V1706

REPORT NO. TRC-91-N11

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION

1992 OLDSMOBILE ACHIEVA

2-DOOR COUPE

NHTSA NO. MN0106

TRC TEST NO. 920408

PREPARED BY:

TRANSPORTATION RESEARCH CENTER INC.

10820 STATE ROUTE 347

EAST LIBERTY, OHIO 43319

MAY 1, 1992

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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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
TRC-91-N11		

4. Title and Subtitle	5. Report Date
NEW CAR ASSESSMENT PROGRAM (NCAP), FRONTAL BARRIER IMPACT TEST OF A 1992 OLDSMOBILE ACHIEVA 2-DOOR COUPE, NHTSA NO. MN0106	May 1, 1992
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
C. A. Markusic, Project Engineer, TRC	TRC-91-N11
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Transportation Research Center Inc. 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 APRIL - MAY 1992
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 1992 Oldsmobile Achieva 2-door coupe, NHTSA No. MN0106, at the Transportation Research Center Inc. on April 8, 1992. This test was conducted to obtain new car assessment and research data indicant of FMVSS No. 208 performance. The barrier impact velocity was 35.2 mph. The vehicle's maximum crush was 20.0 inches. The ambient temperature was 75° F.

The driver's head injury criteria (HIC) was 2021. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.2 g. The driver's left and right femur maximum axial forces were 710 pounds and 1070 pounds, respectively.

The passenger's head injury criteria (HIC) was 343. The passenger's chest maximum resultant accceleration with three (3) milliseconds minimum duration was 41.0 g. The passenger's left and right femur maximum axial forces were 870 pounds and 1239 pounds, respectively.

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test: New Car Assessment Program (NCAP) FMVSS 208, "Occupant Crash Protection"	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)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	274	

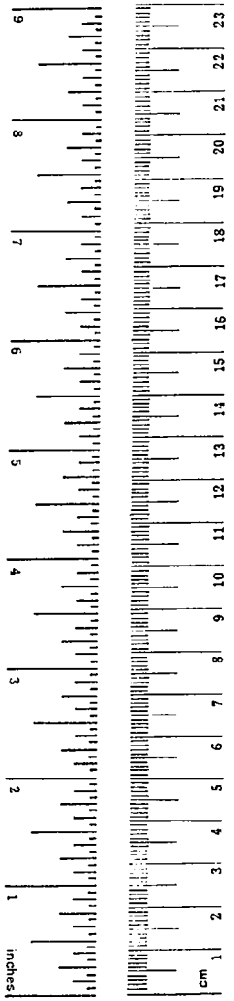
Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

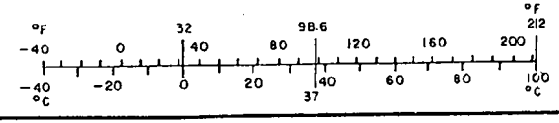
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2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

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



Approximate Conversions from Metric Measures

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



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SECTION 1.0

PURPOSE AND TEST PROCEDURE

PURPOSE

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

The purpose of this test was to obtain new car assessment and research data for vehicle crashworthiness and occupant restraint system performance for the subject vehicle, a 1992 Oldsmobile Achieva 2-door coupe, NHTSA No. MN0106, 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 572B 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.

The sixty-nine (69) data channels were multiplexed and recorded on two (2) 14-track tape drives. The data was digitally sampled at 8000 samples per second and processed per section IP11 of the Laboratory Indicant Test Procedure.

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

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

SECTION 2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This frontal load cell barrier test was conducted at TRC on April 8, 1992.

The test vehicle, a 1992 Oldsmobile Achieva 2-door coupe, NHTSA No. MN0106, was equipped with a 2.3 liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 3293 pounds. The vehicle's impact speed was 35.2 mph. The vehicle sustained 20.0 inches of static crush during the impact.

The driver's head injury criteria (HIC) was 2021. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.2 g. The driver's left and right femur maximum axial forces were 710 pounds and 1070 pounds, respectively.

The passenger's HIC was 343. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.0 g. The passenger's left and right femur maximum axial forces were 870 pounds and 1239 pounds, respectively.

DATA ACQUISITION EXPLANATIONS

The engine top X-axis accelerometer, ENGXG1, recorded questionable data from 94 to 114 milliseconds due to the accelerometer's cable being pinched by the vehicle's crush upon impact.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: MN0106 TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 04/08/92 TEST TIME: 1452 AMBIENT TEMP. (°F): 75

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1992/Oldsmobile/Achieva/2-door coupe

VEHICLE TEST WEIGHT (LBS): 3293

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 20.0

AVERAGE REBOUND (IN): 16.1

DUMMIES:	Driver #713	Passenger #826
TYPE:	Part 572 B	Part 572 B
LOCATION:	Left front	Right front
RESTRAINT:	3-point passive	3-point passive

NUMBER OF DATA CHANNELS: 69

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

*With respect to tow track centerline.
**Speed trap measurement (± .05 mph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: General Motors Corporation

MAKE/MODEL: Olsmobile/Achieva VIN: 1G3NL1435NM414124

BODY STYLE: 2-door coupe MODEL YEAR: 1992

NHTSA NO.: MN0106 COLOR: Silver

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

TRANSMISSION DATA: _3_SPEED, ___MANUAL, _X_AUTOMATIC, _X_FWD, ___RWD, ___4WD

DATE VEHICLE RECEIVED: 04/01/92 ODOMETER READING: 68.6

DEALER'S NAME AND ADDRESS: Chesrown Oldsmobile - GMC, Inc.
4675 Karl Rd.
Columbus, OH 43229

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	Yes
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	Yes
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes
OTHER	Int. wipers		

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: General Motors Corporation

DATE OF MANUFACTURE: 01/92 VIN: 1G3NL1435NM414124

GVWR: 3750 LBS

GAWR: FRONT: 2065 LBS., REAR: 1685 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Michelin, XZ4, P185/75R14

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

SPARE TIRE (MFR., LINE, SIZE): Uniroyal, Hideaway, T115/70D14

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: adjustable

MAXIMUM WIDTH: 68.5 INCHES

WHEELBASE: 102.8 INCHES

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the driver's door.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P185/75R14

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

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 882 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE:	LF	26.9;	RF	27.0;	LR	27.9;	RR 28.0
PRE-TEST ATTITUDE:	LF	26.9;	RF	26.9;	LR	26.9;	RR 26.6
POST-TEST ATTITUDE:	LF	26.7;	RF	26.9;	LR	26.4;	RR 25.8

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

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	909 LBS.	RIGHT REAR	503 LBS.
LEFT FRONT	924 LBS.	LEFT REAR	516 LBS.
TOTAL FRONT WEIGHT	1833 LBS.	(64.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1019 LBS.	(35.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	2852 LBS.		

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2852 LBS)

VCW = VEHICLE CAPACITY WEIGHT (882 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

RCLW*= VCW - 150 (DSC) = 882 - 150(5) = 132 LBS

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

TARGET TEST WEIGHT = 2852 + 132 + 328

TARGET TEST WEIGHT = 3312 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 113 LBS. OF CARGO WEIGHT:

RIGHT FRONT	995 LBS.	RIGHT REAR	647 LBS.
LEFT FRONT	1006 LBS.	LEFT REAR	645 LBS.
TOTAL FRONT WEIGHT	2001 LBS.	(60.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1292 LBS.	(39.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3293 LBS.	(0.5% UNDER TARGET TEST WEIGHT)	

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

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Bumper, tail light, rear seat belts, trunk lid/hinges

CG = 40.3 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: 920408 NHTSA NO.: MN0106

TEST DATE: 04/08/92 TEST TIME: 1452

TEST TYPE: Frontal load cell barrier IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA: 75° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 68° F

IMPACT VELOCITY: PRIMARY = 35.2 MPH SECONDARY = 35.2 MPH

(SPECIFIED RANGE = 34.5 TO 35.5 MPH)

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

EXITING VELOCITY TRAP = 2.0 IN.

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

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 180.8; C 188.2; R 181.2

POST-TEST: L 164.1; C 168.5; R 161.2

TOTAL CRUSH: L 16.7; C 19.7; R 20.0

AVERAGE CRUSH: 18.8

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 15.9; C 14.1; R 18.4; AVG. 16.1

TABLE 4 FUEL SYSTEM DATA

MAKE/MODEL: Oldsmobile/Achieva

NHTSA NO.: MN0106

FUEL SYSTEM CAPACITY: 15.2 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 15.2 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 14.0 GALLONS TO 14.3 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 14.1 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

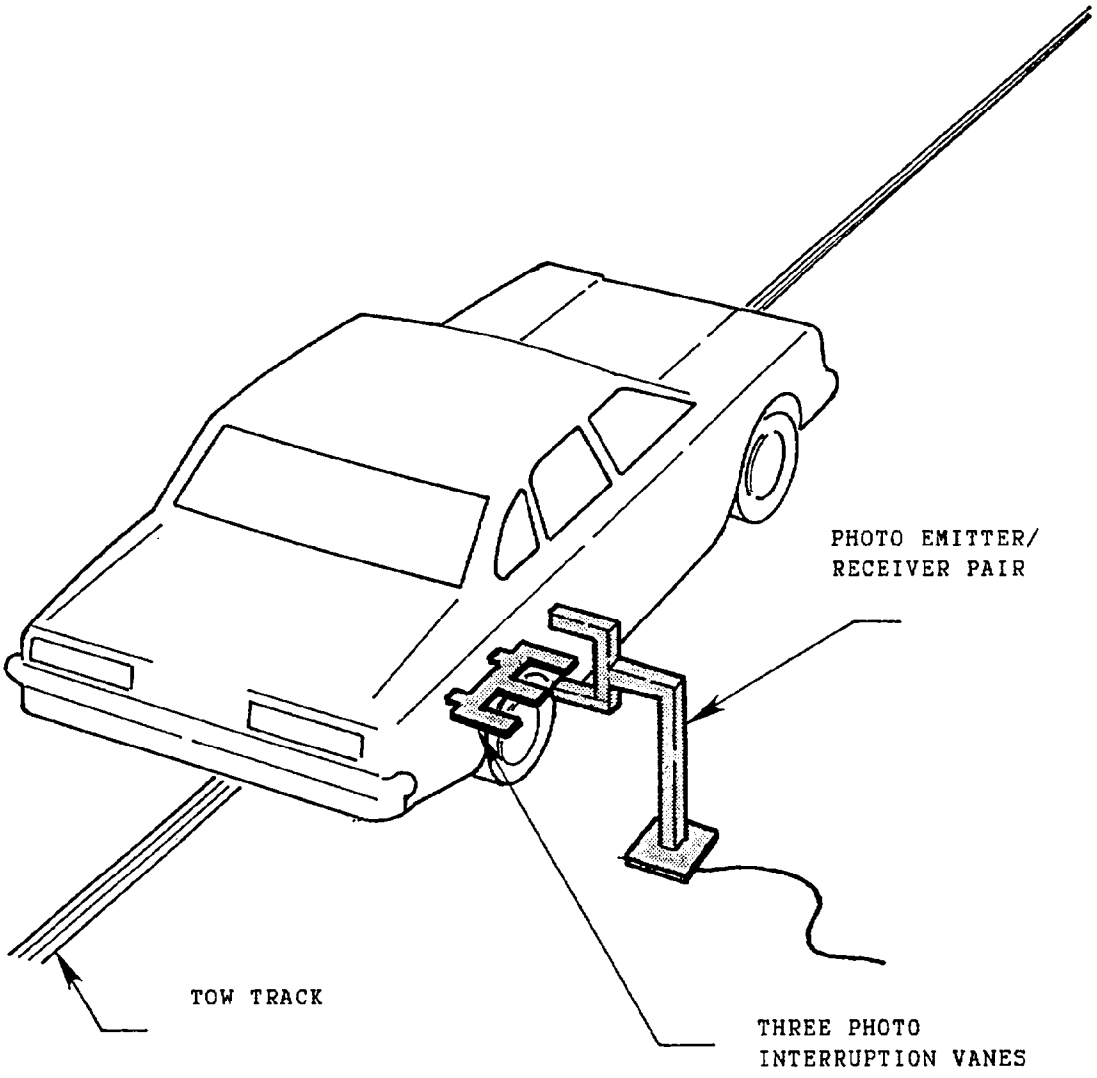
TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel filler is on the right side. The fuel tank is in front of the rear axle. The fuel lines run along the left frame rail to the front.

ELECTRIC FUEL PUMP: Yes FUEL INJECTION: Yes

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

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

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

VEHICLE MAKE/MODEL/BODY STYLE: Oldsmobile/Achieva/2-door coupe

VEHICLE NHTSA NO.: MN0106 ; VIN: 1G3NL1435NM414124

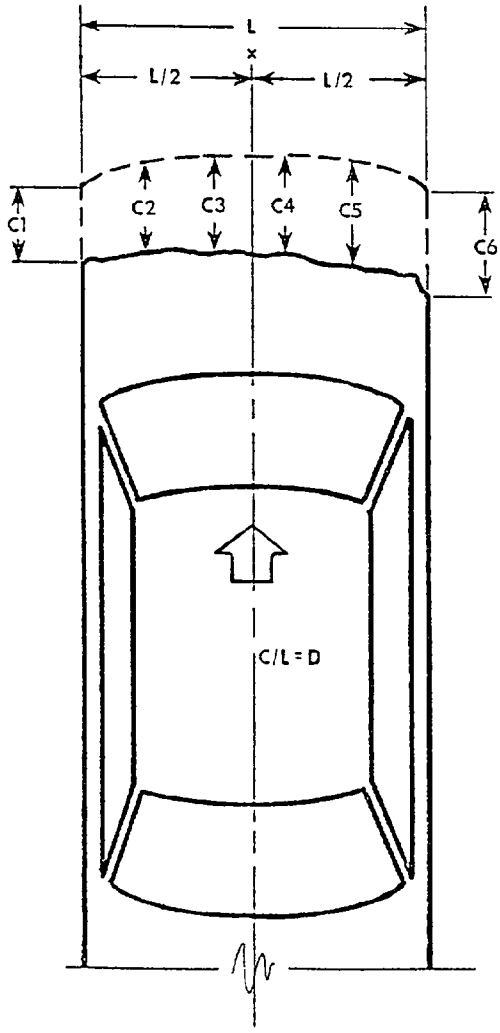
MODEL YEAR: 1992 ; BUILD DATE: 01/92 ; TEST DATE: 04/08/92

VEHICLE SIZE CATEGORY: Compact ; TEST WEIGHT: 3293 LBS.

VEHICLE WHEELBASE: 102.8 INCHES

MAXIMUM WIDTH: 68.5 INCHES

FRONT OVERHANG: 42.5 INCHES



COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW2

CRUSH DEPTH
MEASUREMENTS:

C1 = 16.7 INCHES

C2 = 19.1 INCHES

C3 = 19.8 INCHES

C4 = 19.9 INCHES

C5 = 19.8 INCHES

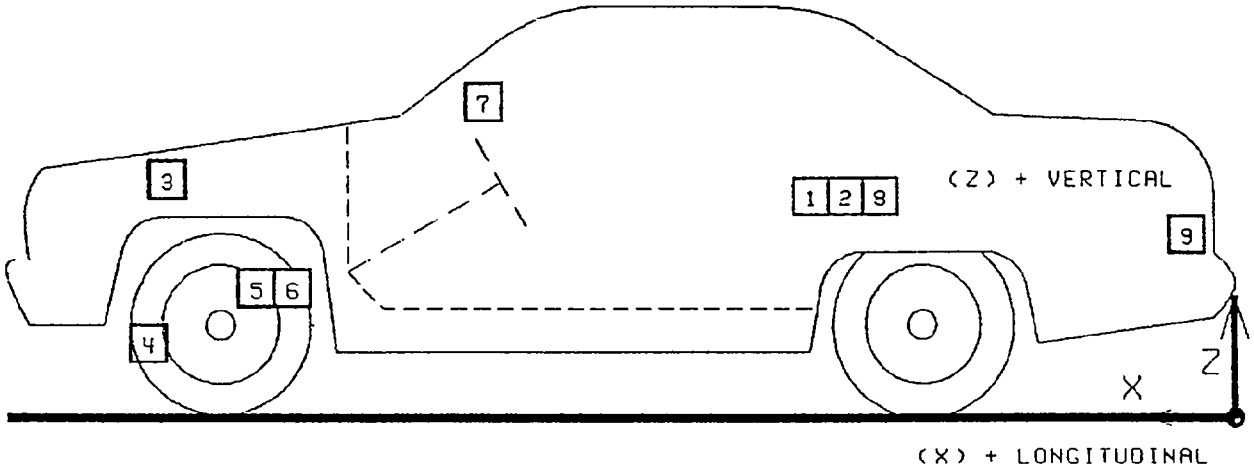
C6 = 20.0 INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

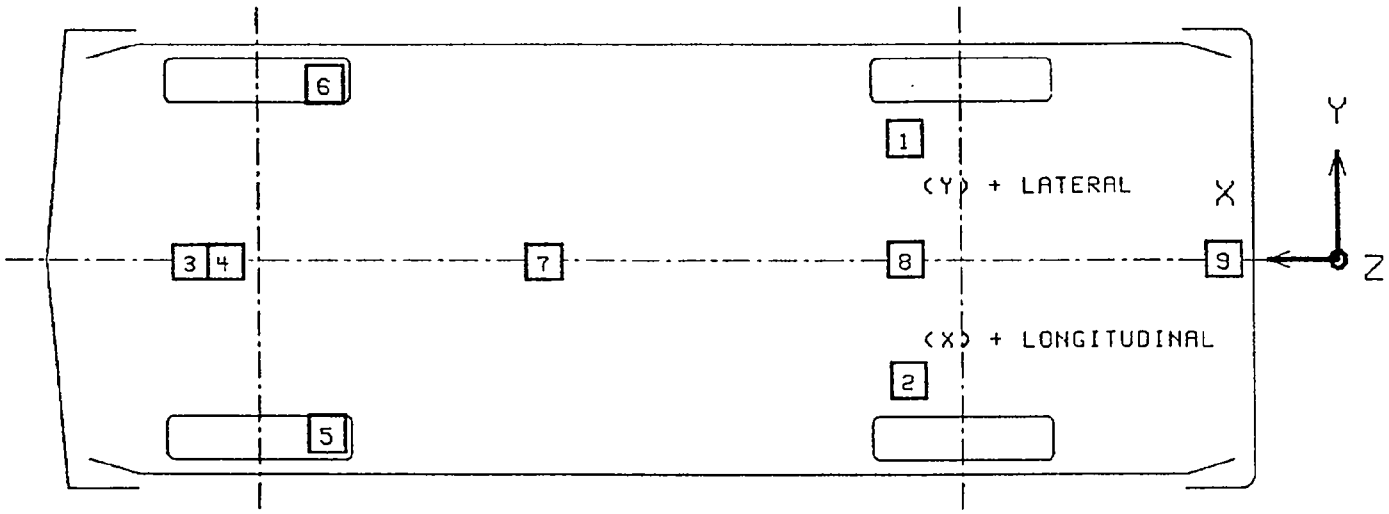
LENGTH OF DAMAGED
REGION: L = 52.4 INCHES

FIGURE 3

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 920408

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER	76.8	15.1	13.2				
	LONGITUDINAL				2.4	144.1	27.0	47.9
2	RIGHT REAR SEAT CROSSMEMBER	76.4	-15.0	13.5				
	LONGITUDINAL				3.2	144.4	29.1	50.5
3	ENGINE TOP	152.8	0.5	31.9				
	LONGITUDINAL				75.9	49.4Y	125.1	35.8Y
4	ENGINE BOTTOM	156.0	-1.0	6.4				
	LONGITUDINAL				26.9	47.8	134.1	38.8
5	RIGHT BRAKE CALIPER	141.2	-24.6	11.6				
	LONGITUDINAL				23.0	71.8	89.8	54.8
6	LEFT BRAKE CALIPER	141.2	24.6	12.1				
	LONGITUDINAL				35.1	77.8	68.6	60.6
7	INSTRUMENT PANEL CENTER	121.9	-0.5	37.1				
	LONGITUDINAL				39.3	75.0	59.1	54.9
8	REAR SEAT CROSSMEMBER CENTER	76.4	0.0	14.1				
	VERTICAL				17.5	43.9	10.8	72.0
9	VEHICLE REAR CENTER	10.4	0.0	18.8				
	VERTICAL				23.9	76.3	19.1	69.5

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

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

Y See DATA ACQUISITION EXPLANATIONS

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #713	PASSENGER #826
HEAD	Steering wheel hub	Sunvisor, chest
CHEST	Steering wheel lower rim	None
ABDOMEN	None	None
LEFT KNEE	Instrument panel	Instrument panel
RIGHT KNEE	Instrument panel	Instrument panel

DOOR OPENING:

	LEFT	RIGHT
FRONT	Easy	Easy
REAR	NA	NA

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	None
REAR	NA	NA

GLAZING DAMAGE:

The entire windshield cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

TABLE 7 FMVSS 208 DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1992/Oldsmobile/Achieva/2-door coupe

VEH. NHTSA NO.: MN0106 ; TEST DATE: 04/08/92

MAXIMUM ACCELERATIONS (G):	DRIVER DUMMY #713	PASSENGER DUMMY #826
HEAD X-AXIS	-229.3	-59.0
HEAD Y-AXIS	70.8	-18.4
HEAD Z-AXIS	-90.0	-51.0
HEAD RESULTANT	249.3	76.4
CHEST X-AXIS	-49.6	-39.5
CHEST Y-AXIS	10.6	-22.5
CHEST Z-AXIS	13.8	18.2
CHEST RESULTANT*	48.2	41.0
CHEST RESULTANT TIME INTERVAL (SEC.)*	.003	.003
HEAD INJURY CRITERIA (HIC) VALUES:		
HIC**	2021	343
HIC STARTING TIME (SEC.)	.092	.098
HIC ENDING TIME (SEC.)	.096	.134
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	184.4	39.0
MAXIMUM CHEST DEFLECTIONS (IN):		
CHEST X-AXIS	NA	NA
MAXIMUM CHEST DEFLECTION TIME (SEC.)	NA	NA
MAXIMUM COMPRESSIVE FEMUR FORCES (LBS):		
LEFT FEMUR	710	870
RIGHT FEMUR	1070	1239
MAXIMUM SEAT BELT FORCES (LBS):		
LAP BELT	640	383
SHOULDER BELT	2037	1700

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.

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 chest then impacted the lower steering wheel rim followed by the dummy's head rotating downward impacting the steering wheel hub. The driver dummy was restrained by the three-point passive belt. The dummy then rebounded rearward into the seat back as the dummy's head rotated rearward into the head restraint. The driver dummy came to rest in the driver's seat restrained by the three-point passive 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 upper torso and head rotated forward and slightly to the right with the dummy's head contacting the passenger's sunvisor and the dummy's chest. The right front passenger dummy was restrained by the three-point passive belt. The dummy then rebounded rearward into the seat back, still slightly rotated to the right, as the dummy's head rotated rearward into the head restraint. The right front passenger dummy came to rest in the right front passenger's seat restrained by the three-point passive belt.

TABLE 8 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	DRIVER	PASSENGER
BELT LENGTH DATA:		
BELT LENGTH FROM TRIM PANEL EXIT TO BOLT HOLE ANCHOR POINT FOR CONTINUOUS WEBBING SYSTEMS.	148.5	147.0
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	40.0	40.0
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	22.0	23.8
SHOULDER BELT SPOOL-OFF LENGTH:		
AS DETERMINED BY FILM ANALYSIS	1.0	2.0
AS DETERMINED MECHANICALLY	1.5	2.0
AS DETERMINED ELECTRONICALLY	2.0	2.7
BELT STRETCH LENGTH (IN/FT):		
AS MEASURED MECHANICALLY	0.1	0.1
AS MEASURED ELECTRONICALLY	0.0	0.0
RETRACTOR LOCK-UP TIME (MS):		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	84	130

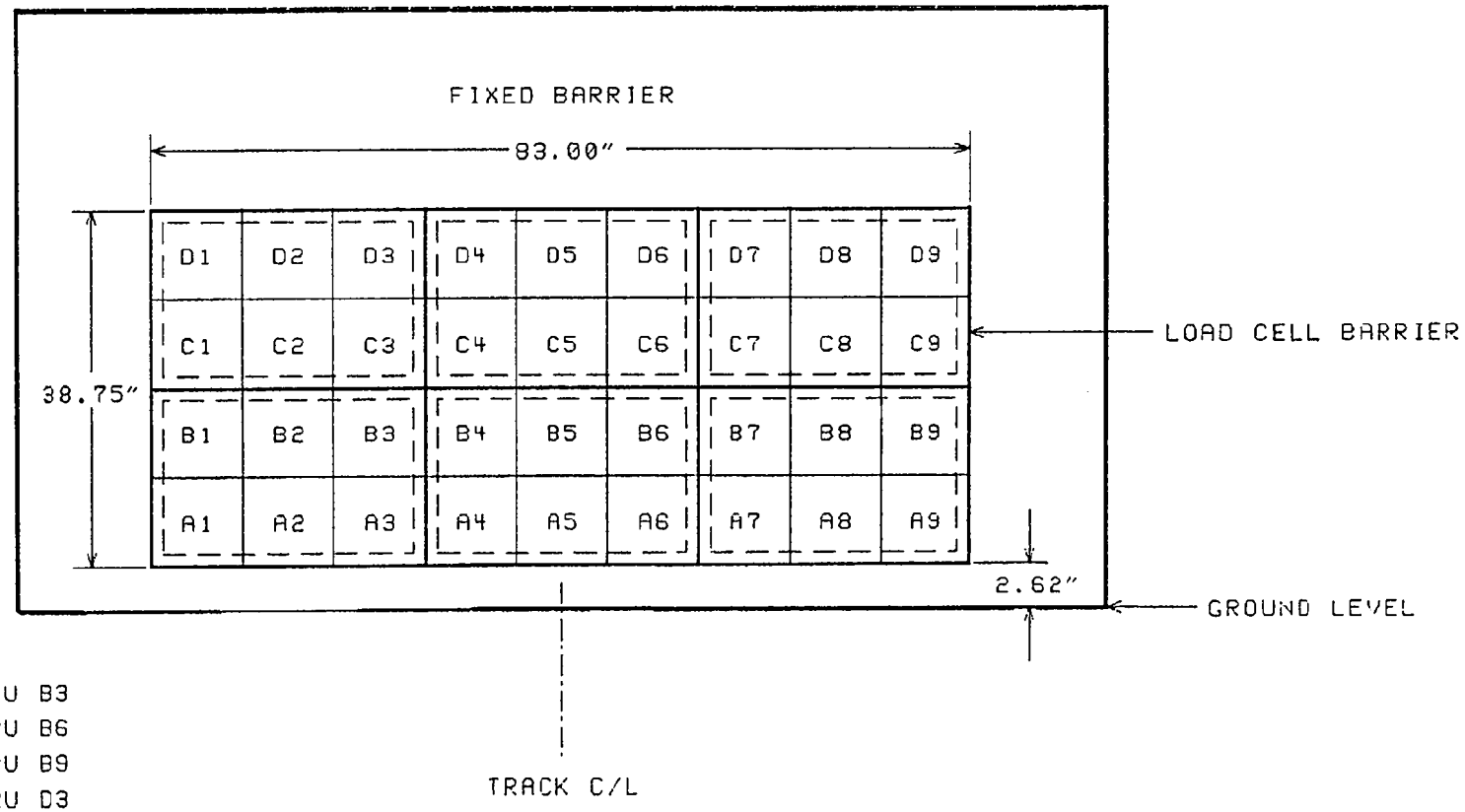
ALL MEASUREMENTS ARE IN INCHES UNLESS OTHERWISE NOTED.

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 9

LOAD CELL BARRIER DATA SUMMARY

TEST NUMBER 920408

LOCATION	POSITIVE DIRECTION LB	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION LB	NEGATIVE DIRECTION MSEC
TOTAL GROUP 1	235	164.4	12204	34.6
TOTAL GROUP 2	156	336.4	57722	36.5
TOTAL GROUP 3	285	3.1	29464	37.4
TOTAL GROUP 4	332	173.3	6489	31.1
TOTAL GROUP 5	317	2.9	17546	39.0
TOTAL GROUP 6	407	171.9	6903	29.4
TOTAL LOAD CELL FORCE	1168	336.1	122990	36.5

TENSION IS POSITIVE
COMPRESSION IS NEGATIVE

SECTION 3.0

OCCUPANT, CAMERA, & VEHICLE MEASUREMENTS

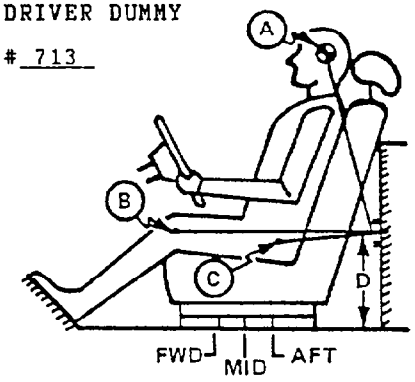
FIGURE 5 DUMMY AND SEAT POSITIONING DATA

TEST NO.: 920408 ; VEHICLE: Oldsmobile/Achieva

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

DRIVER DUMMY

713

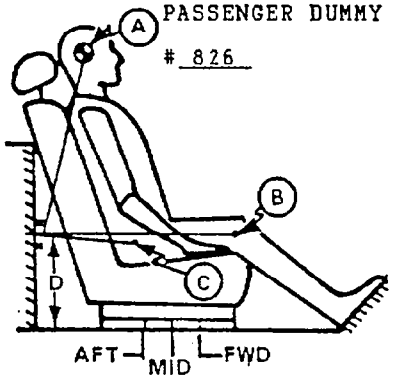


MEASUREMENT LOCATION

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

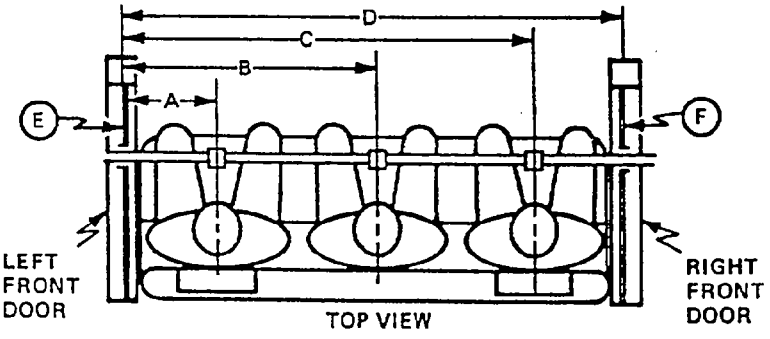
PASSENGER DUMMY

826



A =	23.5	IN.	32	DEGREES	
B =	35.6	IN.	92	DEGREES	
C =	21.3	IN.	117	DEGREES	
D =	10.9	IN.			
SEAT TRACK REARWARD:	12	NOTCHES			

A =	23.3	IN.	30	DEGREES	
B =	35.2	IN.	92	DEGREES	
C =	21.0	IN.	104	DEGREES	
D =	10.9	IN.			
SEAT TRACK REARWARD:	11	NOTCHES			



A = LEFT DOOR TO DRIVER CENTERLINE	12.8	IN.
B = LEFT DOOR TO CENTER PASSENGER CENTERLINE	NA	IN.
C = LEFT DOOR TO RIGHT PASSENGER CENTERLINE	39.2	IN.
D = LEFT DOOR TO RIGHT DOOR	50.8	IN.
E,F = WINDOW GLASS HEIGHT (RIGHT AND LEFT MUST BE EQUAL)	9.2	IN.

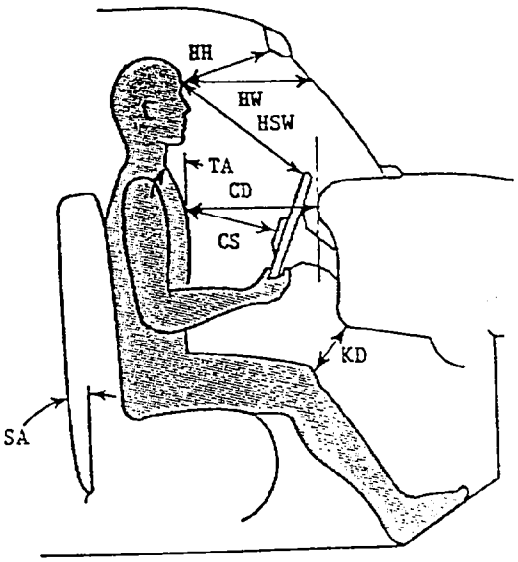
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

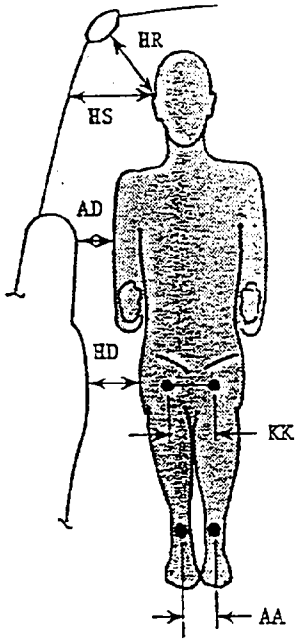
FIGURE 6 DUMMY IN-VEHICLE POSITIONING DATA

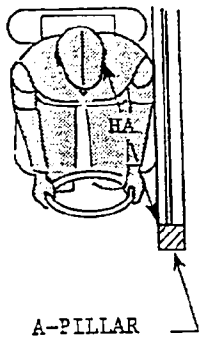
	DRIVER	PASSENGER
HH	13.8	14.3
HW	21.4	19.6
CD	20.5	21.3
CS	13.9	NA
KDL	5.1	5.2
KDR	5.9	5.4
TA	24°	25°
SA	20°	20°
HSW	19.5	NA

	DRIVER	PASSENGER
HR	5.5	4.8
HS	7.6	7.6
AD	4.3	3.9
HD	4.1	3.2
KK	10.2	8.0
AA	11.5	8.2
HA	20.7	20.4

KNEE OUTER BOLT HEAD TO OUTER BOLT HEAD SPACING:
PASSENGER = 14.5
DRIVER = 11.8





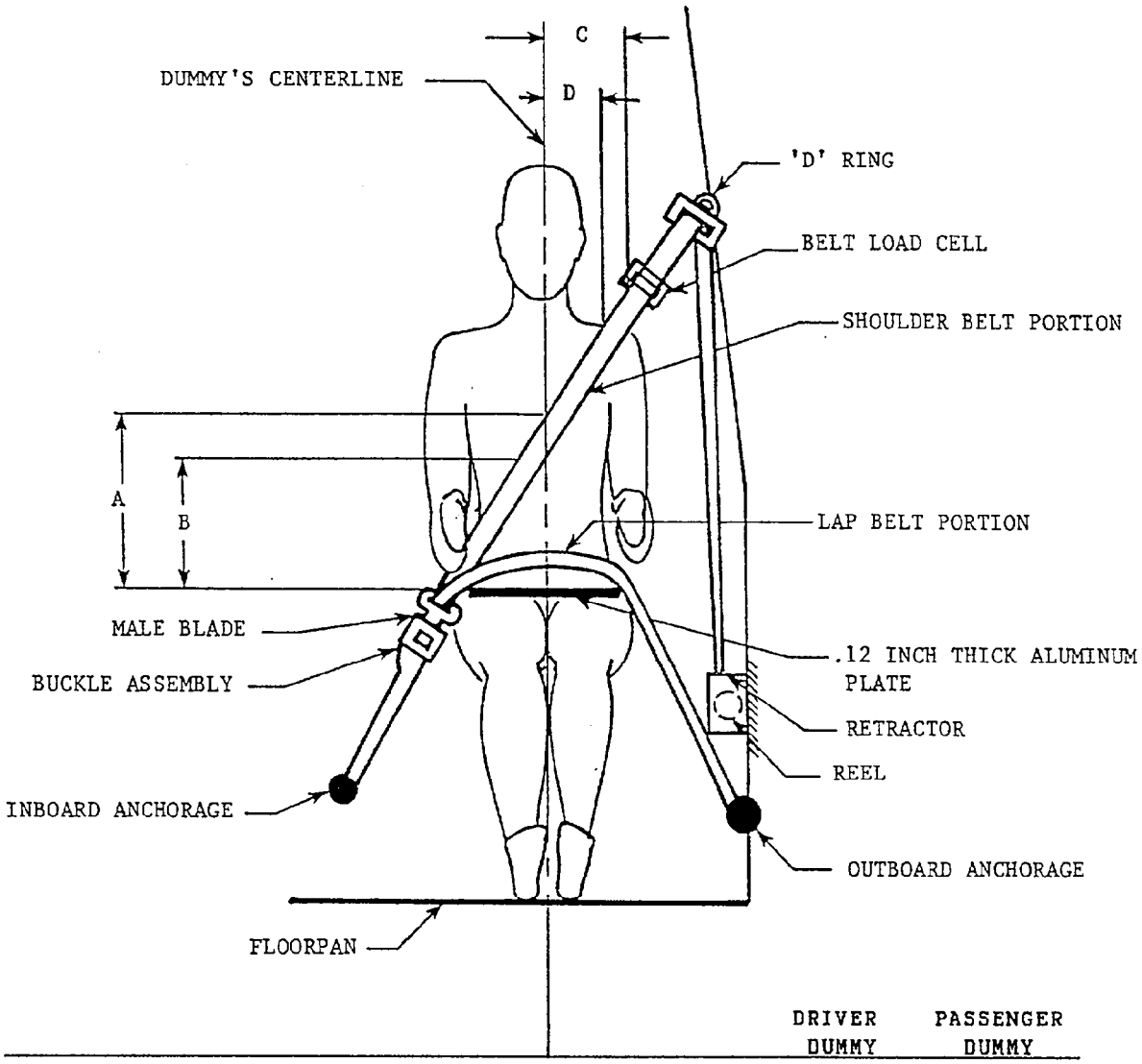


HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW= HEAD TO STEERING WHEEL

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.

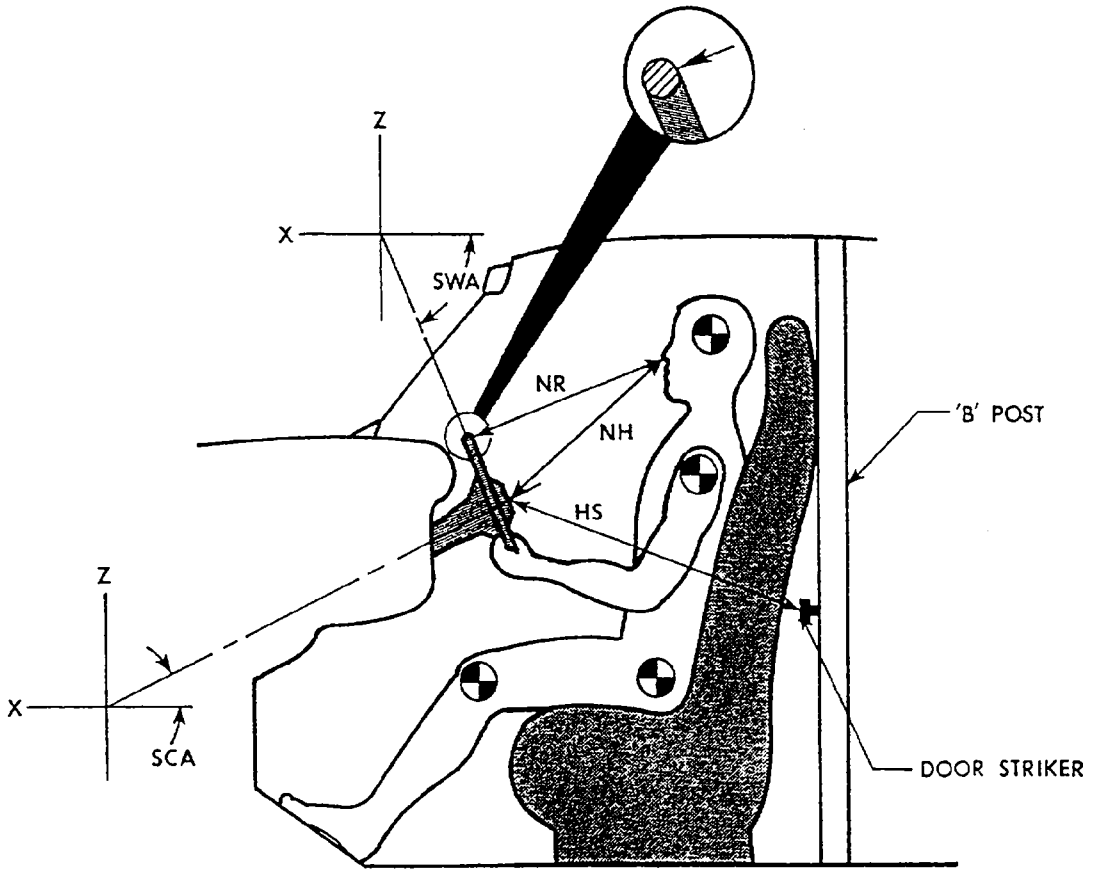
FIGURE 7 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	15.3	14.6
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	11.9	11.0
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	6.8	5.0
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	4.0	2.8

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 8 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY: The steering column was placed in the third of the possible five adjustment positions.

	MEASUREMENTS
NR - DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	17.6
NH - DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	19.4
HS - DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	34.6
SCA - ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	19°
SWA - ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	68°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9

CAMERA POSITIONS

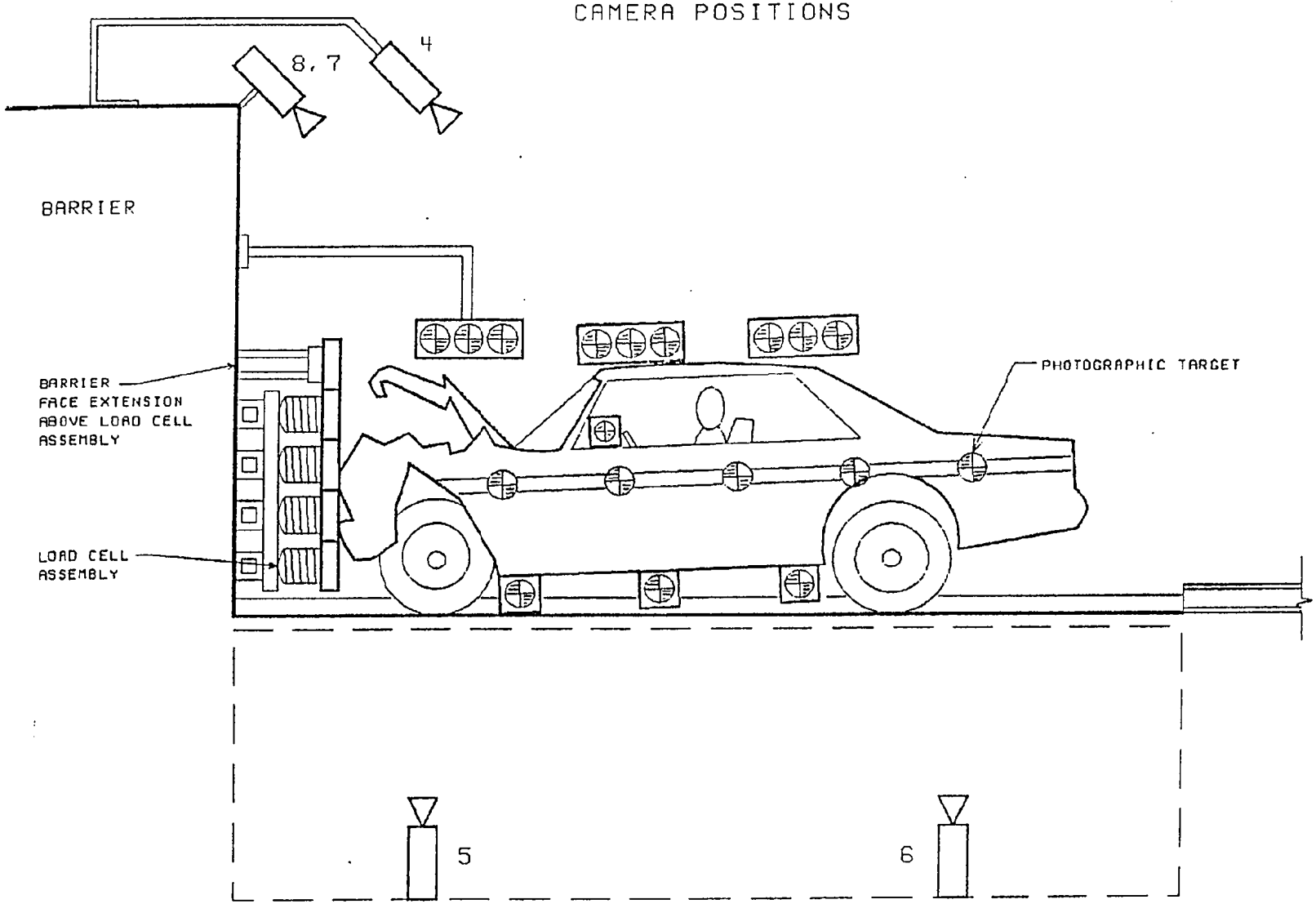


FIGURE 9

CAMERA POSITIONS, CONTINUED

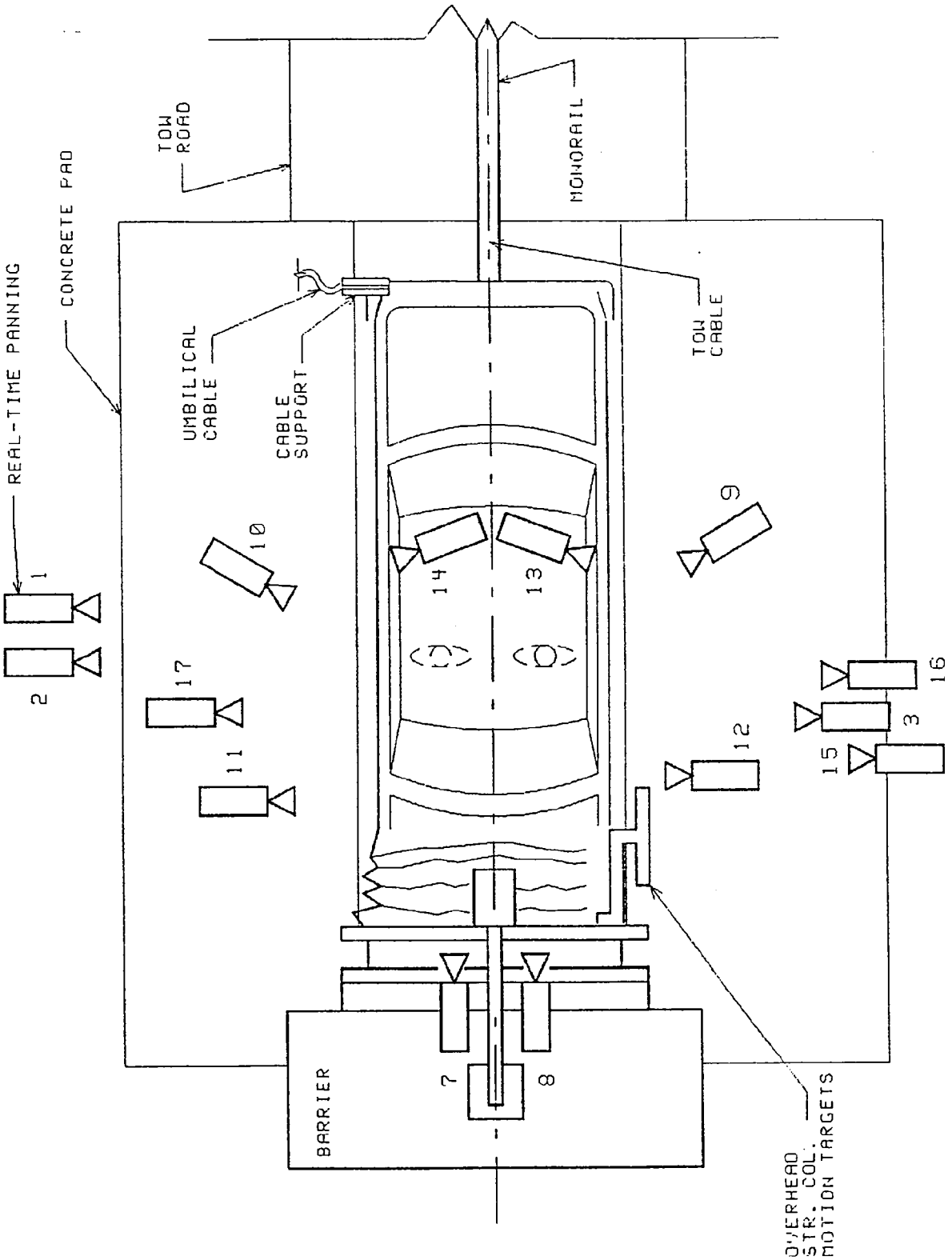


TABLE 10 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 920408 VEHICLE: 1992 Oldsmobile Achieva

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)* X	Y	Z	ANGLE** (DEG)	FILM PLANE TO HEAD TARGET (IN)	LENS (MM)	FILM SPEED (FPS)
1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24
2	Vehicle crush	-81.3	-266.4	37.1	-2	NA	13	500
3	Dummy kinematics	-41.5	295.0	44.0	-12	213.0	25	1002
4	Windshield damage	-36.4	0.0	98.0	-40	NA	13	500
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1000
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	998
7	Passenger kinematics	-4.5	-13.8	85.0	-40	NA	17	503
8	Driver kinematics	-6.8	14.5	85.0	-41	NA	17	495
9	Driver kinematics	-180.0	73.0	102.0	-27	101.0	25	500
10	Passenger kinematics	-184.0	-74.0	100.0	-26	82.0	25	500
11	Windshield intrusion	-38.1	-306.1	44.0	0	NA	50	500
12	Windshield intrusion	-53.0	309.4	42.3	0	NA	50	513
13	Driver seatbelt movement	NA	NA	NA	NA	NA	13	1005
14	Passenger seatbelt movement	NA	NA	NA	NA	NA	13	998
15	Column movement	-126.0	286.0	103.0	-14	NA	25	505
16	Column movement	-126.0	286.0	75.1	-9	NA	25	500
17	Passenger kinematics	-38.8	-210.8	45.3	7	219.0	25	1020

*+X = Film plane forward of barrier face

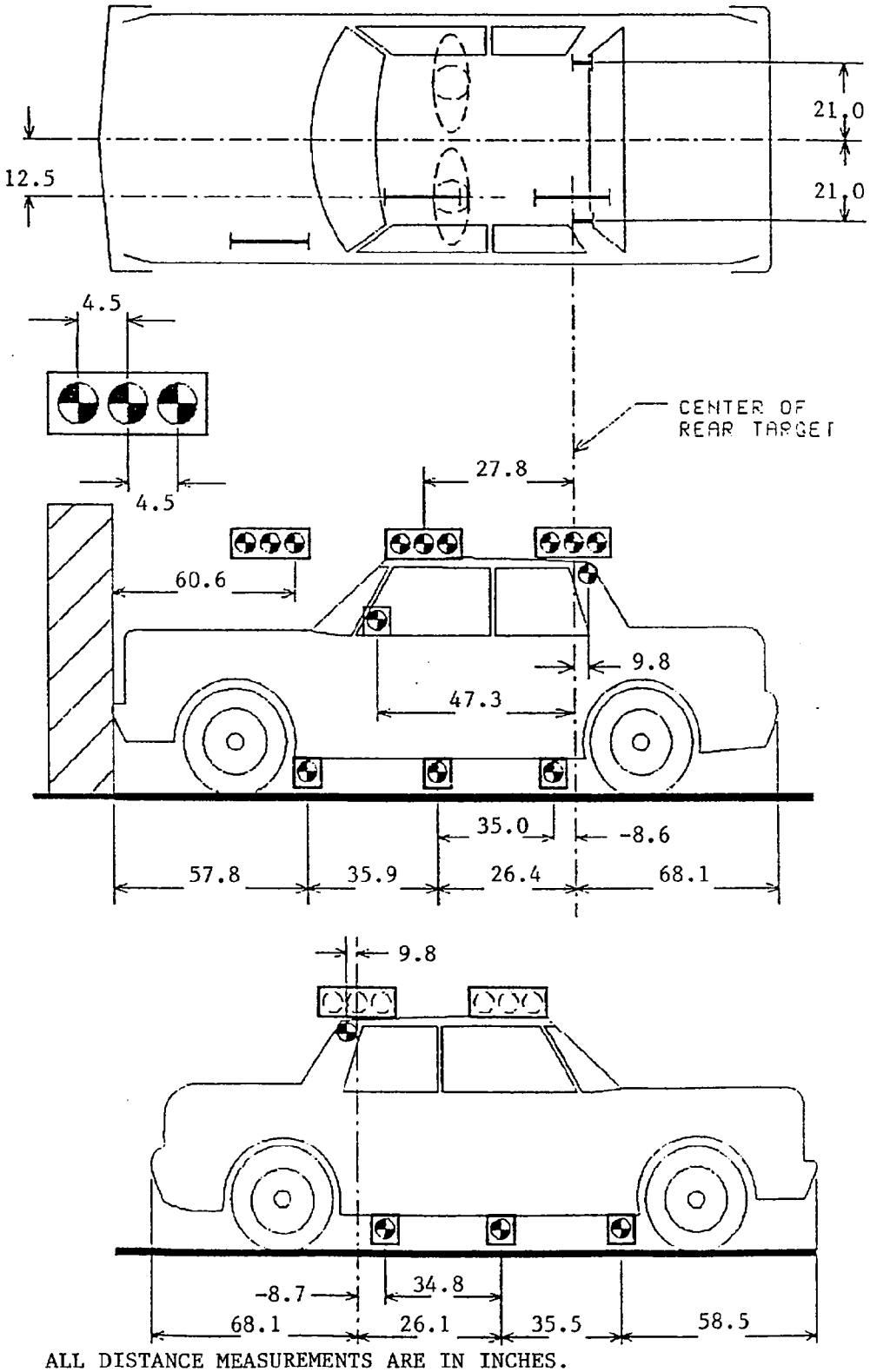
+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

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

FIGURE 10

VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 11

PRE-TEST AND POST-TEST MEASUREMENT POINTS

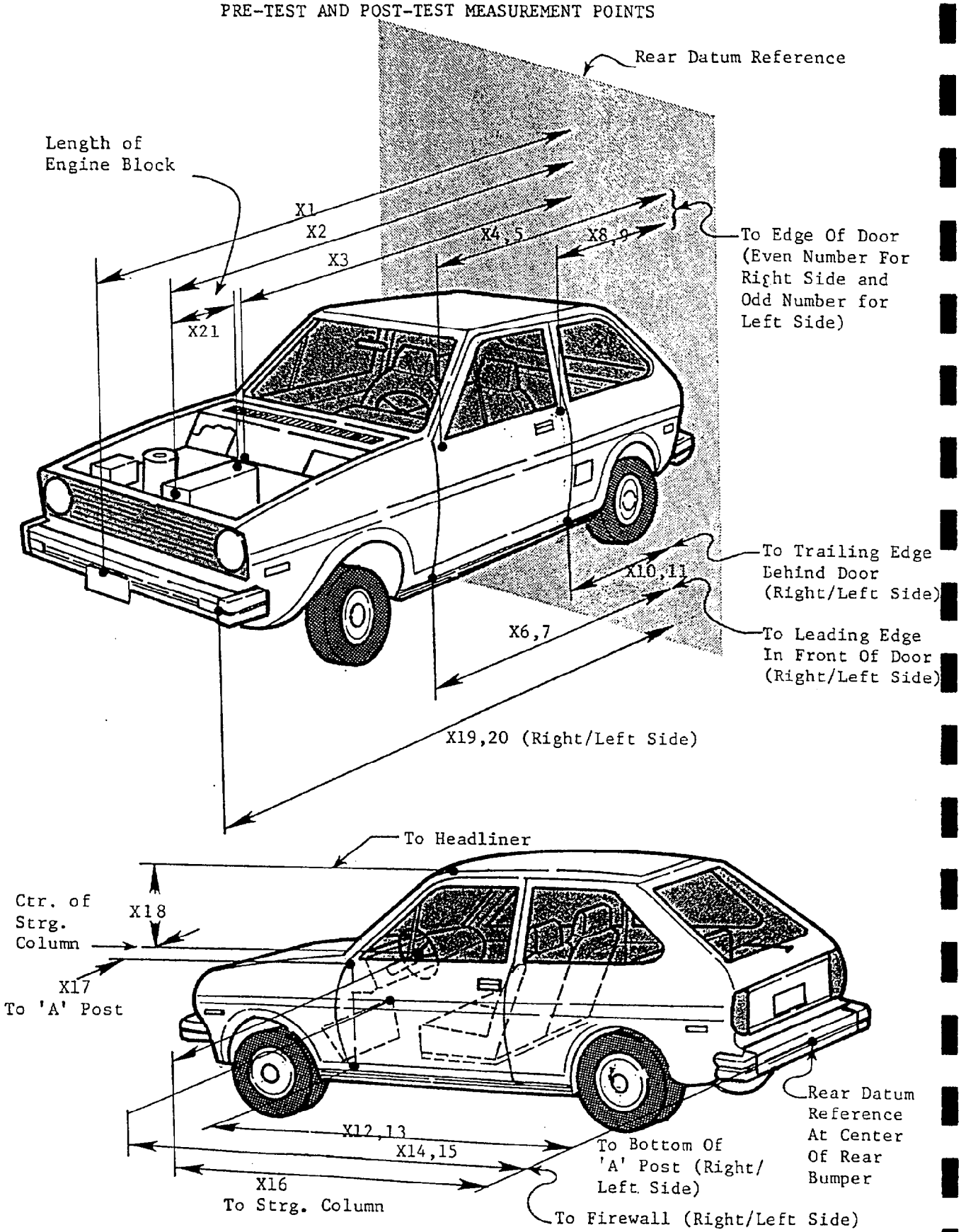


TABLE 11 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Oldsmobile/Achieva TEST NUMBER: 920408

ALL MEASUREMENTS ARE IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	188.2	168.5	19.7
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	156.2	144.2	12.0
X3	REAR SURFACE OF VEHICLE TO FIREWALL	135.8	133.5	2.3
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	125.6	126.1	-0.5
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	125.8	126.4	-0.6
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	124.9	124.6	0.3
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	125.6	125.4	0.2
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	73.0	73.5	-0.5
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	73.1	73.6	-0.5
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	72.5	72.1	0.4
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	72.8	72.5	0.3
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	123.1	123.5	-0.4
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	124.5	124.0	0.5
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	134.8	134.2	0.6
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	135.8	133.4	2.4
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	110.5	108.5	2.0
X17	CENTER OF STEERING COLUMN TO "A" POST	11.5	9.2	2.3
X18	CENTER OF STEERING COLUMN TO HEADLINER	16.2	12.5	3.7
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	181.2	161.2	20.0
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	180.8	164.1	16.7
X21	LENGTH OF ENGINE BLOCK	19.5	19.5	0.0

