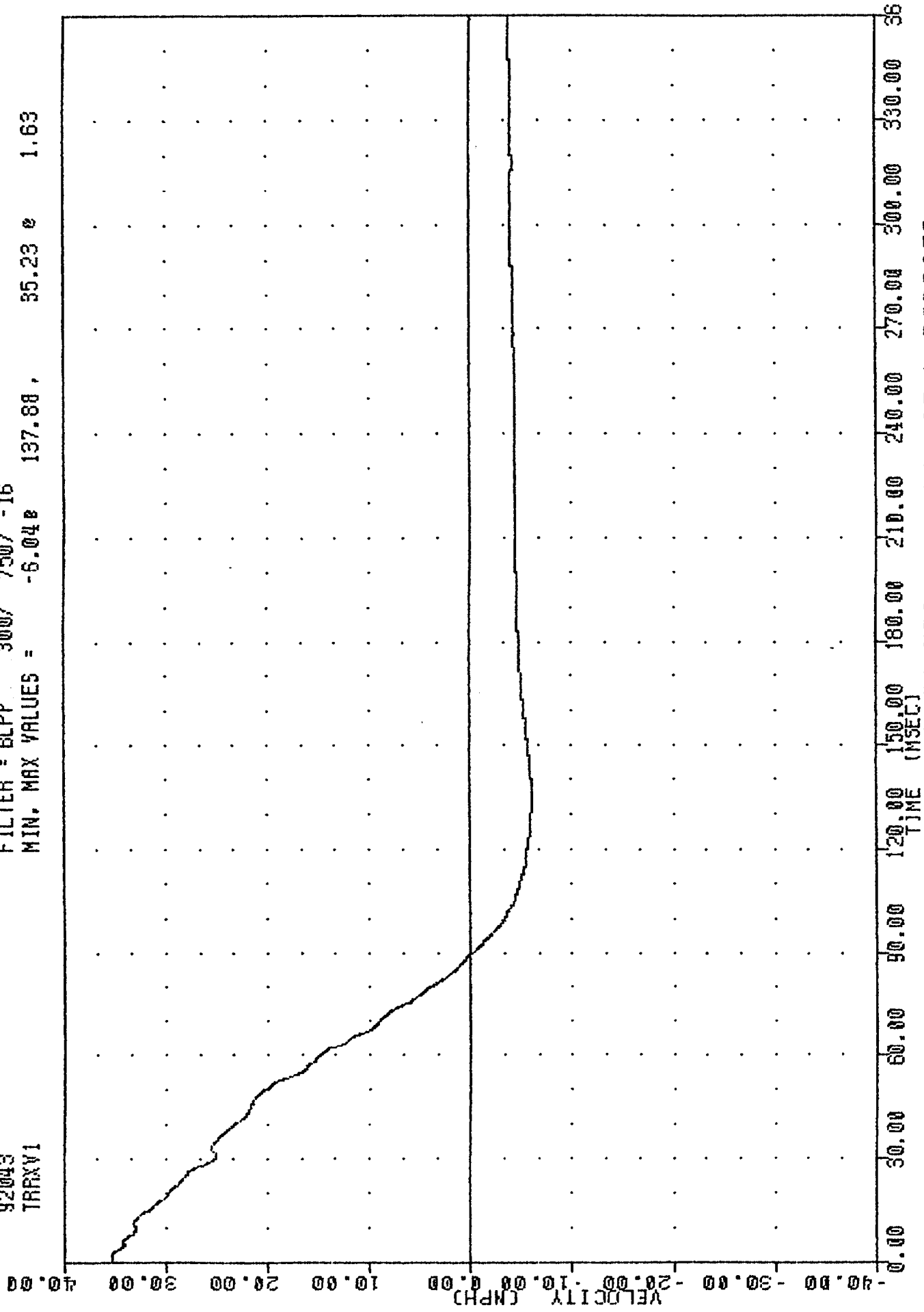
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -34.83 53.50 2.34 158.25



NEW CAR ASSESSMENT PROGRAM

92043
TRRXV1

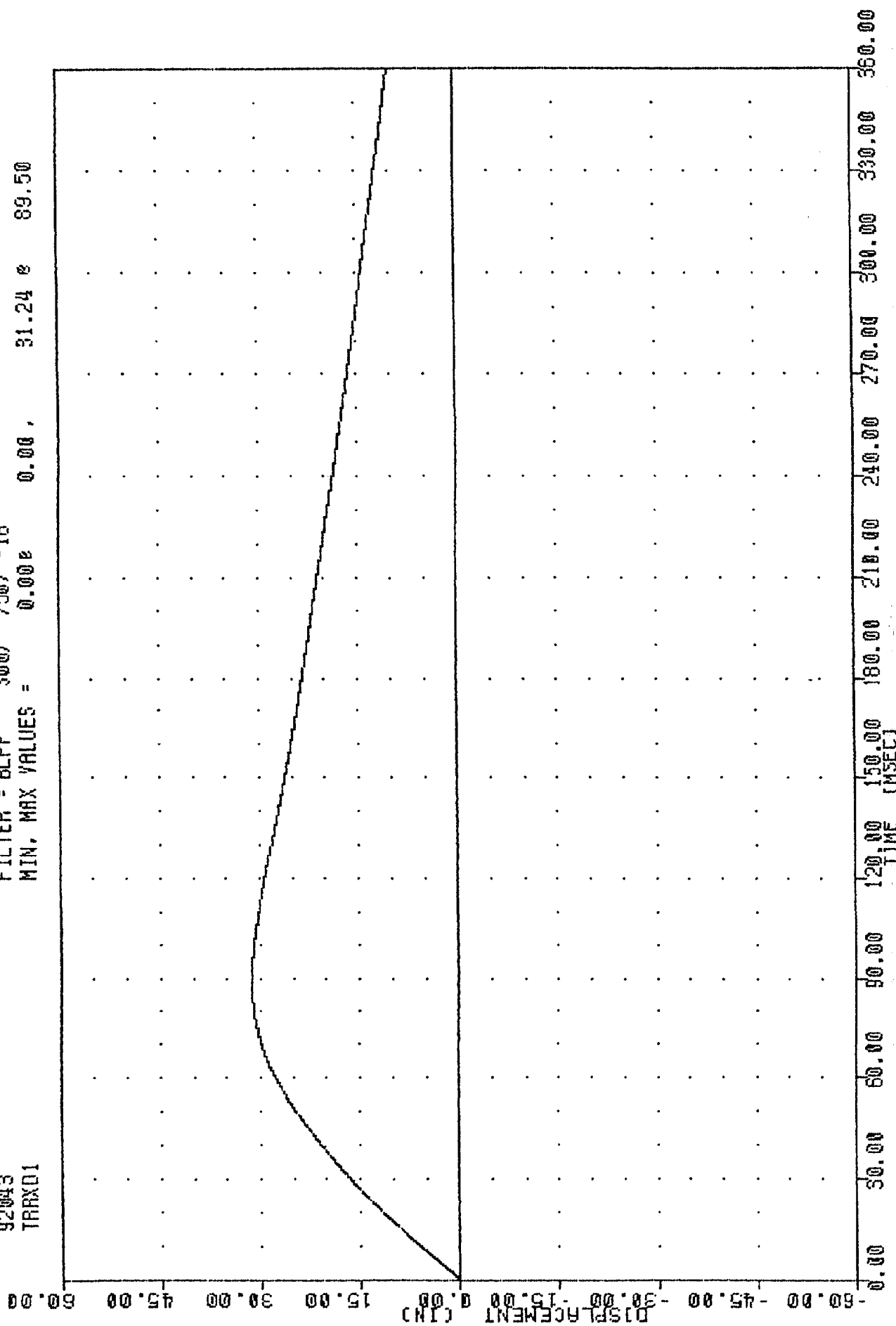
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -5.048 137.88, 35.23 1.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 TRXD1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00e 0.00 , 31.24 e 89.50



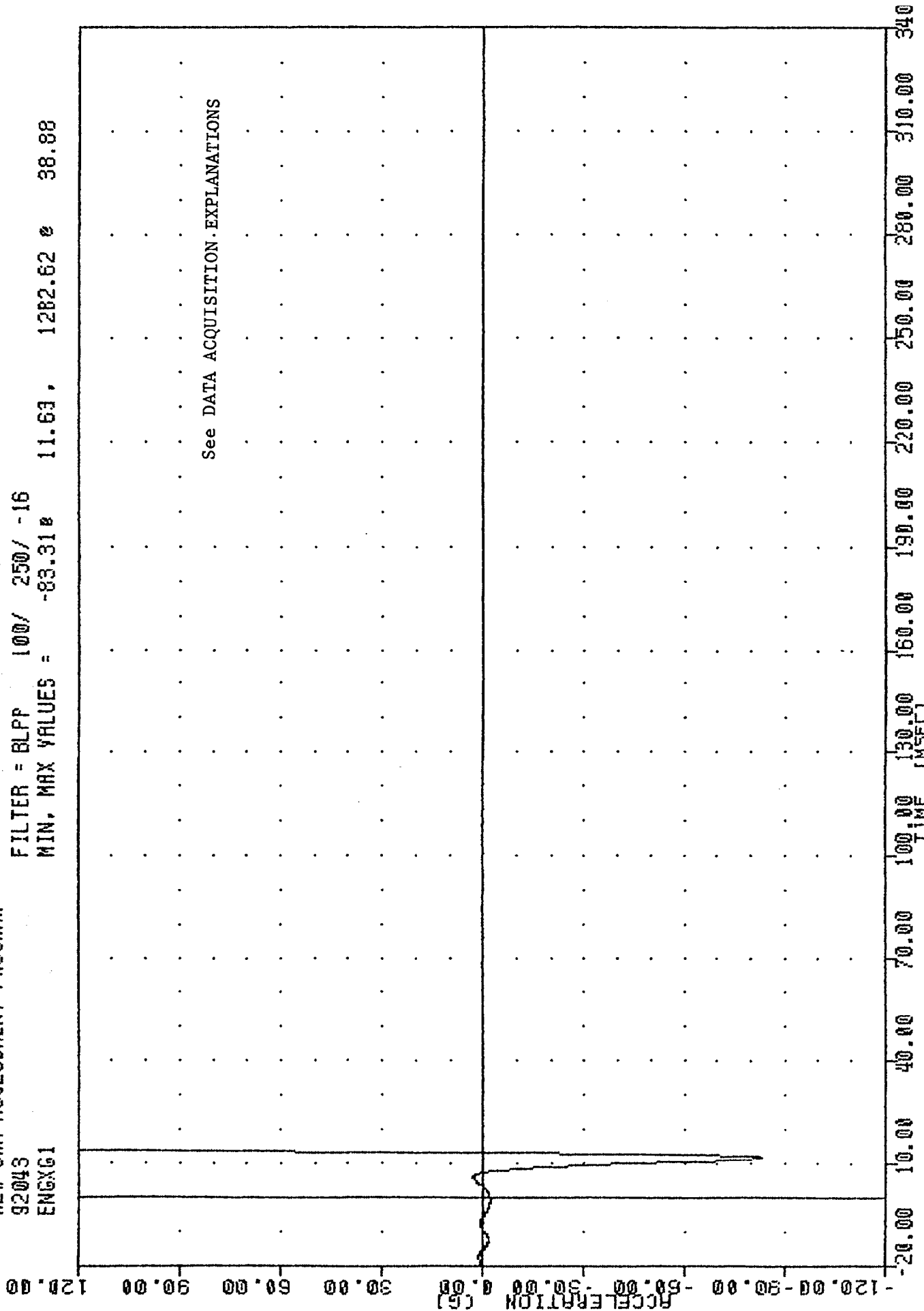
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS DISPLACEMENT

NEW CAR ASSESSMENT PROGRAM

92043
ENGXG1

FILTER = BLPP 100/ 250/ -16

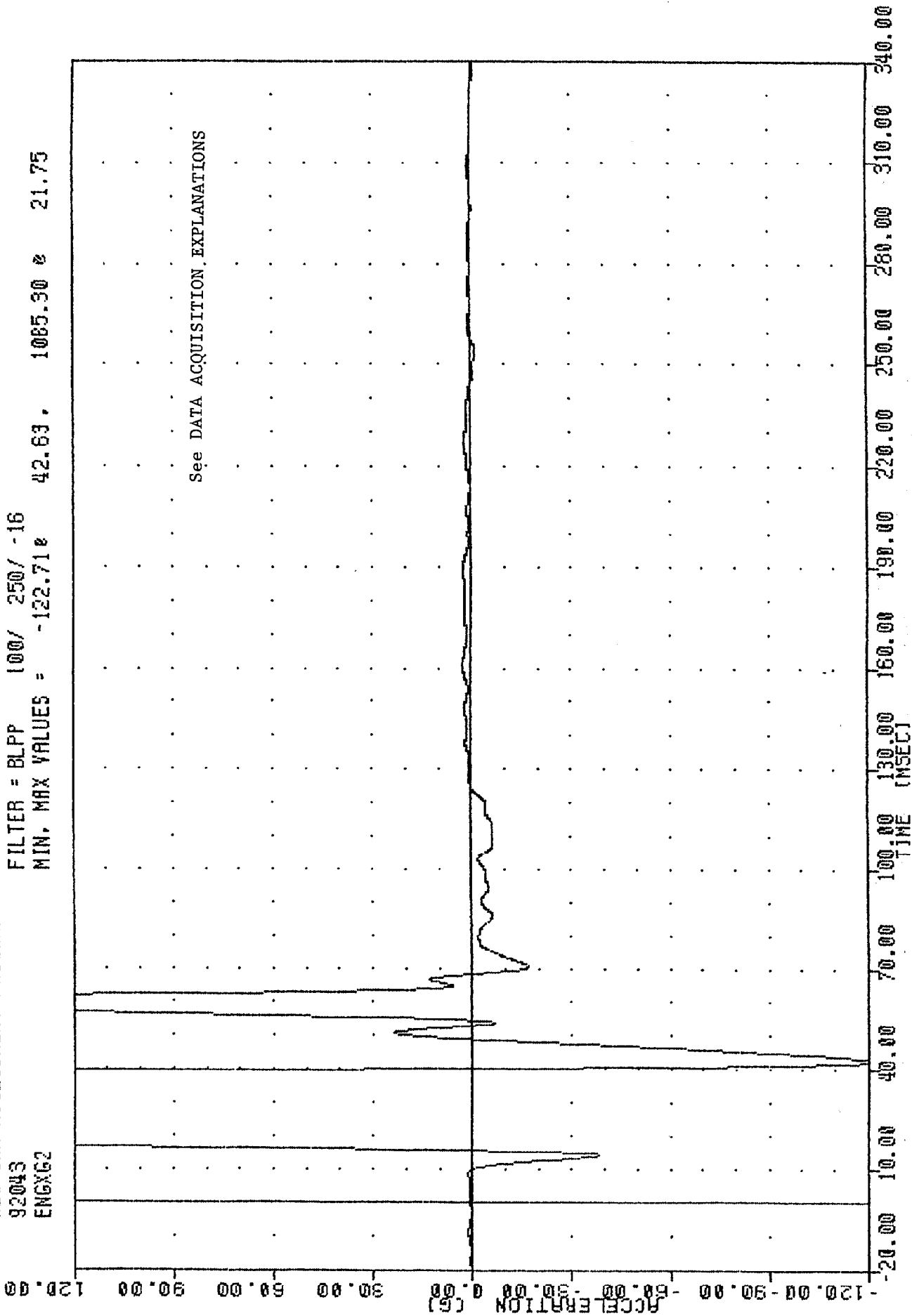
MIN, MAX VALUES = -83.31 11.63, 1282.62 38.88



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
ENGINE TOP X-AXIS ACCELERATION

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 ENGCG2

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -122.71e 42.63, 1085.30 e 21.75



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 ENGINE BOTTOM X-AXIS ACCELERATION

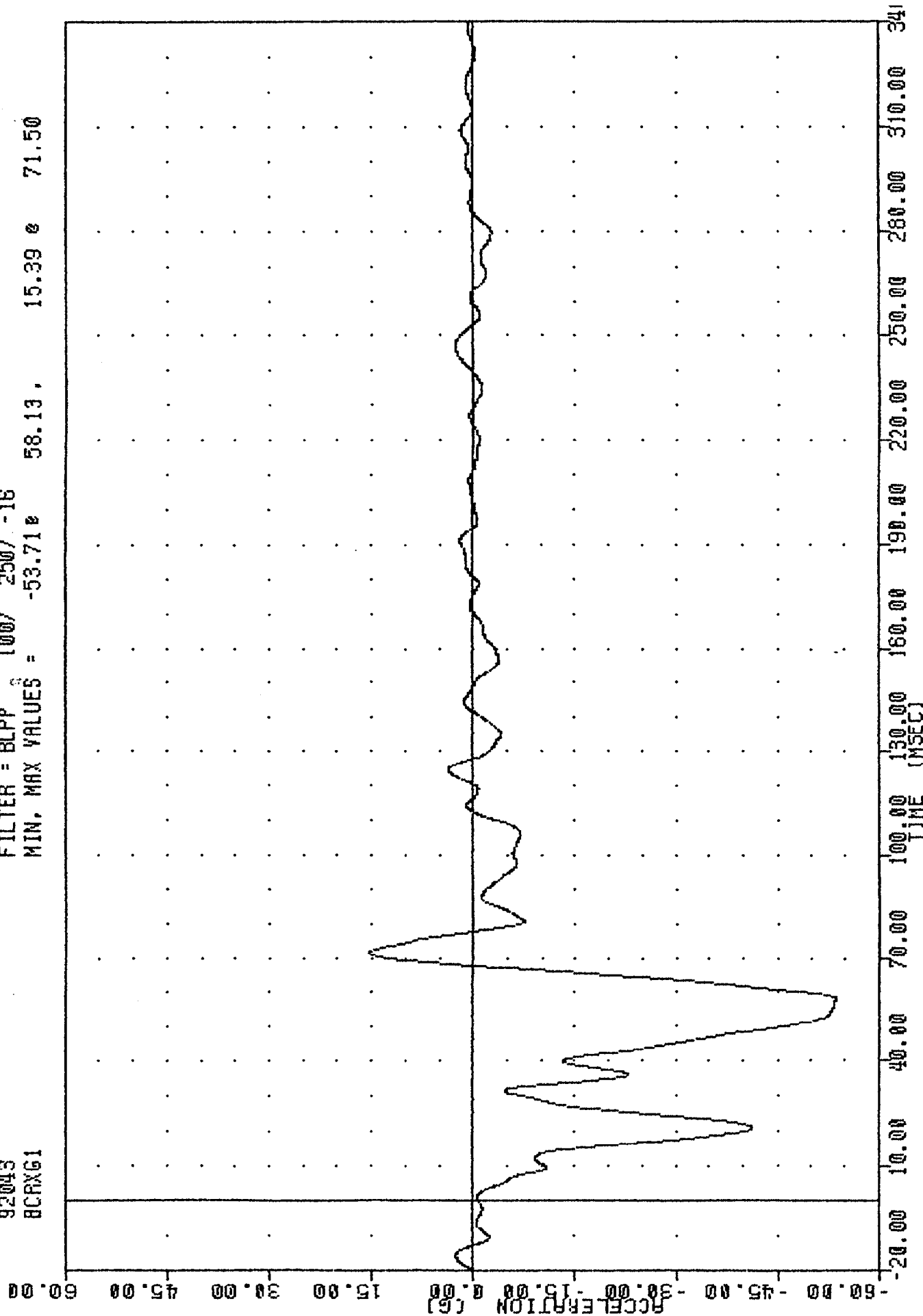
NEW CAR ASSESSMENT PROGRAM

92043

BCRXG1

FILTER = BLPP 100/ 250/ -18

MIN. MAX VALUES = -53.71 58.13 15.39 71.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TRC , 920212
NEW CAR ASSESSMENT PROGRAM

92043

BCLXG1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -63.71 53.63 , 15.38 82.63

45.00

30.00

15.00

0.00

-15.00

-30.00

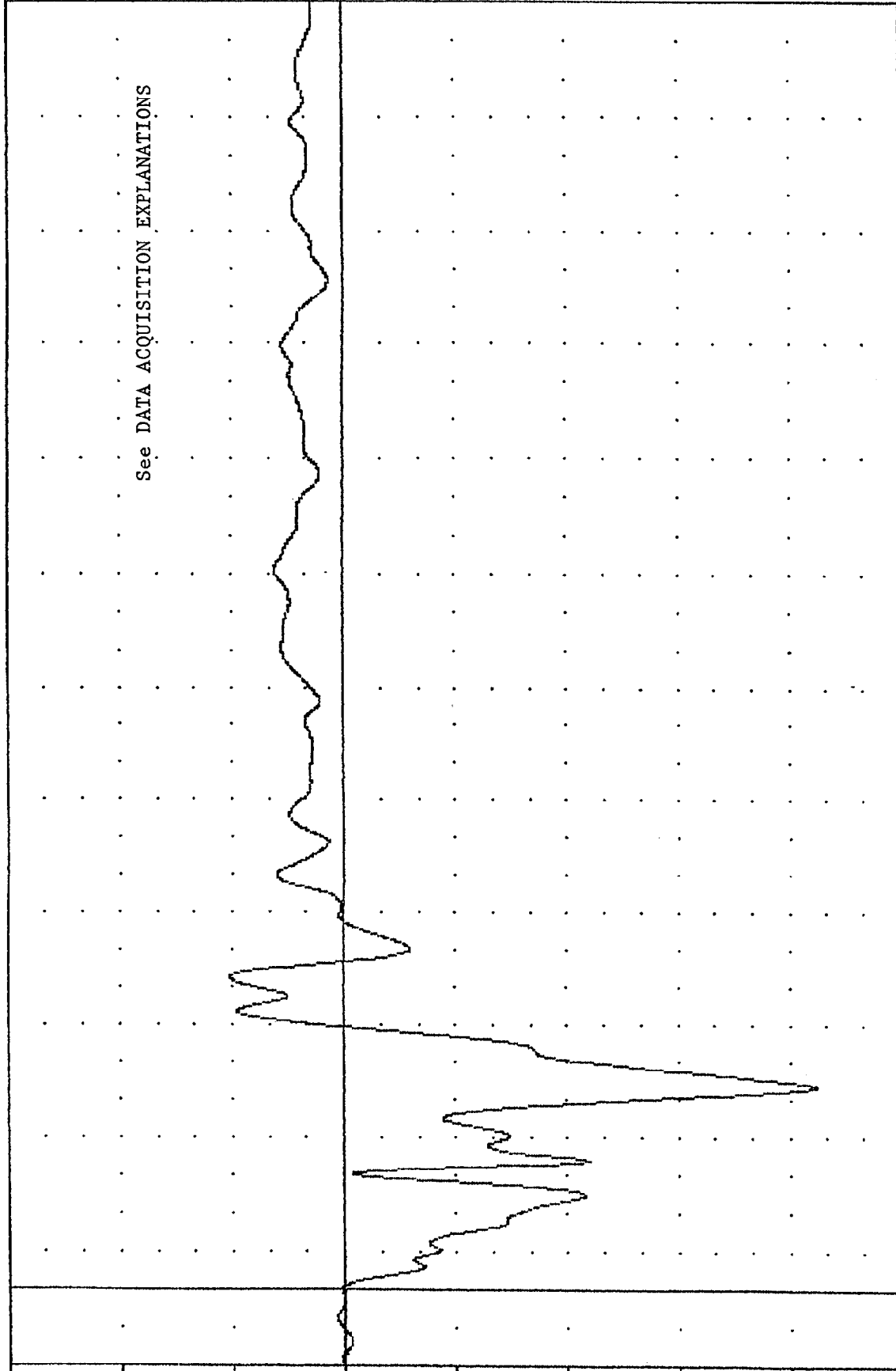
-45.00

-60.00

-75.00

ACCELERATION (G)

See DATA ACQUISITION EXPLANATIONS



-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

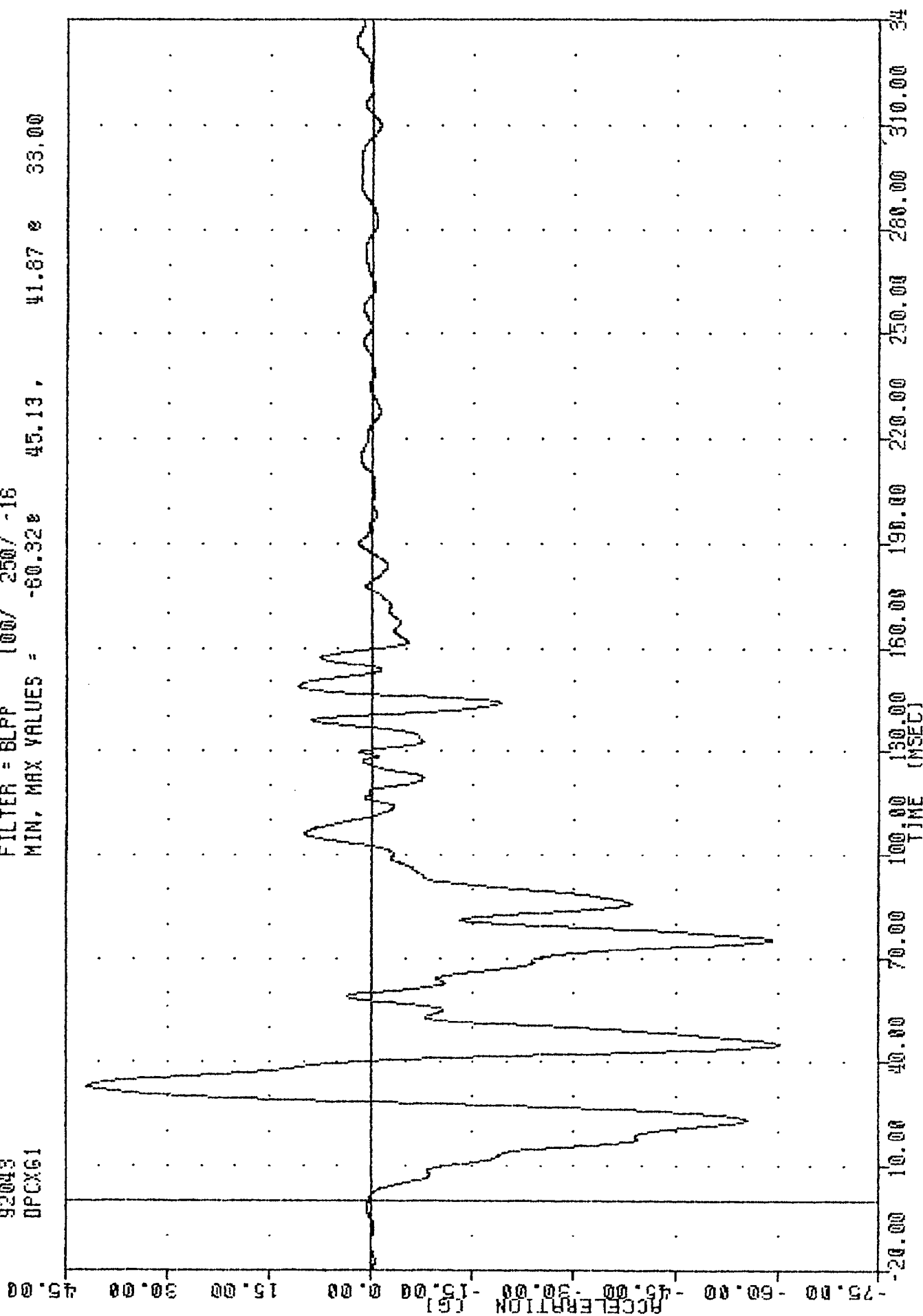
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM

92043
DPCXG1

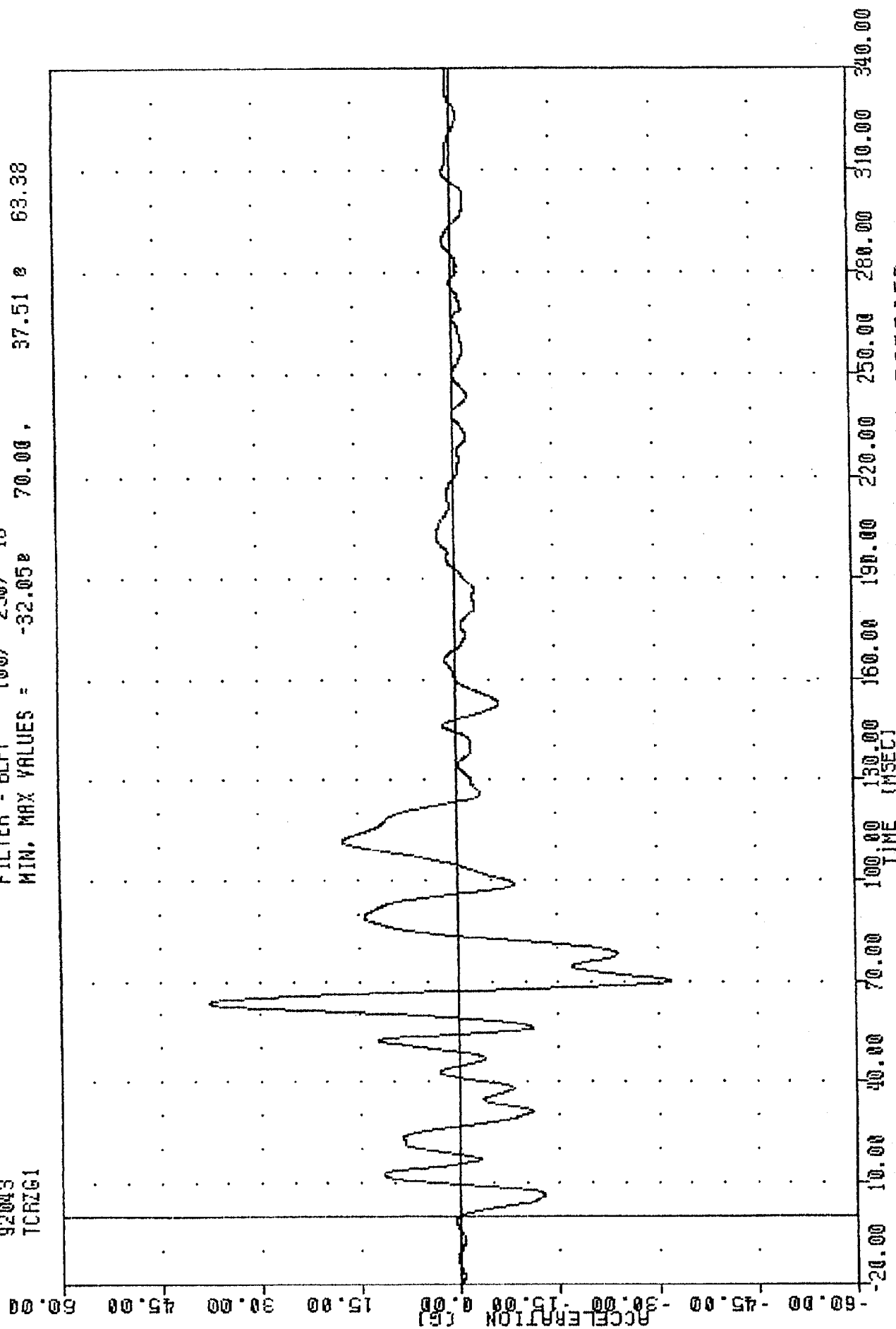
FILTER = BLPP 100/ 250/ -18

MIN, MAX VALUES = -60.32% 45.13, 41.87 & 33.00



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 TCRZG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -32.05 70.00 , 37.51 63.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 REAR SEAT CROSSMEMBER Z-AXIS ACCELERATION

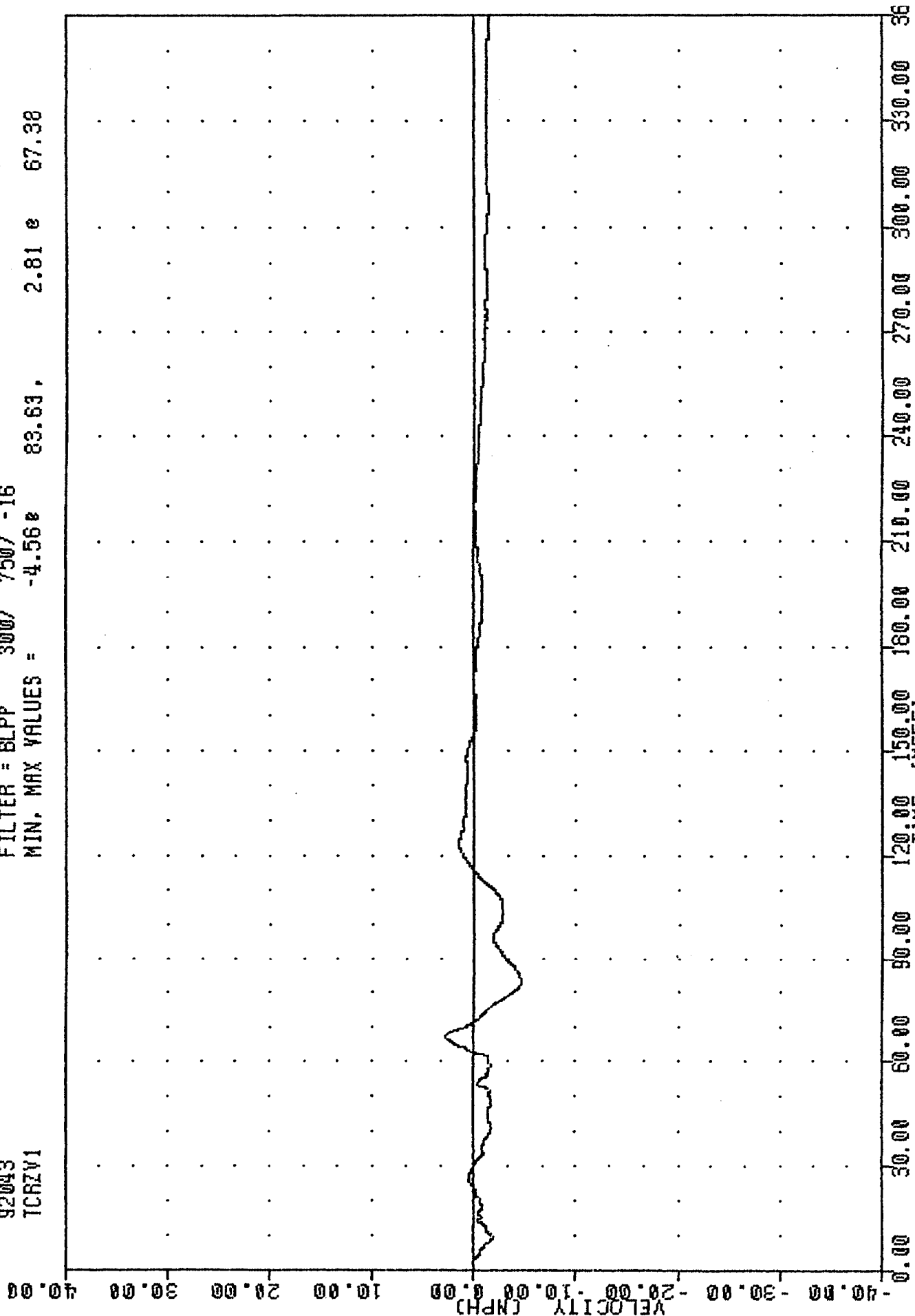
NEW CAR ASSESSMENT PROGRAM

92043

TCRZV1

FILTER = BLPP 300/ 750/ -16

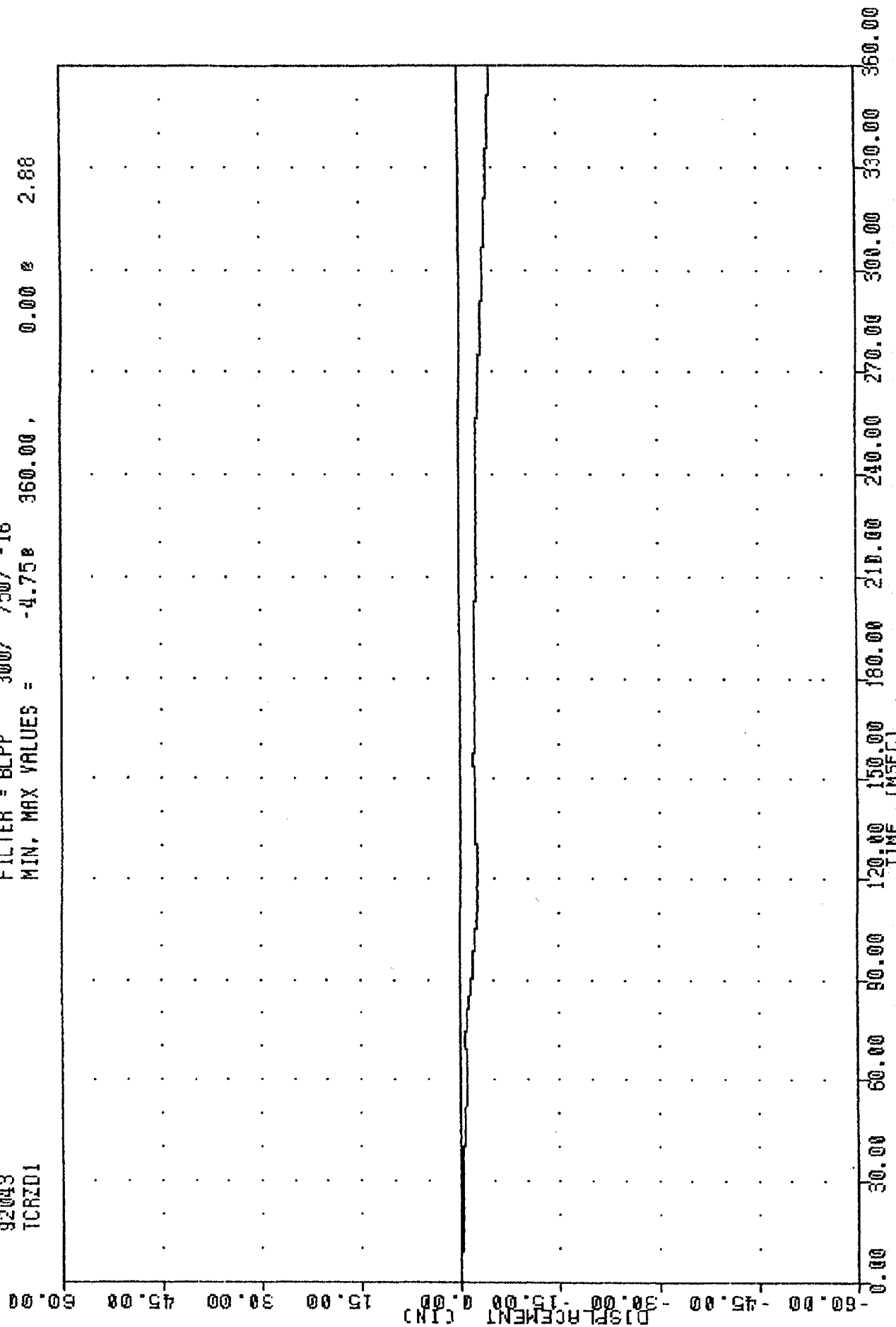
MIN, MAX VALUES = -4.56e 83.63, 2.81 e 67.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS VELOCITY

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 TCRZD1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -4.75B 360.00 , 0.00 2.88

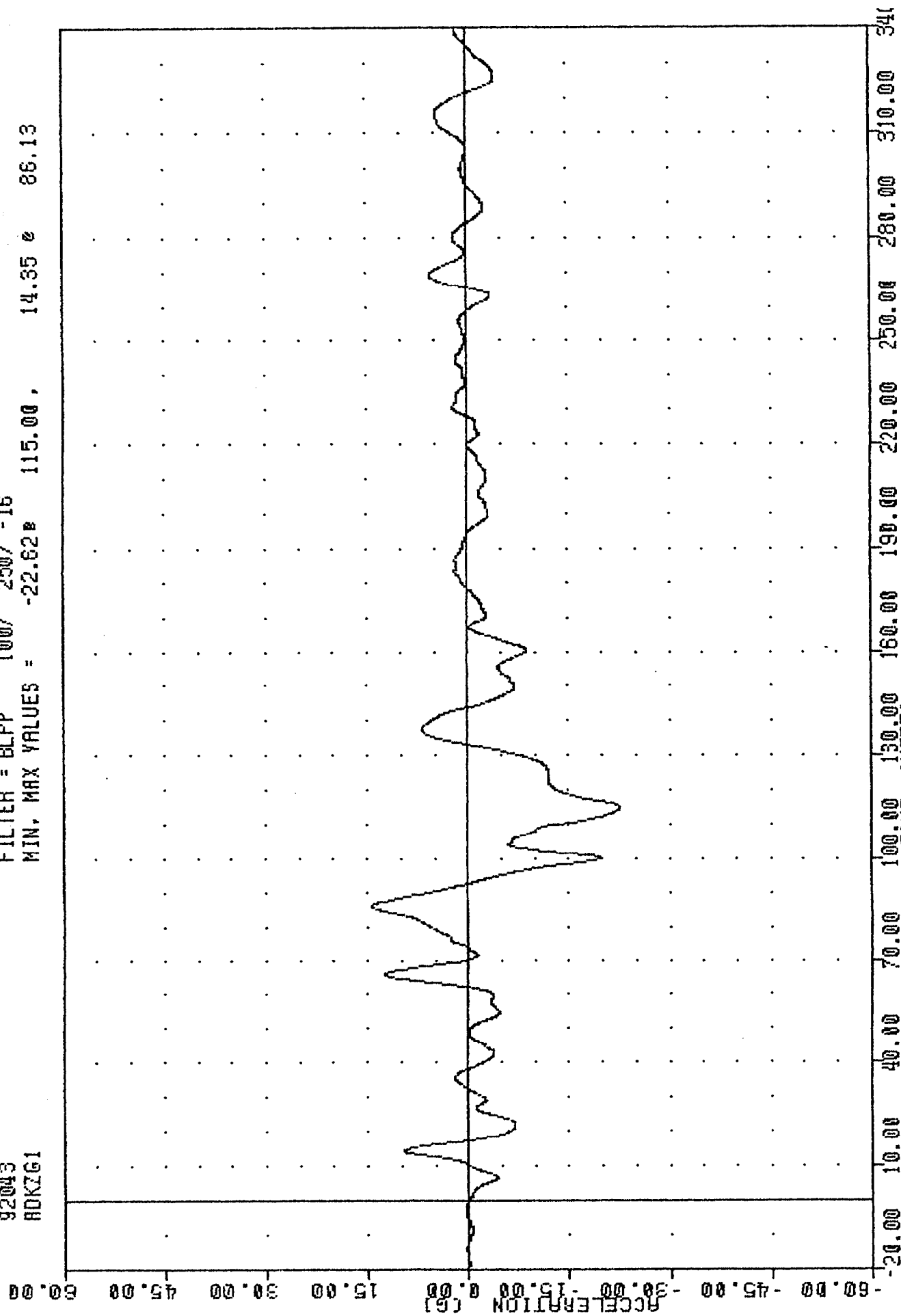


1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 REAR SEAT CROSSMEMBER 7-AXIS DISPLACEMENT

NEW CAR ASSESSMENT PROGRAM

92043
ADKZG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -22.62 115.00, 14.35 86.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

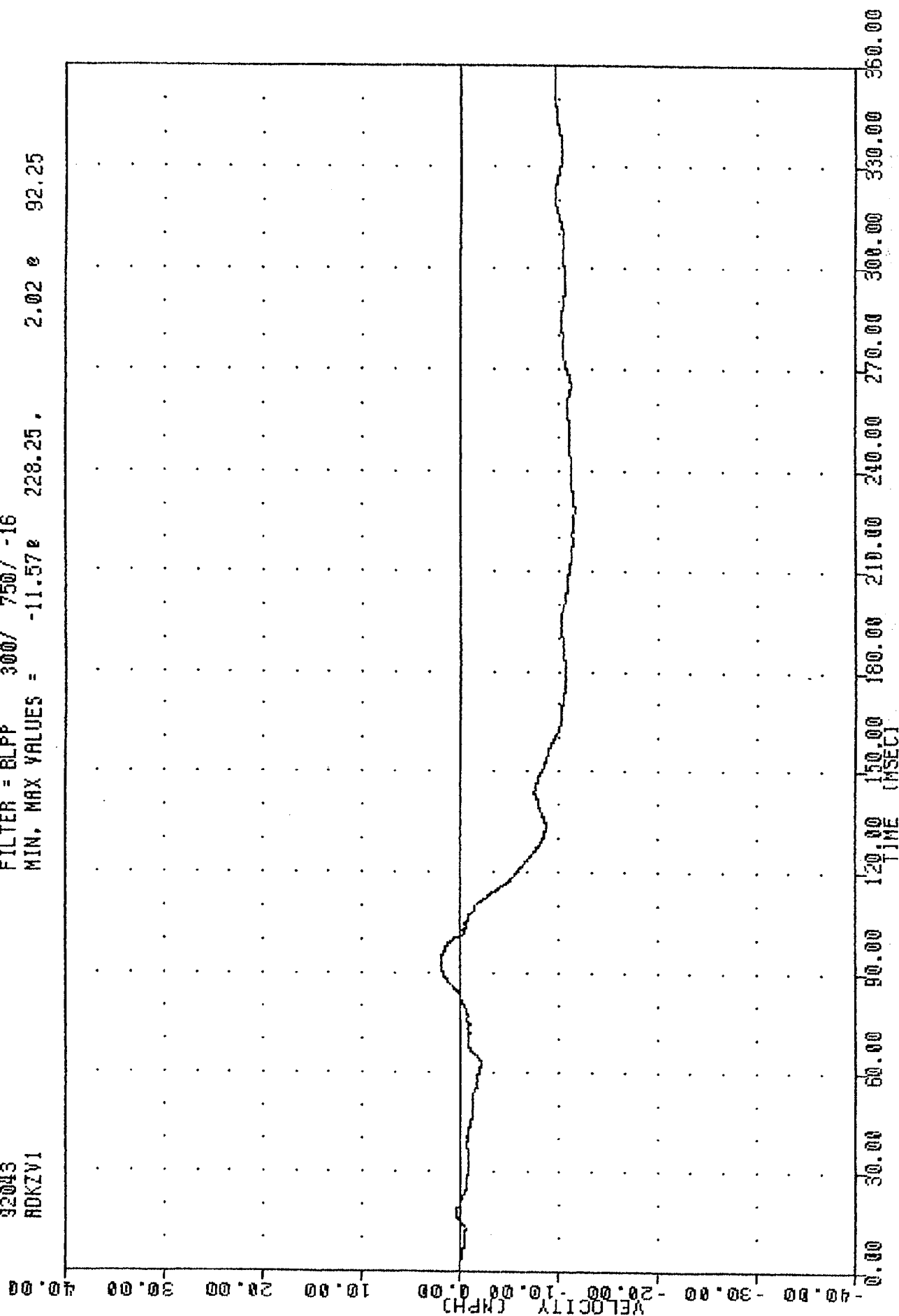
TRC , 920212
NEW CAR ASSESSMENT PROGRAM

92043

ADKZV1

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -11.57 228.25, 2.02 92.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER

VEHICLE REAR CENTER 7-AXIS VELOCITY

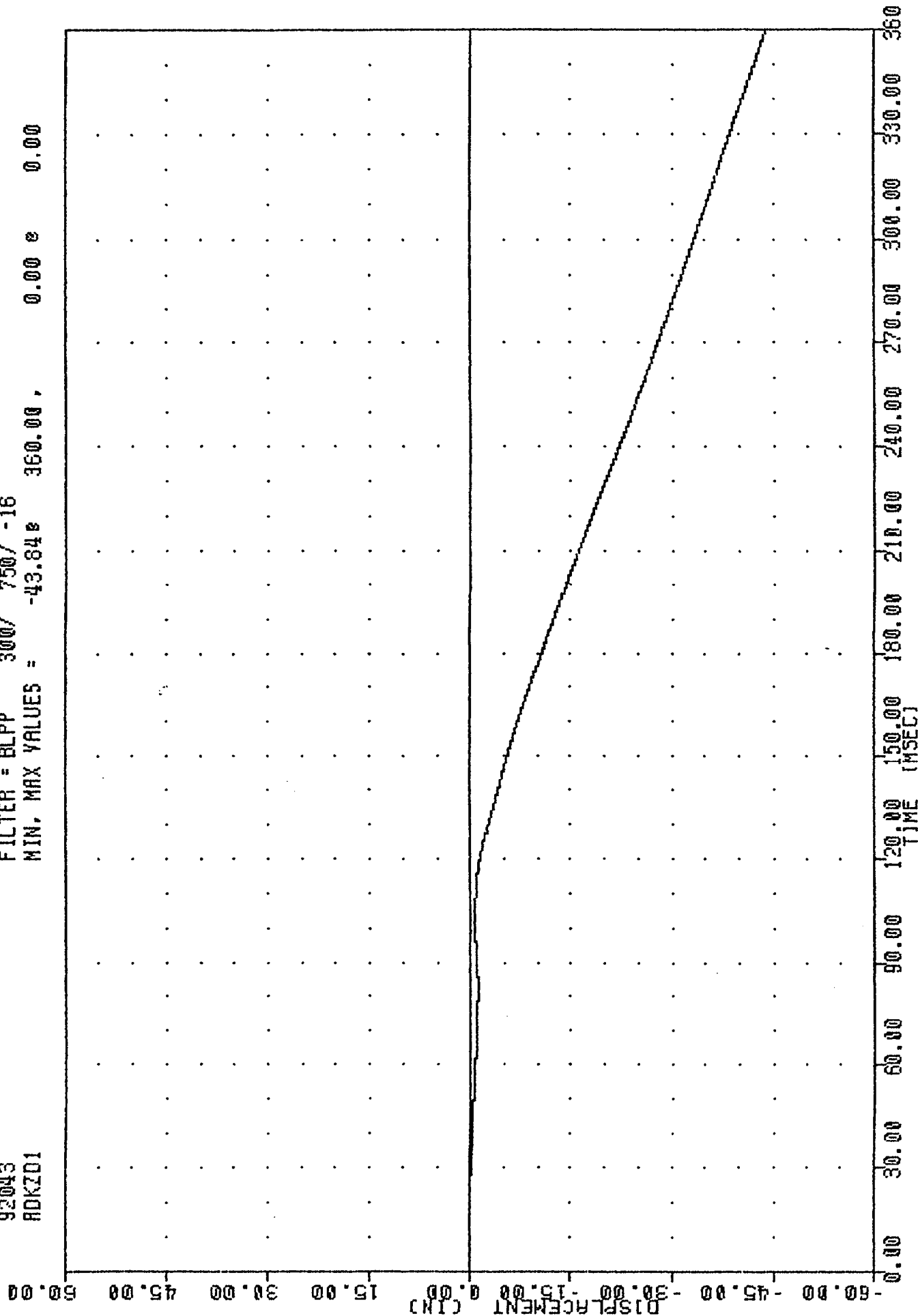
NEW CAR ASSESSMENT PROGRAM

92043

ADKID1

FILTER = BLPP 300/ 750/ -16

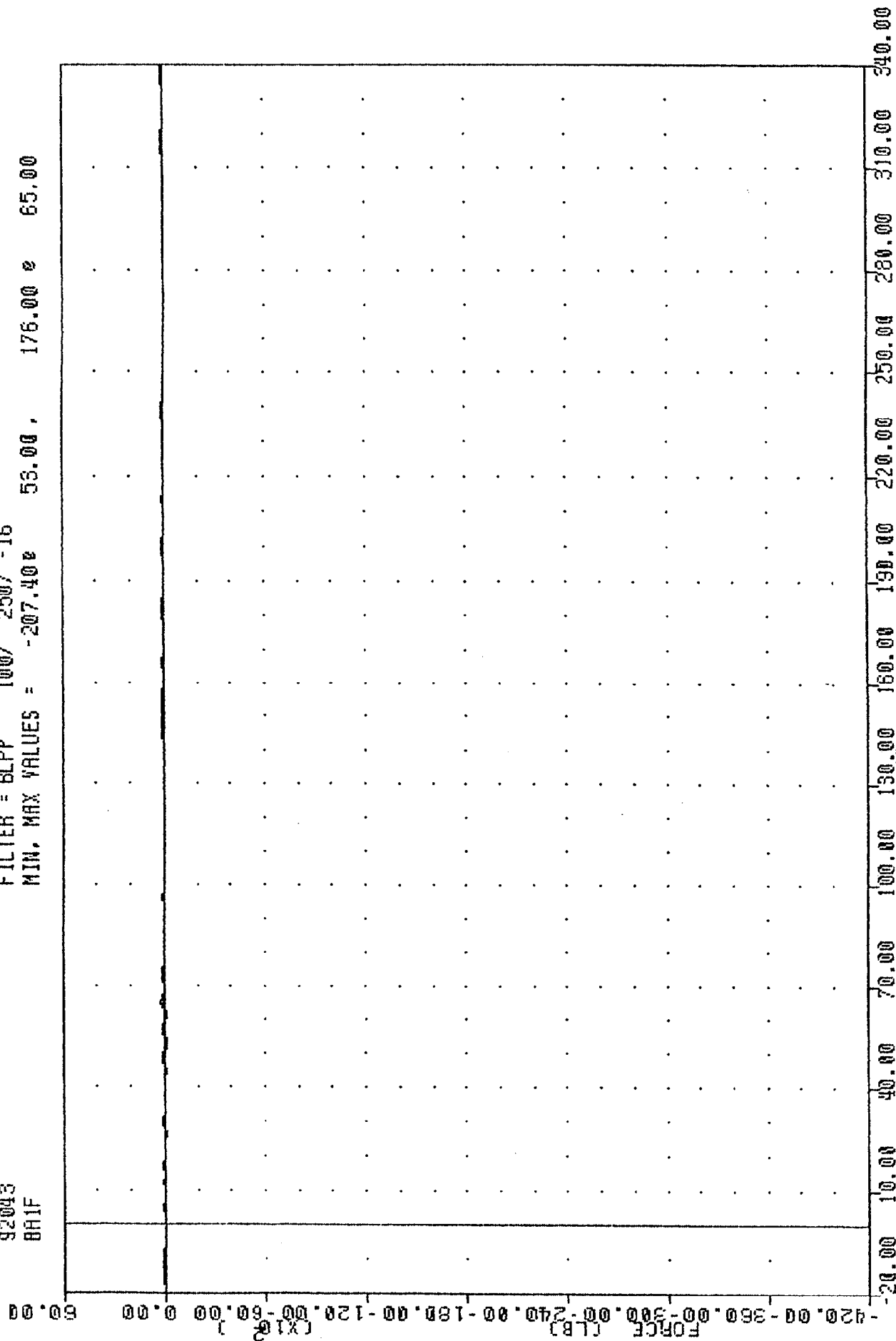
MIN, MAX VALUES = -43.84e 360.00, 0.00 e 0.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS DISPLACEMENT

