

V1708

REPORT NO. TRC-91-N13

OPTIONAL NEW CAR ASSESSMENT PROGRAM (OPTIONAL NCAP)
FRONTAL BARRIER IMPACT TEST

SATURN CORPORATION
1992 SATURN SL2
4-DOOR SEDAN
TRC TEST NO. 920427

PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
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EAST LIBERTY, OHIO 43319



MAY 28, 1992
FINAL REPORT OF OPTIONAL RETEST

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
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16. Abstract <p>A 35 mph frontal load cell barrier impact test was conducted on a 1992 Saturn SL2 4-door sedan, at the Transportation Research Center Inc. on April 27, 1992. This test was conducted to obtain new car assessment and research data indicant of FMVSS No. 208 performance. The barrier impact velocity was 35.0 mph. The vehicle's maximum crush was 21.3 inches. The ambient temperature was 72° F.</p> <p>The driver's head injury criteria (HIC) was 705. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 51.4 g. The driver's chest maximum deflection was 2.0 inches. The driver's left and right femur maximum axial forces were 888 pounds and 1726 pounds, respectively.</p> <p>The passenger's head injury criteria (HIC) was 1063. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 47.4 g. The passenger's left and right femur maximum axial forces were 1583 pounds and 1086 pounds, respectively.</p>					
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METRIC CONVERSION FACTORS

When You Know	Multiply by	To Find	Symbol
LENGTH			
millimeters	0.04	inches	in
centimeters	0.4	inches	in
meters	3.3	feet	ft
kilometers	1.1	yards	yd
	0.5	miles	mi
AREA			
square centimeters	0.16	square inches	in ²
square meters	1.2	square yards	yd ²
square kilometers	0.4	square miles	mi ²
hectares (10,000 m ²)	2.5	acres	
MASS (weight)			
grams	0.035	ounces	oz
kilograms	2.2	pounds	lb
tonnes (1000 kg)	1.1	short tons	
VOLUME			
milliliters	0.03	fluid ounces	fl oz
liters	2.1	pints	pt
liters	1.06	quarts	qt
liters	0.26	gallons	gal
cubic meters	36	cubic feet	ft ³
cubic meters	1.3	cubic yards	yd ³

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

TEMPERATURE (exact)

°C Celsius temperature 9/5 (then add 32) Fahrenheit temperature °F

The image shows two temperature conversion scales. The top scale is Celsius to Fahrenheit, with markings from -40 to 200. The bottom scale is Fahrenheit to Celsius, with markings from -40 to 200. The scales are labeled '°C' and '°F' respectively.

* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 296, Units of Weights and Measures, Price \$2.25, SD Catalog No. C1310-286.

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SECTION 1.0

PURPOSE AND TEST PROCEDURE

PURPOSE

This 35 mph frontal barrier impact test is part of the Optional New Car Assessment Program (Optional NCAP). The program provides manufacturers with an opportunity to retest any of their vehicles that were tested in the New Car Assessment program (NCAP) and subsequently modified with the production changes to improve occupant protection. These Optional NCAP test results will be published by NHTSA in a regular NCAP press release.

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 Saturn SL2 4-door sedan, at an impact speed in excess of the current 30 mph FMVSS 208 requirements.

TEST PROCEDURE

This Optional NCAP 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 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 572 E 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 April 27, 1992.

The test vehicle, a 1992 Saturn SL2 4-door sedan, was equipped with a 1.9 liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 2922 pounds. The vehicle's impact speed was 35.0 mph. The vehicle sustained 21.3 inches of static crush during the impact.

The driver's head injury criteria (HIC) was 705. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 51.4 g. The driver's chest maximum deflection was 2.0 inches. The driver's left and right femur maximum axial forces were 888 pounds and 1726 pounds, respectively.

The passenger's HIC was 1063. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 47.4 g. The passenger's left and right femur maximum axial forces were 1583 pounds and 1086 pounds, respectively.

DATA ACQUISITION EXPLANATIONS

The right front passenger's shoulder belt force load cell, SHBF2, recorded a questionable data spike at 167 milliseconds.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 04/27/92 TEST TIME: 1507 AMBIENT TEMP. (°F): 72

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1992/Saturn/SL2/4-door sedan

VEHICLE TEST WEIGHT (LBS): 2922

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: PRIMARY = 35.0 SECONDARY = 35.0

MAXIMUM STATIC CRUSH (IN): 21.3

AVERAGE REBOUND (IN): 23.4

DUMMIES: Driver #083 Passenger #258

TYPE: Part 572 E Part 572 B

LOCATION: Left front Right front

RESTRAINT: Passive 2-point belt,
lap belt & airbag Passive 2-point belt
and lap belt

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: Saturn Corporation

MAKE/MODEL: Saturn/SL2

VIN: 1G8ZK5571NZ202699

BODY STYLE: 4-door sedan

MODEL YEAR: 1992

COLOR: Green

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 1.9 liter

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

DATE VEHICLE RECEIVED: 04/20/92

ODOMETER READING: 354.0

DEALER'S NAME AND ADDRESS: Saturn of Toledo
5551 West Central Avenue
Toledo, OH 43615

ACCESSORIES:

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

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Saturn Corporation

DATE OF MANUFACTURE: 04/92 VIN: 1G8ZK5571NZ202699

GVWR: 3406 LBS

GAWR: FRONT: 1786 LBS., REAR: 1620 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Firestone, Firehawk GTA, P195/60R15 87H

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 40 PSI
REAR: 40 PSI

SPARE TIRE (MFR., LINE, SIZE): Firestone T115/70R14 88M

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually-adjustable

MAXIMUM WIDTH: 65.8 INCHES

WHEELBASE: 102.5 INCHES

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the interior of the trunk lid.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P195/60R15

RECOMMENDED COLD TIRE PRESSURE: FRONT: 30 PSI; REAR: 26 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 864 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 26.3; RF 26.4; LR 26.5; RR 26.4

PRE-TEST ATTITUDE: LF 26.2; RF 26.1; LR 25.4; RR 25.2

POST-TEST ATTITUDE: LF 24.8; RF 33.6; LR 25.4; RR 23.0

*The vehicle did not contain a label stating capacity data.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	747 LBS.	RIGHT REAR	483 LBS.
LEFT FRONT	769 LBS.	LEFT REAR	482 LBS.
TOTAL FRONT WEIGHT	1516 LBS.	(61.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	965 LBS.	(38.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	2481 LBS.		

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2481 LBS)

VCW = VEHICLE CAPACITY WEIGHT (864 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

$RCLW* = VCW - 150 (DSC) = 864 - 150(5) = 114 \text{ LBS.}$

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 = 2481 + 114 + 164 + 167

TARGET TEST WEIGHT = 2926 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 110 LBS. OF CARGO WEIGHT:

RIGHT FRONT	816 LBS.	RIGHT REAR	647 LBS.
LEFT FRONT	830 LBS.	LEFT REAR	629 LBS.
TOTAL FRONT WEIGHT	1646 LBS.	(56.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1276 LBS.	(43.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2922 LBS.	(0.1% UNDER TARGET TEST WEIGHT)	

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

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Trunk lid, door panels, carpet, rear speakers, rear door windows, tail lights

CG = 44.8 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.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 920427

TEST DATE: 04/27/92

TEST TIME: 1507

TEST TYPE: Frontal load cell barrier

IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA:

72° F

TEMPERATURE IN OCCUPANT COMPARTMENT:

72° F

IMPACT VELOCITY: PRIMARY = 35.0 MPH

SECONDARY = 35.0 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 171.8; C 177.4; R 172.2

POST-TEST: L 156.1; C 156.1; R 156.1

TOTAL CRUSH: L 15.7; C 21.3; R 16.1

AVERAGE CRUSH: 17.7

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 23.9; C 22.8; R 23.4; AVG. 23.4

TABLE 4 FUEL SYSTEM DATA

MAKE/MODEL: Saturn/SL2

FUEL SYSTEM CAPACITY: 12.8 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 12.7 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 11.7 GALLONS TO 11.9 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 11.8 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

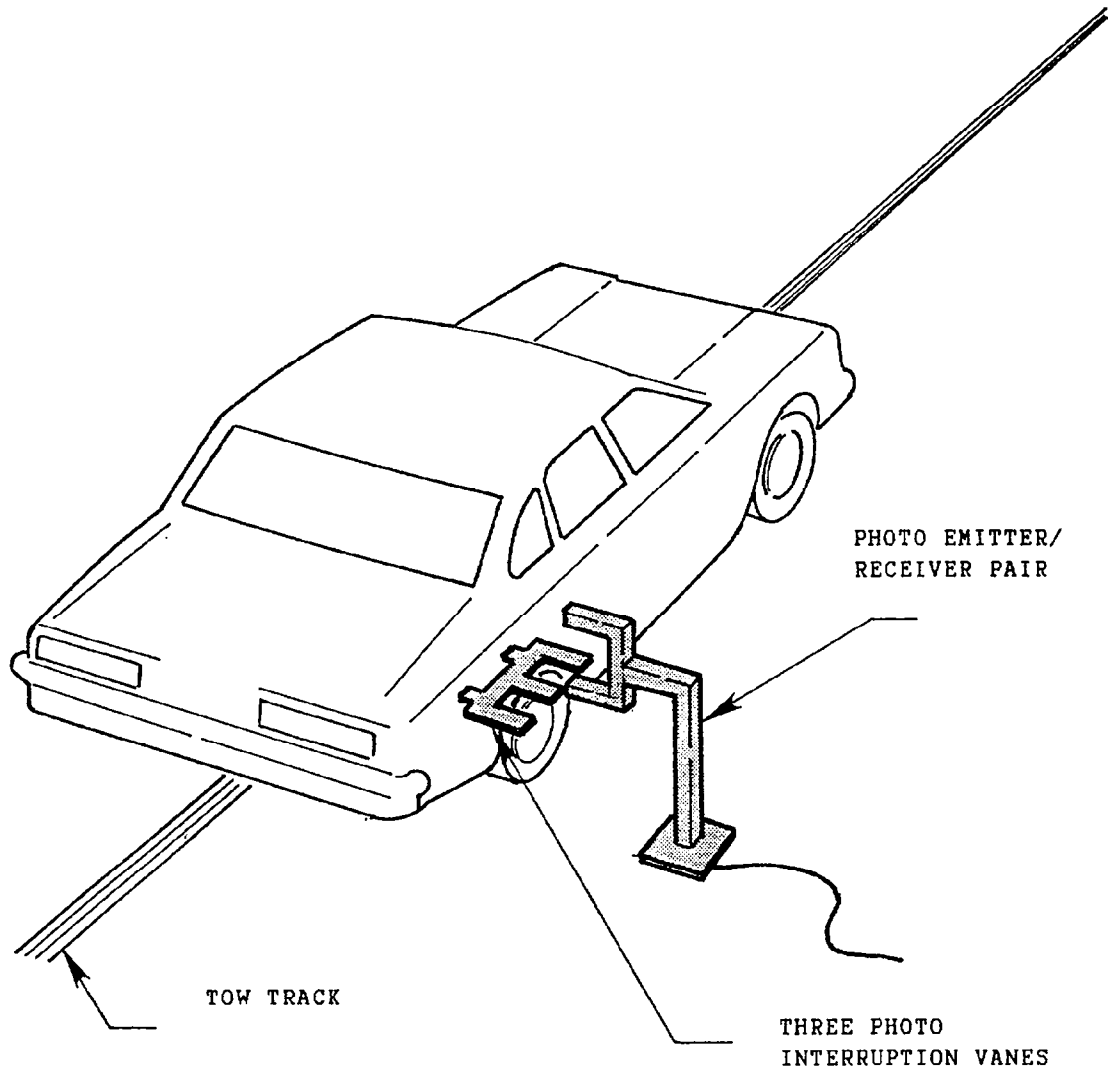
TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel filler is on the left side. The fuel tank is in front of the rear axle. The fuel lines run 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: Saturn/SL2/4-door sedan

VEHICLE NHTSA NO.: NA; VIN: 1G8ZK5571NZ202699

MODEL YEAR: 1992; BUILD DATE: 04/92; TEST DATE: 04/27/92

VEHICLE SIZE CATEGORY: Compact; TEST WEIGHT: 2922 LBS.

VEHICLE WHEELBASE: 102.5 INCHES

MAXIMUM WIDTH: 65.8 INCHES

FRONT OVERHANG: 39.8 INCHES

COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
MEASUREMENTS:

C1 =	<u>15.7</u>	INCHES
C2 =	<u>18.8</u>	INCHES
C3 =	<u>21.2</u>	INCHES
C4 =	<u>20.9</u>	INCHES
C5 =	<u>19.1</u>	INCHES
C6 =	<u>16.1</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

LENGTH OF DAMAGED
REGION: L = 46.0 INCHES

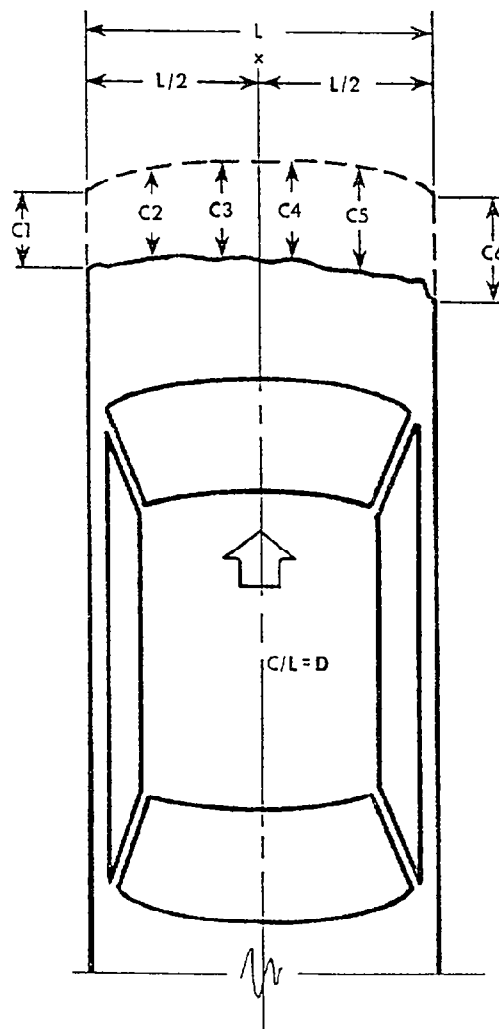
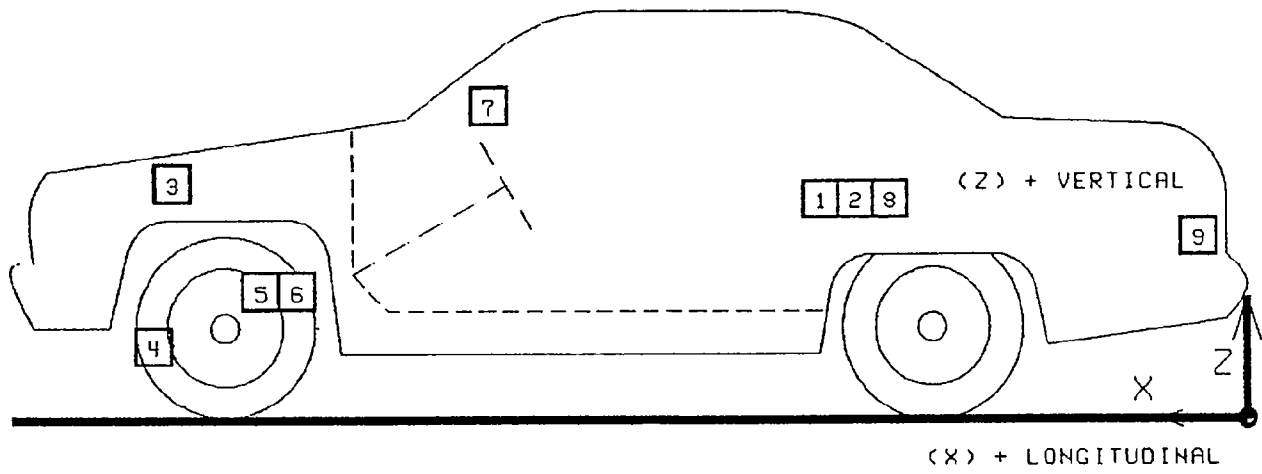
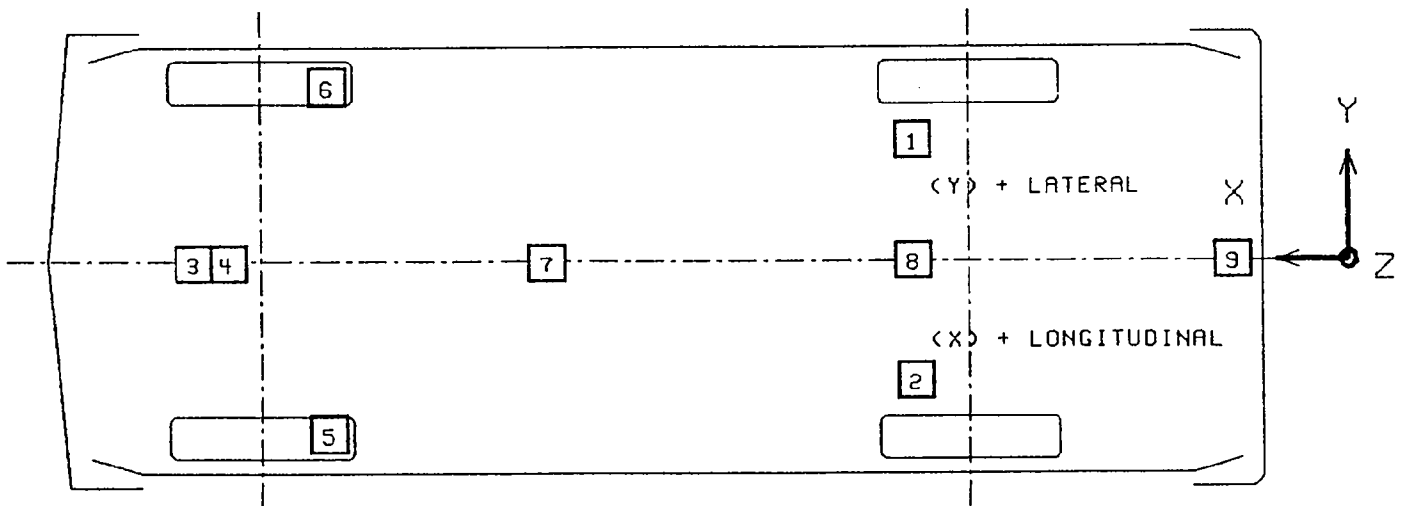


FIGURE 3

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 920427

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
				MAX G	MSEC	MAX G	MSEC
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	62.4	19.8	11.5	2.1	201.8	32.8	59.8
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	62.6	-21.1	11.6	3.9	164.5	44.7	58.9
3 ENGINE TOP LONGITUDINAL	149.4	-5.5	30.2	23.7	57.3	76.2	30.9
4 ENGINE BOTTOM LONGITUDINAL	145.0	-8.0	6.9	43.0	55.6	114.7	40.9
5 RIGHT BRAKE CALIPER LONGITUDINAL	141.0	-25.2	12.2	44.5	67.0	81.7	48.8
6 LEFT BRAKE CALIPER LONGITUDINAL	140.8	25.2	12.1	54.1	63.8	116.0	49.1
7 INSTRUMENT PANEL CENTER LONGITUDINAL	116.0	-0.2	34.1	10.9	58.3	56.0	77.8
8 REAR SEAT CROSSMEMBER CENTER VERTICAL	62.5	0.2	12.6	14.8	65.9	13.2	56.9
9 VEHICLE REAR CENTER VERTICAL	9.2	0.0	20.1	16.9	116.3	18.4	120.8

* 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

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #083	PASSENGER #258
HEAD	<u>Airbag</u>	<u>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>Easy</u>	<u>Easy</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 cracked on impact.

OTHER NOTABLE IMPACT EFFECTS:

None

TABLE 7 FMVSS 208 DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1992/Saturn/SL2/4-door sedan

VEH. NHTSA NO.: NA; TEST DATE: 04/27/92

MAXIMUM ACCELERATIONS (G):	DRIVER DUMMY #083	PASSENGER DUMMY #258
HEAD X-AXIS	-66.7	-44.4
HEAD Y-AXIS	10.8	20.5
HEAD Z-AXIS	-31.3	-84.3
HEAD RESULTANT	71.1	88.3
CHEST X-AXIS	-51.7	-52.1
CHEST Y-AXIS	6.2	26.1
CHEST Z-AXIS	16.0	17.4
CHEST RESULTANT*	51.4	47.4
CHEST RESULTANT TIME INTERVAL (SEC.)*	.003	.003

HEAD INJURY CRITERIA (HIC) VALUES:

HIC**	705	1063
HIC STARTING TIME (SEC.)	.057	.076
HIC ENDING TIME (SEC.)	.092	.112
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	52.3	61.3

MAXIMUM CHEST DEFLECTIONS (IN):

CHEST X-AXIS	2.0	NA
MAXIMUM CHEST DEFLECTION TIME (SEC.)	.074	NA

MAXIMUM COMPRESSIVE FEMUR FORCES (LBS):

LEFT FEMUR	888	1583
RIGHT FEMUR	1726	1086

MAXIMUM SEAT BELT FORCES (LBS):

LAP BELT	592	284
SHOULDER BELT	1684	2041 Y

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.

Y See DATA ACQUISITION EXPLANATIONS

TABLE 8 HYBRID III NECK DATA SUMMARY

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1992/Saturn/SL2/4-door sedan

VEHICLE NHTSA NO.: NA; TEST DATE: 04/27/92

<u>MAXIMUM VALUES:</u>	<u>DRIVER DUMMY #083</u>	<u>PASSENGER DUMMY #258</u>
NECK X-AXIS FORCE (LBS.)	-62	NA
NECK Y-AXIS FORCE (LBS.)	30	NA
NECK Z-AXIS FORCE (LBS.)	427	NA
NECK MOMENT ABOUT X AXIS (FT.-LBS.)	10	NA
NECK MOMENT ABOUT Y AXIS (FT.-LBS.)	43	NA
NECK MOMENT ABOUT Z AXIS (FT.-LBS.)	9	NA

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

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the airbag inflated contacting the driver dummy's chest. The dummy then translated forward on the seat impacting both knees into the instrument panel followed by the dummy's head rotating downward slightly into the airbag. The driver dummy was restrained by the two-point passive belt, lap belt, and airbag. The dummy then rebounded rearward into the seat back as the dummy's head rotated slightly rearward into the head restraint. The driver dummy came to rest in the driver's seat restrained by the two-point passive belt and lap belt.

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 then rotated downward impacting the dummy's chest. The right front passenger dummy was restrained by the two-point passive belt and lap belt. The dummy then rebounded rearward and slightly to the right into the seat back as the dummy's head rotated rearward contacting first the right side passive belt buckle and then the head restraint. The right front passenger dummy came to rest in the right front passenger's seat, leaning slightly to the right, restrained by the two-point passive belt and lap belt.

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.	NA	NA
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	34.9	33.9
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	31.6	32.1
<u>SHOULDER BELT SPOOL-OFF LENGTH:</u>		
AS DETERMINED BY FILM ANALYSIS	1.8	2.0
AS DETERMINED MECHANICALLY	NA*	NA*
AS DETERMINED ELECTRONICALLY	7.4	7.2
<u>BELT STRETCH LENGTH (IN/FT):</u>		
AS MEASURED MECHANICALLY	0.0	0.0
AS MEASURED ELECTRONICALLY	0.0	0.9
<u>RETRACTOR LOCK-UP TIME (MS):</u>		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	25	26

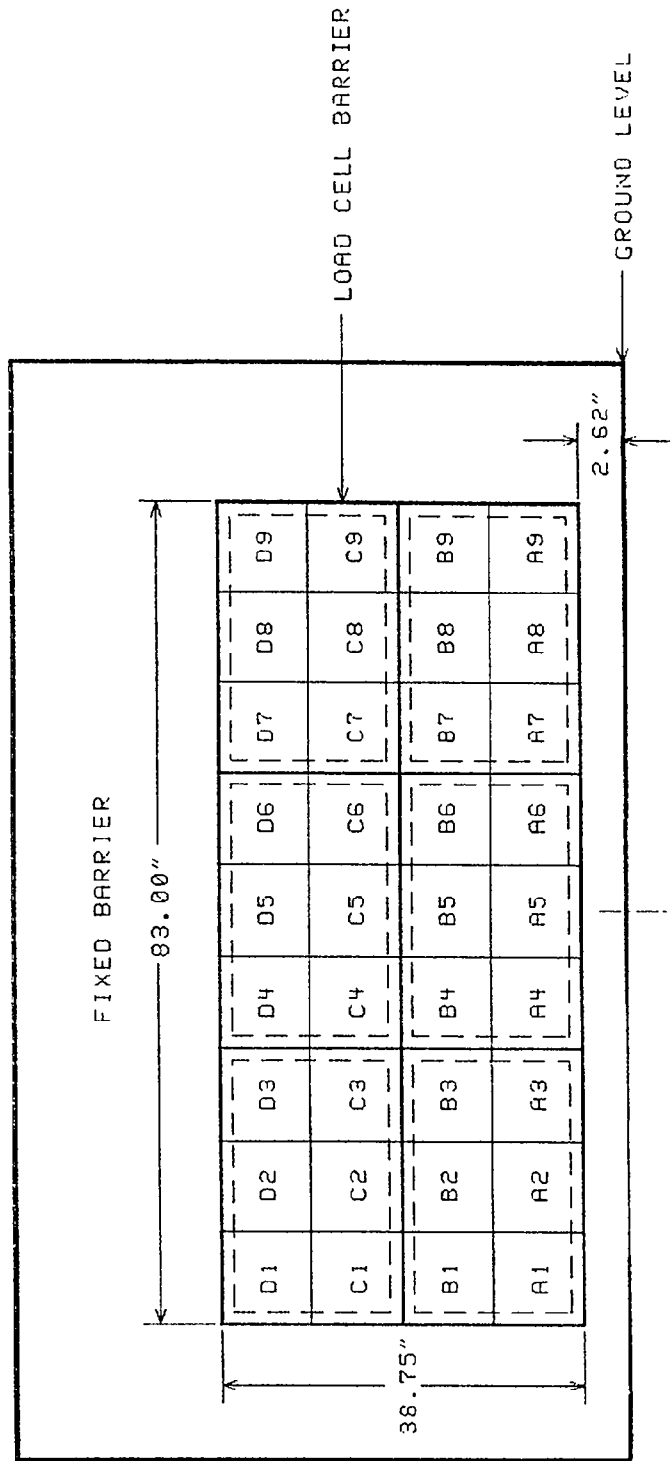
ALL MEASUREMENTS ARE IN INCHES UNLESS OTHERWISE NOTED.

*The shoulder belt spool-off indication strings broke upon impact.

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 920427

LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	LB	MSEC	LB	MSEC
TOTAL GROUP 1	339	196.3	25077	25.5
TOTAL GROUP 2	354	241.5	28321	42.4
TOTAL GROUP 3	304	241.5	24561	27.5
TOTAL GROUP 4	249	172.0	5252	27.1
TOTAL GROUP 5	302	251.6	13141	67.8
TOTAL GROUP 6	372	252.4	9756	39.9
TOTAL LOAD CELL FORCE	1612	252.6	93068	41.1

TENSION IS POSITIVE
COMPRESSION IS NEGATIVE

SECTION 3.0

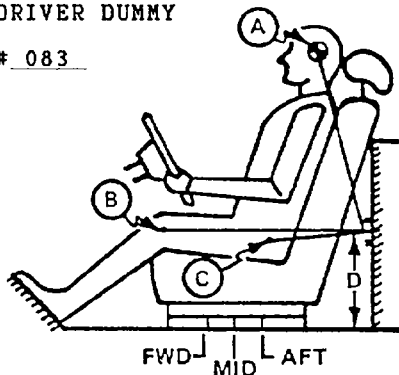
OCCUPANT, CAMERA, & VEHICLE MEASUREMENTS

FIGURE 5 DUMMY AND SEAT POSITIONING DATA

TEST NO.: 920427; VEHICLE: 1992 Saturn SL2

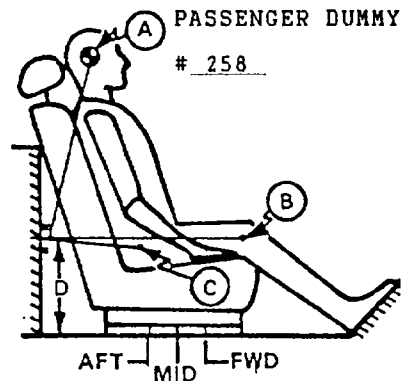
<u>SEAT TYPE:</u>	<u>ADJUSTER TYPE:</u>	<u>FRONT SEAT BACK TYPE:</u>
<u> </u> BENCH	<u> X </u> MANUAL	<u> </u> NON-ADJUSTABLE
<u> X </u> BUCKET	<u> </u> POWER	<u> X </u> ADJUSTABLE RECLINING
<u> </u> SPLIT BENCH		

DRIVER DUMMY
083



**MEASUREMENT
LOCATION**

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

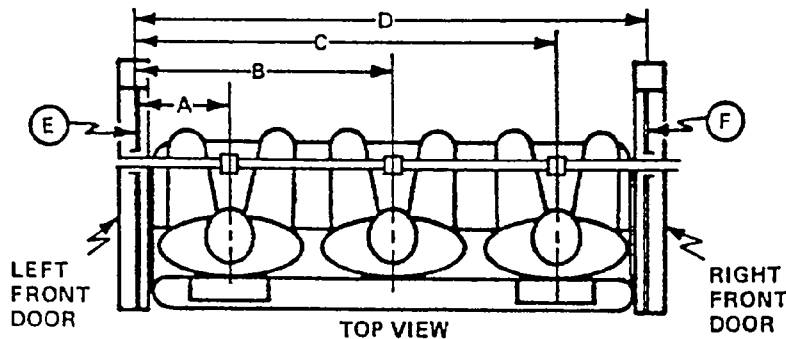


A = 18.1 IN. 13 DEGREES
B = 23.4 IN. 98 DEGREES
C = 10.8 IN. 141 DEGREES
D = 12.4 IN.

A = 17.2 IN. -3 DEGREES
B = 23.3 IN. 98 DEGREES
C = 10.6 IN. 141 DEGREES
D = 12.4 IN.

SEAT TRACK REARWARD: 10 NOTCHES

SEAT TRACK REARWARD: 10 NOTCHES

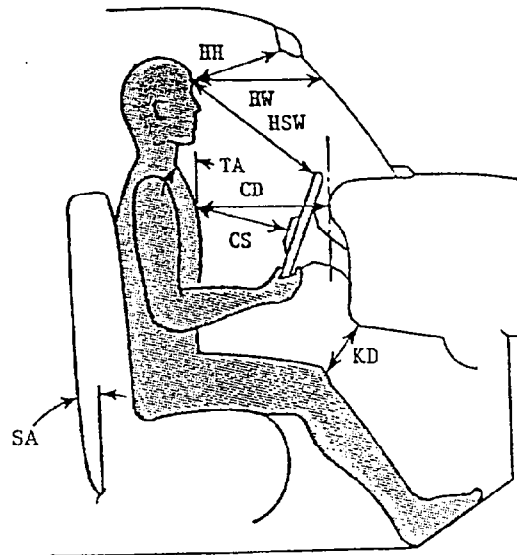


A = LEFT DOOR TO DRIVER CENTERLINE	<u>13.3</u> IN.
B = LEFT DOOR TO CENTER PASSENGER CENTERLINE	<u>NA</u> IN.
C = LEFT DOOR TO RIGHT PASSENGER CENTERLINE	<u>40.4</u> IN.
D = LEFT DOOR TO RIGHT DOOR	<u>52.1</u> IN.
E, F = WINDOW GLASS HEIGHT (RIGHT AND LEFT MUST BE EQUAL)	<u>8.0</u> IN.

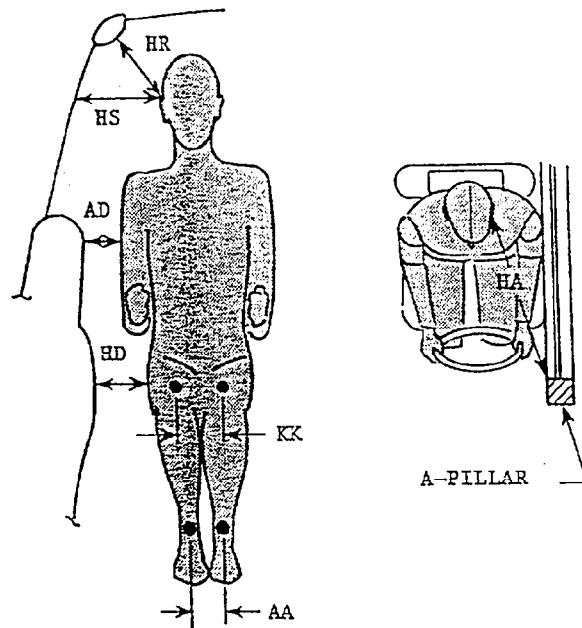
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

FIGURE 6 DUMMY IN-VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	13.6	17.1
HW	22.6	22.9
CD	19.4	22.8
CS	9.9	NA
KDL	3.9	4.4
KDR	4.6	4.1
TA	13°	23°
SA	10°	10°
HSW	15.9	NA



	DRIVER	PASSENGER
HR	5.9	7.0
HS	10.0	7.1
AD	4.2	4.2
HD	5.9	6.7
KK	8.0	7.5
AA	9.5	8.0
HA	20.1	23.3



KNEE OUTER BOLT HEAD TO OUTER BOLT HEAD SPACING:

DRIVER = NA
PASSENGER = 11.8

KNEE OUTER CLEVIS TO OUTER CLEVIS SPACING:

PASSENGER = 10.6
DRIVER = NA

PELVIS ANGLE:

PASSENGER = 23°
DRIVER = NA

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

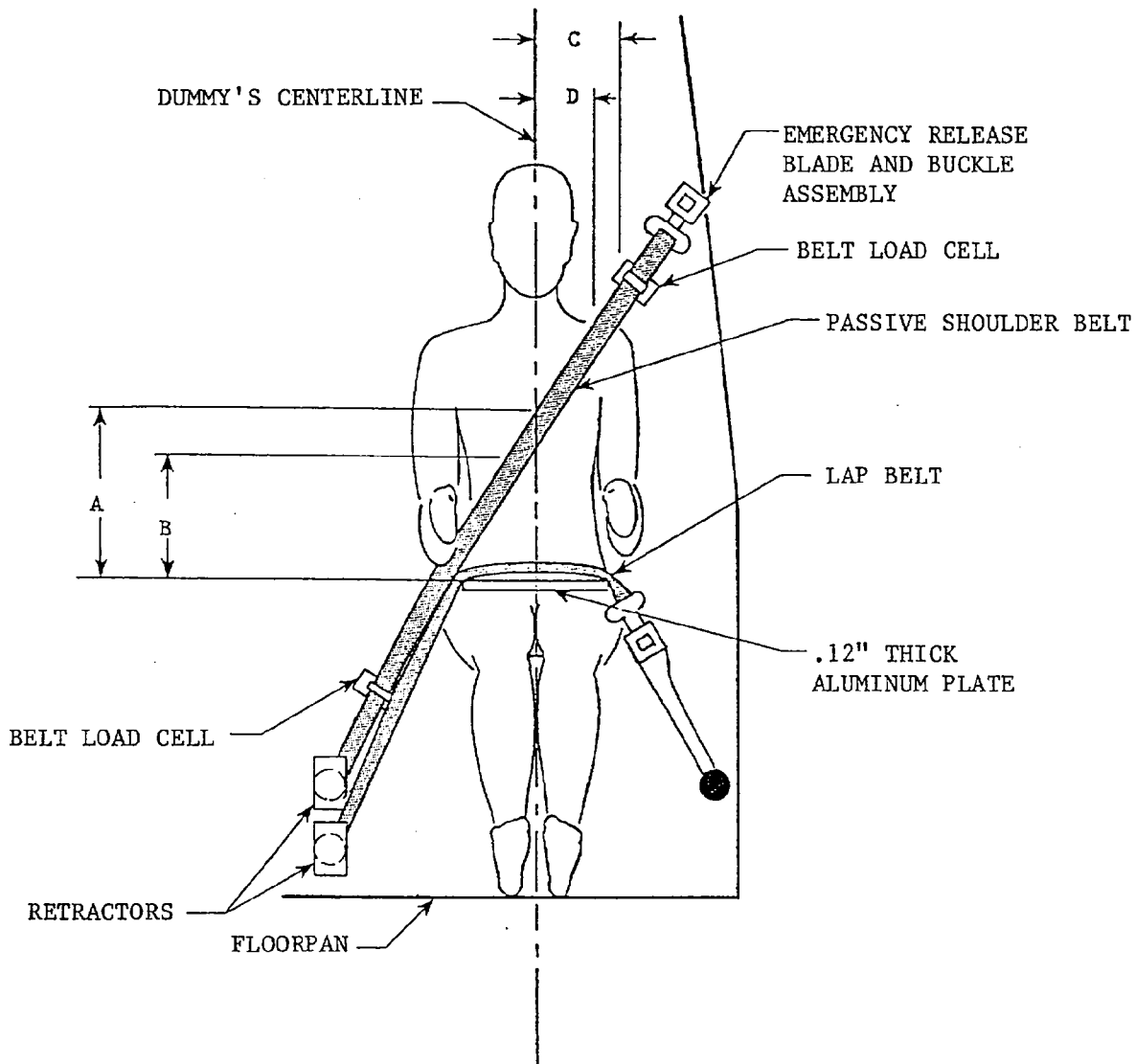
KK = KNEE TO KNEE

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.

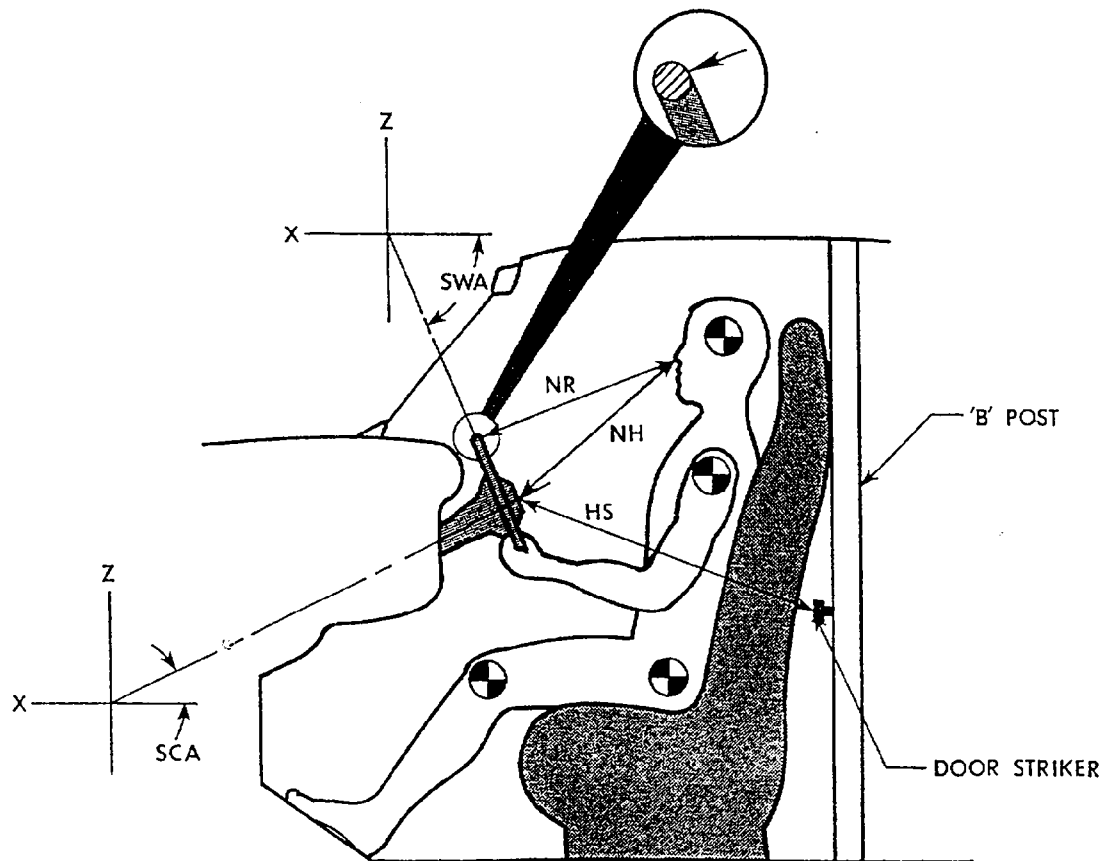
FIGURE 7 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	14.9	16.3
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	12.3	14.0
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.8	7.8
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	2.9	4.5
LAP BELT TENSION (LBS)	3	3
SHOULDER BELT TENSION (LBS)	NA	NA

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 placed in the mid position of the possible range of adjustment.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	14.2
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	14.9
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	23.6
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	18°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	73°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9
CAMERA POSITIONS

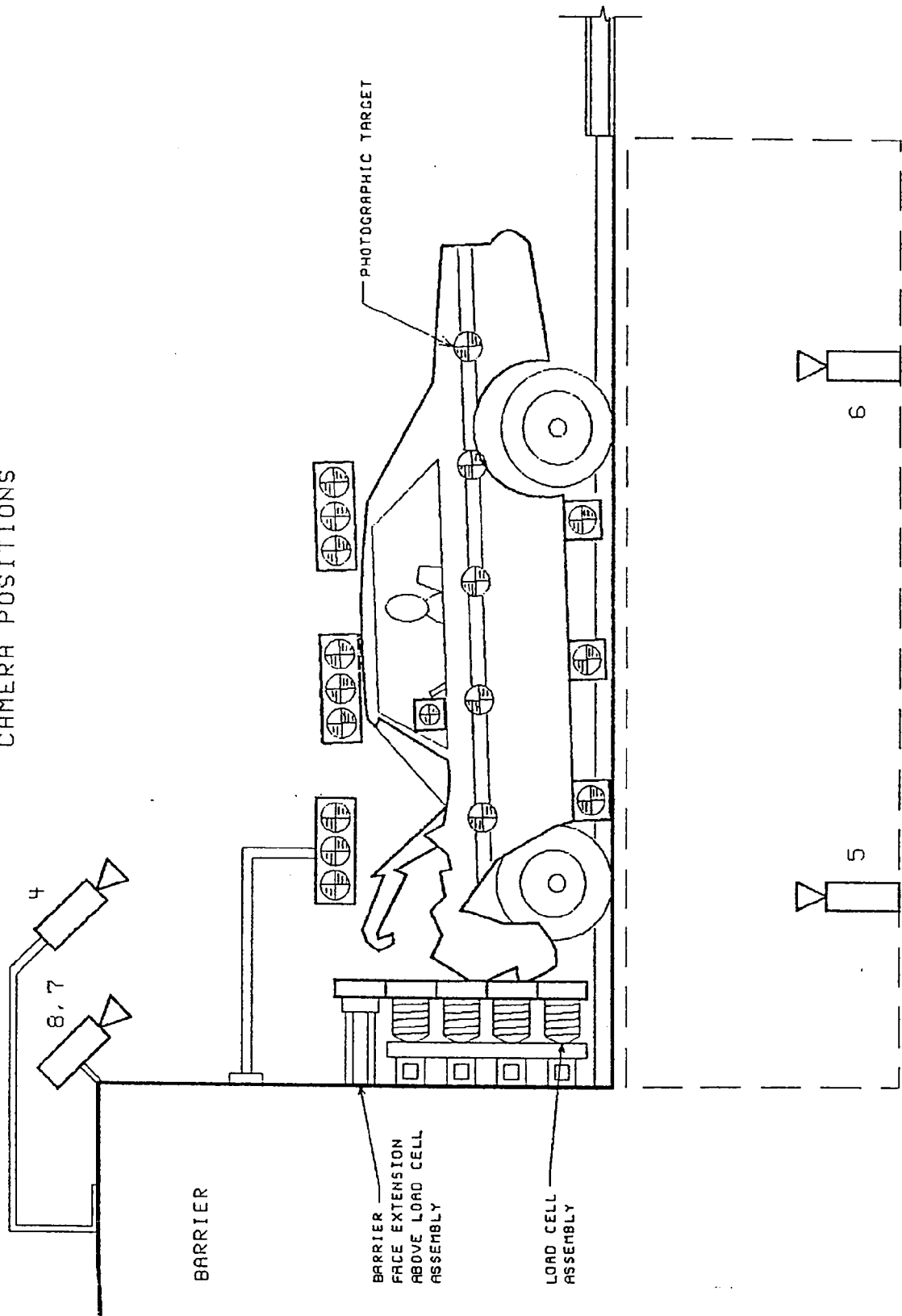


FIGURE 9

CAMERA POSITIONS, CONTINUED

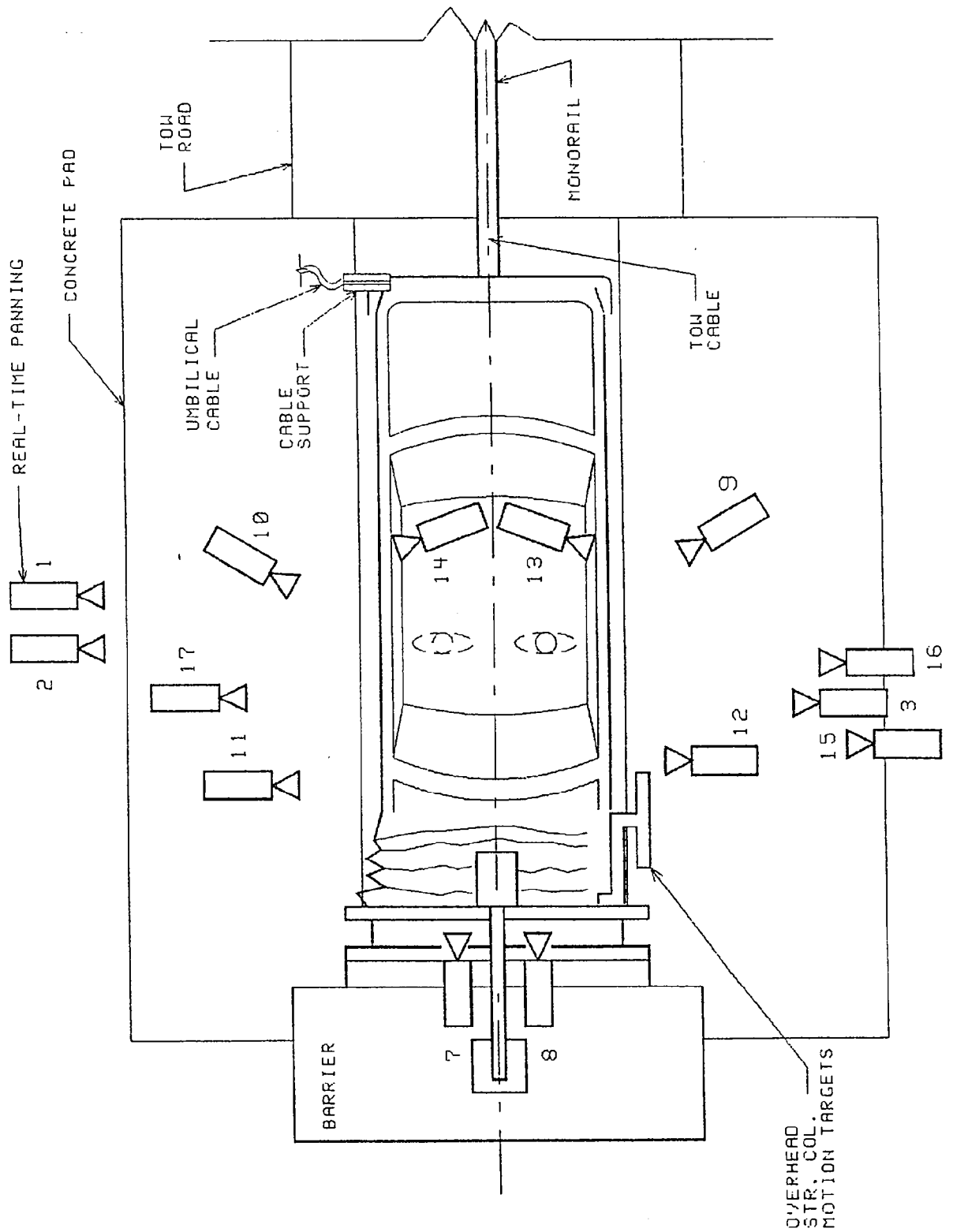


TABLE 11 MOTION PICTURE CAMERA LOCATIONS

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	FILM PLANE		FILM SPEED (FPS)
		X	Y	Z		TO HEAD TARGET (IN)	LENS (MM)	
TEST NO.:	920427	VEHICLE: 1992 Saturn SL2						
1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24
2	Vehicle crush	-81.3	-266.4	37.1	-2	NA	13	508
3	Dummy kinematics	-41.5	295.0	44.0	-12	218.0	25	998
4	Windshield damage	-36.4	0.0	98.0	-40	NA	13	505
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1000
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	1000
7	Passenger kinematics	-4.5	-13.8	85.0	-40	NA	17	505
8	Driver kinematics	-6.8	14.5	85.0	-41	NA	17	500
9	Driver kinematics	-180.0	73.0	102.0	-27	97.0	25	442
10	Passenger kinematics	-184.0	-74.0	100.0	-26	94.0	25	505
11	Windshield intrusion	-38.1	-306.1	44.0	0	NA	50	492
12	Windshield intrusion	-53.0	309.4	42.3	0	NA	50	495
13	Driver seatbelt movement	NA	NA	NA	NA	NA	13	498
14	Passenger seatbelt movement	NA	NA	NA	NA	NA	13	498
15	Column movement	-114.0	286.0	103.0	-14	NA	25	505
16	Column movement	-114.0	286.0	75.1	-9	NA	25	500
17	Passenger kinematics	-38.8	-210.8	45.3	7	209.0	25	1032

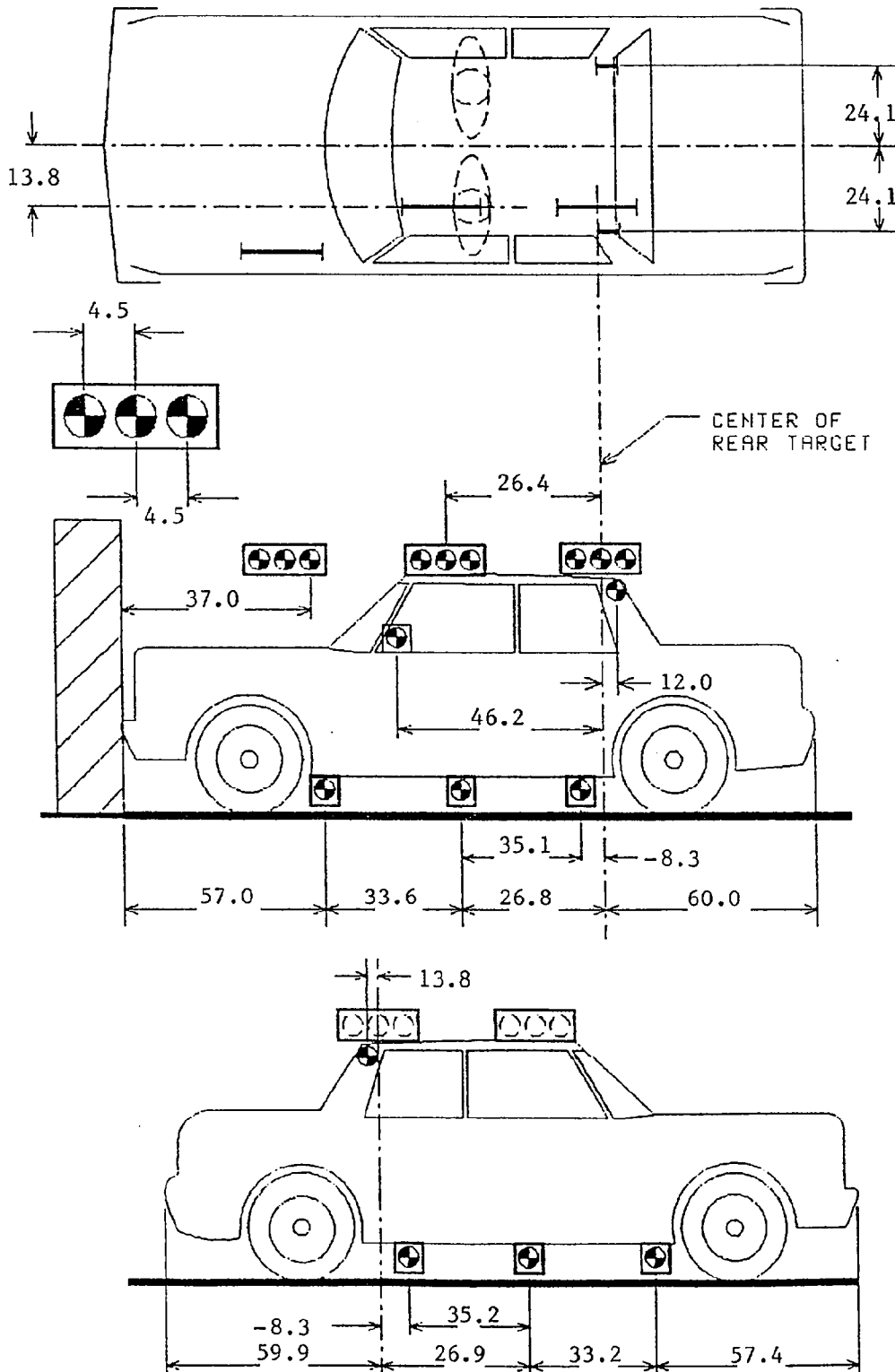
**X = Film plane forward of barrier face

+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

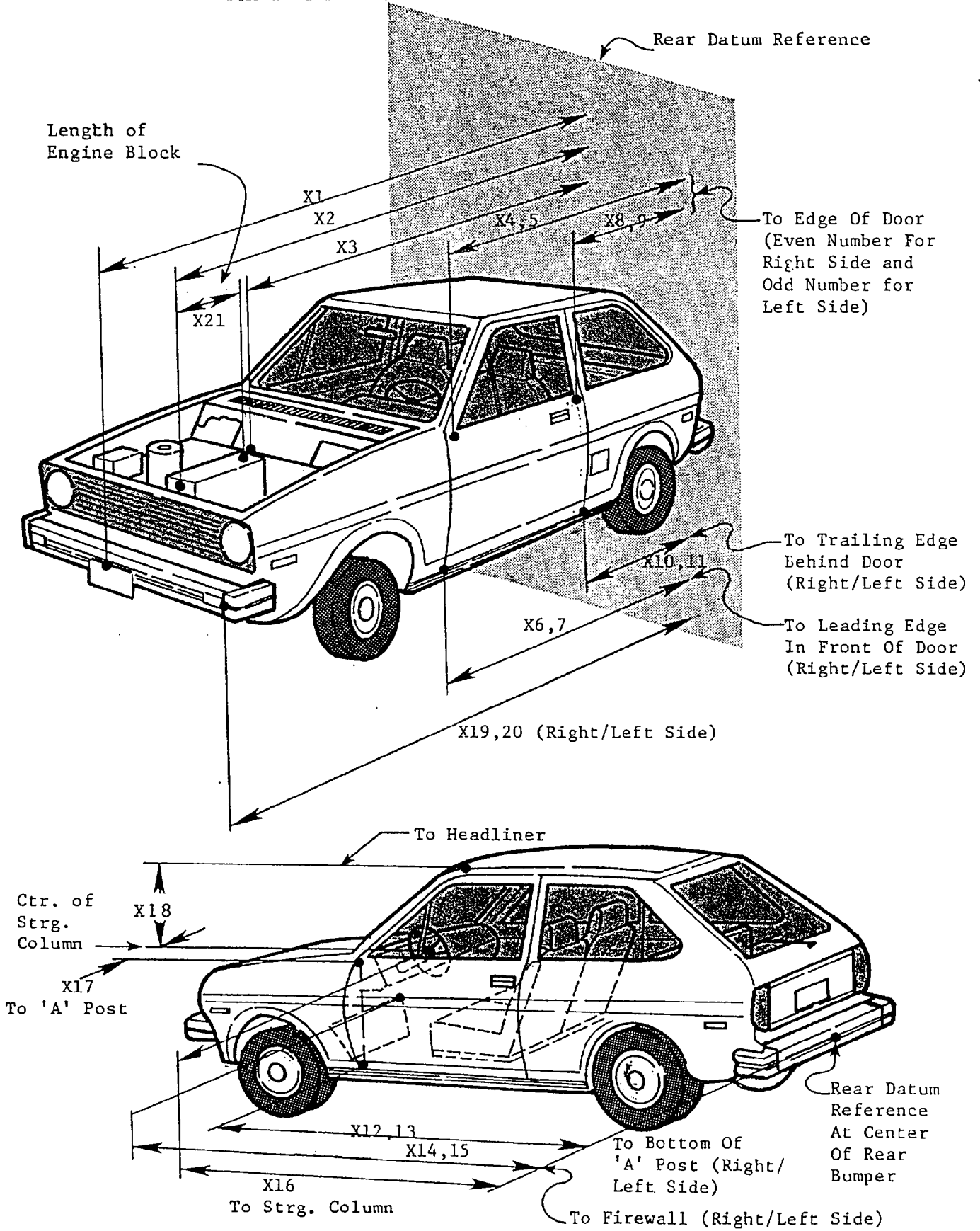


TABLE 12 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Saturn/SL2		TEST NUMBER: 920427	ALL MEASUREMENTS ARE IN INCHES	
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	177.4	156.1	21.3
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	149.0	139.6	9.4
X3	REAR SURFACE OF VEHICLE TO FIREWALL	132.6	126.4	6.2
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	116.9	116.6	0.3
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	116.9	116.9	0.0
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	116.6	115.9	0.7
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	116.8	116.2	0.6
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	76.2	76.0	0.2
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	76.2	76.2	0.0
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	77.4	76.8	0.6
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	77.5	77.2	0.3
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	116.3	115.9	0.4
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	116.4	116.2	0.2
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	130.4	125.0	5.4
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	130.6	127.2	3.4
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	98.5	98.0	0.5
X17	CENTER OF STEERING COLUMN TO "A" POST	9.8	11.1	-1.3
X18	CENTER OF STEERING COLUMN TO HEADLINER	16.9	14.4	2.5
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	172.2	156.1	16.1
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	171.8	156.1	15.7
X21	LENGTH OF ENGINE BLOCK	17.0	17.0	0.0

APPENDIX A

PHOTOGRAPHS

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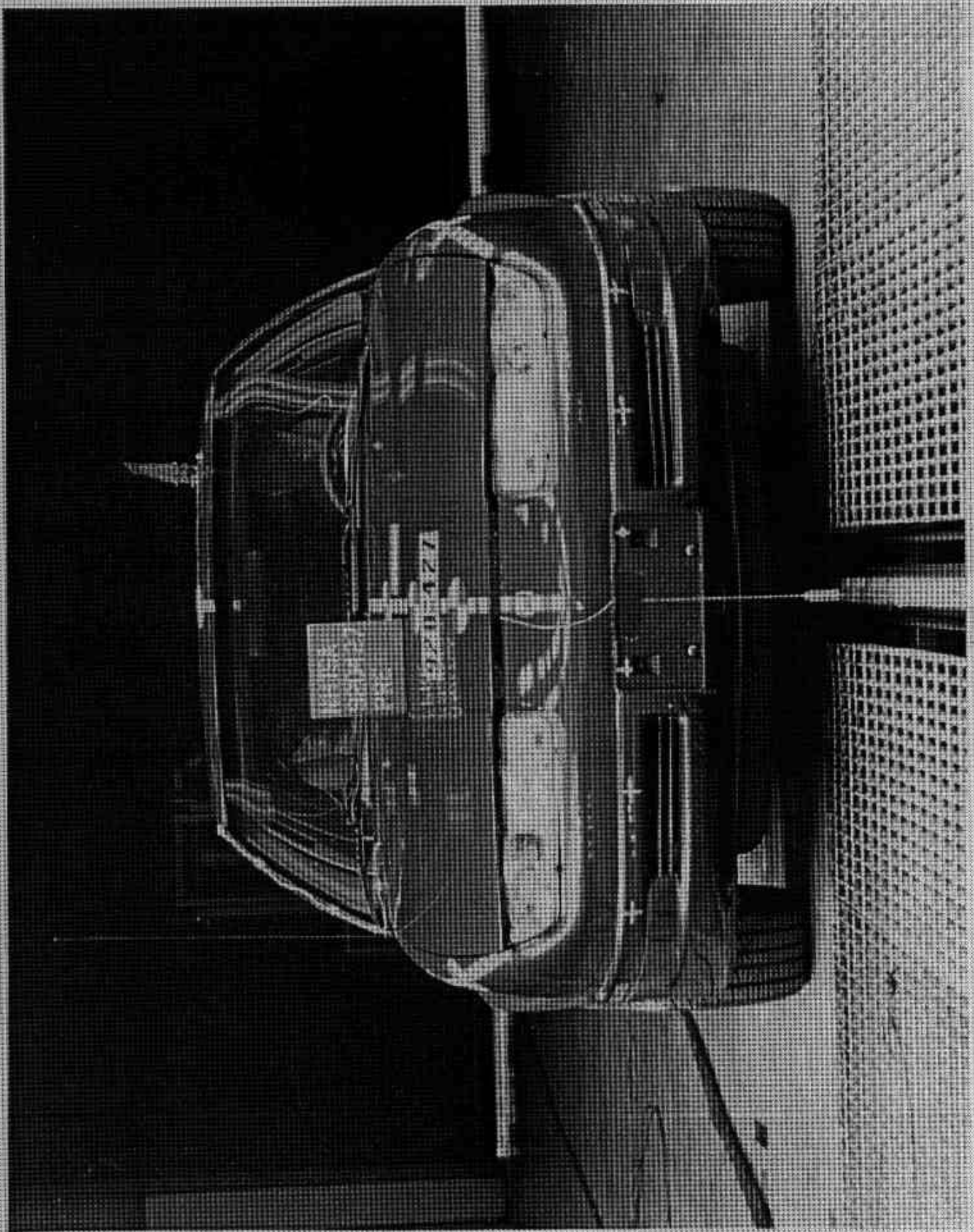