APPENDIX A

PHOTOGRAPHS

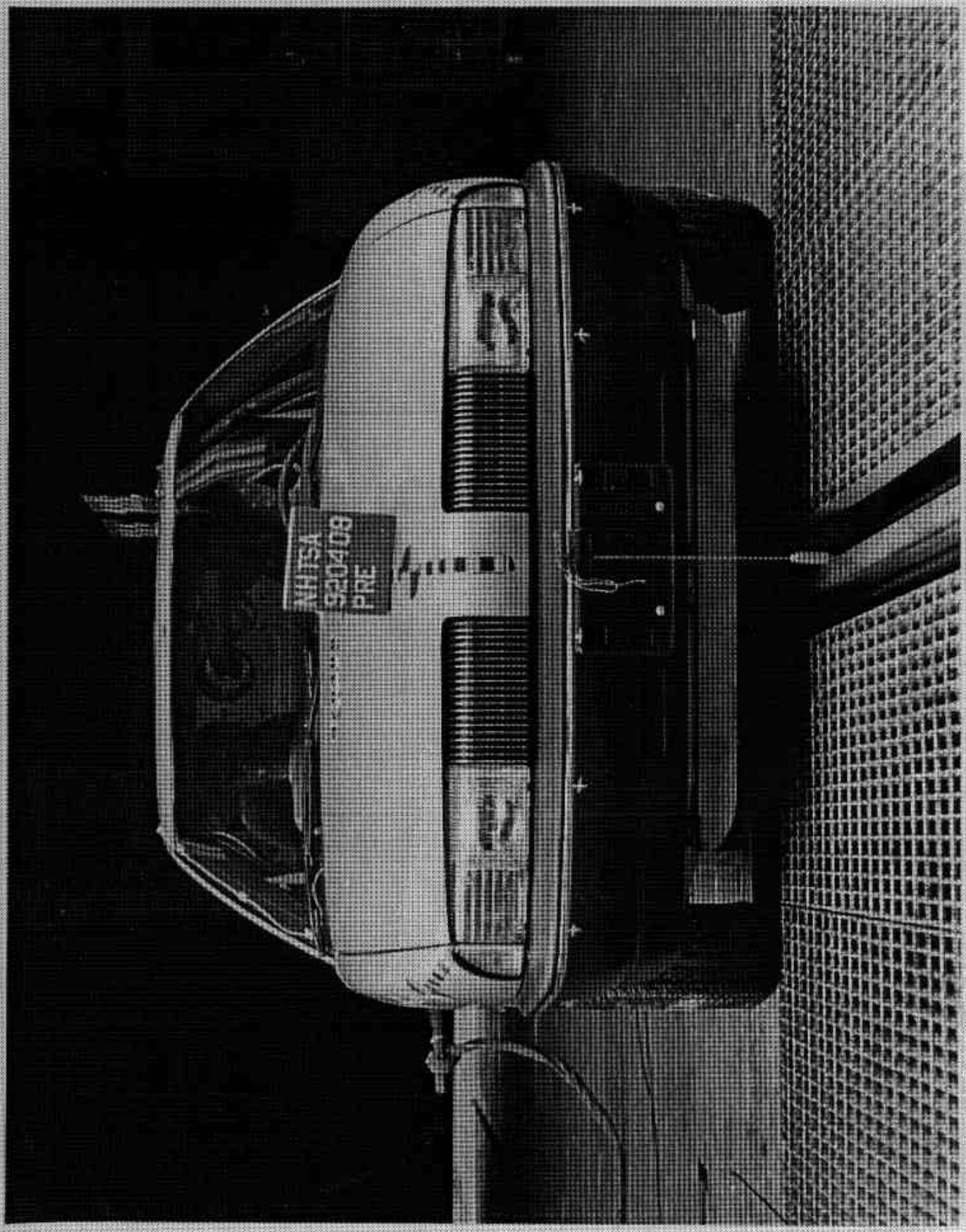


FIGURE A-1. PRE-TEST FRONT VIEW

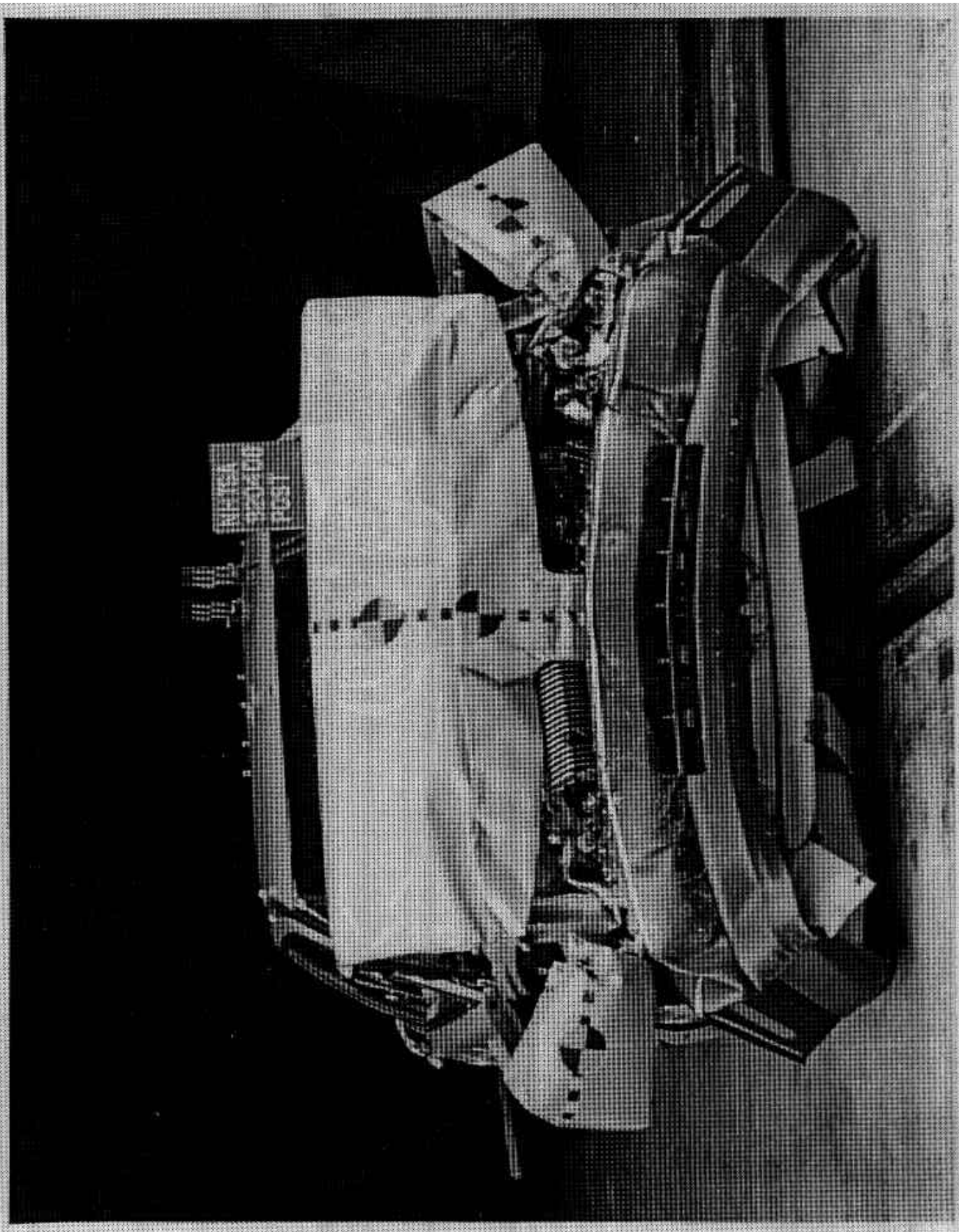


FIGURE A-2. POST-TEST FRONT VIEW

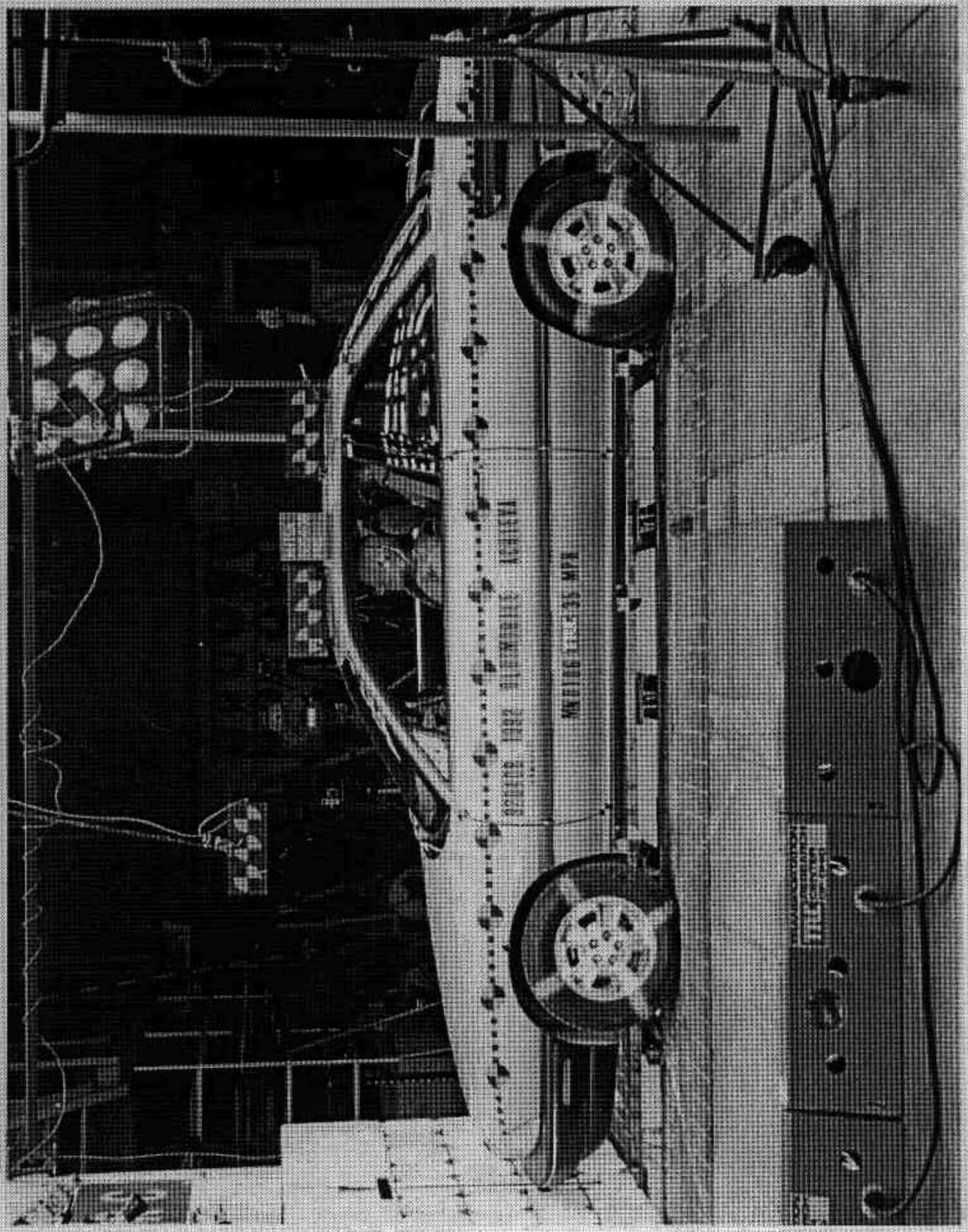


FIGURE A-3. PRE-TEST LEFT SIDE VIEW

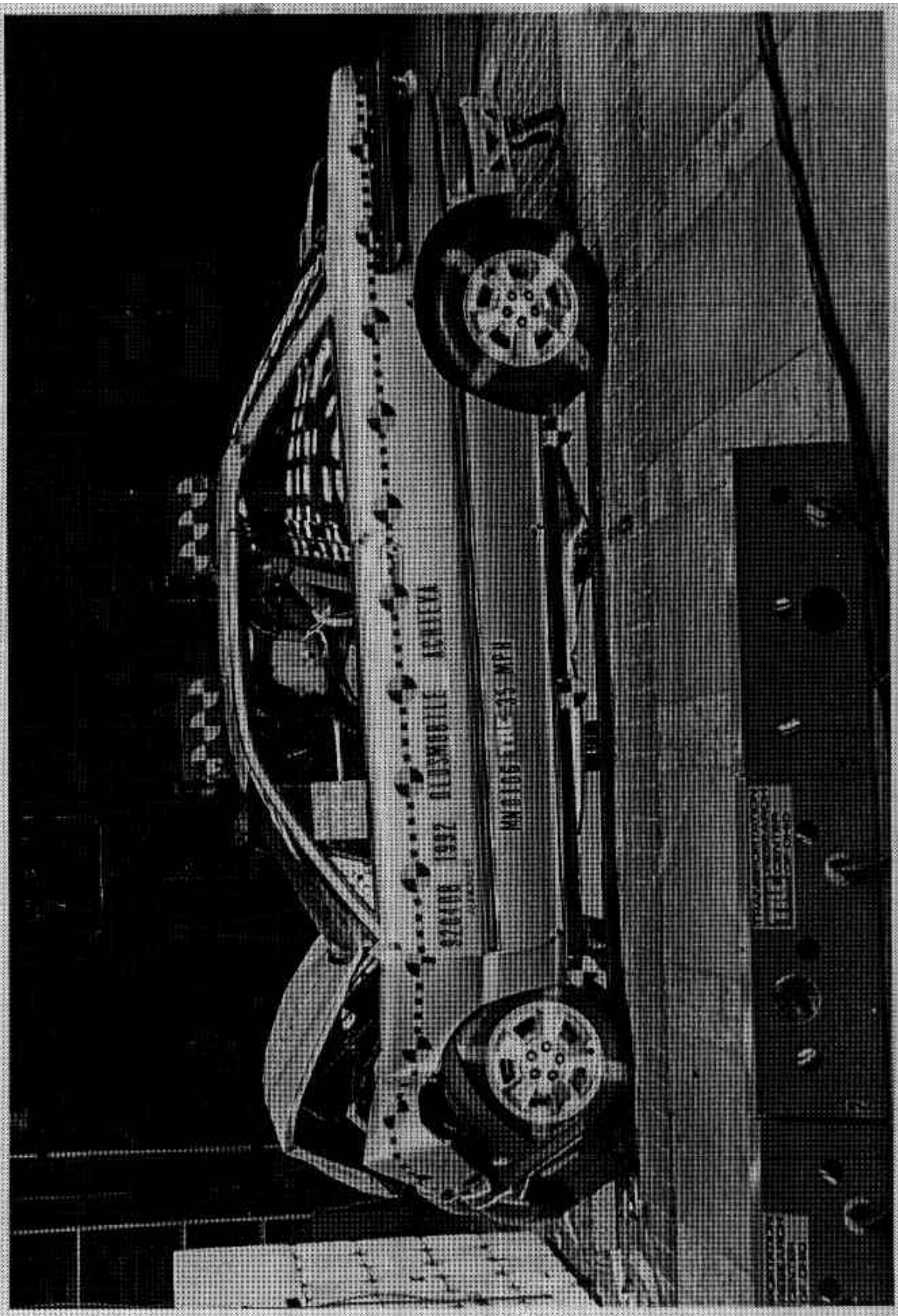


FIGURE A-4. POST-TEST LEFT SIDE VIEW

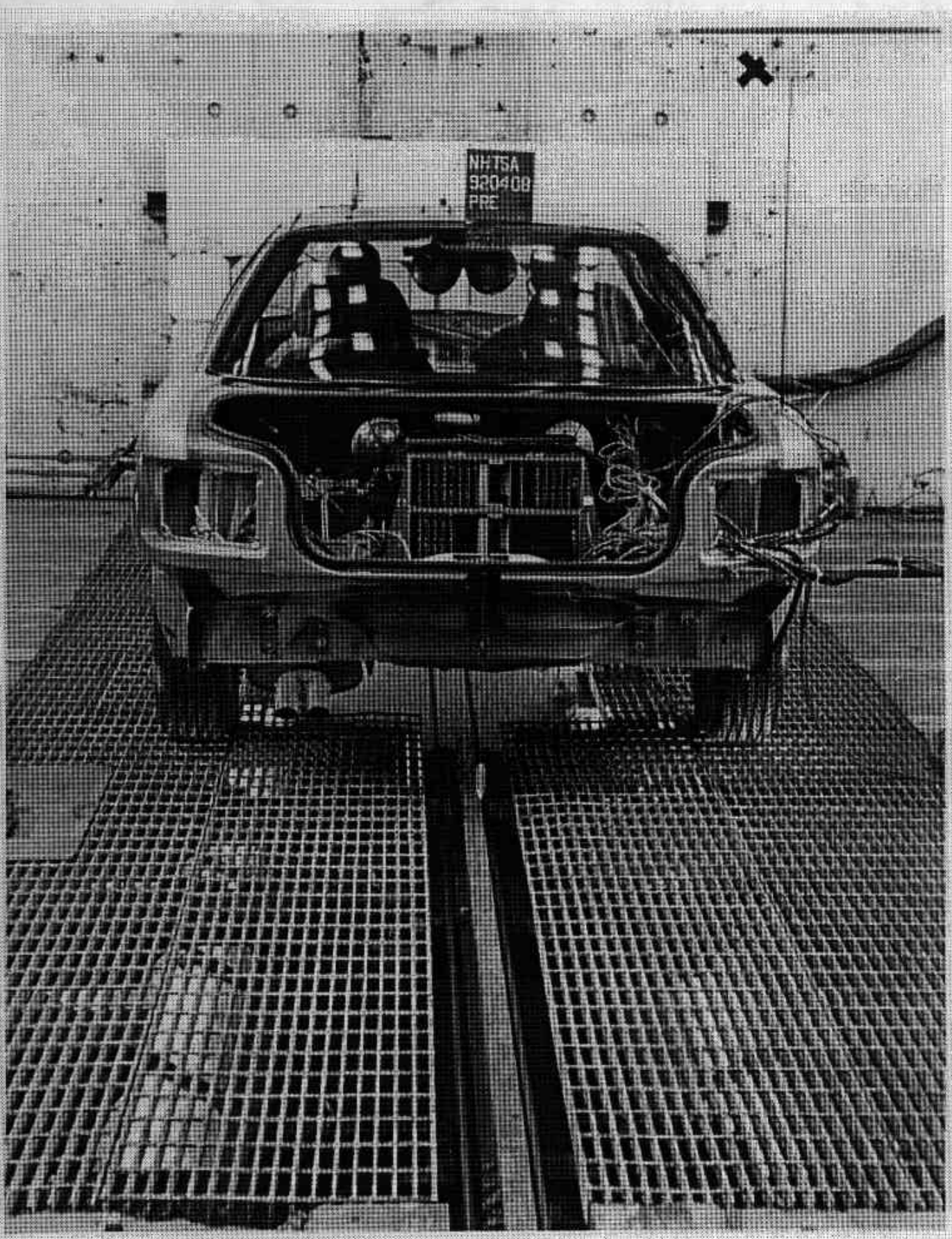


FIGURE A-5. PRE-TEST REAR VIEW

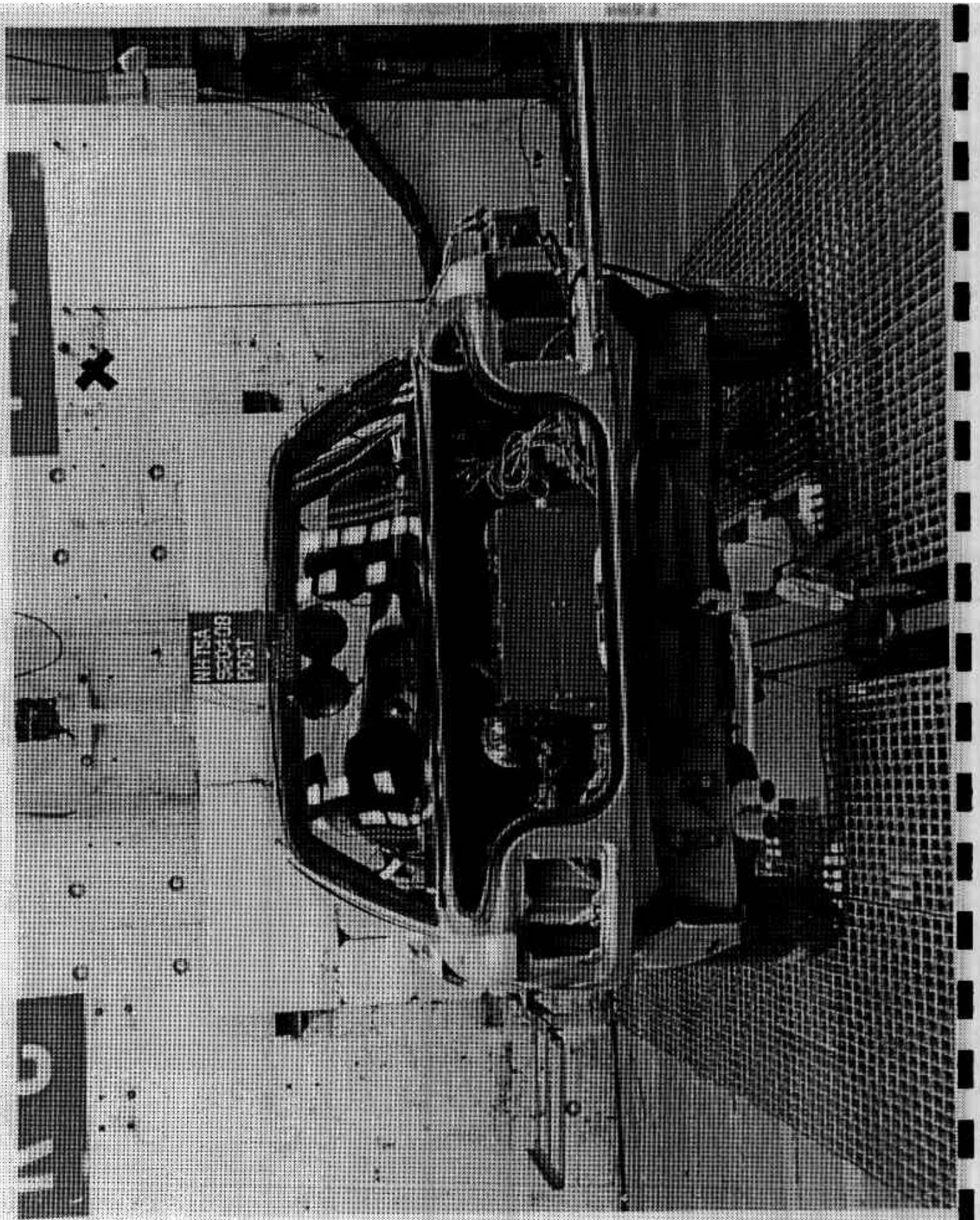


FIGURE A-6. POST-TEST REAR VIEW

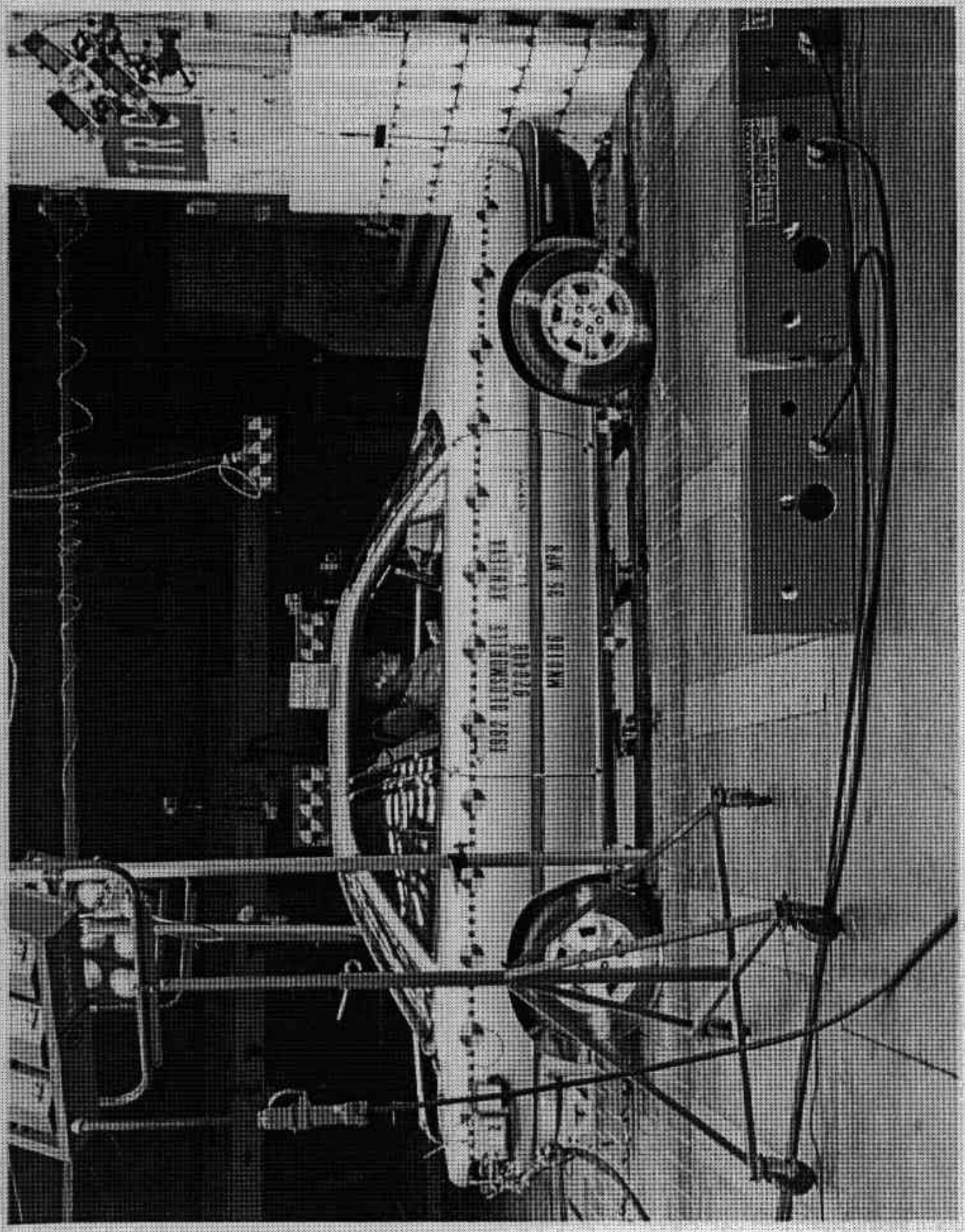


FIGURE A-7. PRE-TEST RIGHT SIDE VIEW

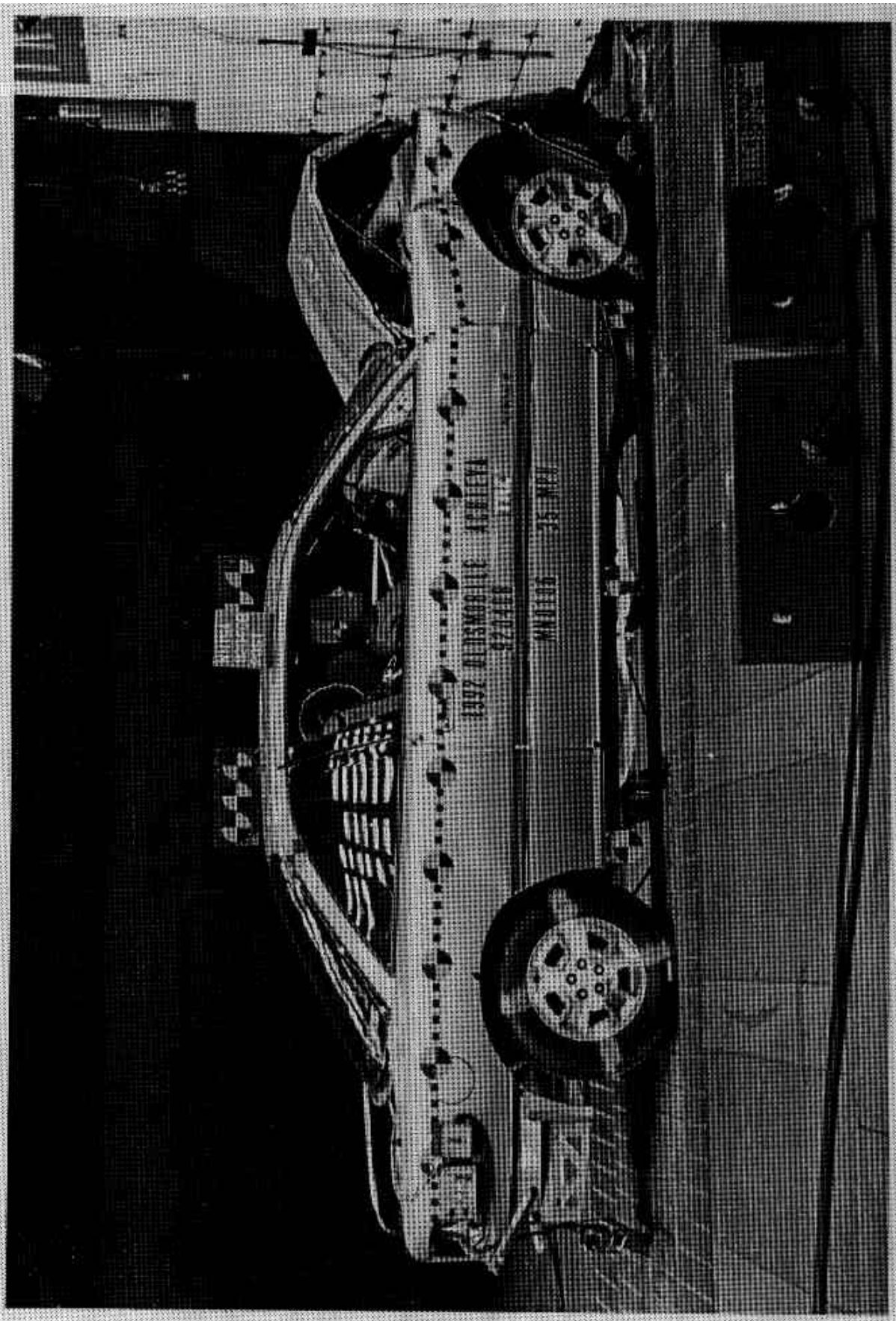


FIGURE A-8. POST-TEST RIGHT SIDE VIEW

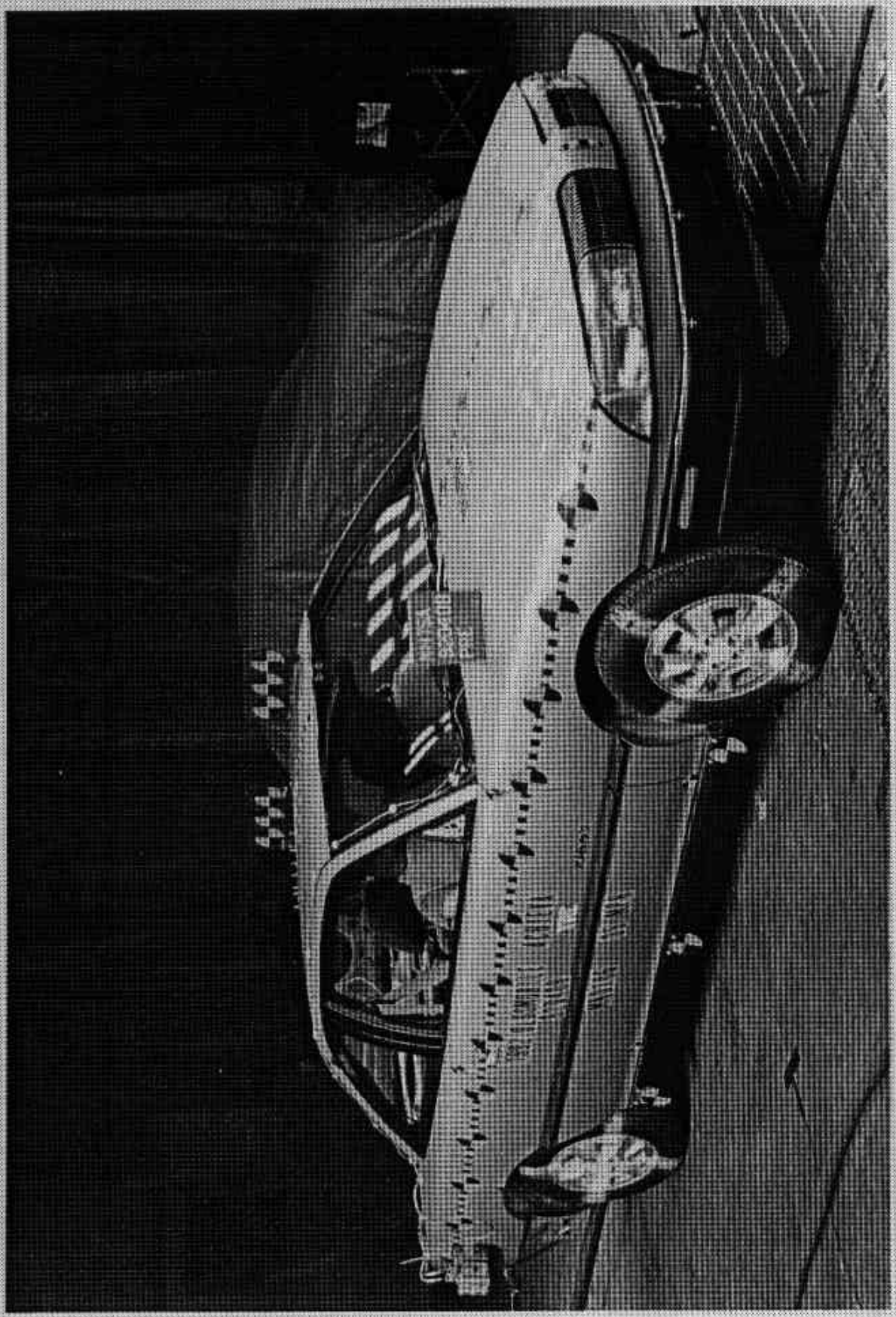


FIGURE A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

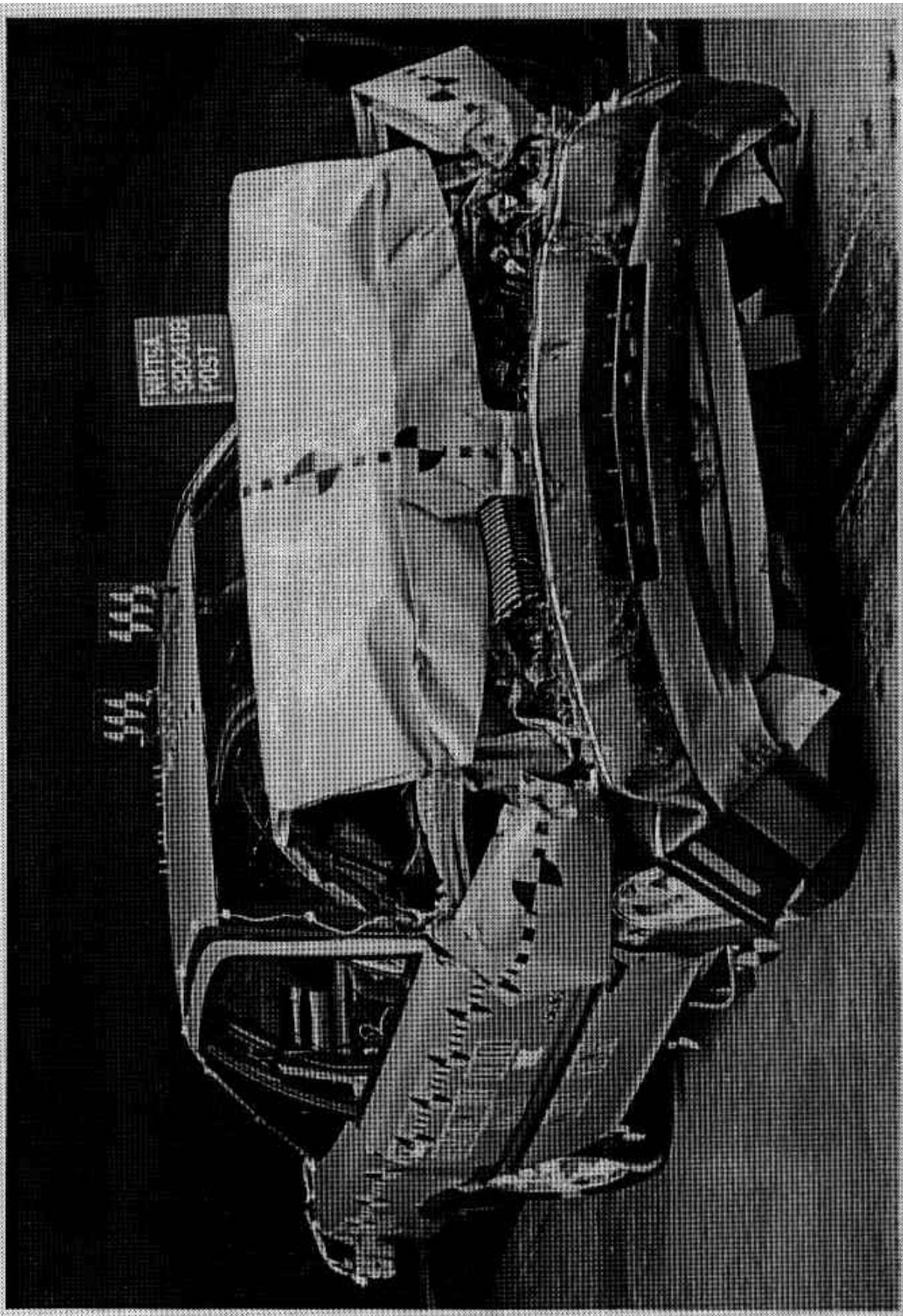


FIGURE A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

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

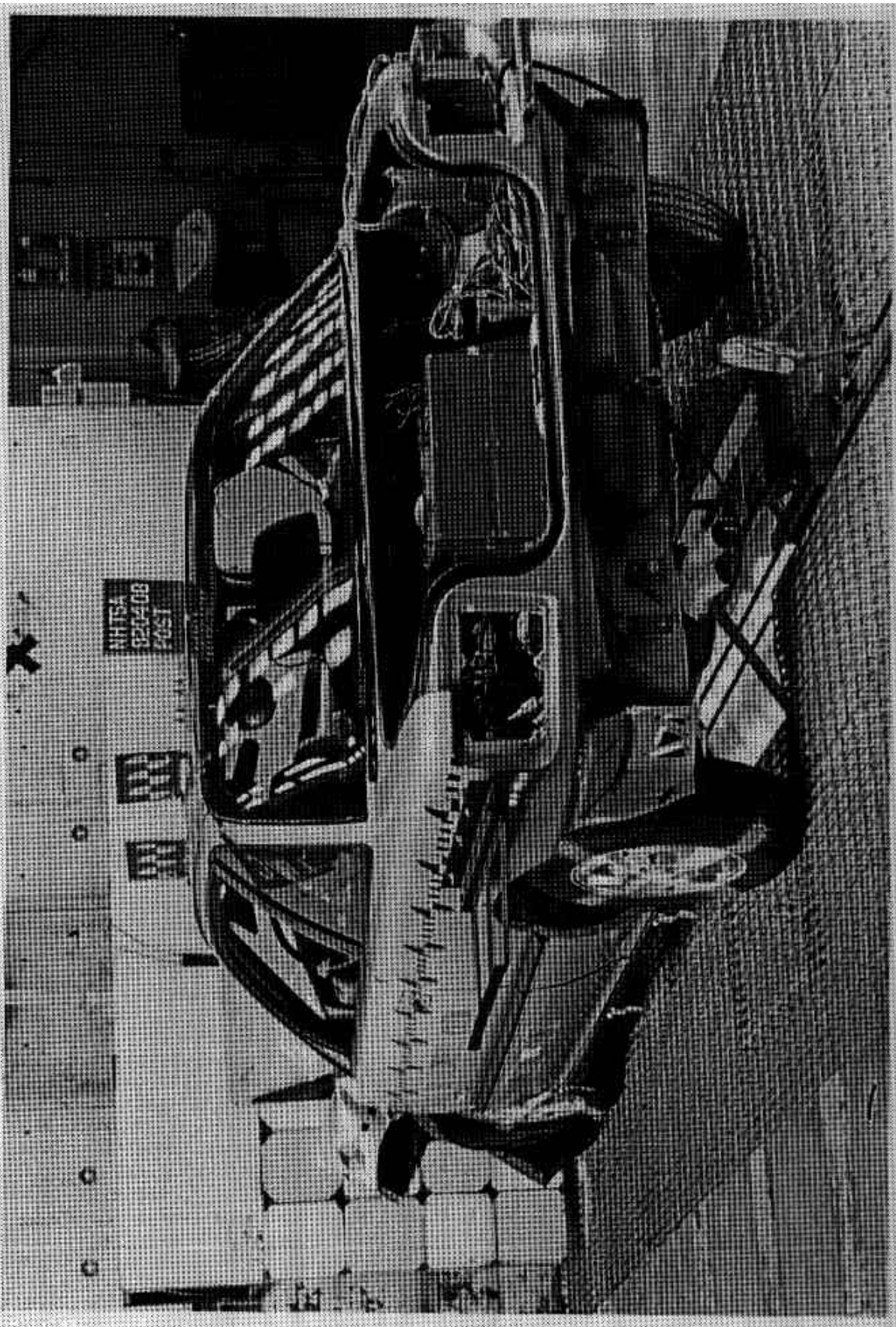


FIGURE A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

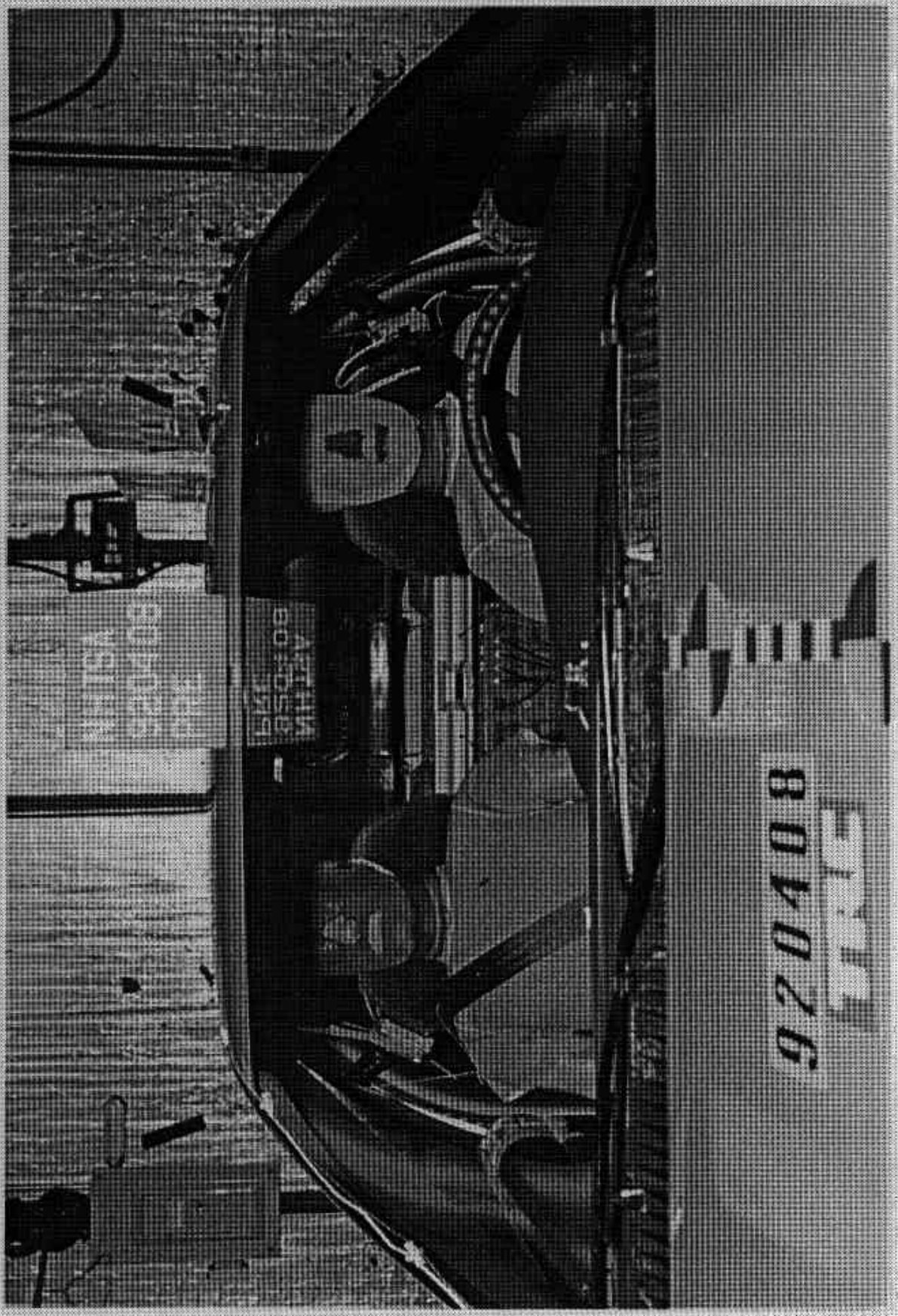


FIGURE A-13. PRE-TEST WINDSHIELD VIEW

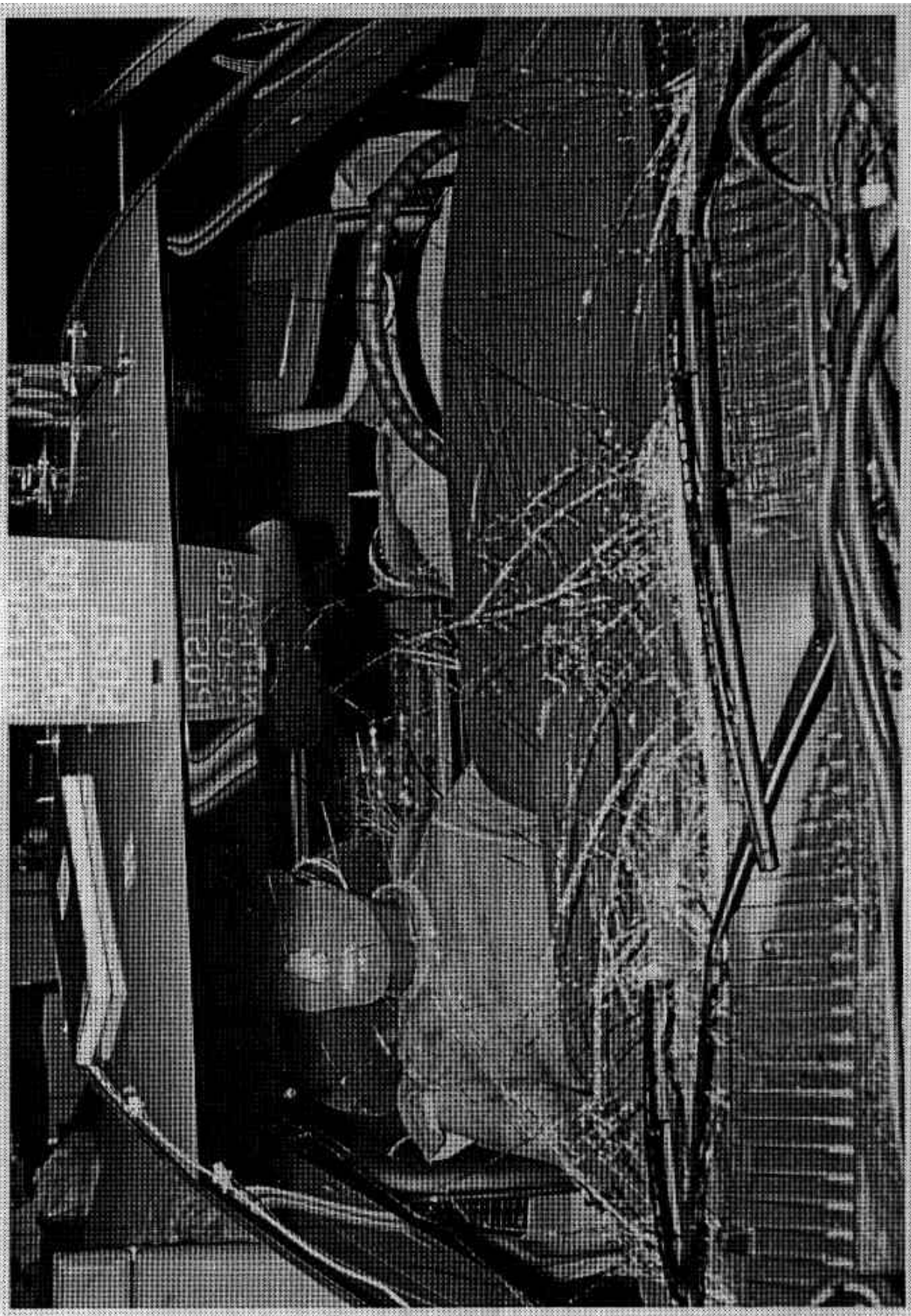


FIGURE A-14. POST-TEST WINDSHIELD VIEW

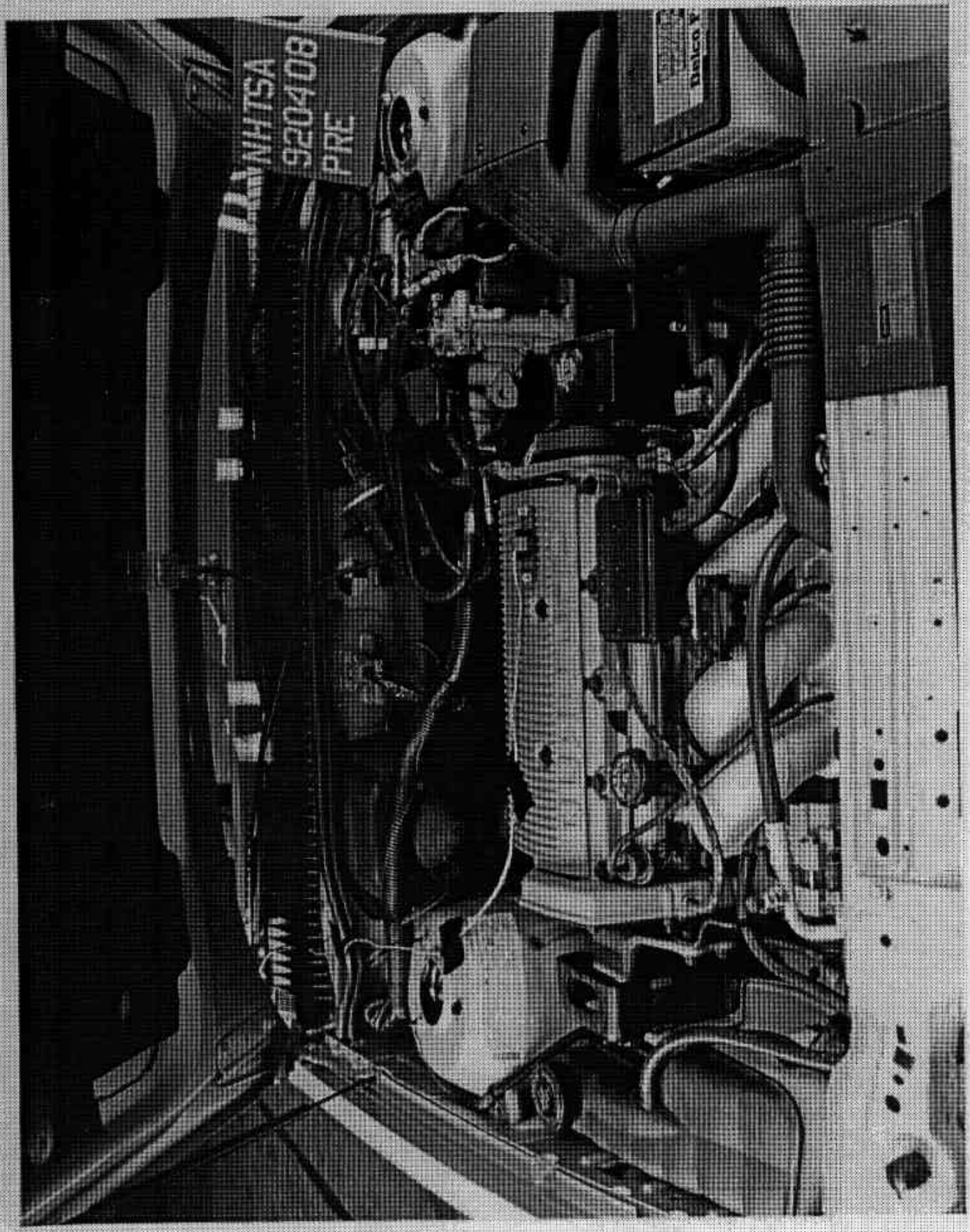


FIGURE A-15. PRE-TEST ENGINE COMPARTMENT VIEW

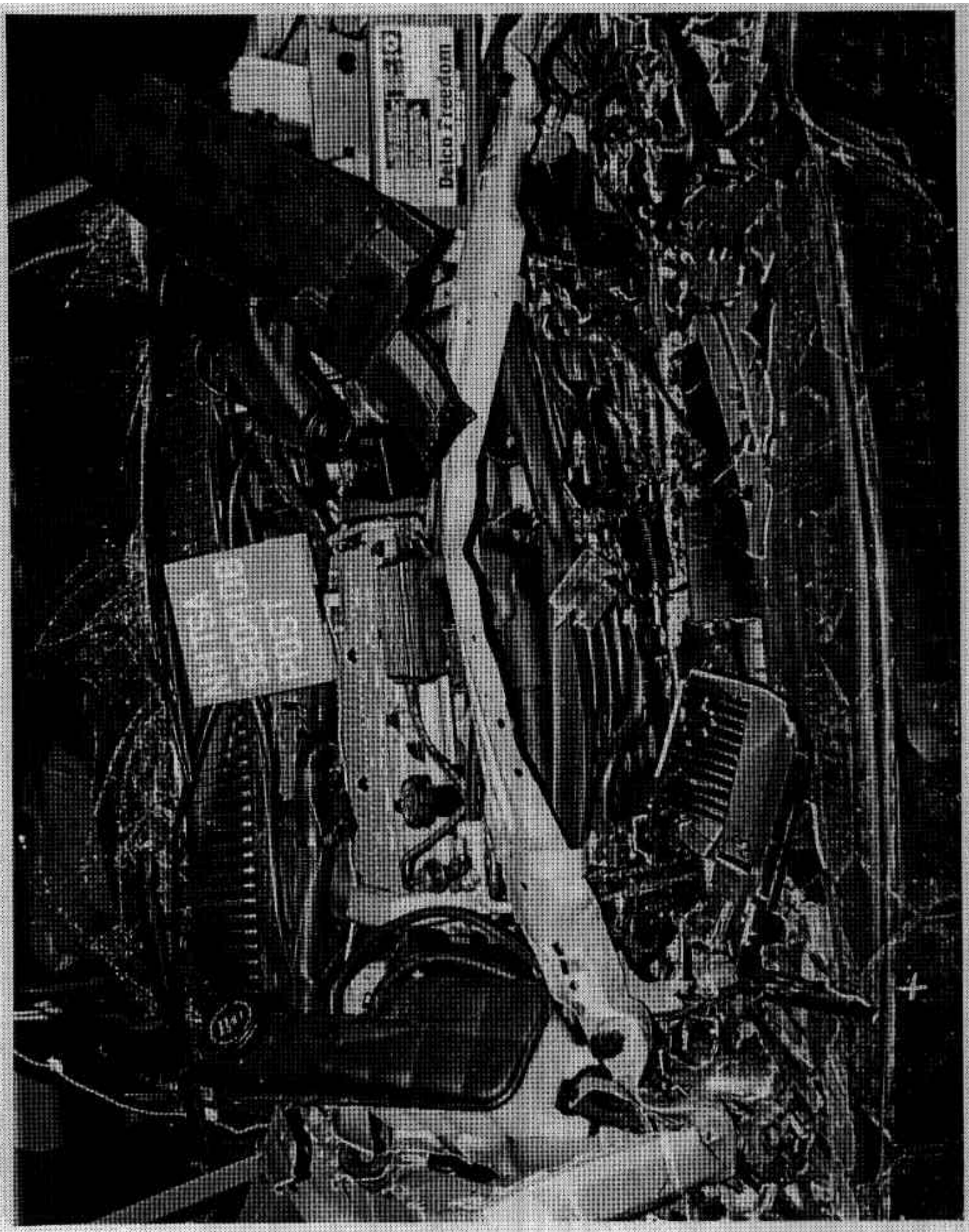


FIGURE A-16. POST-TEST ENGINE COMPARTMENT VIEW

920408

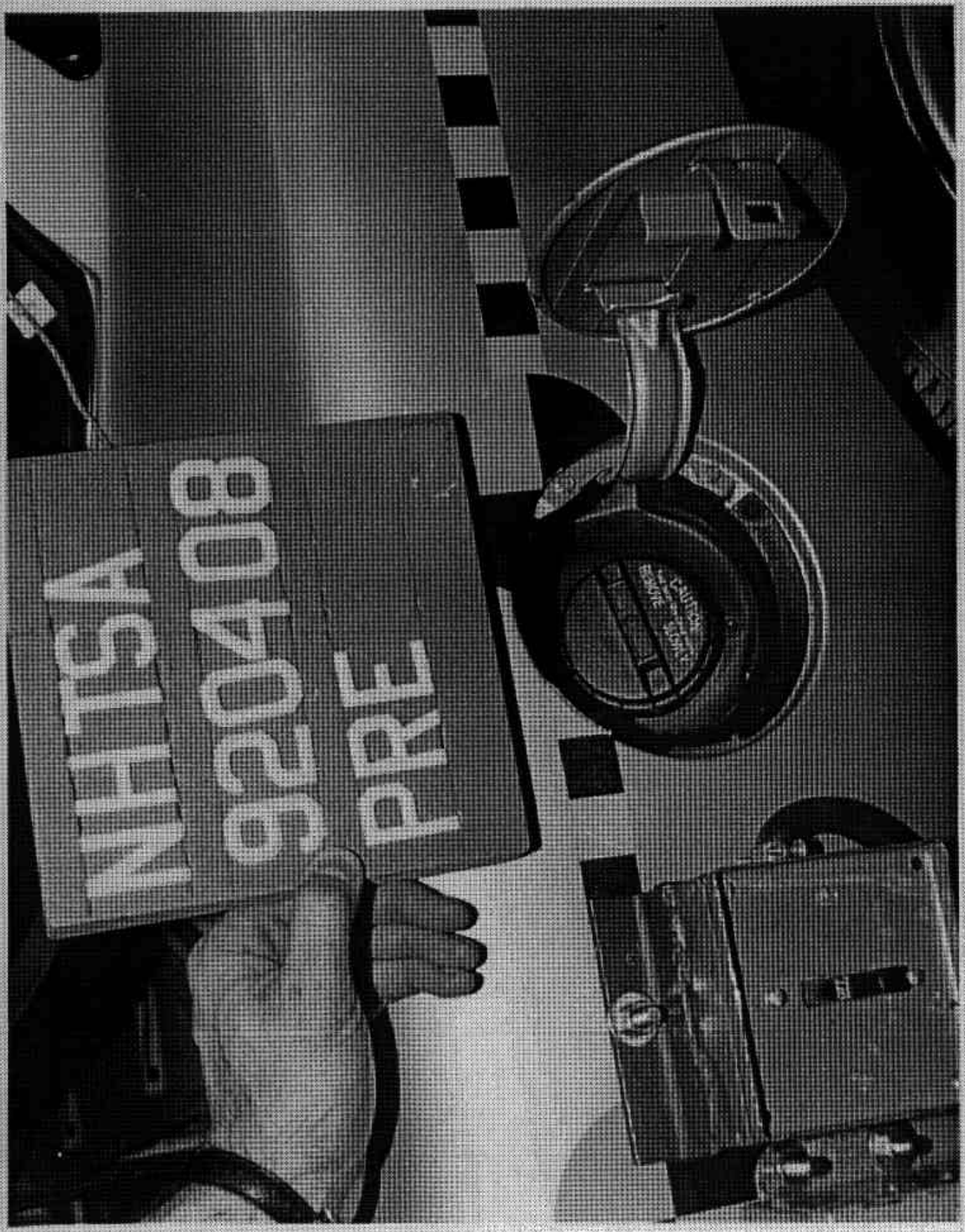


FIGURE A-17. PRE-TEST FUEL FILLER CAP VIEW

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

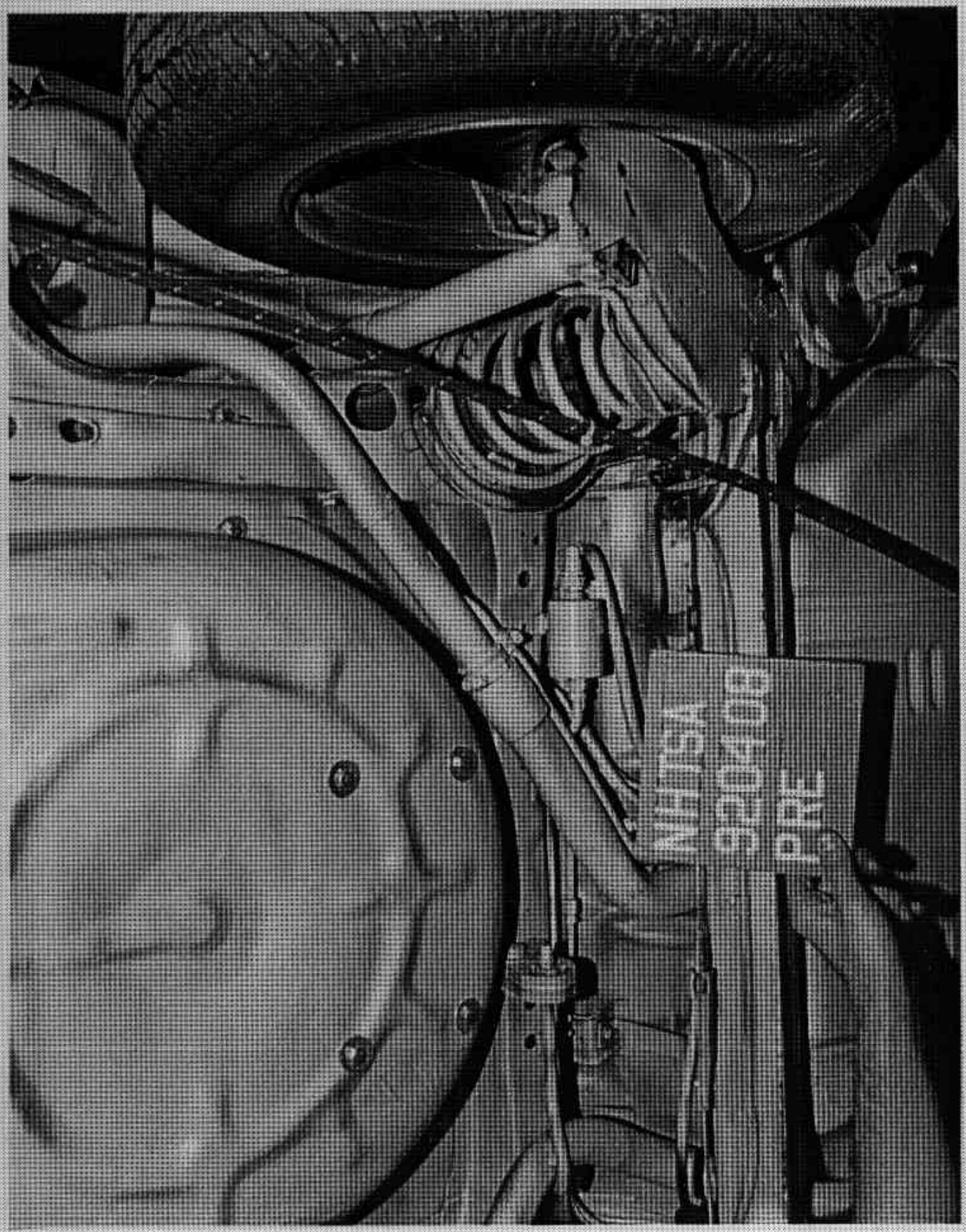


FIGURE A-19. PRE-TEST FUEL FILLER NECK VIEW

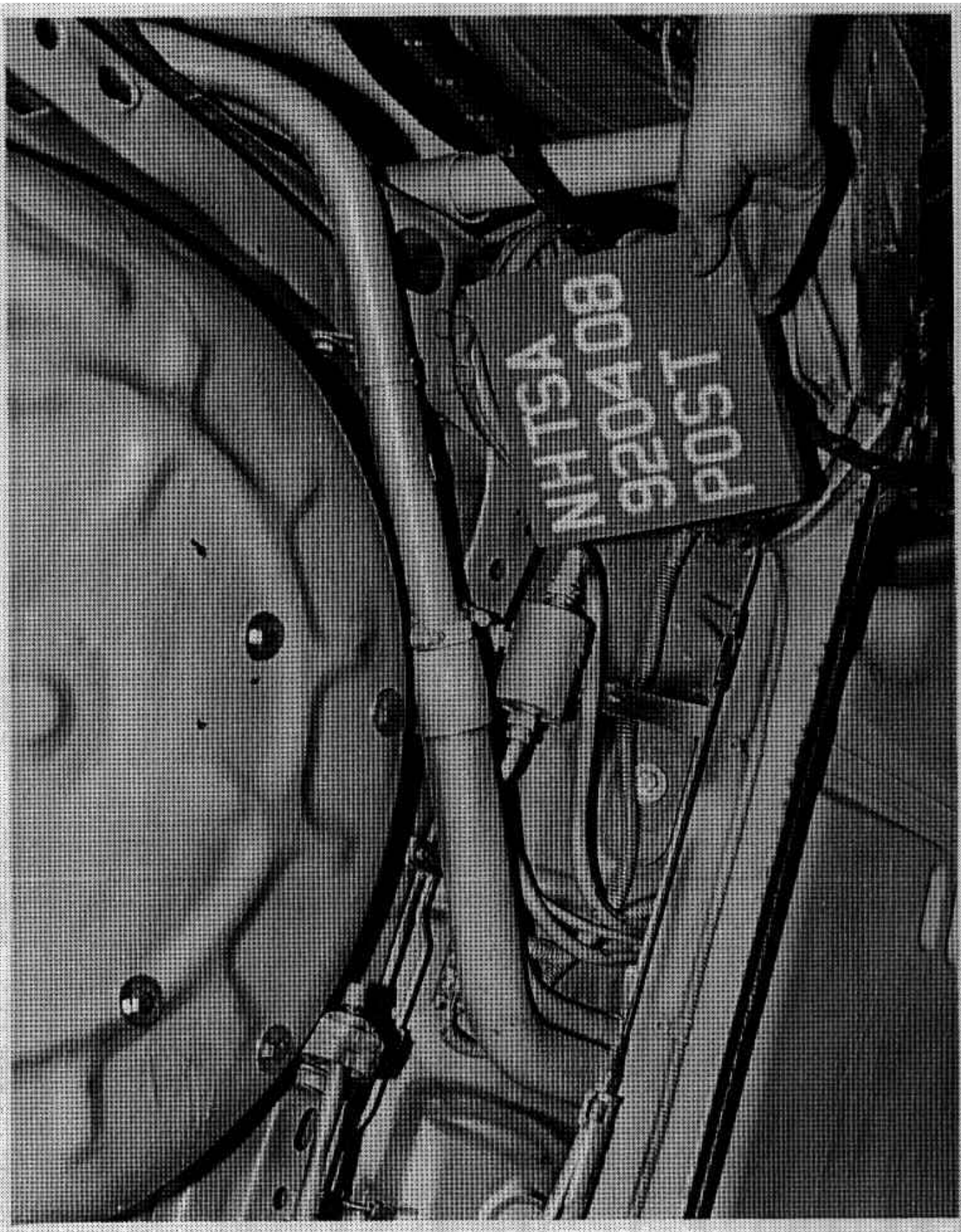


FIGURE A-20. POST-TEST FUEL FILLER NECK VIEW

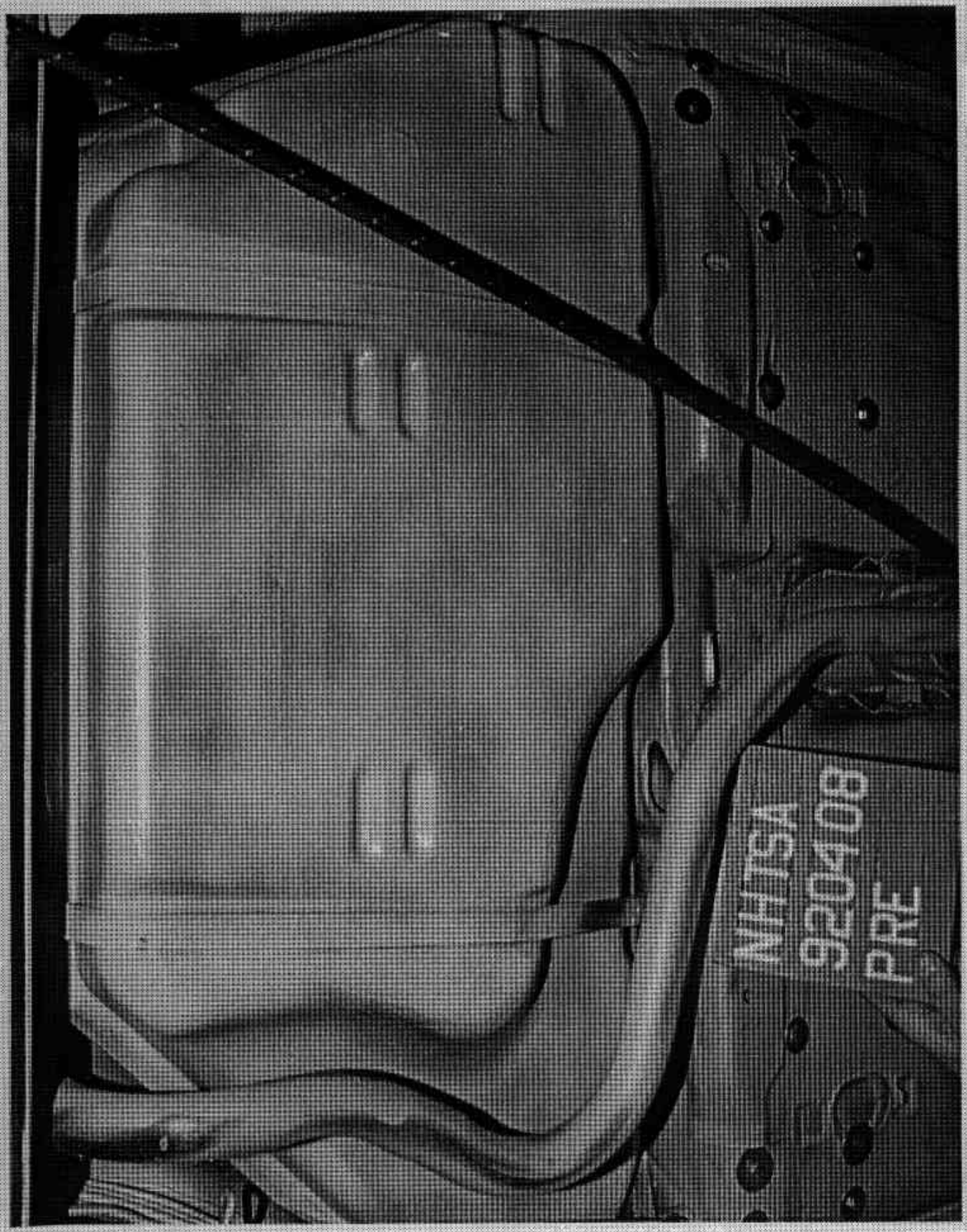


FIGURE A-21. PRE-TEST FUEL TANK VIEW

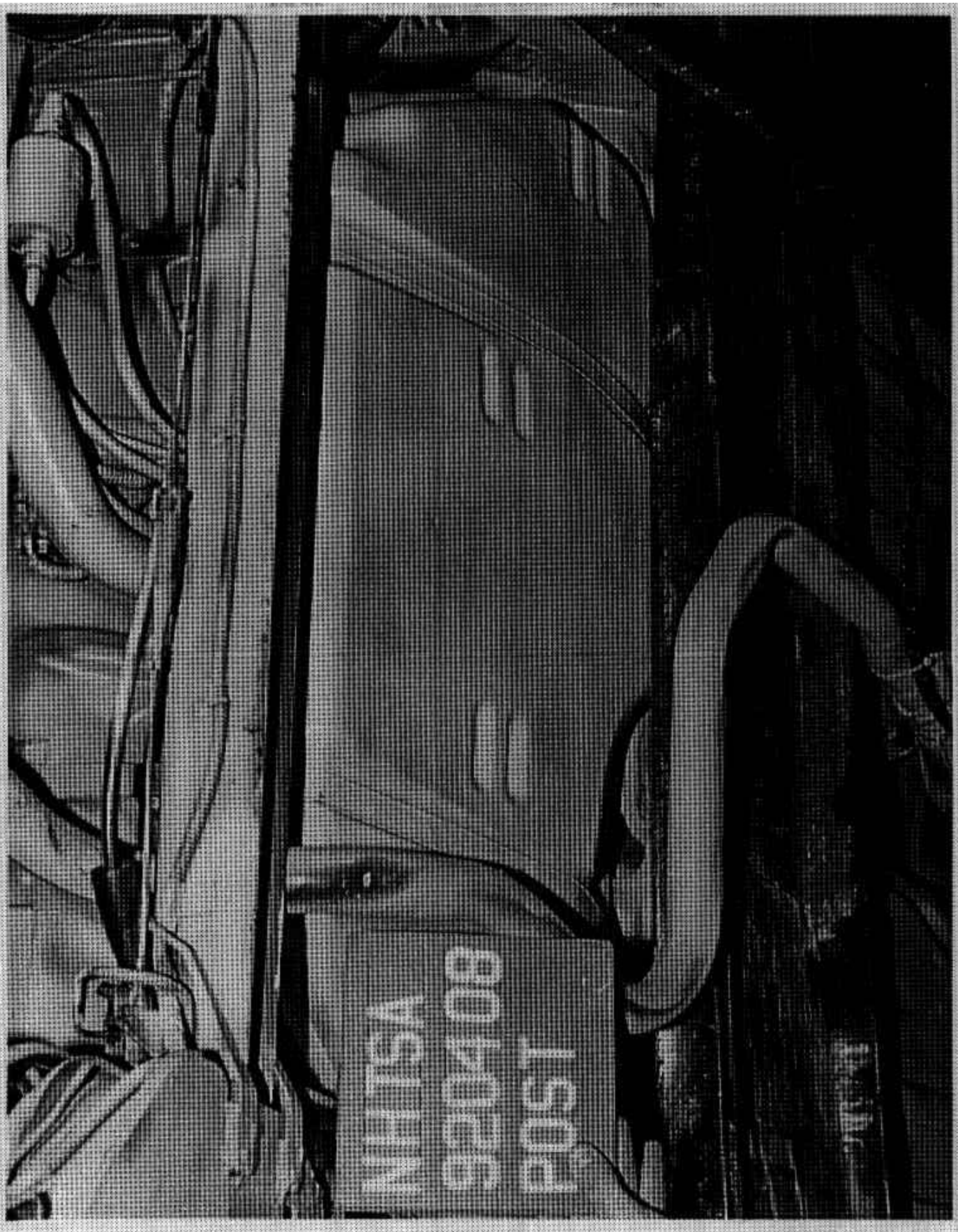


FIGURE A-22. POST-TEST FUEL TANK VIEW

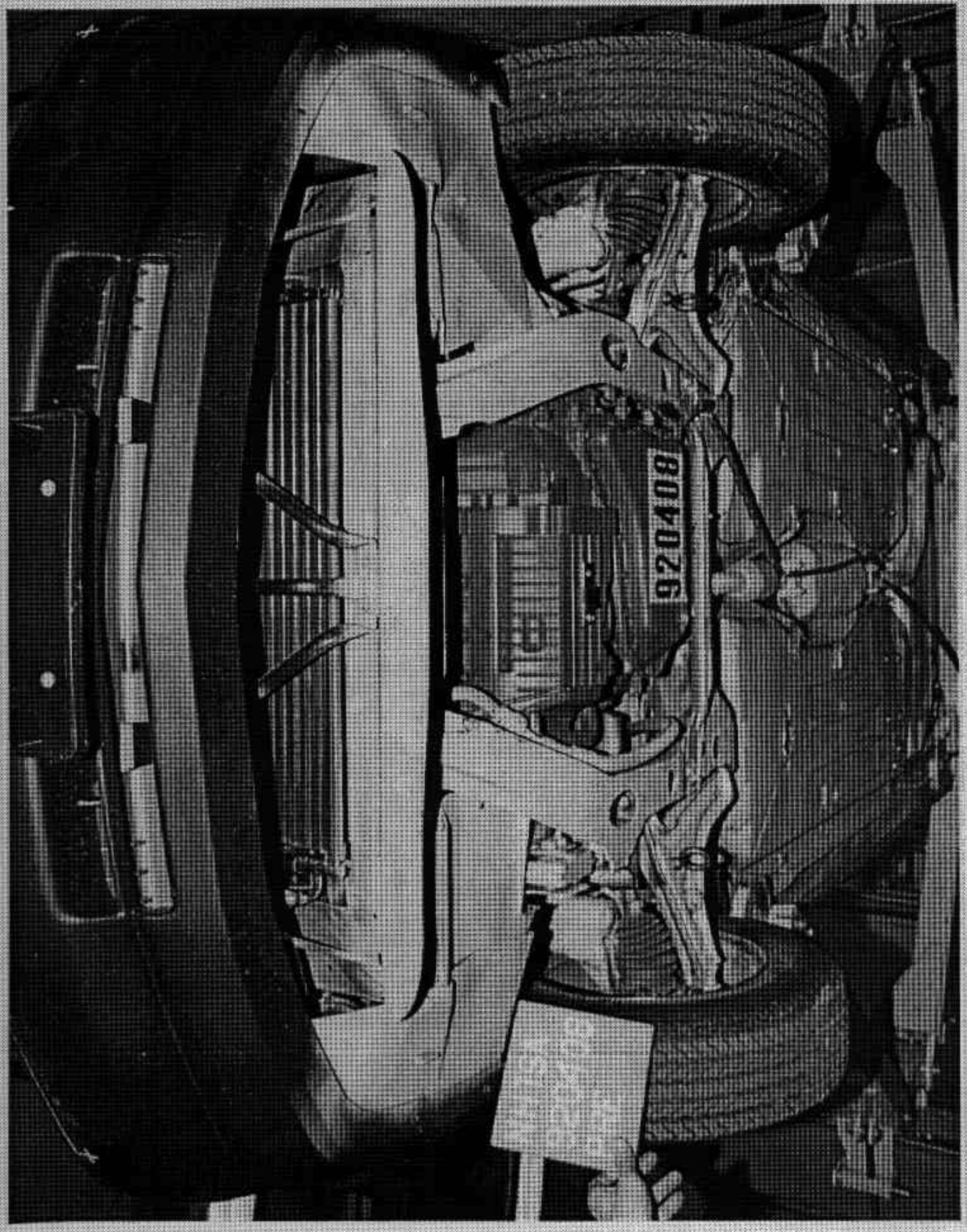


FIGURE A-23. PRE-TEST FRONT UNDERBODY VIEW

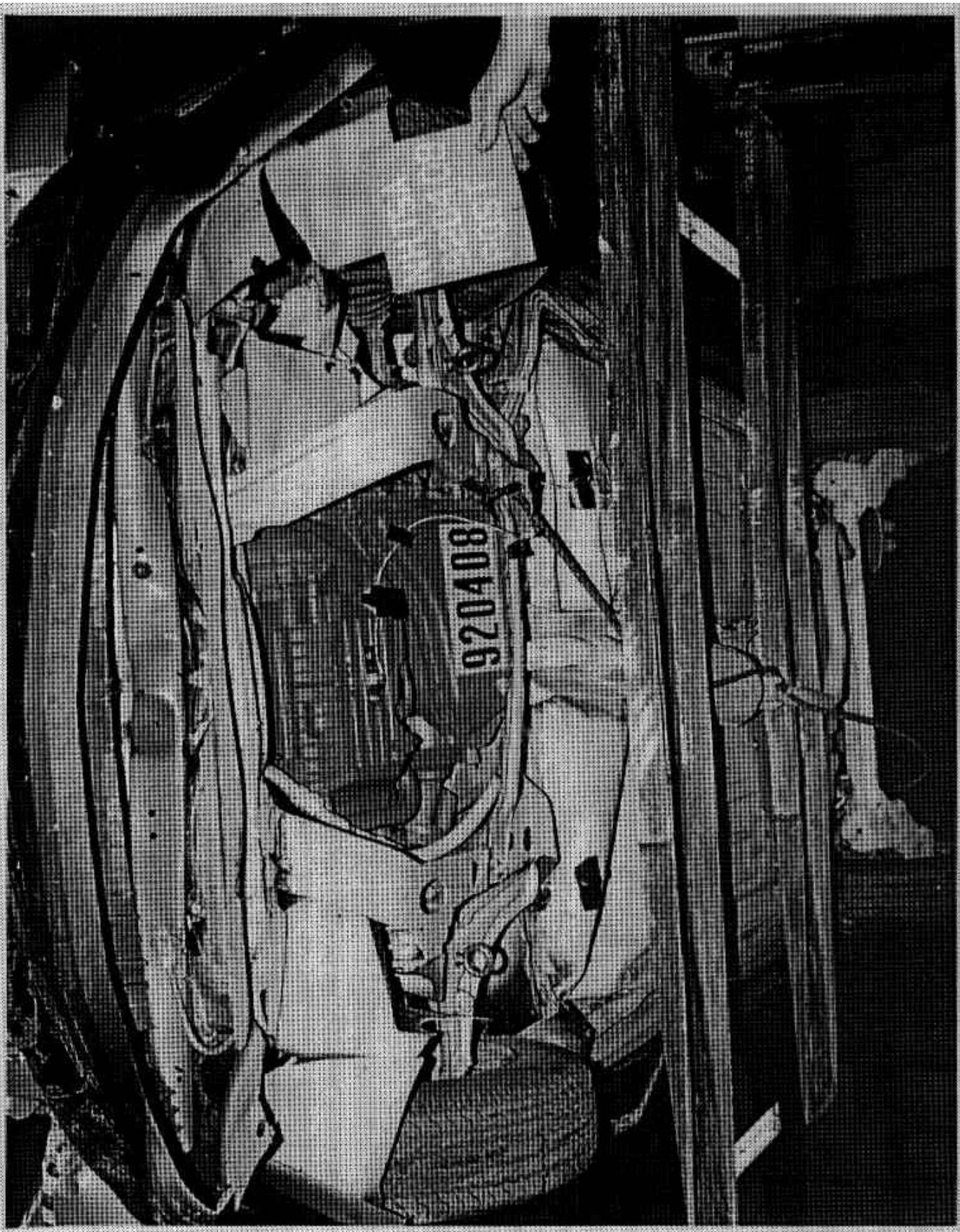


FIGURE A-24. POST-TEST FRONT UNDERBODY VIEW

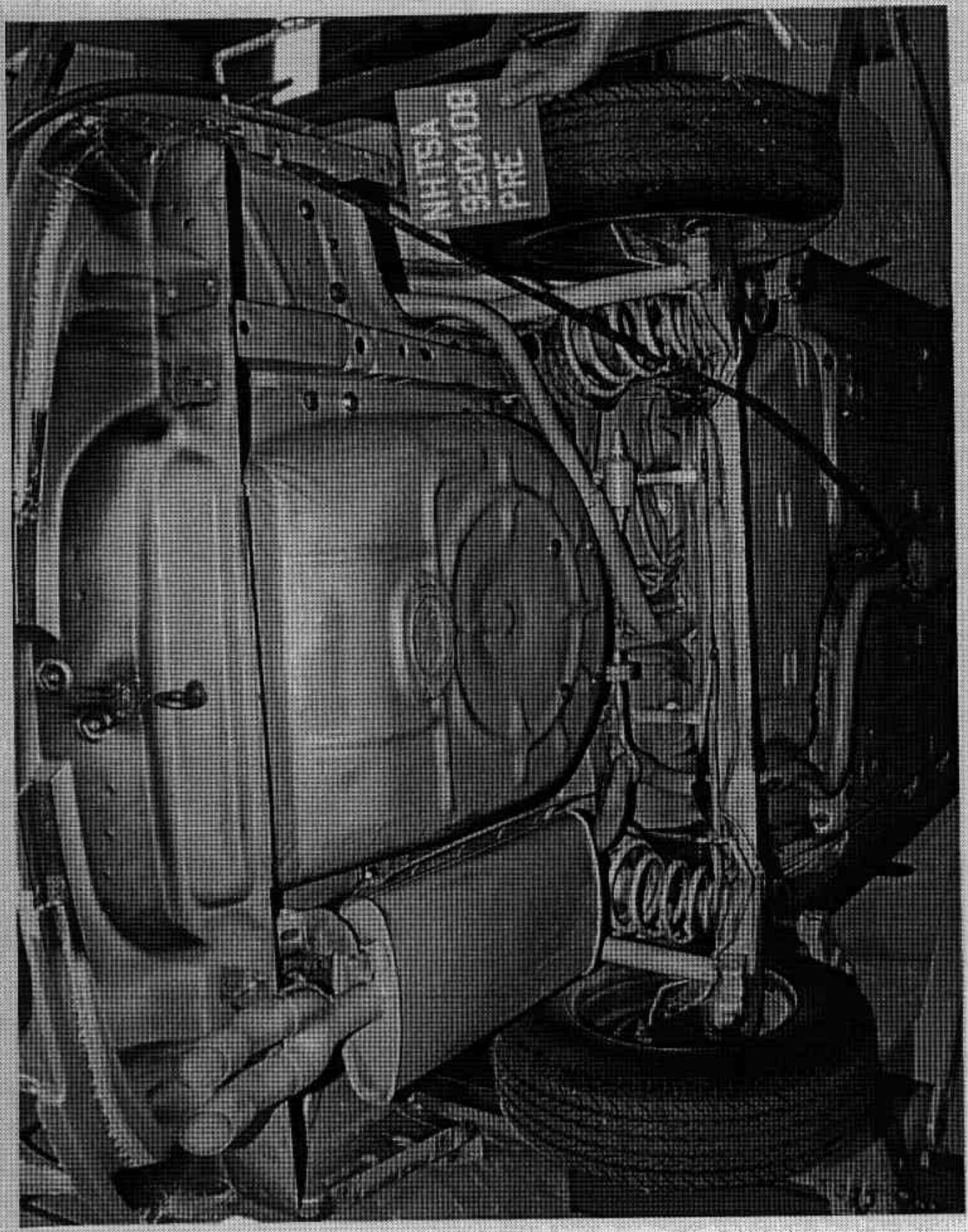


FIGURE A-25. PRE-TEST REAR UNDERBODY VIEW

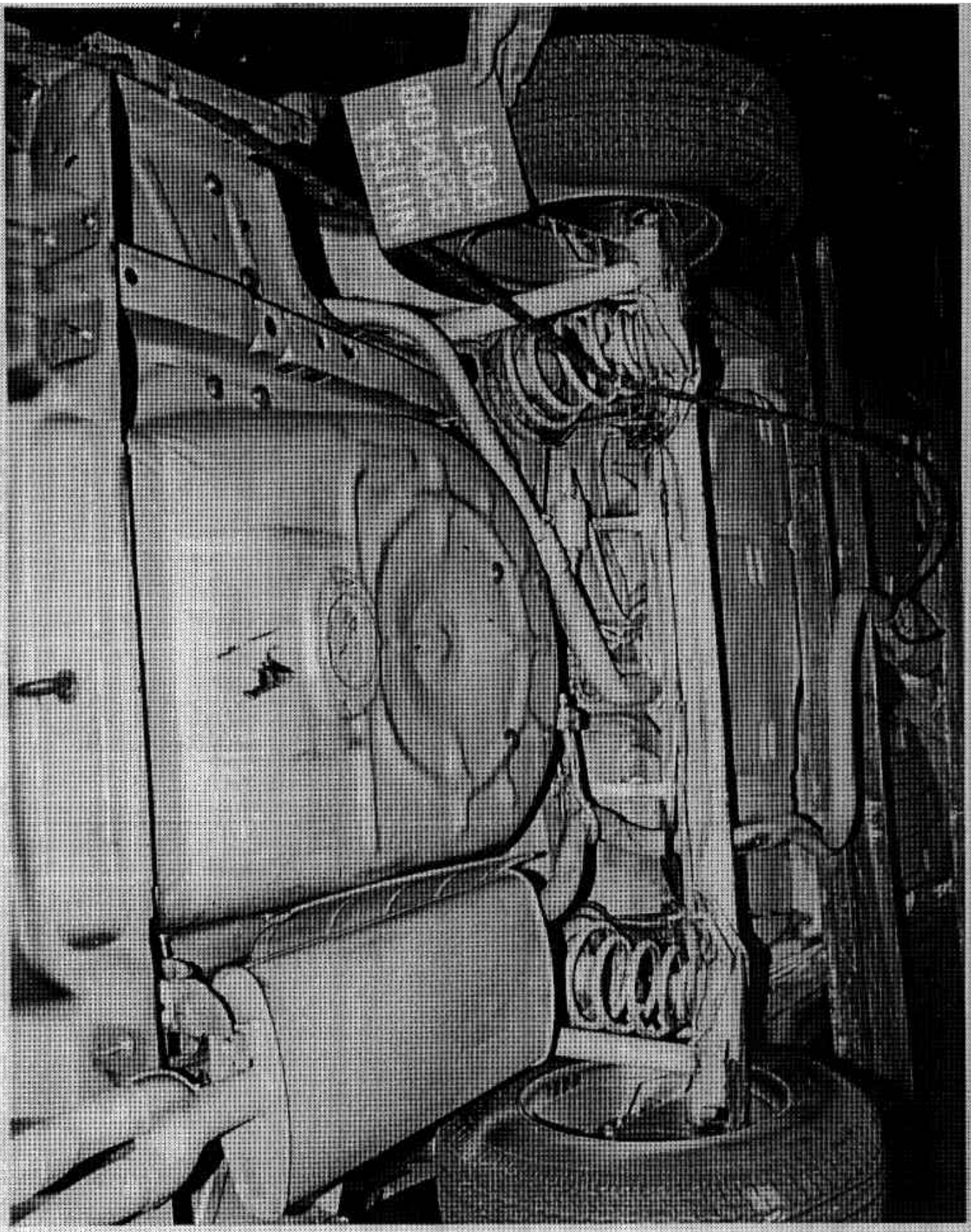


FIGURE A-26. POST-TEST REAR UNDERBODY VIEW

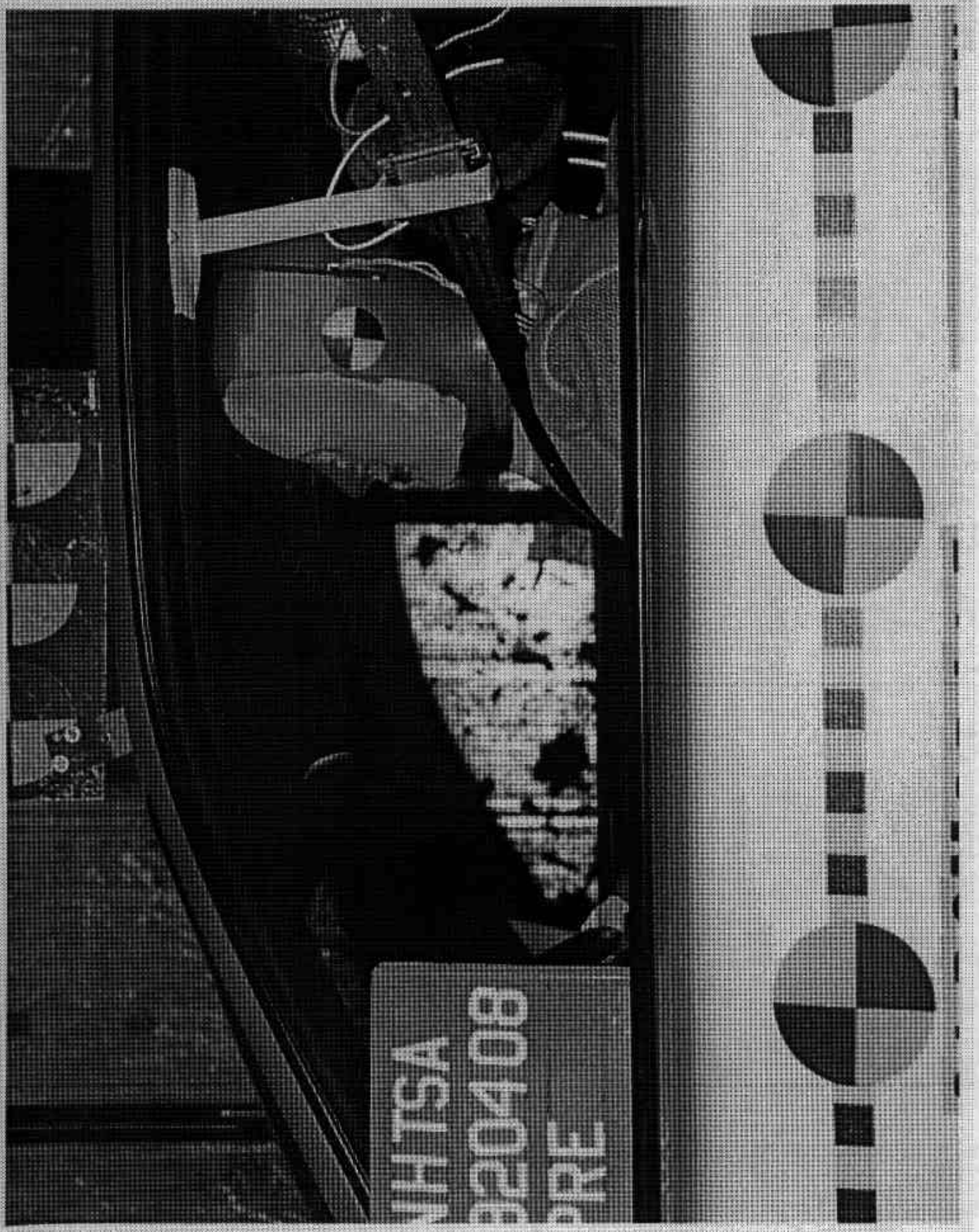


FIGURE A-27. PRE-TEST DRIVER DUMMY POSITION VIEW

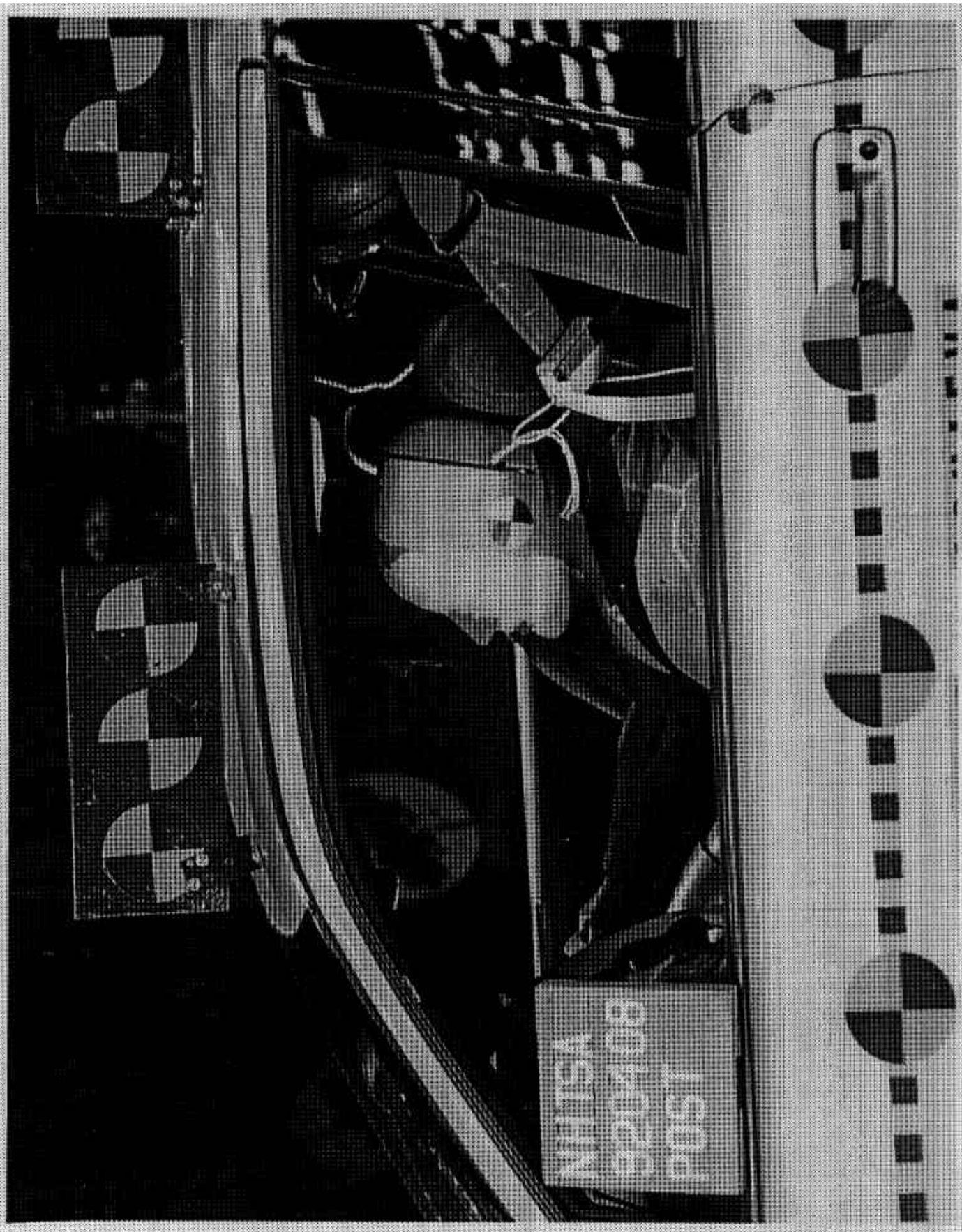


FIGURE A-28. POST-TEST DRIVER DUMMY POSITION VIEW

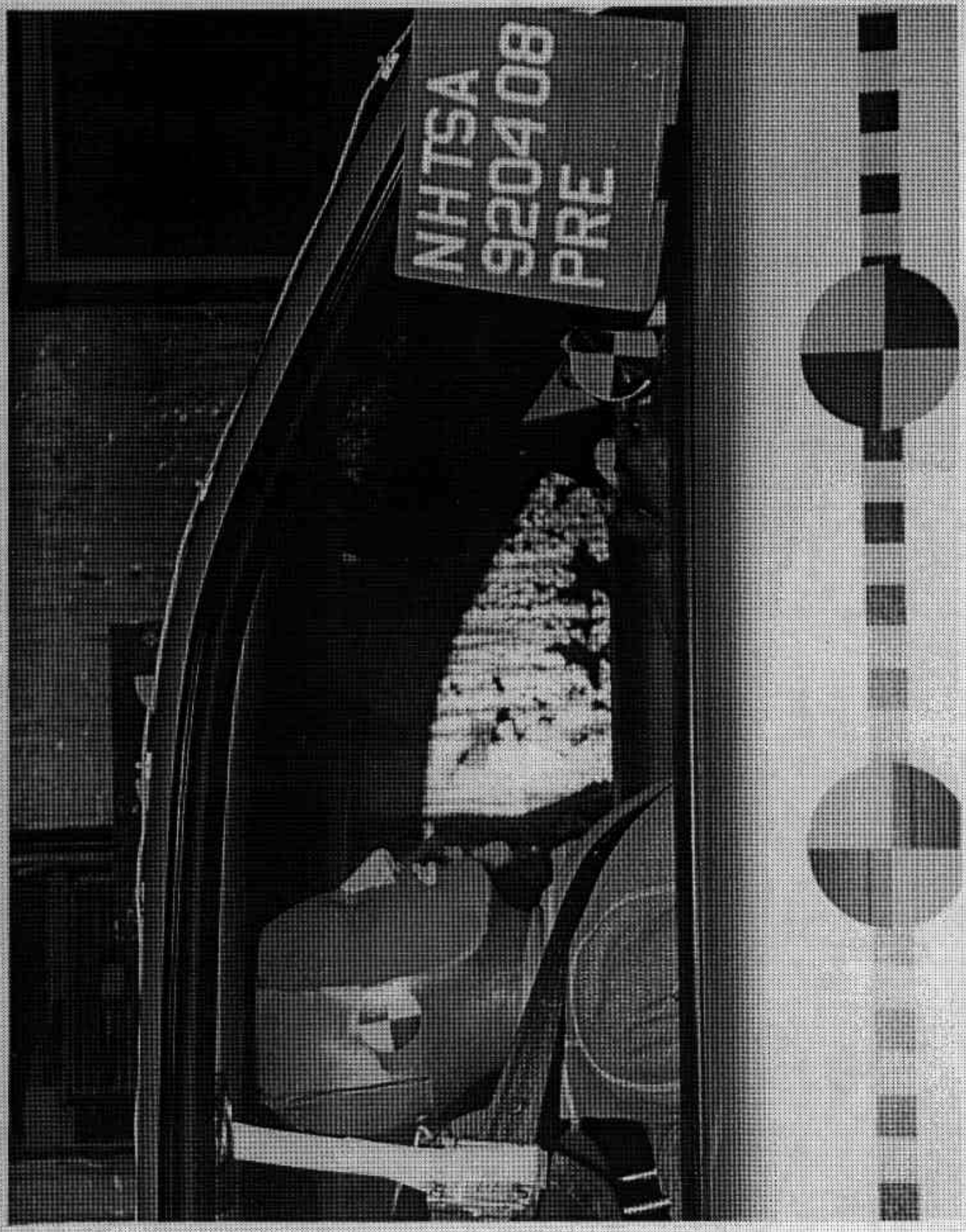


FIGURE A-29. PRE-TEST PASSENGER DUMMY POSITION VIEW

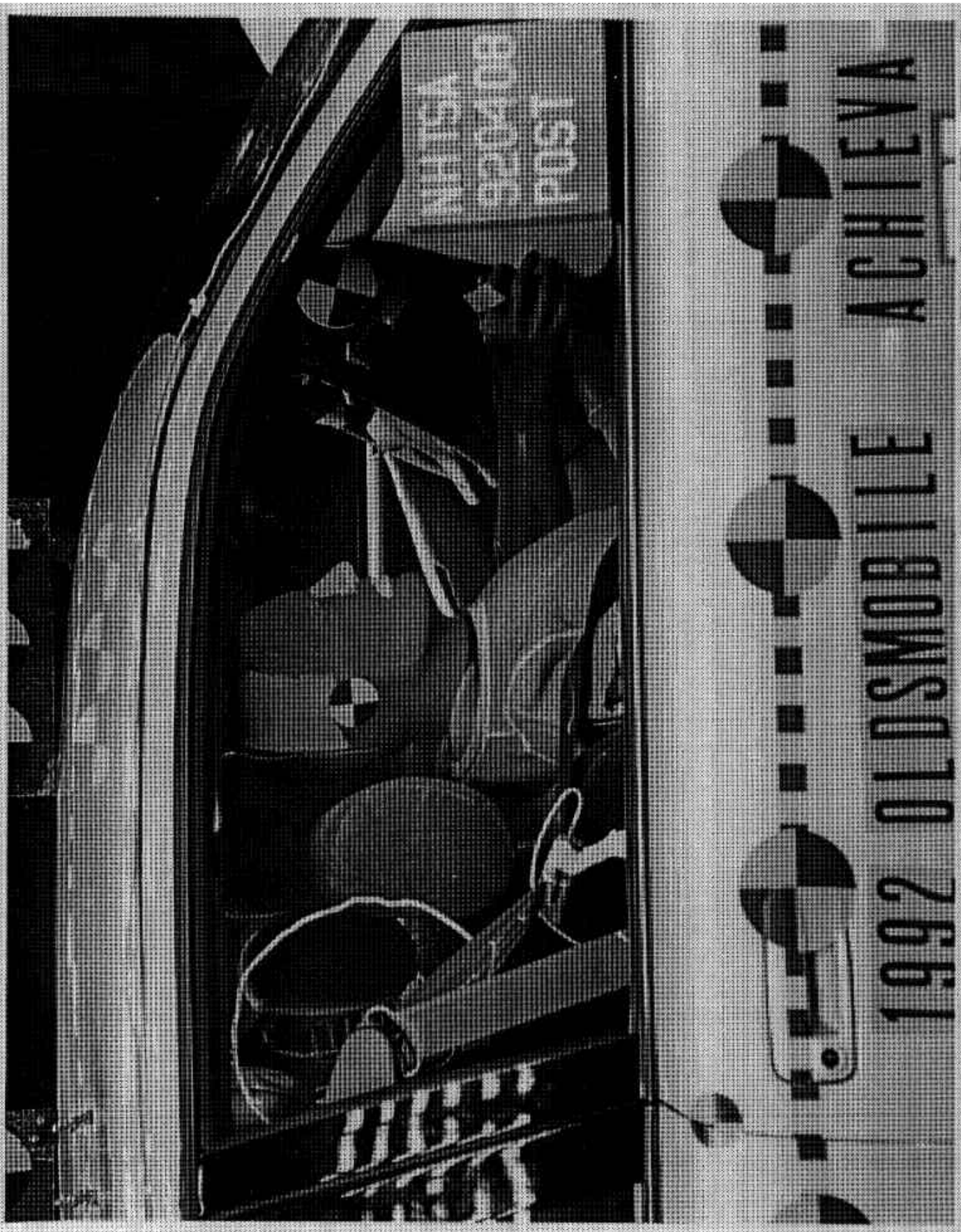


FIGURE A-30. POST-TEST PASSENGER DUMMY POSITION VIEW

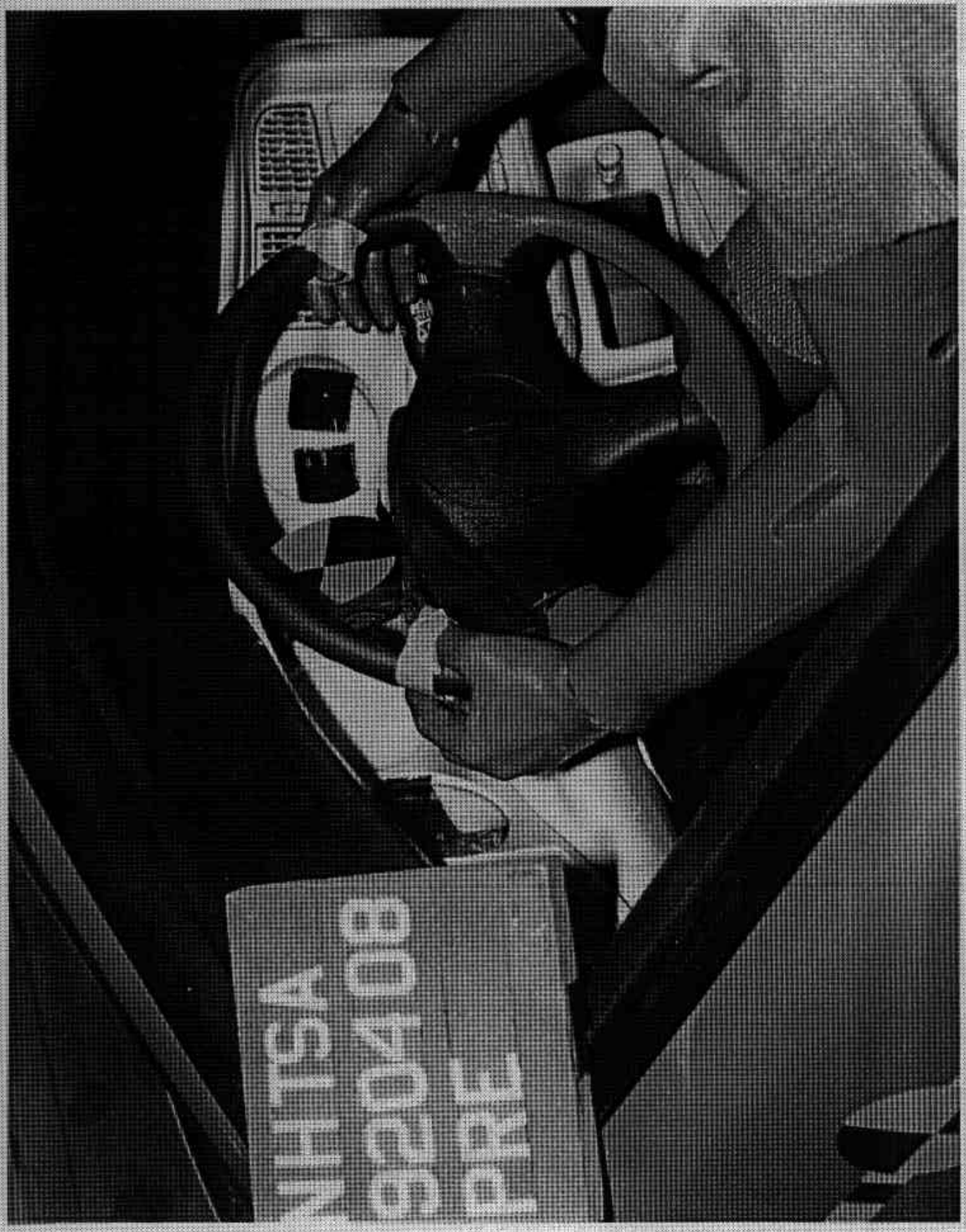


FIGURE A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW

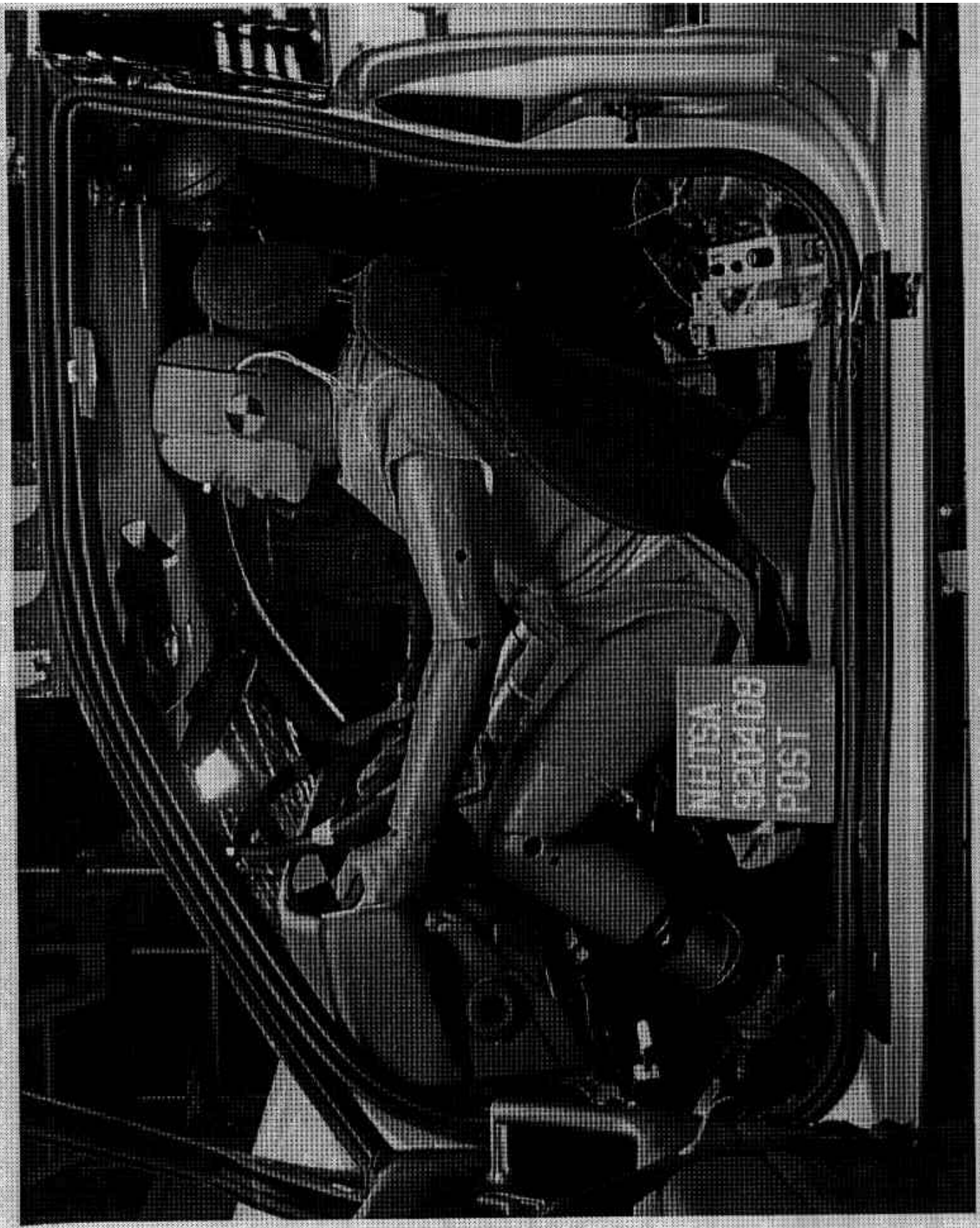


FIGURE A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

920408

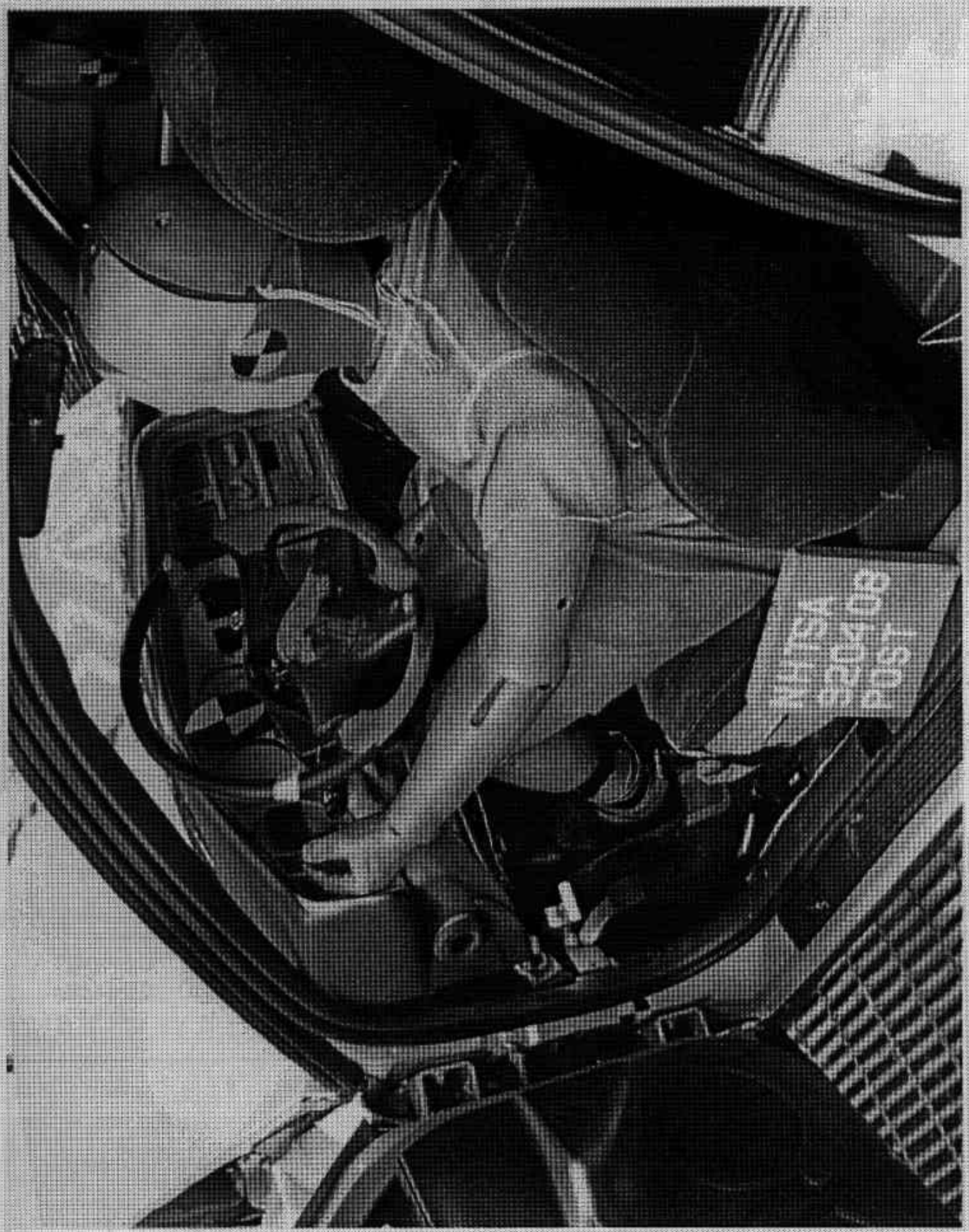


FIGURE A-33. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

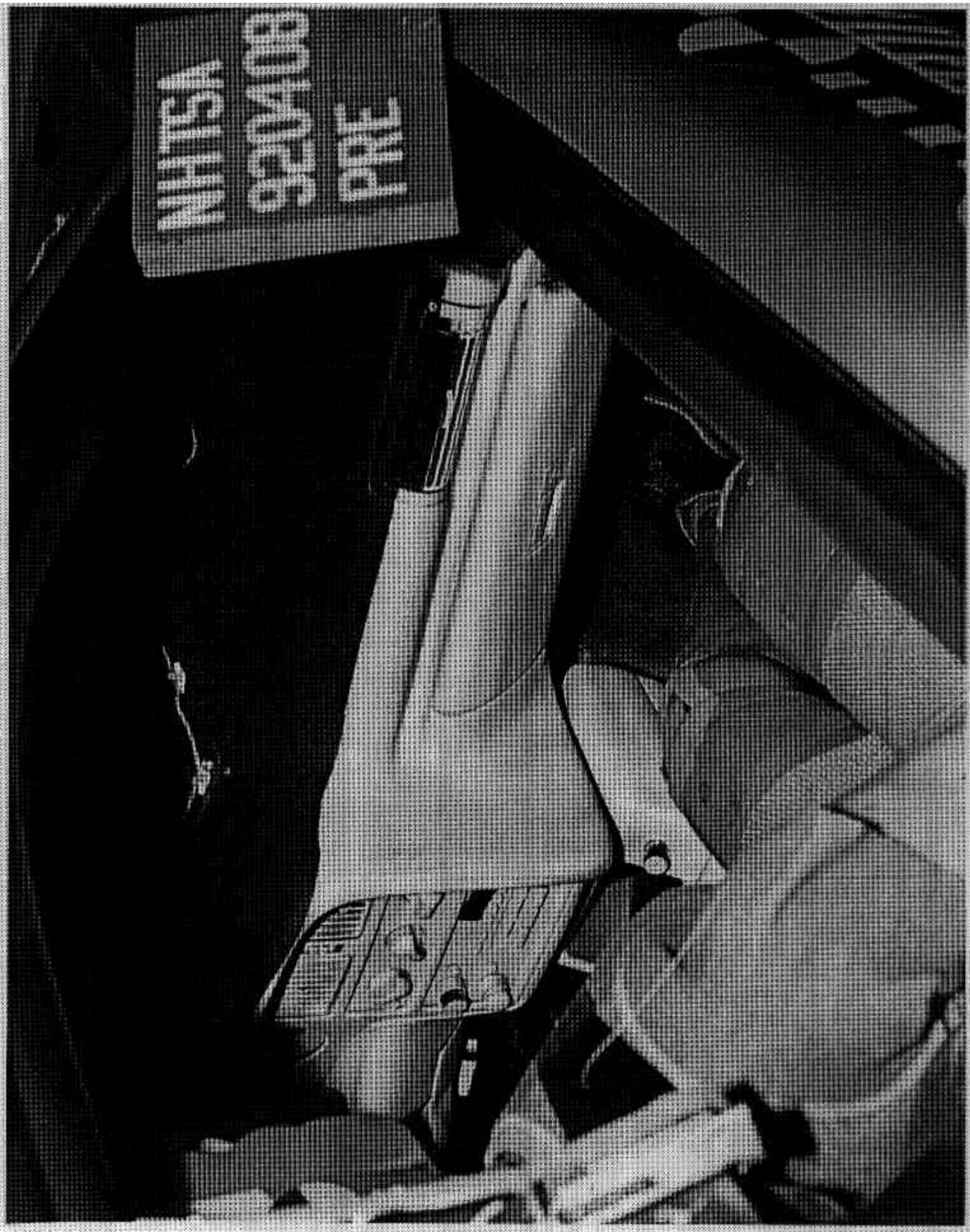


FIGURE A-34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW

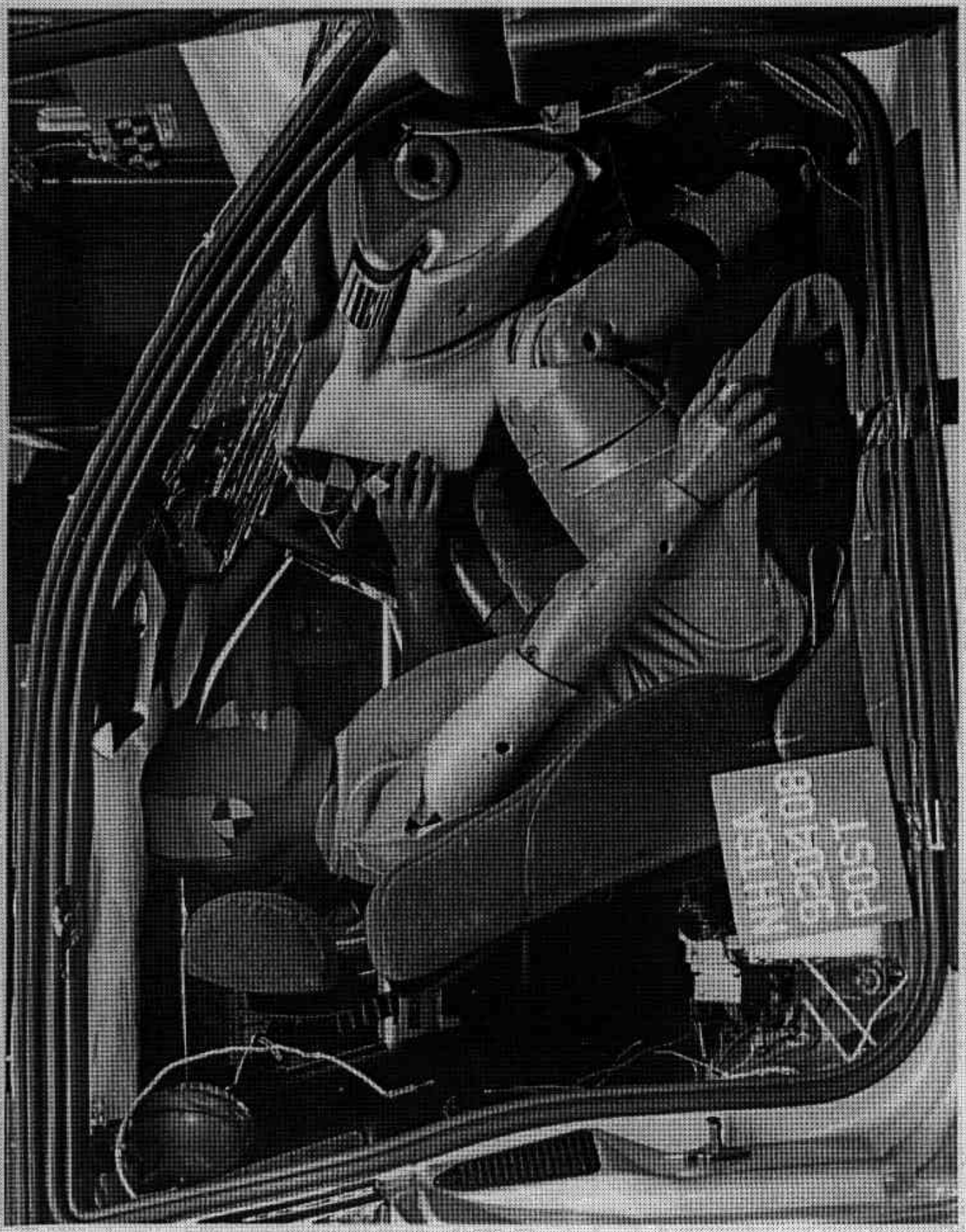


FIGURE A-35. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

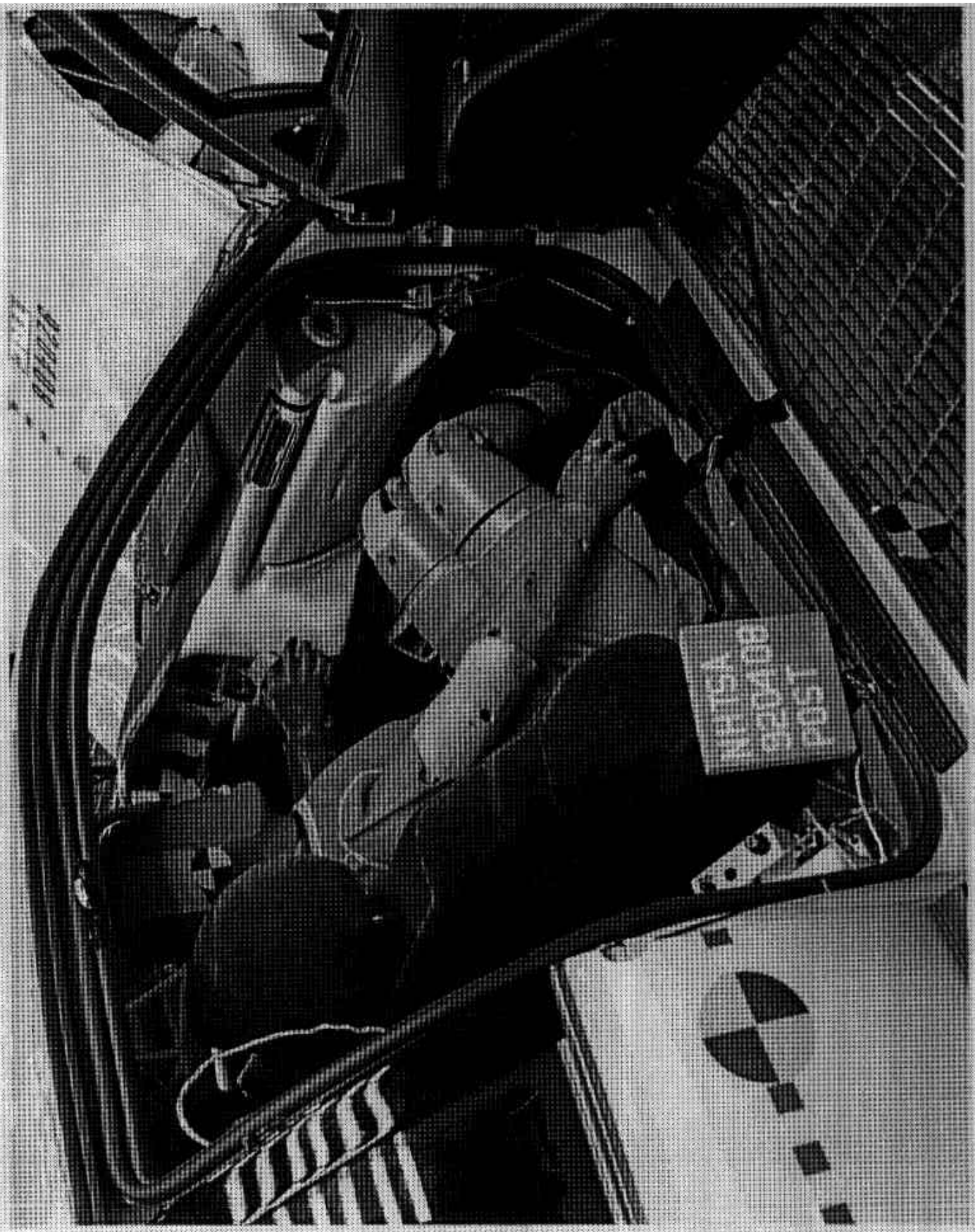


FIGURE A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

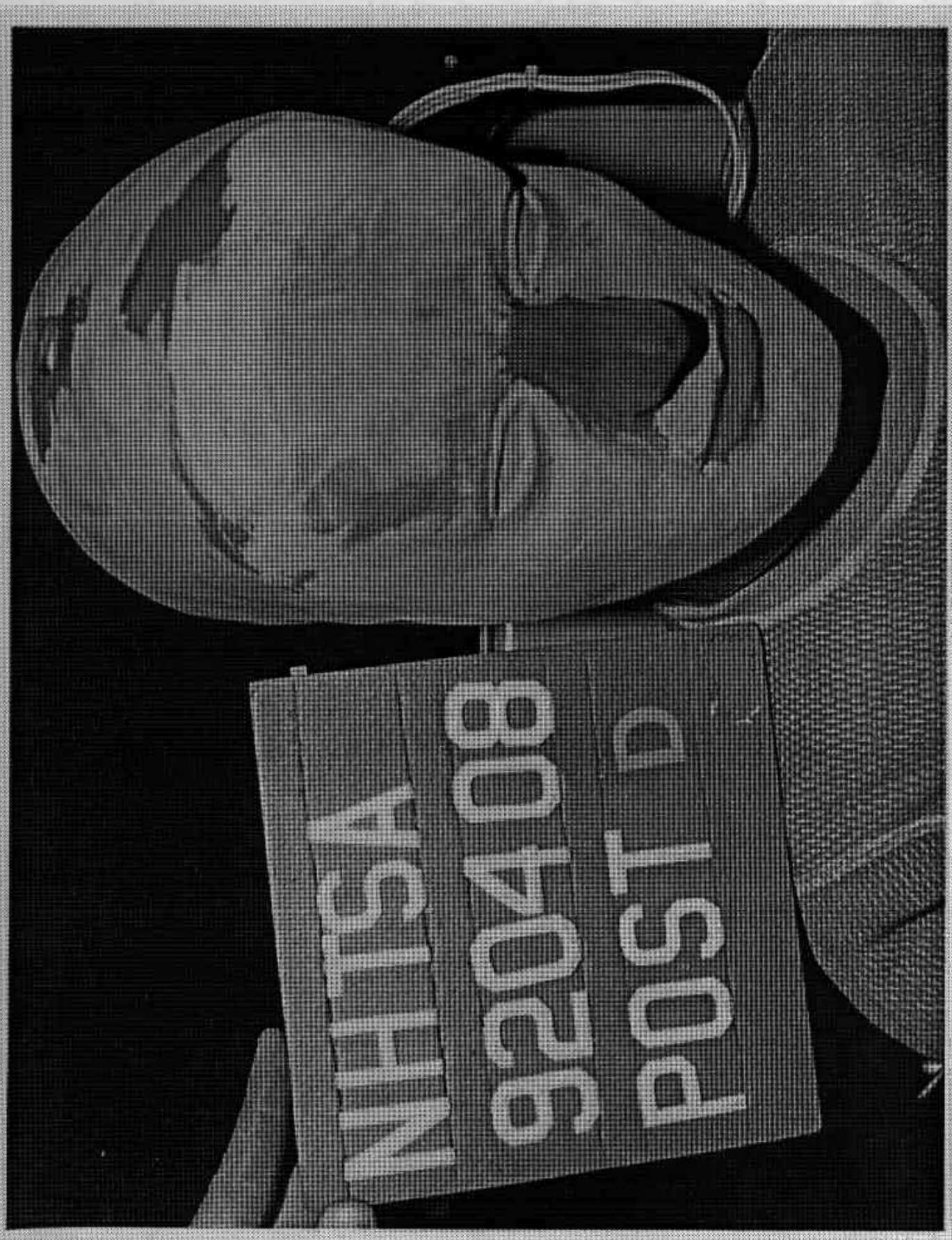


FIGURE A-37. POST-TEST DRIVER DUMMY HEAD CONTACT VIEW

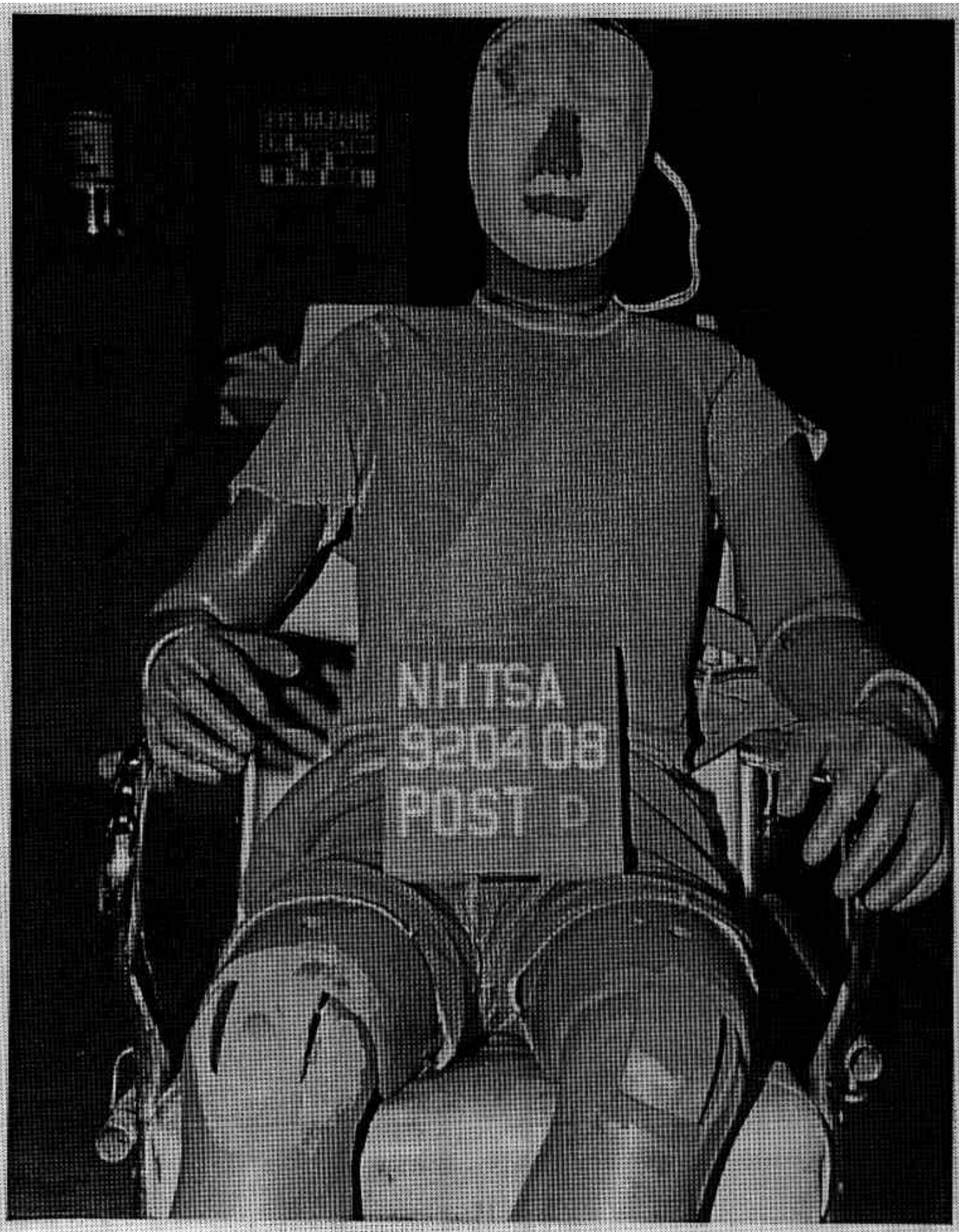


Fig. A-38. POST-TEST DRIVER DUMMY HEAD, CHEST, & KNEE CONTACT - VIEW 1

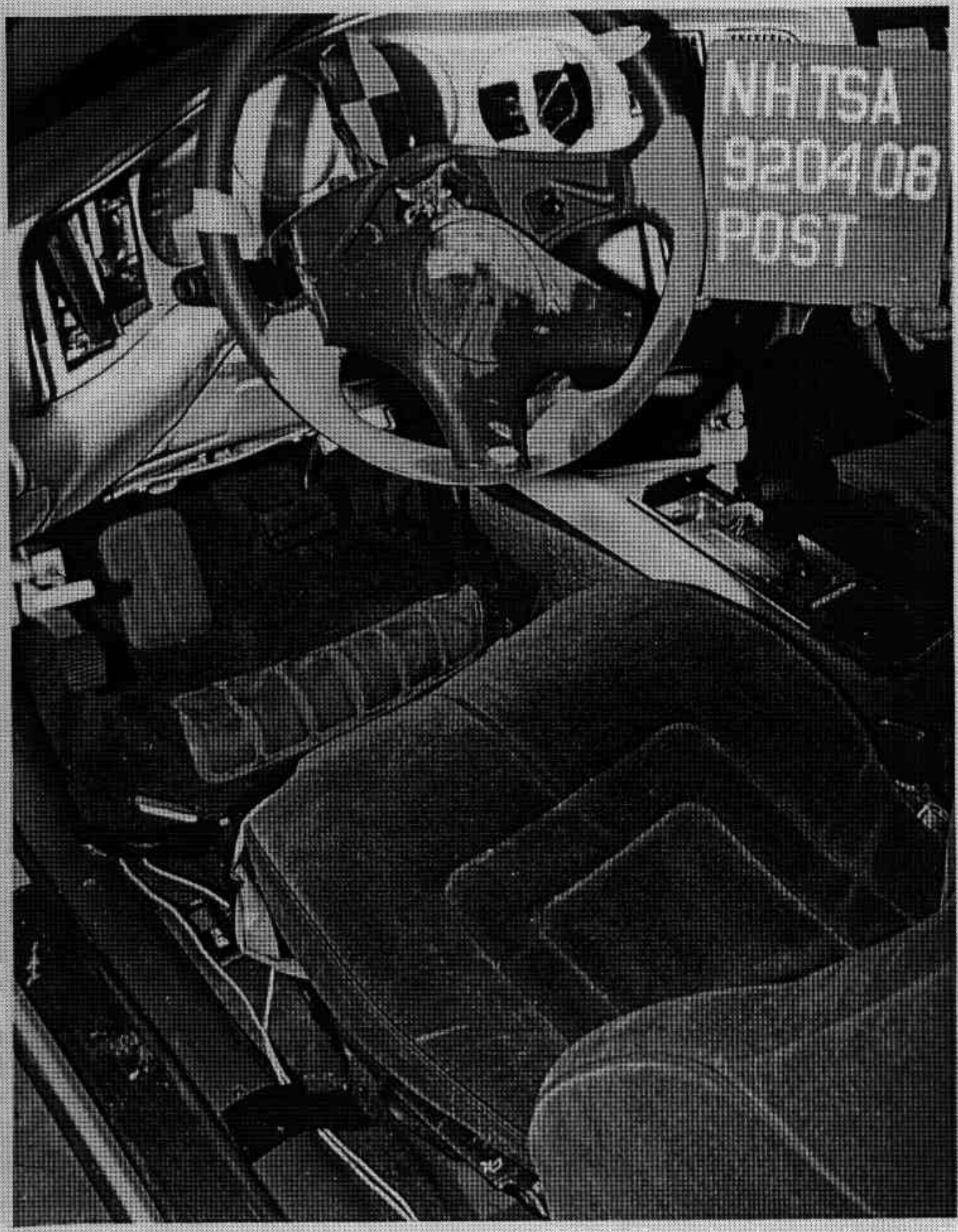


