

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

SATURN CORPORATION
1991 SATURN SL2
4-DOOR SEDAN
NHTSA NO. MM0106
TRC TEST NO. 910313

PREPARED BY:
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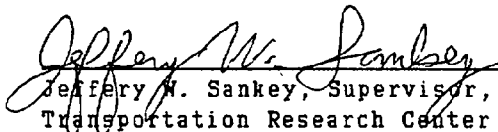
APRIL 5, 1991

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
ROOM NO. 5313 (NRM-22)
400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-90-D-22121. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

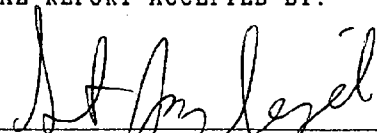
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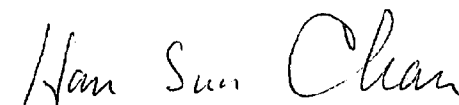
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1. Report No. TRC-90-N07	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle NEW CAR ASSESSMENT PROGRAM (NCAP), FRONTAL BARRIER IMPACT TEST OF A 1991 SATURN SL2 4-DOOR SEDAN, NHTSA NO. MM0106		5. Report Date APRIL 5, 1991	
		6. Performing Organization Code	
		8. Performing Organization Report No. TRC-90-N07	
7. Author(s) J.W. Sankey, Supervisor, Laboratory Engineering, TRC		10. Work Unit No. (TRAIS)	
9. Performing Organization Name and Address Transportation Research Center of Ohio 10820 State Route 347 East Liberty, Ohio 43319		11. Contract or Grant No. DTNH22-90-D-22121	
		13. Type of Report and Period Covered FINAL REPORT MARCH-APRIL 1991	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Market Incentives, Room No. 5313, (NRM-22) 400 Seventh St., S.W., Washington, DC 20590		14. Sponsoring Agency Code NRM-22	
15. Supplementary Notes			
16. Abstract A 35 mph frontal load cell barrier impact test was conducted on a 1991 Saturn SL2 4-door sedan, NHTSA No. MM0106, at the Transportation Research Center of Ohio on March 13, 1991. 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 22.2 inches. The ambient temperature was 69° F. The driver's head injury criteria (HIC) was 918. The driver's maximum chest deceleration over three (3) milliseconds was 44.4 g. The driver's chest displacement was 2.8 inches. The driver's maximum left and right femur forces were 1009 pounds and 1326 pounds, respectively. The passenger's head injury criteria (HIC) was 1018. The passenger's maximum chest deceleration over three (3) milliseconds was 46.0 g. The passenger's chest displacement was 1.7 inches. The passenger's maximum left and right femur forces were 1178 pounds and 974 pounds, respectively			
17. Key Words 35 mph Frontal Barrier Impact Test: New Car Assessment Program (NCAP) FMVSS 208, "Occupant Crash Protection"		18. Distribution Statement Copies of this report are available from Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Wash. D.C. 20590	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 276	22. Price

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
acres	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in ³	cubic inches	16	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions from Metric Measures

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

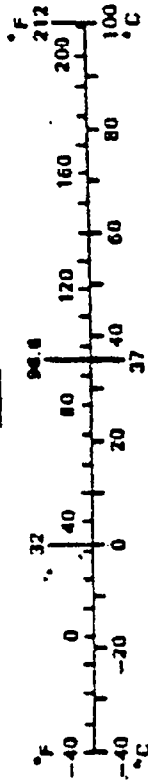


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SECTION 4.0

PURPOSE AND TEST PROCEDURE

PURPOSE

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

The purpose of this test was to obtain new car assessment and research data for vehicle crashworthiness and occupant restraint system performance for the subject vehicle, a 1991 Saturn SL2 4-door sedan, NHTSA No. MM0106, at an impact speed in excess of the current 30 mph FMVSS 208 requirements.

TEST PROCEDURE

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

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

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions 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. Each dummy's instrumentation also included a chest potentiometer to measure longitudinal displacement and a six-axis neck load cell to measure longitudinal, lateral and vertical forces and moments.

The eighty-three (83) 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 vehicle, occupant, and camera 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 March 13, 1991.

The test vehicle, a 1991 Saturn SL2 4-door sedan, NHTSA No. MM0106, was equipped with a 1.9 liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 2901 pounds. The vehicle's impact speed was 35.0 mph. The vehicle sustained 22.2 inches of static crush during the impact.

The driver's head injury criteria (HIC) was 918. The driver's maximum chest resultant acceleration over three (3) milliseconds was 44.4 g. The driver's chest displacement was 2.8 inches. The driver's maximum left and right femur forces were 1009 pounds and 1326 pounds, respectively.

The passenger's HIC was 1018. The passenger's maximum chest resultant acceleration over three (3) milliseconds was 46.0 g. The passenger's chest displacement was 1.7 inches. The passenger's maximum left and right femur forces were 1178 pounds and 974 pounds, respectively.

No fluid spilled from the vehicle's fuel system following the crash test event.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: MM0106 TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 03/13/91 TEST TIME: 1559 AMBIENT TEMP. (°F): 69

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991/Saturn/SL2/4-door sedan

VEHICLE TEST WEIGHT (LBS): 2901*

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 22.2

AVERAGE REBOUND (IN): 45.6

DUMMIES:	Driver #142	Passenger #192
TYPE:	Part 572 E	Part 572 E
LOCATION:	Left front	Right front
RESTRAINT:	2-point passive belt & manual lap belt	2-point passive belt & manual lap belt

NUMBER OF DATA CHANNELS: 83

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: 1G8ZK5472MZ106662

BODY STYLE: 4-door sedan

MODEL YEAR: 1991

NHTSA NO.: MM0106

COLOR: Blue

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

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

DATE VEHICLE RECEIVED: 02/05/91

ODOMETER READING: 59.0

DEALER'S NAME AND ADDRESS: Saturn/North, Inc.
8600 North High Street
Worthington, OH 43085

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	Yes
POWER WINDOWS	No	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: 01/91

VIN: 1G8ZK5472MZ106662

GVWR: 3376 LBS

GAWR: FRONT: 1766 LBS., REAR: 1610 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: 35 PSI
REAR: 35 PSI

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

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 67.5 INCHES

WHEELBASE: 102.0 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on 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 25.9; RF 26.2; LR 26.8; RR 26.8

PRE-TEST ATTITUDE: LF 25.5; RF 25.8; LR 24.6; RR 25.0

POST-TEST ATTITUDE: LF 24.6; RF 22.8; LR 23.8; RR 24.6

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	744 LBS.	RIGHT REAR	471 LBS.
LEFT FRONT	764 LBS.	LEFT REAR	474 LBS.
TOTAL FRONT WEIGHT	1508 LBS.	(61.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	945 LBS.	(38.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2453 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2453 LBS)

VCW = VEHICLE CAPACITY WEIGHT (864 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

$RCLW* = VCW - 150 (DSC) = 864 - 150(5) = 114$

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

TARGET TEST WEIGHT = 2453 + 114 + 334

TARGET TEST WEIGHT = 2901 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 114 LBS. OF CARGO WEIGHT:

RIGHT FRONT	801 LBS.	RIGHT REAR	615 LBS.
LEFT FRONT	831 LBS.	LEFT REAR	654 LBS.
TOTAL FRONT WEIGHT	1632 LBS.	(56.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1269 LBS.	(43.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2901 LBS.	(0.0% UNDER TARGET TEST WEIGHT)	

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

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Rear bumper, trunk lid, rear door glass, rear door interior trim, onboard roof lights

CG = 44.6 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: 910313 NHTSA NO.: MM0106
TEST DATE: 03/13/91 TEST TIME: 1559
TEST TYPE: Frontal load cell barrier IMPACT ANGLE: 0°
AMBIENT TEMPERATURE AT IMPACT AREA: 69° F
TEMPERATURE IN OCCUPANT COMPARTMENT: 68° 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 171.0; C 176.8; R 171.1
POST-TEST: L 155.1; C 154.9; R 151.5
TOTAL CRUSH: L 15.9; C 21.9; R 19.6
AVERAGE CRUSH: 19.1

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 45.1; C 44.4; R 47.4; AVG. 45.6

TABLE 4 FUEL SYSTEM DATA

MAKE/MODEL: Saturn/SL2

NHTSA NO.: MM0106

FUEL SYSTEM CAPACITY: 13.5 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

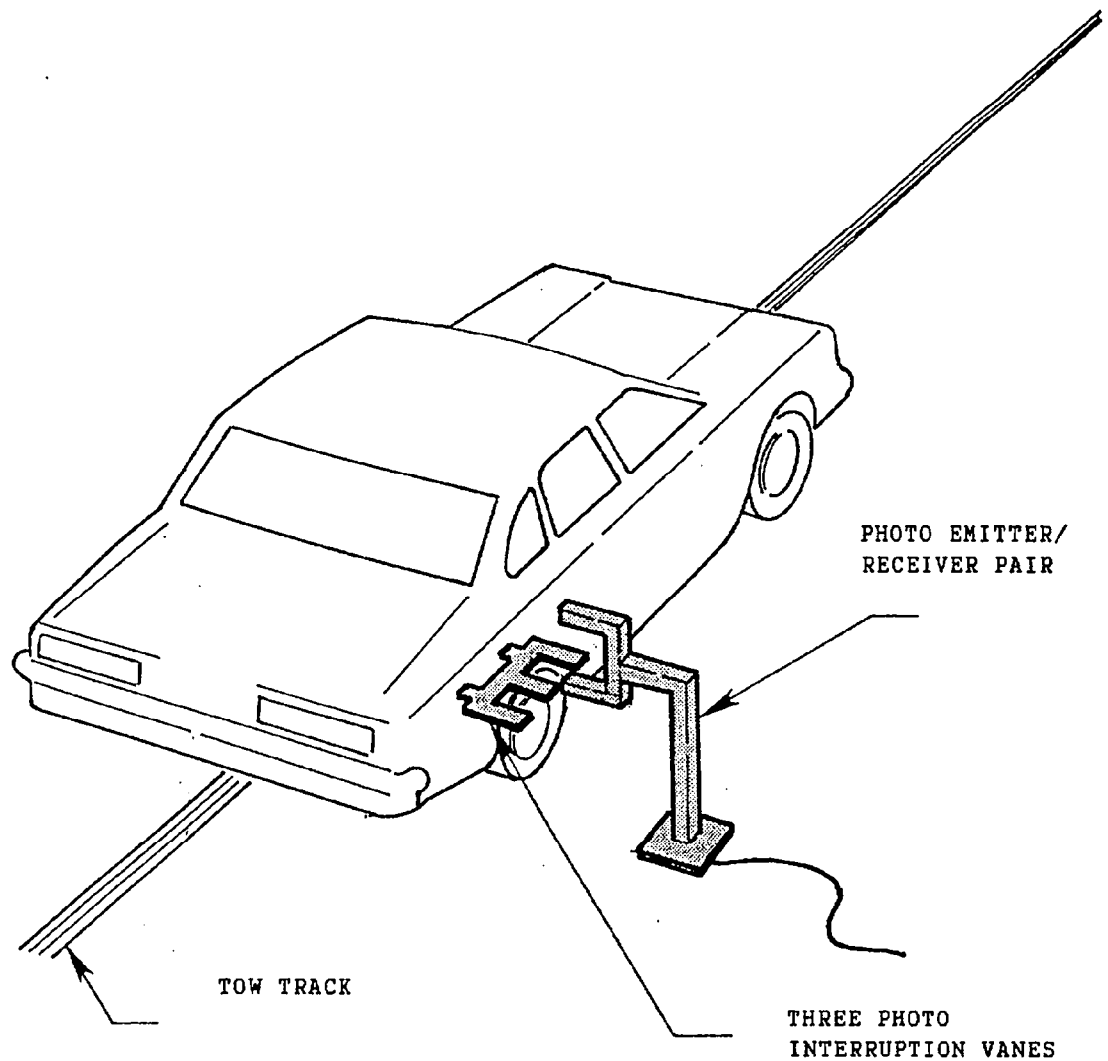
DETAILS OF FUEL SYSTEM: The fuel tank was located in front of the rear
axle. The fuel filler neck was located on the left side and entered the
rear of the fuel tank. The fuel lines ran along the left side to the
front.

ELECTRIC FUEL PUMP: No

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.: MM0106; VIN: 1G8ZK5472MZ106662

MODEL YEAR: 1991; BUILD DATE: 01/91; TEST DATE: 03/13/91

VEHICLE SIZE CATEGORY: Compact; TEST WEIGHT: 2901 LBS.

VEHICLE WHEELBASE: 102.0 INCHES

MAXIMUM WIDTH: 67.5 INCHES

FRONT OVERHANG: 39.8 INCHES

COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
MEASUREMENTS:

C1 =	<u>15.9</u>	INCHES
C2 =	<u>19.6</u>	INCHES
C3 =	<u>21.9</u>	INCHES
C4 =	<u>22.2</u>	INCHES
C5 =	<u>21.0</u>	INCHES
C6 =	<u>19.6</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

LENGTH OF DAMAGED
REGION: L = 47.5 INCHES

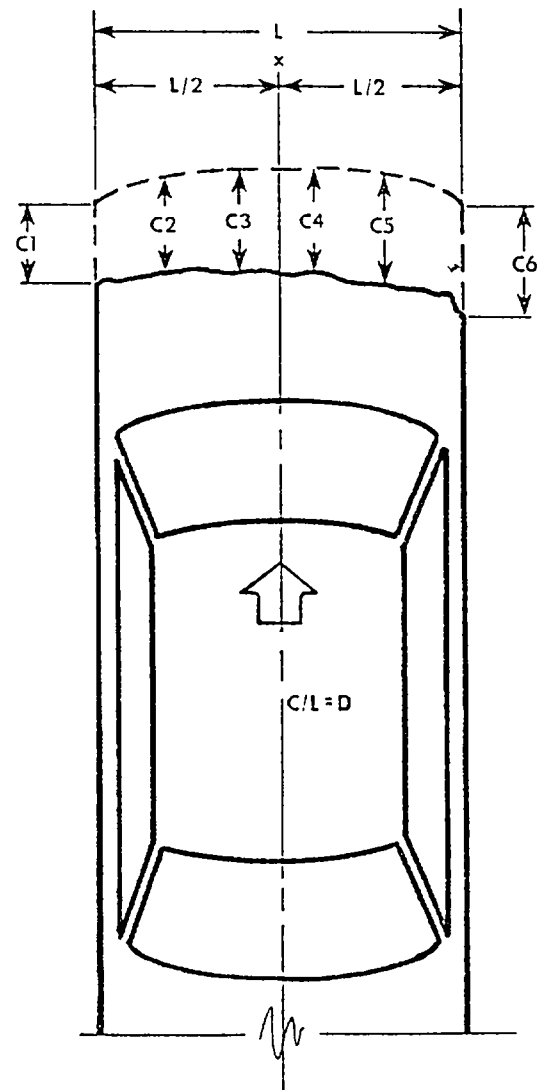
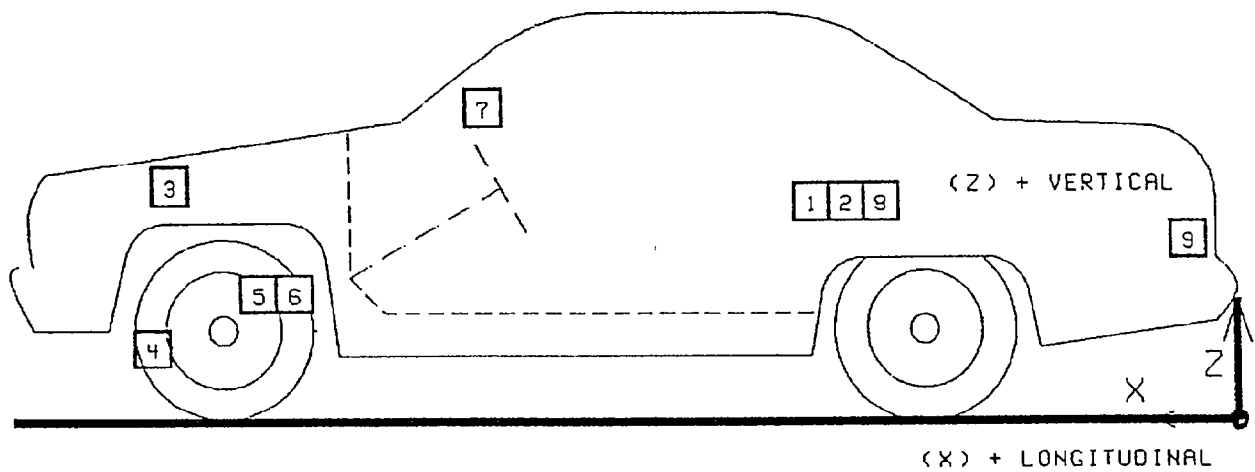
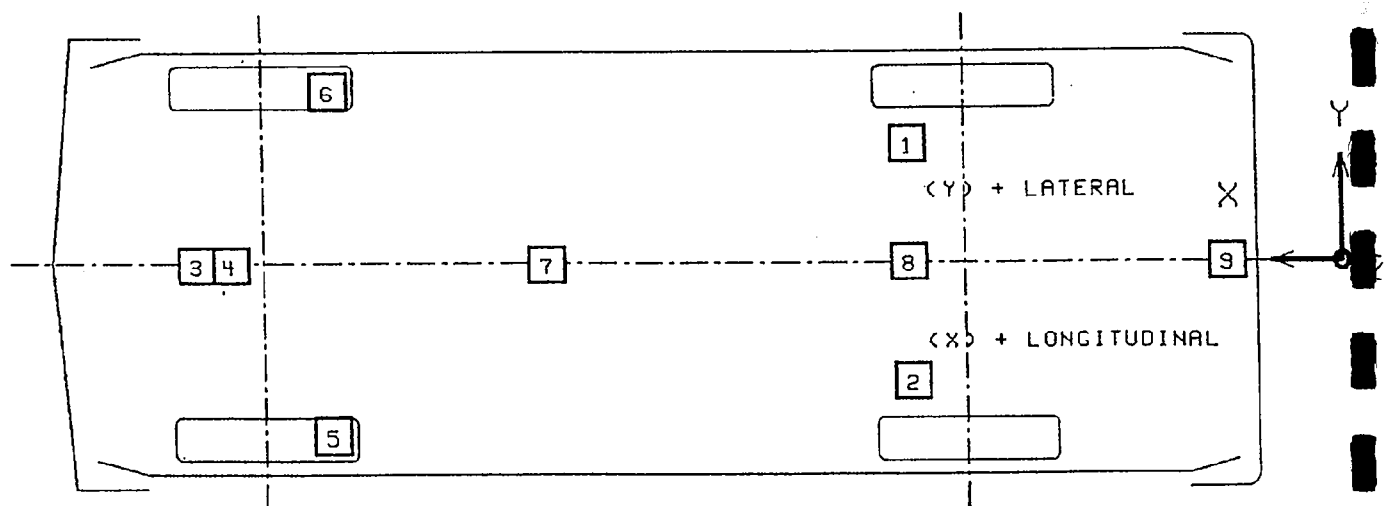


FIGURE 3
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910313

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	G MSEC	MAX	G MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	114.4	17.5	13.0	2.1	136.5	35.6	78.3
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	114.6	-17.2	13.2	2.5	134.4	32.2	73.4
3	ENGINE TOP LONGITUDINAL	30.0	-1.8	31.5	30.9	61.0	150.3	38.9
4	ENGINE BOTTOM LONGITUDINAL	34.2	-7.0	6.4	32.2	55.4	92.0	35.4
5	RIGHT BRAKE CALIPER LONGITUDINAL	34.5	-24.2	13.0	47.7	65.8	69.8	51.8
6	LEFT BRAKE CALIPER LONGITUDINAL	34.8	24.2	13.2	78.0	62.6	97.6	49.8
7	INSTRUMENT PANEL CENTER LONGITUDINAL	60.0	0.0	35.0	9.9	126.3	48.4	78.1
8	REAR SEAT CROSSMEMBER CENTER VERTICAL	114.8	0.5	35.0	15.2	52.5	11.1	111.8
9	VEHICLE REAR CENTER VERTICAL	167.3	0.0	23.5	15.3	75.1	19.8	34.1

* 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 #142	PASSENGER #192
HEAD	<u>Upper steering wheel rim and hub</u>	<u>None</u>
CHEST	<u>None</u>	<u>None</u>
ABDOMEN	<u>Lower Steering wheel rim</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>Driver's seat shifted full forward</u>
REAR	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

The entire windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

TABLE 7 FMVSS 208- DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1991/Saturn/SL2/4-door sedan

VEH. NHTSA NO.: MM0106; TEST DATE: 03/13/91

	DRIVER	PASSENGER
<u>MAXIMUM ACCELERATIONS (G):</u>	<u>DUMMY #142</u>	<u>DUMMY #192</u>
HEAD X-AXIS	-111.5	-42.1
HEAD Y-AXIS	-8.3	11.0
HEAD Z-AXIS	-29.6	-66.9
HEAD RESULTANT	113.0	73.6
CHEST X-AXIS	-49.2	-46.4
CHEST Y-AXIS	6.2	8.2
CHEST Z-AXIS	10.9	5.9
CHEST RESULTANT*	44.4	46.0
CHEST RESULTANT TIME INTERVAL (SEC.)*	.003	.003

HEAD INJURY CRITERIA (HIC) VALUES:

HIC**	918	1018
HIC STARTING TIME (SEC.)	.067	.071
HIC ENDING TIME (SEC.)	.094	.107
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	64.8	60.3

MAXIMUM CHEST DEFLECTIONS (IN):

CHEST X-AXIS	-2.8	-1.7
MAXIMUM CHEST DEFLECTION TIME (SEC.)	.096	.093

MAXIMUM FEMUR COMPRESSIVE FORCES (LBS):

LEFT FEMUR	-1009	-1178
RIGHT FEMUR	-1326	-974

MAXIMUM SEAT BELT FORCES (LBS):

LAP BELT	343	373
SHOULDER BELT	2175	2084

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

*0.003 SEC. MINIMUM DURATION.

**THE MAXIMUM HIC TIME INTERVAL IS 36 MILLISECONDS.

TABLE 8 HYBRID III NECK DATA SUMMARY

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1991/Saturn/SL2/4-door sedan

VEHICLE NHTSA NO.: MM0106; TEST DATE: 03/13/91

<u>MAXIMUM VALUES:</u>	<u>DRIVER DUMMY #192</u>	<u>PASSENGER DUMMY #142</u>
NECK X-AXIS FORCE (LBS.)	193	382
NECK Y-AXIS FORCE (LBS.)	48	-97
NECK Z-AXIS FORCE (LBS.)	500	656
NECK MOMENT ABOUT X AXIS (IN.-LBS.)	-91	268
NECK MOMENT ABOUT Y AXIS (IN.-LBS.)	-283	790
NECK MOMENT ABOUT Z AXIS (IN.-LBS.)	-132	-56

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

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward impacting the upper steering wheel rim and hub. The dummy's torso was restrained by the two-point passive belt and manual lap belt. The dummy's head rotated rearward as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the two-point passive belt and manual 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 rotated forward as the dummy's torso was restrained by the two-point passive belt and the manual lap belt. The dummy's head rotated rearward and the dummy's upper torso rotated toward the right as the dummy rebounded into the seat back. The dummy's head contacted the two-point passive belt's right B-pillar buckle anchor. The dummy came to rest seated in the right front passenger's seat, leaning toward the right, restrained by the two-point belt and manual lap belt.

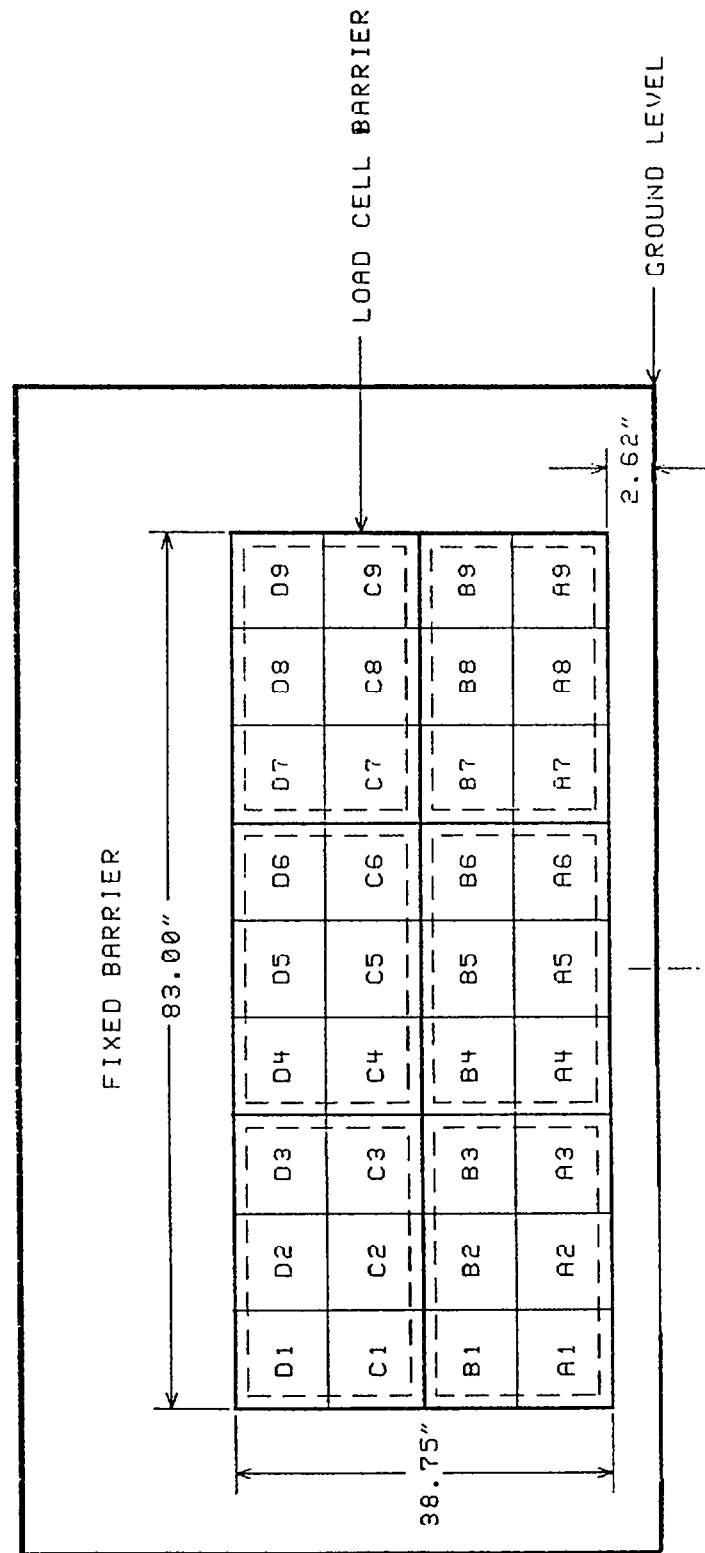
TABLE 9 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	DRIVER	PASSENGER
<u>BELT LENGTH DATA:</u>		
BELT LENGTH FROM TRIM PANEL EXIT TO BOLT HOLE ANCHOR POINT FOR CONTINUOUS WEBBING SYSTEMS.	49.0	49.0
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	34.0	35.0
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	31.0	32.5
<u>SHOULDER BELT SPOOL-OFF LENGTH:</u>		
AS DETERMINED BY FILM ANALYSIS	4.0	3.0
AS DETERMINED MECHANICALLY	5.5	4.7
AS DETERMINED ELECTRONICALLY	5.4	5.3
<u>BELT STRETCH LENGTH (IN/FT):</u>		
AS MEASURED MECHANICALLY	.05	.05
AS MEASURED ELECTRONICALLY	.34	.66
<u>RETRACTOR LOCK-UP TIME (MS):</u>		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	84	64

ALL MEASUREMENTS ARE IN INCHES UNLESS OTHERWISE NOTED.

FIGURE 4
LOAD CELL BARRIER CONFIGURATION
FRONT VIEW

36 LOAD CELLS
4 ROWS
9 COLUMNS



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

TABLE 10
LOAD CELL BARRIER DATA SUMMARY

TEST NUMBER 910313

LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	LB	MSEC	LB	MSEC
TOTAL GROUP 1	442	326. 6	25385	25. 1
TOTAL GROUP 2	394	326. 8	35224	40. 9
TOTAL GROUP 3	311	318. 0	18005	27. 0
TOTAL GROUP 4	346	237. 3	6617	27. 9
TOTAL GROUP 5	302	151. 6	18292	39. 4
TOTAL GROUP 6	274	316. 6	6995	27. 0
TOTAL LOAD CELL FORCE	1515	326. 5	94726	40. 0
TENSION IS POSITIVE				
COMPRESSION IS NEGATIVE				

SECTION 3.0

VEHICLE, OCCUPANT, AND CAMERA MEASUREMENTS

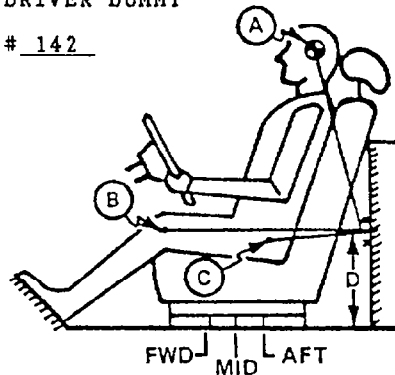
FIGURE 5 DUMMY AND SEAT POSITIONING DATA

TEST NO.: 910313; VEHICLE: Saturn SL2

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

DRIVER DUMMY

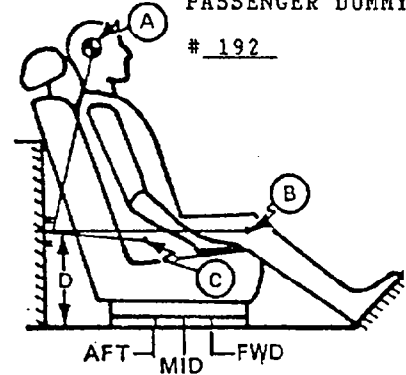
142



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

PASSENGER DUMMY

192

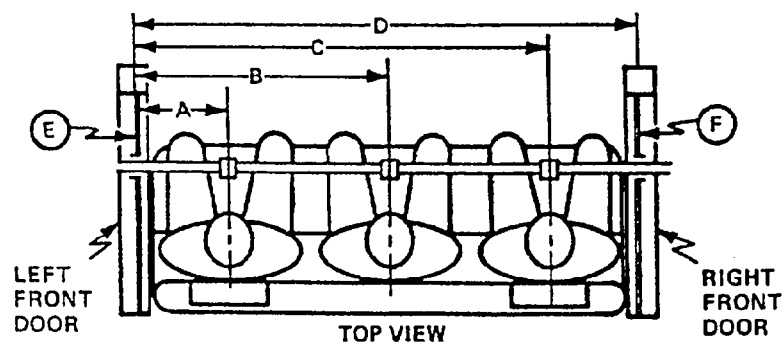


A = 19.8 IN. 4 DEGREES
B = 23.1 IN. 95 DEGREES
C = 8.9 IN. 132 DEGREES
D = 11.8 IN.

A = 18.4 IN. 2 DEGREES
B = 24.2 IN. 89 DEGREES
C = 10.5 IN. 125 DEGREES
D = 11.8 IN.

SEAT TRACK REARWARD: 9 NOTCHES

SEAT TRACK REARWARD: 9 NOTCHES



A = LEFT DOOR TO DRIVER CENTERLINE 13.5 IN.
B = LEFT DOOR TO CENTER PASSENGER CENTERLINE NA IN.
C = LEFT DOOR TO RIGHT PASSENGER CENTERLINE 40.5 IN.
D = LEFT DOOR TO RIGHT DOOR 53.8 IN.
E, F = WINDOW GLASS HEIGHT (RIGHT AND LEFT MUST BE EQUAL) 9.0 IN.

ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

FIGURE 6 DUMMY IN-VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	14.2	13.5
HW	23.8	21.1
CD	19.1	21.2
CS	12.0	NA
KDL	5.3	3.0
KDR	5.2	3.3
TA	18°	20°
SA	23°	23°
HSW	16.0	NA

	DRIVER	PASSENGER
HR	5.8	6.0
HS	10.5	10.5
AD	3.8	4.4
HD	6.2	6.1
KK	8.0	8.0
AA	10.0	8.0
HA	23.1	23.6

KNEE OUTER CLEVIS TO OUTER
CLEVIS SPACING:

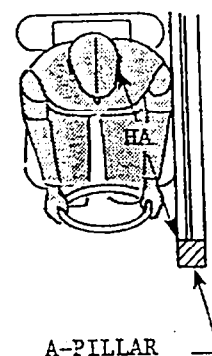
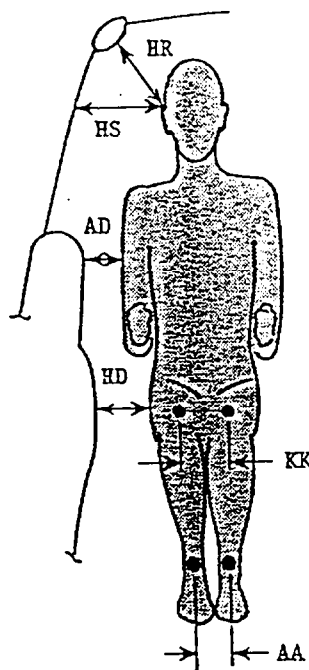
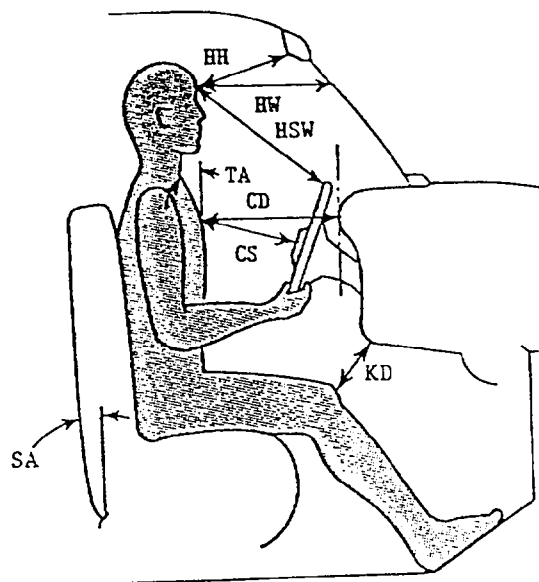
DRIVER = 10.6

PASSENGER = 10.6

PELVIS ANGLE:

DRIVER = 22°

PASSENGER = 25°

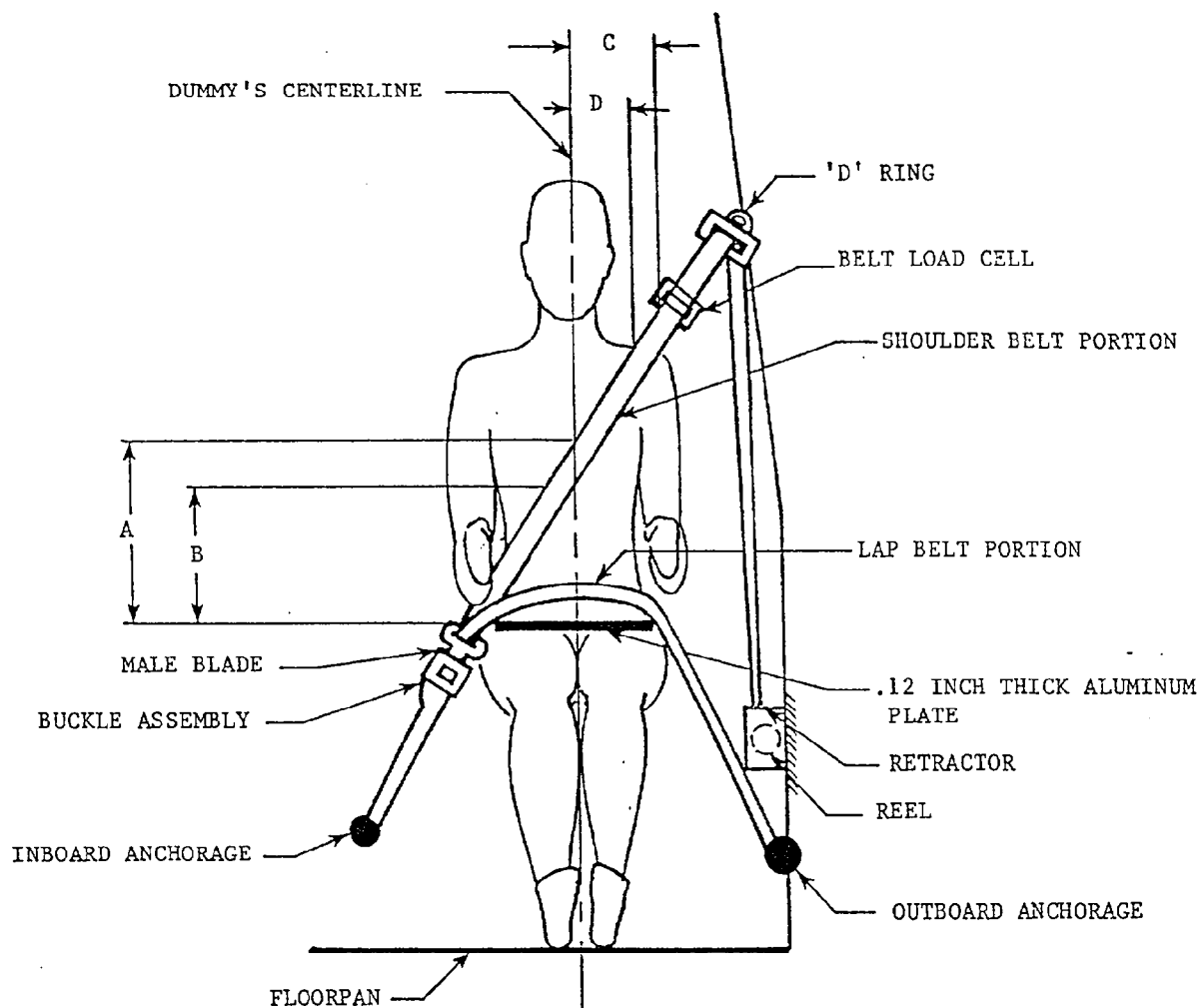


HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW = HEAD TO STEERING WHEEL

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

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

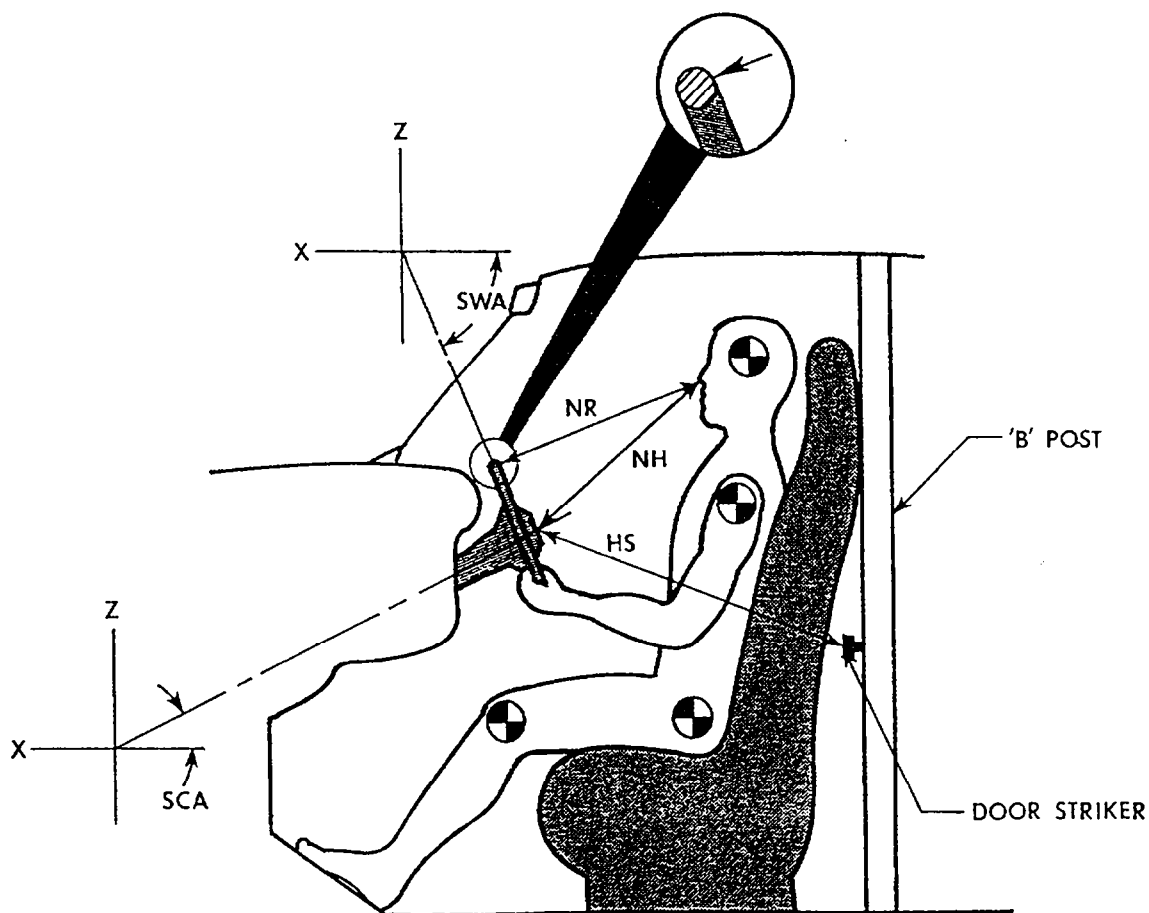
FIGURE 7 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	13.0	13.1
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	10.5	10.6
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.0	4.0
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	2.8	1.5

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 latched in the midpoint of the infinitely-adjustable tilting range. Driver's seat track positioned at manufacturer's specified midpoint.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	14.6
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	16.8
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	21.7
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	21°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	69°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9
CAMERA POSITIONS

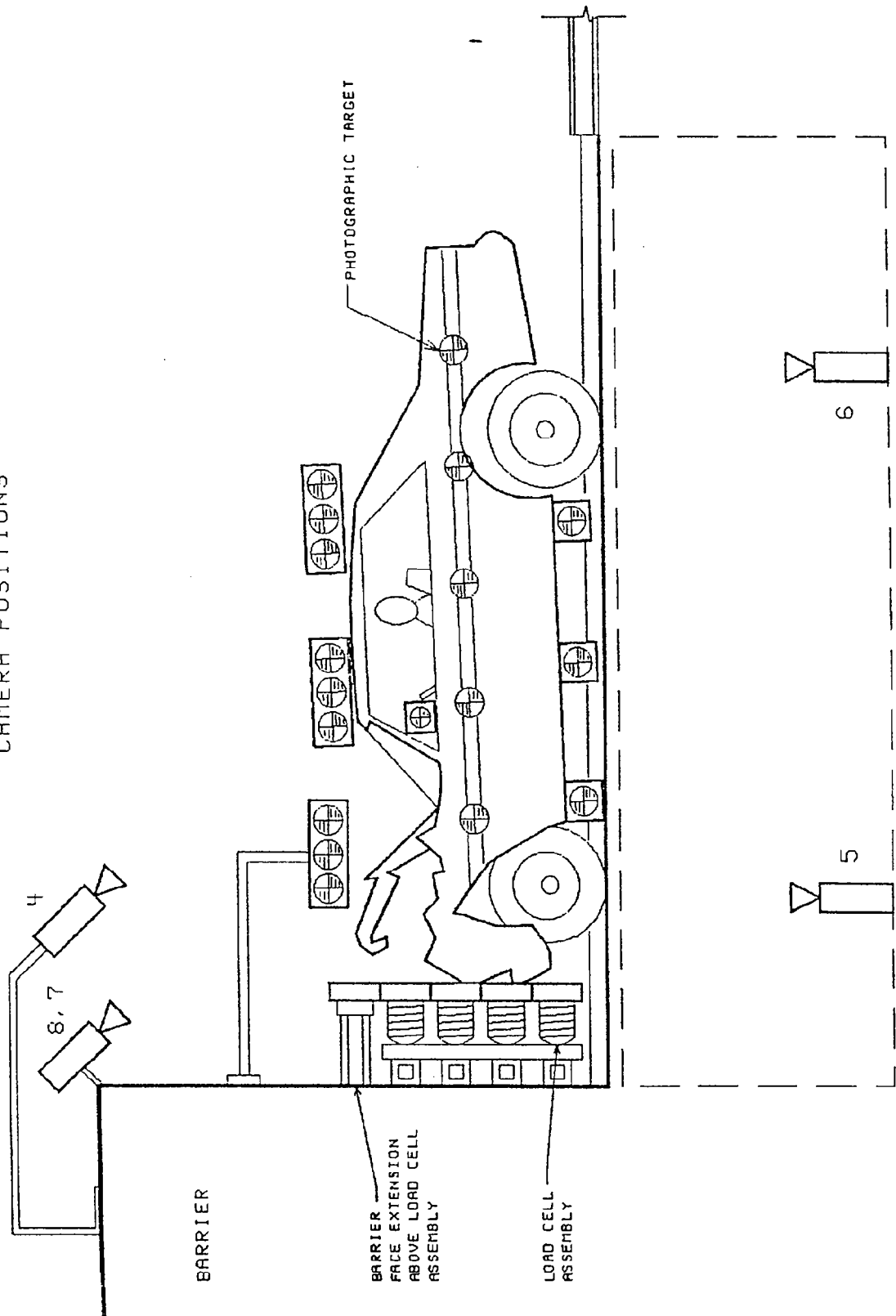


FIGURE 9

CAMERA POSITIONS, CONTINUED

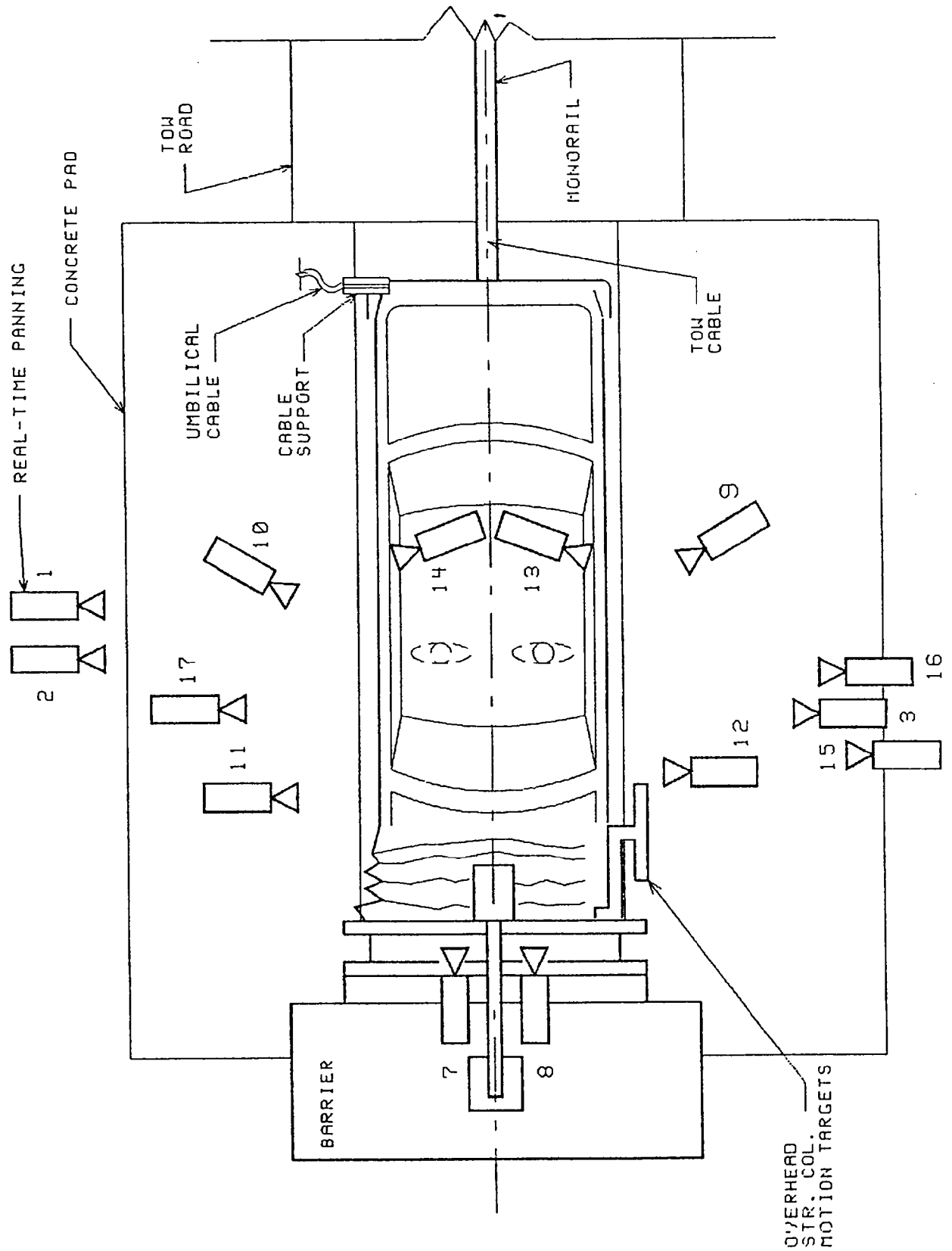


TABLE 11 MOTION PICTURE CAMERA LOCATIONS

TEST NO.:	CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	FILM PLANE TO HEAD TARGET (IN)		FILM SPEED (FPS)
			X	Y	Z				
			VEHICLE: Saturn SL2 4-door sedan						
	1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24
	2	Right side	-81.3	-266.4	37.1	-2	NA	13	498
	3	Left side	-41.5	295.0	44.0	-12	205.0	25	485
	4	Overhead	-36.4	0.0	98.0	-40	NA	8.5	498
	5	Pit - engine	-50.5	0.0	-92.4	90	NA	13	1000
	6	Pit - fuel tank	-99.3	0.0	-99.0	90	NA	13	1002
	7	Front - passenger	-4.5	-13.8	85.0	-40	NA	17	495
	8	Front - driver	-6.8	14.5	85.0	-41	NA	17	498
	9	Left side - driver	-180.0	73.0	102.0	-27	89.0	25	500
	10	Right side - passenger	-184.0	-74.0	100.0	-26	83.0	25	500
	11	Right side - A-pillar	-38.1	-306.1	44.0	0	NA	50	495
	12	Left side - A-pillar	-53.0	309.4	42.3	0	NA	50	505
	13	Onboard - left side	NA	NA	NA	NA	NA	13	502
	14	Onboard - right side	NA	NA	NA	NA	NA	13	500
	15	Left side - steering column	-102.0	286.0	103.0	-14	NA	25	498
	16	Left side - steering column	-102.0	286.0	75.1	-9	NA	25	1000
	17	Right side - passenger	-38.8	-210.8	45.3	7	220.5	25	493

**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

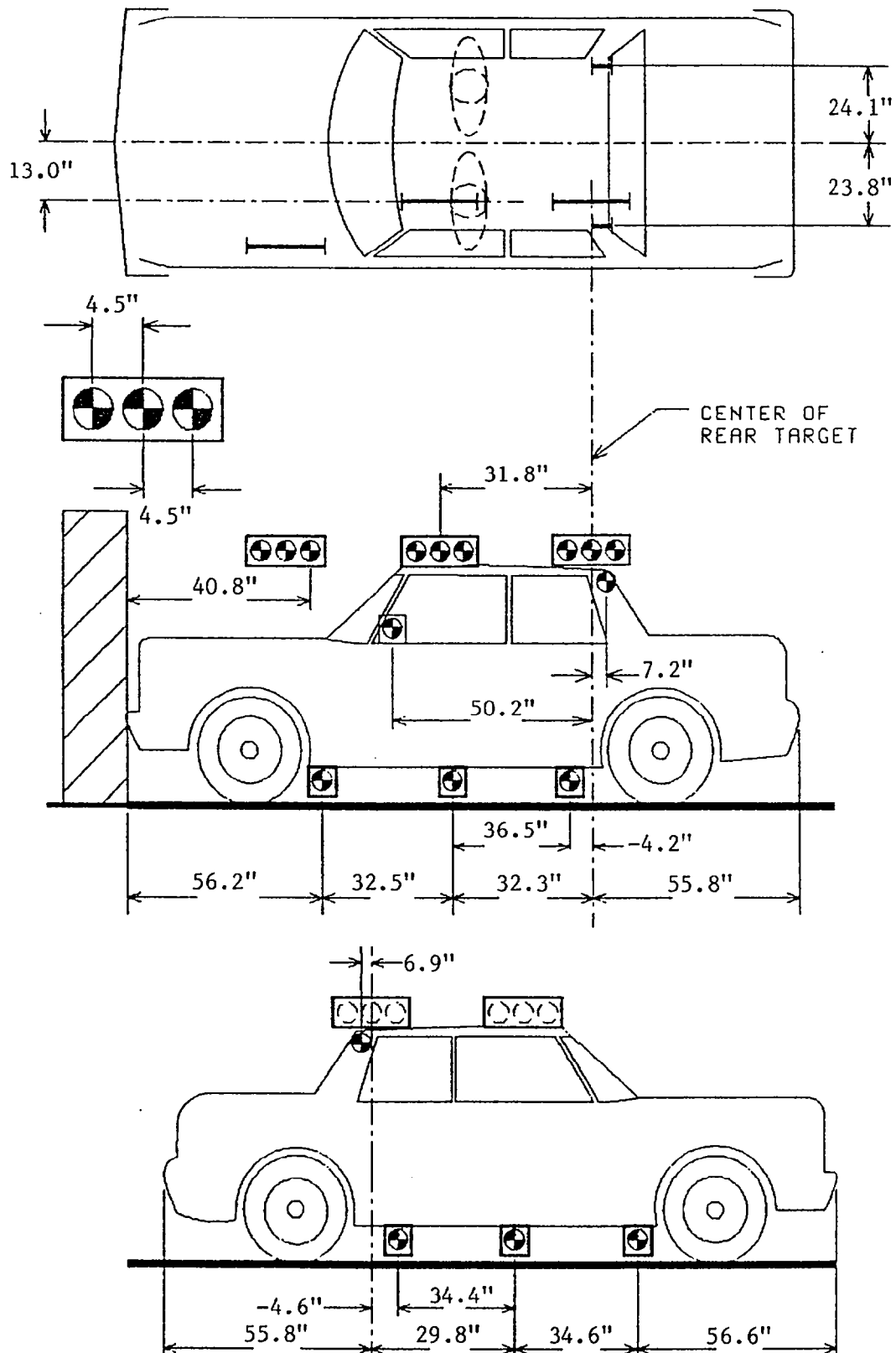


FIGURE 11-

PRE-TEST AND POST-TEST MEASUREMENT POINTS

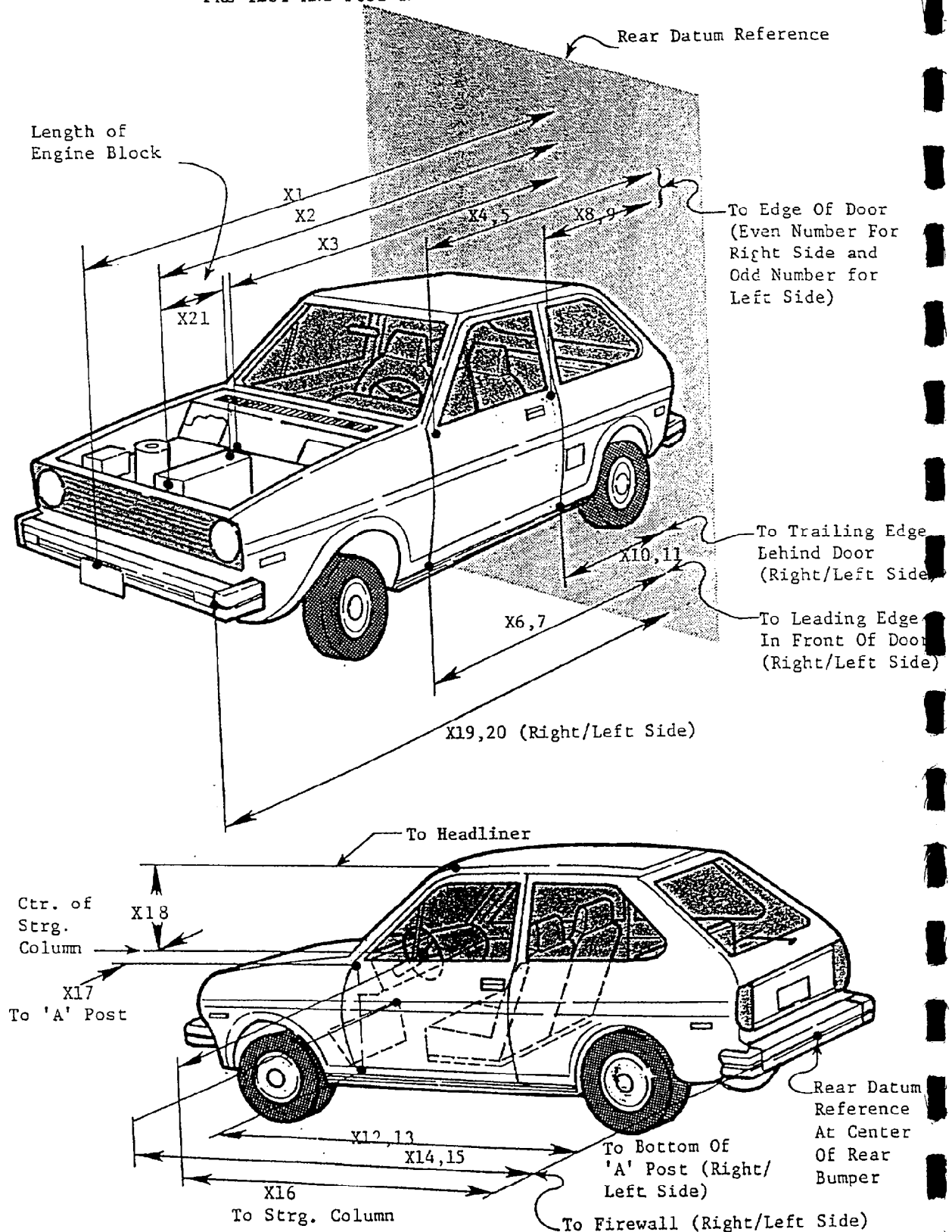


TABLE 12 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Saturn/SL2		TEST NUMBER: 910313	ALL MEASUREMENTS ARE IN INCHES			
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.		
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	176.8	154.9	21.9		
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	148.4	139.8	8.6		
X3	REAR SURFACE OF VEHICLE TO FIREWALL	129.8	127.1	2.7		
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	116.6	116.8	-0.2		
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	116.8	116.5	0.3		
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	116.1	116.0	0.1		
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	116.4	116.2	0.2		
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	76.0	76.0	0.0		
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	76.1	75.8	0.3		
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	76.9	77.0	-0.1		
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	77.2	77.0	0.2		
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	116.2	115.6	0.6		
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	116.2	115.4	0.8		
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	129.9	124.6	5.3		
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	130.9	127.6	3.3		
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	100.5	97.8	2.7		
X17	CENTER OF STEERING COLUMN TO "A" POST	11.4	11.5	-0.1		
X18	CENTER OF STEERING COLUMN TO HEADLINER	17.0	17.2	-0.2		
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	171.1	151.5	19.6		
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	171.0	155.1	15.9		
X21	LENGTH OF ENGINE BLOCK	17.2	17.2	0.0		