FIGURE A-1. PRE-TEST FRONT VIEW

A-2

920427

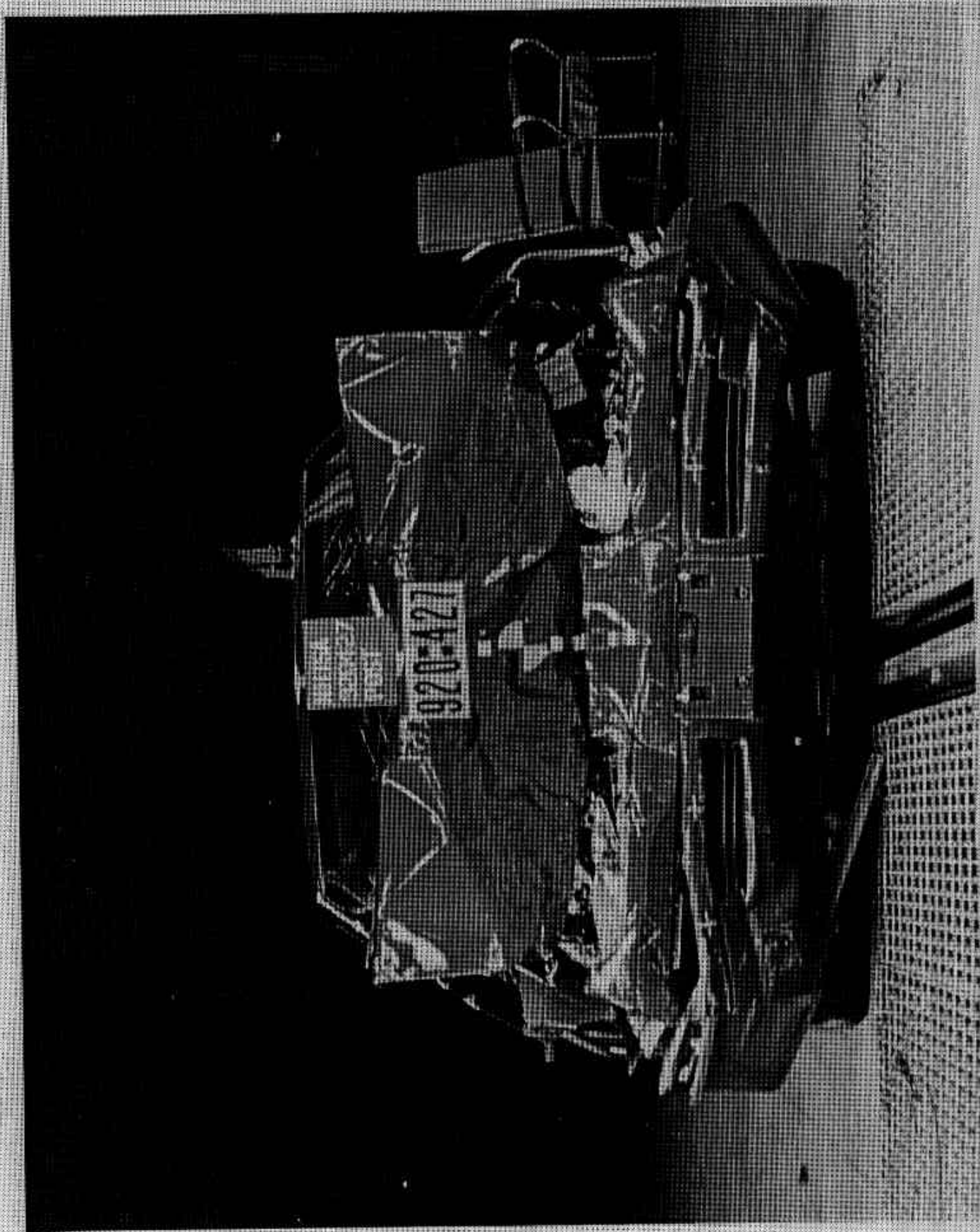


FIGURE A-2. POST-TEST FRONT VIEW

A-3

920427

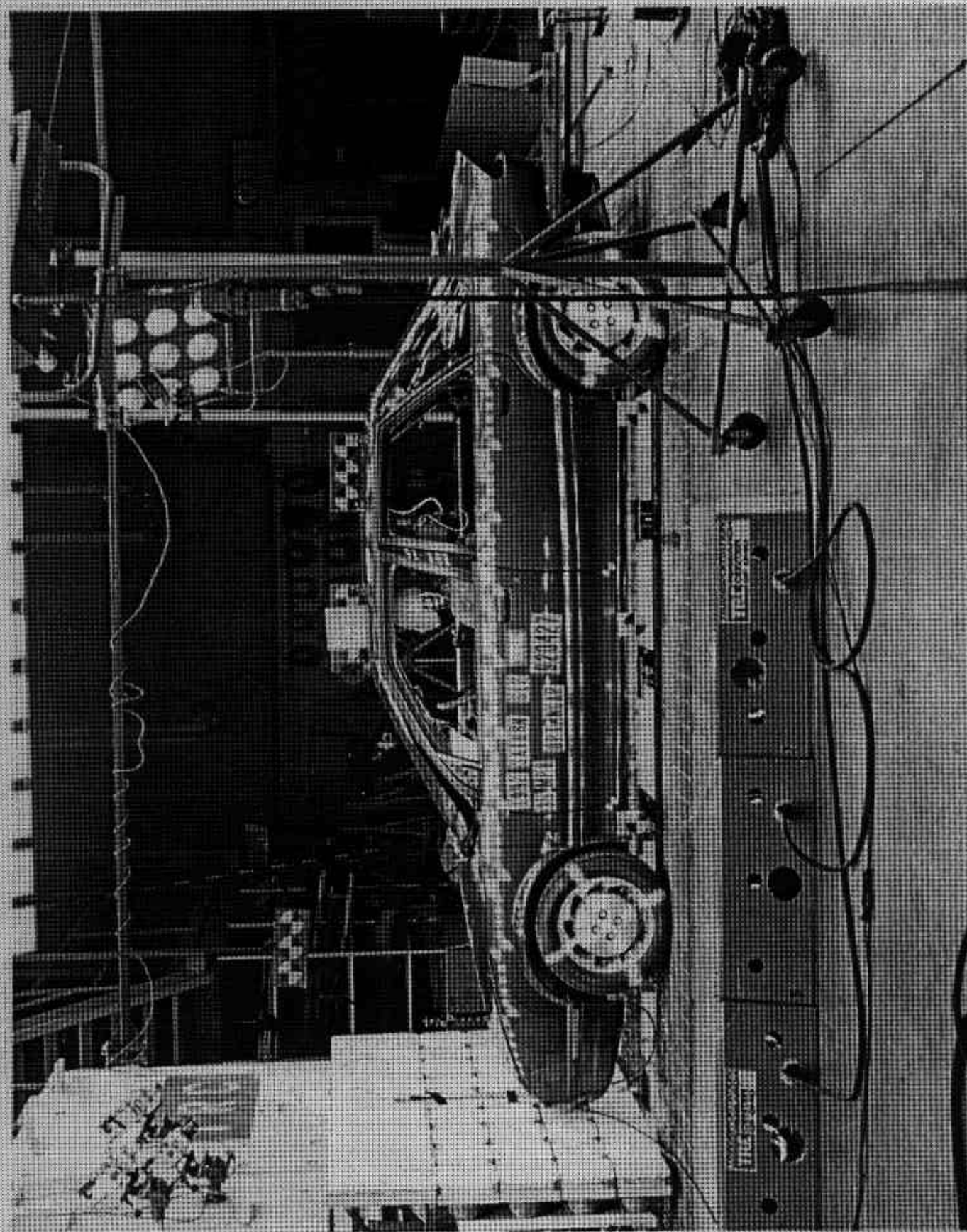


FIGURE A-3. PRE-TEST LEFT SIDE VIEW

A-4

920427

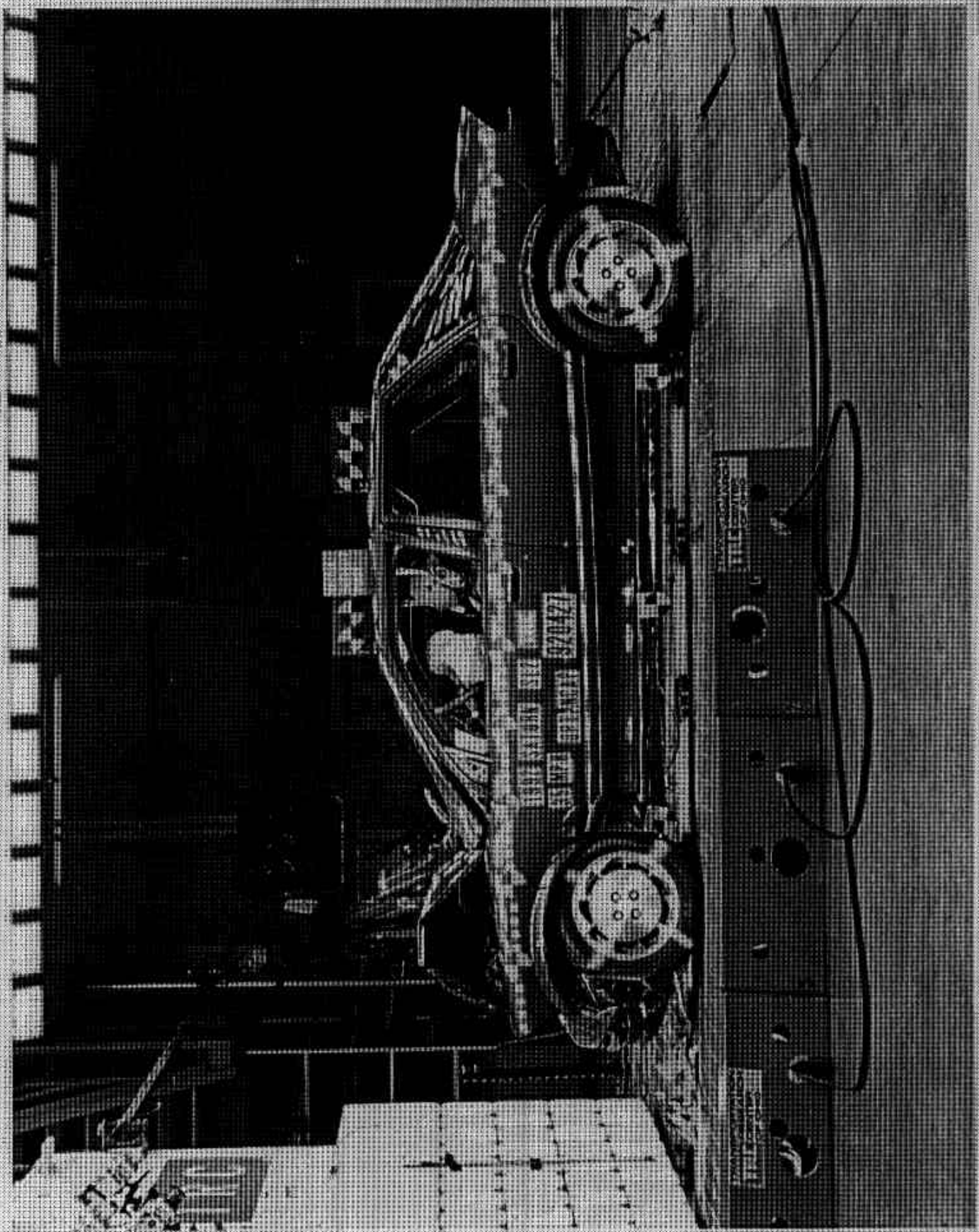


FIGURE A-4. POST-TEST LEFT SIDE VIEW
A-5

920427

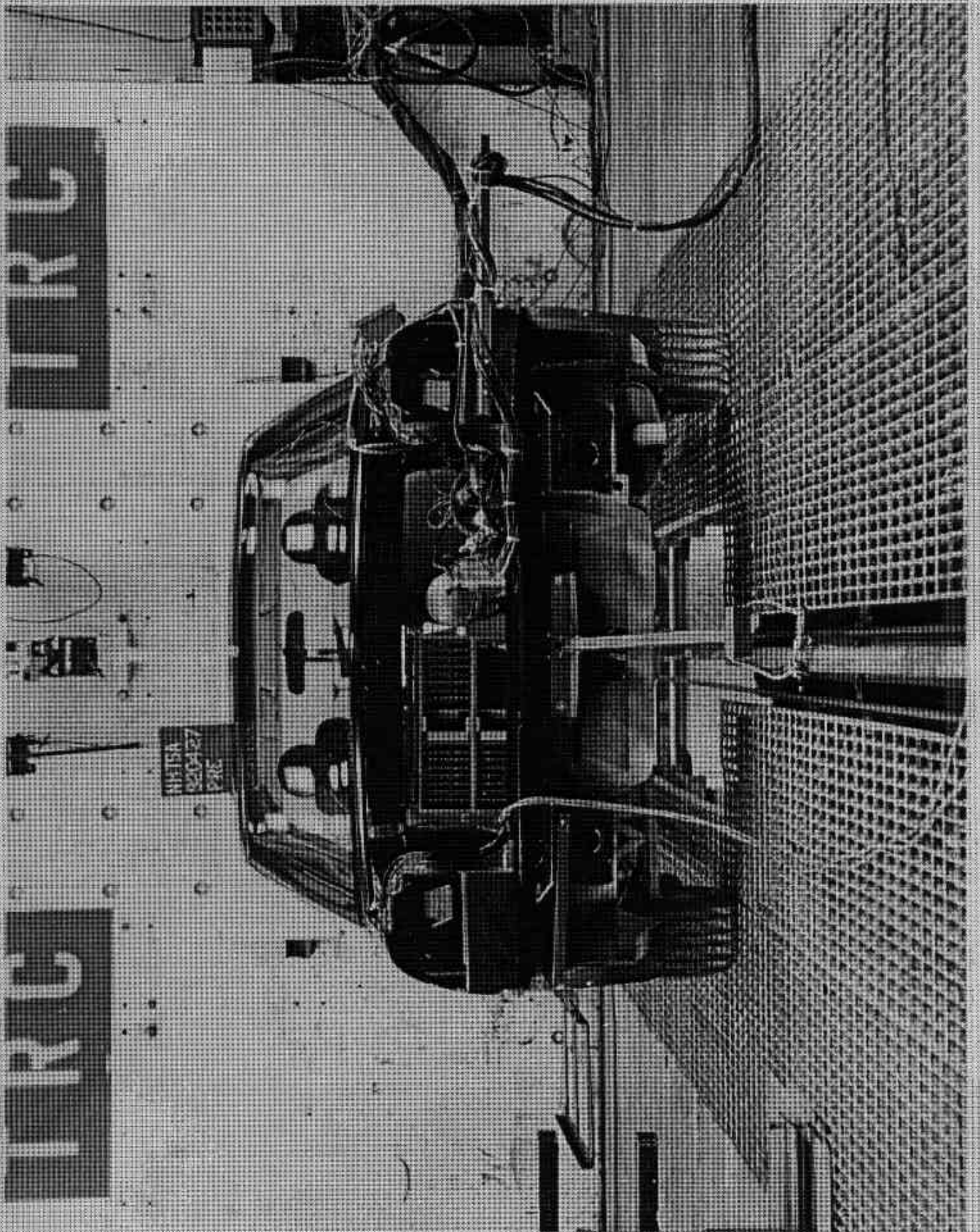


FIGURE A-5. PRE-TEST REAR VIEW

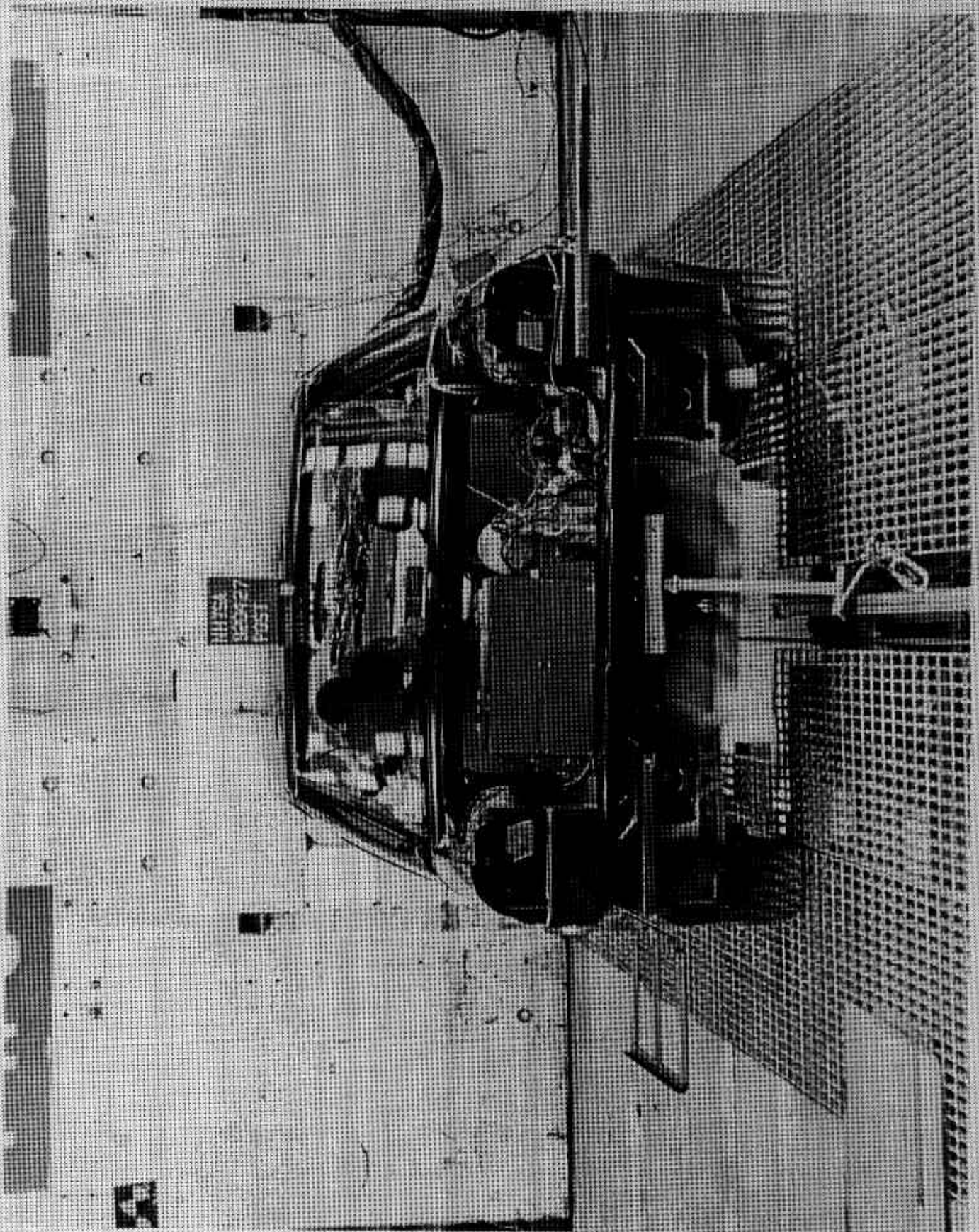


FIGURE A-6. POST-TEST REAR VIEW

A-7

920427

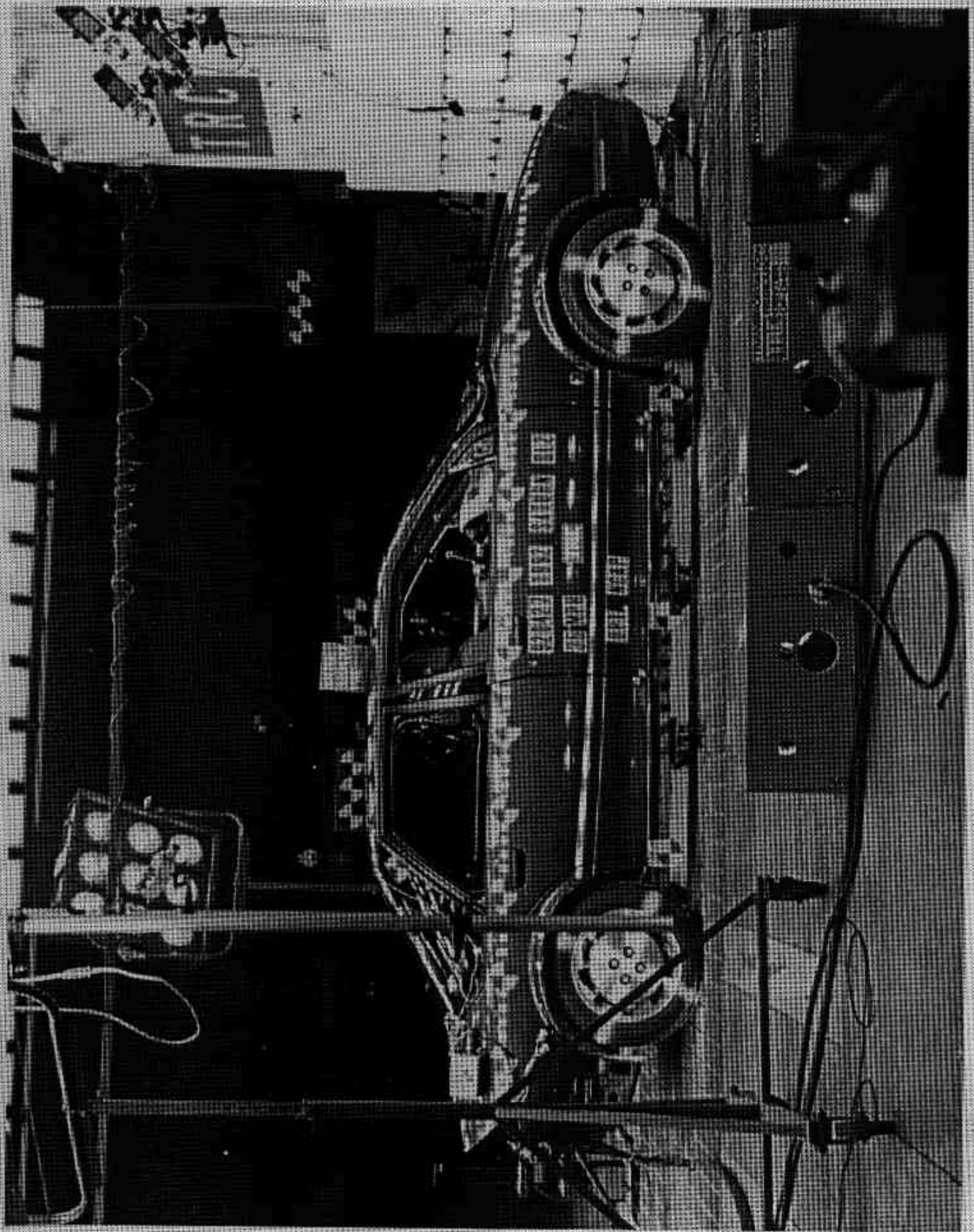


FIGURE A-7, PRE-TEST RIGHT SIDE VIEW
A-8

920427

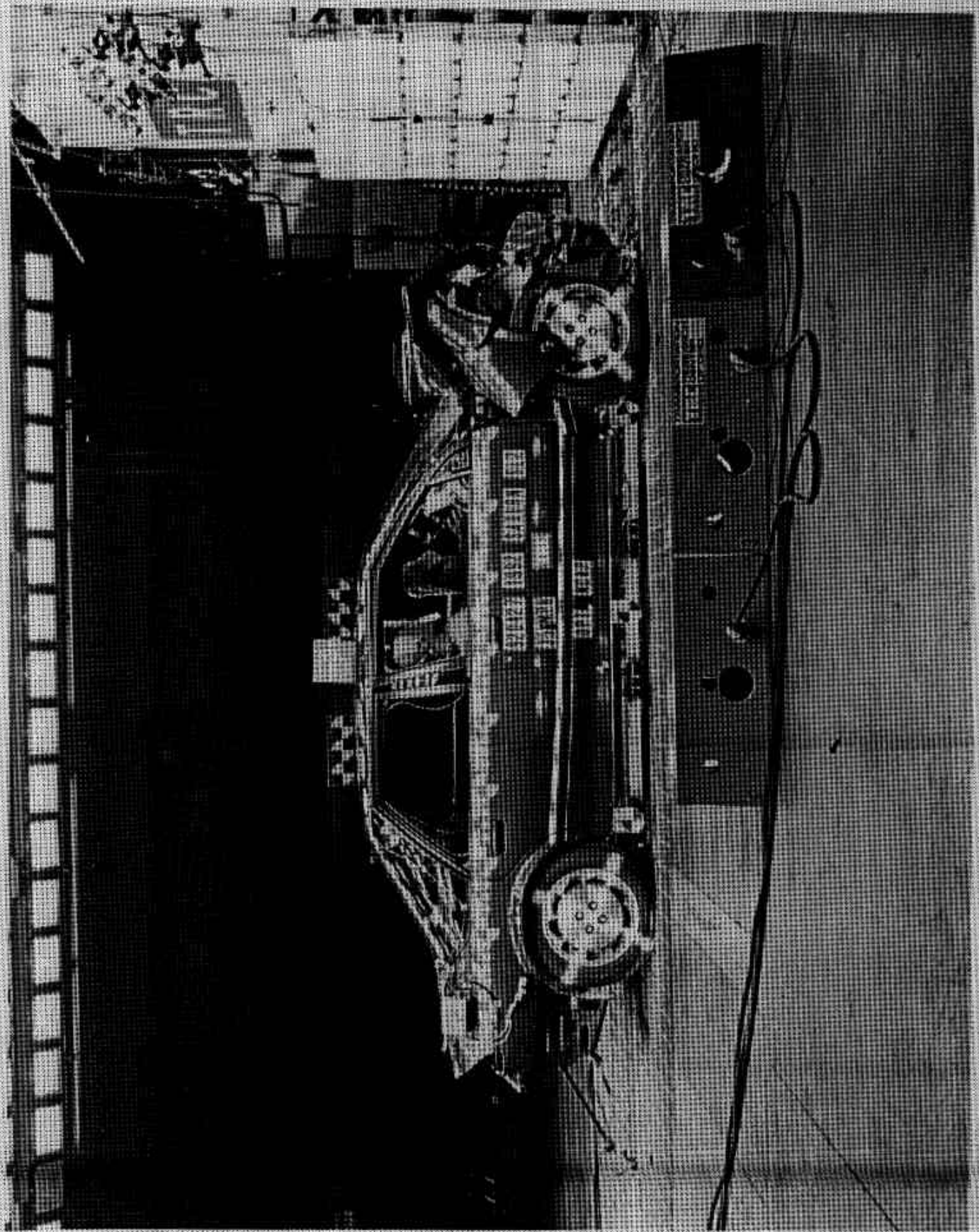


FIGURE A-8. POST-TEST RIGHT SIDE VIEW

A-9

920427

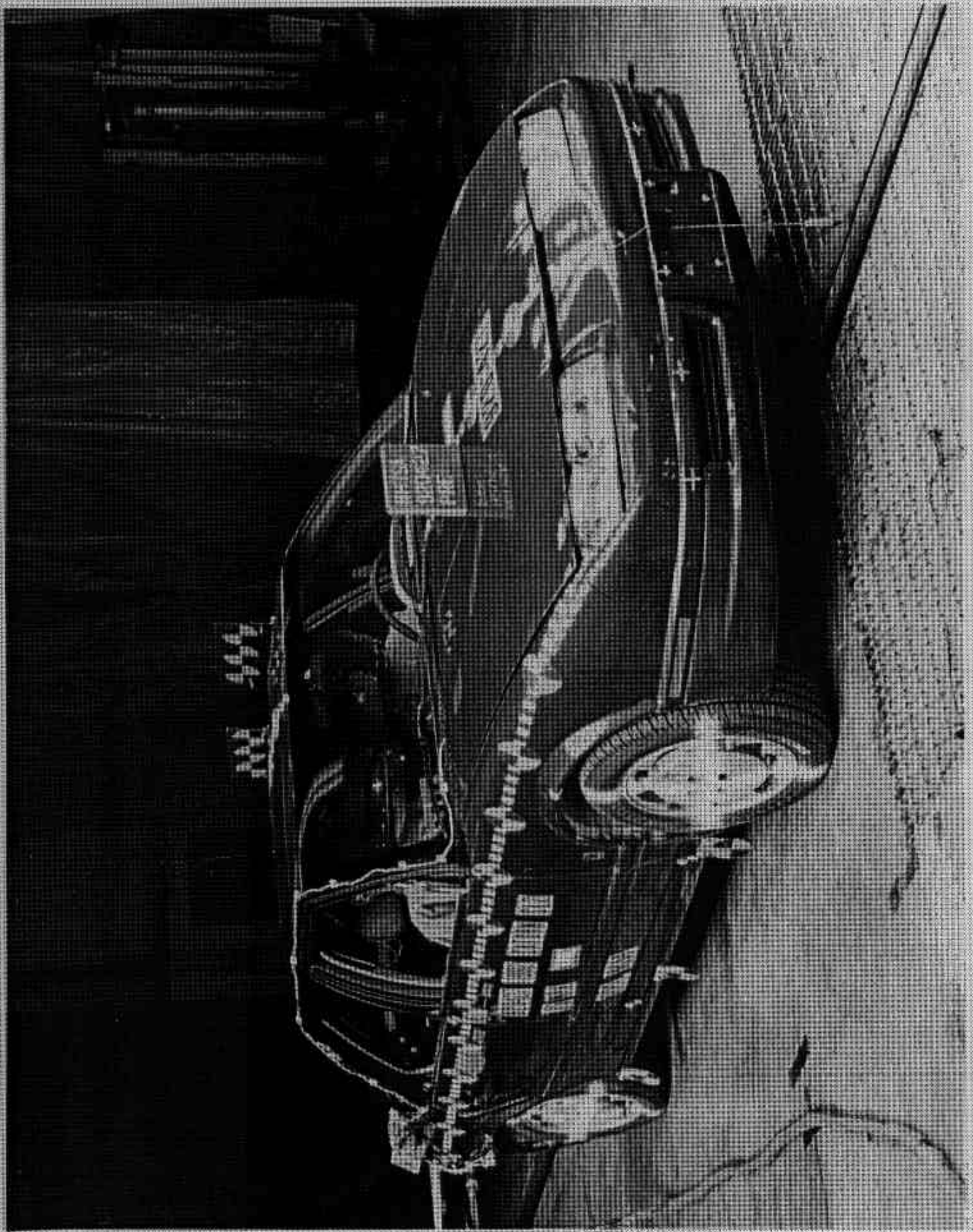


FIGURE A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

920427

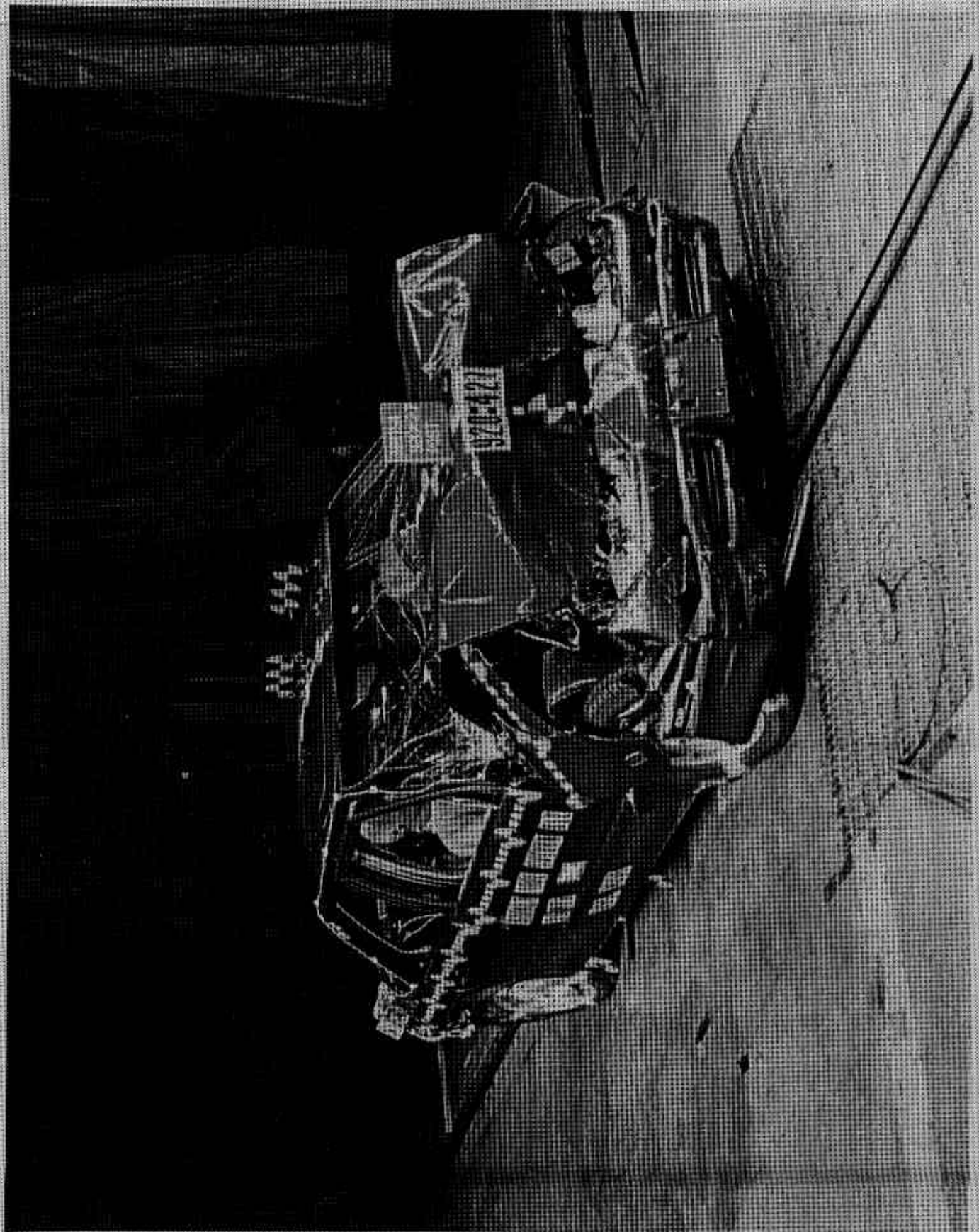


FIGURE A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
A-11

920427

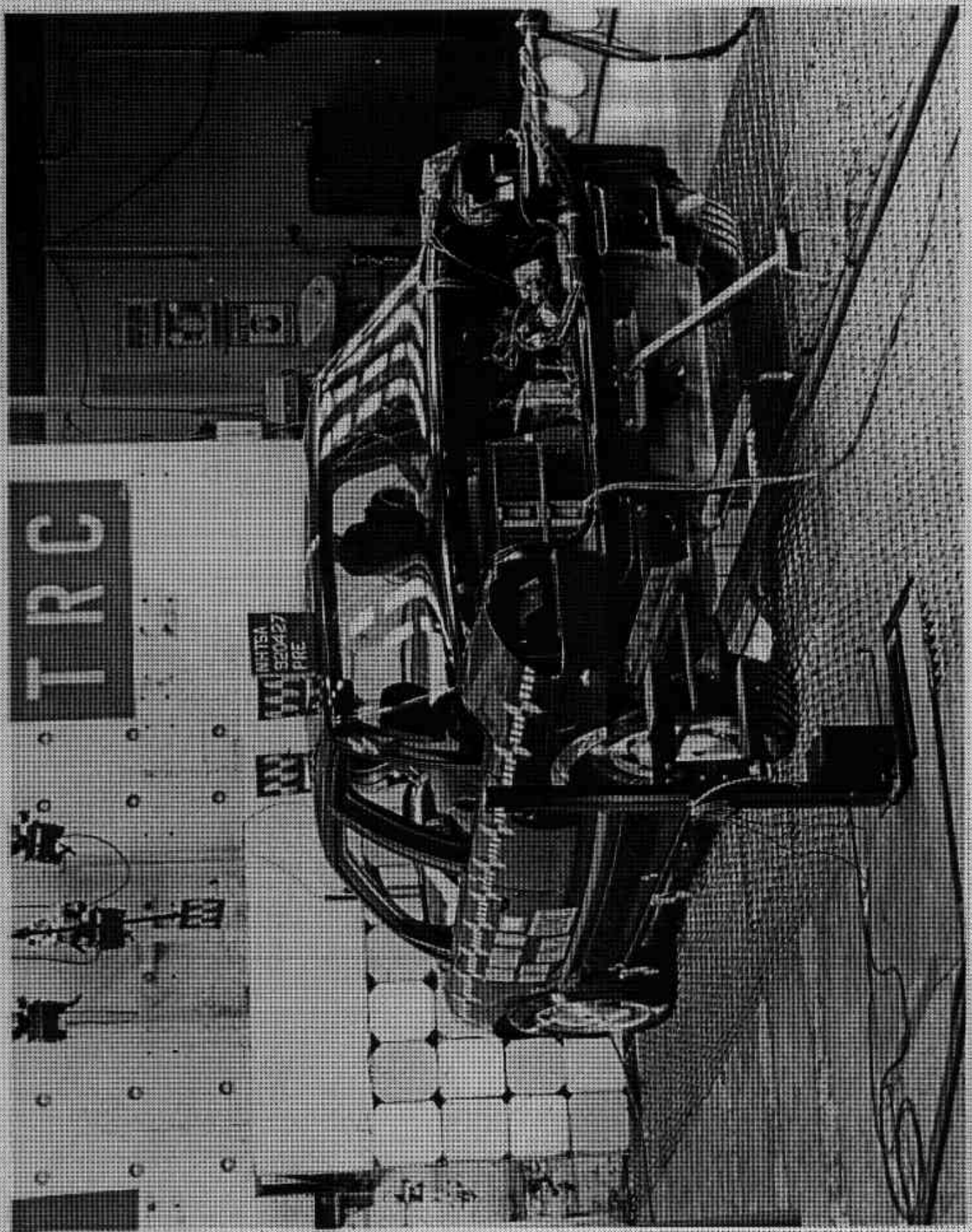


FIGURE A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-12

920427

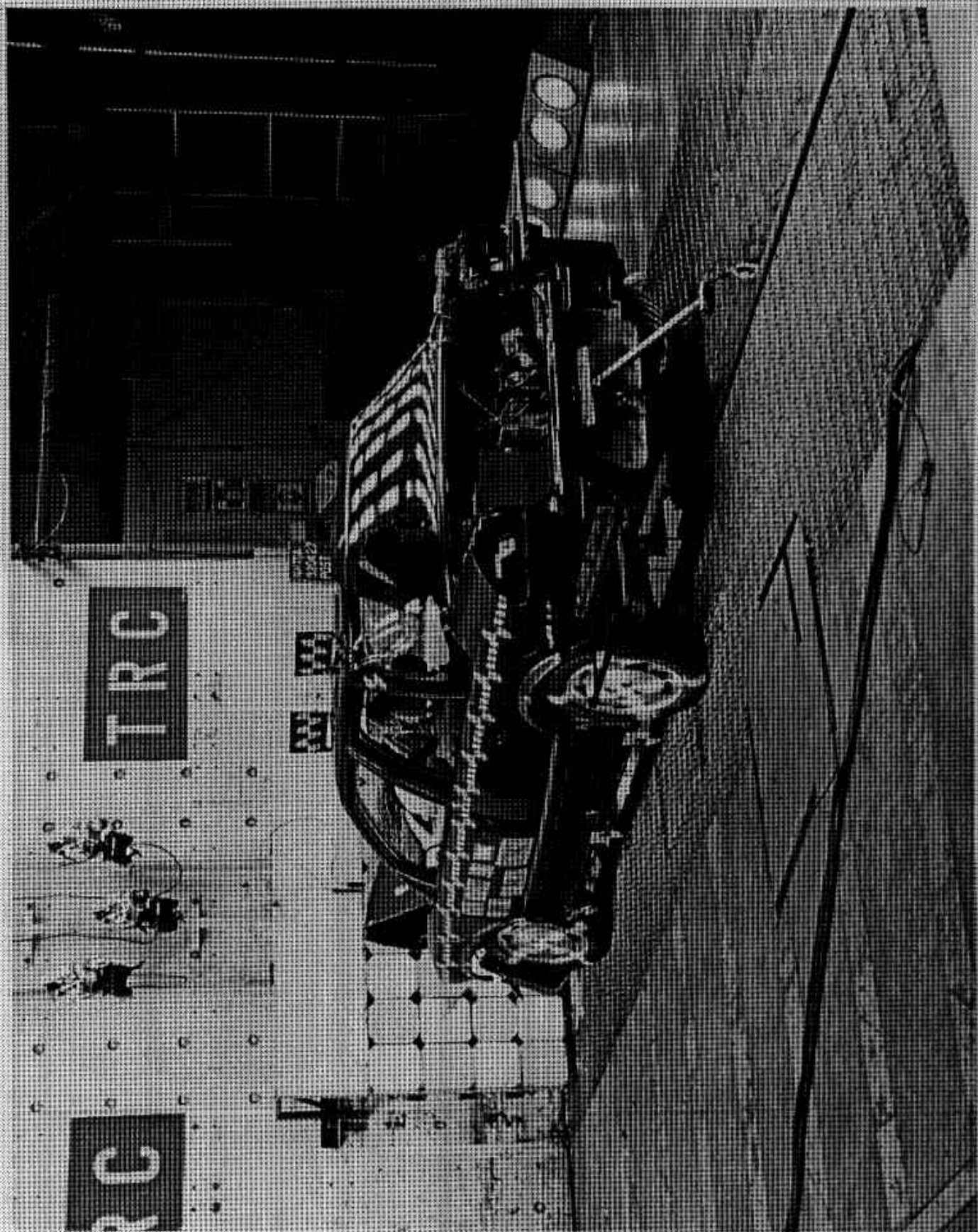


FIGURE A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

A-13

920427

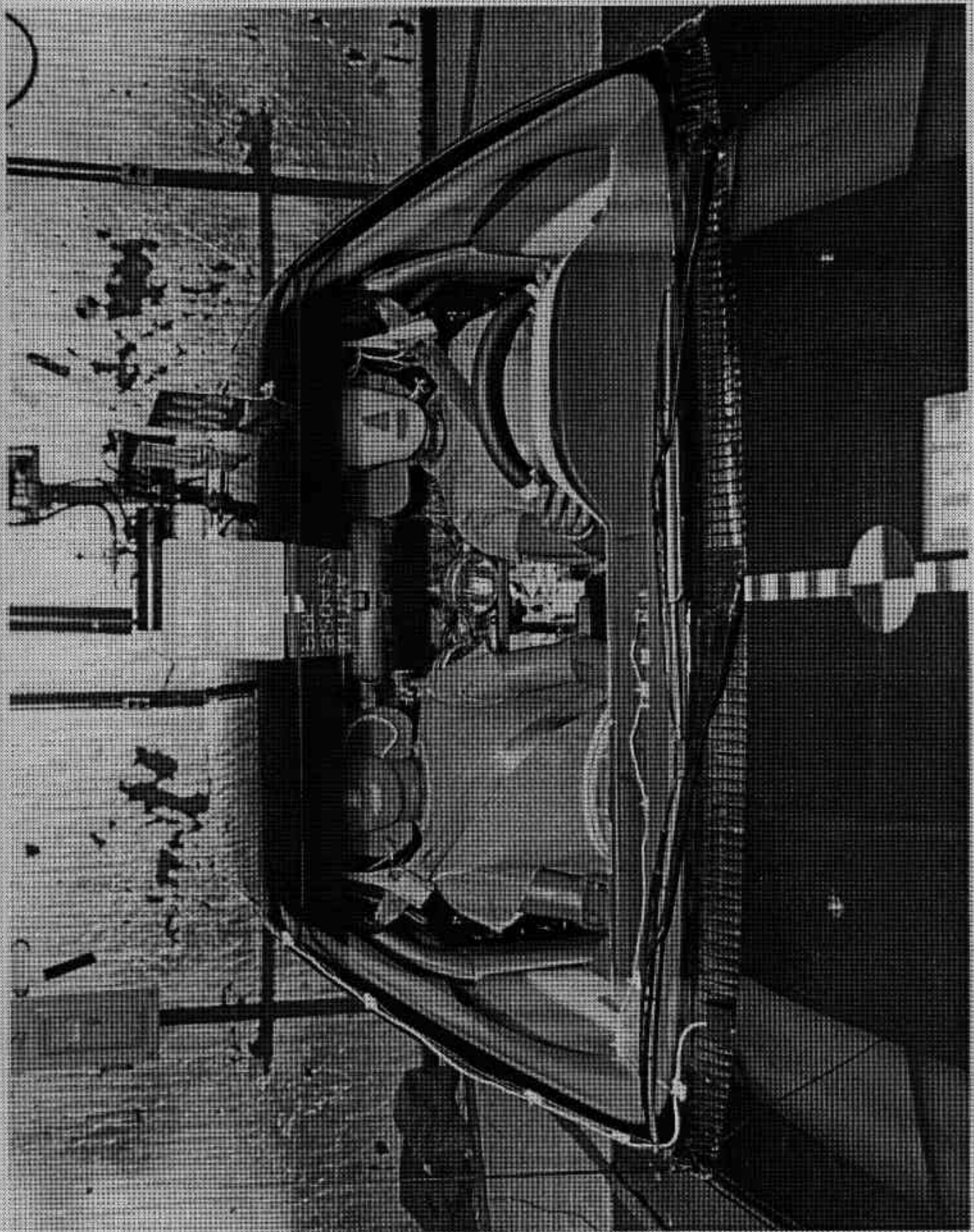


FIGURE A-13. PRE-TEST WINDSHIELD VIEW
A-14

920427

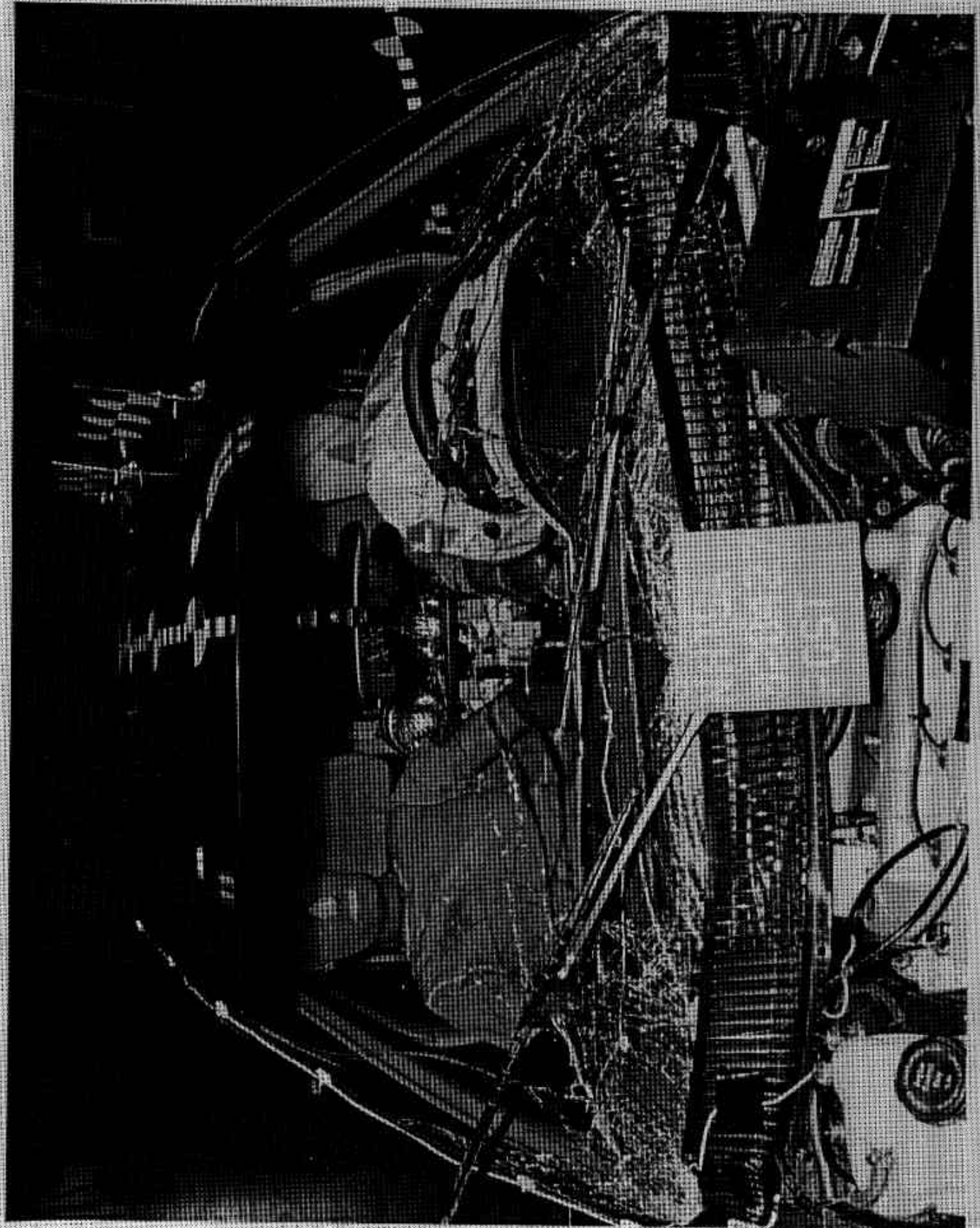


FIGURE A-14. POST-TEST WINDSHIELD VIEW
A-15

920427

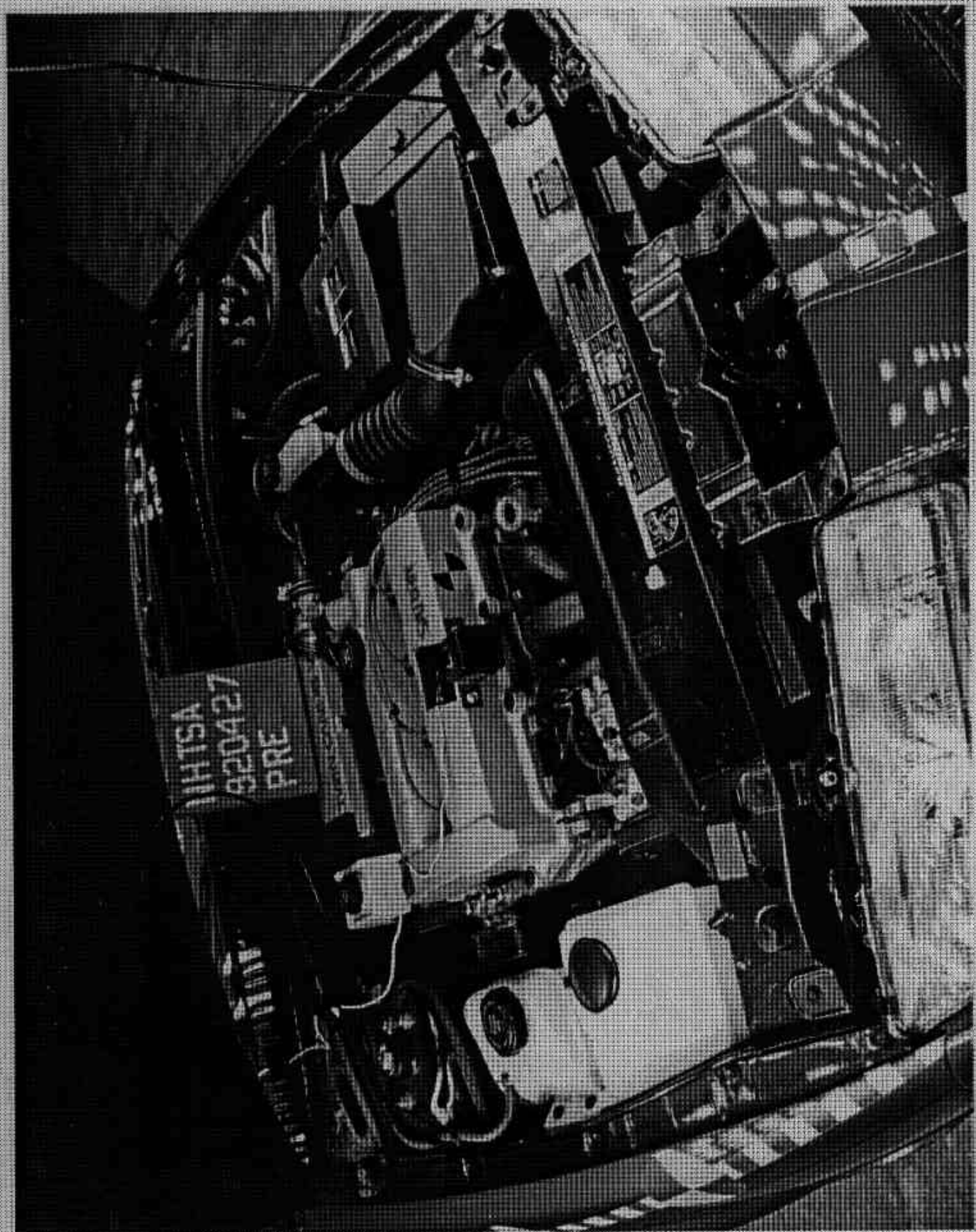


FIGURE A-15. PRE-TEST ENGINE COMPARTMENT VIEW

A-16

920427

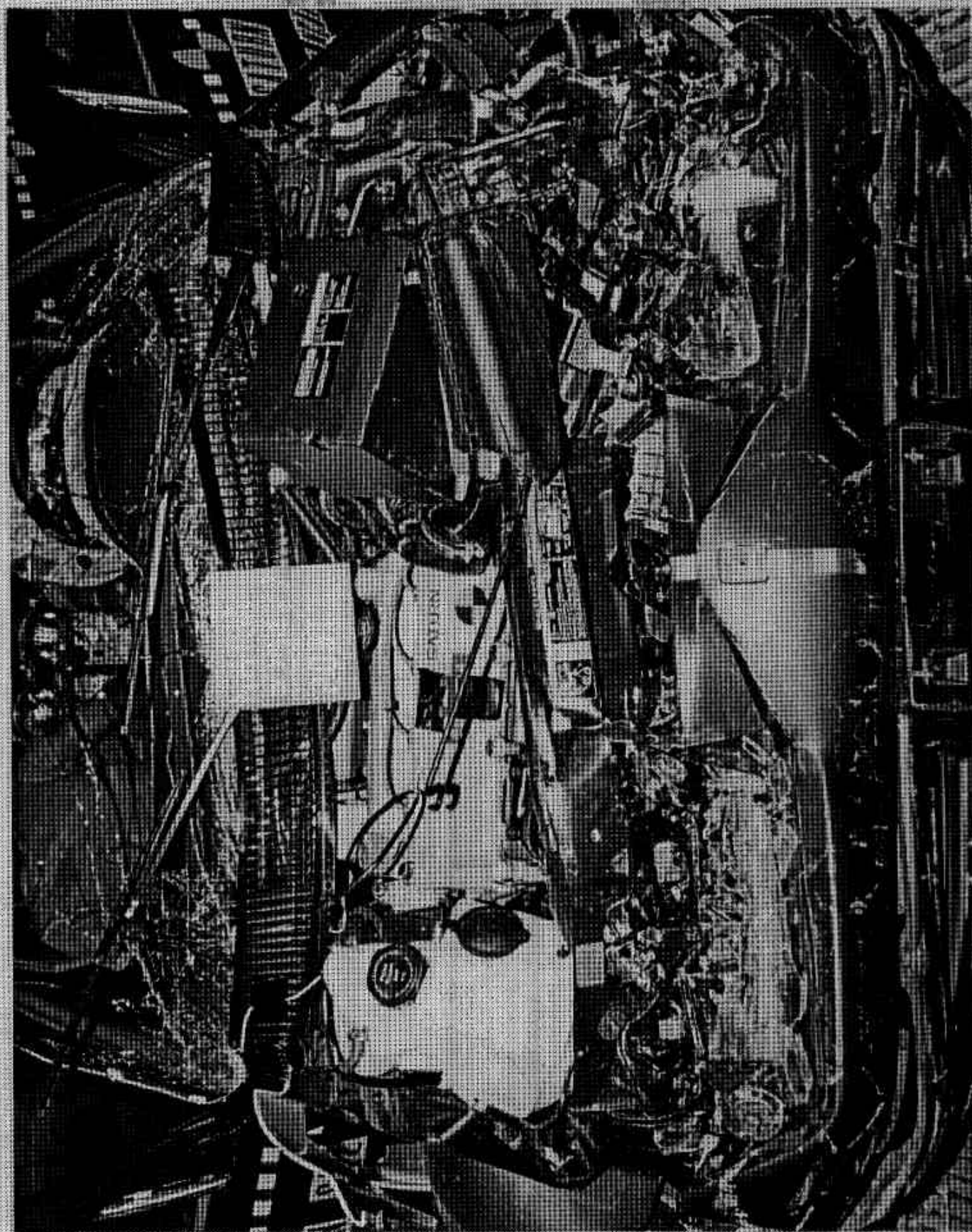


FIGURE A-16. POST-TEST ENGINE COMPARTMENT VIEW

A-17

920427

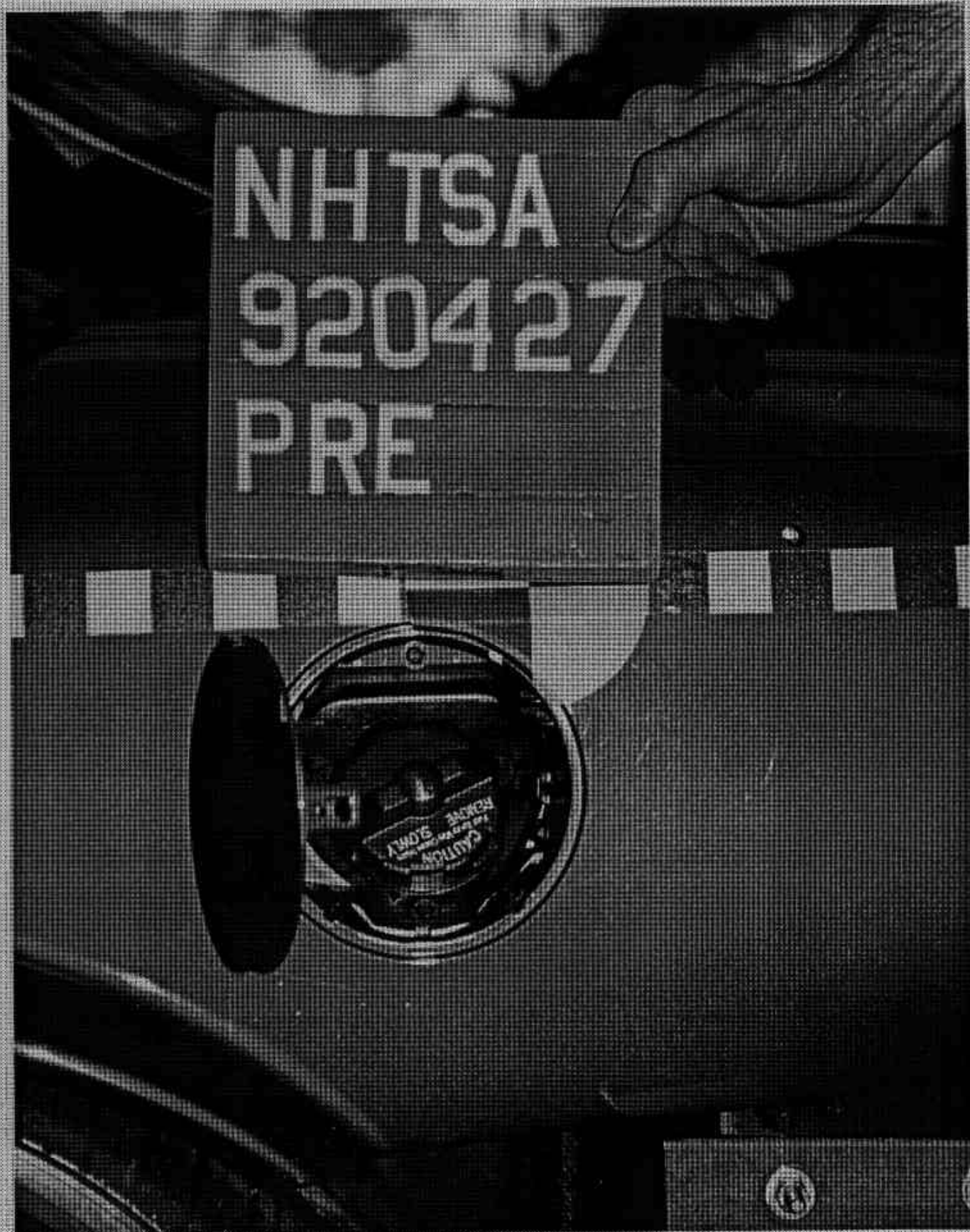


FIGURE A-17. PRE-TEST FUEL FILLER CAP VIEW

A-18

920427

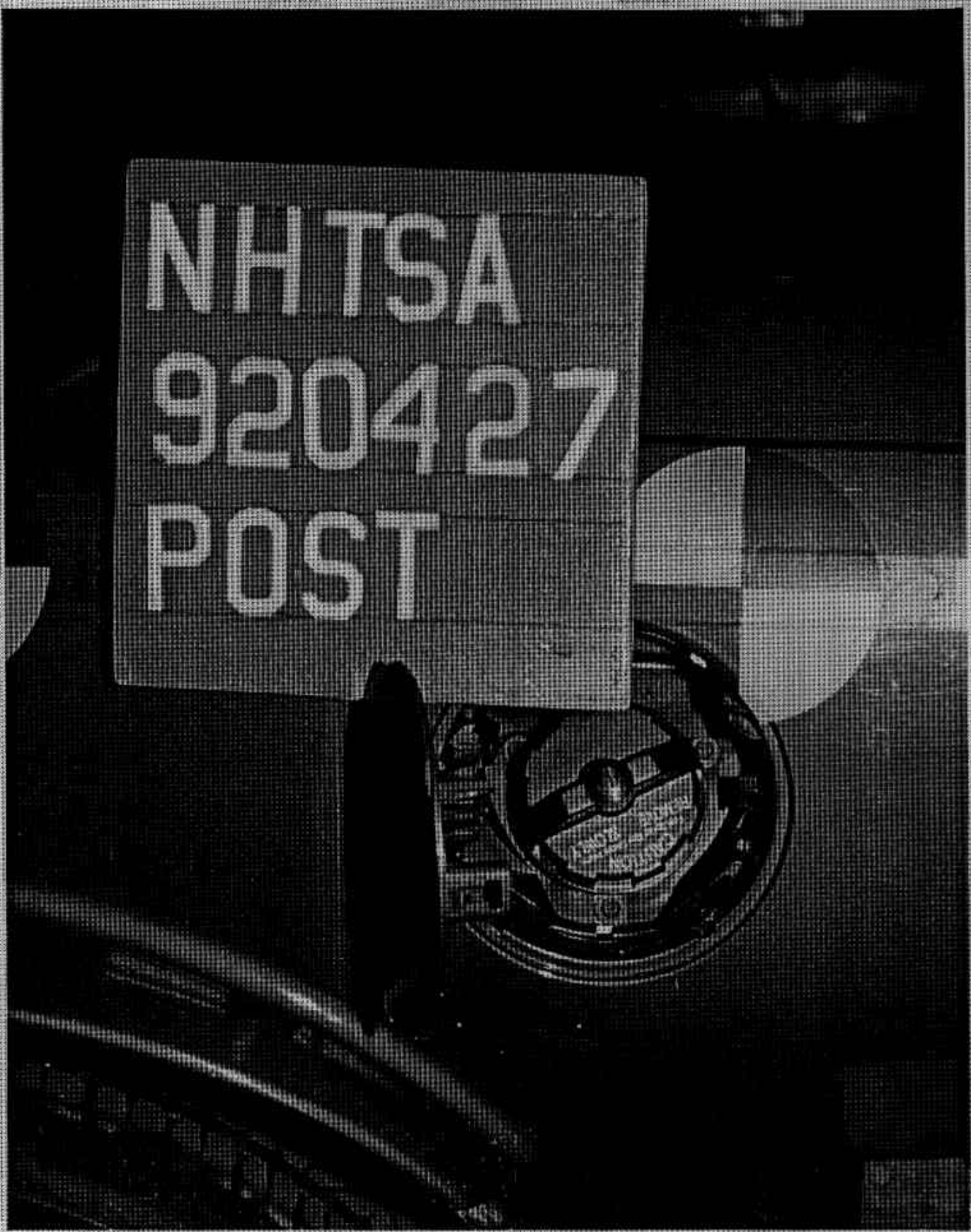


FIGURE A-18. POST-TEST FUEL FILLER CAP VIEW

A-19

920427

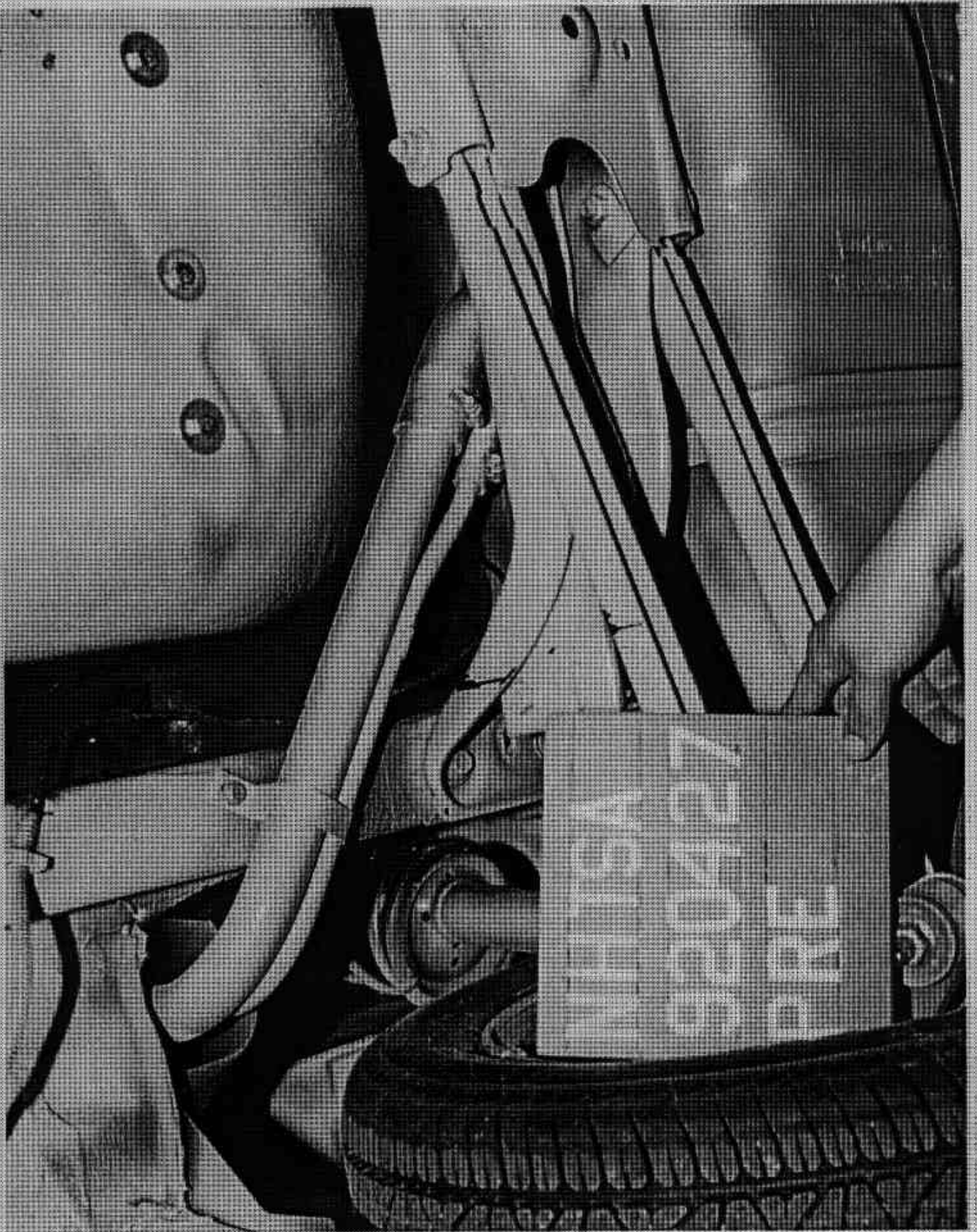


FIGURE A-19. PRE-TEST FUEL FILLER NECK VIEW

A-20

920427



FIGURE A-20. POST-TEST FUEL FILLER NECK VIEW
A-21

920427

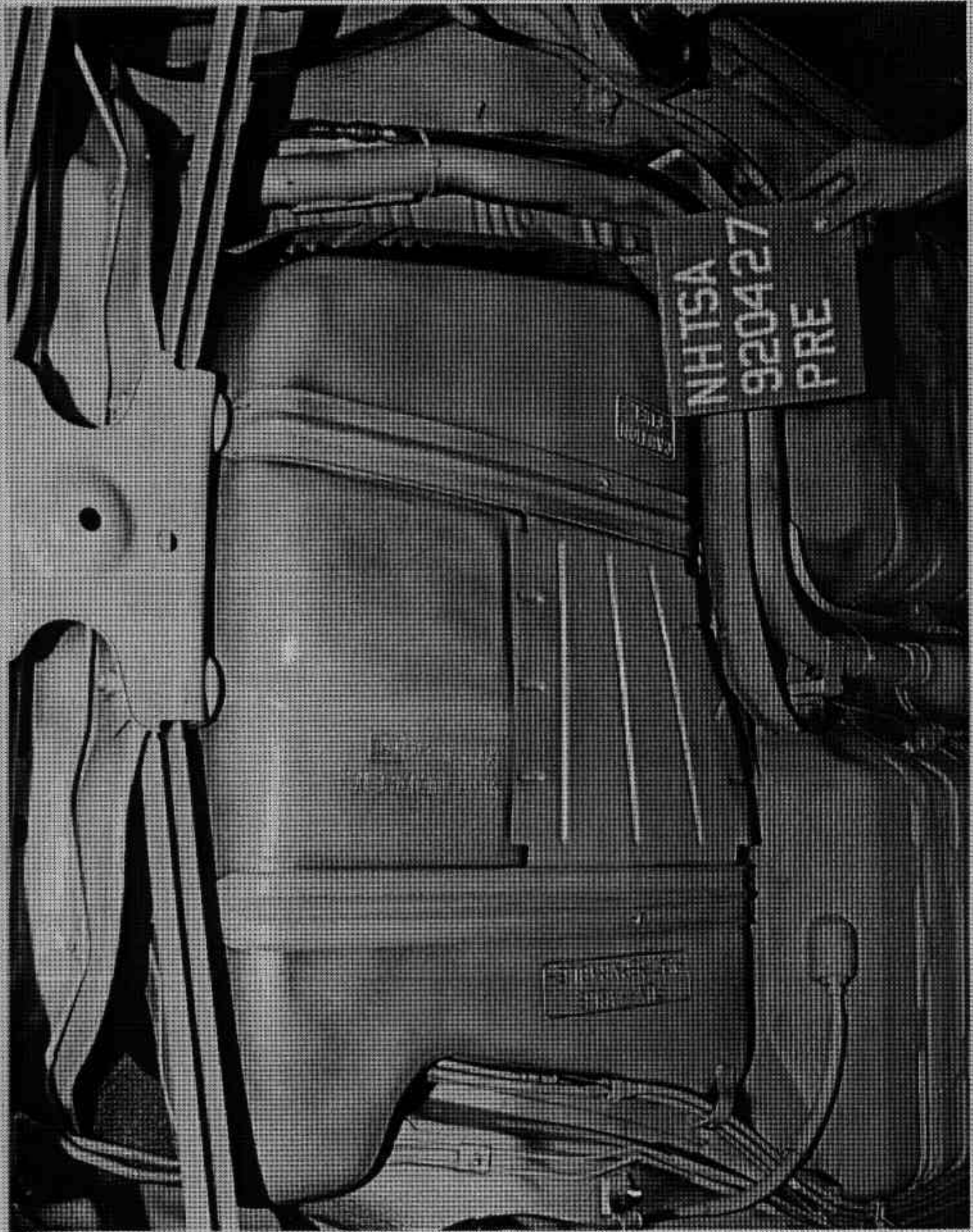


FIGURE A-21. PRE-TEST FUEL TANK VIEW
A-22

920427

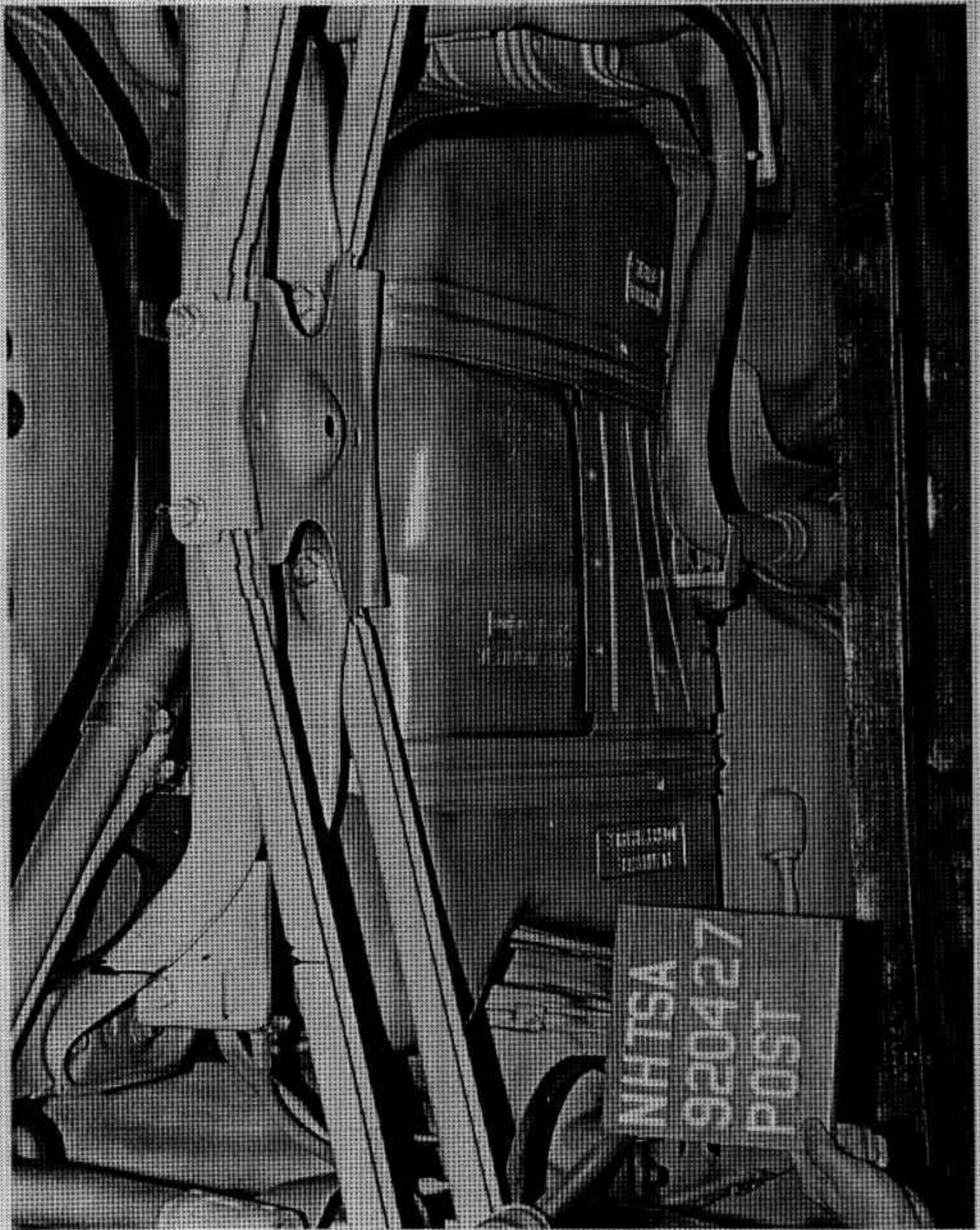


FIGURE A-22. POST-TEST FUEL TANK VIEW
A-23

920427



FIGURE A-23. PRE-TEST FRONT UNDERBODY VIEW

A-24

920427

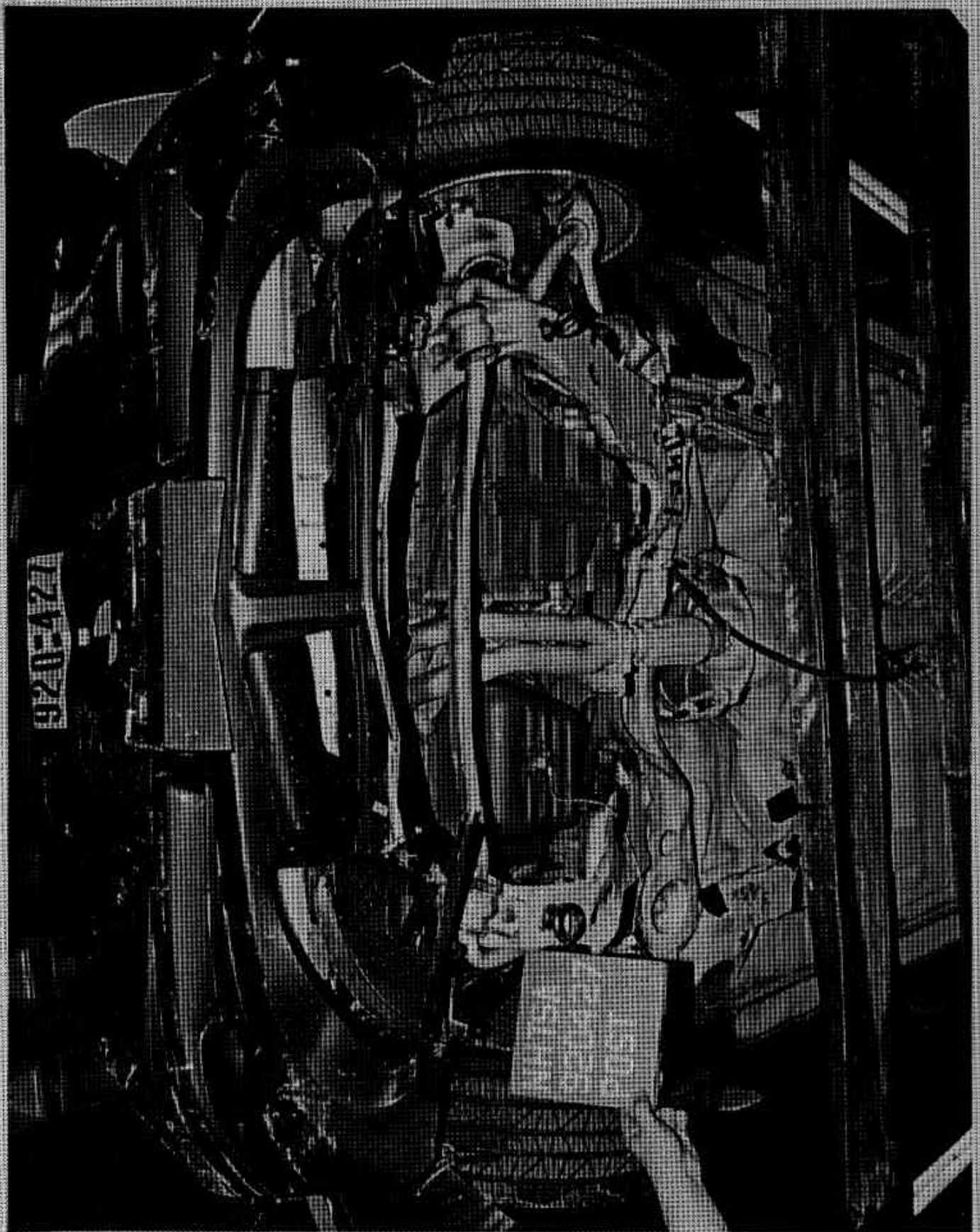


FIGURE A-24. POST-TEST FRONT UNDERBODY VIEW

A-25

920427

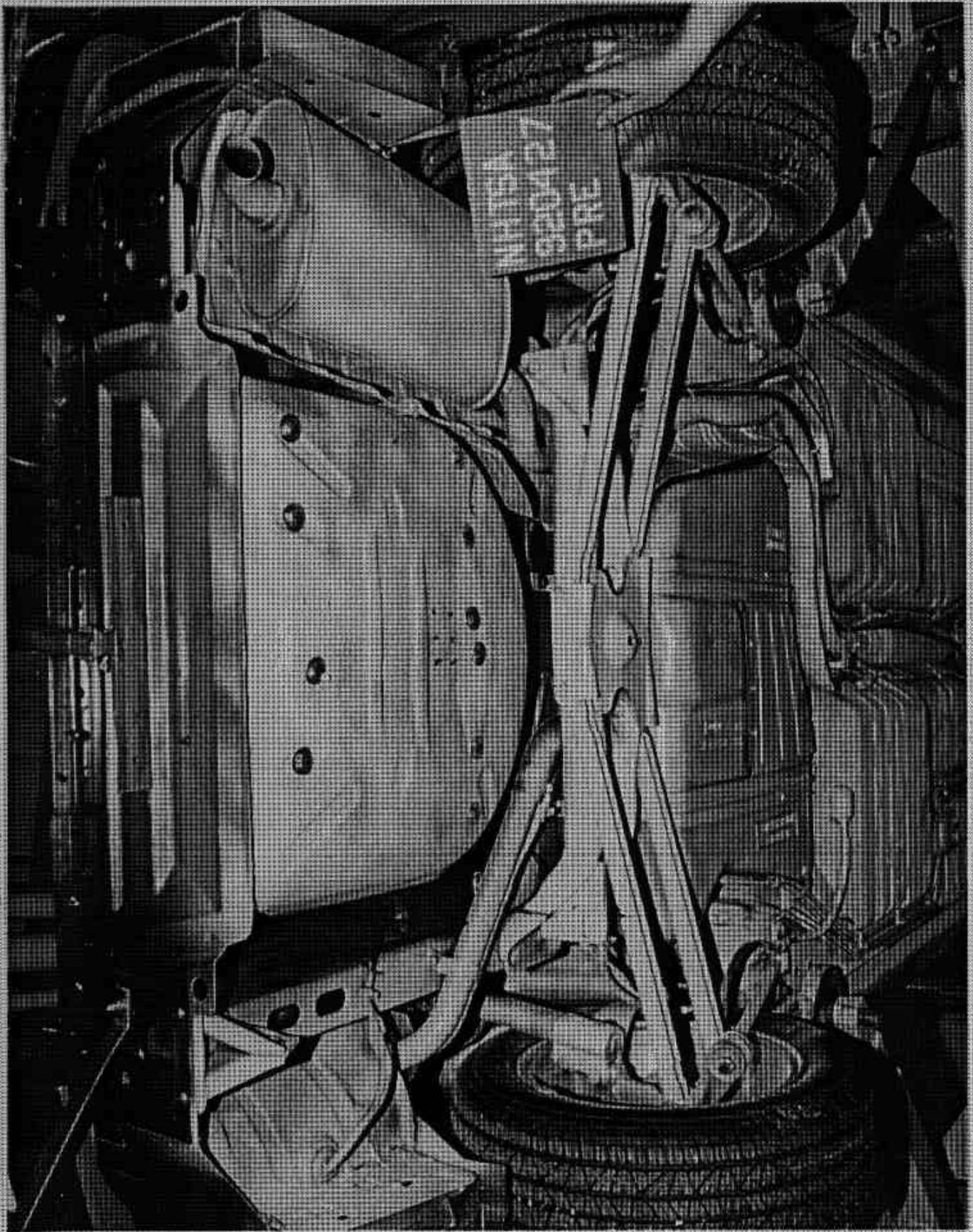


FIGURE A-25. PRE-TEST REAR UNDERBODY VIEW

A-26

920427

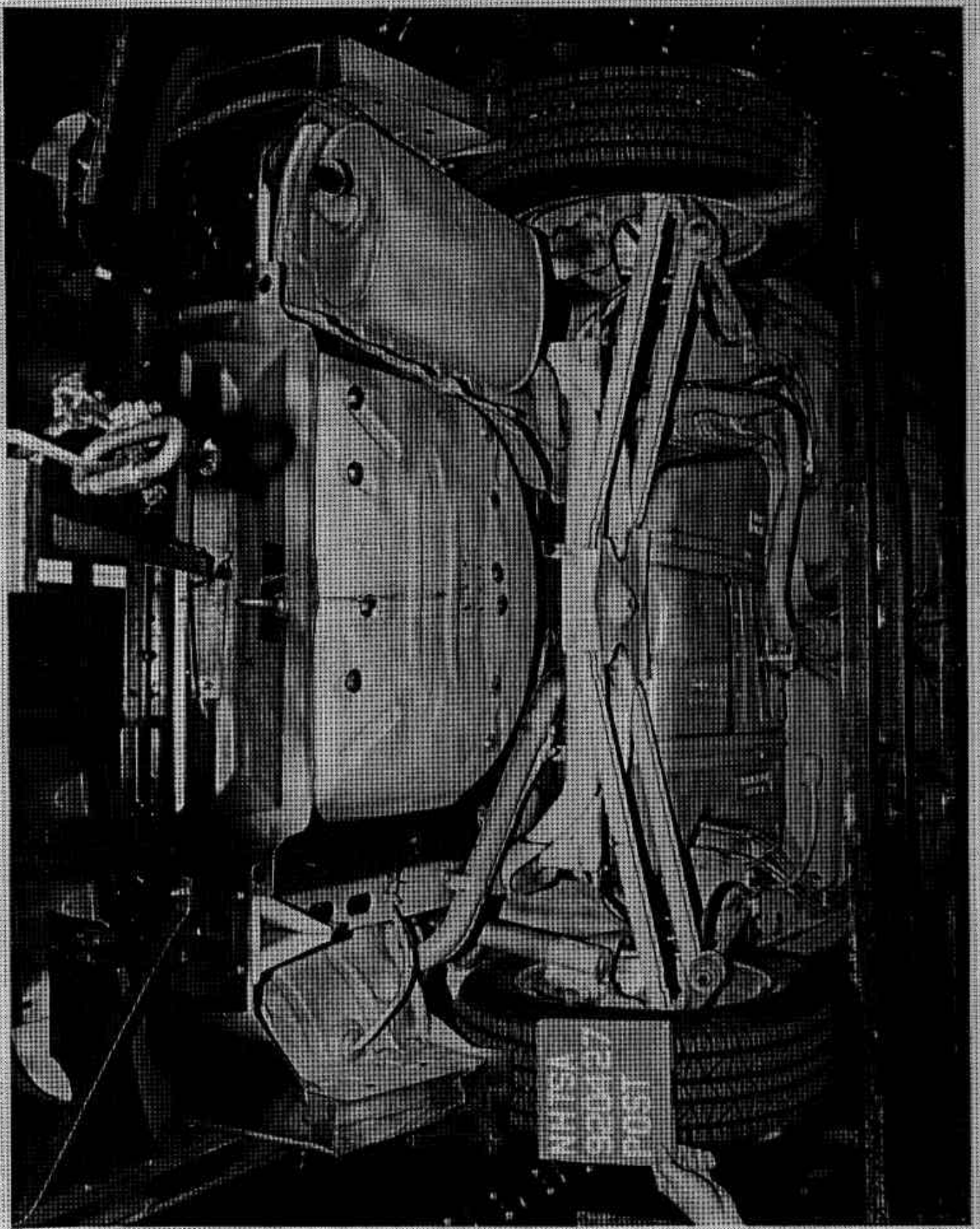


FIGURE A-26. POST-TEST REAR UNDERBODY VIEW

A-27

920427

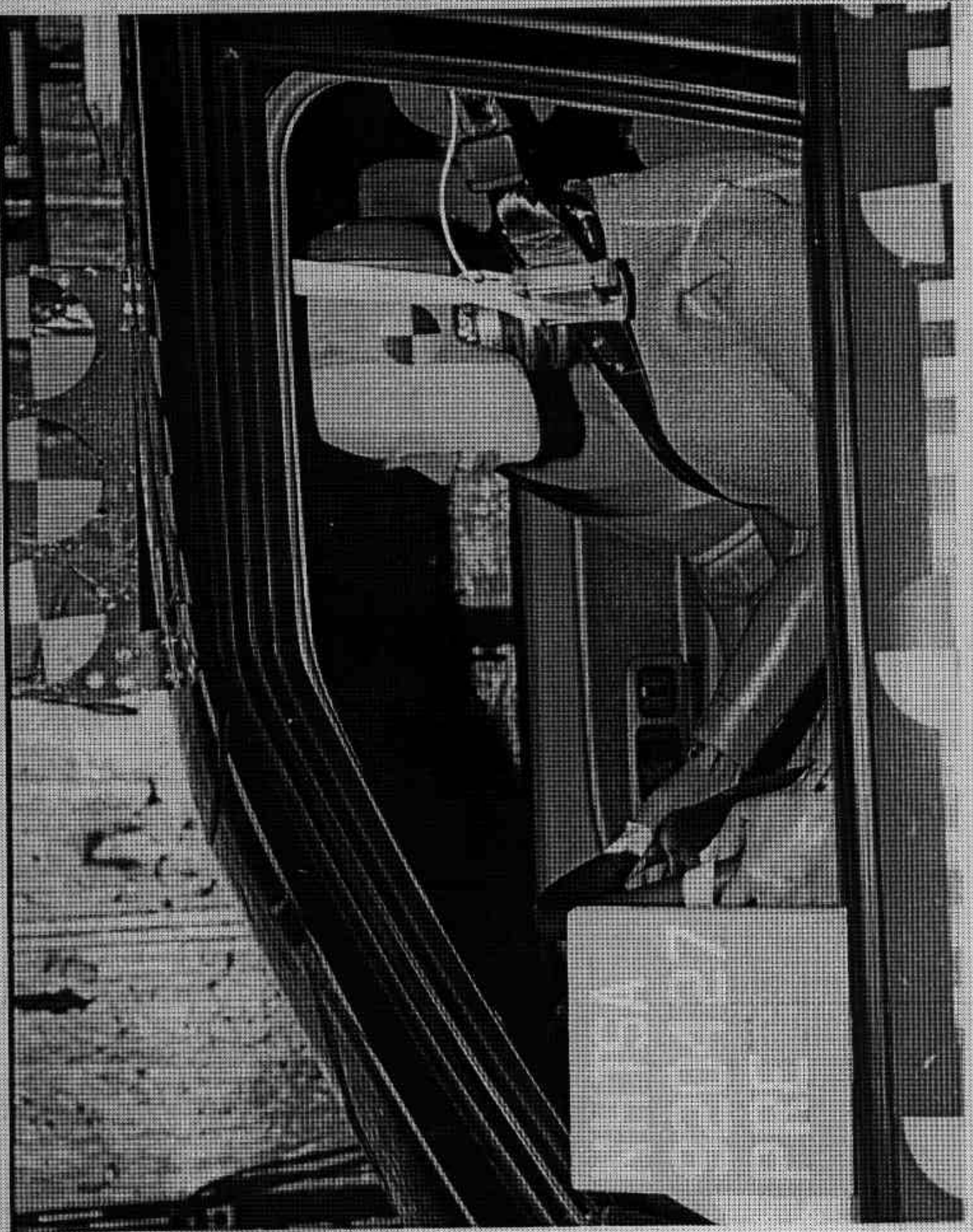


FIGURE A-27. PRE-TEST DRIVER DUMMY POSITION VIEW

A-28

920427

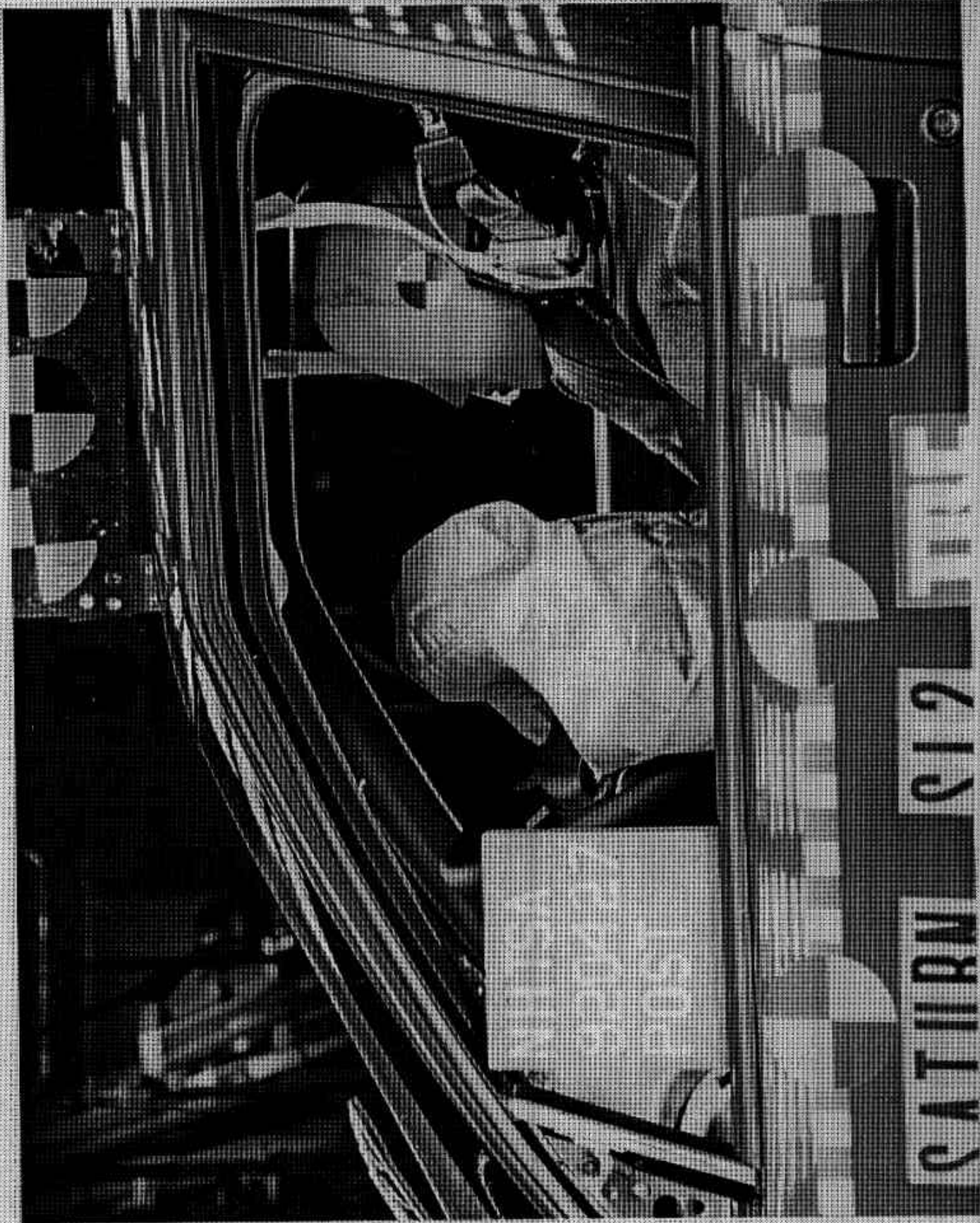


FIGURE A-28. POST-TEST DRIVER DUMMY POSITION VIEW

A-29

920427



FIGURE A-29. PRE-TEST PASSENGER DUMMY POSITION VIEW

A-30

920427

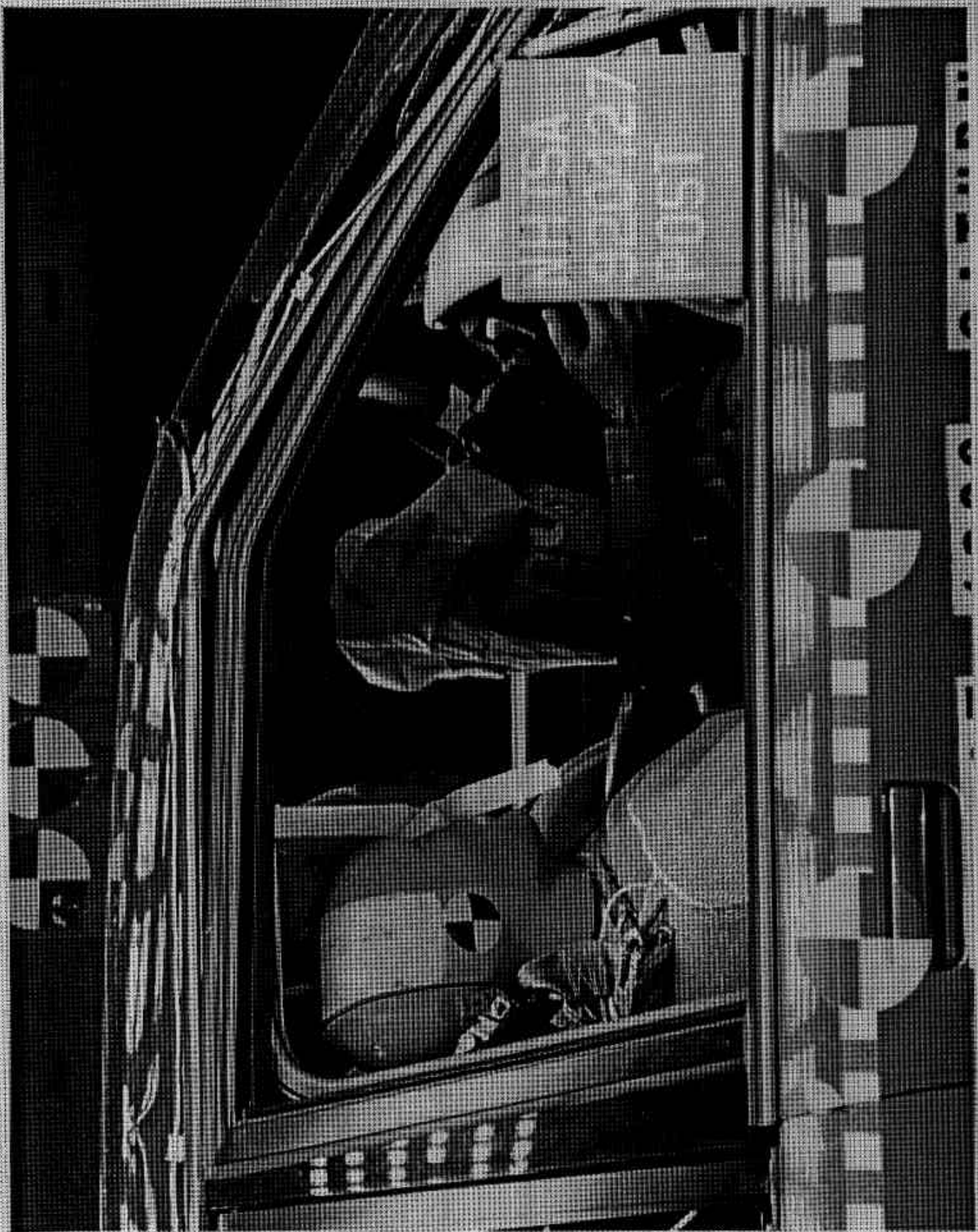


FIGURE A-30. POST-TEST PASSENGER DUMMY POSITION VIEW
A-31

920427



FIGURE A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-32

920427



FIGURE A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-33

920427



FIGURE A-33. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-34

920427



FIGURE A-34. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-35

920427

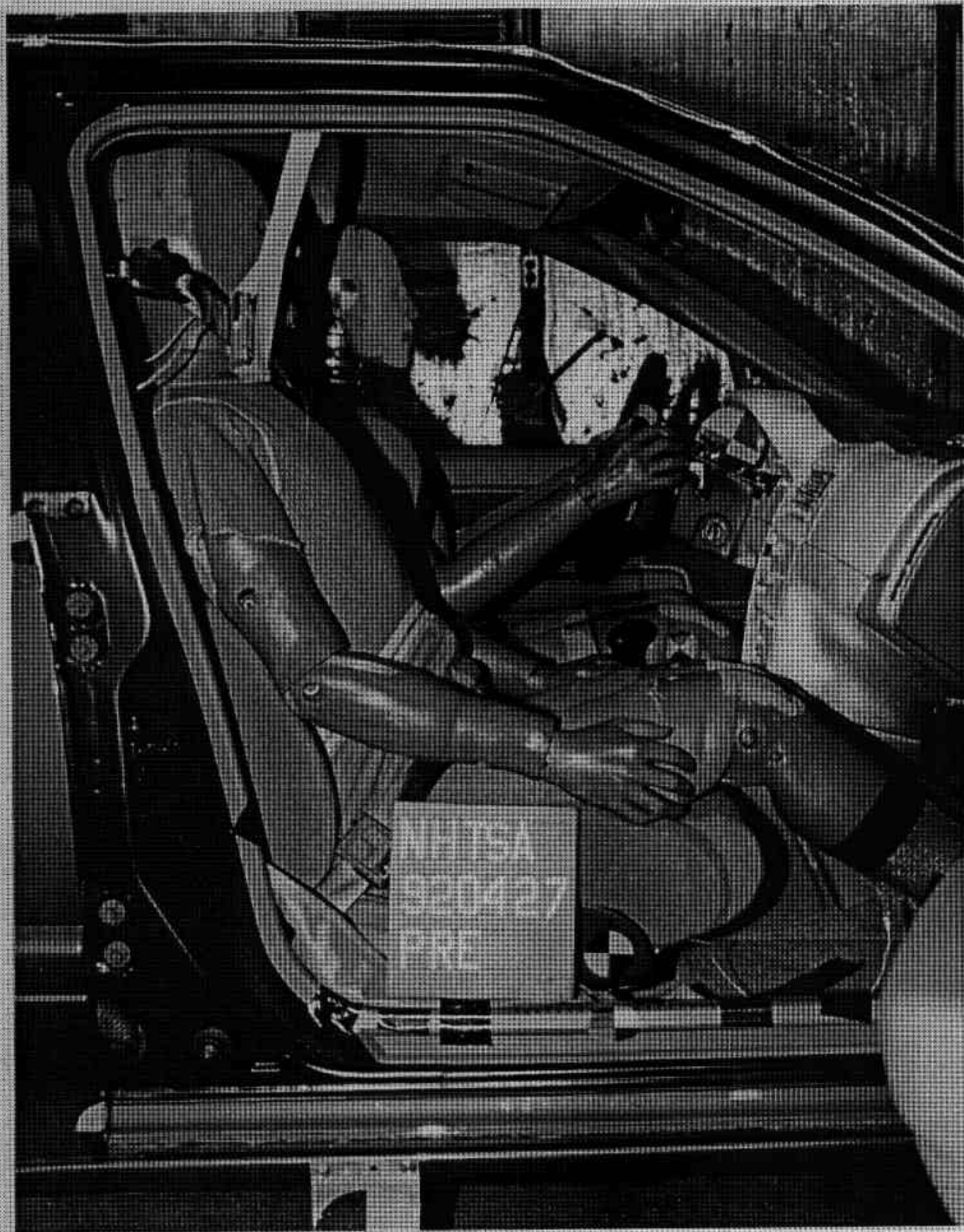


FIGURE A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-36 920427



FIGURE A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-37 920427



FIGURE A-37. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-38 920427



FIGURE A-38. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

A-39

920427

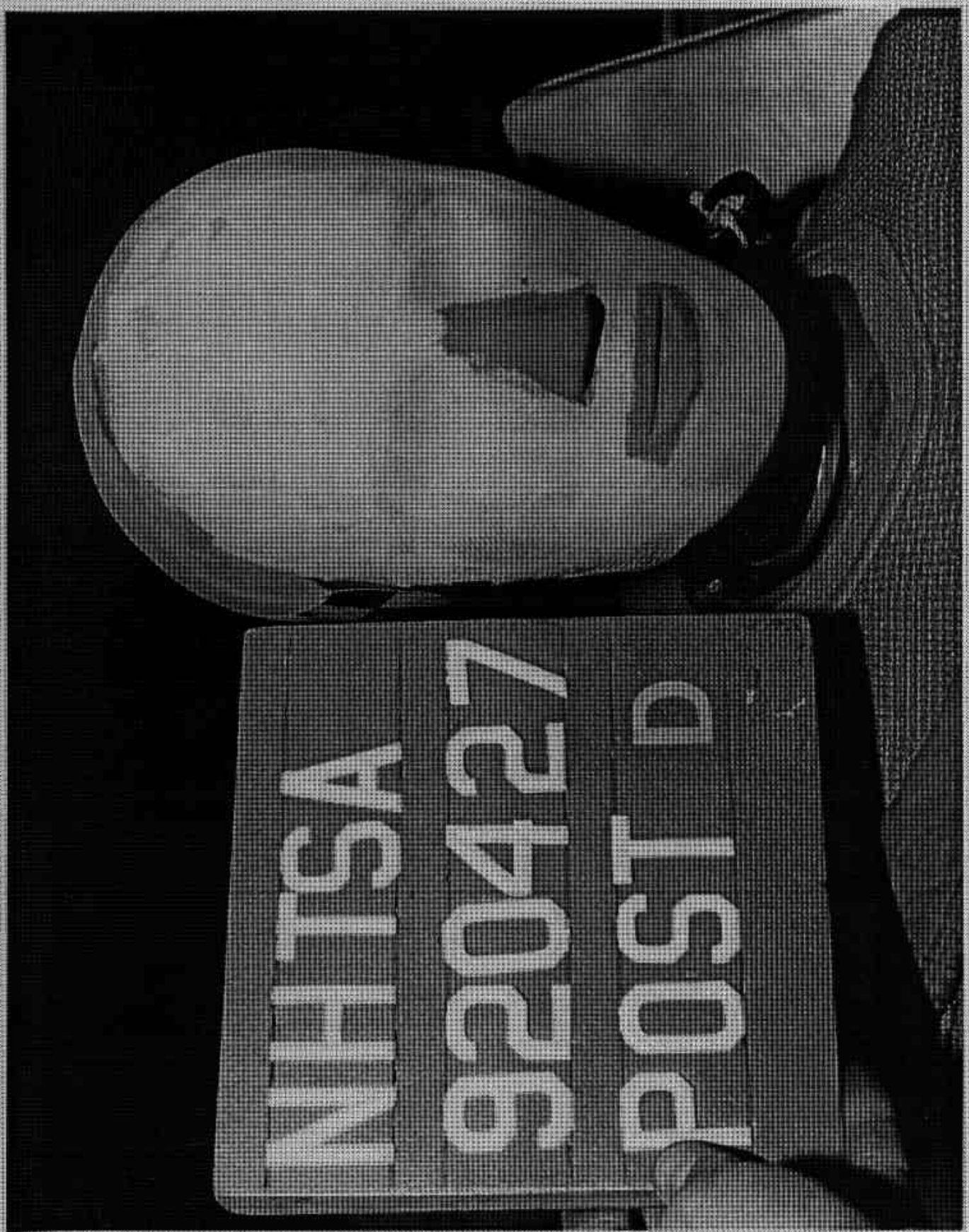


FIGURE A-39. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

A-40

920427



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

A-41

920427

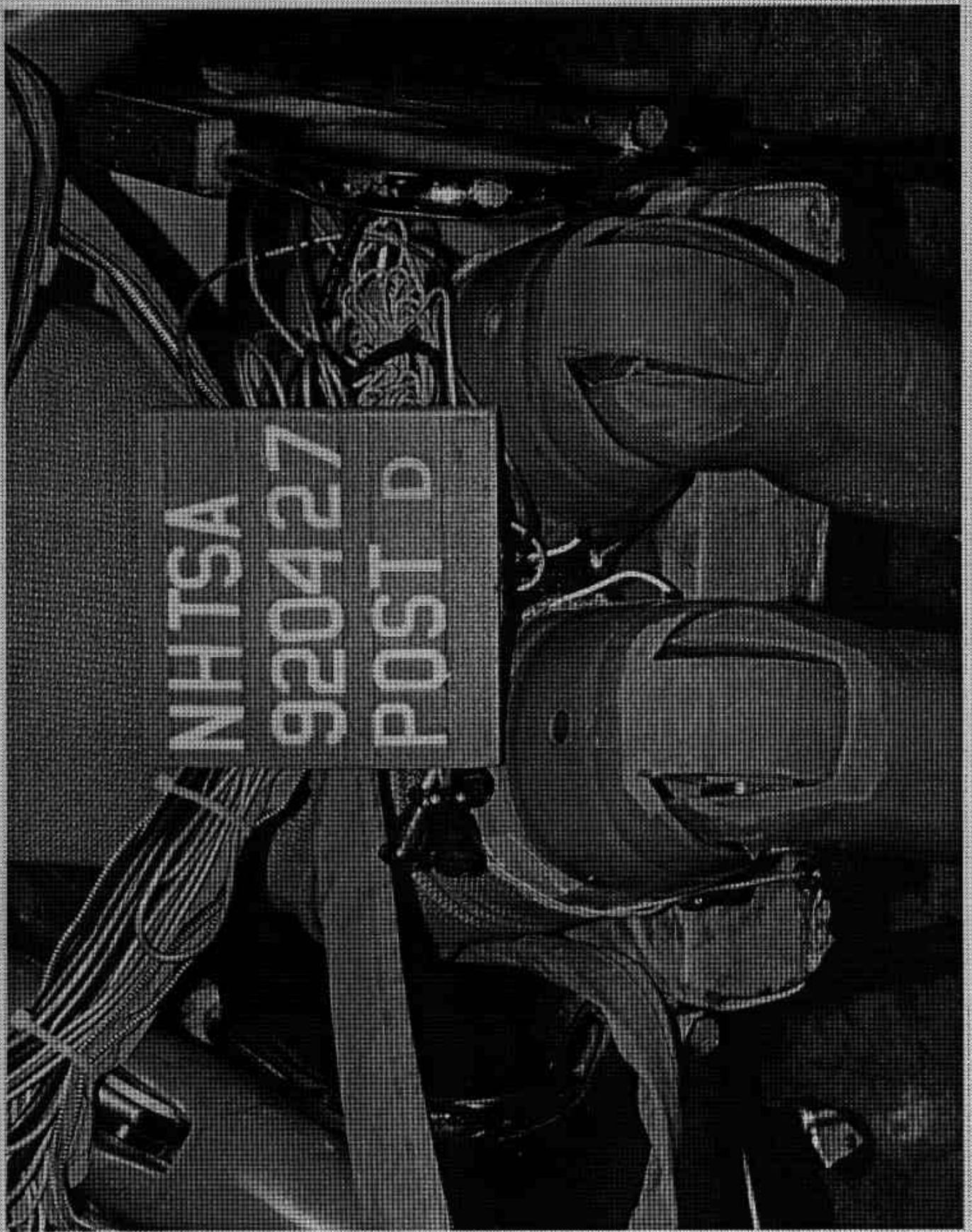


FIGURE A-41. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1



FIGURE A-42. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

A-43

920427

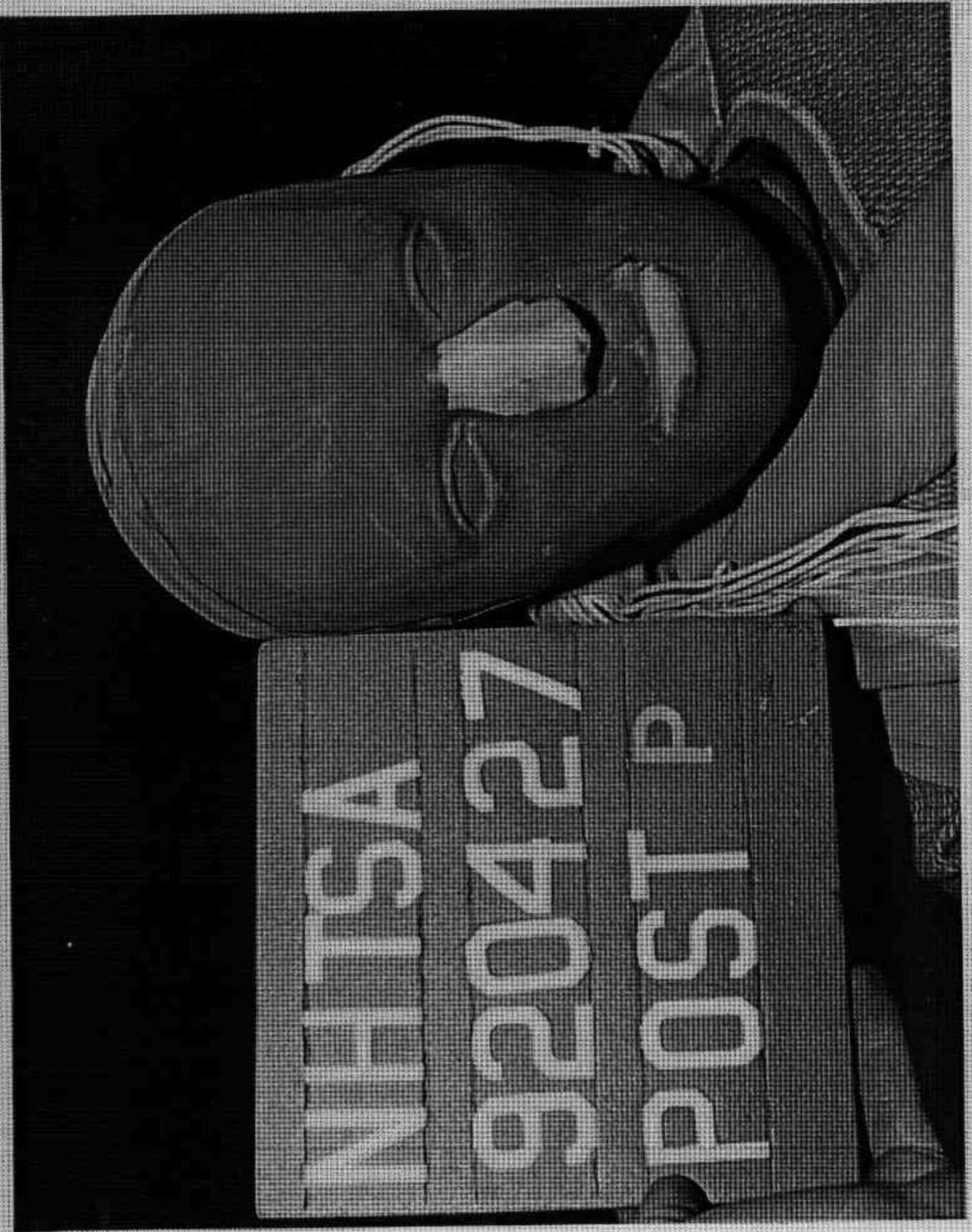


FIGURE A-43. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

A-44

920427

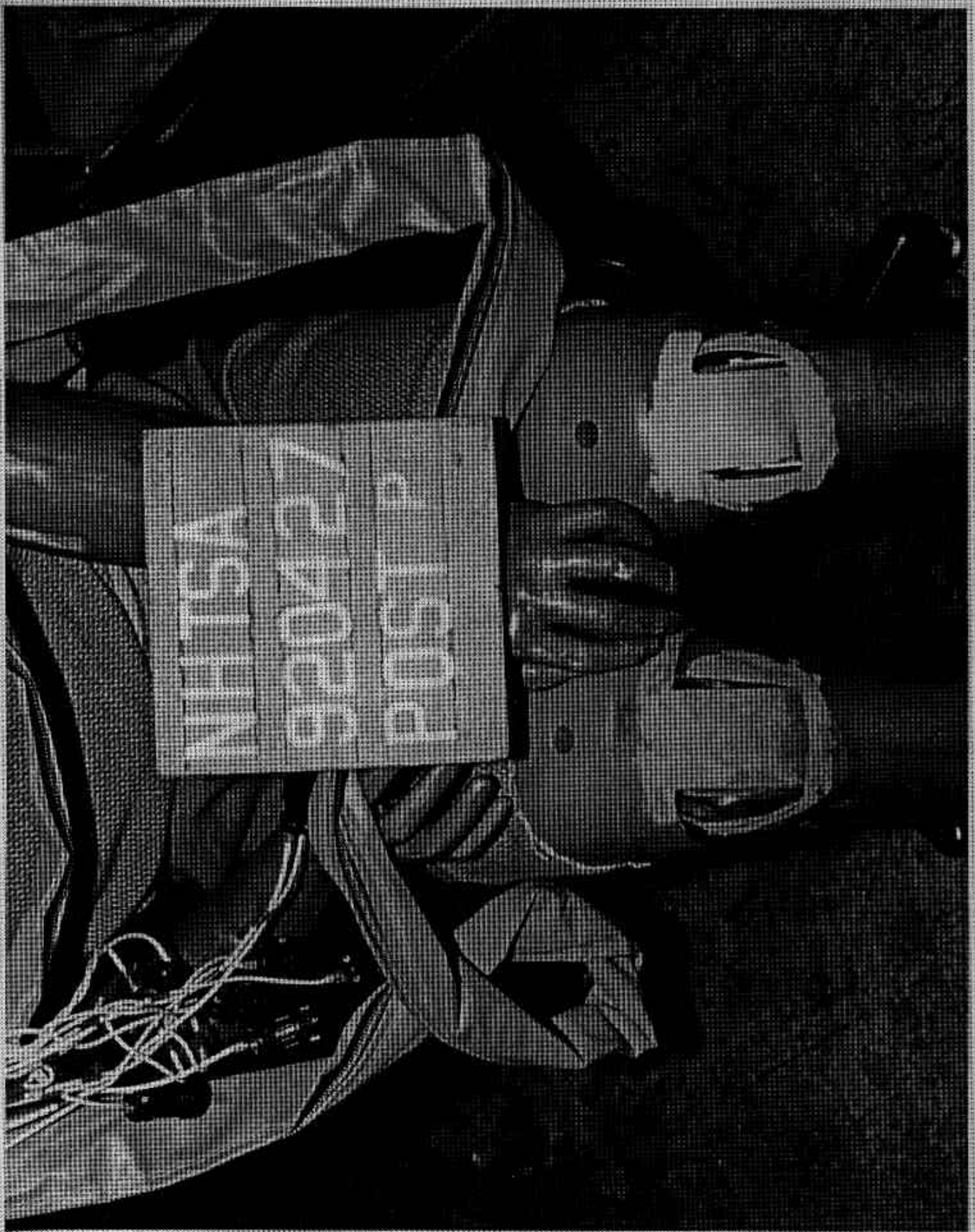


FIGURE A-44. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1

A-45

920427




FIGURE A-45. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

A-46

920427

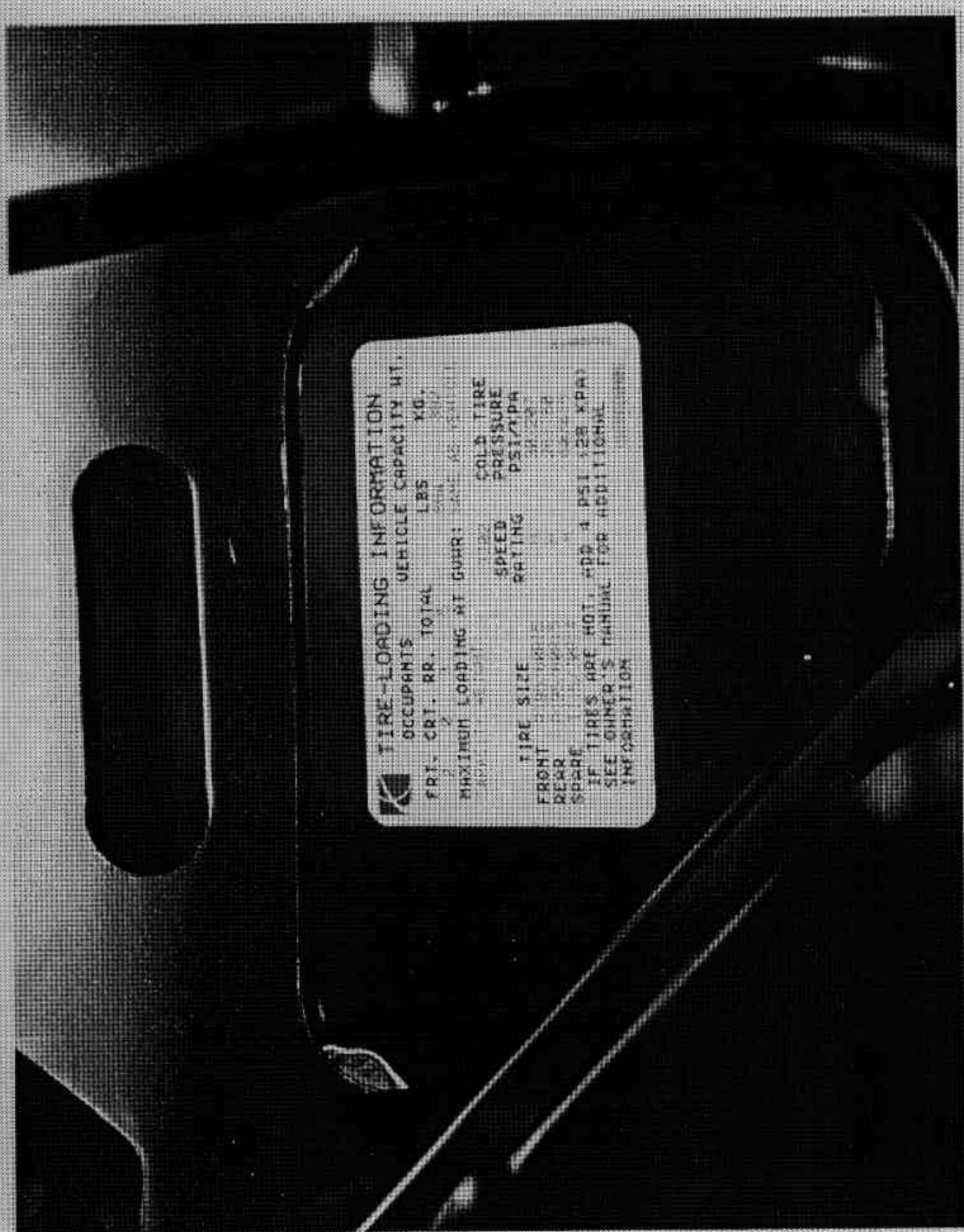
16801012


MFD BY SATURN CORPORATION
 GAWR FRT 1786LB 1520LB
 GAWR RR 810KG 735KG
 DATE 04/92
 3405LB 1545KG

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

1C8ZK5571N1282599 PASS CAR

Figure A-46. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW



TIRE-LOADING INFORMATION

OCCUPANTS VEHICLE CAPACITY WT.
 FRT. CRT. RR. TOTAL LBS KG.
 MAXIMUM LOADING WT GUAR. LBS KG.


TIRE SIZE SPEED RATING COLD TIRE PRESSURE PSI/KPA

FRONT REAR SPARE

IF TIRES ARE HOT, ADD 4 PSI (28 KPA)
 SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

FIGURE A-47. PRE-TEST VEHICLE RECOMMENDED TIRE PRESSURE LABEL VIEW

Intentionally Left Blank

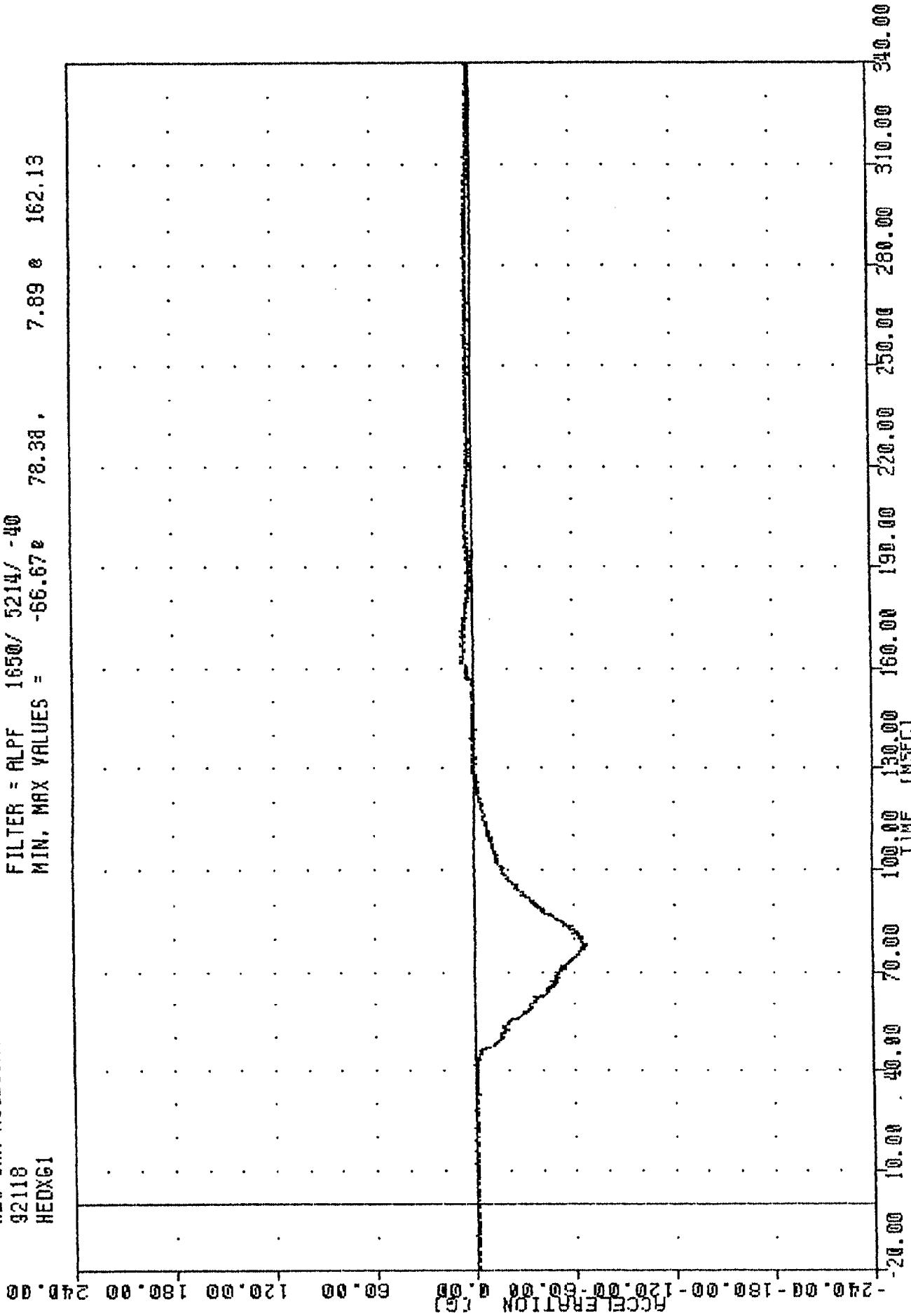
A vertical dashed line consisting of 18 rectangular segments runs down the right side of the page.

APPENDIX B

DATA PLOTS

TRC 920427
NEW CAR ASSESSMENT PROGRAM
92118
HEDXG1

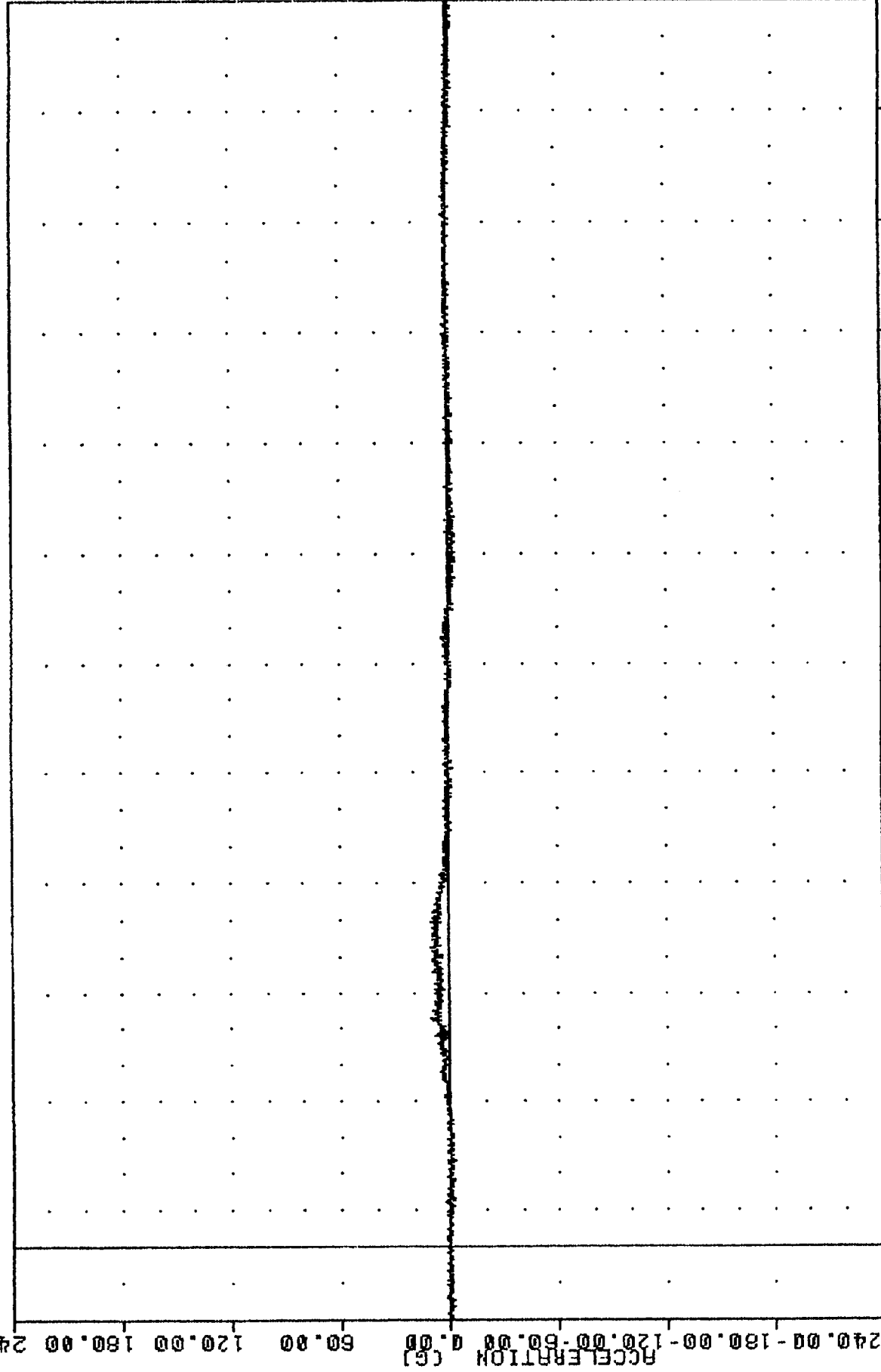
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -66.67e 78.38e 7.89e 162.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD X-AXIS ACCELERATION

JRC, 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 HEDY61

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -3.85e 188.50, 10.75 e 62.75

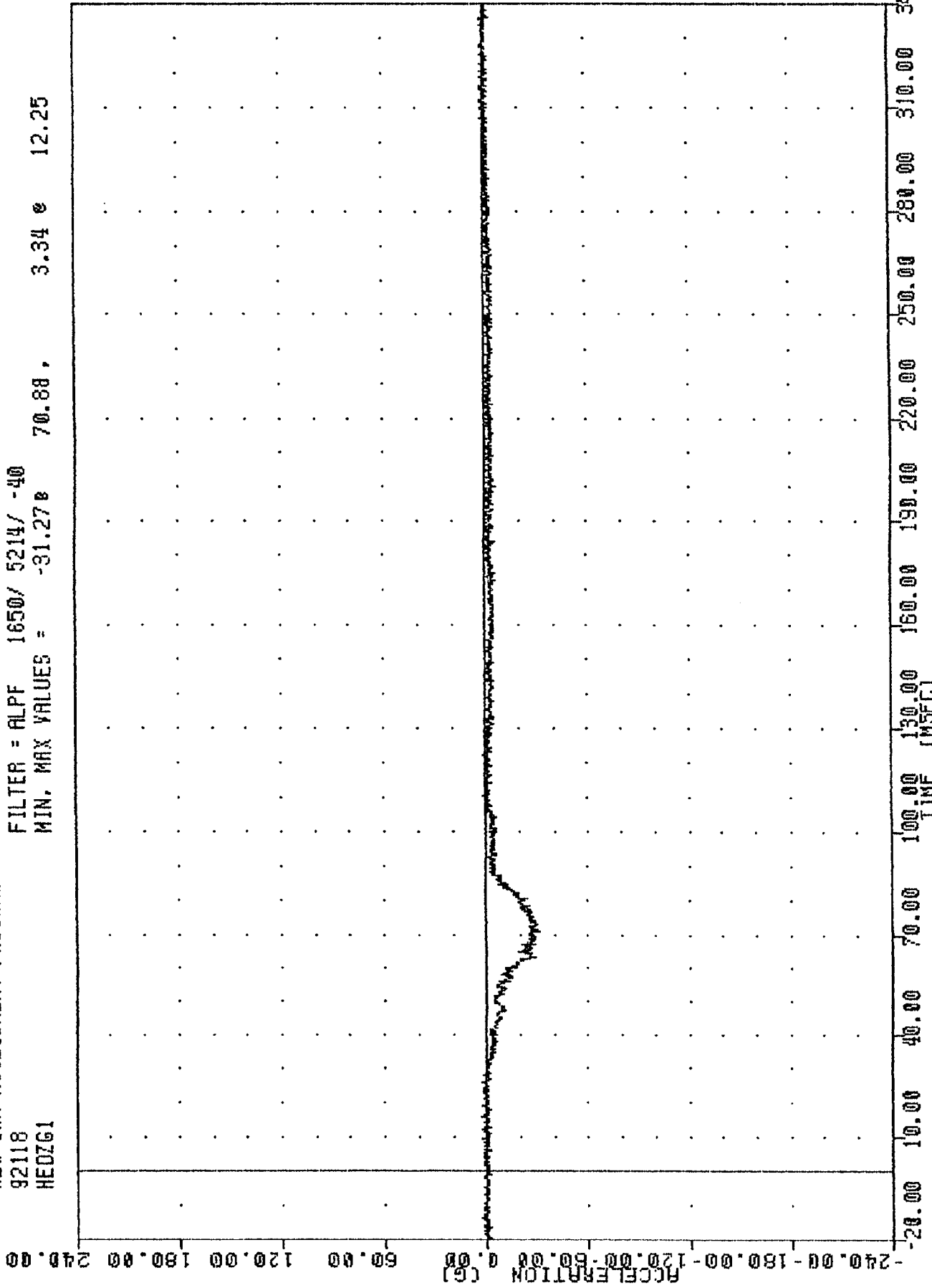


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION

TRC
NEW CAR ASSESSMENT PROGRAM
92118
HEZG1

920427

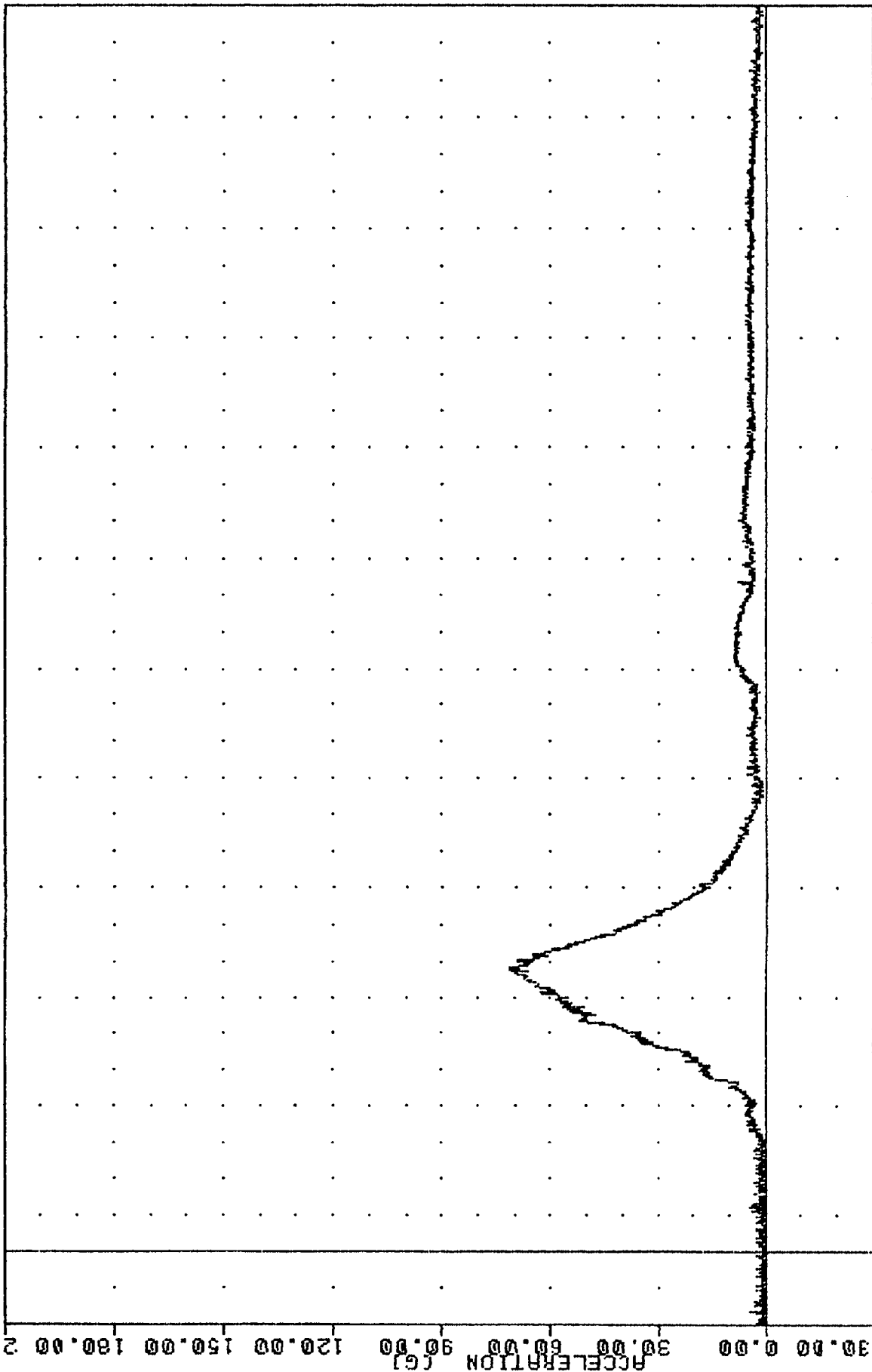
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -31.278 70.88, 3.34 e 12.25



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 HEDRG1

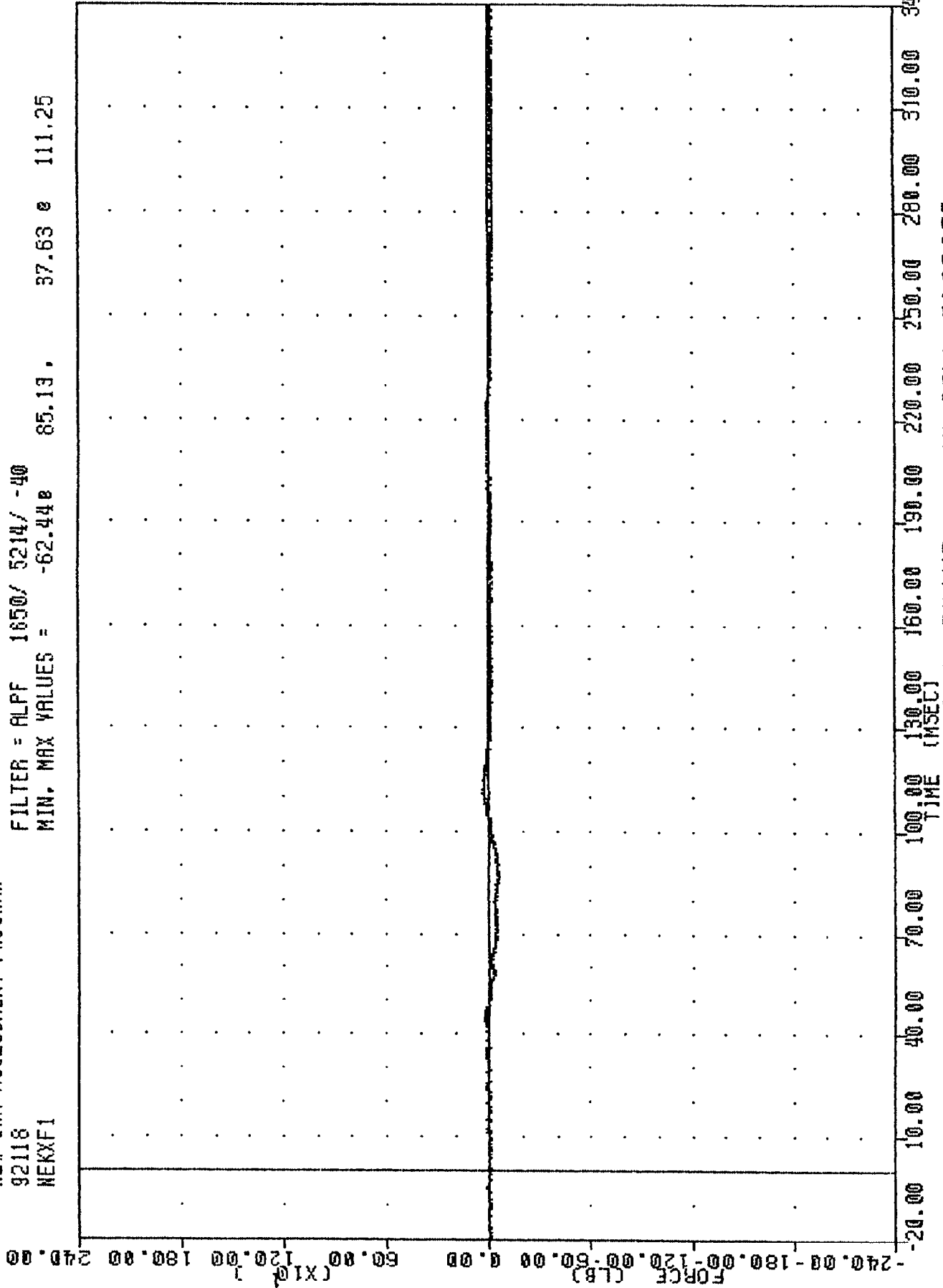
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.132 -9.00, 71.06 e 77.50



-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
 TIME (MSEC)
 1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKXF1