Fig. A-39. POST-TEST DRIVER DUMMY HEAD, CHEST, & KNEE CONTACT - VIEW 2

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

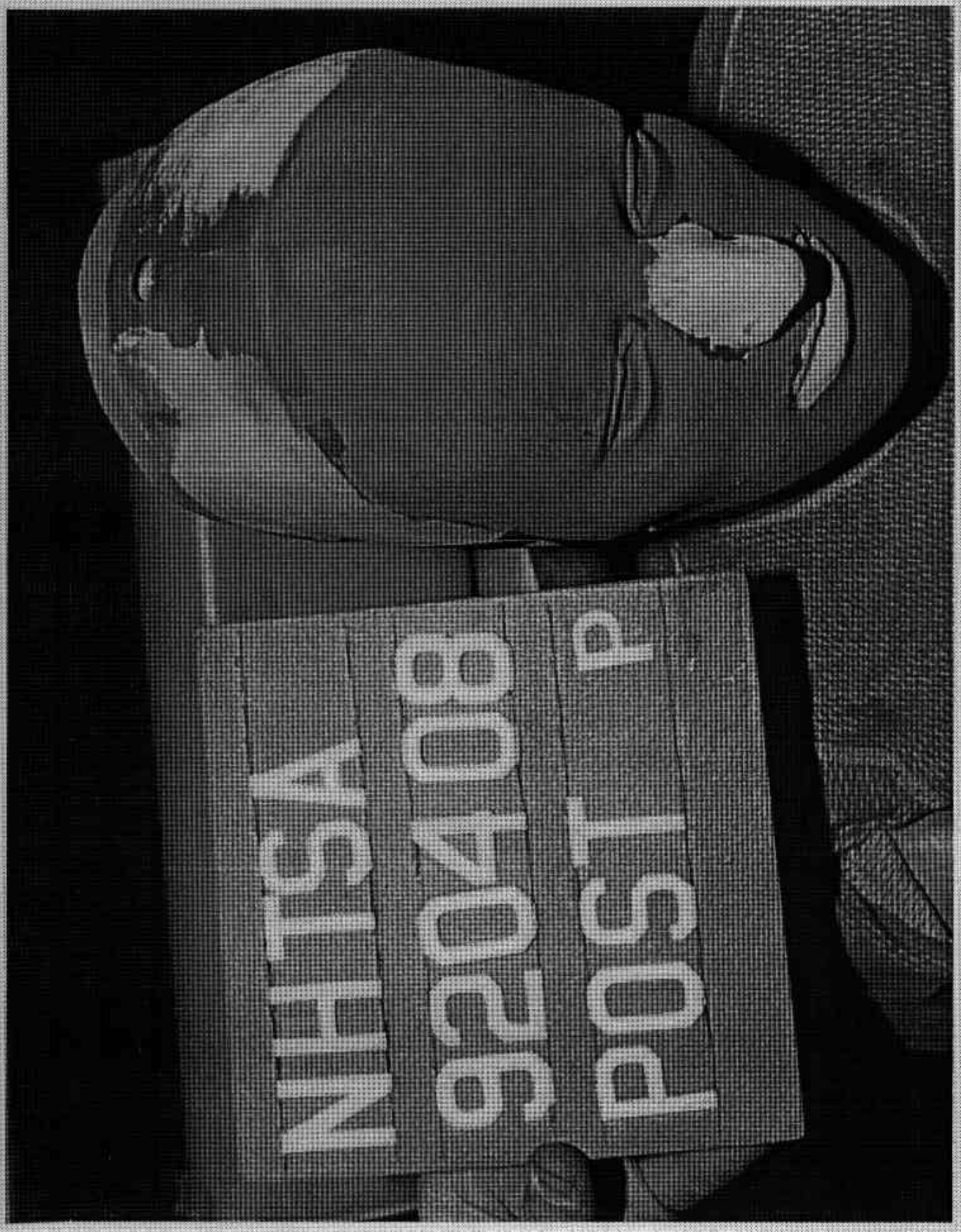


FIGURE A-41. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 1

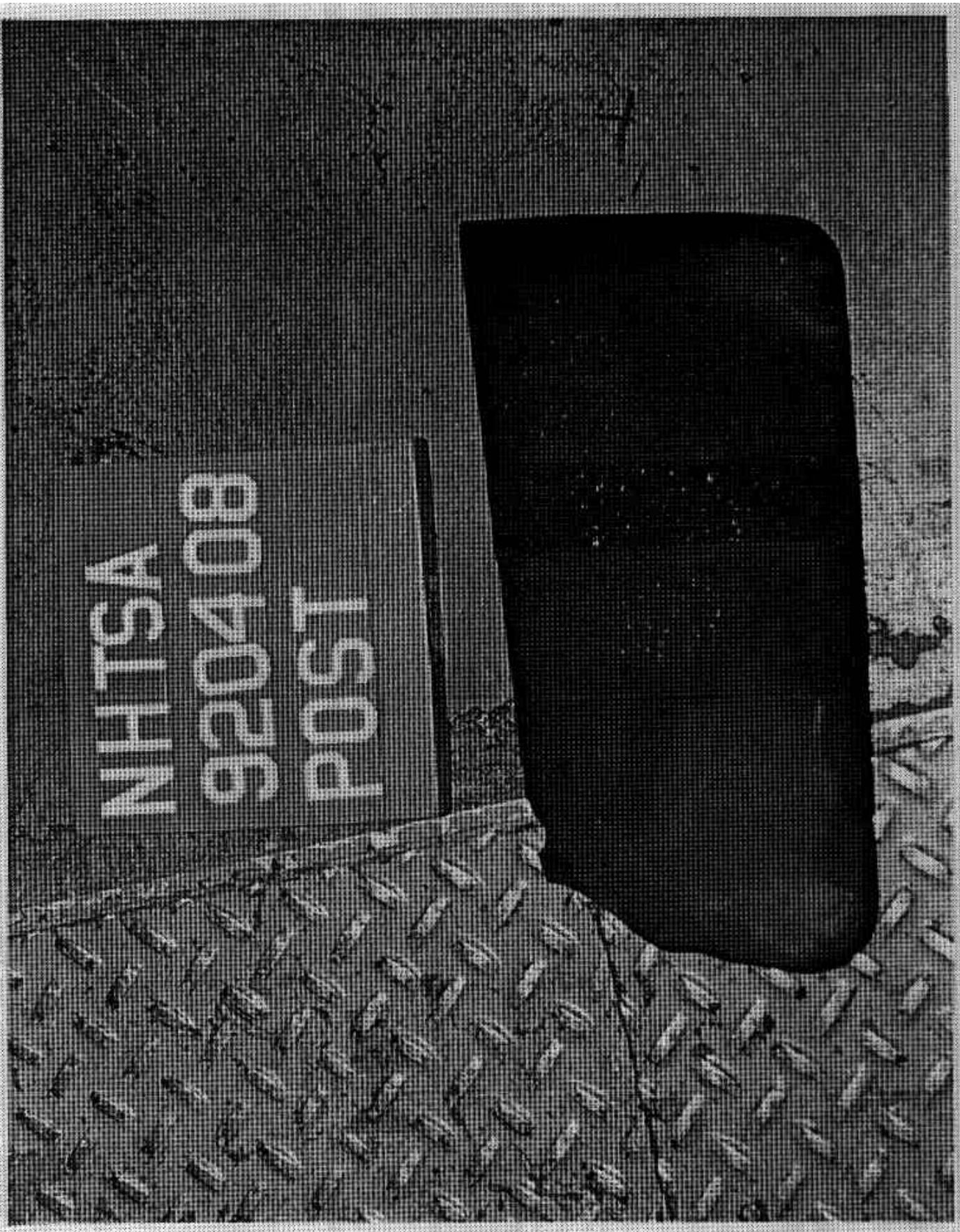


FIGURE A-42. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 2

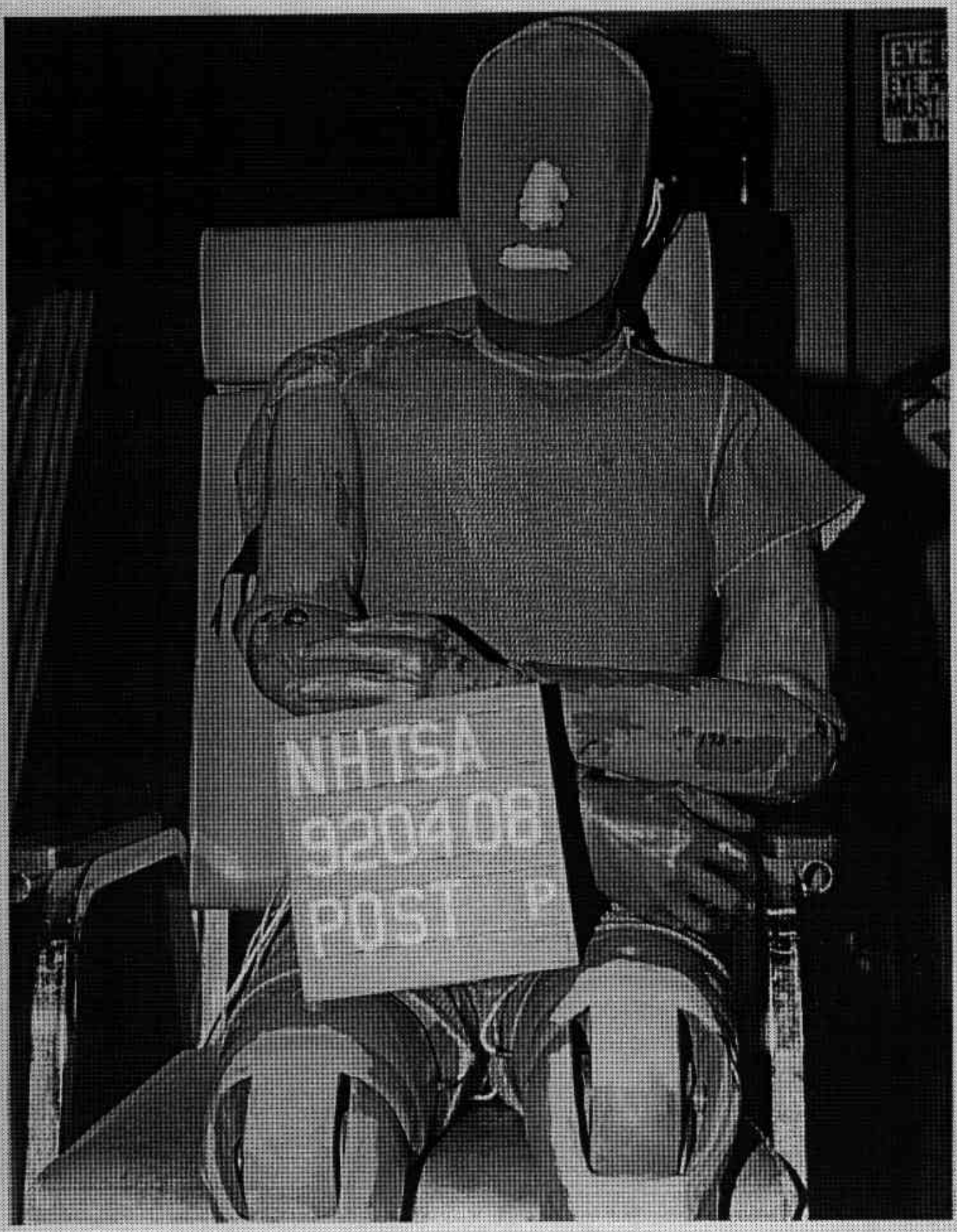


FIGURE A-43. POST-TEST PASSENGER DUMMY HEAD & KNEE CONTACT VIEW

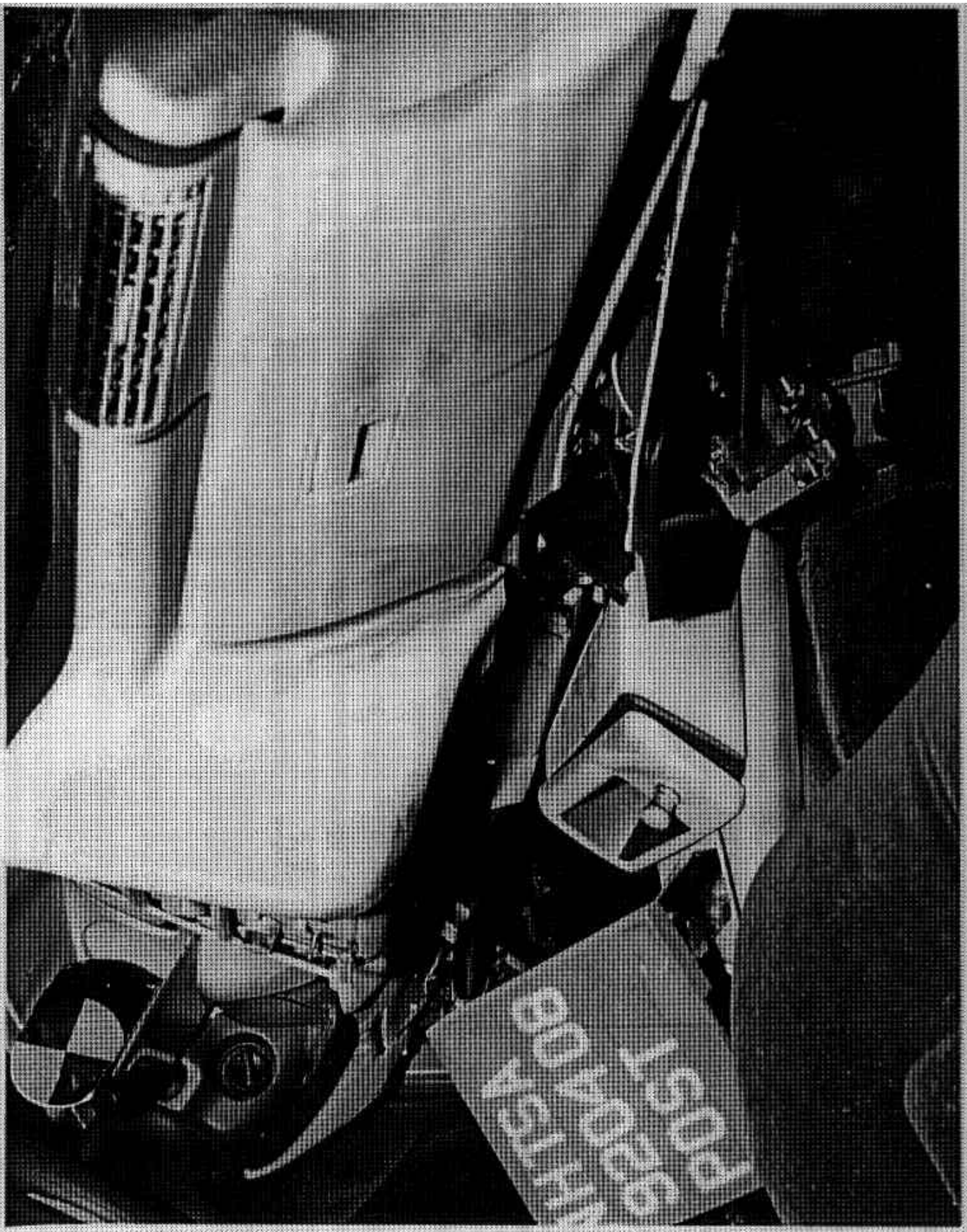


FIGURE A-44. POST-TEST PASSENGER DUMMY KNEE CONTACT VIEW

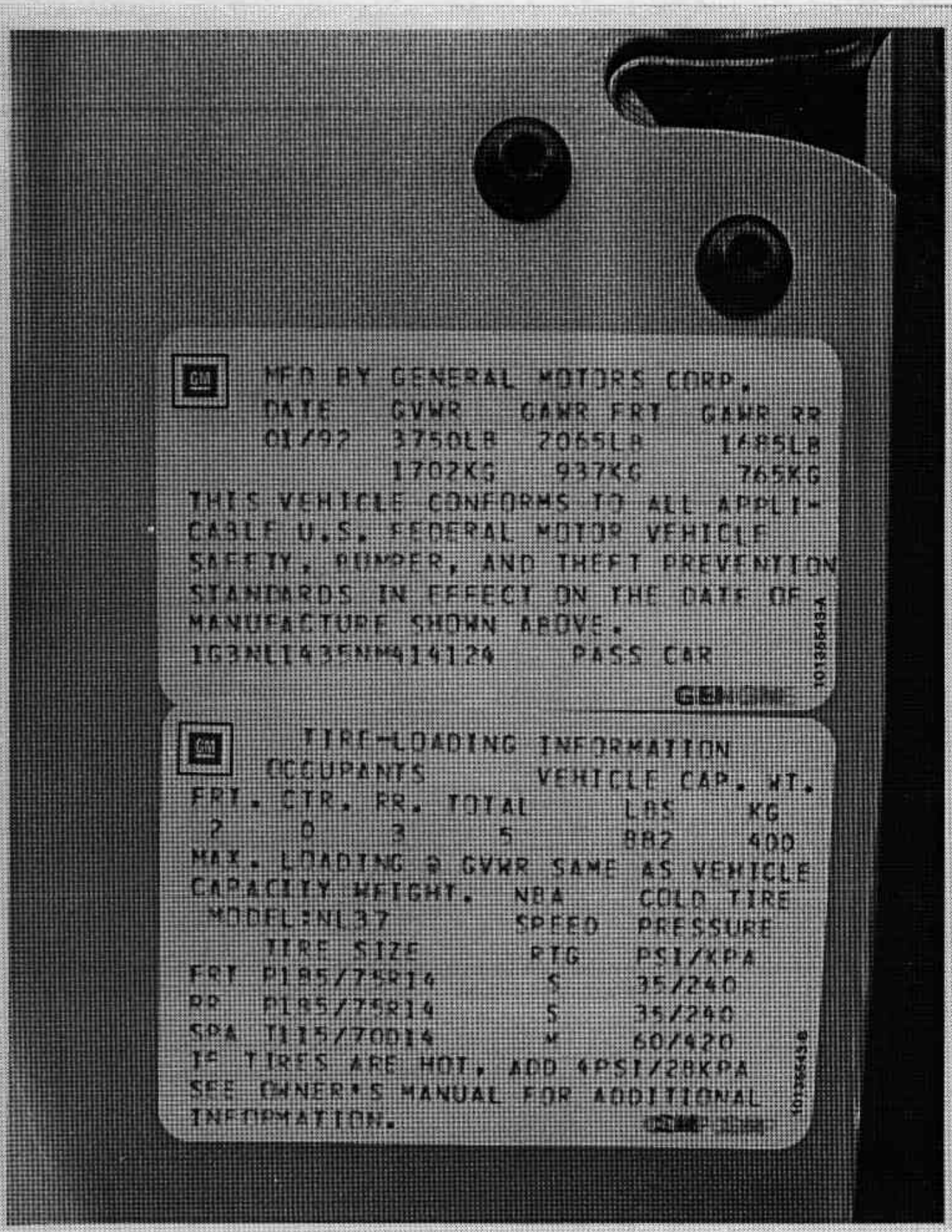
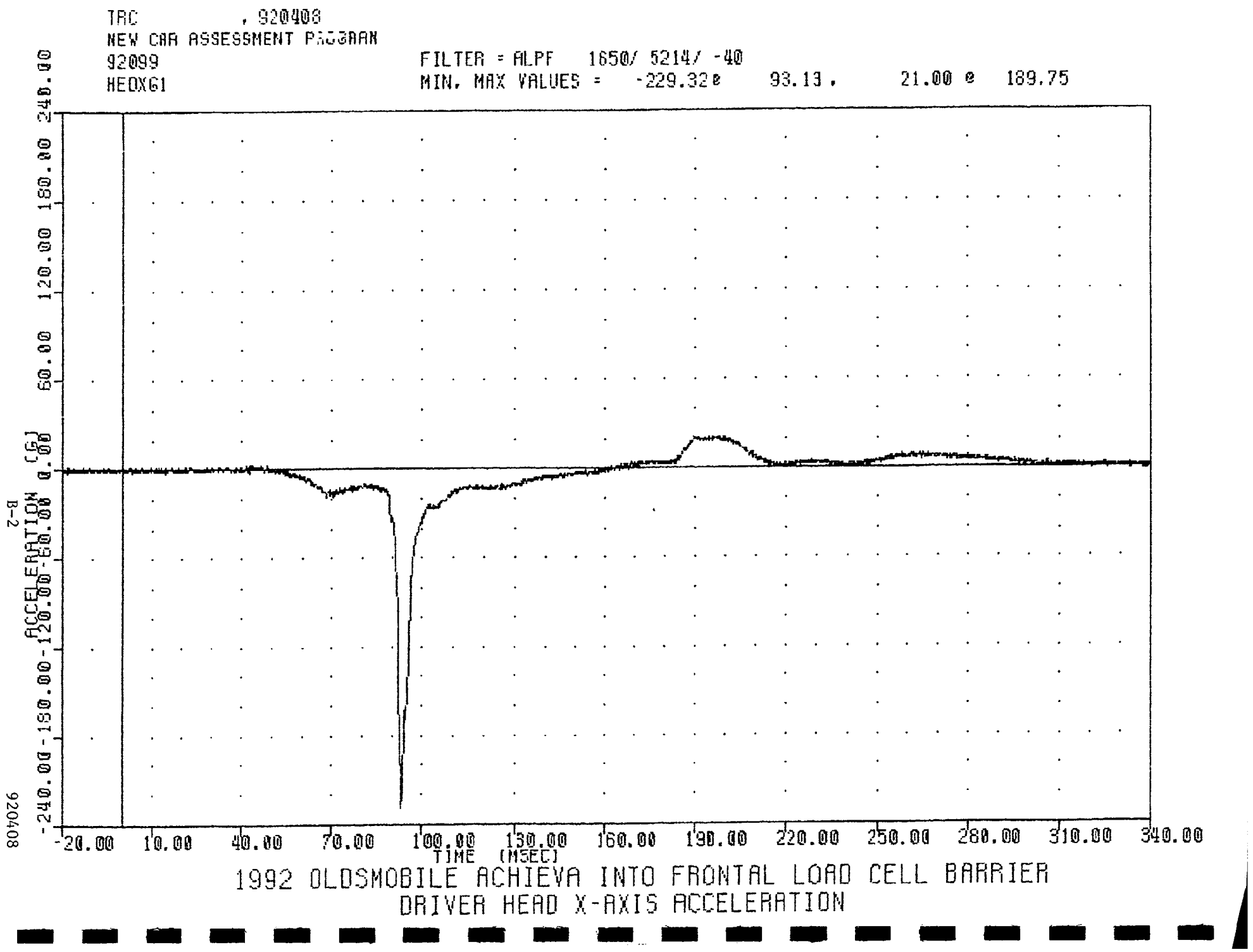


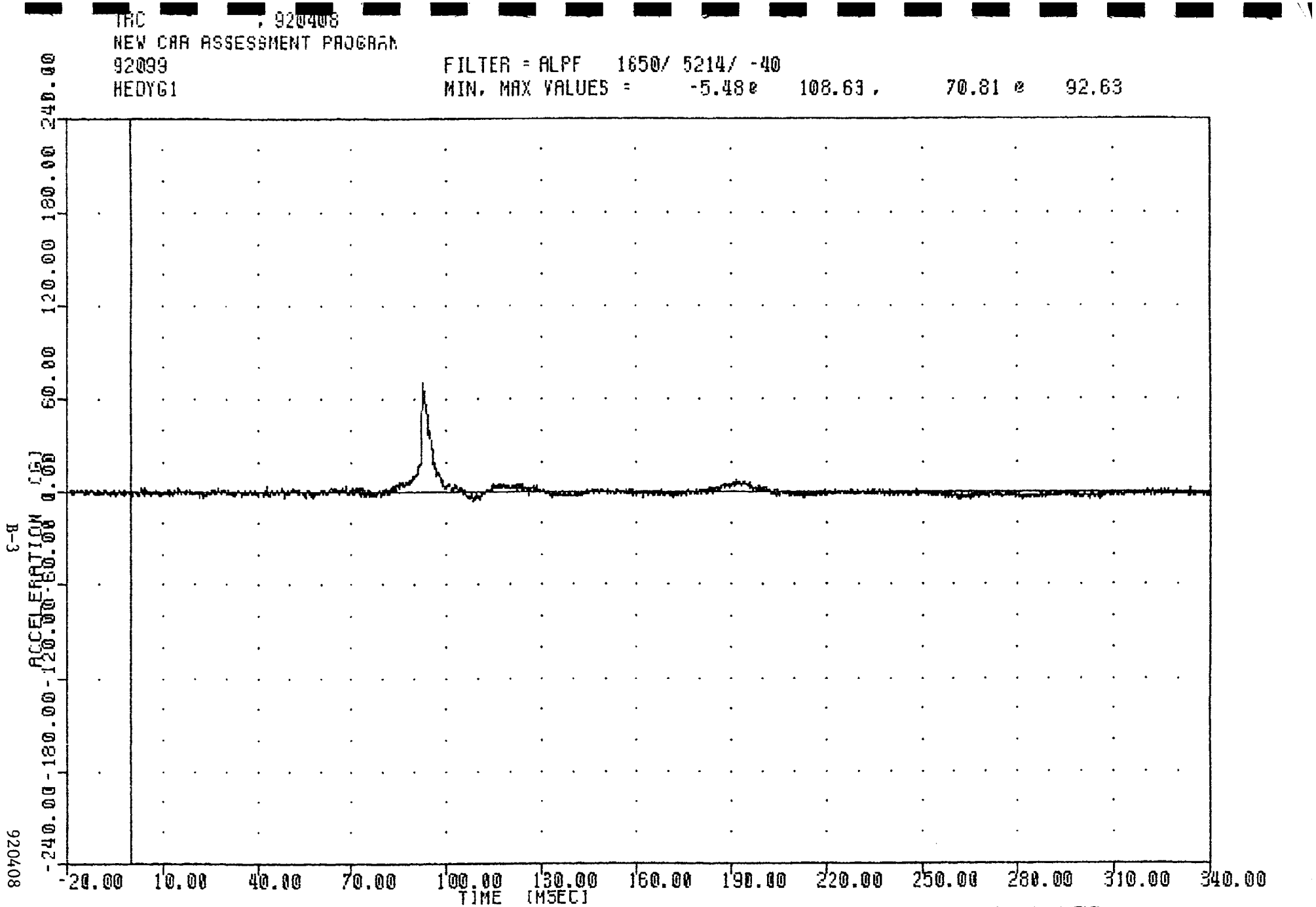
FIG. A-45. PRE-TEST VEHICLE CERT. & RECOMMENDED TIRE PRES. LABELS

Intentionally Left Blank

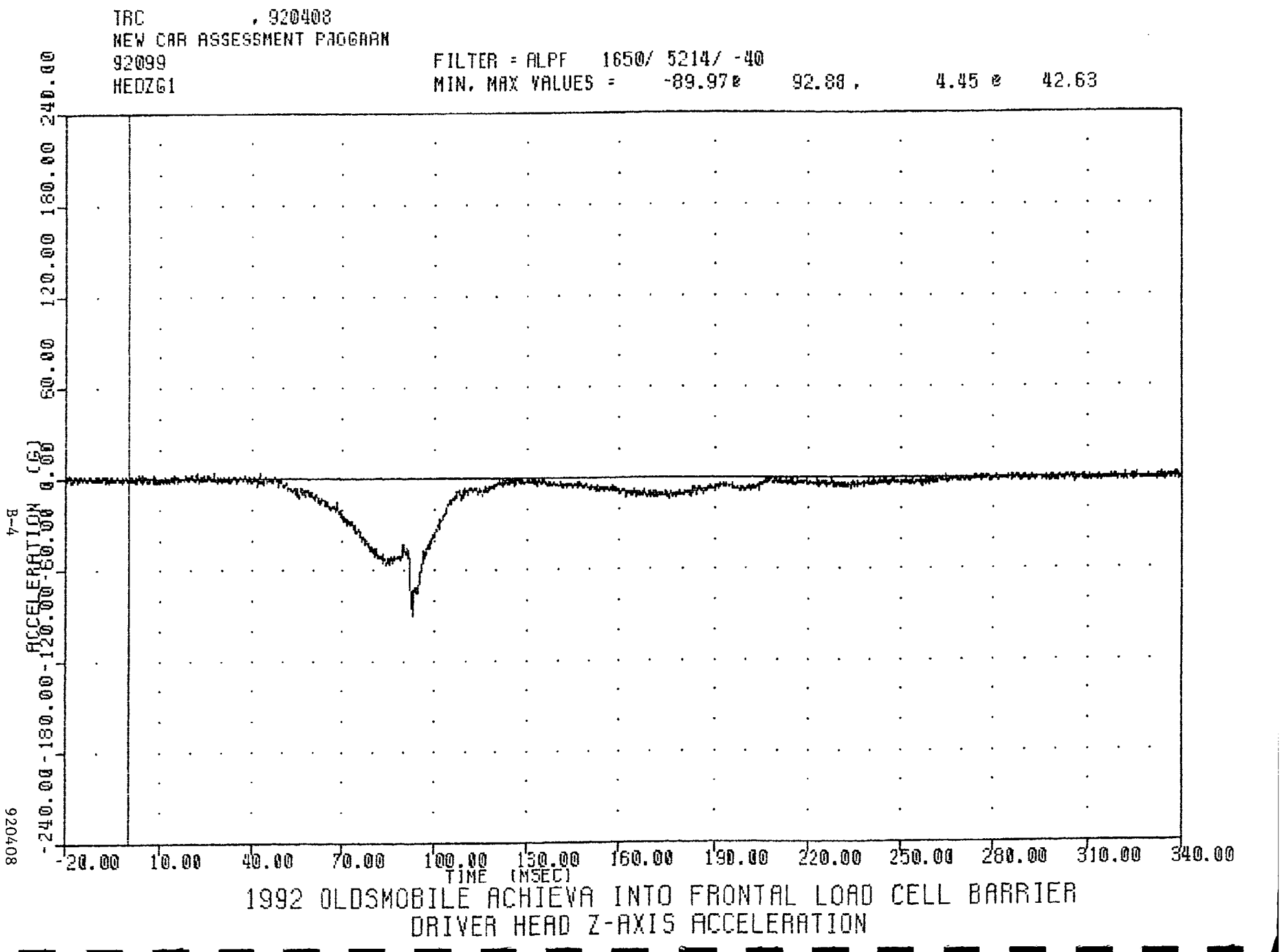
APPENDIX B

DATA PLOTS

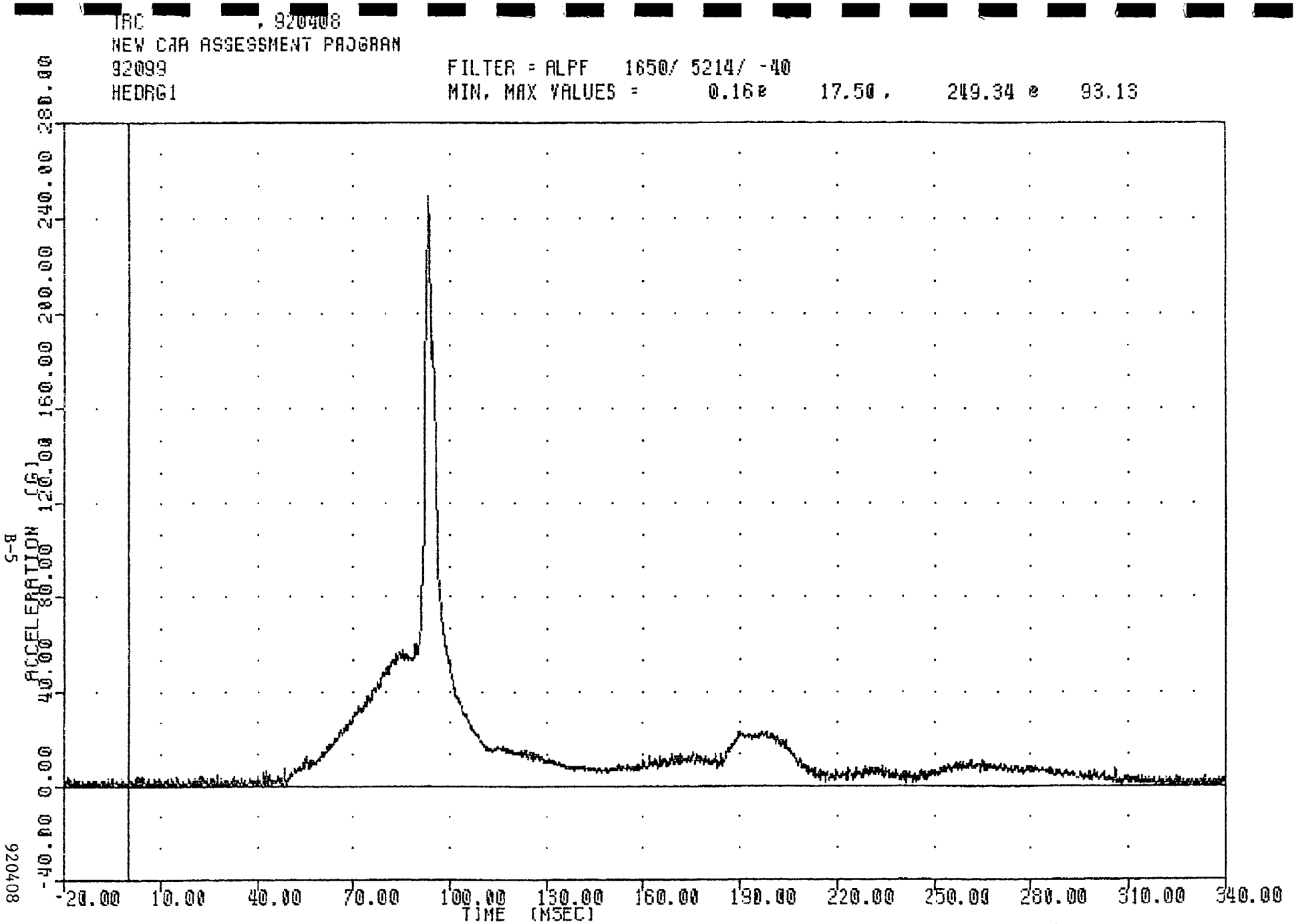

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
HEOXG1
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -229.32 @ 93.13 , 21.00 @ 189.75
240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00
ACCELERATION (G)
B-2
920408
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD X-AXIS ACCELERATION



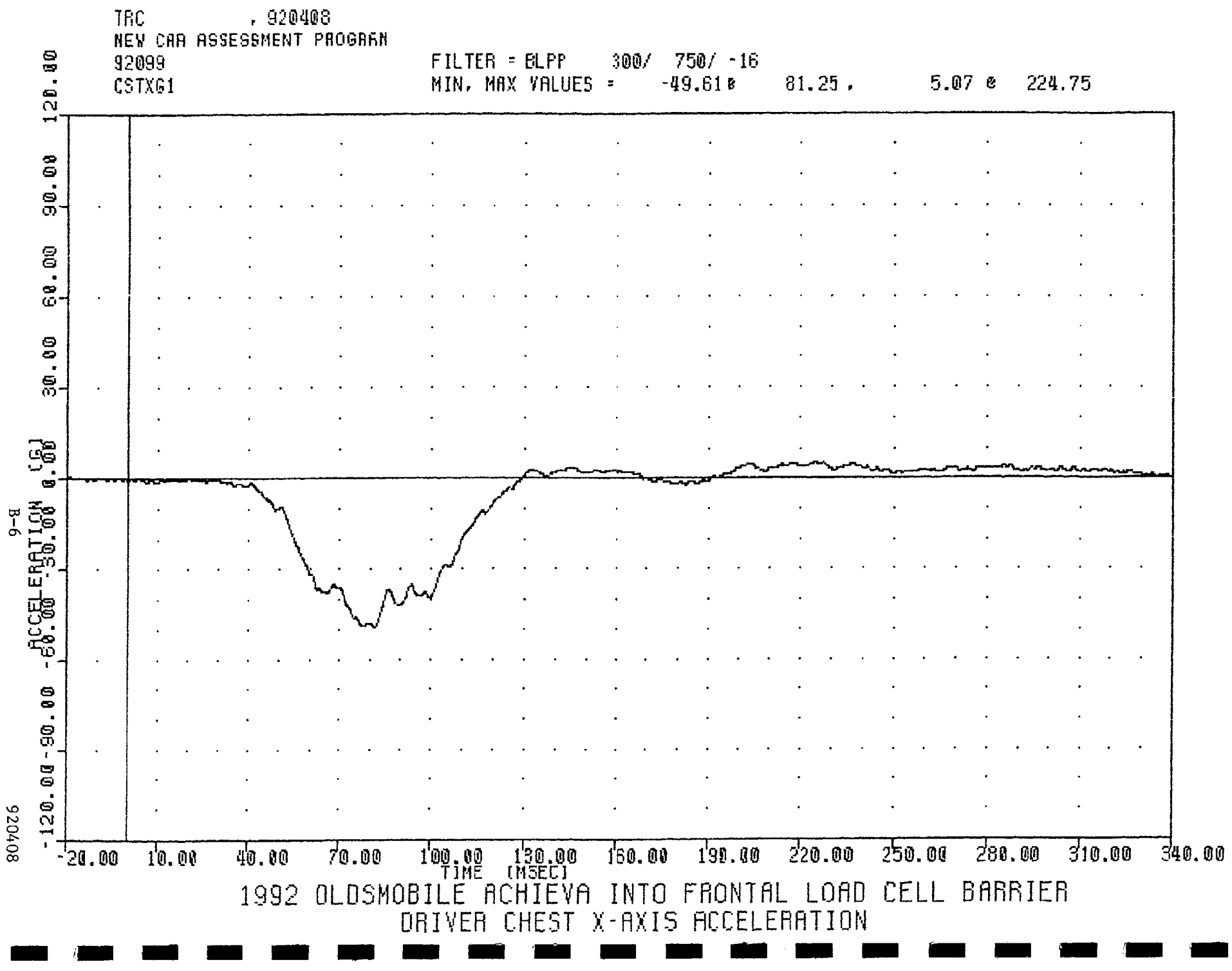
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION

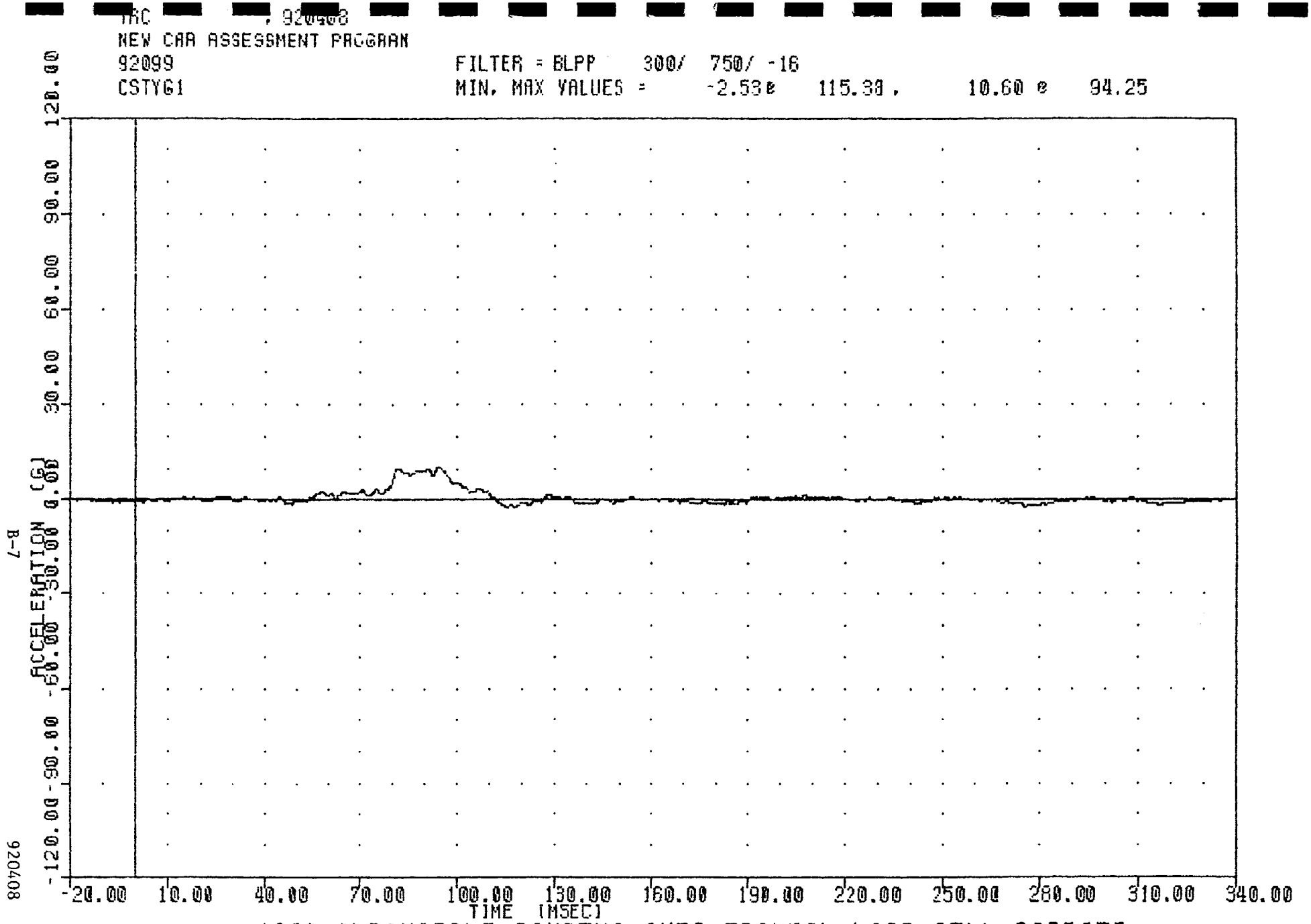


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION



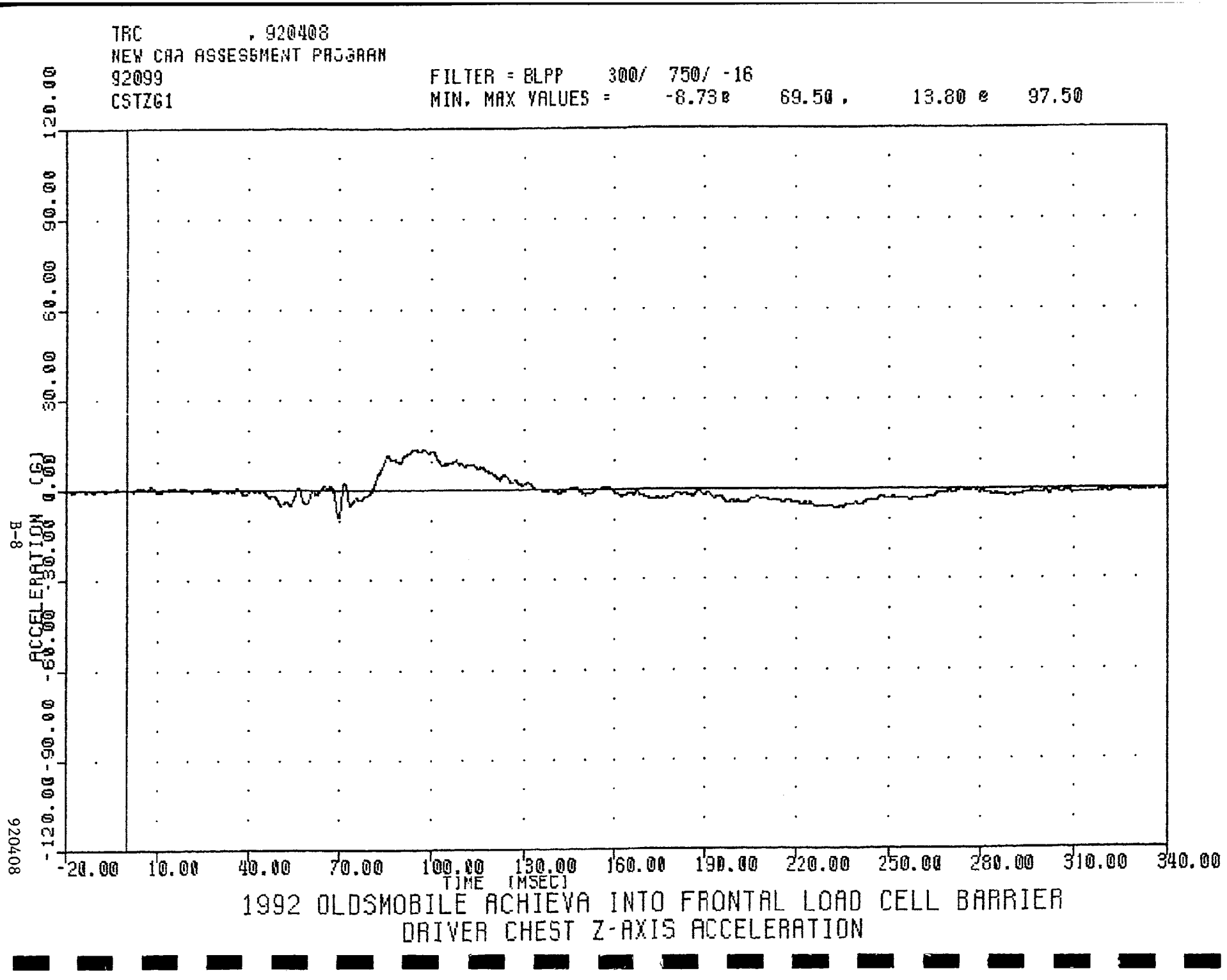
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
CSTXG1
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -49.61 @ 81.25 , 5.07 @ 224.75
120.00
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
B-6
920408
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST X-AXIS ACCELERATION

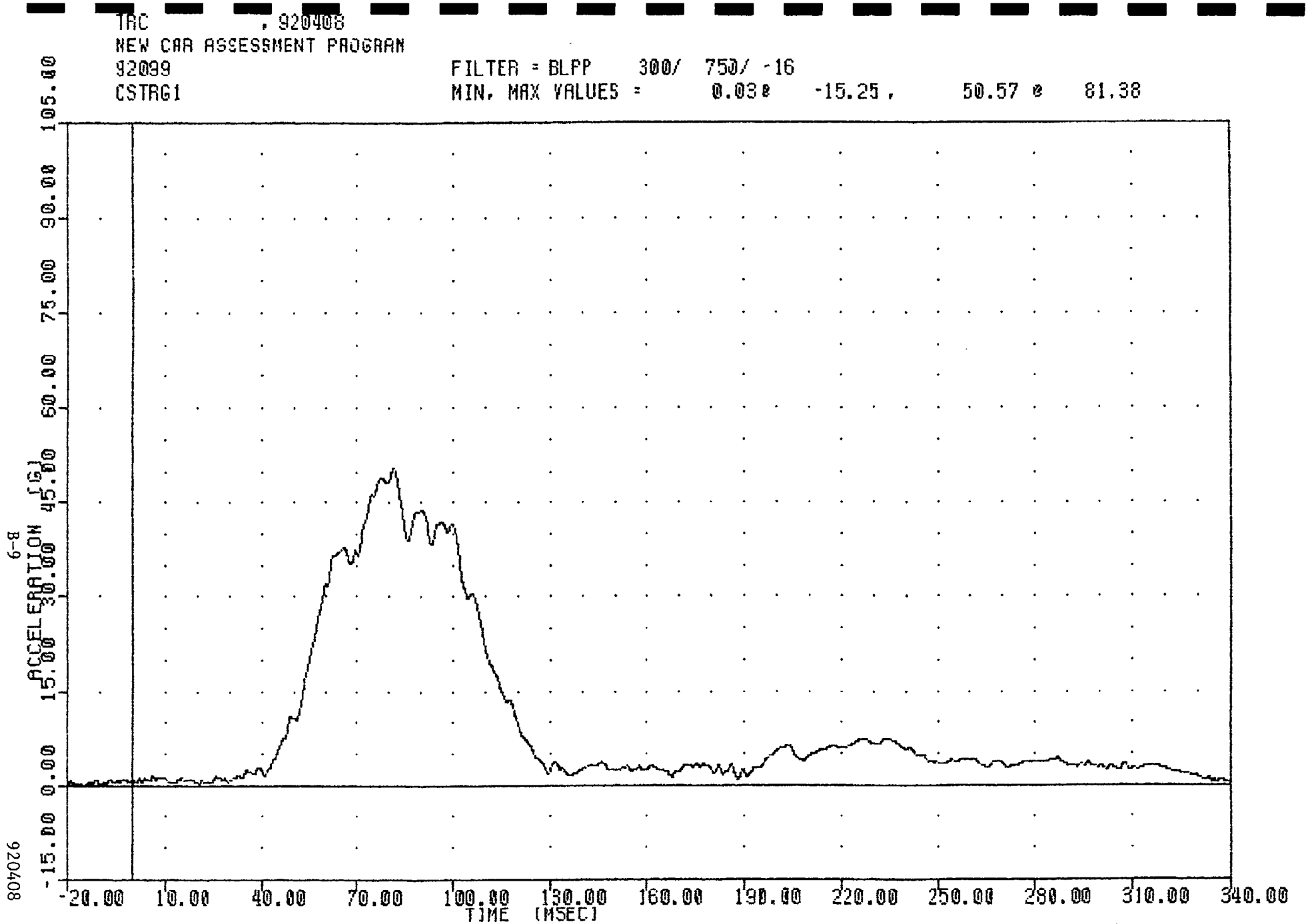


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

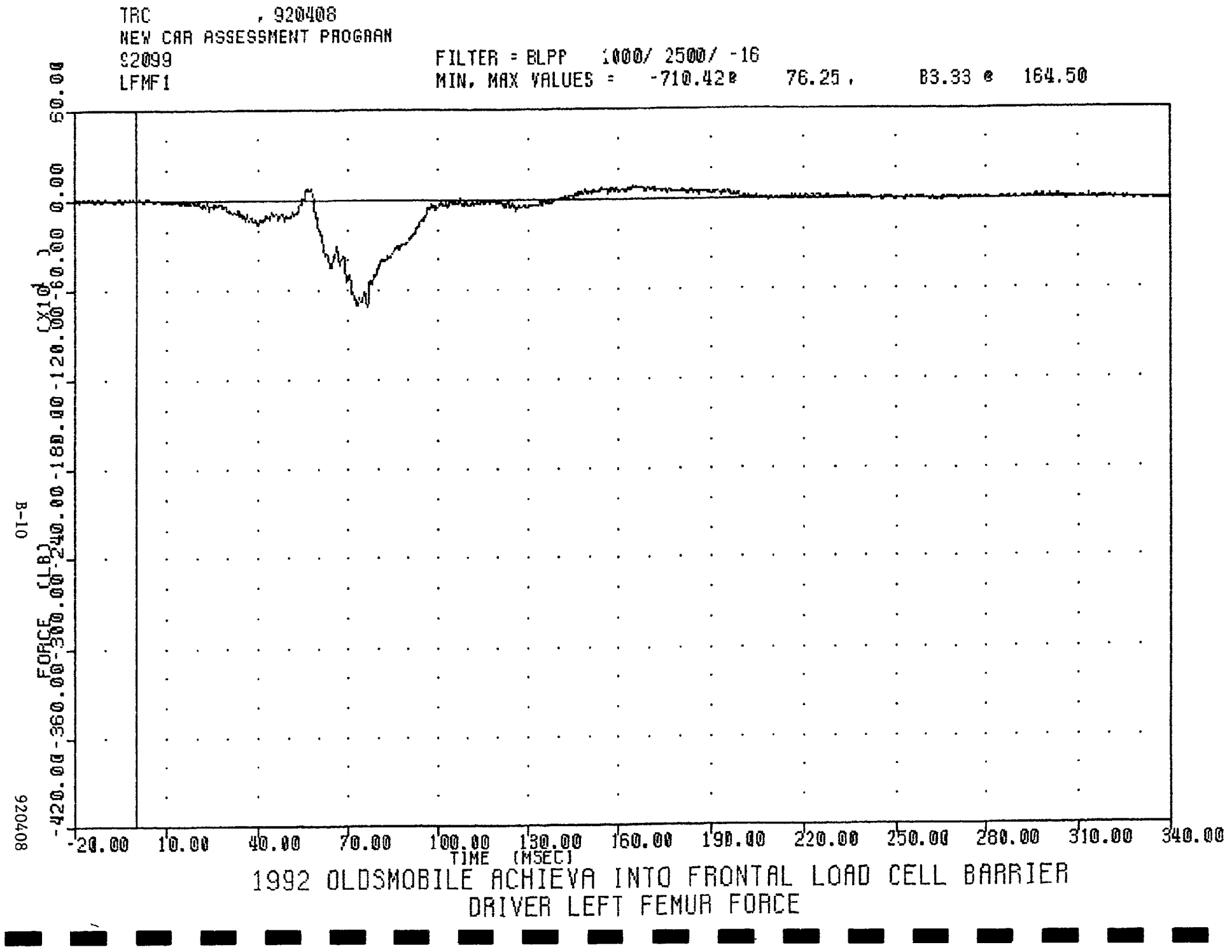
920408



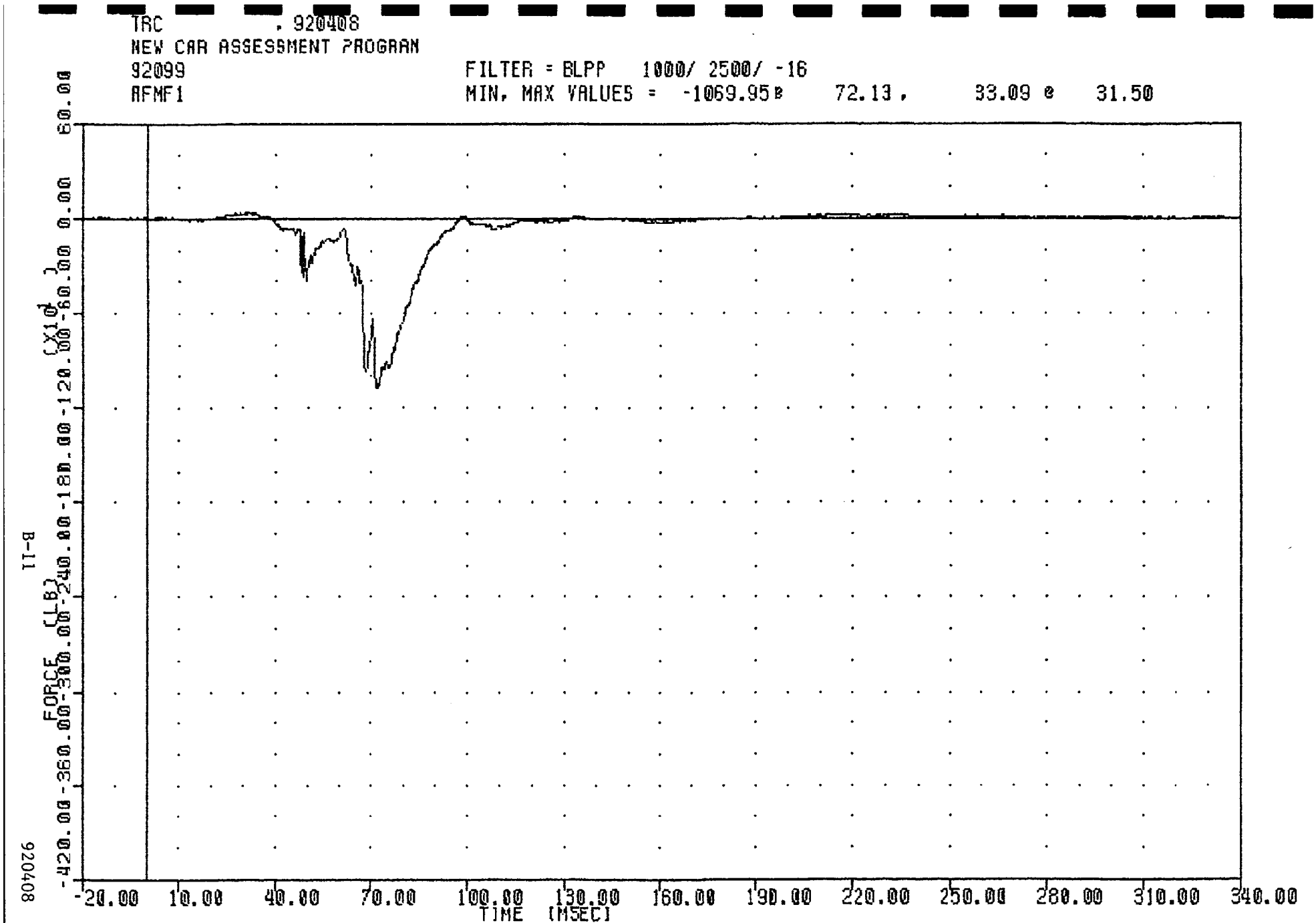
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

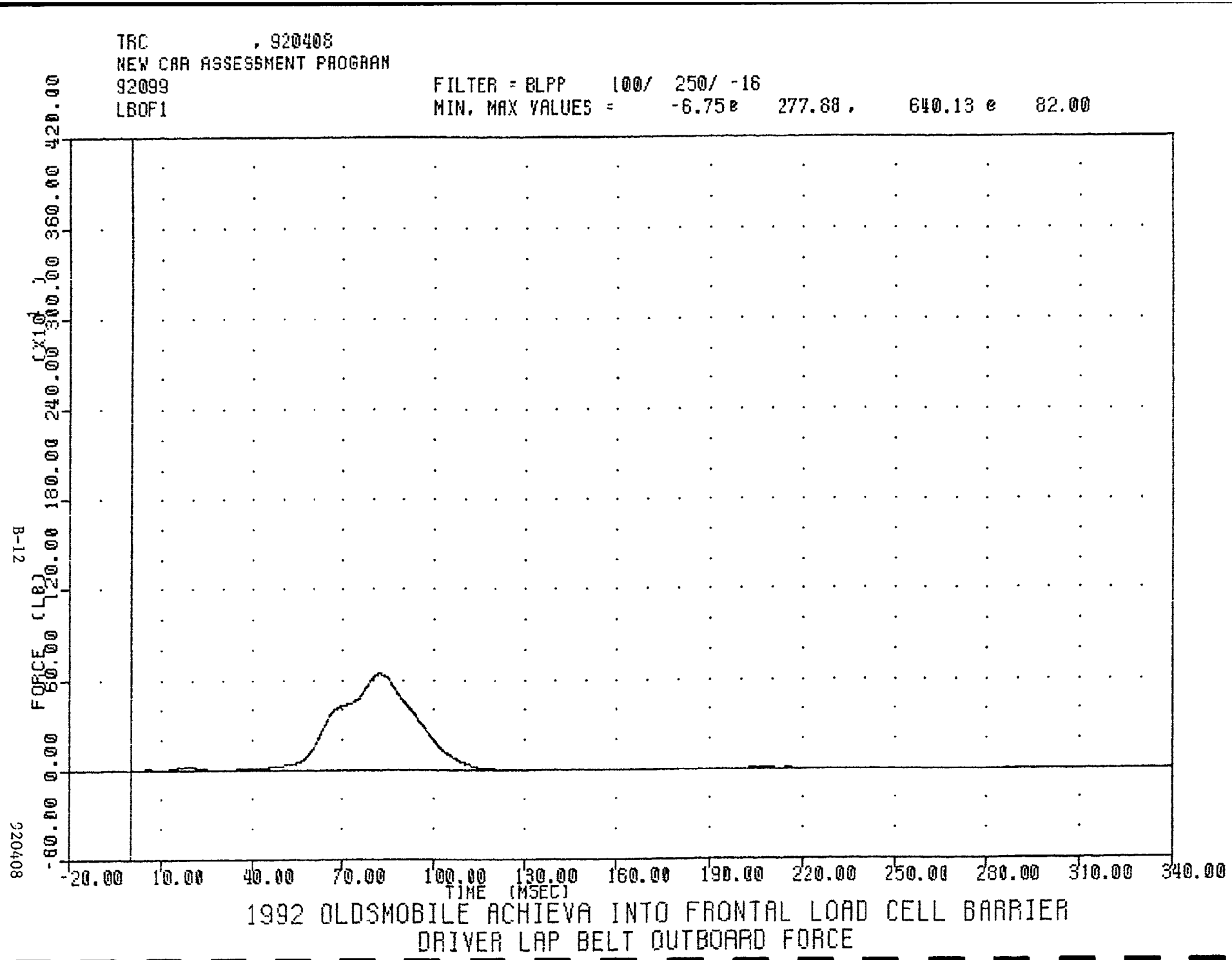


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE



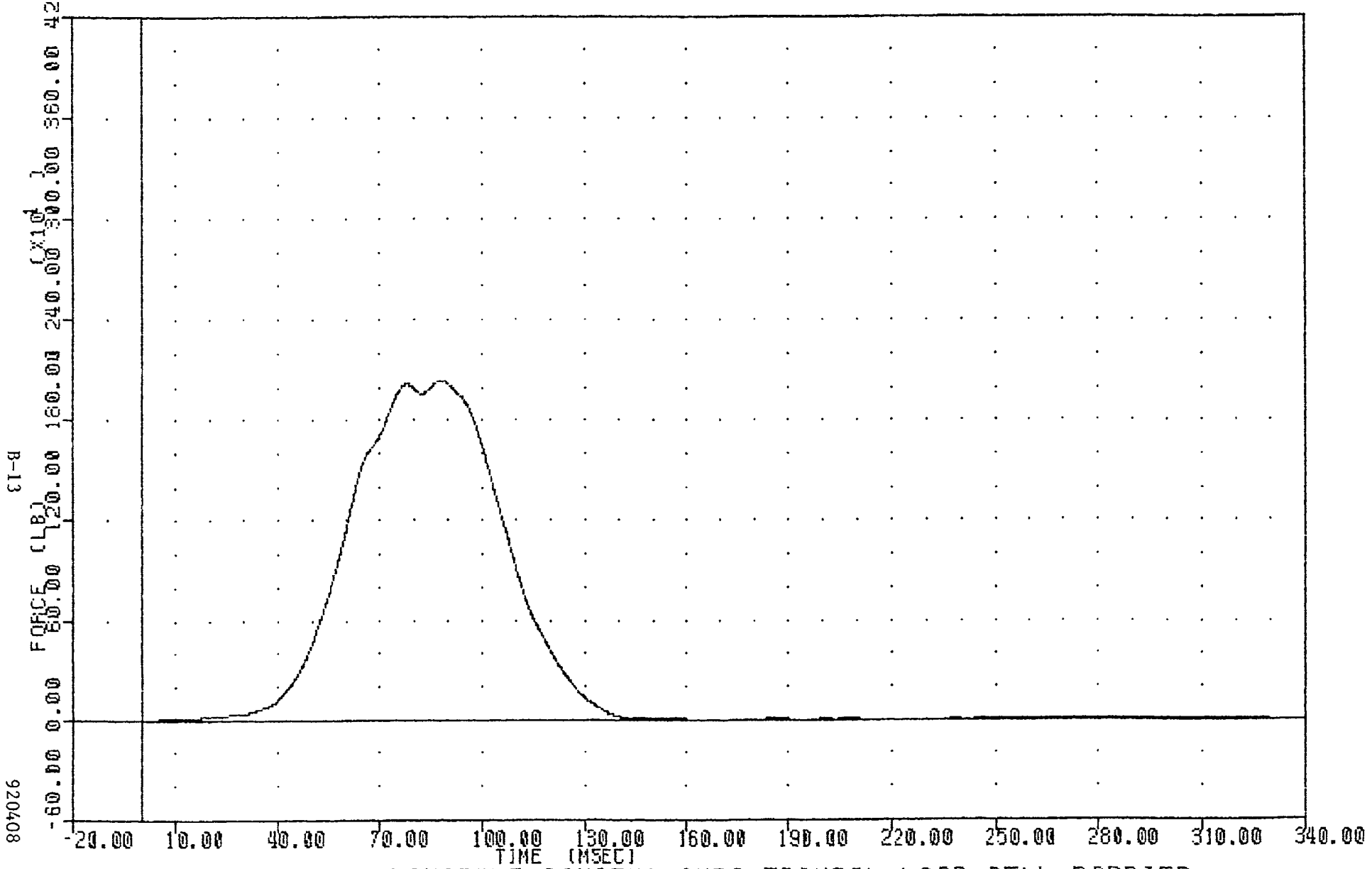
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FEMUR FORCE

920408


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
LBOF1
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -6.75 @ 277.88 , 640.13 @ 82.00
FORCE (LB) (X10)
420.00
360.00
300.00
240.00
180.00
120.00
60.00
0.00
-60.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE

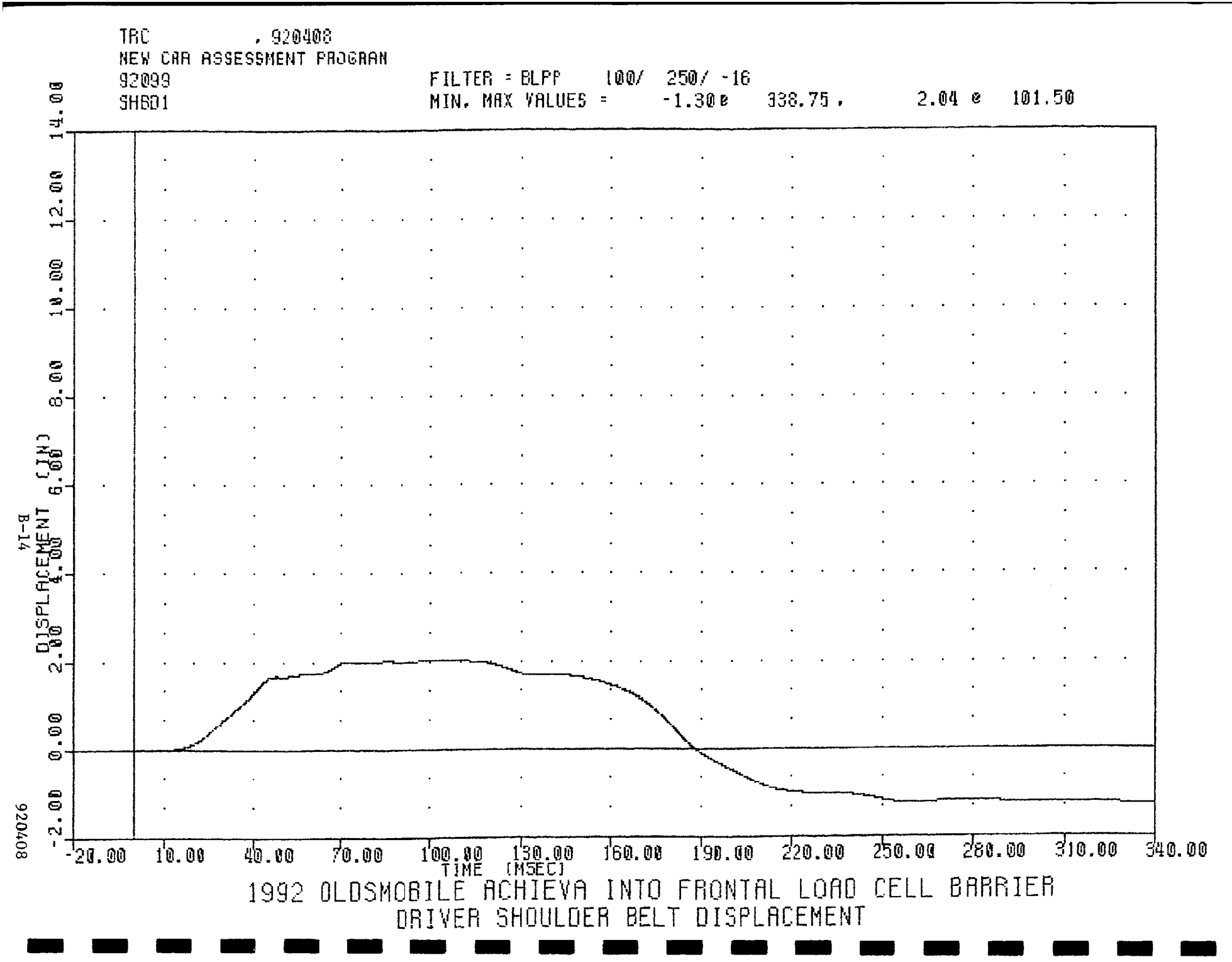
220408

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPP 100/ 250/ -16
SHBF1 MIN, MAX VALUES = -3.01 @ 195.50 , 2036.52 @ 87.88



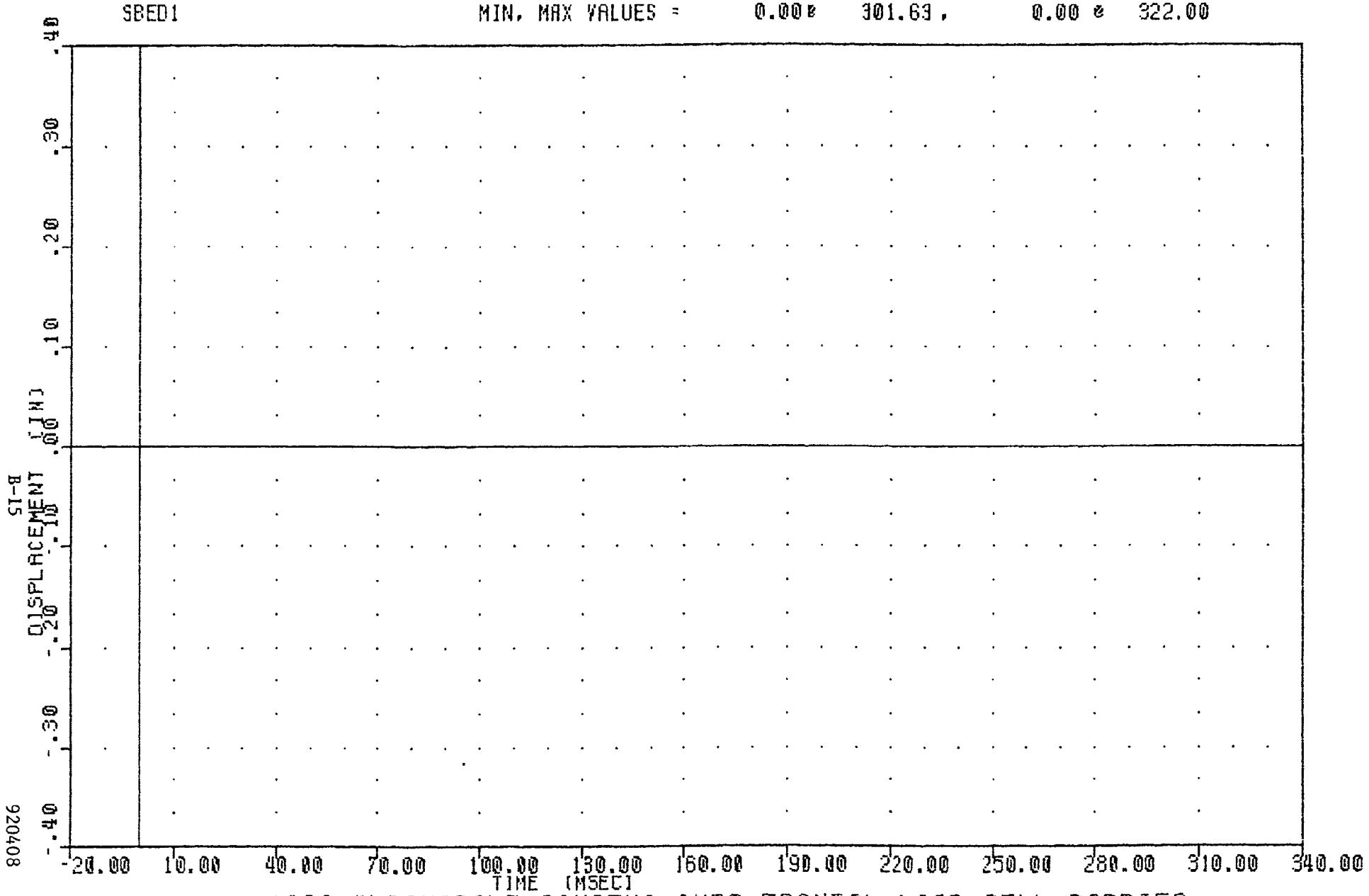
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT FORCE

920408

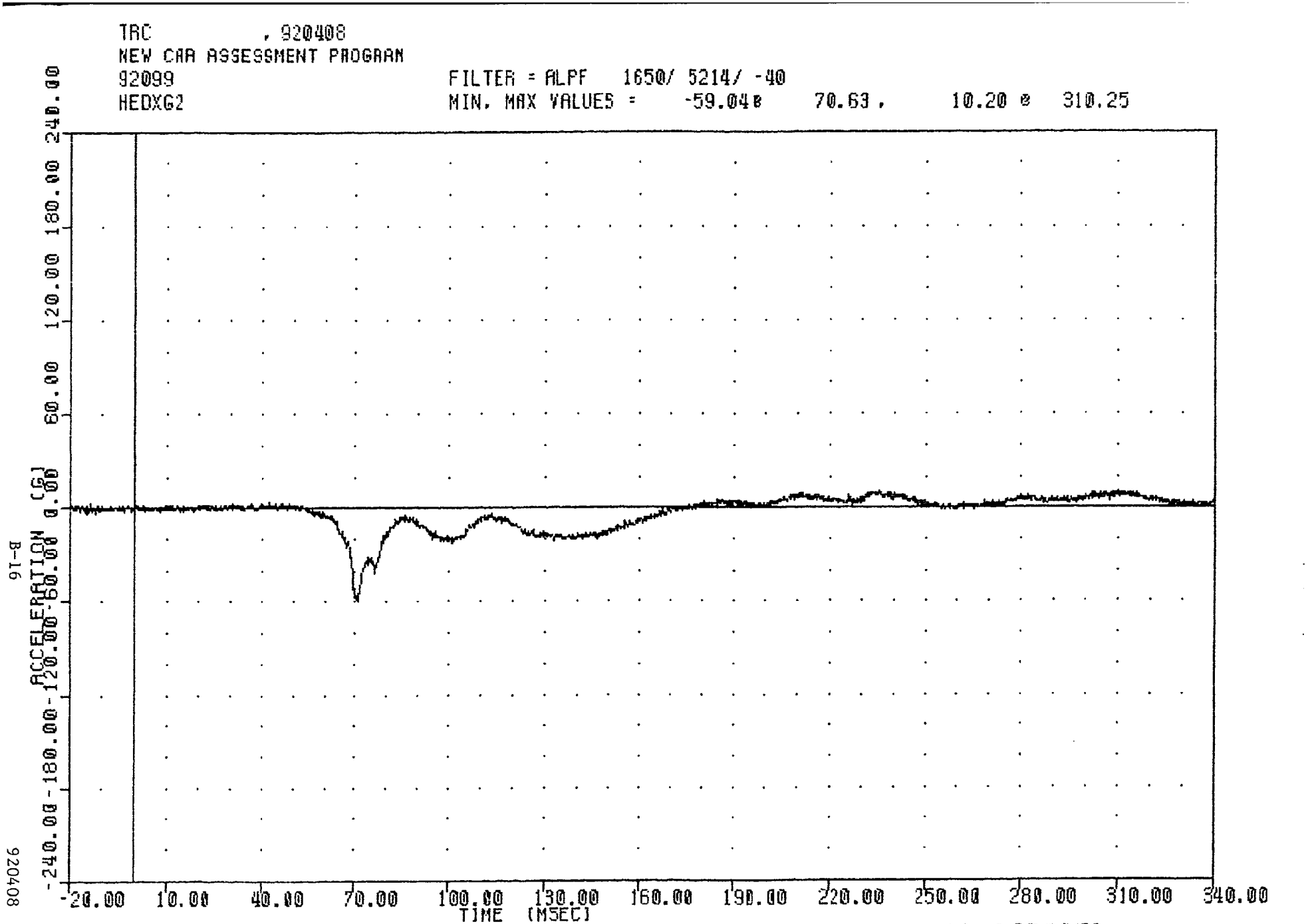


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPF 100/ 250/ -16
SBED1 MIN, MAX VALUES = 0.00 @ 301.63 , 0.00 @ 322.00

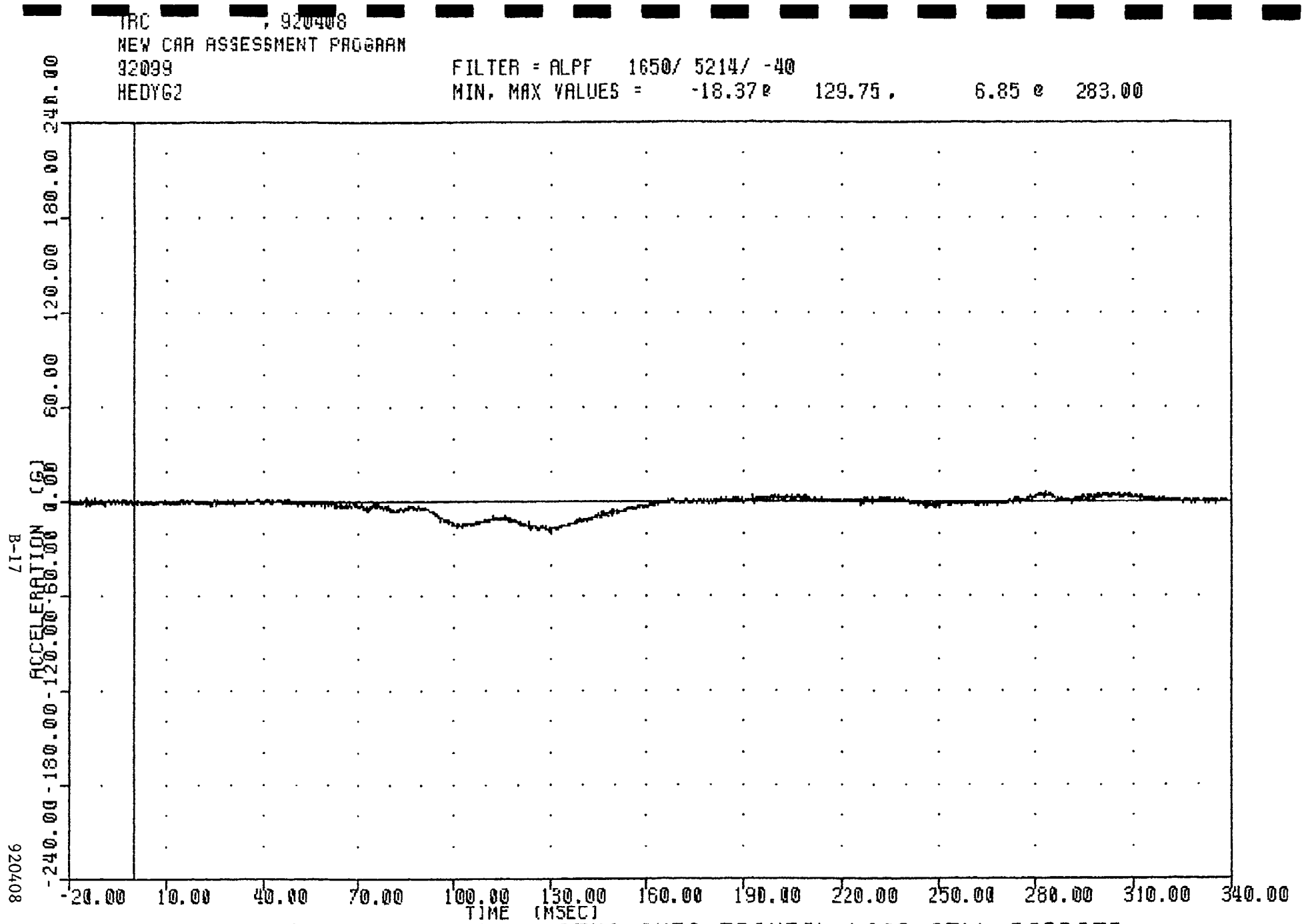


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
DRIVER SEAT BELT EXTENSION



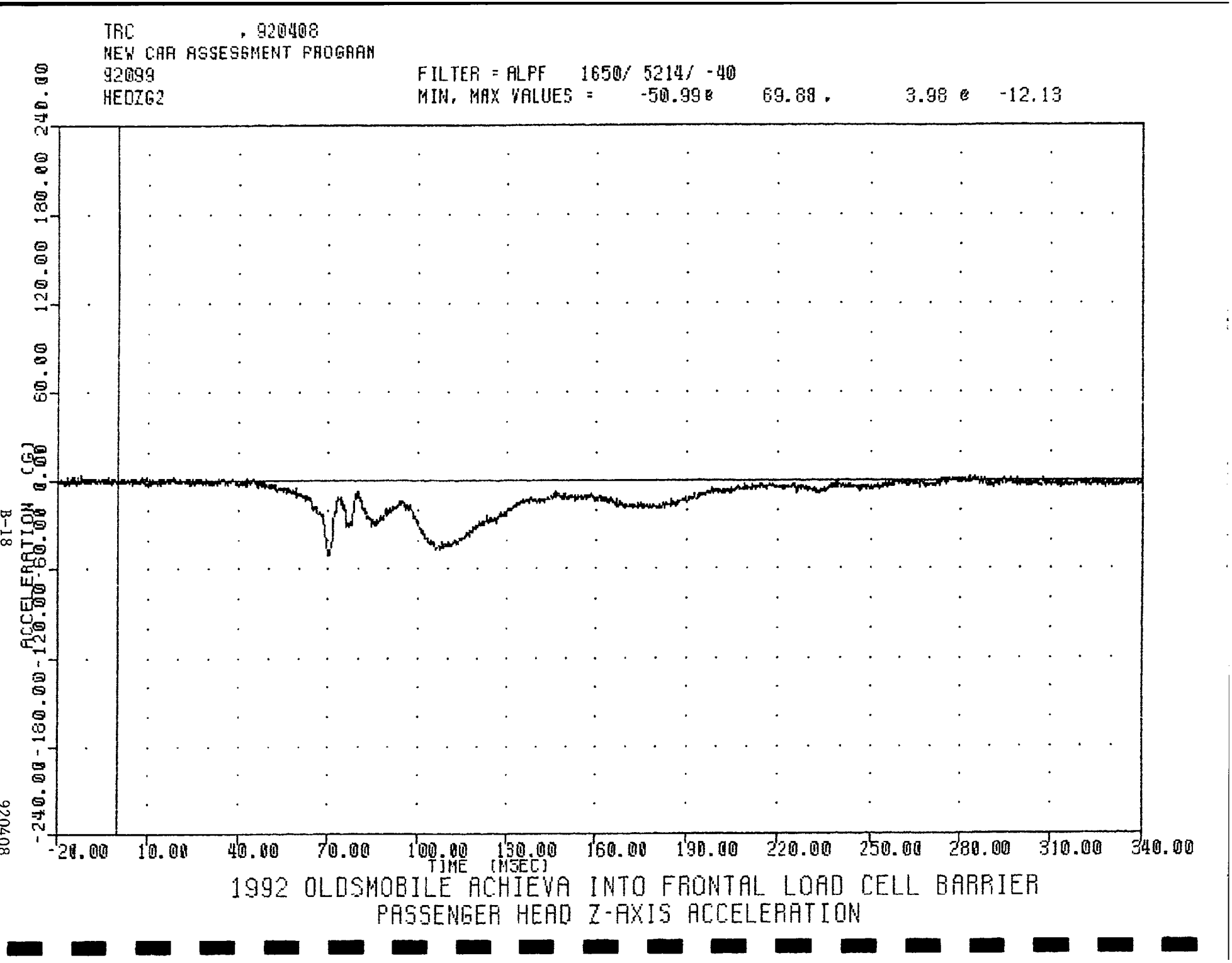
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION

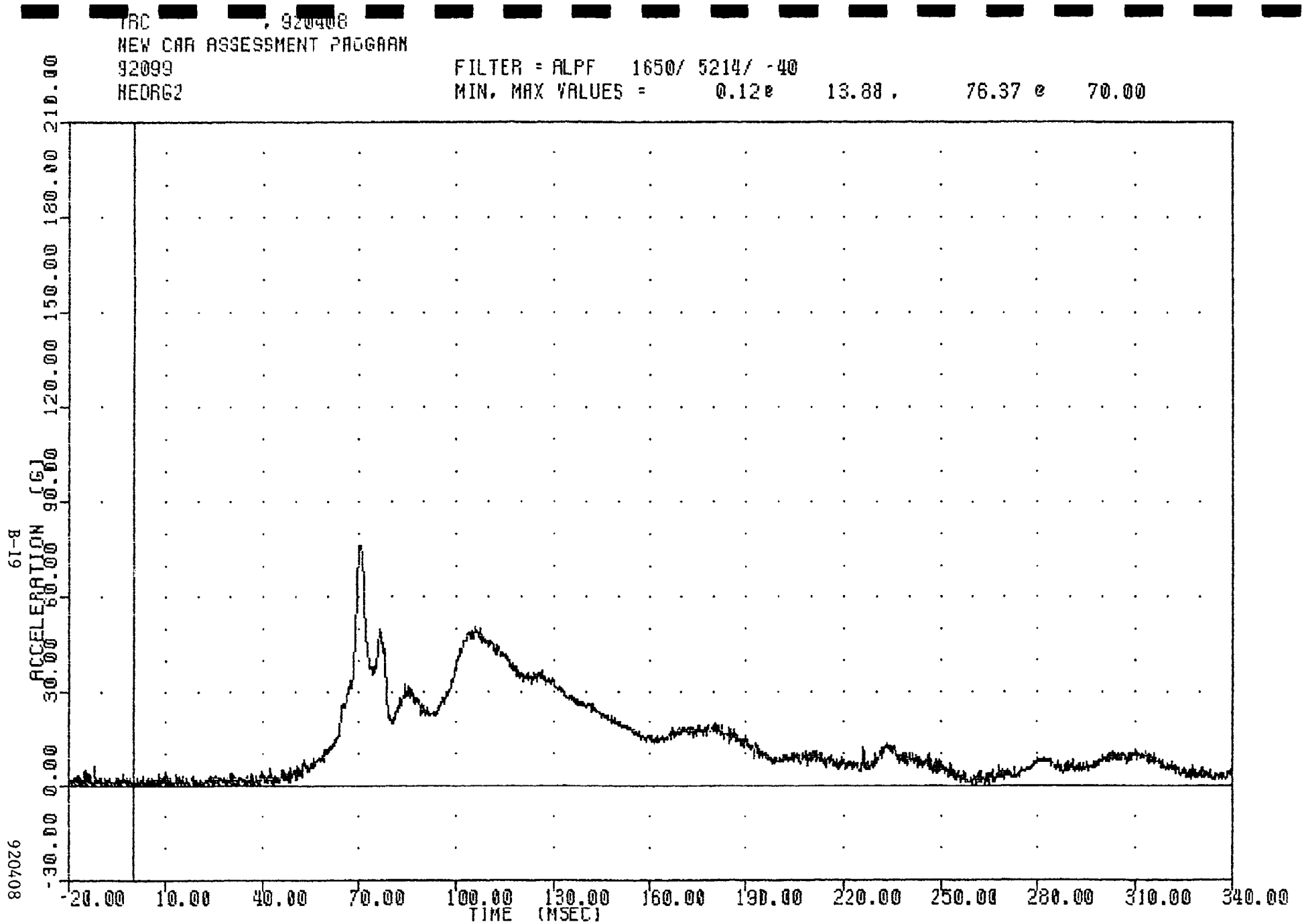
920408



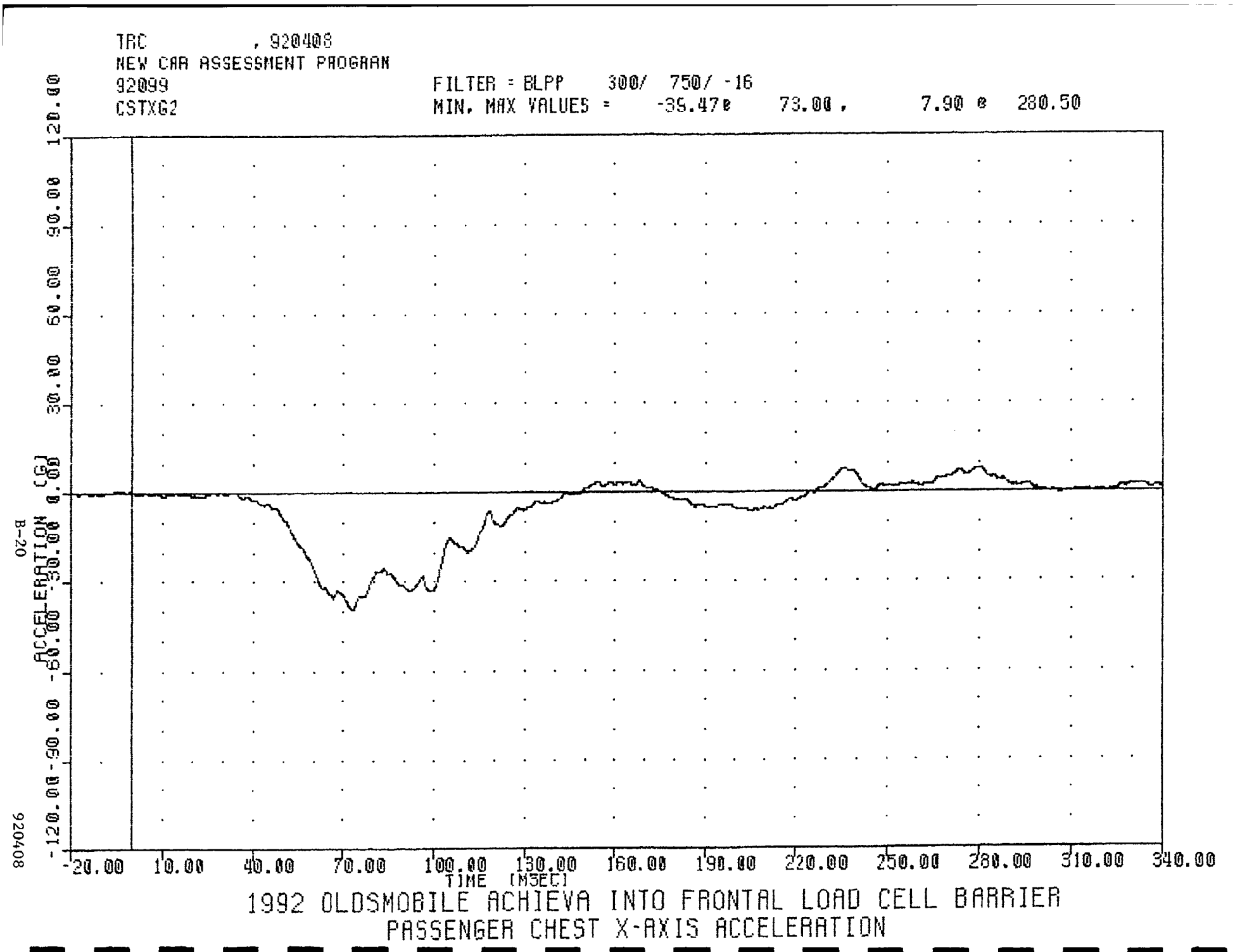
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION

920408

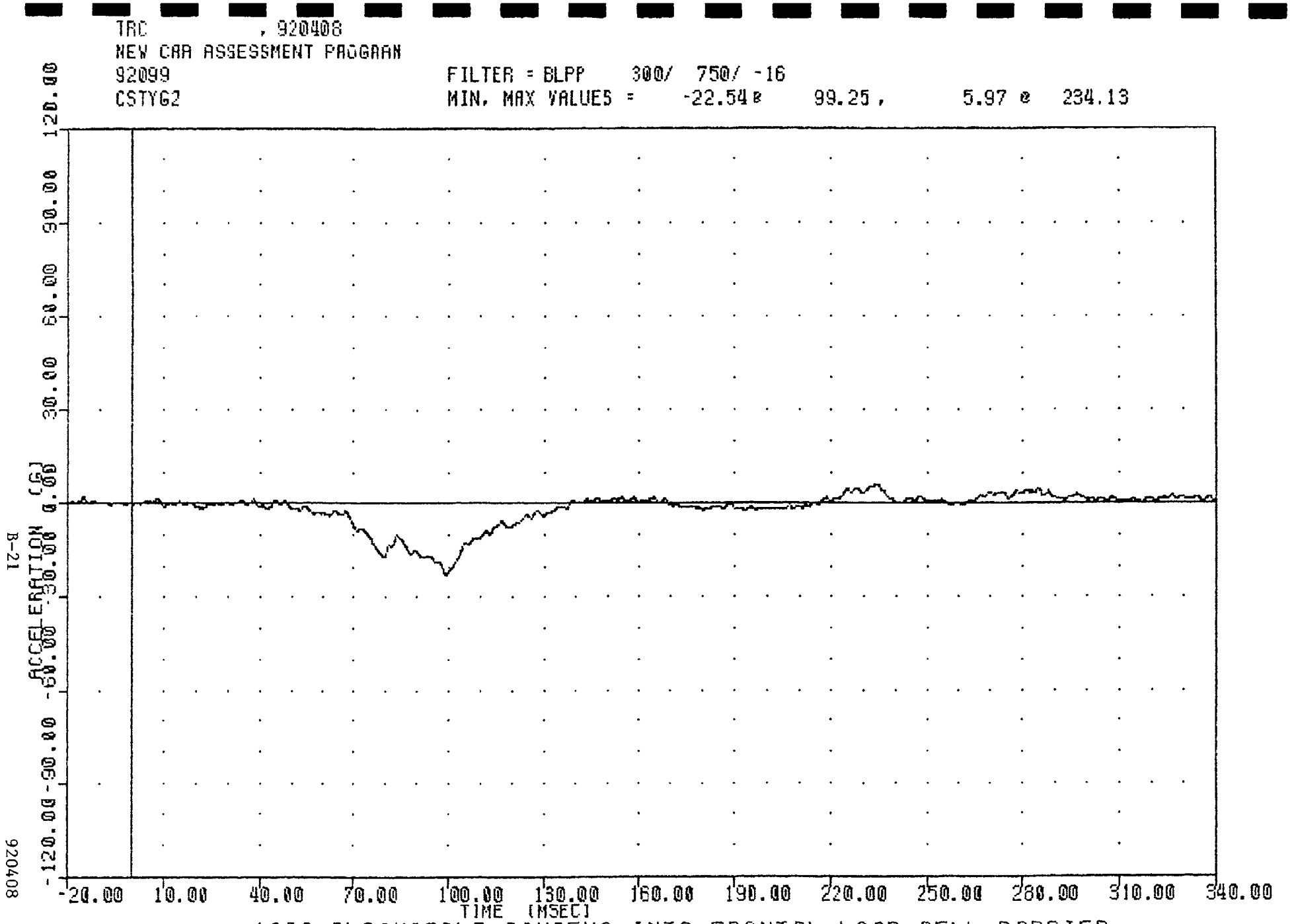

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
HEDZG2
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -50.99 @ 69.88 , 3.98 @ -12.13
240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION

