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REPORT NO. TRC-91-N12

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

ISUZU MOTORS, LTD.

1992 ISUZU TROOPER

4-DOOR MULTIPURPOSE PASSENGER VEHICLE

NHTSA NO. MN5701

TRC TEST NO. 920422

PREPARED BY:

TRANSPORTATION RESEARCH CENTER INC.

10820 STATE ROUTE 347

EAST LIBERTY, OHIO 43319

MAY 15, 1992

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

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WASHINGTON, D.C. 20590

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REPORT PREPARED BY:

Craig A. Markusic Date 5/15/92

Craig A. Markusic, Project Engineer
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REPORT APPROVED BY:

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C. Kay Latimer, Project Manager
Transportation Research Center Inc.

FINAL REPORT ACCEPTED BY:

_____ Date _____

Manager, New Car Assessment Program
NHTSA, Office of Market Incentives

_____ Date _____

Contracting Officer's Technical Representative (COTR),
NHTSA, Office of Market Incentives

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16. Abstract

A 35 mph frontal load cell barrier impact test was conducted on a 1992 Isuzu Trooper 4-door multipurpose passenger vehicle, NHTSA No. MN5701, at the Transportation Research Center Inc. on April 22, 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 24.3 inches. The ambient temperature was 70° F.

The driver's head injury criteria (HIC) was 1219. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 58.8 g. The driver's chest maximum deflection was 2.4 inches. The driver's right femur maximum axial force was 352 pounds. The driver's left femur maximum axial force was not reported due to the recording of questionable data during the impact event. (See DATA ACQUISITION EXPLANATIONS)

The passenger's head injury criteria (HIC) was 1258. The passenger's chest maximum resultant accceleration with three (3) milliseconds minimum duration was 54.6 g. The passenger's chest maximum deflection was 2.2 inches. The passenger's left and right femur maximum axial forces were 808 pounds and 1179 pounds, respectively.

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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

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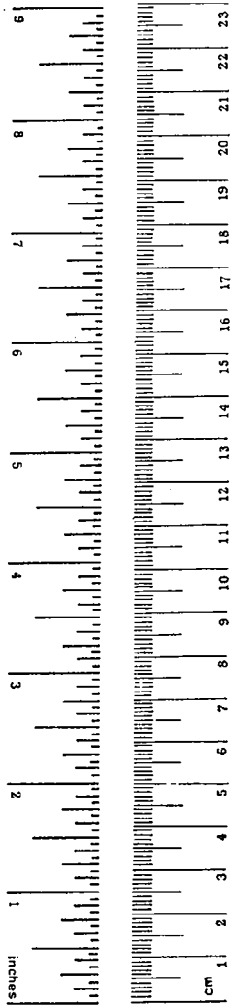
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

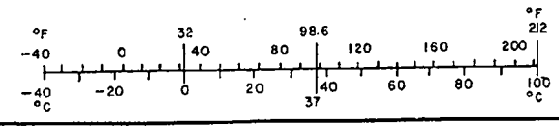
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (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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920422

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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 Isuzu Trooper 4-door multipurpose passenger vehicle, NHTSA No. MN5701, 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 572E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedures specified in Appendices VII and VIII of the Laboratory Indicant Test Procedure.

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

The eighty-three (83) data channels were multiplexed and recorded on two (2) 14-track tape drives. The data was digitally sampled at 8000 samples per second and processed per section IP11 of the Laboratory Indicant Test Procedure.

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

The vehicle, occupant, and load cell barrier data are presented in Section 2.0. The 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 22, 1992.

The test vehicle, a 1992 Isuzu Trooper 4-door multipurpose passenger vehicle, NHTSA No. MN5701, was equipped with a 3.2 liter inline engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 4910 pounds. The vehicle's impact speed was 35.2 mph. The vehicle sustained 24.3 inches of static crush during the impact.

The driver's head injury criteria (HIC) was 1219. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 58.8 g. The driver's chest maximum deflection was 2.4 inches. The driver's right femur maximum axial force was 352 pounds. The driver's left femur maximum axial force was not reported due to the recording of questionable data during the impact event. (See DATA ACQUISITION EXPLANATIONS.)

The passenger's HIC was 1258. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 54.6 g. The passenger's chest maximum deflection was 2.2 inches. The passenger's left and right femur maximum axial forces were 808 pounds and 1179 pounds, respectively.

DATA ACQUISITION EXPLANATIONS

The driver's shoulder belt extension potentiometer, SBED1, lost data at 210 milliseconds due to the cable being pulled out of the potentiometer on impact.

The engine top X-axis accelerometer, ENGXG1, lost data at 13 milliseconds due to the accelerometer cable being cut by the vehicle's crush upon impact.

The engine bottom X-axis accelerometer, ENGXG2, lost data at 46 milliseconds due to the accelerometer being damaged by the vehicle's crush upon impact.

The right rear seat X-axis accelerometer, TRRXG1, did not return to zero after the impact event. This zero shift affected the right rear seat X-axis velocity and displacement calculations.

The vehicle rear center Z-axis accelerometer, RDKZG1, recorded questionable data spikes at 26 and 33 milliseconds. The data spikes affected the vehicle rear center Z-axis velocity and displacement calculations.

The driver's left femur load cell, LFMF1, recorded questionable data.

The barrier load cell, BB4F, did not return to zero after the impact event. This zero shift affected the load cell barrier group number 2 total force calculation and the total load cell barrier force calculation.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: MN5701 TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 04/22/92 TEST TIME: 1559 AMBIENT TEMP. (°F): 70

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1992/Isuzu/Trooper/4-door multipurpose passenger vehicle

VEHICLE TEST WEIGHT (LBS): 4910

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 24.3

AVERAGE REBOUND (IN): 19.5

DUMMIES:	Driver #192	Passenger #142
TYPE:	Part 572 E	Part 572 E
LOCATION:	Left front	Right front
RESTRAINT:	3-point Unibelt	3-point Unibelt

NUMBER OF DATA CHANNELS: 83

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: Isuzu Motors, Ltd. in Japan

MAKE/MODEL: Isuzu/Trooper VIN: JACDH58V3N7902842

BODY STYLE: 4-door multipurpose passenger vehicle MODEL YEAR: 1992

NHTSA NO.: MN5701 COLOR: Red

ENGINE DATA: TYPE: Inline CYLINDERS: 6 DISPLACEMENT: 3.2 liter

TRANSMISSION DATA: _4_ SPEED, ___MANUAL, _X_ AUTOMATIC, ___FWD, ___RWD, _X_ 4WD

DATE VEHICLE RECEIVED: 04/13/92 ODOMETER READING: 92.0

DEALER'S NAME AND ADDRESS: Hatfield Isuzu
1400 Automall Dr.
Columbus, OH 43228

ACCESSORIES:

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

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Isuzu Motors, Ltd. in Japan

DATE OF MANUFACTURE: 12/91 VIN: JACDH58V3N7902842

GVWR: 5510 LBS

GAWR: FRONT: 2755 LBS., REAR: 3085 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Bridgestone, Dueller 684, 245/70R16

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

SPARE TIRE (MFR., LINE, SIZE): Bridgestone, Dueller 684, 245/70R16

TYPE OF SEATS: FRONT: Bucket
REAR: Split Bench

TYPE OF FRONT SEAT BACKS: Manually-adjustable

MAXIMUM WIDTH: 68.2 INCHES

WHEELBASE: 109.0 INCHES

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the driver's side B-pillar.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: 245/70R16

RECOMMENDED COLD TIRE PRESSURE: FRONT: 30 PSI; REAR: 35 PSI

DESIGNATED SEATING CAPACITY: NA FRONT NA REAR NA TOTAL

VEHICLE CAPACITY WEIGHT: NA LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE:	LF	34.2;	RF	34.1;	LR	34.1;	RR 34.0
PRE-TEST ATTITUDE:	LF	33.4;	RF	33.0;	LR	32.6;	RR 32.5
POST-TEST ATTITUDE:	LF	37.1;	RF	35.0;	LR	32.9;	RR 32.1

*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	1065 LBS.	RIGHT REAR	1071 LBS.
LEFT FRONT	1127 LBS.	LEFT REAR	1031 LBS.
TOTAL FRONT WEIGHT	2192 LBS.	(51.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	2102 LBS.	(49.0% OF TOTAL VEHICLE WEIGHT)	

TOTAL DELIVERED WEIGHT 4294 LBS.

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (4294 LBS)

VCW = VEHICLE CAPACITY WEIGHT (NA LBS)

DSC = DESIGNATED SEATING CAPACITY (NA)

RCLW*= VCW - 150 (DSC) = 300

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

TARGET TEST WEIGHT = 4294 + 300 + 334

TARGET TEST WEIGHT = 4928 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 282 LBS. OF CARGO WEIGHT:

RIGHT FRONT	1163 LBS.	RIGHT REAR	1311 LBS.
LEFT FRONT	1187 LBS.	LEFT REAR	1249 LBS.
TOTAL FRONT WEIGHT	2350 LBS.	(47.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	2560 LBS.	(52.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	4910 LBS.	(0.4% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 50 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 56.8 INCHES REARWARD OF FRONT WHEEL CENTERLINE

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

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 920422 NHTSA NO.: MN5701

TEST DATE: 04/22/92 TEST TIME: 1559

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

AMBIENT TEMPERATURE AT IMPACT AREA: 70° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 70° 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 182.8; C 187.8; R 182.8

POST-TEST: L 163.1; C 163.5; R 162.2

TOTAL CRUSH: L 19.7; C 24.3; R 20.6

AVERAGE CRUSH: 21.5

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 19.5; C 18.8; R 20.2; AVG. 19.5

TABLE 4 FUEL SYSTEM DATA

MAKE/MODEL: Isuzu/Trooper

NHTSA NO.: MN5701

FUEL SYSTEM CAPACITY: 22.5 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 22.2 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 20.4 GALLONS TO 20.9 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 20.6 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

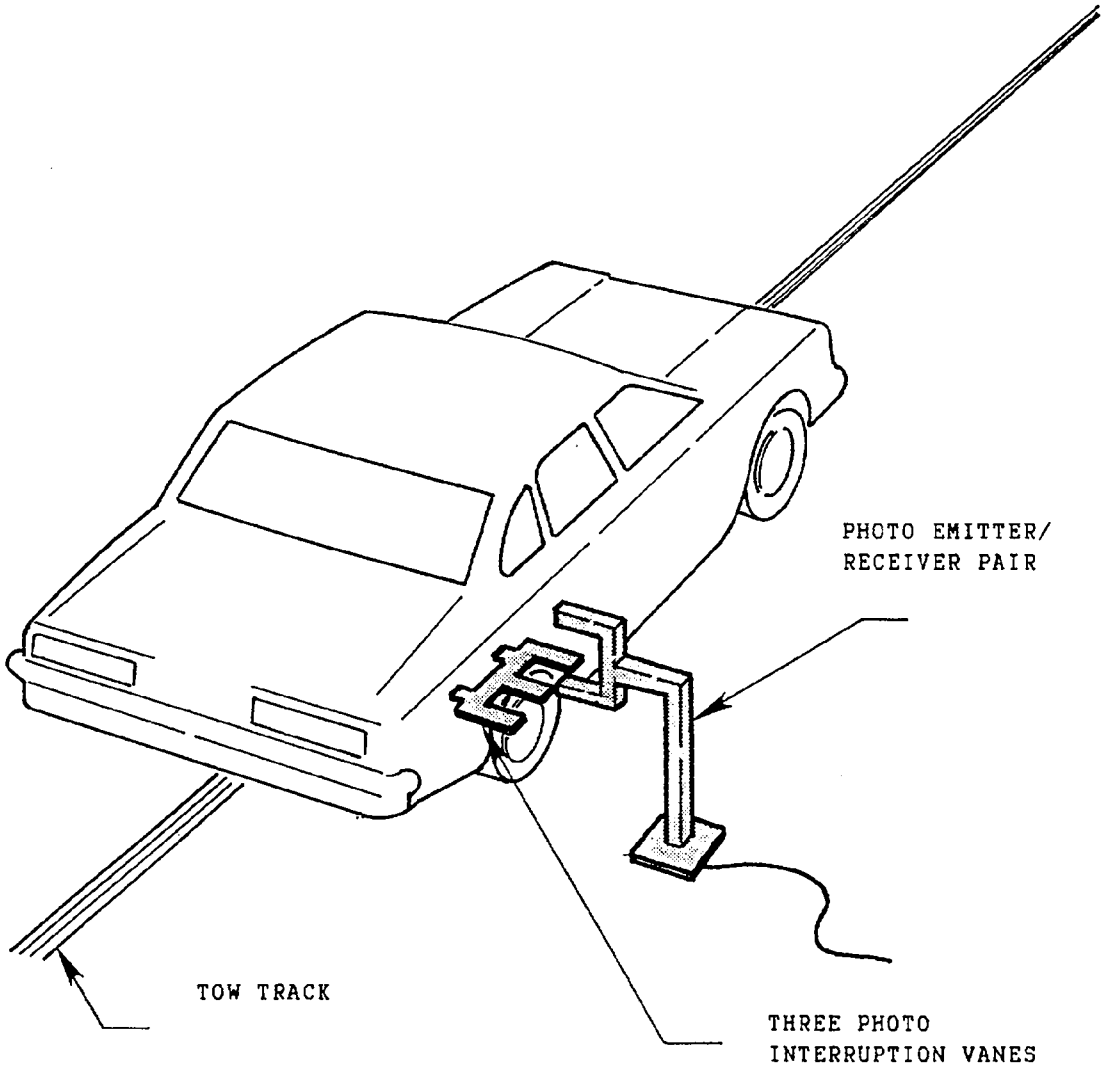
TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel filler is on the right side. The fuel tank is behind the rear axle. The fuel lines run along the right 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: Isuzu/Trooper/4-door multipurpose veh.

VEHICLE NHTSA NO.: MN5701 ; VIN: JACDH58V3N7902842

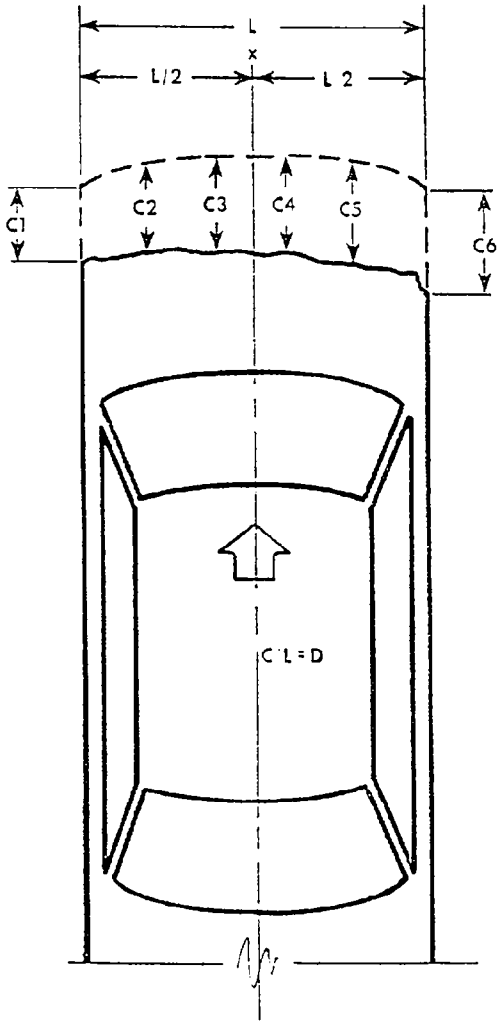
MODEL YEAR: 1992 ; BUILD DATE: 12/91 ; TEST DATE: 04/22/92

VEHICLE SIZE CATEGORY: Special purpose ; TEST WEIGHT: 4910 LBS.

VEHICLE WHEELBASE: 109.0 INCHES

MAXIMUM WIDTH: 68.2 INCHES

FRONT OVERHANG: 30.9 INCHES



COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH MEASUREMENTS:

C1 = 19.7 INCHES

C2 = 22.3 INCHES

C3 = 24.1 INCHES

C4 = 24.3 INCHES

C5 = 22.6 INCHES

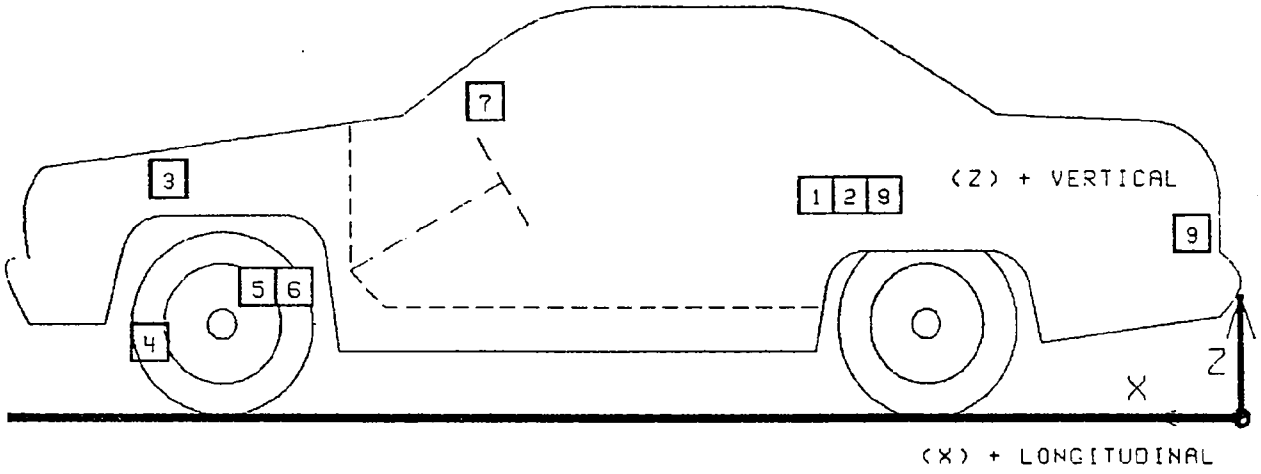
C6 = 20.6 INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

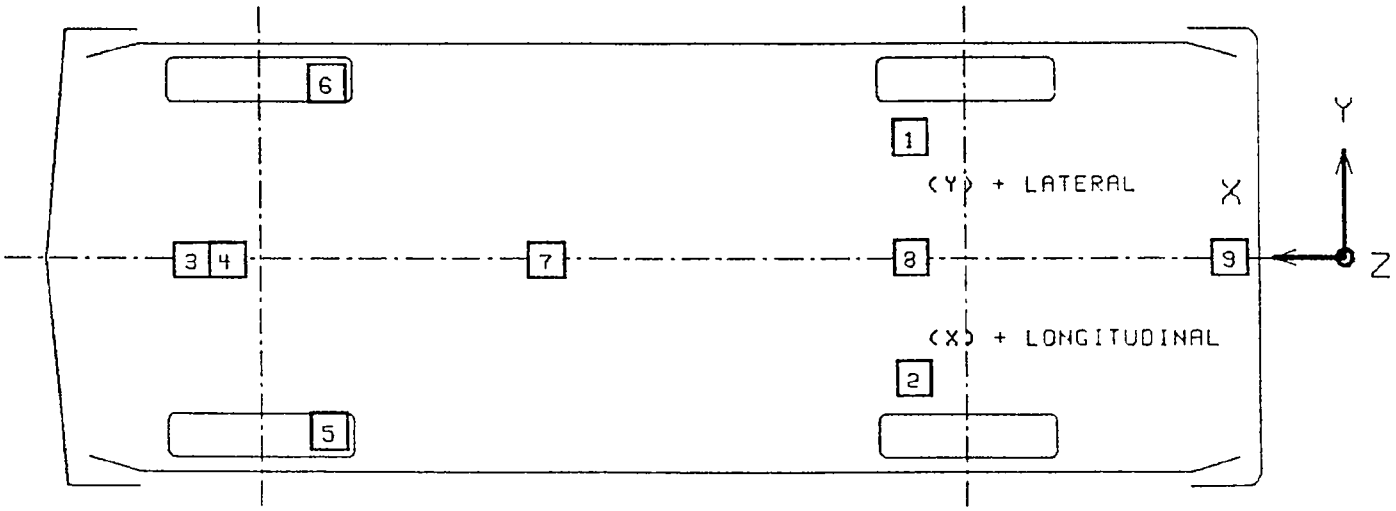
LENGTH OF DAMAGED REGION: L = 61.0 INCHES

FIGURE 3

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 920422

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	66.4	17.4	26.3	2.2	121.1	42.2	23.4
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	66.4	-17.4	26.8	9.5	111.9[Y]	43.6	35.0[Y]
3	ENGINE TOP LONGITUDINAL	155.0	-0.6	30.9	---	---[Y]	---	---[Y]
4	ENGINE BOTTOM LONGITUDINAL	146.2	1.2	13.0	146.8	37.4[Y]	133.3	33.1[Y]
5	RIGHT BRAKE CALIPER LONGITUDINAL	144.4	-24.2	14.2	17.4	59.1	81.3	19.3
6	LEFT BRAKE CALIPER LONGITUDINAL	144.4	24.2	14.1	21.4	54.6	83.2	34.9
7	INSTRUMENT PANEL CENTER LONGITUDINAL	122.8	1.9	51.4	49.8	100.5	71.0	49.1
8	REAR SEAT CROSSMEMBER CENTER VERTICAL	66.4	-0.4	26.8	11.6	50.9	23.0	31.3
9	VEHICLE REAR CENTER VERTICAL	11.4	-0.6	27.5	96.9	33.6[Y]	11.4	97.5[Y]

* 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 #192	PASSENGER #142
HEAD	Steering wheel hub & upper rim & Instrument panel	Instrument panel
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	Difficult, tools required	Difficult, tools required
REAR	Easy	Easy

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/Isuzu/Trooper/4-door multipurpose

VEH. NHTSA NO.: MN5701 ; TEST DATE: 04/22/92

MAXIMUM ACCELERATIONS (G):	DRIVER DUMMY #192	PASSENGER DUMMY #142
HEAD X-AXIS	-115.4	-106.5
HEAD Y-AXIS	-18.1	8.2
HEAD Z-AXIS	-49.4	-63.3
HEAD RESULTANT	117.7	111.1
CHEST X-AXIS	-56.8	-54.4
CHEST Y-AXIS	-6.7	6.8
CHEST Z-AXIS	-19.0	18.9
CHEST RESULTANT*	58.8	54.6
CHEST RESULTANT TIME INTERVAL (SEC.)*	.003	.003
HEAD INJURY CRITERIA (HIC) VALUES:		
HIC**	1219	1258
HIC STARTING TIME (SEC.)	.061	.070
HIC ENDING TIME (SEC.)	.096	.106
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	66.2	65.7
MAXIMUM CHEST DEFLECTIONS (IN):		
CHEST X-AXIS	2.4	2.2
MAXIMUM CHEST DEFLECTION TIME (SEC.)	.080	.076
MAXIMUM COMPRESSIVE FEMUR FORCES (LBS):		
LEFT FEMUR	---γ	808
RIGHT FEMUR	352	1179
MAXIMUM SEAT BELT FORCES (LBS):		
LAP BELT	1332	1672
SHOULDER BELT	1967	1919

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.

γ See DATA ACQUISITION EXPLANATIONS

TABLE 8 HYBRID III NECK DATA SUMMARY

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1992/Isuzu/Trooper/4-door multipurpose

VEHICLE NHTSA NO.: MN5701 ; TEST DATE: 04/22/92

MAXIMUM VALUES:	DRIVER DUMMY #192	PASSENGER DUMMY #142
NECK X-AXIS FORCE (LBS.)	218	338
NECK Y-AXIS FORCE (LBS.)	73	43
NECK Z-AXIS FORCE (LBS.)	665	660
NECK MOMENT ABOUT X AXIS (FT.-LBS.)	19	-33
NECK MOMENT ABOUT Y AXIS (FT.-LBS.)	-35	-42
NECK MOMENT ABOUT Z AXIS (FT.-LBS.)	-11	7

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

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's chest then impacted the lower steering wheel rim followed by the dummy's head rotating downward impacting the upper steering wheel rim, steering wheel hub, and the instrument panel. The driver dummy was restrained by the three-point unibelt. 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 unibelt.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head then rotated downward impacting the instrument panel. The right front passenger dummy was restrained by the three-point unibelt. The dummy then rebounded rearward into the seat back 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 unibelt.

TABLE 9 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.	103.0	102.8
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	32.8	34.2
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	35.5	36.0
SHOULDER BELT SPOOL-OFF LENGTH:		
AS DETERMINED BY FILM ANALYSIS	2.5	2.8
AS DETERMINED MECHANICALLY	3.4	1.8
AS DETERMINED ELECTRONICALLY	4.0	3.6
BELT STRETCH LENGTH (IN/FT):		
AS MEASURED MECHANICALLY	0.1	0.1
AS MEASURED ELECTRONICALLY	NA*	0.9
RETRACTOR LOCK-UP TIME (MS):		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	64	66

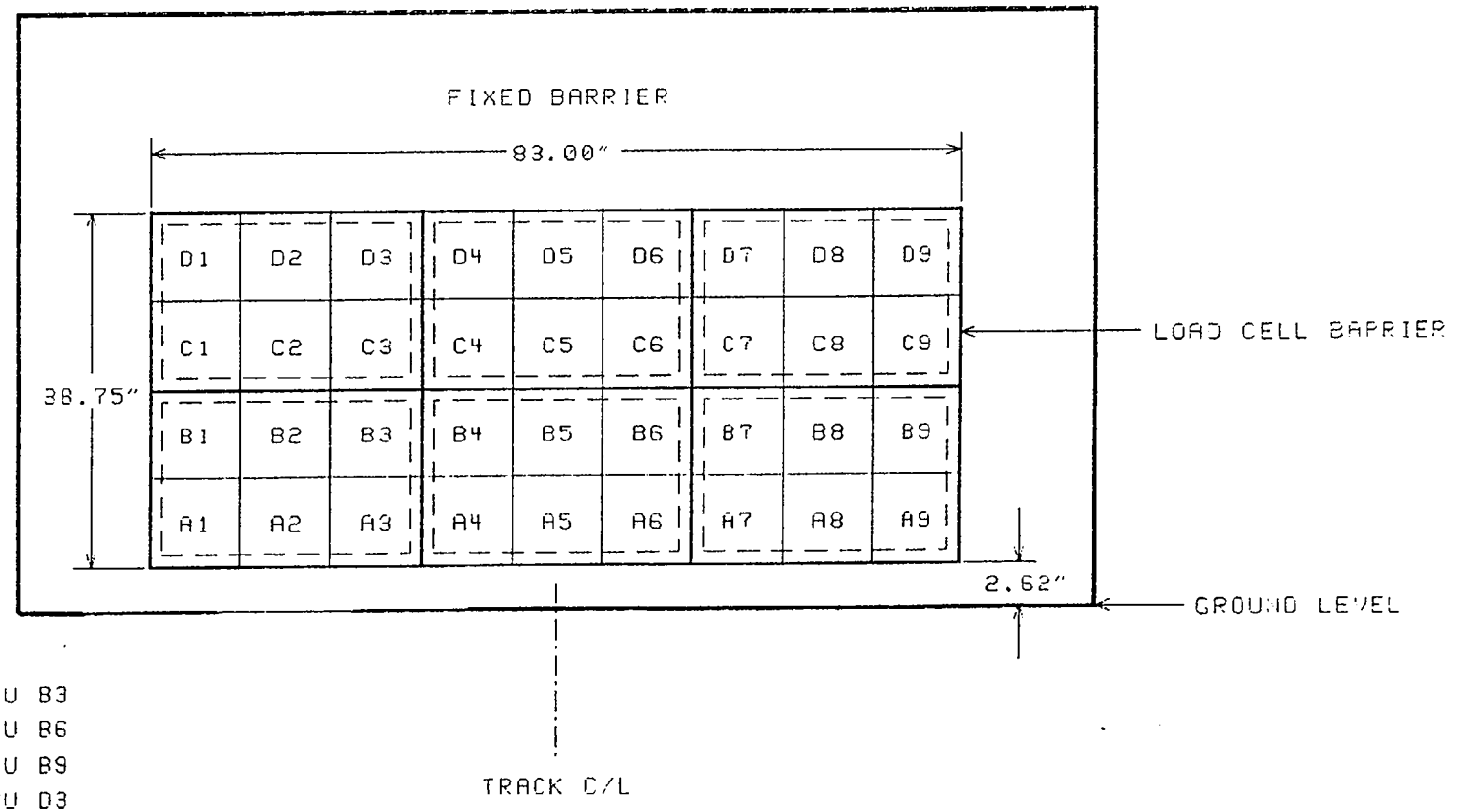
ALL MEASUREMENTS ARE IN INCHES UNLESS OTHERWISE NOTED.
*See DATA ACQUISITION EXPLANATIONS

FIGURE 4

LOAD CELL BARRIER CONFIGURATION

FRONT VIEW

36 LOAD CELLS
4 ROWS
9 COLUMNS



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

TABLE 10

LOAD CELL BARRIER DATA SUMMARY

TEST NUMBER 920422

LOCATION	POSITIVE DIRECTION LB	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION LB	NEGATIVE DIRECTION MSEC
TOTAL GROUP 1	780	319.1	10351	31.3
TOTAL GROUP 2	565	4.1 Y	77594	35.4 Y
TOTAL GROUP 3	1088	8.3	48083	19.0
TOTAL GROUP 4	809	136.5	11786	24.0
TOTAL GROUP 5	464	316.3	74543	35.0
TOTAL GROUP 6	500	317.4	20736	24.5
TOTAL LOAD CELL FORCE	394	317.4 Y	225319	34.9 Y

TENSION IS POSITIVE
COMPRESSION IS NEGATIVE

Y See DATA ACQUISITION EXPLANATIONS

SECTION 3.0

OCCUPANT, CAMERA, & VEHICLE MEASUREMENTS

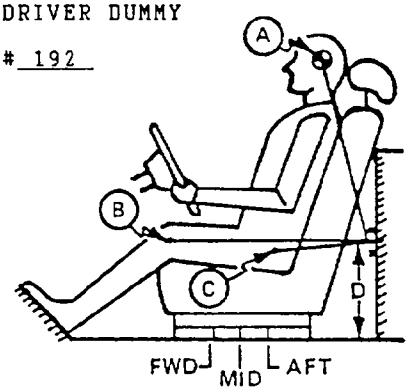
FIGURE 5 DUMMY AND SEAT POSITIONING DATA

TEST NO.: 920422 ; VEHICLE: 1992 Isuzu Trooper

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

DRIVER DUMMY

192

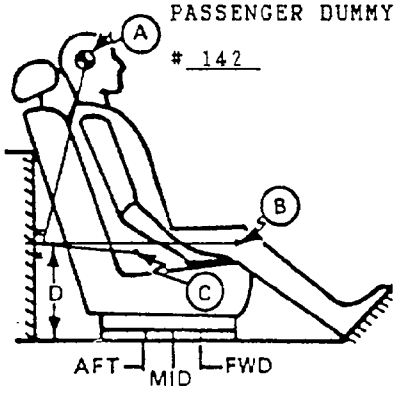


MEASUREMENT LOCATION

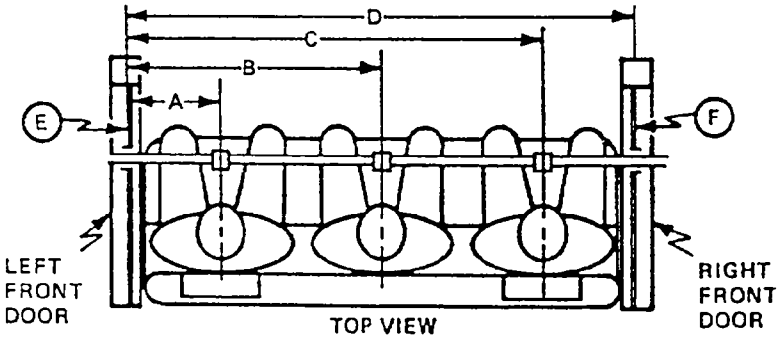
A - HEAD TARGET
B - KNEE JOINT
C - APPROXIMATE 'H' POINT
D - SILL TO DOOR STRIKER REFERENCE POINT

PASSENGER DUMMY

142



A =	26.1 IN.	12 DEGREES	A =	24.8 IN.	9 DEGREES
B =	24.6 IN.	85 DEGREES	B =	25.1 IN.	84 DEGREES
C =	6.0 IN.	90 DEGREES	C =	9.1 IN.	88 DEGREES
D =	14.9 IN.		D =	14.9 IN.	
SEAT TRACK REARWARD:	9 NOTCHES		SEAT TRACK REARWARD:	9 NOTCHES	

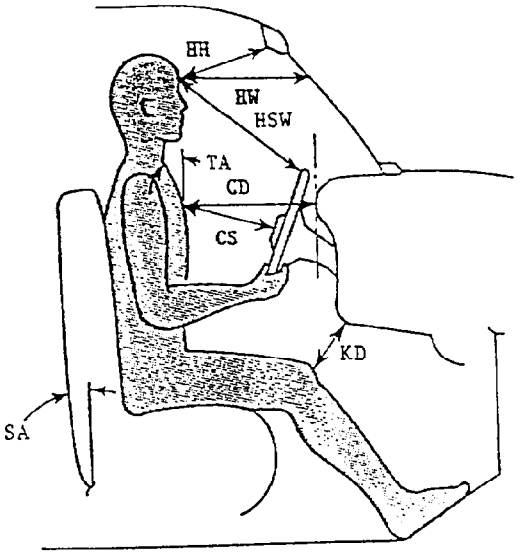


A = LEFT DOOR TO DRIVER CENTERLINE	14.7 IN.
B = LEFT DOOR TO CENTER PASSENGER CENTERLINE	24.1 IN.
C = LEFT DOOR TO RIGHT PASSENGER CENTERLINE	44.8 IN.
D = LEFT DOOR TO RIGHT DOOR	58.2 IN.
E,F = WINDOW GLASS HEIGHT (RIGHT AND LEFT MUST BE EQUAL)	11.2 IN.

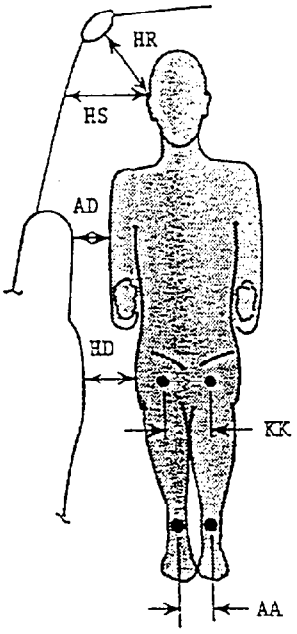
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.

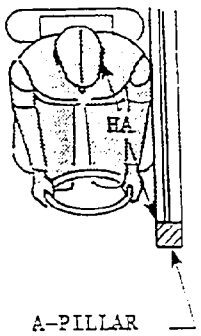
FIGURE 6 DUMMY IN-VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	16.1	15.6
HW	22.4	21.2
CD	20.1	19.4
CS	12.6	NA
KDL	4.3	4.0
KDR	4.4	3.7
TA	16°	16°
SA	23°	23°
HSW	18.1	NA



	DRIVER	PASSENGER
HR	8.7	8.4
HS	11.5	10.8
AD	4.2	3.8
HD	6.5	6.7
KK	8.1	7.4
AA	7.5	7.4
HA	21.1	21.9





KNEE OUTER CLEVIS TO OUTER CLEVIS SPACING:
- PASSENGER = 10.6
- DRIVER = 10.6

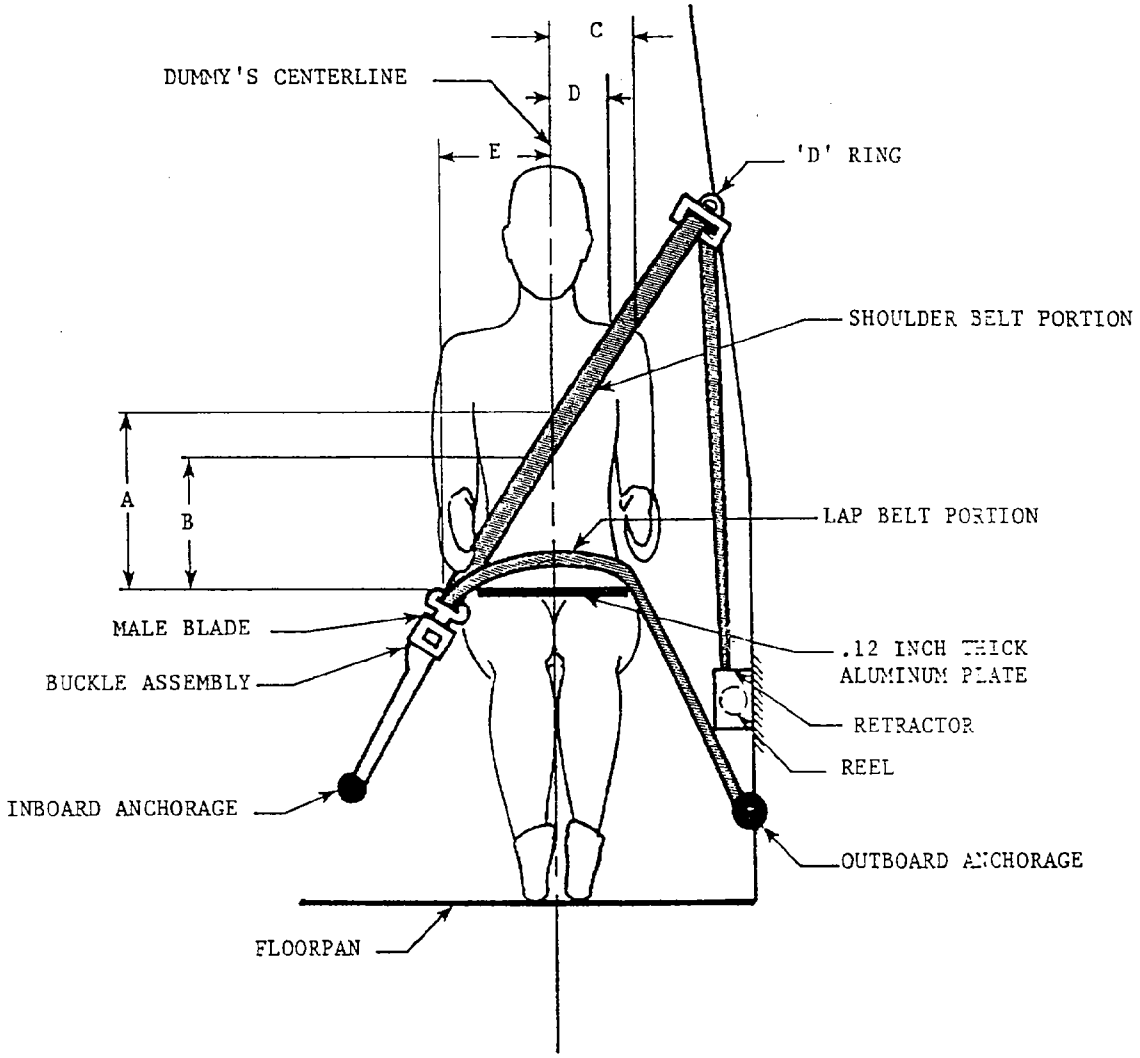
PELVIS ANGLE:
- PASSENGER = 20°
- DRIVER = 21°

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

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

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

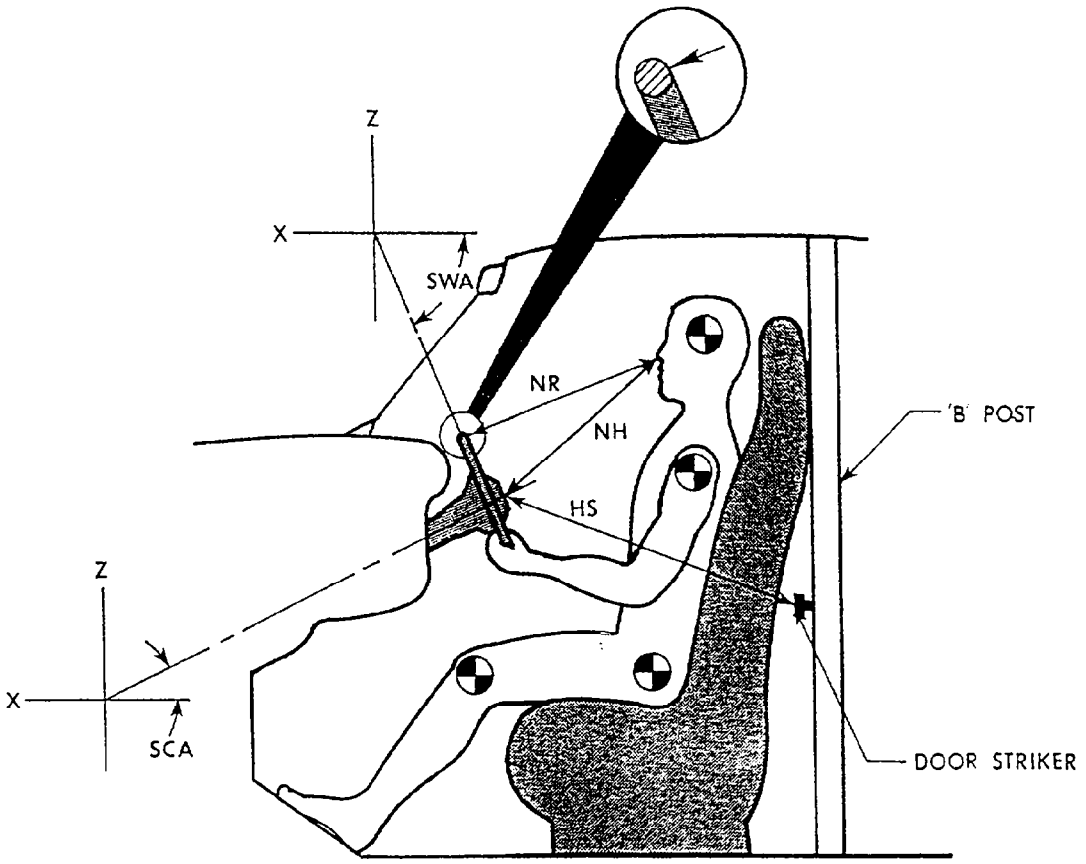
FIGURE 7 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	14.4	13.4
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	10.8	10.2
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.8	6.2
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	3.4	3.8
LAP BELT TENSION (LBS)	4	4
SHOULDER BELT TENSION (LBS)	4	3

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 adjusted in the fifth latch position from the top.

	MEASUREMENTS
NR - DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	15.9
NH - DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	16.9
HS - DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	24.5
SCA - ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	27°
SWA - ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	63°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9

CAMERA POSITIONS

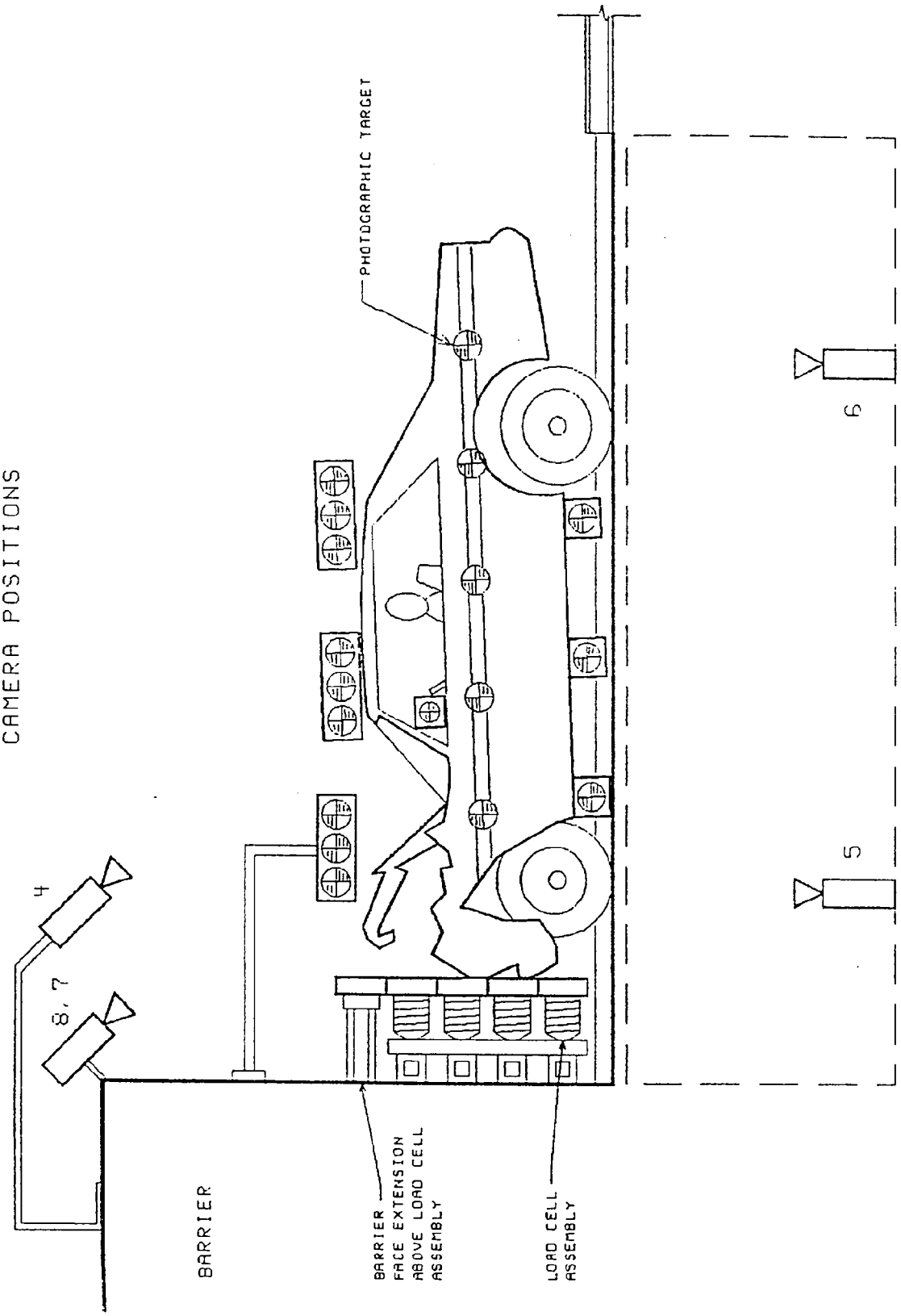


FIGURE 9

CAMERA POSITIONS, CONTINUED

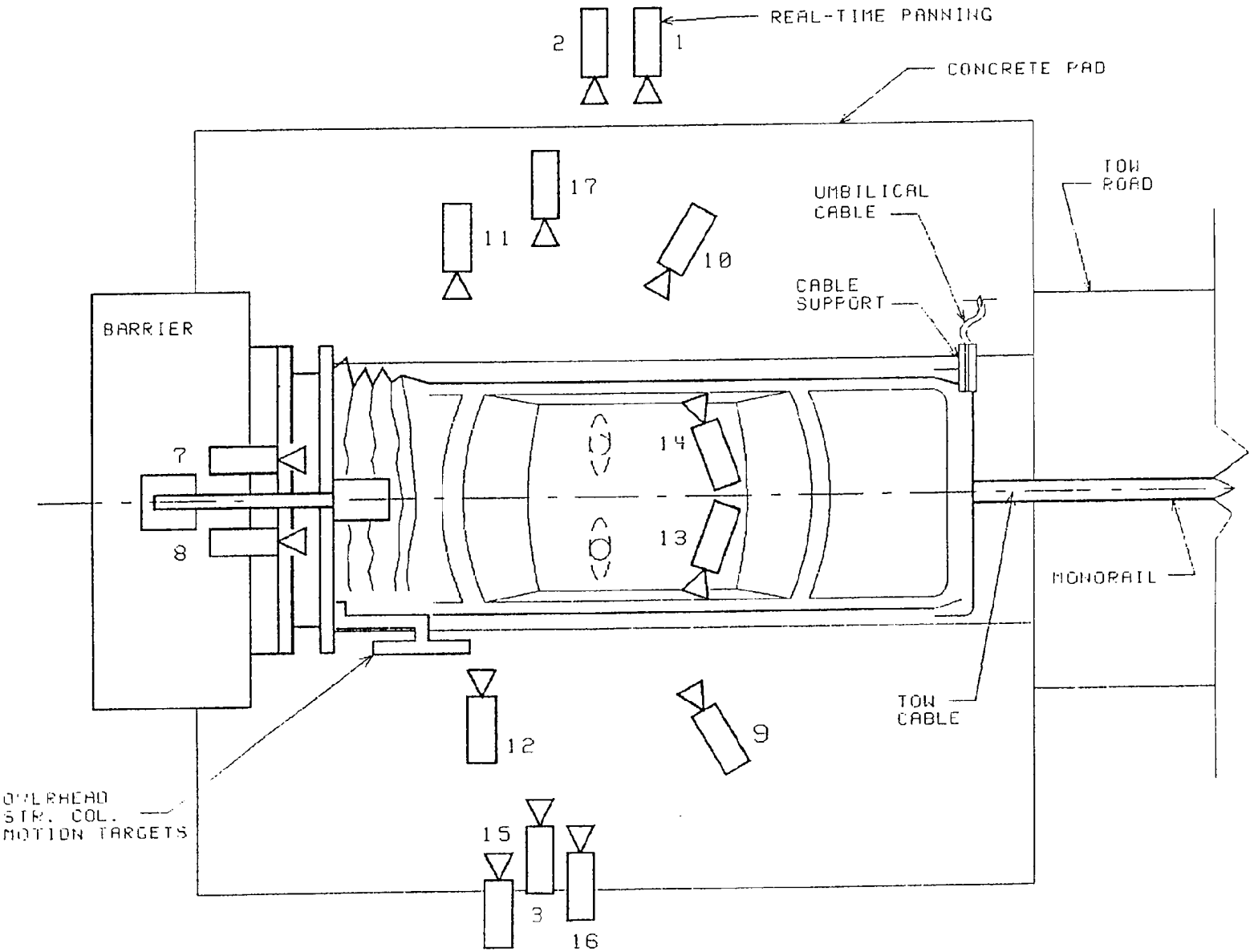


TABLE 11 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 920422 VEHICLE: 1992 Isuzu Trooper

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	505
3	Dummy kinematics	-41.5	295.0	44.0	-12	108.0	25	1000
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	500
8	Driver kinematics	-6.8	14.5	85.0	-41	NA	17	498
9	Driver kinematics	-180.0	73.0	102.0	-27	93.0	25	440
10	Passenger kinematics	-184.0	-74.0	100.0	-26	90.0	25	505
11	Windshield intrusion	-38.1	-306.1	44.0	0	NA	50	508
12	Windshield intrusion	-53.0	309.4	42.3	0	NA	50	495
13	Driver seatbelt movement	NA	NA	NA	NA	NA	13	498
14	Passenger seatbelt movement	NA	NA	NA	NA	NA	13	498
15	Column movement	-96.0	286.0	103.0	-14	NA	25	502
16	Column movement	-96.0	286.0	75.1	-9	NA	25	498
17	Passenger kinematics	-38.8	-210.8	45.3	7	227.0	25	1025

*+X = Film plane forward of barrier face

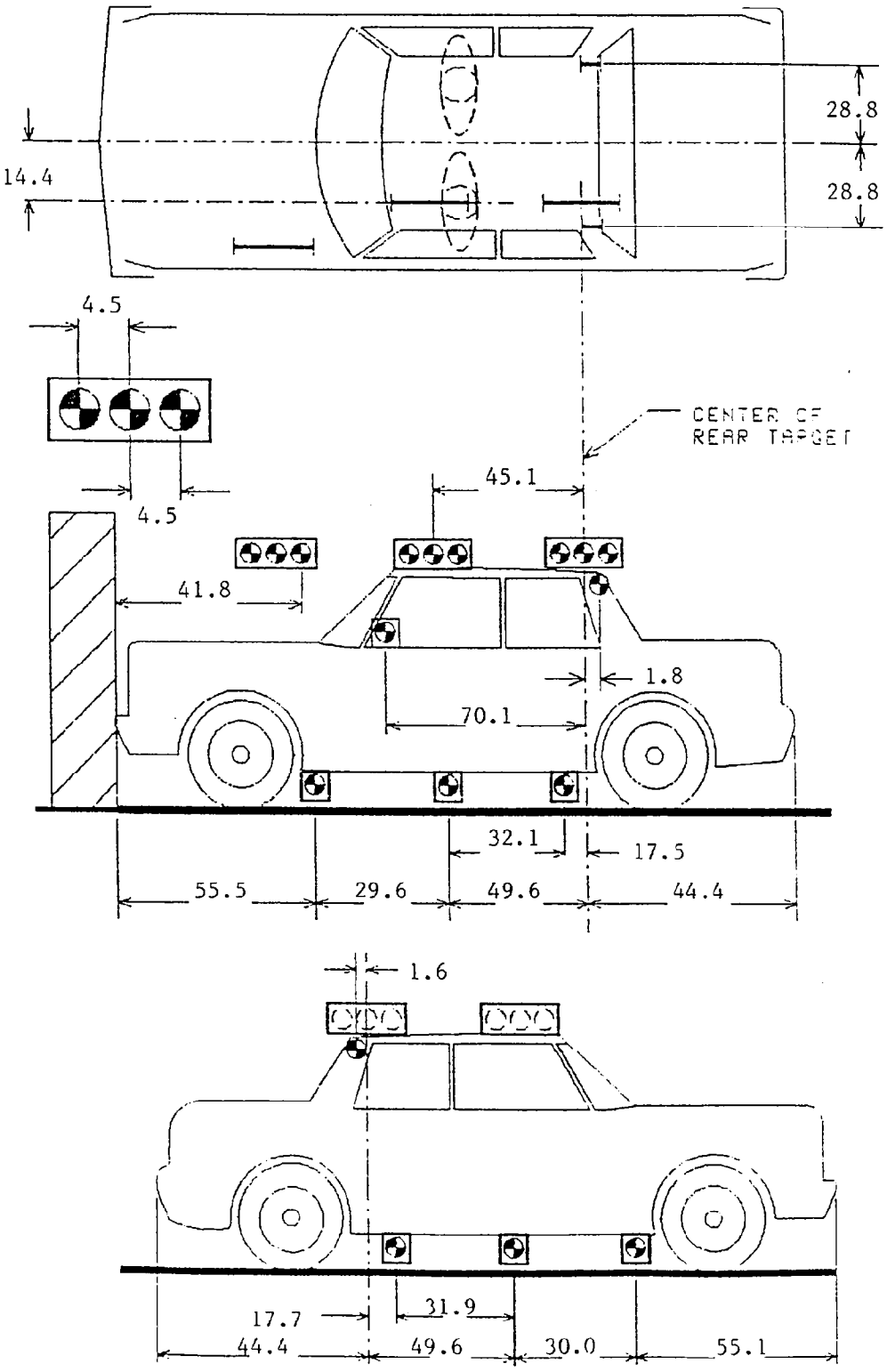
+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

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

FIGURE 10

VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 11

PRE-TEST AND POST-TEST MEASUREMENT POINTS

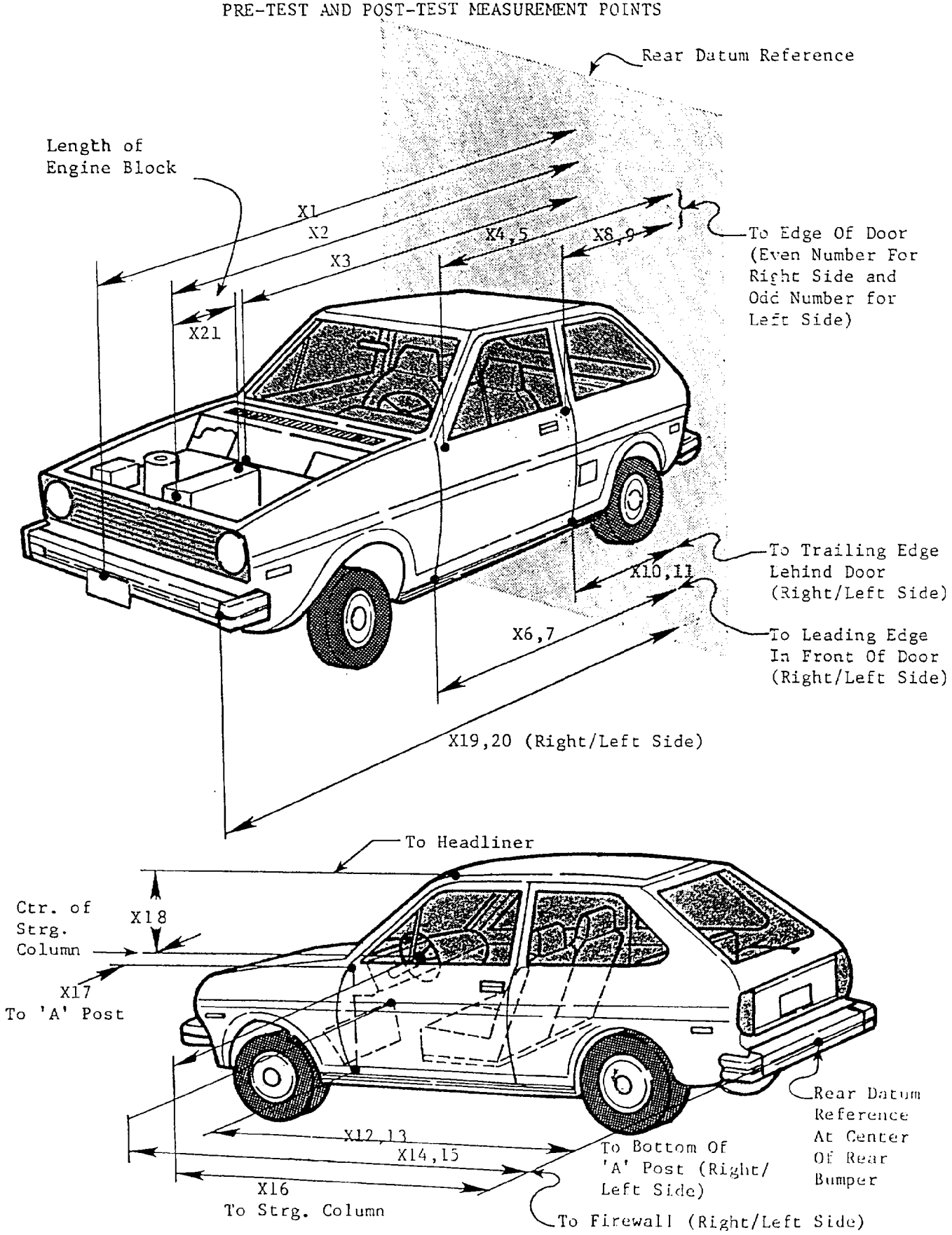


TABLE 12 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Isuzu/Trooper TEST NUMBER: 920422

ALL MEASUREMENTS ARE IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	187.8	163.5	24.3
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	164.0	149.8	14.2
X3	REAR SURFACE OF VEHICLE TO FIREWALL	145.5	137.8	7.7
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	131.8	128.4	3.4
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	132.0	129.6	2.4
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	131.0	128.2	2.8
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	131.5	128.2	3.3
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	91.5	90.4	1.1
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	91.6	89.9	1.7
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	91.6	88.5	3.1
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	92.1	89.4	2.7
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	131.8	128.0	3.8
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	131.8	128.8	3.0
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	144.5	137.8	6.7
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	144.5	140.2	4.3
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	108.2	111.2	-3.0
X17	CENTER OF STEERING COLUMN TO "A" POST	13.8	11.4	2.4
X18	CENTER OF STEERING COLUMN TO HEADLINER	19.5	23.5	-4.0
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	182.8	162.2	20.6
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	182.8	163.1	19.7
X21	LENGTH OF ENGINE BLOCK	18.5	18.5	0.0

APPENDIX A

PHOTOGRAPHS

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FIGURE A-1. PRE-TEST FRONT VIEW

