REPORT NO. TRC-86-N08

DOT0979

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

ISUZU MOTORS LIMITED, JAPAN

1987 ISUZU P'UP DLX SPACECAB

PICKUP

NHTSA NO. CG0617

TRCO TEST NO. 870105

THE TRANSPORTATION RESEARCH CENTER OF OHIO

ST. RT. 33, LOGAN COUNTY

EAST LIBERTY, OHIO 43319

JANUARY 1987

TEST REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

400 SEVENTH STREET, S.W.

ROOM NO. 5313 (NRM-22)

WASHINGTON, DC 20590

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NHTSA NEW CAR ASSESSMENT PROGRAM (NCAP) FRONTAL BARRIER IMPACT TEST ON 1987 ISUZU P'UP DLX SPACECAB PICKUP TO INDICANT REQUIREMENTS OF FMVSS NOS. 212, 219 (PARTIAL), AND 301-75	JANUARY 1987
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15. Supplementary Notes

16. Abstract

A 35 mph frontal barrier impact test using a load cell barrier was conducted on a 1987 Isuzu P'up DLX Spacecab pickup at the Transportation Research Center of Ohio in East Liberty, Ohio on January 5, 1987.

The barrier impact velocity was 35.2 mph, and the ambient temperature at the barrier face at the time of impact was 70°F. The post-test vehicle crush maximum was 18.7 inches and intrusion of the firewall into the compartment was 1.6 inches.

The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standards:

1. FMVSS No. 212, "Windshield Mounting"
2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion"
3. FMVSS No. 301-75, "Fuel System Integrity"

Driver HIC: 1764
Passenger HIC: 1067

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP) FMVSS 212 Indicant Testing FMVSS 219 (Partial) Indicant Testing FMVSS 301-75 Indicant Testing	Available from: National Technical Information Service Springfield, Virginia 22161

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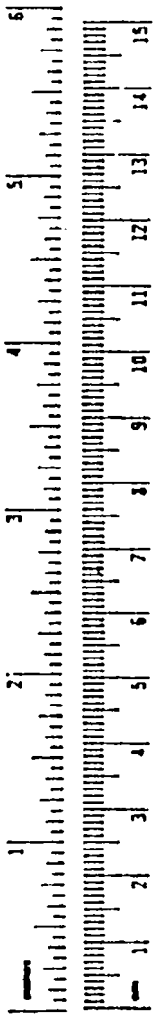
METRIC CONVERSION FACTORS

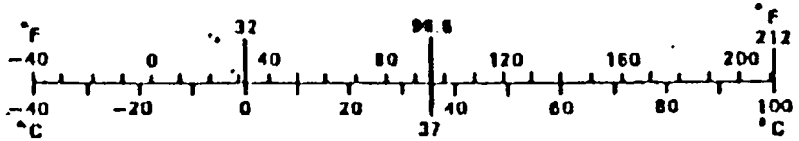
Approximate Conversions to Metric Measures

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	metric ton	t
	VOLUME			
tsp	teaspoons	5	milliliters	mL
Tbsp	tablespoons	15	milliliters	mL
in^3	cubic inches	16	milliliters	mL
fl oz	fluid ounces	30	milliliters	mL
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C



Approximate Conversions from Metric Measures

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



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SECTION 1.0
PURPOSE AND TEST SUMMARY

This 35 mph frontal barrier impact test is part of the Composite FY'86 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-84-D-11149. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph FMVSS 212/219/301-75 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure. Standard Enforcement Indicant Test Program data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 310-75, "Fuel System Integrity", as well as occupant performance data are provided herein.

SECTION 2.0

SUMMARY OF TEST NUMBER CG0617

A load cell barrier consisting of 36 load cells was impacted by a 1987 Isuzu P'up DLX Spacecab pickup at a velocity of 35.2 mph. The test was performed at the Transportation Research Center of Ohio on January 5, 1987. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger designated seating positions, according to dummy placement procedures specified in Laboratory Indicant Test Procedure dated April 1, 1985.

Both ATDs were instrumented with head and chest triaxial accelerometers and right/left femur load cells. In addition, load cells were placed on the driver's and passenger's lap and shoulder belts to measure dummy upper torso and pelvic section loading. A summary of dummy calibration test data can be found in Appendix C.

The crash event was recorded by one real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information are found in Section 4 of this report.

The 66 channels of data were recorded on two 14-track tape drives. Appendix B contains the vehicle, load cell barrier and dummy response data plots.

CRASH TEST SUMMARY

TEST NO. 870105 PROJECT: CG0617

DATE: January 5, 1987 TIME: 14:44 TEMP: 70°F

VEHICLE: Isuzu P'up DLX Spacecab pickup

TEST WEIGHT (LBS): 3349

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: 35.2

MAX CRUSH (IN) STATIC: 18.7

DUMMIES:	DRIVER	PASSENGER
TYPE:	Part 572	Part 572
LOCATION:	Front Left	Front Right
RESTRAINT:	3-pt. Production Seat Belt	3-pt. Production Seat Belt

NUMBER OF DATA CHANNELS: 66

NUMBER OF HIGH SPEED CAMERAS: 16 and 1 real-time camera

*With respect to tow track centerline.

**Speed trap measurement (± .05% accuracy).

GENERAL COMMENTS

The 1987 Isuzu P'up DLX Spacecab pickup was equipped with a 2254 cubic centimeter, 4-cylinder inline engine and automatic 3-speed transmission. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 3349 pounds.

The test vehicle impacted the frontal load cell barrier at a velocity of 35.2 mph and appeared to comply with FMVSS No. 301-75, "Fuel System Integrity". There were 100.0 percent windshield retention and no fuel leakage after impact or during any phase of the rollover test.

The vehicle sustained 18.7 inches of static crush, maximum load cell barrier force measured by the 36 load cells was 176536 pounds at 32.3 milliseconds.

The driver's "Head Injury Criteria" was 1764, the maximum chest deceleration over 3 milliseconds was 65 g's and the right and left femur loads were 478 and 193 pounds, respectively.

The right-front passenger's HIC was 1067, the maximum chest deceleration over 3 milliseconds was 58 g's and the right and left femur loads were 407 and 215 pounds, respectively.

The belt-related data for each occupant are presented in Section 4.0 of this report.

DATA ACQUISITION EXPLANATIONS

After the initial pulse, data channel BC5F, Load Cell Barrier Position C5, did not return to baseline.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Isuzu Motors Limited, Japan

MAKE/MODEL: Isuzu P'up DLX Spacecab VIN: JAACL16L6H0708915

BODY STYLE: Pickup MODEL YEAR: 1987

NHTSA NO.: CG0617 COLOR: Light topaz

ENGINE DATA: TYPE: Inline CYLINDERS: 4 DISPLACEMENT: 2254 cc

__X__ GAS, ____ DIESEL, ____ TURBOCHARGE

TRANSMISSION DATA: 3 SPEED, _____ MANUAL, __X__ AUTOMATIC, ____ FWD __X__ RWD

DATE VEHICLE RECEIVED: 12/12/86 ODOMETER READING: 96

DEALER'S NAME AND ADDRESS: Bob Boyd Isuzu
1128 S. Hamilton Road
Columbus, Ohio 43227

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	No
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER			

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED : Isuzu Motors Limited, Japan

DATE OF MANUFACTURE: 10/86

GVWR: 4150 LBS.

GAWR: FRONT 1830 LBS., REAR 2540 LBS.

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 28 psi; REAR 35 psi

RECOMMENDED TIRE SIZE: 195/75R14 LOAD RANGE X B, C, D

TIRES ON VEHICLE (MFGR., LINE, SIZE): Bridgestone RD-212 Steel P195/75R14

IS SPARE TIRE A "SPACE SAVER": No

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS - Bucket

TYPE OF FRONT SEAT BACKS Adjustable, Manual

NUMBER OF OCCUPANTS 2 FRONT 0 REAR 2 TOTAL

CARGO LOAD NA* LBS. TOTAL NA* LBS.

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

RIGHT FRONT	769 LBS.	RIGHT REAR	625 LBS.
LEFT FRONT	776 LBS.	LEFT REAR	596 LBS.

TOTAL FRONT WEIGHT 1545 LBS. (55.9 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1221 LBS. (44.1 % OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2766 LBS.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2766 LBS)

VCW = VEHICLE CAPACITY WEIGHT NA*

DSC = DESIGNATED SEATING CAPACITY (2)

RCLW = VCW - 150 (DCS) = NA*

TARGET TEST WEIGHT = UDW + RCLW + (2 DUMMIES X 164 LBS/DUMMY)

= 2766 + 300 + 328 LBS**

TARGET TEST WEIGHT = 3374 LBS

*Safety Compliance Certification Label did not contain this information.

**A cargo capacity of 300 lb. was used for this test as specified by the NCAP Laboratoy Procedure.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 255 LBS. CARGO:

RIGHT FRONT	855 LBS.	RIGHT REAR	849 LBS.
LEFT FRONT	830 LBS.	LEFT REAR	815 LBS.

TOTAL FRONT WEIGHT 1685 LBS. (50.3 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1664 LBS. (49.7 % OF TOTAL VEHICLE WEIGHT)

TOTAL TEST WEIGHT 3349 LBS. (0.7 % UNDER TARGET WEIGHT)

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

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 28.6	;LF 28.9	;RR 29.6	;LR 29.8
PRE-TEST ATTITUDE:	RF 28.1	;LF 28.4	;RR 28.3	;LR 28.3
POST-TEST ATTITUDE:	RF 29.8	;LF 28.1	;RR 27.9	;LR 28.1

WHEELBASE: 118.1 INCHES

CG = 58.7 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TEST CONDITIONS

TEST NUMBER: 870105

DATE OF TEST: January 5, 1987 TIME OF TEST: 14:44

TYPE OF TEST: Frontal Load Cell Barrier Impact IMPACT ANGLE: 0 °

AMBIENT TEMPERATURE AT IMPACT AREA: 70°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 71°F

IMPACT VELOCITY: PRIMARY = 35.2 MPH

(SPECIFIED RANGE = 34.5 TO 35.5 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES)

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	R 193.8	;C 196.3	;L 193.8
	POST-TEST:	R 177.1	;C 178.3	;L 175.3
	TOTAL CRUSH:	R 16.7	;C 18.0	;L 18.5

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: R: 9.9 ;C: 8.9 ;L: 9.4

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #411	PASSENGER #880
Head	Upper steering wheel rim Steering wheel hub	Right and left knee
Chest	Lower steering wheel rim	None
Abdomen	None	None
Left Knee	Instrument panel	Instrument panel, head
Right Knee	Instrument panel	Instrument panel, head

DOOR OPENING:

	LEFT	RIGHT
Front	Tools required	No tools required
Rear	DNA	DNA

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	No	No
Rear	DNA	DNA

GLAZING DAMAGE: Left side of windshield fractured. No other glazing damage.

OTHER NOTABLE IMPACT EFFECTS:

SECTION 3.0

SUMMARY OF RESULTS FOR - - -

FMVSS 212, "Windshield Mounting"
FMVSS 219 (Partial), "Windshield Zone Intrusion"
FMVSS 301-75, "Fuel System Integrity"

SUMMARY OF FMVSS 212 AND 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Isuzu P'up DLX Spacecab

BODY STYLE: Pickup MODEL YEAR: 1987

NHTSA NO.: CG0617 COLOR: Light topaz

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: Isuzu Motors Limited, Japan

DATE OF MANUFACTURE: 10/86 VIN: JAACL16L6H0708915

GVWR: 4150 LBS., GAWR: FRONT 1830 LBS., REAR 2540 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Load Cell Barrier Impact

DATE OF TEST: 1/5/87 TIME: 14:44 TEMP: 70°F

REQUIRED IMPACT VELOCITY RANGE: 34.5 MPH TO 35.5 MPH

IMPACT VELOCITY: PRIMARY = 35.2 MPH

TEST WEIGHT = 3349 LBS., STATIC CRUSH MAX. = 18.7 IN., REBOUND = 9.9 IN.

FUEL SYSTEM DATA

TEST FLUID TYPE: PURPLE STODDARD SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: 12.9 GALLONS (FURNISHED BY CTM)

TEST VOLUME: 12.0 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 13.2 GALLONS

DETAILS OF FUEL SYSTEM: Fuel tank centrally located beneath cargo area. Filler cap located forward of rear axle on right hand side. Fuel filler neck enters tank at top right center.

ELECTRIC FUEL PUMP: YES FUEL INJECTION: NO

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? YES

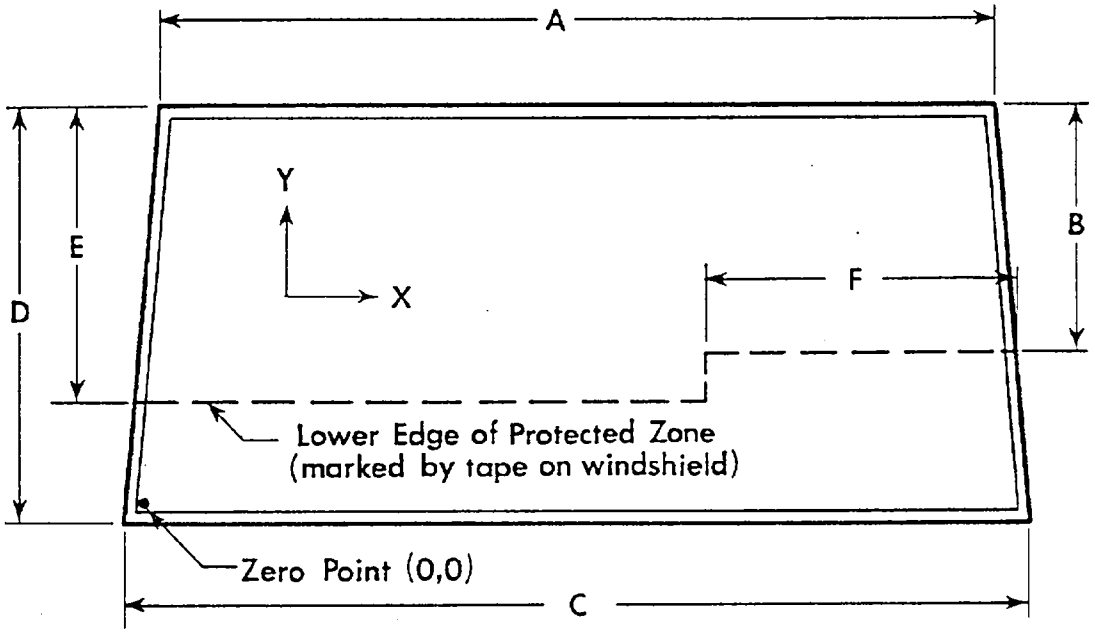
*WITH ENTIRE FUEL SYSTEM FILLED FROM FUEL TANK THROUGH CARBURETOR BOWL.

FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the windshield and top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant form the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:



FRONT VIEW

A = 44.3 C = 54.4 E = 17.8

B = 14.6 D = 24.1 F = 28.2

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration on above sketch)

	COORDINATES X	Y
1.		
2.		
3.		
4.		

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

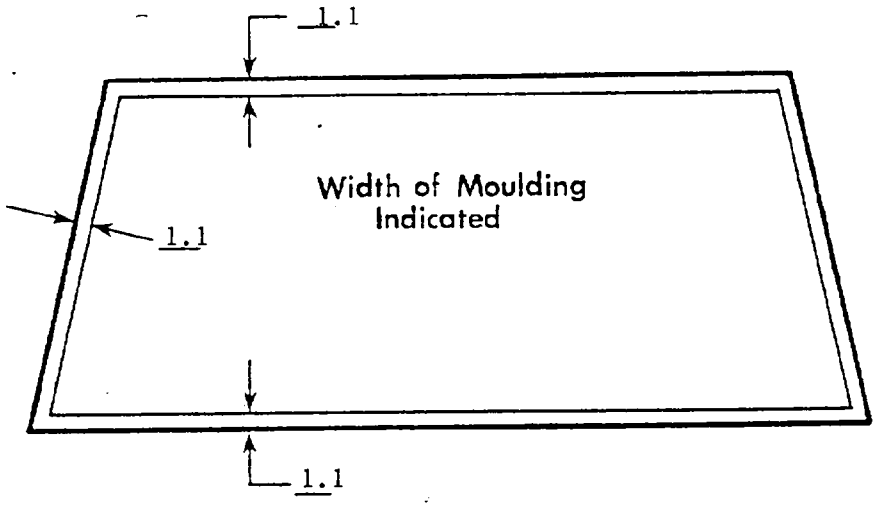
Details of windshield mounting such as retention method, trim type, etc.:

FMVSS 212 REQUIREMENTS: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA: WINDSHIELD PERIPHERY

	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	70.5	70.5	100.0%
LEFT SIDE	70.5	70.5	100.0%
TOTAL	141.0	141.0	100.0%

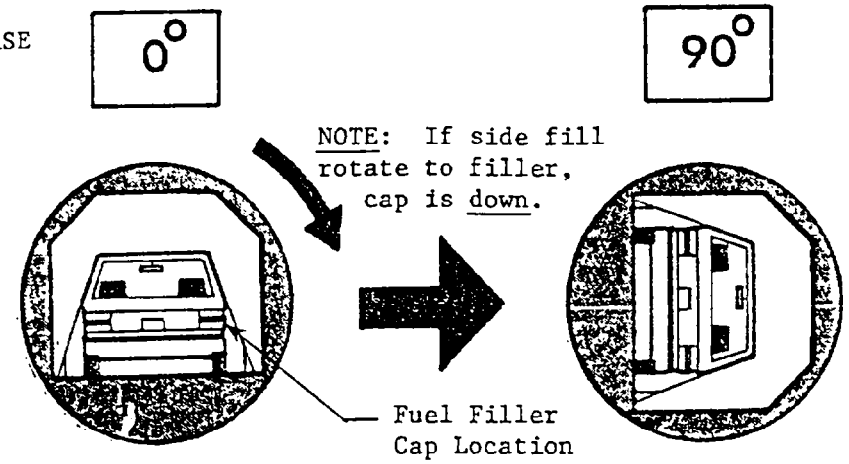
AREA OF RETENTION FAILURE:



FAILURE DETAILS:

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - = 7 minutes

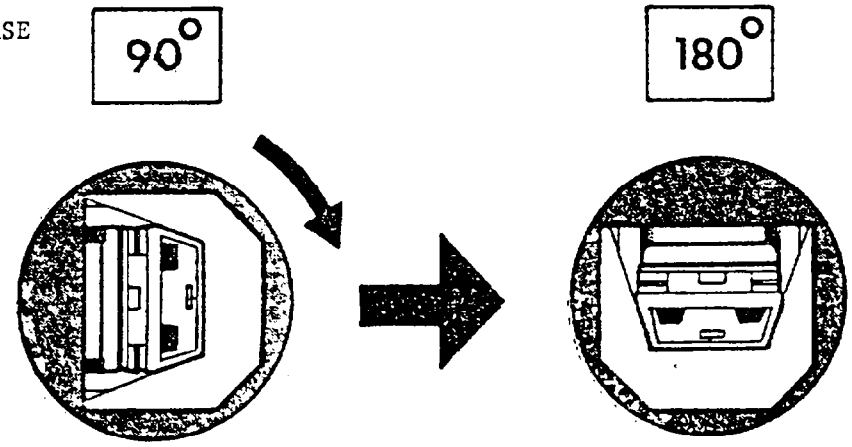
FMVSS 301-75 REQUIREMENTS

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
0 to 90° (filler cap down) - - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - = 14 minutes

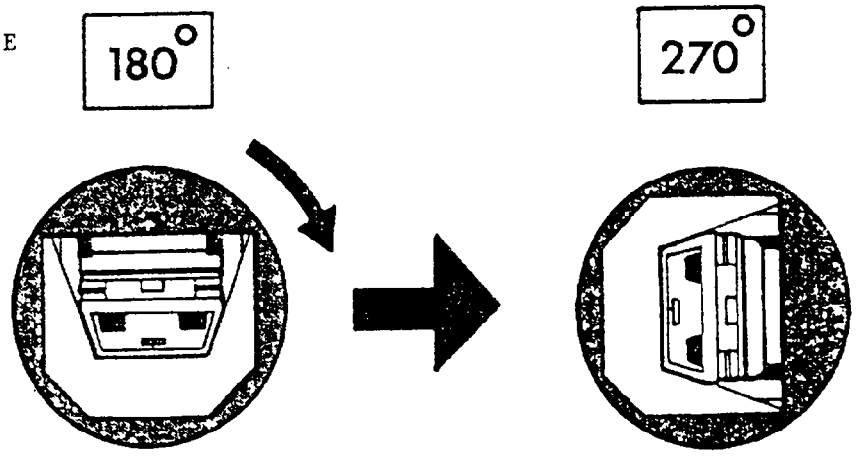
FMVSS 301-75 REQUIREMENTS

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
90° to 180° (filler cap down) - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

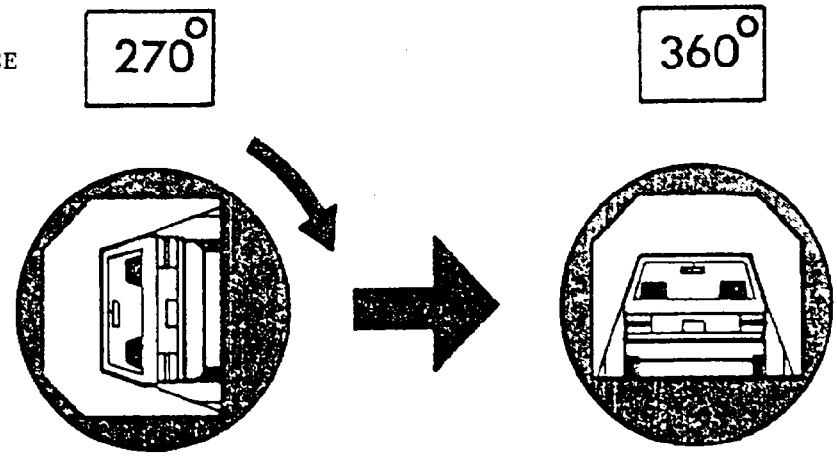
Next Whole Minute Interval - - - - = 21 minutes

FMVSS 301-75 REQUIREMENTS

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
180° to 270° (filler cap down) - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE 

STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - - = 28 minutes

FMVSS 301-75 REQUIREMENTS

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
270° to 360° (filler cap down) - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

VEHICLE STATIC ROLLOVER DATA SUMMARY:

MAXIMUM ALLOWABLE SOLVENT SPILLAGE	FIRST 5 MINUTES FROM ONSET OF ROTATION 5 OZ	6TH MIN. 1 OZ	7TH MIN. 1 OZ
0 TO 90° (FILLER CAP DOWN) - - - - - - -	0	0	0
90 TO 180° - - - - - - - - - - - - - - - -	0	0	0
180 to 270° - - - - - - - - - - - - - - -	0	0	0
270 to 360° - - - - - - - - - - - - - - -	0	0	0

SECTION 4.0

OCCUPANT, VEHICLE AND LOAD CELL BARRIER INFORMATION

DUMMY INJURY CRITERIA

	MAXIMUM ACCELERATION ('G')							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DRIVER	-184.4	15.0	-69.2	±90.5	-62.3	22.1	-35.3	65
PASSENGER	-47.4	-28.3	-85.5	85.8	-52.5	-22.1	-26.3	58

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DRIVER	478.0	193.0
PASSENGER	407.0	215.0

	MAXIMUM FORCE-SEAT BELT LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DRIVER	1652.0	---	1927.0
PASSENGER	1675.0	1663.0	---

	HEAD INJURY CRITERIA**		
	HIC	t_1 (MSEC)	t_2 (MSEC)
DRIVER	1764	61.8	76.4
PASSENGER	1067	73.0	106.1

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

DUMMY KINEMATIC SUMMARY

DRIVER

During impact, the knees translated forward and struck the instrument panel. The dummy's head and upper torso rotated forward until the dummy's face struck the steering wheel hub and upper steering wheel rim and the upper thorax struck the steering wheel lower rim. The dummy rebounded rearward into the seatback. The head contacted the head restraint. The dummy came to rest seated upright and facing forward.

PASSENGER

During impact, the knees translated forward and struck the instrument panel. The head and upper torso rotated forward until arrested by the restraint system. The dummy's face contacted the left and right knee. During forward motion the dummy rotated toward the passenger side. The dummy rebounded rearward from the restraint system until the upper torso contacted the seatback and the head contacted the head restraint. The dummy came to rest seated upright and facing forward.

DUMMY POSITIONING DATA FOR 35 MPH FRONTAL BARRIER IMPACT TEST

PRE-IMPACT DATA:

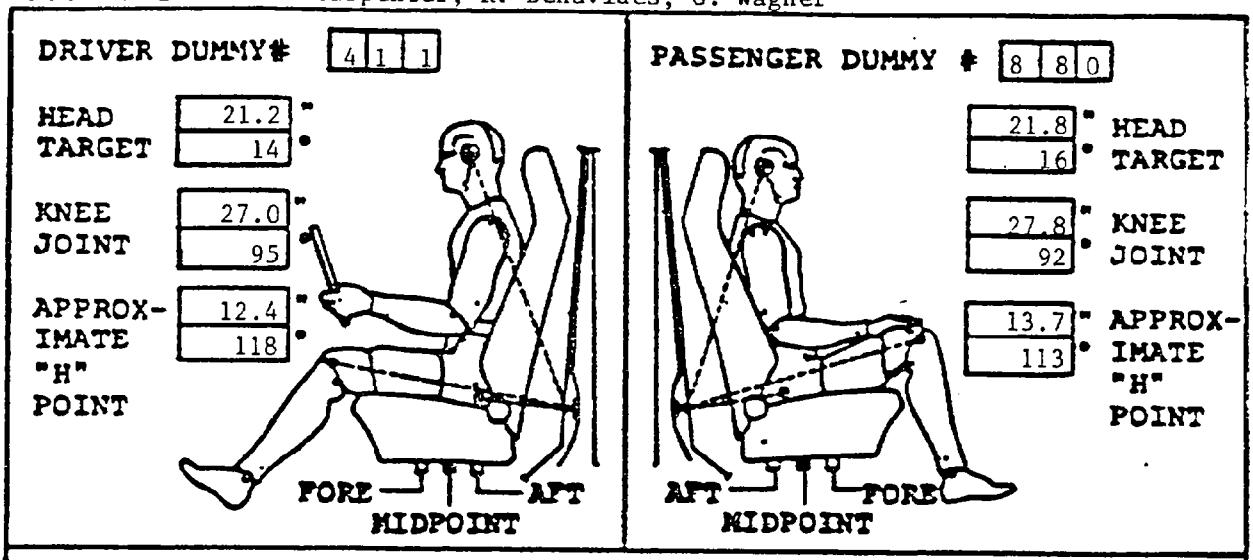
Make/Model: Isuzu P'up DLX Spacecab
Body Style: Pickup **Model Year:** 1987
NHTSA No.: CG0617 **Color:** Lt. Topaz

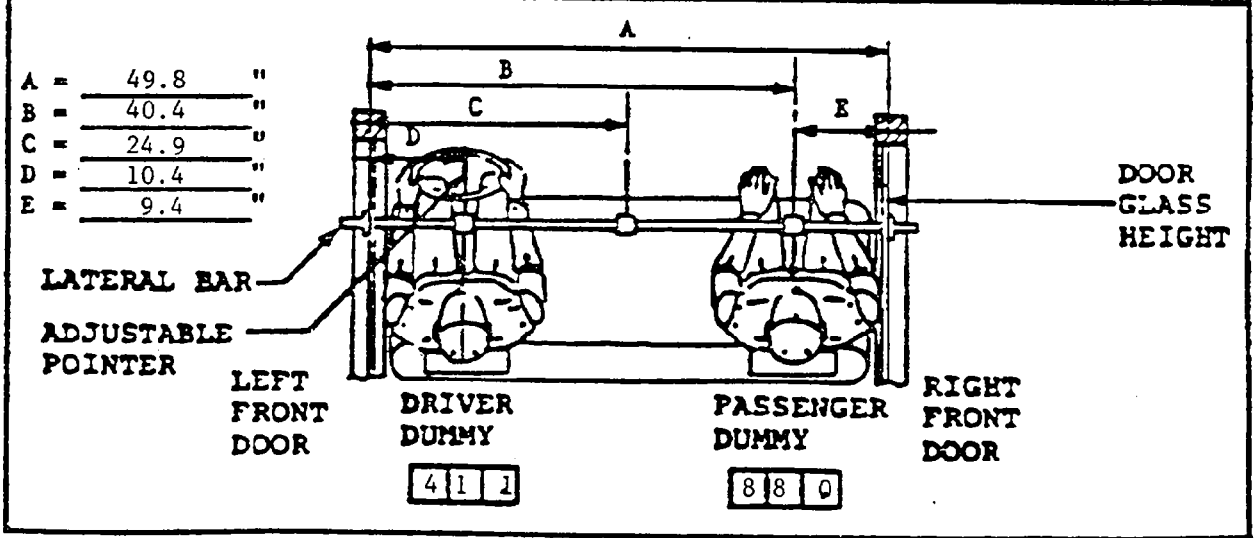
DATA FROM CERTIFICATION LABEL:

Vehicle Manufacturer: Isuzu Motors Limited, Japan
Date of Manufacture: 10/86 ; **VIN:** JAACL16L6H0708915
GVWR: 4150 lb; **GAWR:** Front = 1830 lb; Rear = 2540 lb

POST-IMPACT DATA:

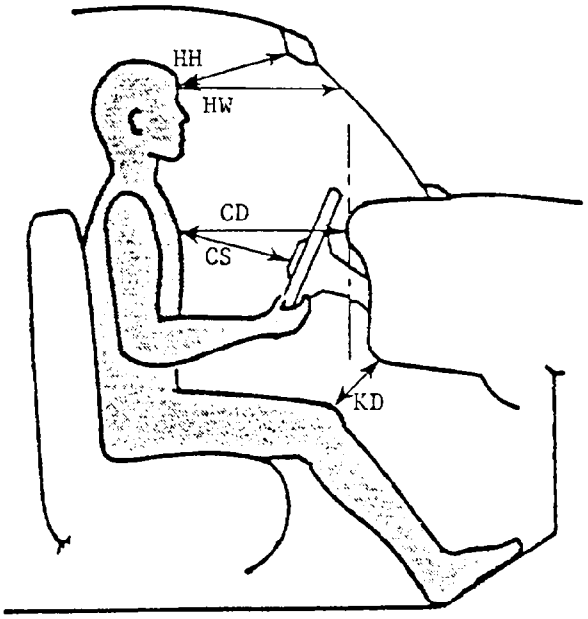
Date of Test: 1/05/87 **Time:** 14:44 **Temperature** 70 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 35.2 mph Secondary = _____ mph
Seat Type: bucket **Adjuster Type:** manual
Bucket Seat Back Type: adjustable reclining
Technicians: D. Carpenter, R. Benavides, G. Wagner



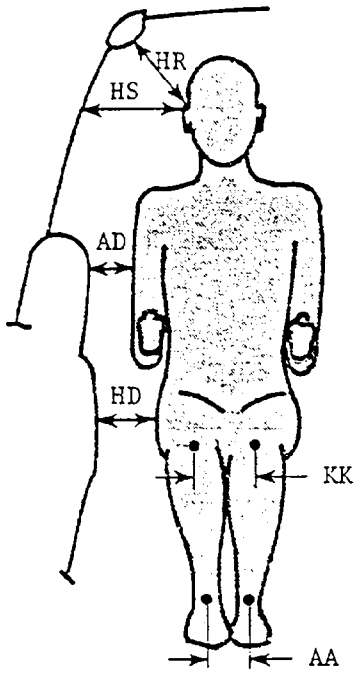


DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER 411	PASSENGER 880
HH	15.3	13.9
HW	20.2	18.3
CD	22.6	23.3
CS	14.4	NA
KDL	6.5	6.6
KDR	5.1	7.0
TA	18°	18°
SA	15°	15°



	DRIVER 411	PASSENGER 880
HR	6.4	6.3
HS	7.4	7.0
AD	2.3	2.5
HD	5.6	5.3
KK	9.3	8.3
AA	9.8	8.8



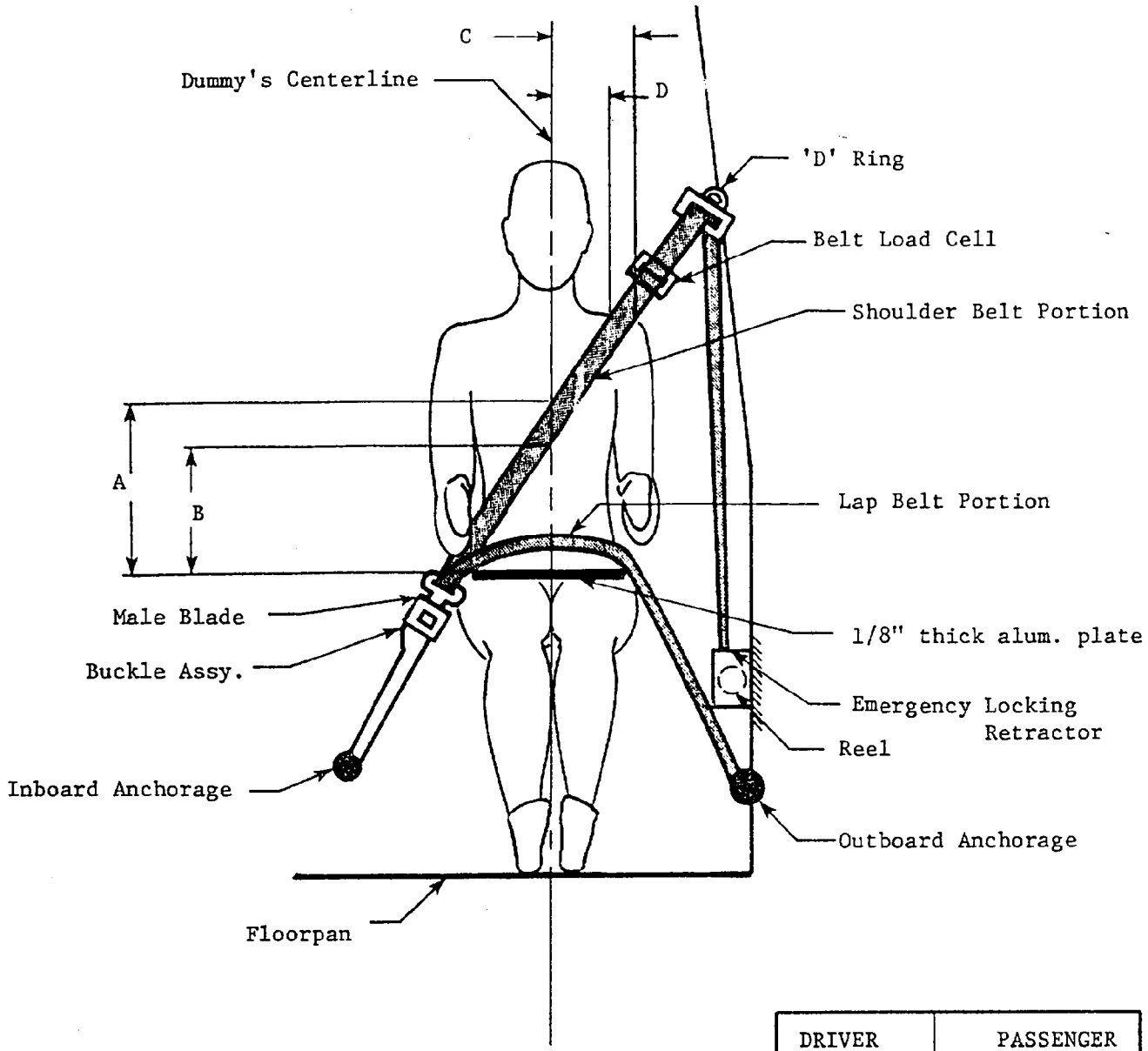
HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knees to Dash
TA = Torso Angle
SA = Seat Back Angle

HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle

Torso and seat back angles are relative to vertical.