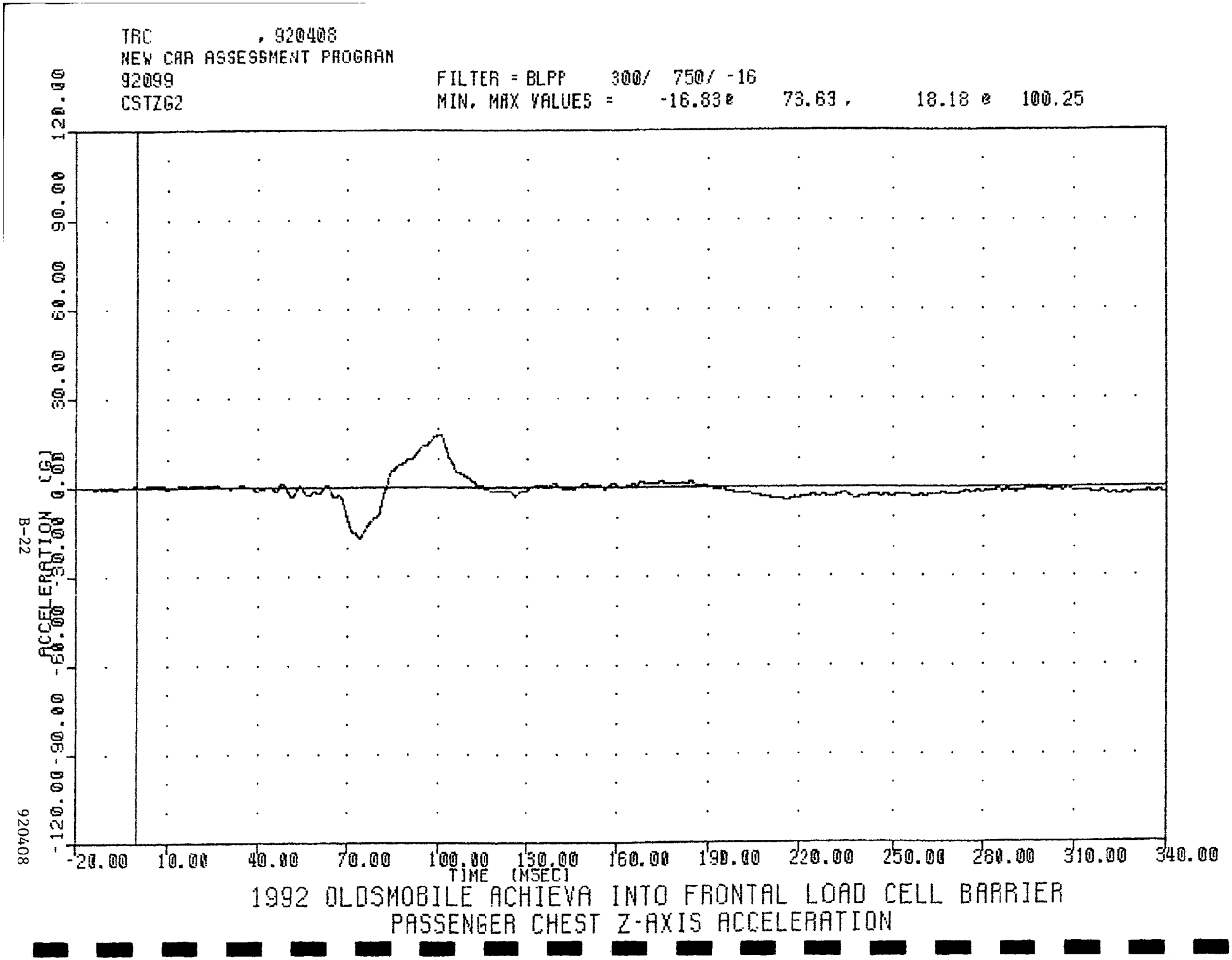


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION

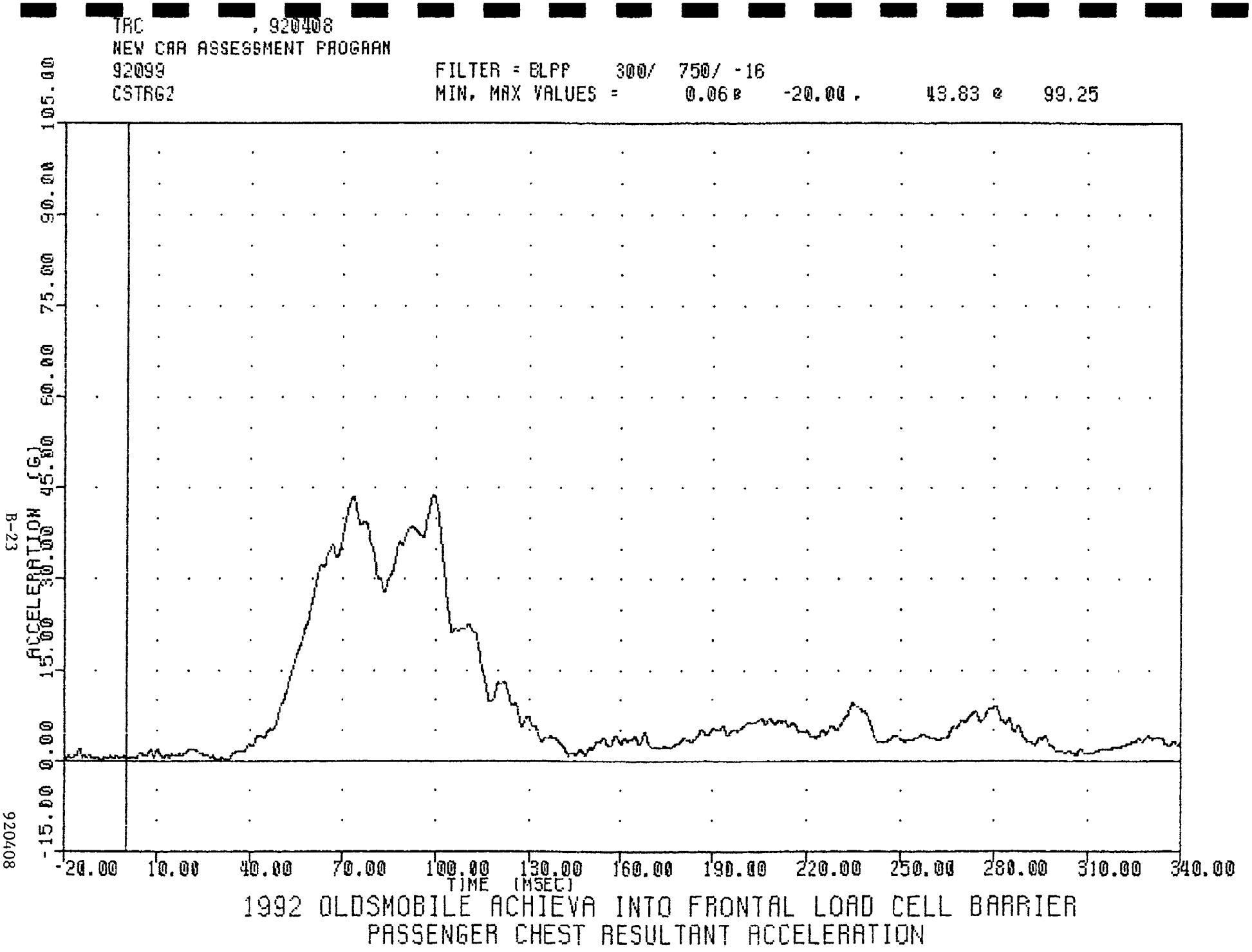


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION

920408

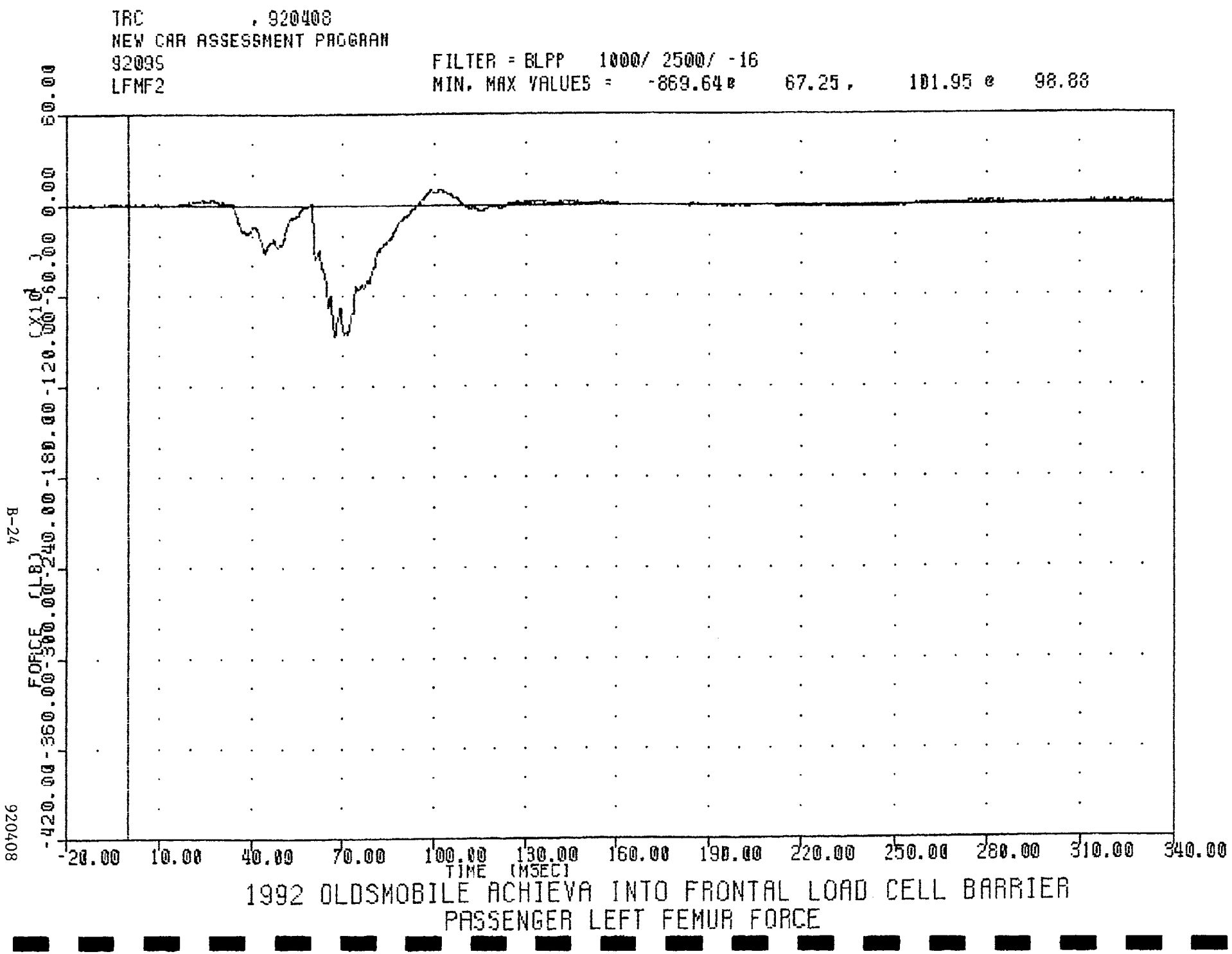


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION



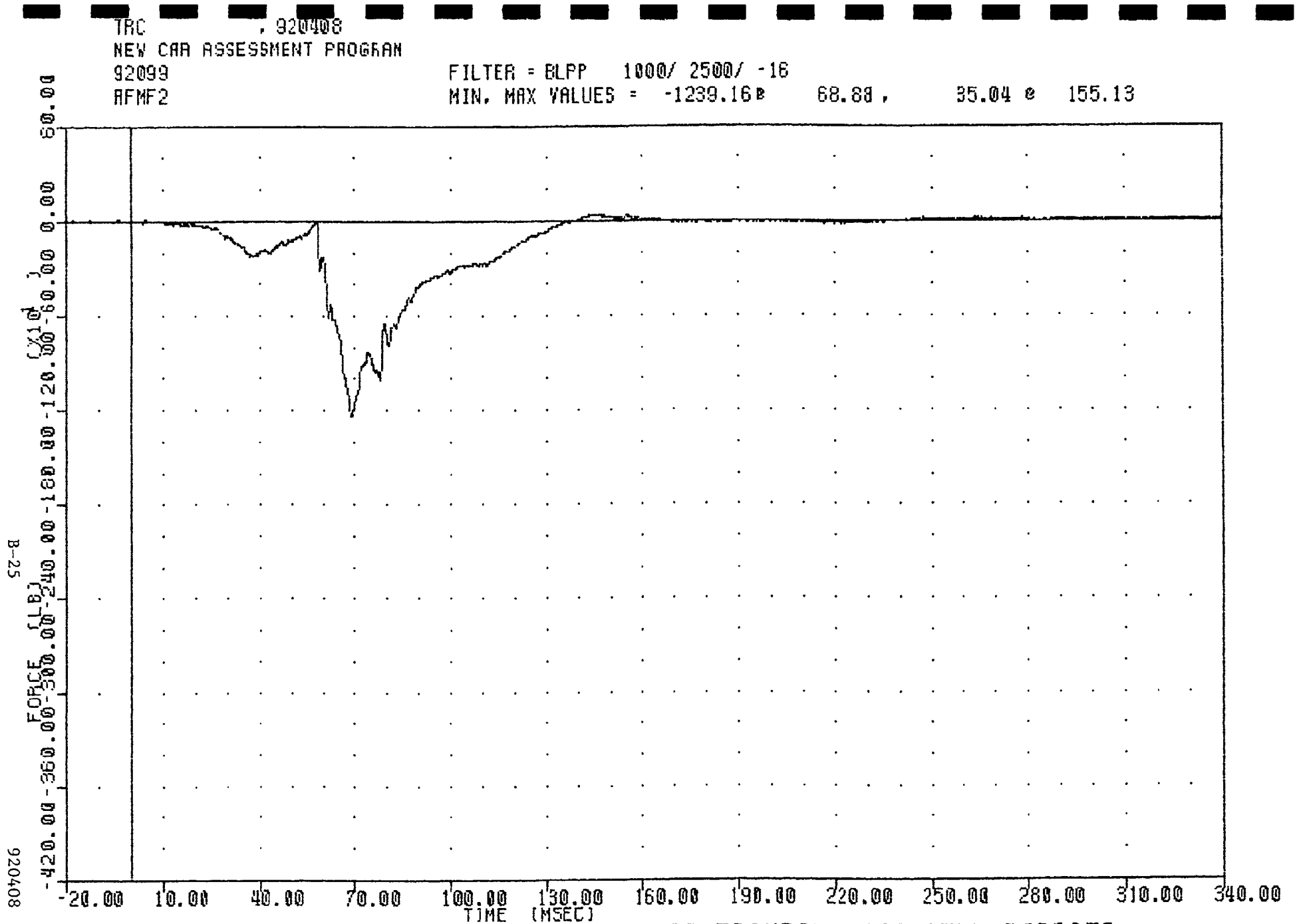
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION

920408



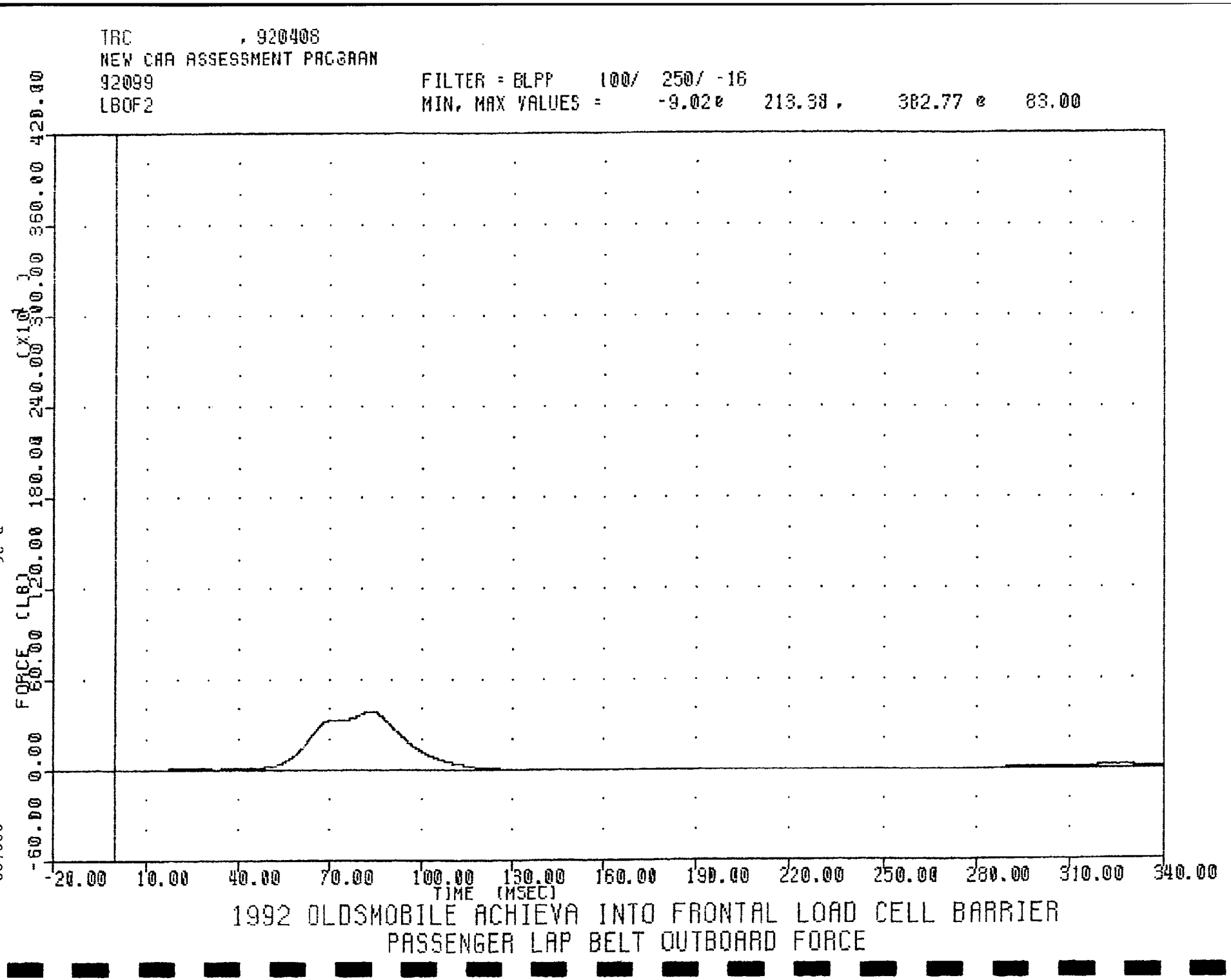
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE

920408

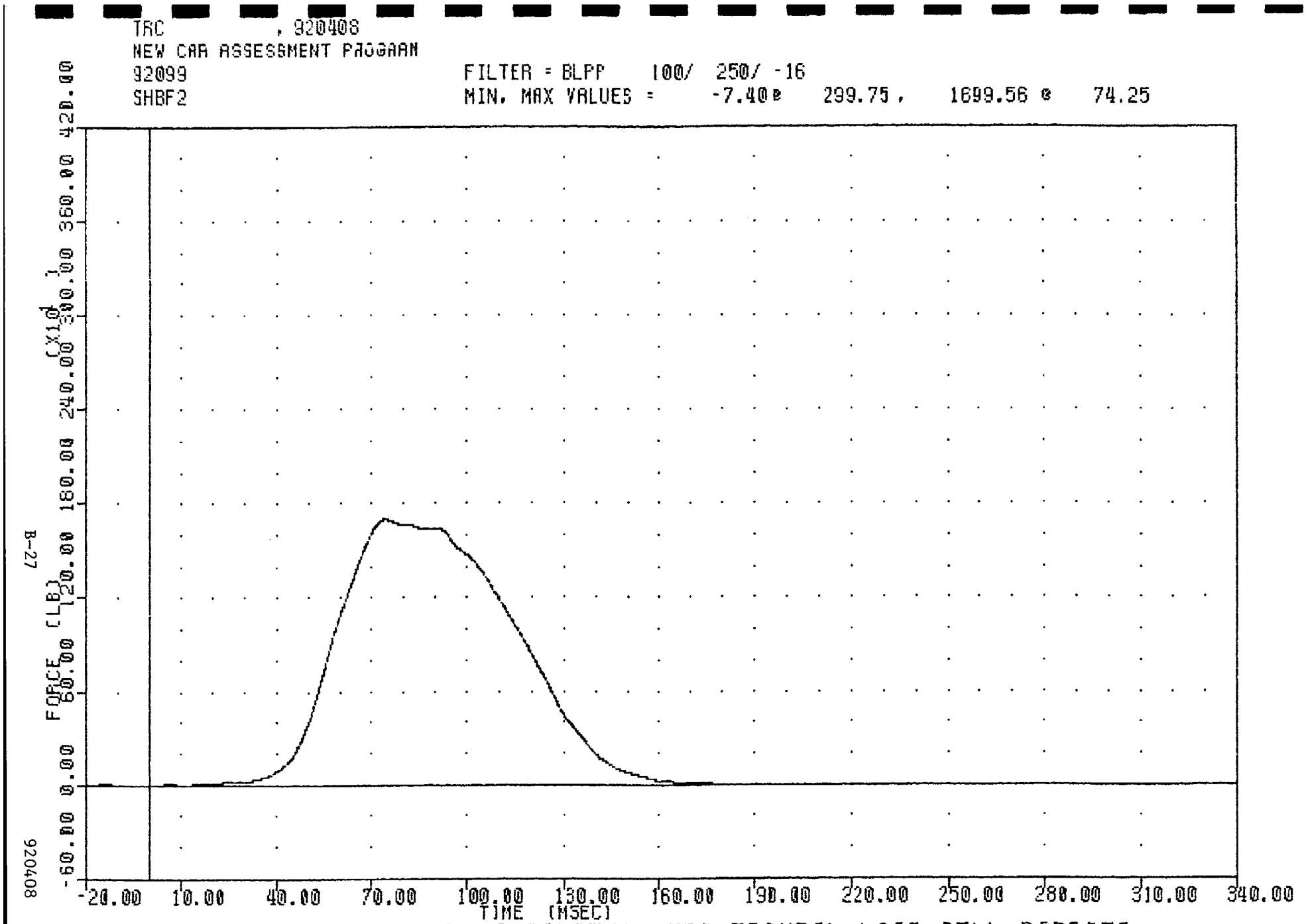


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FEMUR FORCE

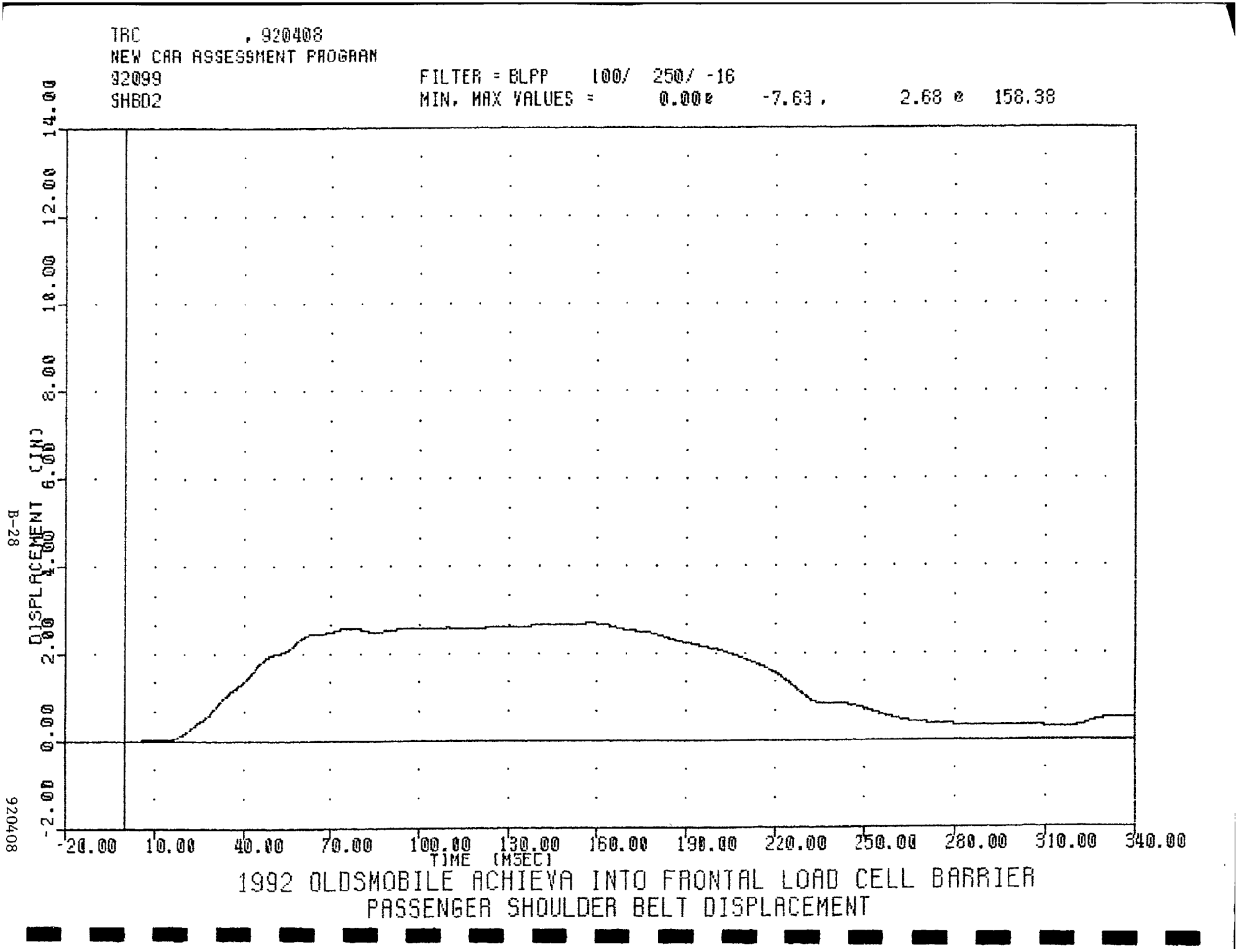
920408


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
LBOF2
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -9.02@ 213.38 , 382.77 @ 83.00
FORCE (LB) (X10)
420.00
360.00
300.00
240.00
180.00
120.00
60.00
0.00
-60.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE

920408



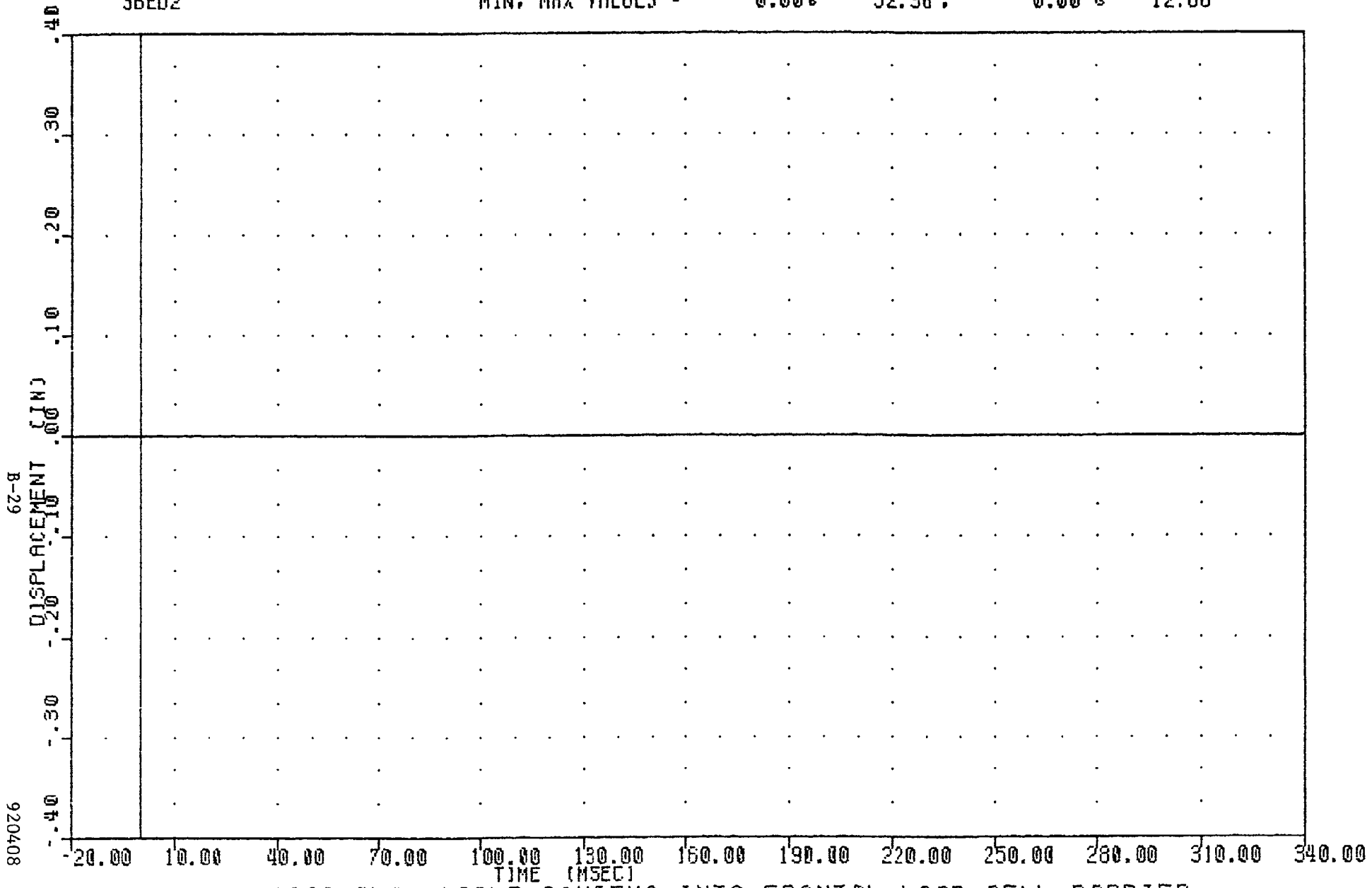
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT

920408

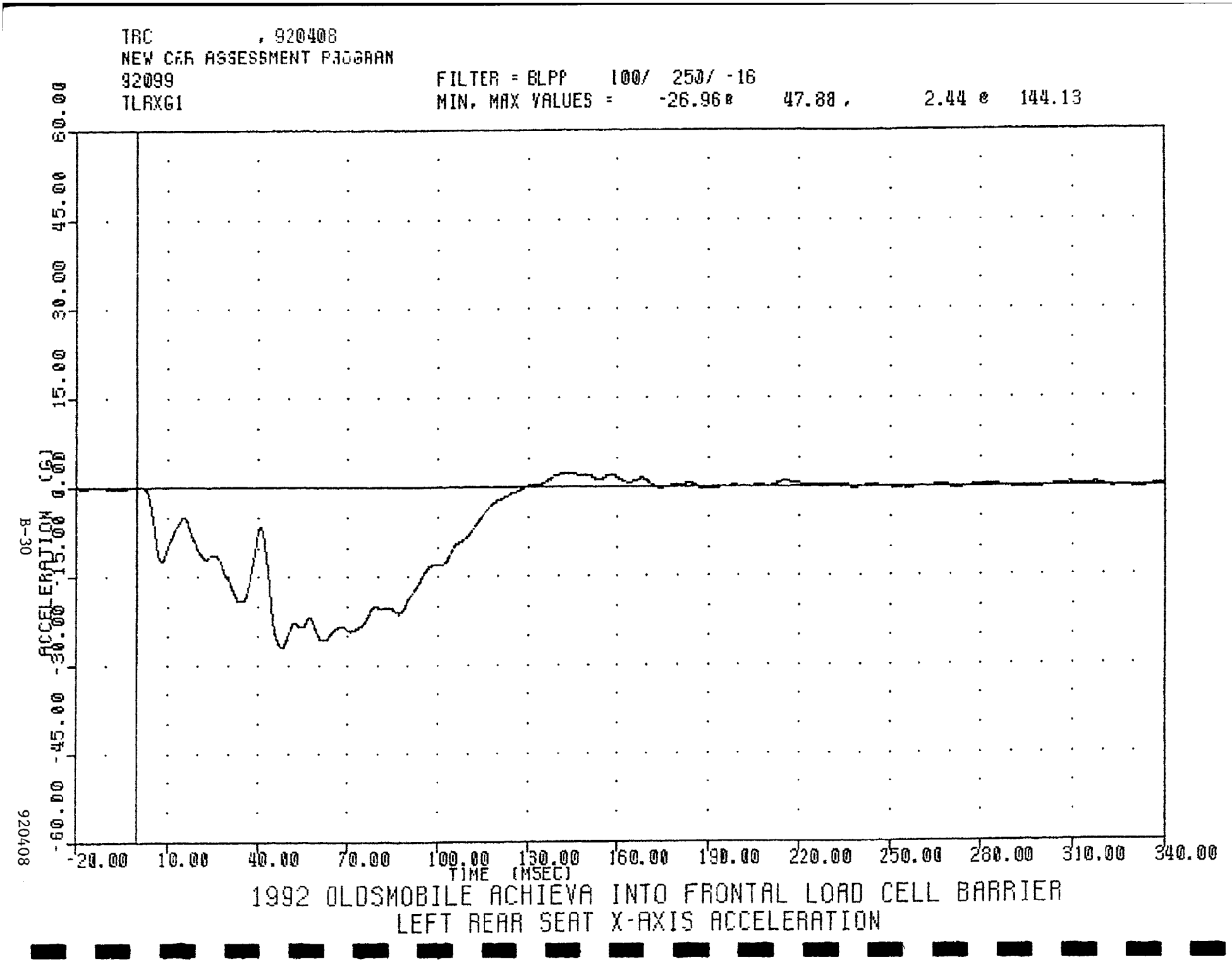
TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92095 FILTER = BLPP 100/ 250/ -16
SBED2 MIN, MAX VALUES = 0.000 52.38 , 0.00 @ -12.88



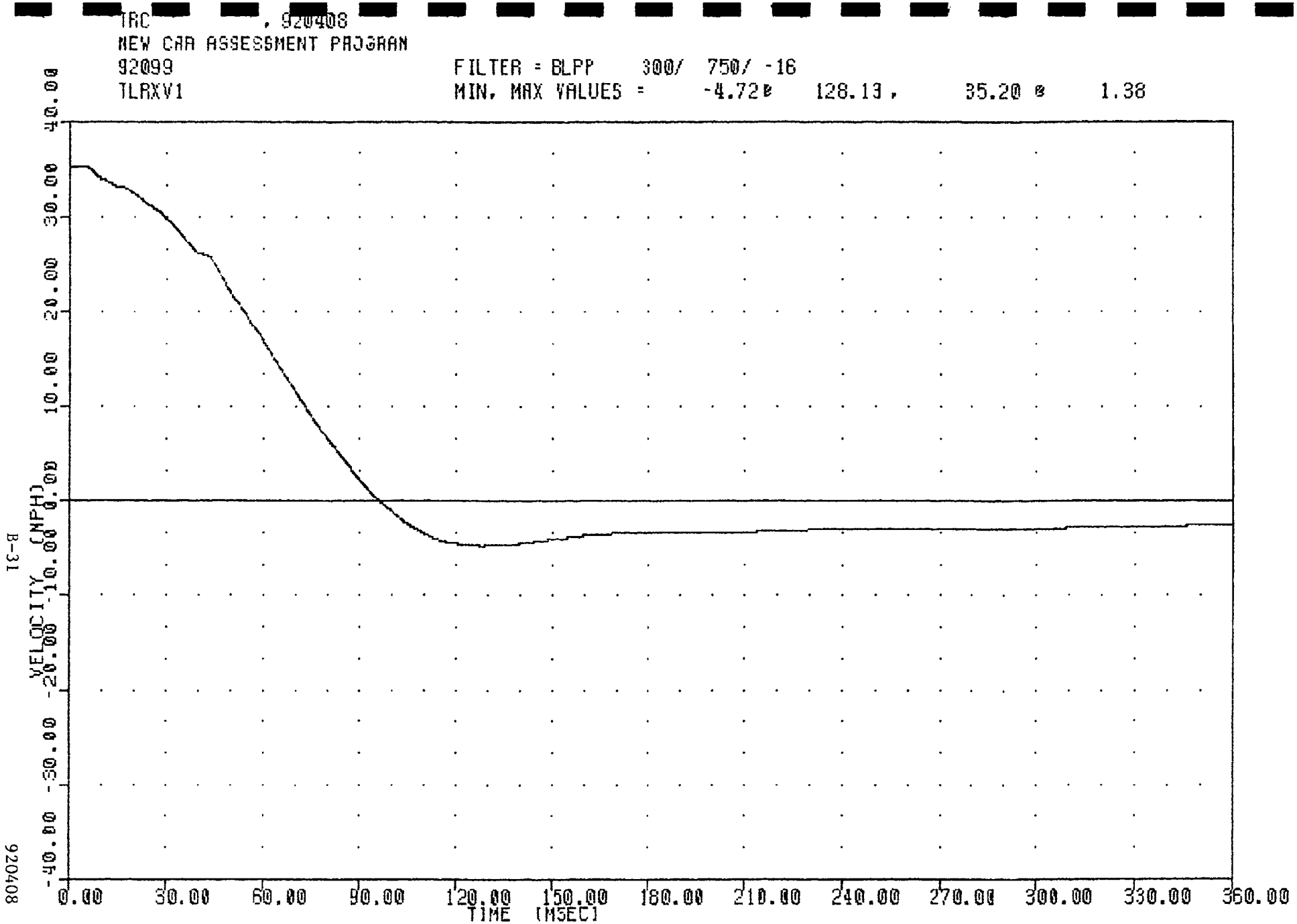
B-29

920408

1992 OLOSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION

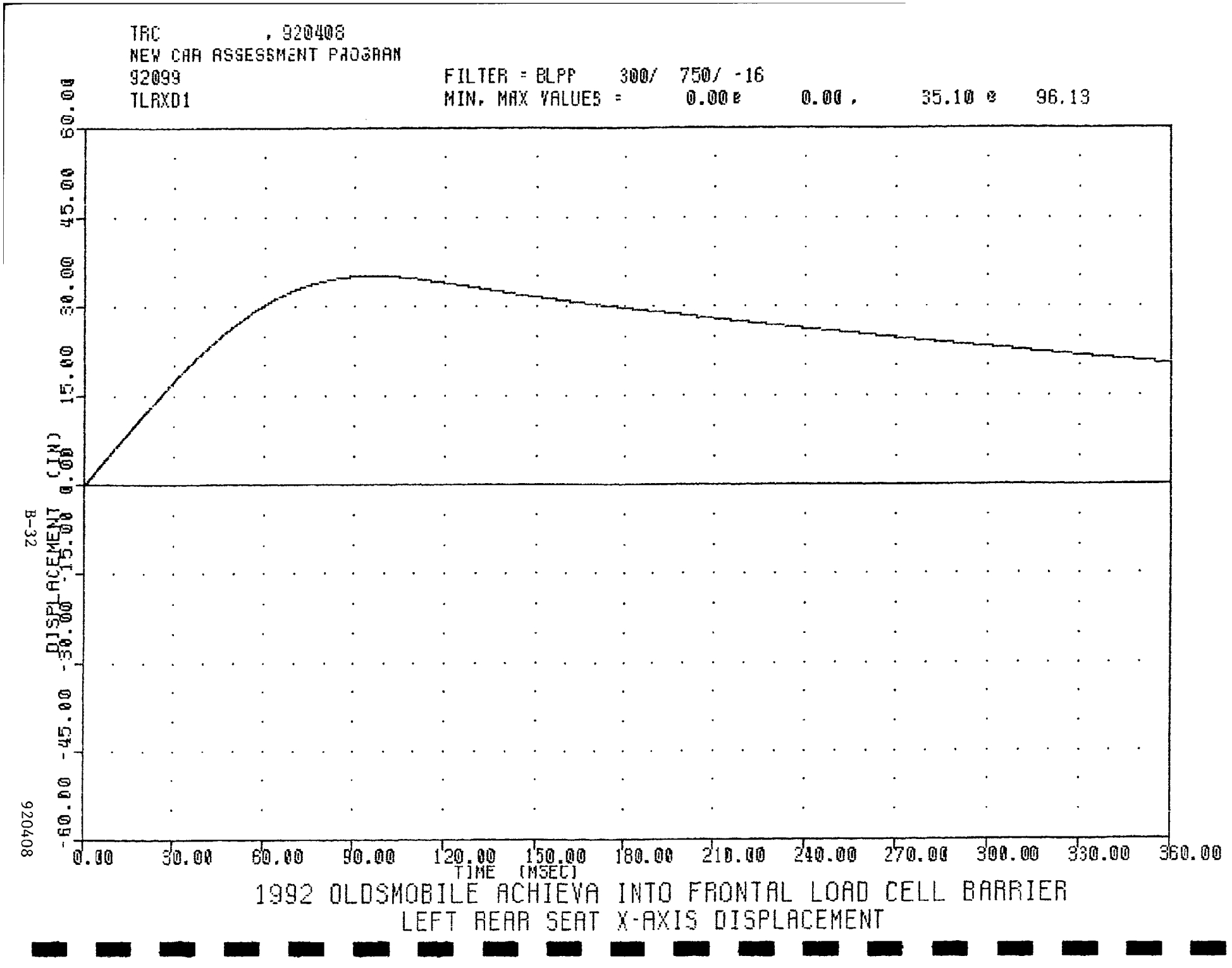


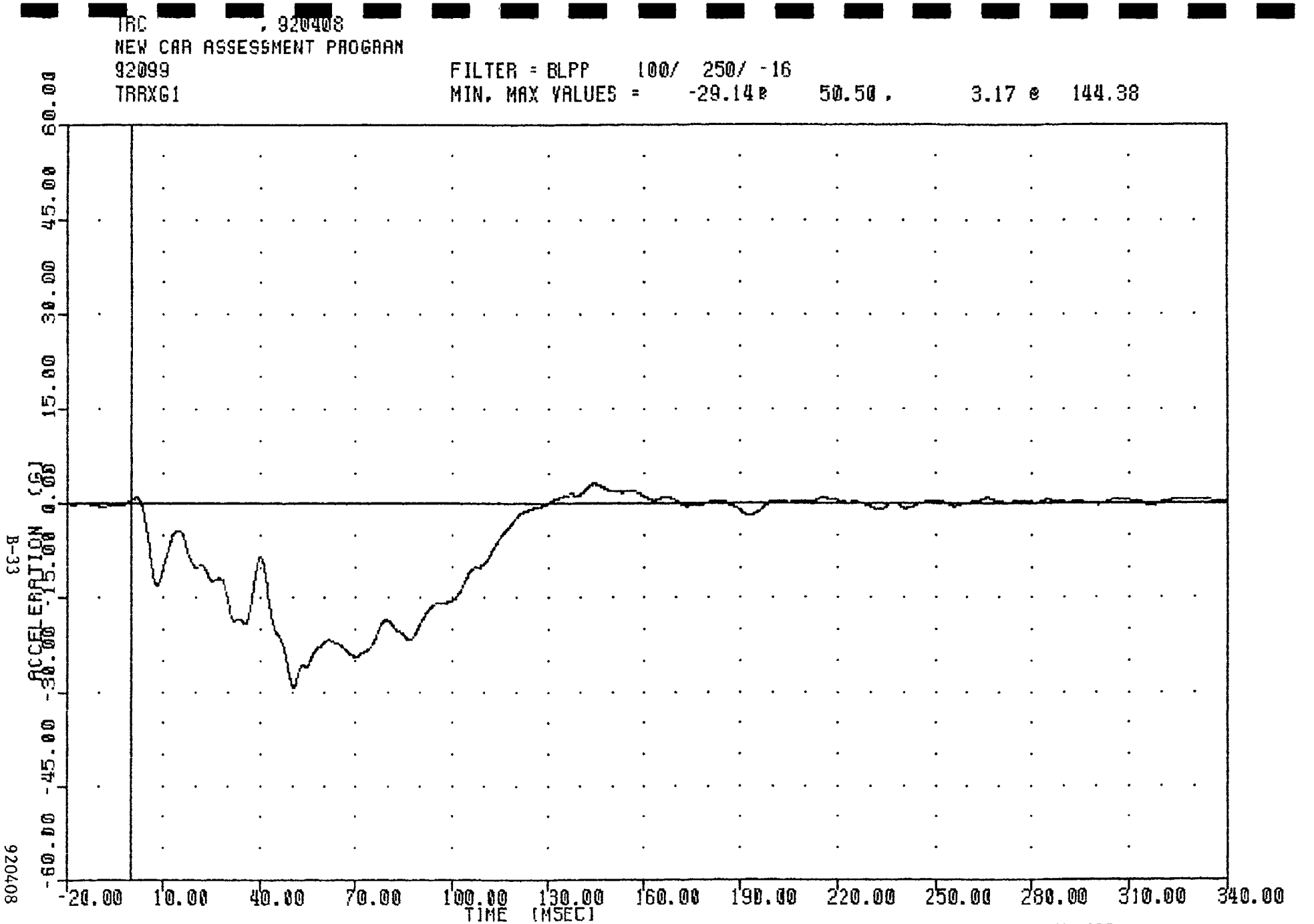
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY

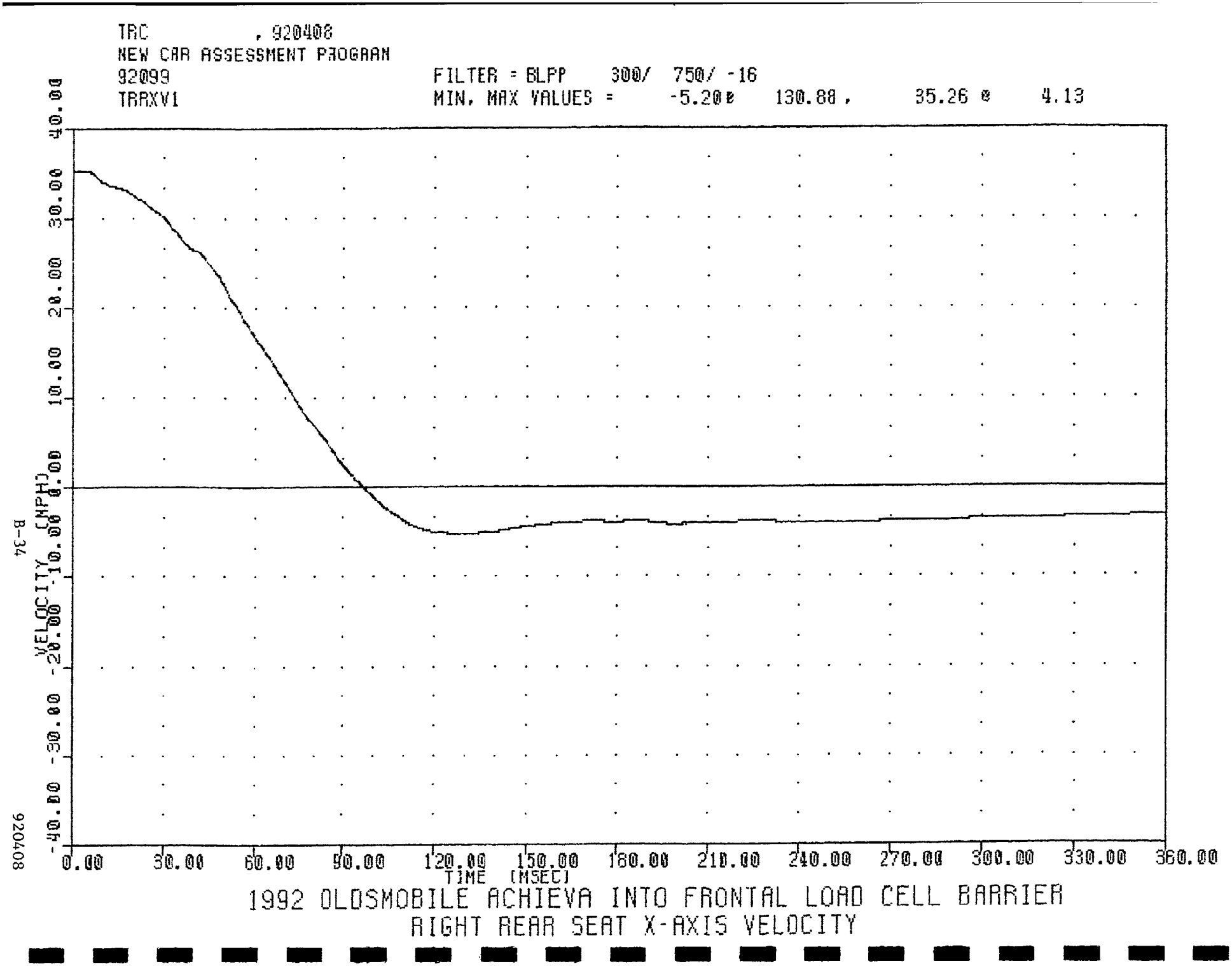
920408


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
TLRXD1
FILTER = CLASS 300/ 750/ -16
MIN, MAX VALUES = 0.00 @ 0.00 , 35.10 @ 96.13
90.00
45.00
0.00
-45.00
-90.00
DISPLACEMENT (IN)
0.00
30.00
60.00
90.00
120.00
150.00
180.00
210.00
240.00
270.00
300.00
330.00
360.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS DISPLACEMENT



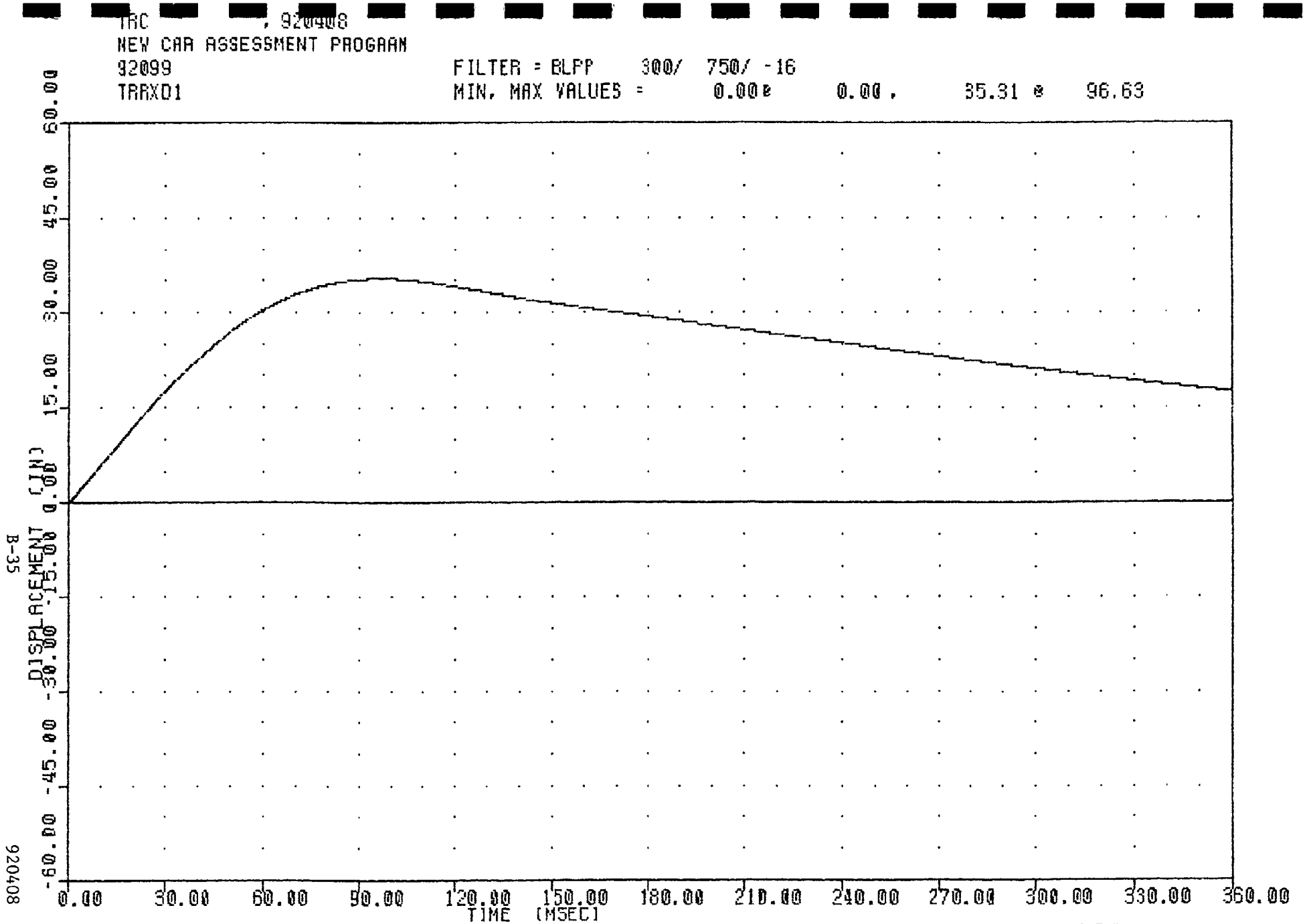
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

920408



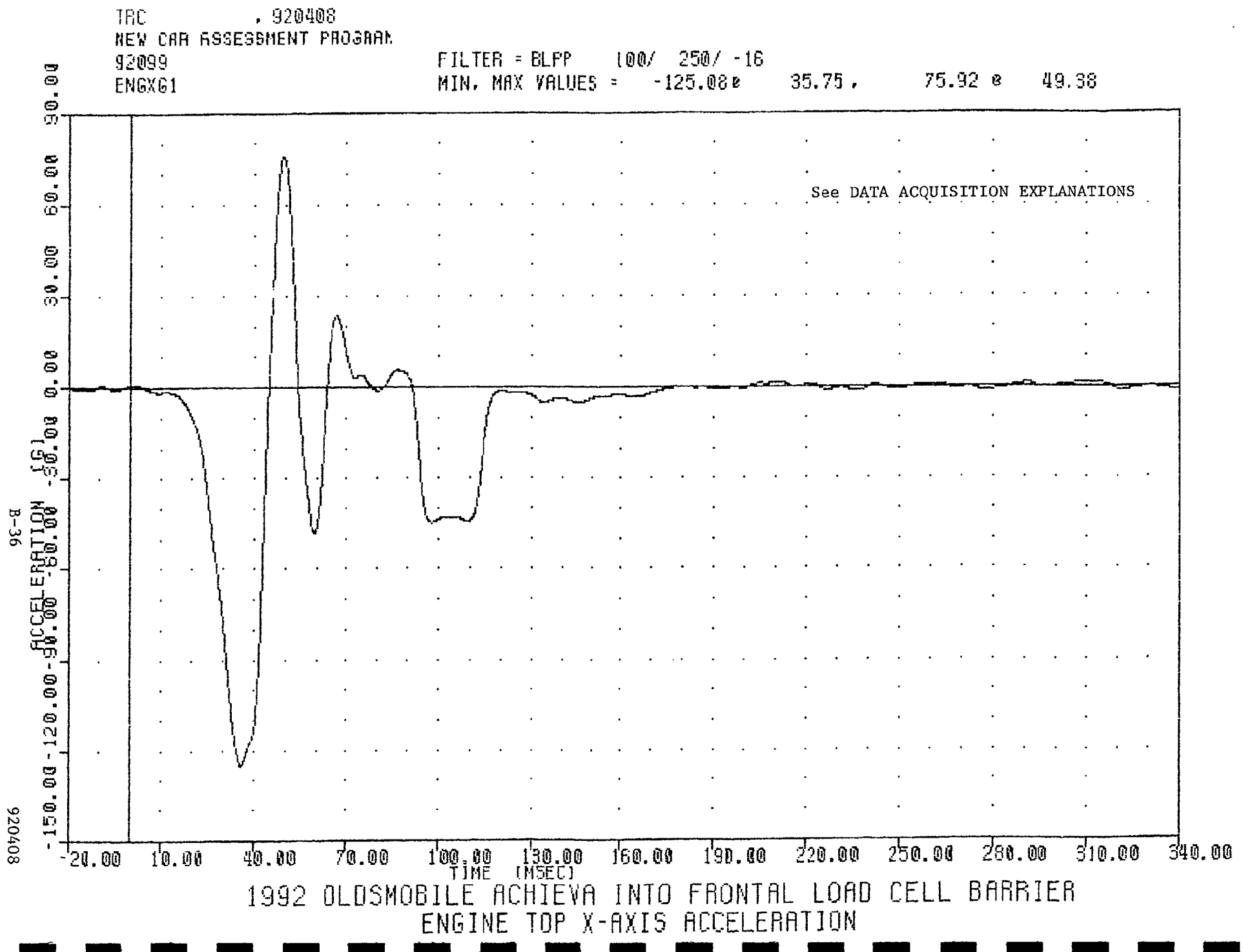
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY

920408

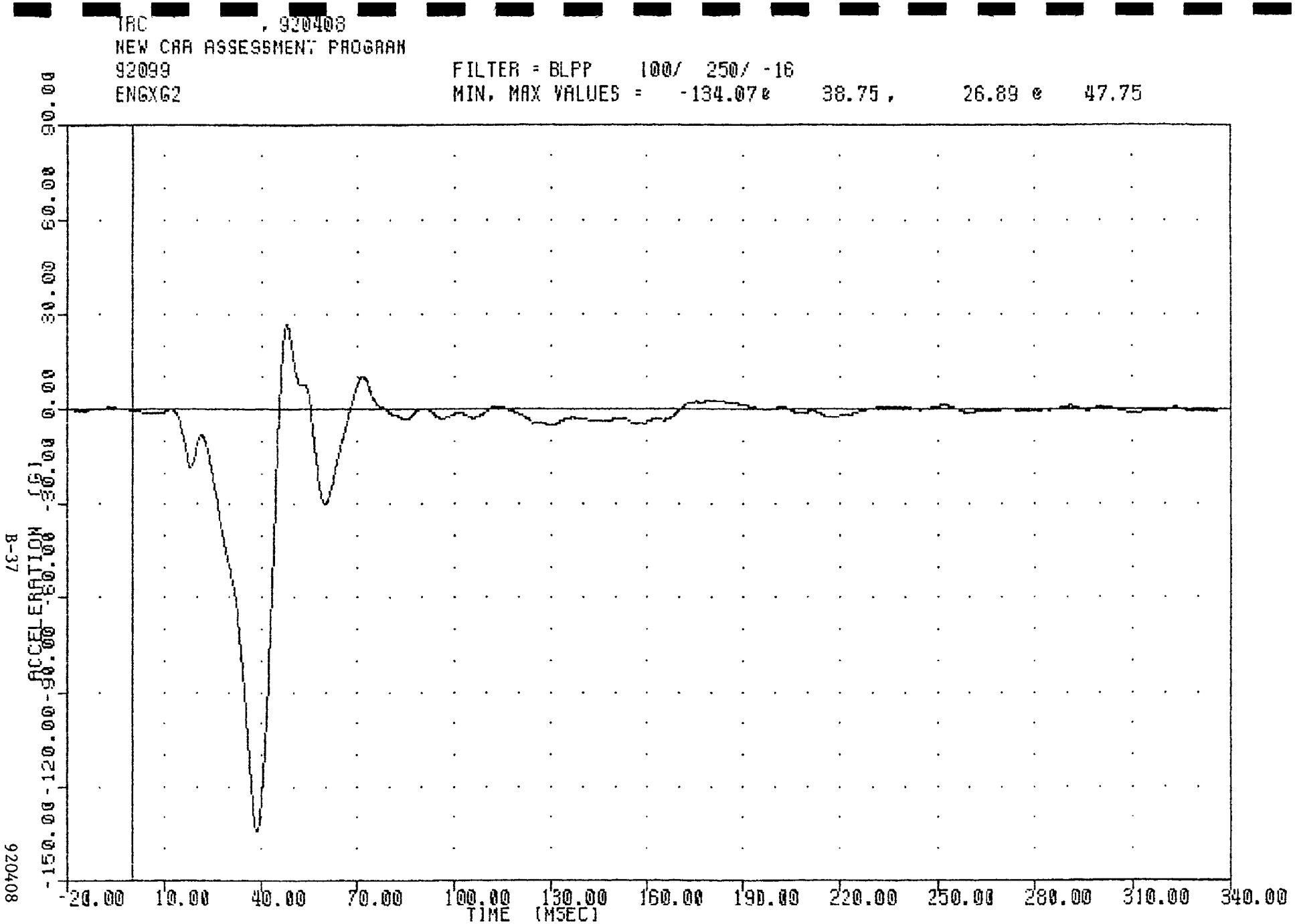


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS DISPLACEMENT

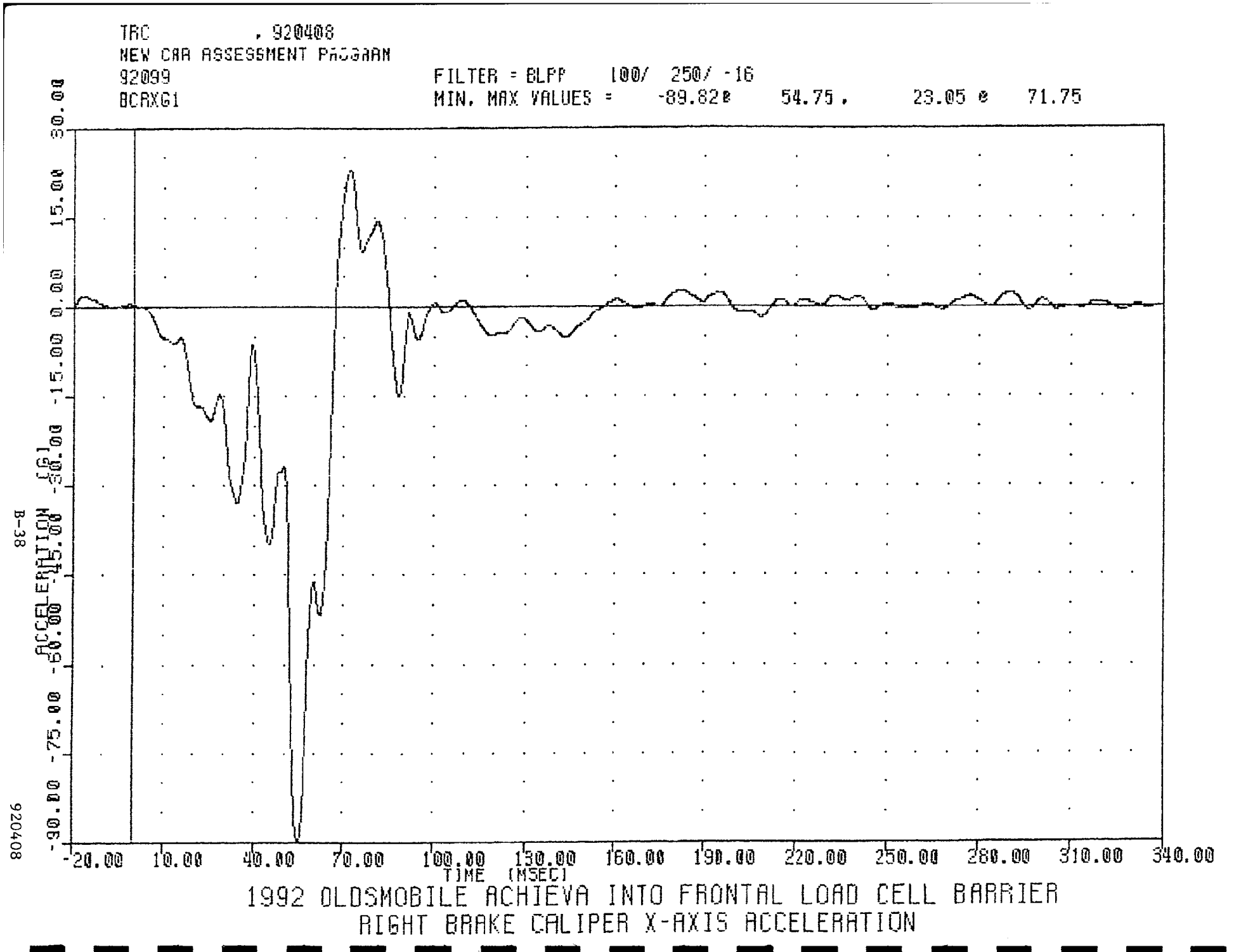
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
ENGINE TOP X-AXIS ACCELERATION

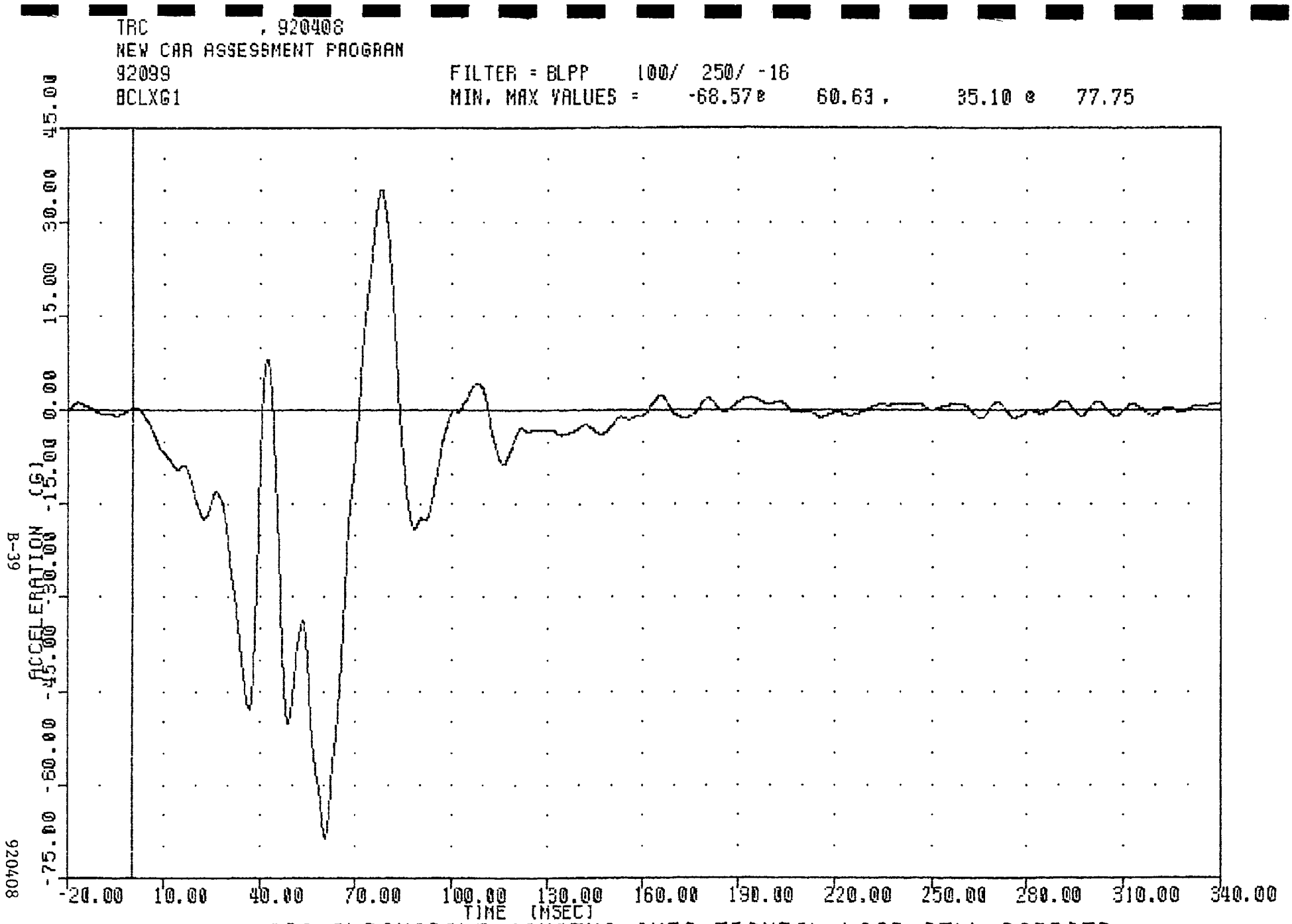


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

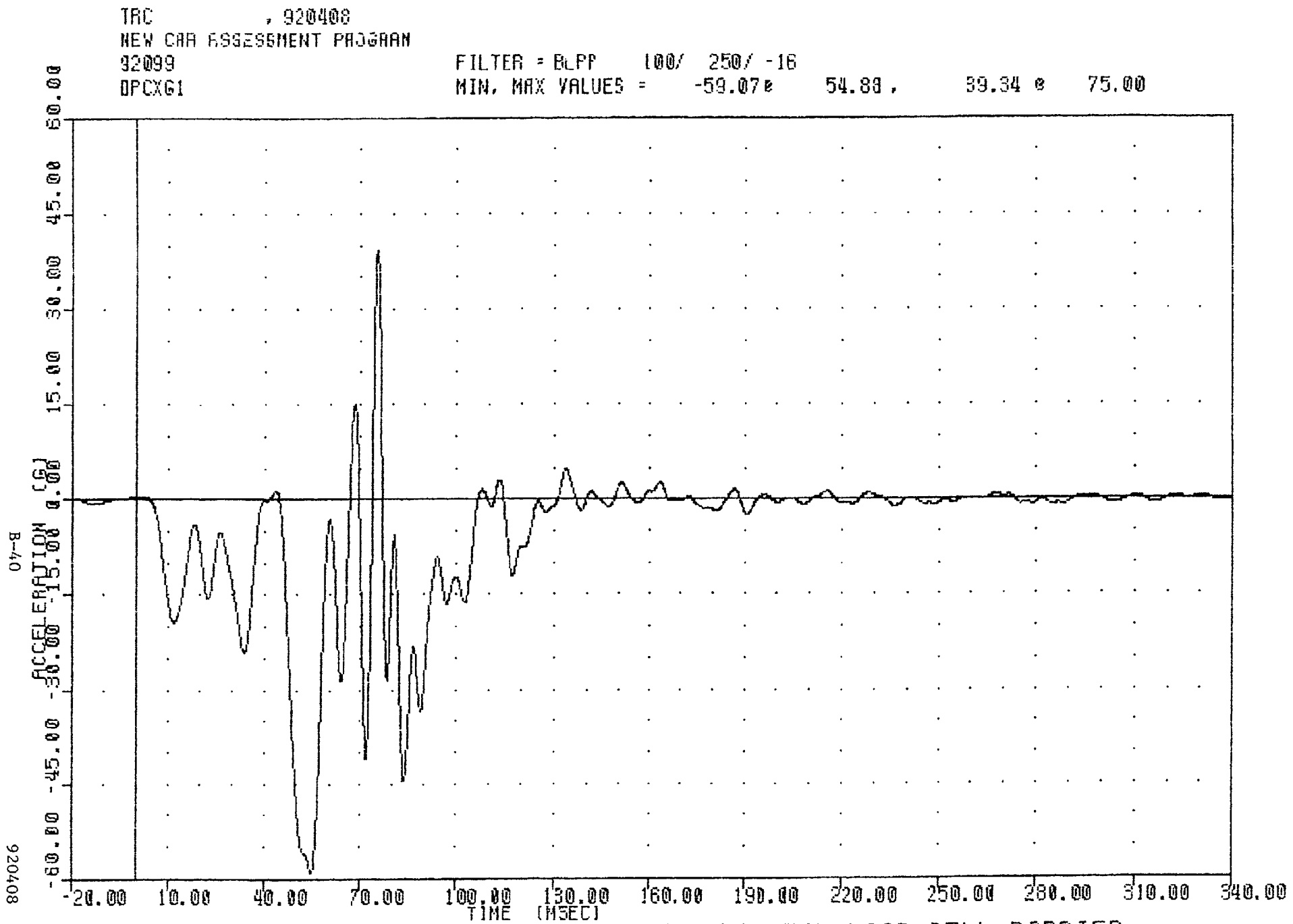


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

920408

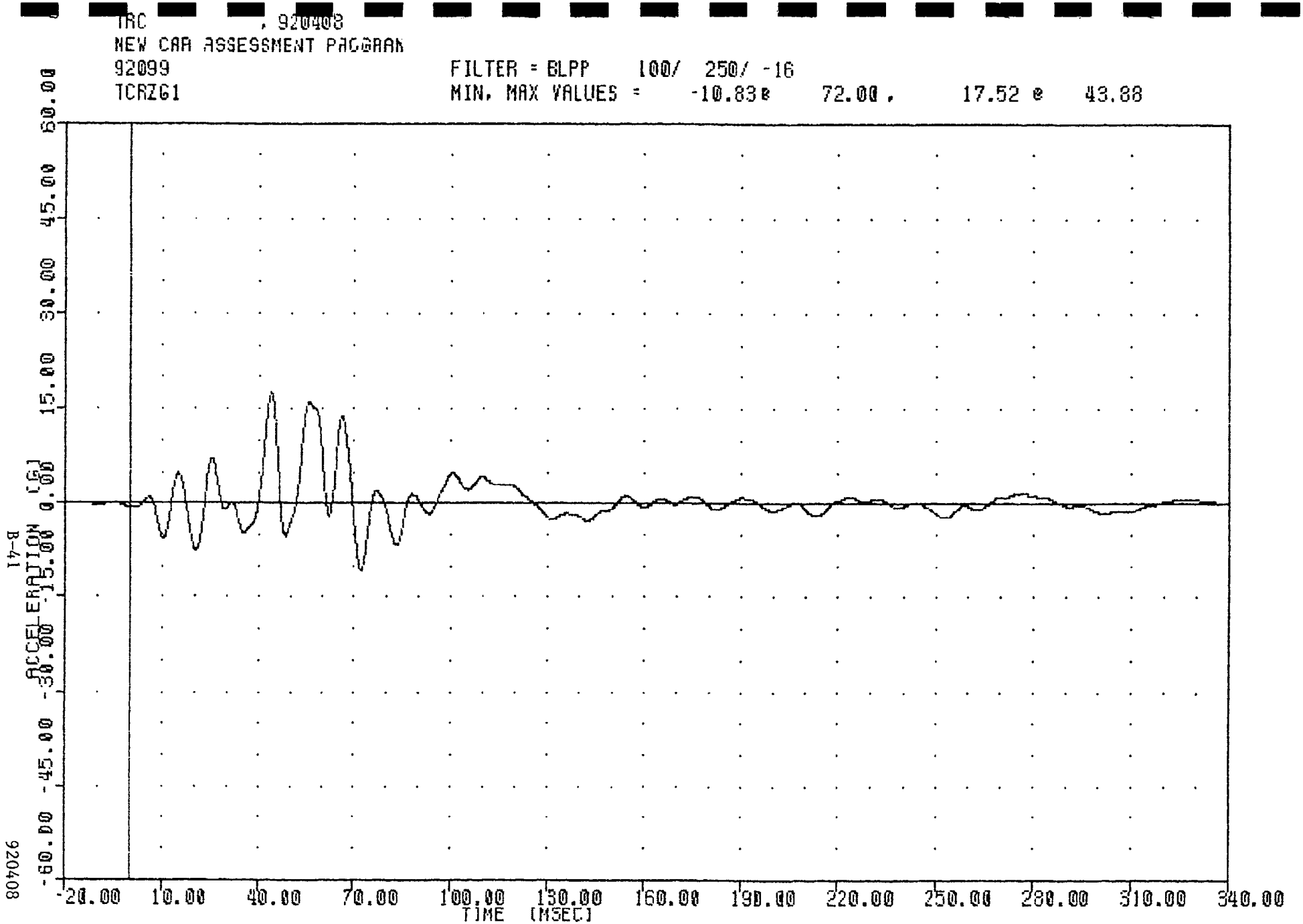


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION



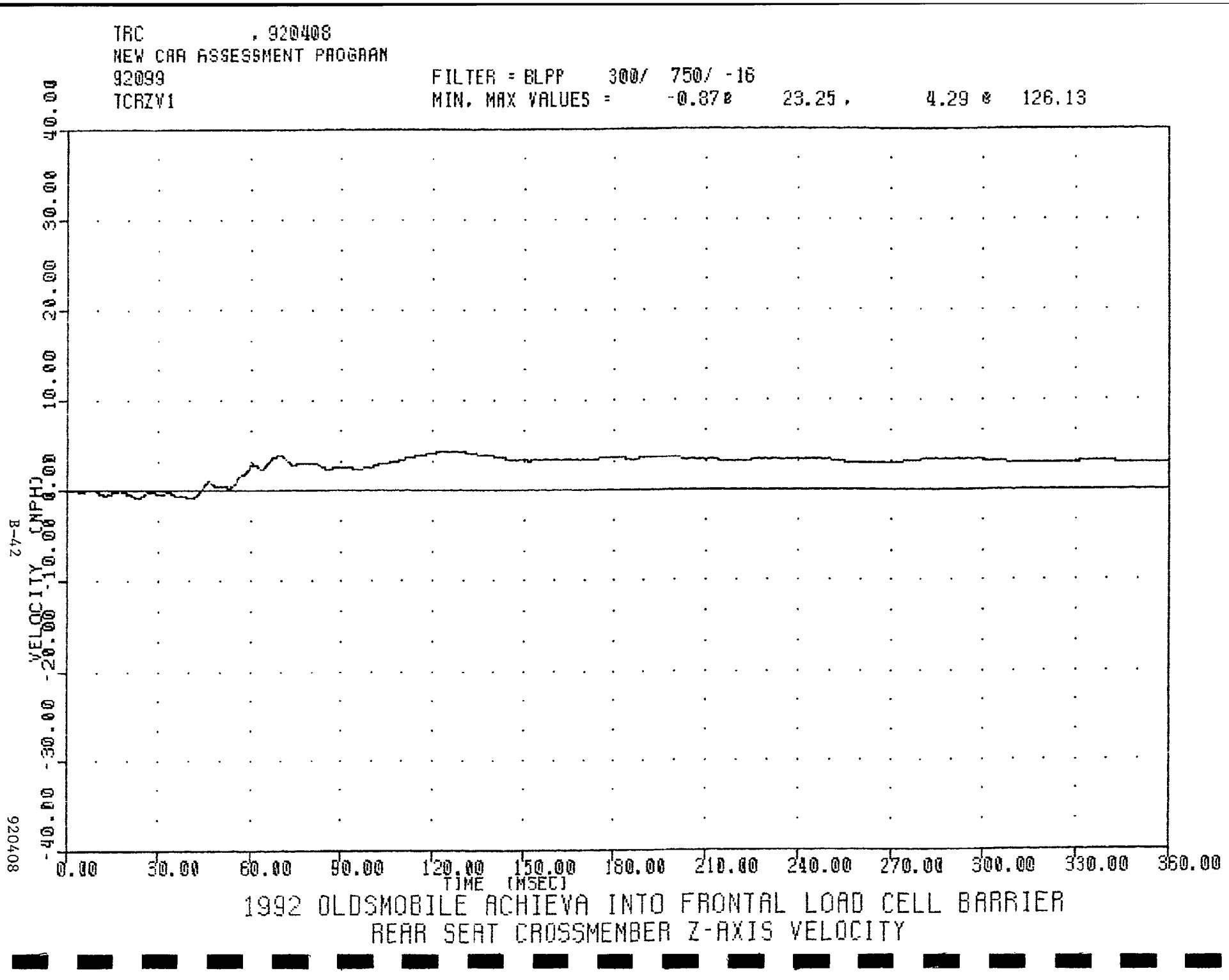
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

920408



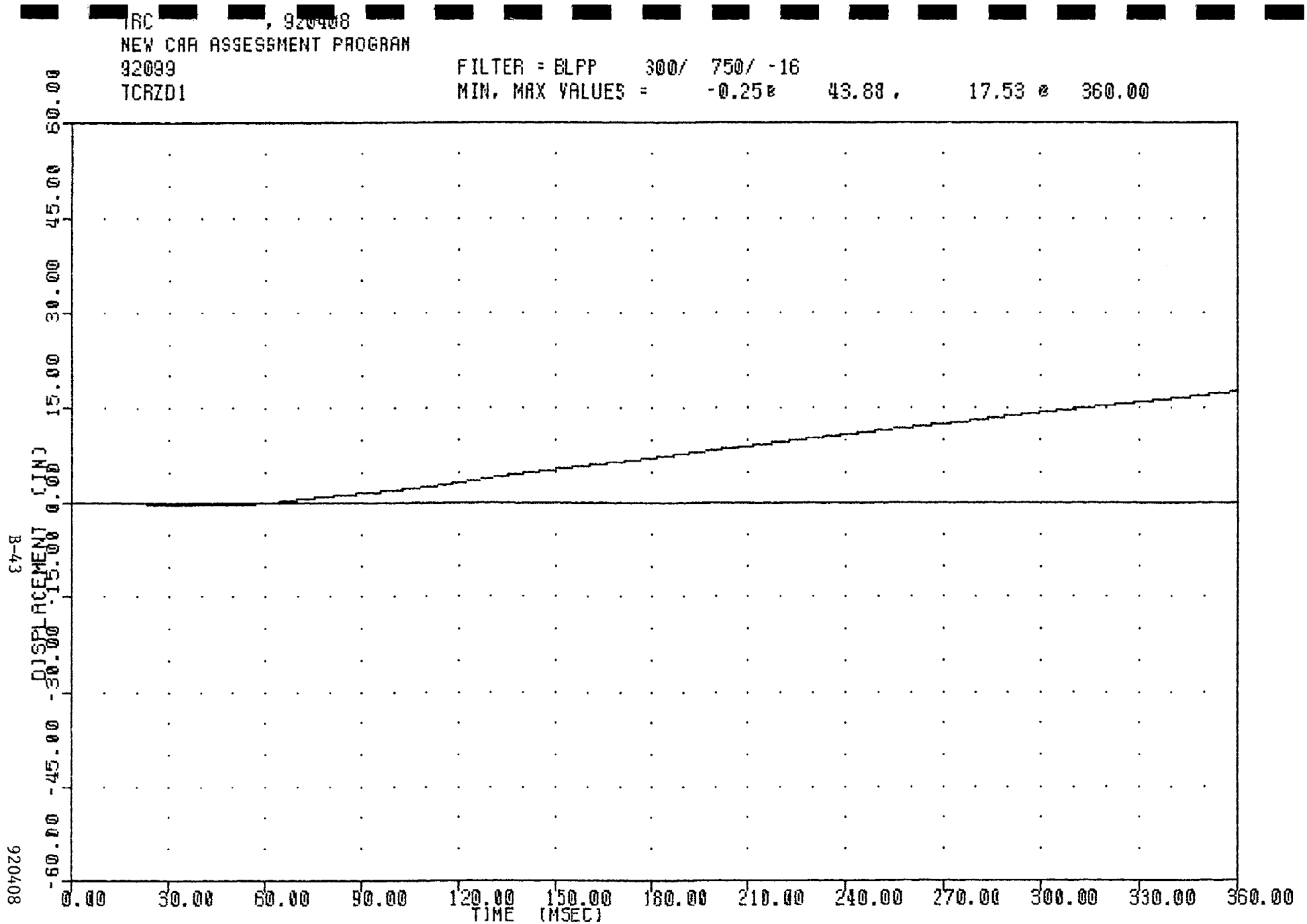
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS ACCELERATION

920408



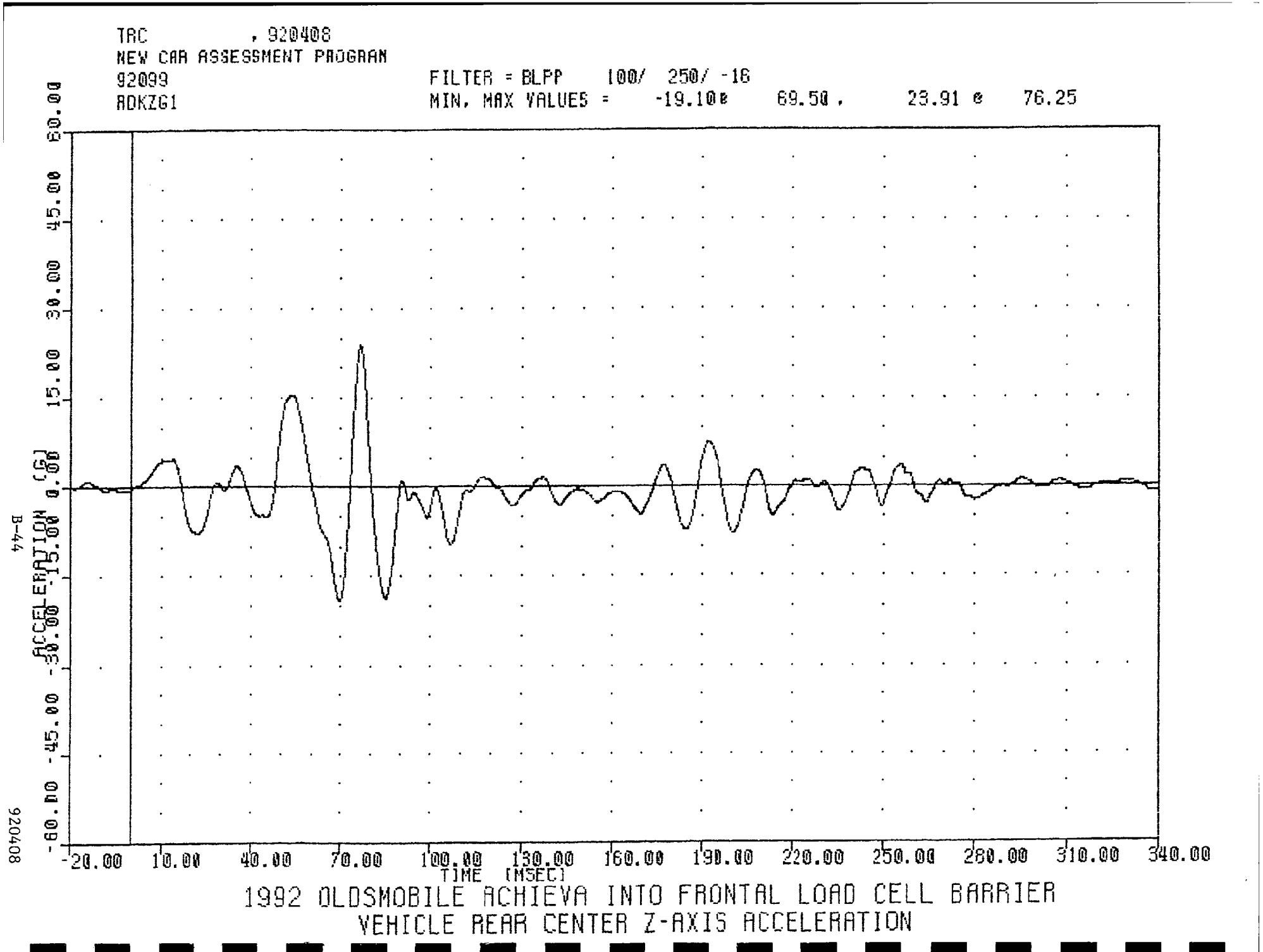
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

REAR SEAT CROSSMEMBER Z-AXIS VELOCITY



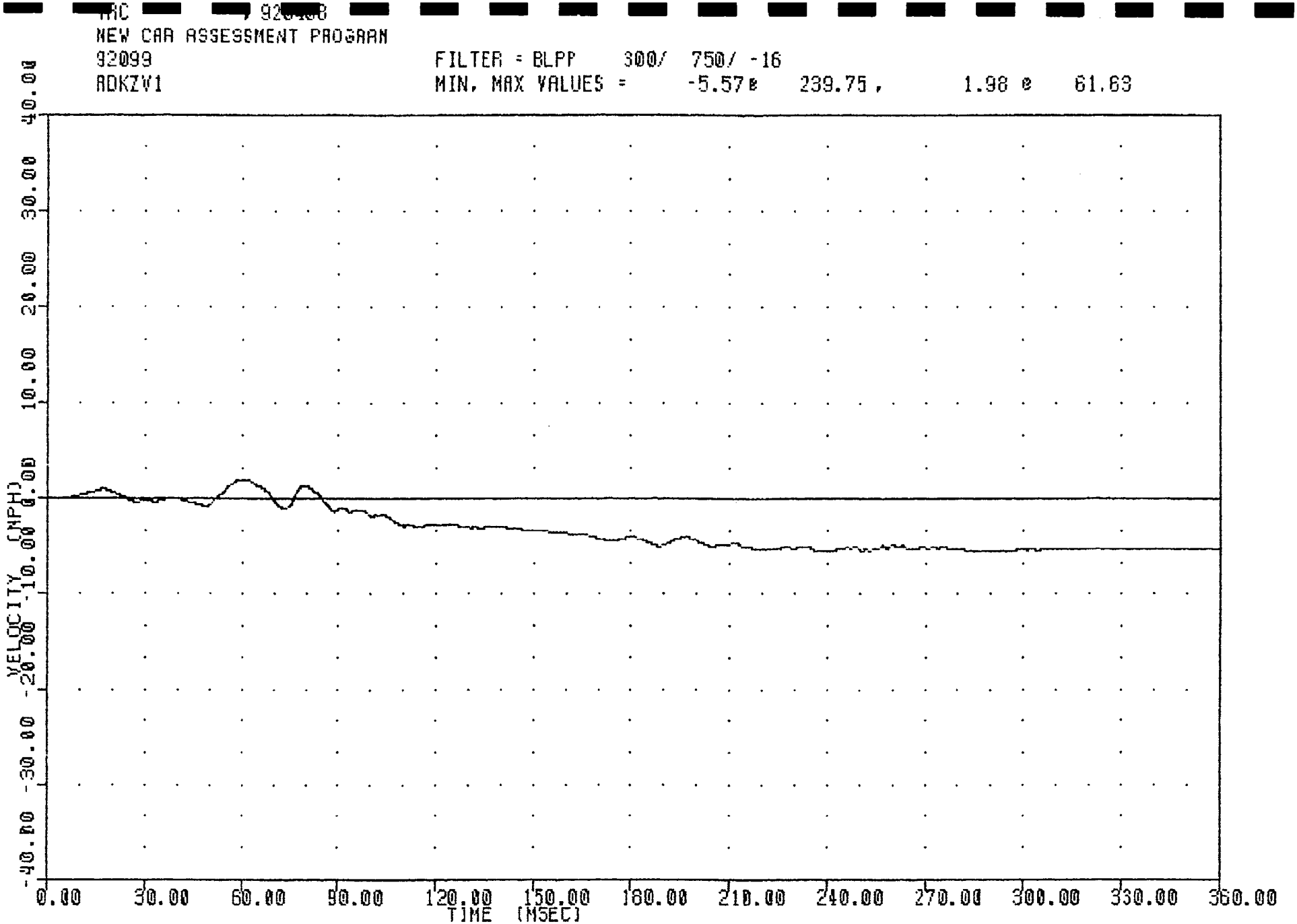
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS DISPLACEMENT

920408

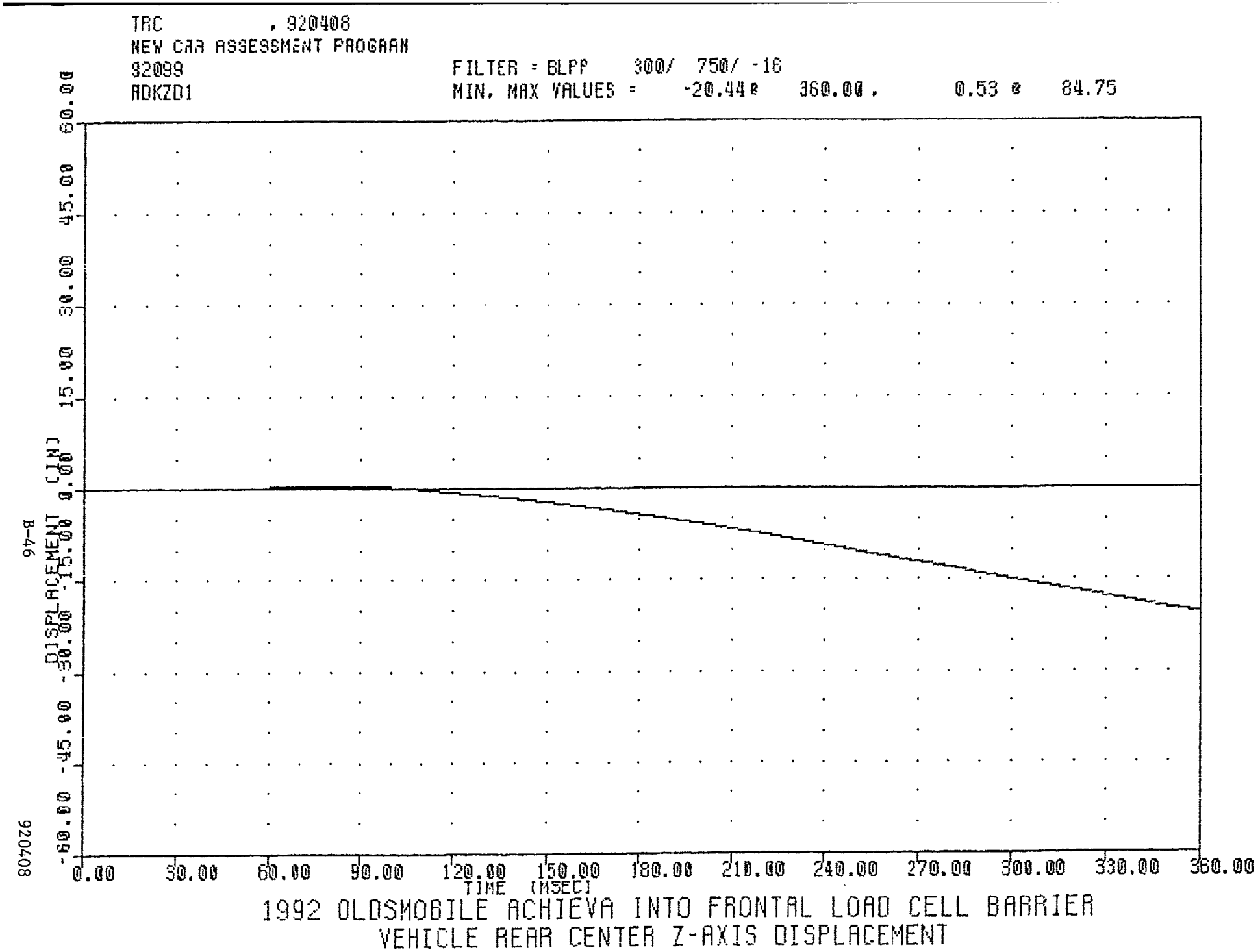


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS VELOCITY

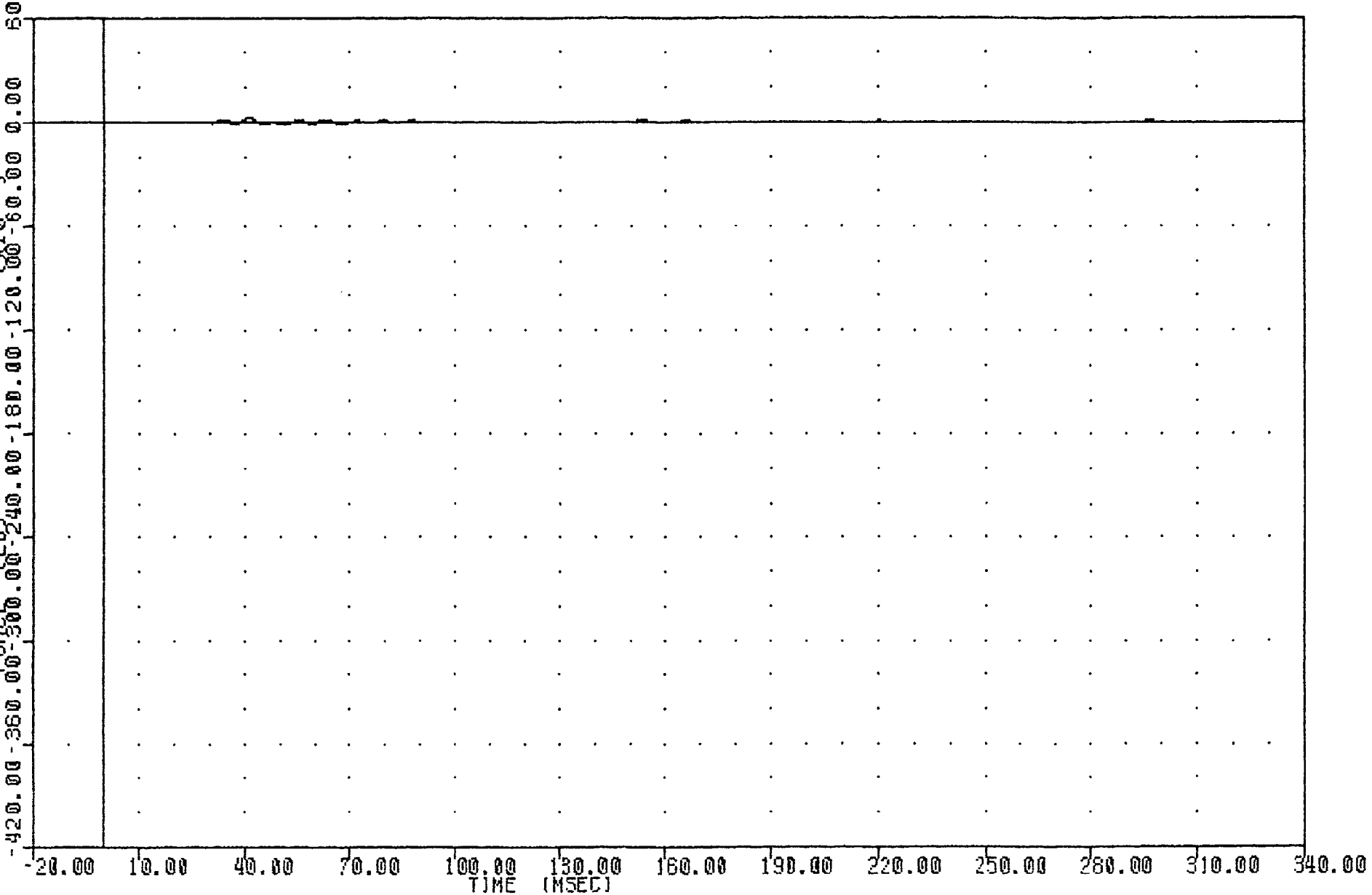


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS DISPLACEMENT

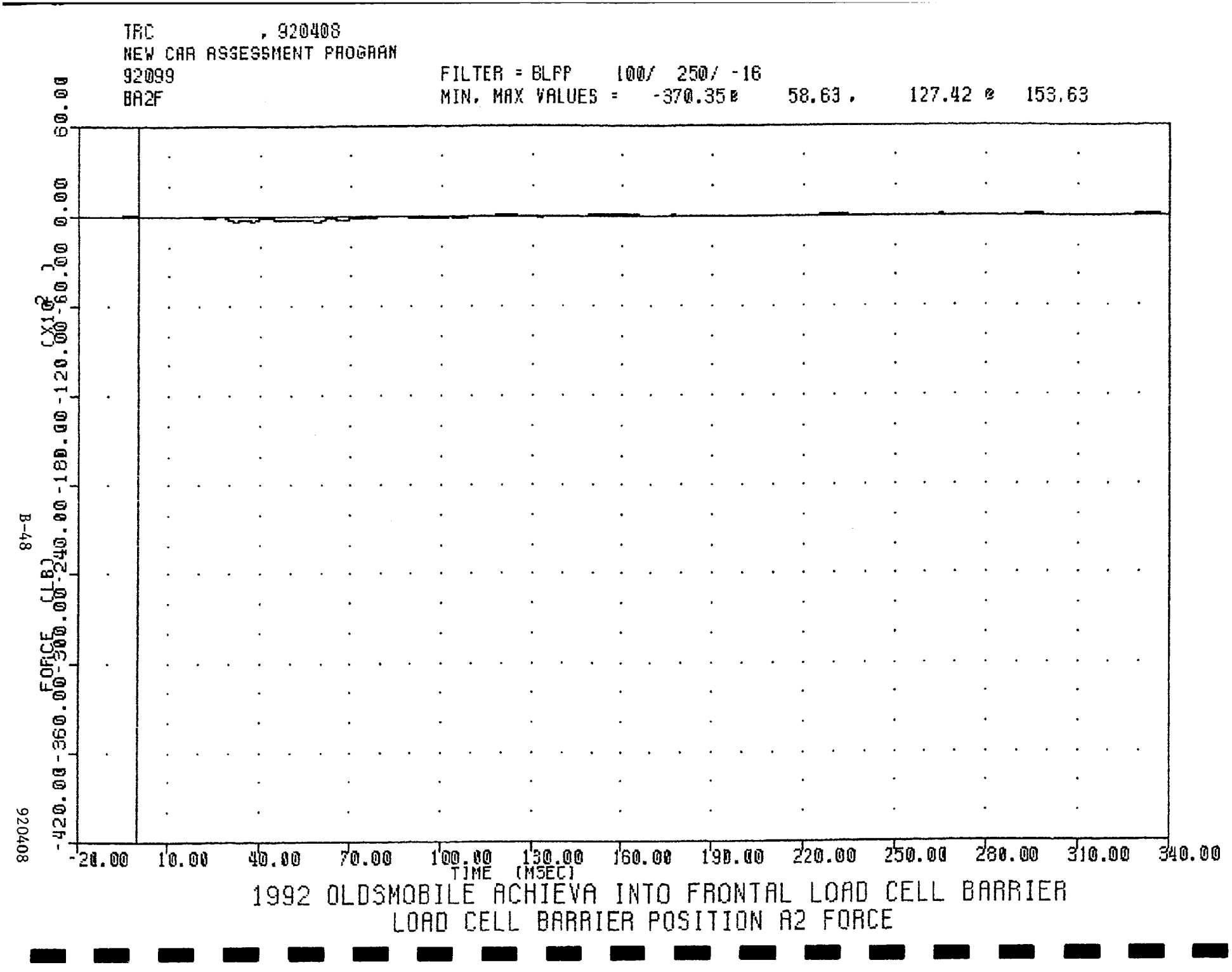
920408

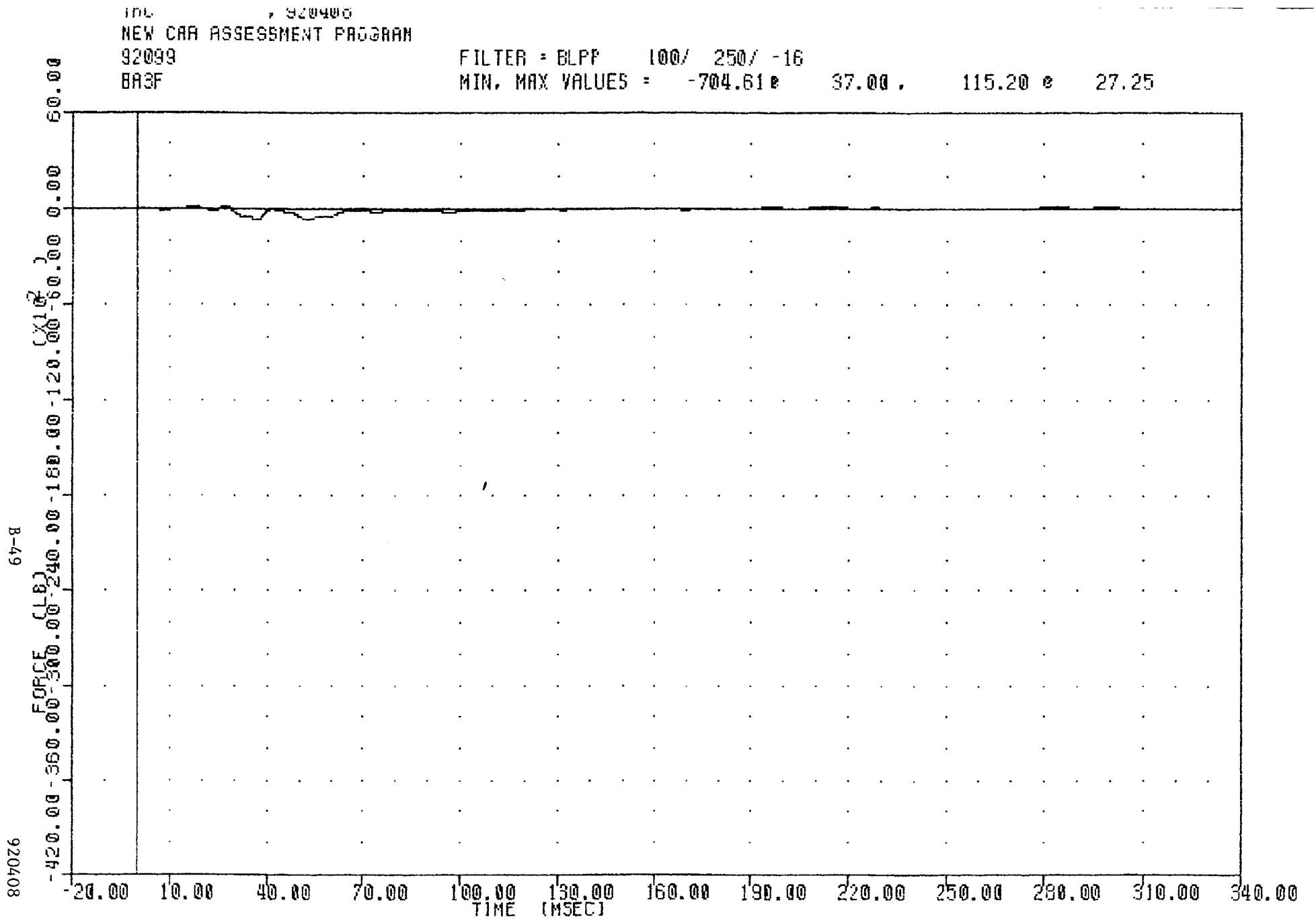
TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BA1F

FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -174.47 @ 67.50 , 228.96 @ 41.00

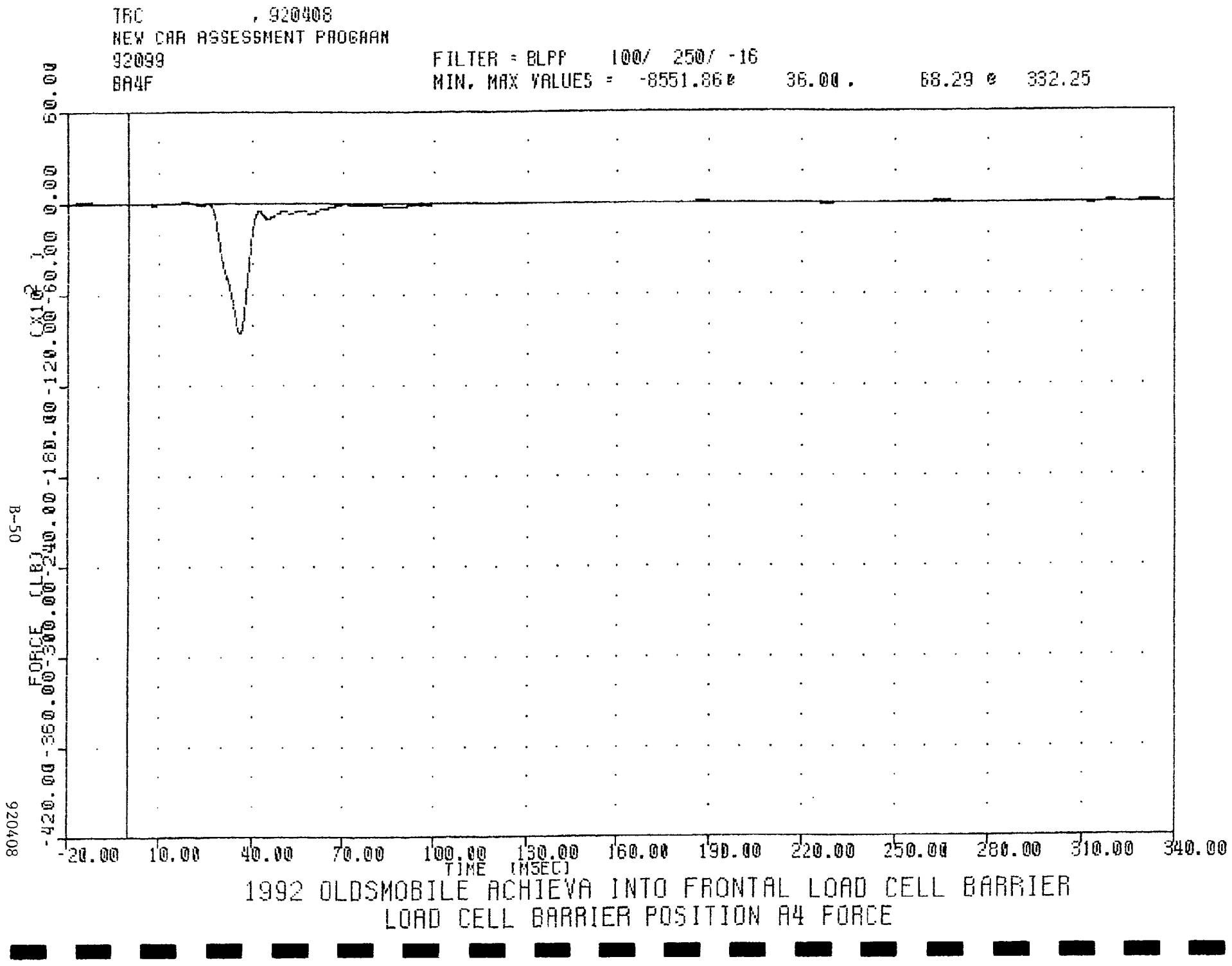


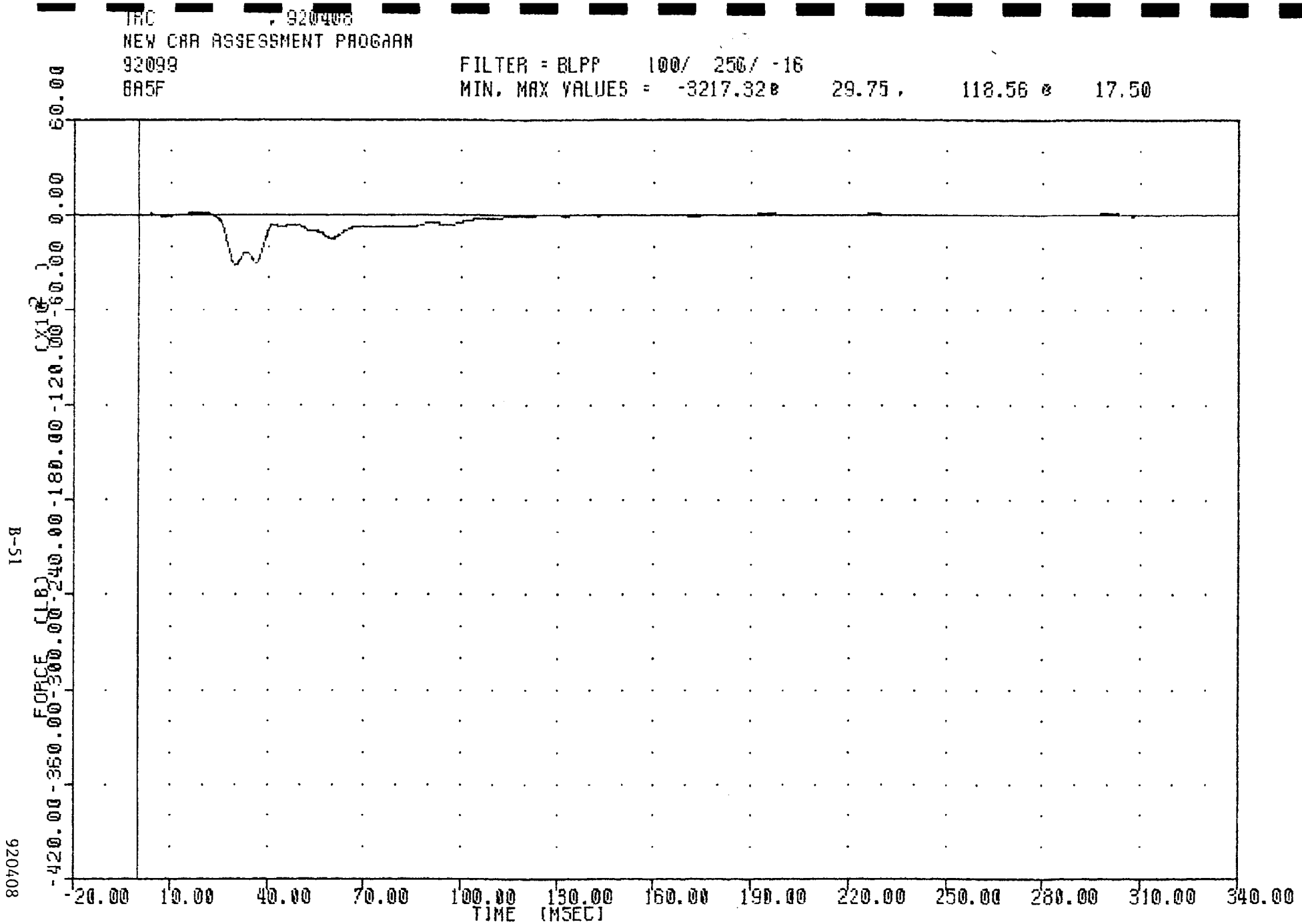
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A1 FORCE


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BA2F
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -370.35 @ 58.63 , 127.42 @ 153.63
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
FORCE (LB) (X10^2)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A2 FORCE



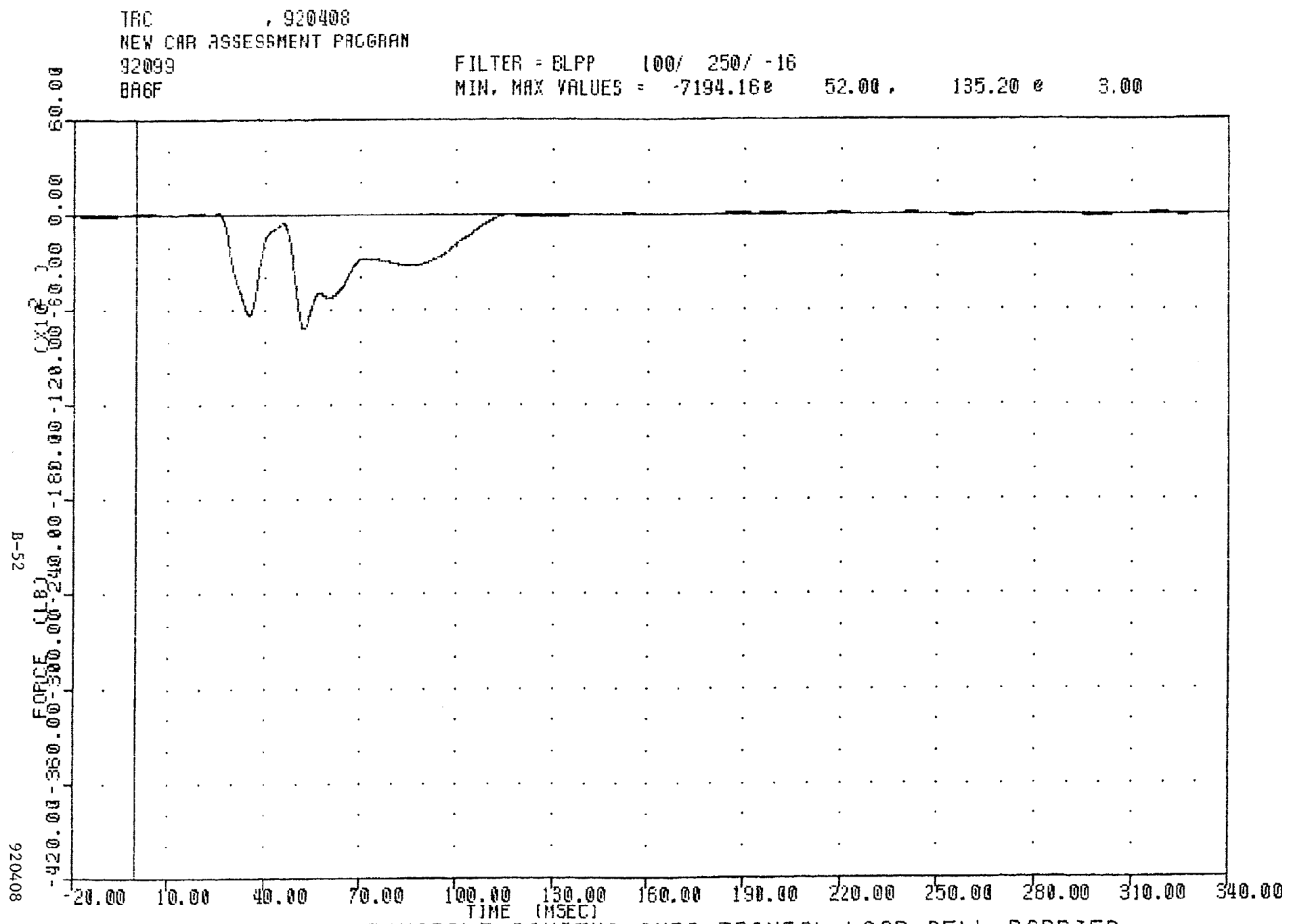
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A3 FORCE


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BA4F
FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -8551.86@ 36.00 , 68.29 @ 332.25
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
(X1@2)
FORCE (LB)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
B-50
920408
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A4 FORCE



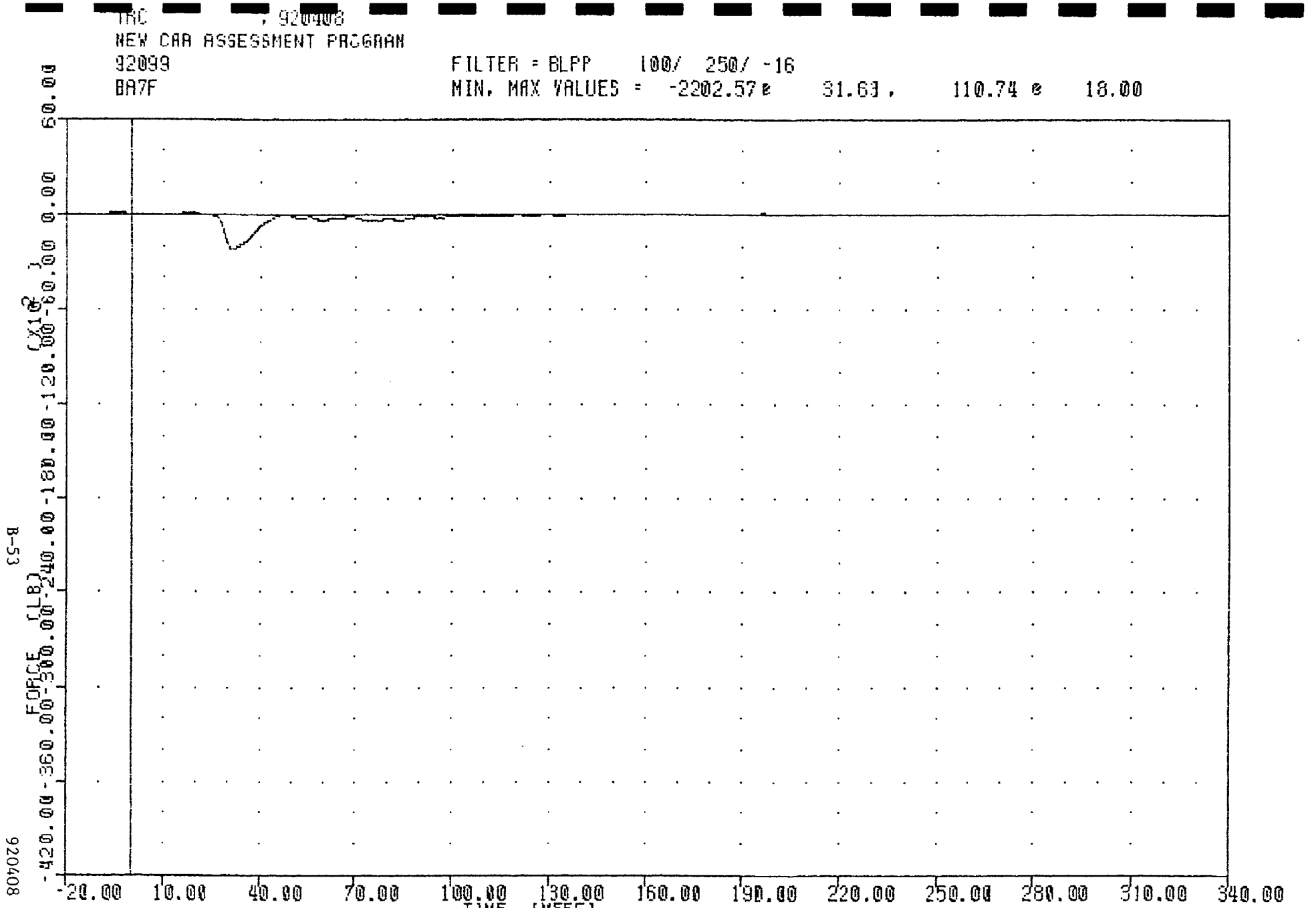
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A5 FORCE

920408



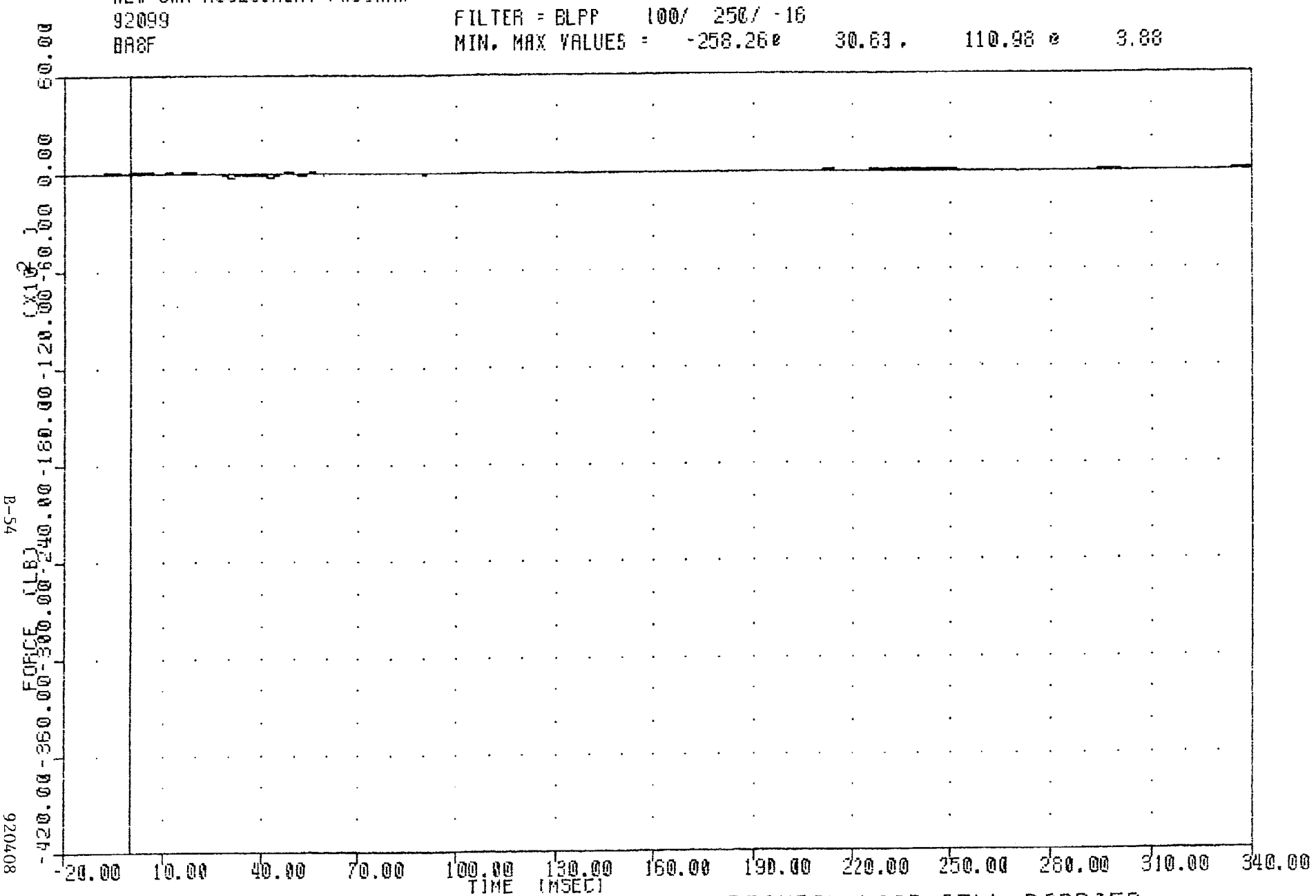
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE

920408



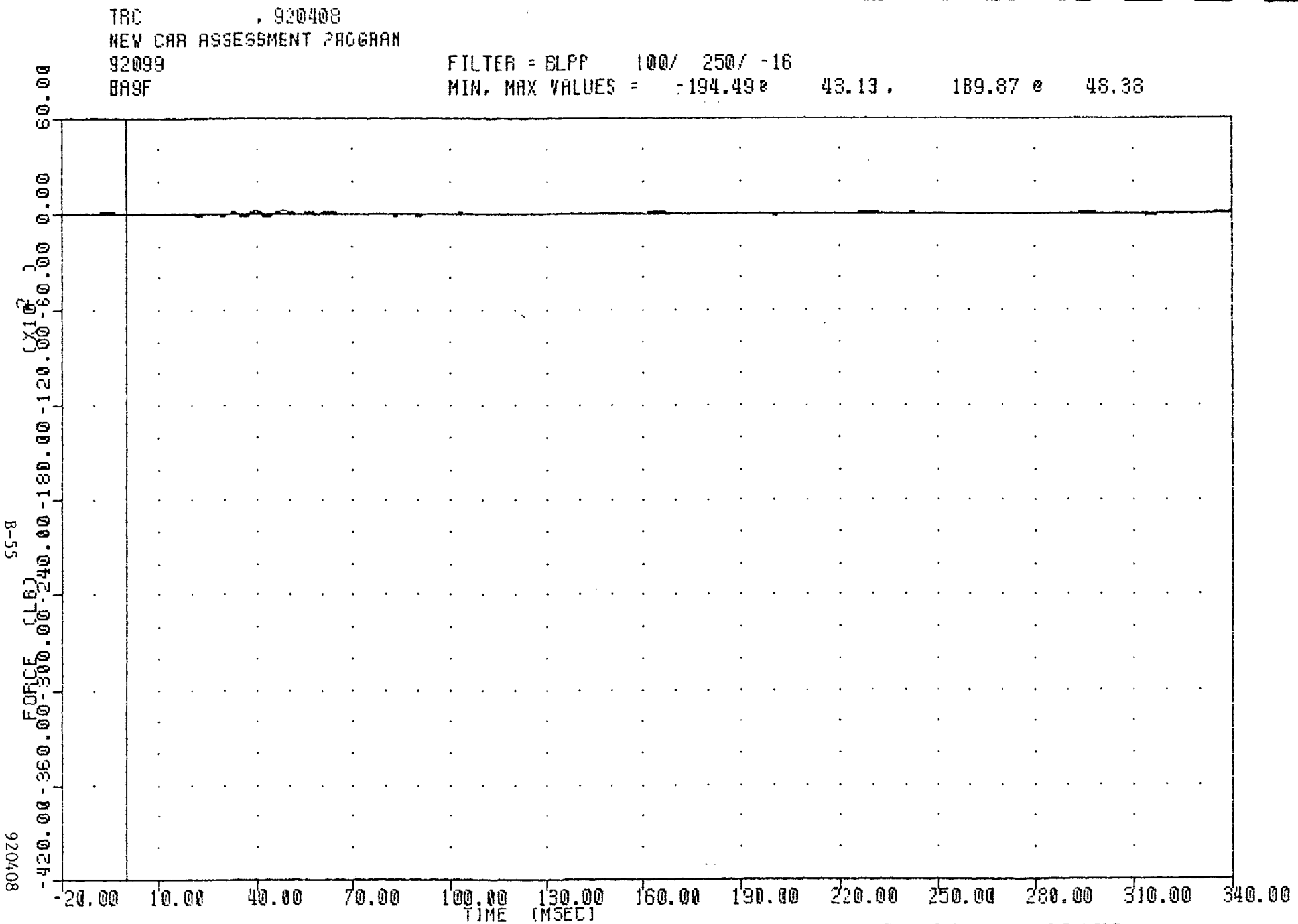
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A7 FORCE

920408

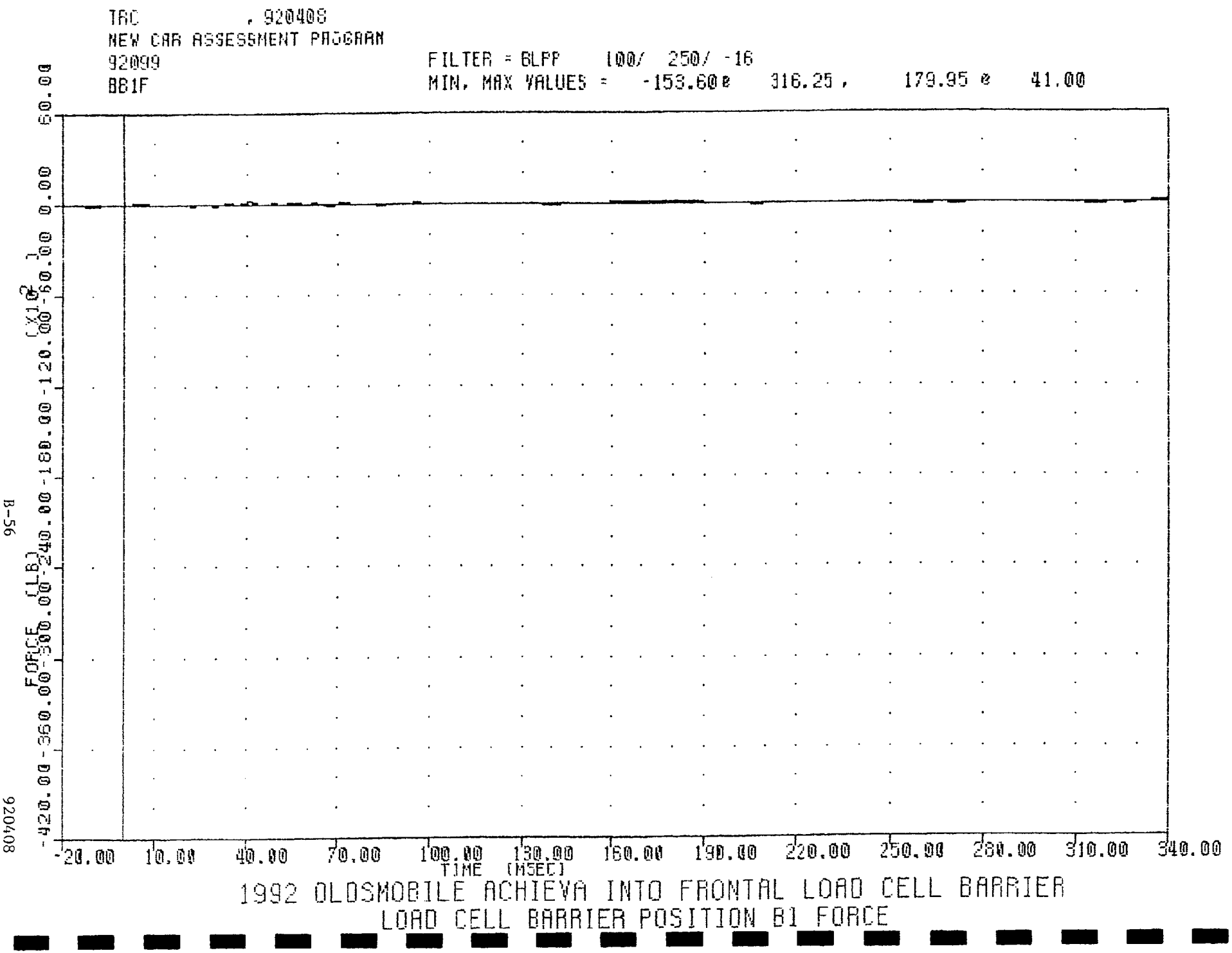


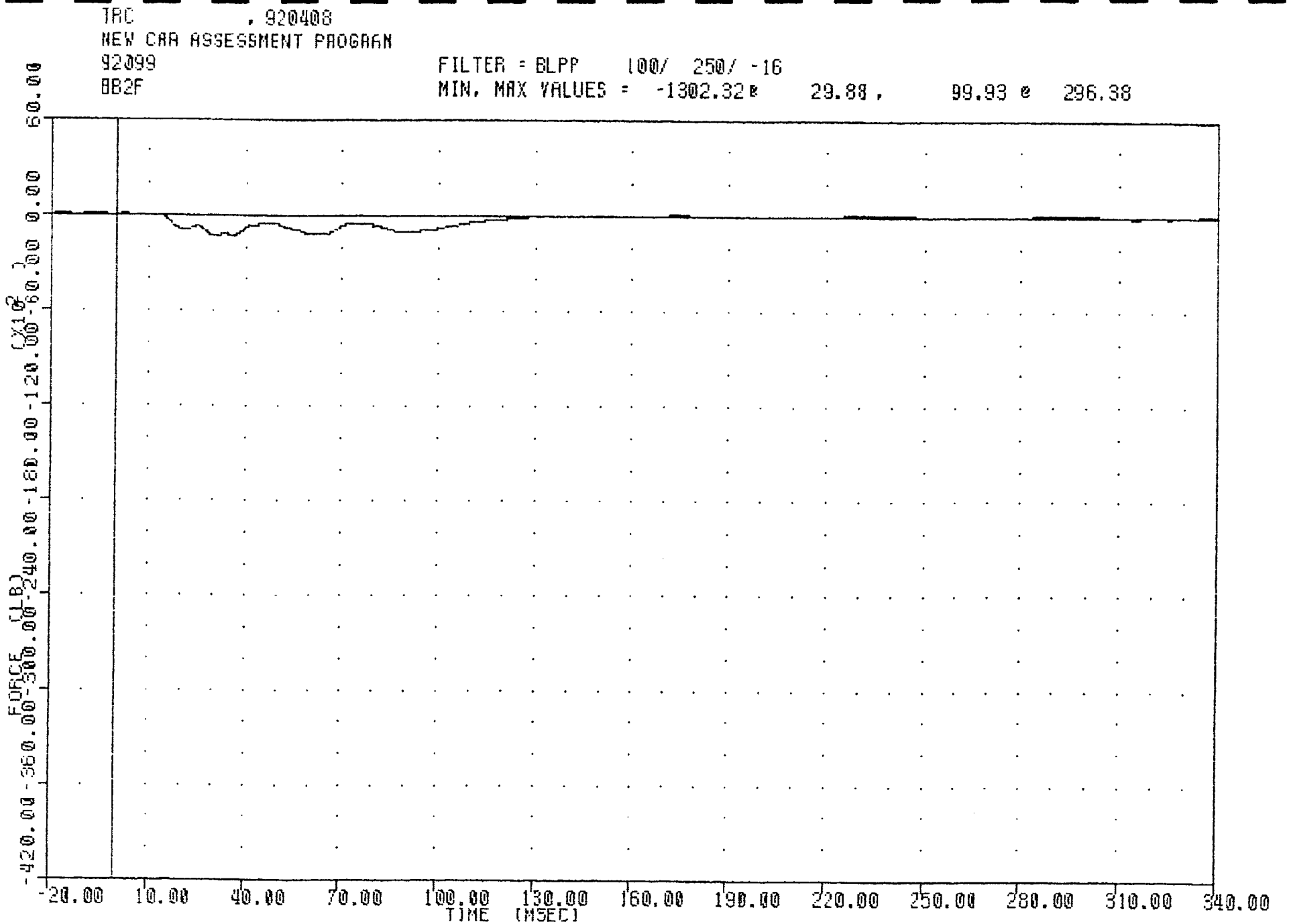
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A8 FORCE



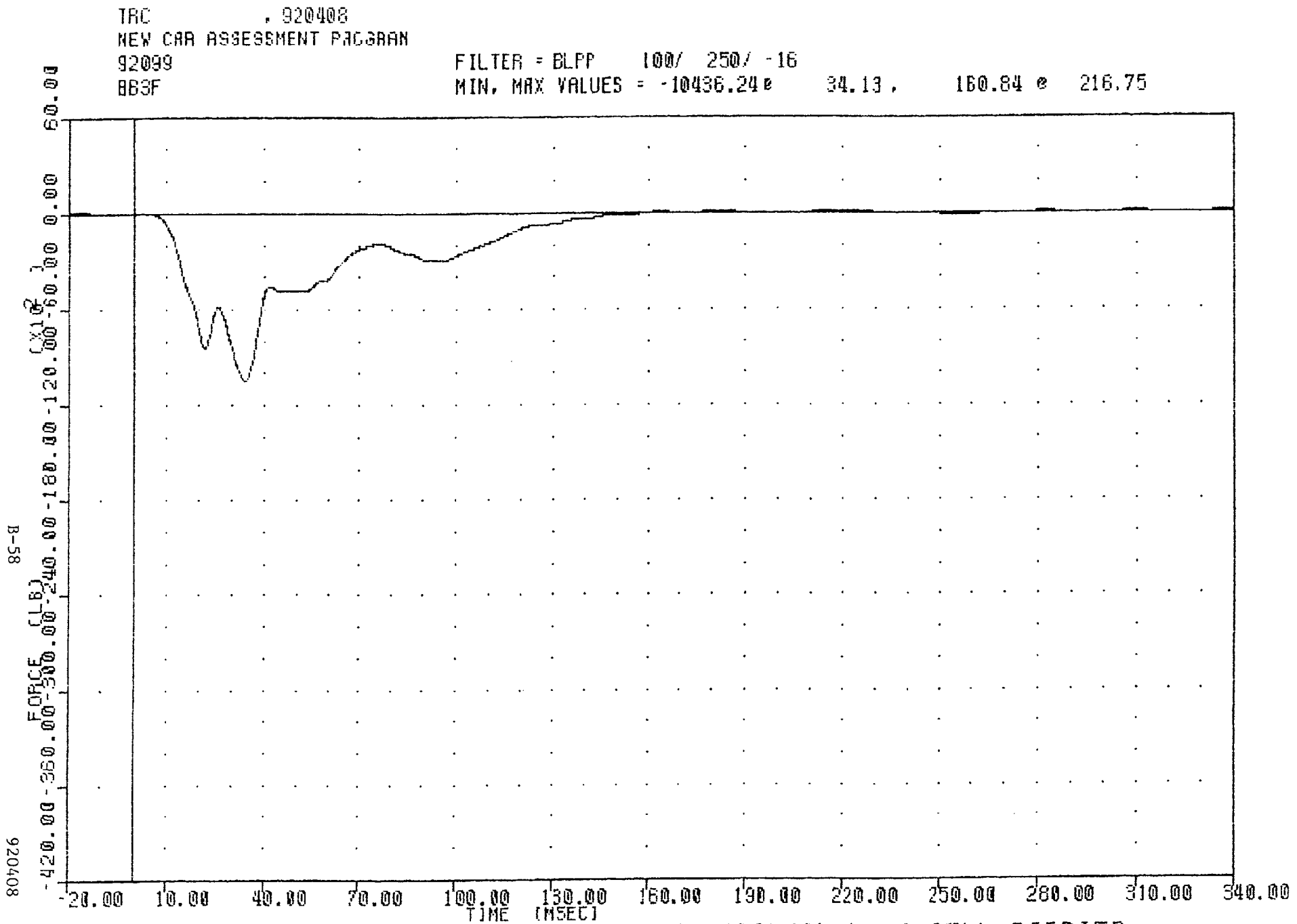
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A9 FORCE


TRC . 920408
NEW CAR ASSESSMENT PROGRAM
92099
BB1F
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -153.60 @ 316.25 , 179.95 @ 41.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
FORCE (LB) (X10^2)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B1 FORCE



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE

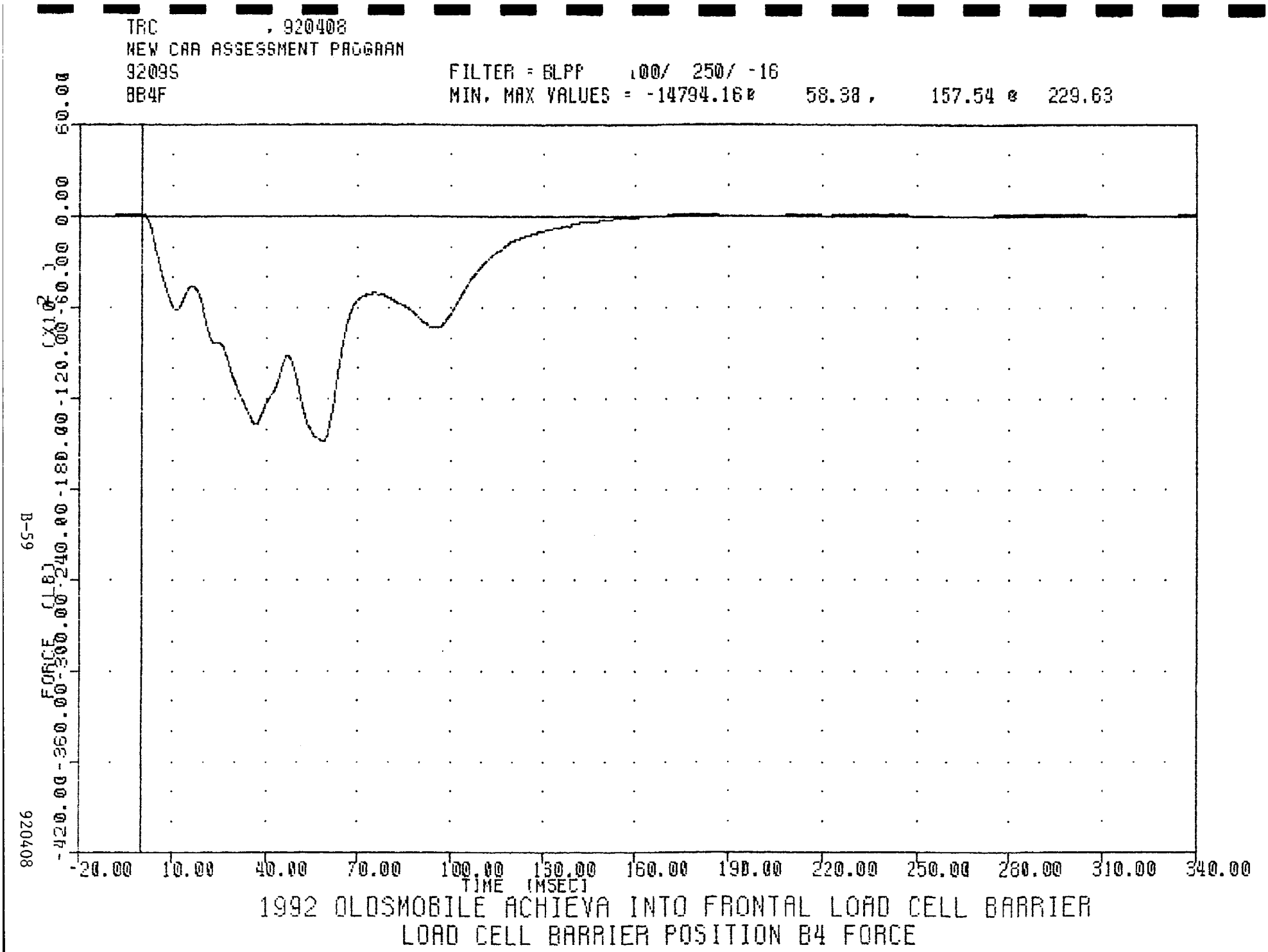
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

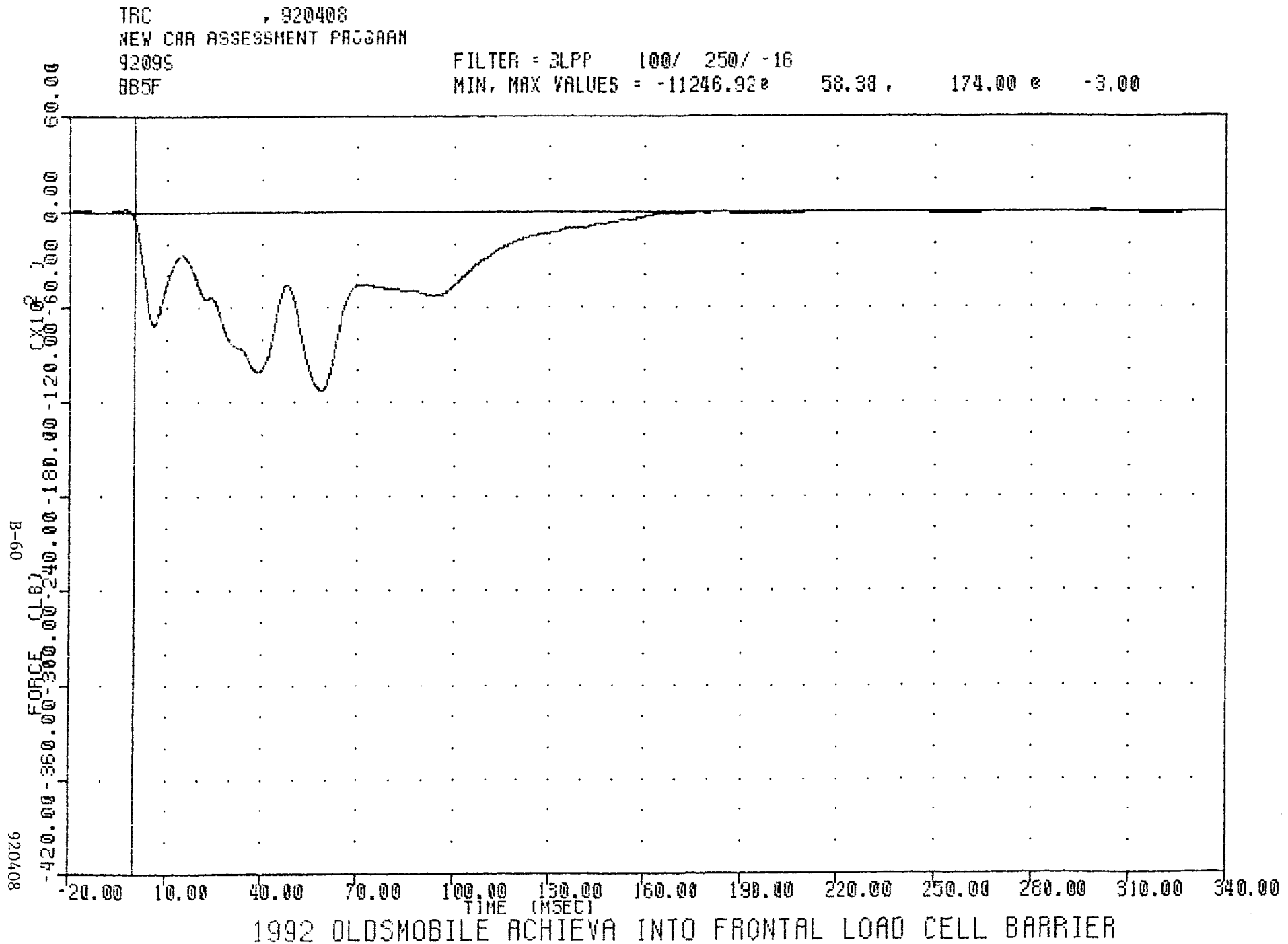
LOAD CELL BARRIER POSITION B3 FORCE

920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE

920408

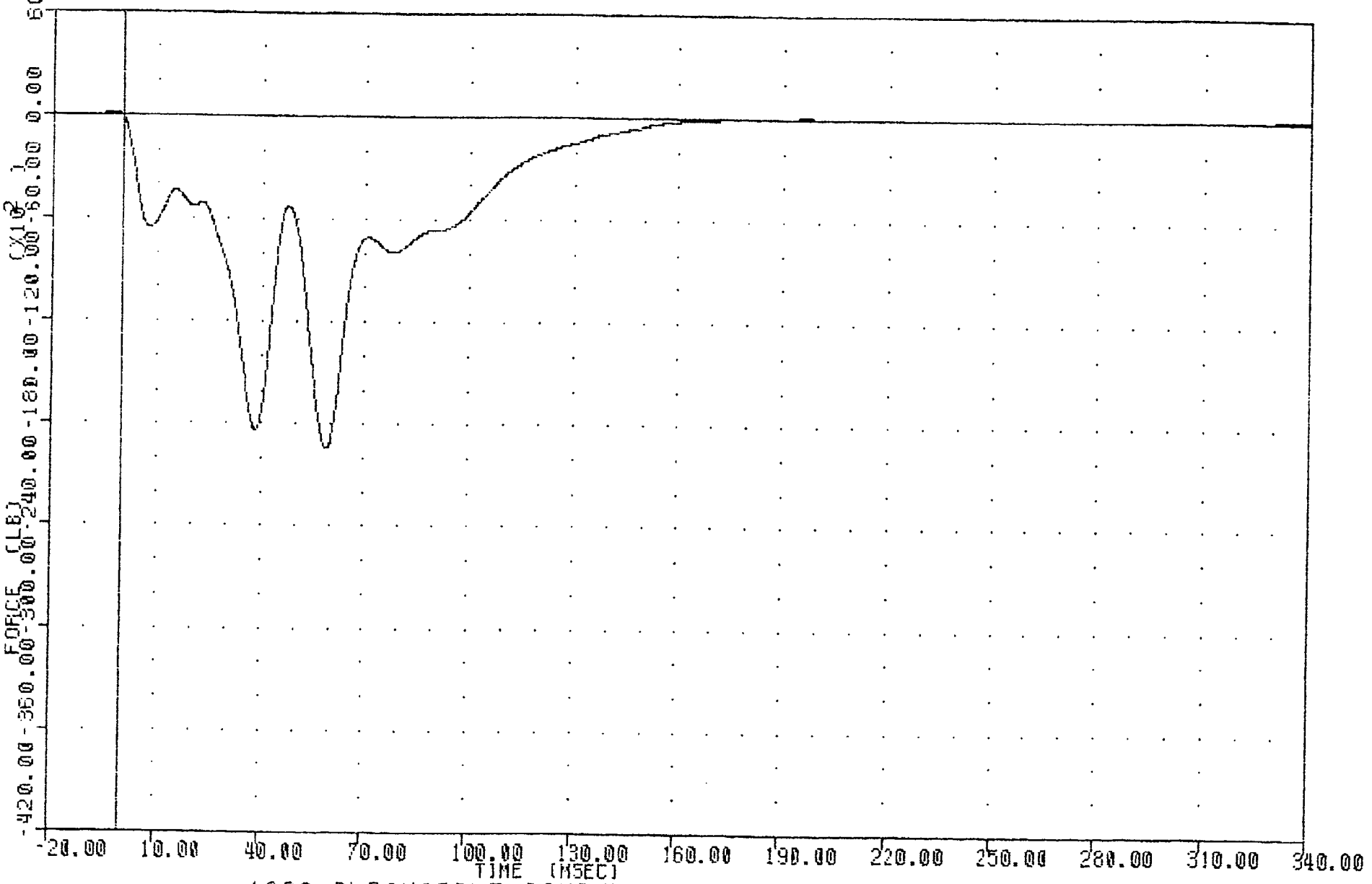


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION B5 FORCE

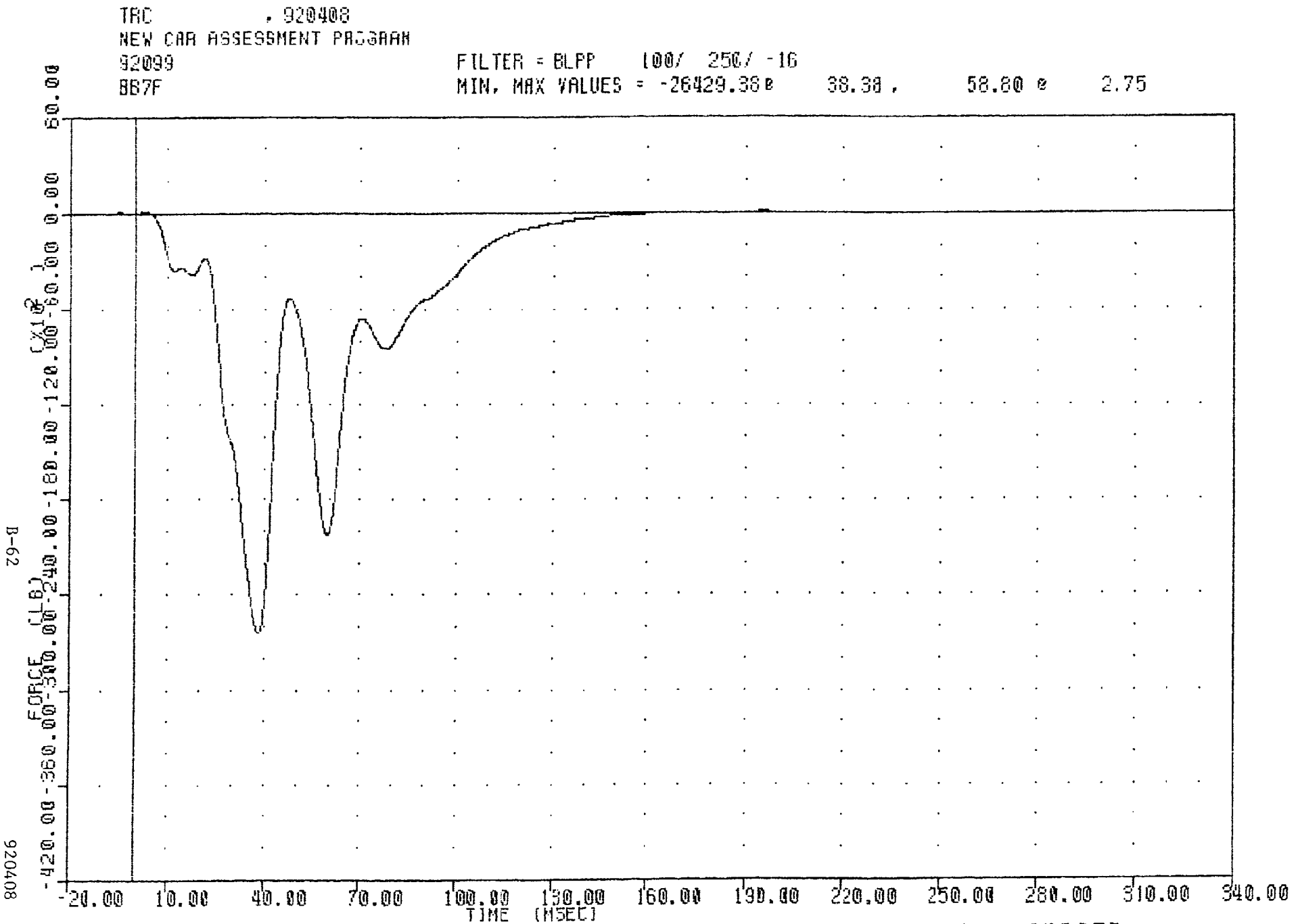
TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BB6F

FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -19416.88 @ 59.00 , 129.04 @ -2.13



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE

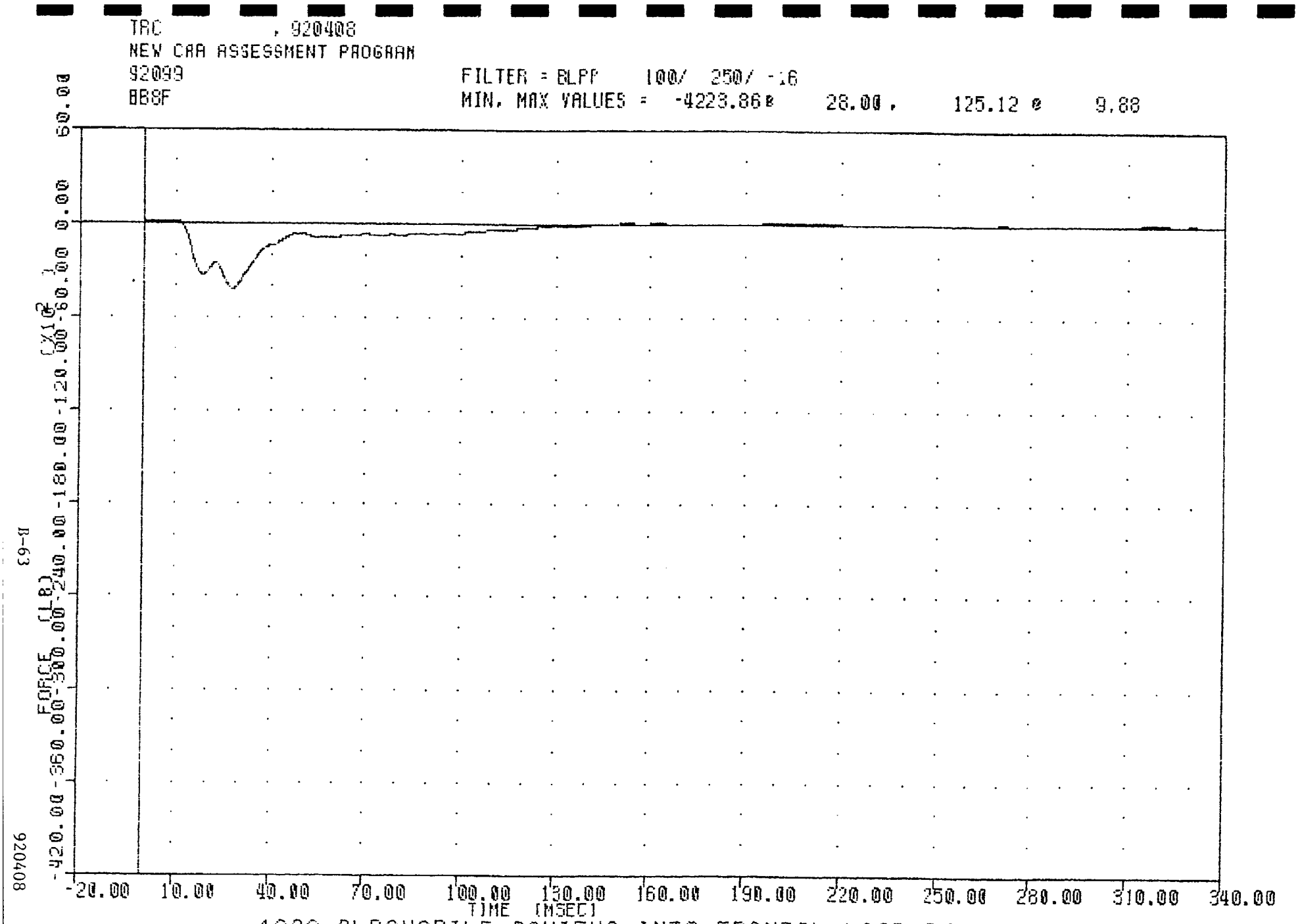
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

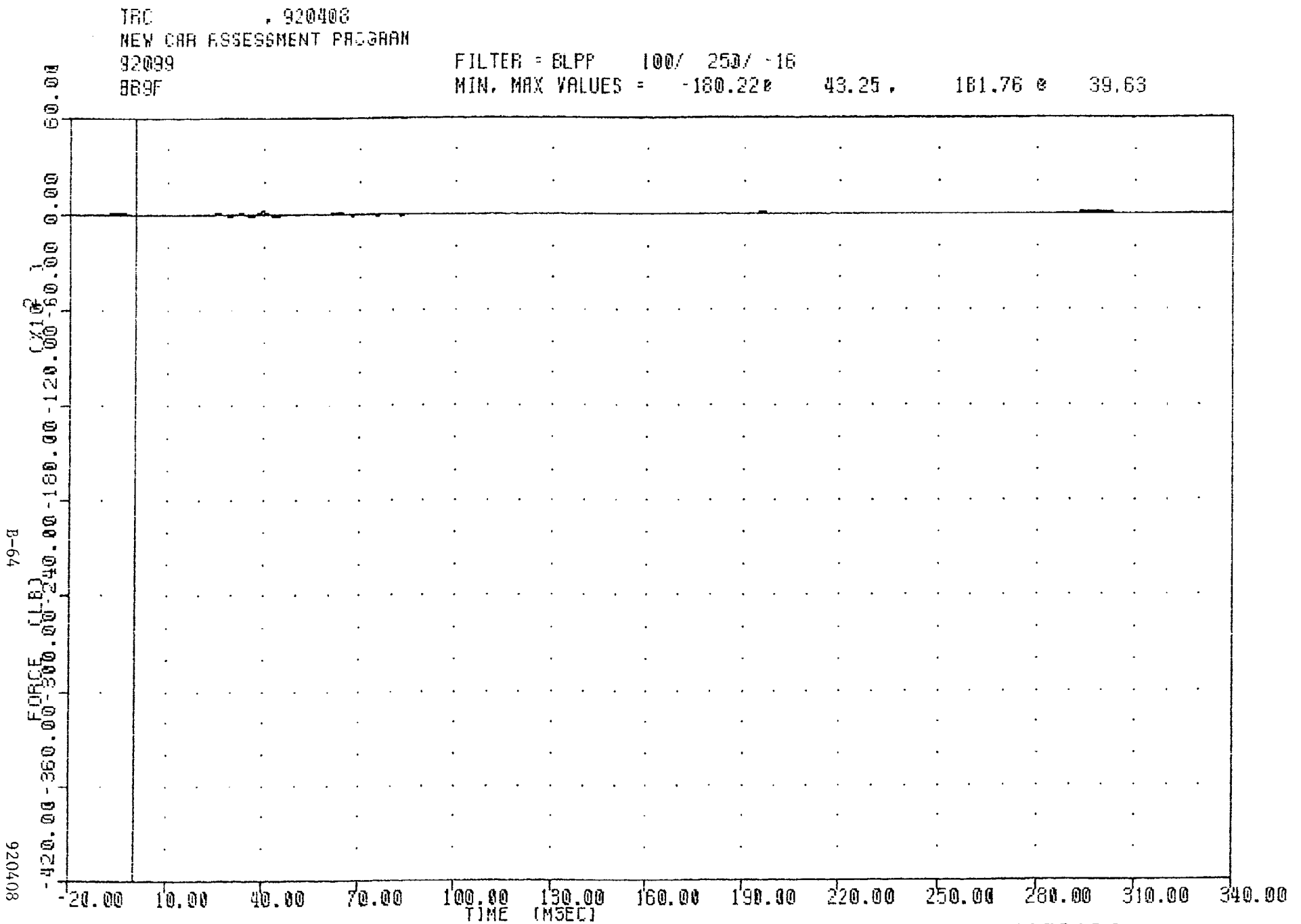
LOAD CELL BARRIER POSITION B7 FORCE

920408



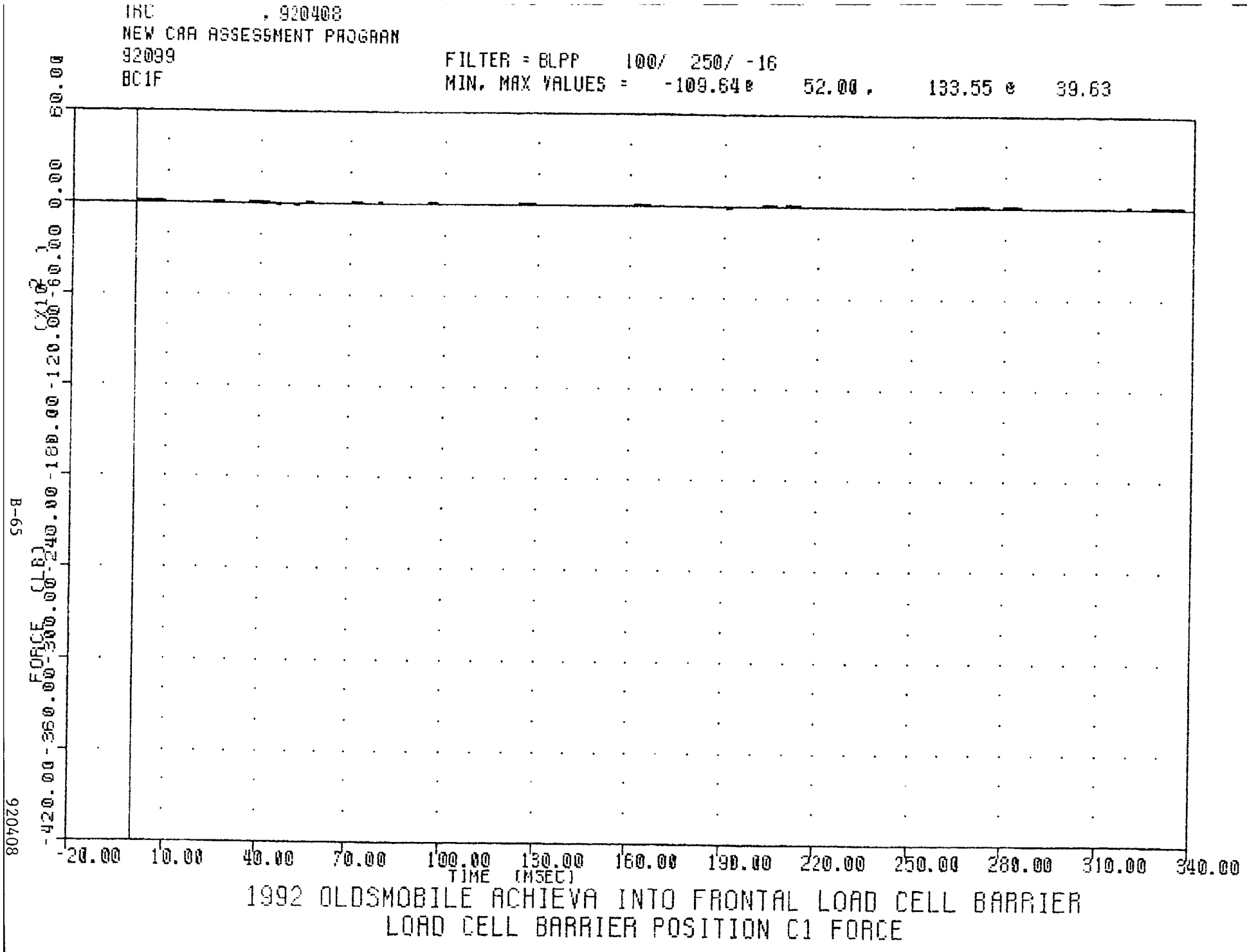
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION 88 FORCE

920408



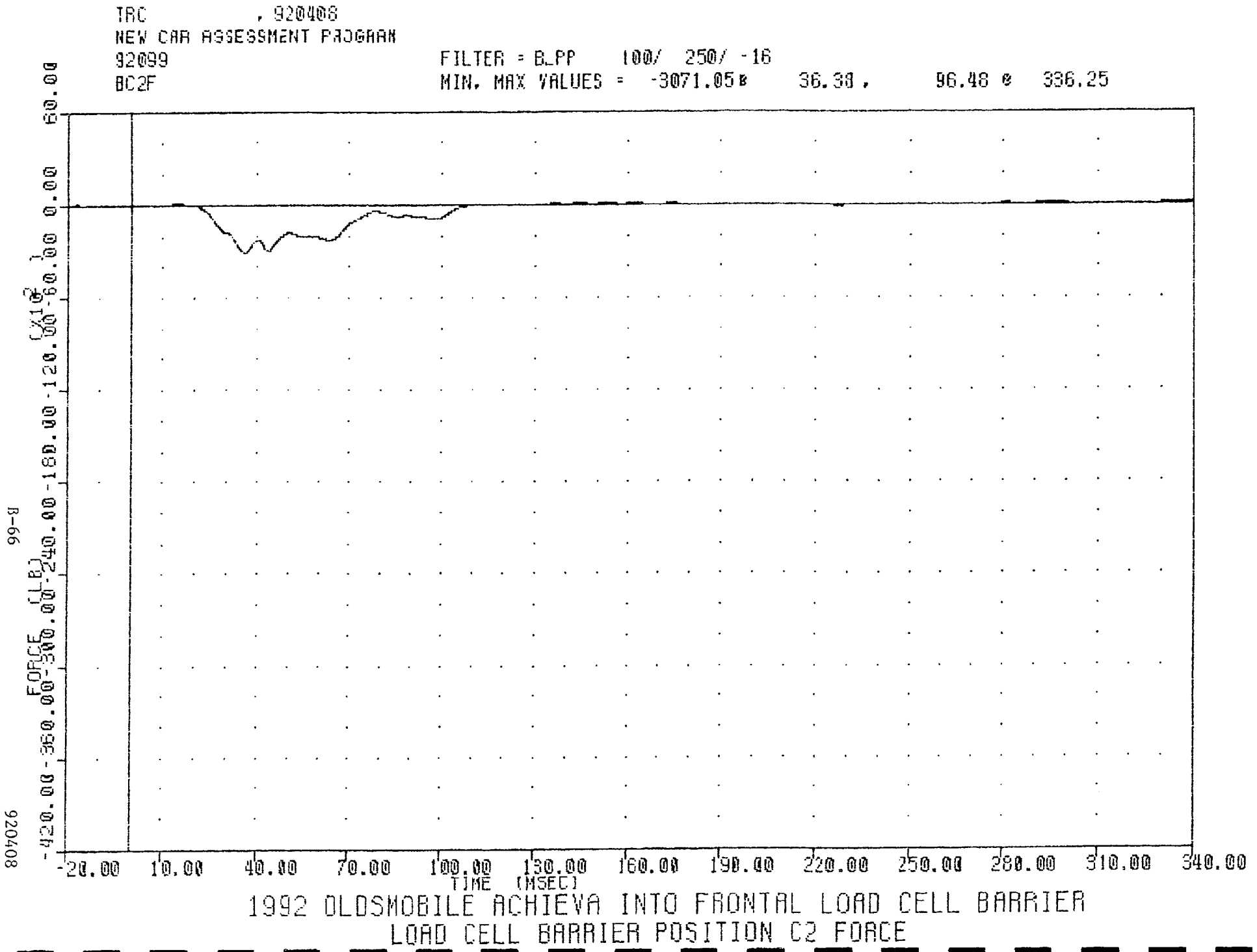
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION B9 FORCE

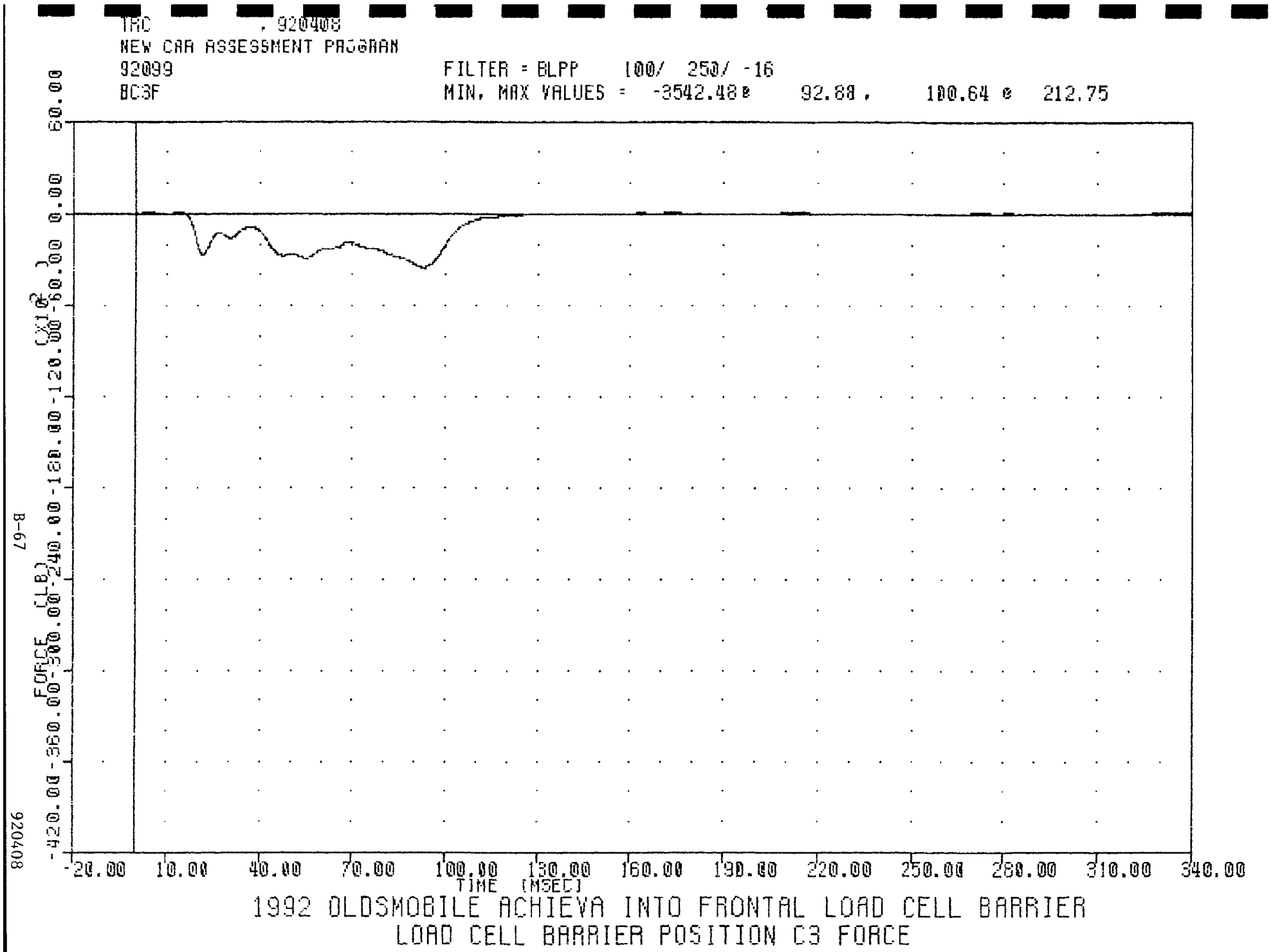


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE

920408

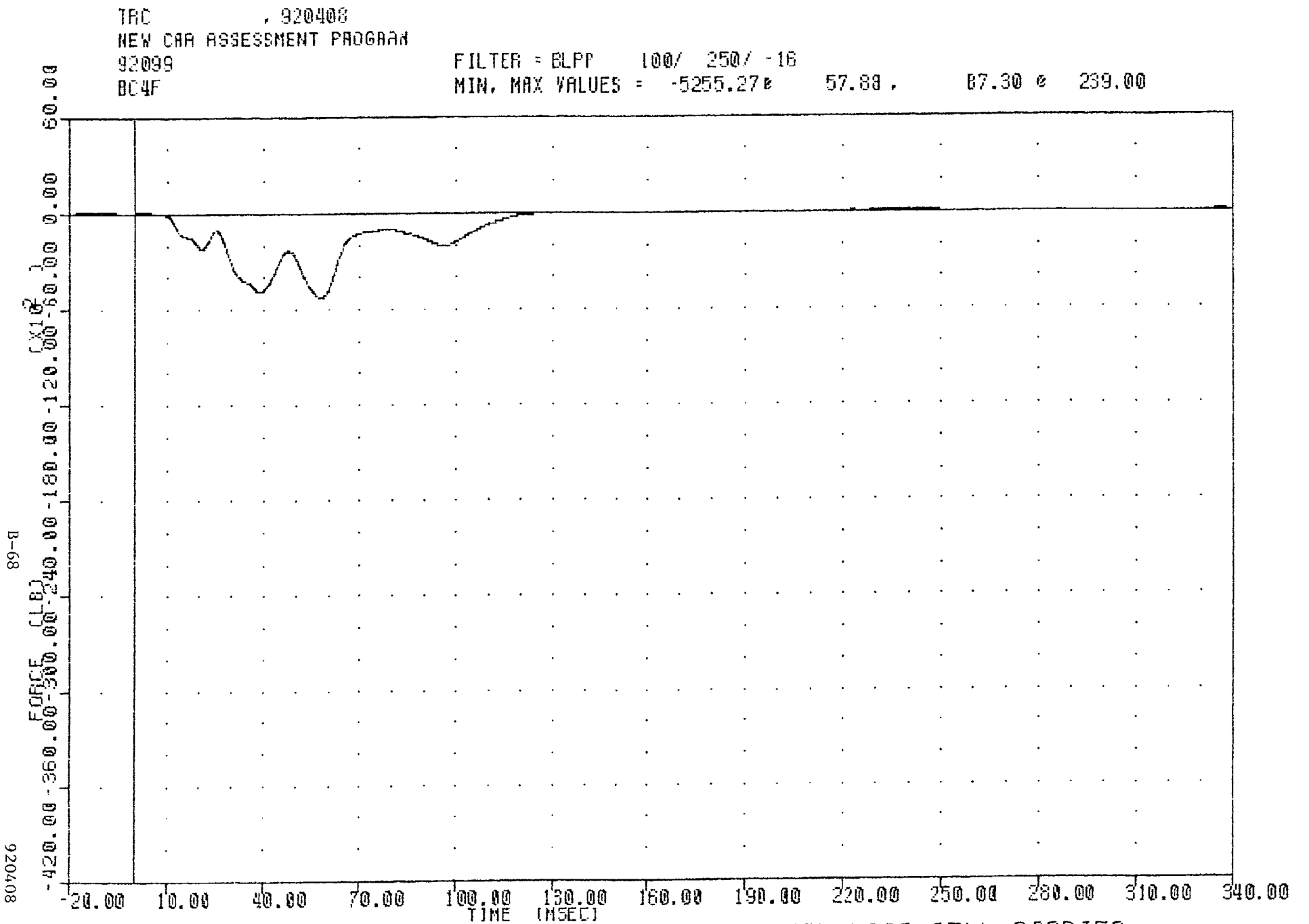

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BC2F
FILTER = B_PP 100/ 250/ -16
MIN, MAX VALUES = -3071.05 @ 36.38 , 96.48 @ 336.25
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
FORCE (LB) (X10^2)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C2 FORCE

920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C3 FORCE

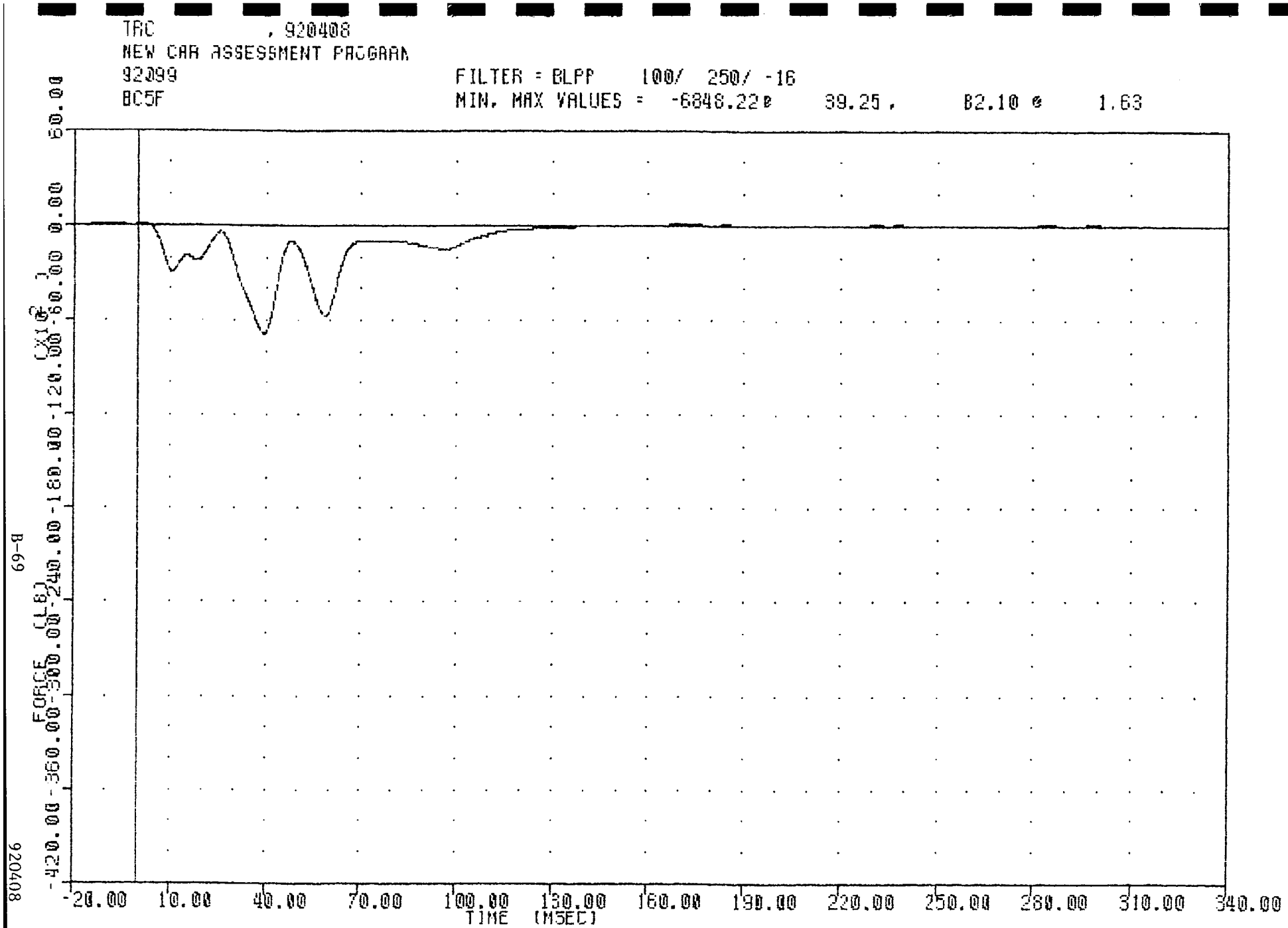
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

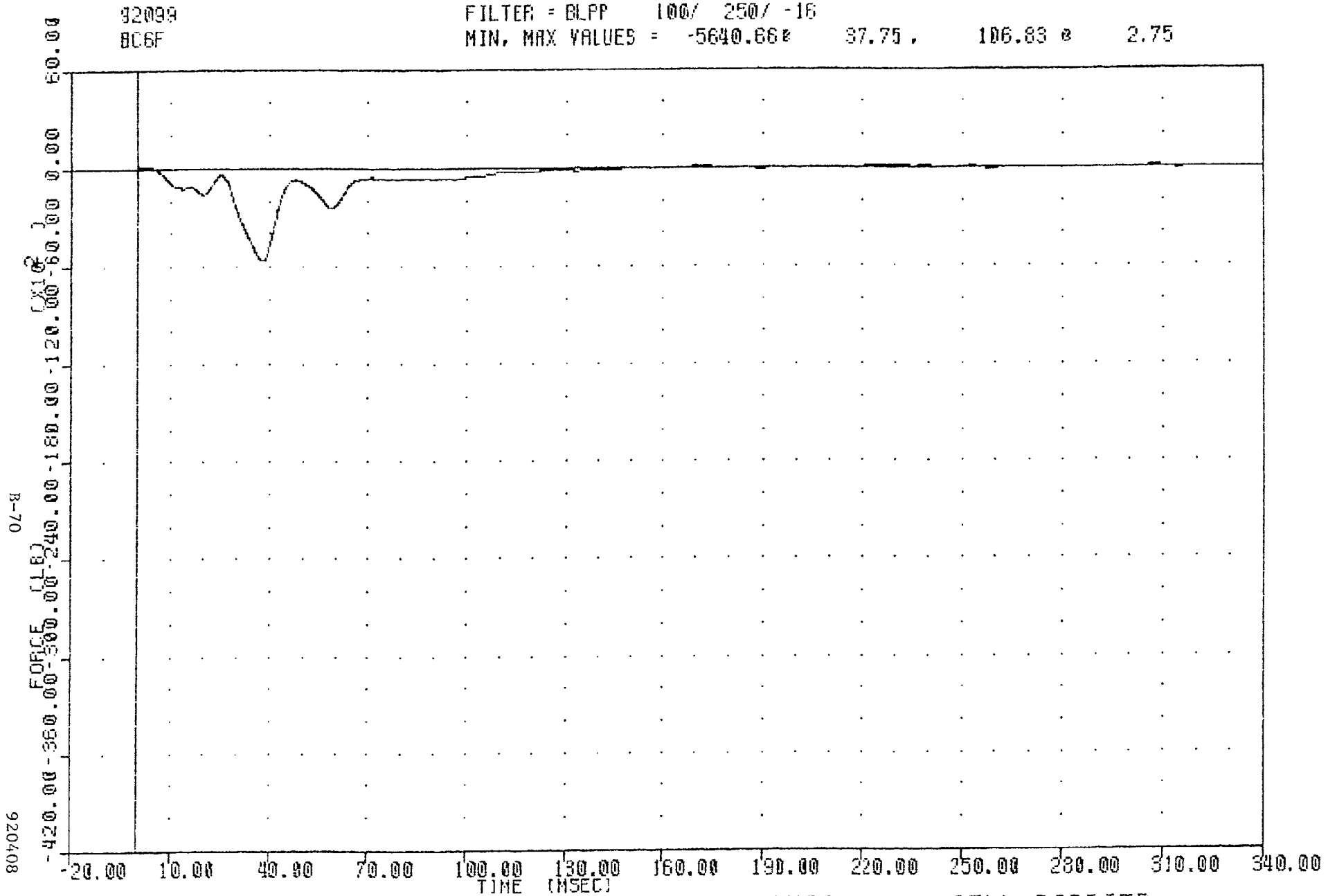
LOAD CELL BARRIER POSITION C4 FORCE

920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE

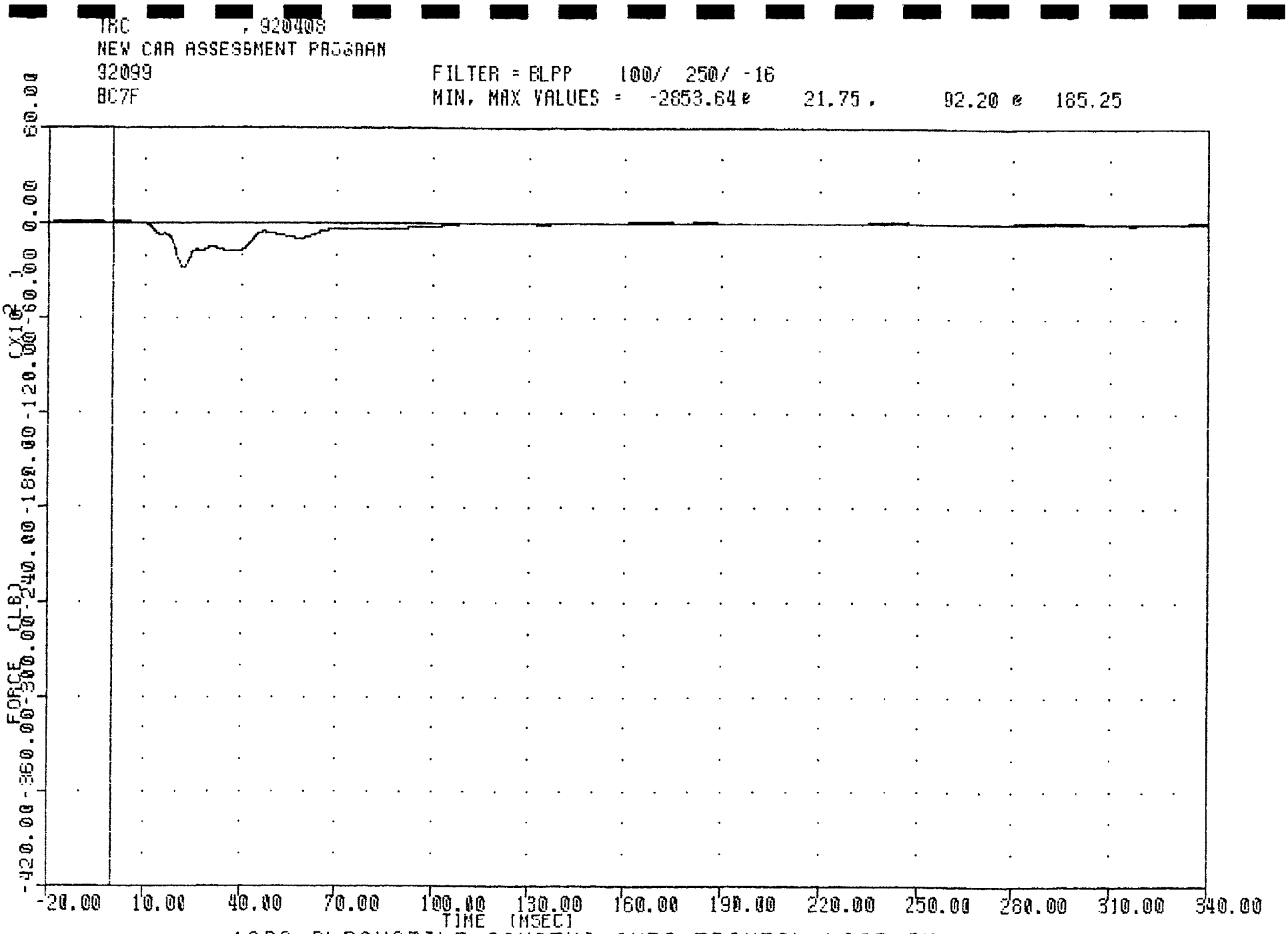
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

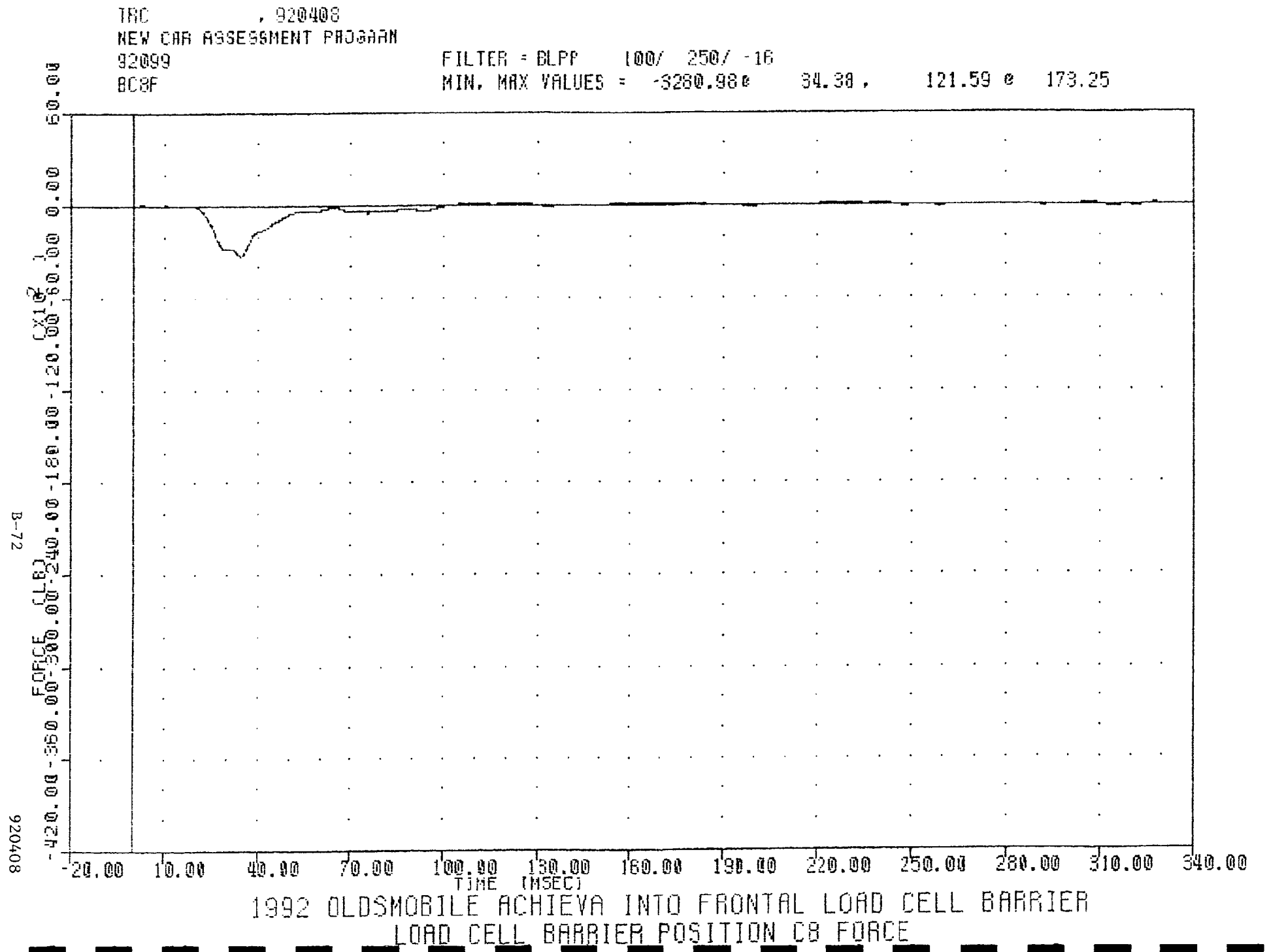
LOAD CELL BARRIER POSITION C6 FORCE

920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE

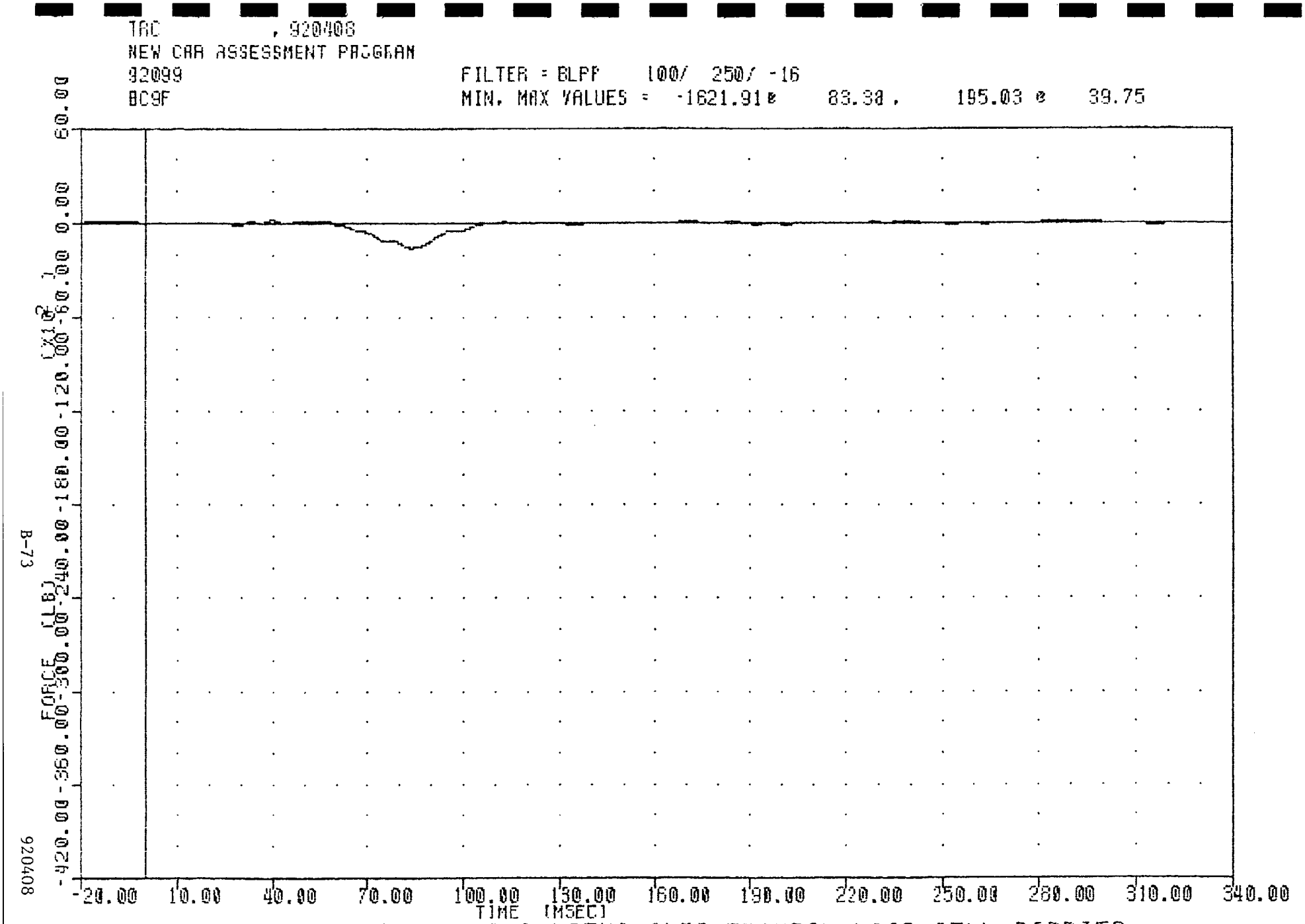
920408



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

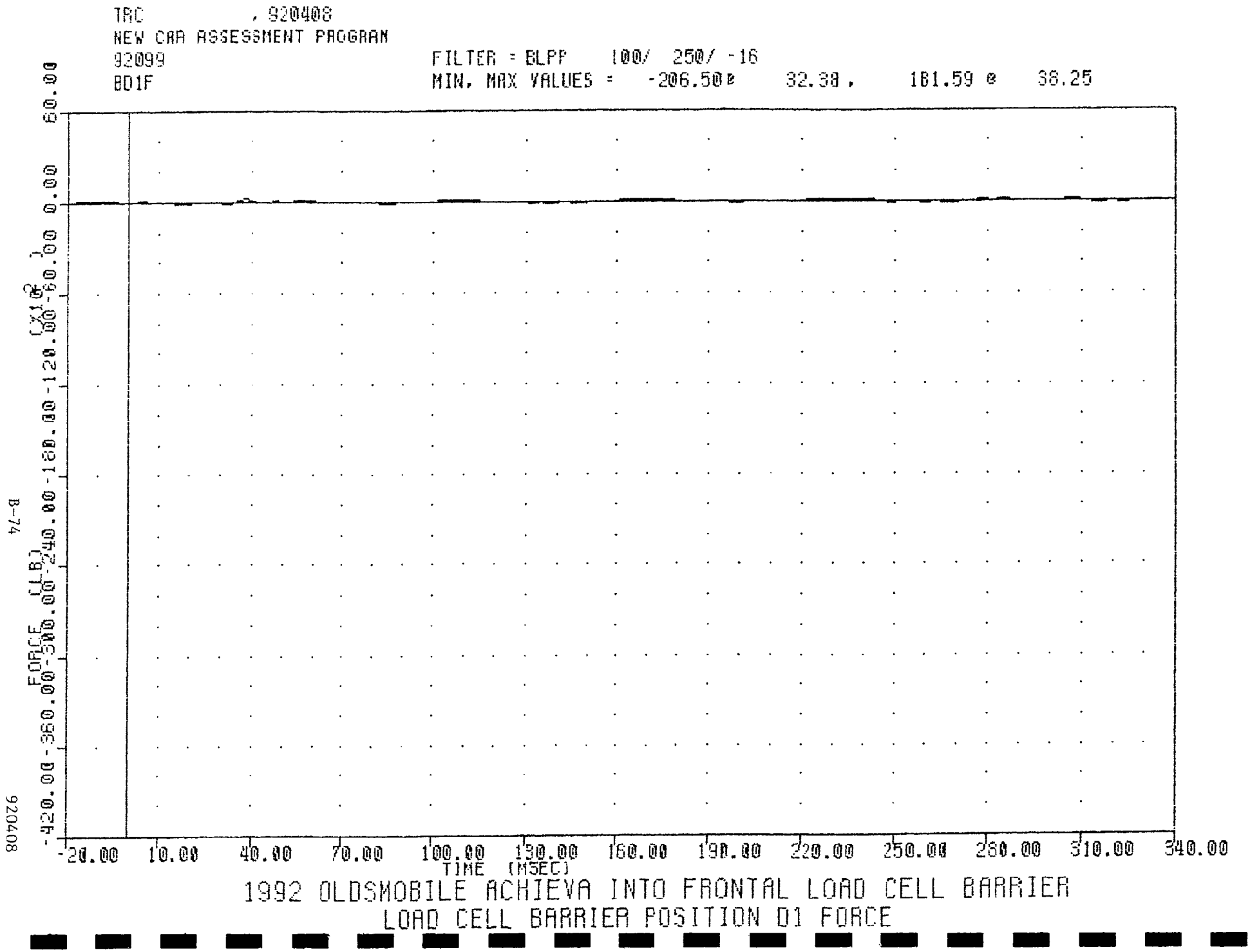
LOAD CELL BARRIER POSITION C8 FORCE

920408



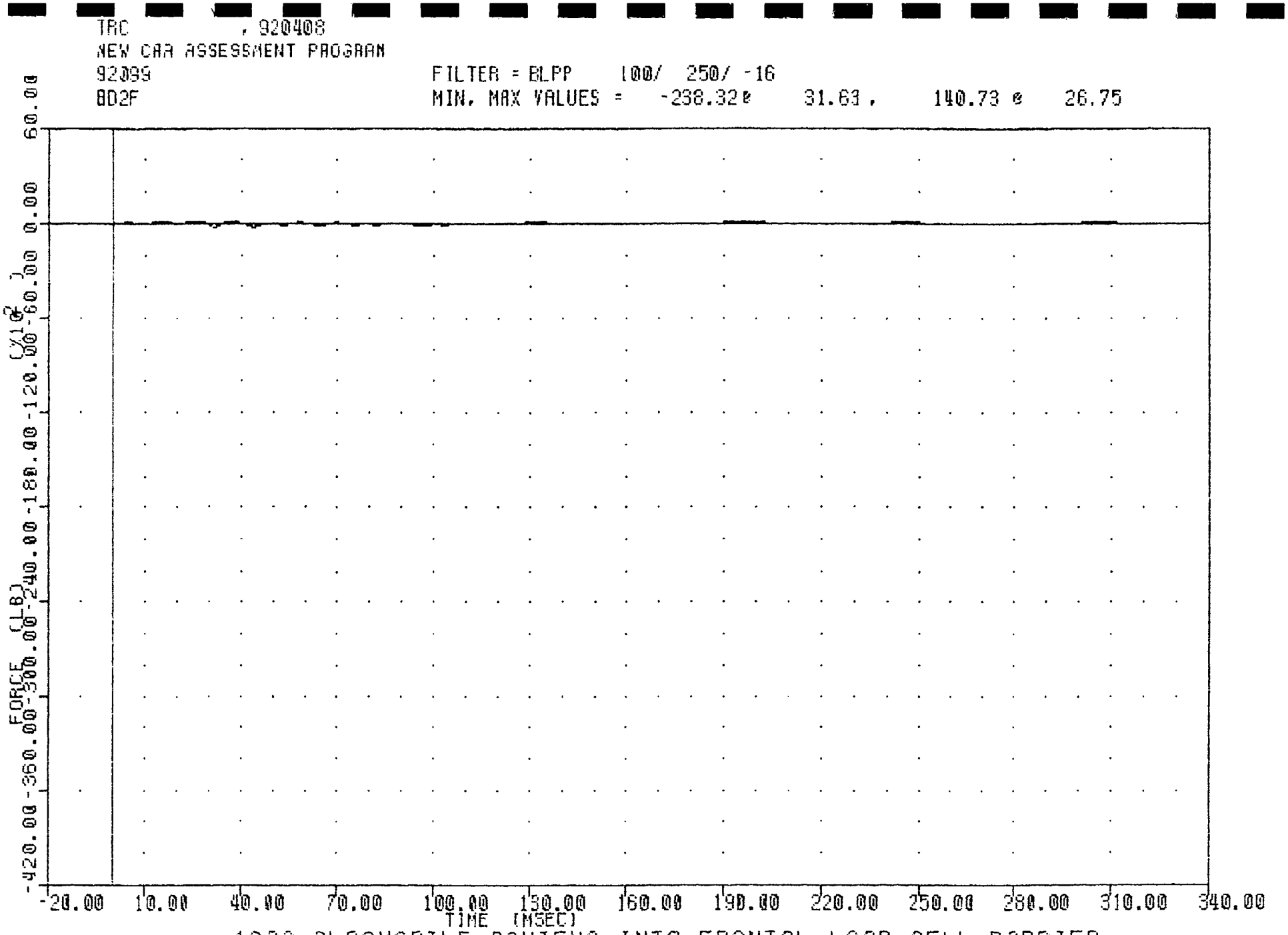
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE