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BH1F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -207.40e 53.00 , 176.00 e 65.00



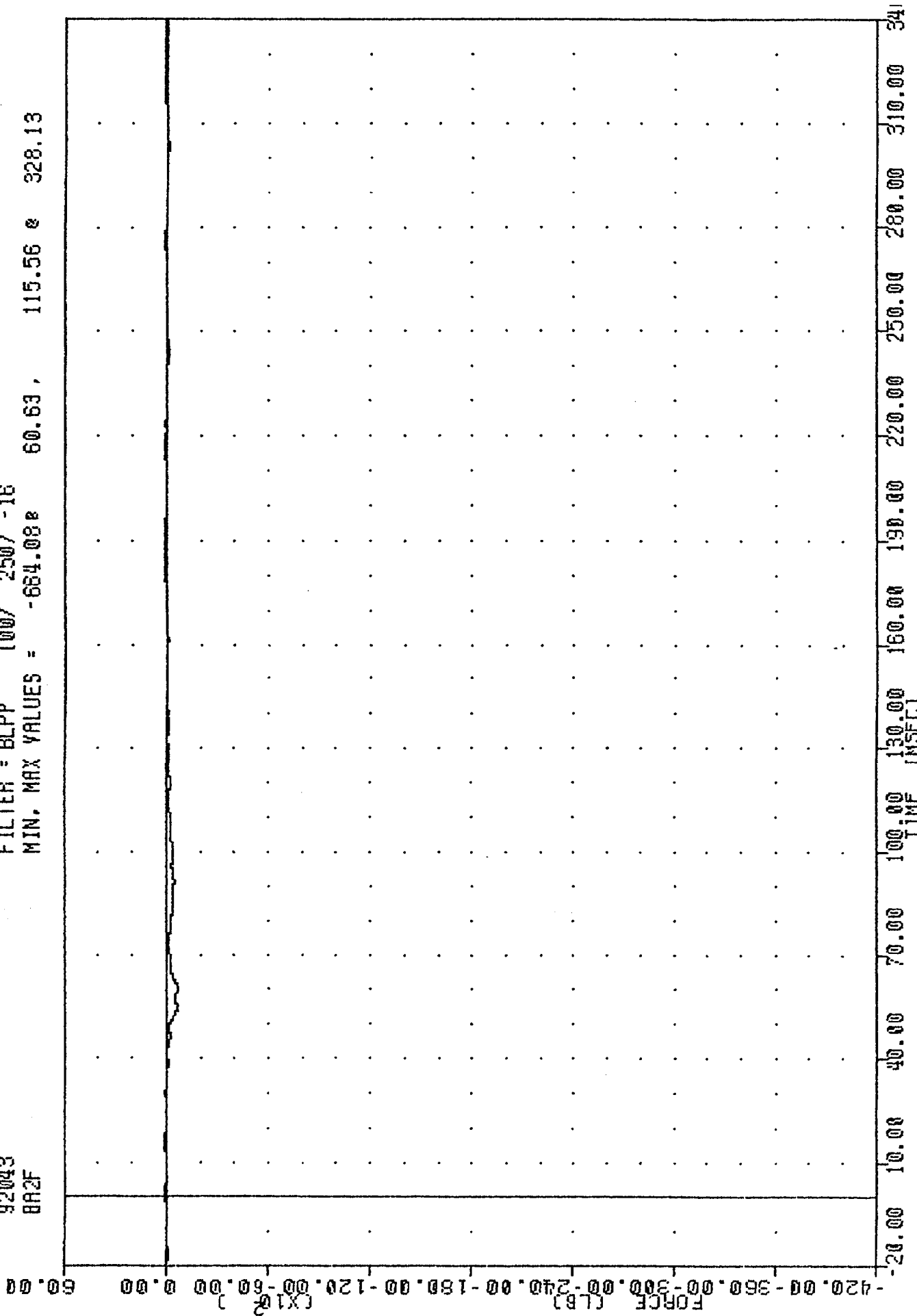
NEW CAR ASSESSMENT PROGRAM

92043

BA2F

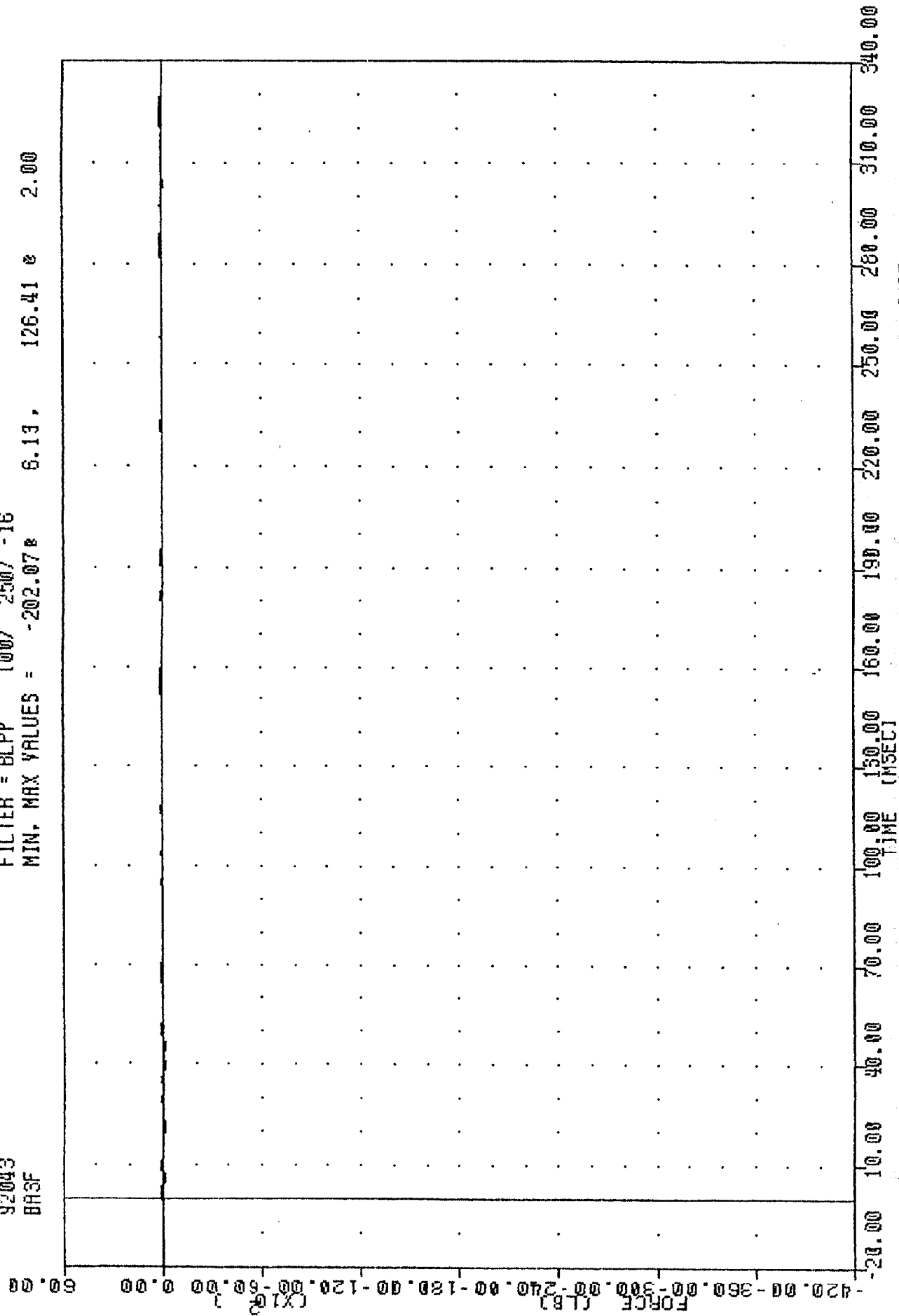
FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -684.088 60.63 , 115.56 @ 328.13



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BR3F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -202.07 8.13, 126.41 2.00



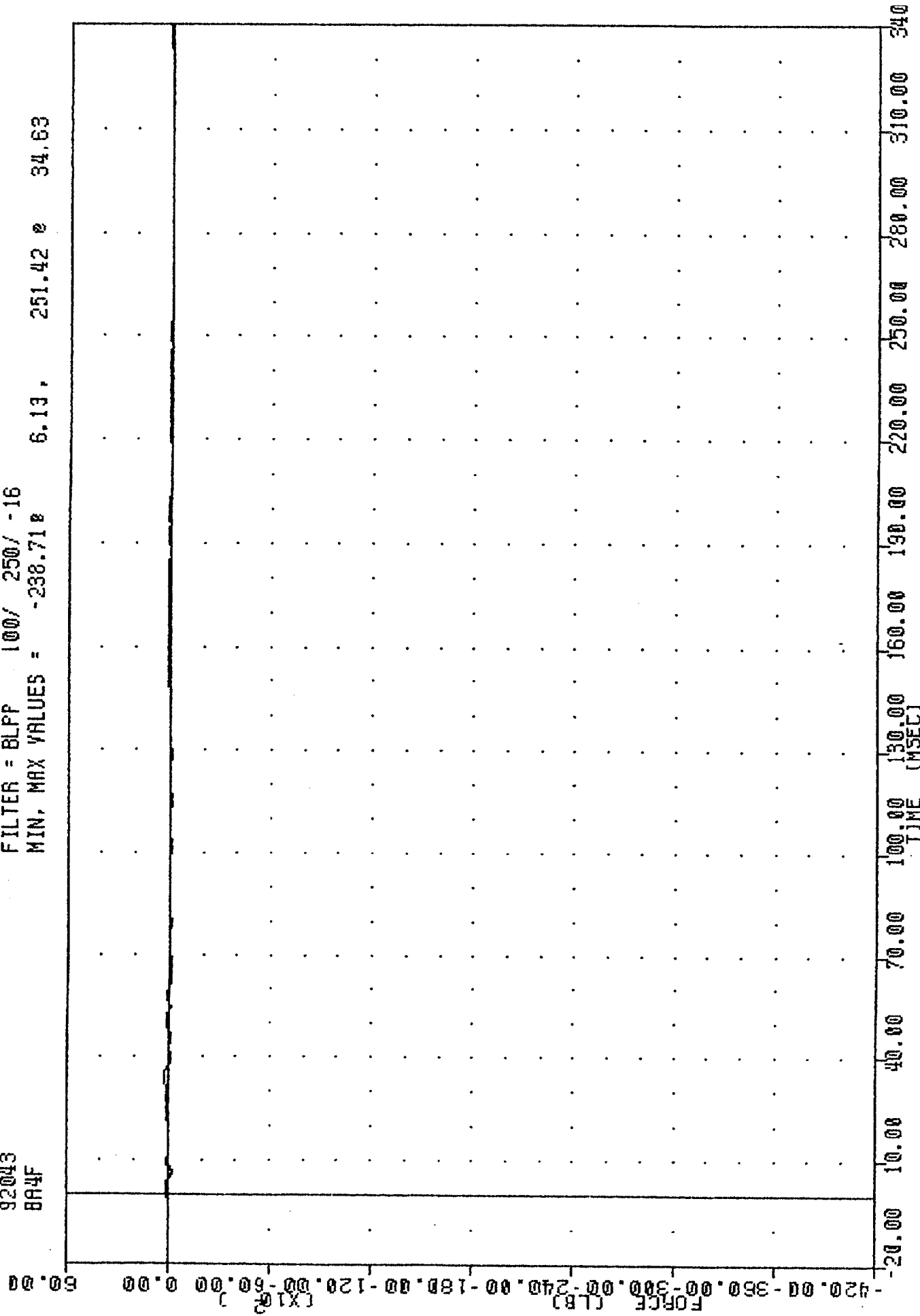
NEW CAR INFORMATION PROGRAM

92043

BA4F

FILTER = BLPP 100/ 250/ -16

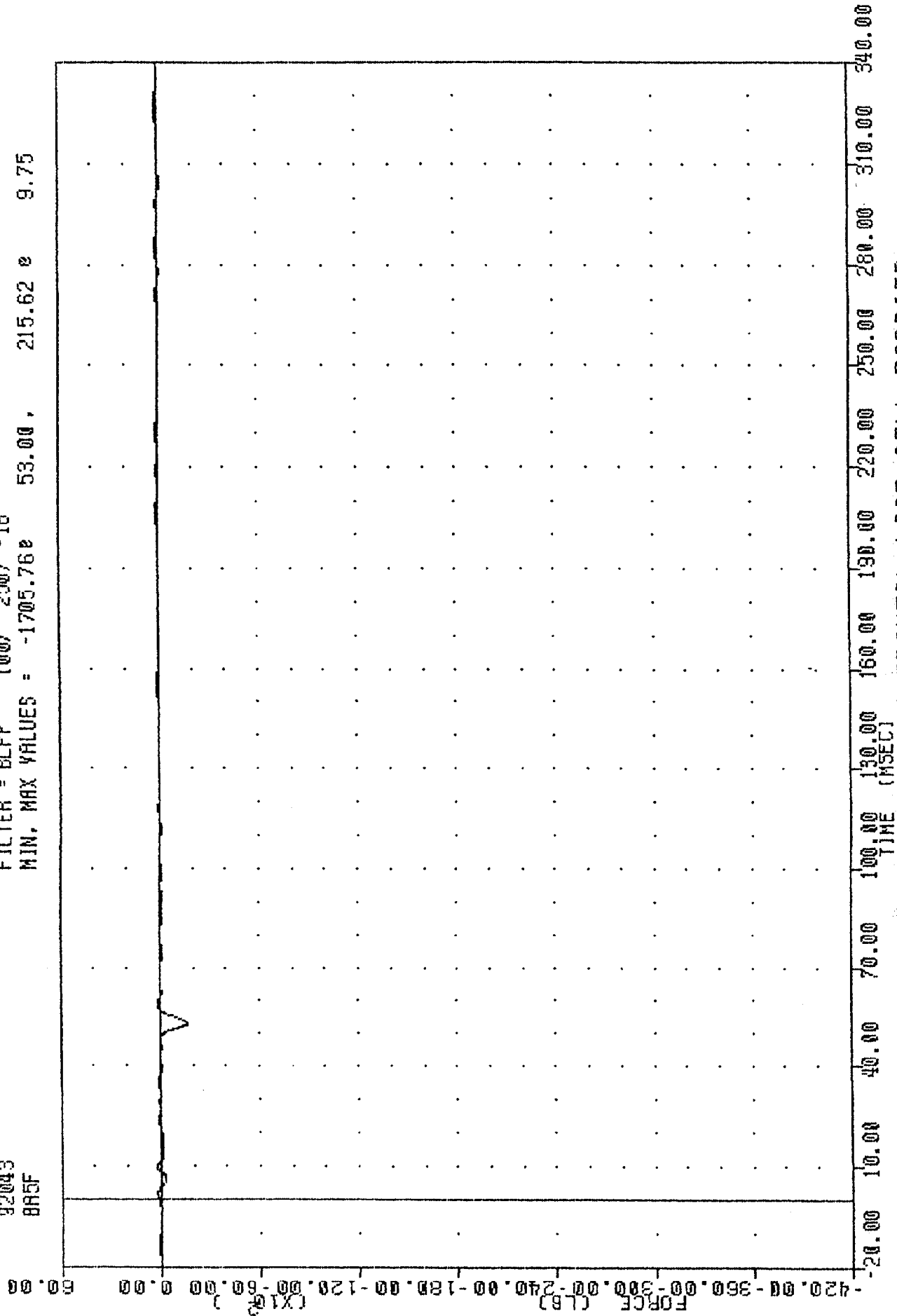
MIN, MAX VALUES = -238.71 6.13, 251.42 2 34.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A4 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BR5F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1705.76e 53.00 , 215.62 e 9.75



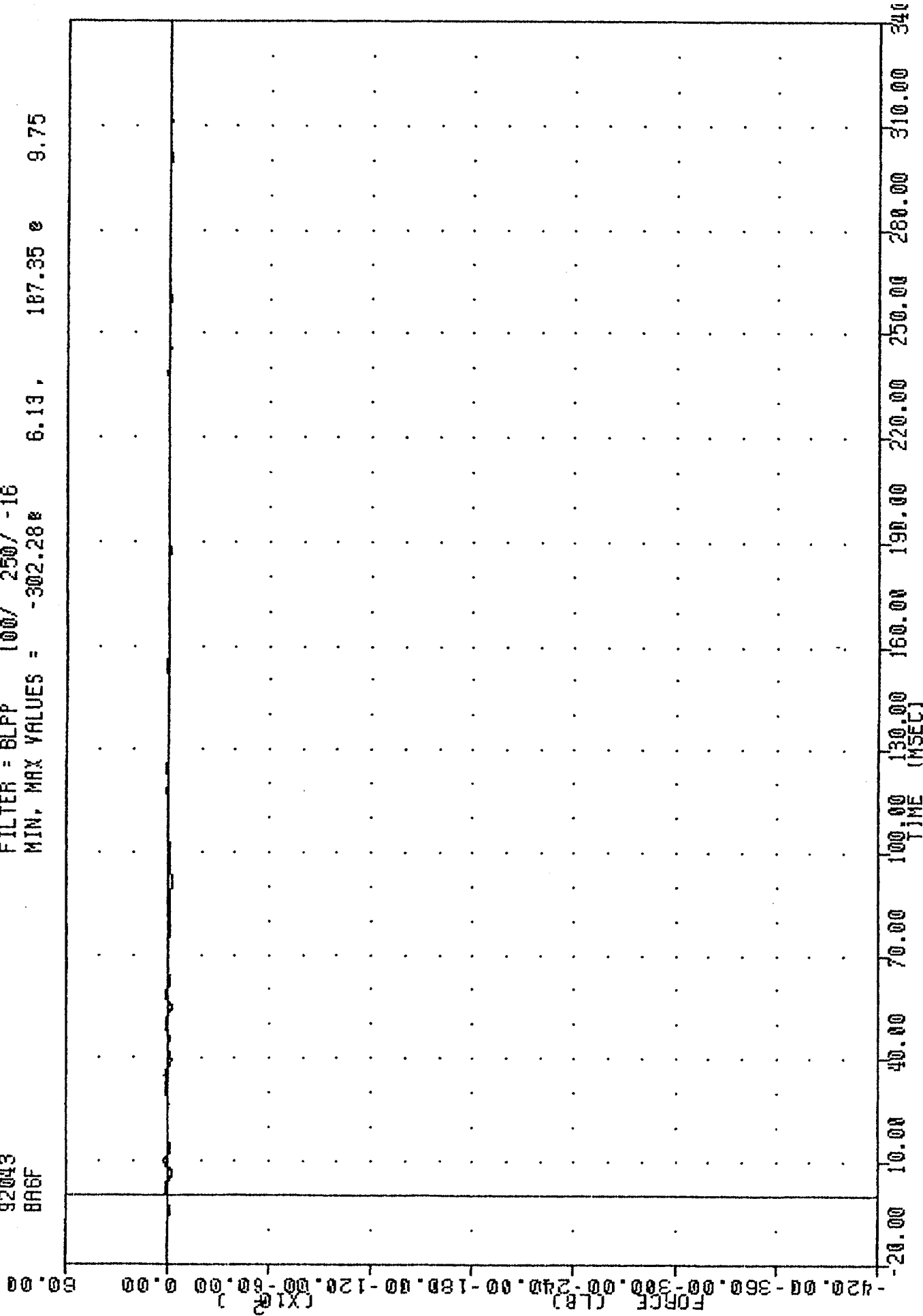
NEW CAR ASSESSMENT PROGRAM

92043

BA6F

FILTER = BLPP 100/ 250/ -16

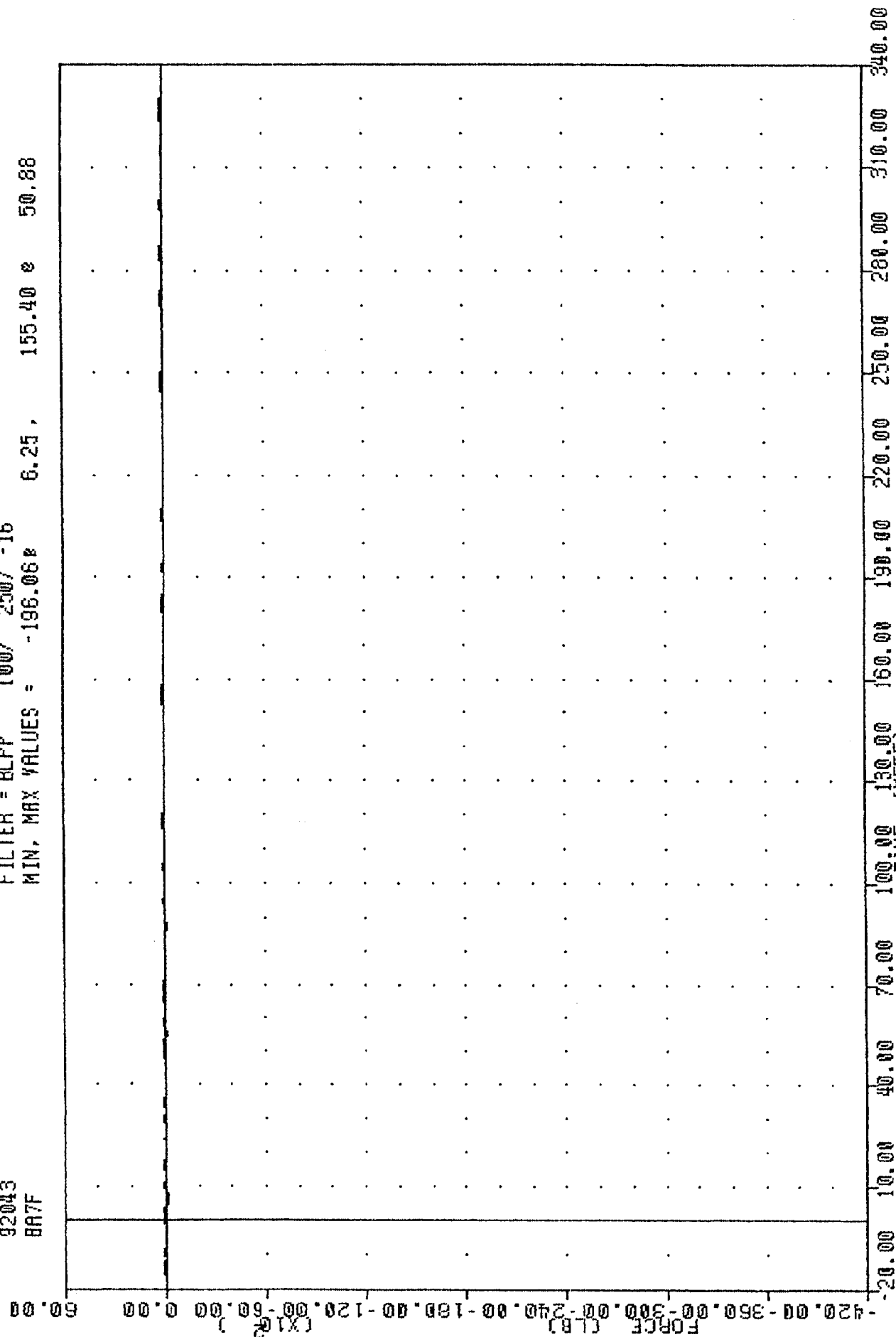
MIN, MAX VALUES = -302.28 6.13, 187.35 9.75



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BA7F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -196.06 6.25, 155.40 50.88

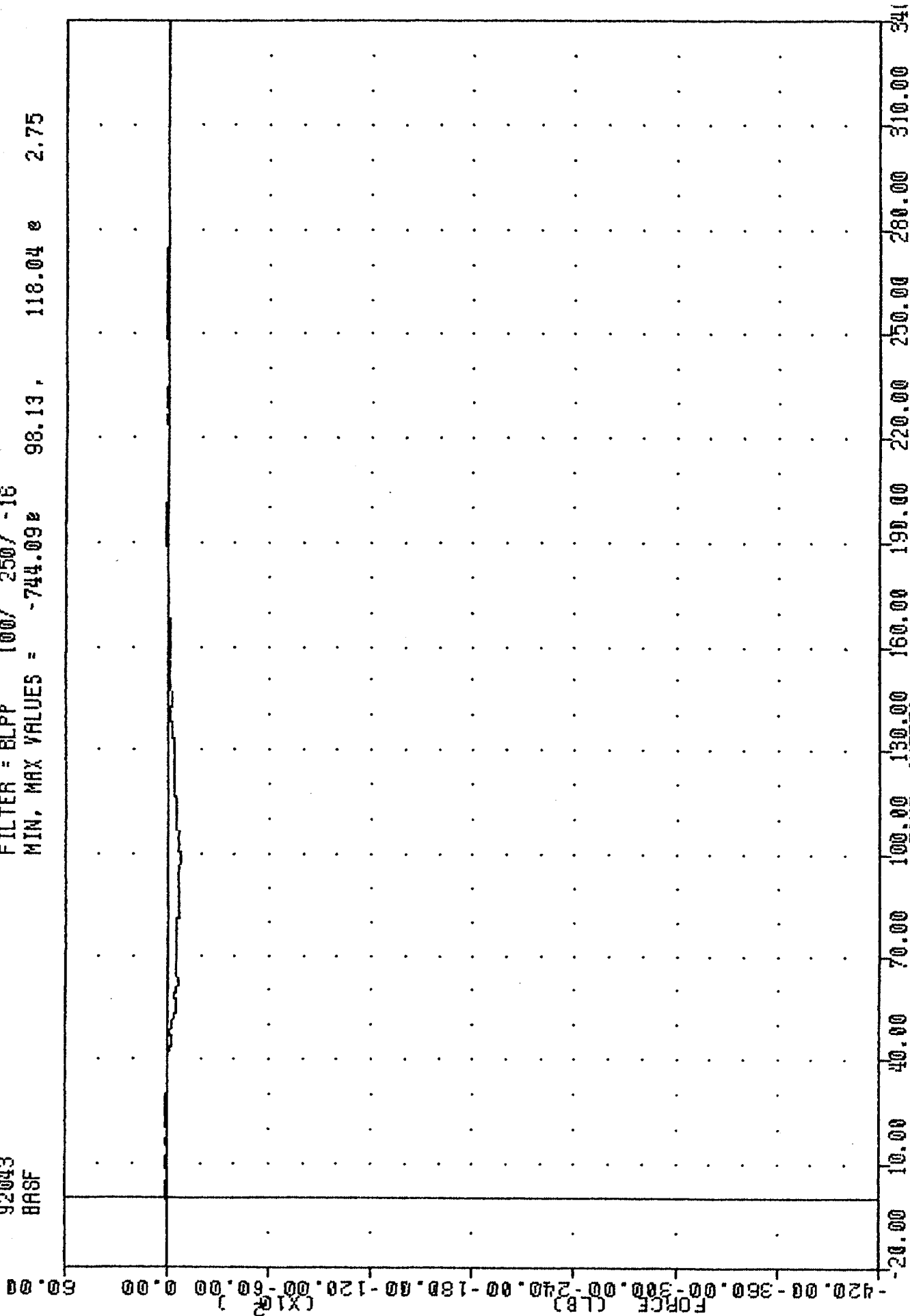


92043

BASF

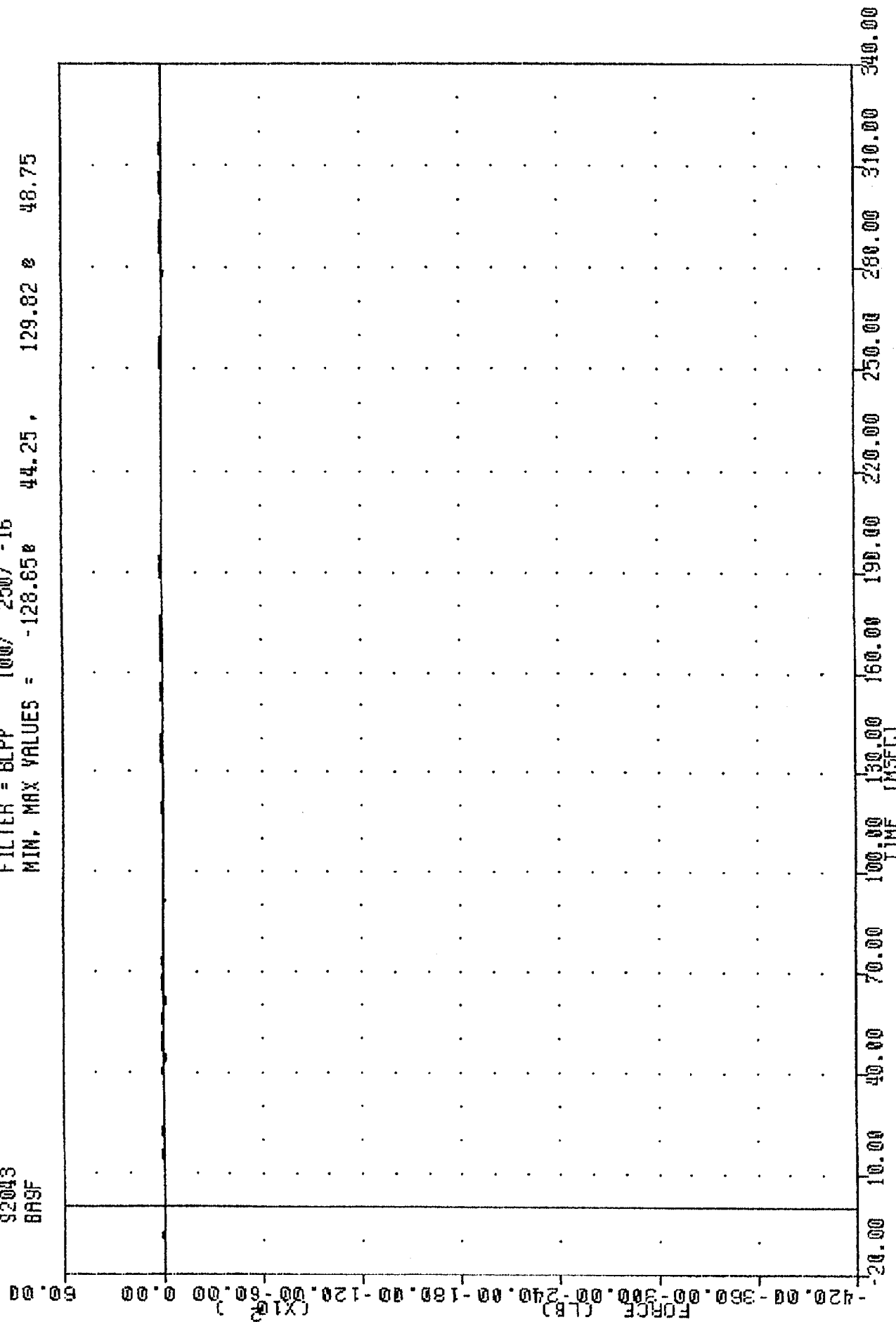
FILTER = BLPP 100/ 250/ -18

MIN, MAX VALUES = -744.092 98.13, 118.04 @ 2.75



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BR9F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -128.65 44.25 , 129.82 48.75



FILTER = BLPP 100/ 250/ -16

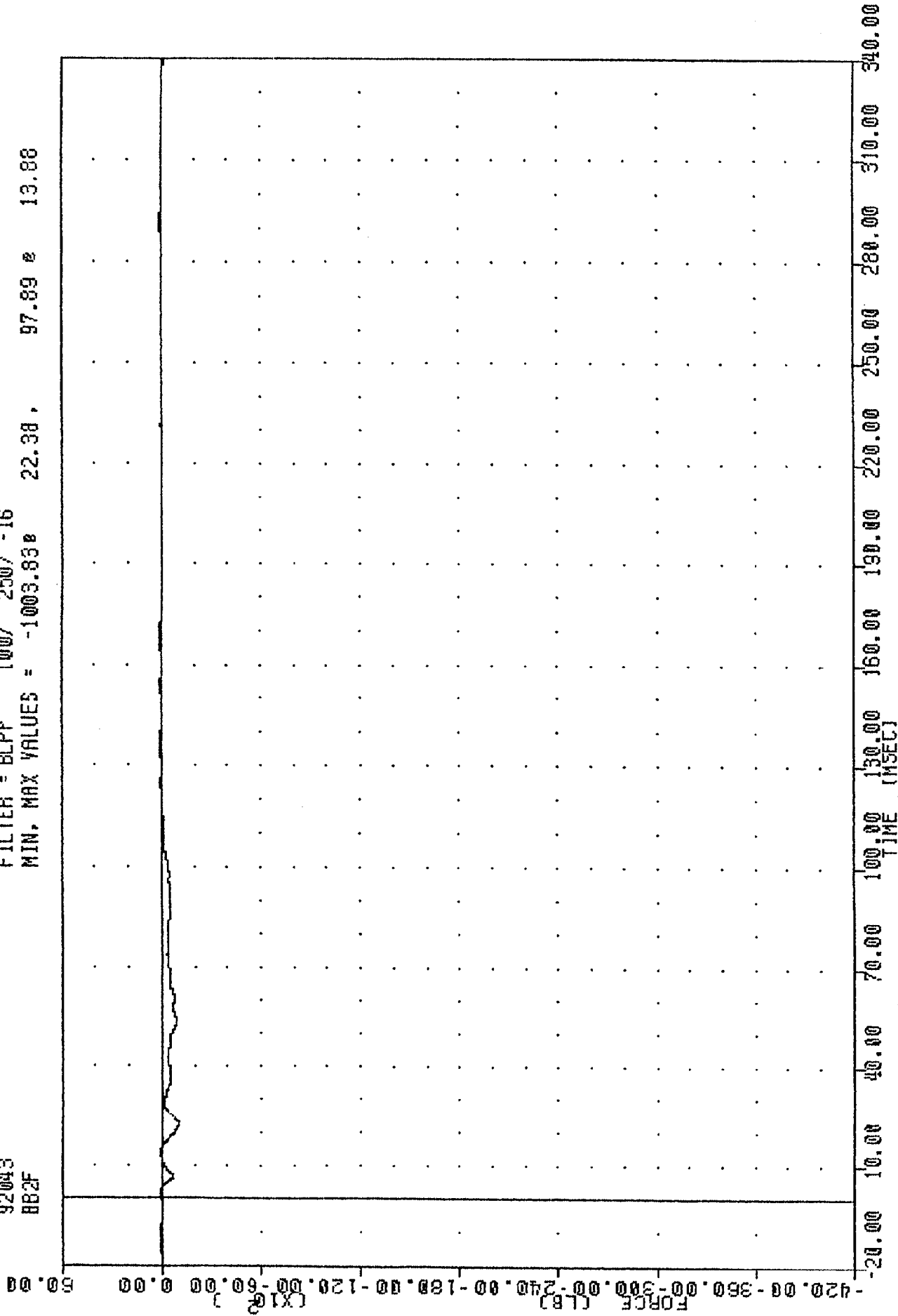
MIN. MAX VALUES = -183.858 53.38 , 134.81 0 73.13

TIME (MSEC)	100.00	130.00	160.00	190.00	220.00	250.00	280.00	310.00	340.00
20.00	.	.	.	.	.	.	.	.	.
40.00	.	.	.	.	.	.	.	.	.
60.00	.	.	.	.	.	.	.	.	.
80.00	.	.	.	.	.	.	.	.	.
100.00	.	.	.	.	.	.	.	.	.
120.00	.	.	.	.	.	.	.	.	.
140.00	.	.	.	.	.	.	.	.	.
160.00	.	.	.	.	.	.	.	.	.
180.00	.	.	.	.	.	.	.	.	.
200.00	.	.	.	.	.	.	.	.	.
220.00	.	.	.	.	.	.	.	.	.
240.00	.	.	.	.	.	.	.	.	.
260.00	.	.	.	.	.	.	.	.	.
280.00	.	.	.	.	.	.	.	.	.
300.00	.	.	.	.	.	.	.	.	.
320.00	.	.	.	.	.	.	.	.	.
340.00	.	.	.	.	.	.	.	.	.
360.00	.	.	.	.	.	.	.	.	.
380.00	.	.	.	.	.	.	.	.	.
400.00	.	.	.	.	.	.	.	.	.
420.00	.	.	.	.	.	.	.	.	.

1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B1 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BB2F

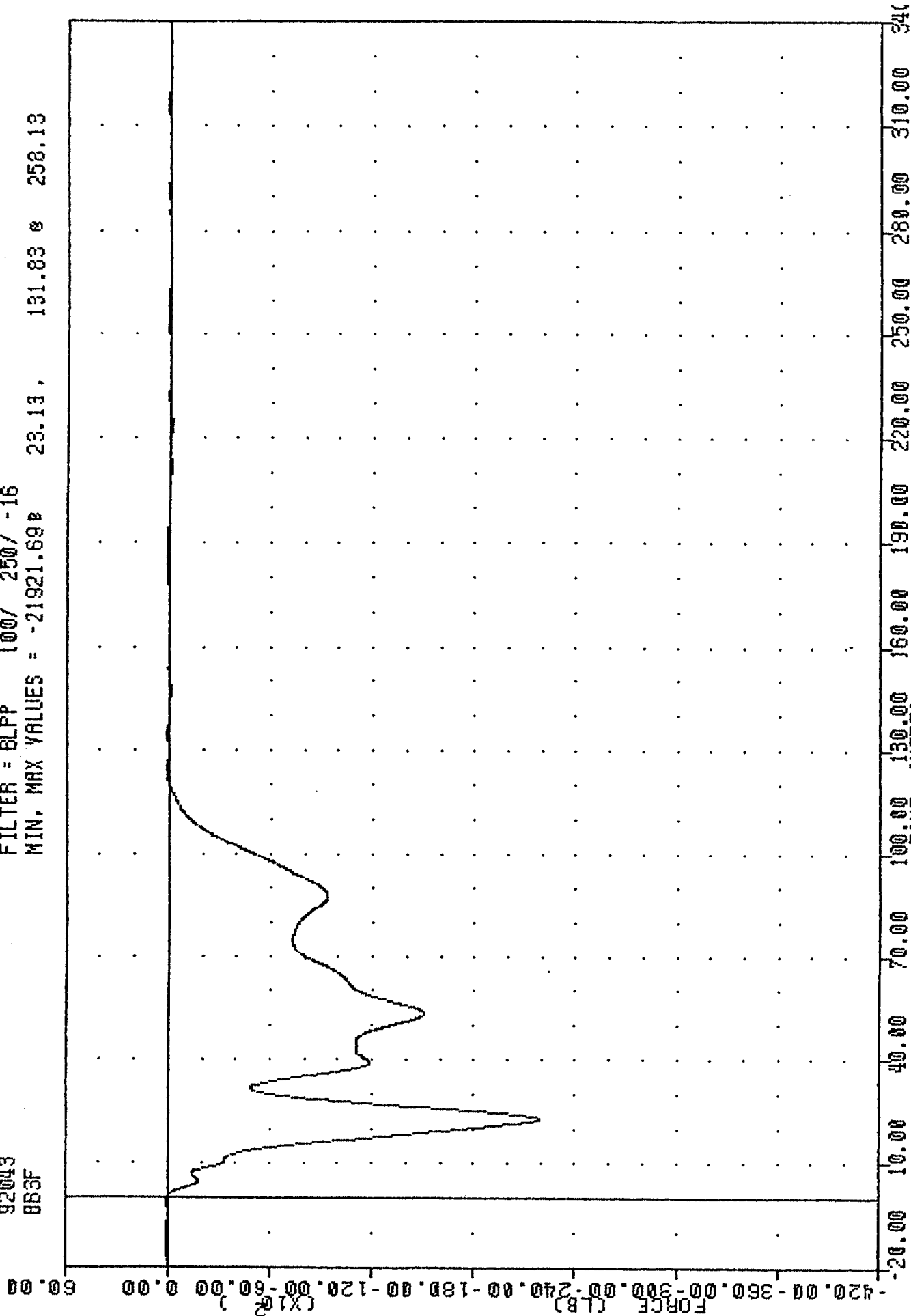
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -1003.838 22.38 , 97.89 e 13.88



92043
BB3F

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -21921.69 23.13

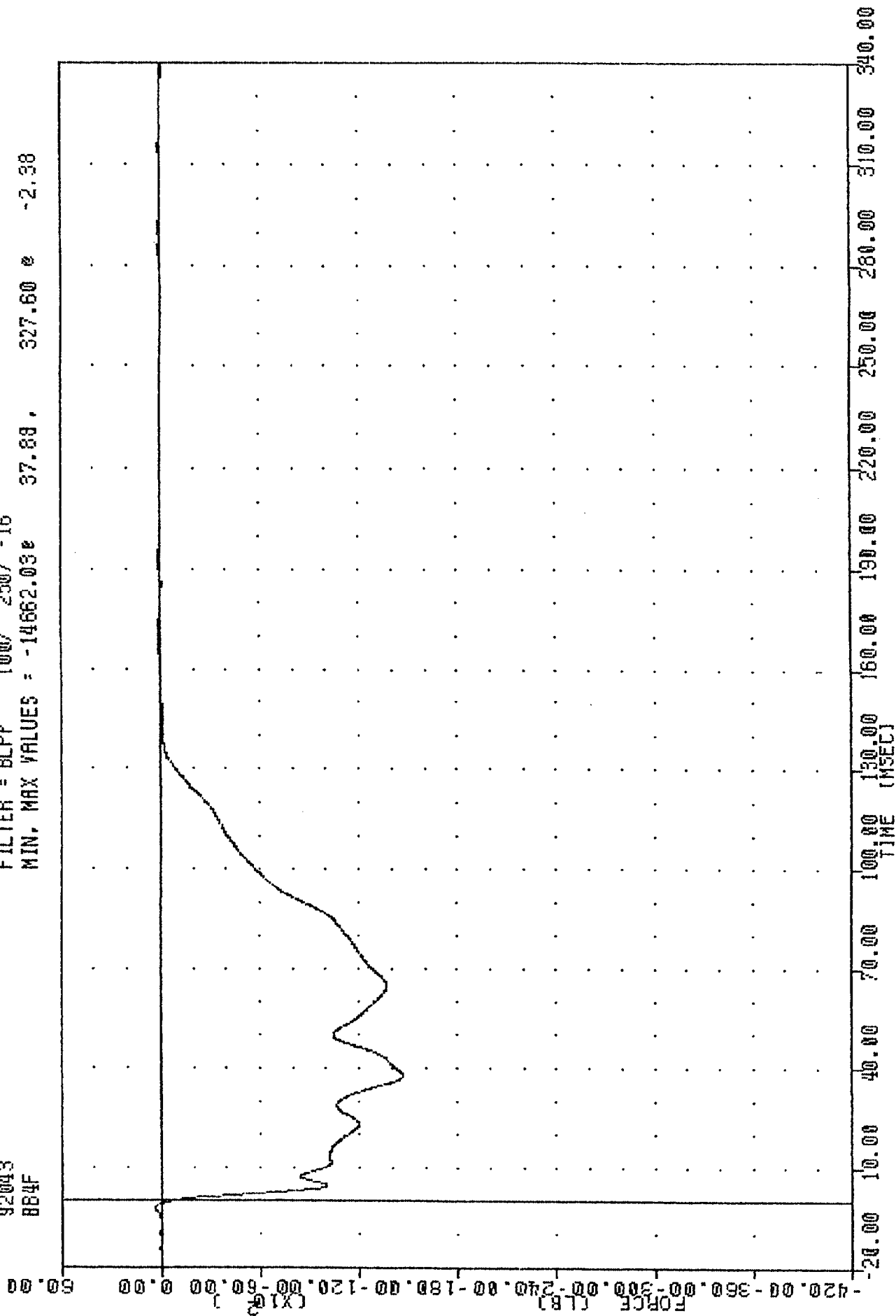
131.83 258.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B3 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BB4F

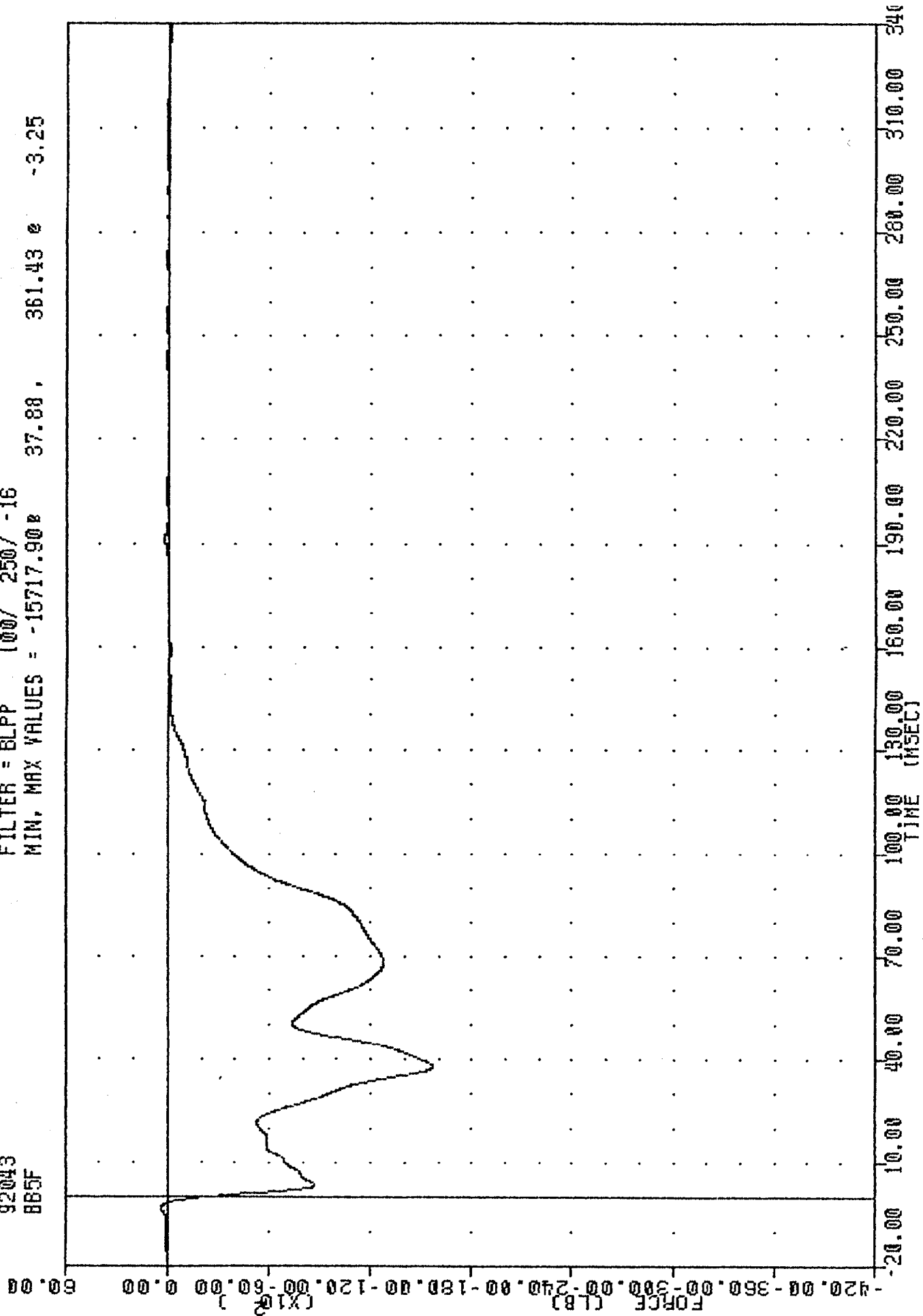
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -14662.03e 37.88 , 327.60 e -2.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B4 FORCE

92043
BB5F

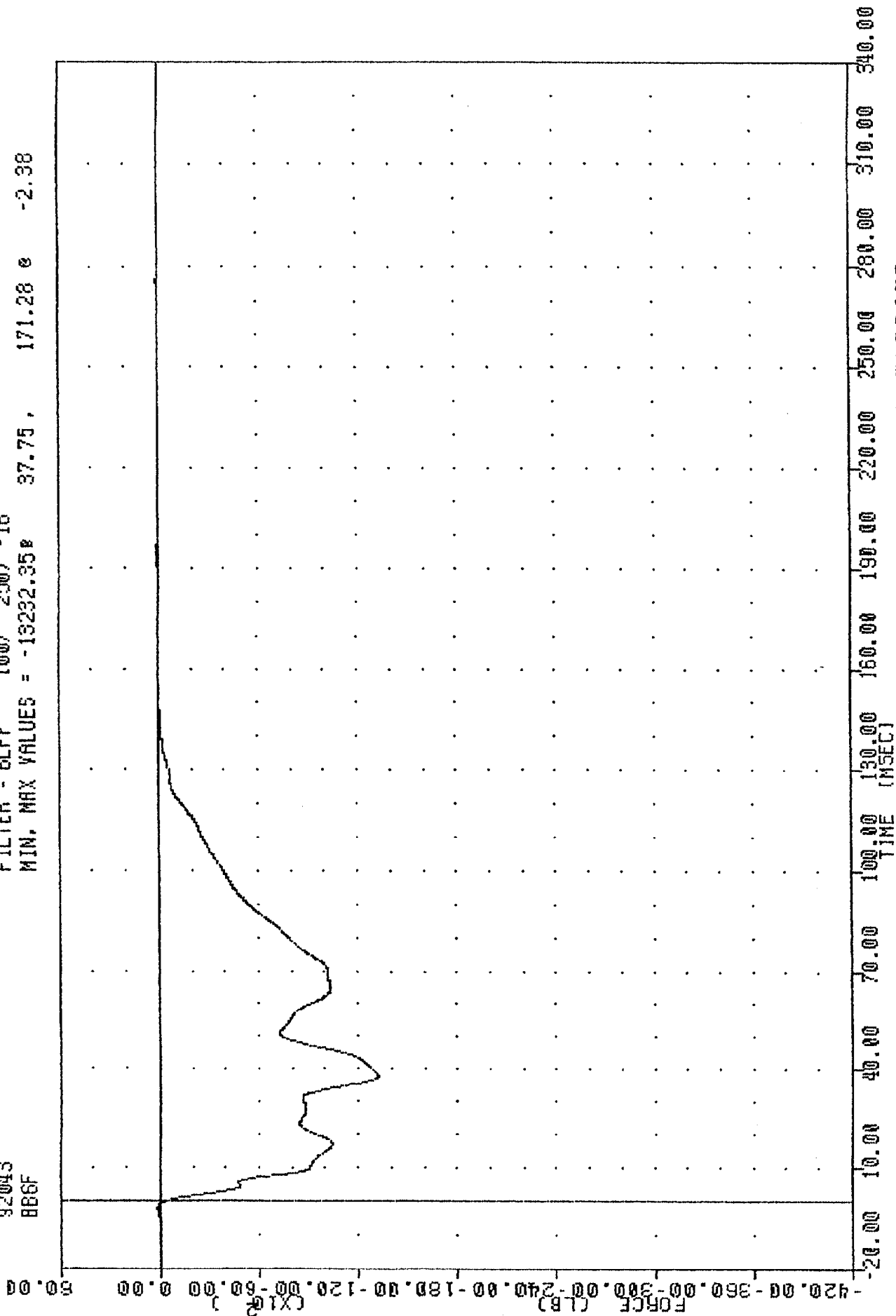
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -15717.90 37.88, 361.43 0 -3.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B5 FORCE

TRC . 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BB6F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -13232.35 37.75 , 171.28 -2.38



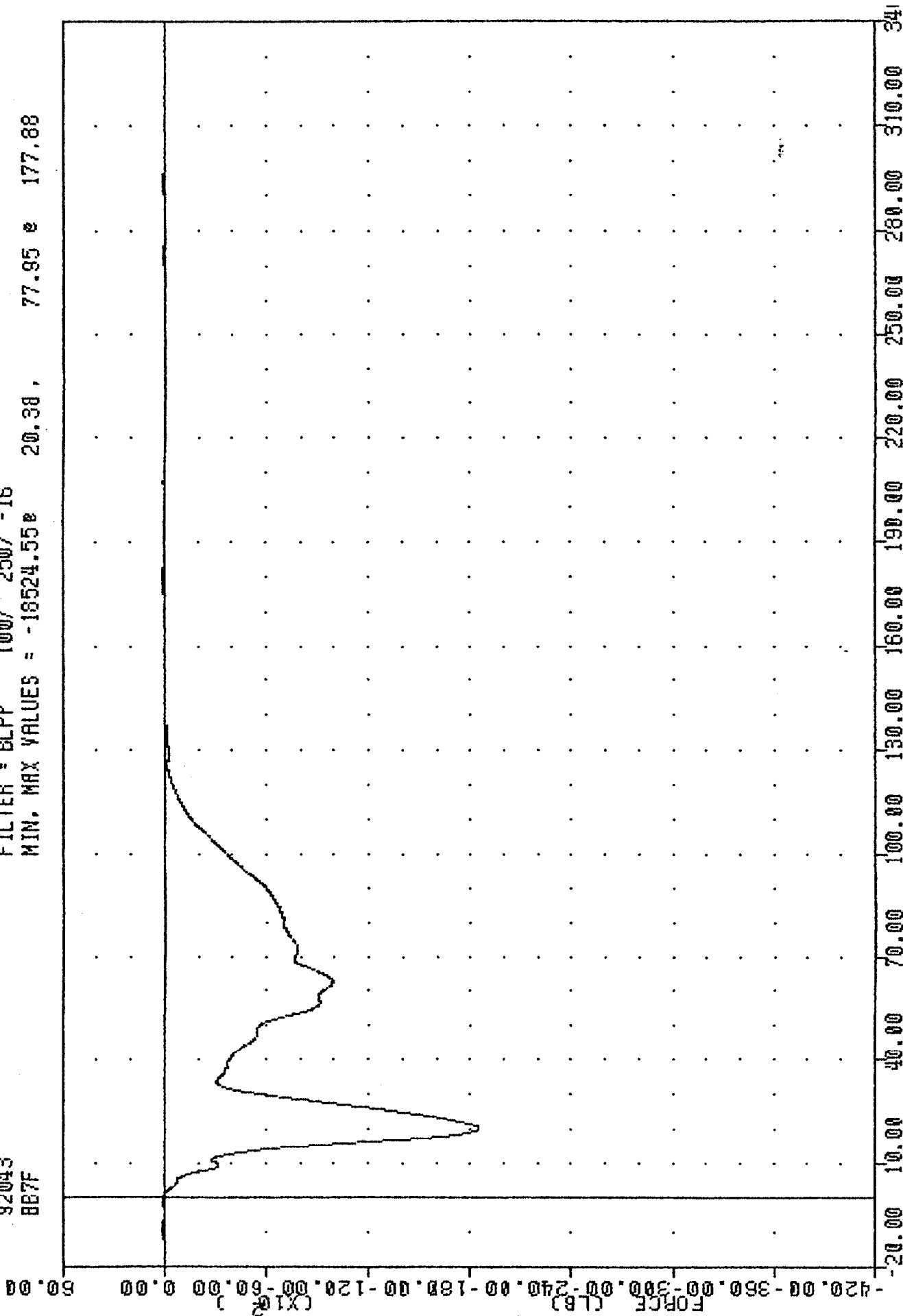
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B6 FORCE