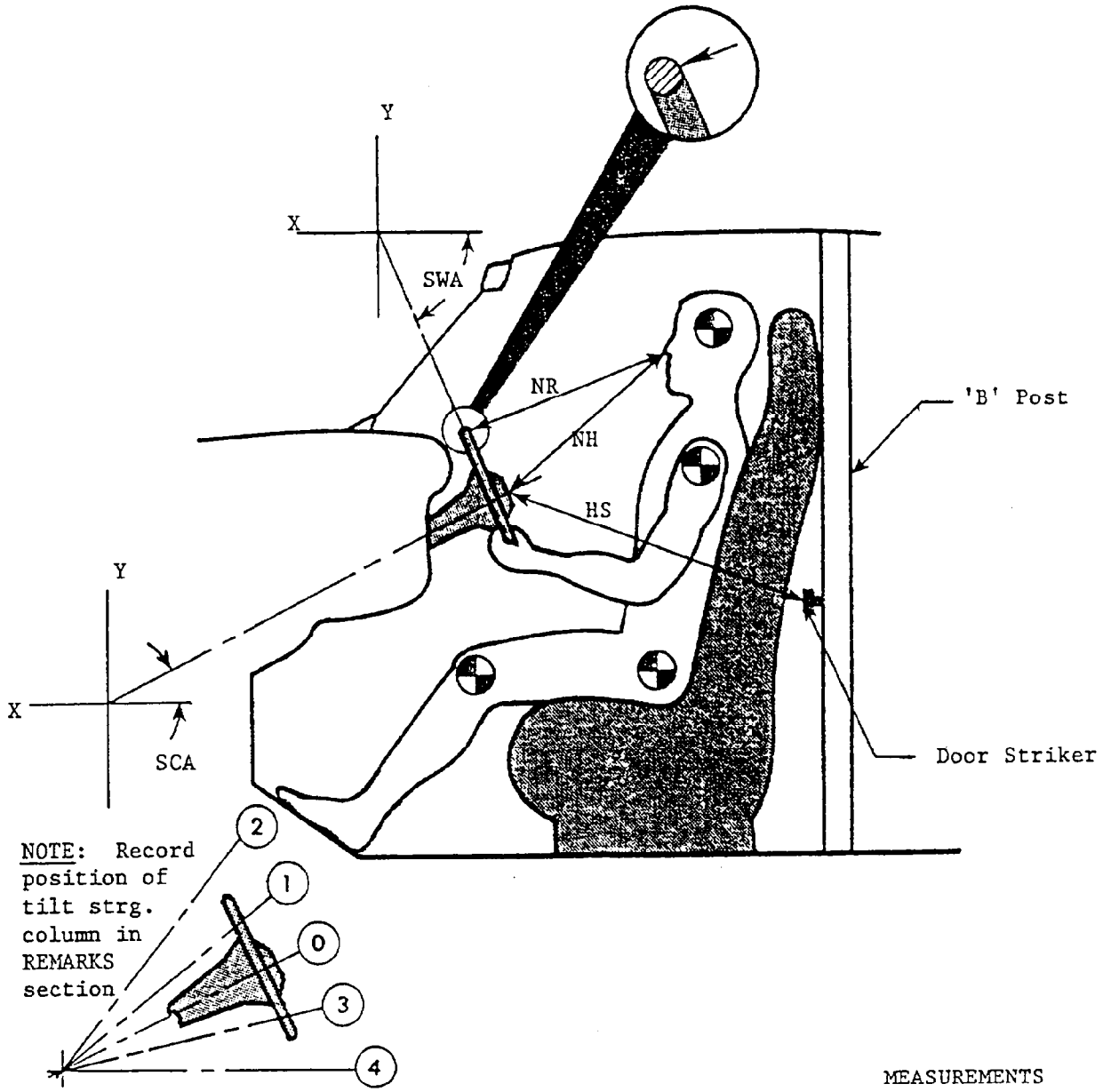
ALL MEASUREMENTS IN INCHES

SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	13.5"	13.3"
B - Top surface of alum. plate to belt lower edge (in)	10.0"	10.0"
C - Dummy centerline to outer edge of belt at chest flesh top (in)	6.5"	6.5"
D - Dummy centerline to inner edge of belt at chest flesh top (in)	3.8"	3.8"
LAP BELT TENSION (lbs)	4	4
SHOULDER BELT TENSION (lbs)	4	4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



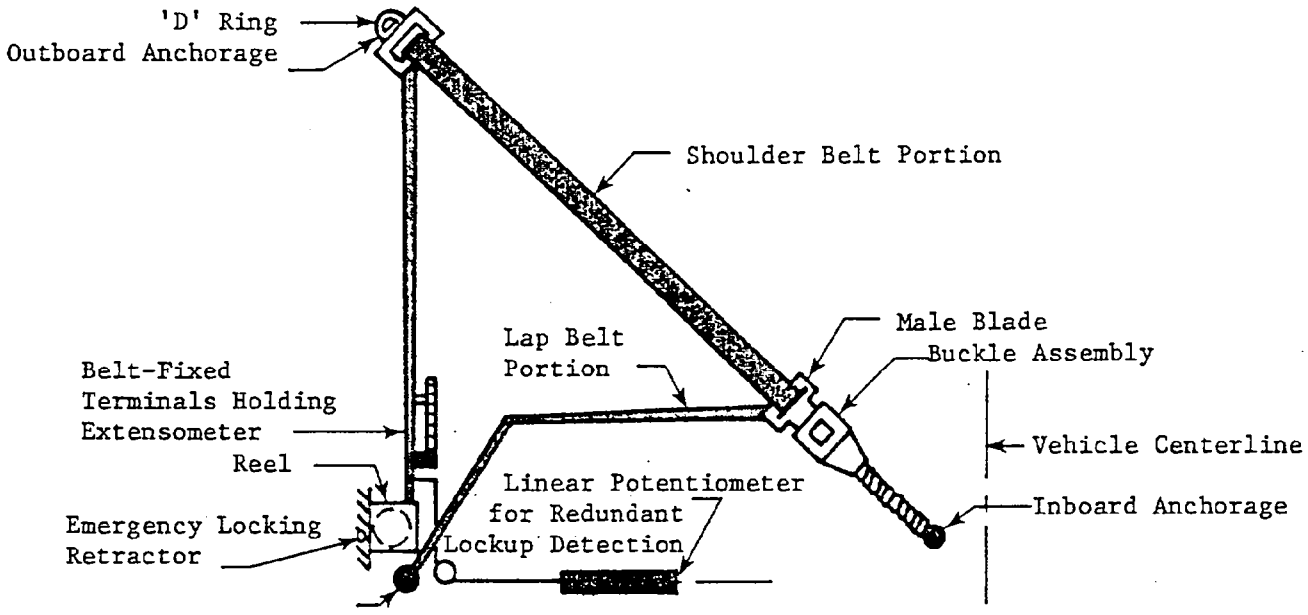
NOTE: Record position of tilt strg. column in REMARKS section

	MEASUREMENTS
NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim.	16.9"
NH - Distance from tip of dummy's nose to center of steering column hub.	18.9"
HS - Distance from center of steering column hub to the forward surface of the door lock striker pin.	26.7"
SCA - Angle of steering column relative to the horizontal X axis.	28°
SWA - Angle of steering wheel relative to the horizontal X axis.	69°

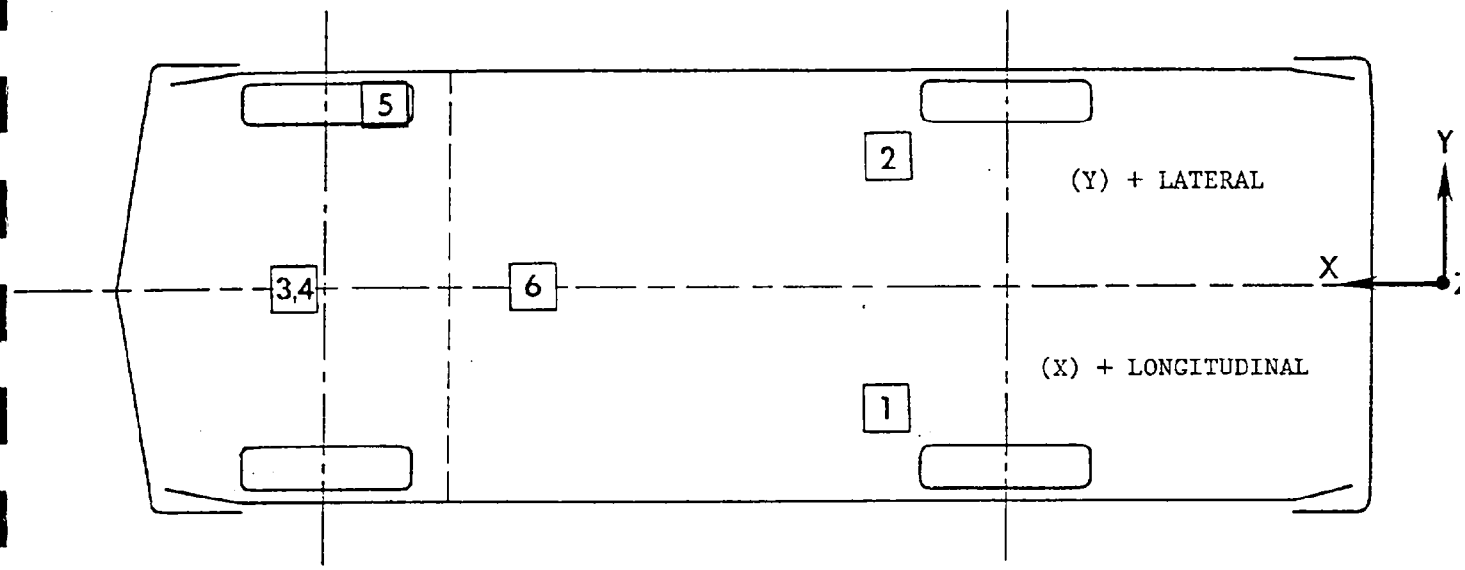
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

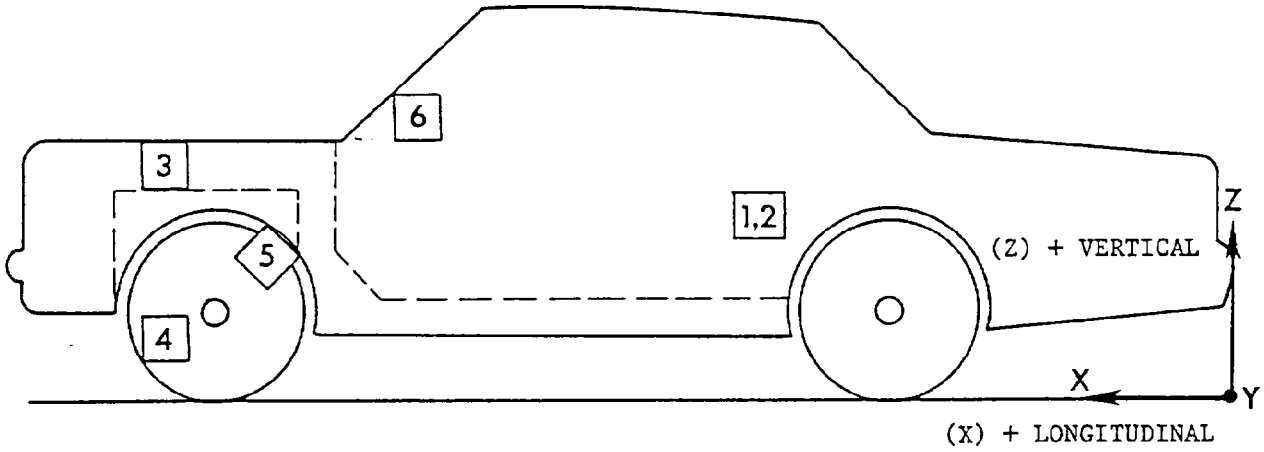
BELT LENGTH DATA:

	DRIVER SIDE		PASSENGER SIDE	
	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
Total belt length from retractor reel to bolt hole anchor point for continous webbing systems.	114.3	115.3	114.4	114.4
Retractor reel to 'D' ring as measured on Part 572 dummy.	22.7	23.8	22.3	23.5
Shoulder belt length as measured on Part 572 dummy.	32.3	33.0	33.3	33.6
Lap belt length as measured on Part 572 dummy.	32.0	34.5	33.0	36.0
Remainder of belt webbing left on retractor reel.	27.3	24.0	25.8	21.3
BELT SPOOL-OFF DATA:				
As determined by film analysis	DNA	5.7	DNA	5.3
As determined electronically	DNA	6.1	DNA	6.1
BELT STRAIN DATA:				
Measured between retractor reel and 'D' ring.	DNA	0.7	DNA	0.5



VEHICLE ACCELEROMETER LOCATIONS





VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

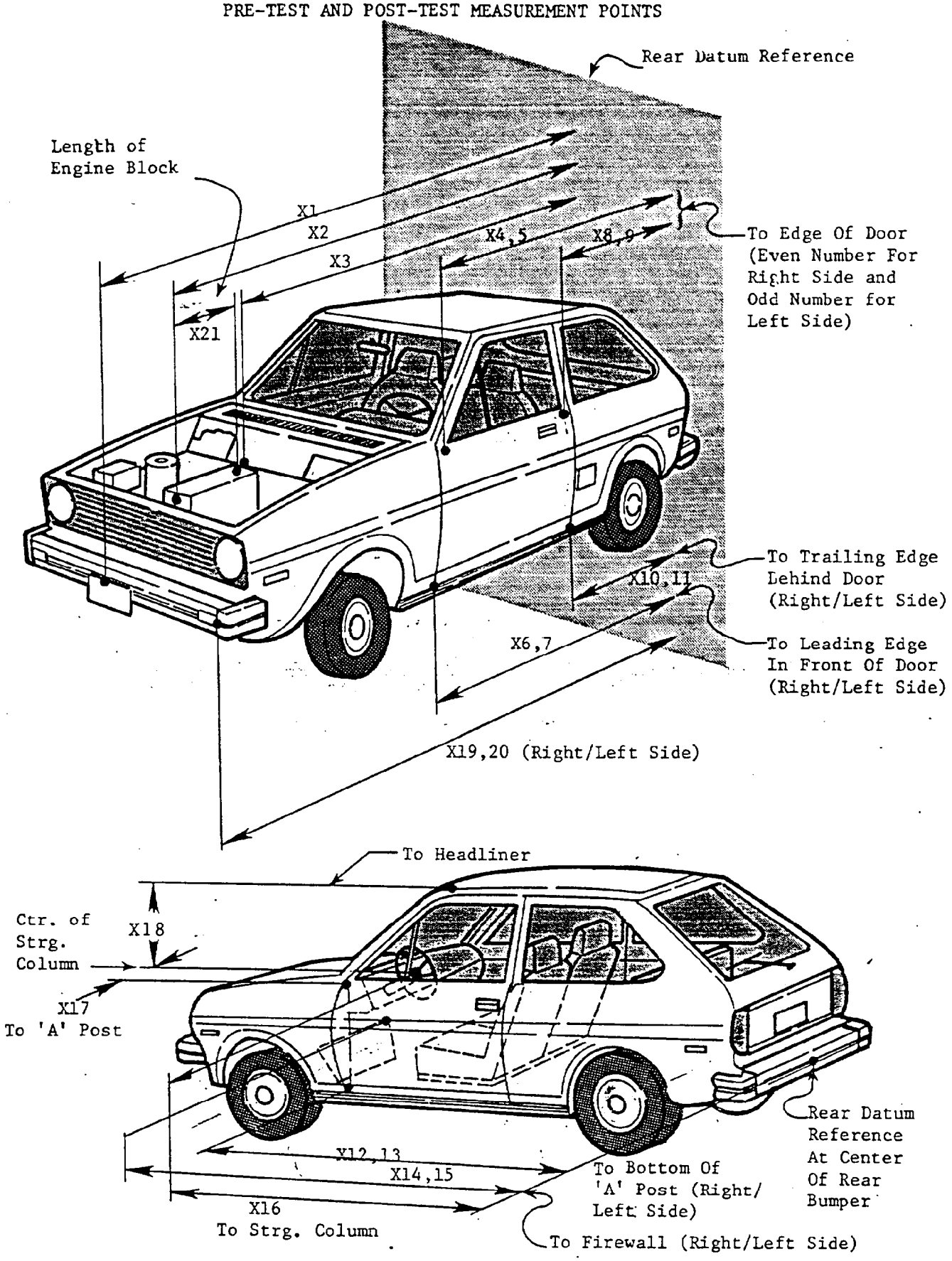
NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION** MAX (g)	POSITIVE DIRECTION** TIME (msec)	NEGATIVE DIRECTION** MAX (g)	NEGATIVE DIRECTION** TIME (msec)
1	REAR SEAT X-MEMBER AT LEFT SIDE LONGITUDINAL	102.9	19.5	15.8	3.2	164.3	41.3	38.3
2	REAR SEAT X-MEMBER AT RIGHT SIDE LONGITUDINAL	102.3	-19.5	15.5	3.0	131.0	48.5	41.9
3	TOP OF ENGINE BLOCK LONGITUDINAL	163.7	-1.0	33.1	54.3	38.6	209.5	30.9
4	BOTTOM OF ENGINE BLOCK LONGITUDINAL	165.8	0.3	8.3	36.8	38.3	173.2	31.6
5	BRAKE CALIPER AT RIGHT SIDE LONGITUDINAL	165.8	-23.3	12.3	41.3	52.3	108.9	36.0
6	DASH PANEL LONGITUDINAL	140.1	0.0	42.4	25.1	94.1	53.9	57.3

* X + Forward from rear bumper
Y + Left vehicle centerline
Z + Up from ground level

** LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

MEASUREMENTS IN INCHES

PRE-TEST AND POST-TEST MEASUREMENT POINTS



IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Isuzu P'up DLX Spacecab TEST NUMBER 870105

DIMENSIONS IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X 1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	196.3	178.3	18.0
X 2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	178.8	172.5	6.3
X 3	REAR SURFACE OF VEHICLE TO FIREWALL	156.8	156.2	0.6
X 4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	146.3	146.4	-0.1
X 5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	146.3	145.8	0.5
X 6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	146.7	146.8	-0.1
X 7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	146.5	146.0	0.5
X 8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	105.1	105.1	0.0
X 9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	105.3	104.8	0.5
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	105.0	104.9	0.1
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE ON LEFT DOOR	105.0	104.5	0.5
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	145.6	145.9	-0.3
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	145.9	144.3	1.6
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	157.1	155.5	1.6
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	156.8	155.8	1.0
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	131.9	130.0	1.9
X17	CENTER OF STEERING COLUMN TO "A" POST	13.9	13.8	0.1

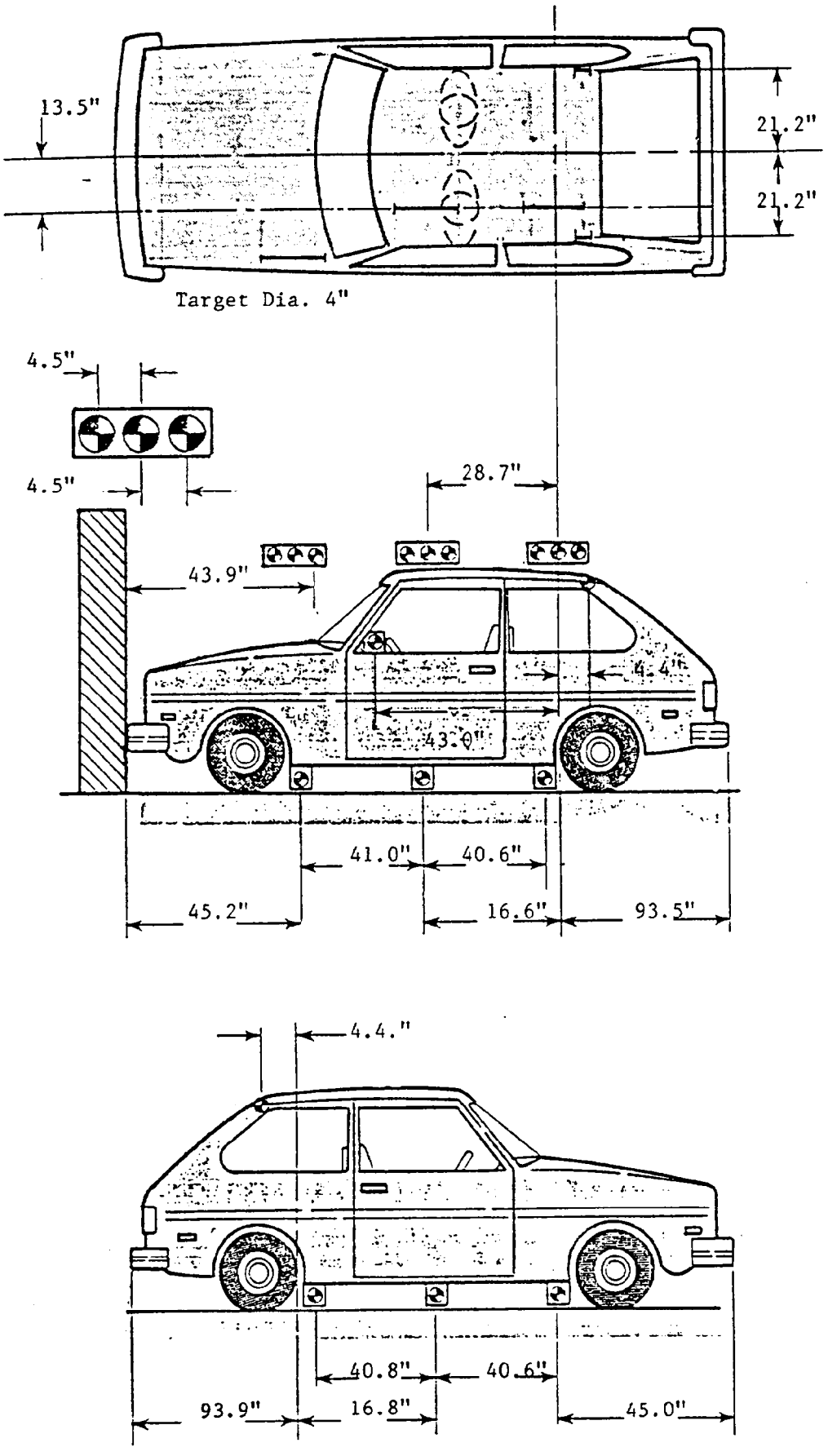
IMPACTED VEHICLE MEASUREMENTS CONTD

VEHICLE MAKE/MODEL Isuzu P'up DLX Spacecab TEST NUMBER 870105

DIMENSIONS IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X18	CENTER OF STEERING COLUMN TO HEADLINING	18.0	18.4	-0.4
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	193.8	177.1	16.7
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	193.8	175.3	18.5
X21	LENGTH OF ENGINE BLOCK	20.0	20.0	0.0

VEHICLE TARGET LOCATIONS



870105

ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Isuzu P'up DLX Spacecab

VEH. NHTSA NO.: CG0617 ; VIN: JAACL16L6H0708915

MODEL YEAR: 1987 ; BUILD DATE: 10/86 ; TEST DATE 1/5/87

VEH. SIZE CATEGORY: Small pickup ; TEST WEIGHT: 3349

VEH. WHEELBASE: 118.1

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 18.5 inches

C2 = 18.4 inches

C3 = 18.7 inches

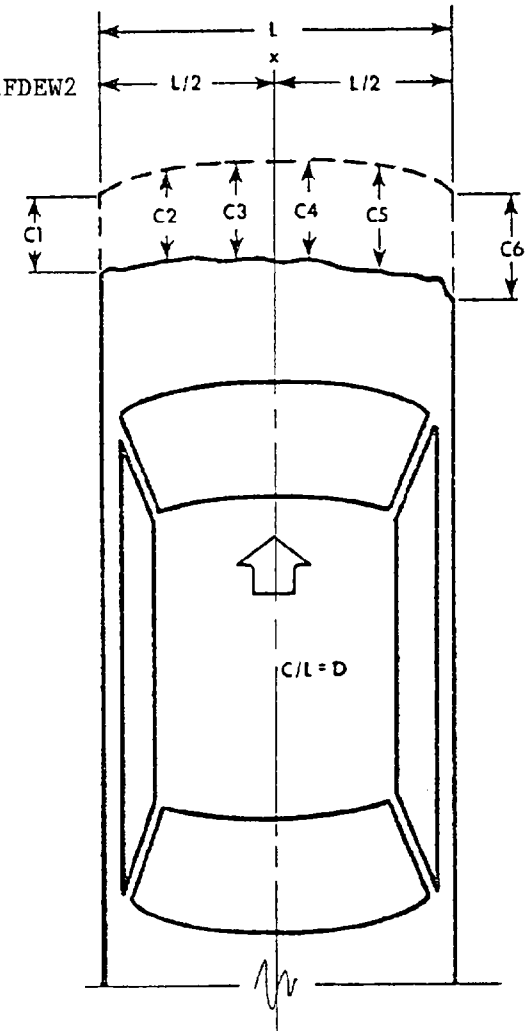
C4 = 18.4 inches

C5 = 16.9 inches

C6 = 16.7 inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitudinal)

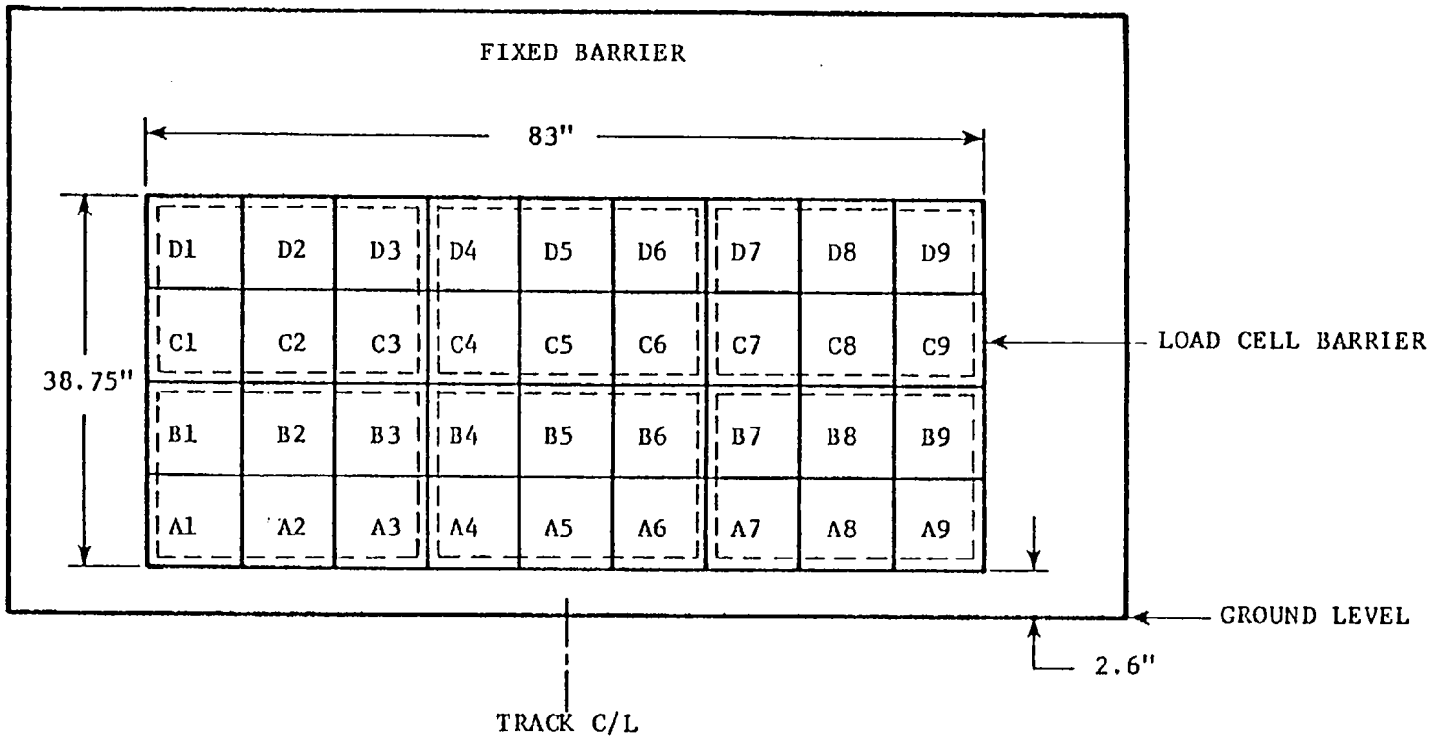
LENGTH OF DAMAGED REGION: L = 60.3 inches



870105

36 LOAD CELLS
4 ROWS
9 COLUMNS

FRONT VIEW



BARRIER LOAD CELL CONFIGURATION

GROUP 1: D1 thru C3
GROUP 2: D4 thru C6
GROUP 3: D7 thru C9
GROUP 4: B1 thru A3
GROUP 5: B4 thru A6
GROUP 6: B7 thru A9

LOAD CELL BARRIER SUMMARY

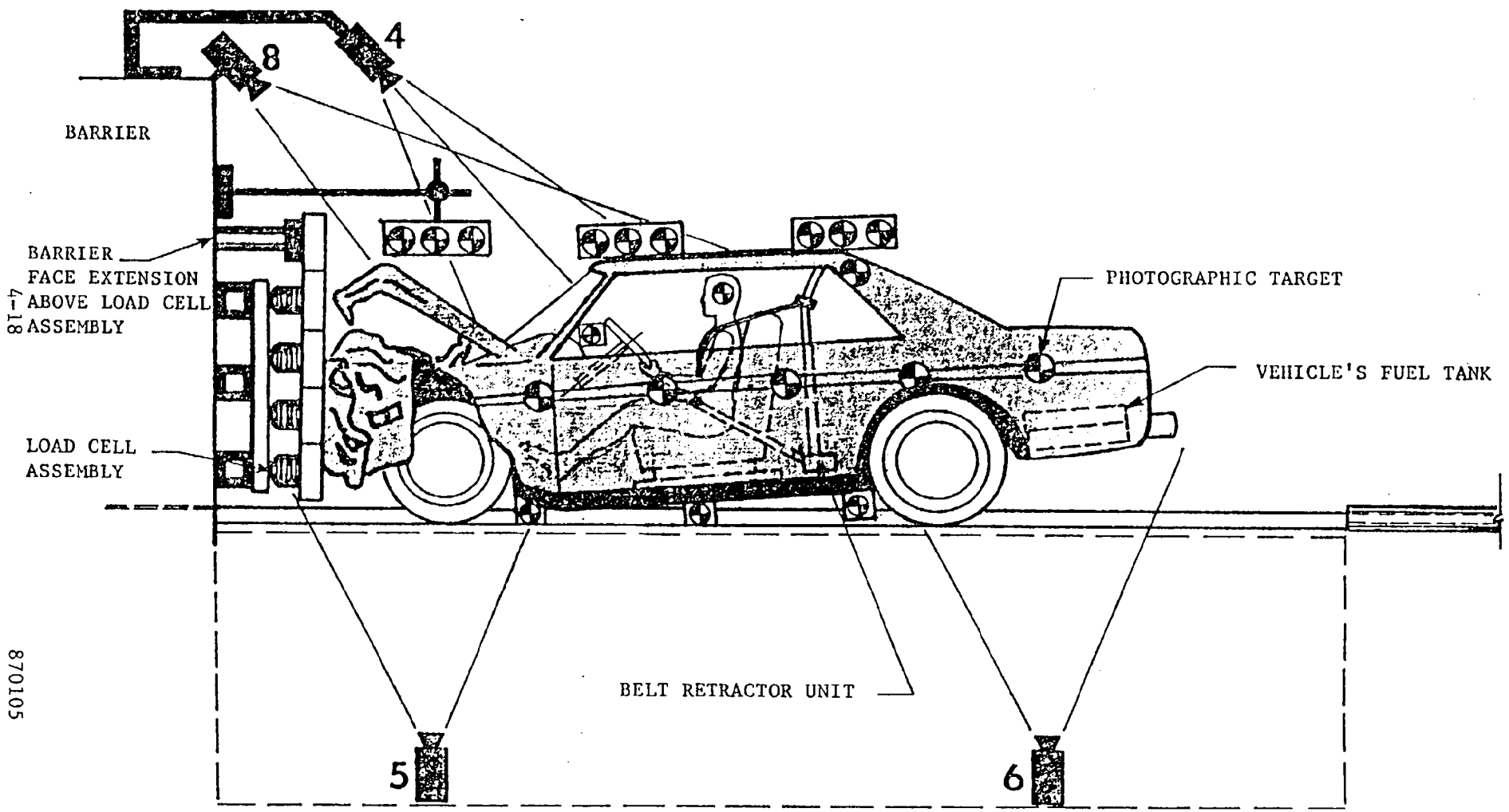
POSITION	POSITIVE DIRECTION* MAX (lb)	TIME (msec)	NEGATIVE DIRECTION* MIN (lb)	TIME (msec)
TOTAL GROUP 1	8899.0	33.3	177.0	320.9
TOTAL GROUP 2	51833.0	31.9 Y	---	--- ε
TOTAL GROUP 3	13411.0	21.8	218.0	323.0
TOTAL GROUP 4	26343.0	17.3	176.0	311.4
TOTAL GROUP 5	73605.0	32.0	174.0	308.6
TOTAL GROUP 6	27153.0	16.4	299.0	169.3
TOTAL LOAD CELL FORCE	176536.0	32.3	29.0	5.6

ε No negative value in range of interest

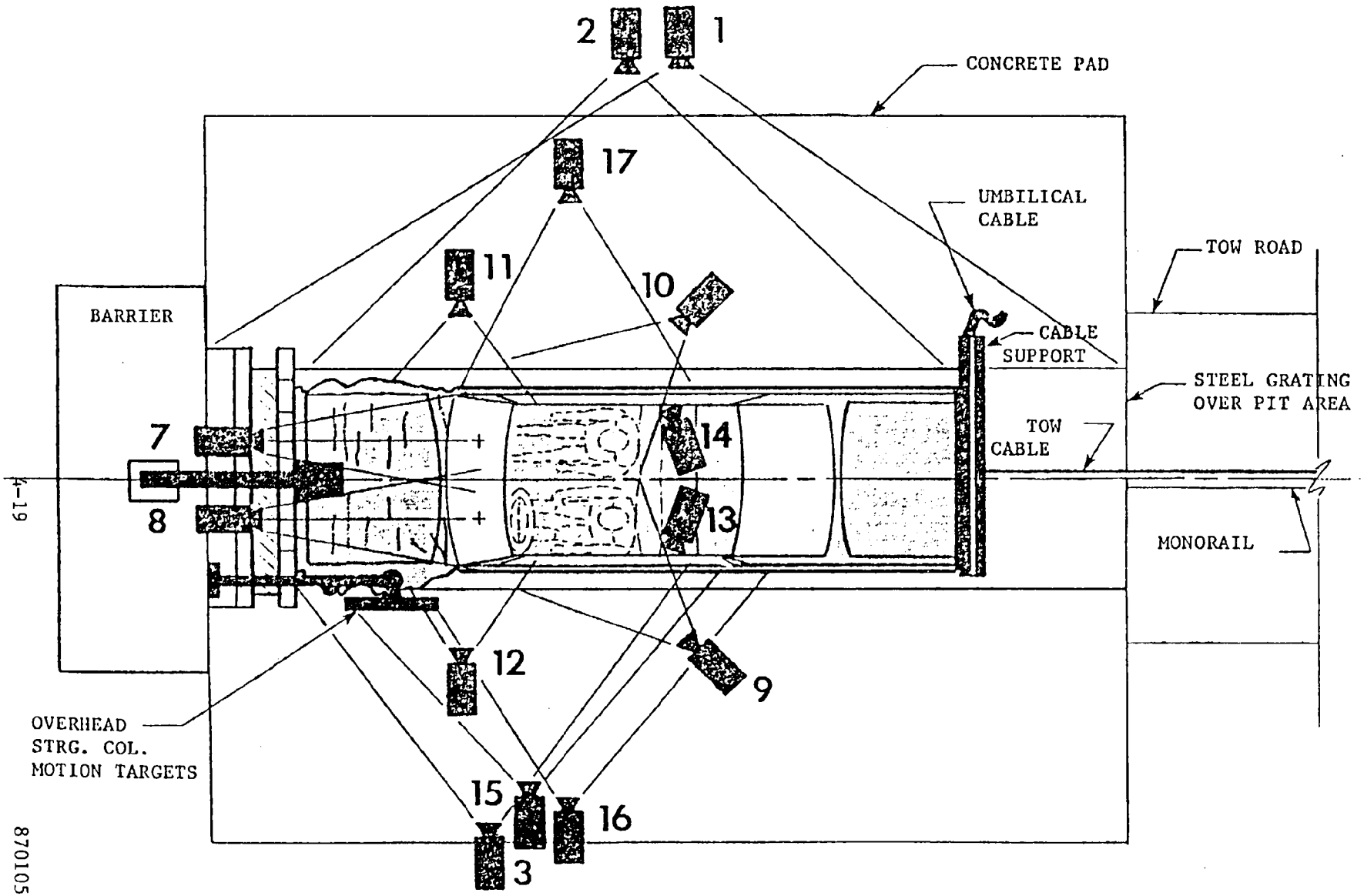
Y See note, page 2-4

*REFERENCE: COMPRESSION IS POSITIVE
TENSION IS NEGATIVE

CAMERA POSITIONS



870105



CAMERA POSITIONS

870105

HIGH SPEED CAMERA LOCATIONS

TEST NO.: 870105 VEHICLE: Isuzu P'up DLX Spacecab

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)* X	Y	Z	ANGLE ** (DEG)	FILM PLANE TO HEAD TARGET	LENS (MM)	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	507
3	Dummy kinematics	-41.5	-295.0	44.0	-12	250.0	25	499
4	Windshield damage	-36.4	0.0	120.0	-83	NA	13	498
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1002
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	1000
7	Passenger kinematics	4.5	13.8	115.0	-60	NA	17	498
8	Driver kinematics	6.8	-14.5	113.3	-60	NA	17	499
9	Driver kinematics	-157.3	-166.9	74.1	-10	170.0	25	495
10	Passenger kinematics	-152.1	167.9	76.0	-13	164.5	25	497
11	Windshield intrusion	-38.1	306.1	44.0	0	NA	50	512
12	Windshield intrusion	-53.0	-309.4	42.3	0	NA	50	498
13	Driver seatbelt movement	NA	NA	NA	NA	NA	13	499
14	Passenger seatbelt movement	NA	NA	NA	NA	NA	13	498
15	Column movement	90.0	-286.0	103.0	-14	NA	25	499
16	Column movement	90.0	-286.0	75.1	-9	NA	25	498
17	Passenger kinematics	-38.8	210.0	45.3	7	246.0	25	500