APPENDIX A

PHOTOGRAPHS



Figure A-1. PRE-TEST FRONT VIEW

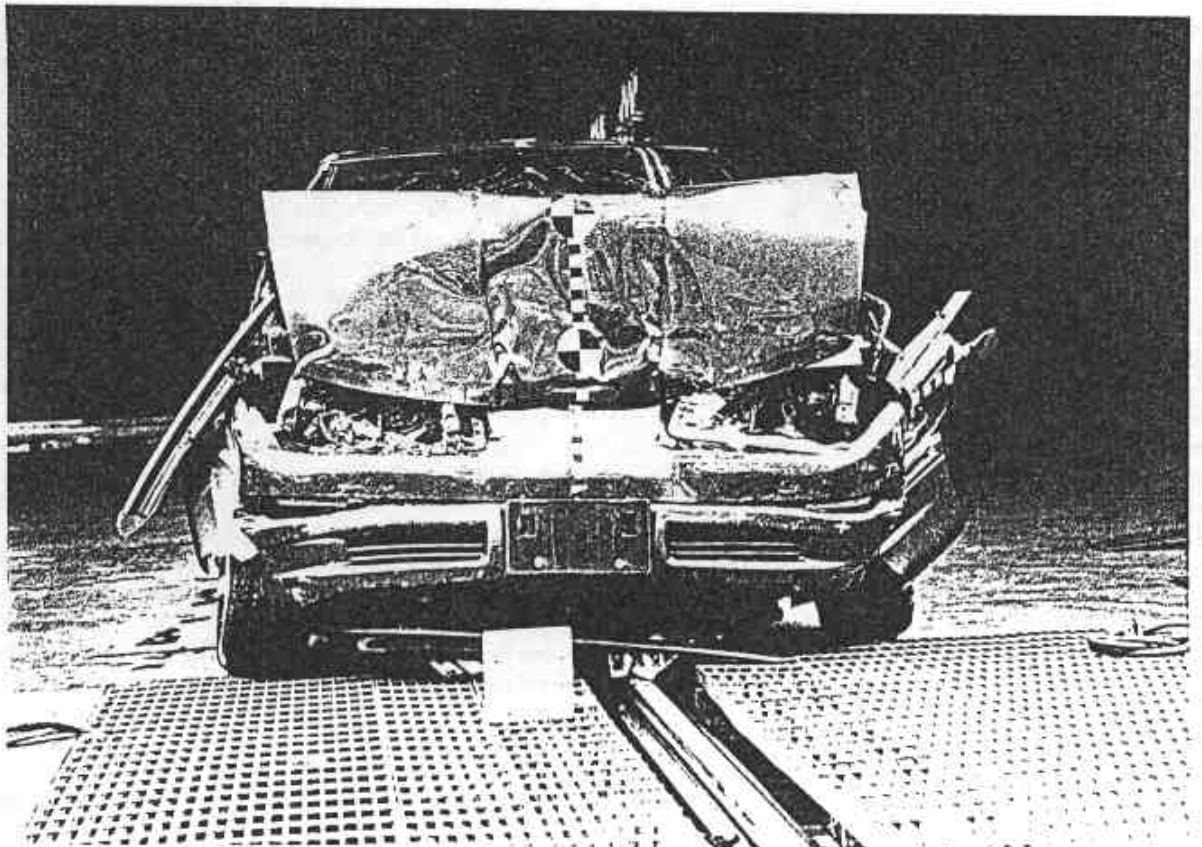


Figure A-2. POST-TEST FRONT VIEW

A-2

910313

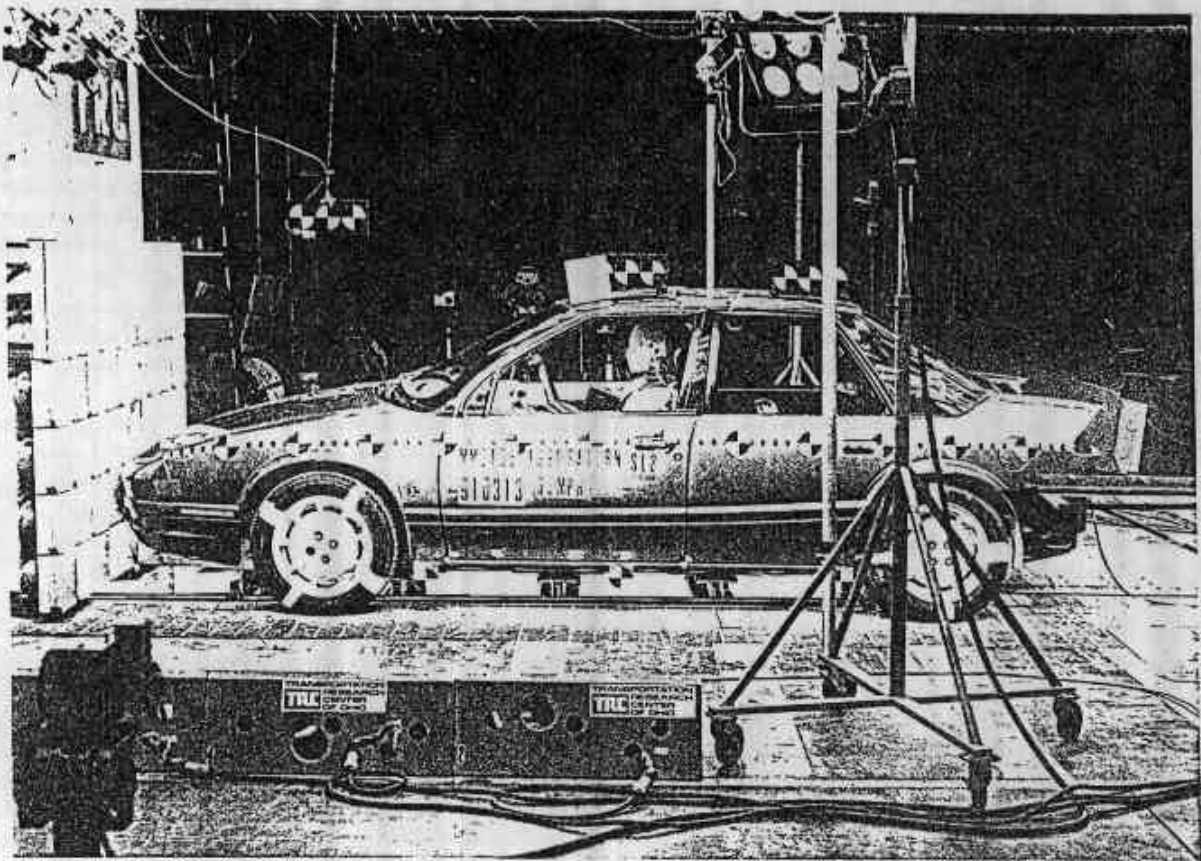


Figure A-3. PRE-TEST LEFT SIDE VIEW



Figure A-4. POST-TEST LEFT SIDE VIEW

A-3

910313

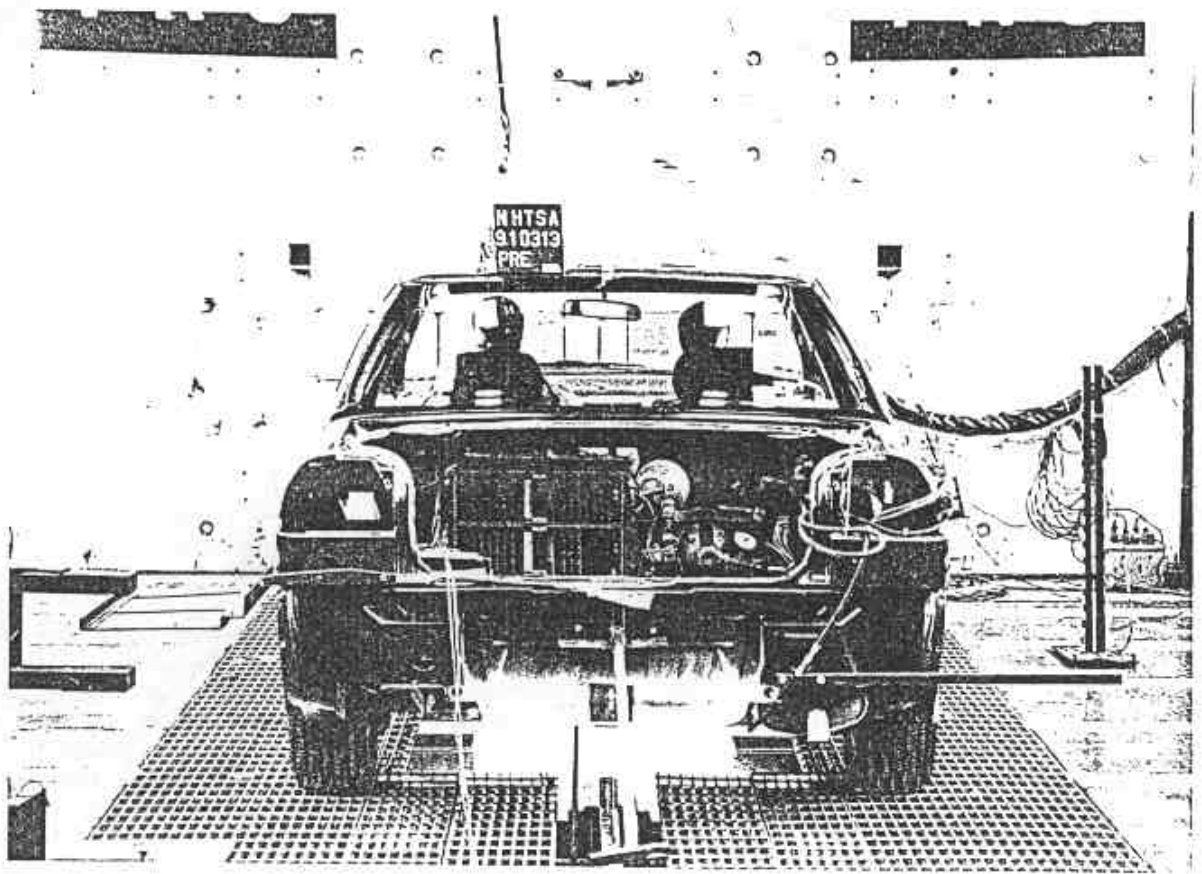


Figure A-5. PRE-TEST REAR VIEW

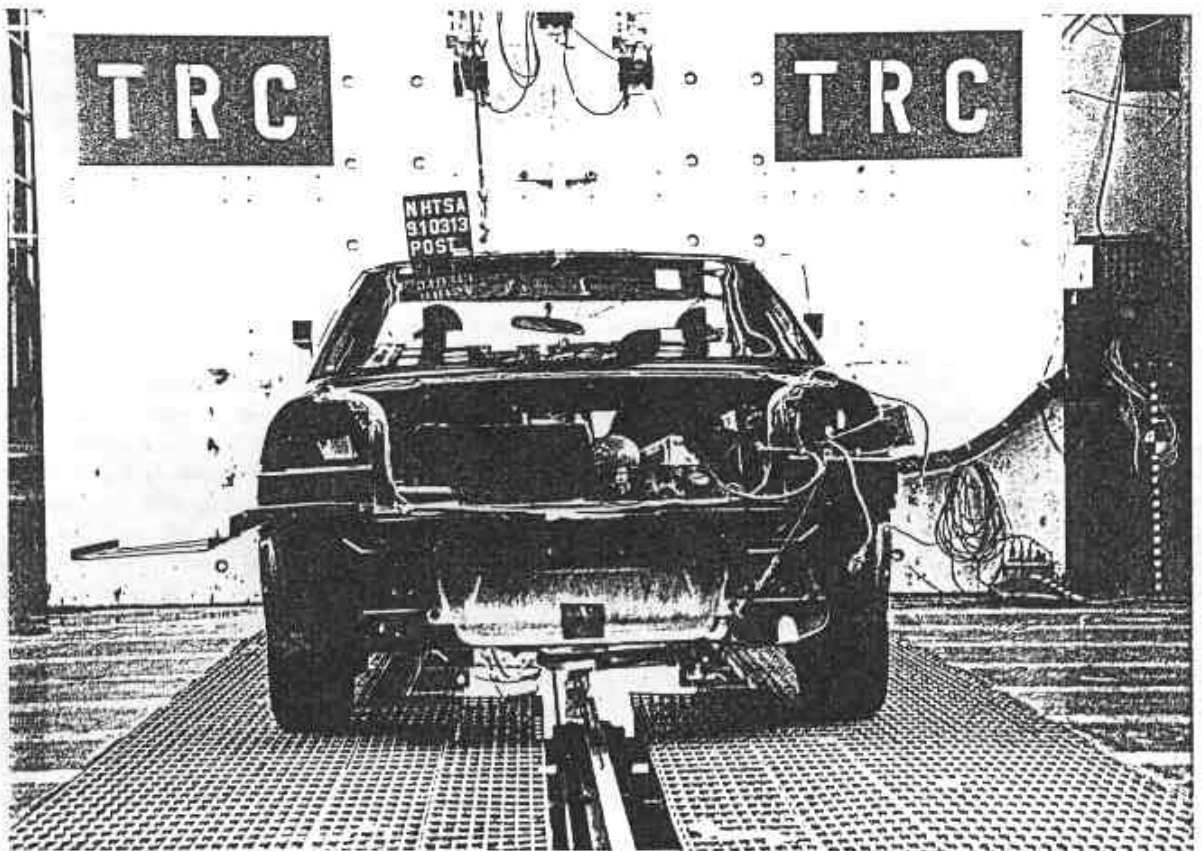


Figure A-6. POST-TEST REAR VIEW

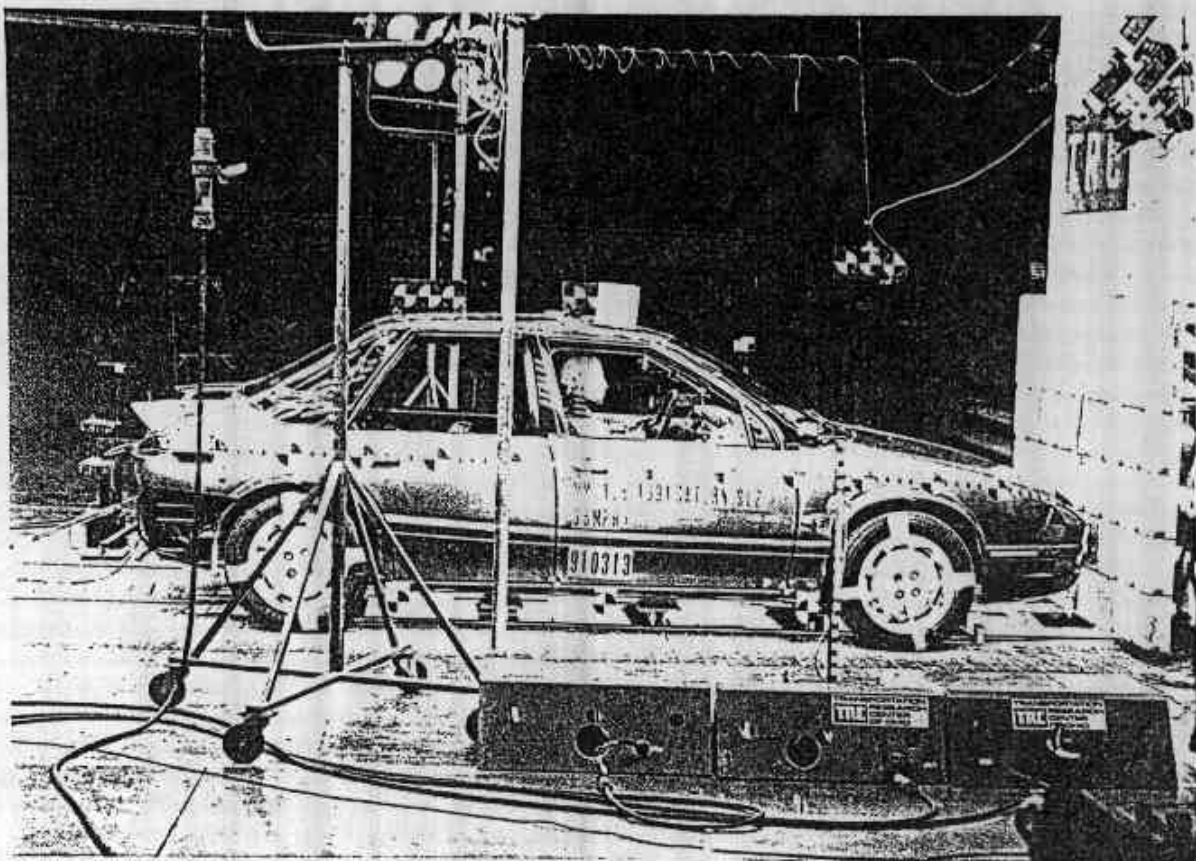


Figure A-7. PRE-TEST RIGHT SIDE VIEW

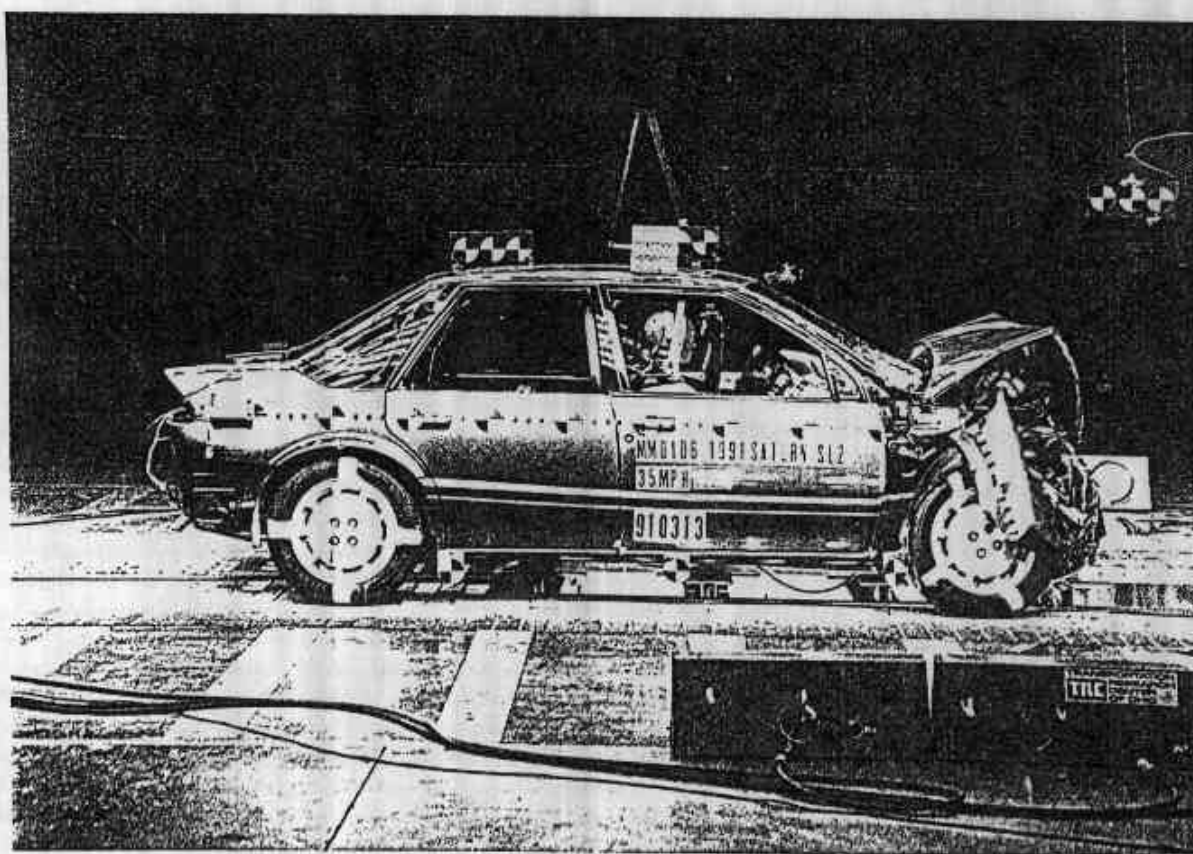


Figure A-8. POST-TEST RIGHT SIDE VIEW

A-5

910313

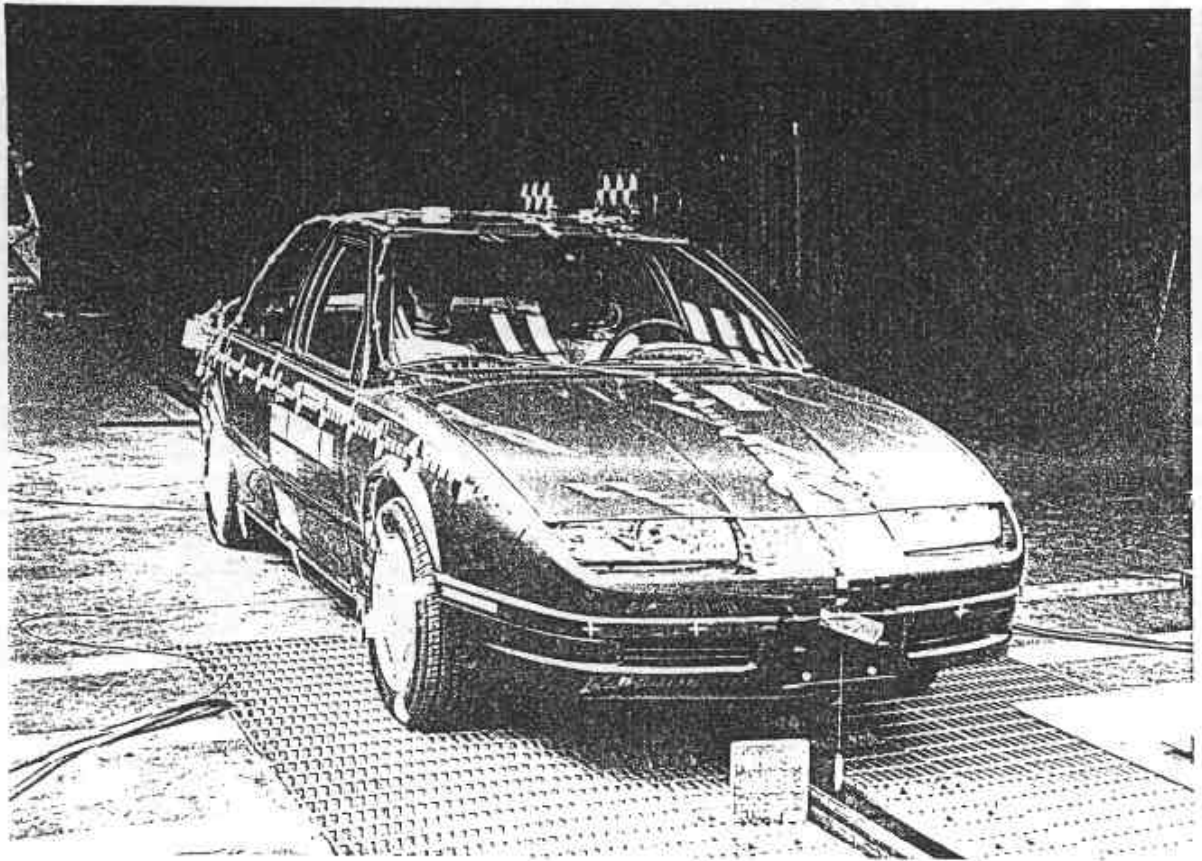


Figure A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

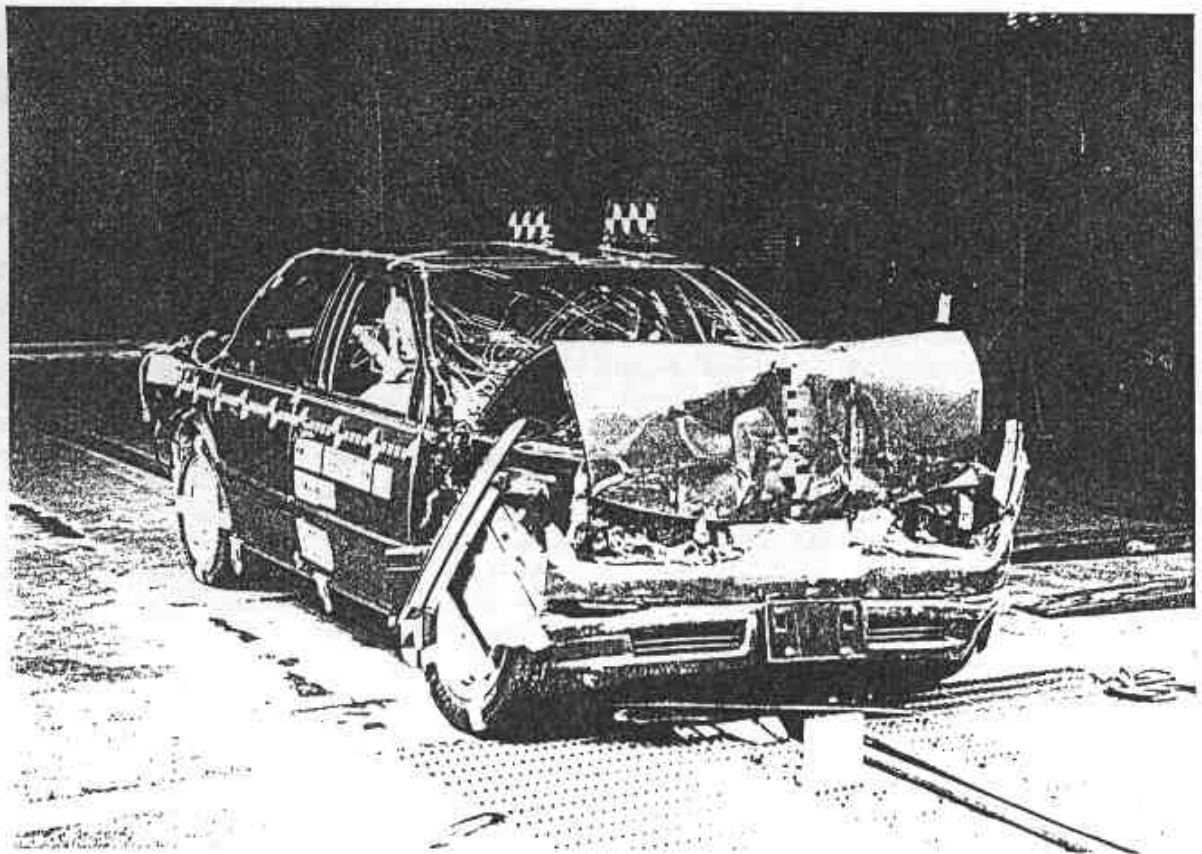


Figure A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

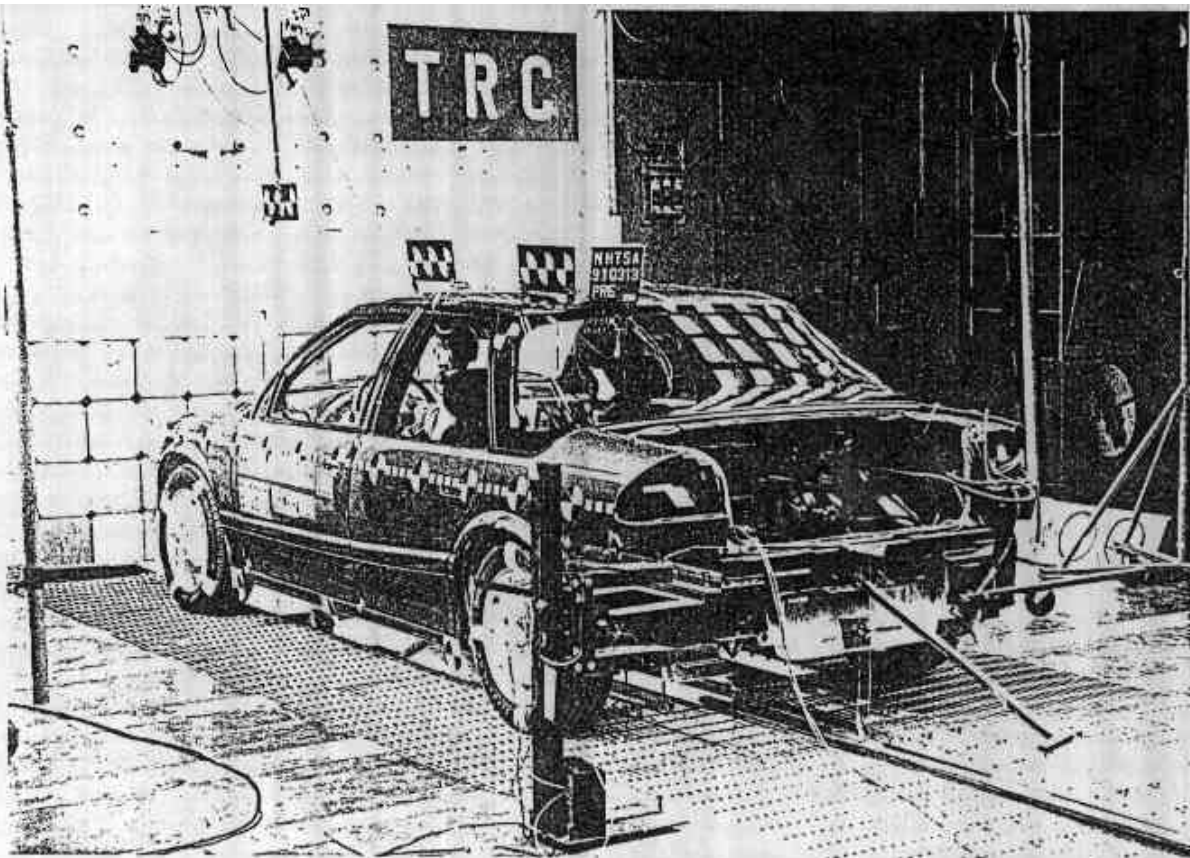


Figure A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW



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

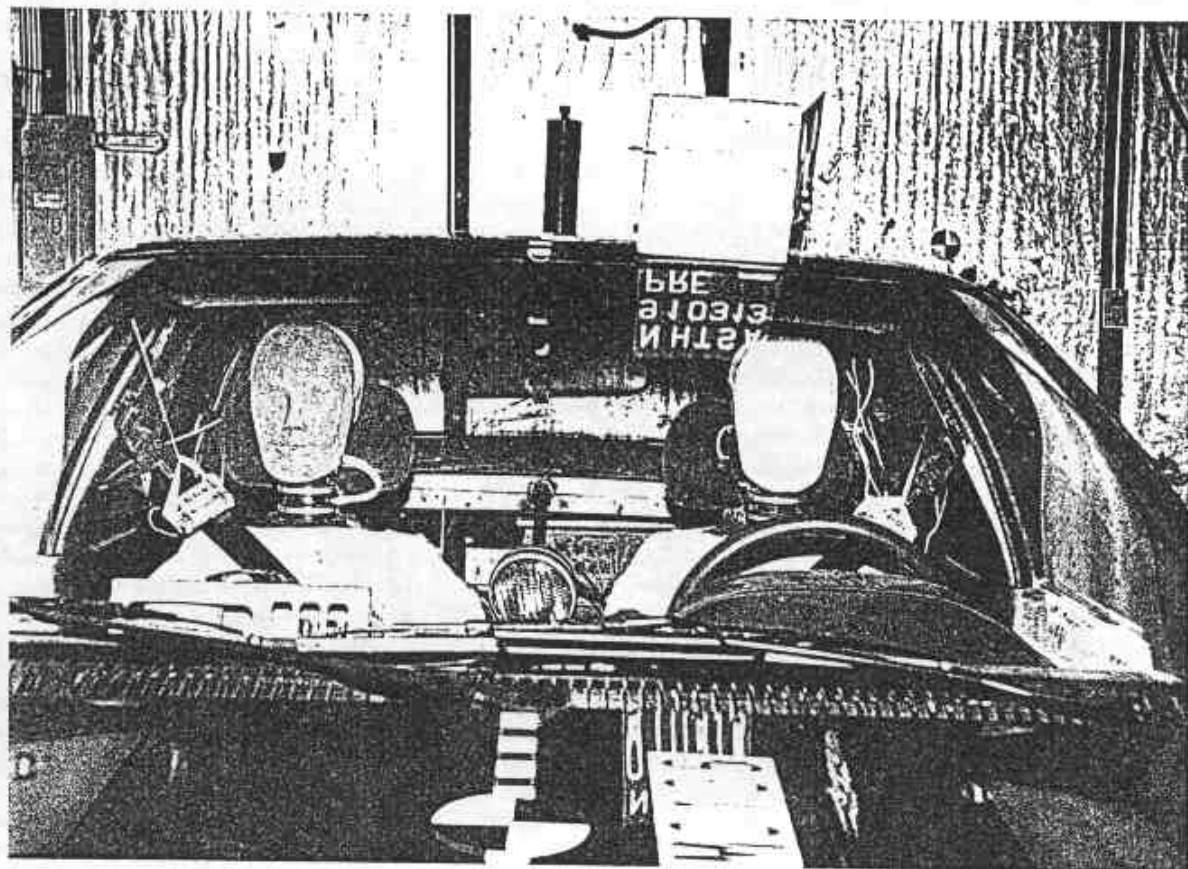


Figure A-13. PRE-TEST WINDSHIELD VIEW

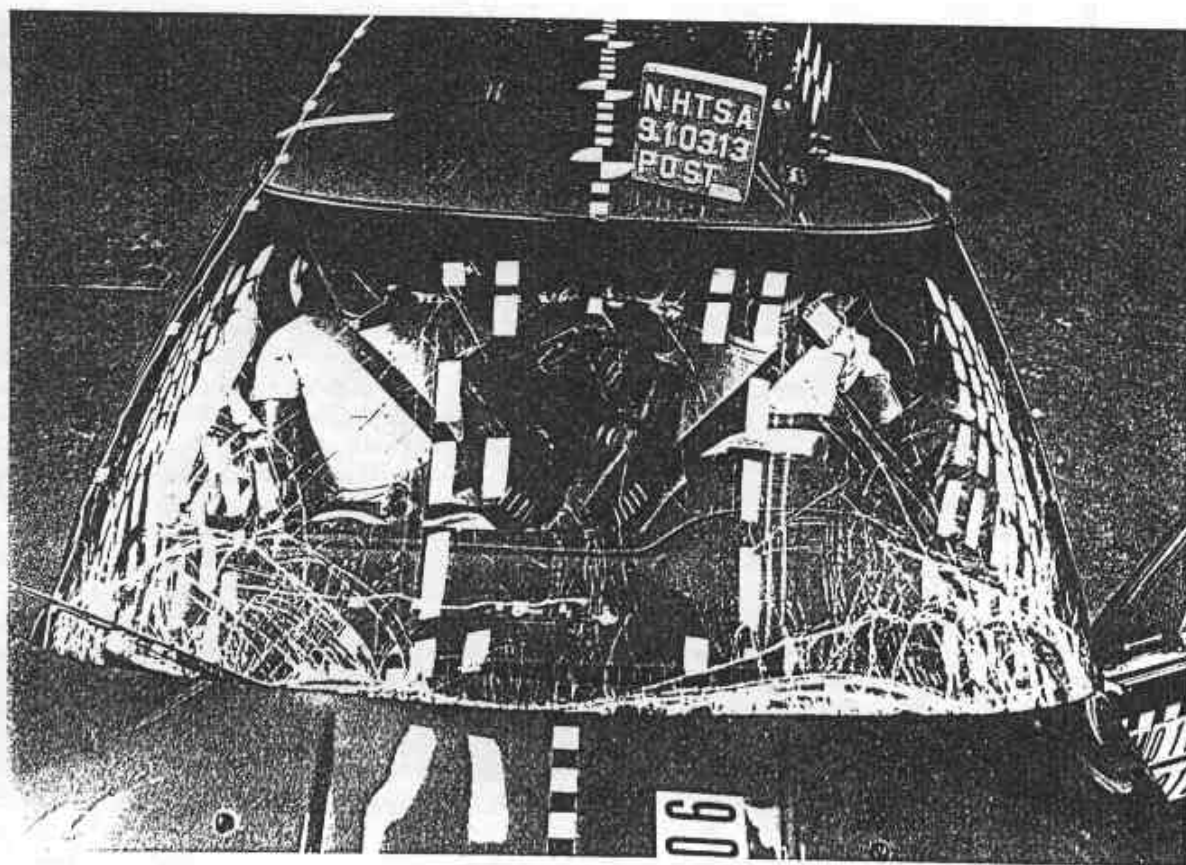


Figure A-14. POST-TEST WINDSHIELD VIEW

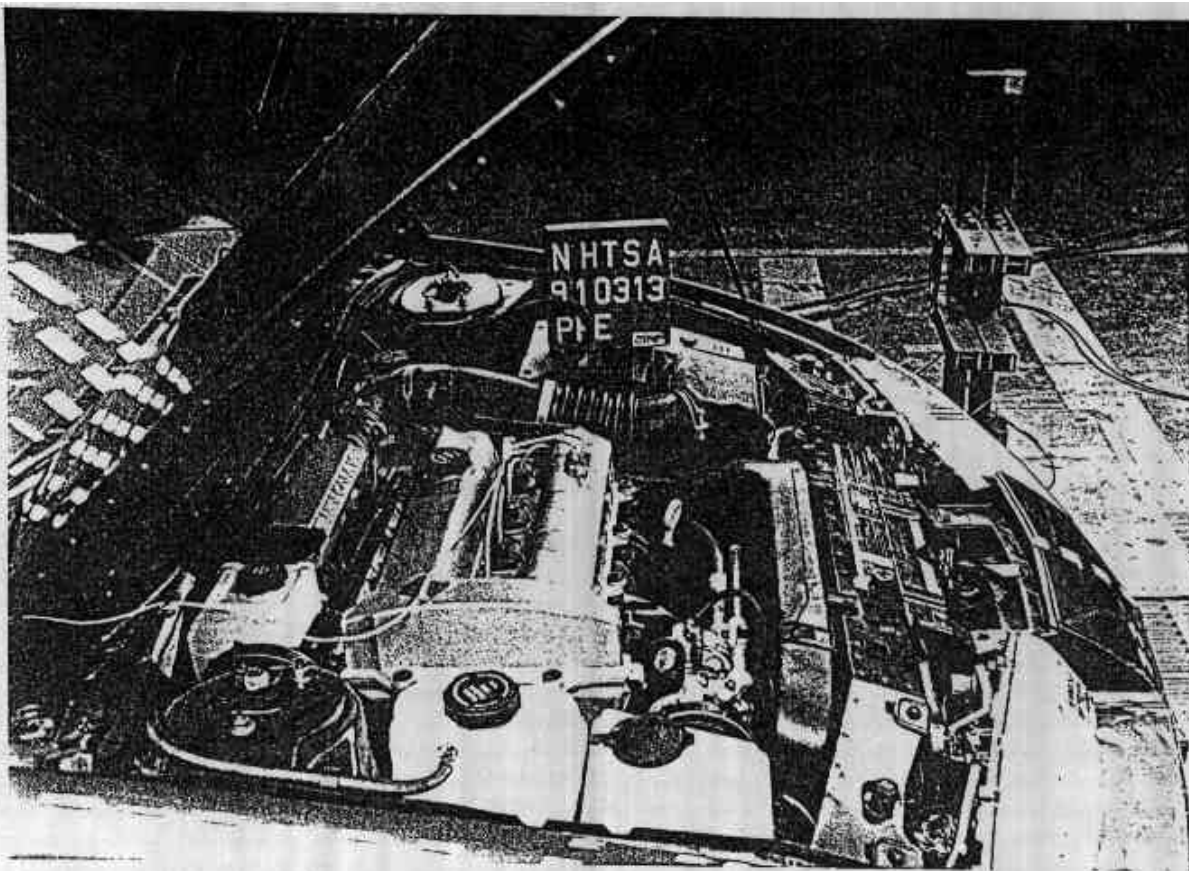


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

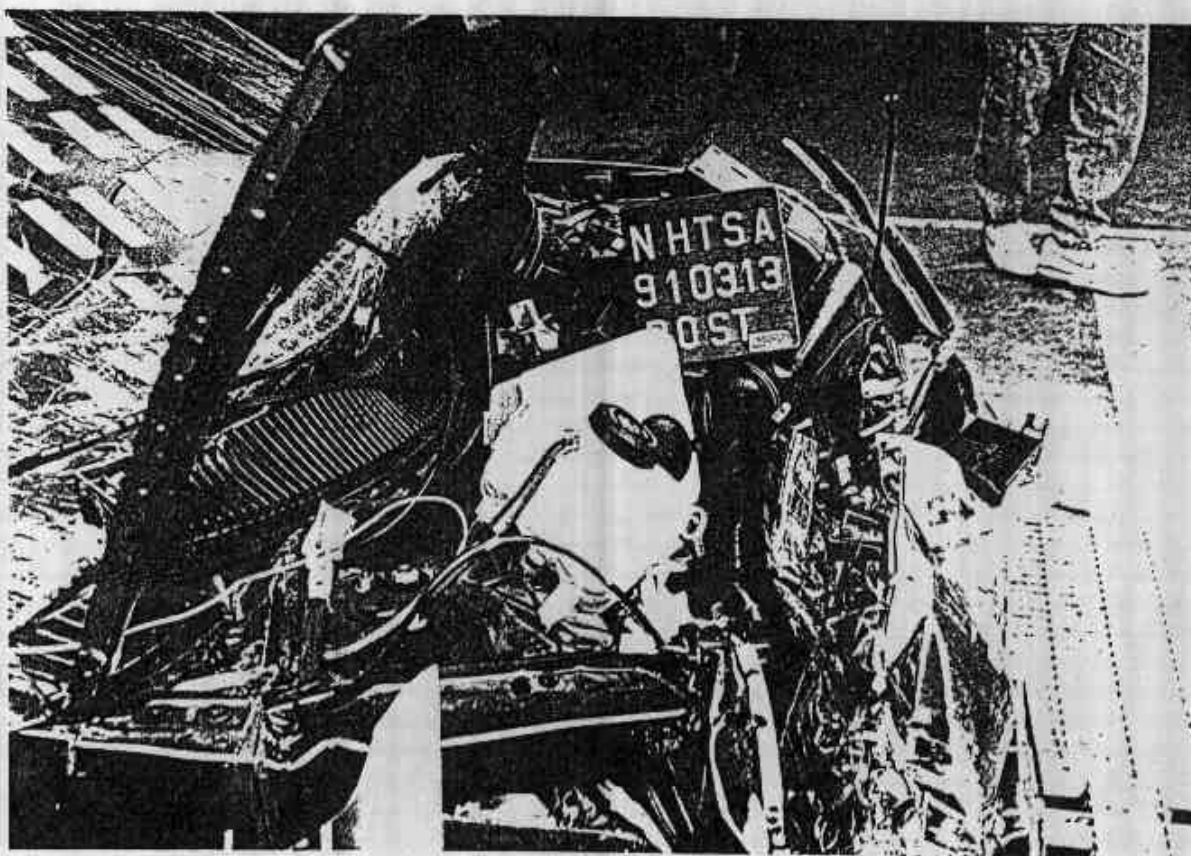


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

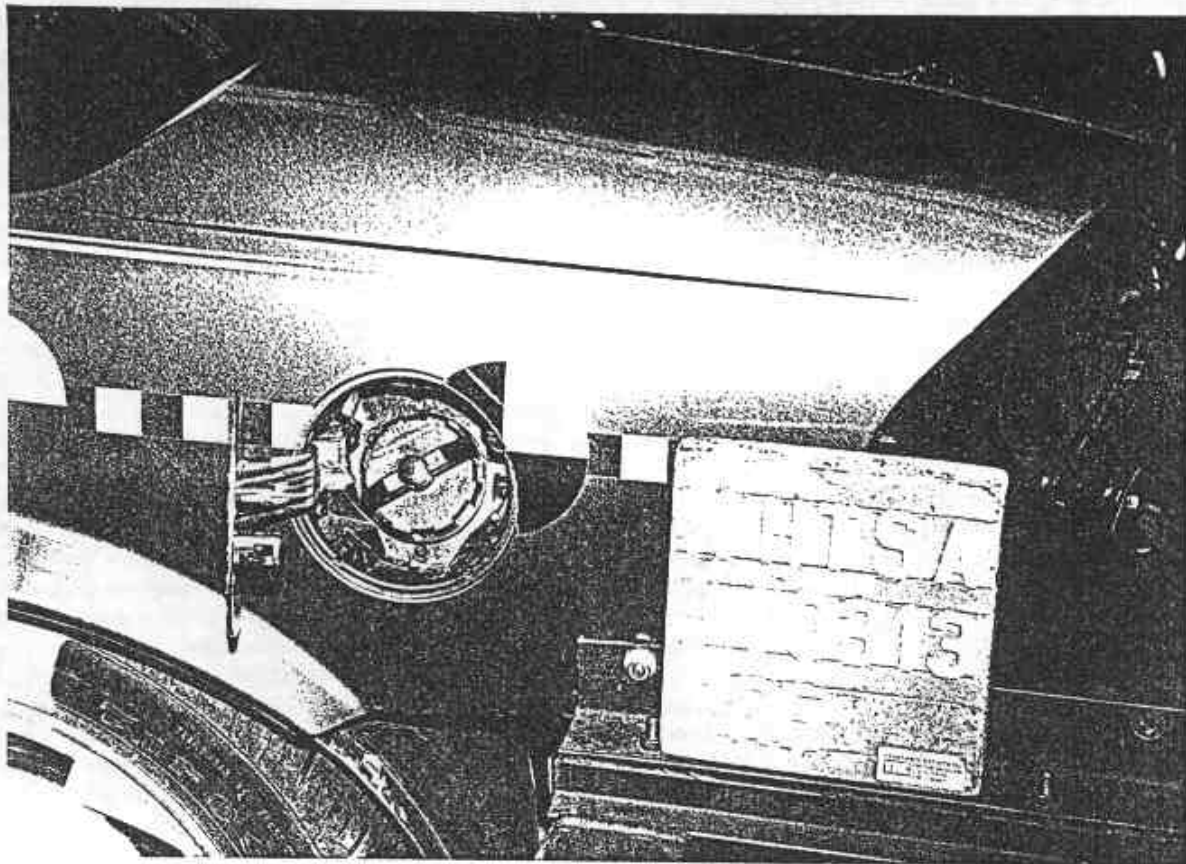


Figure A-17. PRE-TEST FUEL FILLER CAP VIEW

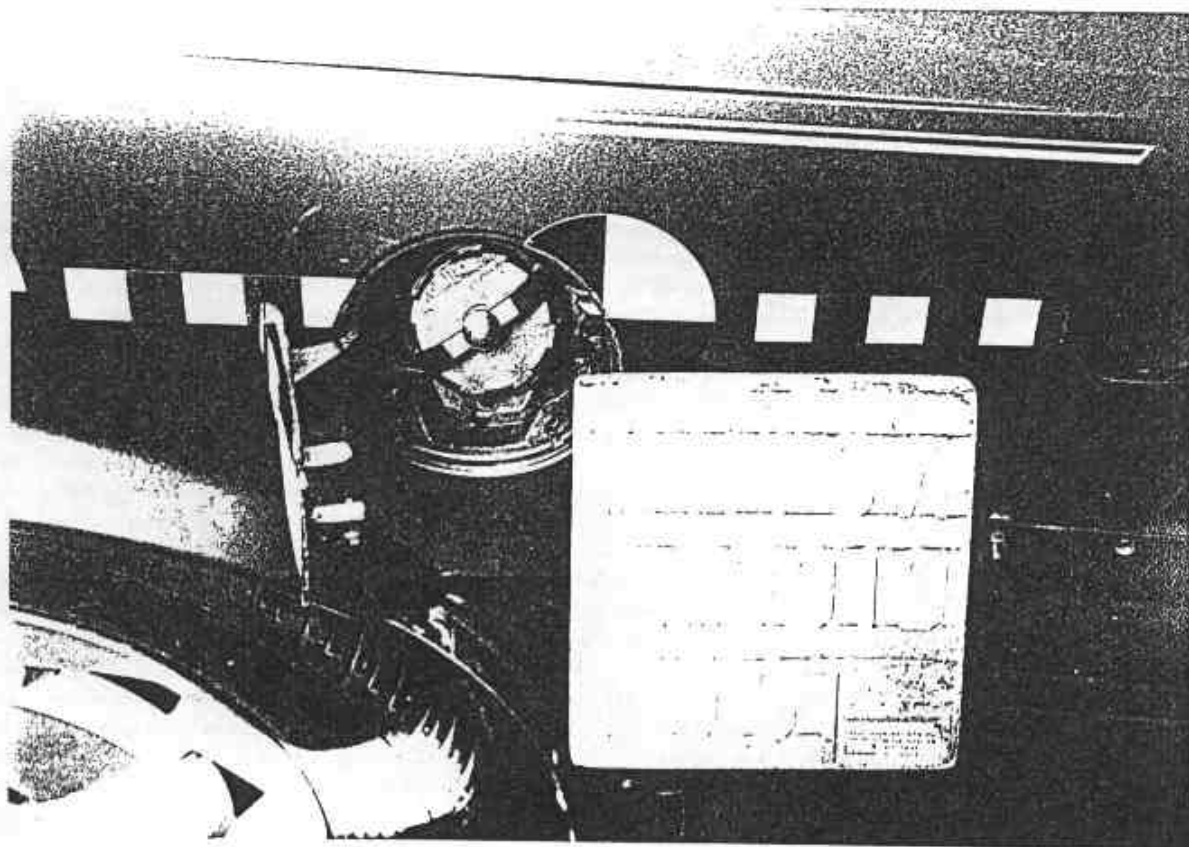


Figure A-18. POST-TEST FUEL FILLER CAP VIEW



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

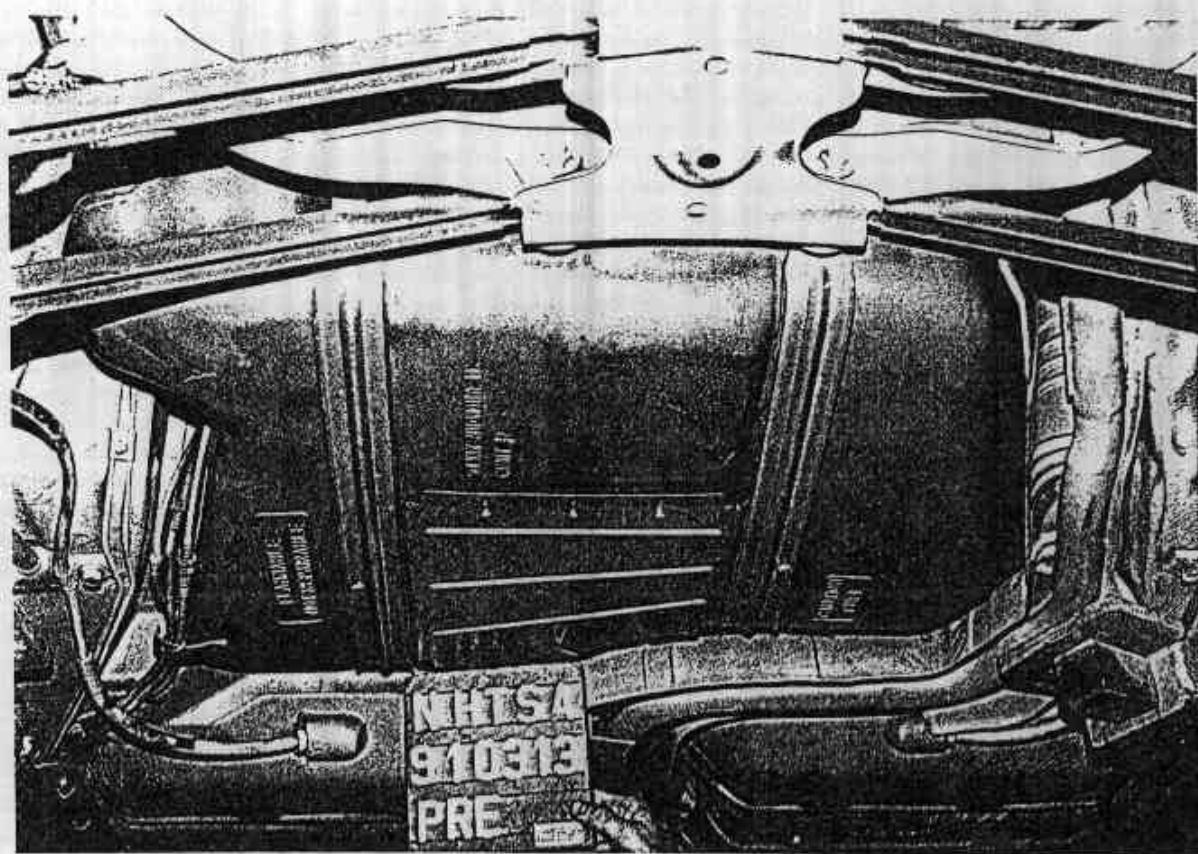


Figure A-20. PRE-TEST FUEL TANK VIEW

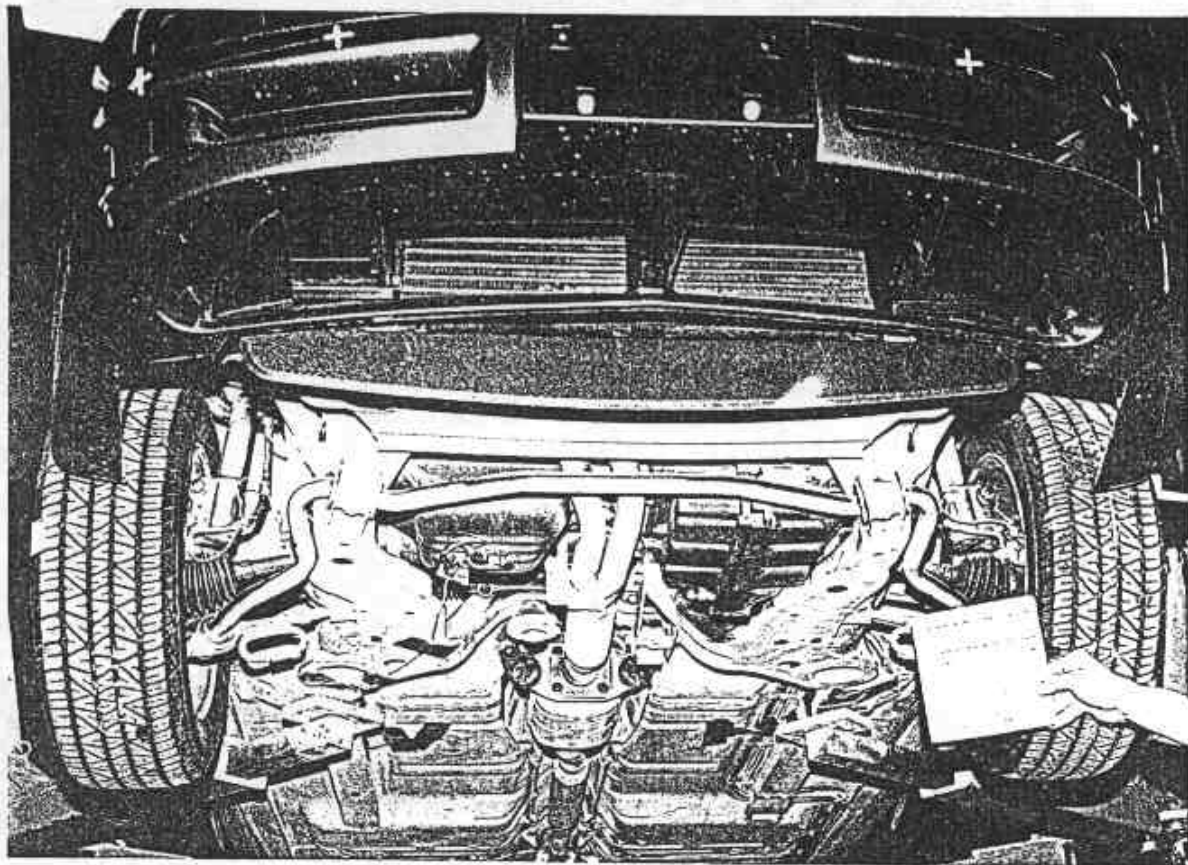


Figure A-21. PRE-TEST FRONT UNDERBODY VIEW

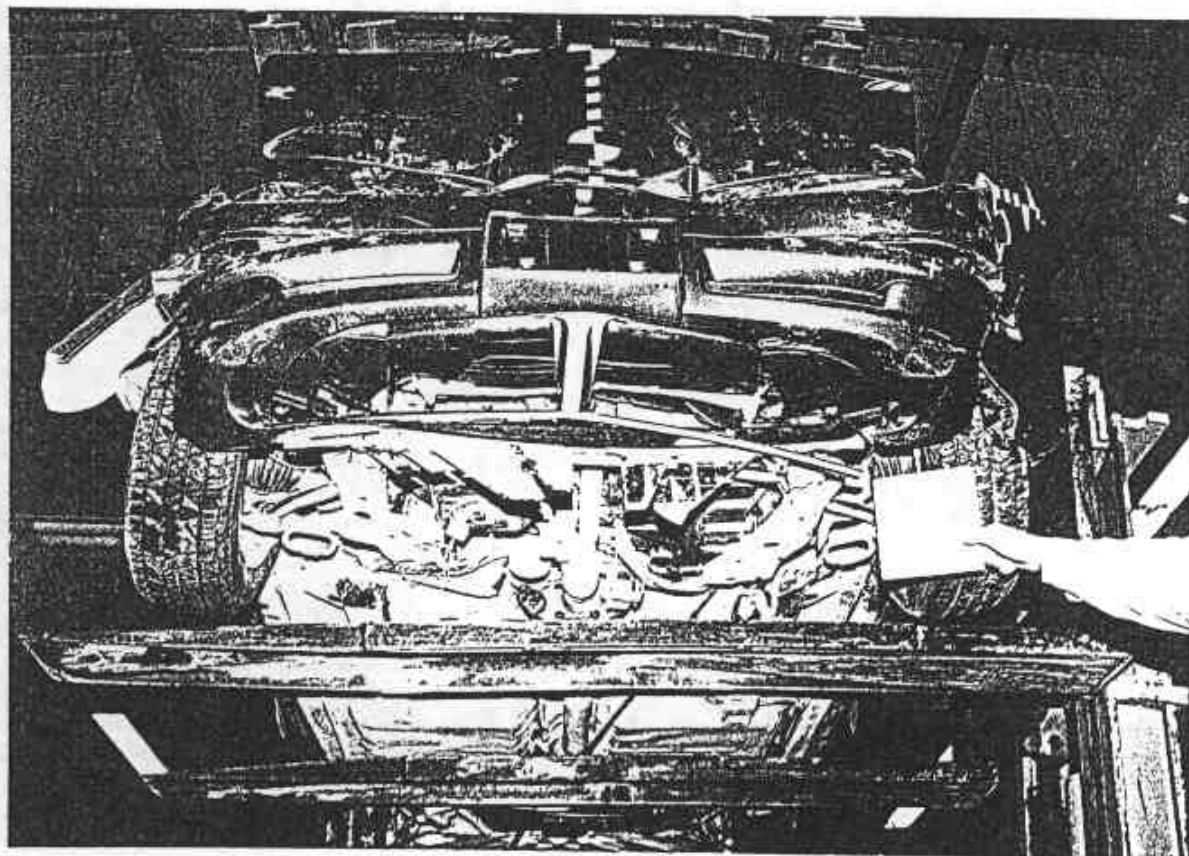


Figure A-22. POST-TEST FRONT UNDERBODY VIEW

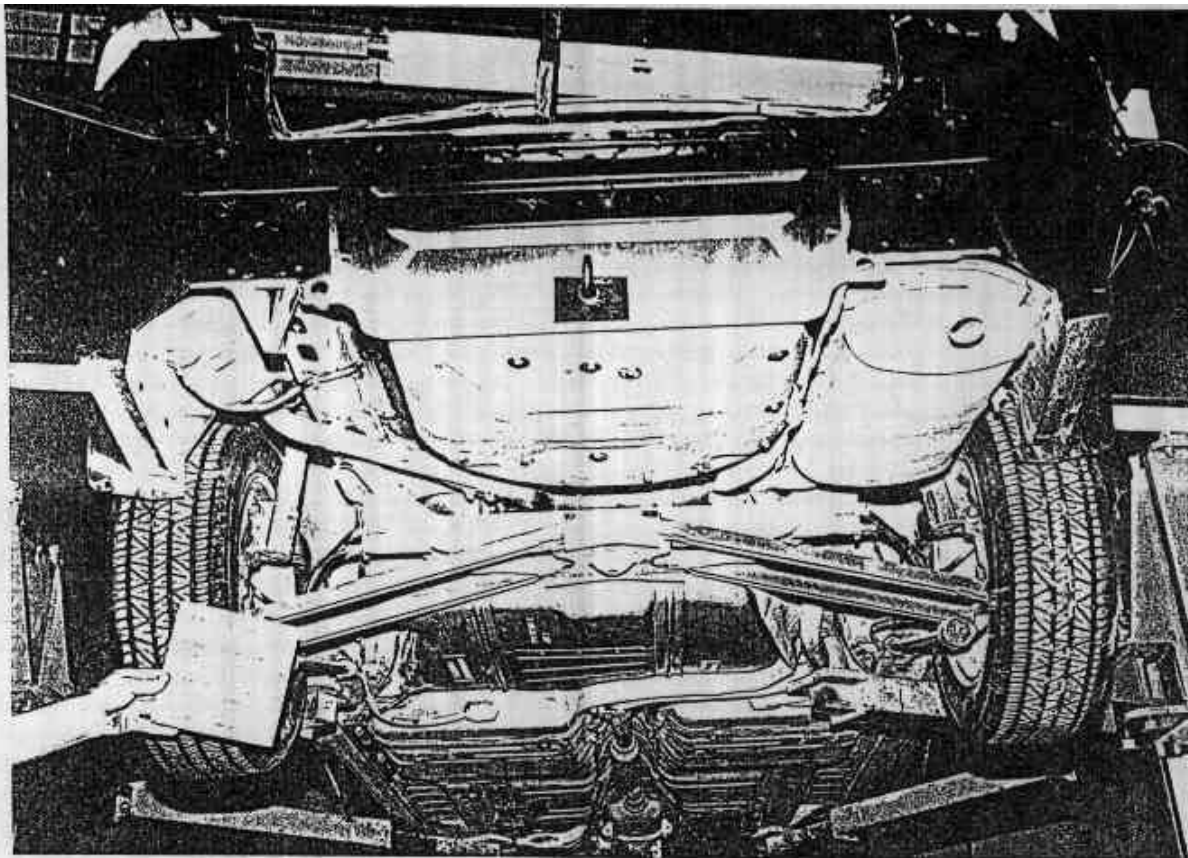


Figure A-23. PRE-TEST REAR UNDERBODY VIEW

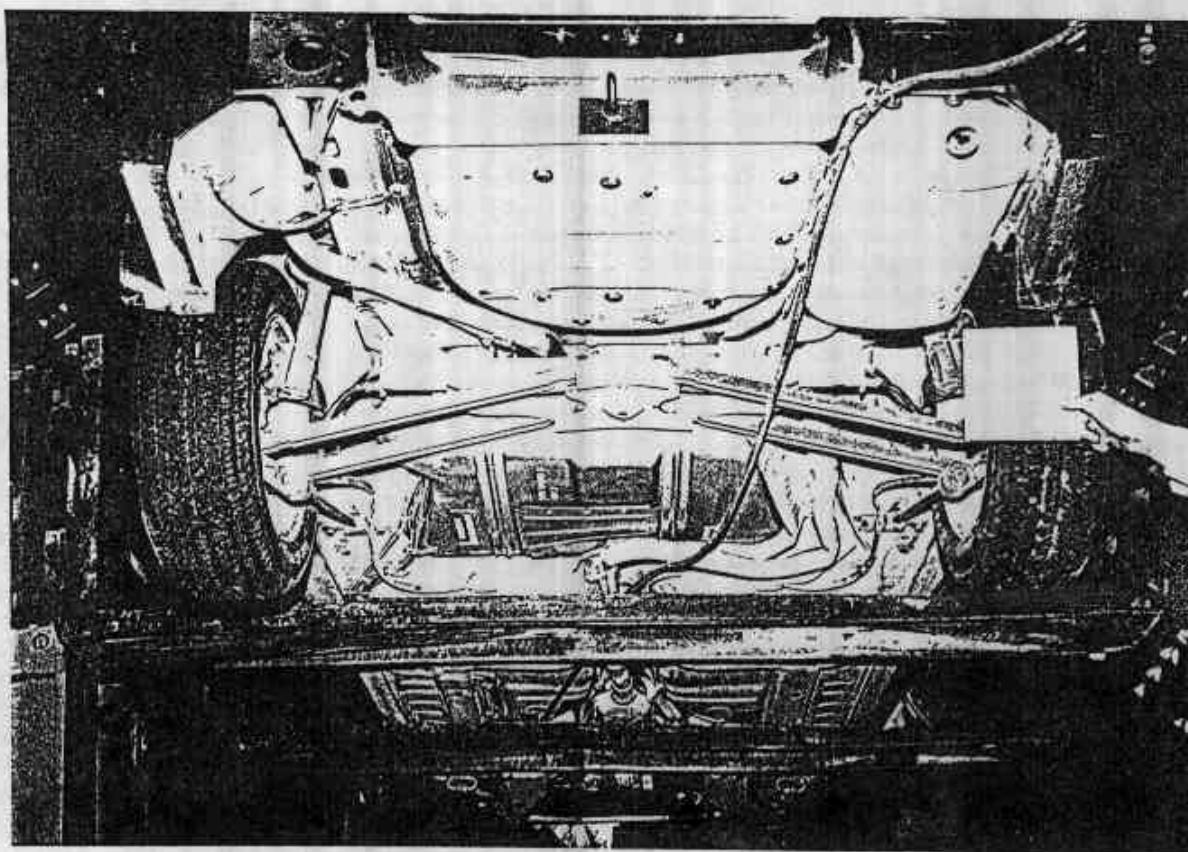


Figure A-24. POST-TEST REAR UNDERBODY VIEW

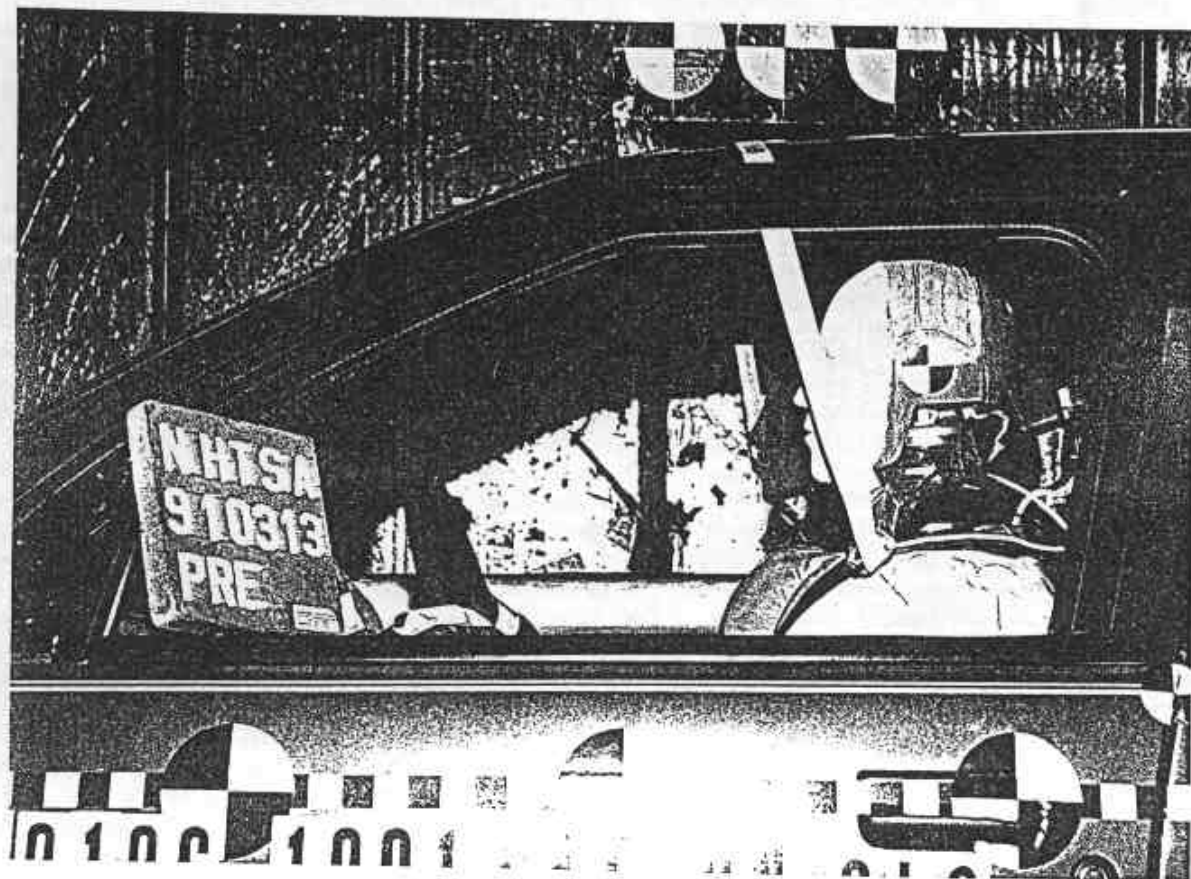


Figure A-25. PRE-TEST DRIVER DUMMY POSITION VIEW



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



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



Figure A-28. POST-TEST PASSENGER DUMMY POSITION VIEW

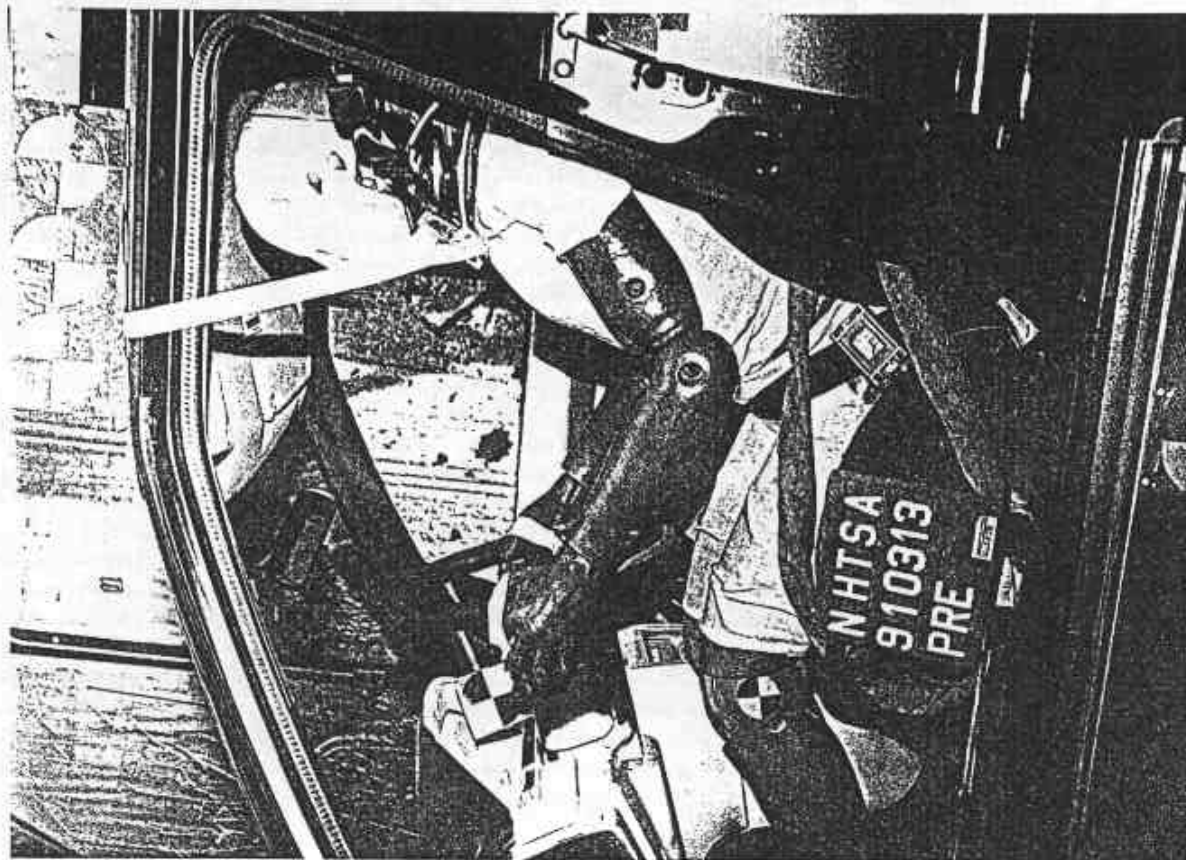


Figure A-29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

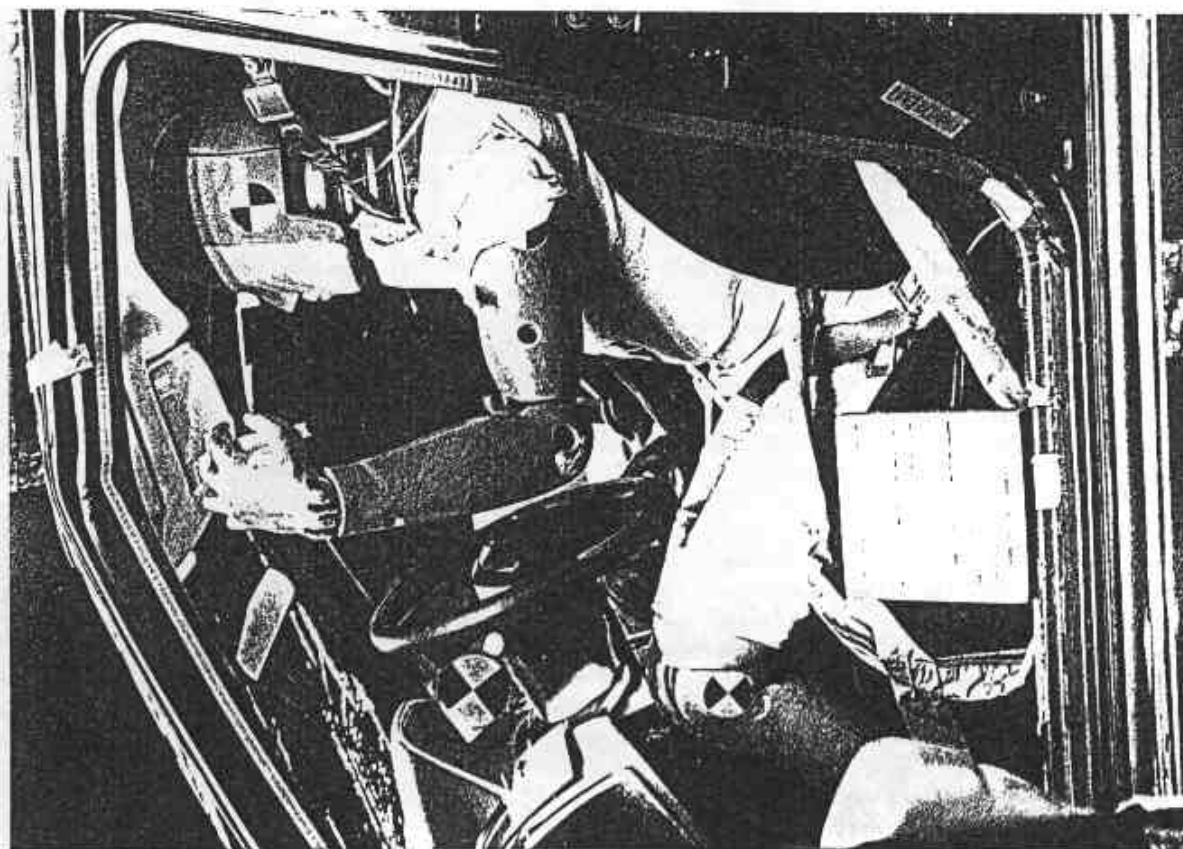


Figure A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW

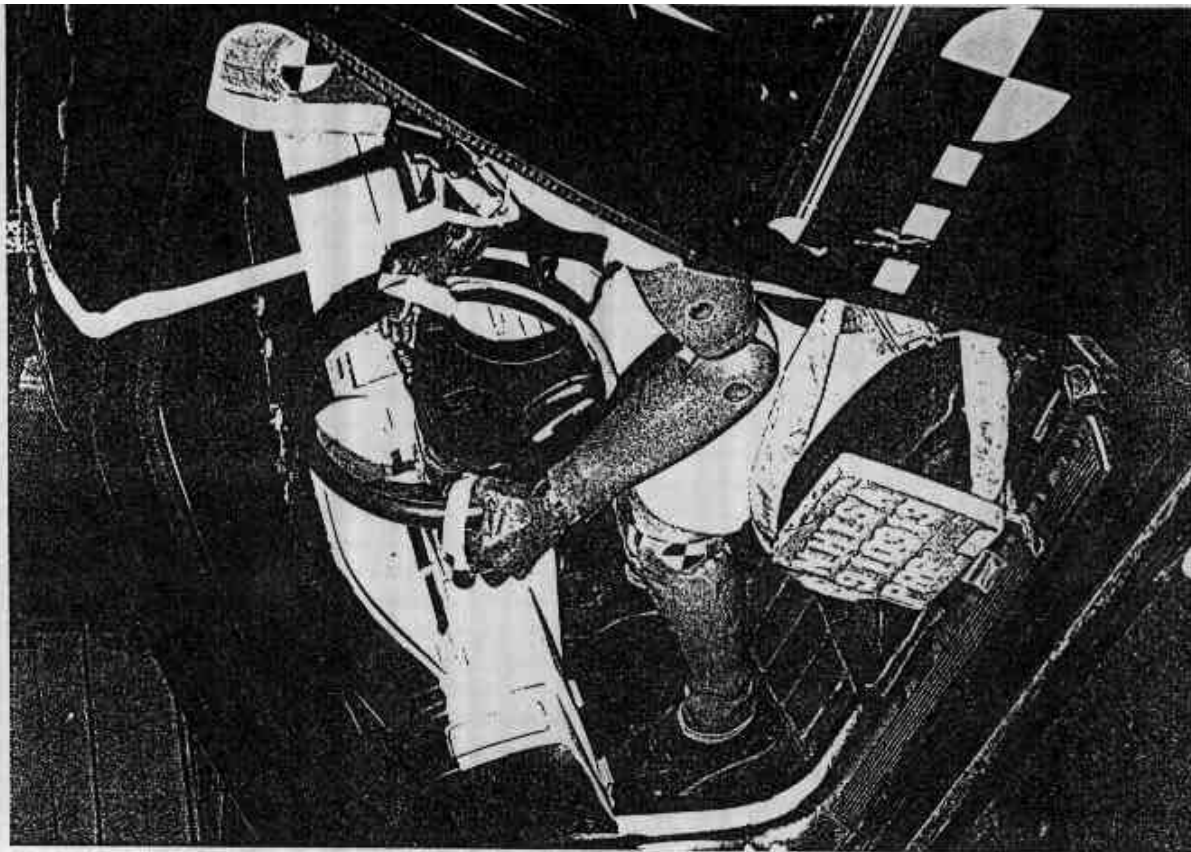


Figure A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

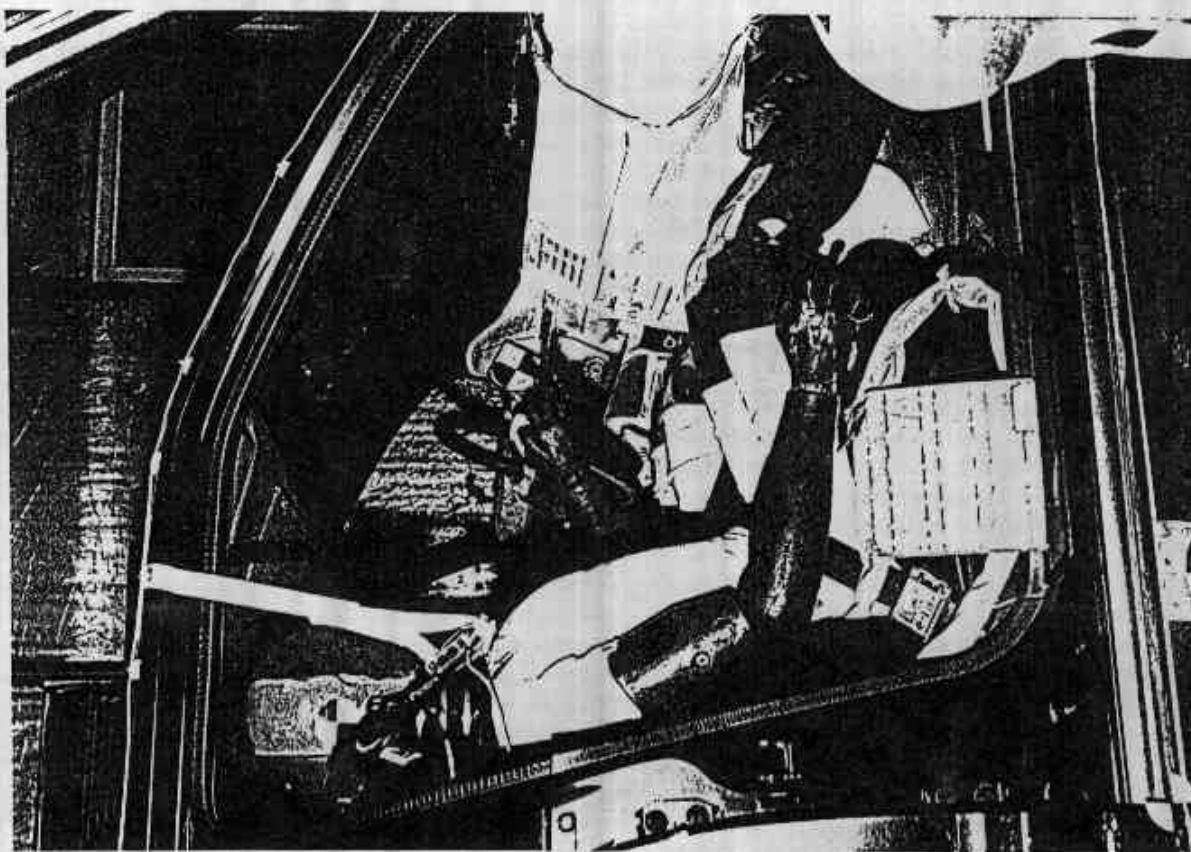


Figure A-32. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

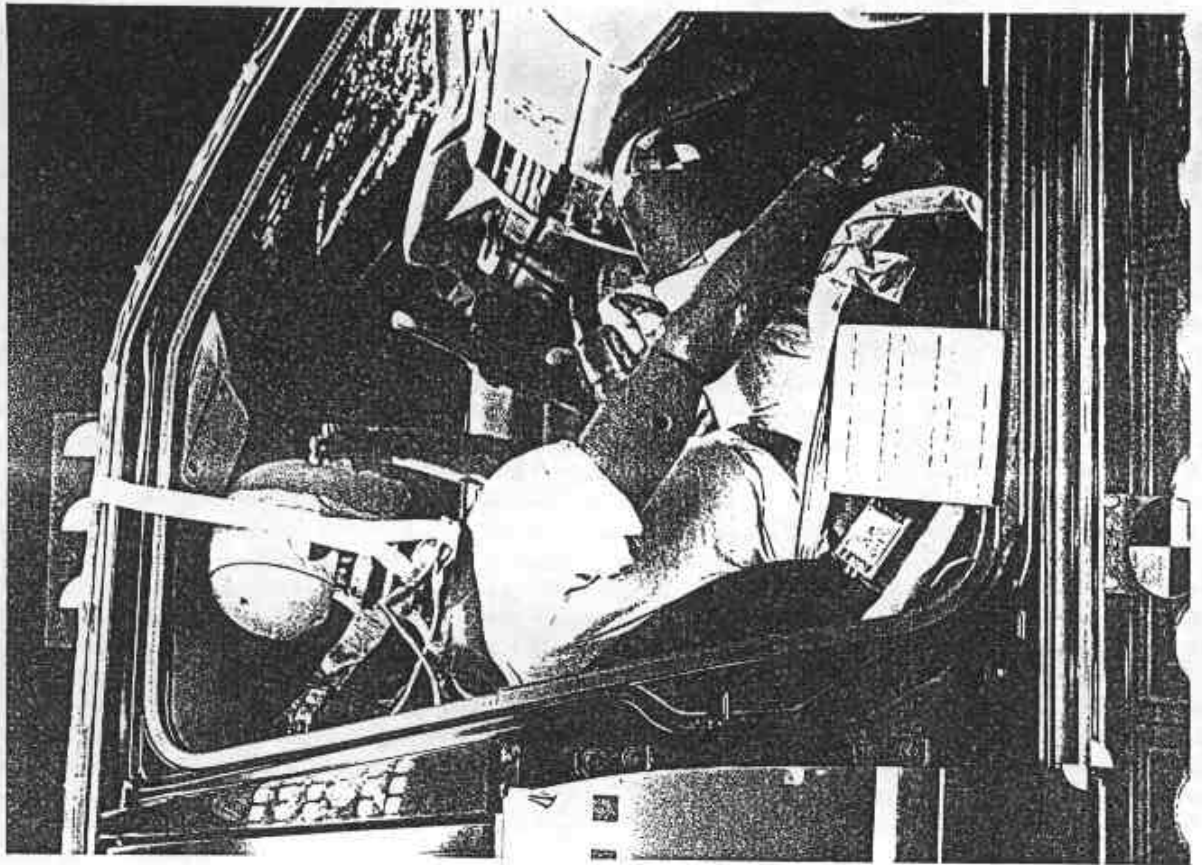


Figure A-33. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

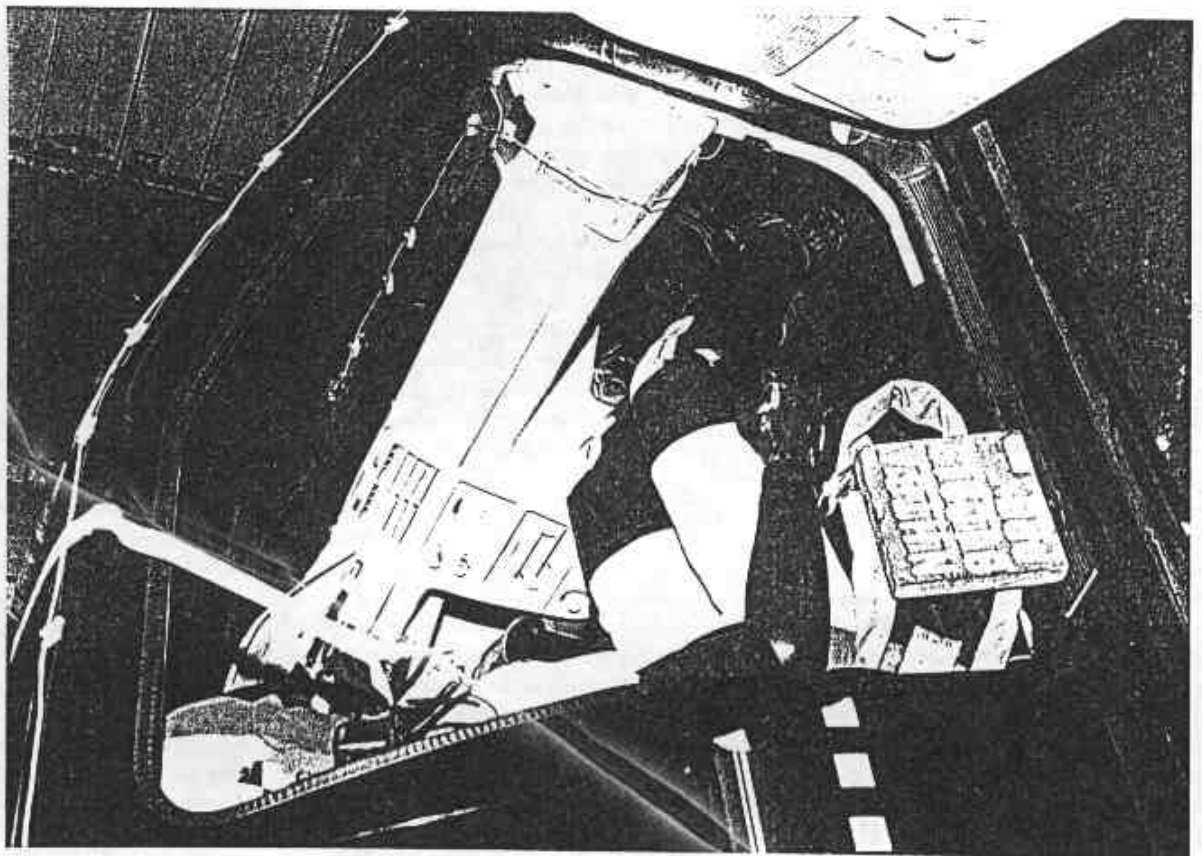


Figure A-34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

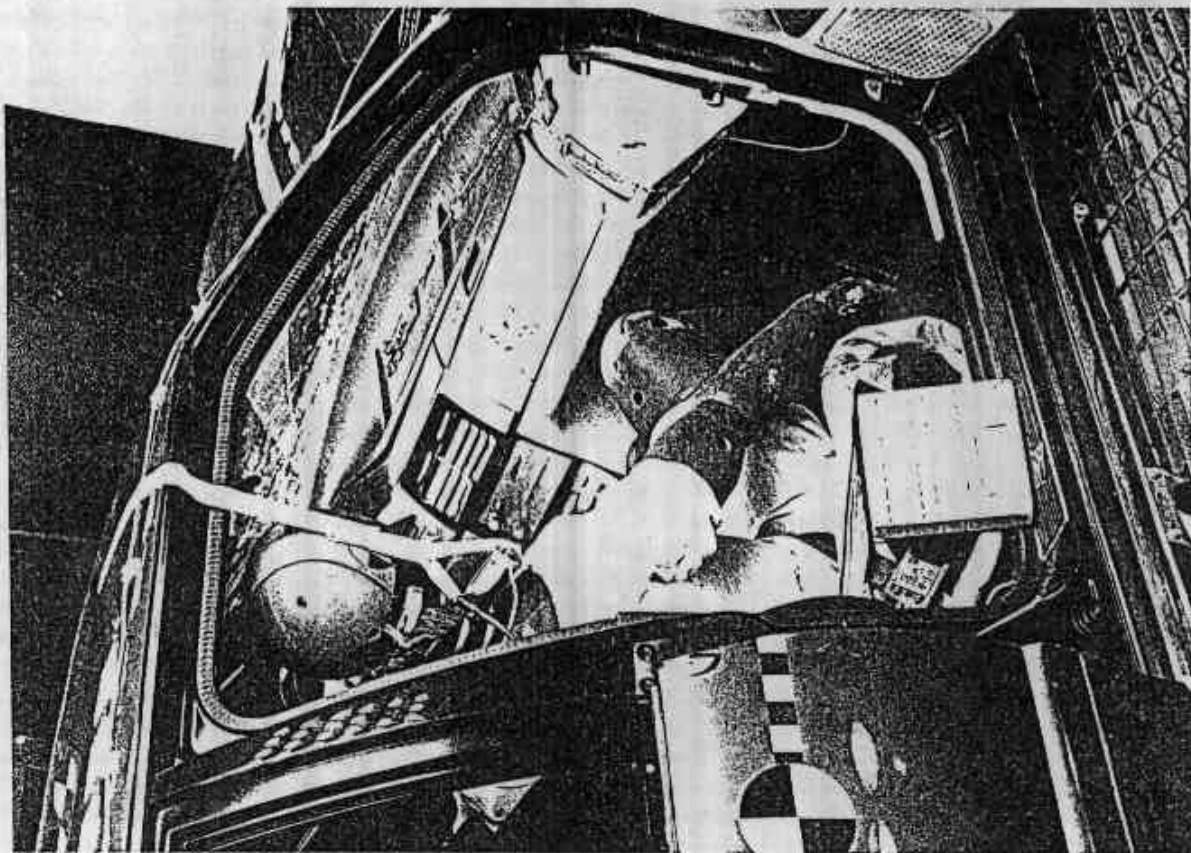


Figure A-35. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

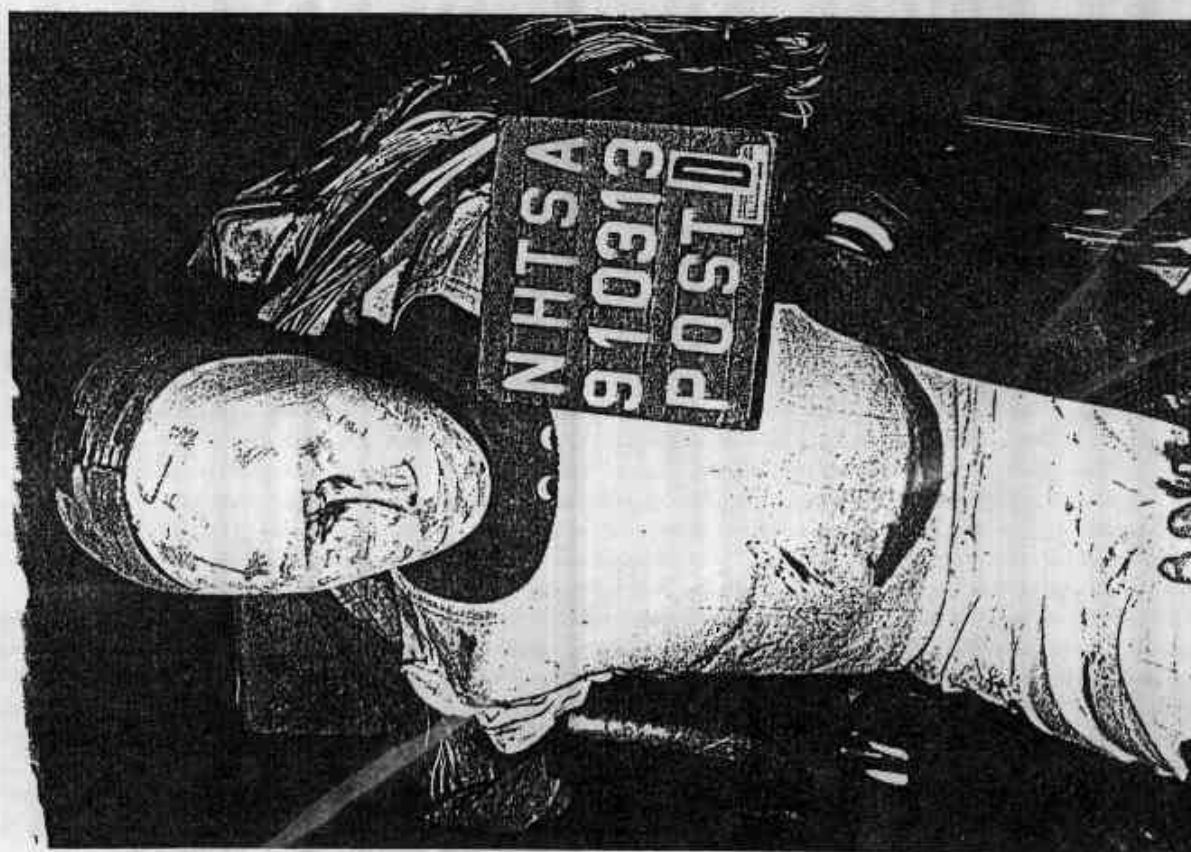


Figure A-36. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

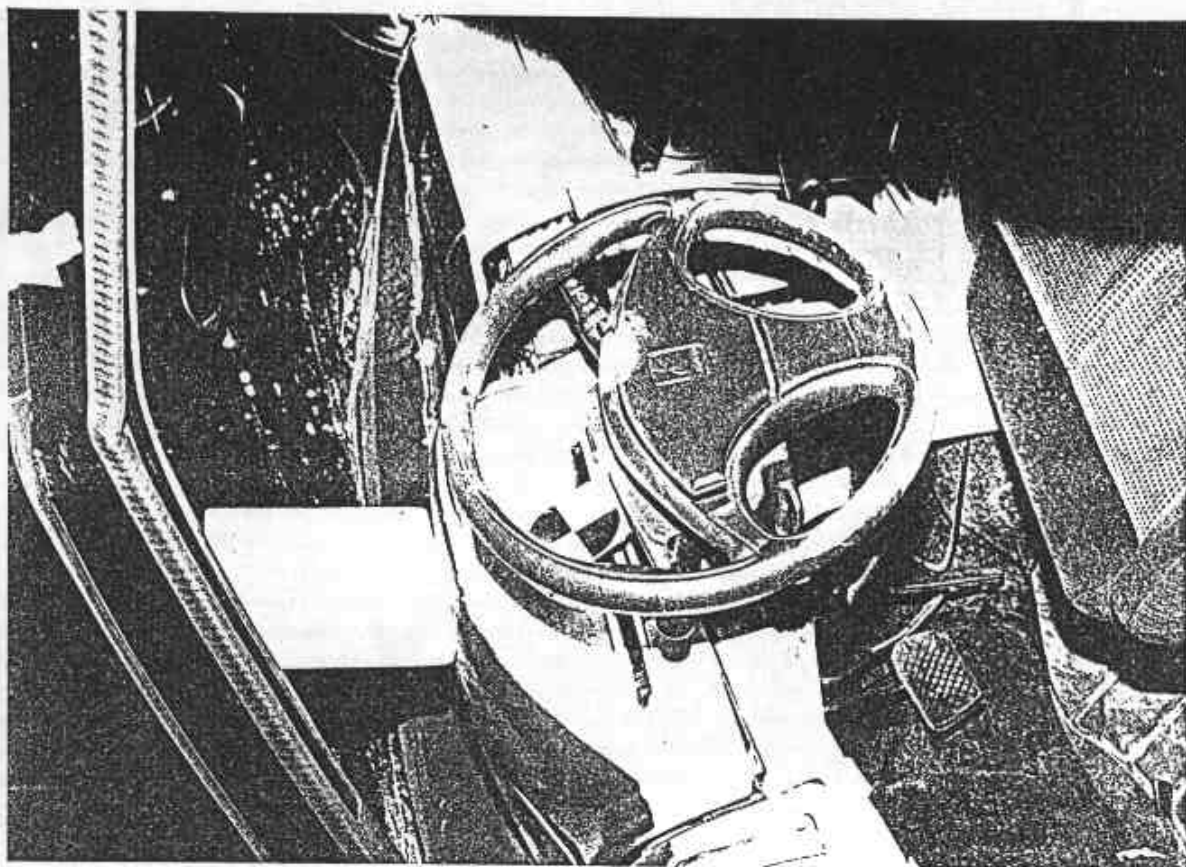


Figure A-37. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2



Figure A-38. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

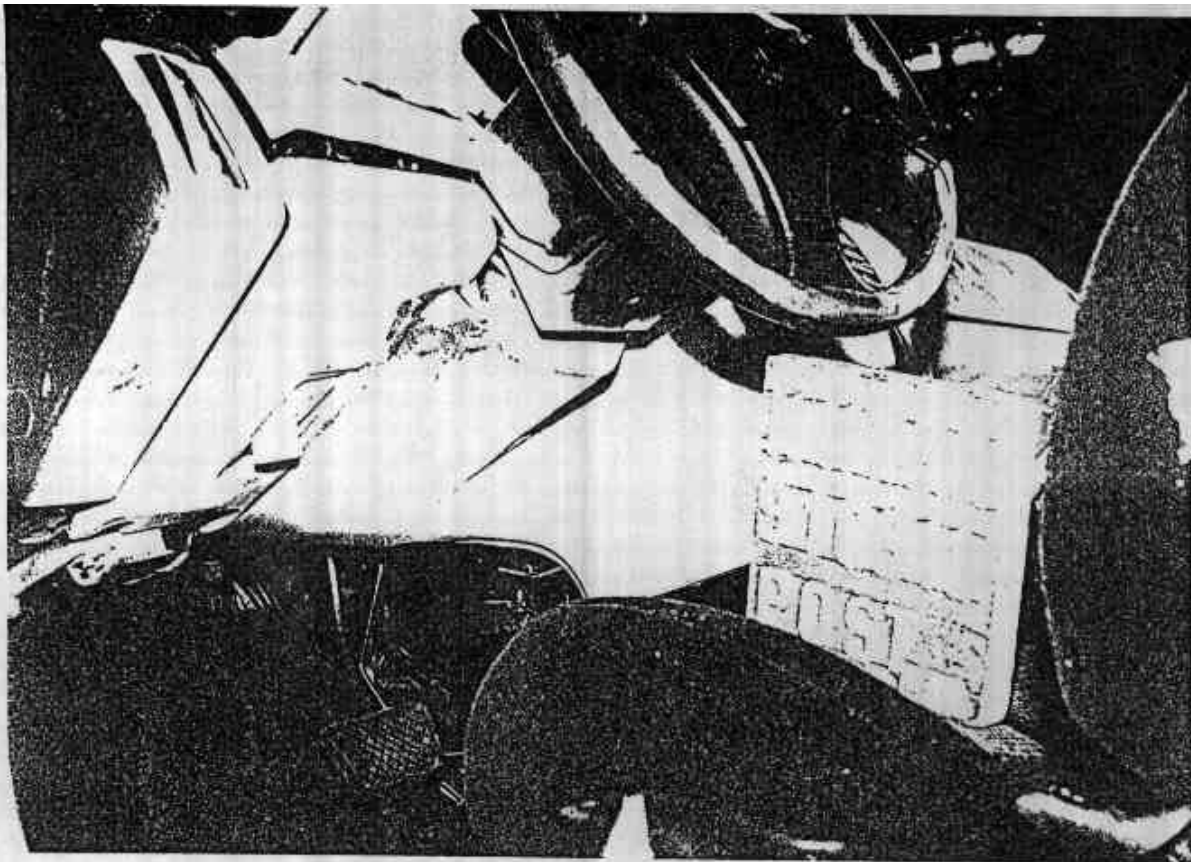


Figure A-39. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2



Figure A-40. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

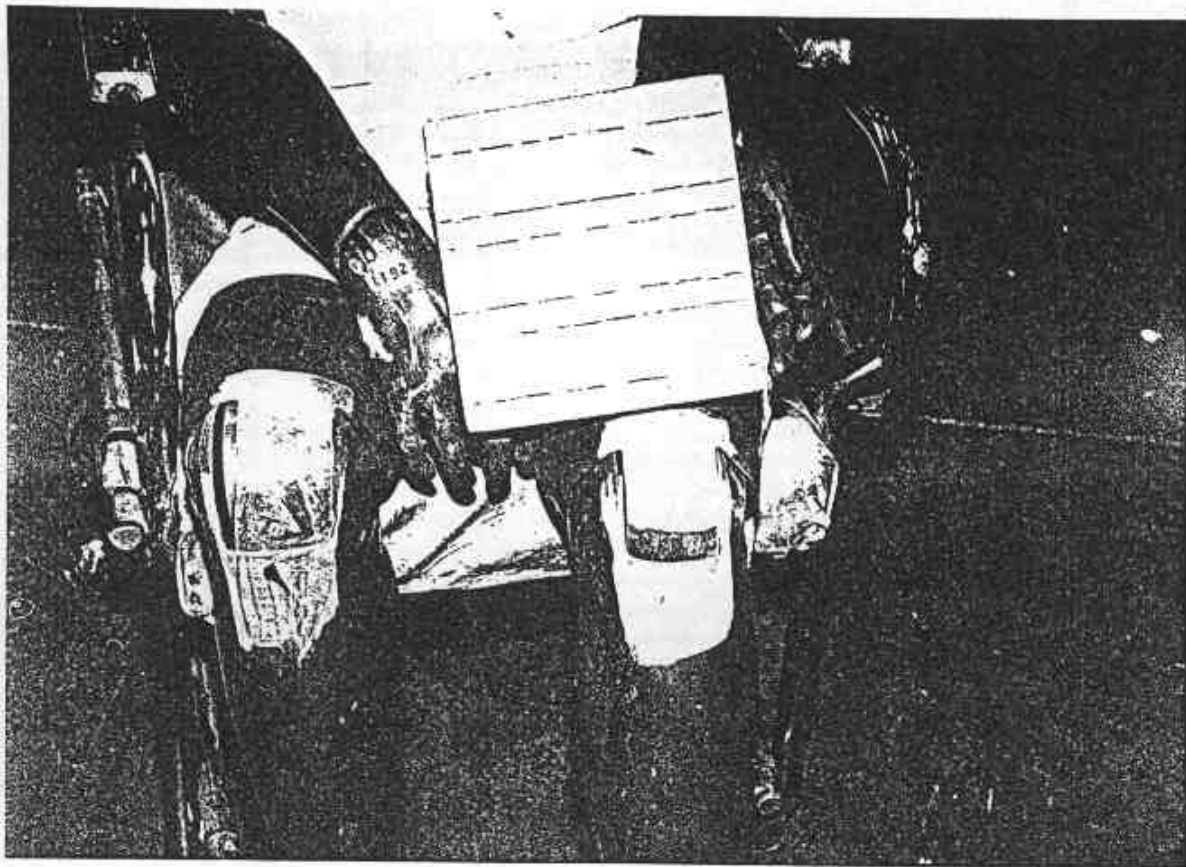


Figure A-41. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1

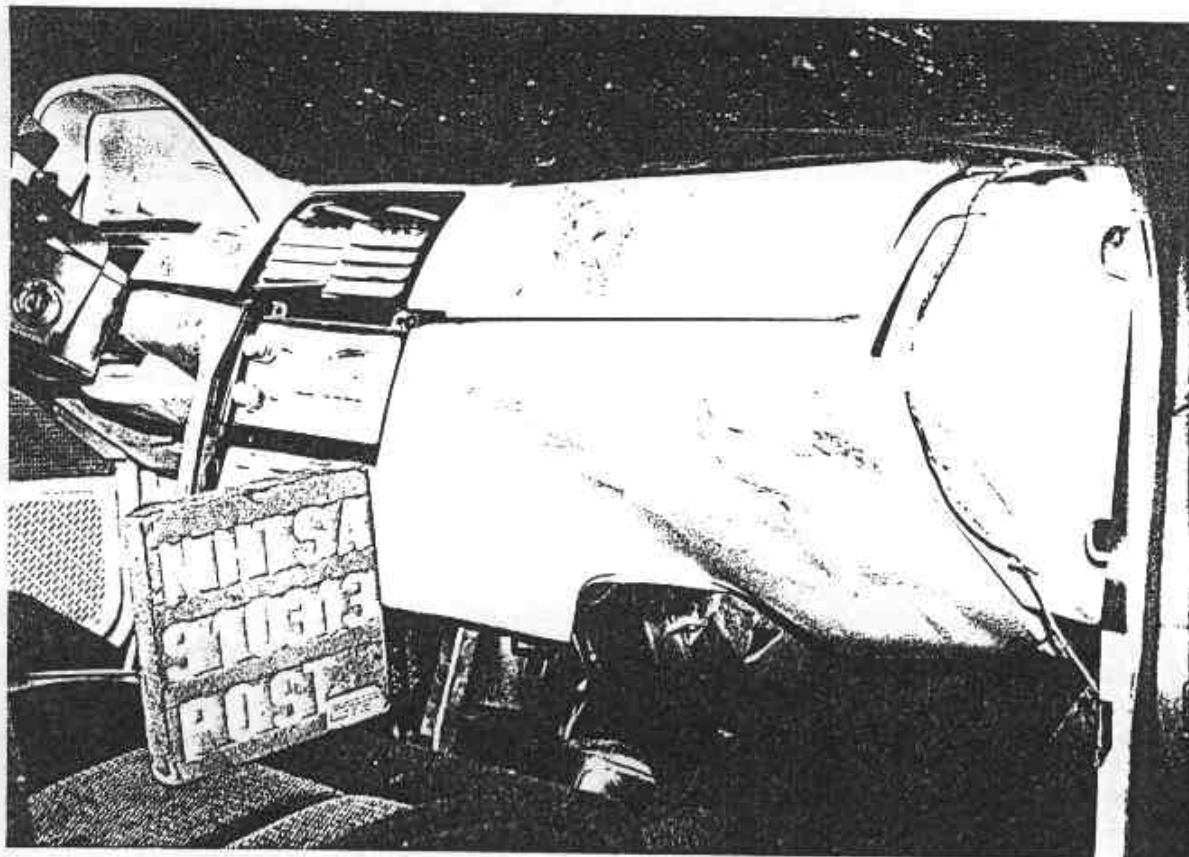


Figure A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

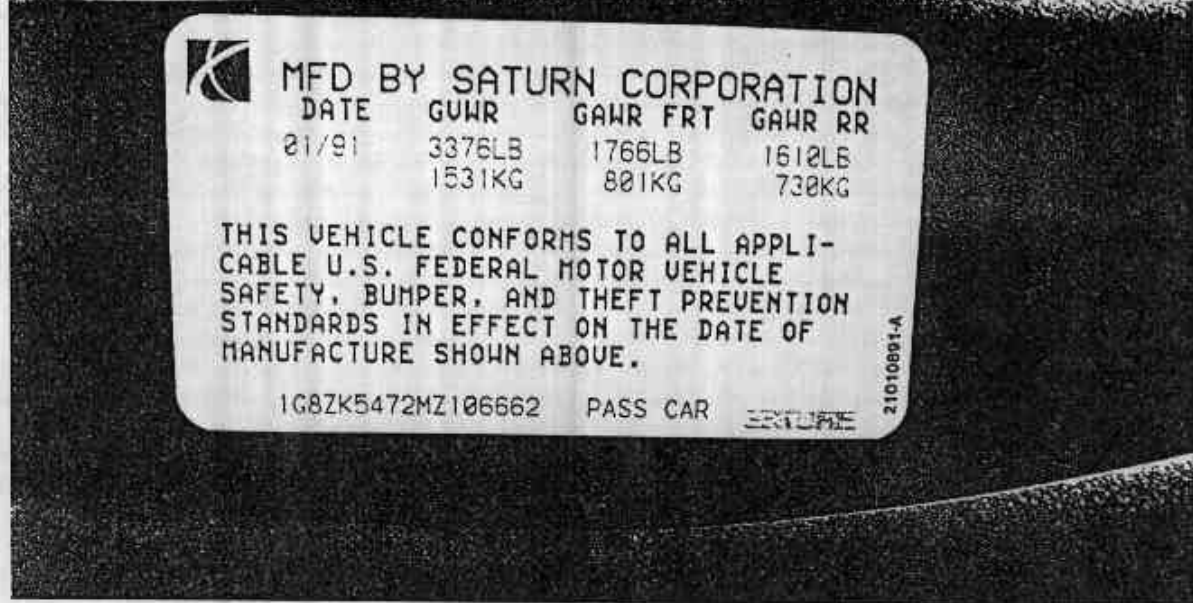


Figure A-43. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

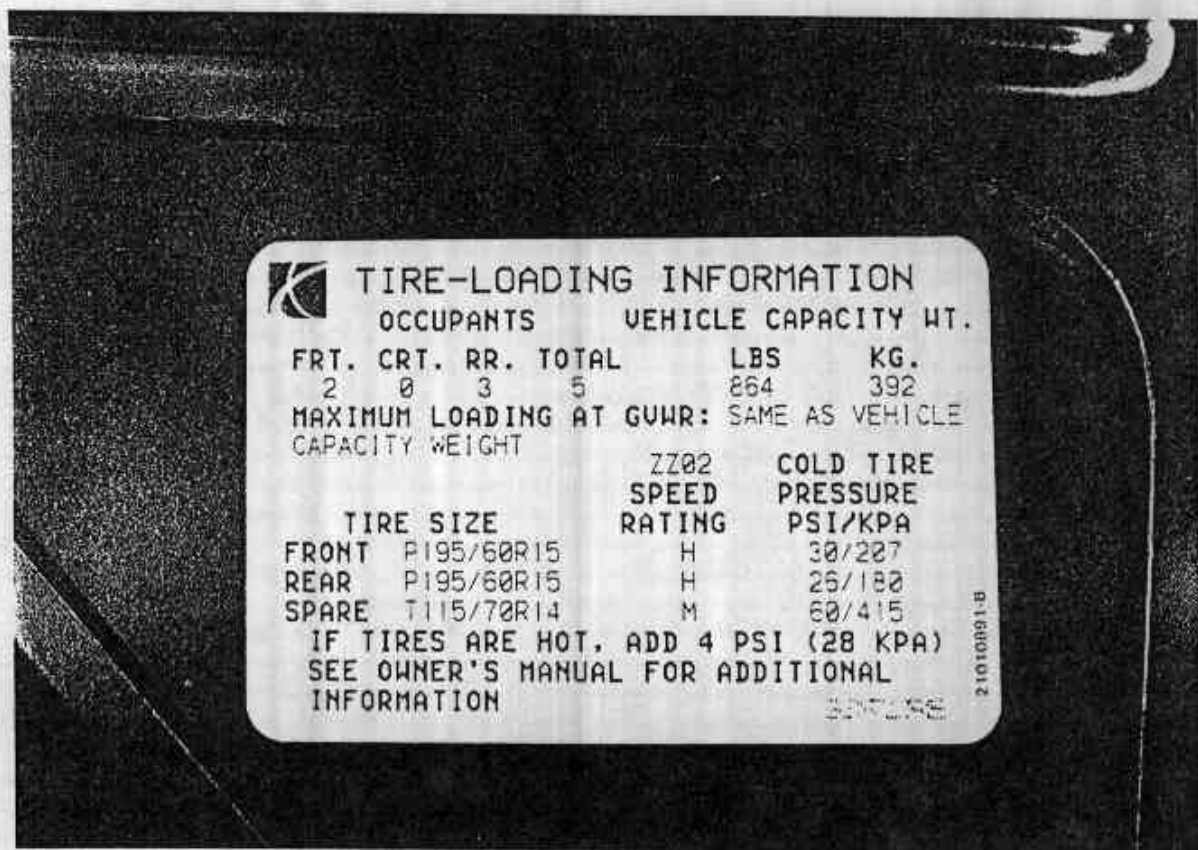


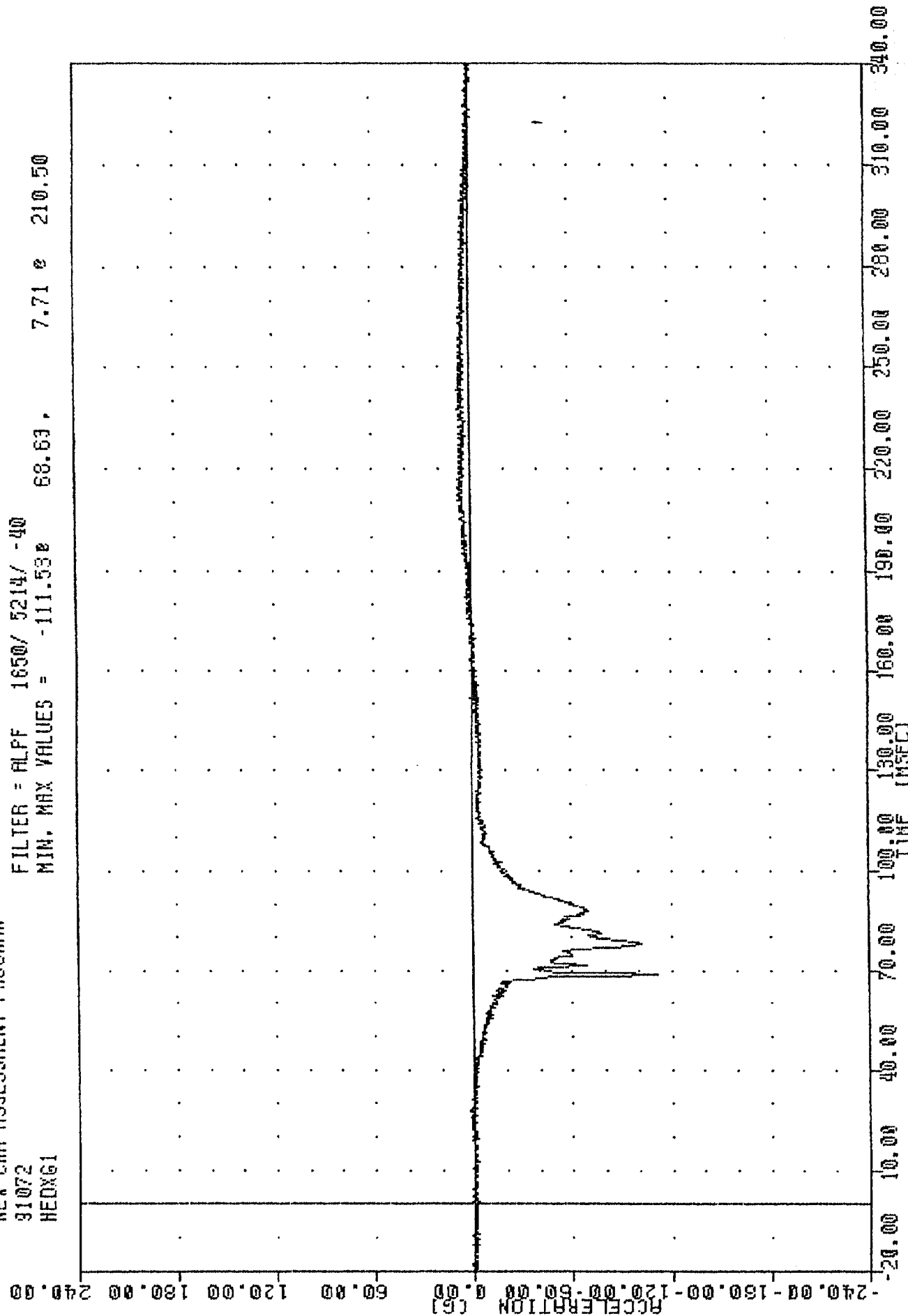
Figure A-44. PRE-TEST RECOMMENDED TIRE PRESSURE LABEL VIEW

APPENDIX B

DATA PLOTS

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 31072
 HEDXG1

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -111.53 68.63 , 7.71 e 210.50



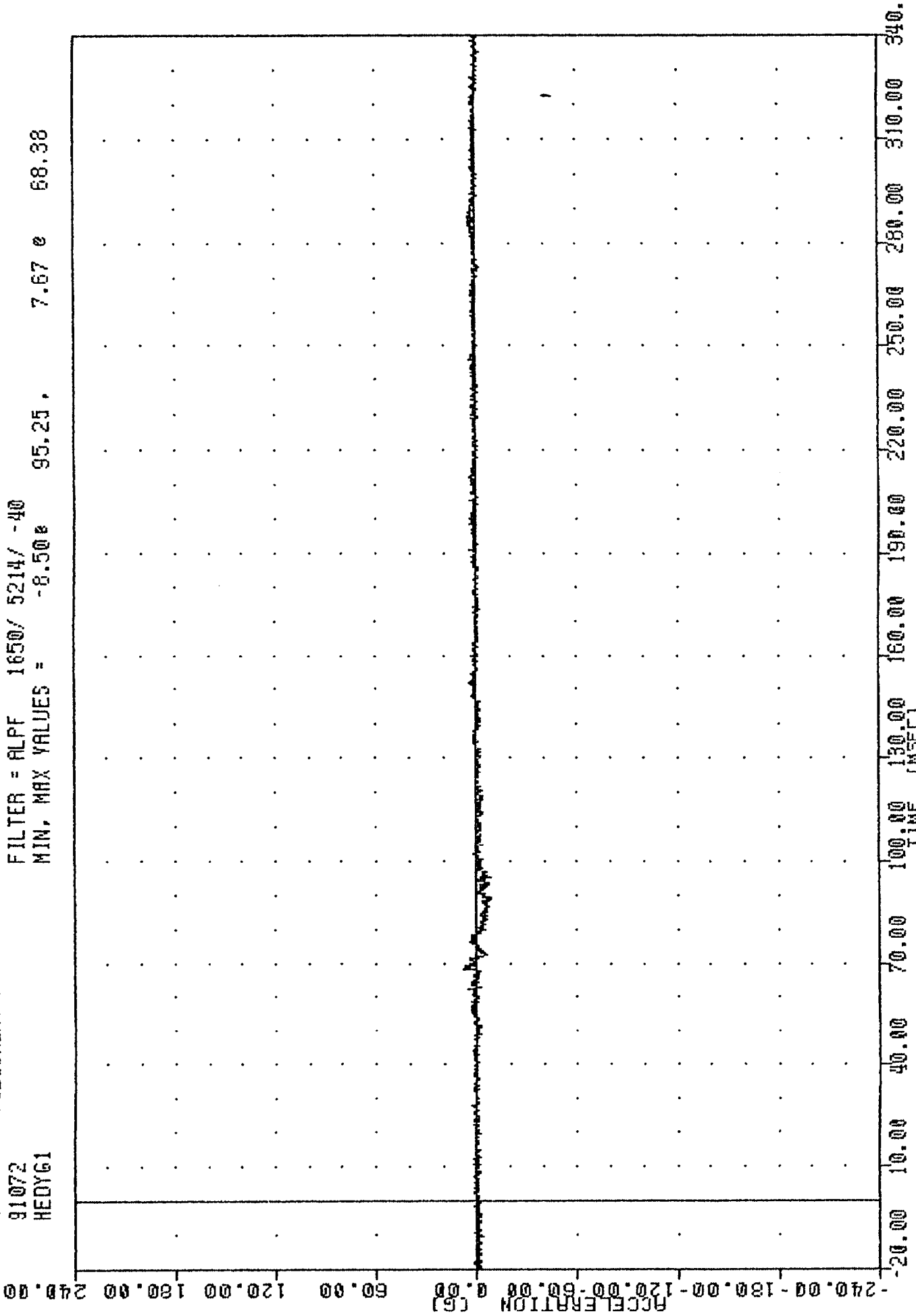
B-2

910313

1991 SATURN 3L2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION

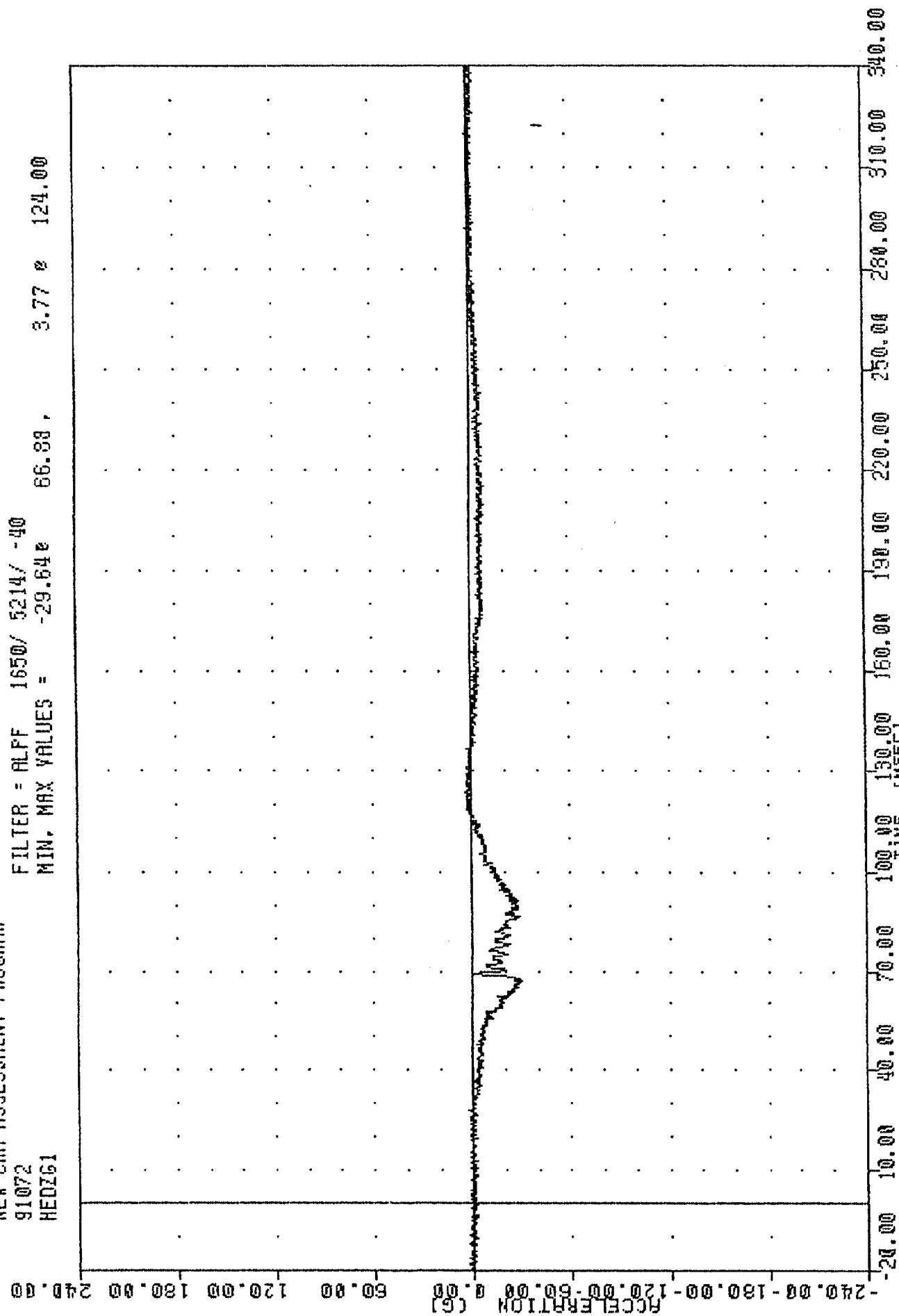
INL , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEDYG1

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -8.50e 95.25, 7.67 e 68.38



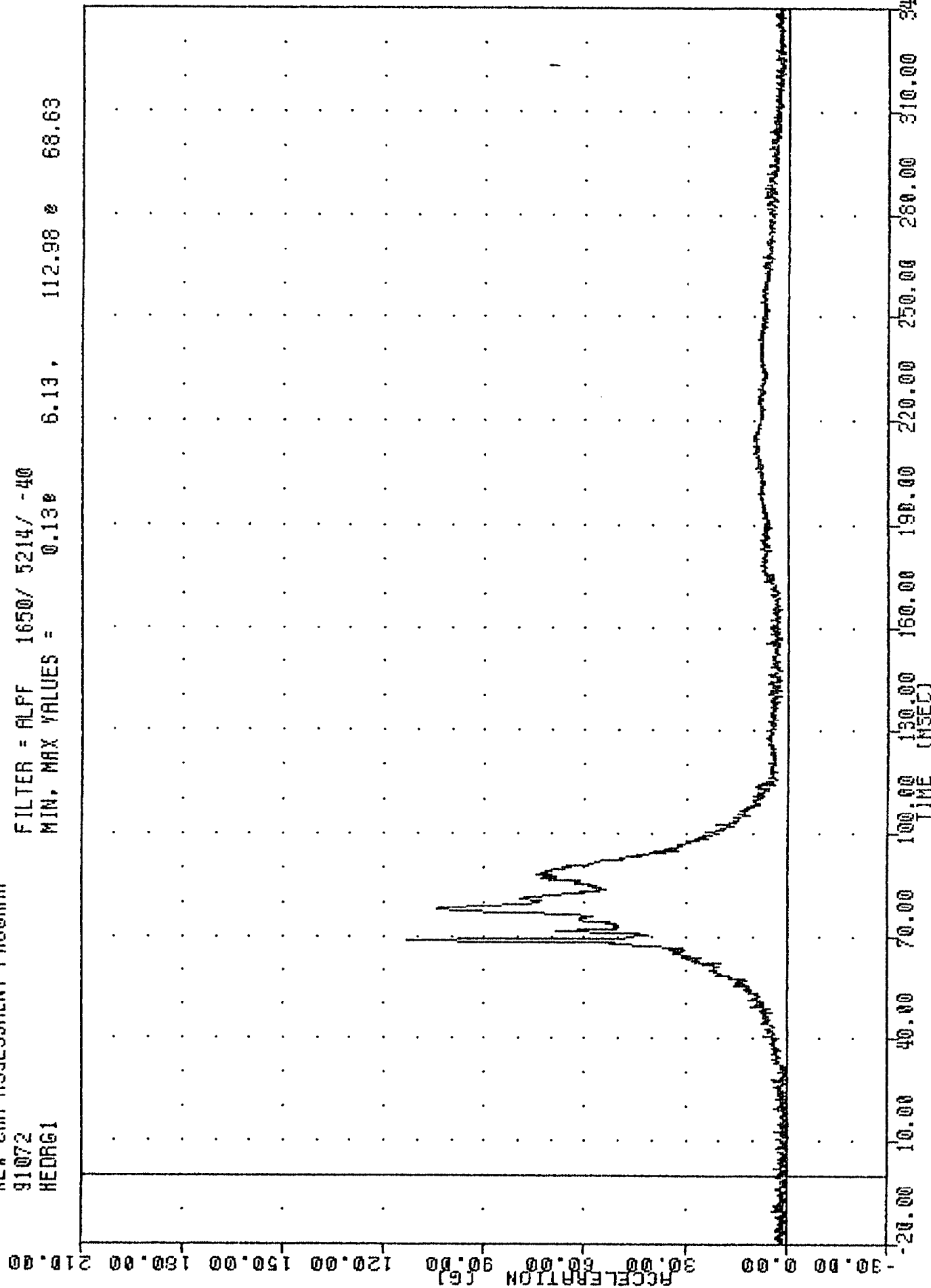
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEDZ61

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -29.64e 66.88 , 3.77 e 124.00



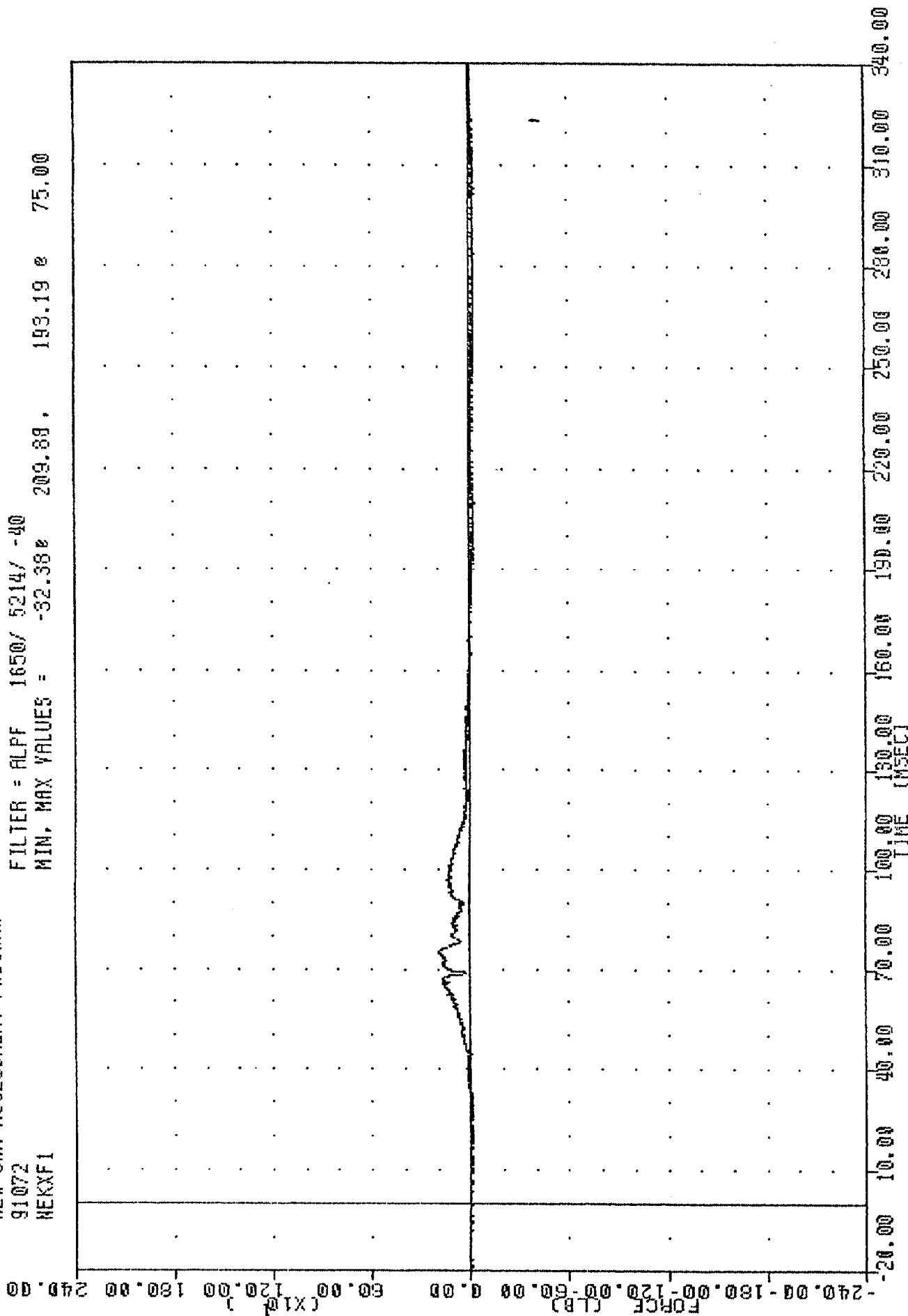
INC , 310313
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEDRG1

FILTER = ALFF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.13e 6.13, 112.98 e 68.63



TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKXF1

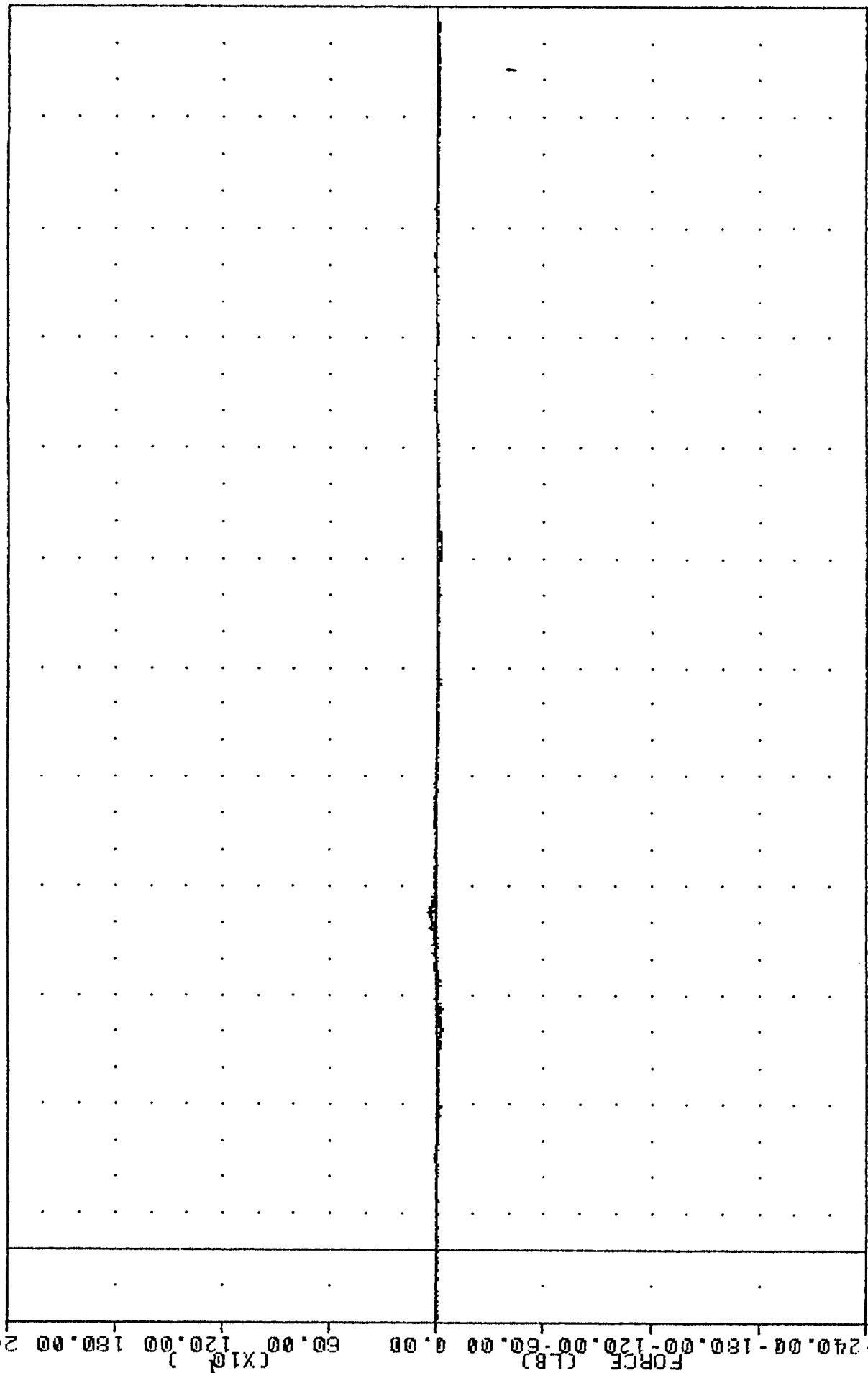
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -32.38% 209.89 , 193.19 @ 75.00



INC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKYF1

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -32.32e 65.88 , 47.87 e 92.38

240.00



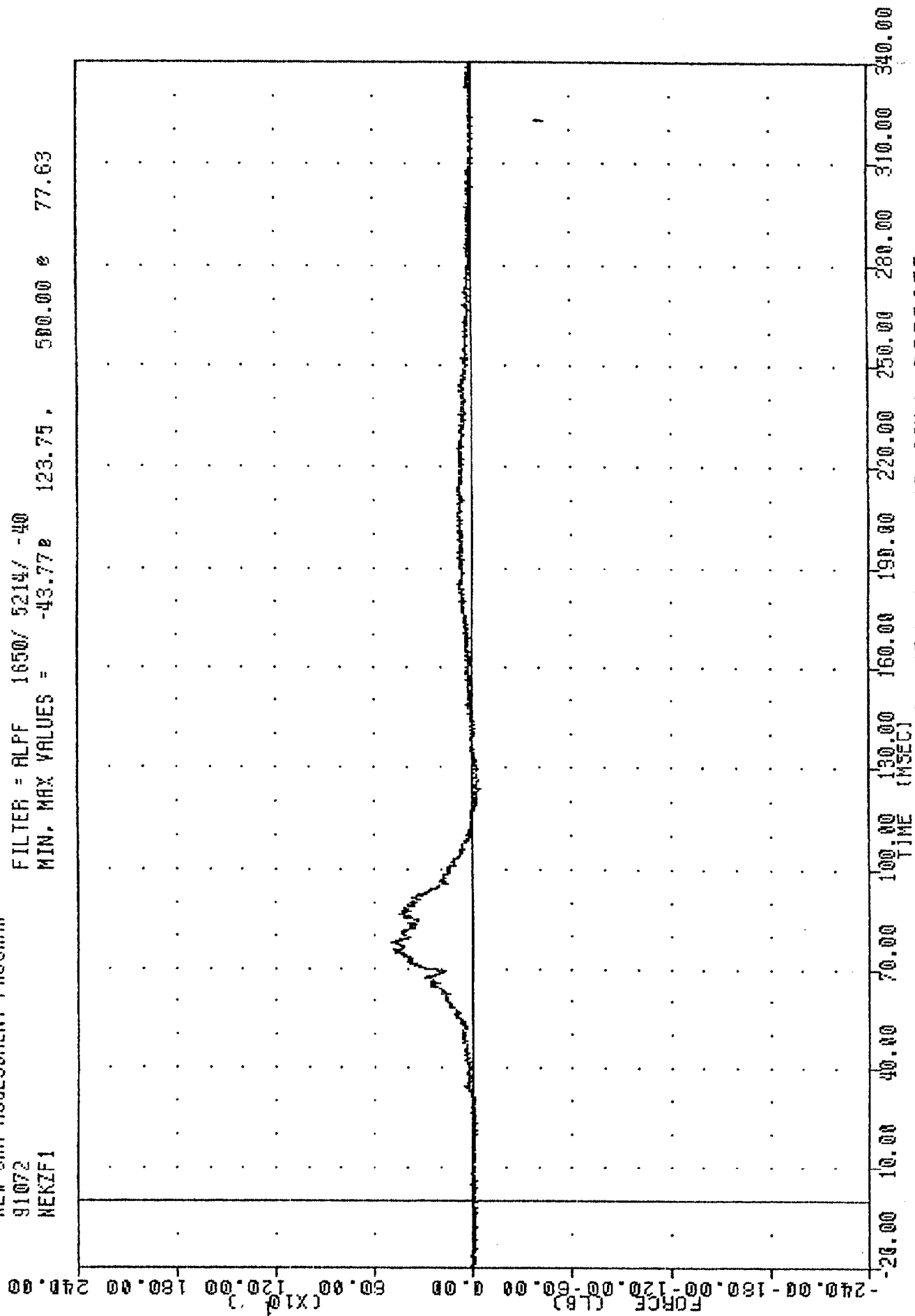
B-7

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Y-AXIS SHEAR FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKZF1

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -43.77 123.75 500.00 77.63



B-8

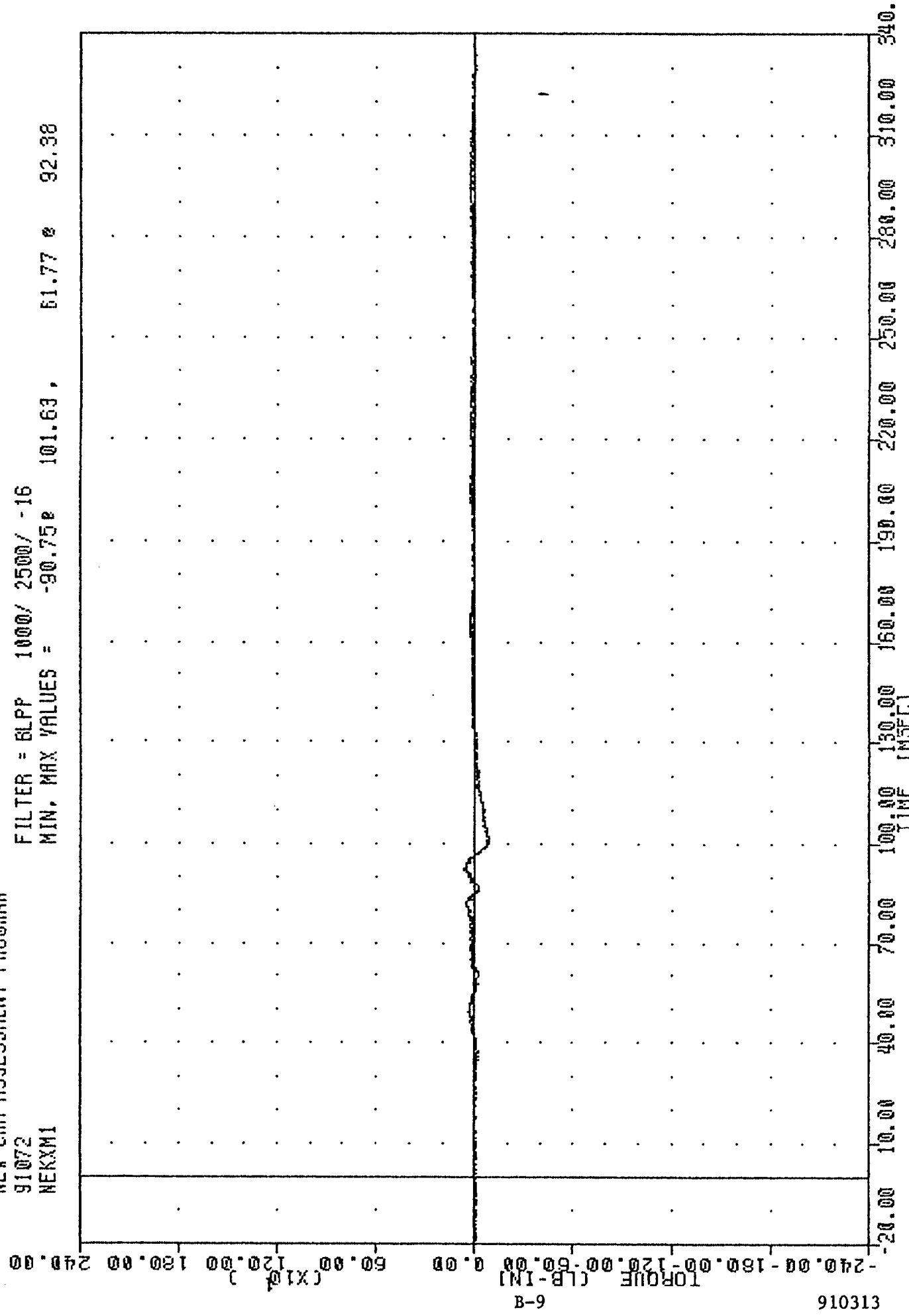
910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