92043

BB7F

FILTER = BLPP 100/ 250/ -16

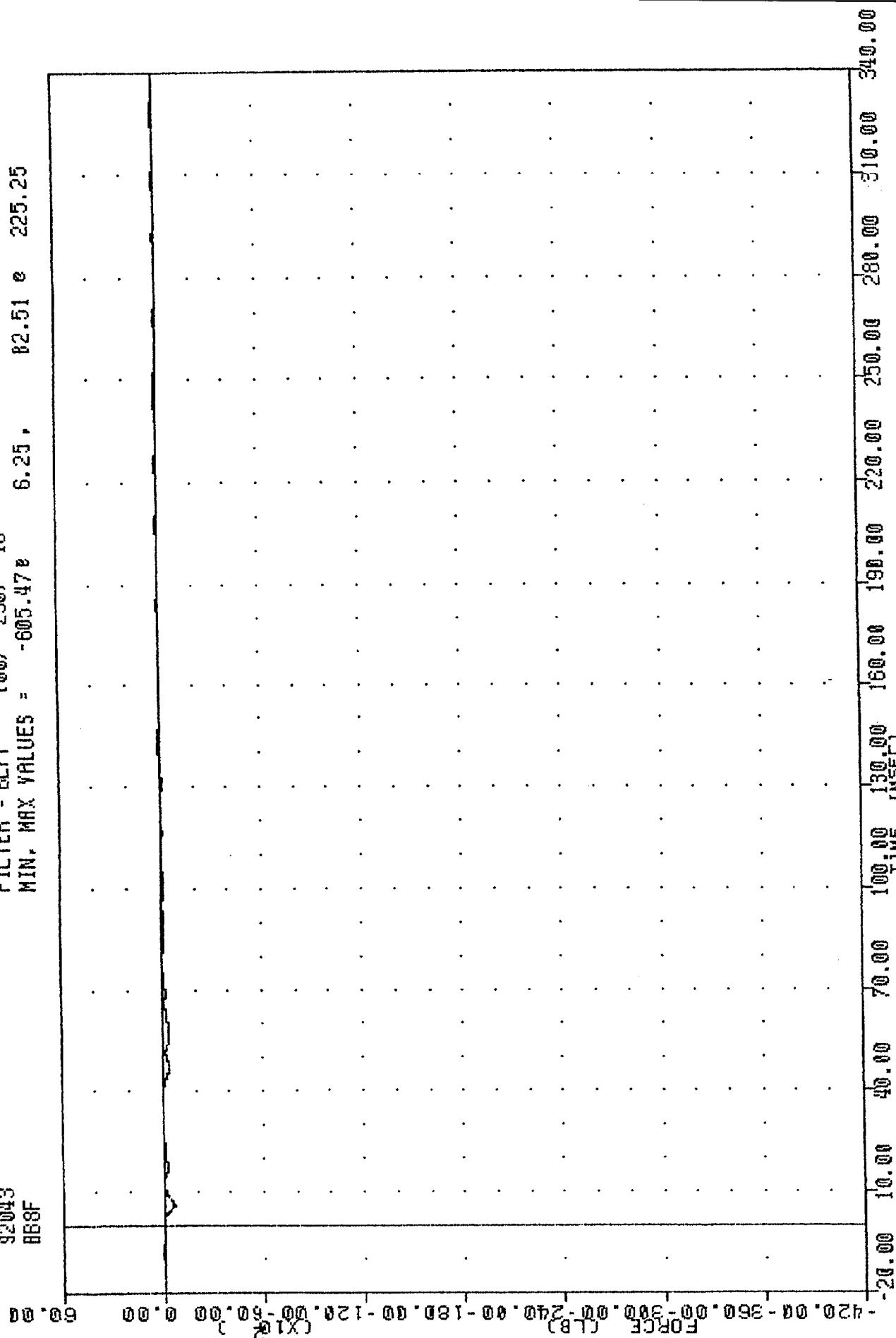
MIN. MAX VALUES = -18524.55e 20.38 , 77.95 e 177.88



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B7 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BE8F

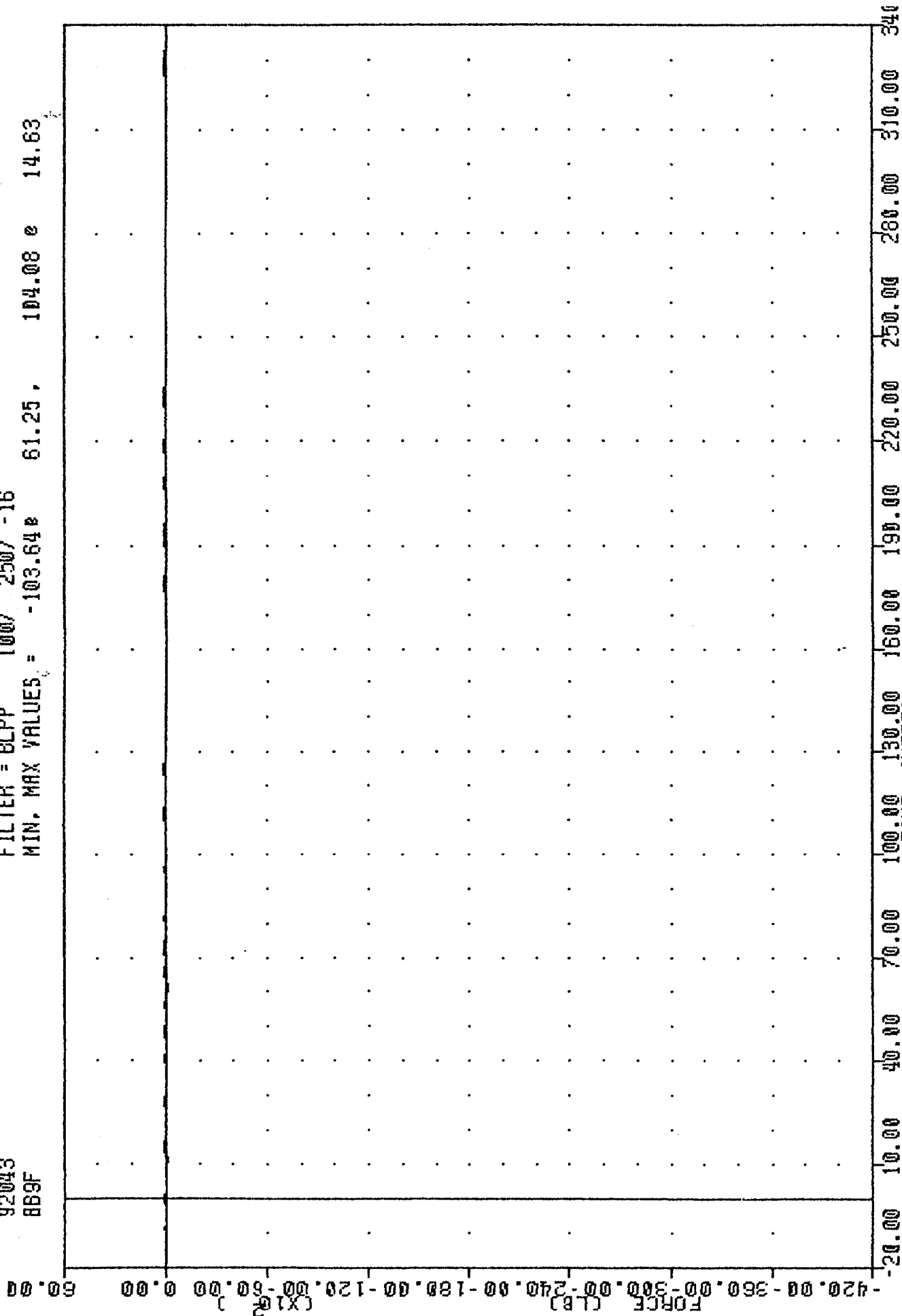
FILTER = ELPP 100/ 250/ -16
 MIN. MAX VALUES = -605.470 6.25 , 82.51 0 225.25



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 88 FORCE

NEW AND DISCONTINUED PRODUCTS
 92043
 889F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -103.64 61.25 104.08 14.63

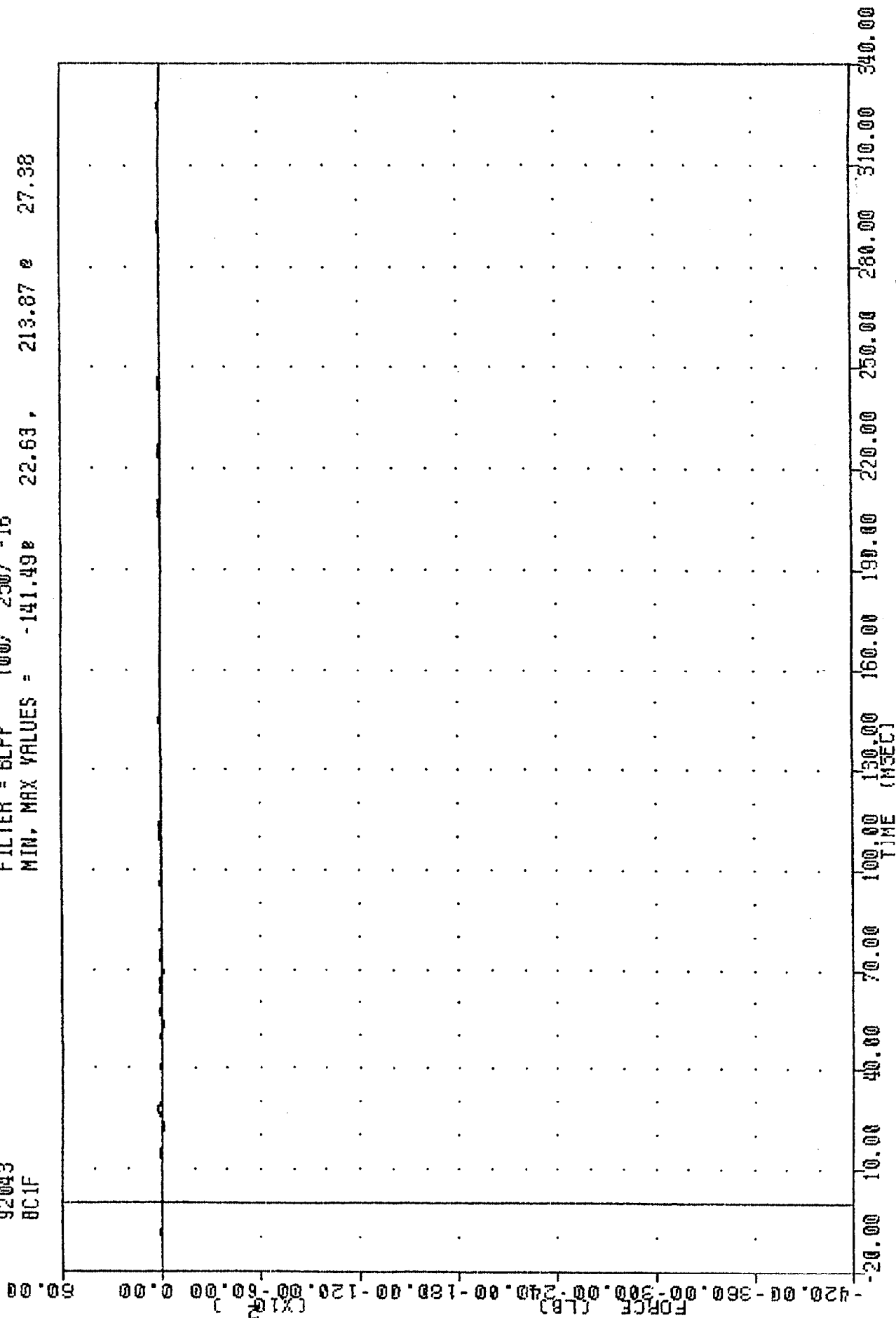


1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 89 FORCE

TRC
NEW CAR ASSESSMENT PROGRAM
92043
BCIF

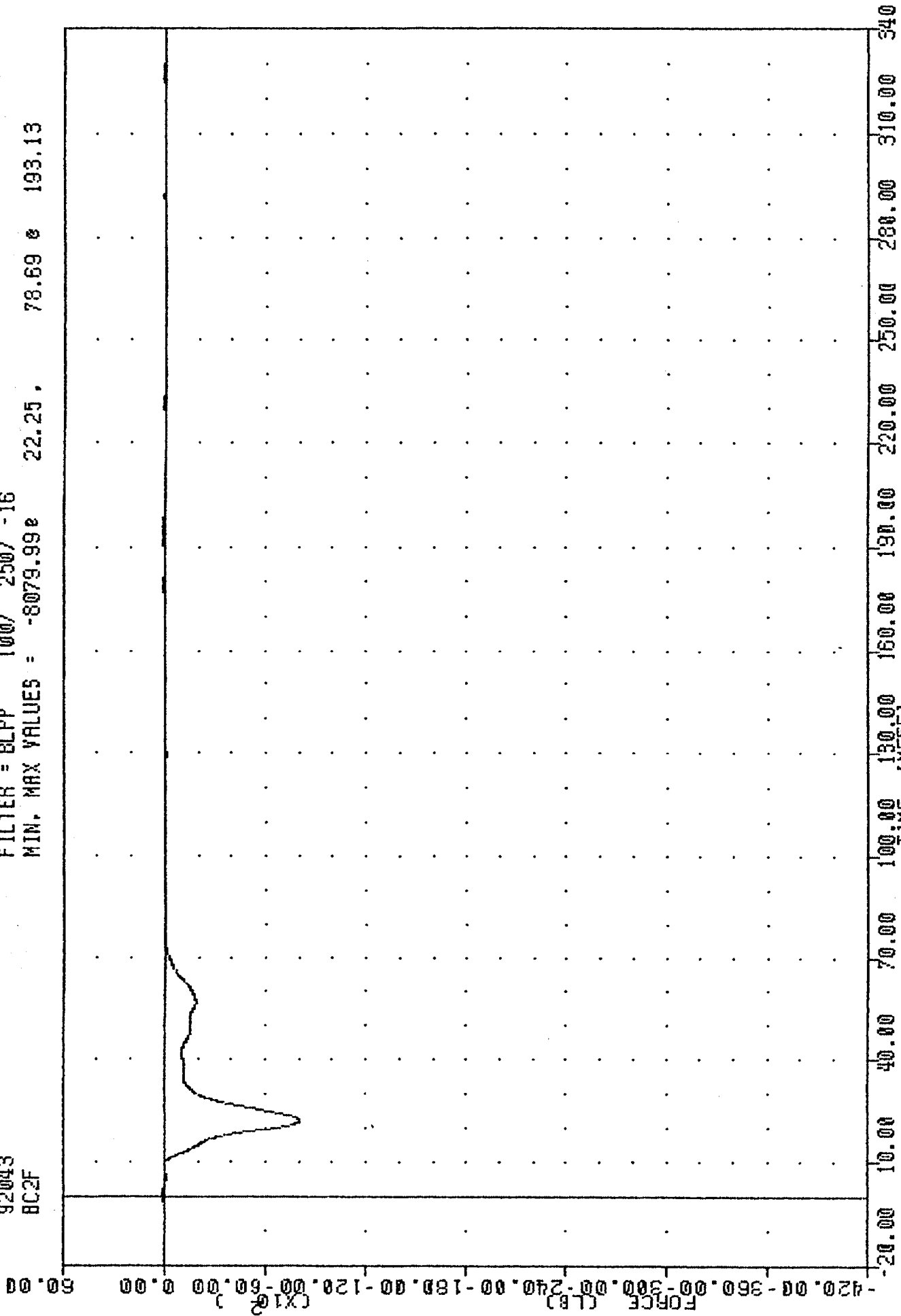
920212

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -141.49# 22.63, 213.87 # 27.38



92043
BC2F

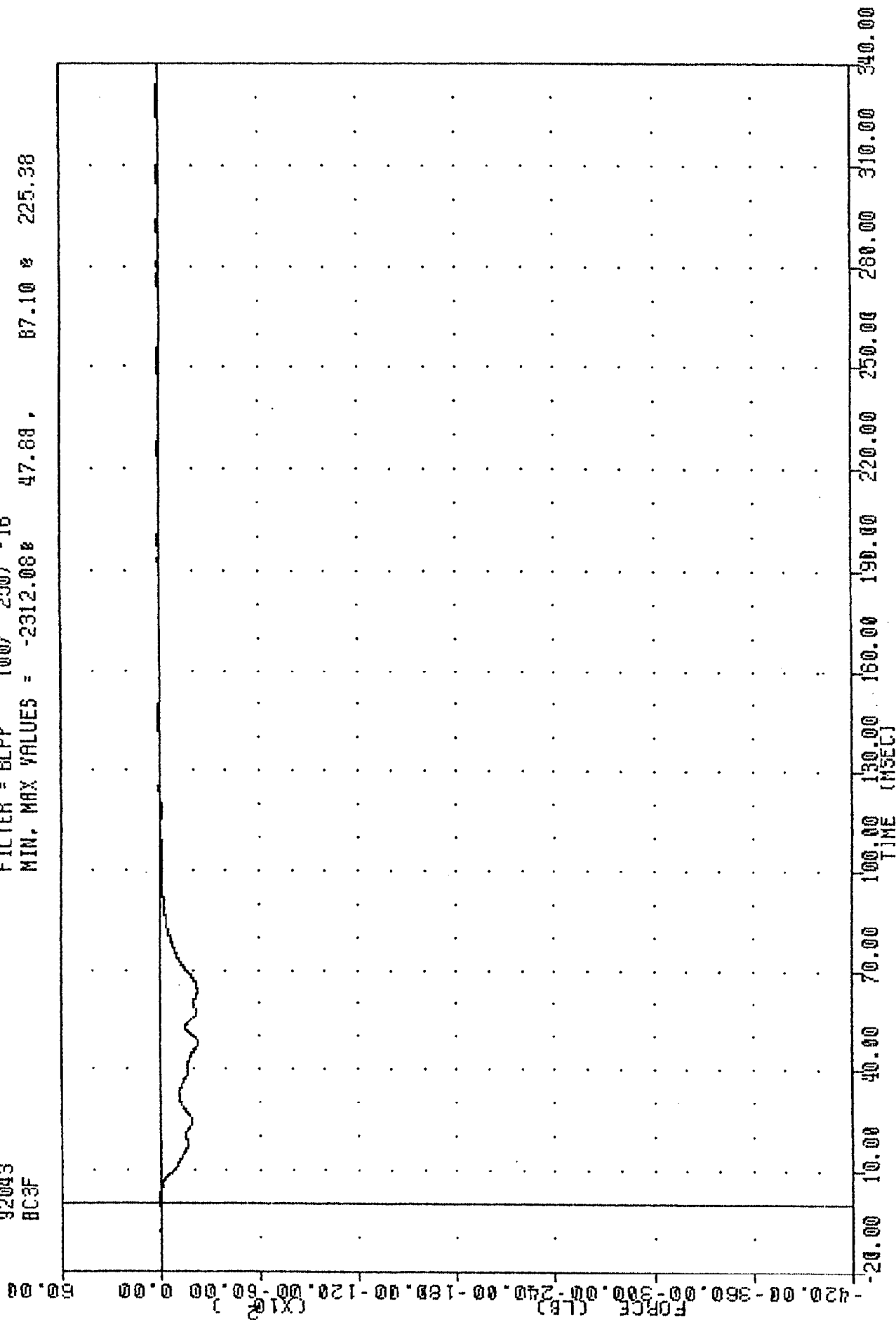
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -8079.99e 22.25, 78.69 e 193.13



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C2 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BC3F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2312.08% 47.88 , 87.10 % 225.38

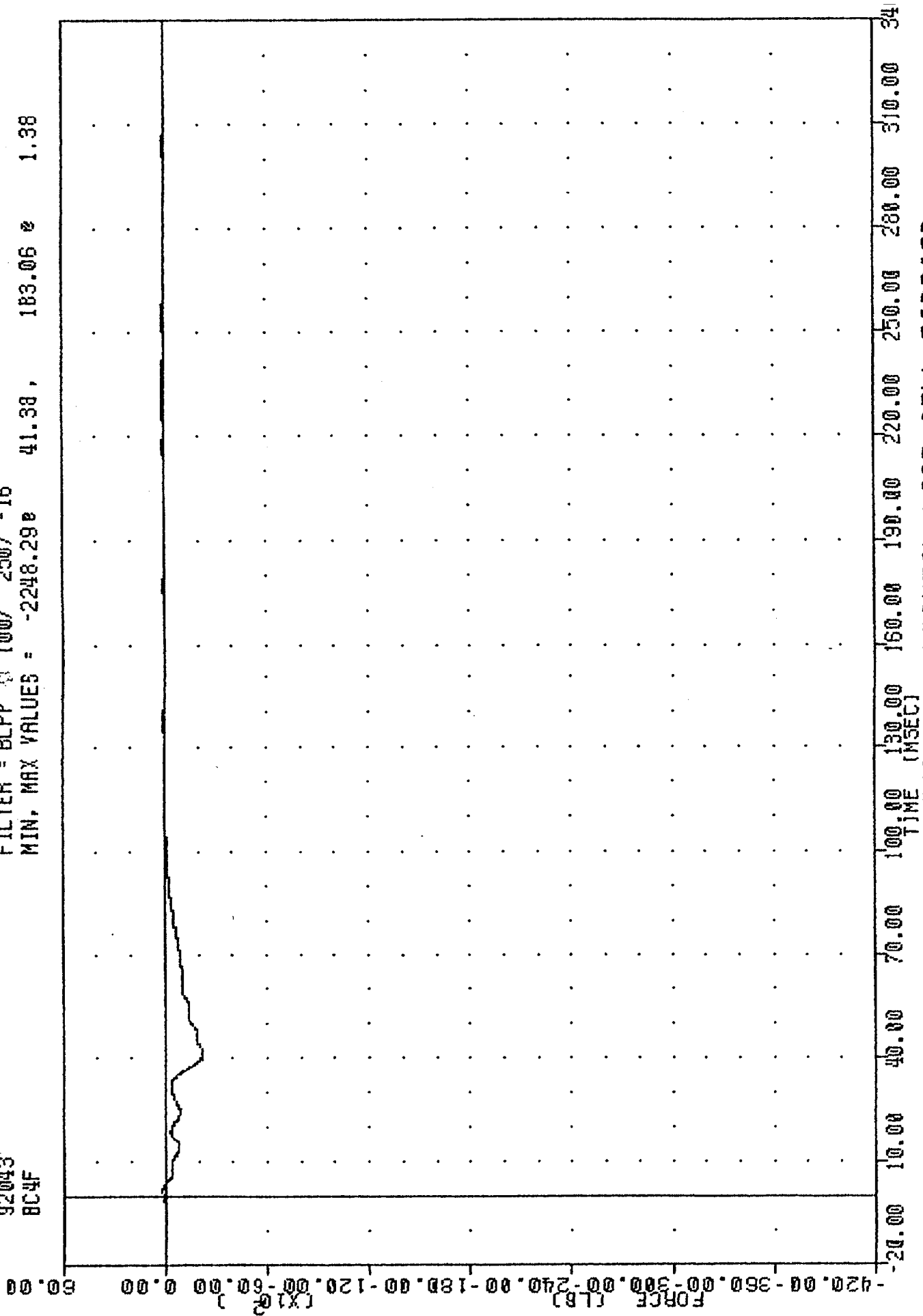


1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C3 FORCE

NEW CAR ASSESSMENT PROGRAM

92043
BC4F

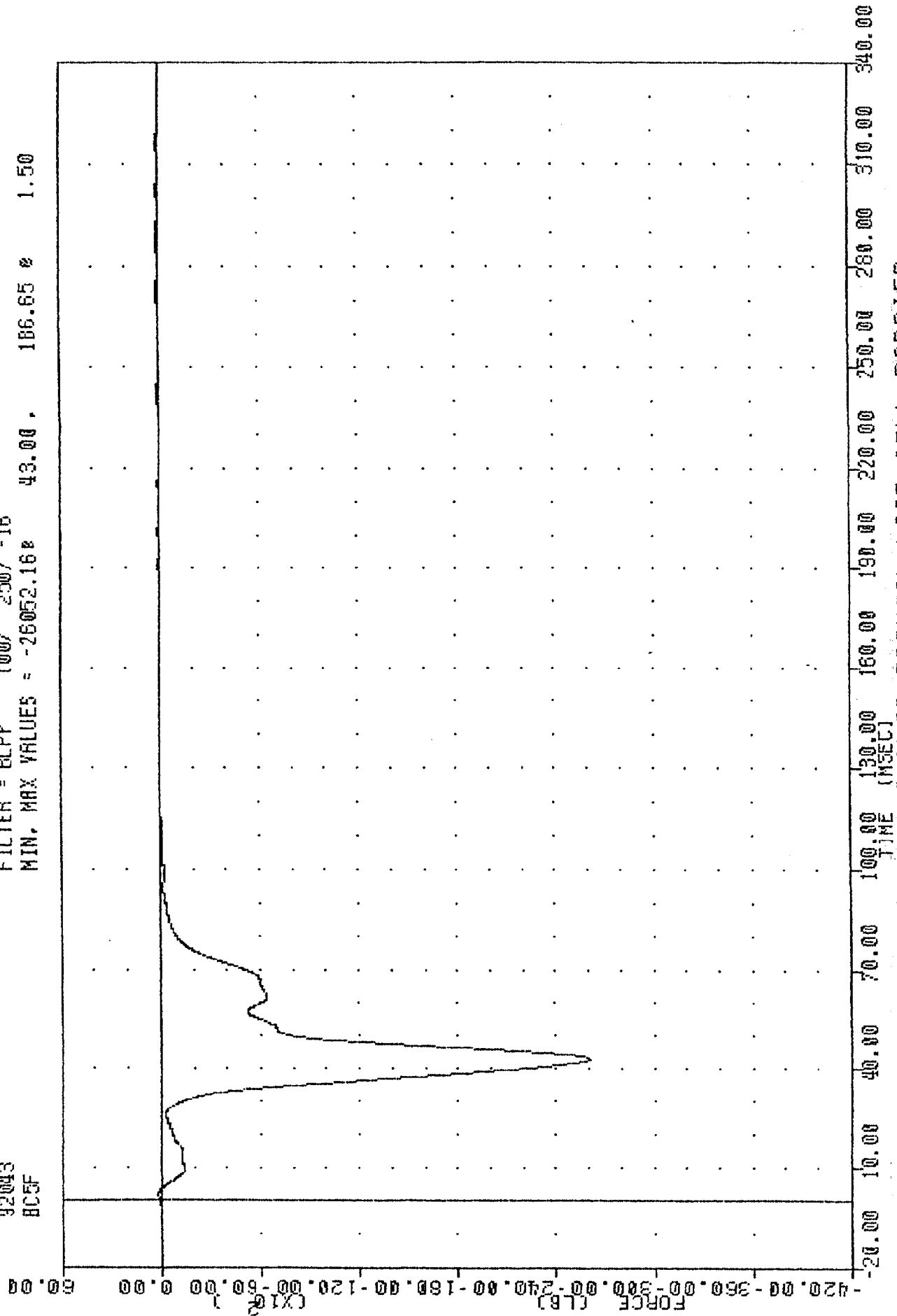
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -2248.29e 41.38 , 183.06 e 1.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C4 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BC5F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -26052.16 43.00 186.65 1.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C5 FORCE

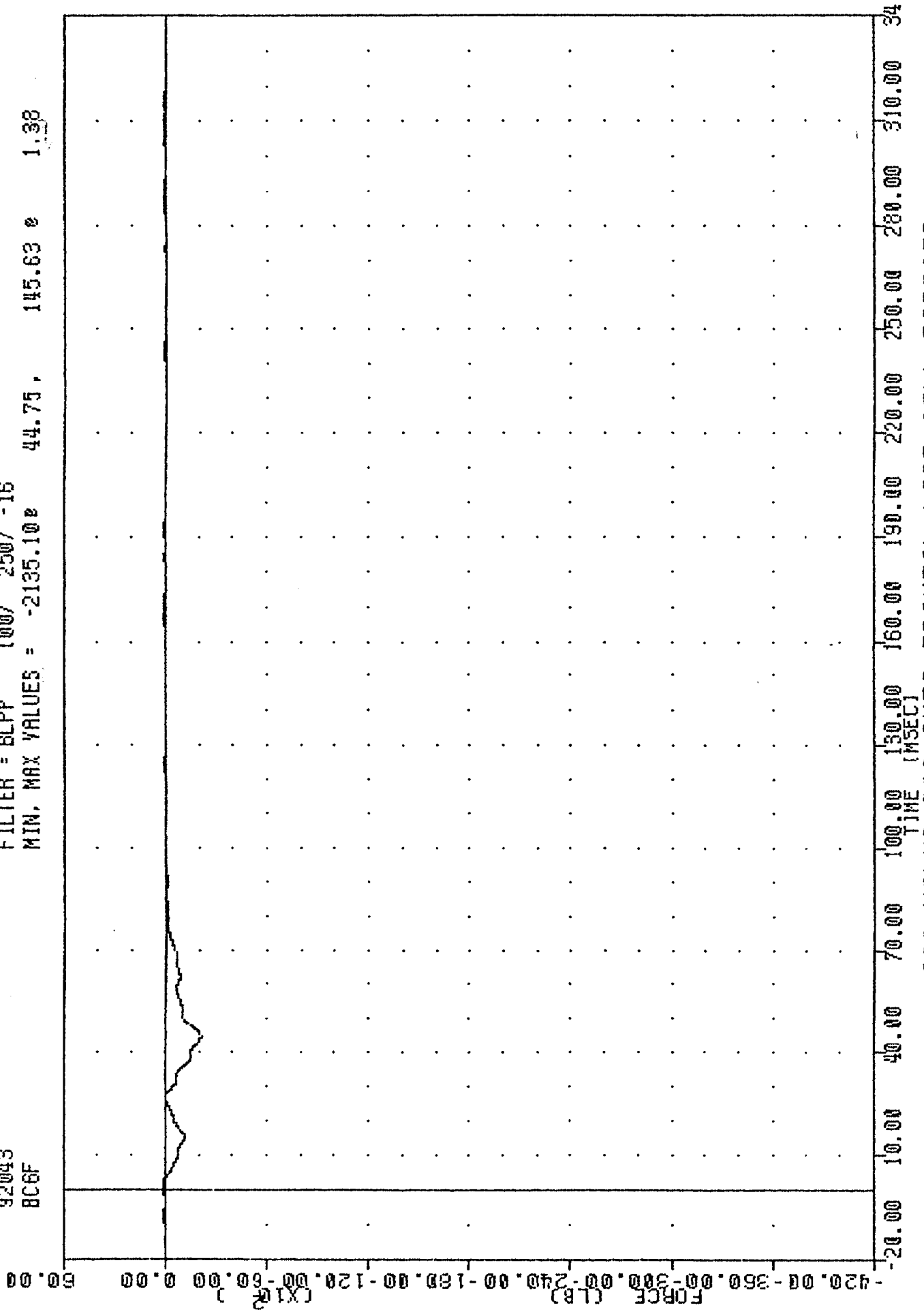
NEW CAR ASSESSMENT PROGRAM

92043

BC6F

FILTER = BLPP 100/ 250/ -16

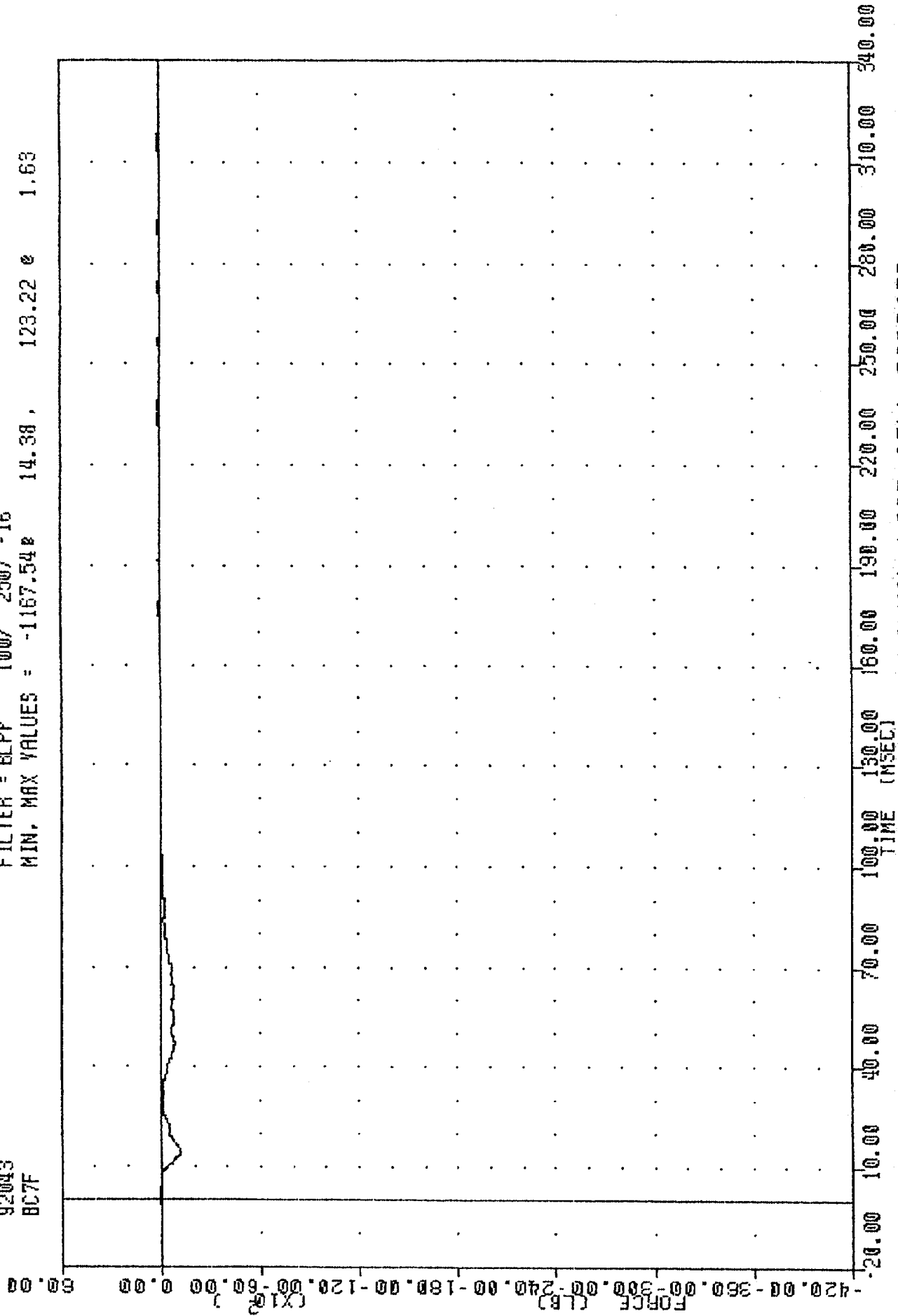
MIN, MAX VALUES = -2135.10 44.75, 145.63 1.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C6 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BC7F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1167.54 14.38 , 123.22 1.63



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C7 FORCE

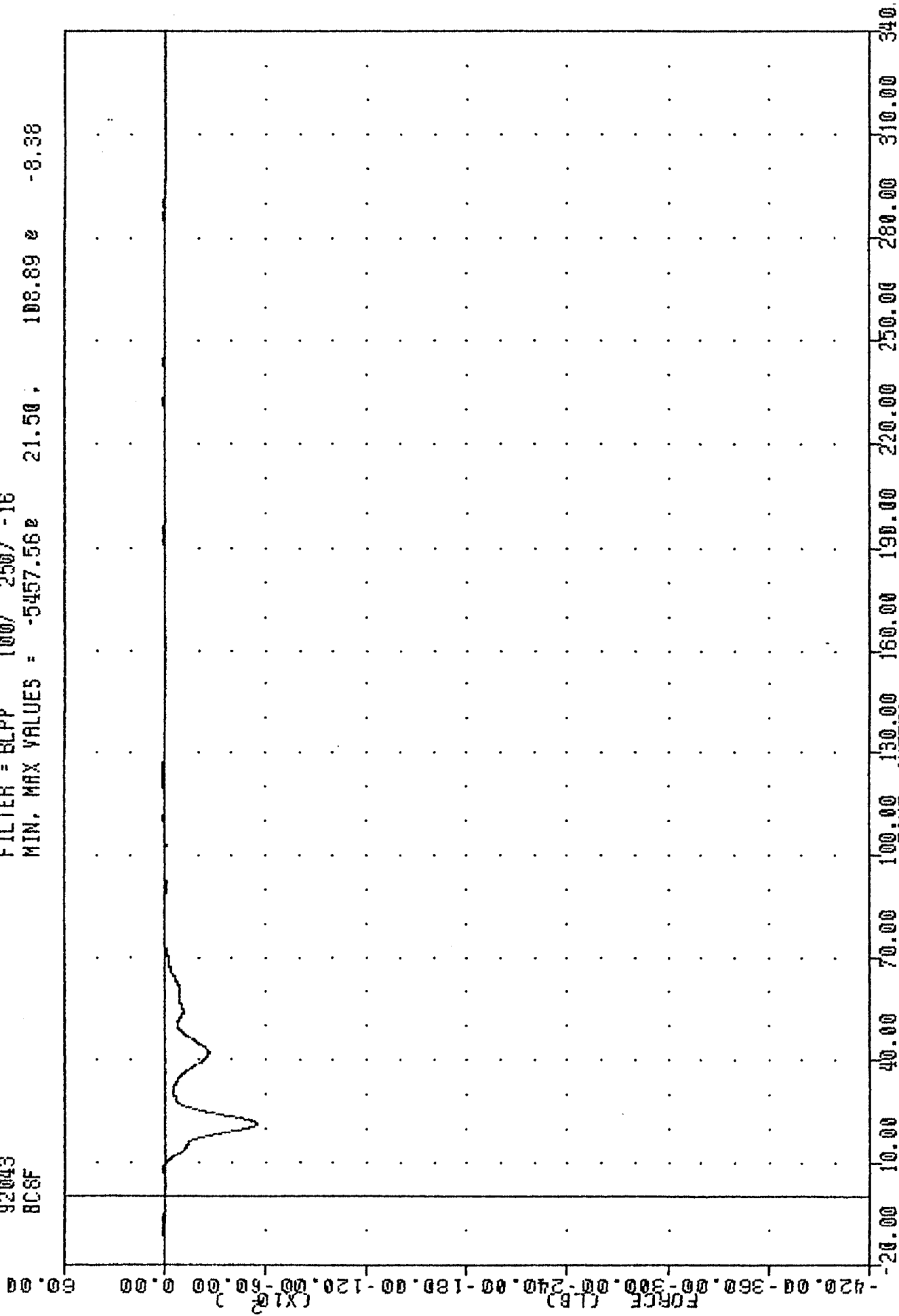
NEW CAR ASSESSMENT PROGRAM

92043

BC8F

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -5457.562 21.50 ; 108.89 2 -8.38

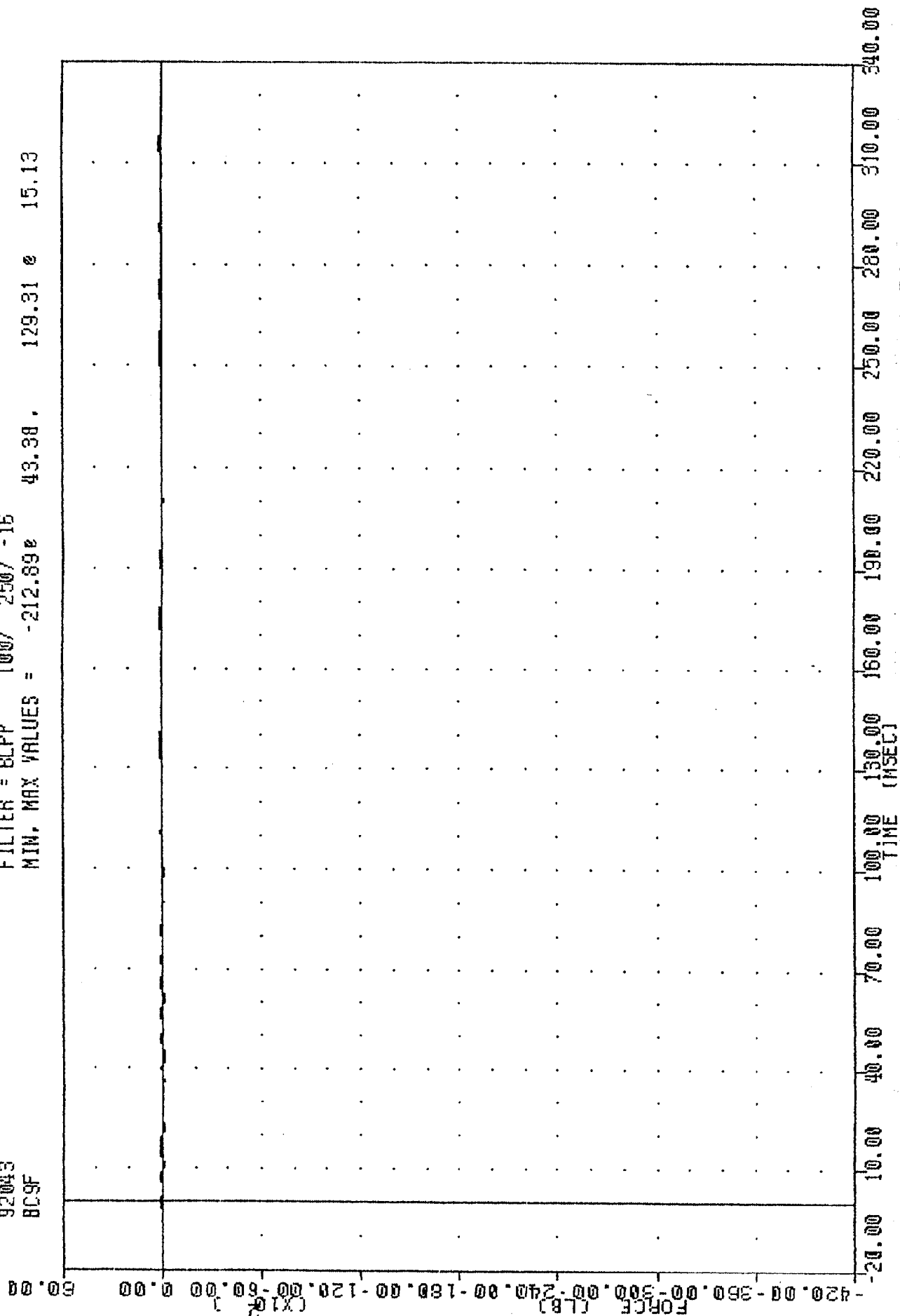


1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION C8 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BC9F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -212.89 43.38 129.31 15.13



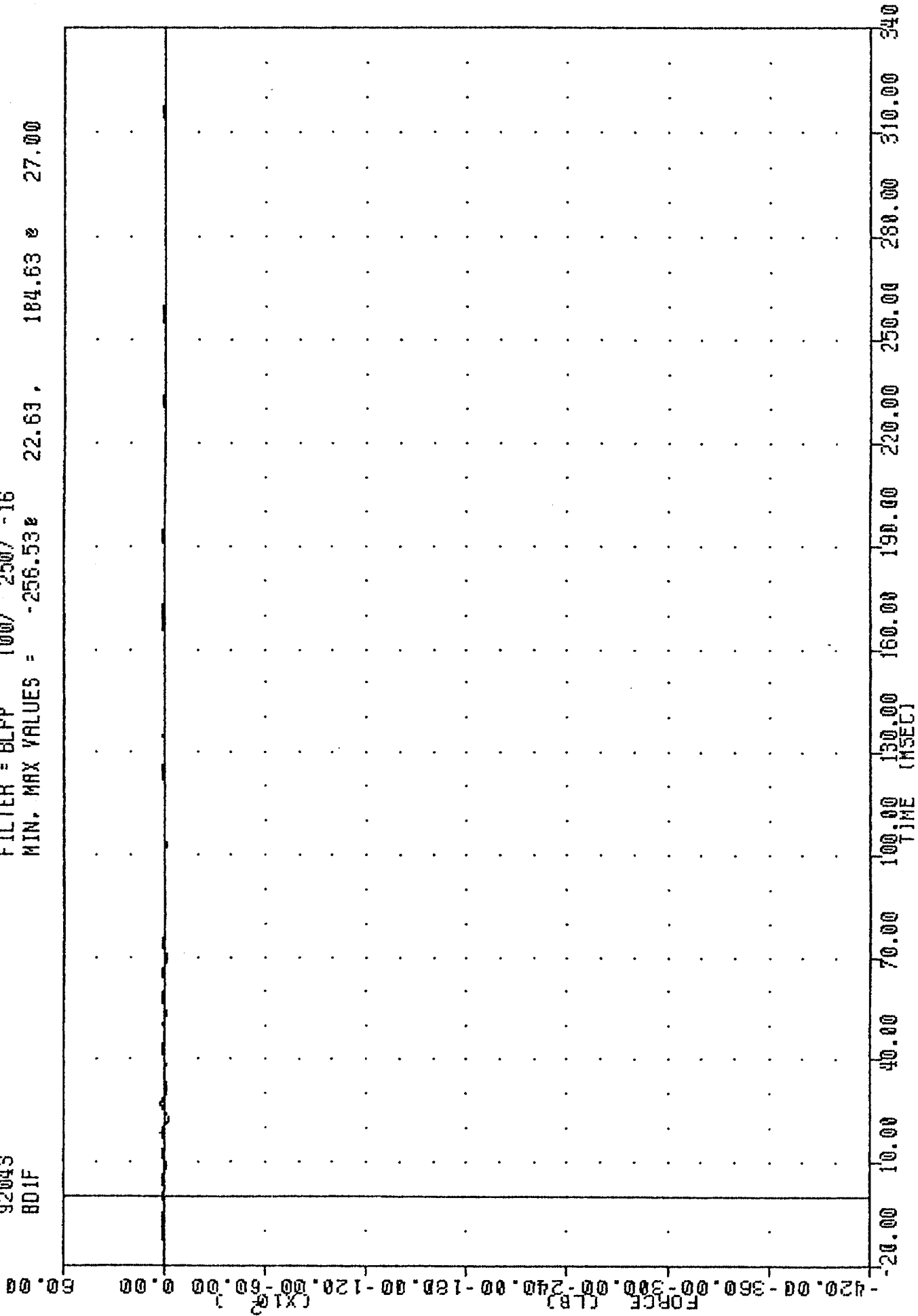
NEW CAR ASSESSMENT PROGRAM

92043

BDIF

FILTER = BLFP 100/ 250/ -16

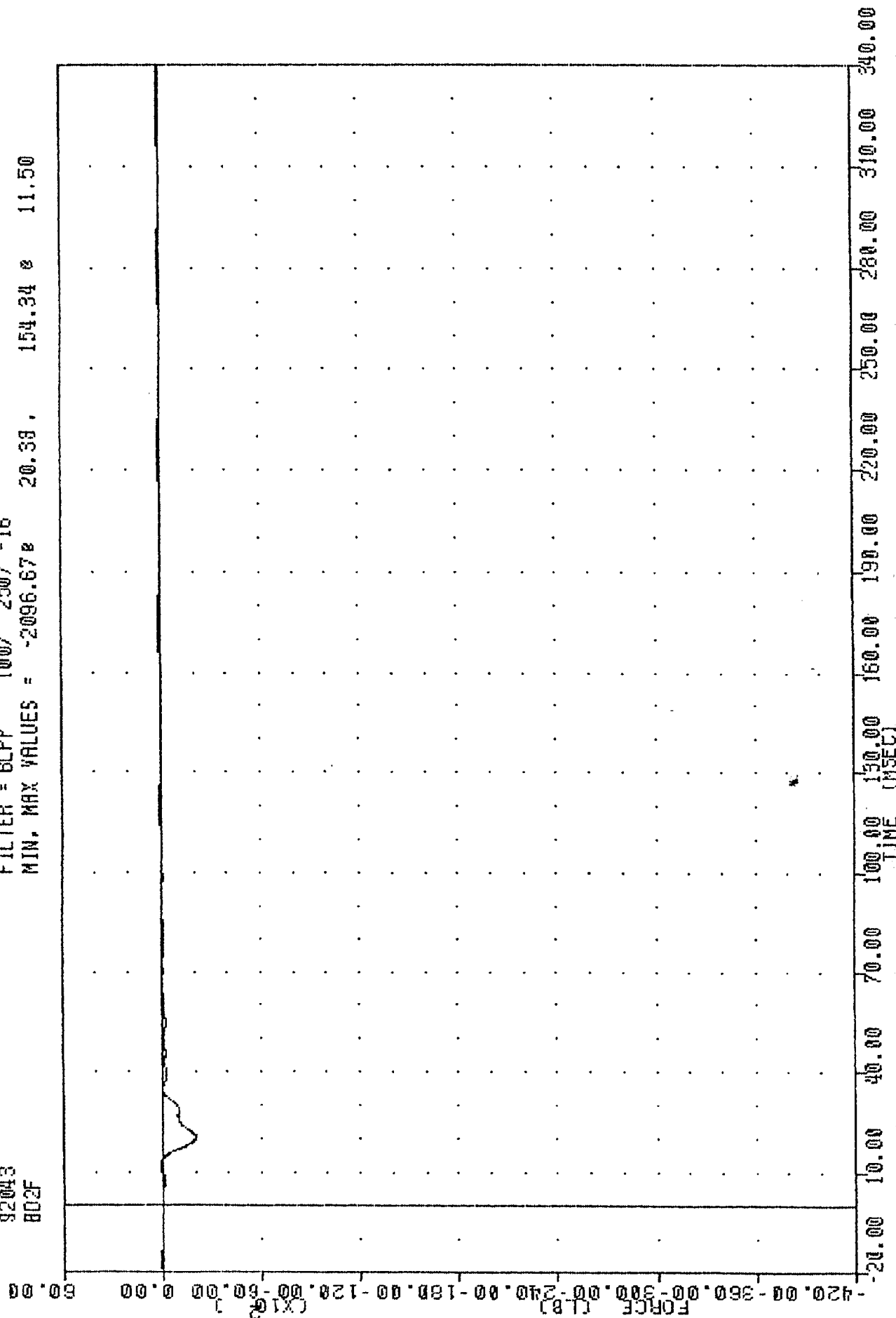
MIN. MAX VALUES = -256.53 22.63, 184.63 27.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D1 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 802F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2096.67 20.38 , 154.34 11.50