* X = Film plane to plane of barrier face
  Y = Film plane to monorail centerline
  Z = Film plane to ground
** Referenced to horizontal plane

APPENDIX A

PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. POST-TEST FRONT VIEW
3. PRE-TEST LEFT SIDE VIEW
4. POST-TEST LEFT SIDE VIEW
5. PRE-TEST RIGHT SIDE VIEW
6. POST-TEST RIGHT SIDE VIEW
7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW
8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
9. PRE-TEST LEFT REAR THREE-QUARTER VIEW
10. POST-TEST LEFT REAR THREE-QUARTER VIEW
11. POST-TEST BOTTOM VIEW (VEHICLE ON ROLLOVER MACHINE)
12. PRE-TEST WINDSHIELD VIEW
13. POST-TEST WINDSHIELD VIEW
14. PRE-TEST ENGINE COMPARTMENT VIEW
15. POST-TEST ENGINE COMPARTMENT VIEW
16. PRE-TEST FUEL FILLER CAP VIEW
17. PRE-TEST FRONT UNDERBODY VIEW
18. POST-TEST FRONT UNDERBODY VIEW
19. PRE-TEST REAR UNDERBODY VIEW
20. POST-TEST REAR UNDERBODY VIEW
21. PRE-TEST DRIVER DUMMY POSITION VIEW
22. POST-TEST DRIVER DUMMY POSITION VIEW
23. PRE-TEST PASSENGER DUMMY POSITION VIEW
24. POST-TEST PASSENGER DUMMY POSITION VIEW
25. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
26. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
27. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
28. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
29. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT
30. POST-TEST PASSENGER HEAD/KNEE CONTACT

Figure 1. PRE-TEST FRONT VIEW

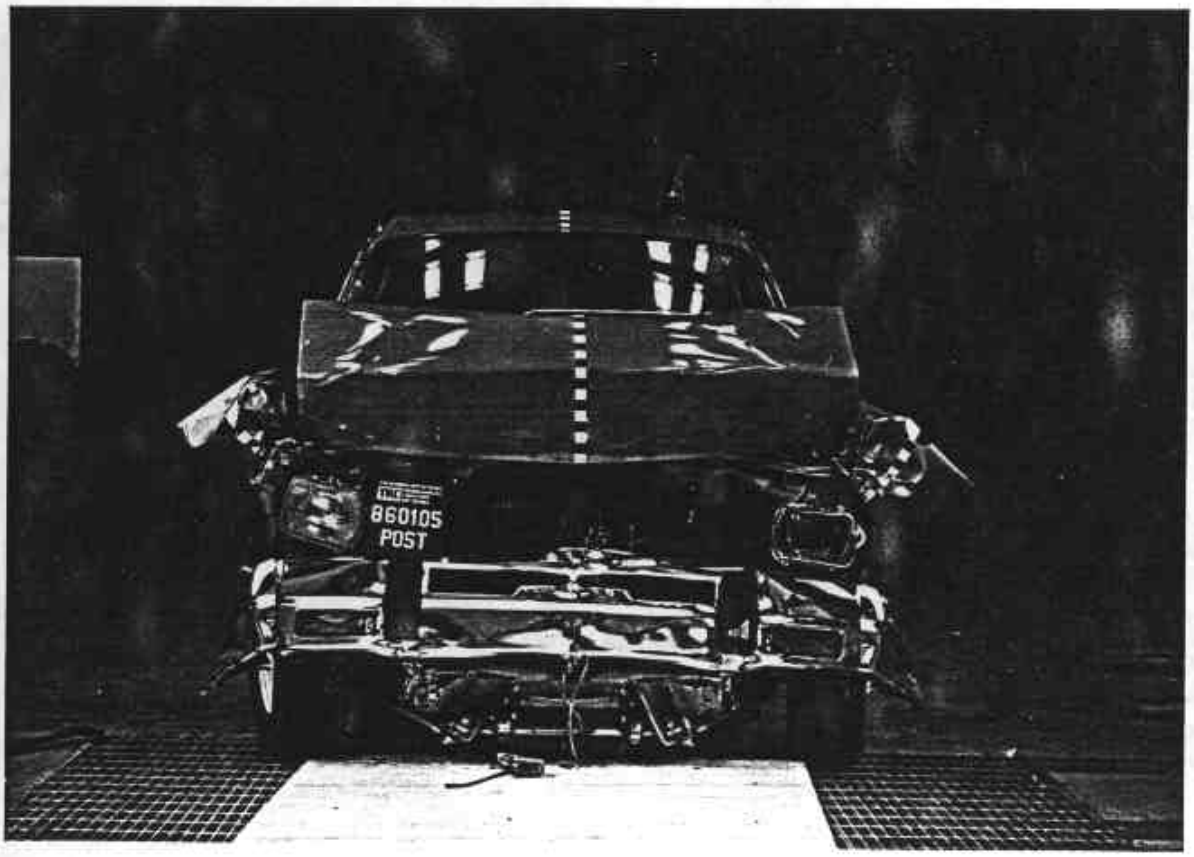


Figure 2. POST-TEST FRONT VIEW

Figure 3. PRE-TEST LEFT SIDE VIEW

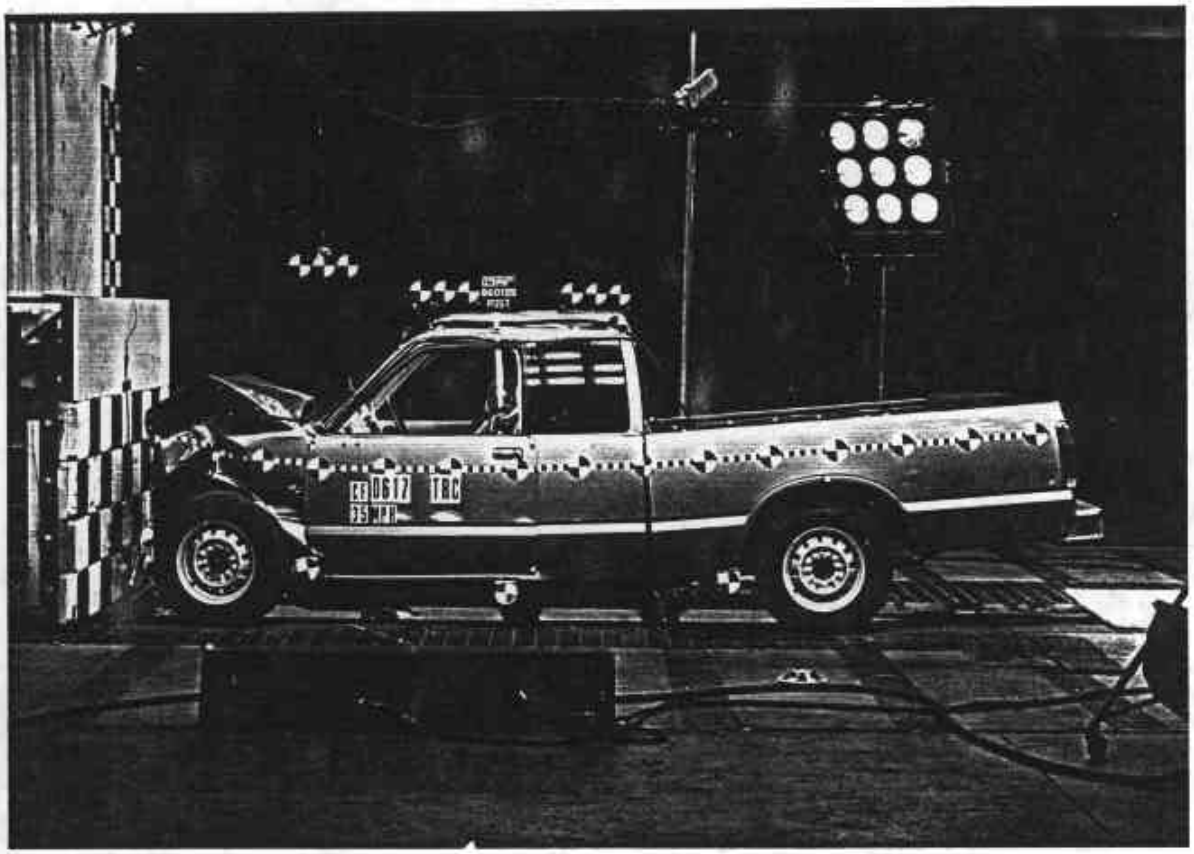


Figure 4. POST-TEST LEFT SIDE VIEW

Figure 5. PRE-TEST RIGHT SIDE VIEW

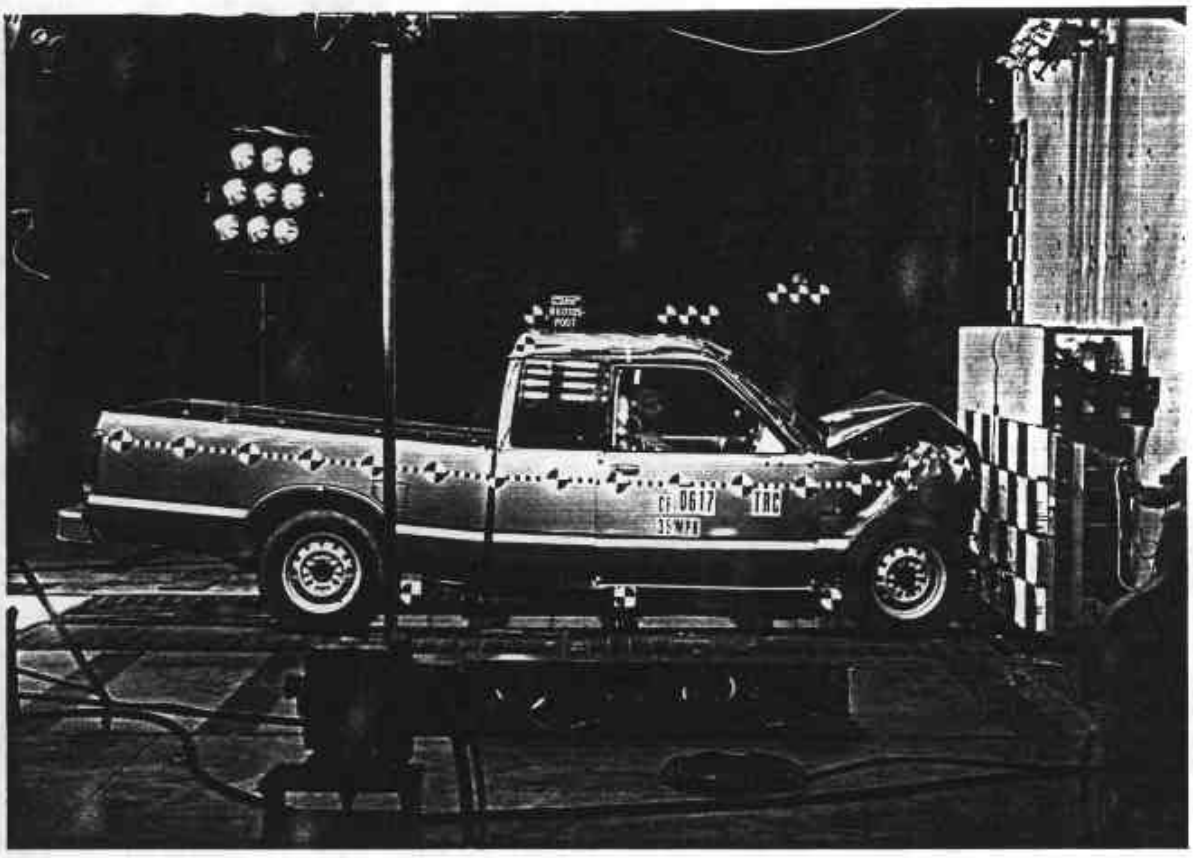


Figure 6. POST-TEST RIGHT SIDE VIEW

Figure 7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

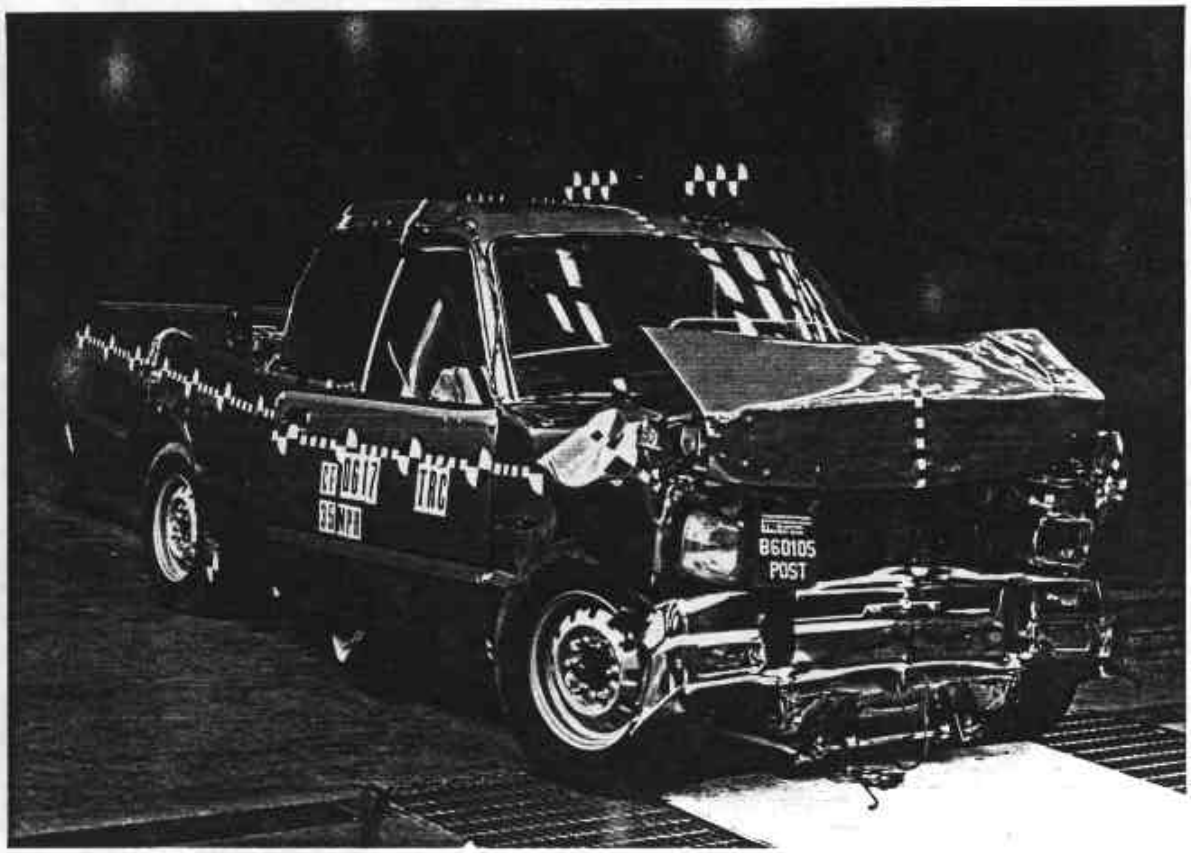


Figure 8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

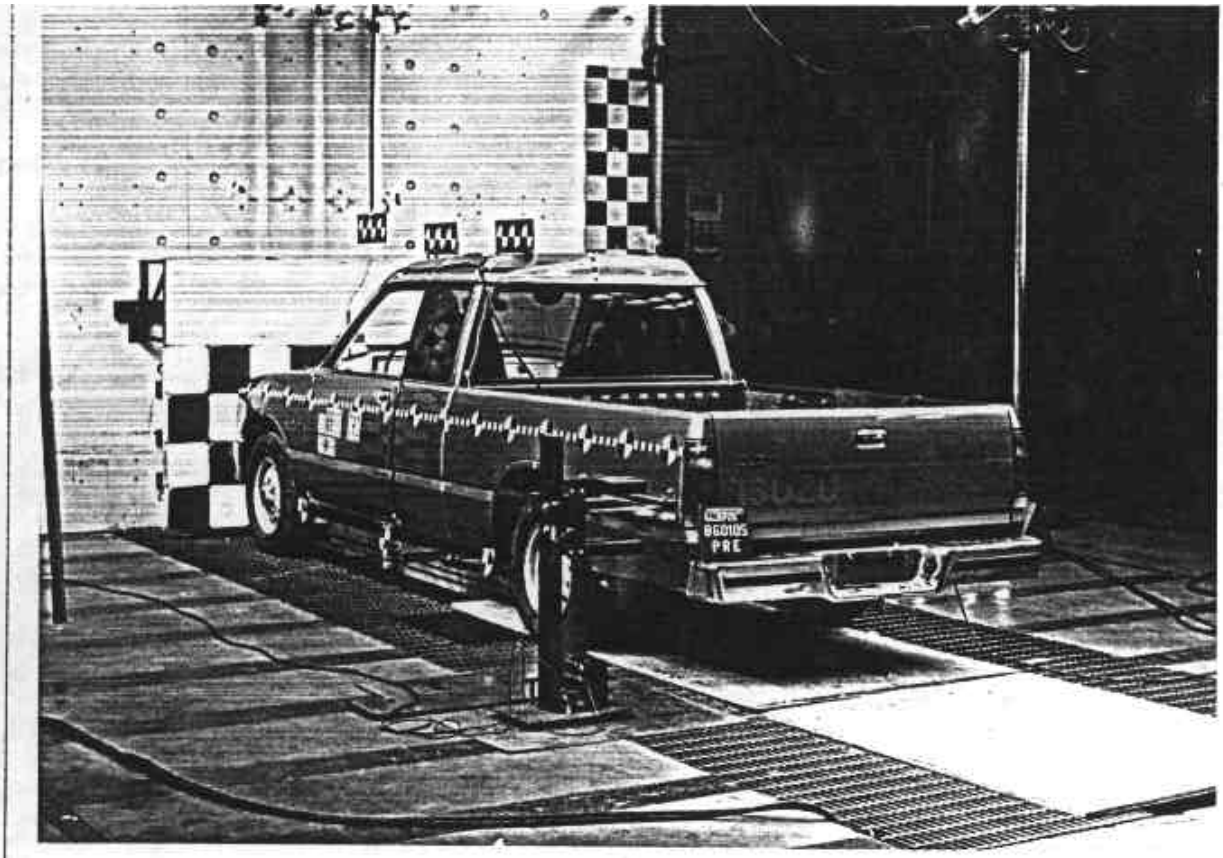


Figure 9. PRE-TEST LEFT REAR THREE-QUARTER VIEW

Figure 10. POST-TEST LEFT REAR THREE-QUARTER VIEW

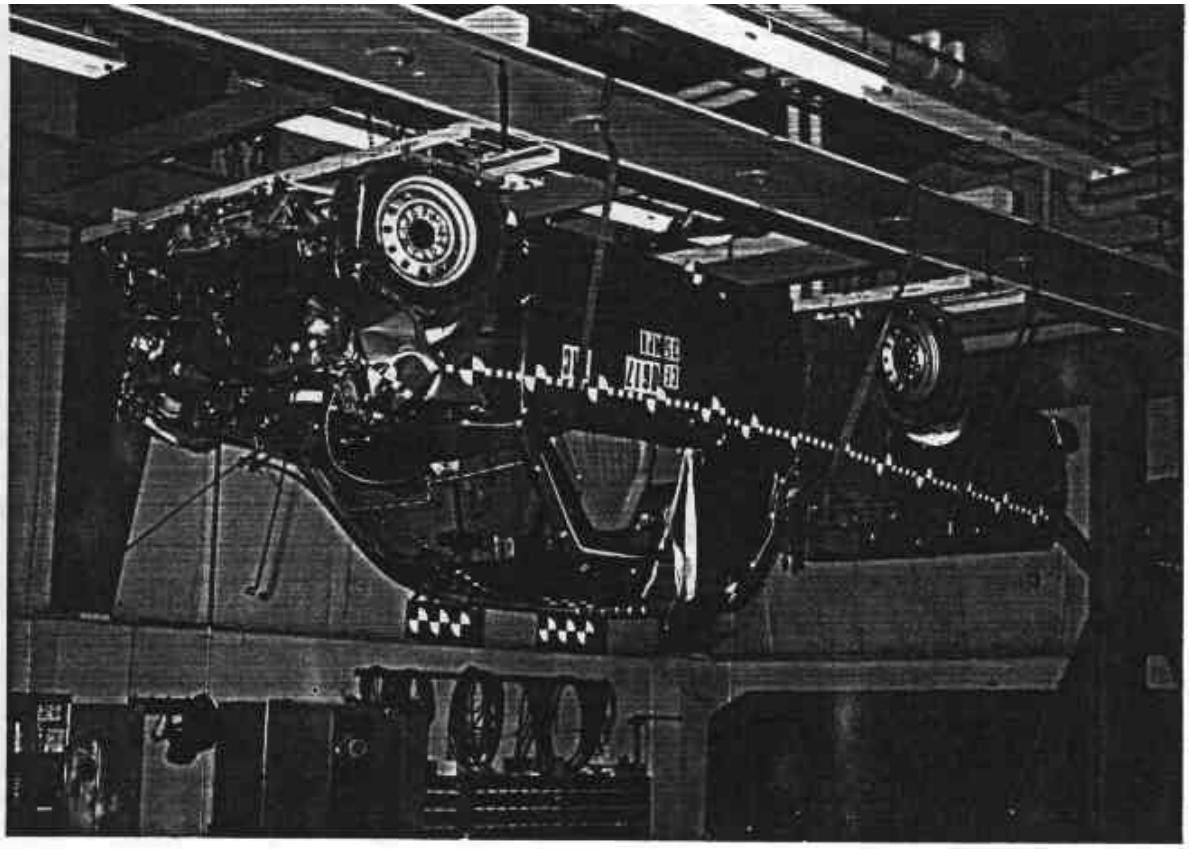


Figure 11. POST-TEST BOTTOM VIEW (VEHICLE ON ROLLOVER MACHINE)