SAFETY MEASURES TAKEN TO PROTECT THE DRIVER

INC 310313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKXM1

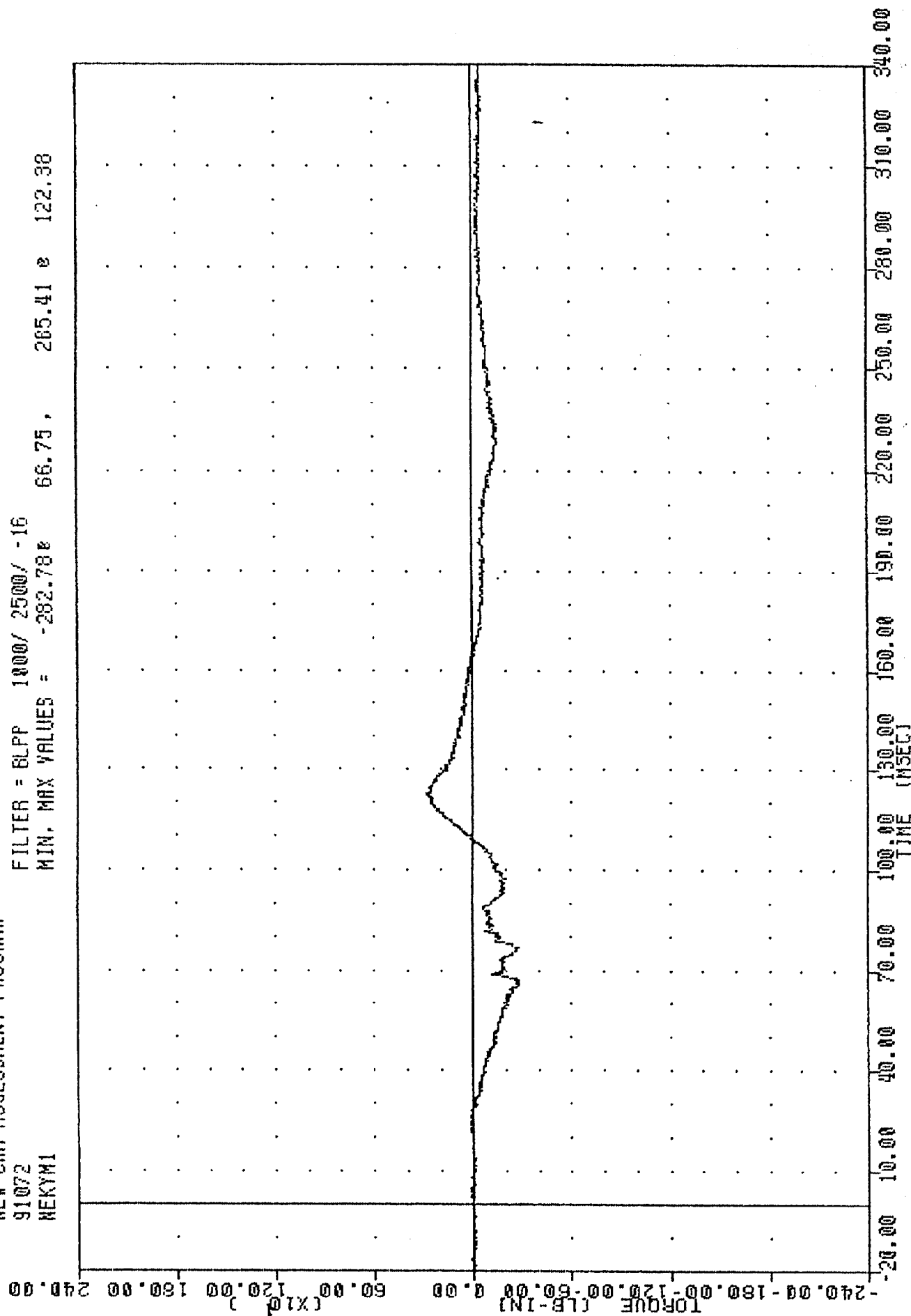
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -90.75e 101.63, 61.77 e 92.38



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT X AXIS

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 REKYM1

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -282.78 66.75, 265.41 122.38



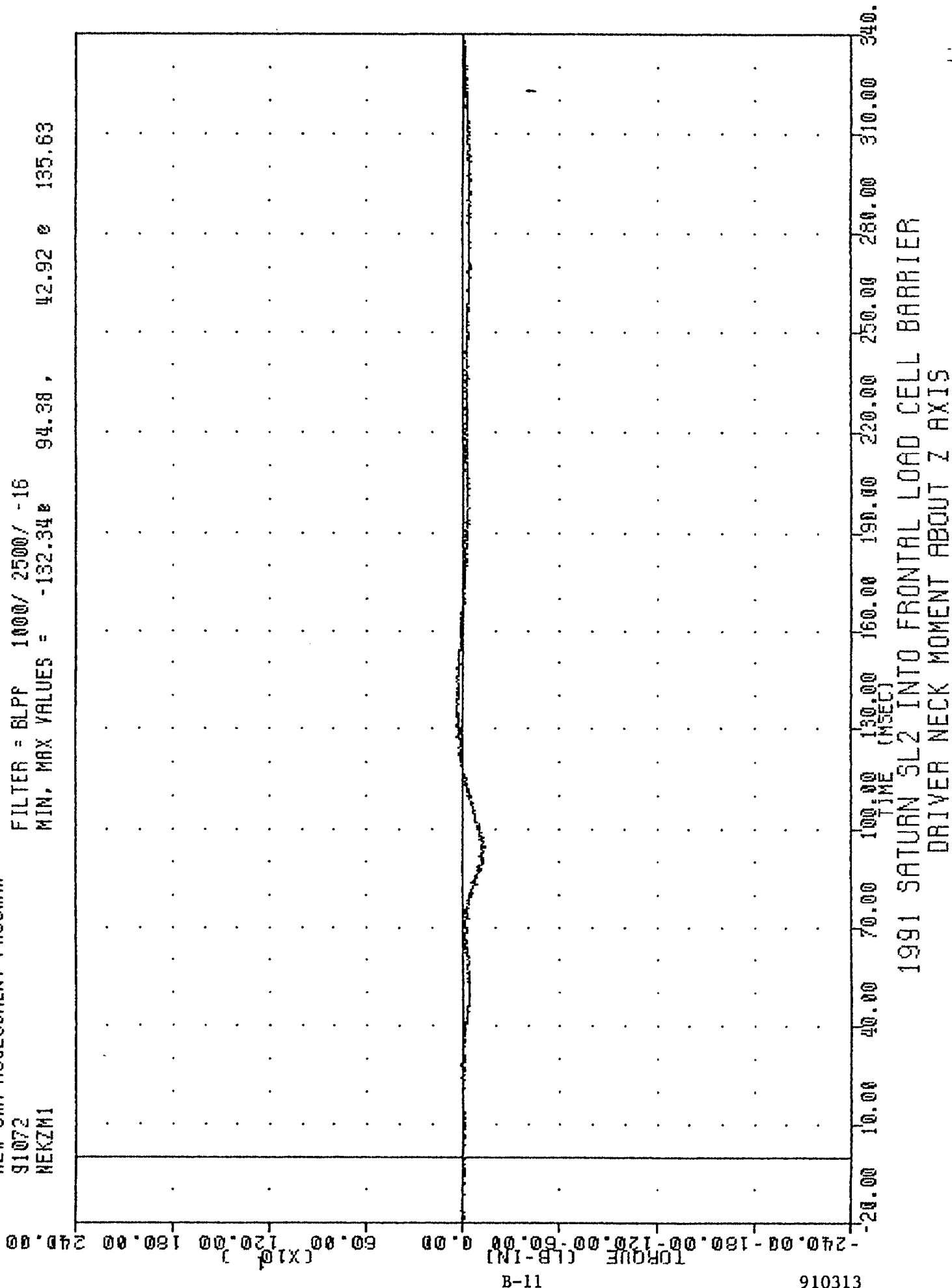
B-10

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS

IRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKZM1

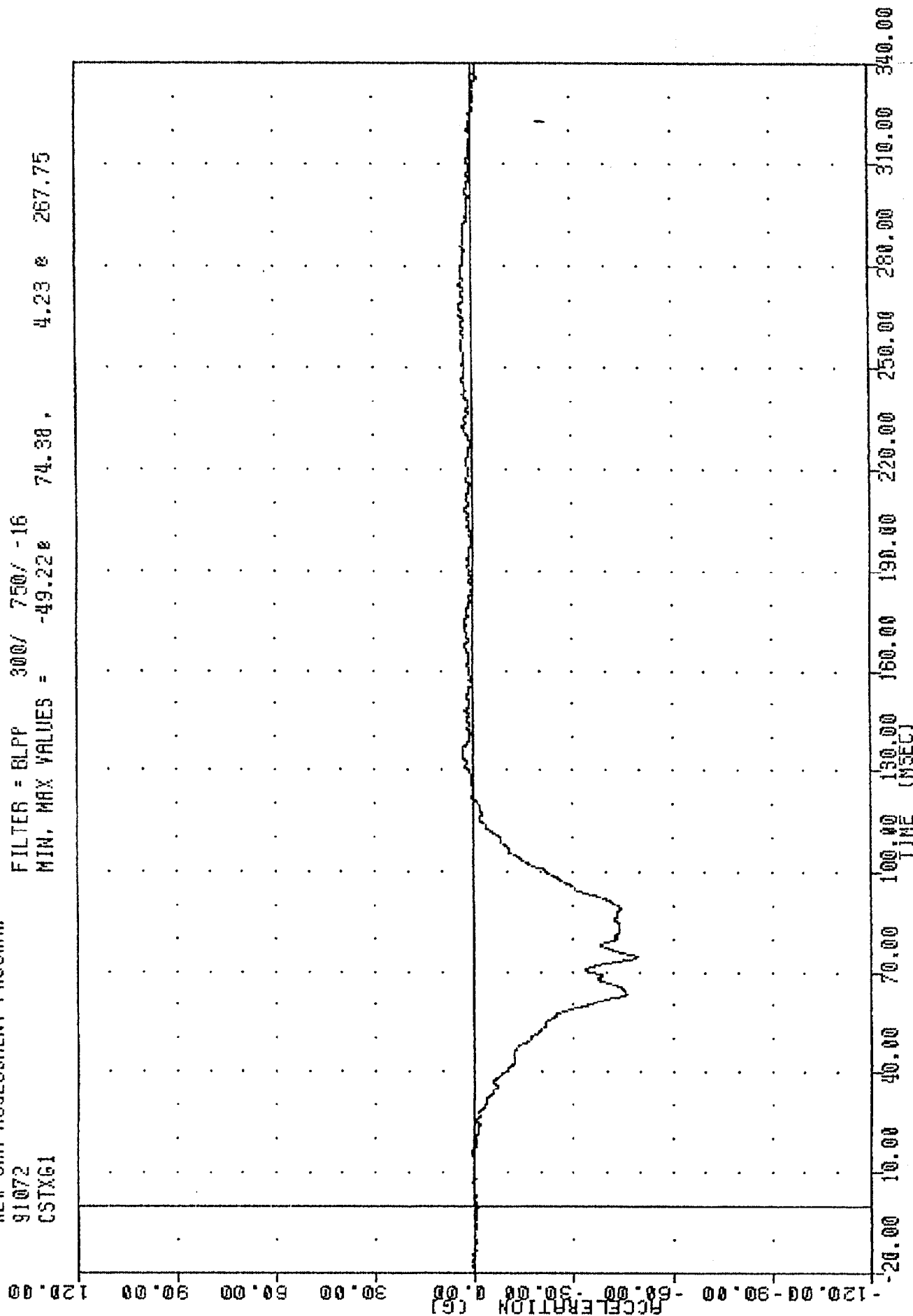
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -132.34 94.38 , 42.92 0 135.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Z AXIS

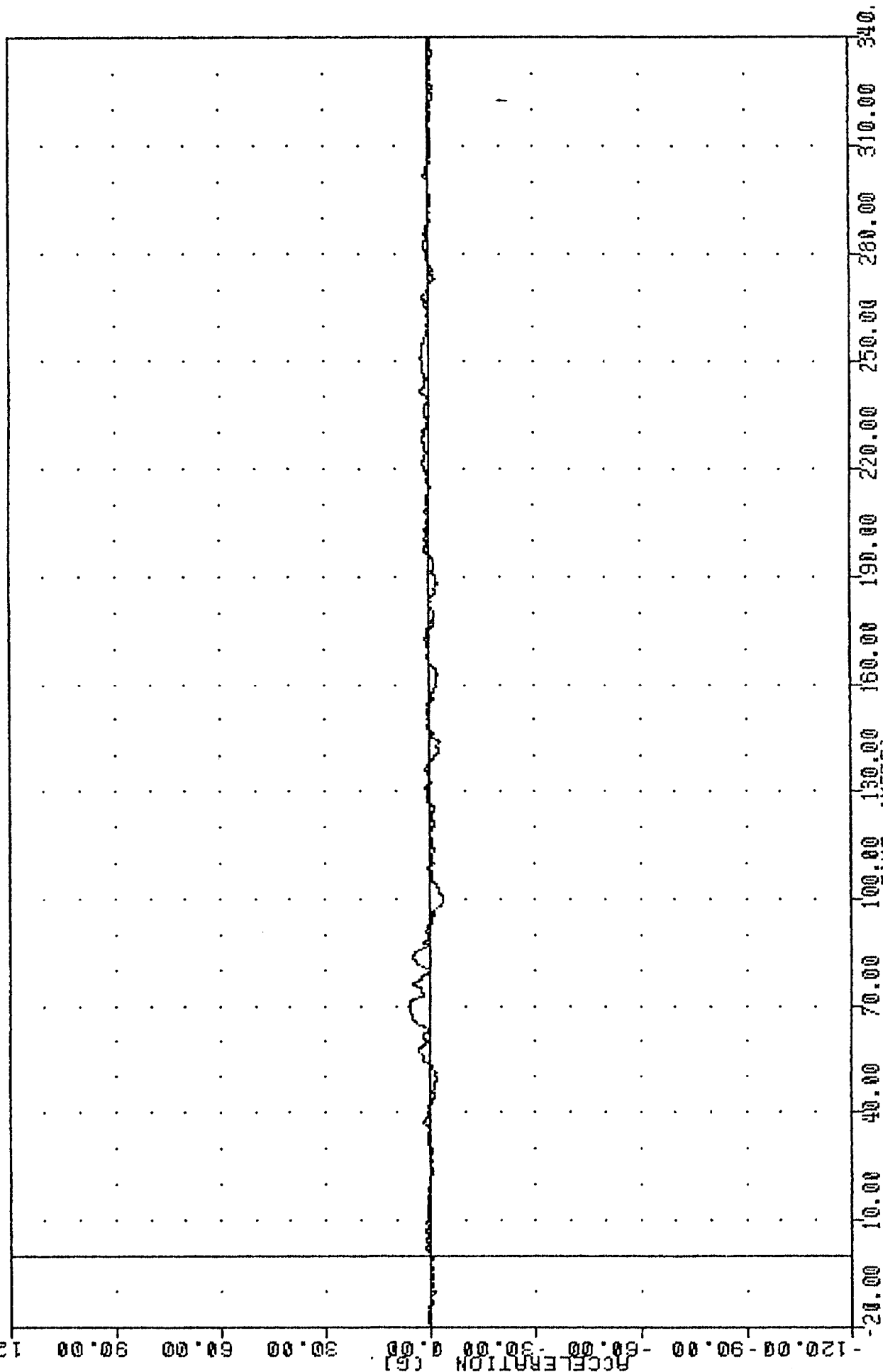
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTXG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -49.22 74.38 , 4.23 267.75



IRC
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTYG1

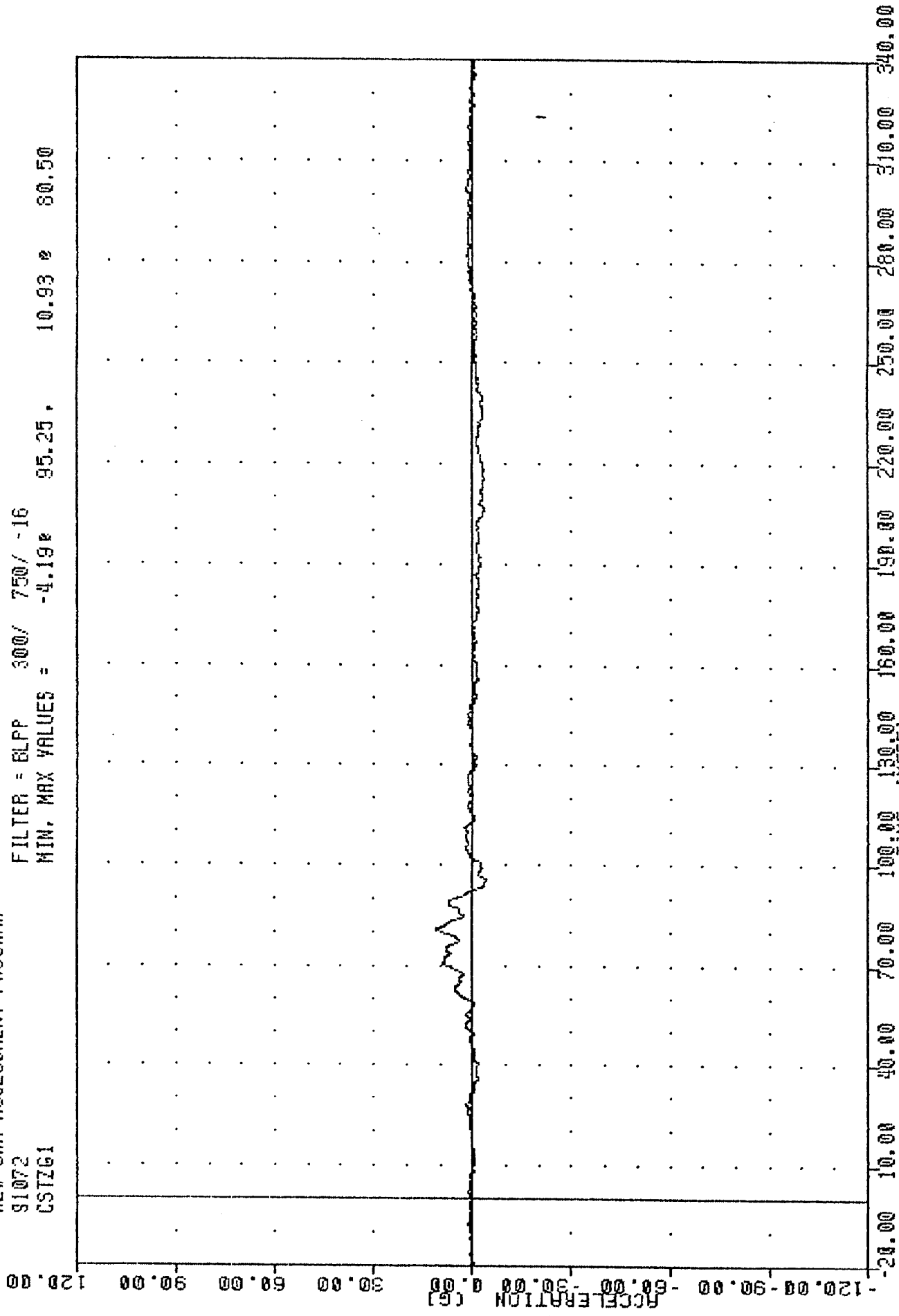
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -3.89e 100.38, 6.21 e 69.75



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSIZG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -4.19% 95.25, 10.93 % 80.50

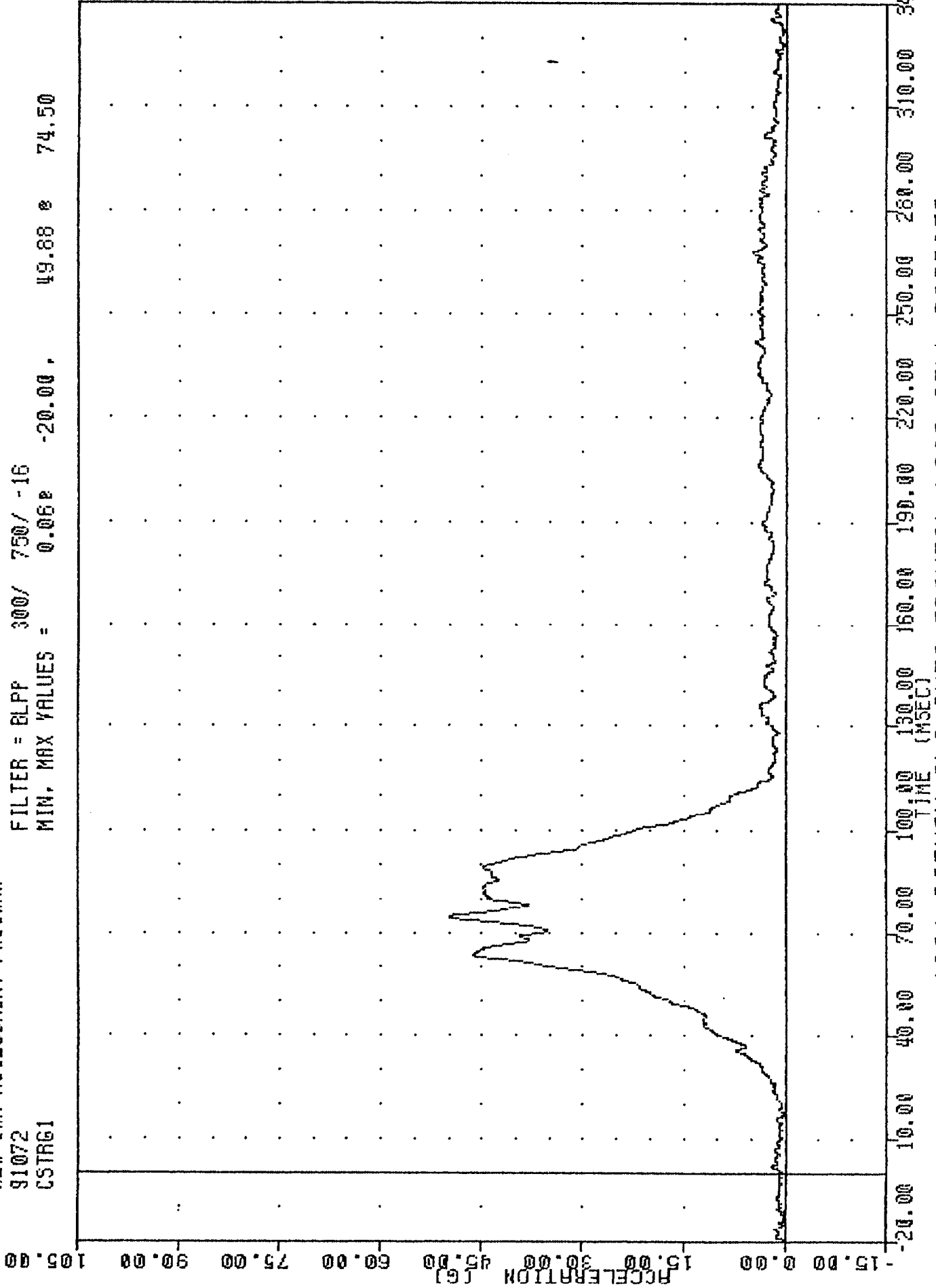


1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

REVIEW CHECK MAXIMUM ACCELERATION

IML , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTRG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.062 -20.00 , 49.88 2 74.50



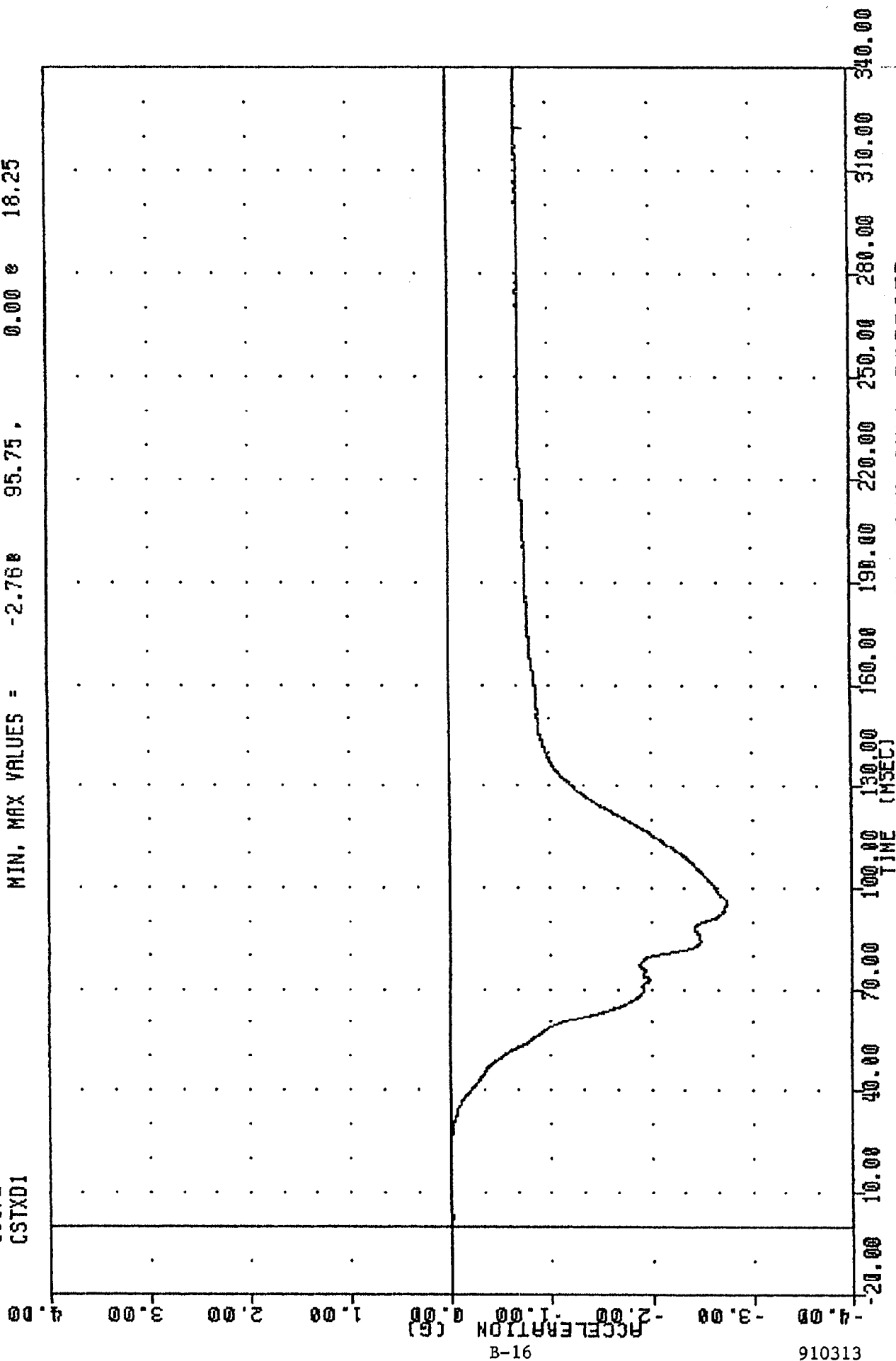
B-15

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTXD1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -2.76 95.75 0.00 18.25

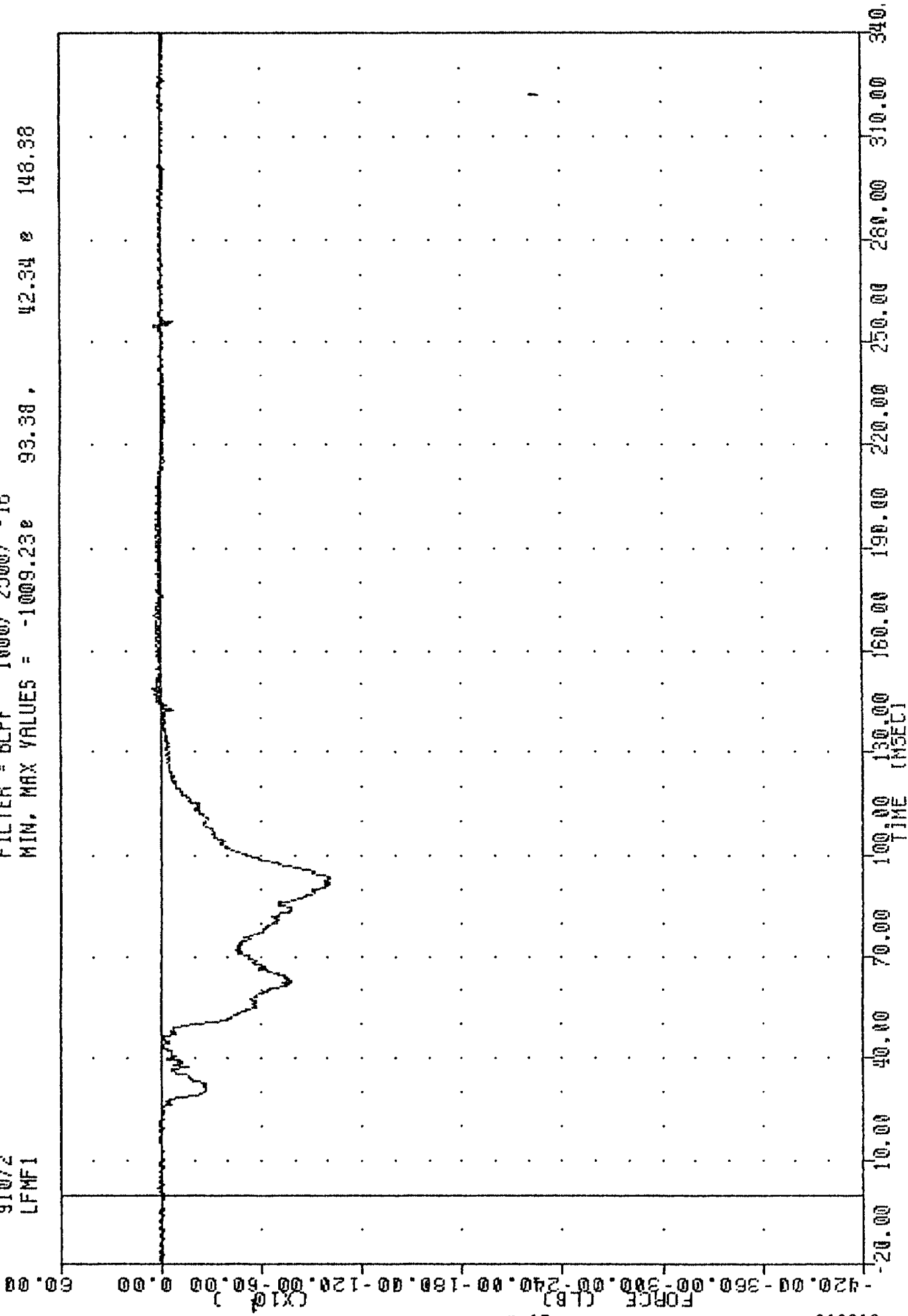


B-16

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT DISPLACEMENT

INC
 NEW CAR ASSESSMENT PROGRAM
 91072
 LFMF1

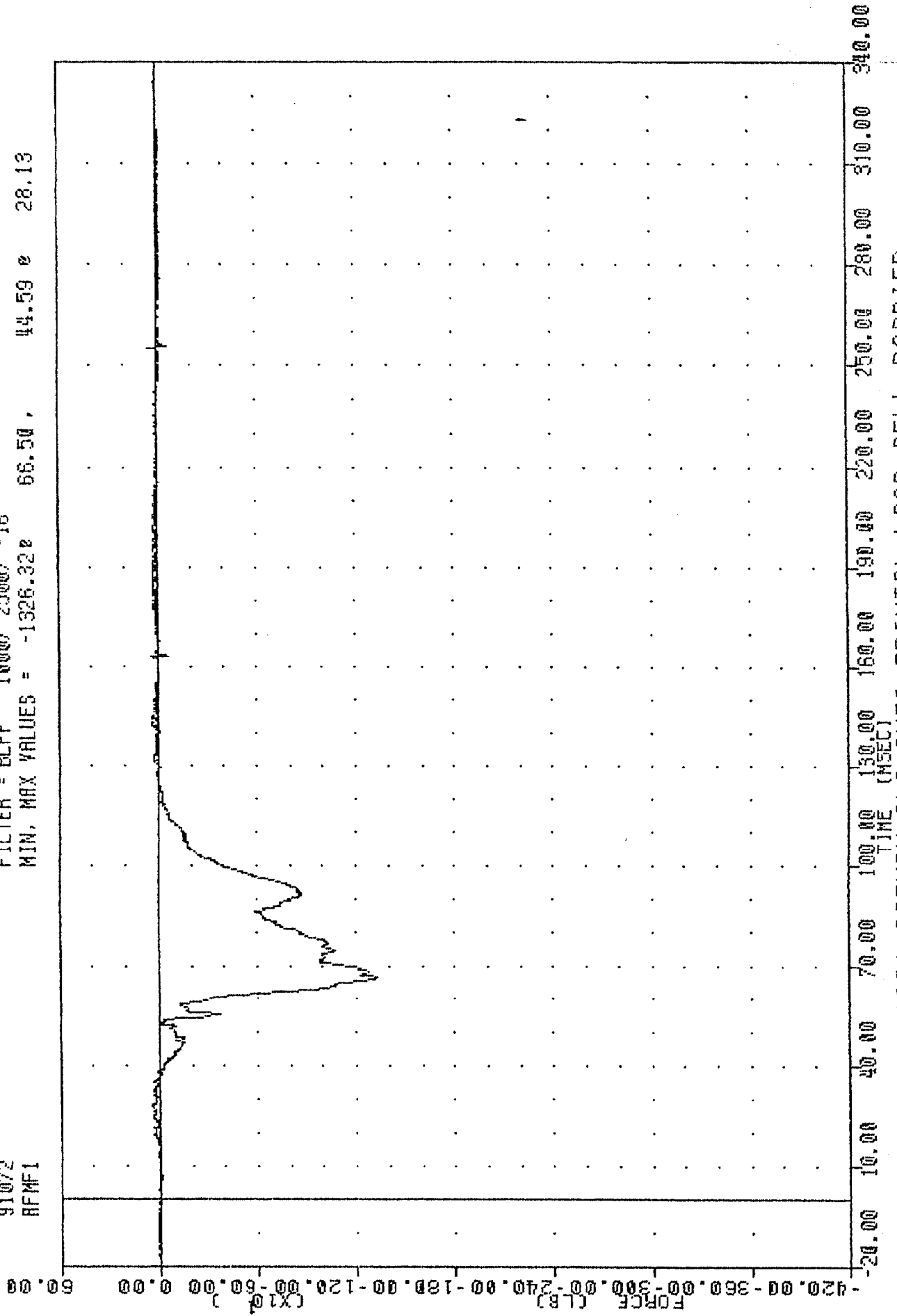
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1009.23e 93.38, 42.34 e 148.38



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER LEFT FEMUR FORCE

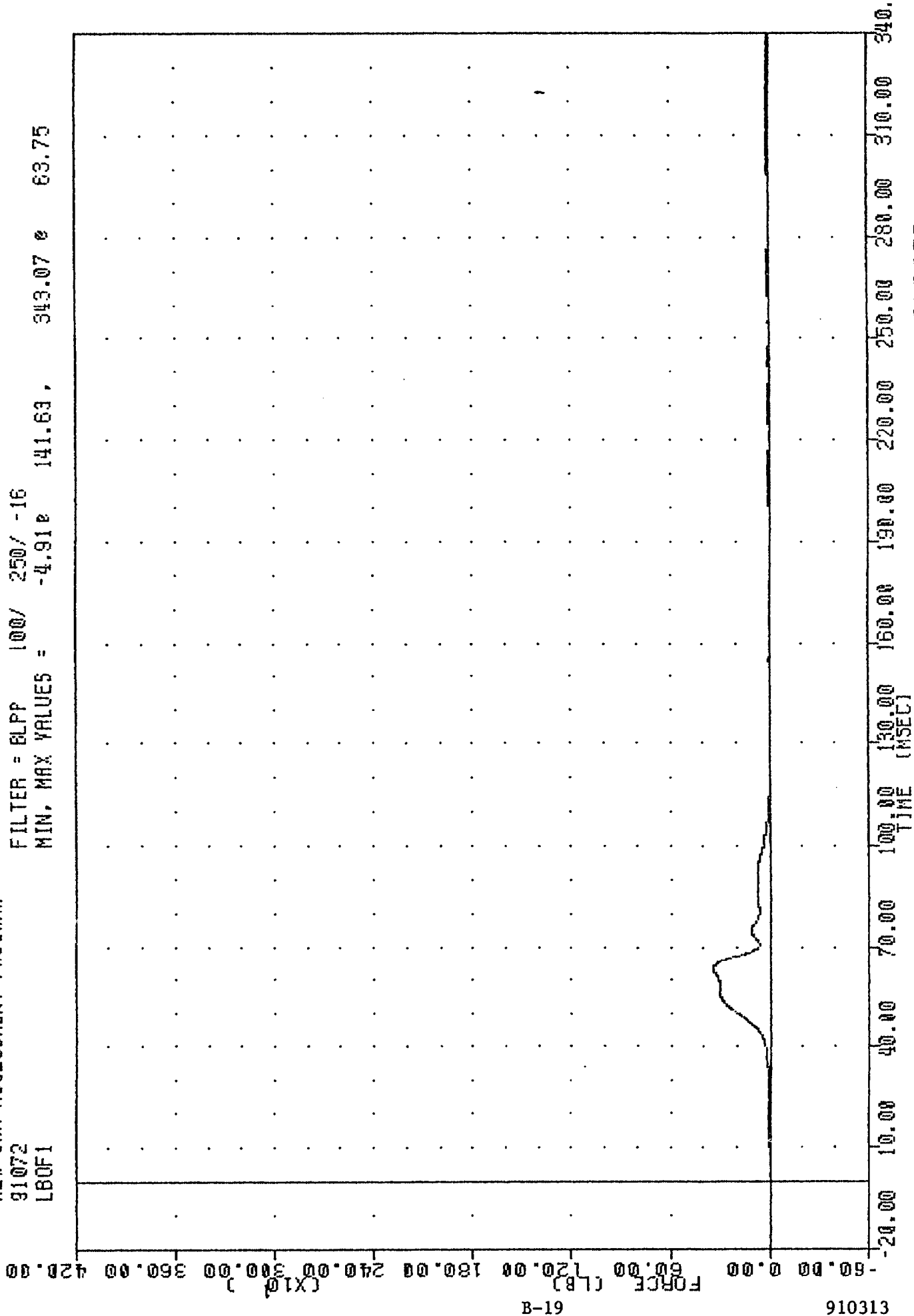
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 RFMF1

FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1326.320 66.50 , 44.59 0 28.13



TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 LBOF1

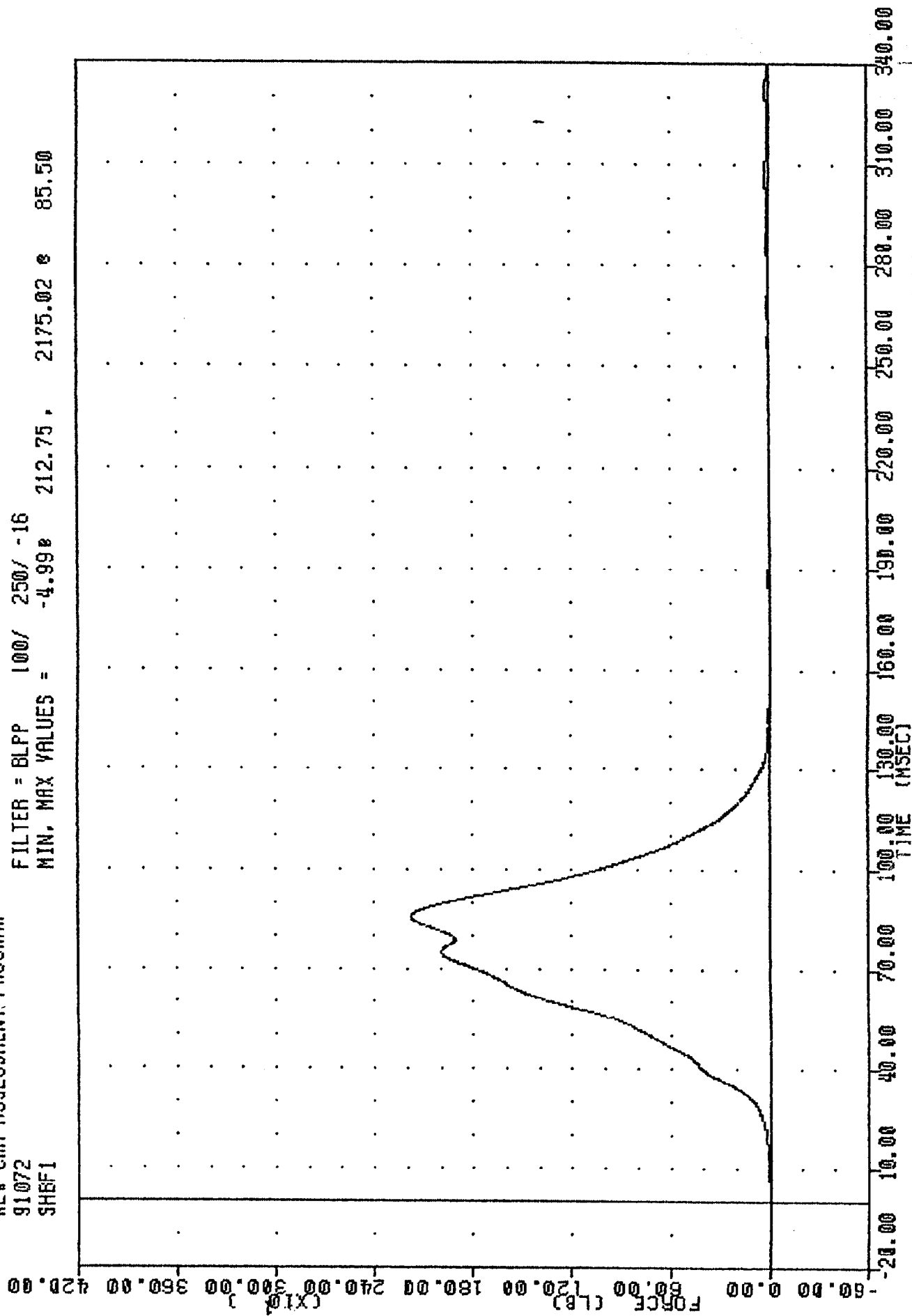
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -4.91e 141.63, 343.07 e 63.75



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER LAP BELT OUTBOARD FORCE

TAC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 SHEF1

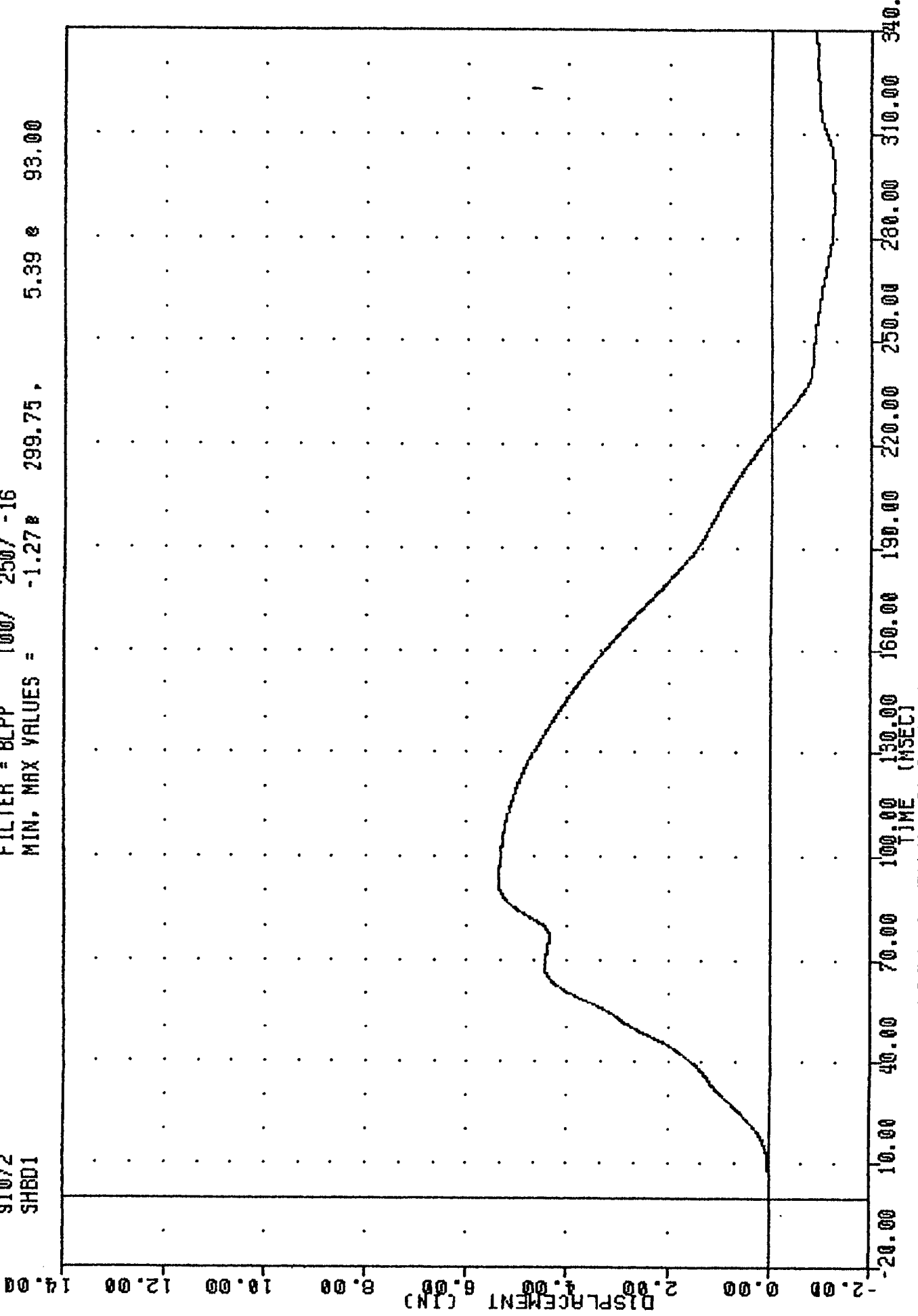
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -4.99e 212.75 , 2175.02 e 85.50



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT FORCE

INL
 NEW CAR ASSESSMENT PROGRAM
 91072
 SHBD1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -1.27 299.75 5.39 93.00



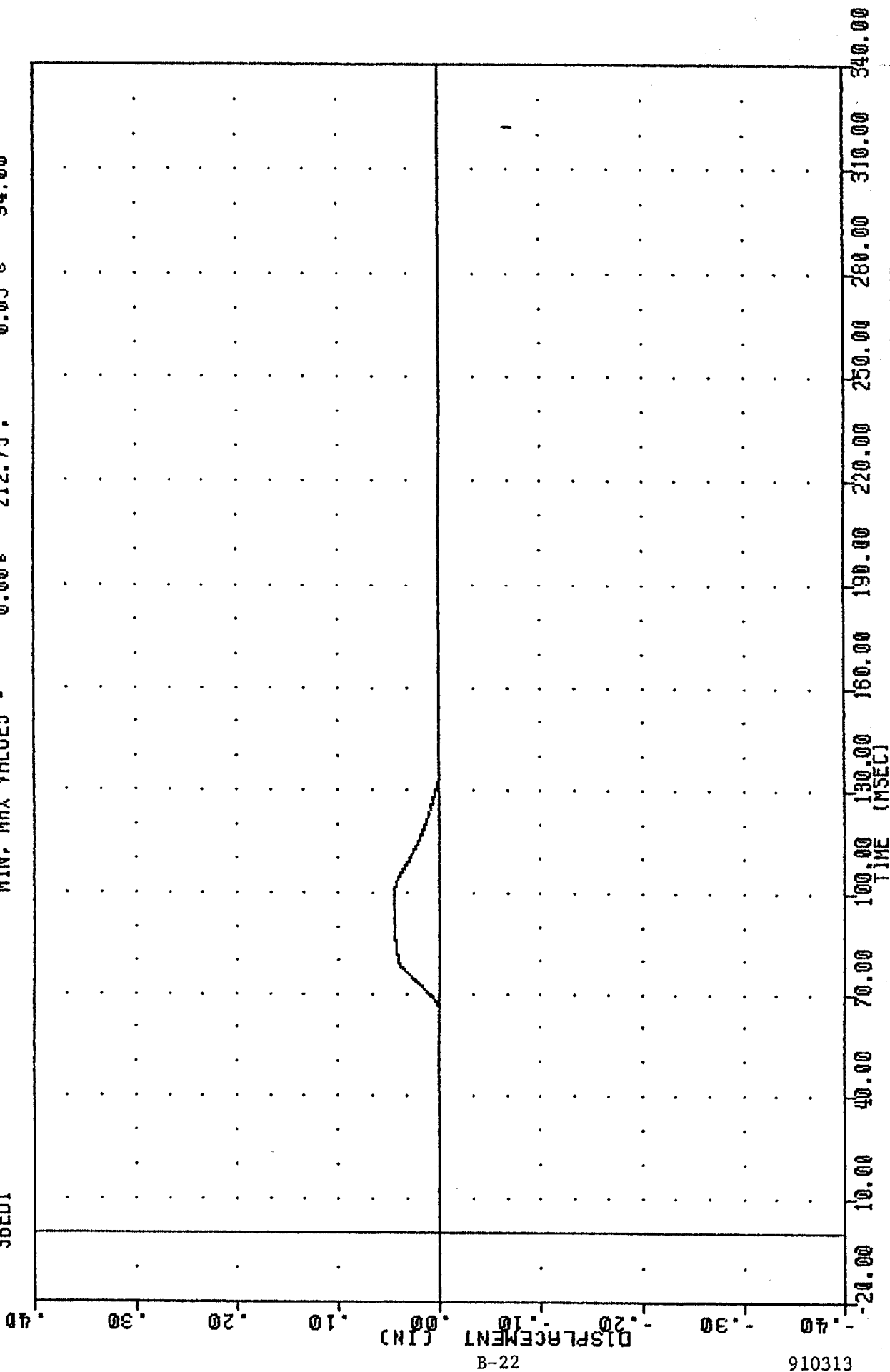
B-21

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT DISPLACEMENT

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 SBED1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.00 212.75 . 0.05 e 94.00



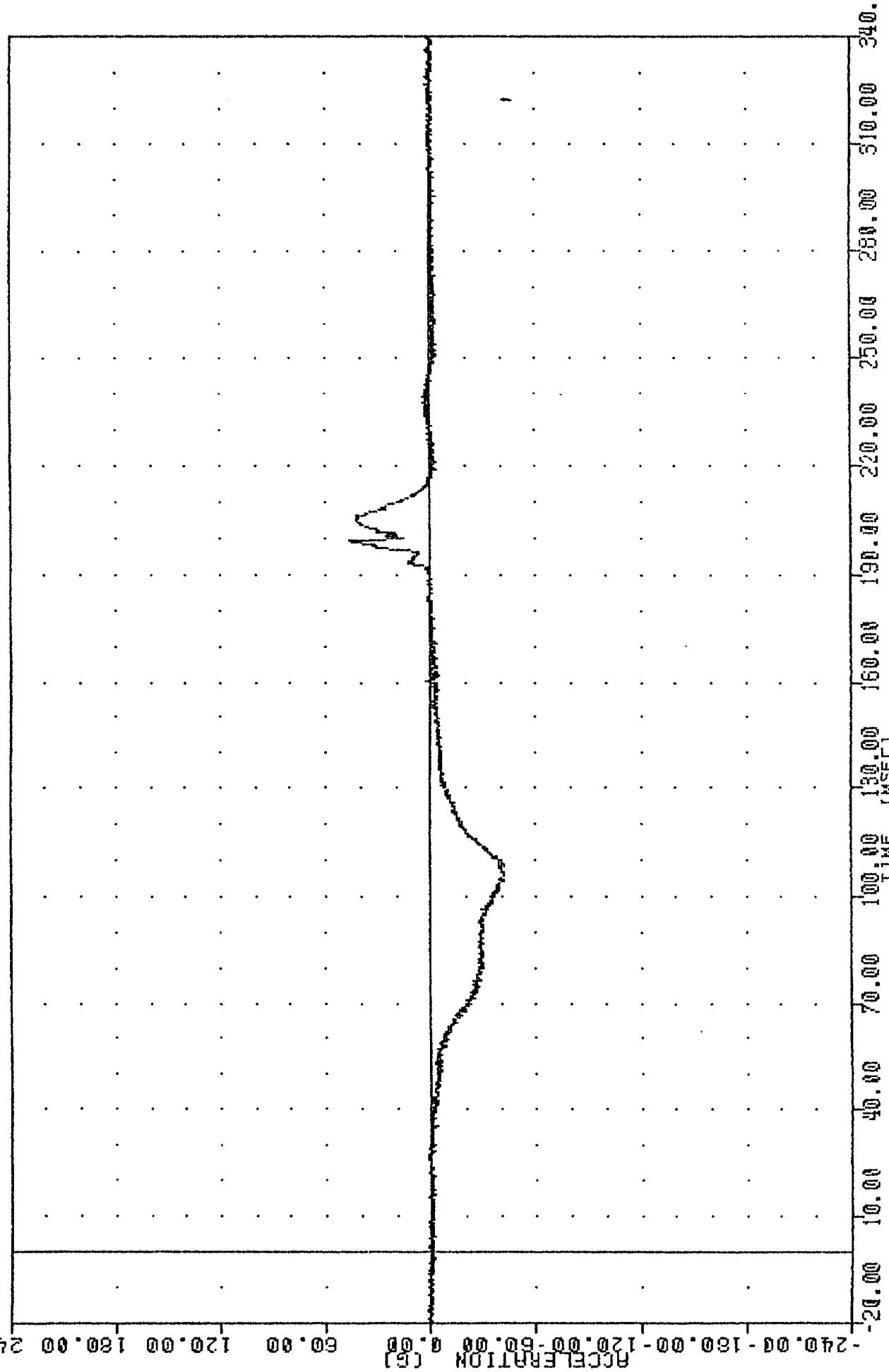
B-22

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT BELT EXTENSION

INL
NEW CAR ASSESSMENT PROGRAM
91072
HEDXG2

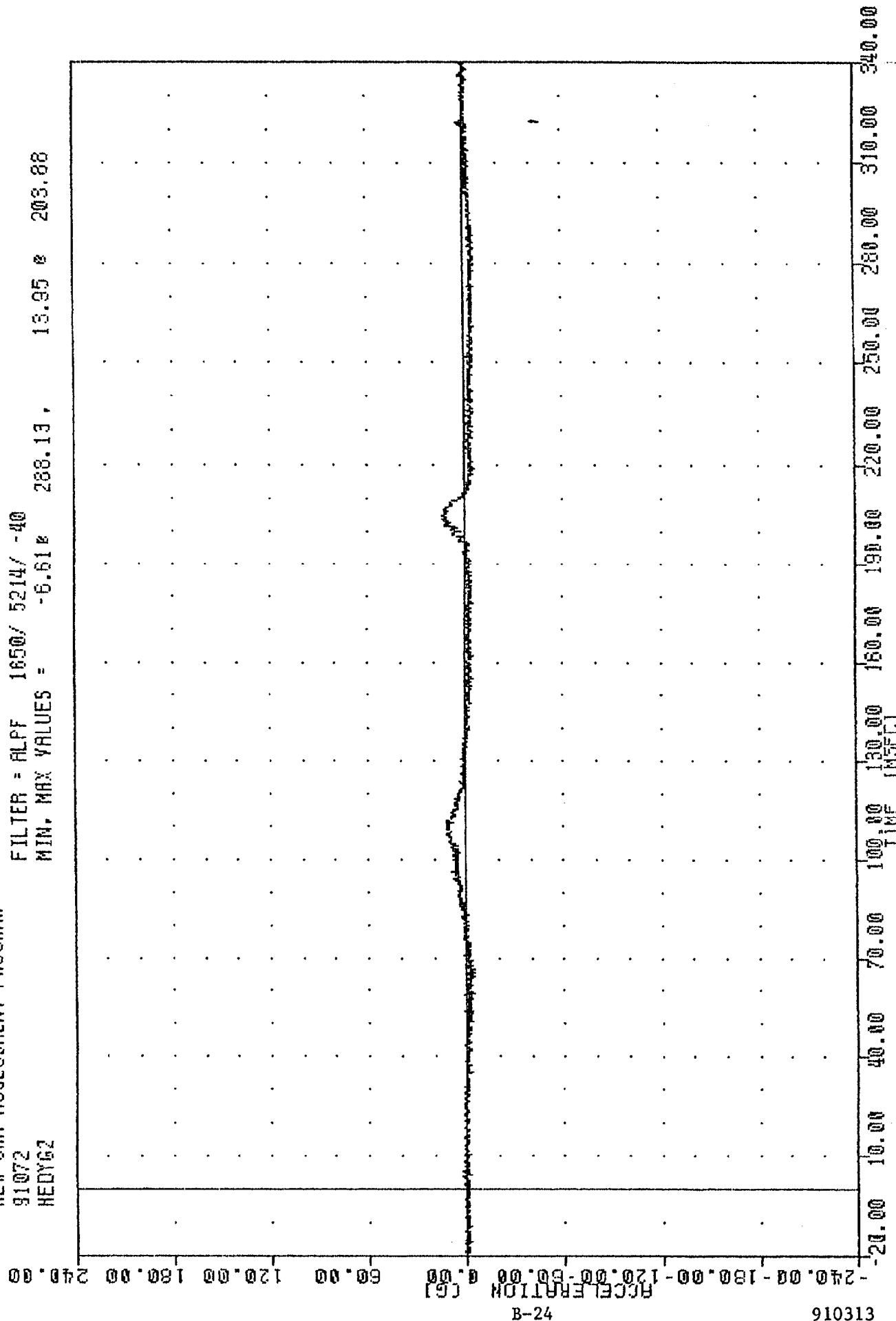
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -42.098 104.25 , 45.51 0 199.25



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION

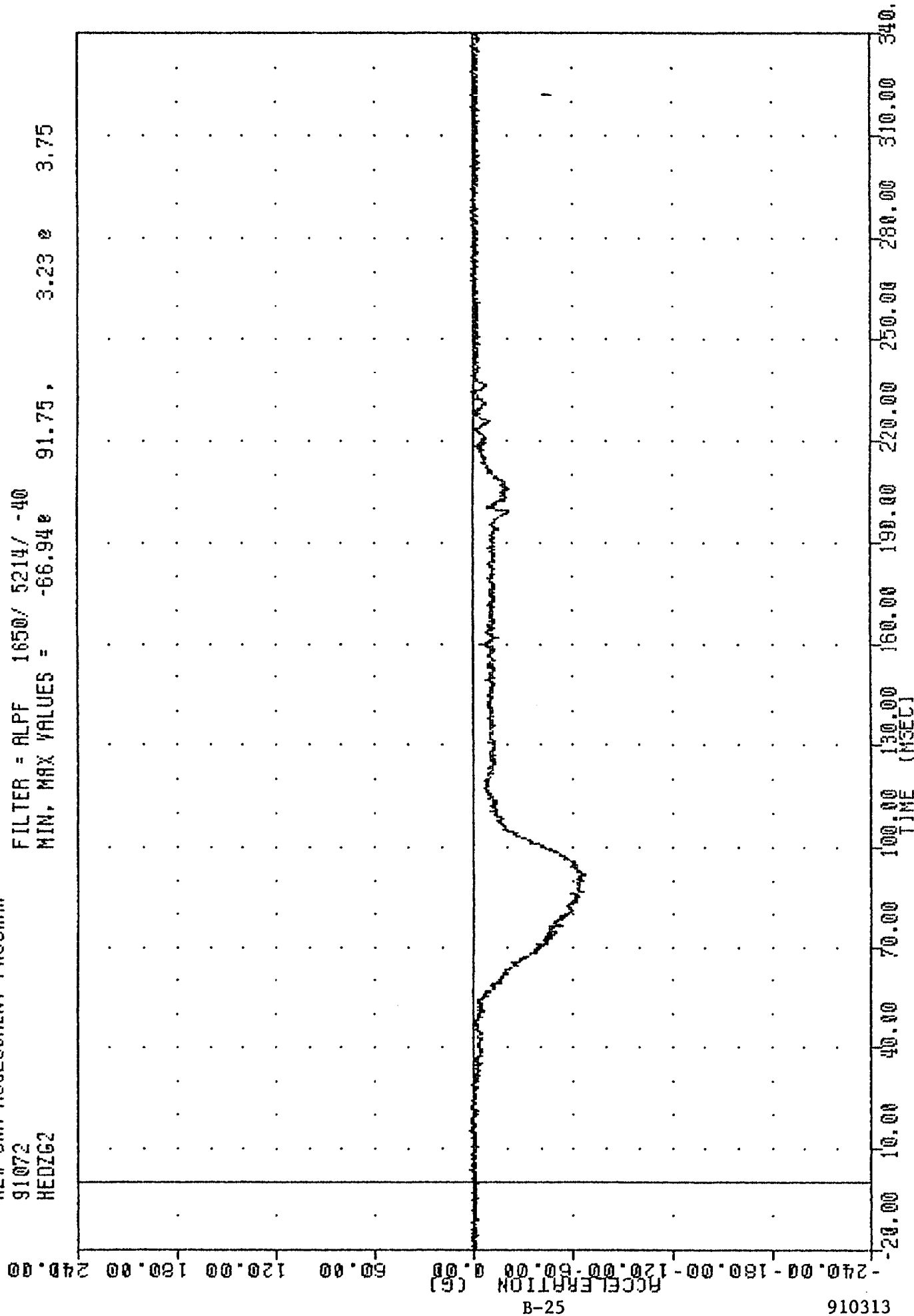
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEDYG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -6.61% 288.13, 13.95 @ 203.88



NEW CAR ASSESSMENT PROGRAM
 91072
 HEDZG2

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -66.94 91.75, 3.23 3.75



910313

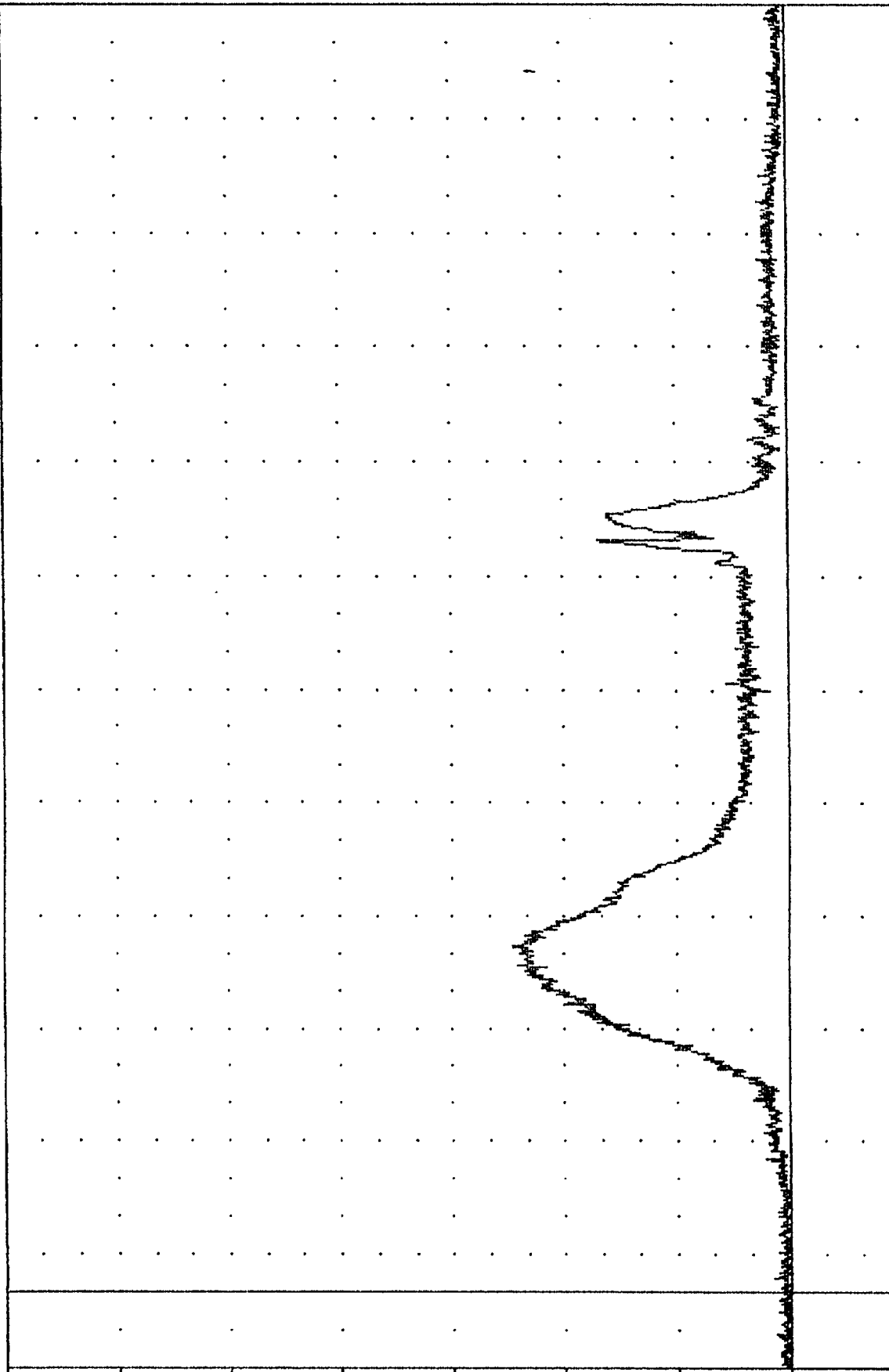
B-25

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD Z-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEDRG2

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.096 -15.00, 73.60 91.75

210.00



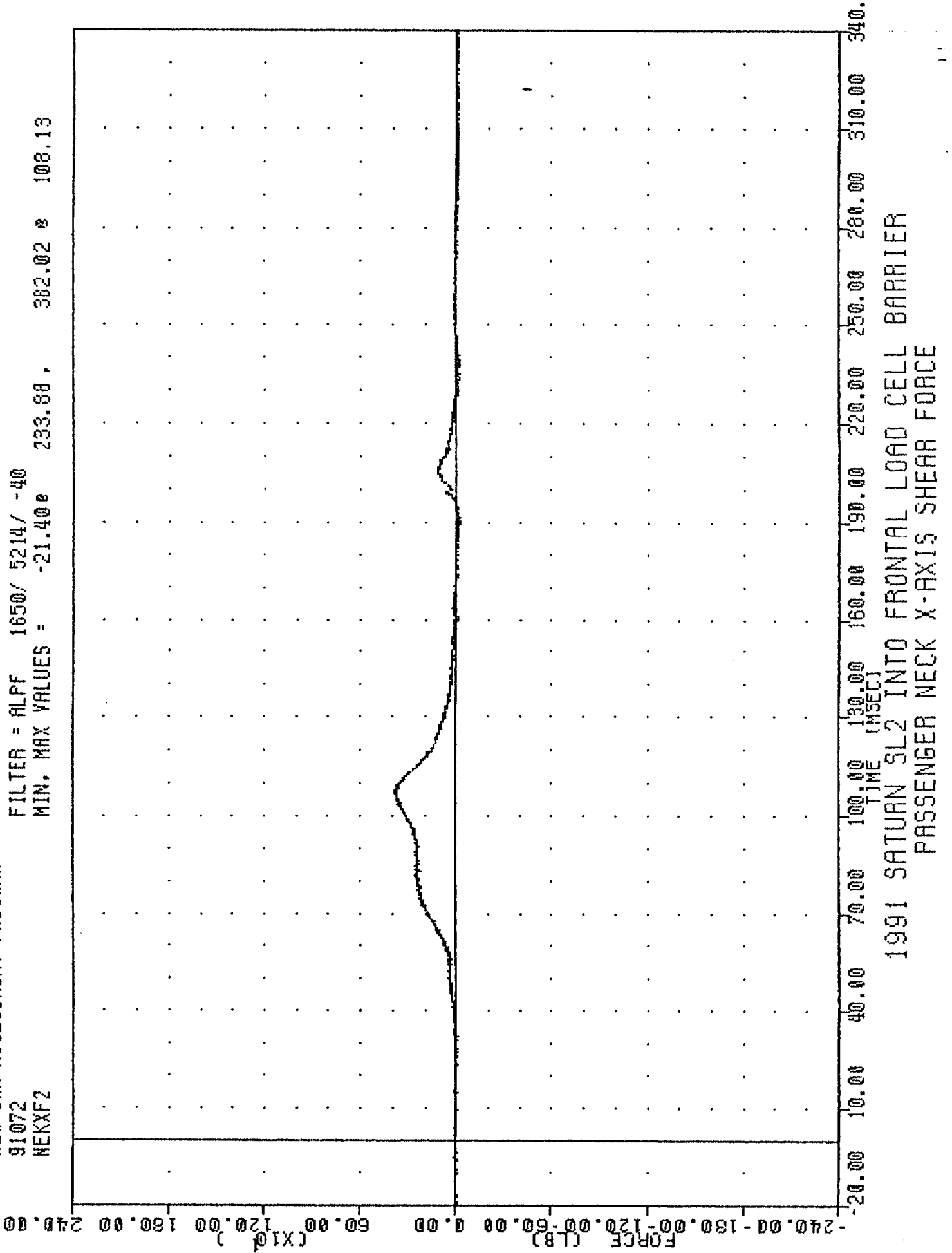
B-26

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER HEAD RESULTANT ACCELERATION

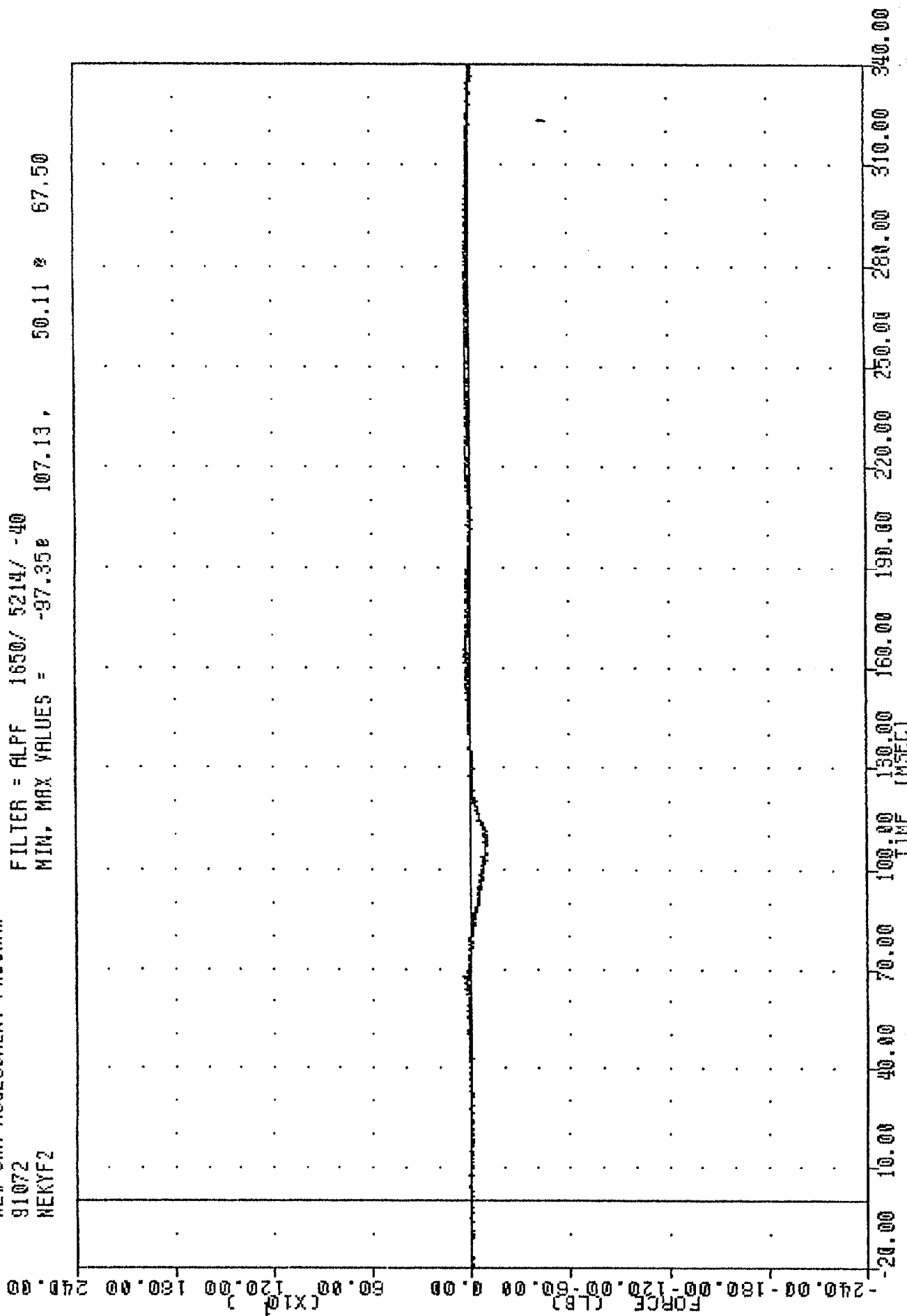
INL , 310313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKXF2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -21.40e 233.88, 382.02 e 108.13



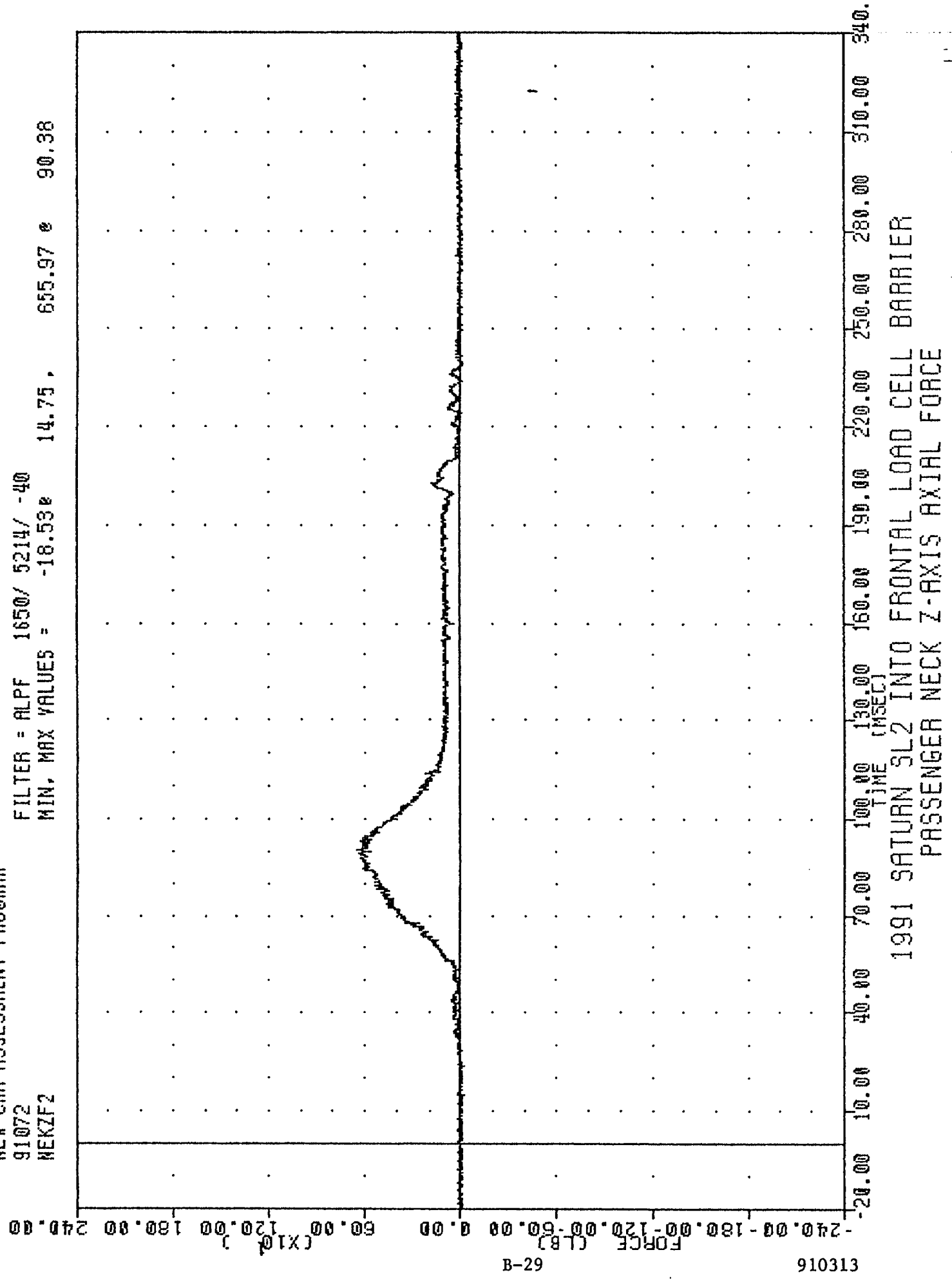
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKYF2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -97.35e 107.13, 50.11 e 67.50



INC
 NEW CAR ASSESSMENT PROGRAM
 91072
 HEKZF2

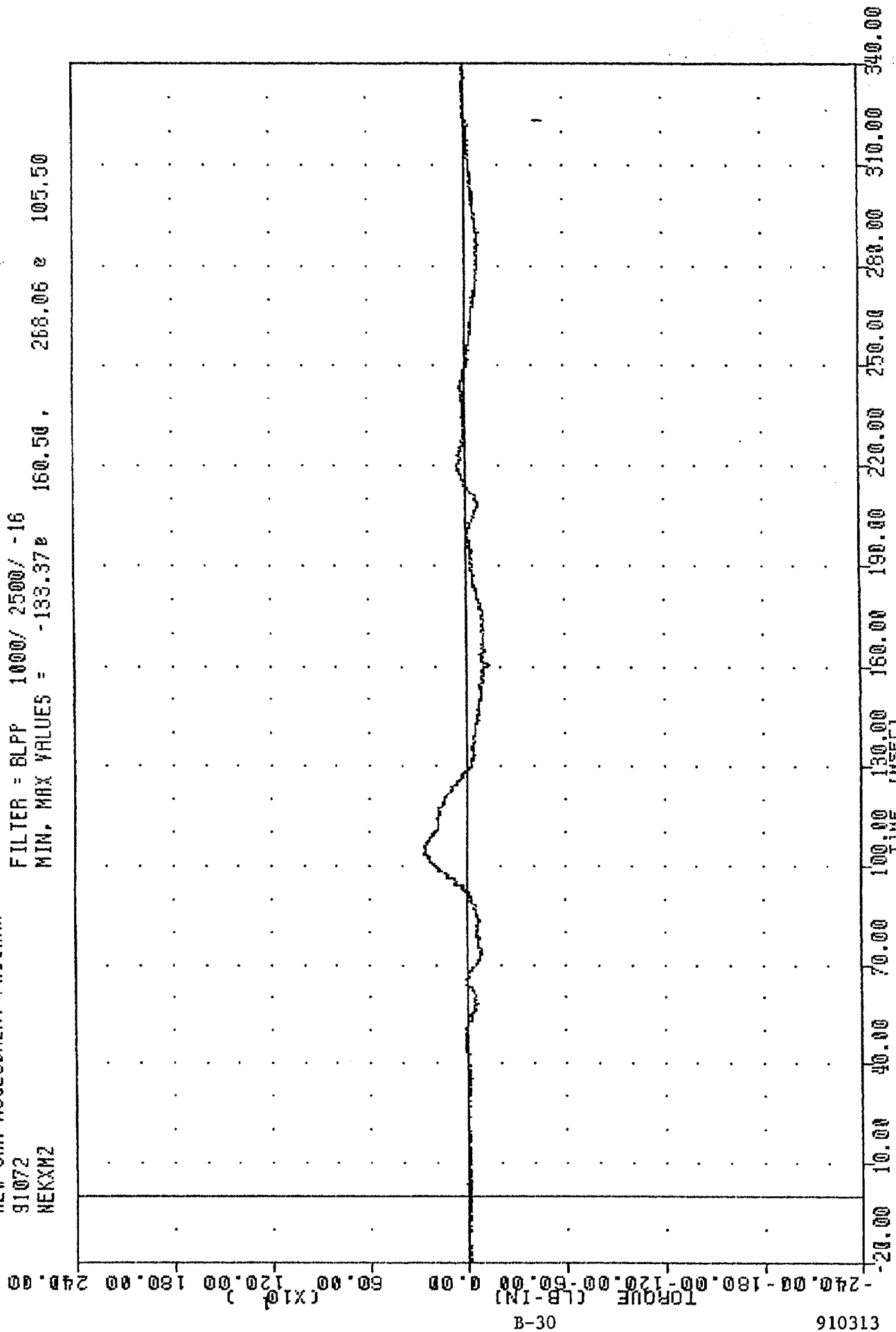
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -18.53e 14.75, 655.97 e 90.38



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER NECK Z-AXIS AXIAL FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKXN2

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -133.37 160.50 , 268.06 105.50



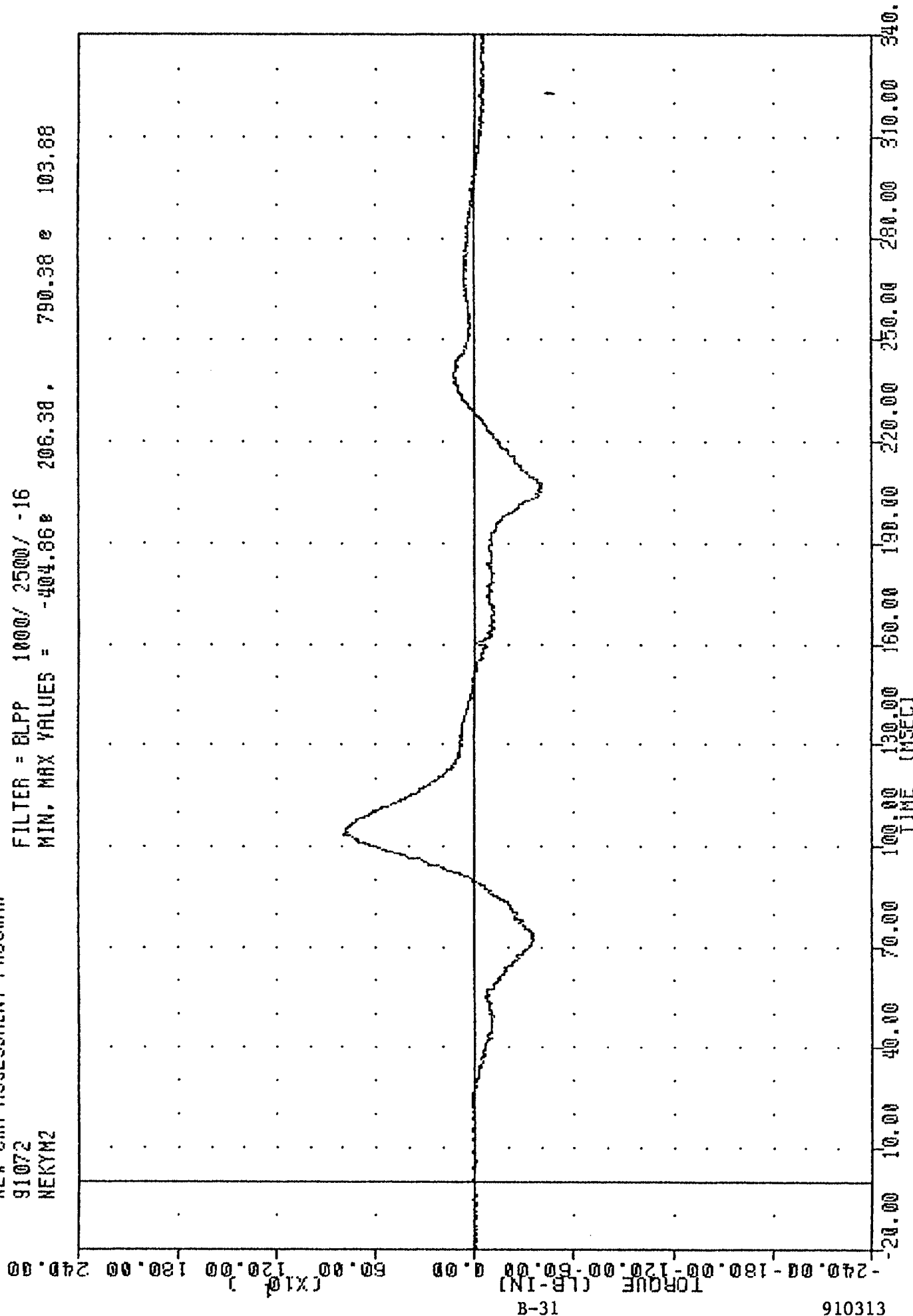
B-30

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER NECK MOMENT ABOUT Y AXIS

NEW CAR ASSESSMENT PROGRAM
 91072
 NEKYM2

FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -404.86 206.38 790.38 103.88



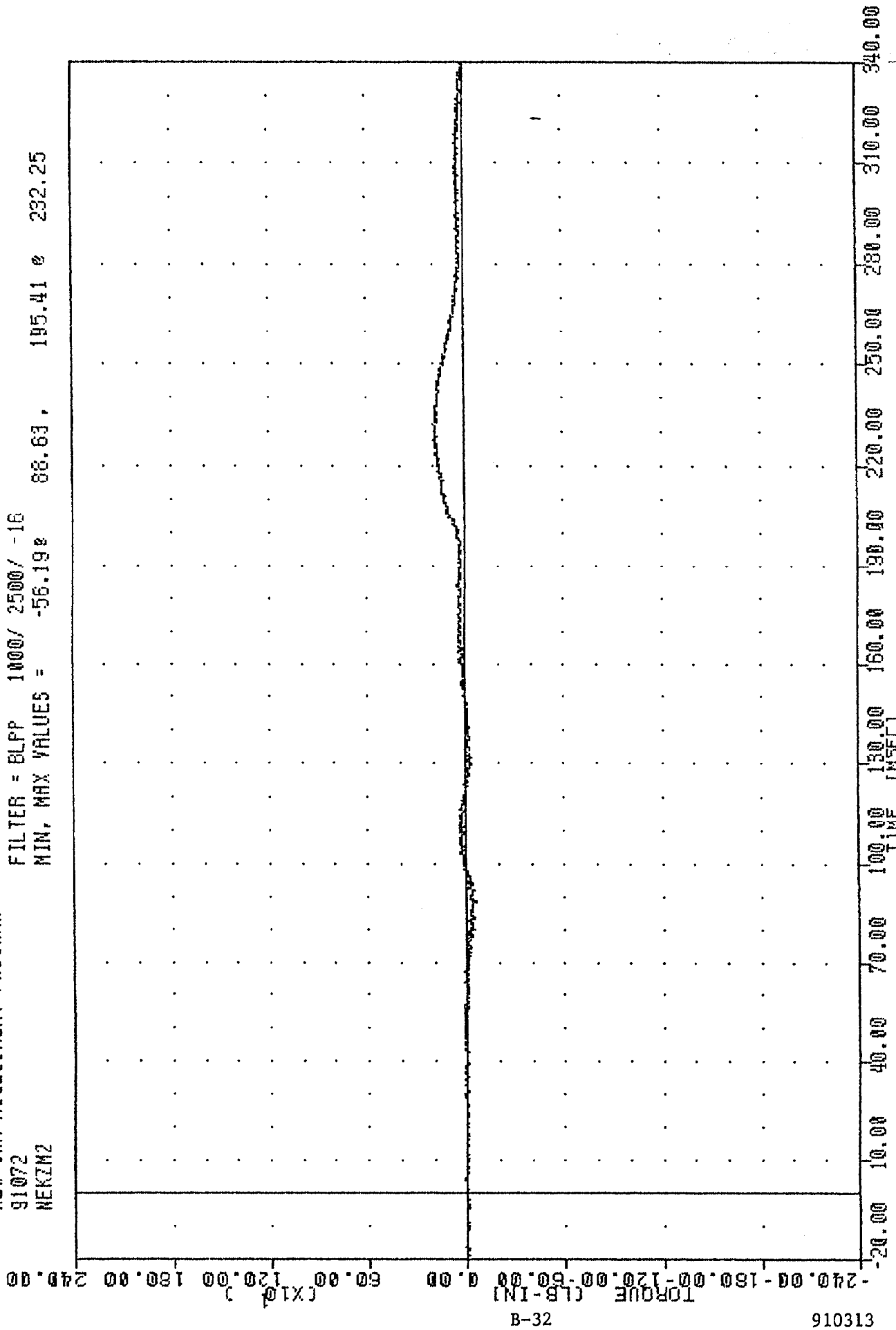
B-31

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER NECK MOMENT ABOUT Y AXIS

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 NEKZM2

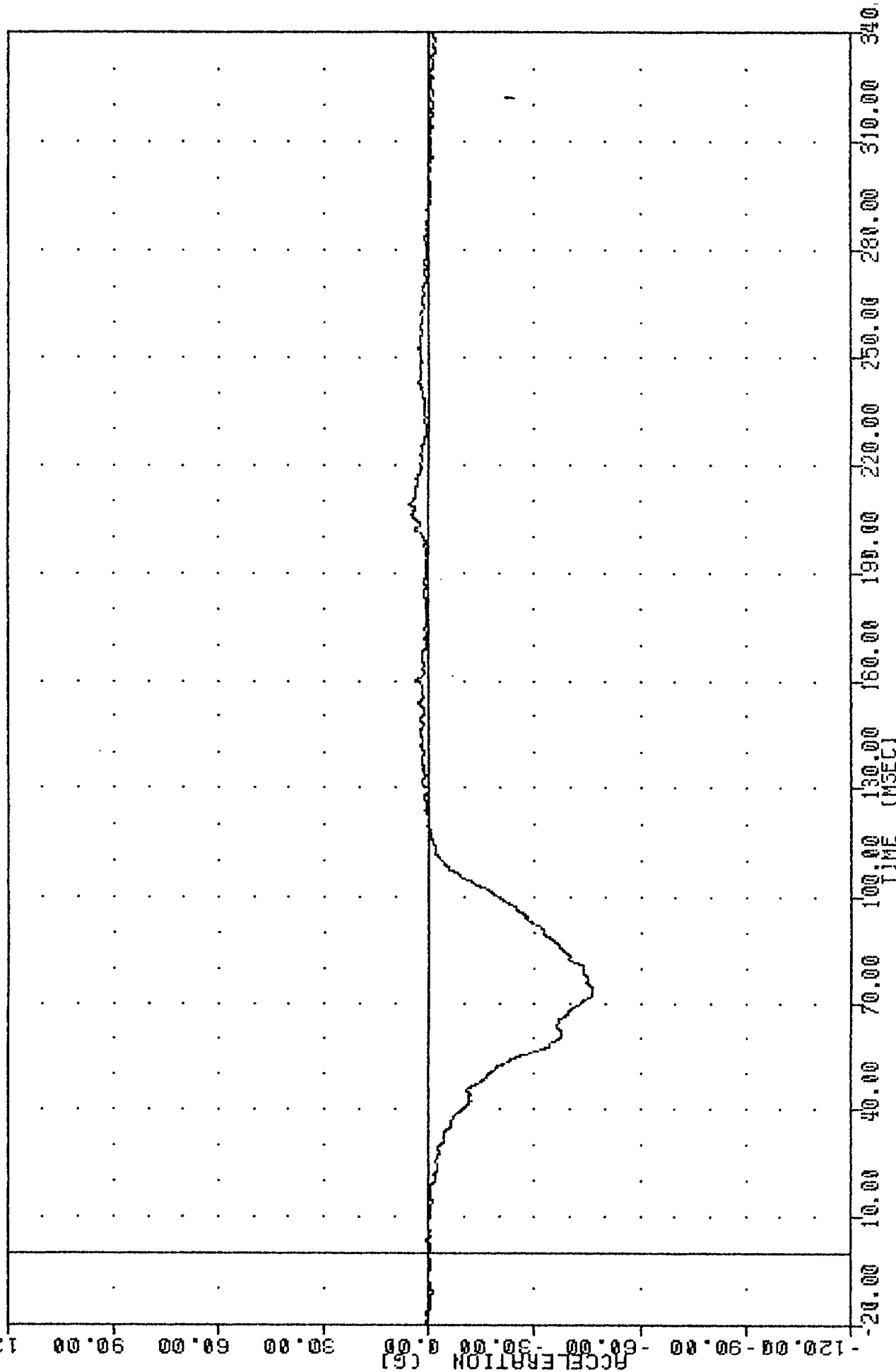
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -56.198 88.63, 195.41 @ 232.25



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER NECK MOMENT ABOUT Z AXIS

NEW CAR ASSESSMENT PROGRAM
 91072
 CSTXG2

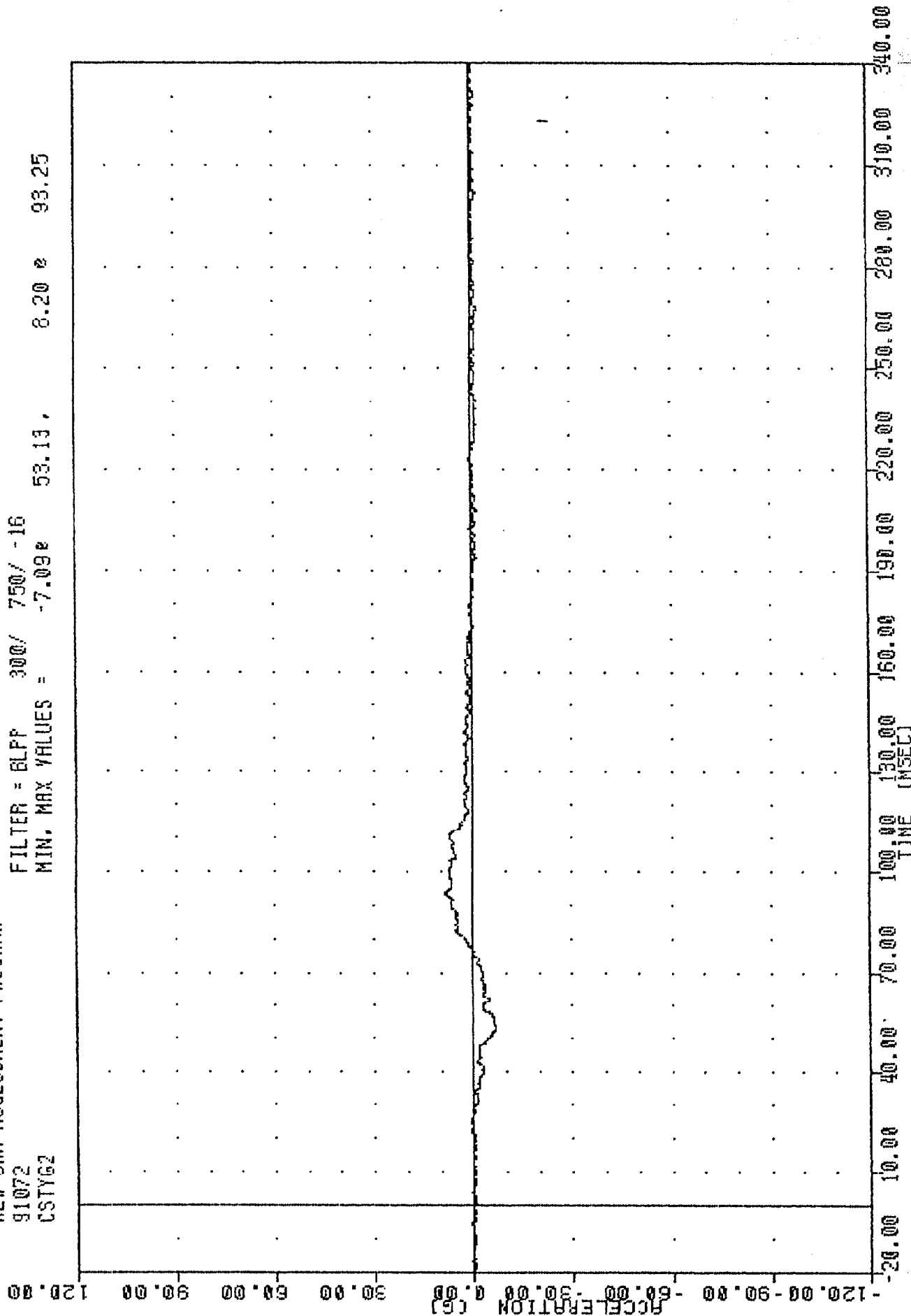
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -46.40e 73.75, 5.58 e 209.13



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST X-AXIS ACCELERATION

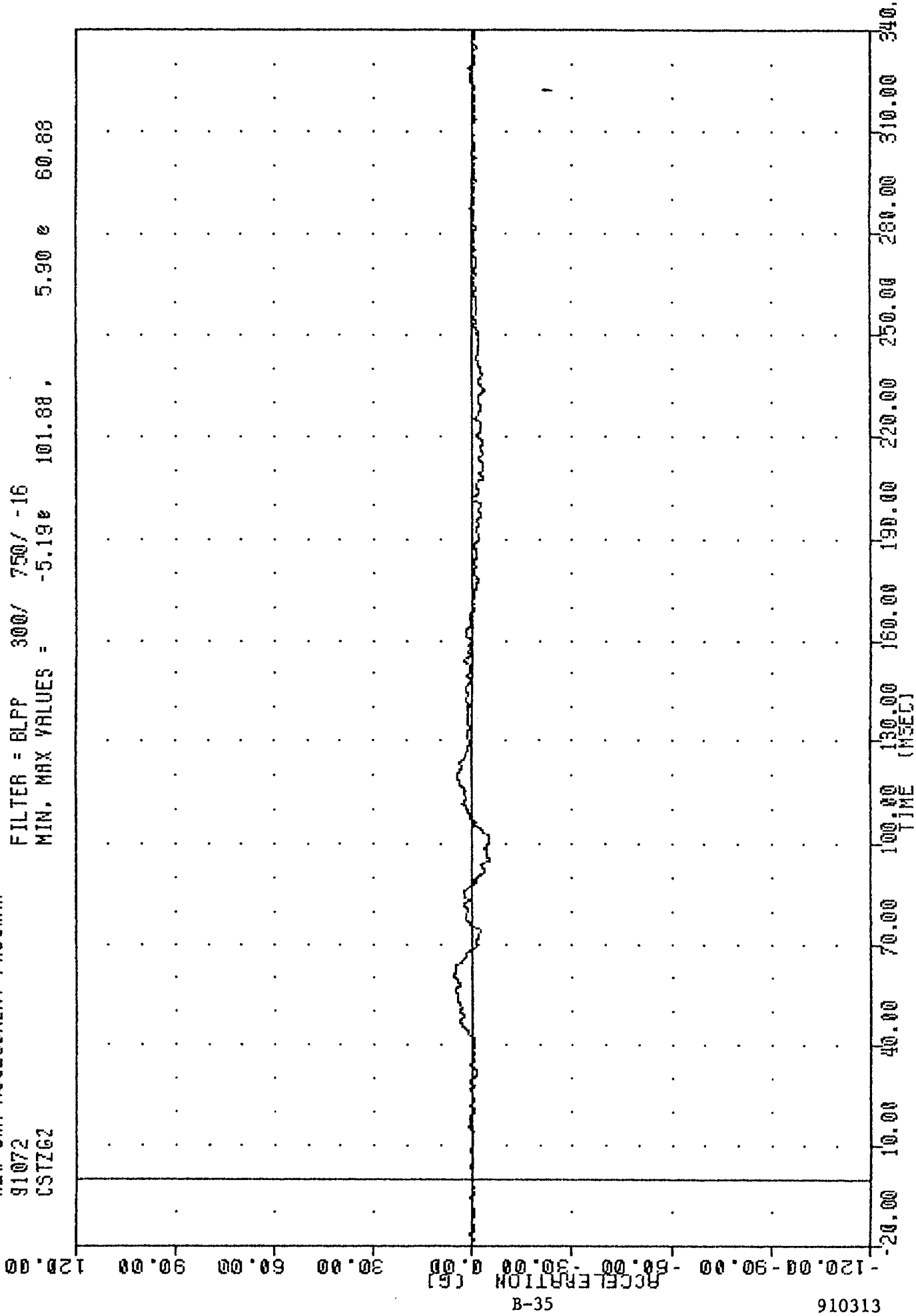
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTY62