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 02 FORCE

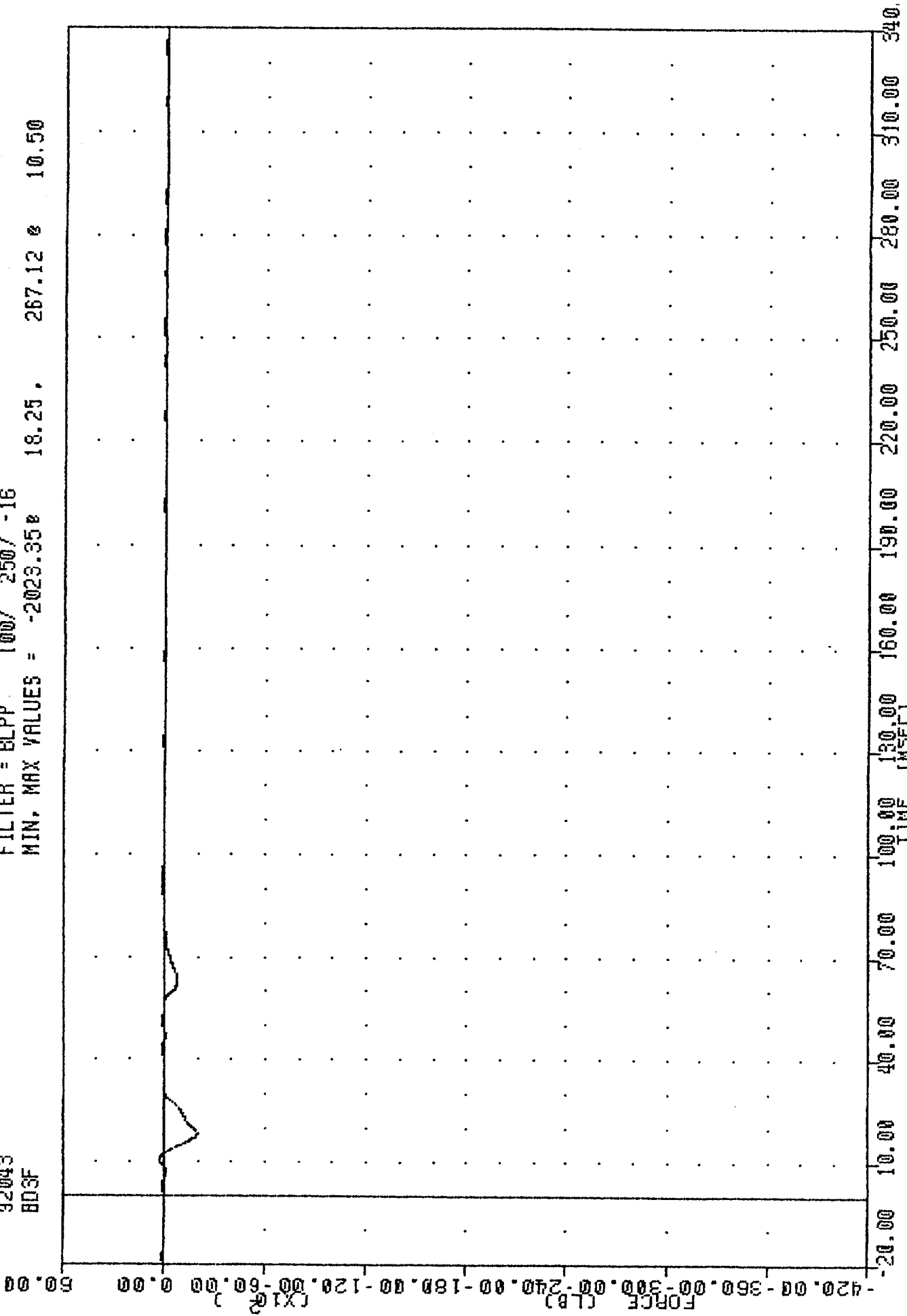
NEW CAR ASSESSMENT PROGRAM

92043

BD3F

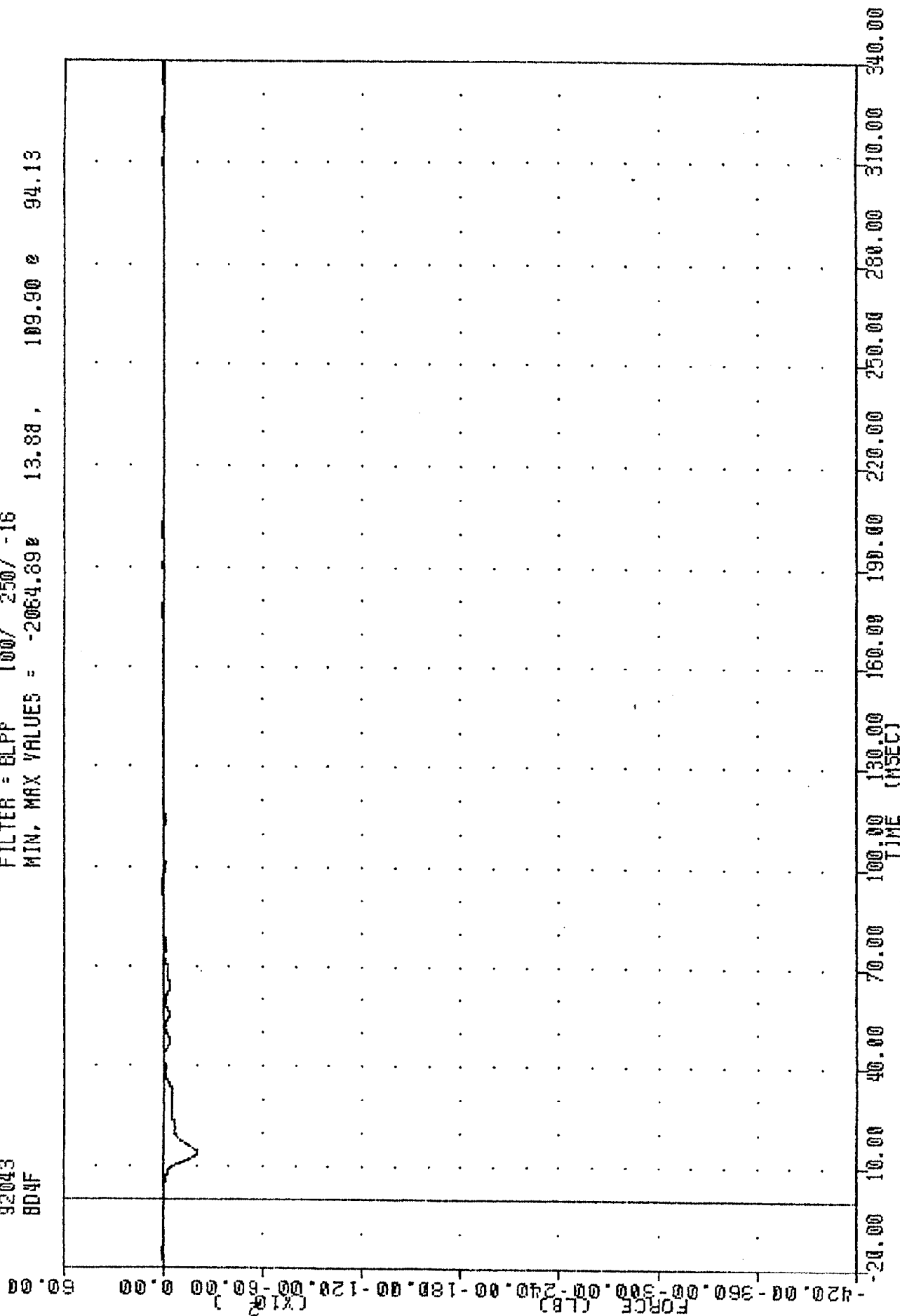
FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -2023.35 18.25, 267.12 10.50



TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BD4F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2064.69 13.88 109.90 2 94.13



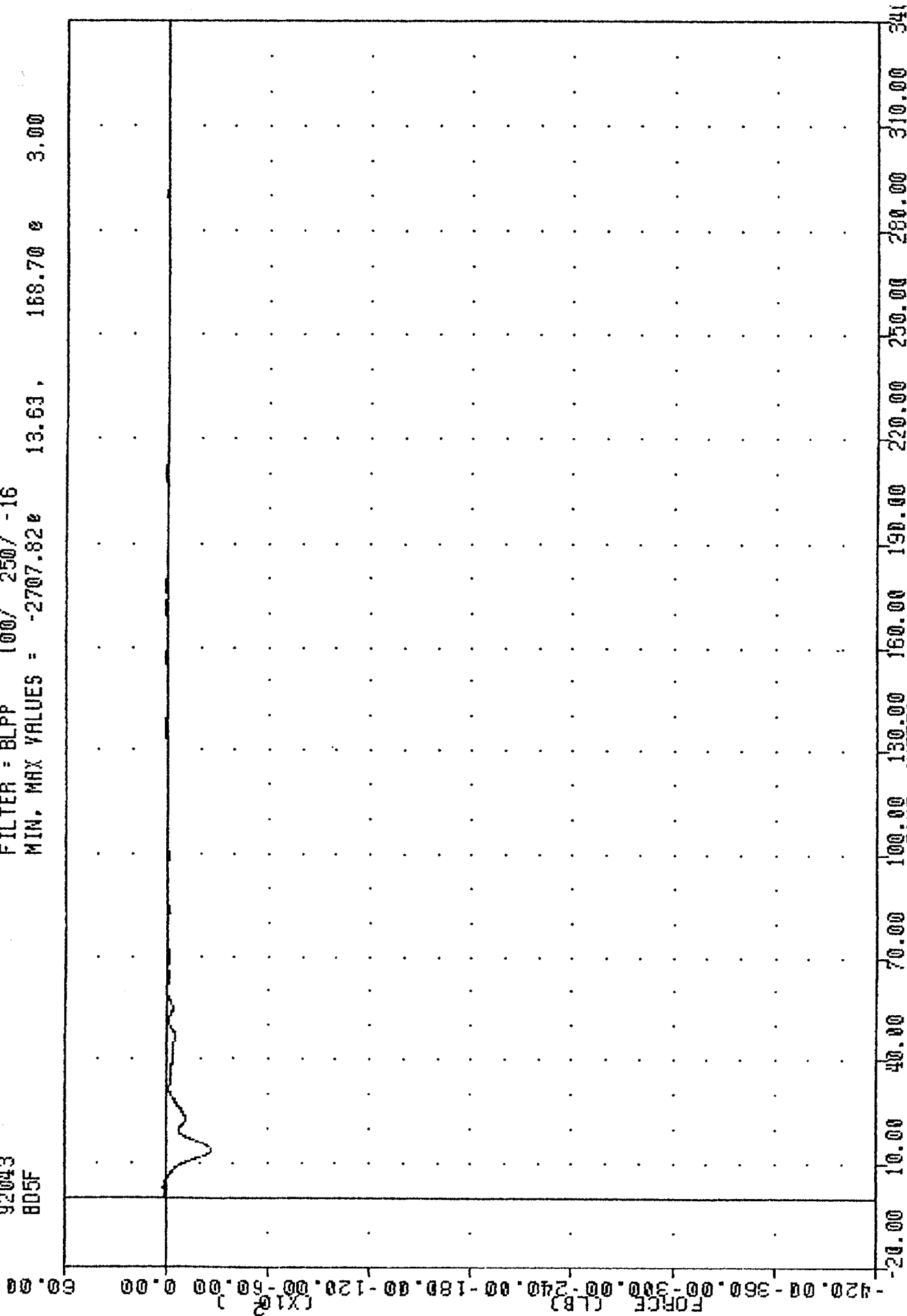
NEW CHH ASSESSMENT PROGRAM

92043

BD5F

FILTER = BLPP 100/ 250/ -16

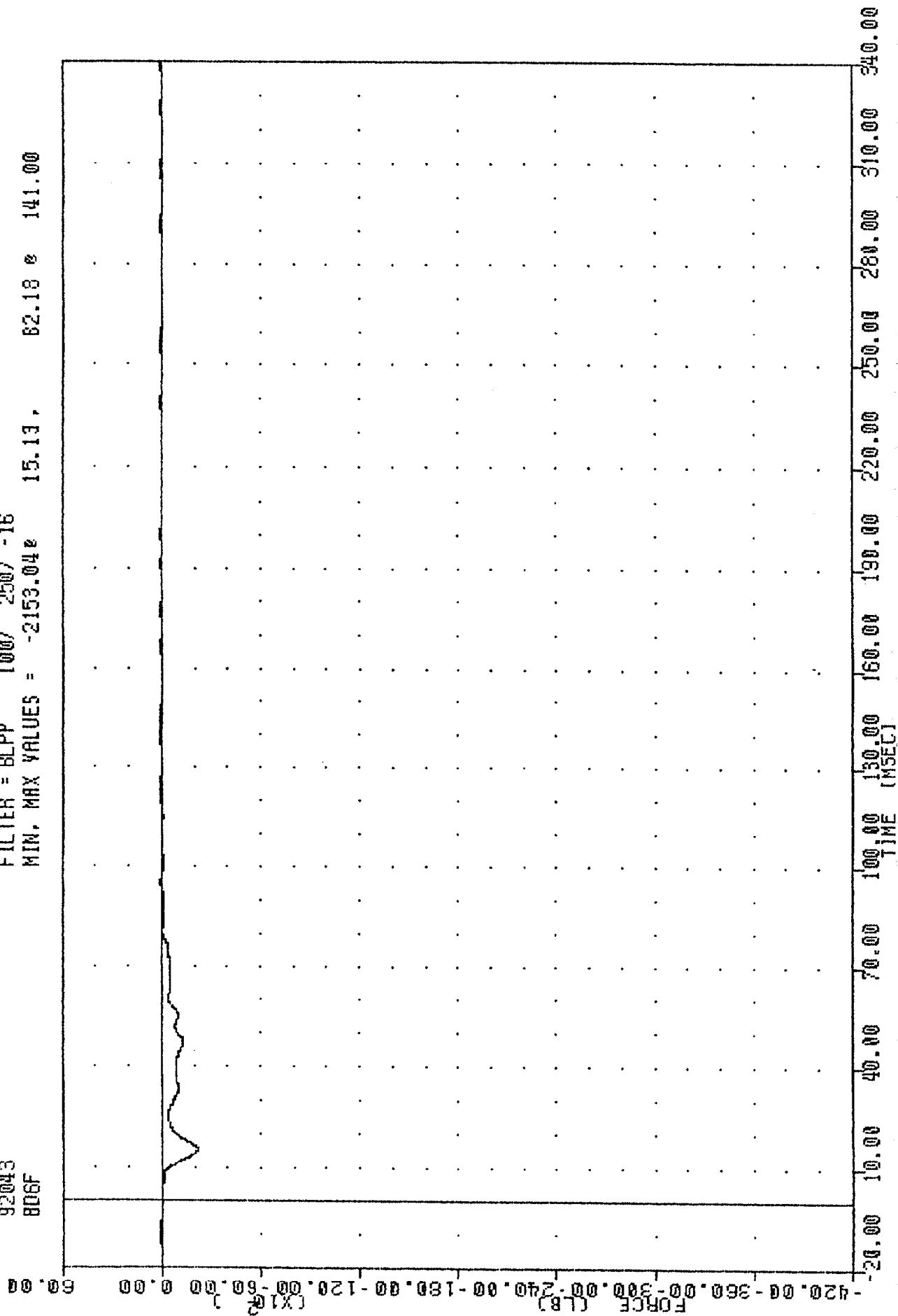
MIN. MAX VALUES = -2707.82e 13.63, 168.70 e 3.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D5 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 806F

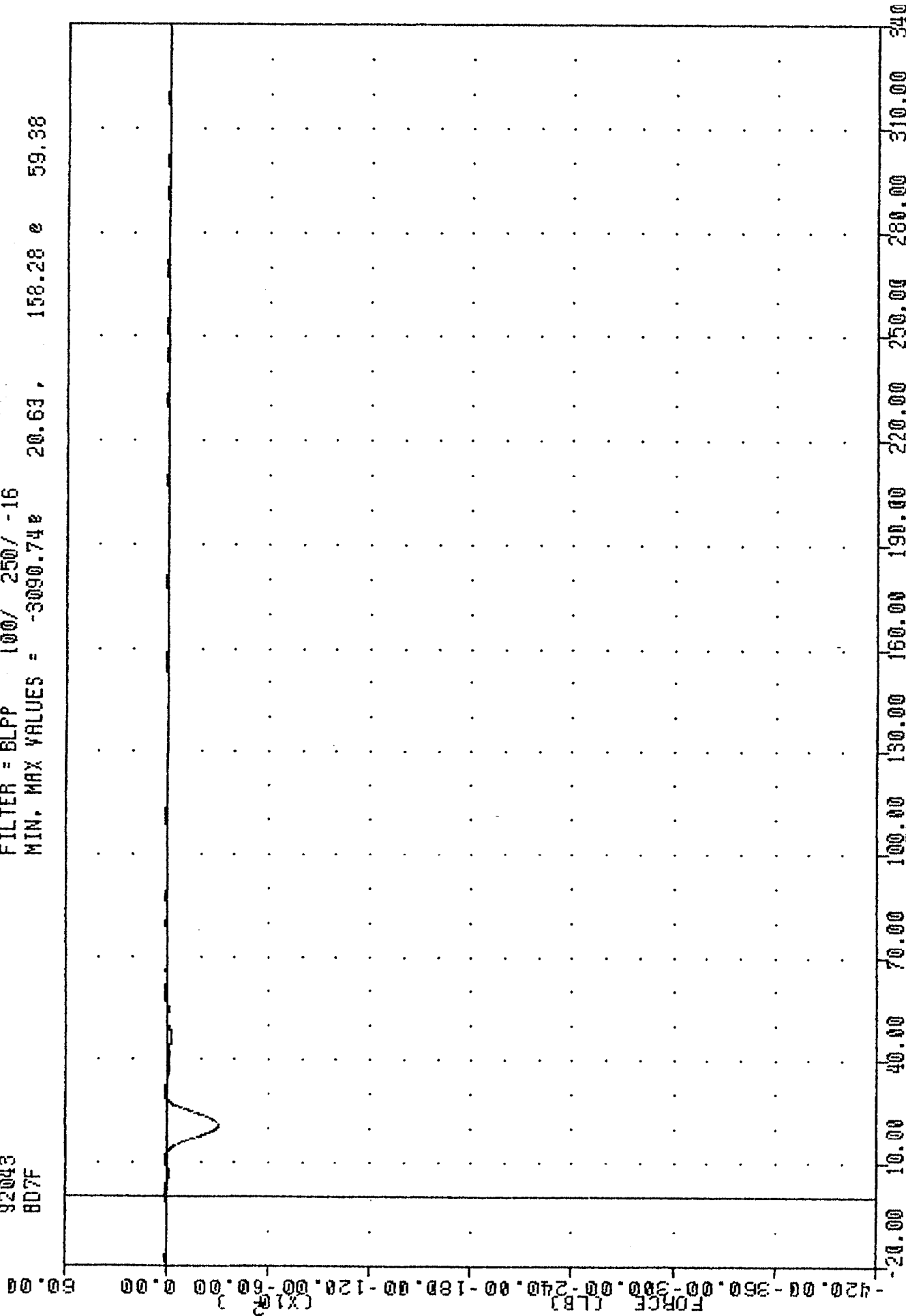
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -2153.04 15.13, 82.18 141.00



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 06 FORCE

FILTER = BLPP 100/ 250/ -16

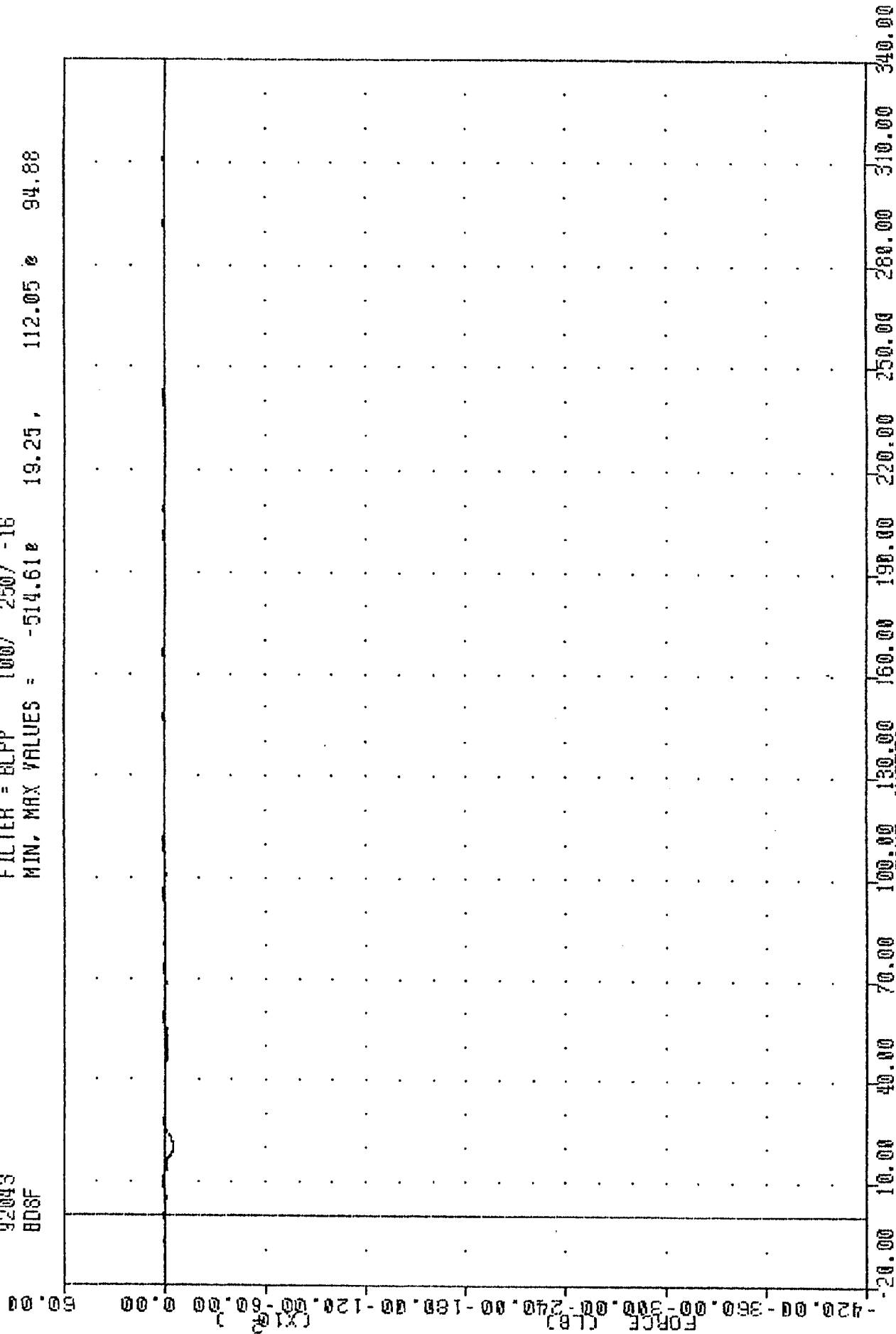
MIN. MAX VALUES = -3090.74e 20.63, 158.28 e 59.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION 07 FORCE

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 BD8F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -514.61 112.05 94.88



709

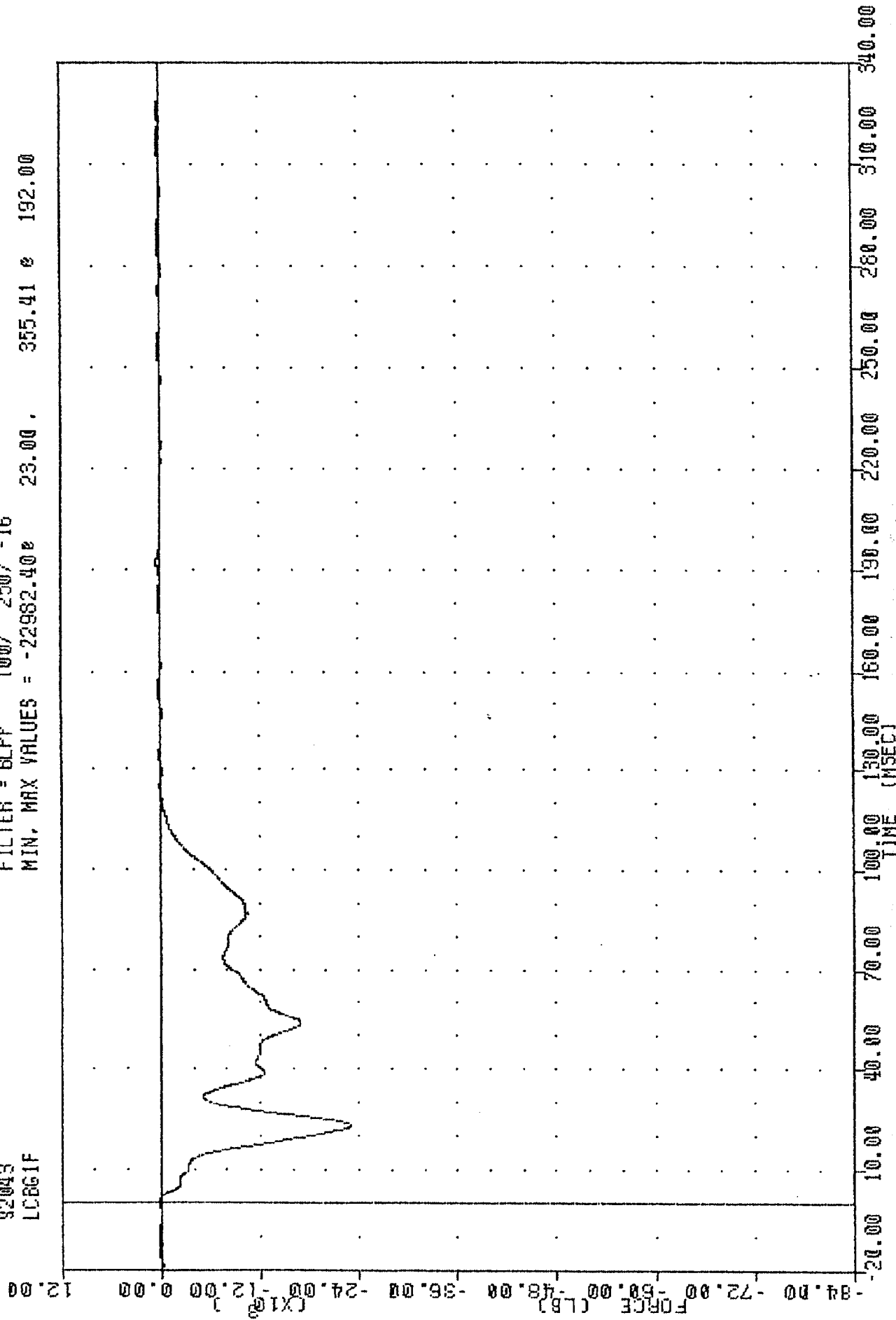
MIN, MAX VALUES = -175.47 21.63.

177.57 7.50

1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D9 FORCE

TRC 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 LCBGIF

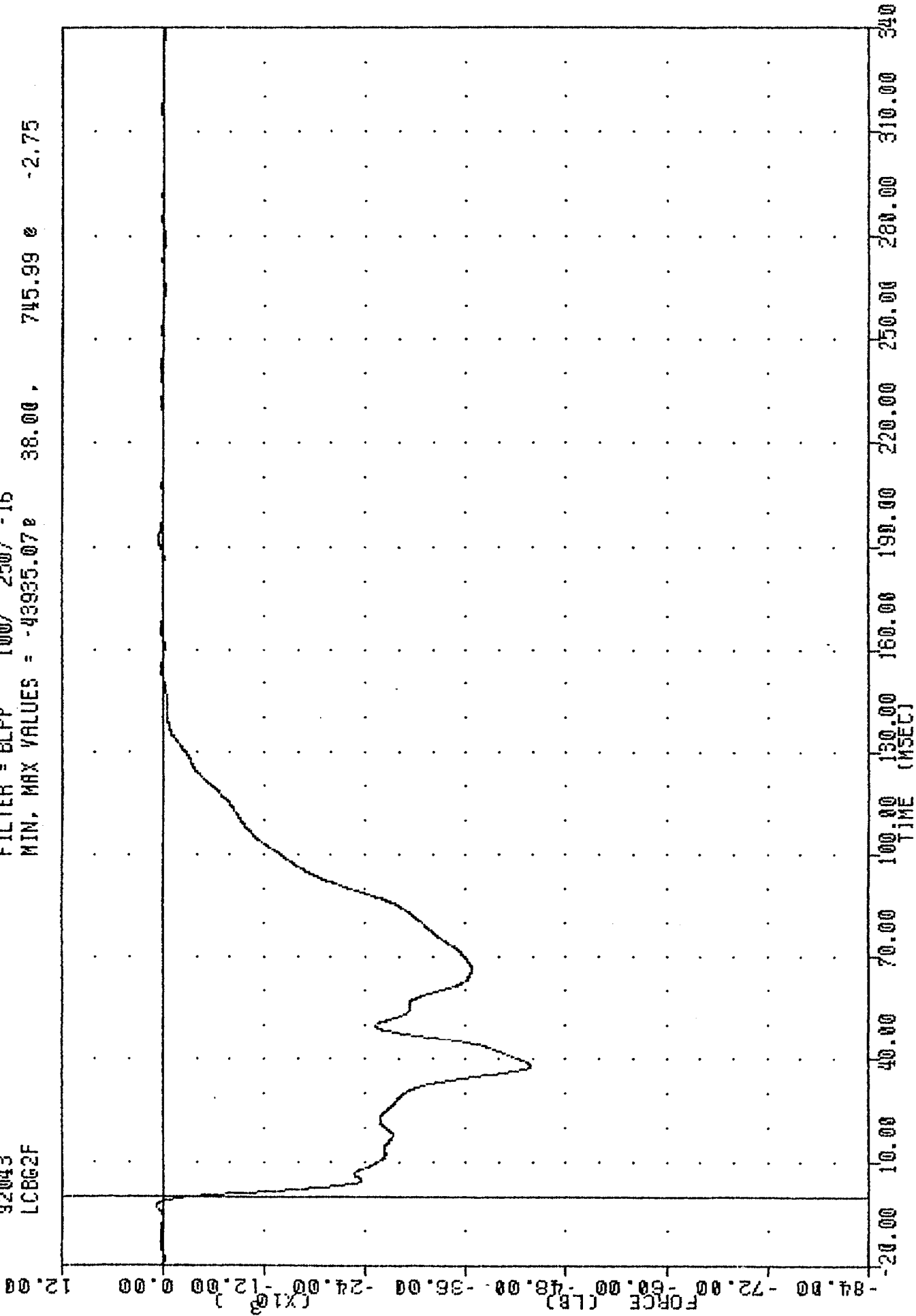
FILTER = BLPF 100/ 250/ -16
 MIN, MAX VALUES = -22982.40e 23.00, 355.41 e 192.00



NEW CAR ASSESSMENT PROGRAM

92043
LCRG2F

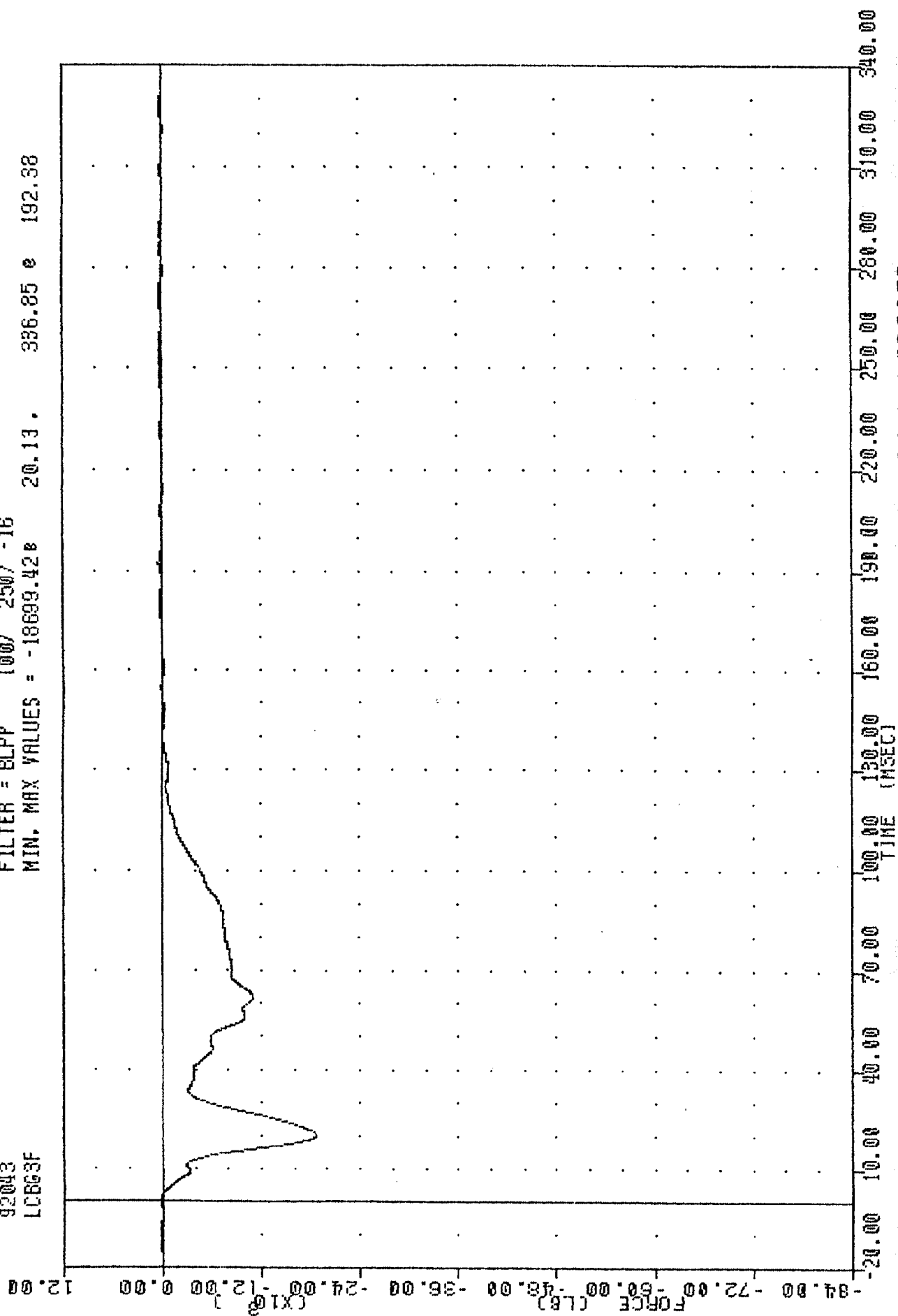
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -43935.07e 38.00 , 745.99 e -2.75



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 2 FORCE TOTAL

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 LCBG3F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -18699.428 20.13 . 396.85 e 192.38



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 3 FORCE TOTAL

NEW CAR ASSESSMENT PROGRAM

92043

LC664F

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -13264.30 22.00 , 308.66 291.50

12.00

0.00

(X10³)

-12.00

-24.00

-36.00

-48.00

-60.00

-72.00

-84.00

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

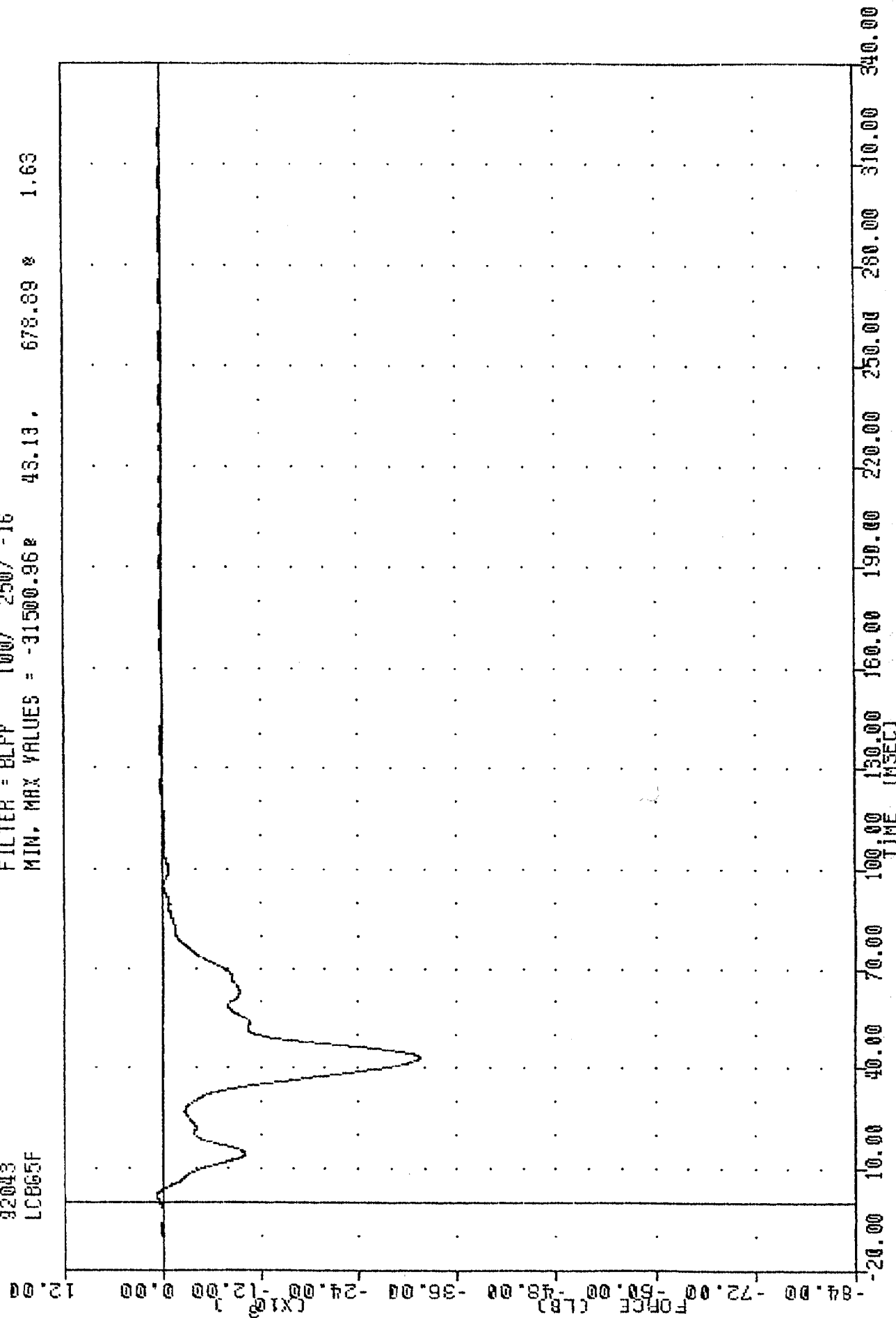
TIME (MSEC)

1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER GROUP - 4 FORCE TOTAL

TRC , 920212
 NEW CAR ASSESSMENT PROGRAM
 92043
 LCB65F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -31500.96 678.89 43.13 1.63

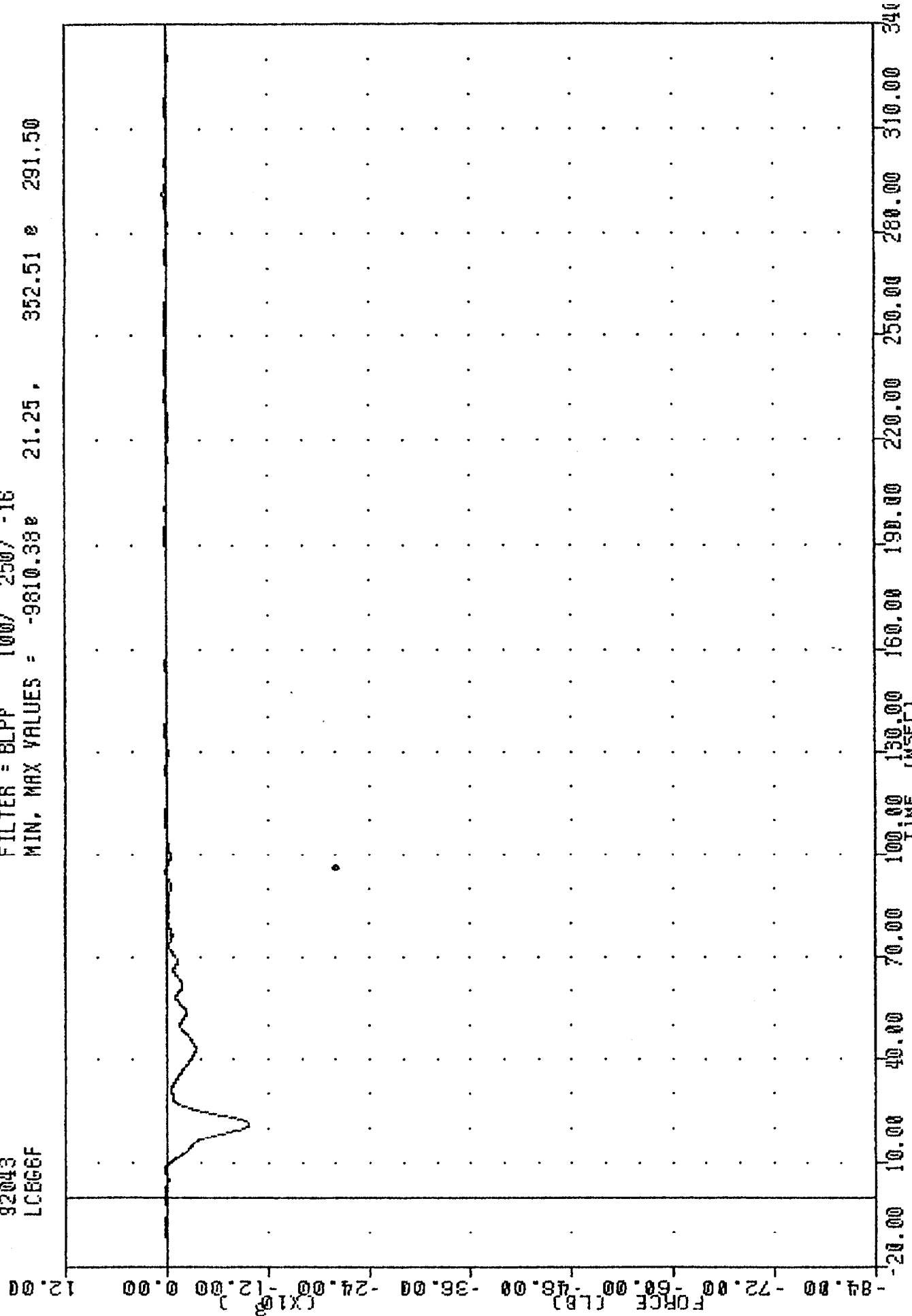


1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP 5 FORCE TOTAL

NEW CAR ASSESSMENT PROGRAM

92043
LCEG6F

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -9810.38 21.25 352.51 291.50



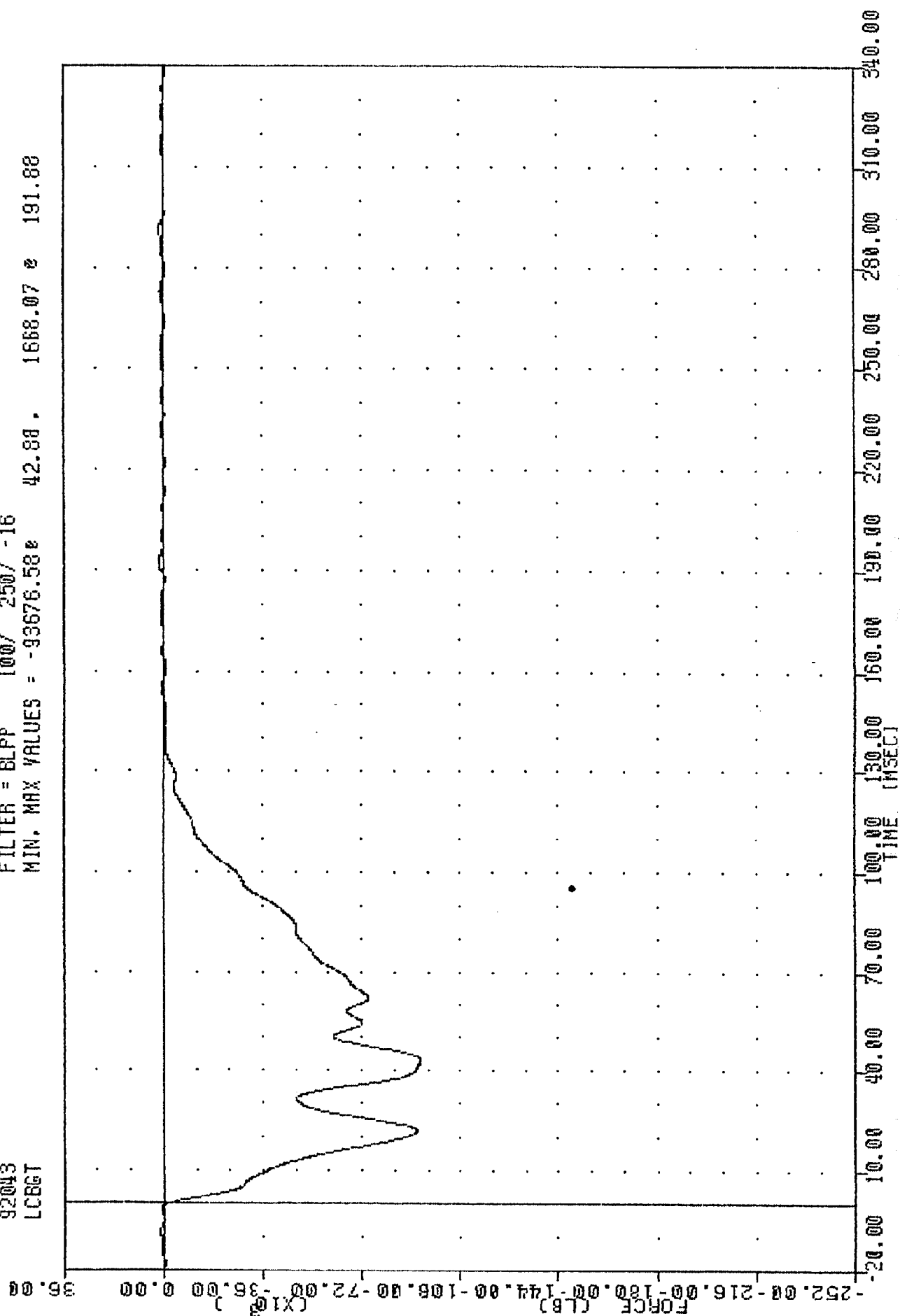
1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 6 FORCE TOTAL

TRC
NEW CAR ASSESSMENT PROGRAM
92043
LCBGT

920212

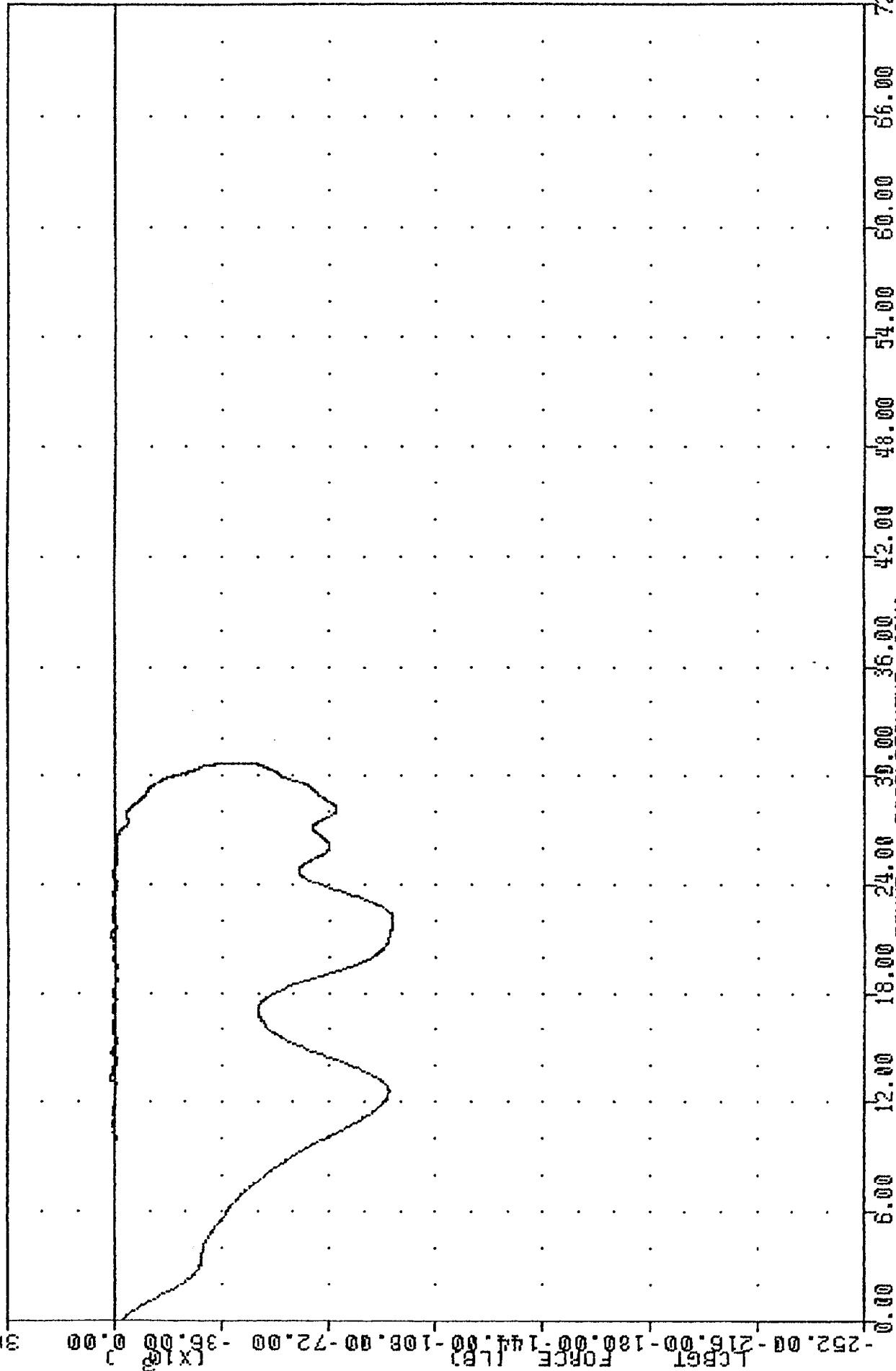
FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -93676.58 42.88 1668.07 191.88



OTHXD 300/ 750/ -16 MIN. MAX = 0.00 0.00 30.70 87.50
 LCBGT 100/ 250/ -16 MIN. MAX = -93676.58 42.88 1688.07 191.88

FILTER = BLPP
 FILTER = BLPP



1992 VOLVO 240 INTO FRONTAL LOAD CELL BARRIER
 TOTAL LOAD CELL BARRIER FORCE VS VEHICLE X-AXIS DISPLACEMENT

APPENDIX C

DUMMY CERTIFICATION DATA

PRE-TEST CERTIFICATION DATA

DRIVER DUMMY S/N: 142

TRANSPORTATION RESEARCH CENTER OF OHIO
HYBRID III EXTERNAL DIMENSIONS
142 HUMANOID

24-JAN-92

TRC 142C9ED1 572E SN142 EXT. DIMENSION CALOR

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			71.0 DEG. F
RELATIVE HUMIDITY			34.0 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9- 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)		38.2-39.4 IN	38.7 IN
WAIST CIRCUMFERENCE (Z)		32.9-34.1 IN	33.3 IN
CHEST DEPTH (O)		8.4- 9.0 IN	8.6 IN
HH-POINT HEIGHT (C)		3.3- 3.5 IN	3.4 IN
HH-POINT FROM SEATBACK (D)		5.3- 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN	34.9 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN	5.7 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN	23.5 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN	18.7 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN	17.8 IN
KNEE PIVOT HEIGHT (M)		19.1-19.7 IN	19.3 IN
FOOT LENGTH (P)		9.9-10.5 IN	10.1 IN
FOOT BREADTH (W)		3.6- 4.2 IN	3.8 IN
SHOULDER PIVOT FROM BACKLINE (E)		3.3- 3.7 IN	3.4 IN
SHOULDER BREADTH (V)		16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN	8.3 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN	13.6 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN	11.5 IN

TEST MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

24-JAN-92

TRC

142C7HD1

572E SN142 HEAD DROP CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	245.29 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.28 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

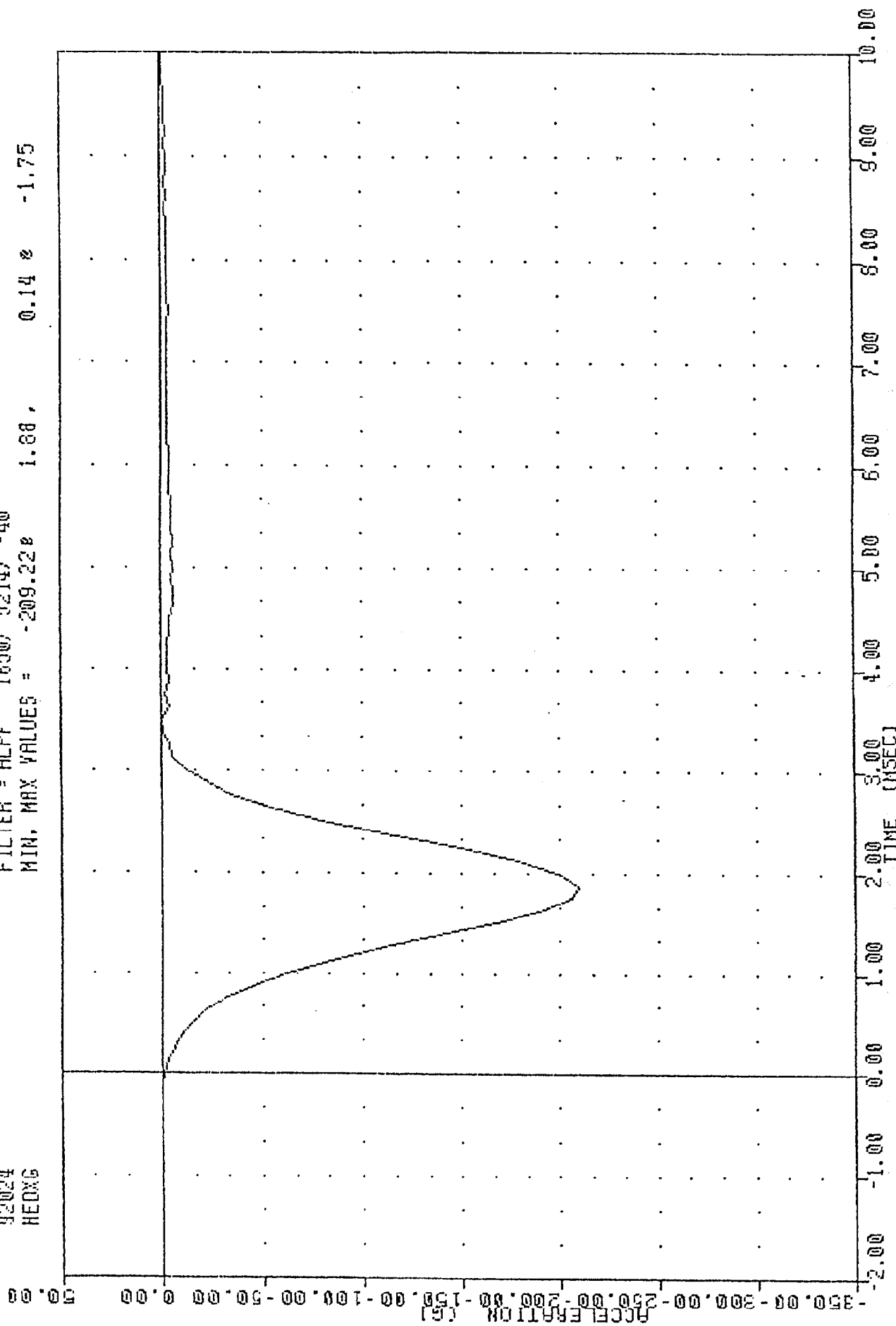
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRC , 142C9HD1
 572E SN142 HEAD DROP CAL 08
 92024
 HEDXG