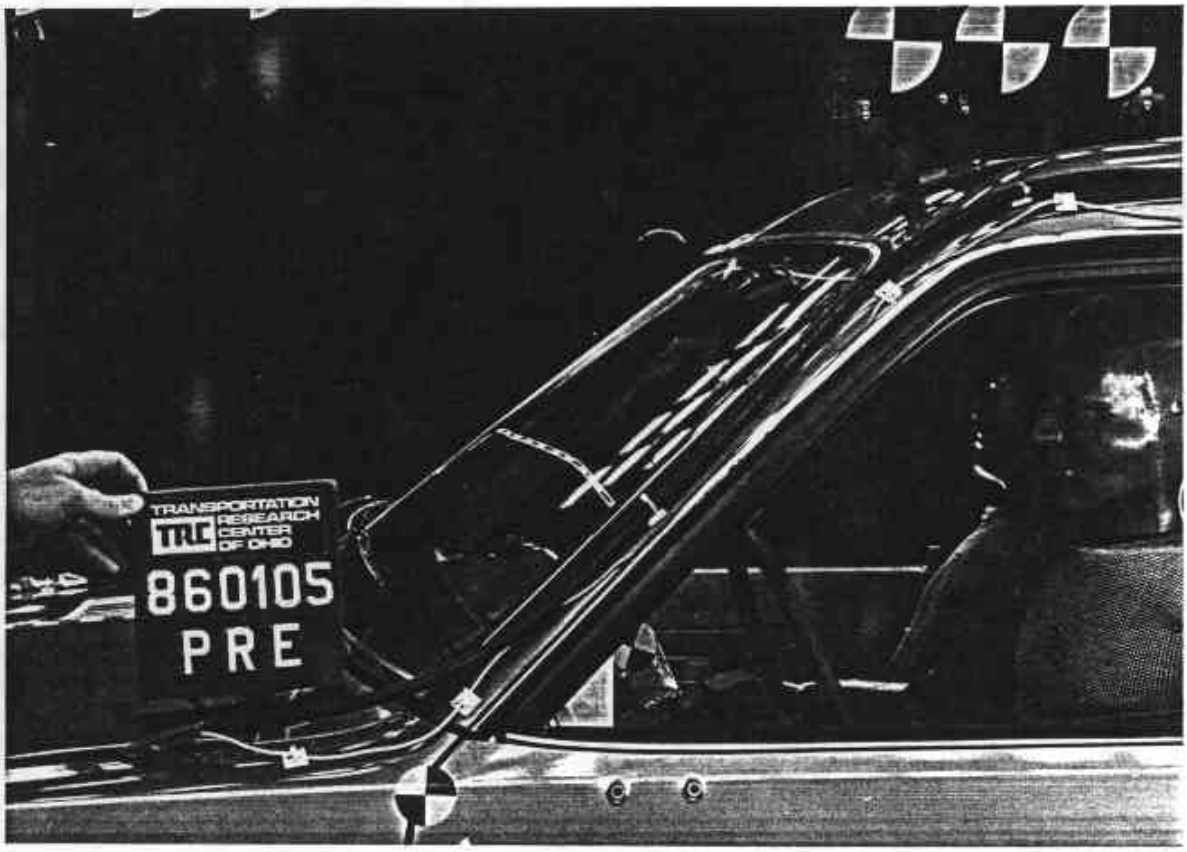


Figure 12. PRE-TEST WINDSHIELD VIEW

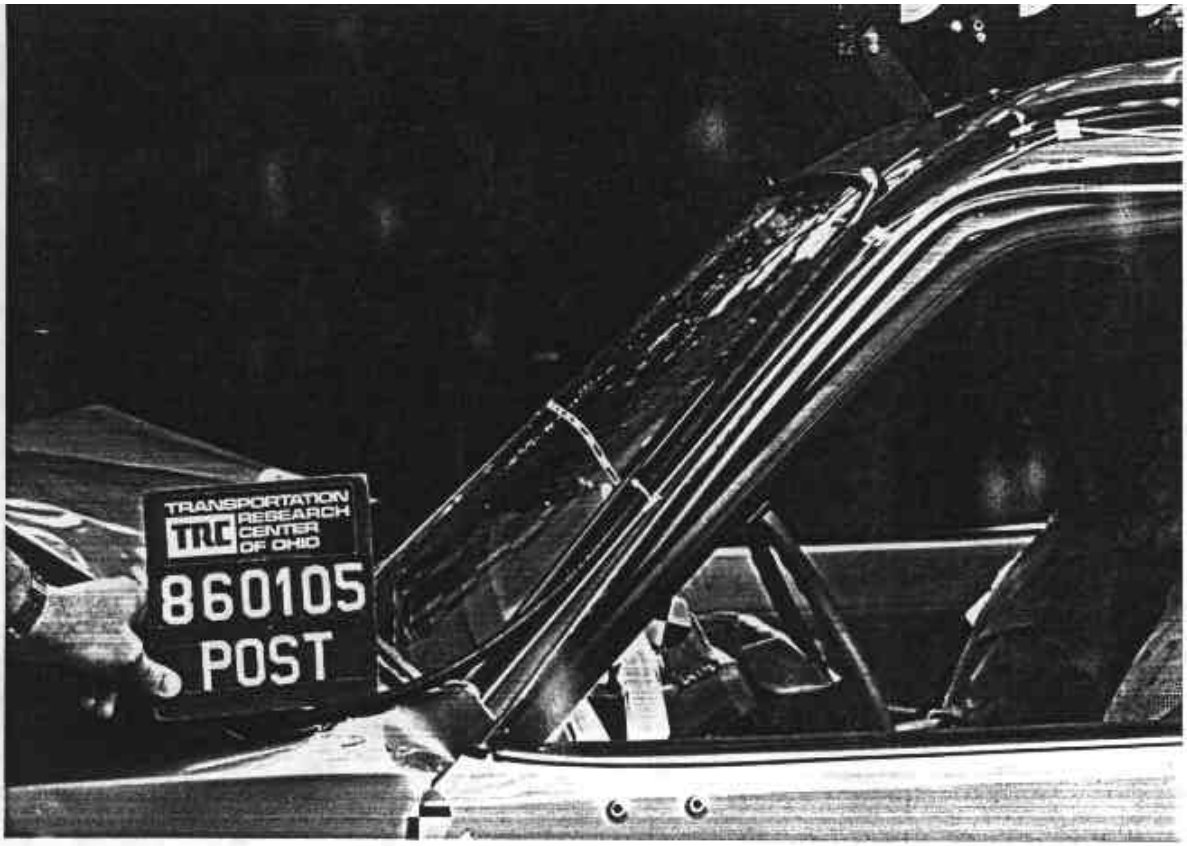


Figure 13. POST-TEST WINDSHIELD VIEW

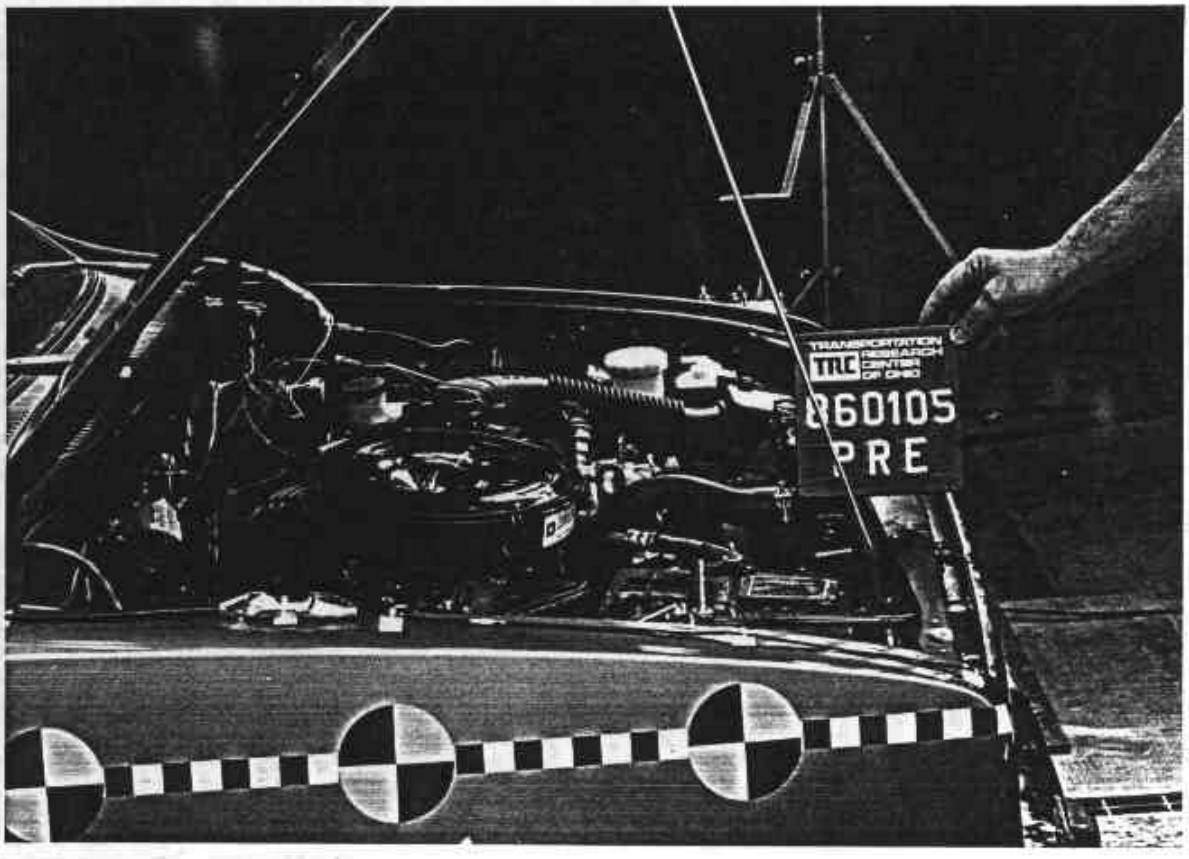


Figure 14. PRE-TEST ENGINE COMPARTMENT VIEW

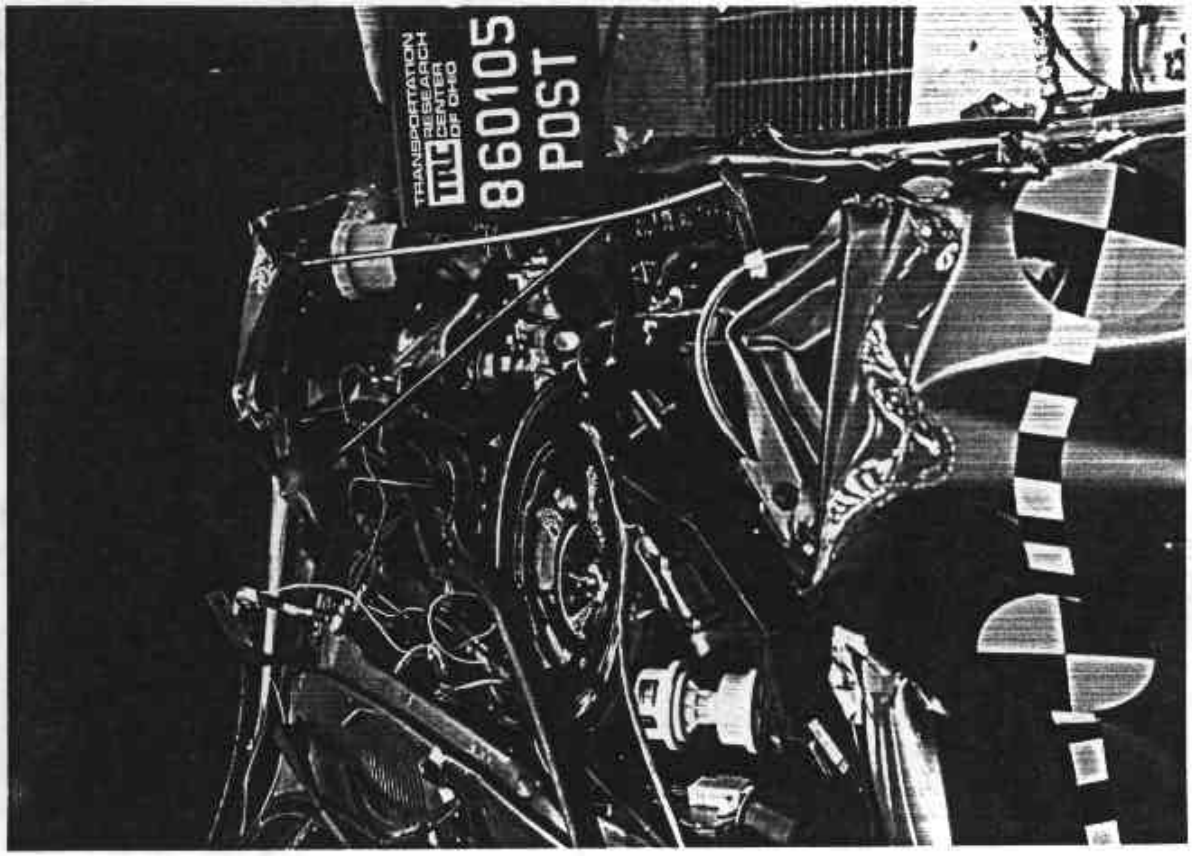


Figure 15. POST-TEST ENGINE COMPARTMENT VIEW

Figure 16. PRE-TEST FUEL FILLER CAP VIEW

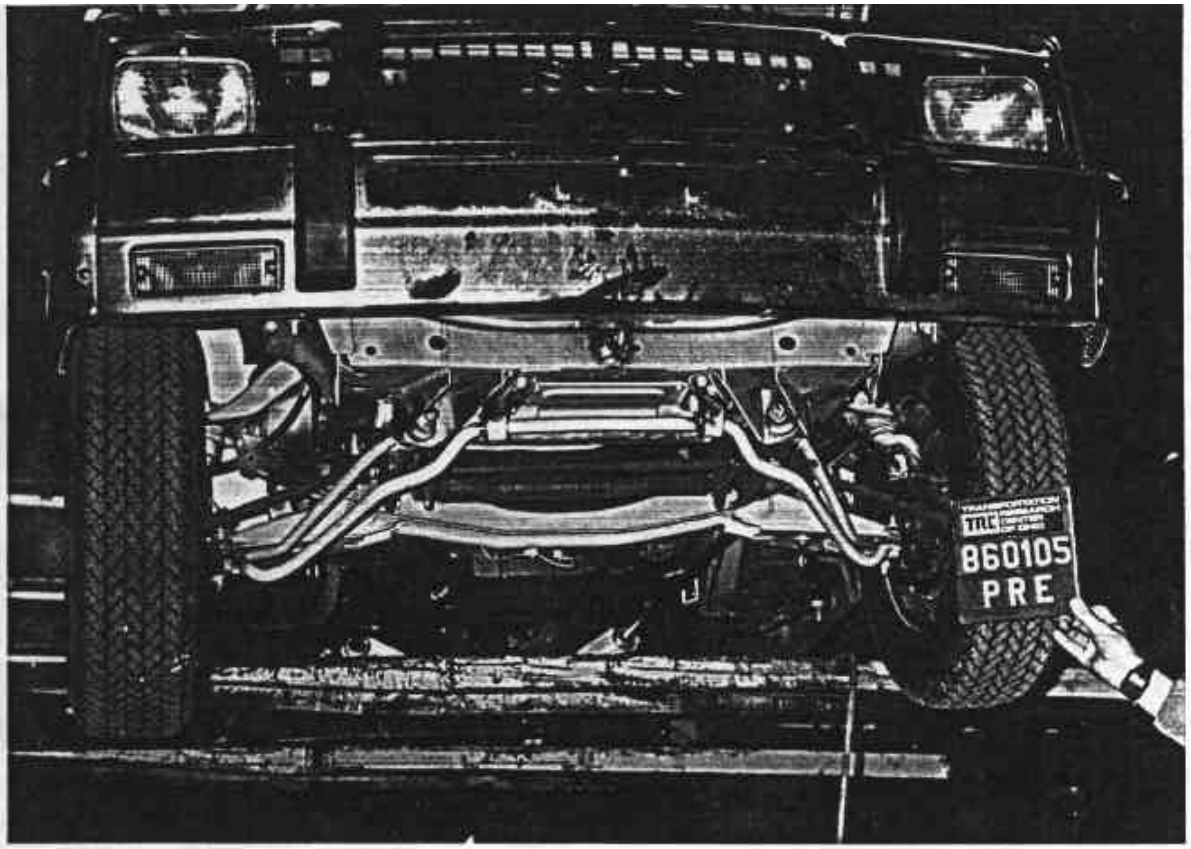


Figure 17. PRE-TEST FRONT UNDERBODY VIEW

Figure 18. POST-TEST FRONT UNDERBODY VIEW

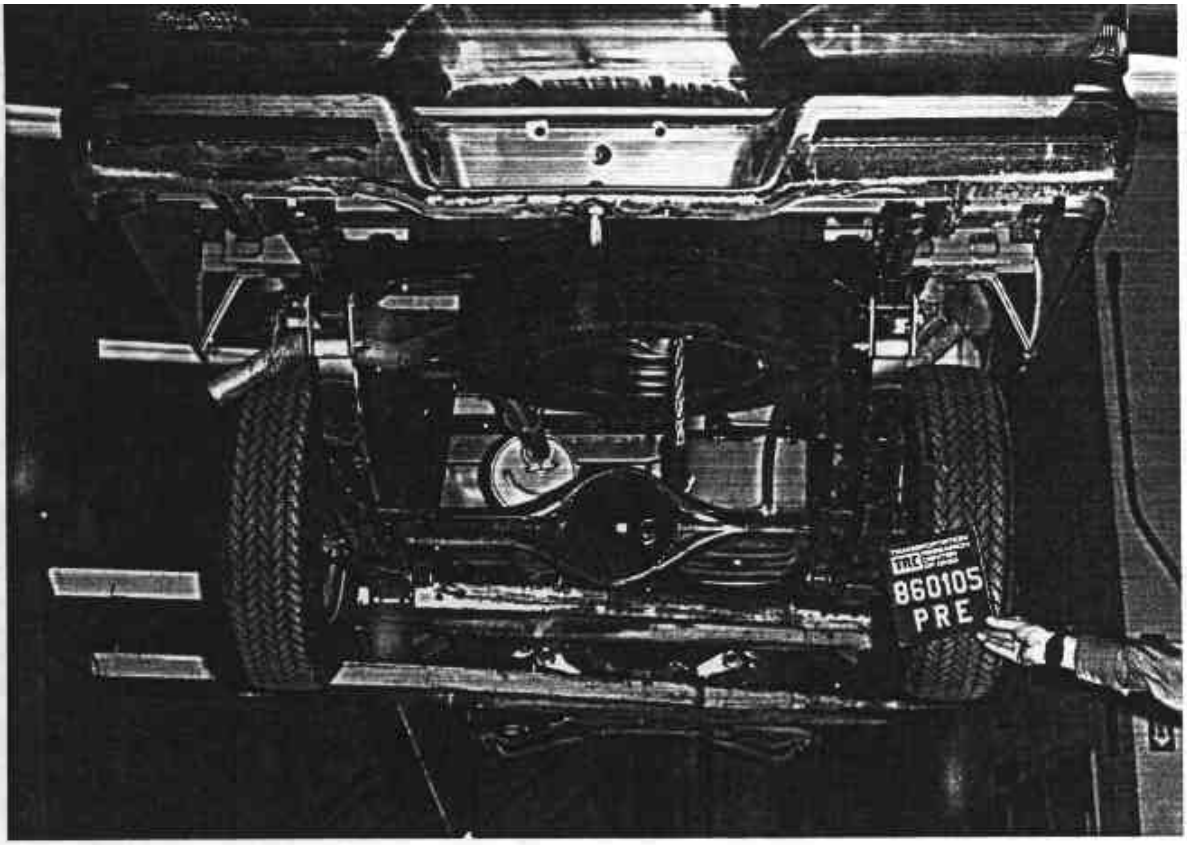


Figure 19. PRE-TEST REAR UNDERBODY VIEW

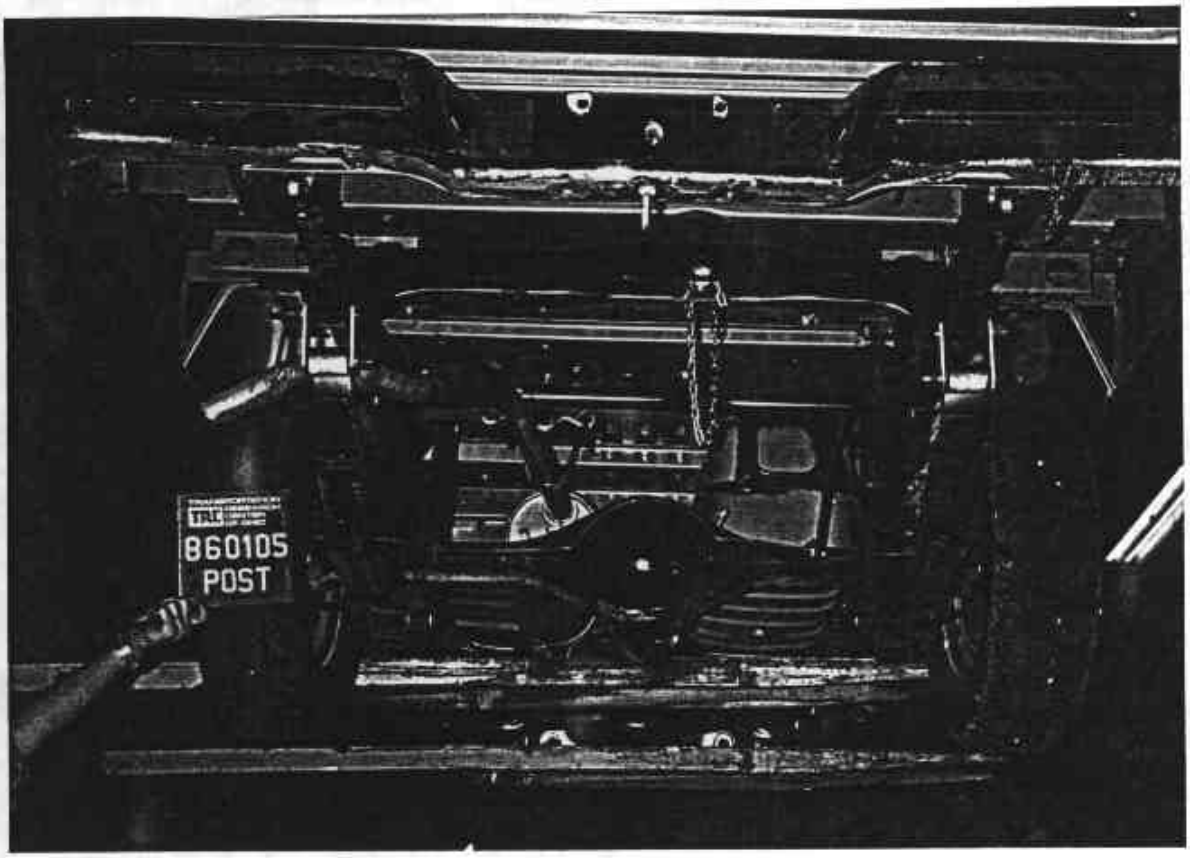


Figure 20. POST-TEST REAR UNDERBODY VIEW

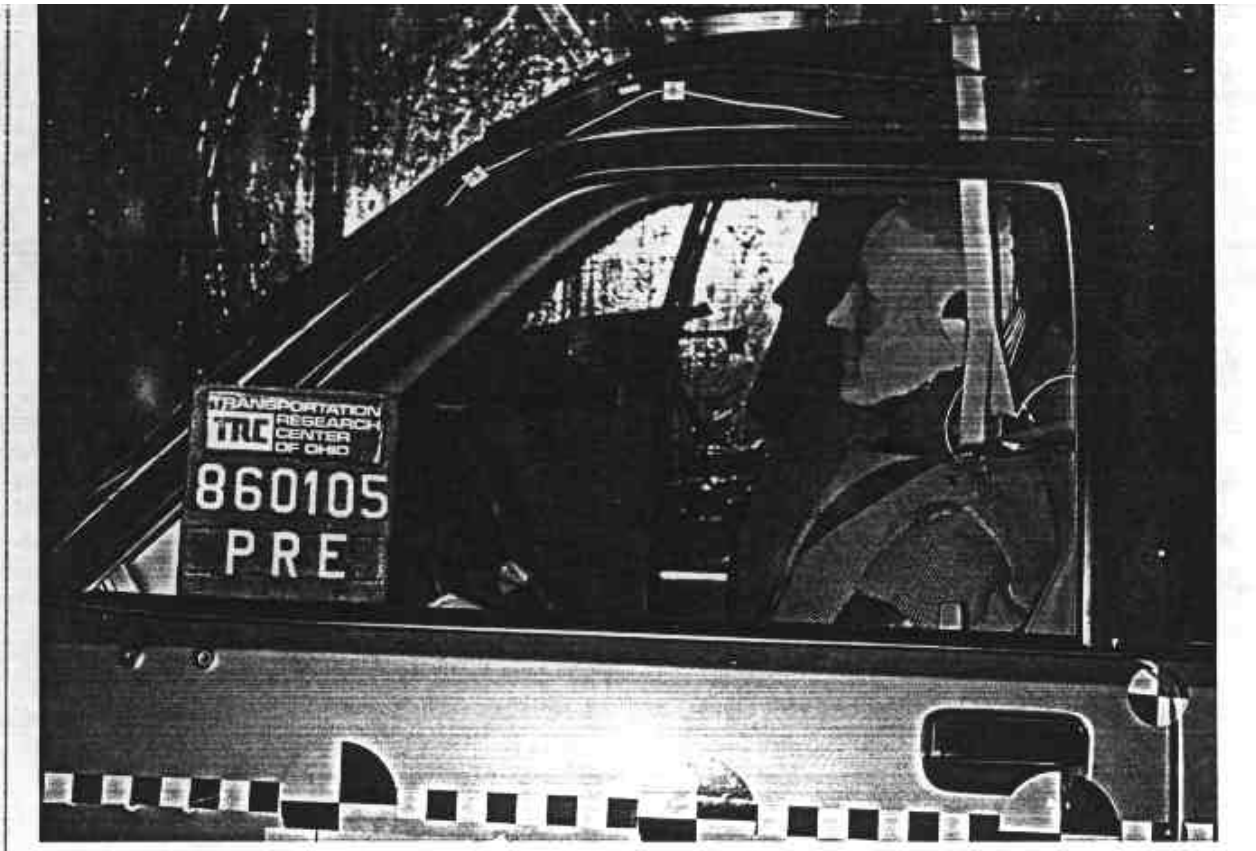


Figure 21. PRE-TEST DRIVER DUMMY POSITION VIEW

Figure 22. POST-TEST DRIVER DUMMY POSITION VIEW

Figure 23. PRE-TEST PASSENGER DUMMY POSITION VIEW

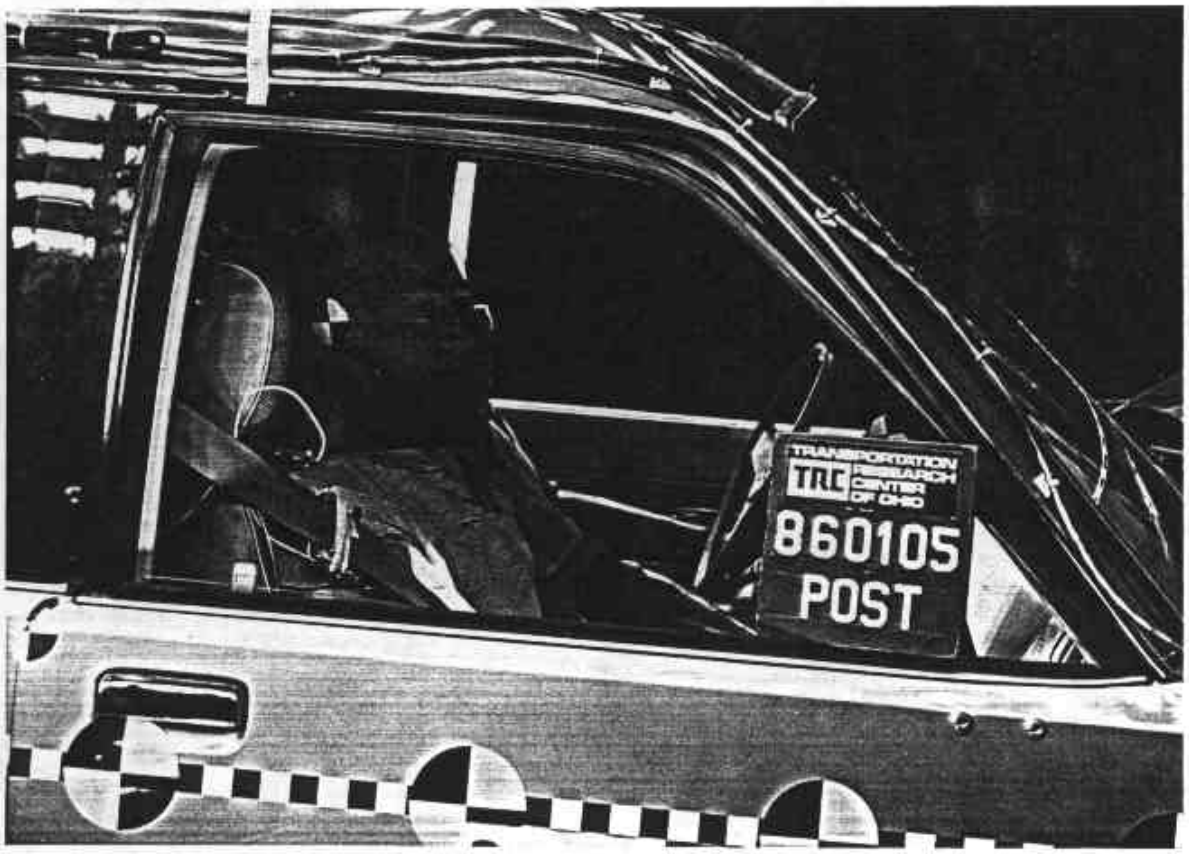


Figure 24. POST-TEST PASSENGER DUMMY POSITION VIEW

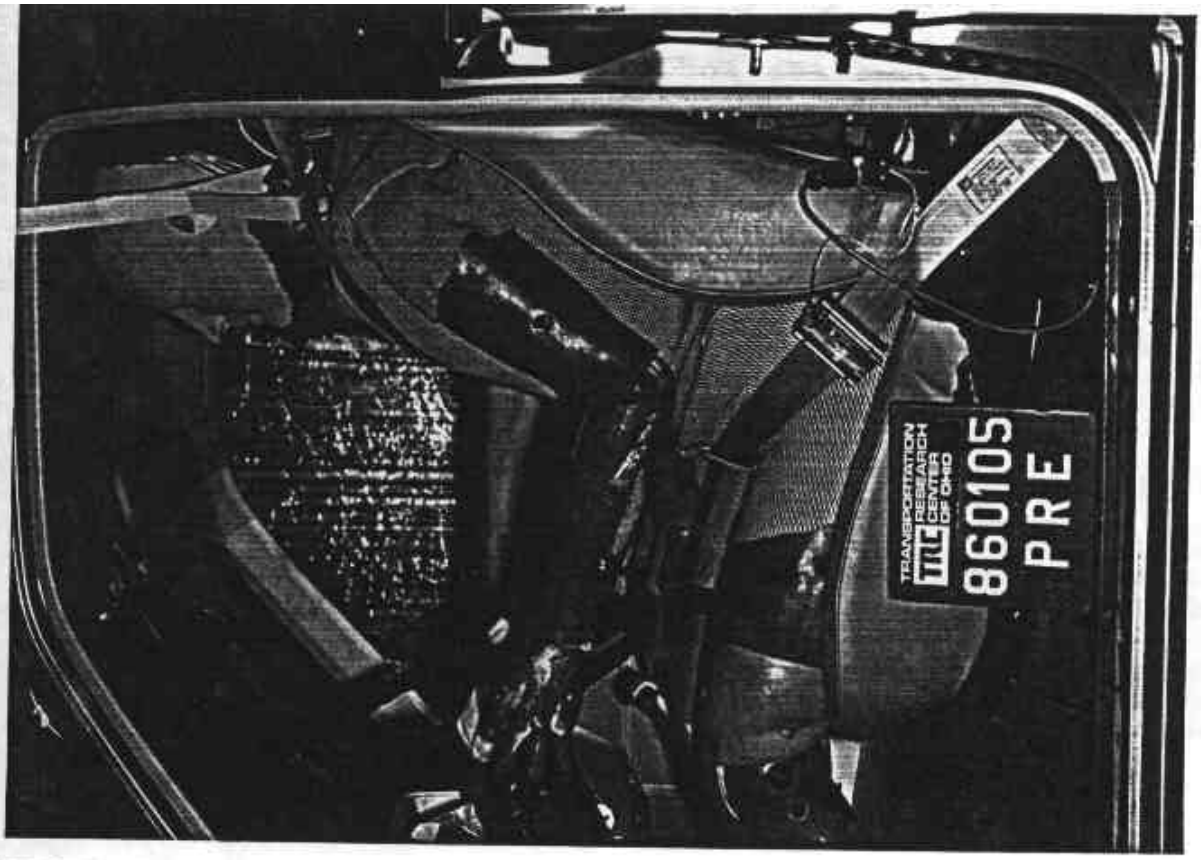


Figure 25. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

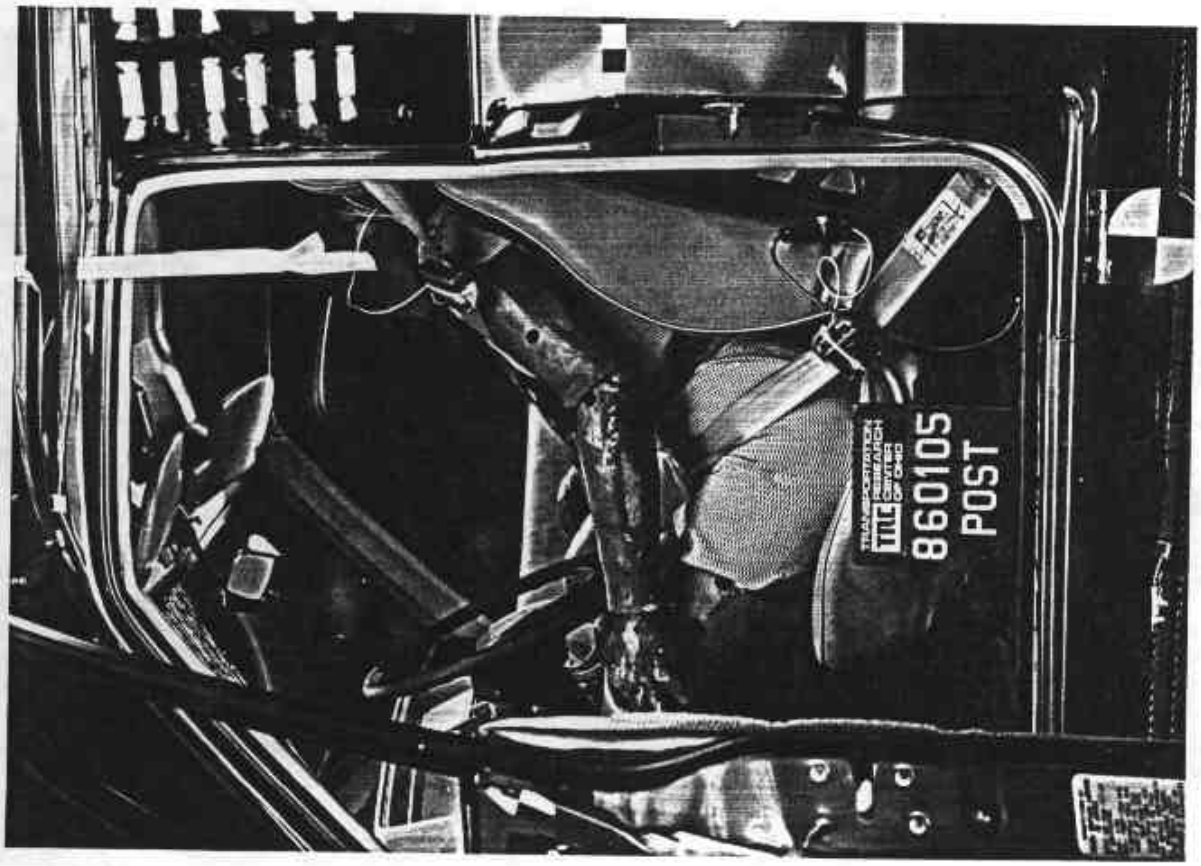


Figure 26. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

Figure 27. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

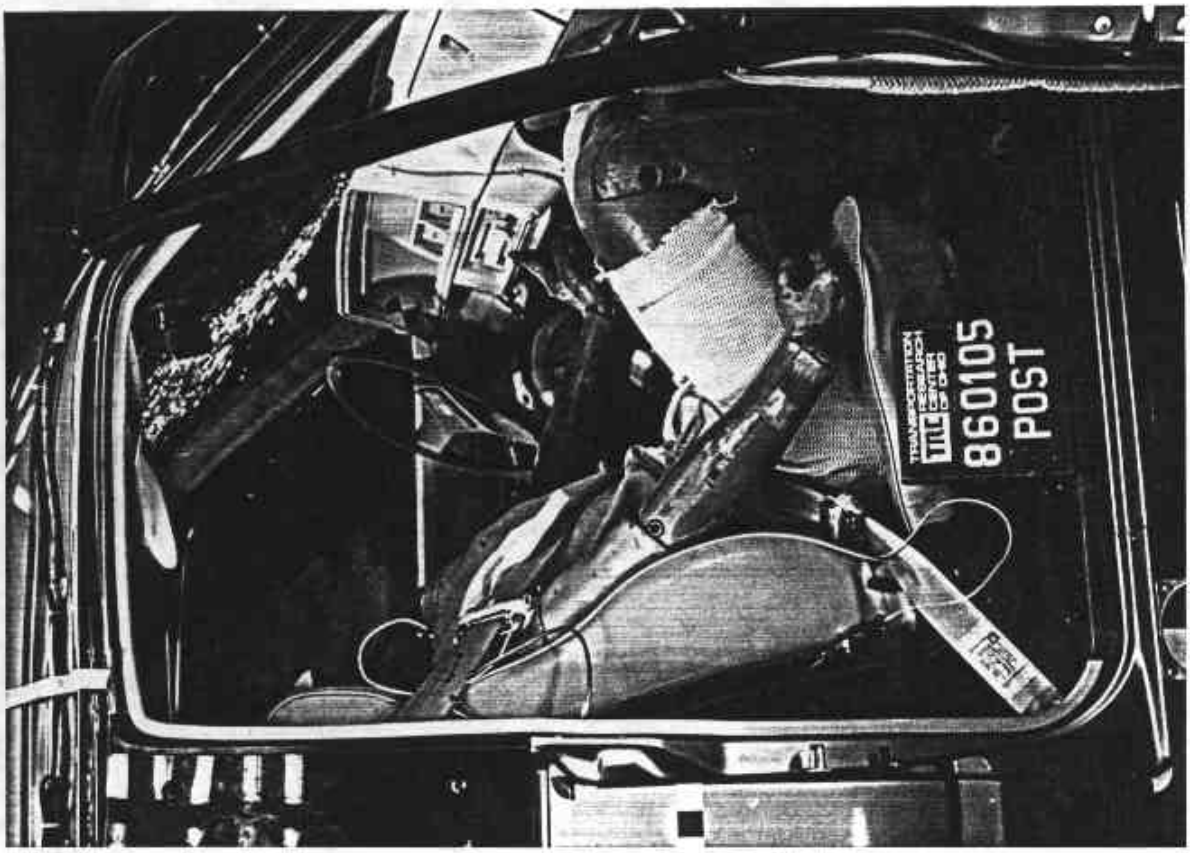


Figure 28. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

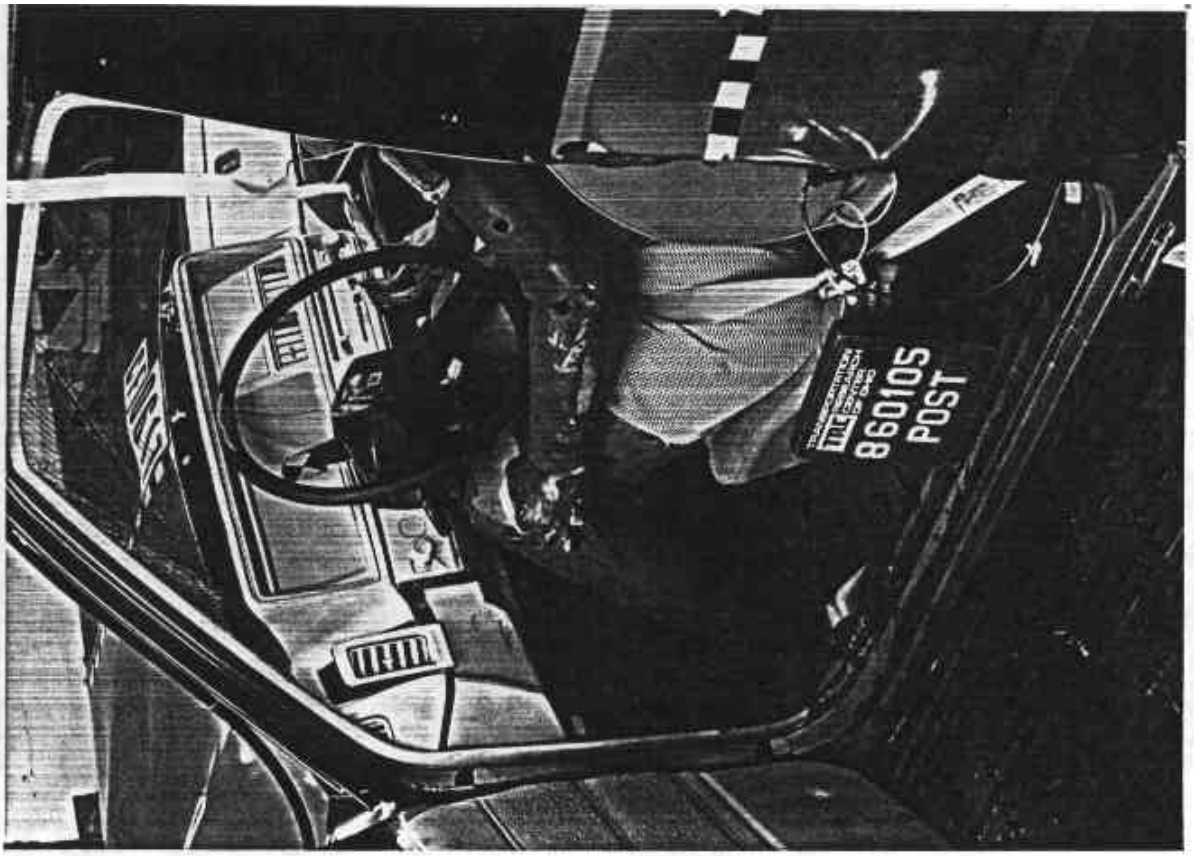


Figure 29. POST-TEST DRIVER DUMMY HEAD CONTACT AREA

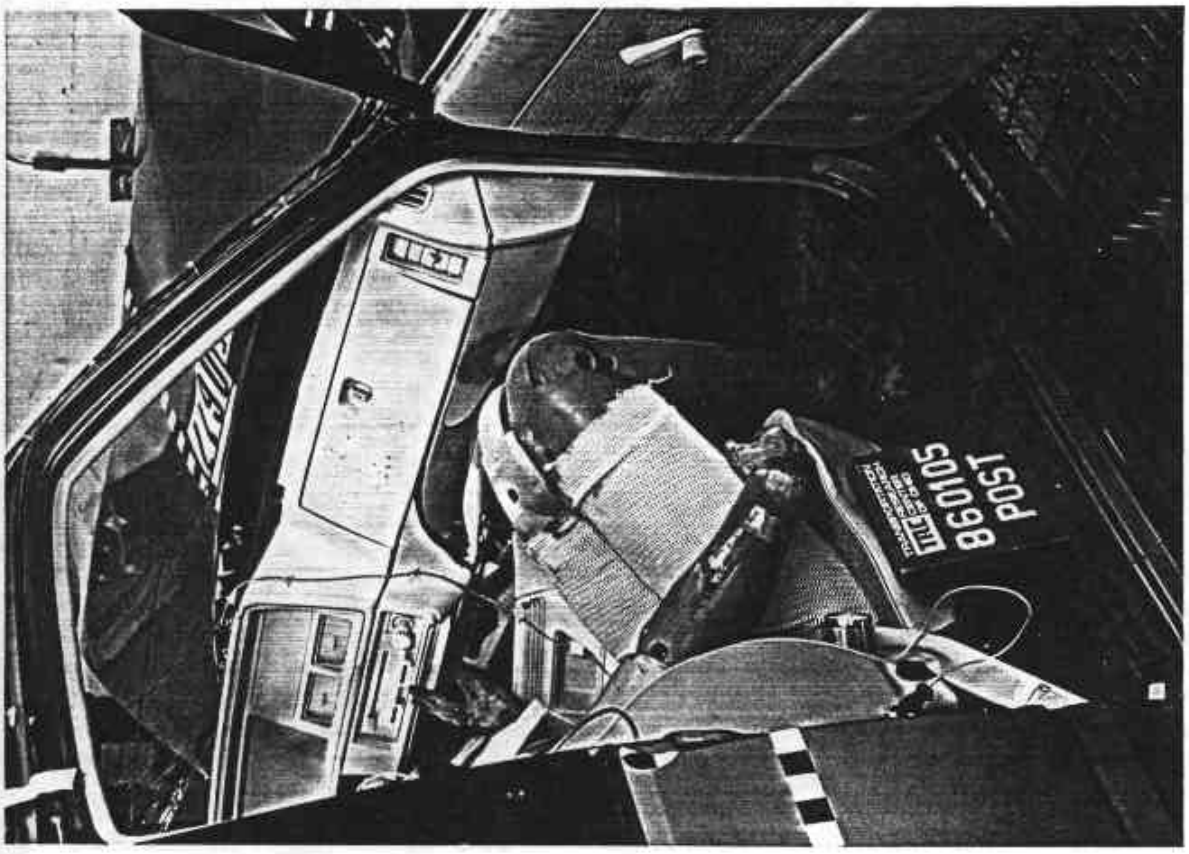
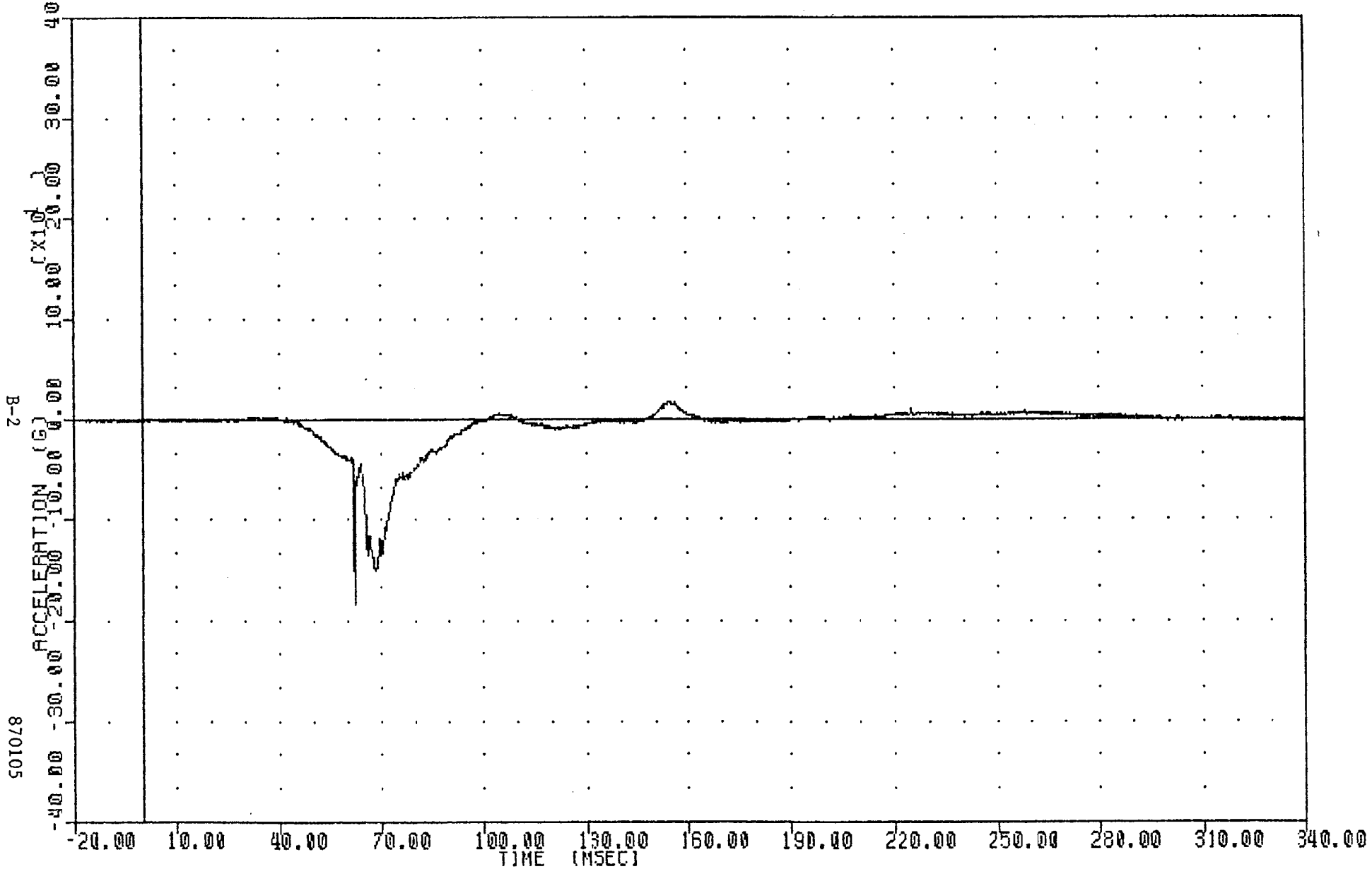