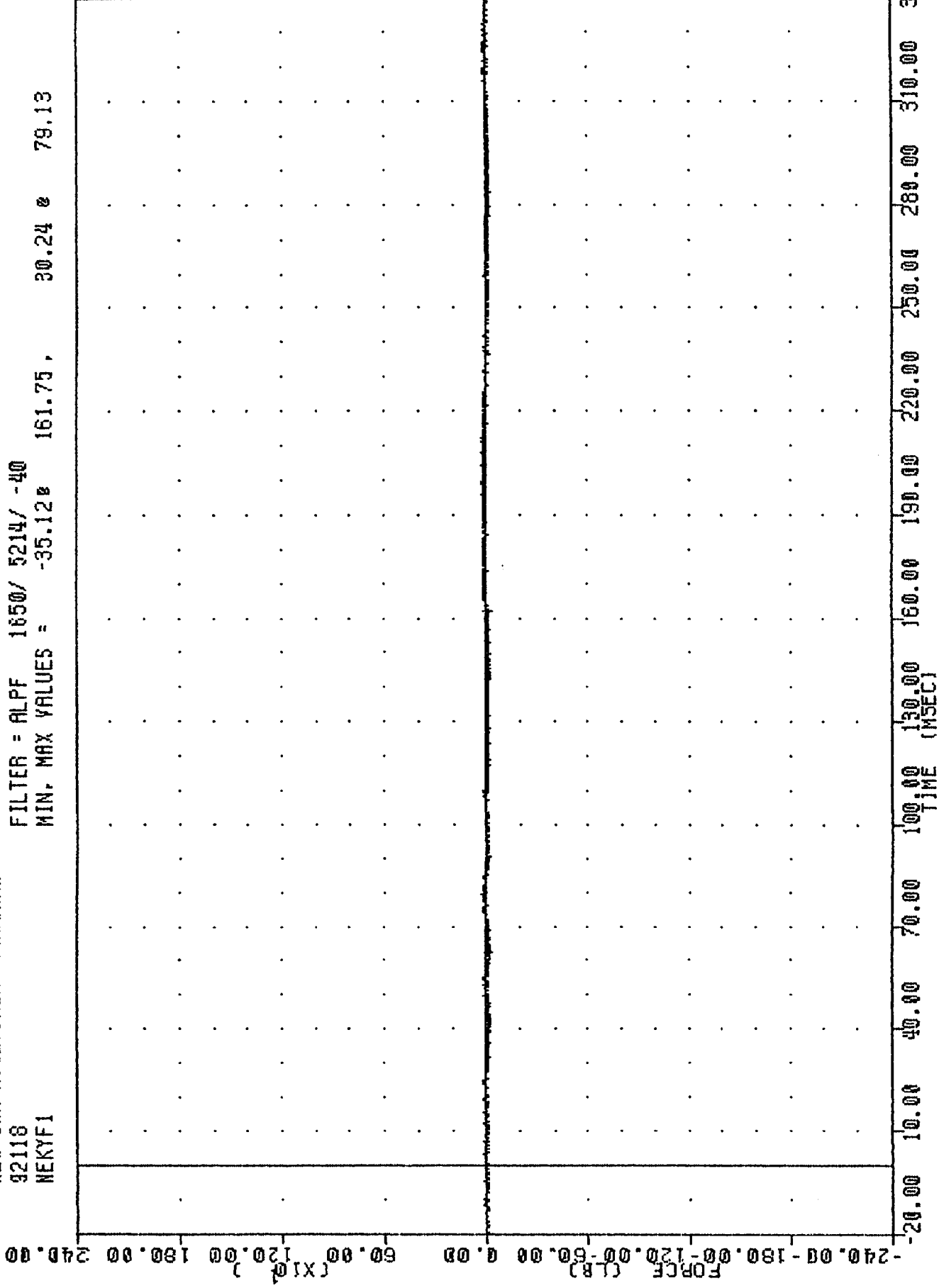
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -62.44e 85.13, 37.63 e 111.25



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK X-AXIS SHEAR FORCE

TRC, 27
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKYF1

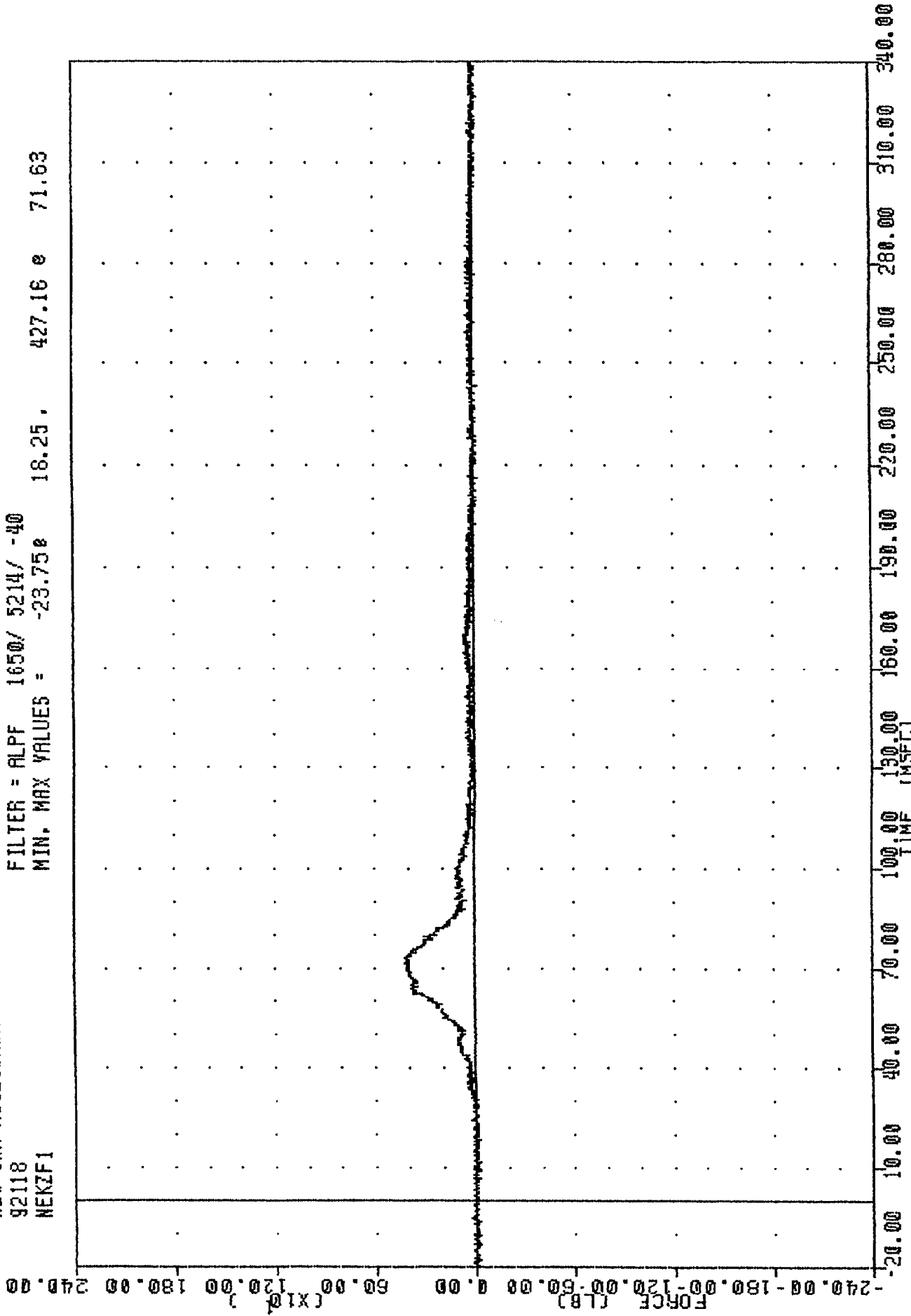
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -35.12 161.75, 30.24 79.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Y-AXIS SHEAR FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKZF1

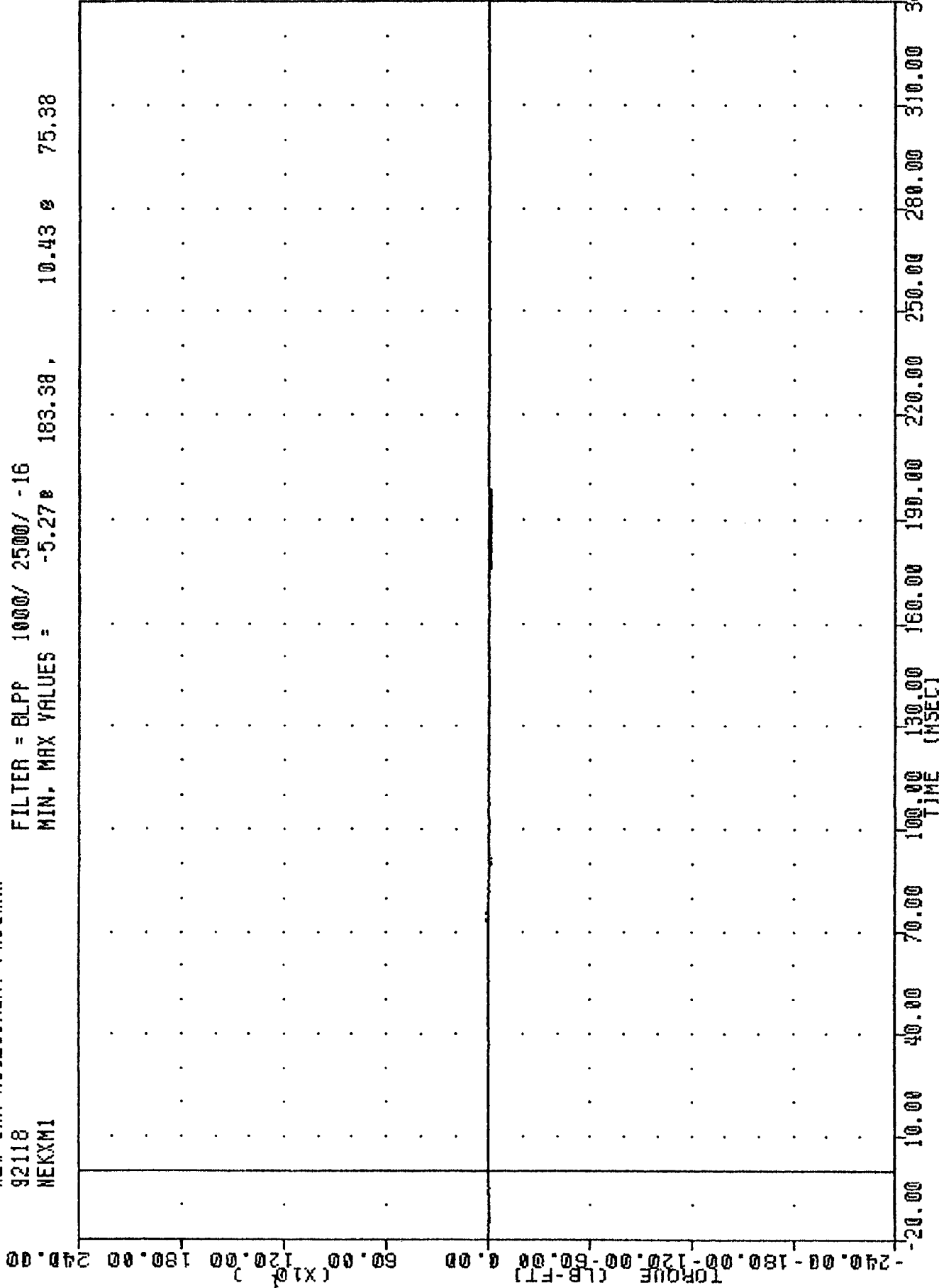
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -23.75e 18.25 . 427.16 e 71.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Z-AXIS AXIAL FORCE

TRC 27
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKXM1

FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -5.27 183.38 , 10.43 75.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT X AXIS

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKYM1

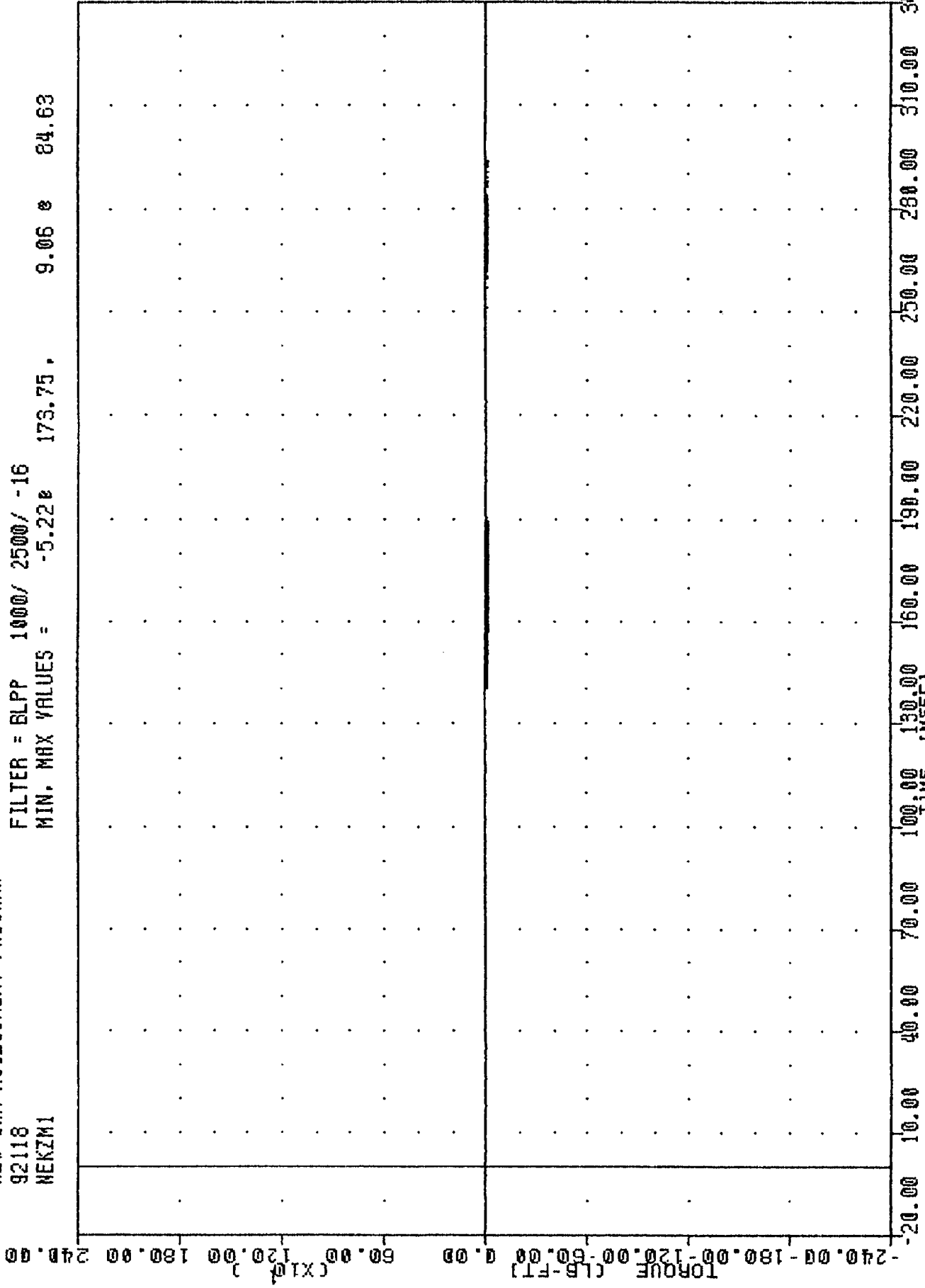
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -10.788 113.88 43.02 e 84.50

TIME (MSEC)	TORQUE (LB-FT)	TORQUE (X10)
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20.00	0.00	0.00
30.00	0.00	0.00
40.00	0.00	0.00
50.00	0.00	0.00
60.00	0.00	0.00
70.00	0.00	0.00
80.00	0.00	0.00
90.00	0.00	0.00
100.00	0.00	0.00
110.00	0.00	0.00
120.00	0.00	0.00
130.00	0.00	0.00
140.00	0.00	0.00
150.00	0.00	0.00
160.00	0.00	0.00
170.00	0.00	0.00
180.00	0.00	0.00
190.00	0.00	0.00
200.00	0.00	0.00
210.00	0.00	0.00
220.00	0.00	0.00
230.00	0.00	0.00
240.00	0.00	0.00
250.00	0.00	0.00
260.00	0.00	0.00
270.00	0.00	0.00
280.00	0.00	0.00
290.00	0.00	0.00
300.00	0.00	0.00
310.00	0.00	0.00
320.00	0.00	0.00
330.00	0.00	0.00
340.00	0.00	0.00

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS

TR 127
 NEW CAR ASSESSMENT PROGRAM
 92118
 NEKZM1

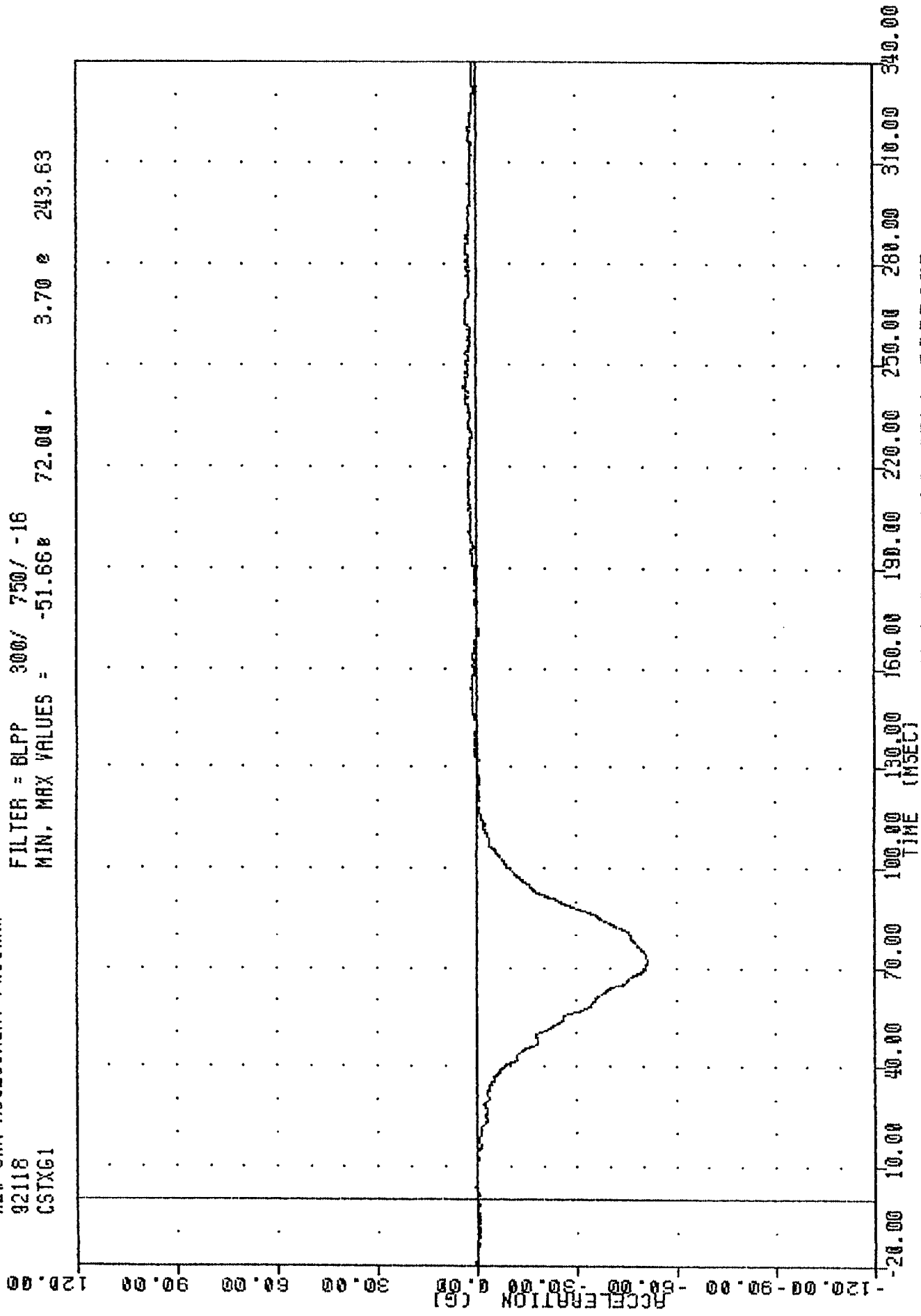
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -5.22e 173.75 . 9.06 e 84.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Z AXIS

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTXG1

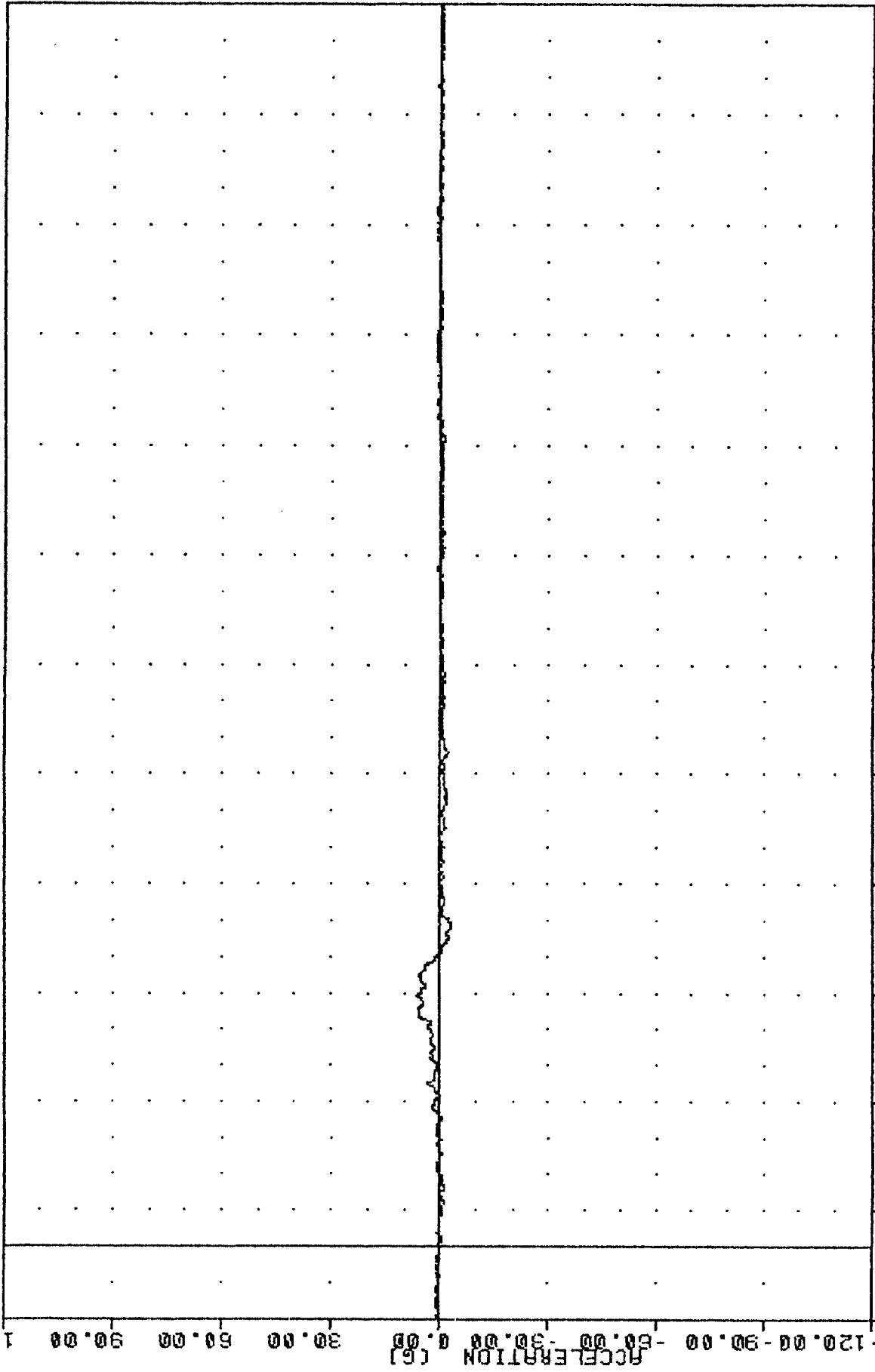
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -51.668 72.00 , 3.70 e 243.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION

IN 12/12/92
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTYG1

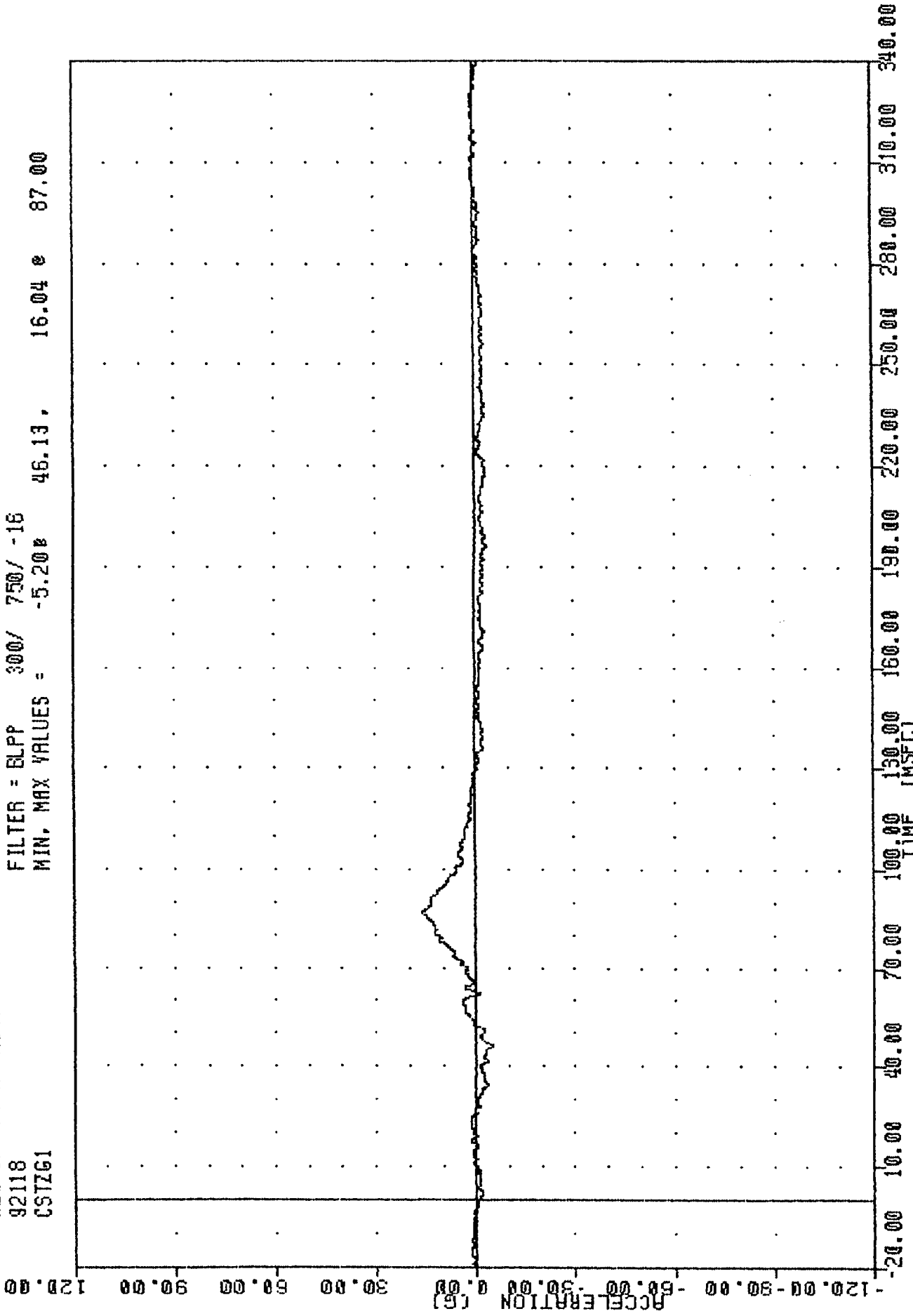
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -3.01E 88.13. 6.21E 69.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTZG1

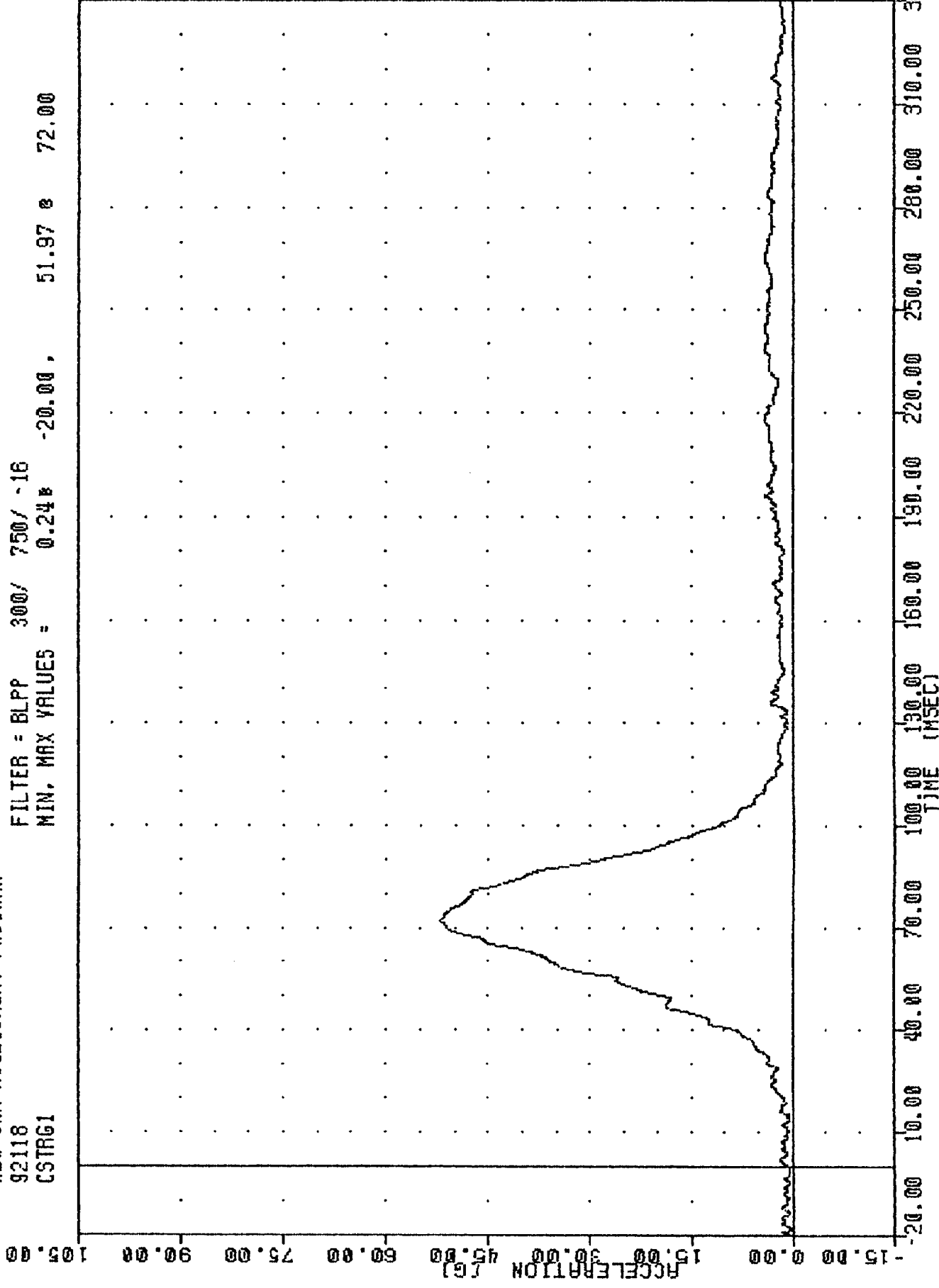
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -5.20 46.13, 16.04 87.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION

TRU 27
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTRG1

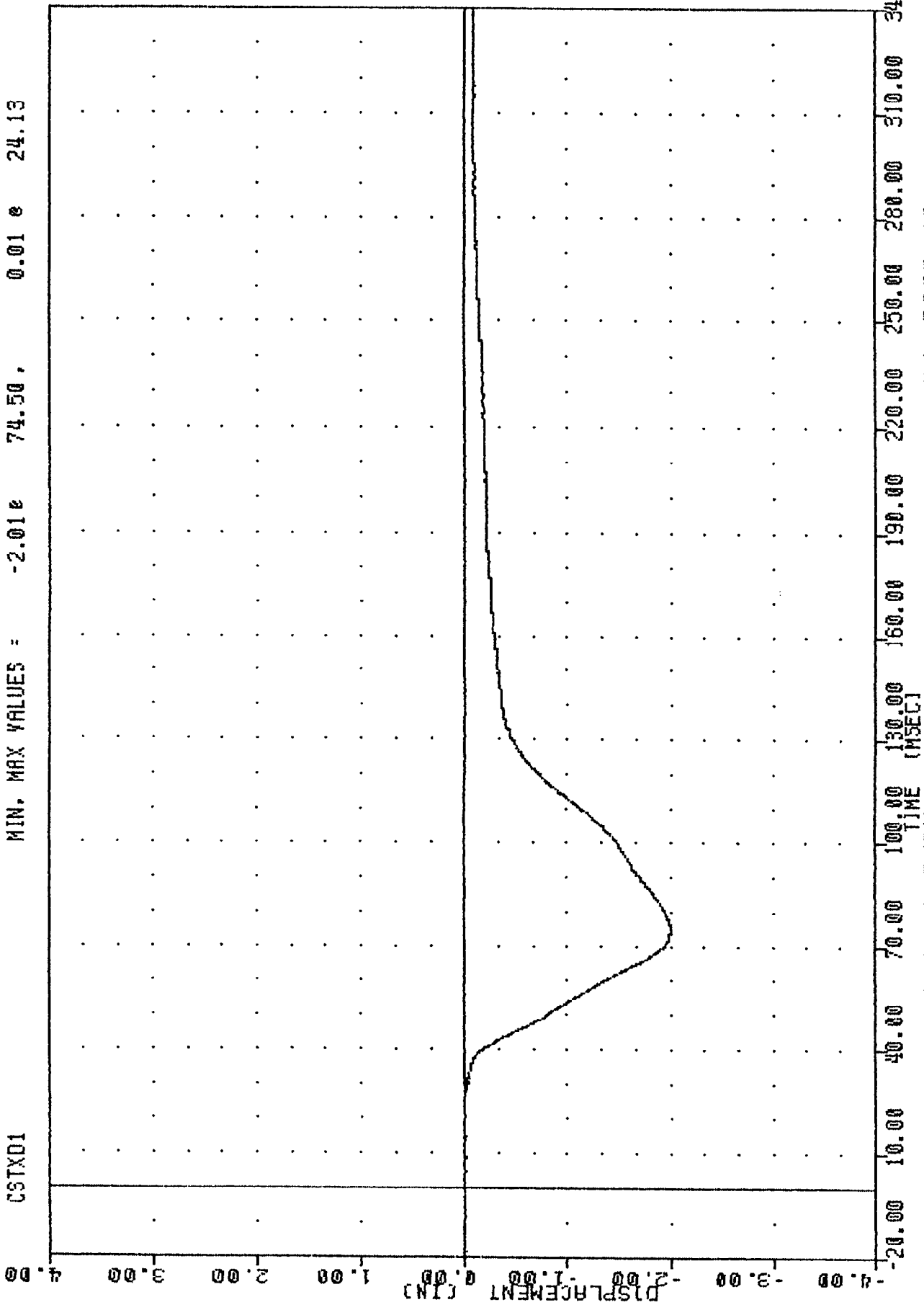
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.248 -20.00, 51.97 8 72.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION

TRC , 920427
NEW CAR ASSESSMENT PROGRAM
92118
CSTXD1

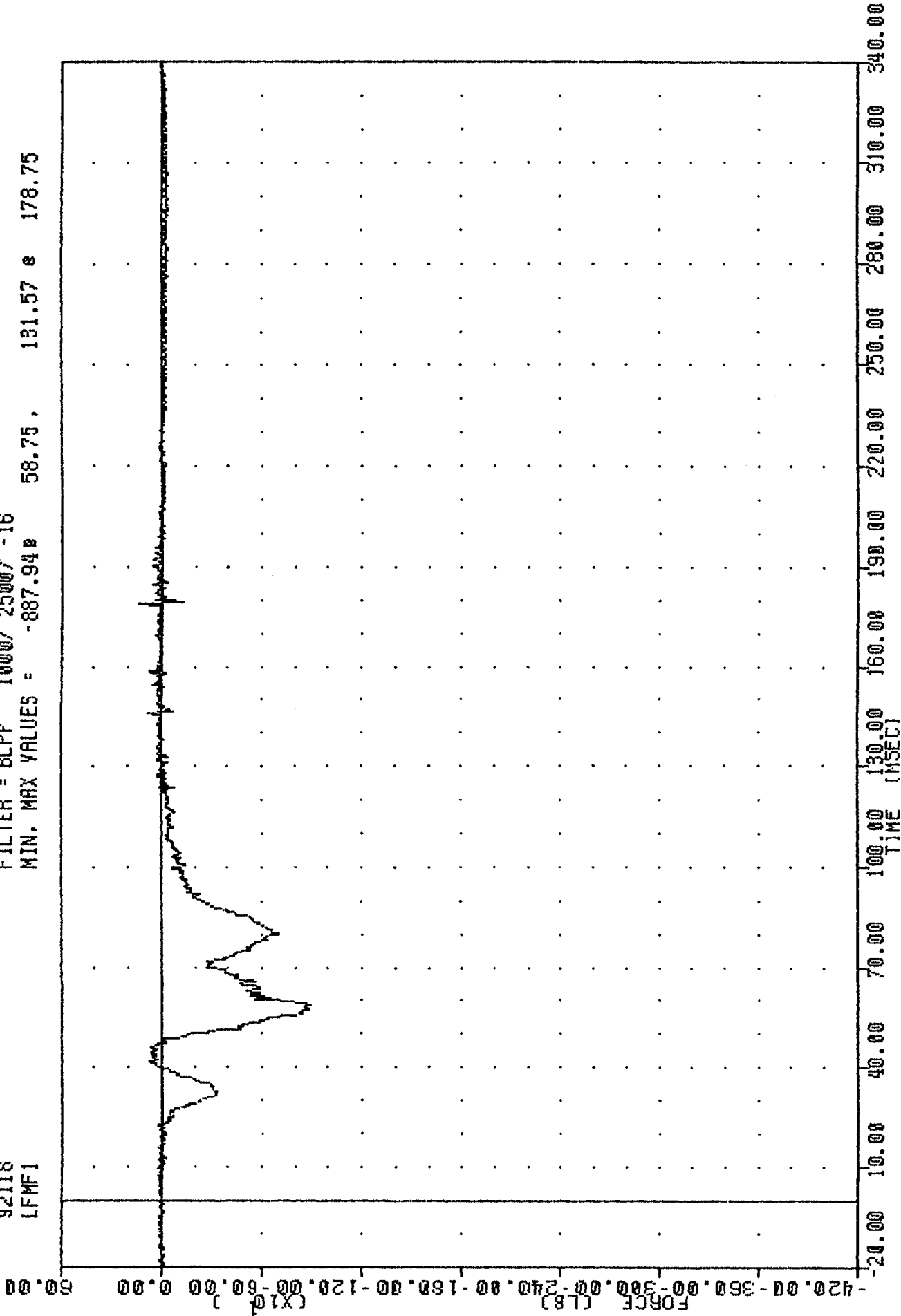
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -2.01e 74.50 , 0.01 e 24.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST DEFLECTION

TRC 27
 NEW CAR ASSESSMENT PROGRAM
 92118
 LFMF1

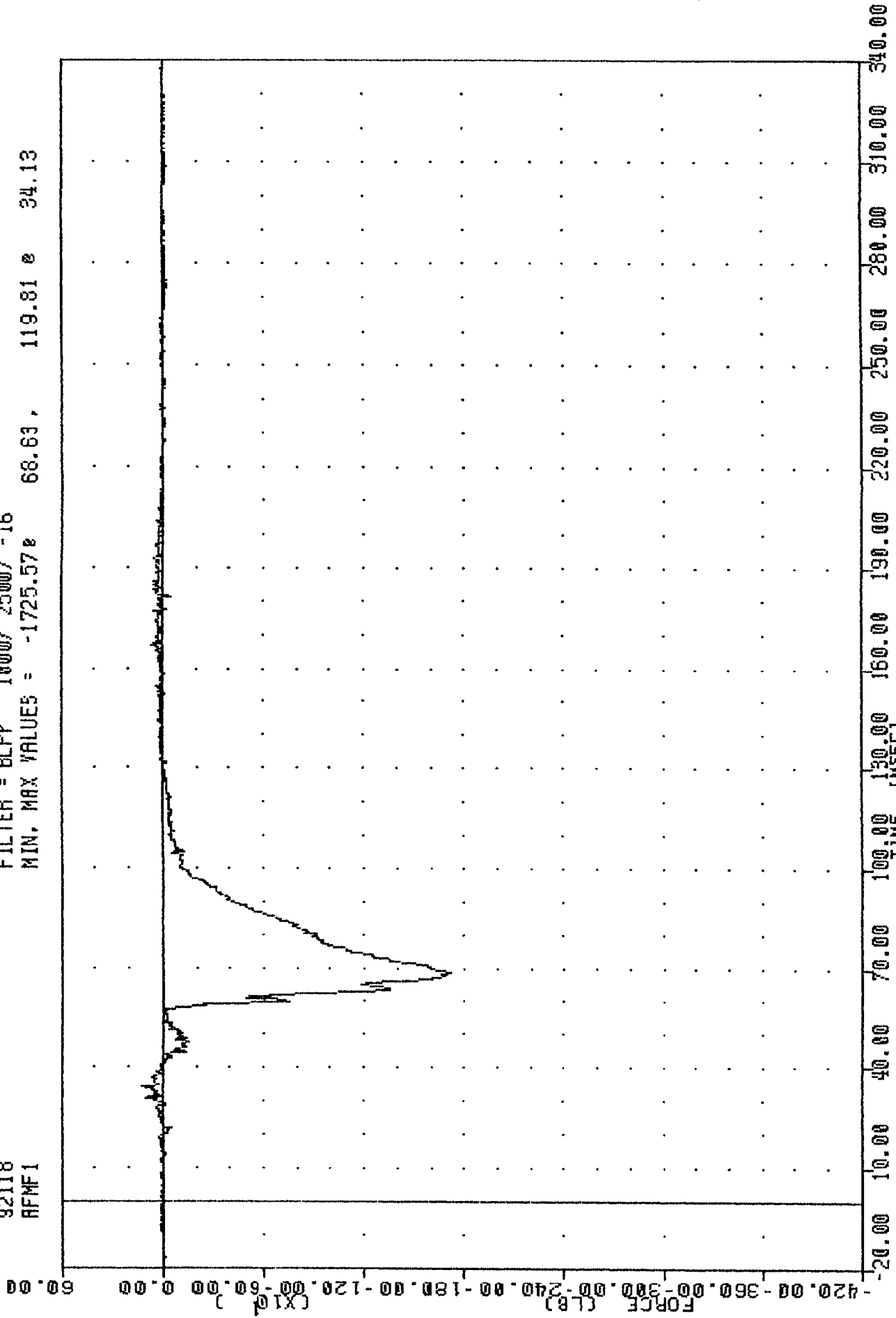
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -887.94 58.75 131.57 178.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER LEFT FEMUR FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 RFMF1

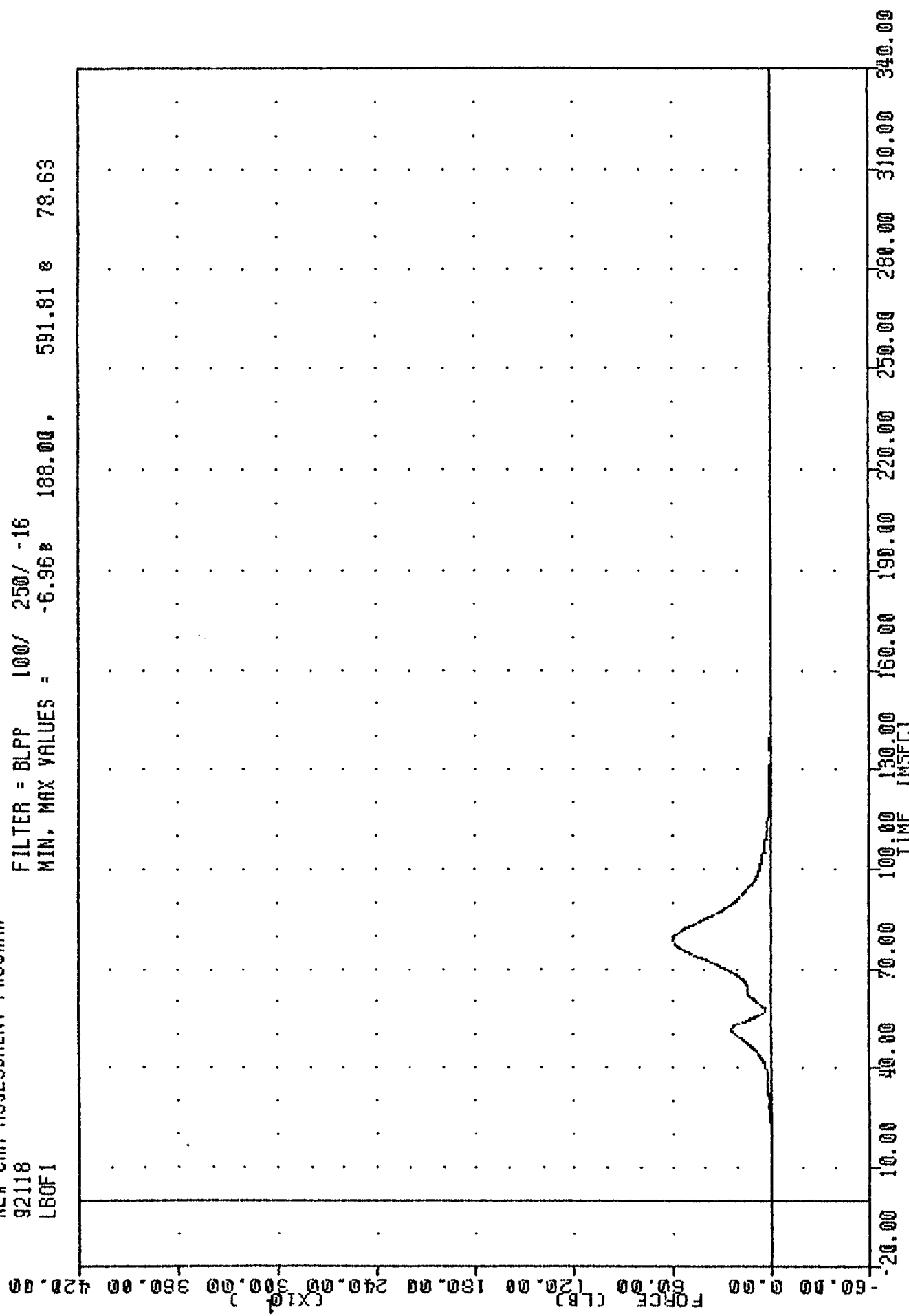
FILTER = BLFP 1000/ 2500/ -16
 MIN, MAX VALUES = -1725.57e 68.63 , 119.81 e 34.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT FEMUR FORCE

NEW CAR ASSESSMENT PROGRAM
 92118
 L80F1

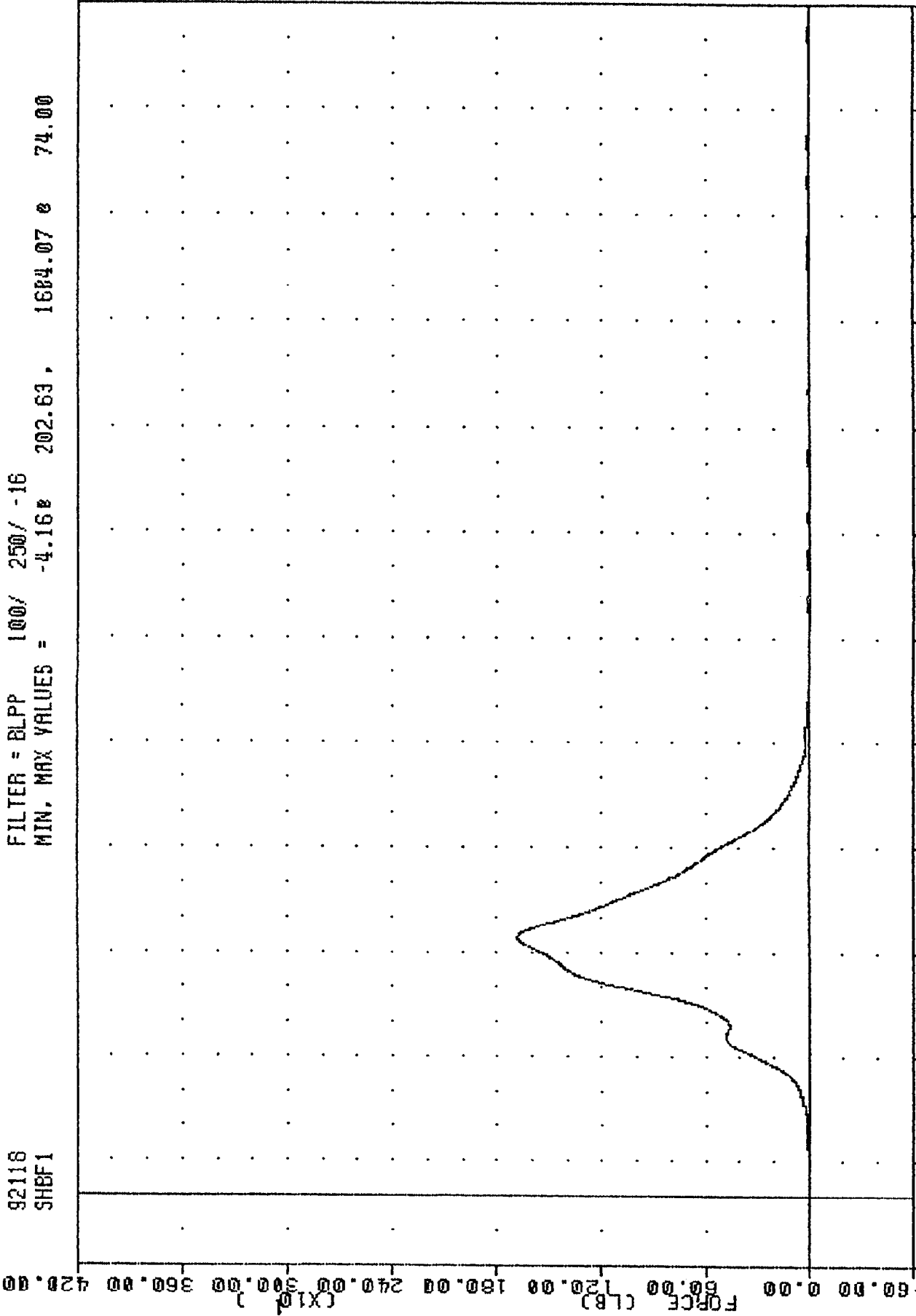
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 188.00, 591.81 e 78.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER LAP BELT OUTBOARD FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92116
 SHEF1

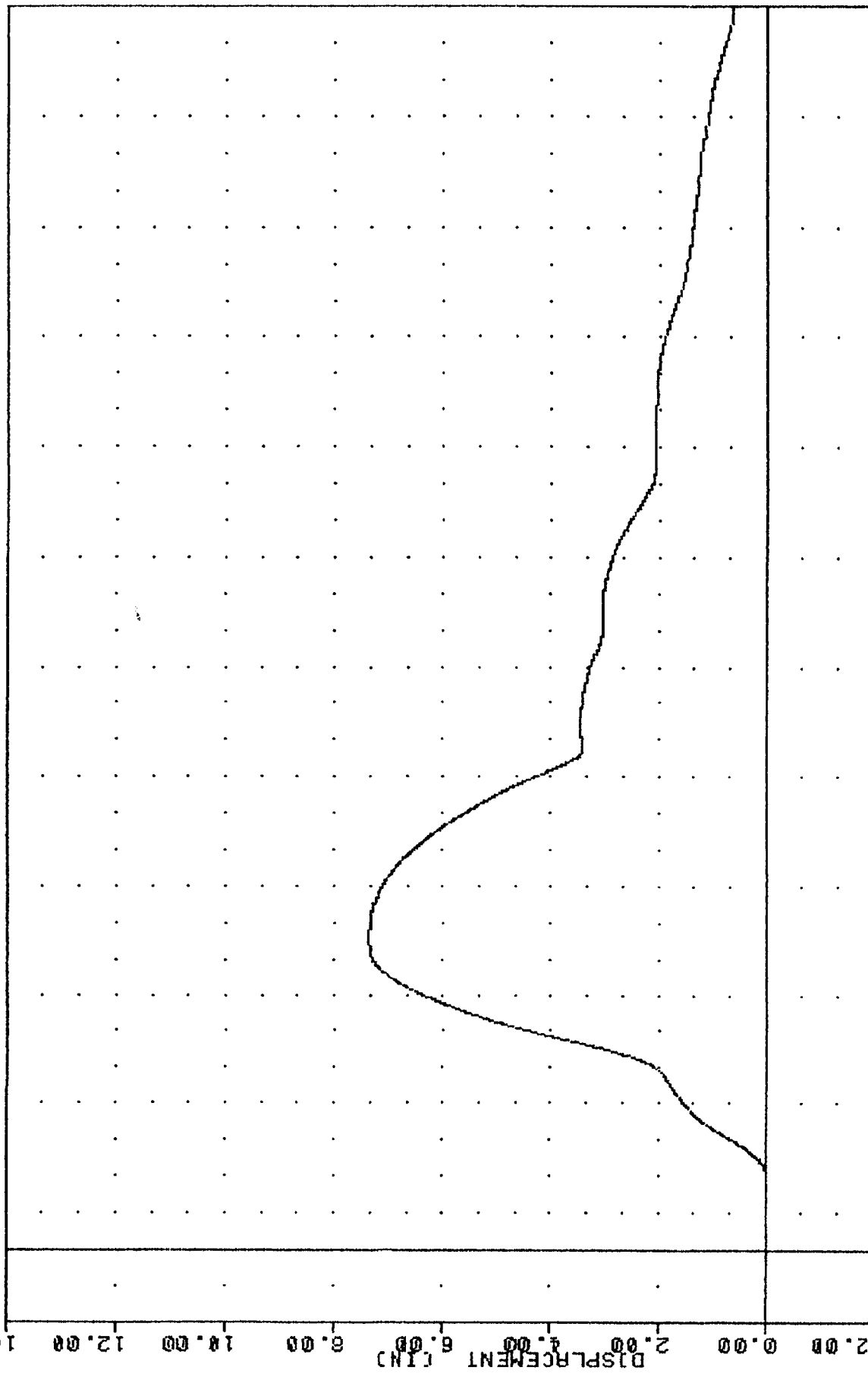
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -4.16# 202.63 , 1684.07 # 74.00



-60.00 0.00 60.00 120.00 180.00 240.00 300.00 360.00 420.00
 (X10)
 -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
 TIME (MSEC)
 1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT FORCE

NEW CAR ASSESSMENT PROGRAM
 92118
 SH801

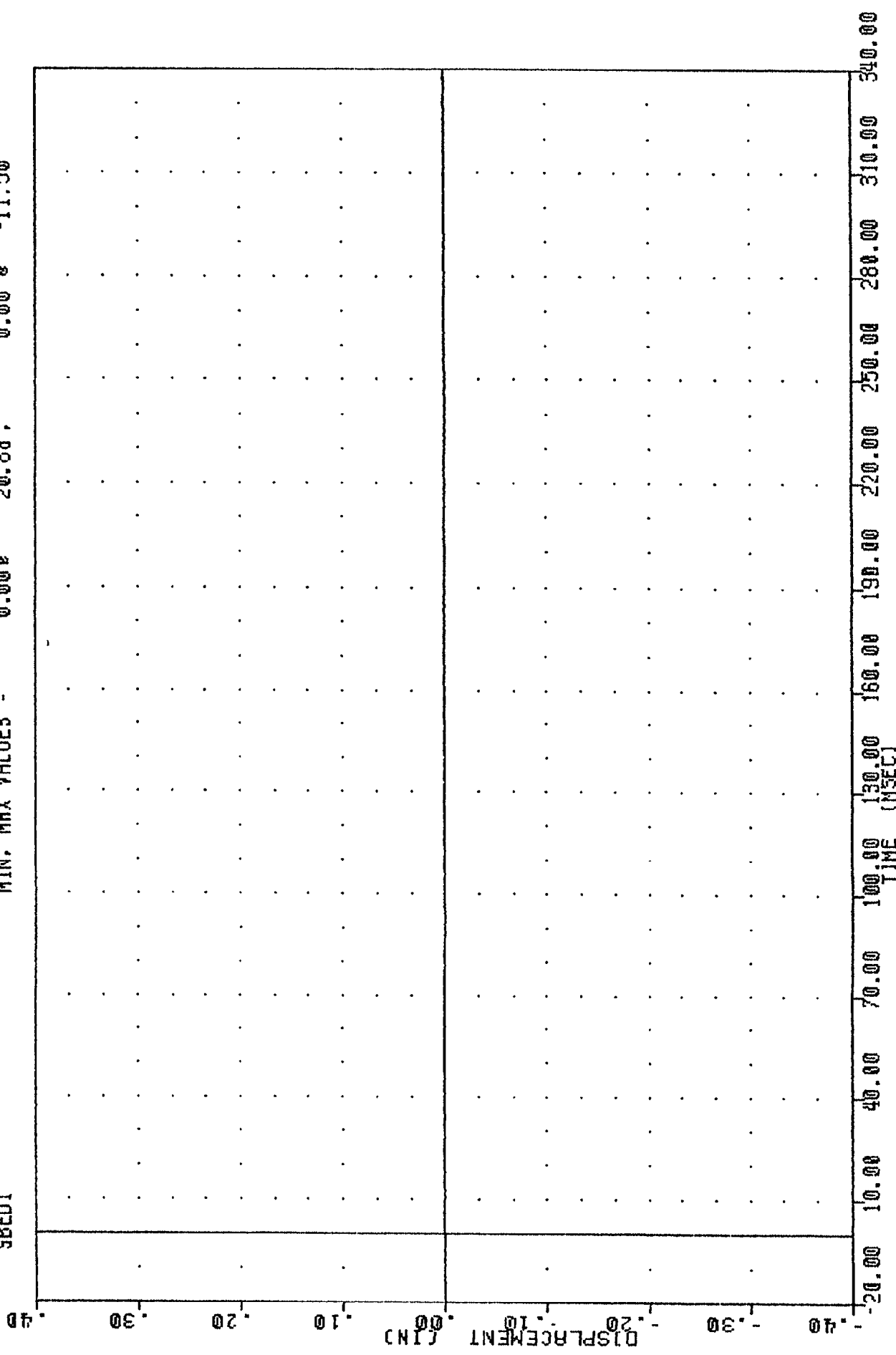
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -0.028 19.50, 7.35 85.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT DISPLACEMENT

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 SBED1

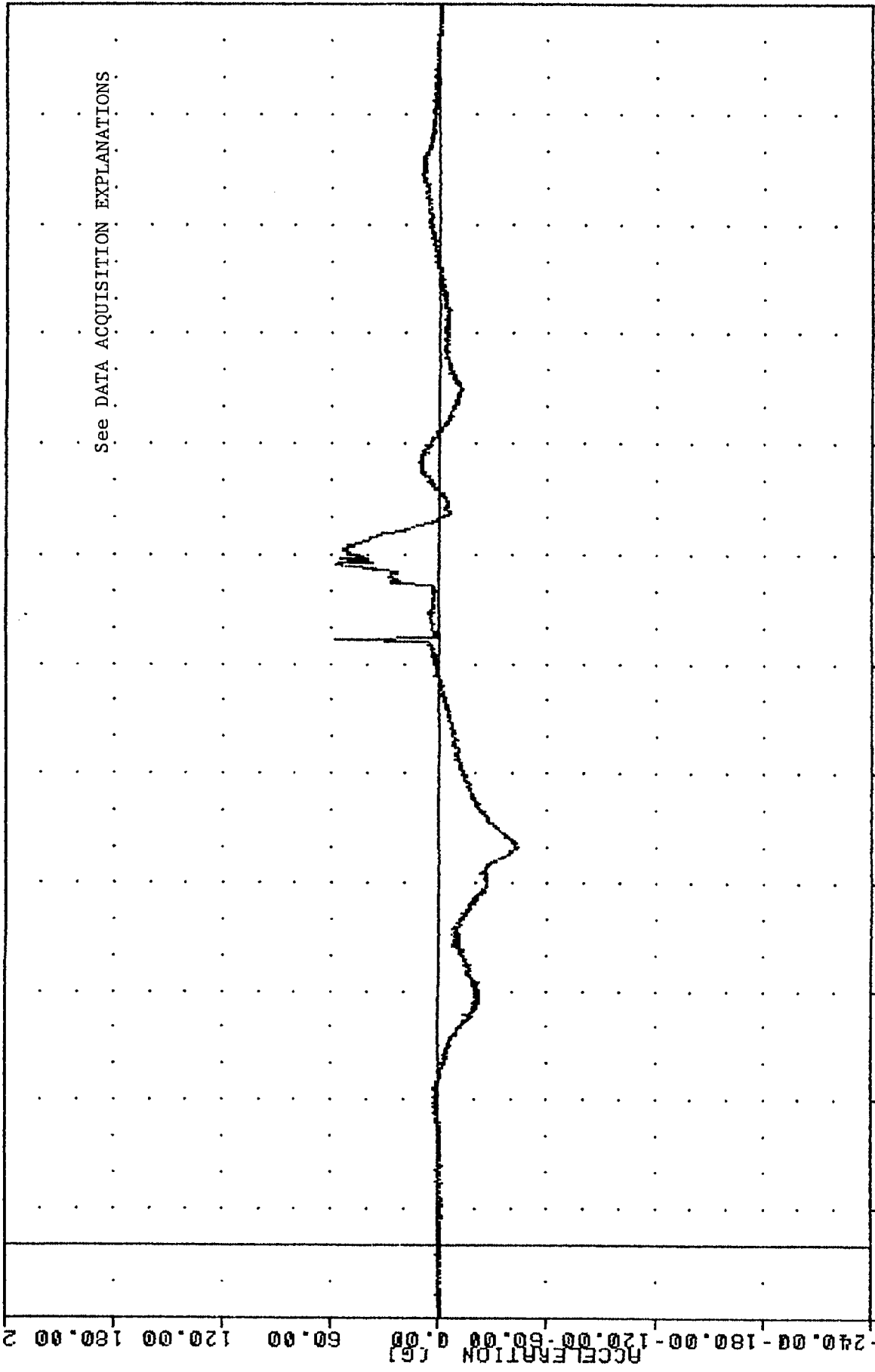
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.00 e 20.88 , 0.00 e -11.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT BELT EXTENSION

IM 32/1
 NEW CAR ASSESSMENT PROGRAM
 92118
 HEDXG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -44.36e 109.75 . 58.12 e 187.50



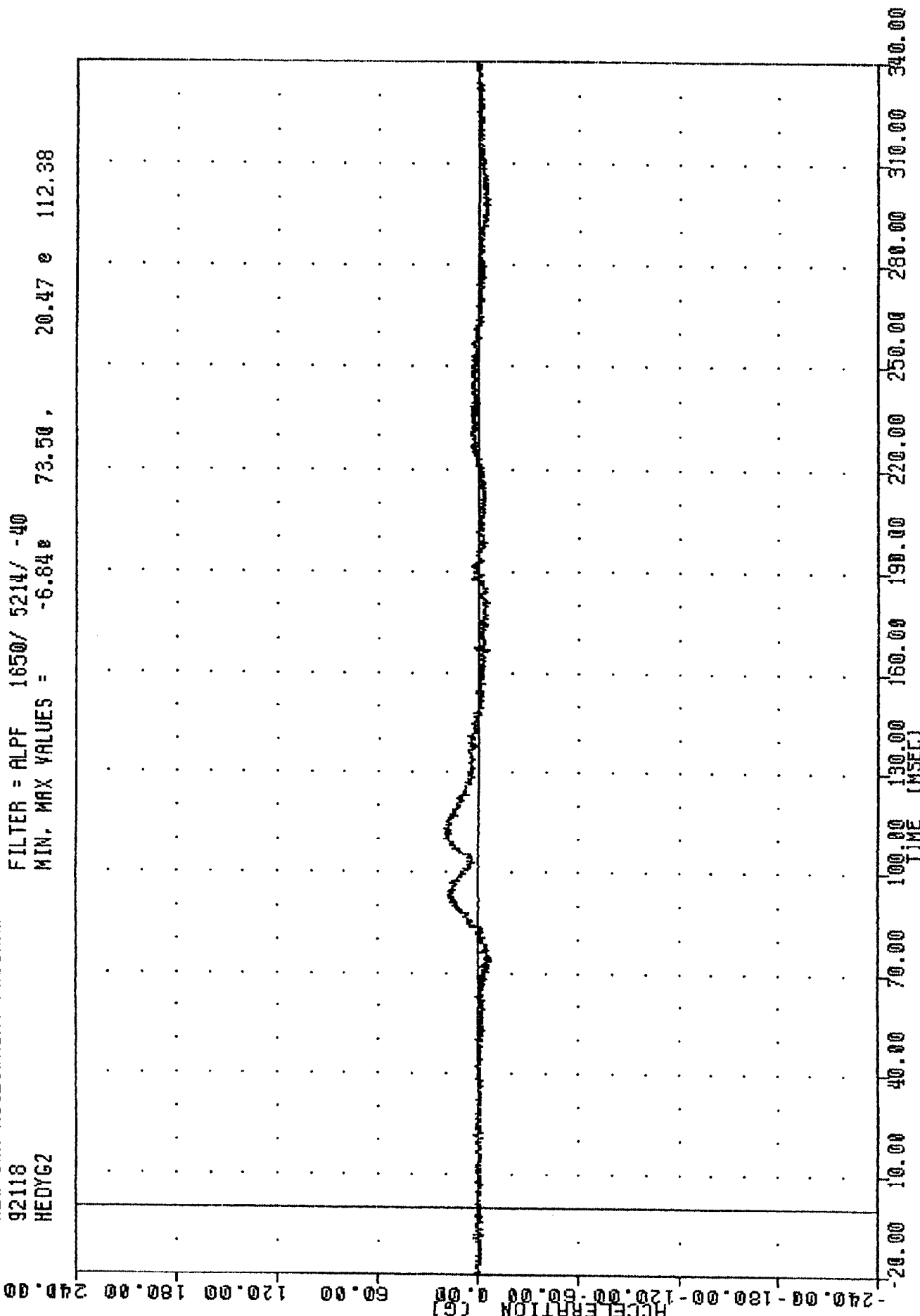
See DATA ACQUISITION EXPLANATIONS

-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
 TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD X-AXIS ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 HEDYG2

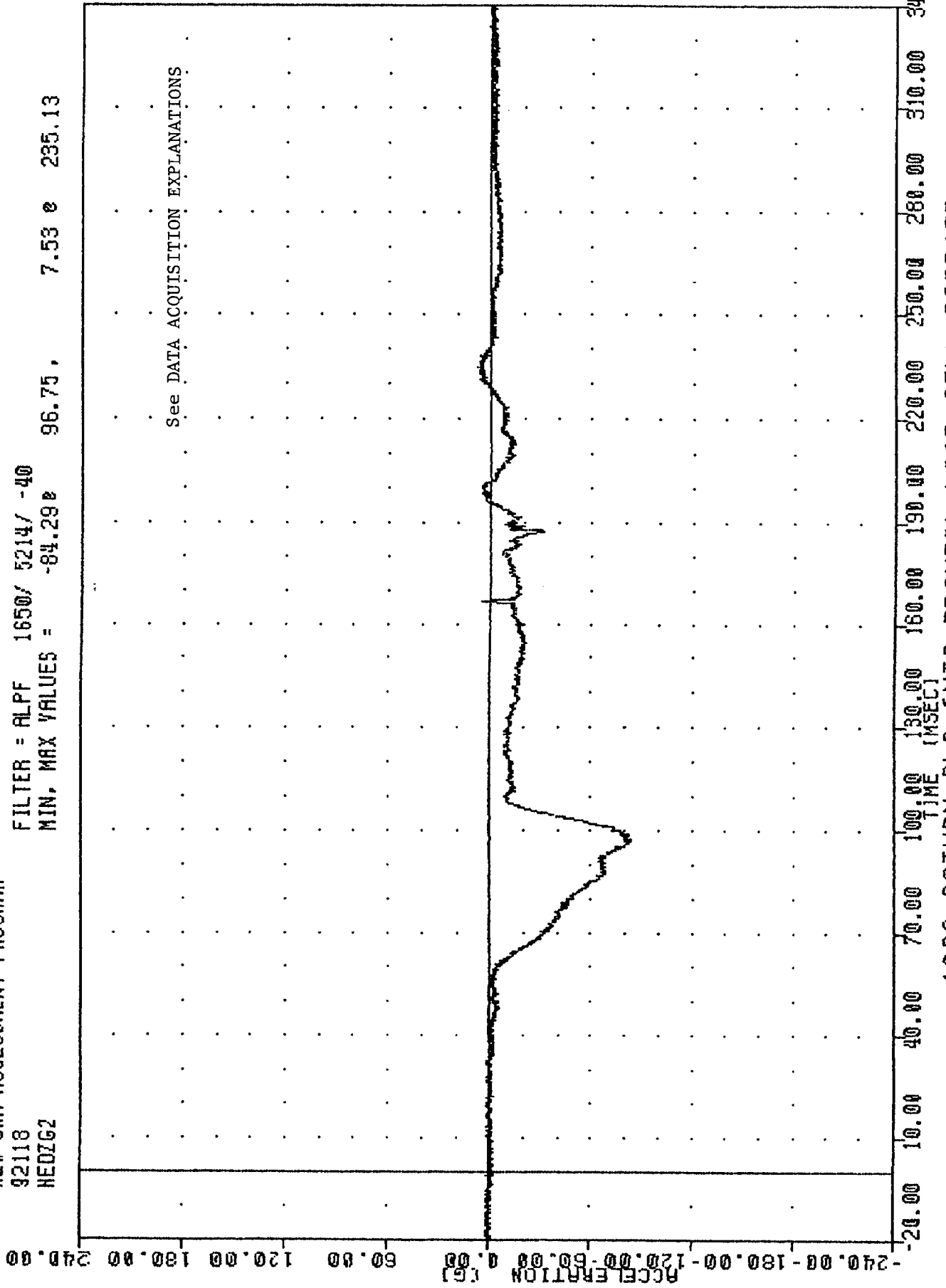
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -6.84e 73.50 , 20.47 e 112.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD Y-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM
 92118
 HEDZG2

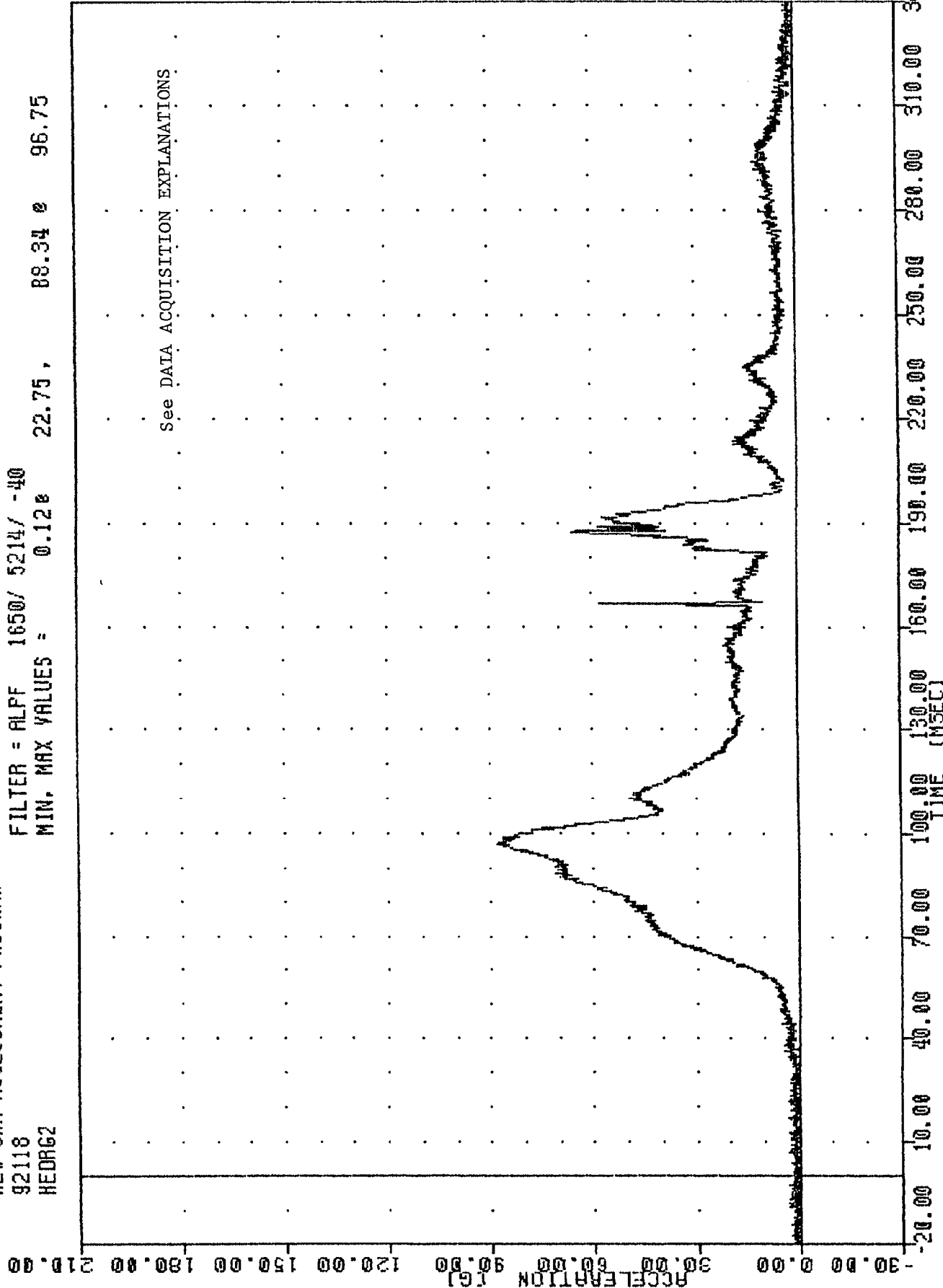
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -84.29 96.75 , 7.53 235.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD Z-AXIS ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 HEDRG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.12e 22.75 , 88.34 e 96.75

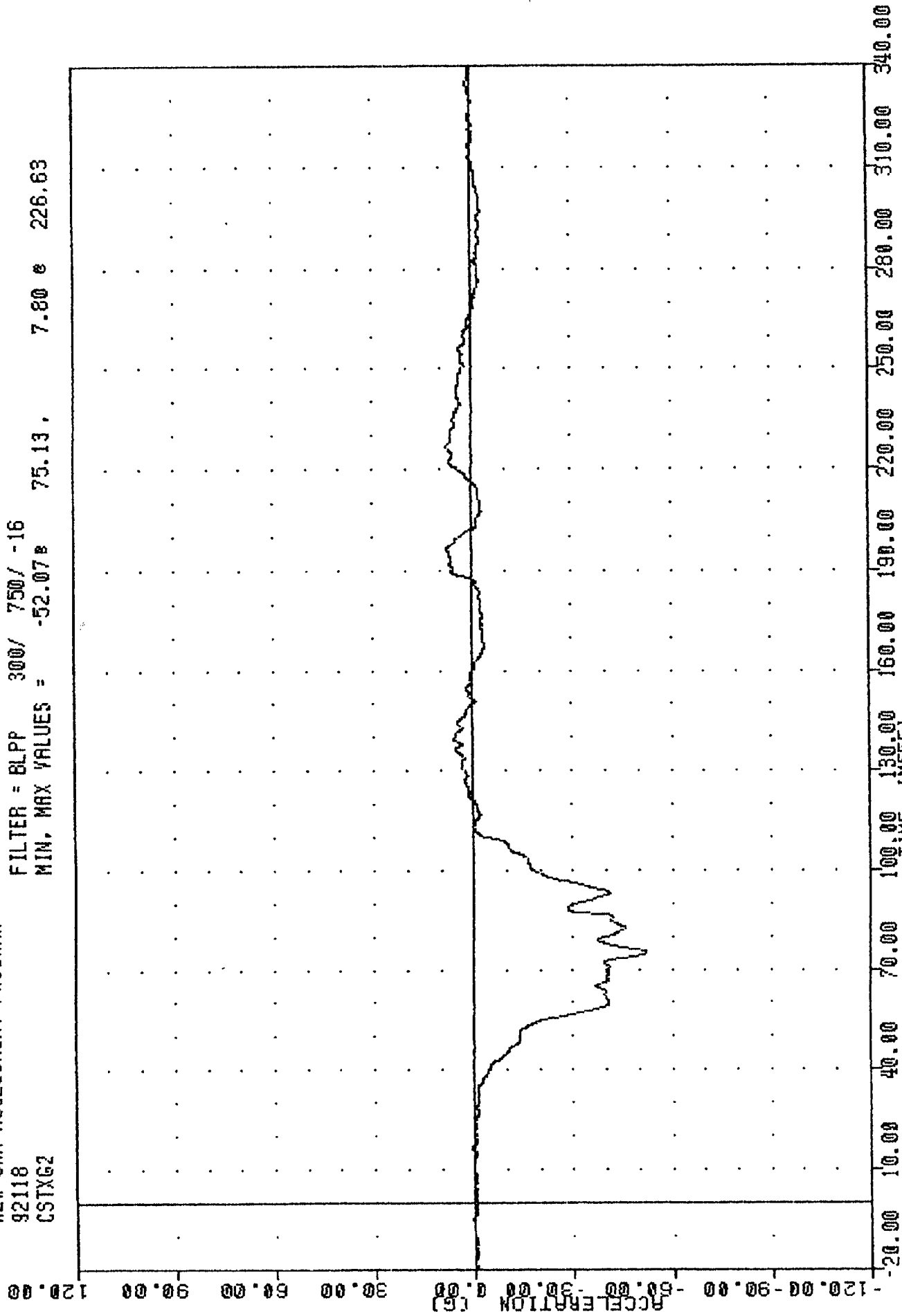


See DATA ACQUISITION EXPLANATIONS

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD RESULTANT ACCELERATION

IRU
NEW CAR ASSESSMENT PROGRAM
92118
CSTXG2

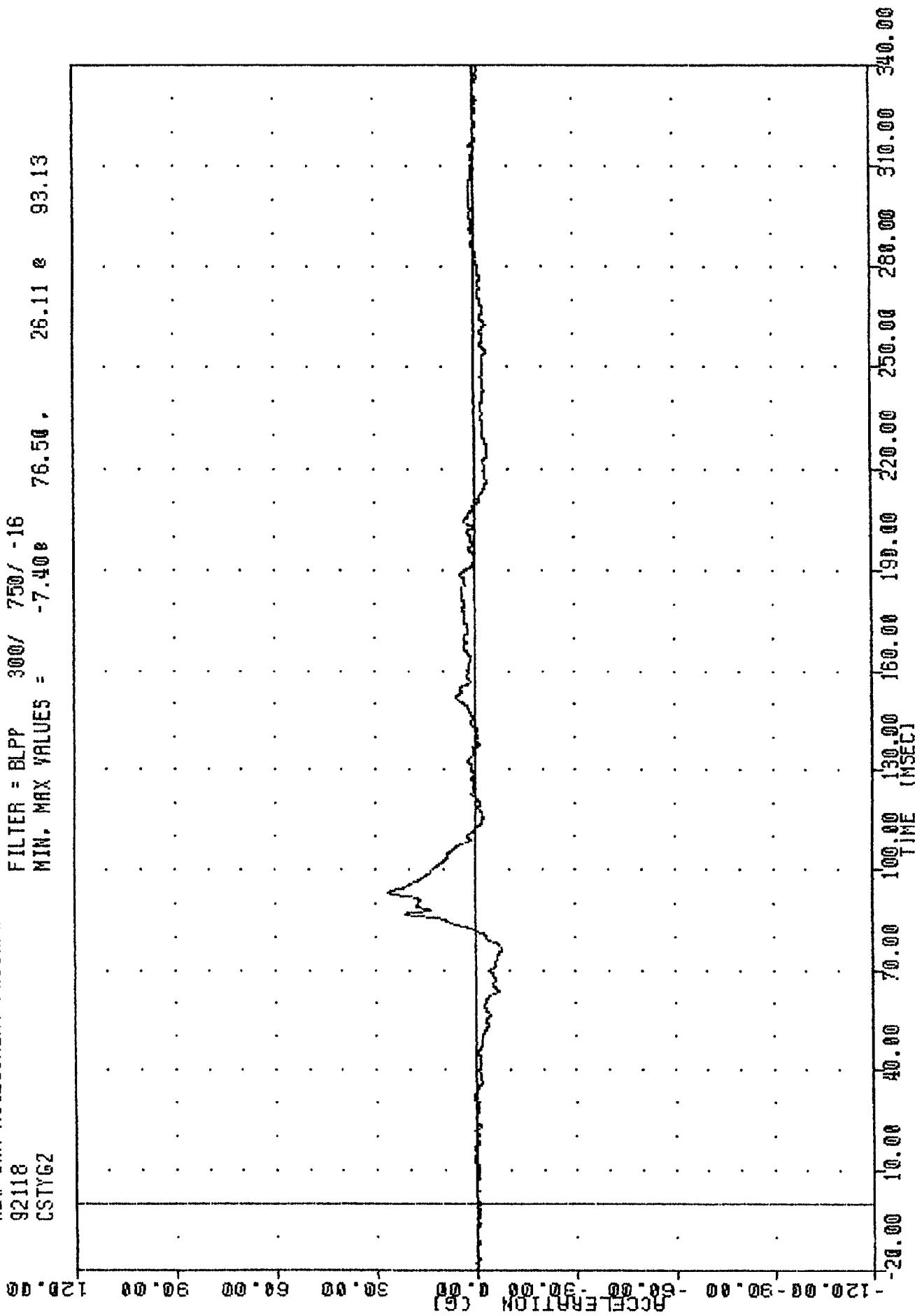
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -52.07 75.13, 7.80 e 226.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTYG2

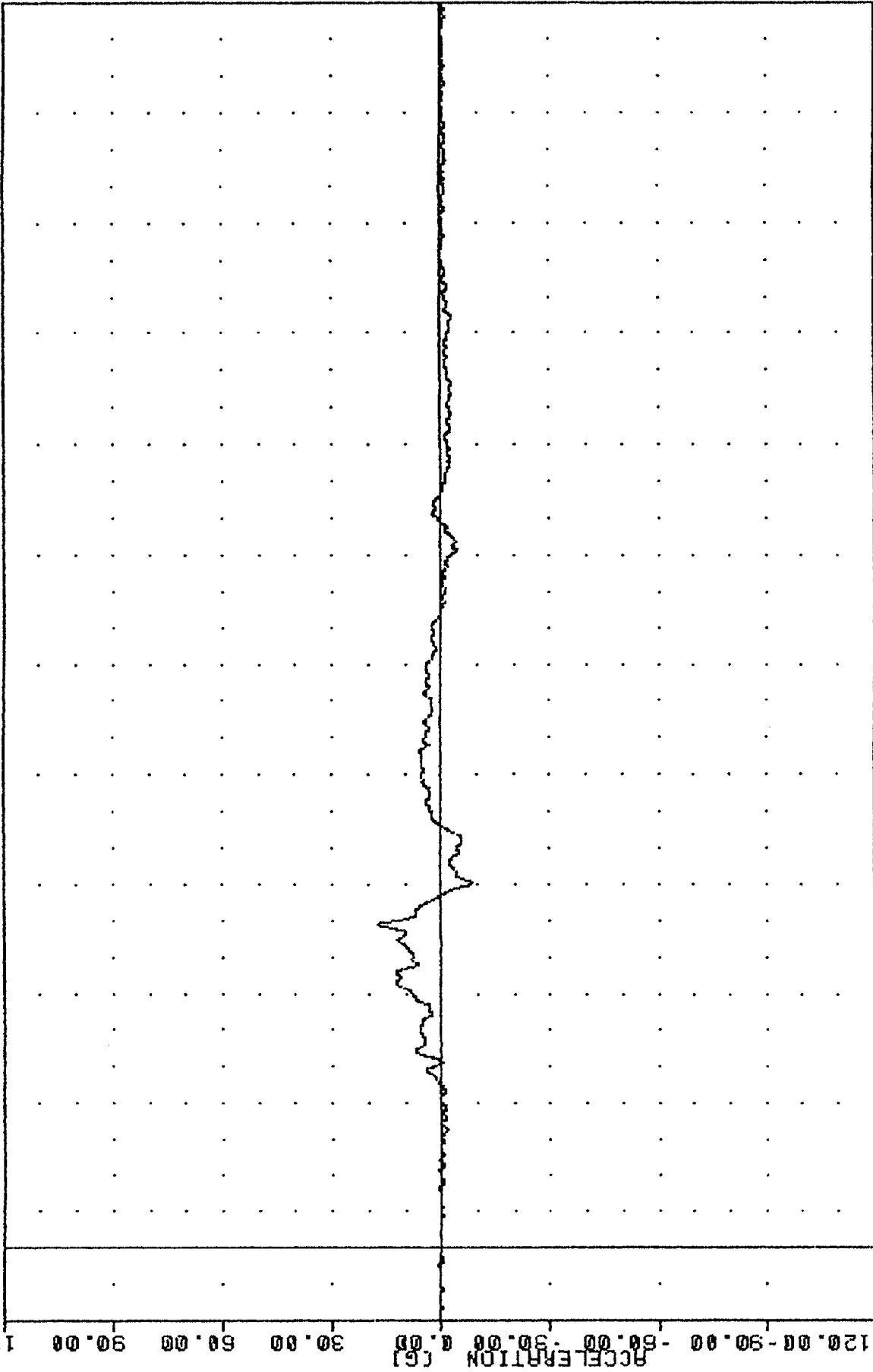
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -7.40e 76.50, 26.11 e 93.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST Y-AXIS ACCELERATION

IH
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTZG2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -8.598 100.38 , 17.42 e 88.88

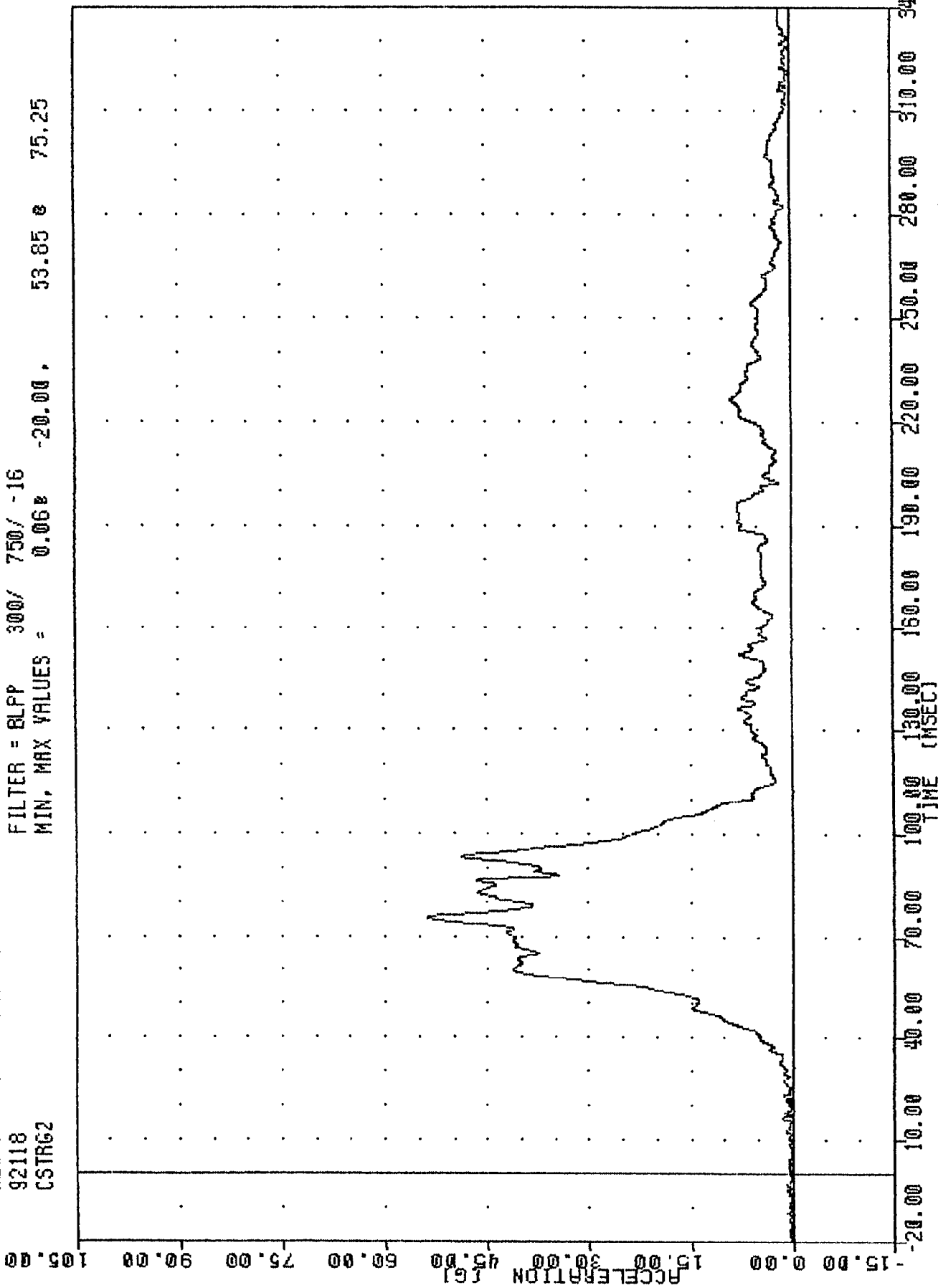


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
 TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST Z-AXIS ACCELERATION

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 CSTRG2

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.06E -20.00, 53.85 E 75.25

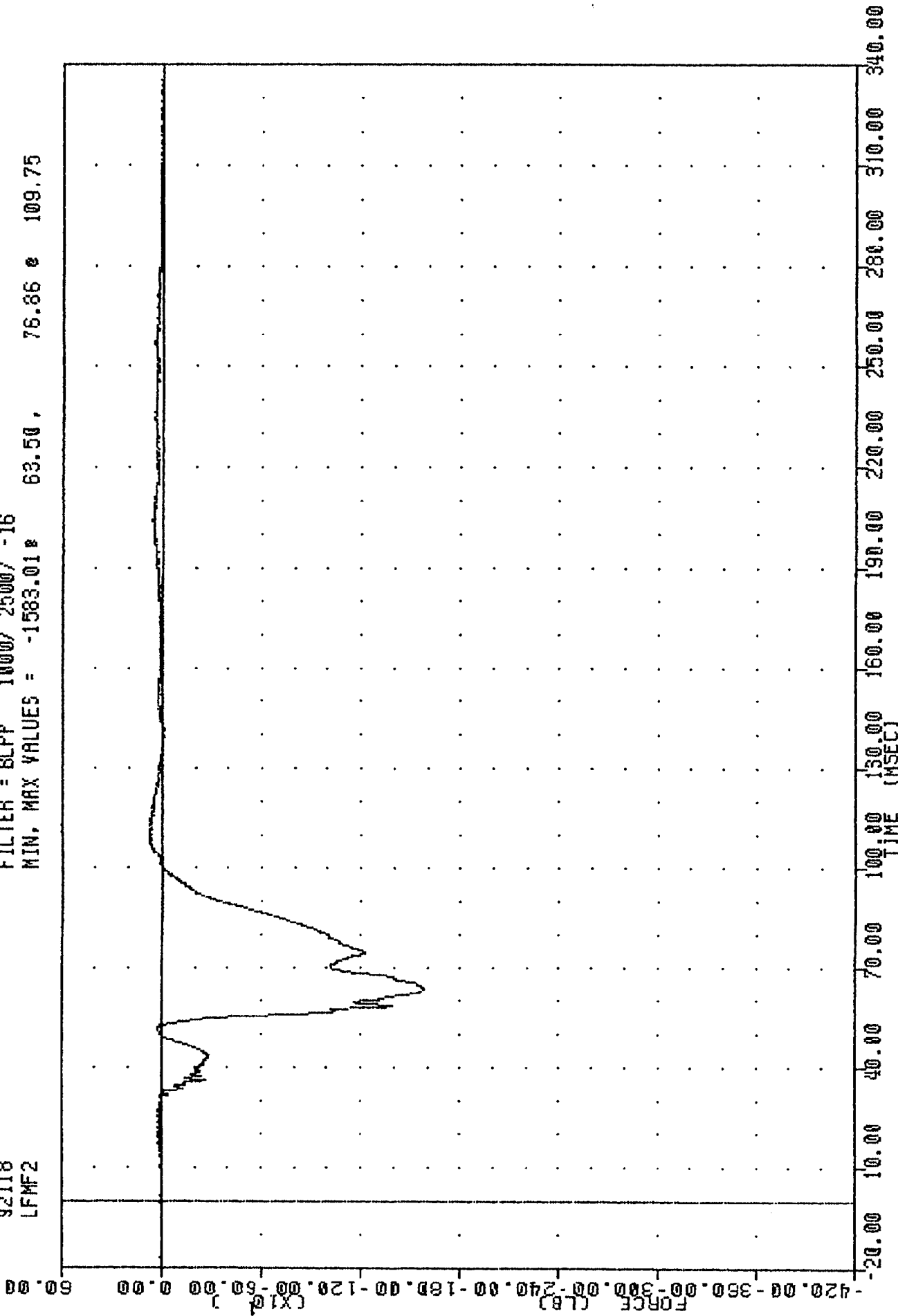


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST RESULTANT ACCELERATION

NEW CAR ASSESSMENT PROGRAM

92118
LFMF2

FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = -1583.018 63.50 , 76.66 e 109.75

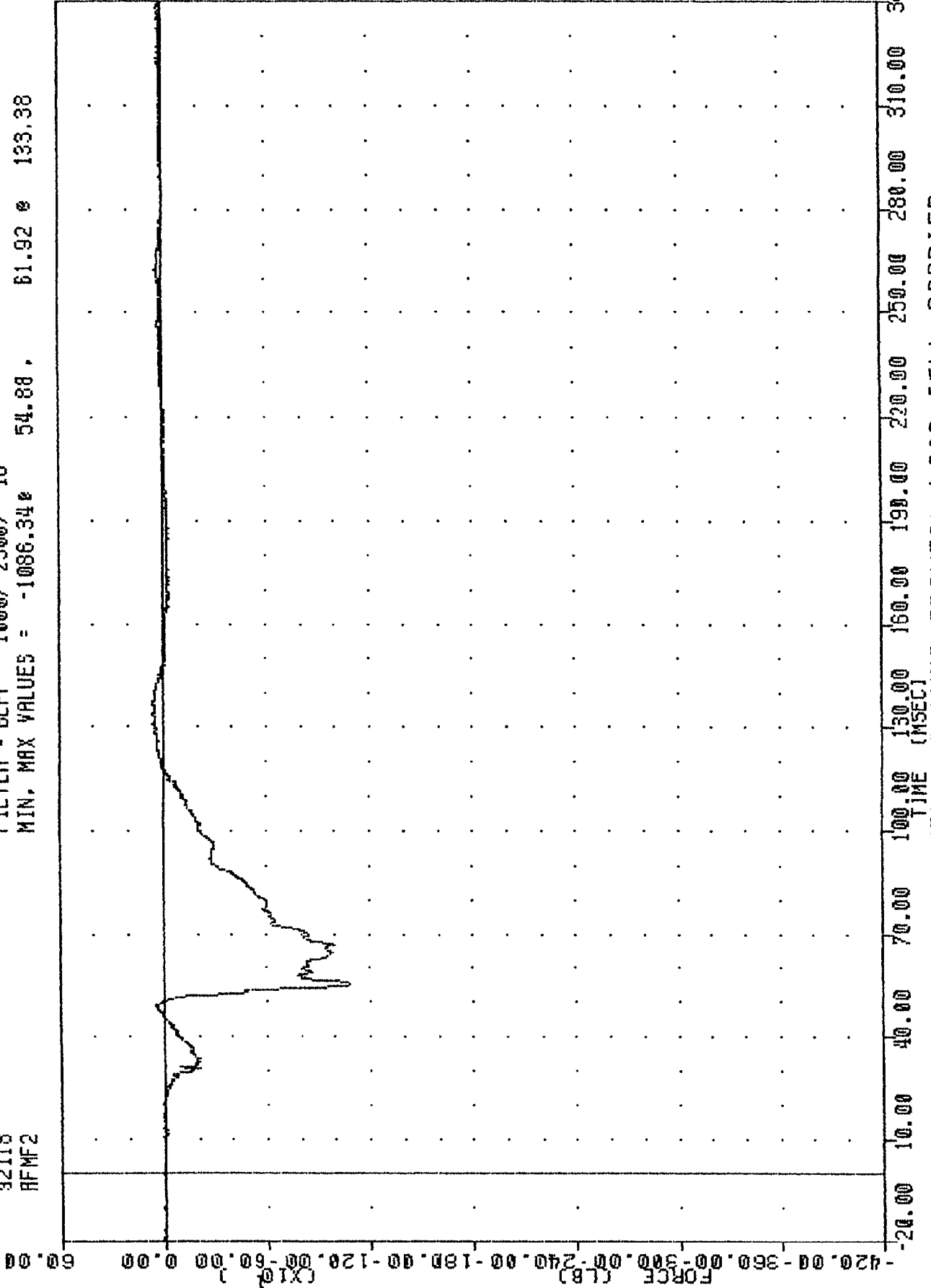


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 RFMF2

920427

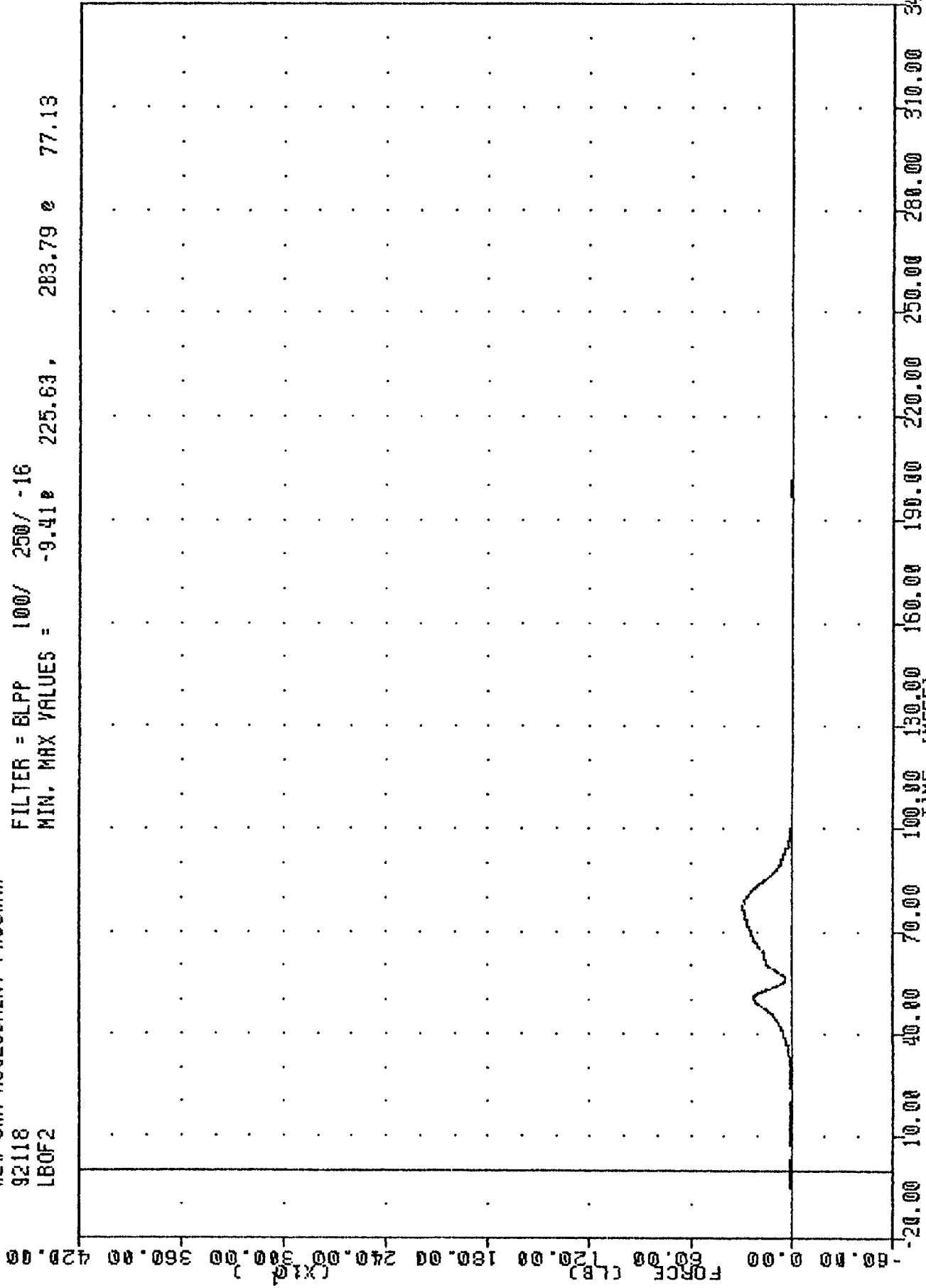
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1086.340 54.88, 61.92 133.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER RIGHT FEMUR FORCE

H
 NEW CAR ASSESSMENT PROGRAM
 92118
 LBOF2

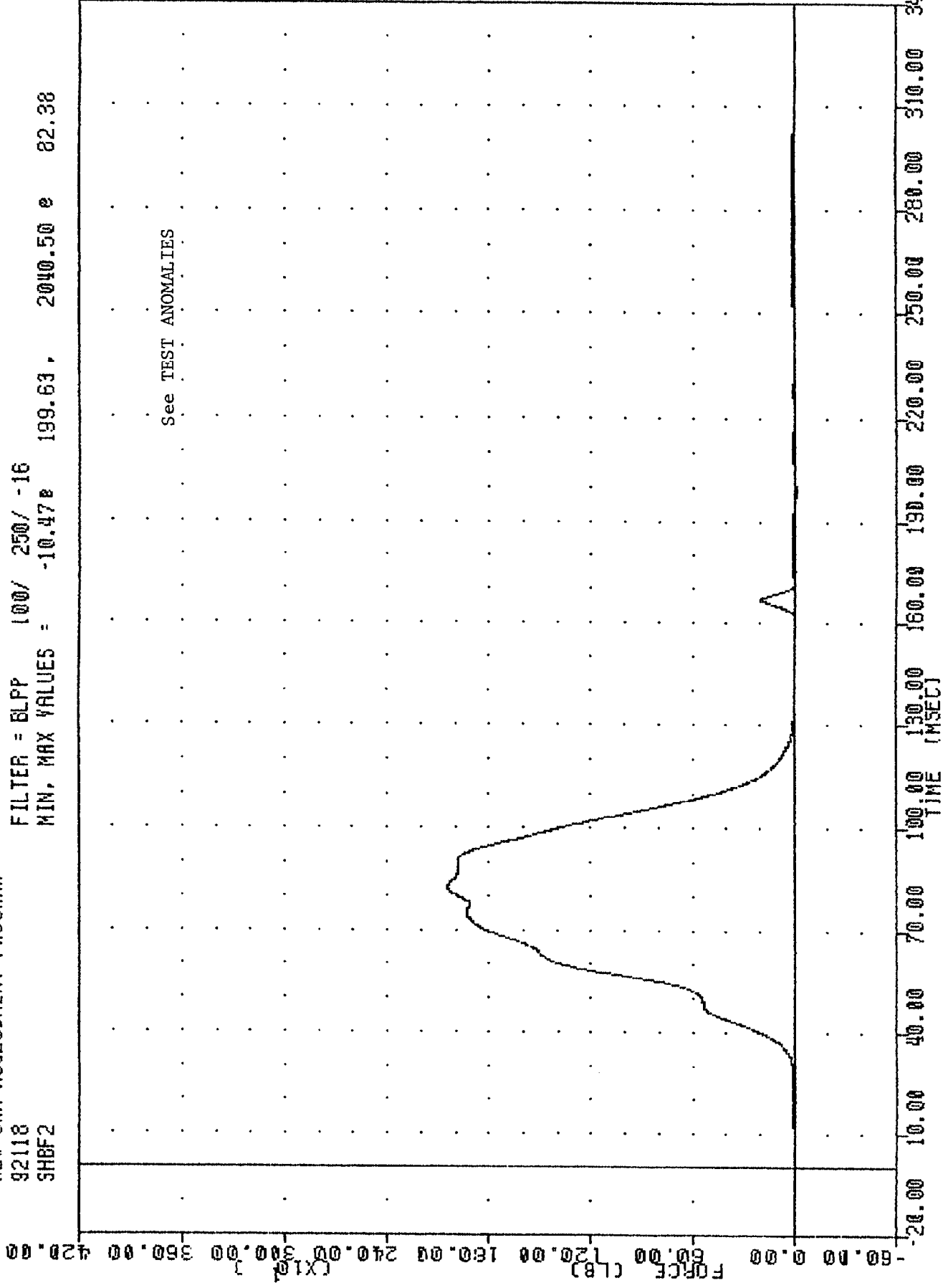
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -9.41e 283.79 e 77.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER LAP BELT OUTBOARD FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 SHBF2