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -7.09e 53.13, 8.20 e 93.25



NEW CAR ASSESSMENT PROGRAM
 91072
 CSTZG2

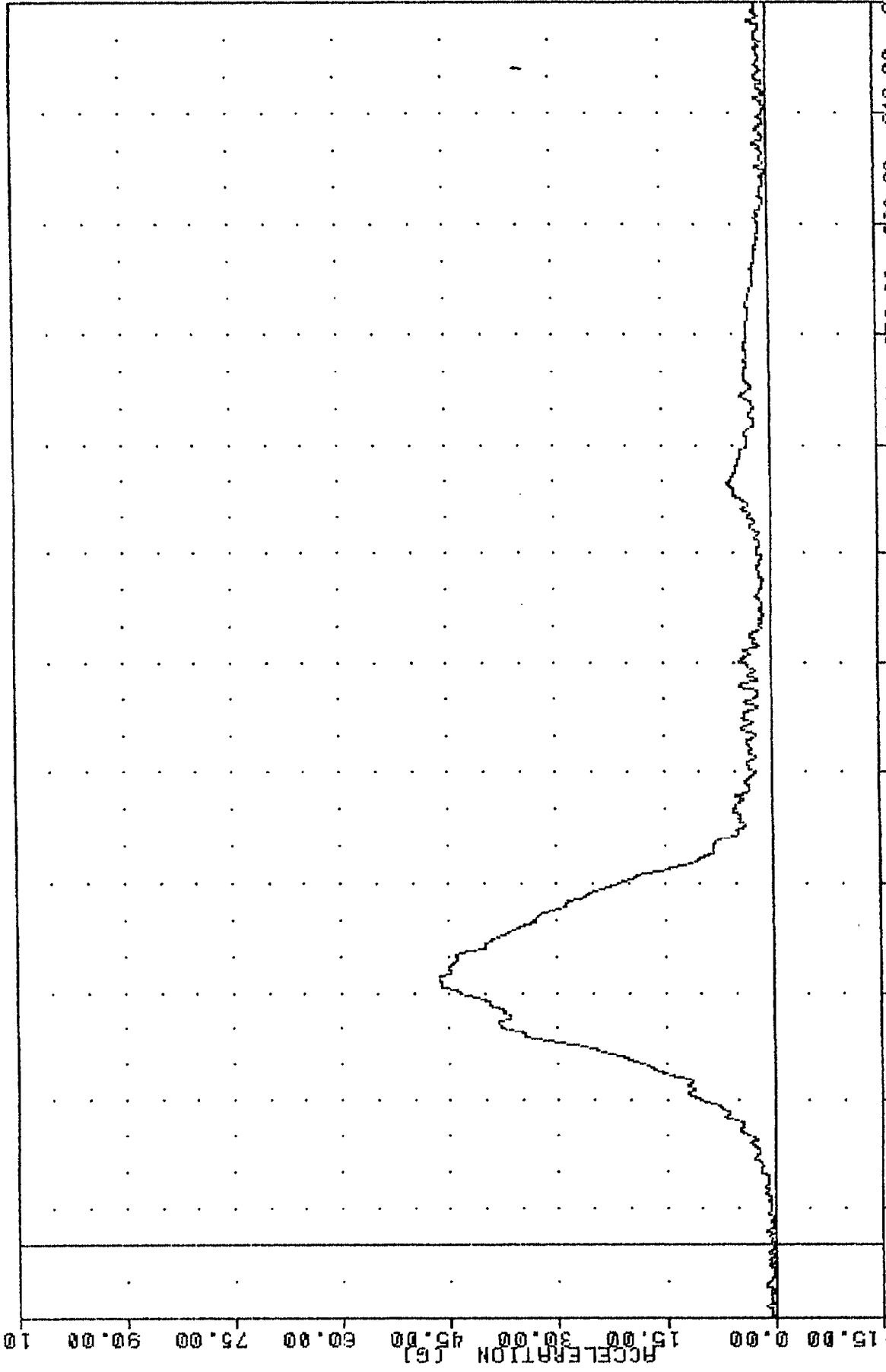
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -5.19e 101.88, 5.90 e 60.88



TRC * 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 CSTRG2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.10% -6.75, 46.49 2 73.88

105.00



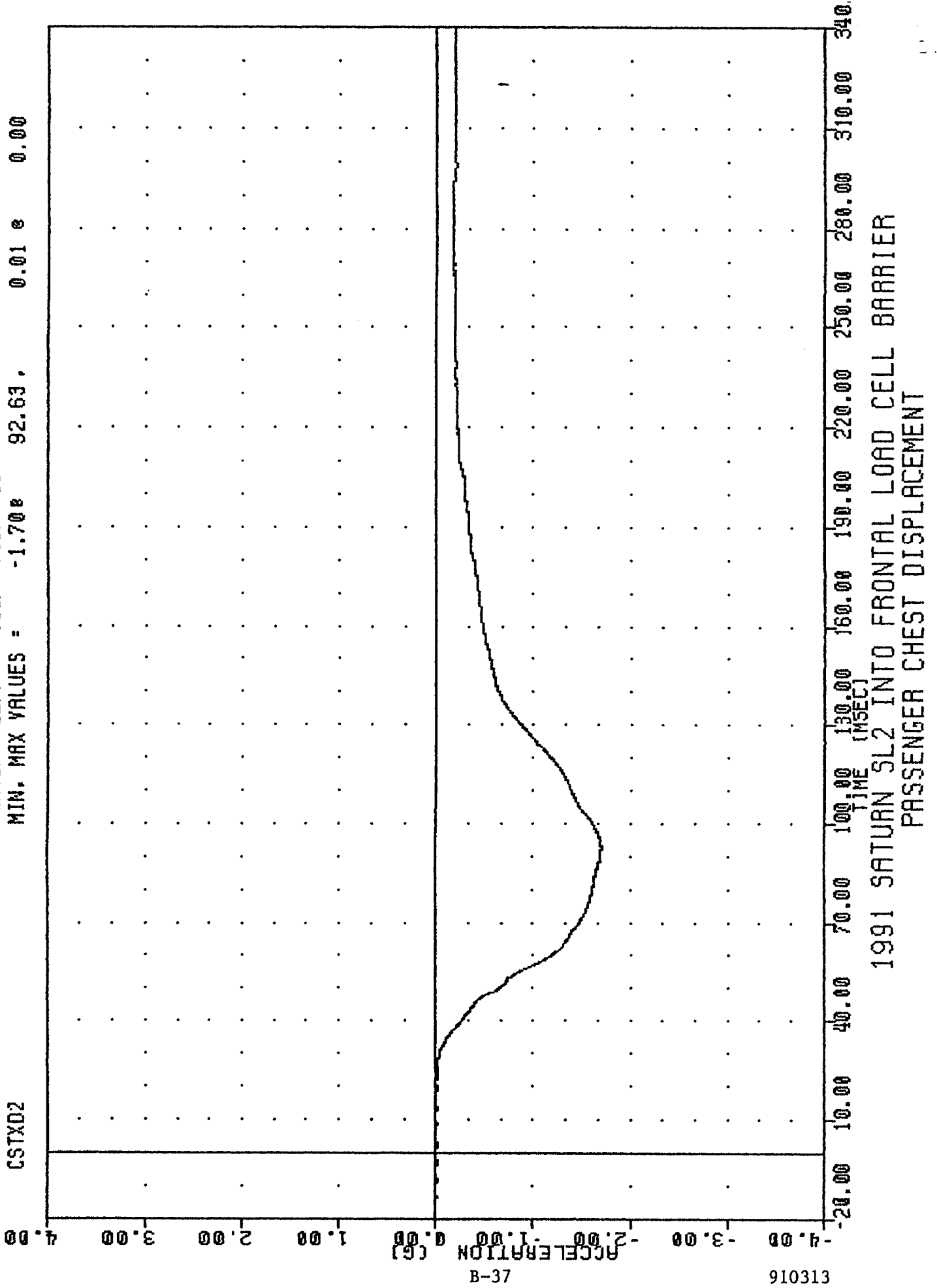
910313

B-36

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PAST SUBSTANT OCCURRENCE

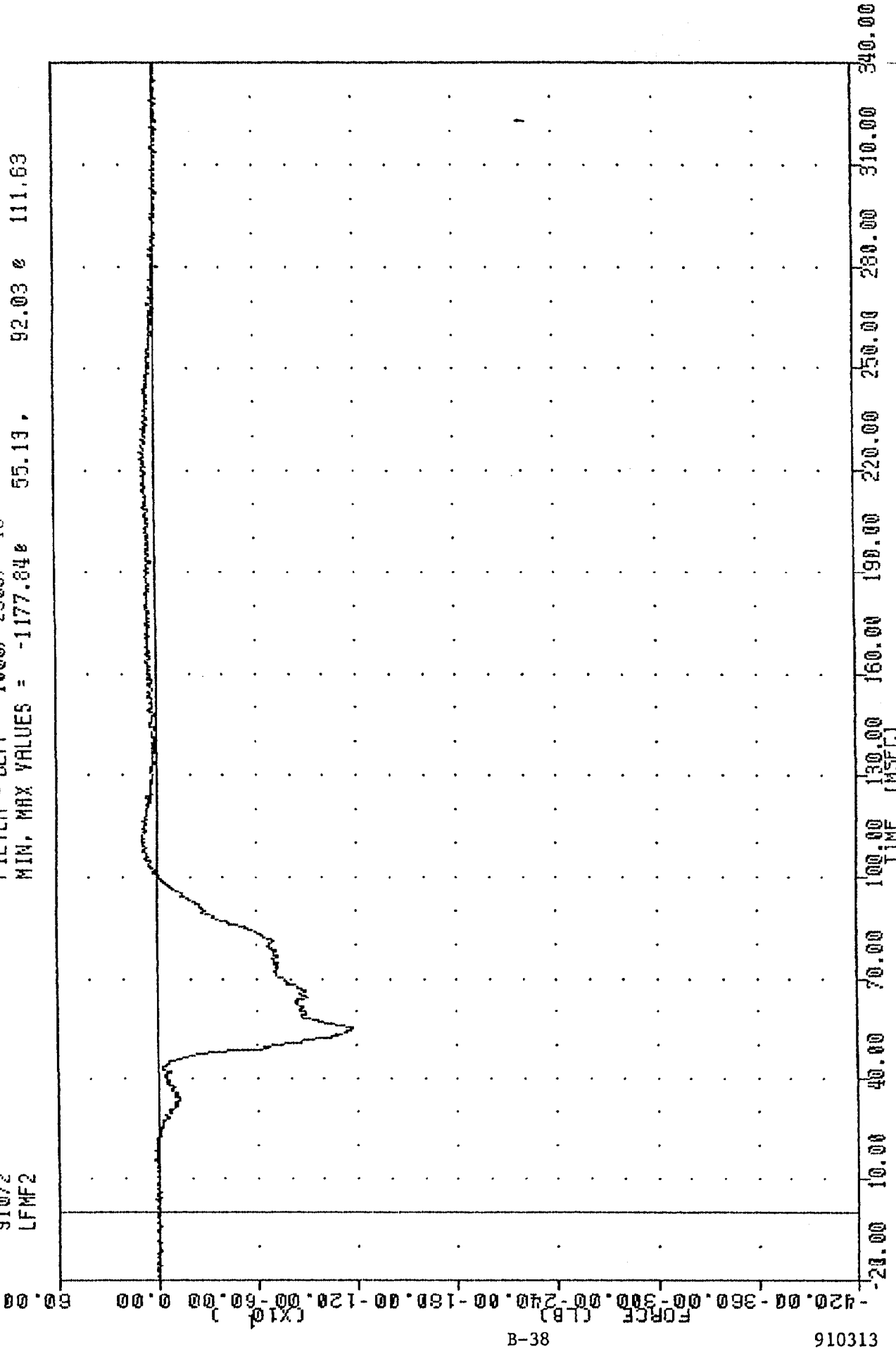
INL , SJW313
NEW CAR ASSESSMENT PROGRAM
91072
CSTXD2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -1.70e 92.63, 0.01 e 0.00



TRC 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 LFMF2

FILTER = BLFP 1000/ 2500/ -16
 MIN, MAX VALUES = -1177.84 55.13 92.03 111.63



B-38

910313

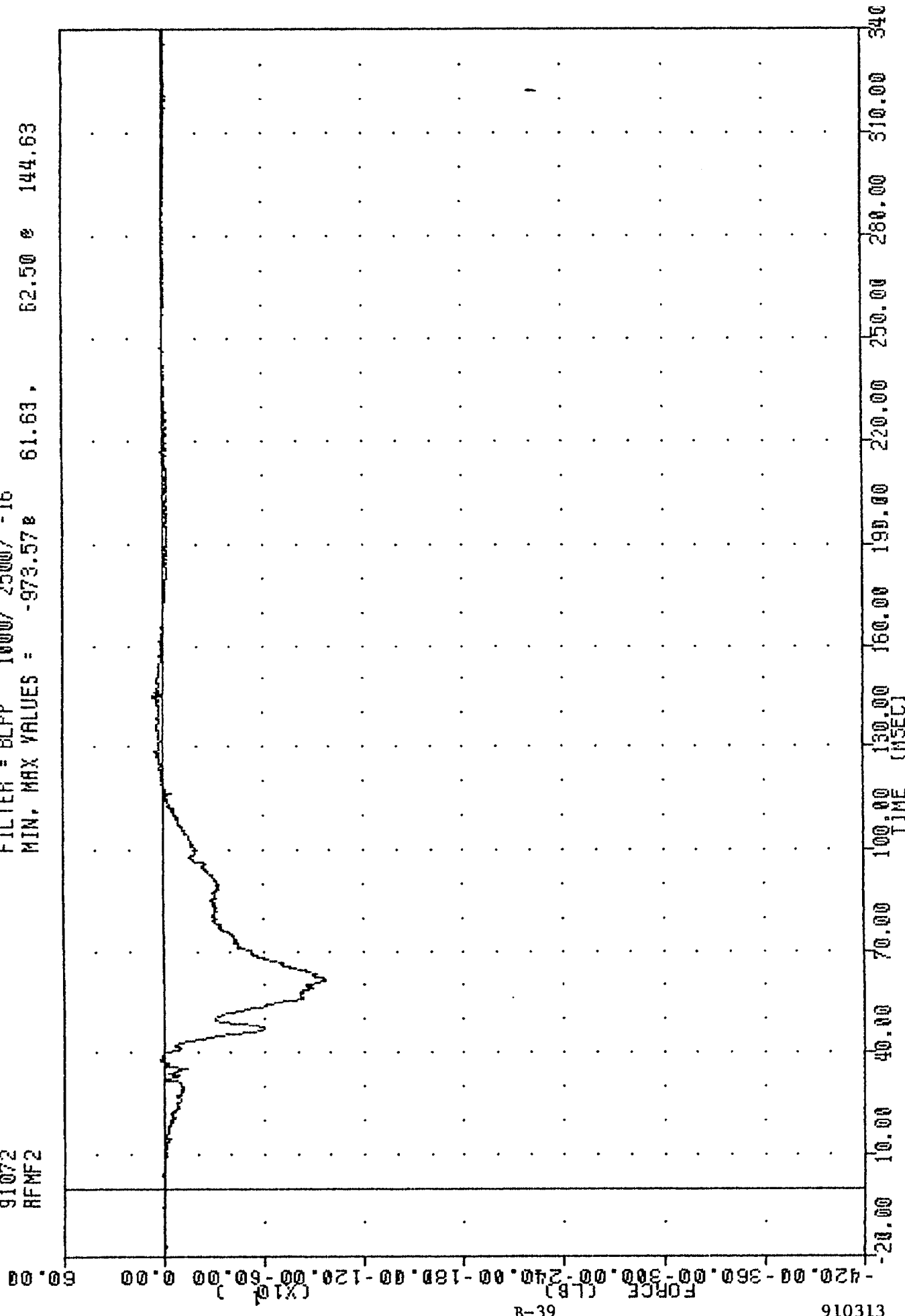
1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

PHASE 1 TEST

MURDER

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 RFMF2

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -973.57 61.63 62.50 144.63



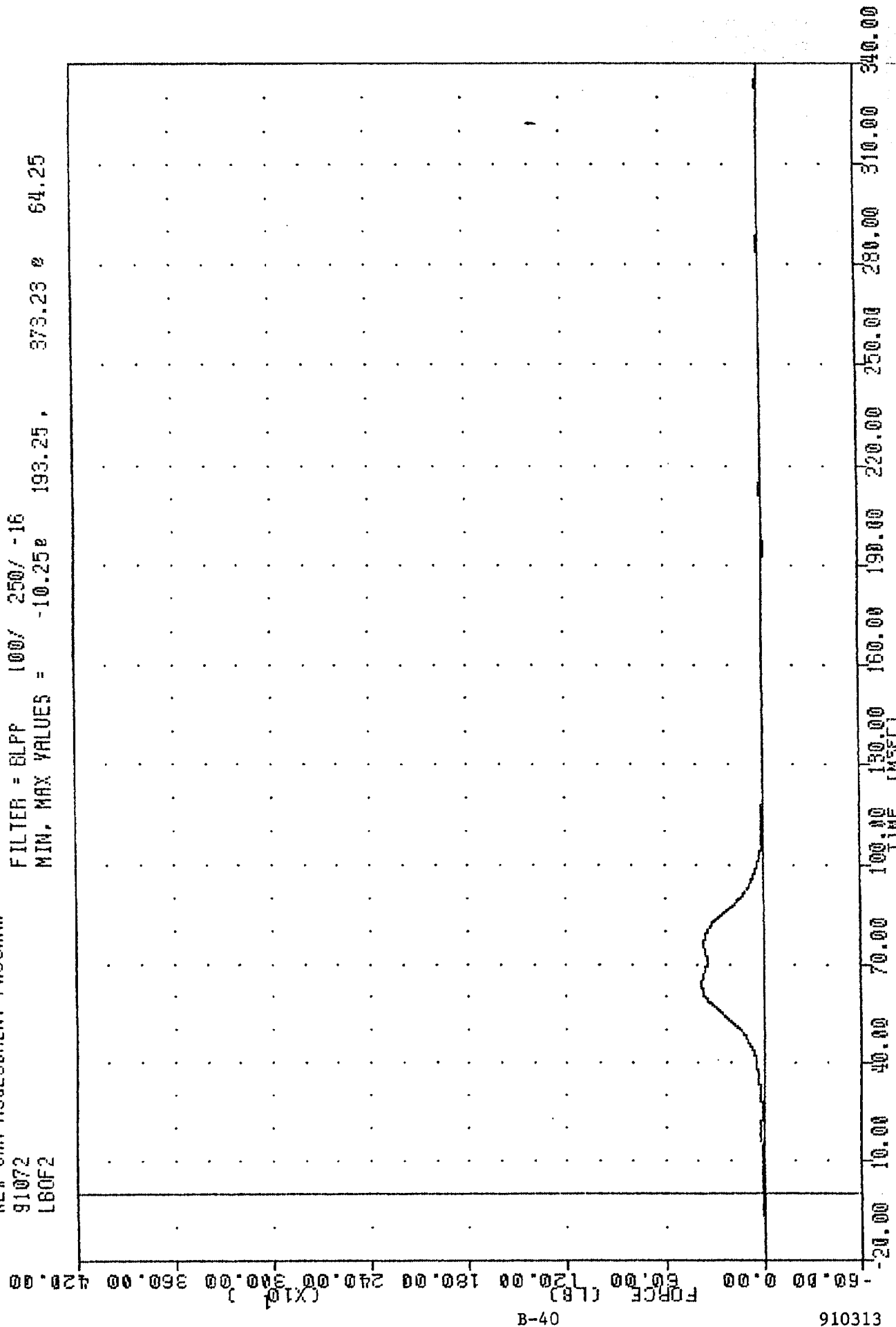
B-39

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER RIGHT FEMUR FORCE

TRC 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 L60F2

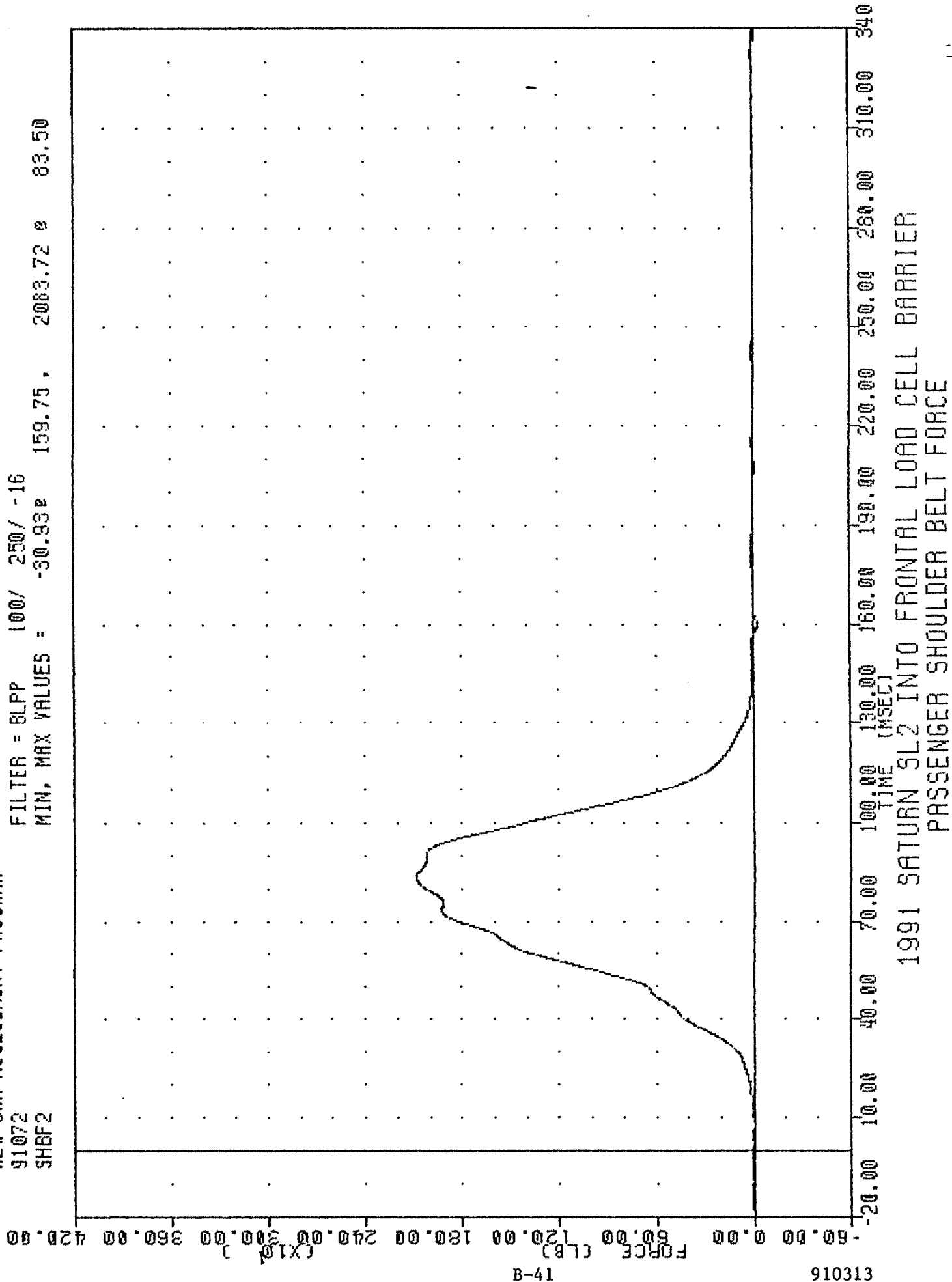
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -10.25e 193.25e 373.23 e 64.25



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER LAP BELT OUTWARD FORCE

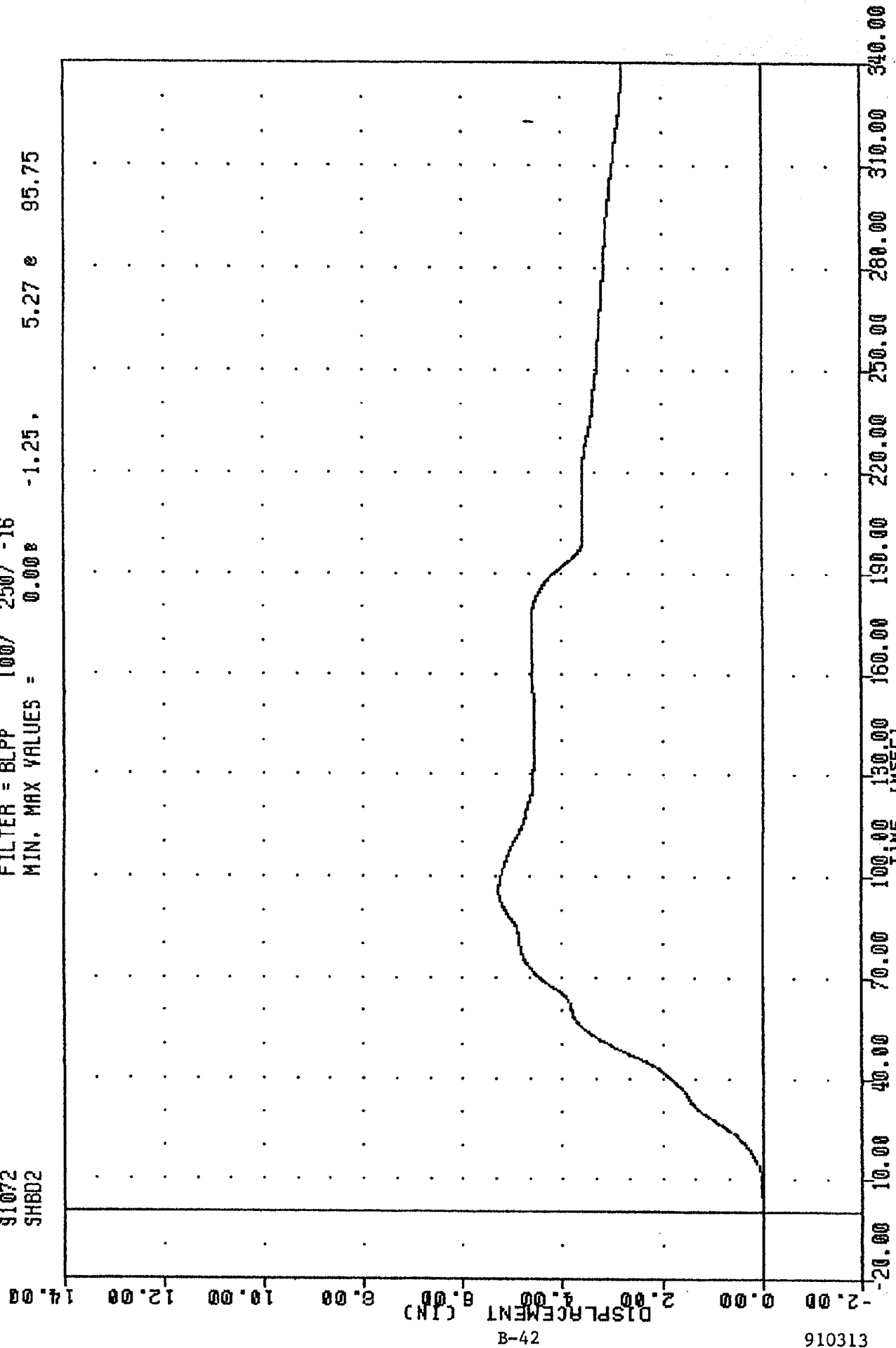
INC 91W513
 NEW CAR ASSESSMENT PROGRAM
 91072
 SHBF2

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -30.93e 159.75, 2083.72 e 83.50



TRC . 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 SHB02

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.008 -1.25, 5.27 e 95.75



B-42

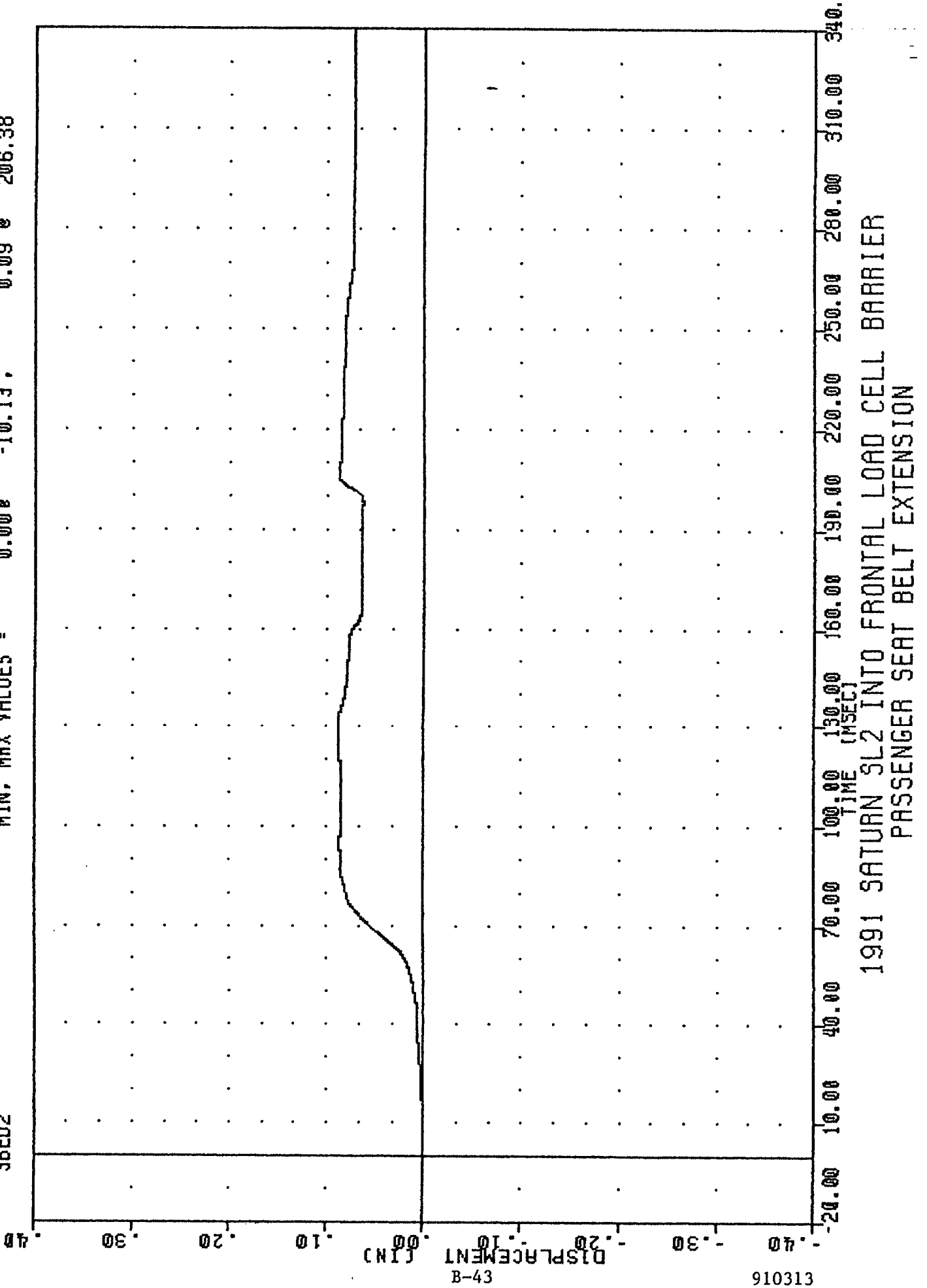
910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

PASSENGER OCCUPANT SURVIVAL RISK ASSESSMENT

INC * 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 SBED2

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.00e -10.13, 0.09 e 206.38



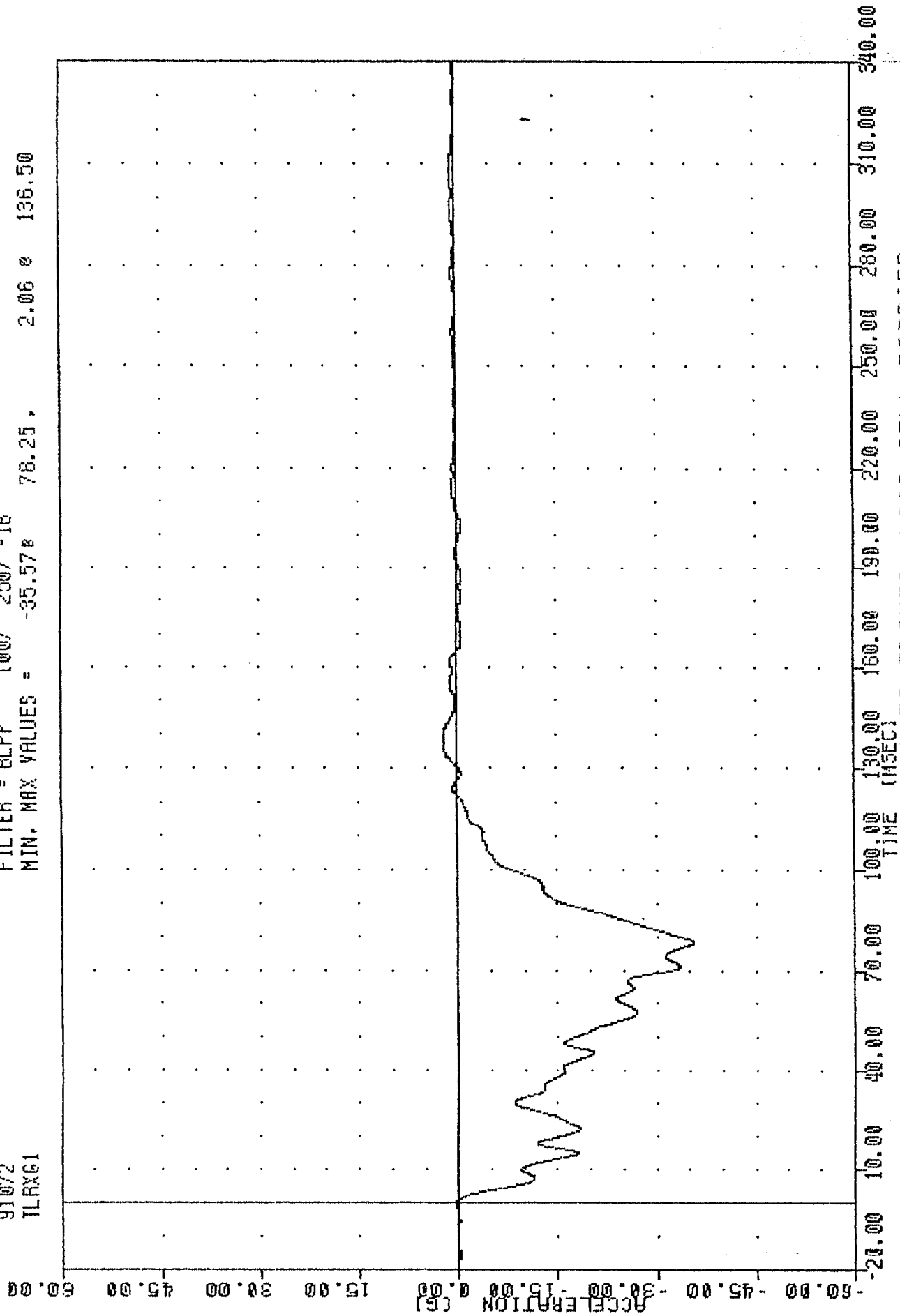
B-43

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 PASSENGER SEAT BELT EXTENSION

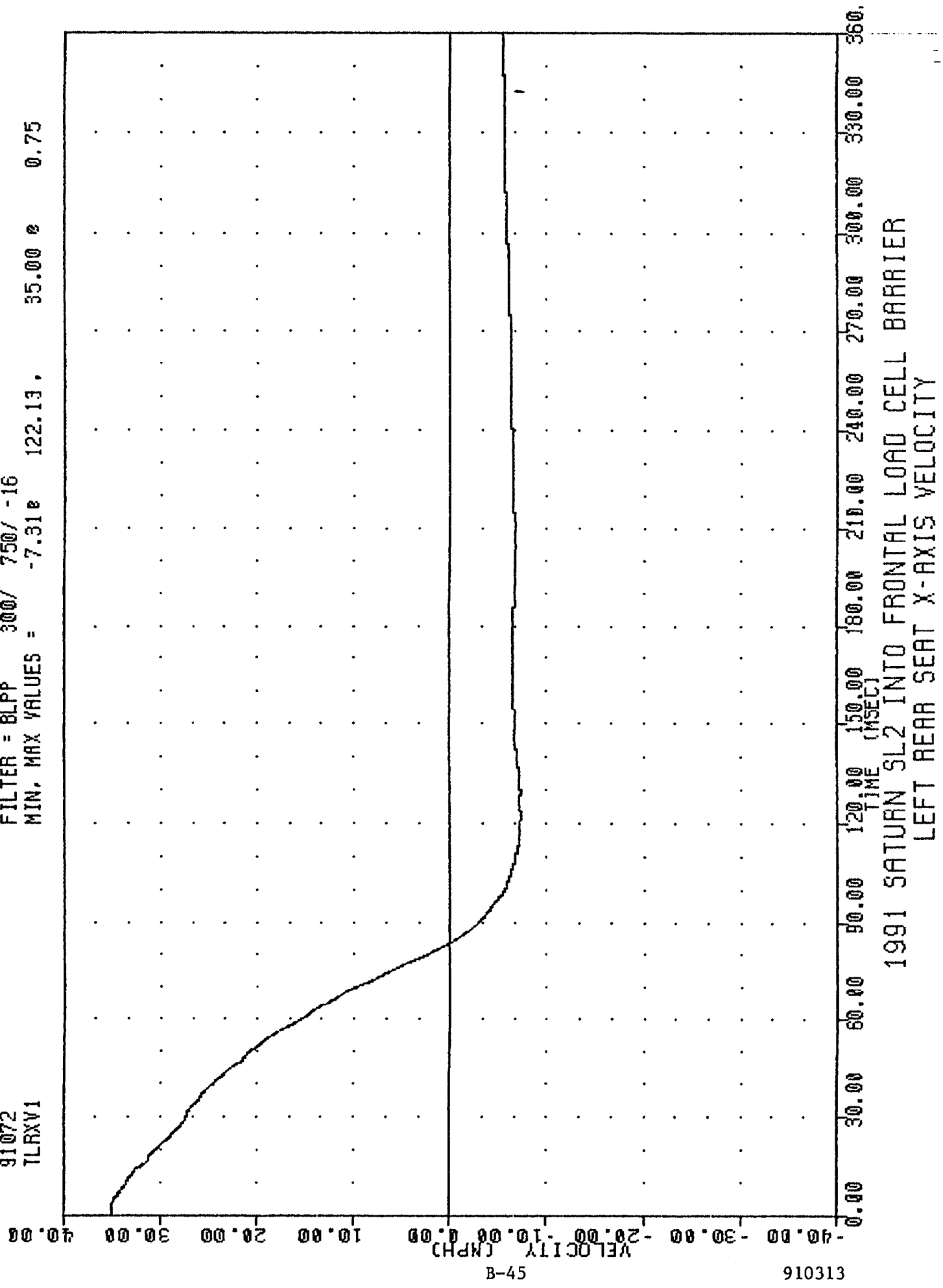
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TLRXG1

FILTER = BLPP 100/ 250/ -18
 MIN. MAX VALUES = -35.57 78.25, 2.06 136.50



INL
 NEW CAR ASSESSMENT PROGRAM
 91072
 TLRXV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -7.31e 122.13. 35.00 e 0.75



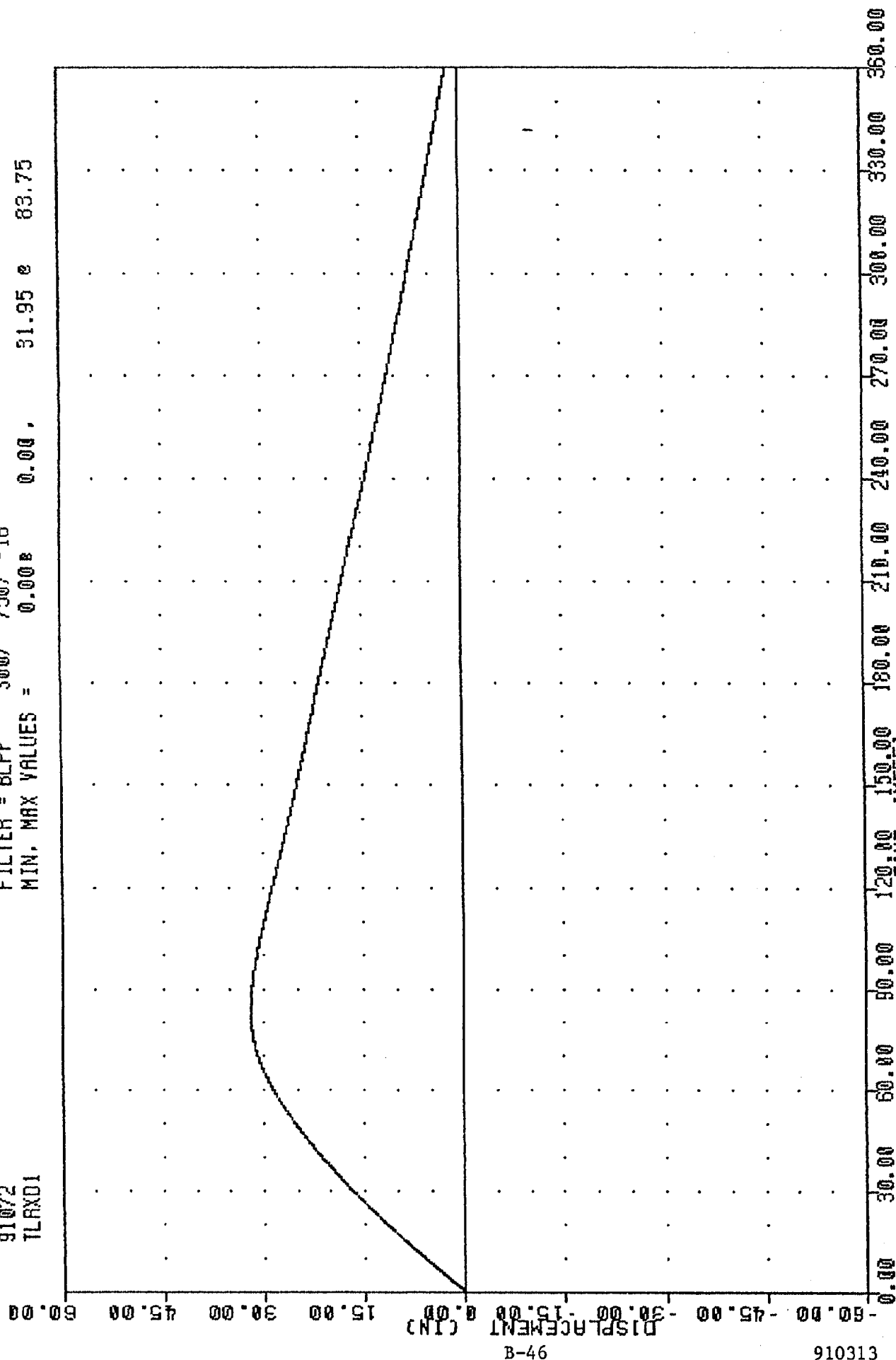
B-45

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LEFT REAR SEAT X-AXIS VELOCITY

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TLX01

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00 0.00 31.95 83.75

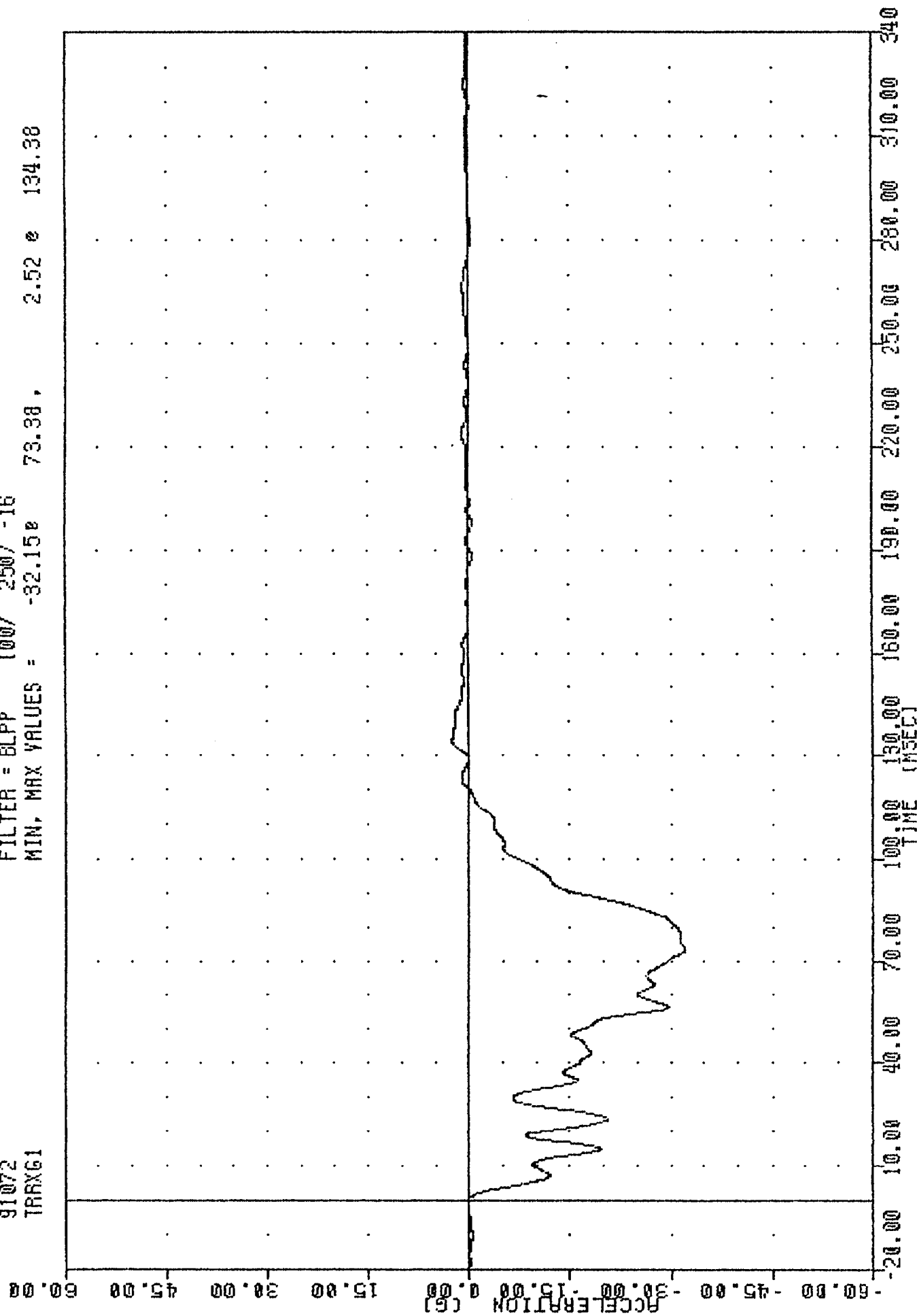


1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

TEST REAR STATIC AXIS DISPLACEMENT

INC
NEW CAR ASSESSMENT PROGRAM
91072
TRRXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -32.150 73.38, 2.52 134.38



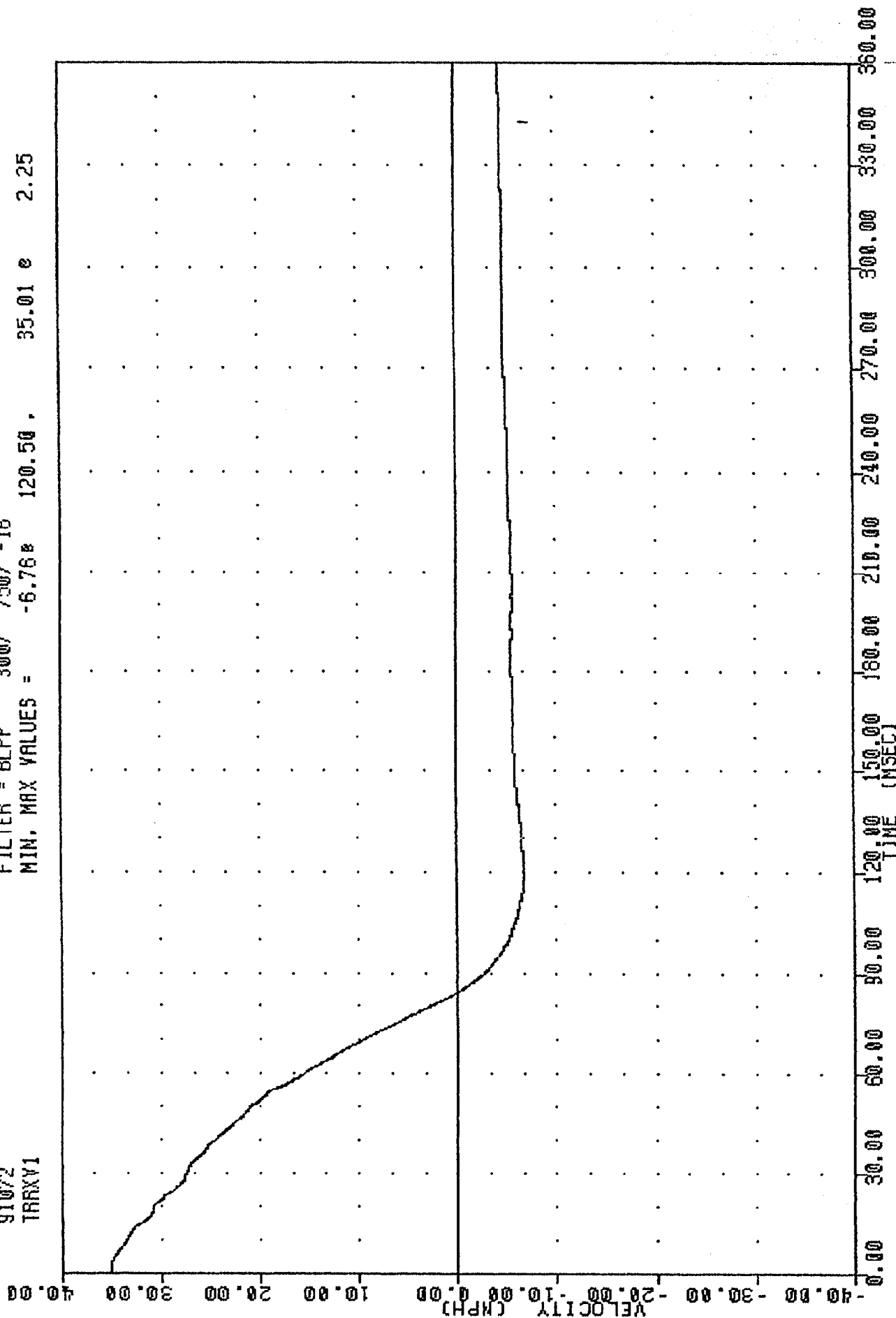
B-47

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TRRXV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -6.76 120.50 35.01 e 2.25

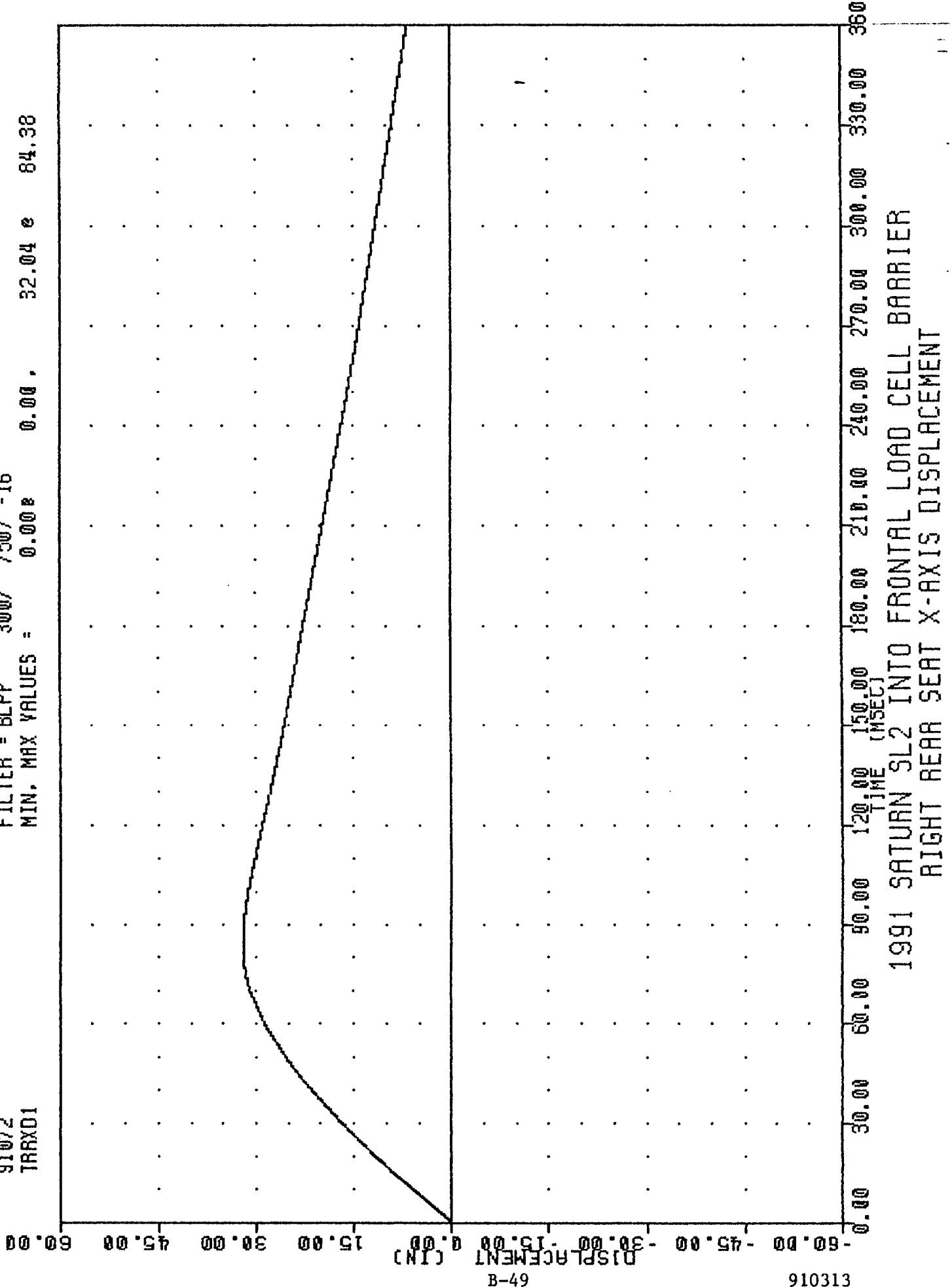


1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

RIGHT REAR SEAT X AXIS VELOCITY

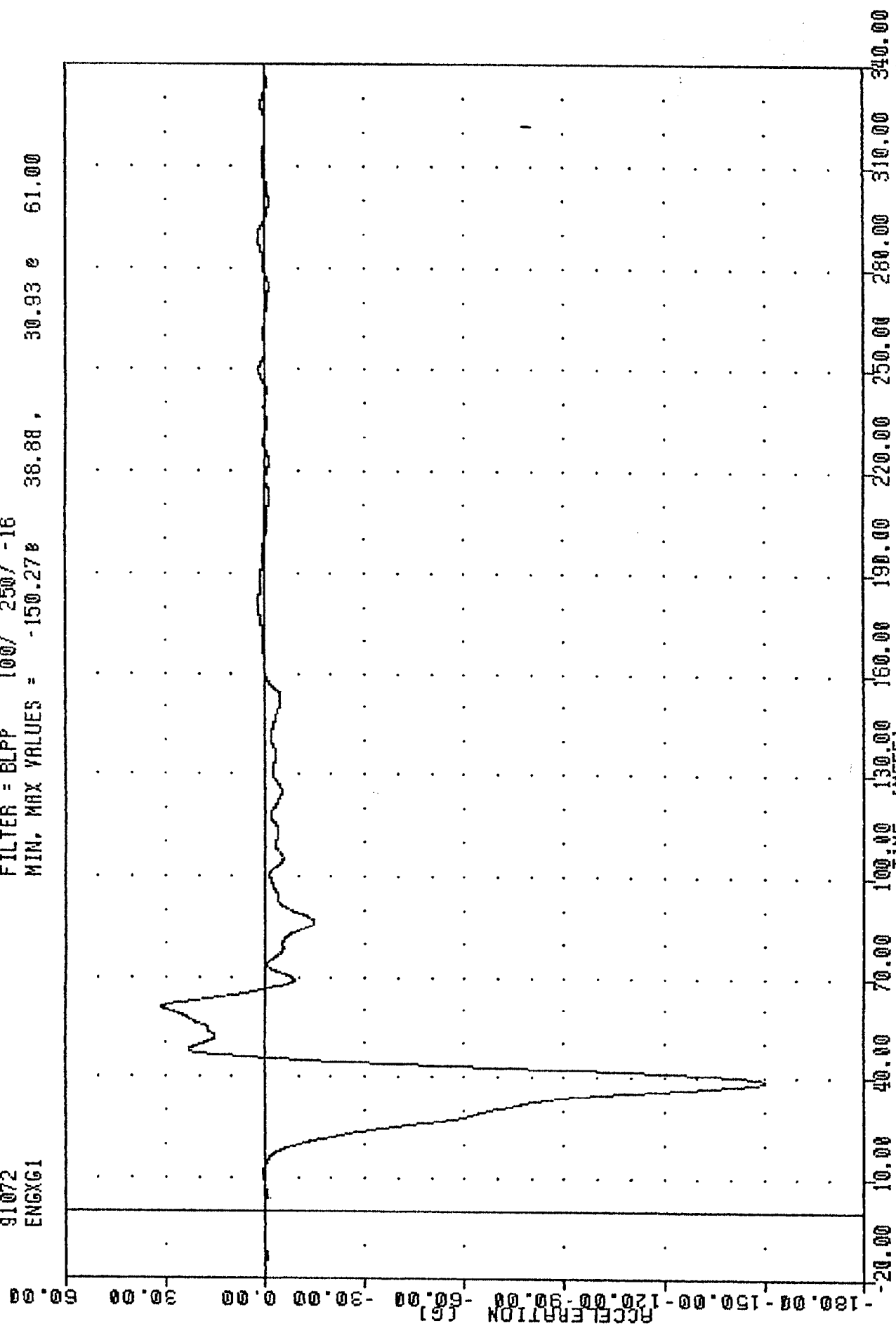
IML 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TRXD1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00 0.00 32.04 e 84.38



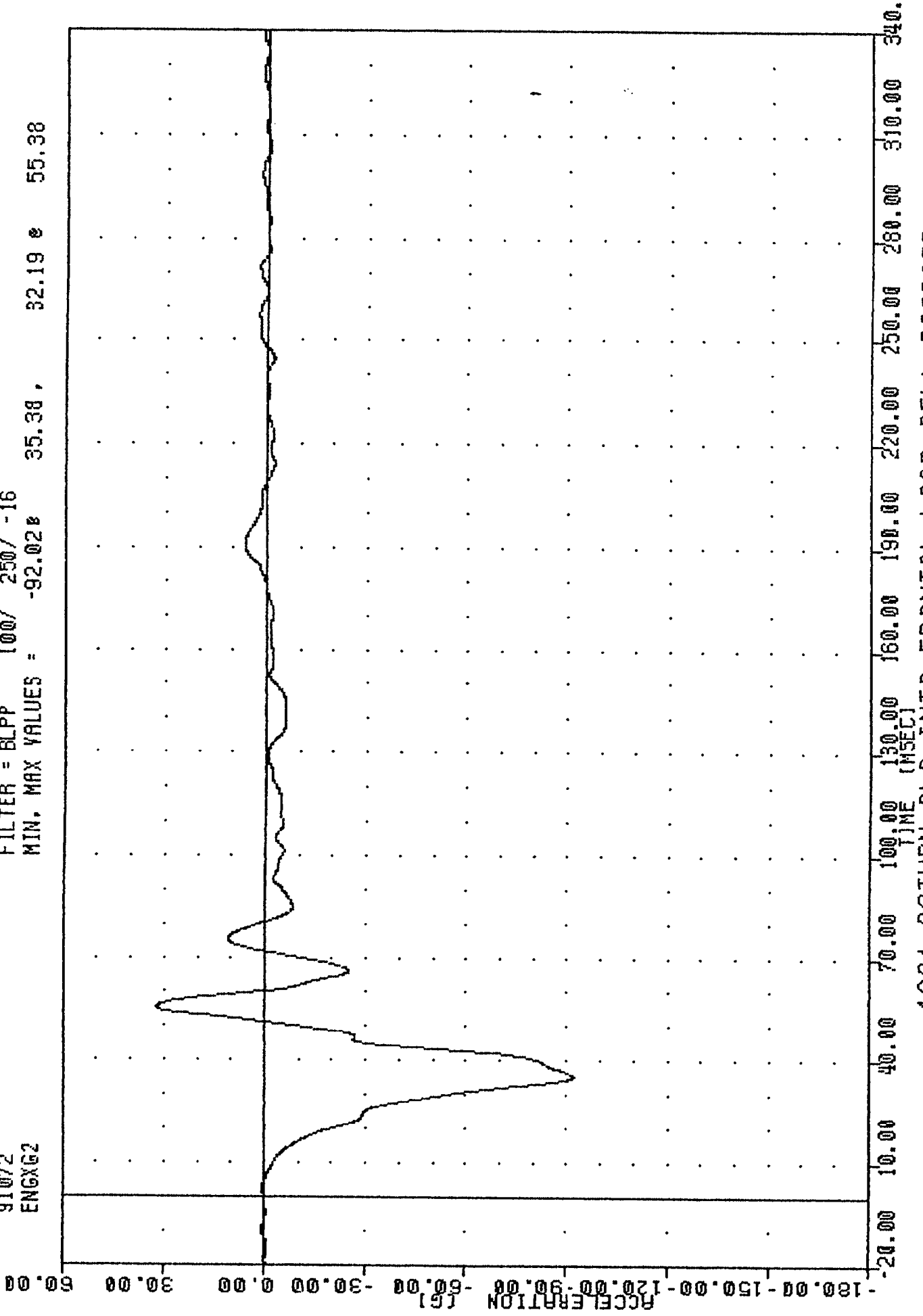
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 ENGCG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -150.270 38.88 , 30.93 e 61.00



INC , SJW313
 NEW CAR ASSESSMENT PROGRAM
 91072
 ENGCG2

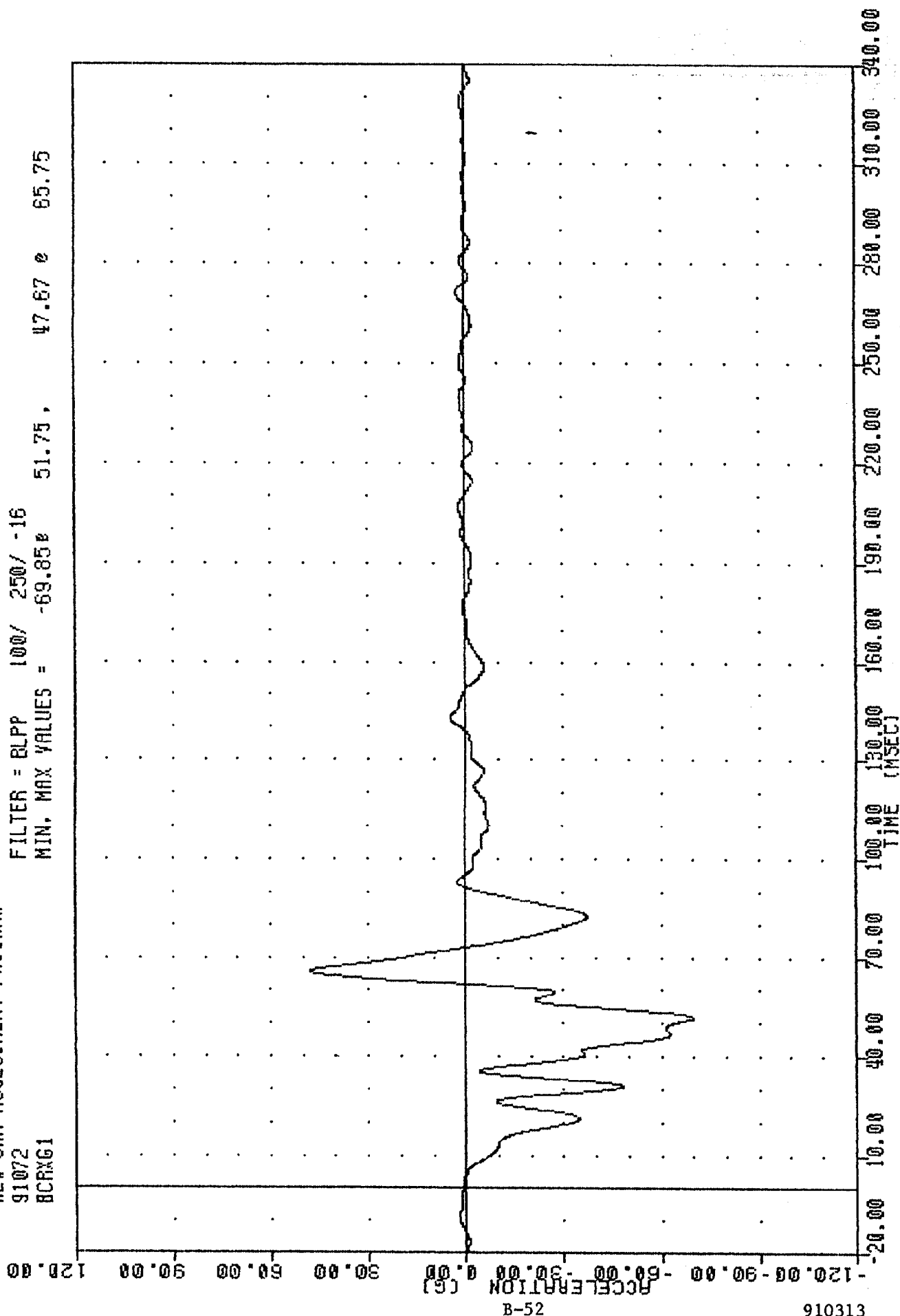
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -92.028 35.38 , 32.19 55.38



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 ENGINE BOTTOM X-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BCRXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -69.85 51.75 47.67 0 65.75



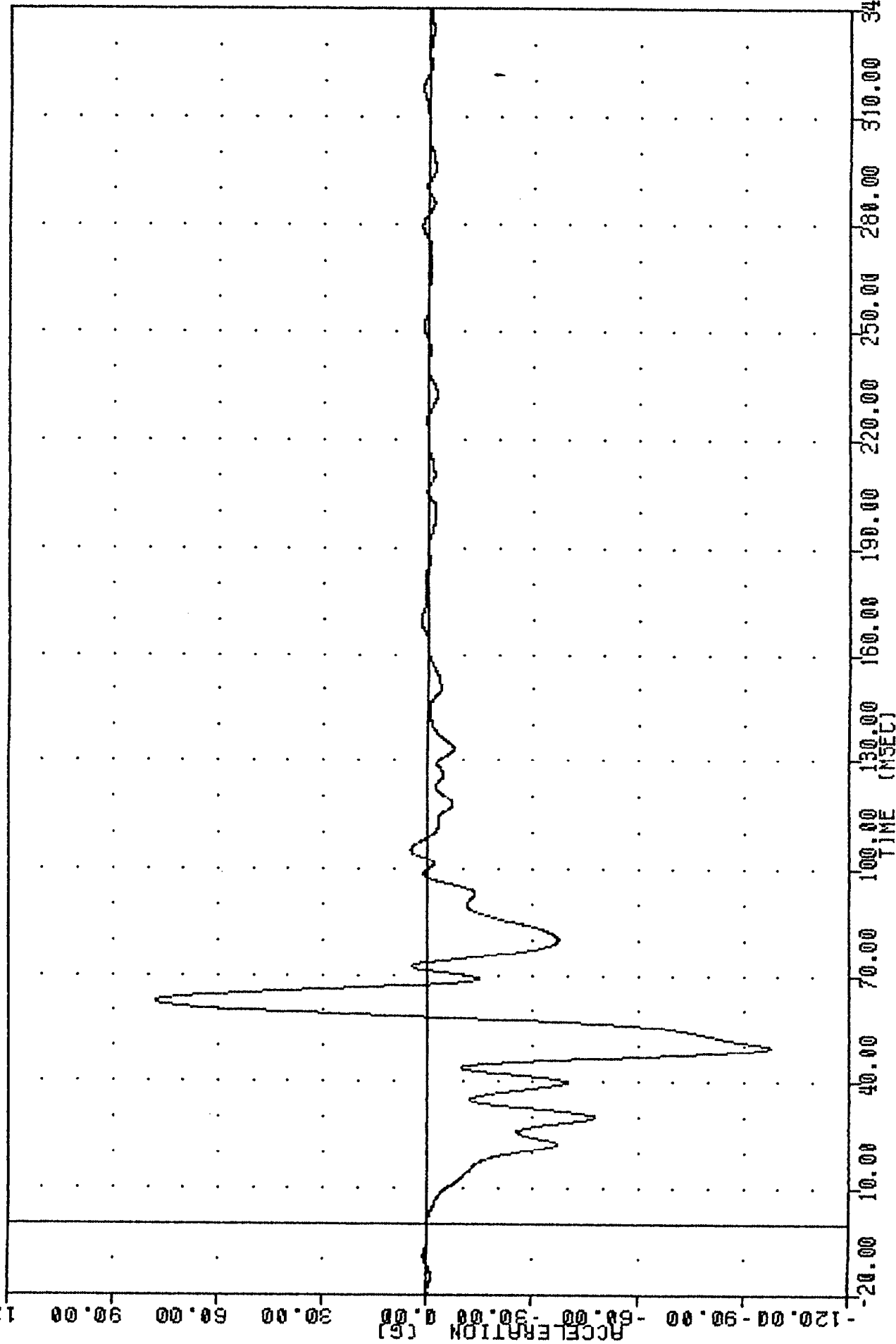
B-52

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 RIGHT BRAKE COLLISION X-AXIS ACCELERATION

IRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BCLXG1

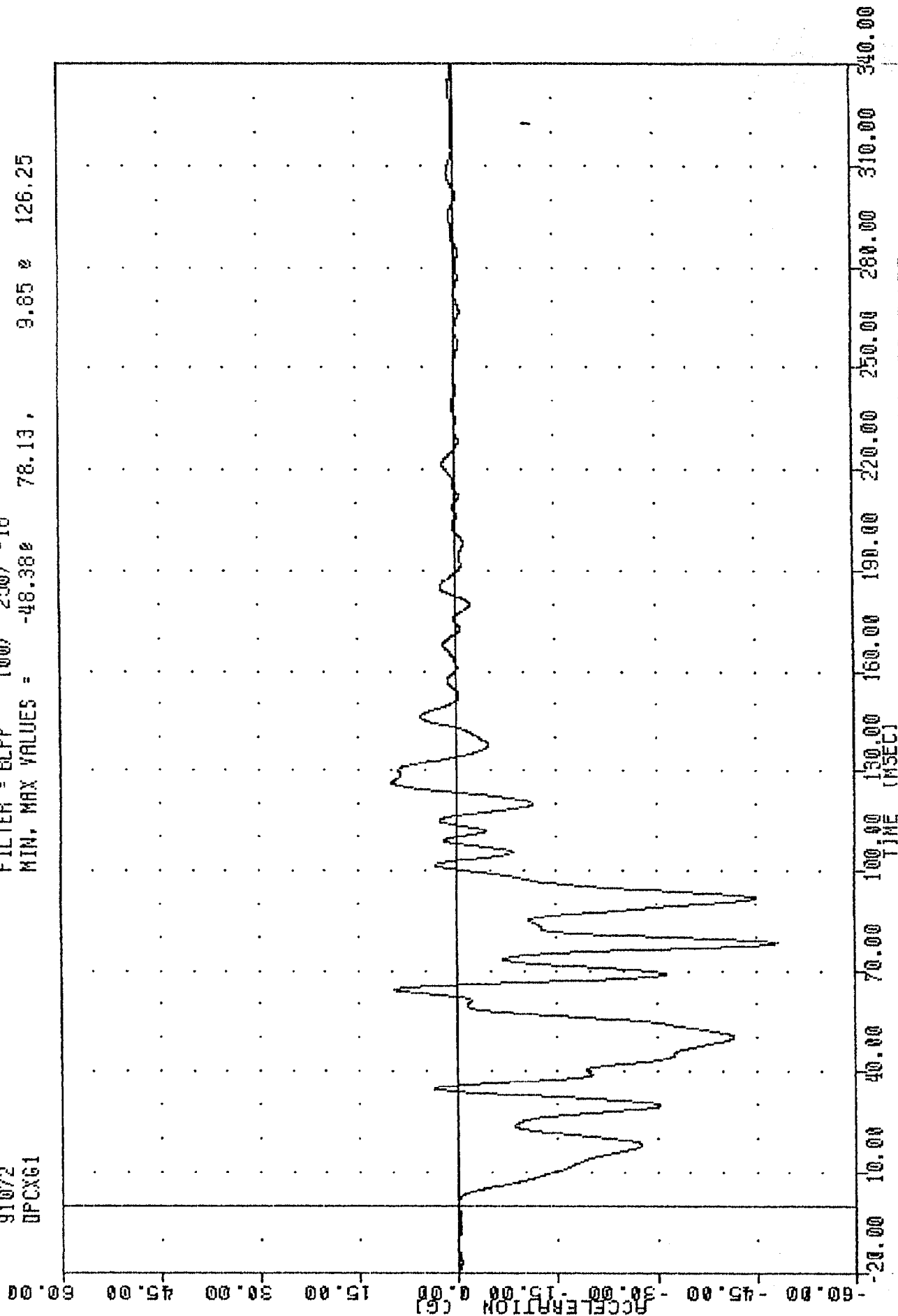
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -97.62e 49.75 , 77.96 e 62.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 DPCXG1

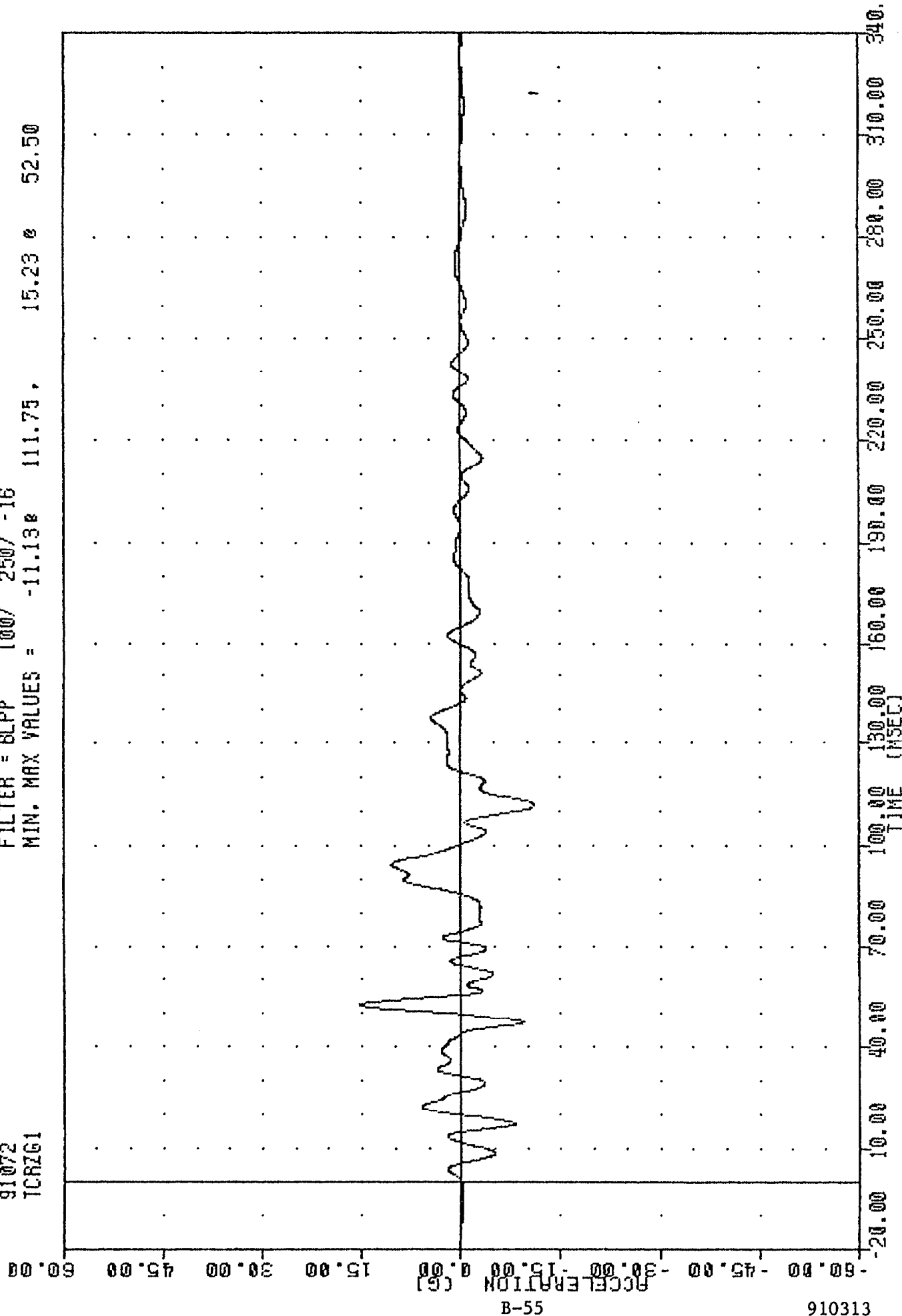
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -48.38% 78.13, 9.85 % 126.25



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

INL , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TCRZG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -11.13 111.75, 15.23 52.50



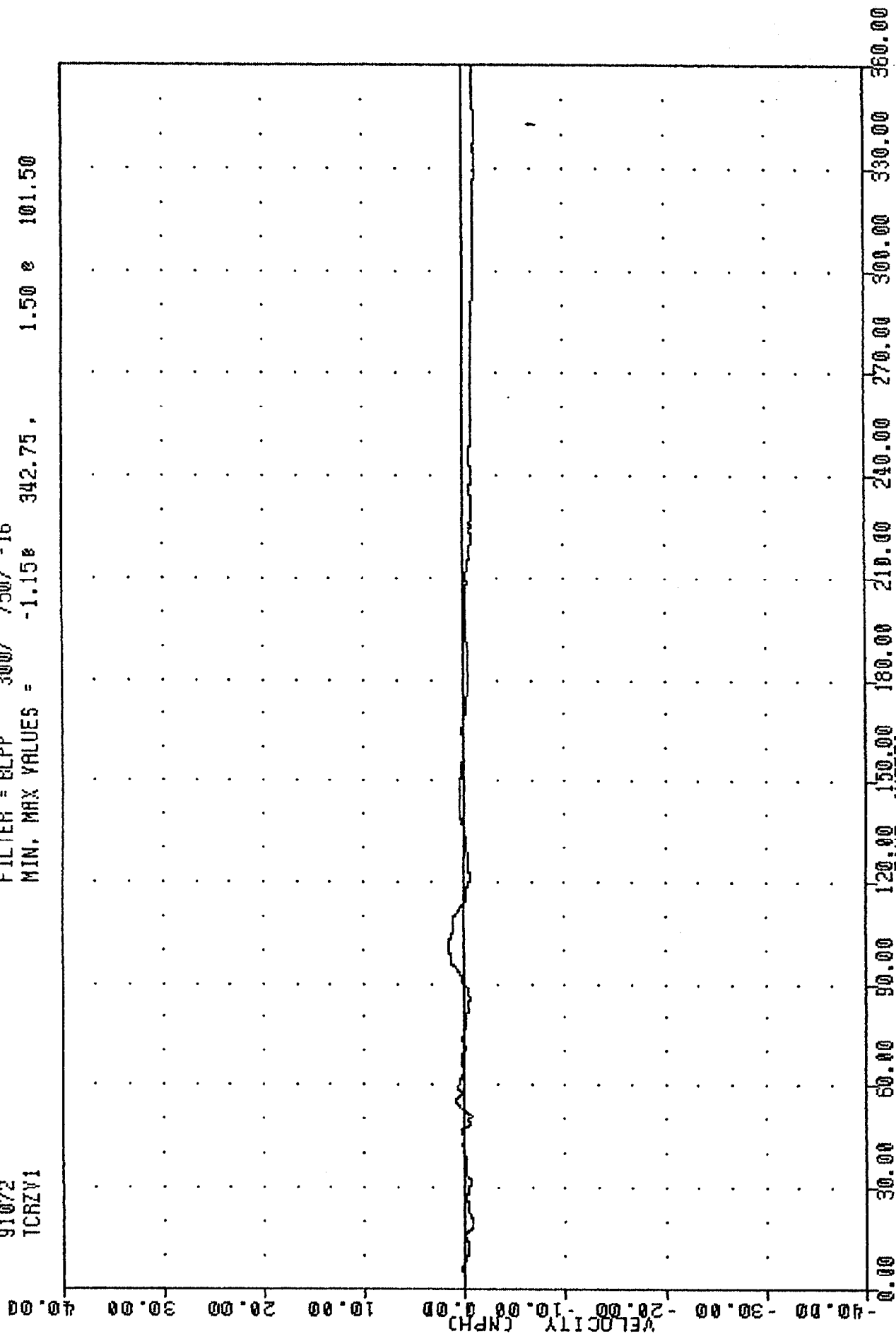
B-55

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 REAR SEAT CROSSMEMBER Z-AXIS ACCELERATION

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 TCRZV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -1.15% 342.75, 1.50 % 101.50



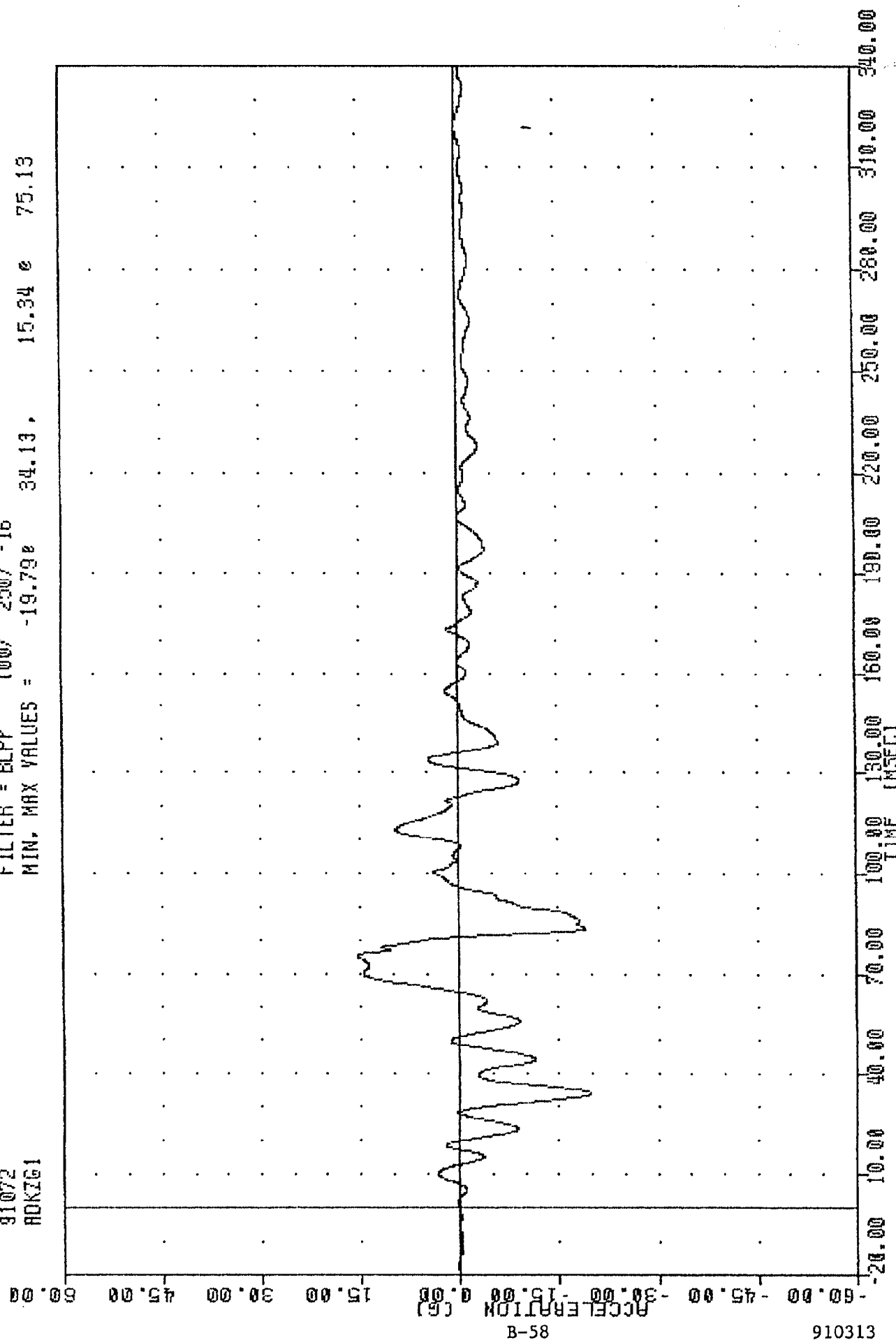
MIN. MAX VALUES =	-2.16	360.00	0.33	169.25
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The graph displays a coordinate system for plotting displacement over time. The vertical axis (y-axis) is labeled 'DISPLACEMENT (IN)' and ranges from 0.00 at the top to -60.00 at the bottom, with major grid lines every 15.00 units. The horizontal axis (x-axis) is labeled 'TIME (MSEC)' and ranges from 0.00 to 360.00, with major grid lines every 30.00 units. A vertical line is drawn at 180.00 msec, dividing the graph into two equal halves. The grid consists of 24 horizontal rows and 12 vertical columns on each side of the 180.00 msec line.

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS DISPLACEMENT

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 ADKZG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -19.79e 34.13, 15.34 e 75.13



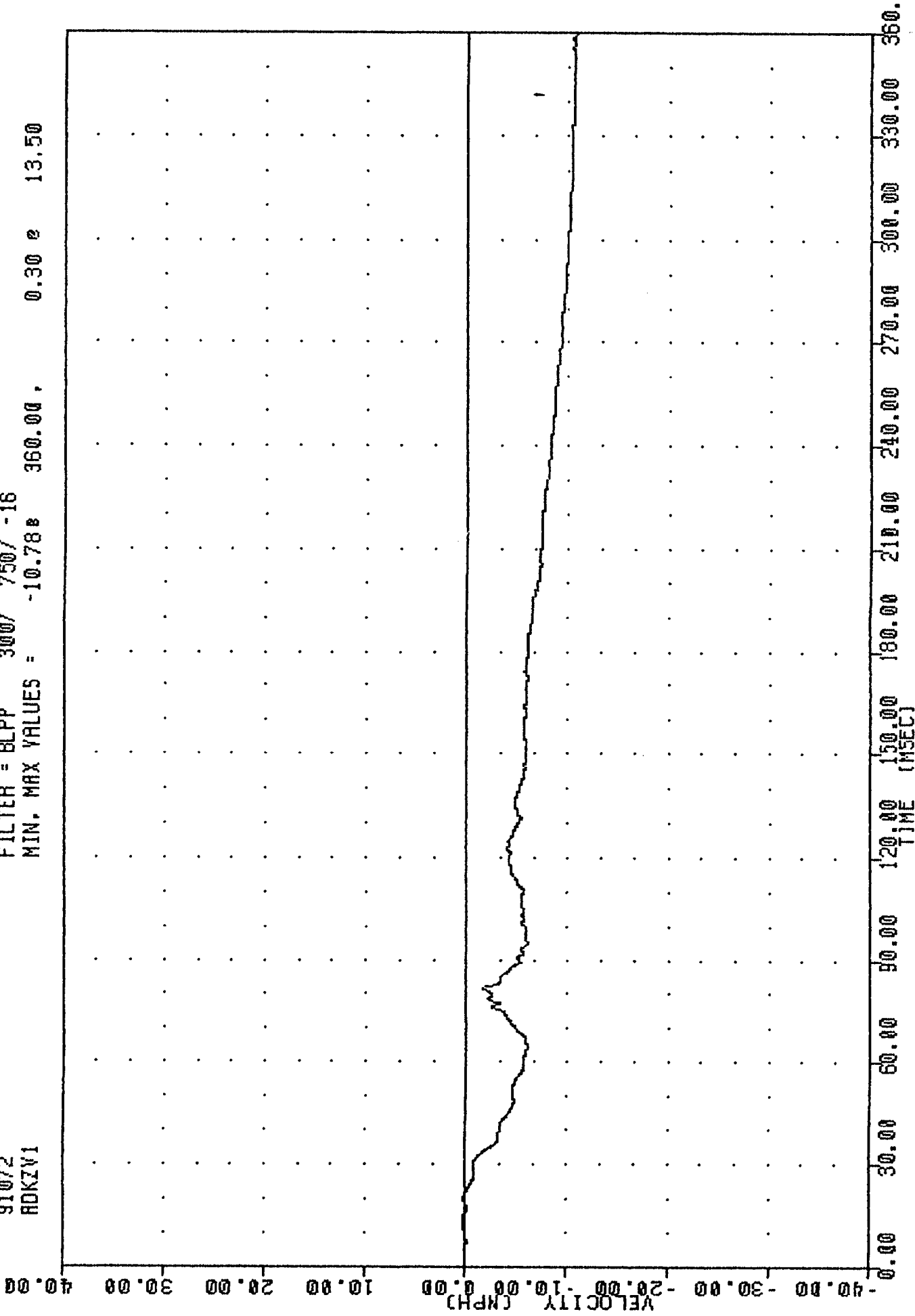
B-58

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 VEHICLE REAR CENTER Z-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM
 91072
 ROKZV1

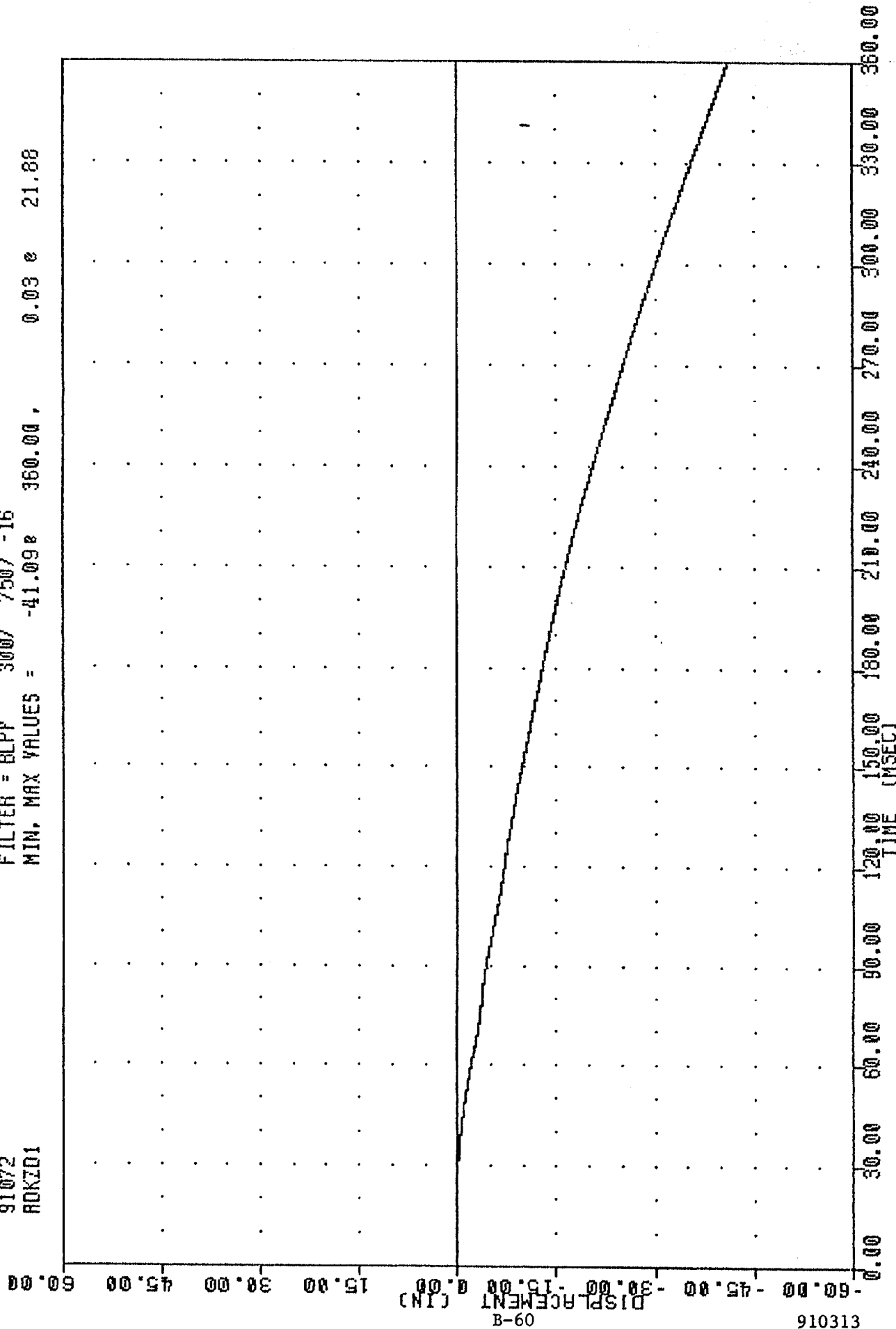
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -10.78 360.00 0.30 13.50



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 VEHICLE REAR CENTER Z-AXIS VELOCITY

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 ROKZD1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -41.09e 360.00 , 0.03 e 21.88



910313

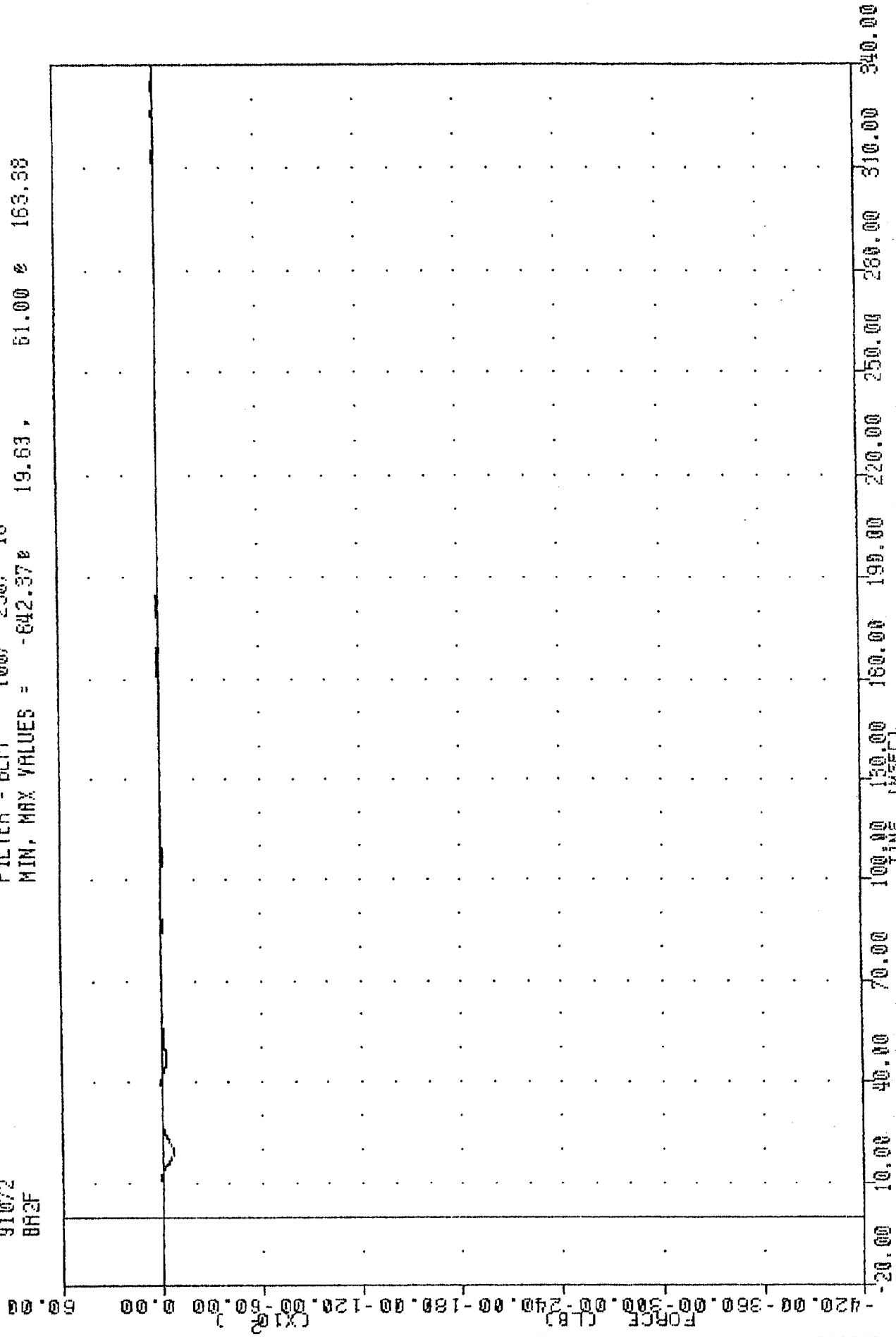
B-60

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

VEHICLE CENTER Z AXIS DISPLACEMENT

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BR2F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -642.37 19.63 61.00 163.58

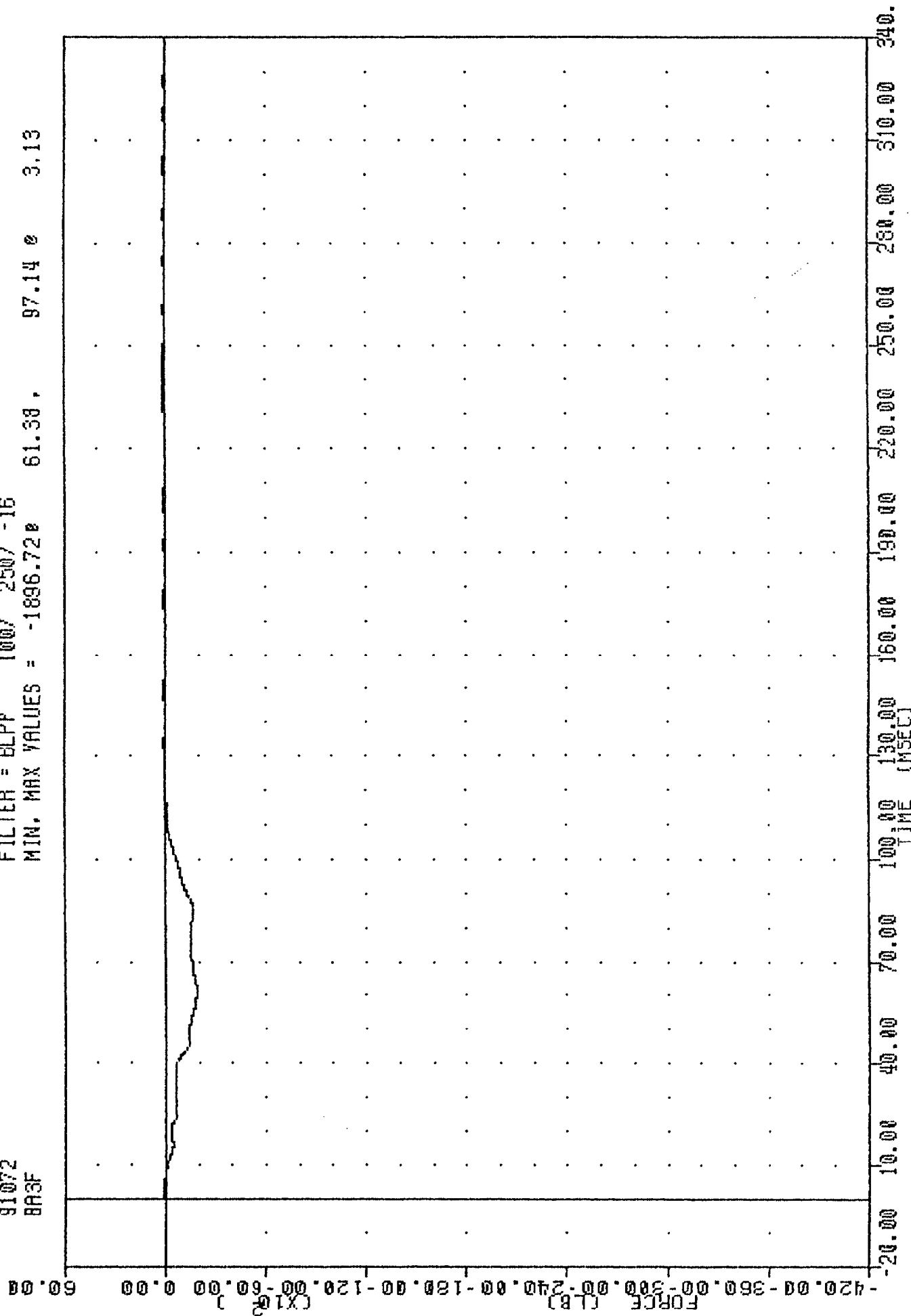


1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION AS FORCES

INL , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BR3F

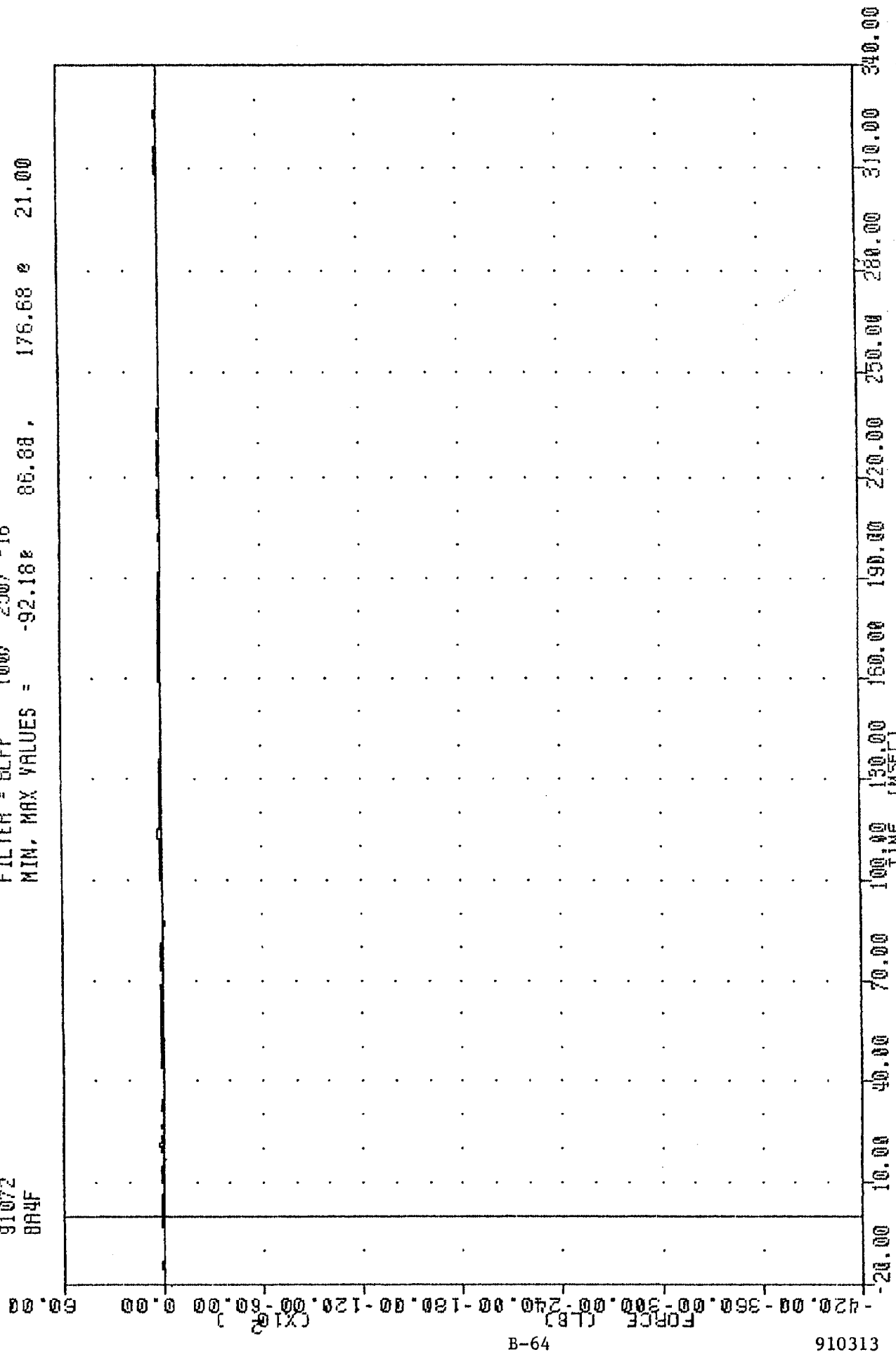
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1896.72 61.38 97.14 3.13



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A3 FORCE

TRC 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BR4F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -92.18% 86.88% 176.68% 21.00



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER POSITION AND FORCE

CTCME: 711

FILTER = BLPP 100/ 250/ -19

2000

MIN. MAX. VALUES

69.25.