Figure 30. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT

APPENDIX B

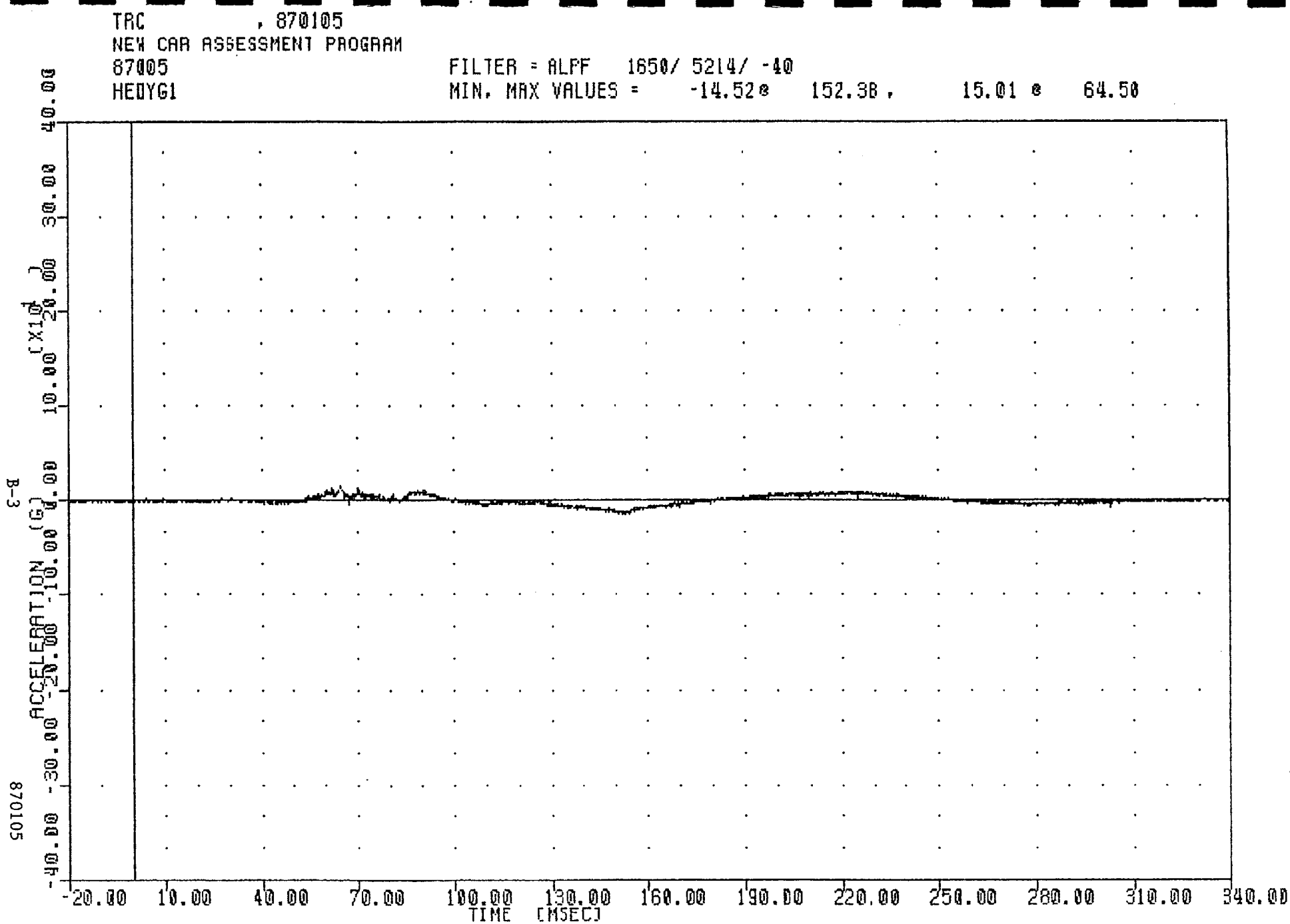
DATA PLOTS

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
HEDXG1
FILTER = CFC 1650/ 5214/ -40
MIN, MAX VALUES = -184.37 @ 62.25 , 17.87 @ 154.50



ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER HEAD ACCELERATION X AXIS

870105

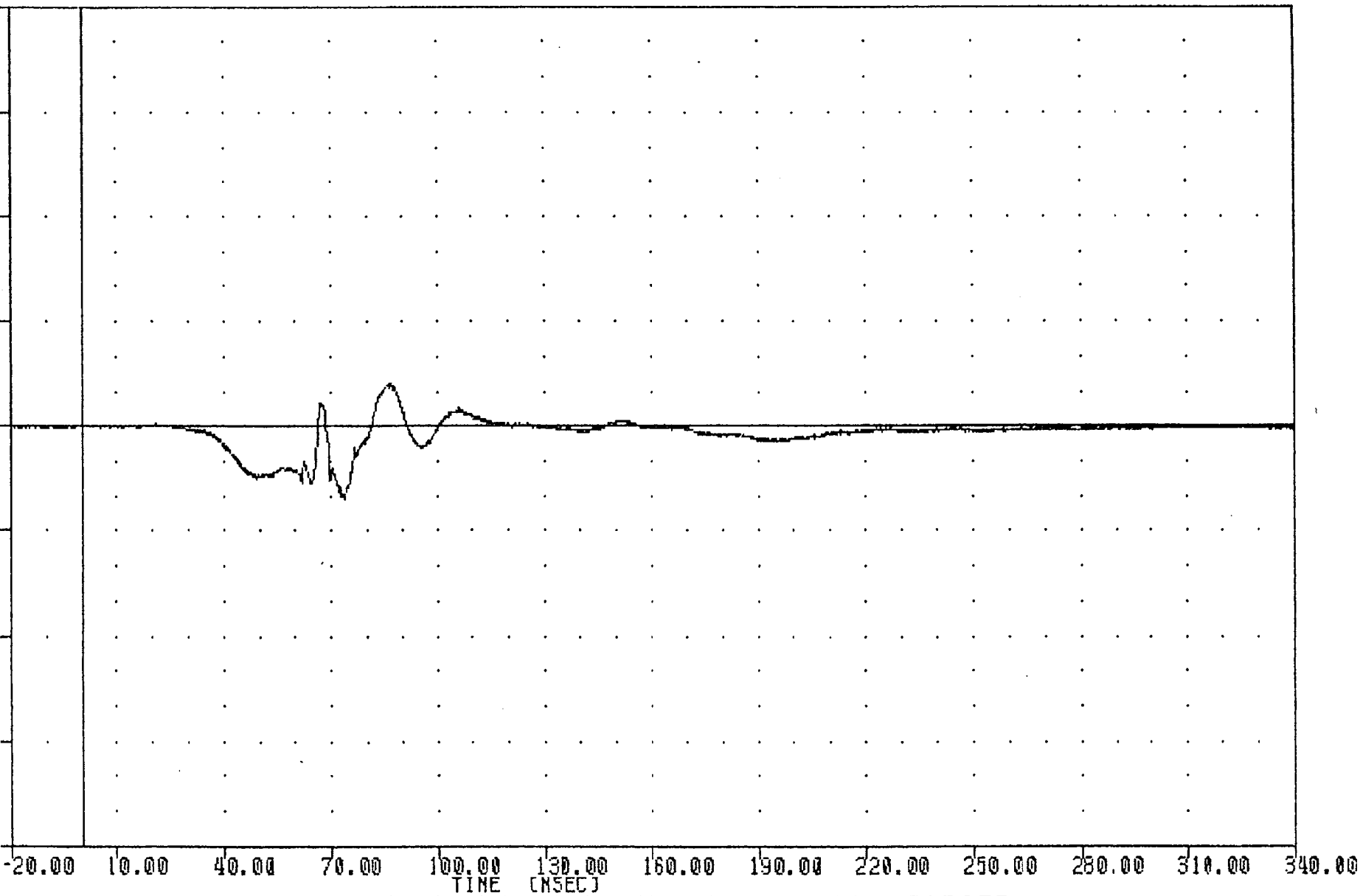


ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER HEAD ACCELERATION Y AXIS

870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
HEDZ61

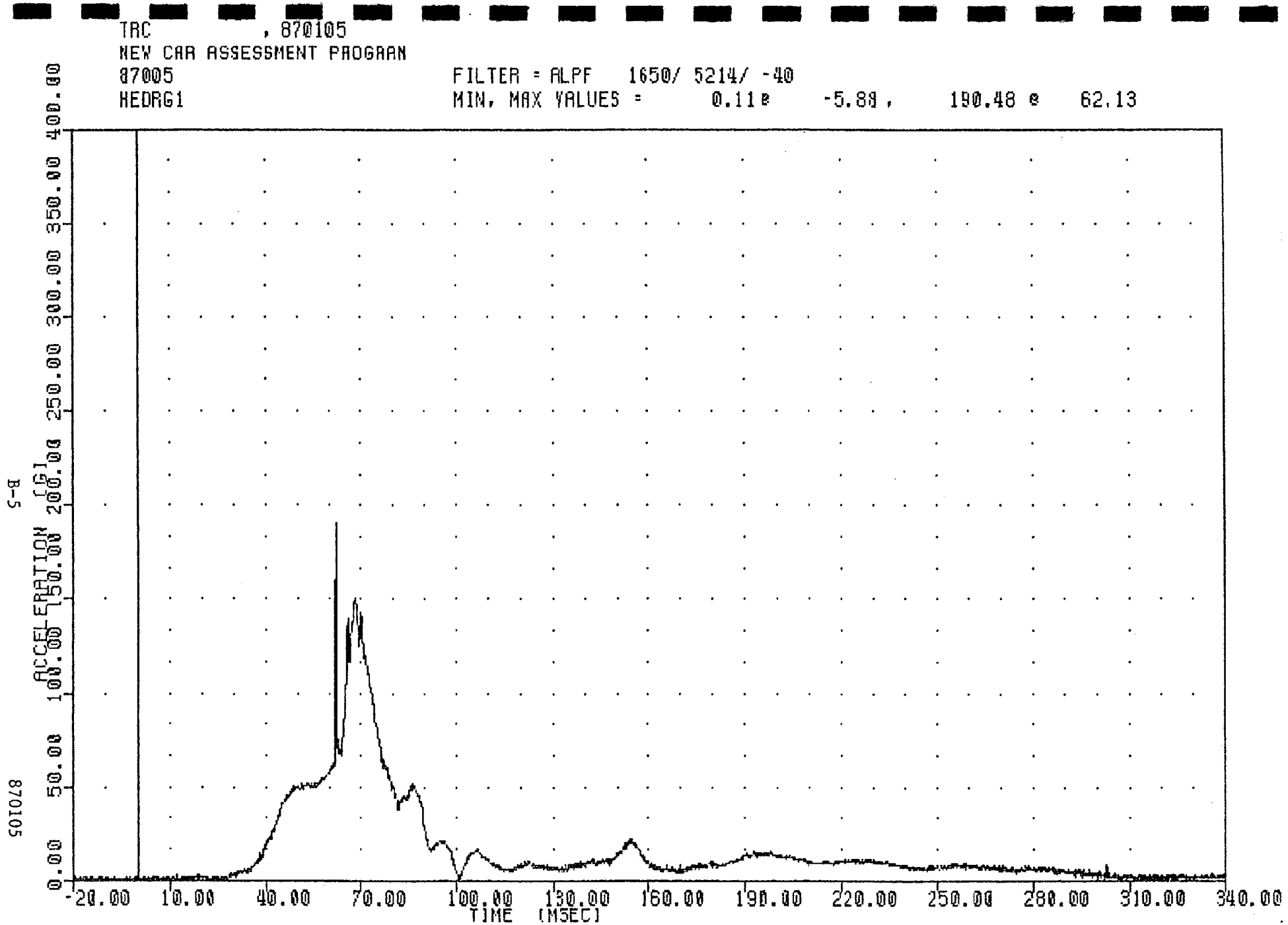
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -69.21 @ 73.88 , 39.85 @ 86.75



B-4

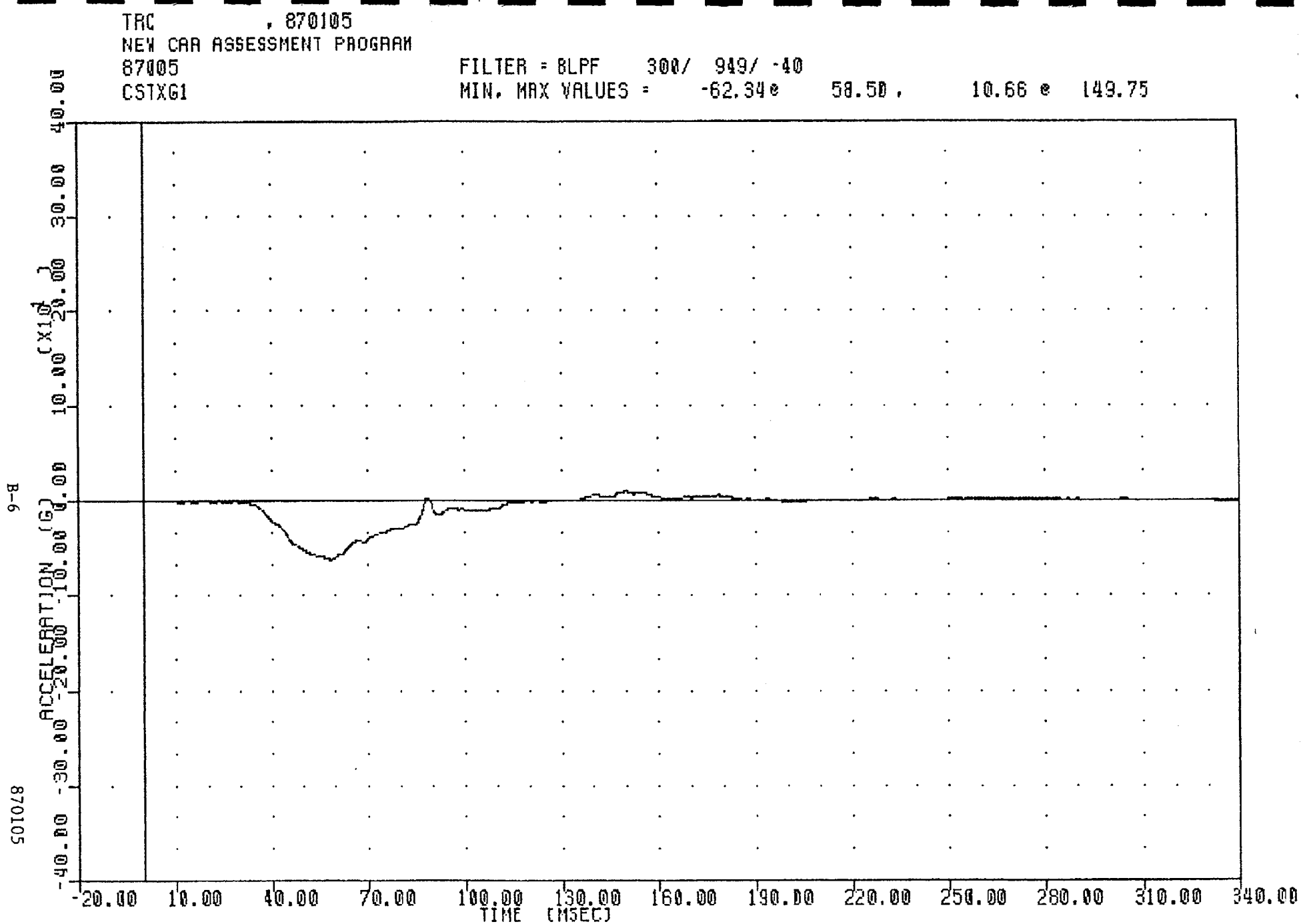
870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER HEAD ACCELERATION Z AXIS



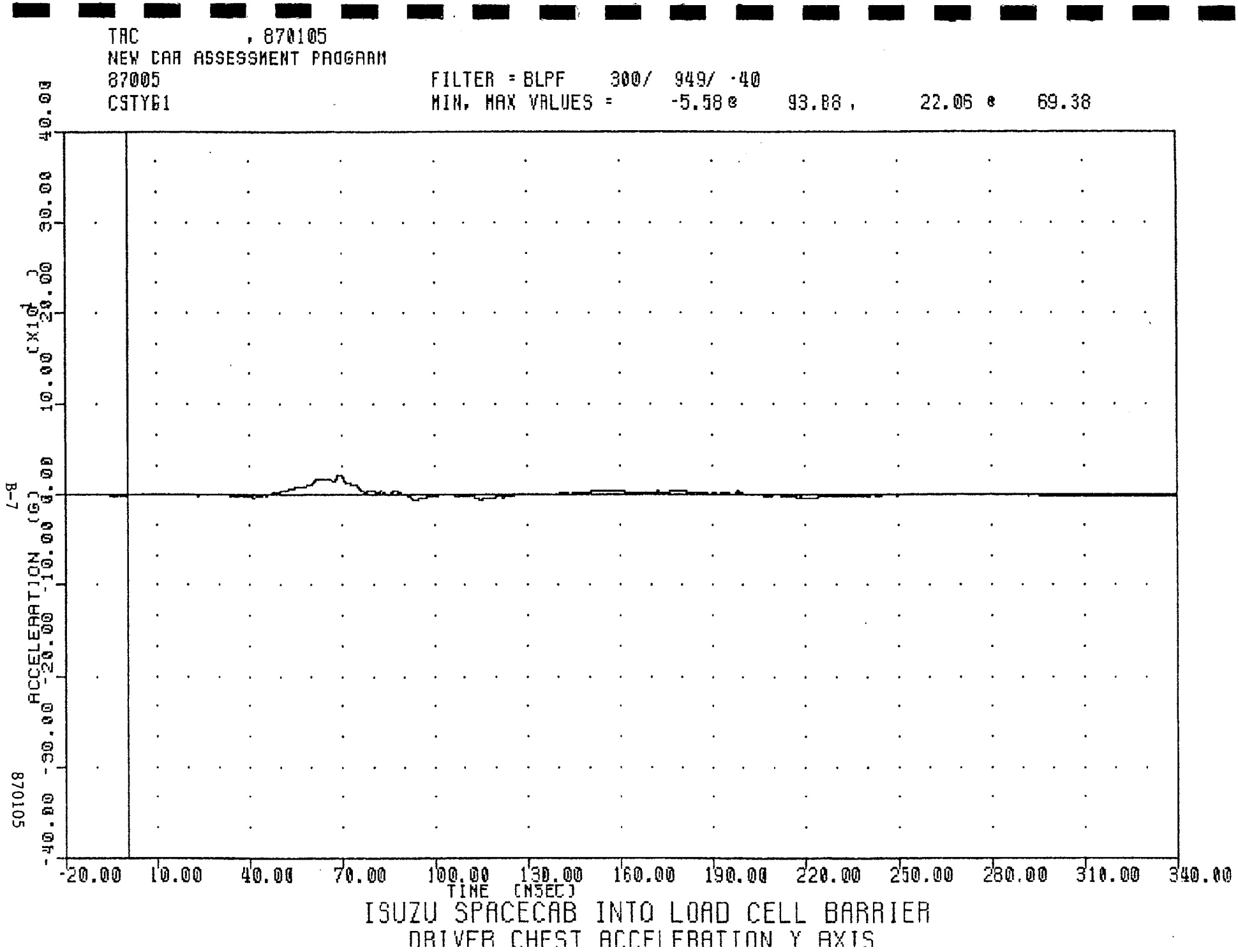
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

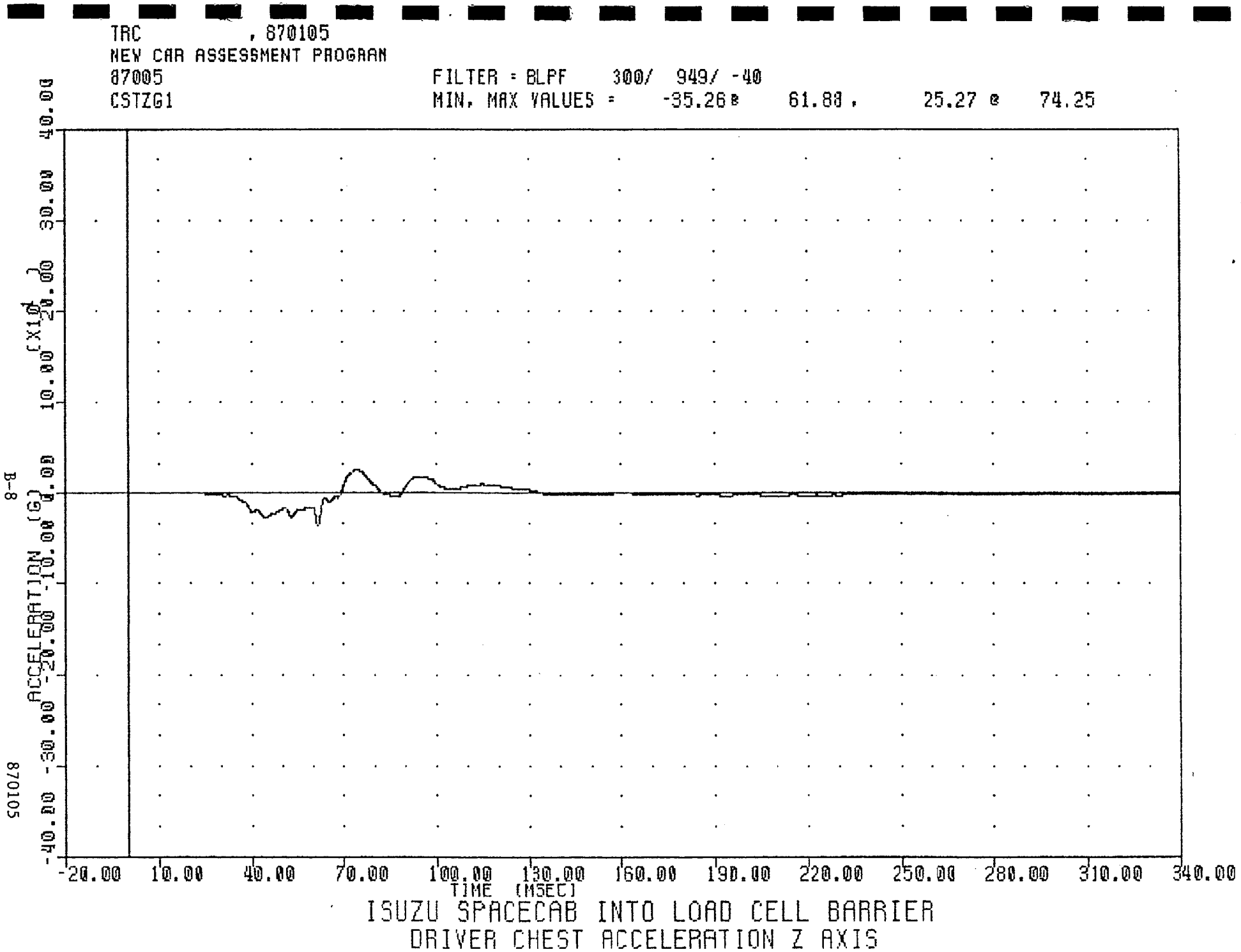
870105



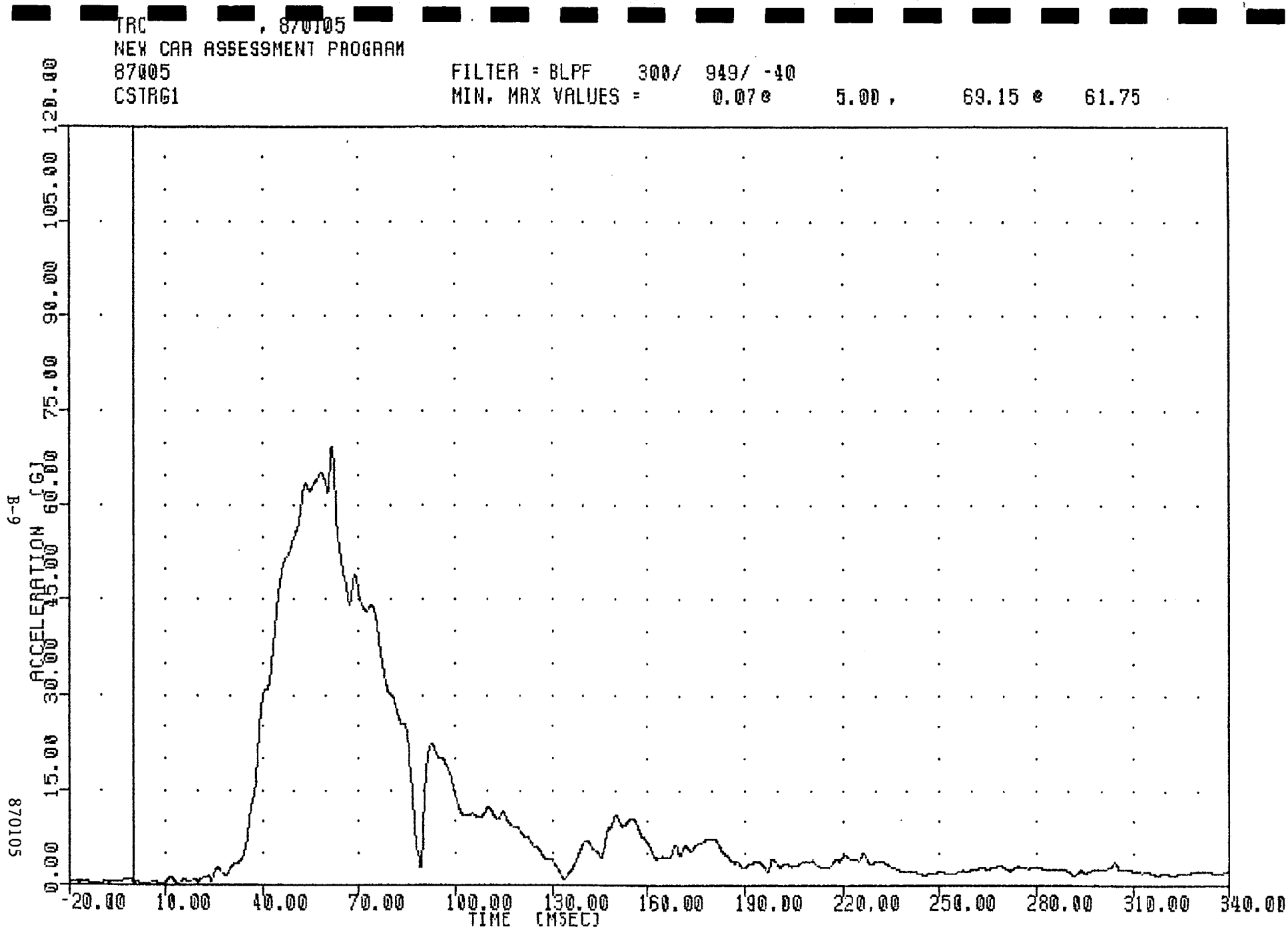
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER CHEST ACCELERATION X AXIS

870105


TAC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
CSTY61
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -5.58 @ 93.88 , 22.06 @ 69.38
ACCELERATION (G) (X10)
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
B-7
870105
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER CHEST ACCELERATION Y AXIS

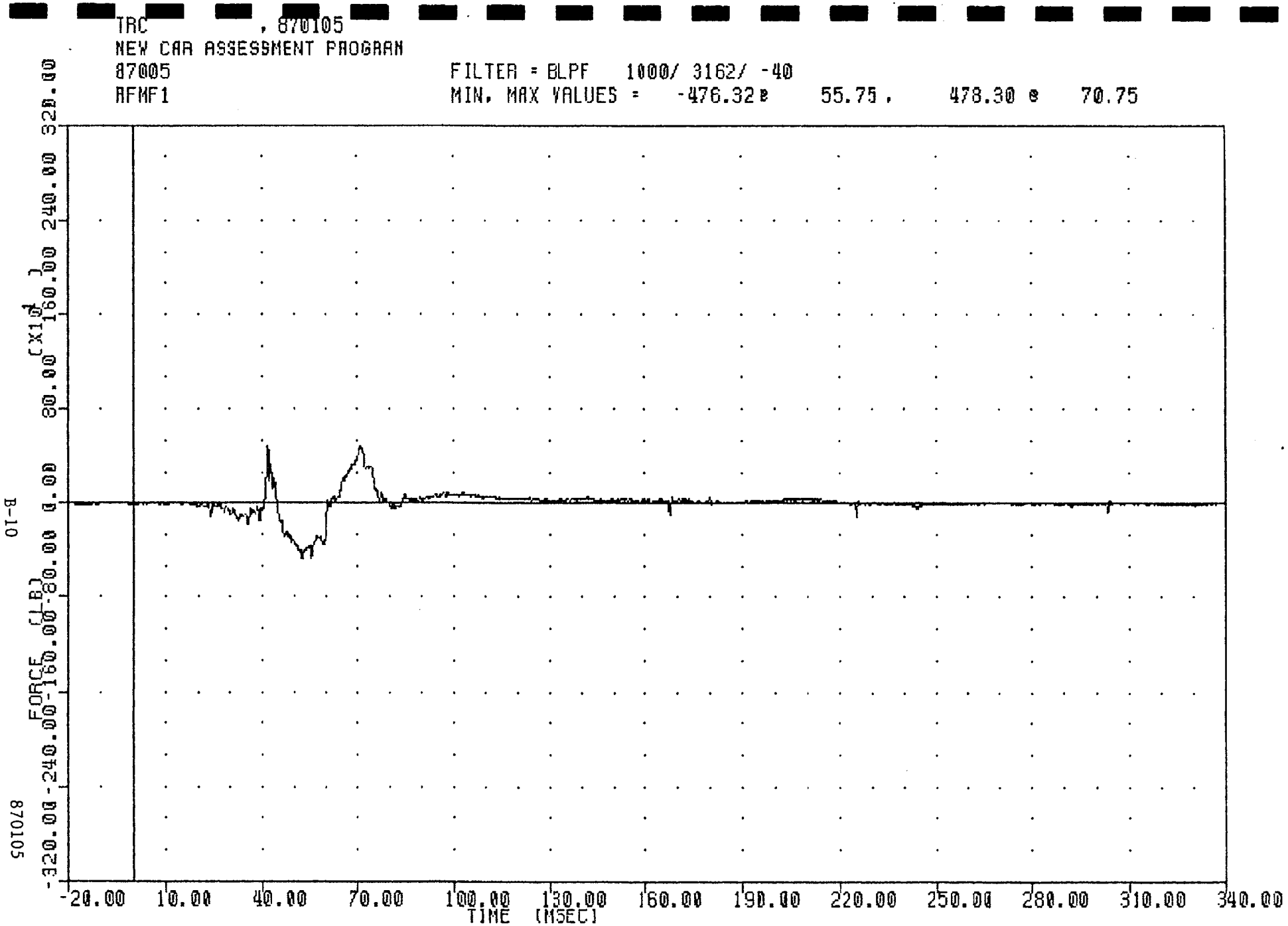


ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER CHEST ACCELERATION Z AXIS



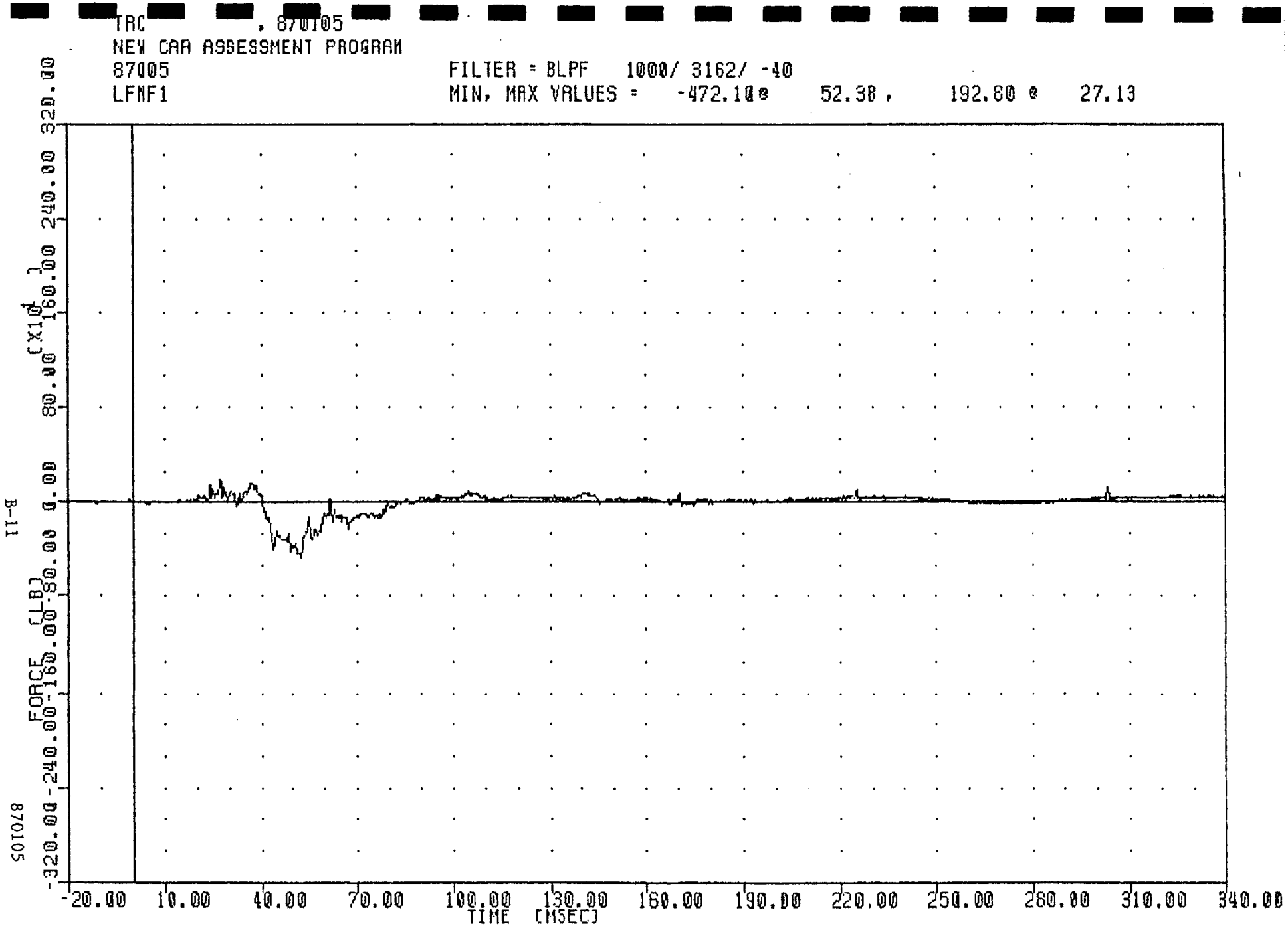
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