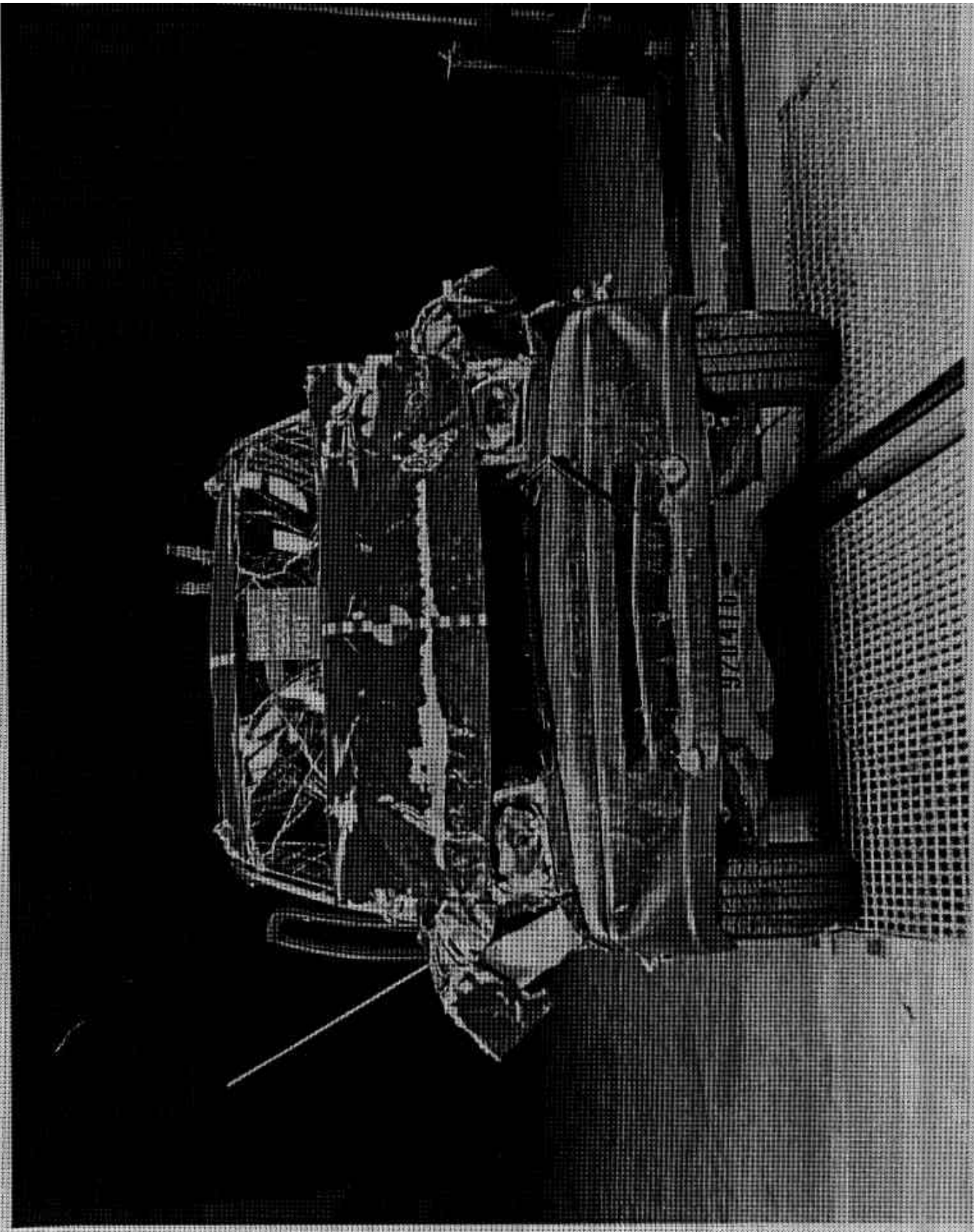

FIGURE A-2. POST-TEST FRONT VIEW

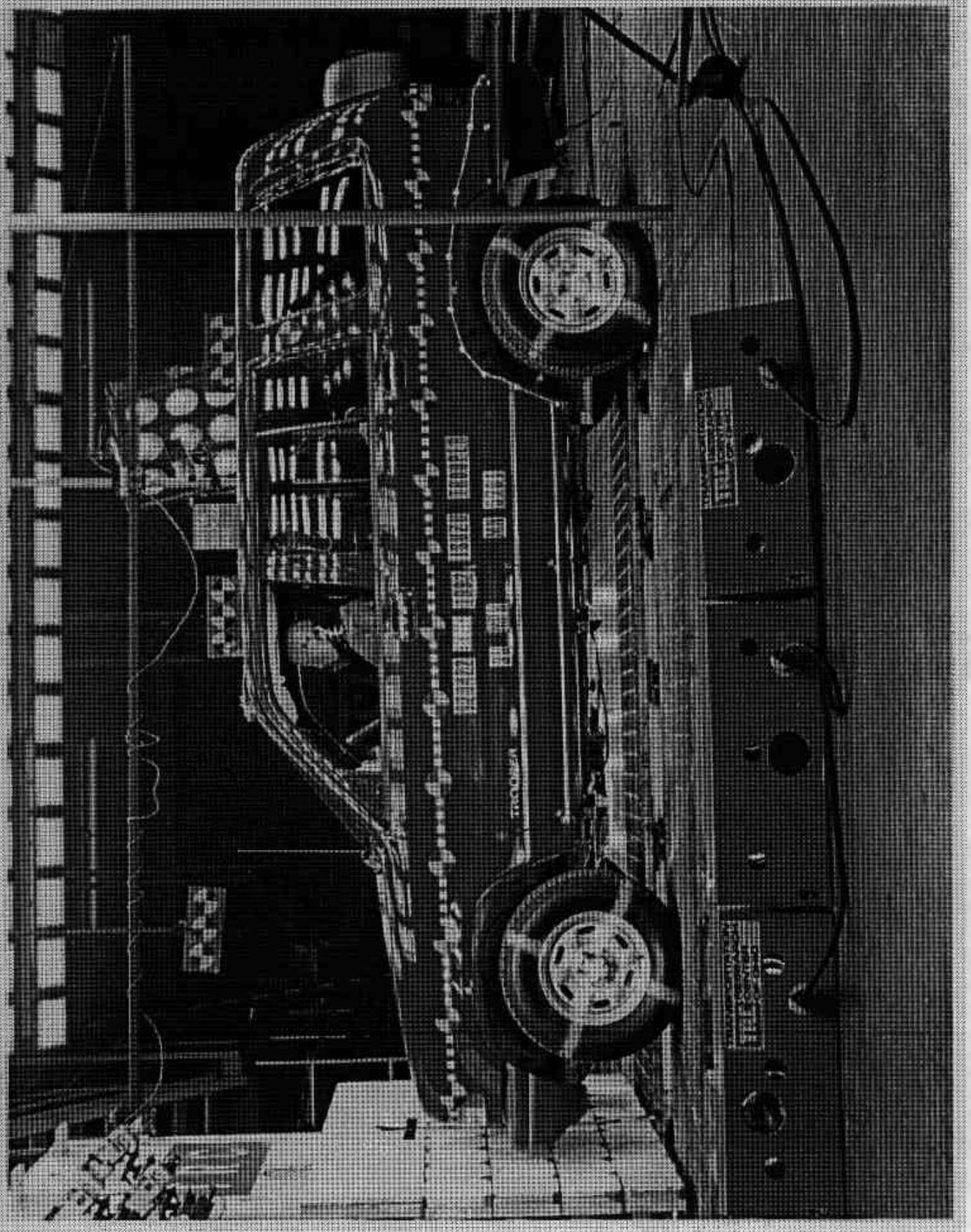

FIGURE A-3. PRE-TEST LEFT SIDE VIEW

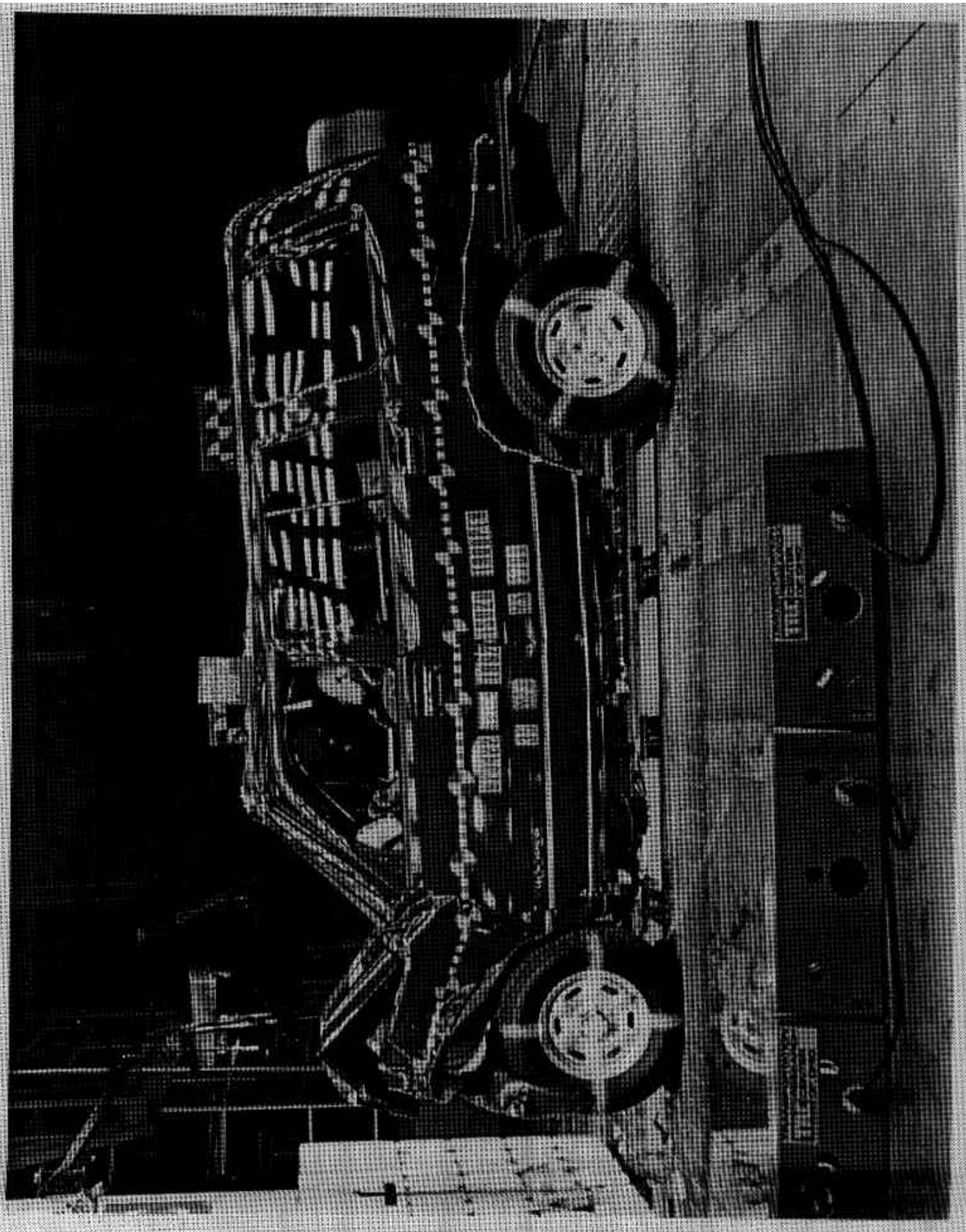

FIGURE A-4. POST-TEST LEFT SIDE VIEW

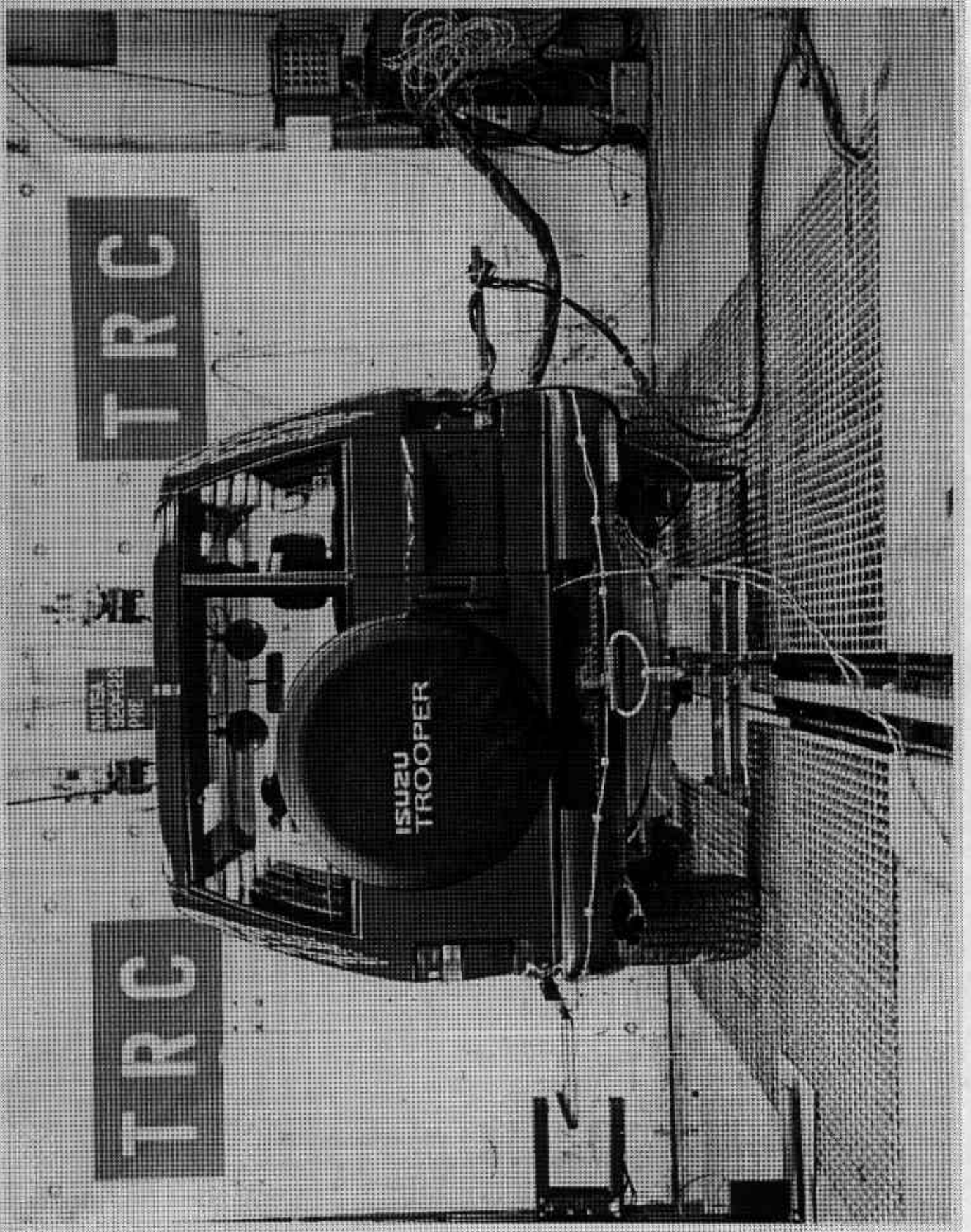

FIGURE A-5. PRE-TEST REAR VIEW

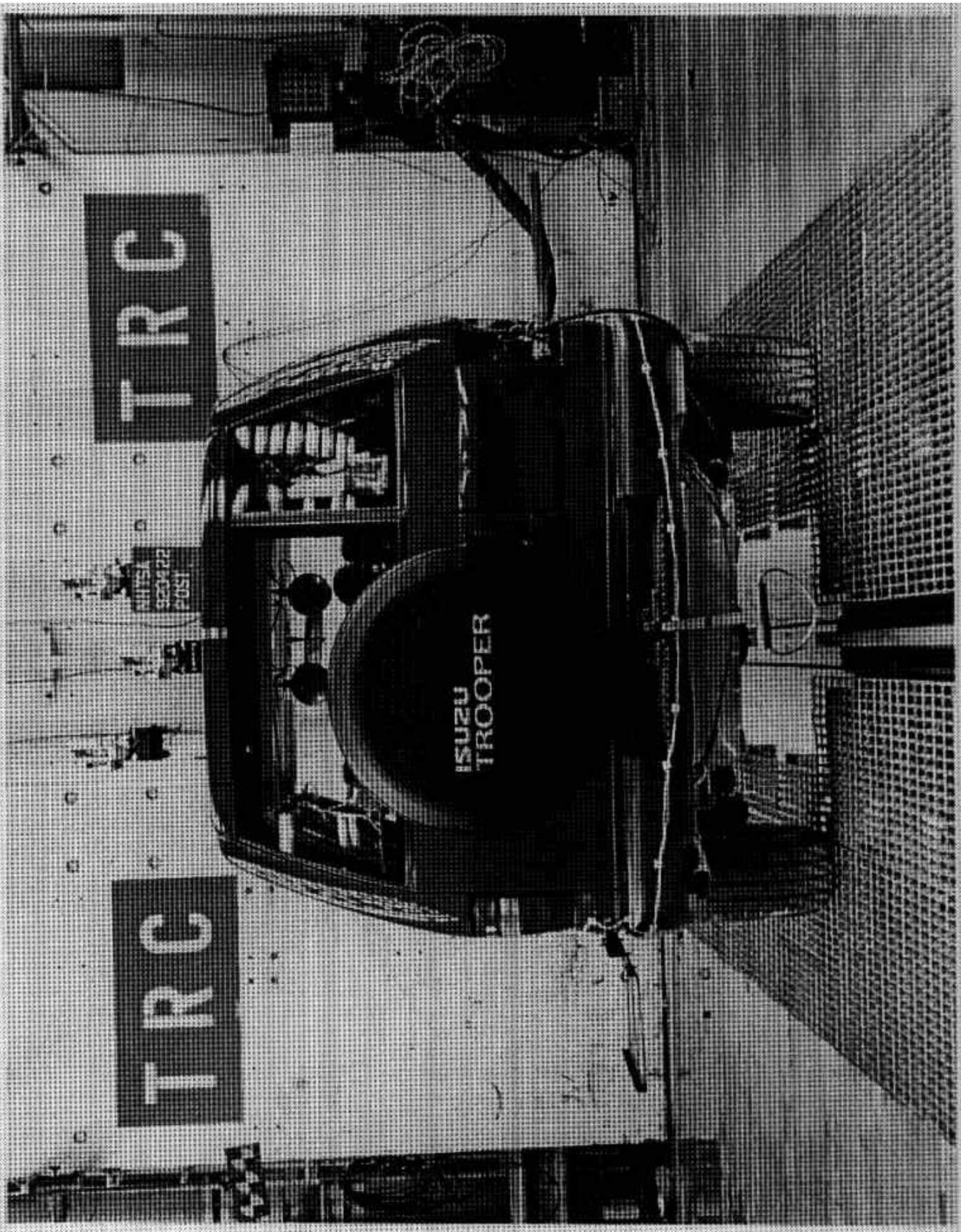

FIGURE A-6. POST-TEST REAR VIEW

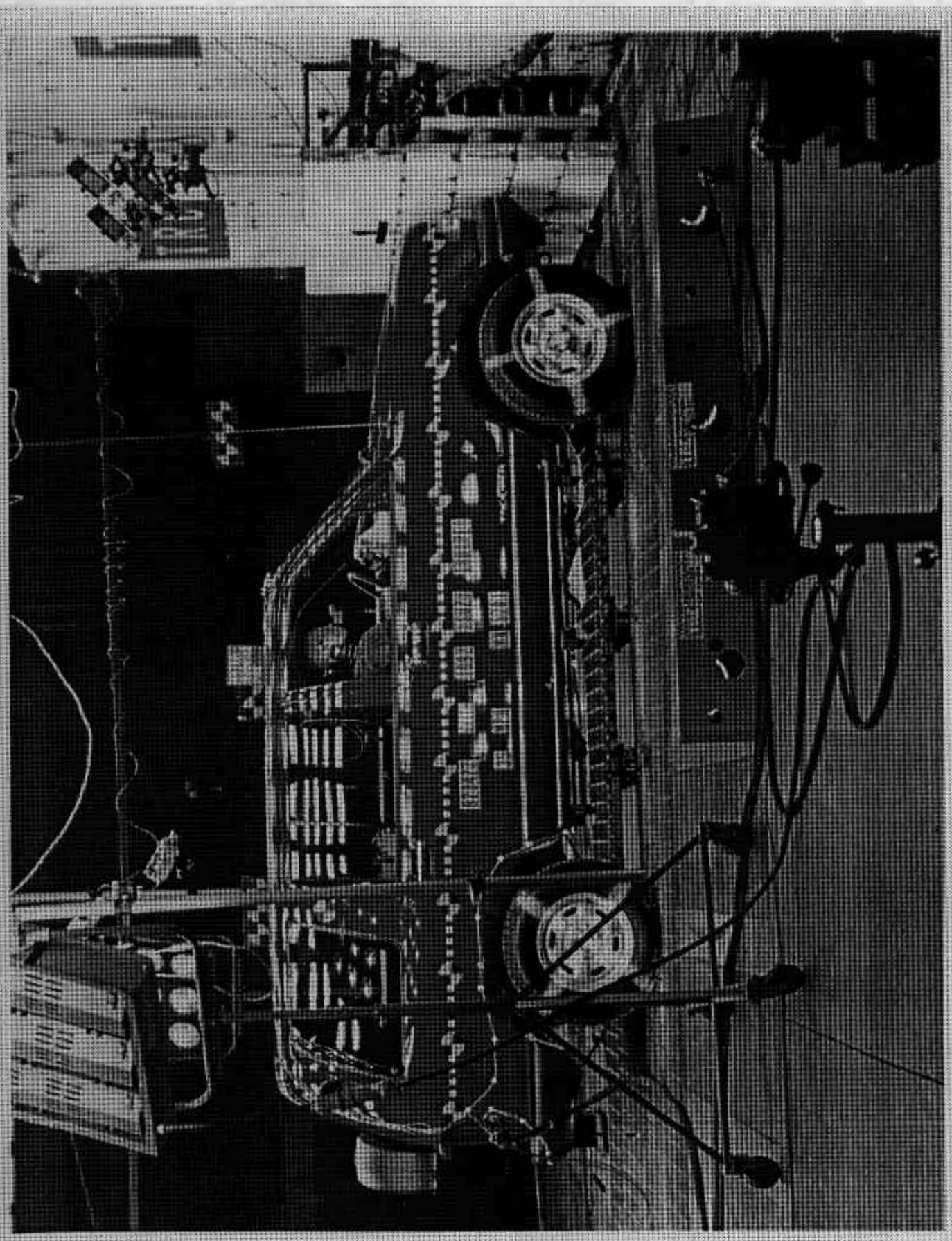

FIGURE A-7. PRE-TEST RIGHT SIDE VIEW

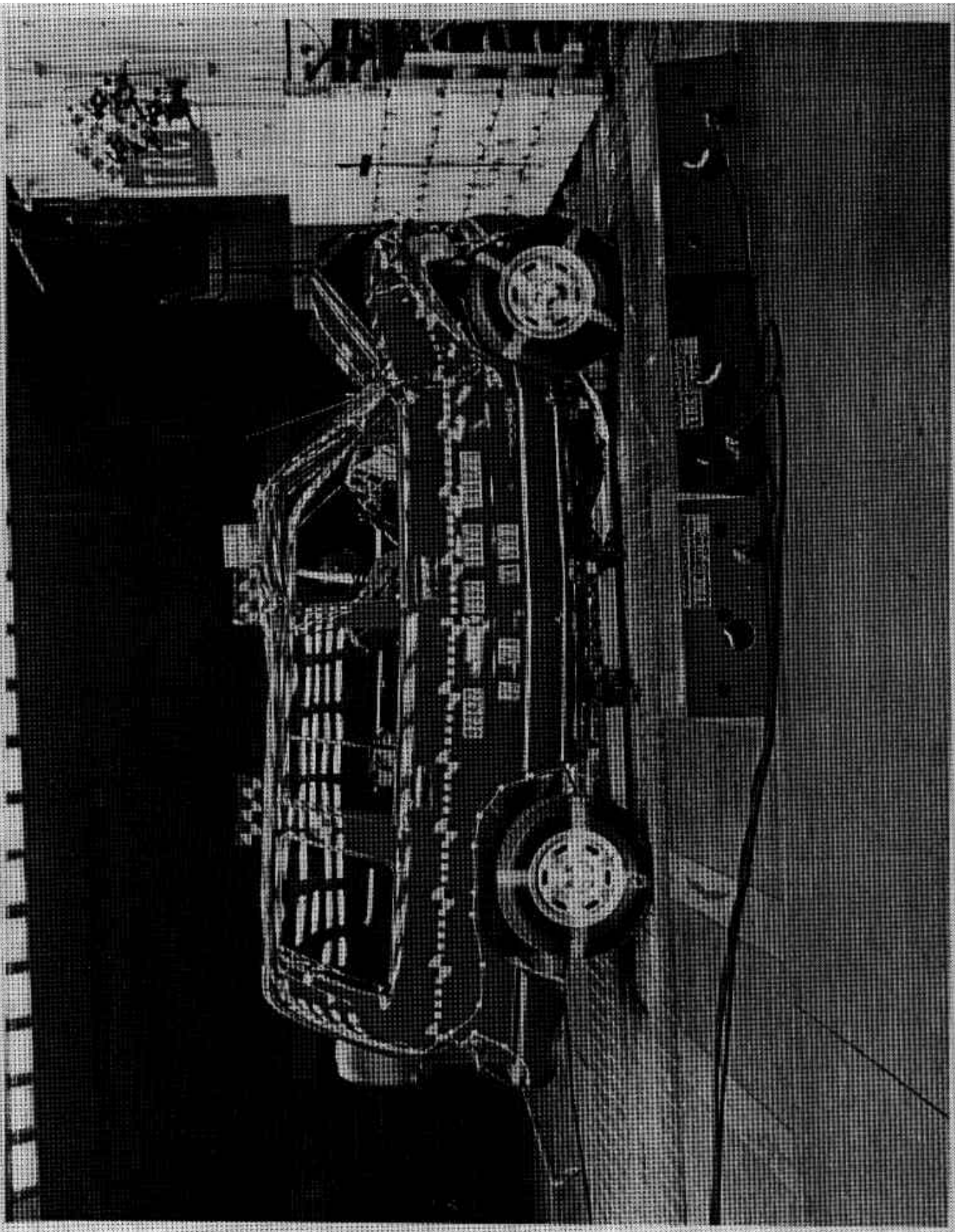

FIGURE A-8. POST-TEST RIGHT SIDE VIEW

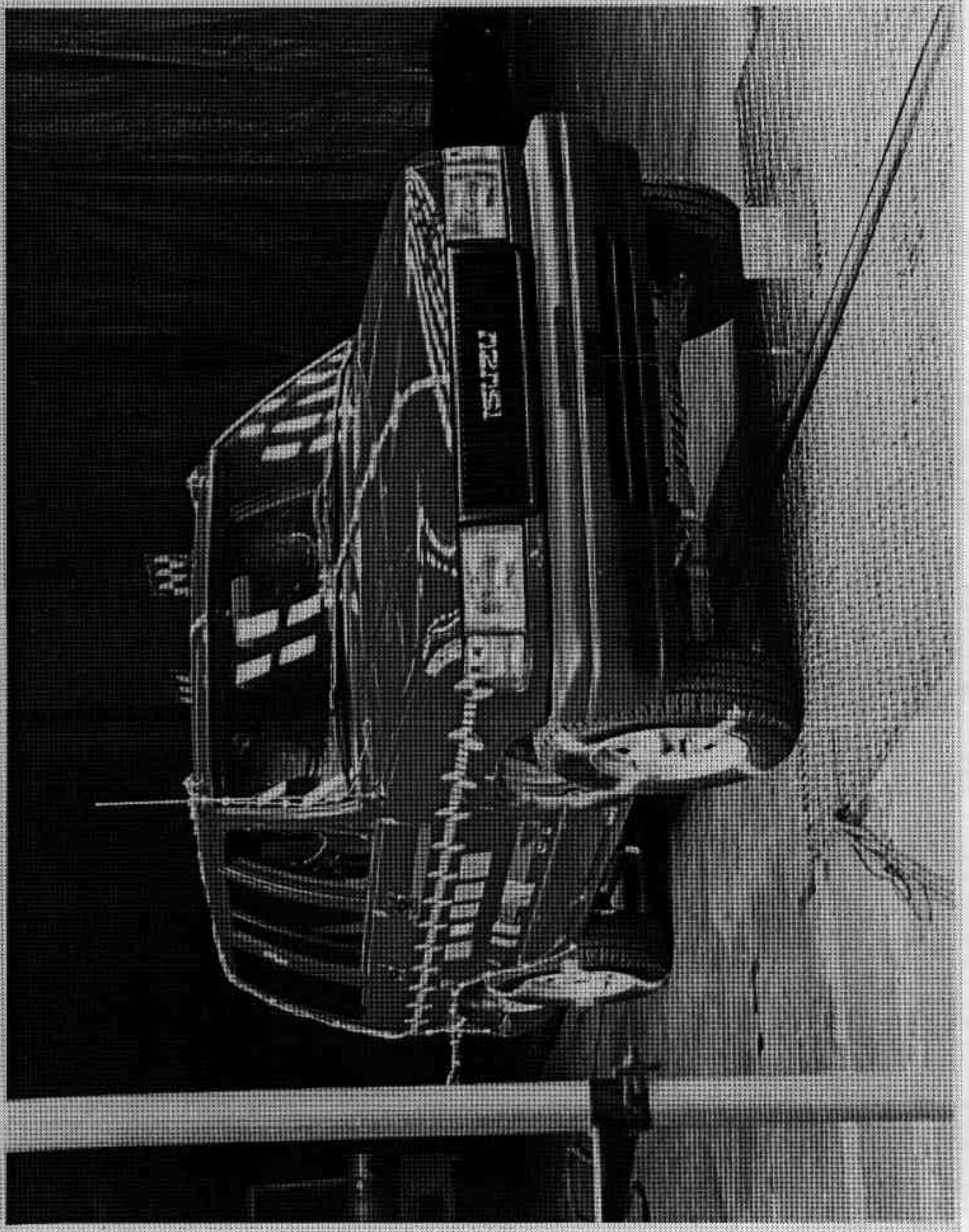

FIGURE A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

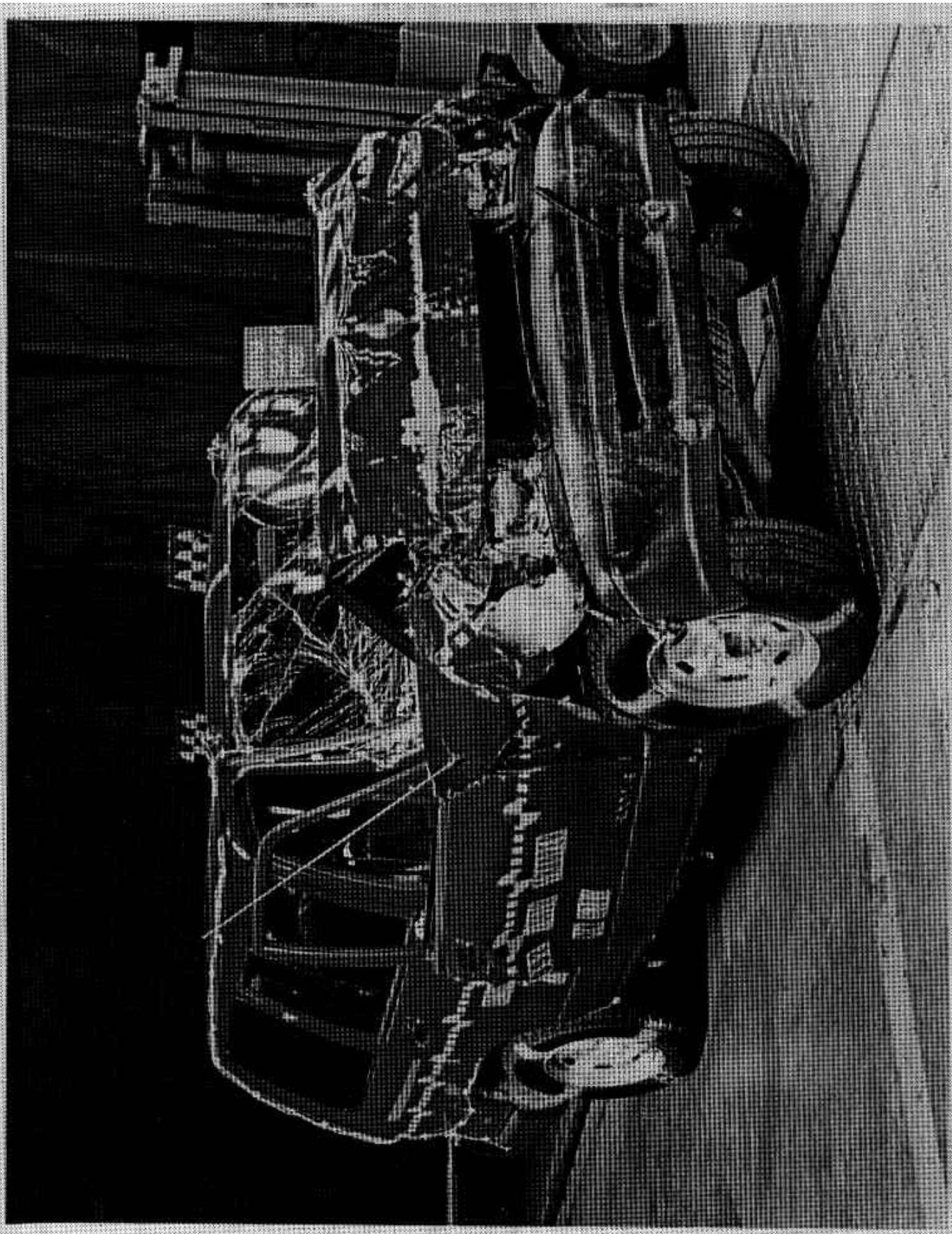

FIGURE A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

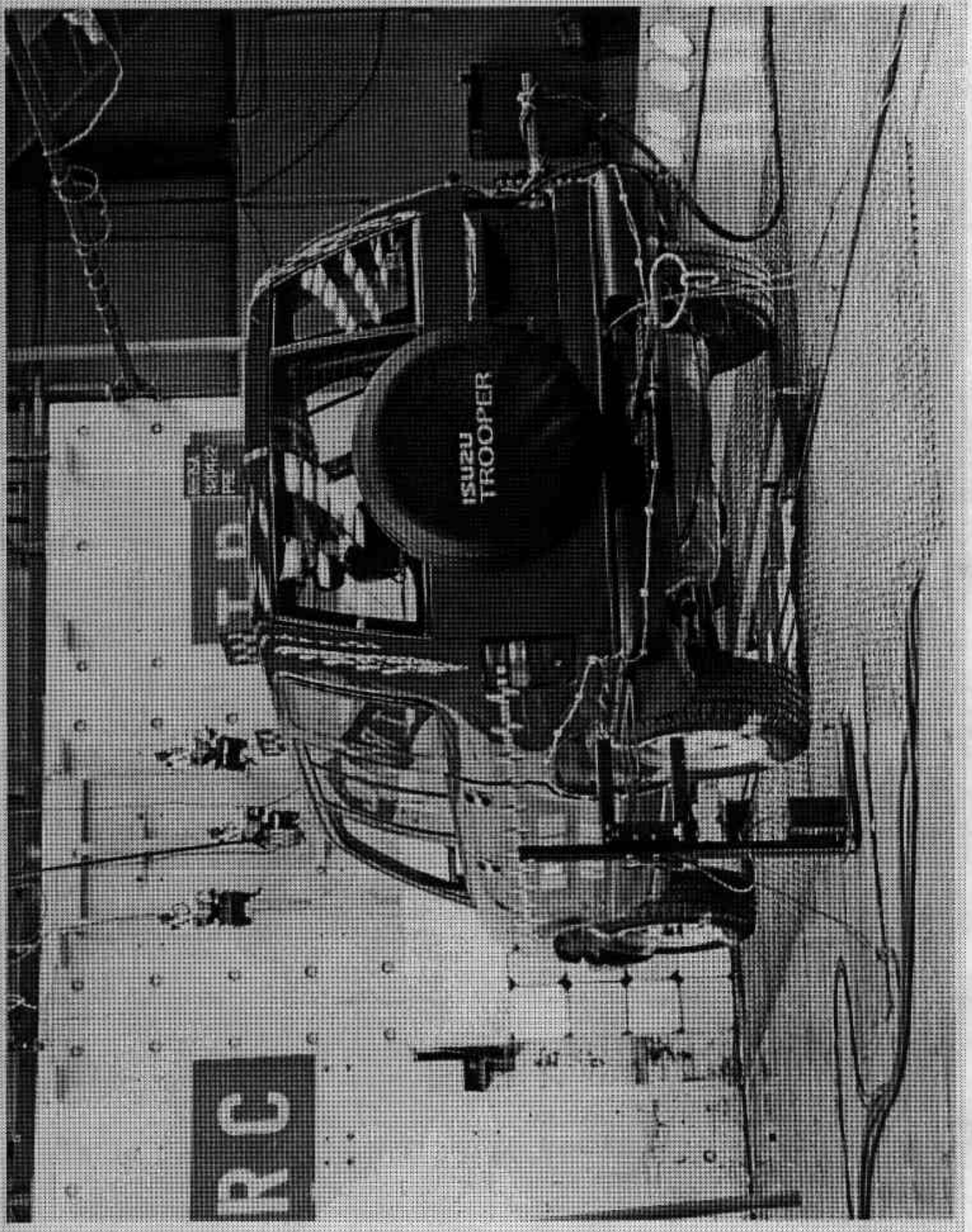

FIGURE A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

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

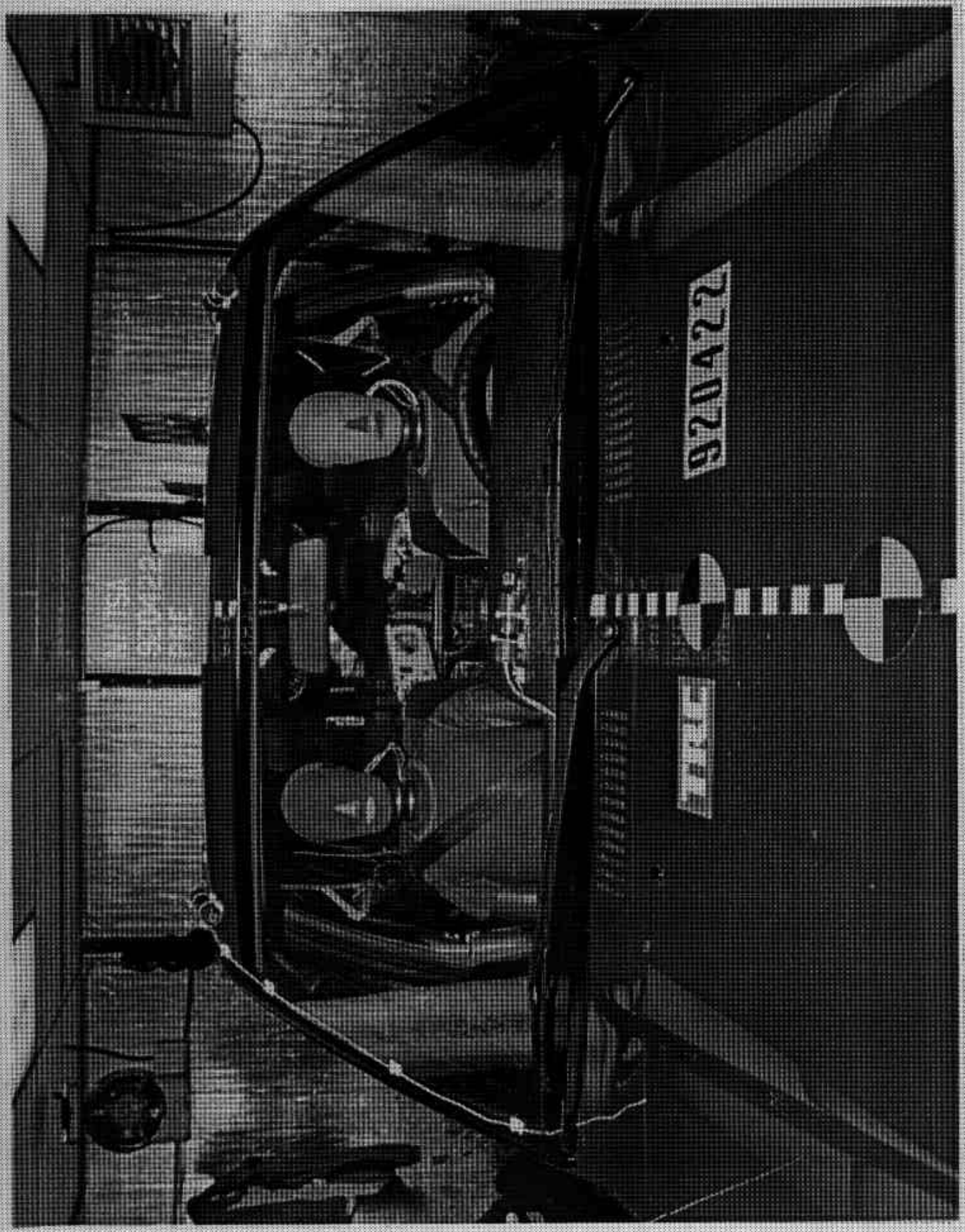

FIGURE A-13. PRE-TEST WINDSHIELD VIEW

FIGURE A-14. POST-TEST WINDSHIELD VIEW

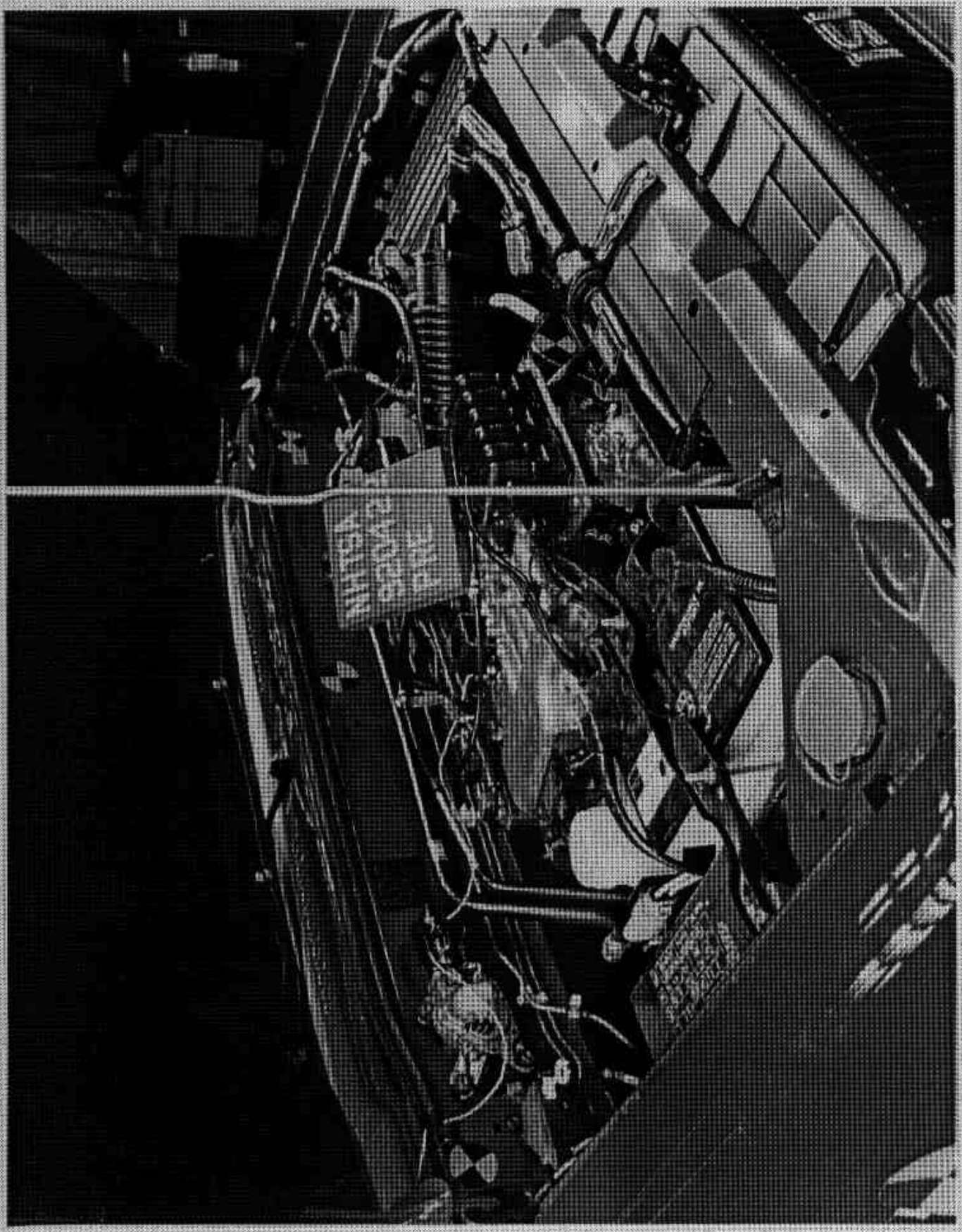

FIGURE A-15. PRE-TEST ENGINE COMPARTMENT VIEW

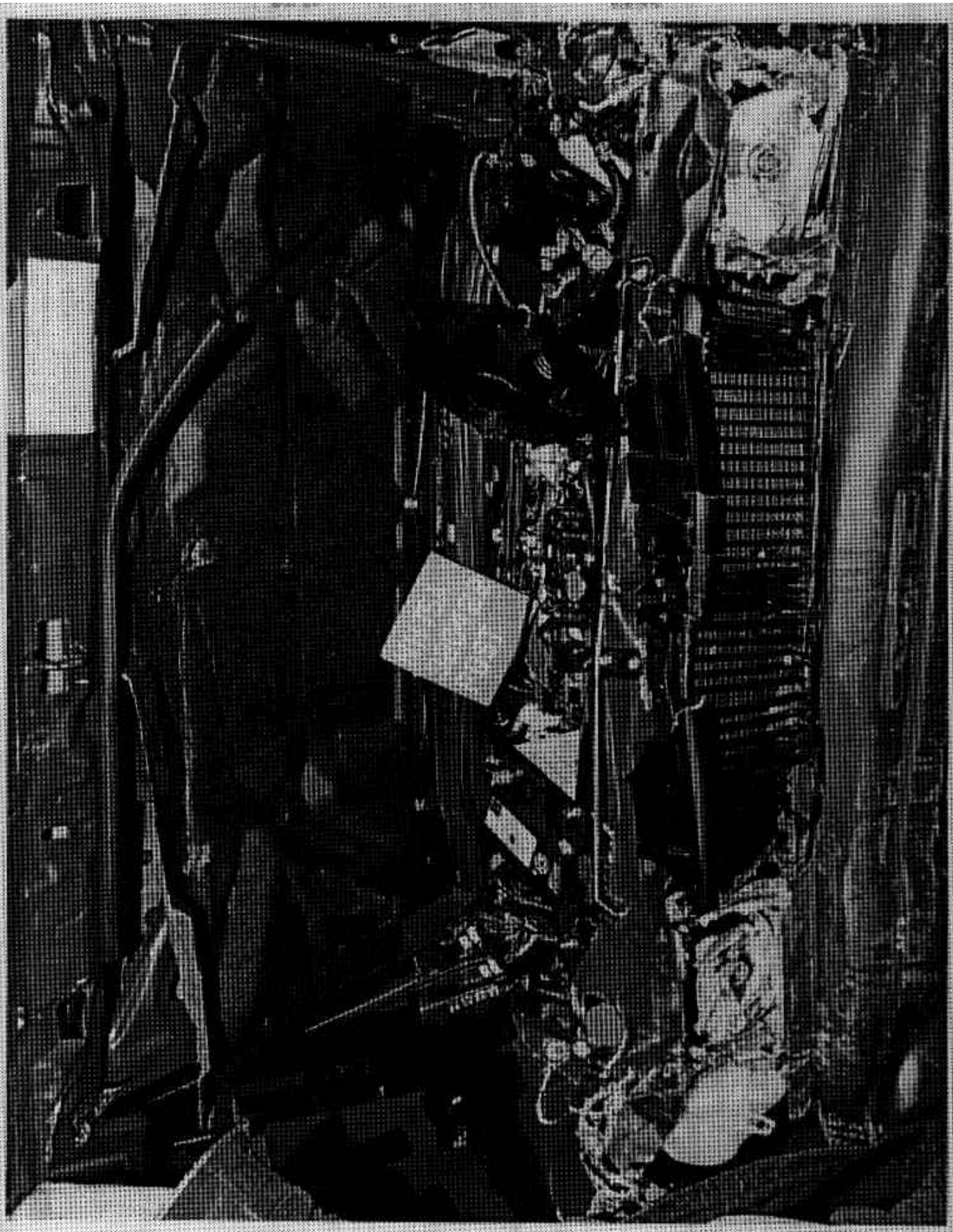

FIGURE A-16. POST-TEST ENGINE COMPARTMENT VIEW

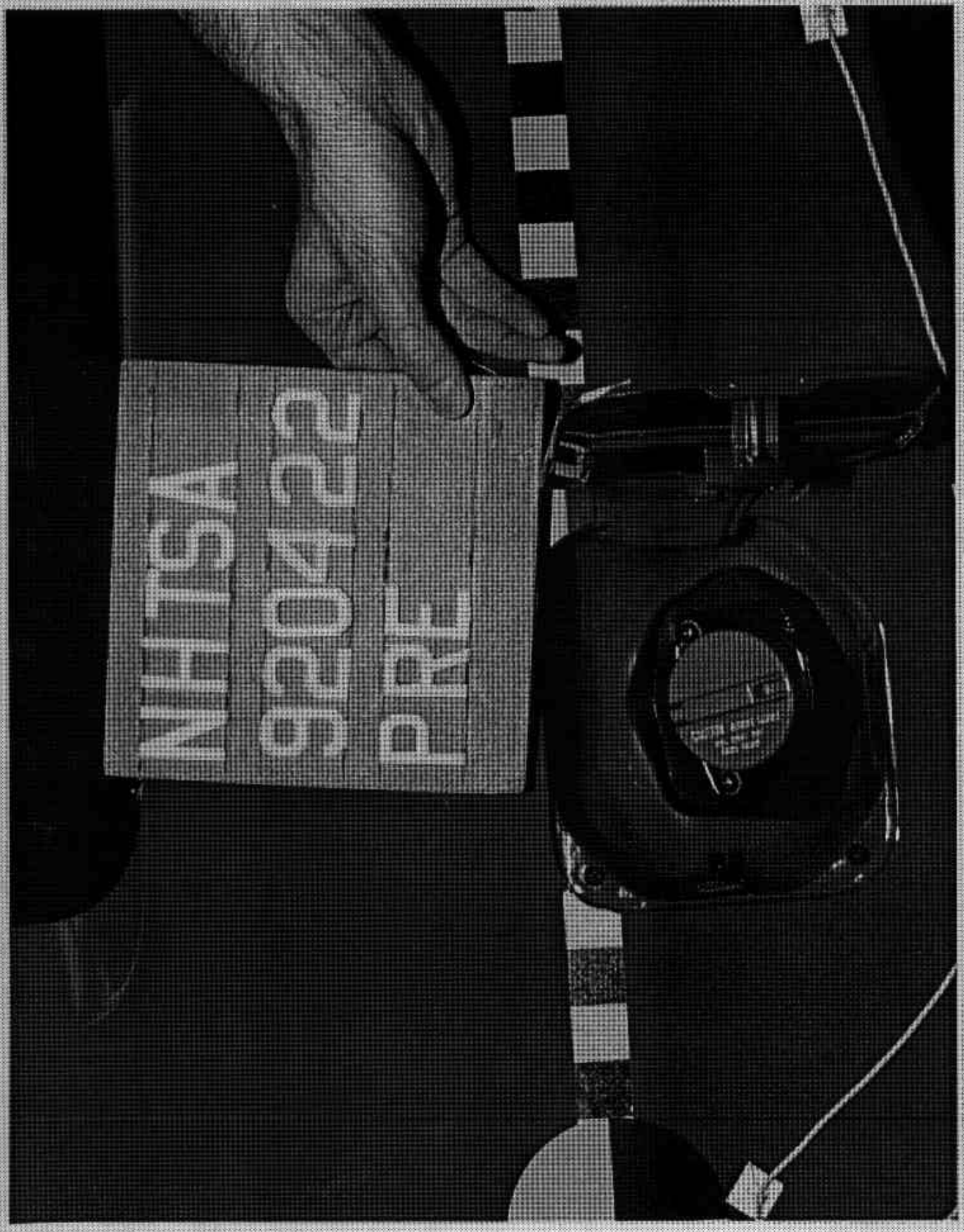

FIGURE A-17. PRE-TEST FUEL FILLER CAP VIEW

920422

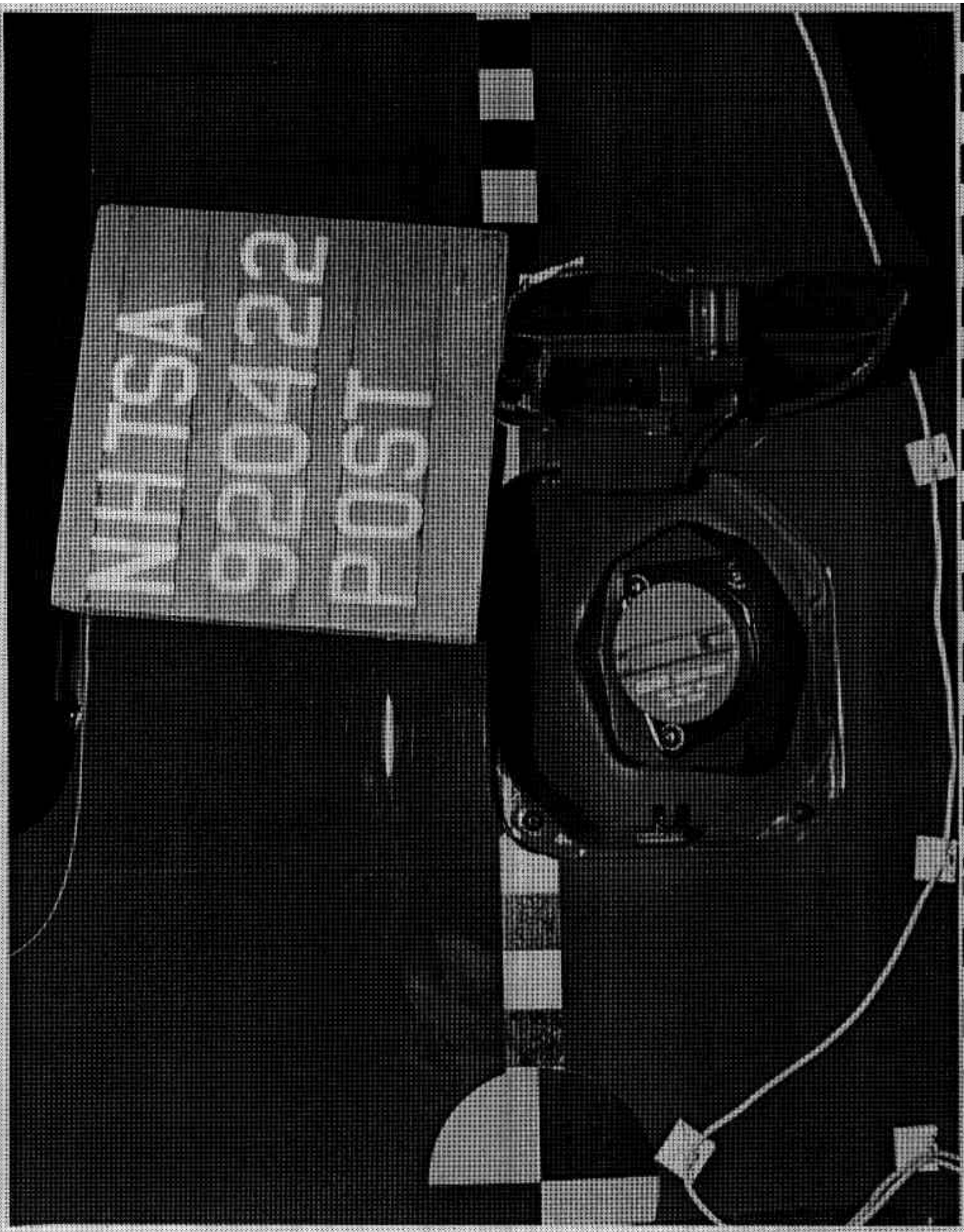

FIGURE A-18. POST-TEST FUEL FILLER CAP VIEW

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

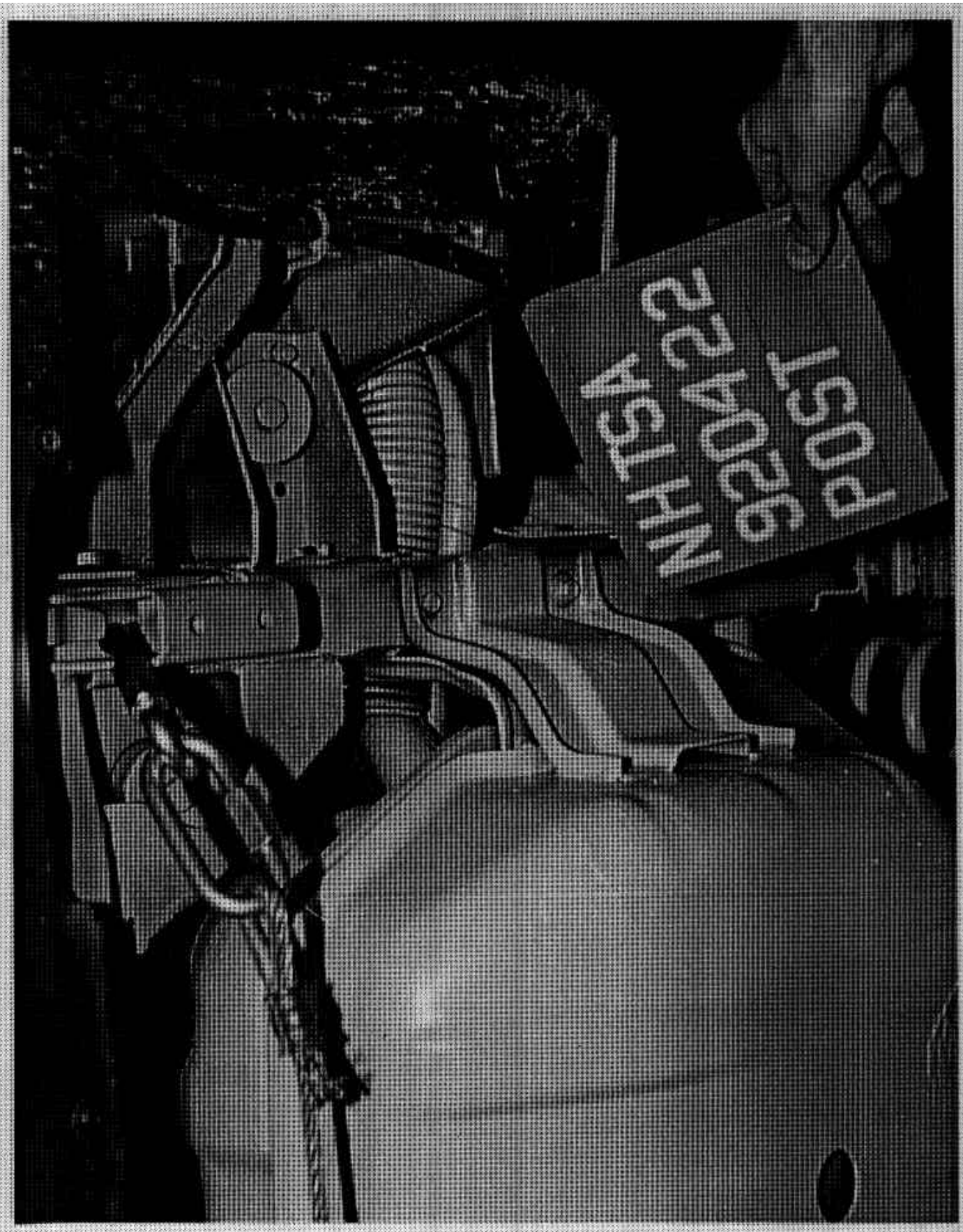

FIGURE A-20. POST-TEST FUEL FILLER NECK VIEW

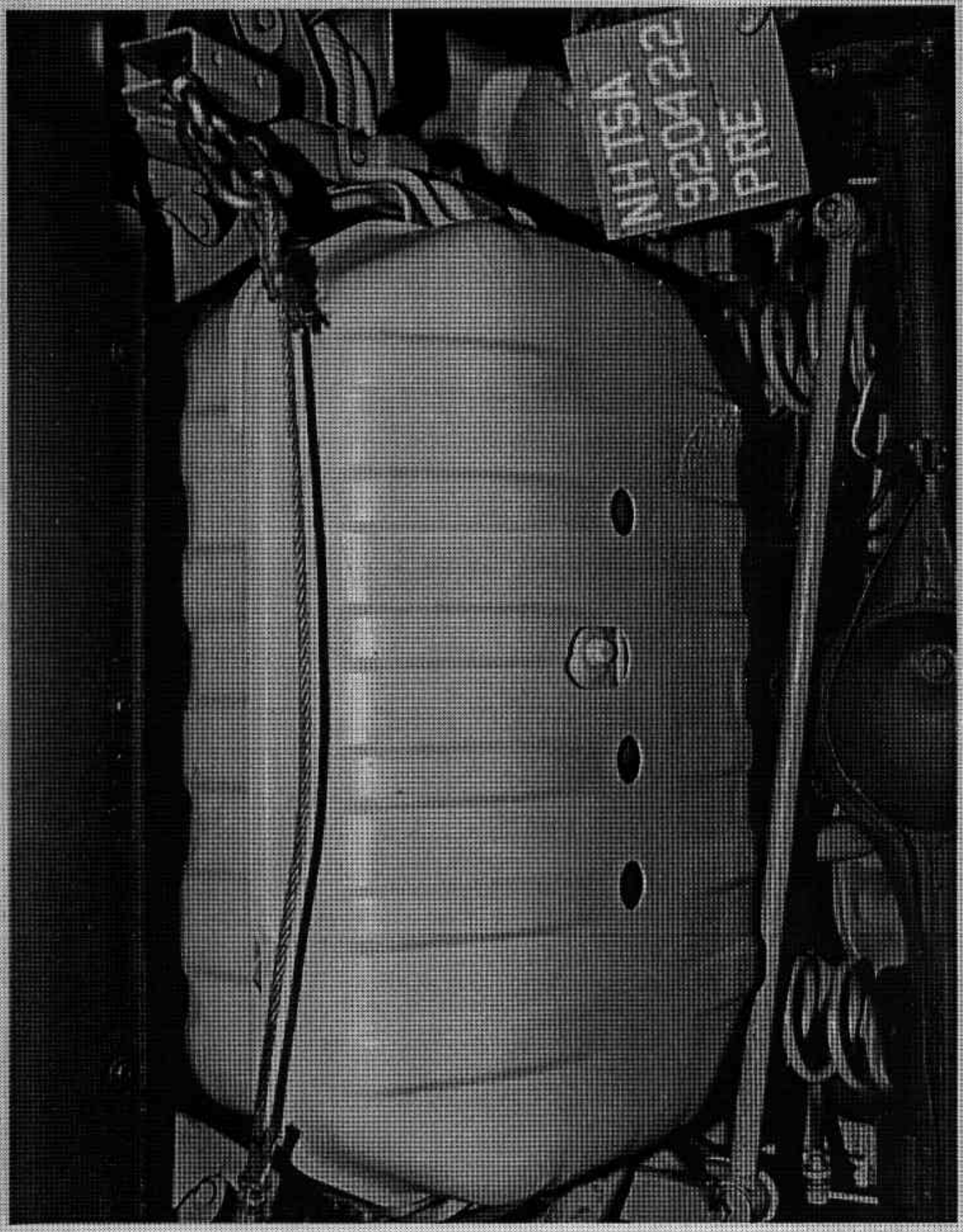

FIGURE A-21. PRE-TEST FUEL TANK VIEW

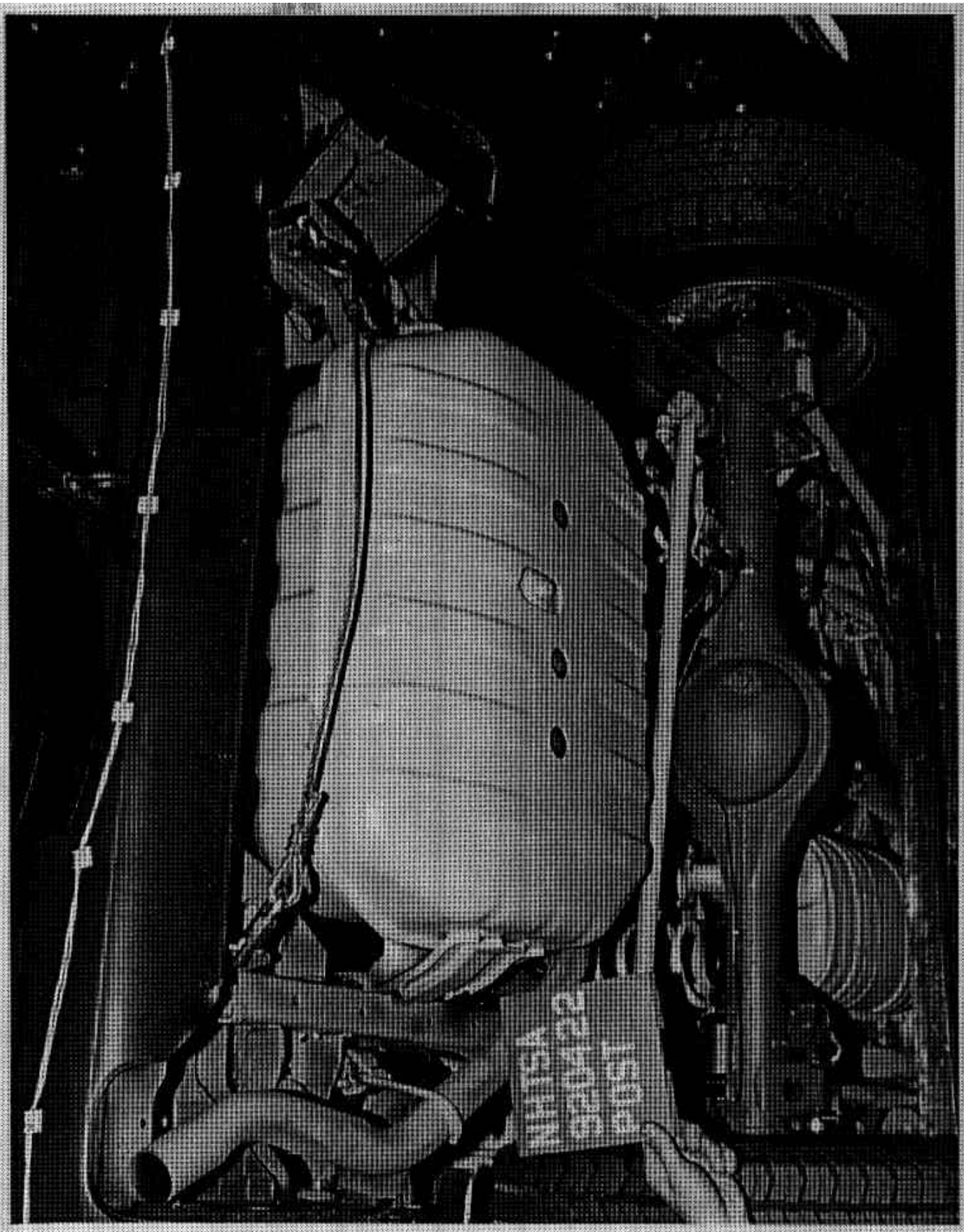

FIGURE A-22. POST-TEST FUEL TANK VIEW

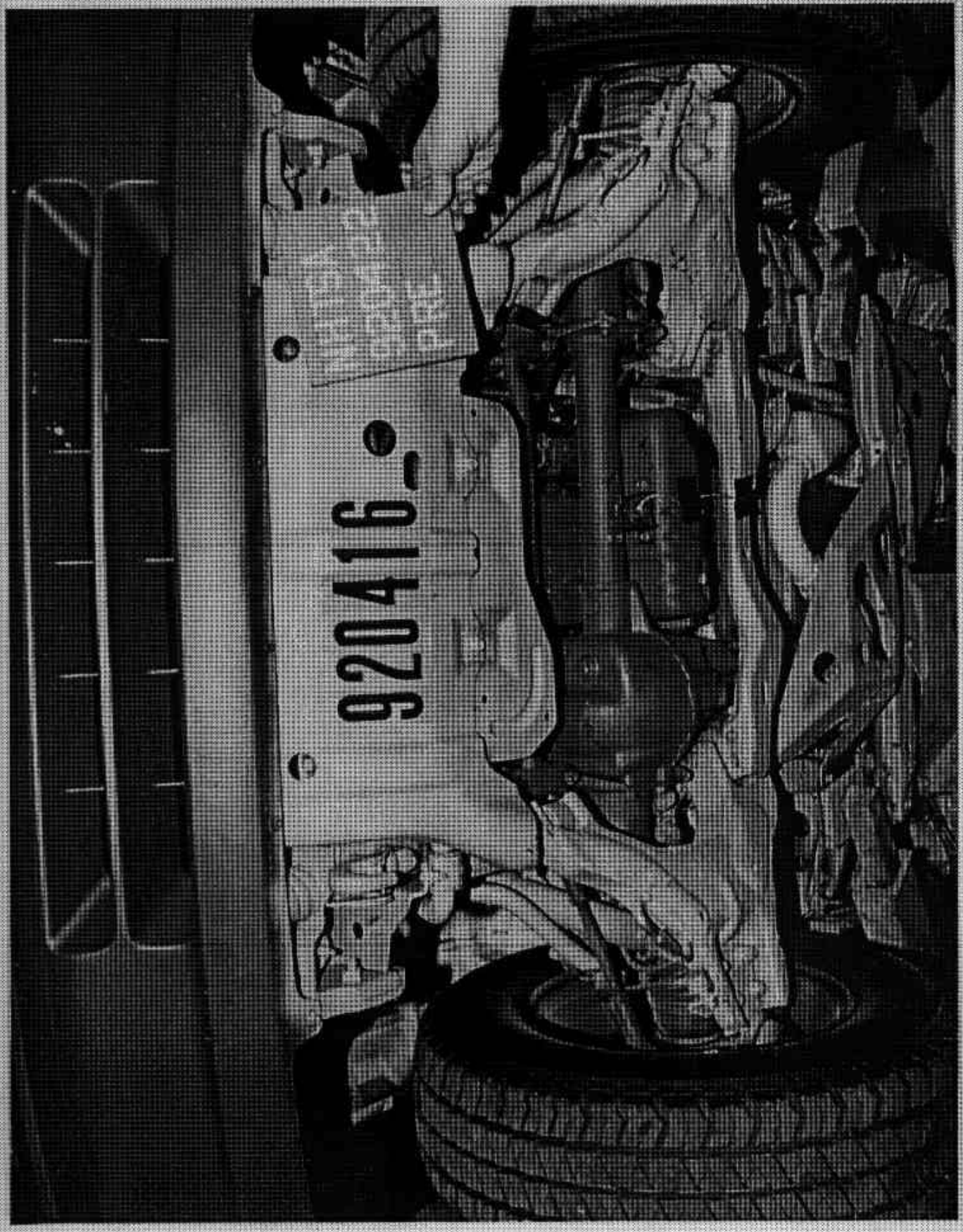

FIGURE A-23. PRE-TEST FRONT UNDERBODY VIEW

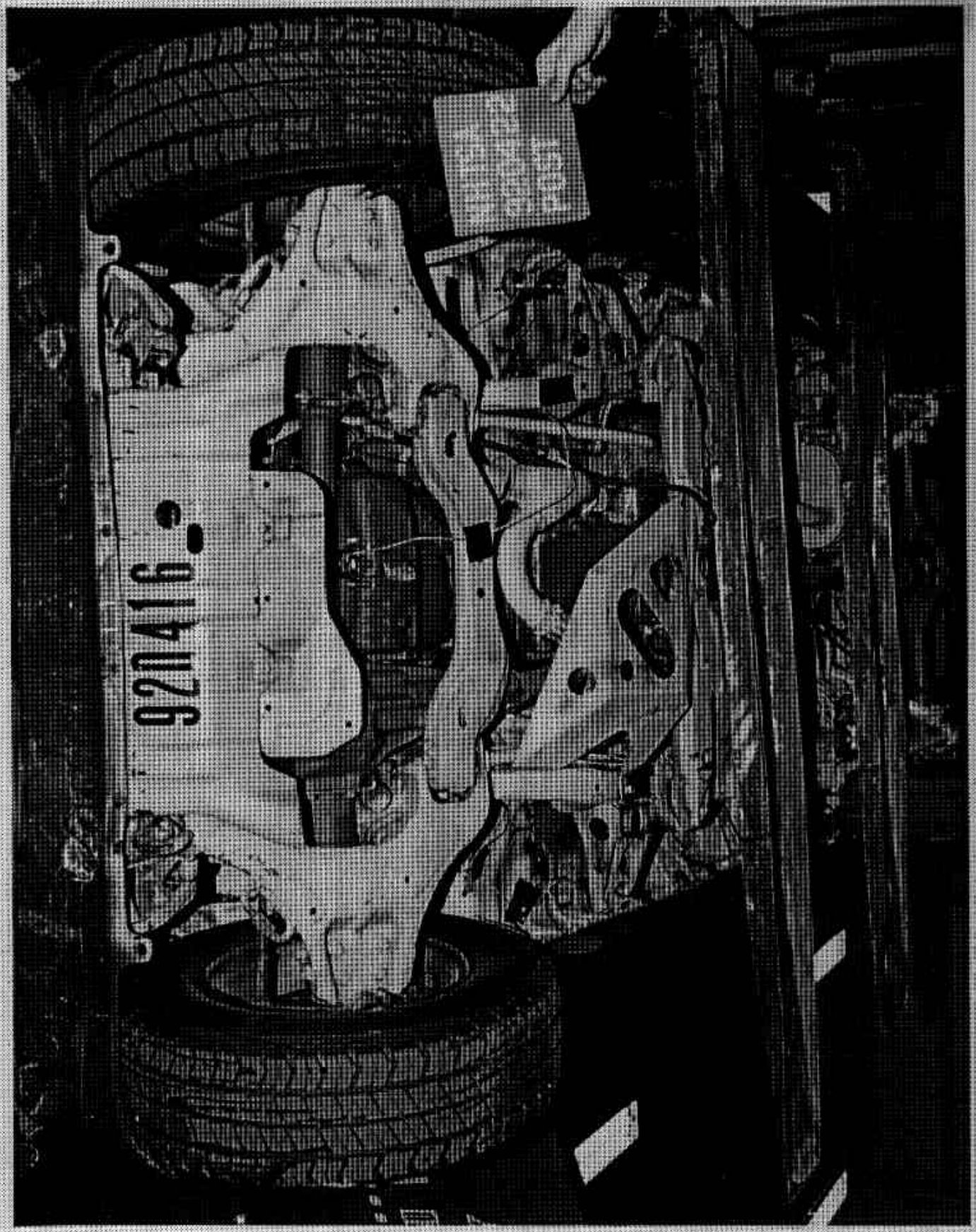

FIGURE A-24. POST-TEST FRONT UNDERBODY VIEW

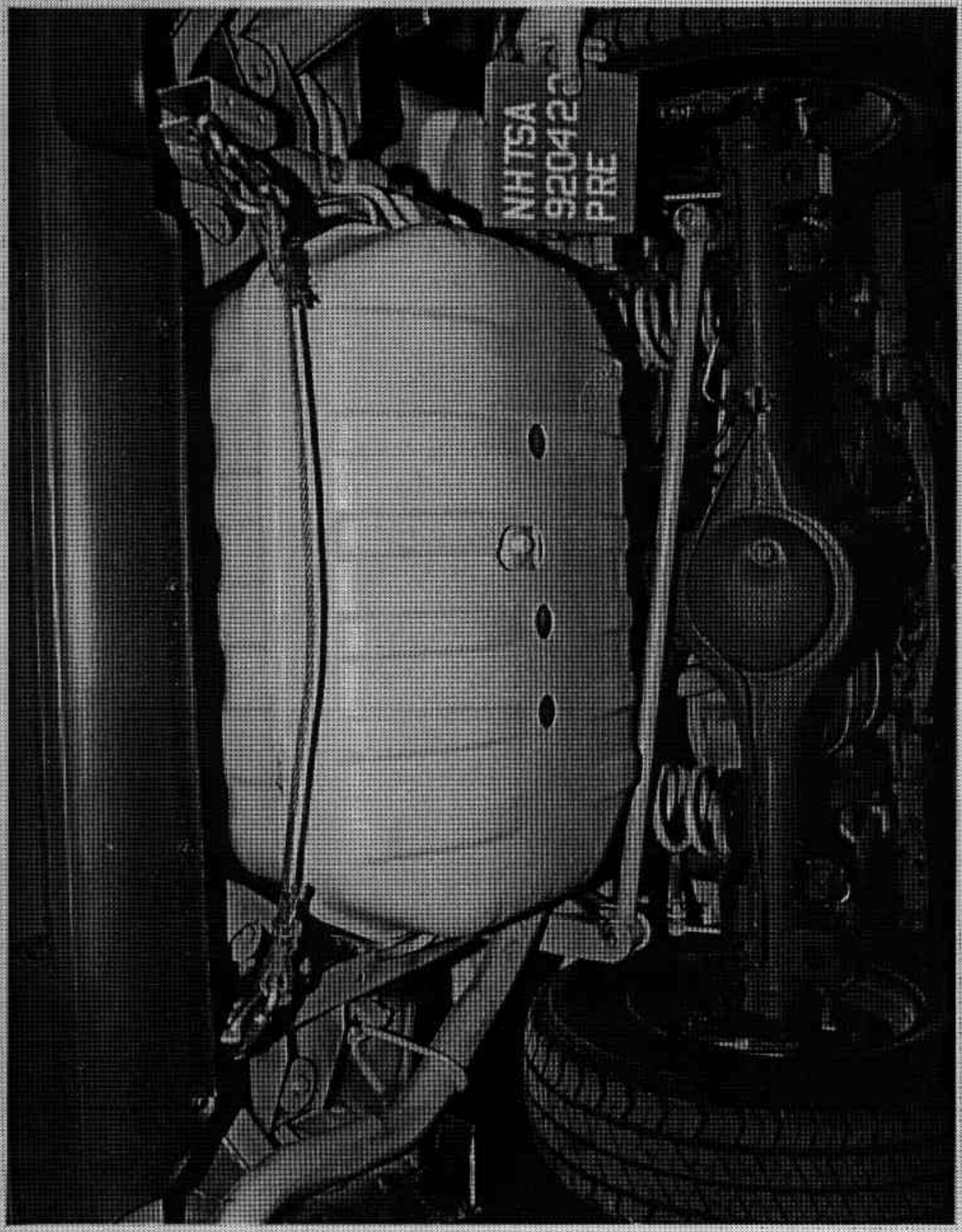

FIGURE A-25. PRE-TEST REAR UNDERBODY VIEW

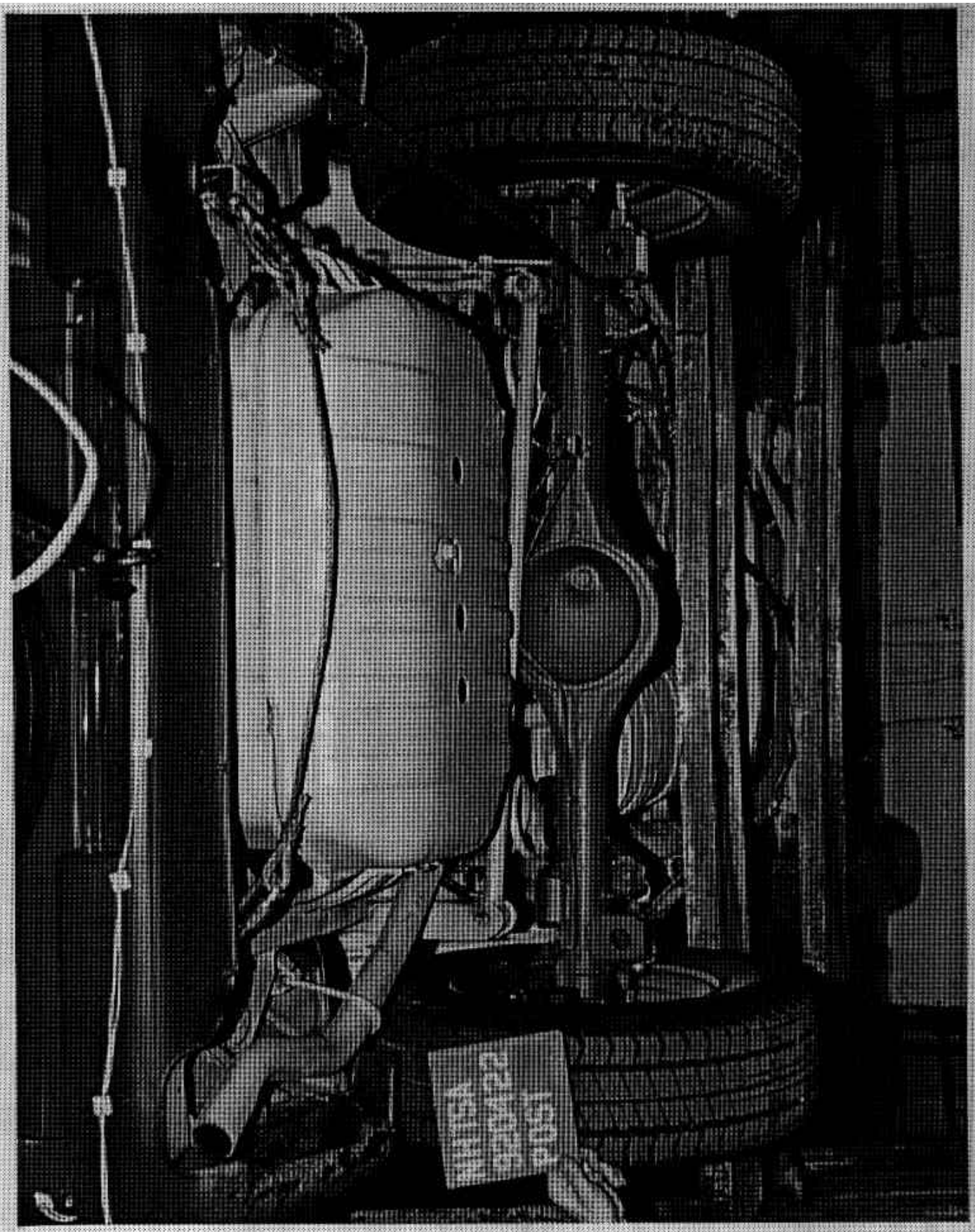

FIGURE A-26. POST-TEST REAR UNDERBODY VIEW

FIGURE A-27. PRE-TEST BALLAST LOCATION VIEW

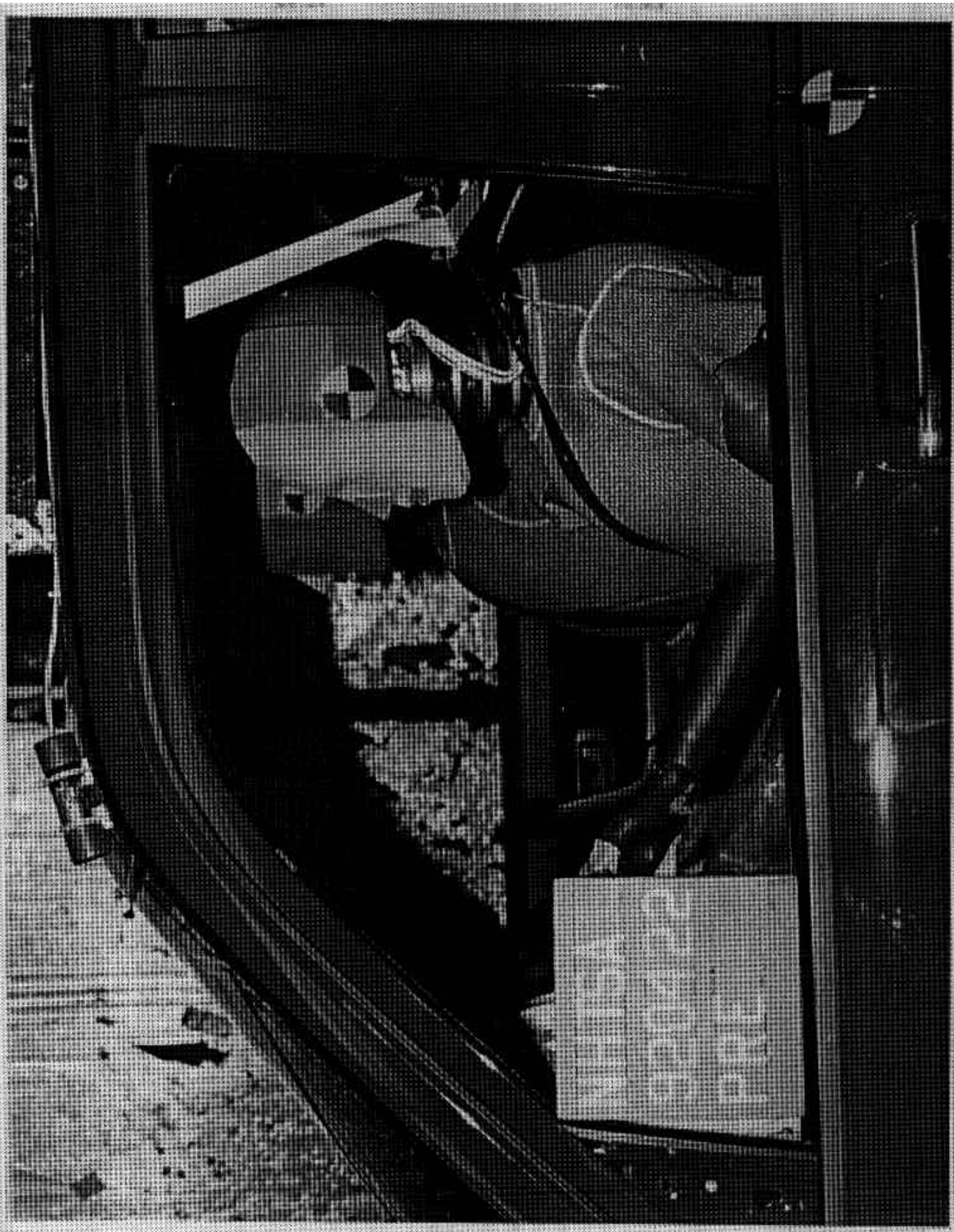