155.32 2 -14.63

10-09

00'0 00

9-00
201XJ

B-65

910313

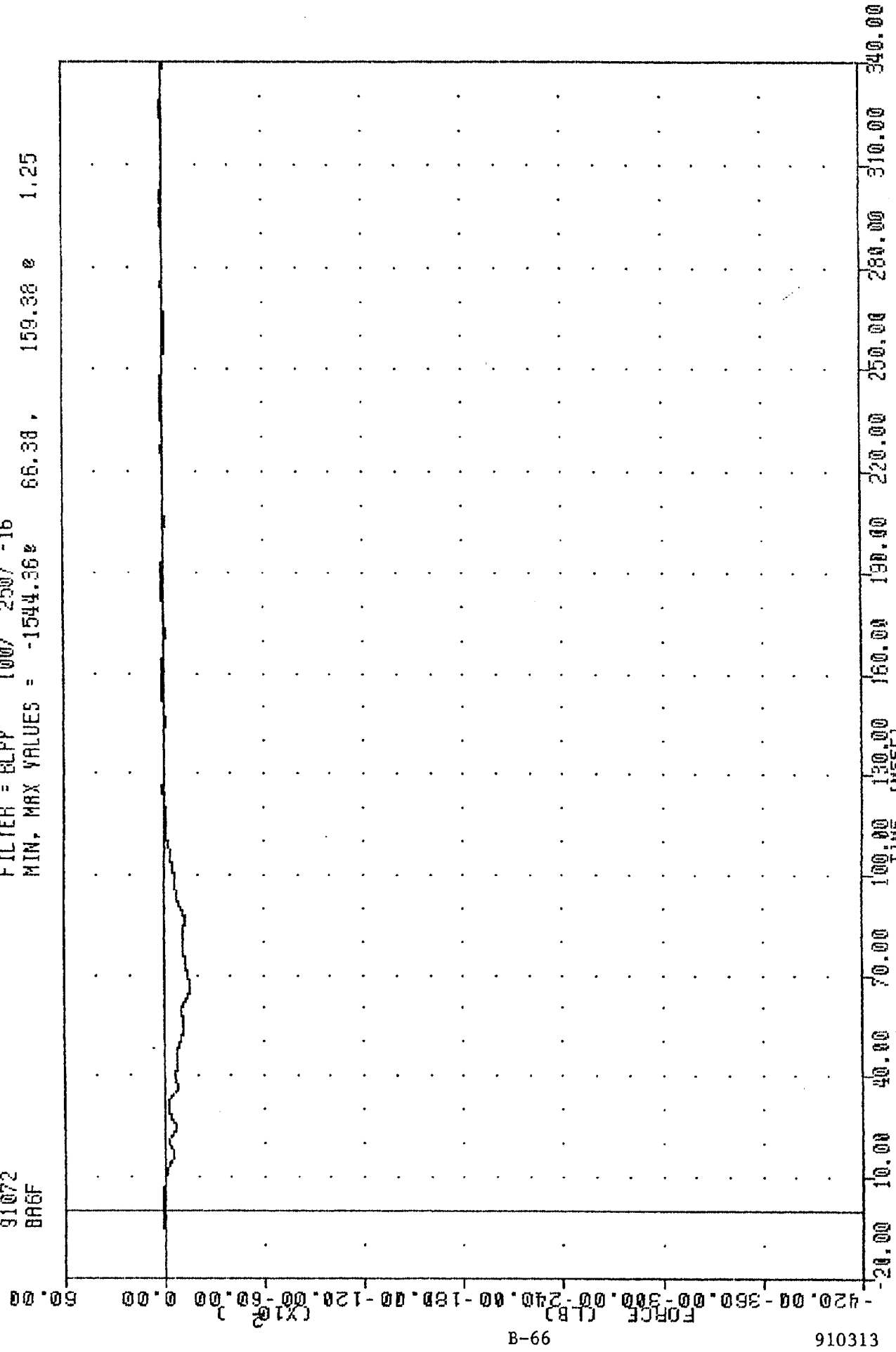
24.00	10.00	40.00	70.00	100.00	130.00	160.00	190.00	220.00	250.00	280.00	310.00	340.00
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07ME 130.01
M5EC1

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION R5 FORCE

TRC
NEW CAR ASSESSMENT PROGRAM

91072
BAGF
FILTER = ELPP 100/ 250/ -16
MIN, MAX VALUES = -1544.36% 66.38, 159.38 @ 1.25



B-66

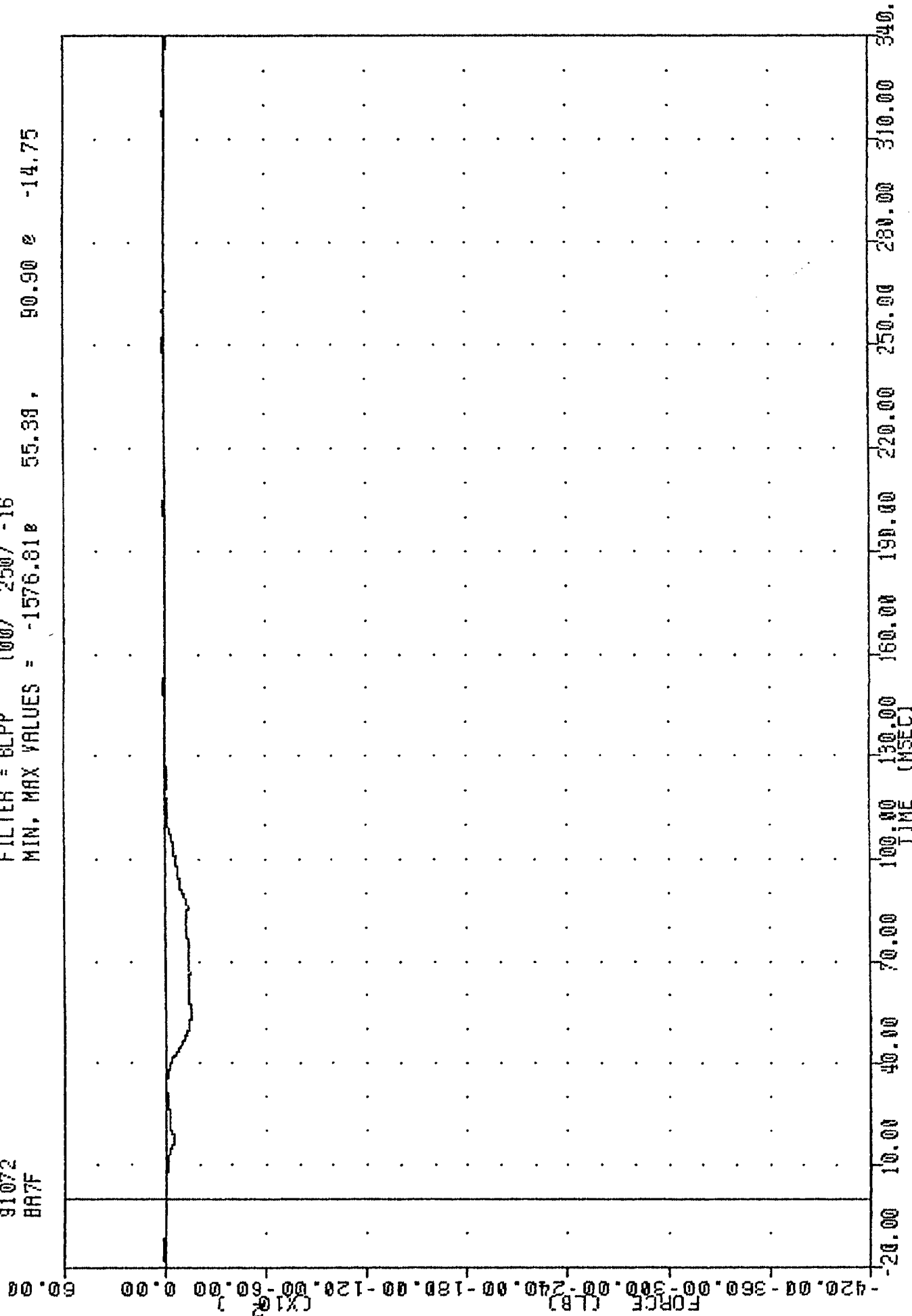
910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

TEST POSITION APPROX 50%

INC
NEW CAR ASSESSMENT PROGRAM
91072
BR7F

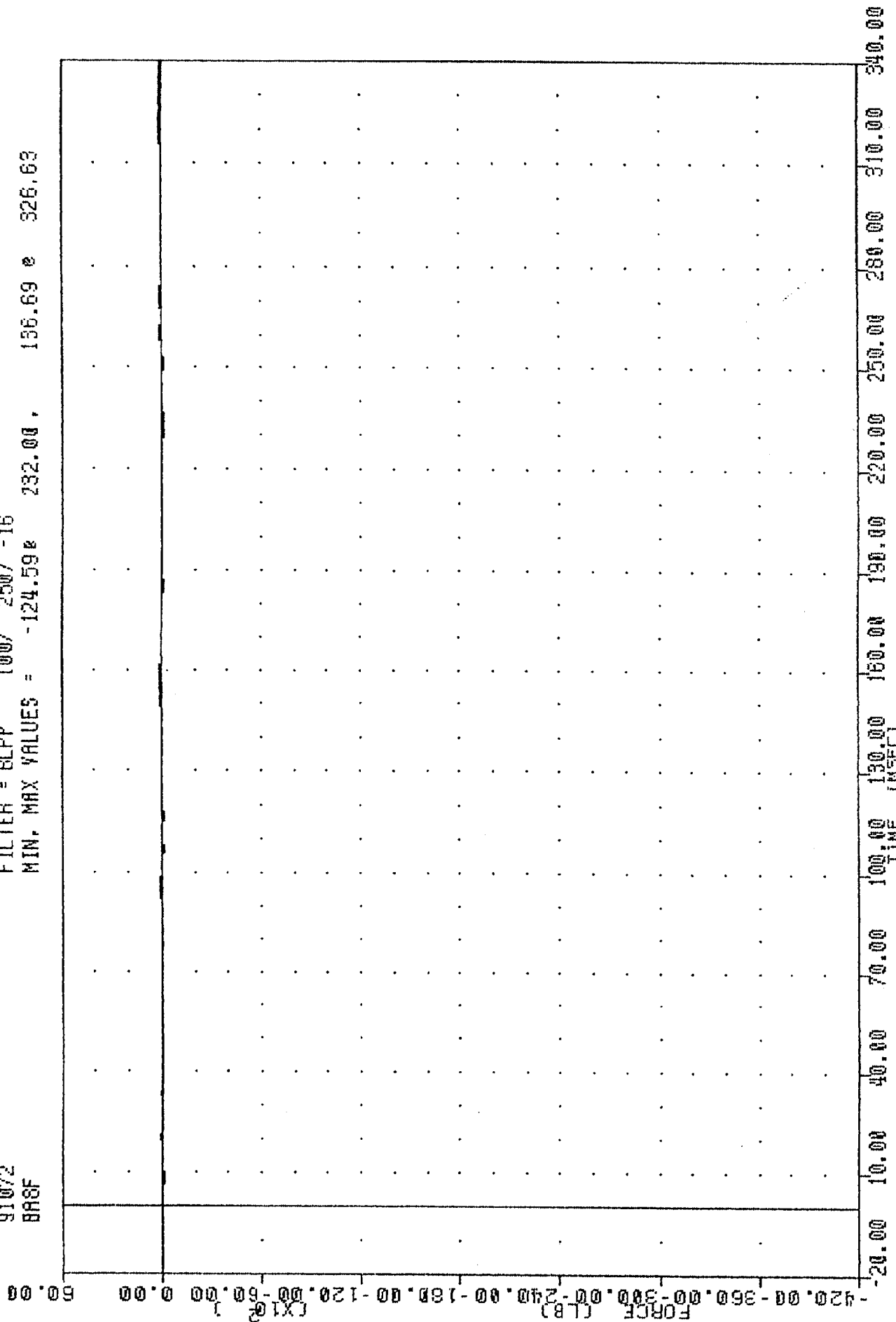
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -1576.818 55.38, 90.90 0 -14.75



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A7 FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BASF

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -124.59 232.00 136.69 326.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

ה'תשנ"ח

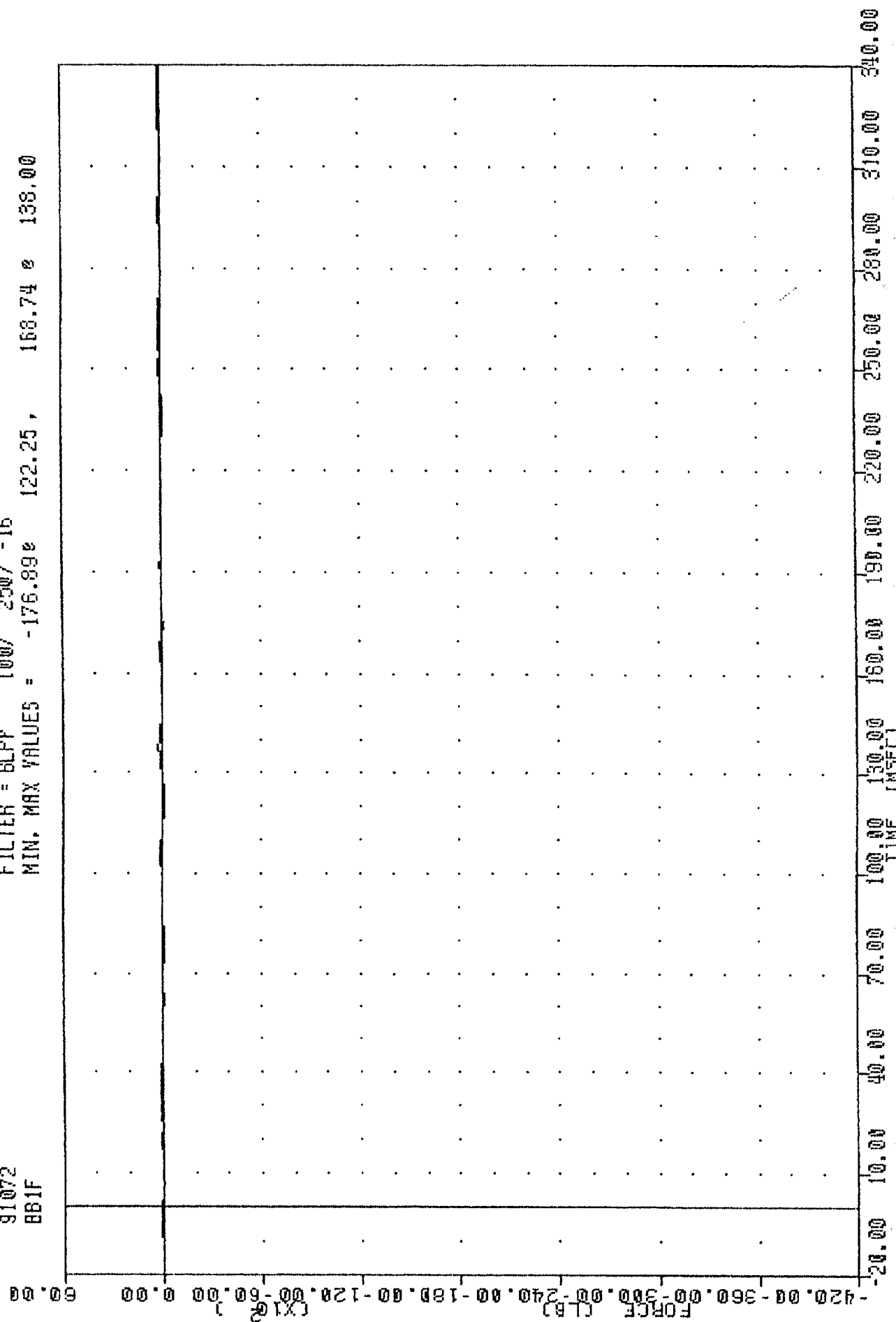
FILTER = BLPP 100/ 250/ -16

B-69

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A9 FORCE

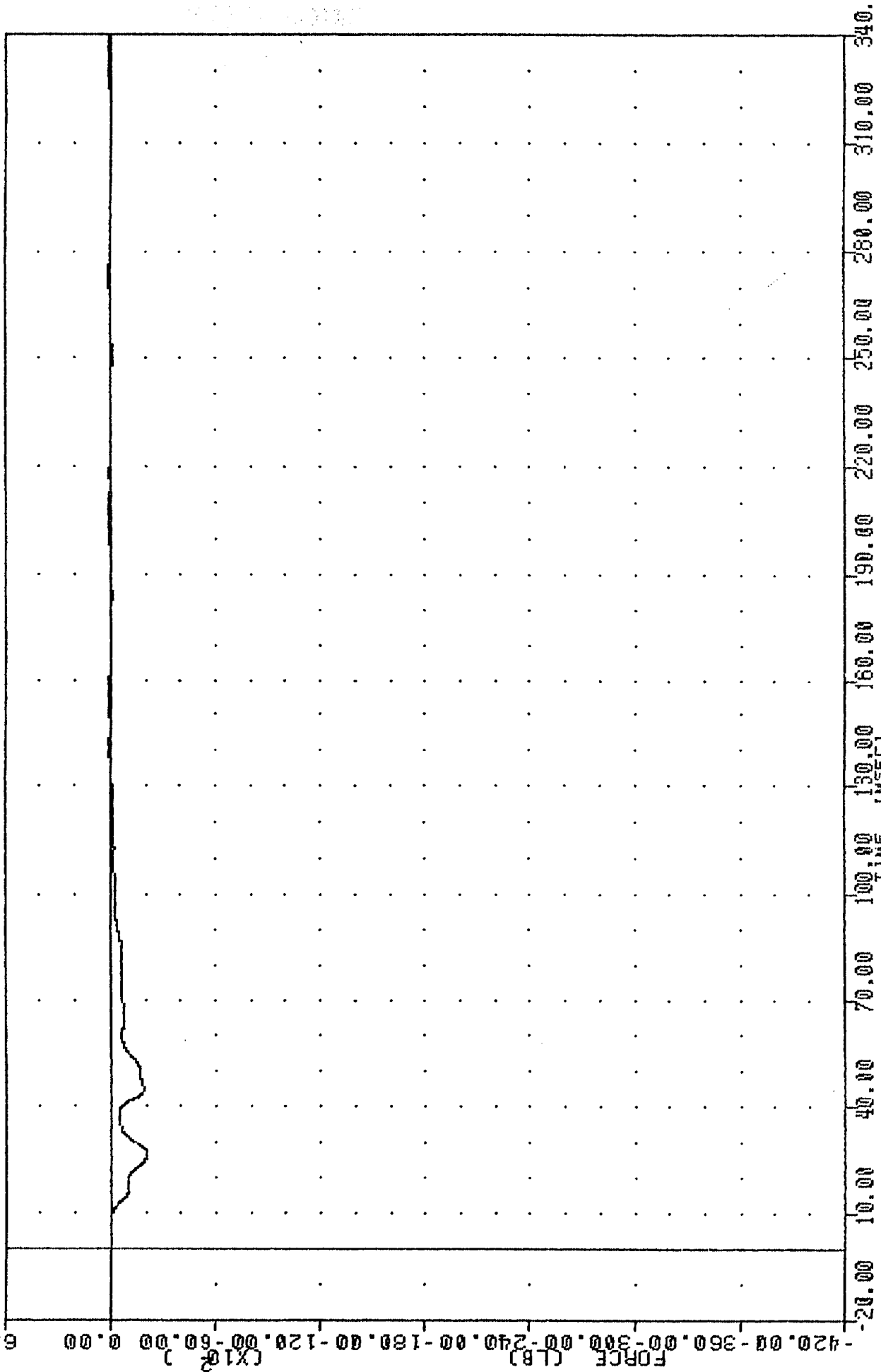
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BB1F

FILTER = BLPF 100/ 250/ -16
 MIN. MAX VALUES = -176.89e 122.25 , 168.74 e 138.00



NEW CAR ASSESSMENT PROGRAM
 91072
 882F

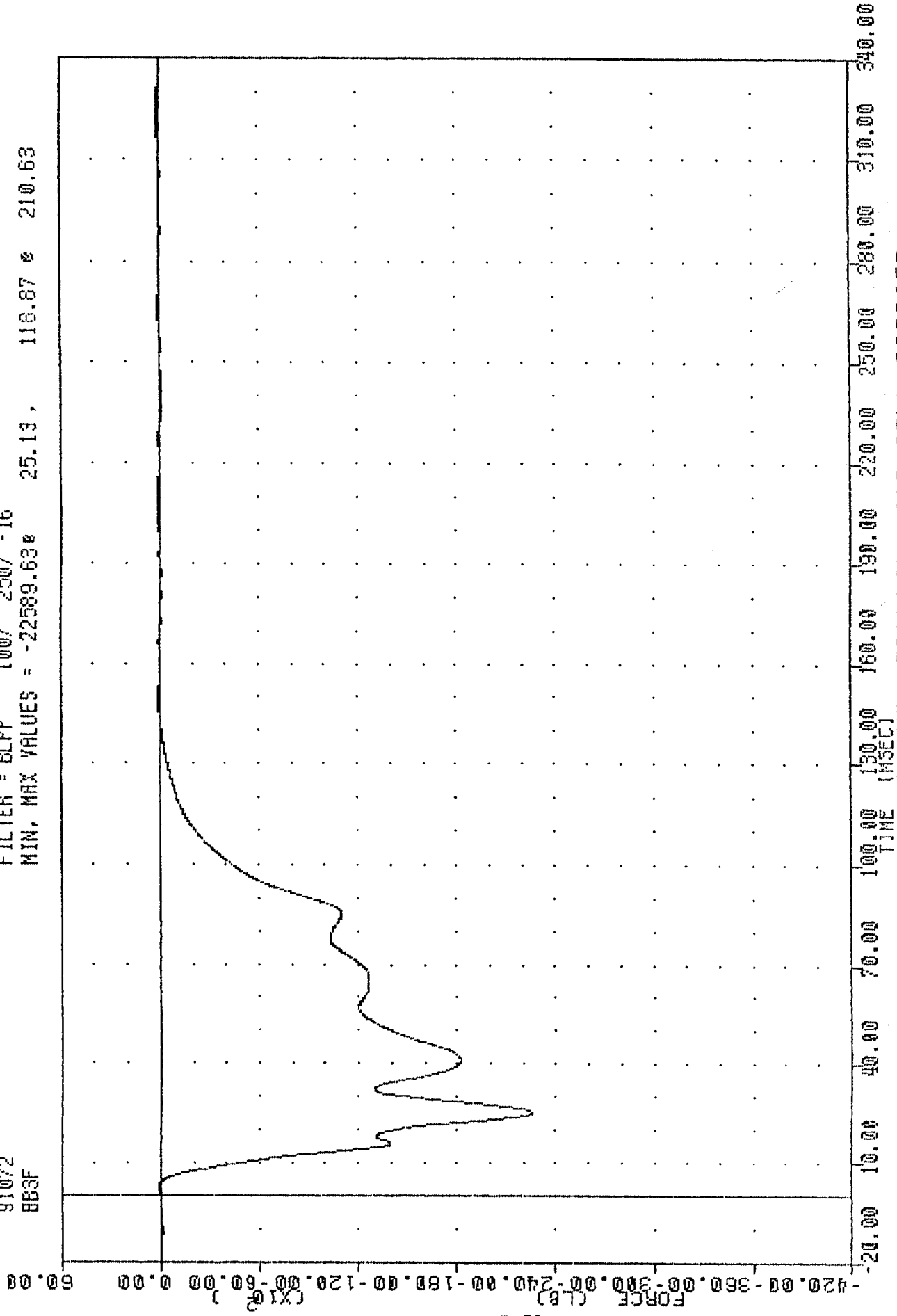
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -2085.49 26.75, 79.82 201.50



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B2 FORCE

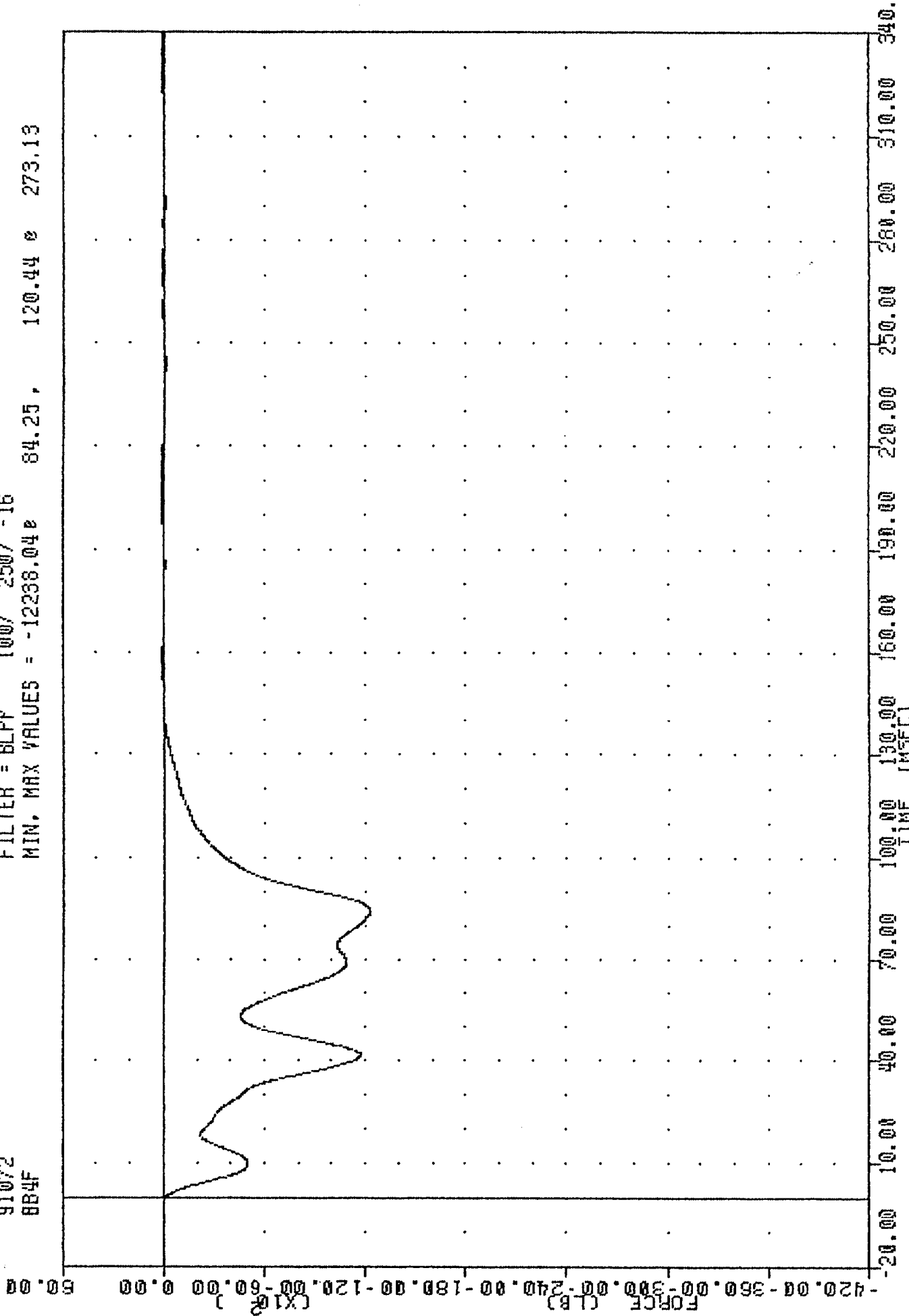
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BB3F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -22589.63e 25.13, 118.87 e 210.63



NEW CAR ASSESSMENT PROGRAM
 91072
 BB4F

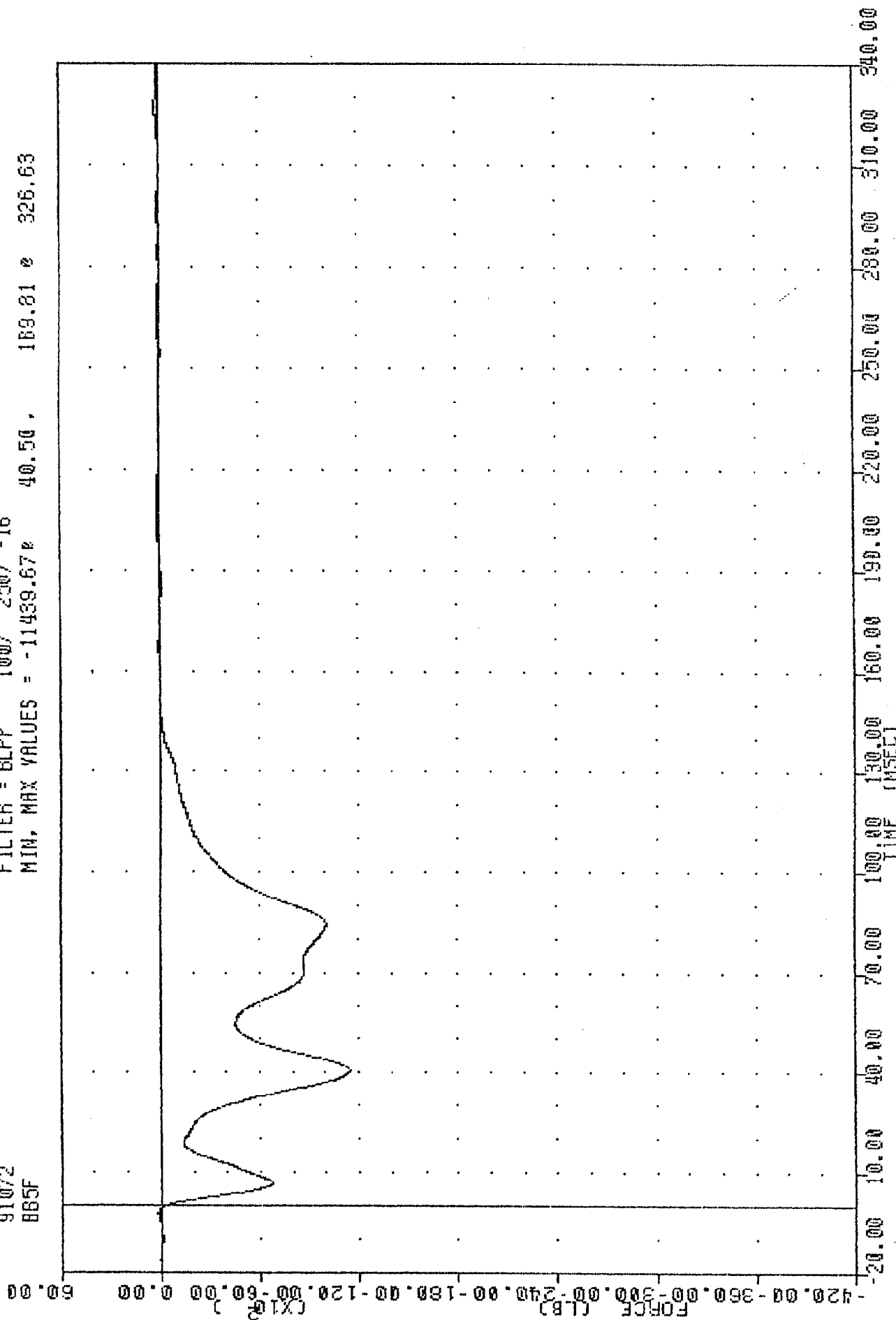
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -12238.04e 84.25, 120.44 e 273.13



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B4 FORCE

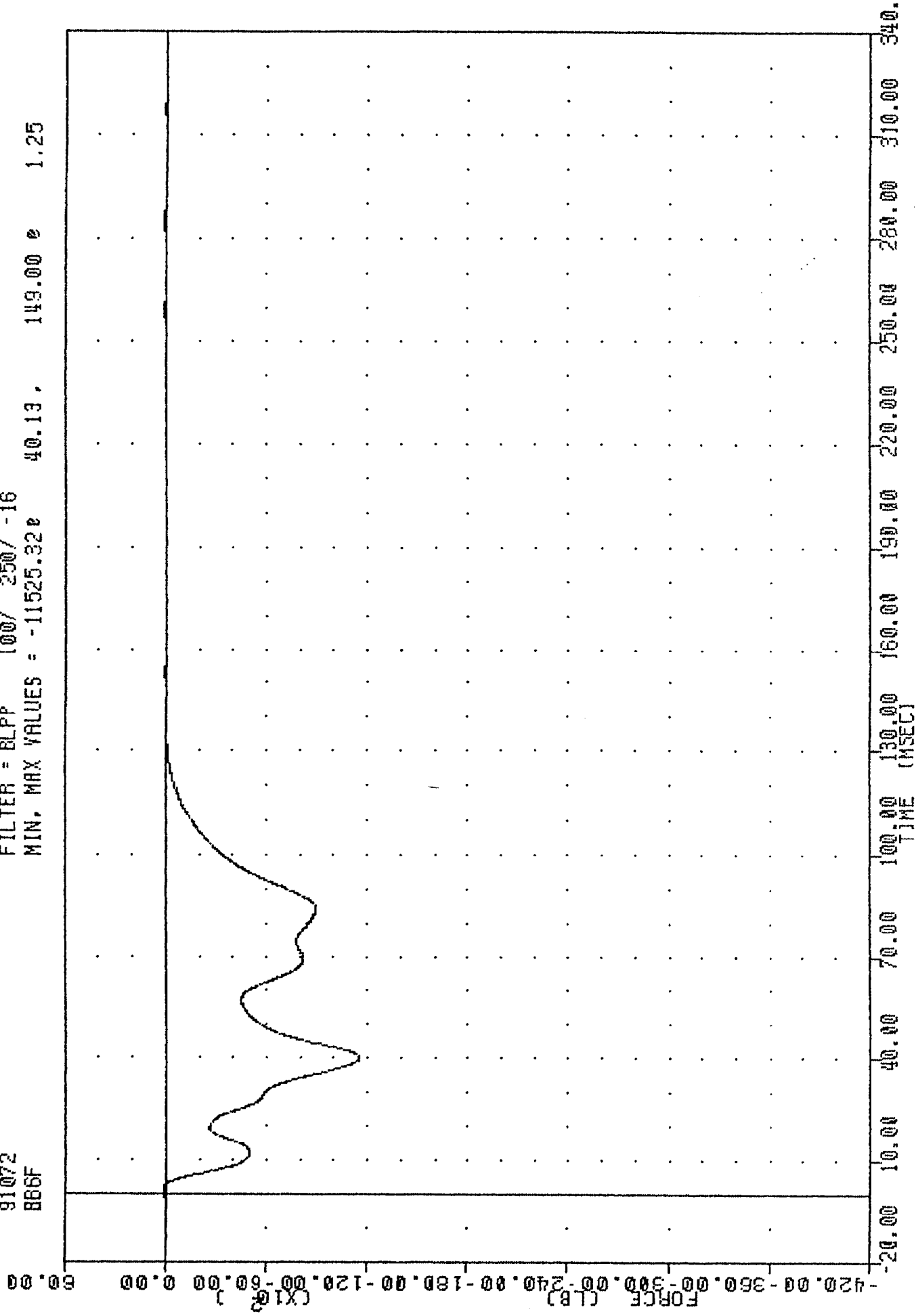
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 885F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -11439.67 40.50 , 189.81 326.63



NEW CAR ASSESSMENT PROGRAM
 91072
 B66F

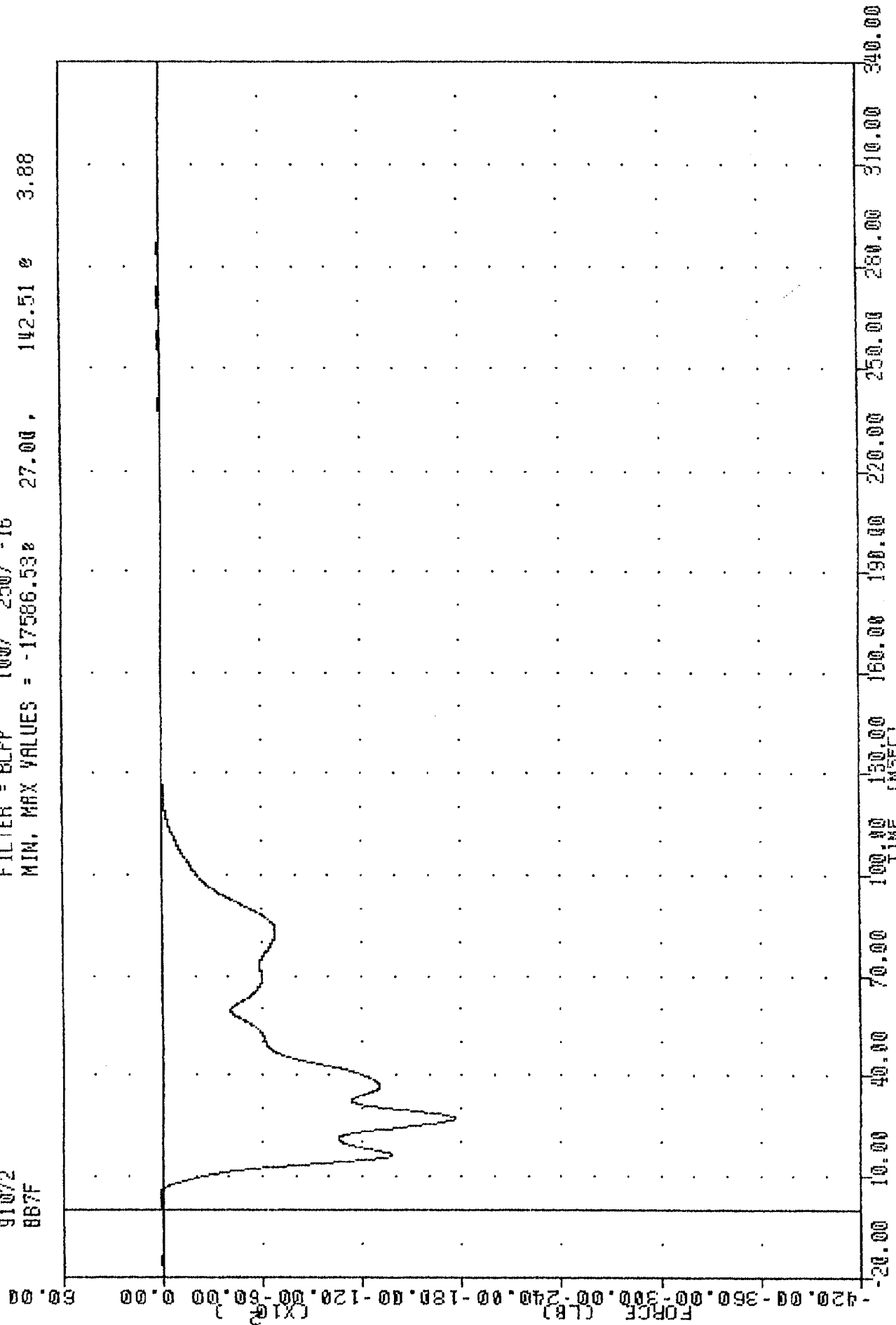
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -11525.320 40.13, 149.00 0 1.25



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B6 FORCE

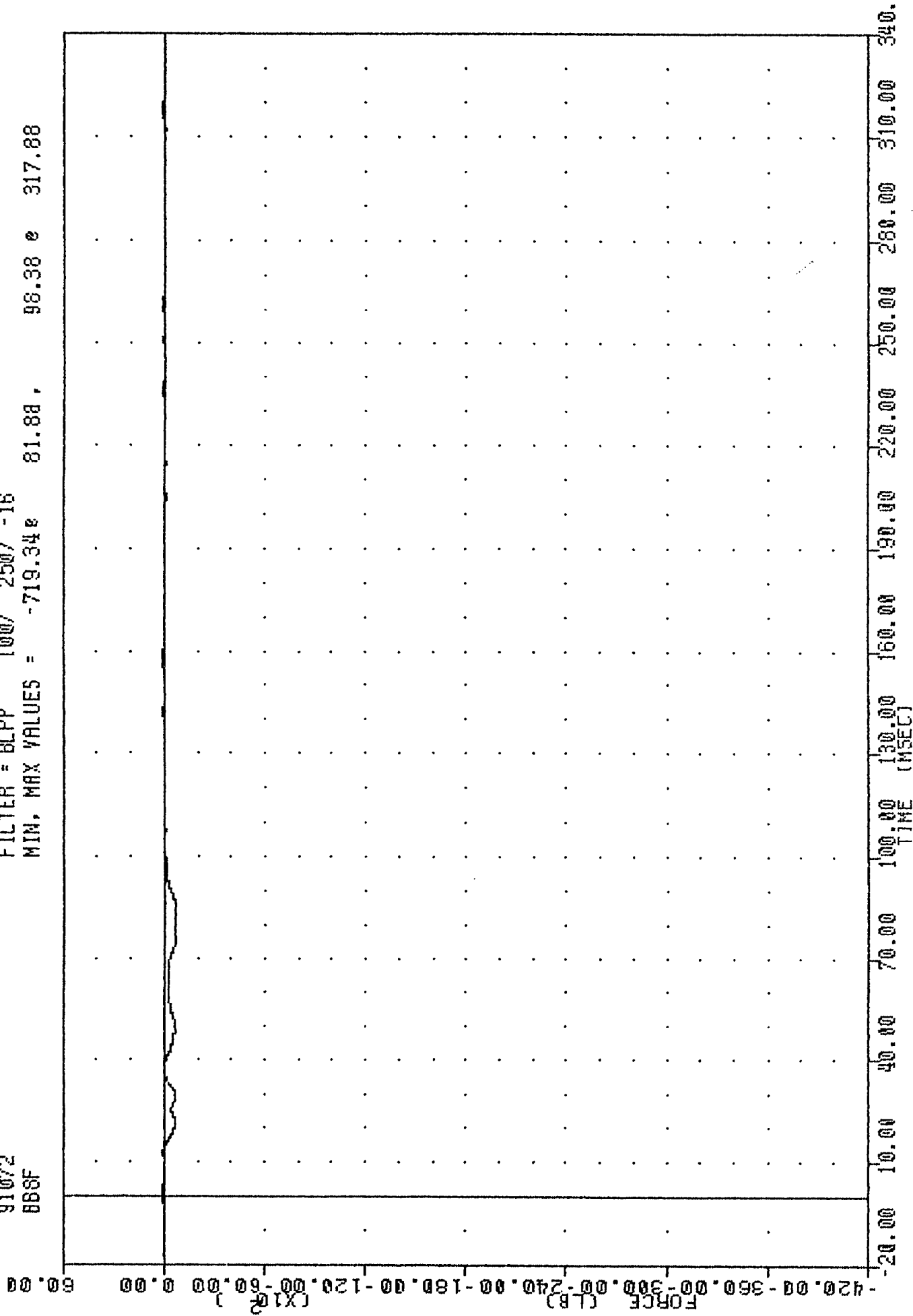
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 887F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -17586.53 27.00 , 142.51 3.88



NEW CAR ASSESSMENT PROGRAM
 91072
 BBSF

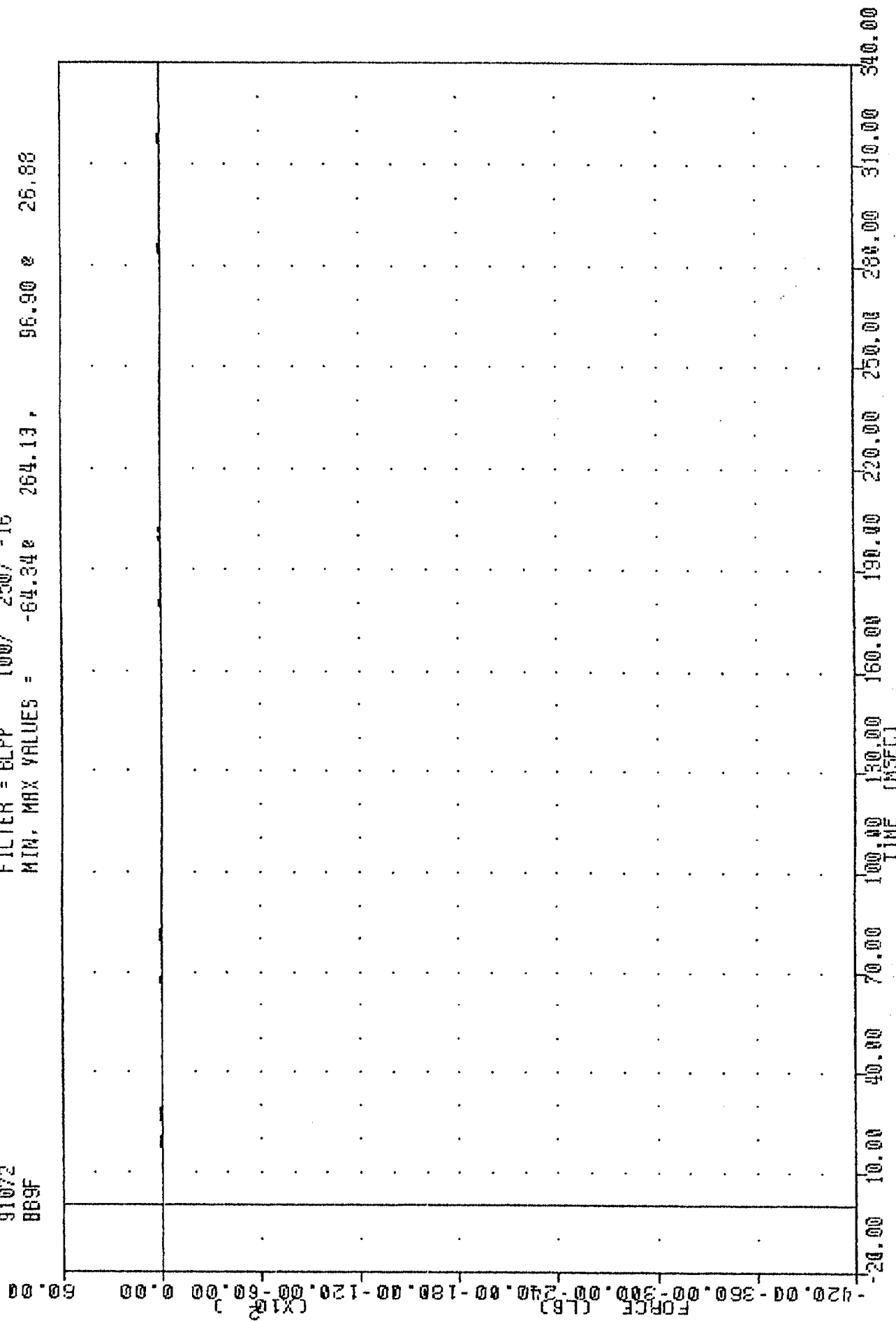
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -719.34e 81.88, 98.38 e 317.88



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B8 FORCE

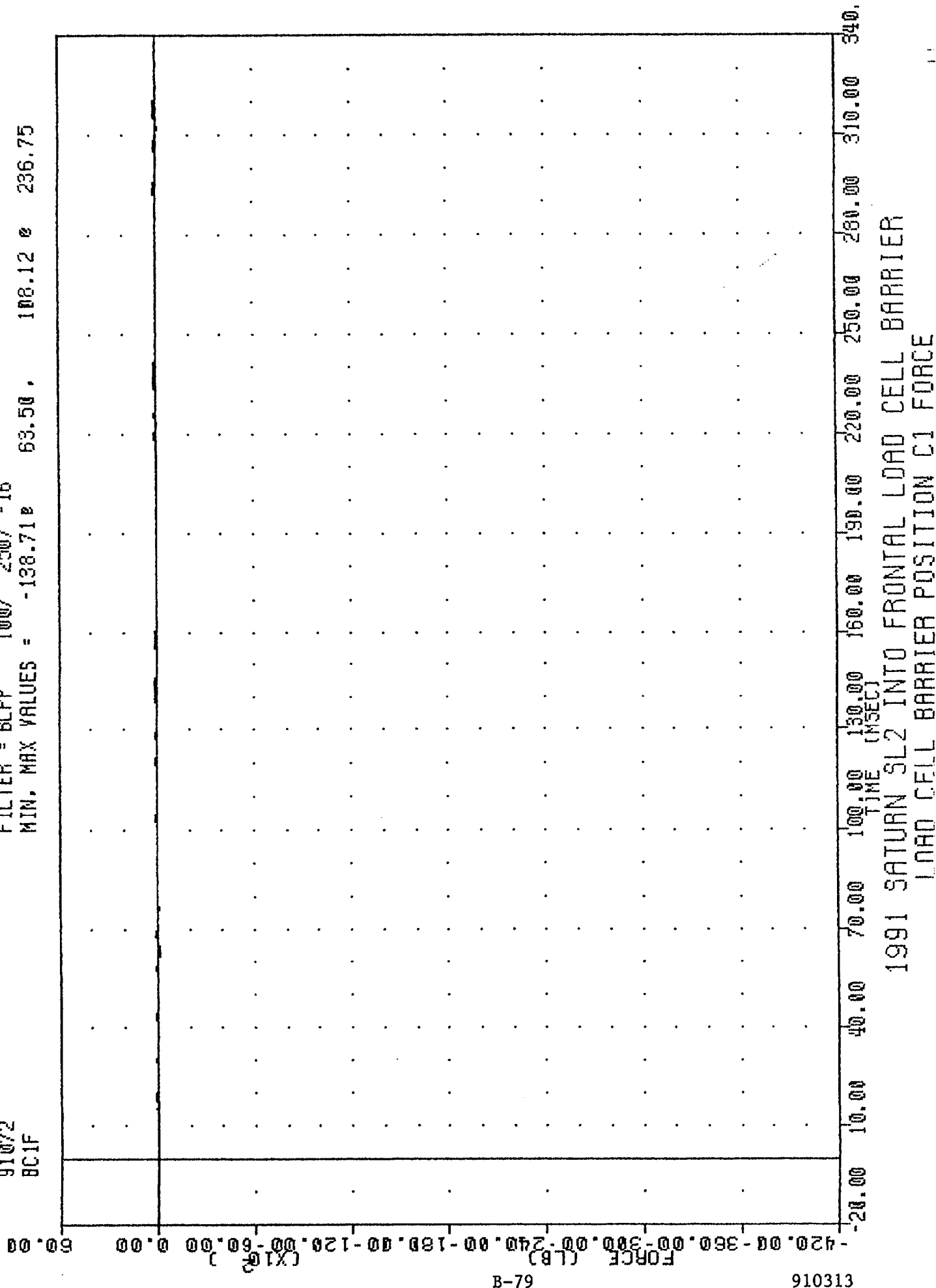
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 B89F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -64.34e 264.13, 96.90 e 26.88



TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC1F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -138.71 63.50 108.12 236.75



TRC
910313

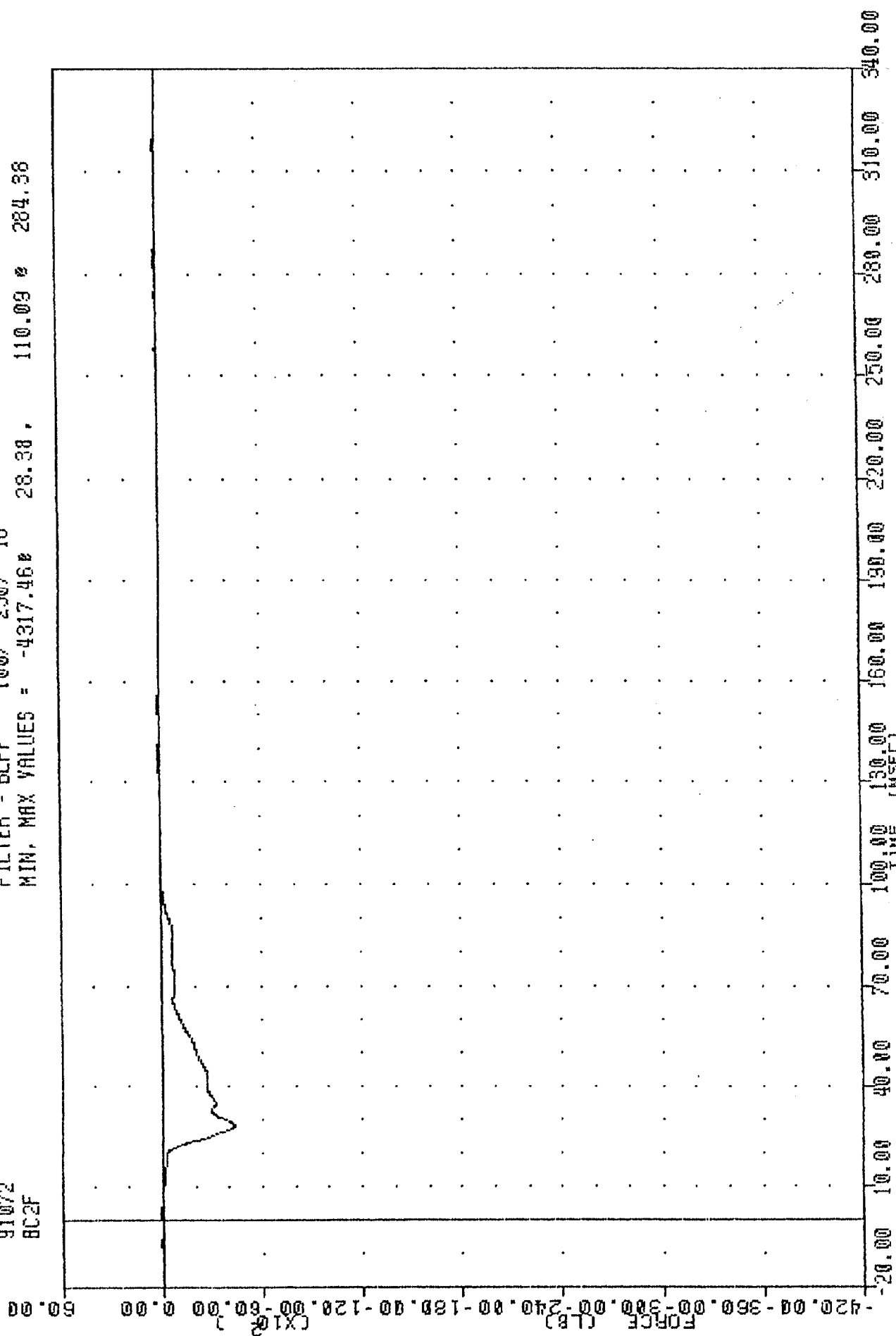
NEW CAP ASSESSMENT PROGRAM

01
12
13
14
15

11

100/250/16

MIN. MAX VALUES =	-4317.46	28.38	110.09	284.38
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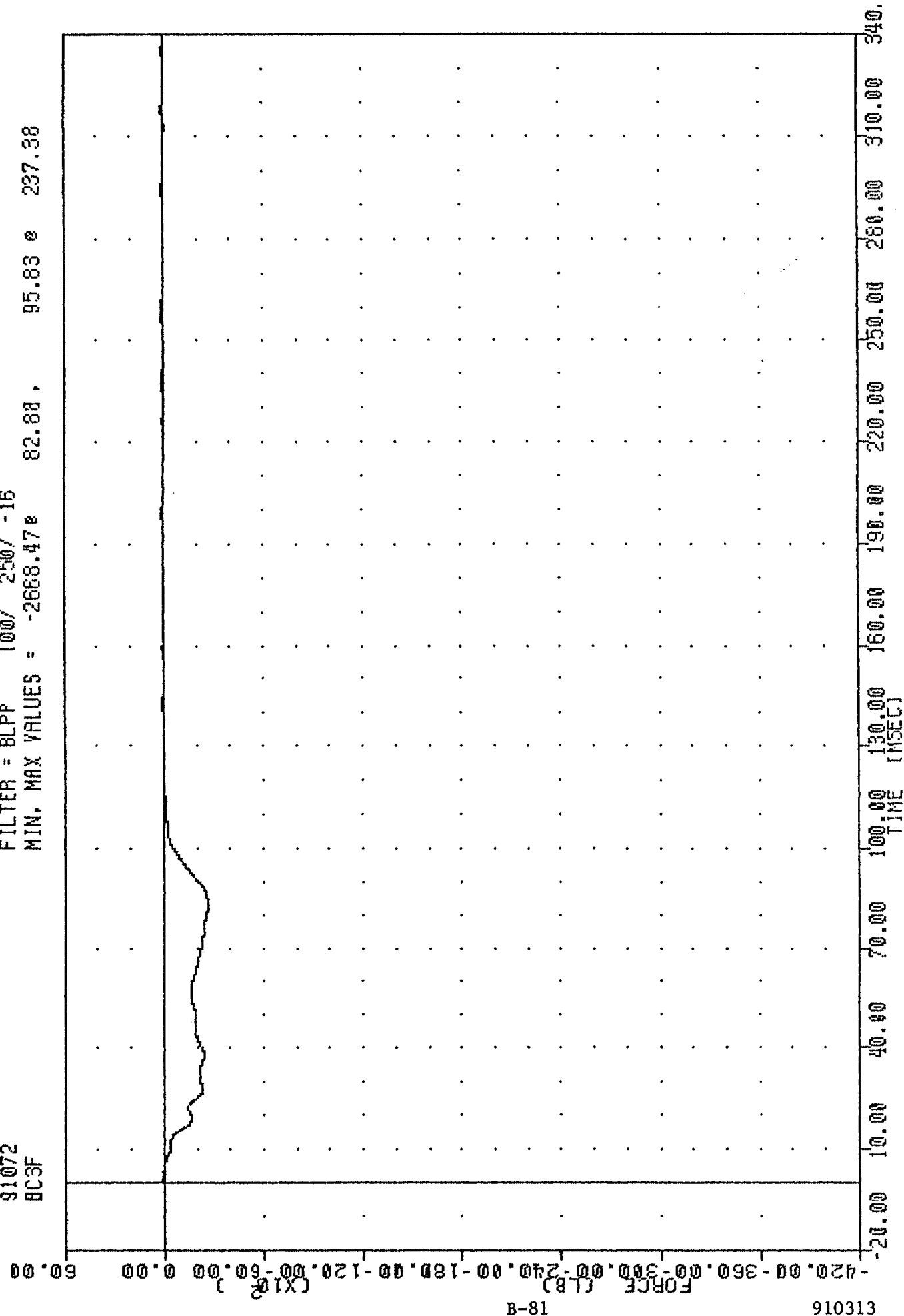
B-80

910313

TIME (USEC)

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC3F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2668.47 82.88 95.83 237.38



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 INAN CFI1 BARRIER POSITION C3 FORCE

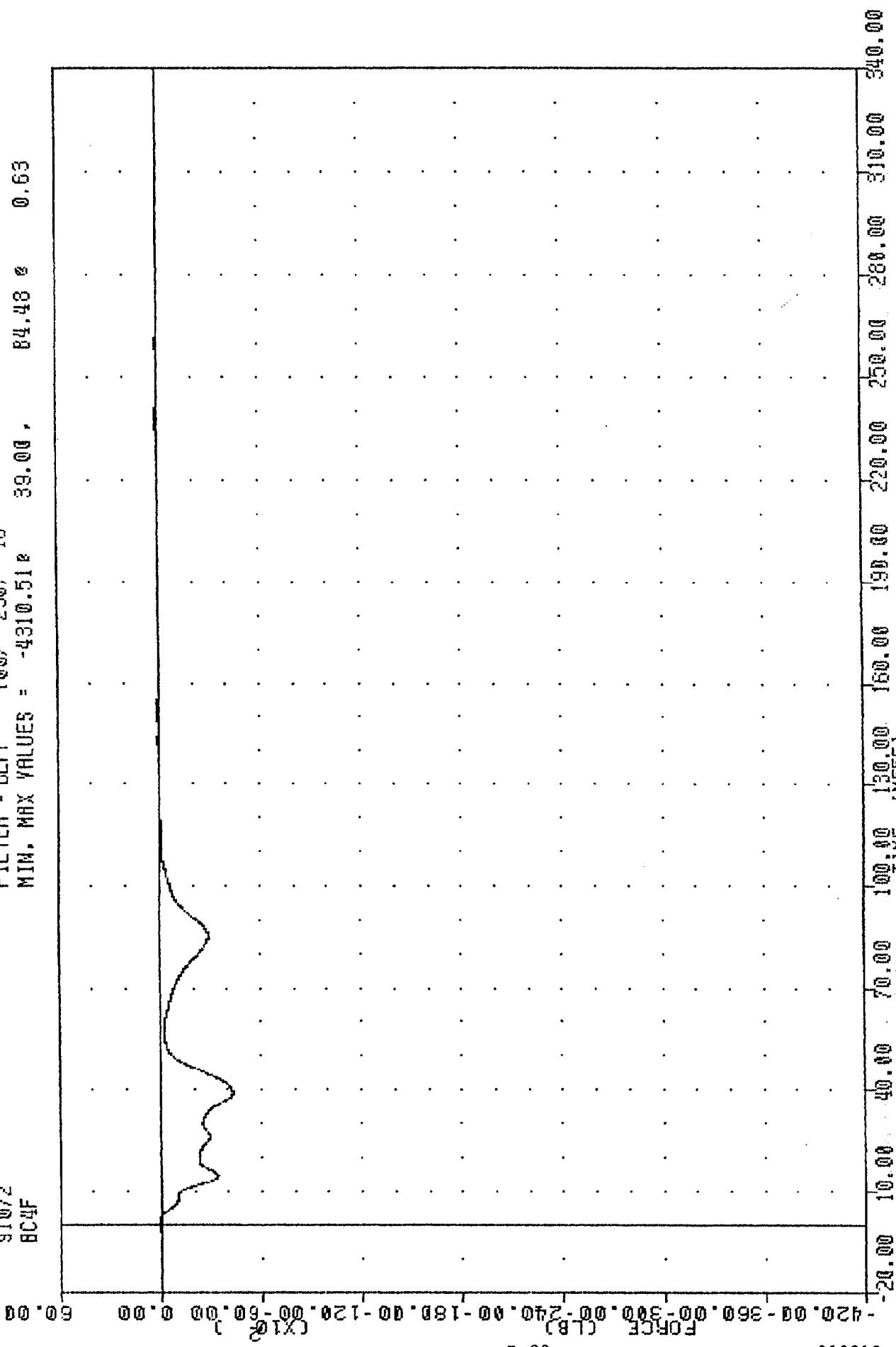
TRC , 910313
NEW CAR ASSESSMENT PROGRAM

FILTER = BLPP 100/ 250/ -16

91072

MIN. MAX VALUES = -4310.510 39.00 , 84.48 0.63

BC4F

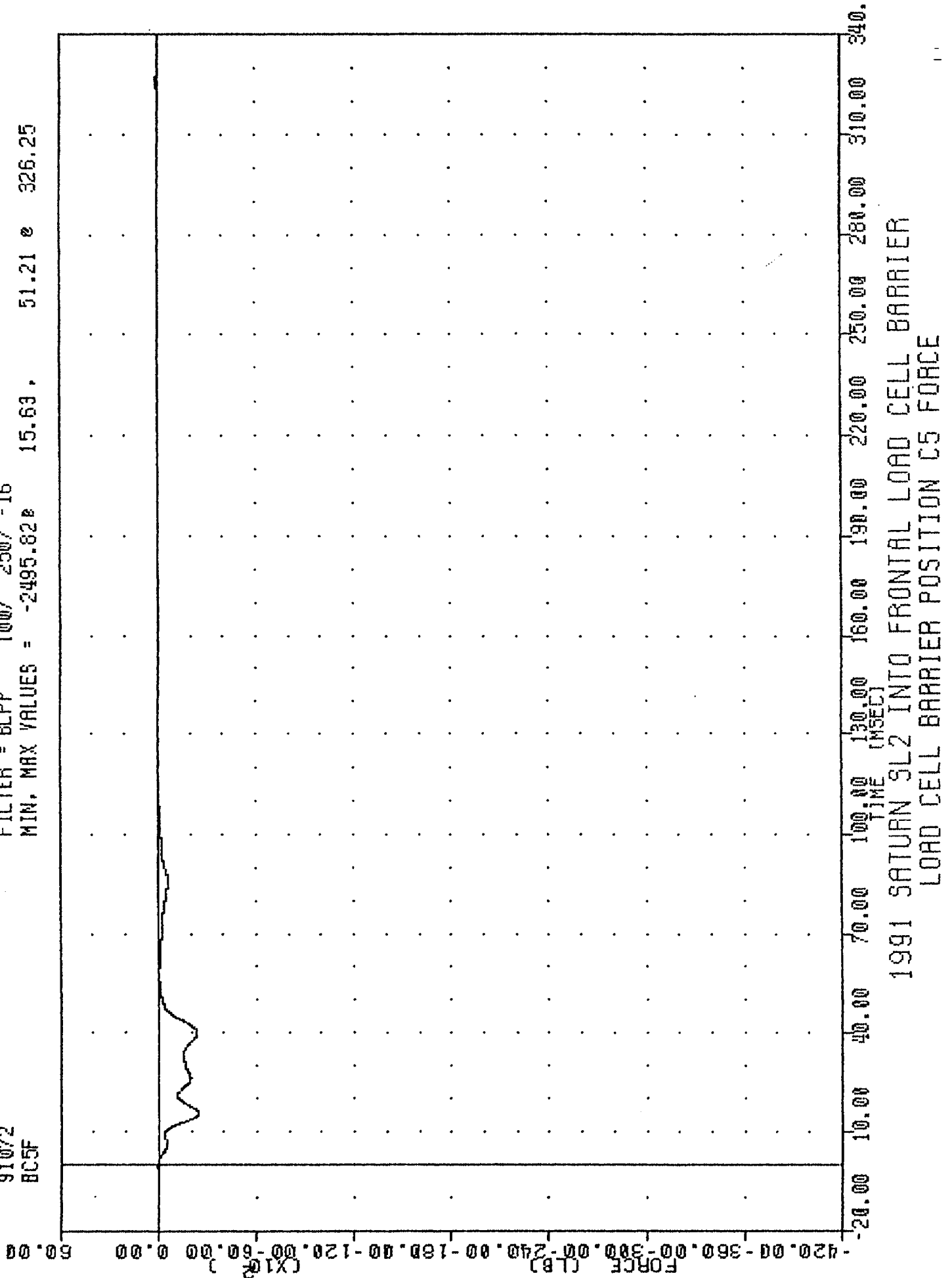


1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION DATA FOR

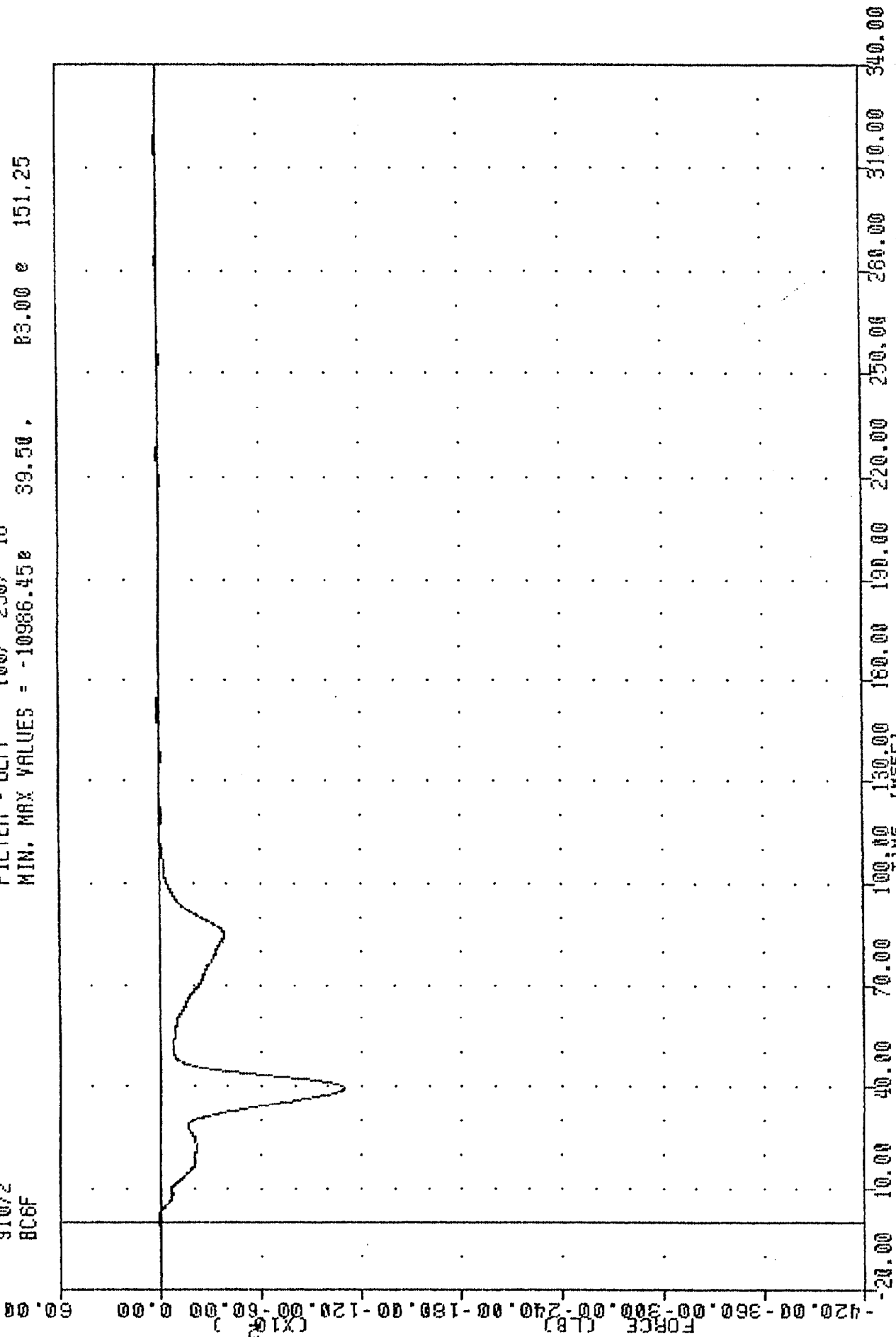
IHC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC5F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2495.82 15.63 51.21 326.25



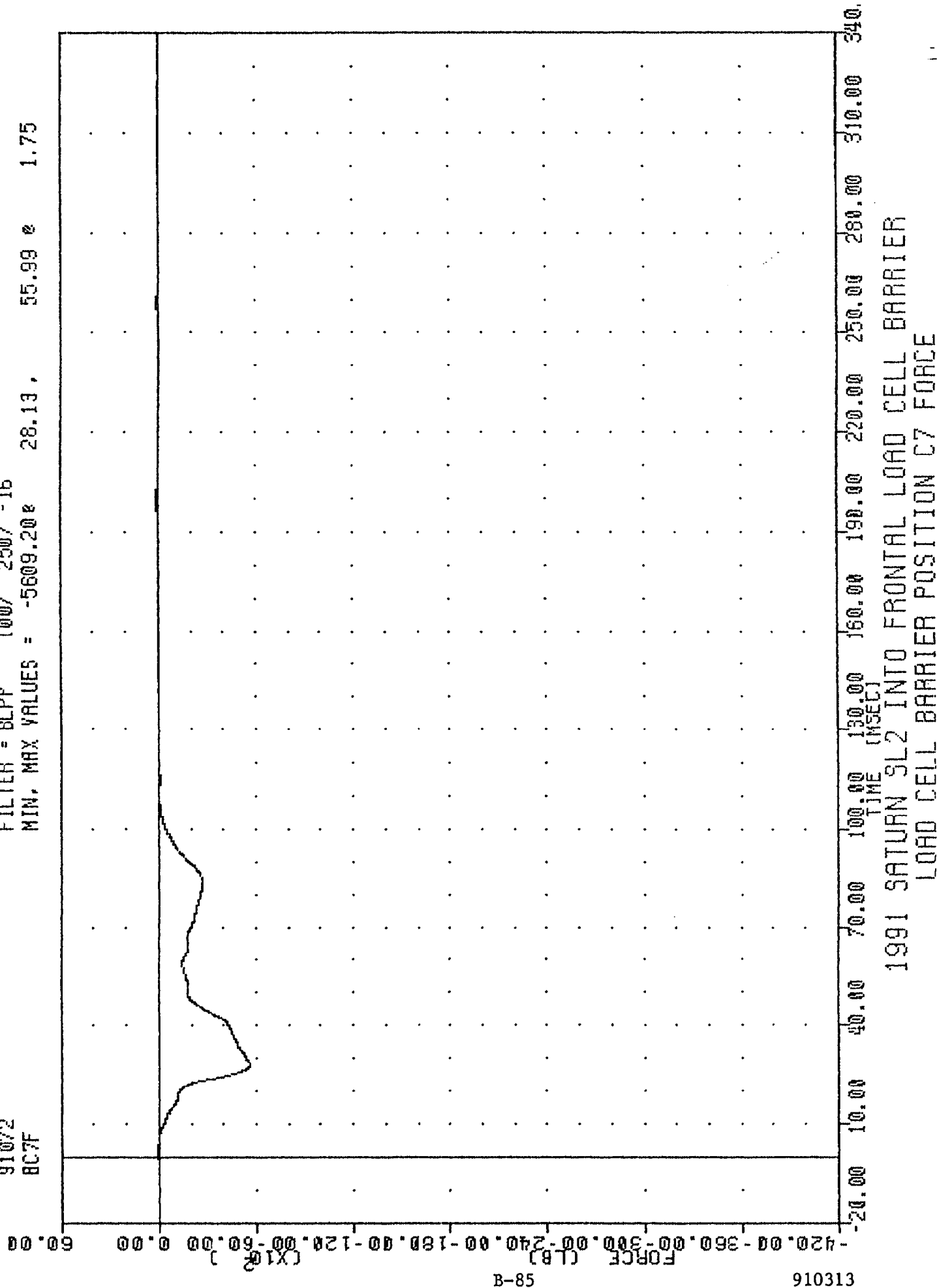
TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC6F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -10986.458 39.50 , 83.00 e 151.25



IHC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC7F

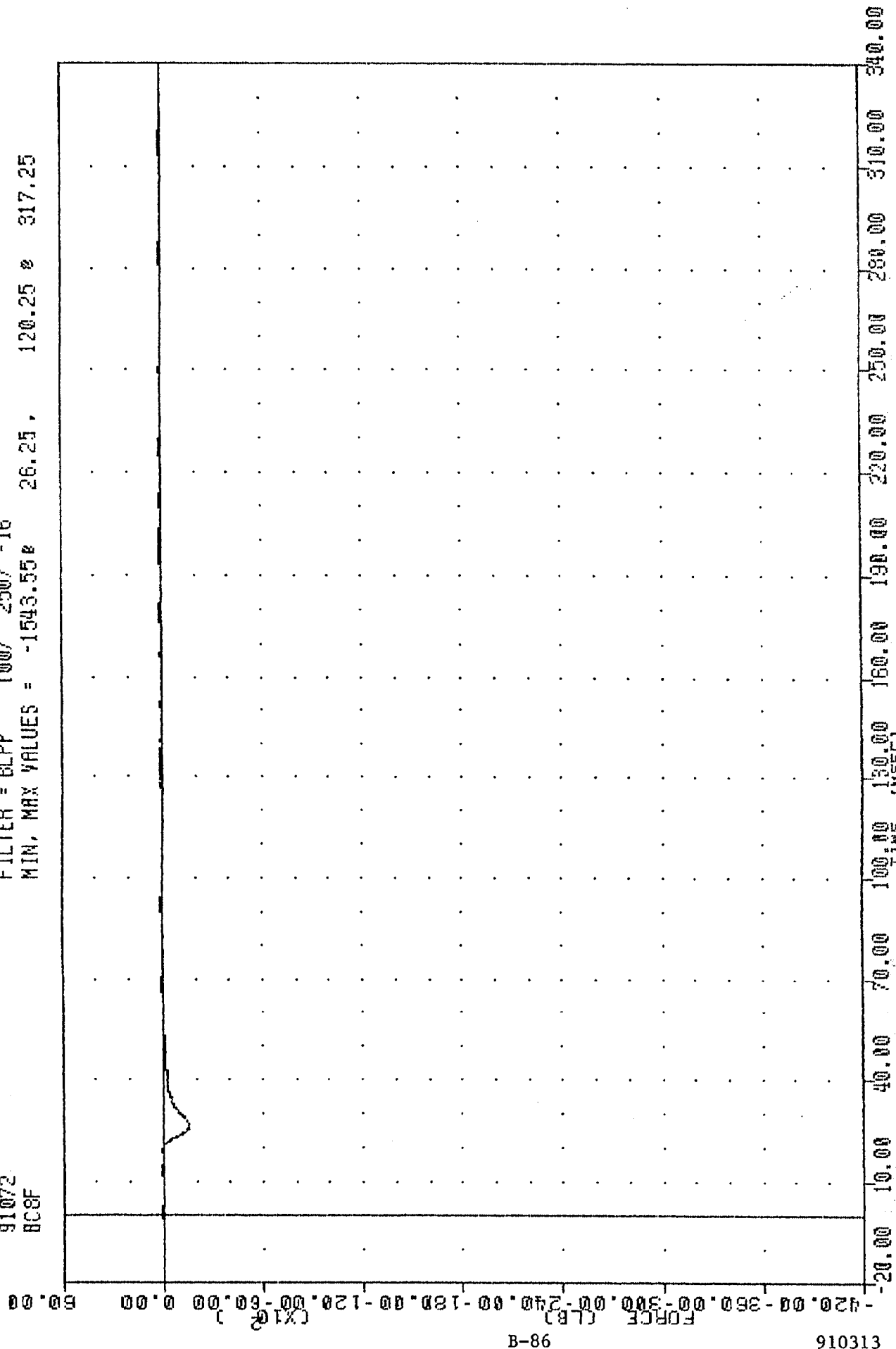
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -5609.20e 28.13, 55.99 e 1.75



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C7 FORCE

TRC .910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC8F

FILTER = BLPP 100/ 250/ -10
 MIN, MAX VALUES = -1543.55# 26.25, 120.25 # 317.25



B-86

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION COORDINATES

IRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BC9F

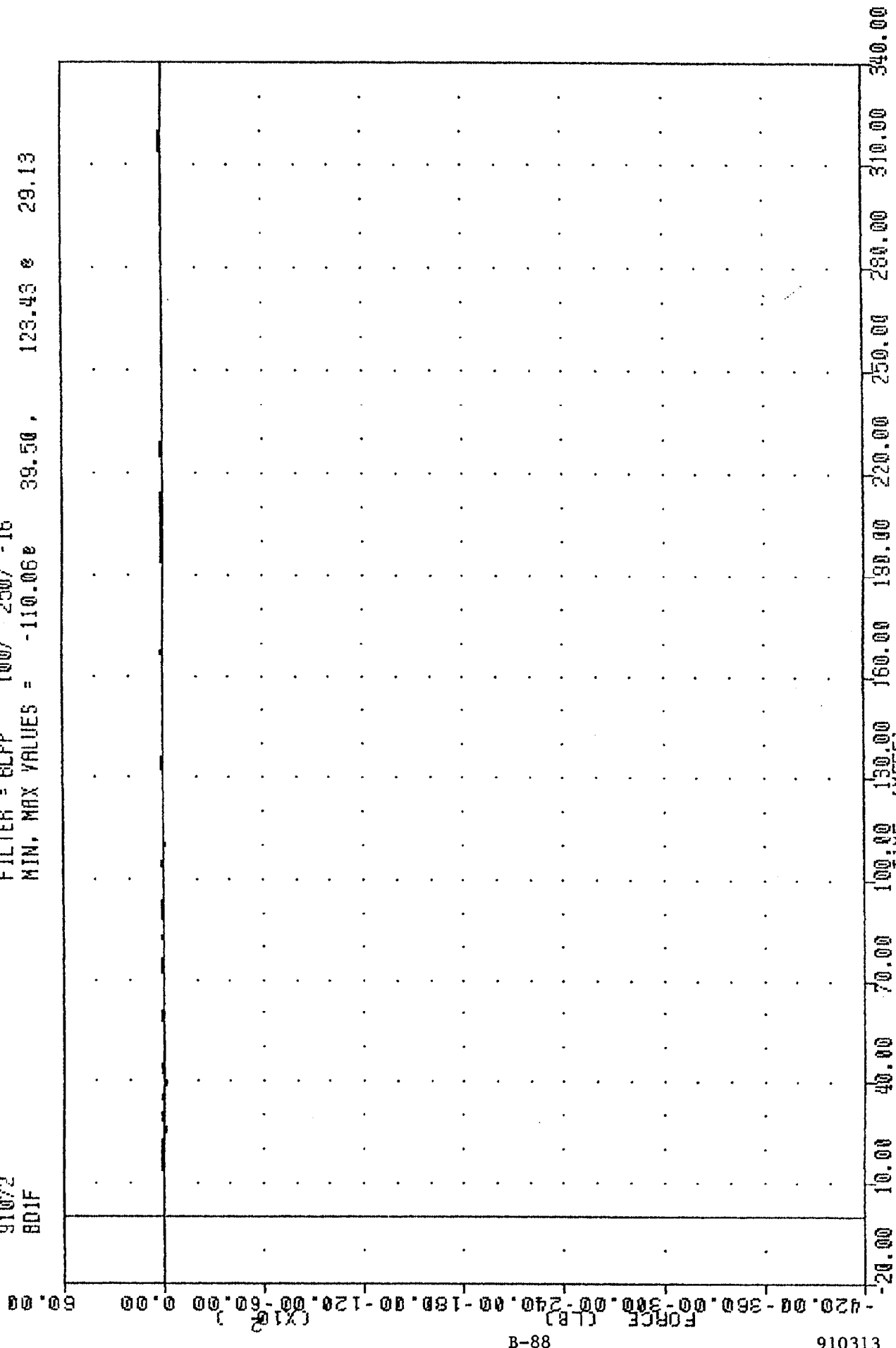
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -77.03e 171.50 , 101.81 e 27.88

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1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C9 FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 8D1F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -110.06e 39.50, 123.43 e 29.13



INL 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BD2F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -116.94 68.25, 105.32 21.38

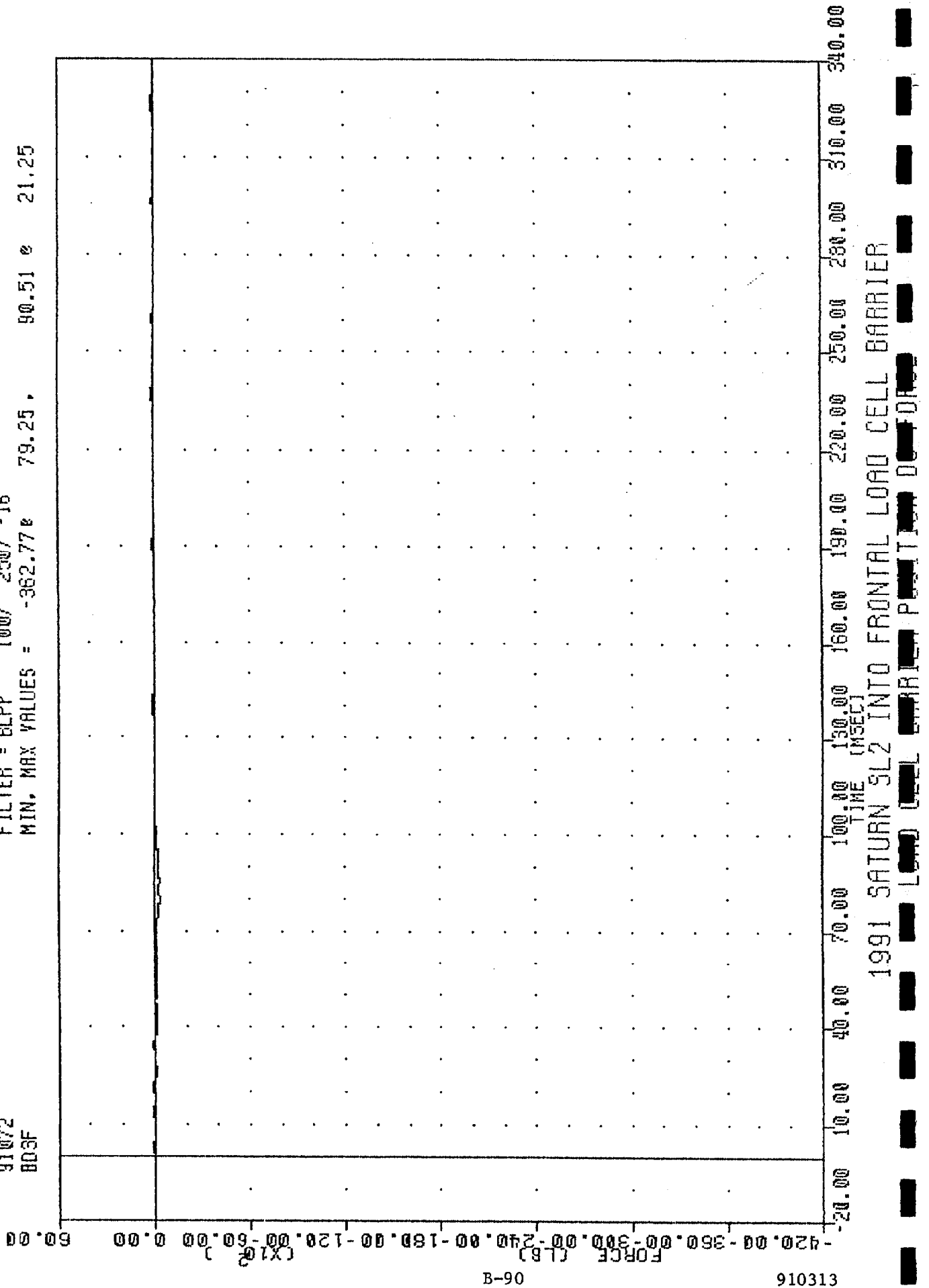
910/2	FILTER = BCLF		100/	230/	-18
802F	MIN, MAX VALUES =		-116.94e	68.25,	105.32 e 21.38

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1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D2 FORCE

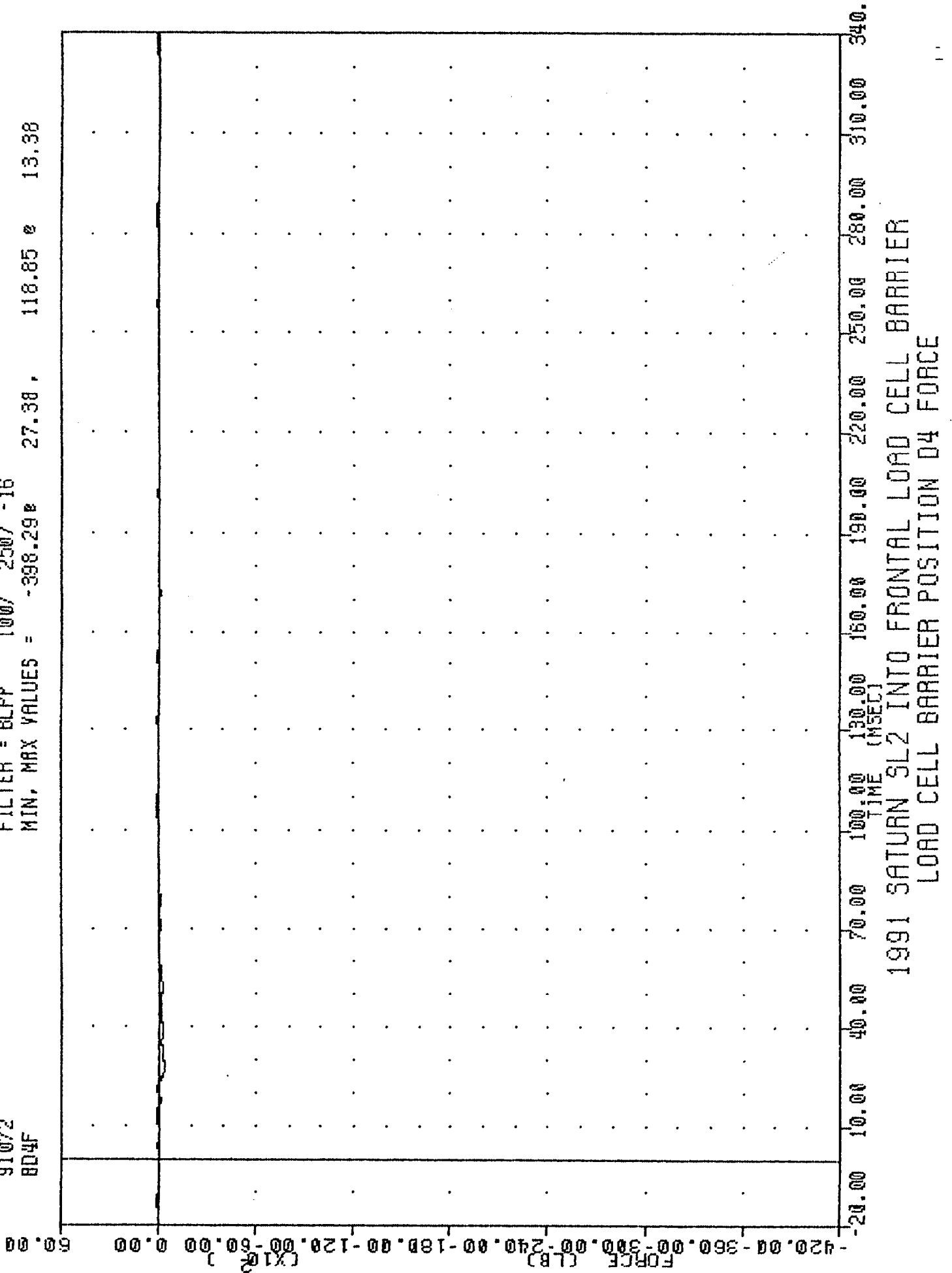
TRC 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 BD3F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -362.77 79.25, 90.51 21.25



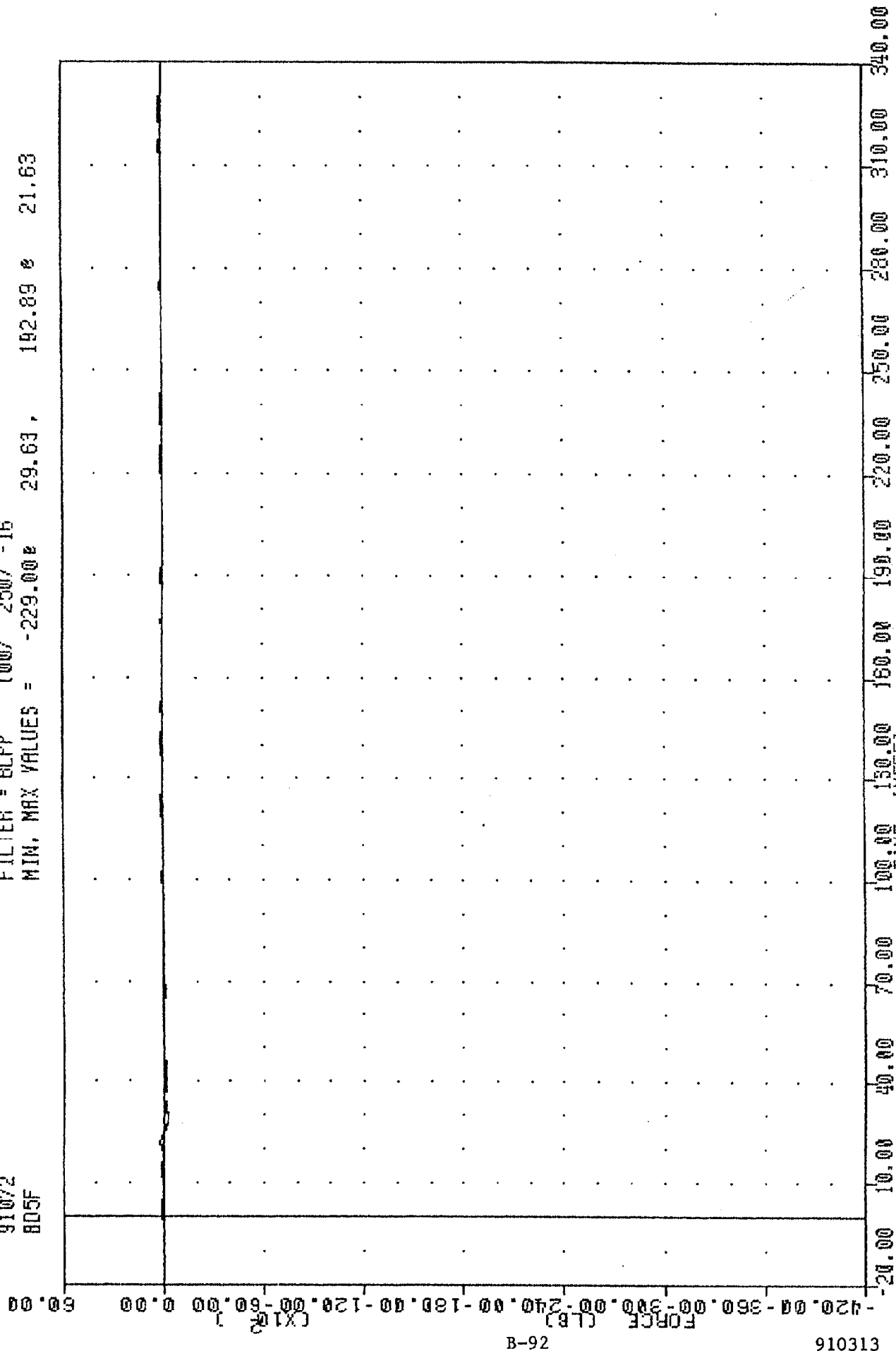
NEW CAR ASSESSMENT PROGRAM
 91072
 BD4F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -398.29 27.38 118.85 13.38



TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 805F

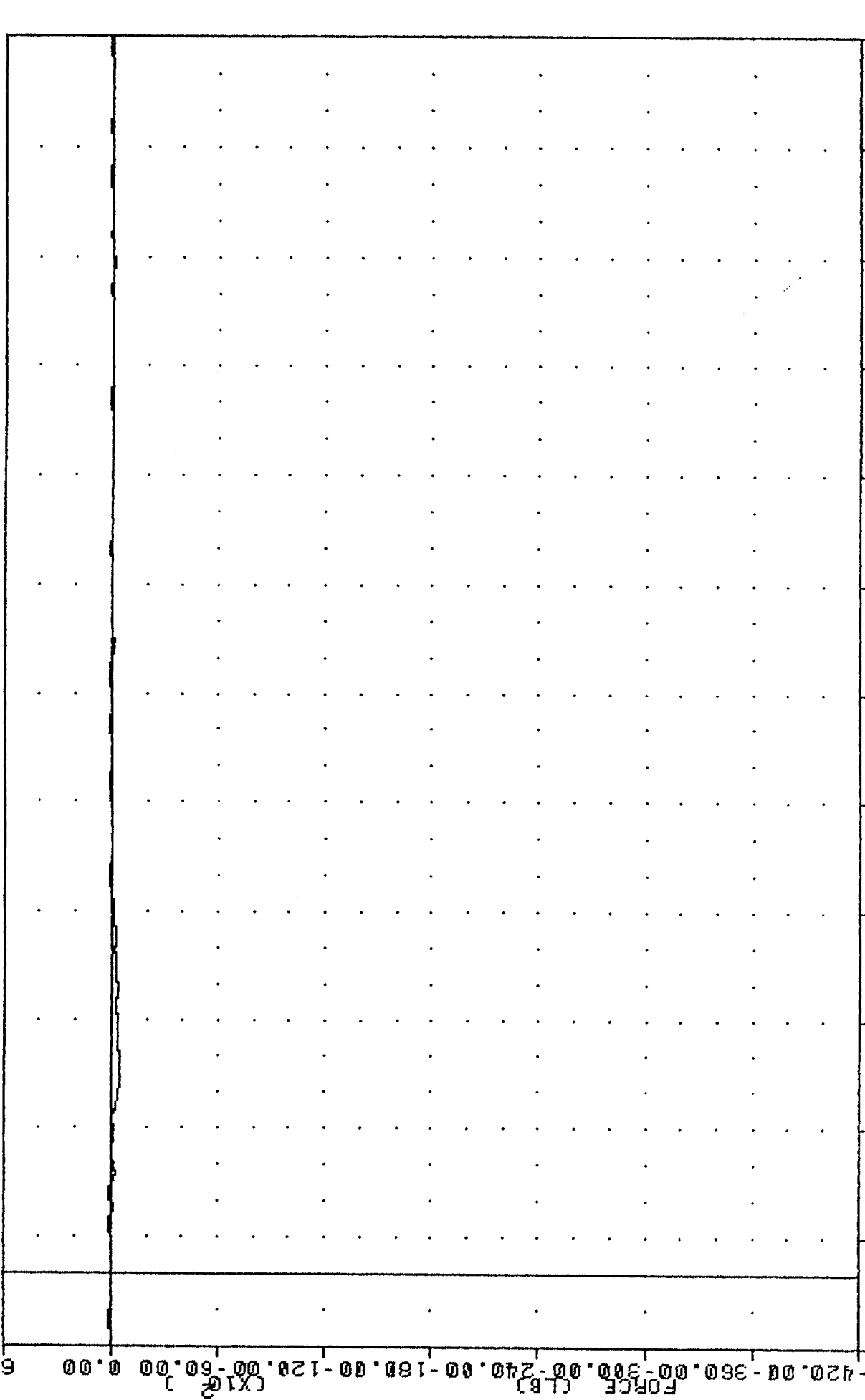
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -229.00 29.63 , 192.89 21.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 Lateral Barrier Position Deformation

NEW CAR ASSESSMENT PROGRAM
 91072
 BD6F

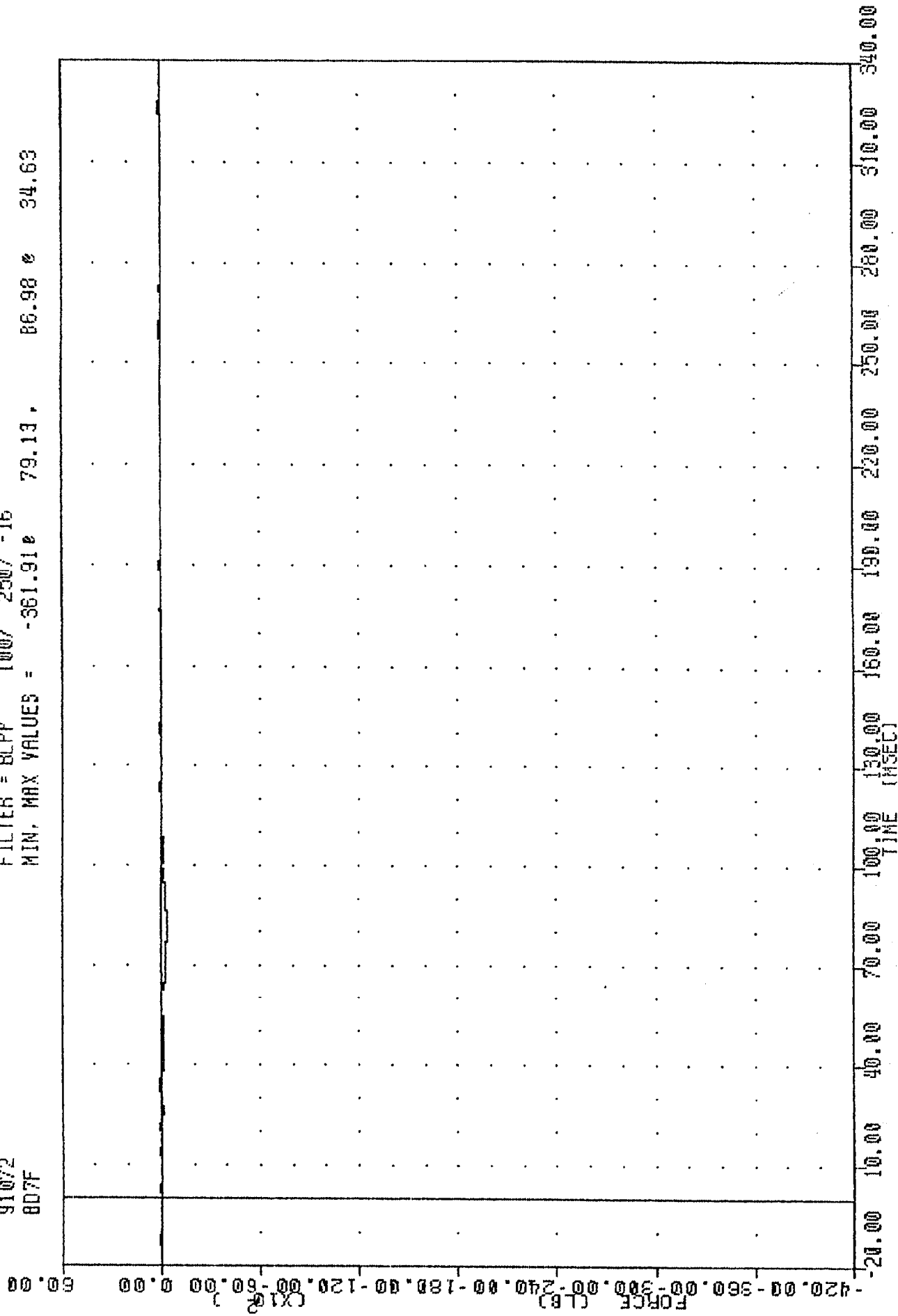
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -565.16 57.63, 165.01 21.88



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION 06 FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 807F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -361.91e 79.13, 86.98 e 34.63



NEW CAR ASSESSMENT PROGRAM
 91072
 B08F

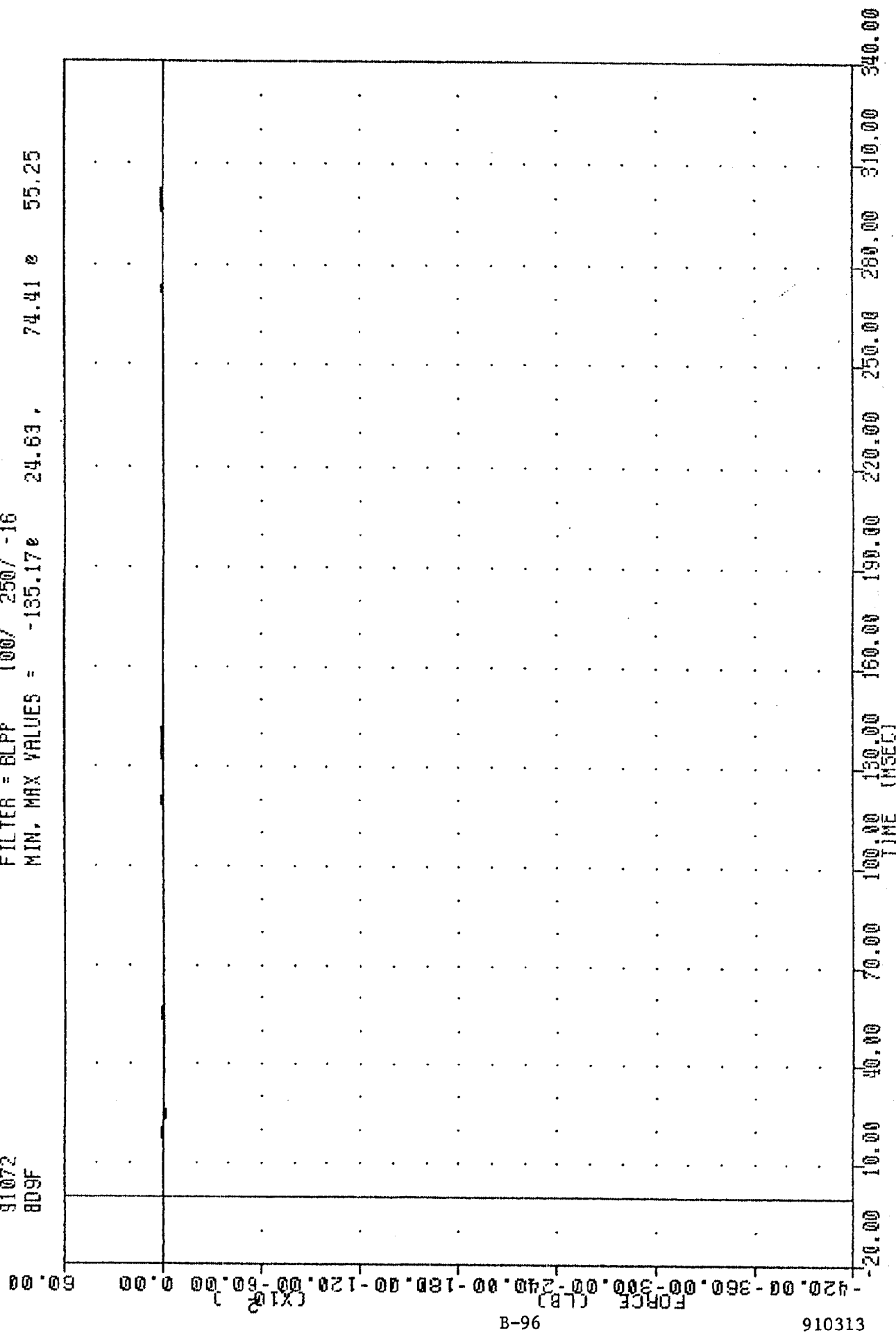
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -93.35 278.63 81.68 8 -12.88

TIME (MSEC)	100.00	130.00	160.00	190.00	220.00	250.00	280.00	310.00	340.00
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290.00	.	.	.	.	.	.	.	.	.
300.00	.	.	.	.	.	.	.	.	.
310.00	.	.	.	.	.	.	.	.	.
320.00	.	.	.	.	.	.	.	.	.
330.00	.	.	.	.	.	.	.	.	.
340.00	.	.	.	.	.	.	.	.	.