870105



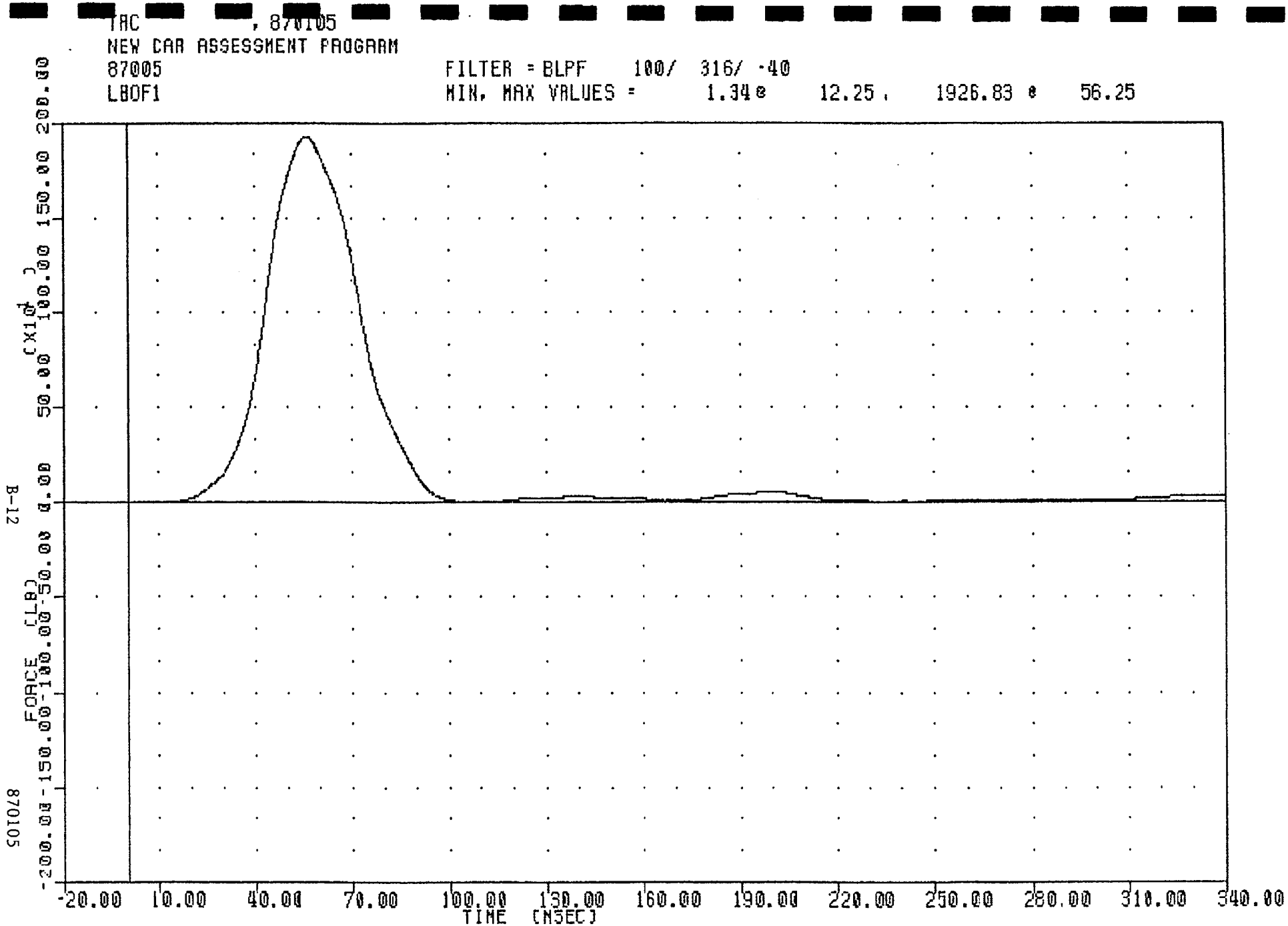
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER RIGHT FEMUR FORCE

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE

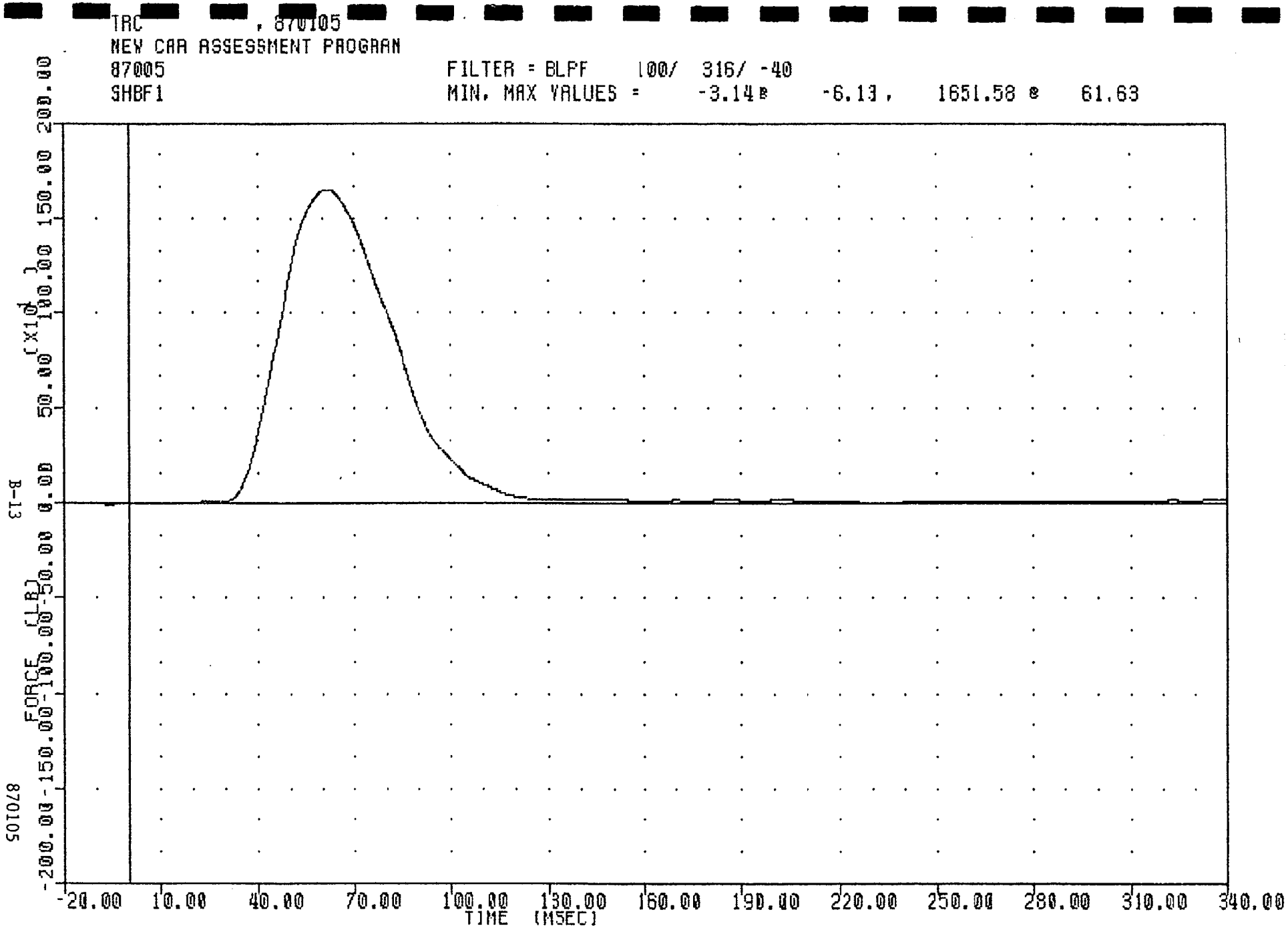
870105



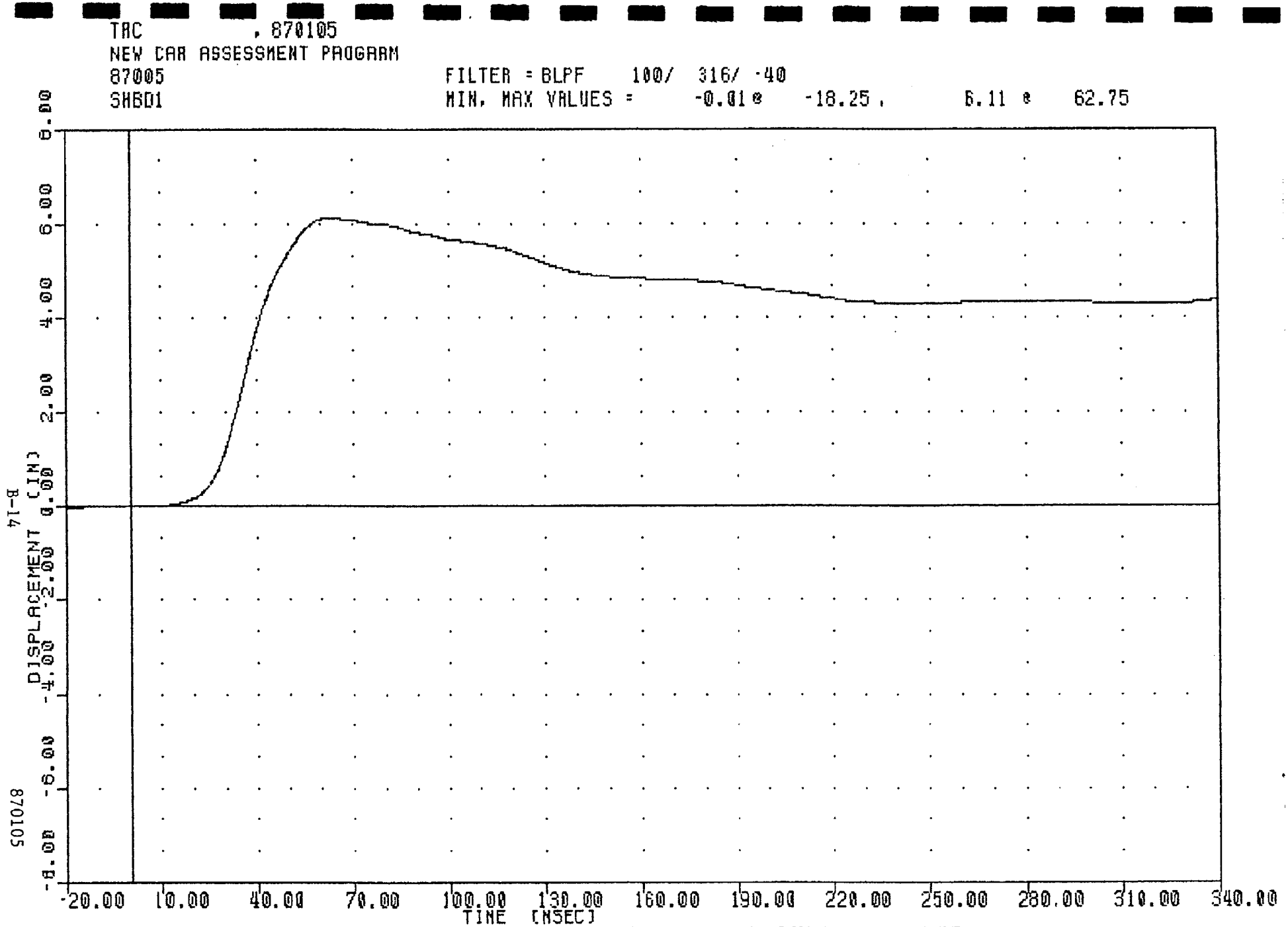
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE

B-12

870105



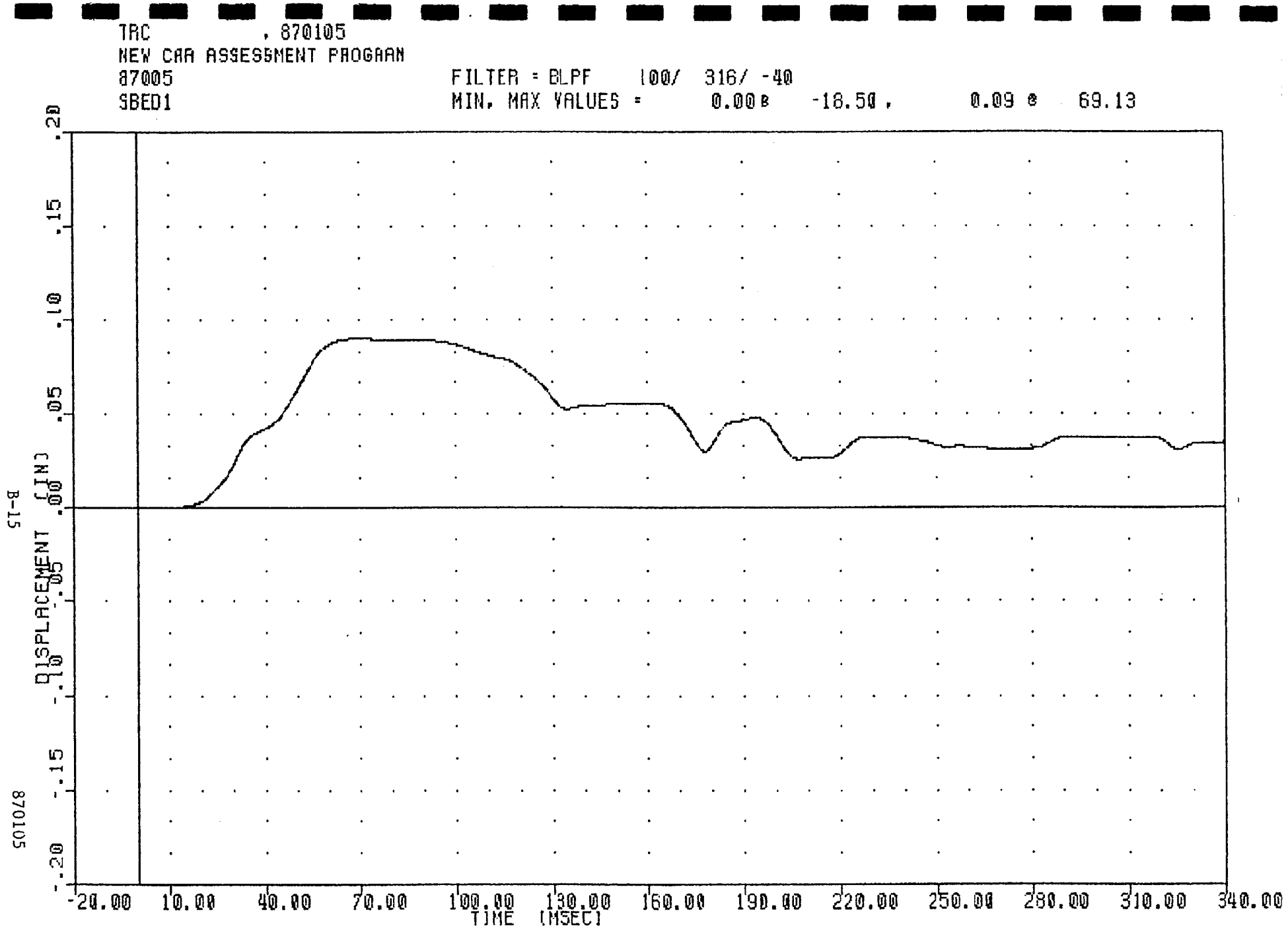
ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER SHOULDER BELT FORCE



B-14

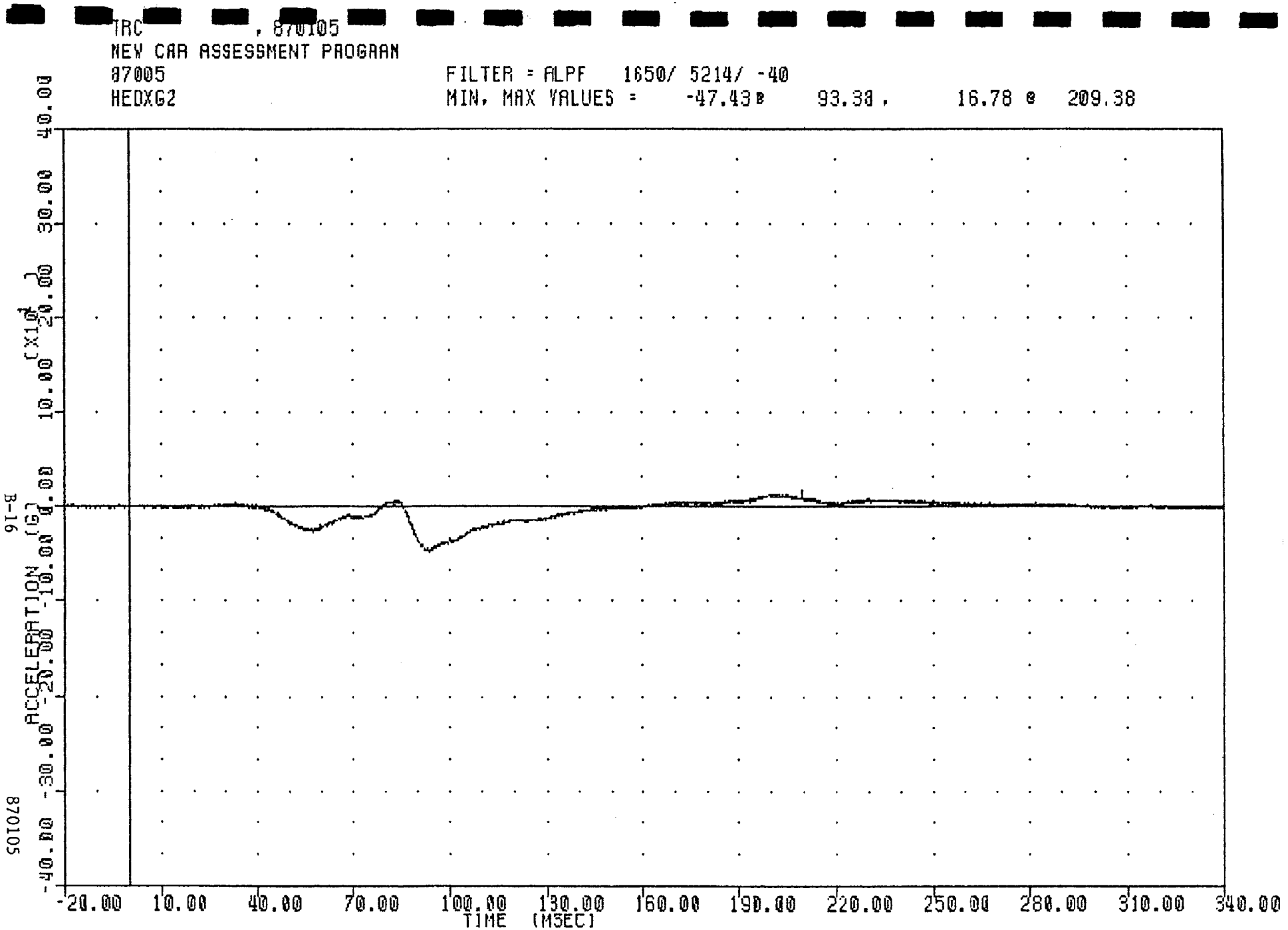
870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT

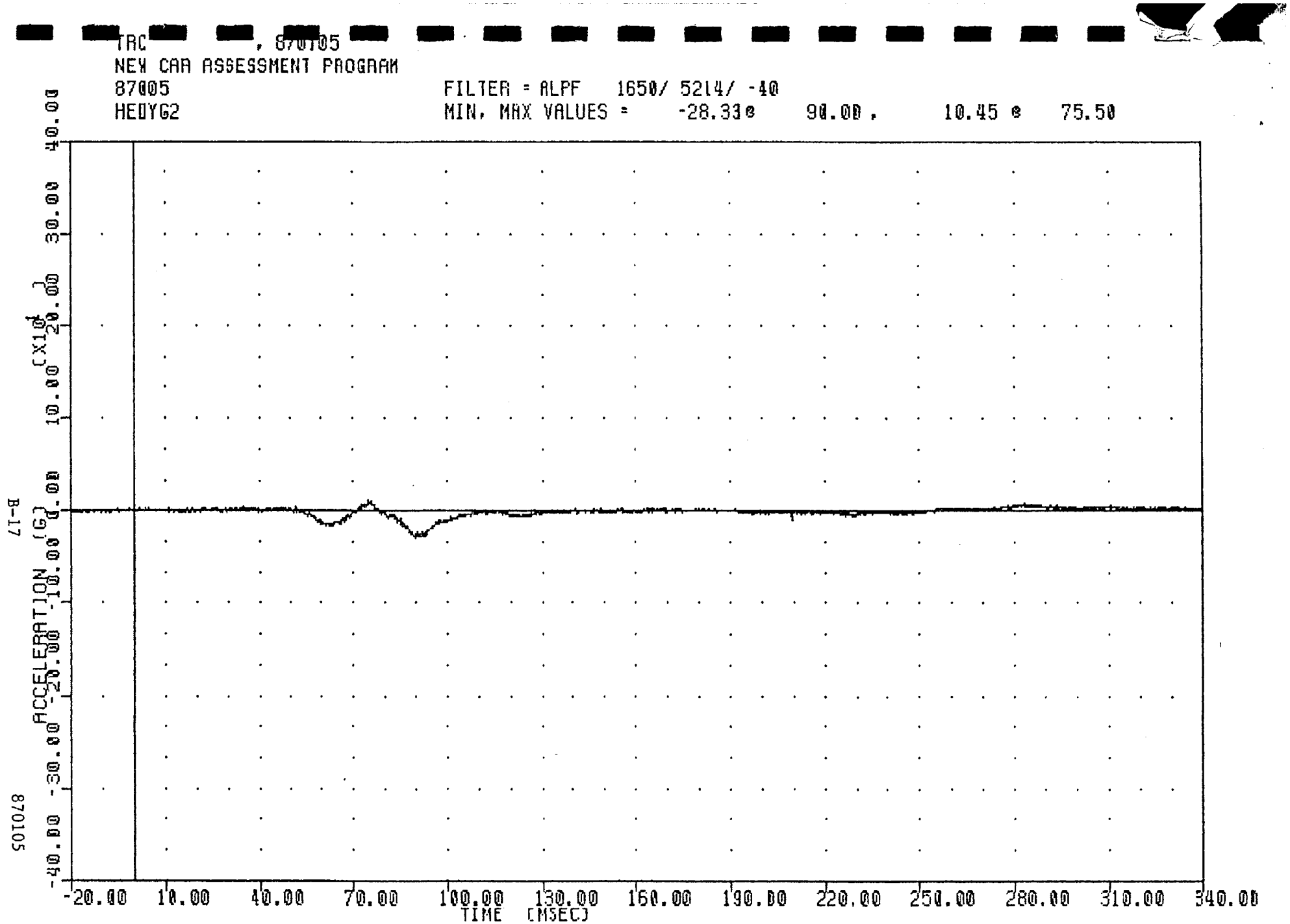


ISUZU SPACECAB INTO LOAD CELL BARRIER
DRIVER SEAT BELT EXTENSION

870105



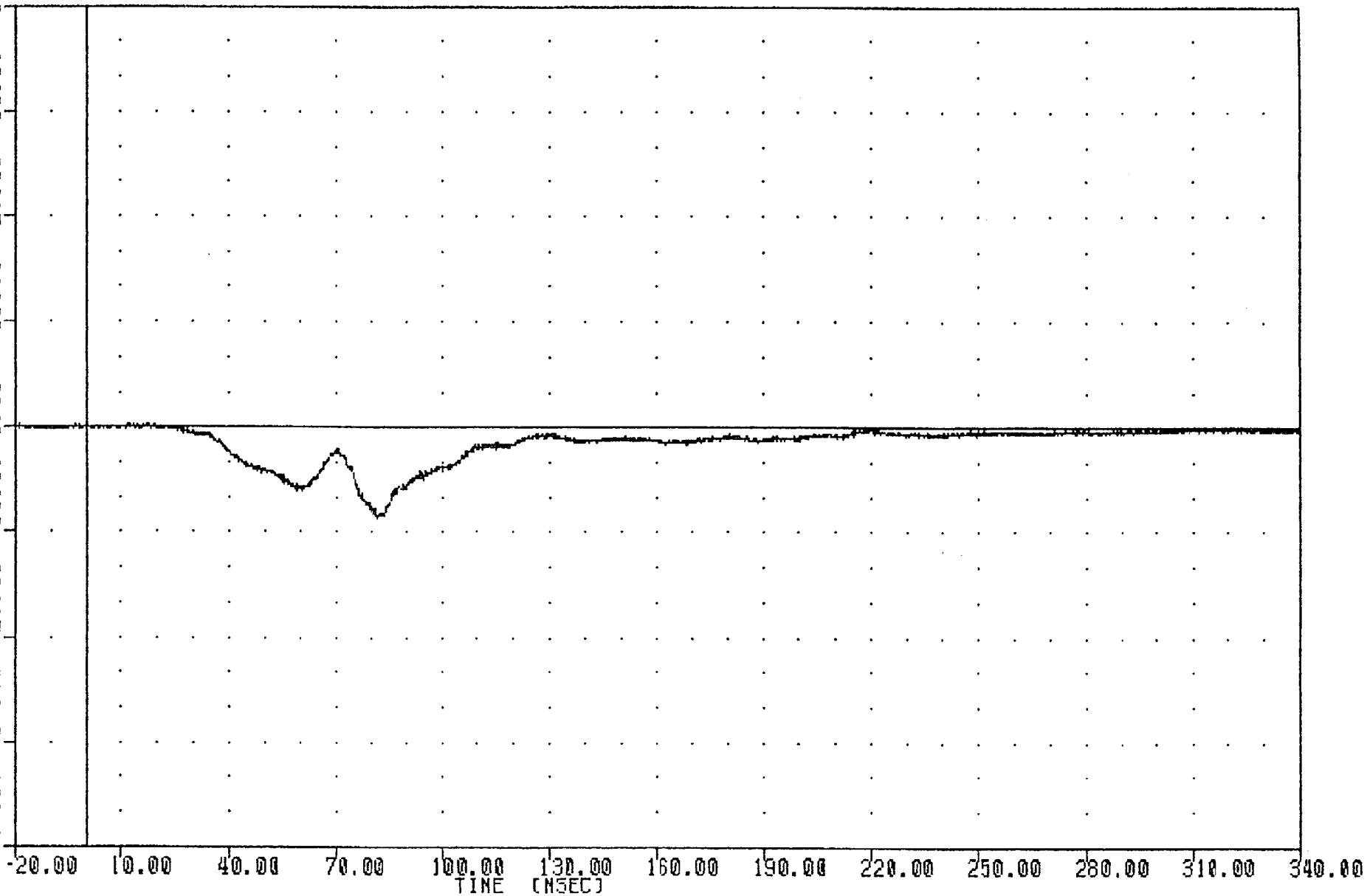
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER HEAD ACCELERATION X AXIS



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER HEAD ACCELERATION Y AXIS

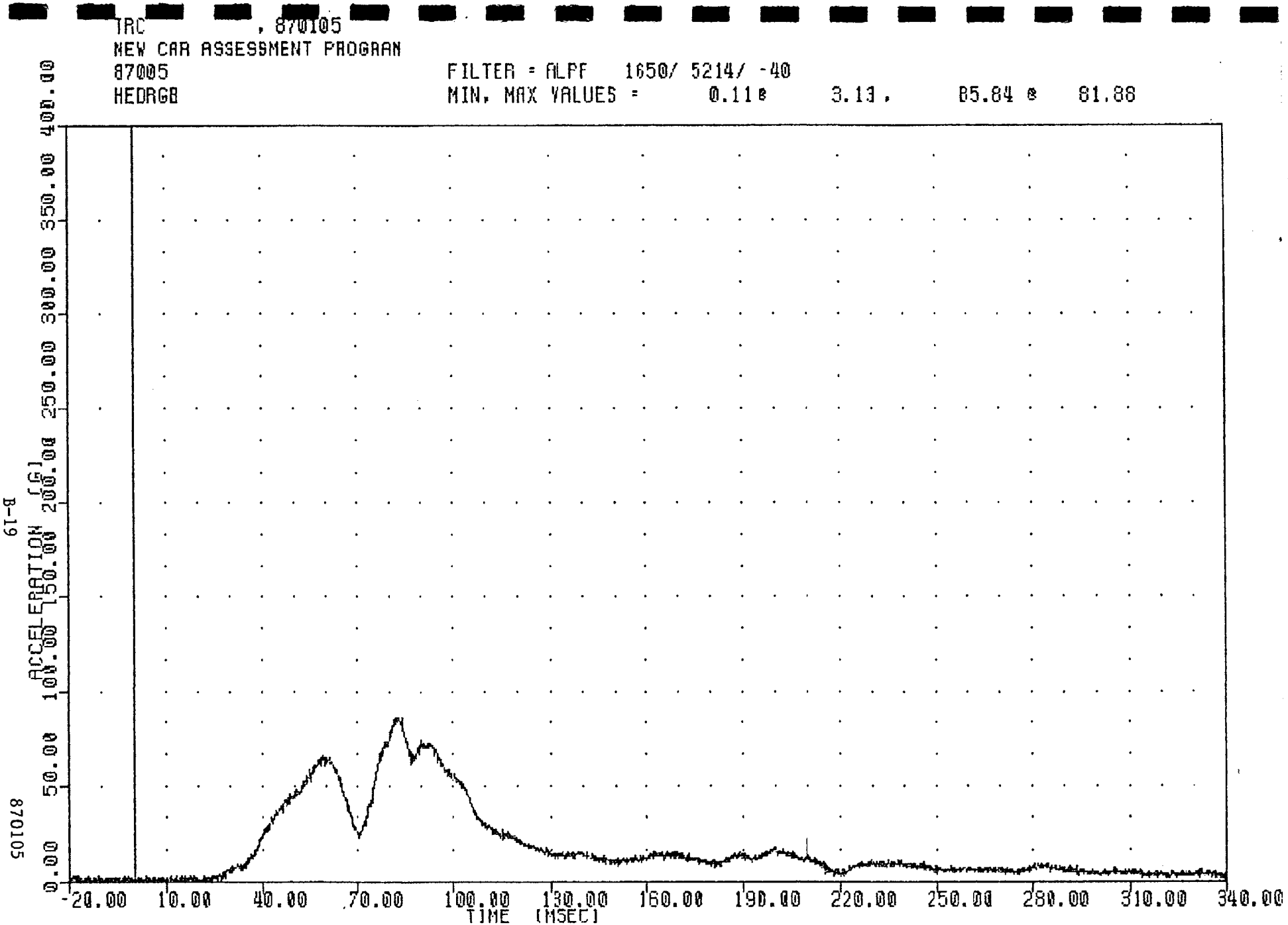
870105

TAC , 870105
NEW CAR ASSESSMENT PROGRAM
87005 FILTER = ALPF 1650/ 5214/ -40
HEDZBB MIN, MAX VALUES = -85.54 @ 81.88 , 3.04 @ 17.38



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER HEAD ACCELERATION Z AXIS

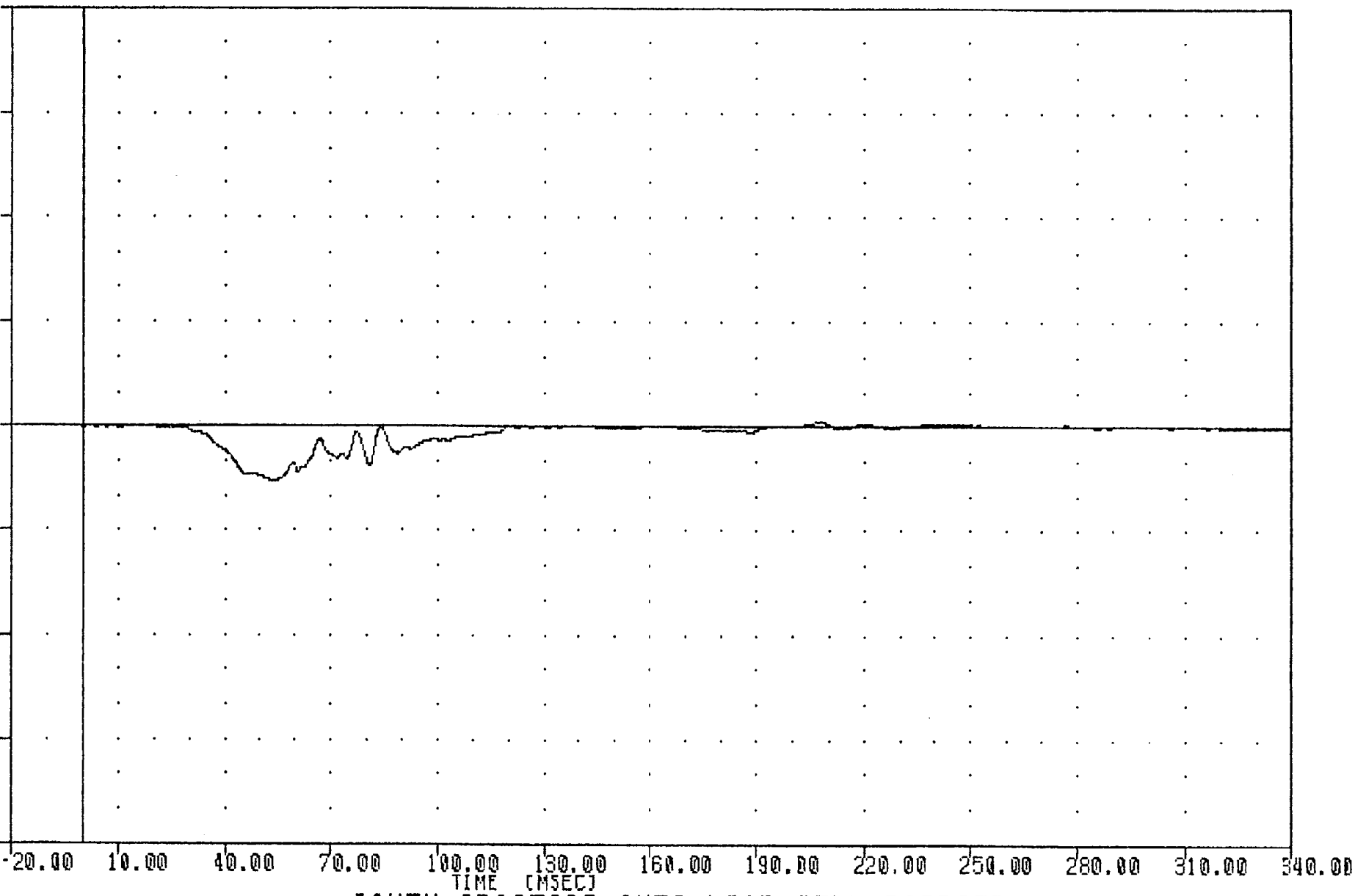
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION

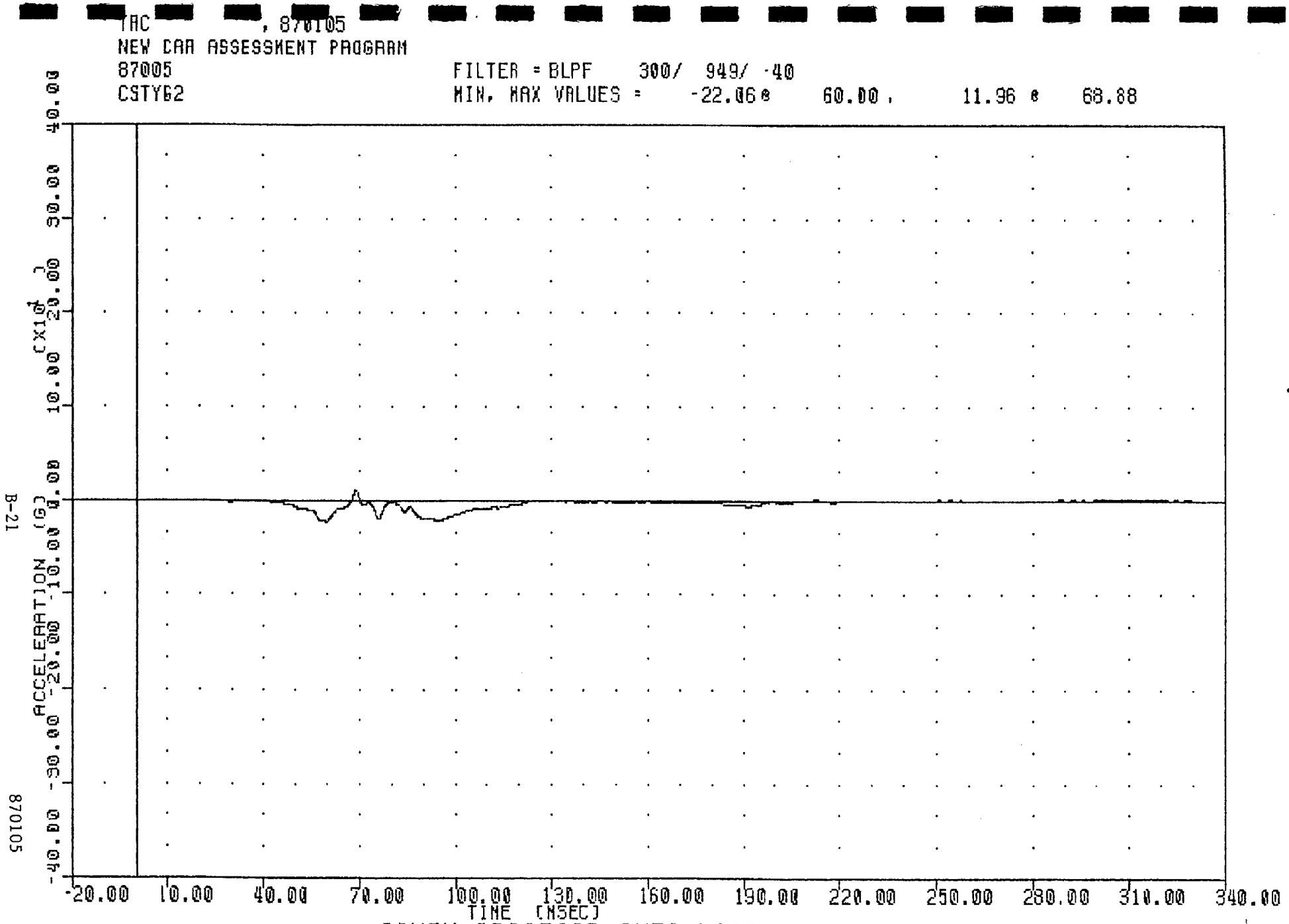
870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005 FILTER = BLPF 300/ 949/ -40
CSIXG2 MIN, MAX VALUES = -52.54 @ 53.38 , 4.37 @ 208.00