FIGURE A-28. PRE-TEST DRIVER DUMMY POSITION VIEW

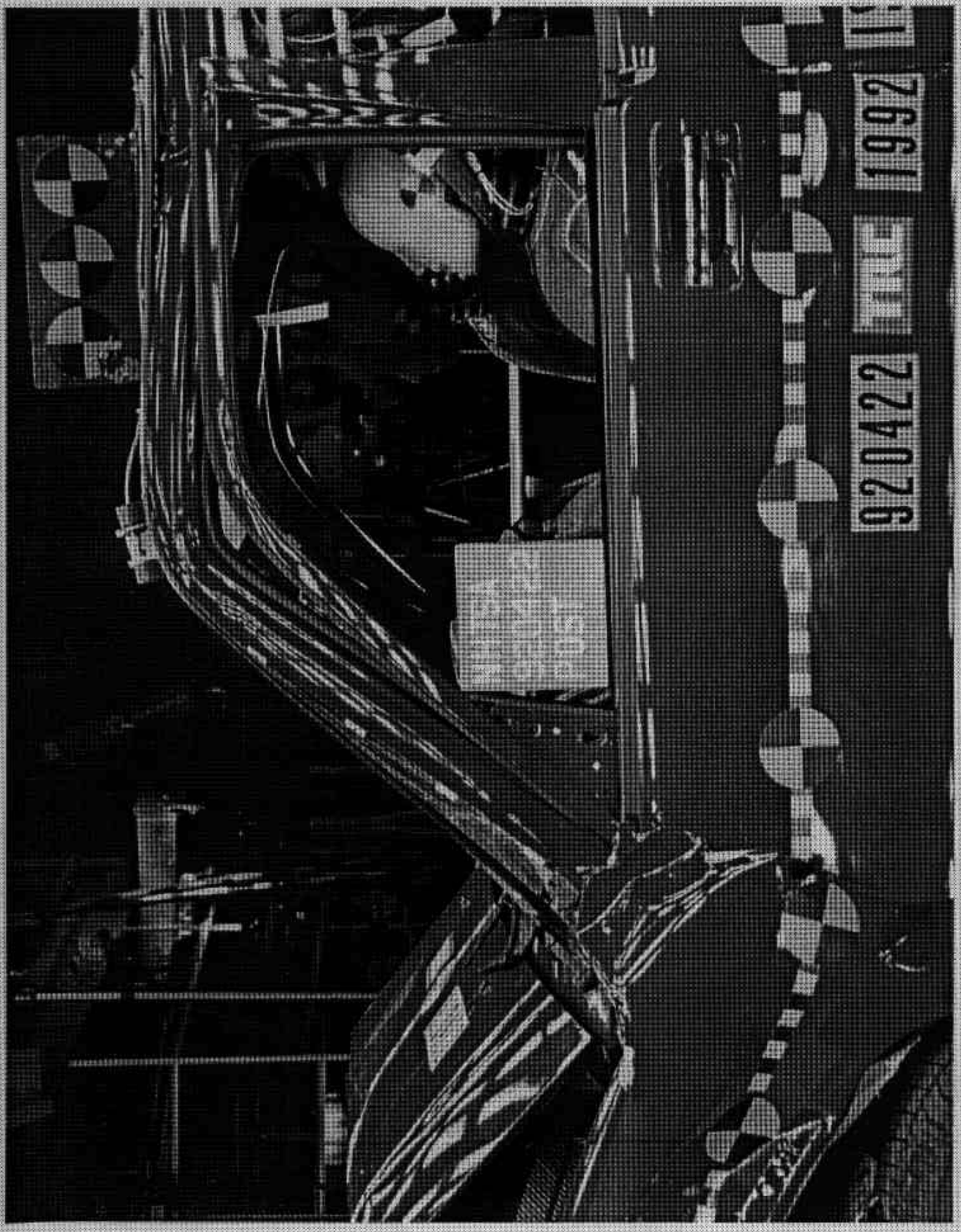

FIGURE A-29. POST-TEST DRIVER DUMMY POSITION VIEW

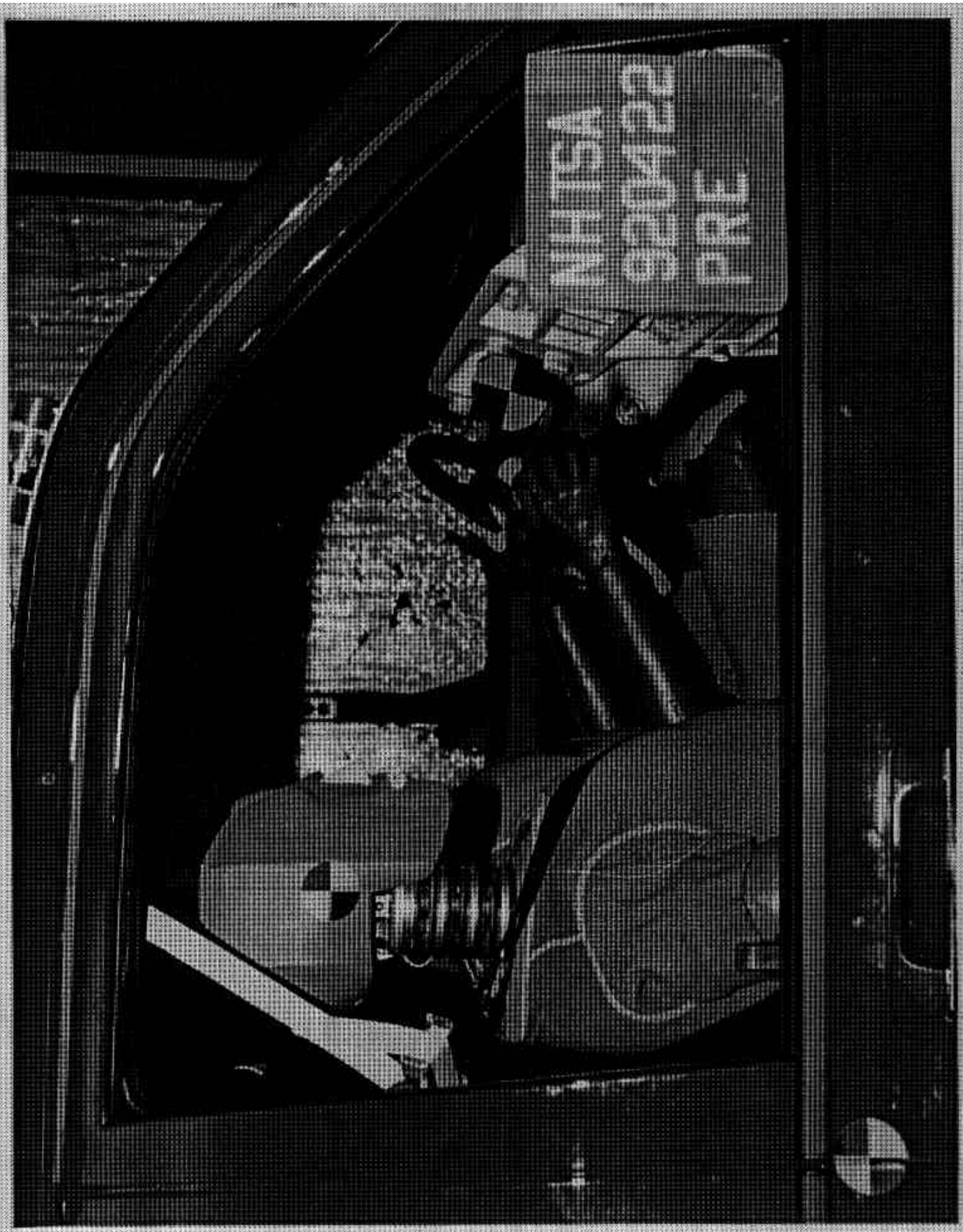

FIGURE A-30. PRE-TEST PASSENGER DUMMY POSITION VIEW

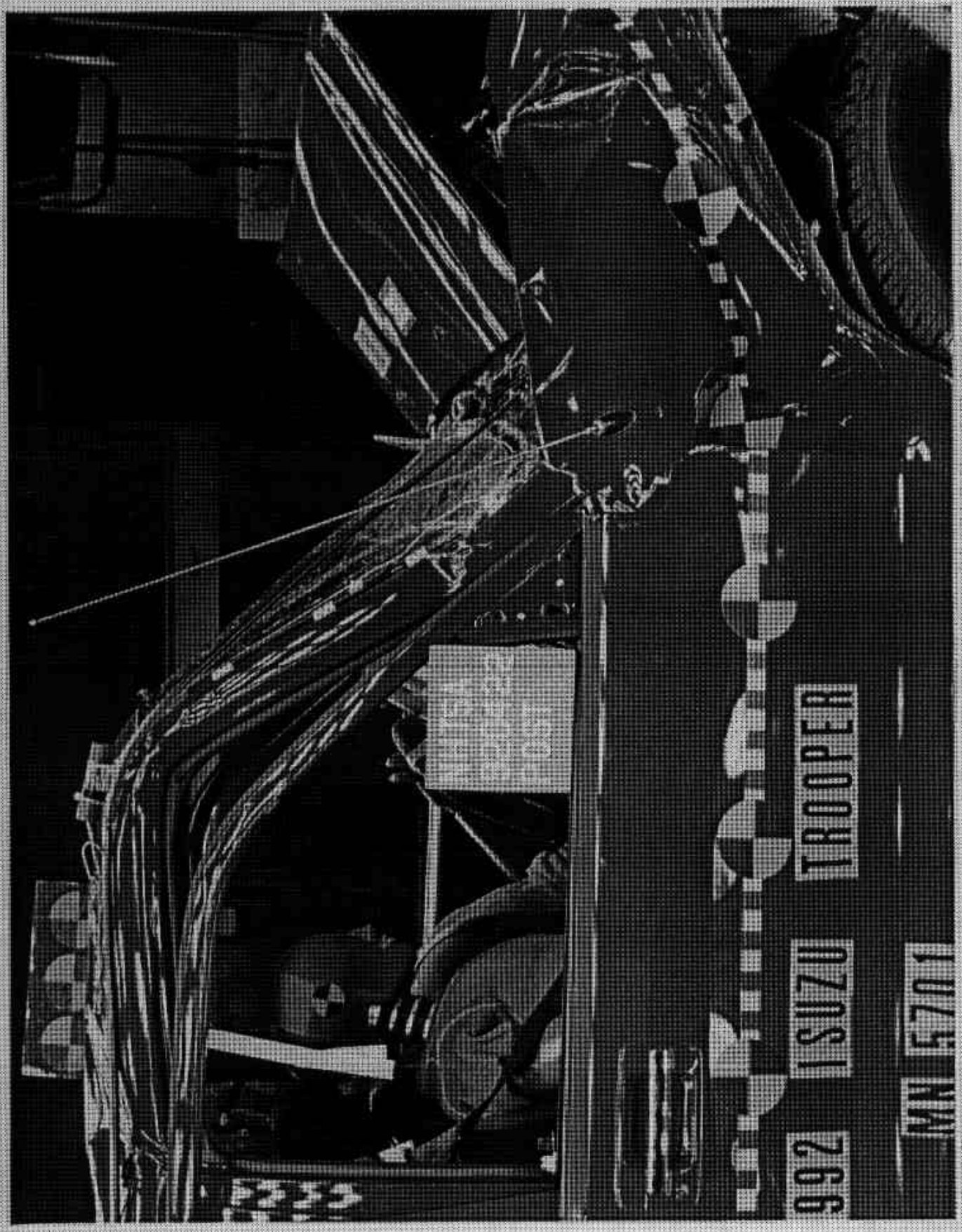

FIGURE A-31. POST-TEST PASSENGER DUMMY POSITION VIEW

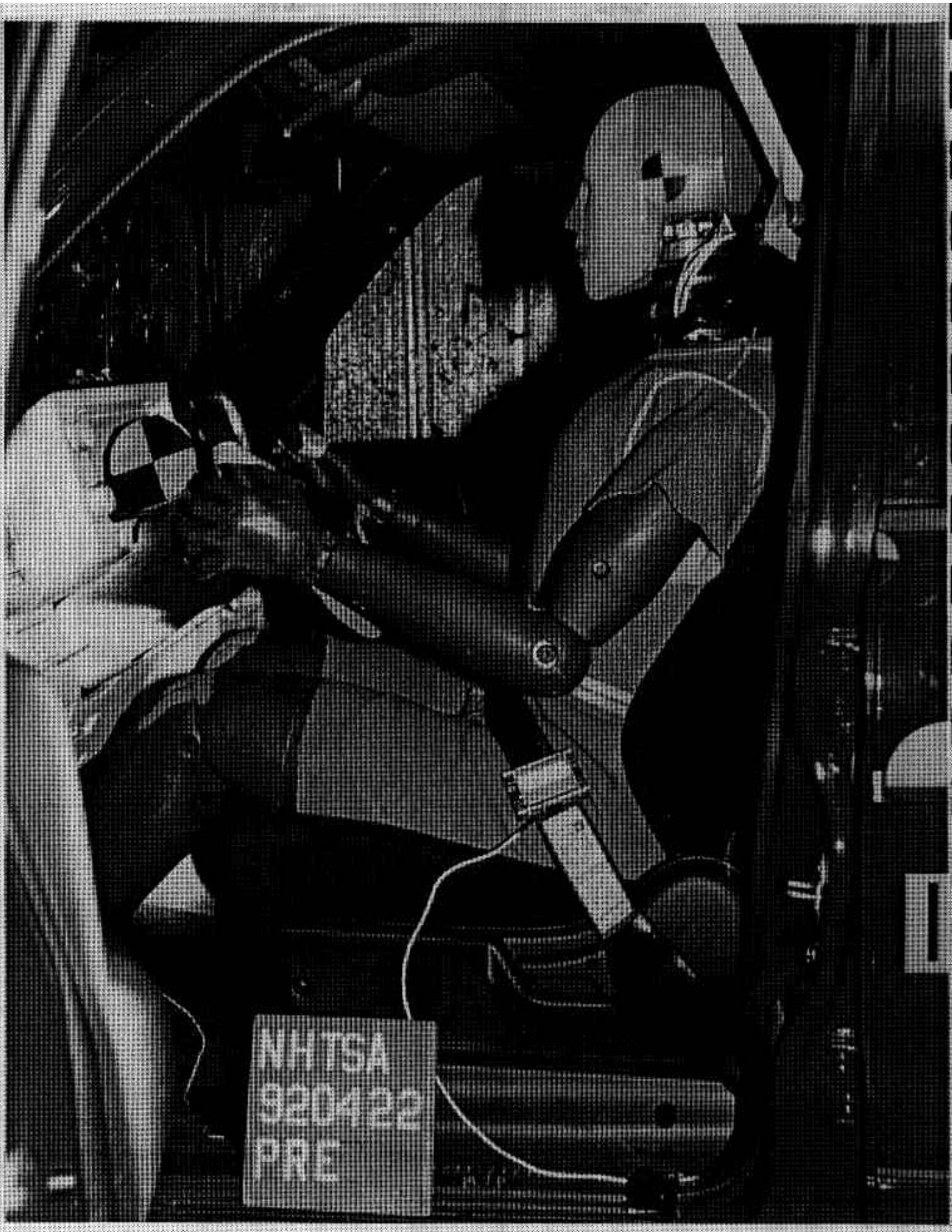

FIGURE A-32. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

FIGURE A-33. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

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

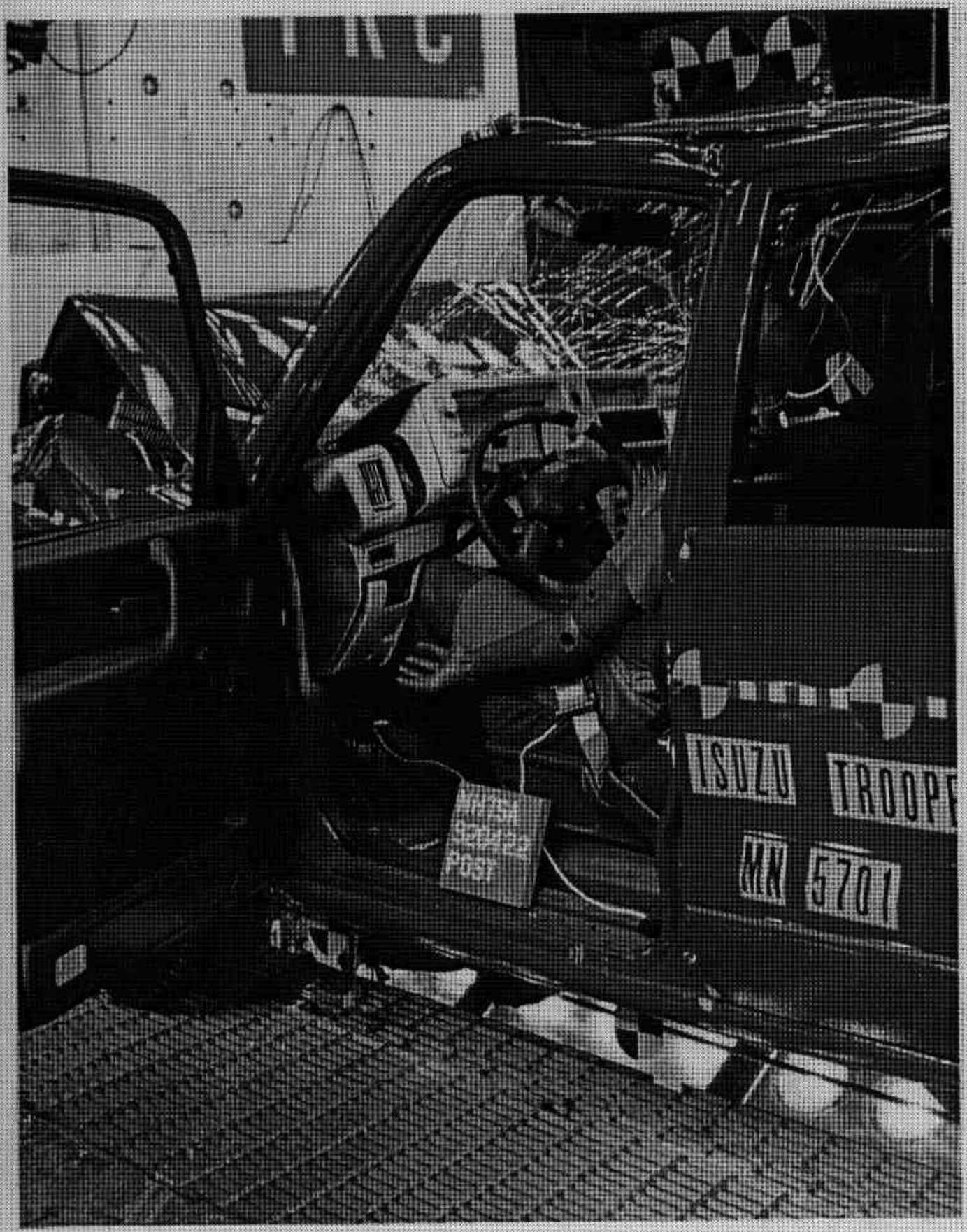

FIGURE A-35. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

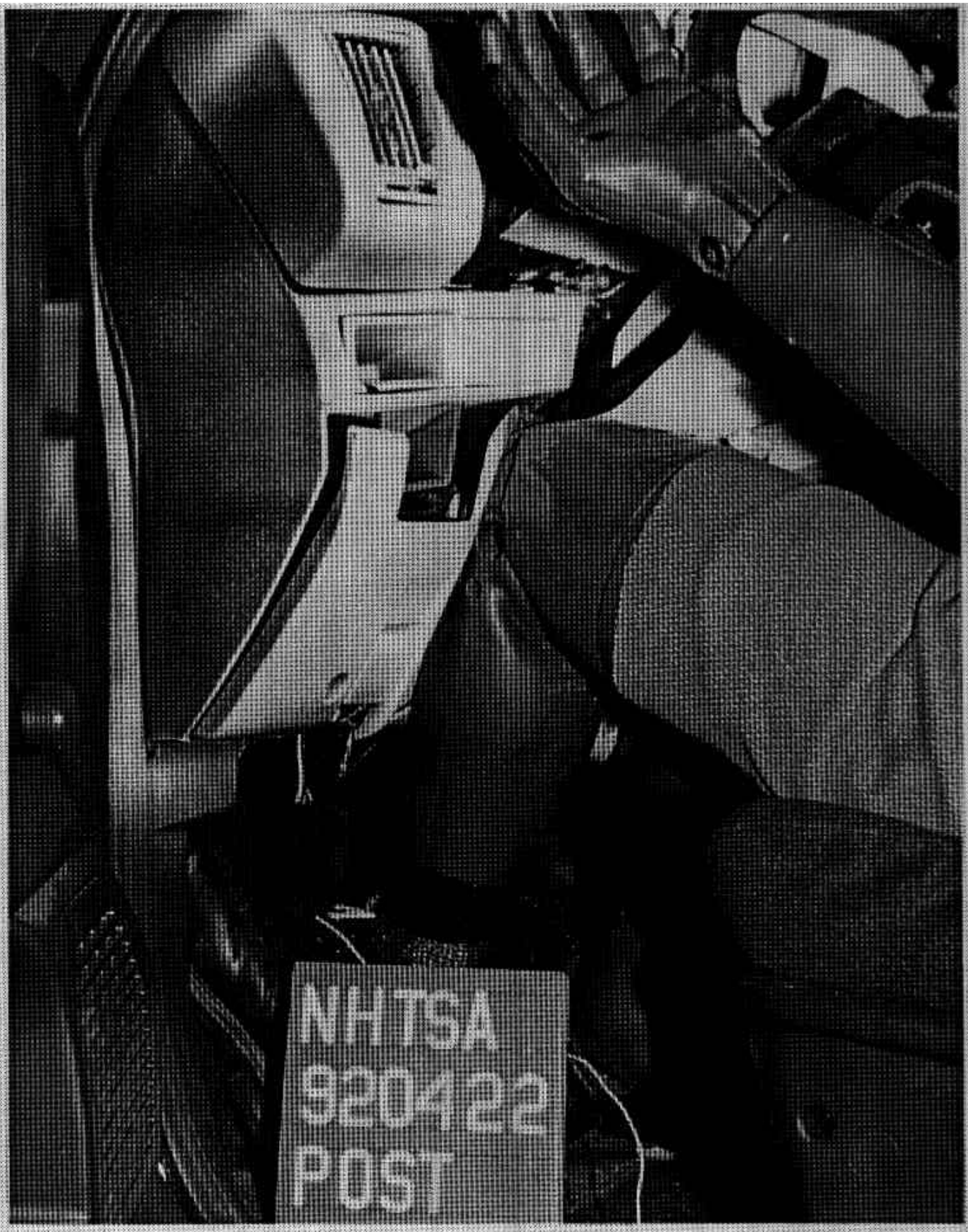

FIGURE A-36. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 3

FIGURE A-37. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

FIGURE A-38. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

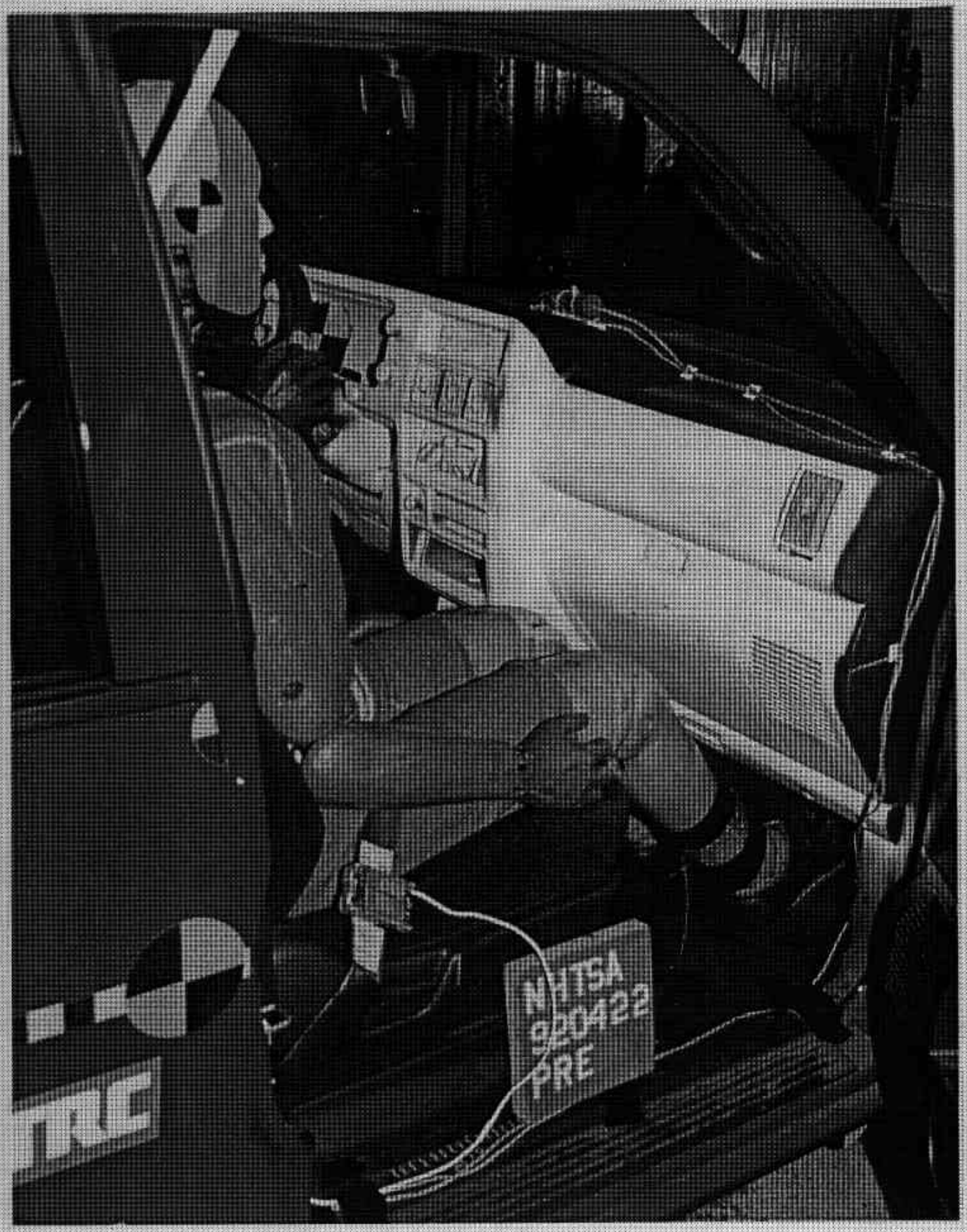

FIGURE A-39. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

FIGURE A-40. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

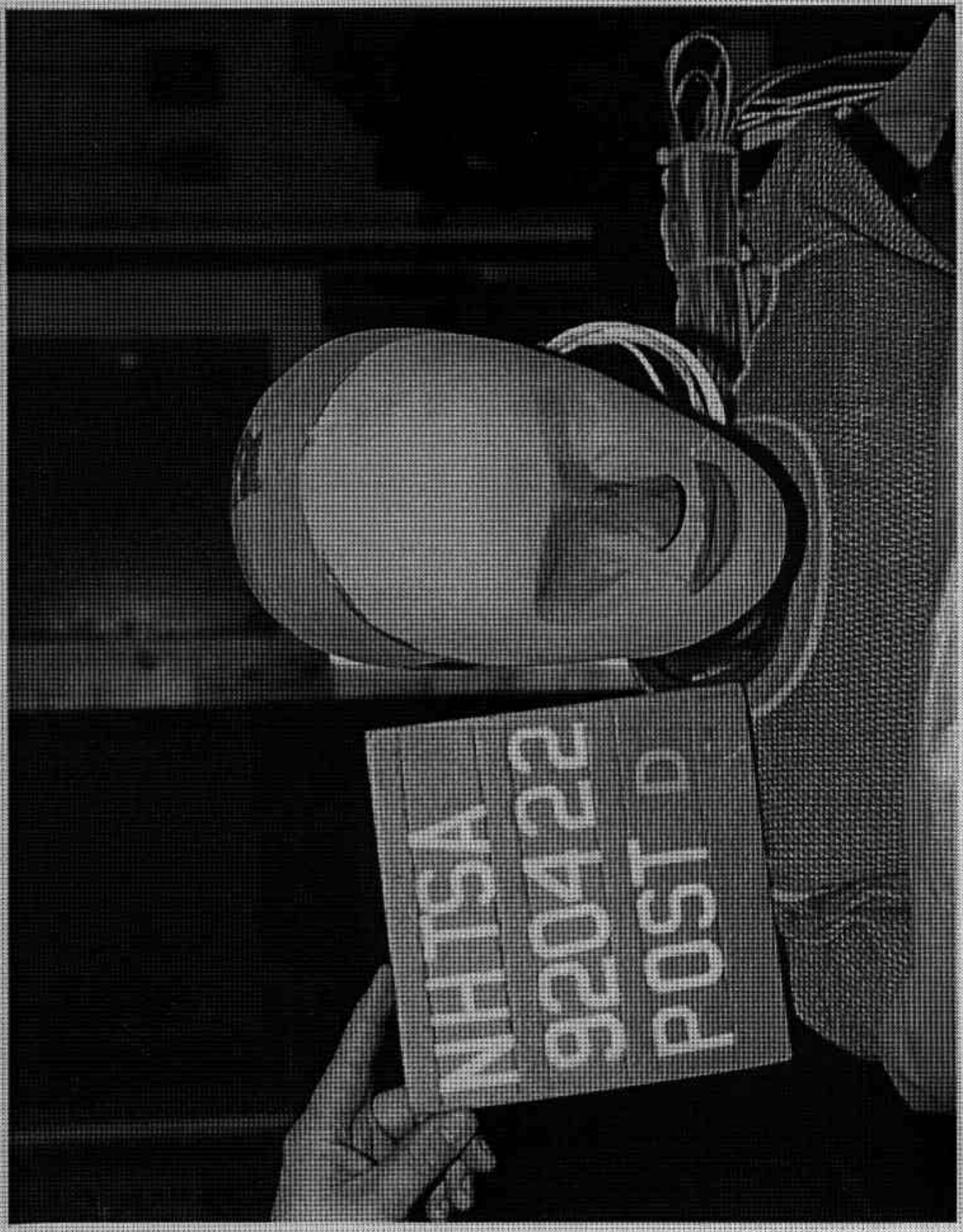

FIGURE A-41. POST-TEST DRIVER DUMMY HEAD CONTACT VIEW

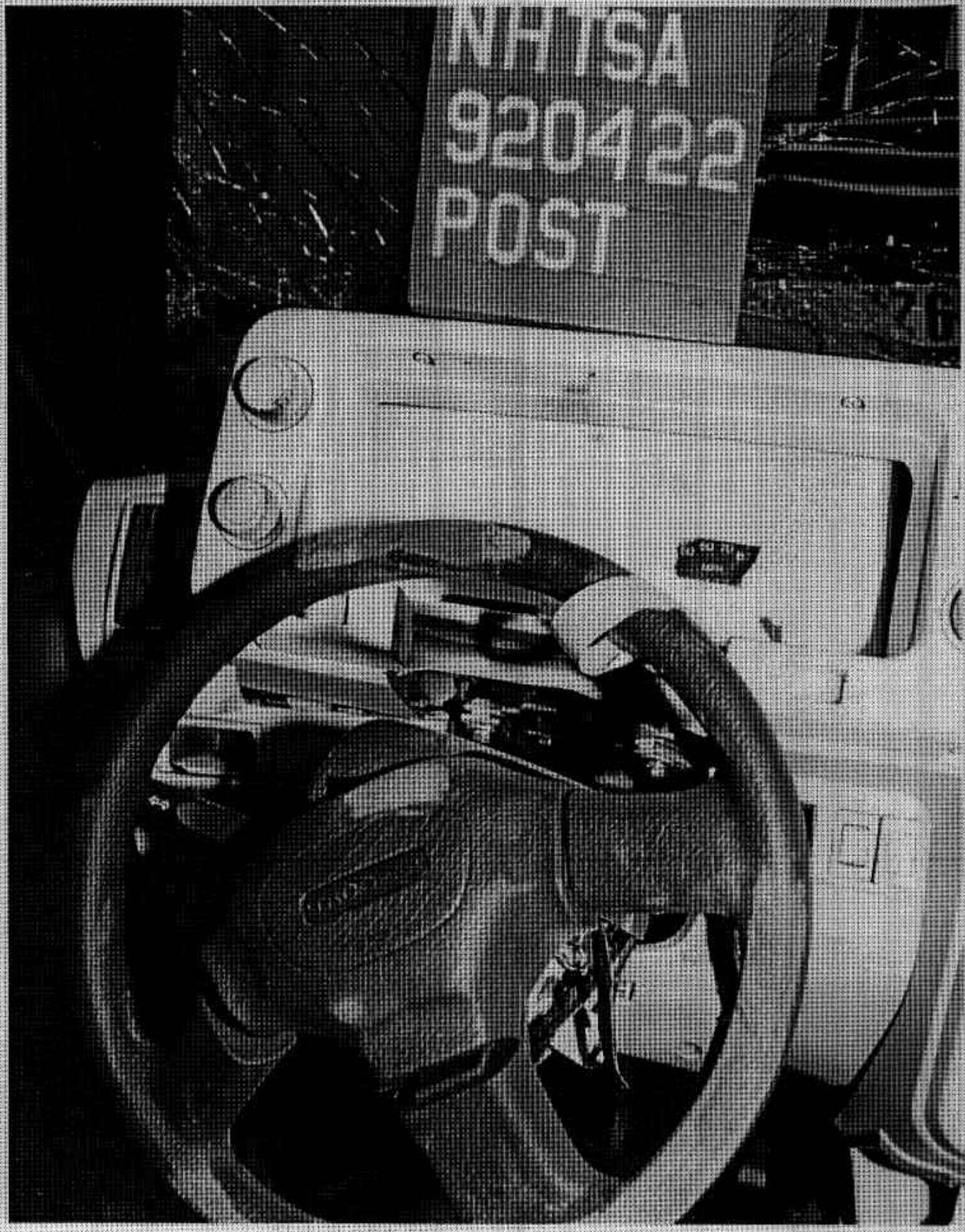

FIGURE A-42. POST-TEST DRIVER DUMMY HEAD & CHEST CONTACT VIEW

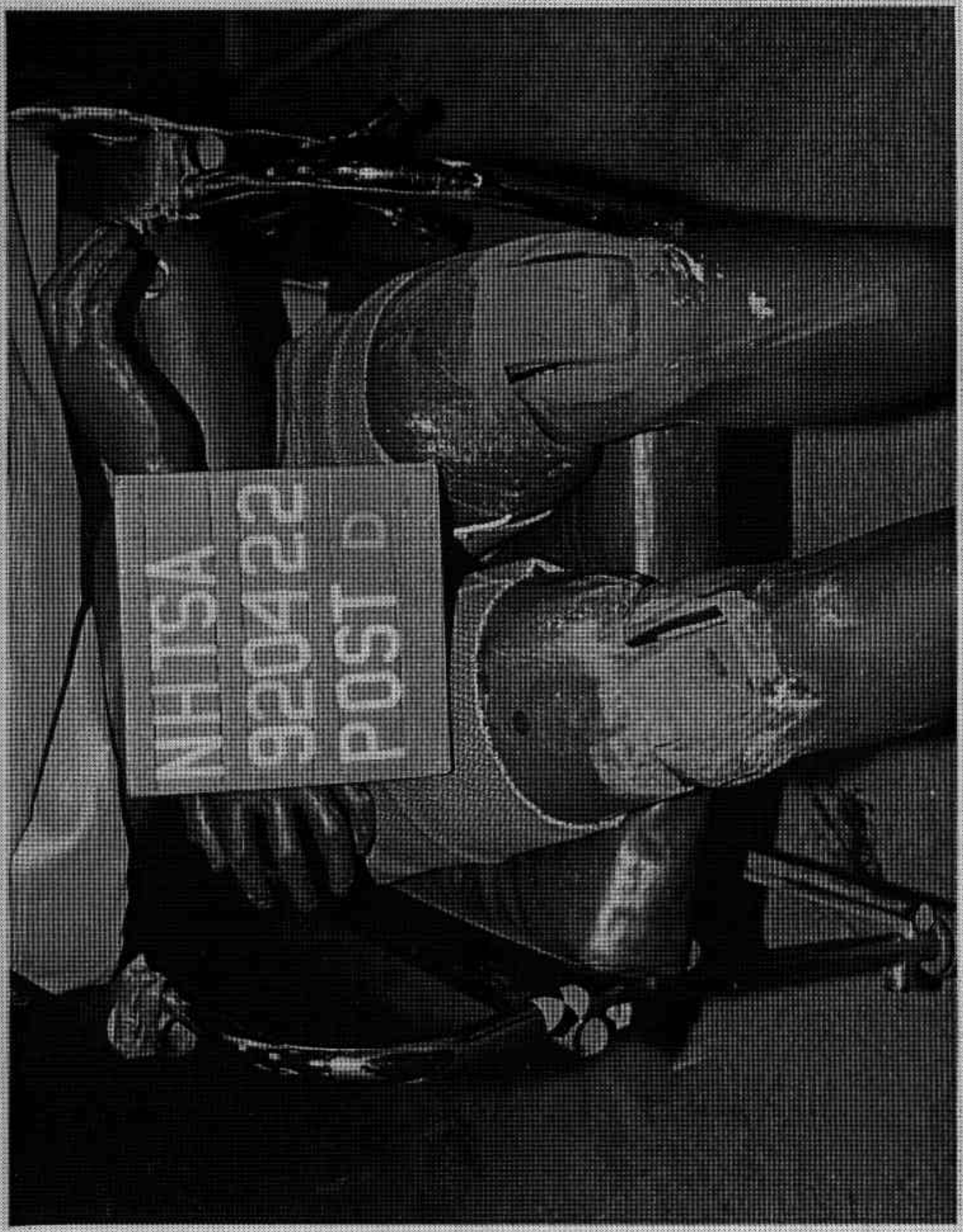

FIGURE A-43. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

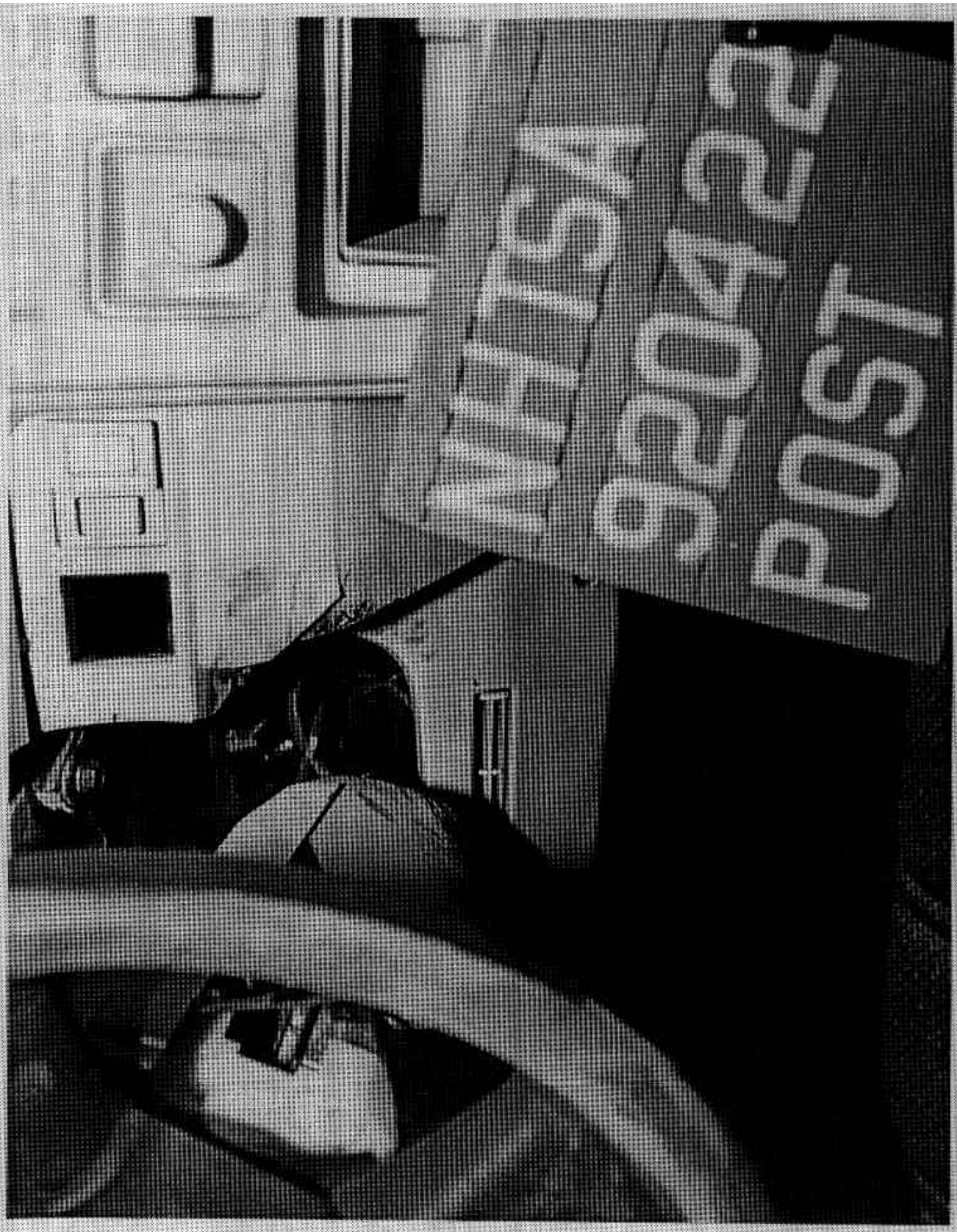

FIGURE A-44. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

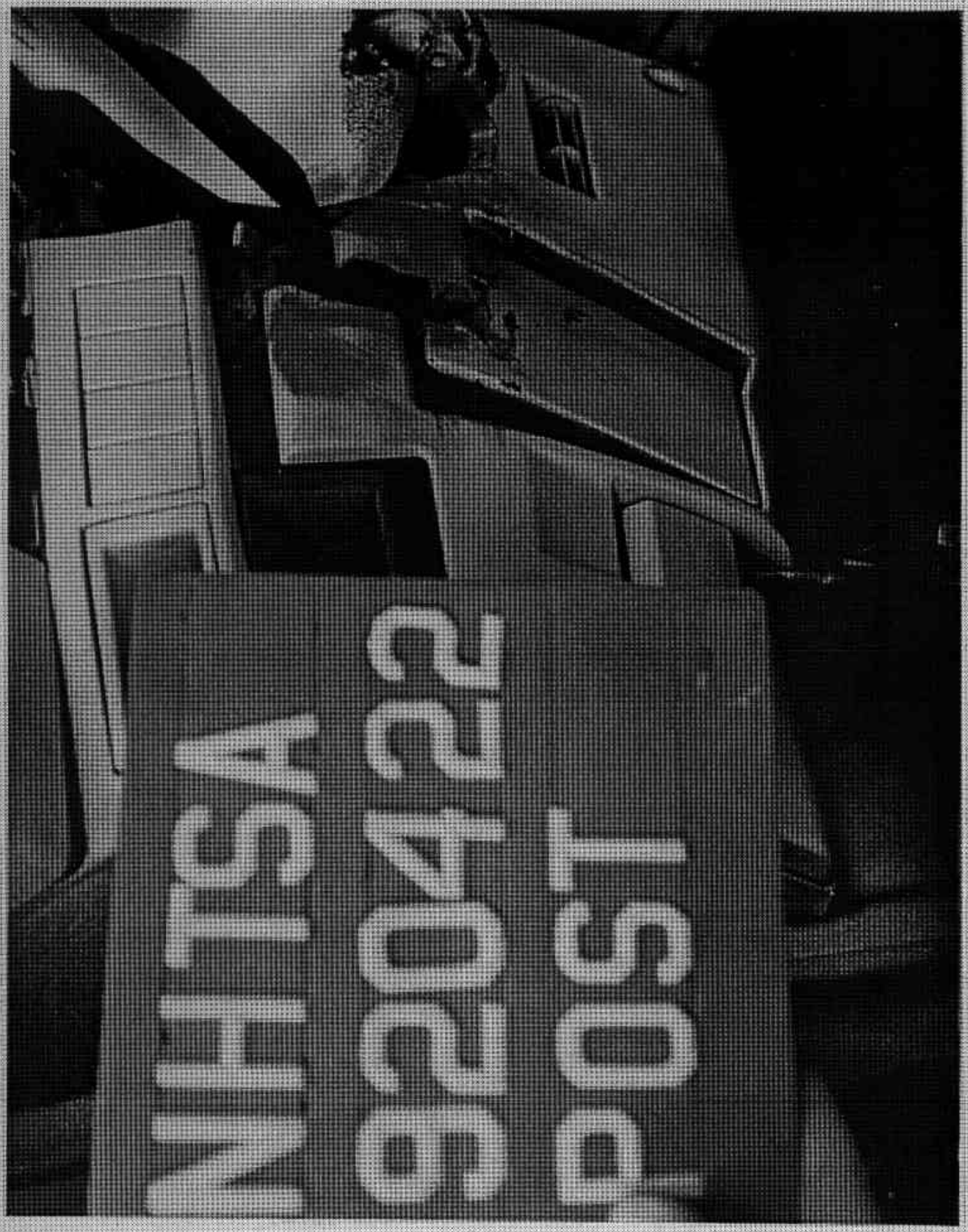

FIGURE A-45. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 3

FIGURE A-46. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

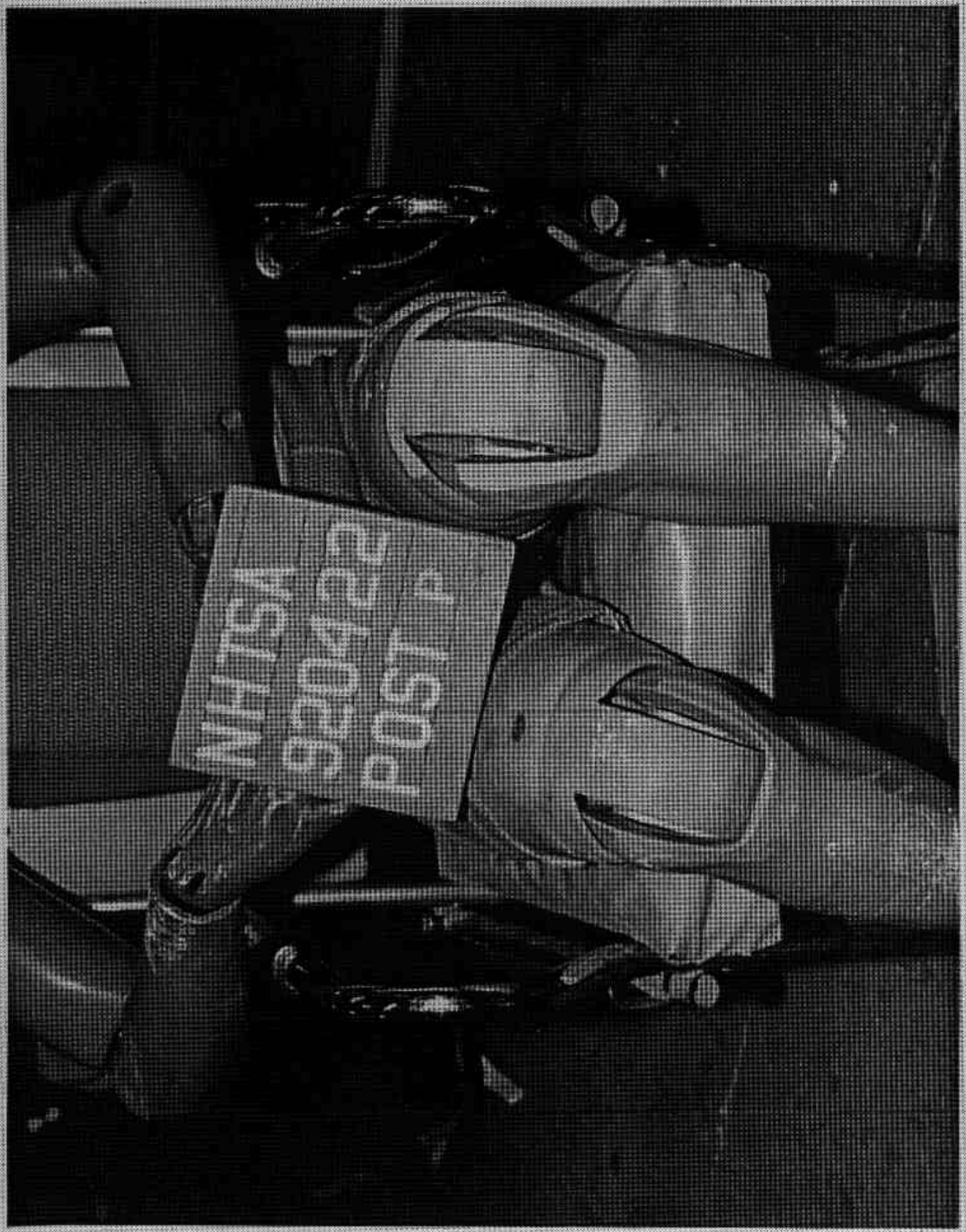

FIGURE A-47. POST-TEST PASSENGER DUMMY KNEE CONTACT VIEW

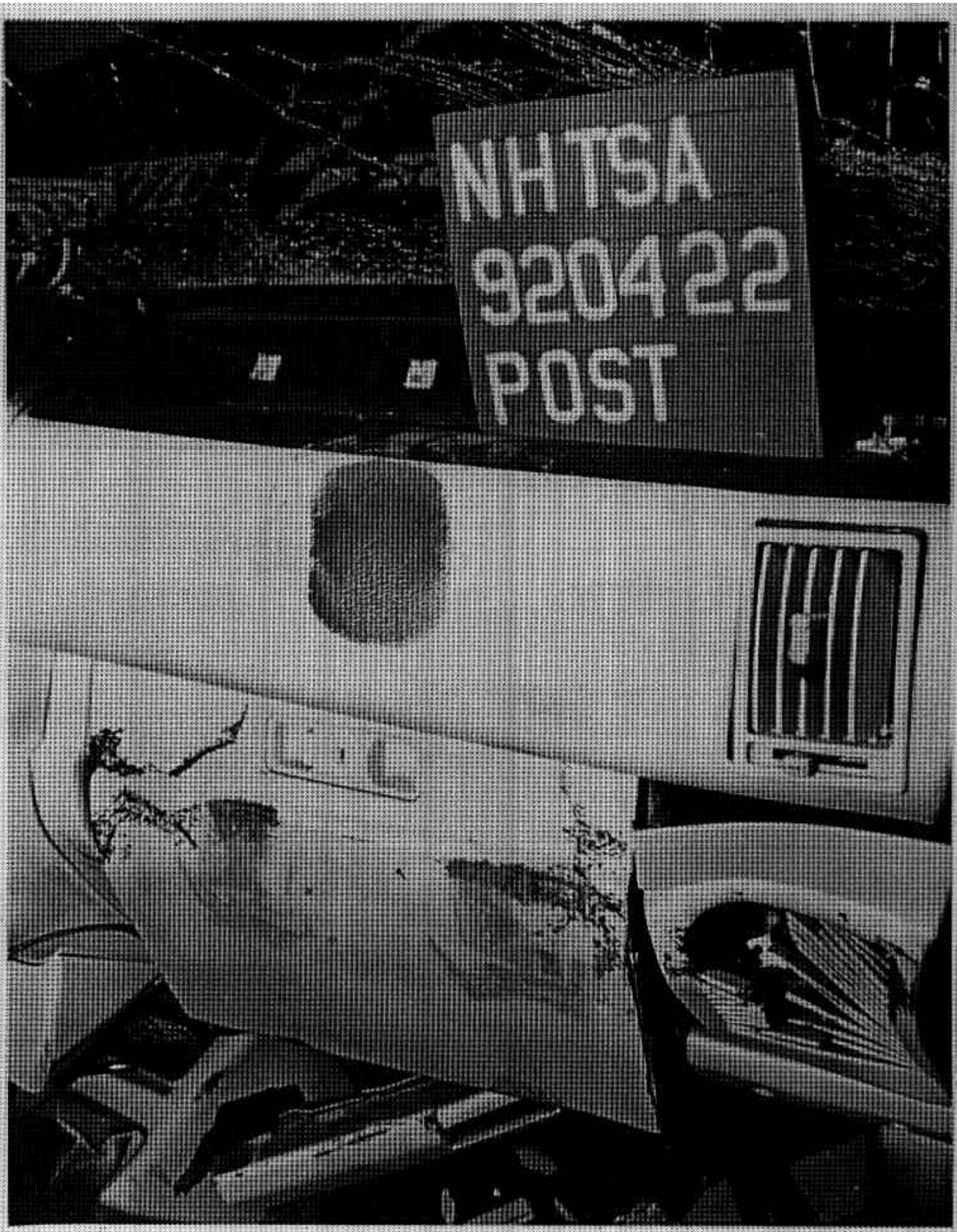

FIGURE A-48. POST-TEST PASSENGER DUMMY HEAD & KNEE CONTACT VIEW

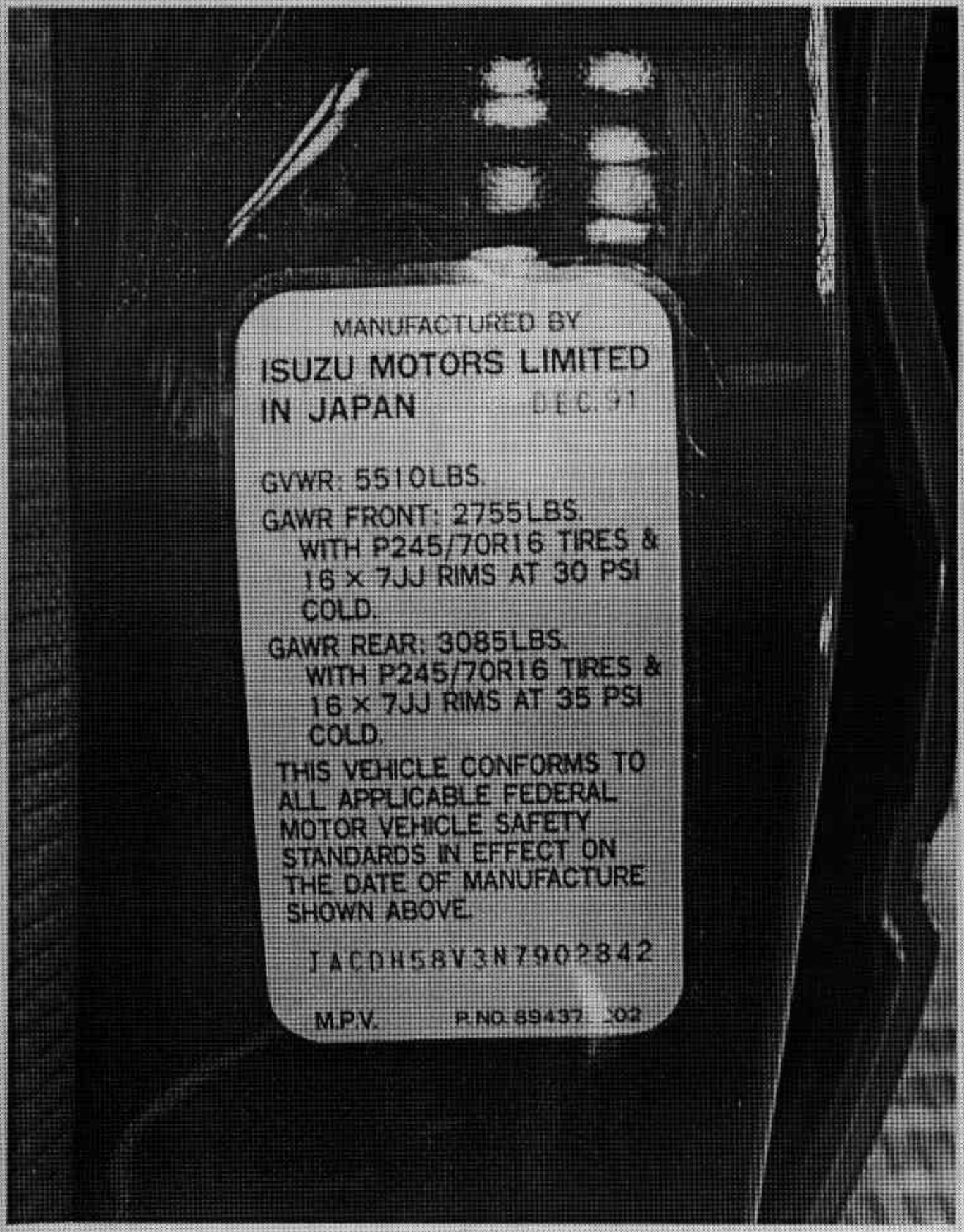

FIGURE A-49. PRE-TEST VEH. CERT. & RECOMMENDED TIRE PRES. LABEL VIEW

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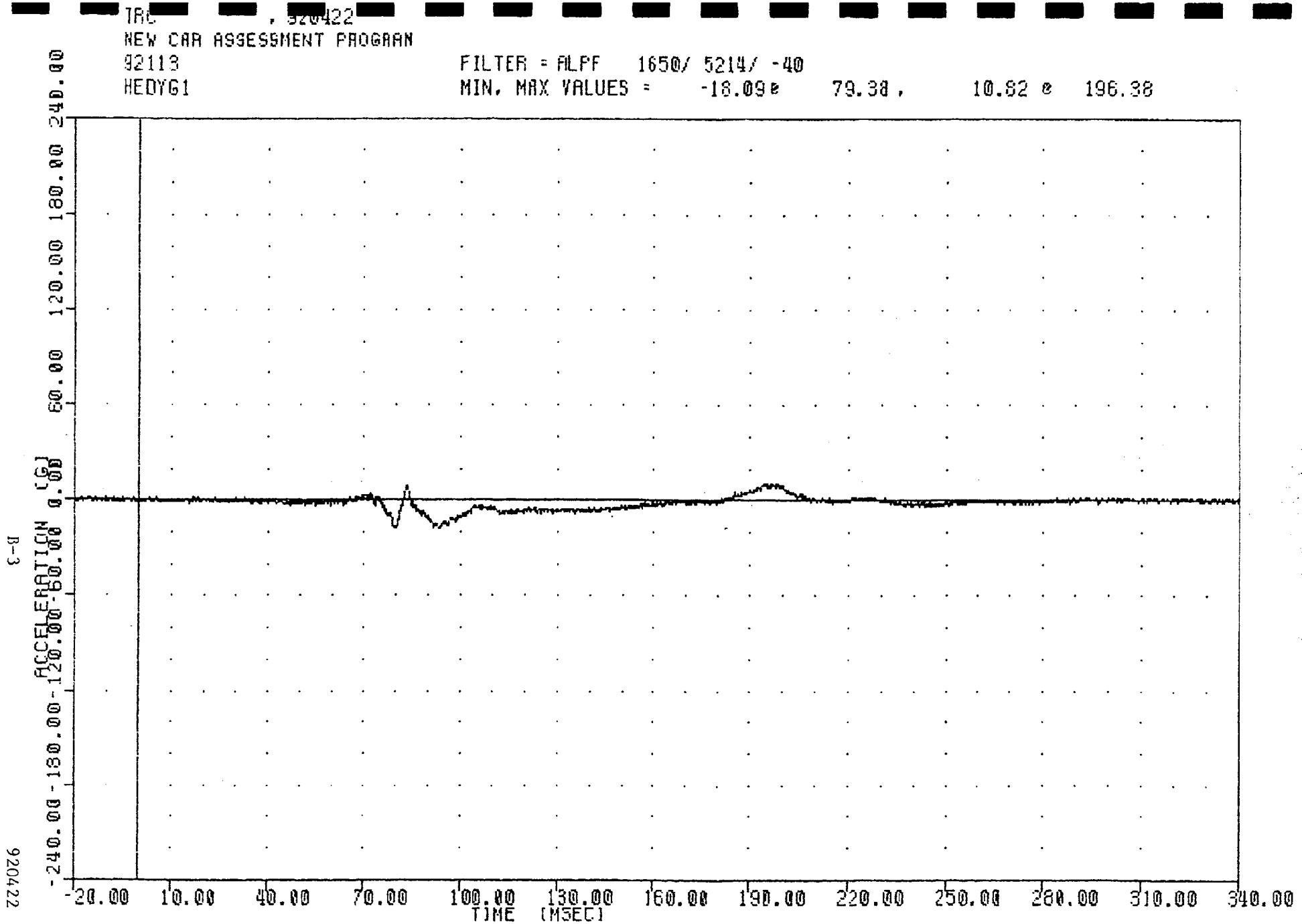
APPENDIX B