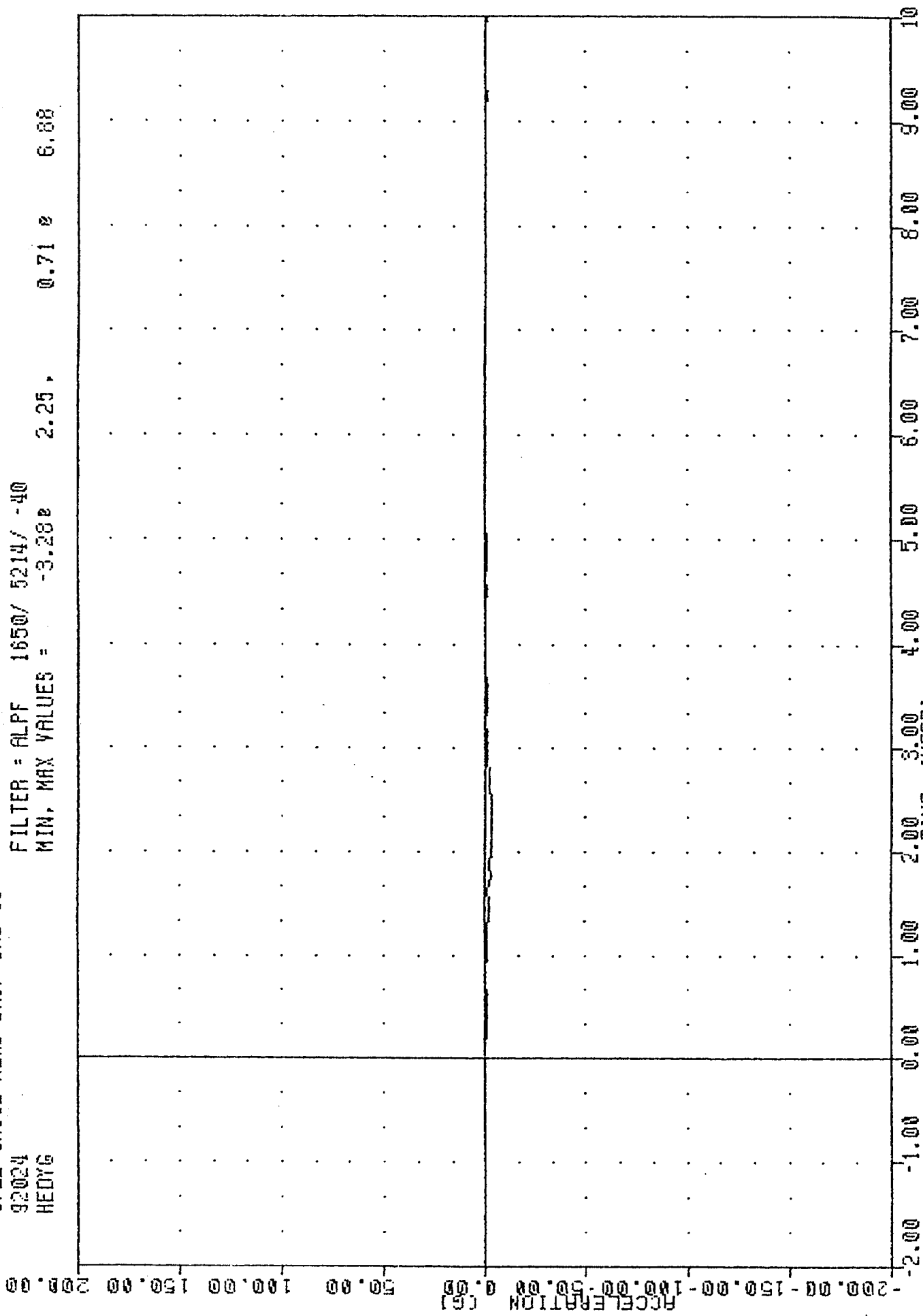
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -209.22e 1.88, 0.14 e -1.75



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

572E SN142 HEAD DROP CAL 09
 92024
 HEDYG

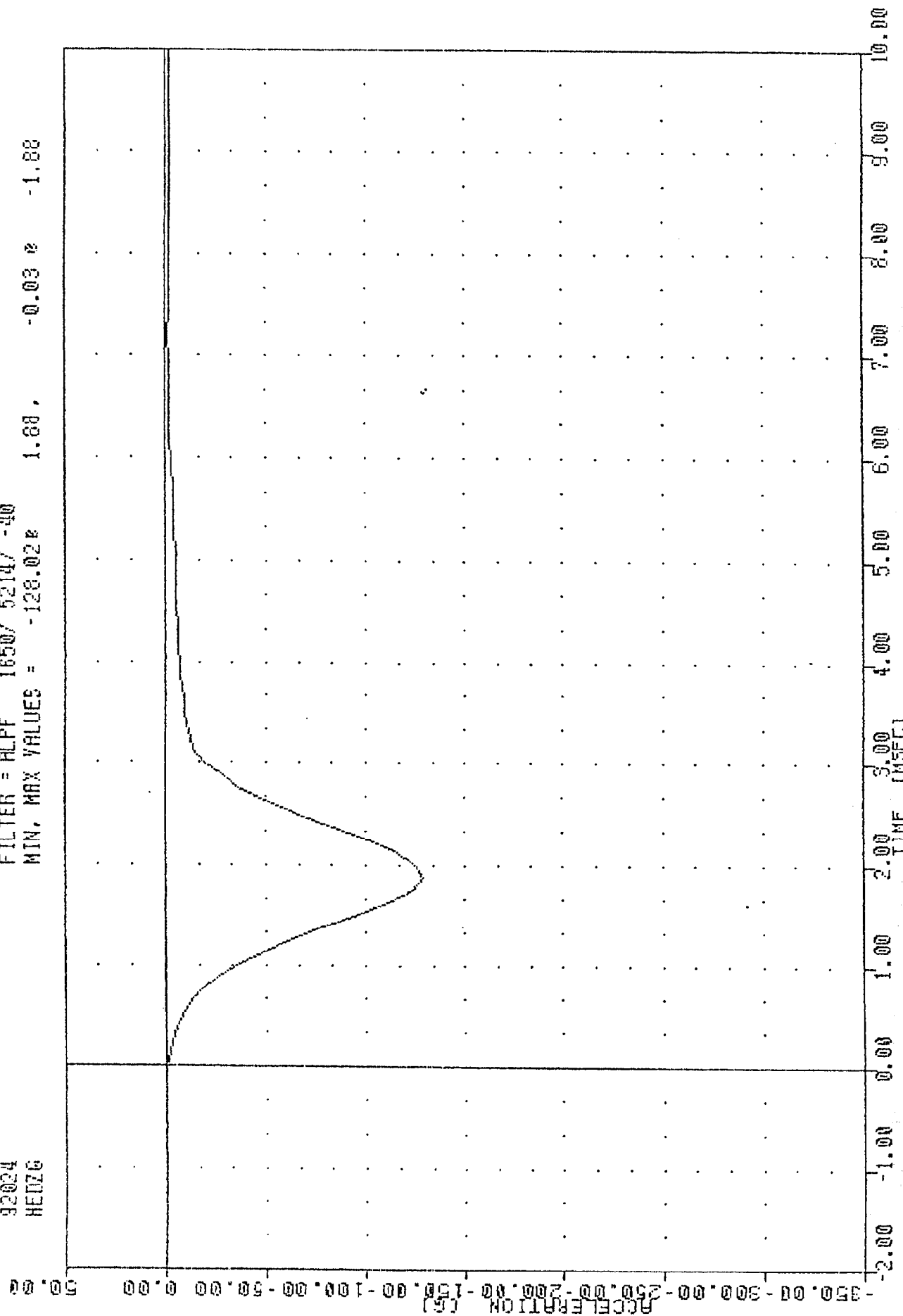
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -3.28e 2.25e 0.71 e 6.88



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

TRC , 14209H01
 572E SN142 HEAD DRDP CAL 00
 92024
 HEDZ6

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -128.028 1.88, -0.038 -1.88



PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

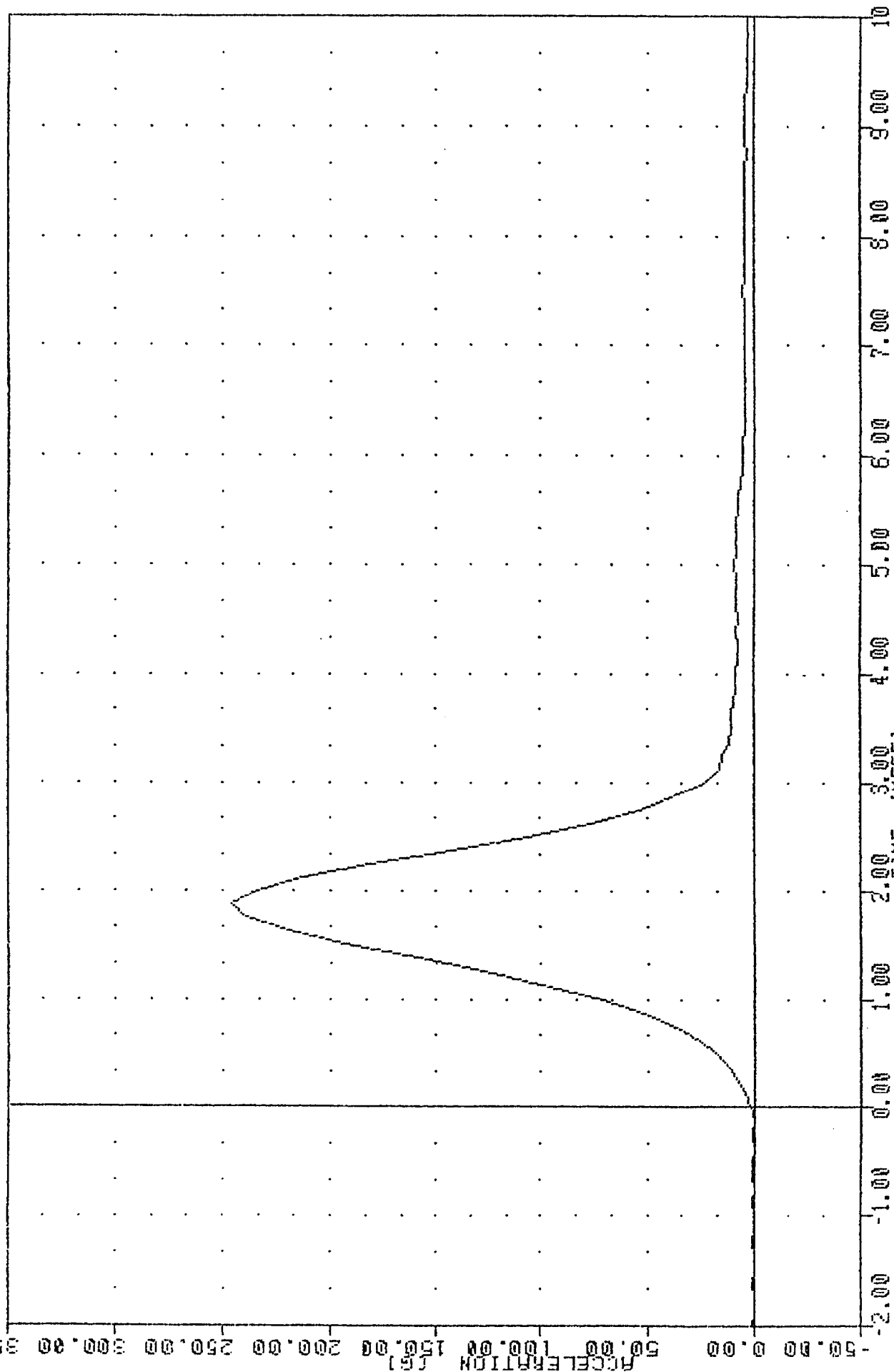
572E 3H142 HEAD DROP CAL 09

92024

HEADG

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 0.07e -0.38 , 245.29 e 1.88



PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF CHIC

NECK FLEXION TEST

HYBRID III

25-JAN-92

6 AXIS NECK TRANSDUCER
TRC 142C9NF1

572E 8N142 NECK FLEXION CRI 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	29.0 %
IMPACT VELOCITY	22.6-23.4 FT/SEC	23.08 FT/SEC
PENDULUM	10 MS 22.50 - 27.50 G	23.47 G
DECELERATION	20 MS 17.60 - 22.60 G	19.55 G
	30 MS 12.50 - 18.50 G	15.34 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.29 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	34 - 42 MS	38.63 MS
D PLANE	MAX 64 - 78 DEG.	73.99 DEG.
ROTATION	TIME 57 - 64 MS	60.88 MS
MOMENT ABOUT OCCIPITAL CONDOYLE	MAX 65 - 80 FT.LBS	68.55 FT.LBS
	TIME 47 - 58 MS	51.13 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	113 - 128 MS	115.00 MS
POSITIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	97 - 107 MS	105.88 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

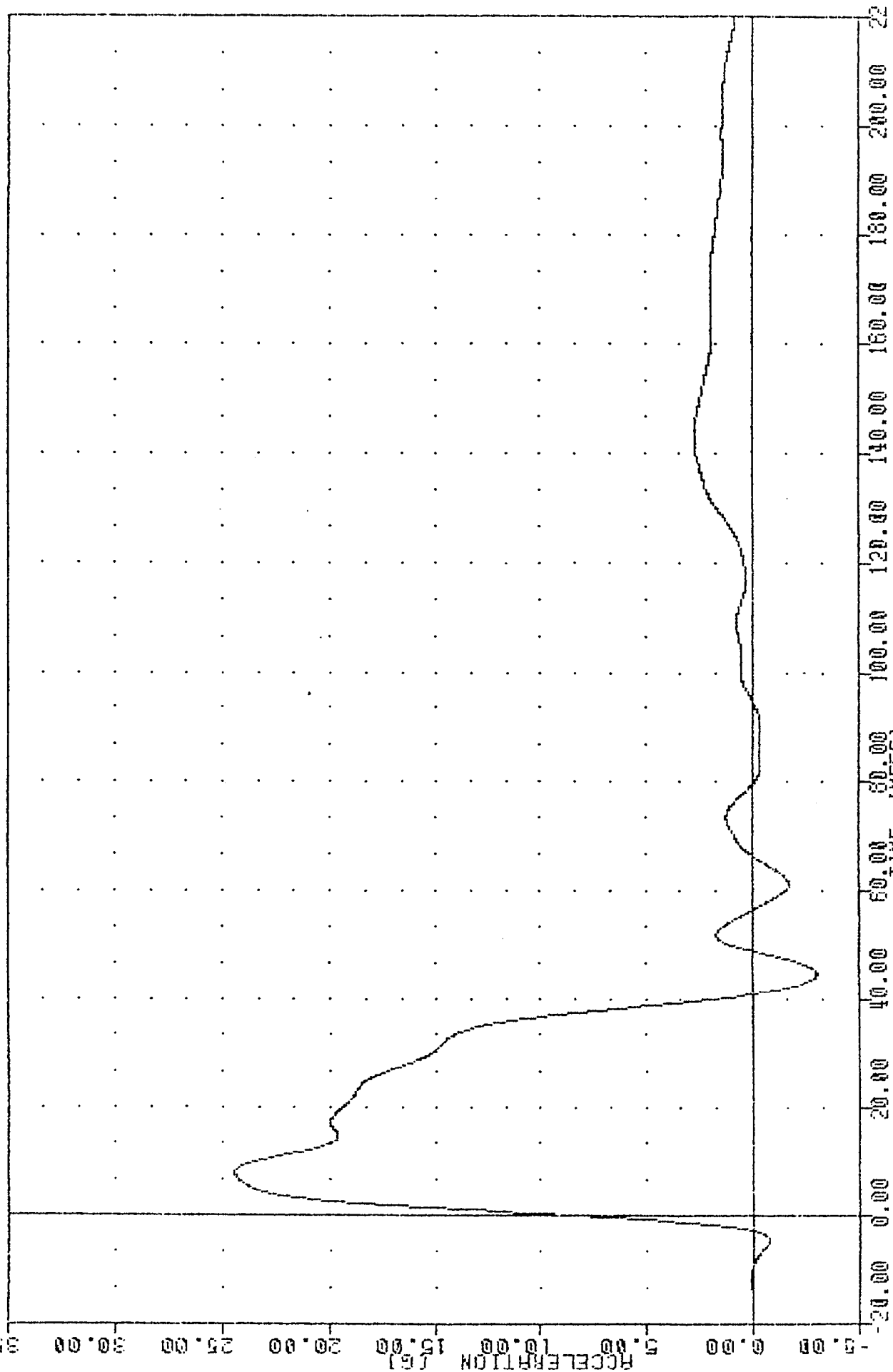
572E SH142 NECK FLEXION CAL09

92025

PENXG

FILTER = BLPP 100/ 317/ -40

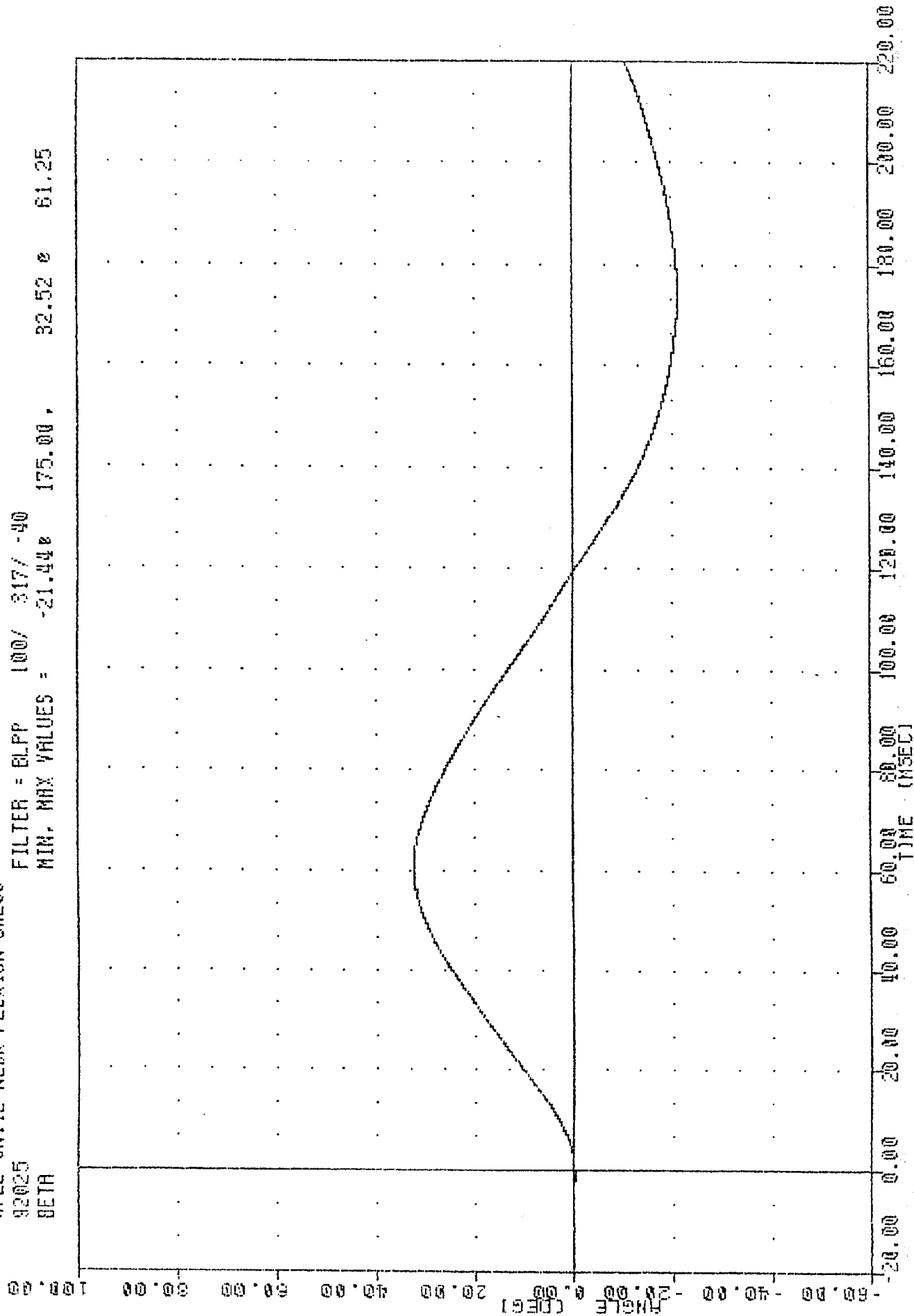
MIN. MAX VALUES = -3.06e 44.50, 24.45 e 7.68



PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC , 14209NF1
 572E SN142 NECK FLEXION CAL09
 92025
 BETA

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -21.44e 175.00 , 32.52 e 61.25



PART 572-E HYBRID III NECK FLEXION CALIBRATION
 RESULT 21.44 DEGREE

572E SN142 NECK FLEXION CALIB

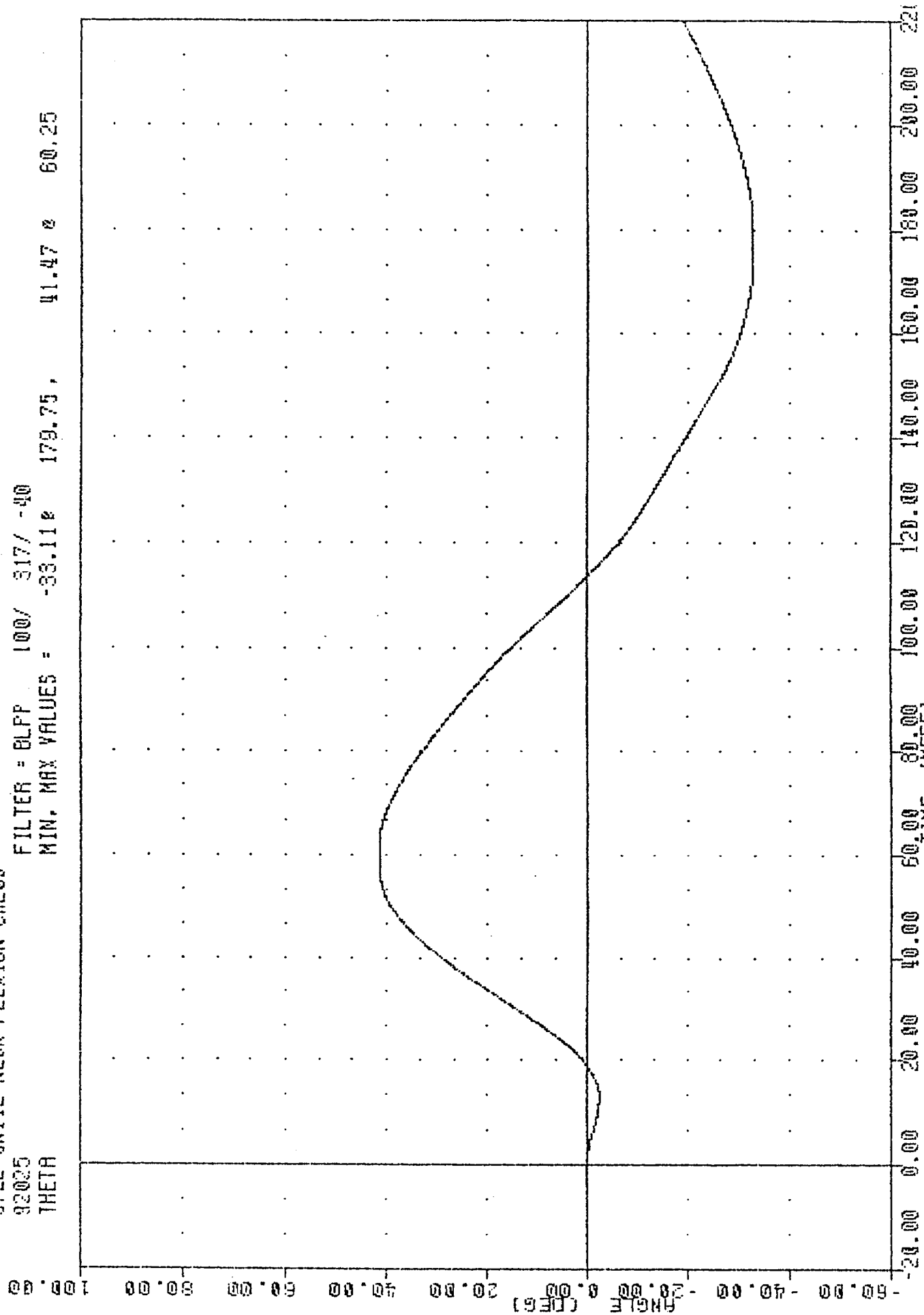
92025

THETA

FILTER = BLPP 100/ 317/ -40

MIN. MAX VALUES = -33.11° 179.75°

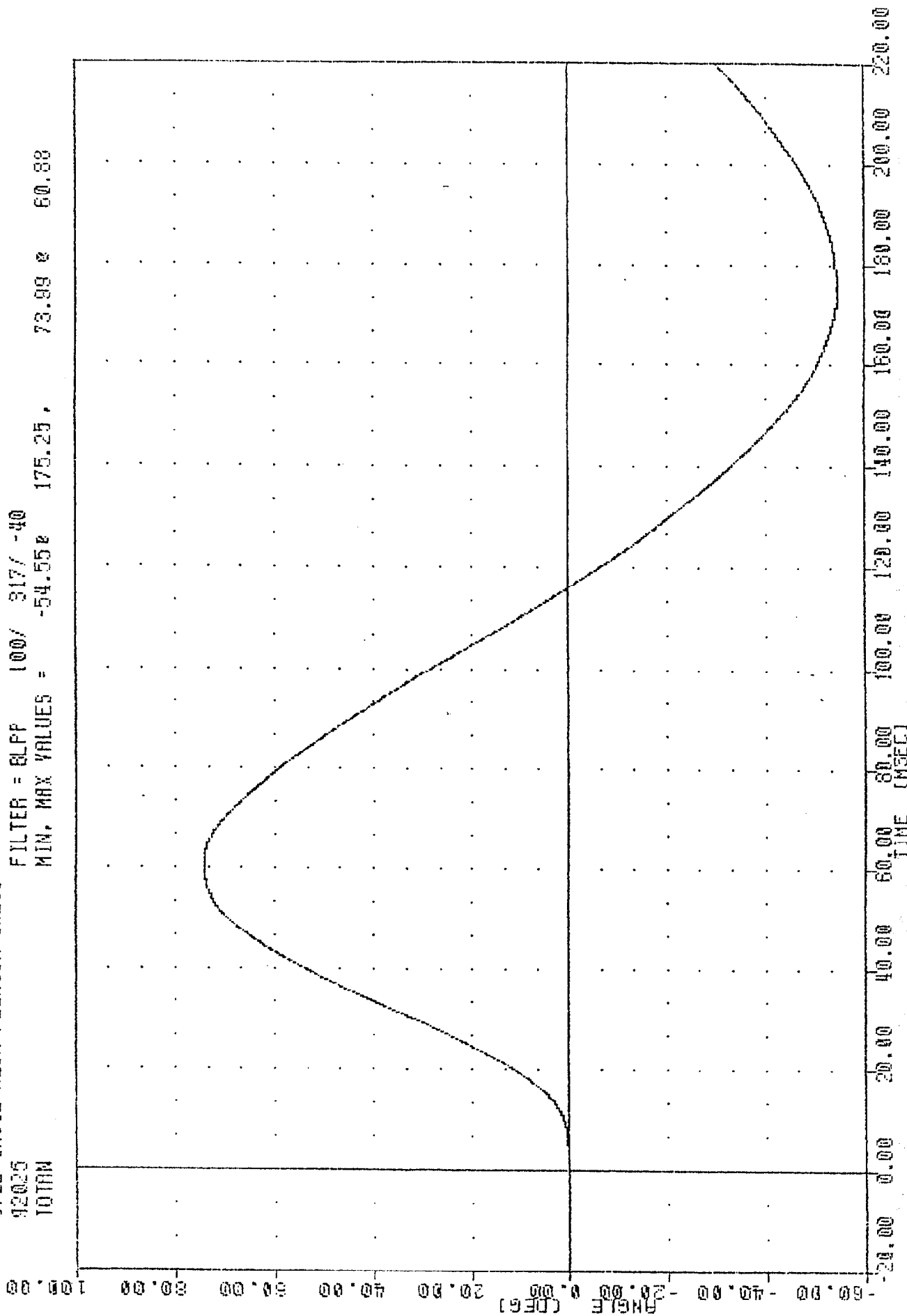
41.47° 60.25



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

TRC , 14209NF1
 572E SN142 NECK FLEXION CAL09
 92025
 10TRM

FILTER = 8LPP 100/ 317/ -40
 MIN, MAX VALUES = -54.55e 175.25, 73.99 e 60.88



PART 572-E HYBRID III NECK FLEXION CALIBRATION
 TOTAL ROTATION

572E SN142 NECK FLEXION CAL09

92025

NEKXF

FILTER = BLPP 100/ 317/ -40

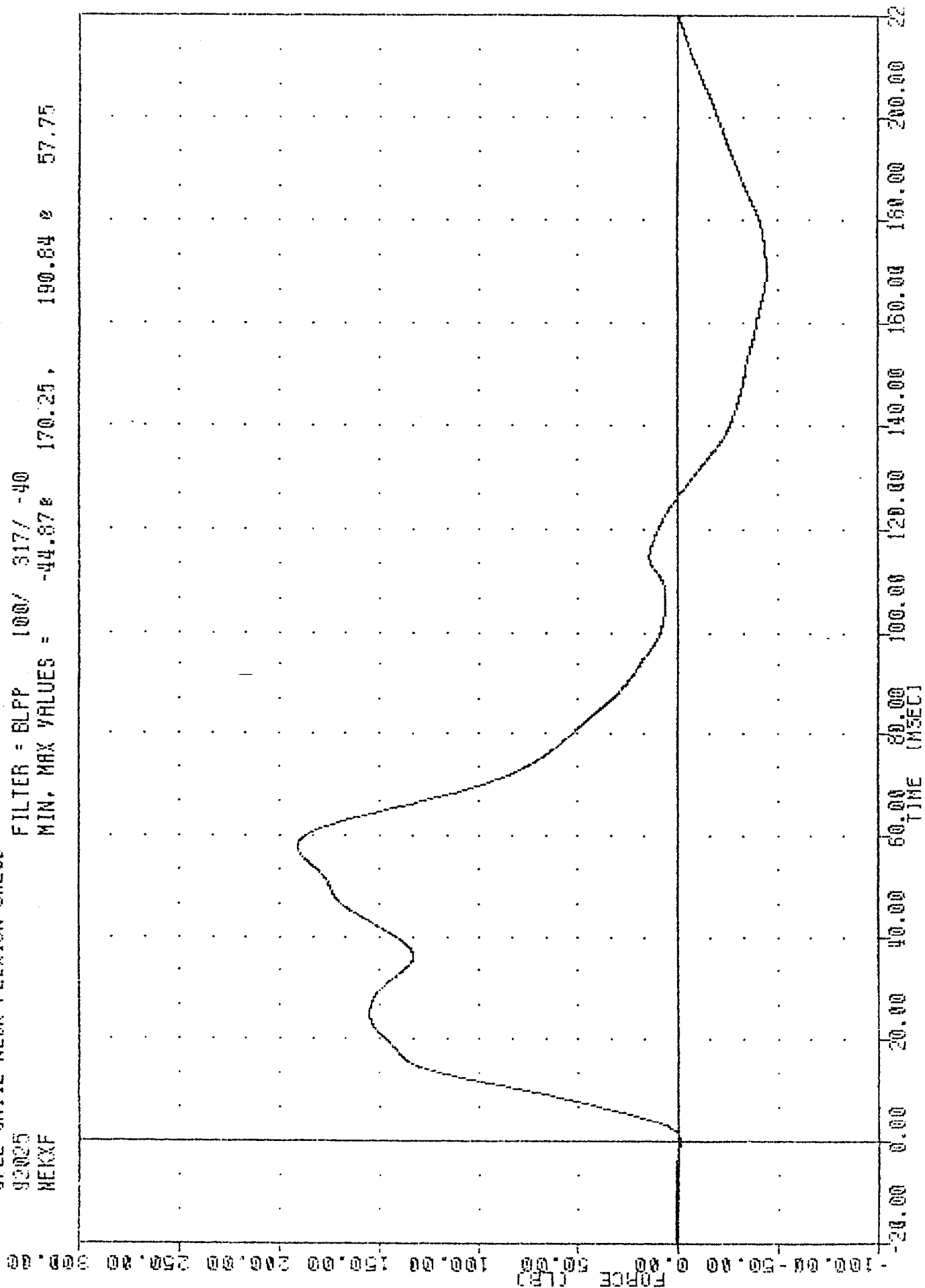
MIN. MAX VALUES =

-44.87%

170.25.

190.84 %

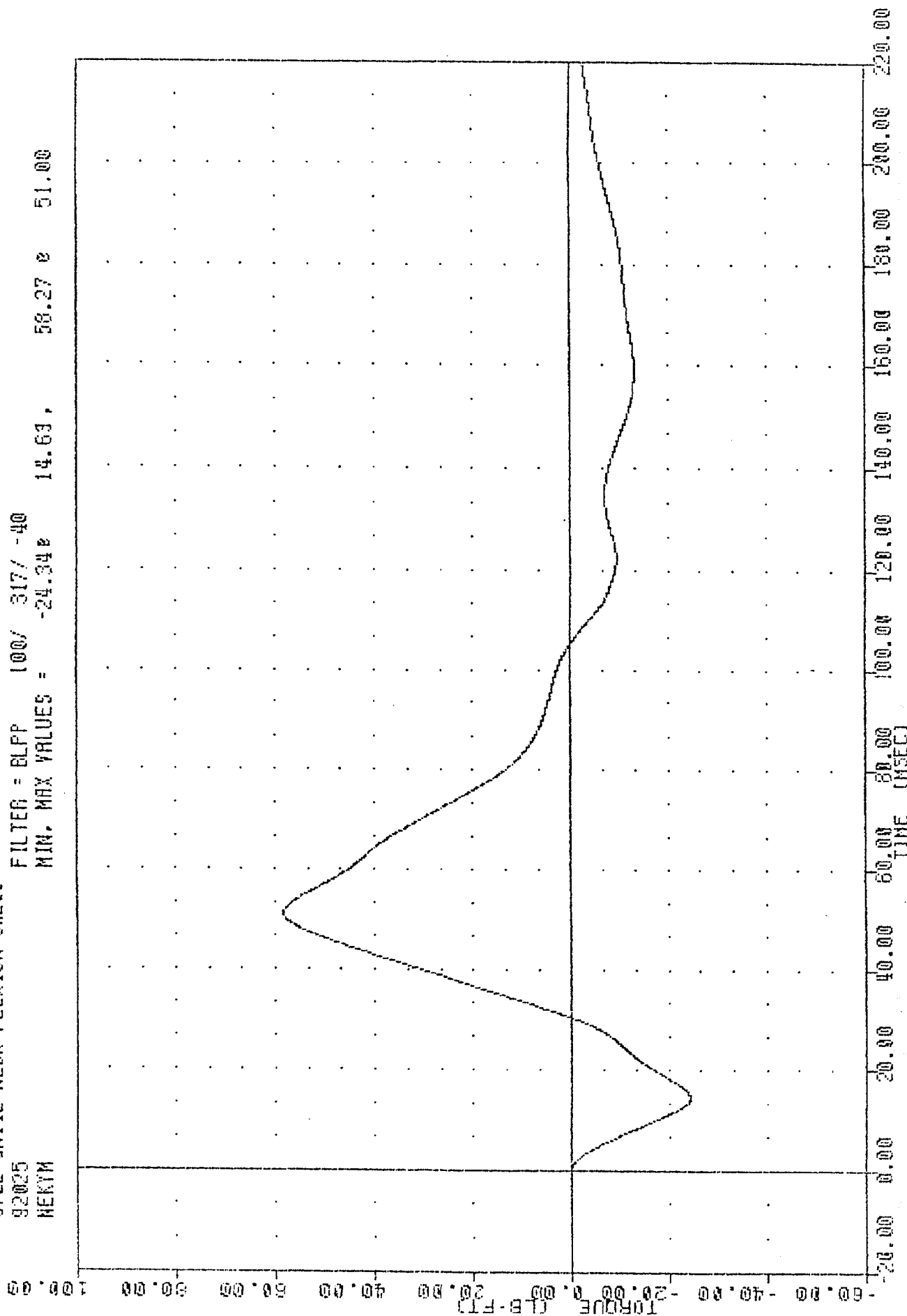
57.75



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

TRC , 142CONF1
 572E SN142 NECK FLEXION CAL08
 92025
 HEKYM

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -24.34e 14.63, 58.27 e 51.00



PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FLEXION CALIBRATION

572E SN142 NECK FLEXION CAL09

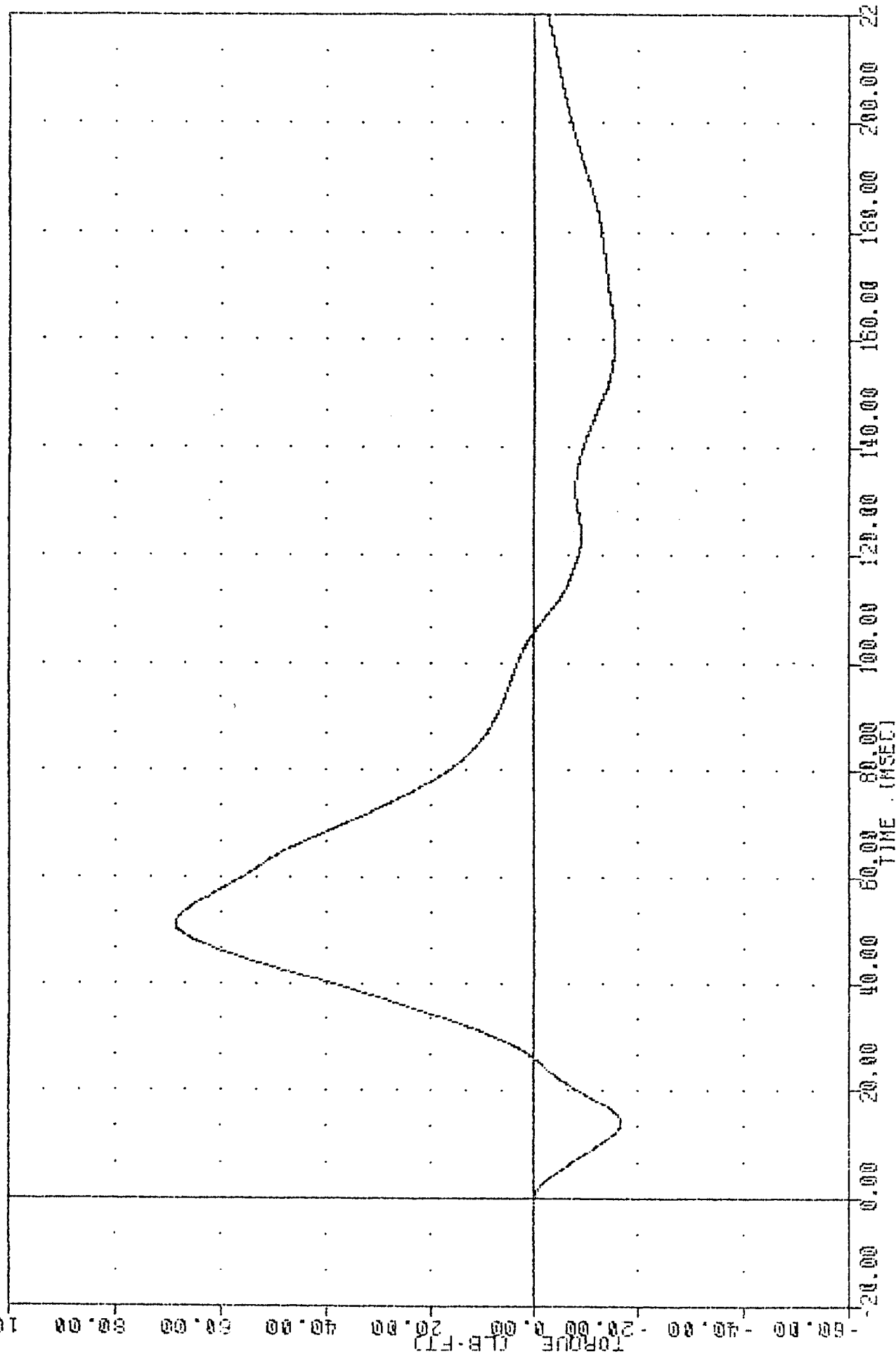
92025

NEKOM

FILTER = BLPP 100/ 317/-40

MIN, MAX VALUES = -16.85e 14.00 ,

88.55 e 51.13



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

TRANSPORTATION RESEARCH CENTER OF 40-

NECK EXTENSION TEST

HYBRID III

23-JAN-92

6 AXIS NECK TRANSDUCER
TRC 142C9NE1

572E SN142 NECK EXT. CAL09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	29.0 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.83 FT/SEC
PENDULUM	10 MS 17.20 - 21.20 G	19.21 G
DECELERATION	20 MS 14.00 - 19.00 G	15.81 G
	30 MS 11.00 - 16.00 G	13.51 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	13.61 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	39.88 MS
D PLANE	MAX 81 - 106 DEG.	98.78 DEG.
ROTATION	TIME 72 - 82 MS	76.13 MS
MOMENT ABOUT OCCIPITAL	MIN -59.0/-39.0 FT.LBS	-55.11 FT.LBS
CONDYLE	TIME 65 - 79 MS	70.38 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	154.13 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	140.50 MS

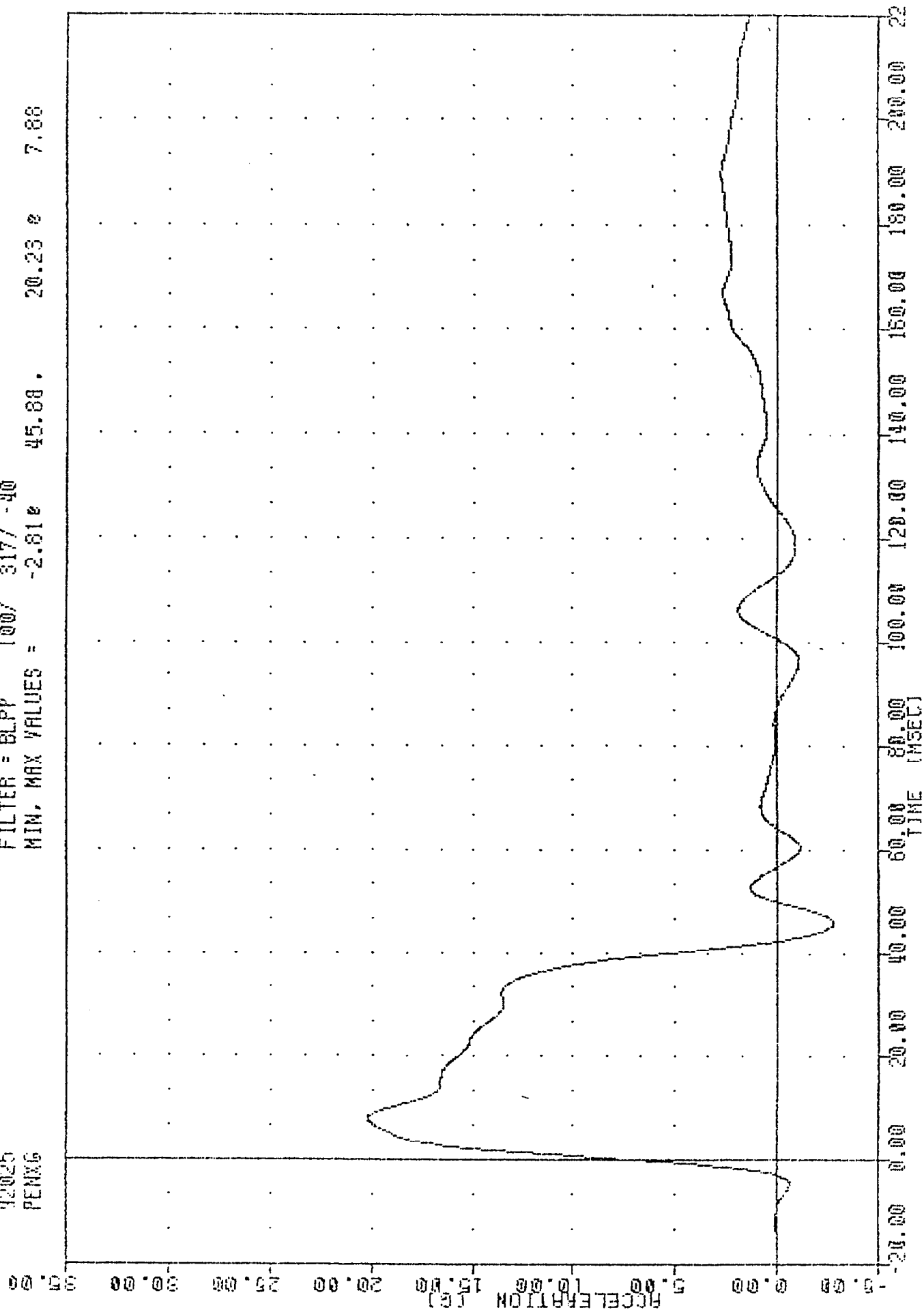
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

572E SN142 NECK EXT. CAL09
 92025
 PENXG

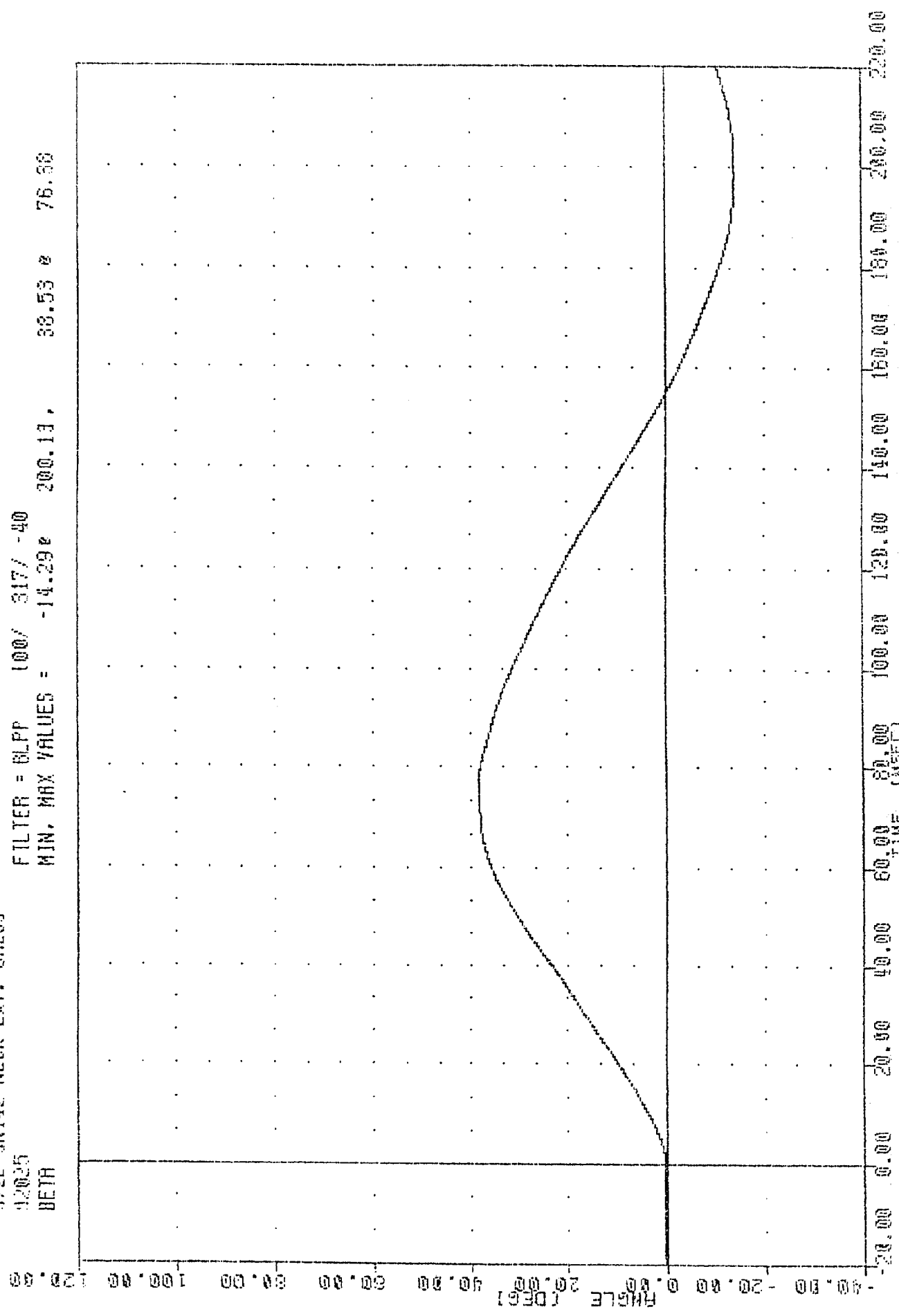
FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -2.61e 45.88. 20.23 e 7.88



PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 PENDULUM DECELERATION

180 , 142C9NE1
 572E SN142 NECK EXT. CAL09
 12025
 BETA

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -14.29e 200.13, 38.53 e 76.38

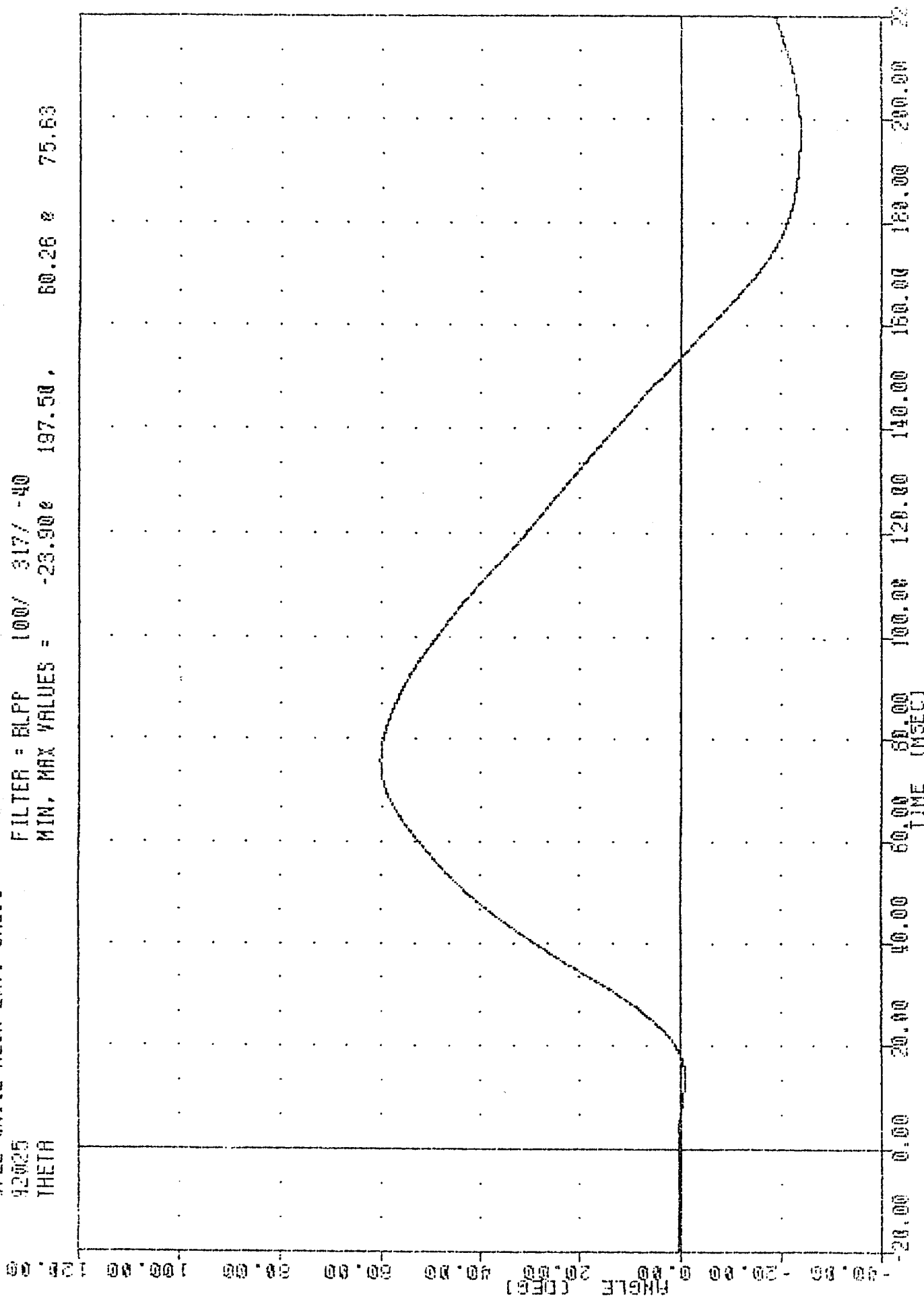


PART 572-E HYBRID III NECK EXTENSION CALIBRATION

PRINTED AT 11:58 AM

572E SH142 NECK EXT. CAL09
 92025
 THETA

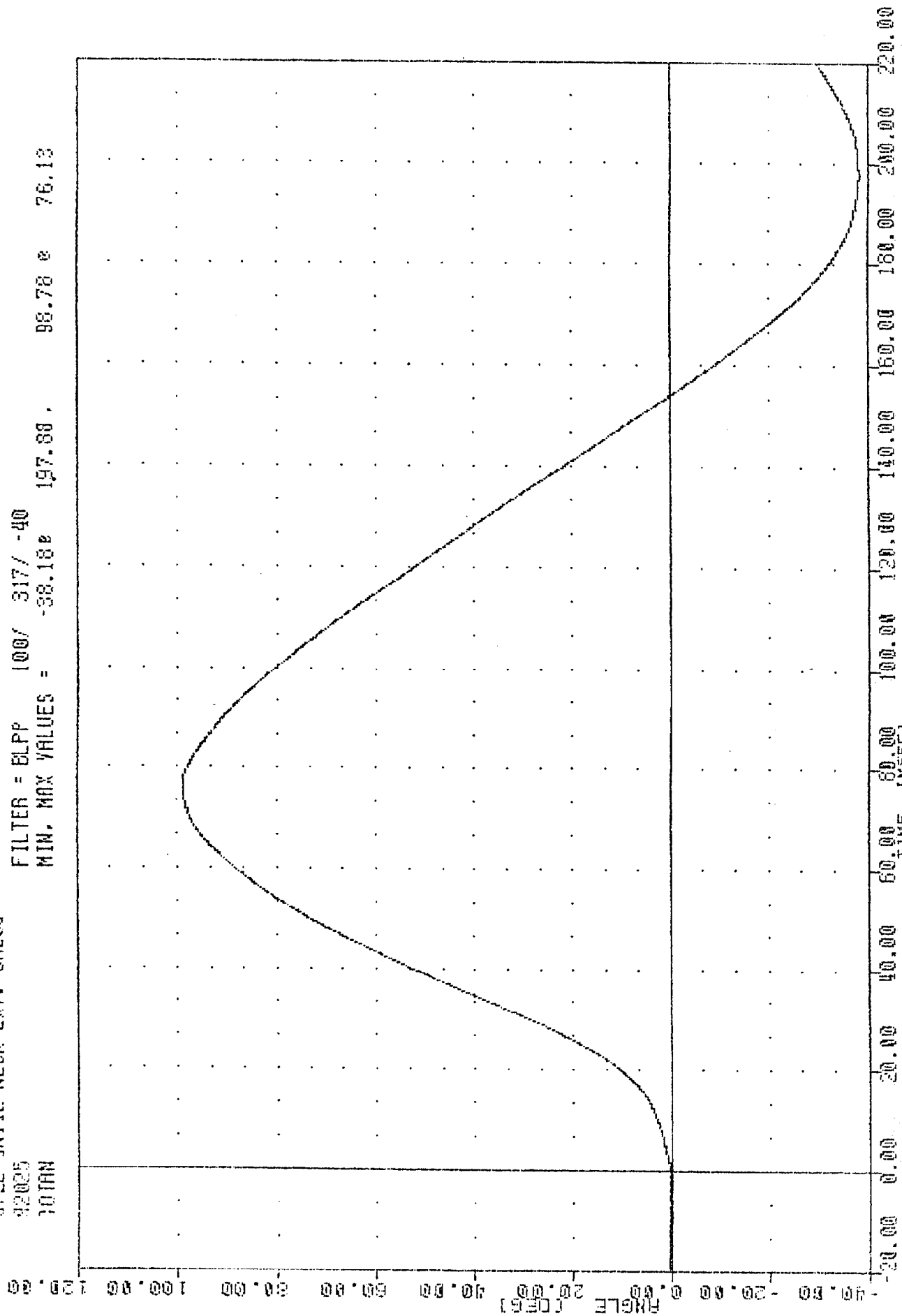
FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -23.900 197.50, 60.26 75.63