920408



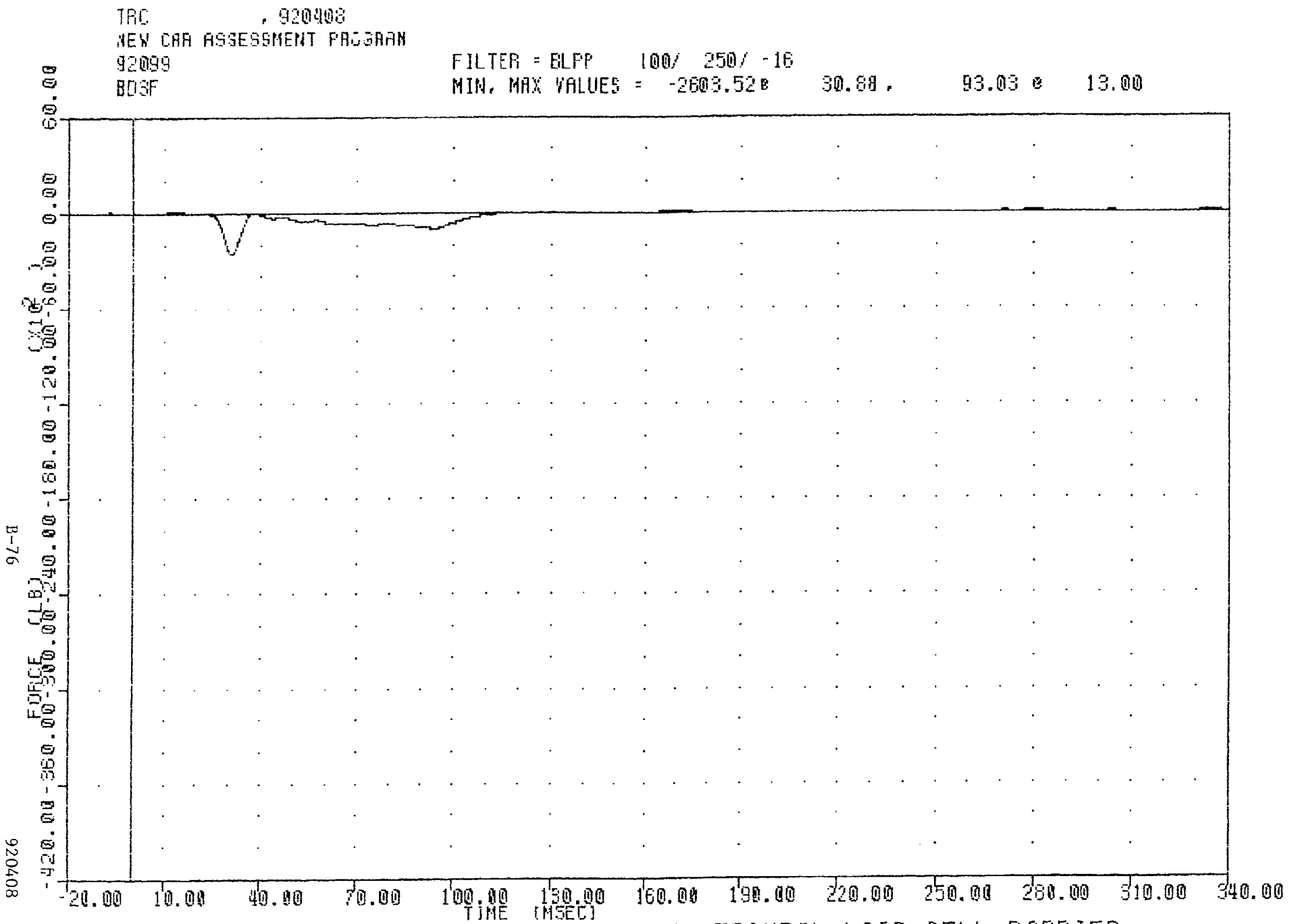
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION D1 FORCE



1992 OLOSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D2 FORCE

920408

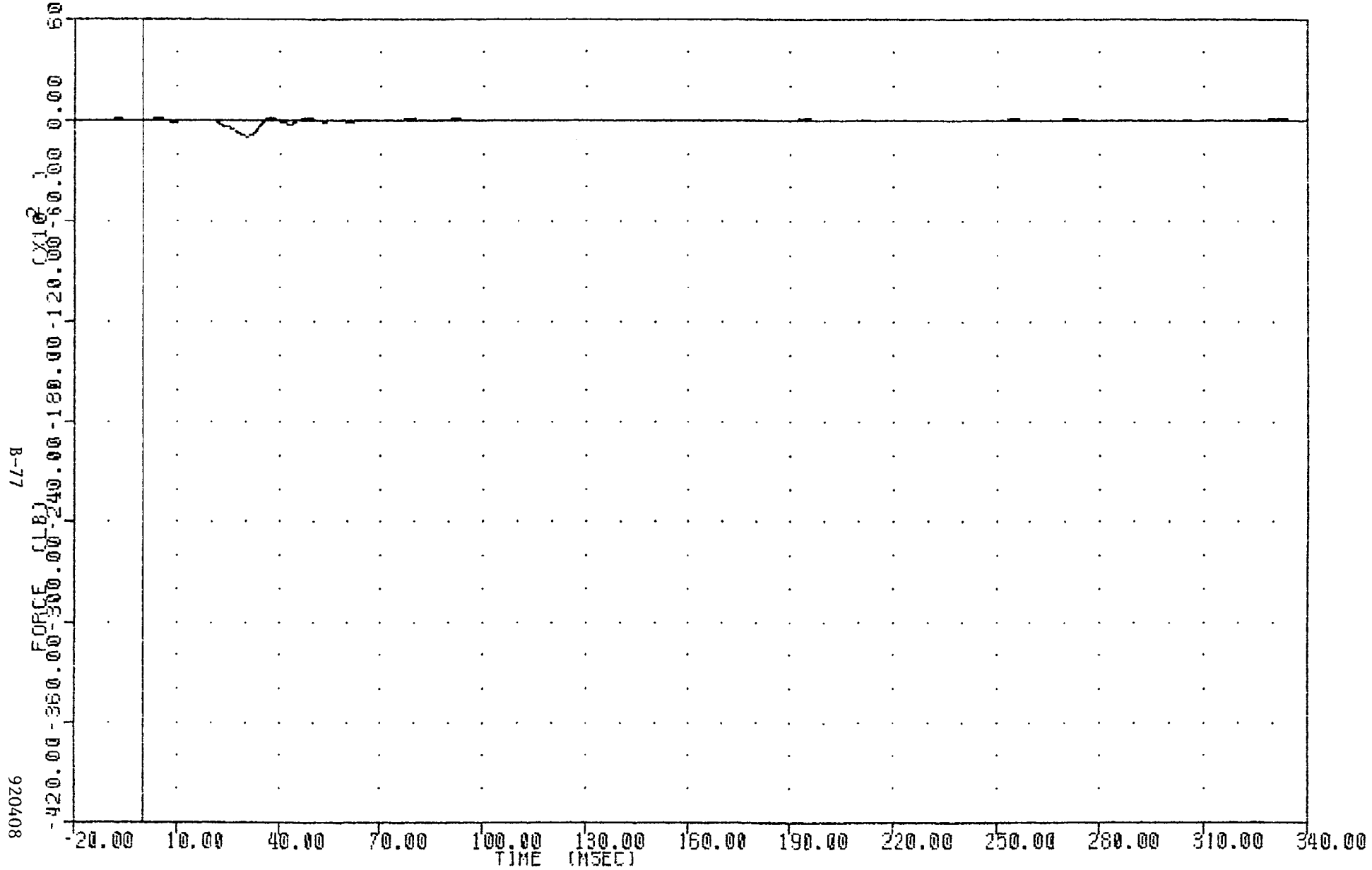


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION D3 FORCE

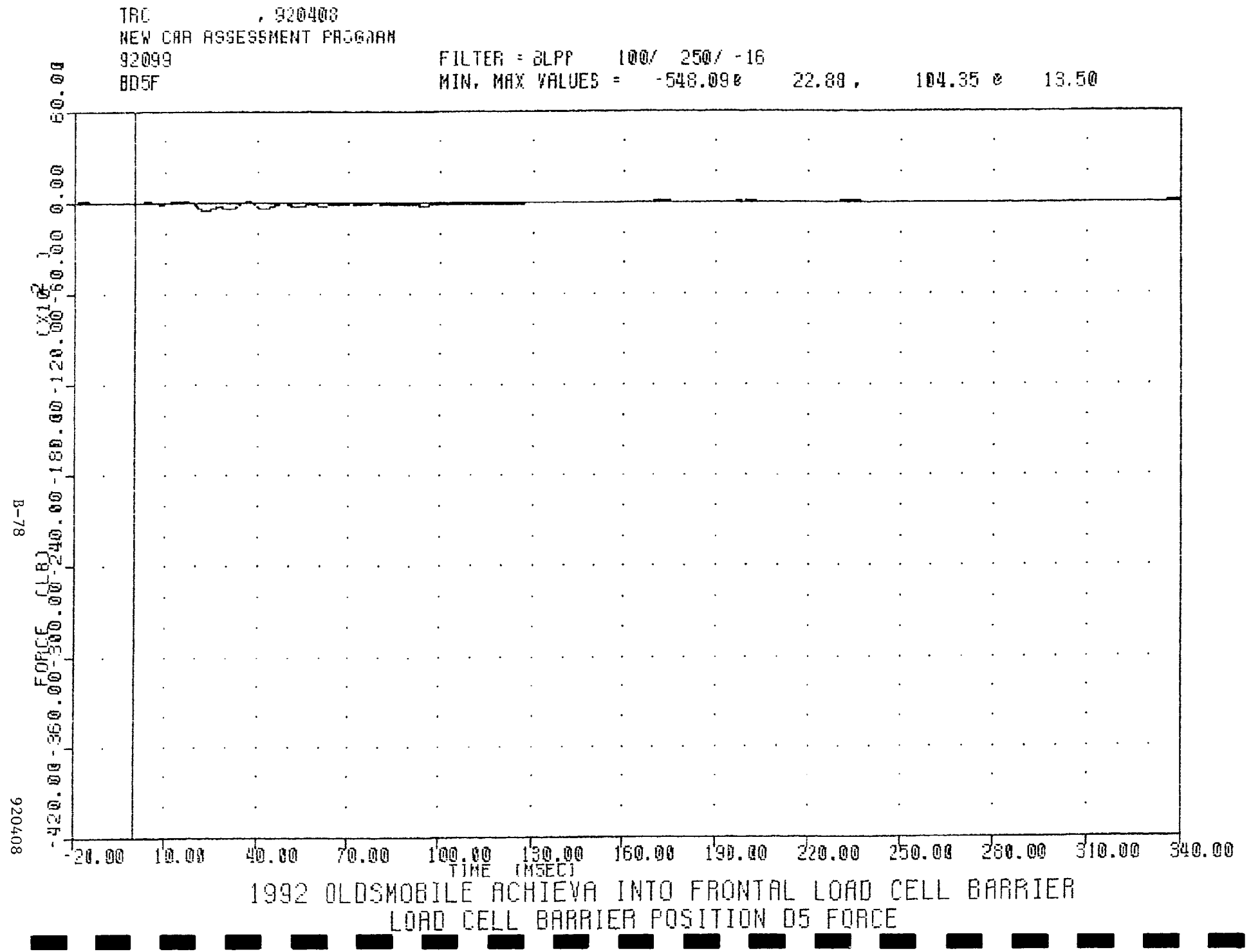
920408

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPP 100/ 250/ -16
BD4F MIN, MAX VALUES = -996.16@ 30.38 , 151.66 @ 37.25

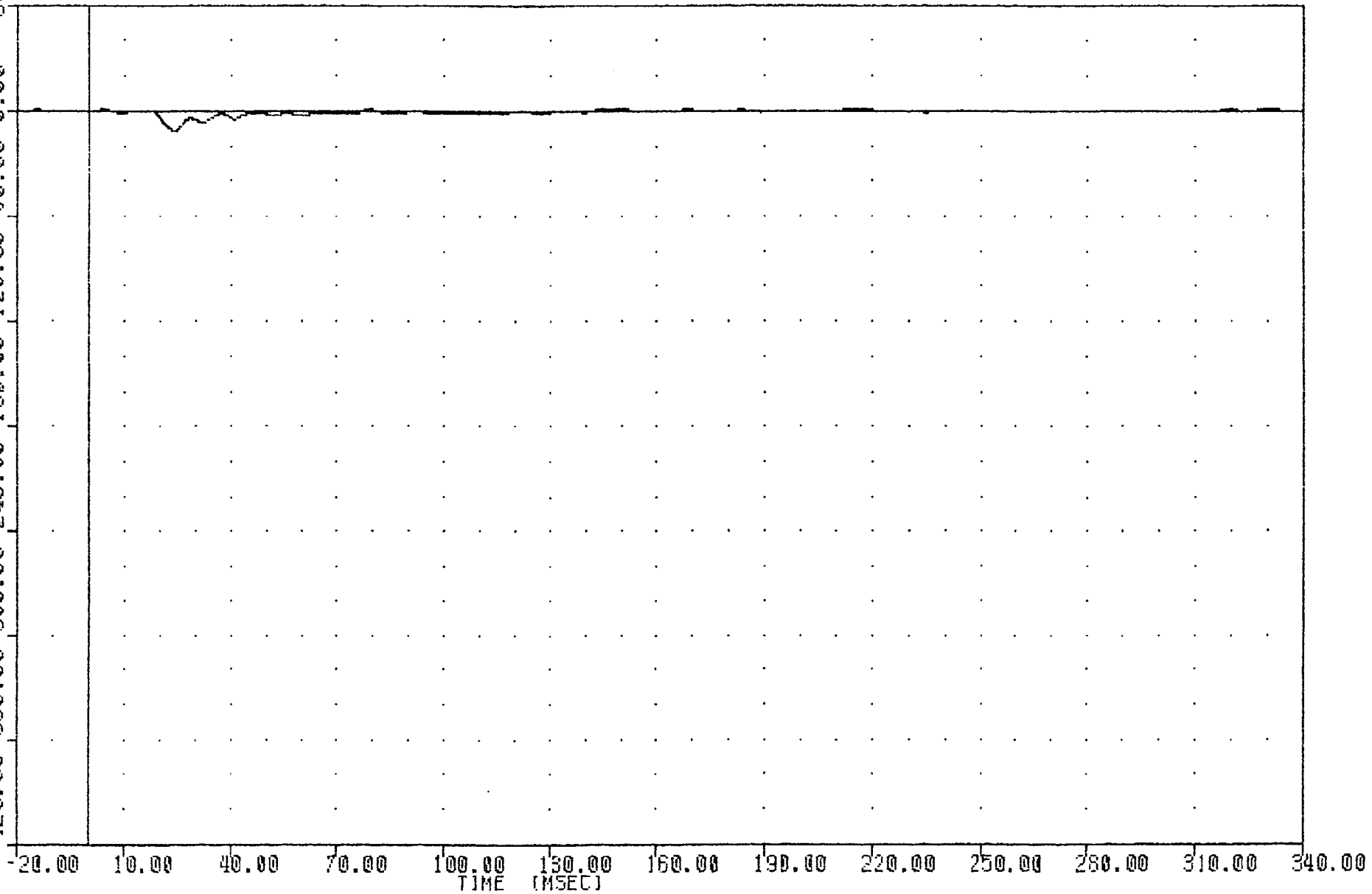


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D4 FORCE

920408

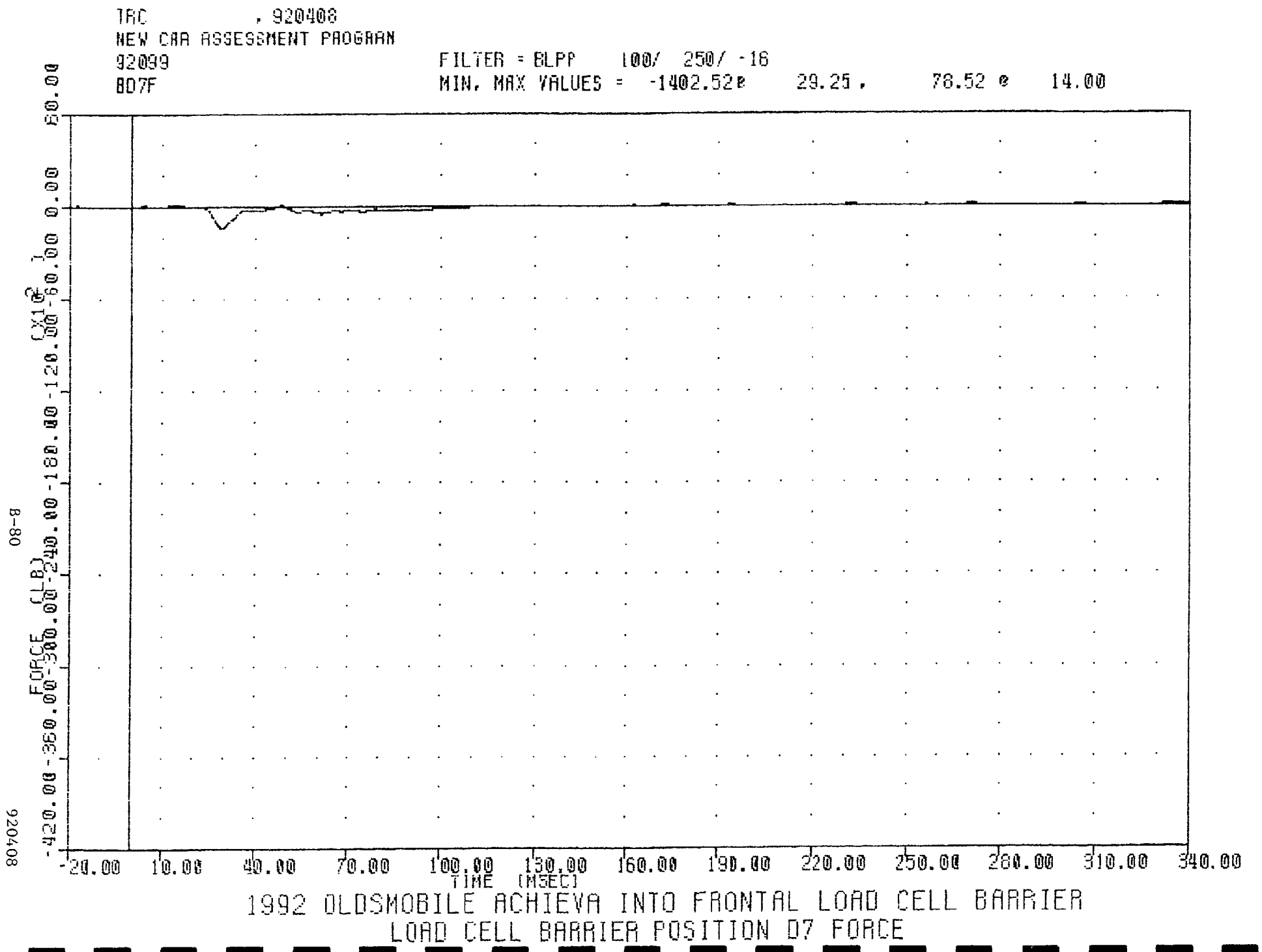

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
BD5F
FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -548.090 22.88 , 104.35 @ 13.50
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
FORCE (LB) (X10^2)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
B-78
920408
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D5 FORCE

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPF 100/ 250/ -16
BD6F MIN, MAX VALUES = -1145.40@ 24.00 , 120.21 @ 146.25



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION 06 FORCE

920408

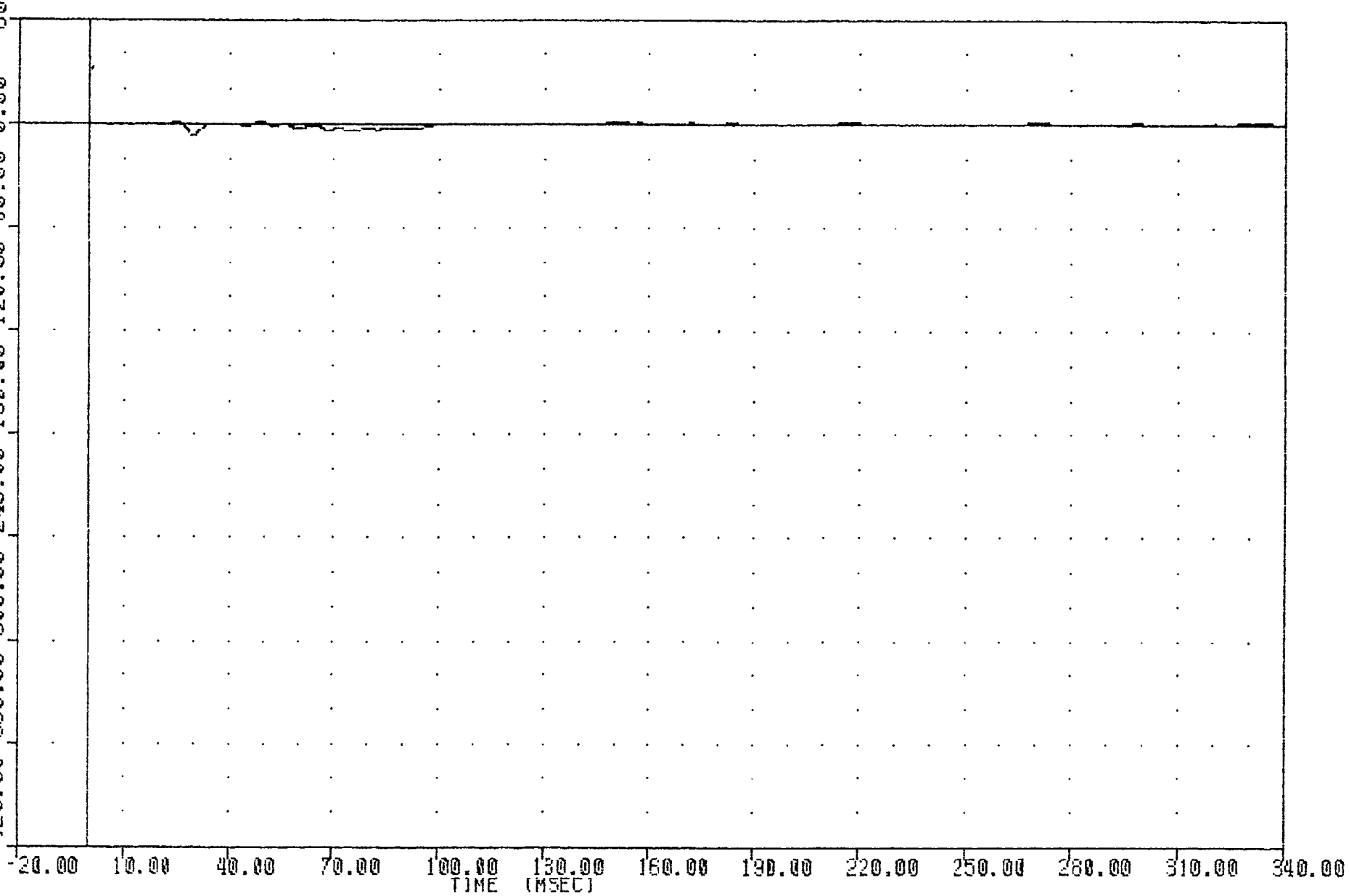


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION D7 FORCE

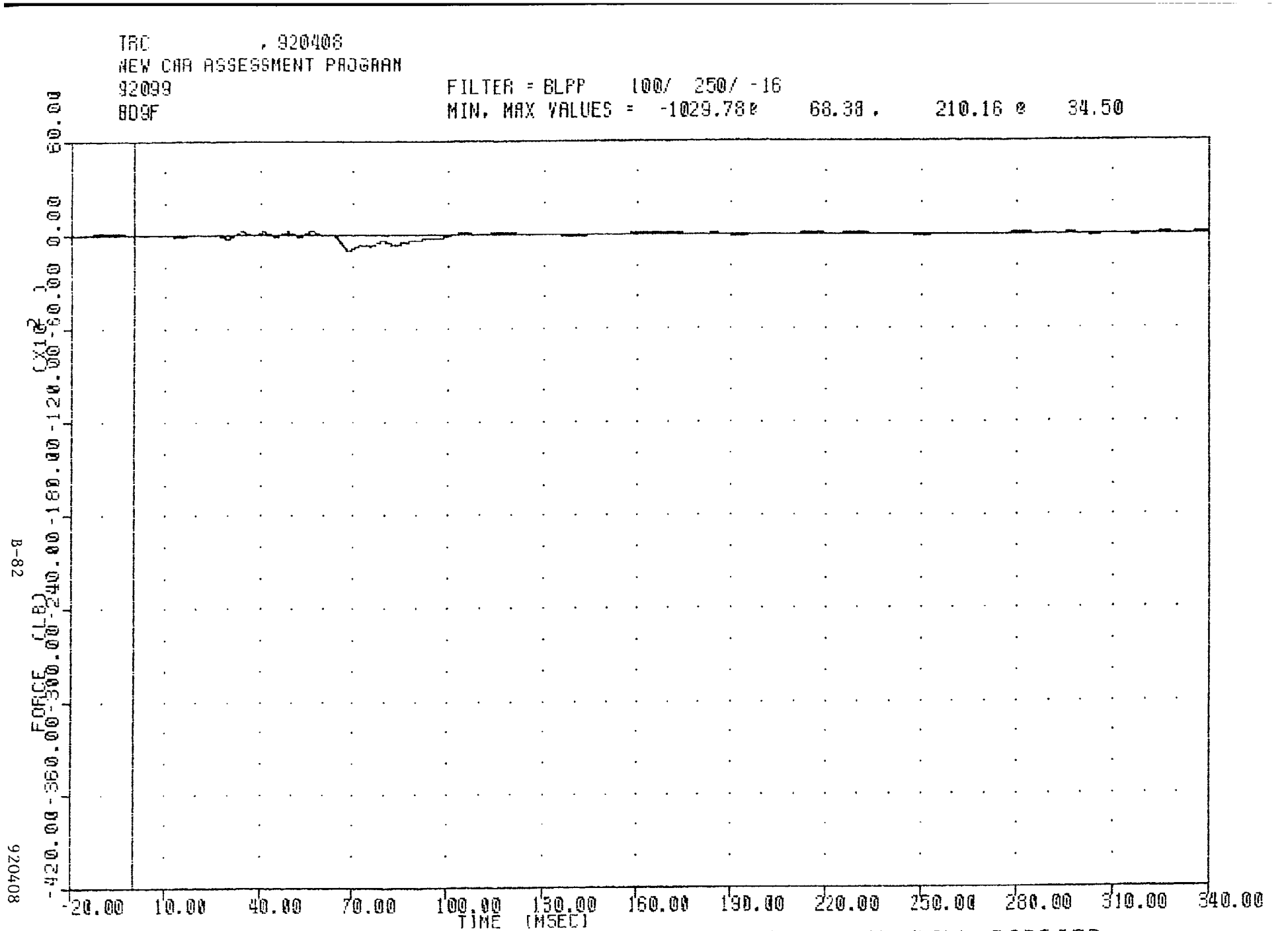
920408

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92069 FILTER = BLPP 100/ 250/ -16
BD8F MIN, MAX VALUES = -690.60 @ 29.75 , 119.75 @ 48.75



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D8 FORCE

920408

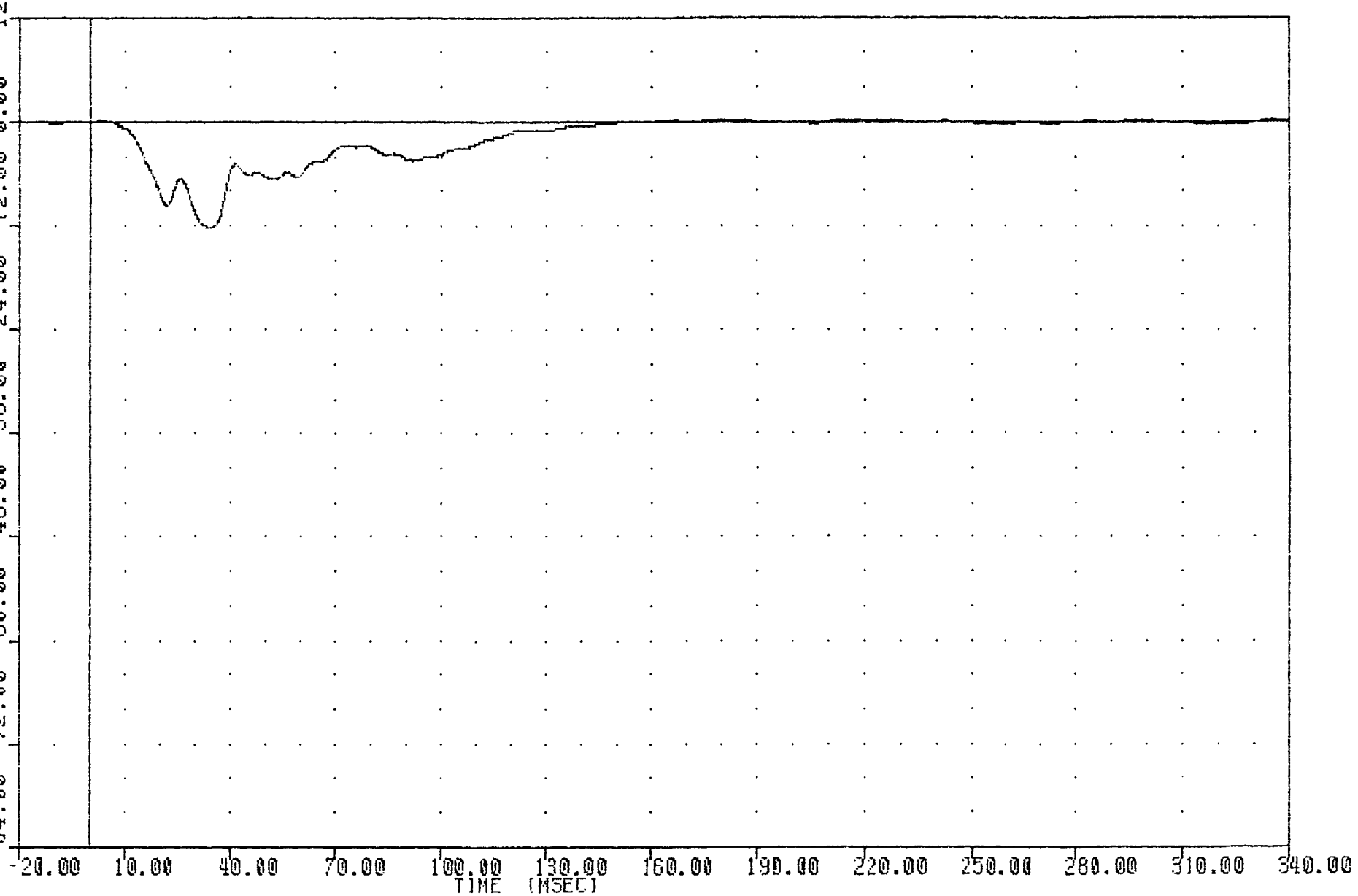


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION D9 FORCE

920408

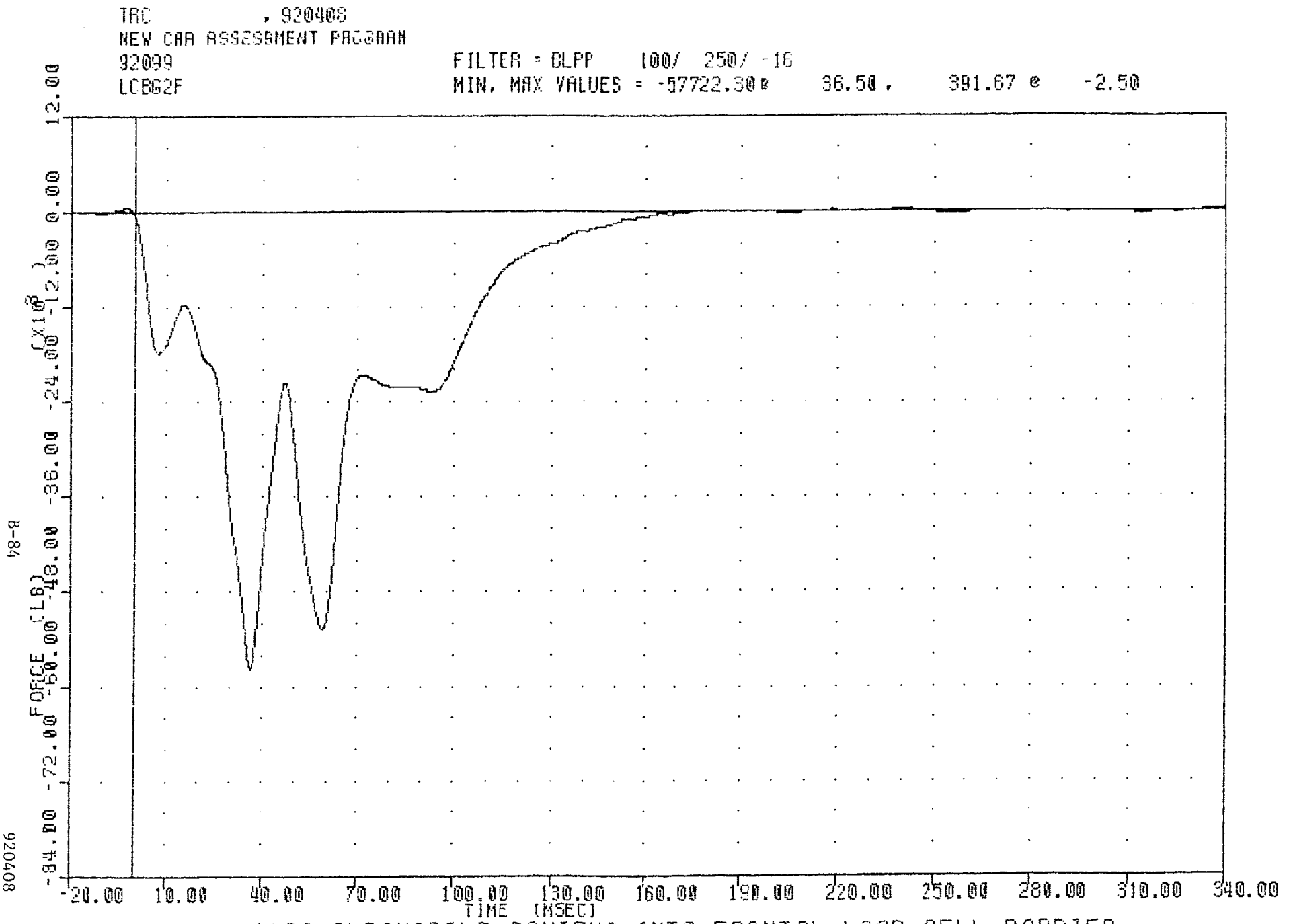
TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPP 100/ 250/ -16
LCBG1F MIN, MAX VALUES = -12204.21 @ 34.63 , 235.11 @ 164.38



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 1 FORCE TOTAL

B-83

920408

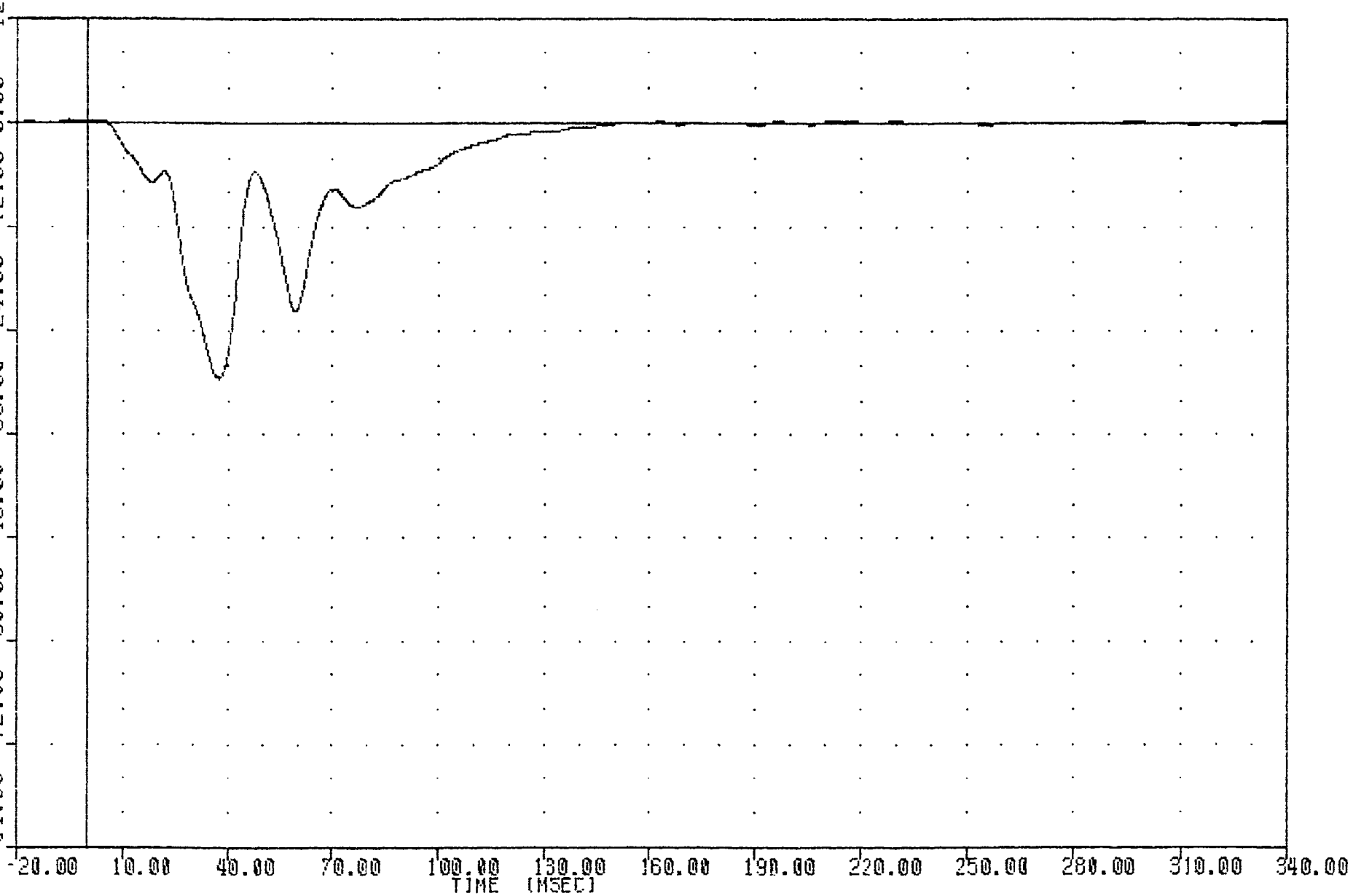


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER GROUP - 2 FORCE TOTAL

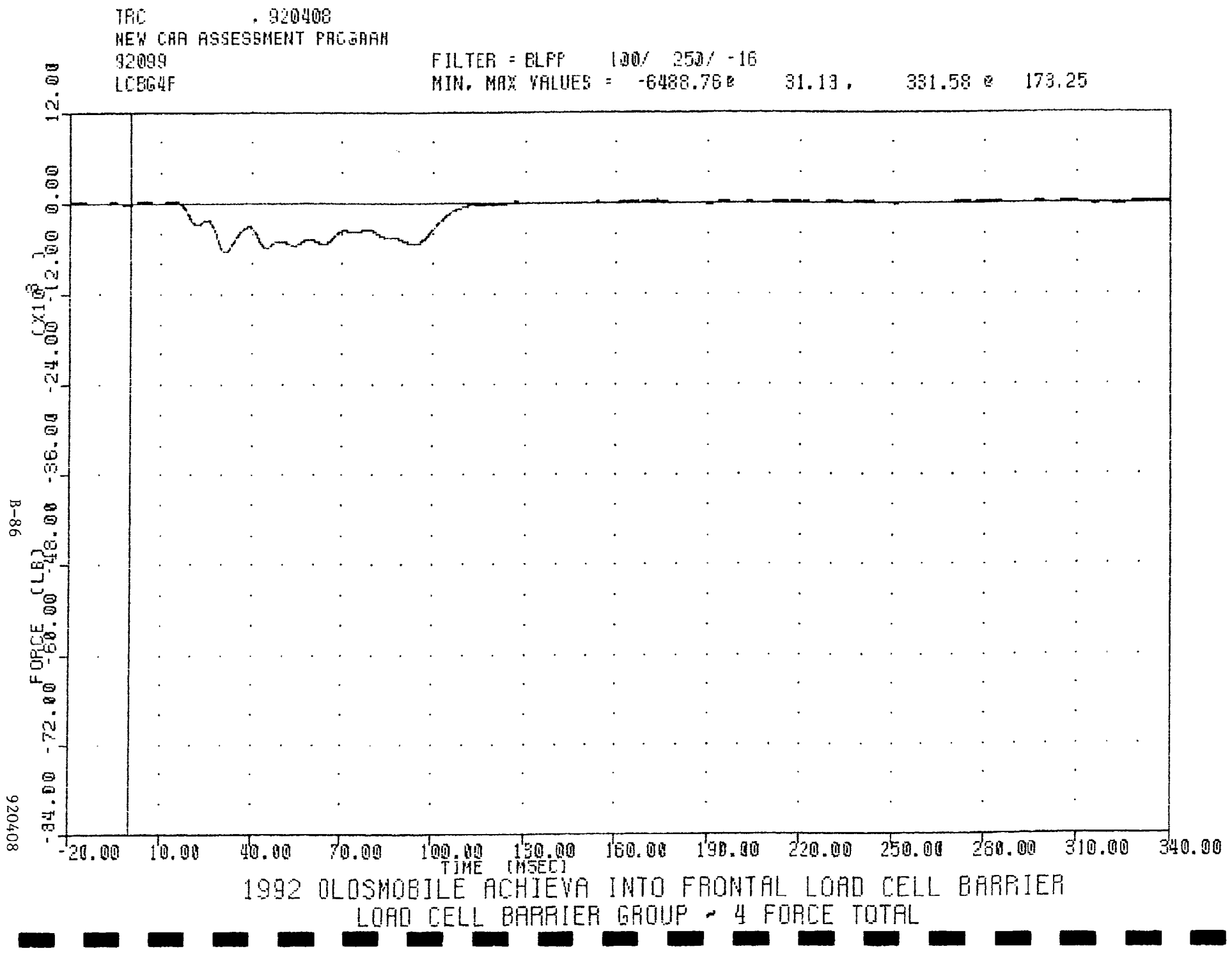
920408

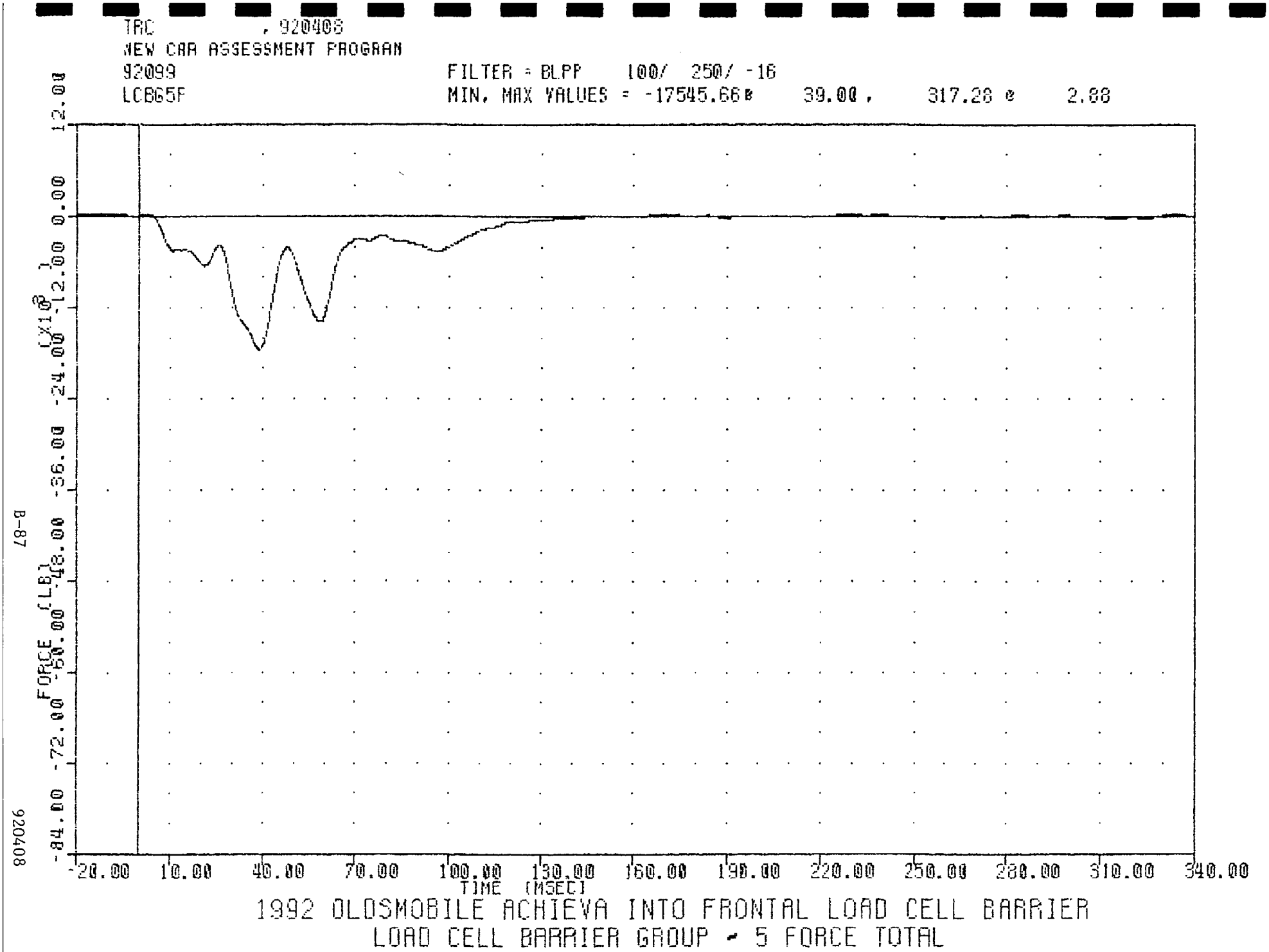
TRC , 920408
NEW CAR ASSESSMENT PROGRAM
S2099 FILTER = BLPF 100/ 250/ -16
LCBG3F MIN, MAX VALUES = -29464.21 @ 37.38 , 331.93 @ -5.38



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 3 FORCE TOTAL

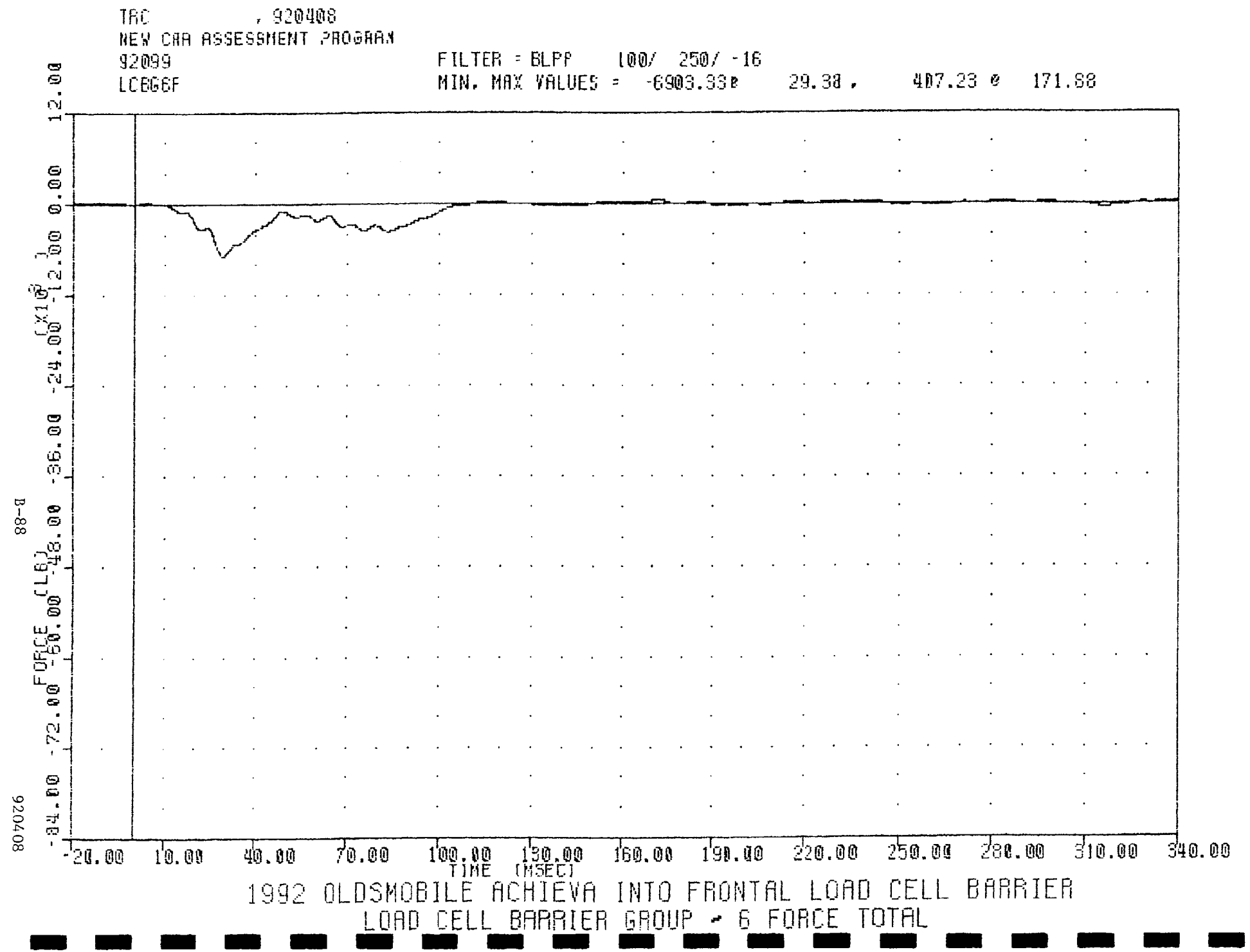
920408


TRC . 920408
NEW CAR ASSESSMENT PROGRAM
92099
LCBG4F
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -6488.76 @ 31.13 , 331.58 @ 173.25
12.00
0.00
-12.00
-24.00
-36.00
-48.00
-60.00
-72.00
-84.00
FORCE (LB) (X10³)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 4 FORCE TOTAL

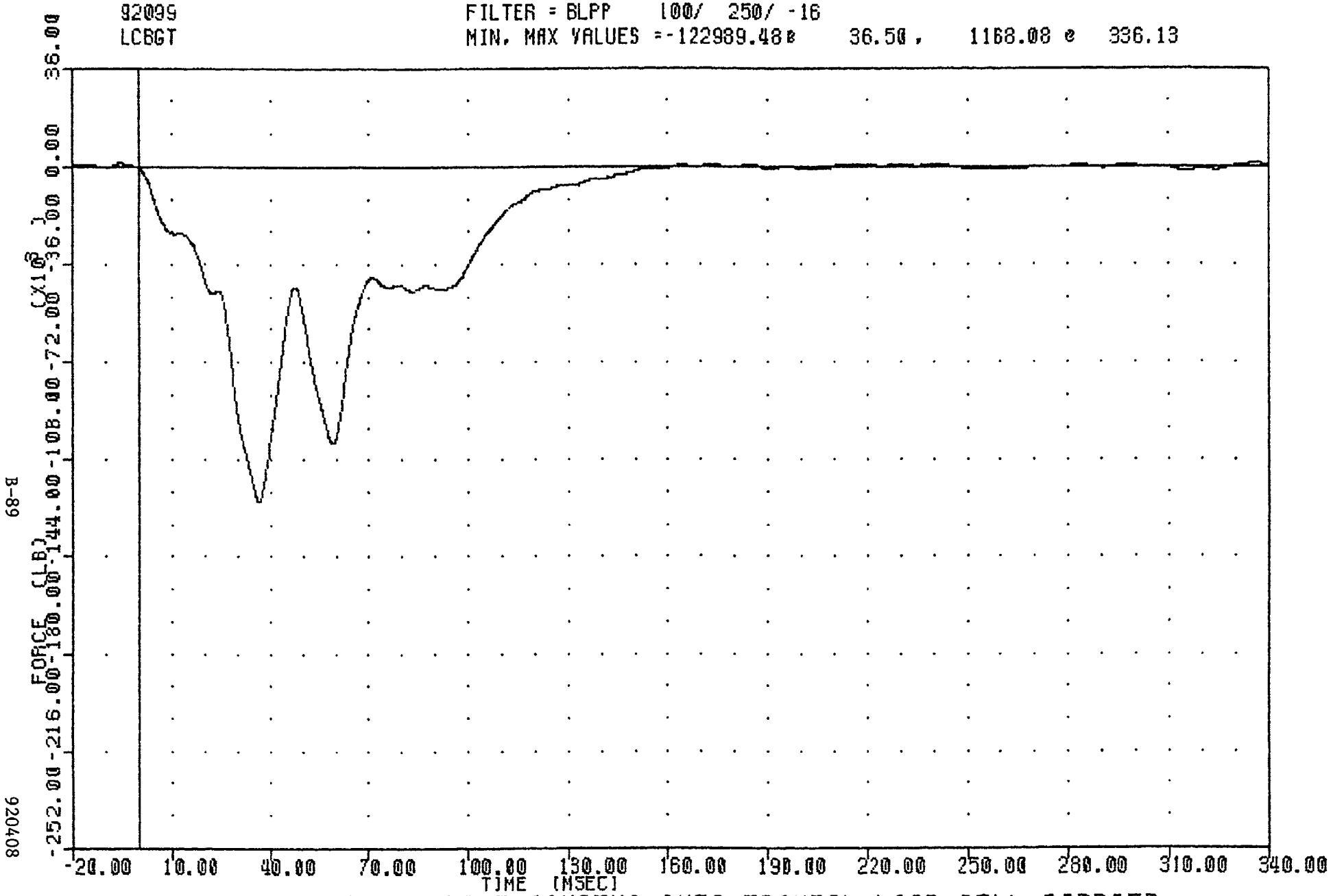


1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 5 FORCE TOTAL

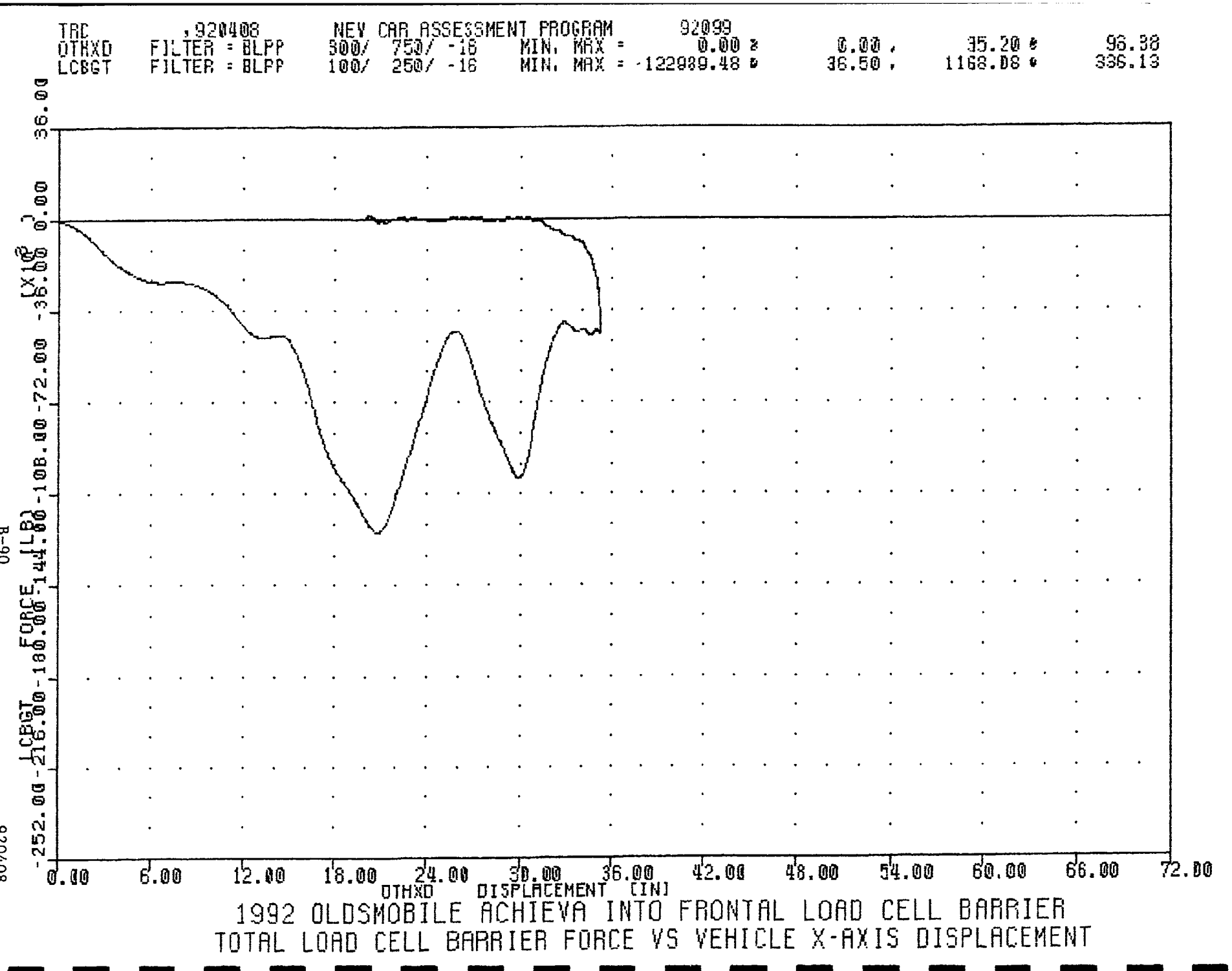
920408


TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099
LC6G6F
FILTER = BLPF 100/ 250/ -16
MIN. MAX VALUES = -6903.33 @ 29.38 , 407.23 @ 171.88
12.00
0.00
-12.00
-24.00
-36.00
-48.00
-60.00
-72.00
-84.00
FORCE (LB) (X10)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 6 FORCE TOTAL

TRC , 920408
NEW CAR ASSESSMENT PROGRAM
92099 FILTER = BLPP 100/ 250/ -16
LCBGT MIN, MAX VALUES =-122989.48@ 36.50 , 1168.08 @ 336.13



1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE


TRC ,920408 NEV CAR ASSESSMENT PROGRAM 92099
OTHXD FILTER = BLPP 300/ 750/ -16 MIN, MAX = 0.00 @ 0.00 , 35.20 @ 96.38
LCBGT FILTER = BLPP 100/ 250/ -16 MIN, MAX = -122989.48 @ 36.50 , 1168.08 @ 336.13
36.00
0.00
-36.00
-72.00
-108.00
-144.00
-180.00
-216.00
-252.00
LCBGT FORCE (LB) (X10^2)
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00
48.00
54.00
60.00
66.00
72.00
OTHXD DISPLACEMENT [IN]
B-90
920408
1992 OLDSMOBILE ACHIEVA INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE VS VEHICLE X-AXIS DISPLACEMENT

APPENDIX C

DUMMY CERTIFICATION DATA

PRE-TEST CERTIFICATION DATA

DRIVER DUMMY S/N: 713

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572 27-FEB-92

TEMPERATURE 71 F RELATIVE HUMIDITY 48 %
TRC ED71303 572B SN713 EXT. DIMENSION CAL03

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

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middlebrook

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

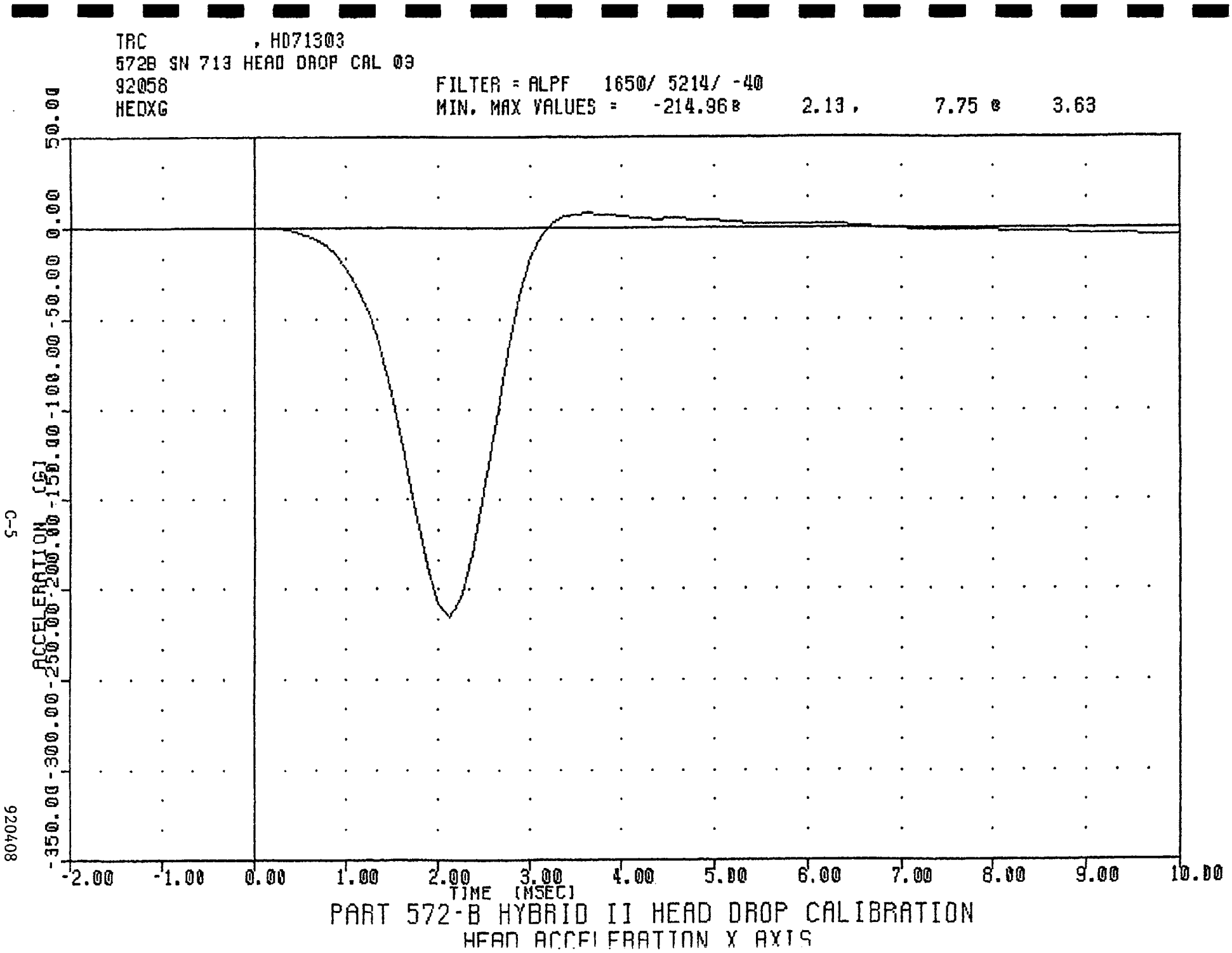
PART 572 27-Feb-92

TEMPERATURE 71 F RELATIVE HUMIDITY 48 %
TRC HD71303 572B SN 713 HEAD DROP CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	255.23 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.25 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	-3.55 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

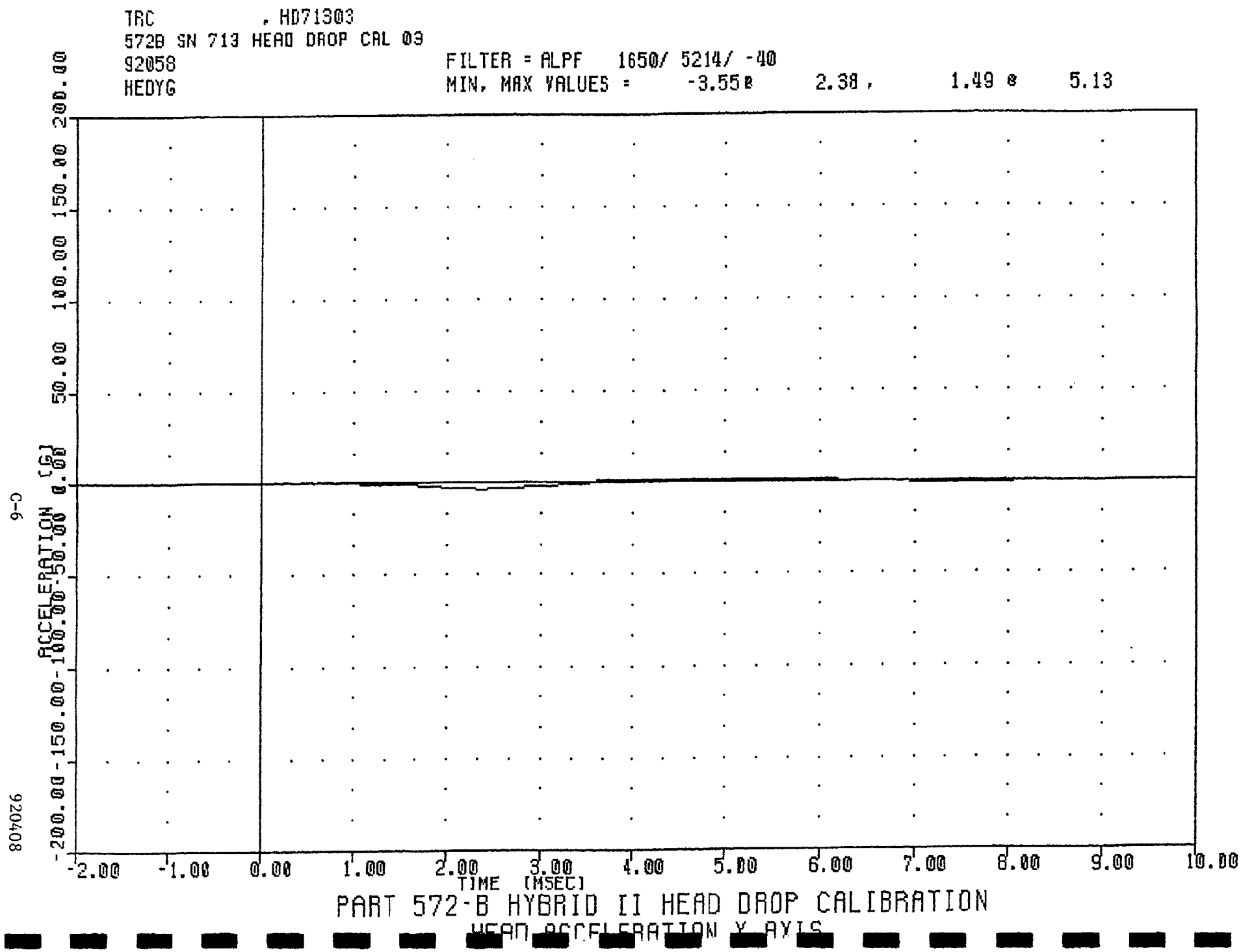
DUMMY MEETS SPECIFICATIONS

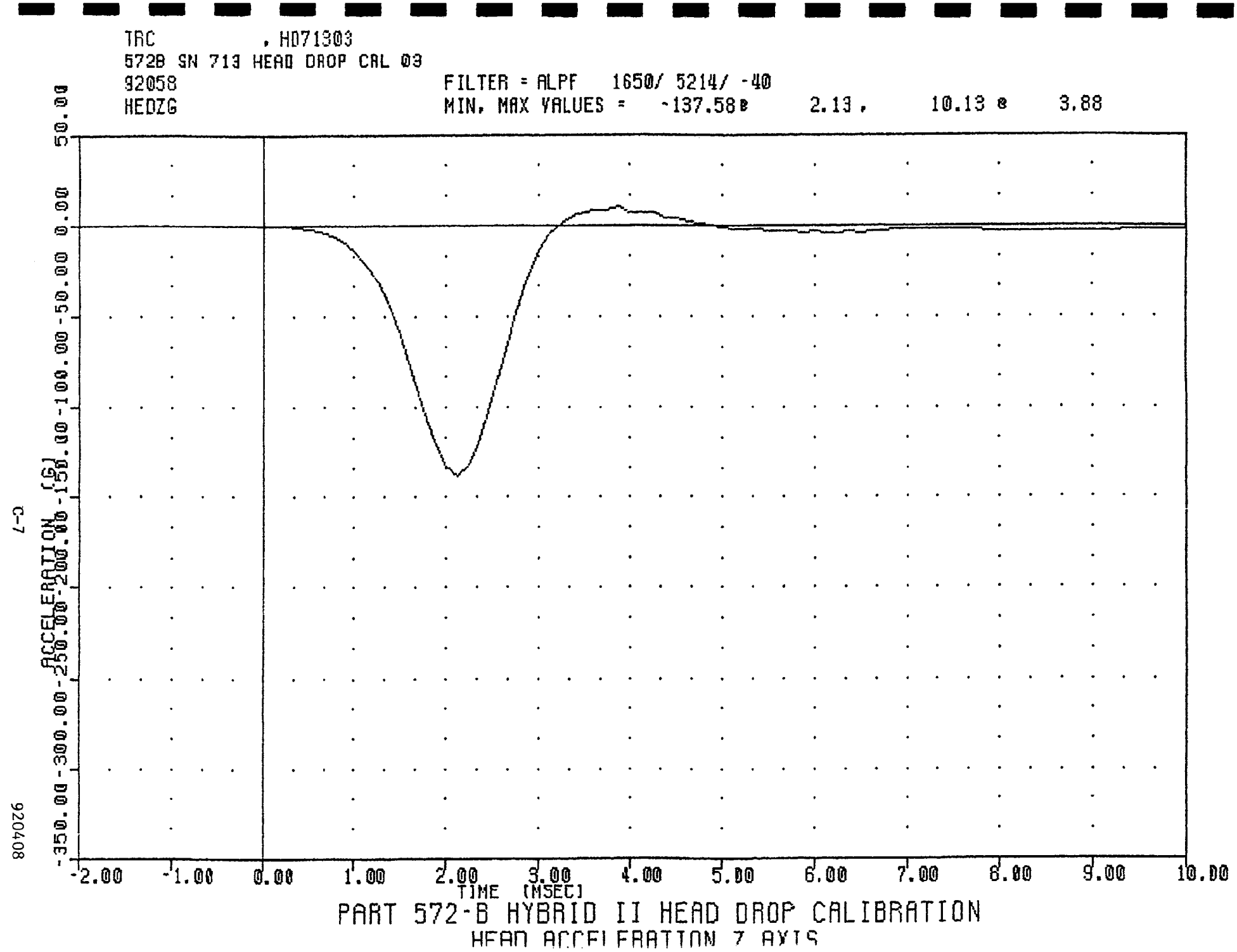
TECHNICIAN Chas. Middlet



PART 572-B HYBRID II HEAD DROP CALIBRATION

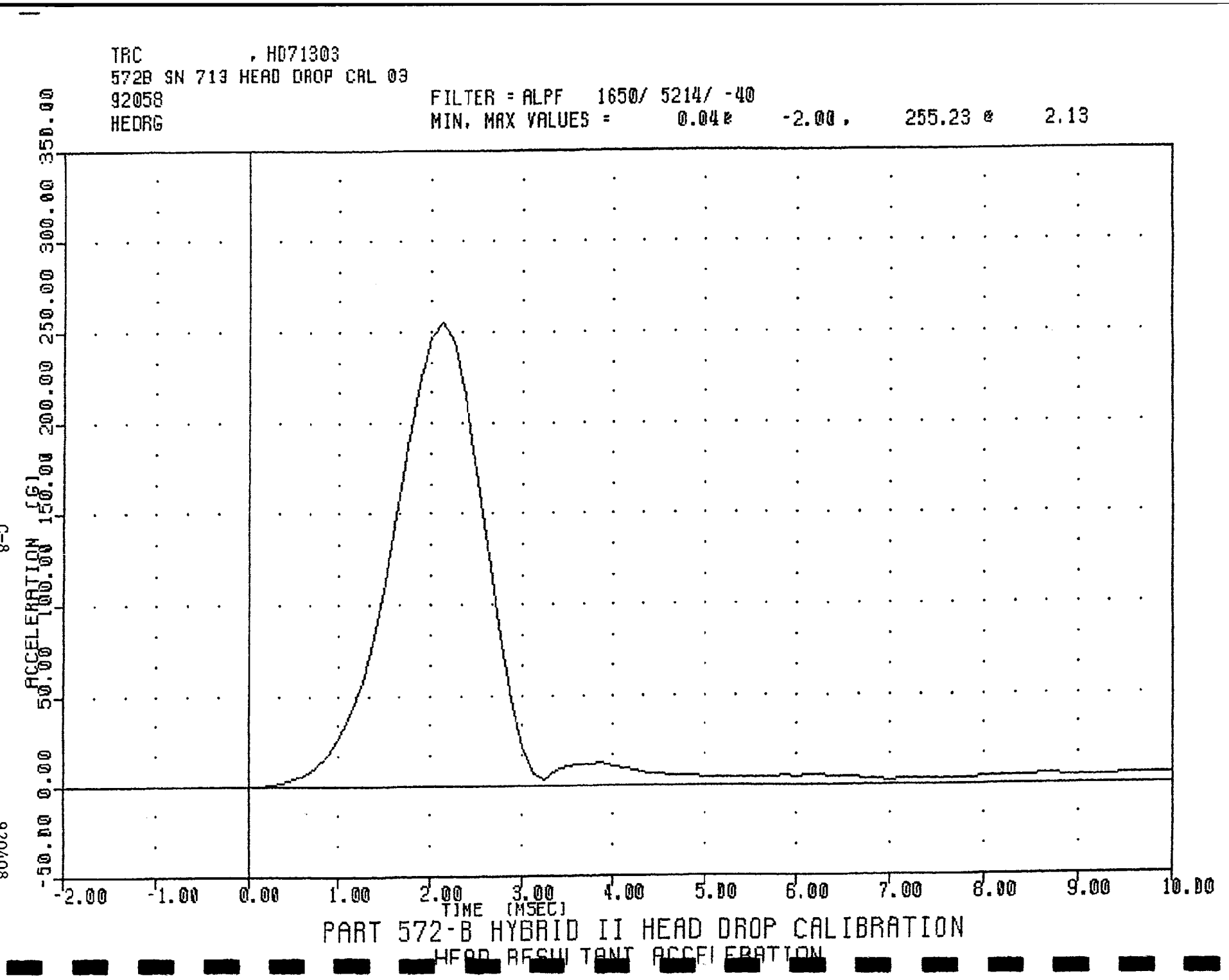
HEAD ACCELERATION X AXIS


TRC . HD71303
572B SN 713 HEAD DROP CAL 03
92058
HEDYG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -3.55@ 2.38 , 1.49 @ 5.13
200.00
150.00
100.00
50.00
0.00
-50.00
-100.00
-150.00
-200.00
ACCELERATION [G]
-2.00
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
TIME [MSEC]
PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS



PART 572-B HYBRID II HEAD DROP CALIBRATION

HEAD ACCELERATION Z AXIS


TRC , HD71303
572B SN 713 HEAD DROP CAL 03
92058
HEDRG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.04 @ -2.00 , 255.23 @ 2.13
ACCELERATION (G)
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
-50.00
-2.00
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
TIME (MSEC)
PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572 28-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
TRC HN71303 572B SN 713 HEAD/NECK CAL 03

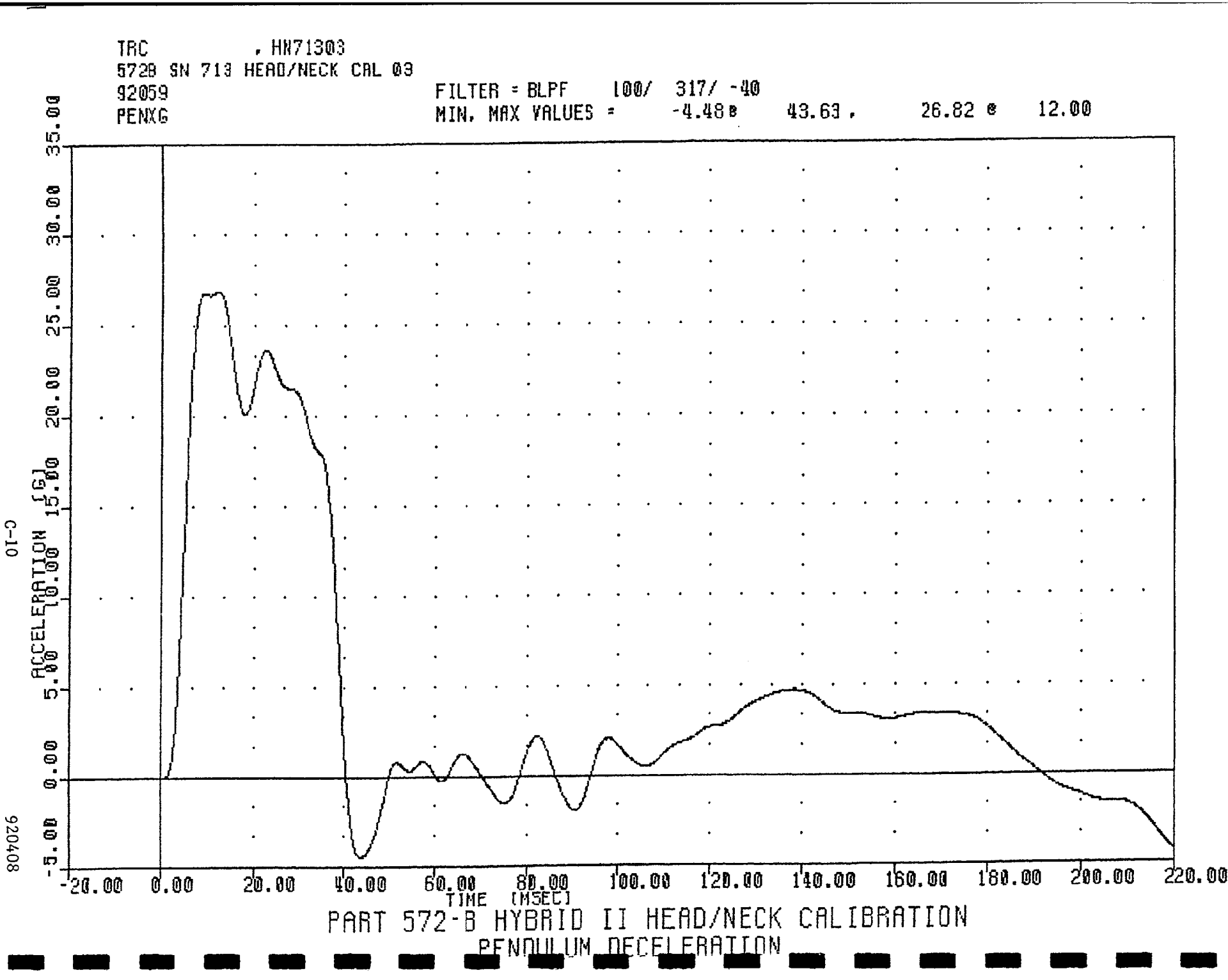
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	21.5 to 25.5 ft/sec	23.76 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.46 msec
T2 - T3: 20 - 20 G	25 - 30 msec	25.32 msec
T3 - T4: 20 - 5 G	10 msec max	7.77 msec
Avg. G level T2 - T3	20 - 24 G	23.31 G
Maximum Rotation Angle	63 - 73 deg	70.28 deg
Peak Head Resultant Accel	26 G max	21.93 G

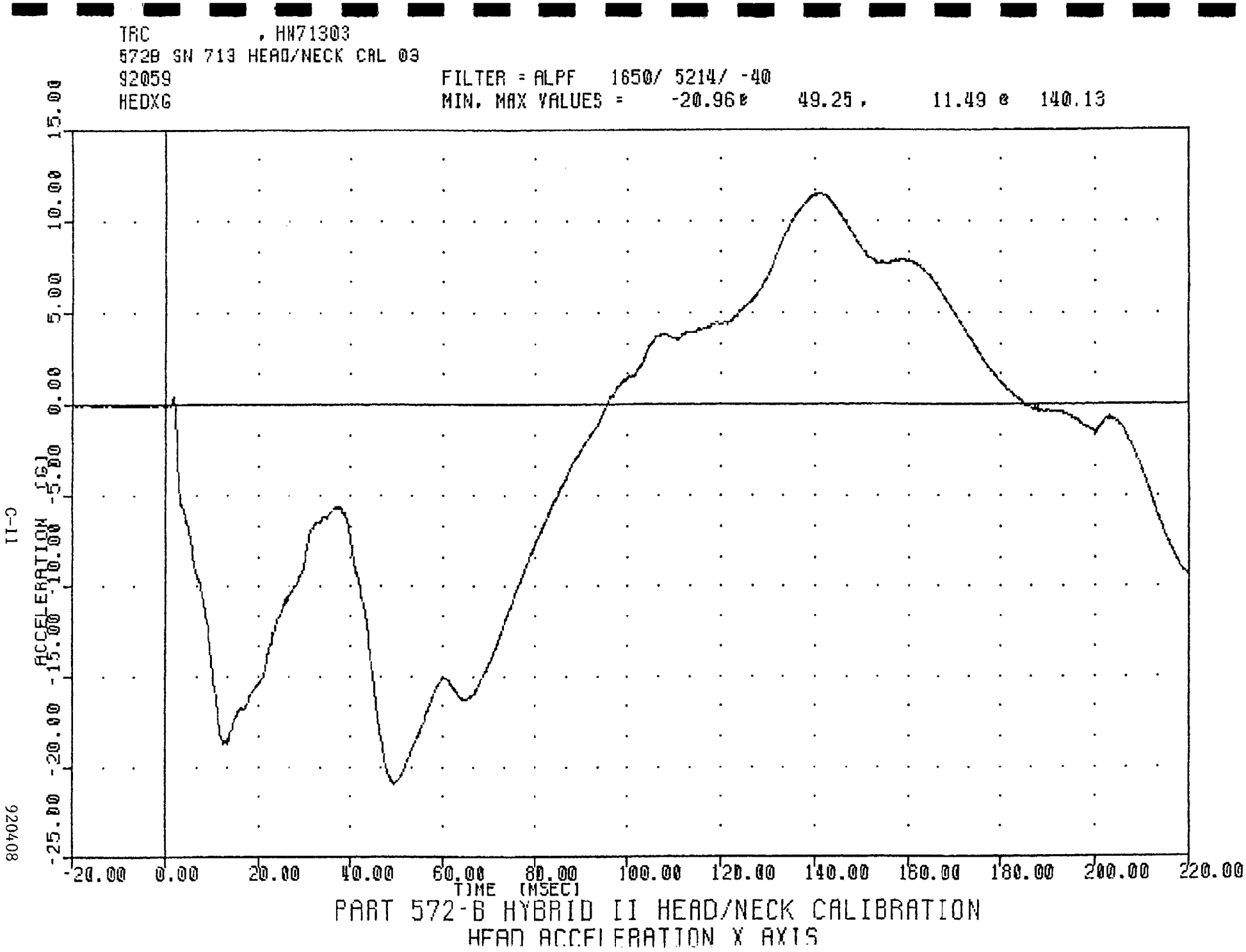
Test Parameter	Specification				Test Results	
Rotation Angle (degrees)	Time (msec)		Chordal Disp. (in)		Time (msec)	Chordal Disp. (in)
0	-2.0 -	+2.0	-0.5 -	+0.5	1.38	0.00
30	25.6 -	34.4	2.1 -	3.1	31.15	2.59
60	40.3 -	51.7	4.3 -	5.3	47.22	4.86
max	53.2 -	66.8	5.0 -	6.0	63.38	5.66
60	67.0 -	83.0	4.3 -	5.3	79.62	4.76
30	85.4 -	104.6	2.1 -	3.1	98.54	2.27
0	101.0 -	123.0	-0.5 -	+0.5	112.86	0.08

SND: 5.95 in

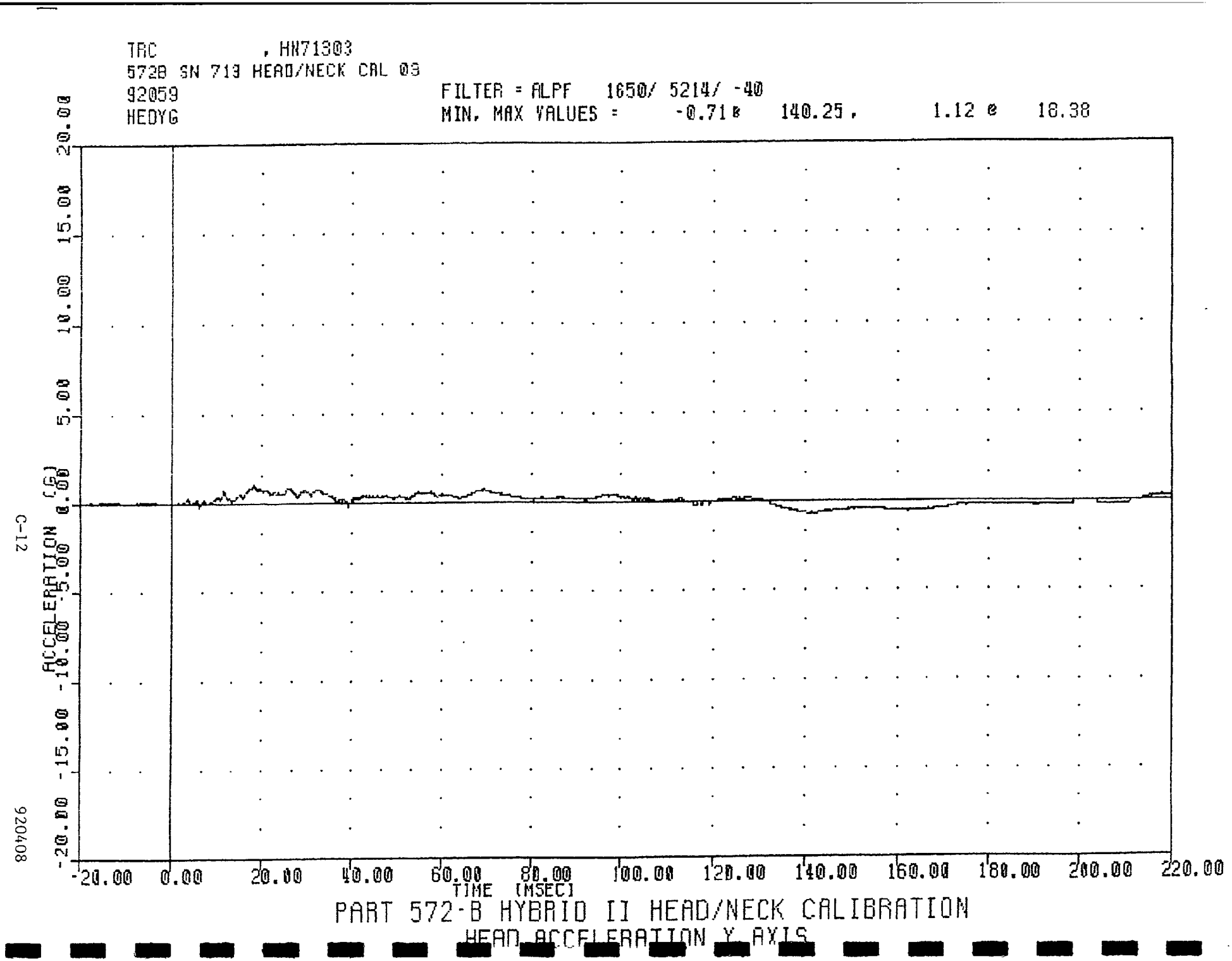
DUMMY MEETS SPECIFICATIONS

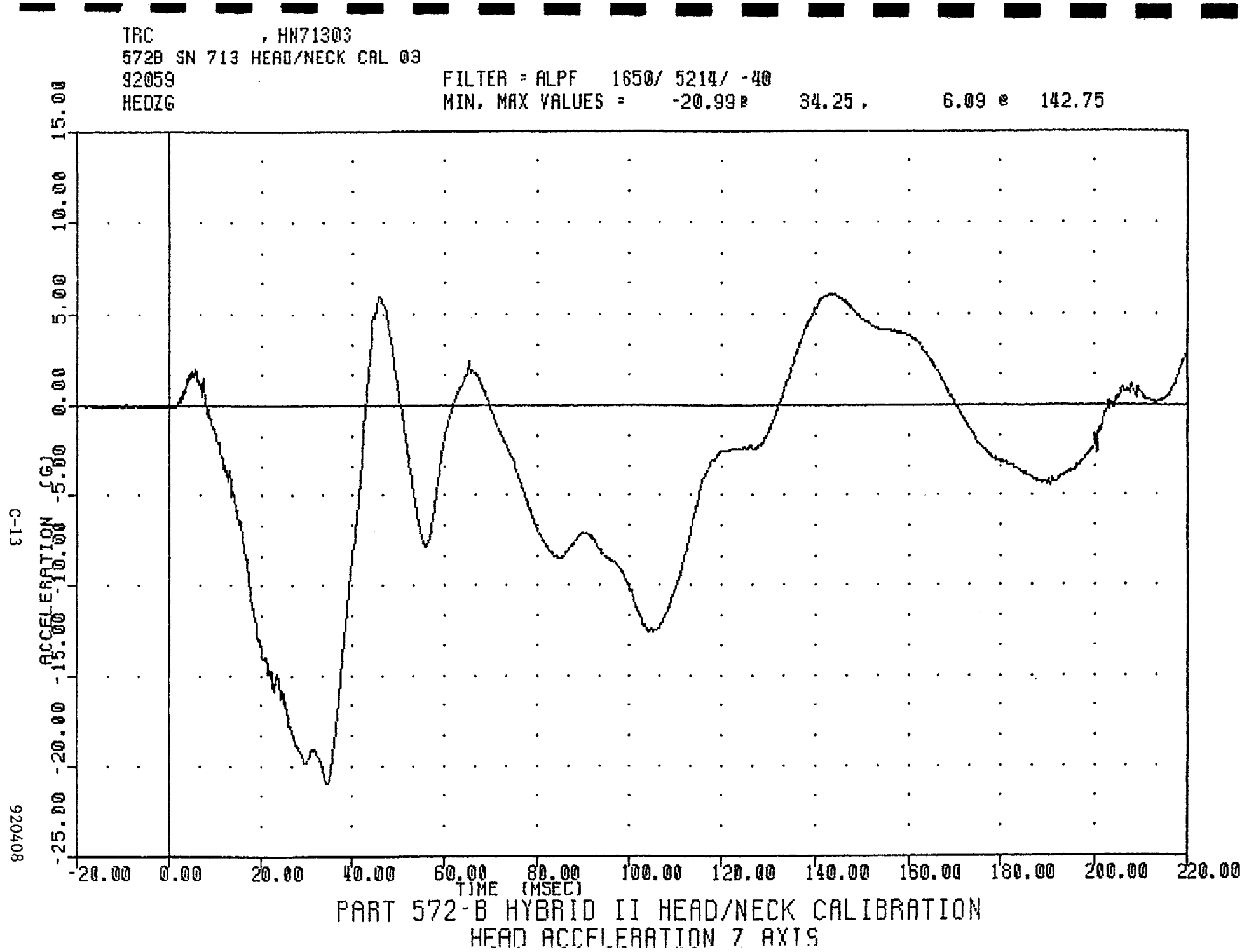
TECHNICIAN Chas. Middleton


TRC , HN71303
5728 SN 713 HEAD/NECK CAL 03
92059
PENXG
FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -4.48 @ 43.63 , 26.82 @ 12.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
ACCELERATION [G]
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME [MSEC]
PART 572-B HYBRID II HEAD/NECK CALIBRATION
PENDULUM DECELERATION

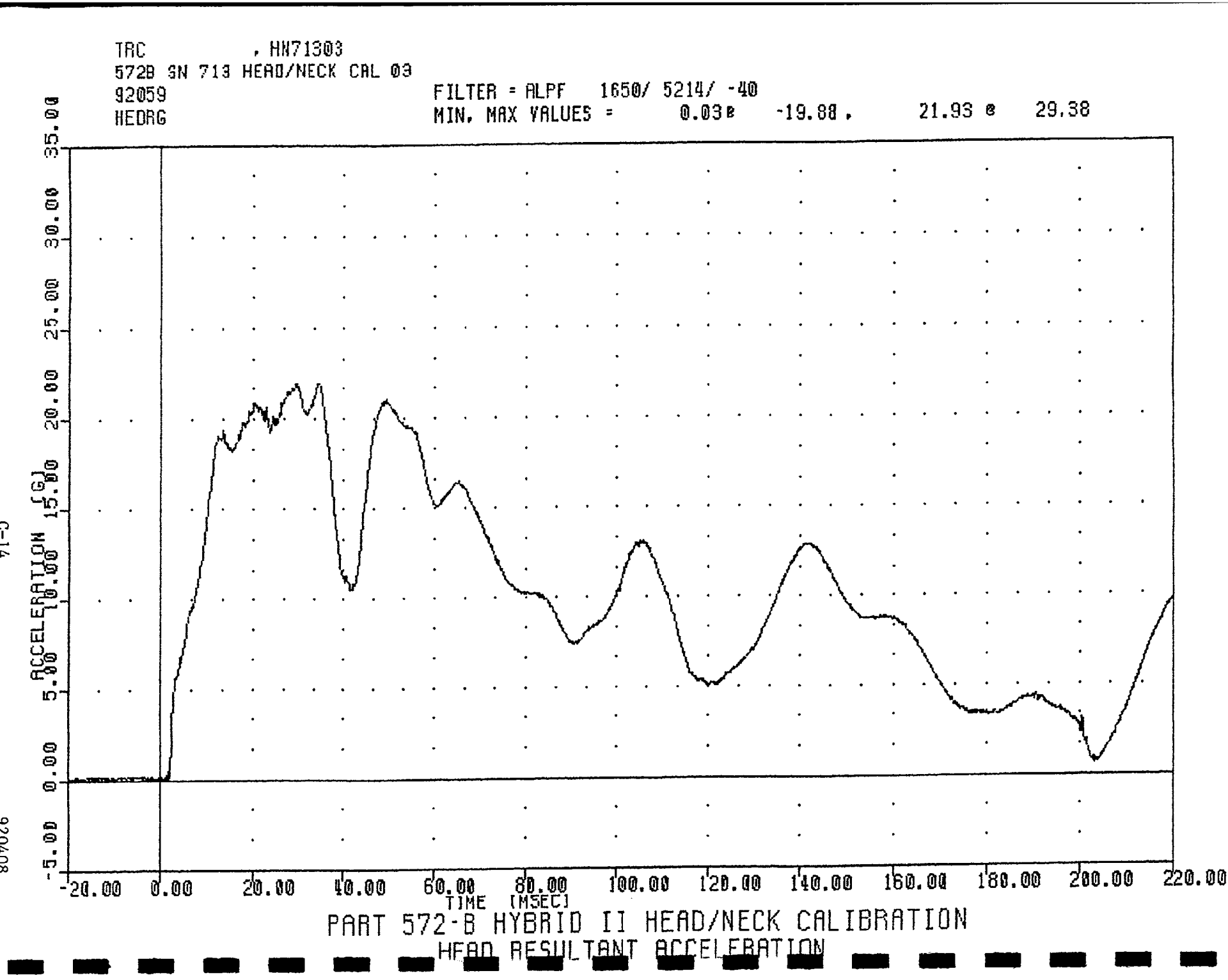


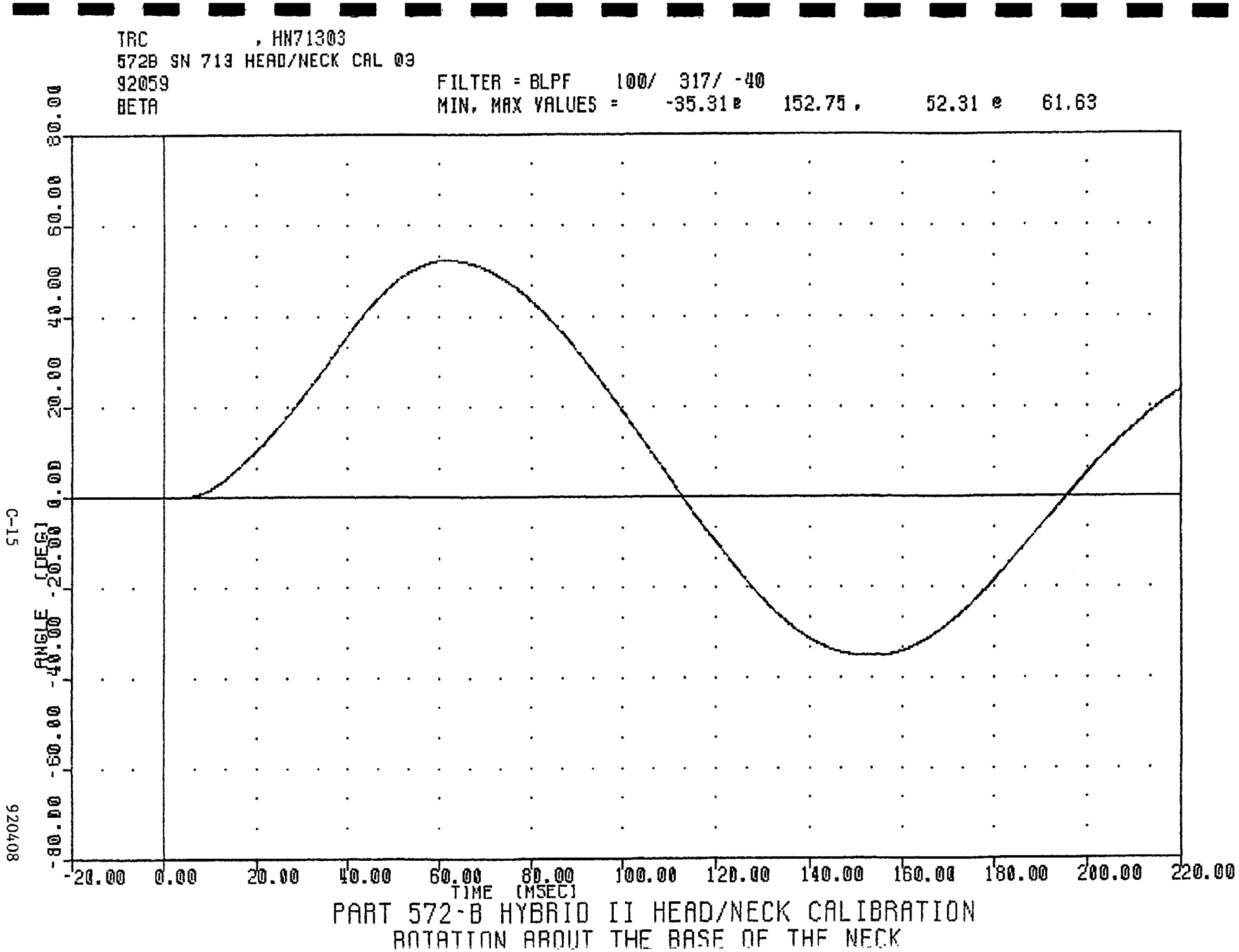
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION X AXIS


TRC , HN71303
572B SN 713 HEAD/NECK CAL 03
92059
HEDYG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -0.71 @ 140.25 , 1.12 @ 18.38
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
ACCELERATION (G)
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION Y AXIS



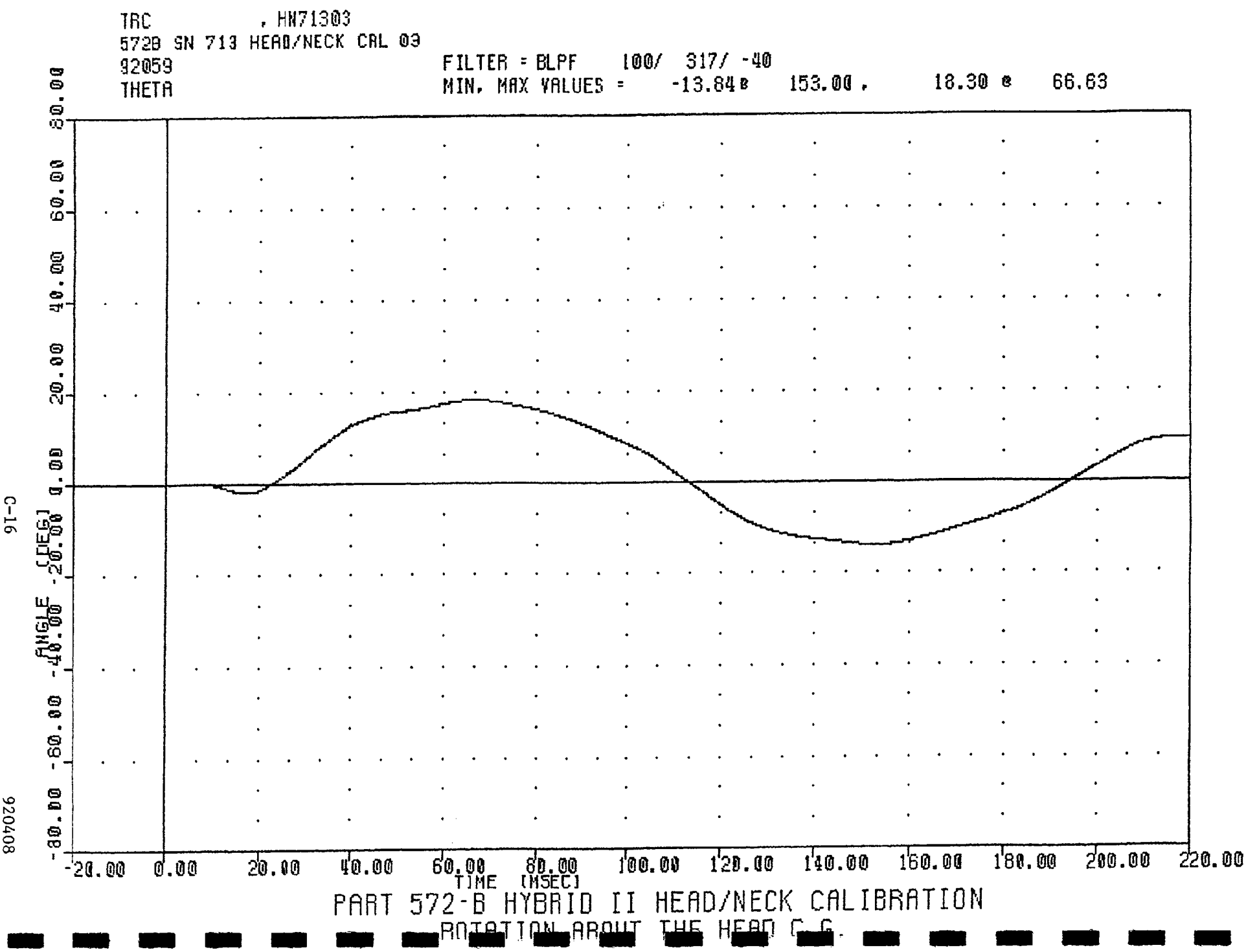
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION Z AXIS

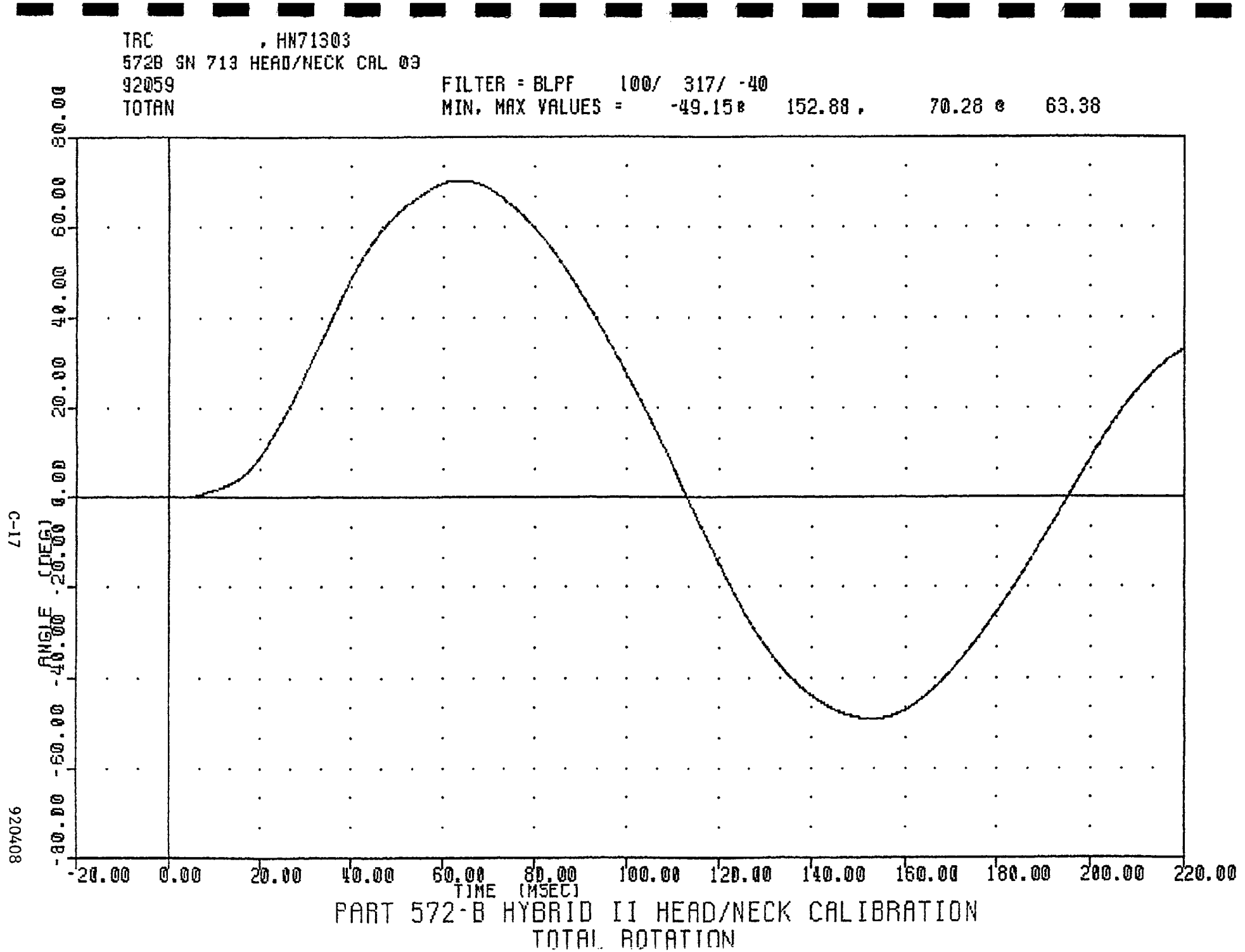

TRC , HN71303
572B SN 713 HEAD/NECK CAL 03
92059
HEDRG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.03@ -19.88 , 21.93 @ 29.38
ACCELERATION (G)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD RESULTANT ACCELERATION



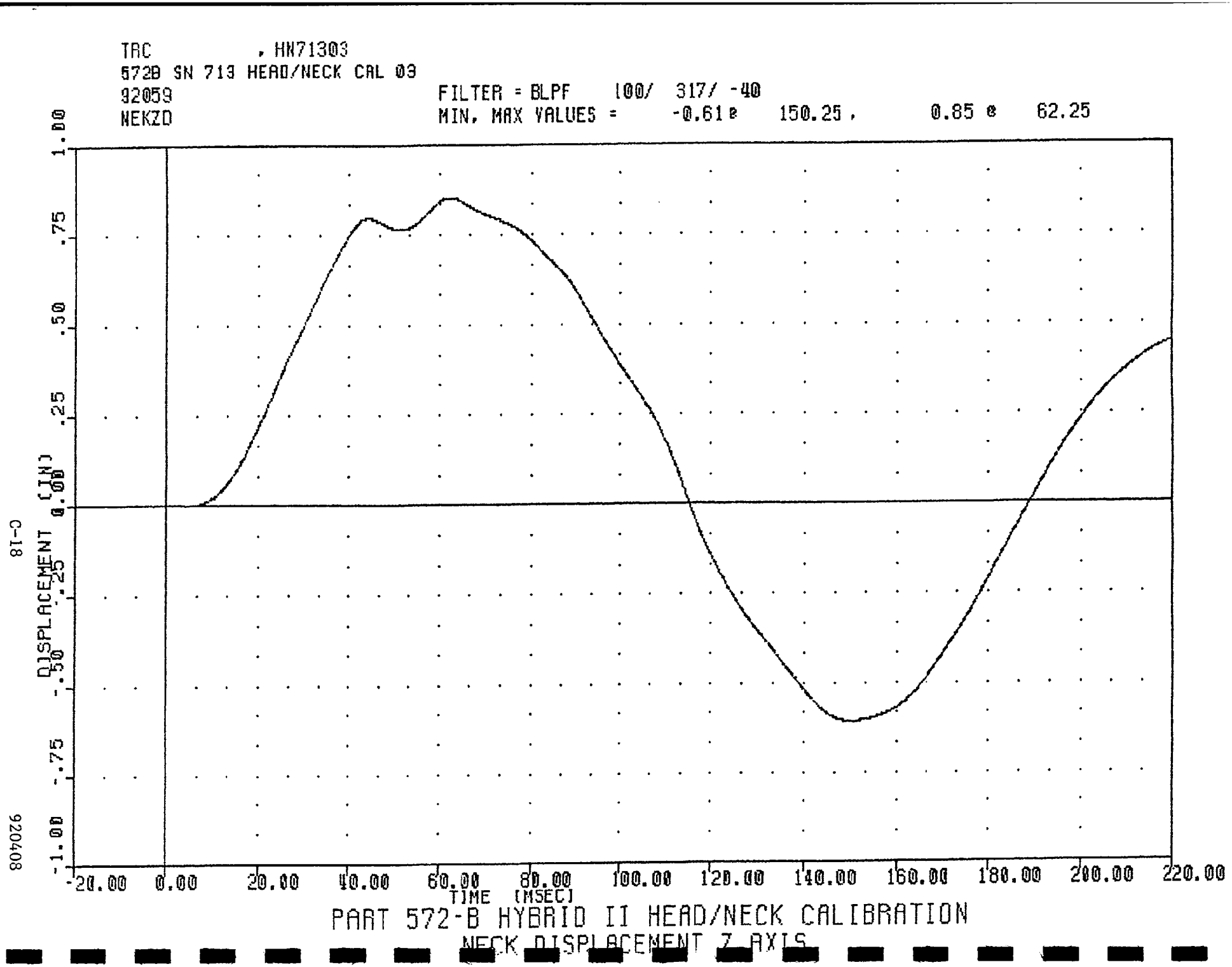
PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE BASE OF THE NECK

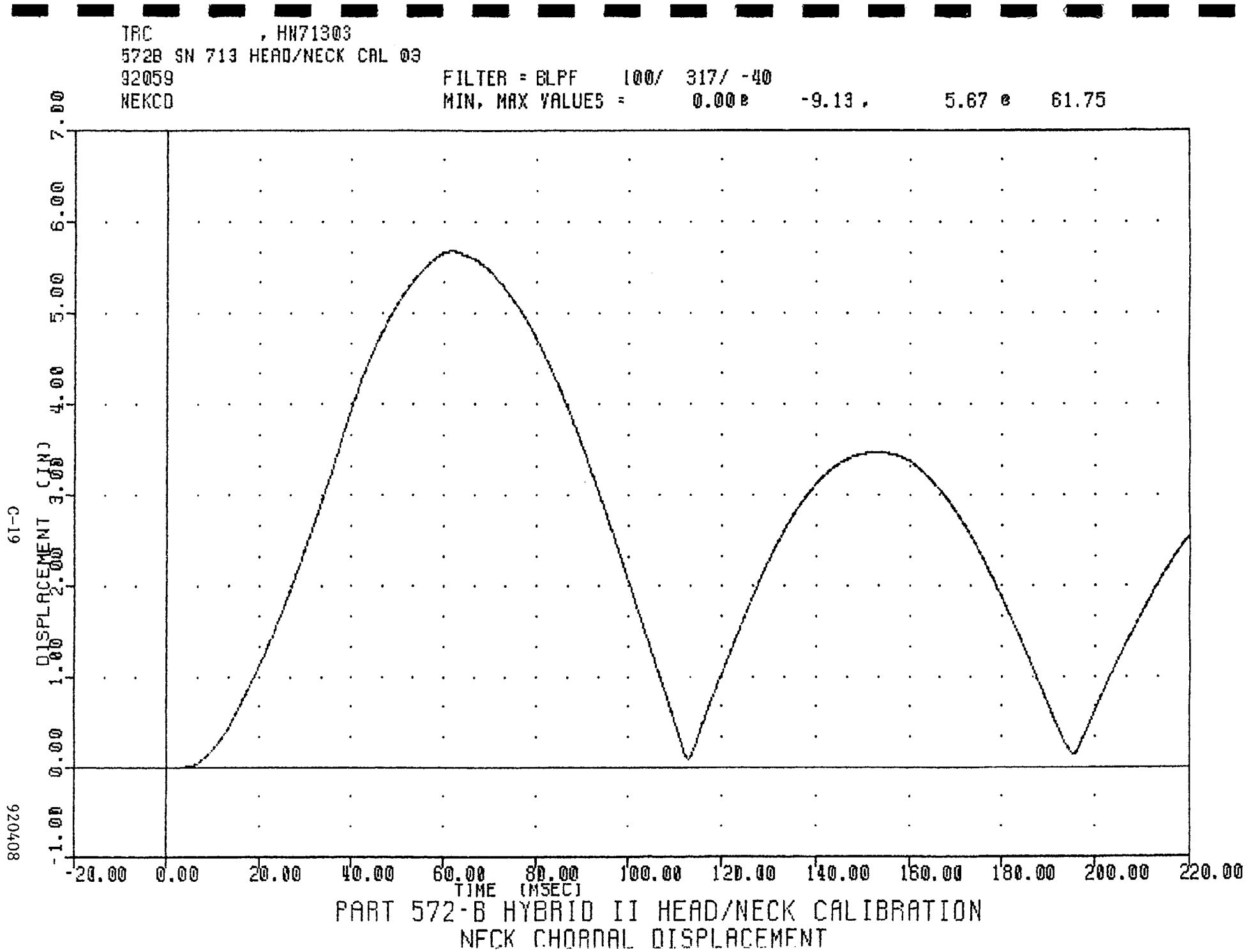
920408


TRC , HN71303
5728 SN 713 HEAD/NECK CAL 03
92059
THETA
FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -13.84 @ 153.00 , 18.30 @ 66.63
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
ANGLE [DEG]
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME [MSEC]
PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE HEAD C.G.