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -10.47e 199.63 , 2010.50 e 82.38



See TEST ANOMALIES

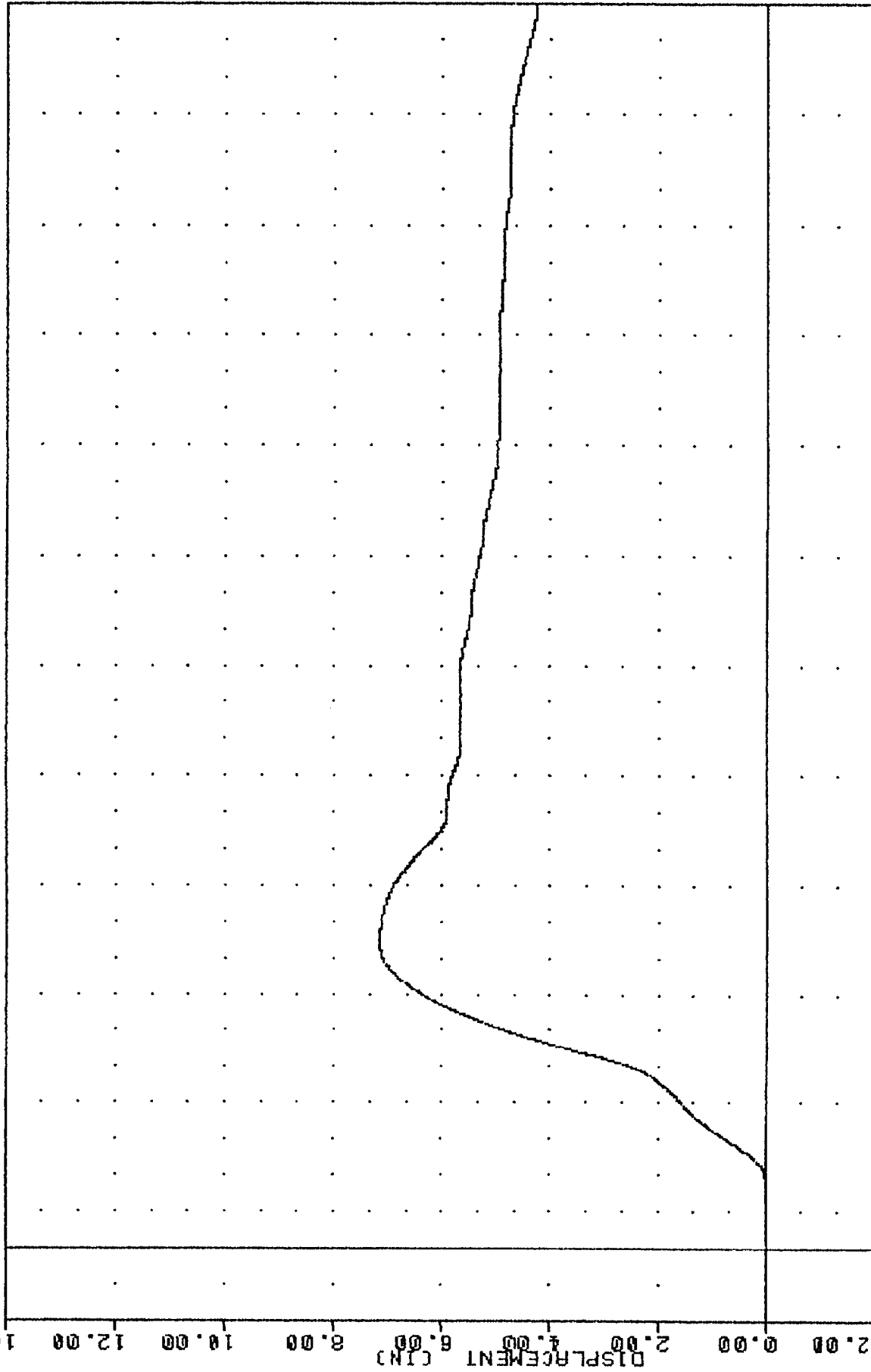
1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER SHOULDER BELT FORCE

IN 427
NEW CAR ASSESSMENT PROGRAM

92118
SH802

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -0.01e -5.75, 7.16 e 84.75

14.00



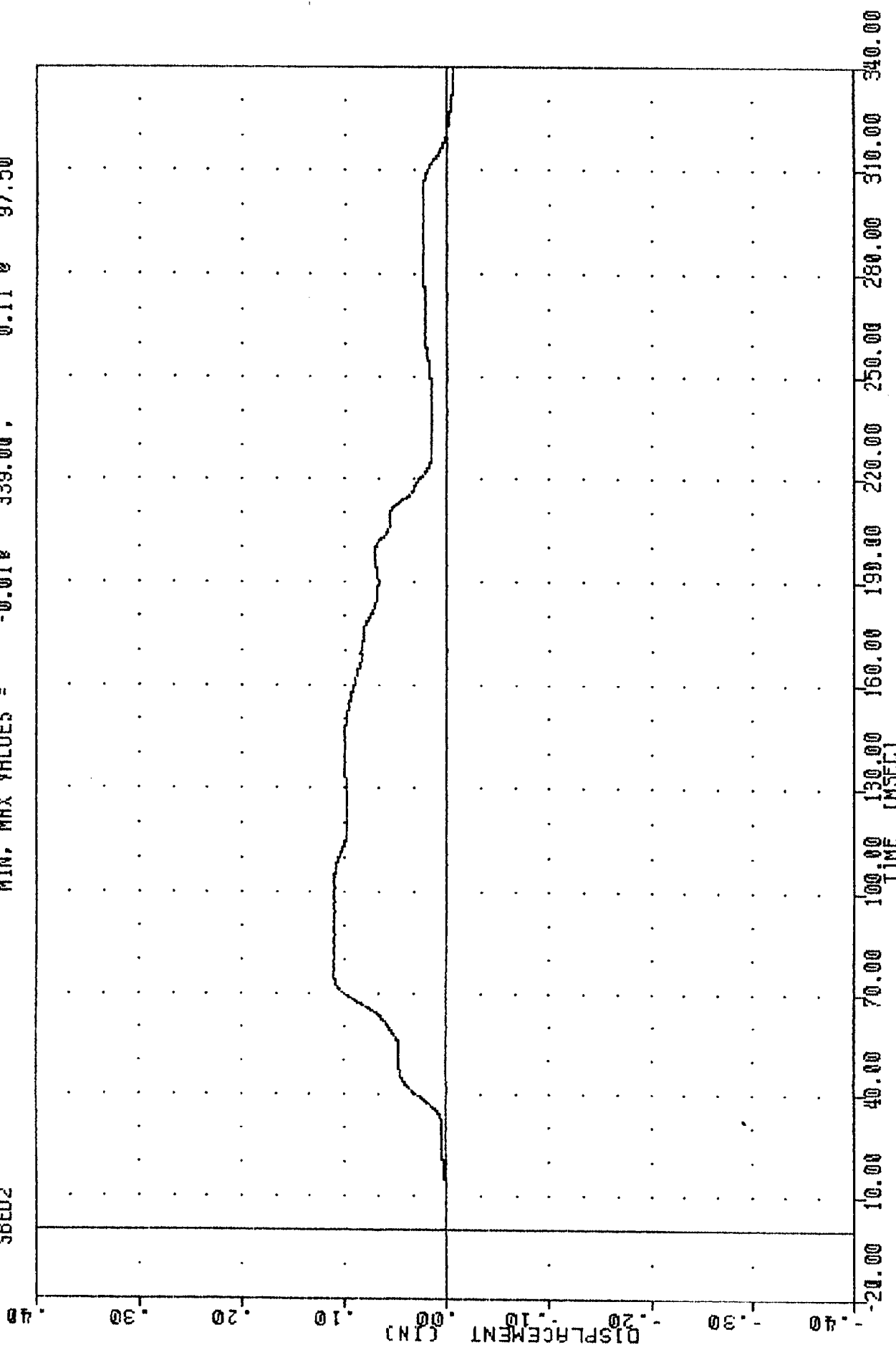
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 SBED2

820427

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -0.01e 339.00 . 0.11 e 97.50



B-36

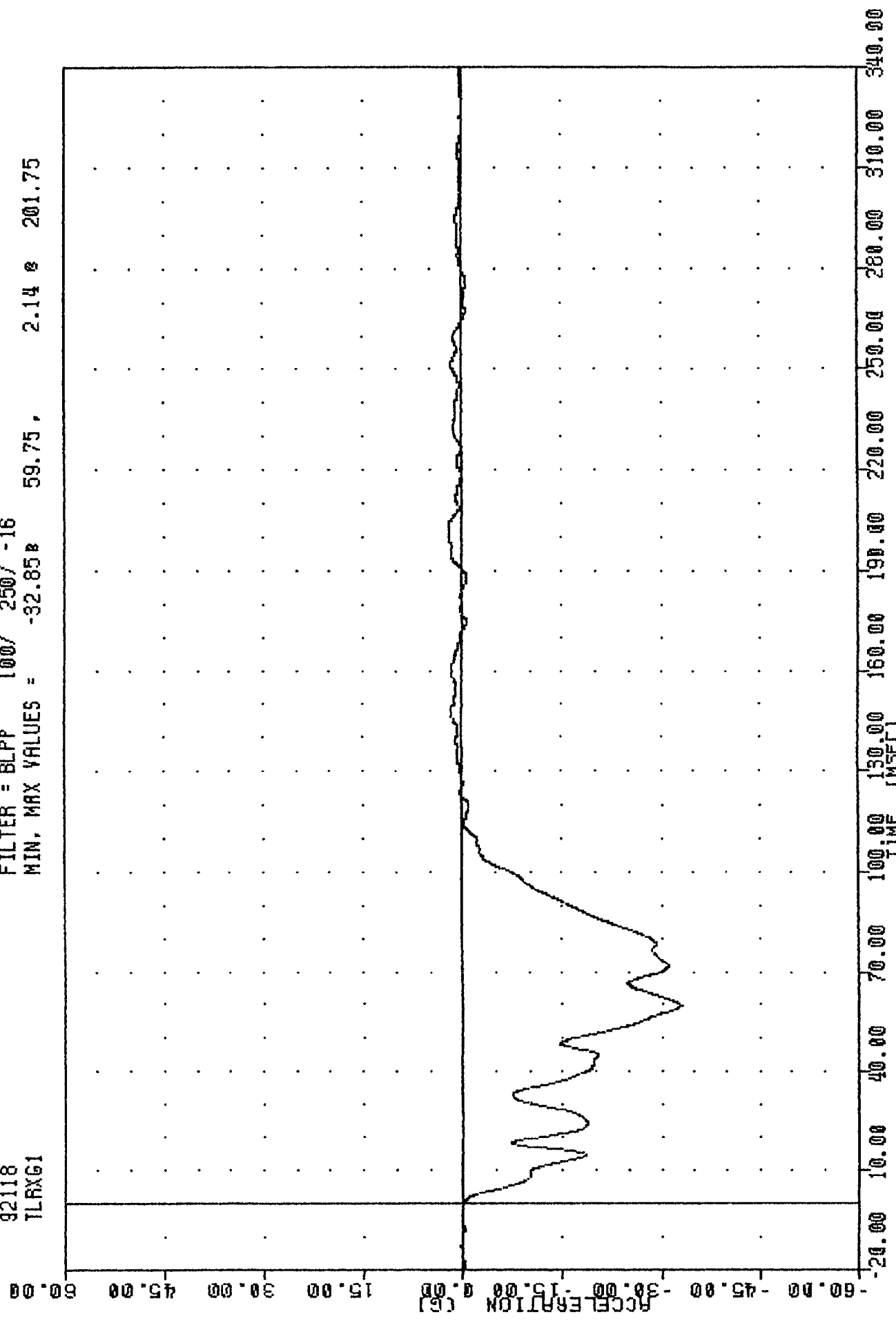
920427

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER SEAT BELT EXTENSION



IN 42 /
 NEW CAR ASSESSMENT PROGRAM
 92118
 TLRXG1

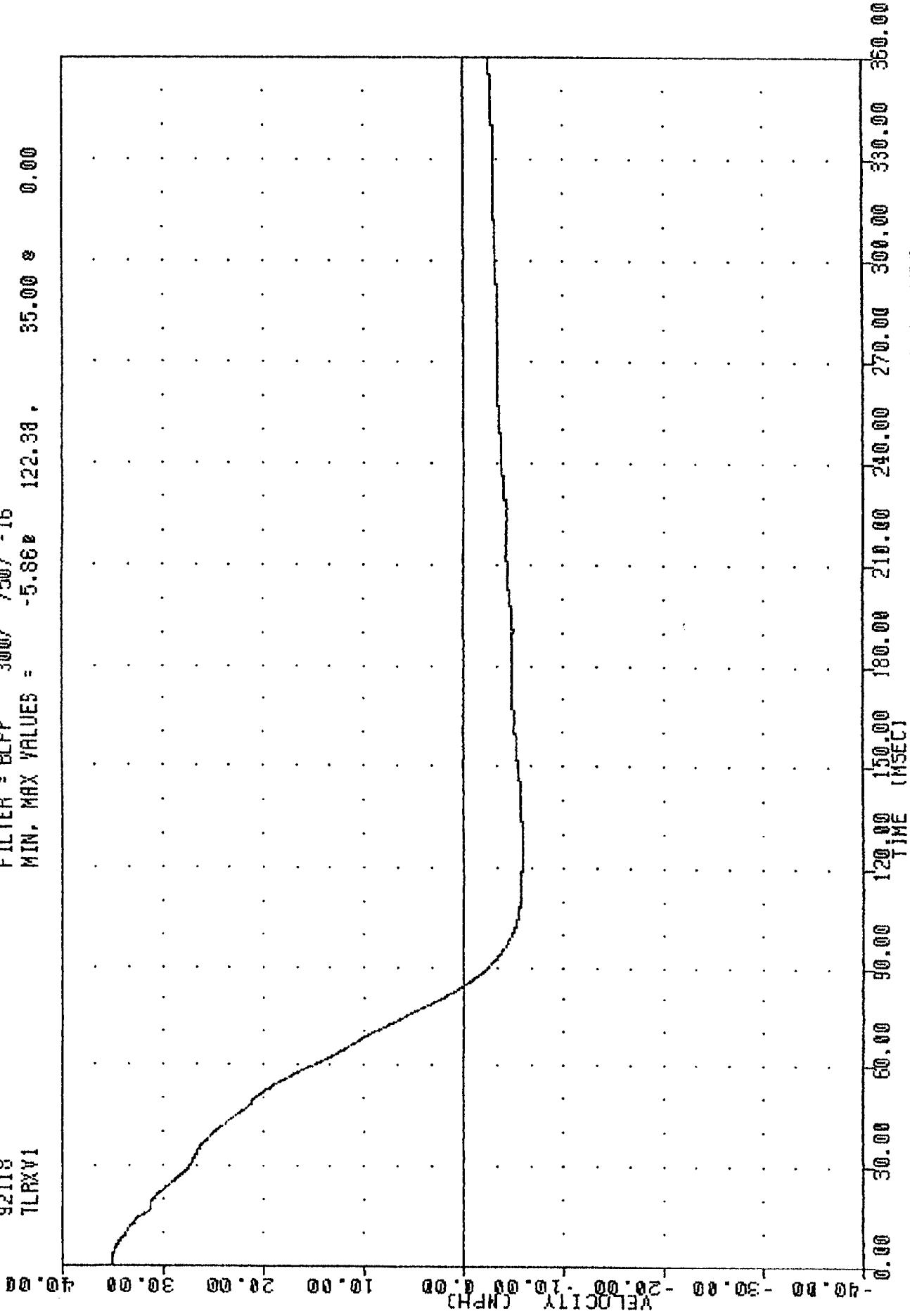
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -32.85# 59.75, 2.14 @ 201.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LEFT REAR SEAT X-AXIS ACCELERATION

TRC . 920427
NEW CAR ASSESSMENT PROGRAM
92118
TLRXV1

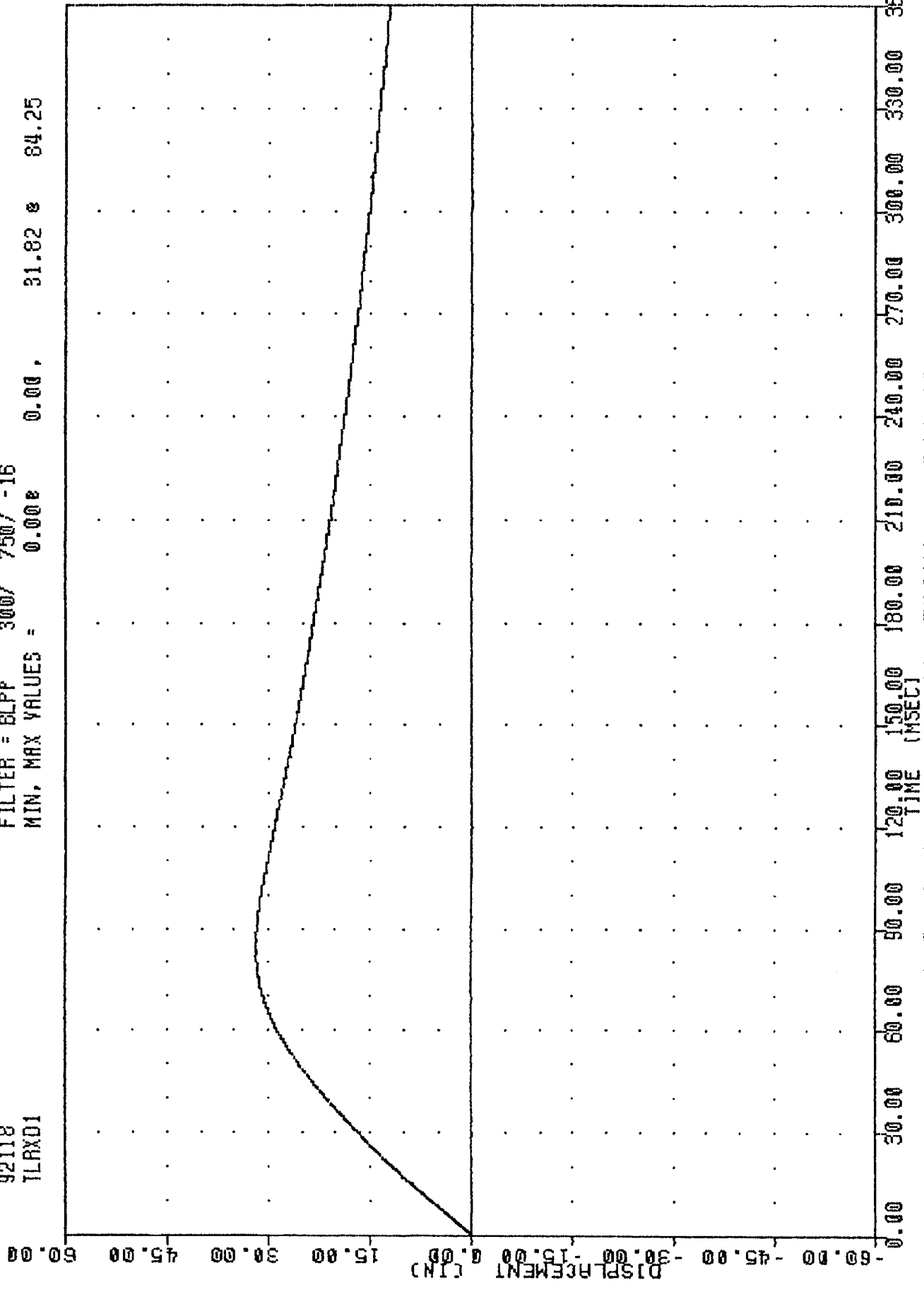
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -5.86 122.38 35.00 0.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY

IR
 NEW CAR ASSESSMENT PROGRAM
 92118
 TLRXD1

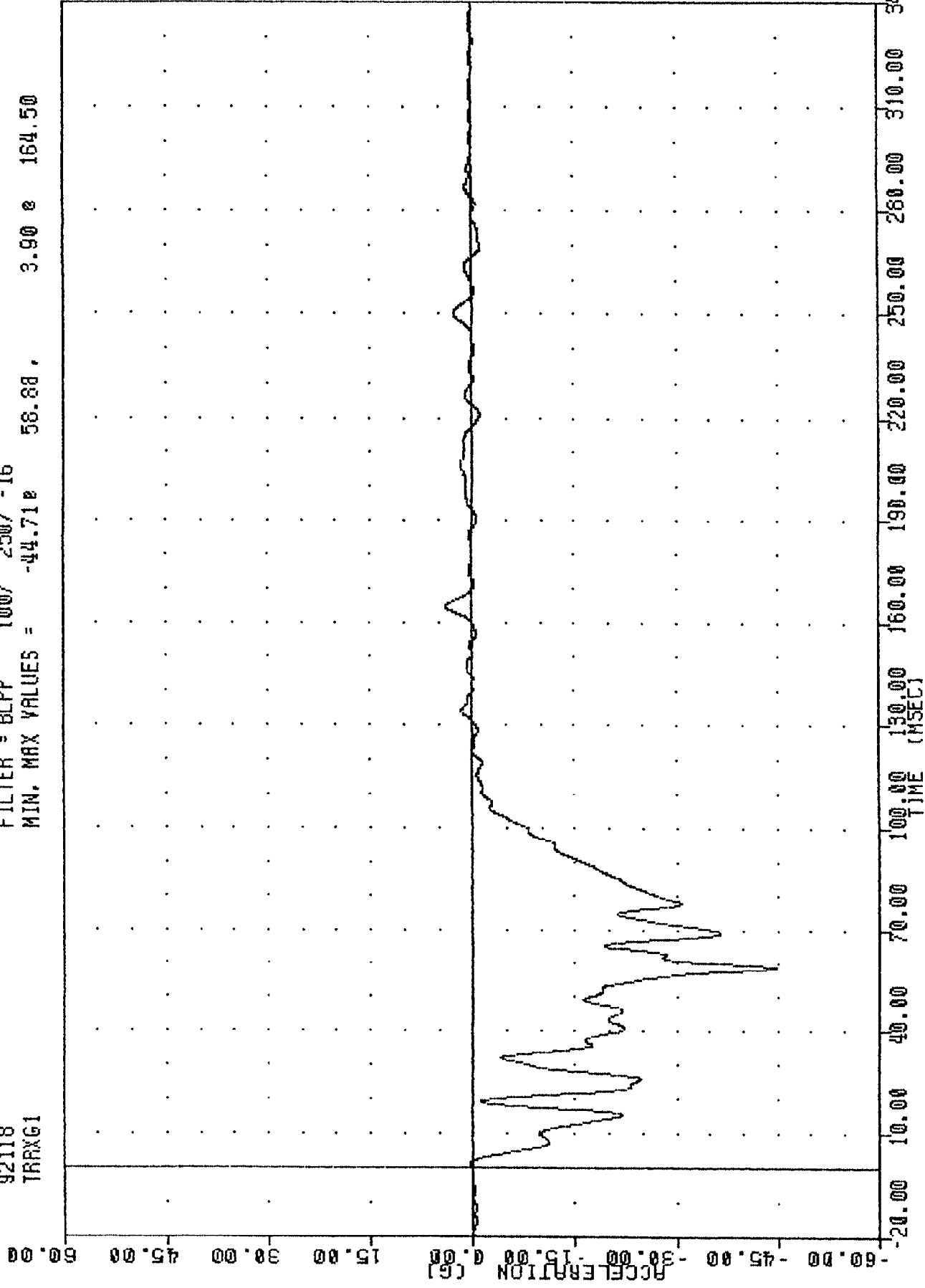
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00e 0.00, 31.82 e 84.25



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LEFT REAR SEAT X-AXIS DISPLACEMENT

IRC
NEW CAR ASSESSMENT PROGRAM
92118
TRRXG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -44.71e 56.88, 3.90 e 164.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

TRC

920427

NEW CAR ASSESSMENT PROGRAM

92118

TRRXV1

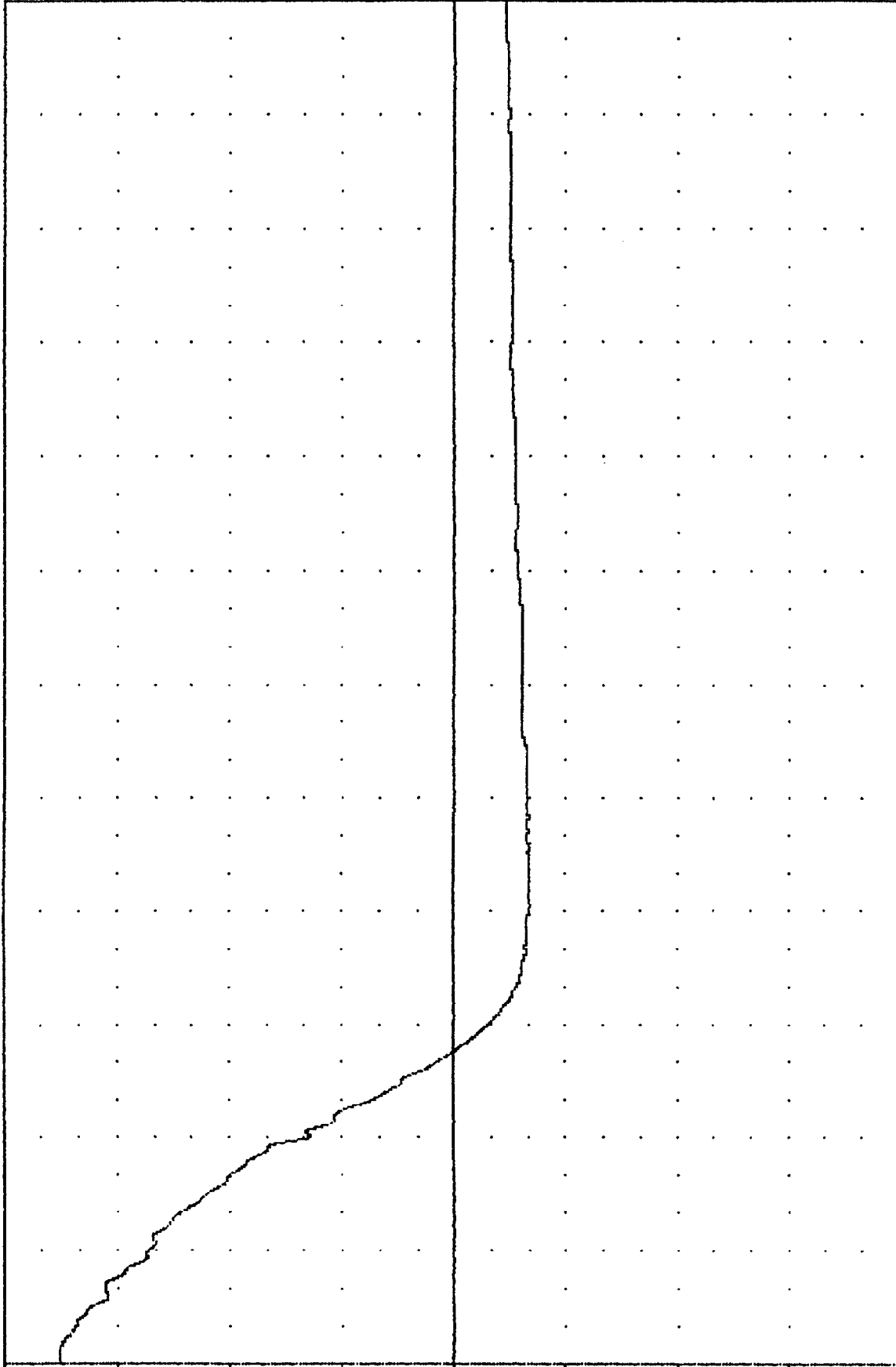
FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -6.78e 35.04 e

132.50, 2.25

40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00

VELOCITY (MPH)



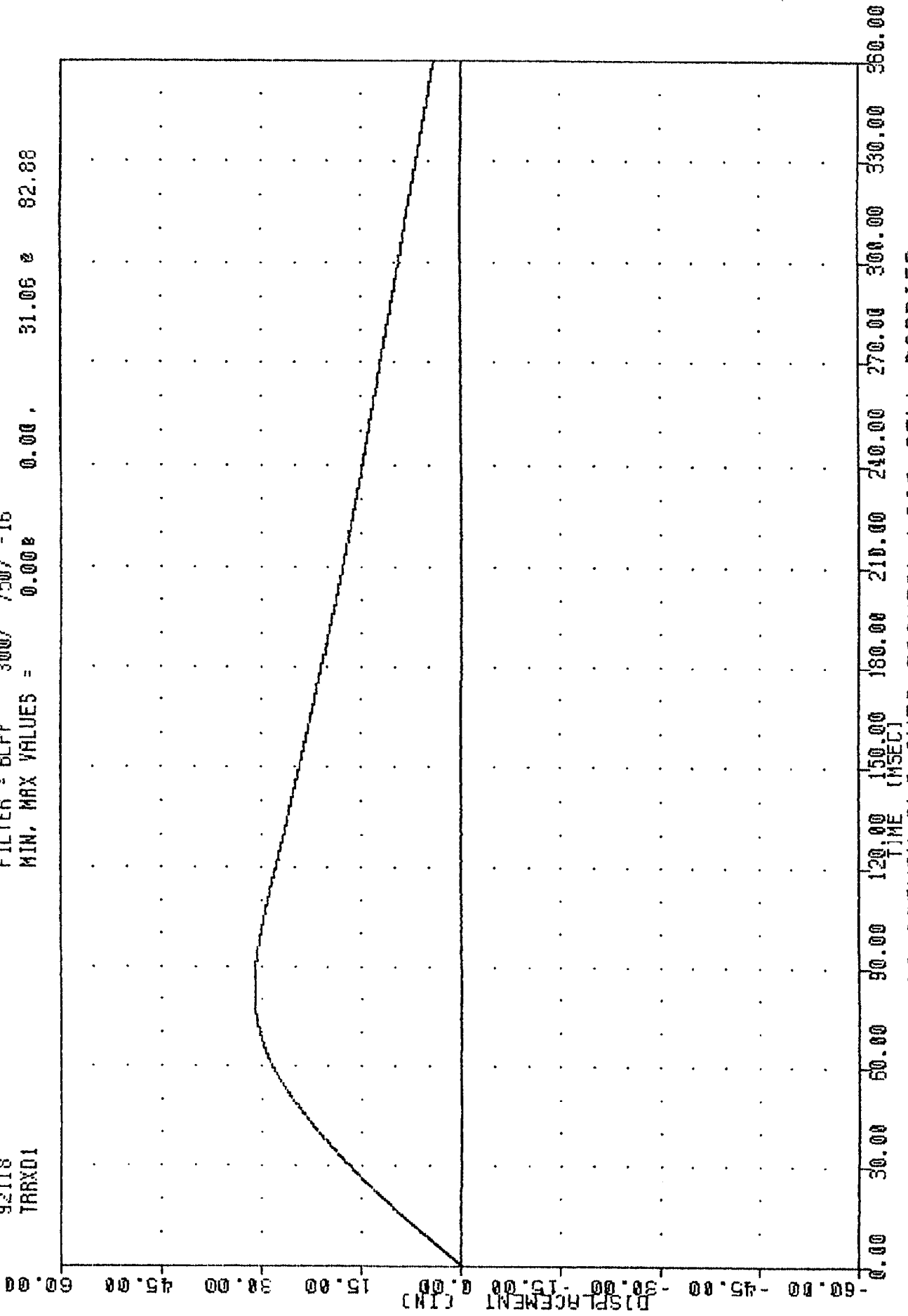
0.00 30.00 60.00 90.00 120.00 150.00 180.00 210.00 240.00 270.00 300.00 330.00 360.00

TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 TRRXD1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00E 0.00, 31.06E 82.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS DISPLACEMENT

NEW CAR ASSESSMENT PROGRAM

92118
ENGXG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -76.18e 30.88, 23.73 e 57.25

120.00

90.00

60.00

30.00

0.00

-30.00

-60.00

-90.00

-120.00

ACCELERATION (G)

-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

TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
ENGINE TOP X-AXIS ACCELERATION

TRC 920427

NEW CAR ASSESSMENT PROGRAM

92118

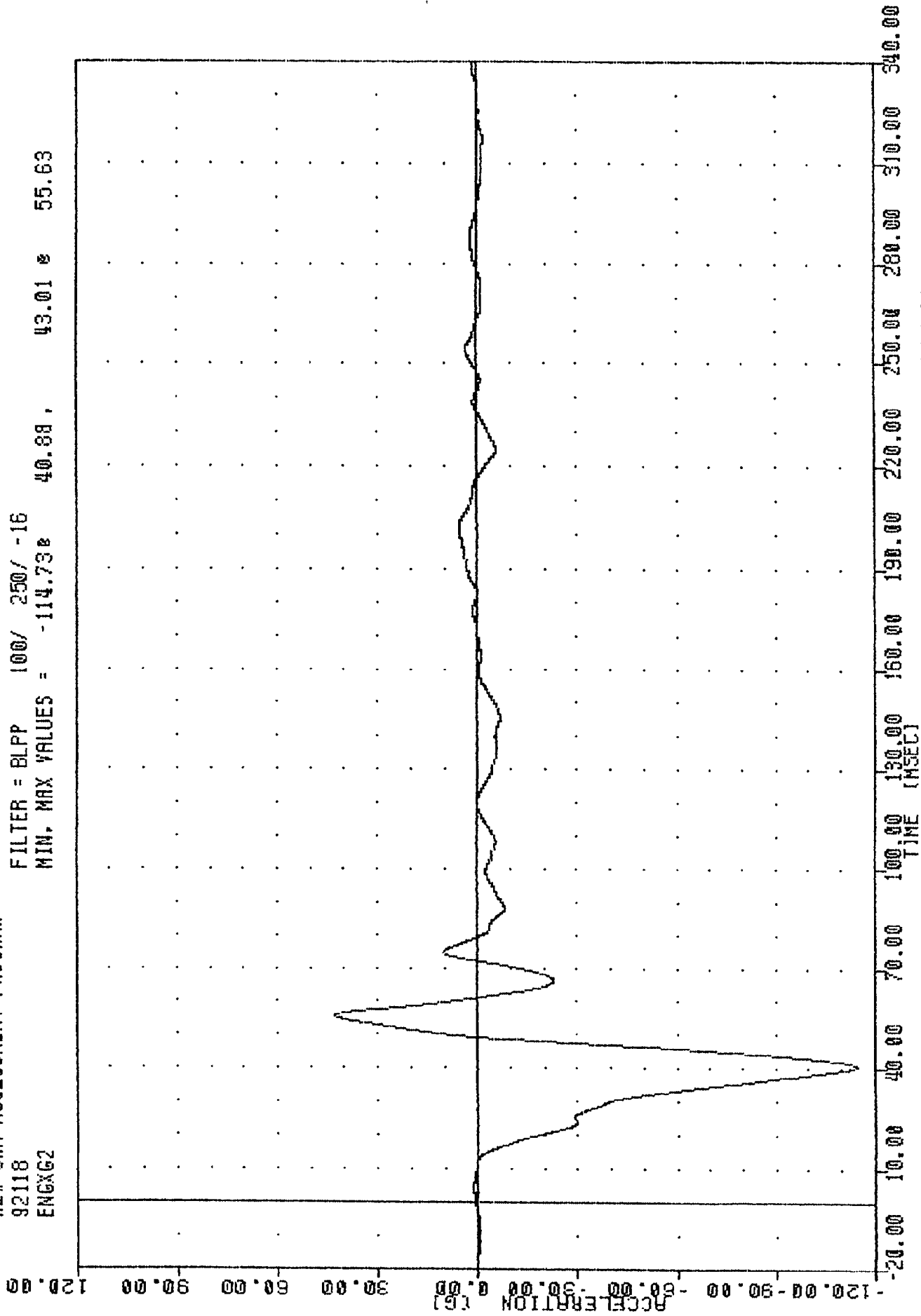
ENGXG2

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -114.73e 40.88 ,

43.01 e

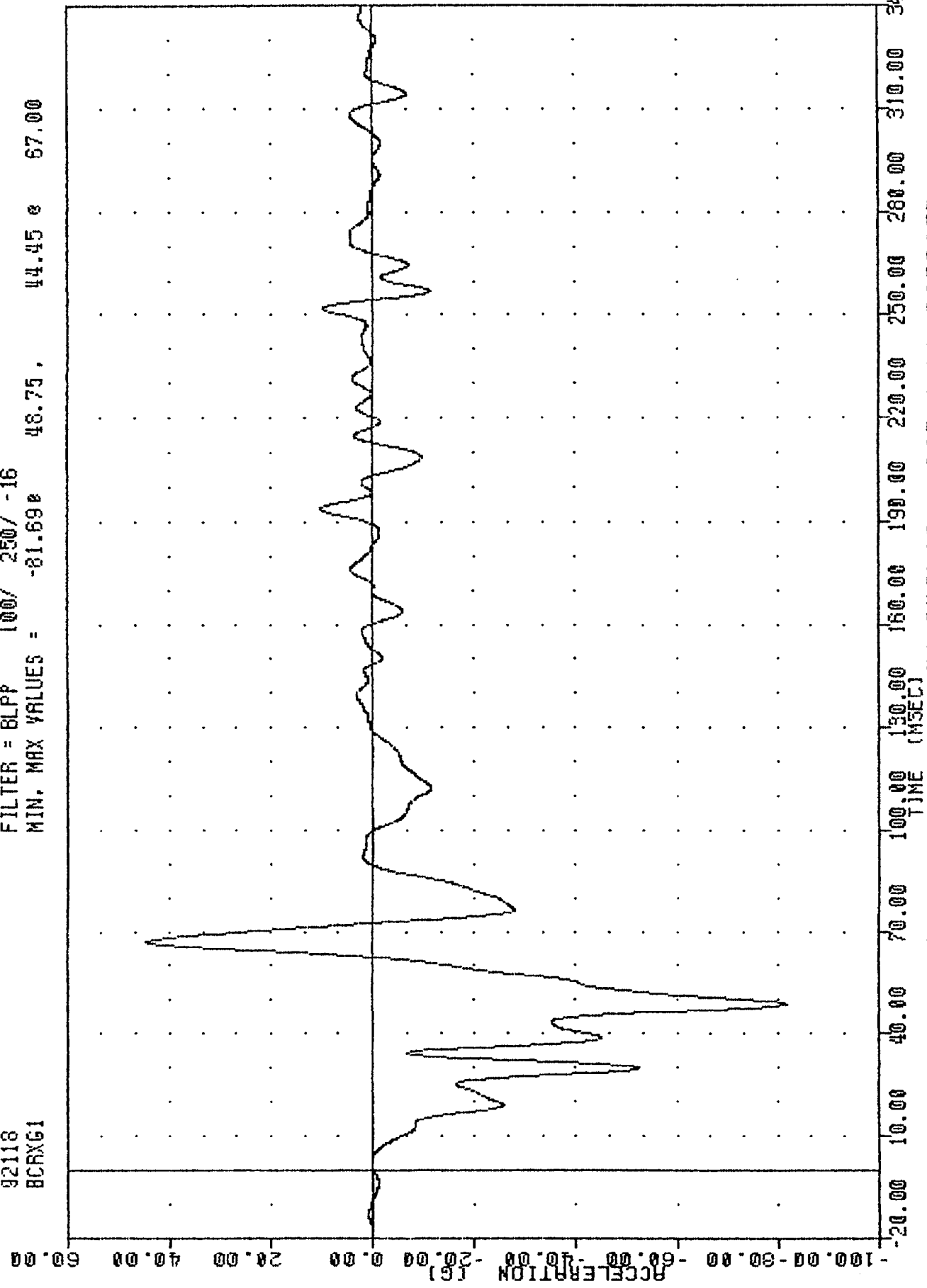
55.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

TRC 92118
NEW CAR ASSESSMENT PROGRAM
BCRXG1

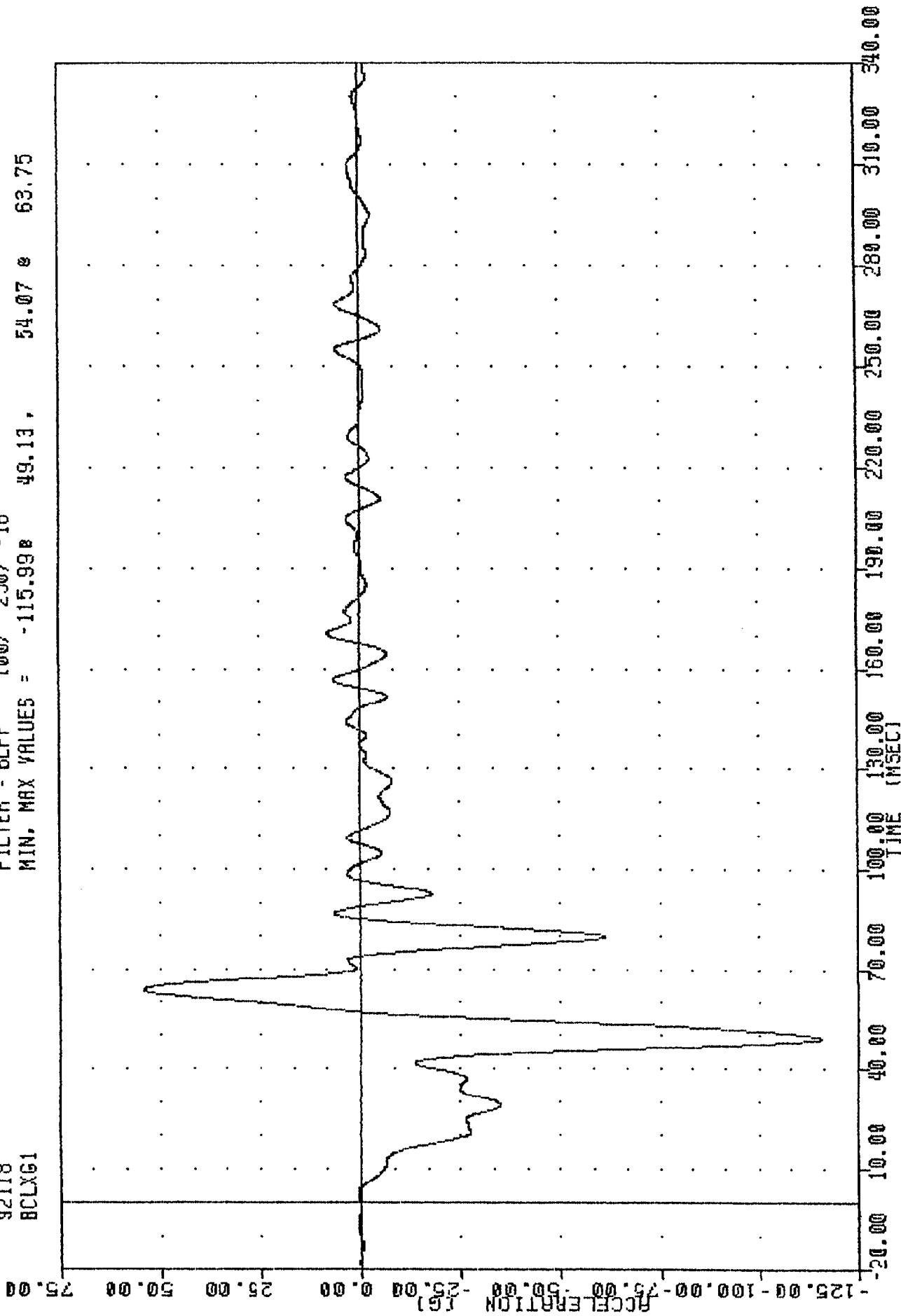
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = 48.75, 44.45 e 67.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TAC , 920427
NEW CAR ASSESSMENT PROGRAM
92118
BCLX61

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -115.99 49.13 , 54.07 e 63.75

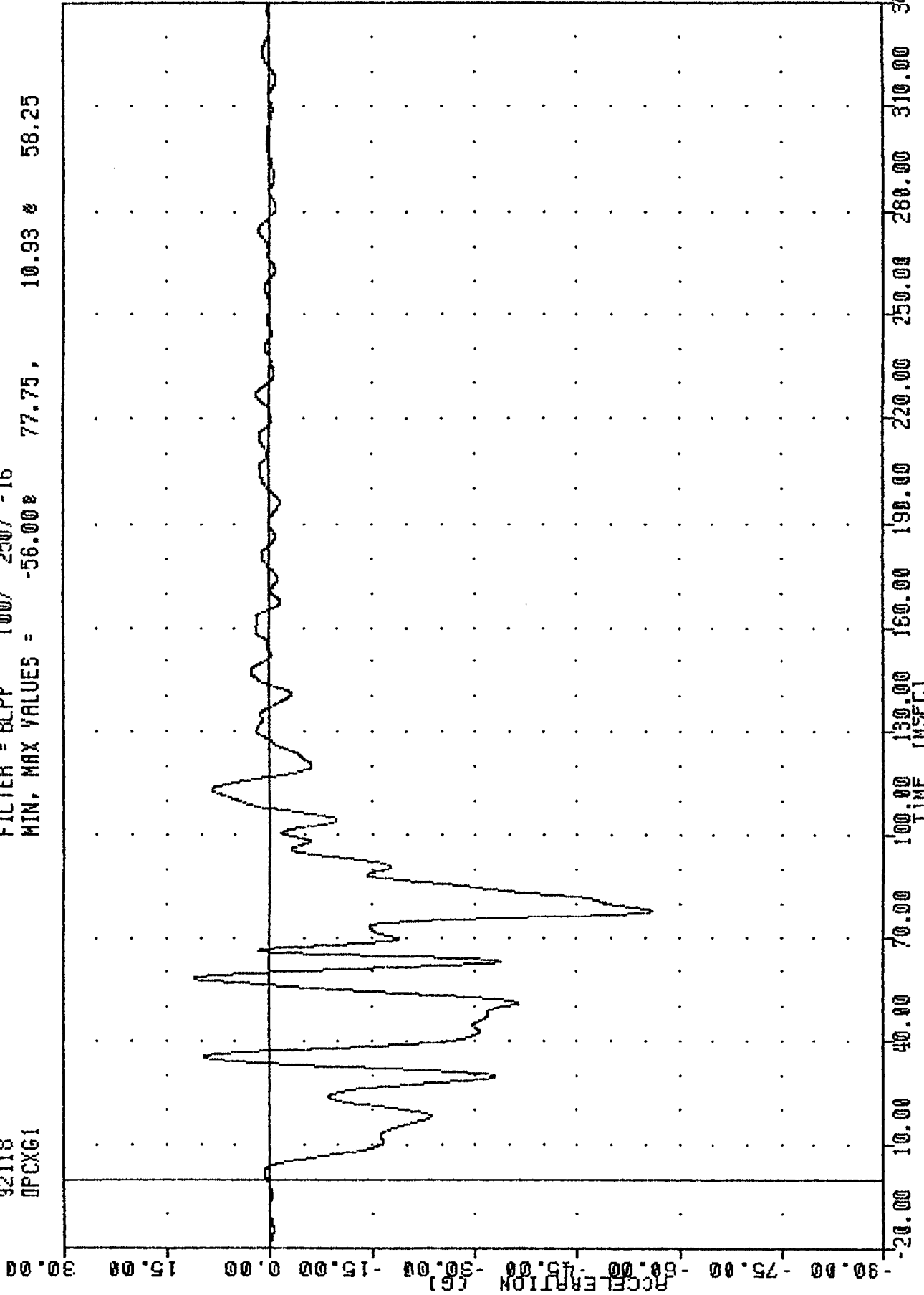


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM
92118
DPCXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -56.00 77.75, 10.93 58.25

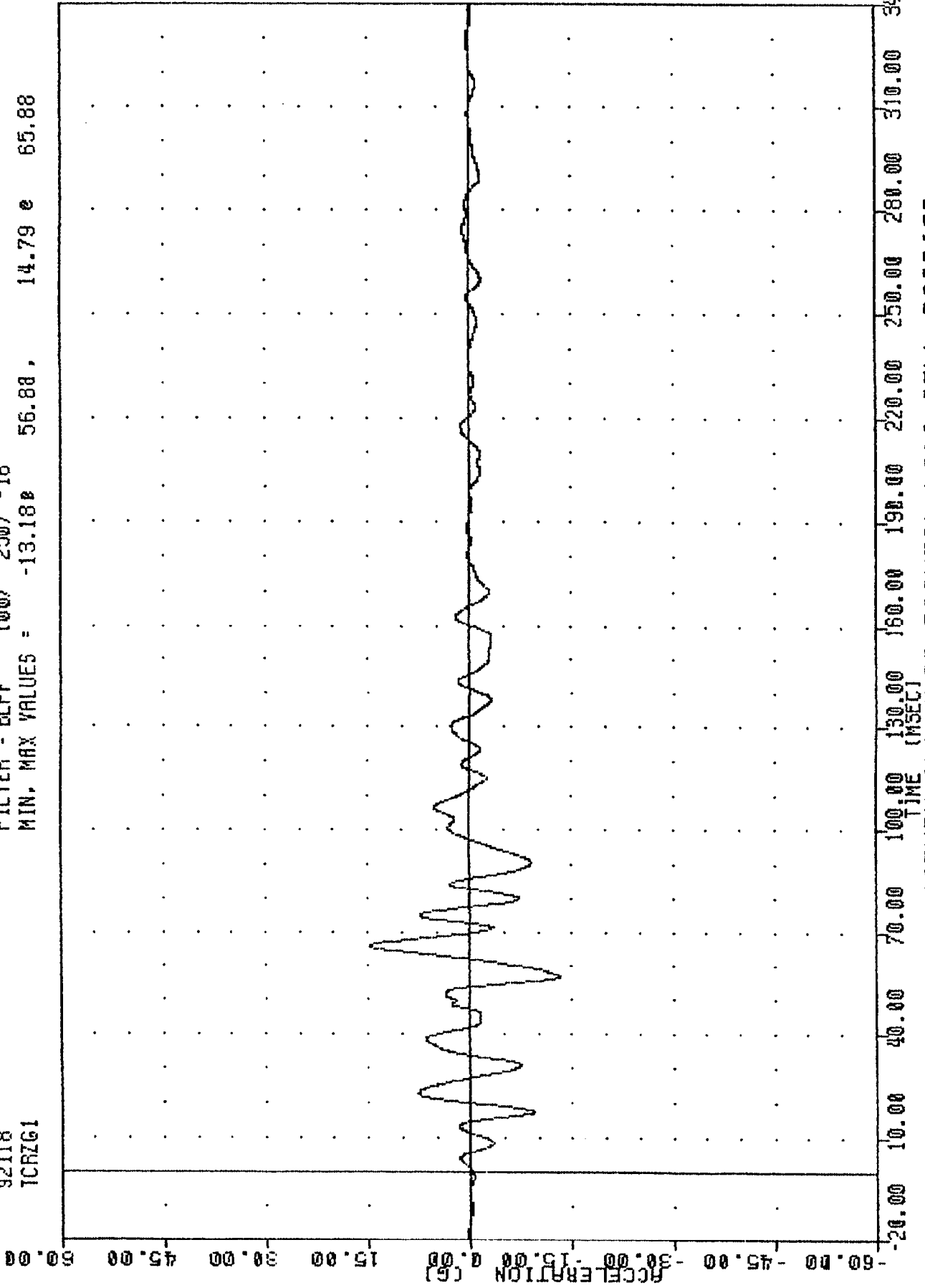
11



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

TRC 920427
NEW CAR ASSESSMENT PROGRAM
92118
TCRZG1

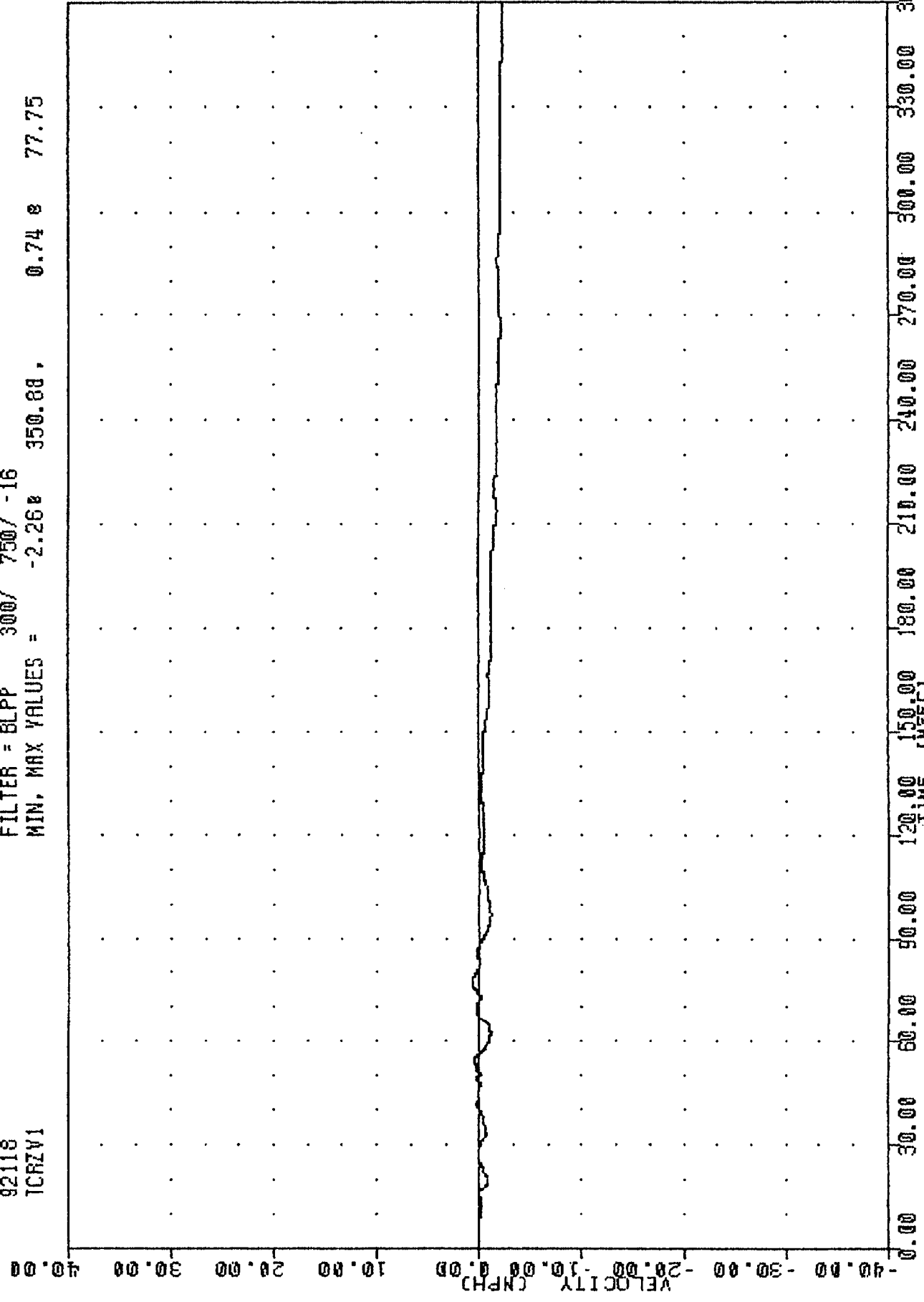
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -13.188 56.88, 14.79 e 65.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS ACCELERATION

TRC 820427
 NEW CAR ASSESSMENT PROGRAM
 92118
 TCRZV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -2.26e 350.68, 0.74 e 77.75

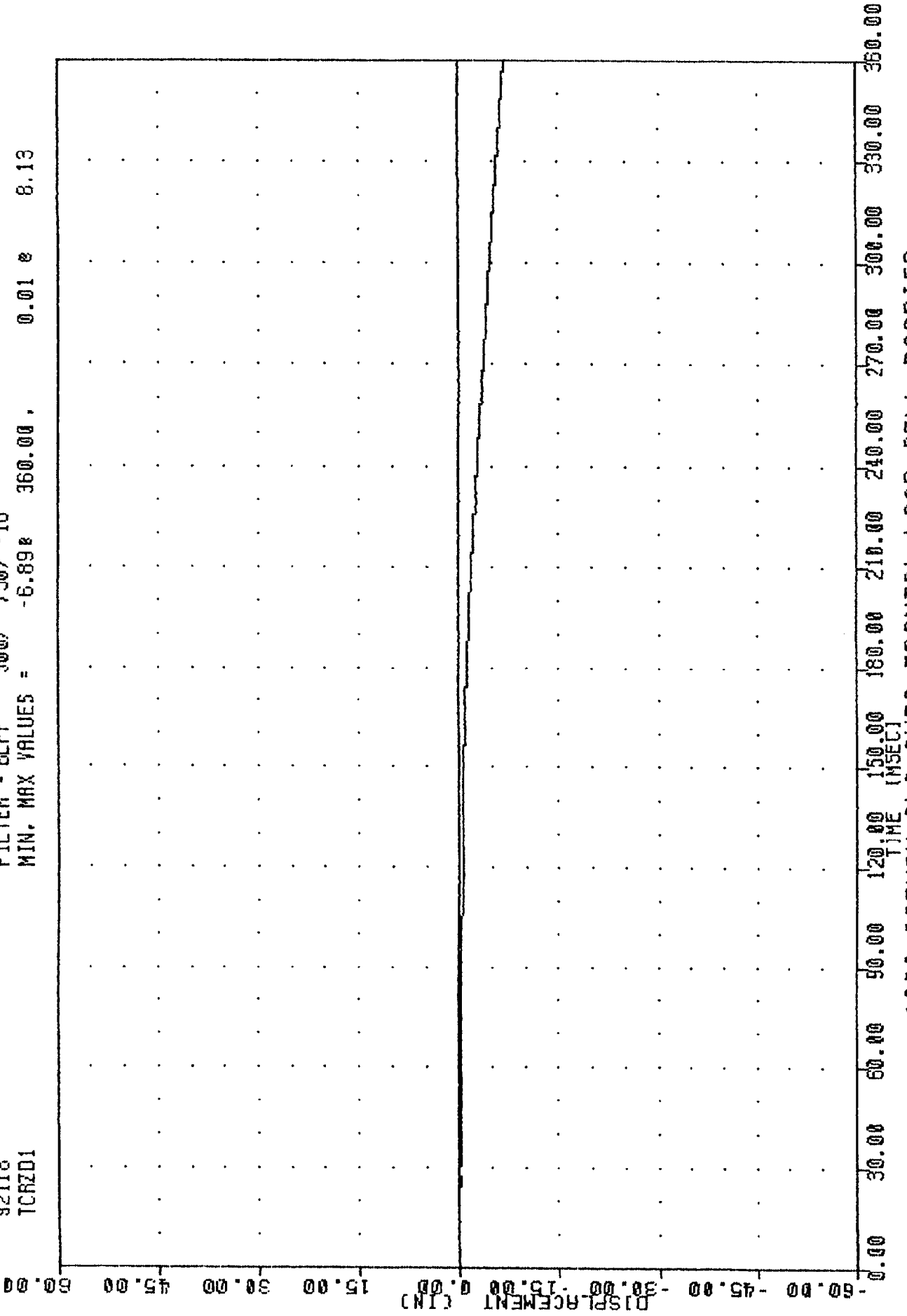


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 REAR SEAT CROSSMEMBER Z-AXIS VELOCITY

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 TCRZD1

920427

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -6.89# 360.00, 0.01 # 8.13



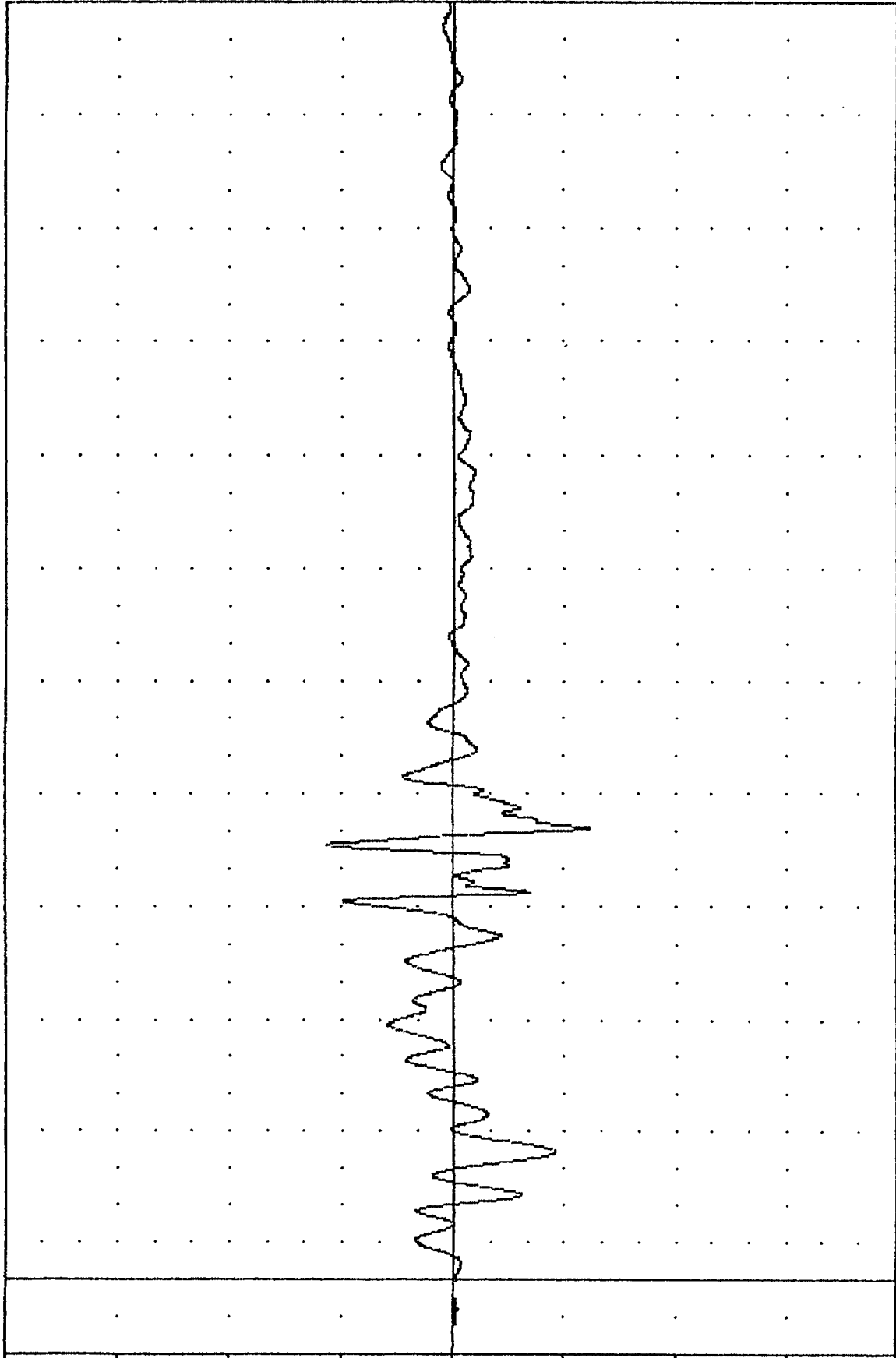
1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 REAR SEAT CROSSMEMBER Z-AXIS DISPLACEMENT

NEW CAR ASSESSMENT PROGRAM

92118
ADKZG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -18.438 120.75 . 16.95 e 116.25

ACCELERATION (G)

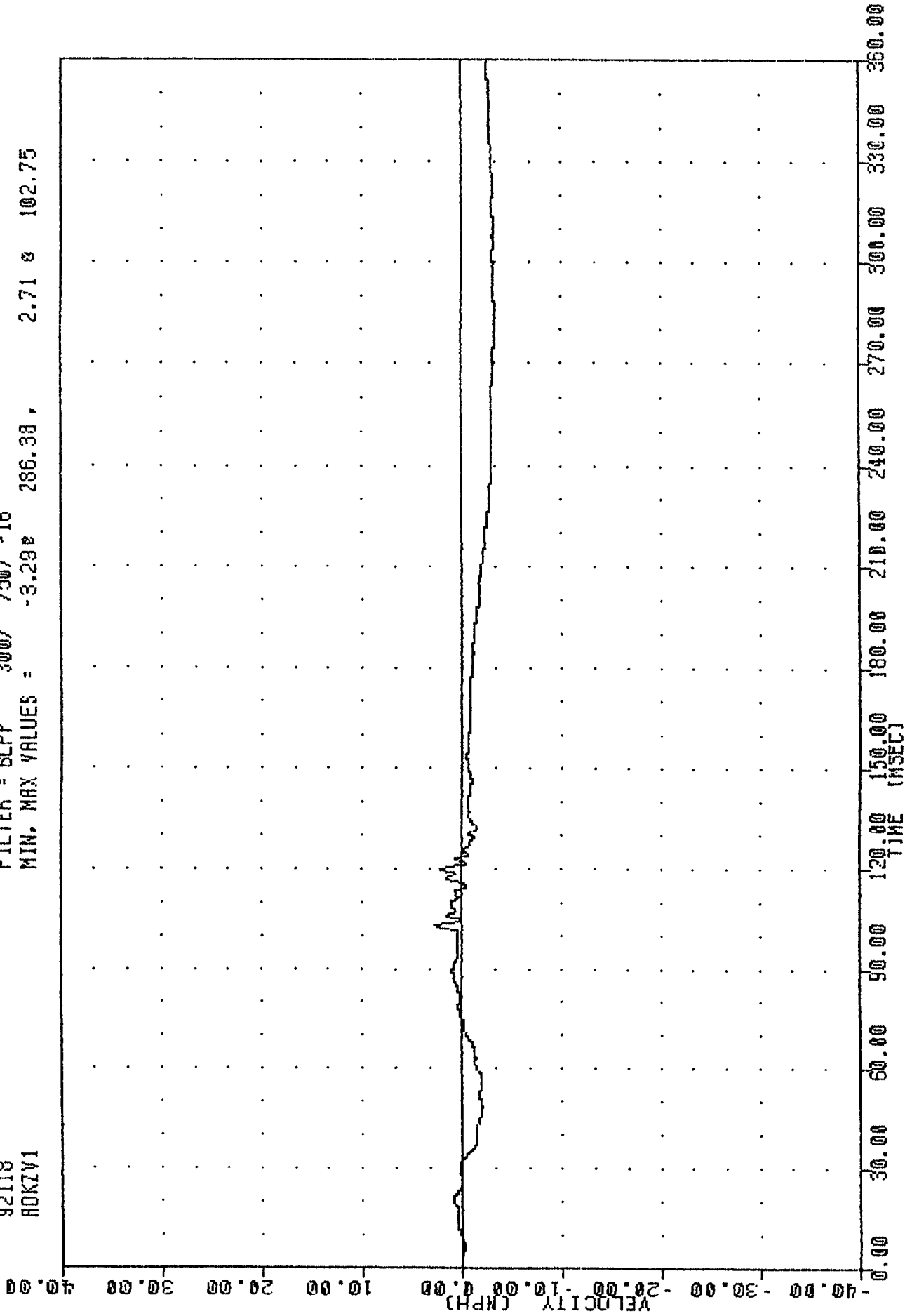


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 ADKZV1

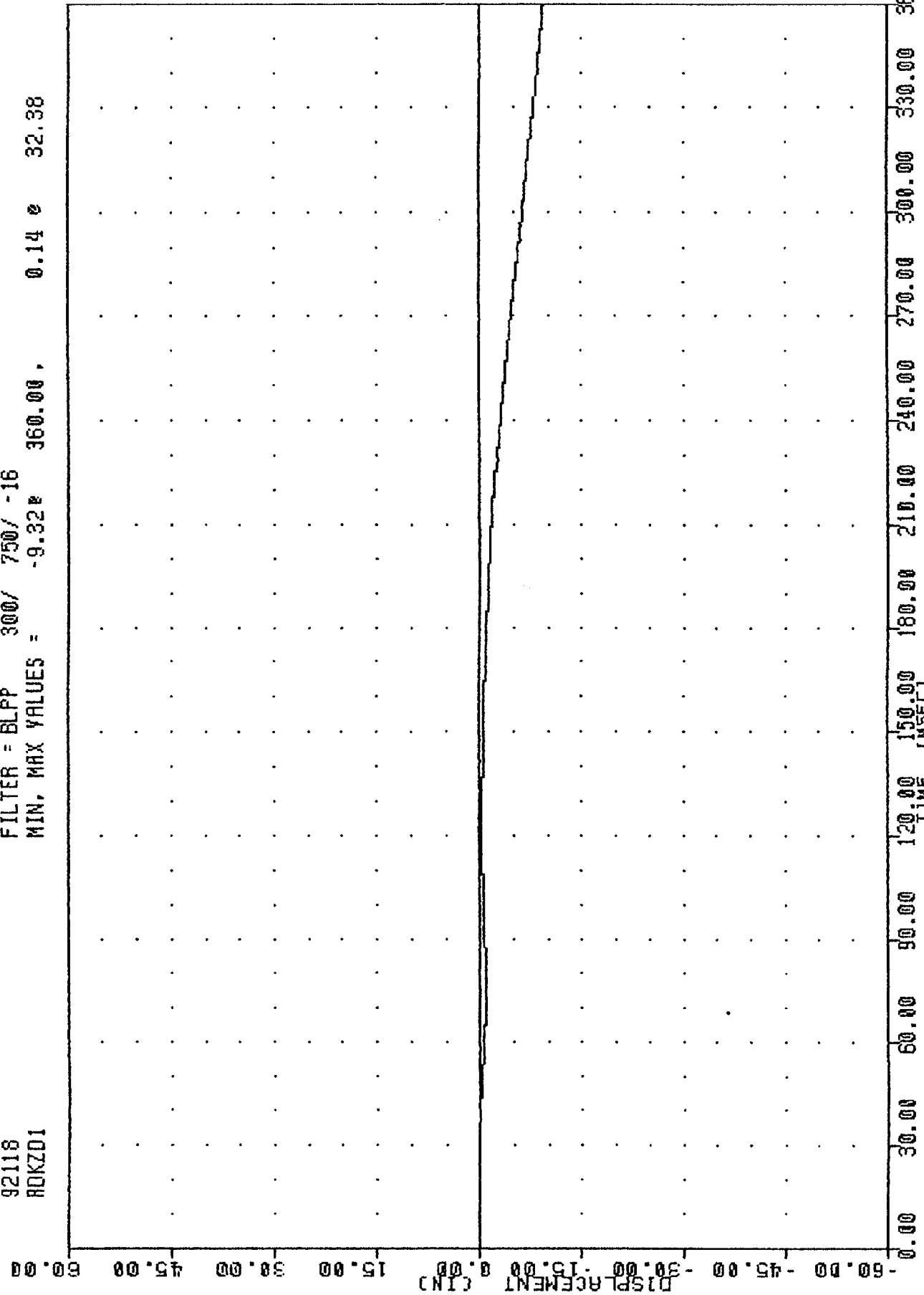
FILTER = 5LPP 300/ 750/ -16
 MIN. MAX VALUES = -3.29e 286.38 , 2.71 e 102.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 VEHICLE REAR CENTER Z-AXIS VELOCITY

TRC
 NEW CAR ASSESSMENT PROGRAM
 92116
 ROKZD1

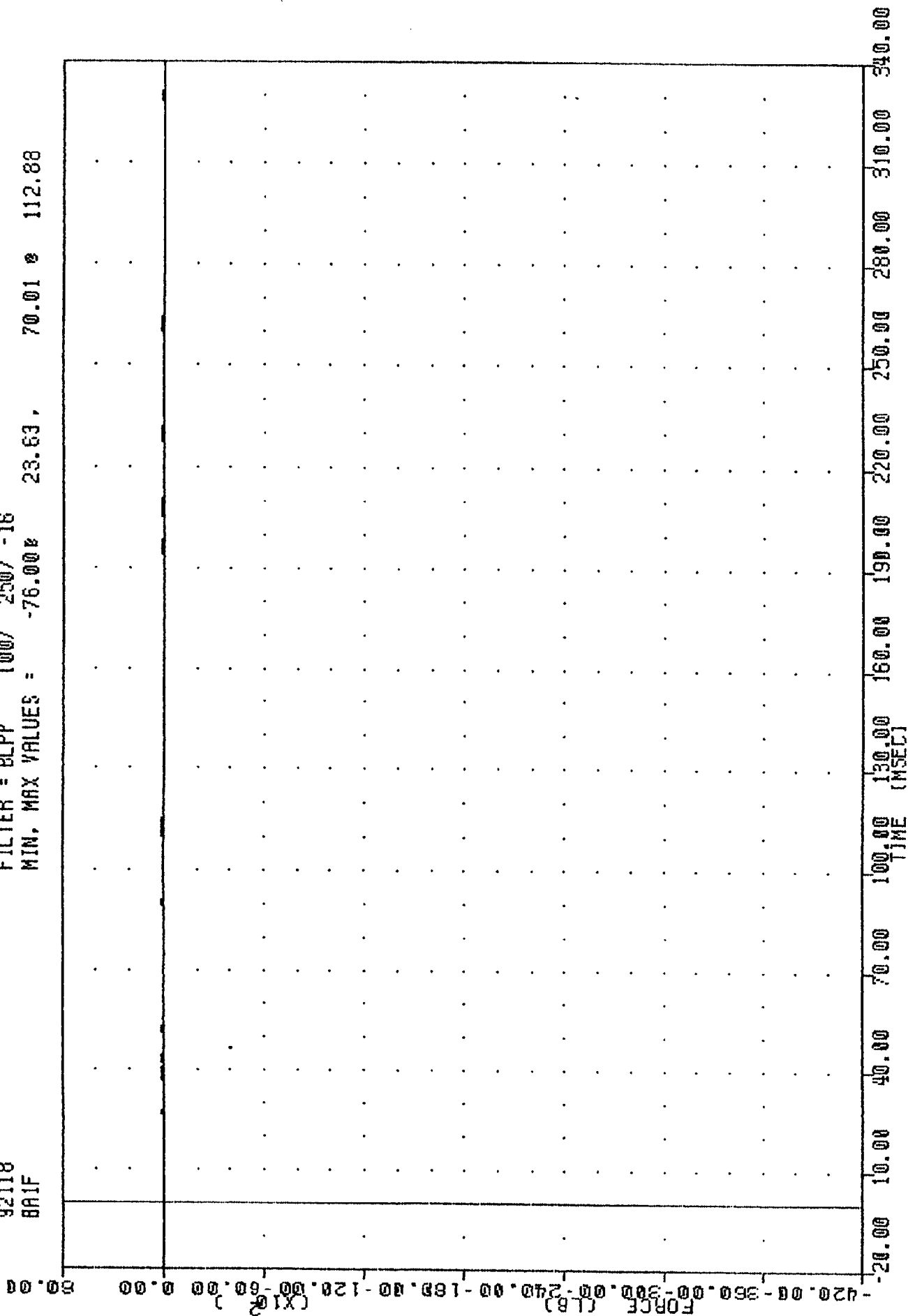
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -9.32# 360.00 , 0.14 e 32.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 VEHICLE REAR CENTER Z-AXIS DISPLACEMENT

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR1F

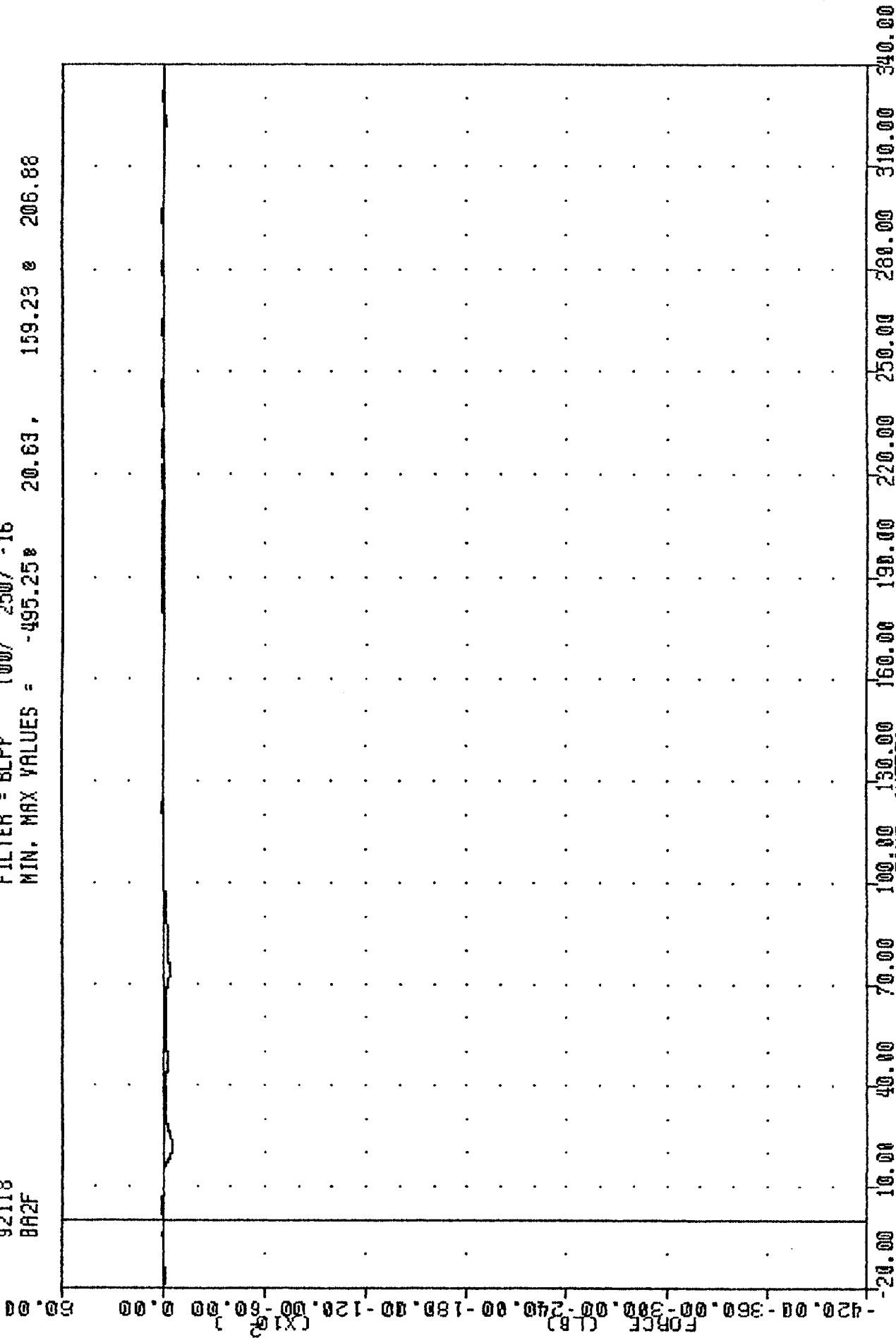
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -76.00% 23.63, 70.01 * 112.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A1 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BA2F

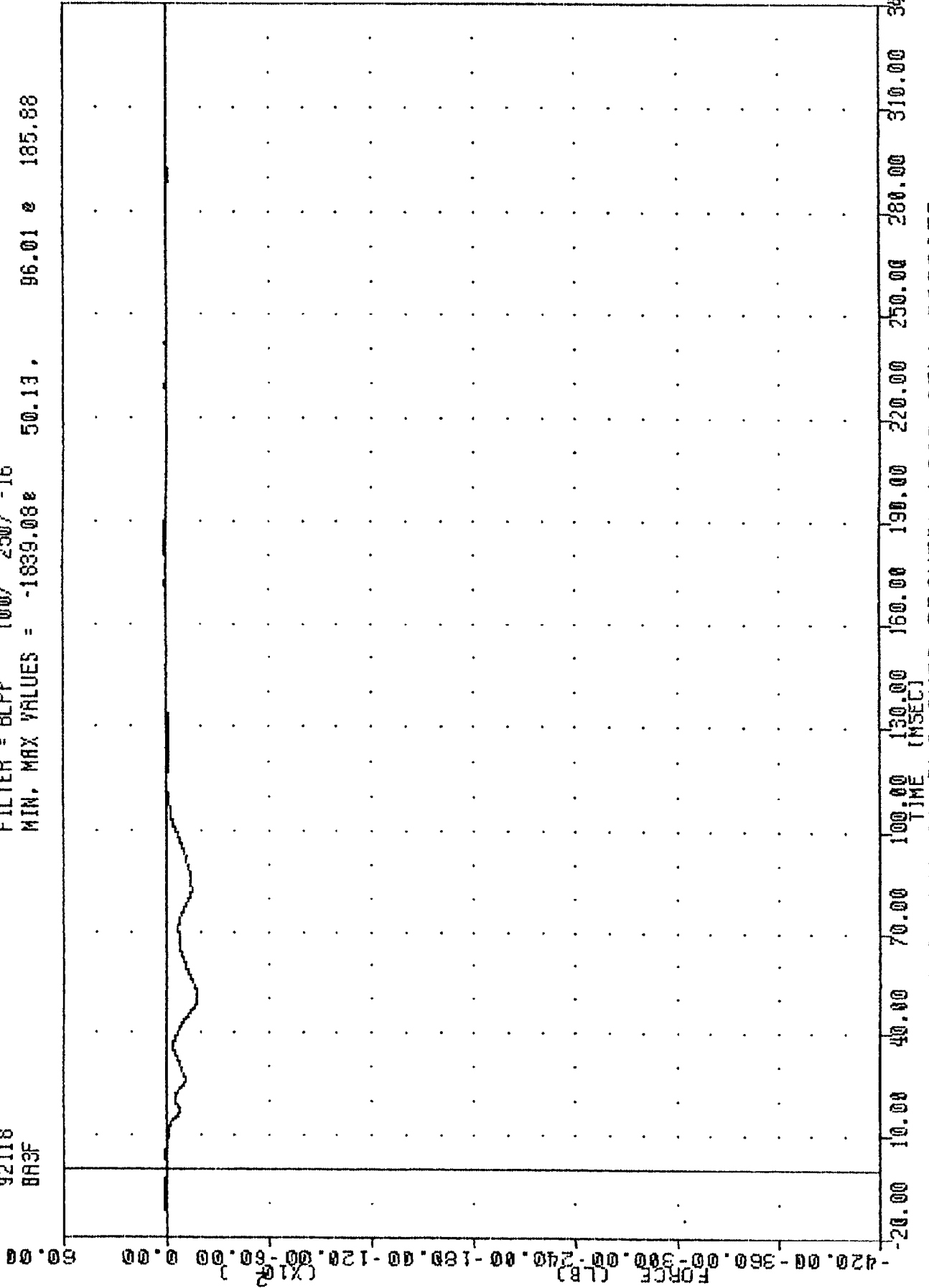
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -495.258 20.63, 159.23 @ 206.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A2 FORCE

TAC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR3F

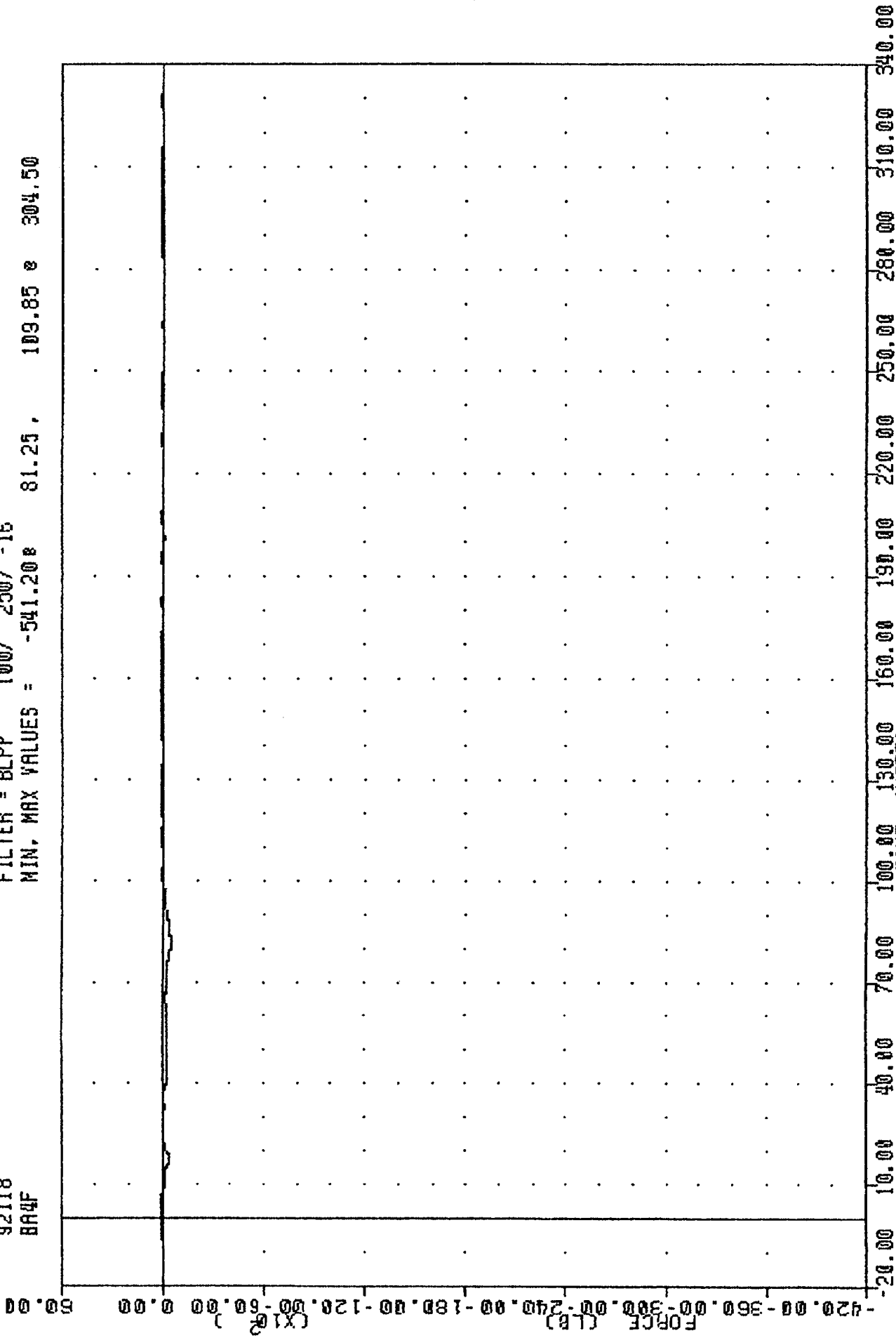
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1839.08e 50.13, 96.01 e 185.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A3 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR4F

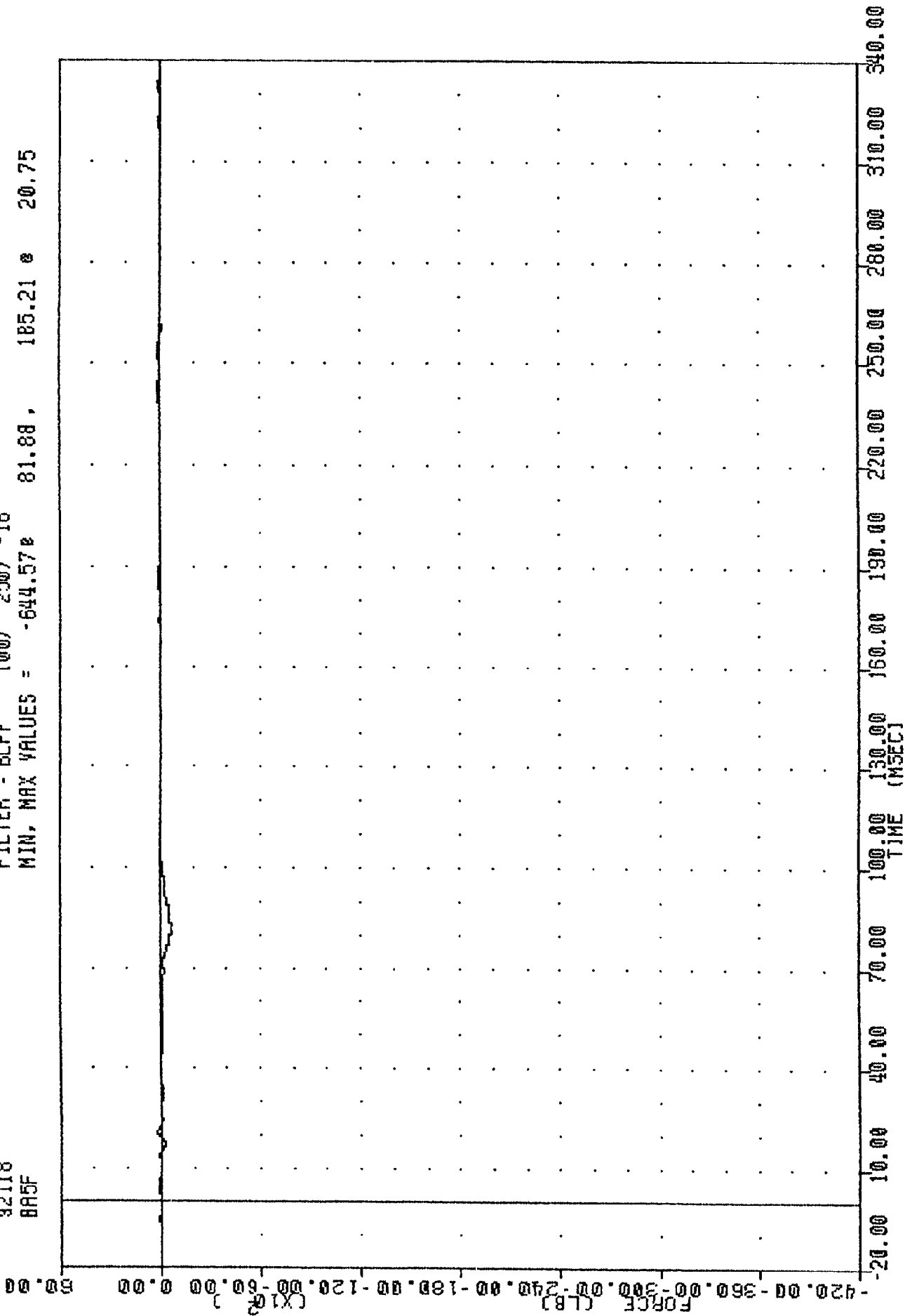
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -541.20e 81.25, 109.85 e 304.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A4 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR5F

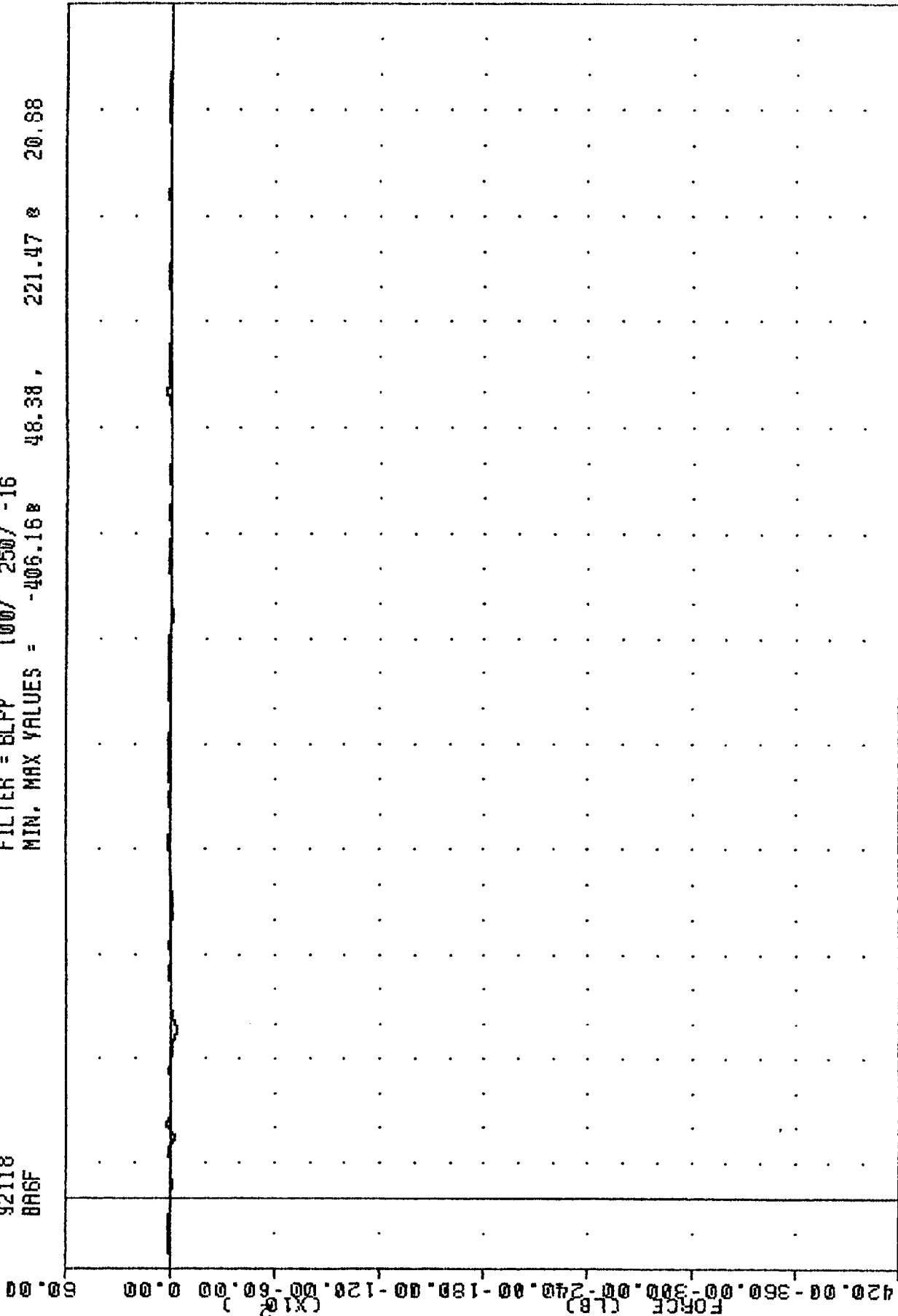
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -644.57e 81.88, 185.21 e 20.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION AS FORCE

IR 9218
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR6F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -406.16 48.38 , 221.47 20.98

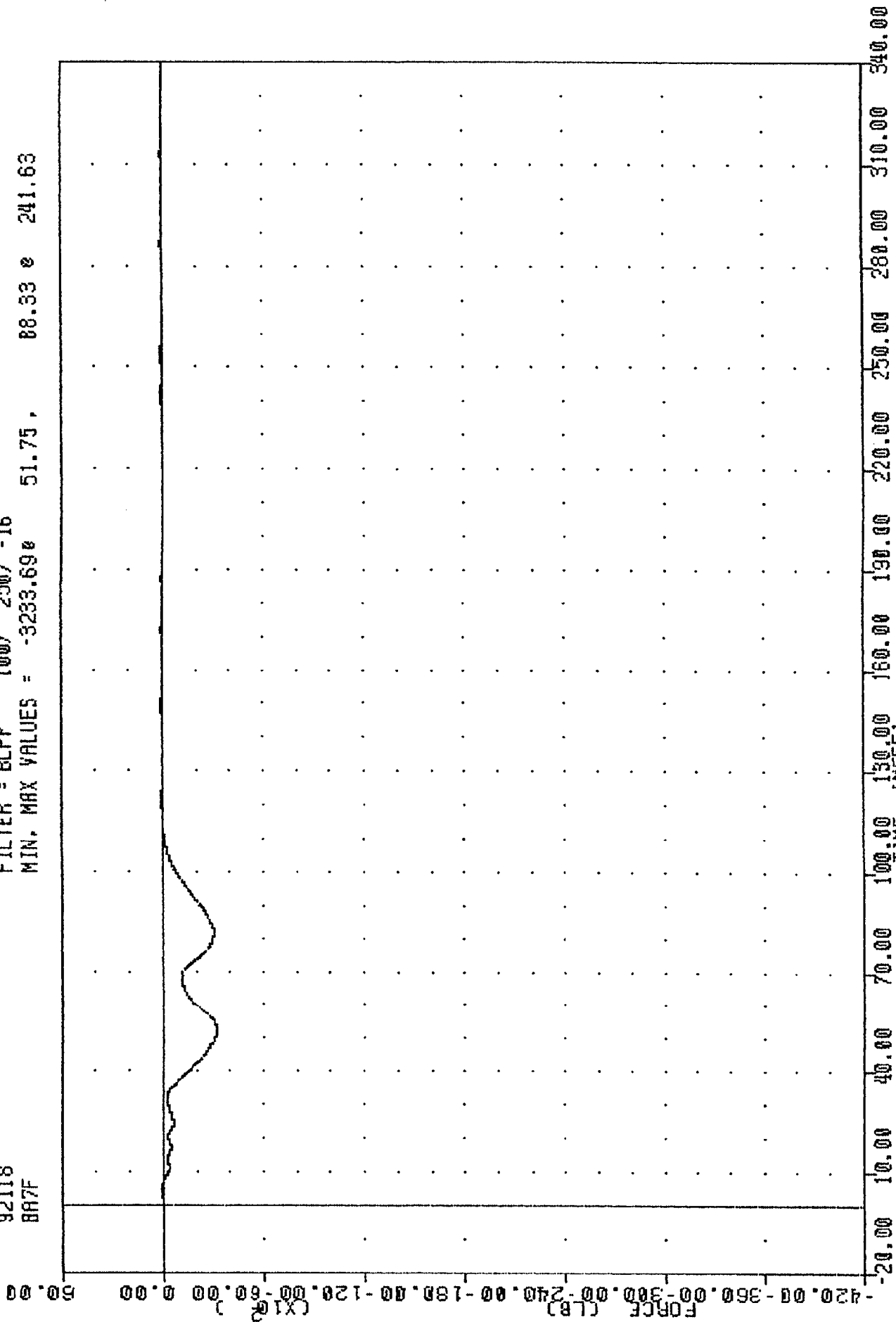


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
 TIME (MSEC)

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION AS FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BA7F

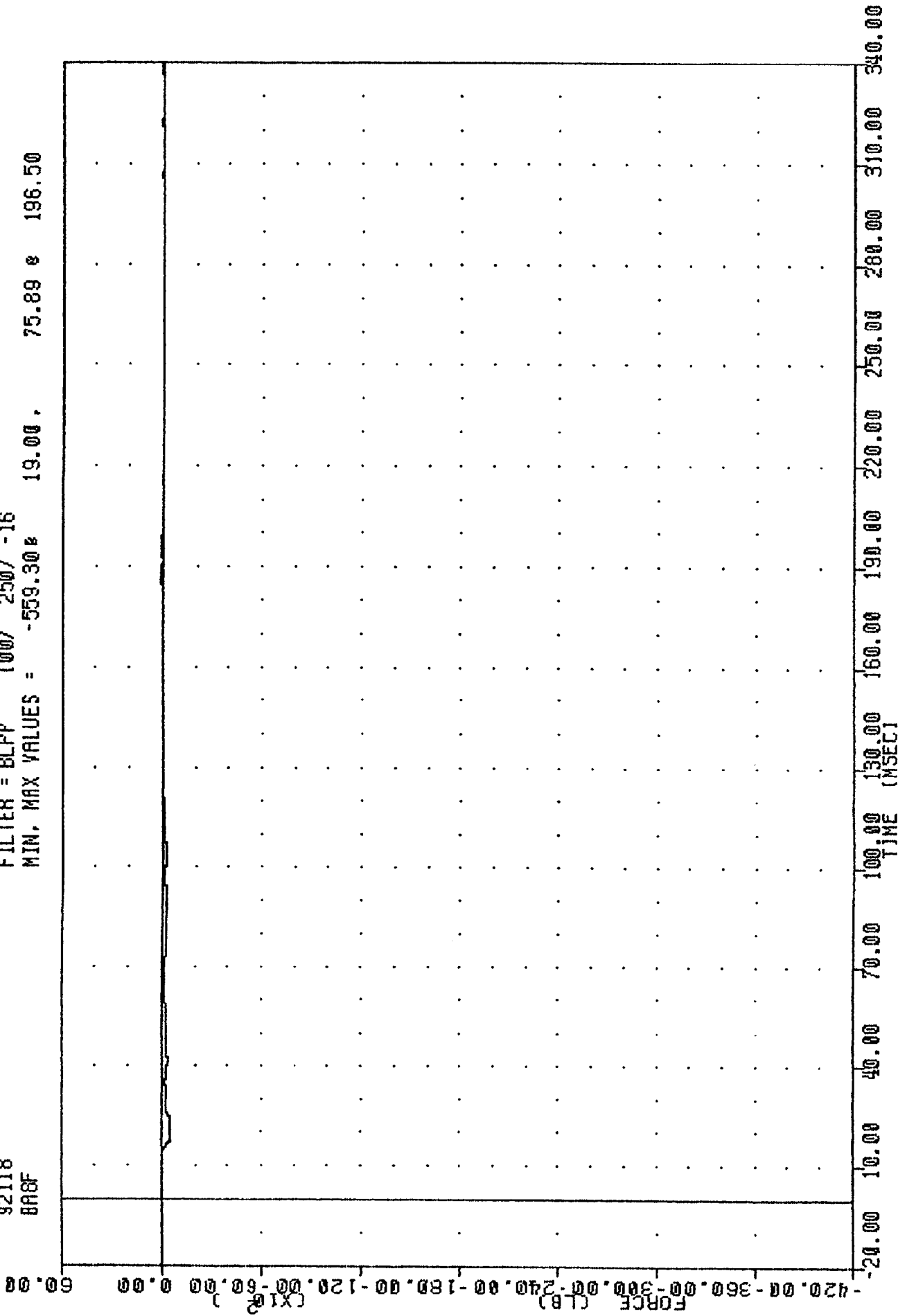
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -3233.69 51.75, 88.33 241.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A7 FORCE