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

150
572E SNI42 NECK EXT. CALIB
92025
101IN

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -38.18 197.88 98.78 76.13



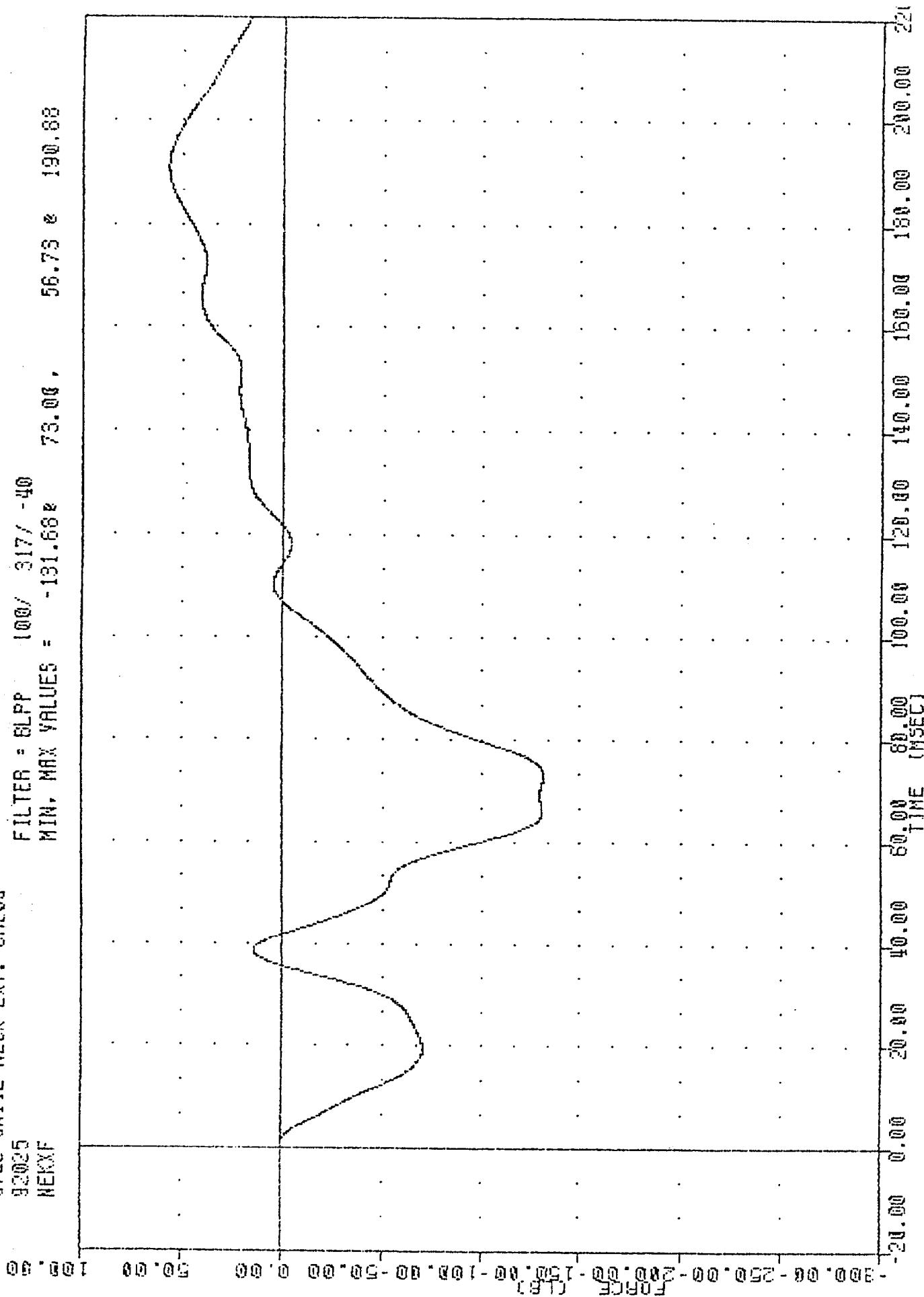
572E SN142 NECK EXT. CAL08

92025

NEKXF

FILTER = 8LPP 100/ 317/ -40

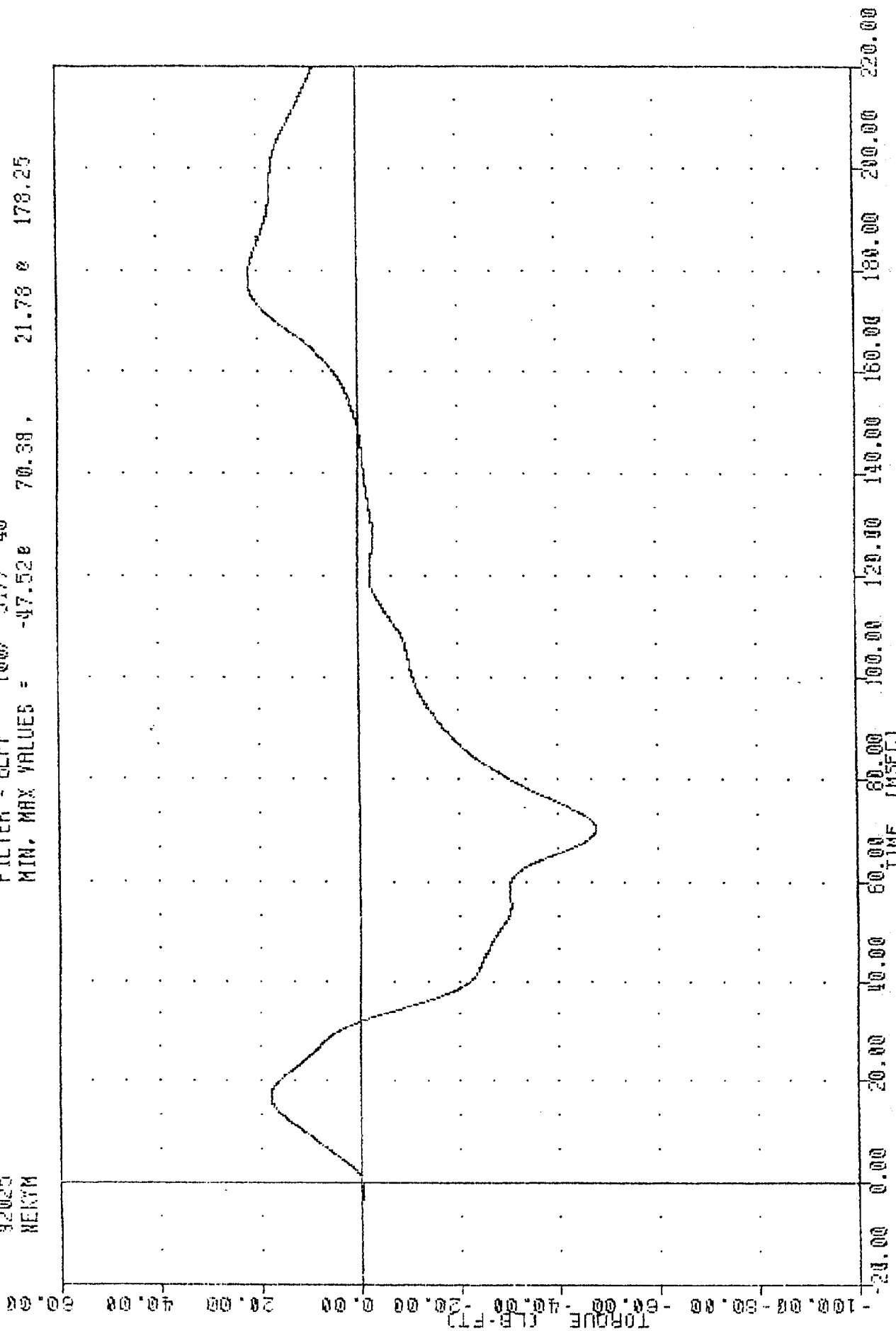
MIN. MAX VALUES = -131.68 73.00 , 56.73 190.88



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

TRC , 14203NE1
 572E SN142 NECK EXT. CAL09
 92025
 NEKYM

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -47.520 70.38, 21.73 0 178.25

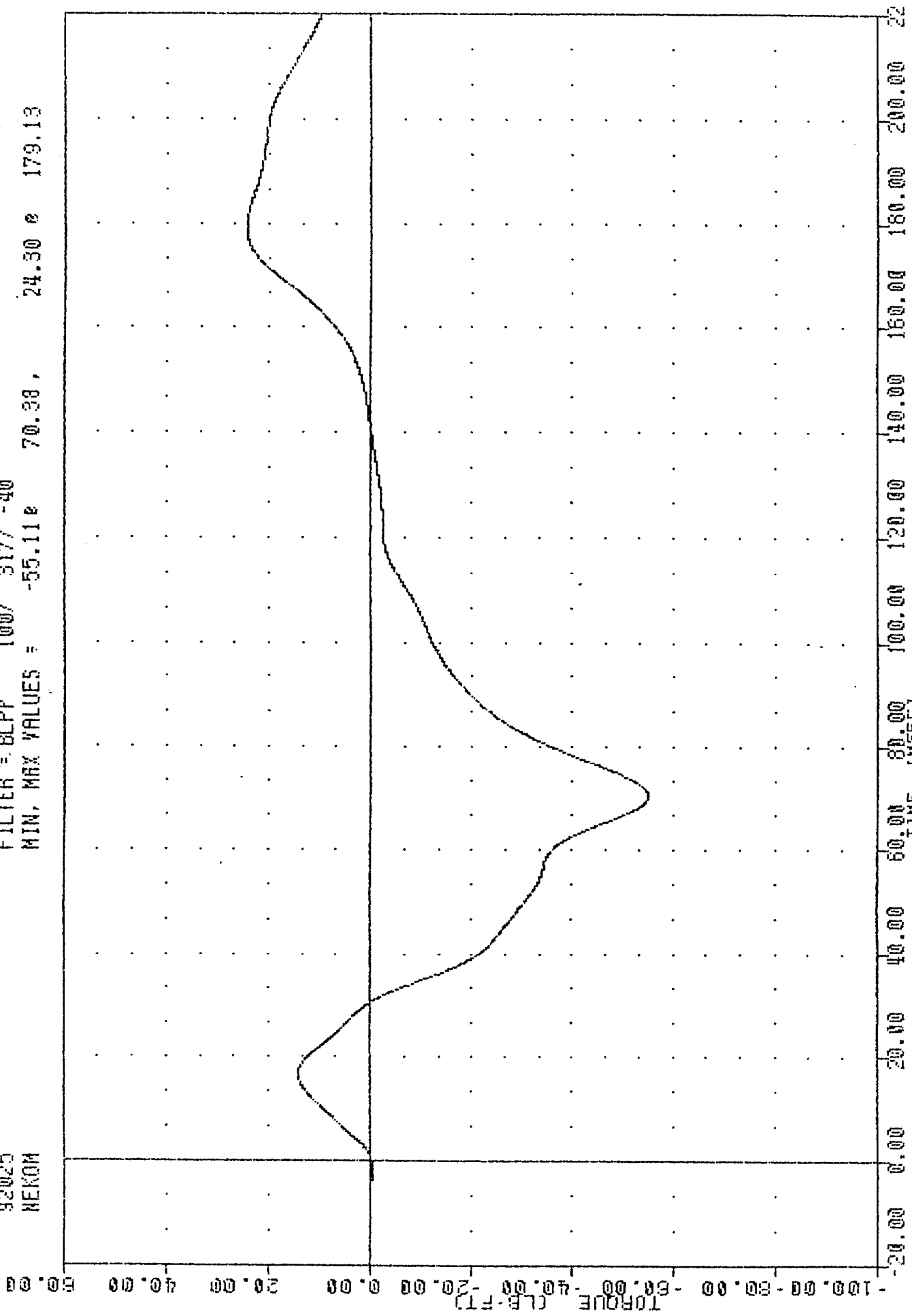


PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK EXTENSION PART 5

572E SN142 NECK EXT. CAL09
 92025
 NEKOM

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -55.118 70.38, 24.30 179.13



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

25-JAN-92

TRC

142C9TH1

572E 90140 H.S. THORAX CAL09

TEST PARAMETER	HIGH SPEED TEST	
	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	29.0 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.92 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.74 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1221.8 LBS
INTERNAL HYSTERESIS	69% - 85%	72.3%

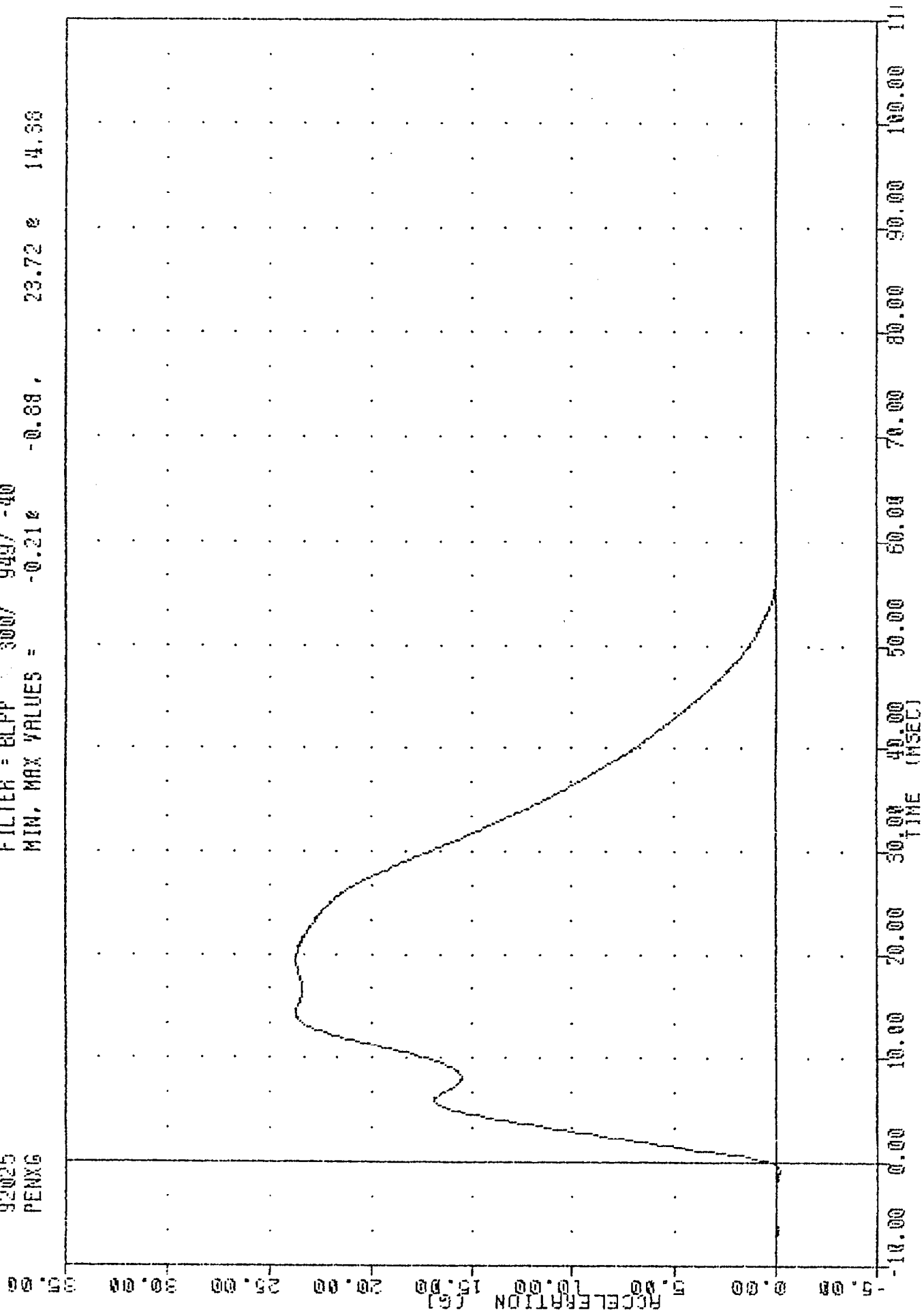
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas Middleton

572E SN142 H.S. THORAX CAL09
 92025
 PENX6

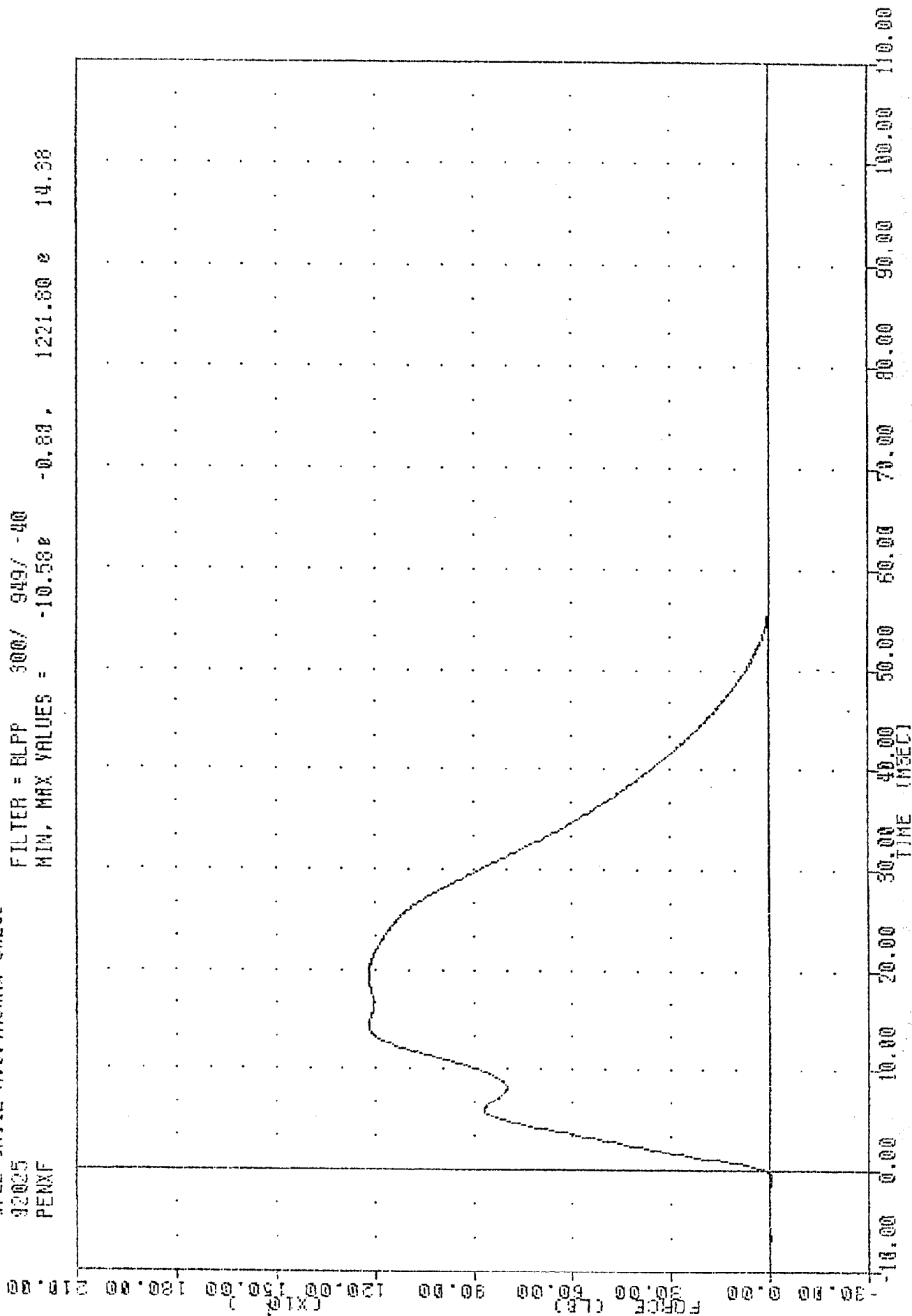
FILTER = BLPP 300/ 949/ -40
 MIN. MAX VALUES = -0.212 -0.88 , 23.72 2 14.38



PART 572-E HYBRID III THORAX CALIBRATION
 PENDULUM DECELERATION

TRC
572E SRI42 H.S. THORAX CAL09
92025
PENXF

FILTER = BLPP 300/ 949/ -40
MIN, MAX VALUES = -10.58e -0.88, 1221.80 e 14.38

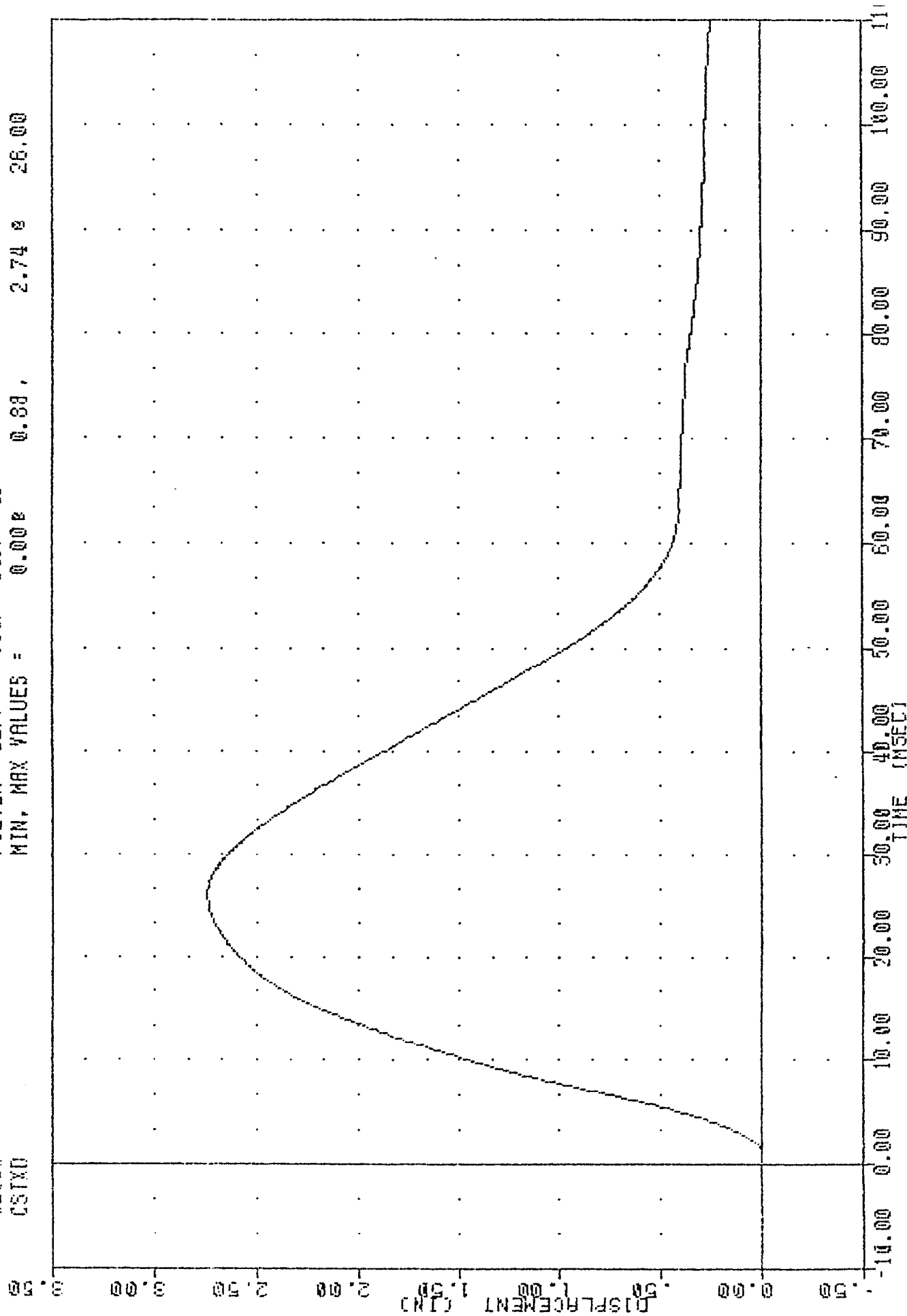


PART 572-E HYBRID III THORAX CALIBRATION

PENDULUM FORCE

572E 3N142 H.S. THORAX CAL09
 92025
 CSIX0

FILTER = BLPP 300/ 249/ -40
 MIN, MAX VALUES = 0.000 0.88, 2.74 0 26.00



PART 572-E HYBRID III THORAX CALIBRATION
 STERNUM DISPLACEMENT

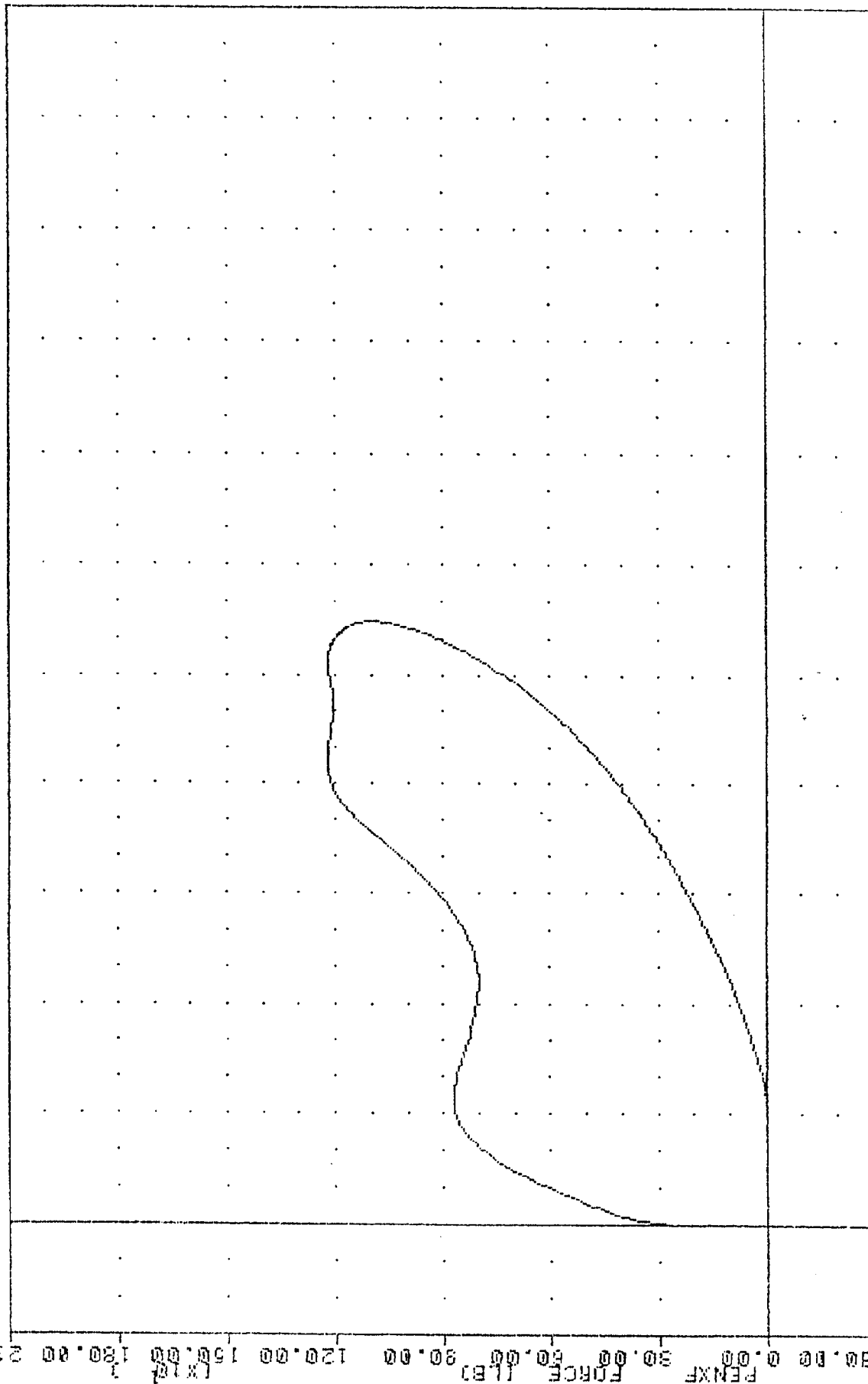
TRC
CSTXD
PENXF

572E SN142 H.S. THORAX CAL03
300/ 949/ -40 MIN. MAX =
300/ 949/ -40 MIN. MAX =

92025
0.00 %
-10.58 %

0.88 %
-0.88 %
2.74 %
1221.80 %
25.00
14.58

-30.00 0.00 30.00 60.00 90.00 120.00 150.00 180.00 210.00
PENXF (LB)
FORCE (LB)
LX10



920212

CSTXD DISPLACEMENT (IN)

PART 572-E HYBRID III THORAX CALIBRATION

CHEST DISPLACEMENT VS PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

24-JAN-92

LEFT KNEE

TRC

142C9LK1

572E SN142 L.KNEE 11LB CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1276.08 LBS
PROBE WEIGHT	11.0 LBS	

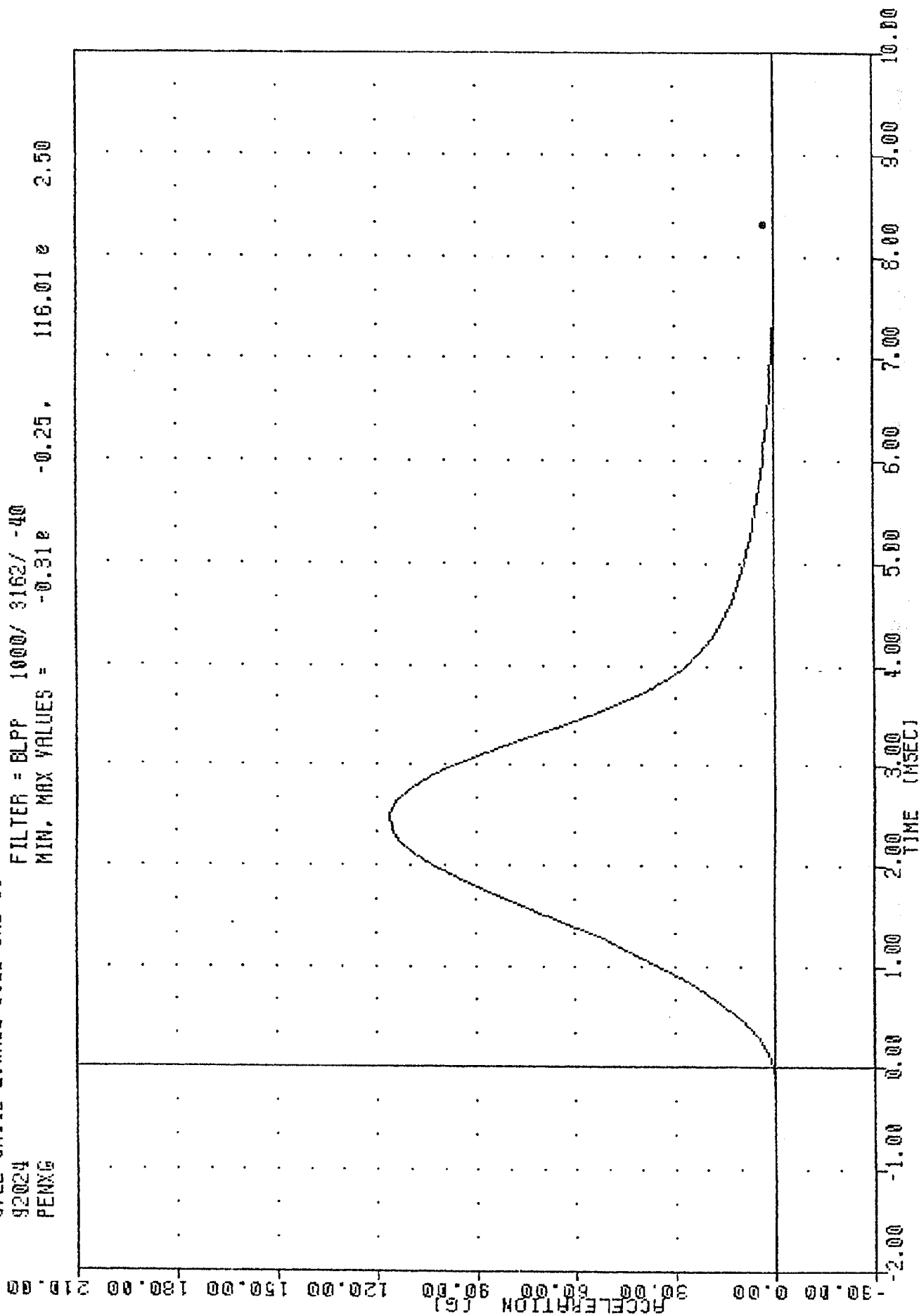
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRC , 142C9LK1
 572E SN142 L.KNEE 111B CAL 09
 92024
 PENNG

FILTER = BLPP 1000/ 3162/ -40
 MIN. MAX VALUES = -0.310 116.01 0 2.50



PART 572-E HYBRID III LEFT KNEE CALIBRATION

572E SN142 L.KNEE 111B CAL 09

92024

PENNG

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

24-JAN-92

RIGHT KNEE

TRC

142C9RK1

572E SN142 R.KNEE 11LB CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.97 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1142.78 LBS
PROBE WEIGHT	11.0 LBS	

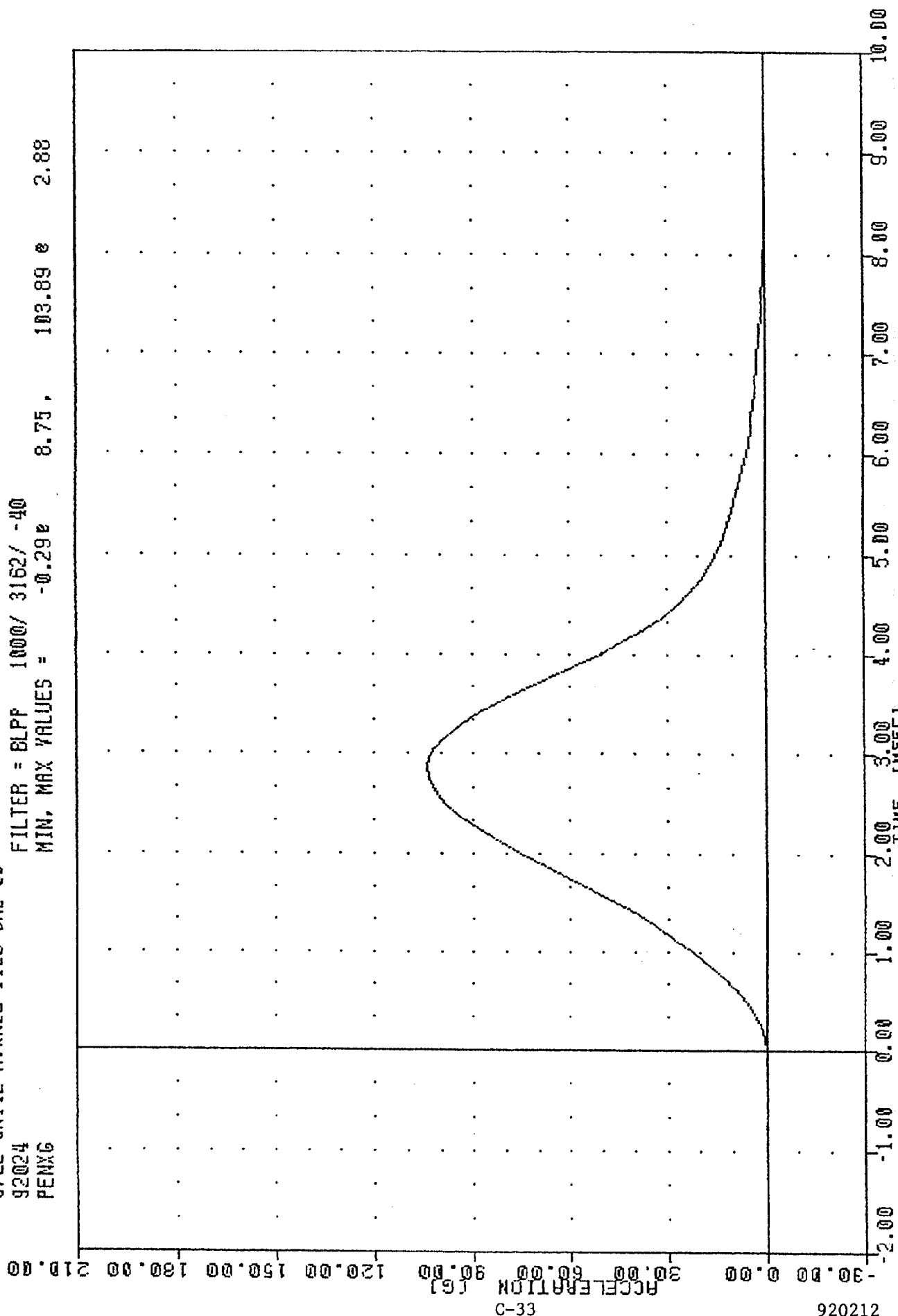
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas Middleton

TRC , 14209AK1
 572E SN142 R.KNEE 11LB CAL 09
 92024
 PENX6

FILTER = BLPP 1000/ 3162/ -40
 MIN. MAX VALUES = -0.29e 8.75, 103.89 e 2.88



C-33

920212

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENULTIMATE DECELERATION (11 LB PEND)

572E SN142 R.KNEE 11LB CAL 09

92024

PENXF

FILTER = BLPP 1000/ 3162/ -40

MIN. MAX VALUES = -3.23e

8.75, 1142.78 e 2.88

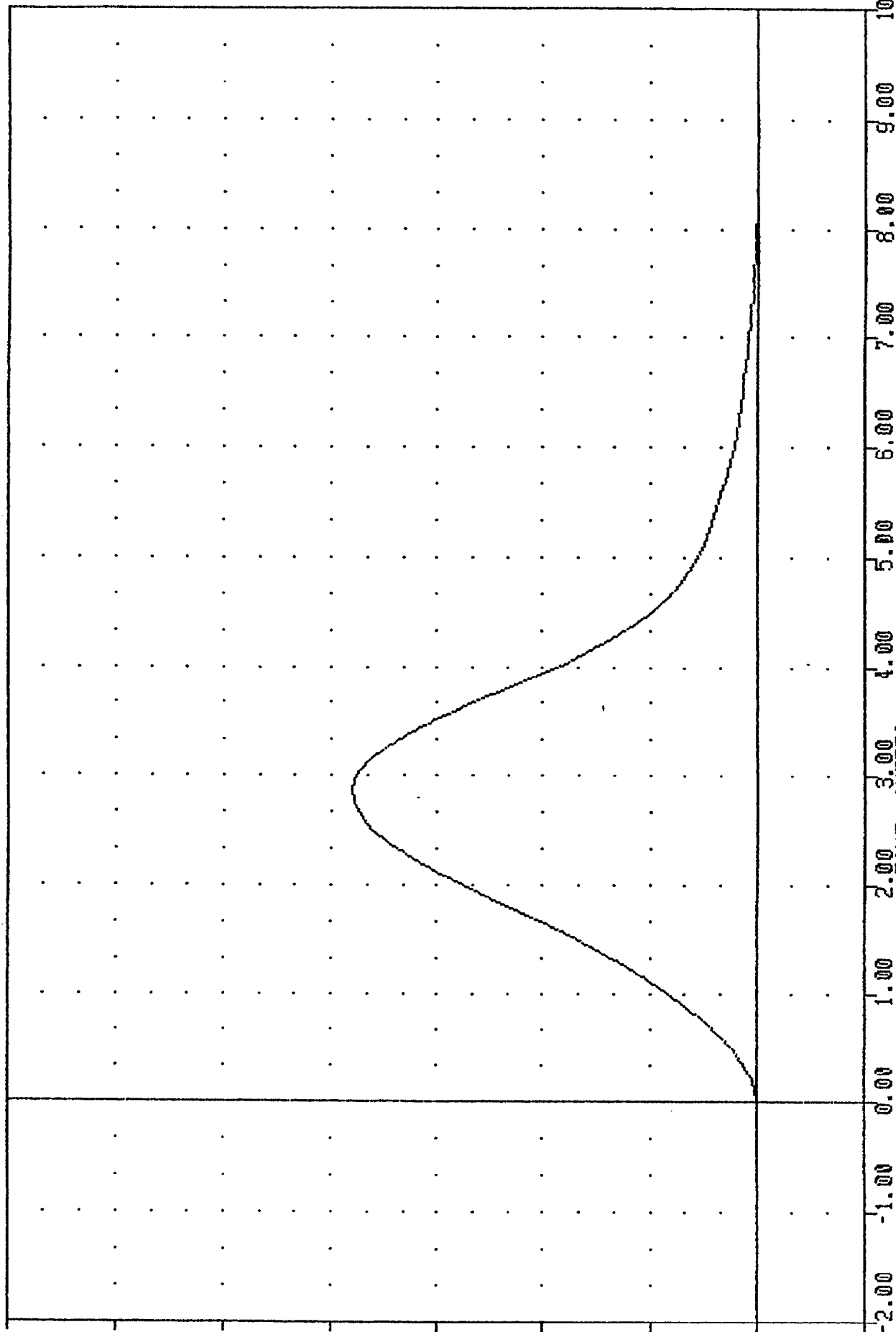
210.00
180.00
150.00
120.00
90.00
60.00
30.00
0.00
-30.00

(X10⁴)

FORCE (LB)

C-34

920212



PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENNILUM FORCE (11 LB PEND.)

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 713

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

09-JAN-92

TEMPERATURE 70 F
TRC ED71302

RELATIVE HUMIDITY 49 %
572B SN713 EXT. DIMENSION CAL02

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN 713 HUMANOID		
Sitting Height	35.6 - 35.8 IN	35.6 IN
Shoulder Pivot Height	21.8 - 22.4 IN	22.1 IN
Hip Pivot Height	3.9 IN	3.9 IN
Hip Pivot From Backline	4.8 IN	4.8 IN
Knee Pivot From Backline	20.1 - 20.7 IN	20.5 IN
Rear of Head From Backline	1.7 IN	1.7 IN
Chest Depth	9.1 - 9.6 IN	9.4 IN
Shoulder Width	17.8 - 18.4 IN	17.9 IN
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.6 IN
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.5 IN
Hip Width	14.0 - 15.4 IN	14.6 IN
Knee Pivot From Floor	19.3 - 19.9 IN	19.6 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

09-Jan-92

TEMPERATURE 70 F
TRC HD71302

RELATIVE HUMIDITY 49 %
572B SN 713 HEAD DROP CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	251.45 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.27 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	6.74 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas Middleton

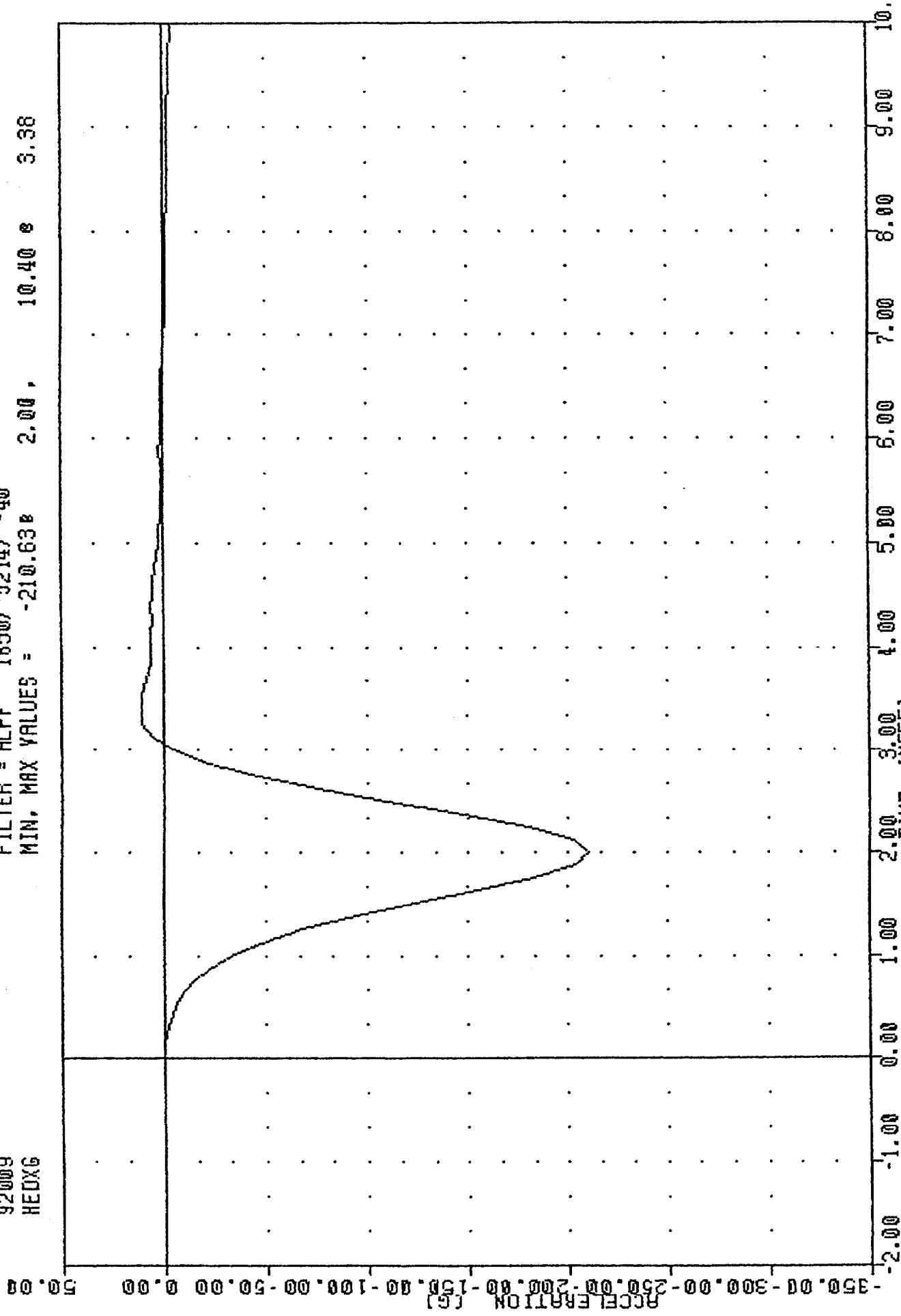
572B SN 713 HEAD DROP CAL 02

92009

HEDXG

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -210.63 2.00, 10.40 3.38



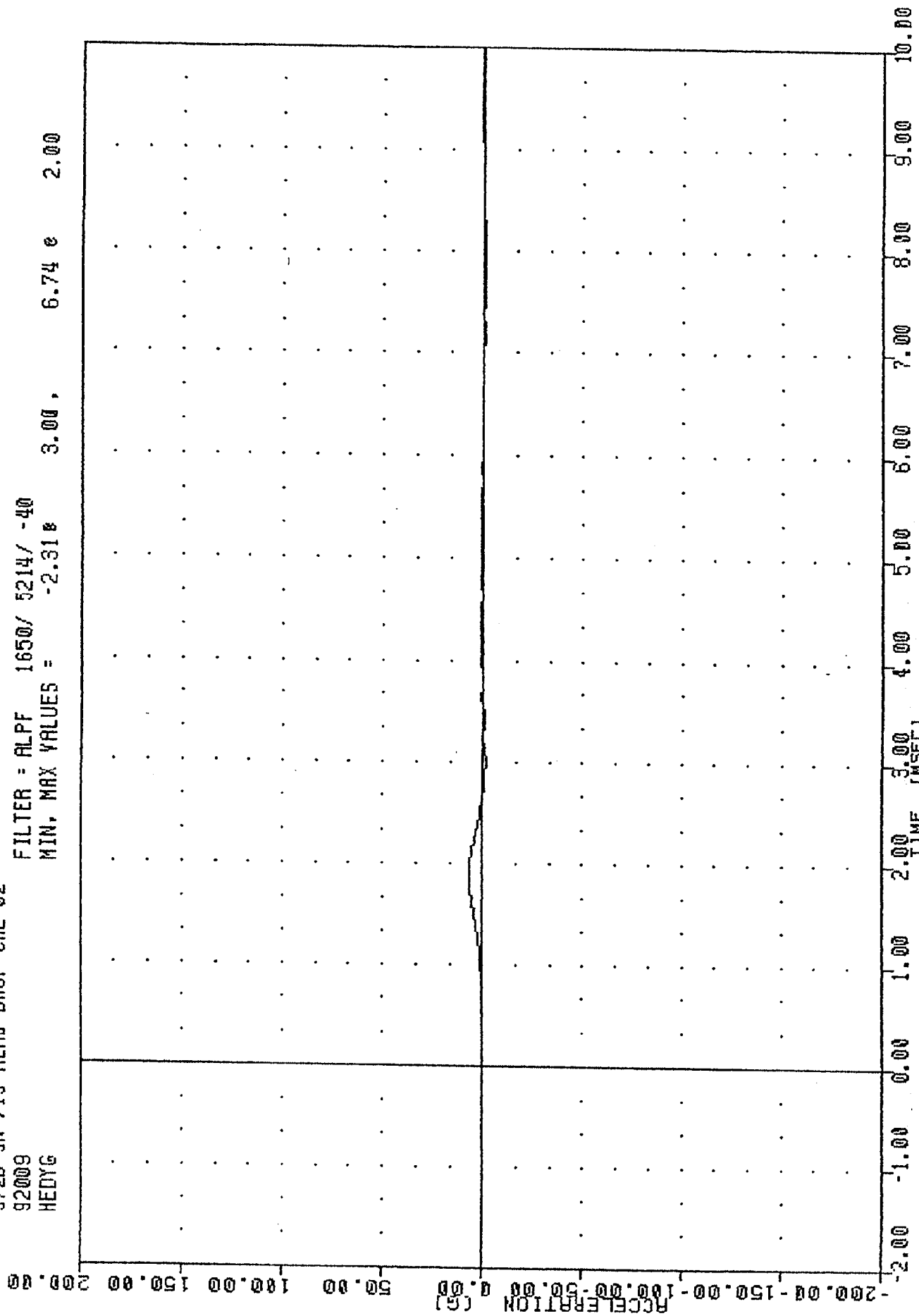
C-38

920212

PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS

TRC , HD71302
572B SN 713 HEAD DROP CAL 02
92009
HEDYG

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -2.318 3.00 , 6.74 e 2.00



572B SN 713 HEAD DROP CAL 02

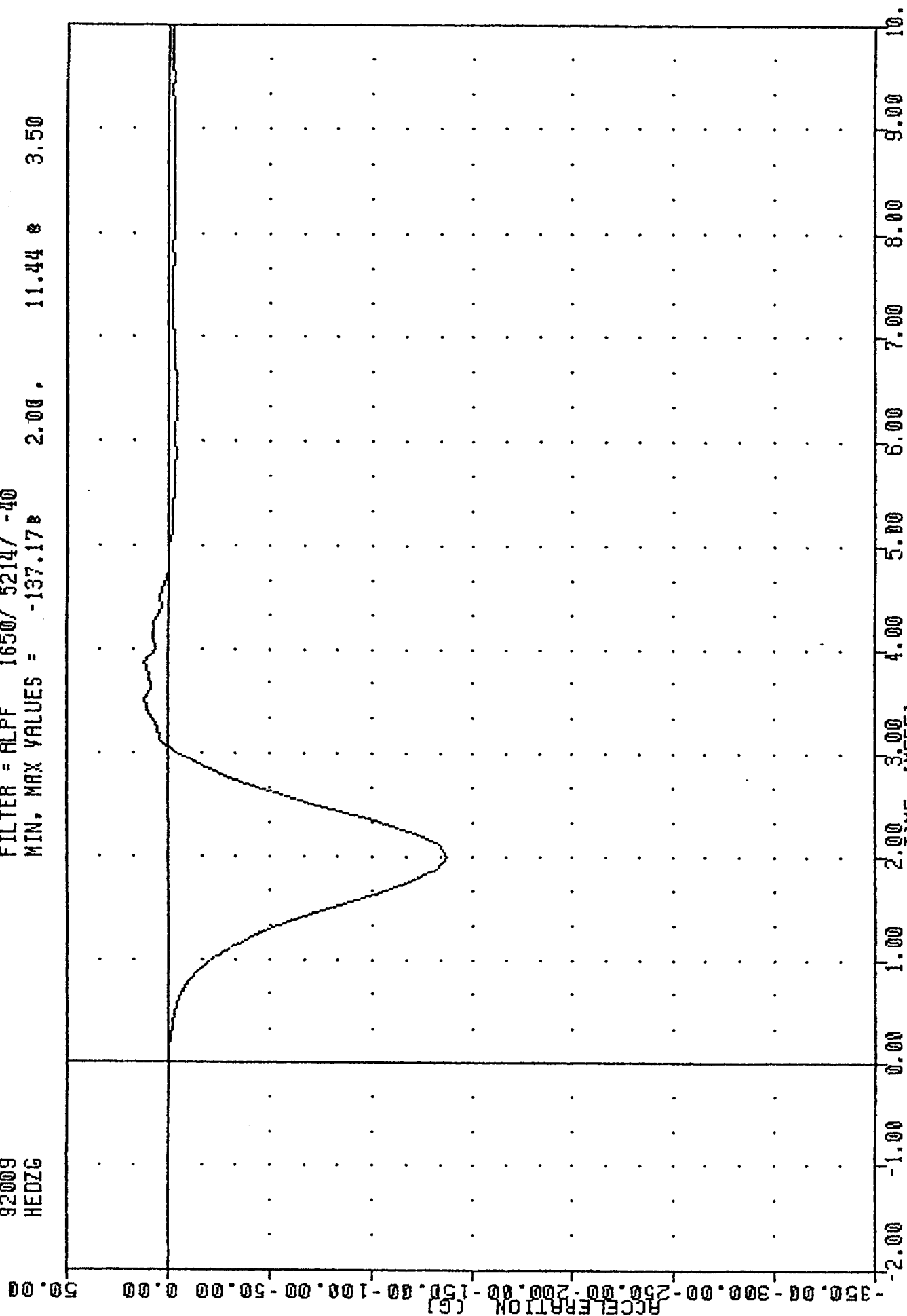
92009

HEDZG

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -137.17 2.00

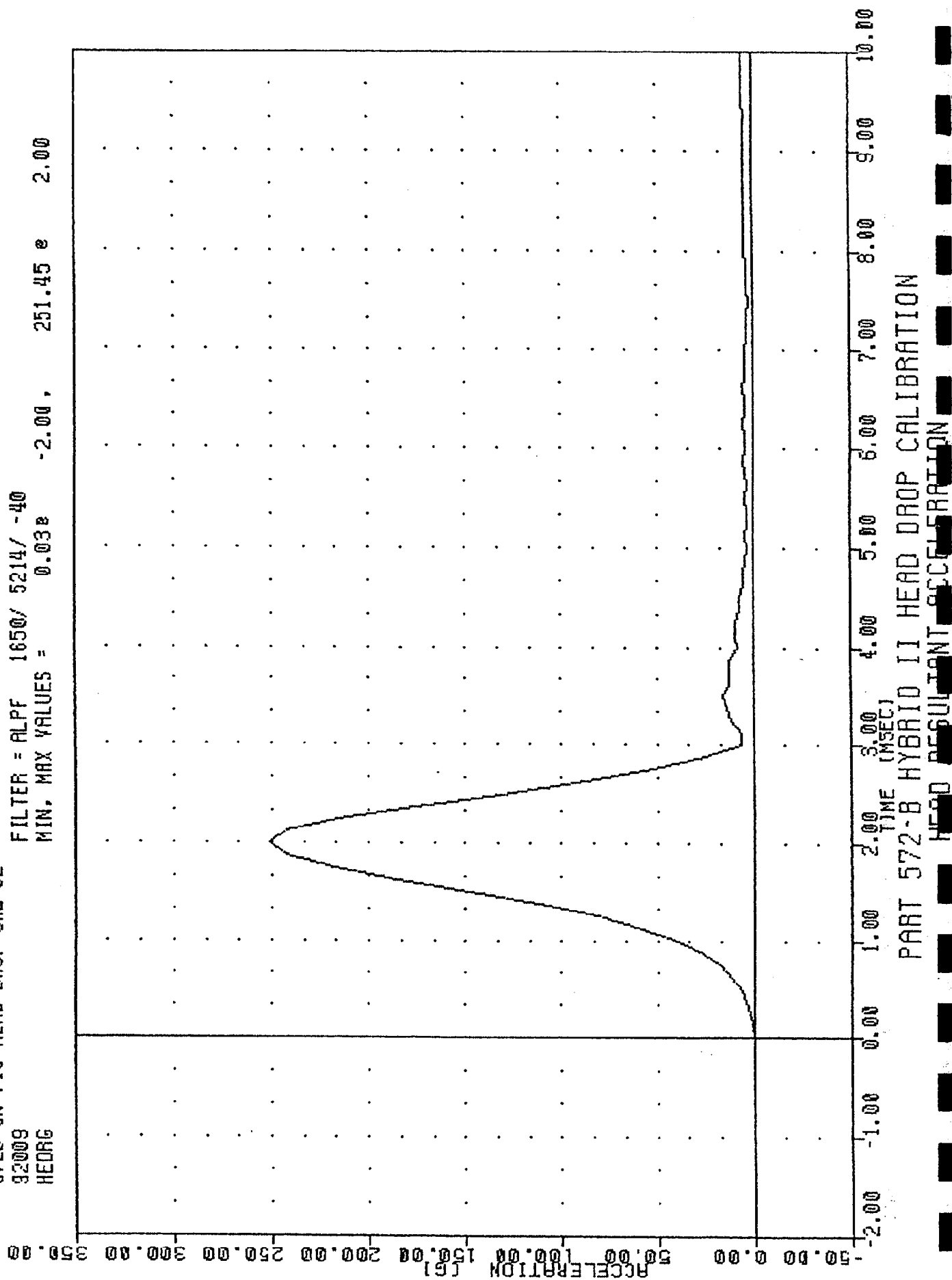
11.44 3.50



PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS

TRC , H071302
 5728 SN 713 HEAD DROP CAL 02
 92009
 HEADRG

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.03e -2.00, 251.45 e 2.00



TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

10-Jan-92

TEMPERATURE 70 F
TRC HN71302

RELATIVE HUMIDITY 34 %
572B SN 713 HEAD/NECK CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	121.5 to 25.5 ft/sec	23.76 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.42 msec
T2 - T3: 20 - 20 G	25 - 30 msec	26.32 msec
T3 - T4: 20 - 5 G	10 msec max	6.17 msec
Avg. G level T2 - T3	20 - 24 G	23.59 G
Maximum Rotation Angle	63 - 73 deg	68.42 deg
Peak Head Resultant Accel	26 G max	22.56 G