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


TRC , HN71303
572B SN 713 HEAD/NECK CAL 03
92059
NEKZD
FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -0.61 @ 150.25 , 0.85 @ 62.25
1.00
.75
.50
.25
0.00
-.25
-.50
-.75
-1.00
DISPLACEMENT (IN)
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
NECK DISPLACEMENT Z AXIS
C-18
920408



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 01-Mar-92

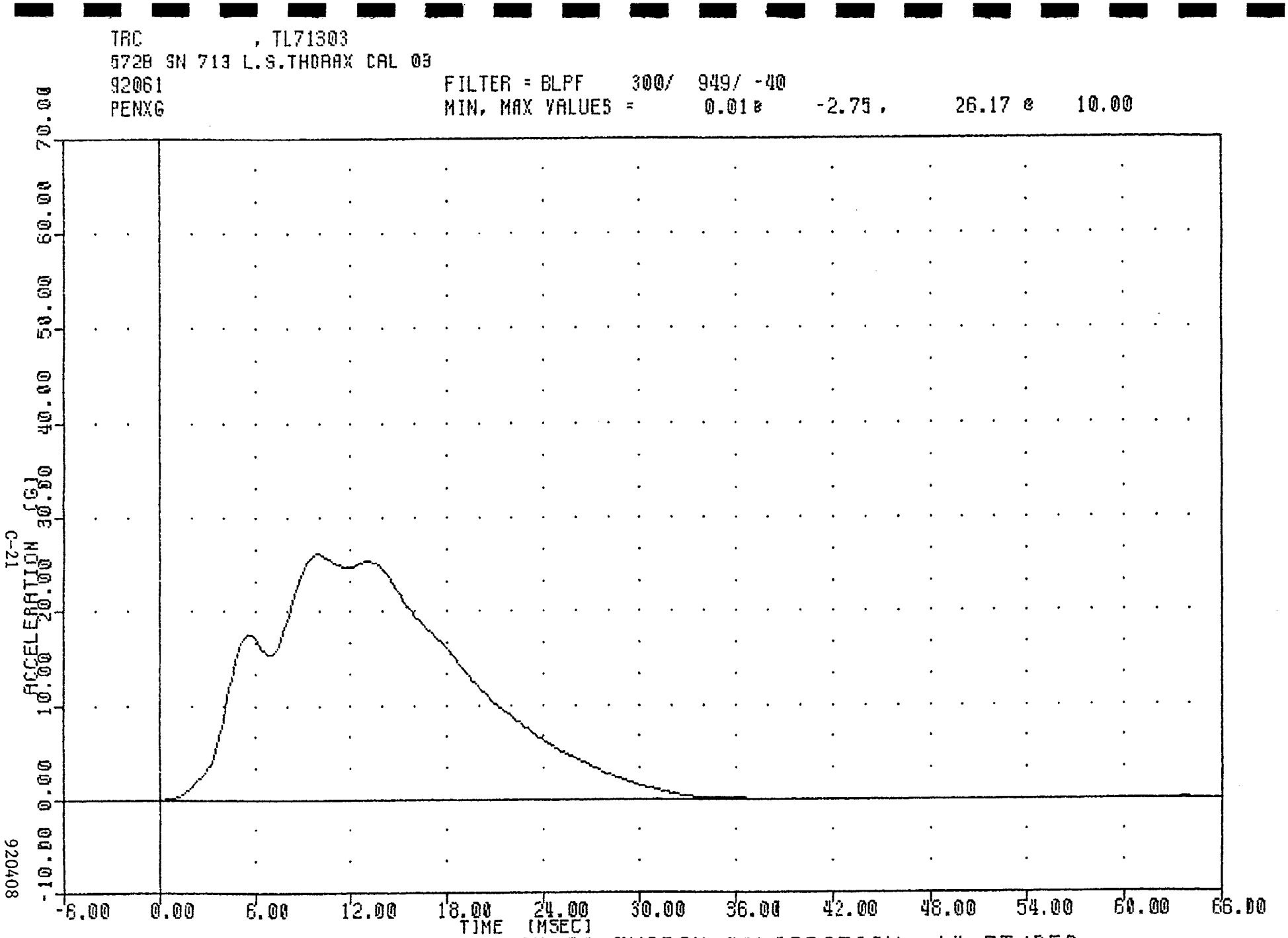
TEMPERATURE 69 F RELATIVE HUMIDITY 50 %
TRC TL71303 572B SN 713 L.S.THORAX CAL 03

TEST PARAMETER	LOW SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	13.97 FT/SEC
PEAK DEFLECTION	1.1 IN max.	0.95 IN
PEAK RESISTIVE FORCE	1,450. LB max.	1348. LB
INTERNAL HYSTERESIS	50% - 70%	64.6%

SCD: 2.25 IN

DUMMY MEETS SPECIFICATIONS

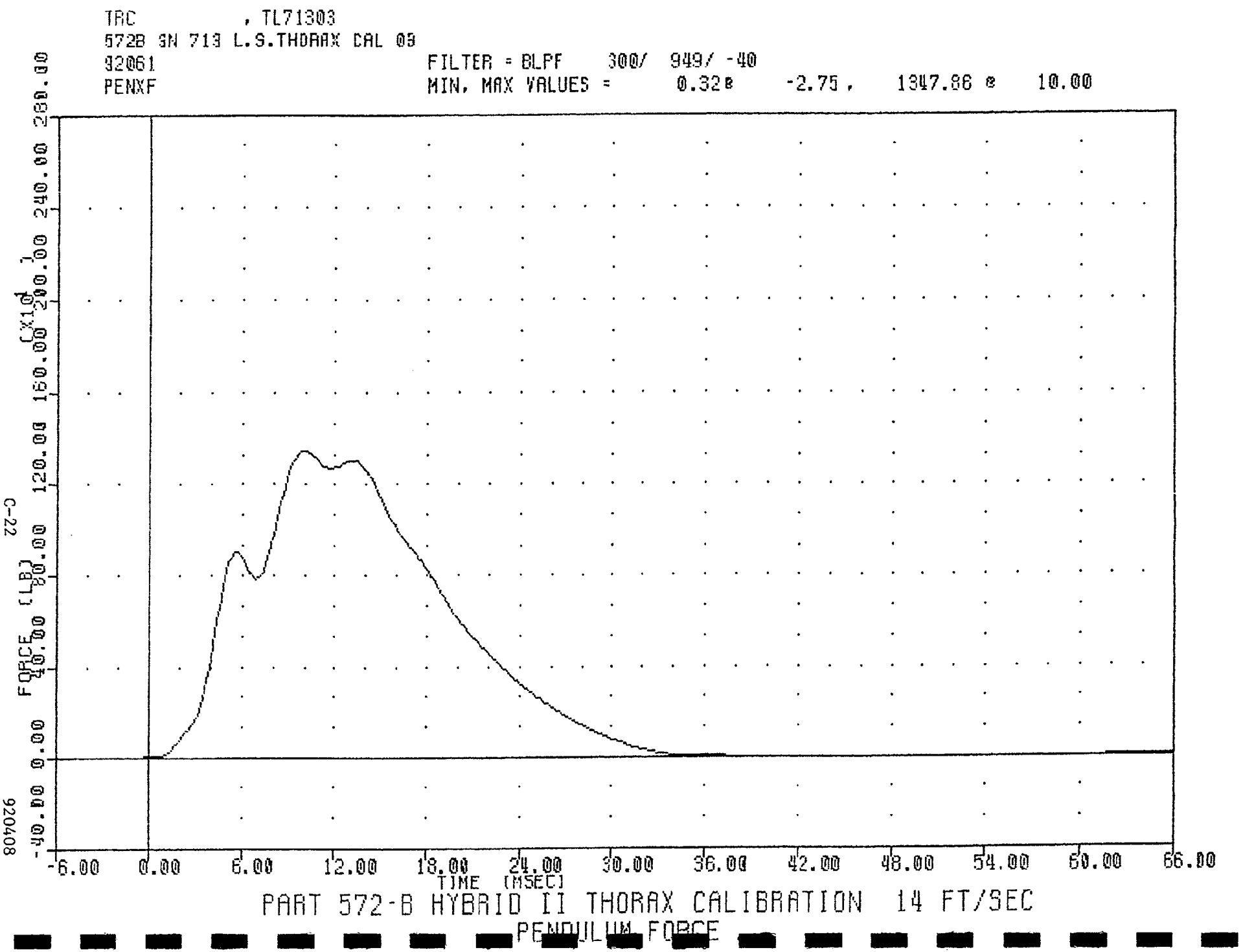
TECHNICIAN Chas. Middlet



C-21

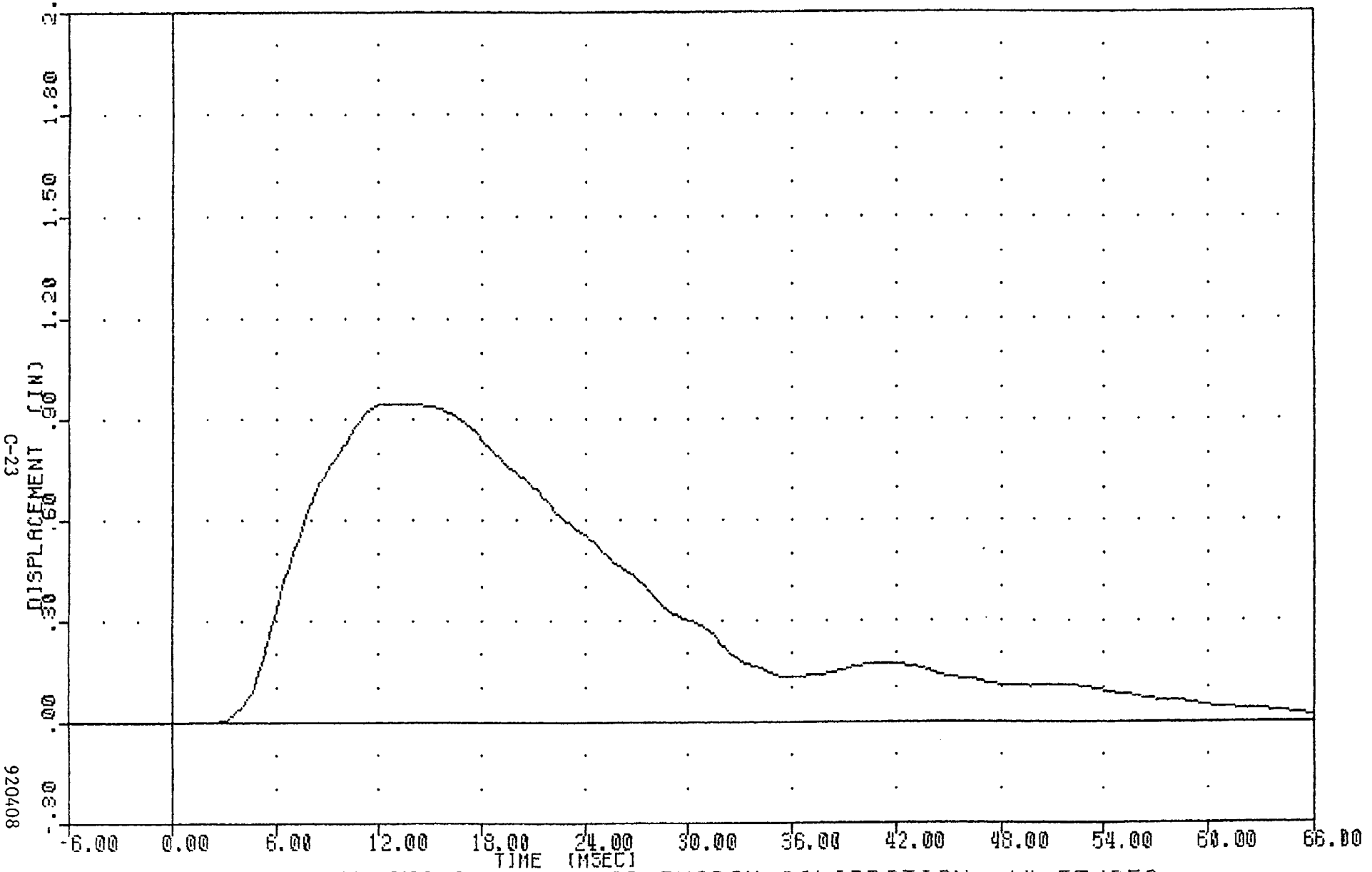
920408

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



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

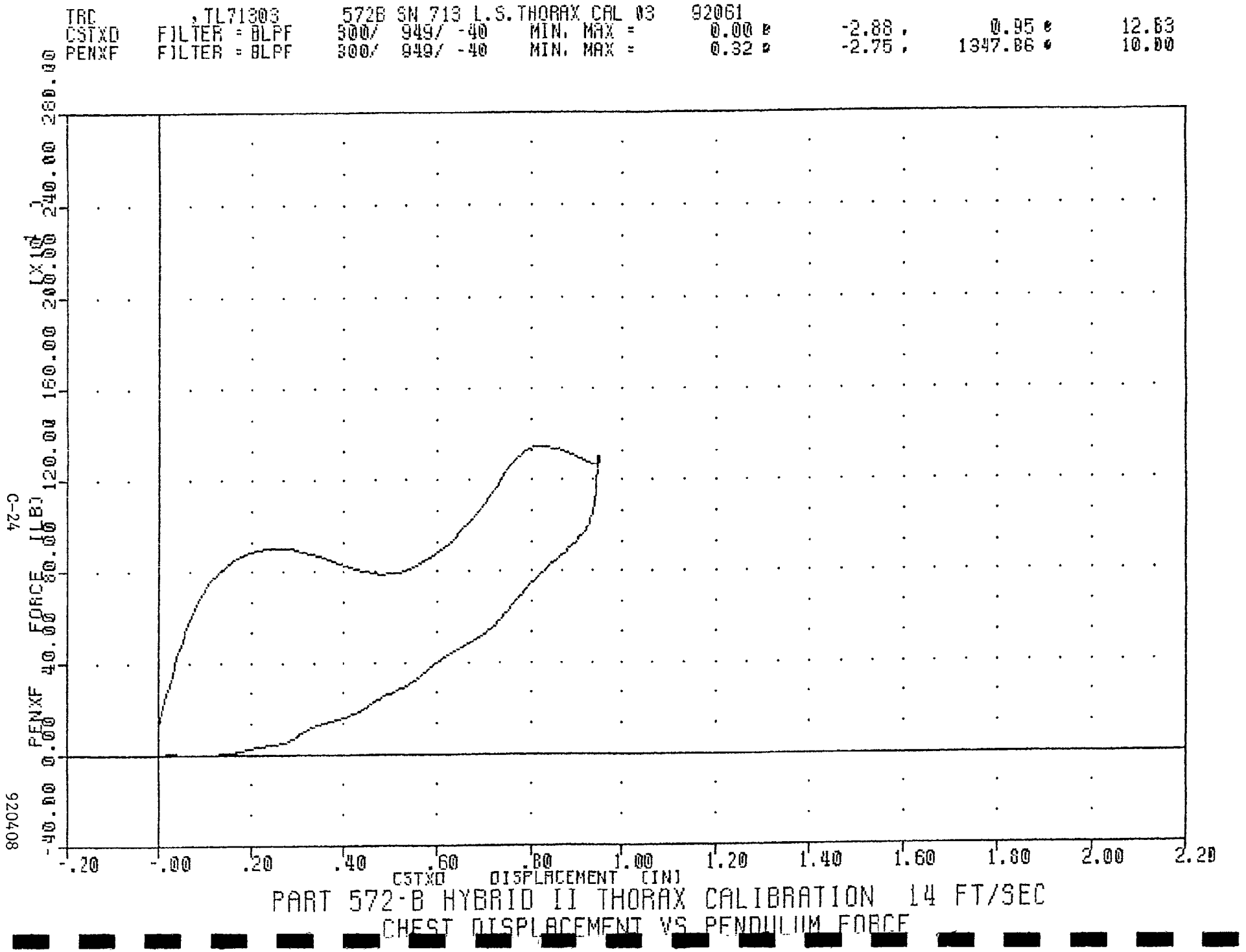
TRC , TL71303
572B SN 713 L.S.THORAX CAL 09
92061 FILTER = BLPF 300/ 949/ -40
CSTXD MIN, MAX VALUES = 0.00@ -2.88 , 0.95 @ 12.63



C-23

920408

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


TRC ,TL71303 572B SN 713 L.S.THORAX CAL 03 92061
CSTXD FILTER = BLPF 300/ 949/ -40 MIN, MAX = 0.00 @ -2.88 , 0.95 @ 12.63
PENXF FILTER = BLPF 300/ 949/ -40 MIN, MAX = 0.32 @ -2.75 , 1347.86 @ 10.00
280.00
240.00
200.00
160.00
120.00
80.00
40.00
0.00
-40.00
PENXF FORCE (LB)
-.20
-.00
.20
.40
.60
.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
CSTXD DISPLACEMENT (IN)
PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
CHEST DISPLACEMENT VS PENDULUM FORCE
C-24
920408

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 01-Mar-92

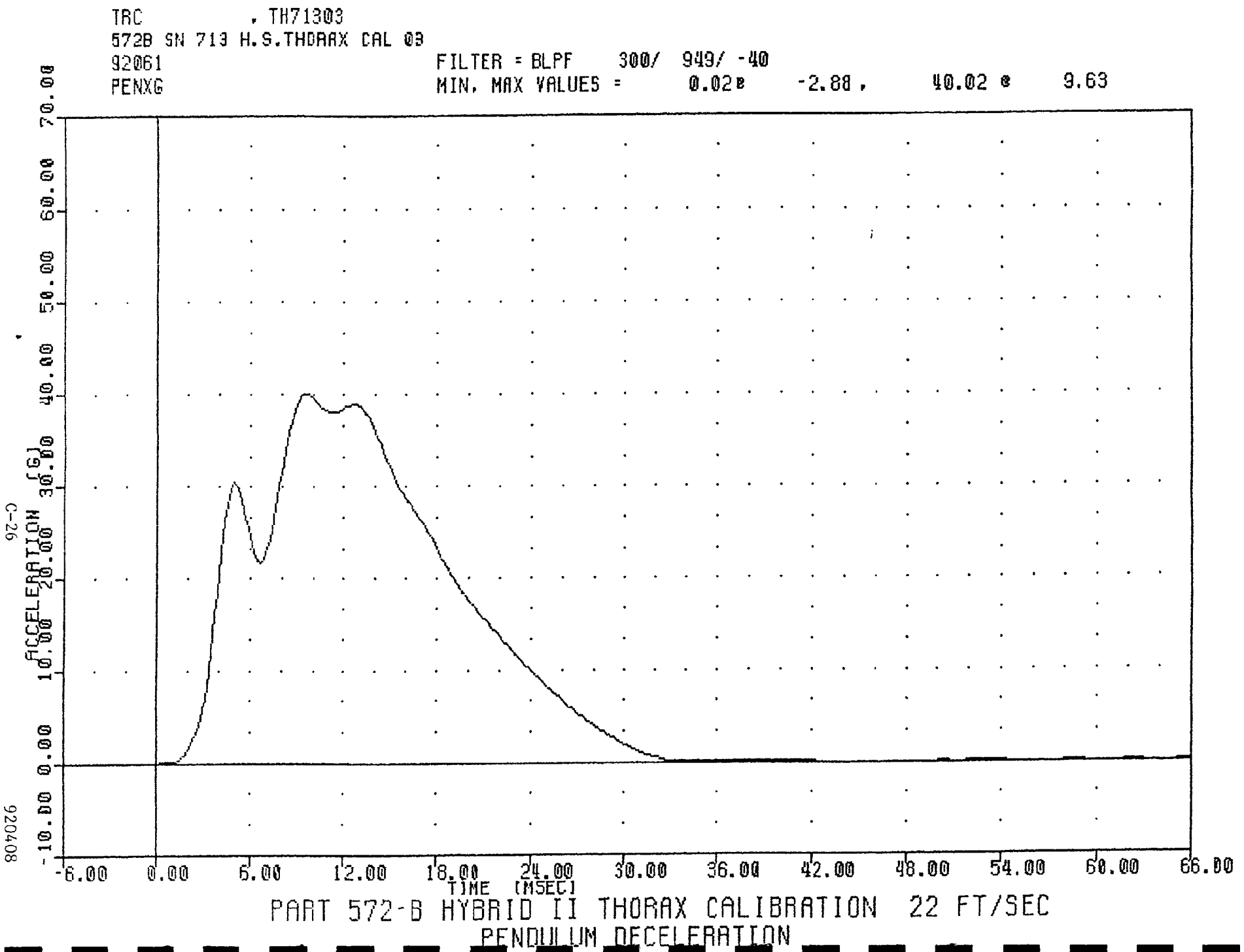
TEMPERATURE 69 F RELATIVE HUMIDITY 50 %
TRC TH71303 572B SN 713 H.S.THORAX CAL 03

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC
PEAK DEFLECTION	1.7 IN max.	1.48 IN
PEAK RESISTIVE FORCE	2,250. LB max.	2061. LB
INTERNAL HYSTERESIS	50% - 70%	65.6%

SCD: 2.25 IN

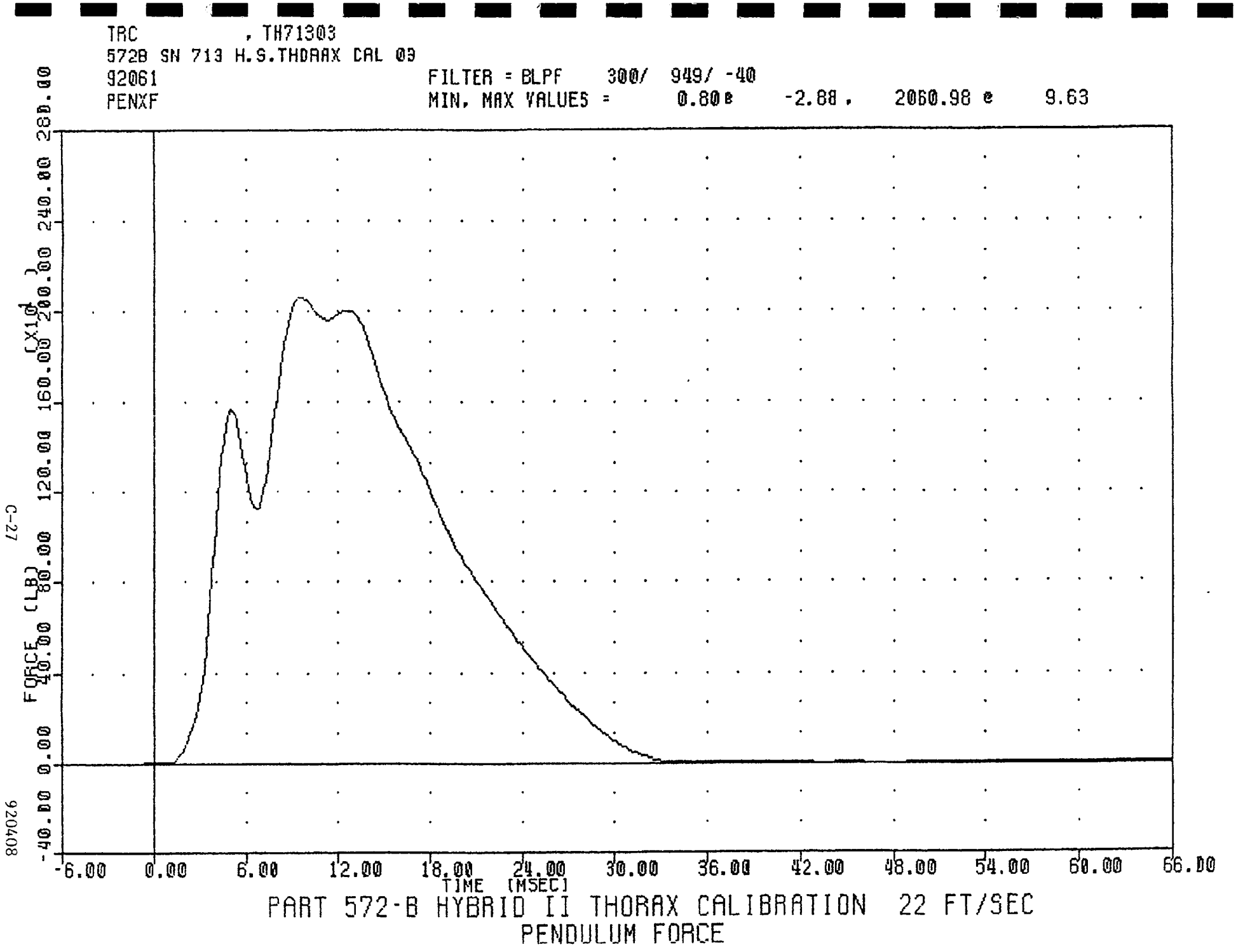
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middlet

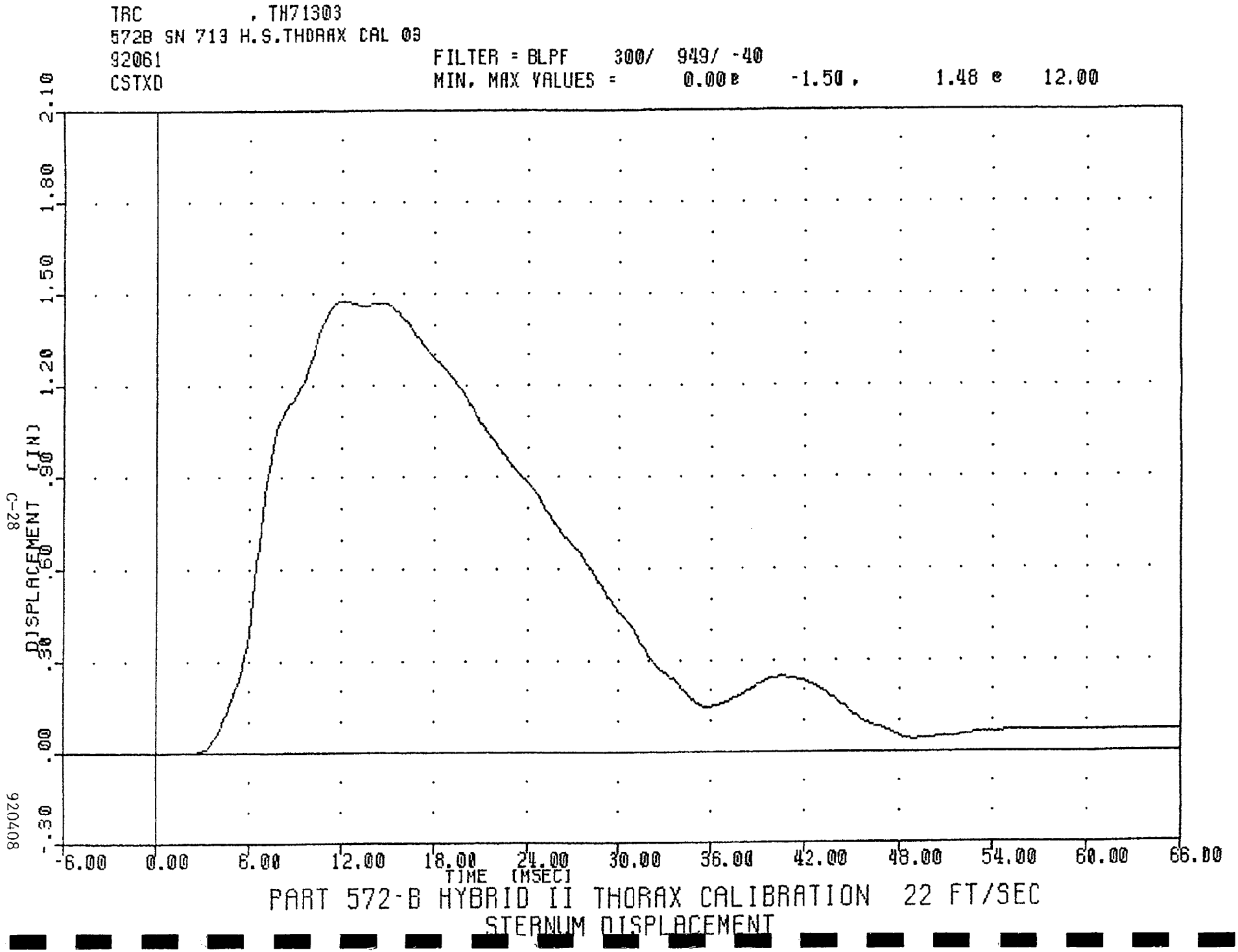


PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
PENDULUM DECELERATION

920408

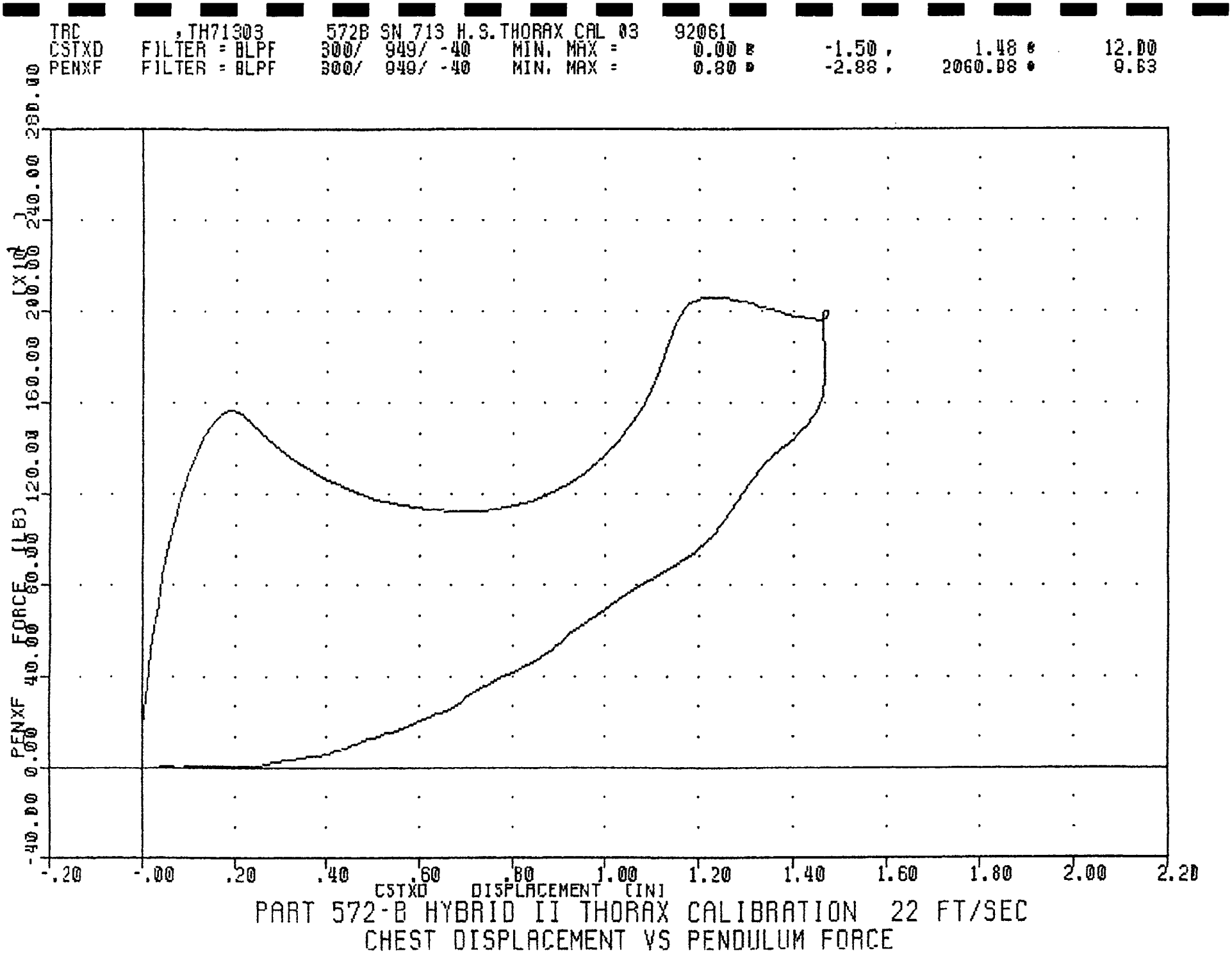


PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
PENDULUM FORCE



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

STERNUM DISPLACEMENT



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

920408

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMEN COMPRESSION TEST

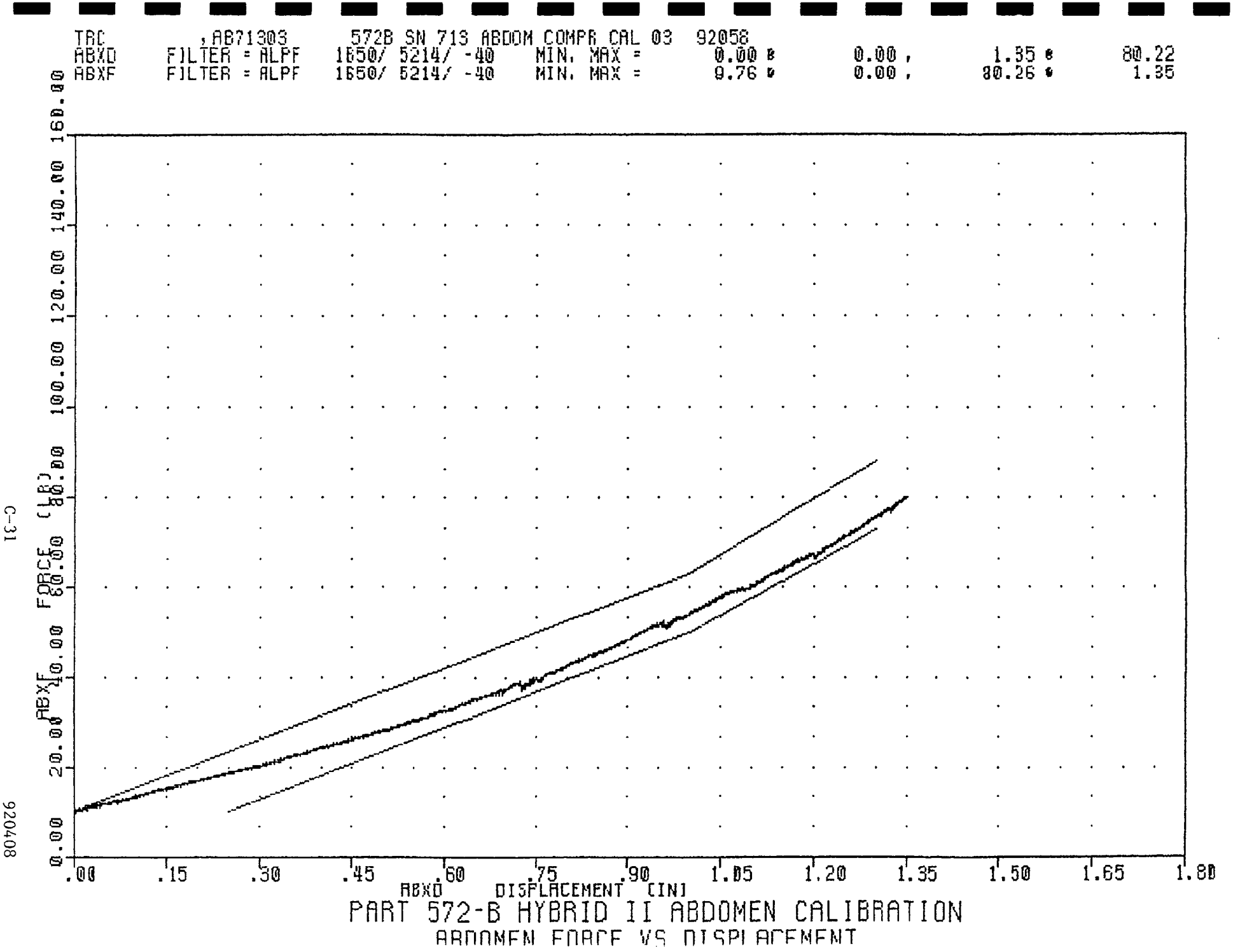
PART 572 27-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
TRC AB71303 572B SN 713 ABDOM COMPR CAL 03

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	28.19 LBS
0.75 IN	36.00 - 50.00 LBS	39.28 LBS
1.00 IN	50.00 - 63.00 LBS	54.27 LBS
1.30 IN	73.00 - 88.00 LBS	75.46 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middlet


TRC ,AB71303 572B SN 713 ABDOM COMPR CAL 03 92058
ABXD FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 0.00 @ 0.00 , 1.35 @ 80.22
ABXF FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 9.76 @ 0.00 , 80.26 @ 1.35
ABXF FORCE (LB)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
.00
.15
.30
.45
.60
.75
.90
1.05
1.20
1.35
1.50
1.65
1.80
ABXD DISPLACEMENT (IN)
PART 572-B HYBRID II ABDOMEN CALIBRATION
ABDOMEN FORCE VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572 27-FEB-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
TRC LF71303 572B SN713 LUMBAR FLEX CAL03

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	25.00 LB
30 DEG	34.00 - 46.00 LB	36.00 LB
40 DEG	46.00 - 58.00 LB	47.00 LB
NET RETURN ANGLE	< 12 DEG	9.00 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

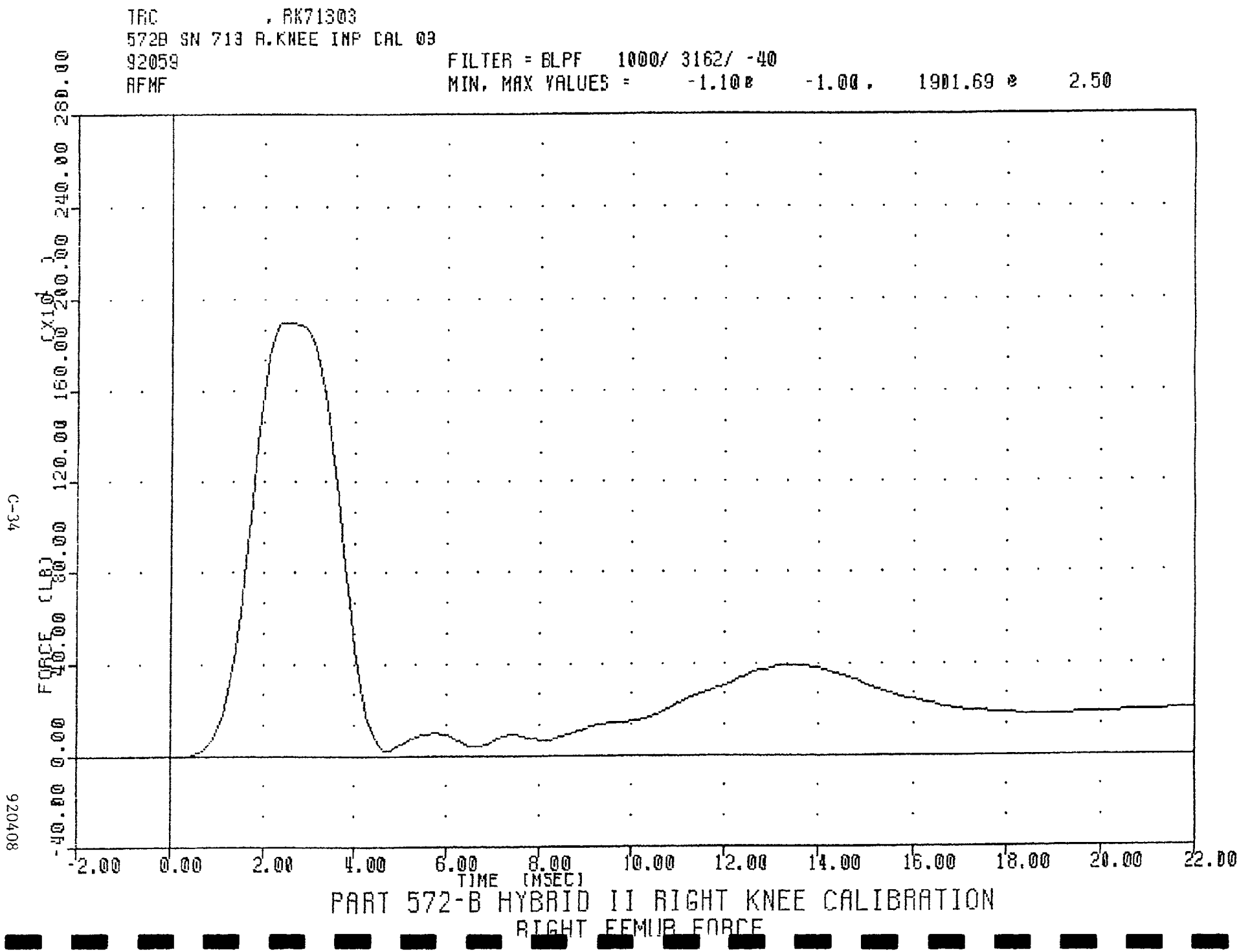
PART 572 28-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
RIGHT KNEE
TRC RK71303 572B SN 713 R.KNEE IMP CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.99 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1901.69 LB
DURATION ABOVE 1000 LB	>=1.7 MSEC	2.00 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Alan Middlet


TRC , RK71303
572B SN 713 R.KNEE IMP CAL 03
92059
RFMF
FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = -1.10 @ -1.00 , 1901.69 @ 2.50
FORCE (LB)
(X10)
280.00
240.00
200.00
160.00
120.00
80.00
40.00
0.00
-40.00
-2.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
TIME (MSEC)
PART 572-B HYBRID II RIGHT KNEE CALIBRATION
RIGHT FEMUR FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

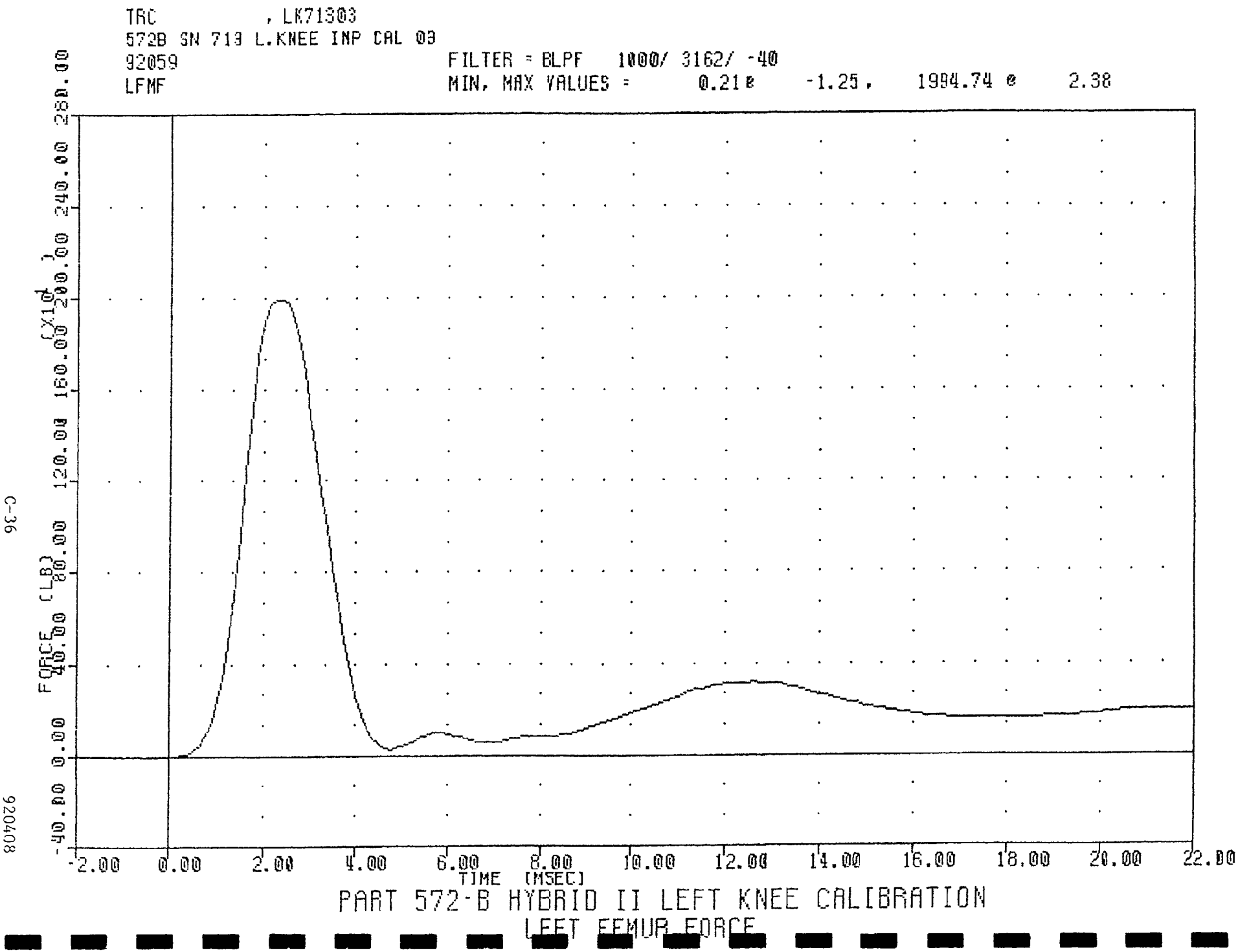
PART 572 28-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
LEFT KNEE
TRC LK71303 572B SN 713 L.KNEE IMP CAL 03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	7.00 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1994.74 LB
DURATION ABOVE 1000 LB	>=1.7 MSEC	1.85 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middlet


TRC , LK71303
572B SN 719 L.KNEE INP CAL 03
92059
LFMF
FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = 0.21 @ -1.25 , 1994.74 @ 2.38
FORCE (LB) (X10^1)
280.00
240.00
200.00
160.00
120.00
80.00
40.00
0.00
-40.00
-2.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
TIME (MSEC)
PART 572-B HYBRID II LEFT KNEE CALIBRATION
LEFT FEMUR FORCE

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 826

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572 27-FEB-92

TEMPERATURE 71 F RELATIVE HUMIDITY 48 %
TRC ED82629 572B SN826 EXT. DIMENSION CAL29

DESCRIPTION SN 826 HUMANOID	SPECIFICATION	TEST RESULTS
Sitting Height	35.6 - 35.8 IN	35.8 IN
Shoulder Pivot Height	21.8 - 22.4 IN	22.4 IN
Hip Pivot Height	3.9 IN	REFERENCE
Hip Pivot From Backline	4.8 IN	REFERENCE
Knee Pivot From Backline	20.1 - 20.7 IN	20.4 IN
Rear of Head From Backline	1.7 IN	REFERENCE
Chest Depth	9.1 - 9.6 IN	9.4 IN
Shoulder Width	17.8 - 18.4 IN	18.0 IN
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.6 IN
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.5 IN
Hip Width	14.0 - 15.4 IN	14.7 IN
Knee Pivot From Floor	19.3 - 19.9 IN	19.3 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middlet

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

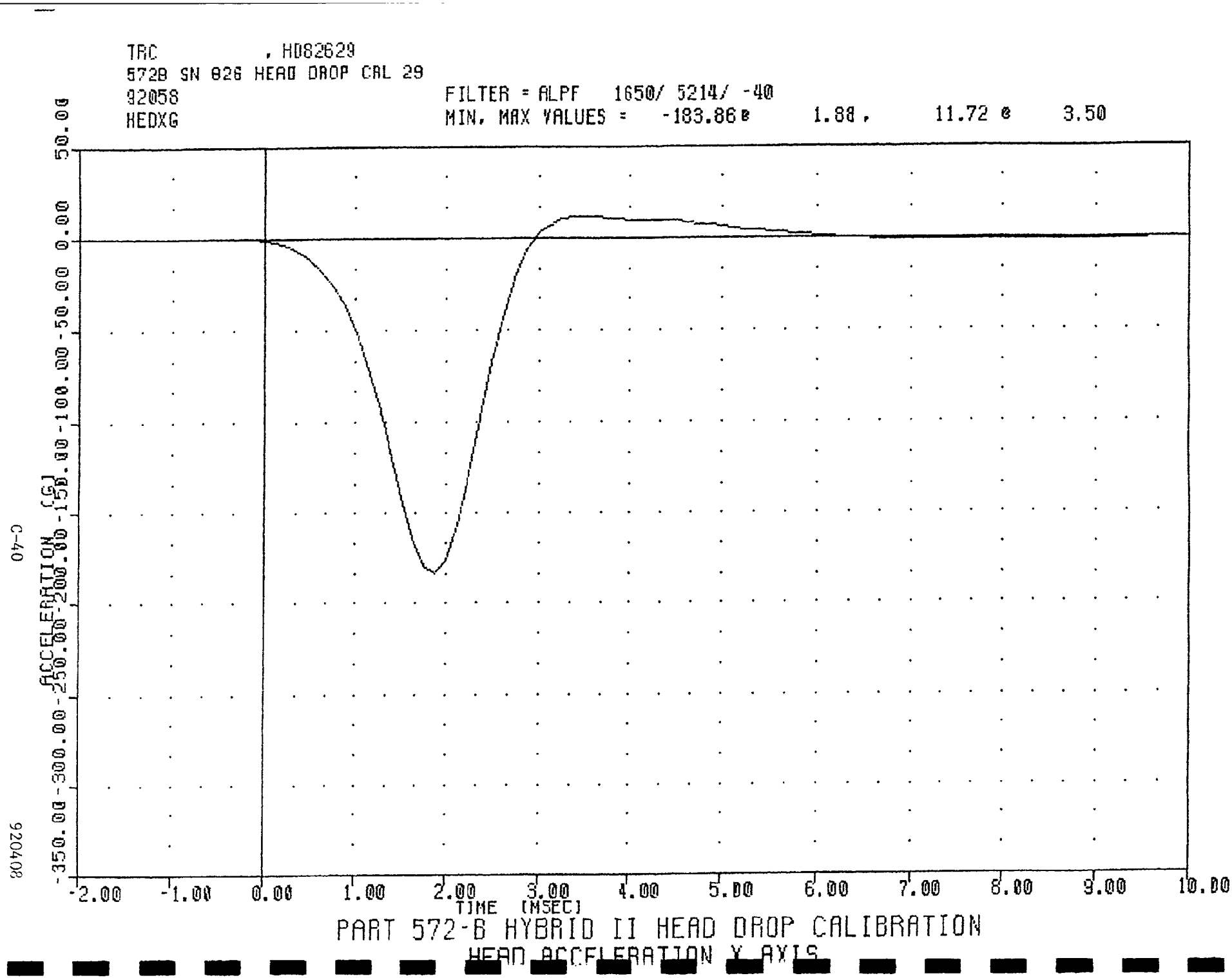
PART 572 27-Feb-92

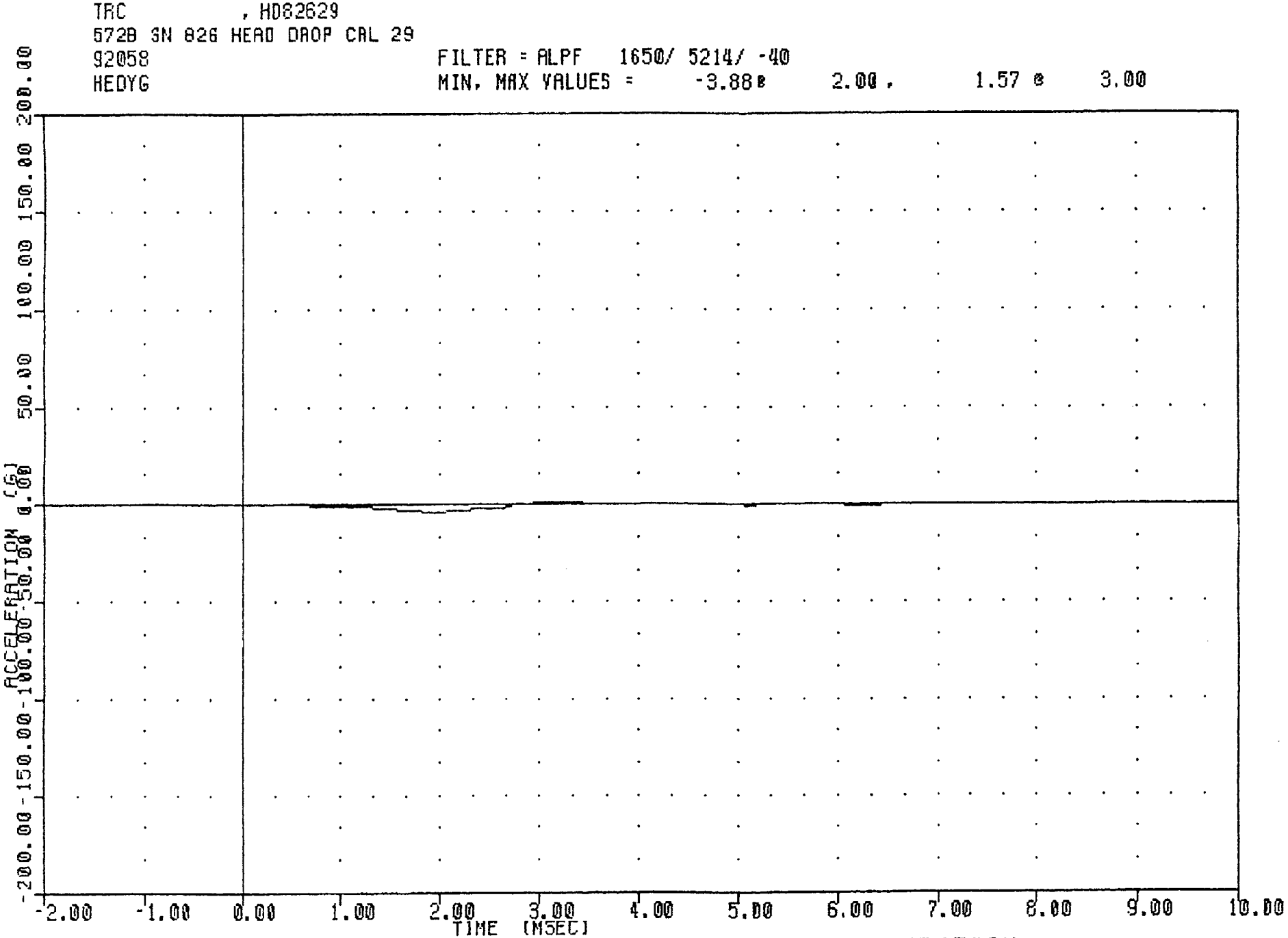
TEMPERATURE 71 F RELATIVE HUMIDITY 48 %
TRC HDS2629 572B SN 826 HEAD DROP CAL 29

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	224.09 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.23 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	-3.88 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

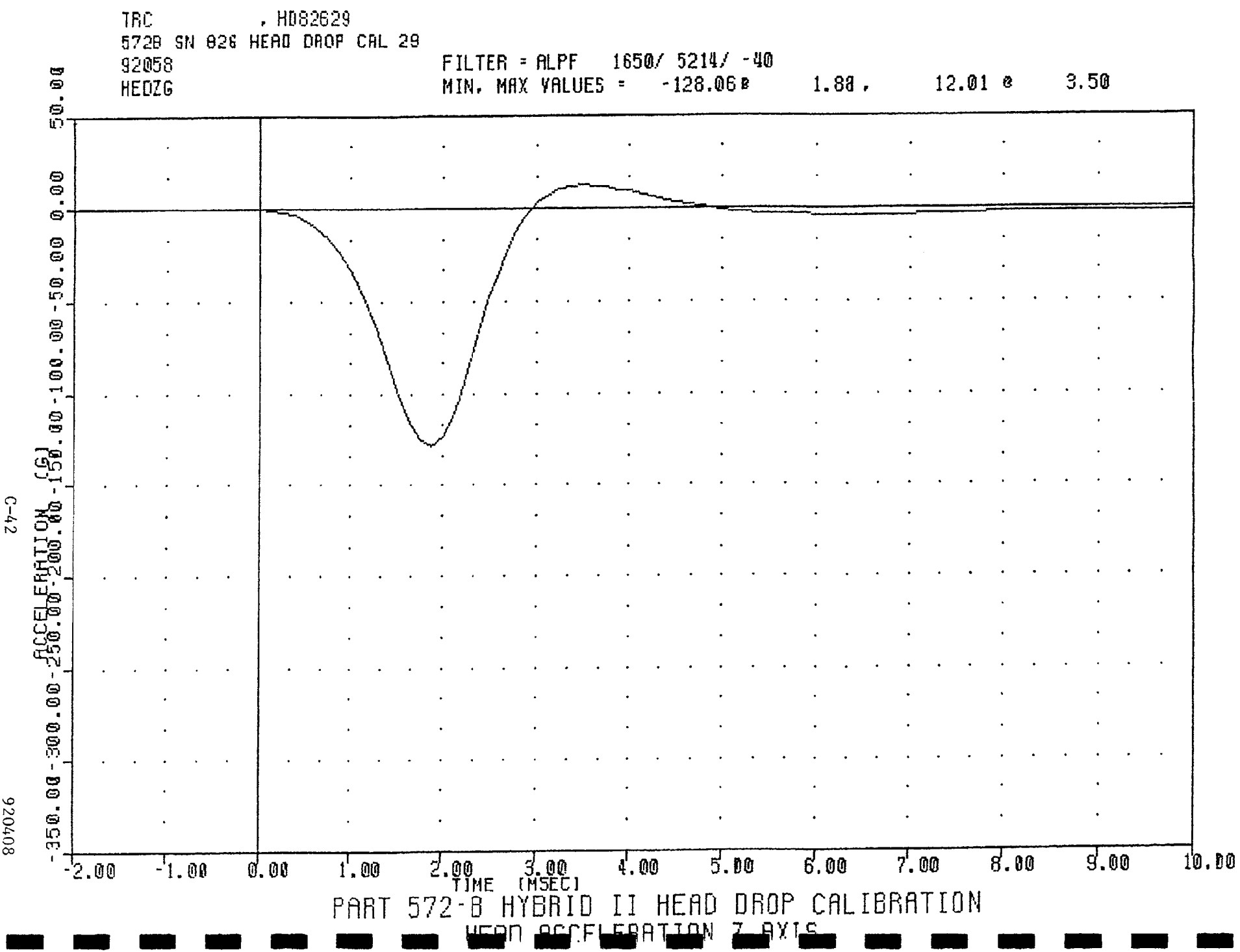
DUMMY MEETS SPECIFICATIONS

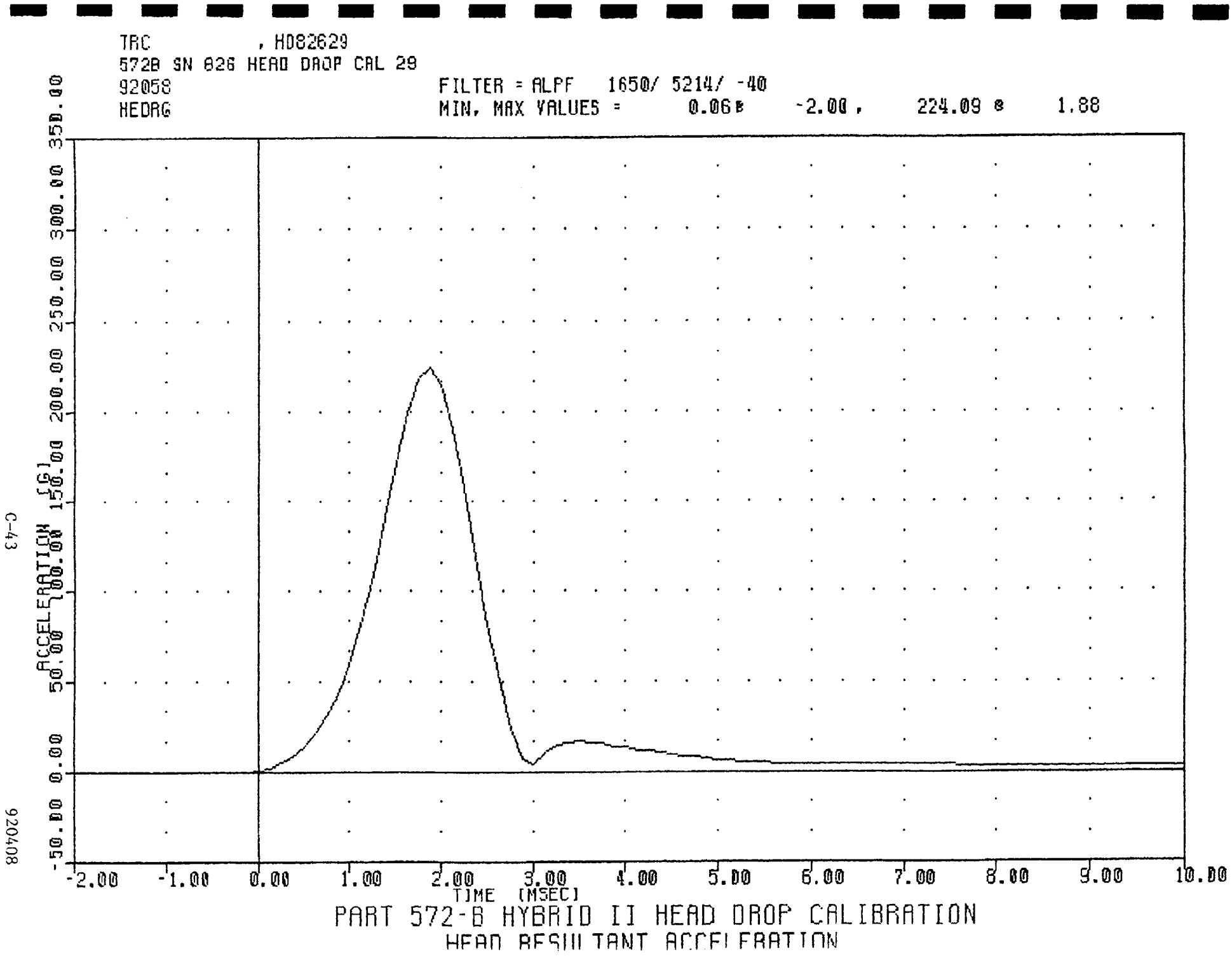
TECHNICIAN Chas. Middlet


TRC , H082629
572B SN 826 HEAD DROP CAL 29
92058
HEDXG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -183.86 @ 1.88 , 11.72 @ 3.50
ACCELERATION (G)
50.00
0.00
-50.00
-100.00
-150.00
-200.00
-250.00
-300.00
-350.00
-2.00
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
TIME (MSEC)
PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS
C-40
92040B



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


TRC , H082629
572B SN 026 HEAD DROP CAL 29
92058
HEDZG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -128.06 @ 1.88 , 12.01 @ 3.50
ACCELERATION (G)
50.00
0.00
-50.00
-100.00
-150.00
-200.00
-250.00
-300.00
-350.00
-2.00
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
TIME (MSEC)
PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS


TRC , H082629
572B SN 826 HEAD DROP CAL 29
92058
HEDRG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.06 @ -2.00 , 224.09 @ 1.88
ACCELERATION (G)
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
-50.00
-2.00
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
TIME (MSEC)
PART 572-B HYBRID II HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572 28-Feb-92

TEMPERATURE 70 F RELATIVE HUMIDITY 49 %
TRC HN82629 572B SN 826 HEAD/NECK CAL 29

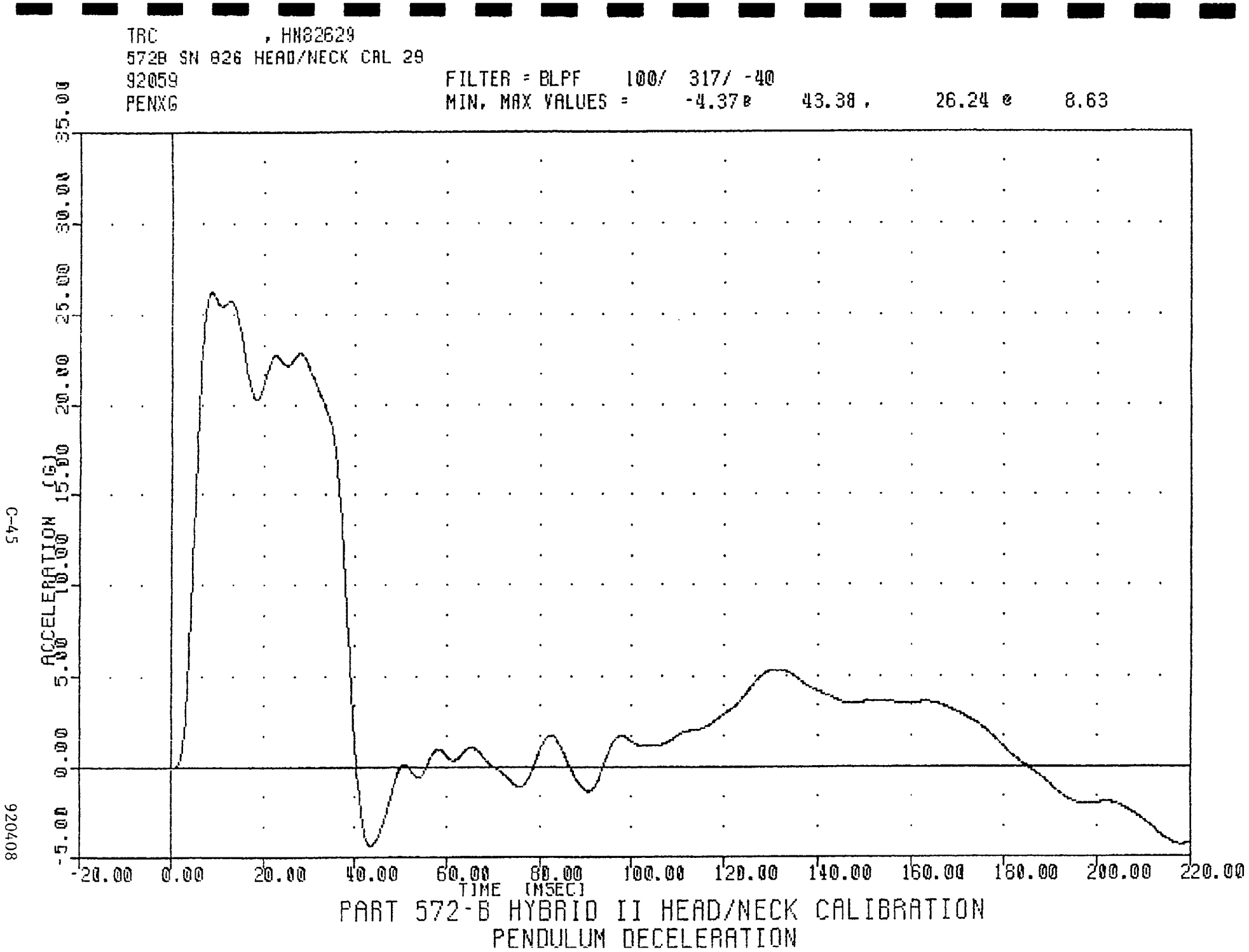
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	21.5 to 25.5 ft/sec	23.76 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.44 msec
T2 - T3: 20 - 20 G	25 - 30 msec	27.11 msec
T3 - T4: 20 - 5 G	10 msec max	5.74 msec
Avg. G level T2 - T3	20 - 24 G	22.96 G
Maximum Rotation Angle	63 - 73 deg	66.36 deg
Peak Head Resultant Accel	26 G max	23.56 G

Test Parameter	Specification		Test Results	
Rotation Angle (degrees)	Time (msec)	Chordal Disp. (in)	Time (msec)	Chordal Disp. (in)
0	-2.0 - +2.0	-0.5 - +0.5	1.50	0.00
30	25.6 - 34.4	2.1 - 3.1	31.48	2.29
60	40.3 - 51.7	4.3 - 5.3	48.68	4.54
max	53.2 - 66.8	5.0 - 6.0	62.50	5.09
60	67.0 - 83.0	4.3 - 5.3	74.39	4.61
30	85.4 - 104.6	2.1 - 3.1	94.35	2.20
0	101.0 - 123.0	-0.5 - +0.5	108.77	0.16

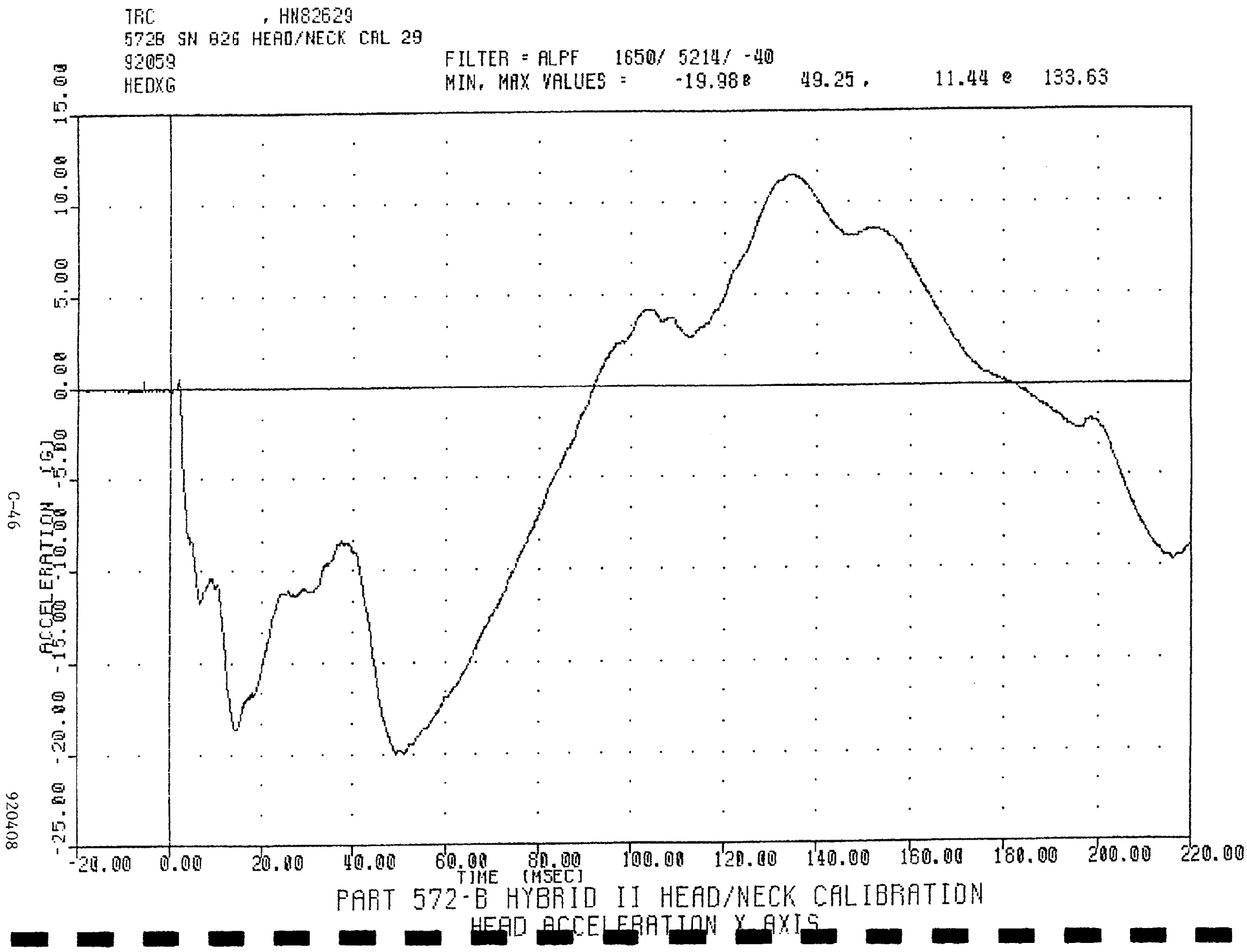
SND: 5.95 in

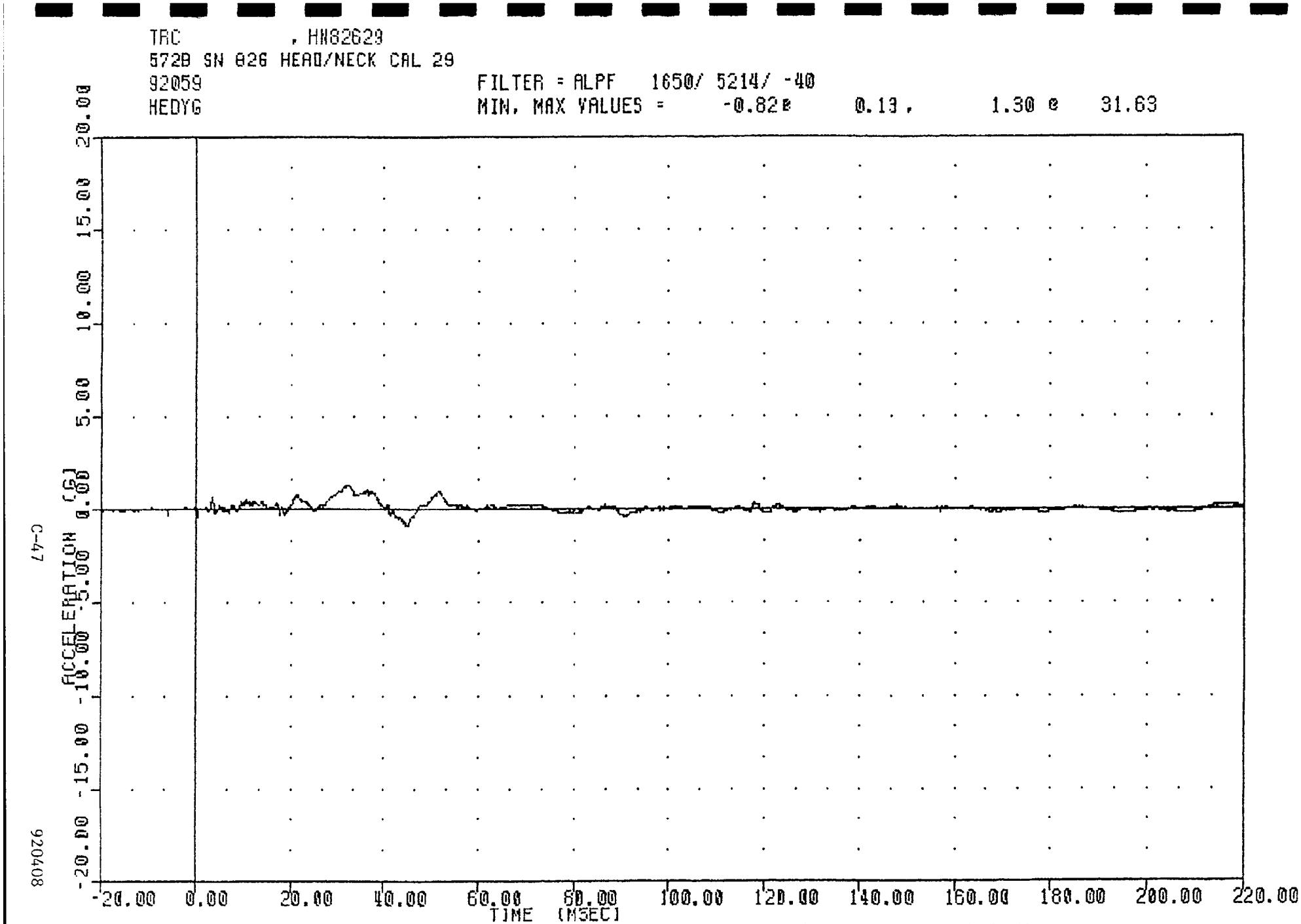
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

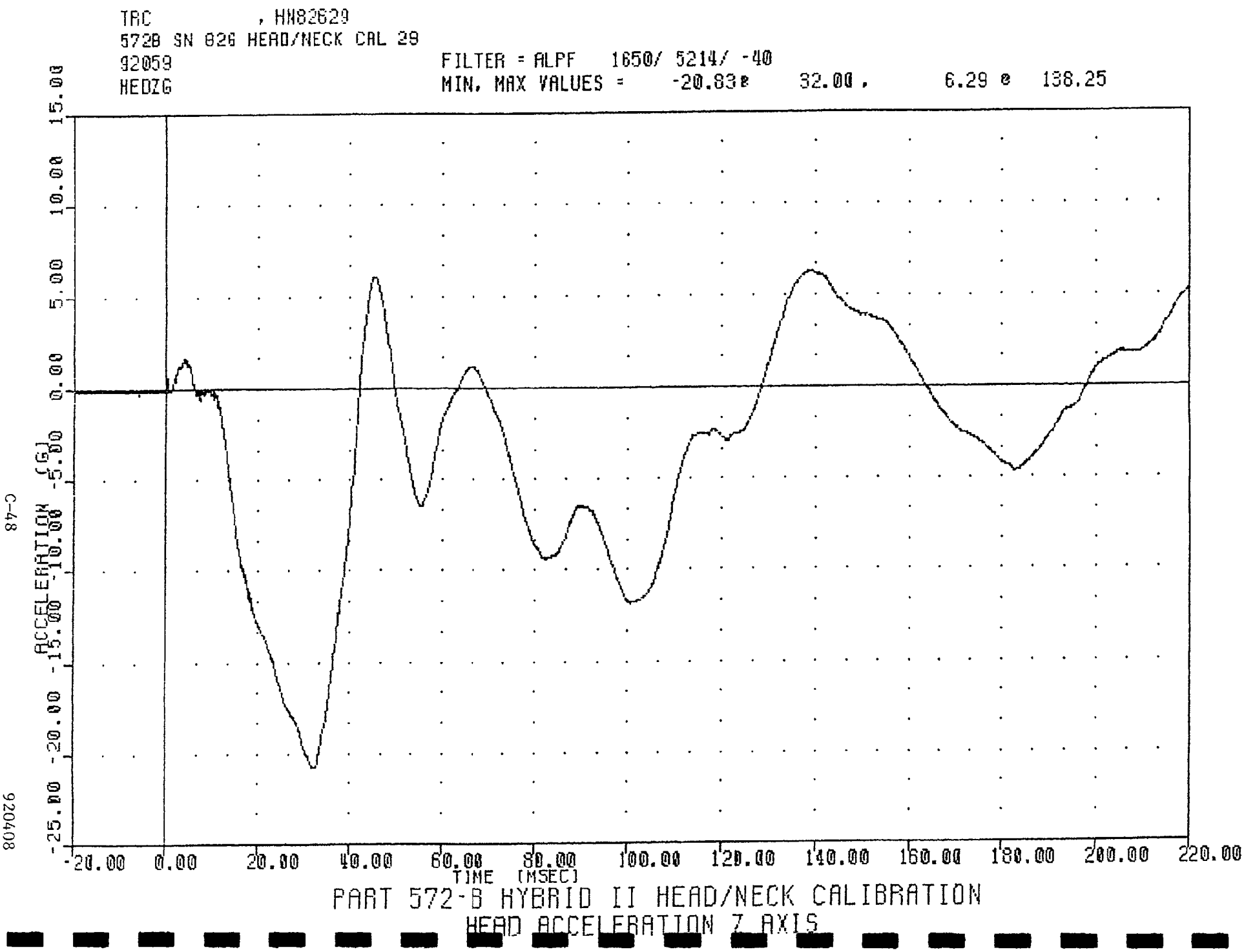


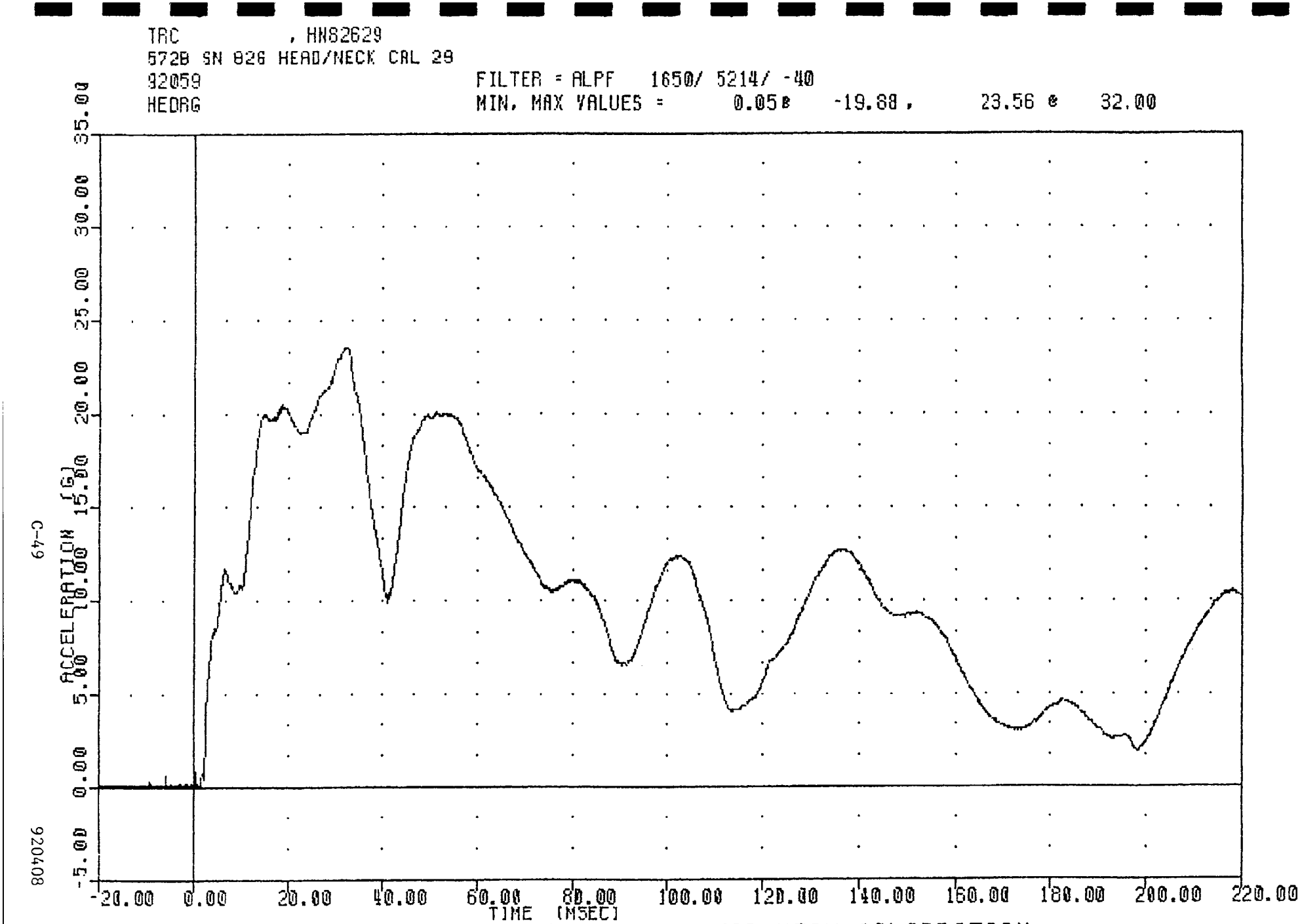
PART 572-B HYBRID II HEAD/NECK CALIBRATION
PENDULUM DECELERATION


TRC , HN82629
572B SN 026 HEAD/NECK CAL 29
92059
HEDXG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -19.98 @ 49.25 , 11.44 @ 133.63
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
ACCELERATION (G)
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION X AXIS



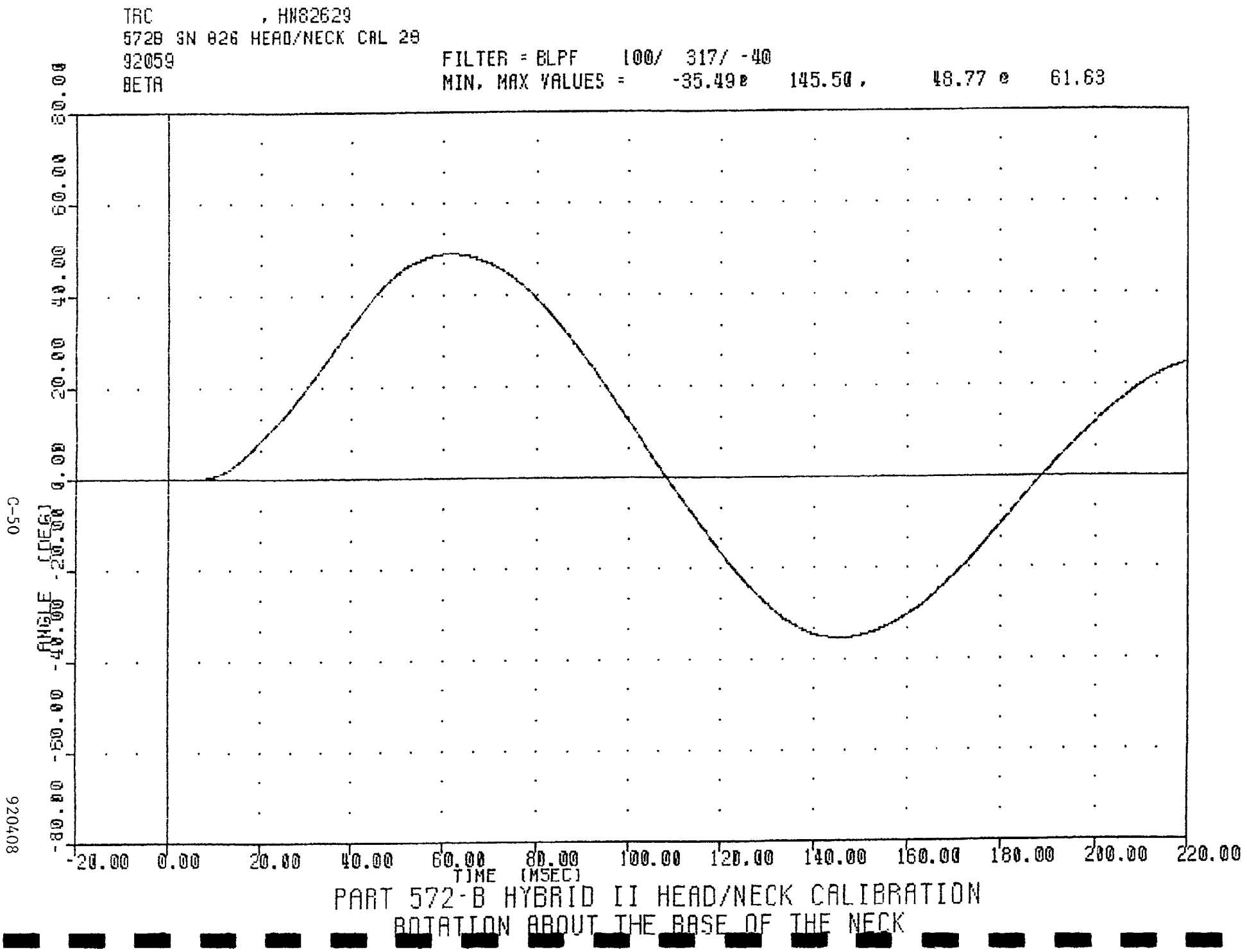
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION Y AXIS