DATA PLOTS

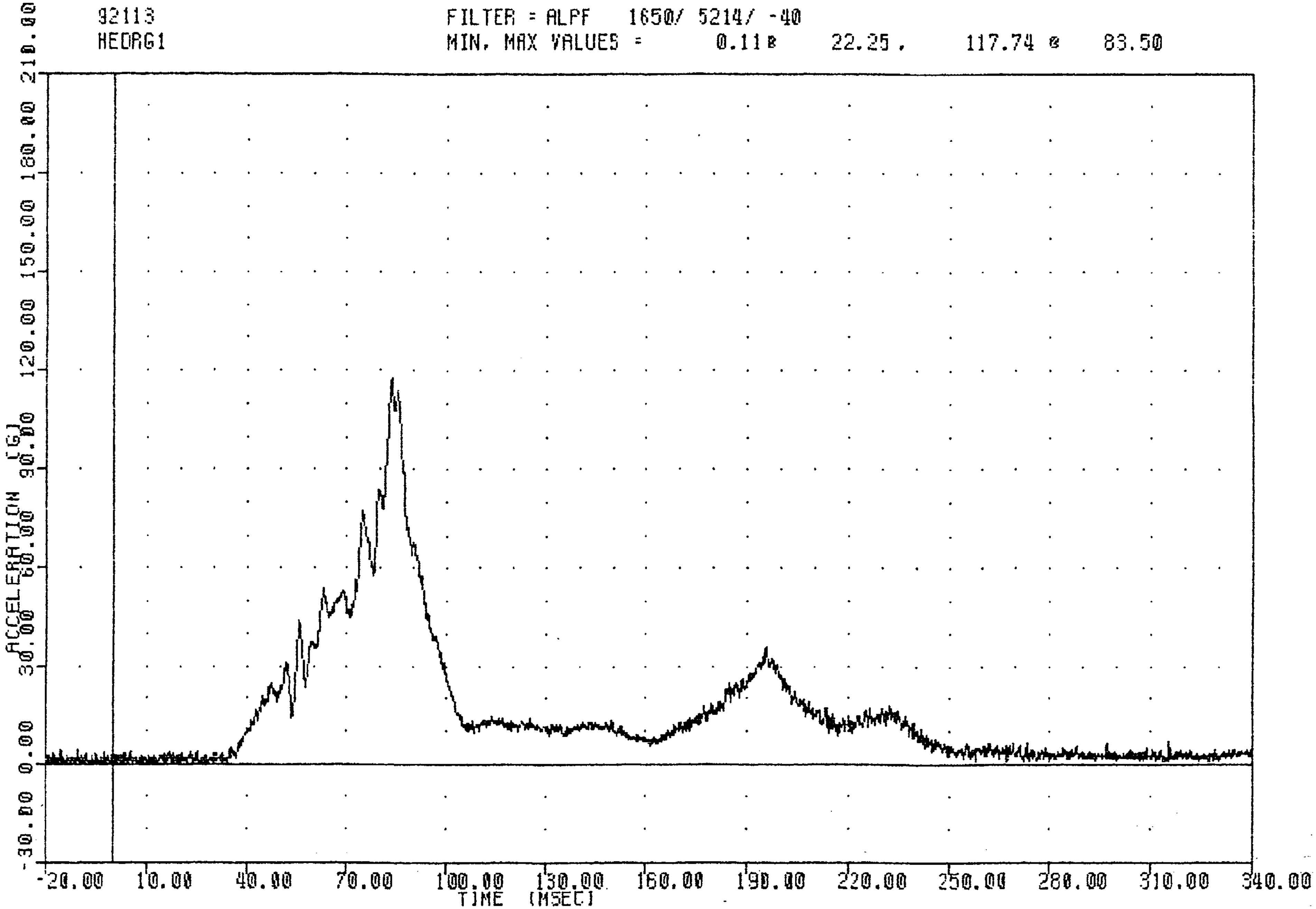


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION

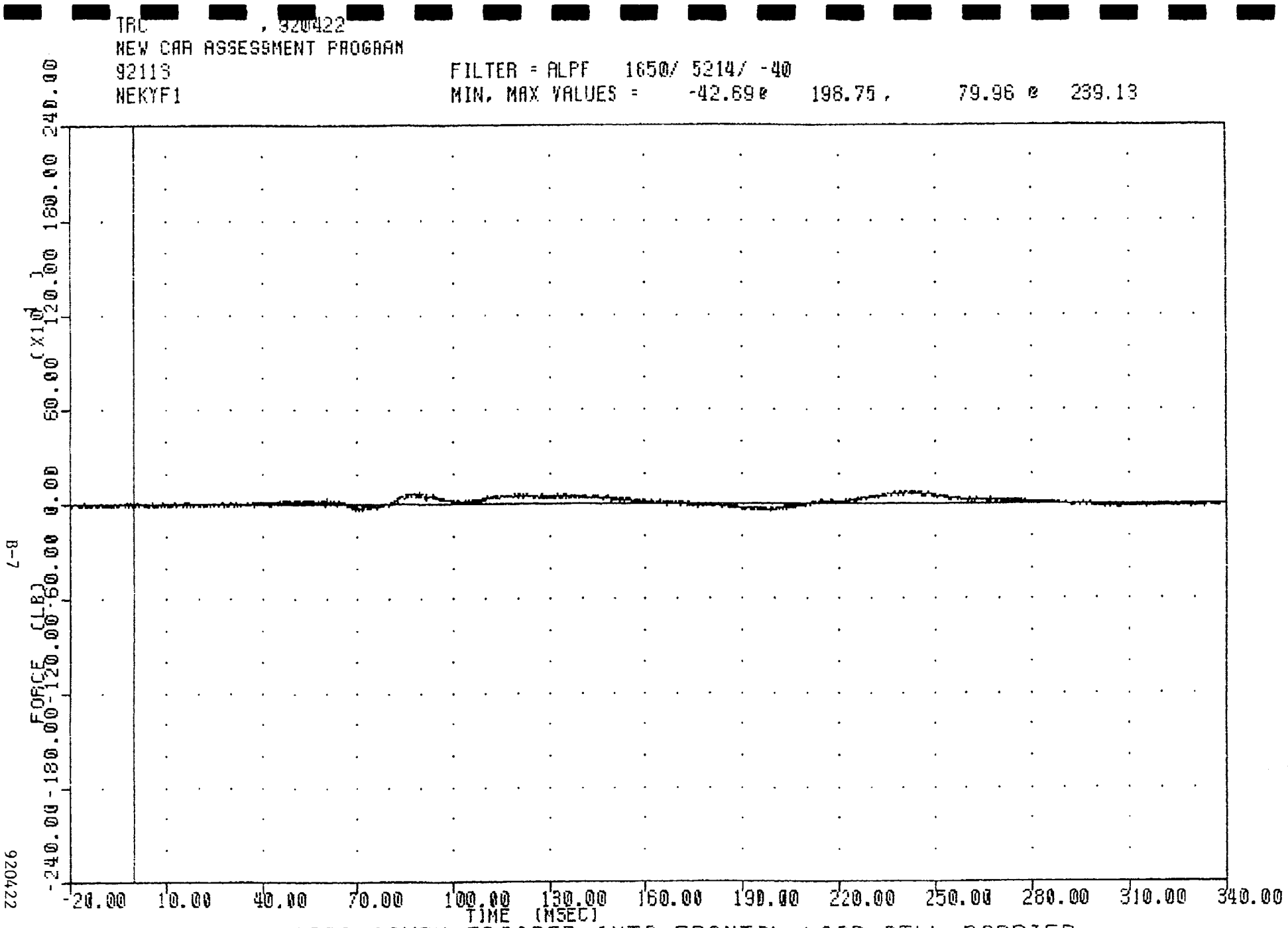
920422

TRC [redacted] , [redacted]422
NEW CAR ASSESSMENT PROGRAM
92113
HEDRG1

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.11 @ 22.25 , 117.74 @ 83.50

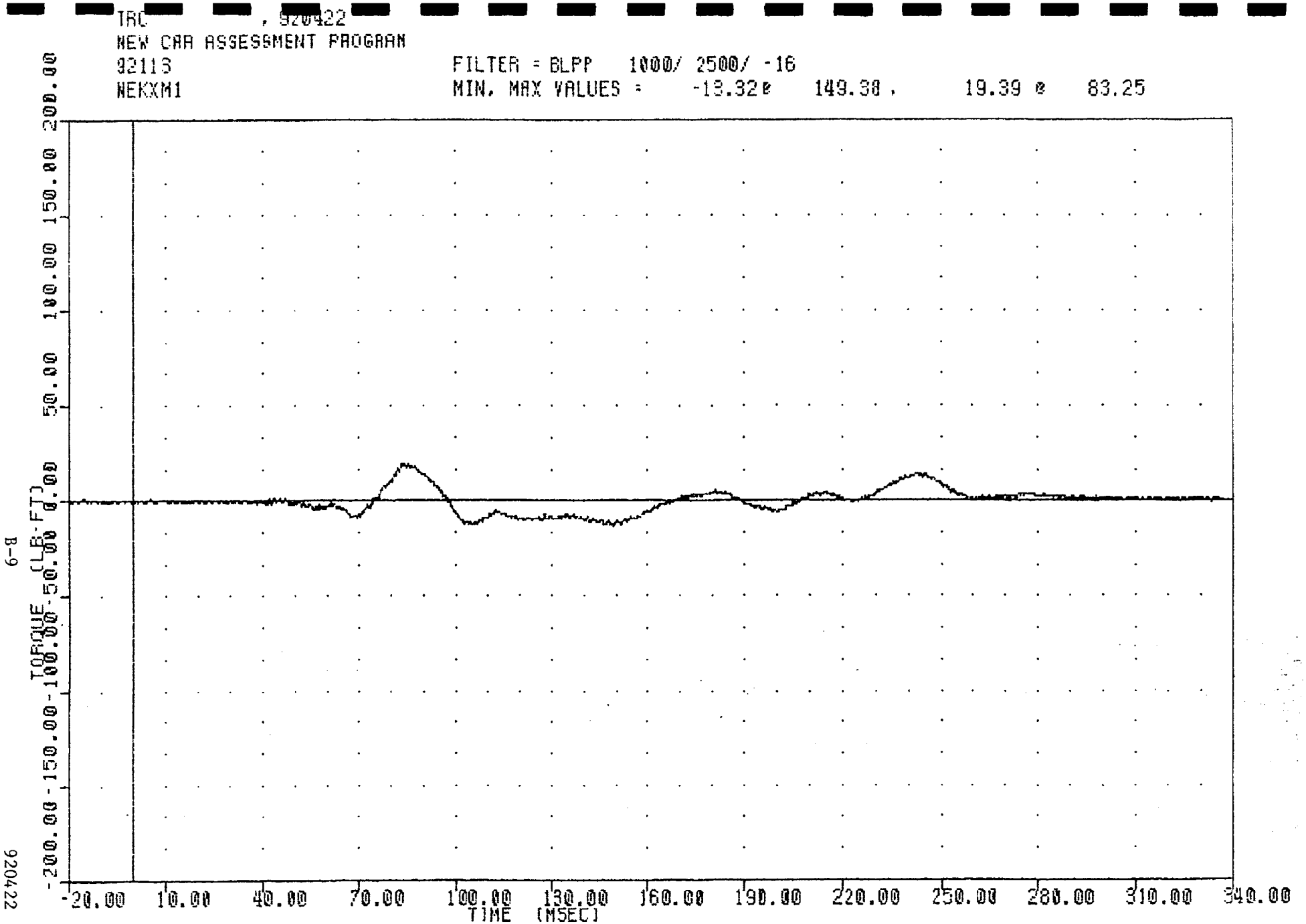


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION



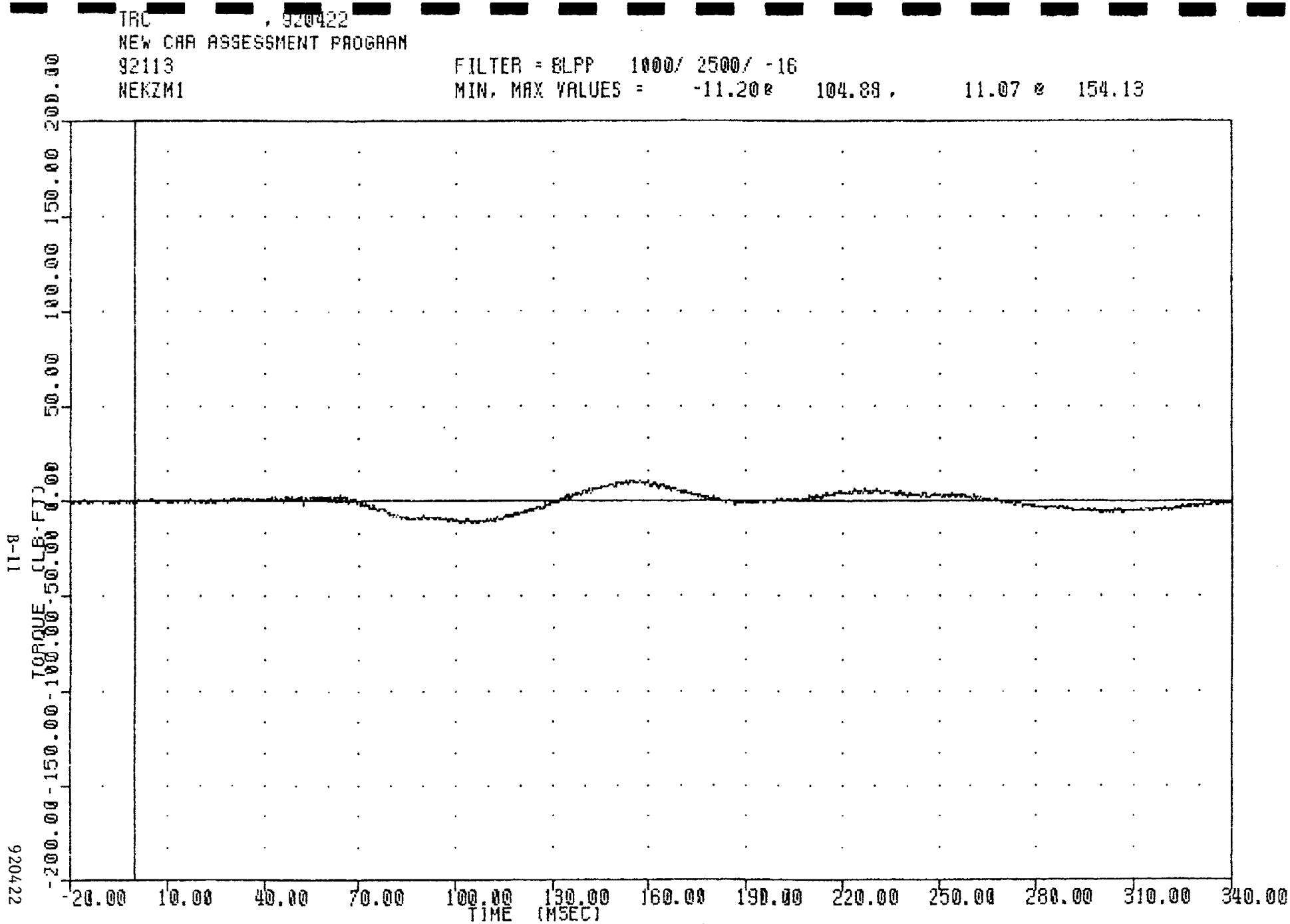
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK Y-AXIS SHEAR FORCE

920422

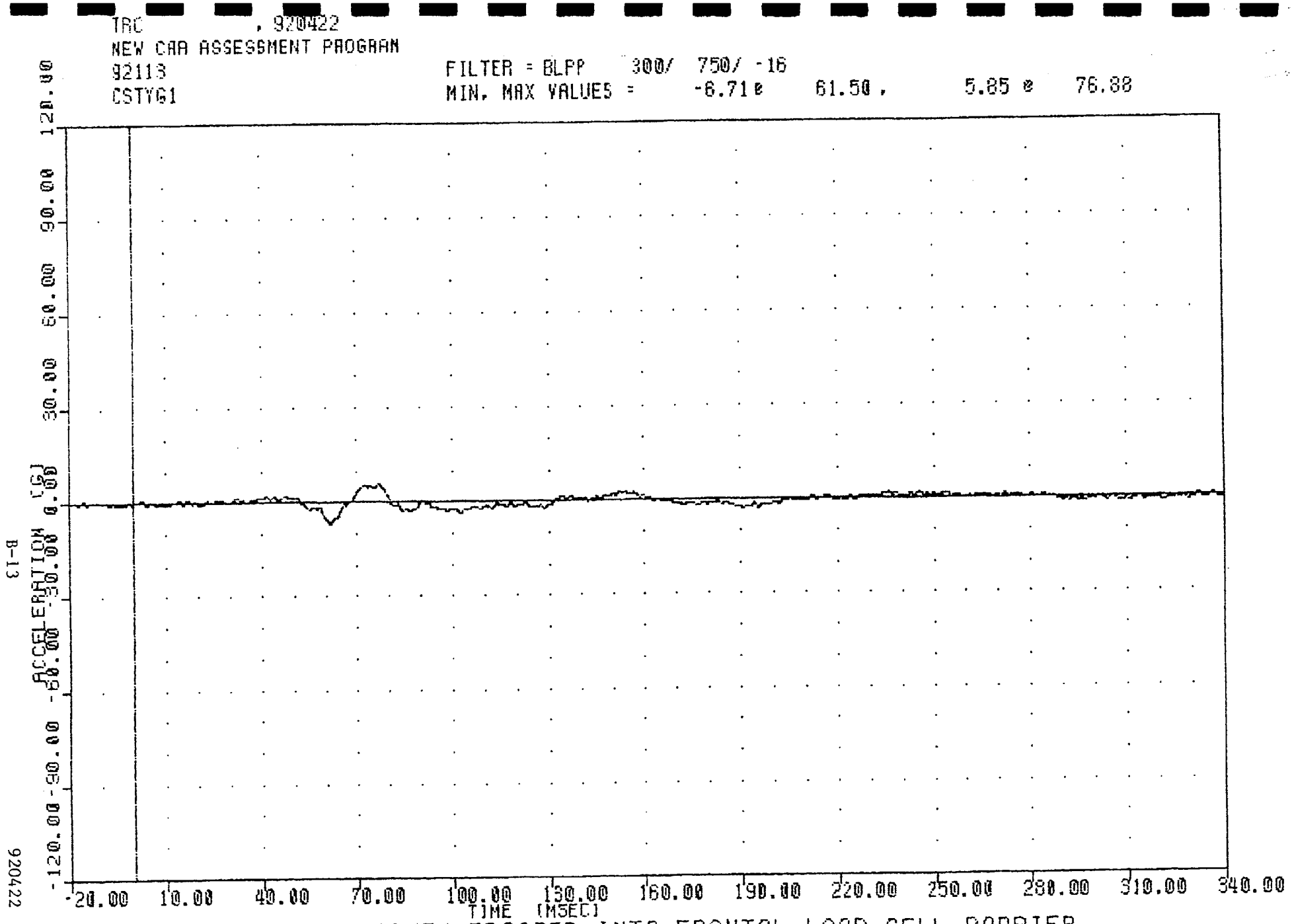


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT X AXIS

920422

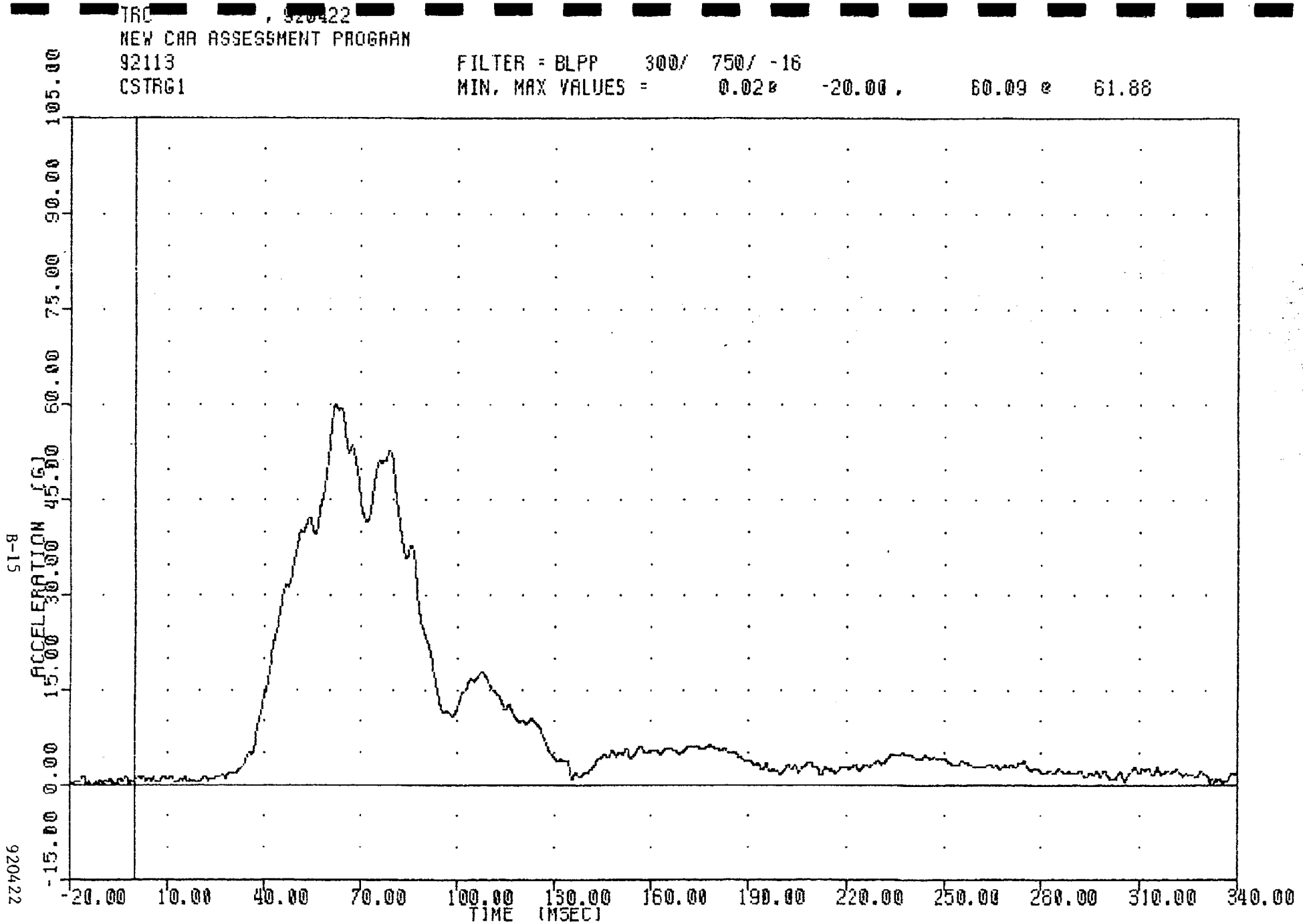


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS



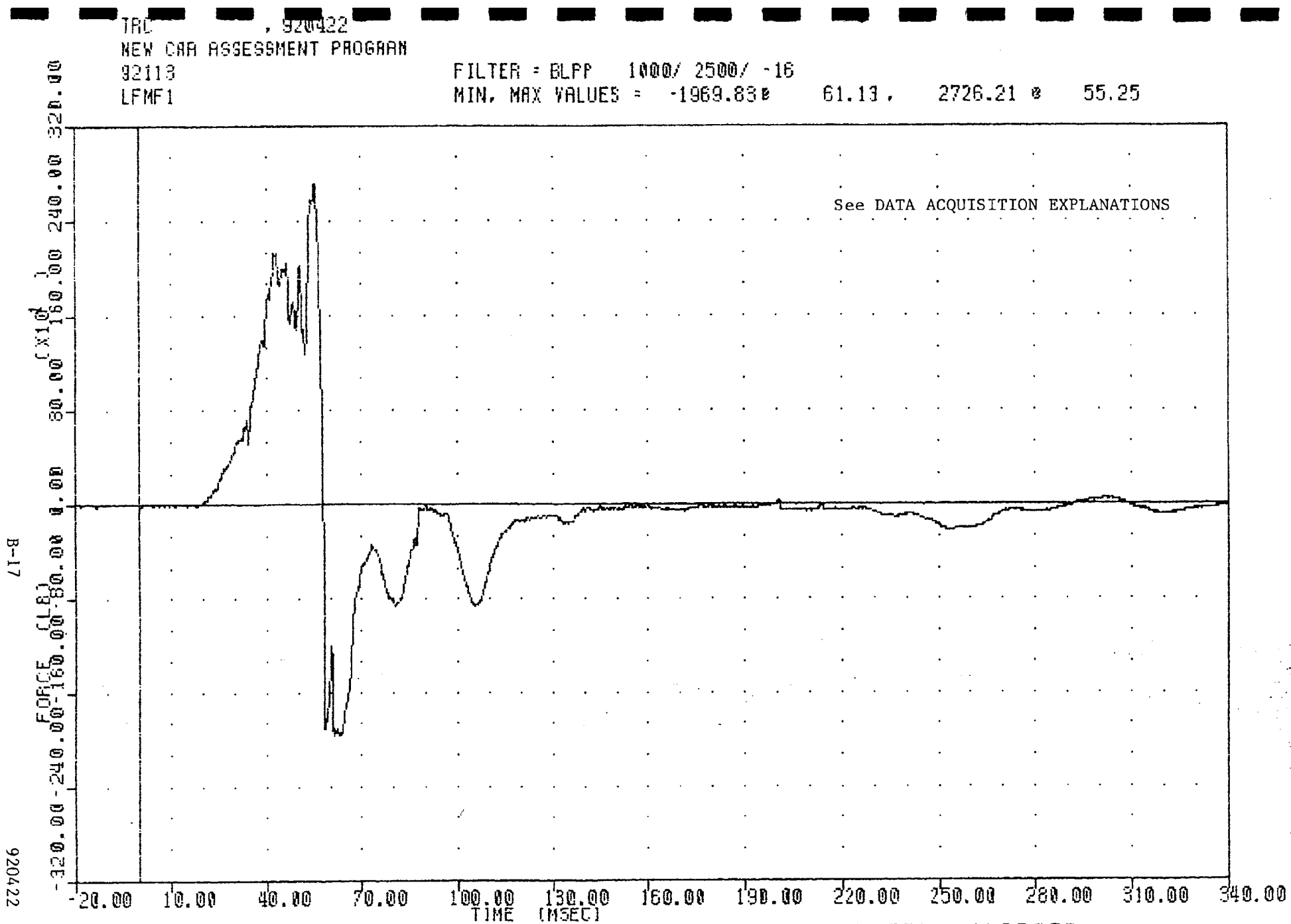
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

920422



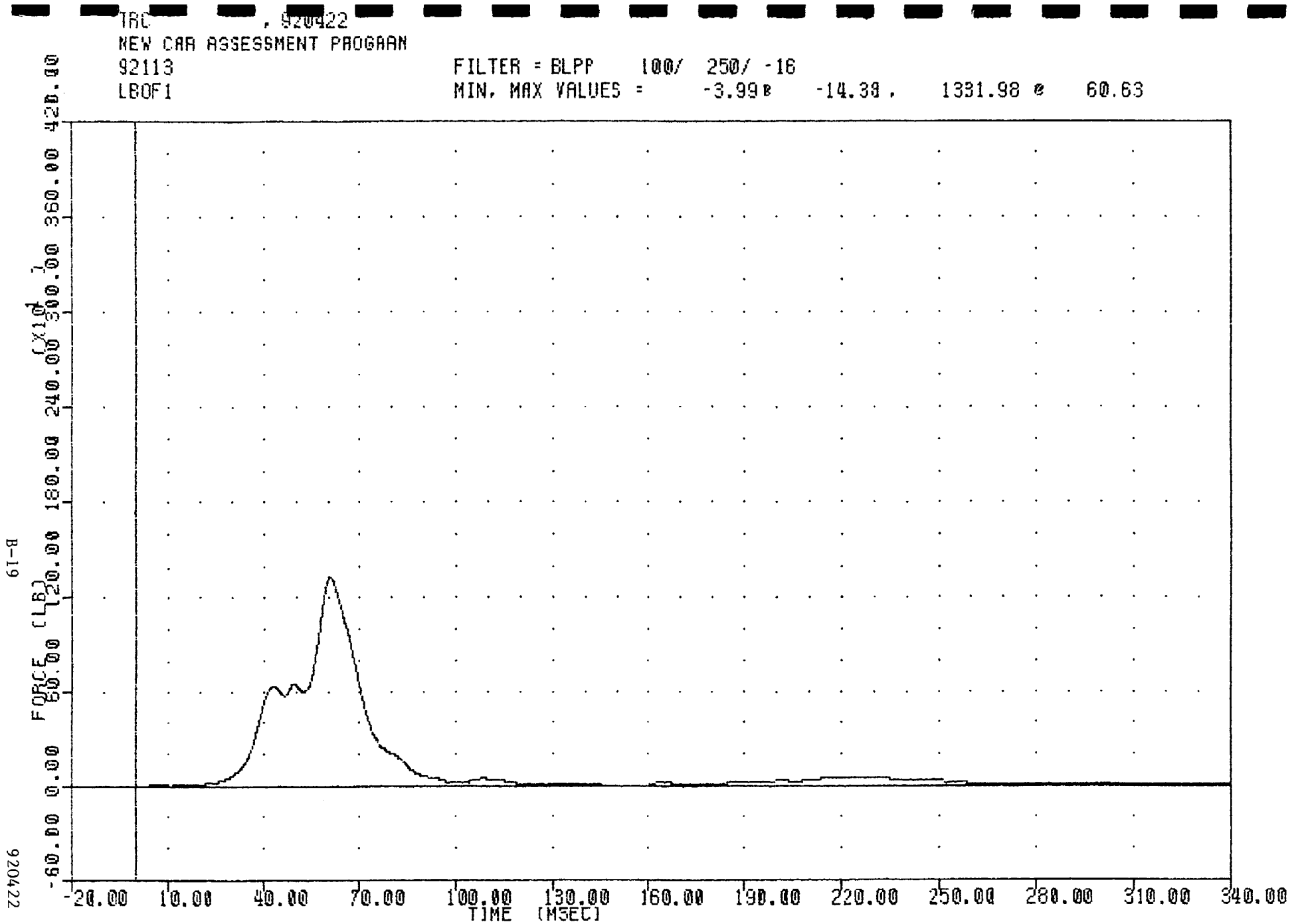
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE

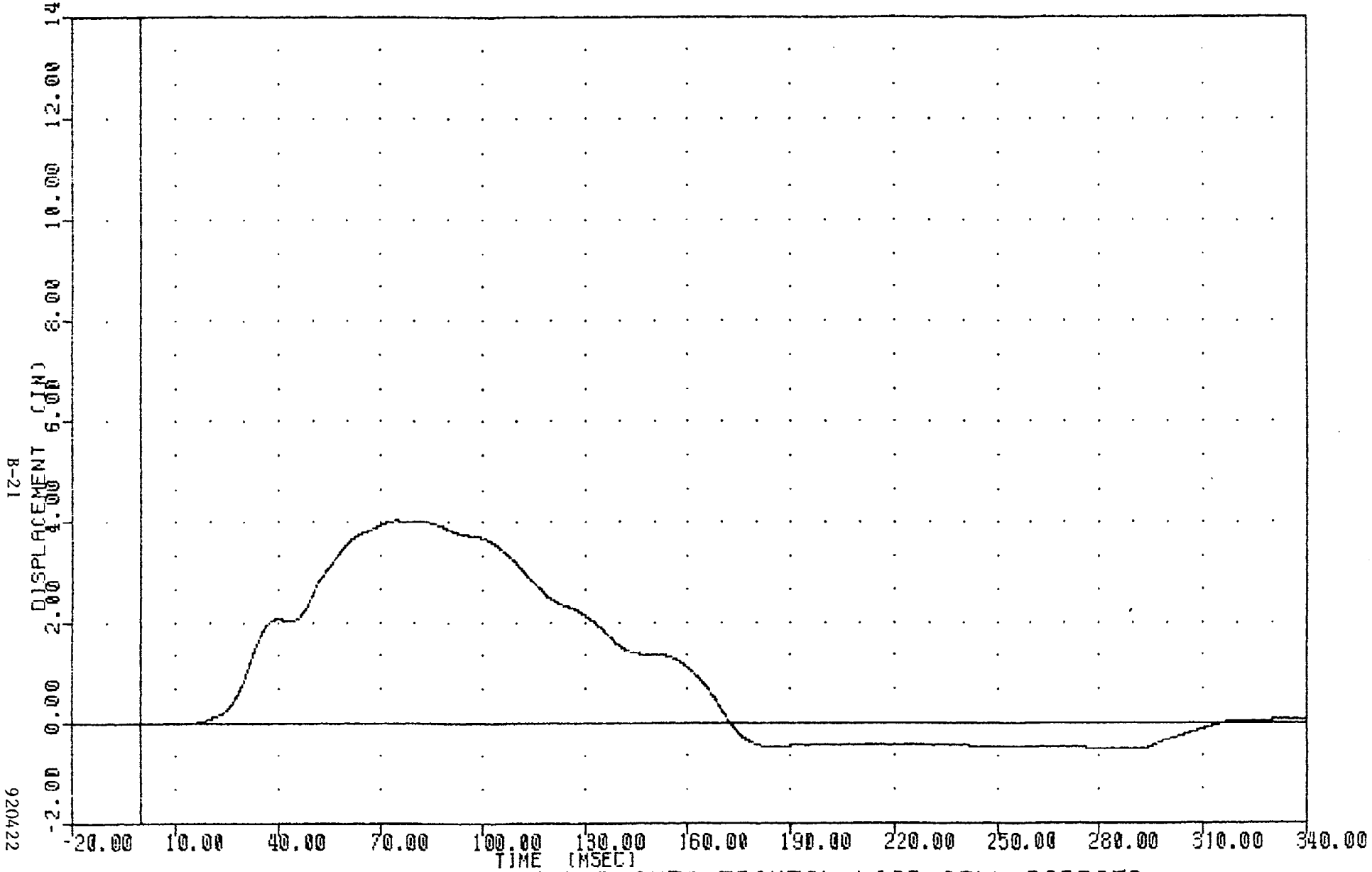
920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE

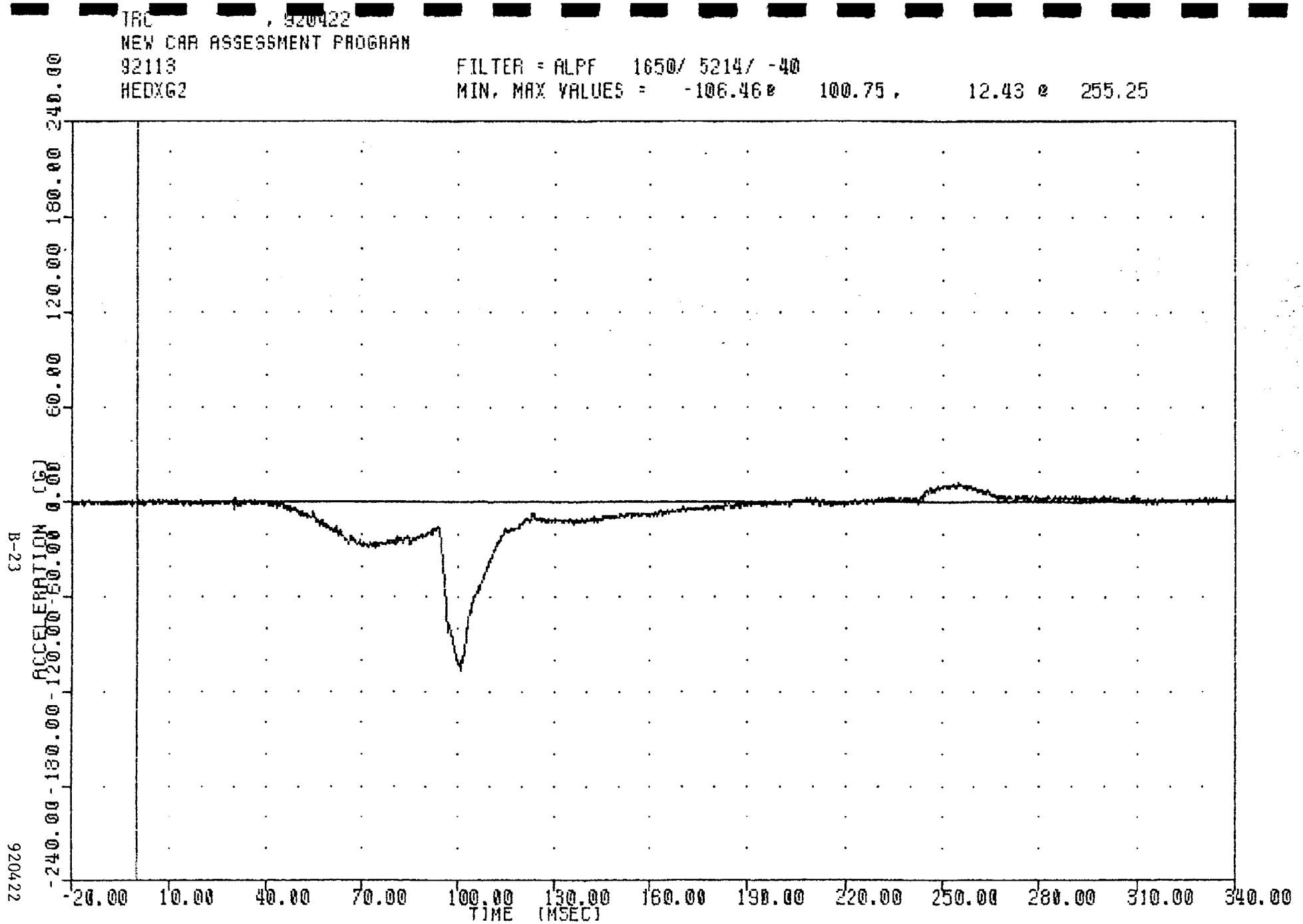
920422

TRC , 920422
NEW CAR ASSESSMENT PROGRAM
92113
SHBD1
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -0.54 @ 289.13 , 4.04 @ 74.38



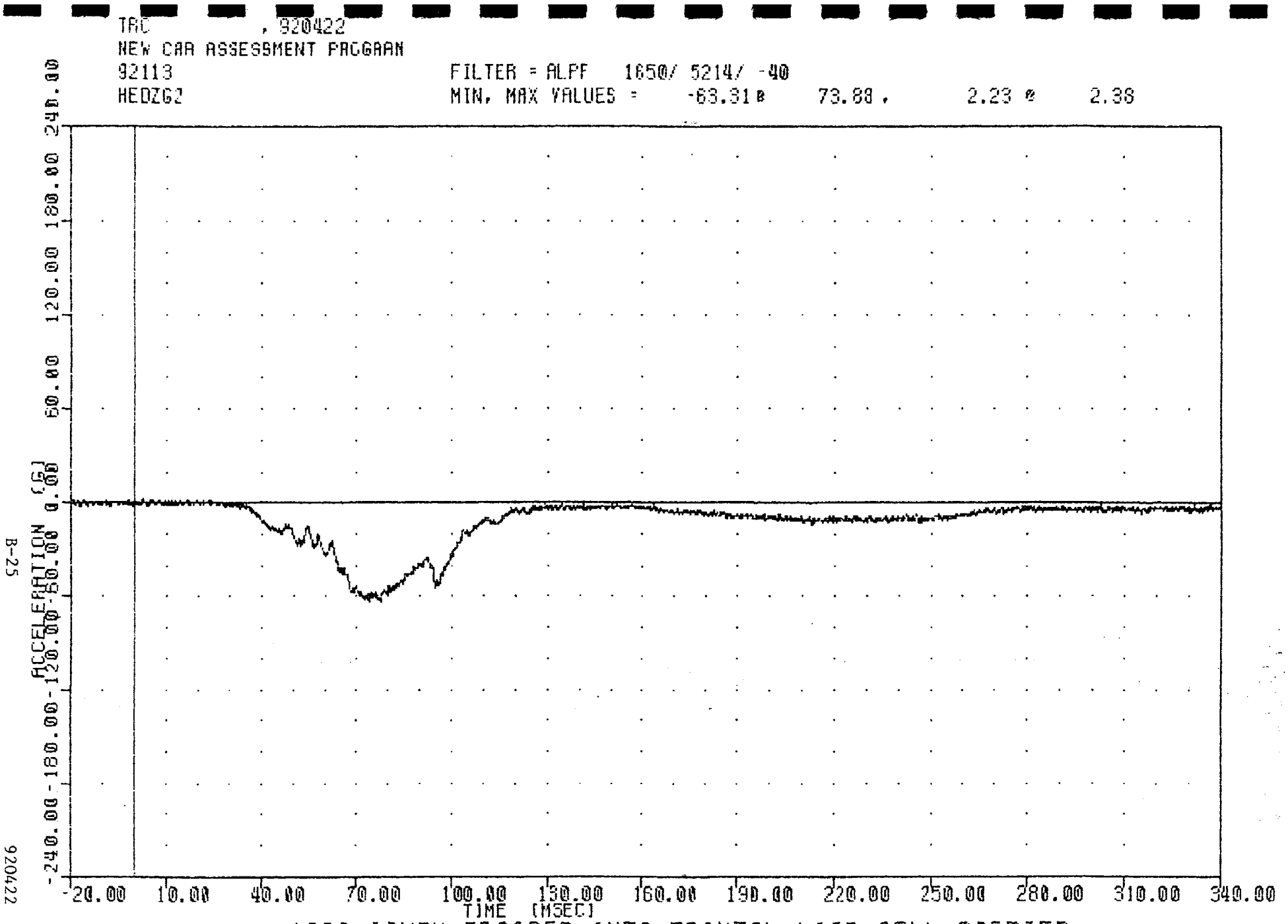
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT

920422



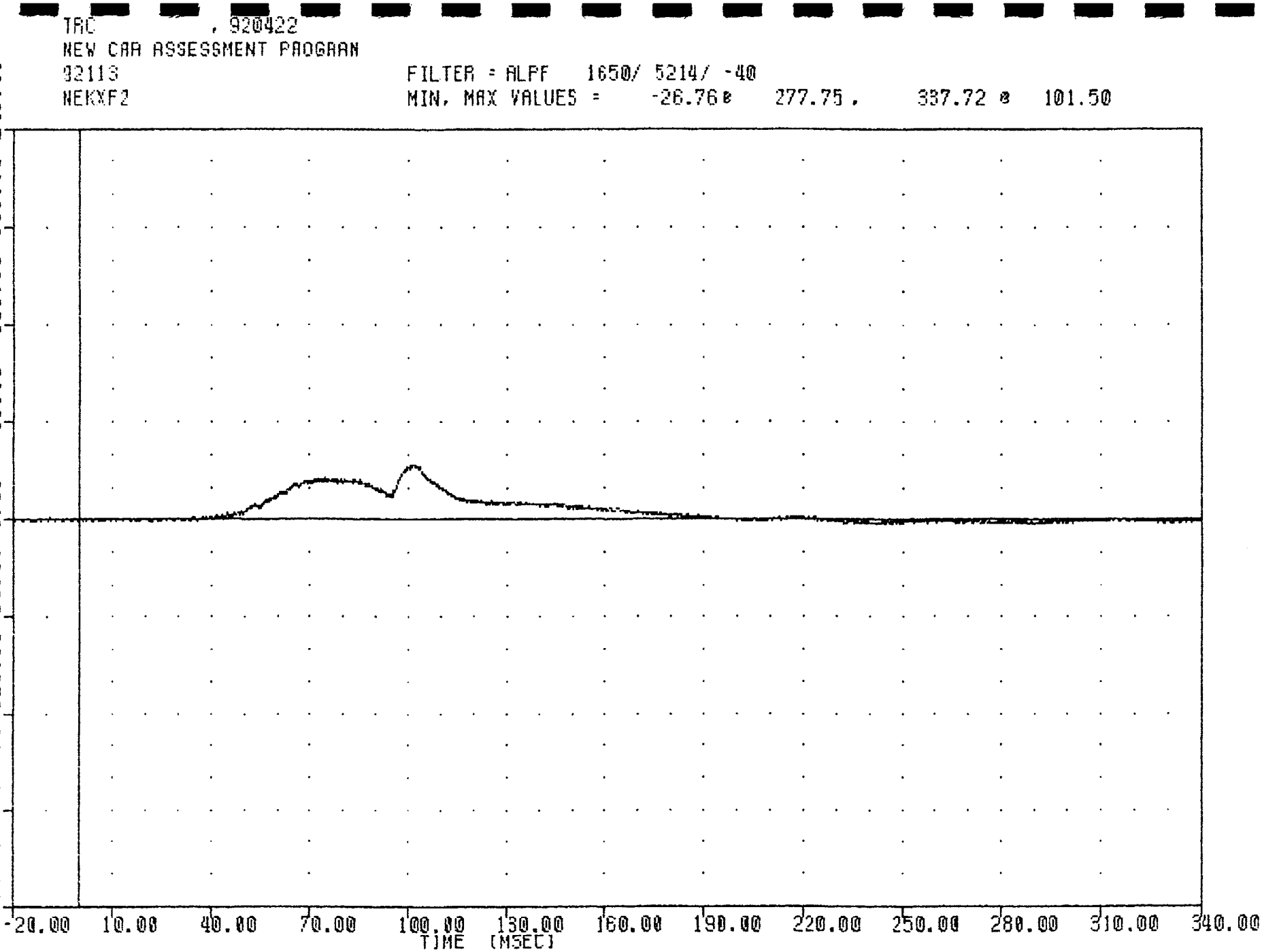
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION

920422

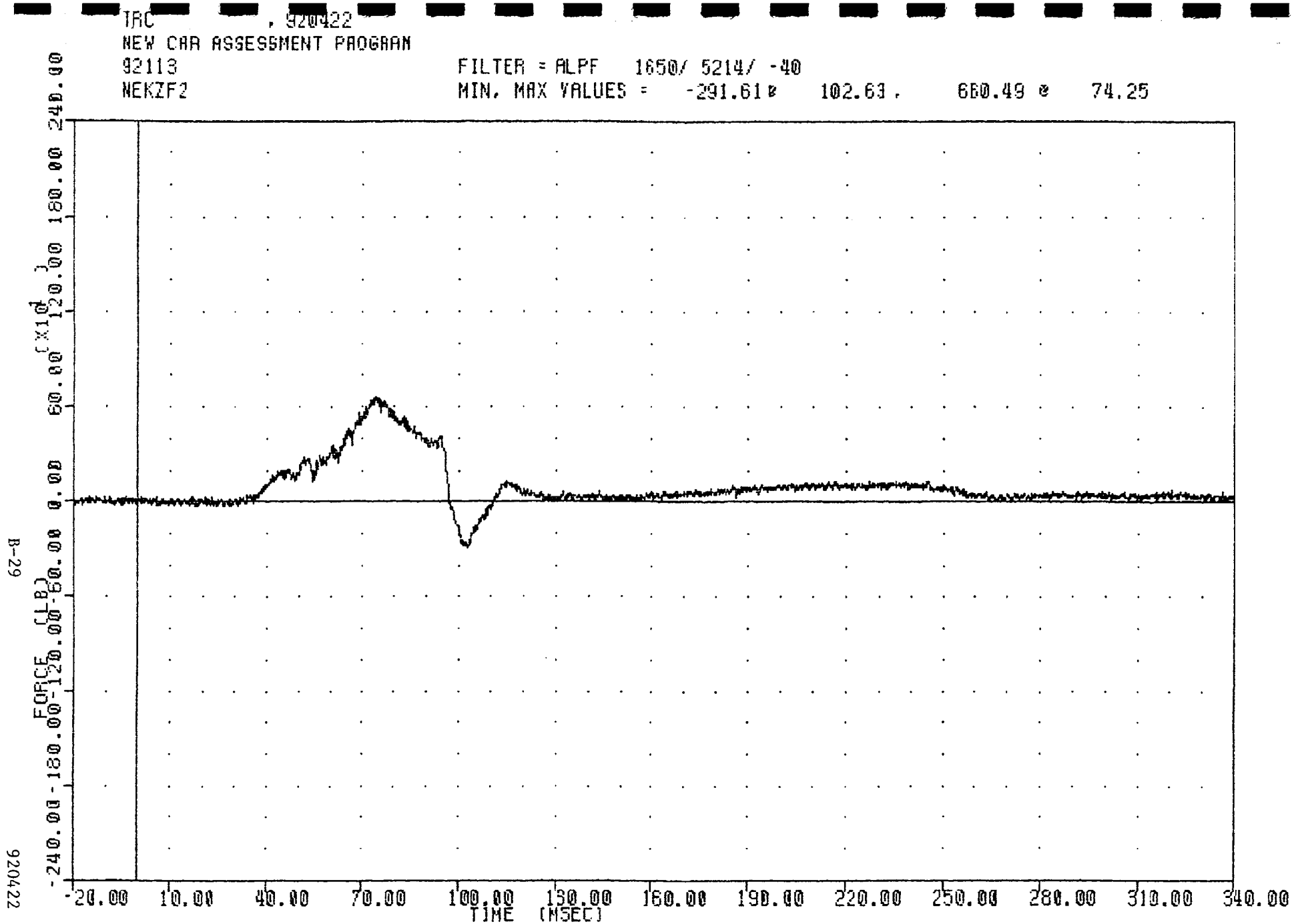


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION

920422

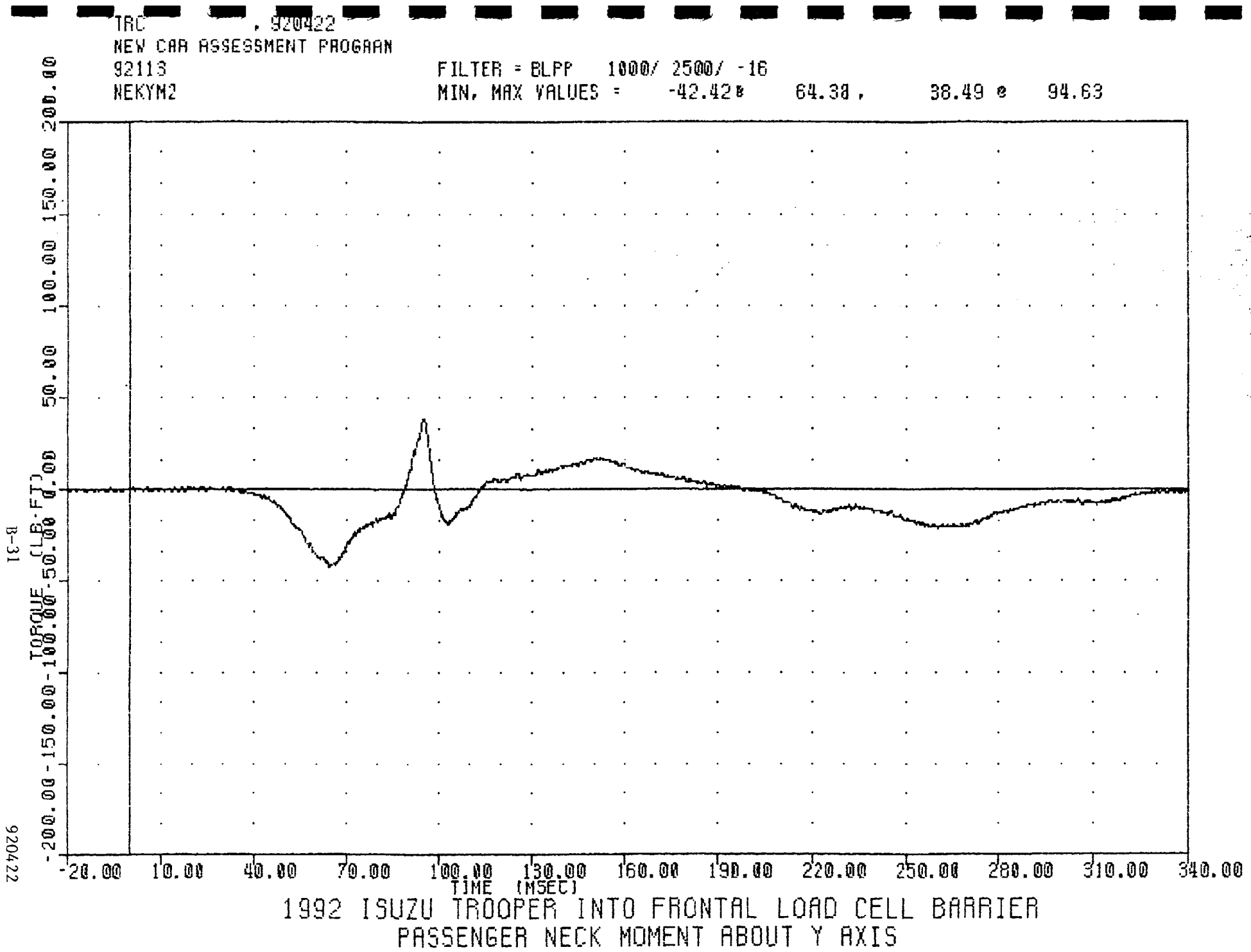


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE



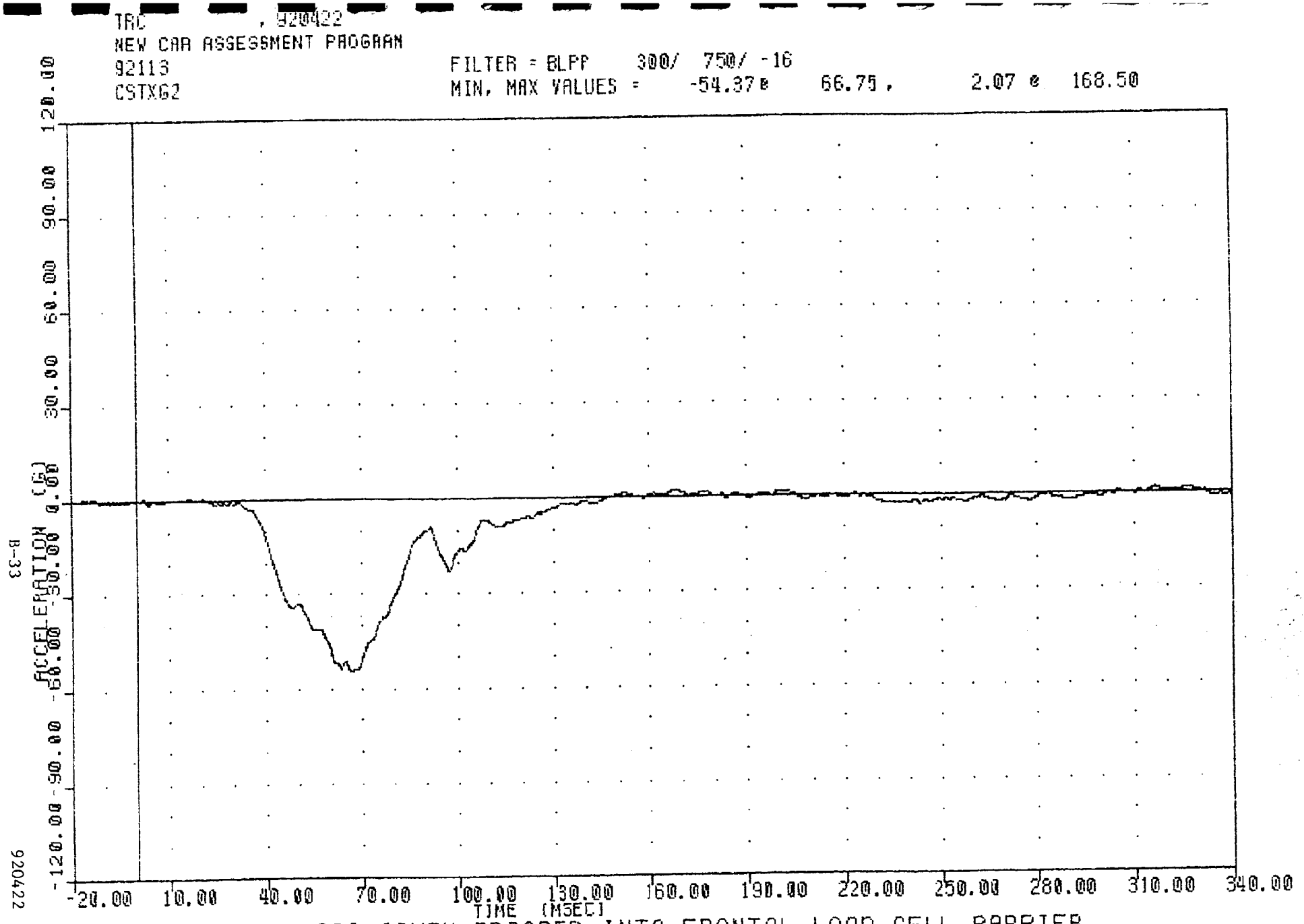
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE