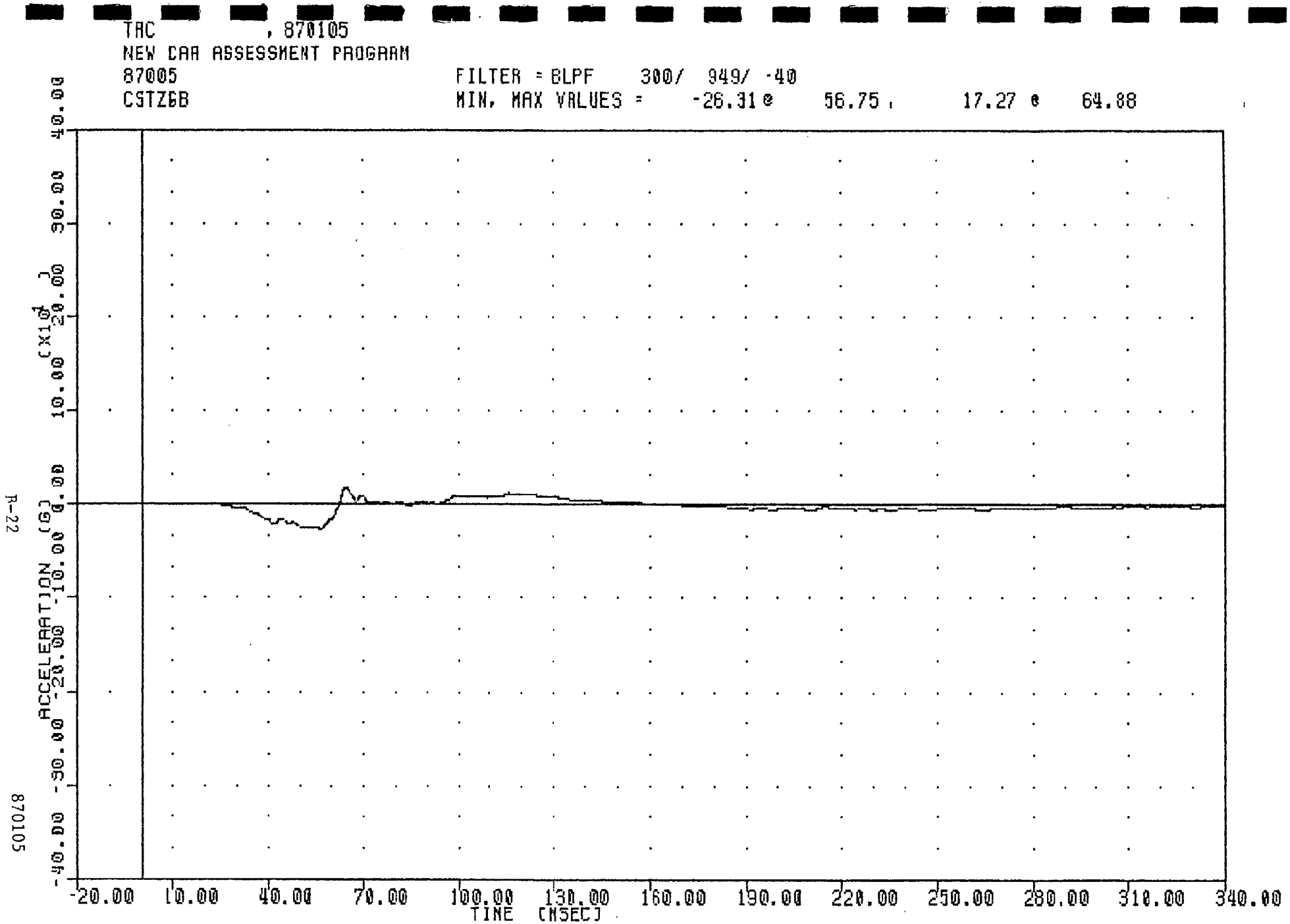
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER CHEST ACCELERATION X AXIS

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER CHEST ACCELERATION Y AXIS

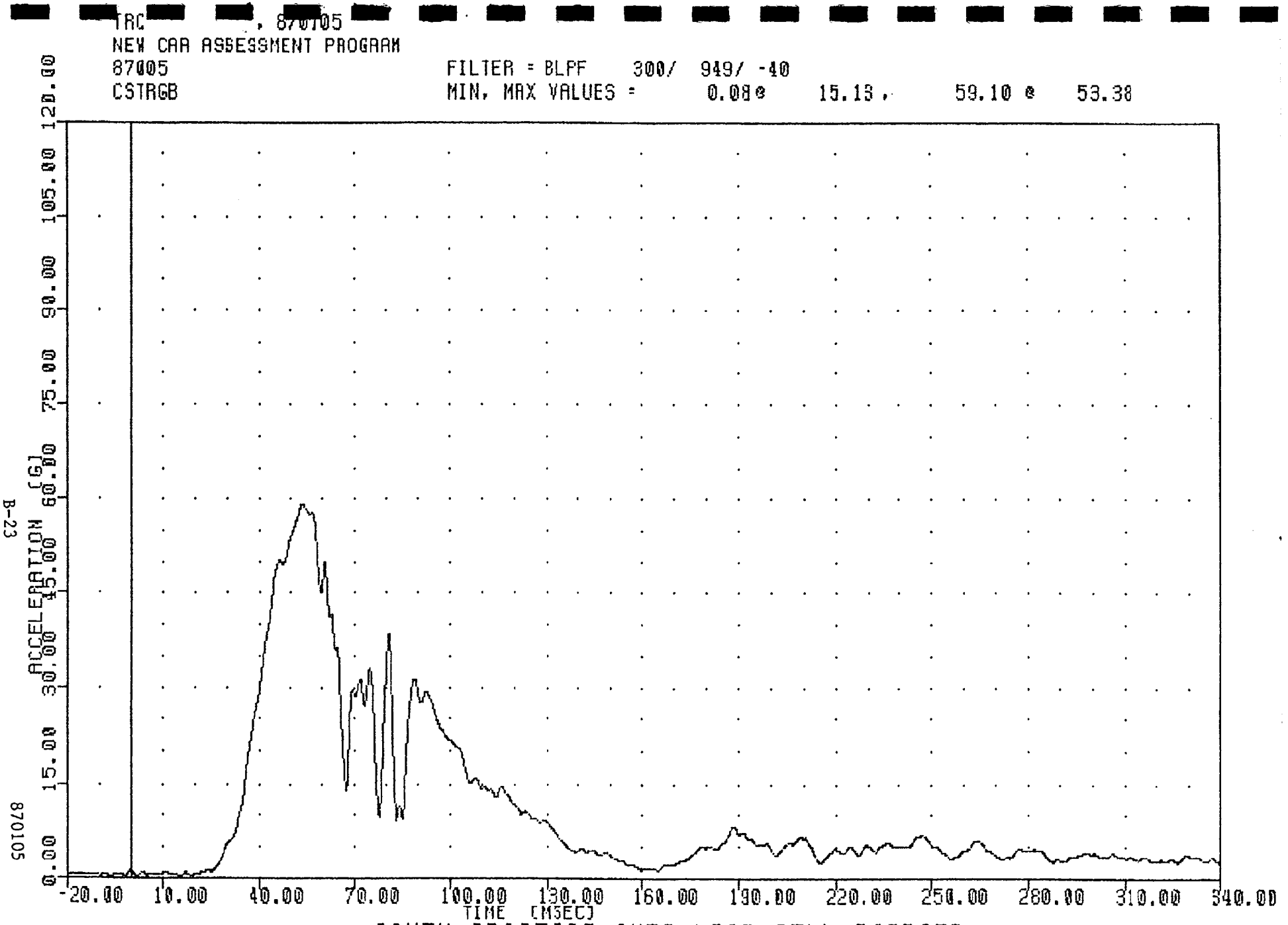
870105



R-22

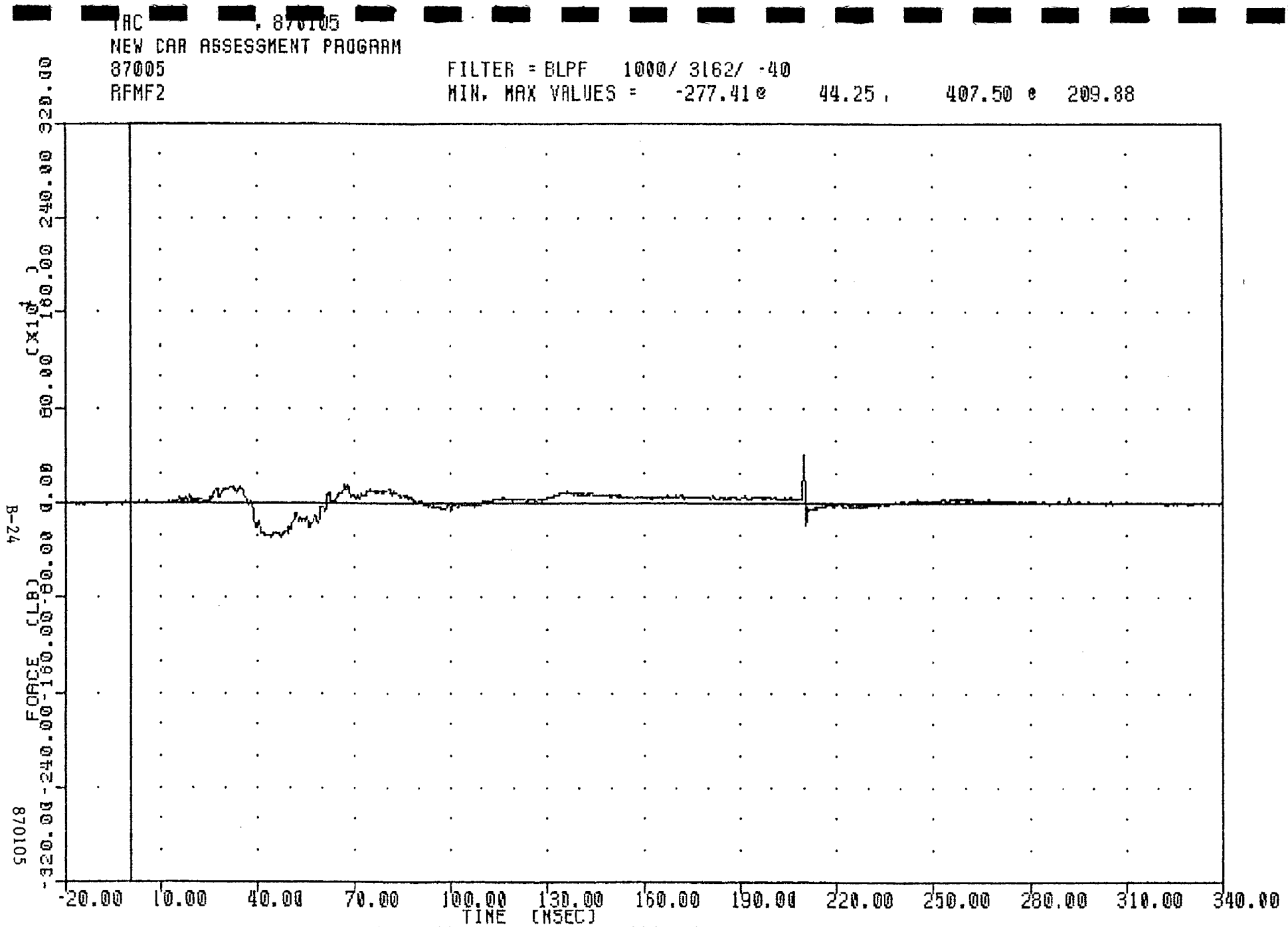
870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER CHEST ACCELERATION Z AXIS



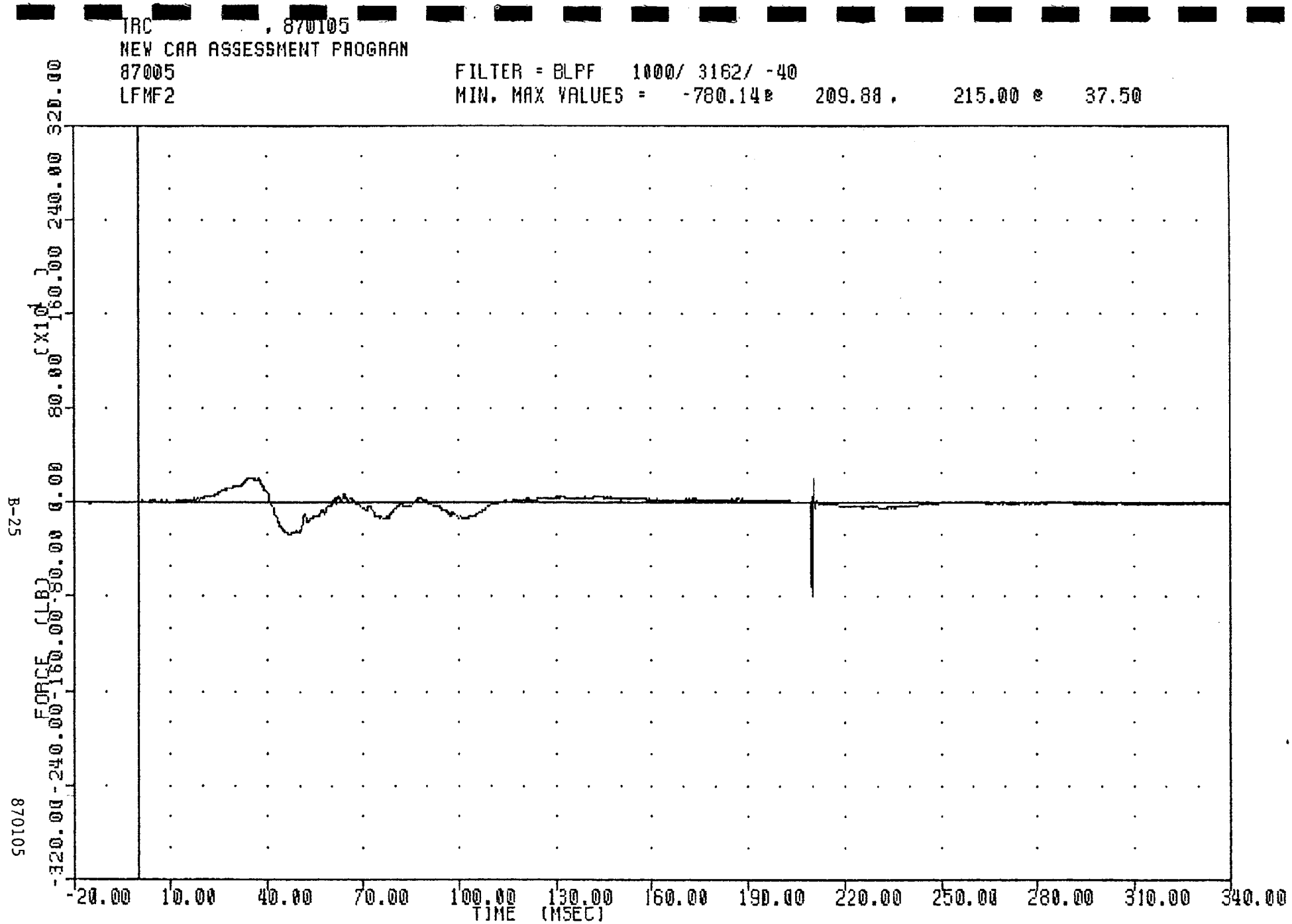
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION

870105



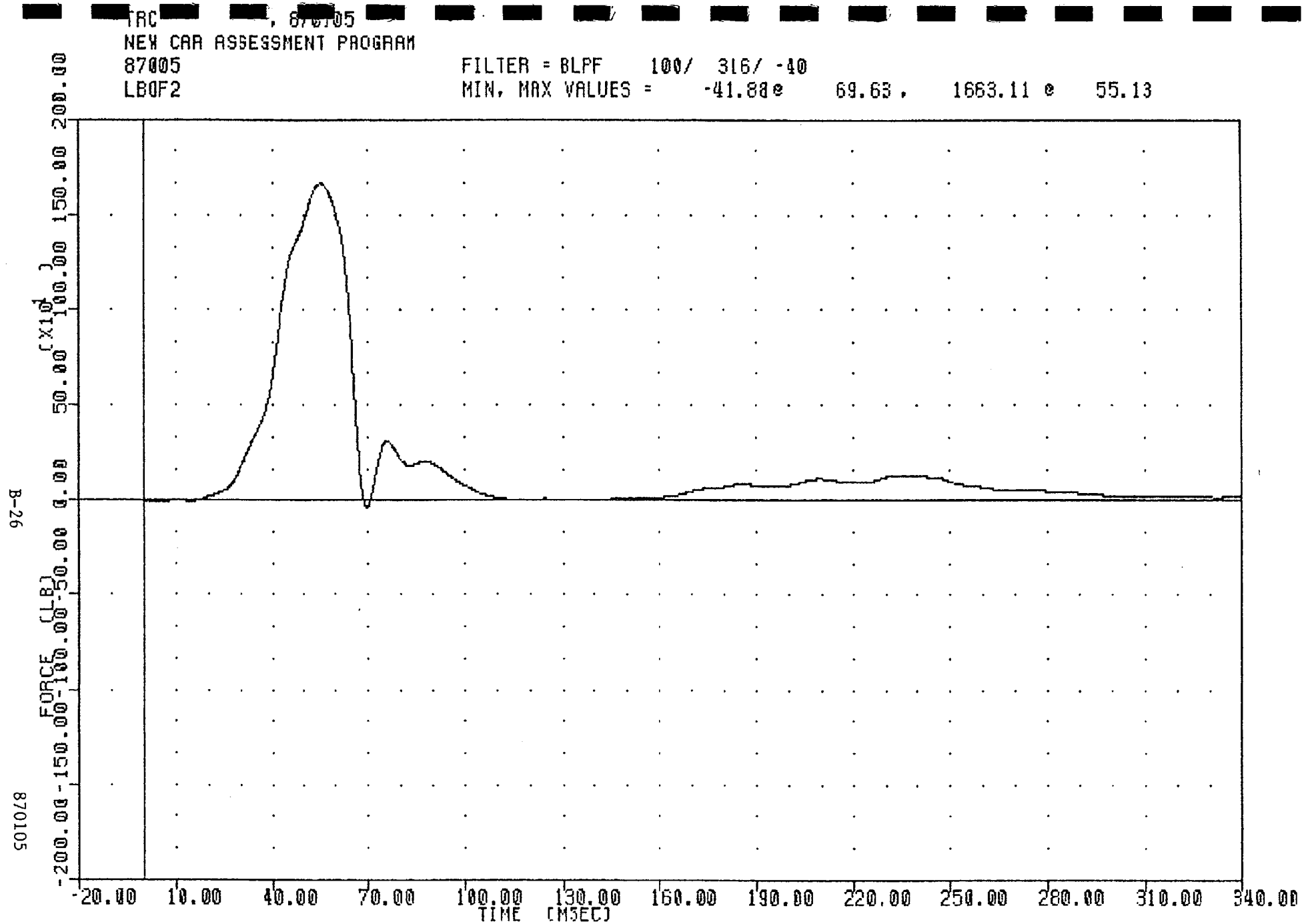
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER RIGHT FEMUR FORCE

870105



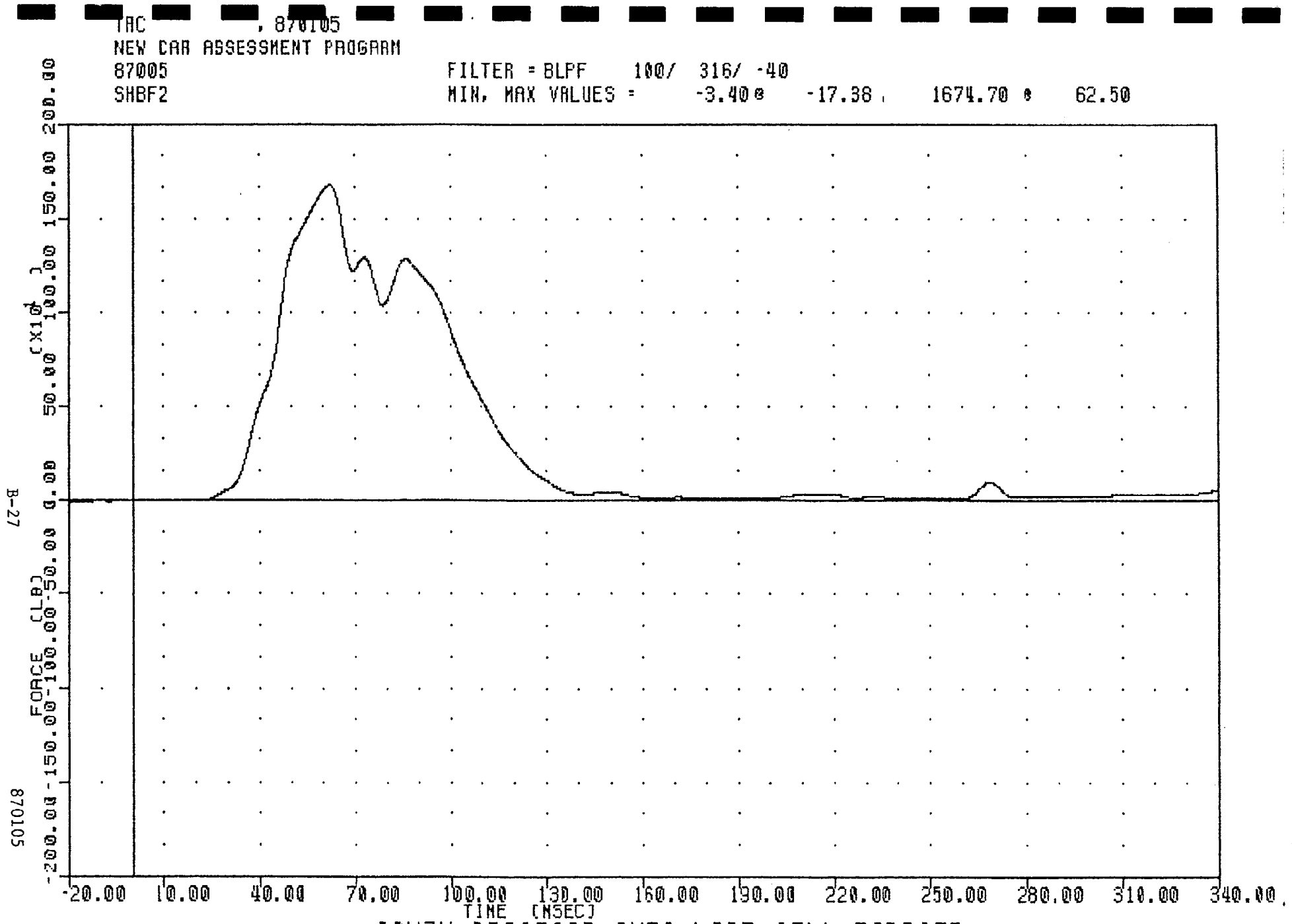
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE

870105



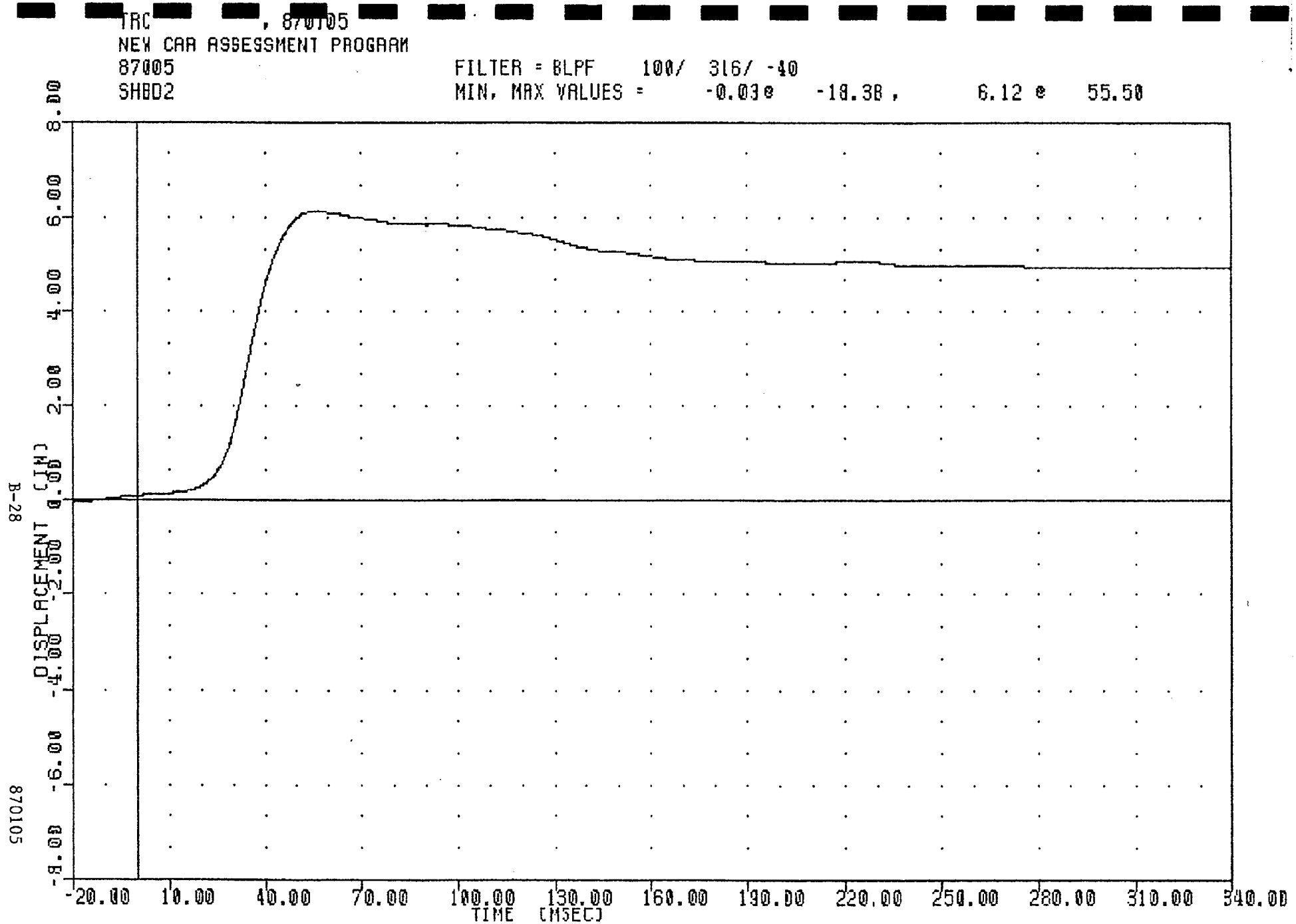
ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE

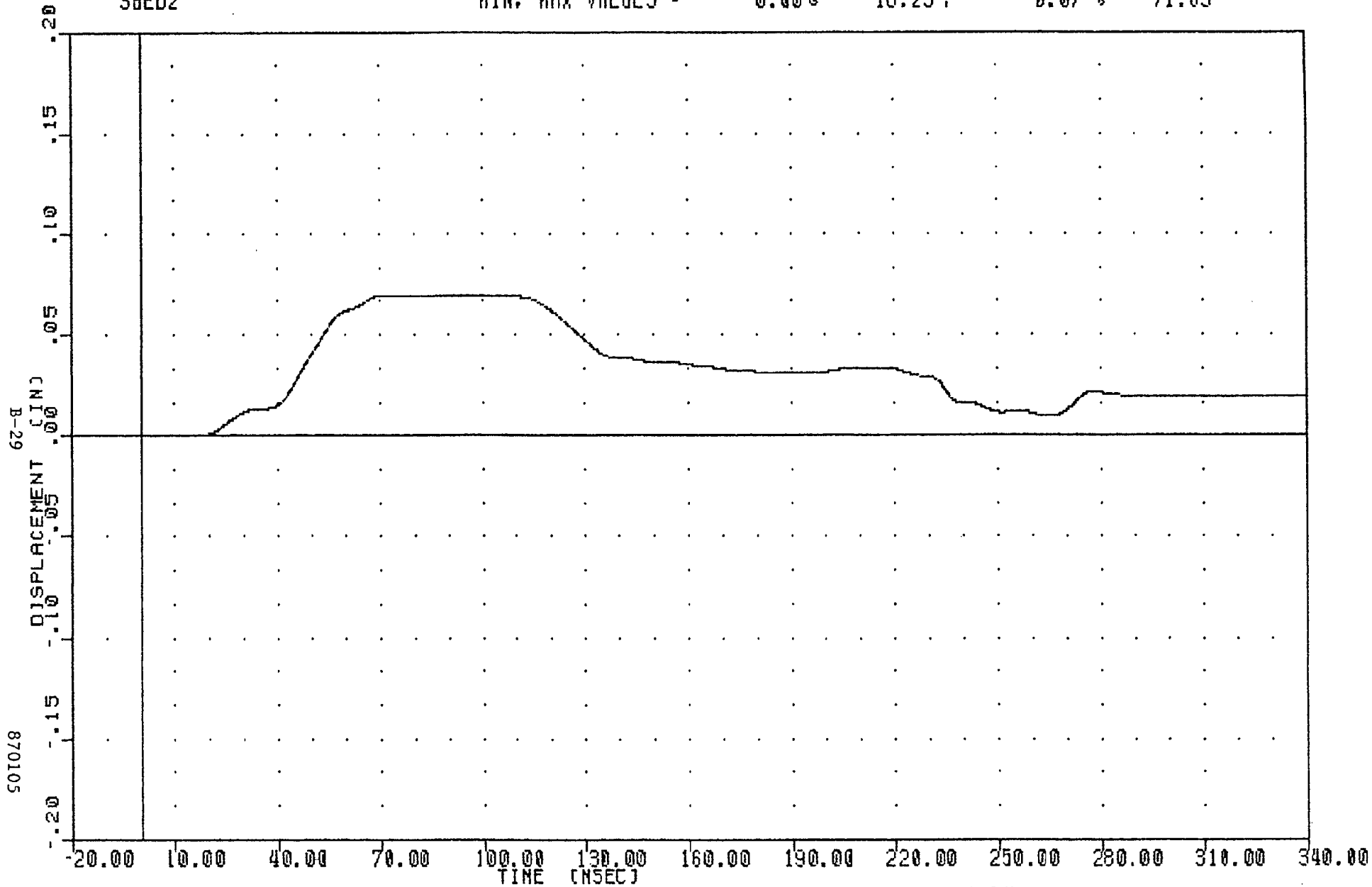
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT

870105

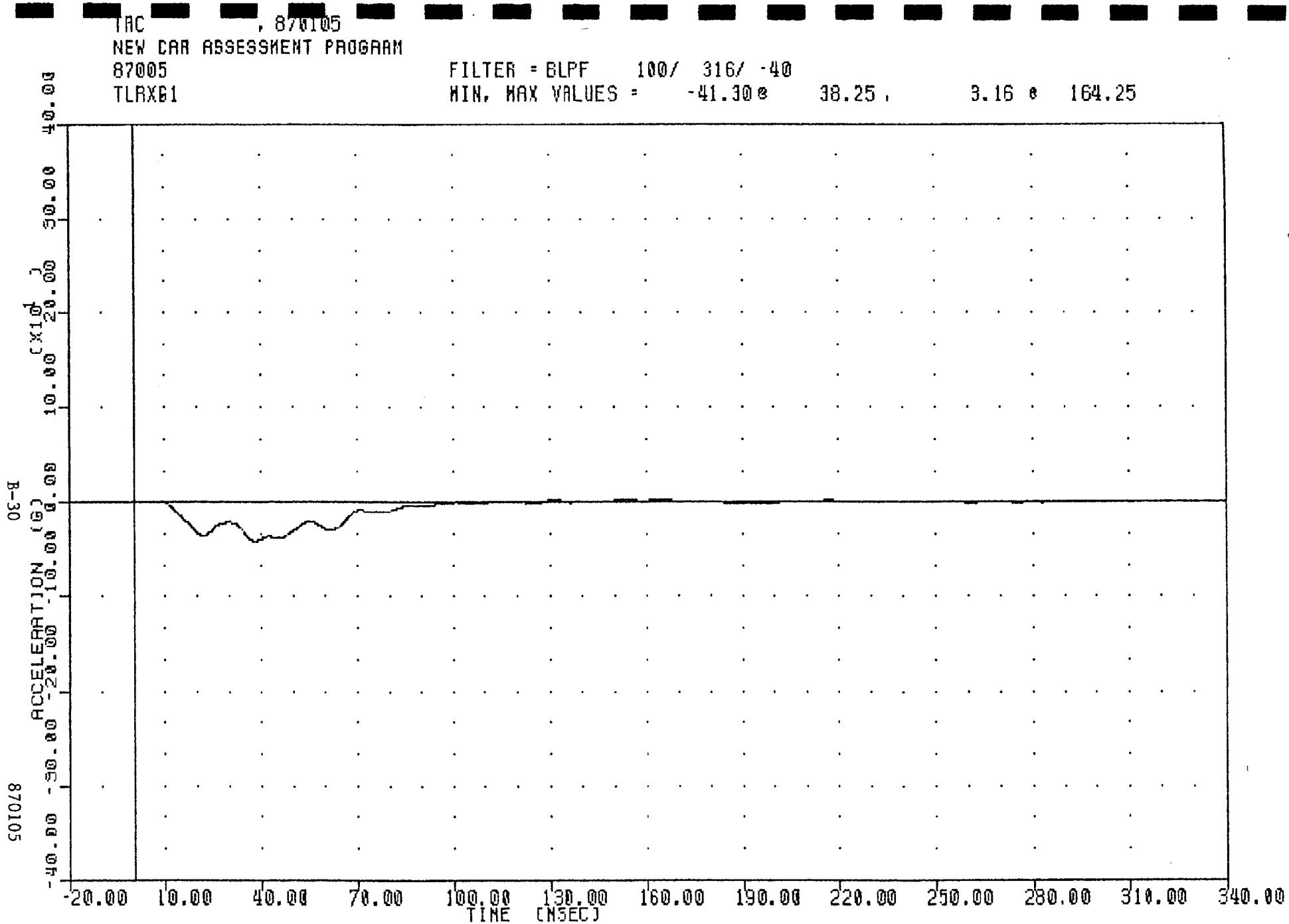
TAC , 870105
NEW CAR ASSESSMENT PROGRAM
87005 FILTER = BLPF 100/ 316/ -40
SBED2 MIN, MAX VALUES = 0.00 @ -18.25 , 0.07 @ 71.63



B-29

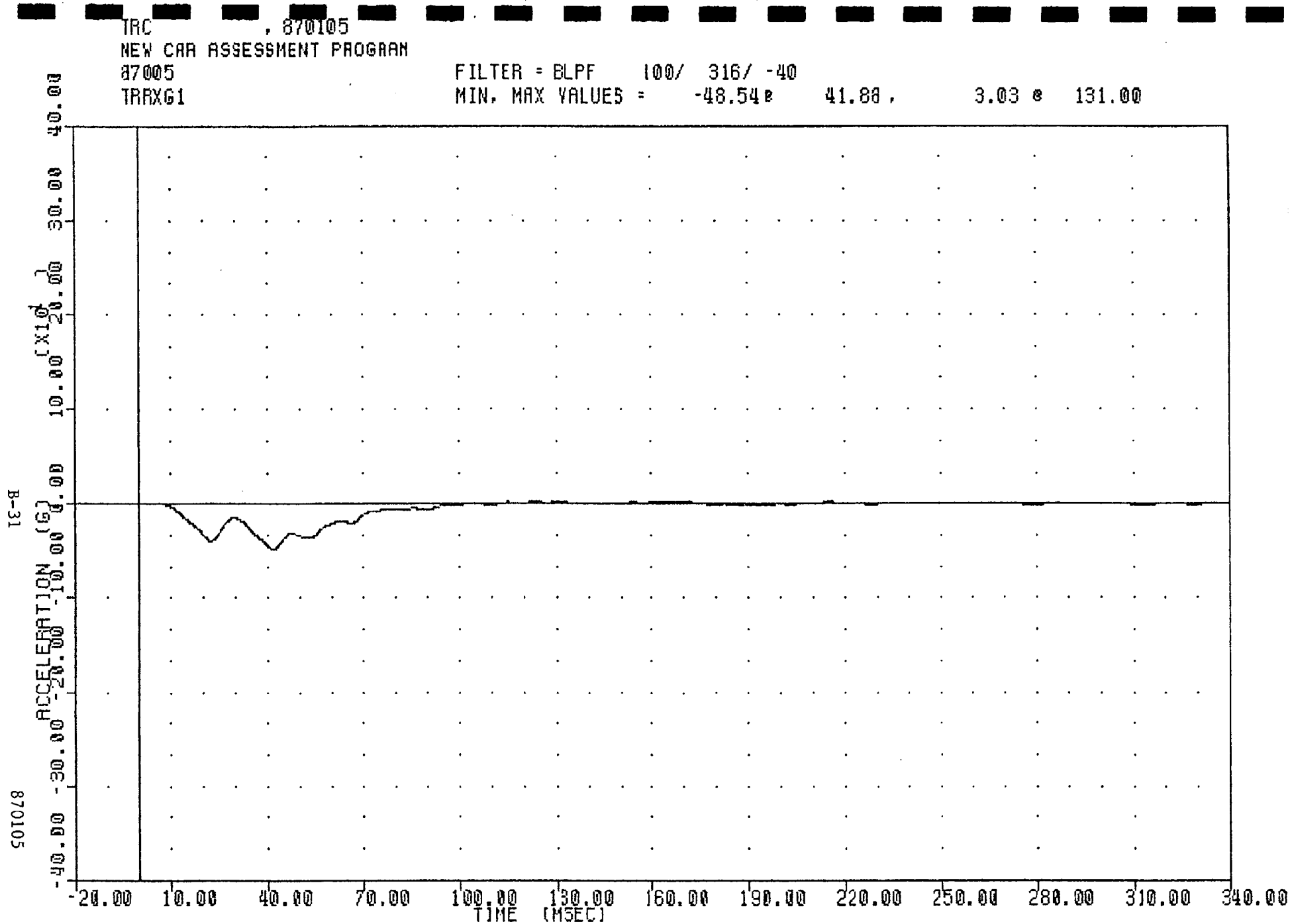
870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION