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D8 FORCE

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 809F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -135.17e 24.63 , 74.41 e 55.25



B-96

910313

1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION DURING IMPACT

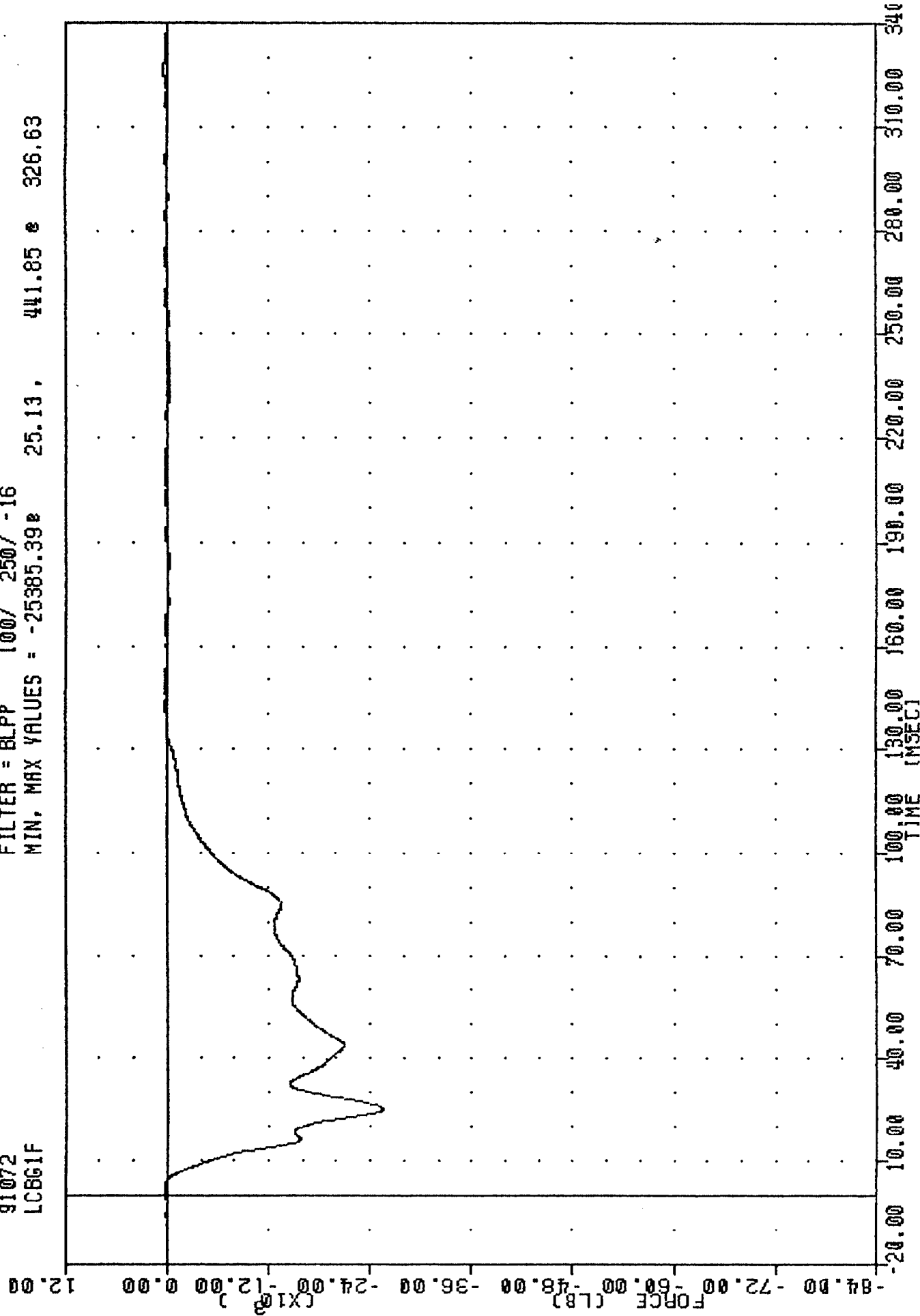
NEW CAR ASSESSMENT PROGRAM

91072

LCB61F

FILTER = BLPP 100/ 250/ -16

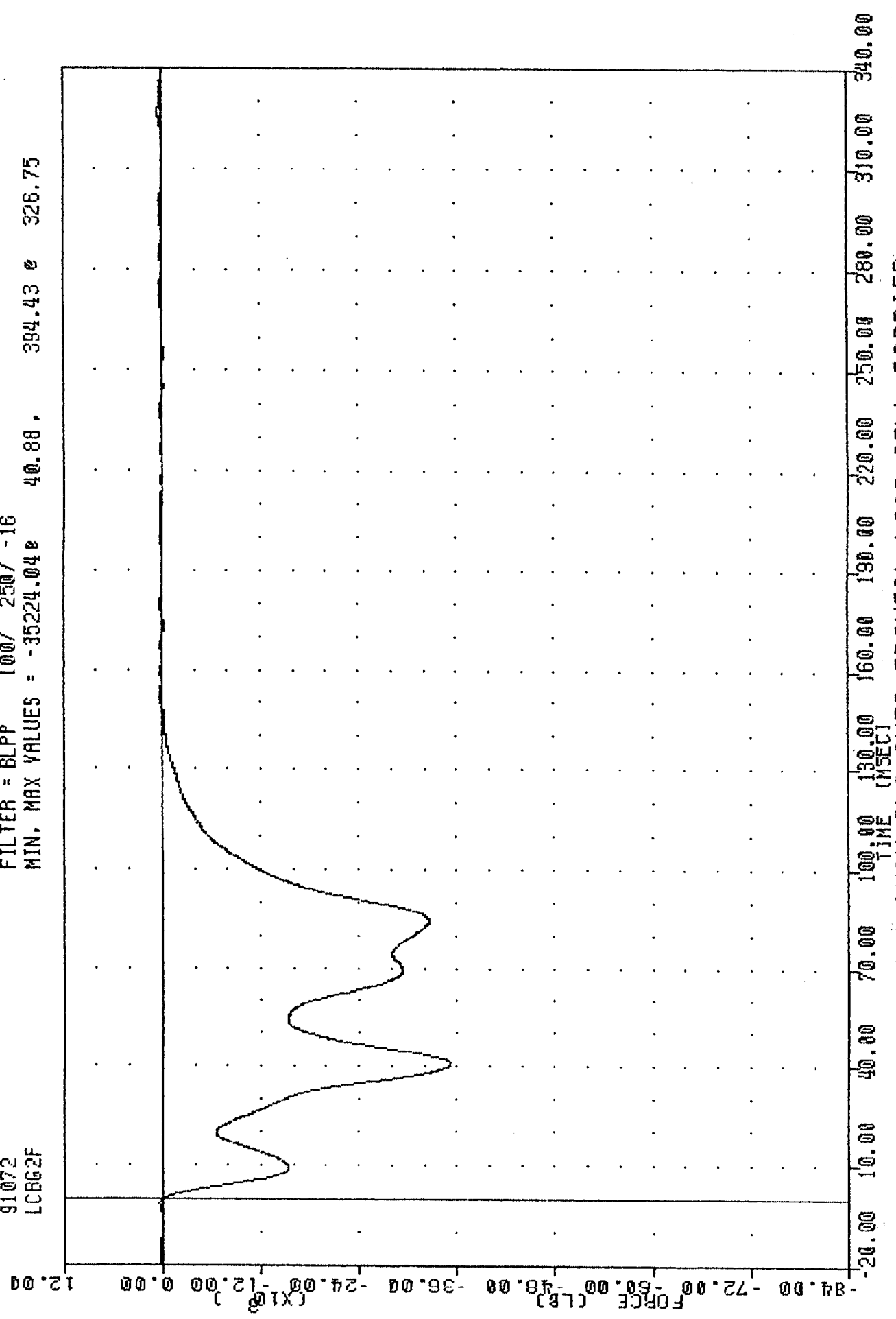
MIN, MAX VALUES = -25385.39e 25.13, 441.85 e 326.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 1 FORCE TOTAL

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 LCBG2F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -35224.04e 40.88 , 394.43 e 326.75



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP 2 FORCE TOTAL

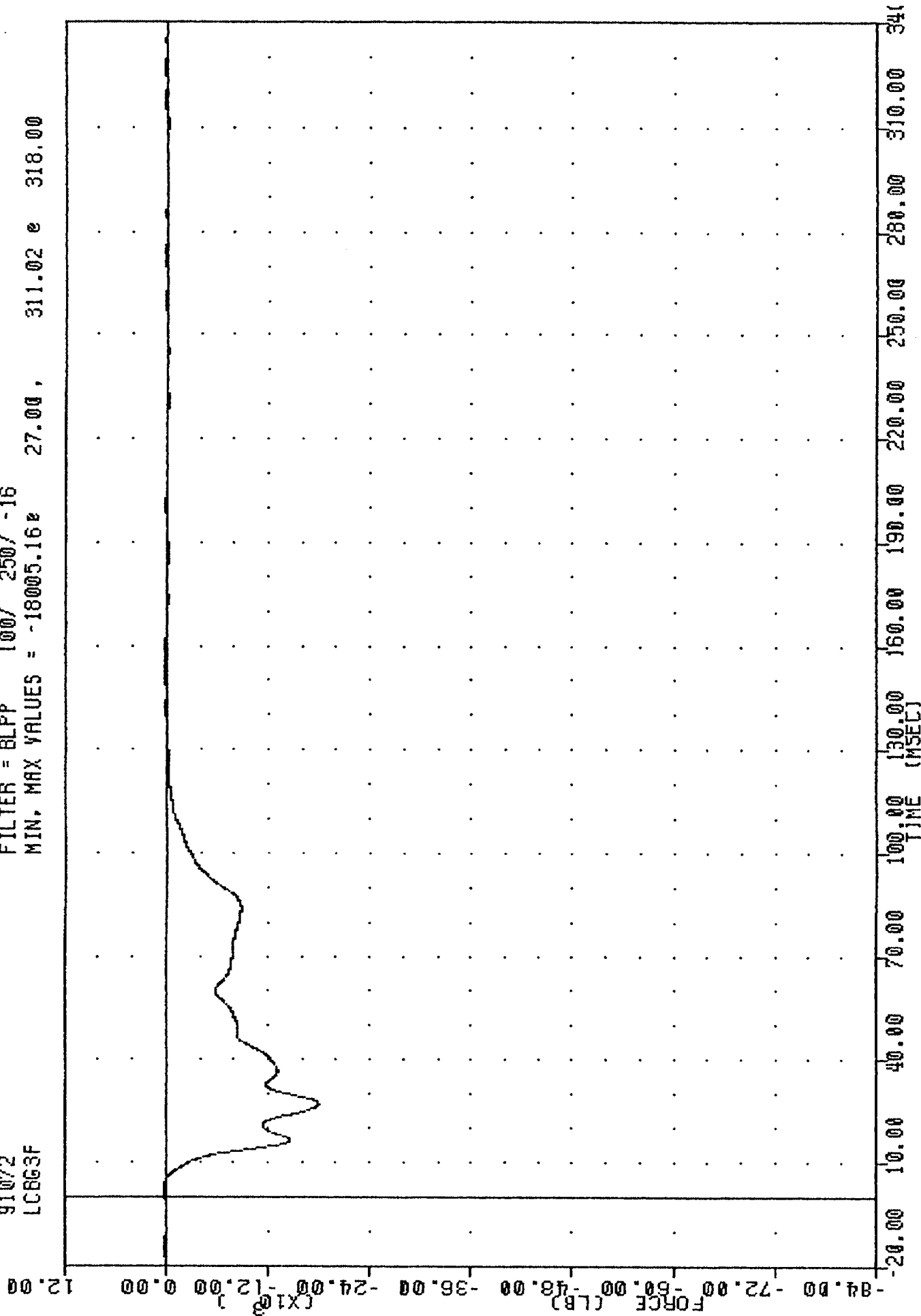
NEW CAR ASSESSMENT PROGRAM

91072

LCB63F

FILTER = BLPP 100/ 250/ -16

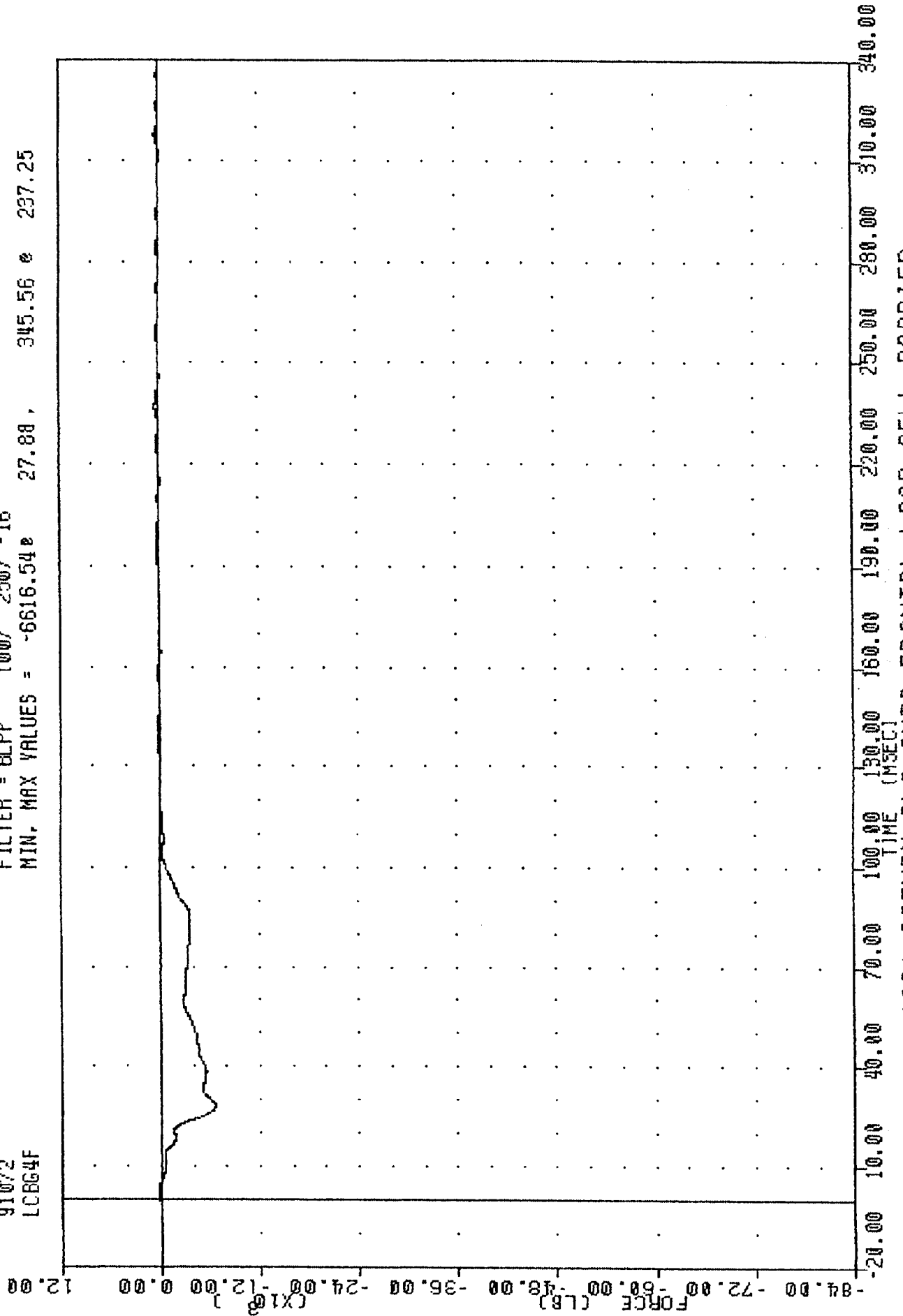
MIN. MAX VALUES = -18005.16 27.00, 311.02 e 318.00



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 3 FORCE TOTAL

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 LCBG4F

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -6616.54e 27.88, 345.56 e 237.25



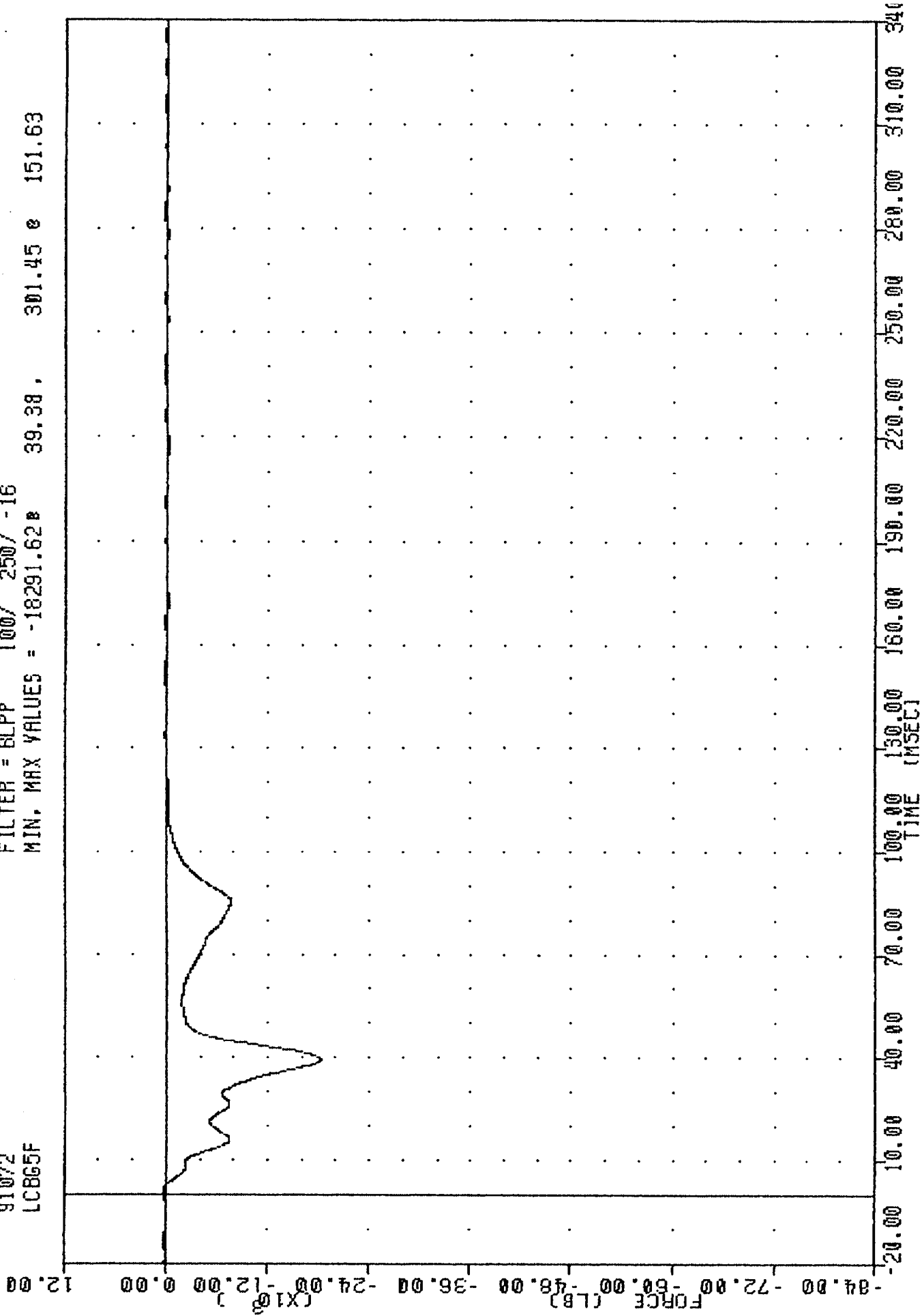
NEW CAR ASSESSMENT PROGRAM

91072

LC8G5F

FILTER = BLPP 100/ 250/ -16

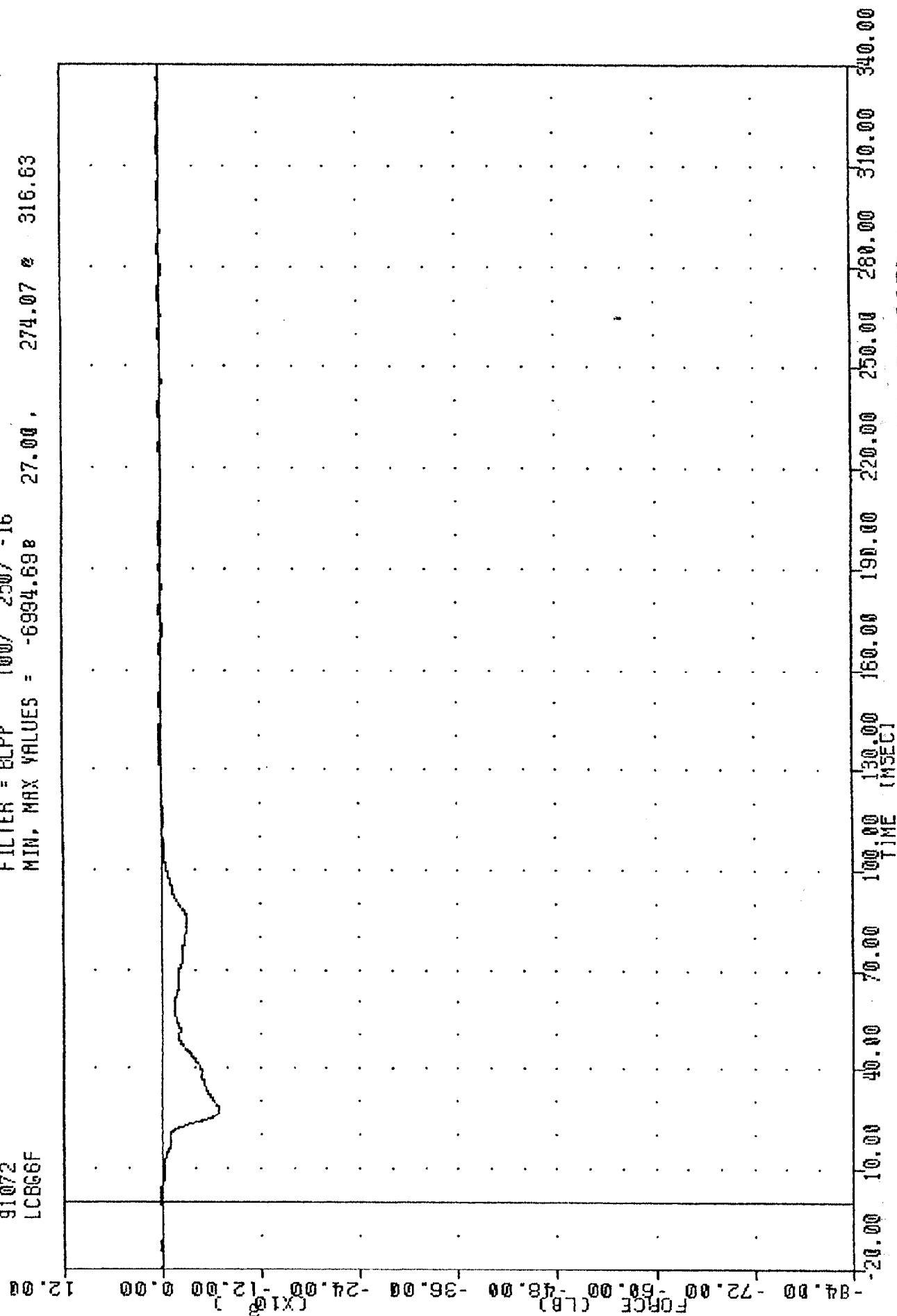
MIN. MAX VALUES = -18291.62 39.38, 301.45 151.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 5 FORCE TOTAL

TRC , 910313
 NEW CAR ASSESSMENT PROGRAM
 91072
 LCB66F

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -6994.698 27.00 , 274.07 & 316.63



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP 16 FORCE TOTAL

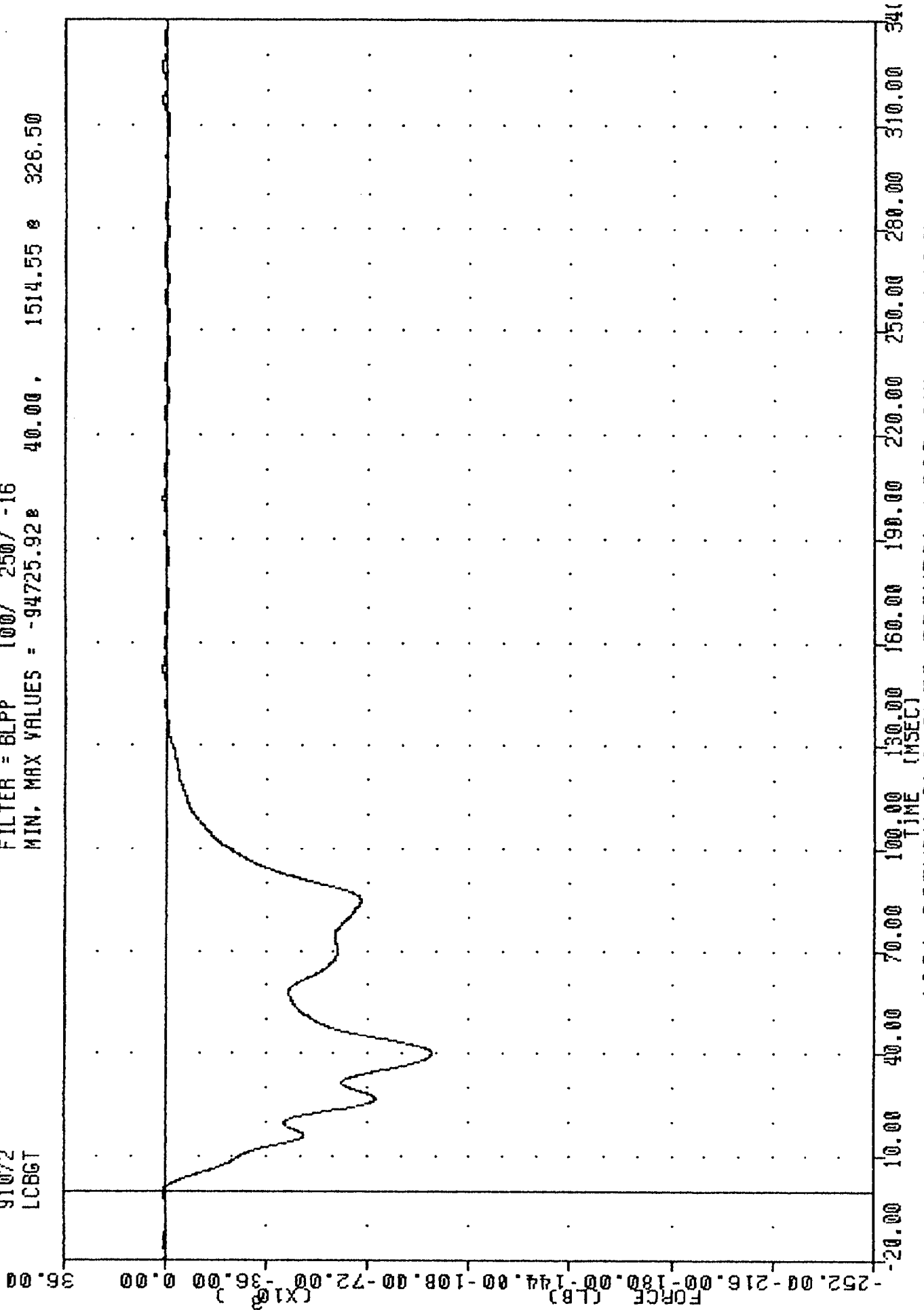
NEW CAR ASSESSMENT PROGRAM

91072

LCBGT

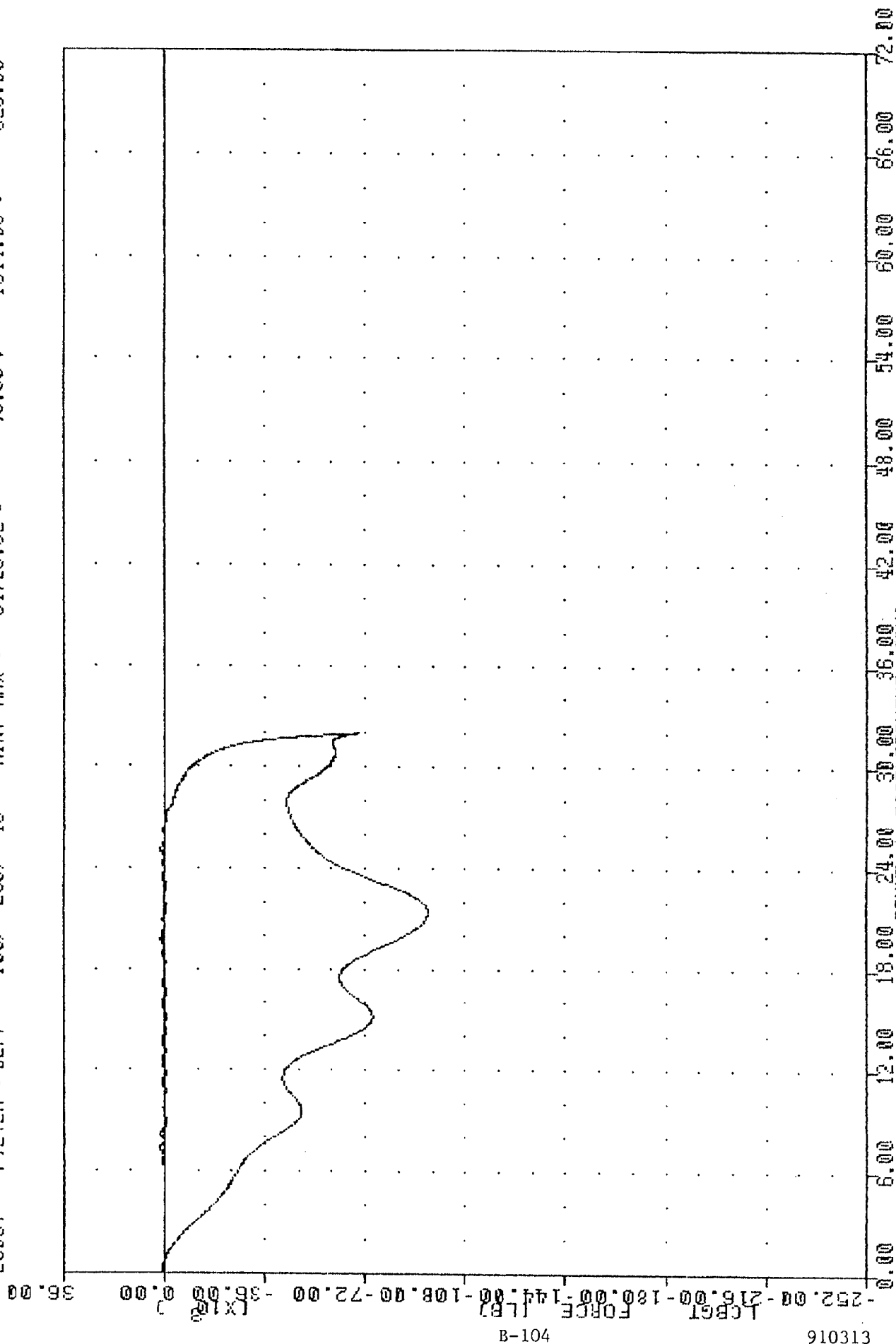
FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -94725.92 40.00, 1514.55 326.50



1991 SATURN SL2 INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE

TRC 910313 NEW CAR ASSESSMENT PROGRAM 91072
 DTHXD FILTER = BLPP 300/ 750/ -16 MIN, MAX = 0.00 31.99 84.00
 LC8GT FILTER = BLPP 100/ 250/ -16 MIN, MAX = -94725.92 40.00 326.50



APPENDIX C

DUMMY CERTIFICATION DATA

PRE-TEST CERTIFICATION DATA

DRIVER DUMMY S/N: 142

HYBRID III EXTERNAL DIMENSIONS
142 HUMANOID

08-MAR-91

NHTSA 142C3ED1 572E SN142 EXT. DIMENSION CAL03

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			72.0 DEG. F
RELATIVE HUMIDITY			24.0 %
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	38.8 IN
WAIST CIRCUMFERENCE (Z)		32.9-34.1 IN	33.2 IN
CHEST DEPTH (O)		8.4- 9.0 IN	8.7 IN
H-POINT HEIGHT (C)		3.3- 3.5 IN	3.4 IN
H-POINT FROM SEATBACK (D)		5.3- 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN	34.8 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN	5.7 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN	23.5 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN	18.7 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN	17.8 IN
KNEE PIVOT HEIGHT (M)		19.1-19.7 IN	19.3 IN
FOOT LENGTH (P)		9.9-10.5 IN	10.1 IN
FOOT BREADTH (W)		3.6- 4.2 IN	3.8 IN
SHOULDER PIVOT FROM BACKLINE (E)		3.3- 3.7 IN	3.5 IN
SHOULDER BREADTH (V)		16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN	8.2 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN	13.6 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN	11.5 IN

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

08-Mar-91

NHTSA

142C3HD1

572E SN142 HEAD DROP CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	24.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	228.19 G
PEAK LATERAL ACCELERATION	15 G MAX	-9.37 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

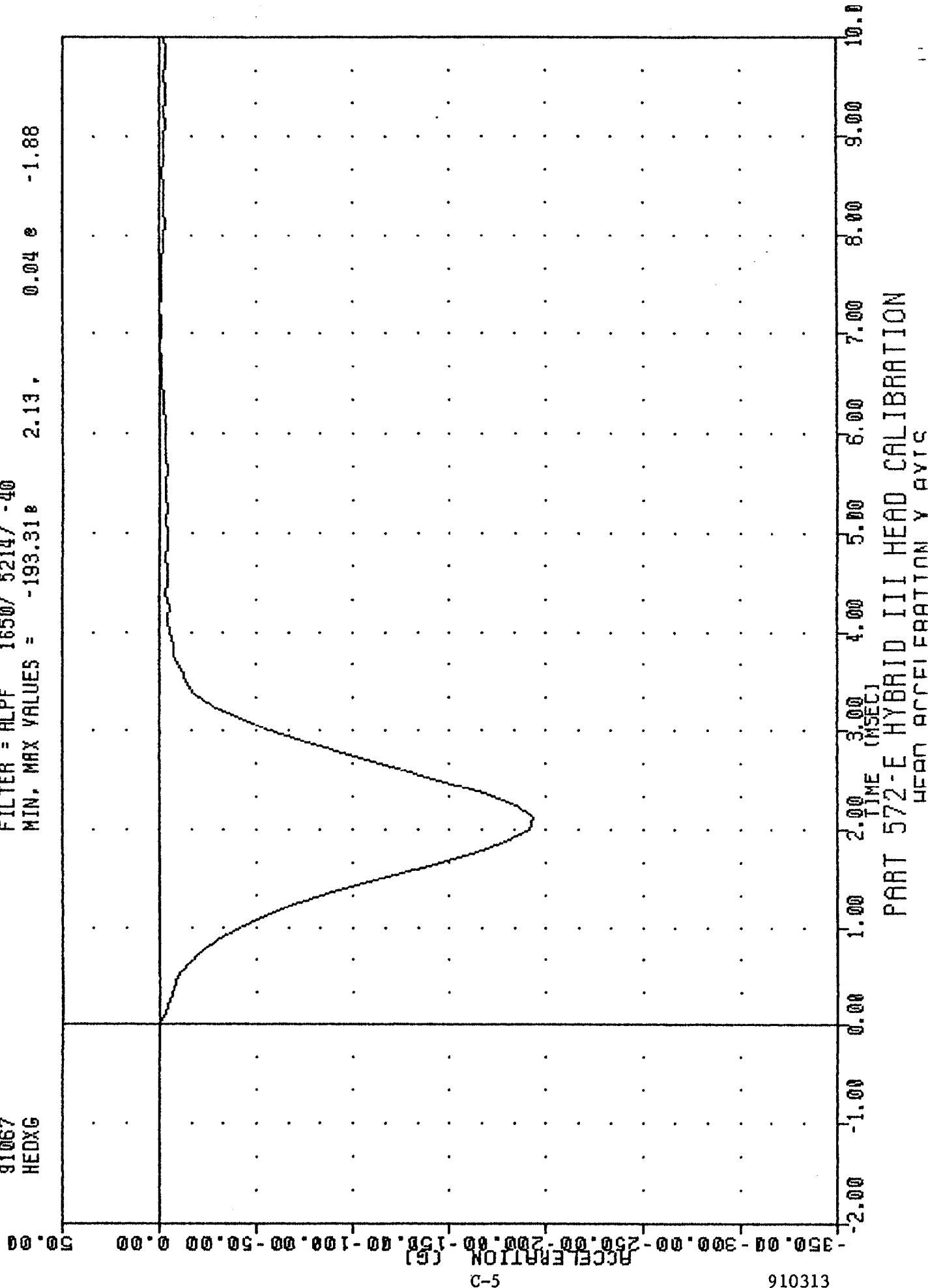
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

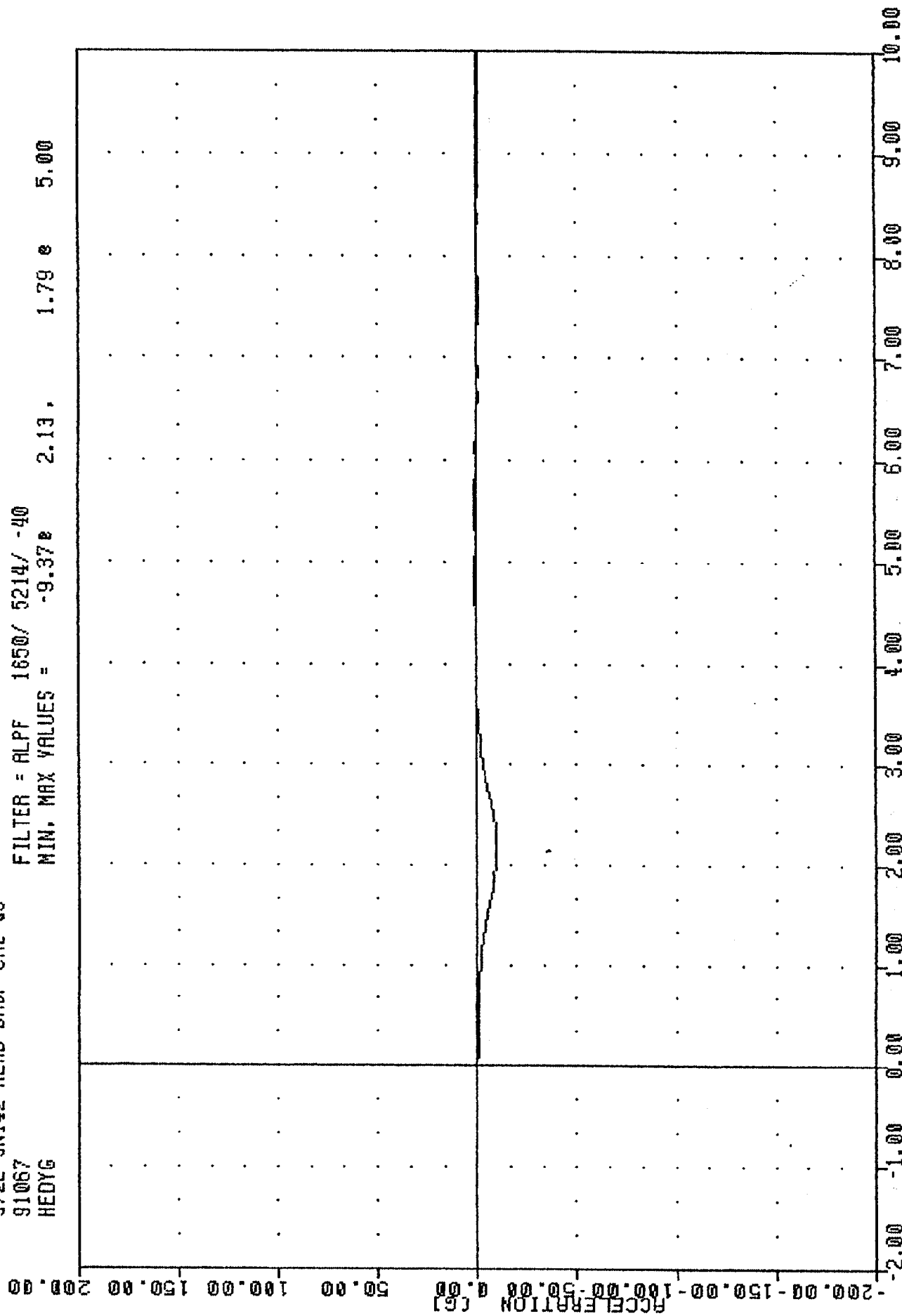
NHTSA
 572E SN142 HEAD DROP CAL 03
 91067
 HEDXG

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -193.31 2.13 0.04 e -1.88



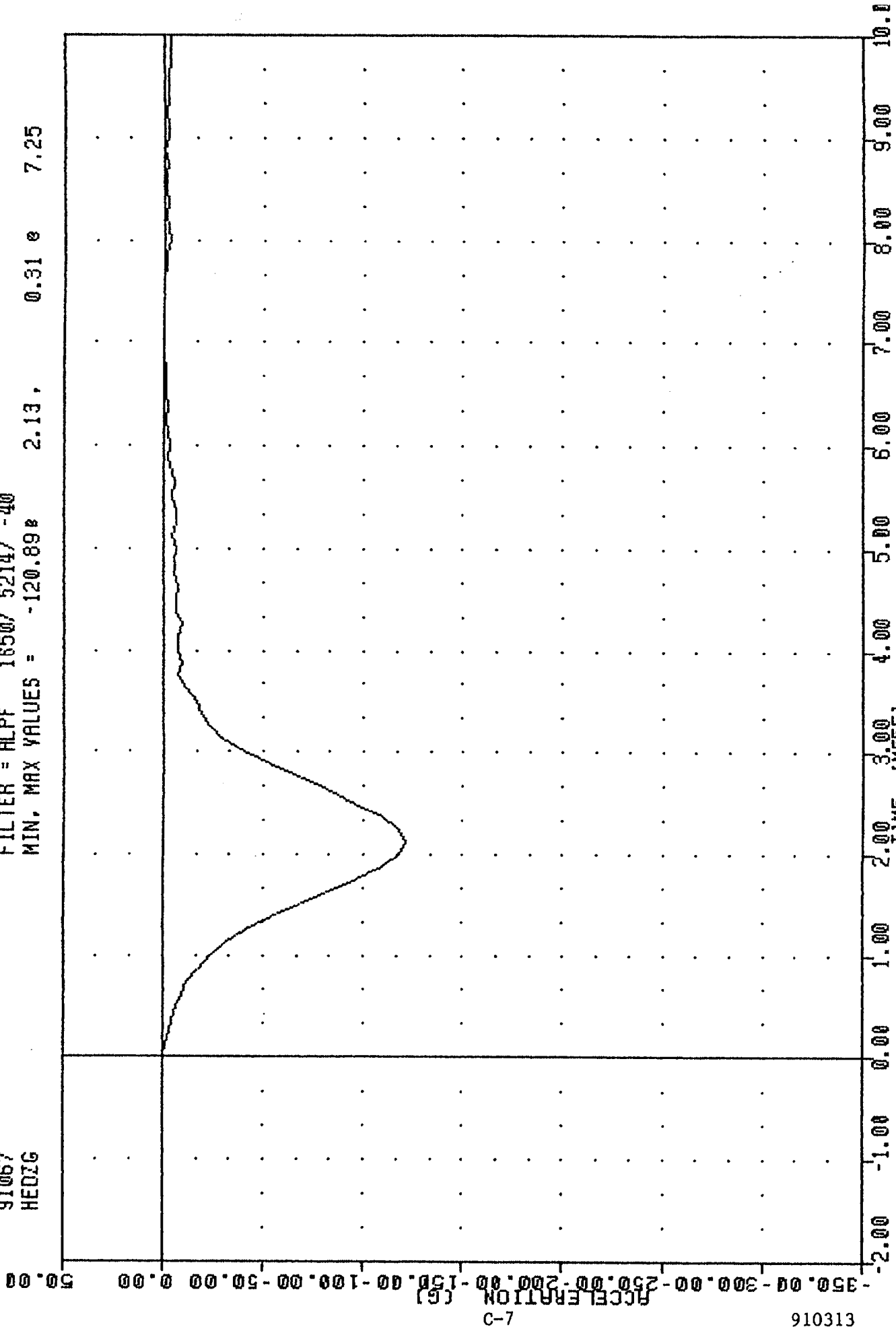
NHTSA , 142C3HD1
 572E SN142 HEAD DRDP CAL 03
 91067
 HEDYG

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -9.37e 2.13, 1.79 e 5.00



NHTSA , 142C3HD1
 572E SN142 HEAD DROP CAL 03
 91067
 HEADZG

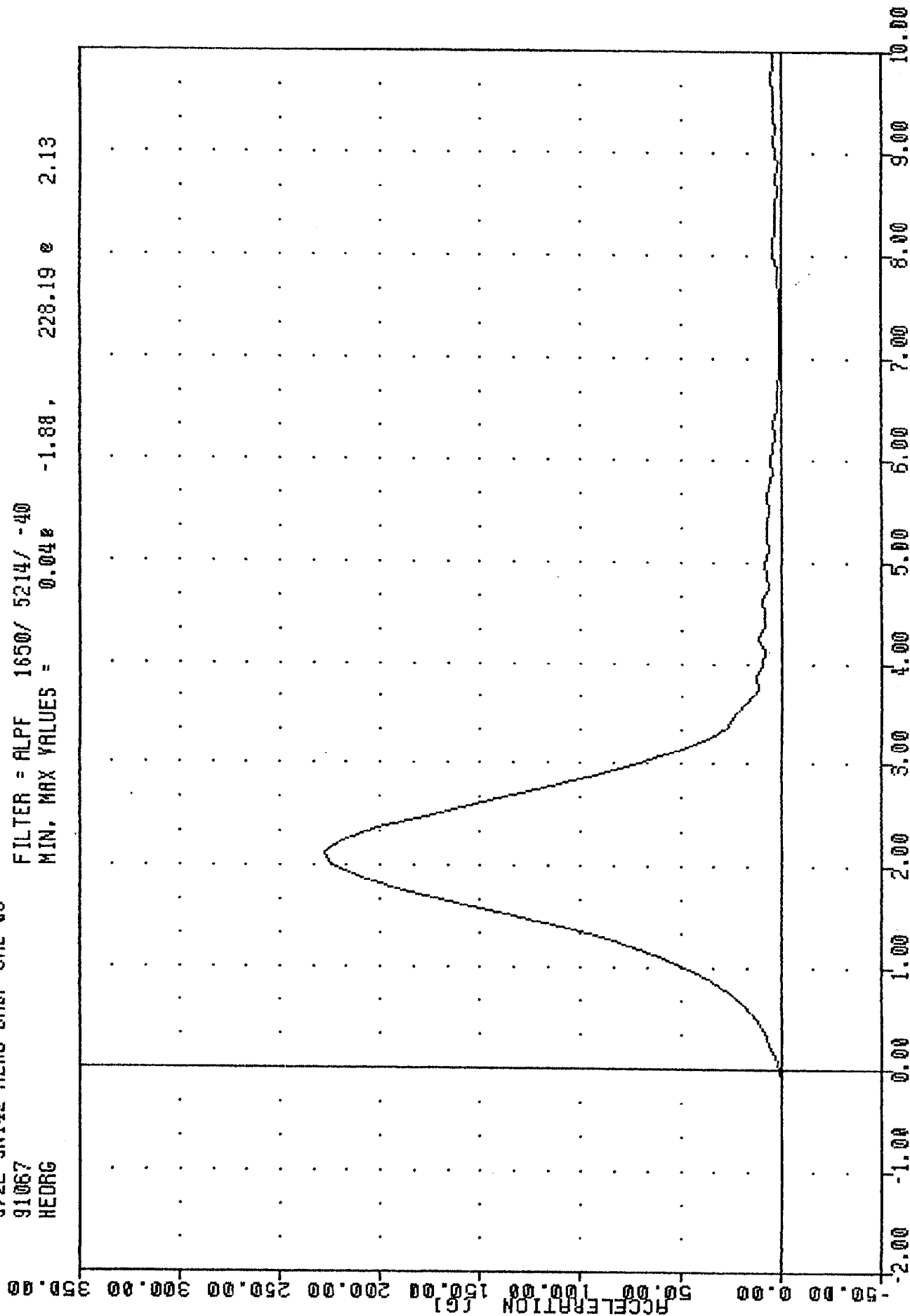
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -120.89# 2.13, 0.31 @ 7.25



PART 572-E HYBRID III HEAD CALIBRATION
 HEAD ACCELERATION 7 AYTS

NHTSR , 142C3HD1
 572E SN142 HEAD DROP CAL 03
 91067
 HEDRG

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.048 -1.88 , 228.19 e 2.13



TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

08-Mar-91

6 AXIS NECK TRANSDUCER
NHTSA 142C3NF1

572E SN142 NECK FLEXION CAL03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	24.00 %
IMPACT VELOCITY	22.6-23.4 FT/SEC	23.08 FT/SEC
PENDULUM	10 MS 22.50 - 27.50 G	22.64 G
DECELERATION	20 MS 17.60 - 22.60 G	19.28 G
	30 MS 12.50 - 18.50 G	16.83 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	16.77 G
DECELERATION-TIME CURVE		
IDECLAY TIME TO 5 G	34 - 42 MS	38.88 MS
D PLANE	MAX 64 - 78 DEG.	73.21 DEG.
ROTATION	TIME 57 - 64 MS	60.75 MS
MOMENT ABOUT OCCIPITAL	MAX 65 - 80 FT.LBS	72.34 FT.LBS
CONDYLE	TIME 47 - 58 MS	52.88 MS
ROTATION ANGLE-TIME CURVE		
IDECLAY TIME TO ZERO	113 - 128 MS	118.00 MS
POSITIVE MOMENT-TIME CURVE		
IDECLAY TIME TO ZERO	97 - 107 MS	104.50 MS

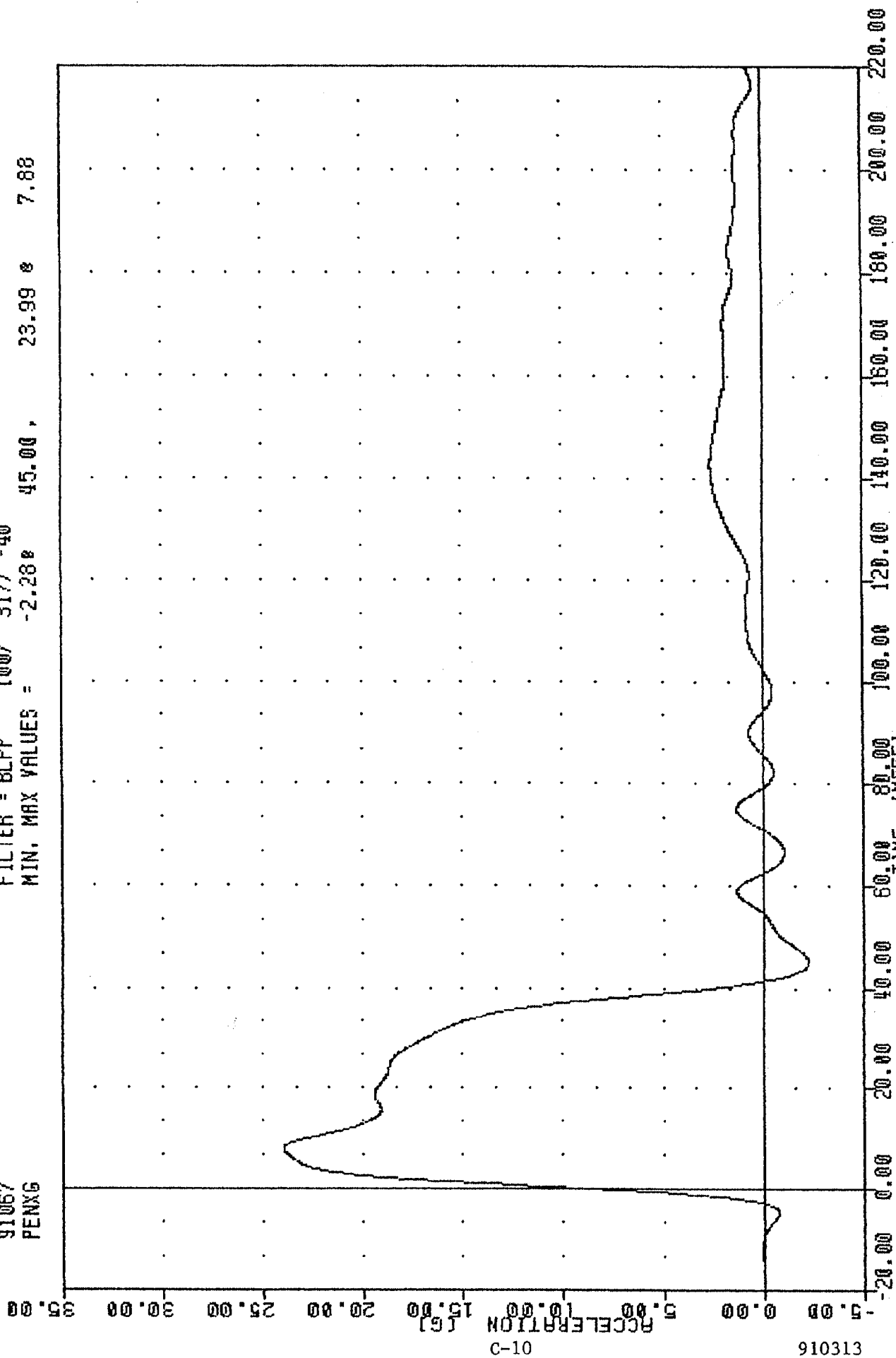
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

NHTSA , 142C3NF1
572E SN142 NECK FLEXION CAL03
91067
PENXG

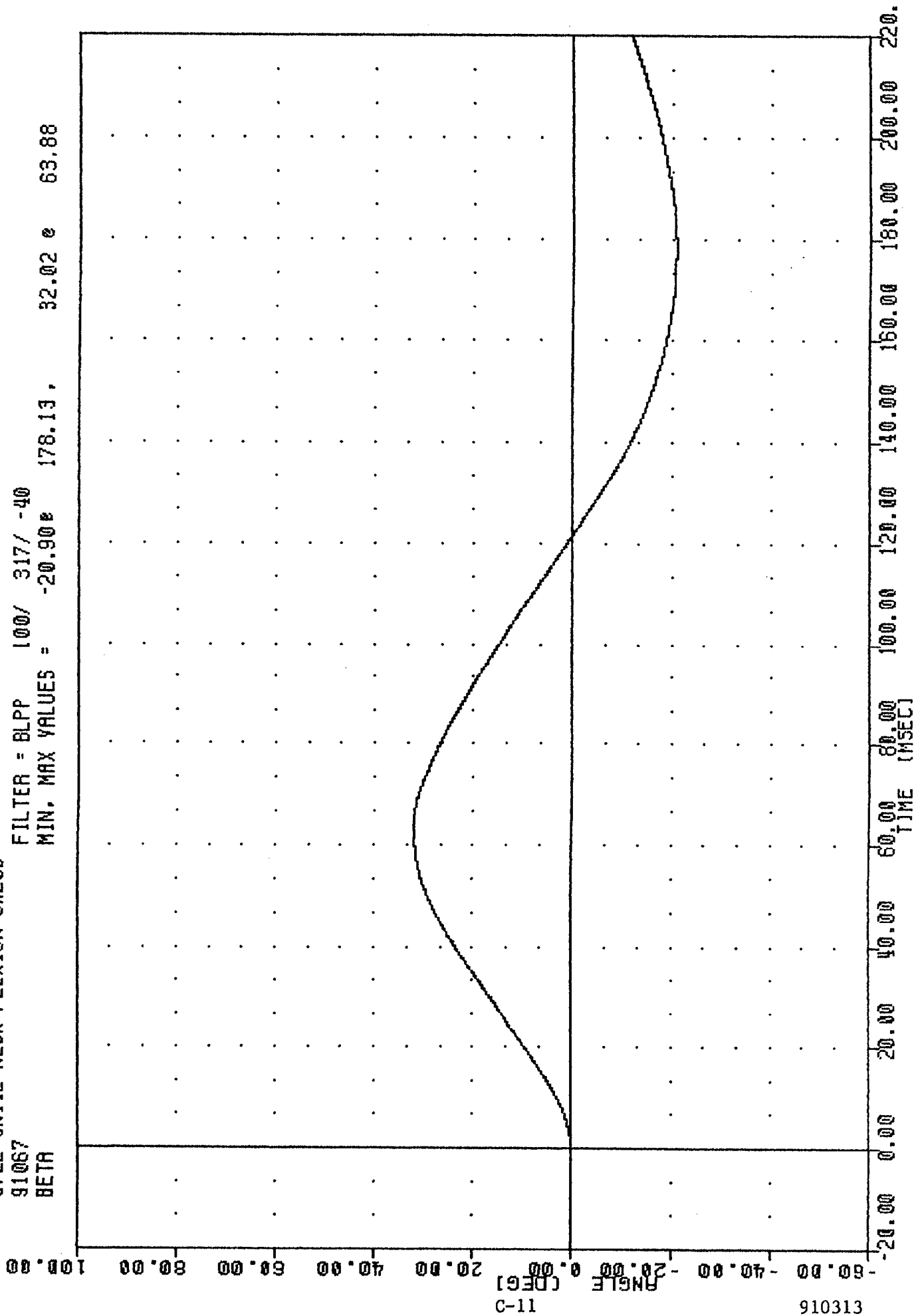
FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -2.28g 45.00g 23.99g 7.88g



PART 572-E HYBRID III NECK FLEXION CALIBRATION

NHTSA , 142C3NF1
 572E SN142 NECK FLEXION CAL03
 91067
 BETA

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -20.90e 178.13, 32.02 e 63.88



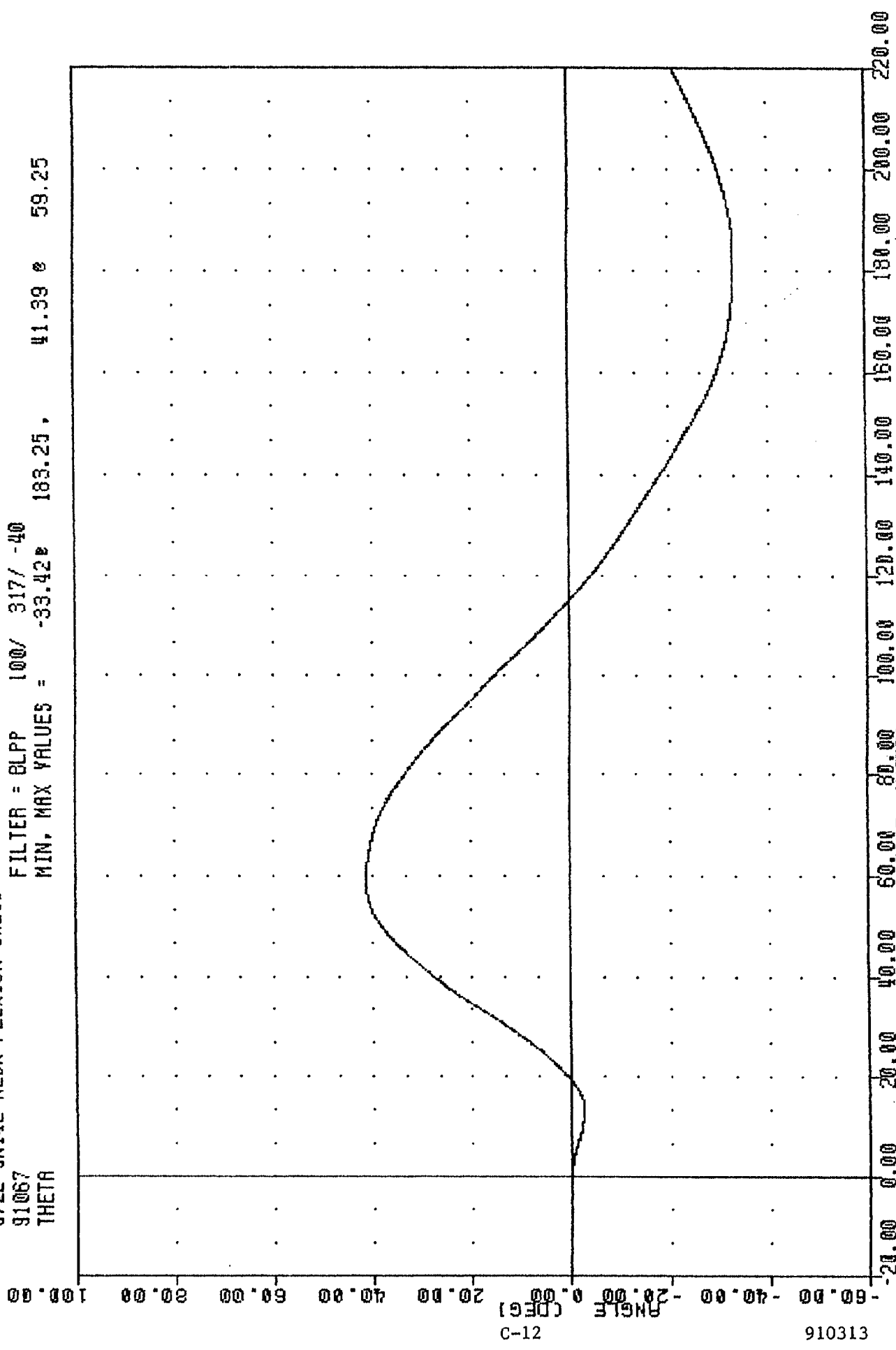
C-11

910313

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

NHTSR , 142C3NF1
 572E SN142 NECK FLEXION CAL03
 91067
 THETA

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -33.42 183.25 , 41.39 59.25



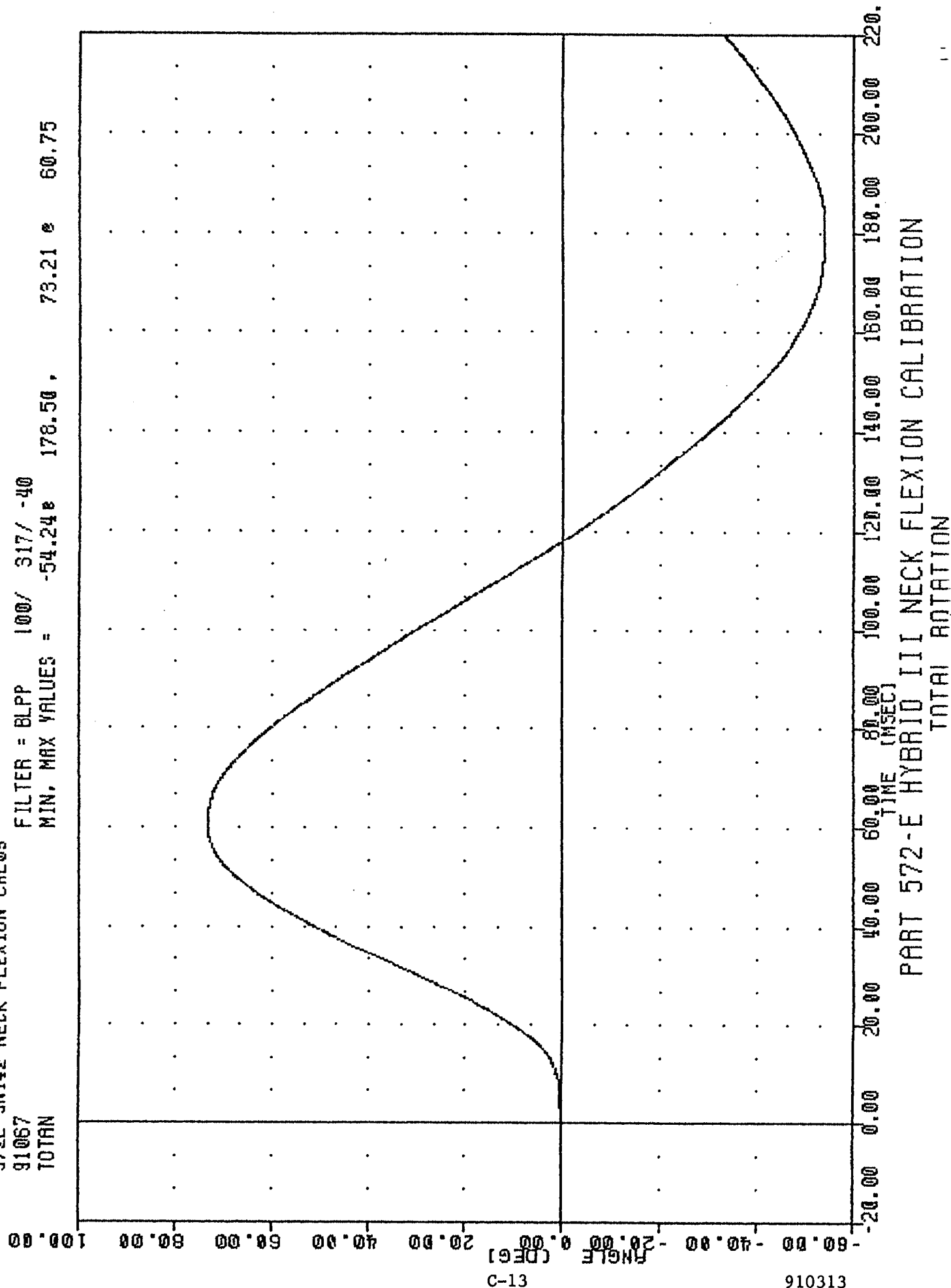
C-12

910313

PART 572-E HYBRID III NECK FLEXION CALIBRATION

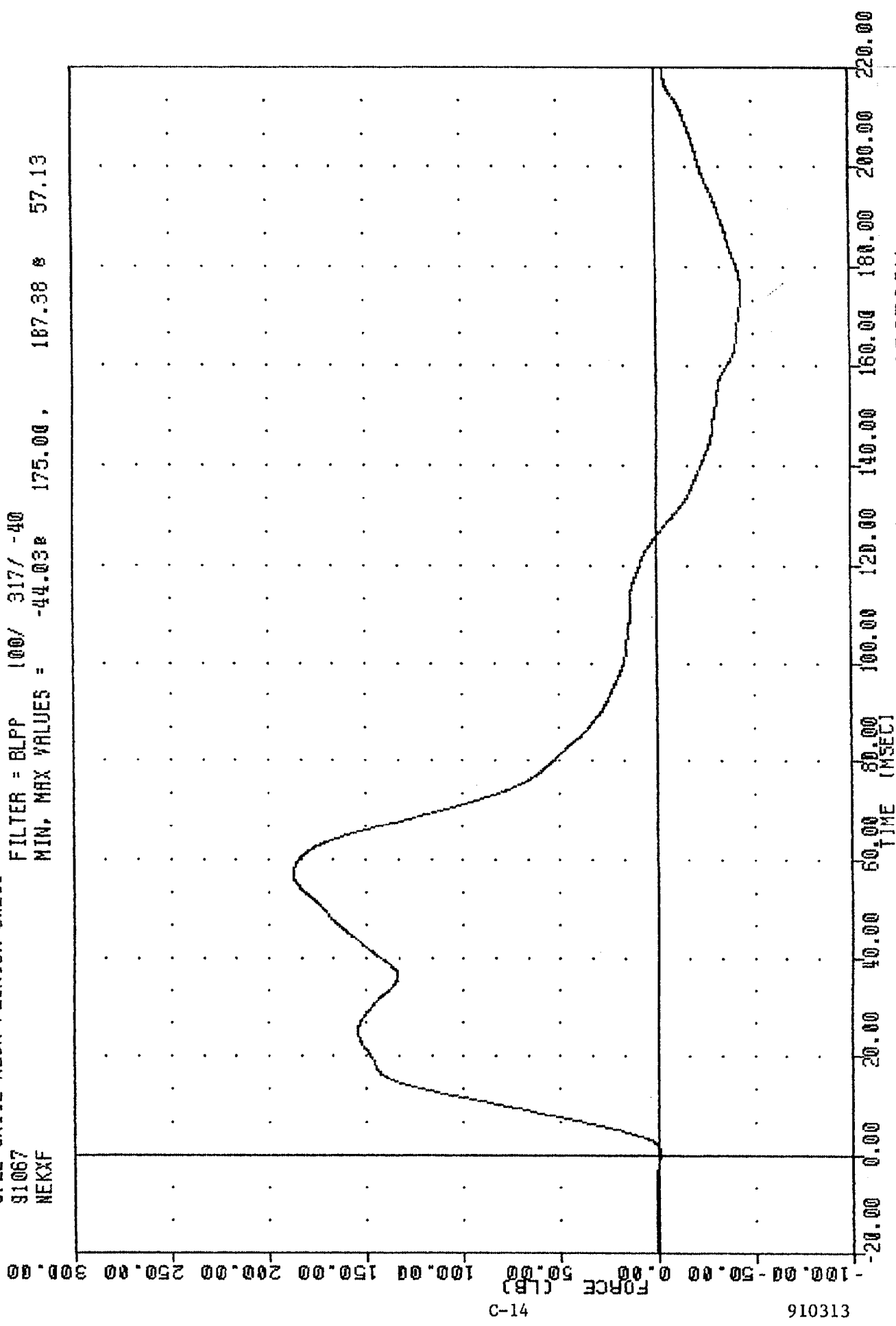
NHTSA , 142C3NF1
 572E SN142 NECK FLEXION CAL03
 91067
 TOTAL

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -54.24 e 178.50 , 73.21 e 60.75



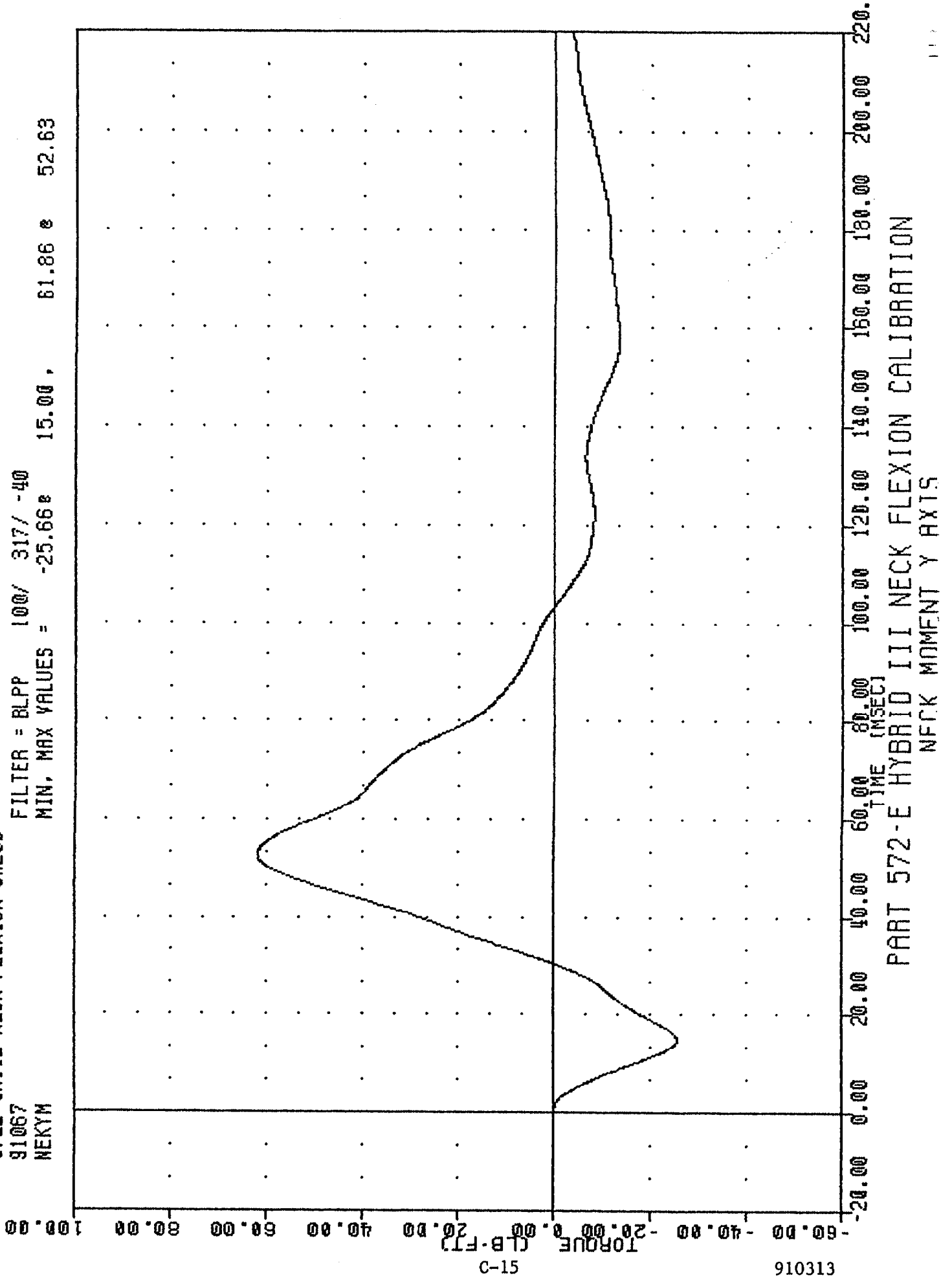
NHTSA , 142CSNF1
 572E SN142 NECK FLEXION CAL03
 91067
 NEKXF

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -44.03e 175.00, 187.38 e 57.13



NHTSA , 142C3NF1
 572E SN142 NECK FLEXION CAL03
 91067
 NEKYM

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -25.66 15.00 , 61.86 52.63



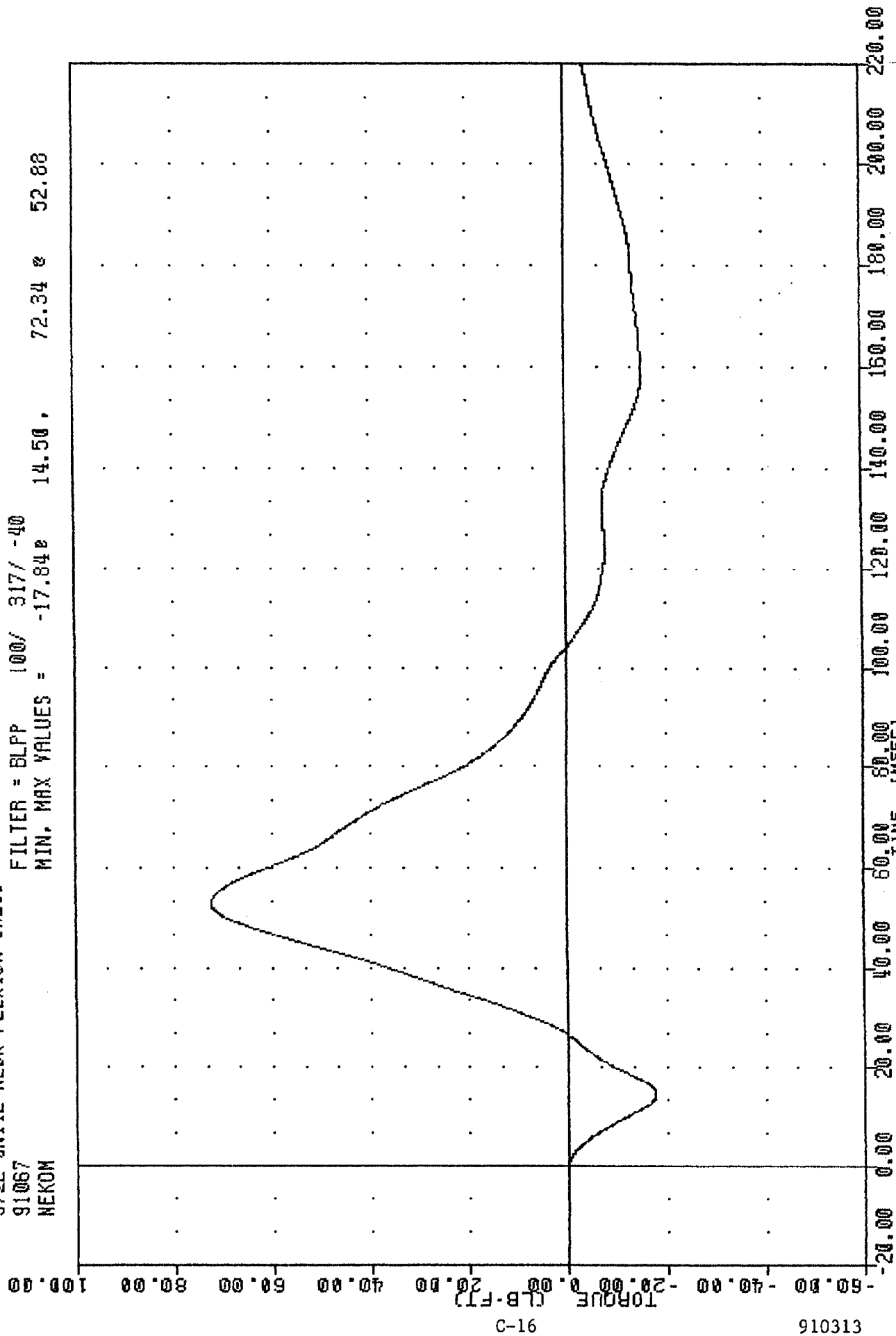
C-15

910313

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

NHTSA , 142C3NF1
 572E SN142 NECK FLEXION CAL03
 91067
 NEKOM

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -17.84e 14.50 , 72.34 e 52.88



C-16

910313

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

08-Mar-91

6 AXIS NECK TRANSDUCER
NHTSA 142C3NE1

572E SN142 NECK EXT. CAL03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	24.00 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.51 FT/SEC
PENDULUM	10 MS 17.20 - 21.20 G	17.87 G
DECELERATION	20 MS 14.00 - 19.00 G	15.03 G
	30 MS 11.00 - 16.00 G	13.18 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	13.12 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	44.25 MS
D PLANE	MAX 81 - 106 DEG.	97.83 DEG.
ROTATION	TIME 72 - 82 MS	78.75 MS
MOMENT ABOUT OCCIPITAL	MIN -59.0/-39.0 FT.LBS	-51.20 FT.LBS
CONDYLE	TIME 65 - 79 MS	75.00 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	160.50 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	147.50 MS

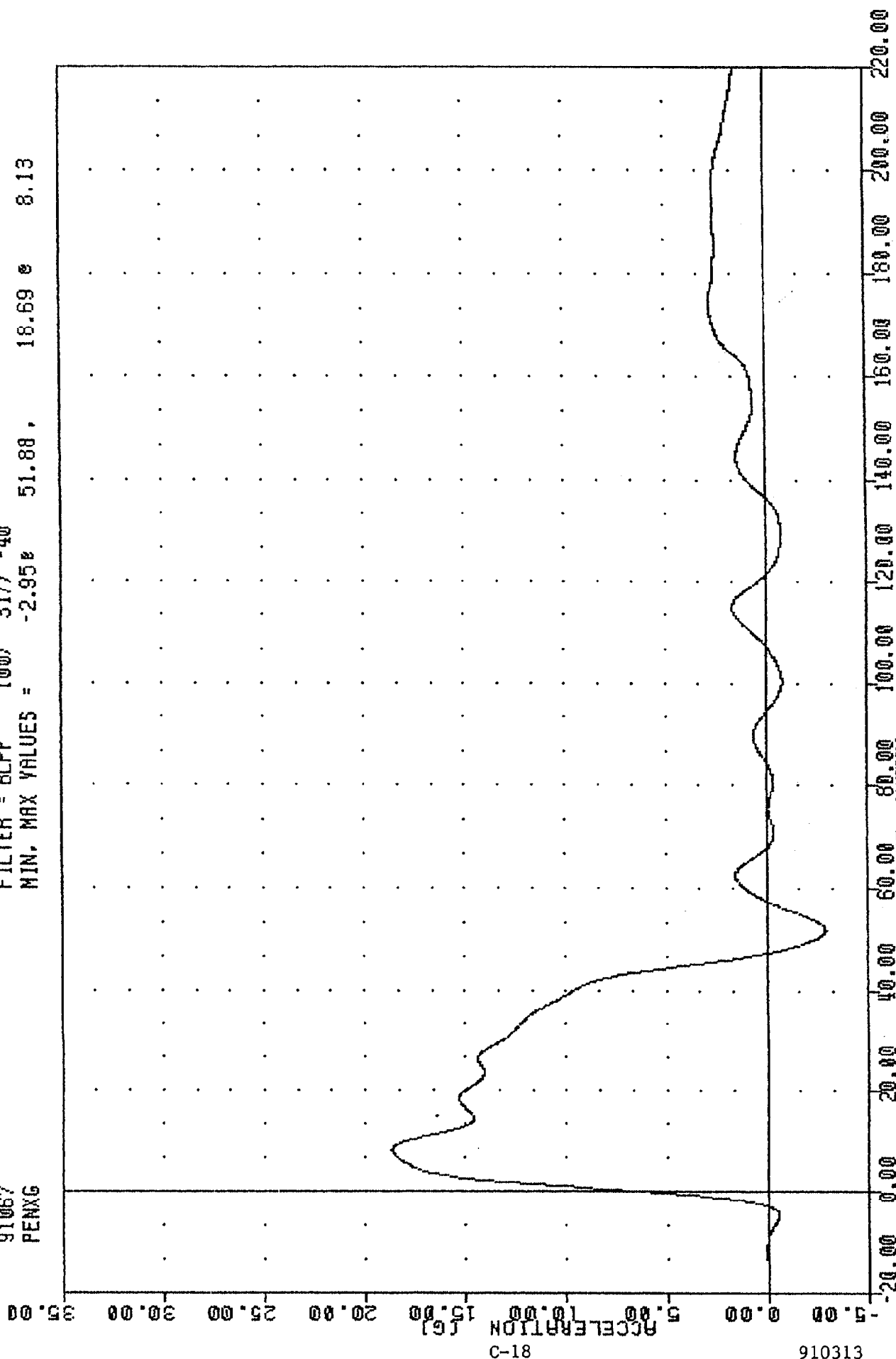
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

WHTSA , 142C3NE1
572E SN142 NECK EXT. CAL03
91067
PENXG

FILTER = BLPP 100/ 317/ -40
MIN, MAX VALUES = -2.95 51.88 18.69 8.13



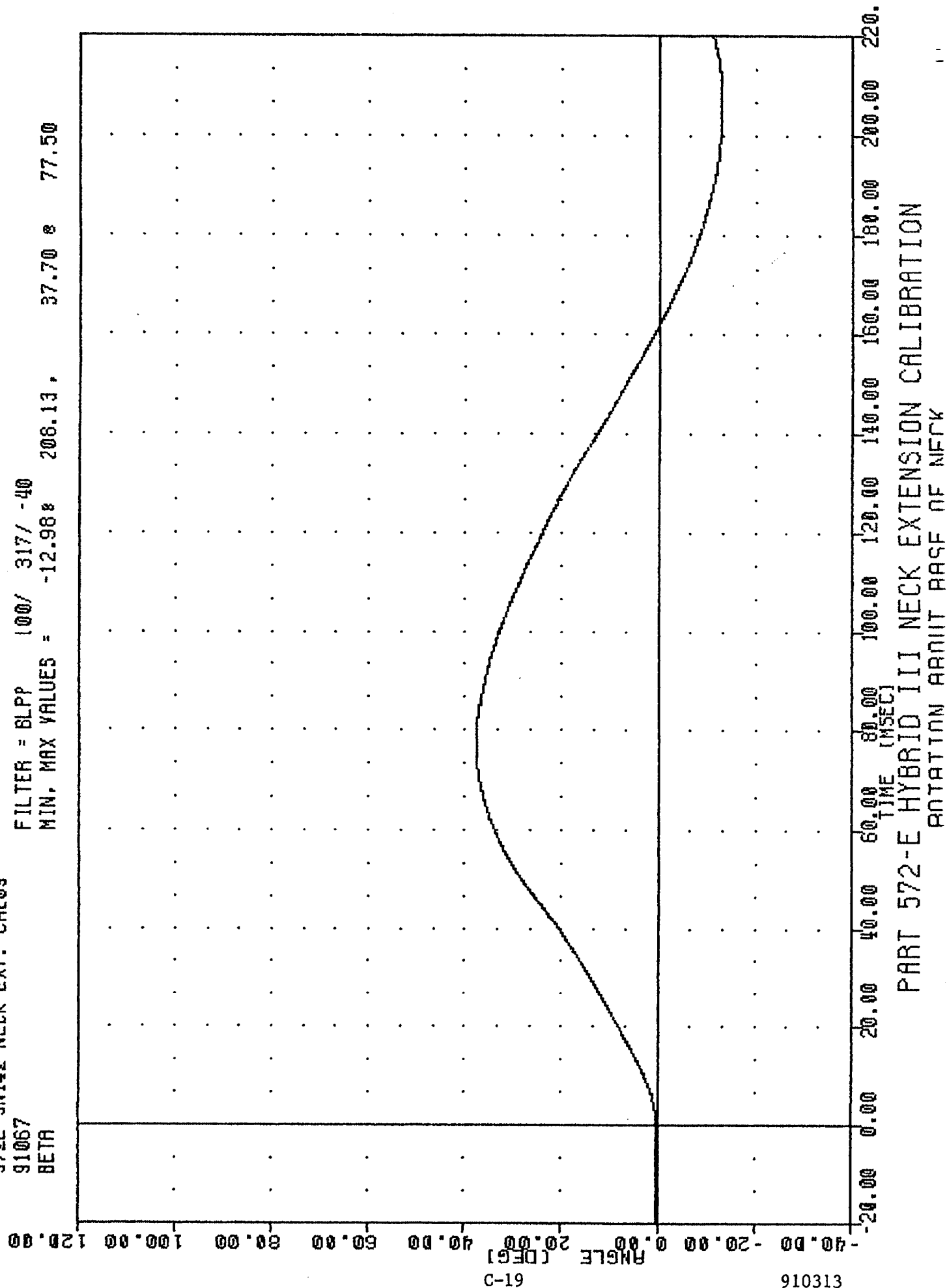
C-18

910313

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

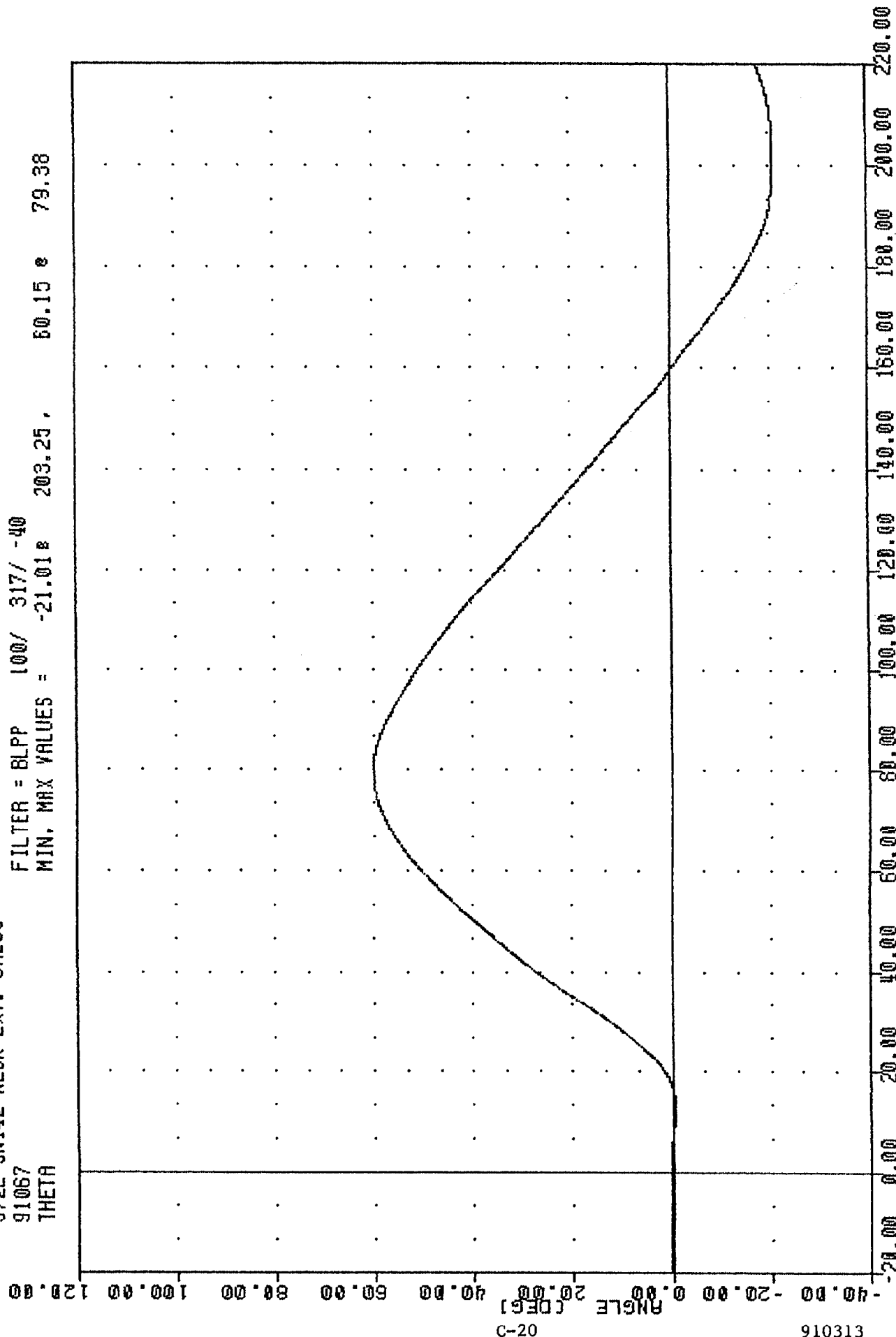
NHTSR , 142C3NE1
 572E SN142 NECK EXT. CAL03
 91067
 BETA

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -12.98% 206.13, 37.70 % 77.50