920422



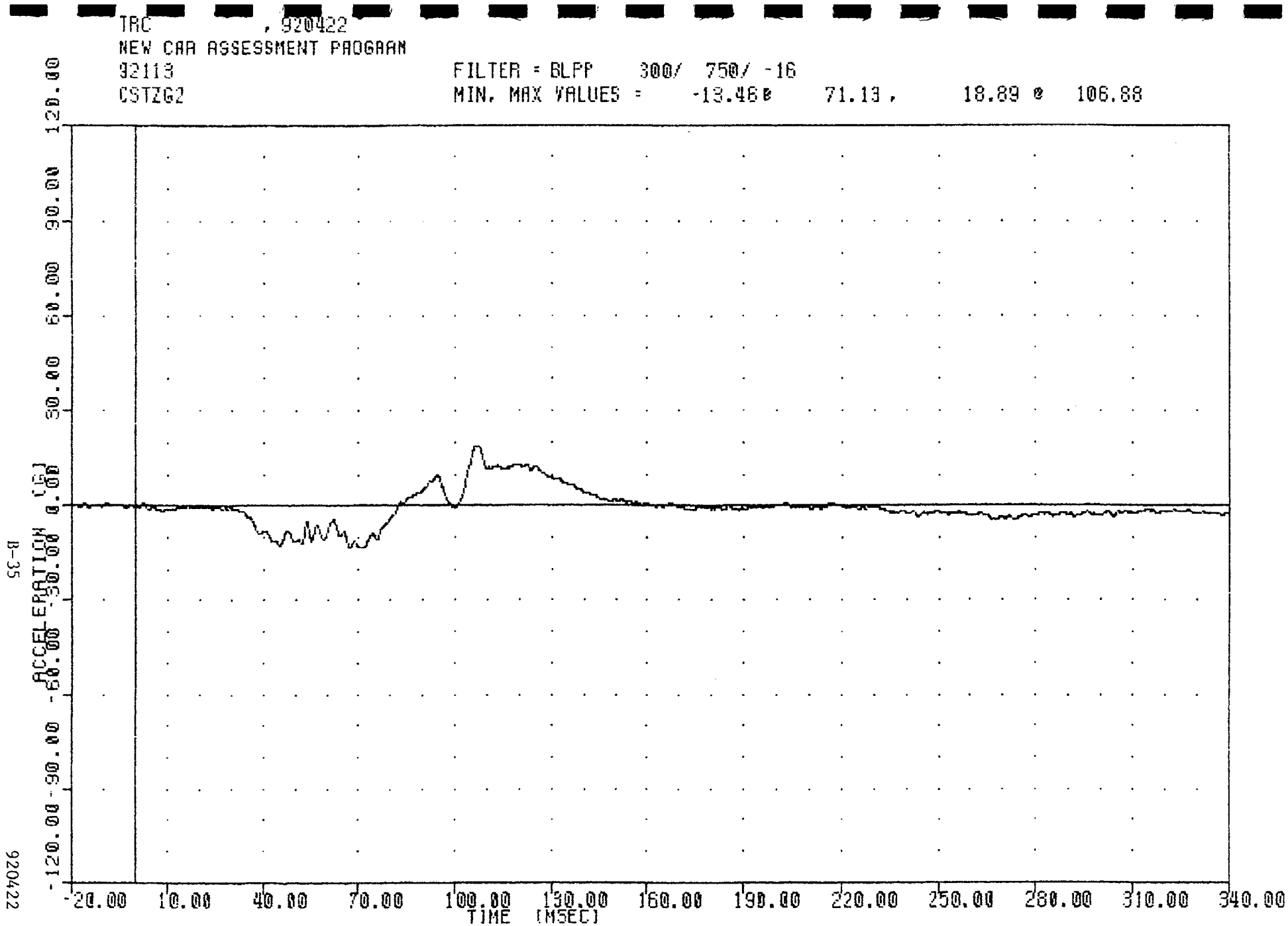
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Y AXIS

920422



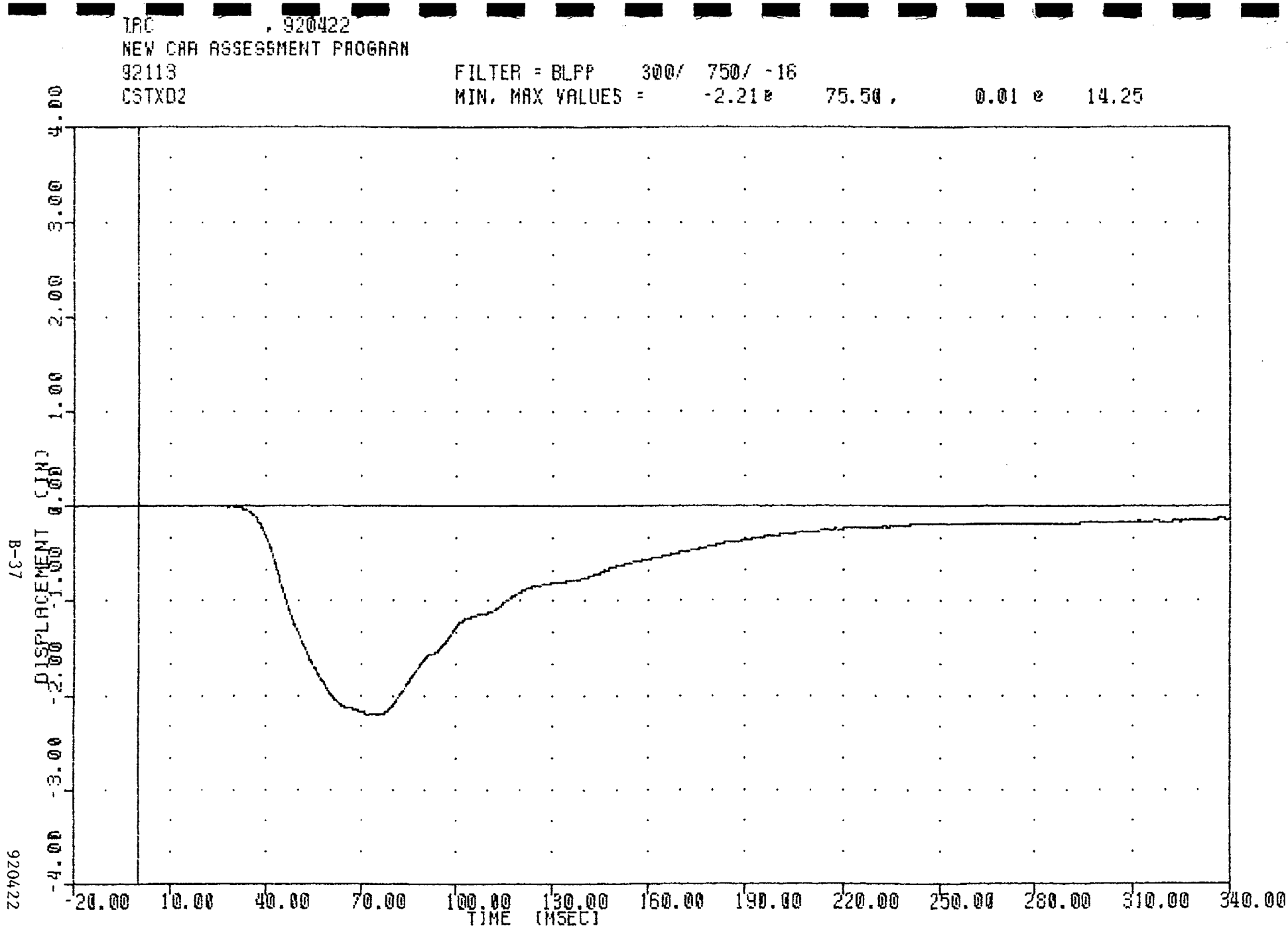
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION

920422



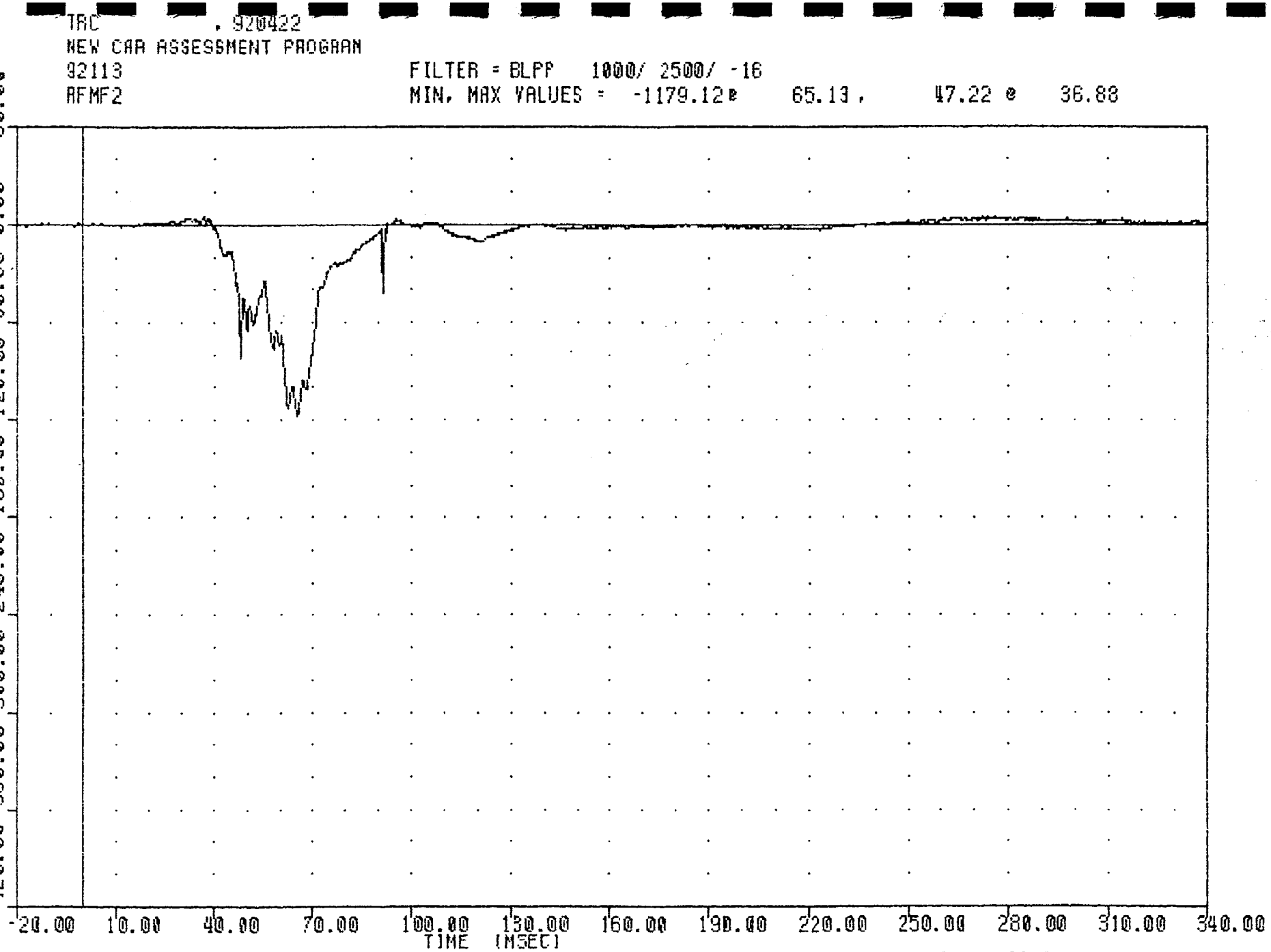
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION

920422

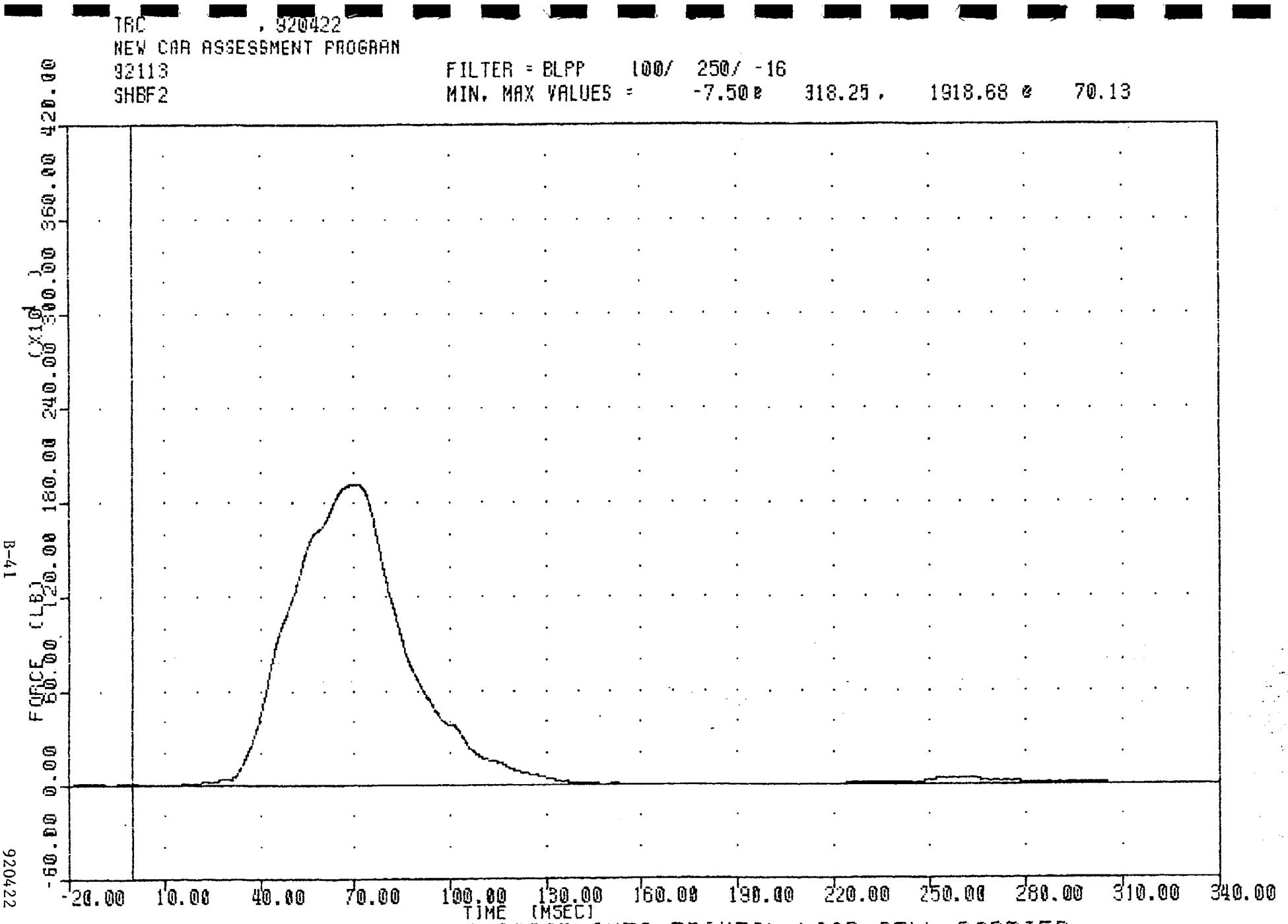


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST DEFLECTION

920422

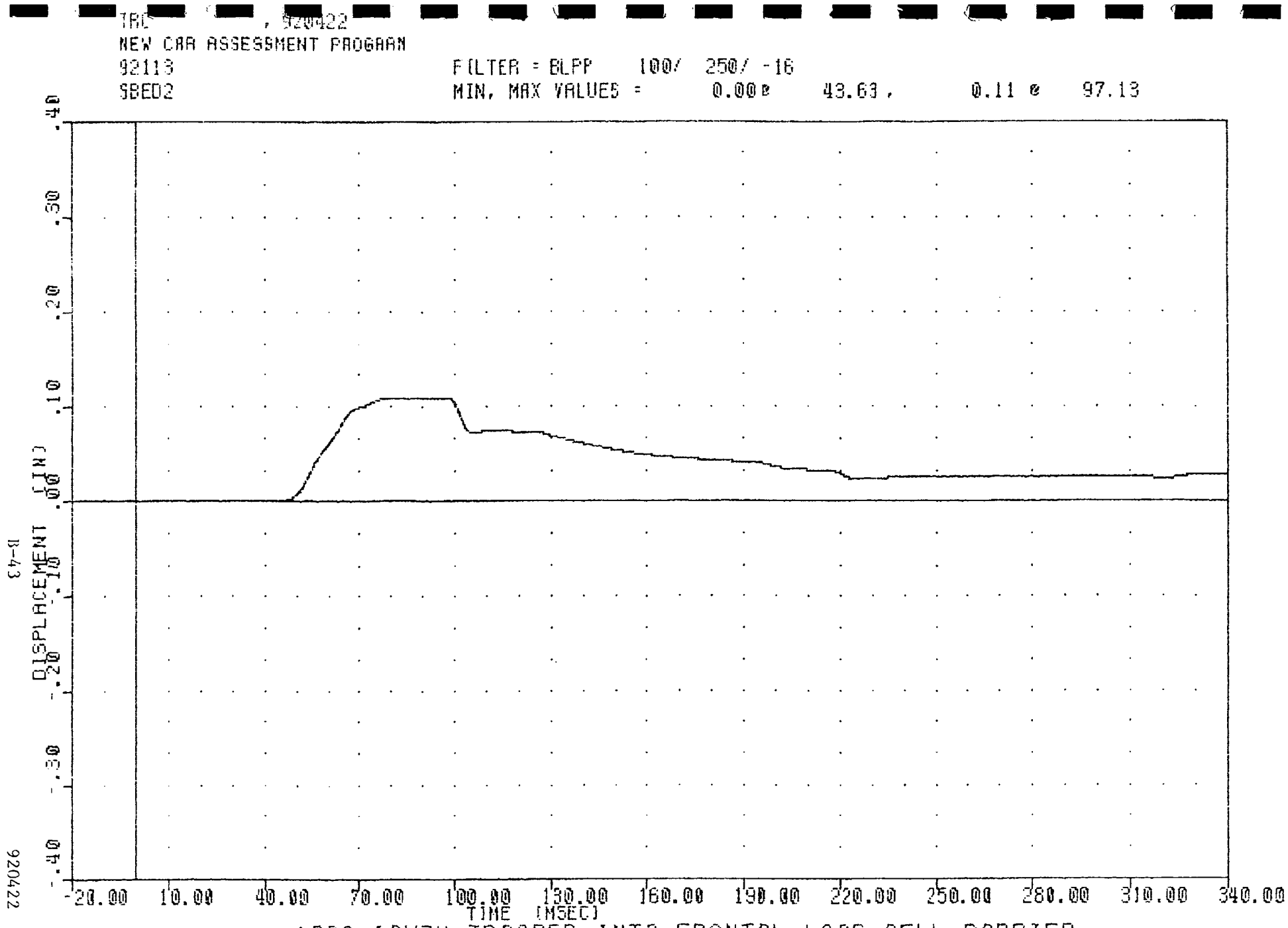


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FEMUR FORCE



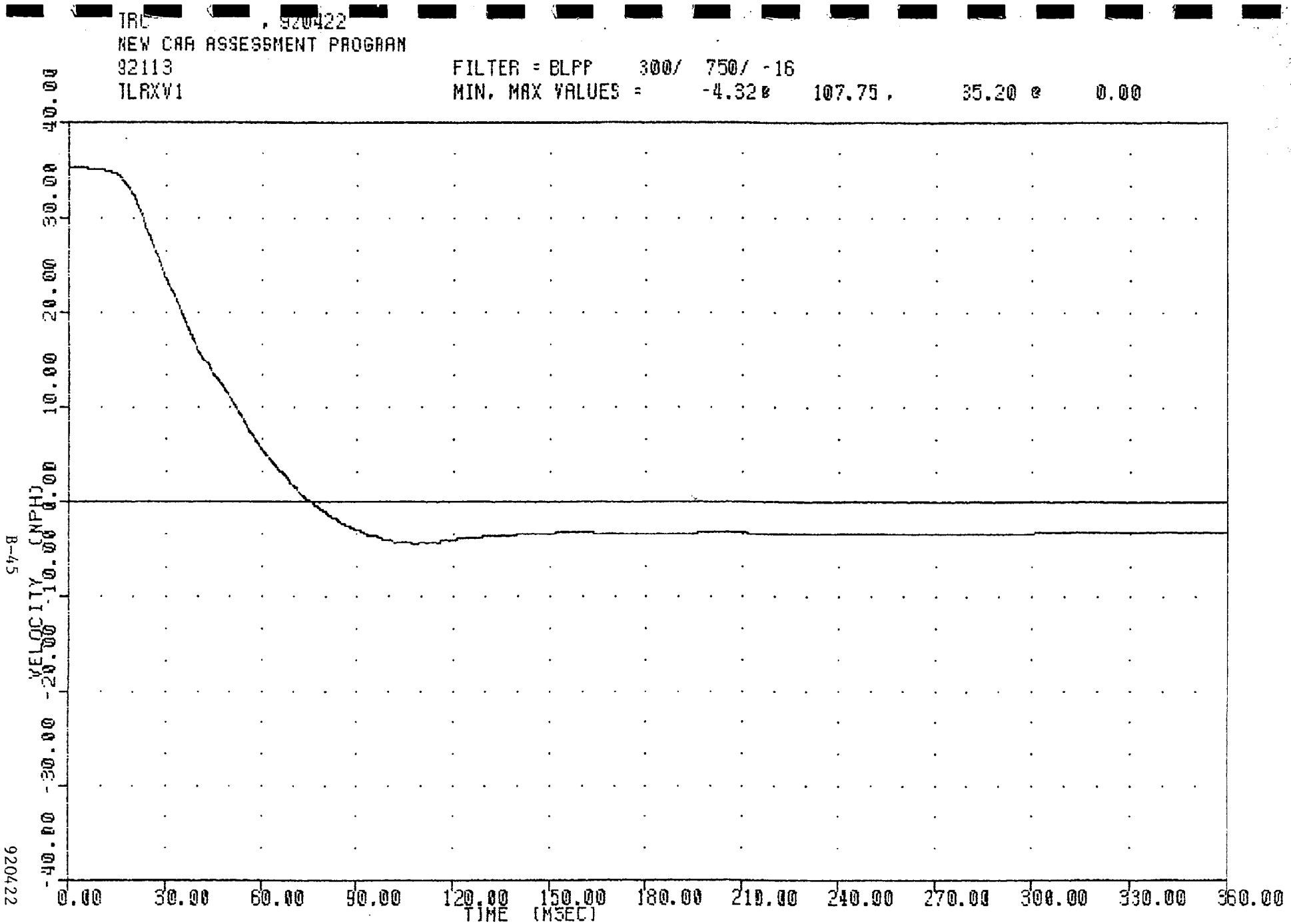
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE

920422



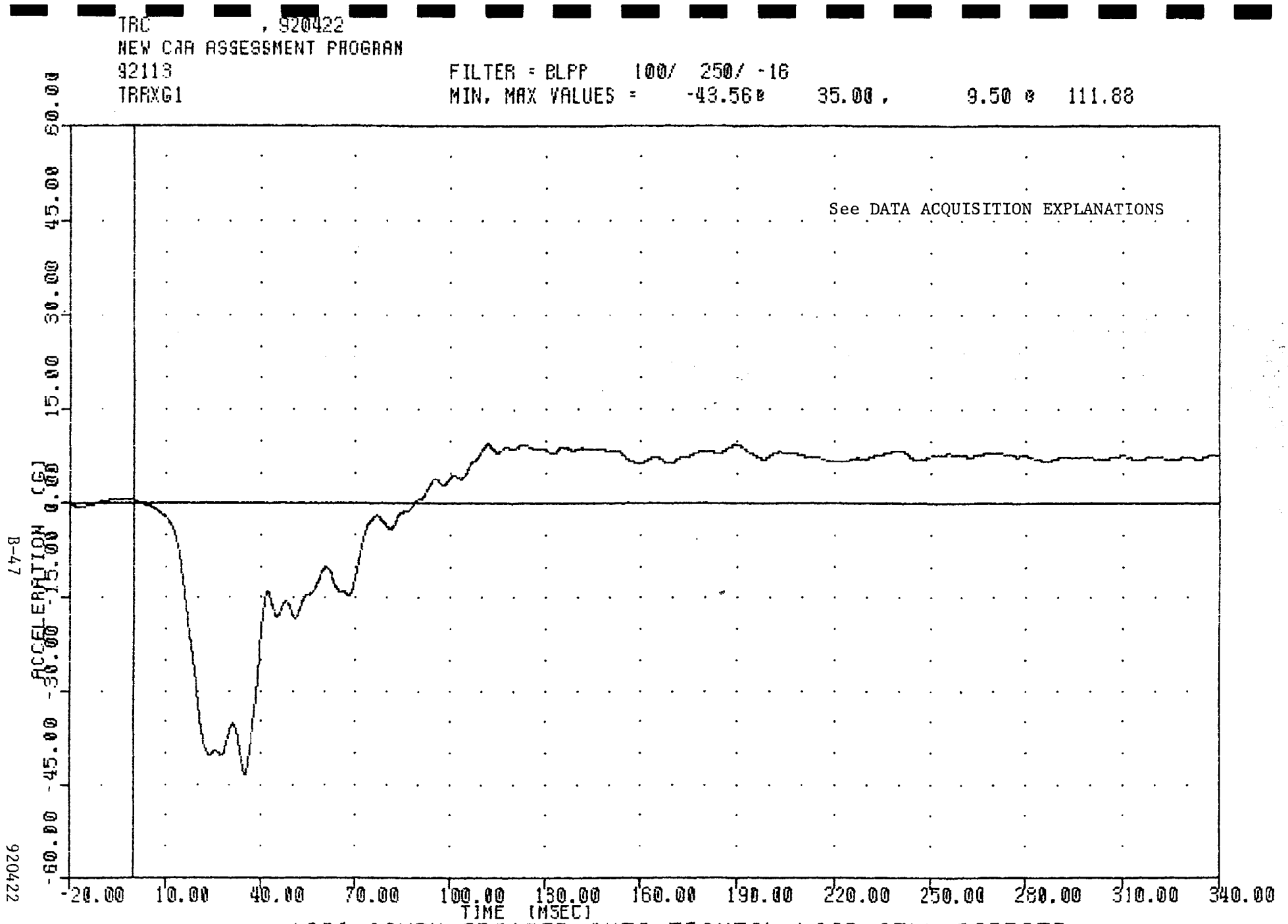
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION

920422



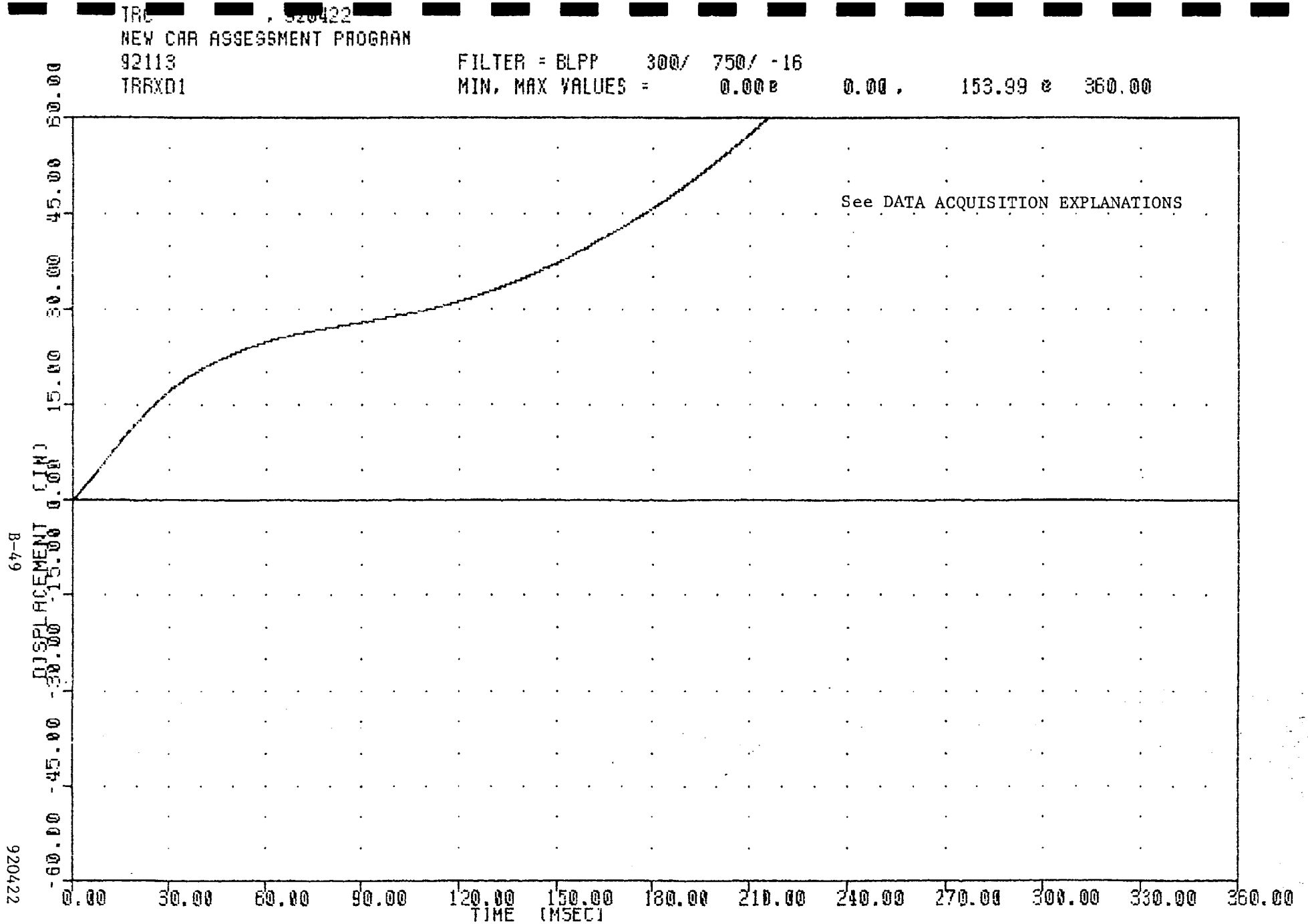
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY

920422



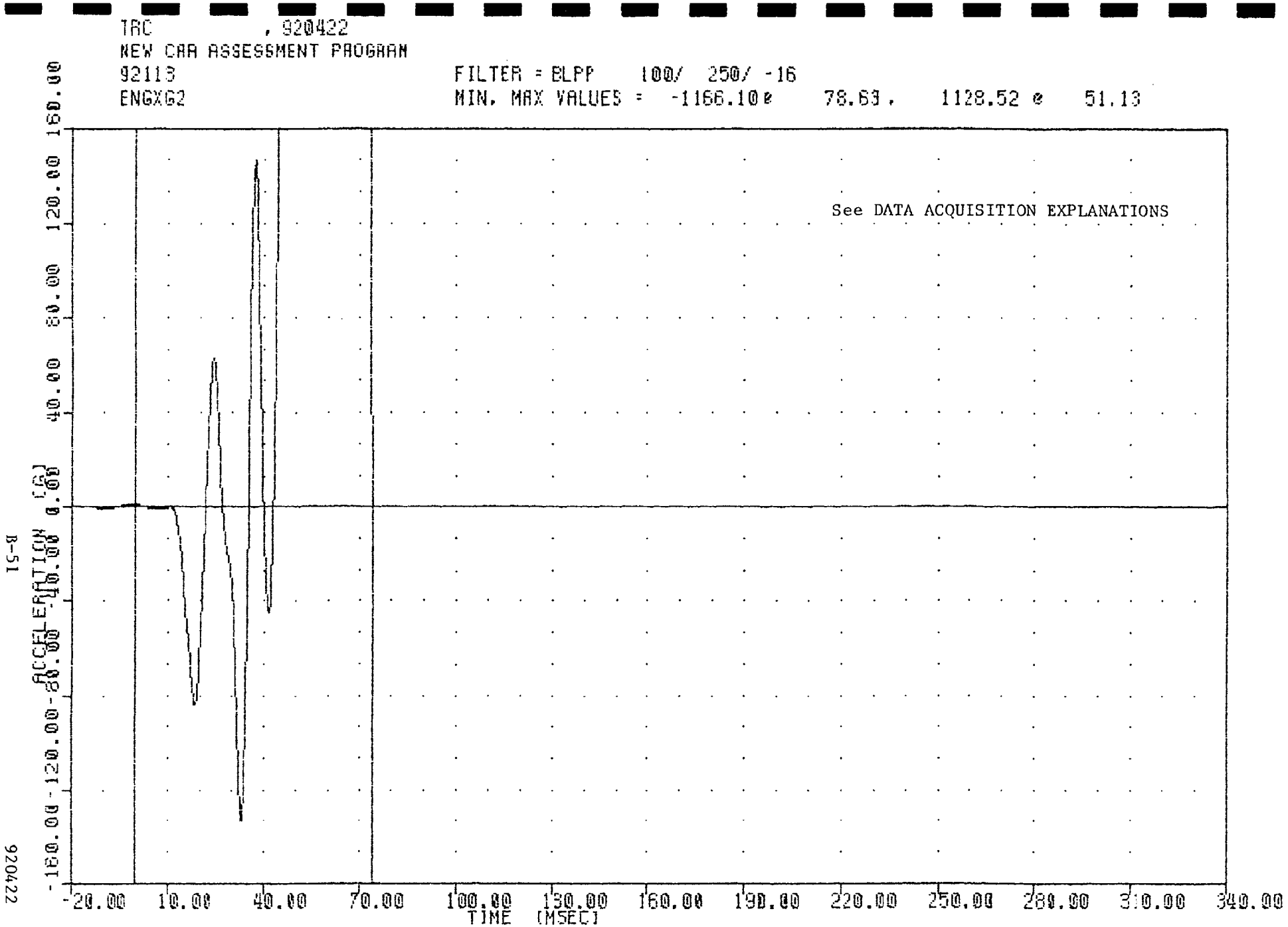
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

920422



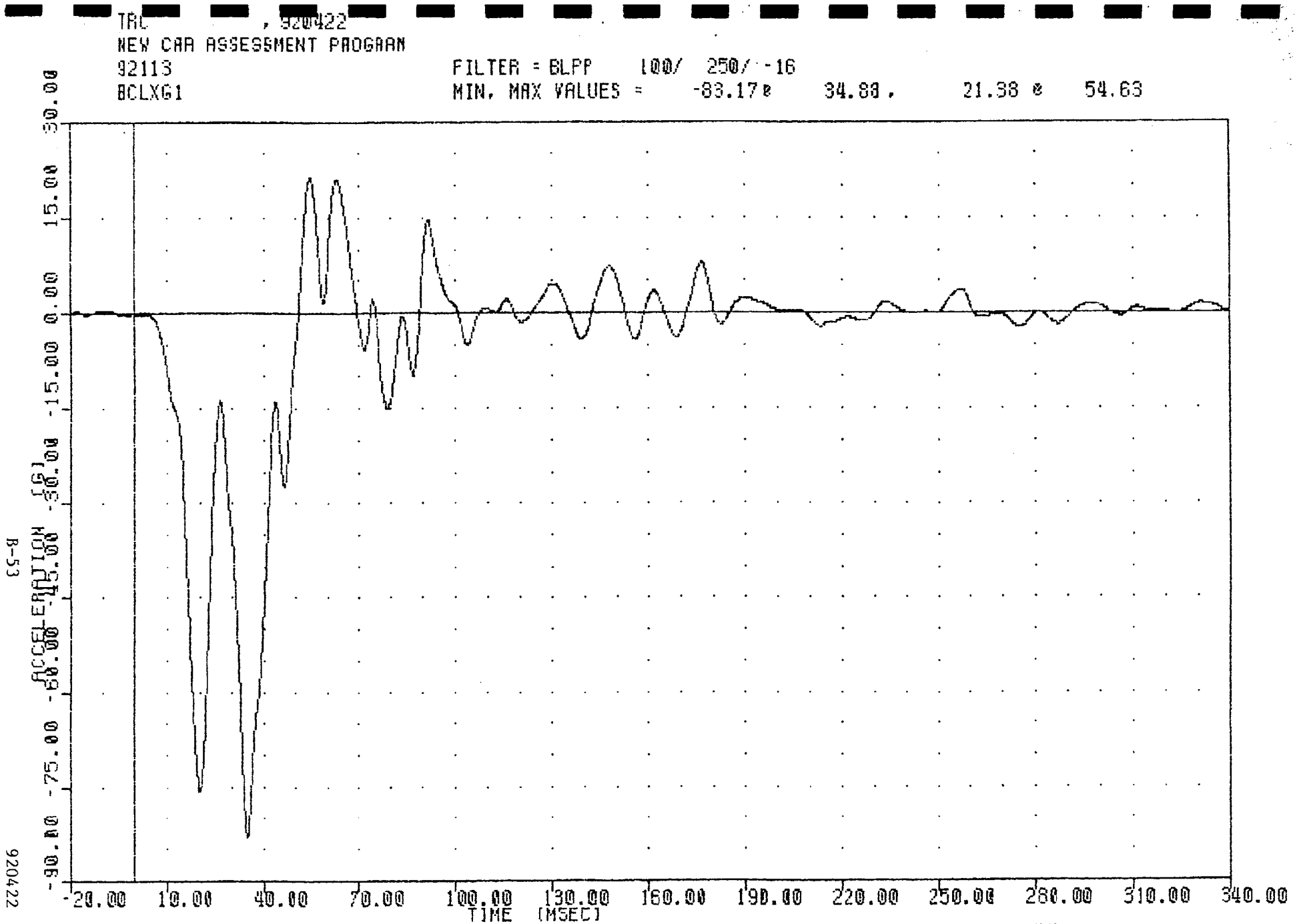
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS DISPLACEMENT

920422

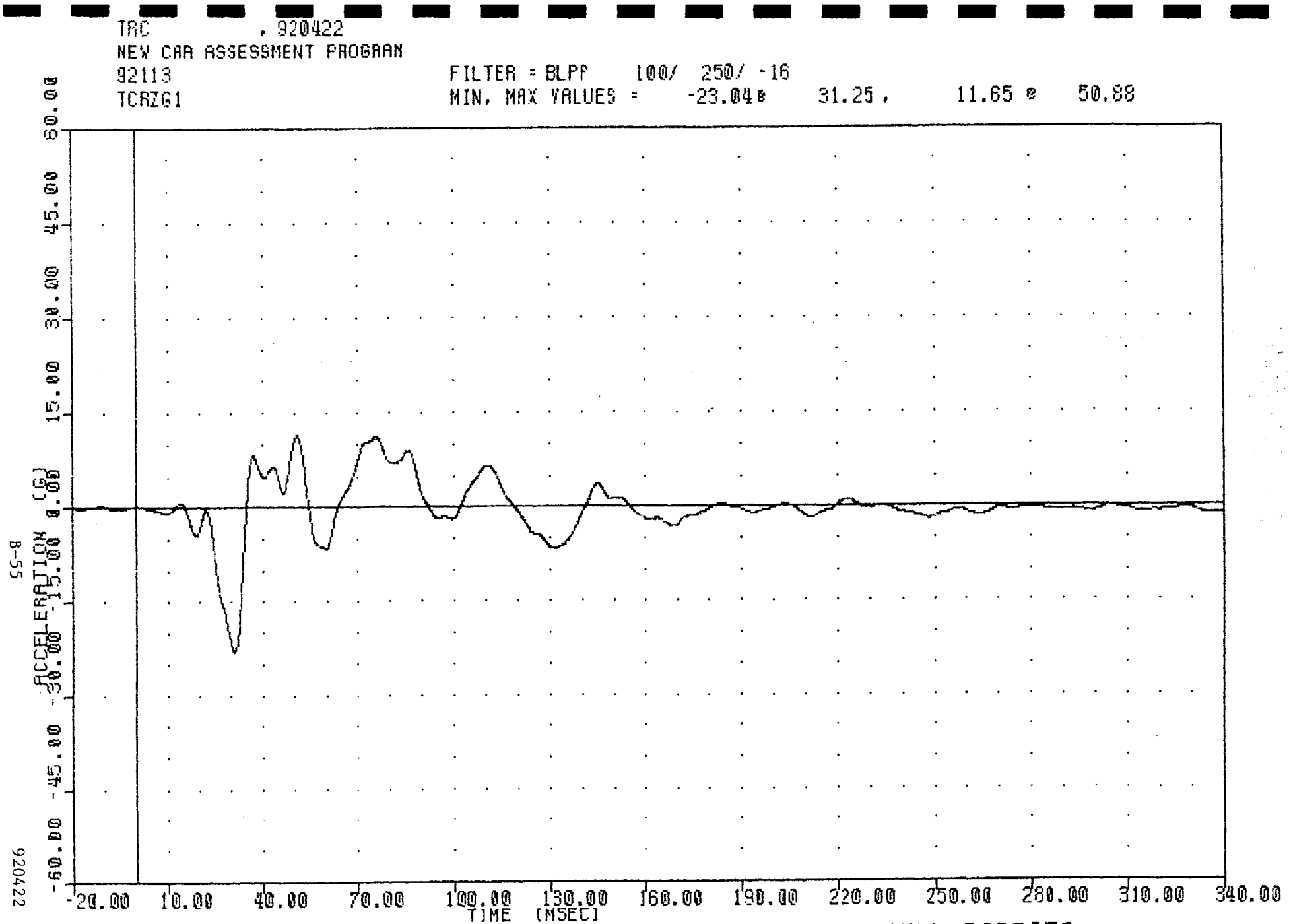


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

920422

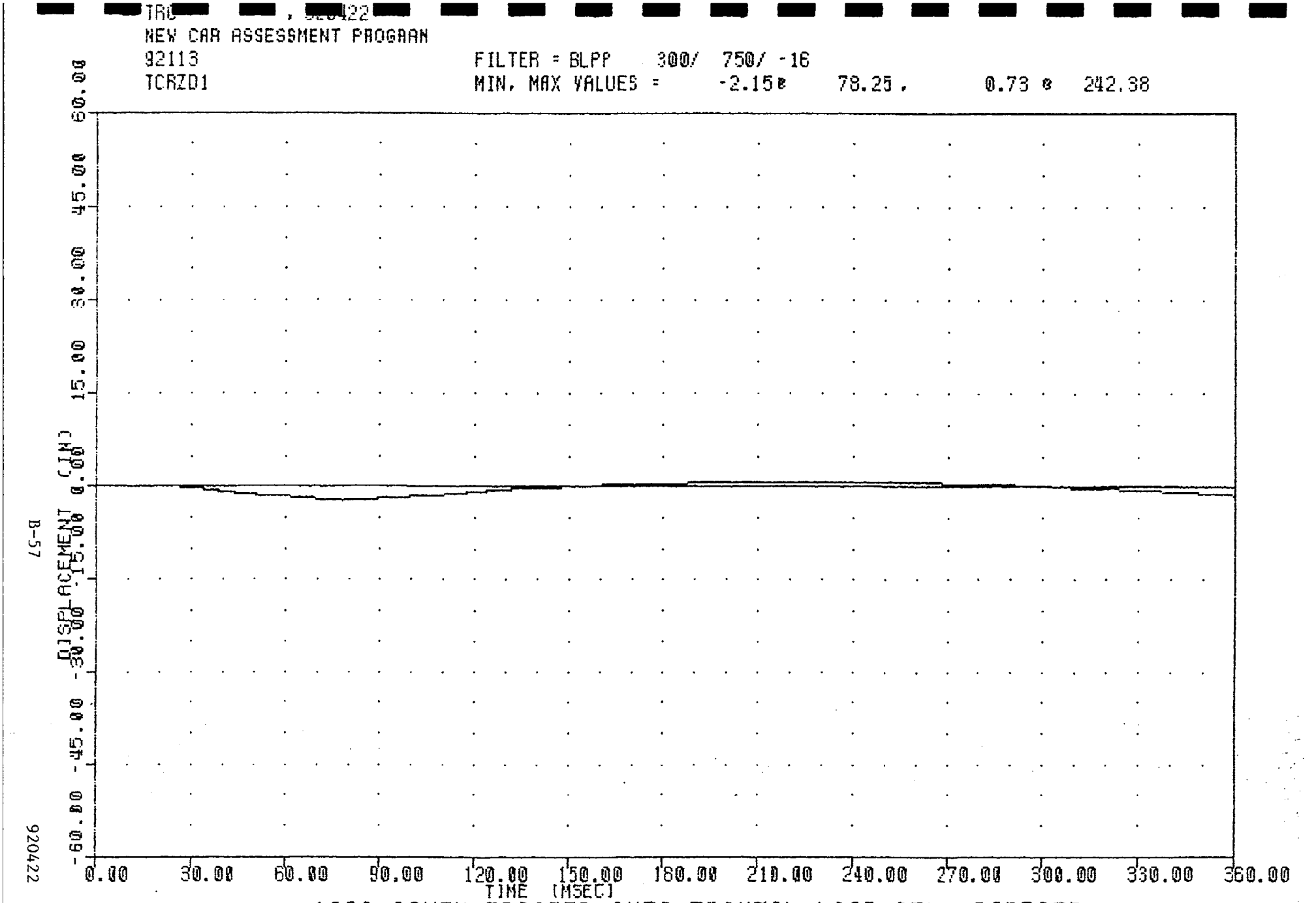


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS ACCELERATION

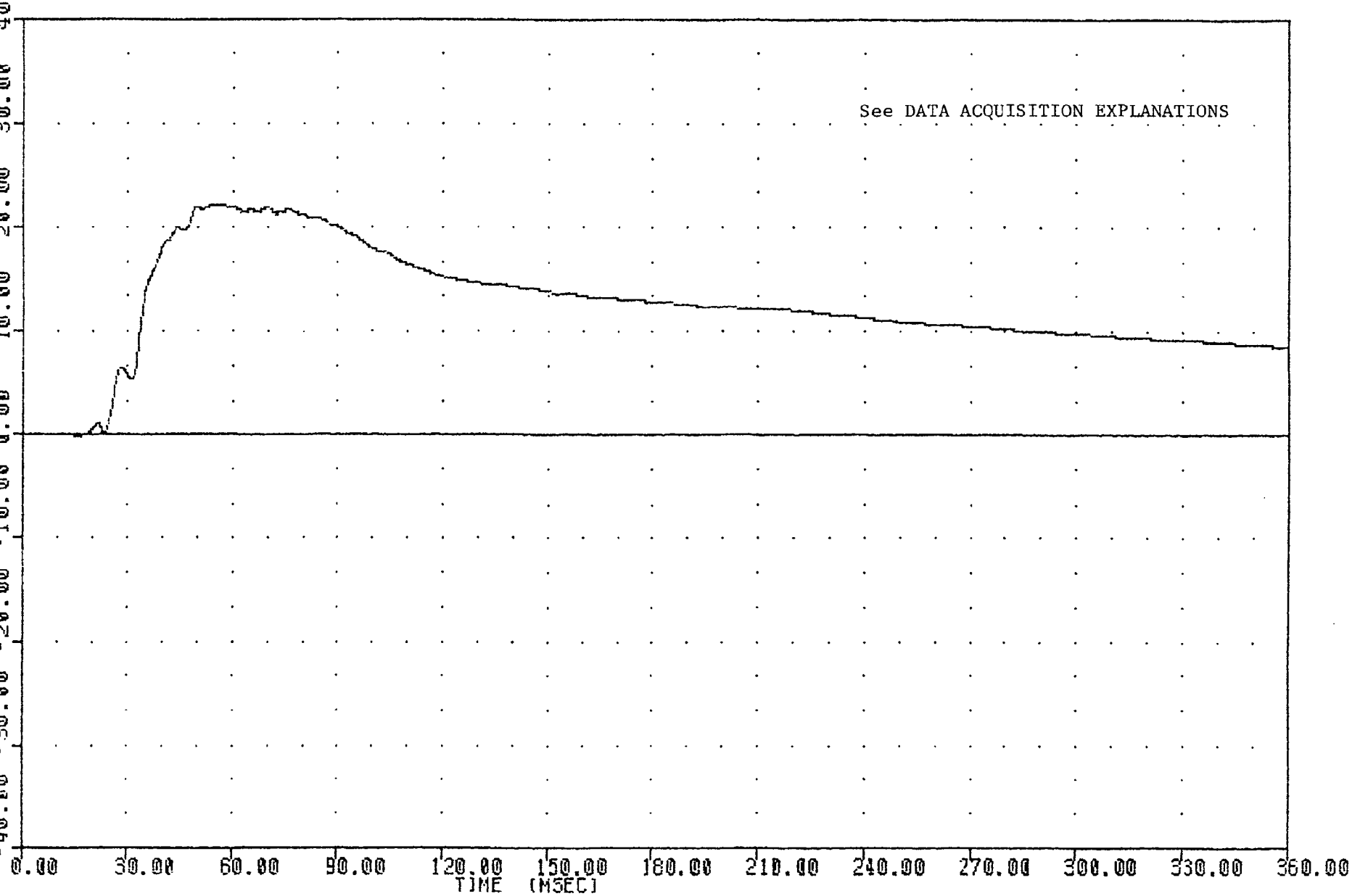
920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
REAR SEAT CROSSMEMBER Z-AXIS DISPLACEMENT

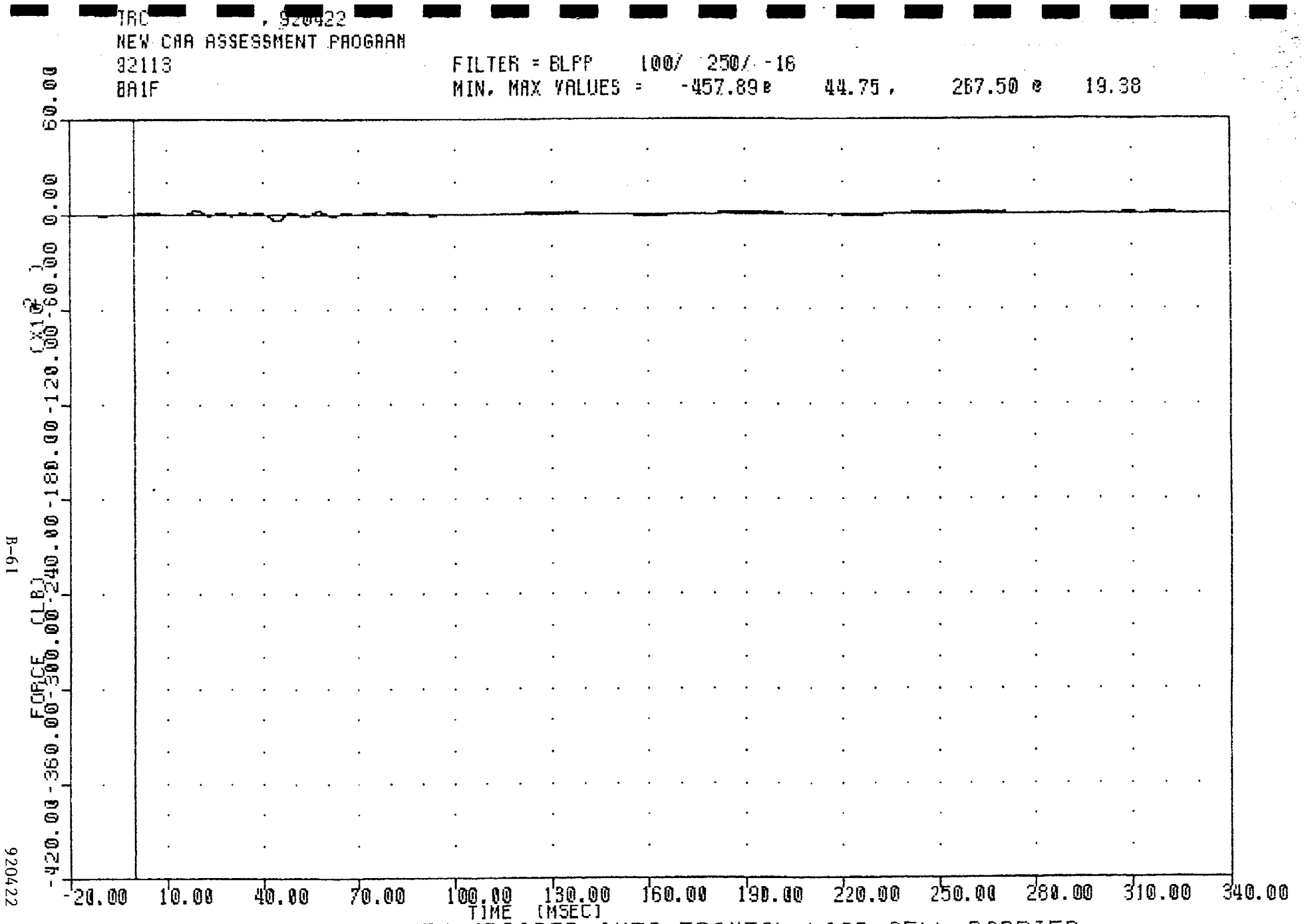
920422

TRC , 920422
NEW CAR ASSESSMENT PROGRAM
92113 FILTER = BLPP 300/ 750/ -16
RDKZV1 MIN, MAX VALUES = -0.10 @ 15.88 , 22.18 @ 54.75



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
VEHICLE REAR CENTER Z-AXIS VELOCITY

920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A1 FORCE

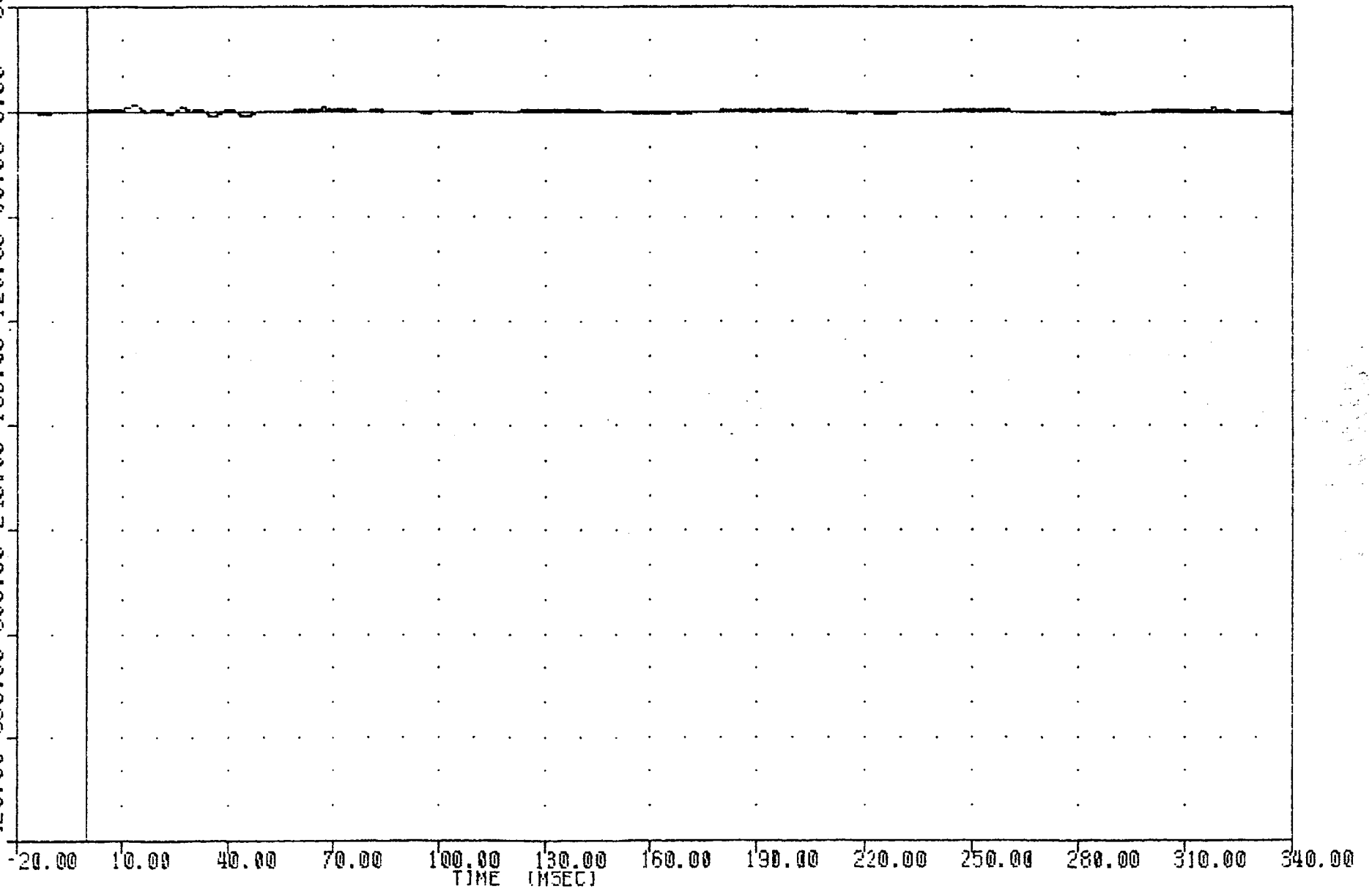
920422

[redacted]TRO[redacted], [redacted]22[redacted]

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPP 100/ 250/ -16

BA3F MIN, MAX VALUES = -335.64 @ 45.00 , 338.06 @ 13.50



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A3 FORCE

920422

[redacted]

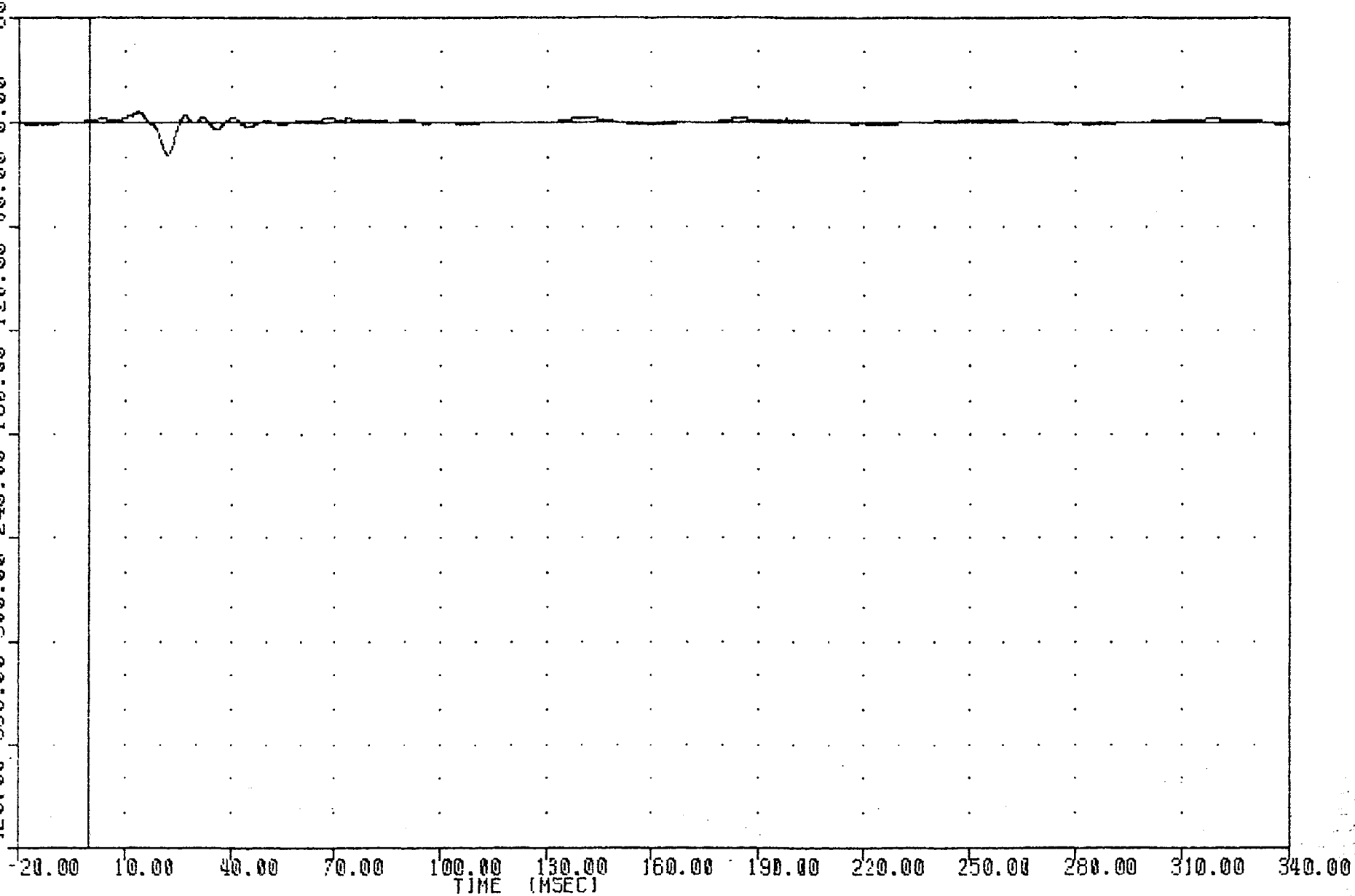
NEW CAR ASSESSMENT PROGRAM

32113

8A5F

FILTER = BLPF 100/ 250/ -16

MIN, MAX VALUES = -1937.70 @ 21.88 , 549.26 @ 13.50



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A5 FORCE

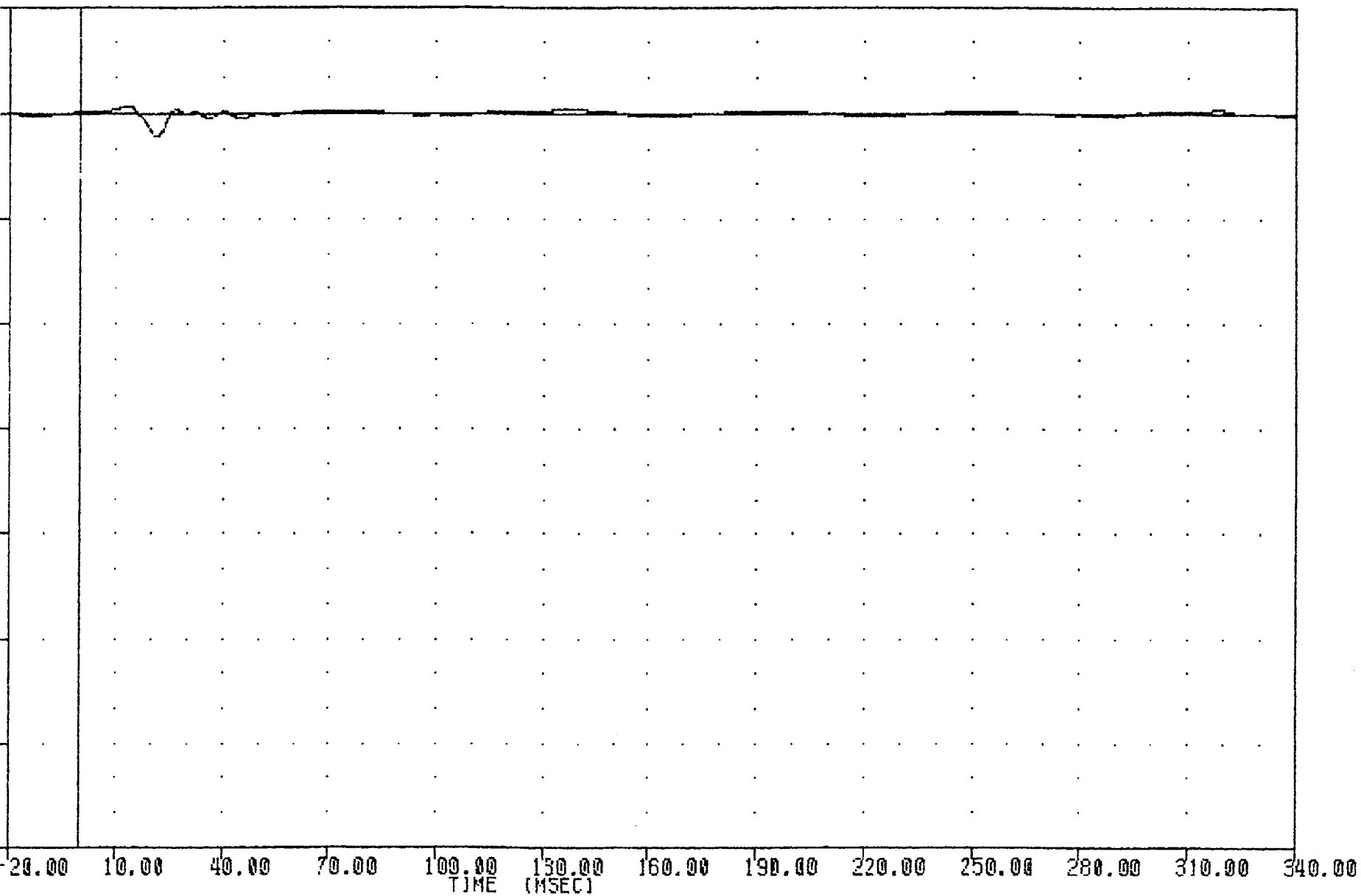
920422

[redacted] TRC[redacted] [redacted], 9[redacted]22 [redacted]