TRC
NEW CAR ASSESSMENT PROGRAM
92118
BR8F

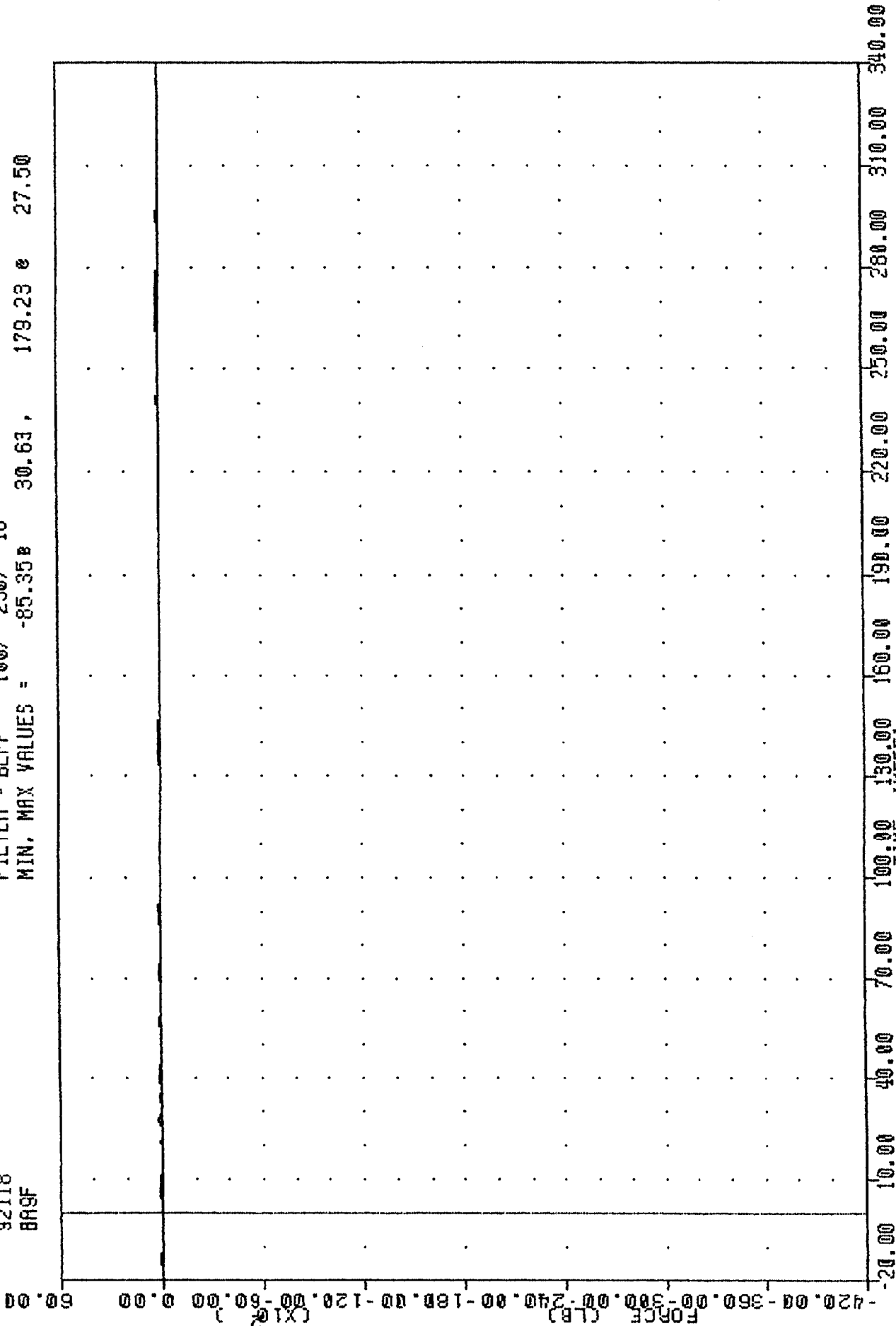
FILTER = BLFP 100/ 250/ -16
MIN, MAX VALUES = -559.30 19.00 75.89 196.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION AB FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 B99F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -85.35B 30.63, 179.23 e 27.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A9 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BBIF

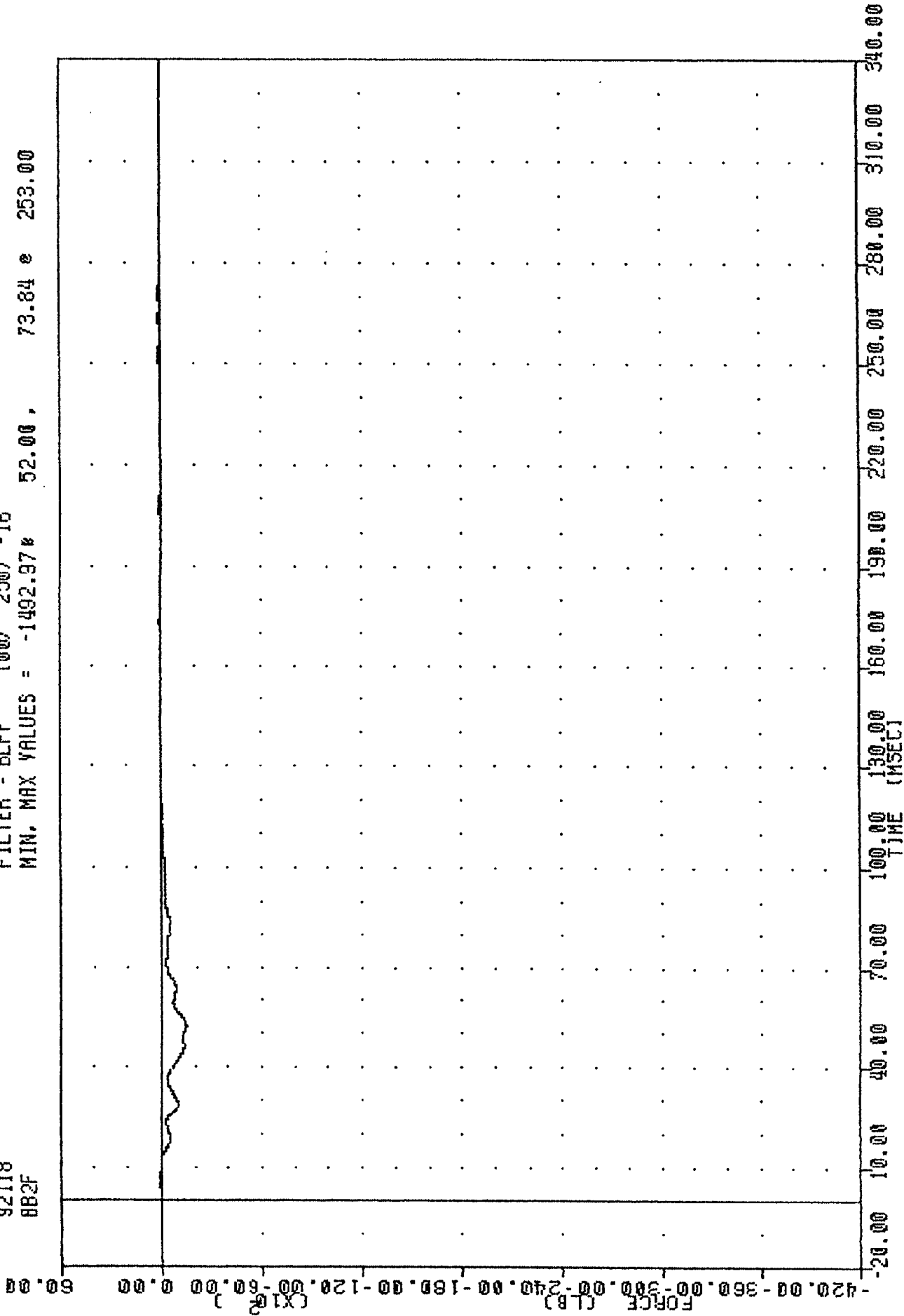
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -95.32 32.63 110.58 18.75

TIME (MSEC)	FORCE (LB)
10.00	0.00
20.00	0.00
30.00	0.00
40.00	0.00
50.00	0.00
60.00	0.00
70.00	0.00
80.00	0.00
90.00	0.00
100.00	0.00
110.00	0.00
120.00	0.00
130.00	0.00
140.00	0.00
150.00	0.00
160.00	0.00
170.00	0.00
180.00	0.00
190.00	0.00
200.00	0.00
210.00	0.00
220.00	0.00
230.00	0.00
240.00	0.00
250.00	0.00
260.00	0.00
270.00	0.00
280.00	0.00
290.00	0.00
300.00	0.00
310.00	0.00
320.00	0.00
330.00	0.00
340.00	0.00

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B1 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BB2F

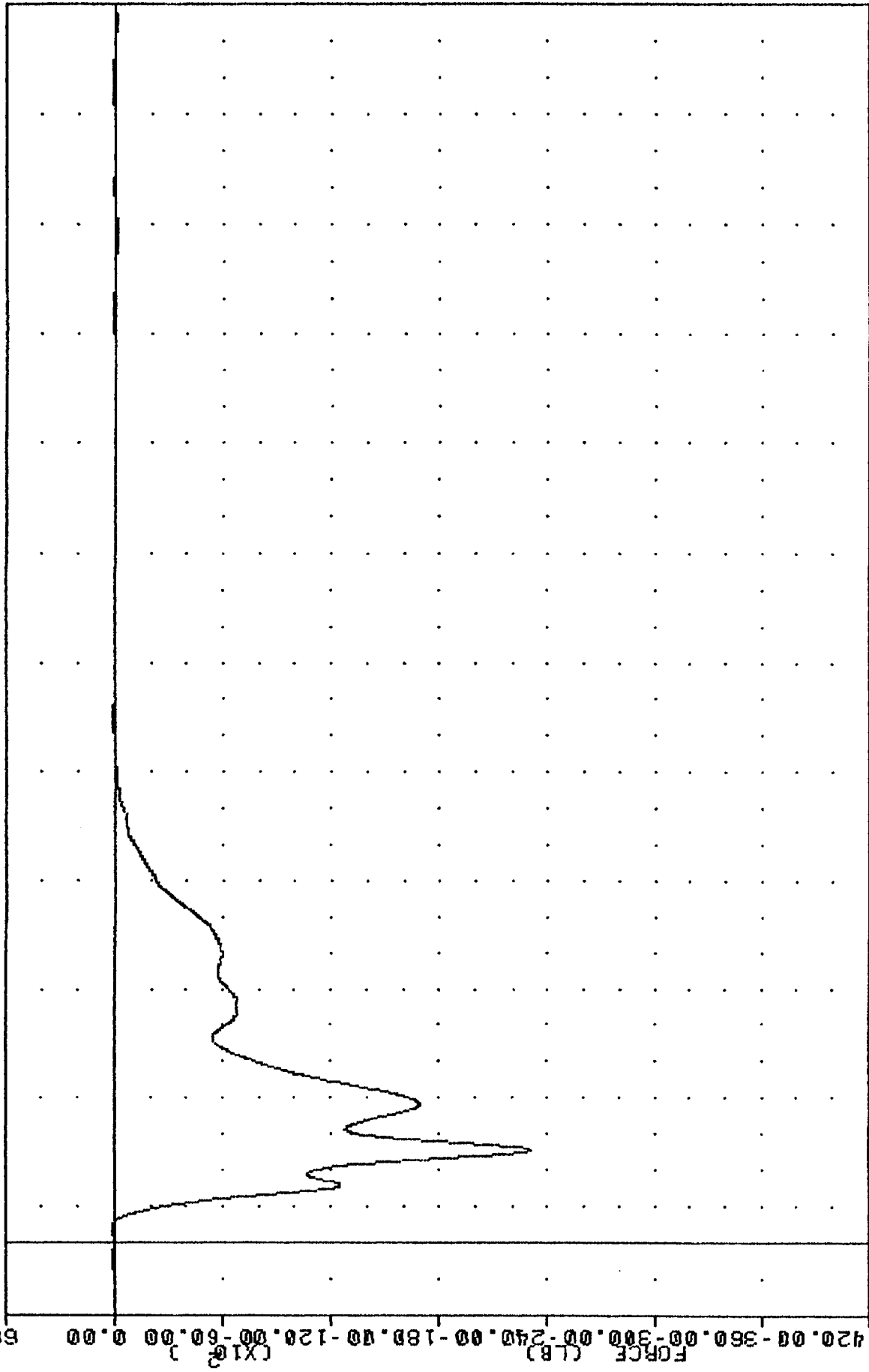
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1492.97# 52.00 , 73.84 e 253.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B2 FORCE

TRC 427
 NEW CAR ASSESSMENT PROGRAM
 92118
 883F

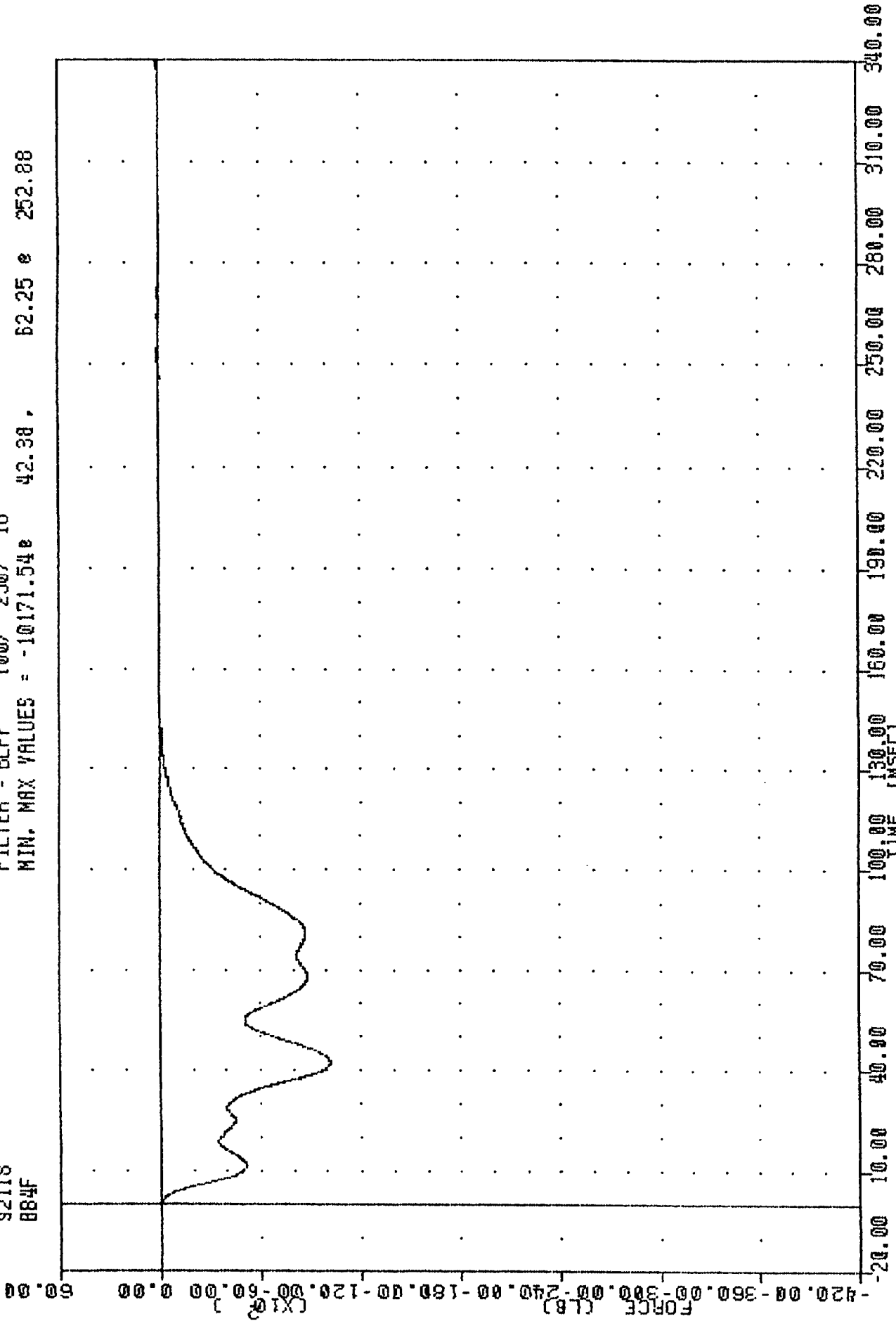
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -23013.18 25.38 , 113.36 e 254.25



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B3 FORCE

TRC . 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 884F

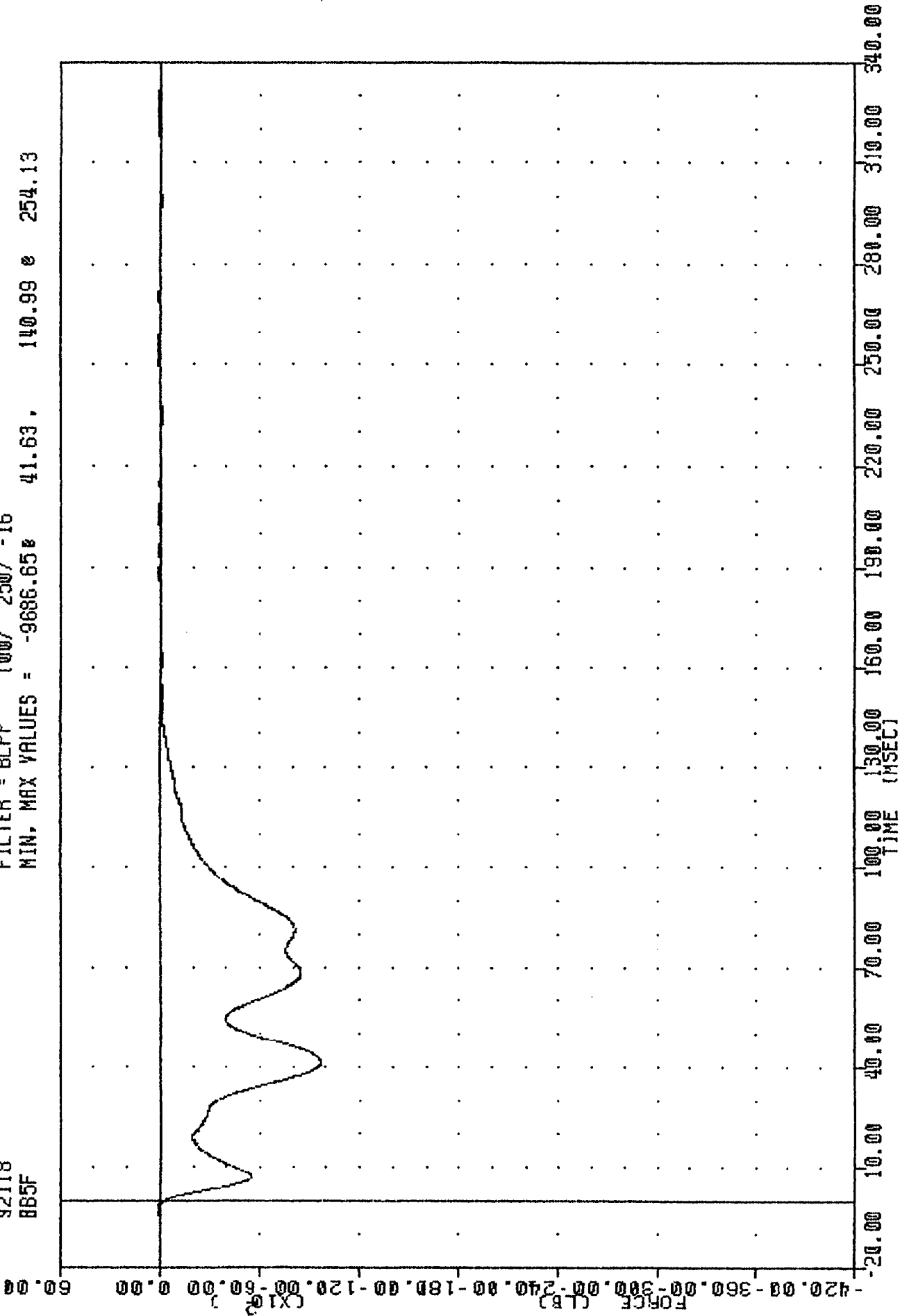
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -10171.54e 42.38, 62.25 e 252.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 84 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 885F

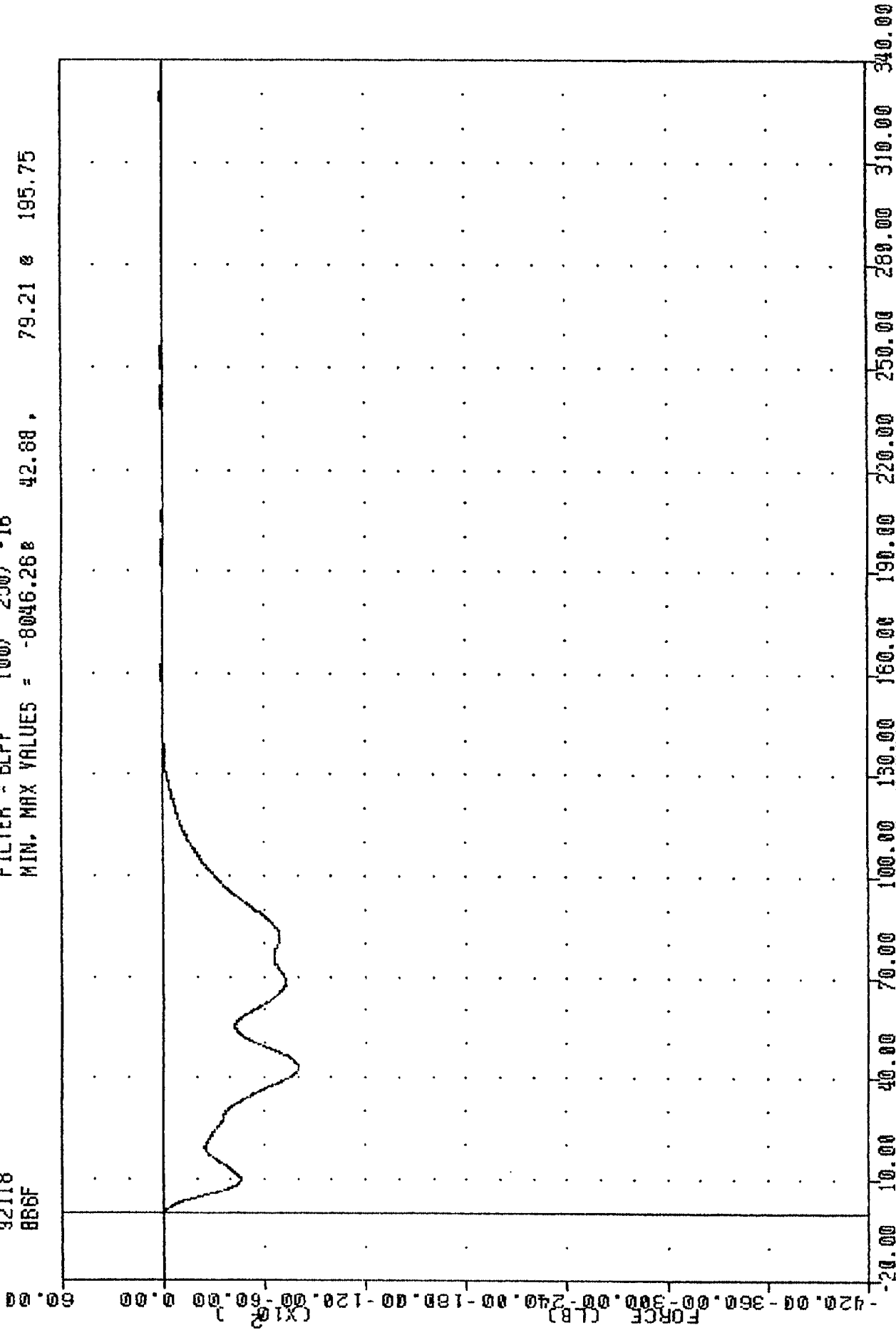
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -9686.65 41.63, 140.99 254.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B5 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BR6F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -8046.26 42.68 79.21 195.75

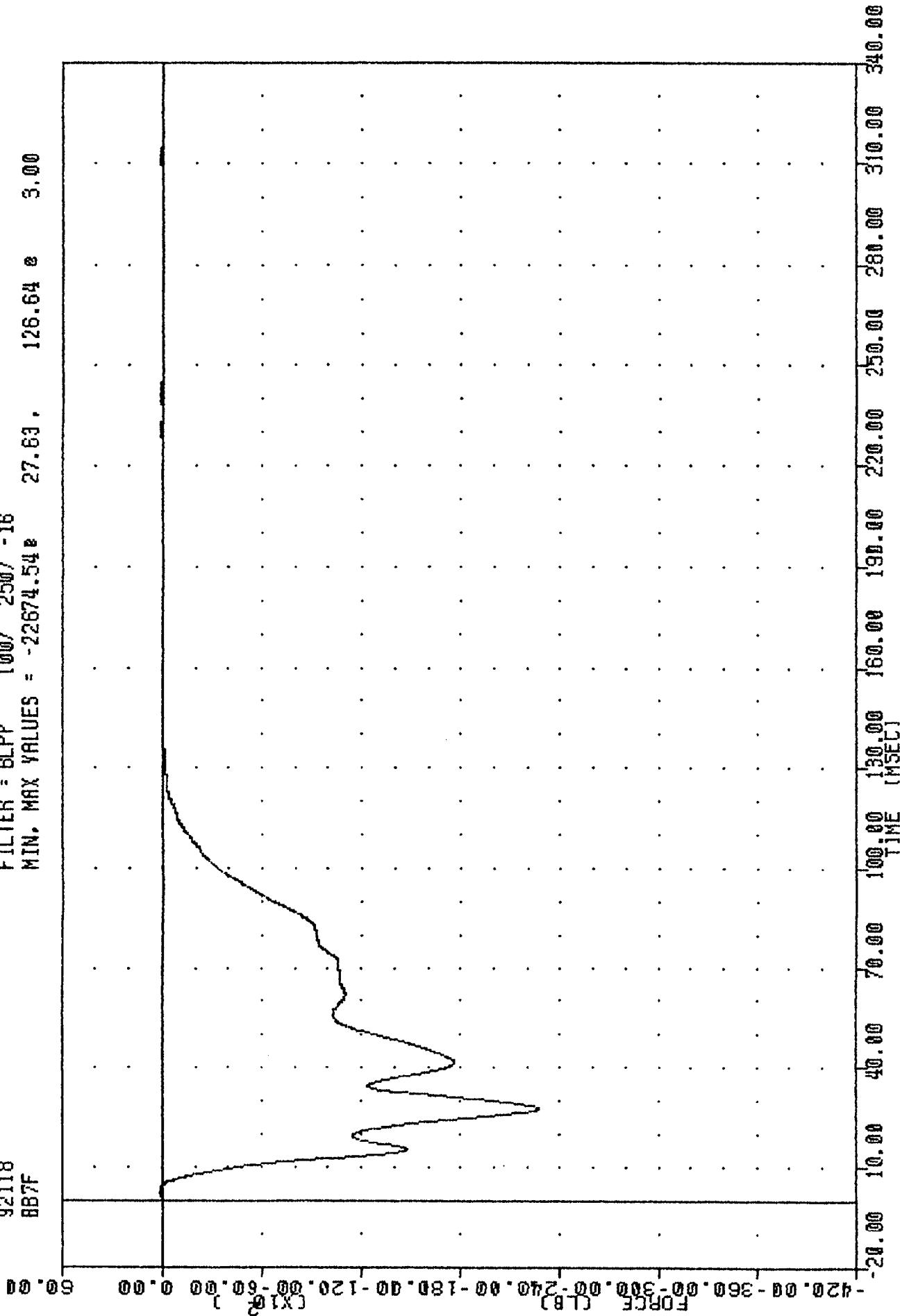


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B6 FORCE

NEW CAR ASSESSMENT PROGRAM

92118
BB7F

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -22674.54 e 27.63 . 126.64 e 3.00

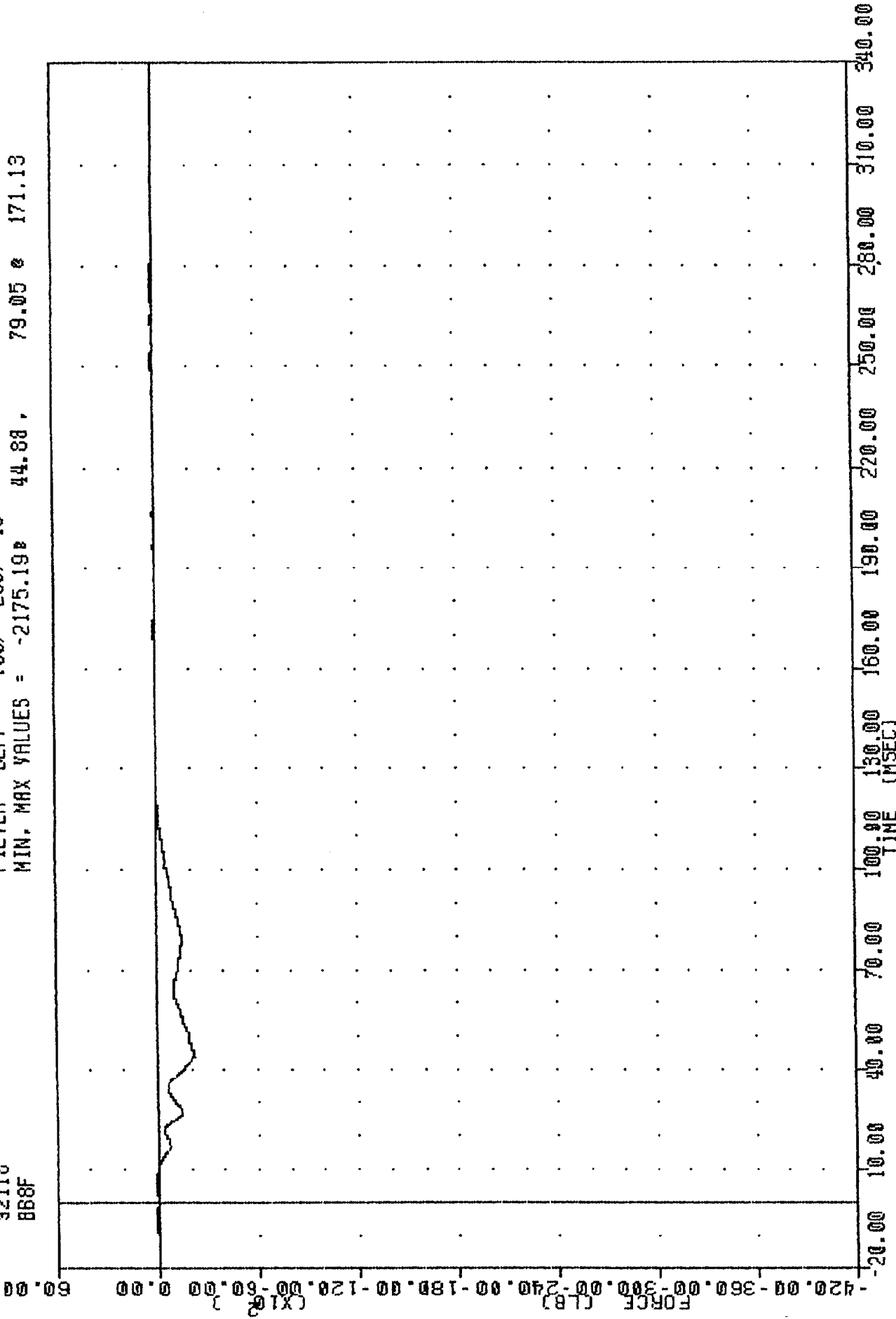


1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B7 FORCE

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 868F

920427

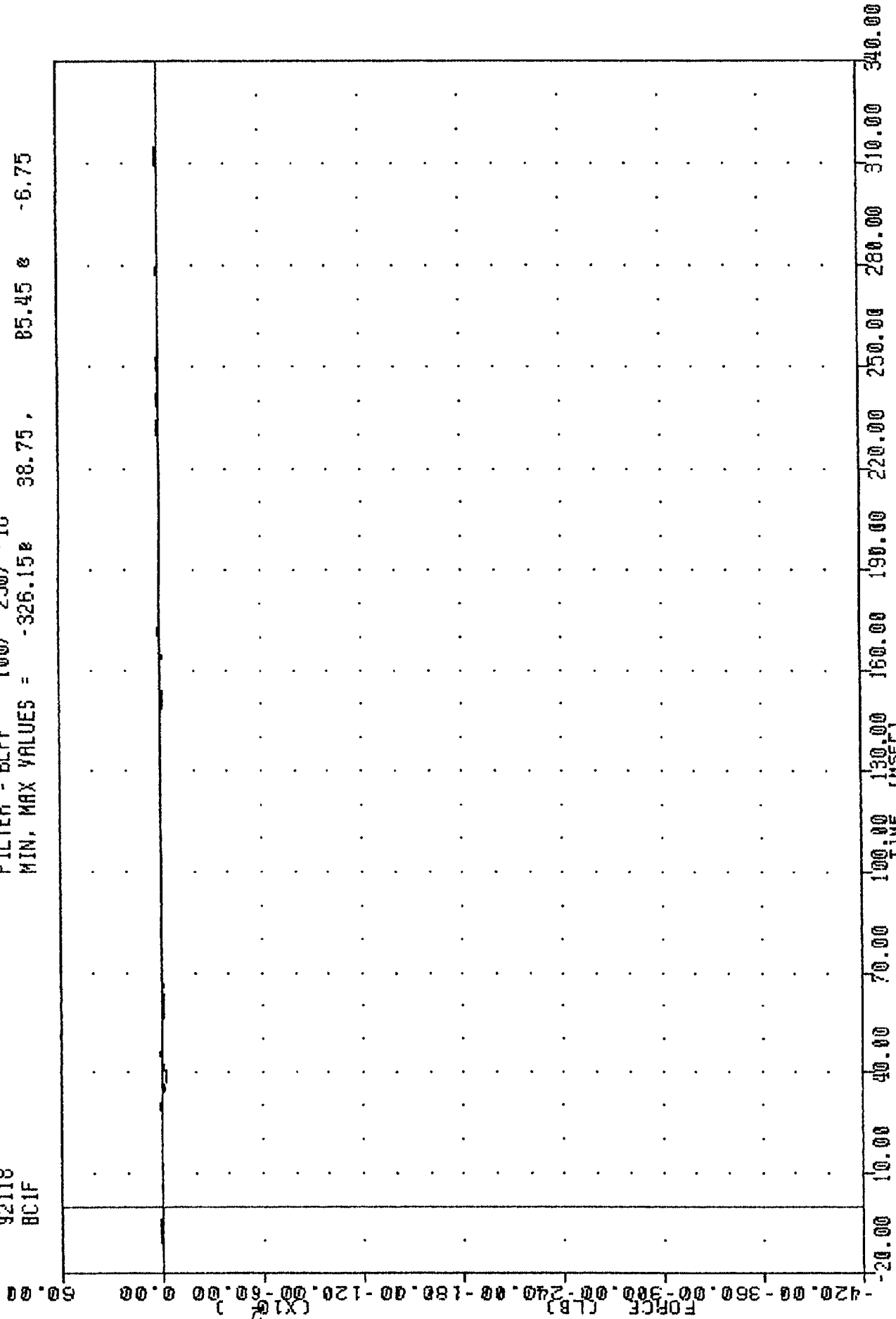
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2175.19 44.88 79.05 171.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 88 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BCIF

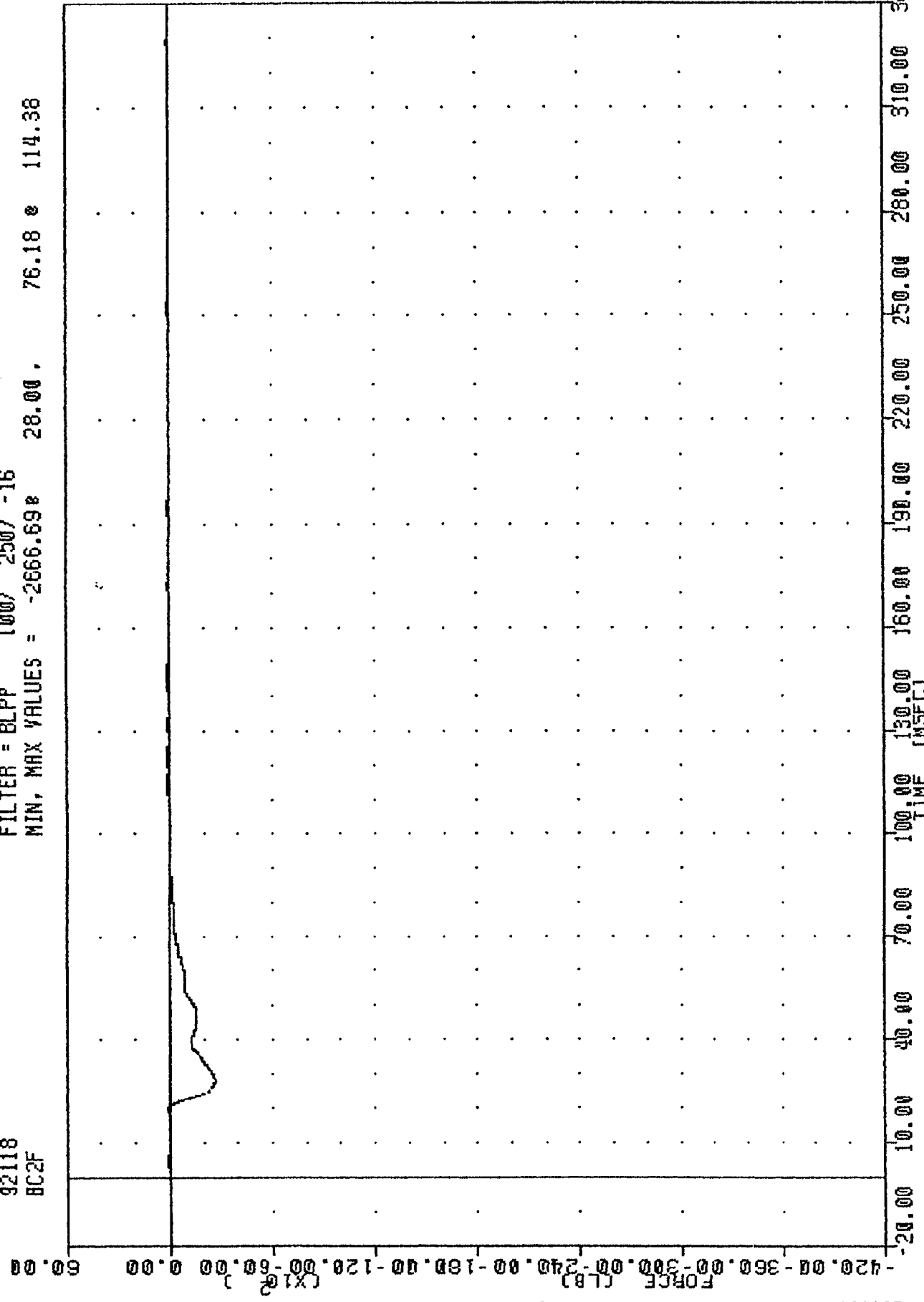
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -326.15e 38.75 , 85.45 e -6.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C1 FORCE

TRC
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC2F

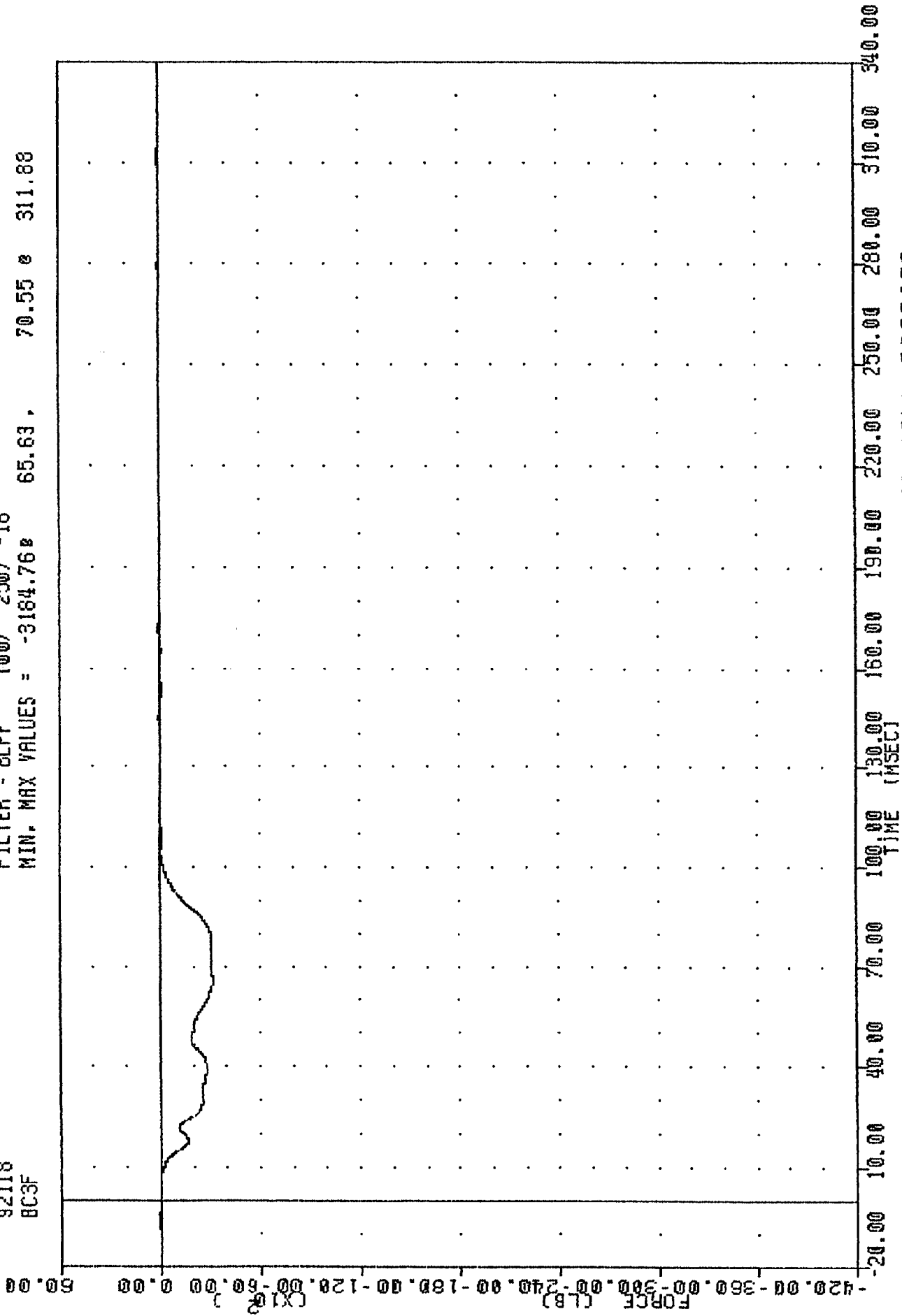
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -2666.69# 28.00 , 76.18 e 114.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C2 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC3F

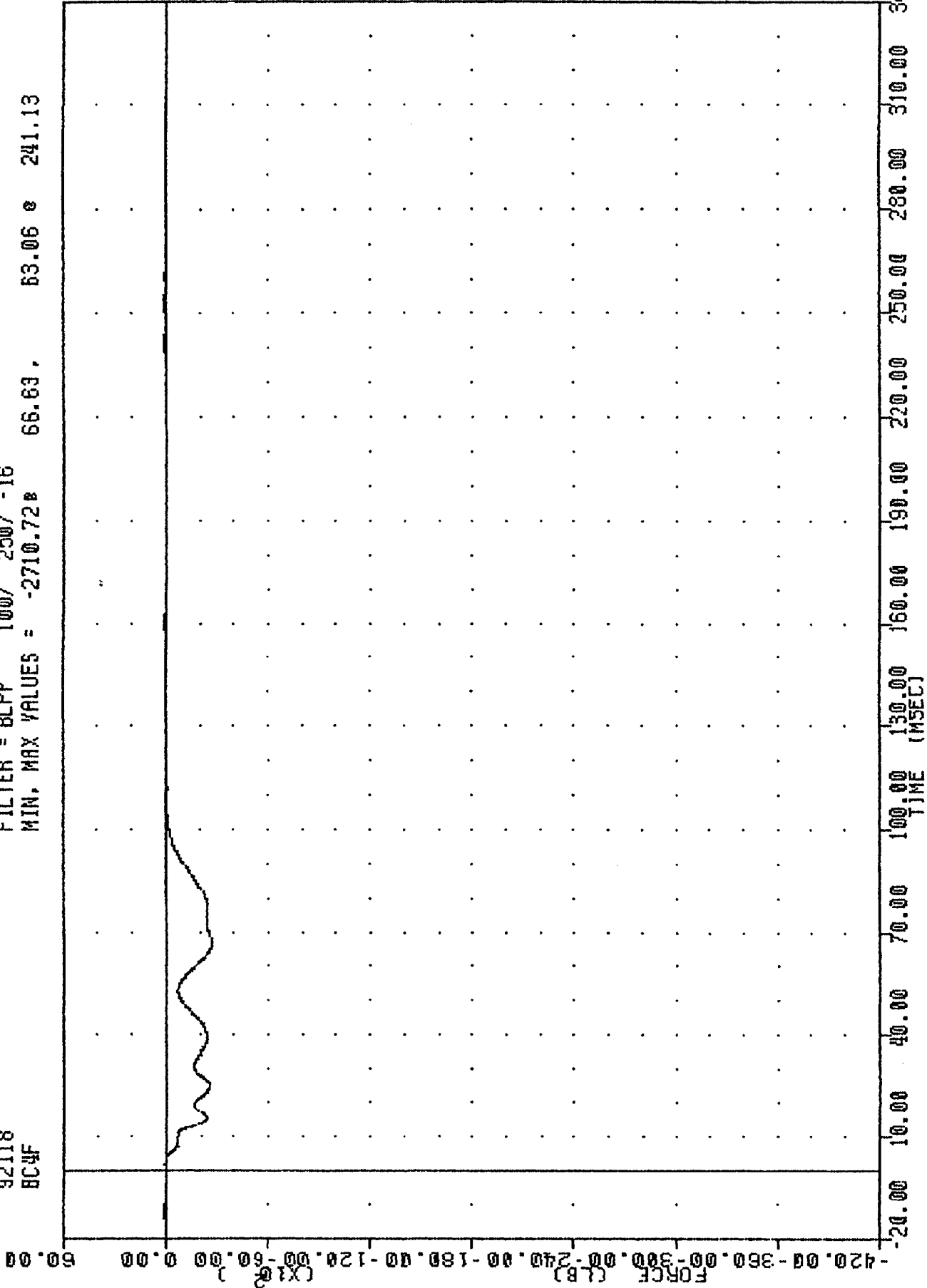
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -3184.76# 65.63, 70.55 e 311.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C3 FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC4F

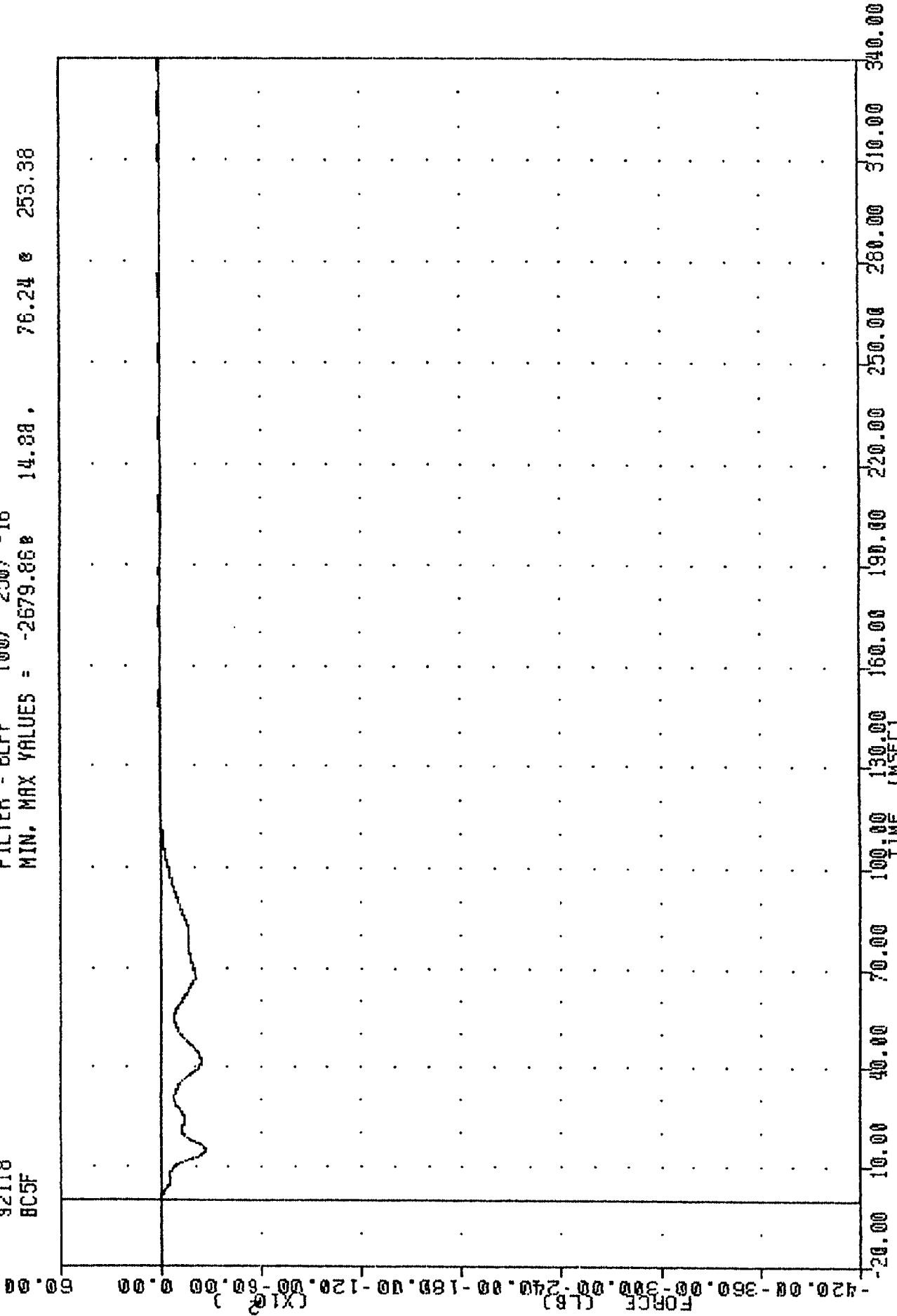
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -2710.72# 66.63, 63.06 e 241.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C4 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC5F

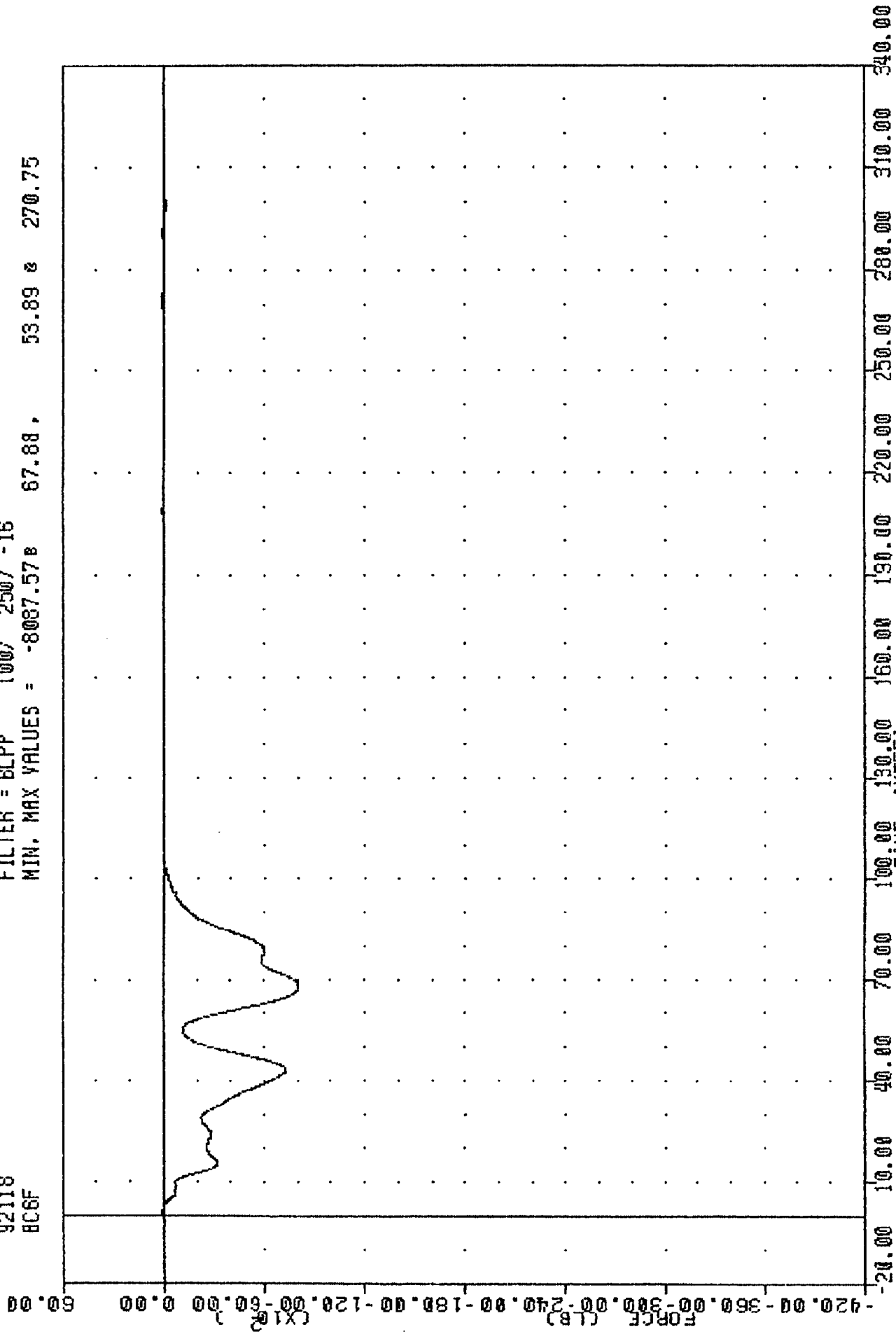
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2679.868 14.88, 76.24 253.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C5 FORCE

TRC 127
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC6F

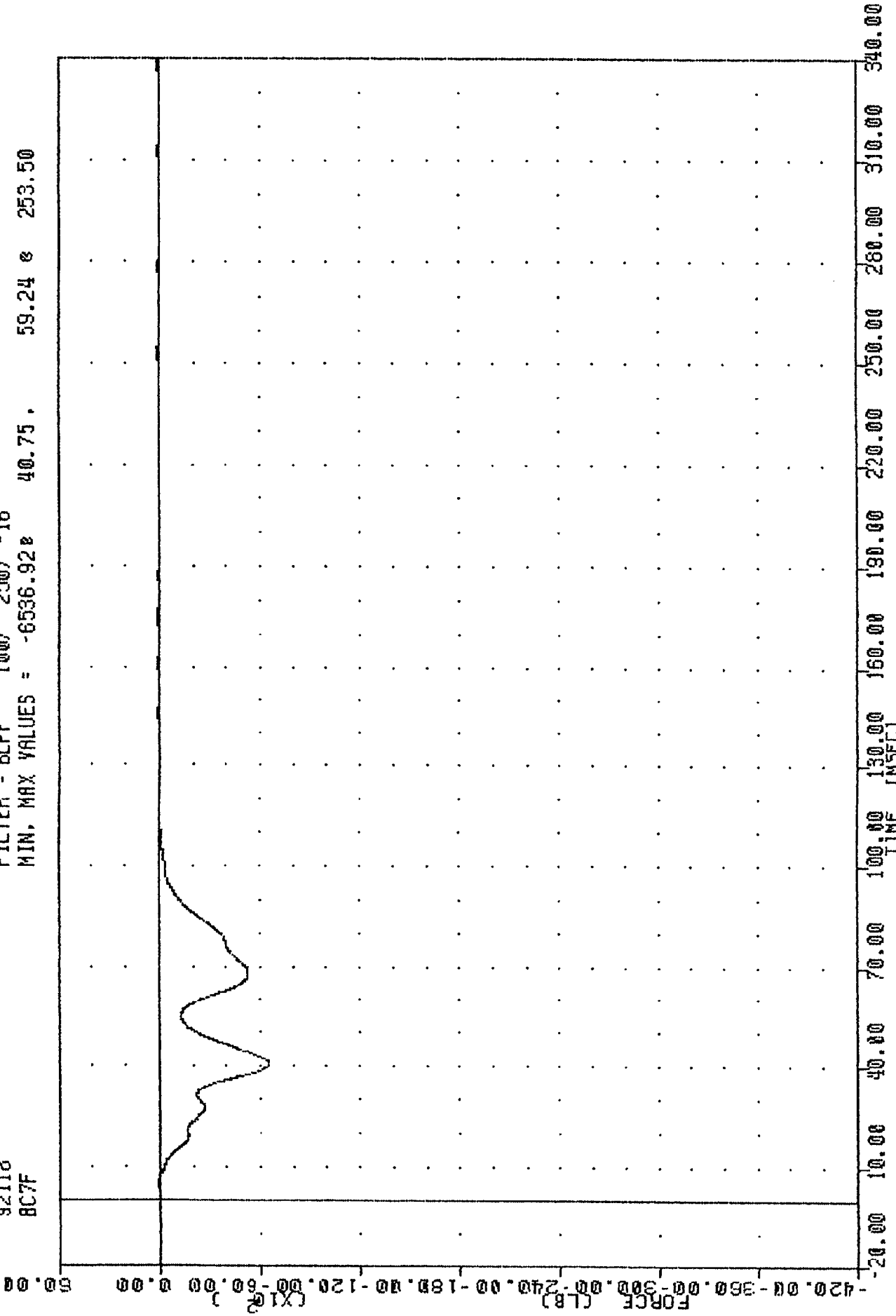
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -8087.57 67.68 53.89 270.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C6 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC7F

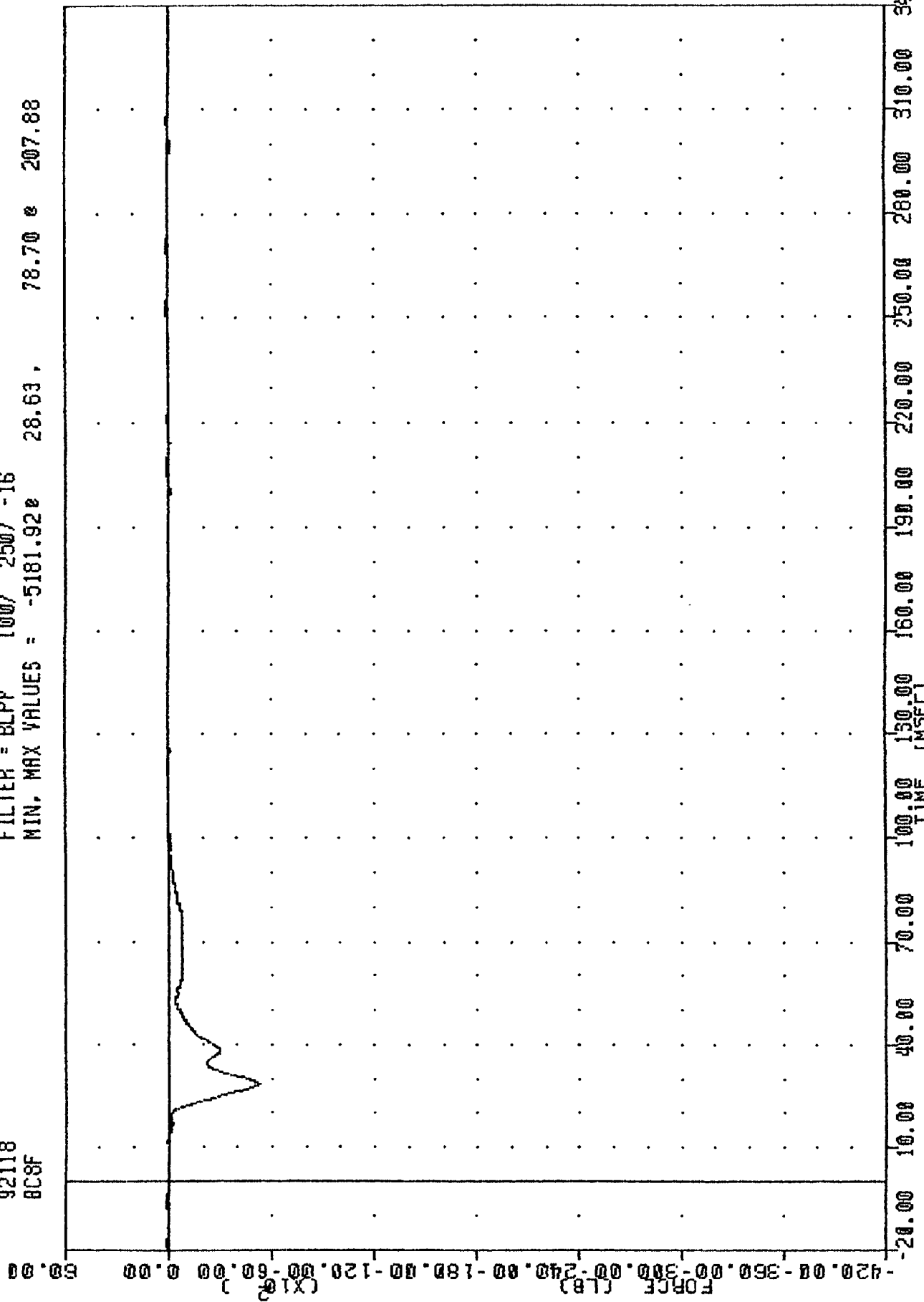
FILTER = 8LPP 100/ 250/ -16
 MIN, MAX VALUES = -6536.92e 40.75, 59.24 e 253.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C7 FORCE

TAC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BC8F

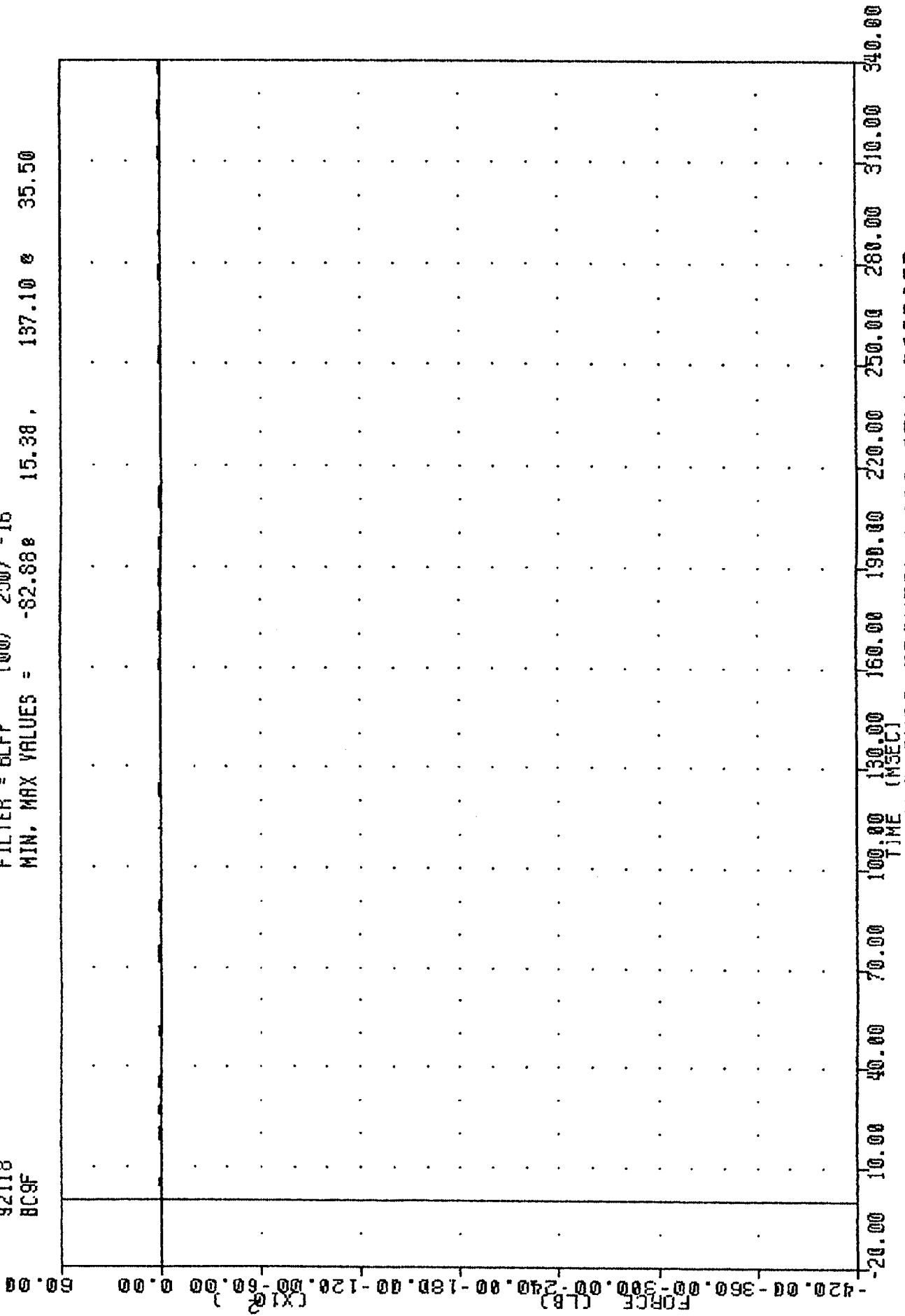
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -5181.92e 28.63, 78.70 e 207.88



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C8 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 BCSF

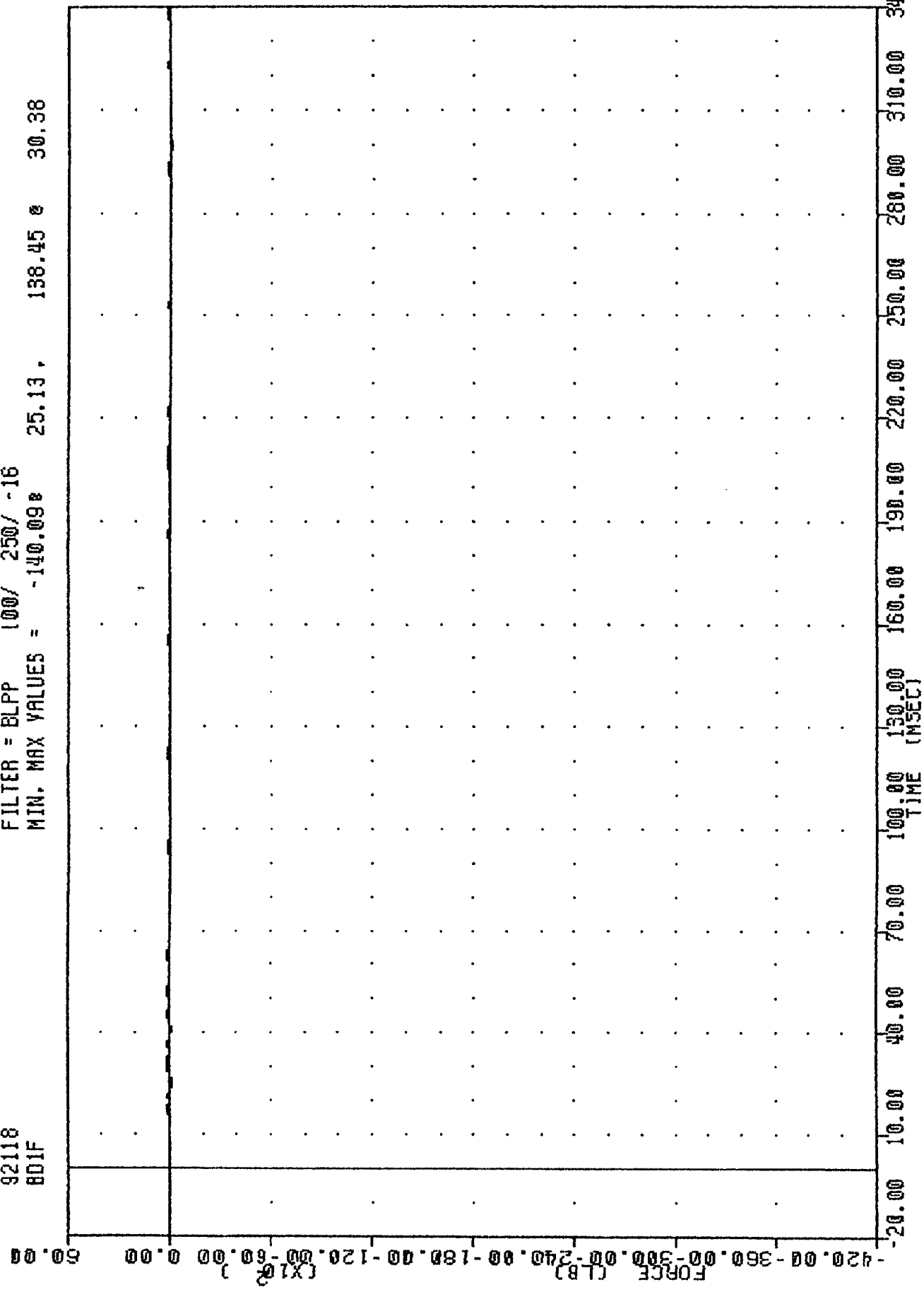
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -82.88e 15.38 , 137.10 e 35.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C9 FORCE

920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 8D1F

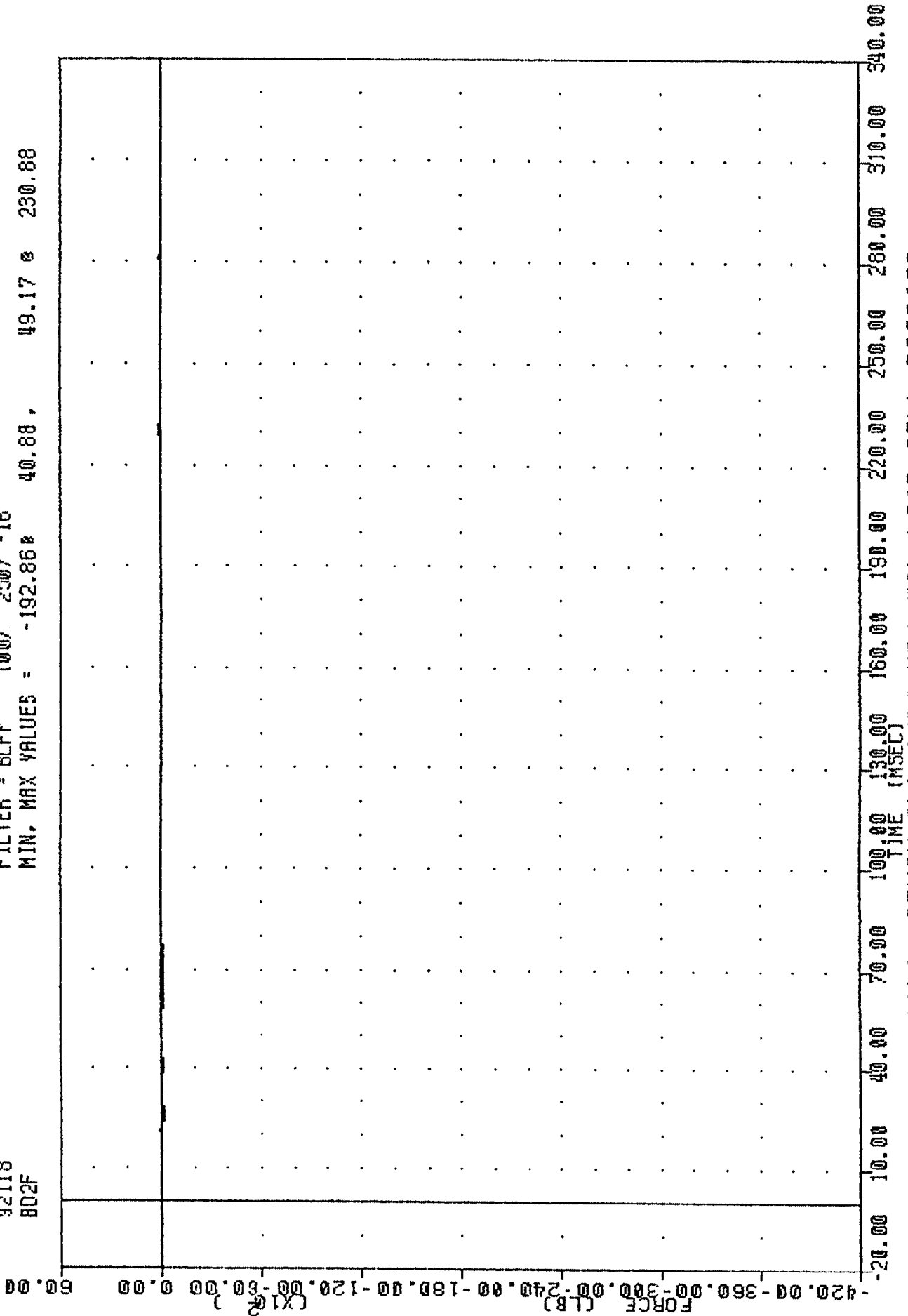
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -140.09* 25.13, 138.45 @ 30.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D1 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 8D2F

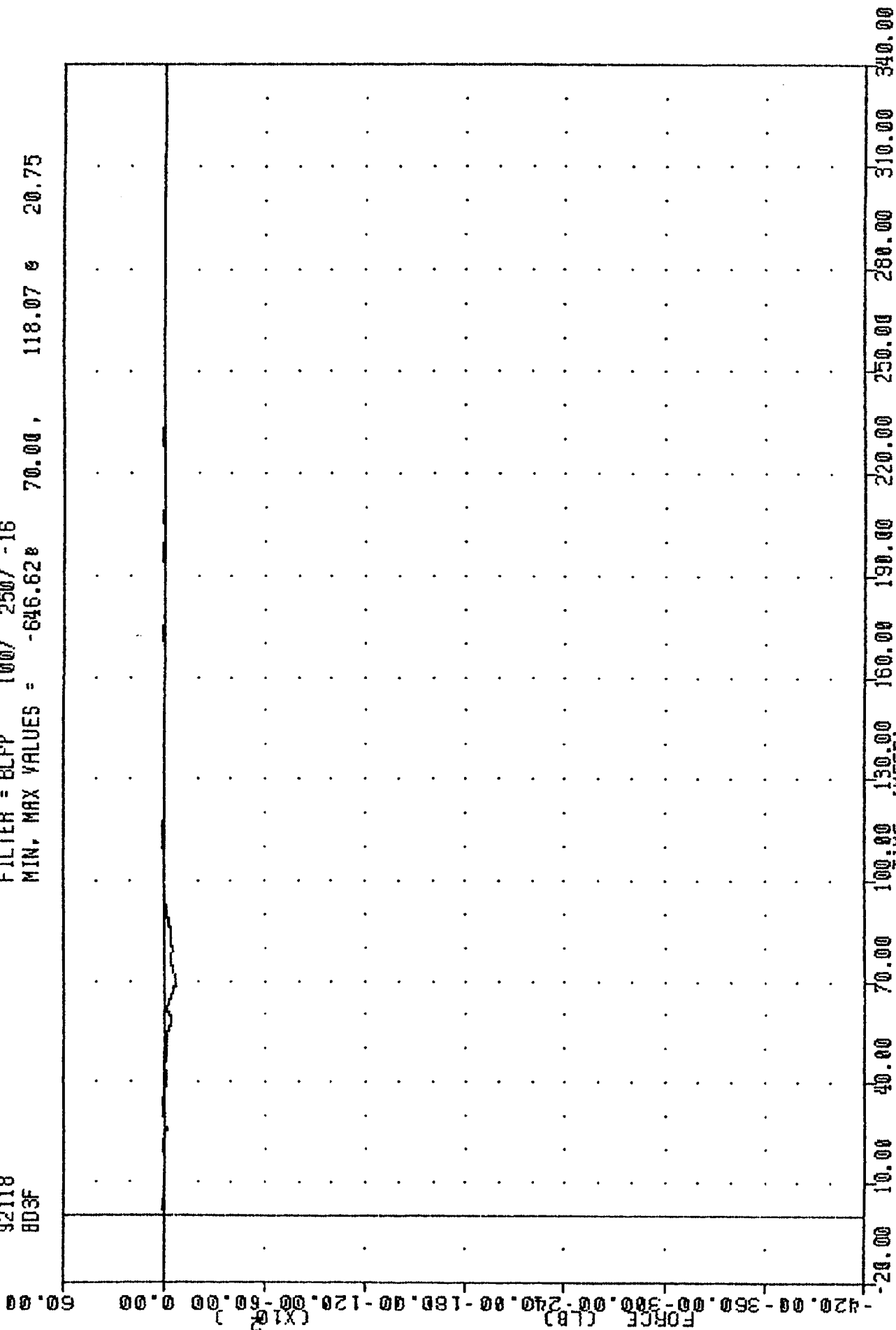
FILTER = BLPF 100/ 250/ -16
 MIN, MAX VALUES = -192.86 40.88, 49.17 230.88



IN 427
NEW CAR ASSESSMENT PROGRAM

92118
BD3F

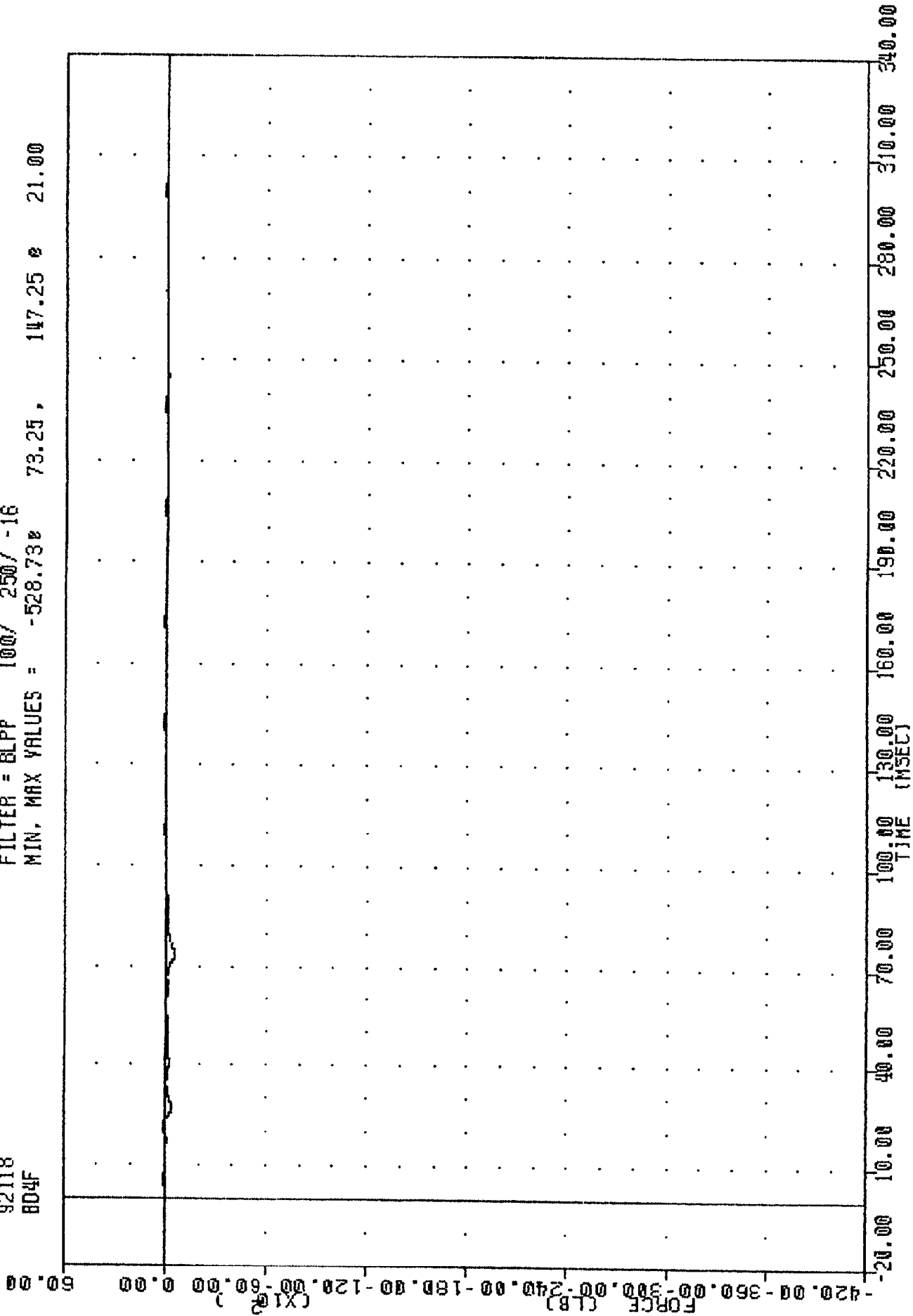
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -646.628 70.00 , 118.07 8 20.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D3 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 804F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -528.73% 73.25, 147.25 % 21.00



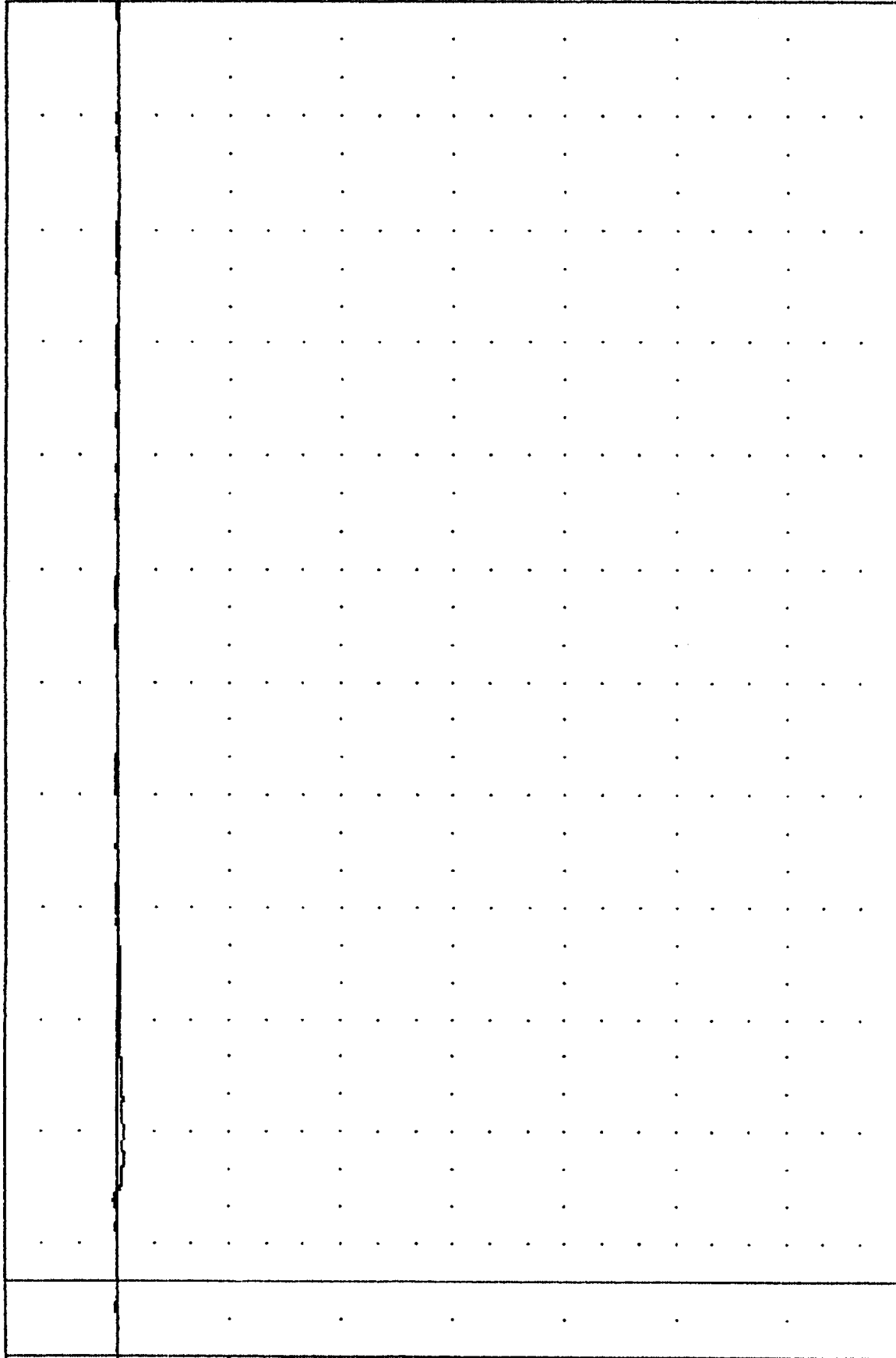
1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 04 FORCE

IN 427
NEW CAR ASSESSMENT PROGRAM

92118
8D5F

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -412.31e 40.00, 169.58 e 21.50

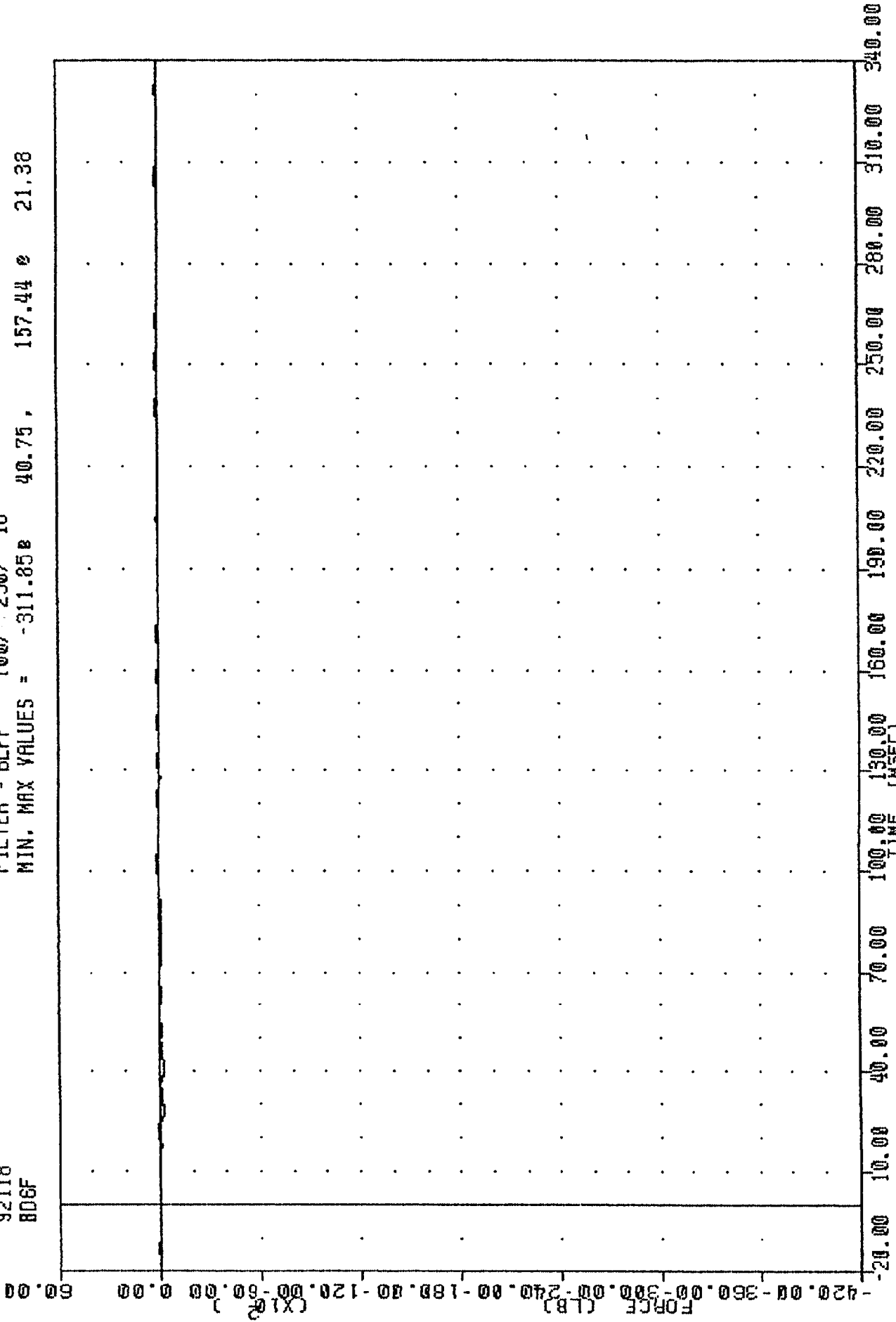
50.00



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D5 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 806F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -311.85 157.44 21.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 06 FORCE

TAC 520427

NEW CAR ASSESSMENT PROGRAM

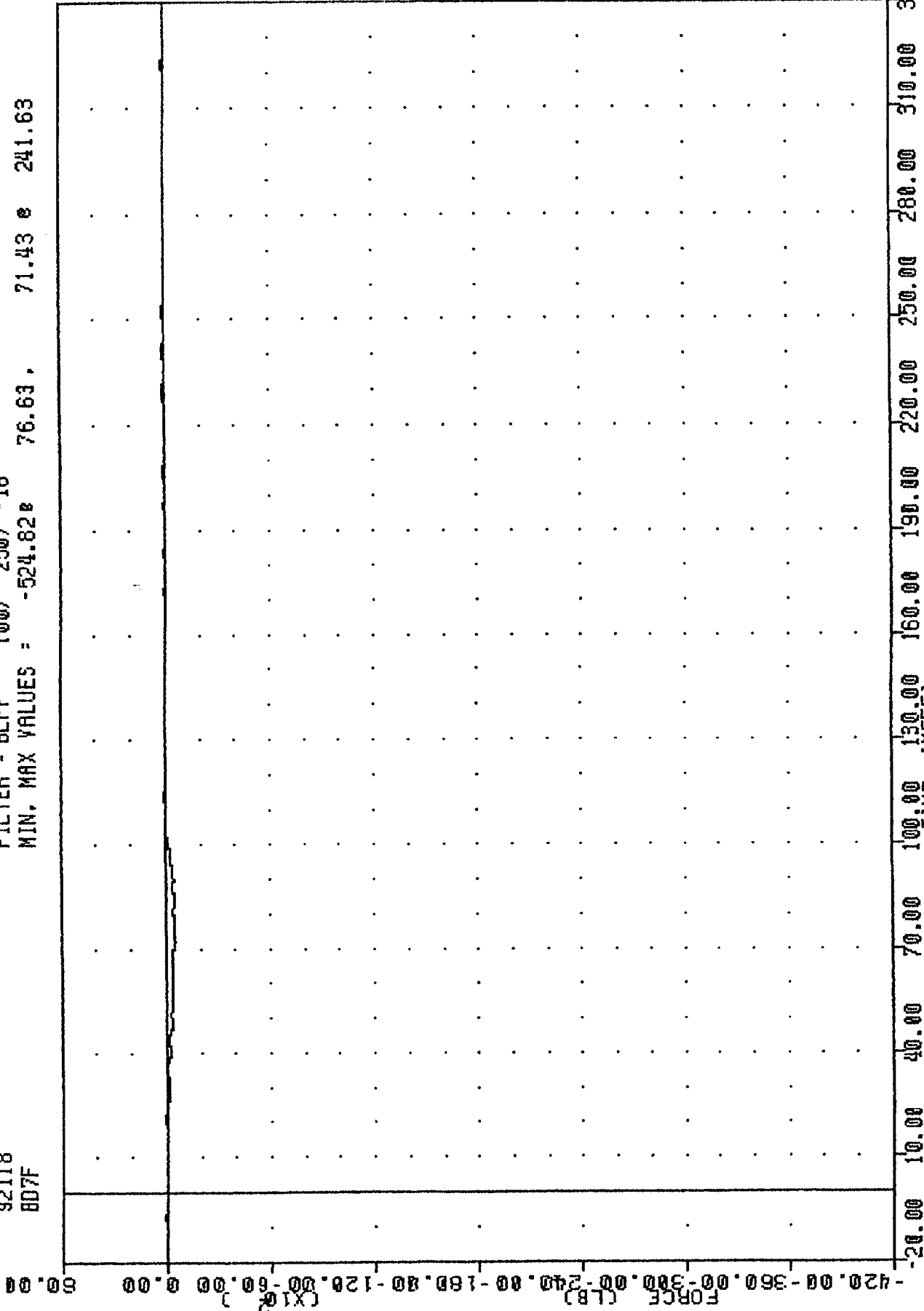
92118

BD7F

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -524.82 76.63

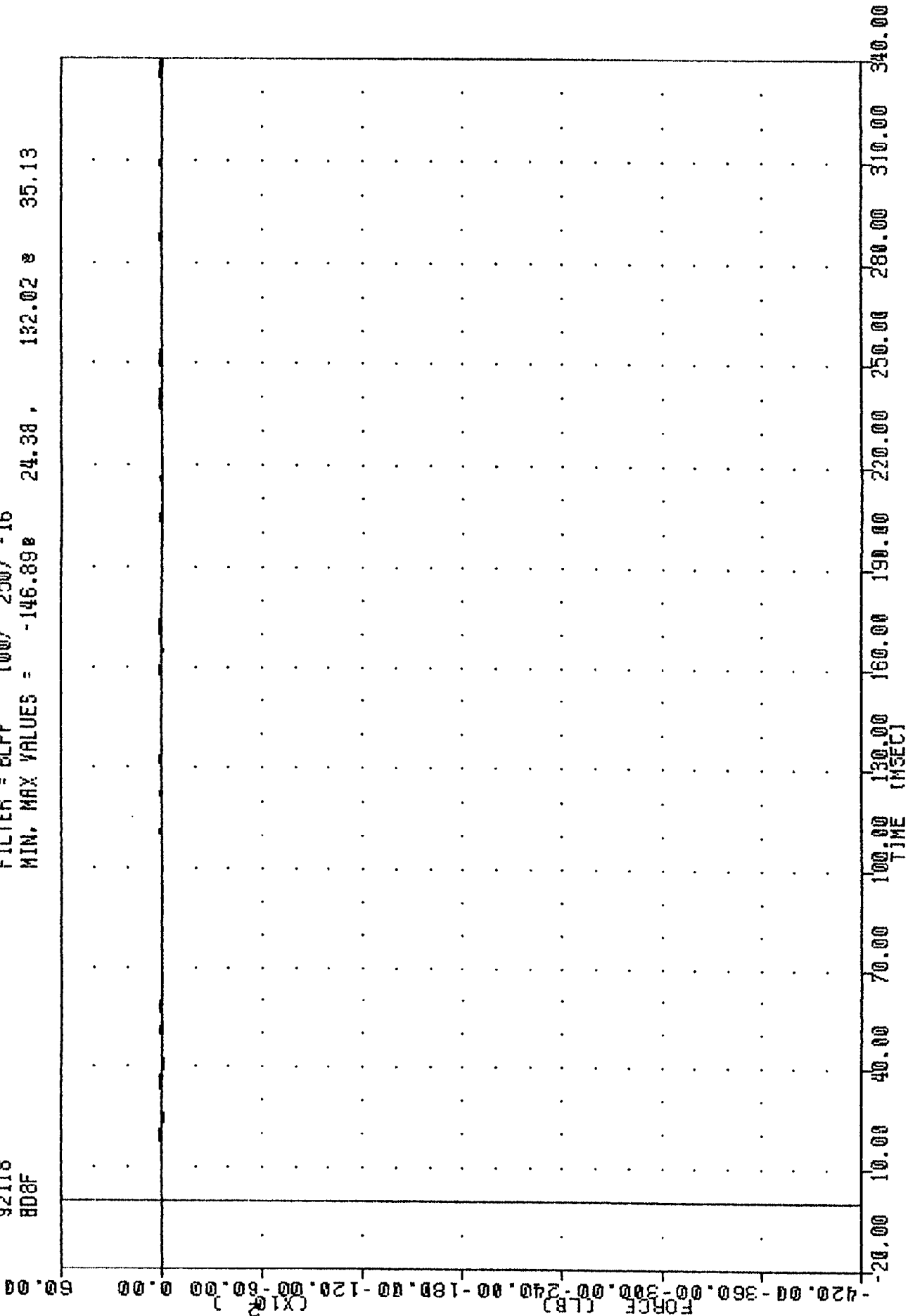
71.43 241.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D7 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 8D8F

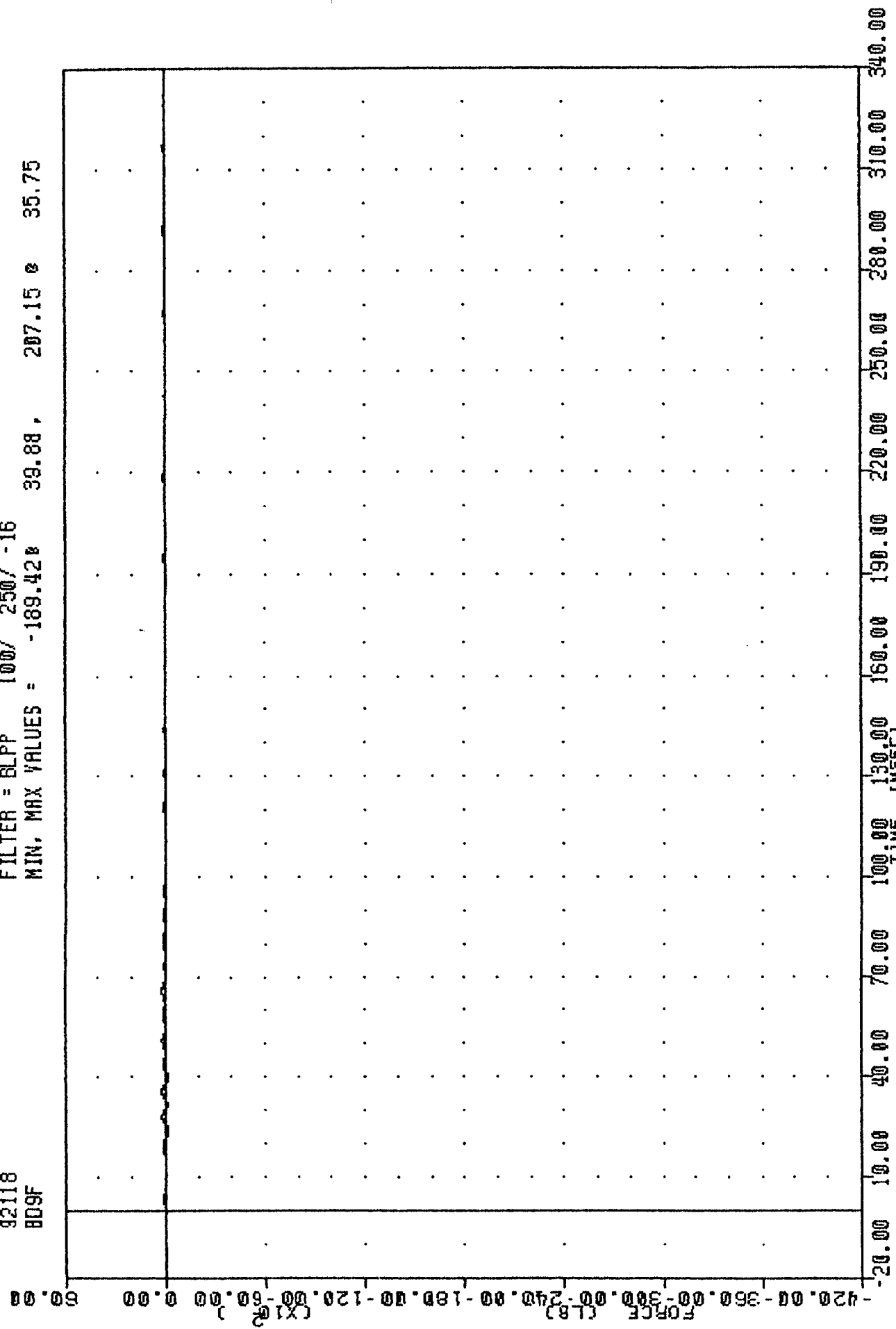
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -146.89 24.38 , 132.02 35.13



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION OR FORCE

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 B09F

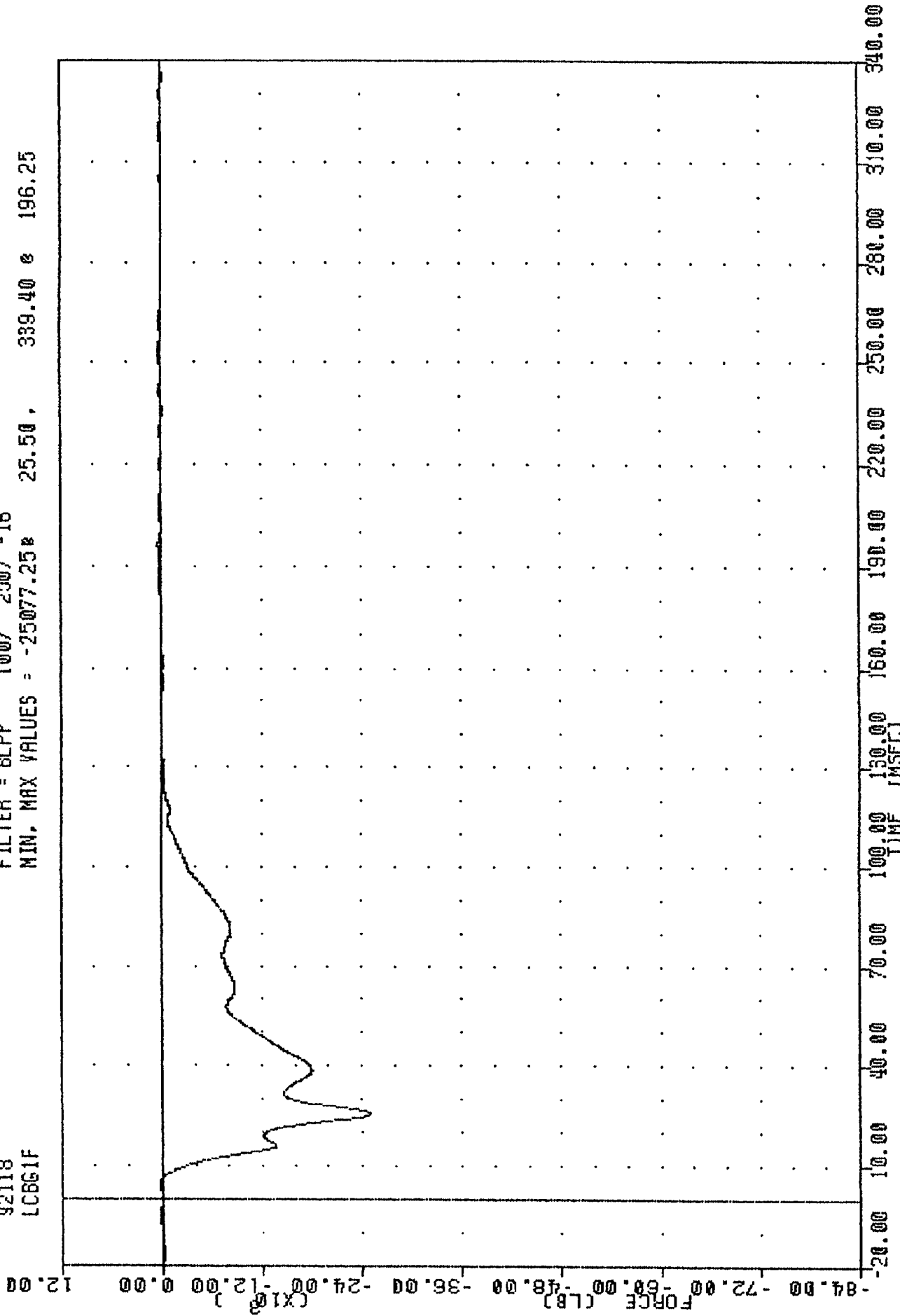
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -189.42 39.88, 207.15 35.75