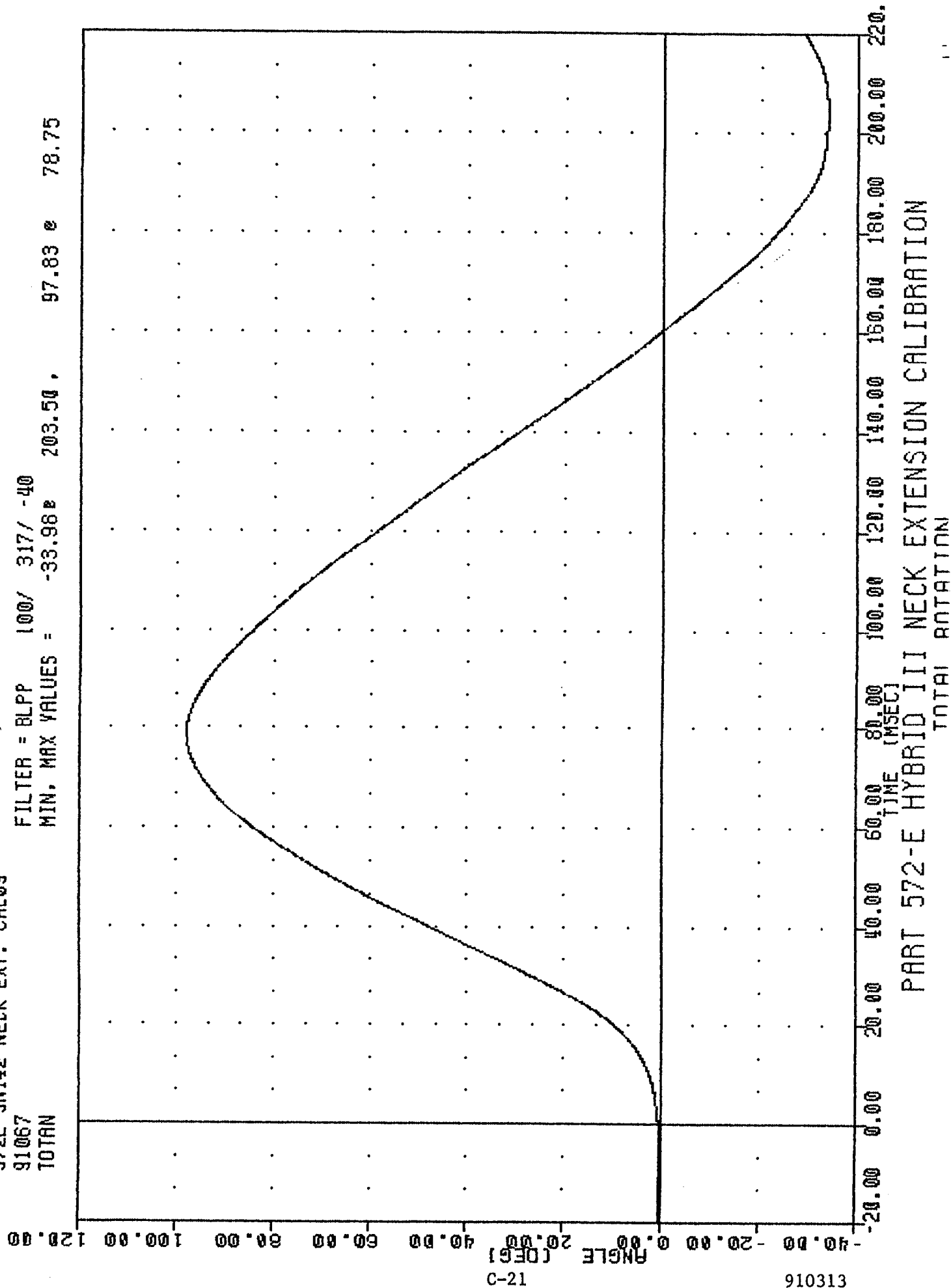
NHTSA , 14203NE1
 572E SN142 NECK EXT. CAL03
 91067
 THETA

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -21.018 203.25, 60.15 e 79.38



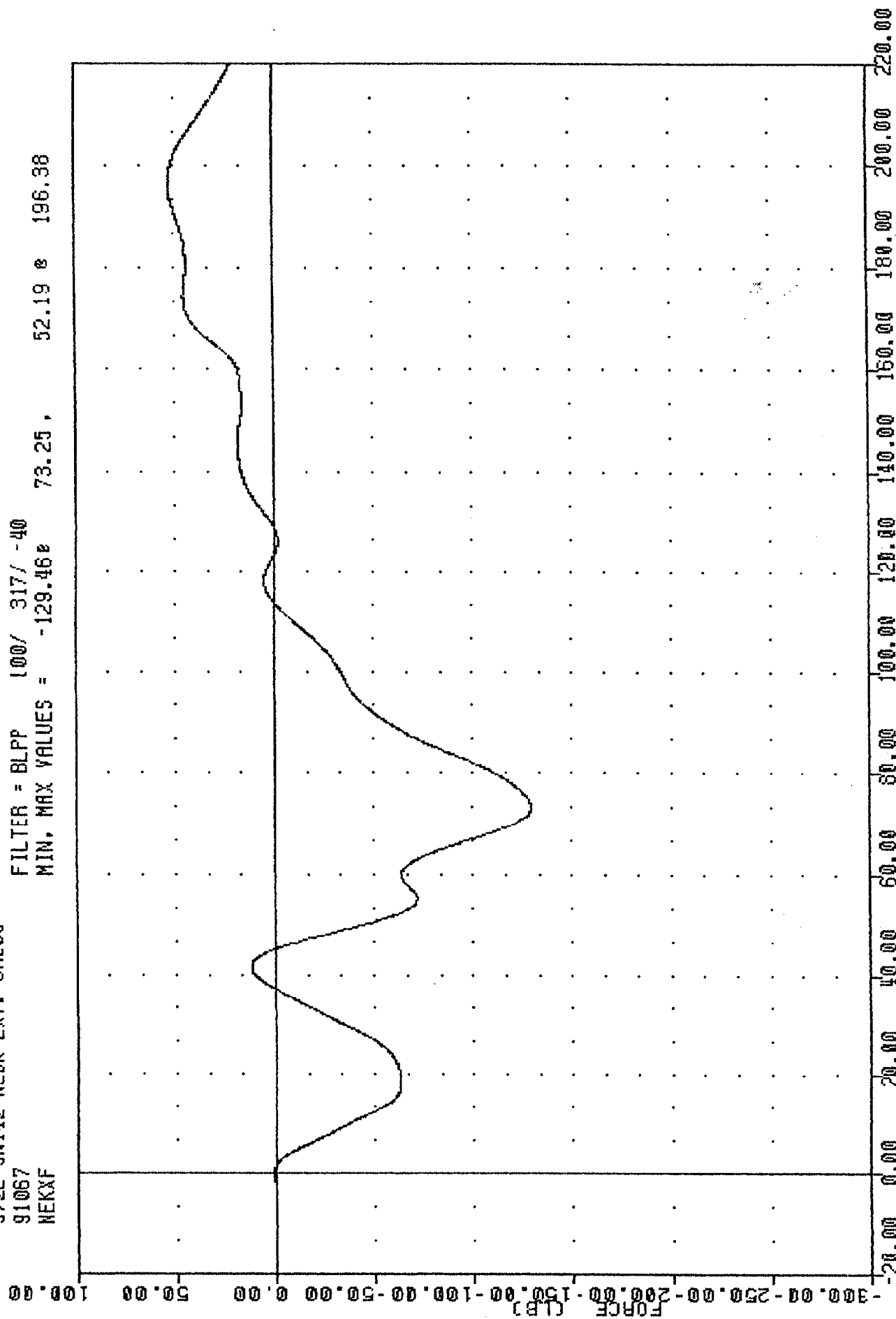
NHTSA , 142C3NE1
 572E SN142 NECK EXT. CAL03
 91067
 TOTAL

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -33.98 203.50 , 97.83 78.75



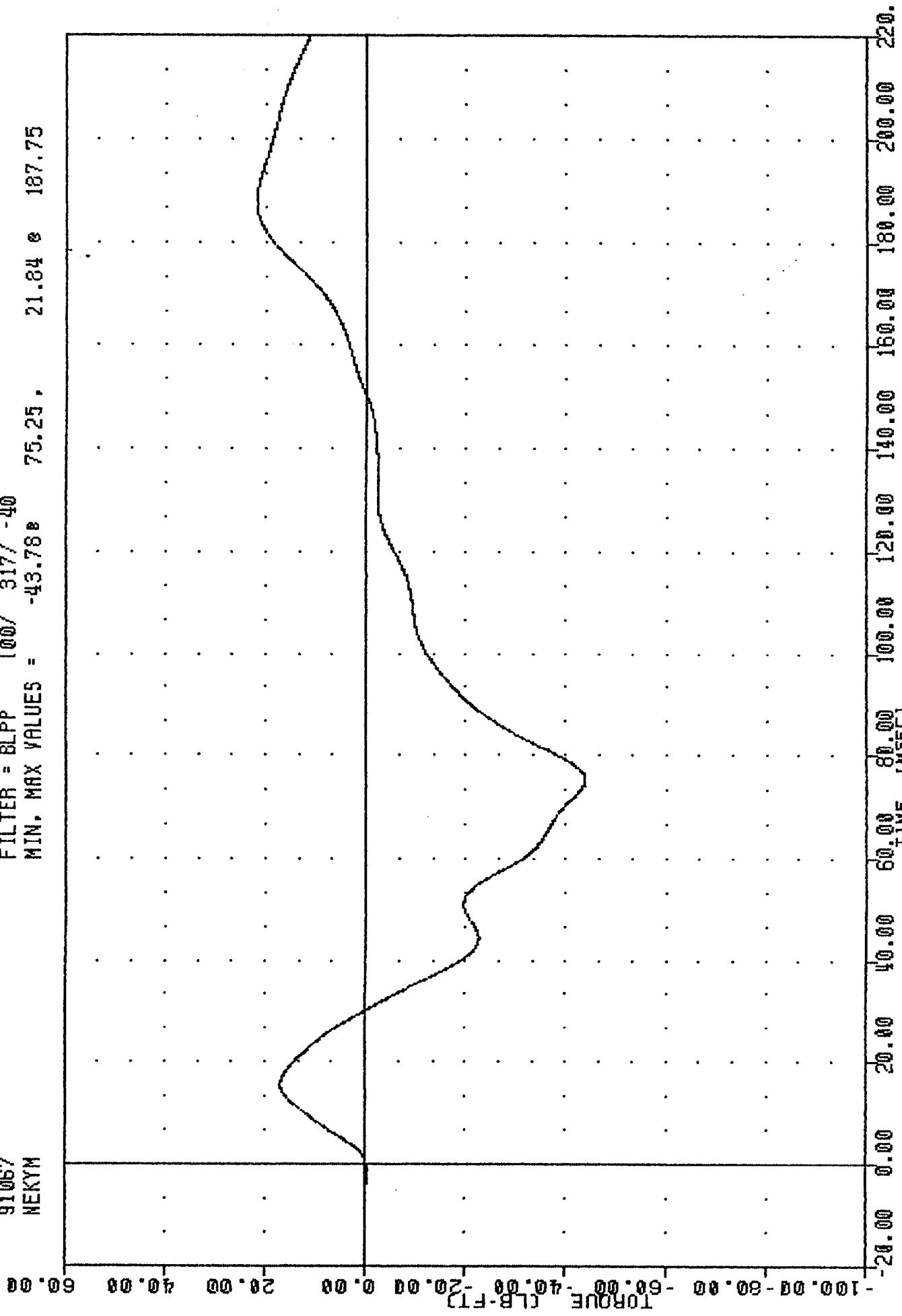
NHTSA
 572E SN142 NECK EXT. CAL03
 91067
 NEKXF

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -129.46e 73.25, 52.19 e 196.38



NHTSR , 142C3NE1
 572E SN142 NECK EXT. CAL03
 91067
 NEKYM

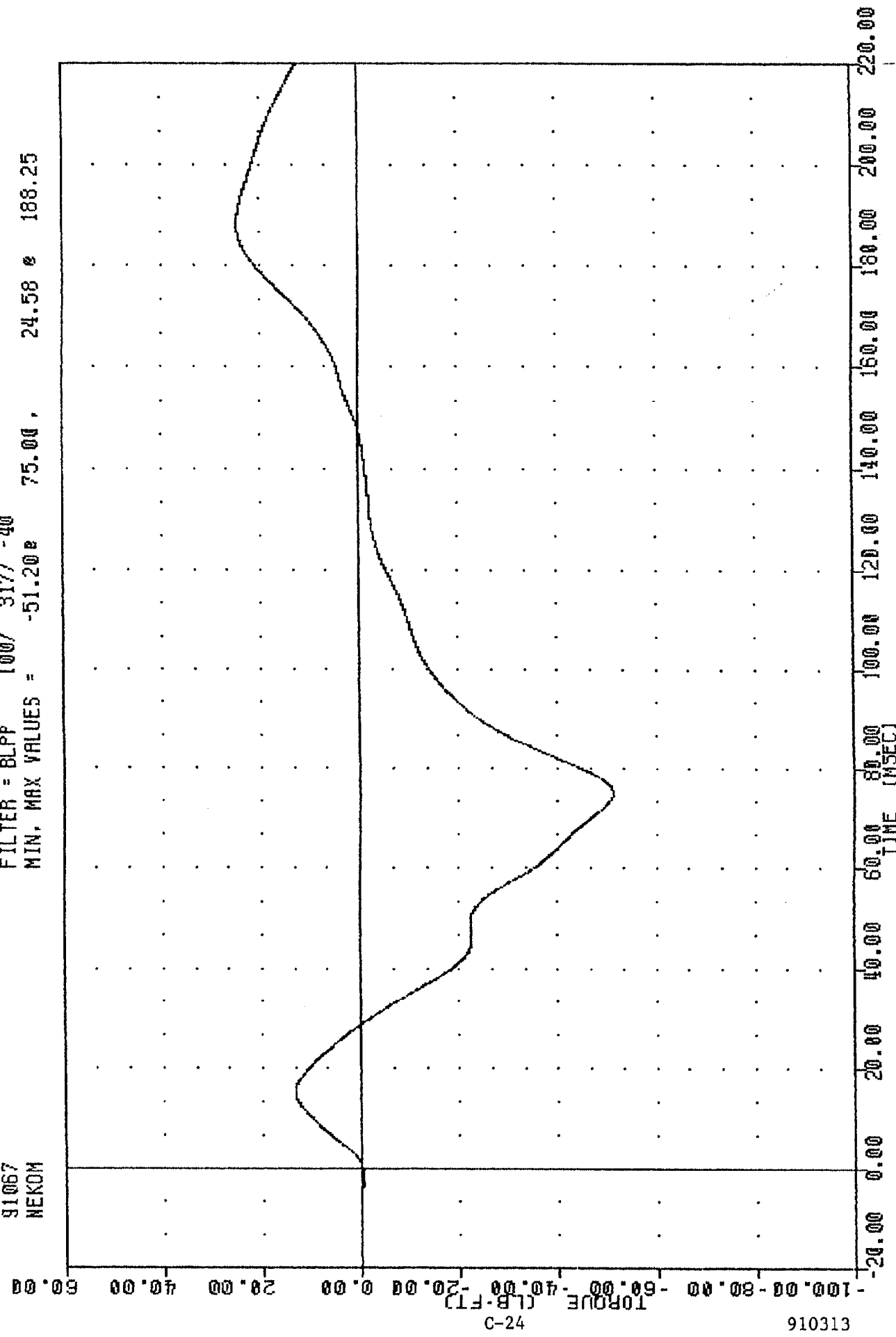
FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -43.78 75.25 21.84 187.75



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

NHTSA , 142C3NE1
 572E SN142 NECK EXT. CAL03
 91067
 NEKOM

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -51.20 75.00 , 24.58 188.25



PART 572-E HYBRID III NECK EXTENSION CALIBRATION

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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

11-Mar-91

NHTSA

142C3TH1

572E SN142 H.S. THORAX CAL03

	HIGH SPEED TEST	
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	27.00 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.92 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.53 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1245.8 LBS
INTERNAL HYSTERESIS	69% - 85%	73.8%

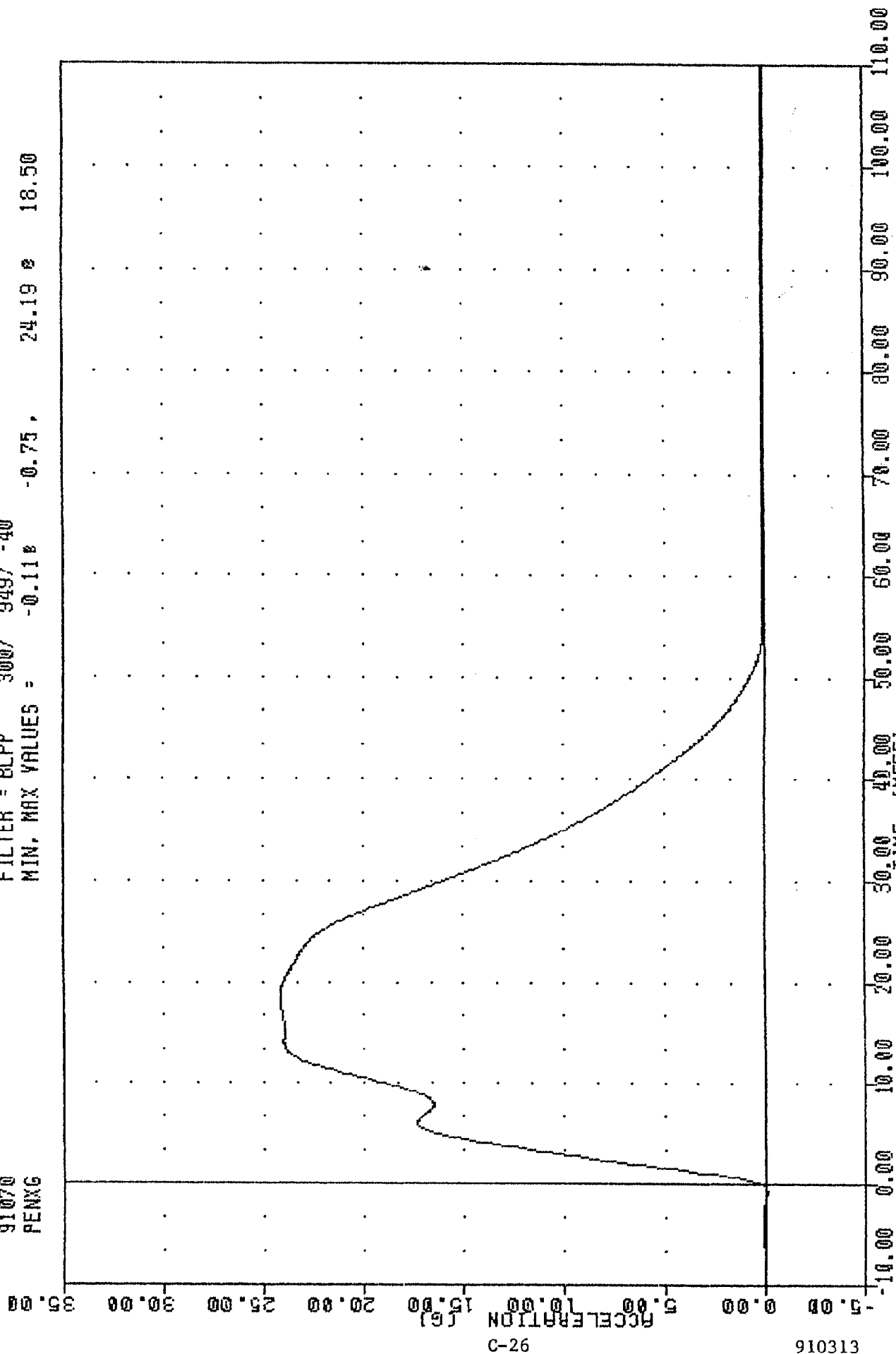
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

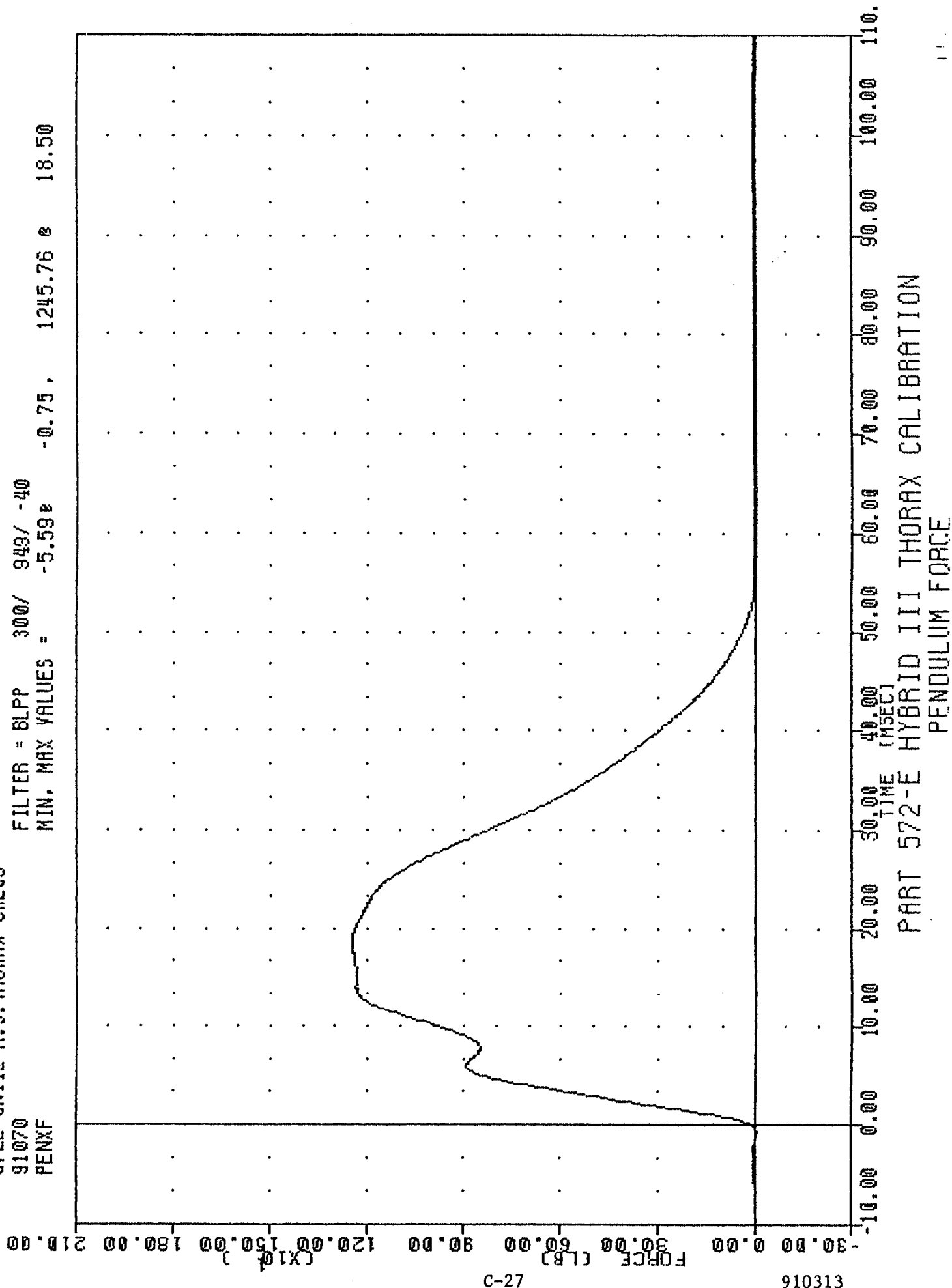
NHTSA , 142C3TH1
 572E 9N142 H.S. THORAX CAL03
 91070
 PENXG

FILTER = BLPP 300/ 949/ -40
 MIN, MAX VALUES = -0.110 -0.75, 24.19 18.50



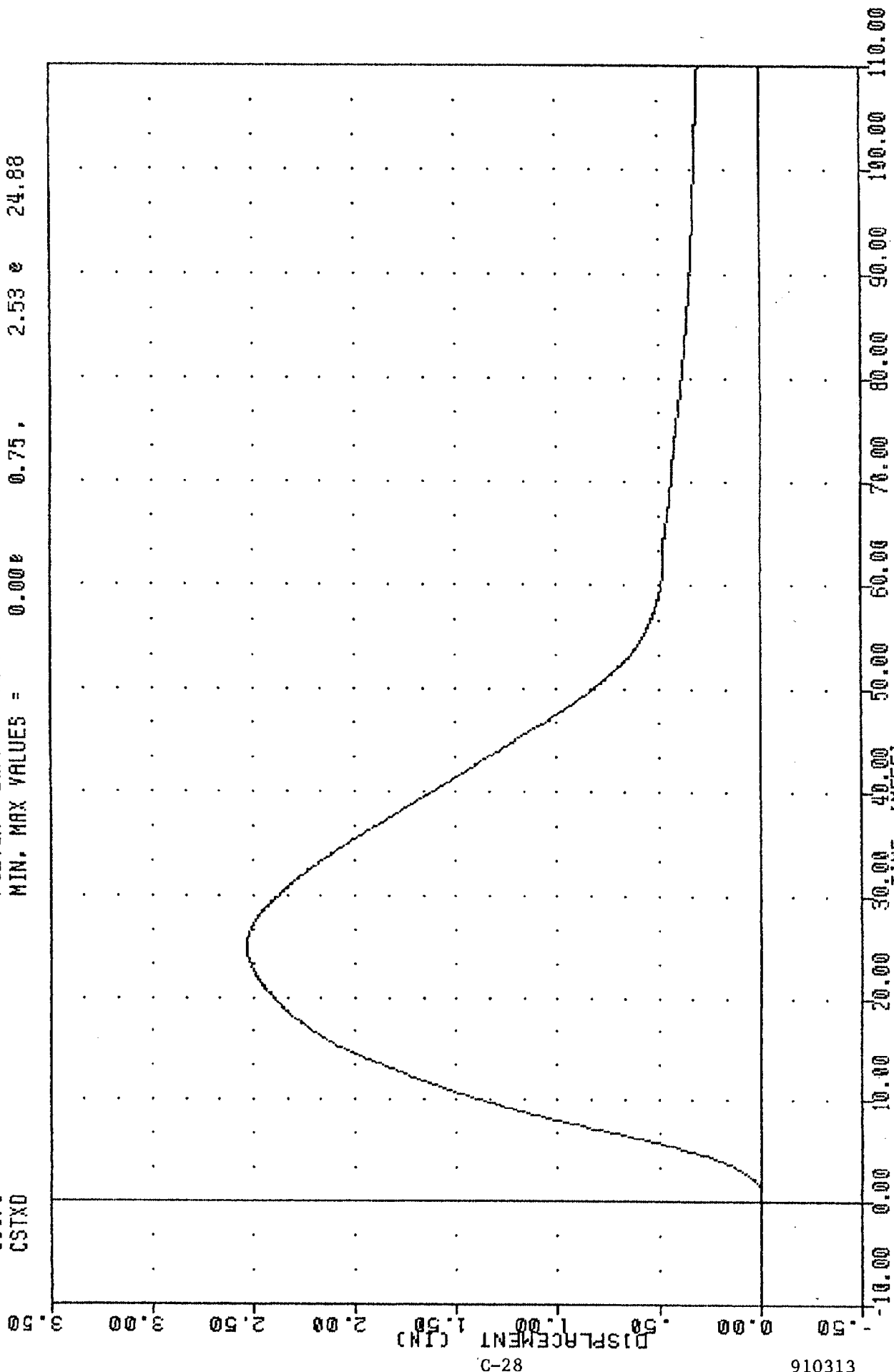
NHTSR , 142C3TH1
 572E SN142 H.S. THORAX CAL03
 91070
 PENXF

FILTER = BLPP 300/ 943/ -40
 MIN, MAX VALUES = -5.59e -0.75, 1245.76 e 18.50



NHTSA , 142C3TH1
 572E SN142 H.S. THORAX CAL03
 91070
 CSTXD

FILTER = BLPP 300/ 949/ -40
 MIN. MAX VALUES = 0.00e 2.53 e 24.88



NHISA
 CSIXD
 PENXF

142C3TH1
 FILTER = BLPP
 FILTER = BLPP

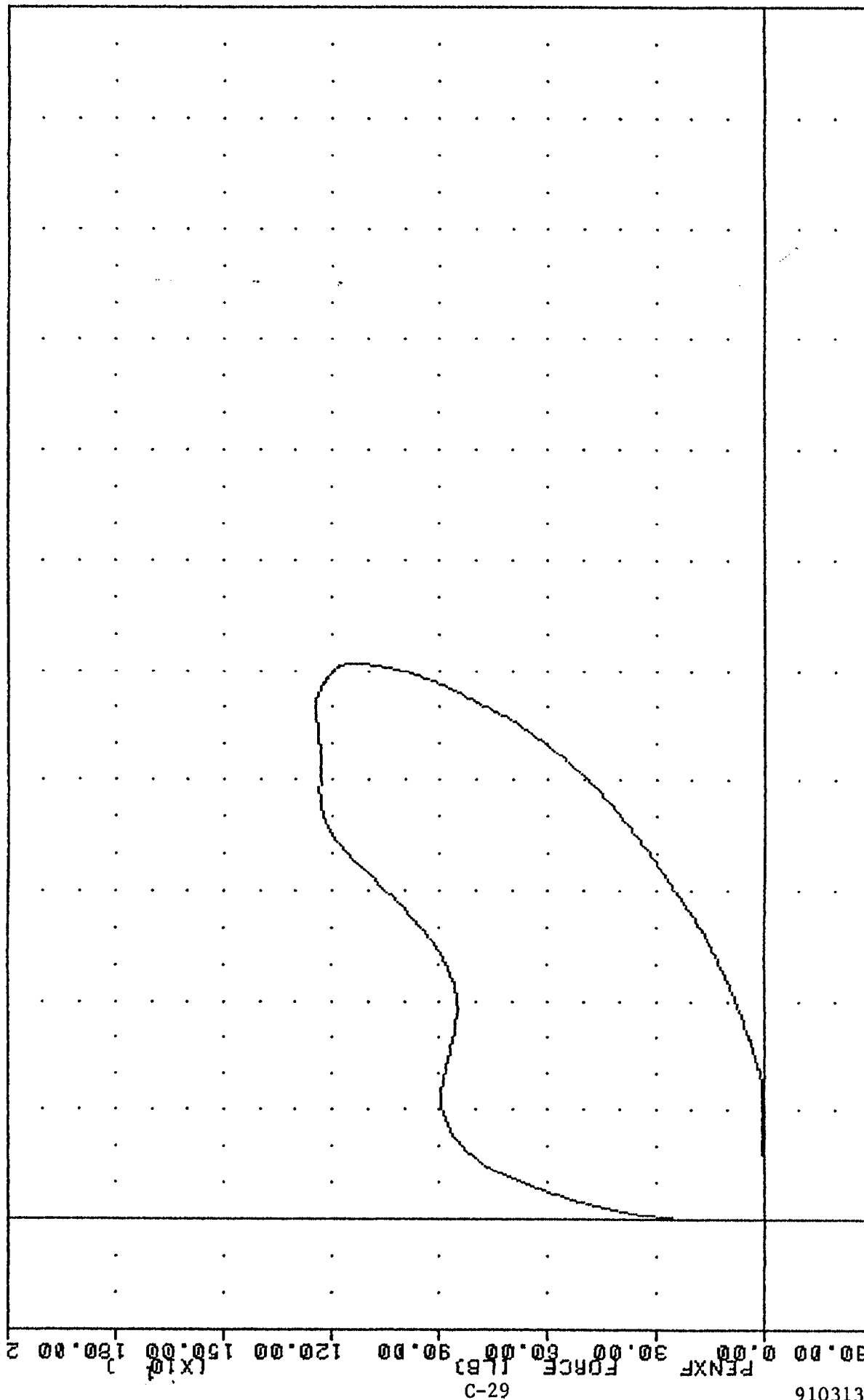
572E SN142 H.S. THORAX CAL03
 300/ 949/ -40 MIN, MAX =
 300/ 949/ -40 MIN, MAX =

91070
 0.000
 -5.500

0.75
 -0.75

2.53
 1245.76

24.88
 18.50



910313
 C-29
 PART 572-E HYBRID III THORAX CALIBRATION
 CHEST DISTRIACEMENT VS PENNIIIM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

08-Mar-91

LEFT KNEE
NHTSA 142C3LK1

572E SN142 L.KNEE 11LB CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	24.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.93 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1221.98 LBS
PROBE WEIGHT	11.0 LBS	

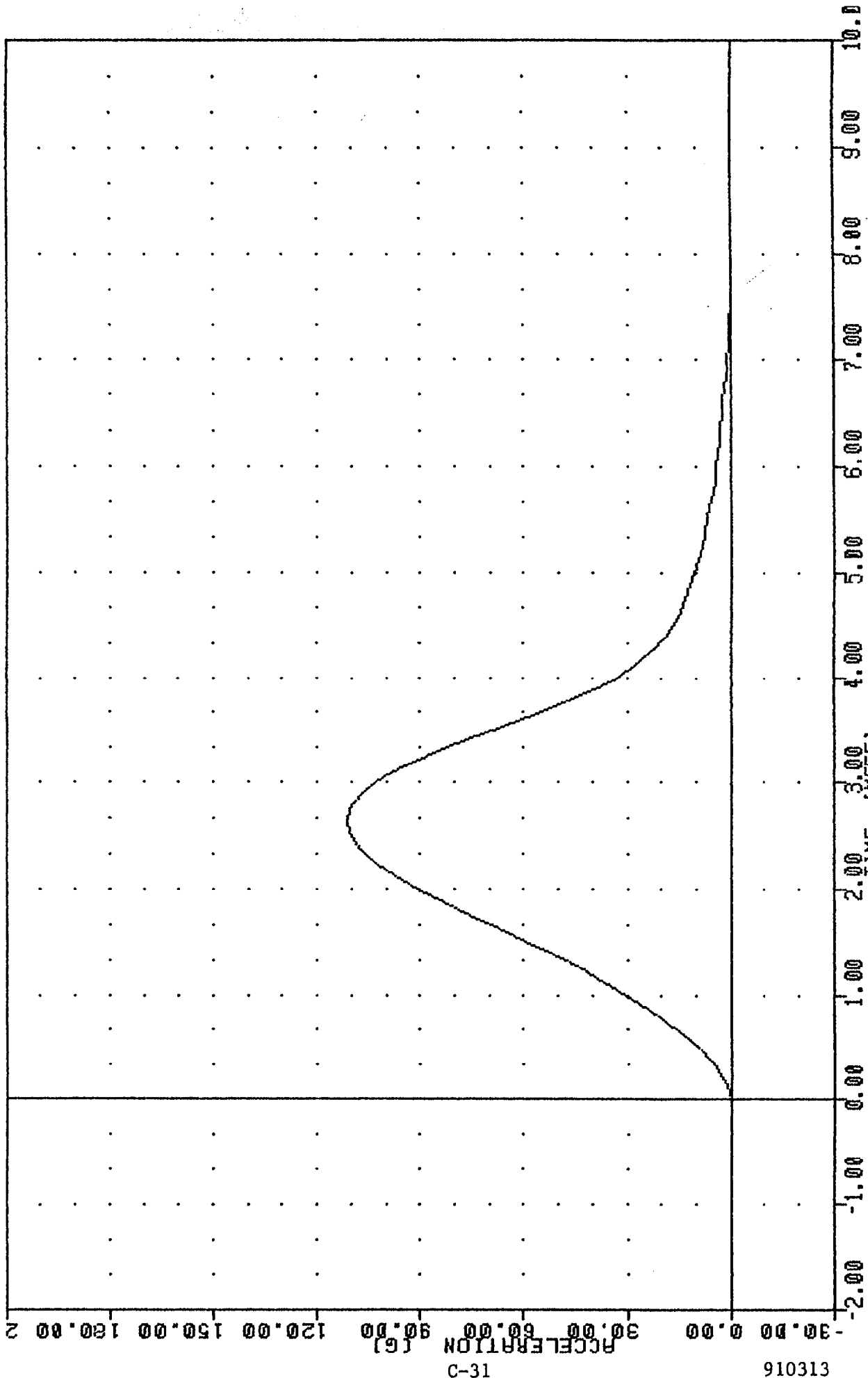
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

WHTSA , 142C3LK1
 572E SN142 L.KNEE 11LB CAL 03
 91067
 PENXG

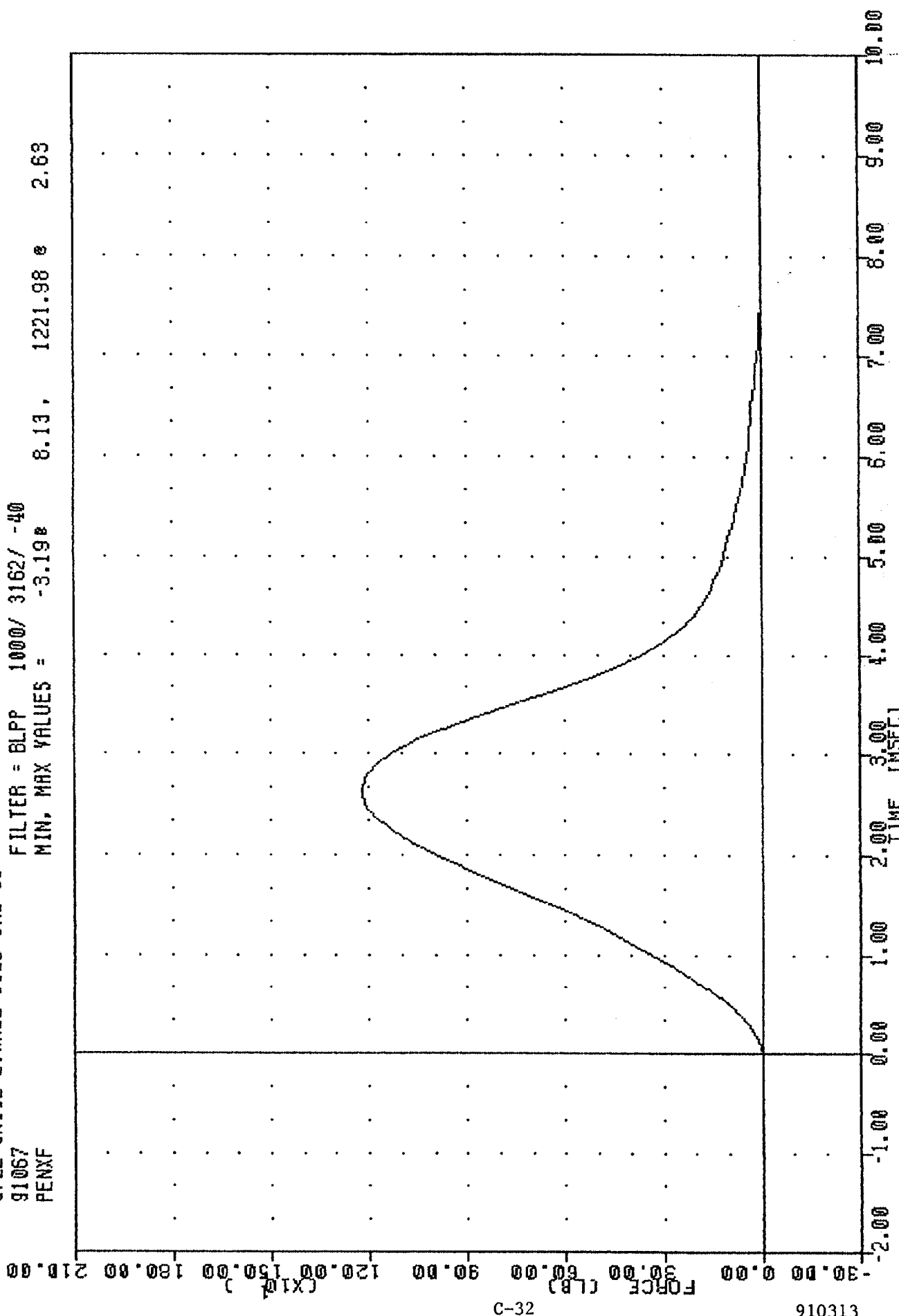
FILTER = BLPP 1000/ 3162/ -40
 MIN, MAX VALUES = -0.298 8.13, 111.09 e 2.63



PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENNIIIM DEFFERATION (111R PENN)

NHTSA , 142C3LK1
 572E SN142 L.KNEE 11LB DAL 03
 91067
 PENXF

FILTER = BLPP 1000/ 3162/ -40
 MIN. MAX VALUES = -3.19e 8.13, 1221.98 e 2.63



PART 572-E HYBRID III LEFT KNEE CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

08-Mar-91

RIGHT KNEE
NHTSA 142C3RK1

572E SN142 R,KNEE 11LB CAL 03

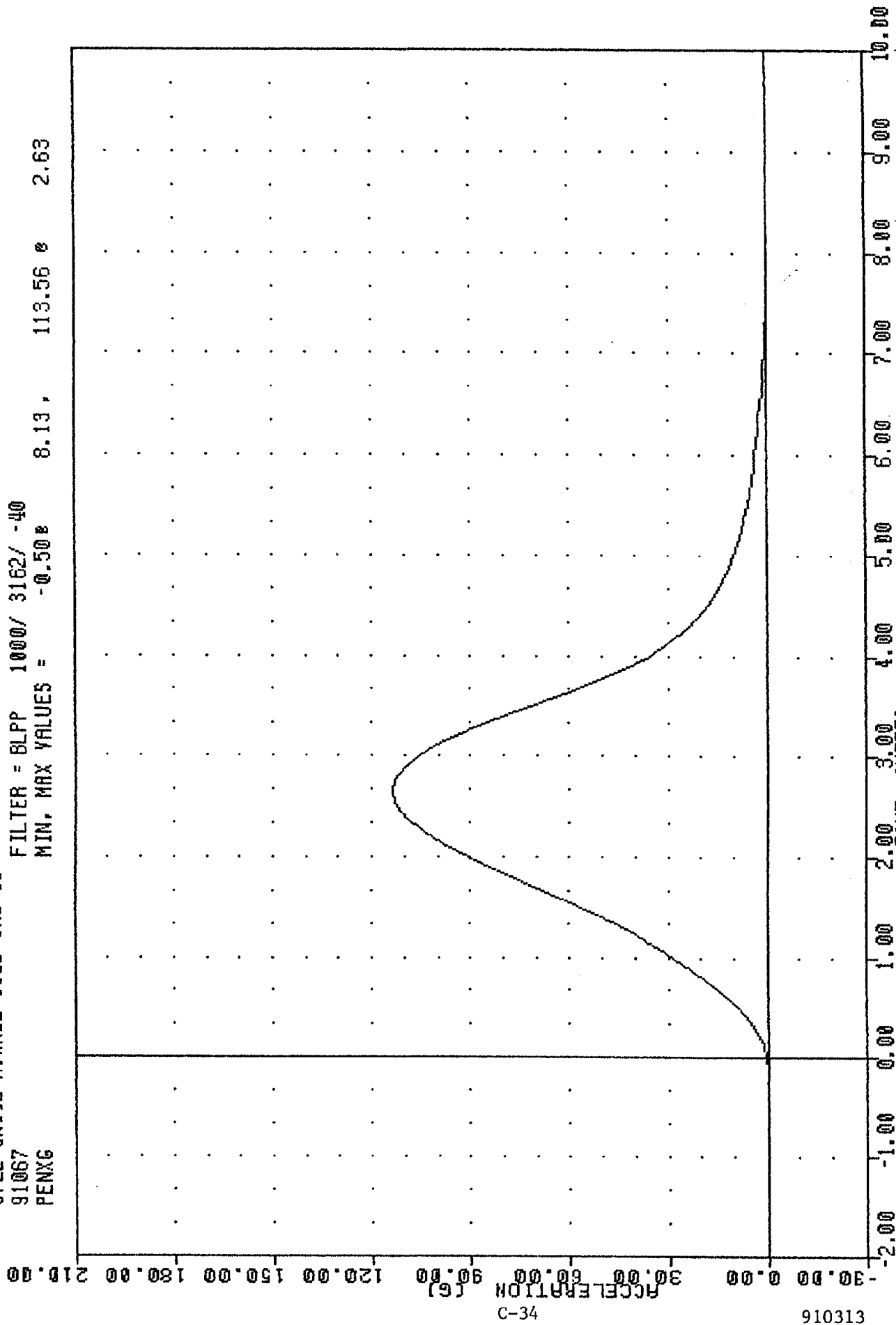
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	24.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.93 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1249.20 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

WHTSR , 142C3RK1
 572E SN142 R.KNEE 11LB CAL 03
 91067
 PENXG

FILTER = BLPP 1000/ 3162/ -40
 MIN, MAX VALUES = -0.50% 8.13, 113.56 % 2.63



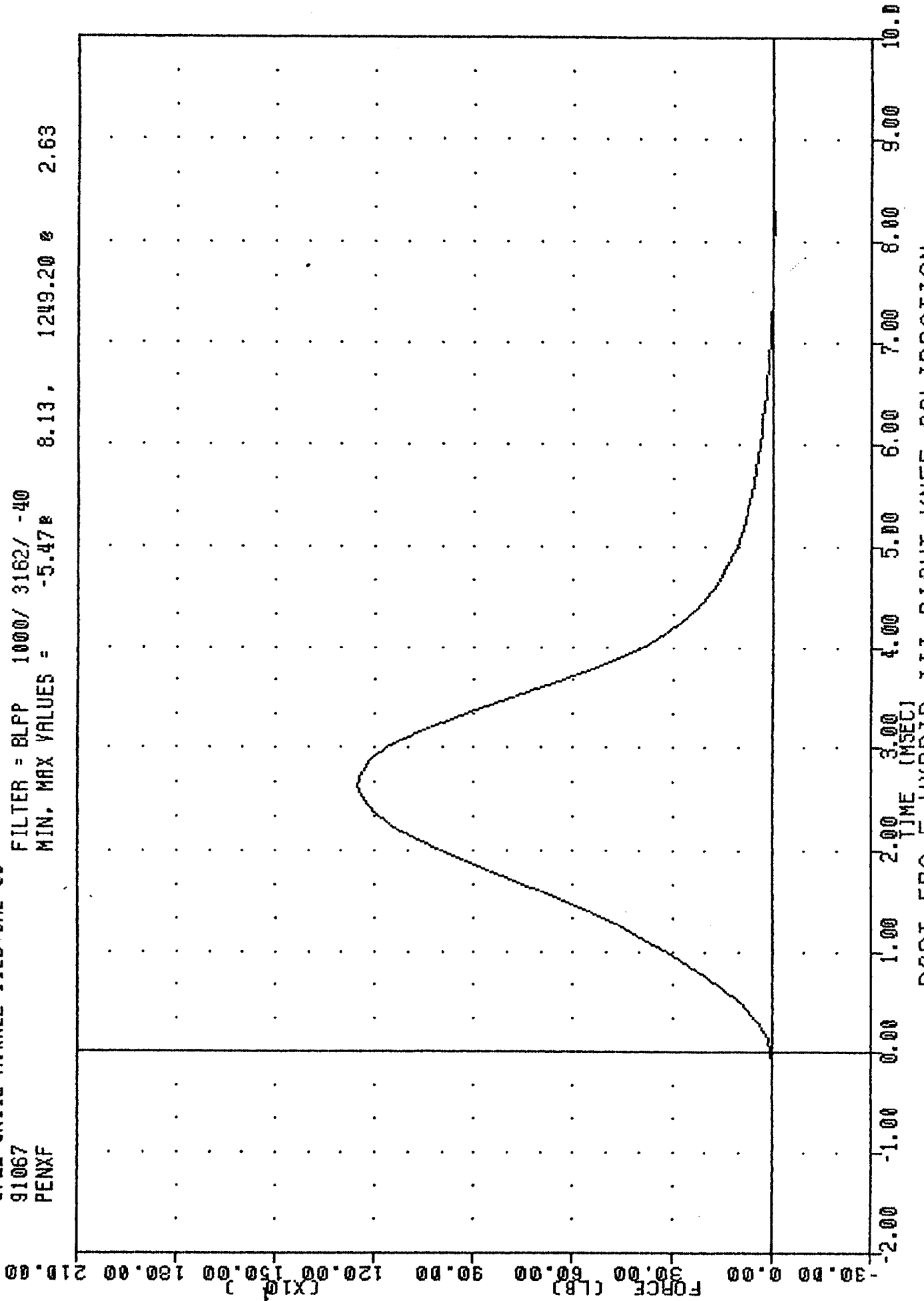
C-34

910313

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PPM II NW DATA FILE

MHTSA , 142C3RK1
 572E SN142 R.KNEE 11LB CAL 03
 91067
 PENXF

FILTER = BLPP 1000/ 3162/ -40
 MIN, MAX VALUES = -5.478 8.13, 1249.20 8 2.63



C-35

910313

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

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 192

HYBRID III EXTERNAL DIMENSIONS
192 ALDERSON

05-MAR-91

NHTSA 192C2ED1 572E SN192 EXT. DIMENSION CAL02

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			71.0 DEG. F
RELATIVE HUMIDITY			34.0 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9- 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)		38.2-39.4 IN	38.5 IN
WAIST CIRCUMFERENCE (Z)		32.9-34.1 IN	33.5 IN
CHEST DEPTH (O)		8.4- 9.0 IN	8.6 IN
H-POINT HEIGHT (C)		3.3- 3.5 IN	3.4 IN
H-POINT FROM SEATBACK (D)		5.3- 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN	34.8 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN	5.8 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN	23.7 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN	18.6 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN	17.7 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	3.6 IN
SHOULDER BREADTH (V)		16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN	8.1 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN	13.4 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN	11.6 IN

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

05-Mar-91

NHTSA

192C2HD1

572E SN192 HEAD DROP CAL 02

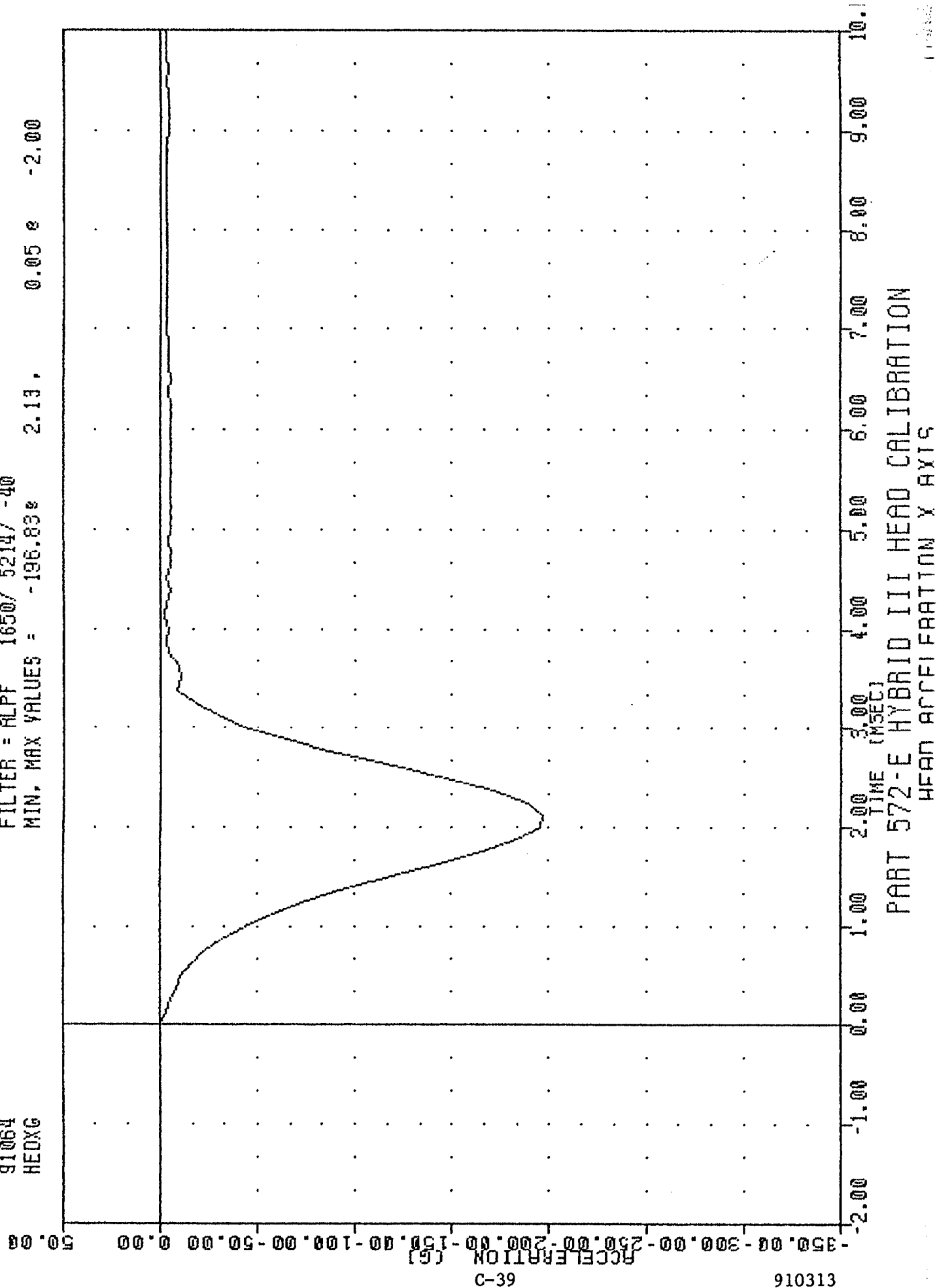
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	229.98 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.41 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

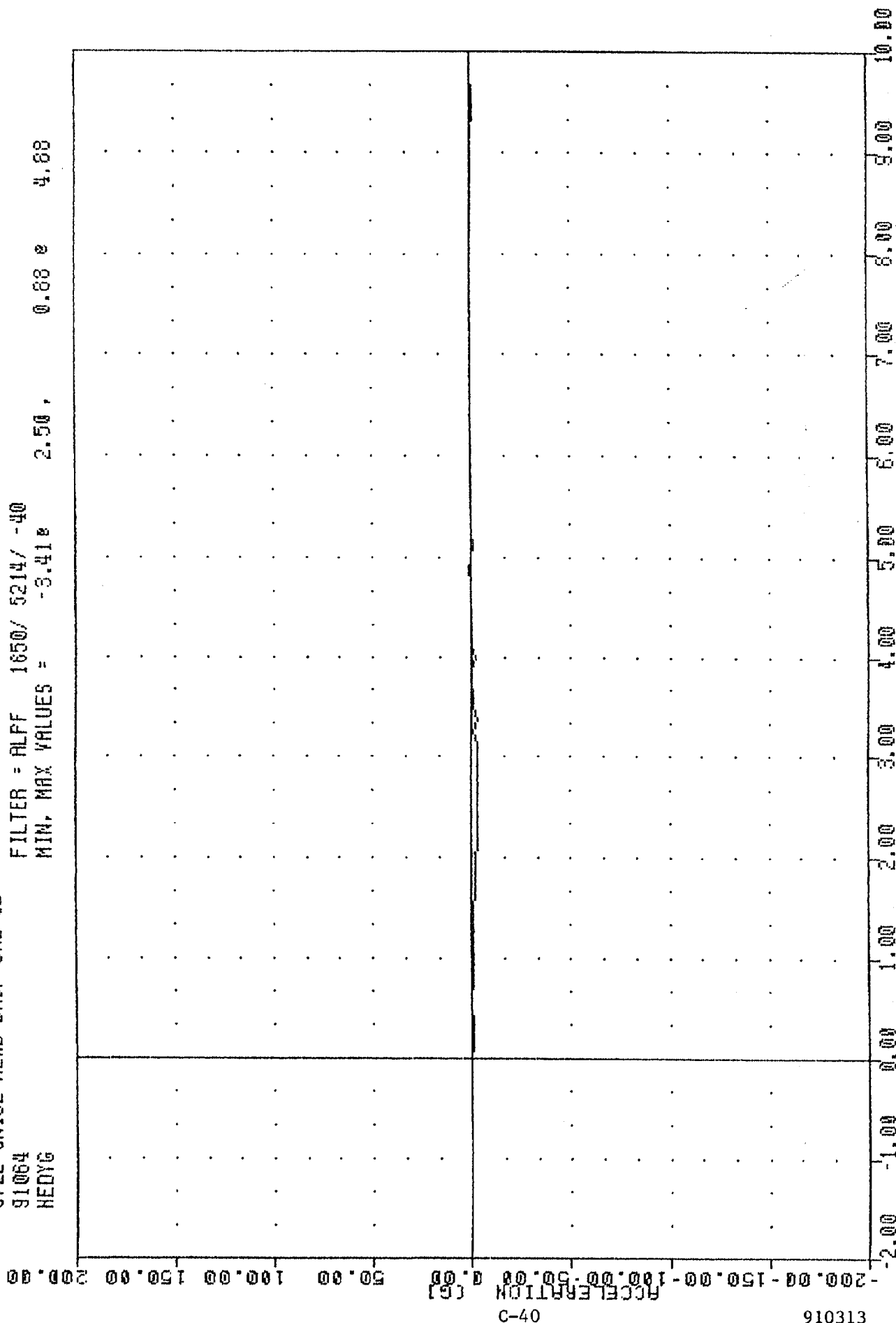
NHTSA . 192C2HD1
 572E SN192 HEAD DROP CAL Q2
 91064
 HEDXC

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -196.83e 2.13. 0.05 e -2.00



NHTSA , 192C2HD1
 572E SN192 HEAD DRDP CAL 02
 91064
 HEDYG

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -3.41e 2.50 , 0.88 e 4.68



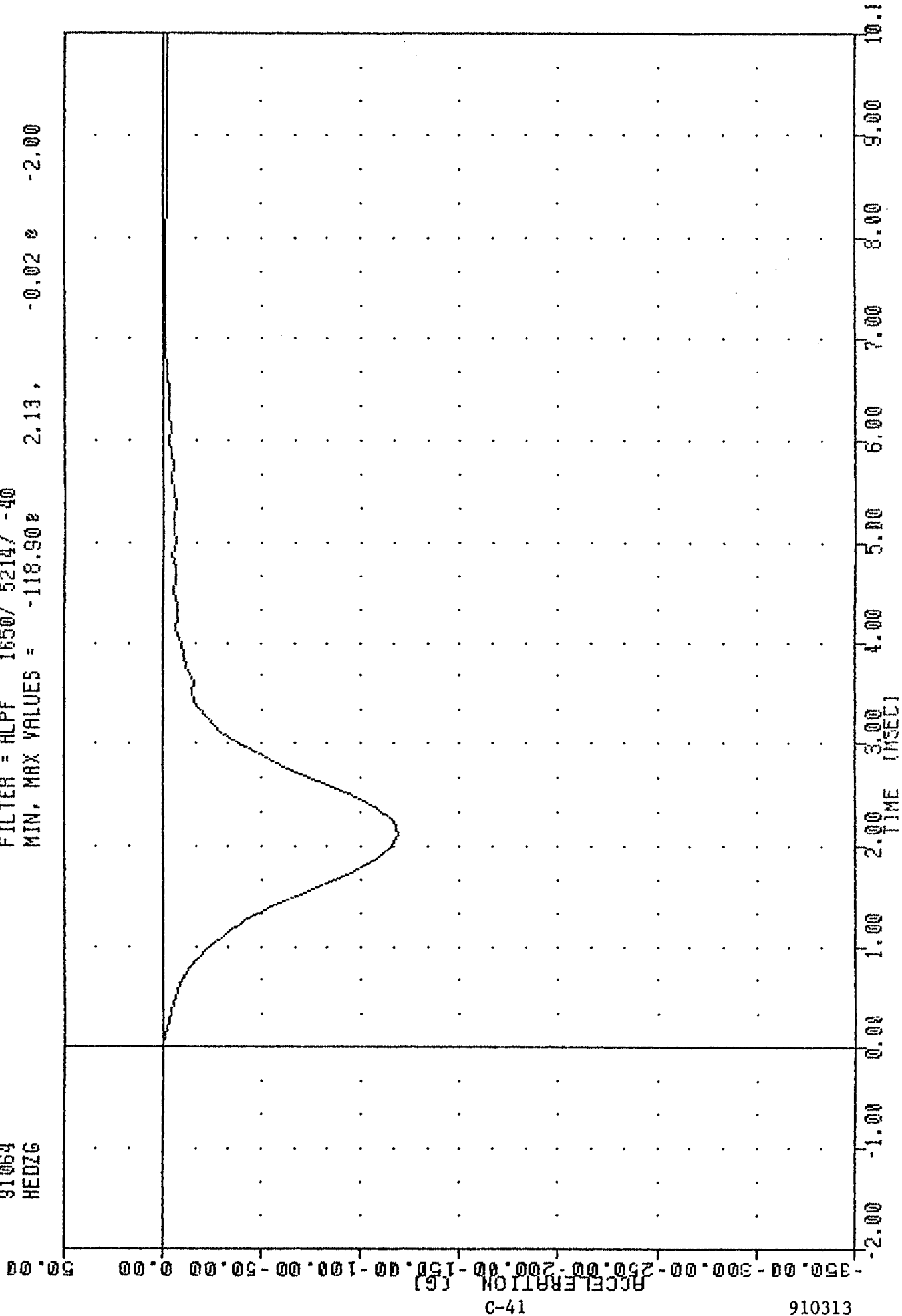
C-40

910313

PART 572-E HYBRID III HEAD CALIBRATION

NHTSA , 192C2HD1
 572E SN192 HEAD DRDP CAL 02
 91064
 HEDZG

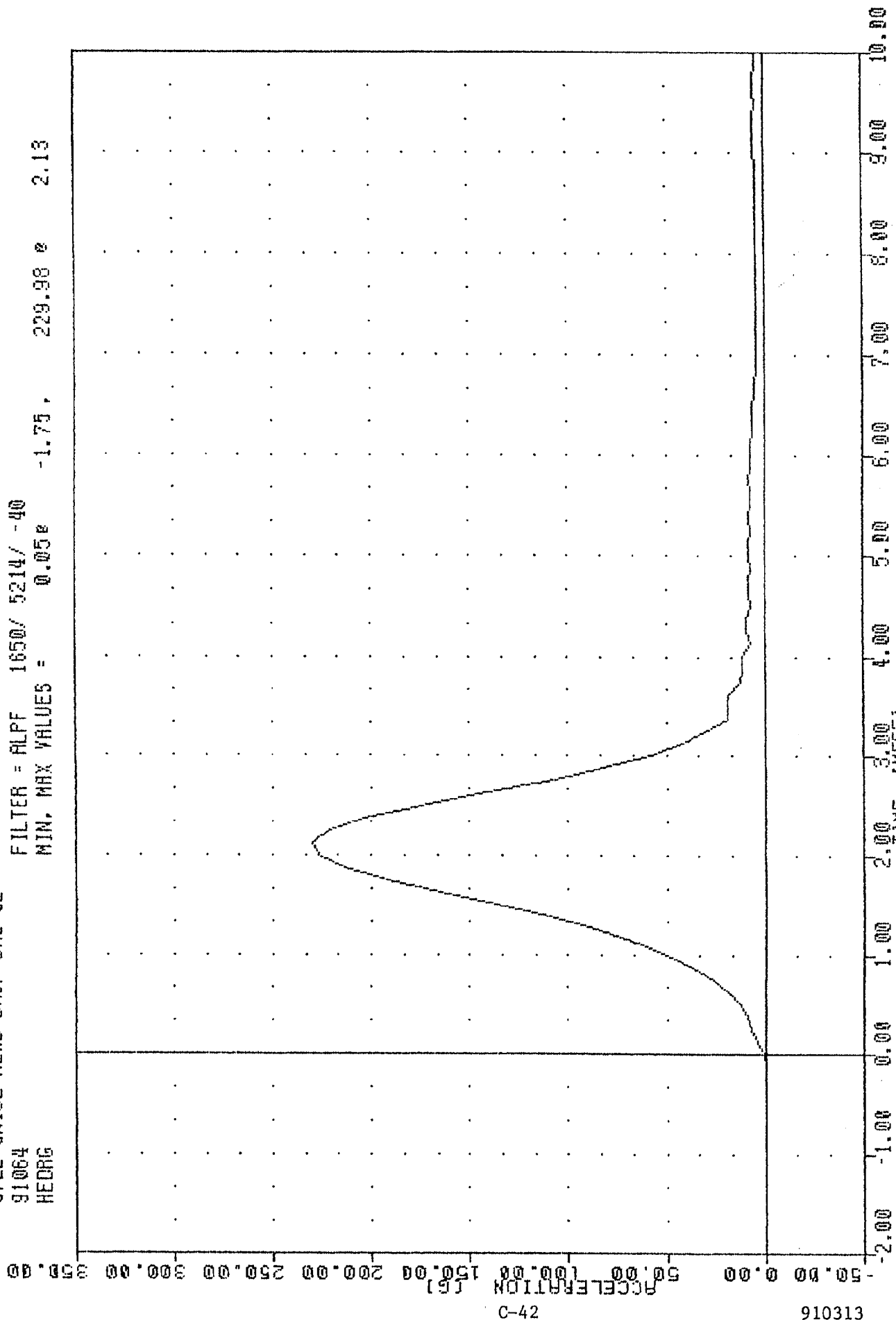
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -118.90e 2.13, -0.02 e -2.00



PART 572-E HYBRID III HEAD CALIBRATION
 HEAD ACCELERATION 7 AXIS

NHTSR , 192C2HD01
 572E SN192 HEAD DRDP CAL 02
 91064
 HEADRG

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.05e -1.75, 229.98 e 2.13



TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

05-Mar-91

6 AXIS NECK TRANSDUCER
NHTSA 192C2NF1

572E SN192 NECK FLEXION CAL02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	35.00 %
IMPACT VELOCITY	22.6-23.4 FT/SEC	22.86 FT/SEC
PENDULUM	10 MS 22.50 - 27.50 G	24.09 G
DECELERATION	20 MS 17.60 - 22.60 G	18.73 G
	30 MS 12.50 - 18.50 G	15.18 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.11 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	34 - 42 MS	39.88 MS
D PLANE	MAX 64 - 78 DEG.	70.57 DEG.
ROTATION	TIME 57 - 64 MS	59.38 MS
MOMENT ABOUT OCCIPITAL	MAX 65 - 80 FT.LBS	70.05 FT.LBS
CONDYLE	TIME 47 - 58 MS	54.00 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	113 - 128 MS	116.63 MS
POSITIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	97 - 107 MS	100.25 MS

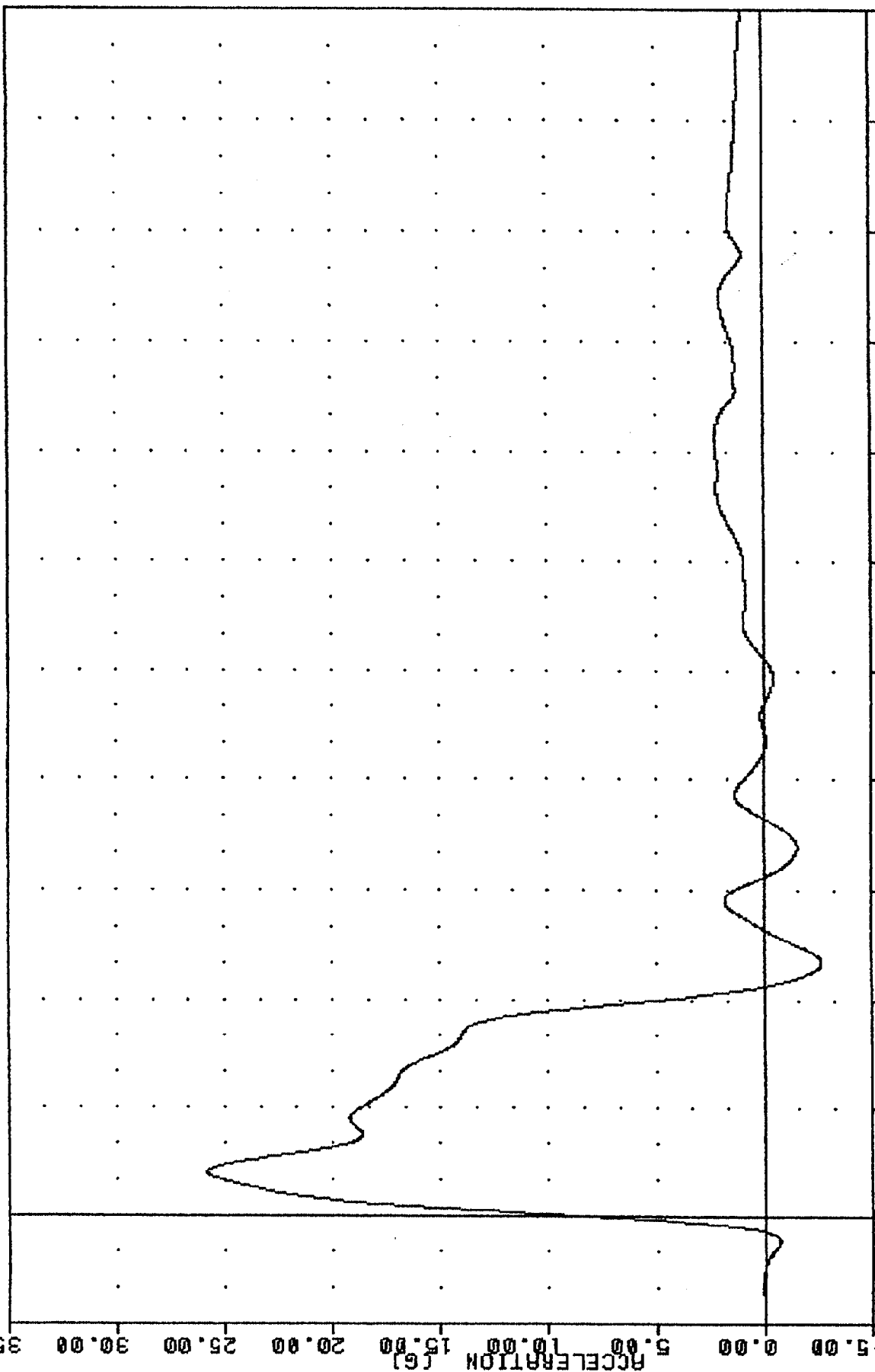
TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

NHTSA , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 PENXG

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -2.738 46.75, 25.83 & 8.00

35.00



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910313

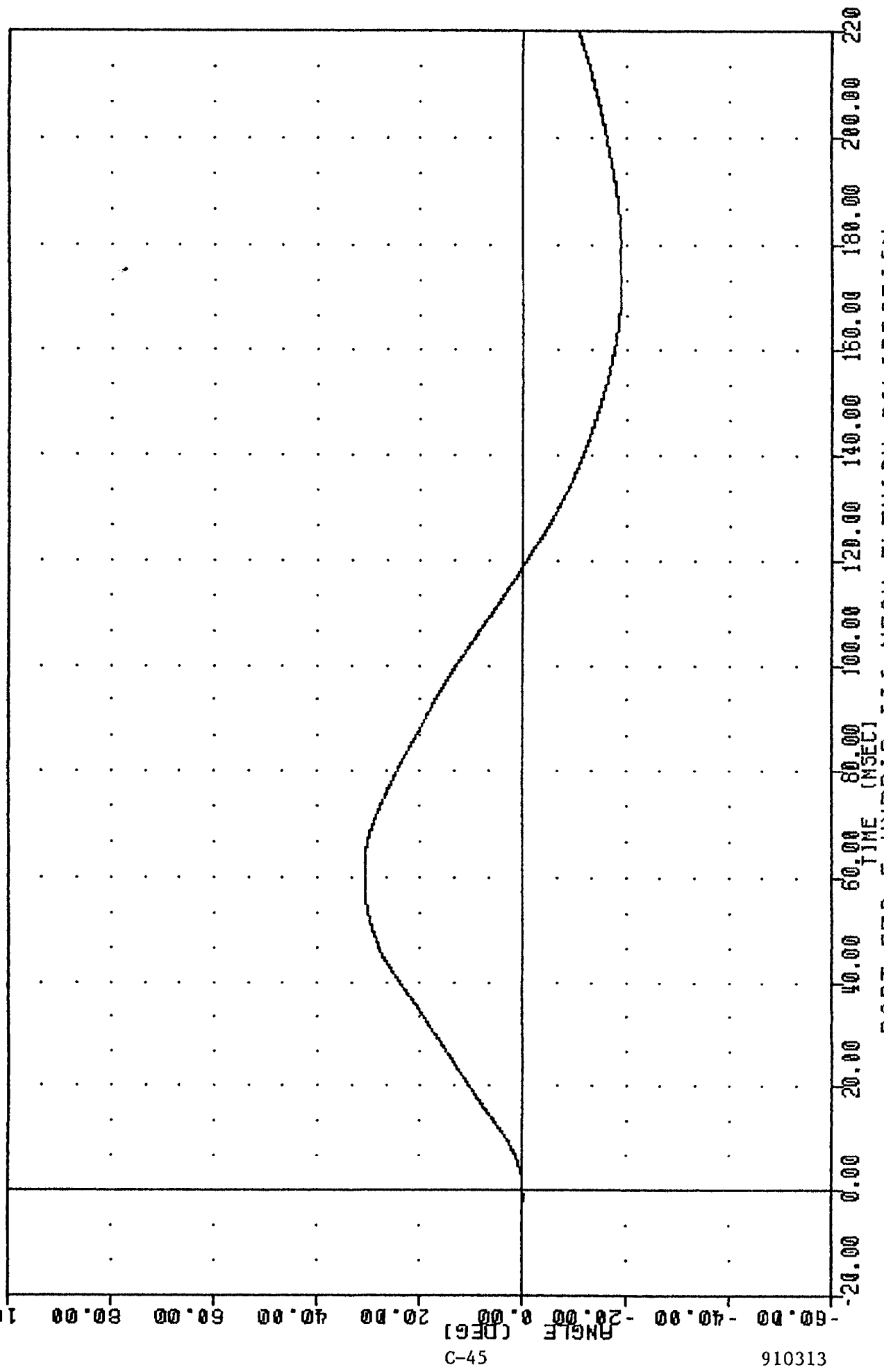
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

PART 572-E HYBRID III NECK FLEXION CALIBRATION

MINIMUM ACCELERATION

MHTSA , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 BETA

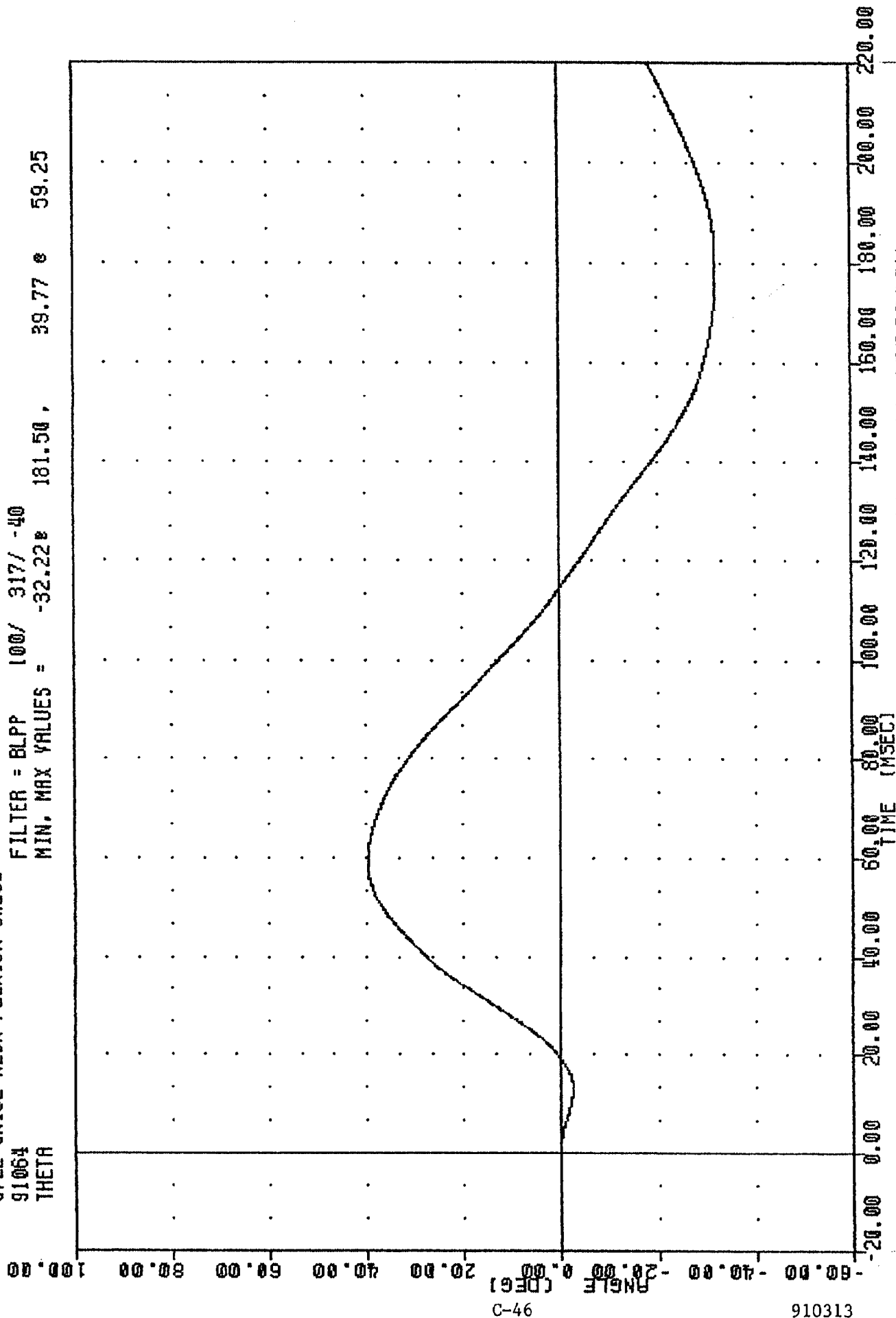
FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -19.03e 174.50 , 30.82 e 61.13



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

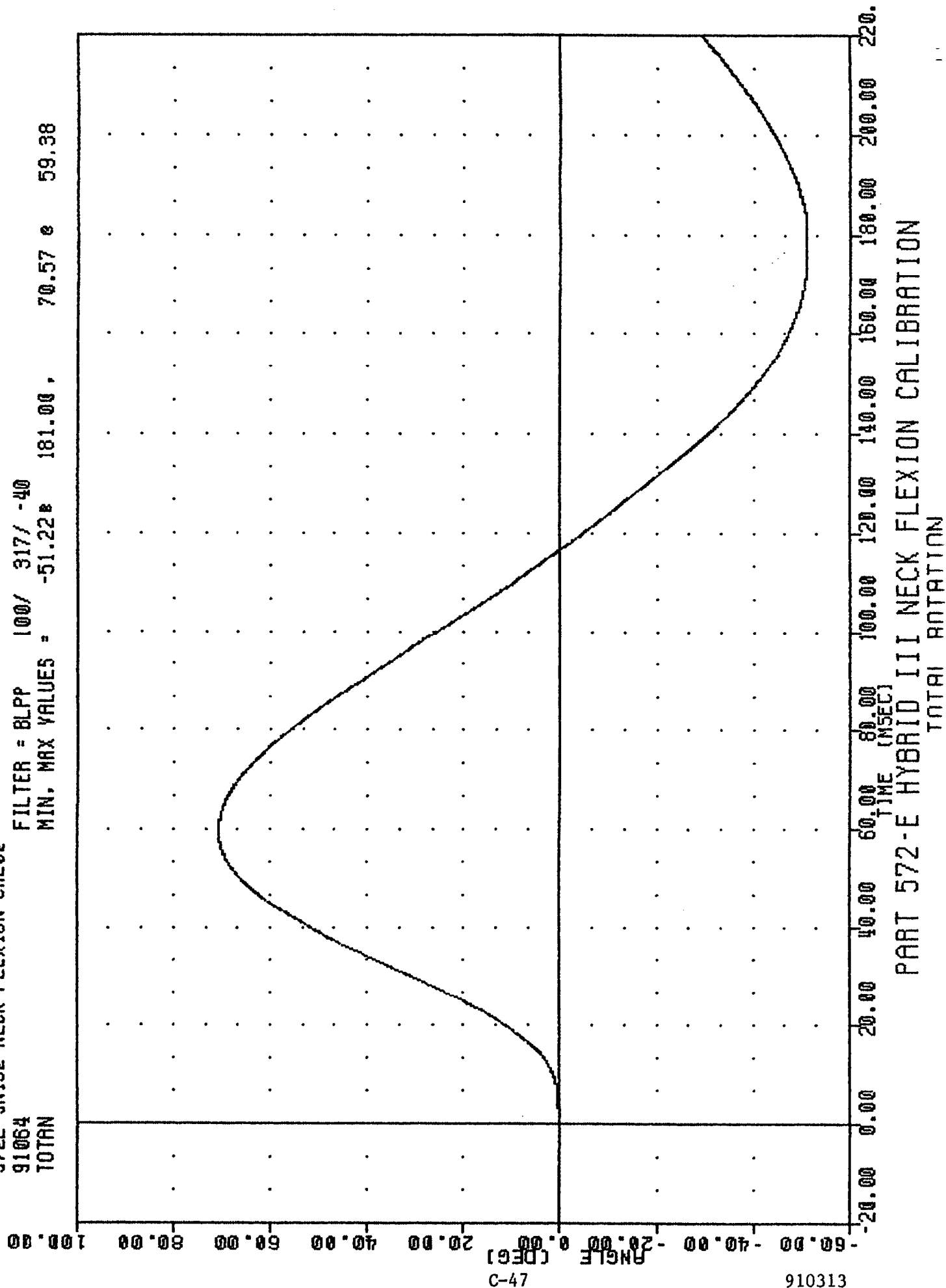
NHTSR , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 THETA

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -32.22 181.50 , 39.77 59.25



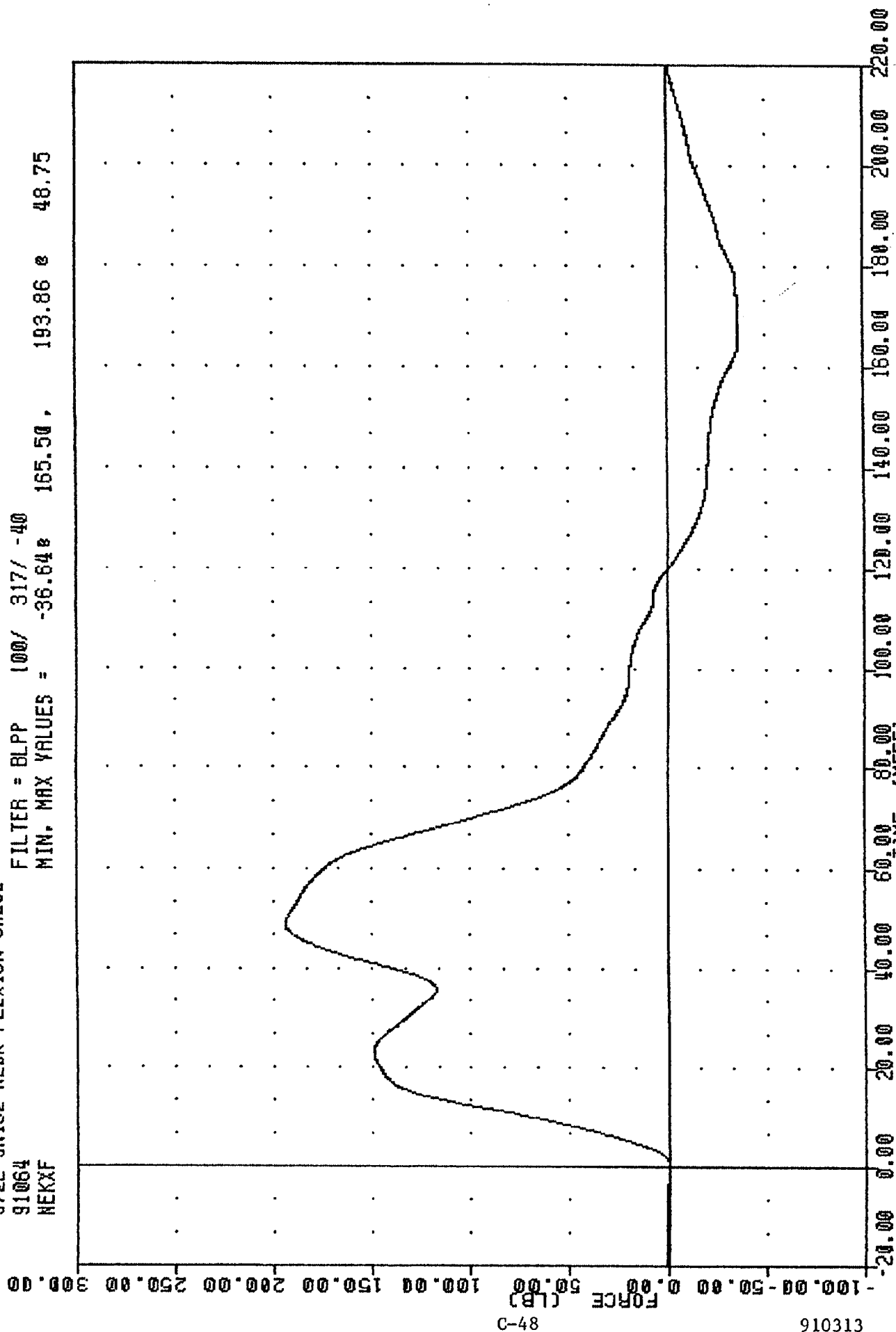
NHTSA , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 TOTAL

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -51.22 181.00, 70.57 59.38



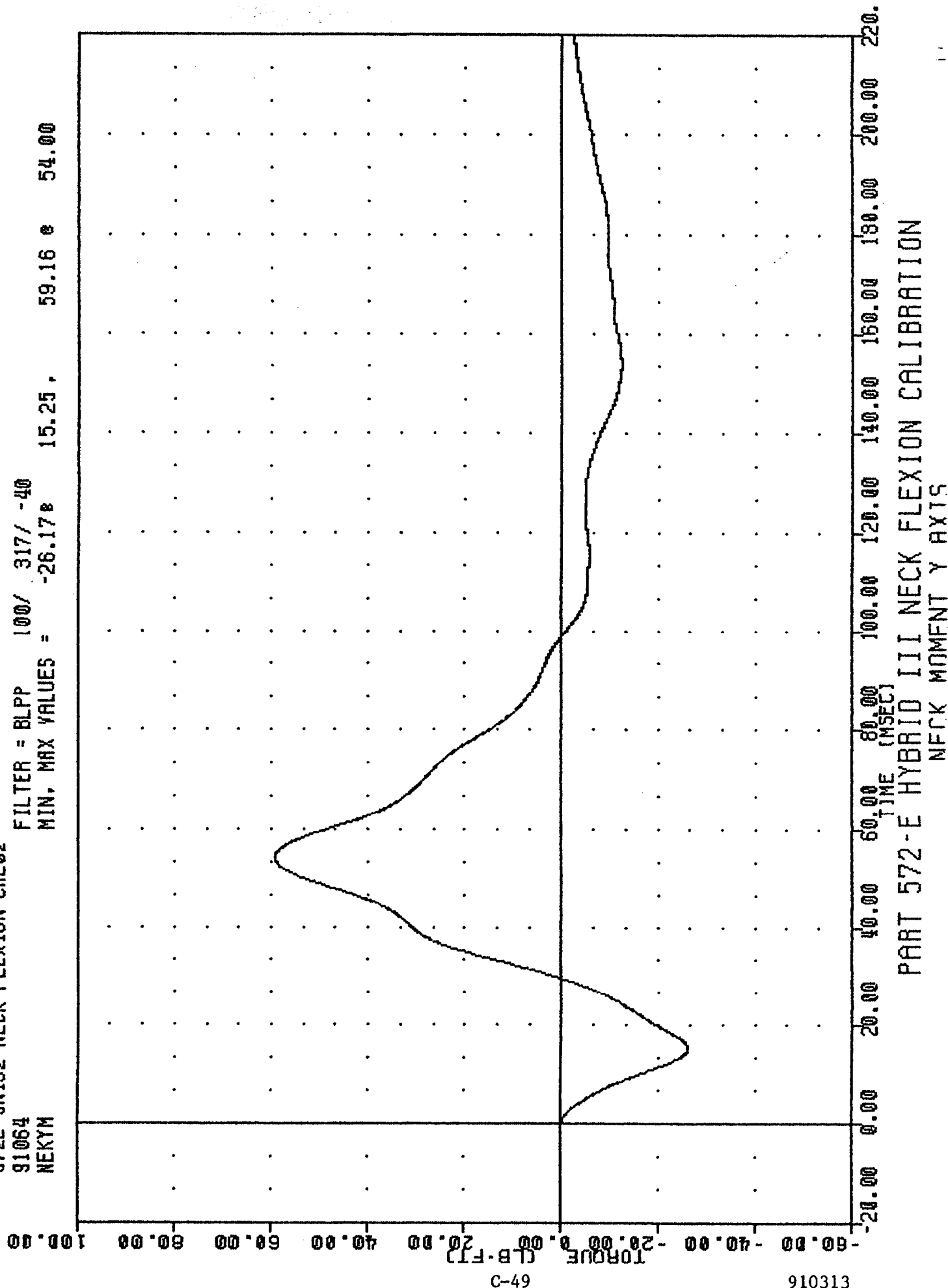
NHTSR , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 NEKXF

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -36.64e 165.50 , 193.86 e 48.75



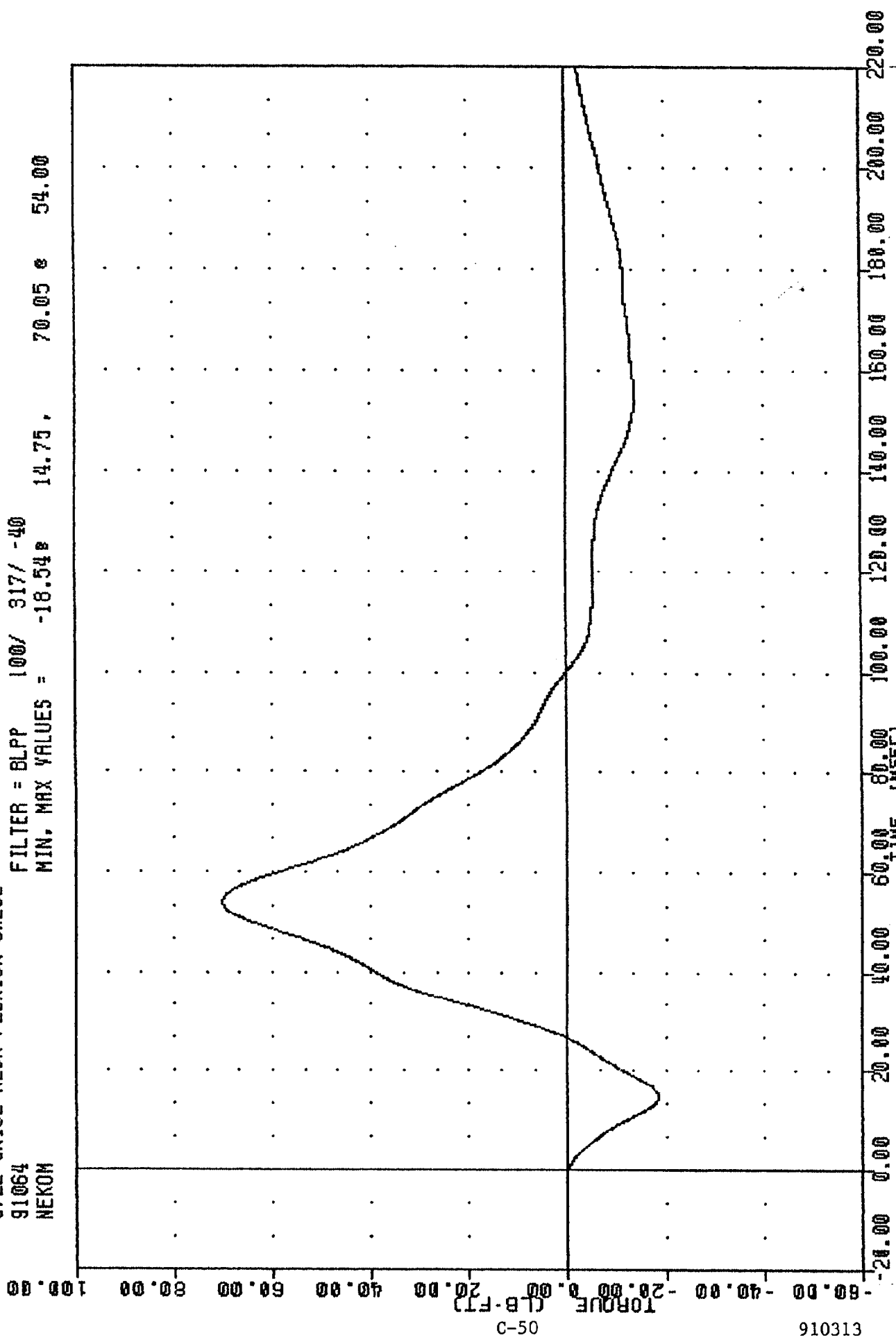
NHTSR , 192C2NF1
 572E SN192 NECK FLEXION CAL02
 91064
 NEKYM

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -26.17 15.25 59.16 54.00



NHTSR
572E SN192 NECK FLEXION CAL02
91064
NEKOM

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -18.54 14.75 70.05 54.00



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910313

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

06-Mar-91

6 AXIS NECK TRANSDUCER
NHTSA 192C2NE1

572E SN192 NECK EXT. CAL02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	40.00 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.51 FT/SEC
PENDULUM	10 MS 17.20 - 21.20 G	17.53 G
DECELERATION	20 MS 14.00 - 19.00 G	15.34 G
	30 MS 11.00 - 16.00 G	12.48 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	12.42 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	44.25 MS
D PLANE	MAX 81 - 106 DEG.	99.85 DEG.
ROTATION	TIME 72 - 82 MS	80.75 MS
MOMENT ABOUT OCCIPITAL	MIN -59.0/-39.0 FT.LBS	-43.48 FT.LBS
CONDYLE	TIME 65 - 79 MS	77.13 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	166.63 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	147.25 MS

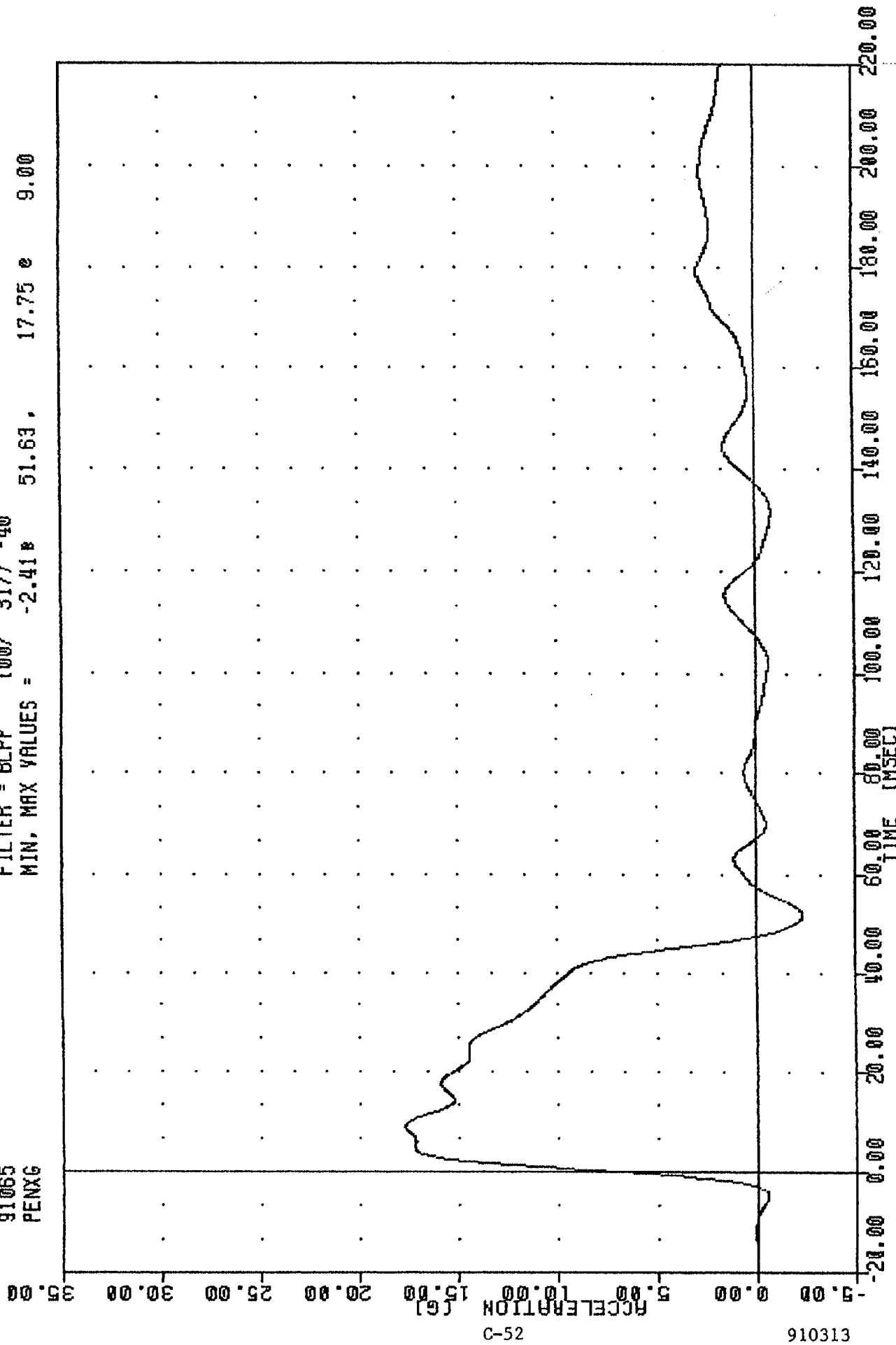
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chris Middleton

RHTSA , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 PENXG

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -2.41 51.63 , 17.75 e 9.00



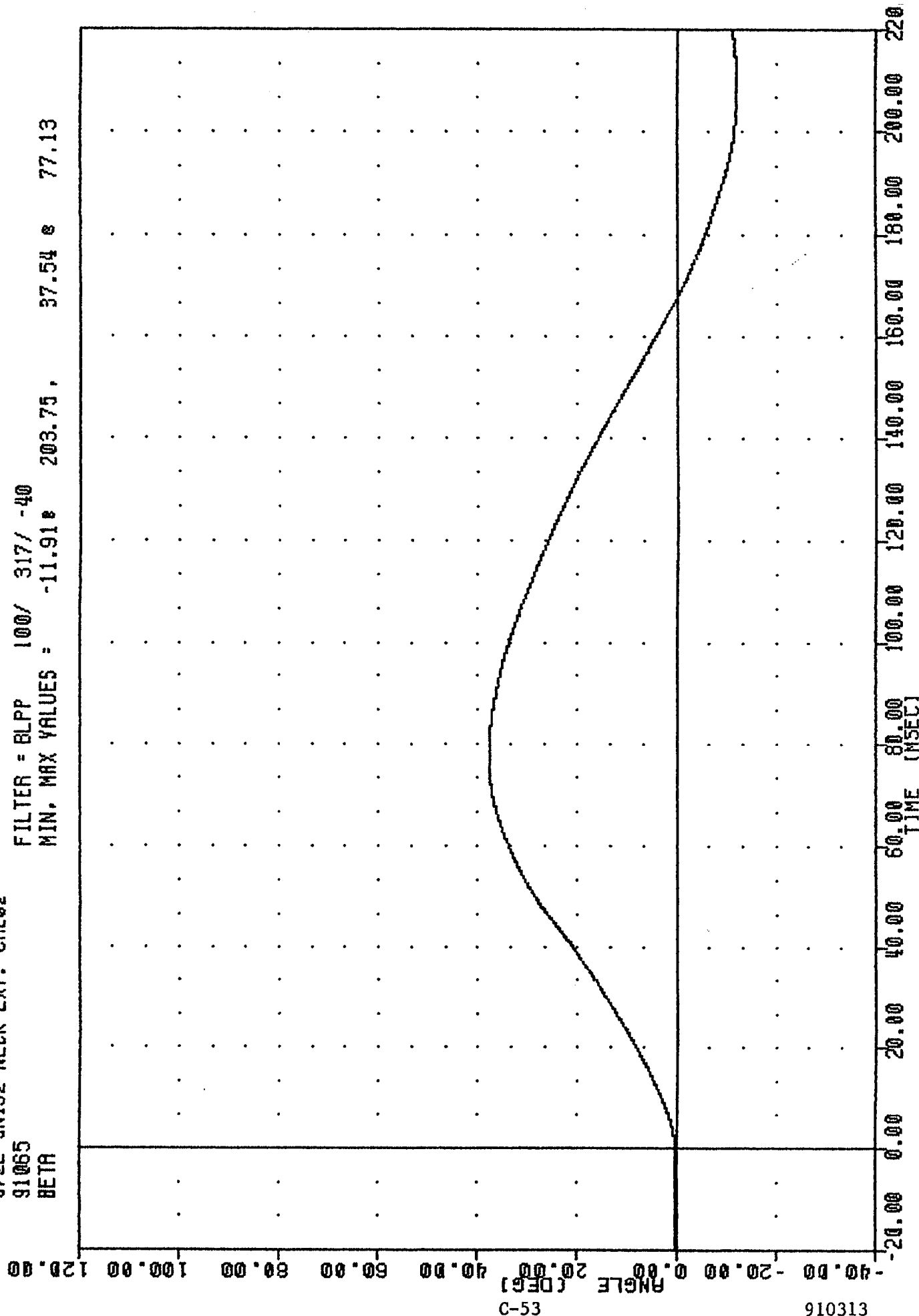
C-52

910313

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NHTSA
572E SN192 NECK EXT. CAL02
91065
BETA