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPF 100/ 250/ -16

BA7F MIN, MAX VALUES = -1356.53 @ 21.25 , 419.50 @ 13.25

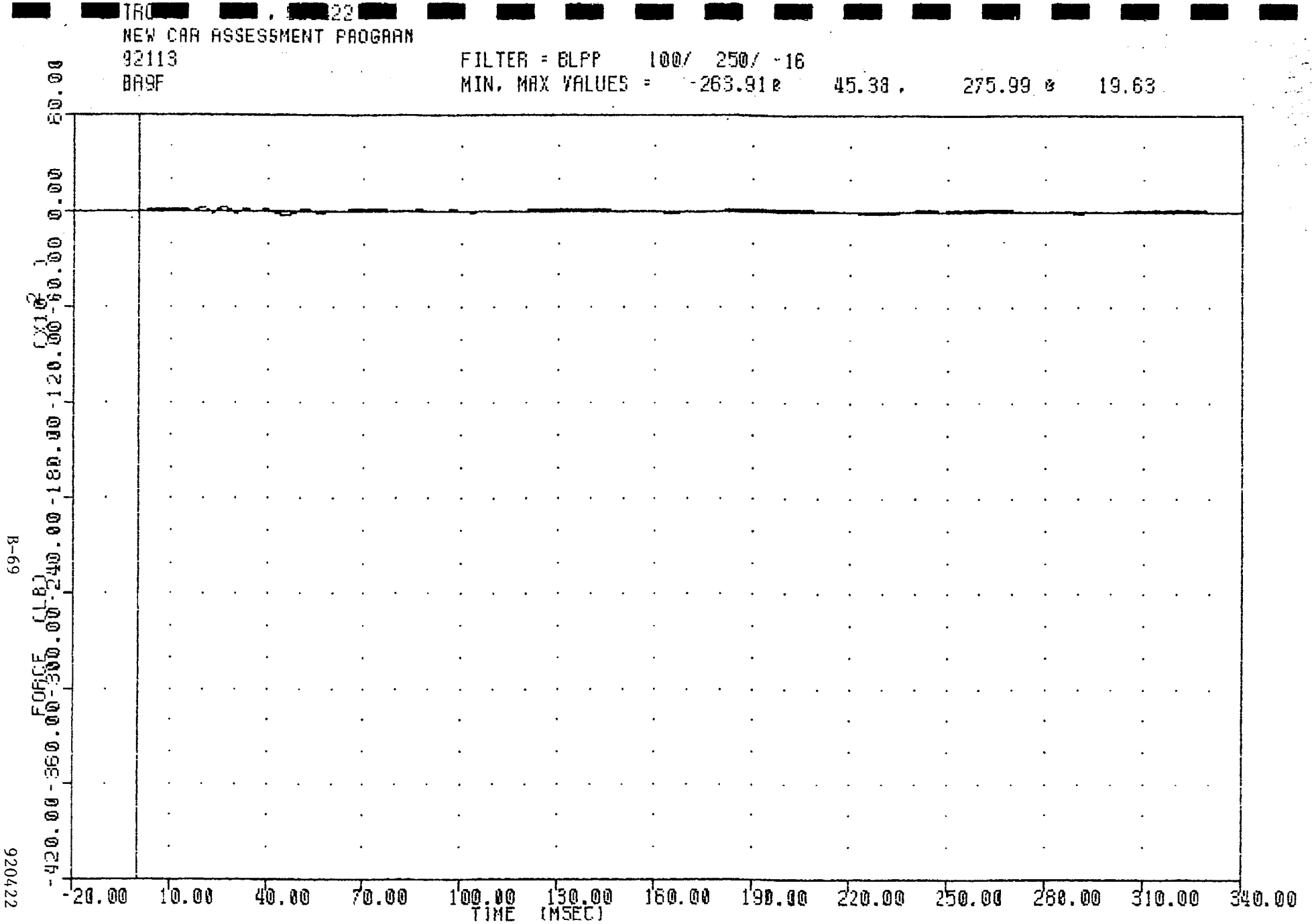


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A7 FORCE

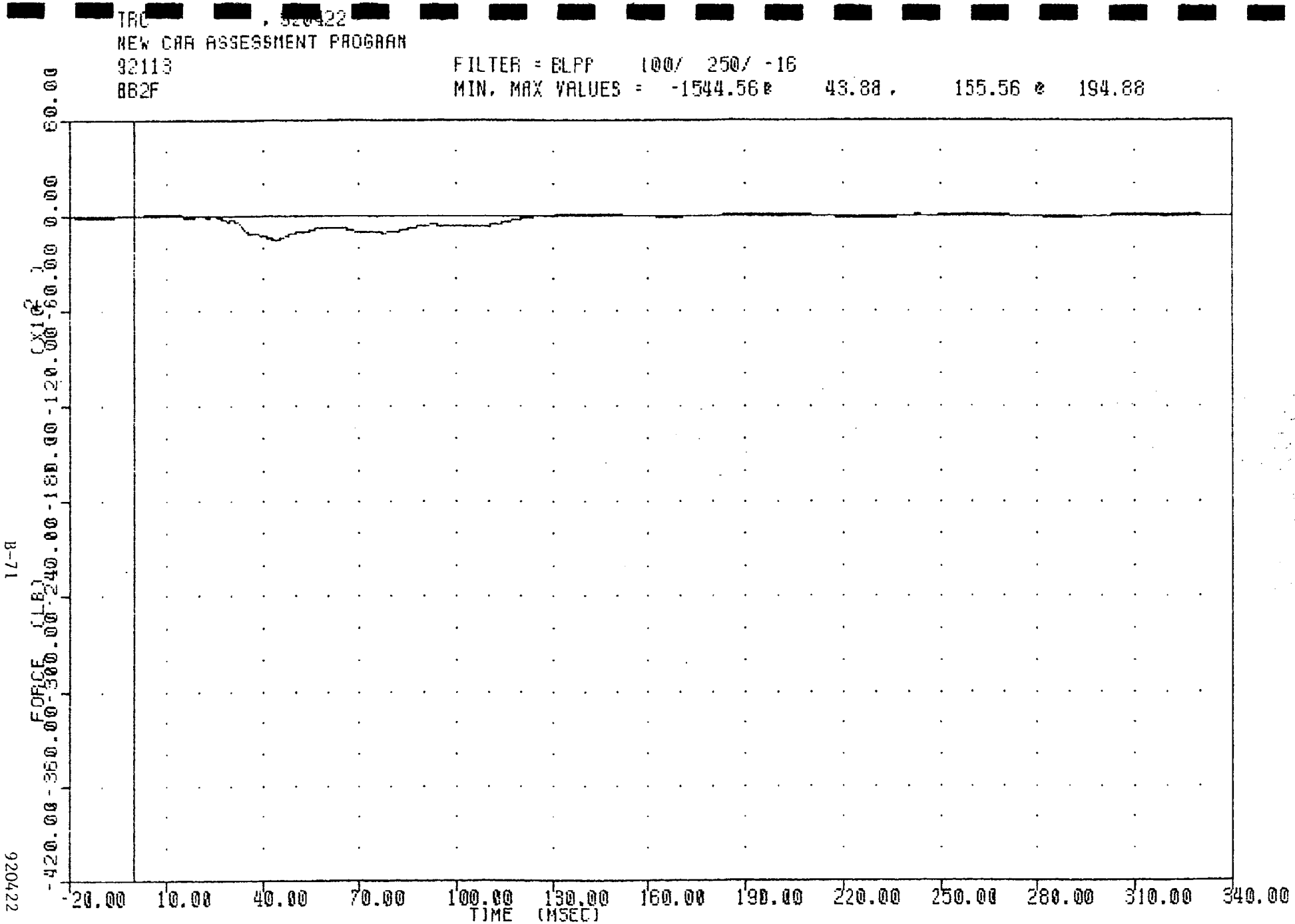
B-67

920422



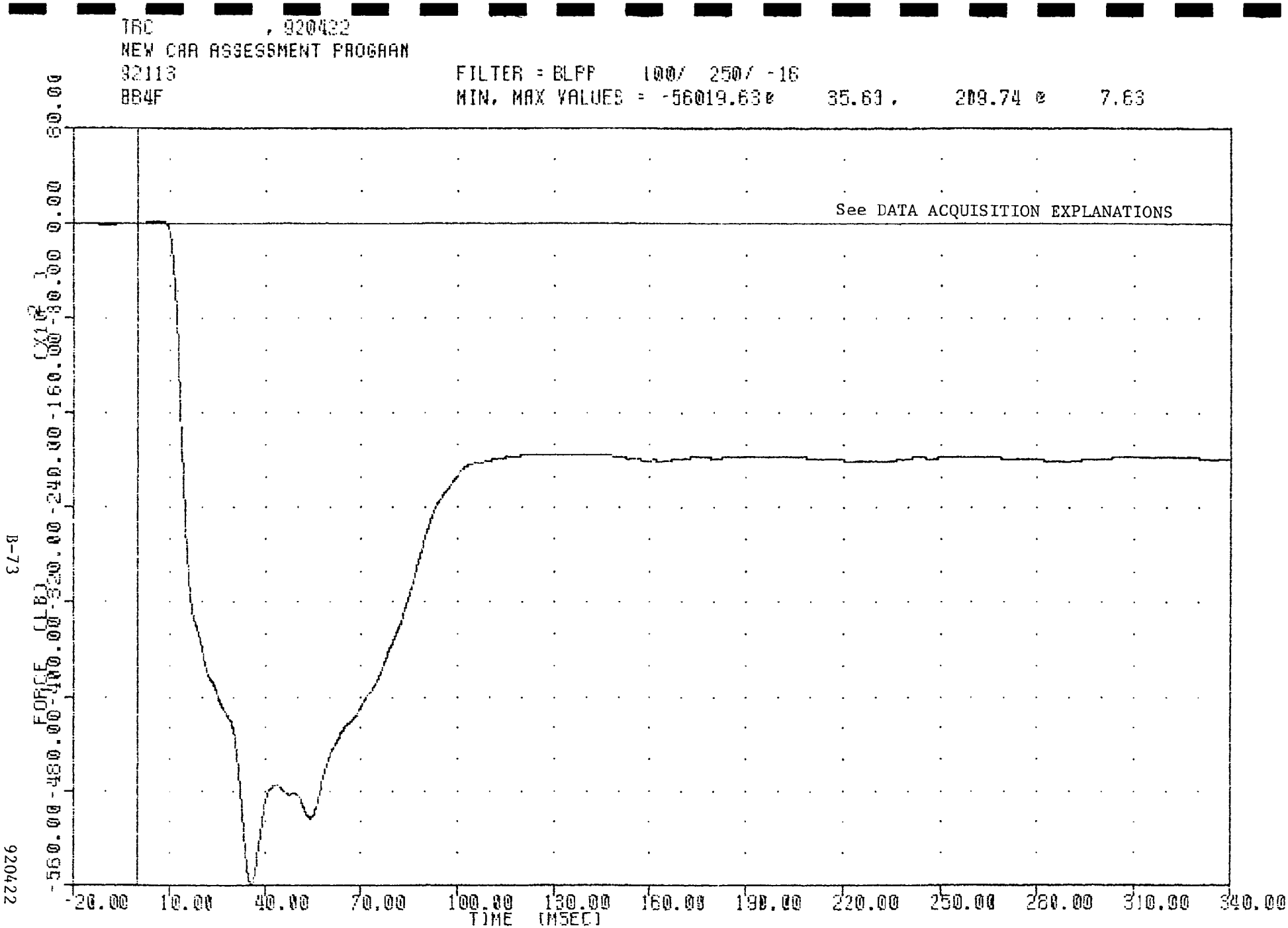
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A9 FORCE

920422



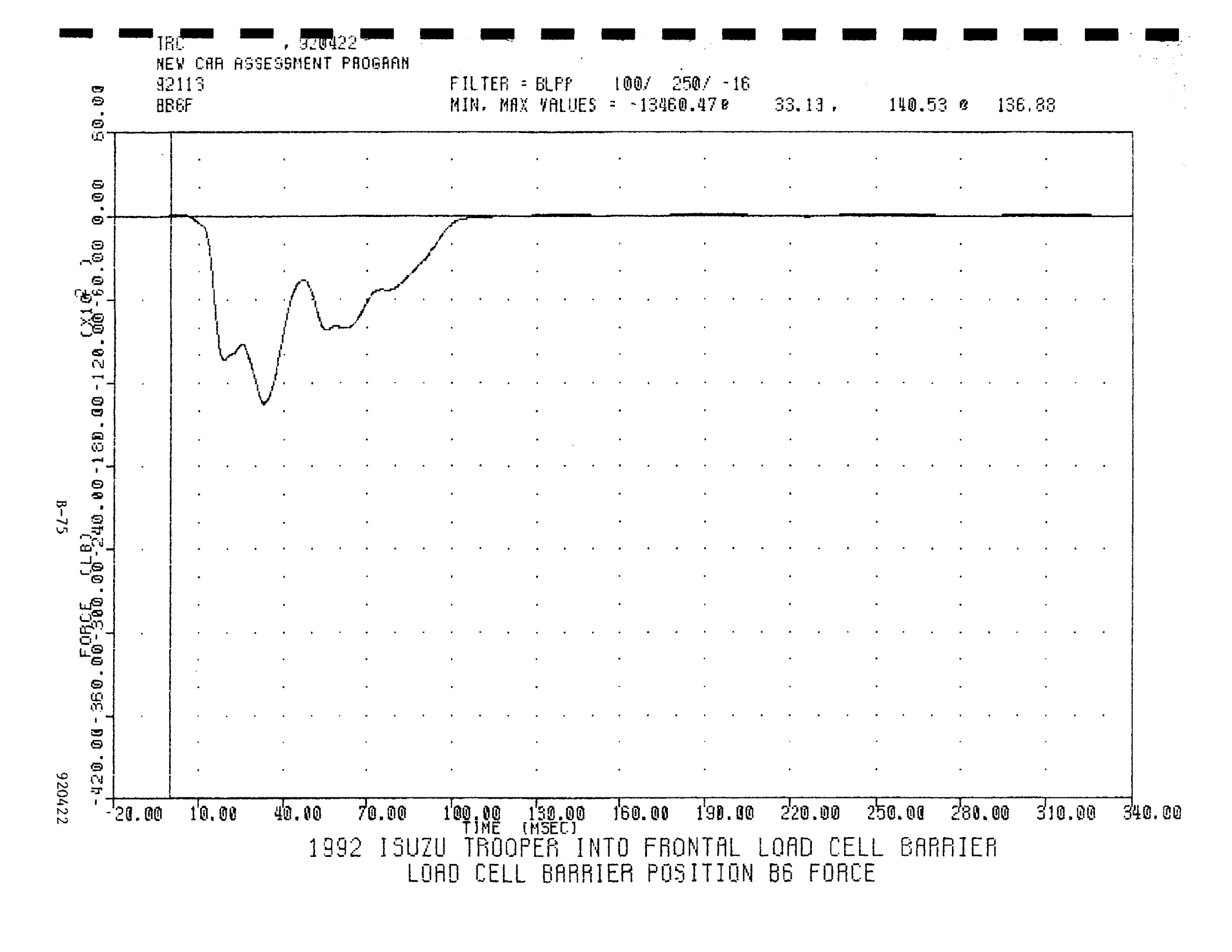
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE

920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE

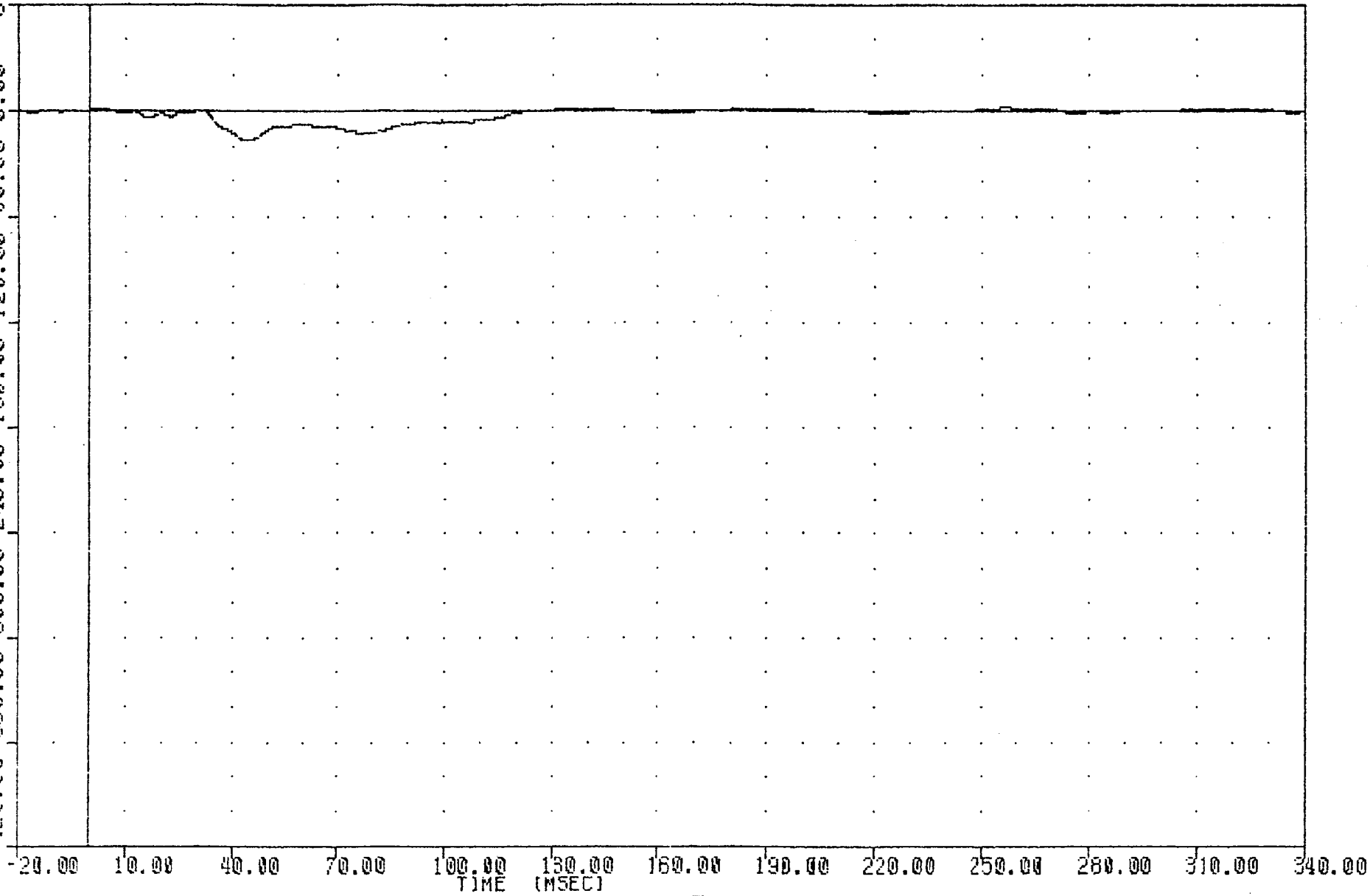
920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE

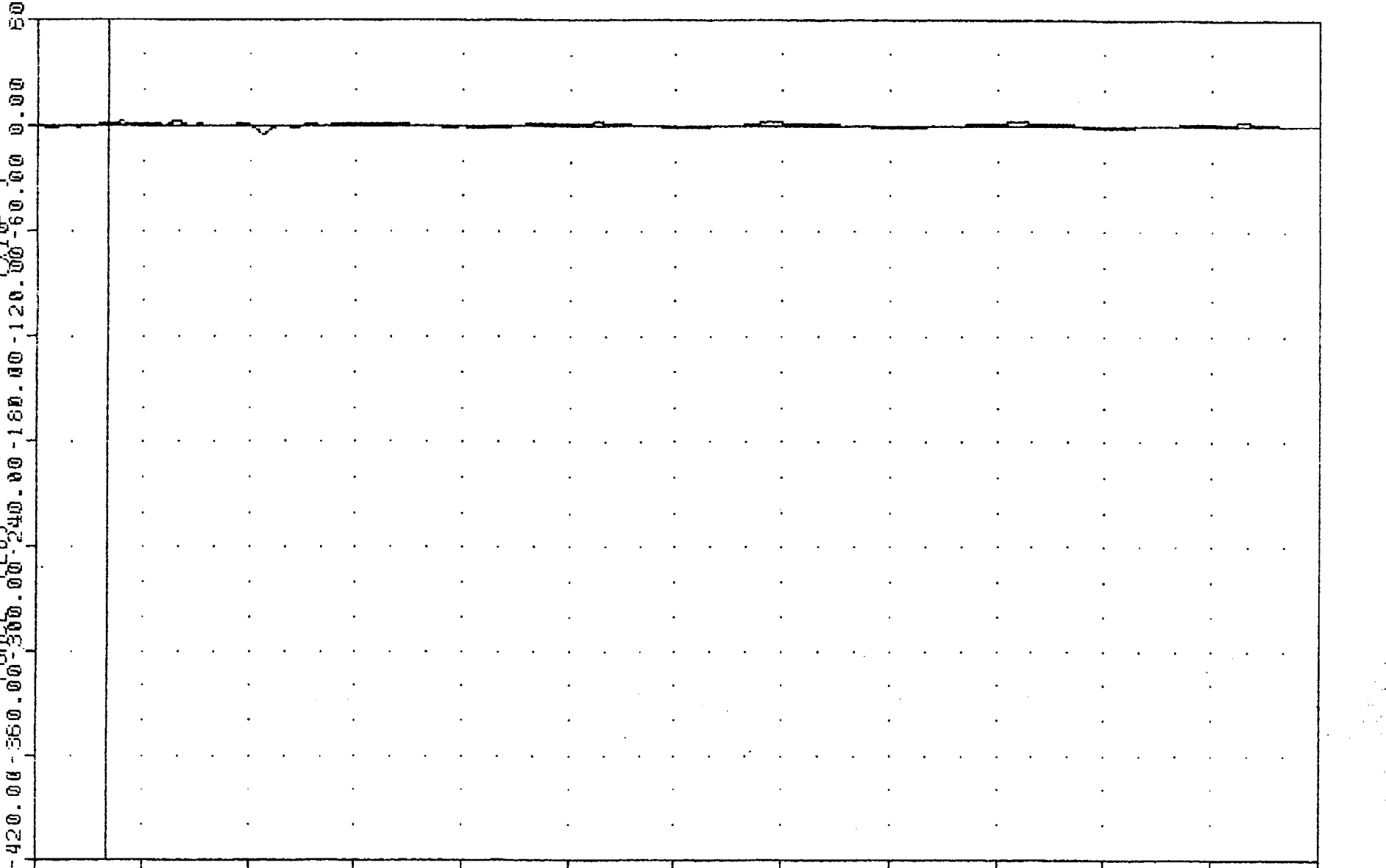
920422

TRC [redacted], 920422
NEW CAR ASSESSMENT PROGRAM
92113
BB8F
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -1722.04 @ 44.13, 176.46 @ 256.63



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B8 FORCE

TRC [redacted] 920422
NEW CAR ASSESSMENT PROGRAM
92113 FILTER = BLPP 100/ 250/ -16
BC1F MIN, MAX VALUES = -498.90 @ 43.63 , 258.75 @ 19.13



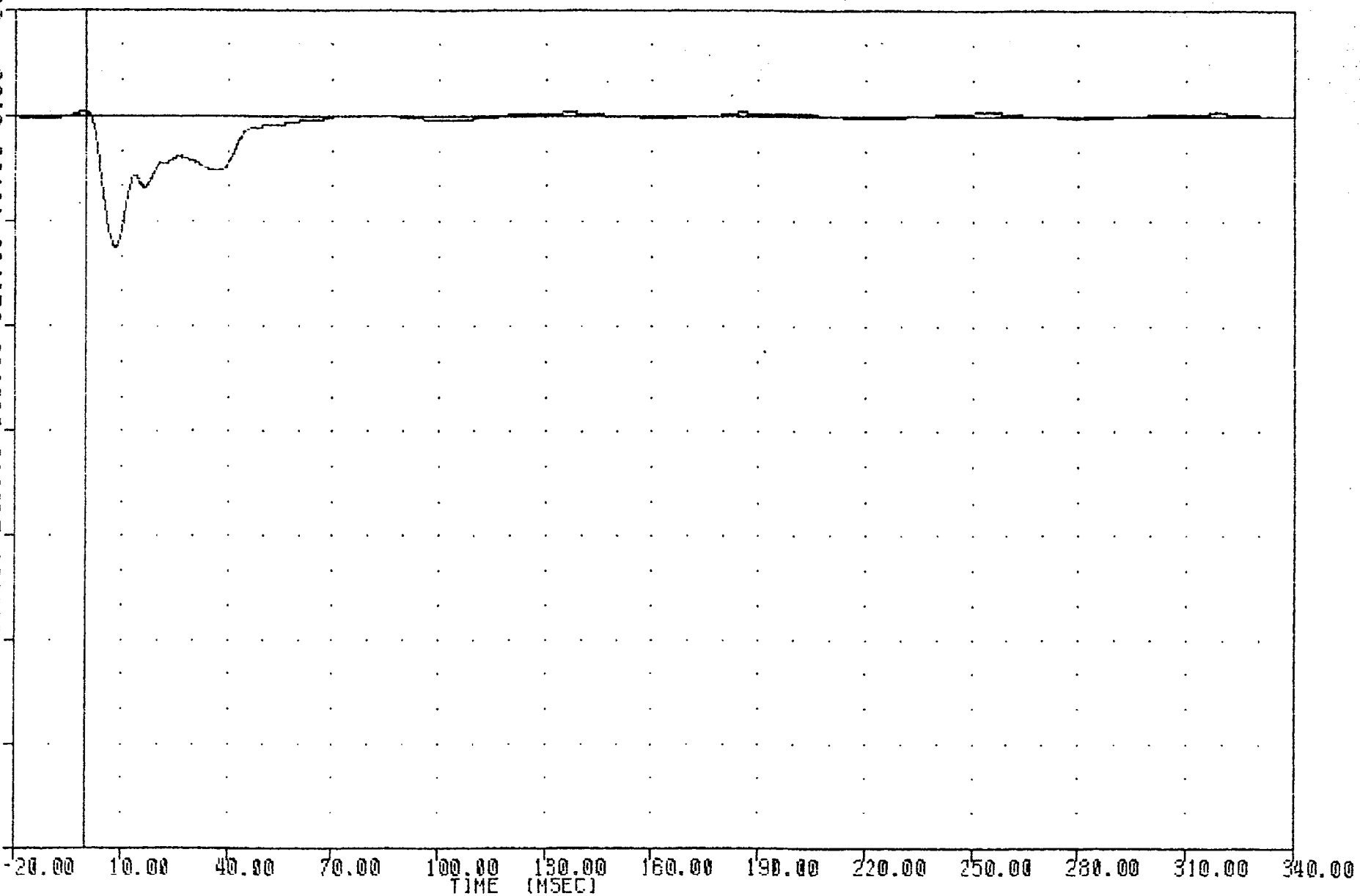
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE

[redacted] IRC[redacted], [redacted]22 [redacted]

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPF 100/ 250/ -16

BC3F MIN, MAX VALUES = -7522.25 @ 8.13 , 267.17 @ -0.38

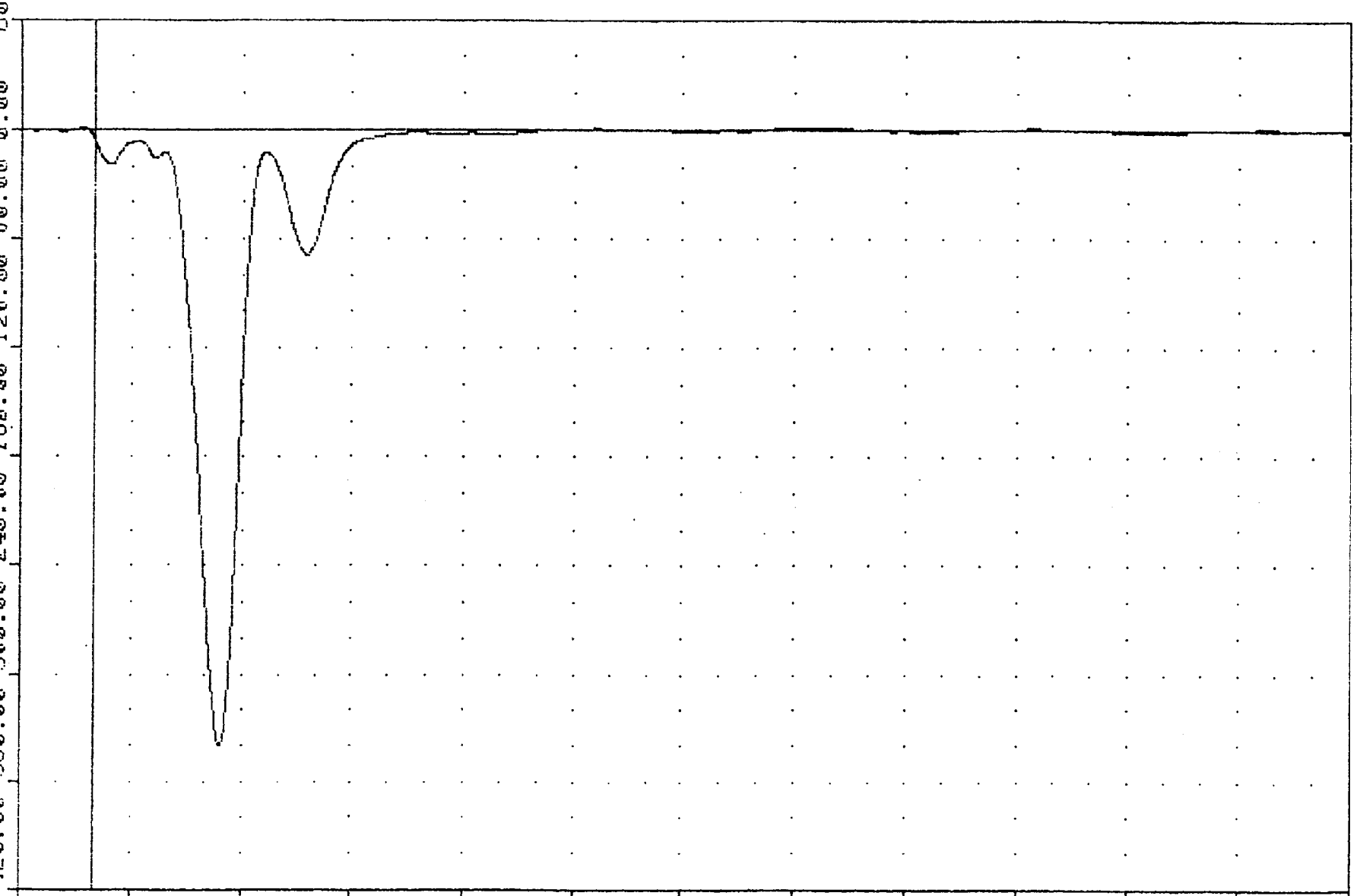


1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION C3 FORCE

920422

[redacted]TRO[redacted], [redacted]22[redacted]
NEW CAR ASSESSMENT PROGRAM
92113 FILTER = BLPP 100/ 250/ -16
BC5F MIN, MAX VALUES = -34016.14@ 34.13, 86.82 @ 194.38



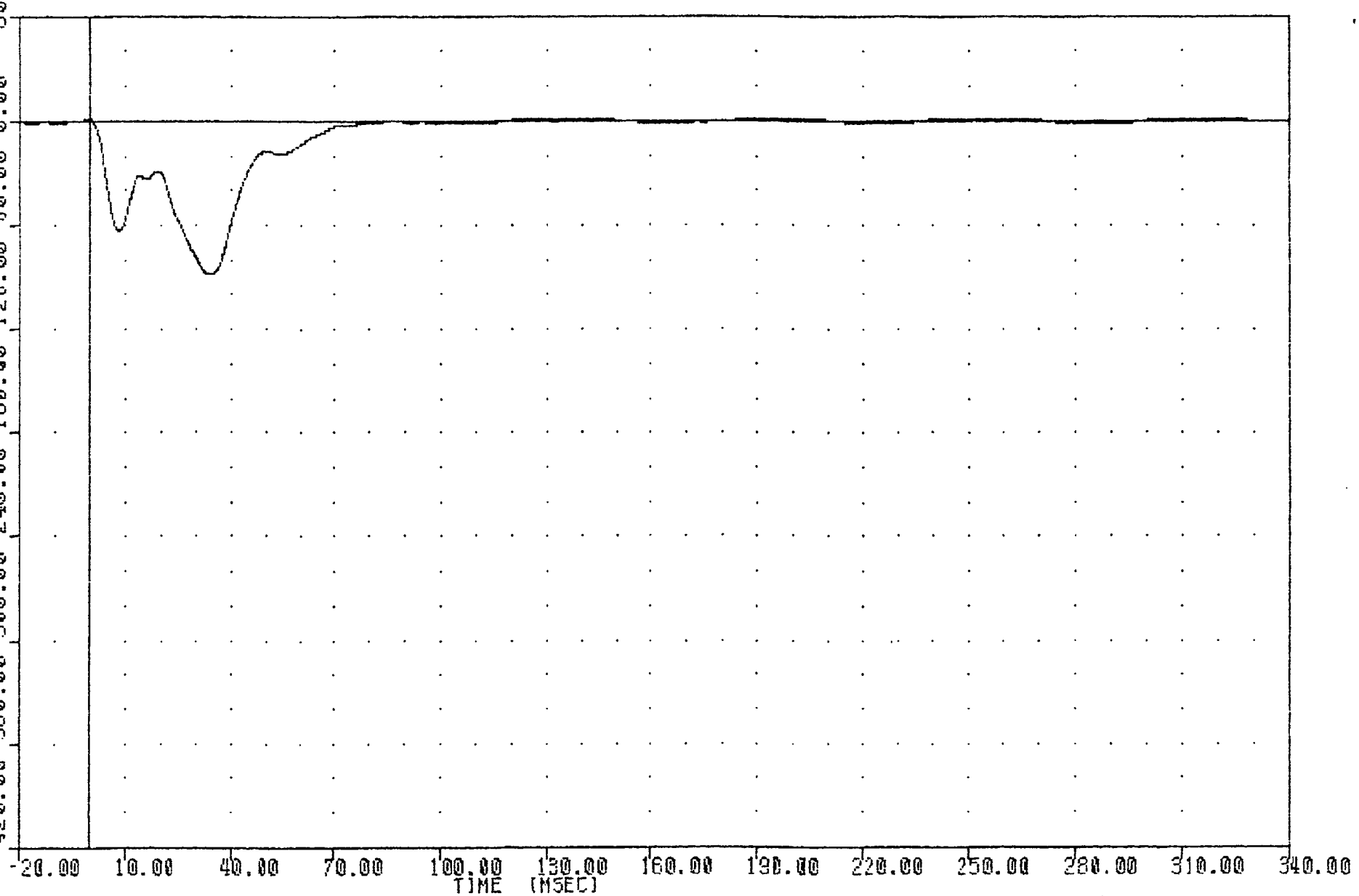
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE

920422

[redacted]

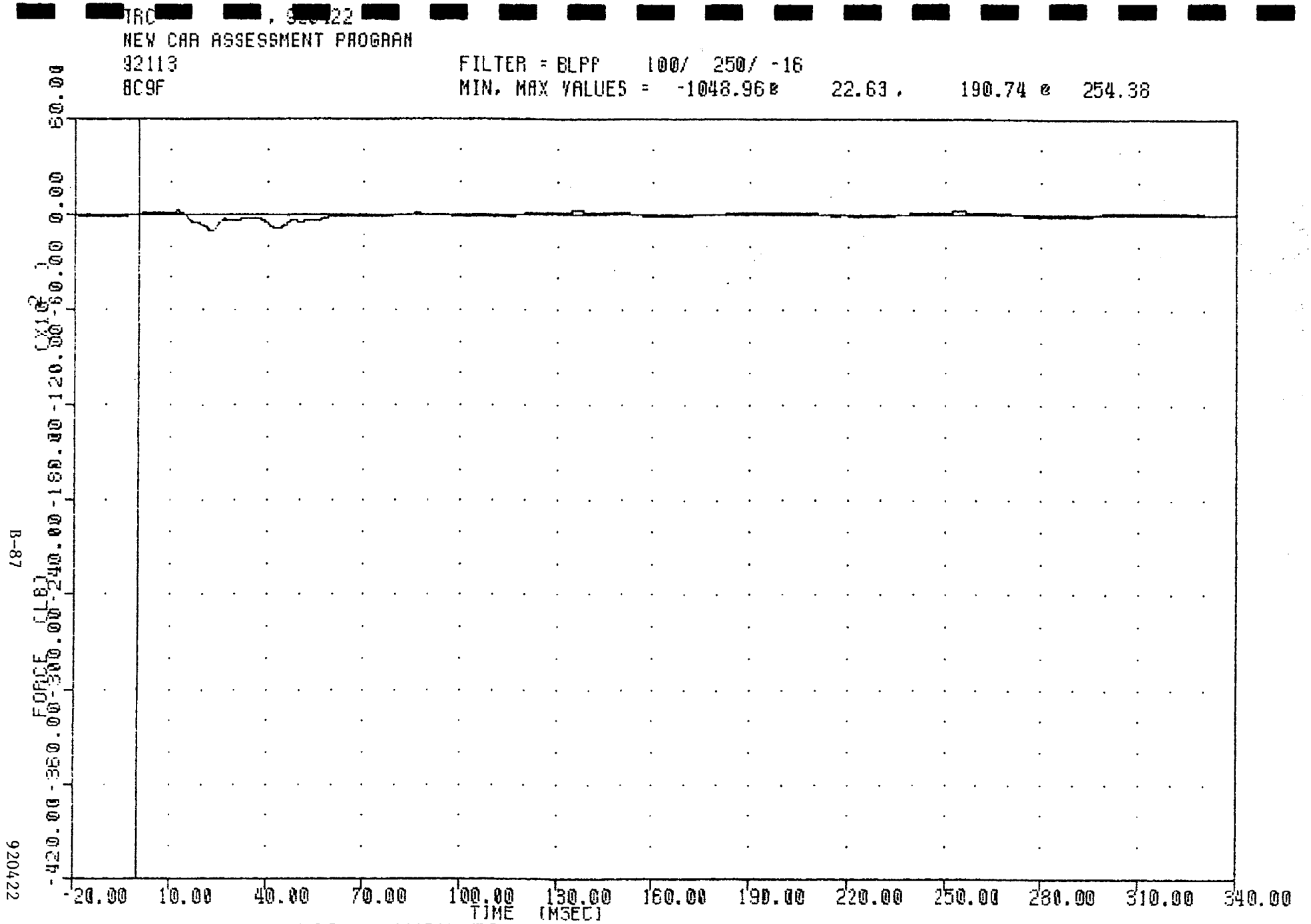
IRC [redacted], 920422
NEW CAR ASSESSMENT PROGRAM
92113
BC7F

FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -6850.21 @ 34.13 , 158.47 @ 254.50



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE

920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE

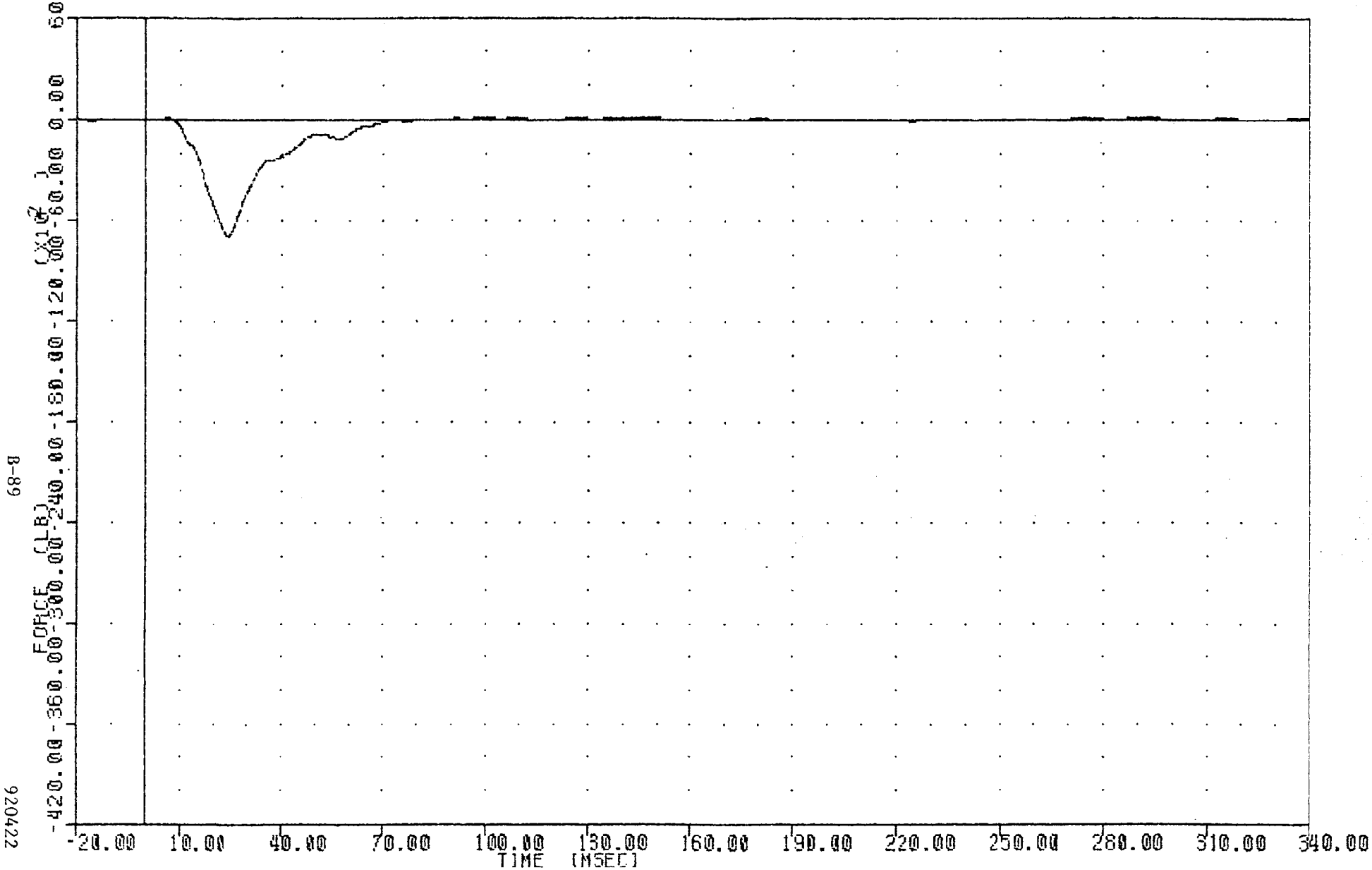
920422

[redacted]

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPF 100/ 250/ -16

BD2F MIN, MAX VALUES = -6872.58 @ 24.38 , 90.84 @ 291.88



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION 02 FORCE

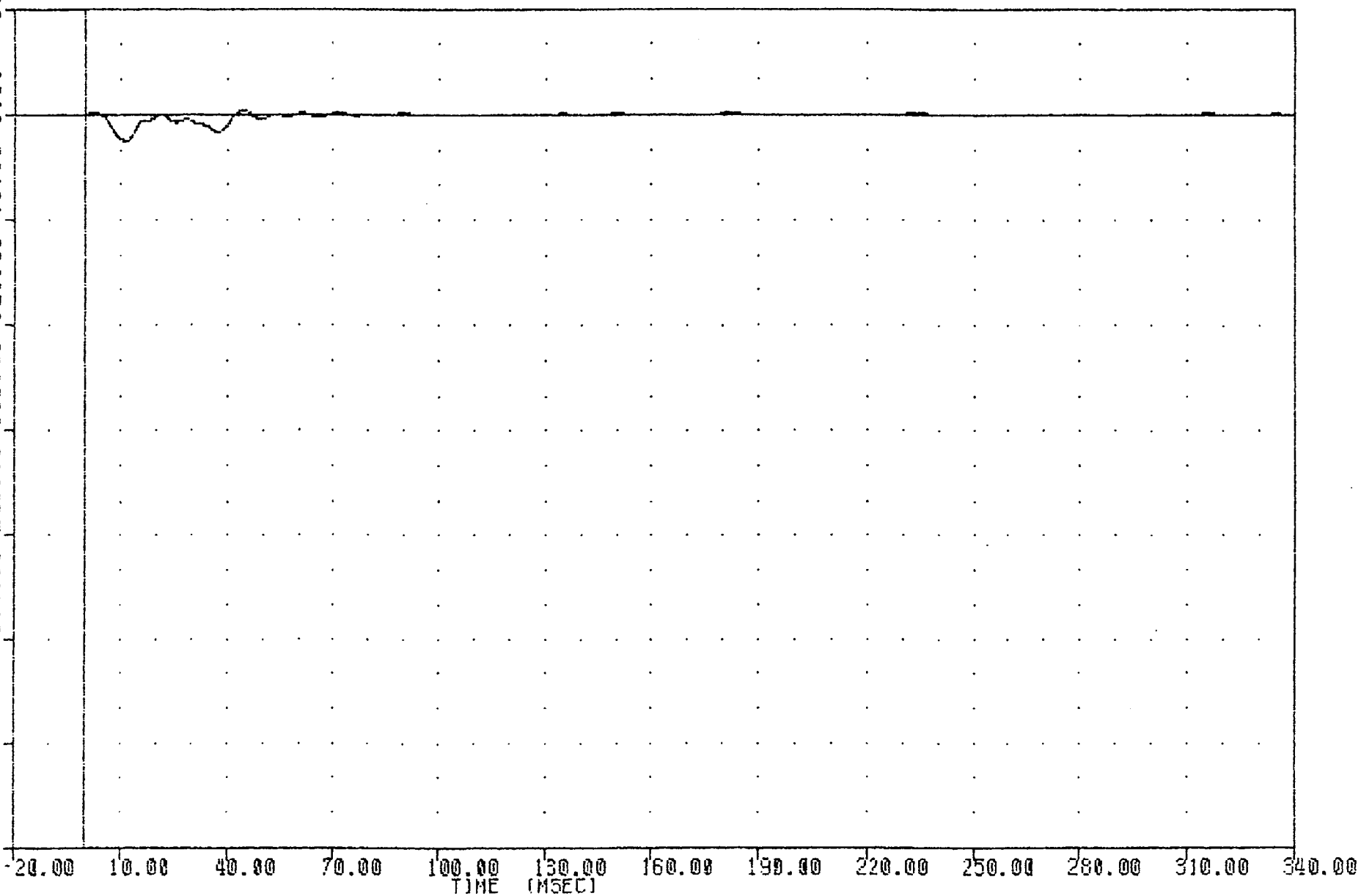
920422

[redacted]TRC[redacted], 9[redacted]22

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPF 100/ 250/ -16

B04F MIN, MAX VALUES = -1567.39@ 11.38, 257.59@ 44.38



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

LOAD CELL BARRIER POSITION D4 FORCE

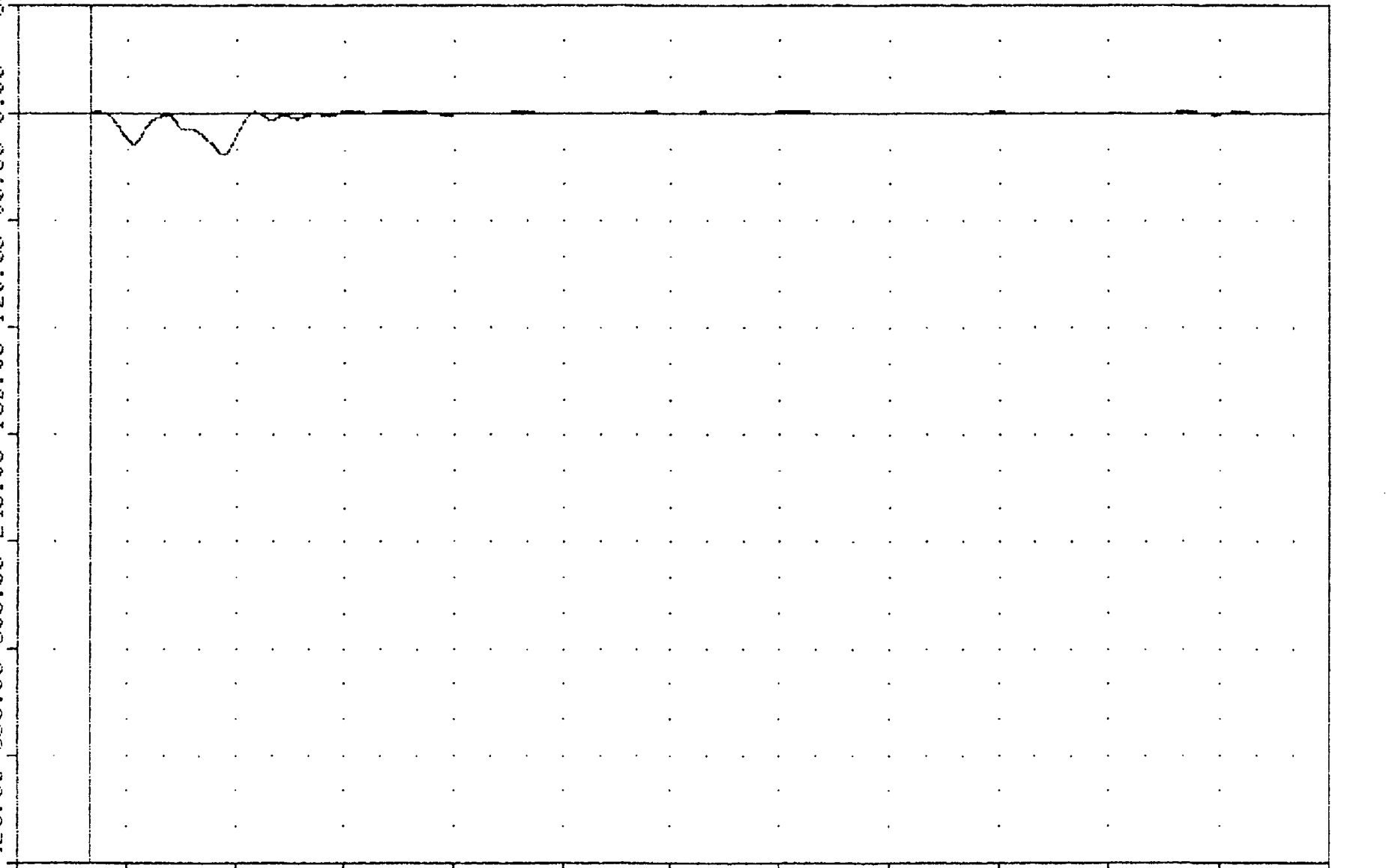
920422

[redacted]

NEW CAR ASSESSMENT PROGRAM

92113 FILTER = BLPF 100/ 250/ -16

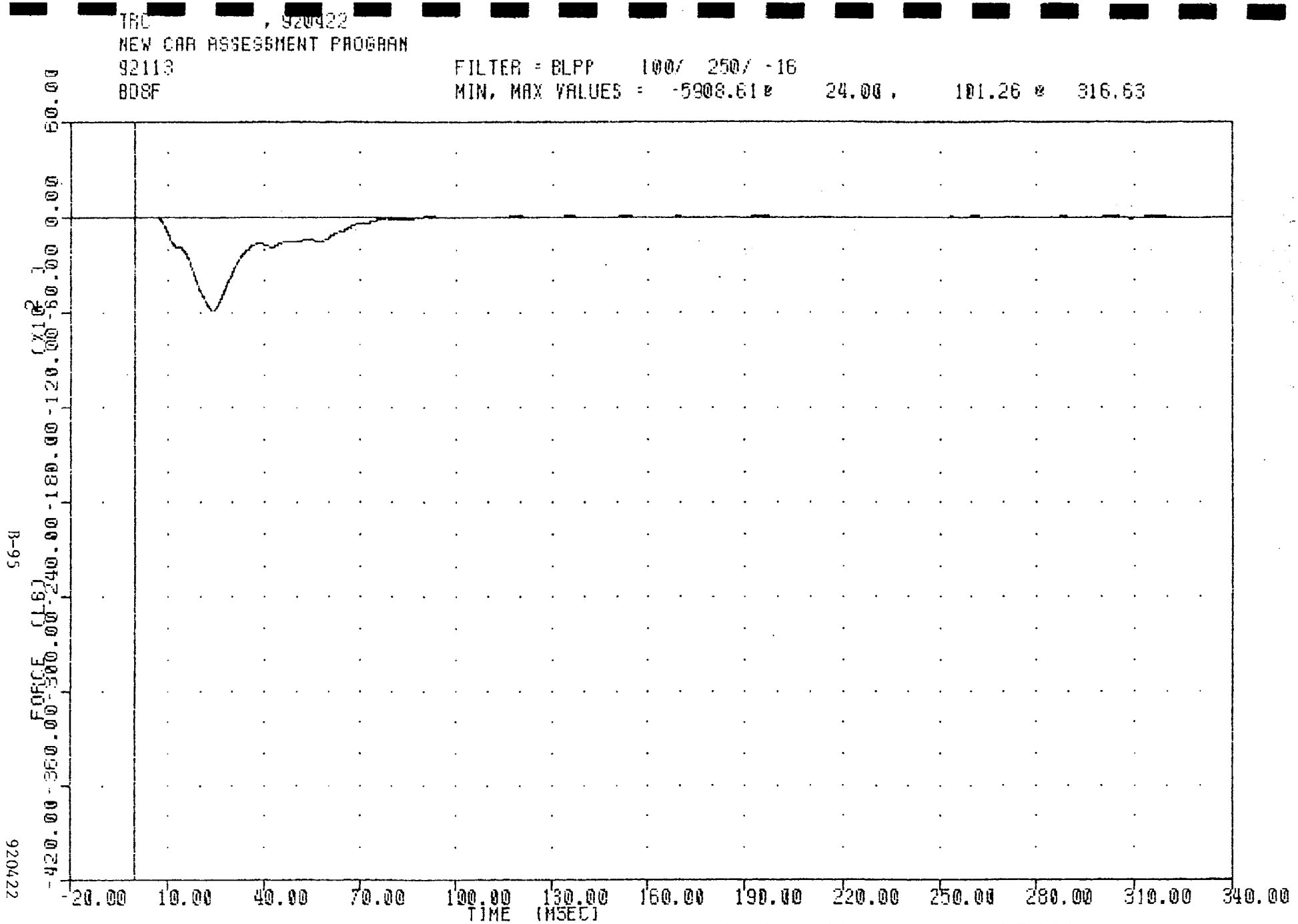
8D6F MIN, MAX VALUES = -2326.21 @ 36.50 , 129.88 @ 194.13



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER

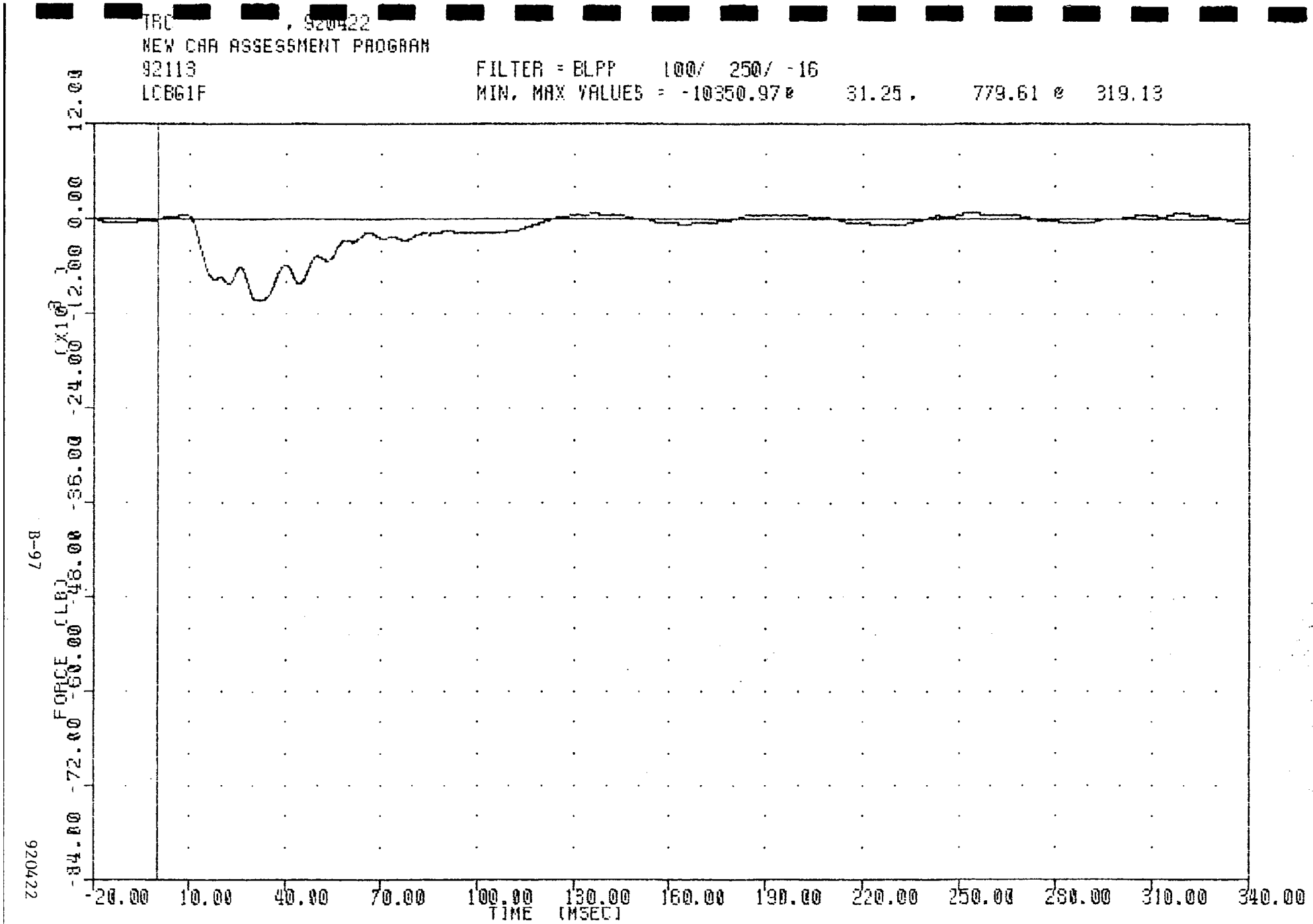
LOAD CELL BARRIER POSITION D6 FORCE

920422



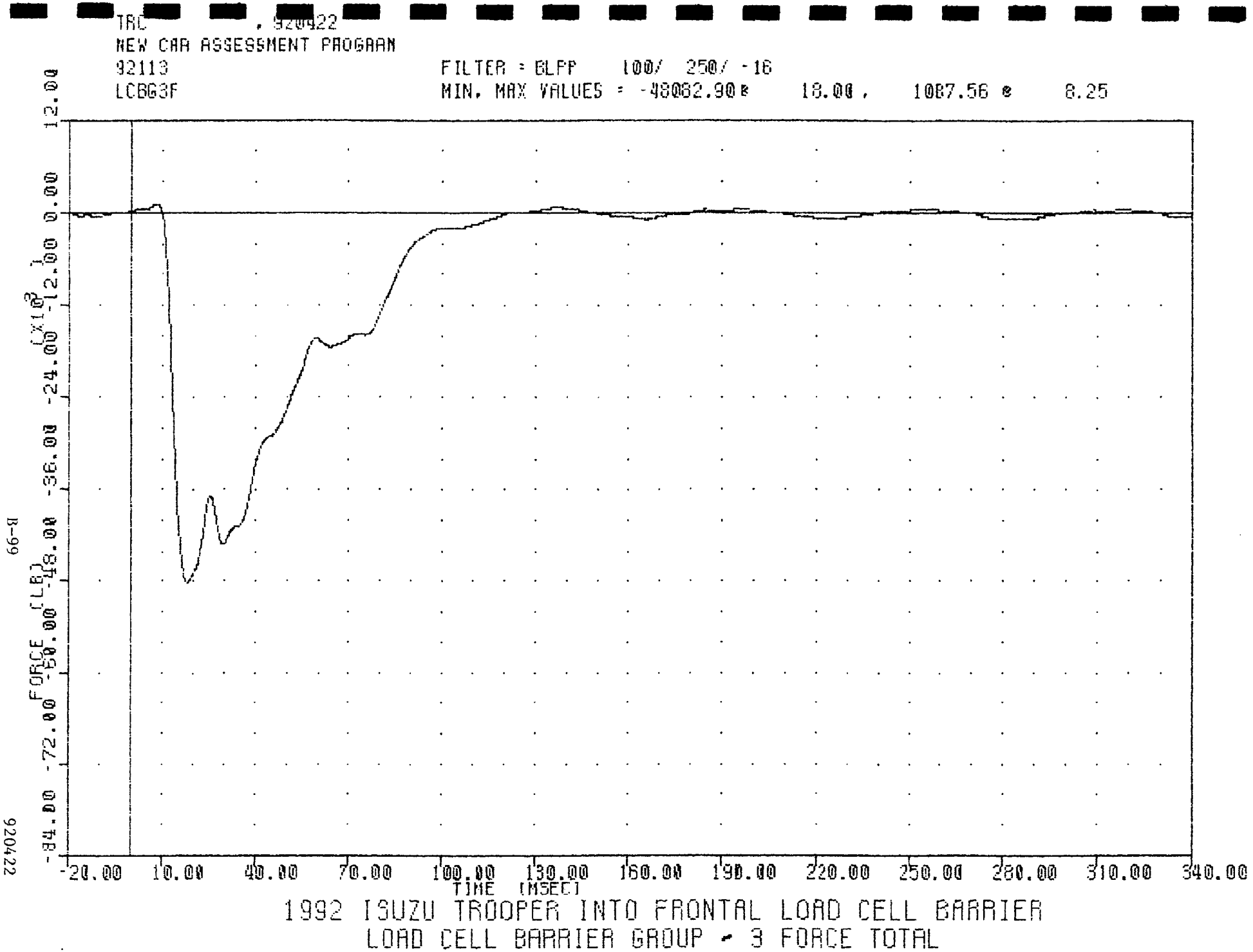
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION DB FORCE

920422



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 1 FORCE TOTAL

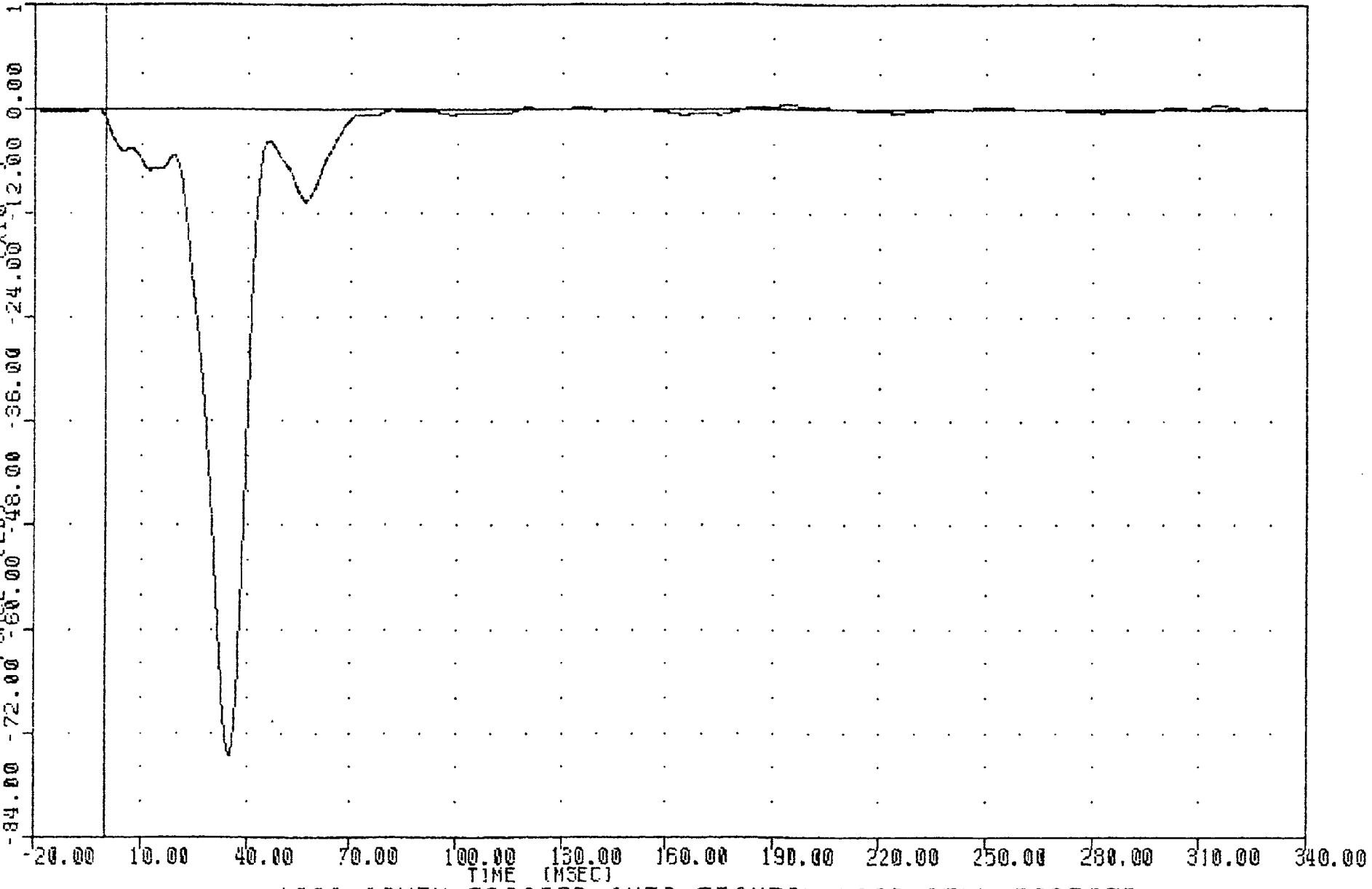
920422



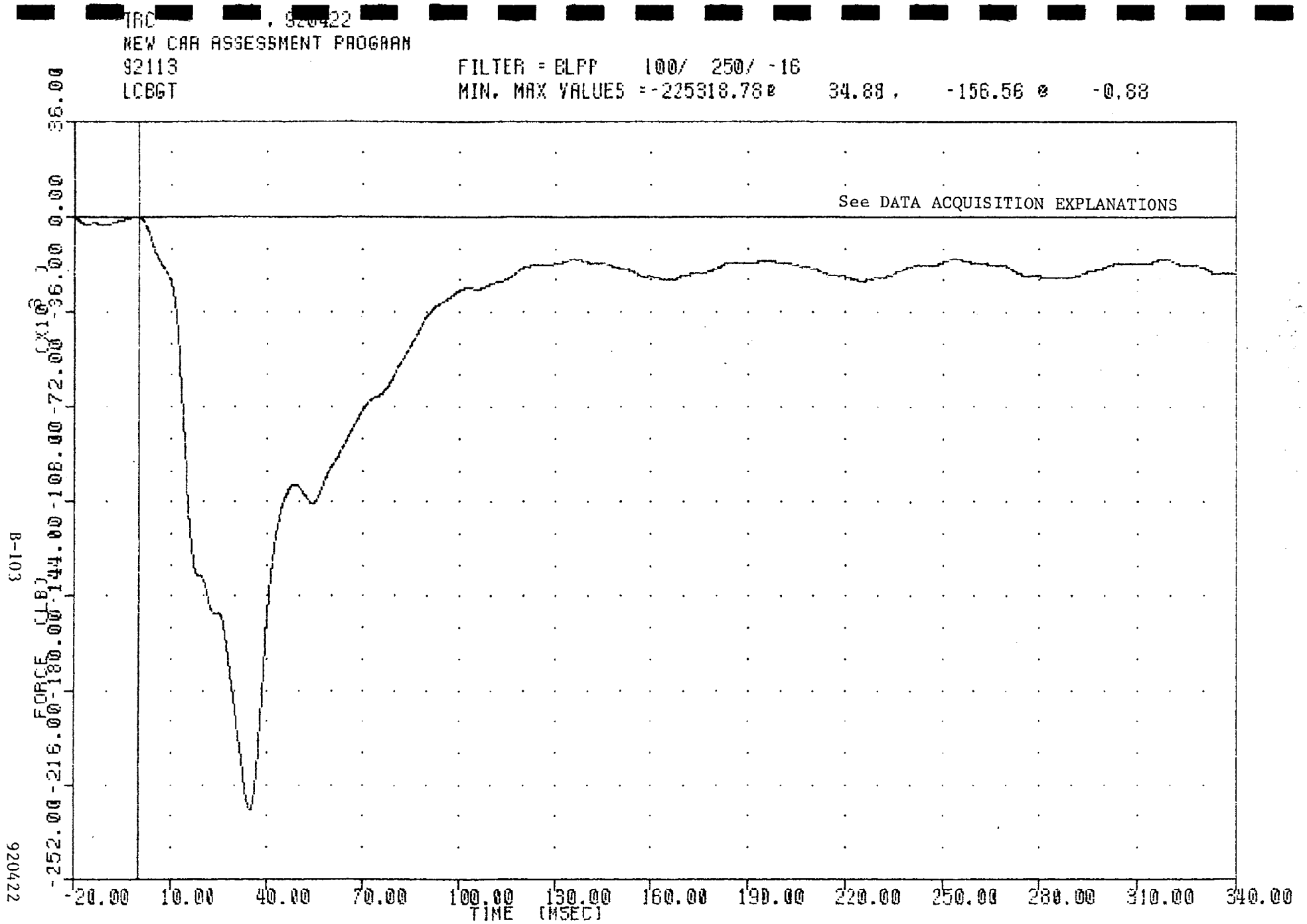
1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 3 FORCE TOTAL