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D9 FORCE

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 LC661F

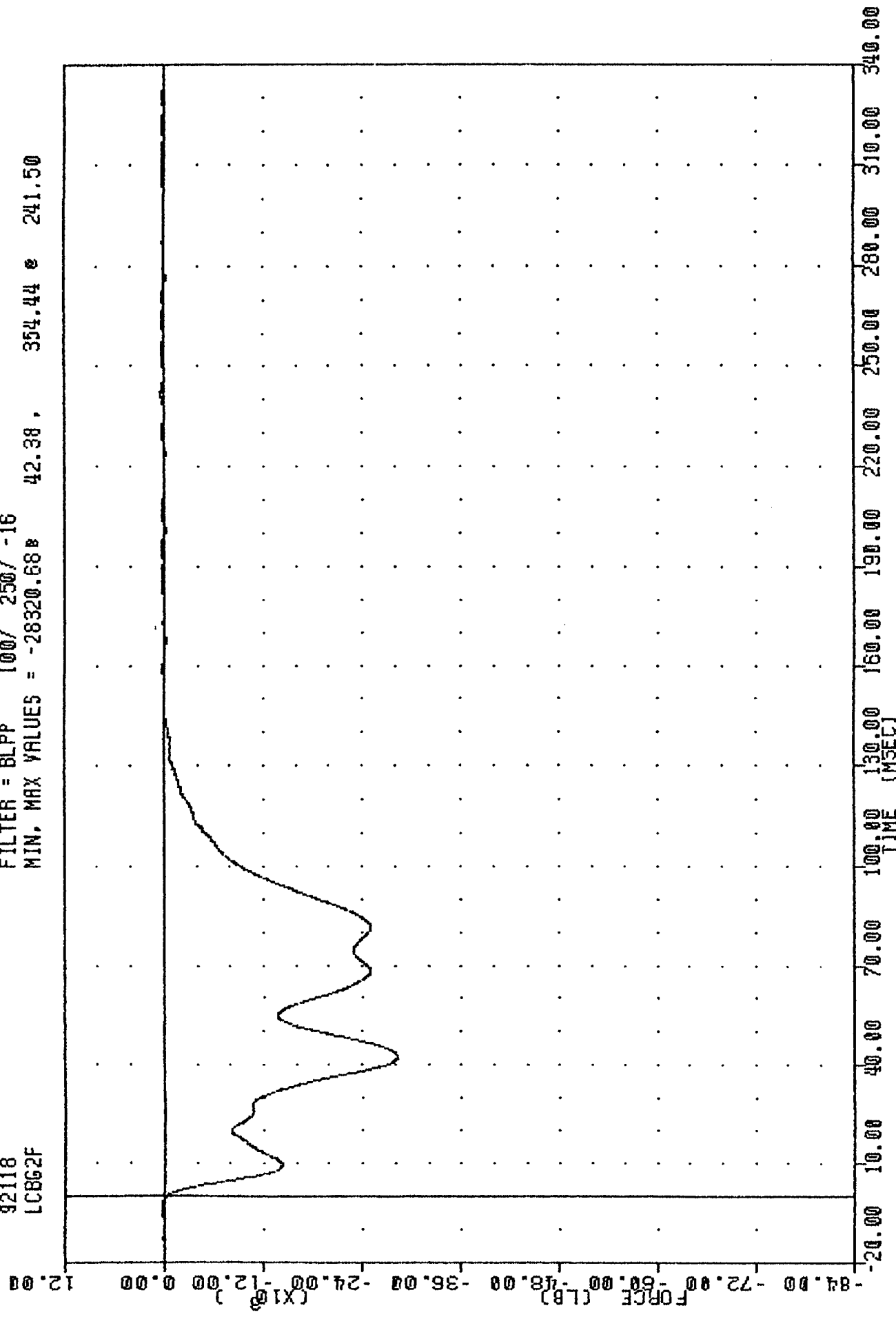
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -25077.25 339.40 196.25



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 1 FORCE TOTAL

TRC 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCB02F

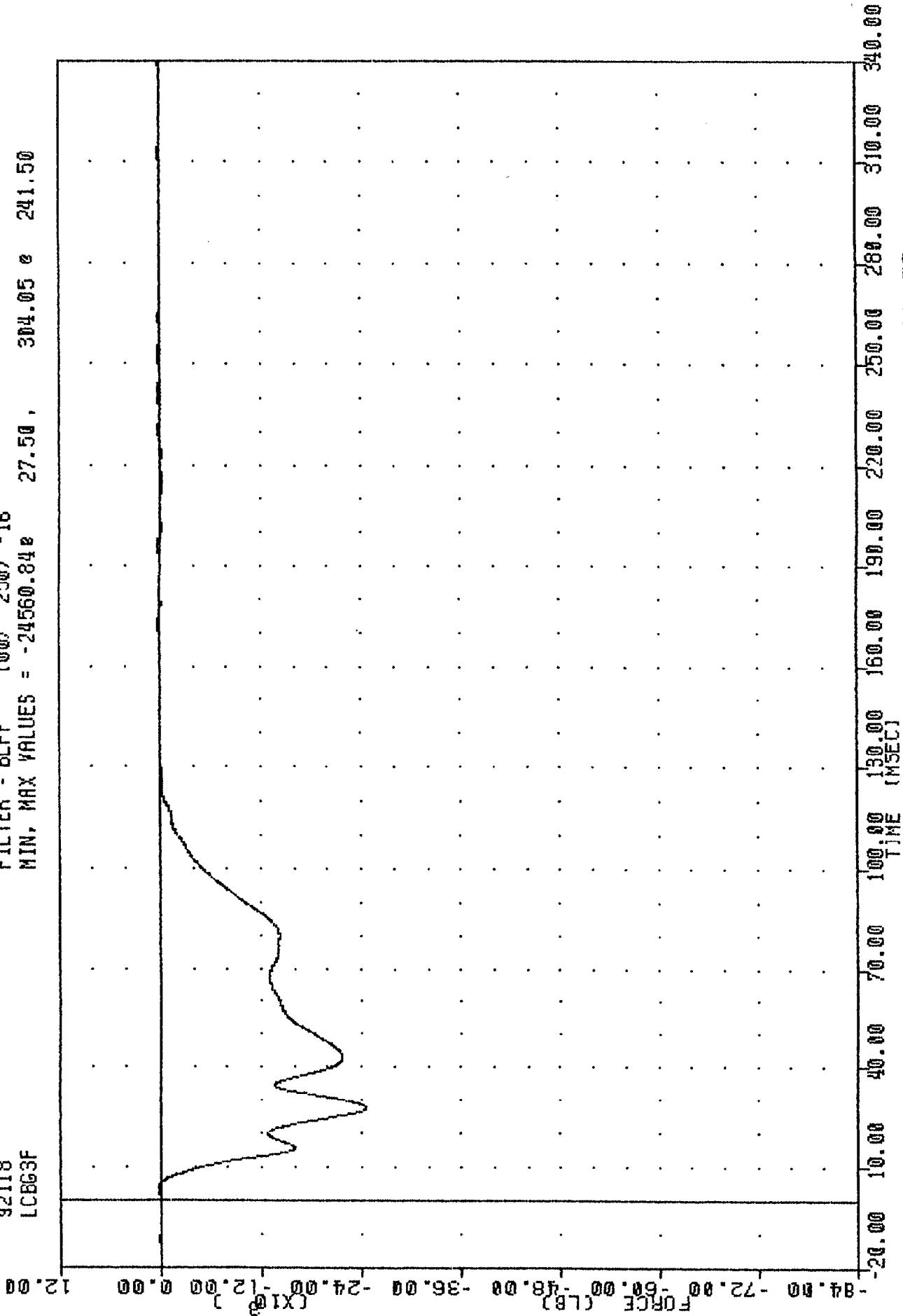
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -28320.68 354.44 @ 241.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 2 FORCE TOTAL

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCBG3F

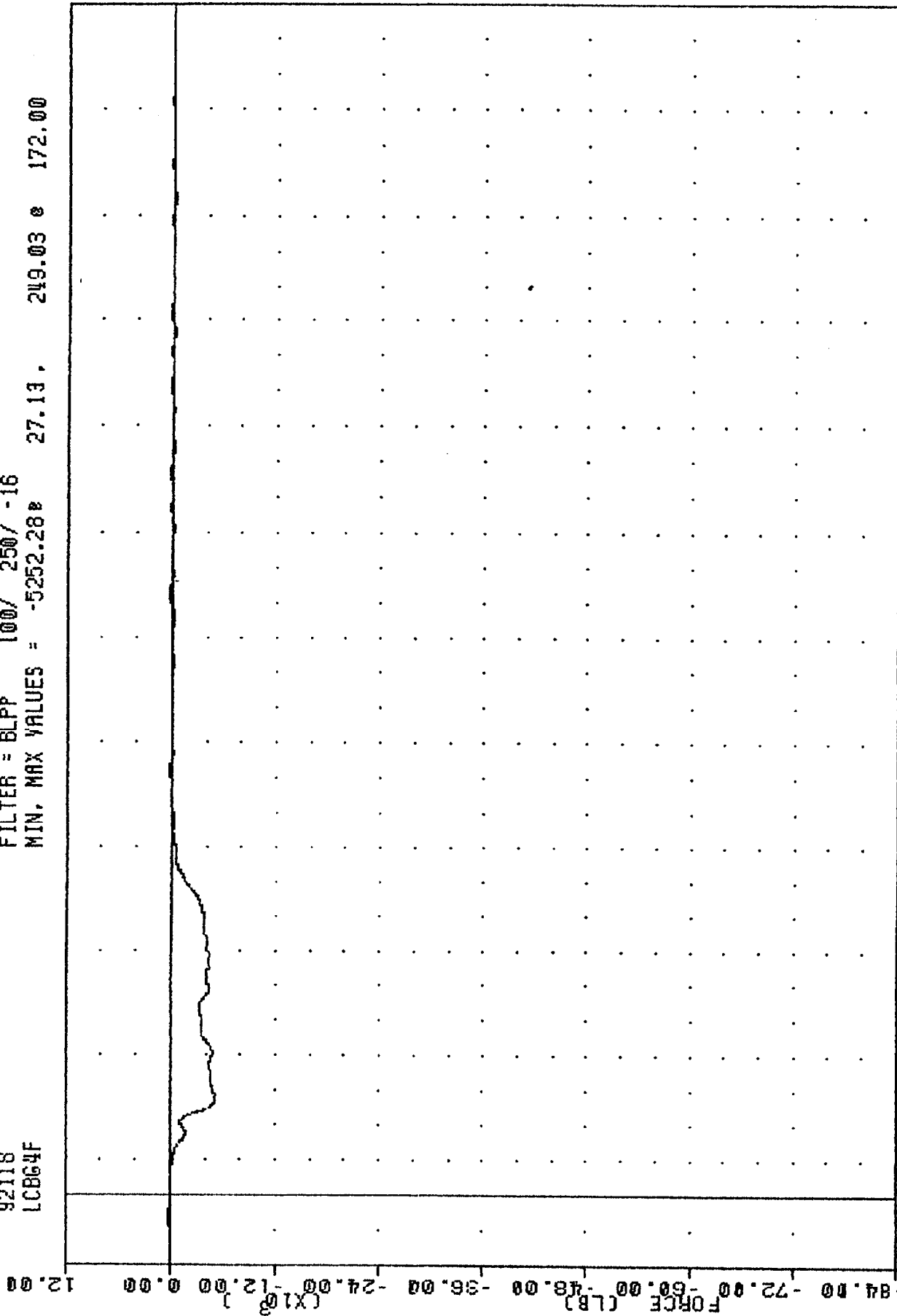
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -24560.84e 27.50 , 304.05 e 241.50



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 3 FORCE TOTAL

TRC, 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCBG4F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -5252.28 27.13, 249.03 172.00

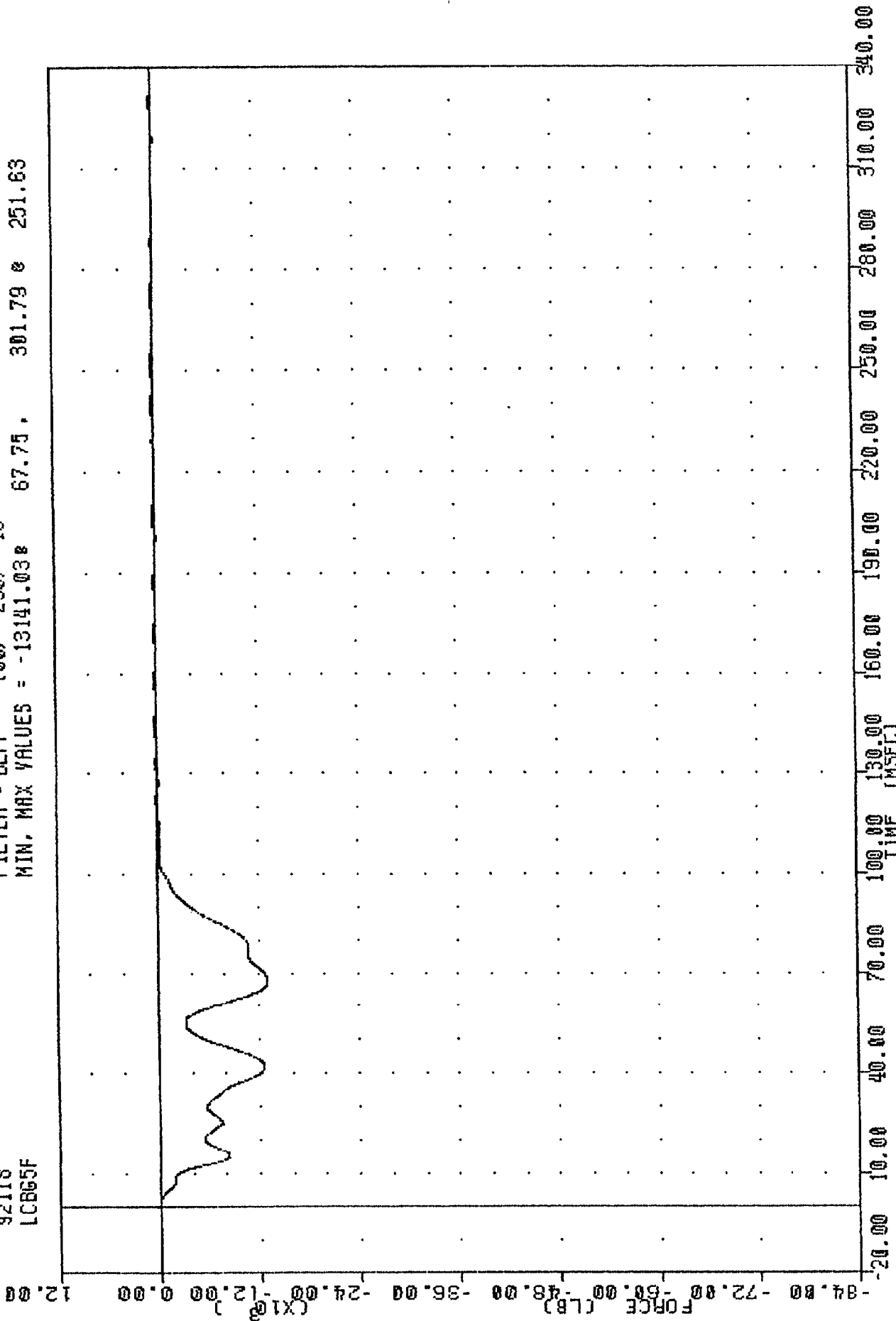


-84.00 -72.00 -60.00 -48.00 -36.00 -24.00 -12.00 0.00 12.00
 -20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 4 FORCE TOTAL

TRC , 920427
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCBG5F

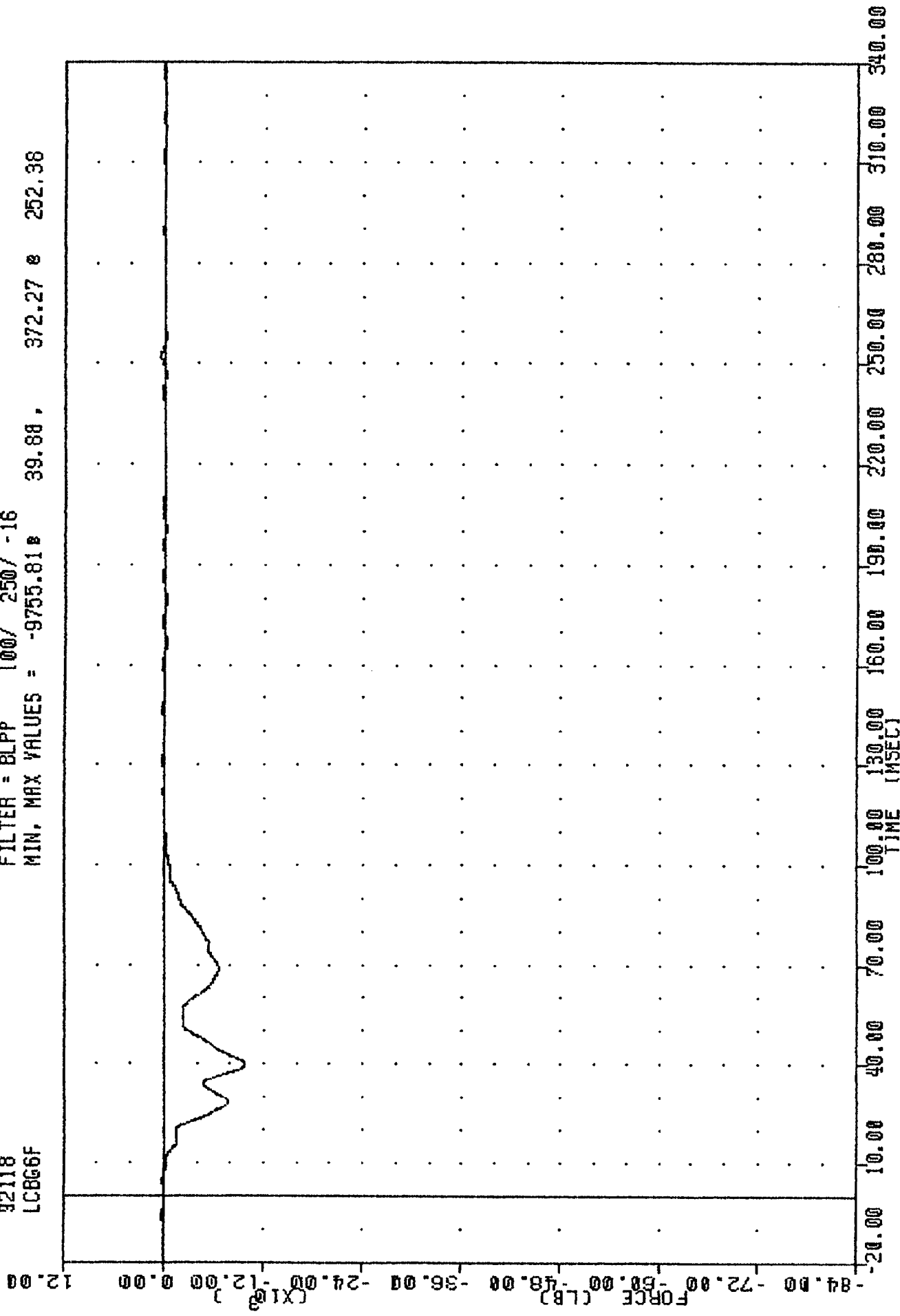
FILTER = BLFF 100/ 250/ -16
 MIN, MAX VALUES = -13141.03 67.75 , 301.79 & 251.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 5 FORCE TOTAL

190
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCBG6F

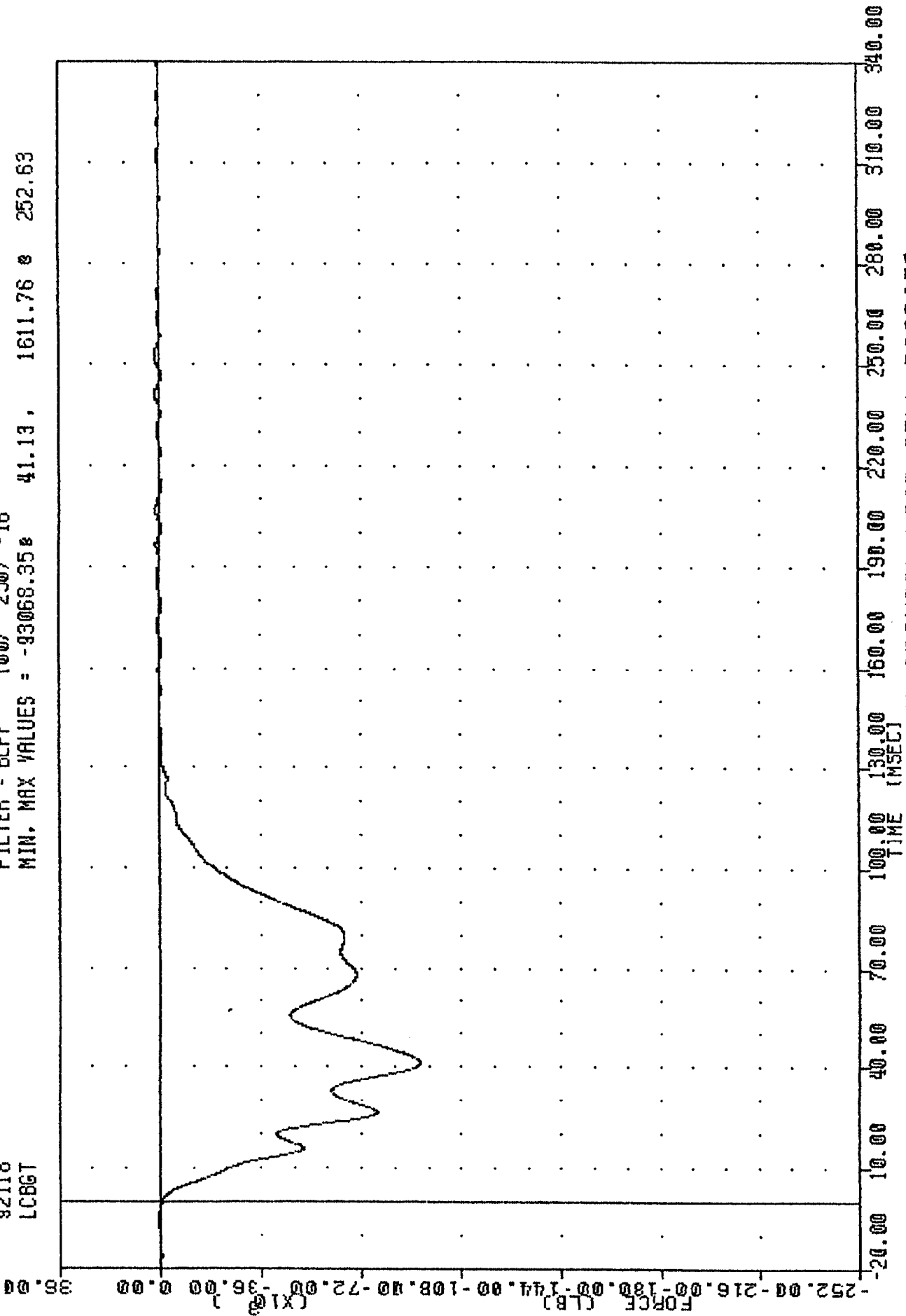
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -9755.81 39.88, 372.27 252.38



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP - 6 FORCE TOTAL

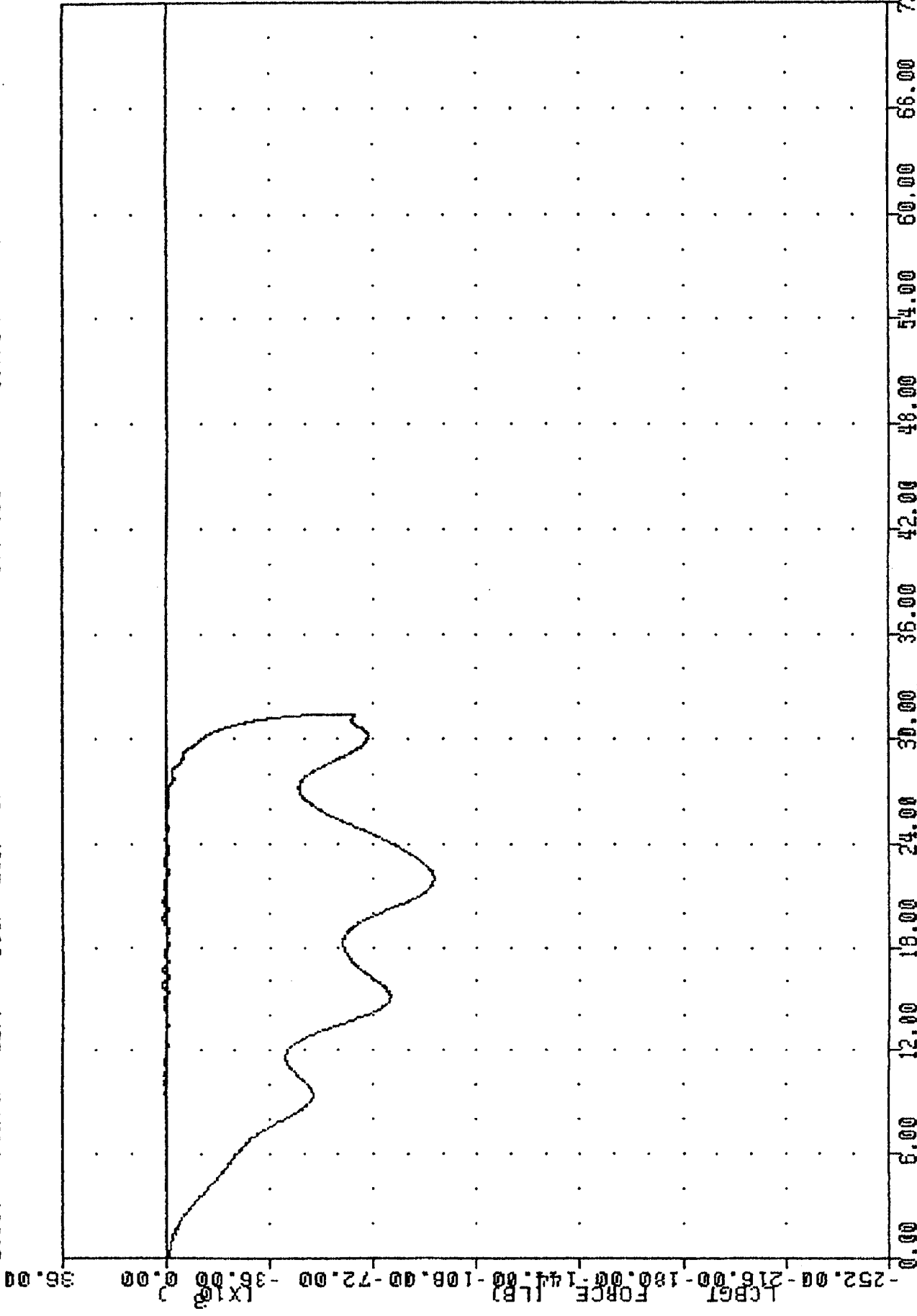
TAC
 NEW CAR ASSESSMENT PROGRAM
 92118
 LCBGT

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -93068.35 41.13, 1611.76 252.63



1992 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 TOTAL LOAD CELL BARRIER FORCE

127
 FILTER = BLPP
 FILTER = BLPP
 500/ 750/ -16
 100/ 250/ -16
 MIN. MAX =
 MIN. MAX =
 211
 0.00
 -93068.35
 0.00
 41.13
 31.44
 1611.76
 83.63
 252.63



1992 SATURN SL2 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: 083

TRANSPORTATION RESEARCH CENTER OF OHIO
HYBRID III EXTERNAL DIMENSIONS
083 HUMANOID

17-APR-92

TRC 83C77ED1 572E SN083 EXT. DIMENSION CAL77

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			71.0 DEG. F
RELATIVE HUMIDITY			43.0 %
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	33.5 IN
CHEST DEPTH (O)		8.4- 9.0 IN	8.5 IN
H-POINT HEIGHT (C)		3.3- 3.5 IN	3.5 IN
H-POINT FROM SEATBACK (D)		5.3- 5.5 IN	5.5 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN	34.8 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN	5.8 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN	23.5 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN	18.5 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN	17.3 IN
KNEE PIVOT HEIGHT (M)		19.1-19.7 IN	19.4 IN
FOOT LENGTH (P)		9.9-10.5 IN	10.2 IN
FOOT BREADTH (W)		3.6- 4.2 IN	4.0 IN
SHOULDER PIVOT FROM BACKLINE (E)		3.3- 3.7 IN	3.5 IN
SHOULDER BREADTH (V)		16.6-17.2 IN	16.9 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN	20.3 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN	8.1 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN	13.2 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN	11.7 IN

TEST MEETS SPECIFICATIONS

TECHNICIAN Chris Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

17-APR-92

TRC

83C77HD1

572E SN93 HEAD DROP CAL 77

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	257.24 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.29 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

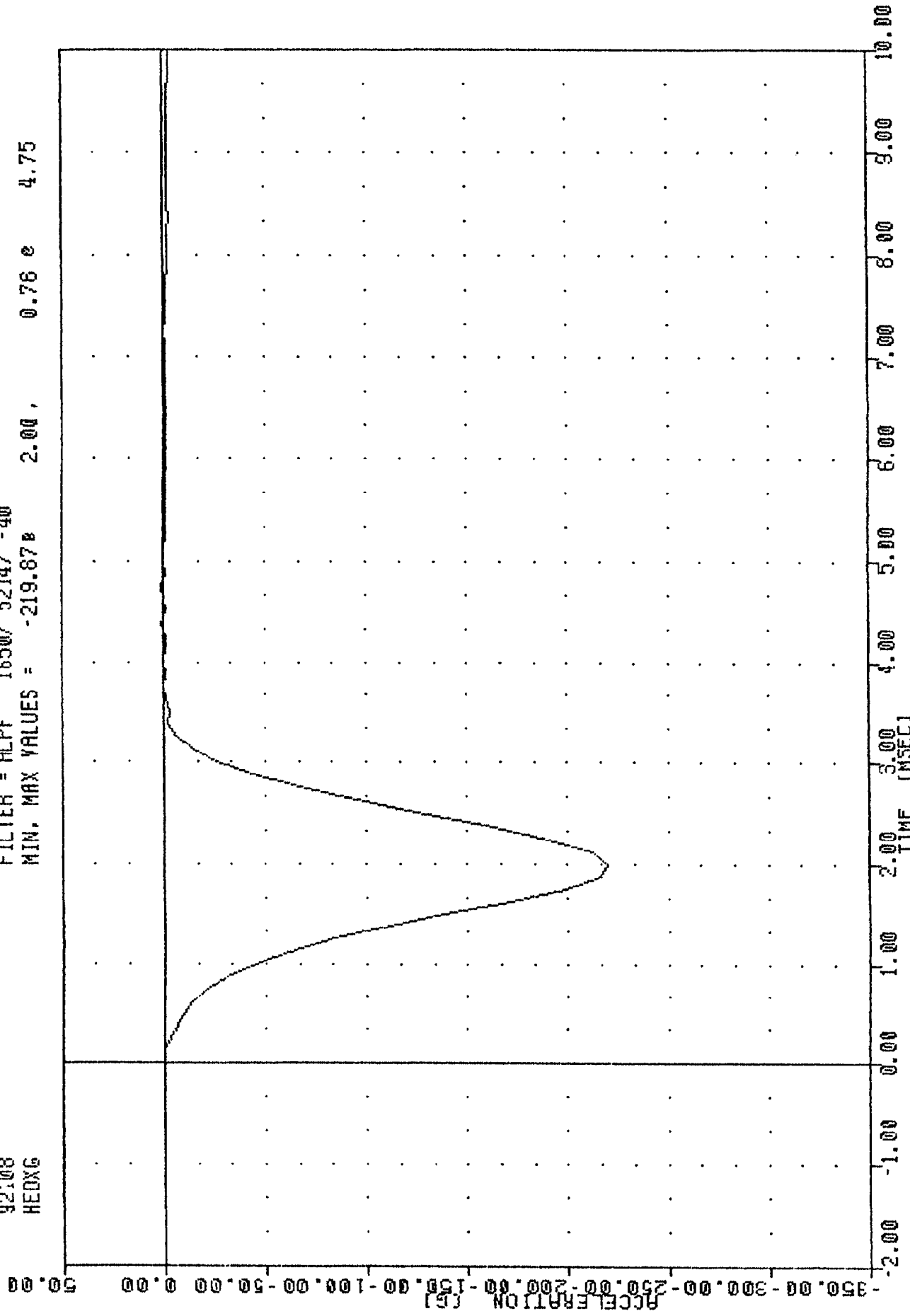
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRC , 83C77H01
572E SING HEAD DRCP CAL 77
92108
HEADG

FILTER = ALPF 1850/ 5214/ -40
MIN. MAX VALUES = -219.87 2.00 , 0.76 e 4.75

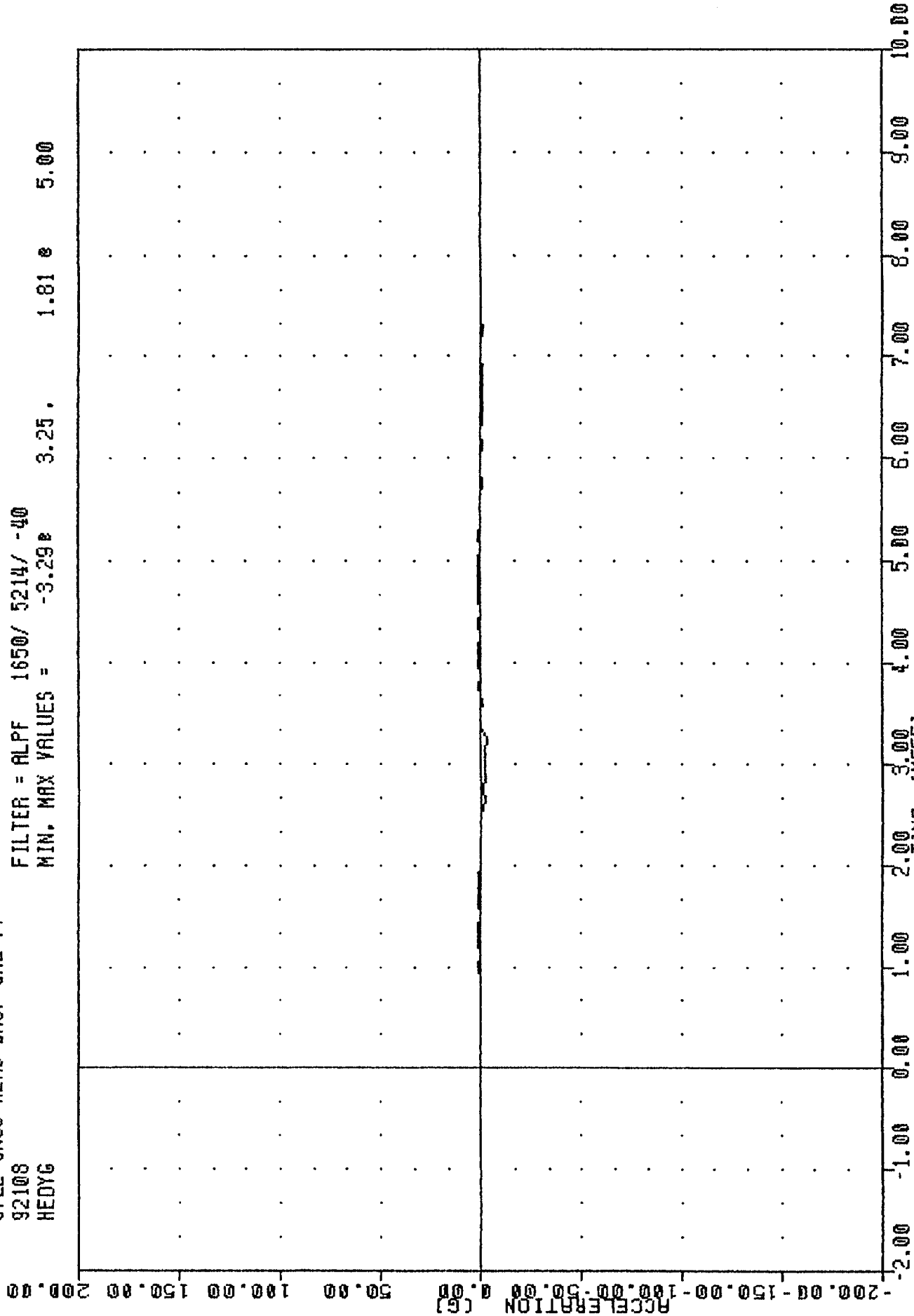


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS

TRC
 572E SN65 HEAD DROP CAL 7?
 82108
 HEDYG

, 83C77HD1

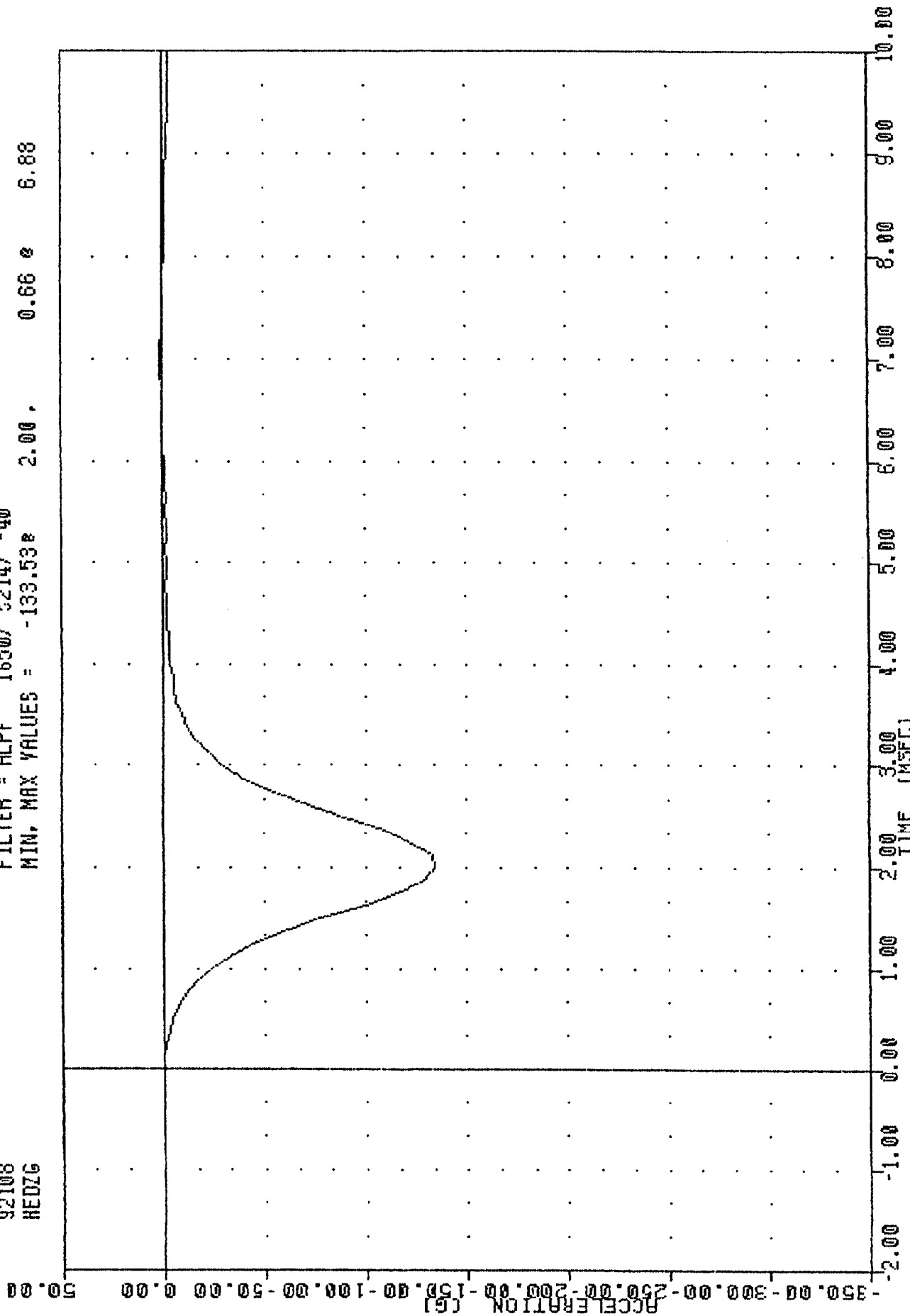
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -3.29 3.25 1.81 5.00



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

TRC , 83C77H01
572E SN83 HEAD DROP CAL 77
92108
HEDZG

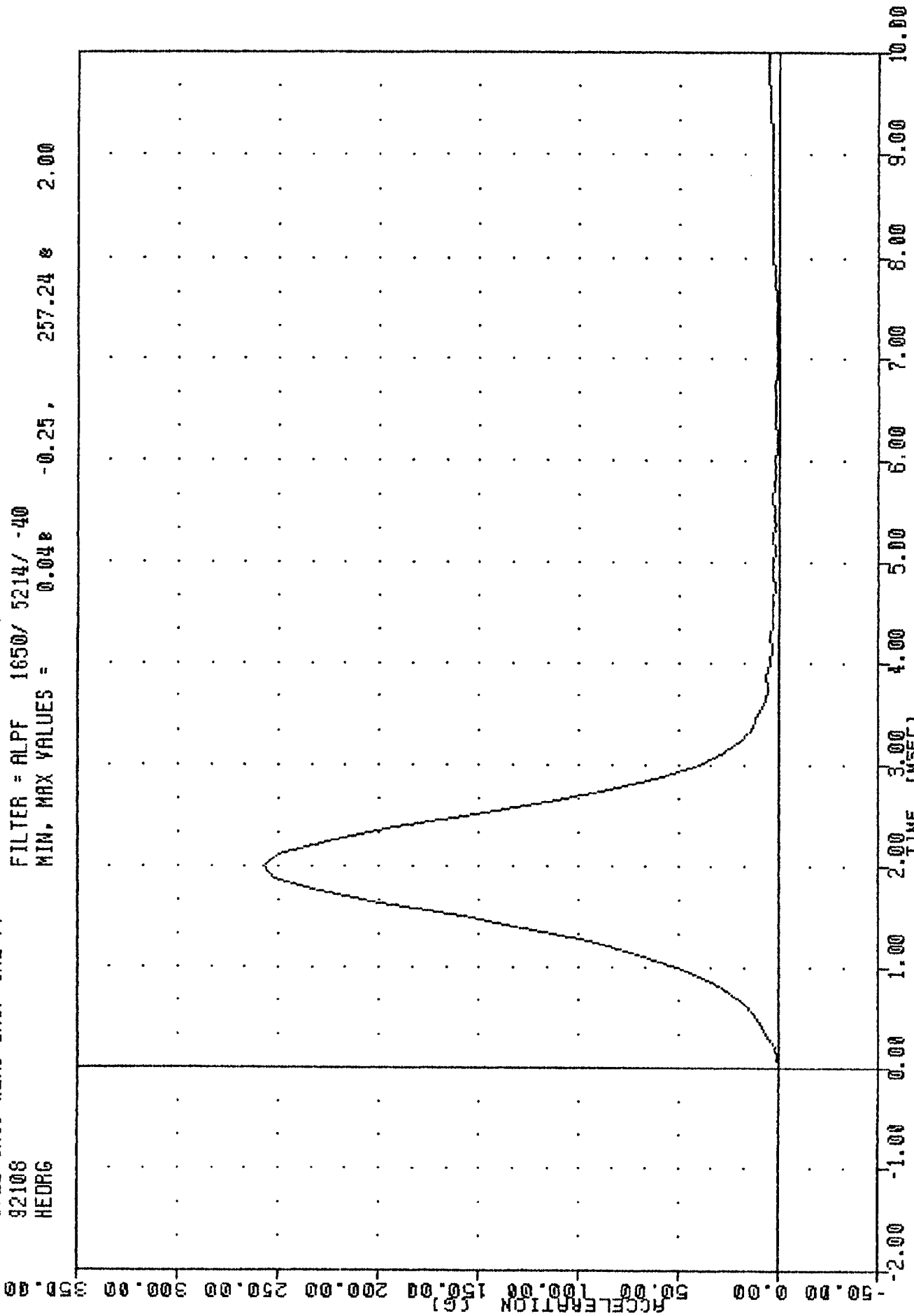
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -133.538 2.00 , 0.66 @ 6.88



PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION AXIS

TRC
572E SN89 HEAD JROP CAL 77
92108
HEADG

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.048 -0.25, 257.24 2.00



PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

17-APR-92

6 AXIS NECK TRANSDUCER
TRC 83C77NF1

572E SNS3 NECK FLEXION CAL77

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
IMPACT VELOCITY	22.6 - 23.4 FT/SEC	23.08 FT/SEC
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	23.95 G
	20 MS 17.60 - 22.60 G	20.15 G
	30 MS 12.50 - 18.50 G	15.57 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.53 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	37.75 MS
D PLANE ROTATION	MAX 64 - 78 DEG.	72.28 DEG.
	TIME 57 - 64 MS	61.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 65 - 80 FT.LBS	71.12 FT.LBS
	TIME 47 - 58 MS	52.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	122.00 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	103.00 MS

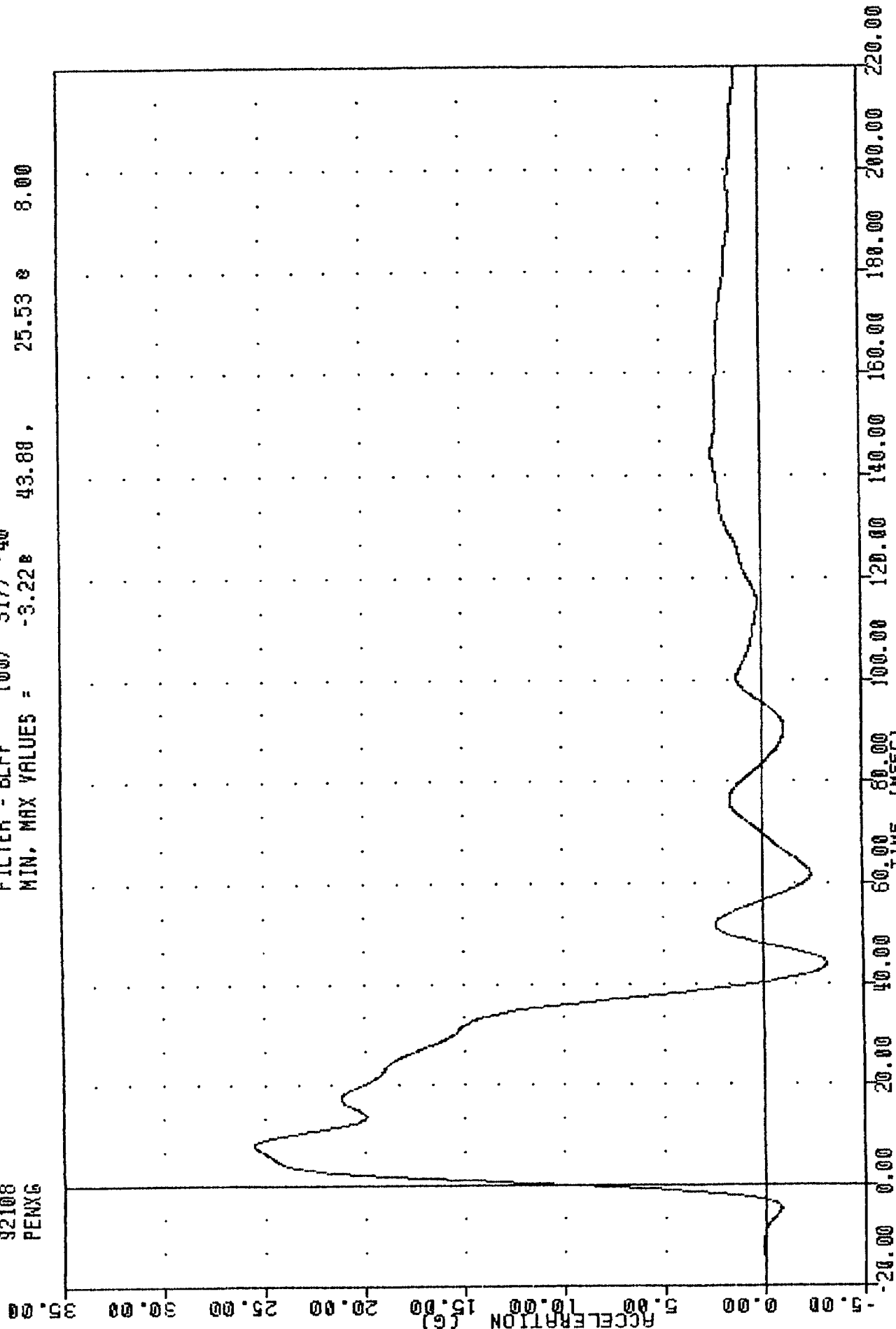
TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
572E SN83 NECK FLEXION CAL77
92108
PENXG

, 83C77NF1

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -3.22 43.88, 25.53 8.00



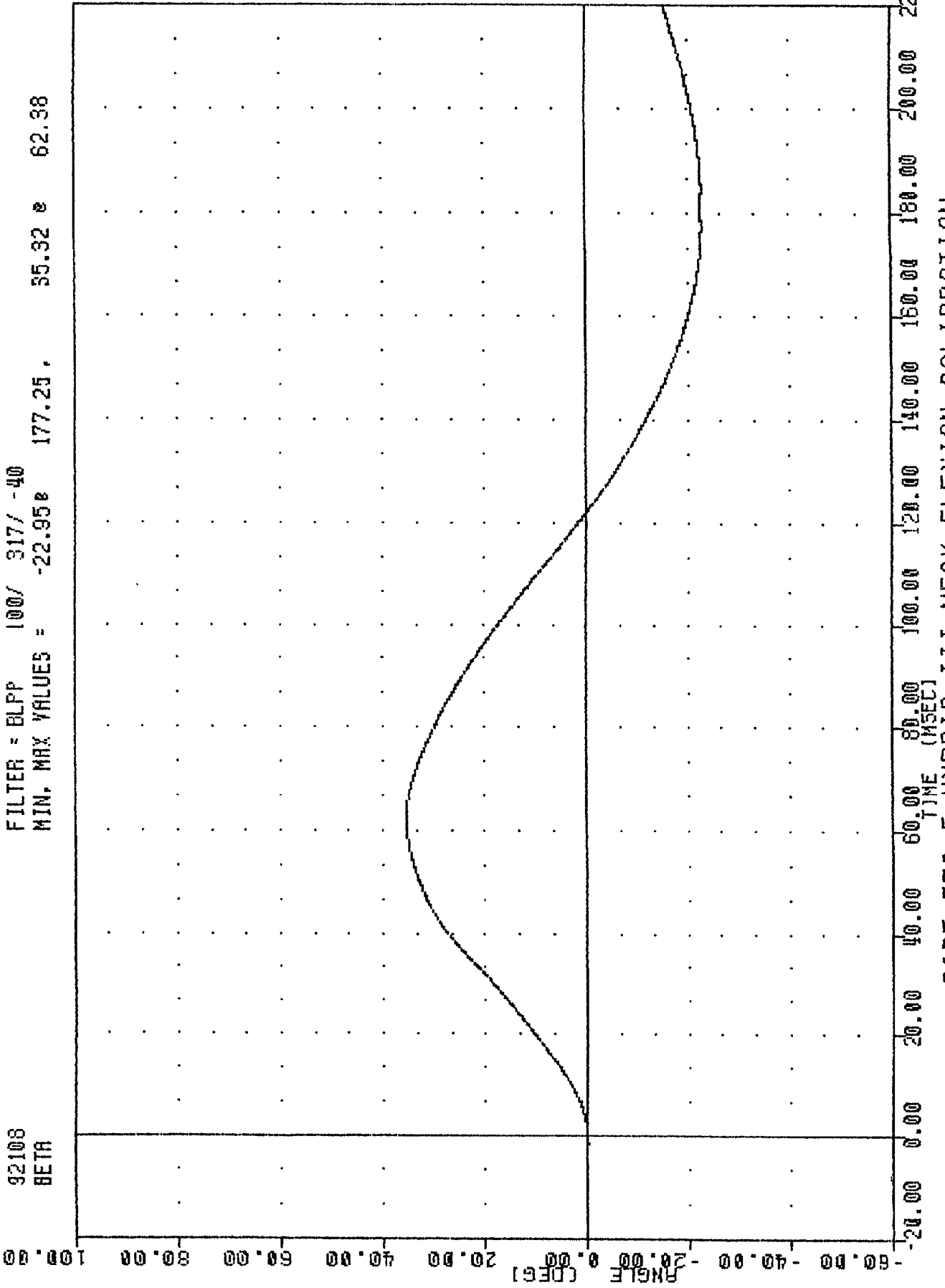
C-10

920427

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC , 83C77NF1
 572E 5N63 NECK FLEXION CAL77
 92108
 BETA

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -22.95e 177.25 , 55.32 e 62.38



11-C

920427

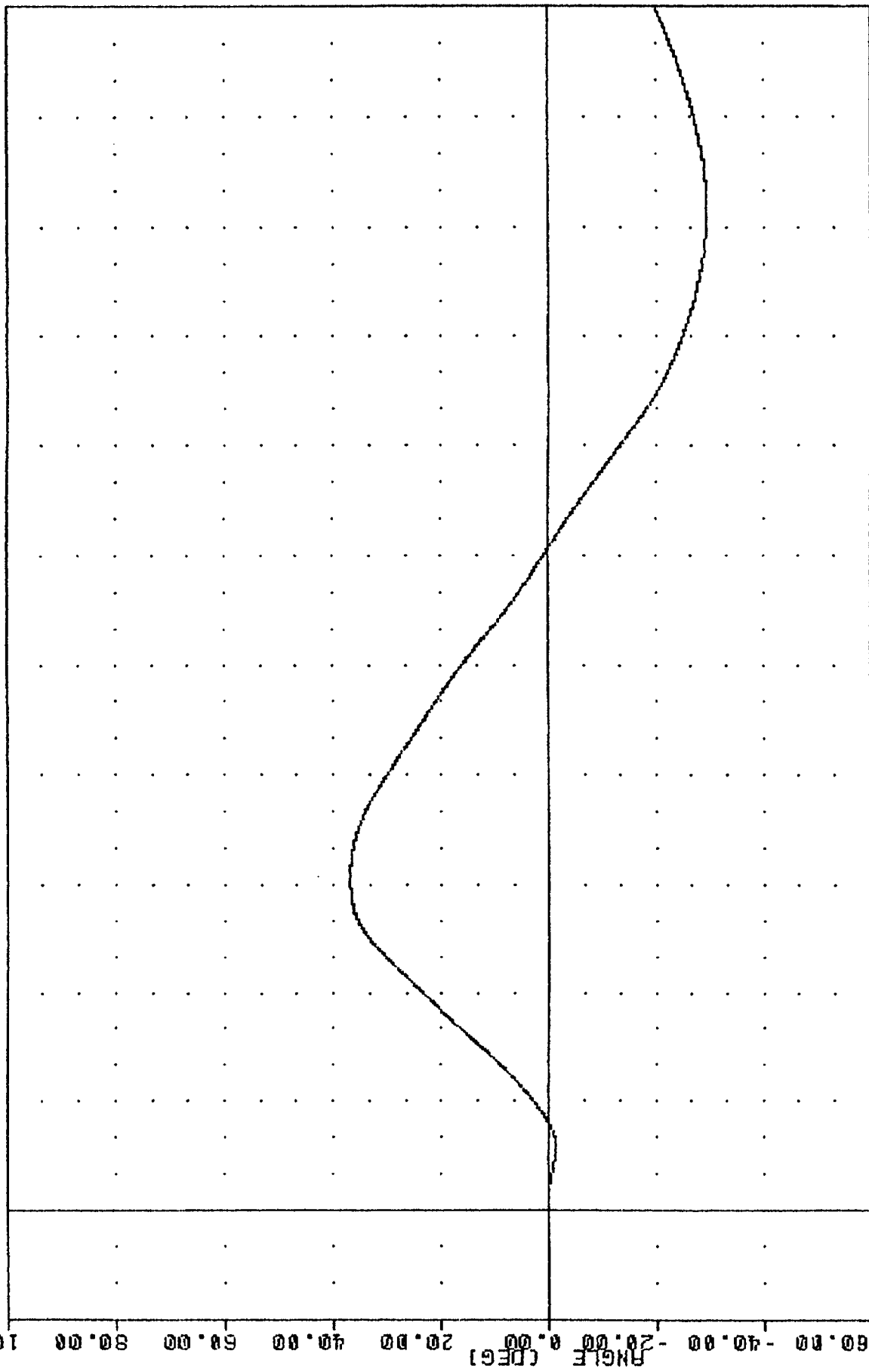
PART 572-E HYBRID III NECK FLEXION CALIBRATION
 ROTATION ABOUT ROSE AS NECK

TRC
 572E SN83 NECK FLEXION CAL77
 92108
 THETA

83C77NF1

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -29.580 183.00, 36.96 61.36

100.00

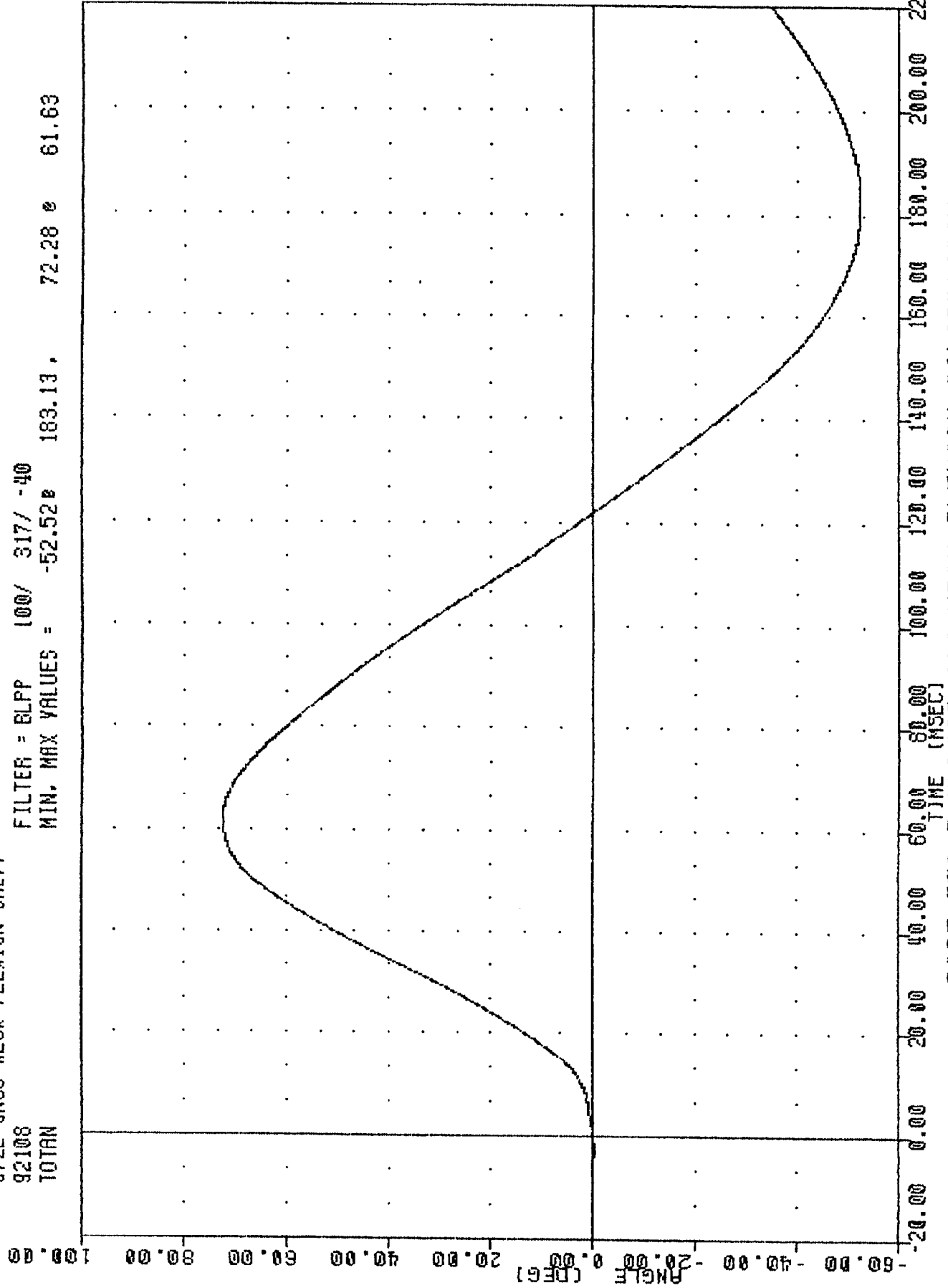


-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

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

TRC , 83C77NF1
572E SNB3 NECK FLEXION CAL77
92108
TOTAL

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -52.52 e 183.13 . 72.28 e 61.63

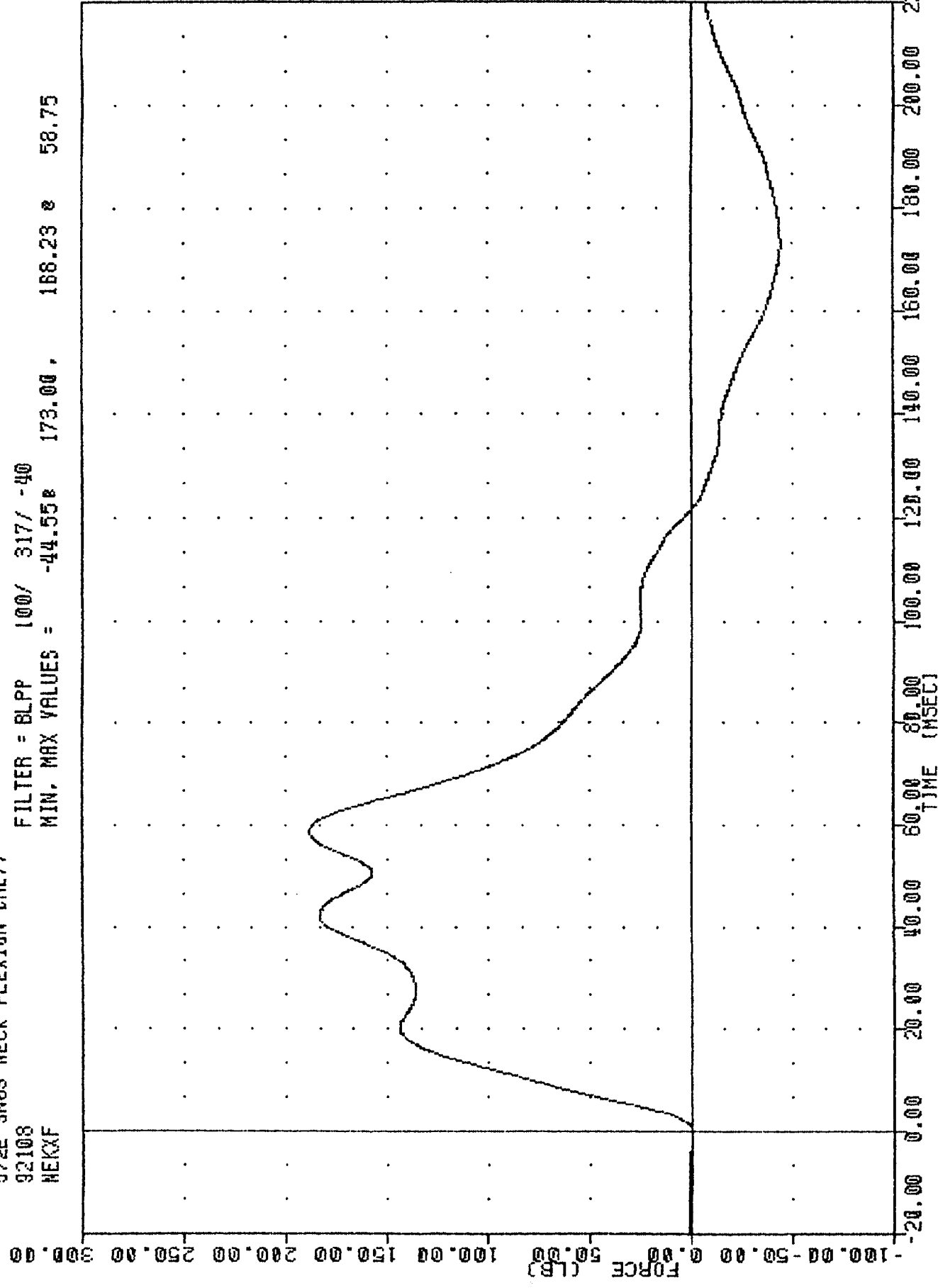


PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC
572E SN83 NECK FLEXION CAL77
92108
NEKXF

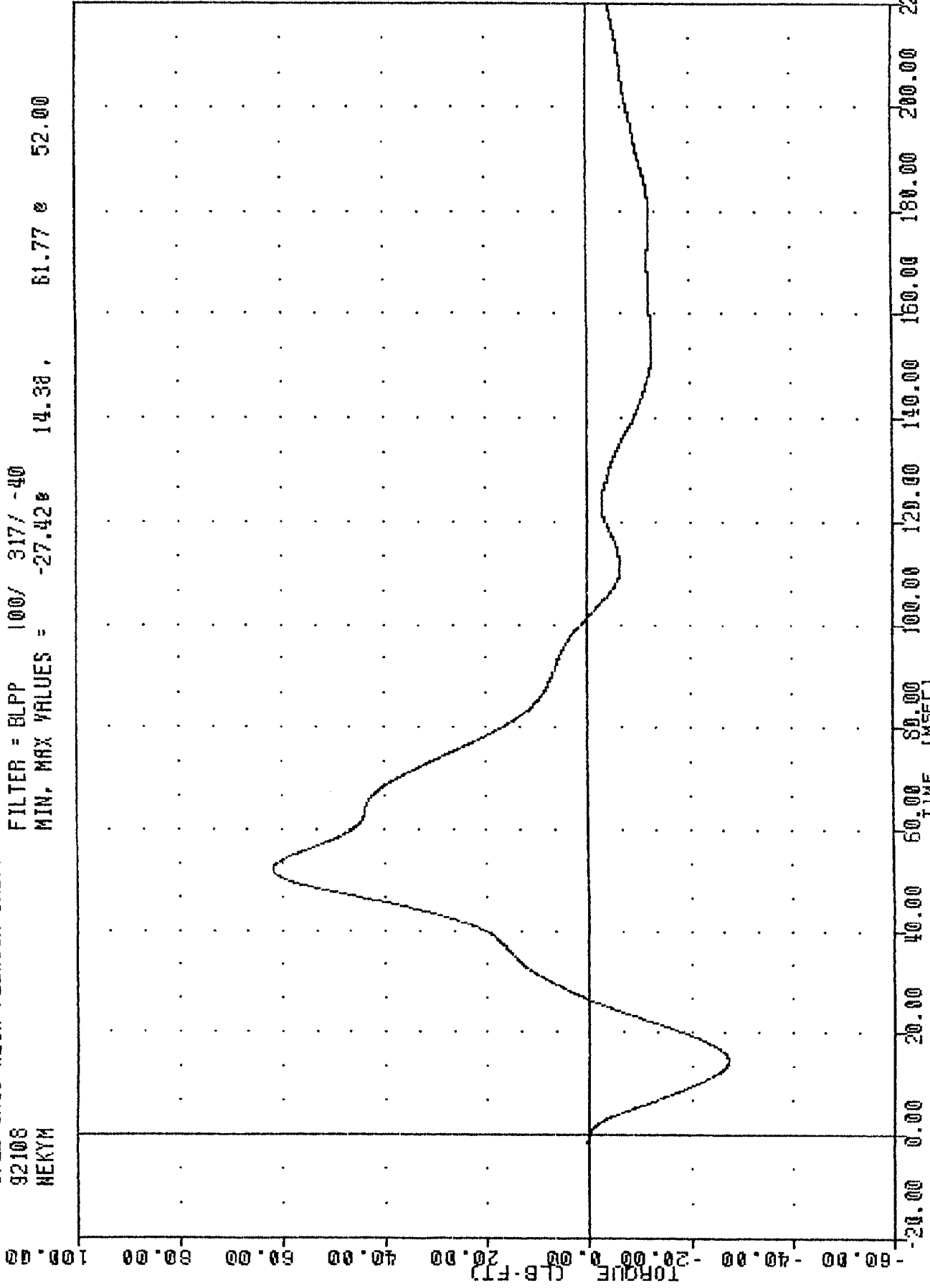
83C77NF1
FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -44.558 173.00, 188.23 @ 58.75



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

TRC , 83C77NF1
572E SN63 NECK FLEXION CAL77
92108
HEKYM

FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -27.42e 14.38, 61.77 e 52.00



C-15

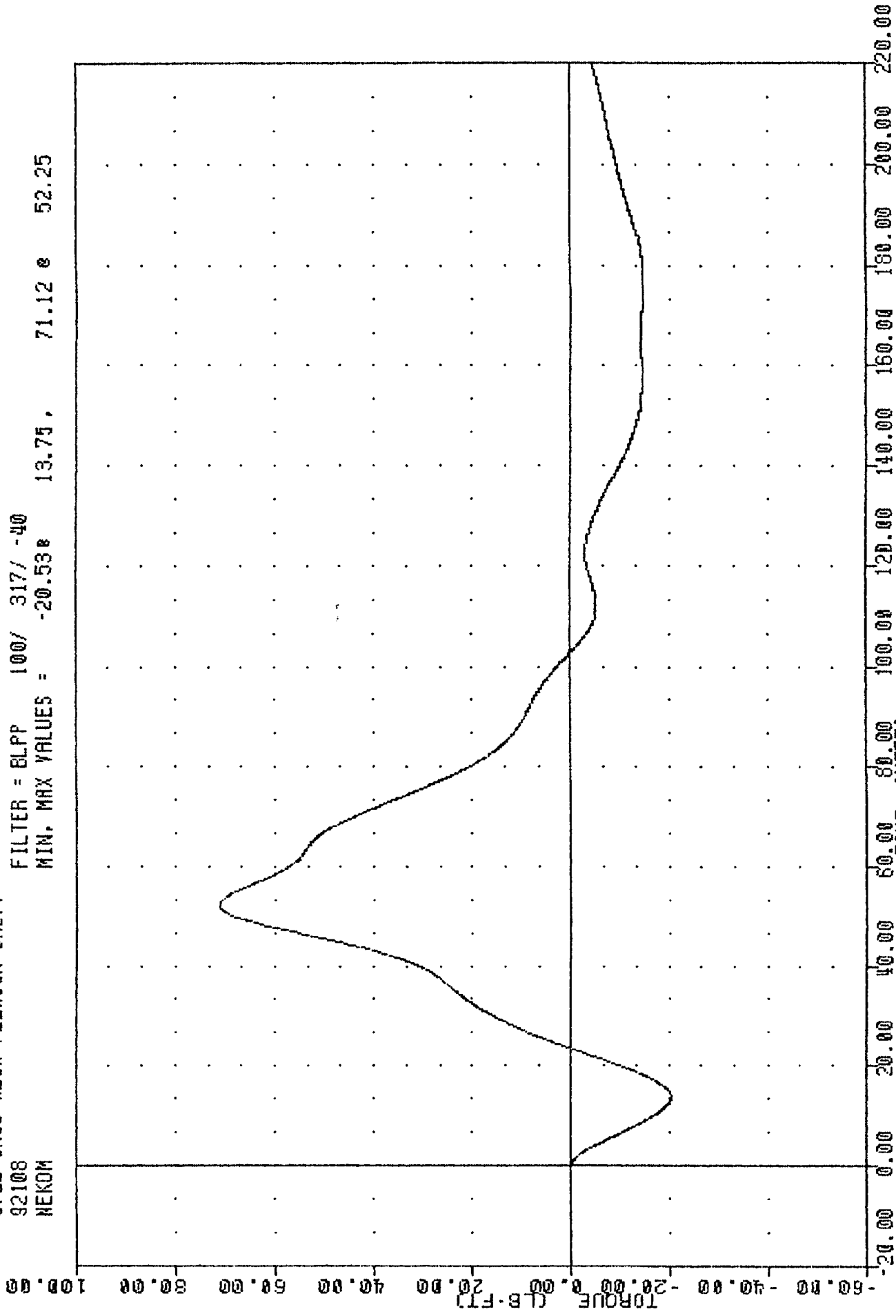
920427

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

TRC
572E 3MB9 NECK FLEXION CAL77
92108
NEKOM

83C77NF1

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -20.53 13.75 71.12 52.25



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

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

17-APR-92

6 AXIS NECK TRANSDUCER
TRC 83C77NE1

572E SNS3 NECK EXT. CAL77

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.83 FT/SEC
PENDULUM DECELERATION	10 MS 17.20 - 21.20 G	19.05 G
	20 MS 14.00 - 19.00 G	17.20 G
	30 MS 11.00 - 16.00 G	15.05 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	15.02 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	38.13 MS
D PLANE ROTATION	MAX 81 - 106 DEG.	97.83 DEG.
	TIME 72 - 82 MS	74.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN -59.0/-39.0 FT.LBS	-56.26 FT.LBS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	TIME 65 - 79 MS	70.50 MS
	147 - 174 MS	159.75 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	138.00 MS

TEST MEETS SPECIFICATIONS

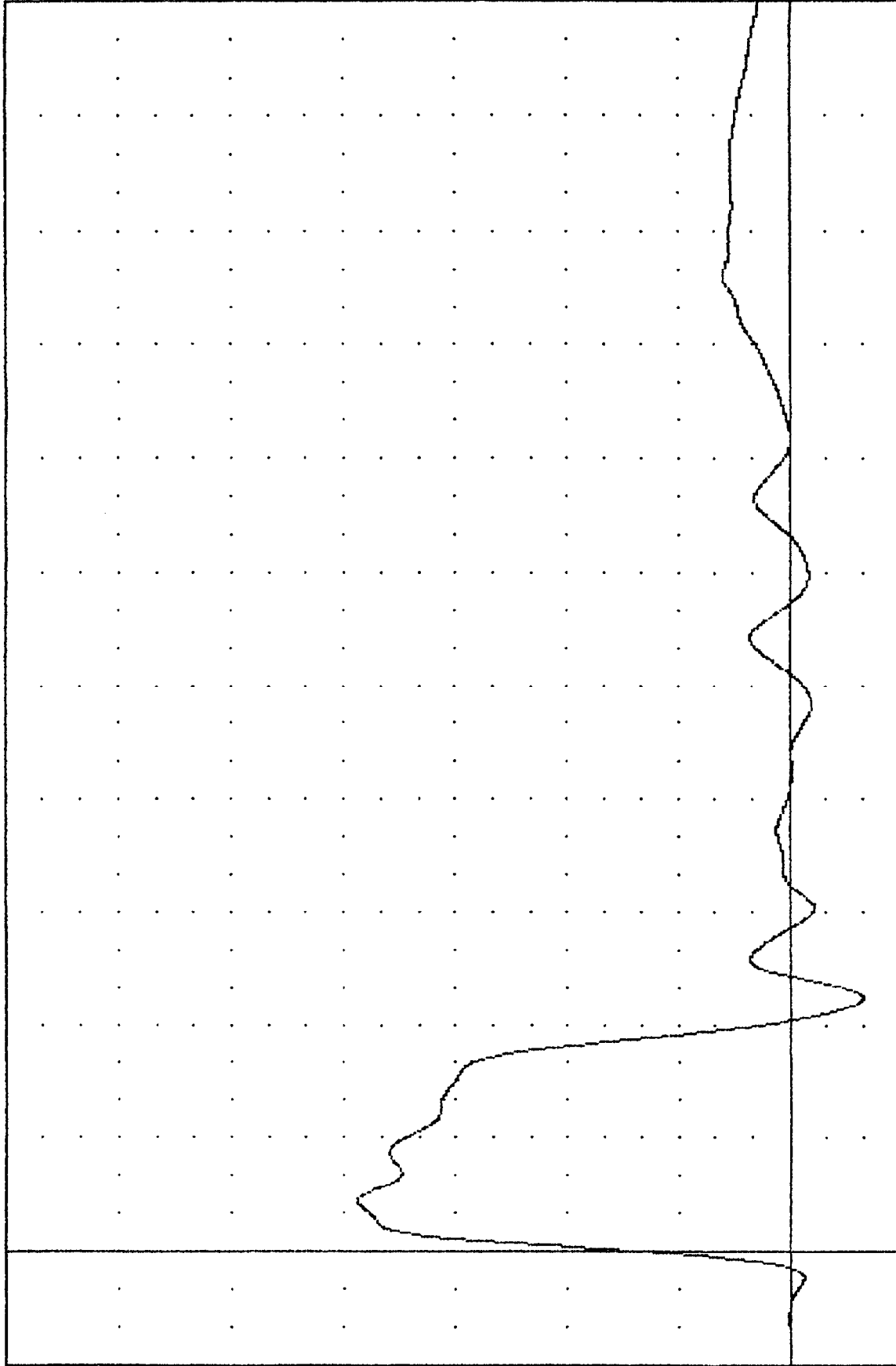
TECHNICIAN Chas Middleton

TAC
572E SN03 NECK EXT. CAL77
92108
PENXG

, 83C77NE1

FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -3.298 44.75, 19.39 e 8.75

ACCELERATION (G)

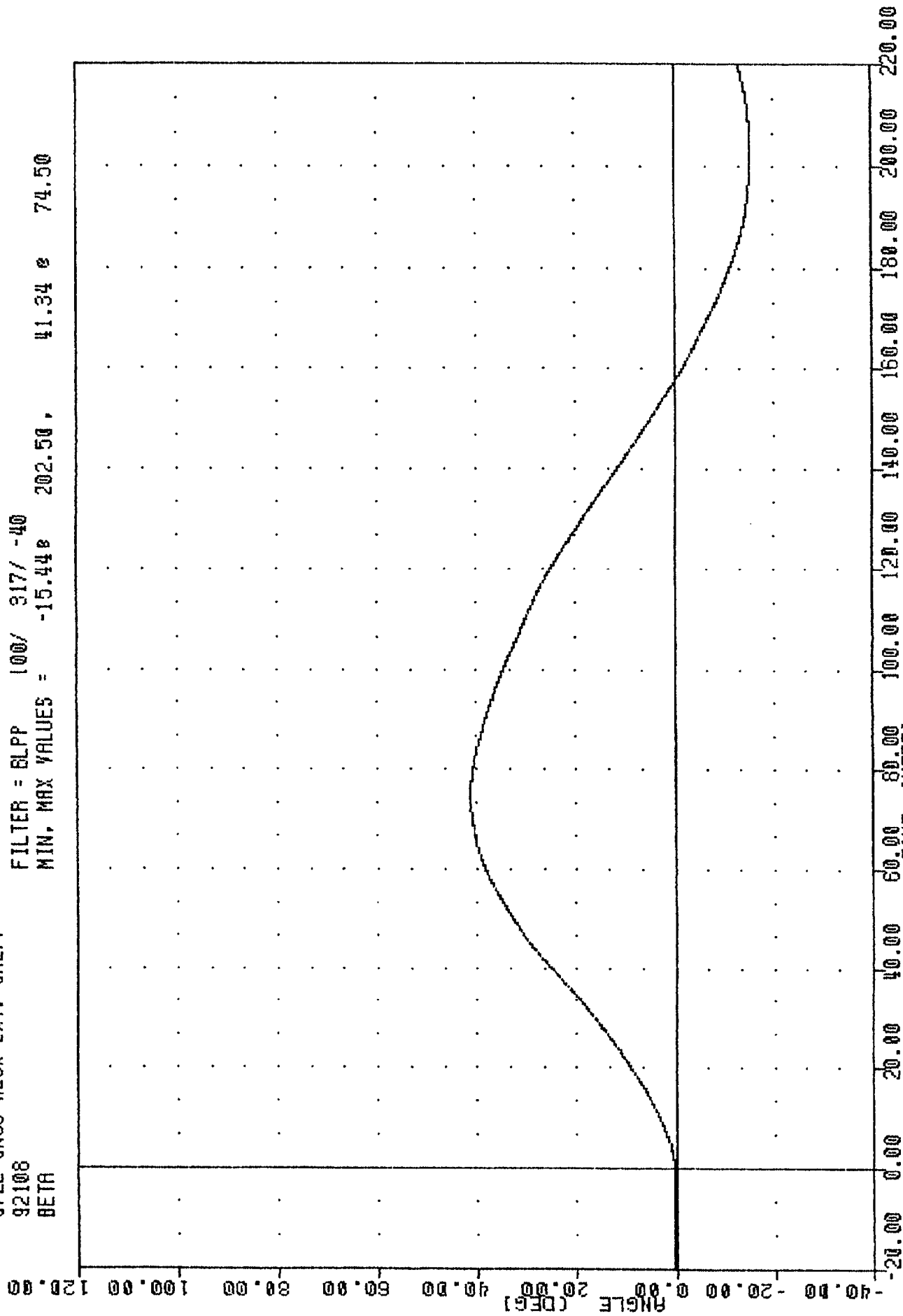


-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC
572E SN03 NECK EXT. CAL77
92108
BETA

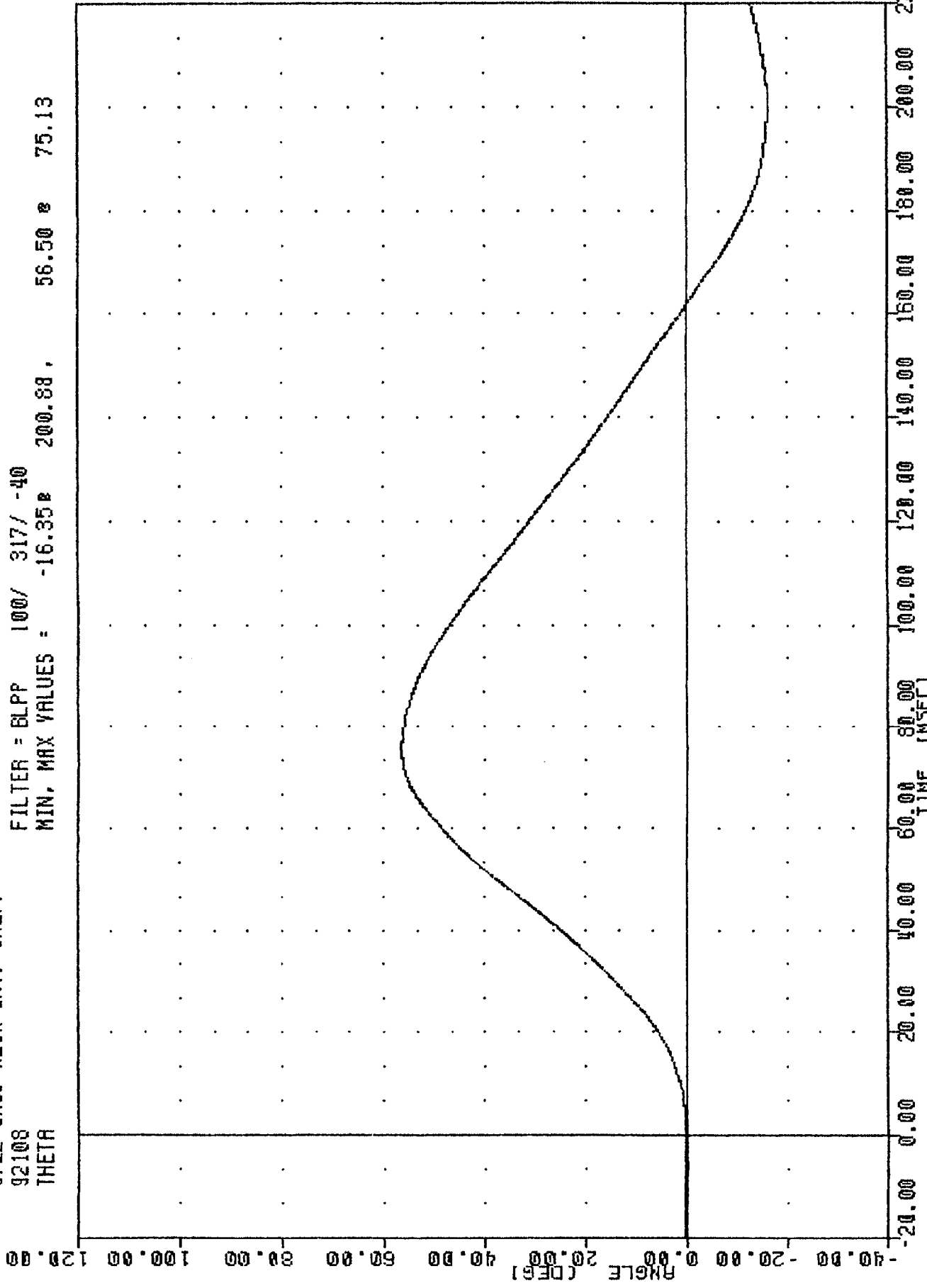
FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -15.448 202.50 41.34 74.50



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

TRC
 572E SN89 NECK EXT. CAL77
 92108
 THETA

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -16.35 200.88, 56.50 75.13

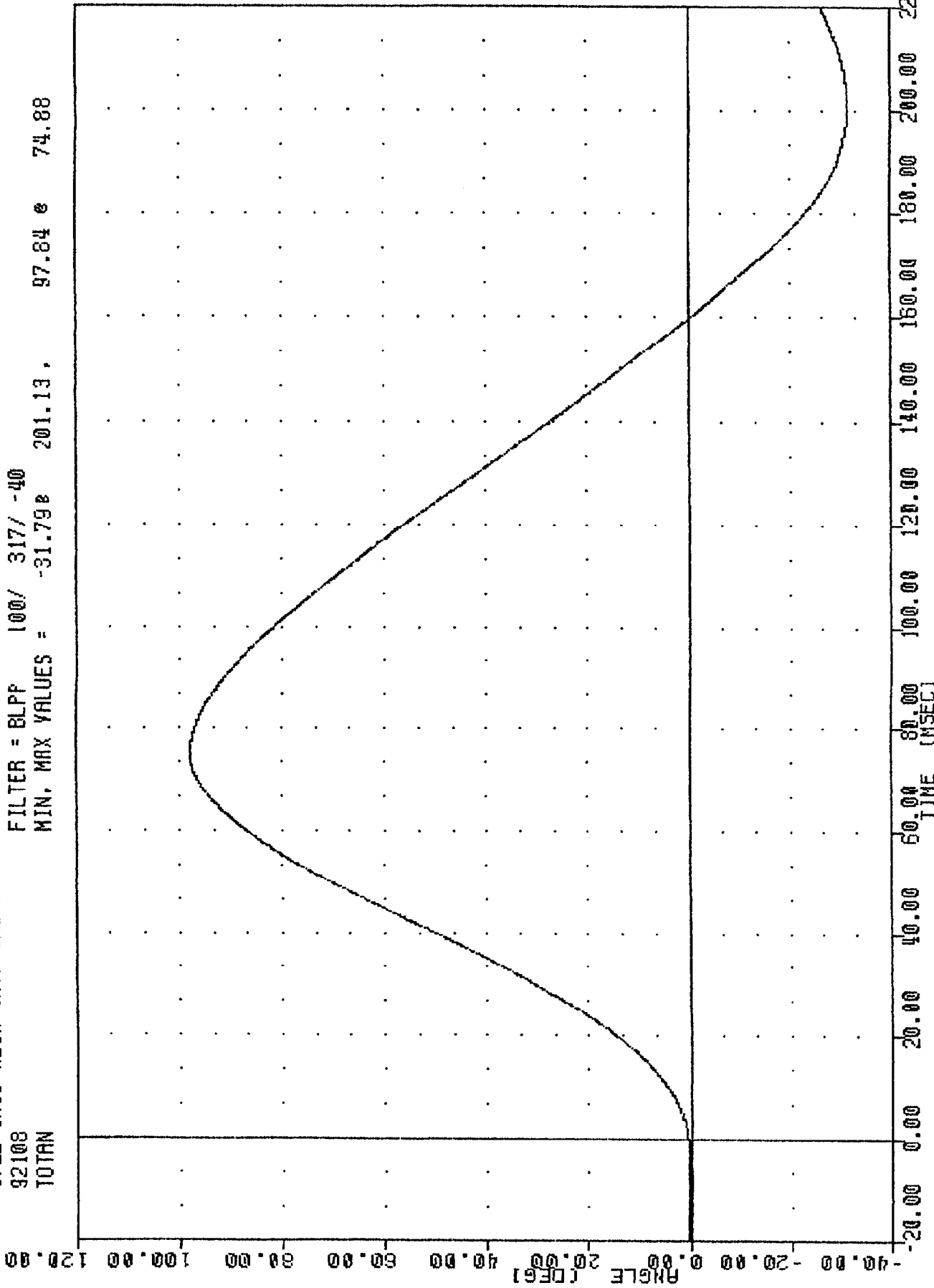


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 ROTATION ABOUT OCCIPITAL CONDYLE

TRC
572E SN83 NECK EXT. CAL77
92108
TOTAN

83C77ME1

FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -31.798 201.13, 97.84 e 74.88

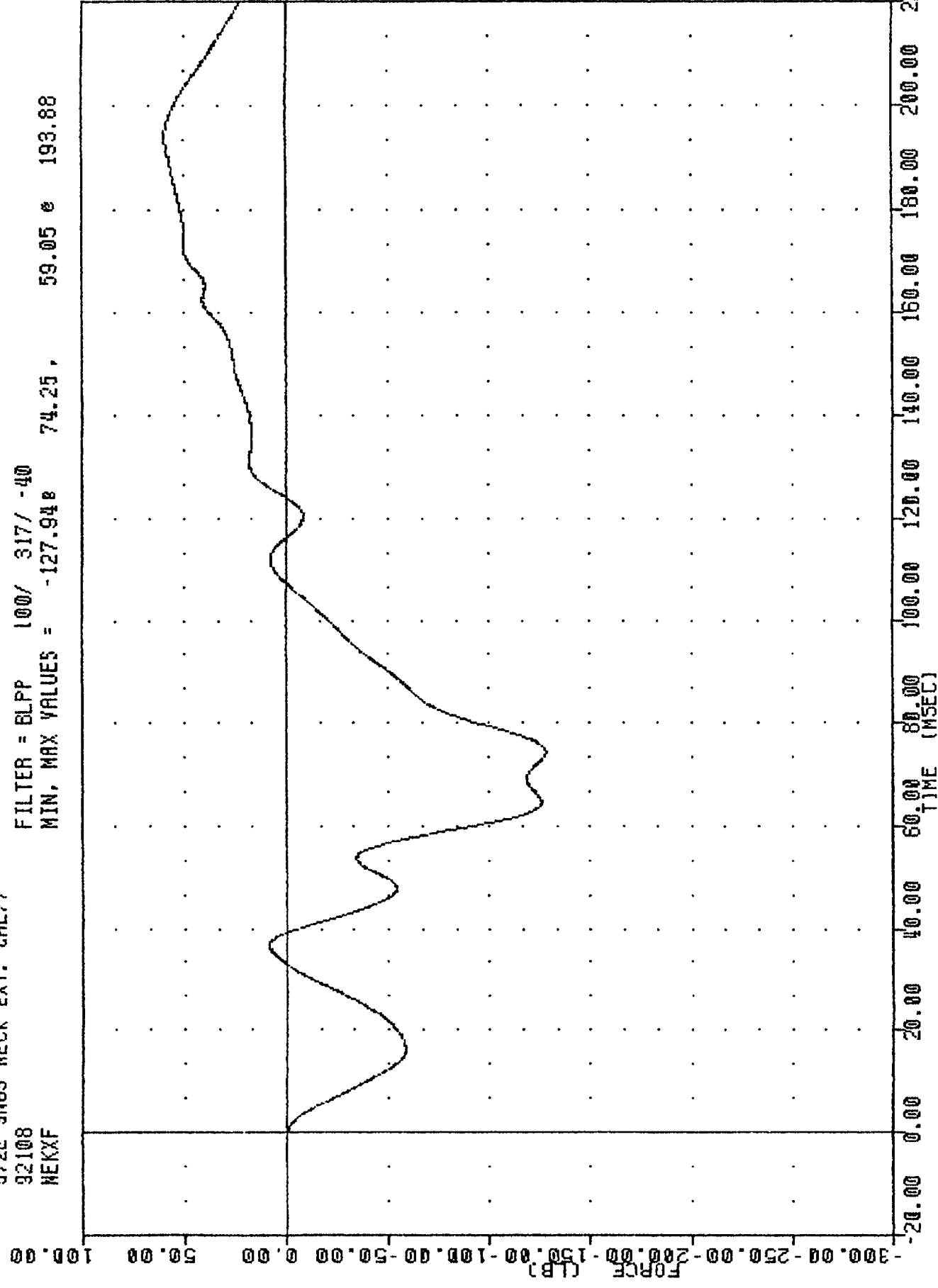


PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC
572E SH03 NECK EXT. CAL77
92108
NEKXF

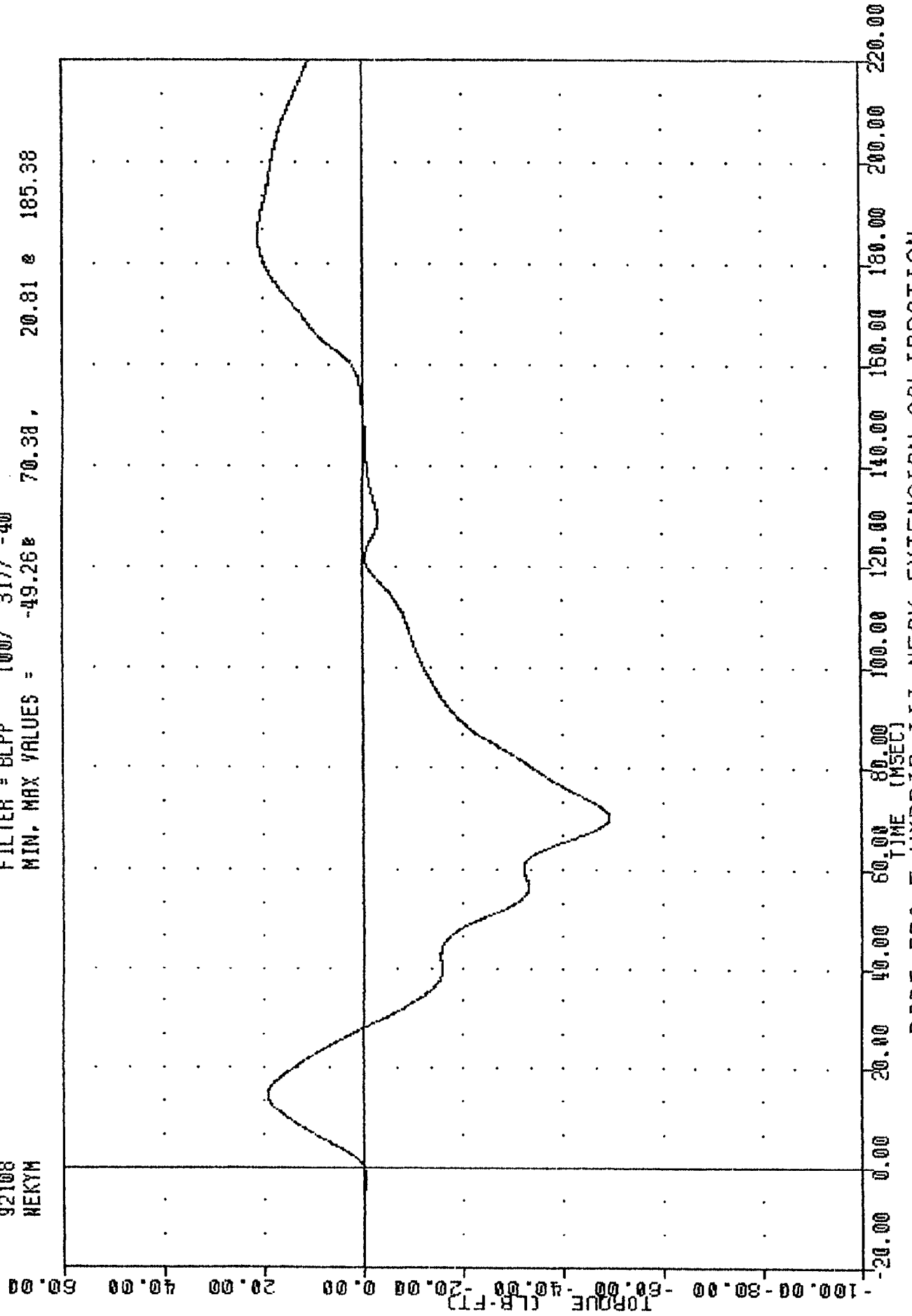
. 83C77NE1
FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -127.948 74.25, 59.05 e 193.88



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

TRC
572E SN89 NECK EXT. CAL77
92108
NEKYM

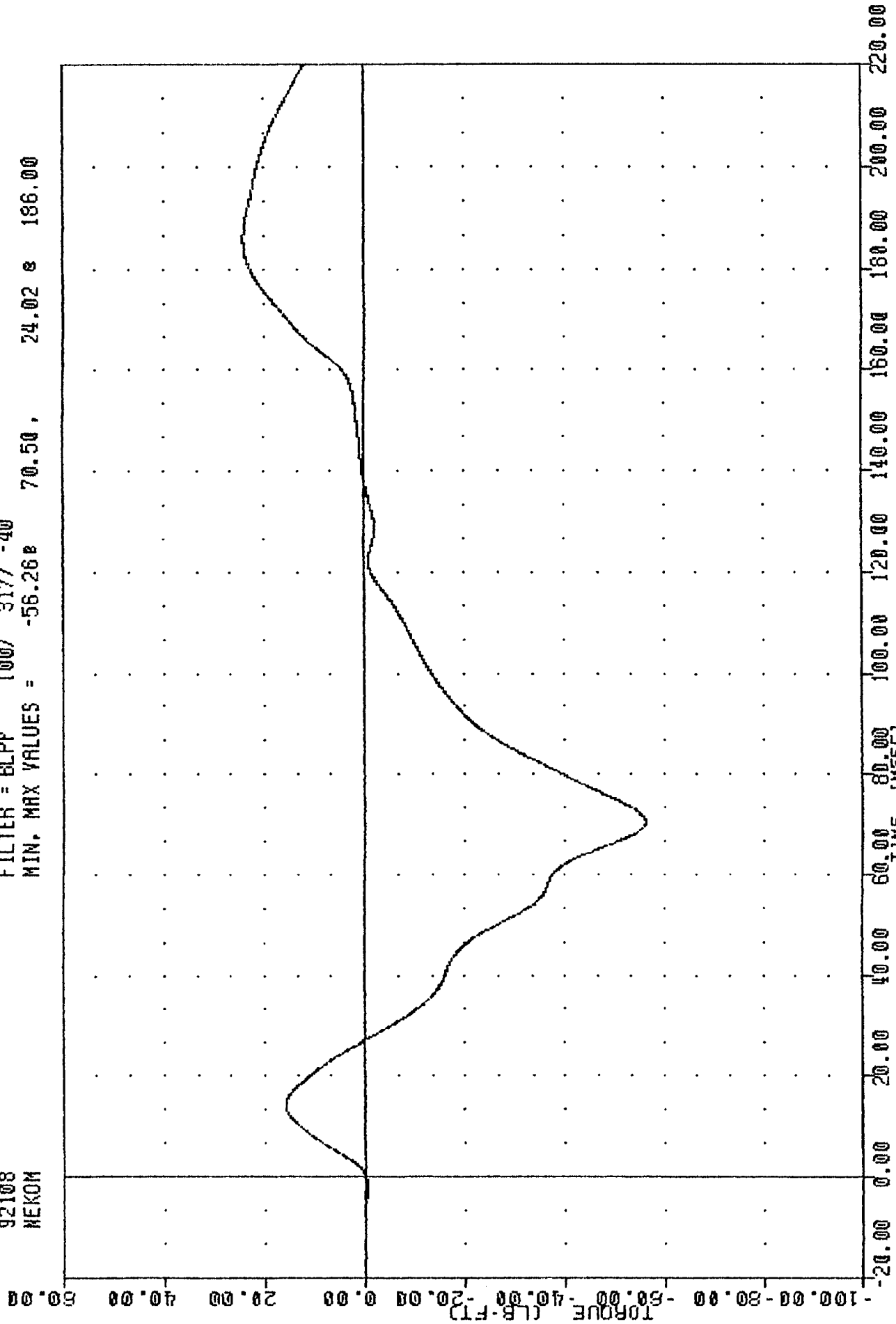
FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -49.26 70.38 , 20.81 & 185.38



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

TRC , 83C77NE1
572E SN6S NECK EXT. CAL77
92108
NEKOM

FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -56.26e 70.50 , 24.02 e 186.00



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

17-APR-92

TRC

83C77TH1

572E SN83 H.S. THORAX CAL77

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.91 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.68 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1234.3 LBS
INTERNAL HYSTERESIS	69% - 85%	73.0%

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
572E 5N93 H.S. THORAX CAL77
92108
PENXG