FILTER = BLPP 100/ 317/ -40
MIN. MAX VALUES = -11.91e 203.75, 37.54 e 77.13

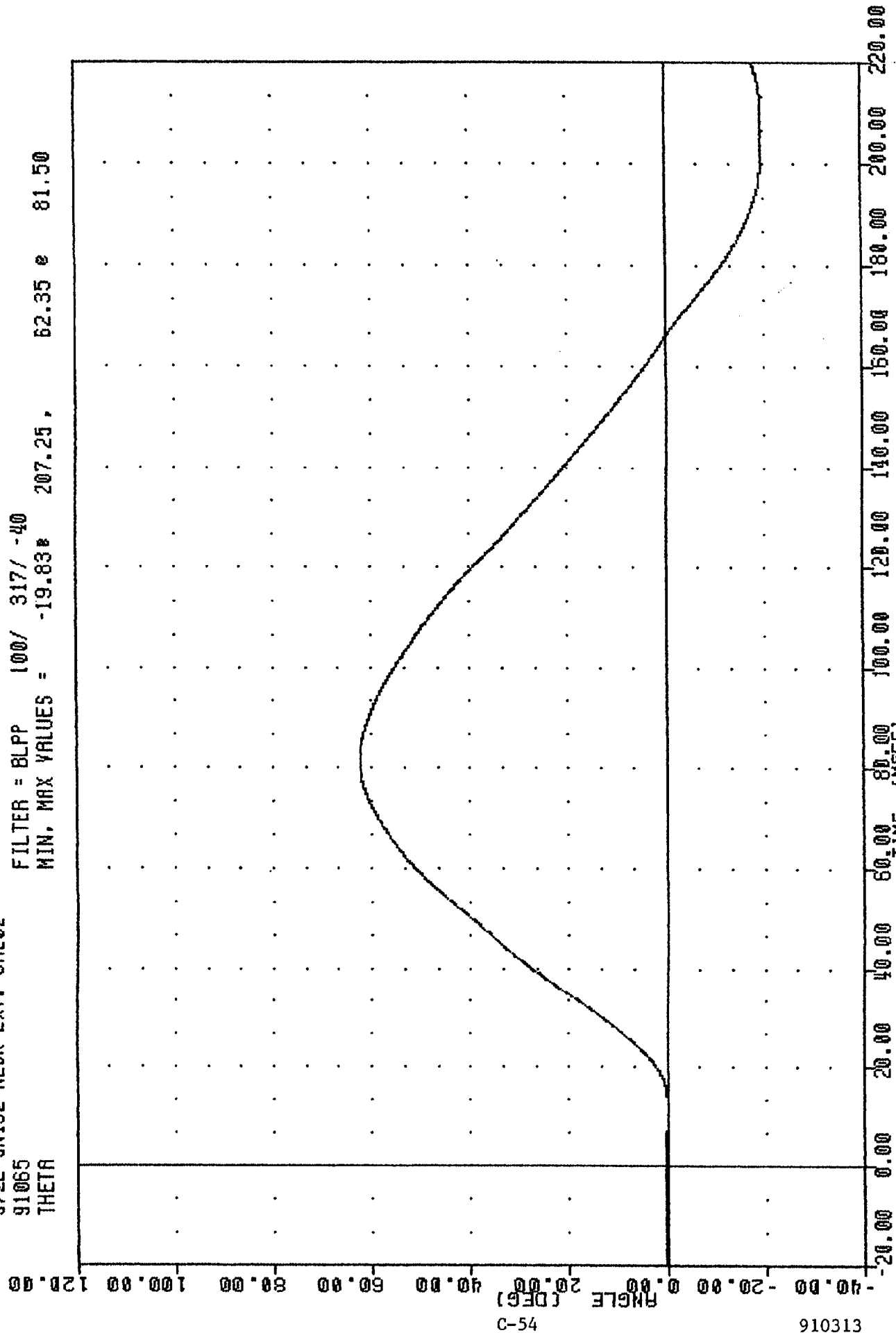


PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

NHTSA , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 THETA

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -19.83 207.25 , 62.35 e 81.50



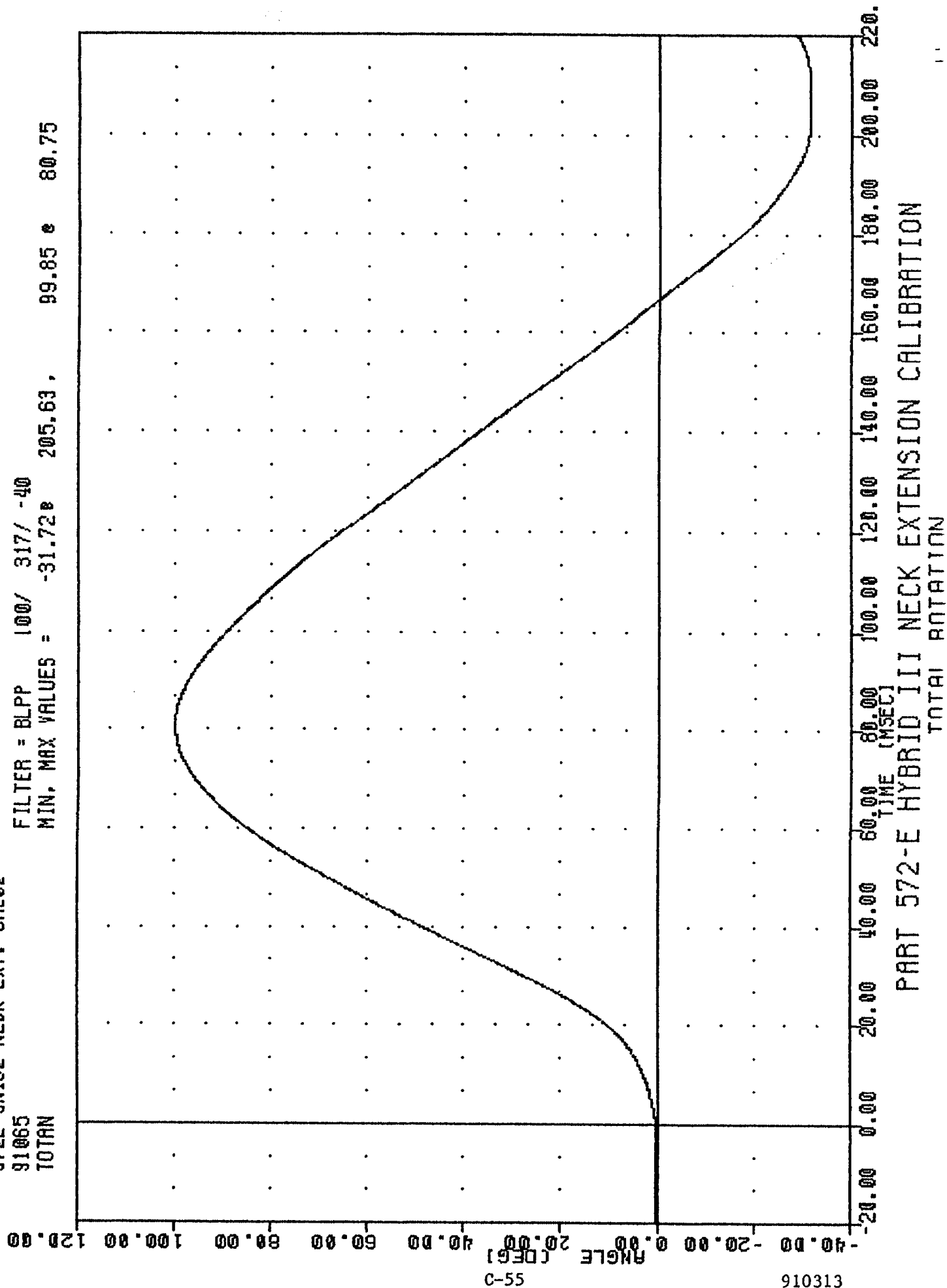
C-54

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PART 572-E HYBRID III NECK EXTENSION CALIBRATION

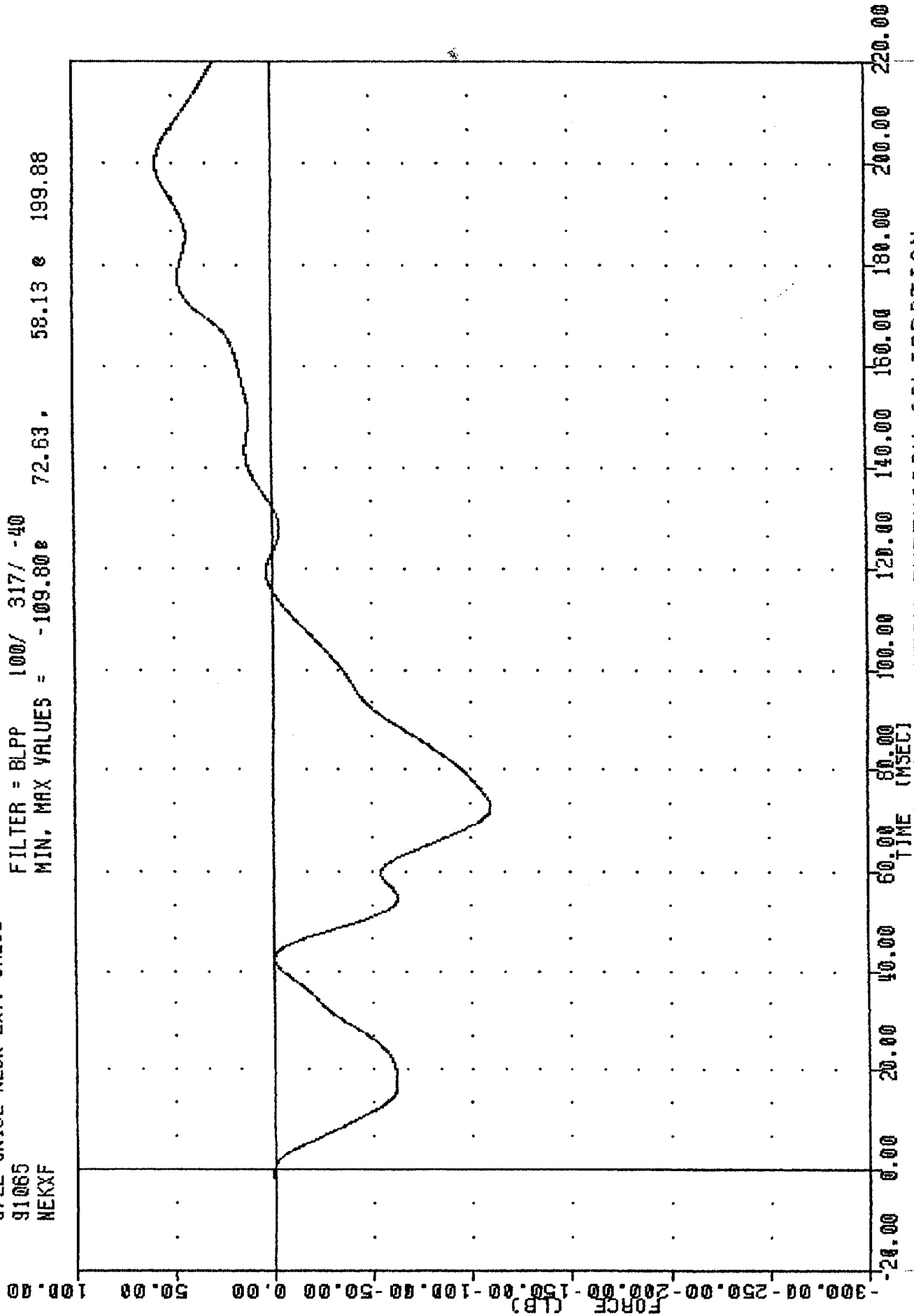
NHTSA , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 TOTAL

FILTER = BLPP 100/ 317/ -40
 MIN. MAX VALUES = -31.72 205.63 , 99.85 80.75



NHTSR , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 NEKXF

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -109.80e 72.63. 58.13 e 199.88



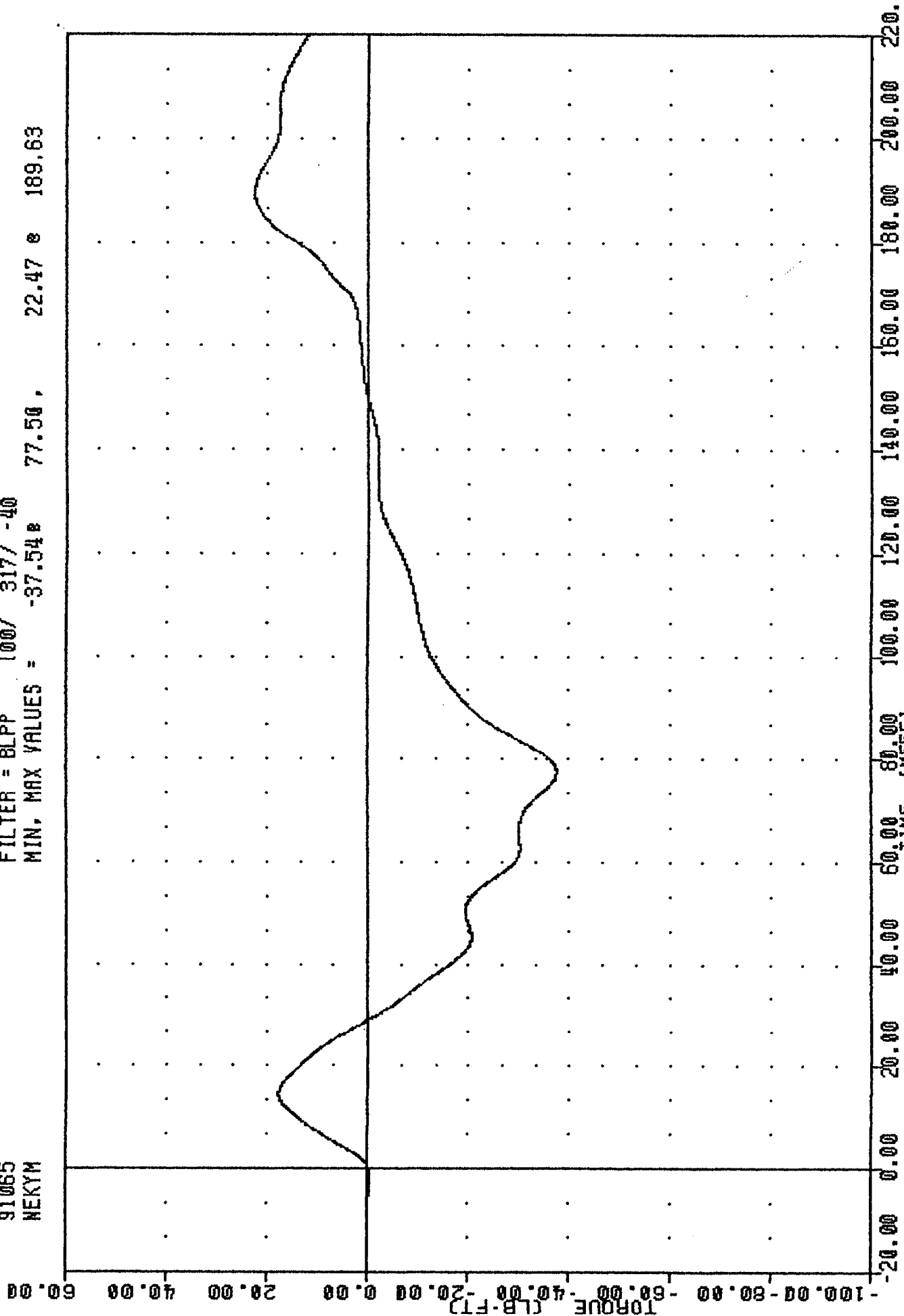
C-56

910313

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

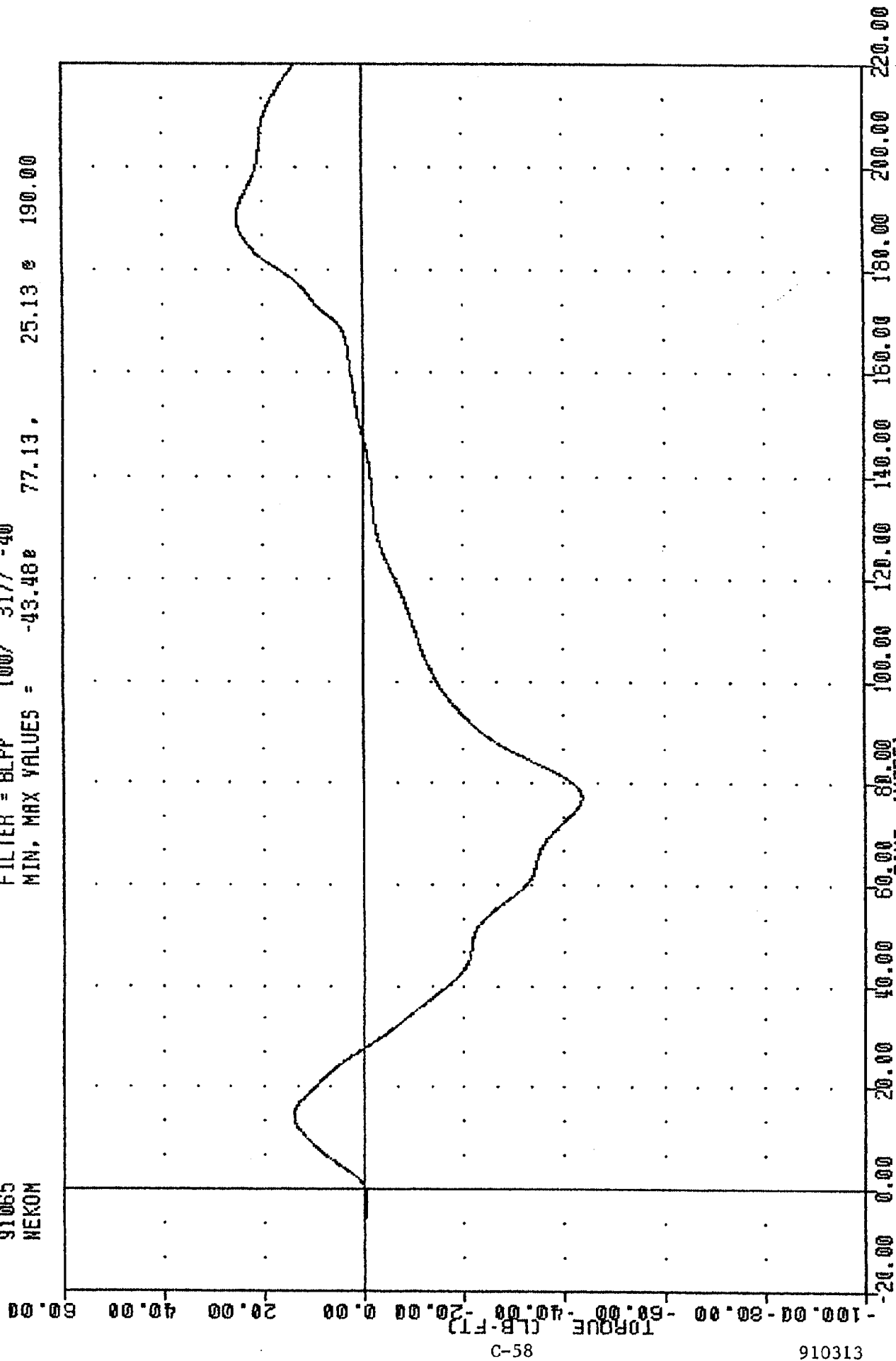
NHTSR , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 NEKYM

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -37.54 77.50 , 22.47 189.63



NHTSA , 192C2NE1
 572E SN192 NECK EXT. CAL02
 91065
 NEKOM

FILTER = BLPP 100/ 317/ -40
 MIN, MAX VALUES = -43.48e 77.13, 25.13 e 190.00



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PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

06-Mar-91

NHTSA

192C2TH1

572E SN192 H.S. THORAX CAL02

	HIGH SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F

RELATIVE HUMIDITY	10% - 70%	42.00 %

PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.77 FT/SEC

MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.55 IN

MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1219.8 LBS

INTERNAL HYSTERESIS	69% - 85%	75.4%

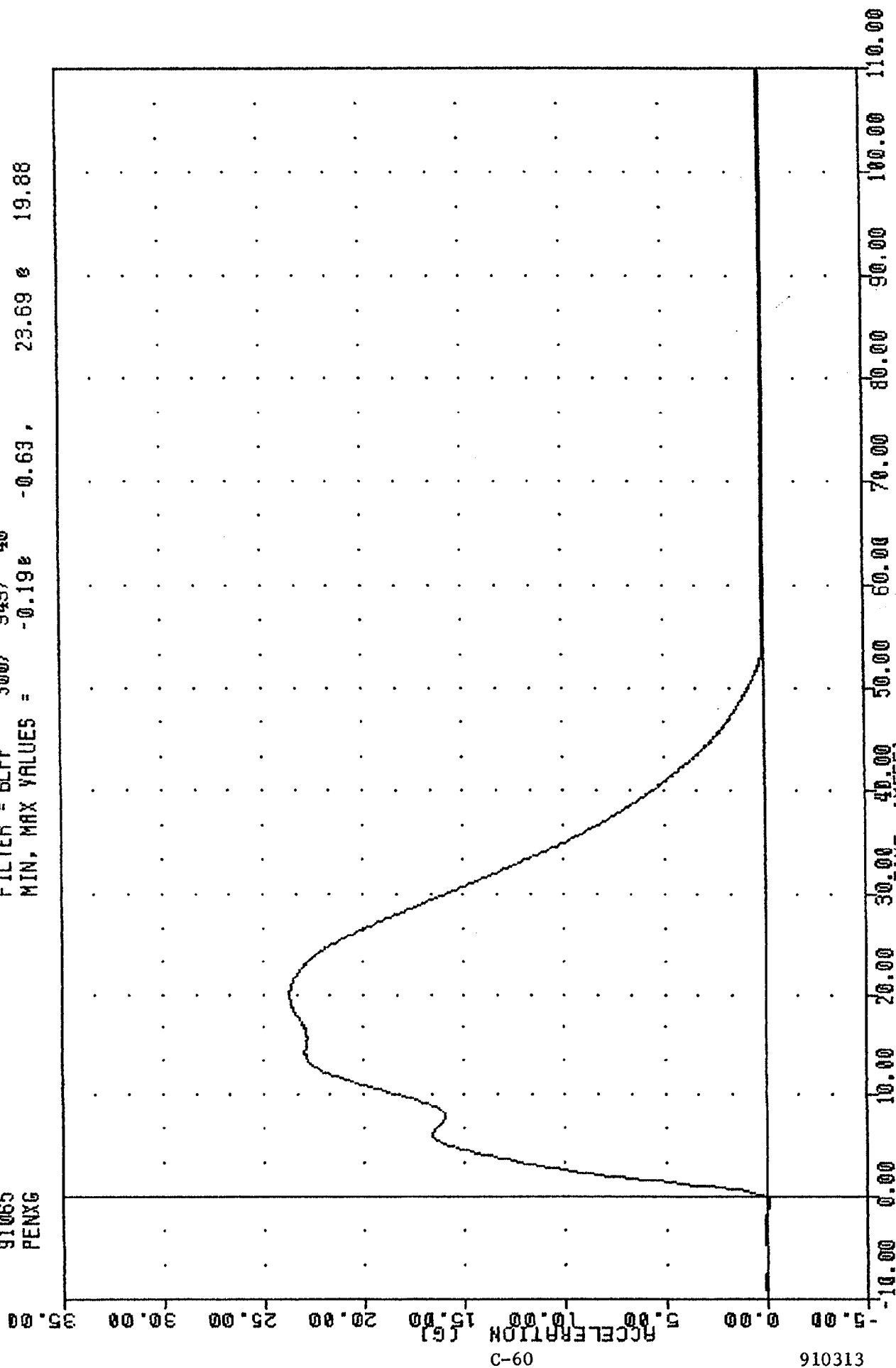
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

NHTSA
 572E SN192 H.S. THORAX CAL02
 91065
 PENXG

FILTER = BLPP 300/ 949/ -40
 MIN. MAX VALUES = -0.19e -0.63, 23.69 e 19.88



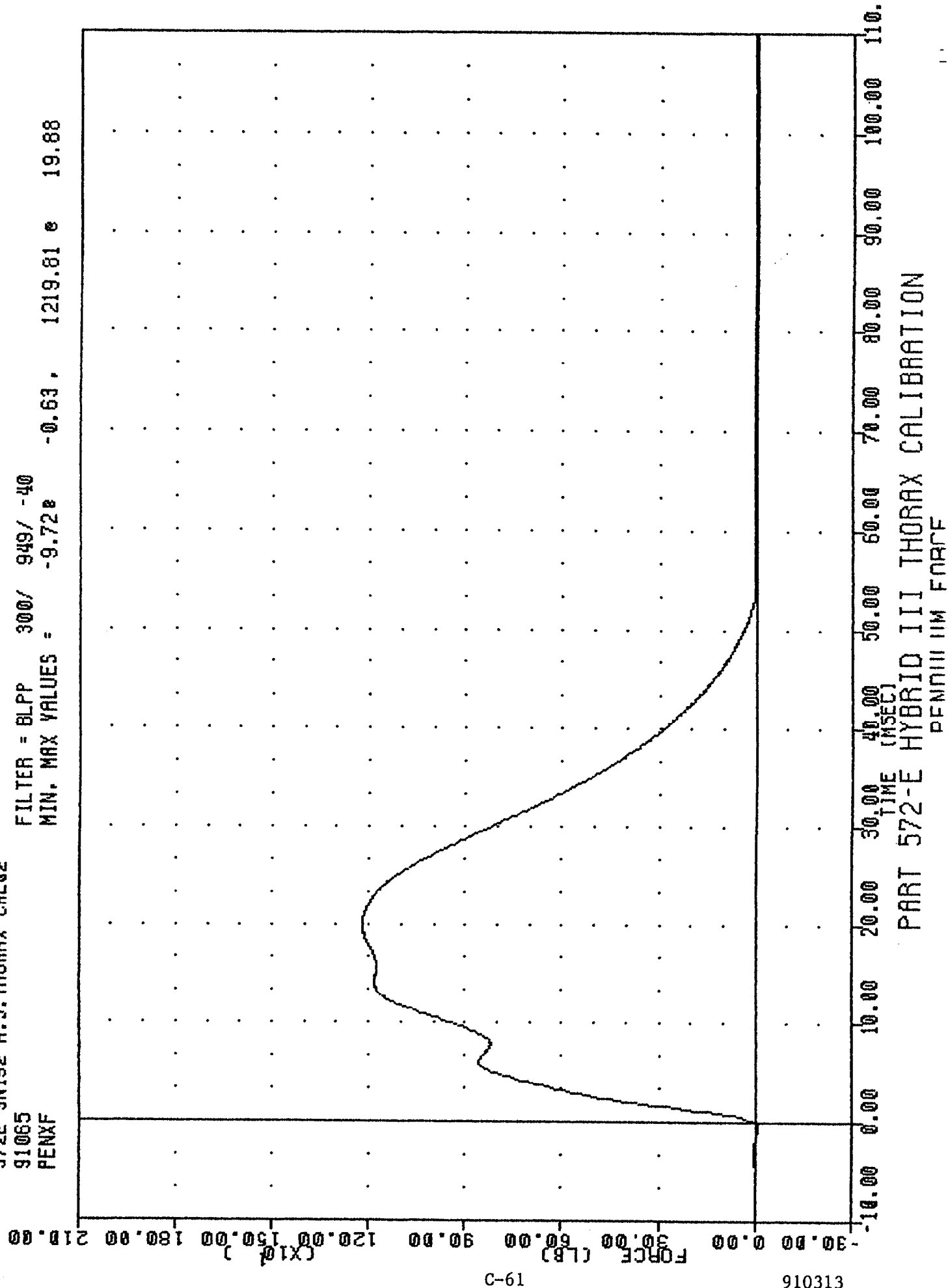
C-60

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PART 572-E HYBRID III THORAX CALIBRATION

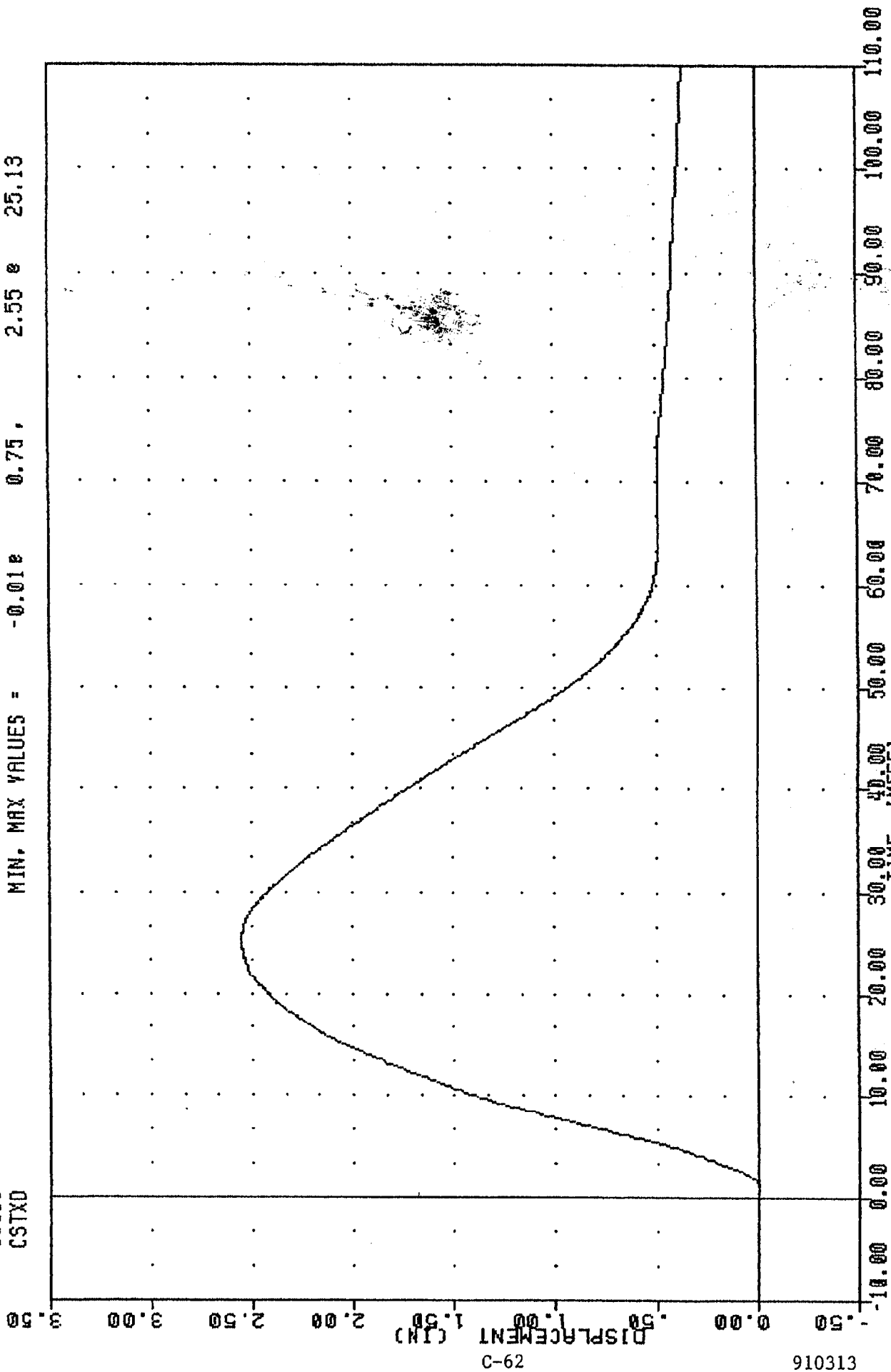
NHTSR , 192C2TH1
 572E SN192 H.S.THORAX CAL02
 91065
 PENXF

FILTER = BLPP 300/ 949/ -40
 MIN. MAX VALUES = -9.72e -0.63, 1219.81 e 19.88



NHTSA , 192C2TH1
 572E SN192 H.S.THORAX CAL02
 91065
 CSTXD

FILTER = BLPP 300/ 949/ -40
 MIN, MAX VALUES = -0.01e 0.75, 2.55 e 25.13



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910313

PART 572-E HYBRID III THORAX CALIBRATION

NHISA
 CSTXD
 PENXF

572E SN192 H.S. THORAX CAL02
 300/ 949/ -40 MIN, MAX =
 300/ 949/ -40 MIN, MAX =

192C2TH1
 FILTER = BLPP
 FILTER = BLPP

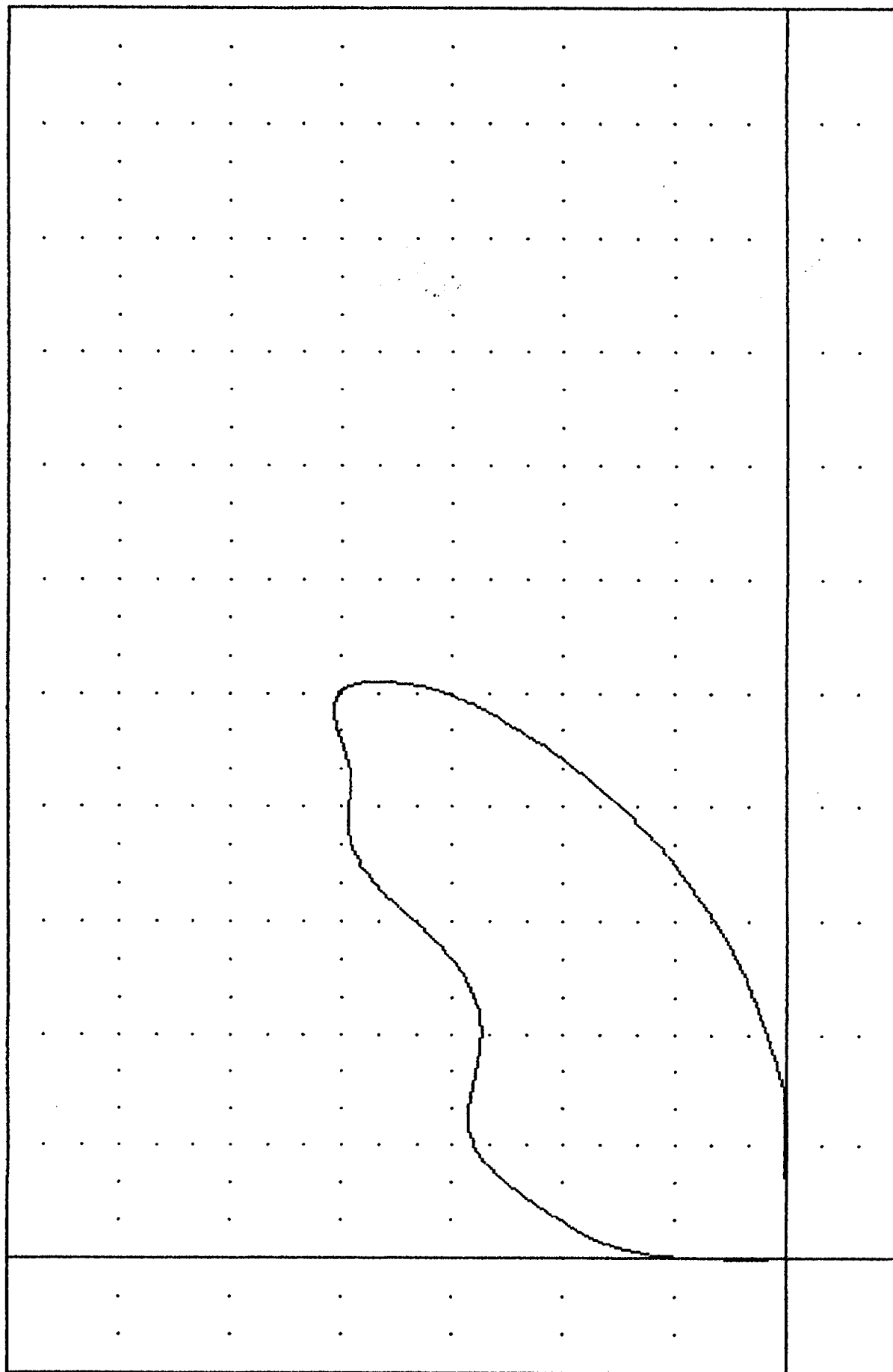
91065
 -0.01 B
 -9.72 B

0.75
 -0.63

2.55 *
 1210.81 *

25.13
 19.88

910313
 C-63
 (X10⁴)
 210.00
 180.00
 150.00
 120.00
 90.00
 60.00
 30.00
 0.00
 -30.00



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

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

05-Mar-91

LEFT KNEE
NHTSA 192C2LK1

572E SN192 L.KNEE 11LB CAL 02

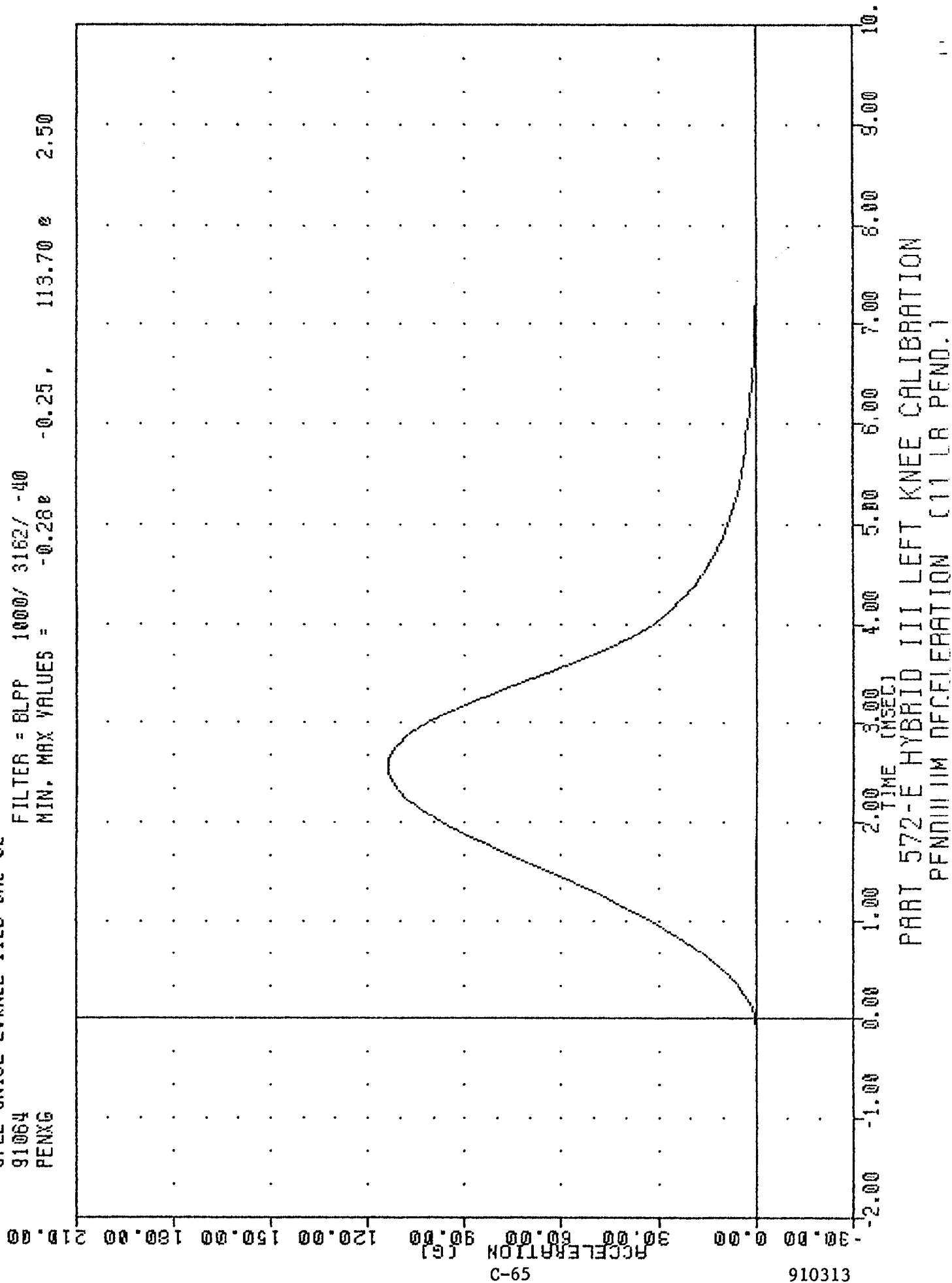
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1250.69 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

NHISA , 19202LKI
 572E SN192 L.KNEE 11LB CAL 02
 91064
 PENXG

FILTER = BLPP 1000/ 3162/ -40
 MIN. MAX VALUES = -0.28 0 113.70 0 2.50



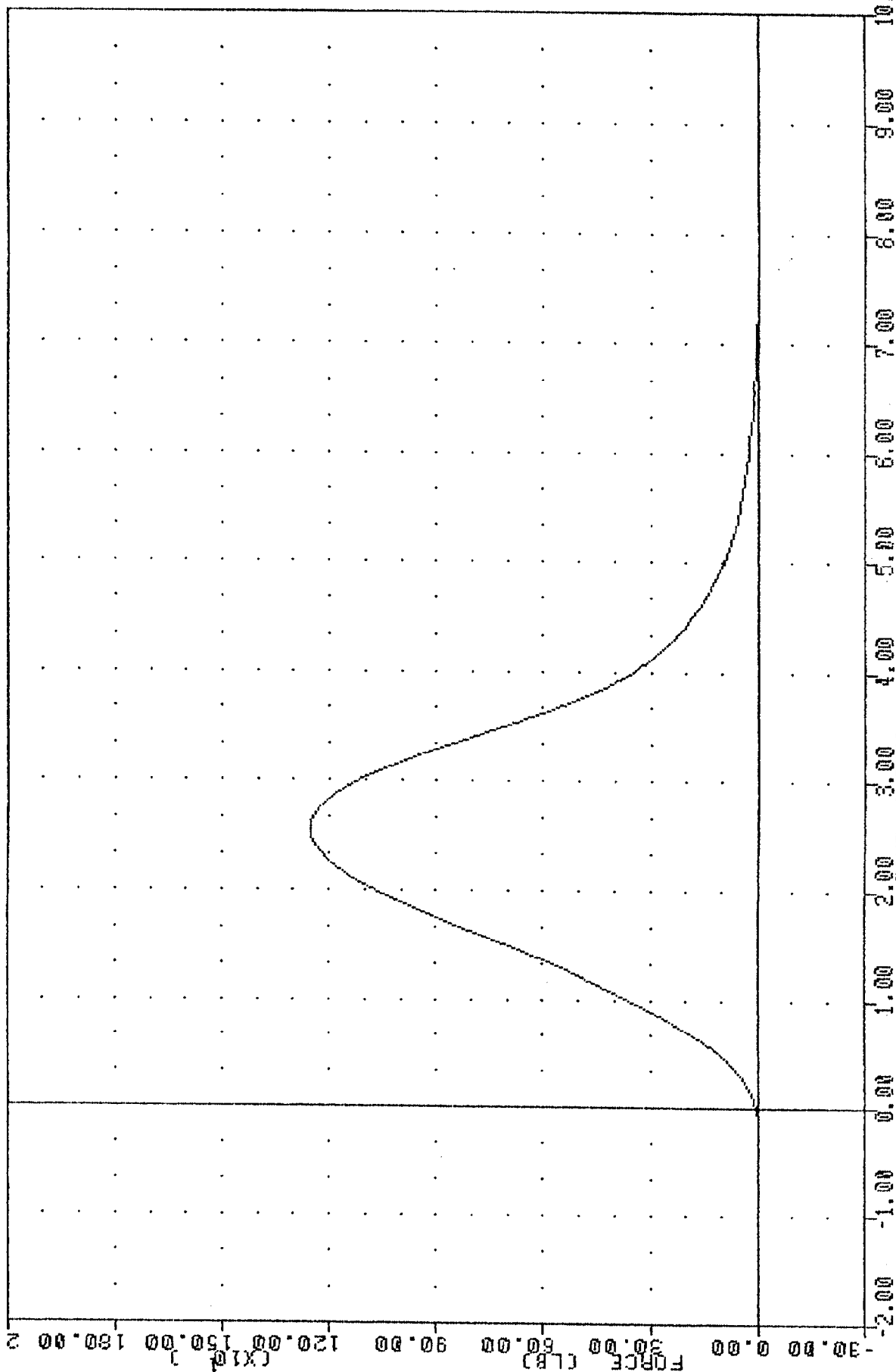
WHTSA , 192C2LK1
 572E SN192 L.KNEE 11LB CAL 02
 91064
 PENXF

FILTER = BLFF 1000/ 3162/ -40
 MIN, MAX VALUES = -3.03e -0.25, 1250.69 e 2.50

-30.00 0.00 30.00 60.00 90.00 120.00 150.00 180.00 210.00
 (X10³)

C-66

910313



PART 572-E HYBRID III LEFT KNEE CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

05-Mar-91

RIGHT
NHTSAKNEE
192C2RK1

572E SN192 R.KNEE 11LB CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	34.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1040 - 1300 LBS	1162.10 LBS
PROBE WEIGHT	11.0 LBS	

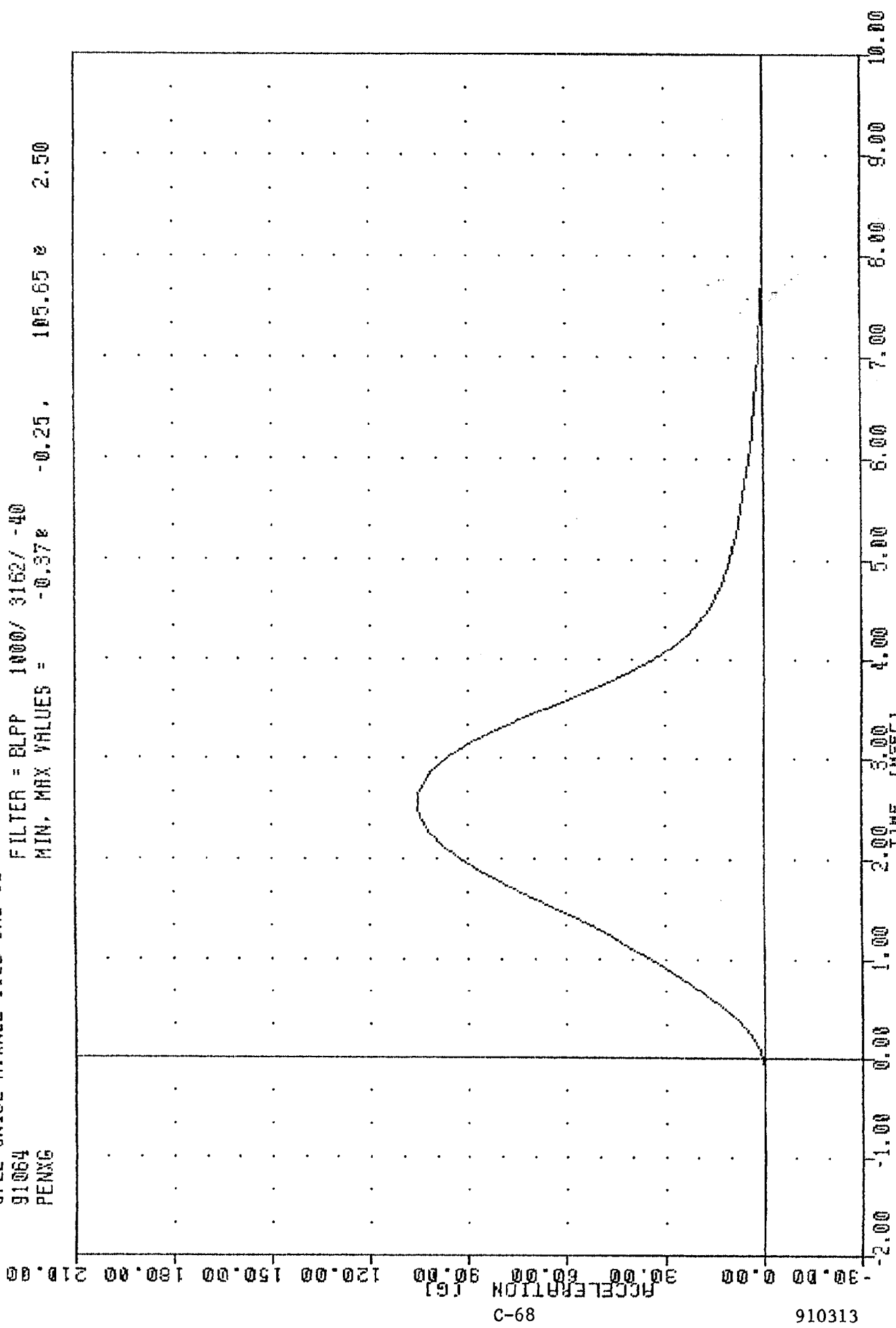
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

NHTSR , 192C2RK1
 572E SN192 R.KNEE 11LB DAL 02
 91064
 PENXG

FILTER = BLPP 1000/ 3162/ -40
 MIN. MAX VALUES = -0.370 105.65 0 2.50



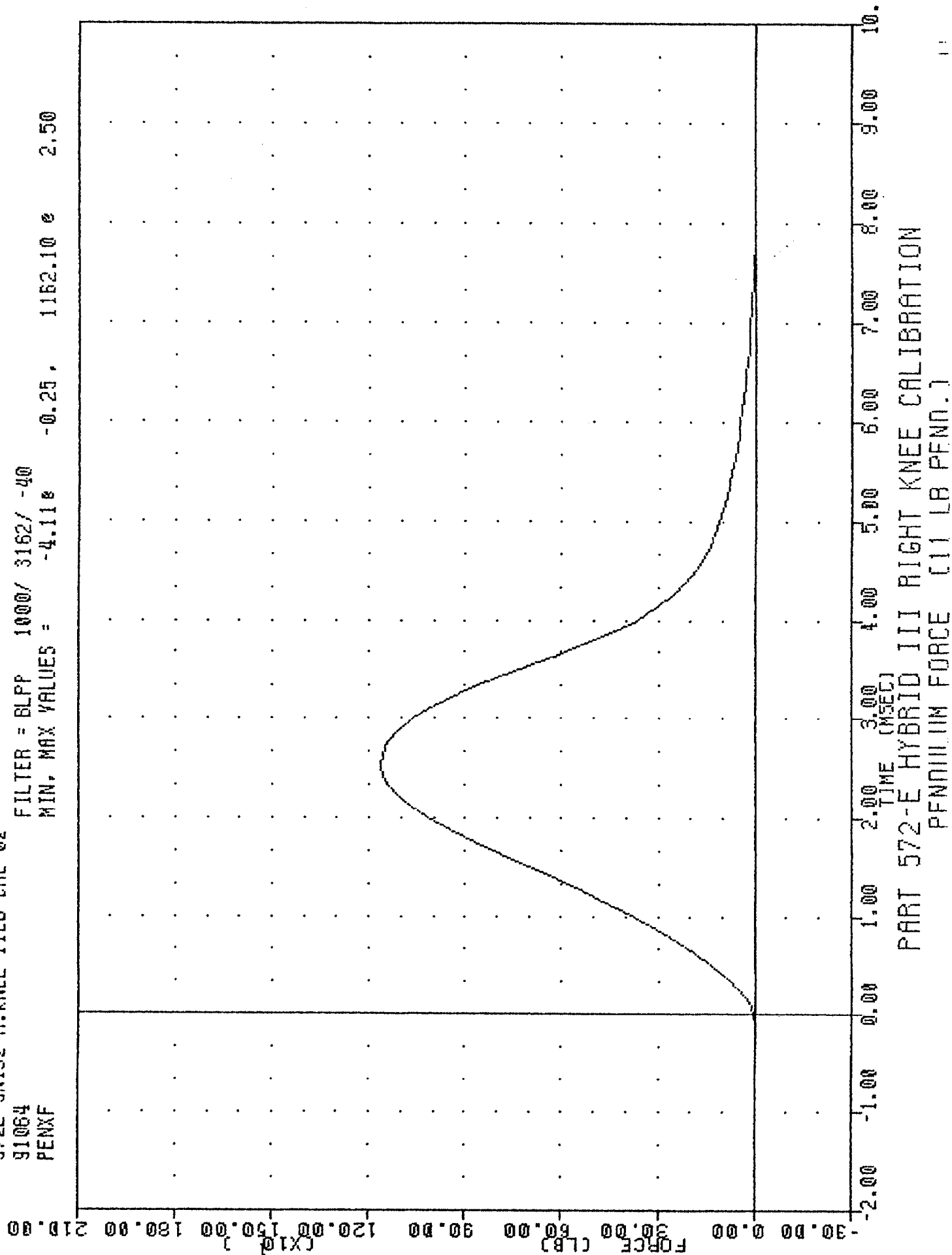
89-C

910313

PART 572-E HYBRID III RIGHT KNEE CALIBRATION

NHT3A
 572E SN192 R.KNEE 11LB CAL 02
 91064
 PENXF

FILTER = BLPP 1000/ 3162/ -40
 MIN, MAX VALUES = -4.11e -0.25, 1162.10 e 2.50



69-C

910313

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PFNNIUM FORCE (11 LB PFNN.)

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #142

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	DC59J	7264	ENDEVCO	11/05/90	05/05/91
Y-AXIS ACCEL.	CW42H	7264	ENDEVCO	11/05/90	05/05/91
Z-AXIS ACCEL.	CT44H	7264	ENDEVCO	11/05/90	05/05/91
CHEST X-AXIS ACCEL.	CR63H	7264	ENDEVCO	11/07/90	05/07/91
Y-AXIS ACCEL.	CK65H	7264	ENDEVCO	11/07/90	05/07/91
Z-AXIS ACCEL.	CK16H	7264	ENDEVCO	11/07/90	05/07/91
LEFT FEMUR FORCE LOAD CELL	1007	2430	GSE	02/15/91	08/15/91
RIGHT FEMUR FORCE LOAD CELL	1006	2430	GSE	02/15/91	08/15/91
*NECK X-AXIS FORCE LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
Y-AXIS FORCE LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
X-AXIS FORCE LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
*NECK MOMENT ABOUT X-AXIS LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
MOMENT ABOUT Y-AXIS LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
MOMENT ABOUT Z-AXIS LOAD CELL	0106	1716	DENTON	11/28/90	05/28/91
*CHEST DEFLECTION POTENTIOMETER	903208	81422A	VERNITECH	12/03/90	06/03/91
LAP BELT FORCE LOAD CELL	236	3419	LEBOW	01/11/91	07/11/91
SHOULDER BELT FORCE LOAD CELL	610	3419	LEBOW	01/11/91	07/11/91
SHOULDER BELT SPOOL-OUT POTENTIOMETER	A12899	PT-101-40A	CELESCO	03/13/91	09/13/91
SHOULDER BELT STRETCH POTENTIOMETER	2087	2051414101	BOURNES	03/13/91	09/13/91

DUMMY INSTRUMENT CALIBRATIONS

PASSENGER DUMMY #192

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCEL.	CC71H	7264	ENDEVCO	11/07/90	05/07/91
Y-AXIS ACCEL.	DA84H	7264	ENDEVCO	11/07/90	05/07/91
Z-AXIS ACCEL.	CL98H	7264	ENDEVCO	11/07/90	05/07/91
CHEST X-AXIS ACCEL.	CW96H	7264	ENDEVCO	11/05/90	05/05/91
Y-AXIS ACCEL.	CM28H	7264	ENDEVCO	11/05/90	05/05/91
Z-AXIS ACCEL.	CG13H	7264	ENDEVCO	11/07/90	05/07/91
LEFT FEMUR FORCE LOAD CELL	903	2430	GSE	11/06/90	05/06/91
RIGHT FEMUR FORCE LOAD CELL	923	2430	GSE	11/06/90	05/06/91
*NECK X-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/07/90	05/07/91
Y-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/07/90	05/07/91
Z-AXIS FORCE LOAD CELL	0280	1716	DENTON	11/07/90	05/07/91
*NECK MOMENT ABOUT X-AXIS LOAD CELL	0280	1716	DENTON	11/27/90	05/27/91
MOMENT ABOUT Y-AXIS LOAD CELL	0280	1716	DENTON	11/27/90	05/27/91
MOMENT ABOUT Z-AXIS LOAD CELL	0280	1716	DENTON	11/27/90	05/27/91
*CHEST DEFLECTION POTENTIOMETER	87313-96	81422A	VERNITECH	12/03/90	06/03/91
LAP BELT FORCE LOAD CELL	613	3419	LEBOW	01/10/91	07/10/91
SHOULDER BELT FORCE LOAD CELL	606	3419	LEBOW	11/28/90	05/28/91
SHOULDER BELT SPOOL-OUT POTENTIOMETER	0586135	PT-101-40A	CELESCO	03/13/91	09/13/91
SHOULDER BELT STRETCH POTENTIOMETER	5089	2051414101	BOURNES	03/13/91	09/13/91

VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
LEFT SEAT REAR CROSSMEMBER X-AXIS	BY01J	7264	ENDEVCO	01/17/91	07/17/91
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CJ39H	7264	ENDEVCO	11/07/90	05/07/91
ENGINE TOP X-AXIS	CJ30H	7264	ENDEVCO	01/17/91	07/17/91
ENGINE BOTTOM X-AXIS	CY23H	7264	ENDEVCO	10/24/90	04/24/91
RIGHT BRAKE CALIPER X-AXIS	CG98H	7264	ENDEVCO	12/11/90	06/11/91
LEFT BRAKE CALIPER X-AXIS	CH97H	7264	ENDEVCO	10/12/90	04/12/91
INSTRUMENT PANEL CENTER X-AXIS	CH81H	7264	ENDEVCO	10/24/90	04/24/91
REAR SEAT CROSSMEMBER CENTER Z-AXIS	CK09H	7264	ENDEVCO	12/21/90	06/21/91
VEHICLE REAR CENTER Z-AXIS	CR66H	7264	ENDEVCO	11/13/90	05/13/91

CALIBRATION LABORATORY INSTRUMENTS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
NECK BENDING PENDULUM ACCEL.	CC59	7232	ENDEVCO	10/09/90	04/09/91
NECK BENDING ROTARY POTENTIOMETER	NA	35435-1-102	BOURNES	MFR. SPECIFICATION	
NECK BENDING LINEAR POTENTIOMETER	NA	5184-2051846003	BOURNES	10/10/90	04/16/91
FEMUR/CHEST/THORAX PENDULUM ACCEL.	CC64	7232	ENDEVCO	10/16/90	04/16/91
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	10/01/90	04/01/91
ABDOMEN COMPRESSION FORCE GAUGE	1261	3167	LEBOW	10/17/90	04/17/91

SIGN CONVENTION
NHTSA DATA TAPE REFERENCE GUIDE

ACCELEROMETERS:

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

POTENTIOMETERS:

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

LOAD CELLS:

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

NECK LOAD CELLS:

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

TIBIA LOAD CELLS:

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

FREQUENCY RESPONSE CLASSES

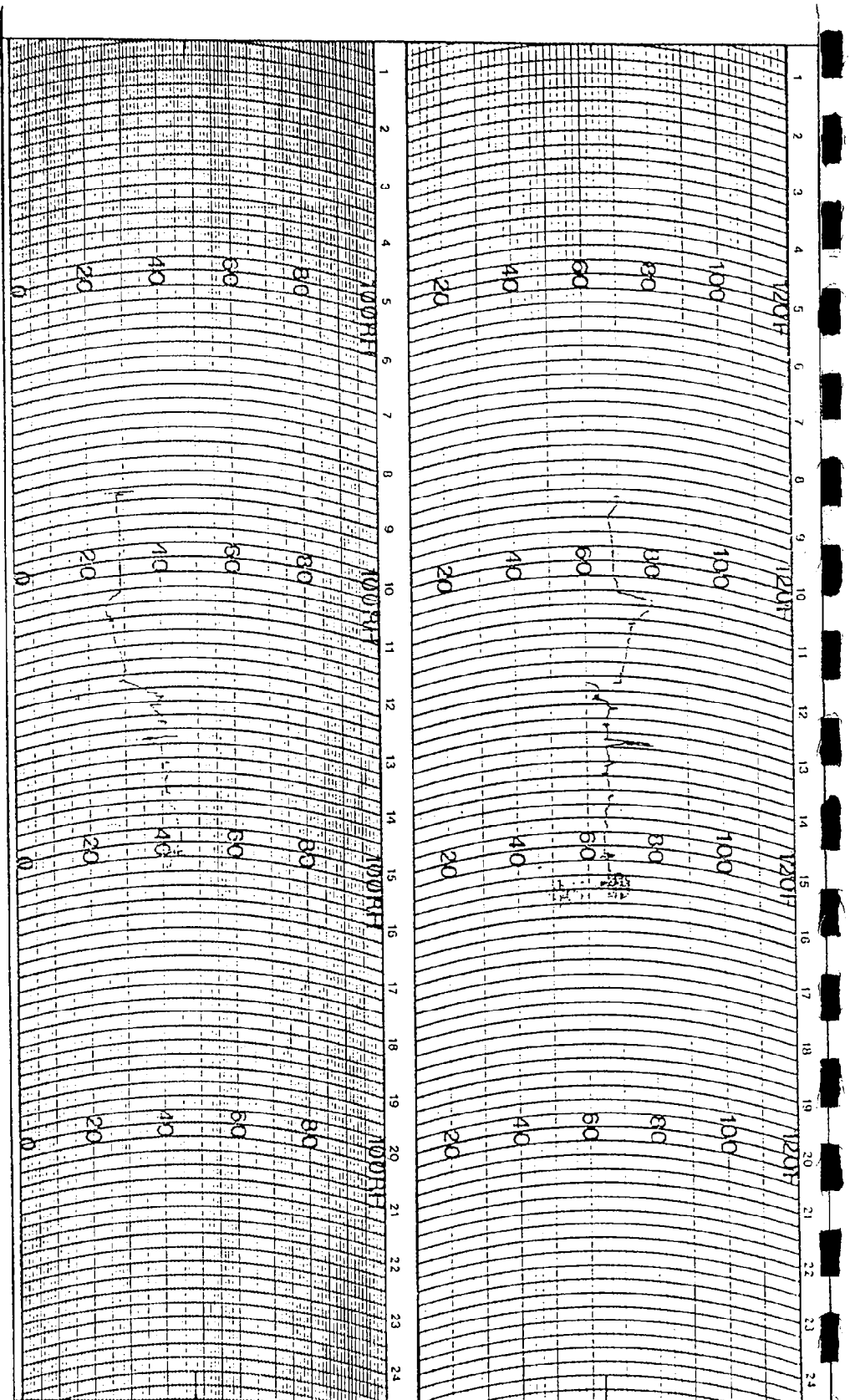
SAE J211 OCT88

TYPICAL TEST MEASUREMENTS

CHANNEL CLASS

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

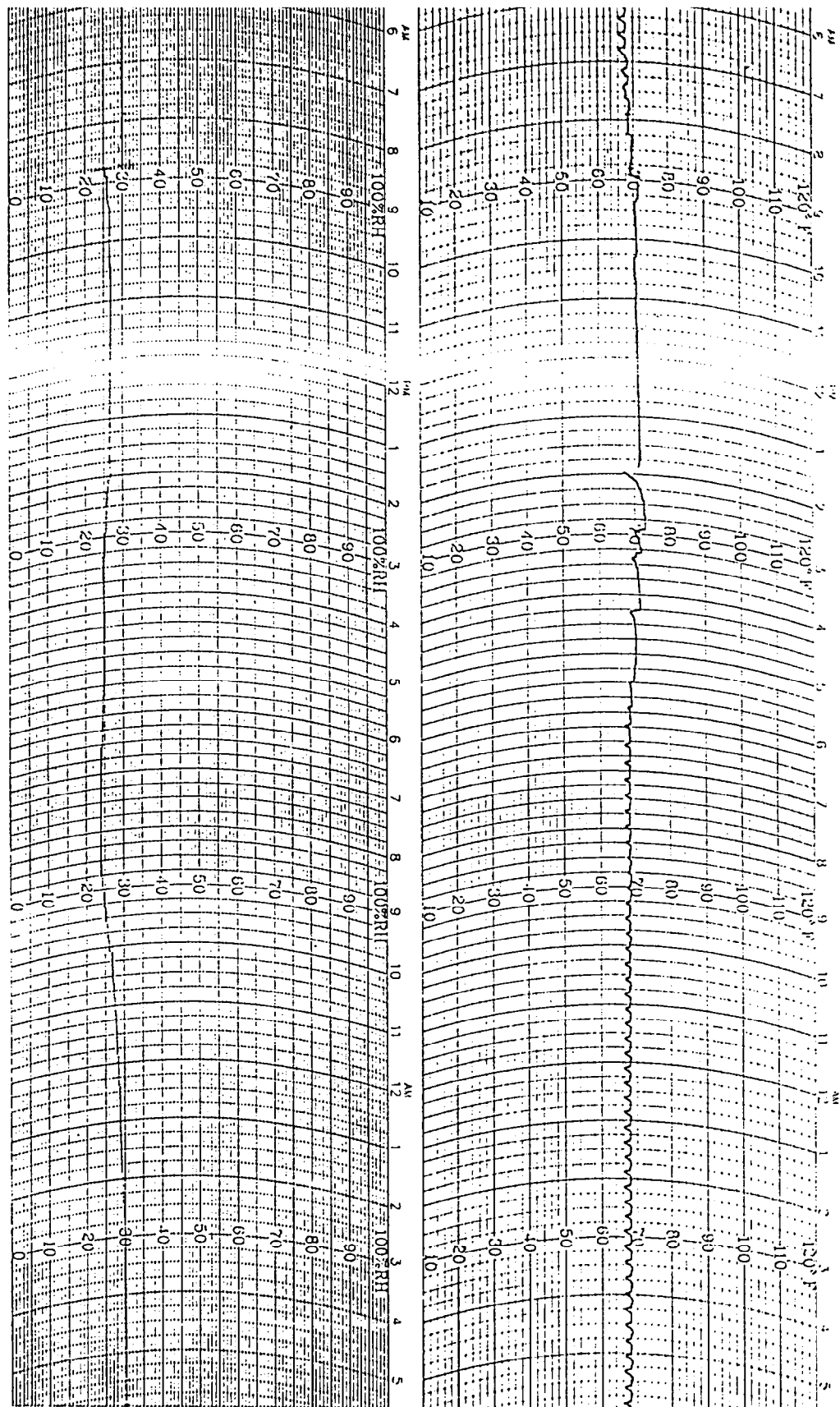


WEATHER MEASURE
PO BOX 41257
SACRAMENTO, CA 95841
PHONE (916) 481-7565

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HIF
PART # 535123

STATION SN 1911 WL-2 DATE ON 2/13/21 DATE OFF 2/13/21



Weather Measurements
 WEATHERLronics
 Division of QUALIMETRICS, Inc.
 P.O. BOX 41030
 SACRAMENTO, CA 95841
 PHONE: (916) 923-0055

HYGROTHERMOGRAPH
 1 DAY

CHART NO. MC99123
 651 0 11
 121 2/17
 6 9 87

STATION 211111 010000 DATE ON 2/12/91 DATE OFF 3/12/91

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

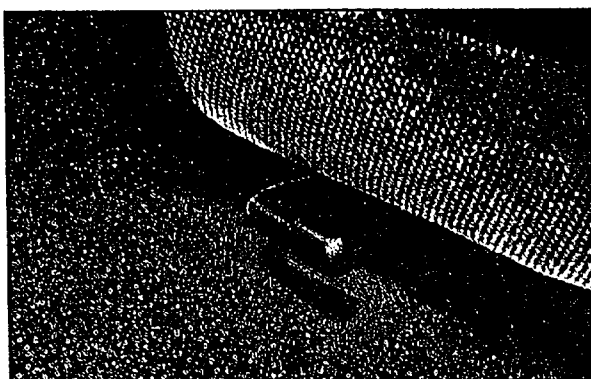
This section tells you about the seats — how to adjust them, and also about reclining front seatbacks, and head restraints.

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.

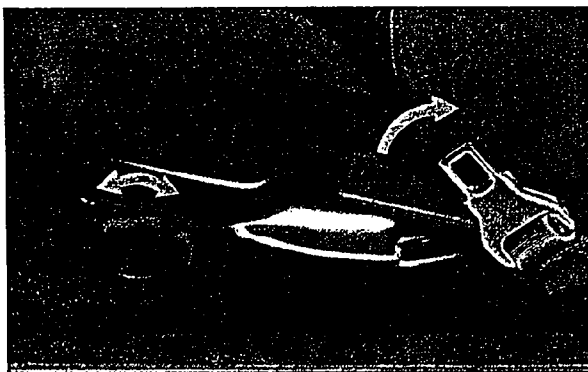


Move the lever under the front seat to unlock it. Slide the seat to where you want it. Then release the lever and try to move the seat with your body, to make sure the seat is locked into place.

Seat Cushion Adjuster (Option)

Turn the knob to raise or lower your seat cushion.

Seats and Safety Belts — pg. 8



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.

Seats and Safety Belts — pg. 9

⚠ 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.

Seats and Safety Belts — pg. 10

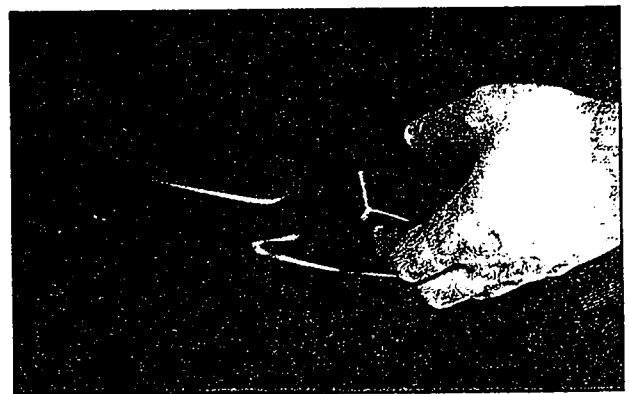
Head Restraints



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



The driver's seatback (coupe models only) folds forward to let people get into the back seat.

Seats and Safety Belts — pg. 11

Pull the latch to fold the seatback 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.

- Pull up on the recliner release lever. The whole seat will slide forward and then tilt the seatback fully 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.

Seats and Safety Belts — pg. 12



Split Fold-Down Seatback

Your Saturn is equipped with split fold-down 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 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.

Seats and Safety Belts — pg. 13

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 additional support.

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

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.



This figure lights up when you turn the key to "Run" or "Start" when your shoulder belt isn't buckled, and you'll hear a tone, too. 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.**

You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are very mild. In them, you won't get hurt even if you're not buckled up. And some crashes can be so serious, like being hit by a train, that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could be badly hurt or killed.

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 not go off after you start your vehicle. If this happens 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.

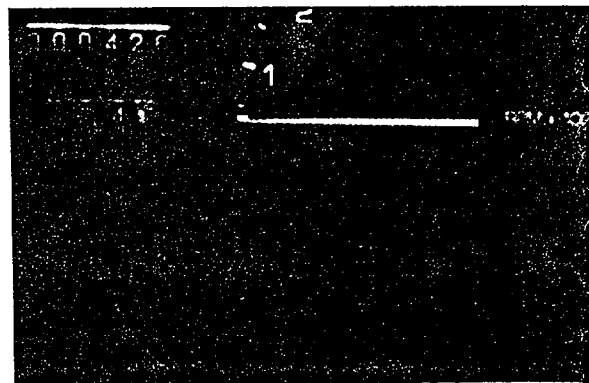
Seats and Safety Belts — pg. 16

⚠ CAUTION

If your shoulder belt light stays on after the driver's shoulder belt is buckled, it means that your shoulder belt may not be properly positioned. You might not have the protection you'd need in a crash. Use the temporary latch plate (to see how, see Index under "Motorized Shoulder Belt") and have your vehicle fixed.

When the key is turned to "Run" or "Start," a tone will come on for about six seconds to remind people to fasten their safety belts, unless the driver's safety belts are buckled. The shoulder belt warning light will come on and stay on until the driver's shoulder belt is buckled.

Lap Belt Warning Light

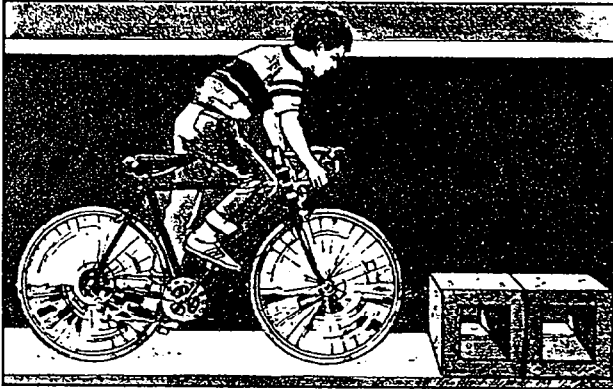


This light flashes for about ten seconds and then stay on until the driver's lap belt is buckled.

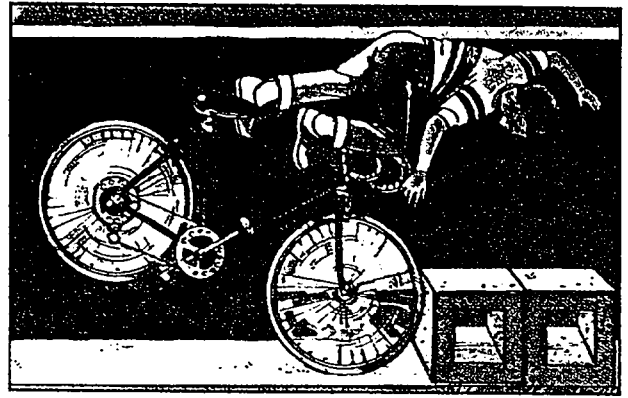
Seats and Safety Belts — pg. 17

WHY SAFETY BELTS WORK

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

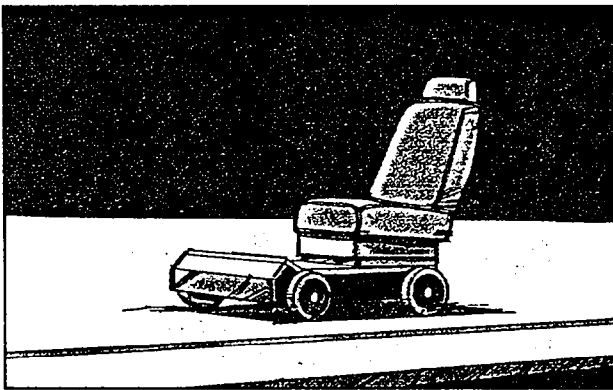


For example, if the bike is going 10 mph (16 km/h), so is the child.

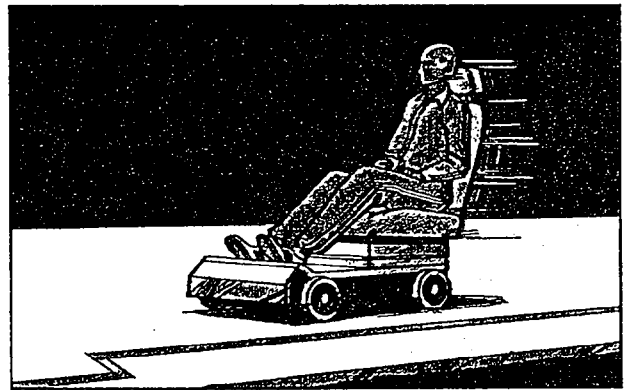


When the bike hits the block, it stops. But the child keeps going!

Seats and Safety Belts — pg. 18

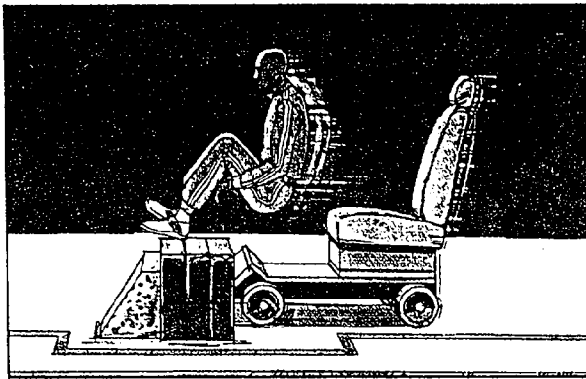


Take the simplest "car." Suppose it's just a seat on wheels.



Put someone on it.

Seats and Safety Belts — pg. 19

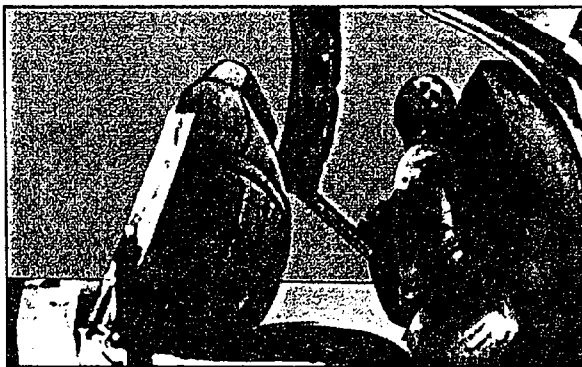


Get it up to speed. Then stop the "car." The rider doesn't stop.

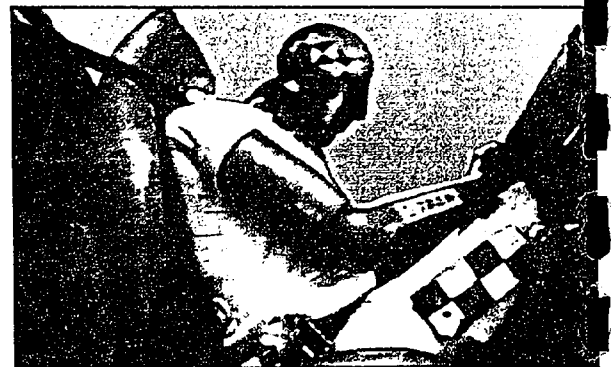


The person keeps going until stopped by something. In a real vehicle, it could be the windshield ...

Seats and Safety Belts — pg. 20



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.

Seats and Safety Belts — pg. 21

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).

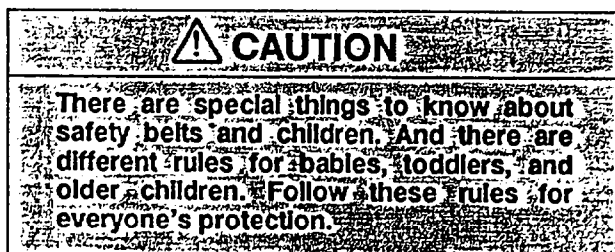
Safety belts are for everyone.

Seats and Safety Belts — pg. 22

HOW TO WEAR SAFETY BELTS PROPERLY

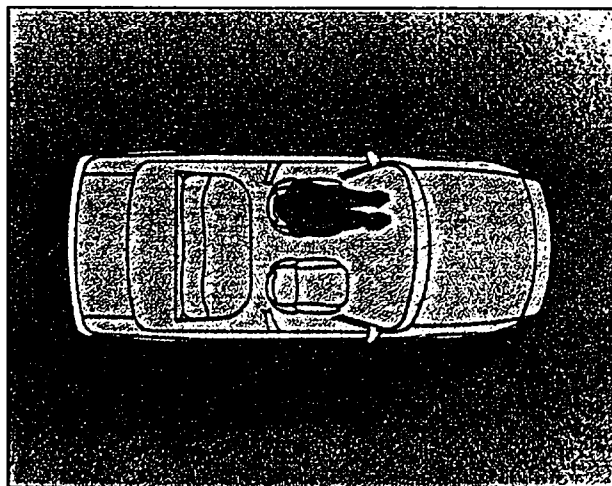
Adults

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."



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

Driver Position



Seats and Safety Belts — pg. 23

Motorized Shoulder Belt and Manual Lap Belt

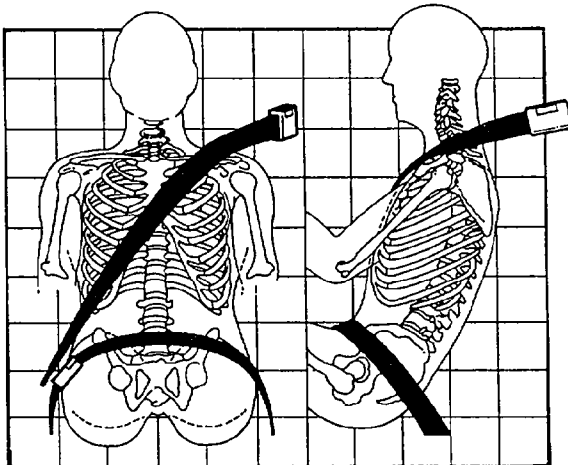


This shoulder belt is motorized. You don't have to buckle up the shoulder belt when you get into your car.



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

Seats and Safety Belts — pg. 24



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.

Seats and Safety Belts — pg. 25



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.

Seats and Safety Belts — pg. 26



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.

Seats and Safety Belts — pg. 27

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.

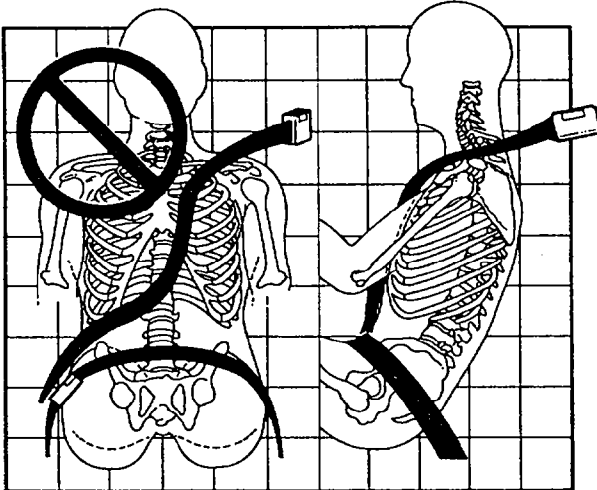
Seats and Safety Belts — pg. 28



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

Seats and Safety Belts — pg. 29

Q: What's wrong with this?

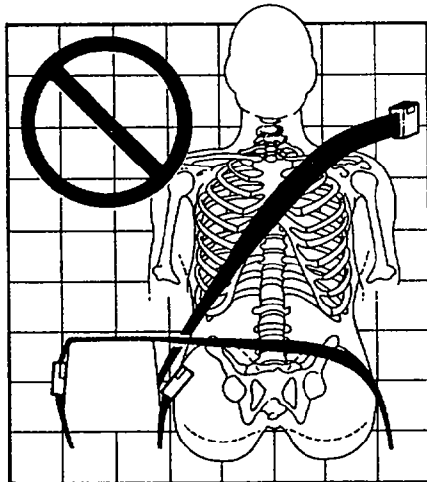


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

**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.

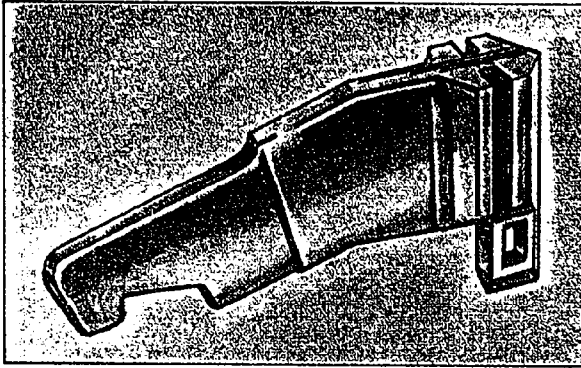
**CAUTION**

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.

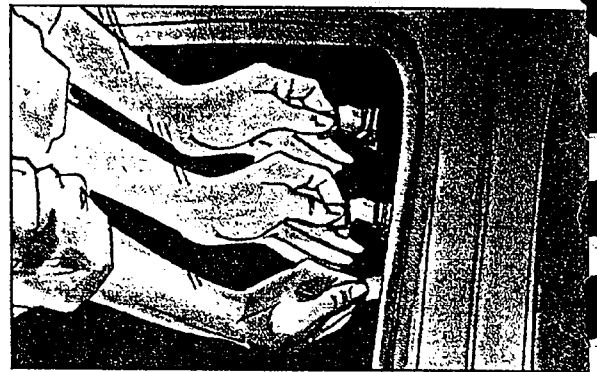
To unlatch the lap belt, just push the button on the buckle. The lap belt should go back out of the way.

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.

If the motorized shoulder belt doesn't move into position properly, you can still use the shoulder belt. There is 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.

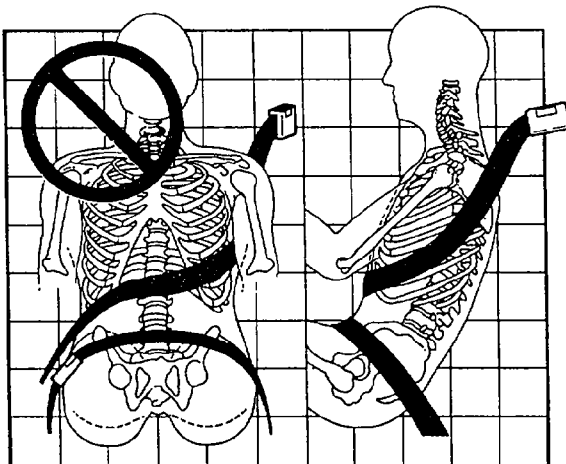


Release the shoulder belt and fasten it to the plate. Follow the instructions earlier in this section for unbuckling and reattaching the motorized shoulder belt.

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

Seats and Safety Belts — pg. 32

Q: What's wrong with this?



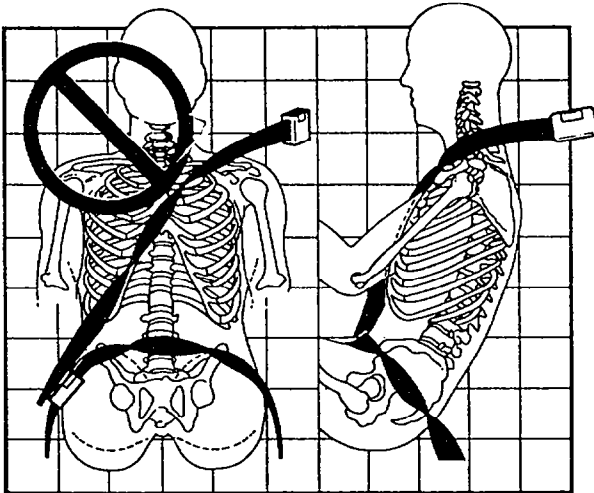
A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

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.

Seats and Safety Belts — pg. 33

Q: What's wrong with this?



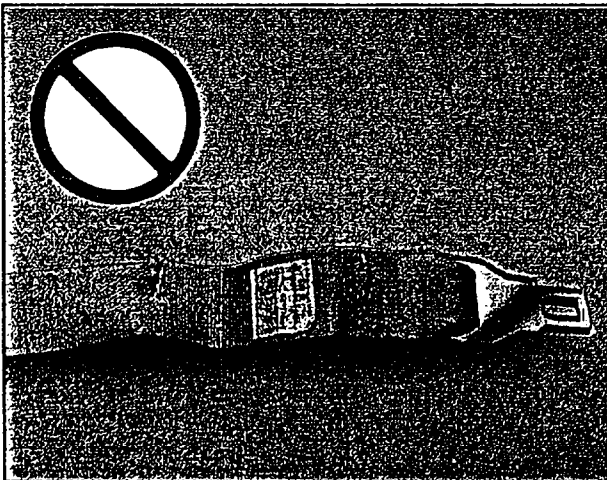
A: The belt is twisted across the body.

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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.

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.

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Safety Belt Use During Pregnancy

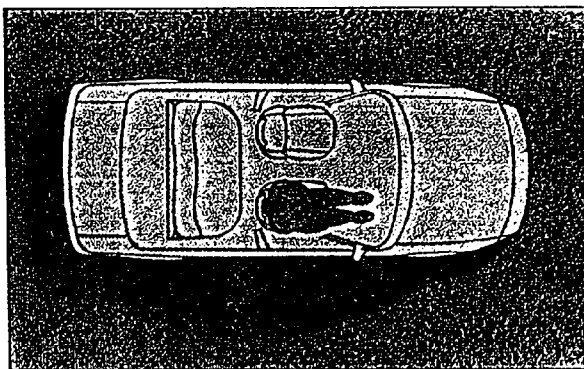
Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts. The lap portion should be worn as low as possible throughout the pregnancy.

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.



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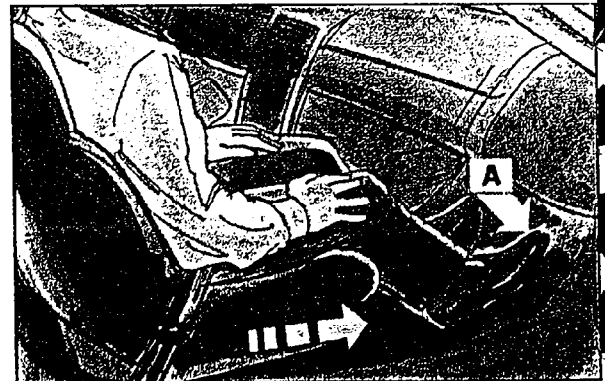
Right Front Passenger Position



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

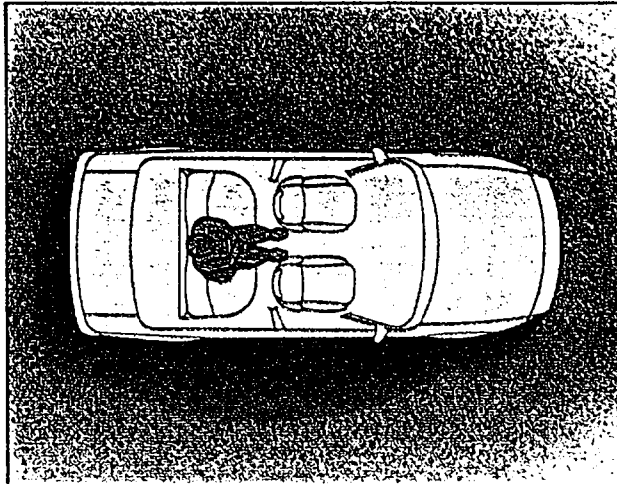
When the lap belt is pulled out all the way, it will lock. If it does not, let it go back all the way and start again.

- 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.



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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.

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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.

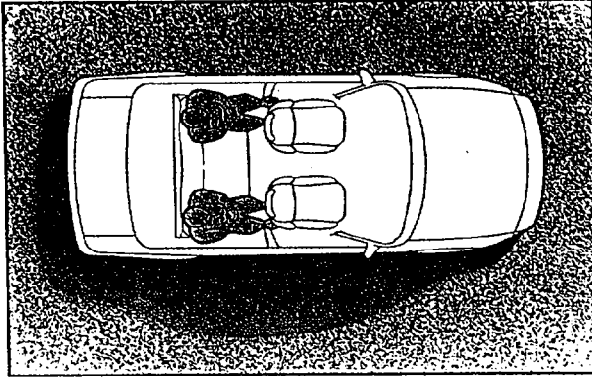
Rear Seat Passengers

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.

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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.

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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.

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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)



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CAUTION (Continued)



Secure the baby in an infant restraint.

CHILD RESTRAINTS

Be sure to follow the instructions for the restraint. 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.

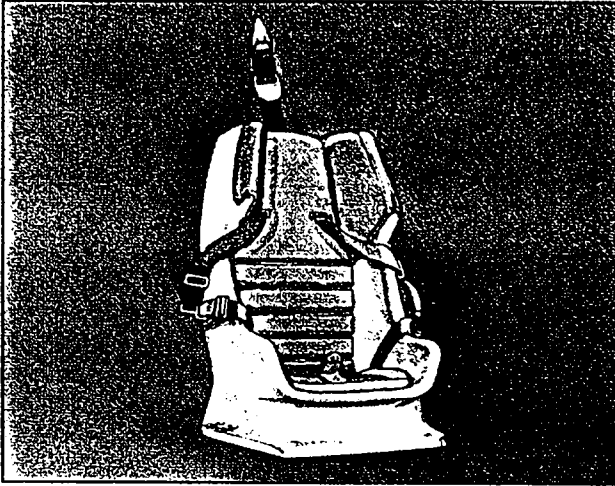
Where to Put the Restraint

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.

But wherever you install it, be sure to secure the child restraint properly.

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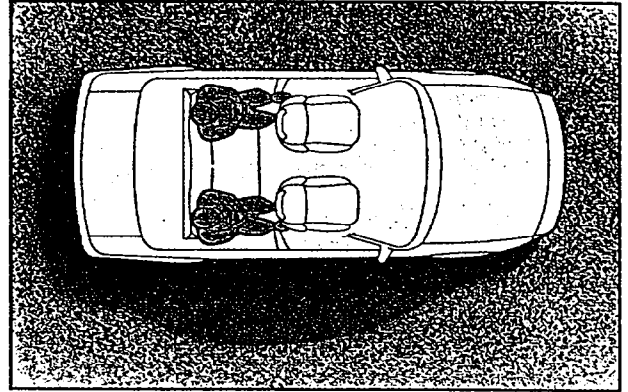
Top Strap



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

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

Securing a Child Restraint in a Rear Outside Position



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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.

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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.

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

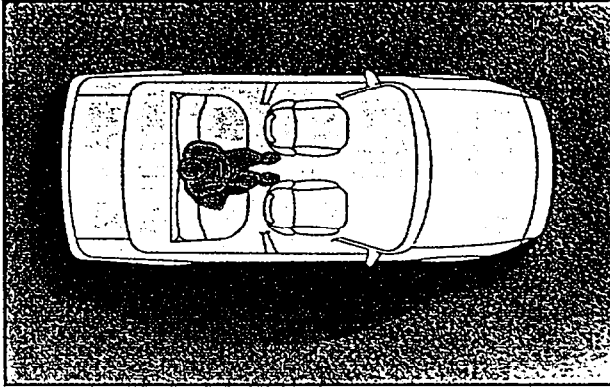
CAUTION

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.

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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. If the child restraint has a top strap, don't put it in this seat. See Top Strap earlier in this section.

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



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

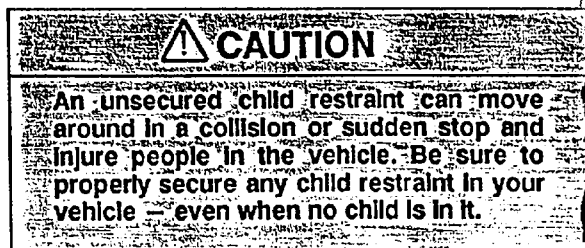
Seats and Safety Belts — pg. 50



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.

Seats and Safety Belts — pg. 51

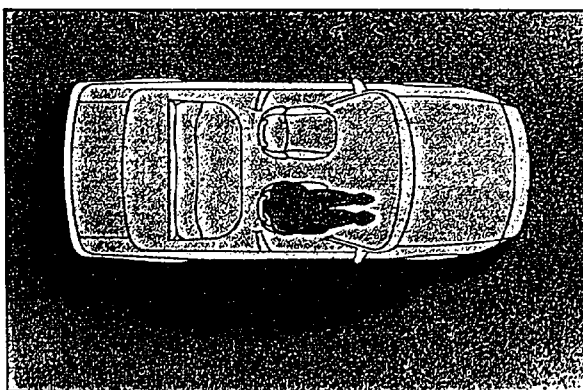
6. To tighten the belt, pull its free end while you push down on the child restraint.
7. Push and pull the child restraint in different directions to be sure it is secure. If the child restraint isn't secure, turn the latch plate over and buckle it again. Then see if it is secure. If it isn't, secure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



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.

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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 top end of the shoulder belt.

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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.

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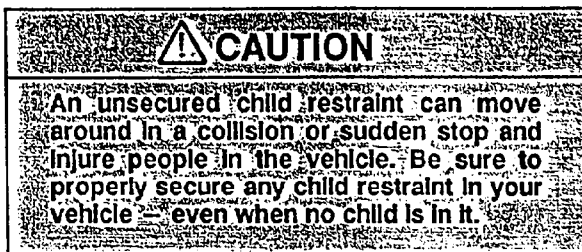


6. To tighten the belt, feed it back into the retractor while you push down on the child restraint.



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

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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.

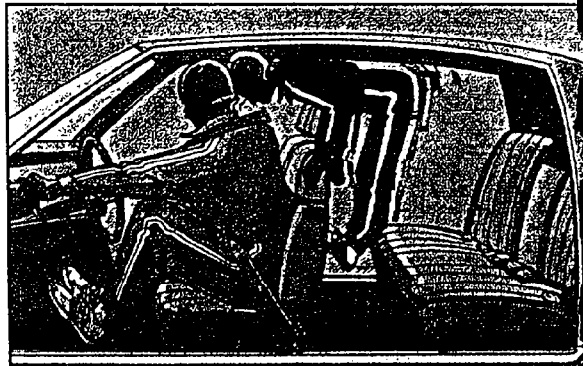
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Larger Children



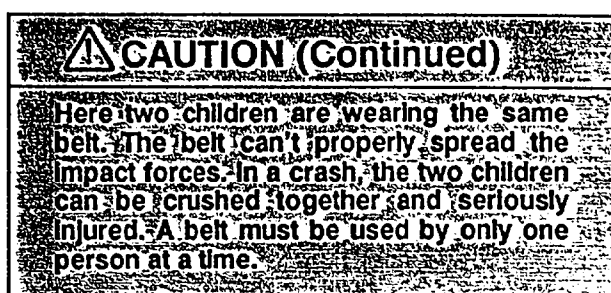
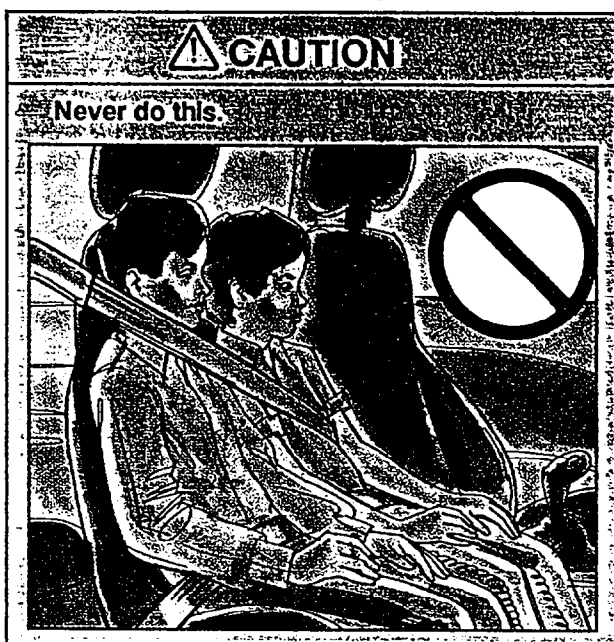
Children who have outgrown child restraints should wear the vehicle's safety belts. If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional

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.

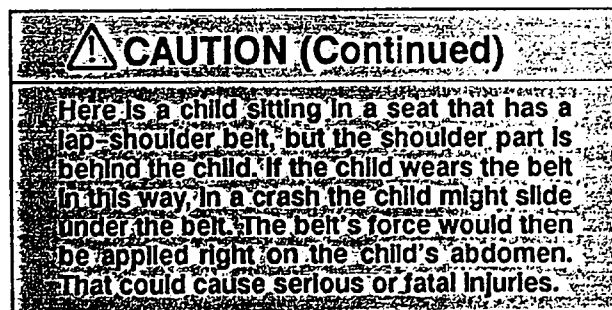
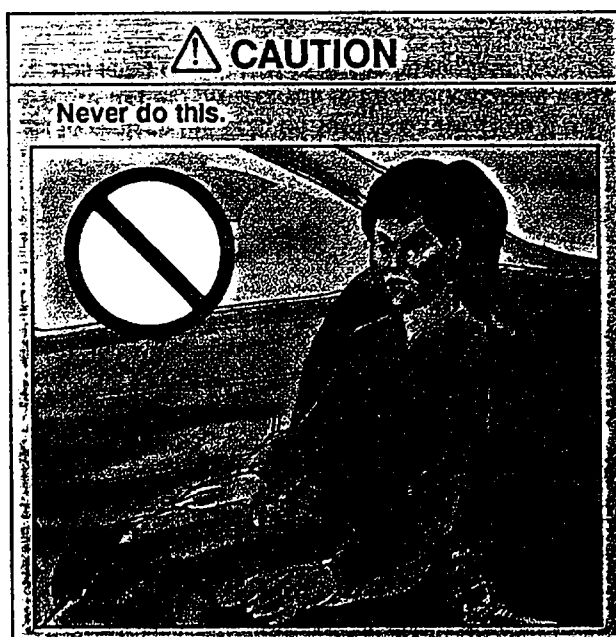
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Q: What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

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.

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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.

Seats and Safety Belts — pg. 59

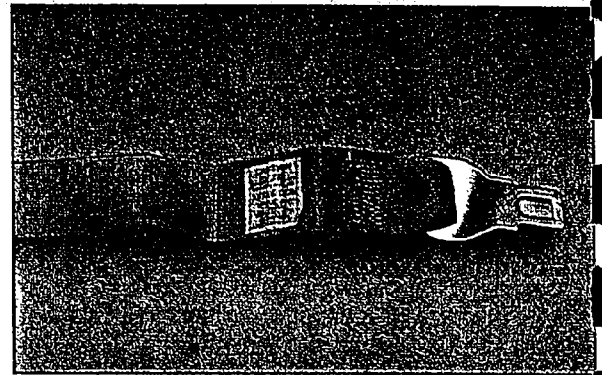
CHECKING YOUR RESTRAINT SYSTEMS

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.

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