TRC , HN82629
572B SN 026 HEAD/NECK CAL 29
92059
HEDZG
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -20.83@ 32.00 , 6.29 @ 138.25
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
ACCELERATION (G)
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD ACCELERATION Z AXIS

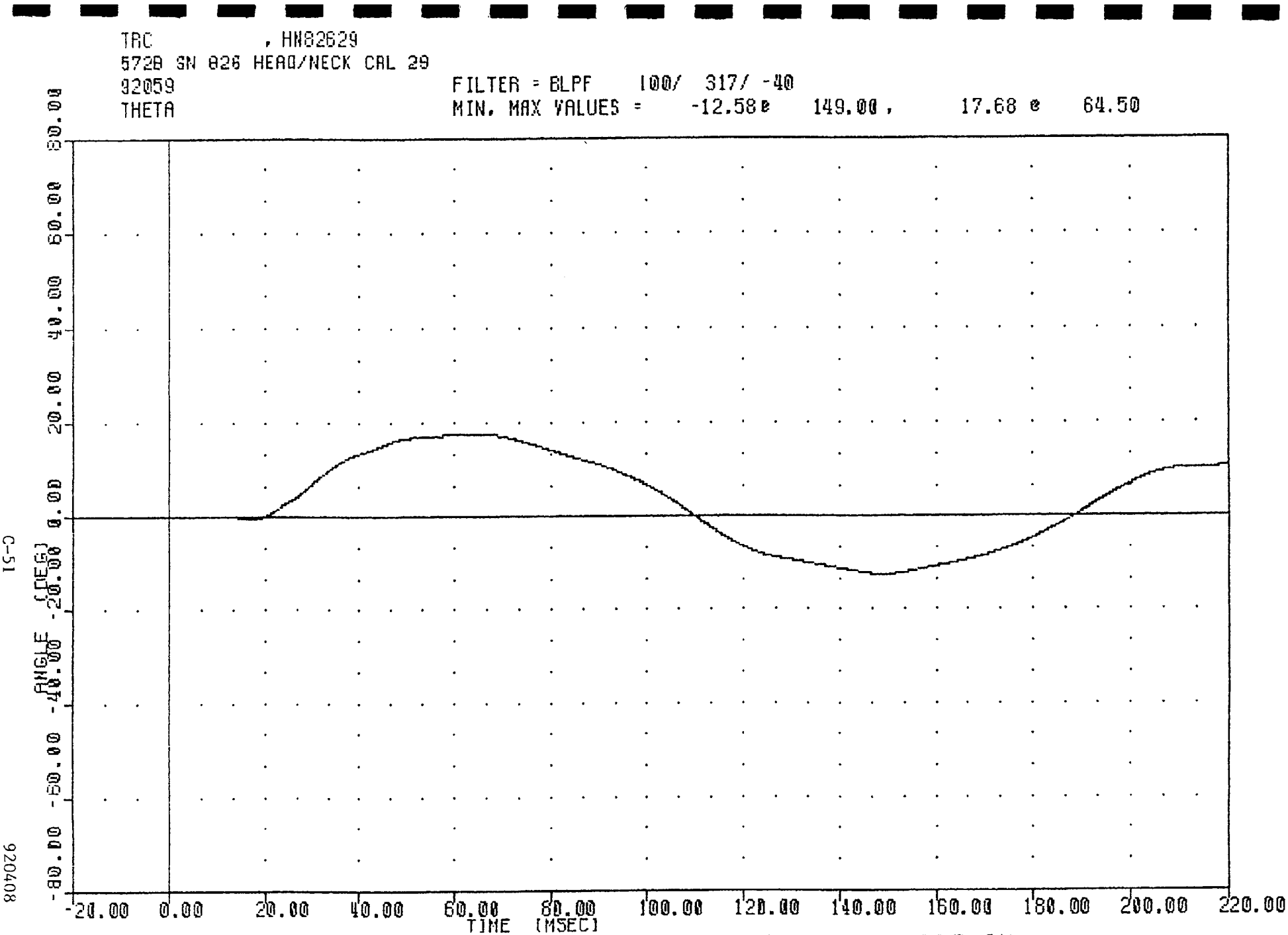


PART 572-B HYBRID II HEAD/NECK CALIBRATION
HEAD RESULTANT ACCELERATION

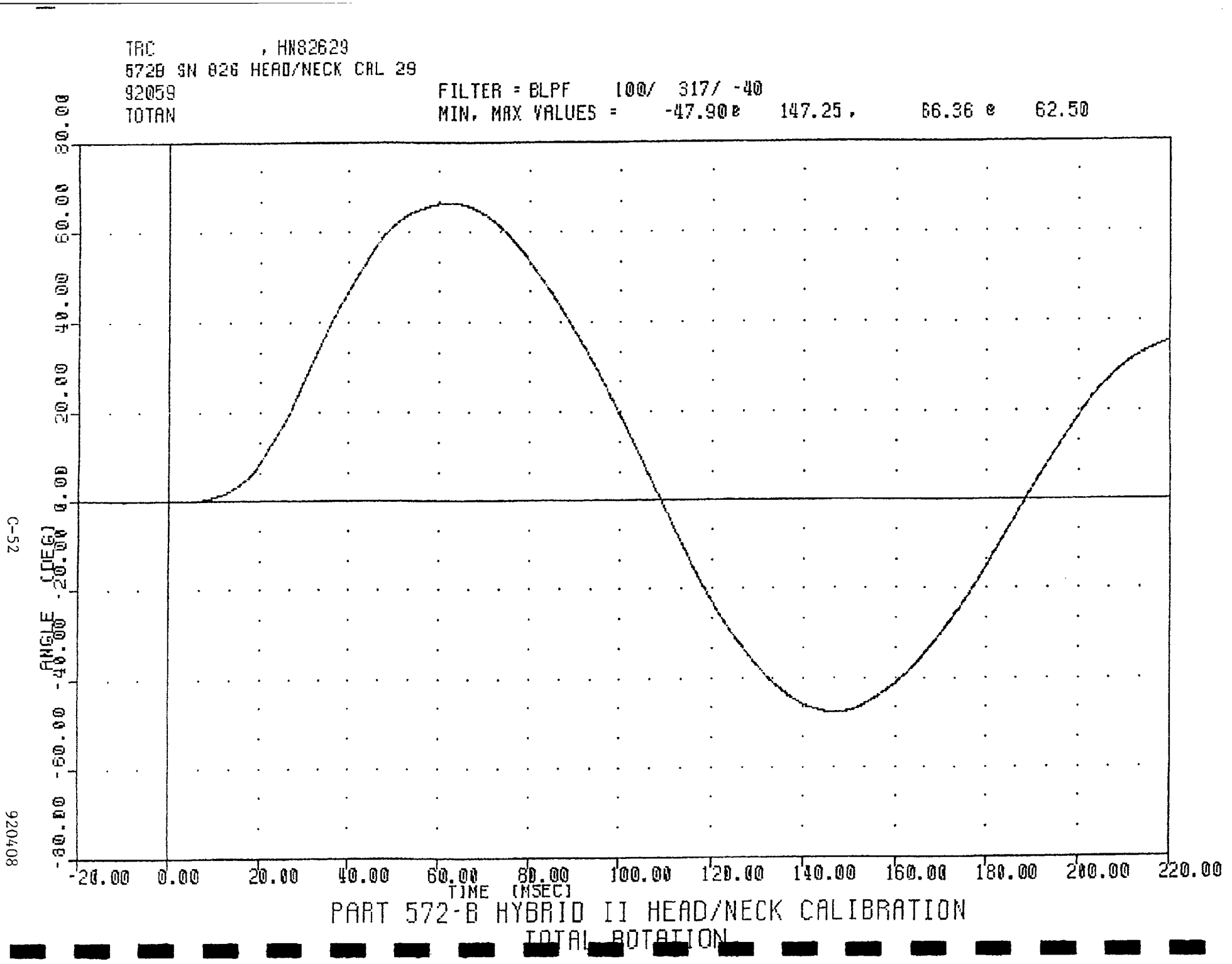
920408

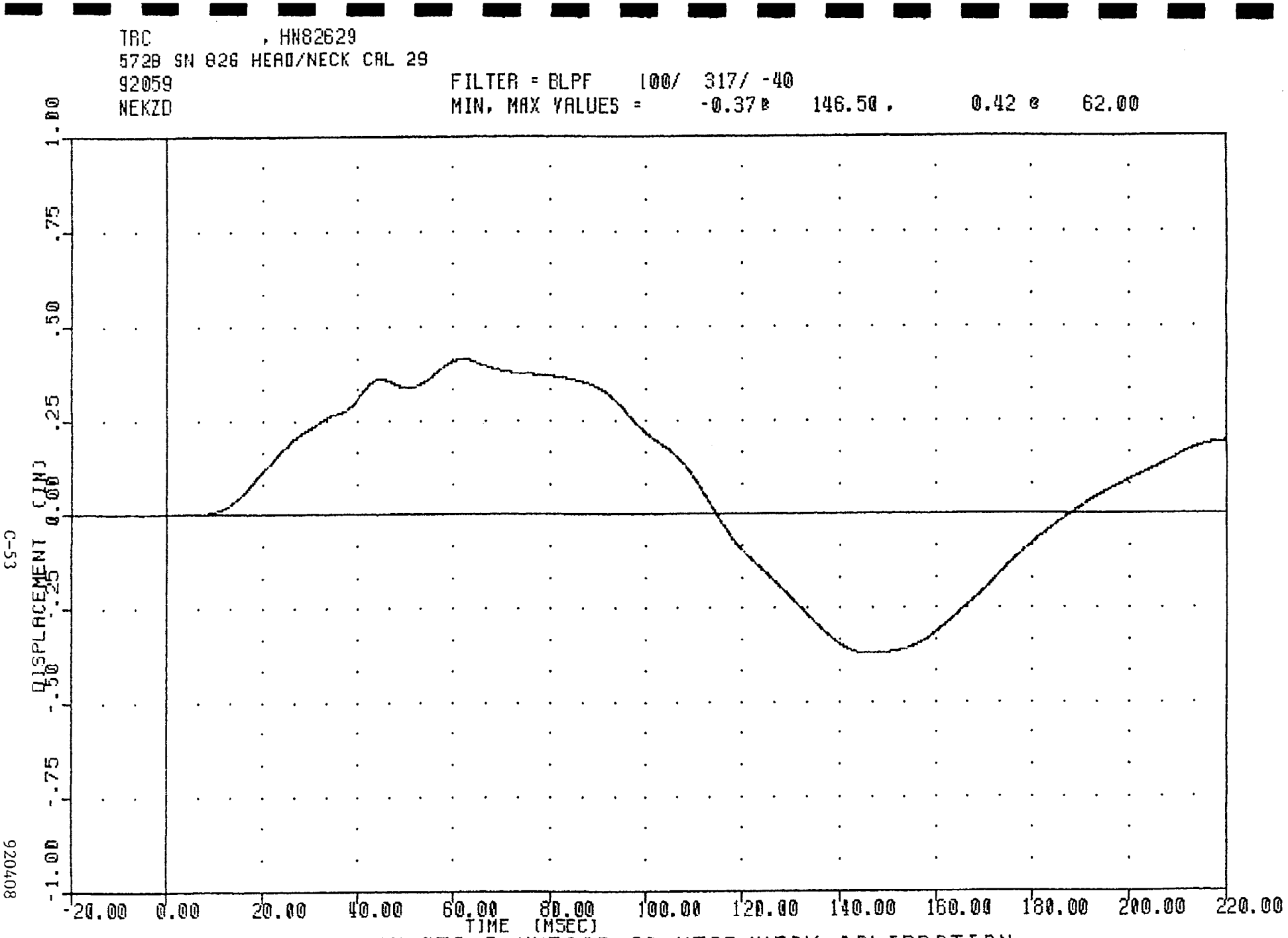


PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE BASE OF THE NECK



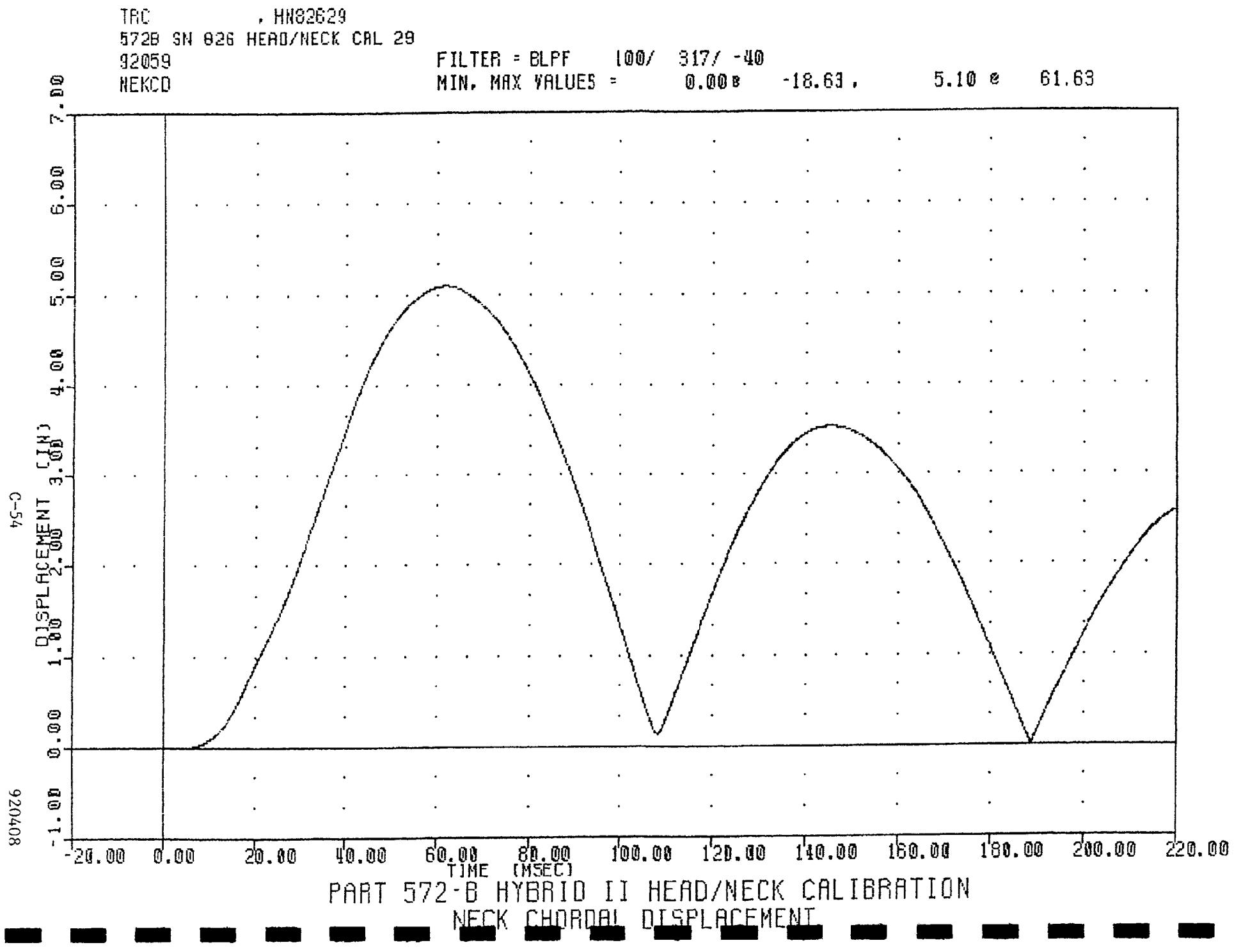
PART 572-B HYBRID II HEAD/NECK CALIBRATION
ROTATION ABOUT THE HEAD C.G.


TRC , HN82629
572B SN 026 HEAD/NECK CAL 29
92059
TOTAN
FILTER = BLPF 100/ 317/ -40
MIN, MAX VALUES = -47.90 @ 147.25 , 86.36 @ 62.50
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
ANGLE (DEG)
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
TIME (MSEC)
PART 572-B HYBRID II HEAD/NECK CALIBRATION
TOTAL ROTATION



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

920408



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 28-Feb-92

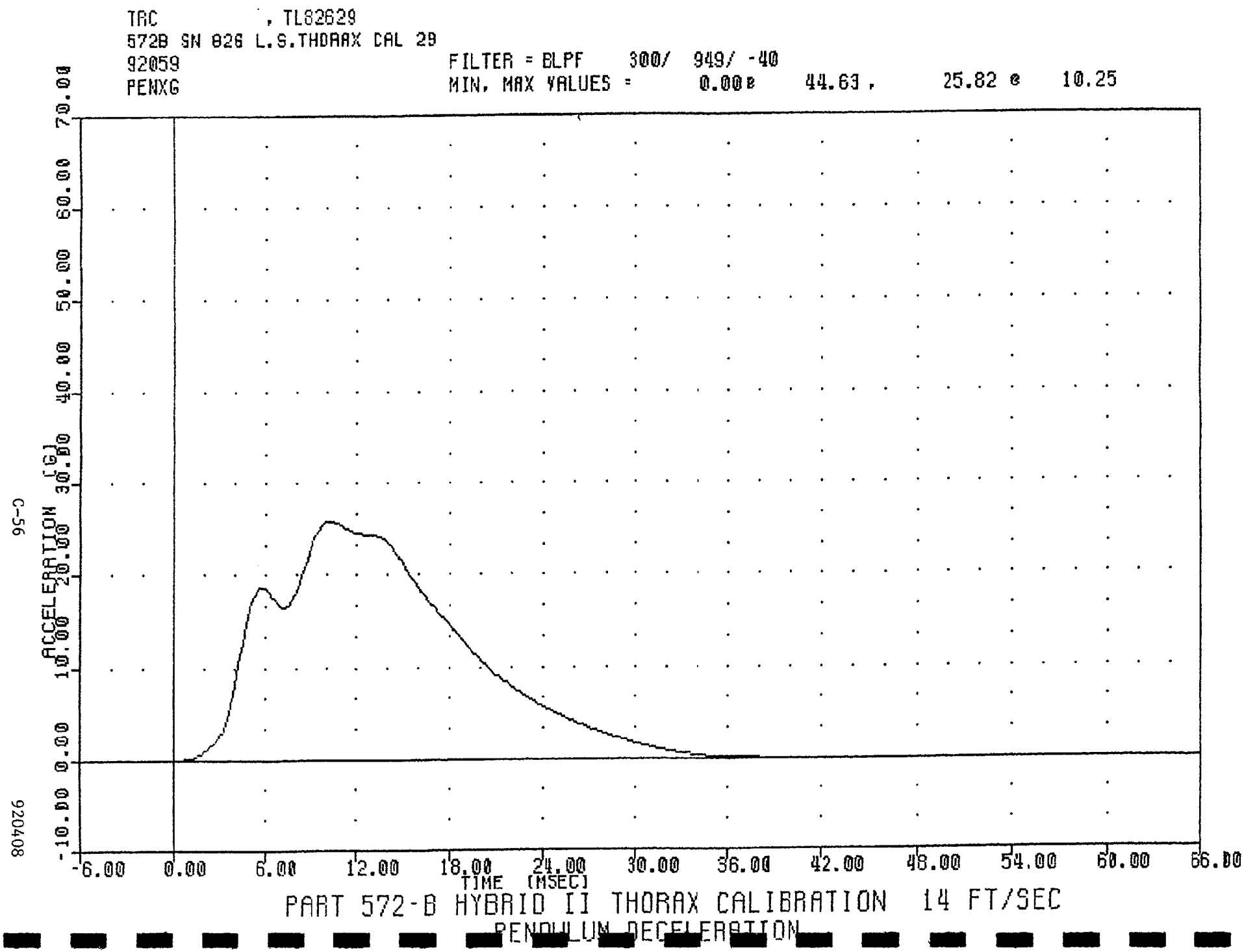
TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
TRC TL82629 572B SN 826 L.S.THORAX CAL 29

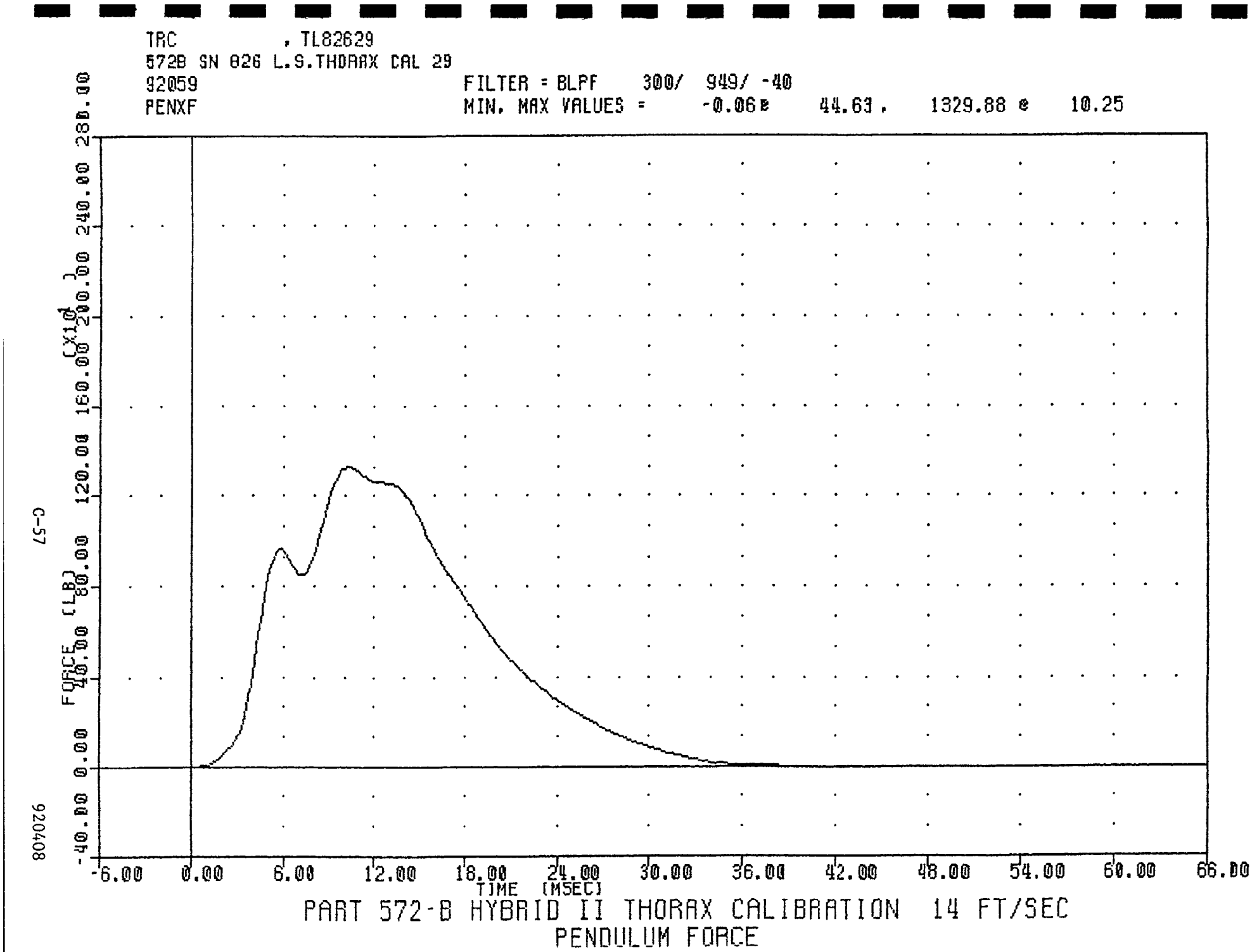
TEST PARAMETER	LOW SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	13.97 FT/SEC
PEAK DEFLECTION	1.1 IN max.	0.97 IN
PEAK RESISTIVE FORCE	1,450. LB max.	1330. LB
INTERNAL HYSTERESIS	50% - 70%	68.8%

SCD: 2.25 IN

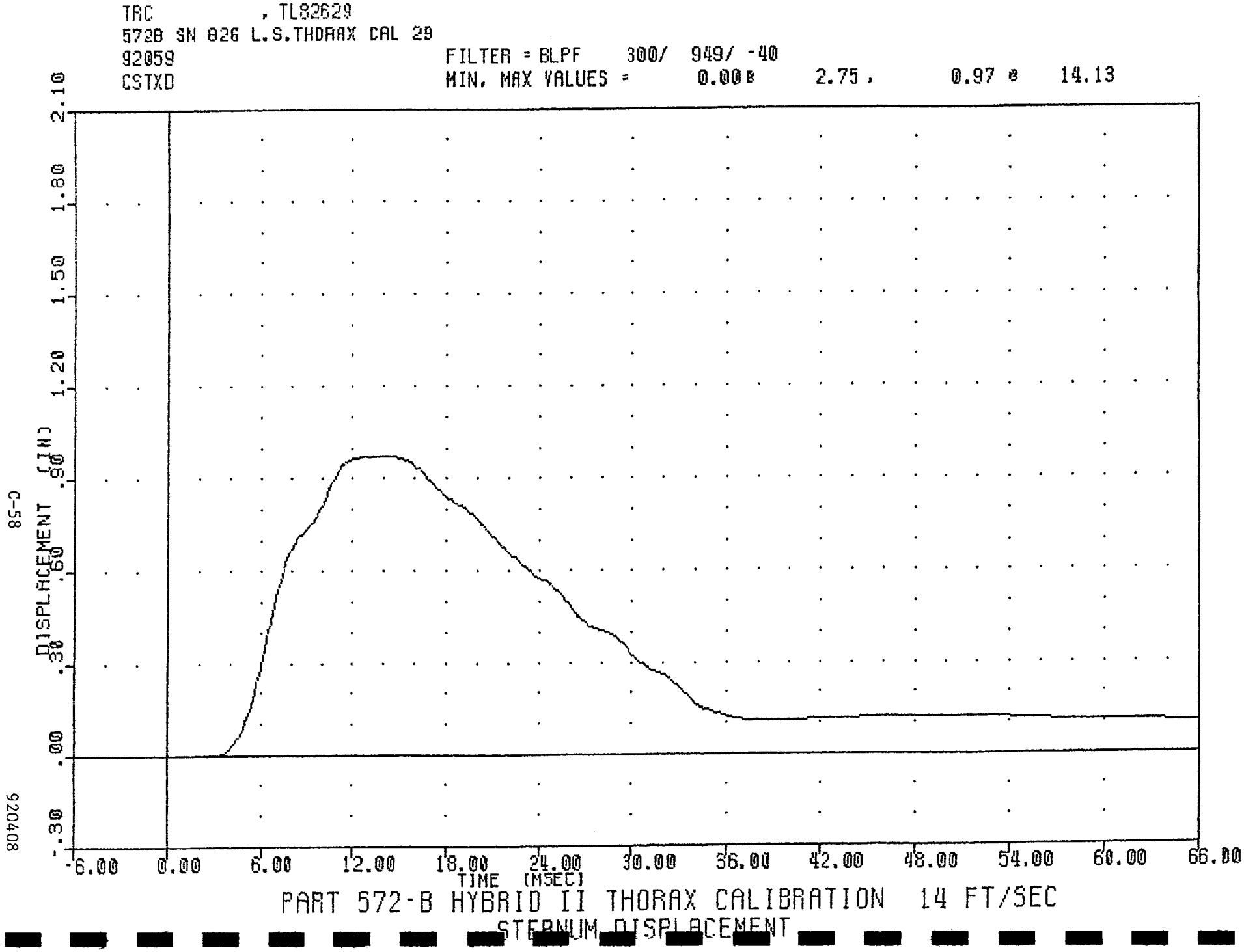
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet


TRC , TL82629
572B SN 826 L.S.THORAX CAL 29
92059
PENXG
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = 0.00 @ 44.63 , 25.82 @ 10.25
ACCELERATION (G)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
-6.00
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00
48.00
54.00
60.00
66.00
TIME (MSEC)
PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
PENDULUM DECELERATION

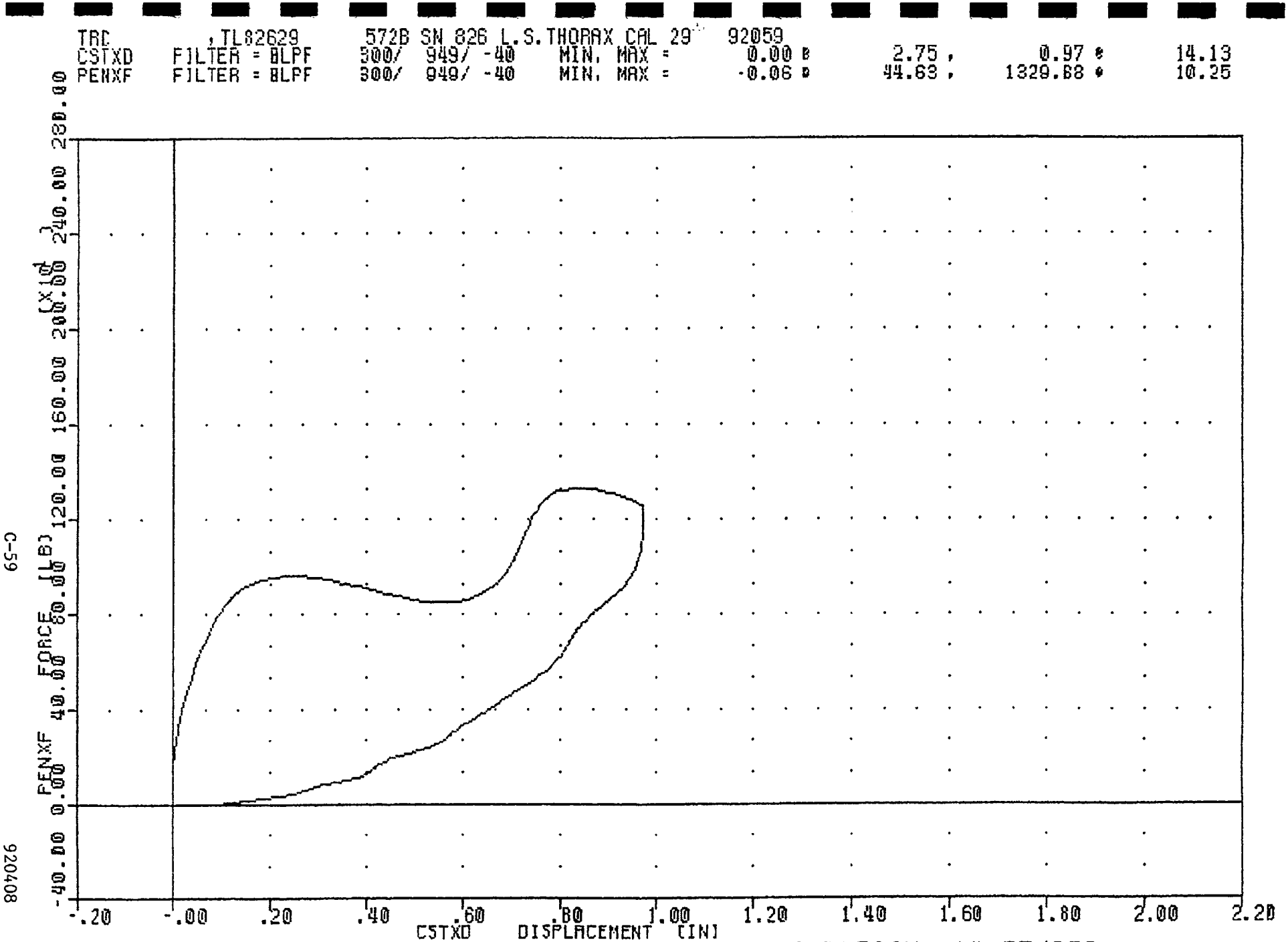


PART 572-B HYBRID II THORAX CALIBRATION 14 FT/SEC
PENDULUM FORCE



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

STERNUM DISPLACEMENT



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

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 28-Feb-92

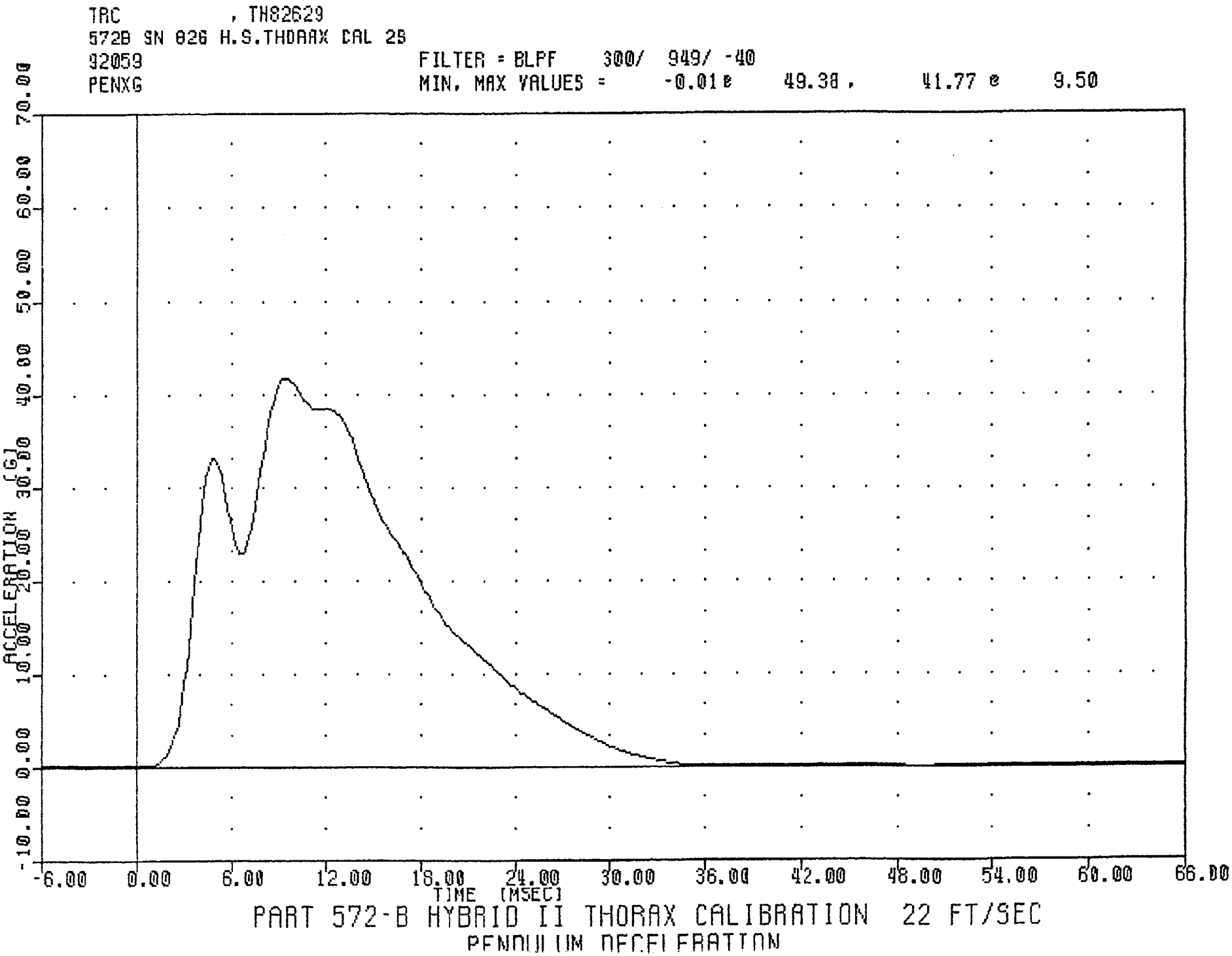
TEMPERATURE 69 F RELATIVE HUMIDITY 48 %
TRC TH82629 572B SN 826 H.S.THORAX CAL 29

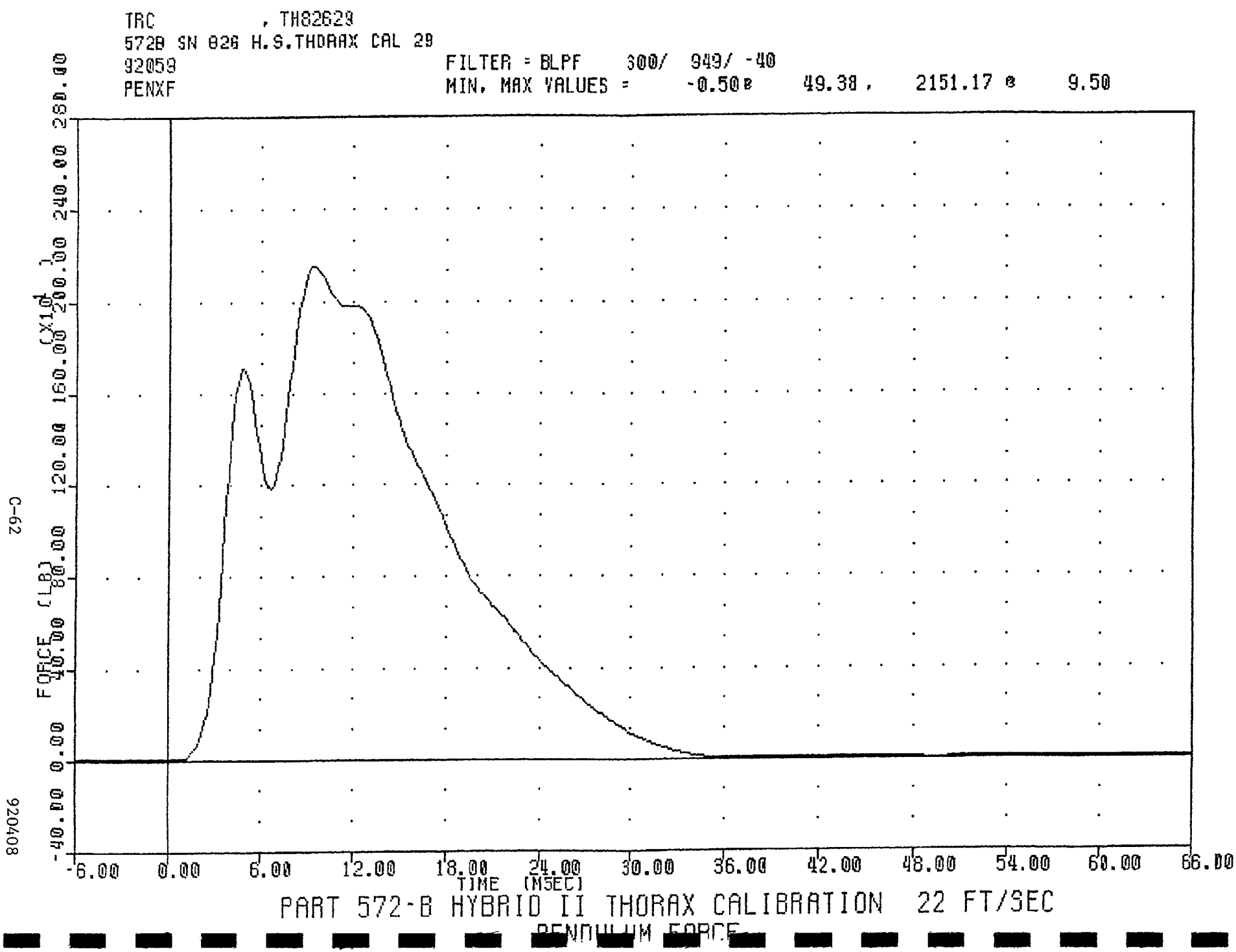
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC
PEAK DEFLECTION	1.7 IN max.	1.53 IN
PEAK RESISTIVE FORCE	2,250. LB max.	2151. LB
INTERNAL HYSTERESIS	50% - 70%	68.1%

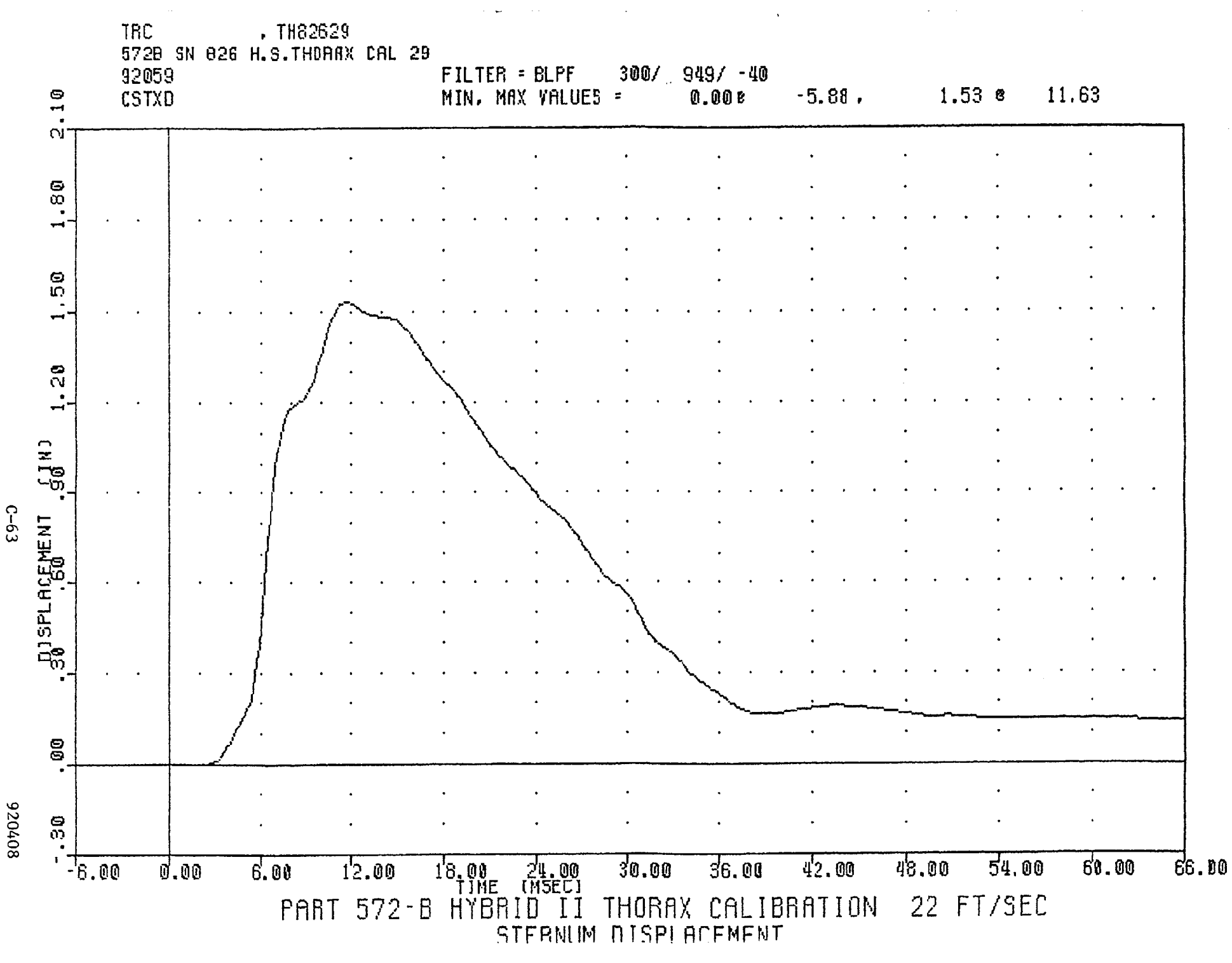
SCD: 2.25 IN

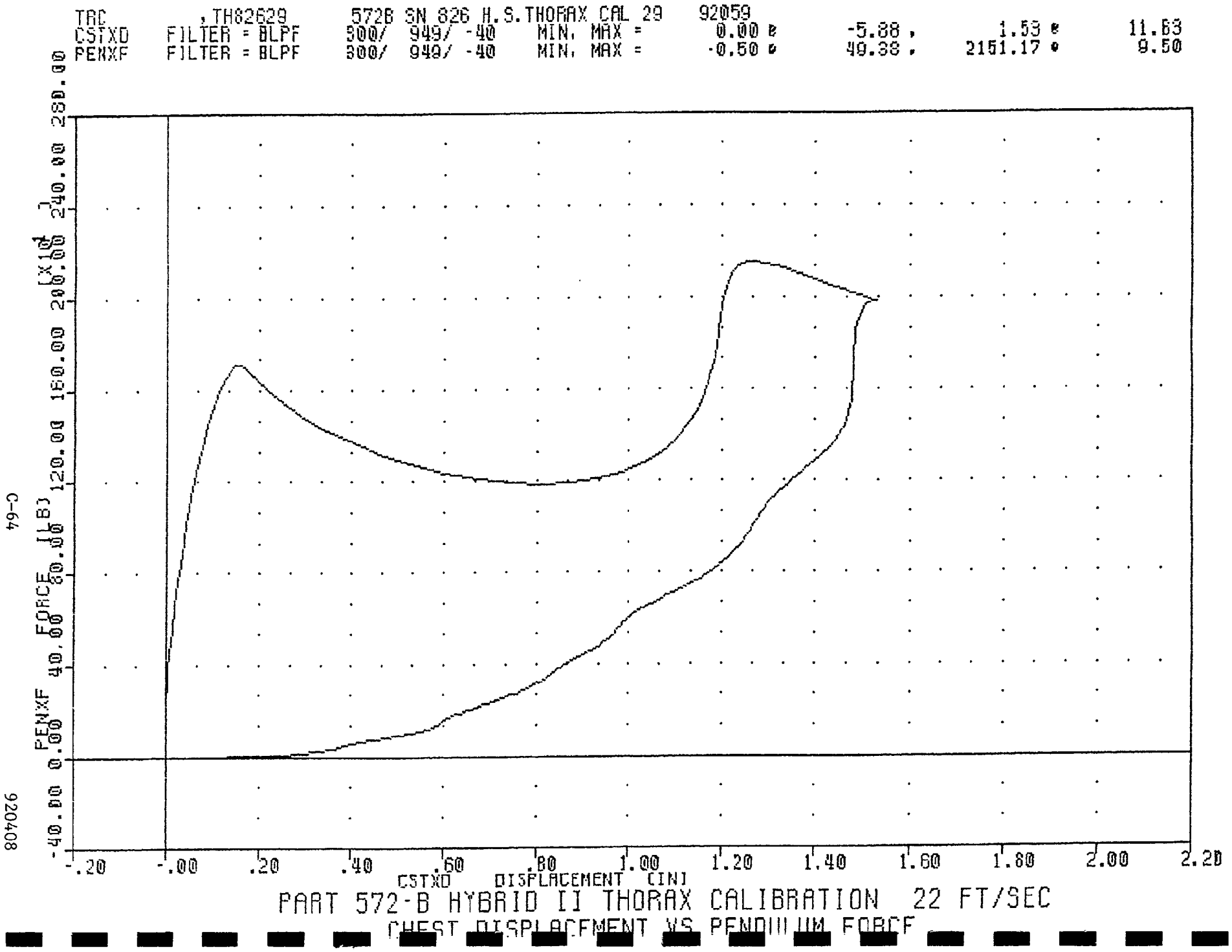
DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet


TRC , TH82629
572B SN 826 H.S.THORAX CAL 25
92059
PENXG
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -0.01 @ 49.38 , 41.77 @ 9.50
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
ACCELERATION (G)
-6.00
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00
48.00
54.00
60.00
66.00
TIME (MSEC)
PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
PENDULUM DECELERATION


TRC , TH82629
572B SN 826 H.S.THORAX CAL 29
92059
PENXF
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -0.50 @ 49.38 , 2151.17 @ 9.50
FORCE (LB) (X10^1)
280.00
240.00
200.00
160.00
120.00
80.00
40.00
0.00
-40.00
-6.00
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00
48.00
54.00
60.00
66.00
TIME (MSEC)
PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
PENDULUM FORCE


TRC , TH82629
572B SN 026 H.S.THORAX CAL 29
92059
CSTXD
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = 0.00 @ -5.88 , 1.53 @ 11.63
DISPLACEMENT (IN)
2.10
1.80
1.50
1.20
.90
.60
.30
.00
-.30
-6.00
0.00
6.00
12.00
18.00
24.00
30.00
36.00
42.00
48.00
54.00
60.00
66.00
TIME (MSEC)
PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
STERNUM DISPLACEMENT


TRC ,TH82629 572B SN 826 H.S.THORAX CAL 29 92059
CSTXD FILTER = BLPF 300/ 949/ -40 MIN, MAX = 0.00 @ -5.88 , 1.53 @ 11.63
PENXF FILTER = BLPF 300/ 949/ -40 MIN, MAX = -0.50 @ 49.38 , 2151.17 @ 9.50
PENXF FORCE [LB] [X10]
280.00
240.00
200.00
160.00
120.00
80.00
40.00
0.000
-40.00
-.20
-.00
.20
.40
.60
.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
CSTXD DISPLACEMENT [IN]
PART 572-B HYBRID II THORAX CALIBRATION 22 FT/SEC
CHEST DISPLACEMENT VS PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMEN COMPRESSION TEST

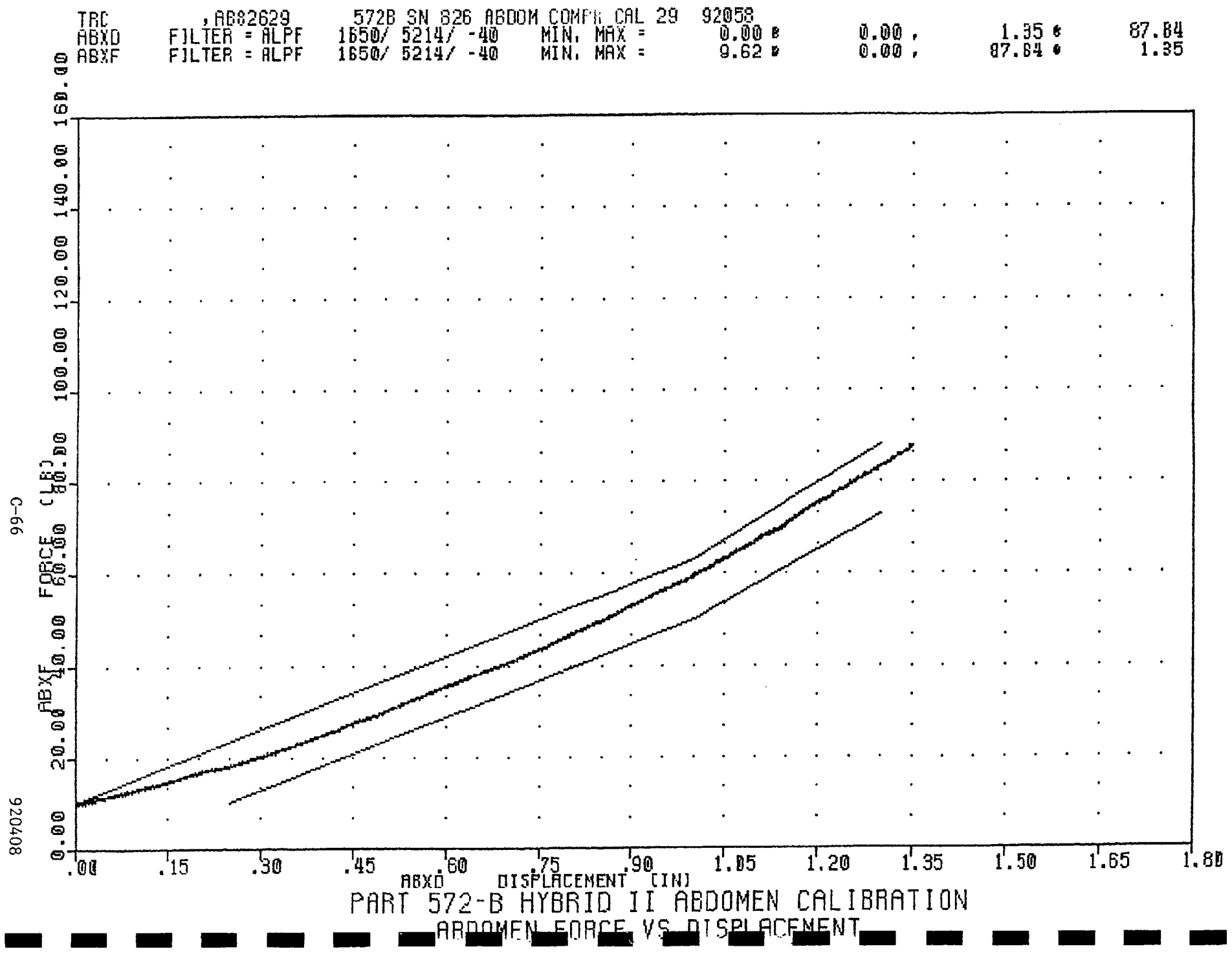
PART 572 27-Feb-92

TEMPERATURE 70 F RELATIVE HUMIDITY 49 %
TRC AB82629 572B SN 826 ABDOM COMPR CAL 29

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	29.88 LBS
0.75 IN	36.00 - 50.00 LBS	43.51 LBS
1.00 IN	50.00 - 63.00 LBS	59.60 LBS
1.30 IN	73.00 - 88.00 LBS	82.92 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet


TRC ,AB82629 572B SN 626 ABDOM COMPR CAL 29 92058
ABXD FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 0.00 @ 0.00 , 1.35 @ 87.84
ABXF FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 9.62 @ 0.00 , 87.84 @ 1.35
ABXF FORCE (LB)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
.00
.15
.30
.45
.60
.75
.90
1.05
1.20
1.35
1.50
1.65
1.80
ABXD DISPLACEMENT (IN)
PART 572-B HYBRID II ABDOMEN CALIBRATION
ABDOMEN FORCE VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572 27-FEB-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
TRC LF82629 572B SN826 LUMBAR FLEX CAL29

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	30.00 LB
30 DEG	34.00 - 46.00 LB	40.00 LB
40 DEG	46.00 - 58.00 LB	55.00 LB
NET RETURN ANGLE	< 12 DEG	0.00 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

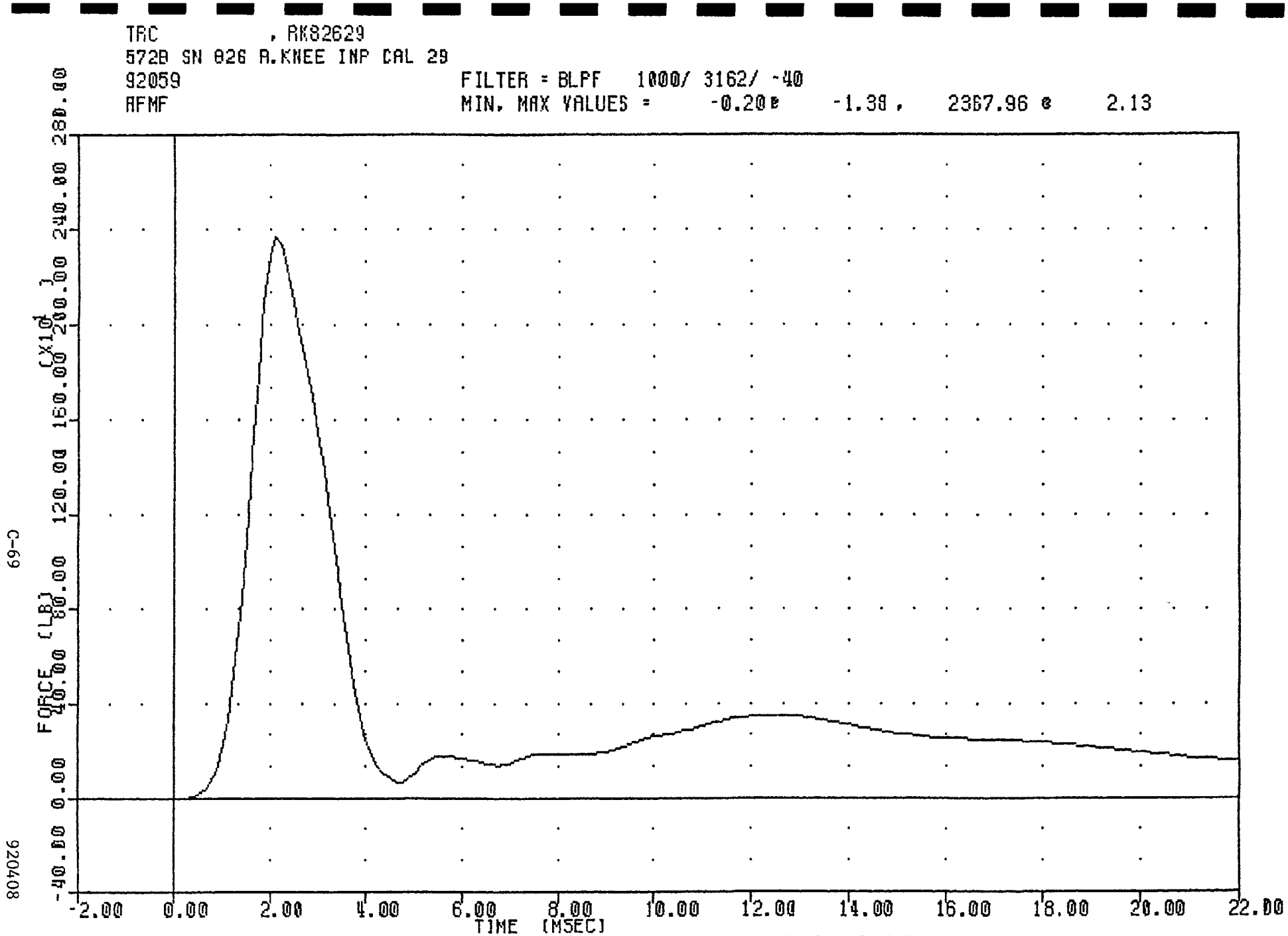
PART 572 28-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
RIGHT KNEE
TRC RK82629 572B SN 826 R.KNEE IMP CAL 29

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	7.00 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2367.96 LB
DURATION ABOVE 1000 LB	>=1.7 MSEC	1.93 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet



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

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

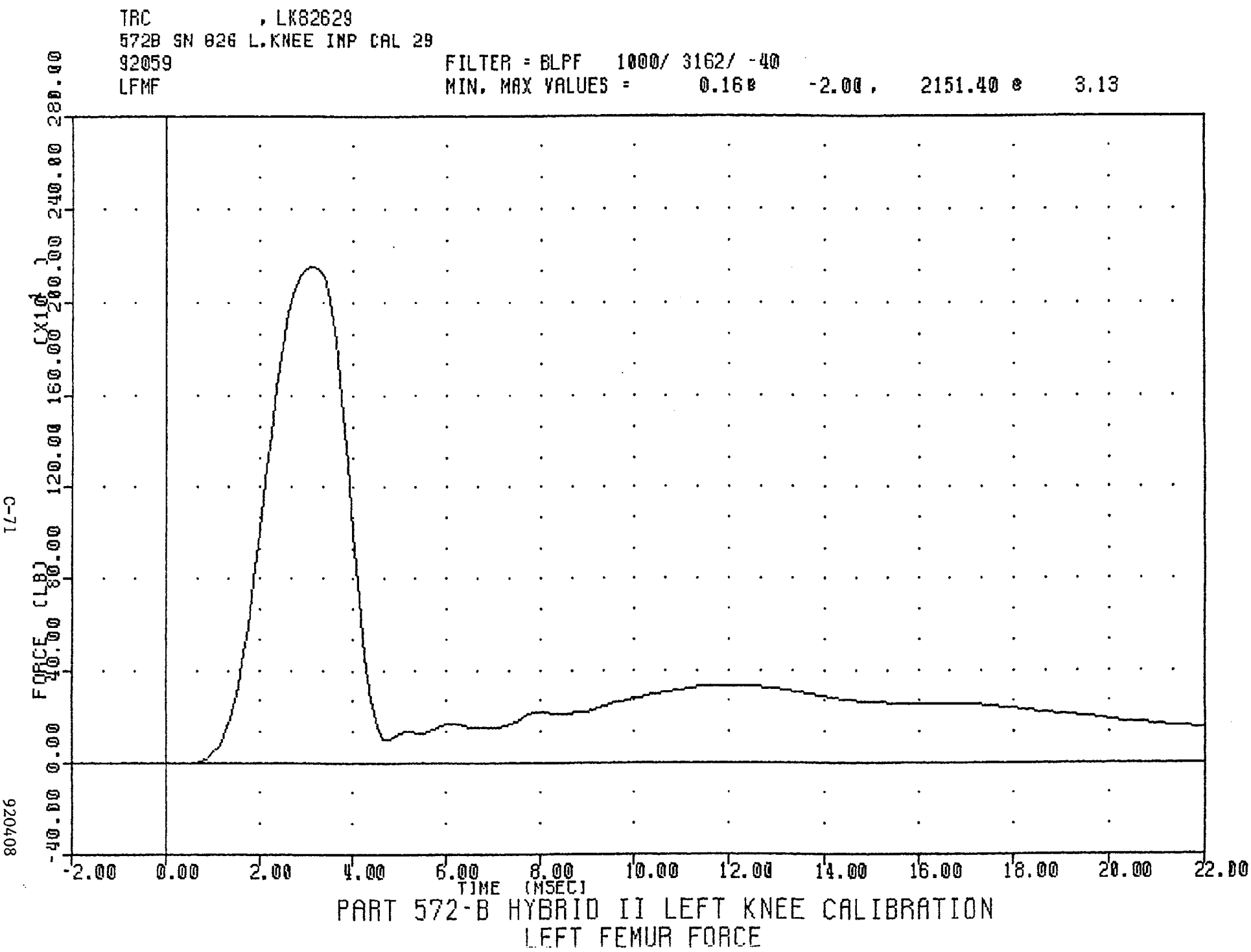
PART 572 28-Feb-92

TEMPERATURE 69 F RELATIVE HUMIDITY 49 %
LEFT KNEE
TRC LK82629 572B SN 826 L.KNEE IMP CAL 29

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	7.00 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2151.40 LB
DURATION ABOVE 1000 LB	>=1.7 MSEC	2.00 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middlet



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

920408

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #713

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	DUE
HEAD X-AXIS ACCEL.	CW96H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	DN99JC	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CR78H	7264	ENDEVCO	01/08/92	07/08/92
CHEST X-AXIS ACCEL.	CC71H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	CY32H	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CG13H	7264	ENDEVCO	01/08/92	07/08/92
LEFT FEMUR FORCE LOAD CELL	901	2430	GSE	01/09/92	07/09/92
RIGHT FEMUR FORCE LOAD CELL	902	2430	GSE	01/09/92	07/09/92
*NECK X-AXIS FORCE LOAD CELL	NA				
Y-AXIS FORCE LOAD CELL	NA				
Z-AXIS FORCE LOAD CELL	NA				
*NECK MOMENT ABOUT X-AXIS LOAD CELL	NA				
MOMENT ABOUT Y-AXIS LOAD CELL	NA				
MOMENT ABOUT Z-AXIS LOAD CELL	NA				
*CHEST DEFLECTION POTENTIOMETER	NA				
LAP BELT FORCE LOAD CELL	236	3419	LEBOW	09/12/91	03/12/92
SHOULDER BELT FORCE LOAD CELL	612	3419	LEBOW	09/12/91	03/12/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	A12899	PT-101-40A	CELESCO	11/27/91	05/27/92
SHOULDER BELT STRETCH POTENTIOMETER	2087	2051414101	BOURNES	11/27/91	05/27/92

*HYBRID III USE ONLY.

DUMMY INSTRUMENT CALIBRATIONS

PASSENGER DUMMY #826

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	DUE
HEAD X-AXIS ACCEL.	CL95H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	DW12JC	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CC11H	7264	ENDEVCO	01/08/92	07/08/92
CHEST X-AXIS ACCEL.	DB74H	7264	ENDEVCO	01/08/92	07/08/92
Y-AXIS ACCEL.	CY31H	7264	ENDEVCO	01/08/92	07/08/92
Z-AXIS ACCEL.	CH67H	7264	ENDEVCO	01/08/92	07/08/92
LEFT FEMUR FORCE LOAD CELL	880	2430	GSE	01/09/92	07/09/92
RIGHT FEMUR FORCE LOAD CELL	898	2430	GSE	01/09/92	07/09/92
*NECK X-AXIS FORCE LOAD CELL	NA				
Y-AXIS FORCE LOAD CELL	NA				
X-AXIS FORCE LOAD CELL	NA				
*NECK MOMENT ABOUT X-AXIS LOAD CELL	NA				
MOMENT ABOUT Y-AXIS LOAD CELL	NA				
MOMENT ABOUT Z-AXIS LOAD CELL	NA				
*CHEST DEFLECTION POTENTIOMETER	NA				
LAP BELT FORCE LOAD CELL	610	3419	LEBOW	10/19/91	04/19/92
SHOULDER BELT FORCE LOAD CELL	590	3419	LEBOW	09/12/91	03/12/92
SHOULDER BELT SPOOL-OUT POTENTIOMETER	0586135	PT-101-40A	CELESCO	11/27/91	05/27/92
SHOULDER BELT STRETCH POTENTIOMETER	NA	2051414101	BOURNES	11/27/91	05/27/92

*HYBRID III USE ONLY.

VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	DUE
LEFT SEAT REAR CROSSMEMBER X-AXIS	CL80H	7264	ENDEVCO	02/06/92	08/06/92
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CT68H	7264	ENDEVCO	03/18/92	03/18/92
ENGINE TOP X-AXIS	BW77J	7264	ENDEVCO	11/27/91	05/27/92
ENGINE BOTTOM X-AXIS	DK62H	7264	ENDEVCO	03/18/92	09/18/92
RIGHT BRAKE CALIPER X-AXIS	CG67H	7264	ENDEVCO	12/16/91	06/16/92
LEFT BRAKE CALIPER X-AXIS	CC30H	7264	ENDEVCO	01/12/92	07/12/92
INSTRUMENT PANEL CENTER X-AXIS	CF08H	7264	ENDEVCO	12/18/91	06/18/92
REAR SEAT CROSSMEMBER CENTER Z-AXIS	CJ39H	7264	ENDEVCO	01/17/92	07/17/92
VEHICLE REAR CENTER Z-AXIS	CH24H	7264	ENDEVCO	12/02/91	06/22/92

CALIBRATION LABORATORY INSTRUMENTS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	DUE
NECK BENDING PENDULUM ACCEL.	CC44	7232	ENDEVCO	04/06/92	10/06/92
NECK BENDING ROTARY POTENTIOMETER	NA	35435-1-102	BOURNES	MFR. SPECIFICATION	
NECK BENDING LINEAR POTENTIOMETER	NA	5184-2051846003	BOURNES	04/06/92	10/06/92
THORAX/HYBRID II FEMUR PEND. ACCEL.	CC64	7232	ENDEVCO	04/06/92	10/06/92
LUMBAR FLEXION FORCE GAUGE	NA	DPPH-50	CHATILLON	05/03/89	REPAIRED
LUMBAR FLEXION ROTATION GAUGE	CP17-0601-1	7020	HUMPHREY	MFR. SPECIFICATION	
ABDOMEN COMPRESSION DISPL. GAUGE	4075-172	80294-2051941504	BOURNES	04/06/92	10/06/92
ABDOMEN COMPRESSION FORCE GAUGE	1261	3167	LEBOW	04/08/92	10/08/92
HYBRID III FEMUR PEND. ACCEL.	CG83	7232	ENDEVCO	04/06/91	10/06/92

SIGN CONVENTION

NHTSA DATA TAPE REFERENCE GUIDE

ACCELEROMETERS:

+X: FORWARD

+Y: LEFTWARD

+Z: UPWARD

POTENTIOMETERS:

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

LOAD CELLS:

+FEMUR FORCE: TENSION

+SEAT BELT FORCE: TENSION

+BARRIER FORCE: TENSION

NECK LOAD CELLS:

+X FORCE: HEAD PUSHED FORWARD

+Y FORCE: HEAD PUSHED LEFTWARD

+Z FORCE: HEAD PULLED UPWARD (TENSION ON NECK)

+X MOMENT: RIGHT EAR ROTATING TOWARD RIGHT SHOULDER

+Y MOMENT: CHIN ROTATING TOWARD CHEST

+Z MOMENT: CHIN ROTATING TOWARD LEFT SHOULDER

TIBIA LOAD CELLS:

+X FORCE: TENSION

+Y FORCE: TENSION

+Z FORCE: TENSION

+X MOMENT: BOTTOM OF TIBIA MOVING LEFTWARD

+Y MOMENT: BOTTOM OF TIBIA MOVING REARWARD

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

APPENDIX E

RESTRAINT SYSTEM INSTRUCTIONS FROM OWNER'S MANUAL

Part 1
Seats & Safety Belts

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

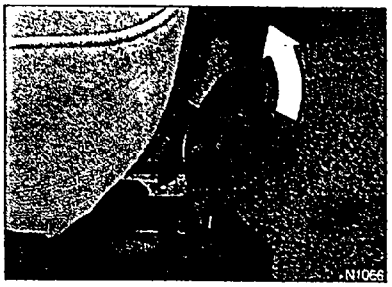
■ Seats and Seat Controls

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

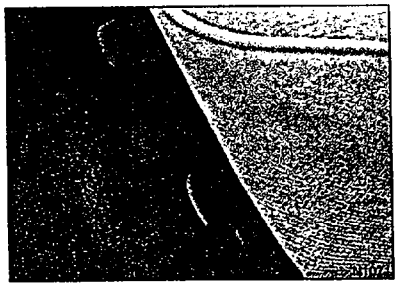
Manual Front Seat

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 control lever under the front of the 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.

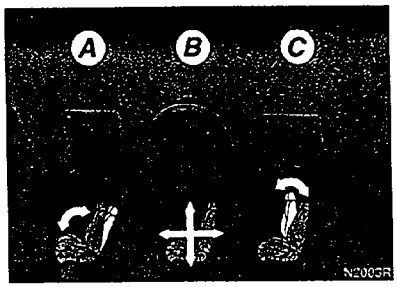


Manual 4-Way Adjustable Seat *(OPTION)*

There are two levers at the front of the seat. The left lever adjusts the seat forward and back. The right lever adjusts the angle of the front seat.

To Adjust the Seat's Forward and Rearward Movement: Lift the left lever up and adjust the seat forward or back. Then release the lever and try to move the seat to be certain that it is locked in place.

To Raise or Lower the Front of the Seat: Lift the right lever, and lean forward or backward.



Power Seat Controls *(OPTION)*

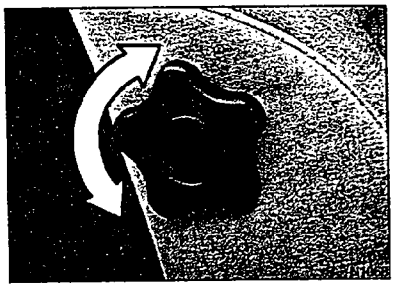
To adjust the power seat on some models:

Front Control (A): Raise the front of the seat by holding the switch up. Lower the front of the seat by holding the switch down.

Center Control (B): Move the seat forward or back by holding the control to the front or back.

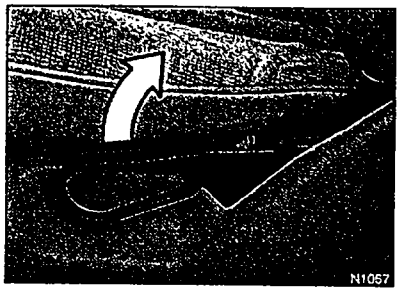
Move the seat higher by holding the control up. Lower the seat by holding the control down.

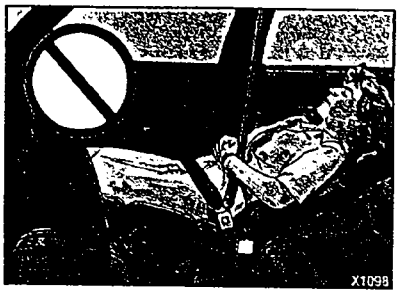
Rear Control (C): Raise the rear of the seat by holding the switch up. Lower the rear of the seat by holding the switch down.



Manual Lumbar Support

Turn the knob on the side of the driver's seat clockwise to increase support to the lower back. Turn the knob counter-clockwise to decrease support.





Manual Reclining Seatback

To adjust the seatback, lift the lever on the outer side of the seat and move the seatback where you want it. Release the lever to lock the seatback.

Pull up on the lever and the seat will go to an upright position.

But don't have a seatback reclined if your vehicle is moving.

CAUTION

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

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

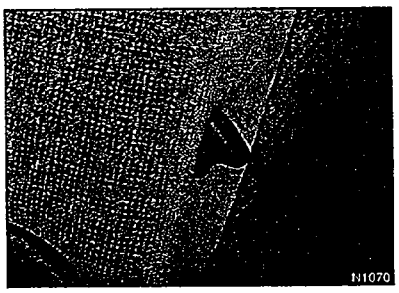
The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones. This could cause serious internal injuries.

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

Head Restraints

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

This position reduces the chance of a neck injury in a crash.



Front Seatback Latches

(2-DOOR MODELS)

The front seatback folds forward to let people get into the back seat. Your seatback will move back and forth freely, unless you come to a sudden stop. Then it will lock into place.

There's one time the front seats may not fold without some help from you. That's if your vehicle is parked going down a fairly steep hill.

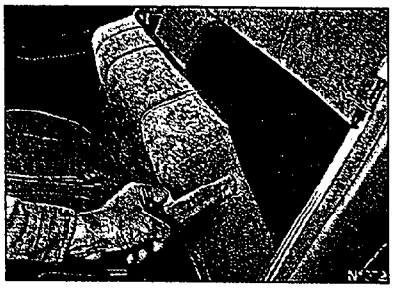
To fold a front seatback forward, push the seatback toward the rear seat as you lift this latch. Then the seatback will fold forward. The latch must be down for the seat to work properly.

Easy-Entry Seat

(2-DOOR MODELS)

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

- When you tilt the right front seatback fully forward, the whole seat will slide forward.
- After someone gets into the rear seat area, move the right front seatback to its original position. Then move the seat rearward until it locks.



Easy-Entry Seat (CONT.)

CAUTION

⚠ If an easy-entry right front seat isn't locked, it can move. In a sudden stop or crash, the person sitting there could be injured. After you've used it, be sure to push rearward on an easy-entry seat to be sure it is locked.

To get out, again tilt the seatback fully forward.

Split Fold-Down Rear Seat (OPTION)

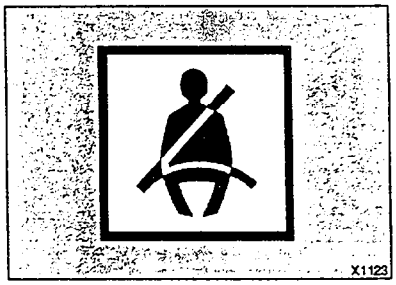
To Open: Pull forward on the seat tab.

To Close: Push the seatback up to its original position.

To make sure the seatback latches securely, push it into a fully upright position. A loose seatback can cause an injury in a sudden stop.

■ Safety Belts: They're For Everyone

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



CAUTION

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

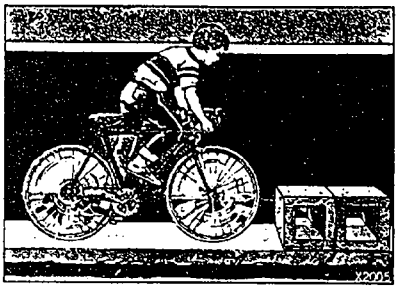
This figure lights up when you turn the key to **Run** or **Start** when your safety belt isn't buckled, and you'll hear a chime, too. It's the reminder to buckle up. In many states and Canadian provinces, the law says to wear safety belts. Here's why: **They work.**

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!

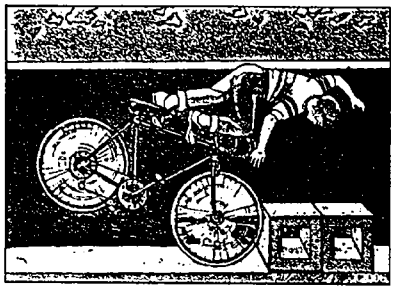
Seats & Safety Belts



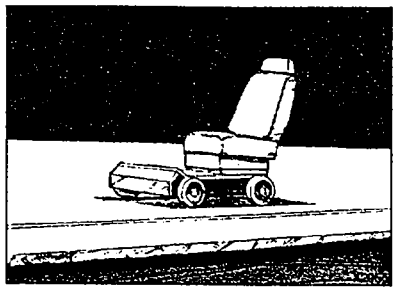
Why Safety Belts Work

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

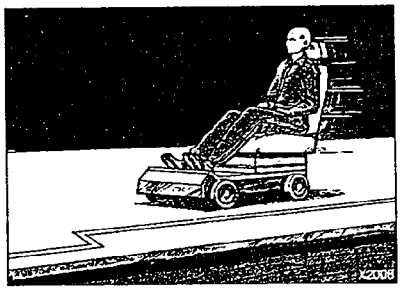
1. For example, if the bike is going 10 mph (16 km/h), so is the child.



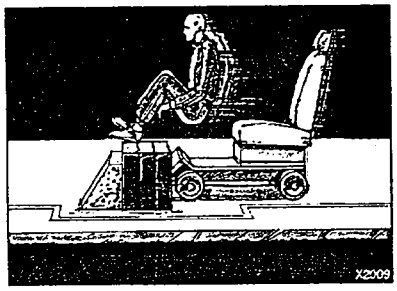
2. When the bike hits the block, it stops. But the child keeps going!



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



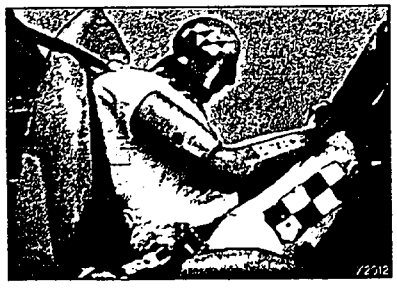
4. Put someone on it.



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

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

7. or the instrument panel...



8. or the safety belts!

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

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

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

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

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

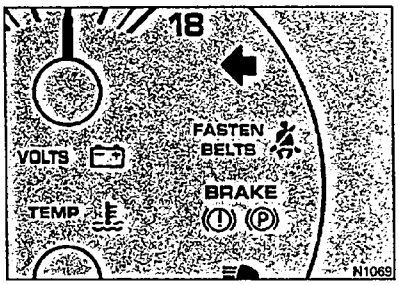
A: "Air bags," or Supplemental Inflatable Restraint systems, are in some vehicles today and will be in more of them in the future. But they are supplemental systems only—so they work with safety belts, not instead of them. Every "air bag" system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has "air bags," you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

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

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

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

Safety belts are for everyone.



Safety Belt Warning Light

When the key is turned to **Run** or **Start**, a chime will come on for about eight seconds to remind people to fasten their safety belts, unless the driver's safety belt is buckled.

The safety belt light will also come on and stay on for about a minute. If the driver's belt is buckled, neither the chime nor the light will come on.

CAUTION

If your safety belt light ever comes on or stays on after the front doors are closed and the driver's belt is buckled, have your vehicle fixed.

If you don't, you might not have the protection you'd need in a crash.

■ How to Wear Safety Belts Properly—Adults

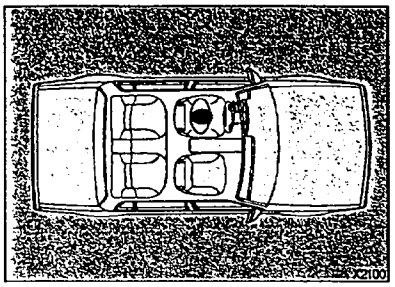
This section is only for people of adult size.

CAUTION

There are special things to know about safety belts and children. And there are different rules for babies and smaller children. If a child will be riding in your Oldsmobile, see the *Index* under *Children and Safety Belts*. Follow those rules for everyone's protection.

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

Seats & Safety Belts



Vehicles First Sold in Canada

Was your Oldsmobile first sold, when new, in Canada? (If it was, a sticker on the driver's door will say "conforms to all applicable Canada motor vehicle..." etc.) If so, then the rest of Part 1 does not apply to your vehicle.

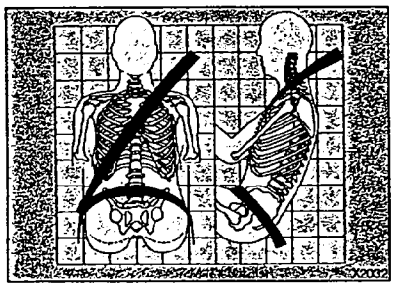
To learn how to use your safety belts, please read the **Owner's Manual Safety Belt Supplement**. It comes with every new Oldsmobile first sold in Canada.

Driver Position

This section describes the driver's restraint system.

Automatic Lap-Shoulder Belt

This safety belt is called "automatic" because you don't have to buckle up when you get into your vehicle.



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

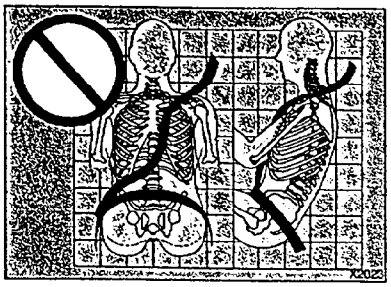
Just get into your vehicle. Then close and lock your door. Adjust the seat (to see how, see the *Index* under *Seat Controls*) so you can sit up straight.

The lap belt should be as low on the hips as possible. 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 if there's a sudden stop or a crash.

It's possible that an automatic belt could keep you from fully opening a door. That can happen if the door was slammed shut very hard. Just close the door all the way, then slowly open it. If that doesn't fix it, then your Oldsmobile needs service.

We hope you will always keep your automatic belt buckled. However, you may need to unbuckle it in an emergency.



Automatic Lap-Shoulder Belt
(CONT.)

To unbuckle the automatic belt, just push the button on the buckle.

To reattach the automatic belt:

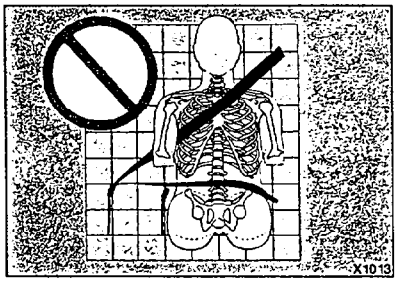
1. Close and lock the door.
2. Adjust the seat (to see how, see the *Index* under *Seat Controls*) so you can sit up straight.
3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks.

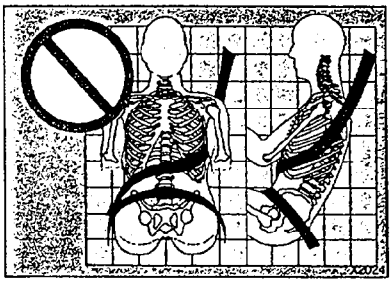
Q: What's wrong with this?

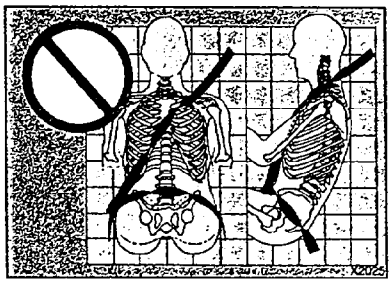
A: The shoulder belt is too loose. It won't give nearly as much protection this way.

CAUTION

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







Q: What's wrong with this?

A: The belt is buckled in the wrong place.

CAUTION

⚠ You can be seriously injured if your 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.

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

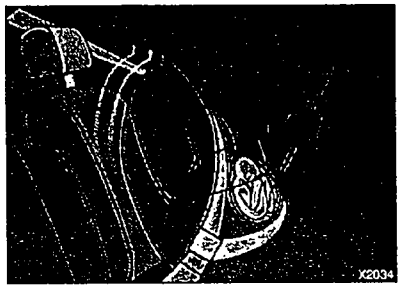
⚠ You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely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

Q: What's wrong with this?

A: The belt is twisted across the body.

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.

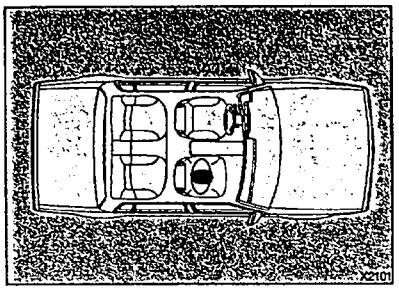


Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.

A pregnant woman should wear a lap-shoulder belt and the lap portion should be worn as low as possible throughout the pregnancy.

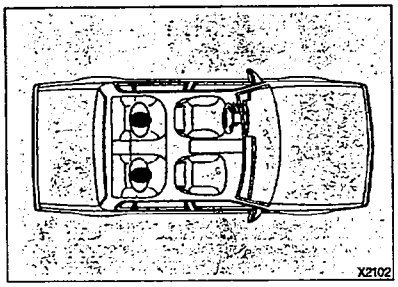
The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.



Right Front Passenger Position

The right front passenger's safety belt works the same way as the driver's safety belt. See the *Index* under *Driver Position.*

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



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.

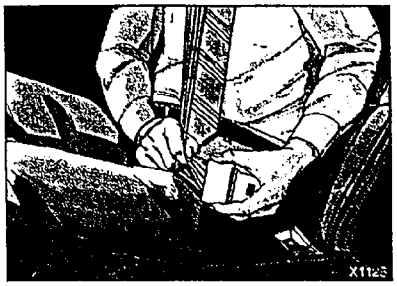
Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

Rear Seat Outside Passenger 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.



Rear Seat Outside Passenger Positions (CONT.)

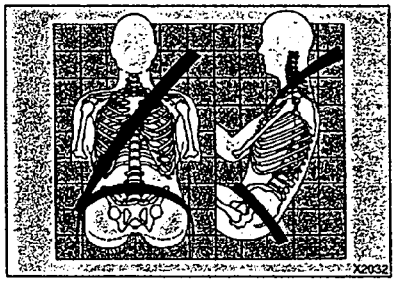
2. Push the latch plate into the buckle until it clicks.

If the belt is not long enough, see the *Index* under *Safety Belt Extender.*

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.

If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it.

To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.



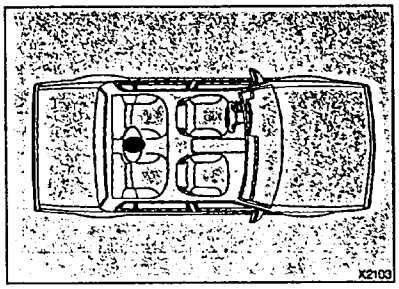
The lap part of the belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even 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 if there's a sudden stop or a crash.

CAUTION

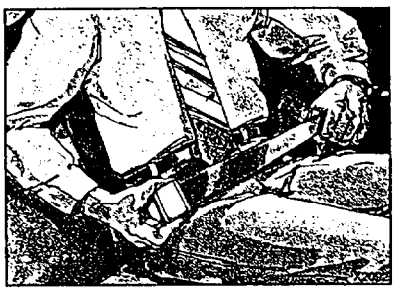
⚠ You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

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



Center Passenger Position

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



When you sit in a center seating position, you have a lap safety belt, which has no retractor.

To make the belt longer, tilt the latch plate and pull it along the belt.

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

Buckle, position and release it the same way as a lap-shoulder belt.

If the belt isn't long enough, see the *Index* under *Safety Belt Extender.*

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.

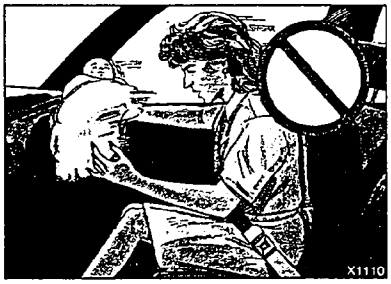
■ Children

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 might not 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.

(Continued)

Smaller Children and Babies (CONT.)

CAUTION

(Continued)
Secure the baby in an infant restraint.

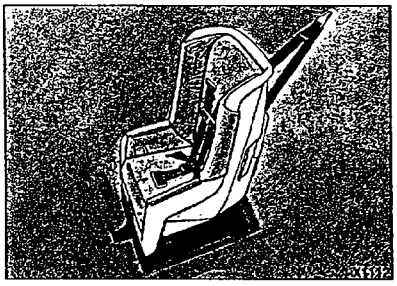
Child Restraints

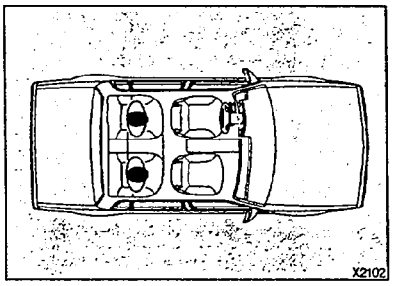
Be sure to follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. The instructions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

Where to Put the Restraint

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

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





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.

Top Strap

If your child restraint has a top strap, it should be anchored. If you need to have an anchor installed, you can ask your Oldsmobile dealer to put it in for you. If you want to install an anchor yourself, your dealer can tell you how to do it.

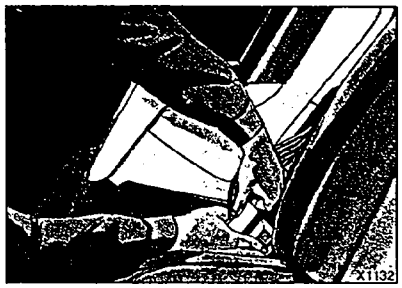
Vehicles first sold in Canada have child restraint anchor bracket hardware in the glove box, along with instructions for installing it. This should be used only with a child restraint, and only to secure a child restraint at the rear seating positions. Additional anchor brackets for child restraints at one or both of the rear seating positions are available at Oldsmobile dealerships in Canada.

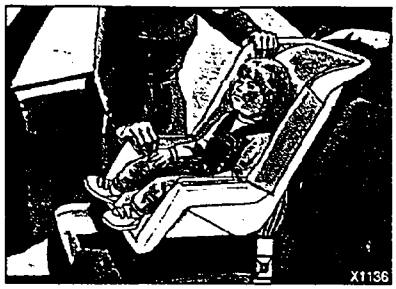
Securing a Child Restraint in a Rear Outside Position

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

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





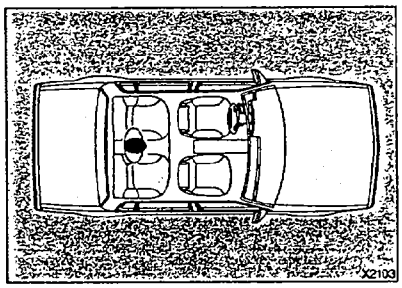
Securing a Child Restraint in a Rear Outside Position (CONT.)

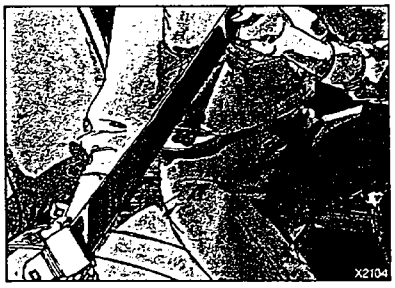
4. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.

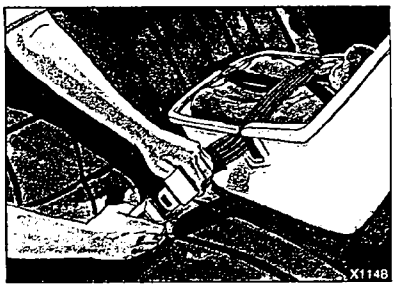
5. To tighten the belt, pull up on the shoulder belt while you push down on the child restraint.

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

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



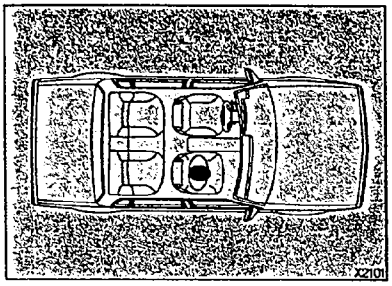


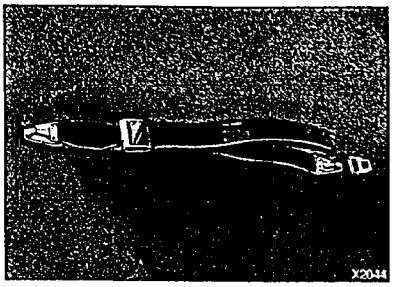


Securing a Child Restraint in a Center Seat Position

When you secure a child restraint in a center seating position, you'll be using the lap belt. See the *Index* under *Top Strap*, if the child restraint has one.

1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
2. Put the restraint on the seat. Follow the instructions for the child restraint.
3. Secure the child in the child restraint as the instructions say.
4. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.
5. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.





Securing a Child Restraint in a Center Seat Position (CONT.)

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.

Securing a Child Restraint in the Right Front Seat

To use a child restraint here, you will need a special infant/child seat attaching belt and the hardware that goes with it. See the earlier section about the top strap if the child restraint has one.

Your dealer can get these and install the hardware for you. It's free. The special belt is GM Part Number 12340286. Your dealer can find the correct hardware in the safety belt section of the GM Parts Catalog.

CAUTION

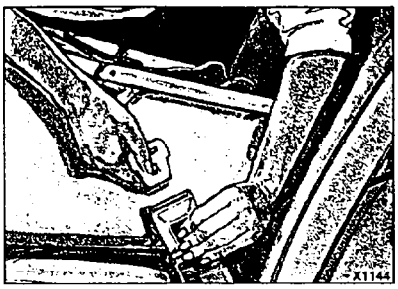
⚠ Don't use the special infant/child seat attaching hardware in another vehicle. If you do, it may not work well and the child may not be protected properly in a crash. The special hardware is for your vehicle only.

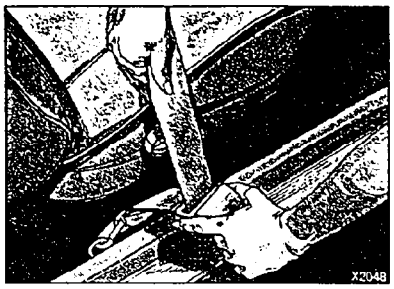
Also, don't use the special belt for anything but securing a child restraint in the right front seat. If an adult or older child uses it, the belt won't provide protection and may even increase injury in a crash.

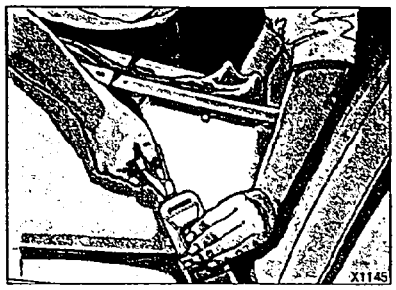
Once the special hardware is installed, please follow the instructions with it, and these easy steps:

1. Unbuckle the automatic lap-shoulder belt by pushing the button on the buckle. It will stay on the door, ready to be rebuckled for use by adults or older children.

2. Snap one hook of the infant/child seat attaching belt near the floor at the door side of the seat.

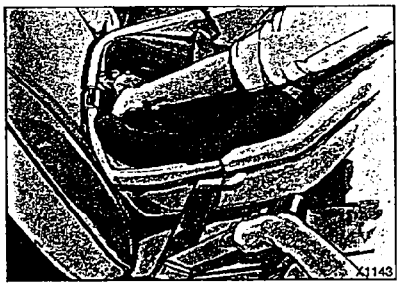


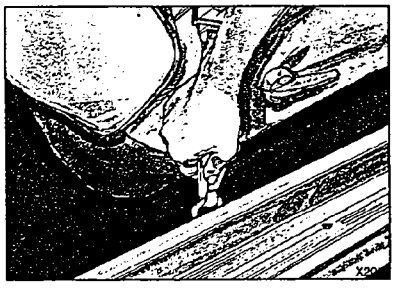




Securing a Child Restraint in the Right Front Seat (CONT.)

3. Put the belt's special latch plate into the vehicle's safety belt buckle.
4. You can make the belt longer by tilting the buckle and pulling it along the belt.
5. Put the restraint on the seat. Follow the instructions for the child restraint.
6. Secure the child in the child restraint as the instructions say.
7. Run the belt through or around the child restraint. The child restraint instructions will show you how.
8. Put the hook on the free end through the slot in the latch plate.

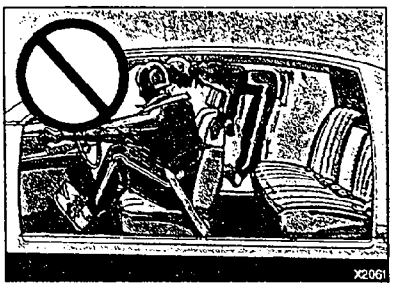




9. To make it tight, pull the belt while you push down on the child restraint. If the belt won't stay tight, switch it end for end.
10. Push and pull the child restraint in different directions to be sure it is secure.

To Remove the Infant/Child Seat Restraint:

1. Push the button on the safety belt buckle and remove the special latch plate. Leave the latch plate on the special belt.
2. Push the spring on the hook near the door and remove the special belt.
3. Put the belt away in a safe place in your vehicle, so it won't fly around in a crash and injure someone.
4. Remember to reattach the automatic belt again, once the child restraint is removed. Be sure it isn't twisted.



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 be thrown out in a crash.
- Children who aren't buckled up can strike other people who are.

CAUTION

⚠ **Never do this.**

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

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

A: Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide.

If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in the center seat position, the one that has only a lap belt.

CAUTION

⚠ **Never do this.**

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

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

Safety Belt Extender

If the vehicle's safety belt will fasten around you, you should use it. The automatic lap-shoulder belt has plenty of extra length built in, so it will fasten around almost all people. But if a safety belt isn't long enough to fasten, your dealer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

Checking Your Restraint Systems

Now and then, make sure all your belts, buckles, latch plates, retractors, anchorages and reminder 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.

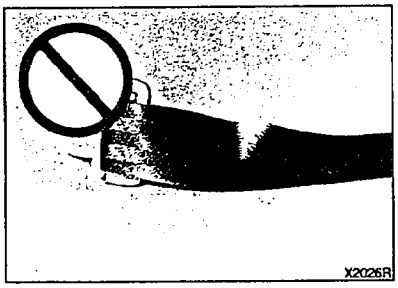
Replacing Safety Belts After a Crash

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 belts are cut or damaged, replace them. Collision damage also may mean you will have to have safety belt parts, like the retractor, replaced or anchorage locations repaired—even if the belt wasn't being used at the time of the collision.

If your seat adjuster won't work after a crash, the special part of the safety belt that goes through the seat to the adjuster may need to be replaced.



Q: What's wrong with this?

A: The belt is torn.

CAUTION

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