83C77TH1

FILTER = BLPP 300/ 949/ -40
MIN. MAX VALUES = -0.25 23.97 20.00

35.00

30.00

25.00

20.00

15.00

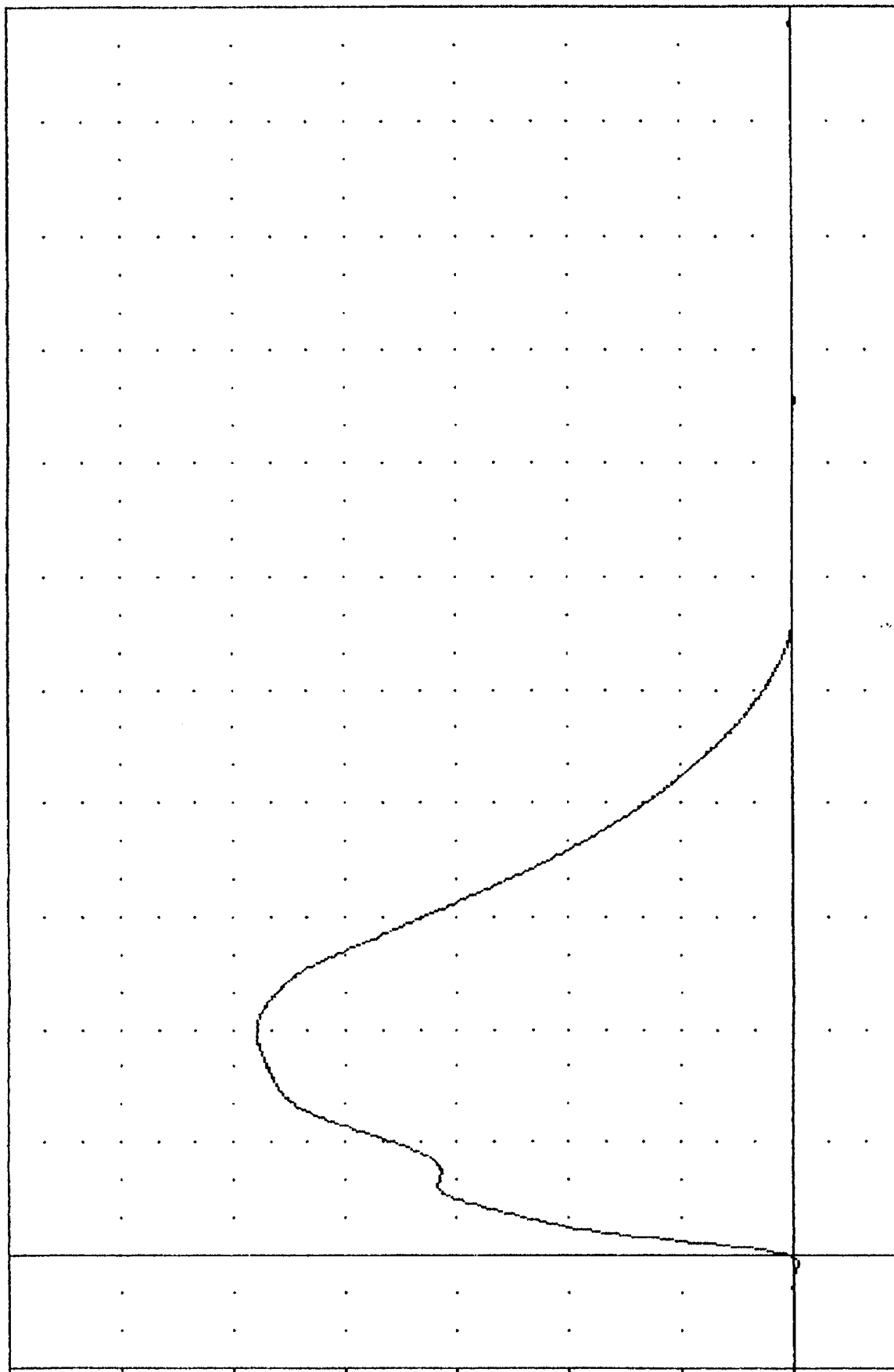
10.00

5.00

0.00

-5.00

-10.00

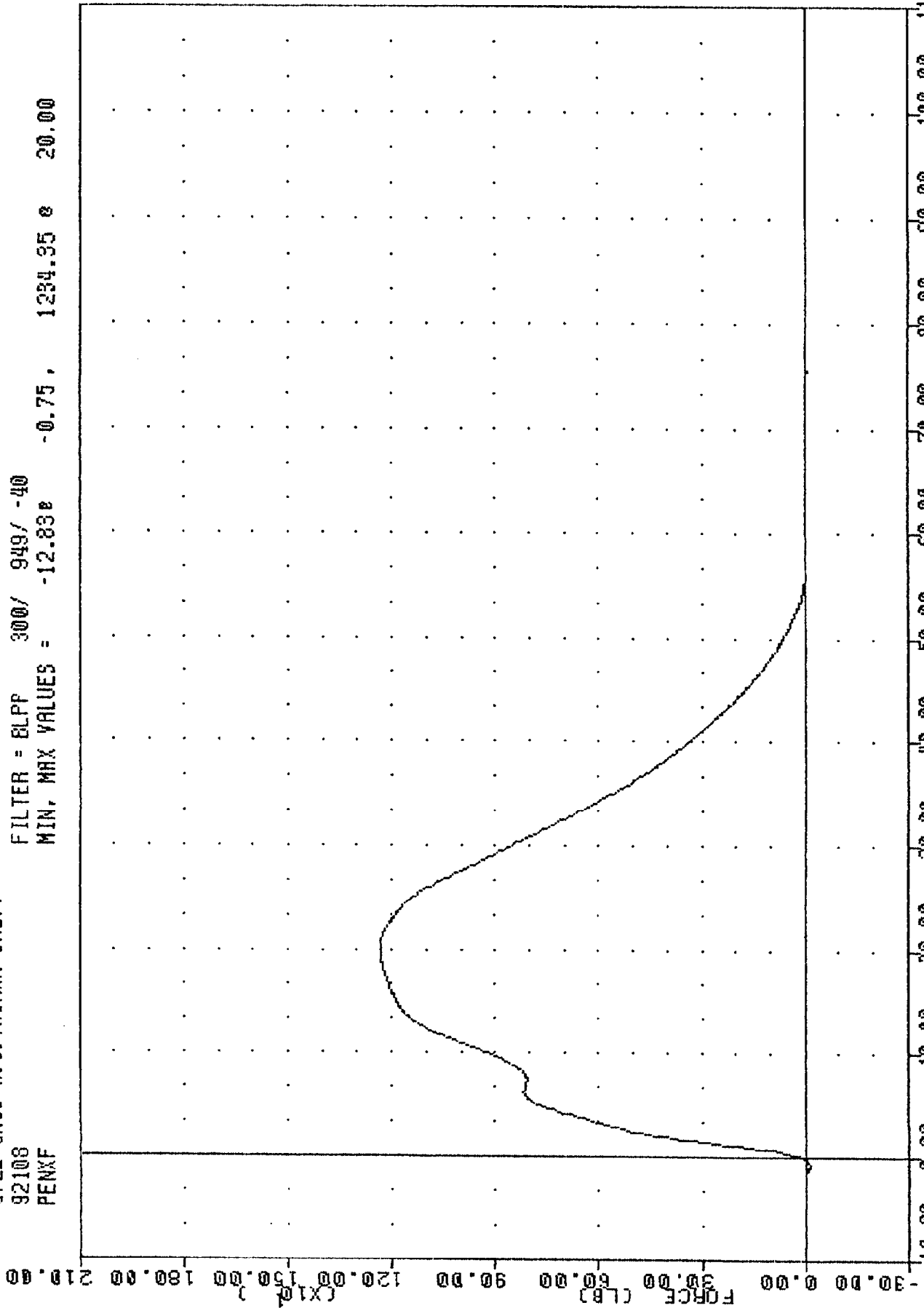


-10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC , 83C77TH1
572E SNG9 H.S. THORAX CAL77
92108
PENXF

FILTER = BLPP 300/ 949/ -40
MIN, MAX VALUES = -12.83e -0.75, 1234.95 e 20.00

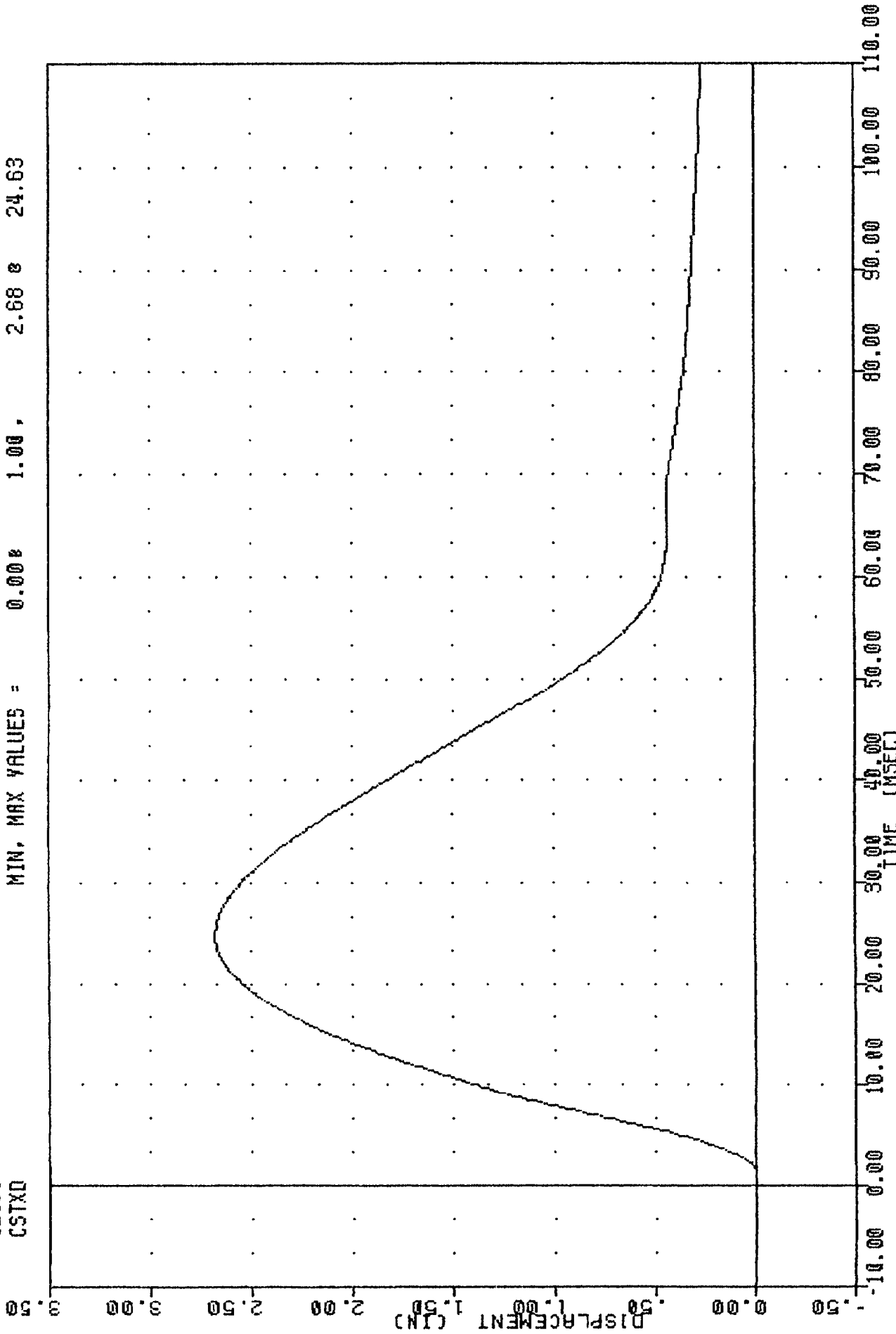


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC
572E SN65 H.S. THORAX CAL77
92108
CSTXD

83C77TH1

FILTER = BLPP 300/ 949/ -40
MIN, MAX VALUES = 0.00% 1.00, 2.68 @ 24.63



PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC
 CSTXD
 PENXF

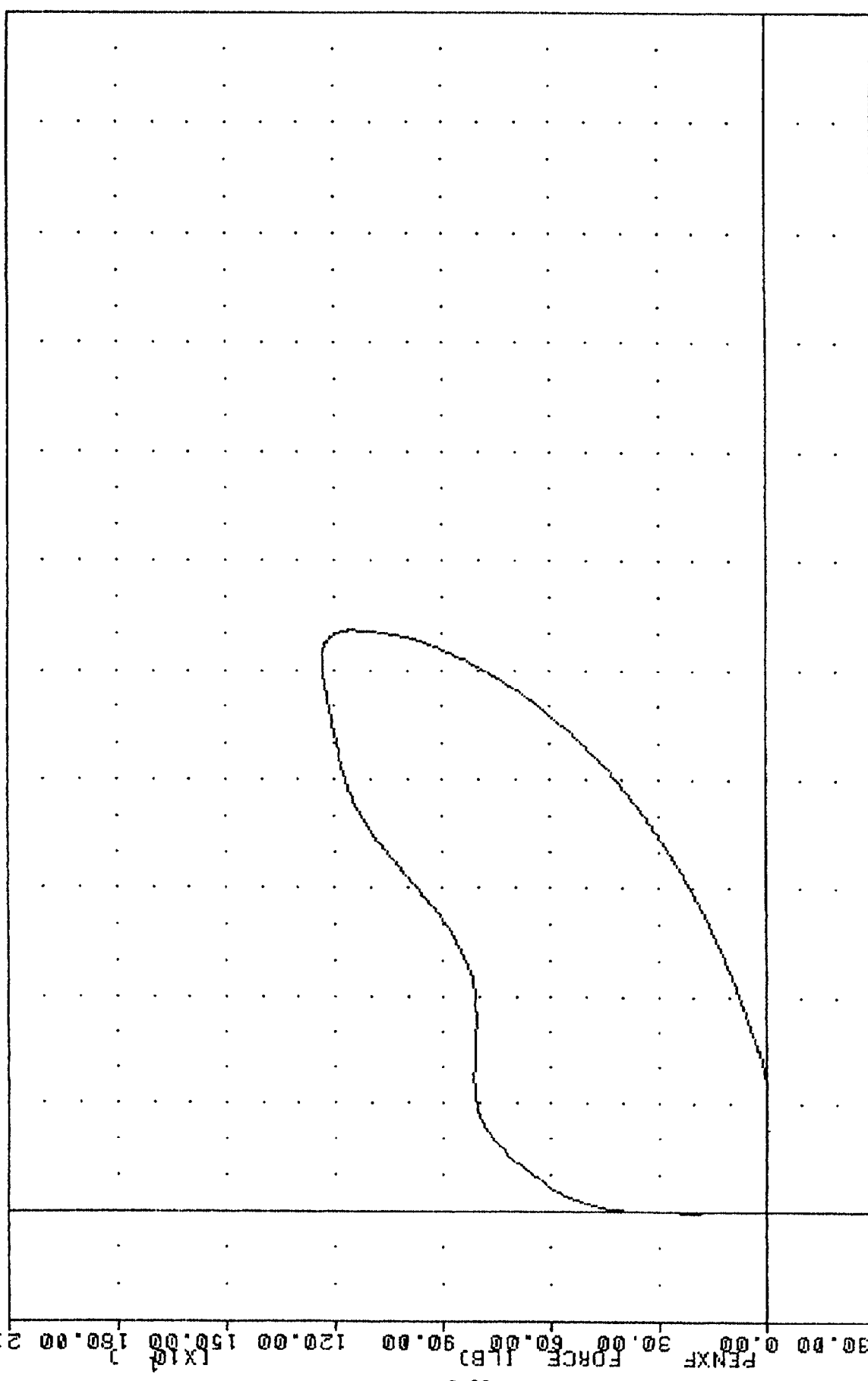
572E SN83 H.S. THORAX CAL77
 300/ 949/ -40 MIN, MAX =
 300/ 949/ -40 MIN, MAX =

92108
 0.00 #
 -12.63 #

1.00 #
 -0.75 #

2.68 #
 1234.35 #

24.63
 20.00



920427

CSTXD DISPLACEMENT (CIN)

PART 572-E HYBRID III THORAX CALIBRATION

CHEST DISPLACEMENT VS. PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

17-APR-92

RIGHT KNEE
TRC

83C77RK1

572E SN83 RIGHT KNEE CAL 77

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.88 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1177.57 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

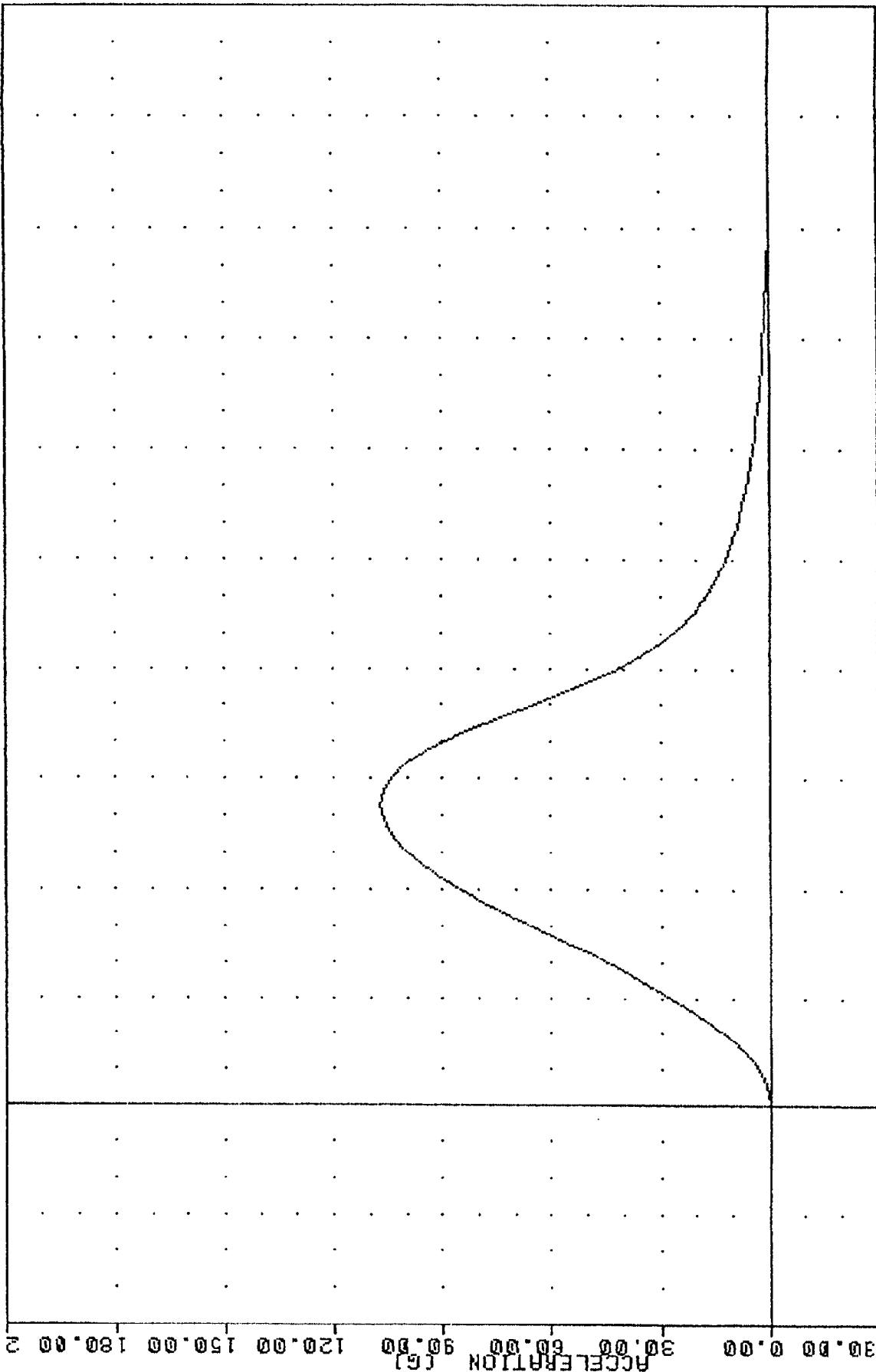
TECHNICIAN Chas. Middleton

TRC
572E SNB3 RIGHT KNEE CAL 77
92108
PENXG

83077R1

FILTER = BLPP 1000/ 3162/ -40
MIN, MAX VALUES = -0.258 107.05 e 2.75

219.00



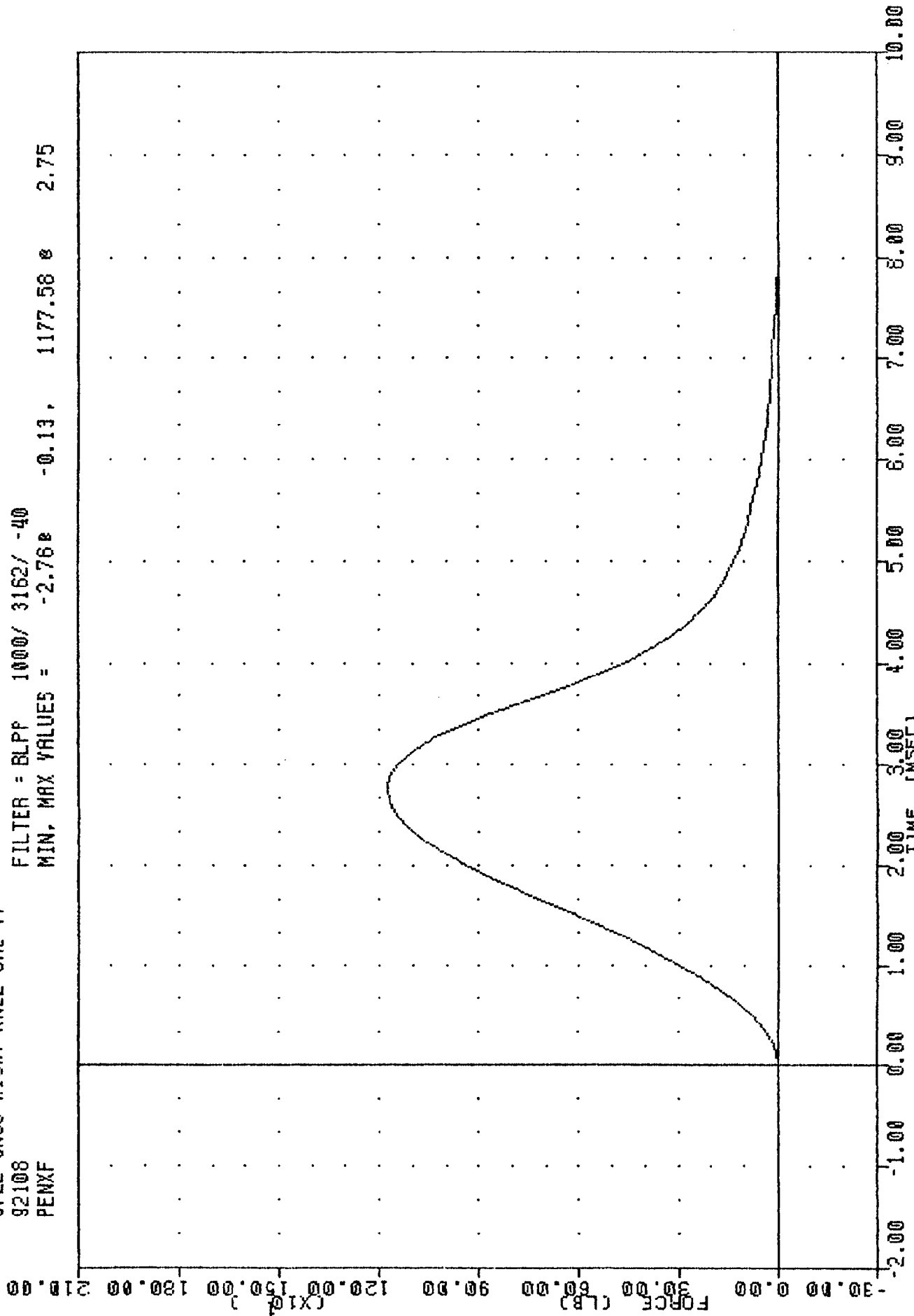
C-31

920427

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENULUM DECELERATION (11 LB BEND)

TRC
 572E SN03 RIGHT KNEE CAL 77
 92108
 PENXF

FILTER = BLPP 1000/ 3162/ -40
 MIN, MAX VALUES = -2.76 1177.56 0 2.75



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

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

17-APR-92

LEFT KNEE

TRC

83C77LK1

572E 8N83 LEFT KNEE CAL 77

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.89 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1235.42 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

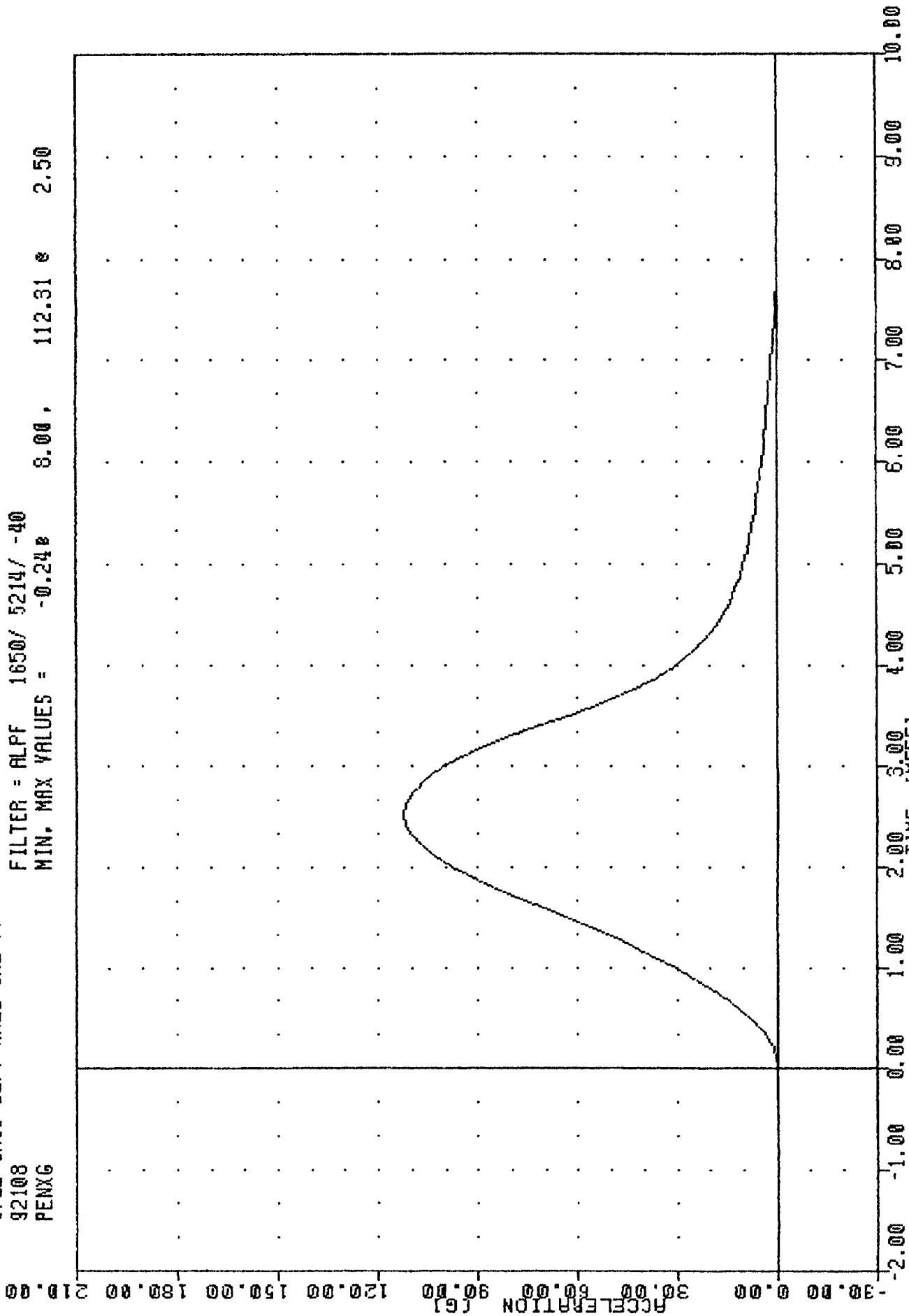
TECHNICIAN

Chas. Middleton

TRC
 572E SN83 LEFT KNEE CAL 77
 92108
 PENXG

83C77LK1

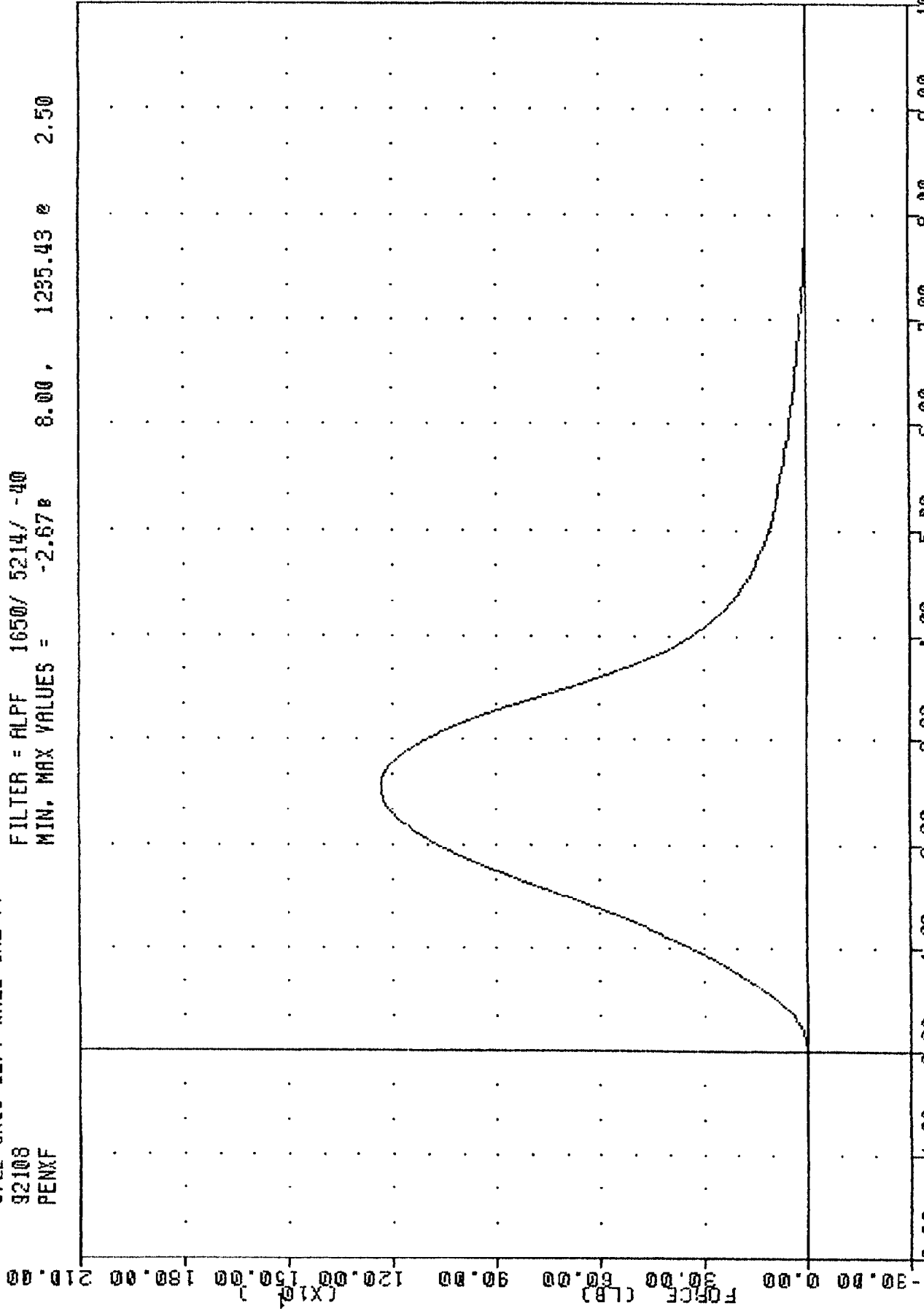
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -0.248 8.00, 112.31 @ 2.50



PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM DECELERATION (11 LB PEND.)

TRC
572E SN69 LEFT KNEE CAL 77
92108
PENXF

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 8.00 , 1235.43 @ 2.50



PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENX UN FORCE (11 LP PEND.)

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 258

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

07-APR-92

TEMPERATURE 70 F
TRC ED25870

RELATIVE HUMIDITY 40 %
572B SN258 EXT. DIMENSION CAL70

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN SN 258 HUMANOID		
Sitting Height	35.6 - 35.8 IN	35.7 IN
Shoulder Pivot Height	21.8 - 22.4 IN	22.4 IN
Hip Pivot Height	3.9 IN	REFERENCE
Hip Pivot From Backline	4.8 IN	REFERENCE
Knee Pivot From Backline	20.1 - 20.7 IN	20.6 IN
Rear of Head From Backline	1.7 IN	REFERENCE
Chest Depth	9.1 - 9.6 IN	9.5 IN
Shoulder Width	17.8 - 18.4 IN	18.0 IN
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.7 IN
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.1 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. Muddlet

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

07-Apr-92

TEMPERATURE 70 F
TRC HD25870

RELATIVE HUMIDITY 40 %
572B SN 258 HEAD DROP CAL 70

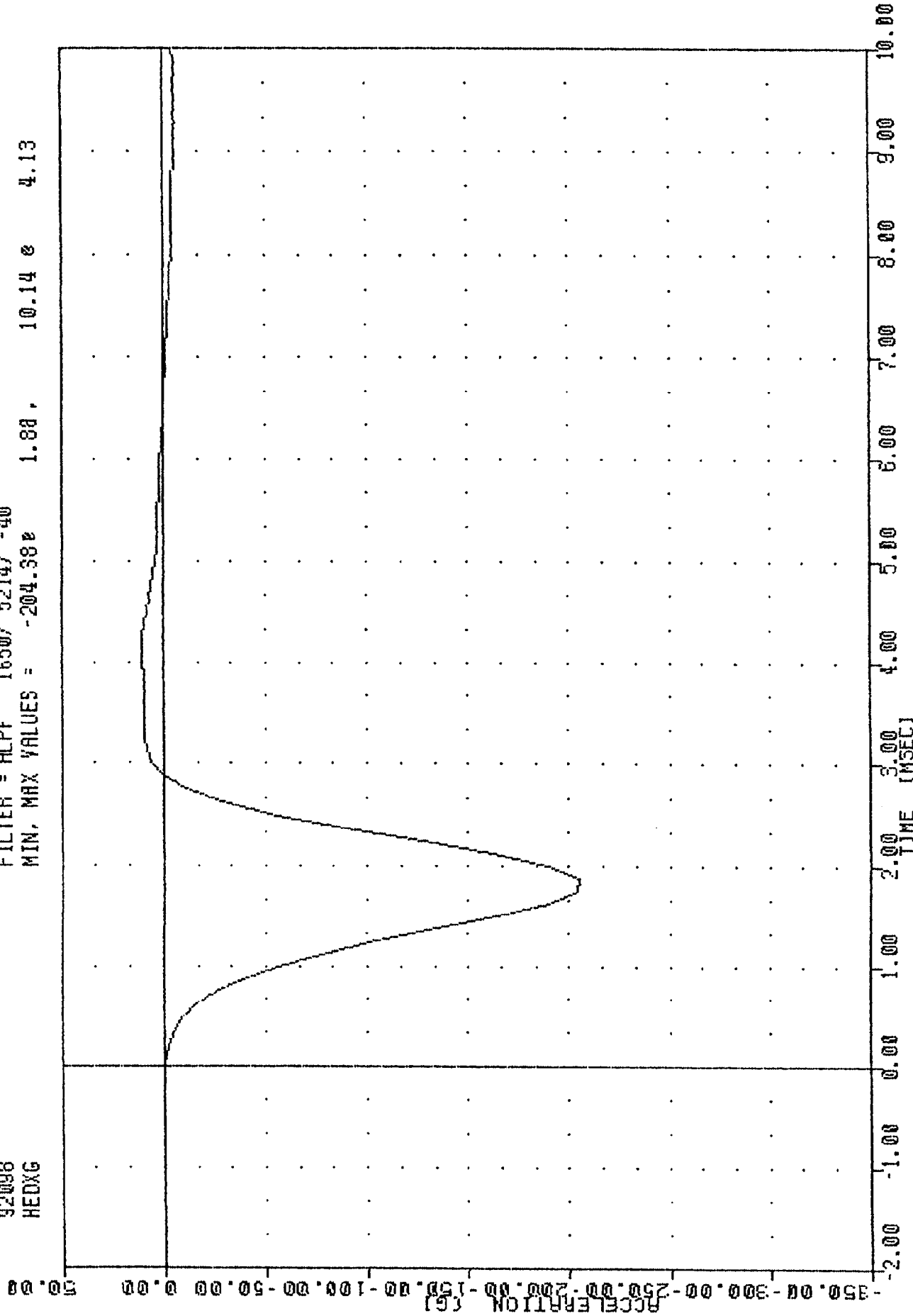
TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	243.94 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.25 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	2.28 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
5728 SN 258 HEAD DROP CAL 70
92096
HEDXG

HD25870
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -204.38% 1.80, 10.14 & 4.13

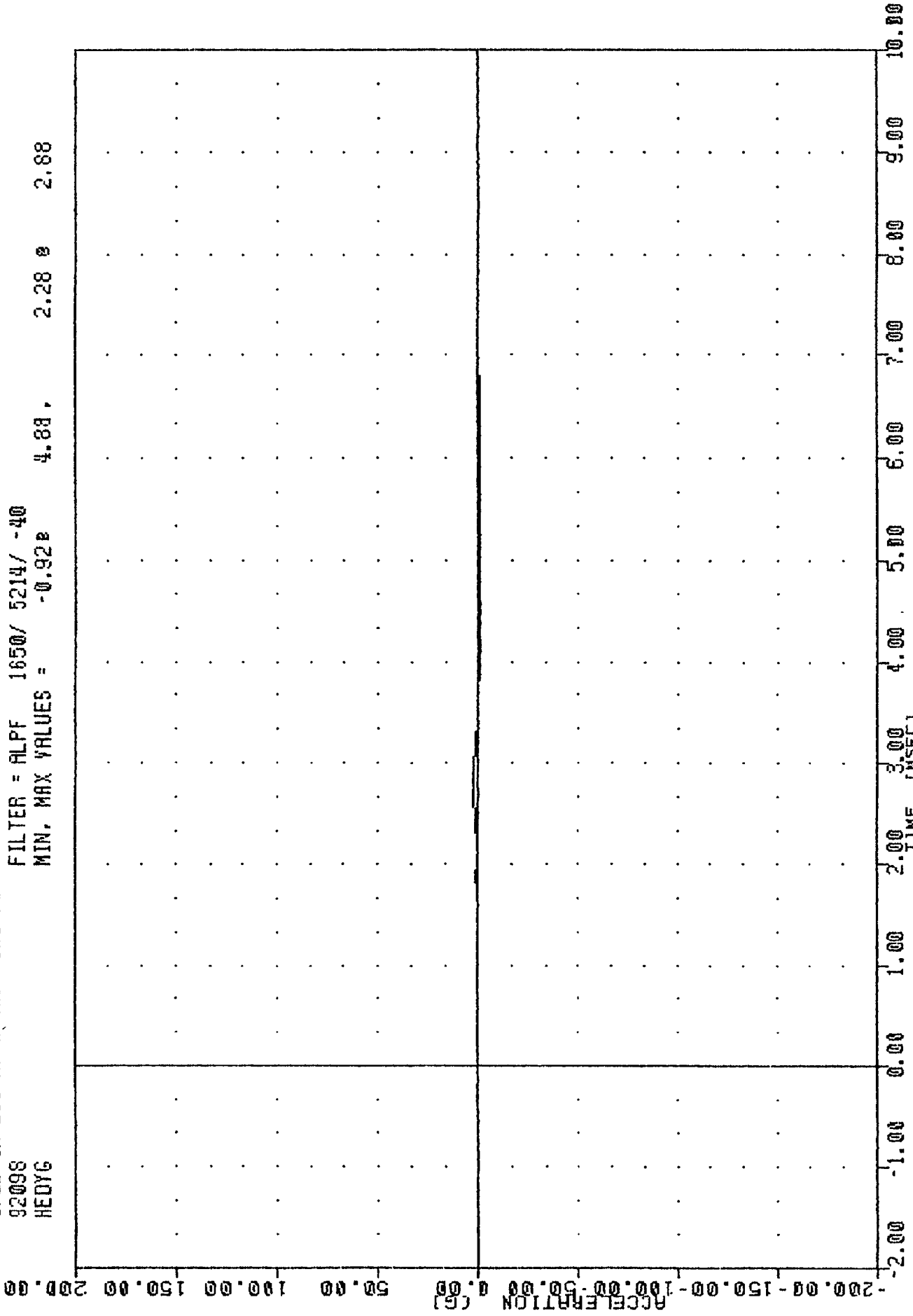


PART 572-8 HYBRID II HEAD DROP CALIBRATION

HEAD ACCELERATION X AXIS

TFC
 572B SN 258 HEAD DROP CAL 70
 92098
 HEDYG

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -0.928 4.88 2.28 2.88



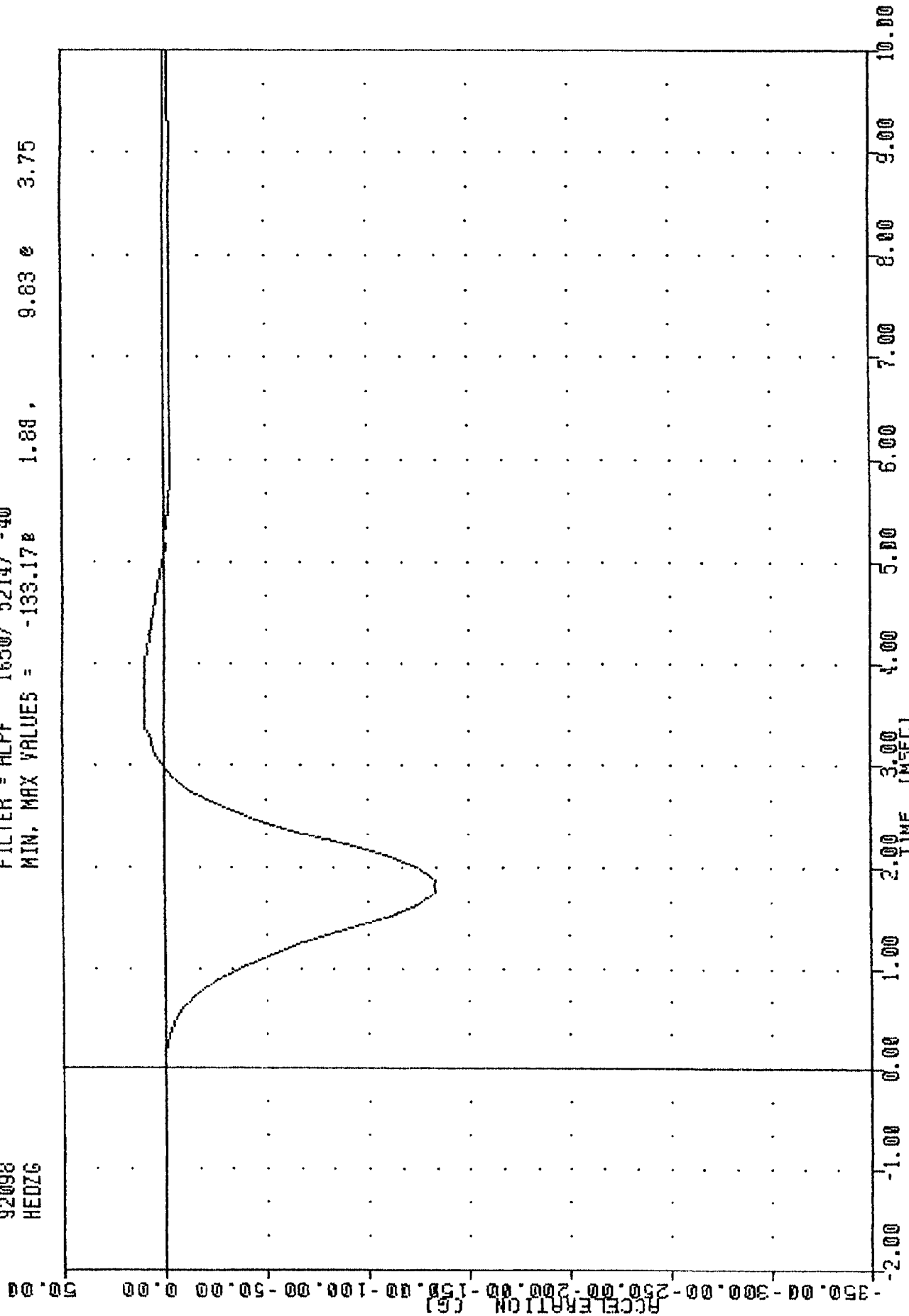
PART 572-B HYBRID II HEAD DROP CALIBRATION
 HEAD ACCELERATION Y AXIS

TRC
572B SN 250 HEAD DROP CAL 70
92098
HEDZG

HD25070

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -133.17 1.88,

9.83 3.75

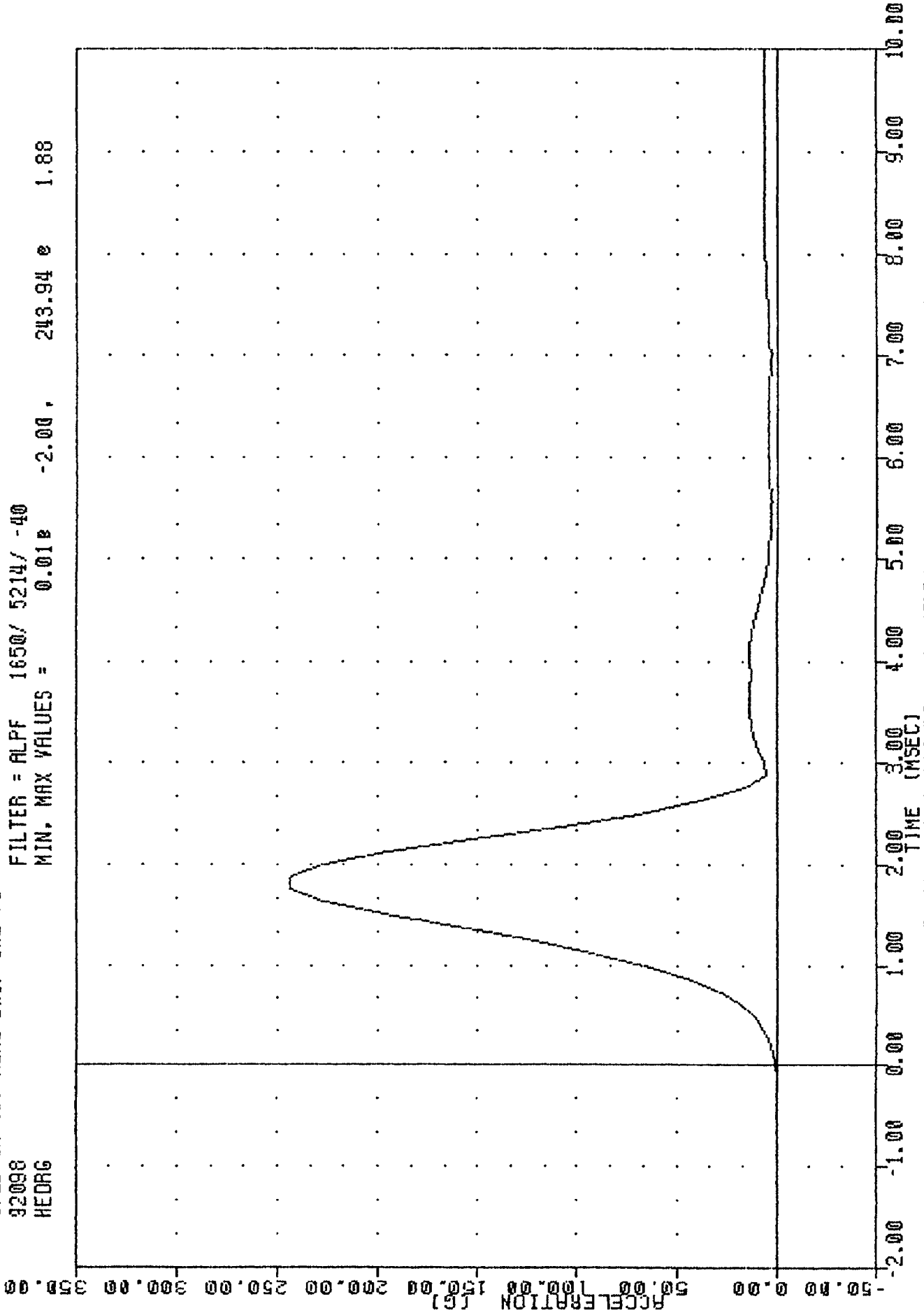


PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION 7 AXIS

TRC
572B SN 258 HEAD DROP CAL 70
32098
HEADG

HD25870

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.018 -2.00 , 243.94 e 1.88



PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

07-Apr-92

TEMPERATURE 70 F
TRC HN25870

RELATIVE HUMIDITY 40 %
572B SN 258 HEAD/NECK CAL 70

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	21.5 to 25.5 ft/sec	23.76 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.41 msec
T2 - T3: 20 - 20 G	25 - 30 msec	25.91 msec
T3 - T4: 20 - 5 G	10 msec max	7.36 msec
Avg. G level T2 - T3	20 - 24 G	23.29 G
Maximum Rotation Angle	63 - 73 deg	68.90 deg
Peak Head Resultant Accel	26 G max	22.95 G

Test Parameter	Specification		Test Results	
Rotation Angle (degrees)	Time (msec)	Chordal Disp. (in)	Time (msec)	Chordal Disp. (in)
0	-2.0 - +2.0	-0.5 - +0.5	1.38	0.01
30	25.6 - 34.4	2.1 - 3.1	31.42	2.57
60	40.3 - 51.7	4.3 - 5.3	48.35	4.83
max	53.2 - 66.8	5.0 - 6.0	64.38	5.43
60	67.0 - 83.0	4.3 - 5.3	79.02	4.69
30	85.4 - 104.6	2.1 - 3.1	98.52	2.29
0	101.0 - 123.0	-0.5 - +0.5	113.19	0.15

SND: 5.95 in

DUMMY MEETS SPECIFICATIONS

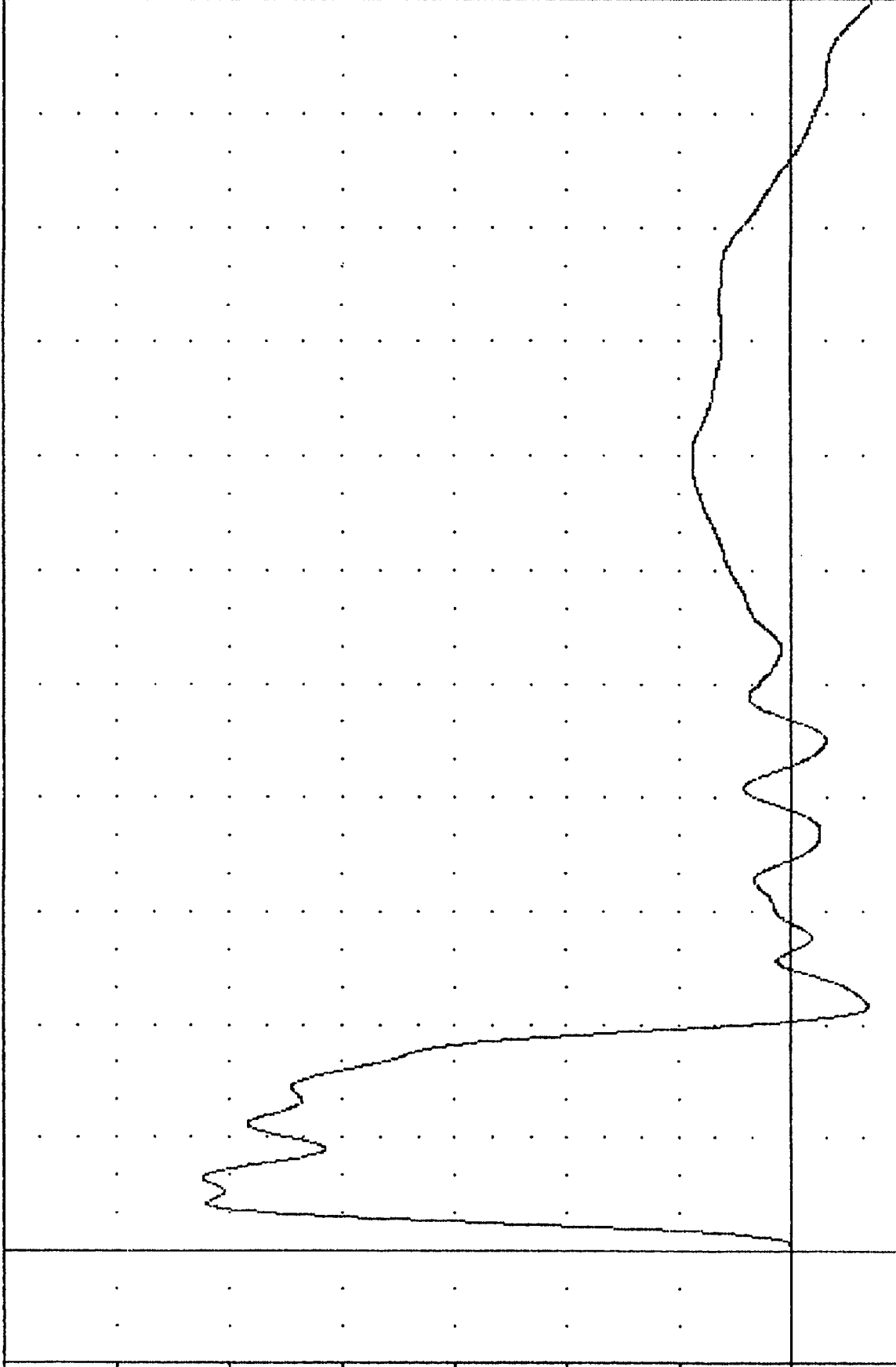
TECHNICIAN *Chris Middle*

TRC
572B SN 258 HEAD/NECK CAL 70
92098
PENXG

, HX25870

FILTER = BLPF 100/ 317/ -40
MIN. MAX VALUES = -3.71g 220.00g , 26.16g 12.75

ACCELERATION (G)
-5.00 0.00 5.00 10.00 15.00 20.00 25.00 30.00 35.00



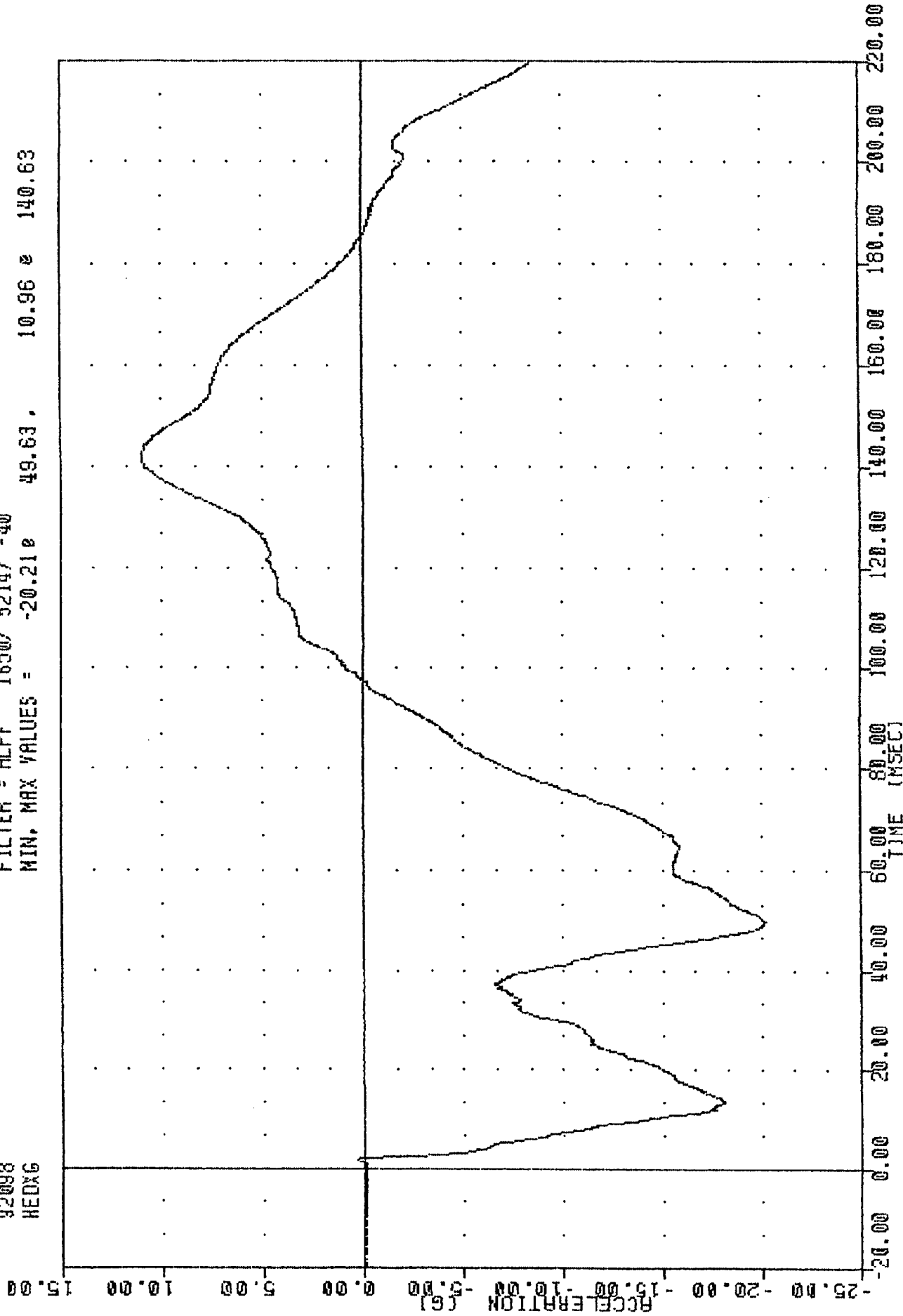
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

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

TRC
5728 SN 258 HEAD/NECK CAL 70
92098
HEADXG

, HN25870

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -20.21e 49.63 . 10.96 e 140.63



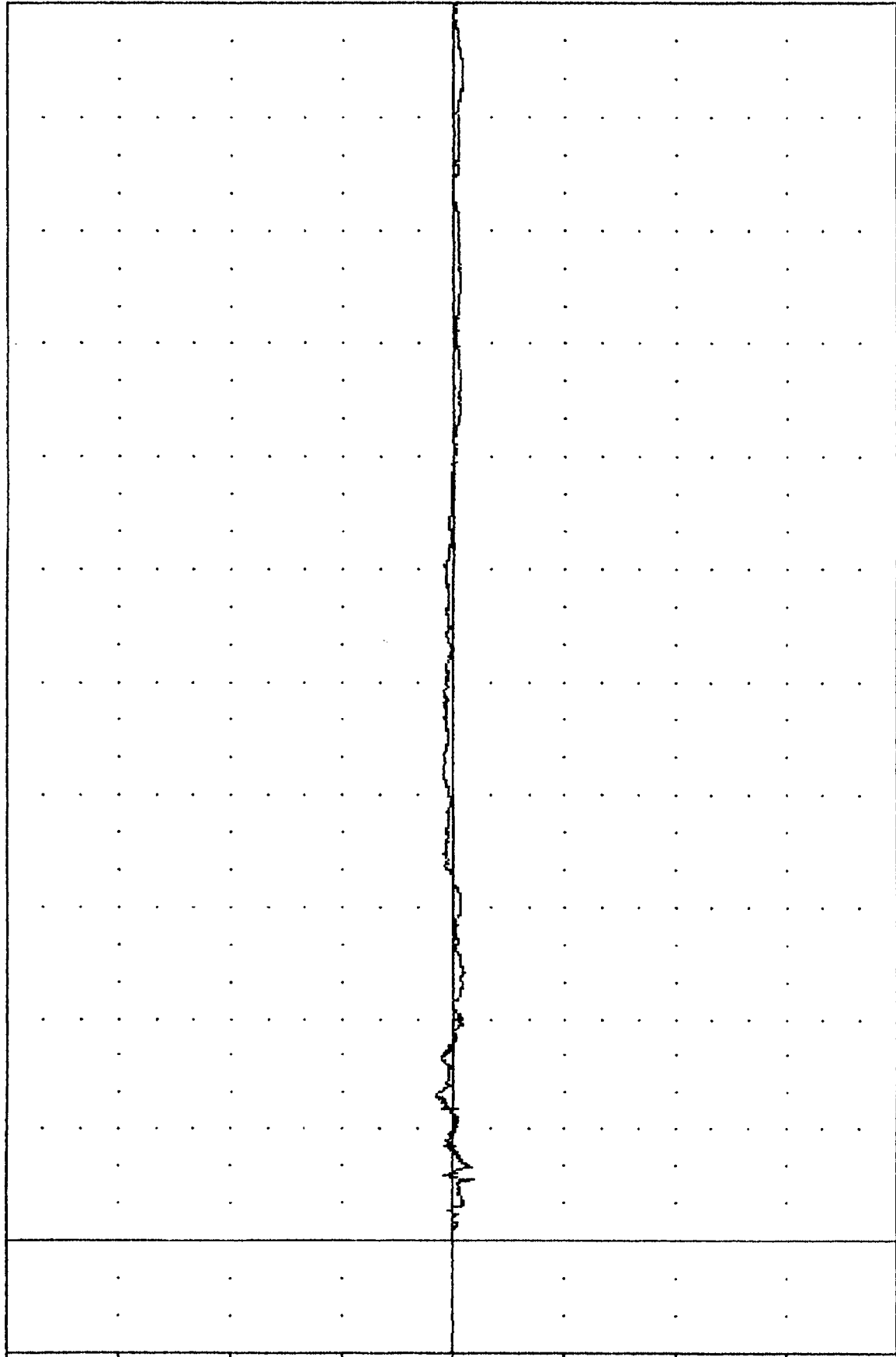
PART 572-8 HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION X AXIS

TRC
5728 SN 250 HEAD/NECK CAL 70
32098
HEDYG

, HW25870

FILTER = ALFF 1650/ 5214/ -40
MIN. MAX VALUES = -0.94e 10.75 , 0.75 e 25.88

ACCELERATION (G)
-20.00
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00



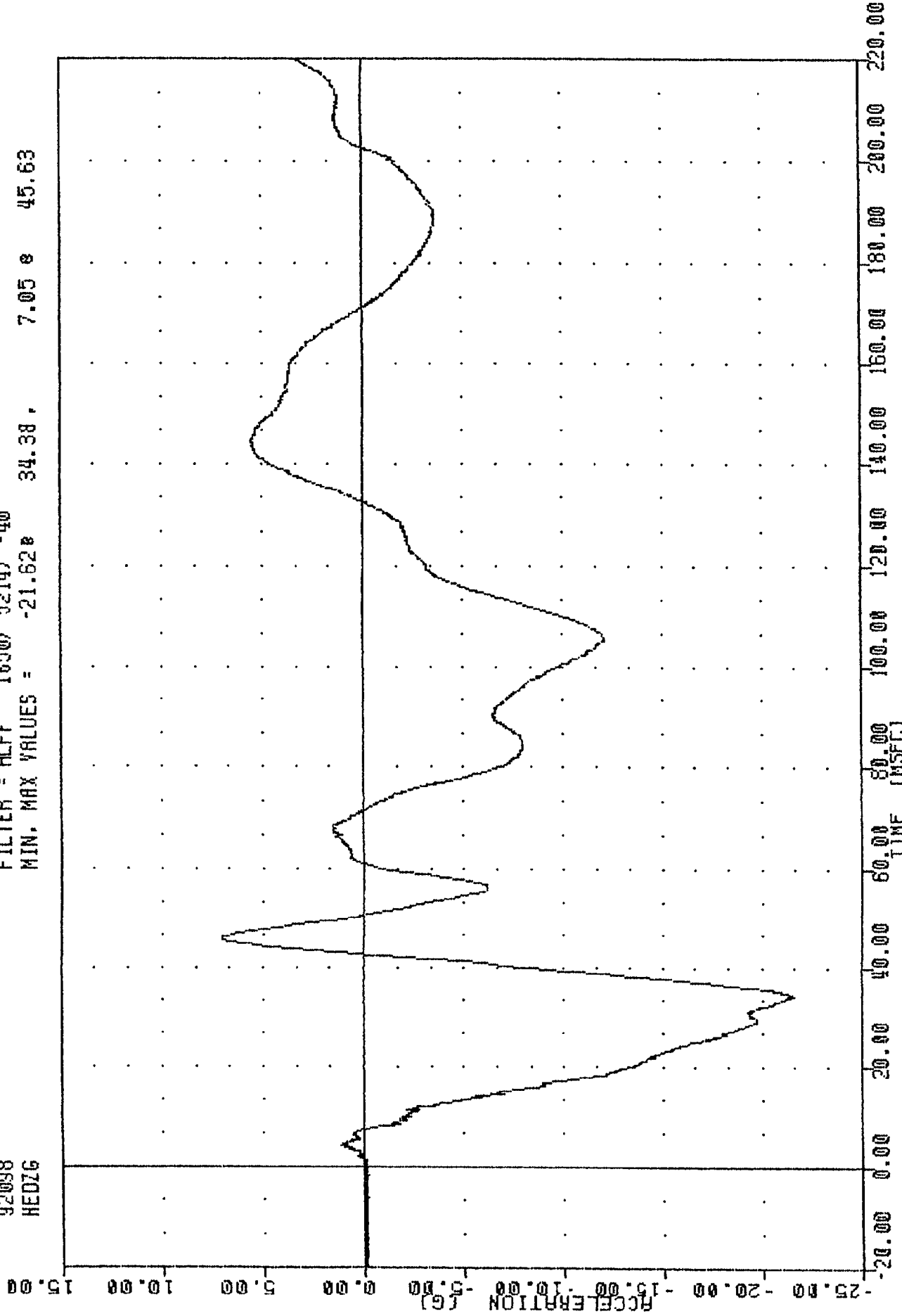
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00
TIME (MSEC)

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

TRC
5728 SN 258 HEAD/NECK CAL 70
92098
HEADZG

HW25870

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -21.62e 34.38 , 7.05 e 45.63



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

TRC

, HW25870

572B SN 258 HEAD/NECK CAL 70

92098

HEADG

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = 0.03B -18.13,

22.95 e

34.38

35.00

30.00

25.00

20.00

15.00

10.00

5.00

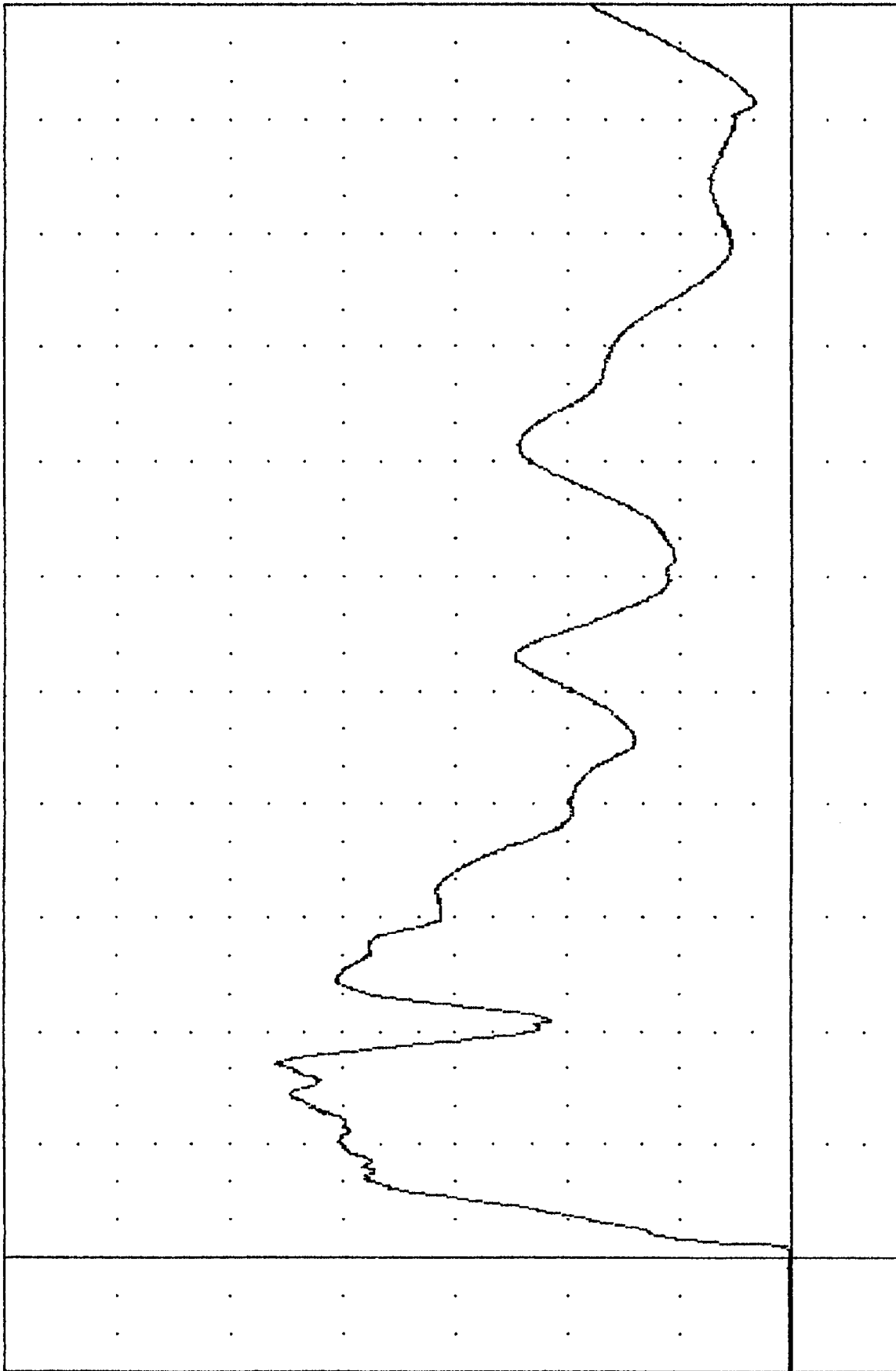
0.00

-5.00

-10.00

-15.00

ACCELERATION (G)



-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

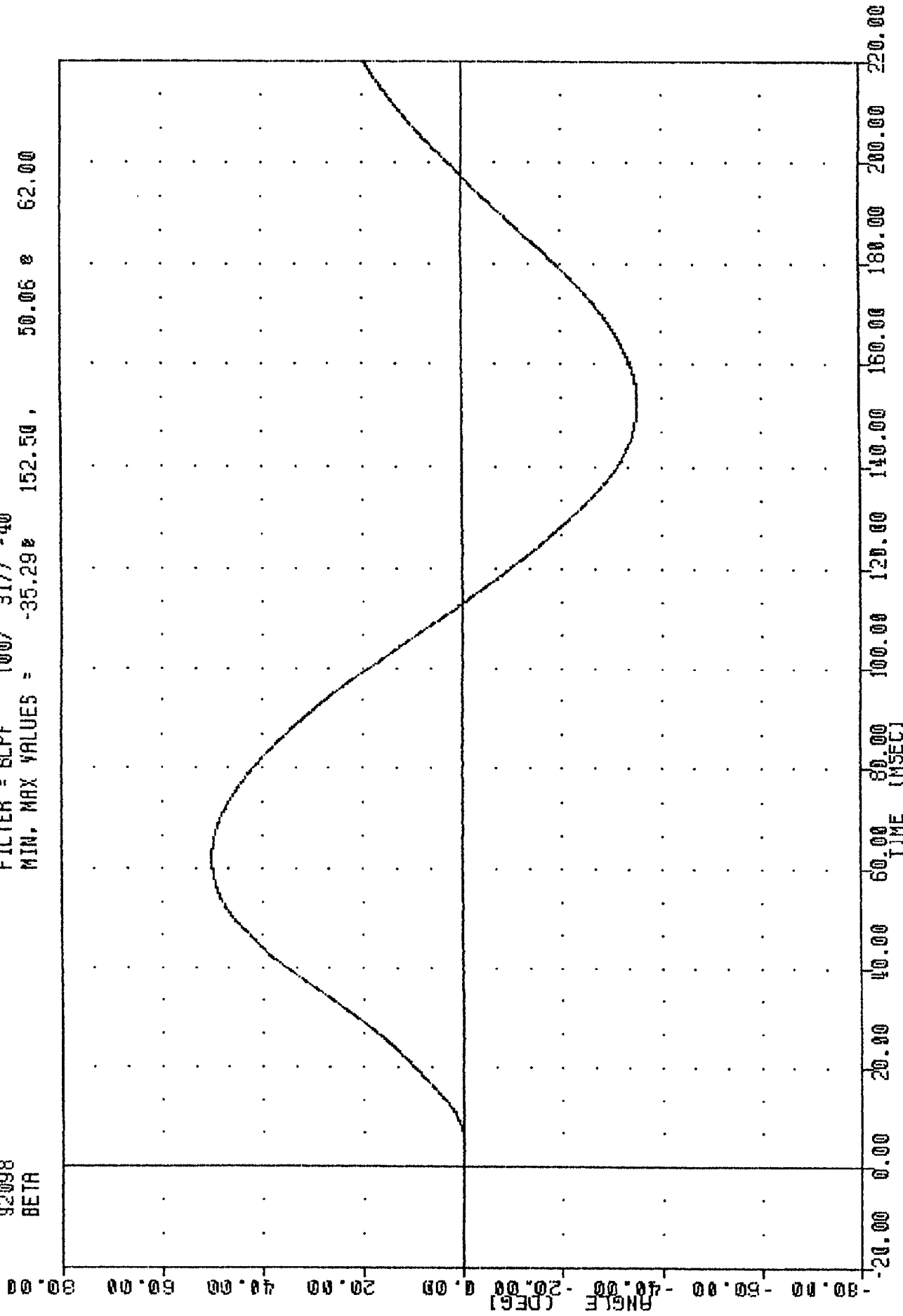
TIME (MSEC)

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

TRC
572B SN 250 HEAD/NECK CAL 70
92098
BETA

HN25670

FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -35.29e 152.50 , 50.06 e 62.00

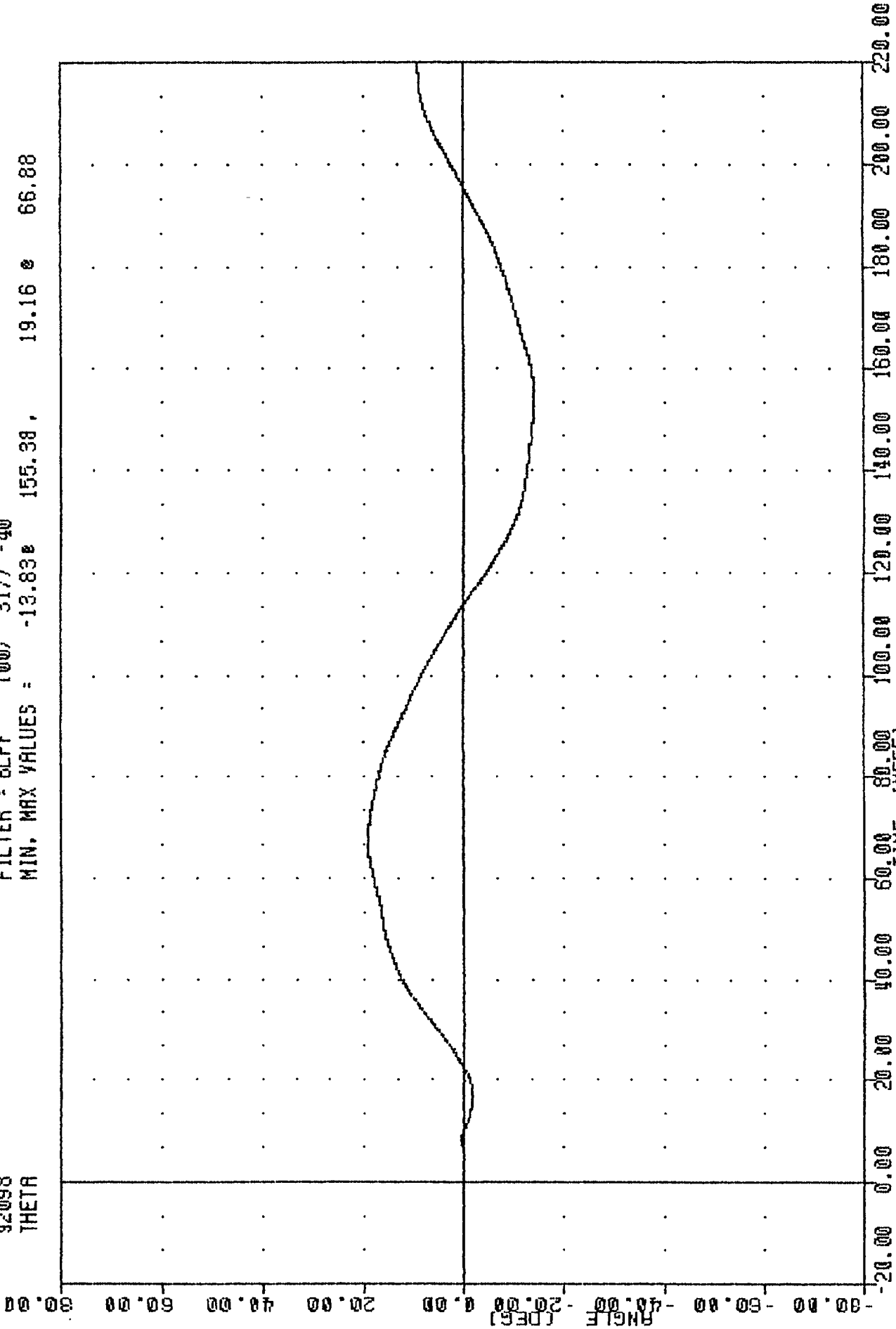


PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE BASE OF THE NECK

TRC
572B SN 258 HEAD/NECK CAL 70
92098
THETA

, HN25870

FILTER = 8LPF 100/ 317/ -40
MIN. MAX VALUES = -13.83 155.38 , 19.16 66.88

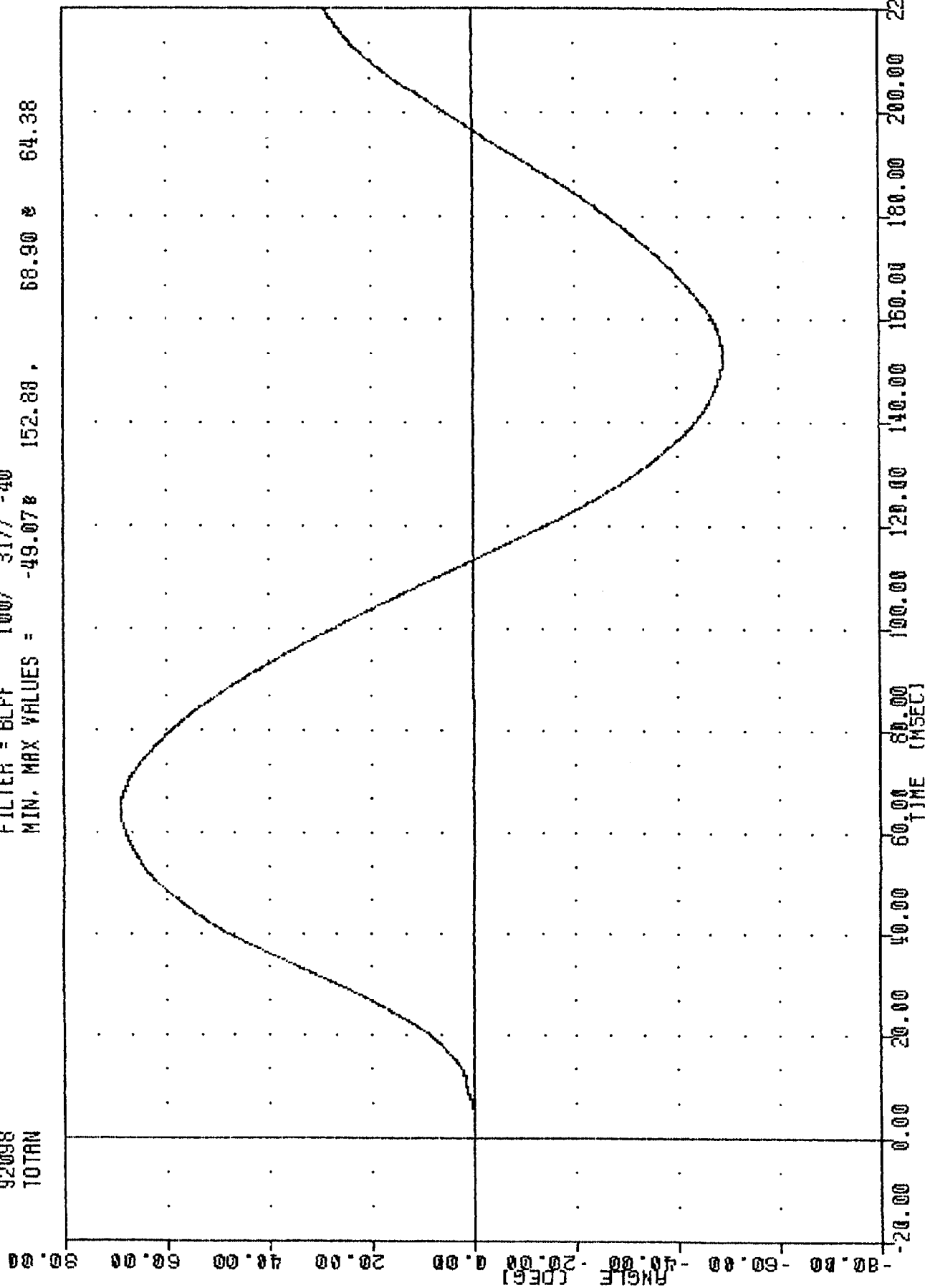


PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE HEAD C.G.

TRC
5728 SN 258 HEAD/NECK CAL 70
92098
TOTAN

HN25870

FILTER = BLPF 100/ 317/ -40
MIN. MAX VALUES = -49.078 152.88 68.90 64.38

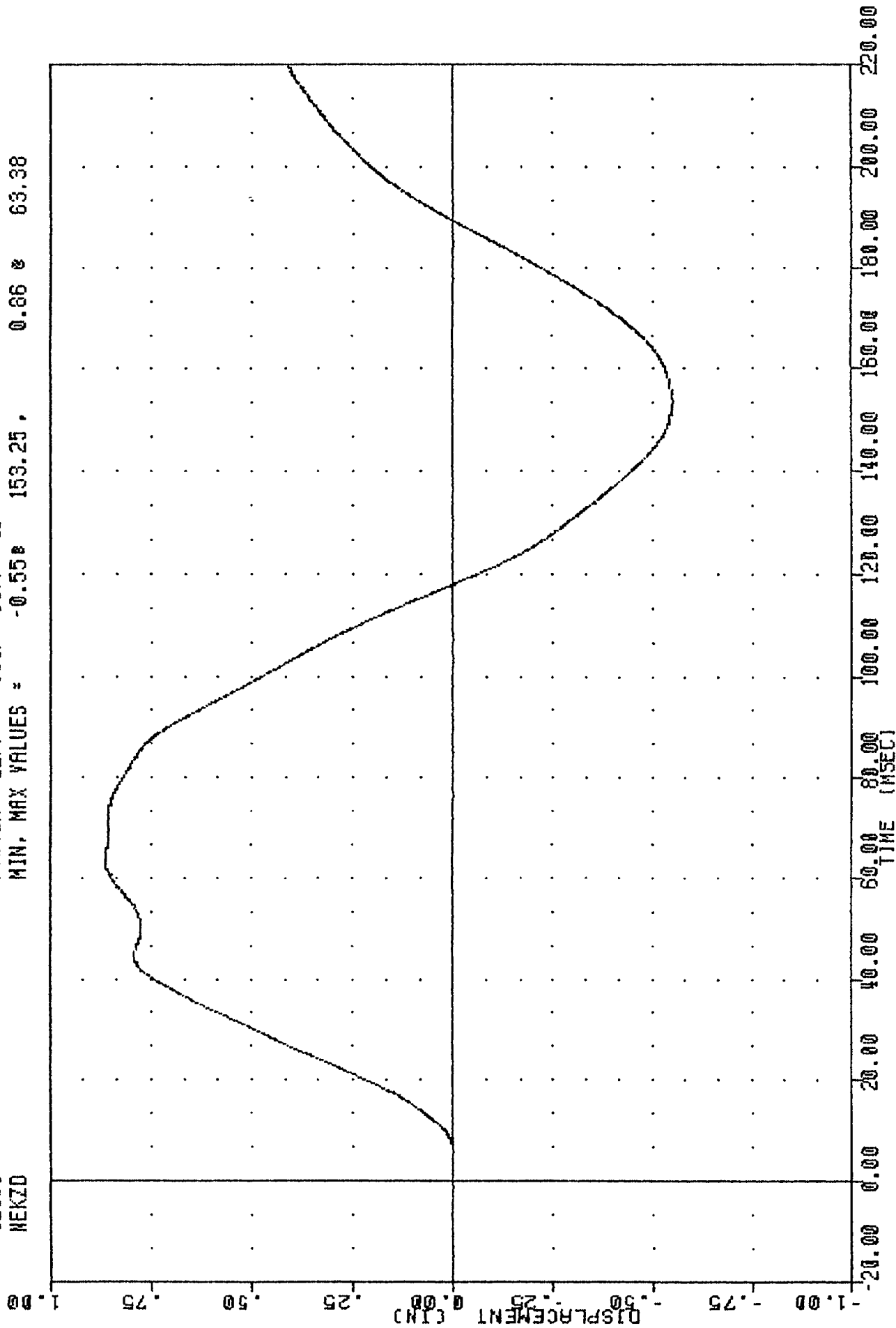


PART 572-B HYBRID II HEAD/NECK CALIBRATION
TOTAL ROTATION

TRC
572B SN 258 HEAD/NECK CAL 70
92098
MEKID

HW25870

FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -0.558 153.25 , 0.66 63.38

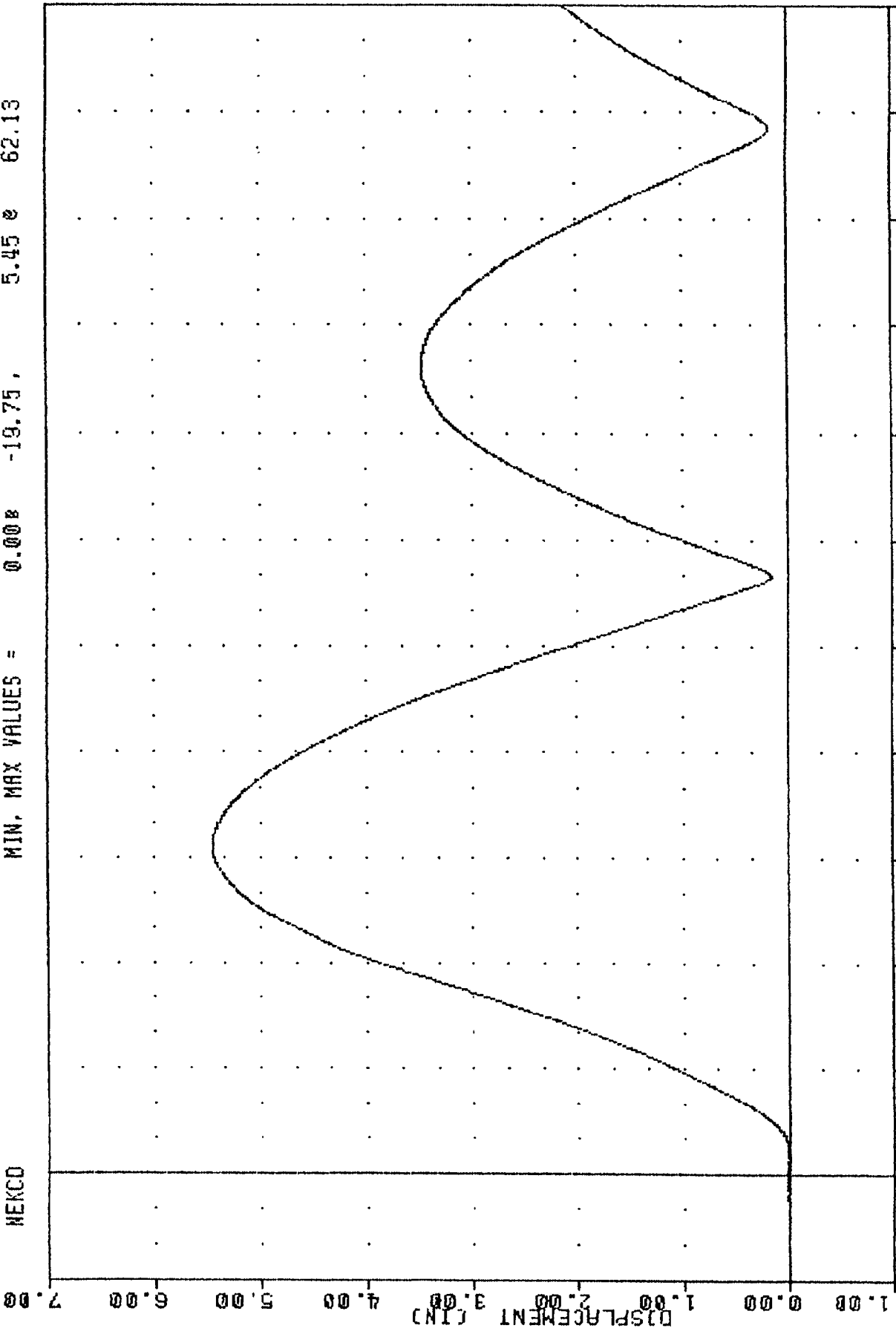


PART 572-B HYBRID II HEAD/NECK CALIBRATION
NECK DISPLACEMENT Z AXIS

TRC
5728 SN 258 HEAD/NECK CAL 70
92098
HEKCD

HM25870

FILTER = BLPF 100/ 317/ -40
MIN. MAX VALUES = 0.008 -19.75, 5.45 e 62.13



-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

08-Apr-92

TEMPERATURE 70 F
TRC TL25870

RELATIVE HUMIDITY 40 %
572B SN 258 L. S. THORAX CAL 70

TEST PARAMETER	LOW SPEED TEST	
	SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.04 FT/SEC
PEAK DEFLECTION	1.1 IN max.	1.00 IN
PEAK RESISTIVE FORCE	1,450. LB max.	1240. LB
INTERNAL HYSTERESIS	50% - 70%	65.3%

SCD: 2.05 IN

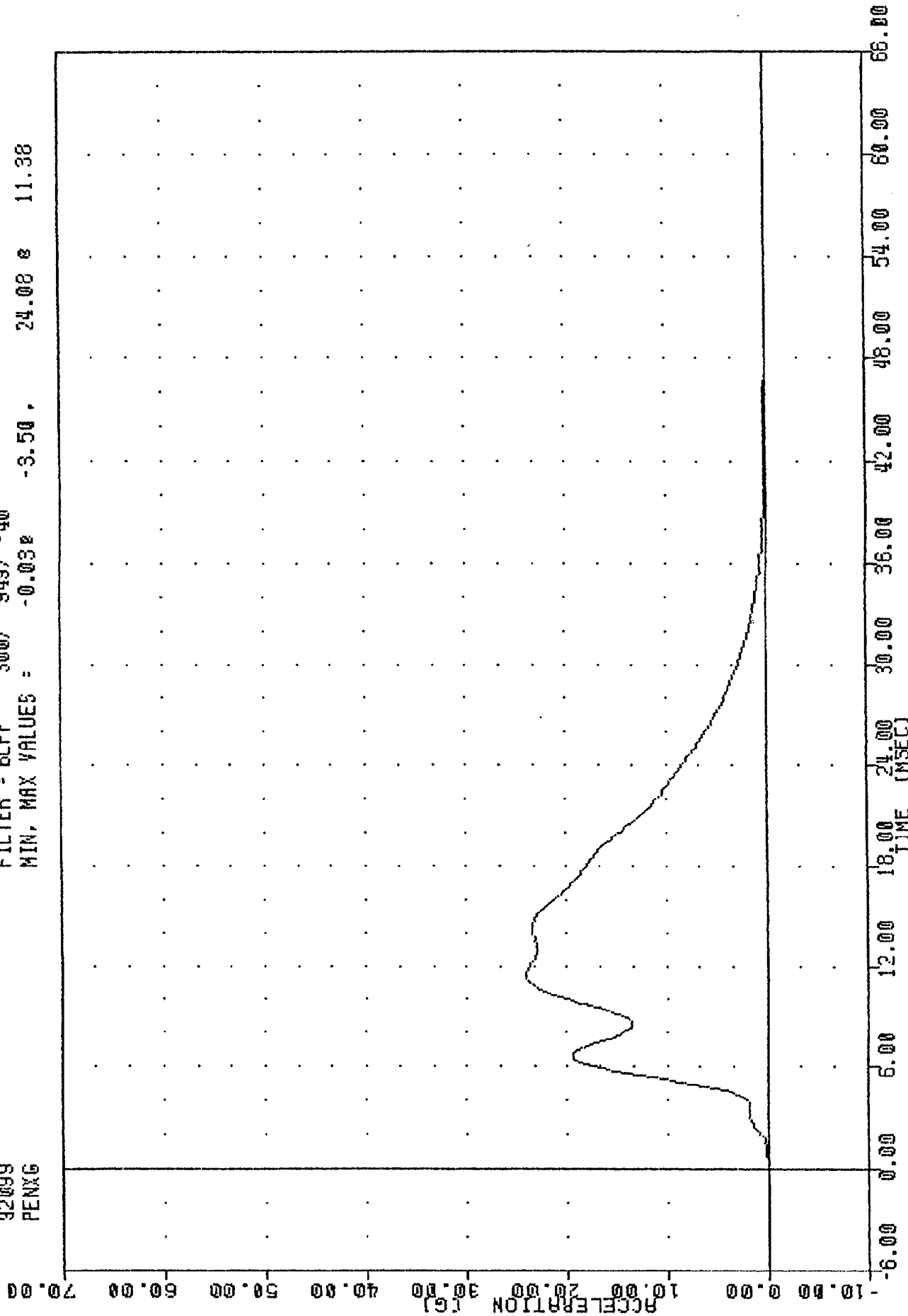
DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRC , TL25870
572B SN 258 L.S. THORAX CAL 70
92099
PENXG

FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = -0.032 -3.50 , 24.08 8 11.38



C-55

920427

PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
PENXG UNACCELERATION

TRC

, TL25870

572B SN 258 L.S. THORAX CAL 7D

92099

PENXF

FILTER = BLPF 300/ 949/ -40

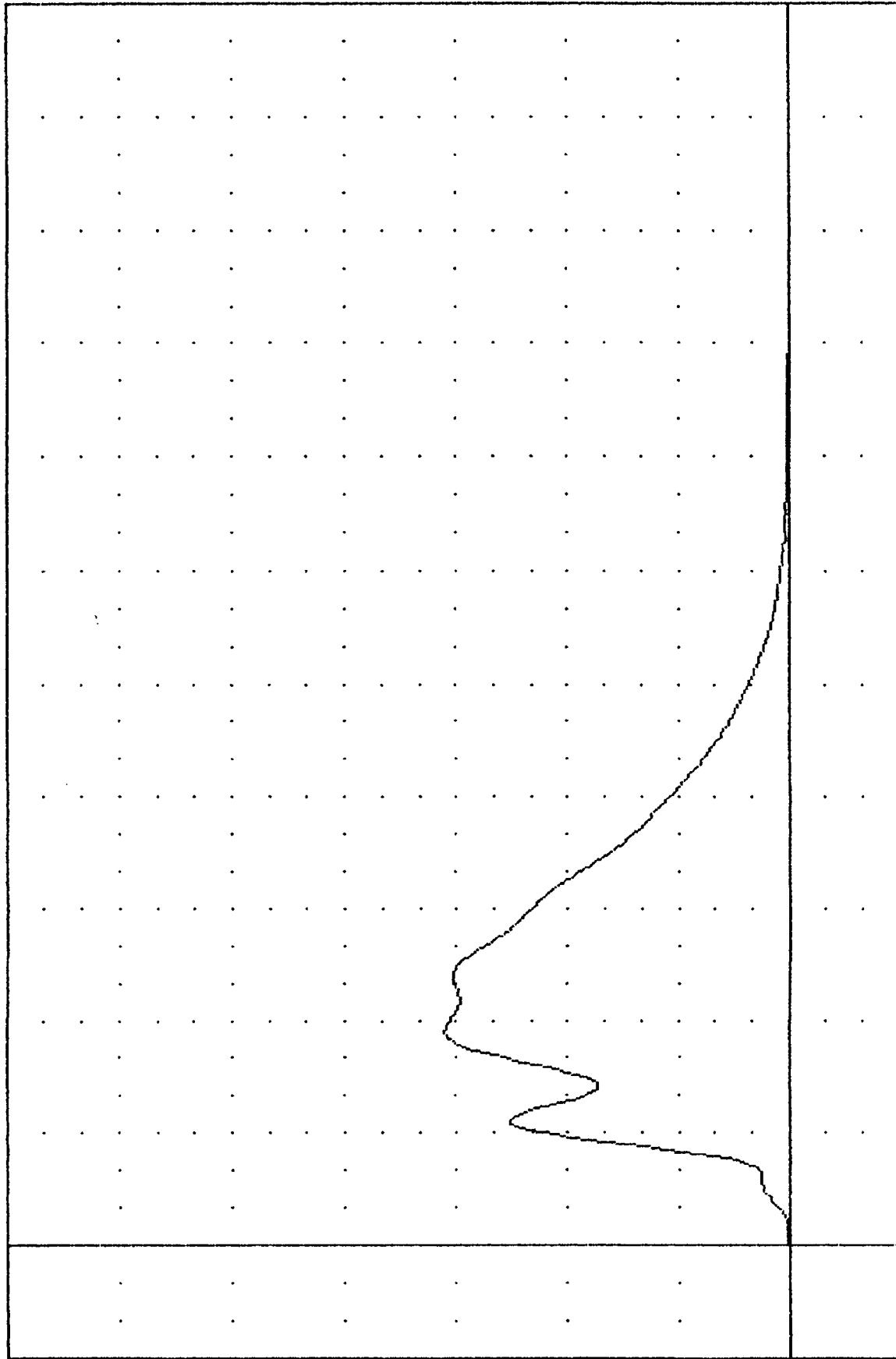
MIN, MAX VALUES = -1.36e

-3.50,

1240.32 e

11.38

FORCE (LB) (X10⁴)

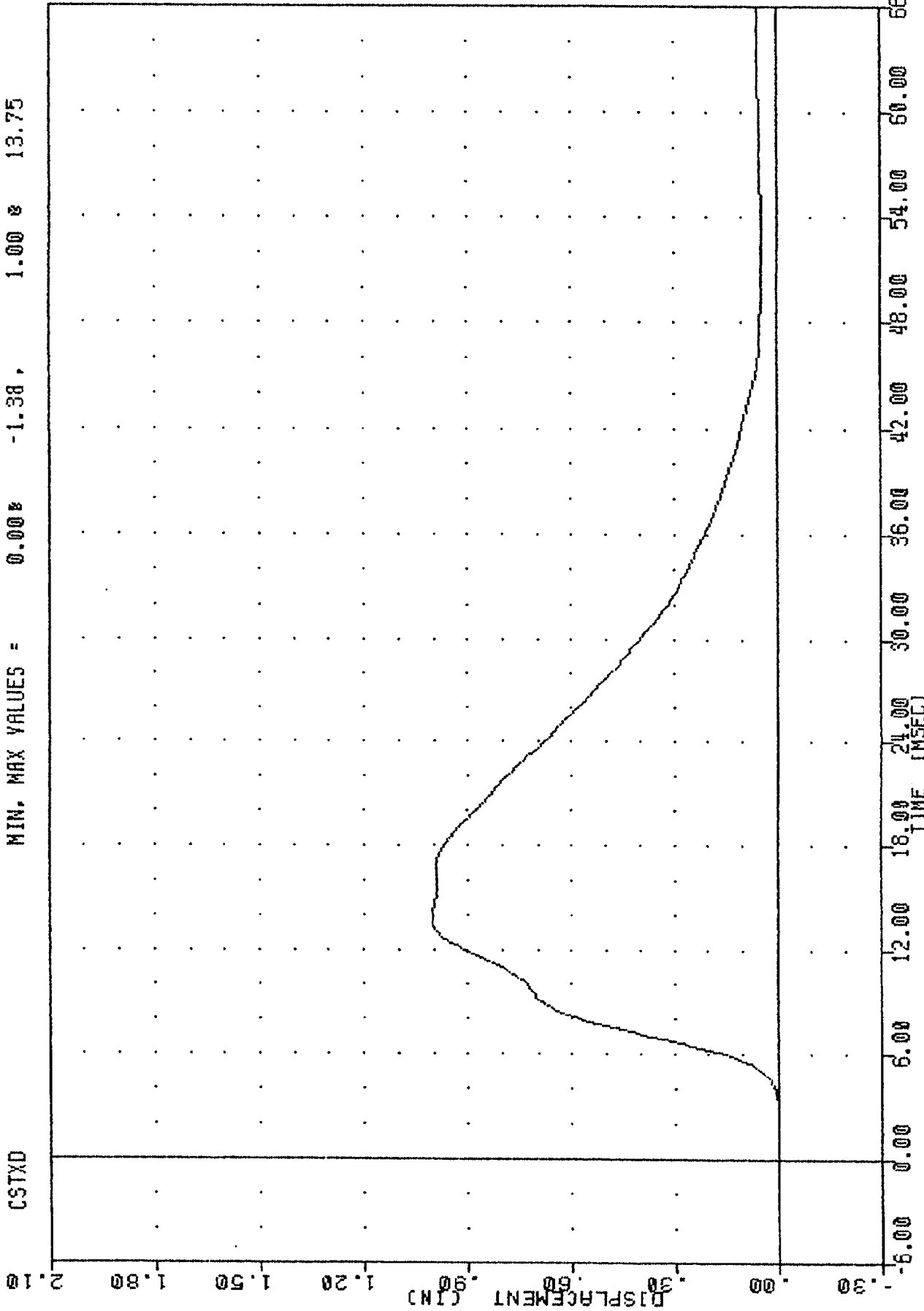


-6.00 0.00 6.00 12.00 18.00 24.00 30.00 36.00 42.00 48.00 54.00 60.00 66.00

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

TRC , TL25870
5728 SN 258 L.S.THORAX CAL 7D
92099
CSTXD

FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = 0.00% -1.38 , 1.00 % 13.75