Test Parameter	Specification	Test Results
Rotation Angle	Time	Chordal Disp.
(degrees)	(msec)	(in)
0	-2.0 - +2.0	-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

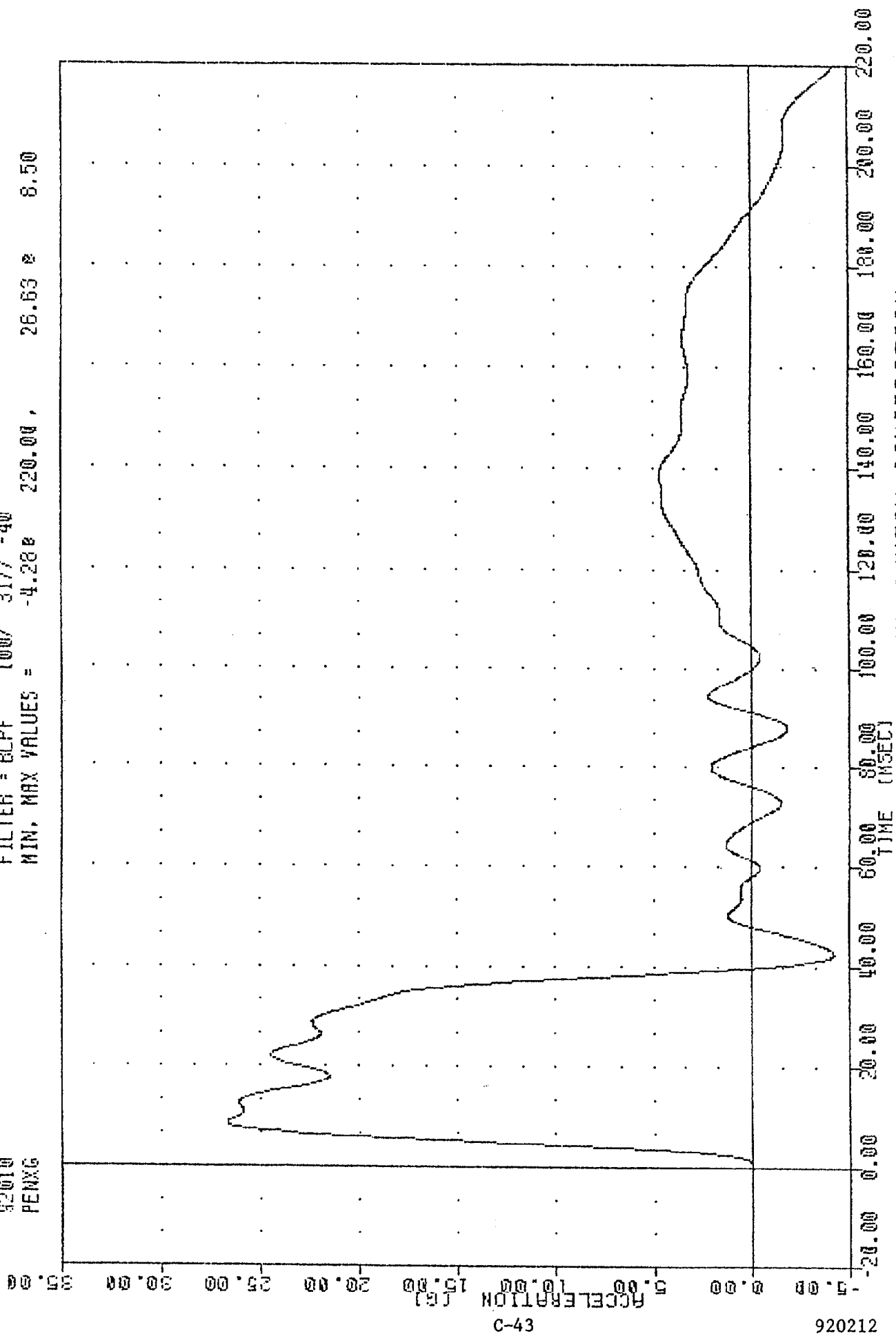
SND: 5.95 in

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRC , HW71302
 572B SN 713 HEAD/NECK CAL 02
 92010
 PENXG

FILTER = BLPF 100/ 317/ -40
 MIN, MAX VALUES = -4.200 220.00 , 26.63 8.50



C-43

920212

PART 572-B HYBRID II HEAD/NECK CALIBRATION
 PENDULUM DECELERATION

572B SN 713 HEAD/NECK CAL 02

92010

HEAD

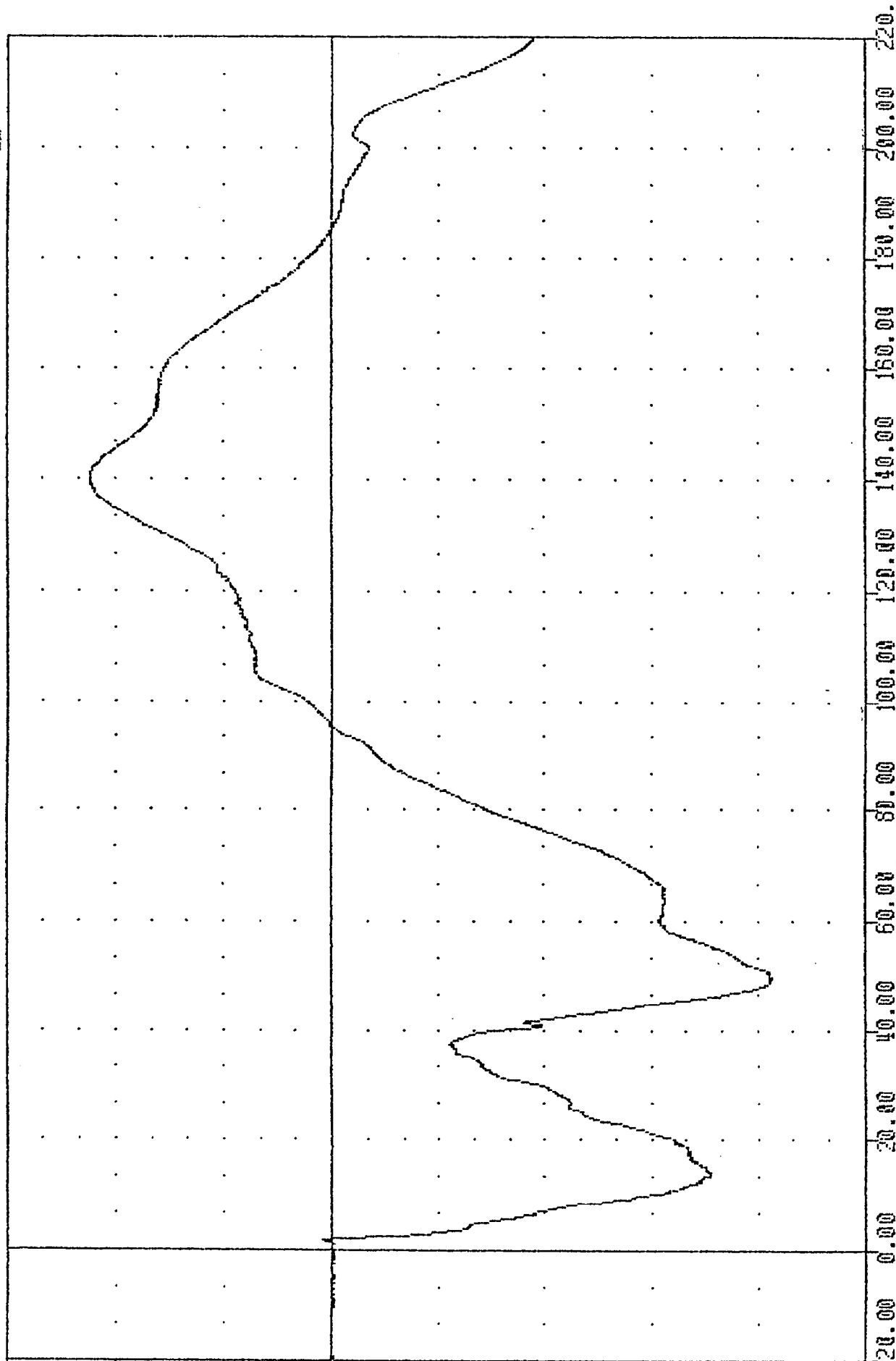
FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -20.650 49.50, 11.17 @ 139.13

ACCELERATION (G)

C-44

920212

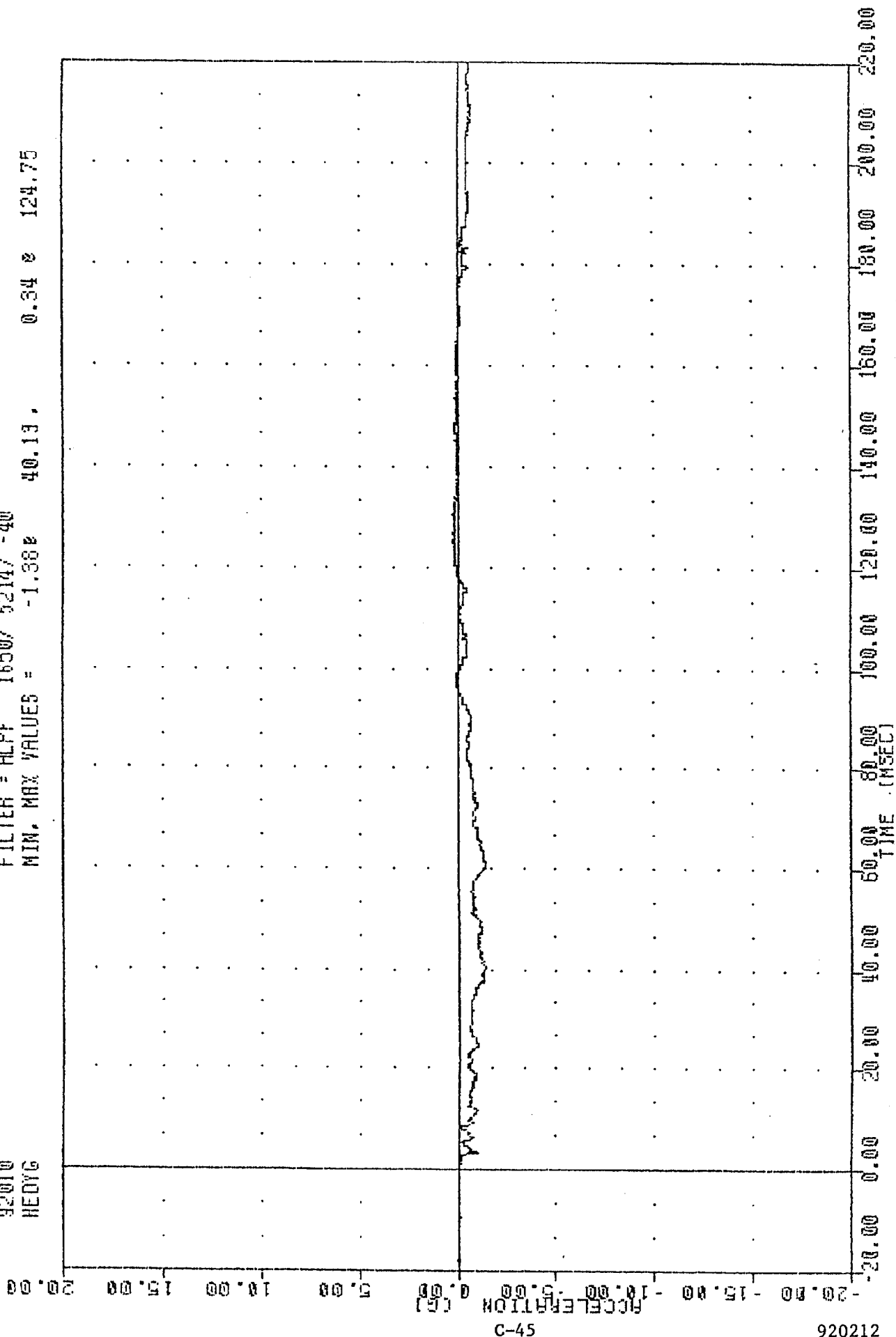


PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION X AXIS

TRC
5728 SN 713 HEAD/NECK CAL 02
92010
HEDYG

HW71302

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -1.38% 40.13, 0.34 @ 124.75



920212

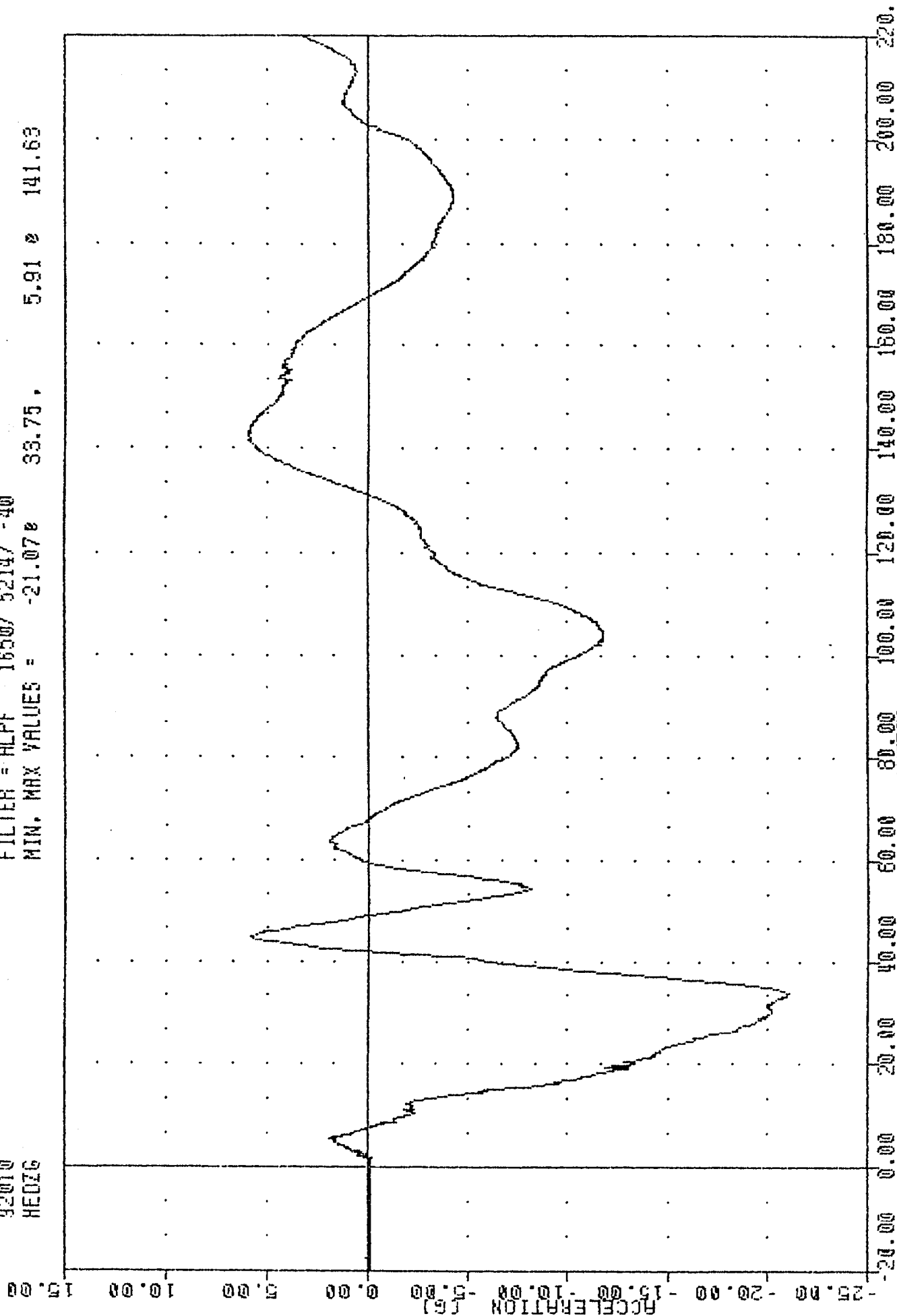
9200 300 / 100000000 000 000

92010

HEAD

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -21.070 33.75 , 5.91 0 141.63

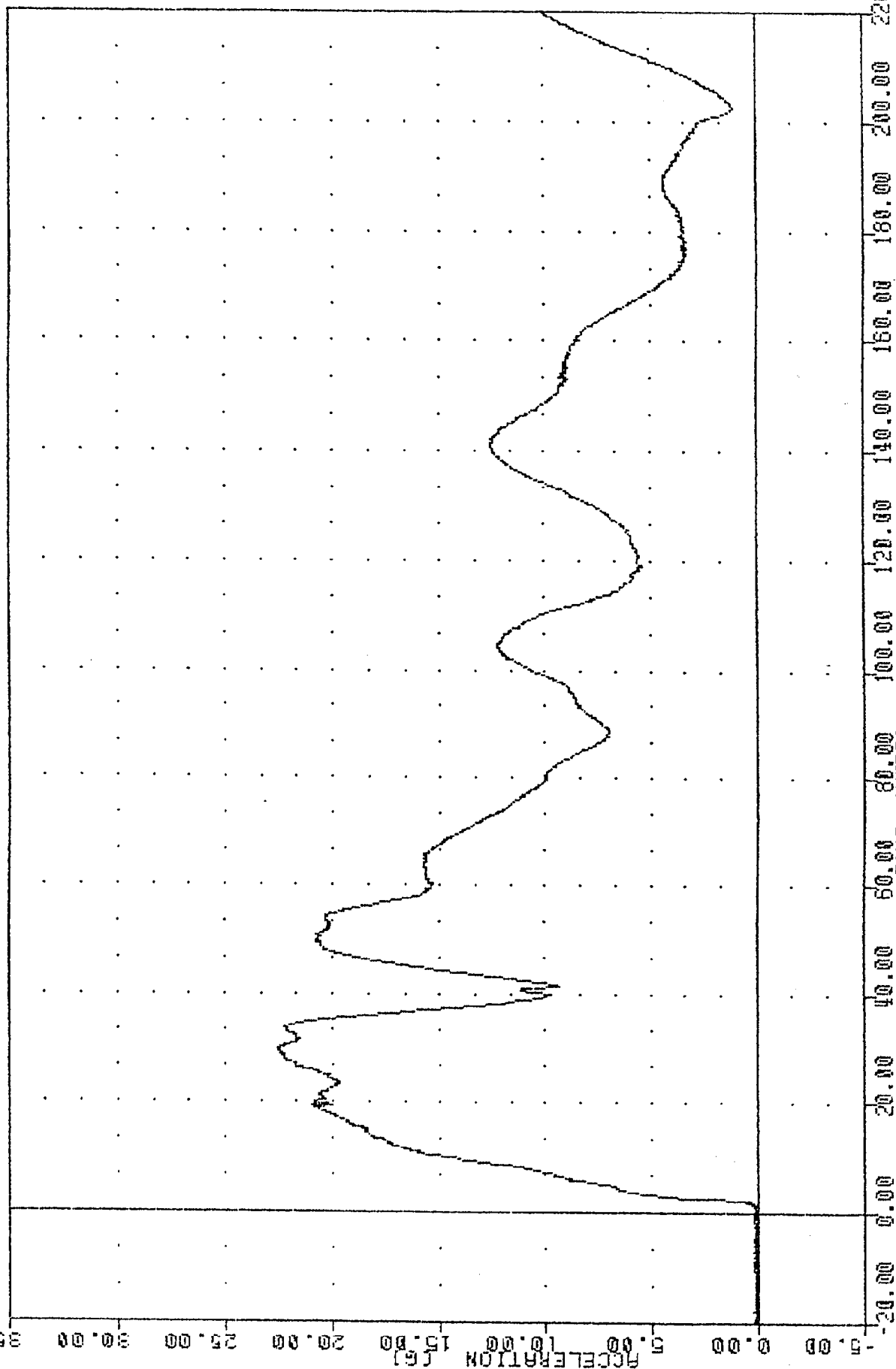


PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION Z AXIS

TRC , HN71302
 5720 SN 713 HEAD/NECK CAL 02
 92010
 HEAD

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.02e -19.88 , 22.56 e 29.88

35.00



C-47

920212

PART 572-B HYBRID II HEAD/NECK CALIBRATION
 HEAD RESULTANT ACCELERATION

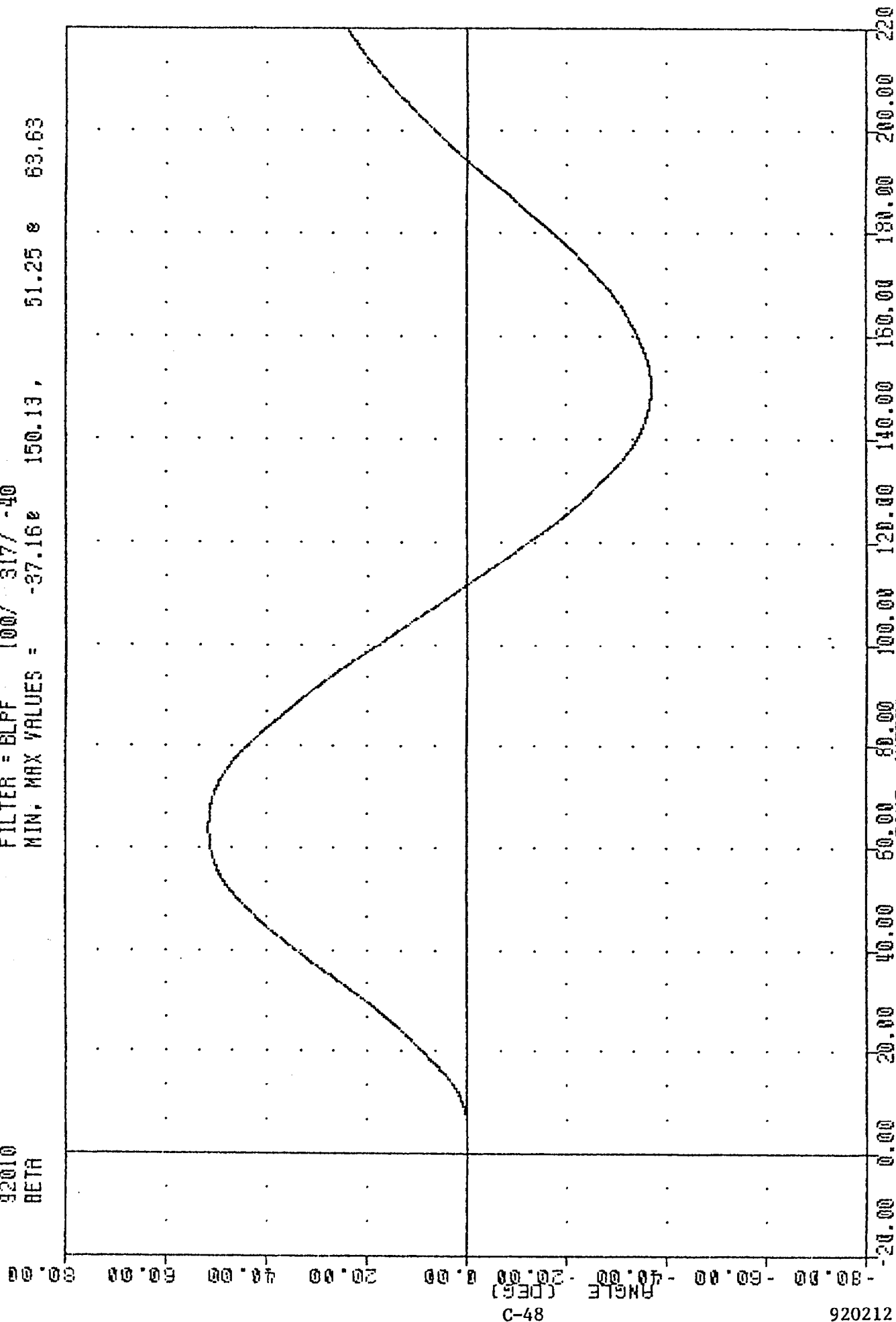
5720 014 719 HEAD/NECK CAL W2

92010

BETA

FILTER = BLPF 100/ 317/ -40

MIN, MAX VALUES = -37.16° 150.13, 51.25° 63.63



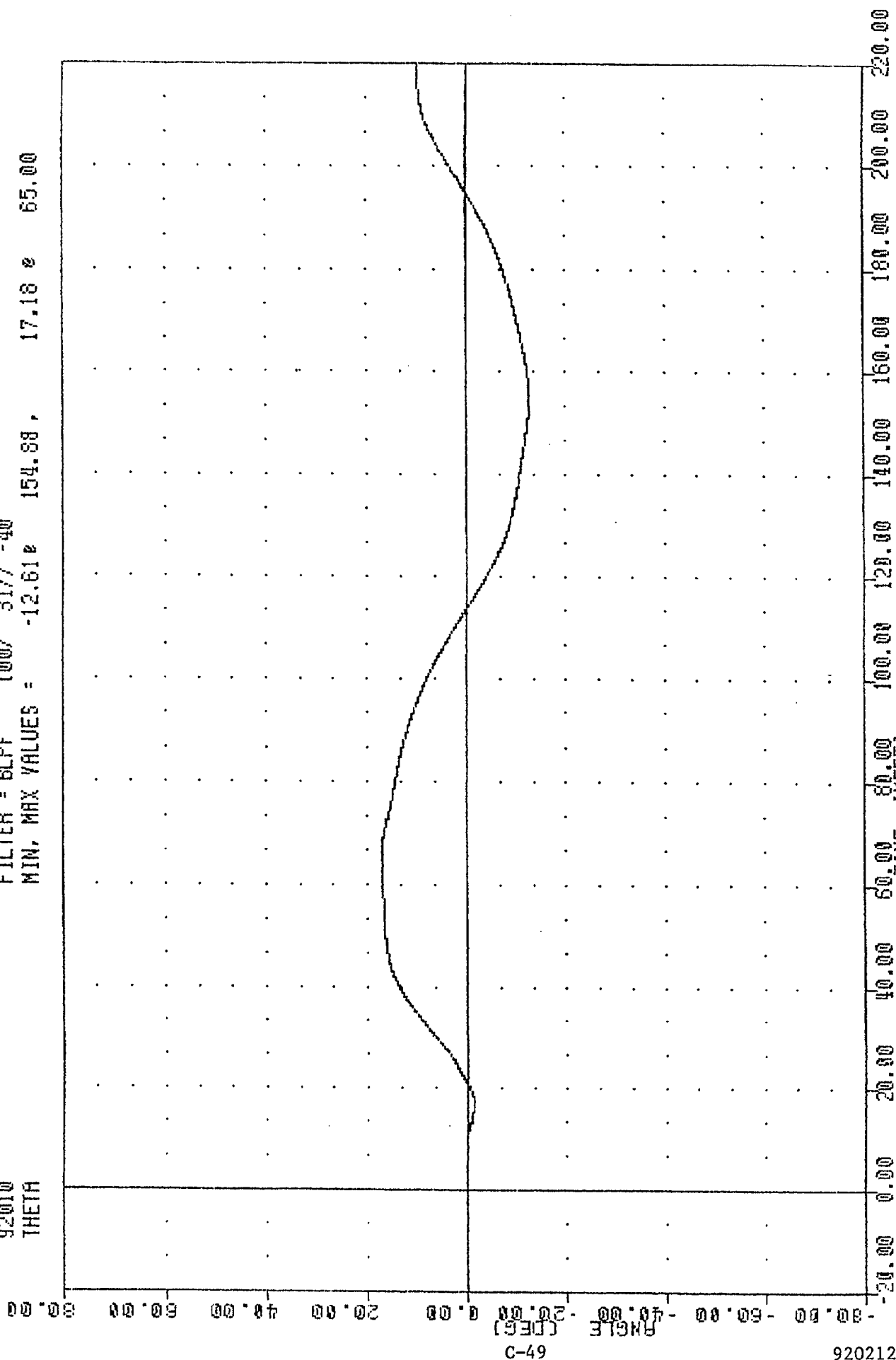
C-48

920212

PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE BASE OF THE NECK

TRC , HN71302
 5720 SN 713 HEAD/NECK CAL 02
 92010
 THEIA

FILTER = BLPF 100/ 317/ -40
 MIN, MAX VALUES = -12.61% 154.88, 17.18 % 65.00



920212

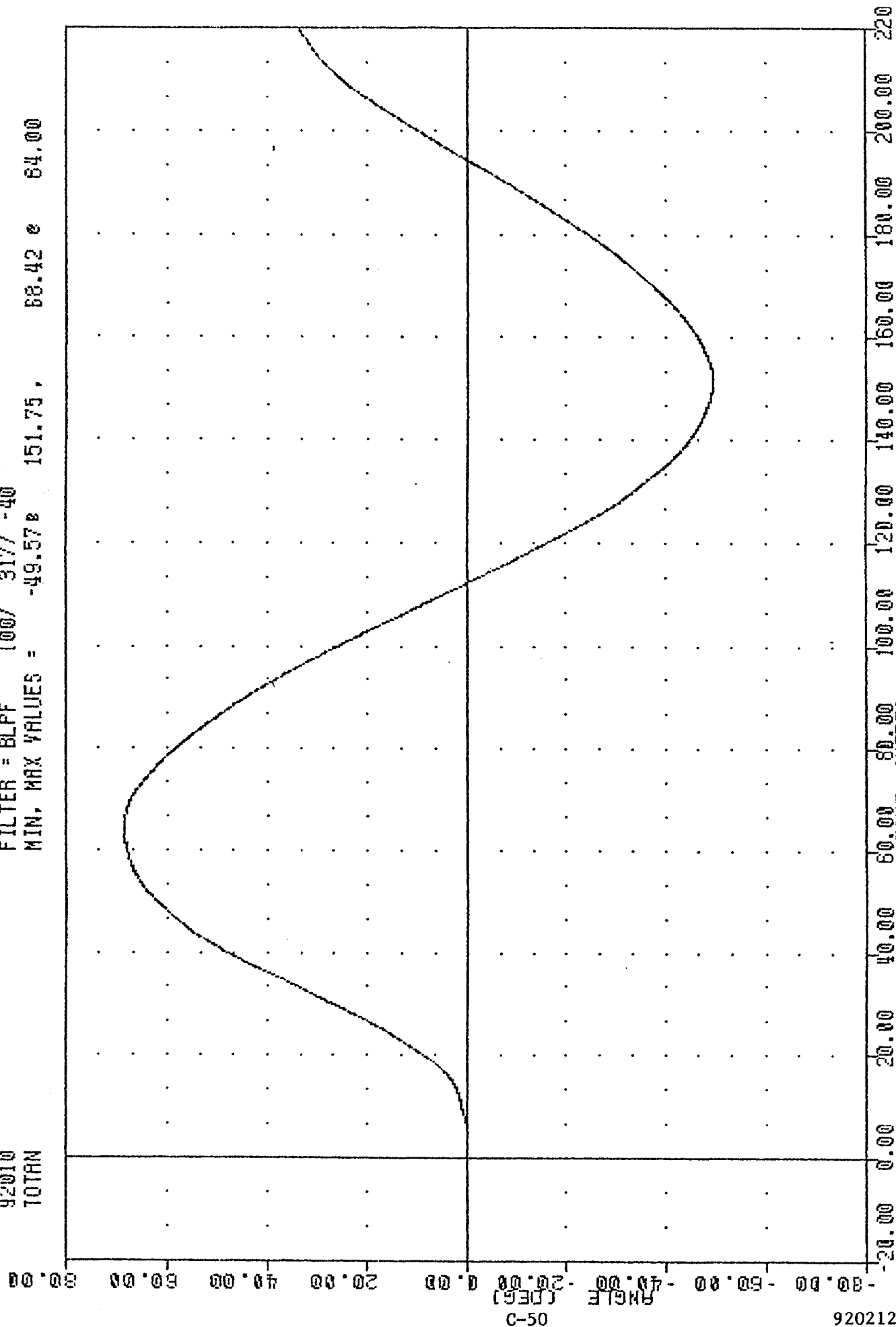
PART 572-B HYBRID II HEAD/NECK CALIBRATION
 ROTATION ABOUT THE HEAD C.G.

3/20 3M / 13 HEAD/NECK CAL W2

92010
TOTAL

FILTER = BLPF 100/ 317/ -40

MIN, MAX VALUES = -49.57° 151.75°, 68.42° 64.00



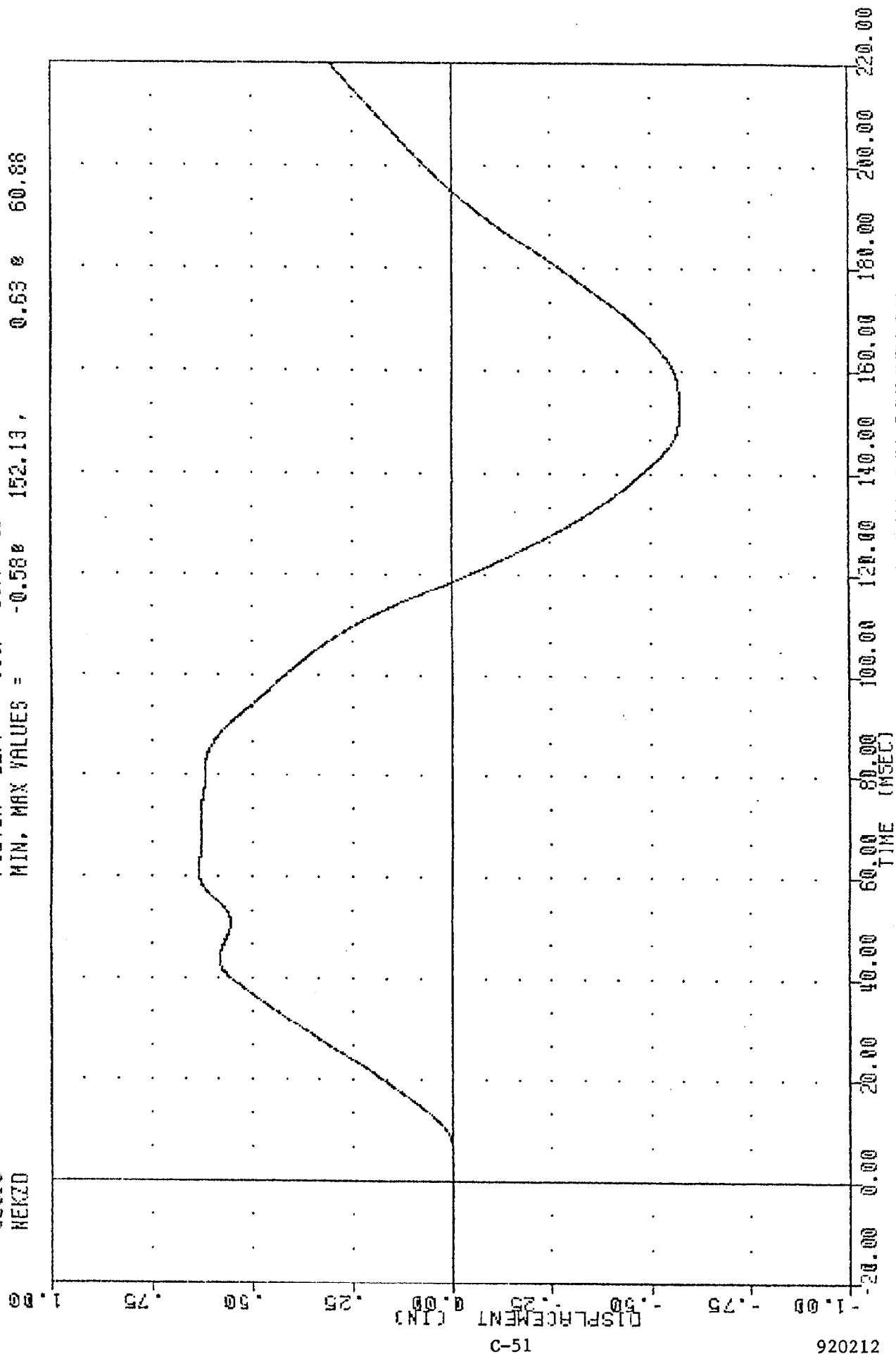
920212

PART 572-B HYBRID II HEAD/NECK CALIBRATION
TOTAL ROTATION

TRC
5728 SN 713 HEAD/NECK CAL 02
92010
NEK20

, HN71302

FILTER = BLPF 100/ 317/ -40
MIN. MAX VALUES = -0.588 152.13, 0.63 60.88



9200 311 110 100000000 000 000

92010

NEKCO

FILTER = ELPF 100/ 317/ -40

MIN, MAX VALUES = 0.000 -17.00, 5.45 0 63.50

7.00

6.00

5.00

4.00

3.00

2.00

1.00

0.00

-1.00

-2.00

DISPLACEMENT (IN)

C-52

920212

-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00
TIME (MSEC)

PART 572-B HYBRID II HEAD/NECK CALIBRATION
NECK CHORDAL DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

10-Jan-92

TEMPERATURE 70 F
TRC TH71302RELATIVE HUMIDITY 40 %
572B SN 713 H.S.THORAX CAL 02

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC
PEAK DEFLECTION	1.7 IN max.	1.55 IN
PEAK RESISTIVE FORCE	2,250. LB max.	2075. LB
INTERNAL HYSTERESIS	50% - 70%	64.9%

SCD: 2.20 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

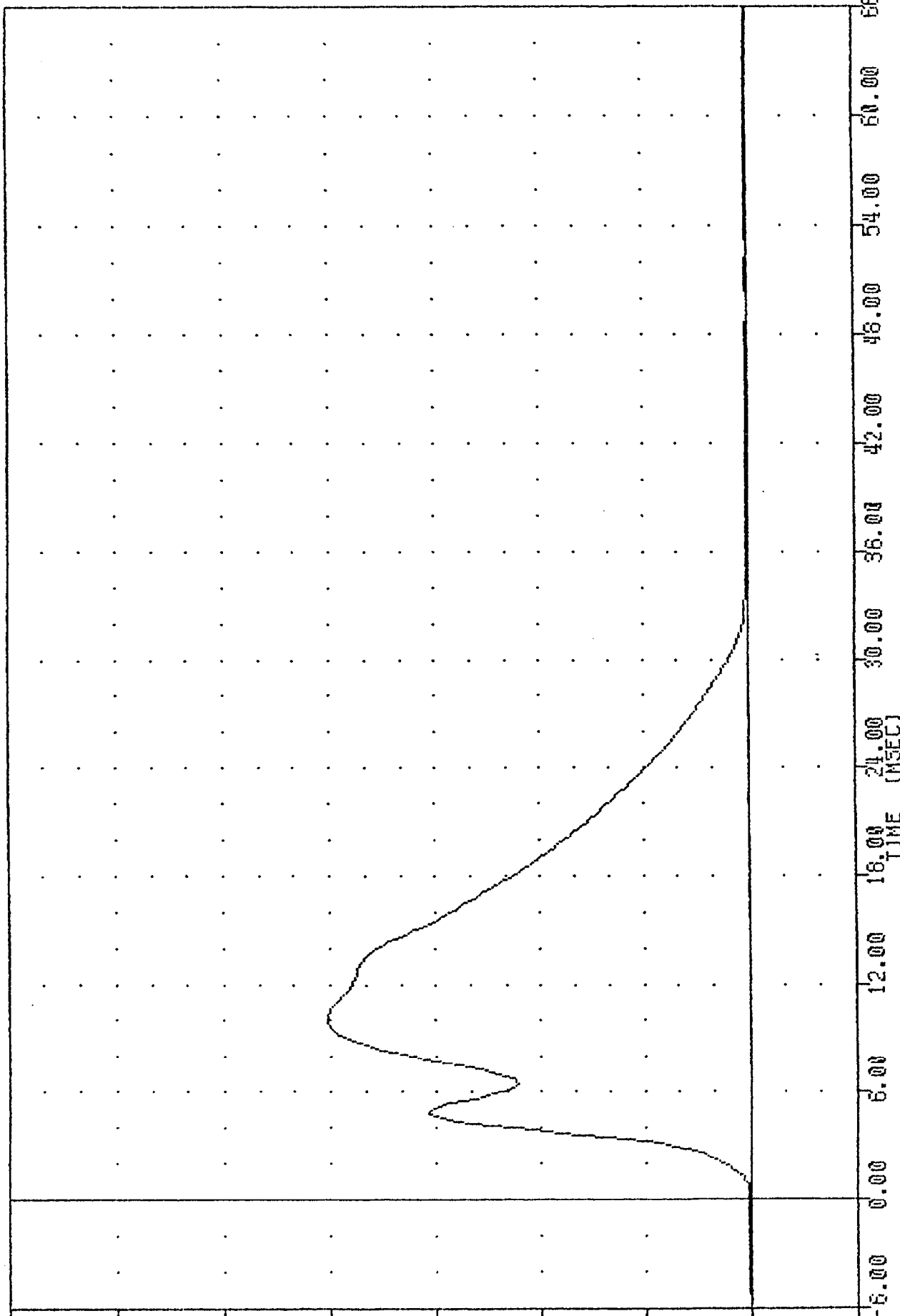
92010
PENXG

FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = 0.048 -6.00 , 40.30 0 10.13

ACCELERATION (G)

C-54

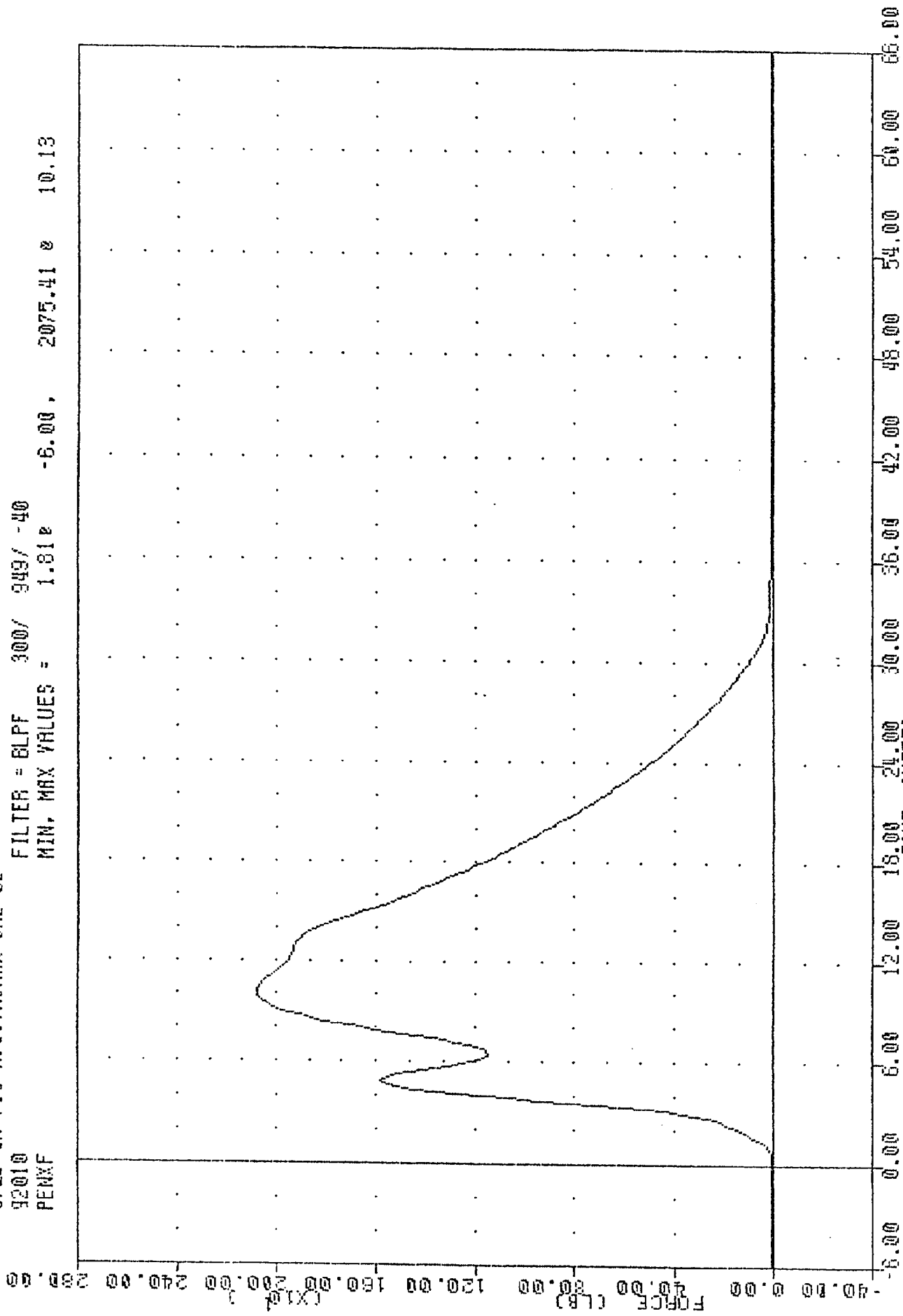
920212



PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
PENDULUM DECELERATION

TRC , TH71302
 572B SN 713 H.S.THORAX CAL 02
 92010
 PENXF

FILTER = 8LPF 300/ 949/ -40
 MIN, MAX VALUES = 1.81e -6.00, 2075.41 e 10.13



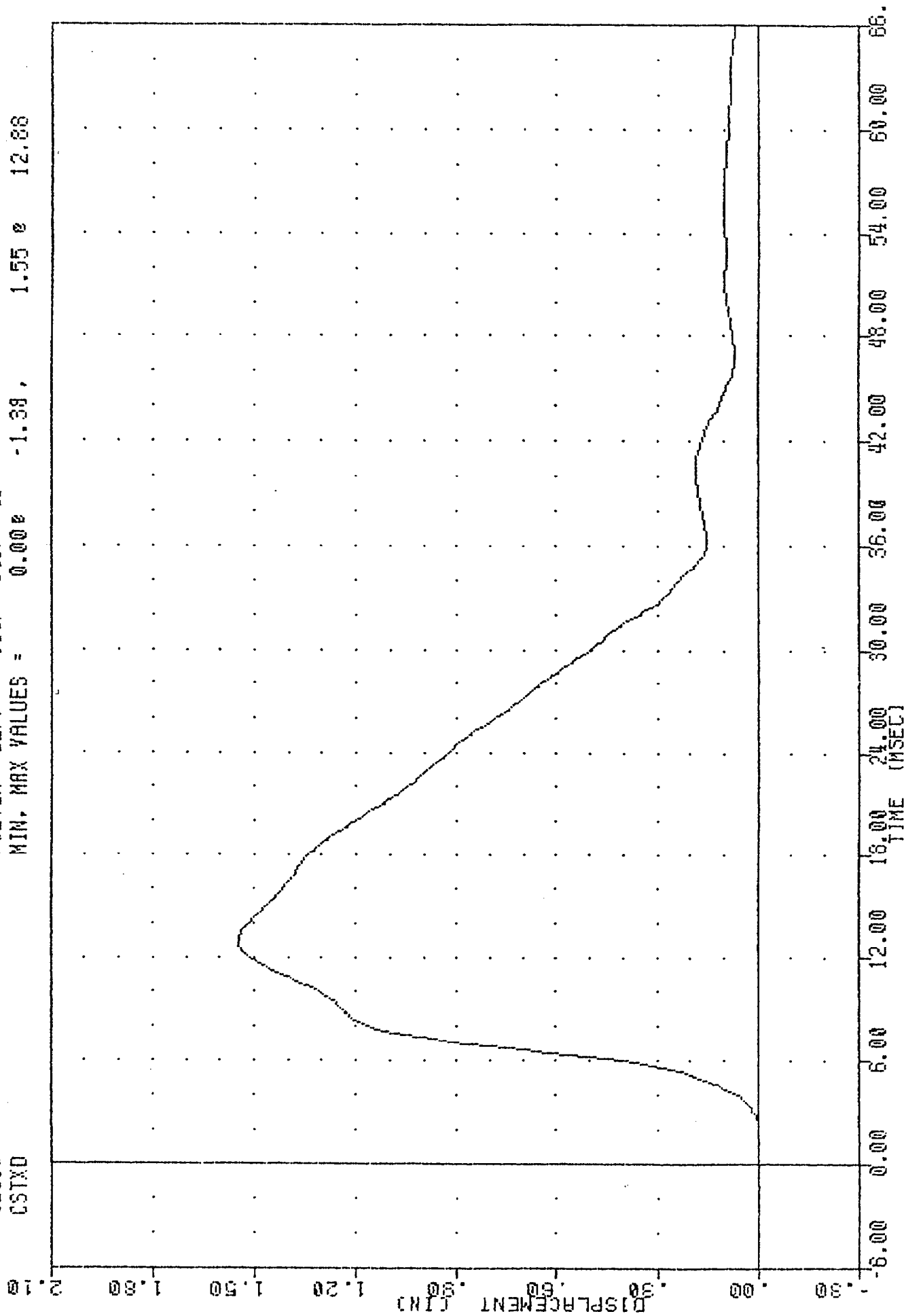
PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
 PENDULUM FORCE