TRC , 920422
NEW CAR ASSESSMENT PROGRAM
92113
LC865F

FILTER = CLPP 100/ 250/ -16
MIN, MAX VALUES = -74543.38 @ 35.00 , 463.88 @ 316.25



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 5 FORCE TOTAL



1992 ISUZU TROOPER INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE

APPENDIX C

DUMMY CERTIFICATION DATA

TRANSPORTATION RESEARCH CENTER OF OHIO
HYBRID III EXTERNAL DIMENSIONS
SN 192 HUMANOID

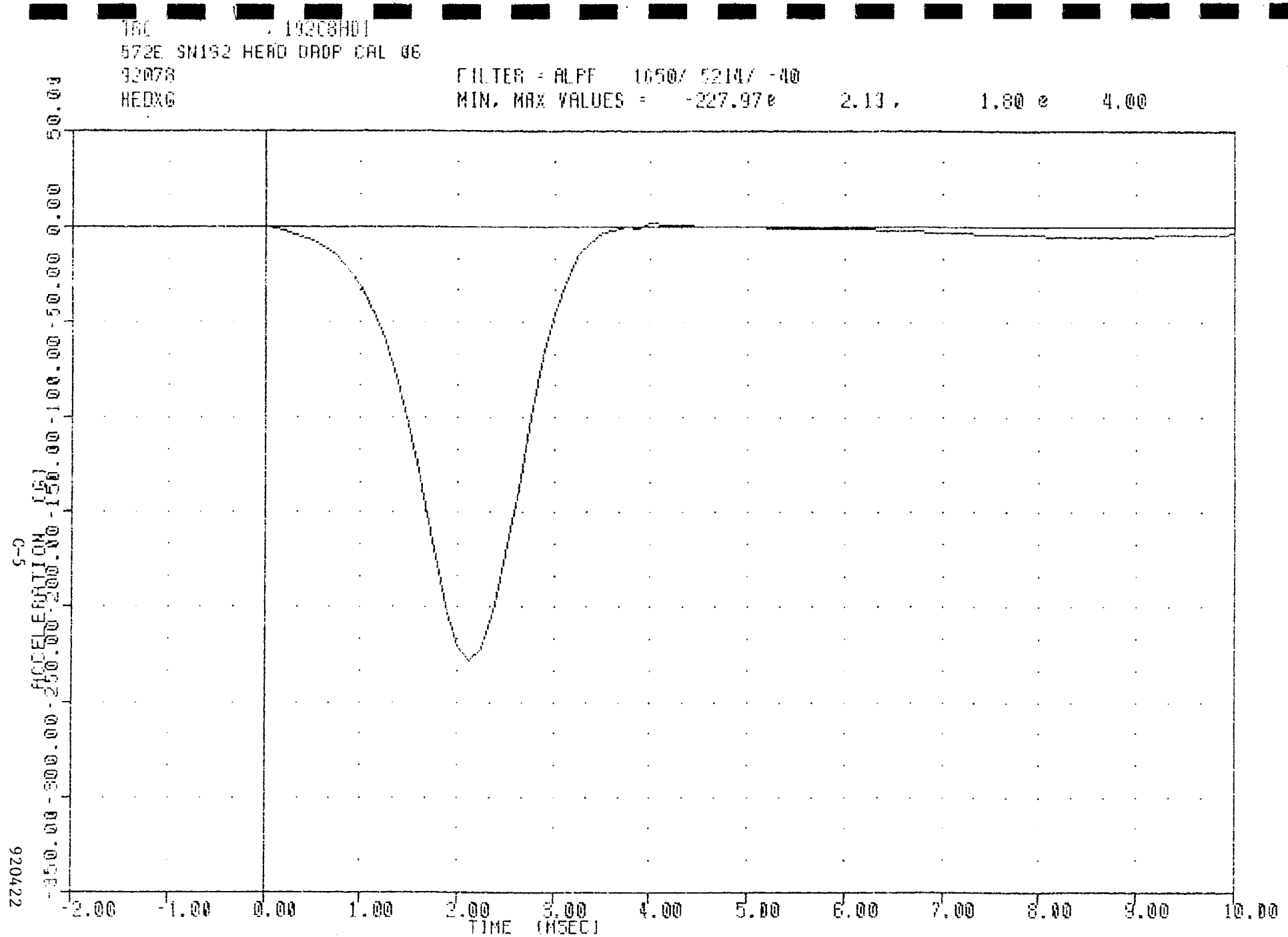
18-MAR-92

TRC 192C8ED1 572E SN192 EXT DIMENSION CALCS

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			70.0 DEG. F
RELATIVE HUMIDITY			44.0 %
LOCATION FOR CHEST CIRCUMFERENCE	(AA)	16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE	(BB)	8.9- 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE	(Y)	38.2-39.4 IN	38.7 IN
WAIST CIRCUMFERENCE	(Z)	32.9-34.1 IN	33.4 IN
CHEST DEPTH	(O)	8.4- 9.0 IN	8.6 IN
H-POINT HEIGHT	(C)	3.3- 3.5 IN	3.4 IN
H-POINT FROM SEATBACK	(D)	5.3- 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE	(H)	1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT	(A)	34.6-35.0 IN	34.8 IN
THIGH CLEARANCE	(F)	5.5- 6.1 IN	5.8 IN
BUTTOCK KNEE LENGTH	(K)	22.8-23.6 IN	23.7 IN
BUTTOCK POPLITEAL LENGTH	(N)	17.8-18.6 IN	18.6 IN
POPLITEAL HEIGHT	(L)	16.9-17.9 IN	17.7 IN
KNEE PIVOT HEIGHT	(M)	19.1-19.7 IN	19.4 IN
FOOT LENGTH	(P)	9.9-10.5 IN	10.2 IN
FOOT BREADTH	(W)	3.6- 4.2 IN	4.0 IN
SHOULDER PIVOT FROM BACKLINE	(E)	3.3- 3.7 IN	3.6 IN
SHOULDER BREADTH	(V)	16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT	(B)	19.9-20.5 IN	20.2 IN
ELBOW REST HEIGHT	(J)	7.5- 8.3 IN	8.1 IN
SHOULDER-ELBOW LENGTH	(I)	13.0-13.6 IN	13.4 IN
BACK OF ELBOW TO WRIST PIVOT	(G)	11.4-12.0 IN	11.6 IN

TEST MEETS SPECIFICATIONS

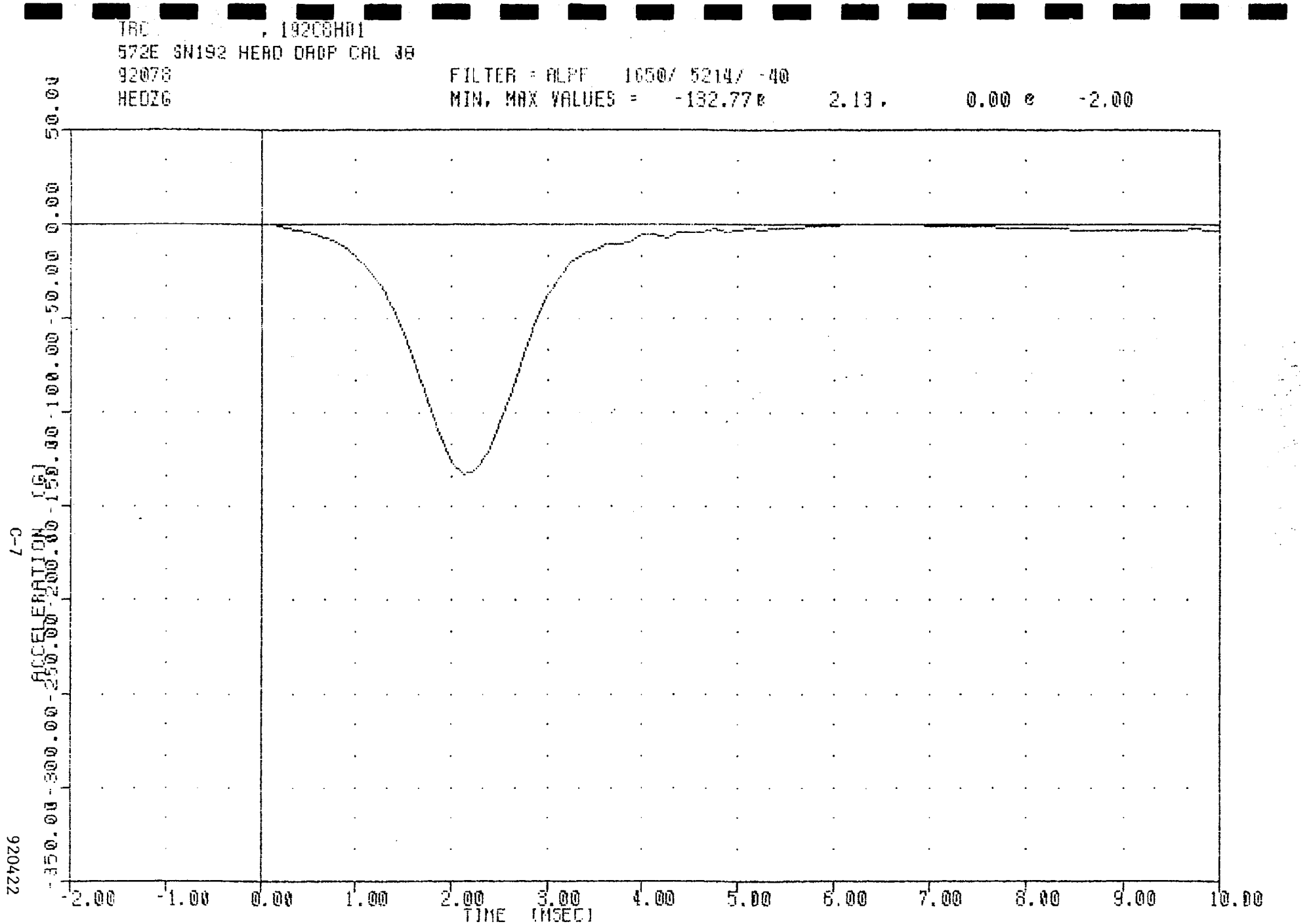
TECHNICIAN Kevin Watkins



C-5

920422

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



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

920422

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

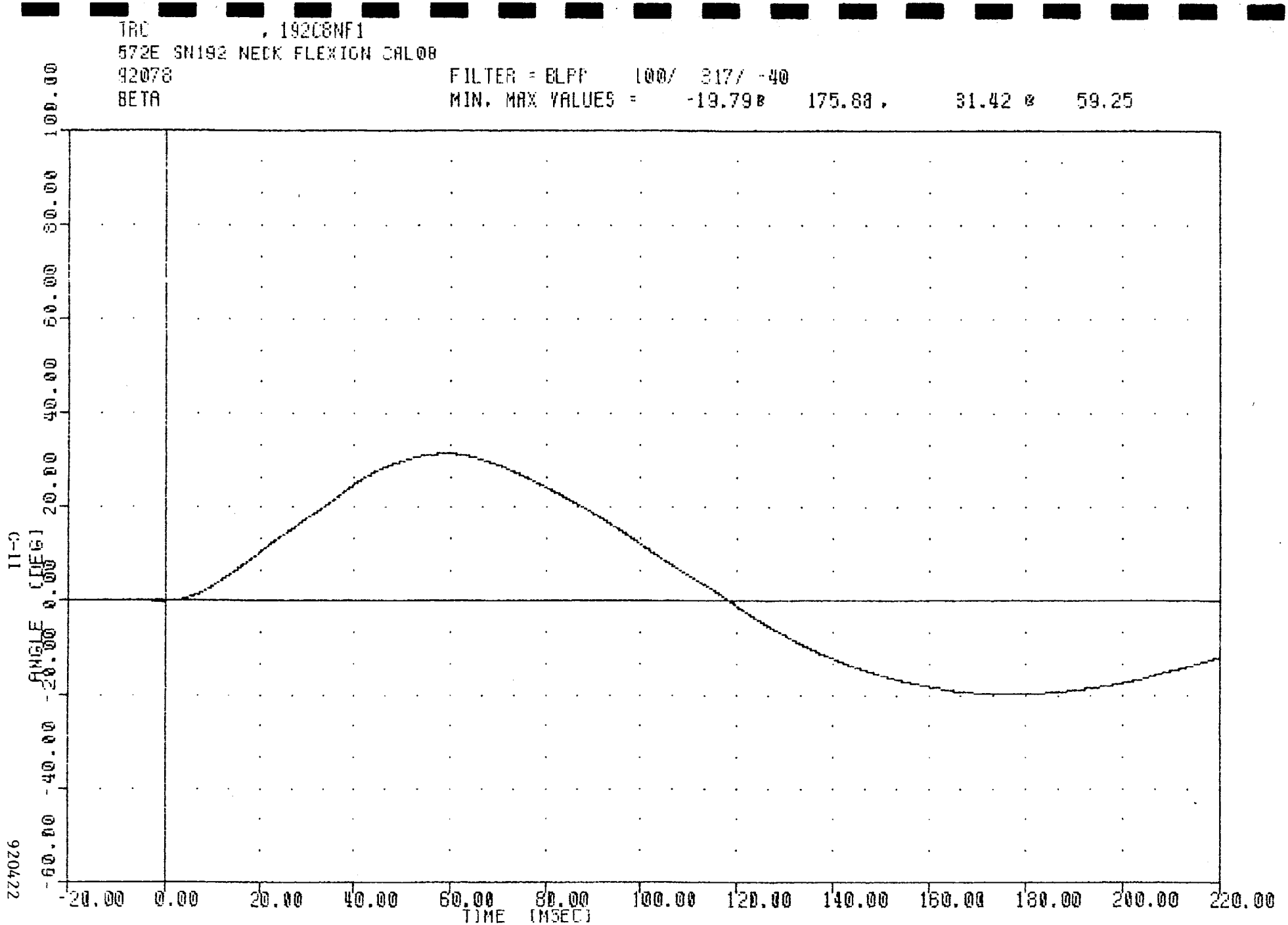
HYBRID III 18-MAR-92

6 AXIS NECK TRANSDUCER
TRC 192CSNF1 572E SN192 NECK FLEXION CAL08

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10% - 70%	44.0 %
IMPACT VELOCITY		22.6-23.4 FT/SEC	23.08 FT/SEC
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.00 G
	20 MS	17.60 - 22.60 G	19.60 G
	30 MS	12.50 - 18.50 G	16.41 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	17.20 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.63 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	73.07 DEG.
	TIME	57 - 64 MS	59.25 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.LBS	70.61 FT.LBS
	TIME	47 - 58 MS	50.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	101.88 MS

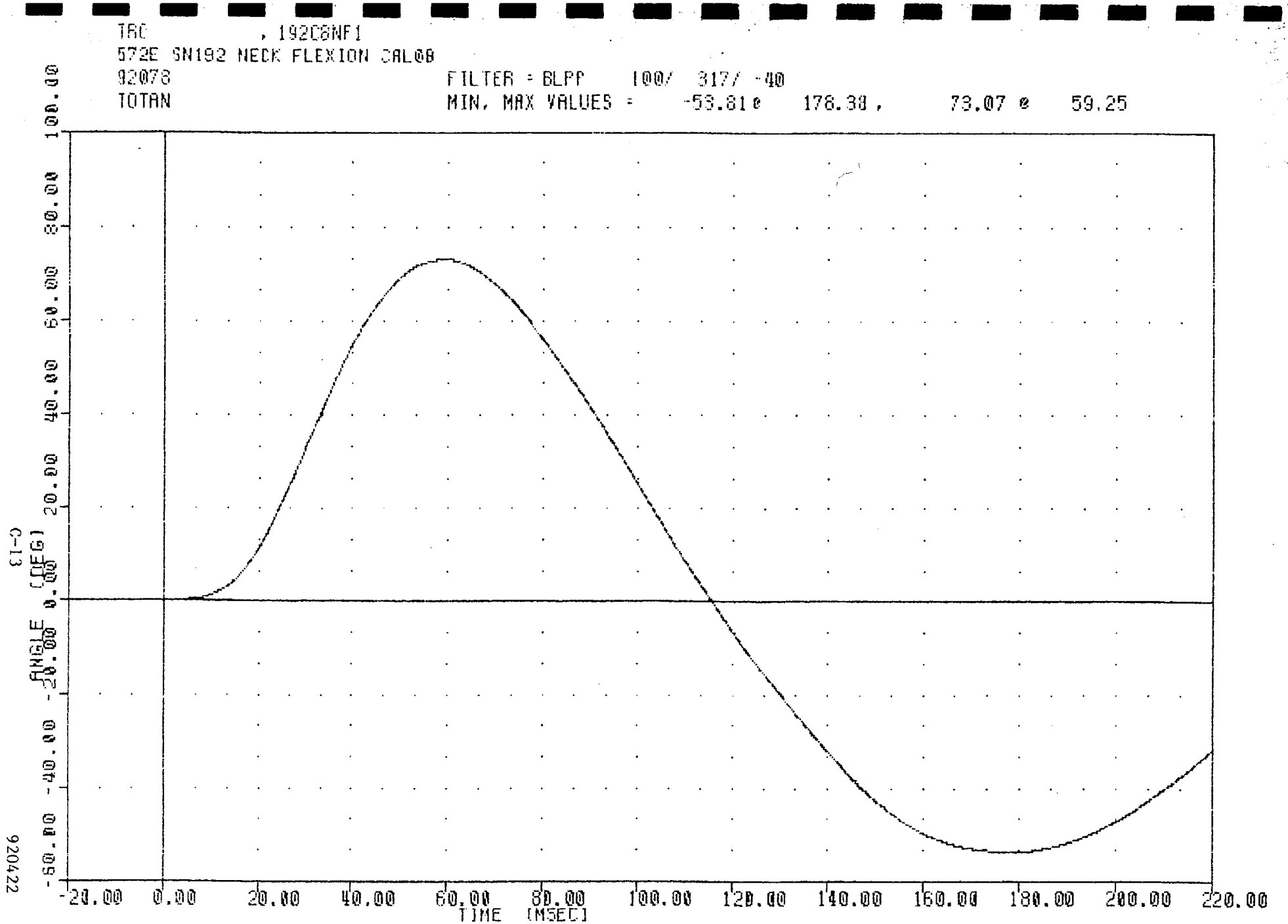
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



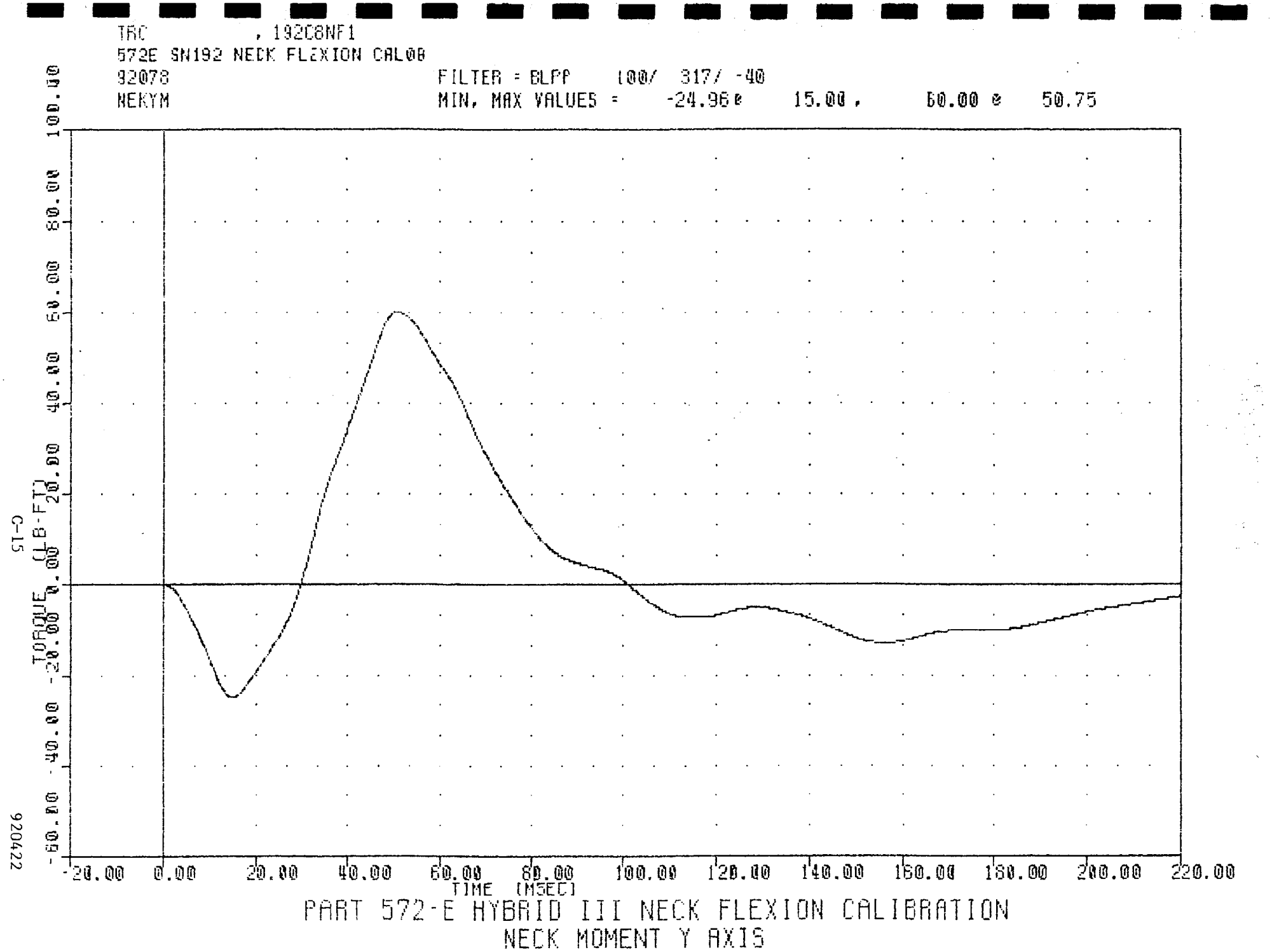
PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

920422



PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION

920422



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

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

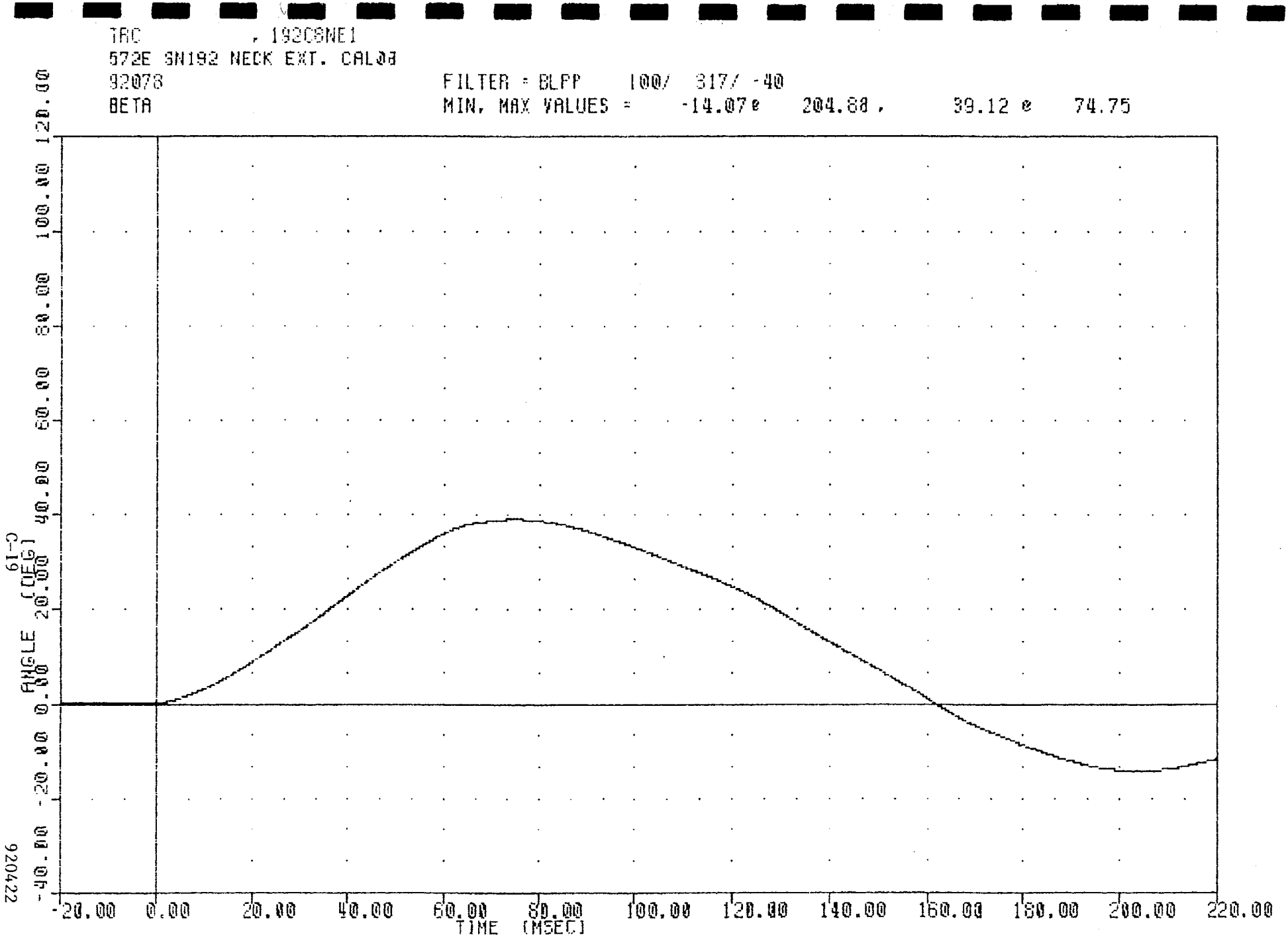
HYBRID III 18-MAR-92

6 AXIS NECK TRANSDUCER
TRC 192C8NE1 572E SN192 NECK EXT. CAL08

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10% - 70%	44.0 %
IMPACT VELOCITY		19.50-20.30 FT/SEC	19.83 FT/SEC
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.86 G
	20 MS	14.00 - 19.00 G	16.20 G
	30 MS	11.00 - 16.00 G	14.56 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.54 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	39.00 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	104.07 DEG.
	TIME	72 - 82 MS	76.50 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-59.0/-39.0 FT.LBS	-52.89 FT.LBS
	TIME	65 - 79 MS	72.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	160.88 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	143.38 MS

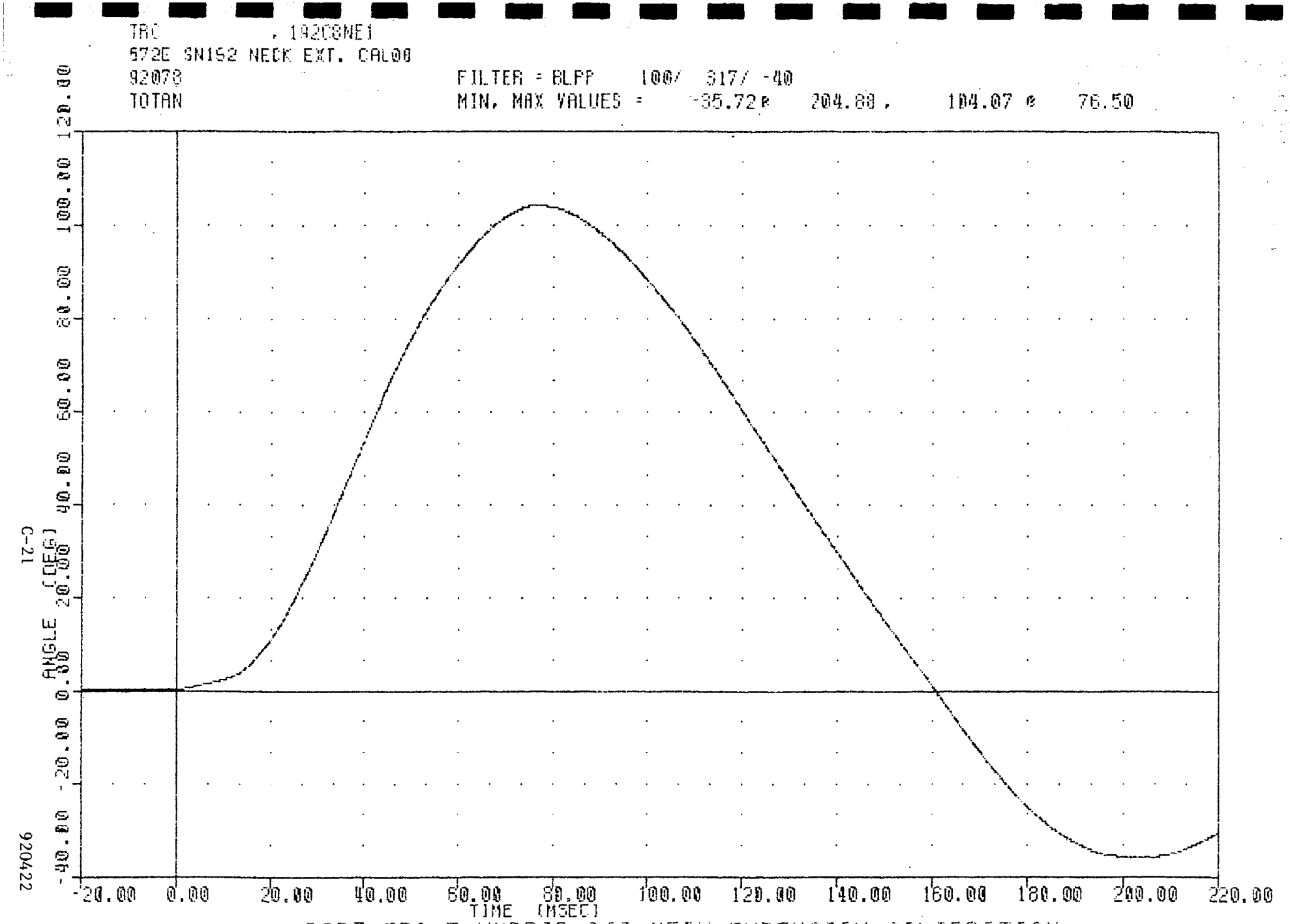
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



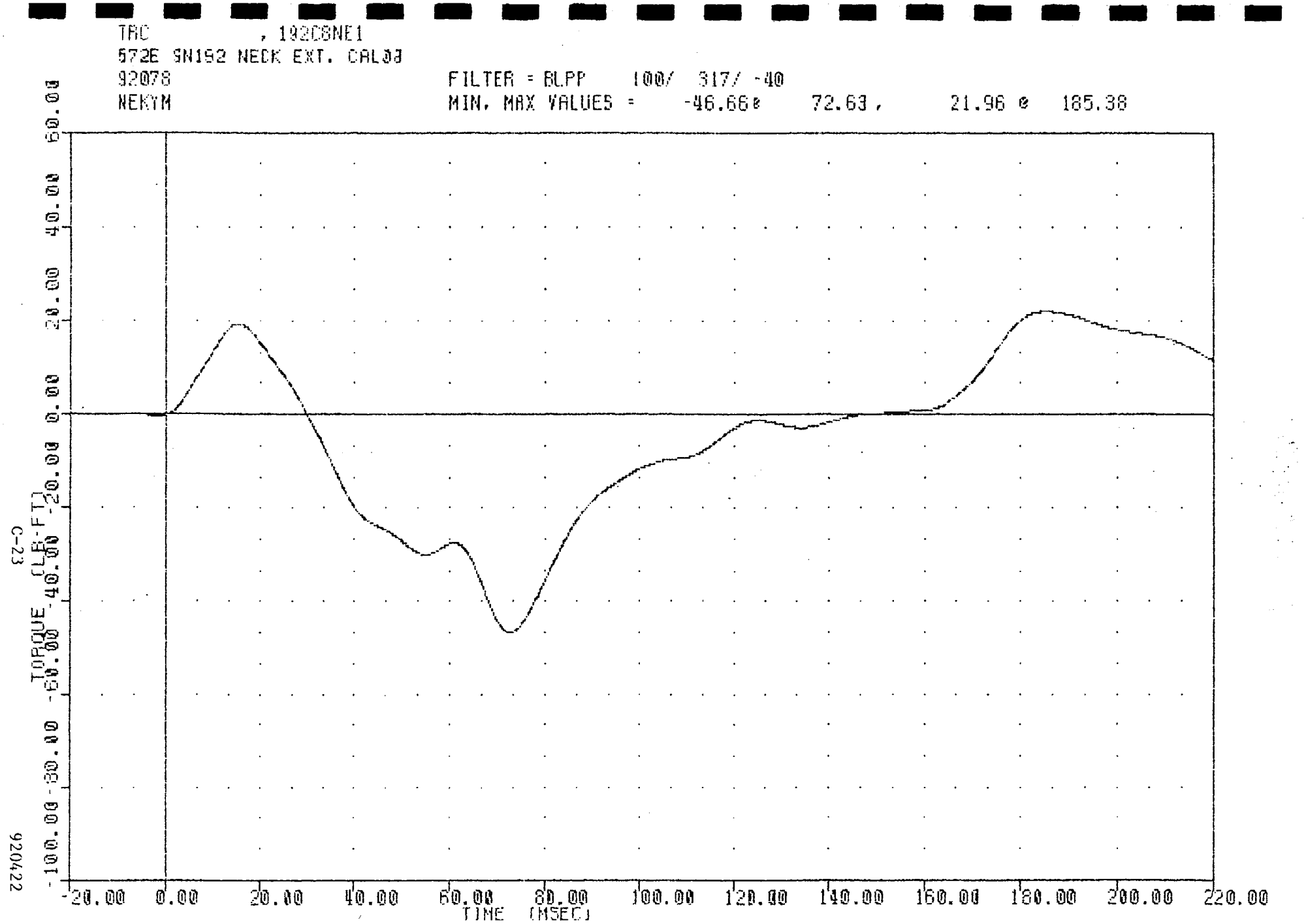
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

920422



PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION

920422



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

9204422

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

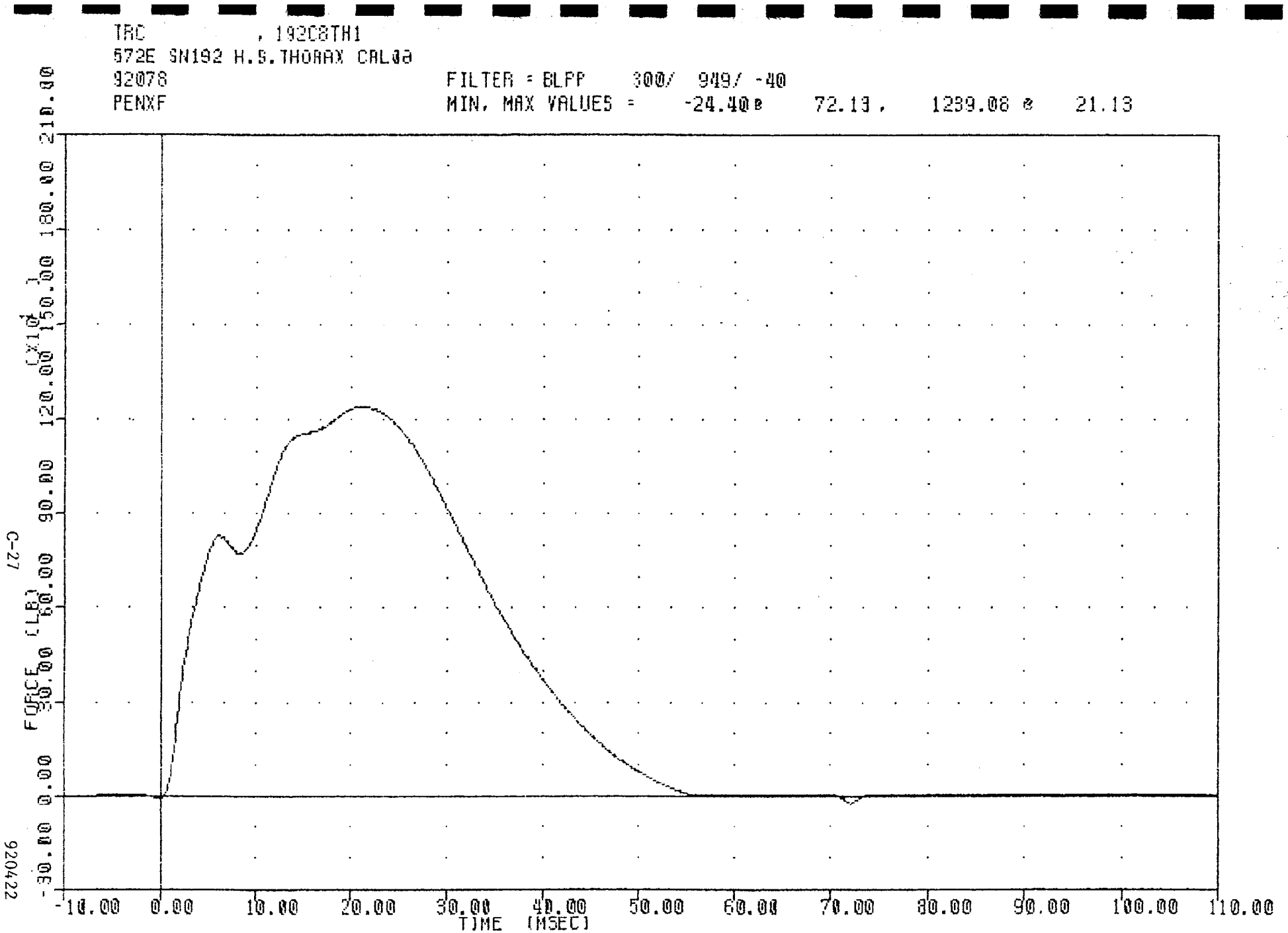
HYBRID III 18-MAR-92

TRC 192C8TH1 572E SN192 H.S.THORAX CAL08

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.92 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.77 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1239.1 LBS
INTERNAL HYSTERESIS	69% - 85%	73.1%

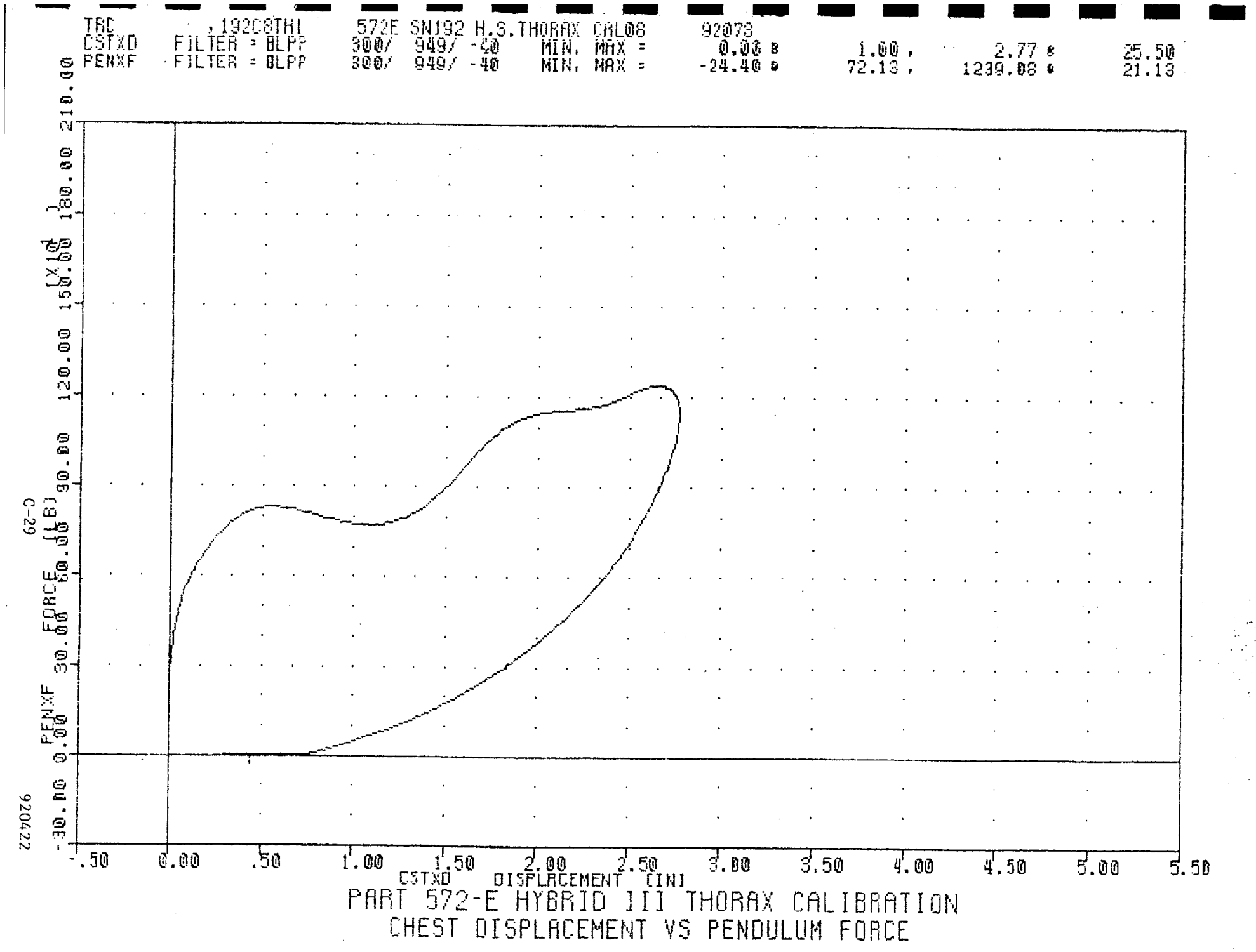
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins

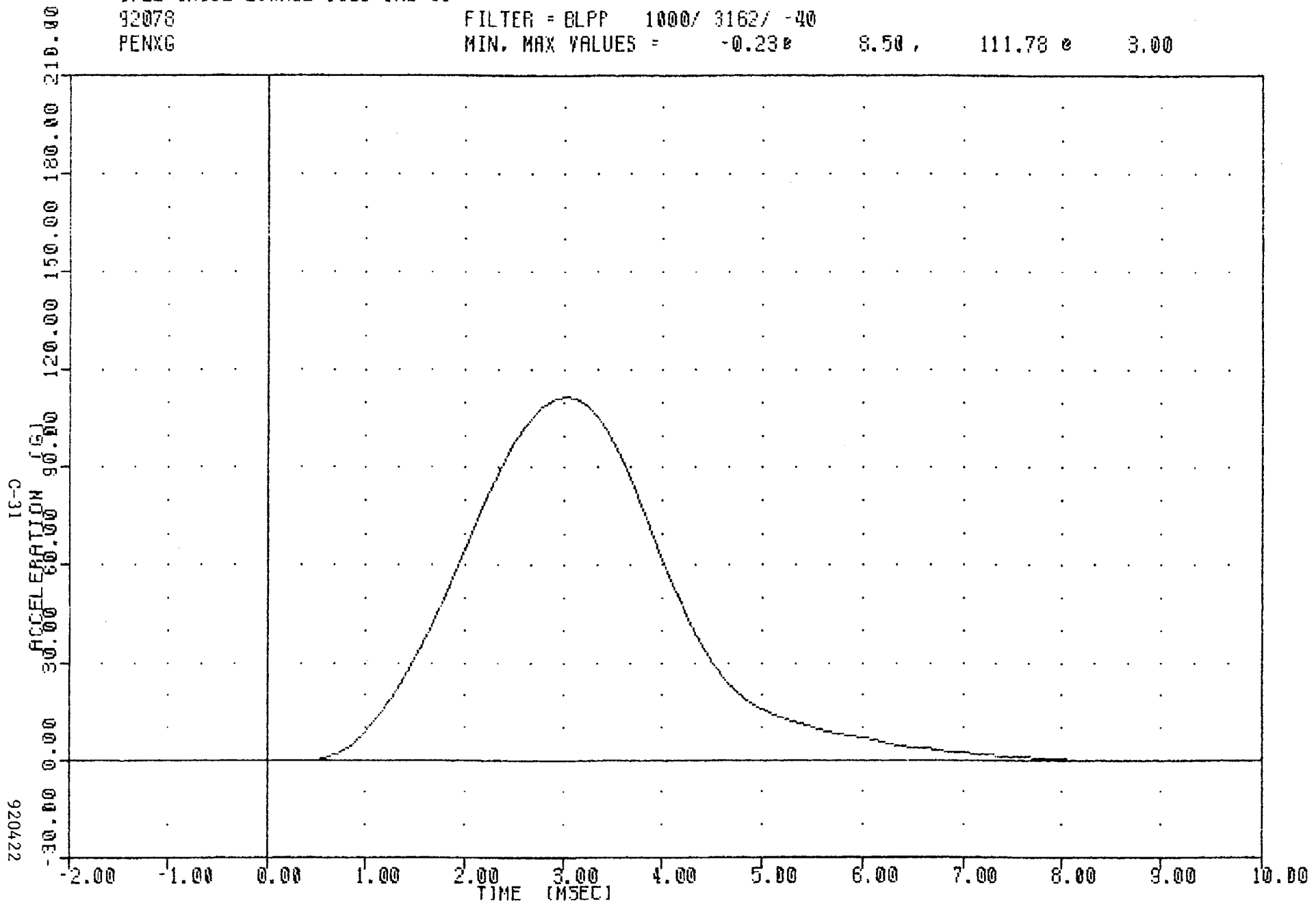


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

920422



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



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

920422

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

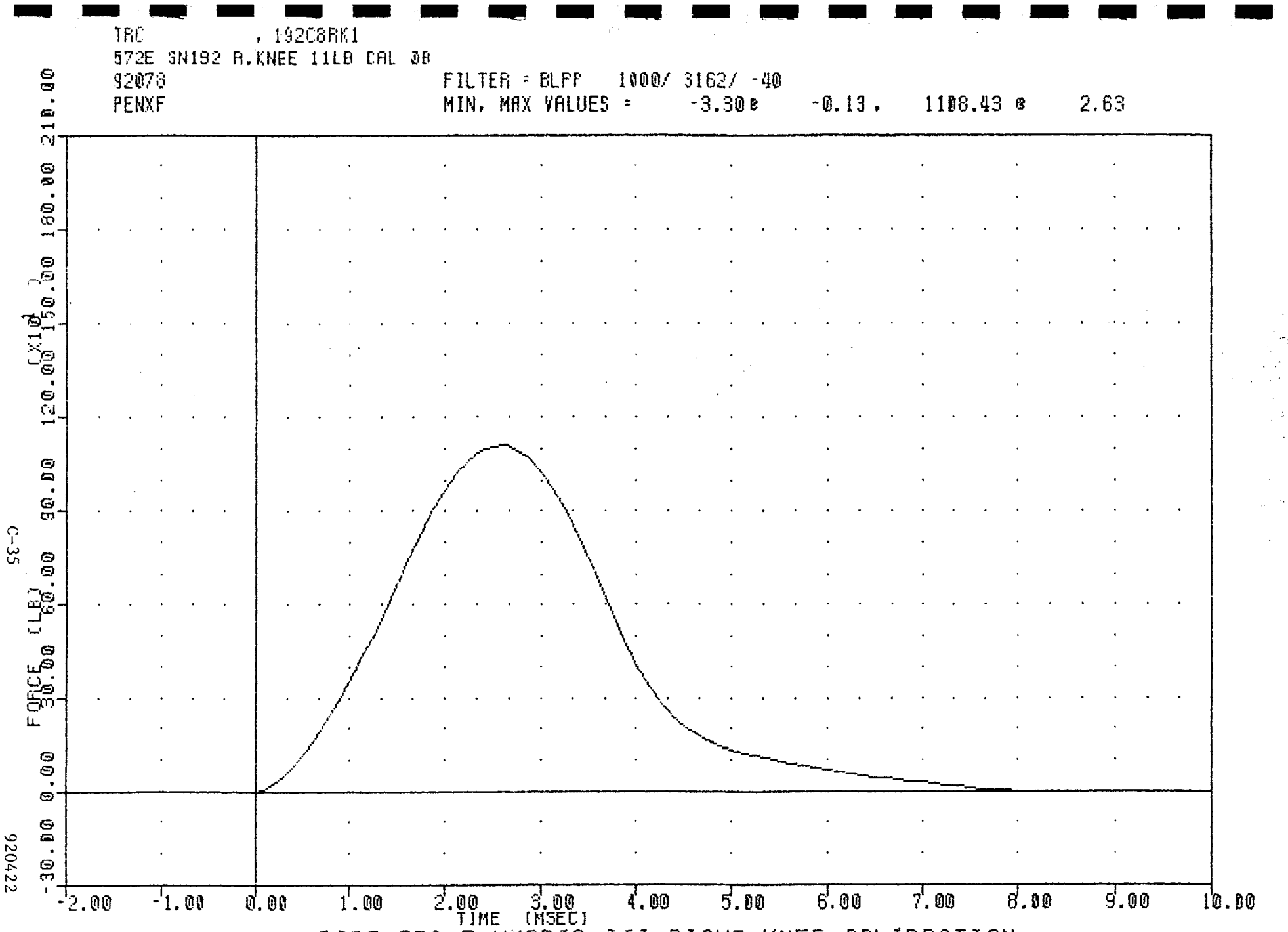
HYBRID III 18-MAR-92

RIGHT KNEE
TRC 192CSRK1 572E SN192 R.KNEE 11LB CAL 08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	44.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.93 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1108.43 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



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

920422

TRANSPORTATION RESEARCH CENTER OF OHIO
HYBRID III EXTERNAL DIMENSIONS
SN 142 HUMANOID

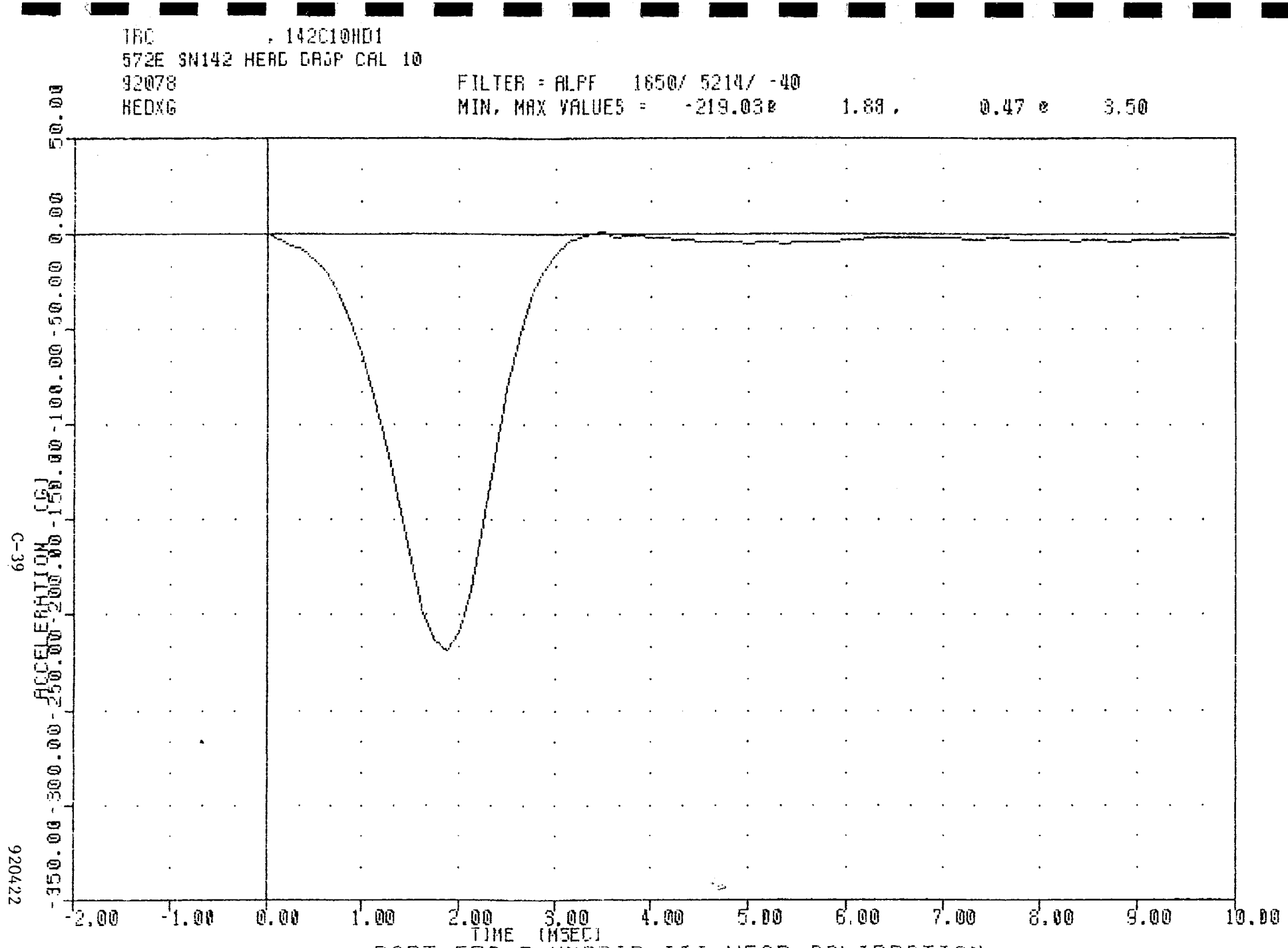
18-MAR-92

TRC 142C10ED1 572E SN142 EXT. DIMENSION CAL10

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			70.0 DEG. F
RELATIVE HUMIDITY			44.0 %
LOCATION FOR CHEST CIRCUMFERENCE	(AA)	16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE	(BB)	8.9- 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE	(Y)	38.2-39.4 IN	38.7 IN
WAIST CIRCUMFERENCE	(Z)	32.9-34.1 IN	33.3 IN
CHEST DEPTH	(O)	8.4- 9.0 IN	8.6 IN
H-POINT HEIGHT	(C)	3.3- 3.5 IN	3.4 IN
H-POINT FROM SEATBACK	(D)	5.3- 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE	(H)	1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT	(A)	34.6-35.0 IN	34.9 IN
THIGH CLEARANCE	(F)	5.5- 6.1 IN	5.7 IN
BUTTOCK KNEE LENGTH	(K)	22.8-23.8 IN	23.5 IN
BUTTOCK POPLITEAL LENGTH	(N)	17.8-18.8 IN	18.7 IN
POPLITEAL HEIGHT	(L)	16.9-17.9 IN	17.8 IN
KNEE PIVOT HEIGHT	(M)	19.1-19.7 IN	19.3 IN
FOOT LENGTH	(P)	9.9-10.5 IN	10.1 IN
FOOT BREADTH	(W)	3.6- 4.2 IN	3.8 IN
SHOULDER PIVOT FROM BACKLINE	(E)	3.3- 3.7 IN	3.4 IN
SHOULDER BREADTH	(V)	16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT	(B)	19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT	(J)	7.5- 8.3 IN	8.3 IN
SHOULDER-ELBOW LENGTH	(I)	13.0-13.6 IN	13.6 IN
BACK OF ELBOW TO WRIST PIVOT	(G)	11.4-12.0 IN	11.5 IN

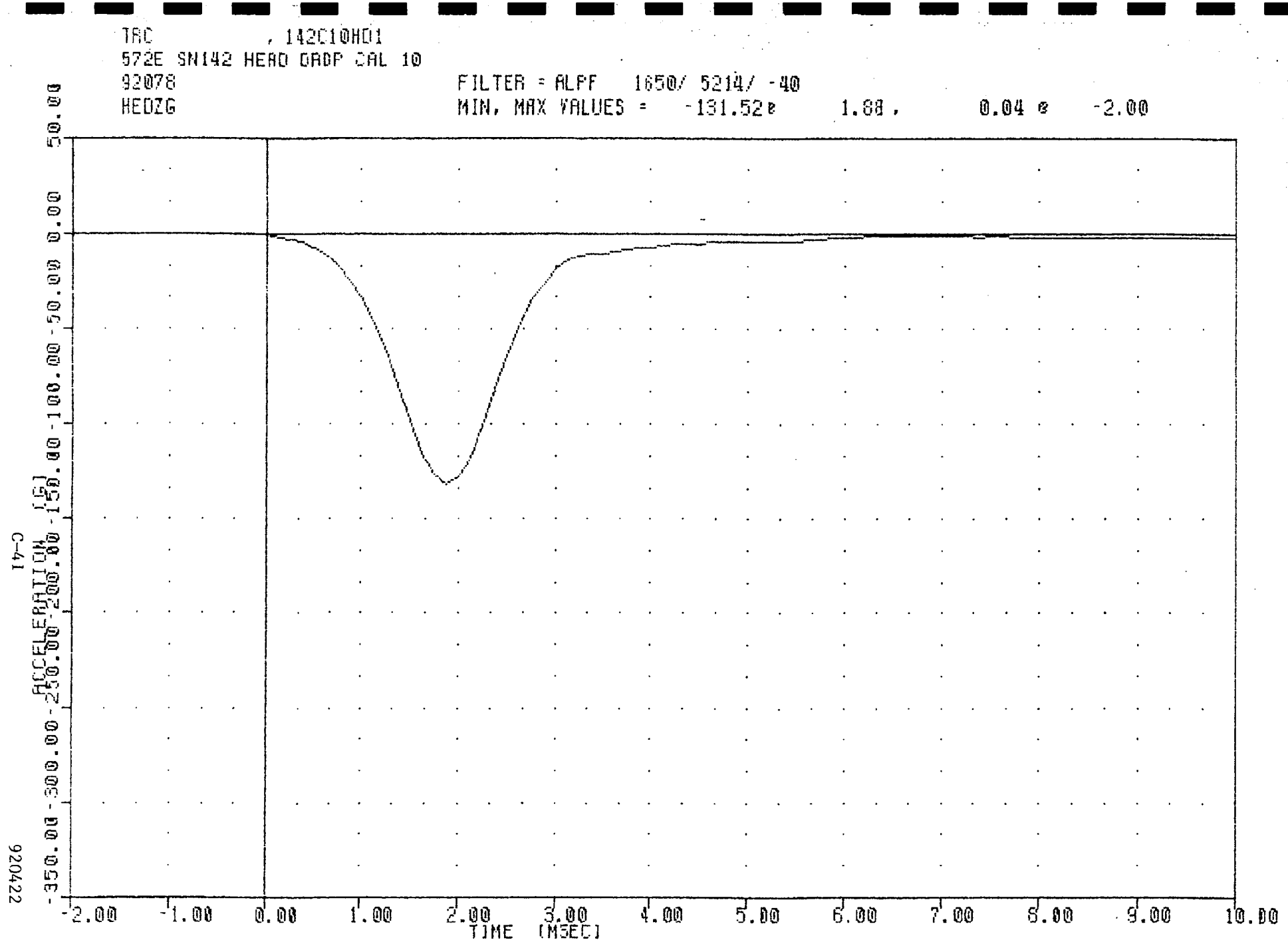
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



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

920422



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

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

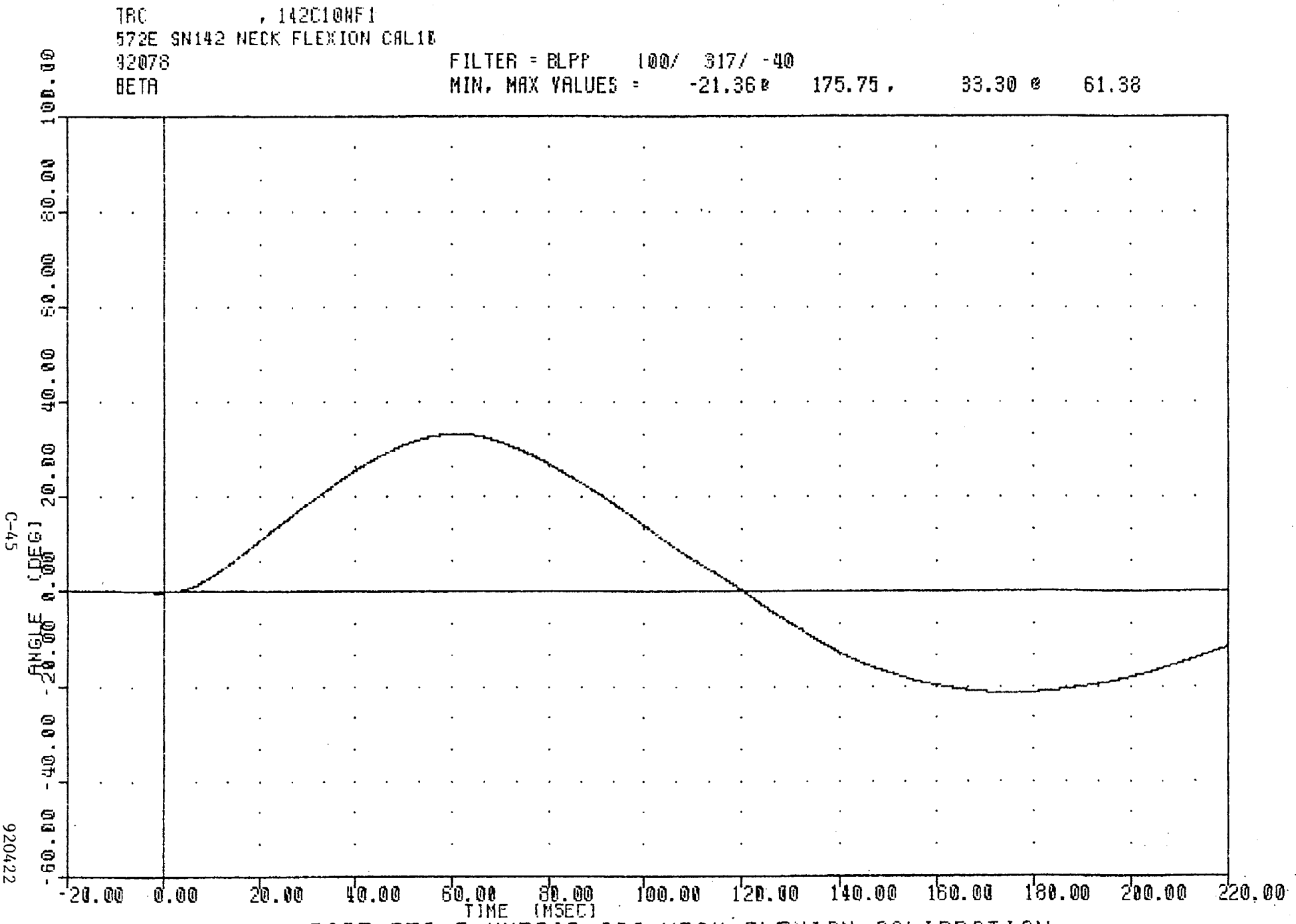
HYBRID III 18-MAR-92

6 AXIS NECK TRANSDUCER
TRC 142C10NF1 572E SN142 NECK FLEXION CAL10

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10% - 70%	44.0 %
IMPACT VELOCITY		22.6-23.4 FT/SEC	23.08 FT/SEC
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.93 G
	20 MS	17.60 - 22.60 G	20.41 G
	30 MS	12.50 - 18.50 G	15.51 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	15.45 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.75 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	76.28 DEG.
	TIME	57 - 64 MS	60.25 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.LBS	69.14 FT.LBS
	TIME	47 - 58 MS	50.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	116.38 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	106.88 MS