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

TBC
CSTXD
PENXF

TL25870
FILTER = BLPF
FILTER = BLPF

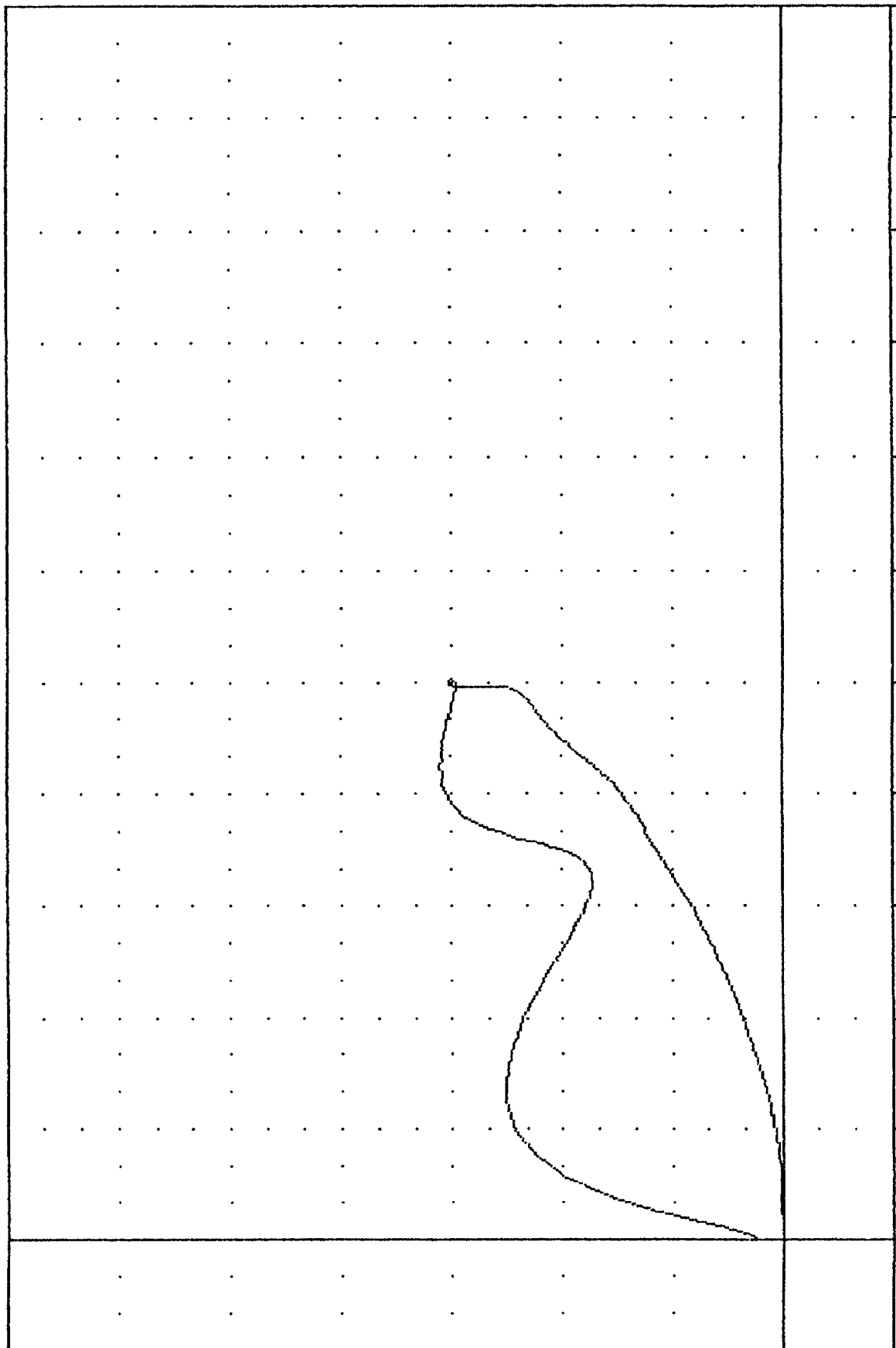
572B SN 258 L.S. THORAX CAL 70
300/ 949/ -40 MIN. MAX =
300/ 949/ -40 MIN. MAX =

92099
0.00 e
-1.36 e

-1.38
-3.50
1.00 e
1240.32 e

13.75
11.38

40.00
0.00
-40.00
PENXF (LB)
FORCE (LB)
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
(x10²)



-.20 .00 .20 .40 .60 .80 1.00 1.20 1.40 1.60 1.80 2.00 2.20
DISPLACEMENT (IN)
CSTXD

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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

08-Apr-92

TEMPERATURE 70 F
TRC TH25870

RELATIVE HUMIDITY 40 %
572B SN 258 H. S. THORAX CAL 70

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC
PEAK DEFLECTION	1.7 IN max.	1.51 IN
PEAK RESISTIVE FORCE	2,250. LB max.	2018. LB
INTERNAL HYSTERESIS	50% - 70%	62.4%

SCD: 2.05 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC

TH25870

572B SN 258 H.S. THORAX CAL 70

92099

PENXG

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.018 63.13 , 39.19 & 10.50

70.00

60.00

50.00

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

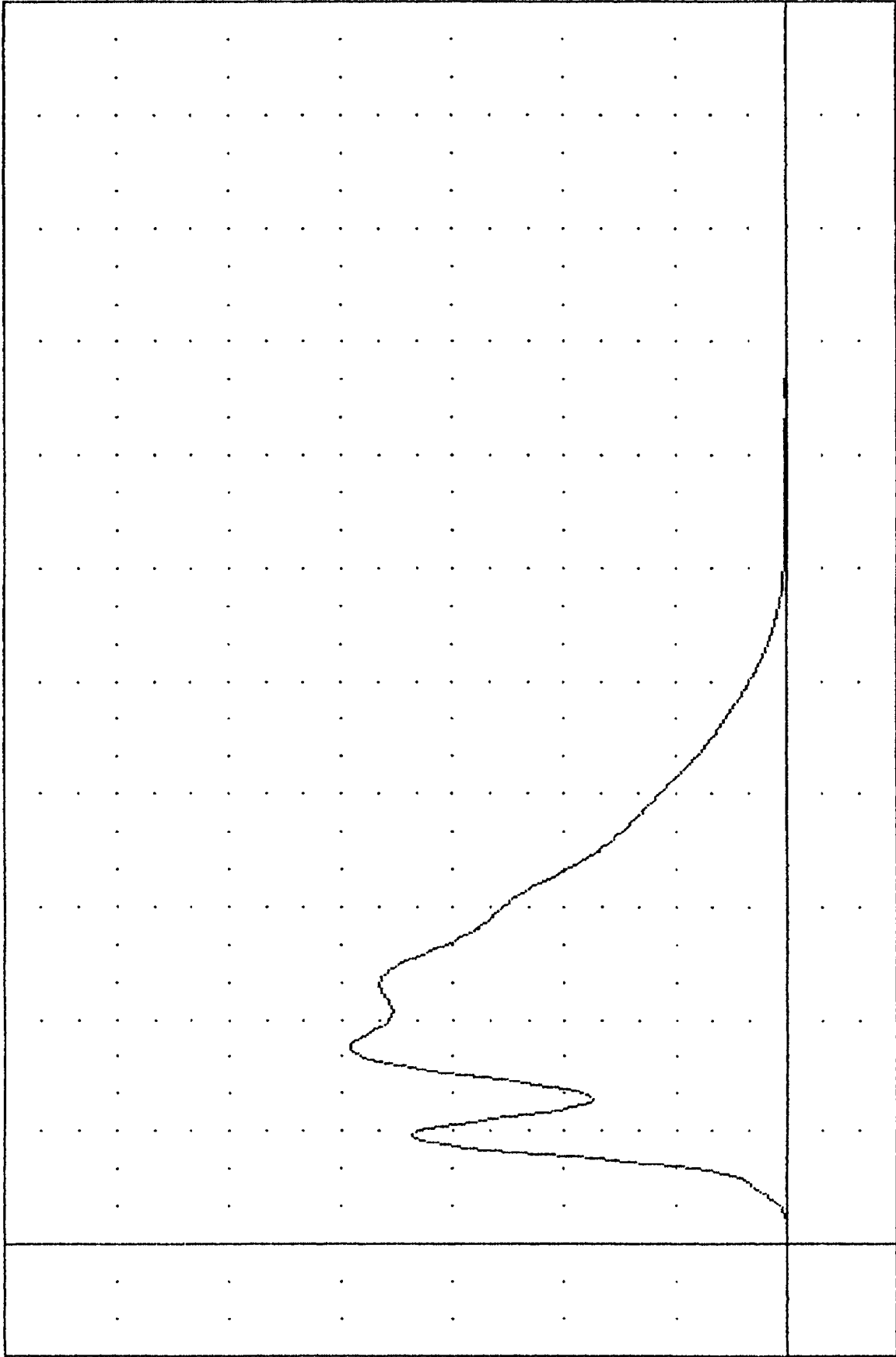
-40.00

-50.00

-60.00

-70.00

ACCELERATION (G)



-6.00

0.00

6.00

12.00

18.00

24.00

30.00

36.00

42.00

48.00

54.00

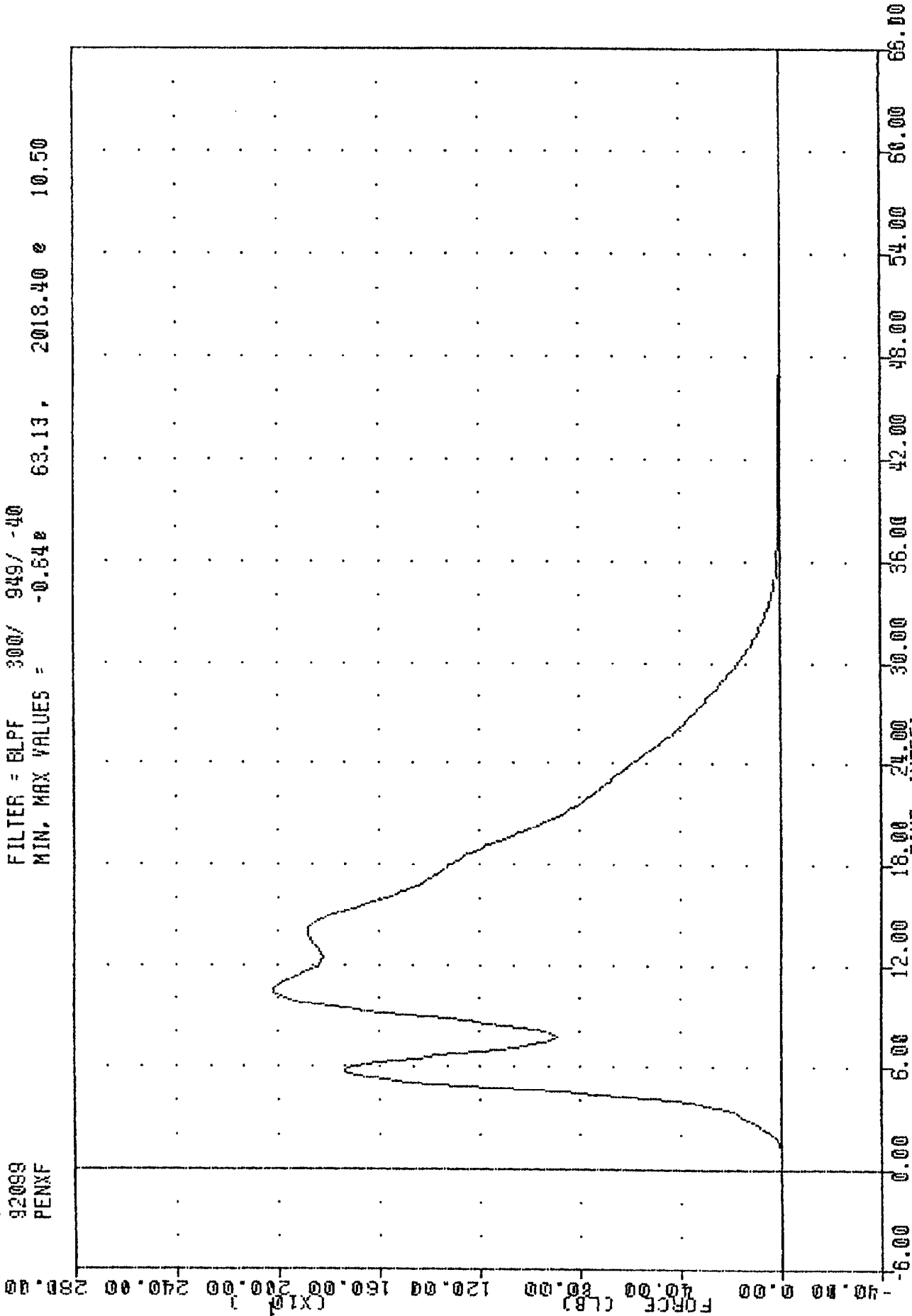
60.00

66.00

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

TRC , TH25870
 572B SN 258 H.S.THORAX CAL 70
 92099
 PENXF

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -0.64e 63.13 , 2018.40 e 10.50



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

PENDULUM FORCE

TRC

TH25870

572B SN 258 H.S.THORAX CAL 70

92099

CSTXD

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.00e

-5.63

1.51 e

12.88

2.10

1.80

1.50

1.20

.90

.60

.30

.00

-.30

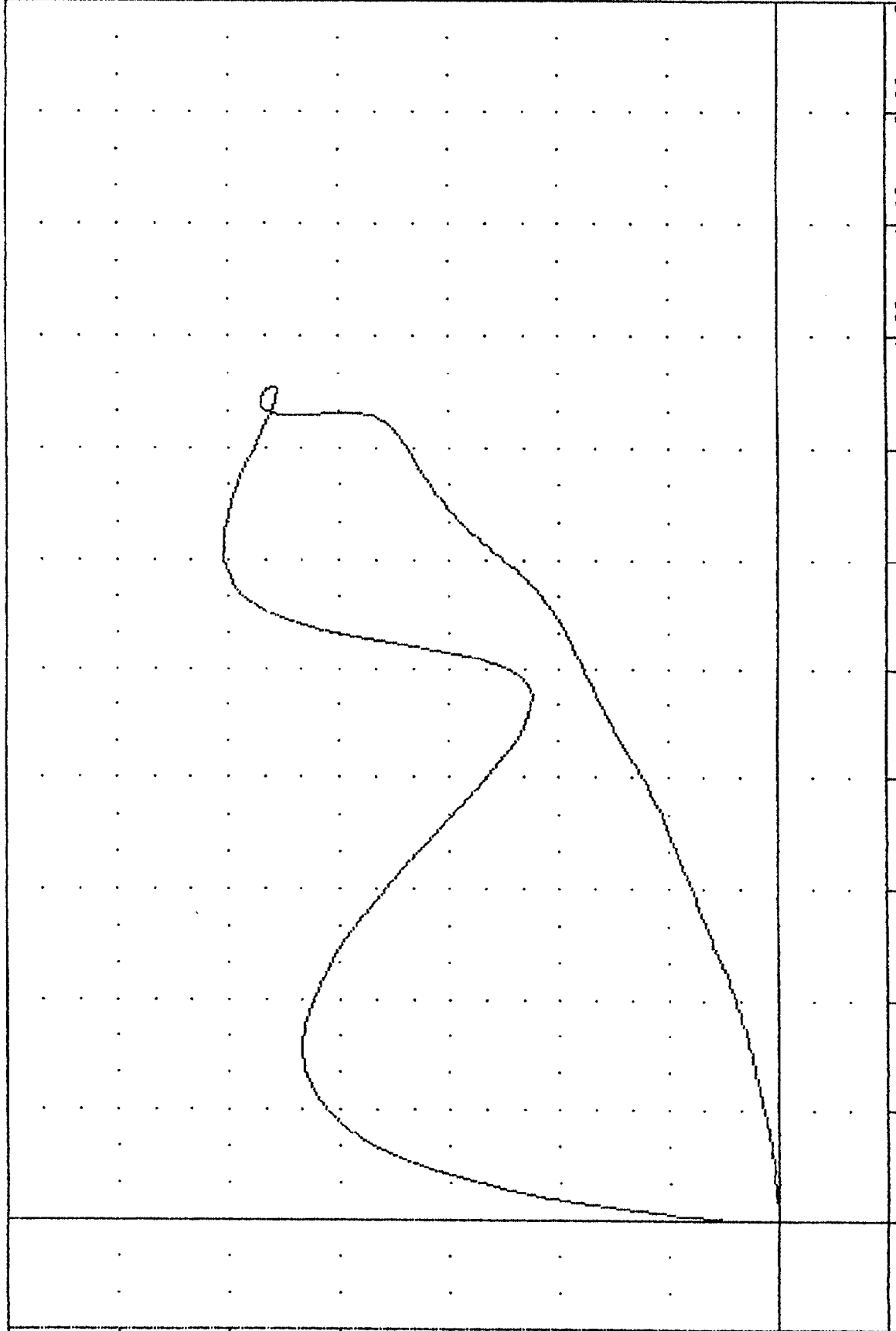
-6.00 0.00 6.00 12.00 18.00 24.00 30.00 36.00 42.00 48.00 54.00 60.00 66.00

TIME (MSEC)

PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
STERNUM DISPLACEMENT

TBC
 CSTXD
 PENKF
 JH25870
 FILTER = BLPF
 FILTER = BLPF
 572B SN 258 H.S. THORAX CAL 70
 300/ 949/ -40 MIN, MAX =
 300/ 949/ -40 MIN, MAX =
 92099
 0.000
 -0.64
 -5.63
 63.13
 1.51
 2018.40
 12.88
 10.50

-40.00 0.00 40.00 80.00 120.00 160.00 200.00 240.00 280.00
 (x10³)
 FORCE (LB)
 PENX (x10³)
 920427
 C-63



-0.20 -0.00 .20 .40 .60 .80 1.00 1.20 1.40 1.60 1.80 2.00 2.20
 CSTXD
 DISPLACEMENT (IN)
 PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
 CHEST DISPLACEMENT VS. PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMEN COMPRESSION TEST

PART 572

08-Apr-92

TEMPERATURE 70 F
TRC AB25870

RELATIVE HUMIDITY 40 %
572B SN 258 ABDOM COMPR CAL 70

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	27.43 LBS
0.75 IN	36.00 - 50.00 LBS	39.69 LBS
1.00 IN	50.00 - 63.00 LBS	56.86 LBS
1.30 IN	73.00 - 88.00 LBS	84.56 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

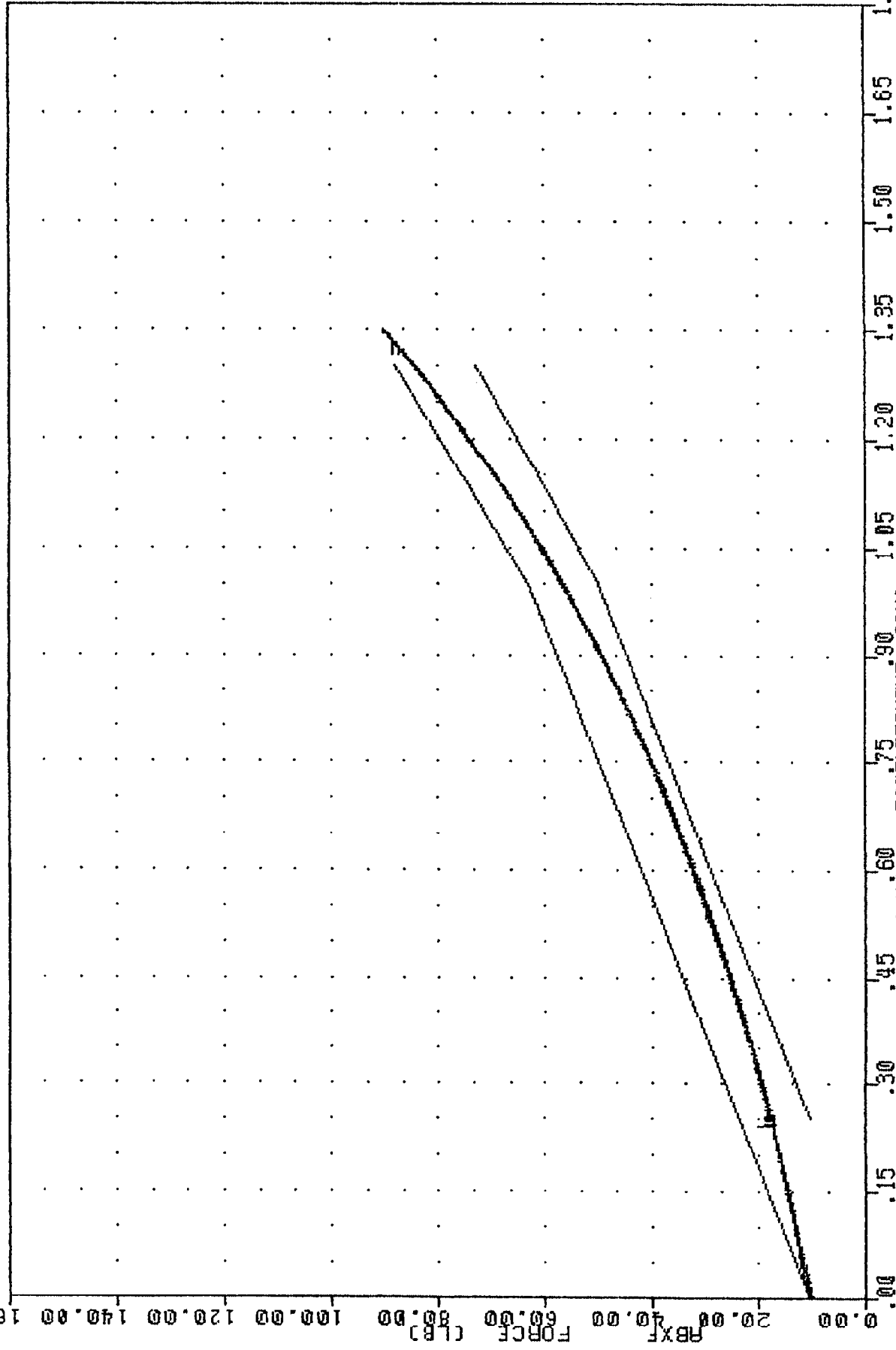
TRC
ABXD
ABXF

572B SN 258 ABDOM COMPR CAL 70 92099
1650/ 5214/ -40 MIN, MAX = 0.00 B
1650/ 5214/ -40 MIN, MAX = 9.88 B

FILTER = ALPF
FILTER = ALPF

1.35 e
90.49 e

90.49
1.35



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

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

07-APR-92

TEMPERATURE 70 F
TRC LF25870

RELATIVE HUMIDITY 40 %
572B SN258 LUMBAR FLEX CAL70

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	28.00 LB
30 DEG	34.00 - 46.00 LB	38.00 LB
40 DEG	46.00 - 58.00 LB	51.00 LB
NET RETURN ANGLE	< 12 DEG	4.60 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chris Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

08-Apr-92

TEMPERATURE 70 F
RIGHT KNEE
TRC RK25870

RELATIVE HUMIDITY 39 %
572B SN 258 R. KNEE IMP CAL 70

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.97 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1899.67 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.91 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC

RK25870

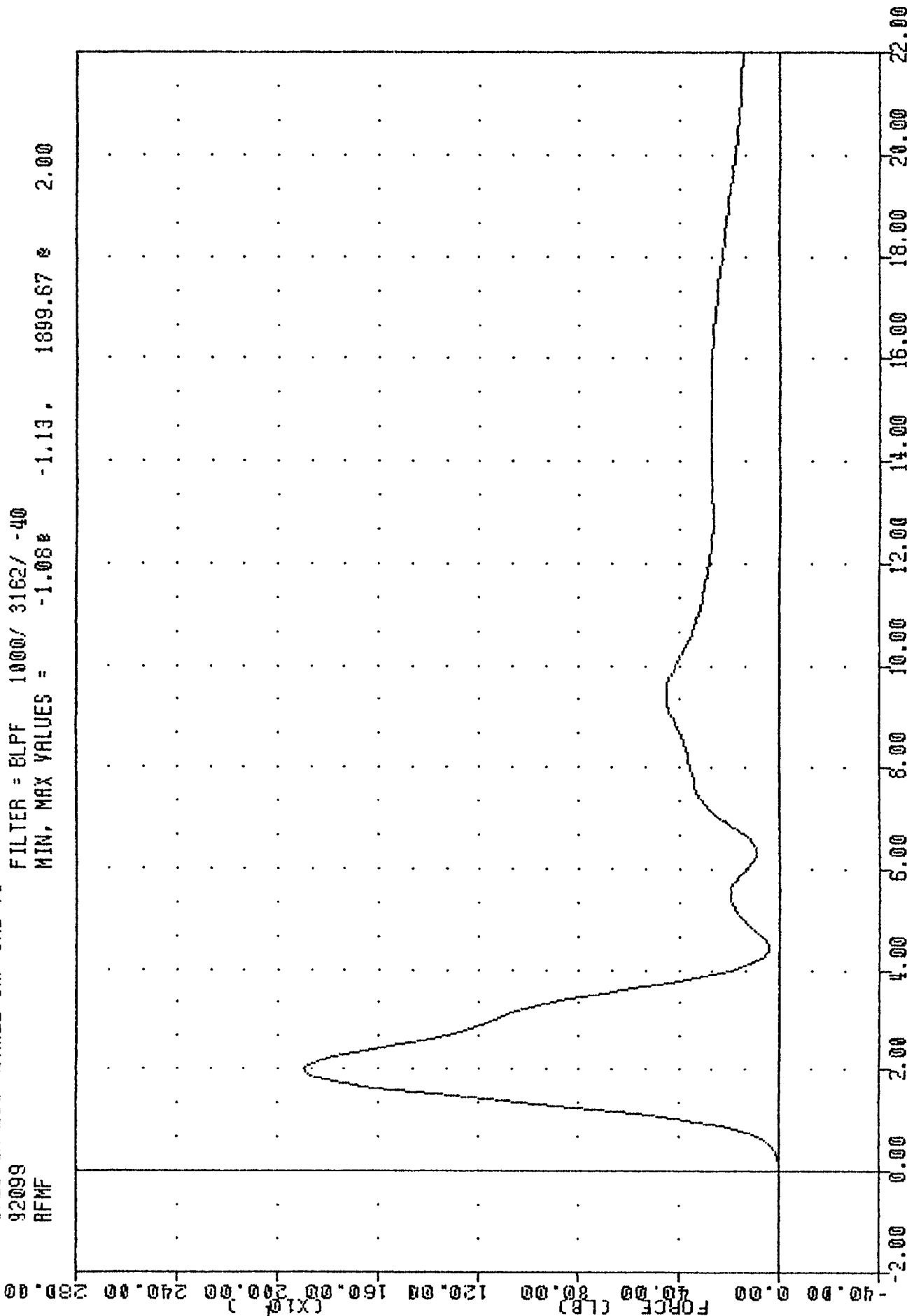
5728 SN 258 R.KNEE INP CAL 7D

92099

RFMF

FILTER = 6LFF 1000/ 3162/ -40

MIN. MAX VALUES = -1.08e -1.13. 1899.67 e 2.00



PART 572-6 HYBRID II RIGHT KNEE CALIBRATION
RIGHT FEMUR FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

08-Apr-92

TEMPERATURE 70 F
LEFT KNEE
TRC LK25870

RELATIVE HUMIDITY 39 %
572B SN 258 L.KNEE IMP CAL 70

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.99 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2127.00 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	2.09 MSEC

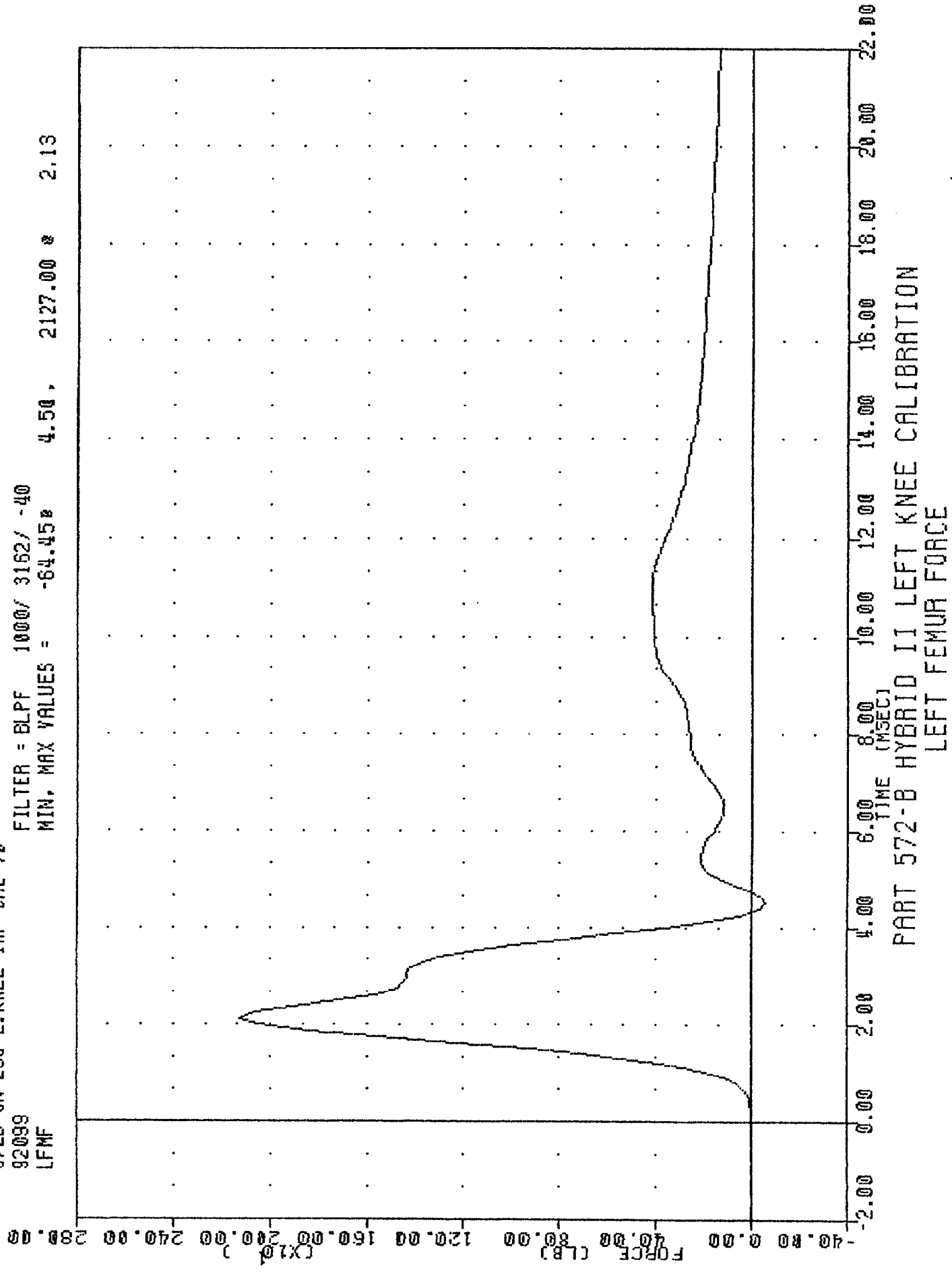
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
572B SN 258 L.KNEE INF CAL 70
92099
LFMF

LK25870

FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = -64.45 2127.00 2.13



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

PASSENGER DUMMY S/N: 258

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

28-APR-92

TEMPERATURE 70 F
TRC HD25870A

RELATIVE HUMIDITY 39 %
572B SN 258 HEAD DROP CAL 70

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	246.20 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.24 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	1.53 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

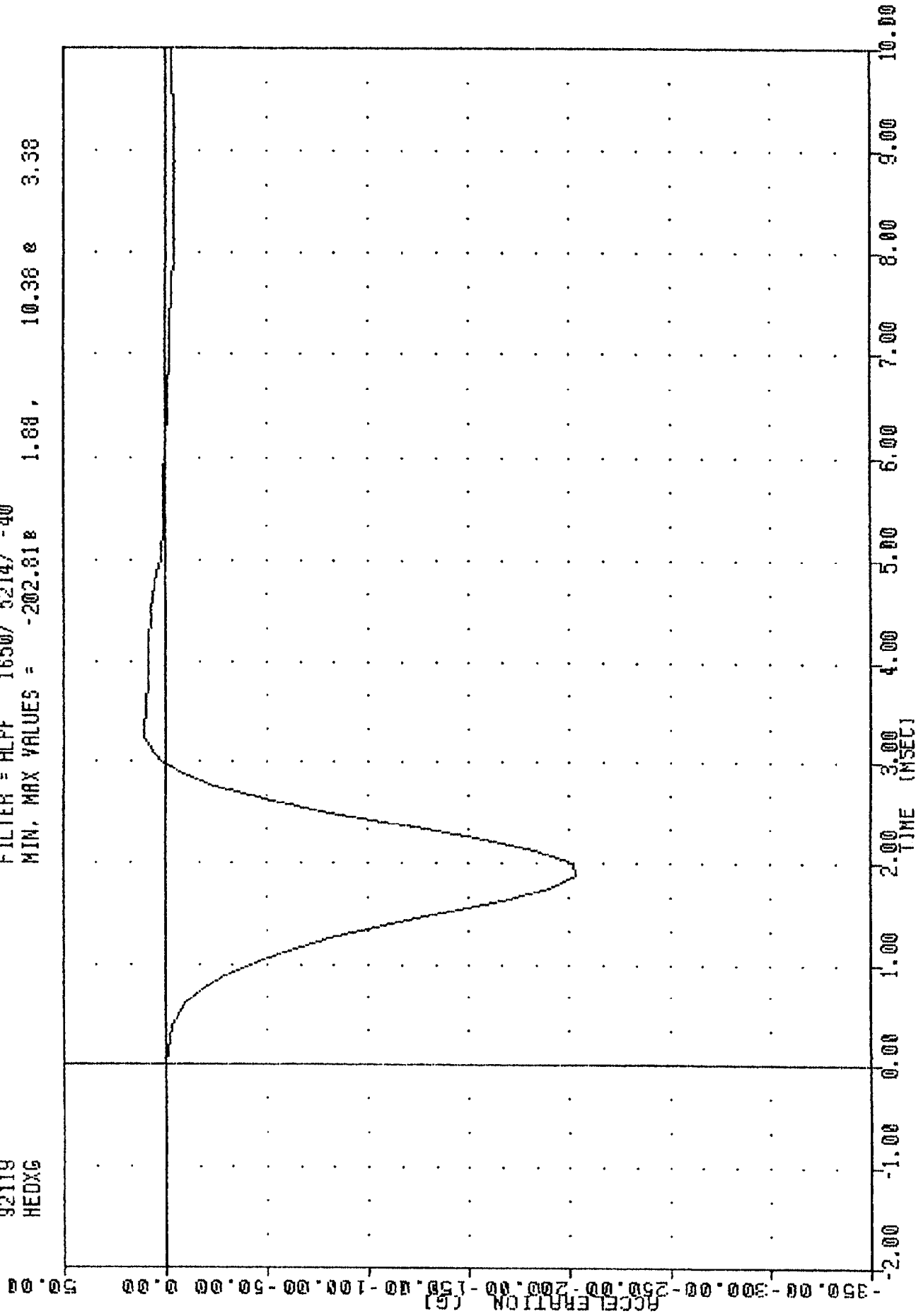
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRC
5728 SN 258 HEAD DROP CAL 70
92119
HEDXG

H025870A

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -202.818 1.88, 10.388 3.58



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

TRC

, H025870A

5728 SN 258 HEAD DROP CAL 70

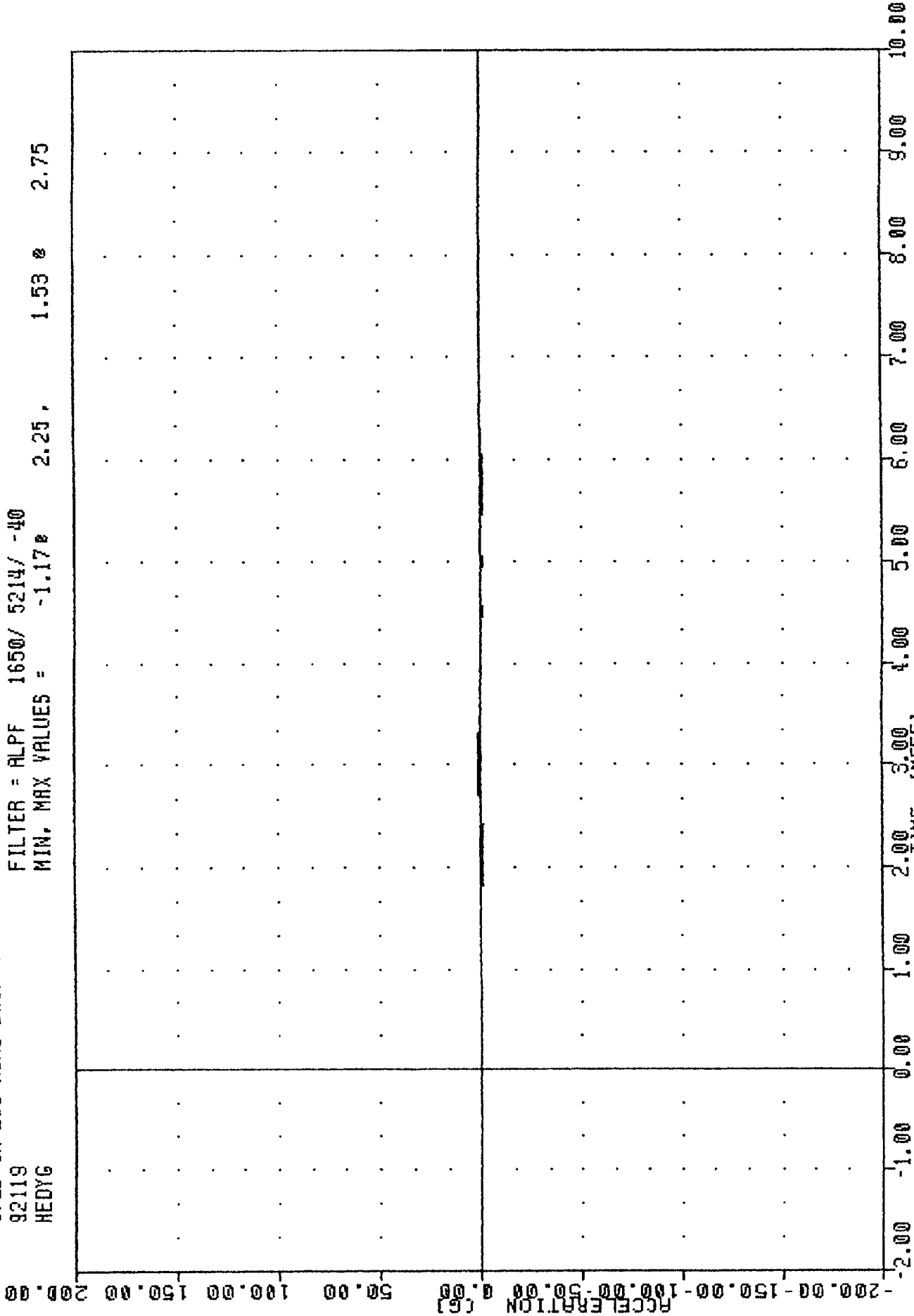
92119

HEDYG

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -1.17 2.25

1.53 2.75

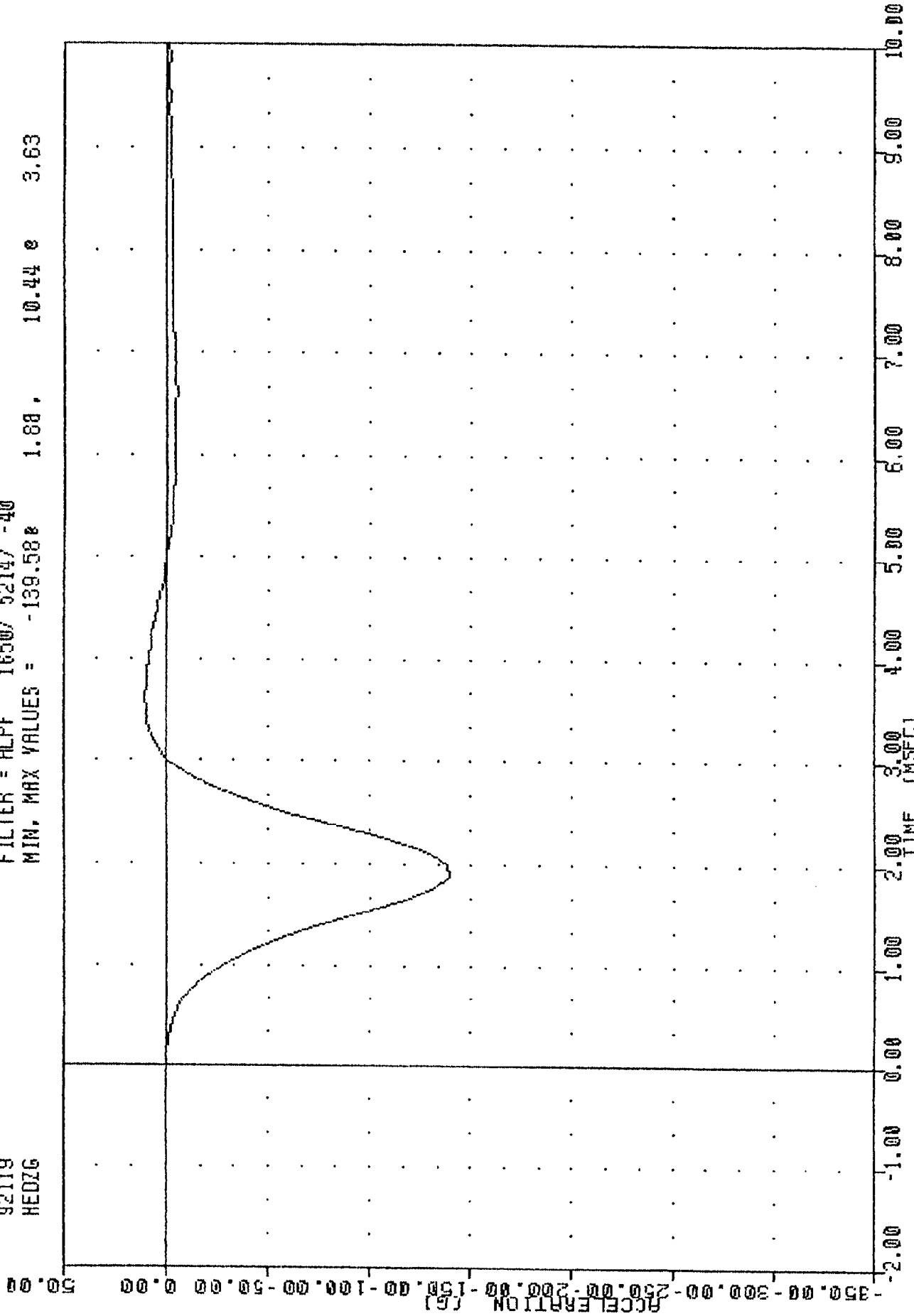


PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION Y AXIS

TRC
5728 SN 258 HEAD DROP CAL 70
92119
HEDZG

, H025870A

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -139.588 1.88, 10.44 e 3.63



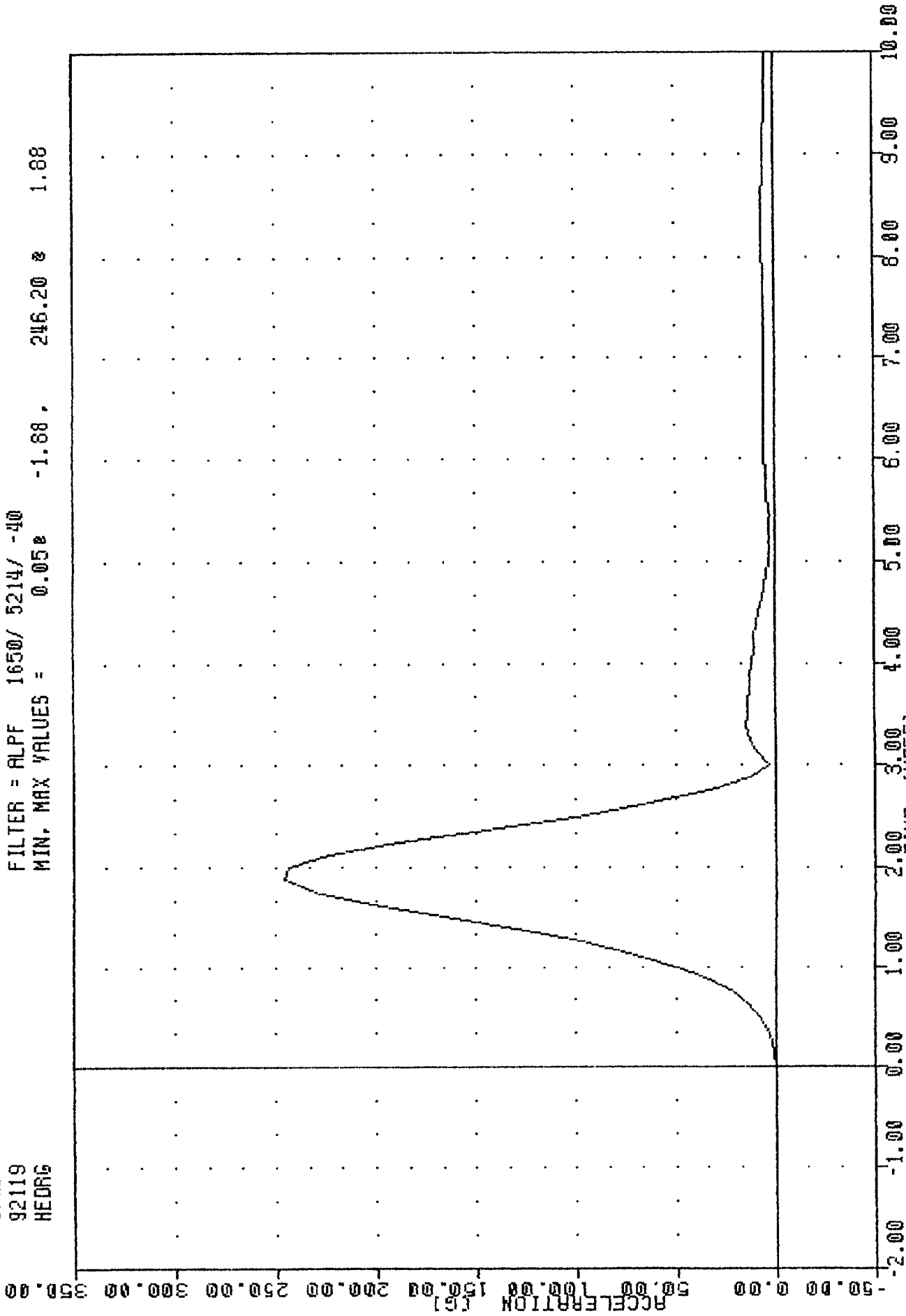
PART 572-B HYBRID II HEAD DROP CALIBRATION

HEAD ACCELERATION Z-AXIS

TRC
5728 SN 258 HEAD DROP CAL 70
92119
HEDRG

, H025870A

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.05e -1.68, 246.20 e 1.68



PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #083

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	CK11H	7264	ENDEVCO	12/19/91	06/19/92
Y-AXIS ACCEL.	CH28H	7264	ENDEVCO	12/19/91	06/19/92
Z-AXIS ACCEL.	CL55H	7264	ENDEVCO	12/19/91	06/19/92
CHEST X-AXIS ACCEL.	CE16H	7264	ENDEVCO	12/19/91	06/19/92
Y-AXIS ACCEL.	CD74H	7264	ENDEVCO	12/19/91	06/19/92
Z-AXIS ACCEL.	CK32H	7264	ENDEVCO	12/19/91	06/19/92
LEFT FEMUR FORCE LOAD CELL	1006	2430	GSE	01/09/92	07/09/92
RIGHT FEMUR FORCE LOAD CELL	1007	2430	GSE	01/09/92	07/09/92
*NECK X-AXIS FORCE LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
Y-AXIS FORCE LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
Z-AXIS FORCE LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
*NECK MOMENT ABOUT X-AXIS LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
MOMENT ABOUT Y-AXIS LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
MOMENT ABOUT Z-AXIS LOAD CELL	104	1716	DENTON	04/15/92	10/15/92
*CHEST DEFLECTION POTENTIOMETER	82369-19	81422A	VERNITECH	11/06/91	05/06/92
LAP BELT FORCE LOAD CELL	236	3419	LEBOW	10/29/91	04/29/92
SHOULDER BELT FORCE LOAD CELL	612	3419	LEBOW	11/20/91	05/20/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	A02465	PT-101-50A	CELESCO	04/27/92	10/27/92
SHOULDER BELT STRETCH POTENTIOMETER	2087	2051414101	BOURNES	04/27/92	10/27/92

*HYBRID III USE ONLY.

DUMMY INSTRUMENT CALIBRATIONS

PASSENGER DUNNY #258

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	A73JT	7264	ENDEVCO	11/22/91	05/22/92
Y-AXIS ACCEL.	A74JT	7264	ENDEVCO	11/22/91	05/22/92
Z-AXIS ACCEL.	A83JJ	7264	ENDEVCO	11/22/91	05/22/92
CHEST X-AXIS ACCEL.	A72JJ	7264	ENDEVCO	11/18/91	05/18/92
Y-AXIS ACCEL.	A51JJ	7264	ENDEVCO	11/19/91	05/19/92
Z-AXIS ACCEL.	A68JJ	7264	ENDEVCO	11/18/91	05/18/92
LEFT FEMUR FORCE LOAD CELL	0125	2121A	DENTON	11/07/91	05/07/92
RIGHT FEMUR FORCE LOAD CELL	0126	2121A	DENTON	11/07/91	05/07/92
*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	610	3419	LEBOW	01/18/92	07/18/92
SHOULDER BELT FORCE LOAD CELL	590	3419	LEBOW	01/18/92	07/18/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	0586135	PT-101-40A	CELESCO	04/27/92	10/27/92
SHOULDER BELT STRETCH POTENTIOMETER	NA	2051414101	BOURNES	04/27/92	10/27/92

*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	CL80H	7264	ENDEVCO	02/06/92	08/06/92
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CT68H	7264	ENDEVCO	03/18/92	09/18/92
ENGINE TOP X-AXIS	CH35H	7264	ENDEVCO	02/06/91	08/06/92
ENGINE BOTTOM X-AXIS	CJ04H	7264	ENDEVCO	03/18/92	09/18/92
RIGHT BRAKE CALIPER X-AXIS	CG67H	7264	ENDEVCO	12/16/91	06/16/92
LEFT BRAKE CALIPER X-AXIS	CC30H	7264	ENDEVCO	01/12/92	07/12/92
INSTRUMENT PANEL CENTER X-AXIS	CF80H	7264	ENDEVCO	12/18/91	06/18/92
REAR SEAT CROSSMEMBER CENTER Z-AXIS	CJ37H	7264	ENDEVCO	01/15/92	07/15/92
VEHICLE REAR CENTER Z-AXIS	CK16H	7264	ENDEVCO	01/12/92	07/12/92

CALIBRATION LABORATORY INSTRUMENTS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
NECK BENDING PENDULUM ACCEL.	CC44	7232	ENDEVCO	04/06/92	10/06/92
NECK BENDING ROTARY POTENTIOMETER	NA	35435-1-102	BOURNES	MFR. SPECIFICATION	
NECK BENDING LINEAR POTENTIOMETER	NA	5184-2051846003	BOURNES	04/06/92	10/06/92
THORAX/HYBRID II FEMUR PEND. ACCEL.	CC64	7232	ENDEVCO	04/06/92	10/06/92
LUMBAR FLEXION FORCE GAUGE	NA	DPPH-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	04/06/92	10/06/92
ABDOMEN COMPRESSION FORCE GAUGE	1261	3167	LEBOW	04/08/92	10/08/92
HYBRID III FEMUR PEND. ACCEL.	CG83	7232	ENDEVCO	04/06/92	10/06/92

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:

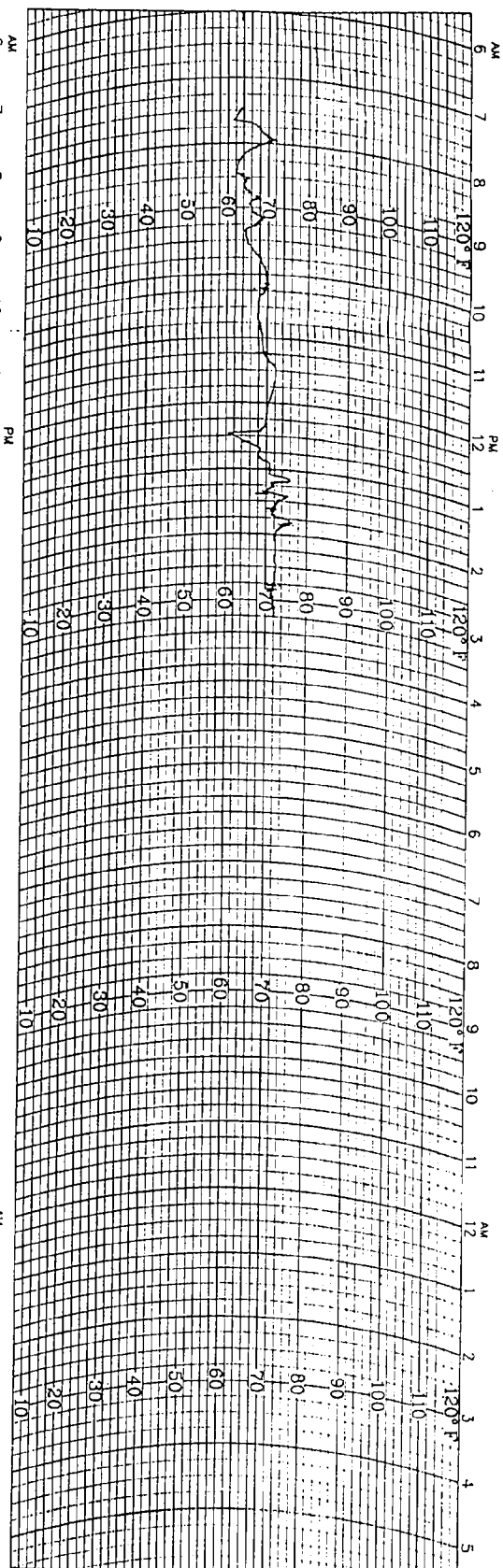
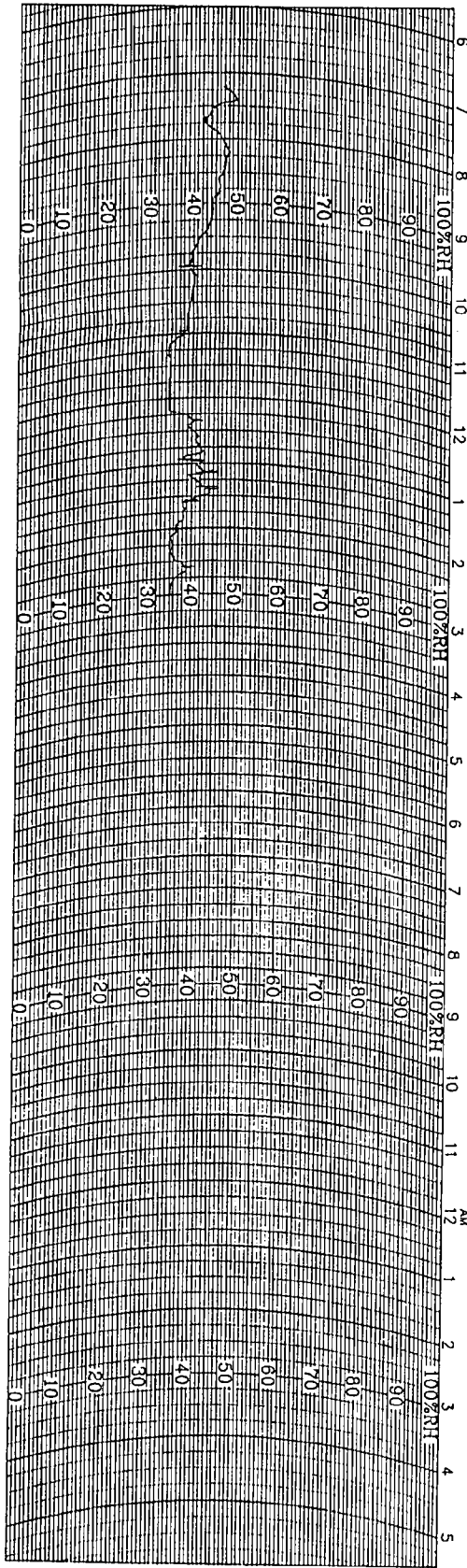
+FEMUR FORCE: TENSION
+SEAT BELT FORCE: TENSION
+BARRIER FORCE: TENSION

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



Weather Measure
WEATHERtronic
 Division of QUALIFITRICS, 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 _____ DATE ON _____ DATE OFF _____

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

APPENDIX E

RESTRAINT SYSTEM INSTRUCTIONS FROM OWNER'S MANUAL



Seats and Safety Belts

Here you'll find information about the seats in your Saturn and how to use your safety belts properly. You can also learn about some things you should not do with safety belts.

SEATS AND SEAT CONTROLS

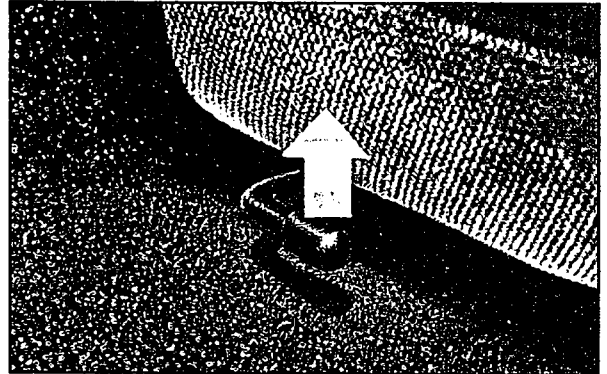
This section tells you about the seats — how to adjust them, and also about reclining front seatbacks, and head restraints.

Manual Seat

CAUTION

You can lose control of the vehicle if you try to adjust a manual driver's seat while the vehicle is moving. The sudden movement could startle and confuse you, or make you push a pedal when you don't want to. Adjust the driver's seat only when the vehicle is not moving.

- Lift the lever under the front seat to unlock it. Slide the seat to where you want it. Then release the lever and try to move the seat with your body, to make sure the seat is locked into place.



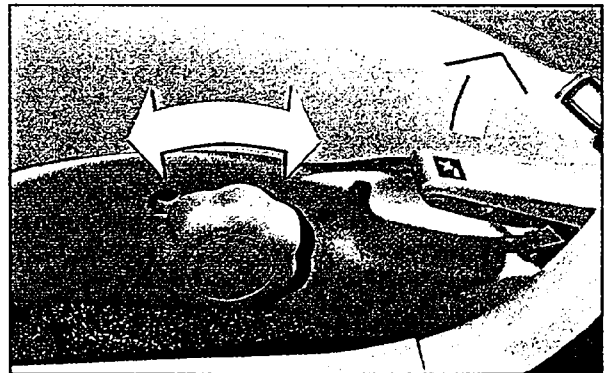
Seat Cushion Adjuster (Option)

Turn the knob to raise or lower your seat cushion.

Reclining Front Seatback(s)

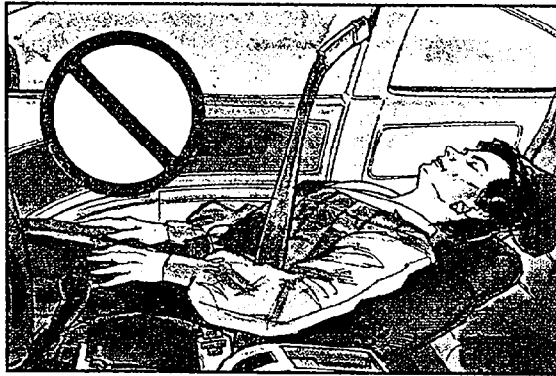
To adjust the seatback, lift the lever on the outer side of the seat. Release the lever to lock the seatback where you want it. Pull up on the lever and the seat will go to its original upright position.

Don't have a seatback reclined when your vehicle is moving.



⚠ CAUTION

Sitting in a reclined position when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined like this.



⚠ CAUTION (Continued)

The shoulder belt can't do its job because it won't be against your body. Instead, it will be in front of you. In a crash you could go into it, receiving neck or other injuries.

The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones. This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

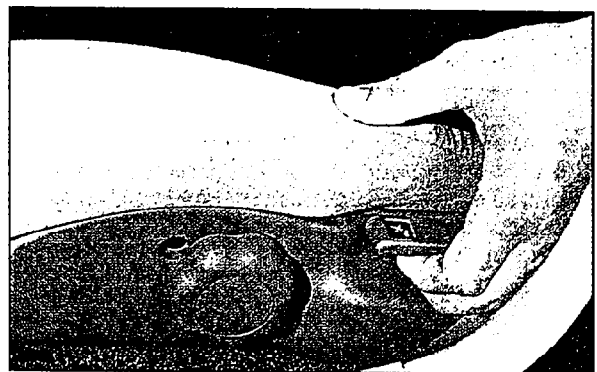
Head Restraints



Slide the head restraint up or down so that the top of the restraint is closest to the top of your ears.

This position reduces the chance of a neck injury in a crash. If you have the optional seating, the head restraints tilt forward and rearward also.

**Driver's Seatback Latch
(Coupe Models Only)**



The driver's seatback folds forward to let people get into the back seat.

To fold the seatback forward, pull this latch and the seatback will fold forward.

To return the seatback to the upright position, just push the seatback rearward.

When you return the seatback to its original position, make sure the seatback is locked.

CAUTION

Always press rearward on the seatback to be sure it is locked. If it isn't, the seatback could move forward in a sudden stop or crash, and that could cause injury to the person sitting there.

Easy Entry Seat (Coupe Models Only)

The right front seat of your vehicle makes it easy to get in and out of the rear seat.

When you pull up on the recliner release lever, the seatback will tilt forward and the whole seat will slide forward.

After someone gets into the rear seat area, move the seat rearward until it locks. Then move the seatback to its original position.

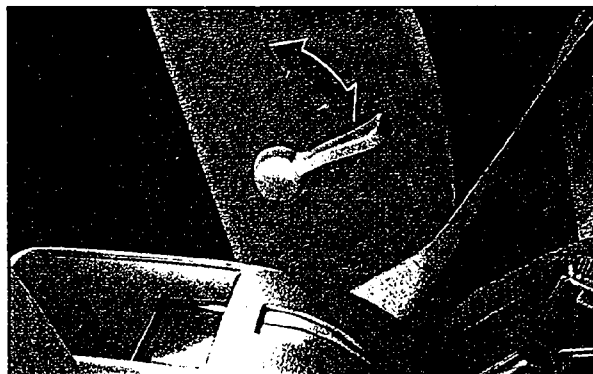
CAUTION

If an easy entry right front seat isn't locked, it could slide forward in a sudden stop or crash. That could cause injury to the person sitting there. After you've used it, be sure to push rearward on an easy entry seat to be sure it is locked.

To get out of the rear seat area, pull up on the recliner release lever. The seatback will tilt forward and the whole seat will slide forward.

Driver's Lumbar Support (Option)

Support of the lower back (lumbar) can be adjusted by moving the lever on the inner side of the seat back. Support is increased by pulling the lever forward and down. The lever has various positions. Vertical gives the least support and horizontal gives maximum support.



Split Fold-Down Rear Seatback

Your Saturn is equipped with split fold-down rear seatbacks. This feature is designed to increase the cargo area of your Saturn. To fold down either section of the rear seatback, pull on the strap on the upper corner of the seatback. This will allow you to fold down the seatback. When you fold the seatback up, be sure the latch engages or it may fold down unintentionally.



⚠ CAUTION

Always press rearward on the seatback to be sure it is locked. If it isn't, the seatback could move forward in a sudden stop or crash, and that could cause injury to the person sitting there.

**SAFETY BELTS:
THEY'RE FOR EVERYONE**

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

⚠ CAUTION

Don't let anyone ride where they can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be *much* worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be injured or killed if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.

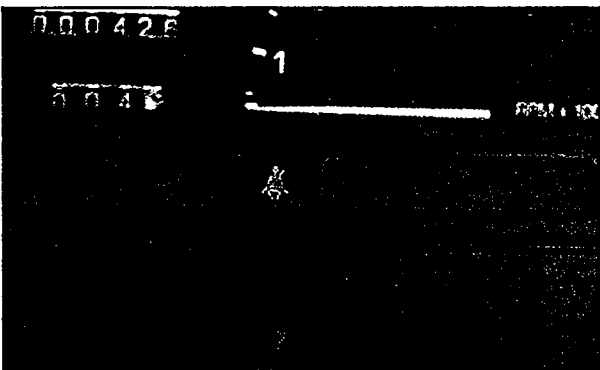


This figure lights up when you turn the key to "Run" or "Start" when your shoulder belt isn't buckled. It's the reminder to buckle up. In many states and Canadian provinces, the law says to wear safety belts. Here's why: They work.

After 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter . . . a lot!



Shoulder Belt Warning Light



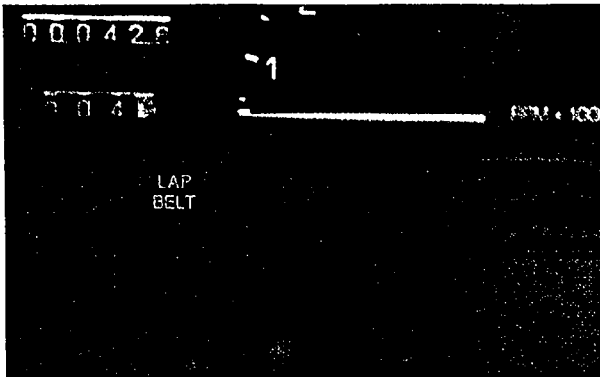
This light might stay on after you start your vehicle. If the light does not turn off when the driver's shoulder belt is buckled, it means that the shoulder belt system may not work properly in a crash. See the Index under "Motorized Shoulder Belt" for what to do.

⚠ CAUTION

If your shoulder belt light stays on after the driver's shoulder belt is buckled, it means that your shoulder belt system might not work properly in a crash. If the light stays on, use the temporary latch plate (to see how, see Index under "Motorized Shoulder Belt") and have your vehicle fixed.

The shoulder belt warning light will come on and stay on until the driver's shoulder belt is buckled.

Lap Belt Warning Light

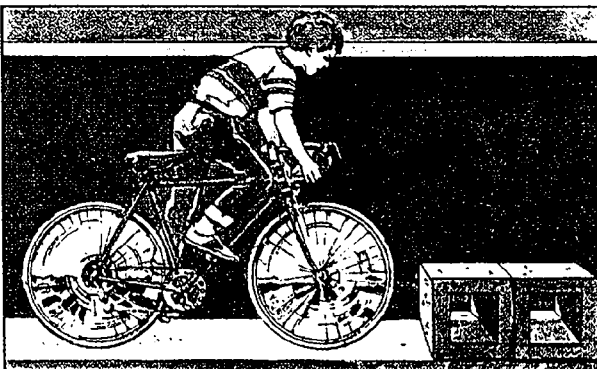


When the key is turned to "Run" or "Start," this light flashes for about ten seconds and then stays on until the driver's lap belt is buckled.

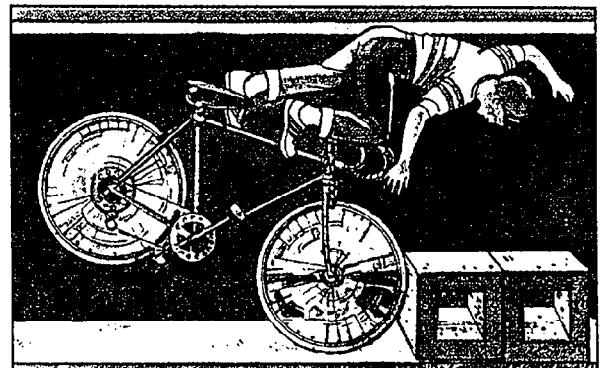
When the key is turned to "Run" or "Start," a tone will come on for about six seconds to remind people to fasten their lap belts, unless the driver's lap belt is buckled.

WHY SAFETY BELTS WORK

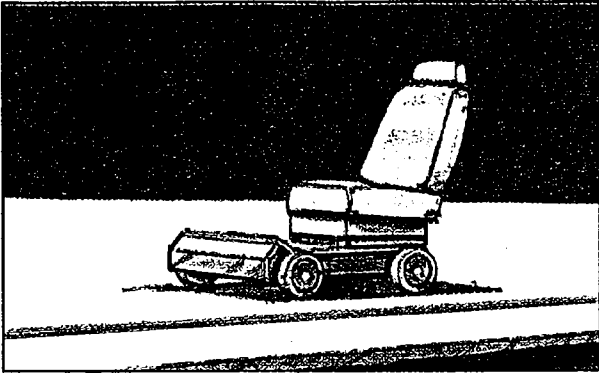
When you ride in or on anything, you go as fast as it goes.



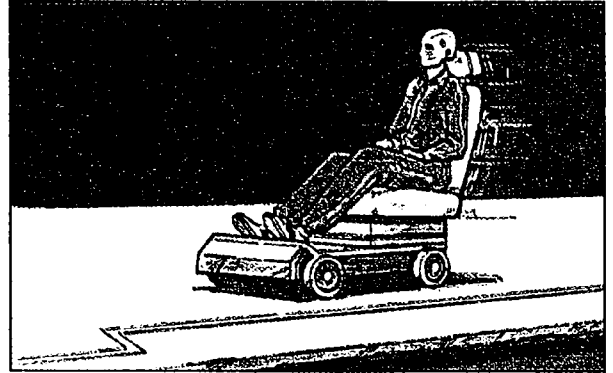
For example, if the bike is going 10 mph (16 km/h), so is the child.



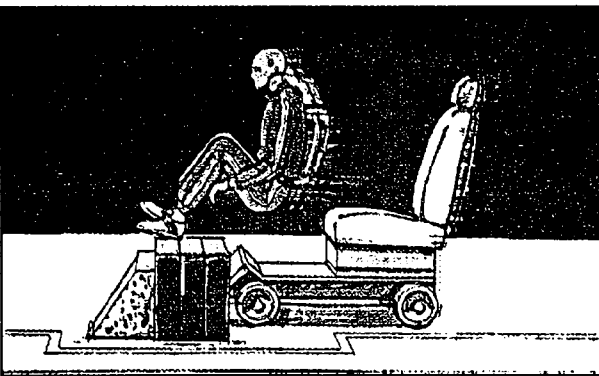
When the bike hits the block, it stops. But the child keeps going!



Take the simplest "car." Suppose it's just a seat on wheels.



Put someone on it.

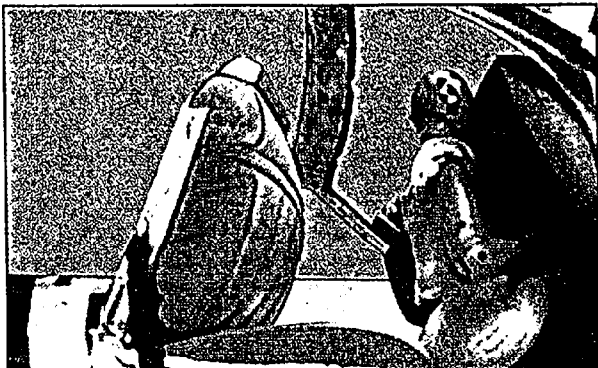


Get it up to speed. Then stop the "car." The rider doesn't stop.

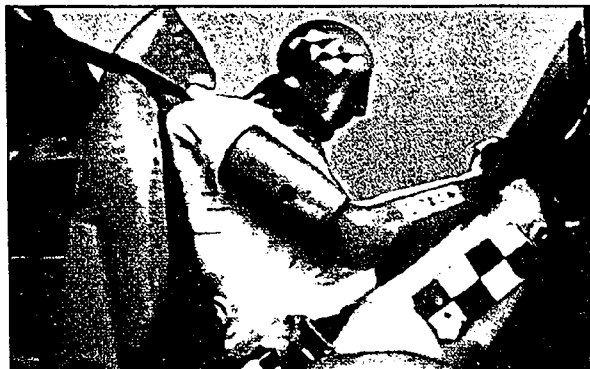


The person keeps going until stopped by something.

In a real vehicle, it could be the windshield ...



or the instrument panel ...



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts — and the Answers

Q: Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?

A: You could be — whether you're wearing a safety belt or not. But you can easily unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you can unbuckle and get out, is much greater if you are belted.

Q: Why don't they just put in air bags so people won't have to wear safety belts?

A: "Air bags," or Supplemental Inflatable Restraint systems, are in some vehicles today and will be in more of them in the future. But they are supplemental systems only — so they work with safety belts, not instead of them. Every "air bag"

system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has "air bags," you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

Q: If I'm a good driver, and I never drive far from home, why should I wear safety belts?

A: You may be an excellent driver, but if you're in an accident — even one that isn't your fault — you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.


Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speed of less than 40 mph (65 km/h).

Safety belts are for everyone.

HOW TO WEAR SAFETY BELTS PROPERLY

Adults

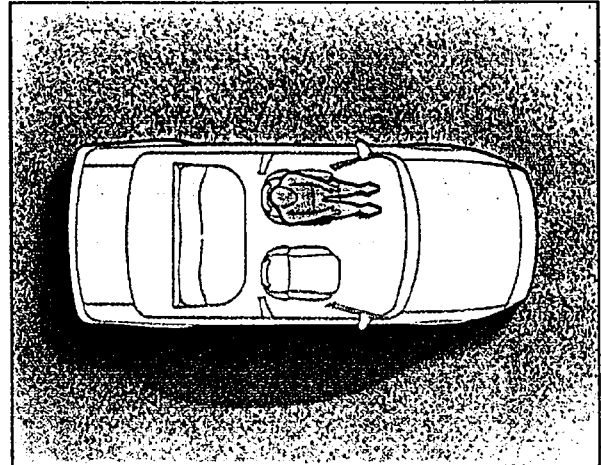
This section is for people of adult size only. If a child will be riding in your Saturn, see the section after this one, called "Children."

 CAUTION
<p>There are special things to know about safety belts and children. And there are different rules for babies, toddlers, and older children. Follow these rules for everyone's protection.</p>

First, you'll want to know which restraint systems your vehicle has. We'll start with the driver position.

Driver Position

This section describes the driver's restraint system.



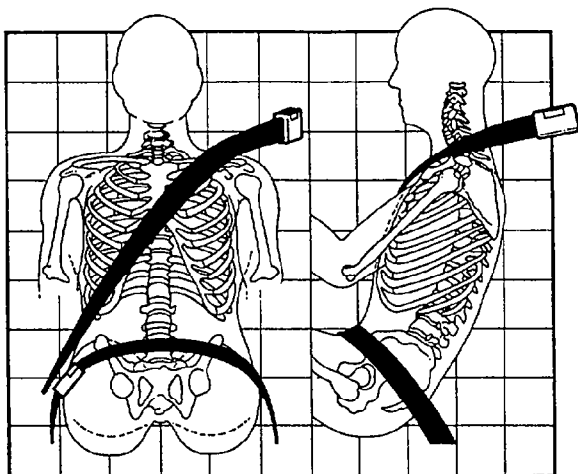
Motorized Shoulder Belt and Manual Lap Belt



This shoulder belt is motorized. You don't have to buckle up the shoulder belt when you get into your car.



And you don't have to unbuckle the shoulder belt when you get out.



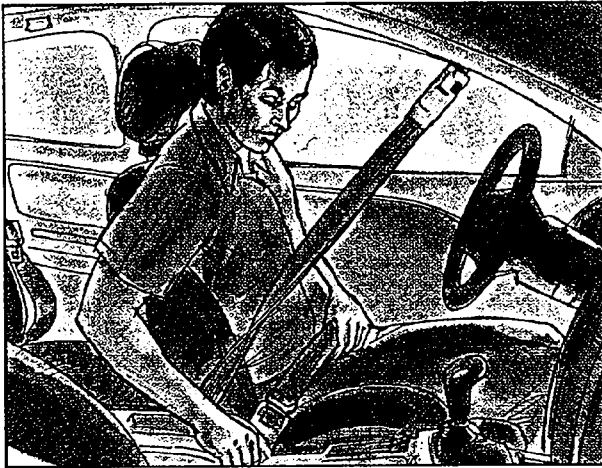
The shoulder belt moves automatically when you get in or out of your car. Be careful that your head or hair is not in the way of the shoulder belt or hook when it is moving along the track.

The lap belt is not motorized. You must buckle the lap belt yourself when you get into the car. The motorized shoulder belt and the manual lap belt should always be worn together. Here's how to wear them properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see Index under "Seats") so you can sit up straight.



3. Pick up the latch plate and, in a single motion, pull the lap belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks. If the belt stops before it reaches the buckle, let it go back all the way and start again.



5. Feed the lap belt back into the retractor to tighten it.

⚠ CAUTION

If you aren't wearing your lap belt properly, you will increase your chance of severe or fatal injury in an accident. The shoulder belt alone may not properly restrain you. Always fasten your lap belt in addition to using the motorized shoulder belt.

The lap belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The shoulder belt locks only if there's a sudden stop or a crash. The lap belt remains locked at all times.

You should always keep your motorized shoulder belt buckled. However, you may need to unbuckle it in an emergency.

To unbuckle the motorized shoulder belt, just push the button on the buckle.

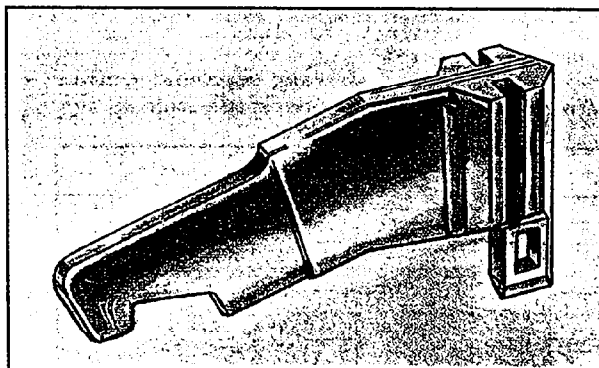


To reattach the motorized shoulder belt:

1. Close and lock the door.
2. Adjust the seat (to see how, see Index under "Seats") so you can sit up straight.

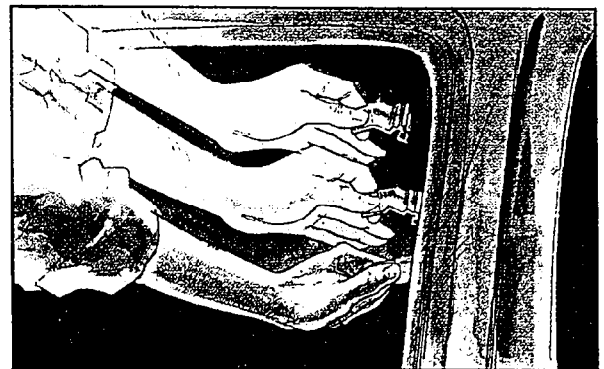


3. Pick up the buckle and pull the shoulder belt across you.
4. Push the buckle onto the latch plate until it clicks.



If the motorized shoulder belt doesn't move into position properly, you can still use the shoulder belt. You should have a temporary latch plate in the glove box of your vehicle.

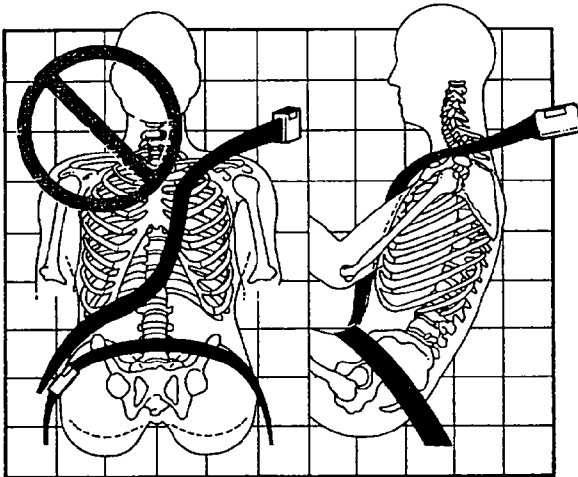
Place the plate into the end of the belt track on the lock pillar. Push it down until you hear a click. Then try to pull it up to make sure it is secure.



Then, release the shoulder belt and fasten it to the plate. Follow the instructions earlier in this section for unbuckling and reattaching the motorized shoulder belt.

You can now use the shoulder belt, but have the motorized system serviced by your Saturn retailer as soon as possible.

Q: What's wrong with this?

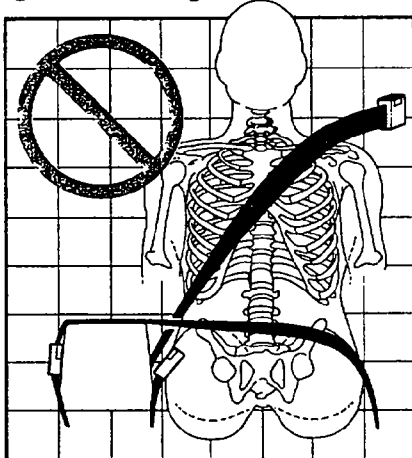


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

⚠ CAUTION

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could significantly increase injury. The shoulder belt should fit against your body.

Q: What's wrong with this?



A: The lap belt is buckled in the wrong place.

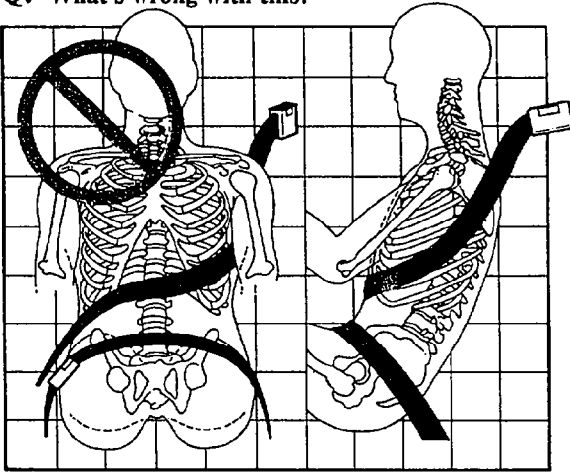
⚠ CAUTION

You can be seriously hurt if your lap belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

To unlatch the lap belt, just push the button on the buckle. The lap belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

Q: What's wrong with this?

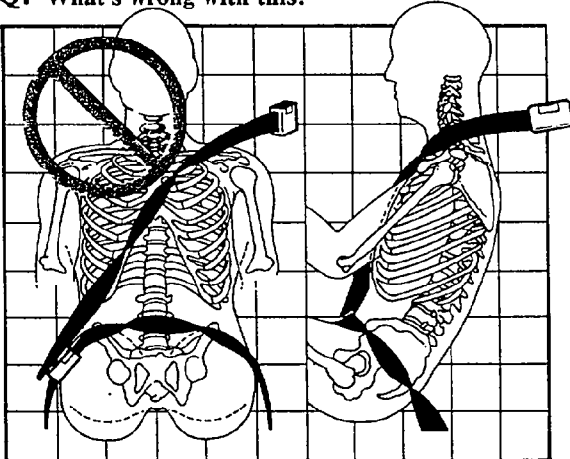


⚠ CAUTION

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

Q: What's wrong with this?



⚠ CAUTION

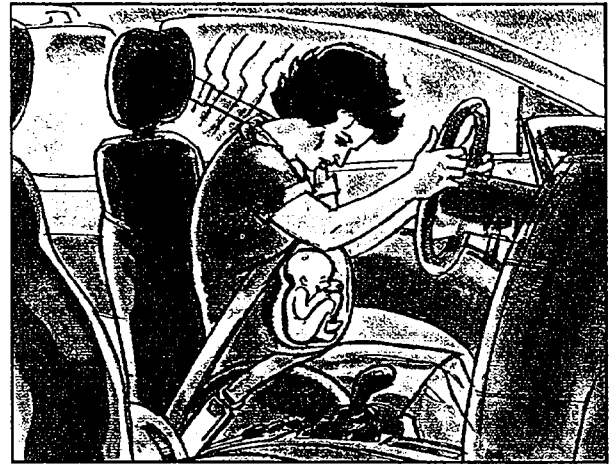
You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to take impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

A: The belt is twisted across the body.

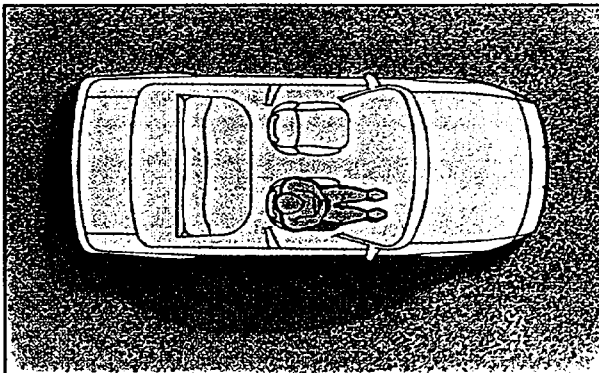
Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts. A pregnant woman should wear a lap-shoulder belt if at all possible. The lap portion should be worn as low as possible throughout the pregnancy.

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.



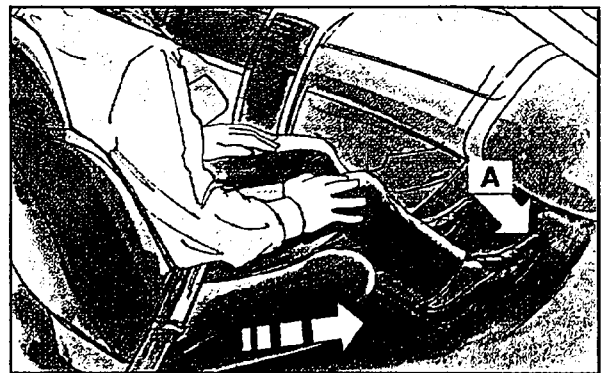
Right Front Passenger Position



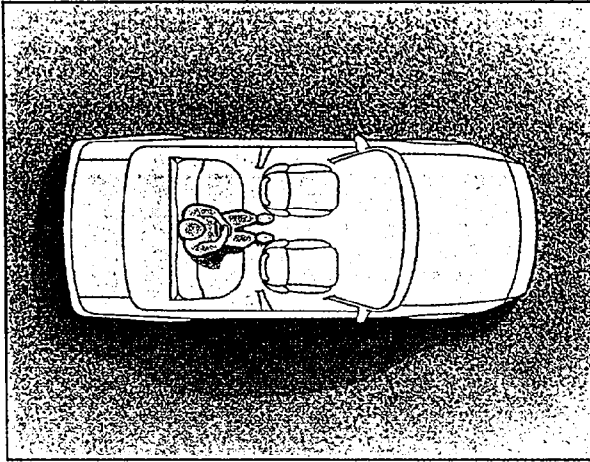
The right front passenger's safety belts work the same way as the driver's safety belts. See "Driver Position," earlier in this section.

When the lap belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

Adjust the seat (to see how, see Index under "Seats") so you can sit up straight. Move your seat far enough forward that your feet touch the part of the car that is called the "toeboard" (A). That way you'd be less likely to slide under the lap belt in a crash.



Center Passenger Position



If your vehicle has a rear bench seat, someone can sit in the center position.



In the center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.

To make the belt shorter, pull its free end as shown until the belt is snug.



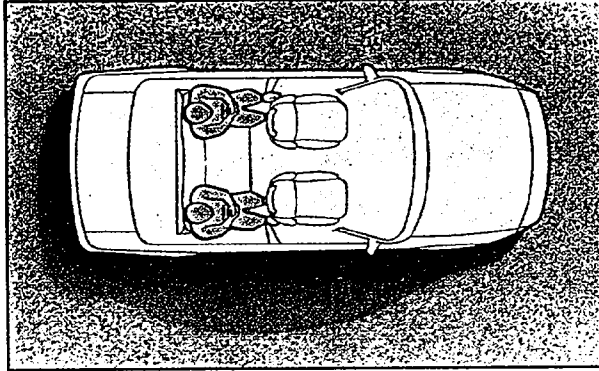
Buckle, position and release it the same way as a front seat lap belt. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.

Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

Outside Positions



The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.

1. Pick up the latch plate and pull it across you. Don't let it get twisted.

2. Push the latch plate into the buckle until it clicks. If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.



3. Pull up on the shoulder belt to tighten the lap belt.

The lap part of the belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces. The safety belt locks only if there's a sudden stop or a crash.

⚠ CAUTION

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.



4. To unlatch the belt, just push the button on the buckle.

CHILDREN



Everyone in a vehicle needs protection! That includes infants and all children smaller than adult size. In fact, the law in every state and Canadian province says children up to some age must be restrained while in a vehicle.

Smaller Children and Babies

⚠ CAUTION

Smaller children and babies should always be restrained in a child or infant restraint. The instructions for the restraint will say whether it is the right type and size for your child. A very young child's hip bones are so small that a regular belt can't stay low on the hips, as it should. Instead, the belt will likely be over the child's abdomen. In a crash the belt would apply force right on the child's abdomen, which could cause serious or fatal injuries. So, be sure that any child small enough for one is always properly restrained in a child or infant restraint.

⚠ CAUTION

Never hold a baby in your arms while riding in a vehicle. A baby doesn't weigh much — until a crash. During a crash a baby will become so heavy you can't hold it. For example, in a crash at only 25 mph (40 km/h), a 12-pound (5.5 kg) baby will suddenly become a 240-pound (110 kg) force on your arms. The baby would be almost impossible to hold.

⚠ CAUTION (Continued)



⚠ CAUTION (Continued)

Secure the baby in an infant restraint.



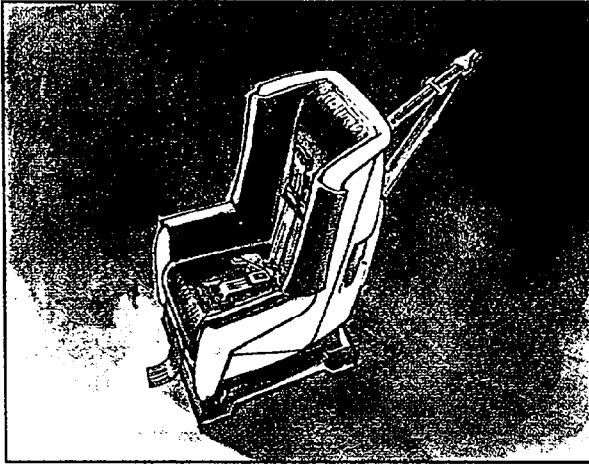
CHILD RESTRAINTS

Be sure to follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. The instructions that come with the infant or child restraint will show you how to do that.

Where to Put the Restraint

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. We at Saturn therefore recommend that you put your child restraint in the rear seat unless the child is an infant and you're the only adult in the vehicle. In that case, you might want to secure the restraint in the front seat where you can keep an eye on the baby. Wherever you install it, be sure to secure the child restraint properly.

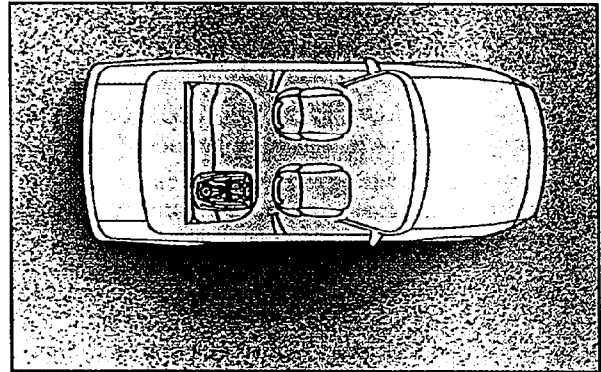
Top Strap



If your child restraint has a top strap, it should be anchored.

If you need to have an anchor installed, you can ask your Saturn retailer to put it in for you. If you want to install an anchor yourself, your retailer can tell you how to do it.

Securing a Child Restraint in a Rear Outside Position

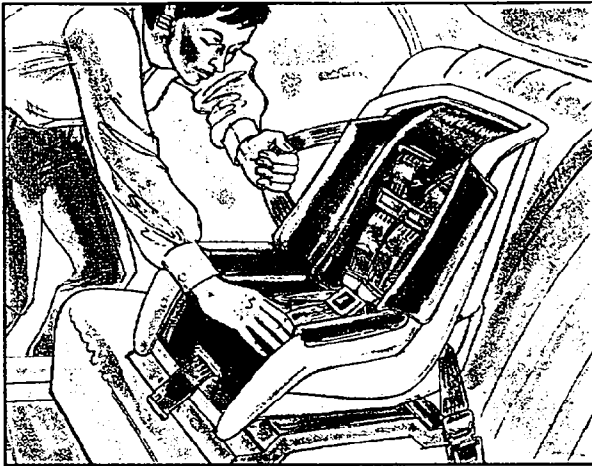


You'll be using the lap-shoulder belt. See the earlier section about the top strap if the child restraint has one.

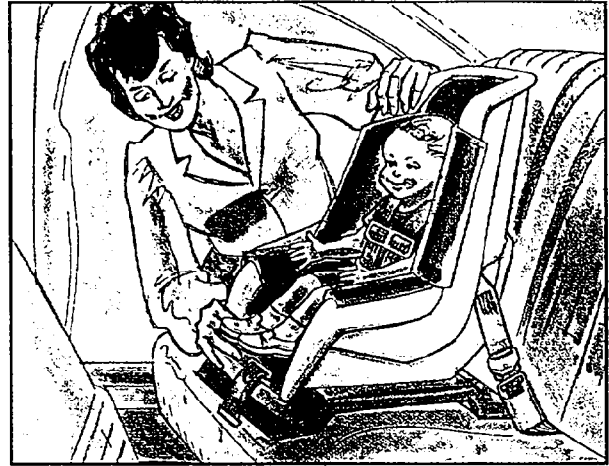
1. Put the restraint on the seat. Follow the instructions for the child restraint.
2. Secure the child in the child restraint as the instructions say.
3. Pull out the vehicle's safety belt and run the lap part through or around the restraint. The child restraint instructions will show you how.
4. Tilt the latch plate to adjust the belt if needed. See if the shoulder belt would go in front of the child's face or neck. If so, put it behind the child restraint.



5. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.



6. To tighten the belt, pull up on the shoulder belt while you push down on the child restraint.



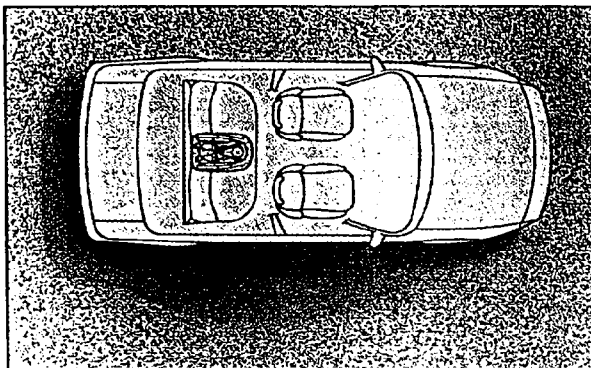
7. Push and pull the child restraint in different directions to be sure it is secure.

⚠ CAUTION

An unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

Securing a Child Restraint in the Center Rear Seat Position



When you secure a child restraint in a center seating position, you'll be using the lap belt.

See the earlier section about the top strap if the child restraint has one.

1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.



2. Put the restraint on the seat. Follow the instructions for the child restraint.



3. Secure the child in the child restraint as the instructions say.
4. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.
5. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.

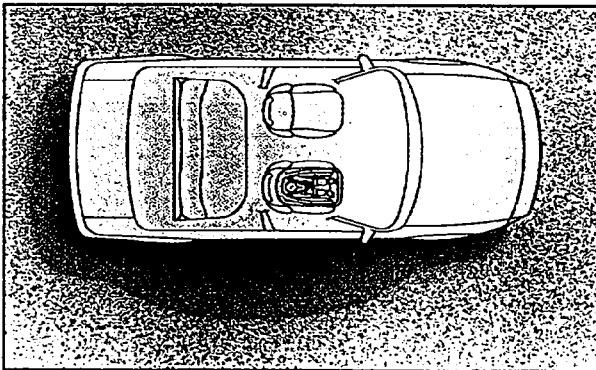
6. To tighten the belt, pull its free end while you push down on the child restraint.
7. Push and pull the child restraint in different directions to be sure it is secure. If the child restraint isn't secure, turn the latch plate over and buckle it again. Then see if it is secure. If it isn't, secure the restraint in a different place in the vehicle and contact the child restraint maker for their advice.

⚠ CAUTION

An unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.

Securing a Child Restraint in the Right Front Seat



You'll be using the manual lap belt. See the earlier section about the top strap if the child restraint has one.

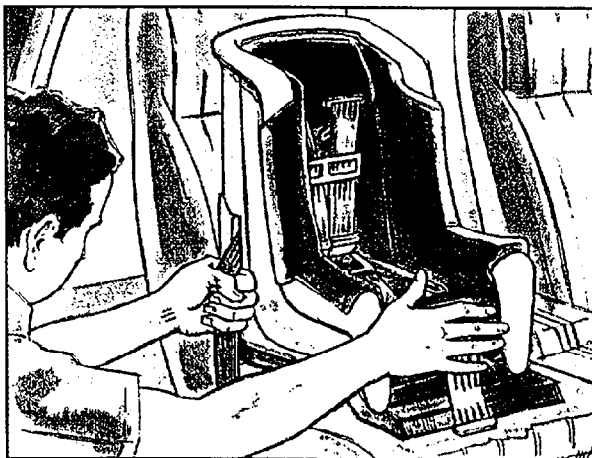


1. Disconnect the shoulder belt using the emergency release at the upper end of the shoulder belt.

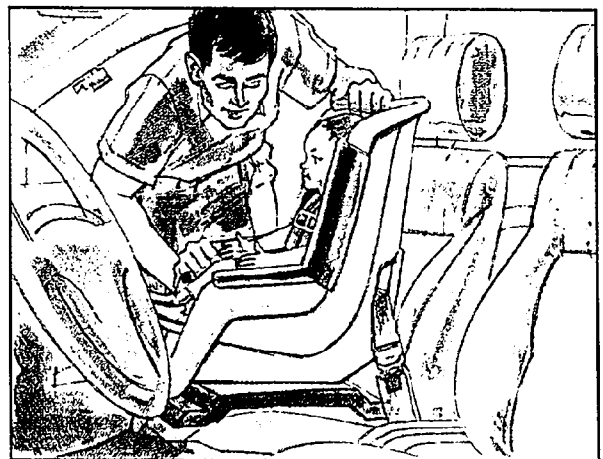


2. Put the restraint on the seat. Follow the instructions for the child restraint.
3. Secure the child in the child restraint as the instructions say.
4. Pull out the vehicle's lap belt and run it through or around the restraint. The child restraint instructions will show you how.
5. Buckle the belt.

6. To tighten the belt, feed it back into the retractor while you push down on the child restraint.



7. Push and pull the child restraint in different directions to be sure it is secure.



⚠ CAUTION

An unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

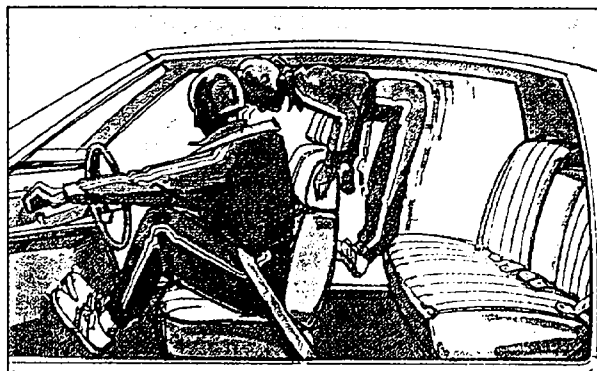
To remove the child restraint, unbuckle the vehicle's safety belt and let it go back all the way.

Remember to reattach the shoulder belt once the child restraint is removed. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

Larger Children



Children who have outgrown child restraints should wear the vehicle's safety belts. If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide. Accident statistics show that children are safer if they are restrained in the rear seat. But they need to use the safety belts properly.



Children who aren't buckled up can strike other people who are.

⚠ CAUTION

Never do this.



⚠ CAUTION (Continued)

Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

Q: What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

A: Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide. If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in a seat that has a lap belt, if your vehicle has one.

⚠ CAUTION

Never do this.



⚠ CAUTION (Continued)

Here is a child sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low, snug below the hips, and just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

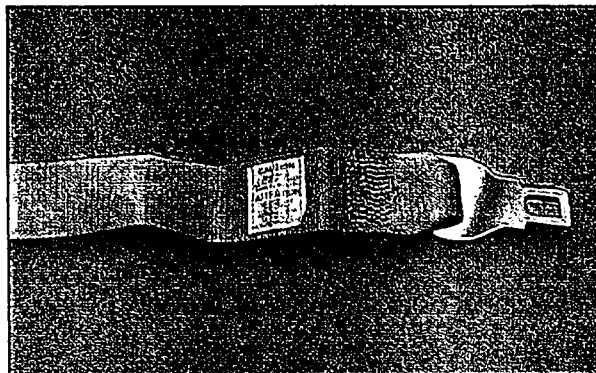
CHECKING YOUR RESTRAINT SYSTEMS

Now and then, make sure all your belts, buckles, latch plates, retractors, anchorages and warning systems are working properly. Look for any loose parts or damage. If you see anything that might keep a restraint system from doing its job, have it repaired.

REPLACING SAFETY BELTS AFTER A CRASH

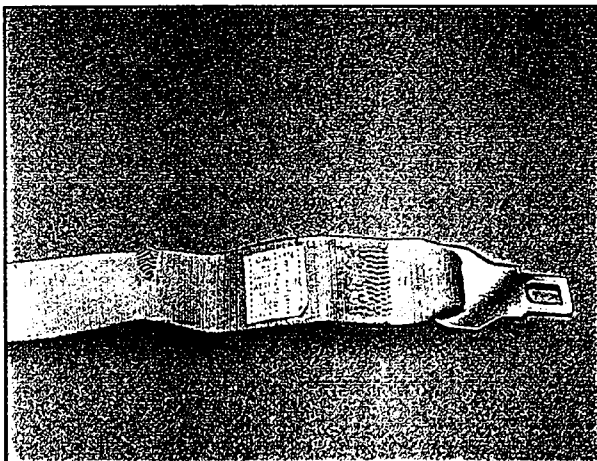
If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new belts. If you ever see a label on a safety belt that says to replace the belt, be sure to do so. Then it will be there to help protect you in an accident. You would see this label on the belt near the latch plate.



If belts are cut or damaged, replace them. Collision damage also may mean you will have to have safety belt parts, like the retractor, replaced or anchorage locations repaired — even if the belt wasn't being used at the time of the collision. If your seat adjuster won't work after a crash, the special part of the safety belt that goes through the seat to the adjuster may need to be replaced.

Q: What's wrong with this?



A: The belt is torn.

⚠ CAUTION

Torn or frayed belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.