08-1695 ADP = 931713

01035

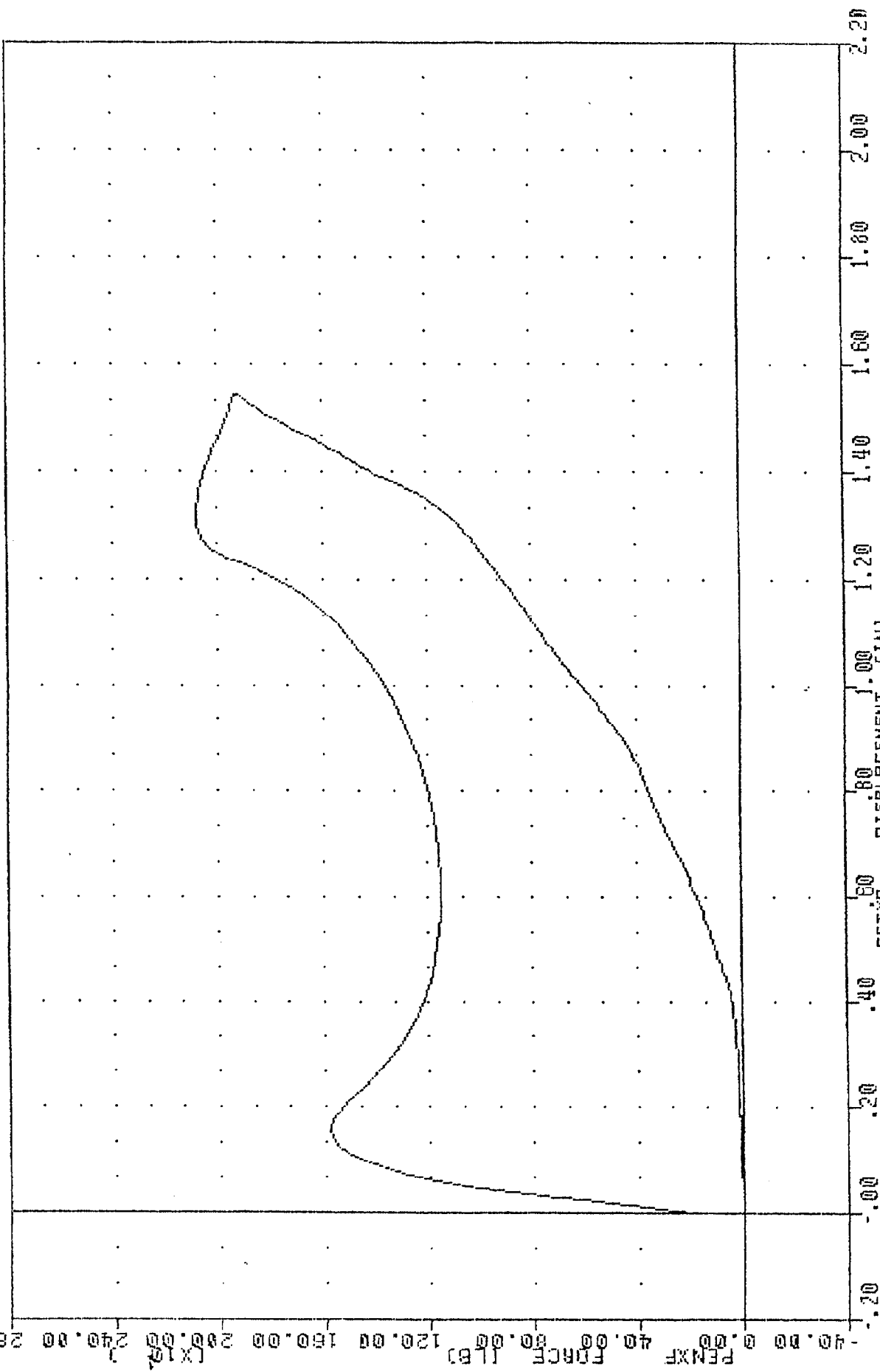
0X157

1.39.	1.55	12.88
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PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
STERNUM DISPLACEMENT

TRC
 CSTXD
 PENNF
 'TH71302
 FILTER = BLPF
 FILTER = BLPF
 572B SM 713 H. S. THORAX CAL 02 92010
 300/ 949/ -40 MIN. MAX = 0.00 0
 300/ 949/ -40 MIN. MAX = 0.00 0
 -1.38
 -6.00
 1.55
 2075.41
 12.86
 10.13



PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
 CHEST DISPLACEMENT VS PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

10-Jan-92

TEMPERATURE 70 F
TRC TL71302RELATIVE HUMIDITY 40 %
572B SN 713 L.S.THORAX CAL 02

	LOW SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
PENDULUM VELOCITY	13.86-14.14 FT/SEC	13.97 FT/SEC

PEAK DEFLECTION	1.1 IN max.	0.96 IN

PEAK RESISTIVE FORCE	1,450. LB max.	1348. LB

INTERNAL HYSTERESIS	50% - 70%	64.3%

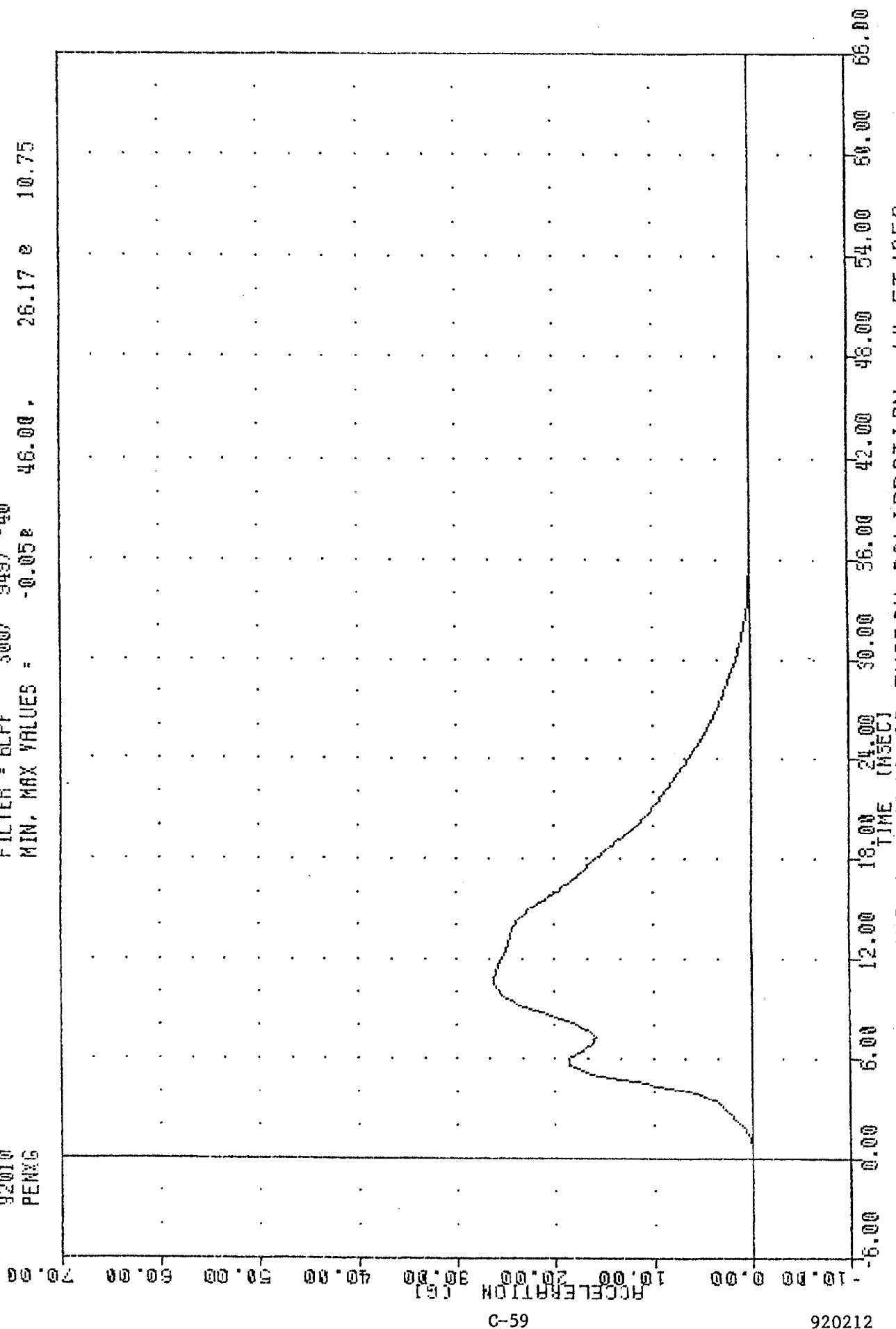
SCD: 2.20 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
5720 SN 713 L.S. THORAX CAL 02
92010
PENXS

FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = -0.05e 26.17 e 10.75



920212

C-59

PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
PENDULUM DECELERATION

572B SN 713 L.S. THORAX CHL 02

92010

PENXF

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -2.65e 46.00, 1347.53 e 10.75

280.00

240.00

200.00

160.00

120.00

80.00

40.00

0.00

-40.00

-80.00

-120.00

-160.00

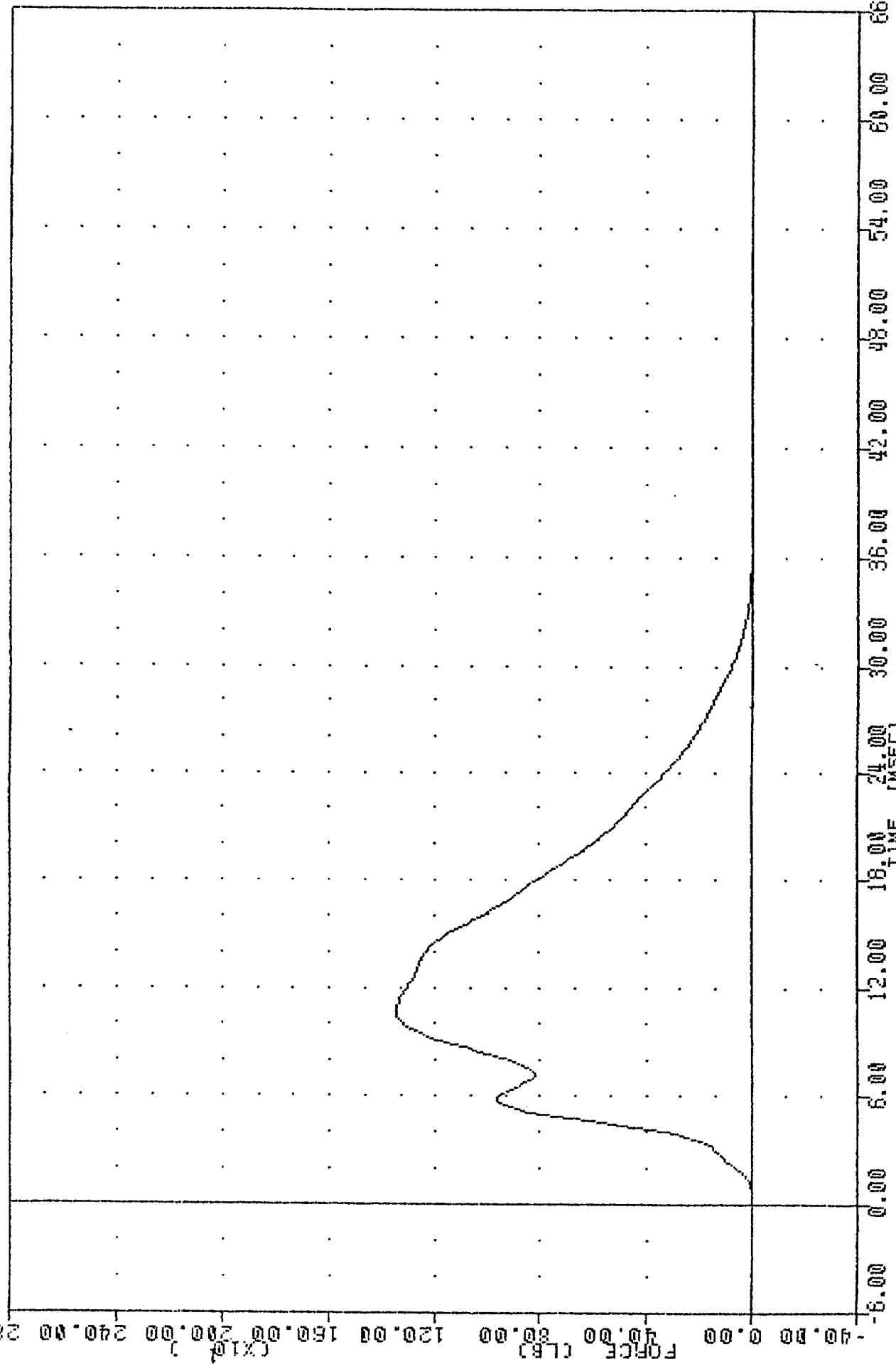
-200.00

-240.00

-280.00

C-60

920212



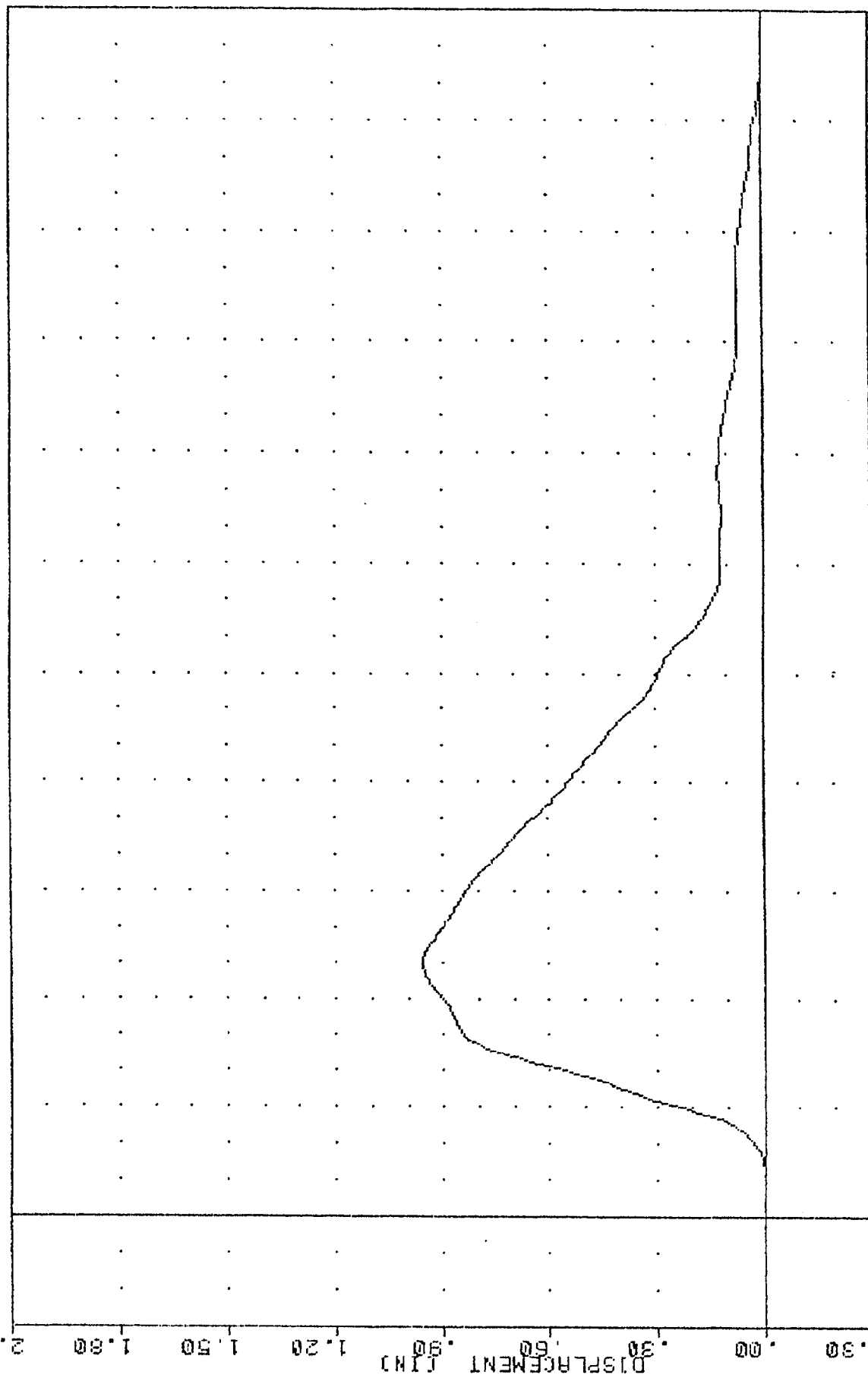
PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
PENDULUM FORCE

TRC
572B SN 713 L.S. THORAX CAL 02
92010
CSTXD

, TL71302

FILTER = BLFF 300/ 949/ -40
MIN. MAX VALUES = 0.00e 66.00 0.96 e 13.88

2.10

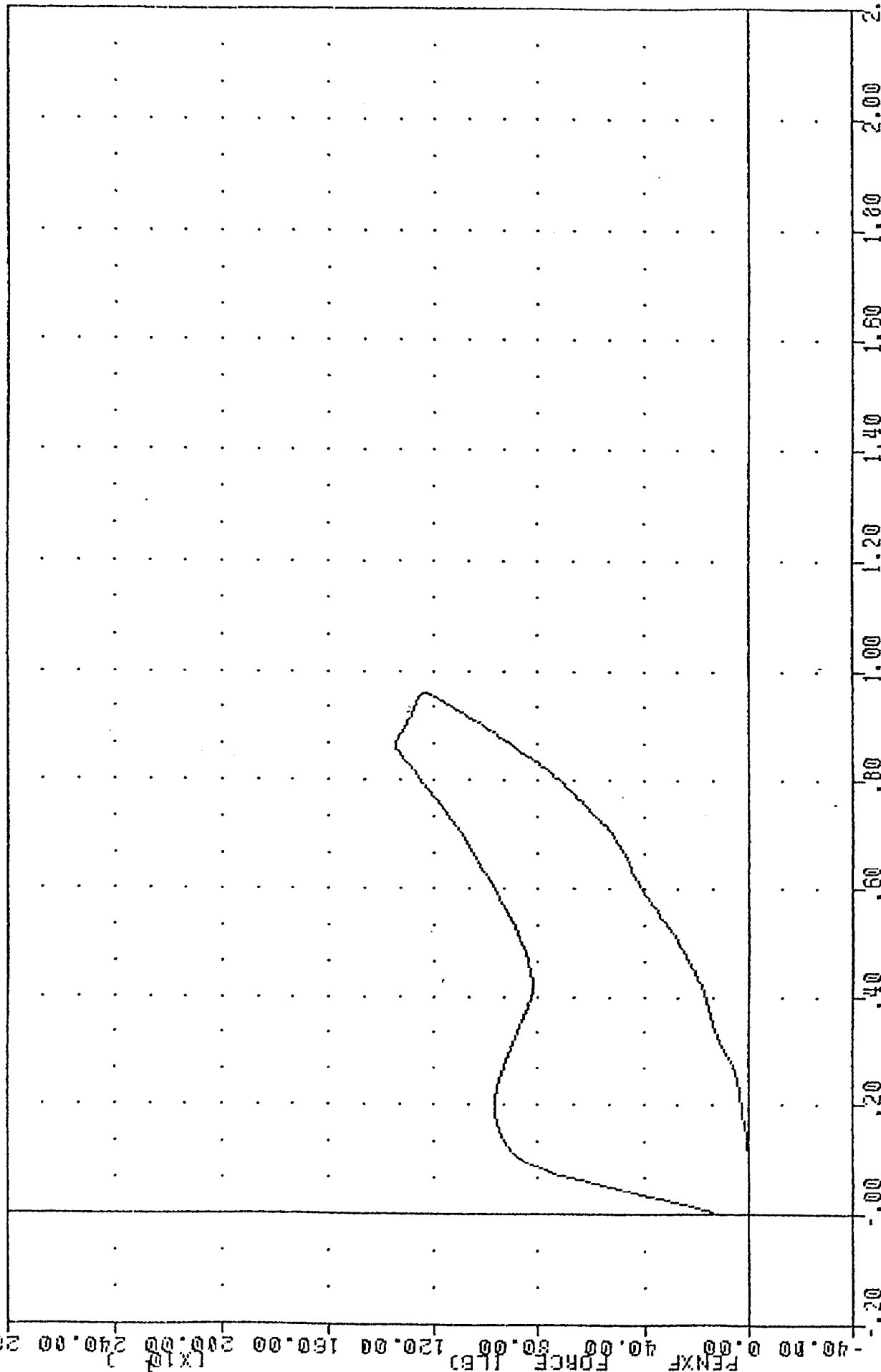


19-C

920212

PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
STERNUM DISPLACEMENT

231AD
 PENXF
 FILTER = 8LFF
 3000/ 949/ -40
 3000/ 949/ -40
 MIN, MAX =
 MIN, MAX =
 W. SW S
 -2.65 S
 48.00 S
 1347.53 S
 13.00
 10.75



PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
 CHEST DISPLACEMENT VS PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMEN COMPRESSION TEST

PART 572

10-Jan-92

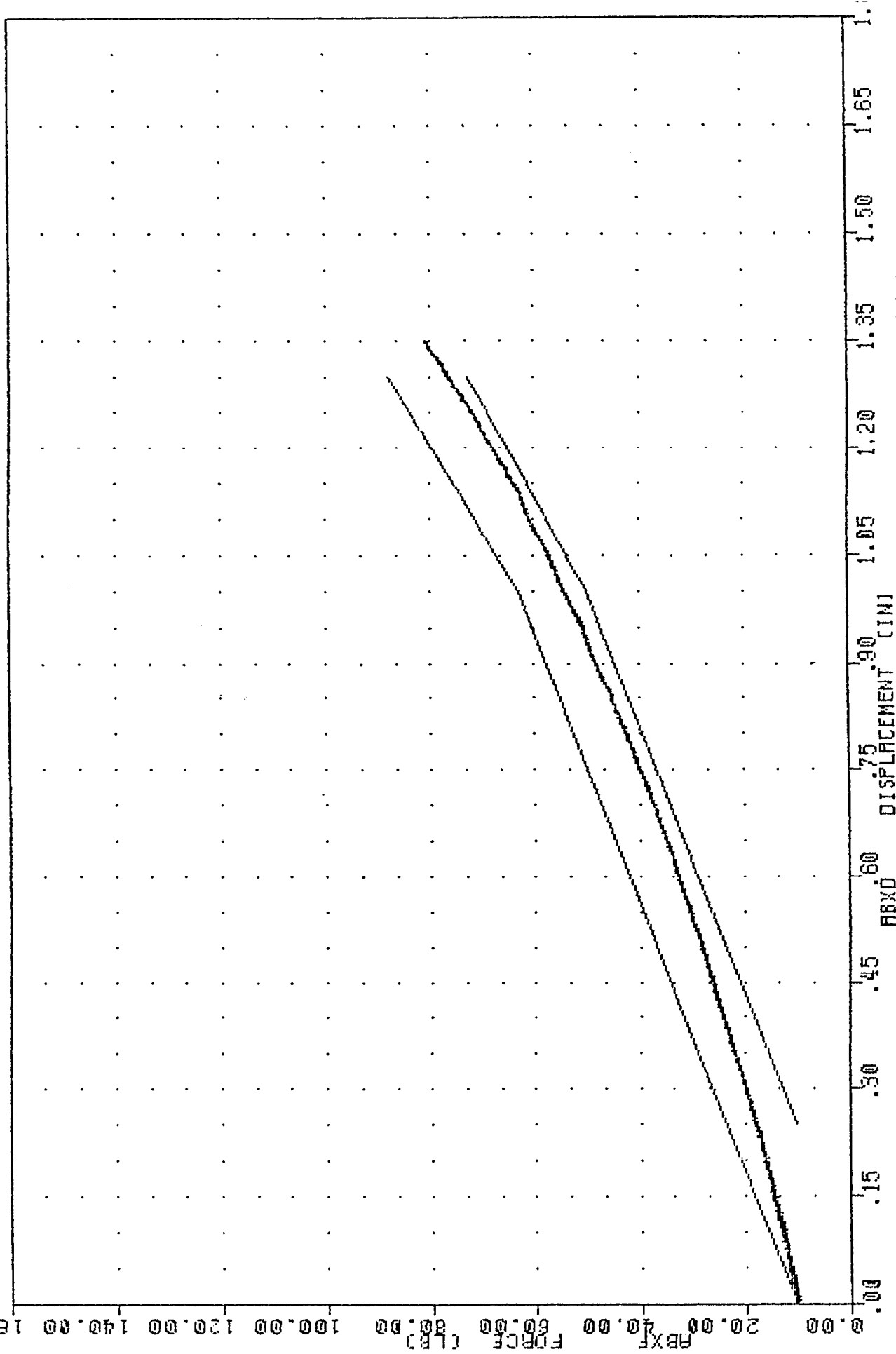
TEMPERATURE 70 F
TRC AB71302RELATIVE HUMIDITY 34 %
572B SN 713 ABDOM COMPR CAL 02

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	28.04 LBS
0.75 IN	36.00 - 50.00 LBS	39.89 LBS
1.00 IN	50.00 - 63.00 LBS	54.49 LBS
1.30 IN	73.00 - 88.00 LBS	76.45 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

ASXF 1650/ 5214/ -40 MIN. MAX = 9.57 80.89 1.35



PART 572-B HYBRID II ABDOMEN CALIBRATION
ABDOMEN FORCE VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

10-JAN-92

TEMPERATURE 70 F
TRC LF71302RELATIVE HUMIDITY 34 %
572B SN713 LUMBAR FLEX CAL02

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	29.00 LB
30 DEG	34.00 - 46.00 LB	39.00 LB
40 DEG	46.00 - 58.00 LB	52.00 LB
NET RETURN ANGLE	< 12 DEG	2.23 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

KNEE IMPACT TEST

PART 572

10-Jan-92

TEMPERATURE 70 F
LEFT KNEE
TRC LK71302

RELATIVE HUMIDITY 40 %
572B SN 713 L.KNEE IMP CAL 02

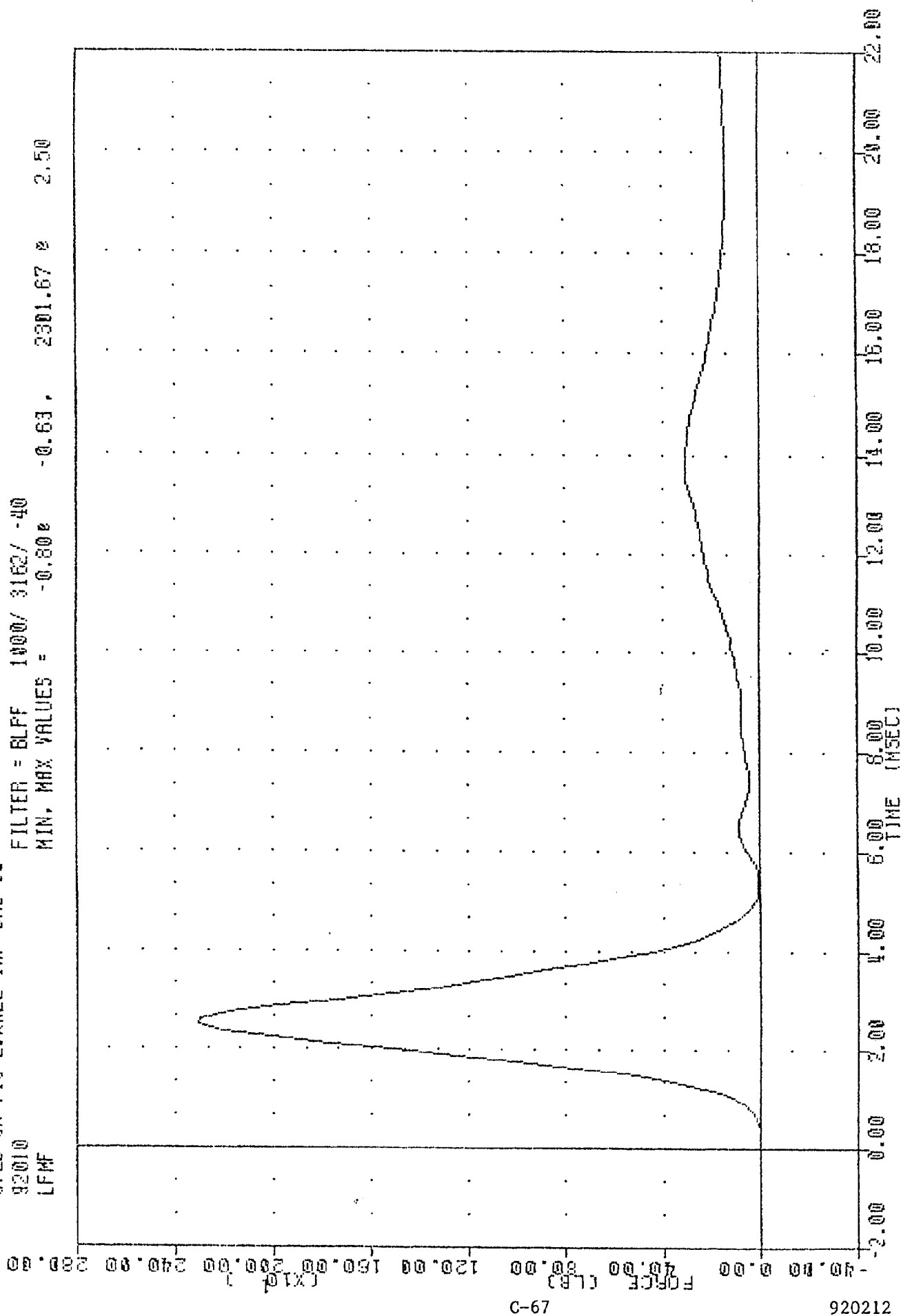
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.97 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2301.67 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.78 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
5728 SN 713 L.KNEE INP CAL 02
92010
LFMF

FILTER = BLPF 1000/ 3162/ -40
MIN. MAX VALUES = -0.80e -0.63, 2301.67 e 2.50



C-67

920212

PART 572-8 HYBRID II LEFT KNEE CALIBRATION
LEFT FEMUR FORCE

KNEE IMPACT TEST

PART 572

10-Jan-92

TEMPERATURE 70 F
RIGHT KNEE
TRC RK71302

RELATIVE HUMIDITY 40 %
572B SN 713 R.KNEE IMP CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.97 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2129.01 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.98 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

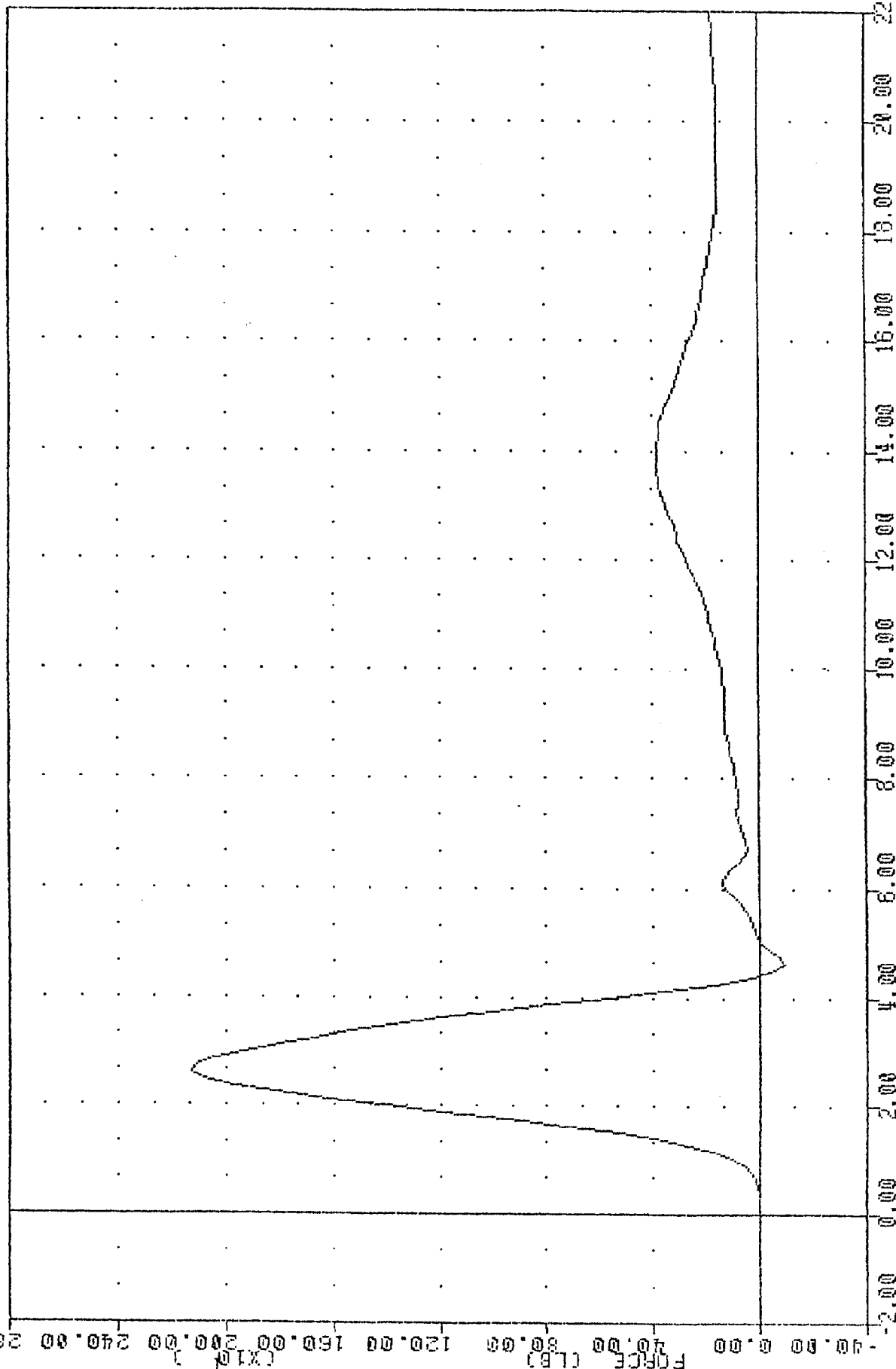
Chris Middleton

TRC
5728 SN 713 R.KNEE INP CAL 02
92010
AFMF

FILTER = BLPF 1000/ 3162/ -40
MIN. MAX VALUES = -95.51 2

4.63, 2129.01 2 2.63

920212



PART 572-8 HYBRID II RIGHT KNEE CALIBRATION
RIGHT FEMUR FORCE

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #142

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	CR59H	7264	ENDEVCO	11/07/91	05/07/92
Y-AXIS ACCEL.	CR99H	7264	ENDEVCO	11/07/91	05/07/92
Z-AXIS ACCEL.	CH44H	7264	ENDEVCO	11/07/91	05/07/92
CHEST X-AXIS ACCEL.	DA88H	7264	ENDEVCO	11/07/91	05/07/92
Y-AXIS ACCEL.	CL09H	7264	ENDEVCO	11/07/91	05/07/92
Z-AXIS ACCEL.	CH74H	7264	ENDEVCO	11/07/91	05/07/92
LEFT FEMUR FORCE LOAD CELL	829	2430	GSE	11/06/91	05/06/92
RIGHT FEMUR FORCE LOAD CELL	610	2430	GSE	11/06/91	05/06/92
*NECK X-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
Y-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
Z-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
*NECK MOMENT ABOUT X-AXIS LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
MOMENT ABOUT Y-AXIS LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
MOMENT ABOUT Z-AXIS LOAD CELL	0280	1716	DENTON	11/06/91	05/06/92
*CHEST DEFLECTION POTENTIOMETER	90320B	81422A	VERNITECH	11/15/91	05/15/92
LAP BELT FORCE LOAD CELL	571	3419	LEBOW	10/19/91	04/19/92
SHOULDER BELT FORCE LOAD CELL	616	3419	LEBOW	10/19/91	04/19/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	A12899	PT-101-40A	CELESCO	11/20/91	05/20/92
SHOULDER BELT STRETCH POTENTIOMETER	2087	2051414101	BOURNES	11/20/91	05/20/92

*HYBRID III USE ONLY.

DUMMY INSTRUMENT CALIBRATIONS

PASSENGER DUMMY #713

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	CW96H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	DN99JC	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CR78H	7264	ENDEVCO	01/08/92	07/08/92
CHEST X-AXIS ACCEL.	CC71H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	CY32H	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CG13H	7264	ENDEVCO	01/08/92	07/08/92
LEFT FEMUR FORCE LOAD CELL	901	2430	GSE	01/09/92	07/09/92
RIGHT FEMUR FORCE LOAD CELL	902	2430	GSE	01/09/92	07/09/92
*NECK X-AXIS FORCE LOAD CELL	NA				
Y-AXIS FORCE LOAD CELL	NA				
X-AXIS FORCE LOAD CELL	NA				
*NECK MOMENT ABOUT X-AXIS LOAD CELL	NA				
MOMENT ABOUT Y-AXIS LOAD CELL	NA				
MOMENT ABOUT Z-AXIS LOAD CELL	NA				
*CHEST DEFLECTION POTENTIOMETER	NA				
LAP BELT FORCE LOAD CELL	236	3419	LEBOW	10/19/91	04/19/92
SHOULDER BELT FORCE LOAD CELL	615	3419	LEBOW	09/12/91	03/12/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	0586135	PT-101-40A	CELESCO	11/27/91	05/27/92
SHOULDER BELT STRETCH POTENTIOMETER	NA	2051414101	BOURNES	11/27/91	05/27/92

*HYBRID III USE ONLY.

VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
LEFT SEAT REAR CROSSMEMBER X-AXIS	BY03J	7264	ENDEVCO	12/02/91	06/02/92
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CJ04H	7264	ENDEVCO	09/05/91	03/05/92
ENGINE TOP X-AXIS	CG95H	7264	ENDEVCO	09/18/91	03/18/92
ENGINE BOTTOM X-AXIS	CJ81H	7264	ENDEVCO	10/18/91	04/18/92
RIGHT BRAKE CALIPER X-AXIS	CT68H	7264	ENDEVCO	09/18/91	03/18/92
LEFT BRAKE CALIPER X-AXIS	DK62J	7264	ENDEVCO	09/05/91	03/05/92
INSTRUMENT PANEL CENTER X-AXIS	CJ05H	7264	ENDEVCO	09/04/91	03/04/92
REAR SEAT CROSSMEMBER CENTER Z-AXIS	CK56H	7264	ENDEVCO	09/05/91	03/05/92
VEHICLE REAR CENTER Z-AXIS	DK59J	7264	ENDEVCO	09/04/91	03/04/92

CALIBRATION LABORATORY INSTRUMENTS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
NECK BENDING PENDULUM ACCEL.	CC59	7232	ENDEVCO	10/08/91	04/08/92
NECK BENDING ROTARY POTENTIOMETER	NA	35435-1-102	BOURNES	MFR. SPECIFICATION	
NECK BENDING LINEAR POTENTIOMETER	NA	5184-2051846003	BOURNES	10/08/91	04/08/92
THORAX/HYBRID II FEMUR PEND. ACCEL.	CC64	7232	ENDEVCO	10/08/91	04/08/92
LUMBAR FLEXION FORCE GAUGE	NA	DPH-50	CHATILLON	05/03/89	REPAIRED
LUMBAR FLEXION ROTATION GAUGE	CP17-0601-1	7020	HUMPHREY	MFR. SPECIFICATION	
ABDOMEN COMPRESSION DISPL. GAUGE	4075-172	80294-2051941504	BOURNES	10/08/91	04/08/92
ABDOMEN COMPRESSION FORCE GAUGE	1261	3167	LEBOW	10/08/91	04/08/92
HYBRID III FEMUR PEND. ACCEL.	CC83	7232	ENDEVCO	10/08/91	04/08/92

SIGN CONVENTION
NHTSA DATA TAPE REFERENCE GUIDE

ACCELEROMETERS:

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

POTENTIOMETERS:

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

LOAD CELLS:

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

NECK LOAD CELLS:

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

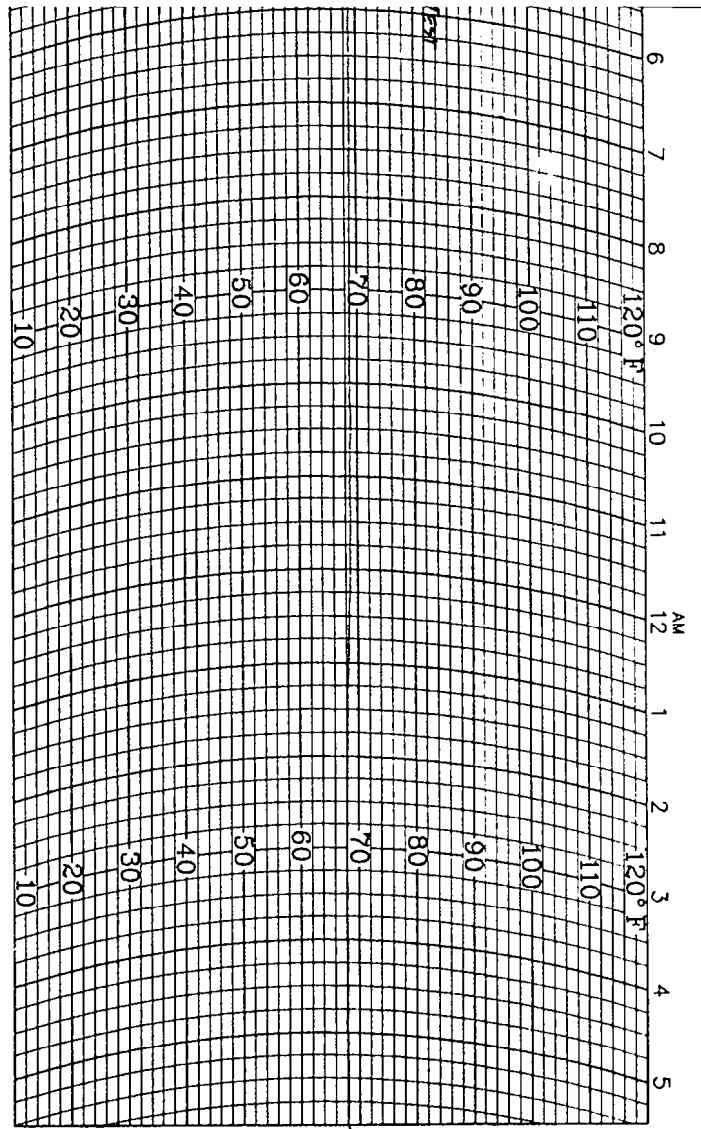
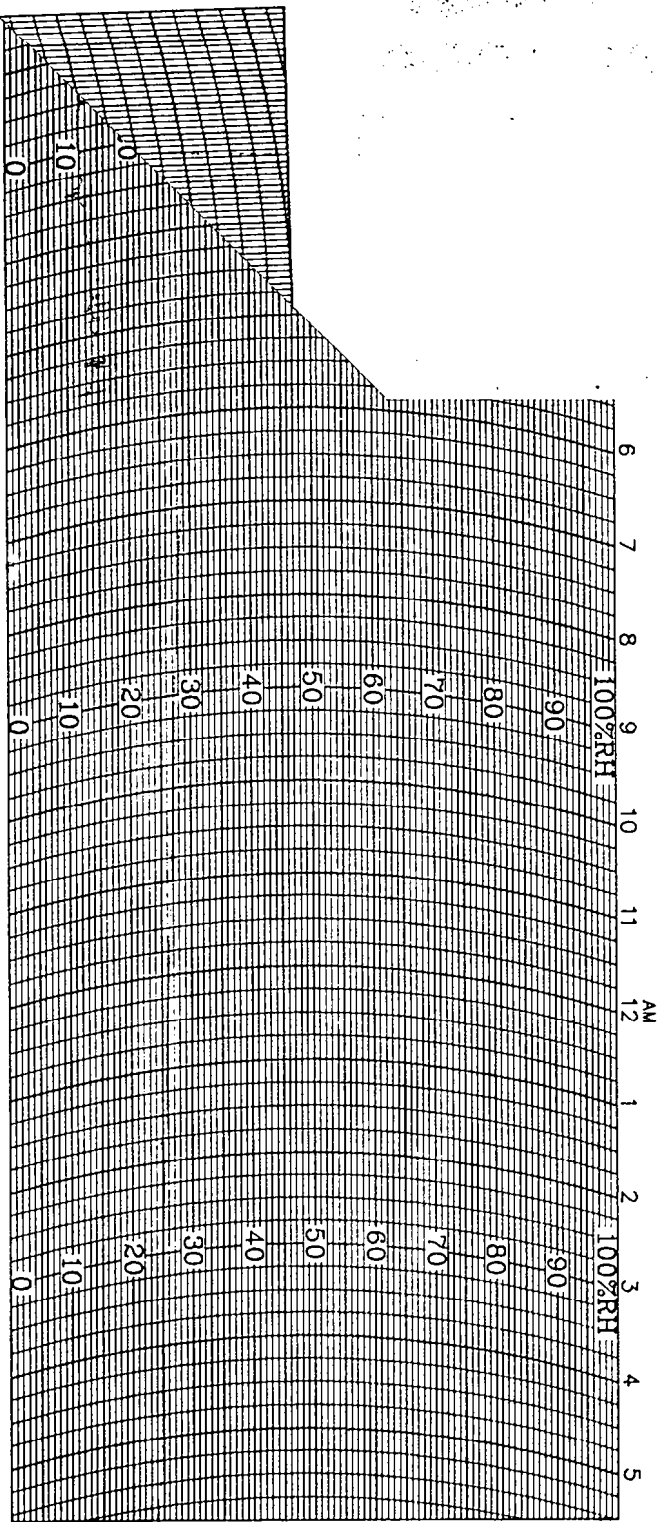
TIBIA LOAD CELLS:

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

FREQUENCY RESPONSE CLASSES

SAE J211 OCT88

<u>TYPICAL TEST MEASUREMENTS</u>	<u>CHANNEL CLASS</u>
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	180
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Headform Accelerations	1000



WeatherMeasure
WEATHERtronics
 Division of QUALIMETRICS, Inc.

P.O. BOX 41039
 SACRAMENTO, CA 95841
 PHONE: (916) 923-0055

HYGROTHERMOGRAPH
 1 DAY

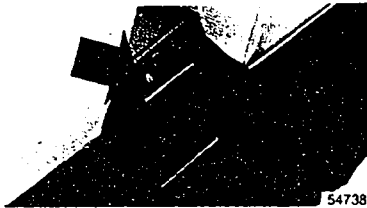
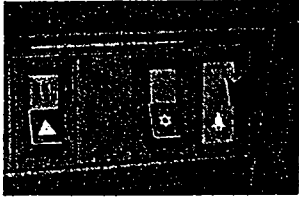
CHART NO. M699123
 C311-D-HF
 ECN 2717
 6-9-87

STATION Volvo 240 DATE ON 2/11/92 DATE OFF 2/12/92

APPENDIX E

RESTRAINT SYSTEM INSTRUCTIONS FROM OWNER'S MANUAL

Seat belts



54738



Release buttons, front seats



Seat belts, retractable

Always fasten the seat belts before you drive or ride.

Two lights will be illuminated for 4–8 seconds after the starting (ignition) key is turned to driving position. One light is located in the instrument cluster and one in the console between the front seats.

A chime will sound at the same time if the driver has not fastened his seat belt. The front and rear outboard seats are provided with self-retracting inertia-reel belts.

To buckle:

Pull the belt out from the retractor far enough to insert the latch into the buckle until a distinct snapping sound is heard. The belt should not be twisted or turned.

Note: The lap belt should sit low and tight under abdomen.

To unfasten, depress red pushbutton in buckle and let the belts rewind into their retractors. Before exiting the car, check that the seat belt retracts fully after being unbuckled. If necessary, guide the belt back into its retractor slot.

WARNING! The seat back should not be tilted too far back. The shoulder belt must be taut in order to function properly.

The seat belt retractors are normally "unlocked".

The retractors will lock up as follows:

- if belt is pulled out rapidly
- during braking and acceleration
- if the vehicle is leaning excessively
- when driving in turns

Check seat belt mechanism function as follows:

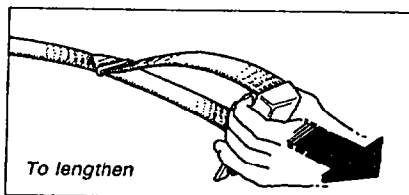
1 Attach the seat belt. Pull rapidly on the strap.

2 **WARNING! Check other traffic before performing this check.**

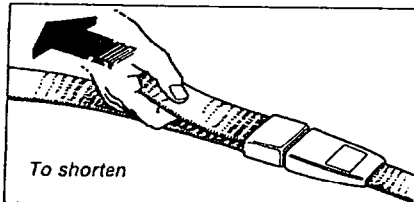
Brake firmly from approximately 30 mph (50 km/h) or turn in a tight circle while pulling on the belt.

In all the above checks you should not be able to pull the belt out.

40



To lengthen



To shorten

58405



The lap belt should sit low under abdomen

Seat belts, manually adjustable

The center-rear seat belt is manually adjustable. It should always be adjusted to fit snugly across the lap.

During pregnancy

Pregnant women should always wear seat belts. Remember that the belt should always be positioned in such a way as to avoid any possible pressure on the abdomen. The lap portion of the belt should be located low, as shown in the above illustration.

WARNING: Never use any single seat belt for more than one occupant.

Never wear the shoulder portion of the belt under the arm or otherwise out of position. Such use could, in event of accident, cause injury.

Volvo recommends that all occupants fasten their seat belts. Aftermarket devices used to induce slack into the shoulder belt portion of Volvo's three-point belt system will have a detrimental effect on the amount of protection available to you in the event of a collision.

As the seat belts lose much of their strength when stretched, they should be replaced after collision, even though they may appear to be undamaged.

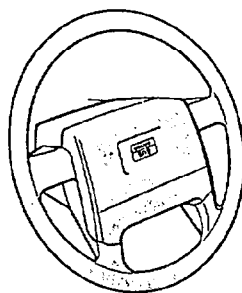
Never repair the belt on your own; have this done by an authorized Volvo dealer only.

Note: Legislation in your state or province may mandate seat belt usage.

Seat belt maintenance

Check periodically that the anchor bolts are secure and that the belts are in good condition. Use water and a mild detergent for cleaning.

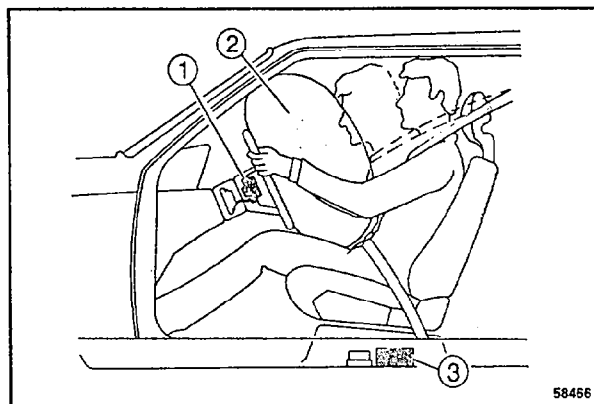
Supplemental Restraint System



As an enhancement to the three-point seat belt system, your Volvo is equipped with a Supplemental Restraint System (SRS). The Volvo SRS consists of a driver's side airbag with a driver's side knee bolster. The system is designed to supplement the protection provided by the three-point seat belt system.

The interior of an SRS-equipped Volvo looks very much the same as any other. The only indications of the system's presence are the "SRS" embossed on the steering wheel pad, and the knee bolster beneath the steering column. Also, the SRS diagnostic receptacle is indicated on the center dash panel.

The airbag is folded and located in the center of the steering wheel. It is released only during certain frontal or front-angular collisions, depending upon the crash severity, angle, speed, and object impacted.



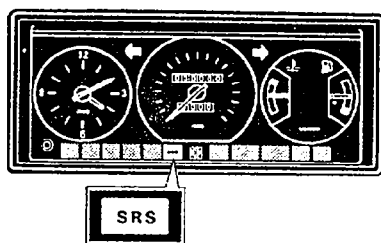
The airbag system includes a gas generator (1), surrounded by the airbag itself (2). To deploy the system, the sensor (3) activates the gas generator causing the airbag to be inflated with nitrogen gas. As the movement of the driver compresses the airbag, some of the gas is expelled at a controlled rate to provide better cushioning. The entire process, including inflation and deflation of the airbag takes approximately two-tenths of a second.

WARNING! As its name implies, SRS is designed to be a **SUPPLEMENT** to – not a replacement for – the three-point belt system. The airbag is not designed to be released in the event of a side or rear-end collision, or during a rollover situation. For maximum protection, wear seat belts at all times. Be aware that no system can prevent all possible injuries that may occur in an accident.

WARNING: When installing any optional equipment make sure that the SRS system is not damaged. Do not attempt to service any component of the SRS yourself. Attempting to do so may result in serious personal injury. If a problem arises, take your car to the nearest authorized Volvo Dealer for inspection as soon as possible.

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Supplemental Restraint System



A self-diagnostic system incorporated in the sensor monitors the SRS. If a fault is detected, the "SRS" warning light will illuminate. The light is included in the warning/indicator light cluster in the instrument panel. Normally, the SRS warning lamp should light up when the ignition is switched on and should go out after 10 seconds or when the engine is started. Check that this light is functioning properly every time the car is started.

The following items are monitored by the diagnostic system:

- Sensor unit electronics integrity.
- Reserve energy supply.
- Diagnostic output circuit.
- System voltage.
- Integrity of system connectors.
- Gas generator ignitor.

WARNING! If the SRS warning light stays on after the engine has started or if it comes on while you are driving, drive the car to the nearest authorized Volvo Dealer for inspection as soon as possible.

ATTENTION! SRS VEHICLE!

THIS CAR IS EQUIPPED WITH A SUPPLEMENTAL RESTRAINT SYSTEM, TO PROVIDE CONTINUED RELIABILITY, CERTAIN ELEMENTS OF THE SUPPLEMENTAL RESTRAINT SYSTEM SHALL BE SERVICED OR REPLACED BY JAN. XXXX SEE OWNERS MANUAL FOR FURTHER INFORMATION.

VOLVO

58468

The above is a sample of the decal which can be found on the left-hand door pillar.

There is no maintenance to perform on the SRS yourself. The only periodic maintenance recommended on the SRS is that the air bag module should be replaced approximately every ten years and that the other components in the system (wiring, connectors, etc.) should also be inspected at this time. The SRS decal on your car shows the month and year servicing is due. This service must be performed by an authorized Volvo dealer.

Should you have any questions about the SRS system, please contact your authorized Volvo Dealer or the Consumer Affairs Department:

In the U.S.A.
Volvo Cars of North America
One Volvo Drive,
Rockleigh, New Jersey 07647
800-458-1552

In Canada:
Volvo Canada Ltd.
175 Gordon Baker Road
Willowdale, Ontario M2H 2N7
416-493-3700