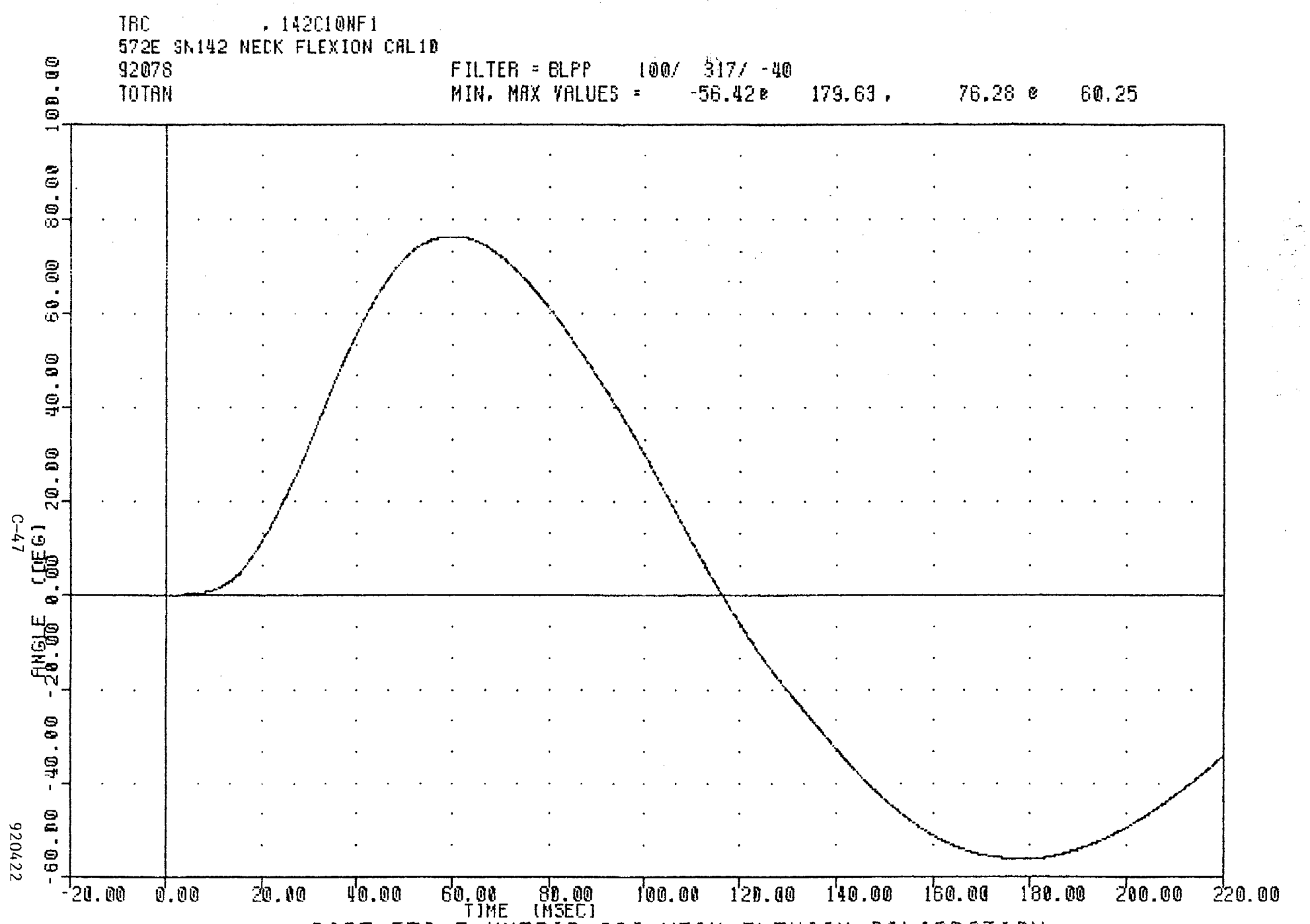
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



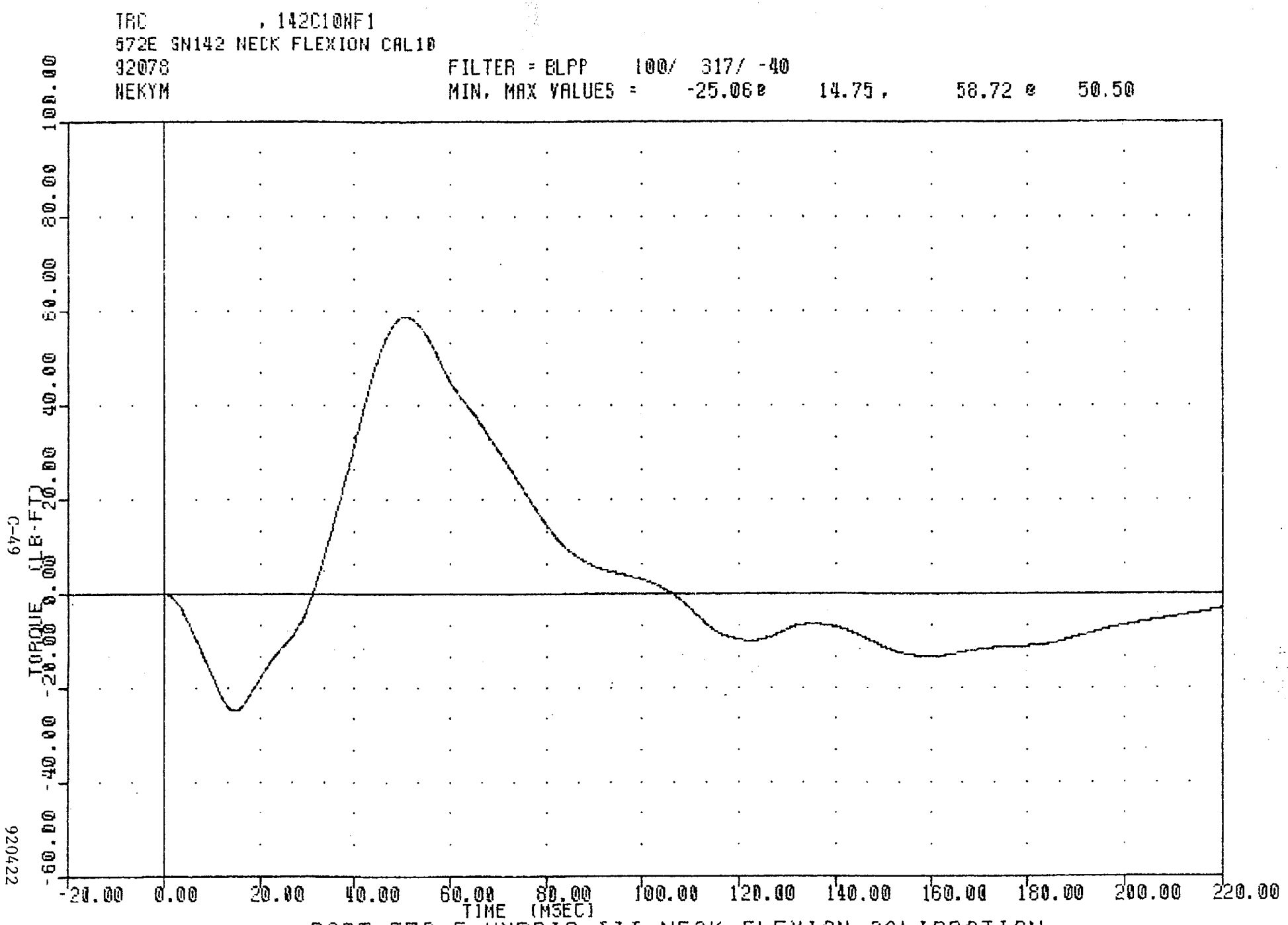
PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

920422



PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION

920422



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

920422

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

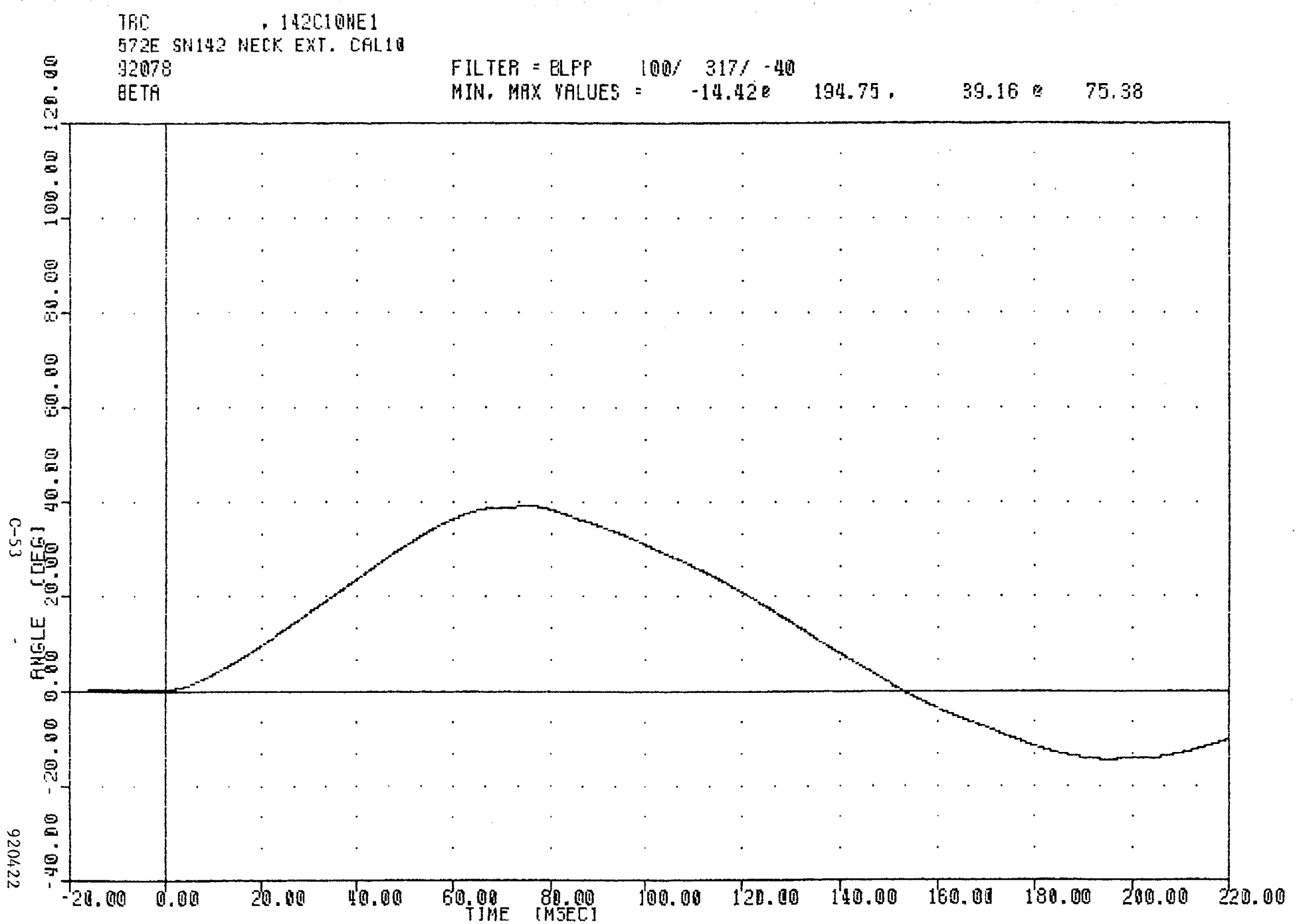
HYBRID III 18-MAR-92

S AXIS NECK TRANSDUCER
TRC 142C10NE1 572E SN142 NECK EXT. CAL10

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10% - 70%	44.0 %
IMPACT VELOCITY		19.50-20.30 FT/SEC	19.83 FT/SEC
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	19.12 G
	20 MS	14.00 - 19.00 G	16.73 G
	30 MS	11.00 - 16.00 G	14.25 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.22 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	39.00 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	99.76 DEG.
	TIME	72 - 82 MS	75.00 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-59.0/-39.0 FT.LBS	-56.76 FT.LBS
	TIME	65 - 79 MS	70.50 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	152.75 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.25 MS

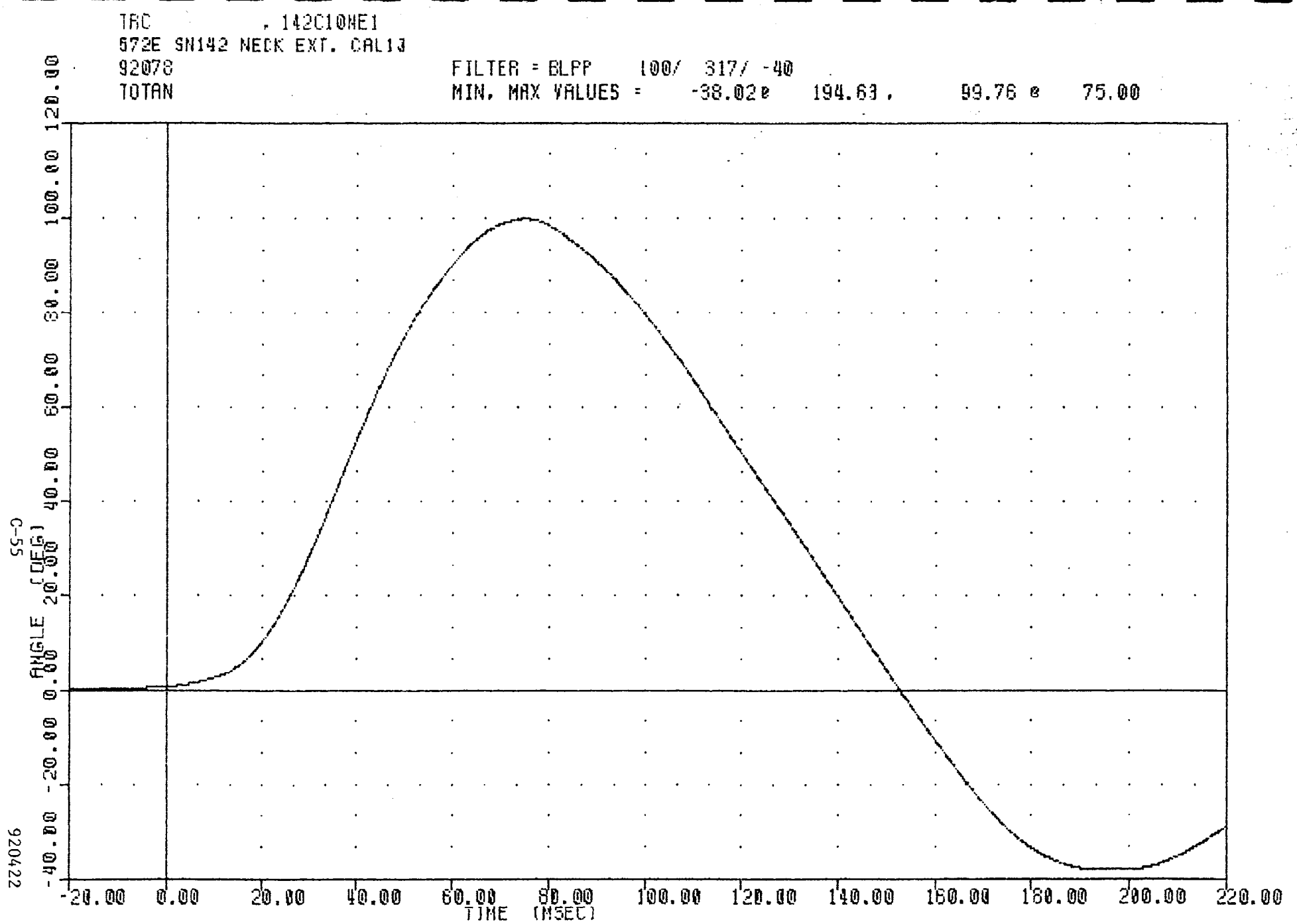
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



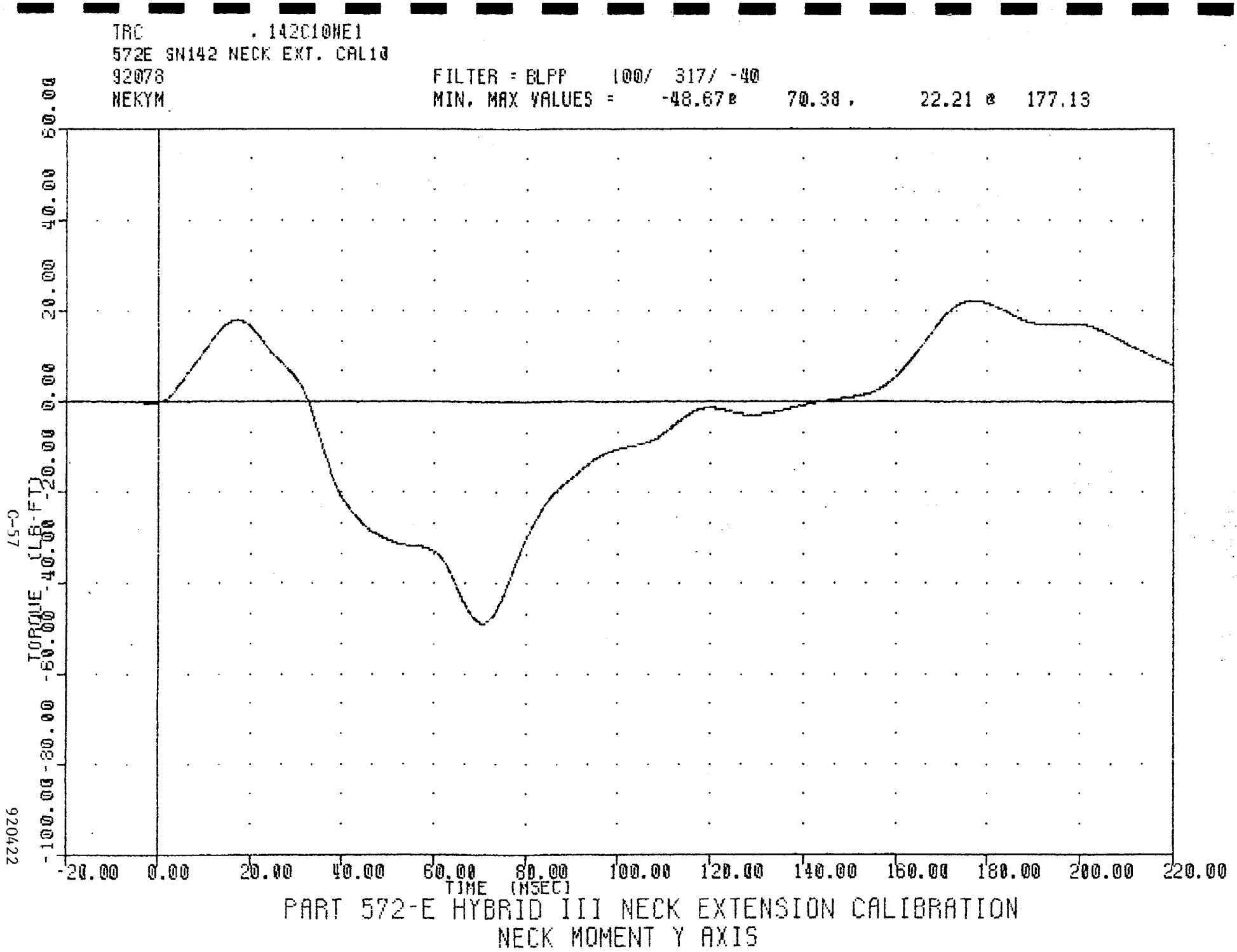
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

920422



PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION

920422



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

9204222

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

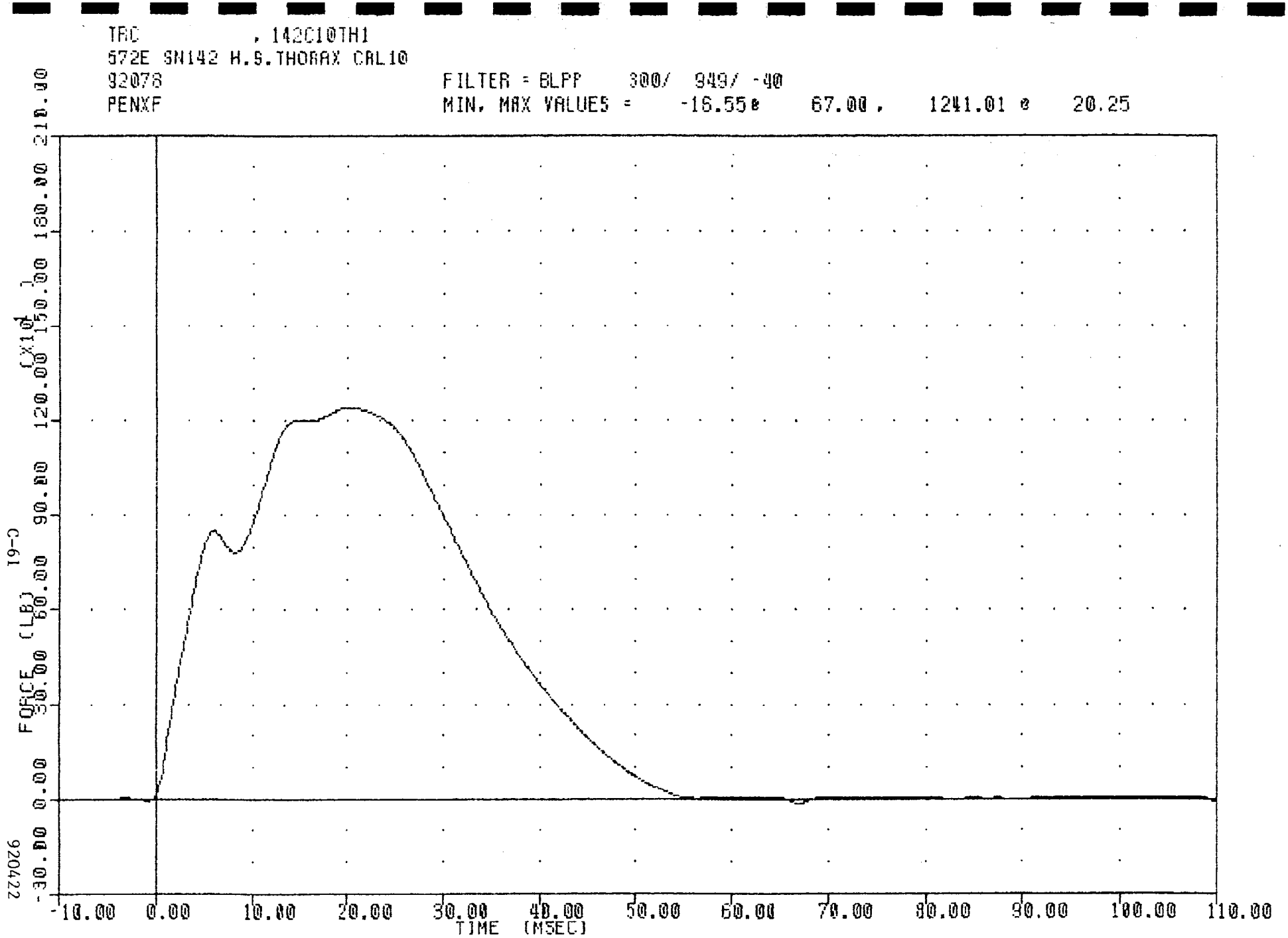
HYBRID III 18-MAR-92

TRC 142C10TH1 572E SN142 H.S.THORAX CAL10

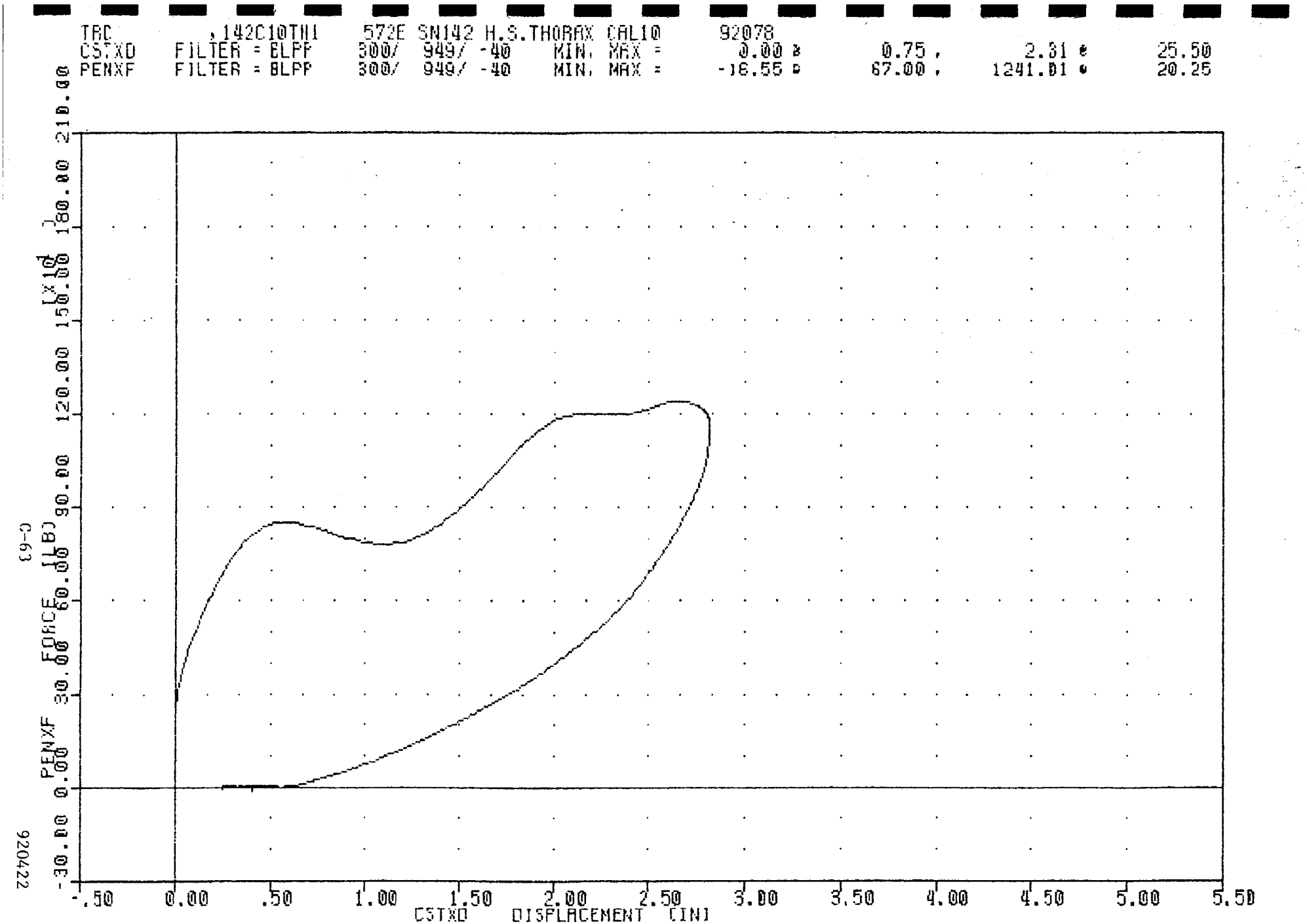
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	43.0 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.92 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.81 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1241.0 LBS
INTERNAL HYSTERESIS	69% - 85%	71.2%

TEST MEETS SPECIFICATIONS

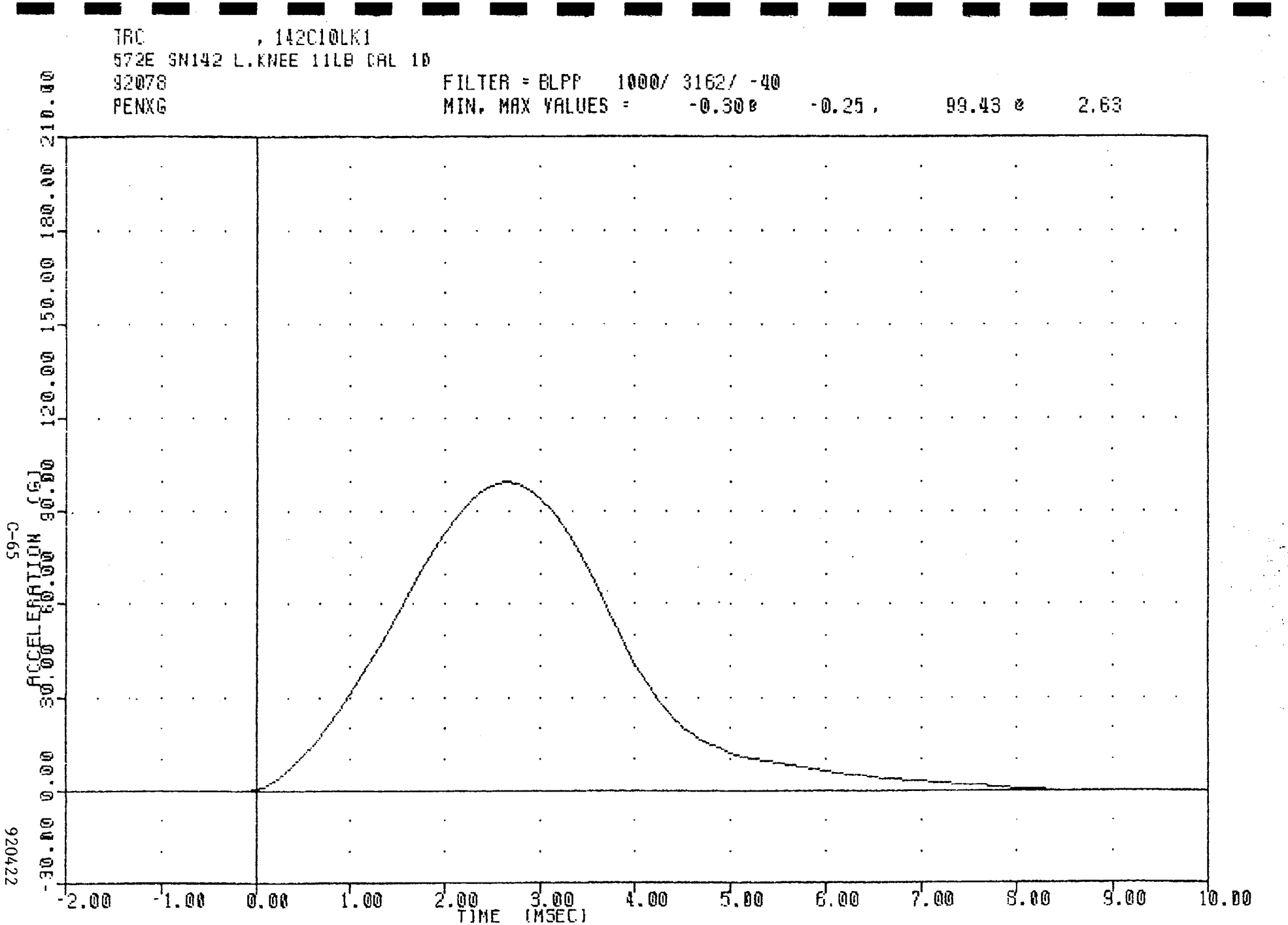
TECHNICIAN Kevin Watkins



PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE



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



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

920422

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

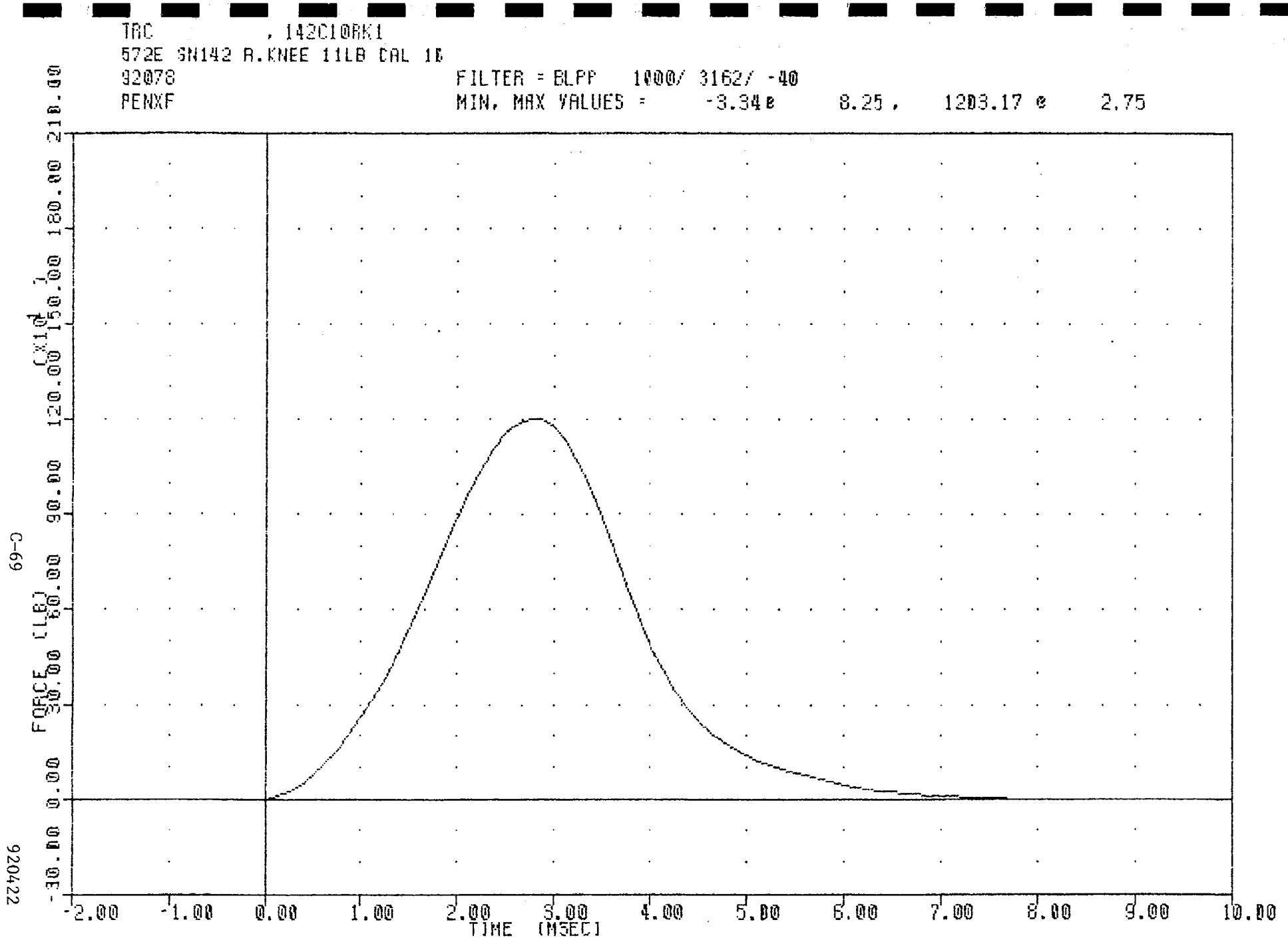
HYBRID III 18-MAR-92

RIGHT KNEE
TRC 142C108K1 572E SN142 R.KNEE 11LB CAL 10

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10% - 70%	44.0 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1203.17 LBS
PROBE WEIGHT	11.0 LBS	

TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins



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

920422

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #192

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	DUE
HEAD X-AXIS ACCEL.	CY19H	7264	ENDEVCO	11/07/91	05/07/92
Y-AXIS ACCEL.	DH74J	7264	ENDEVCO	11/07/91	05/07/92
Z-AXIS ACCEL.	AJ9FJ	7264	ENDEVCO	11/19/91	05/19/92
CHEST X-AXIS ACCEL.	DW04J	7264	ENDEVCO	11/07/91	05/07/92
Y-AXIS ACCEL.	A97CJ	7264	ENDEVCO	11/22/91	05/22/92
Z-AXIS ACCEL.	DK56J	7264	ENDEVCO	11/07/91	05/07/92
LEFT FEMUR FORCE LOAD CELL	613	2430	GSE	11/06/91	05/06/92
RIGHT FEMUR FORCE LOAD CELL	827	2430	GSE	11/06/91	05/06/92
*NECK X-AXIS FORCE LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
Y-AXIS FORCE LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
X-AXIS FORCE LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
*NECK MOMENT ABOUT X-AXIS LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
MOMENT ABOUT Y-AXIS LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
MOMENT ABOUT Z-AXIS LOAD CELL	085	1716	DENTON	11/06/91	05/06/92
*CHEST DEFLECTION POTENTIOMETER	87313-96	81422A	VERNITECH	11/15/91	05/15/92
LAP BELT FORCE LOAD CELL	236	3419	LEBOW	10/29/92	04/29/92
SHOULDER BELT FORCE LOAD CELL	612	3419	LEBOW	11/20/92	05/20/92
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.

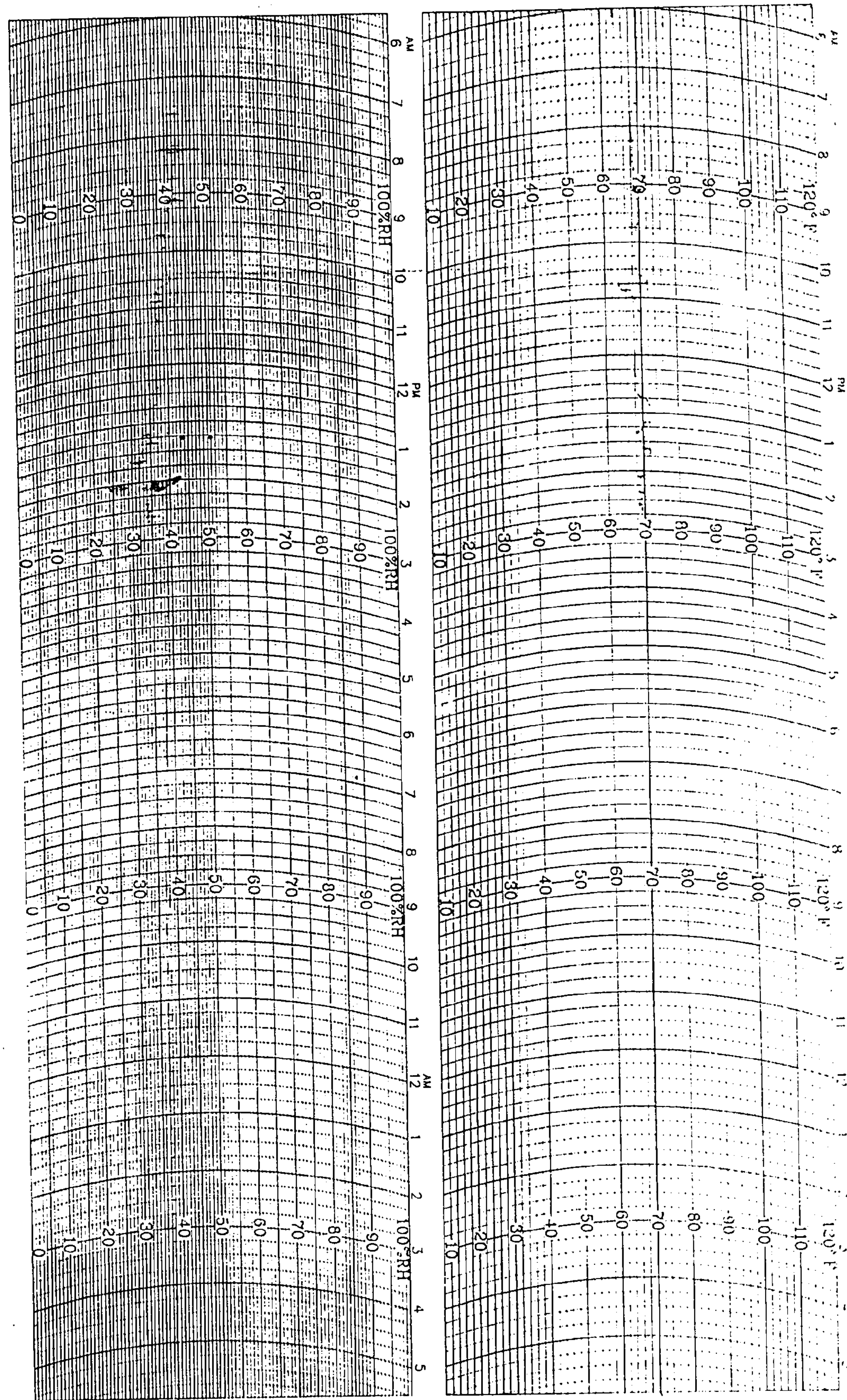
VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE LAST	CALIBRATION DATE DUE
LEFT SEAT REAR CROSSMEMBER X-AXIS	CL80H	7264	ENDEVCO	02/06/92	08/06/92
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CT68H	7264	ENDEVCO	03/18/92	09/18/92
ENGINE TOP X-AXIS	CK87H	7264	ENDEVCO	11/15/91	05/15/92
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	12/01/91	06/01/92
INSTRUMENT PANEL CENTER X-AXIS	CF80H	7264	ENDEVCO	12/18/91	06/18/92
REAR SEAT CROSSMEMBER CENTER Z-AXIS	CJ37H	7264	ENDEVCO	01/15/92	07/15/92
VEHICLE REAR CENTER Z-AXIS	CK16H	7264	ENDEVCO	01/12/92	07/12/92

CALIBRATION LABORATORY INSTRUMENTS

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



WeatherMeasure
WEATHERtronics
Division of QUALIMETRICS, Inc.

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

HYGROTHERMOGRAPH
1 DAY

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

STATION .... DATE ON ____________ DATE OFF ...

920422

FREQUENCY RESPONSE CLASSES

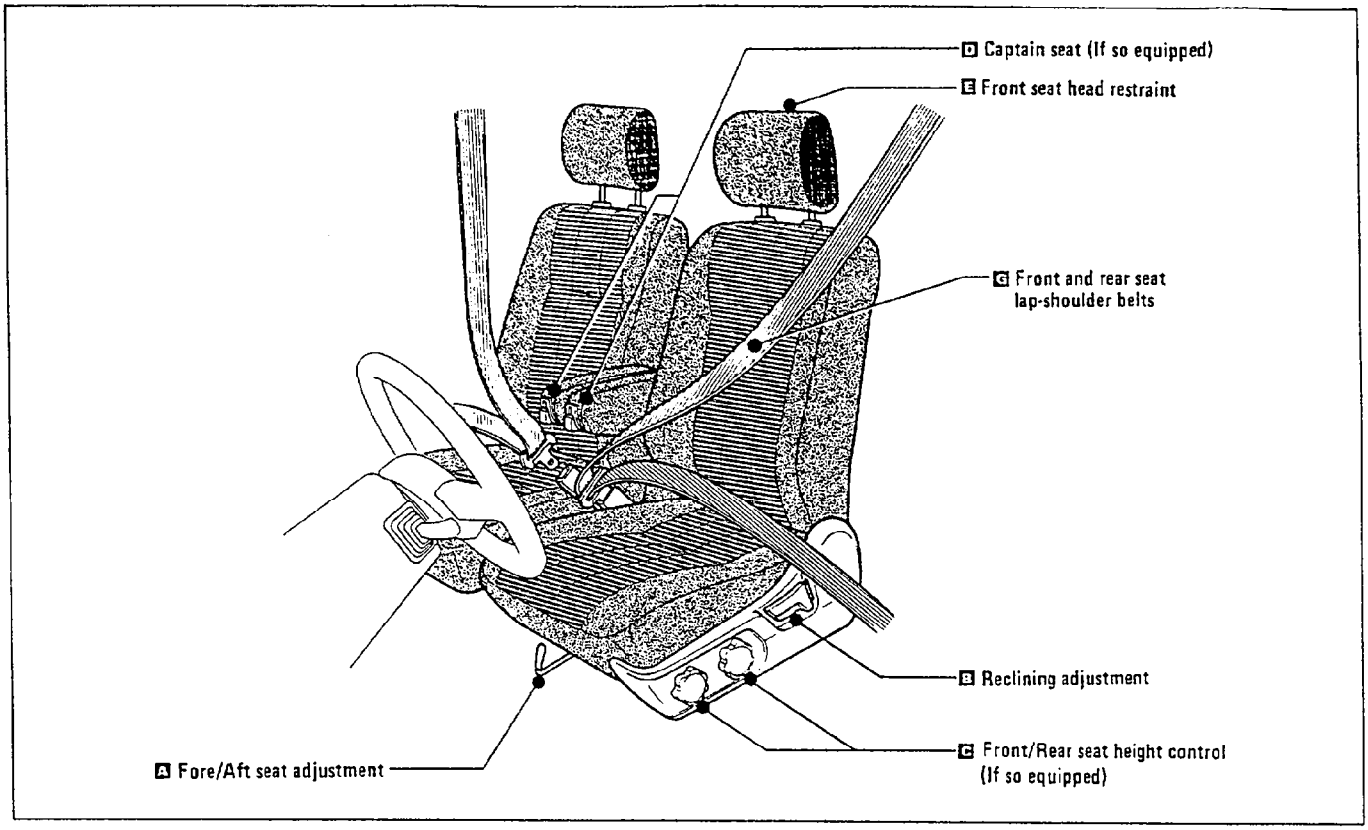
SAE J211 OCT88

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

3. *Seats and Seat Belts*



3-2

A FORE/AFT SEAT ADJUSTMENT

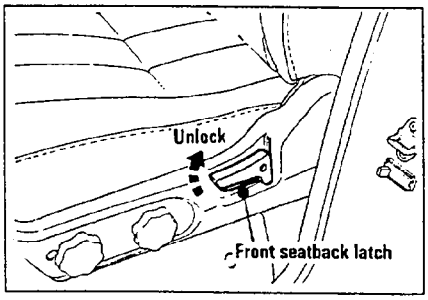
The front seats may be adjusted forward or backward by moving the lever at the front of the seat to one side and then using body pressure to move the seat to the desired position. Let go of the lever and the seat will lock in the position you want.

WARNING

- *After adjusting a manually operated seat always use body weight to push forward and backward on the seat to be sure the seat adjusters have latched. Movement of the seat indicates that at least one latch did not engage. This could increase the chance of injury and/or the degree of injury in an accident. Take the vehicle to your Isuzu Dealer for service if you find that your seat adjusters do not latch.*
- *Do not attempt to adjust the driver's seat while the vehicle is in motion. The seat could move suddenly, causing you to lose control of your vehicle.*

B RECLINING ADJUSTMENT

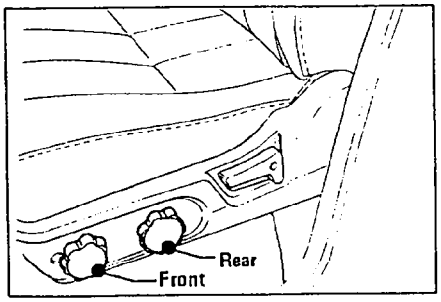
Lean forward to remove the pressure from the seatback. Pull the seatback latch up as shown in the illustration. With the seatback disengaged, lean back to the desired angle and release the latch. Seatbacks will fully recline.



WARNING

- *To reduce the risk of sliding under the lap belt during a collision, an occupied seat should not be reclined any more than needed for comfort. The seatback and safety belts work best only when the occupant is sitting well back and straight up in the seat. (The lap belt is designed to spread the force of a collision over the hip-bone. If you are reclined, the lap belt may slide past your hips and apply restraint forces directly to the abdomen.)*
- *Do not adjust the driver's seatback while the vehicle is in motion.*
  The seat back could move unexpectedly and cause the driver to lose control of the vehicle.

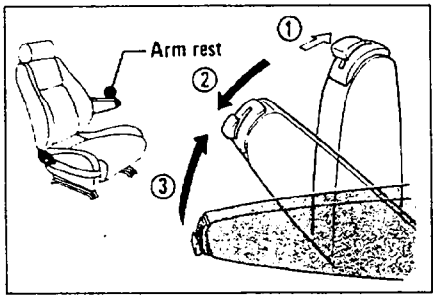
C FRONT/REAR SEAT HEIGHT CONTROL (If so equipped)



The height of the front seat cushion (front and rear) can be adjusted independently. Rotating the dial clockwise will increase the cushion height and counterclockwise will decrease it. The forward dial controls the front of the seat cushion, the rear dial controls the rear of the cushion.

D CAPTAIN SEAT (If so equipped)

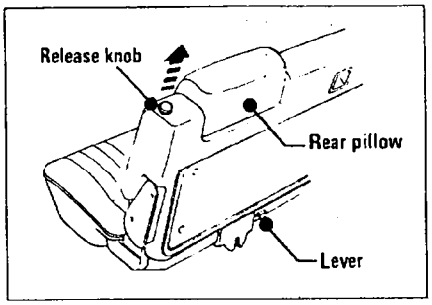
① Raise the knob on the end of the armrest in the arrow direction, and
② Lower the armrest.
Releasing the knob allows the armrest to be locked at any position.
③ The armrest can be raised without using the knob.



NOTE

- *Raise the armrest first before opening the center console cover.*

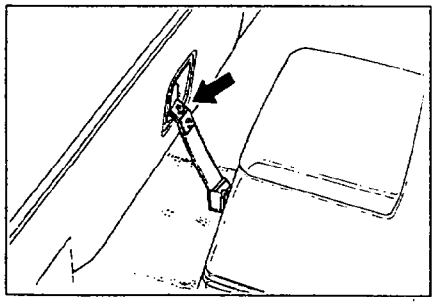
FOLDING TYPE REAR SEAT (If so equipped)



The rear seat can be folded forward to provide additional luggage area.

1. Move the rear pillow to the lowest position.
2. Pull up on the release knob on either right or left.
   Then fold the seatback forward.
3. Push down and unlatch the lever located at the back of the rear seat cushion (as shown in the illustration). At the same time lift the rear seat and push forward, until in the upright position.

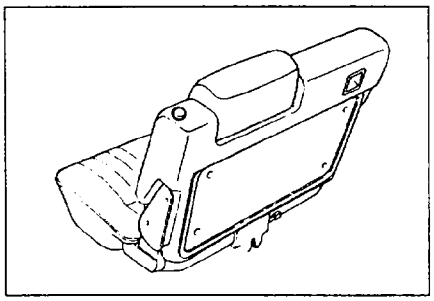
4. Remove the center console rear lid. Attach the band in the rear of the center console to the clasp on the back of the seat back.



WARNING

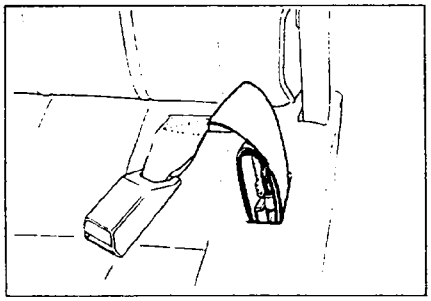
- *Do not permit anyone to ride in the luggage compartment or on a rear seat while it is folded down during vehicle operation. Rear seat occupants should be seated in the seat only in its locked upright position and properly restrained at all times.*

FOLDING AND RECLINING TYPE REAR SEAT (WITH CENTER ARMREST) (If so equipped)

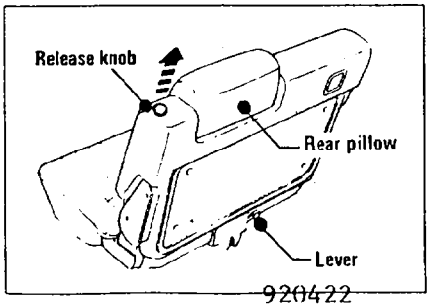


The rear seat can be folded forward to provide additional luggage area.

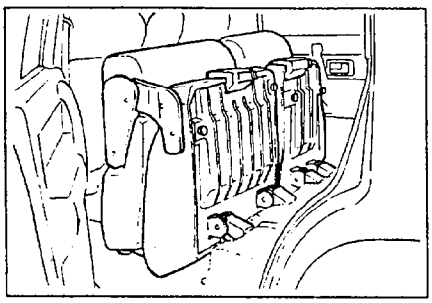
1. First, fold the seat belt buckle against the belt and roll up the belt strap around the belt buckle. Then insert it into the buckle holder.



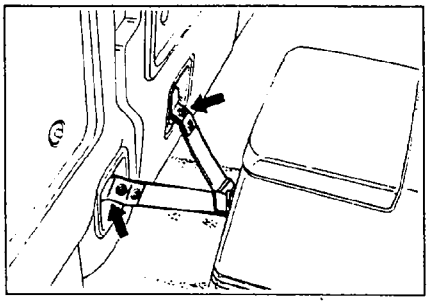
2. Move the rear pillow to the lowest position.
3. Pull up on the release knob on either right or left (Non split seatback).
   Pull the release knob on right or left for each seatback (Split seatback).
   Then fold the seatback forward.



4. Push down and unlatch the lever located at the back of the rear seat cushion (as shown in the illustration). At the same time lift the rear seat and push forward, until in the upright position.



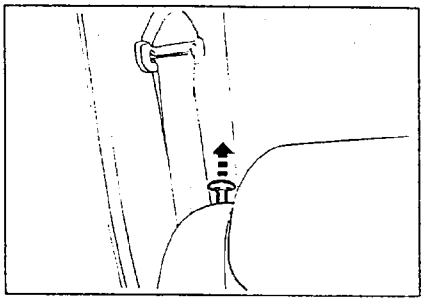
5. Remove the center console rear lid. Attach the 1 band (Non split seatback)/2 bands (Split seatback) in the rear of the center console to the clasp on the back of the seat back.



WARNING

- *Do not permit anyone to ride in the luggage compartment or on a rear seat while it is folded down during vehicle operation. Rear seat occupants should be seated in the seat only in its locked upright position and properly restrained at all times.*

To Place the Rear Seat in the Reclining Position

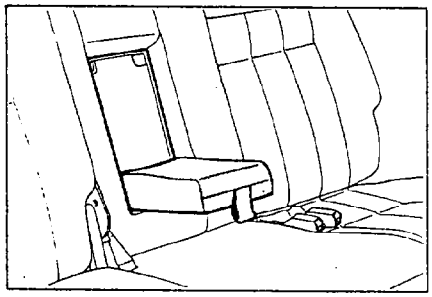


From the upright position, pull the seatback release knob located on the seatback. With the knob pulled, push the seatback to the rear until it is in the desired position. Releasing the knob locks the seat in position.

WARNING

- *If the seat is reclining at an extreme angle while the vehicle is in motion, the passenger may not be fully protected by the seat belt. In the event of a sudden stop, there is the possibility the passenger may slide under the seat belt, causing serious injury to self or others.*

Center Armrest

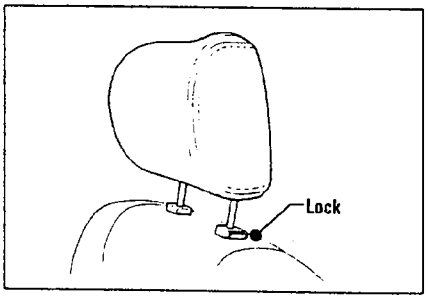


The center armrest can be pulled out when there are only 1 or 2 rear seat passengers.

F FRONT SEAT HEAD RESTRAINT

Head restraints are designed to help reduce the risk of neck injuries. Choose the position which places the top of the head restraint closest to the top of your ears.

Pull the head restraint up to raise it. Release the lock to lower the head restraint by pushing the lock button.



WARNING

- *Do not attempt to adjust the driver's head restraint while the vehicle is in motion, because it could cause a loss of control of the vehicle.*
- *Do not operate the vehicle with the head restraint removed, since it will increase the risk of neck injury in the event of an accident.*

F REAR PILLOW

Pull or push the rear pillow to raise or lower it.

G FRONT AND REAR SEAT LAP-SHOULDER BELTS

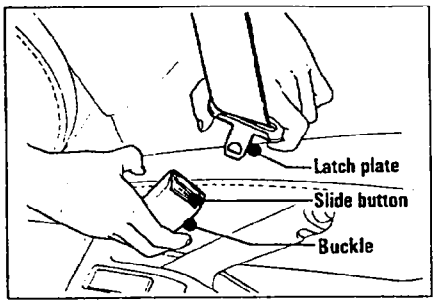
To help lessen the chance of injury in accidents or sudden stops, we urge that people riding in the vehicle be properly restrained at all times, using the seat belts provided. This includes children and pregnant women. See the following pages for use of restraints by children and pregnant women.

The National Safety Council's statistics clearly indicate that the use of seat belts drastically reduces the probability of serious injury or even fatality in the event of an accident or a sudden stop. Prior to starting the vehicle, ensure that all passengers have properly adjusted and latched their seat belts.

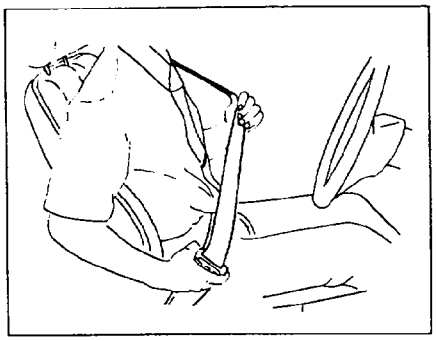
There is a seat belt provided for each position designated for occupant seating. Lap-shoulder belts are located in the front seats. Lap-shoulder belts are also provided for the rear outboard seating positions.

NOTE

- *Special instructions for use of seat belts for children and pregnant women are on the following pages.*



- Holding the latch plate, pull the lap-shoulder belt across your body. Insert the latch plate into the buckle. Push firmly until the plate latches in the buckle.
- Position the "lap" portion of the belt across your lap as LOW ON THE HIPS as possible. Then, adjust it to a SNUG FIT by grasping the "shoulder" portion of the seat belt and pulling it UPWARD through the latch plate until the lap portion is snug across your lap. This reduces the risk of sliding under the belt during an accident.



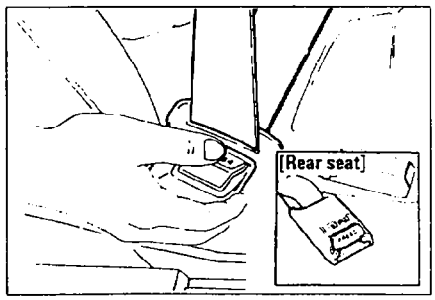
WARNING

- *A snug fit with the lap belt positioned low on the hips is necessary to help lessen the chance and/or severity of injury in an accident. This spreads the force of the lap belt over the hip bone instead of across the abdomen.*
- *Never use the same belt for more than one person at a time. Do not wear belts twisted, and do not let belts or belt hardware become damaged by pinching them in the seat or door.*
- *Do not remove the retractor. These are intricate mechanisms and require special skills to correct or repair. If the retractor does not work properly take your vehicle to your Isuzu Dealer for repair or replacement.*
- *The lap-shoulder belts are designed to permit normal free forward body movement. However, when they are subjected to sudden and harsh impact, the retractor mechanisms will engage, restricting the passengers' forward movement.*
- *Never wear twisted seat belts.*
- *Too much slack could increase the amount of injury because the belt would not be able to properly restrain you in an accident. DO NOT wear shoulder belt under the arm or out of position. Such use could increase the chance of injury and/or the degree of injury in an accident.*
- *According to accident statistics, children are safer when properly restrained in the rear seating positions than in the front seating positions.*
- *It is advisable to have children seated in the rear center seat and restrained with the vehicle's safety belt.*
  Children who have outgrown child restraint systems should use the vehicle's safety belts and sit in the rear seat.
  If the child's seating position has a shoulder belt which is on or very close to the face or neck, position the child so that the belt is properly positioned.

NOTE

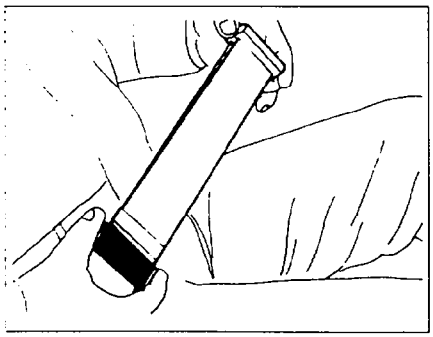
- *The retractor will lock the belt only during a sudden stop or on impact.*
- *At other times you can move around freely.*

- To unfasten the belts, push in the slide button in the center of the buckle.



- When no longer in use, seat belts should be stowed by letting them rewind into their retractors. The belt should retract when the buckle is unlatched, but hold the latch plate as it does so, to keep it from hitting people or nearby objects. If necessary, move the keeper along the front seat belt webbing to let the belt retract fully. This will also put the latch plate within easy reach on the door pillar. To help prevent damage to the safety belt and interior trim, before closing the door be sure the belt is fully retracted and the latch plate is out of the way.

REAR SEAT LAP BELT (Non-retractor type)



- The rear center seat belt is a non-retractable type lap belt.
- To fasten the lap belt, insert the latch plate into the buckle.
- You will hear a click when the latch plate locks into the buckle. Make sure the connection is secure and the belt is not twisted. If the belt is too short for you, hold the latch plate at a right angle to the belt and pull on the latch plate.
- To lengthen a lap belt, place the latch plate at right angles to the belt webbing and pull on the latch plate: the belt should then slide easily through the latch plate.
- To unfasten the belts, push in the slide button in the center of the buckle.

SEAT BELT REMINDER

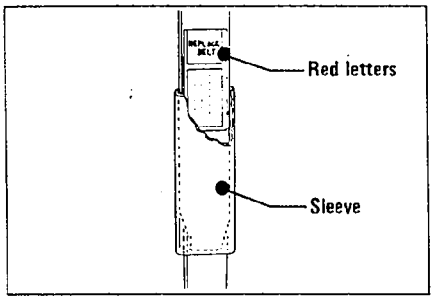
When the key is turned to the "ON" position, a light will come on for 4 to 8 seconds to remind people to fasten their safety belts. Unless the driver's safety belt is buckled, a buzzer will sound at the same time.

SEAT BELT REPLACEMENT LABEL

The front seat safety belt has a loop of webbing under the sleeve for effectiveness of the entire restraint system.

WARNING

- *Replace the front safety belt when the loop has been pulled out and a red letter words "REPLACE BELT" are visible at the top edge of the sleeve.*



SEAT BELT INSPECTION

- Occasionally check that the belts, buckles, latch plates, retractors, reminder systems, guide loops, keepers, and anchors work properly. Also check for damage that could keep the restraint system from doing its job.
- Keep sharp edges and damaging objects away from the belts and other parts of the restraint system.
- Replace belts if cut, weakened, or frayed. Also, have belts replaced if they have been worn in a collision.
- If there is any doubt have all related parts including belts replaced.
- Keep belts clean and dry.
- Clean only with mild soap and lukewarm water.
- Do not bleach or dye belts since this may badly weaken them.

RESTRAINT OF PREGNANT WOMEN

It is recommended that pregnant women use seat belts. Check with your doctor for specific recommendations. The lap belt should be snug and positioned as low as possible around the hips. Do not position the lap belt around the waist. This can be very dangerous in the event of an accident or sudden stop.

CHILD RESTRAINT

Children in vehicles should be restrained to help lessen the chance and/or severity of injury in accidents or sudden stops. Never let a child of any age stand or kneel on any seat. Use of infant or child restraint systems which conform to Federal motor vehicle safety standards and which are installed according to their instructions is the surest way of minimizing the risk of injury to young passengers. Older children should be placed on a seat and restrained with the seat belts provided with your vehicle. Both lap and shoulder belts should be used.
The use of infant or child restraint systems may be required by the laws of your state. You should check with the appropriate state authorities to ensure that you are in compliance with these laws.

WARNING

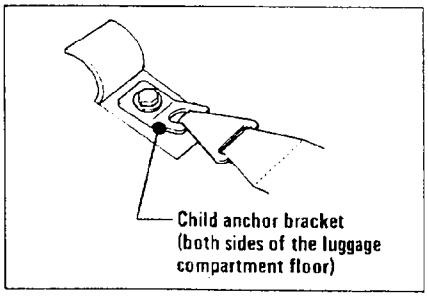
- *For effective protection in automobile accidents and sudden stops, children should not be transported unrestrained. The preferred restraint for small children is a child restraint system. If this is not*

available, children should be placed in the rear seat and restrained with the vehicle's safety belt if they are old enough to sit alone.

- *Holding a child in your arms is dangerous. In an accident, a child held in a person's arms can be struck or crushed by any unrestrained occupant. An unrestrained child may also be injured by striking the interior, or by being ejected from the vehicle during a sudden maneuver or impact.*
- *All child restraint systems are designed to be secured in vehicle seats by the lap belt or lap portion of a lap-shoulder belt.*
- *Children could be endangered in a crash if the child restraint is not properly secured in your vehicle.*
- *According to Federal accident statistics, children are safer when properly restrained in the rear seating positions than in the front seating positions.*
- *It is recommended that children or infants be restrained in an appropriate child or infant restraint secured in the center rear seating position.*
- *It is recommended that an adult be seated adjacent to an infant who is in a rear-facing infant restraint. If the driver is the only adult in the vehicle, the infant may be placed in an infant restraint on the front seat and properly restrained.*

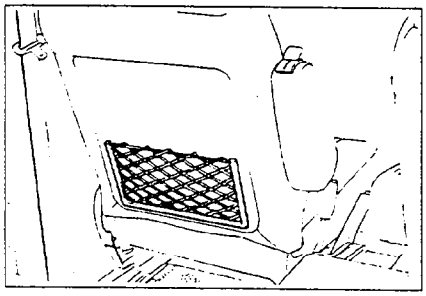
INSTRUCTIONS FOR CHILD RESTRAINT INSTALLATION

- Secure the child restraint with the lap belt or the lap portion of lap-shoulder belt in accordance with the restraint manufacturer's instructions.
  The child anchor bracket is available, and it is stored in the glove box.



- Push and pull the child restraint in all directions to be sure it is secure.
- If the child restraint is not secure, use a different seating position in the vehicle.
- Secure the child in the restraint in accordance with the manufacturer's instructions.

FRONT SEATBACK STORAGE POCKET



The front seatback storage pocket is provided to store small items.