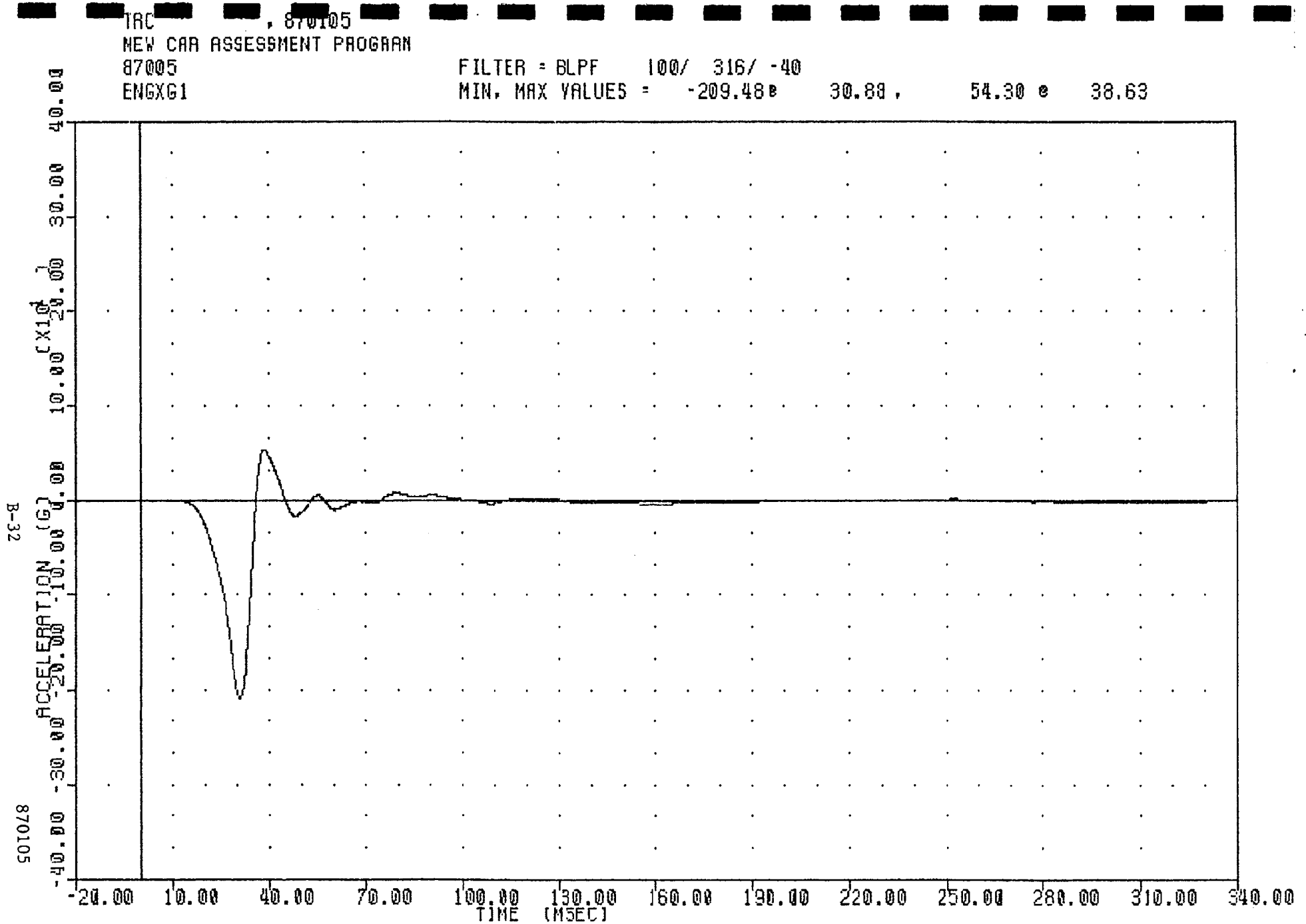
ISUZU SPACECAB INTO LOAD CELL BARRIER
LEFT REAR SEAT ACCELERATION X AXIS

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
RIGHT REAR SEAT ACCELERATION X AXIS

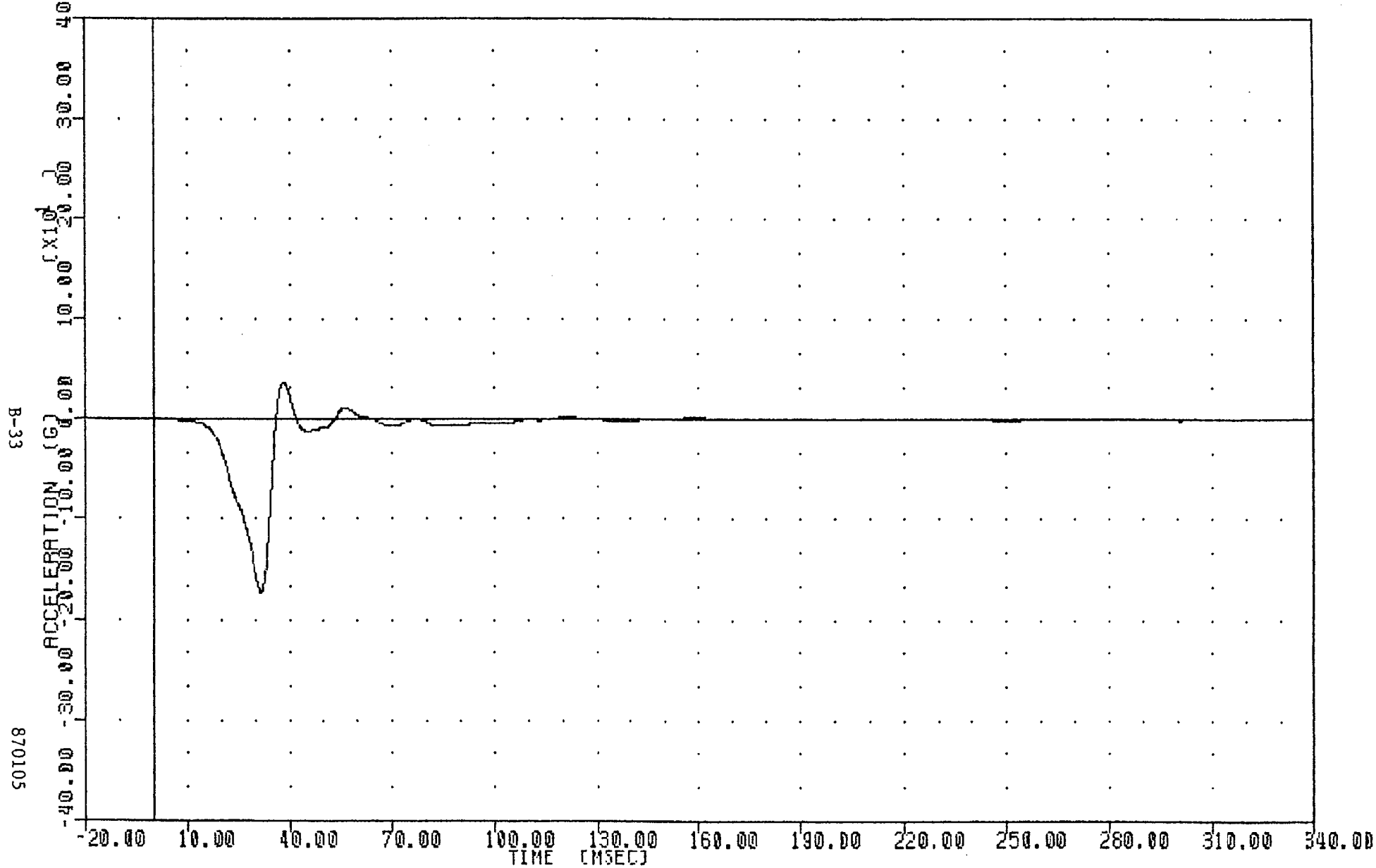
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
ENGINE UPPER BLOCK ACCELERATION X AXIS

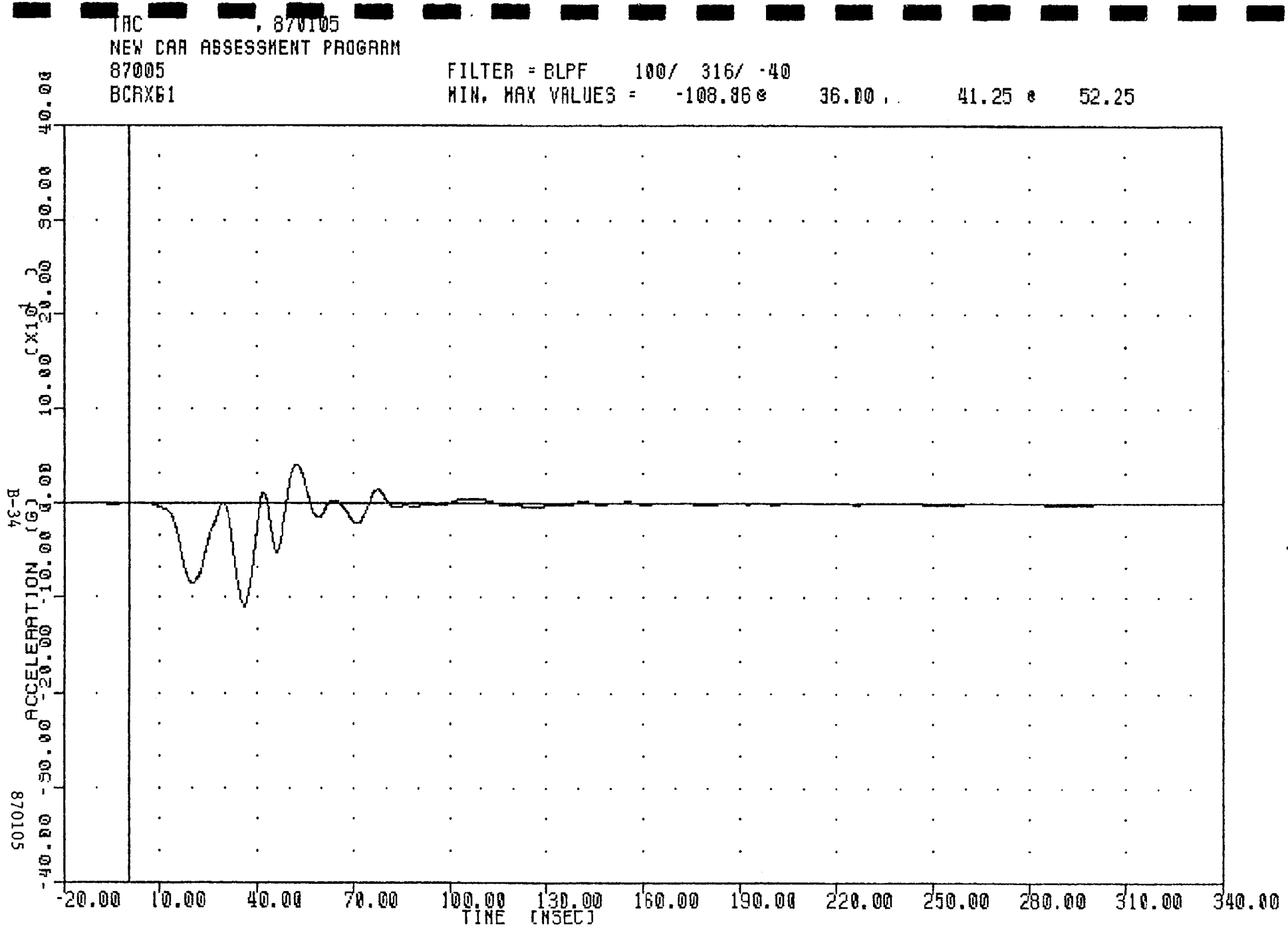
870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005 FILTER = BLPF 100/ 316/ -40
ENGXG2 MIN, MAX VALUES = -173.16 @ 31.63 , 36.79 @ 38.25

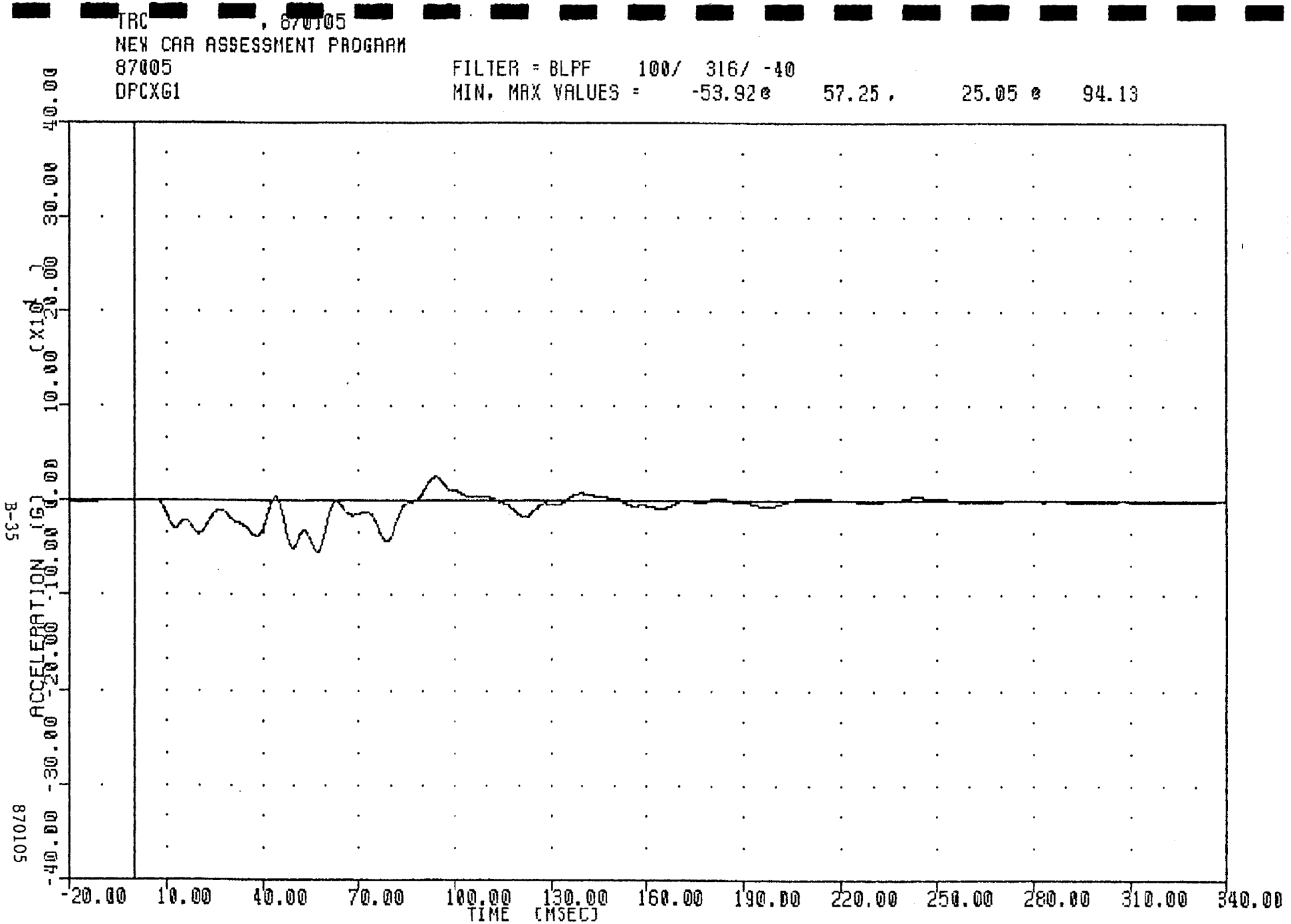


ISUZU SPACECAB INTO LOAD CELL BARRIER
ENGINE LOWER BLOCK ACCELERATION X AXIS

870105

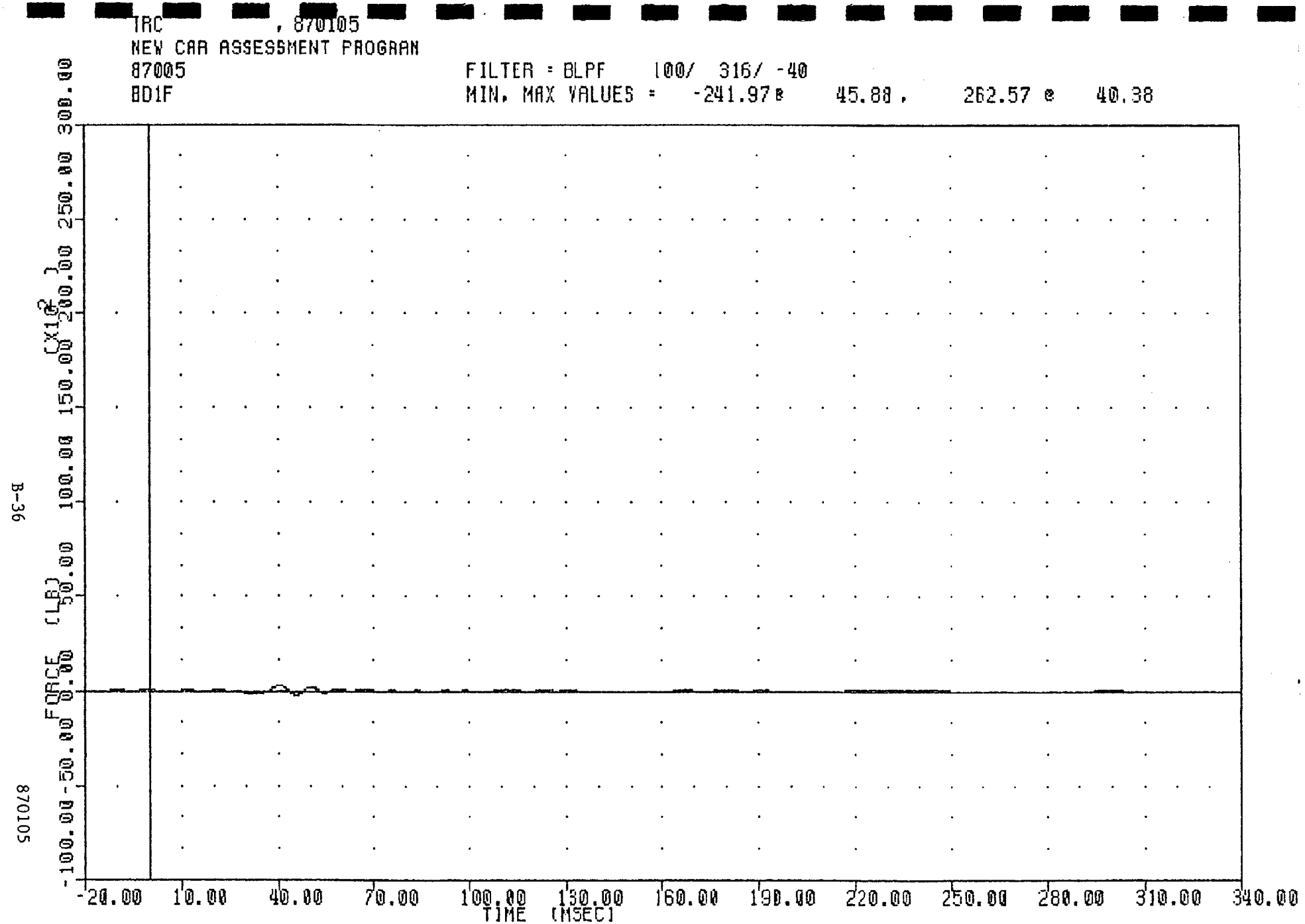


ISUZU SPACECAB INTO LOAD CELL BARRIER
RIGHT BRAKE CALIPER ACCELERATION X AXIS



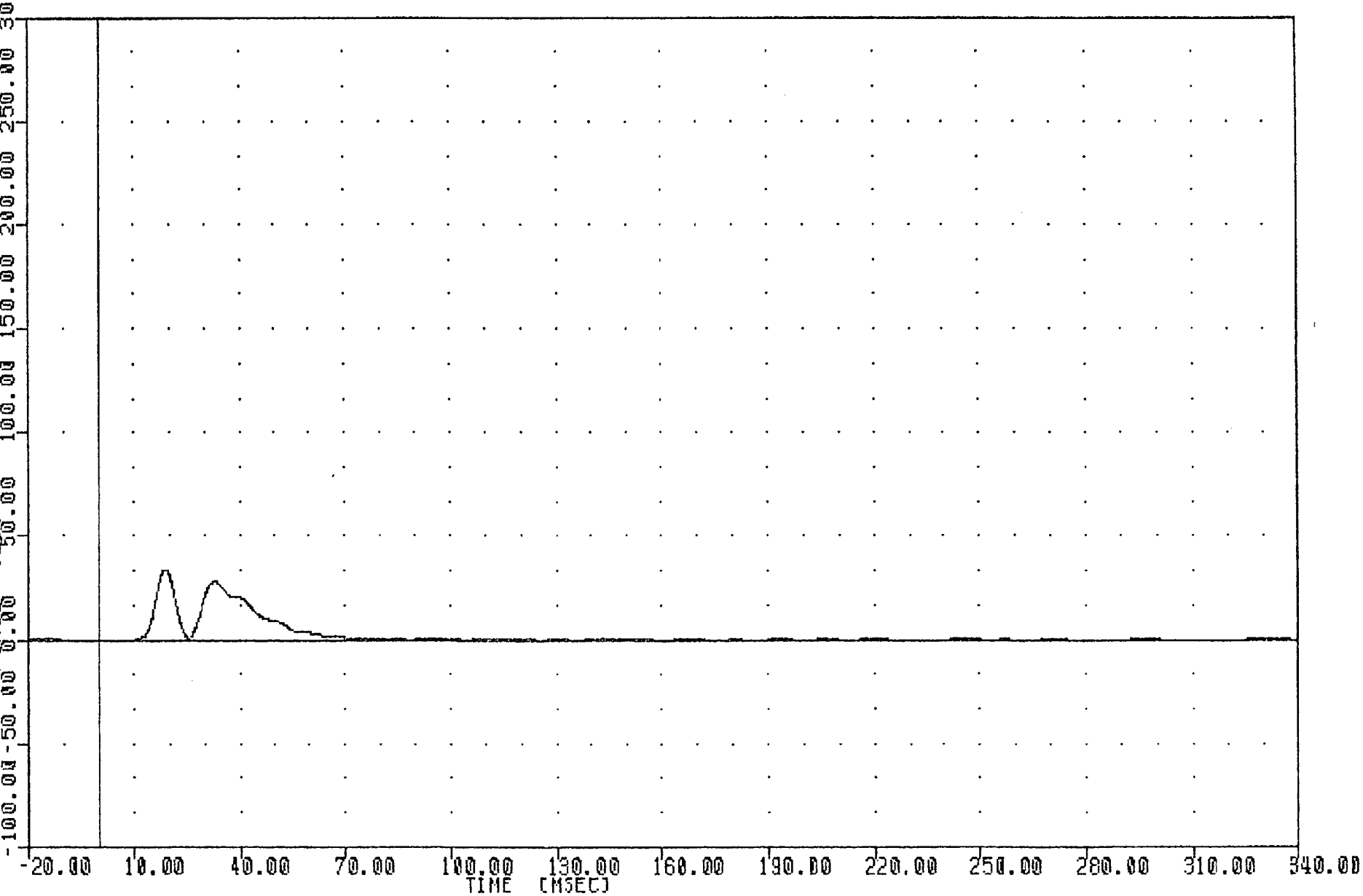
ISUZU SPACECAB INTO LOAD CELL BARRIER
DASH PANEL CENTER ACCELERATION X AXIS

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D1 FORCE

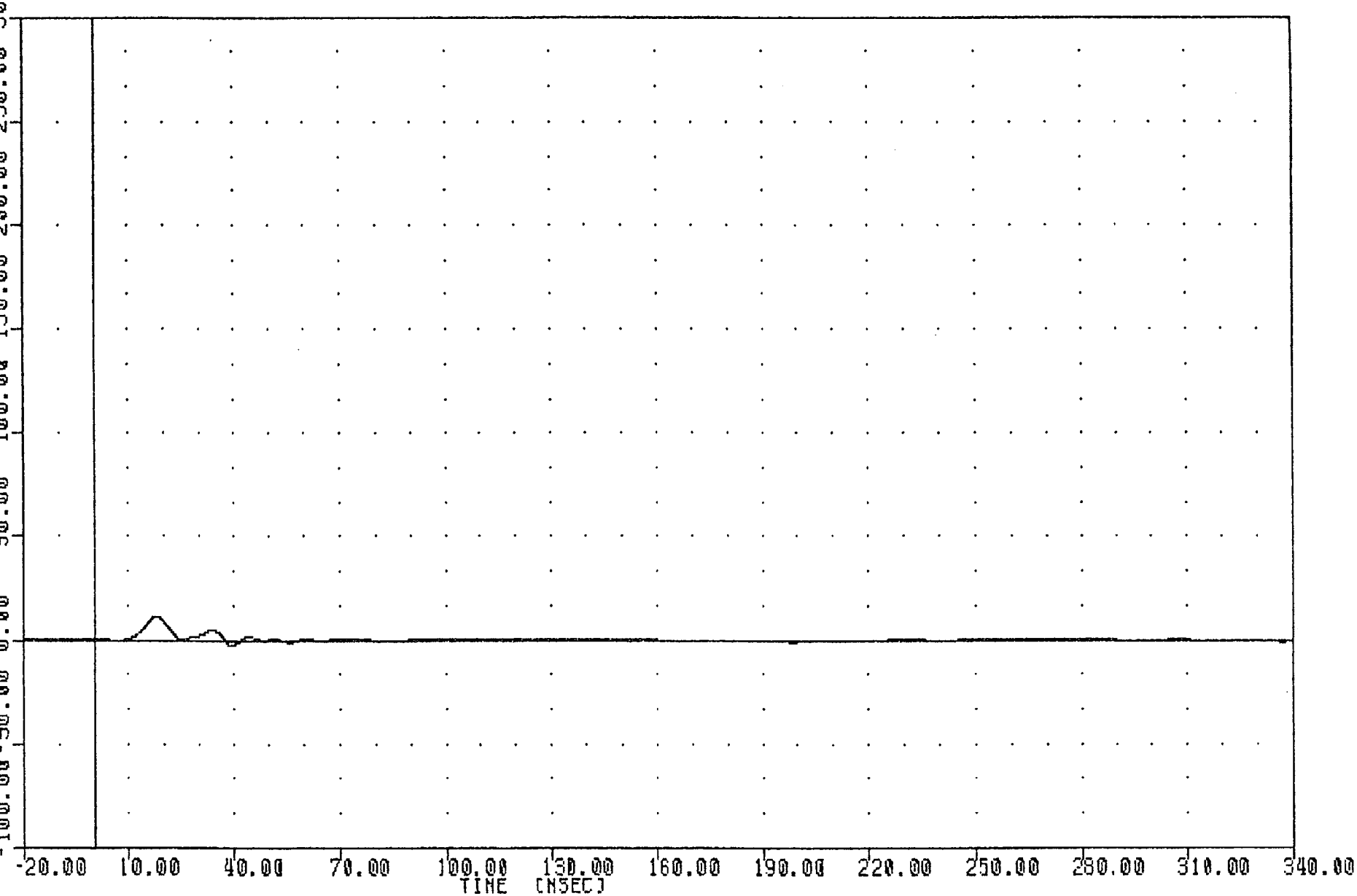
TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BD2F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -54.06 @ 7.25 , 3396.92 @ 18.88



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D2 FORCE

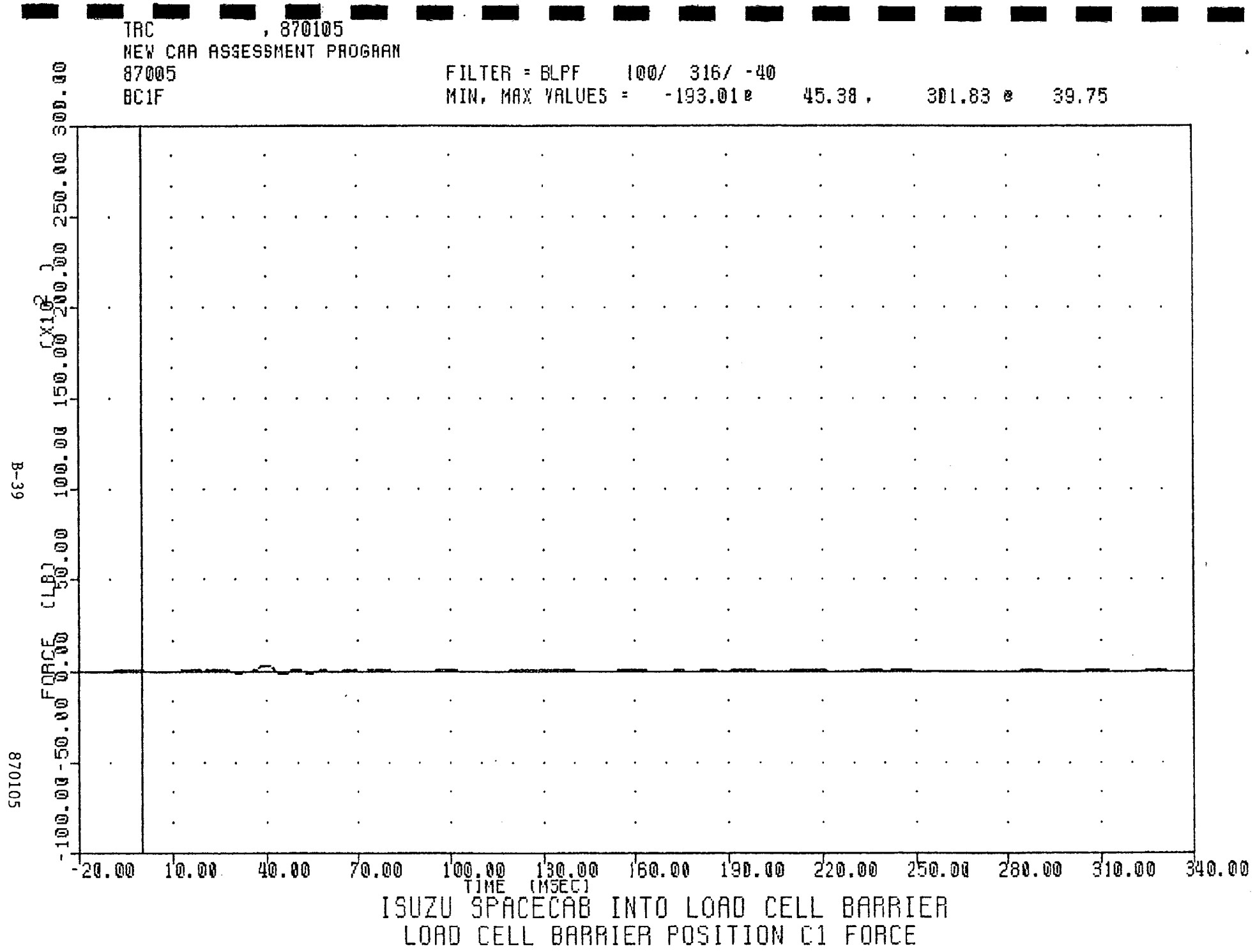
870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BD3F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -271.19 @ 39.50 , 1114.58 @ 17.75



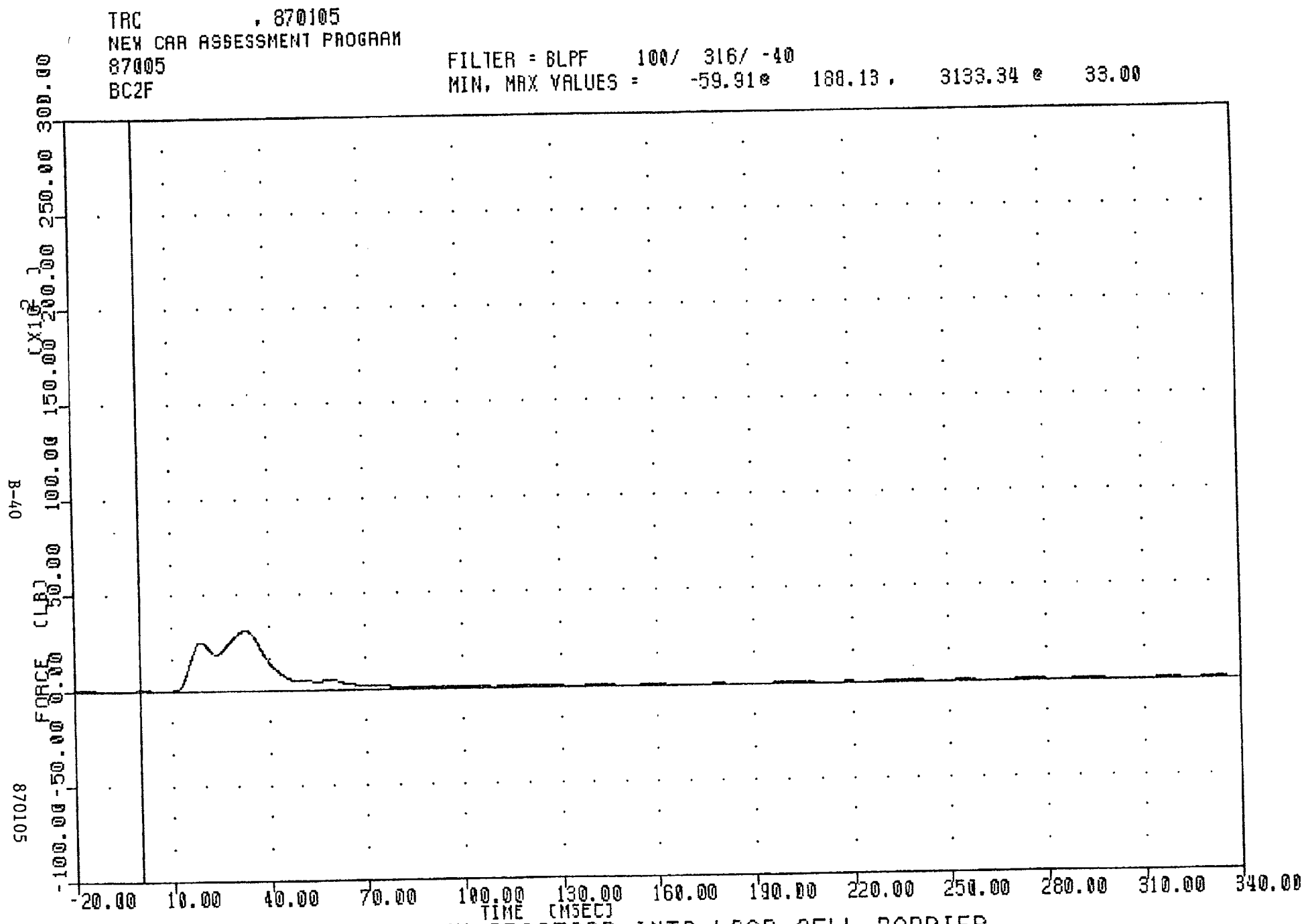
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D3 FORCE

870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE

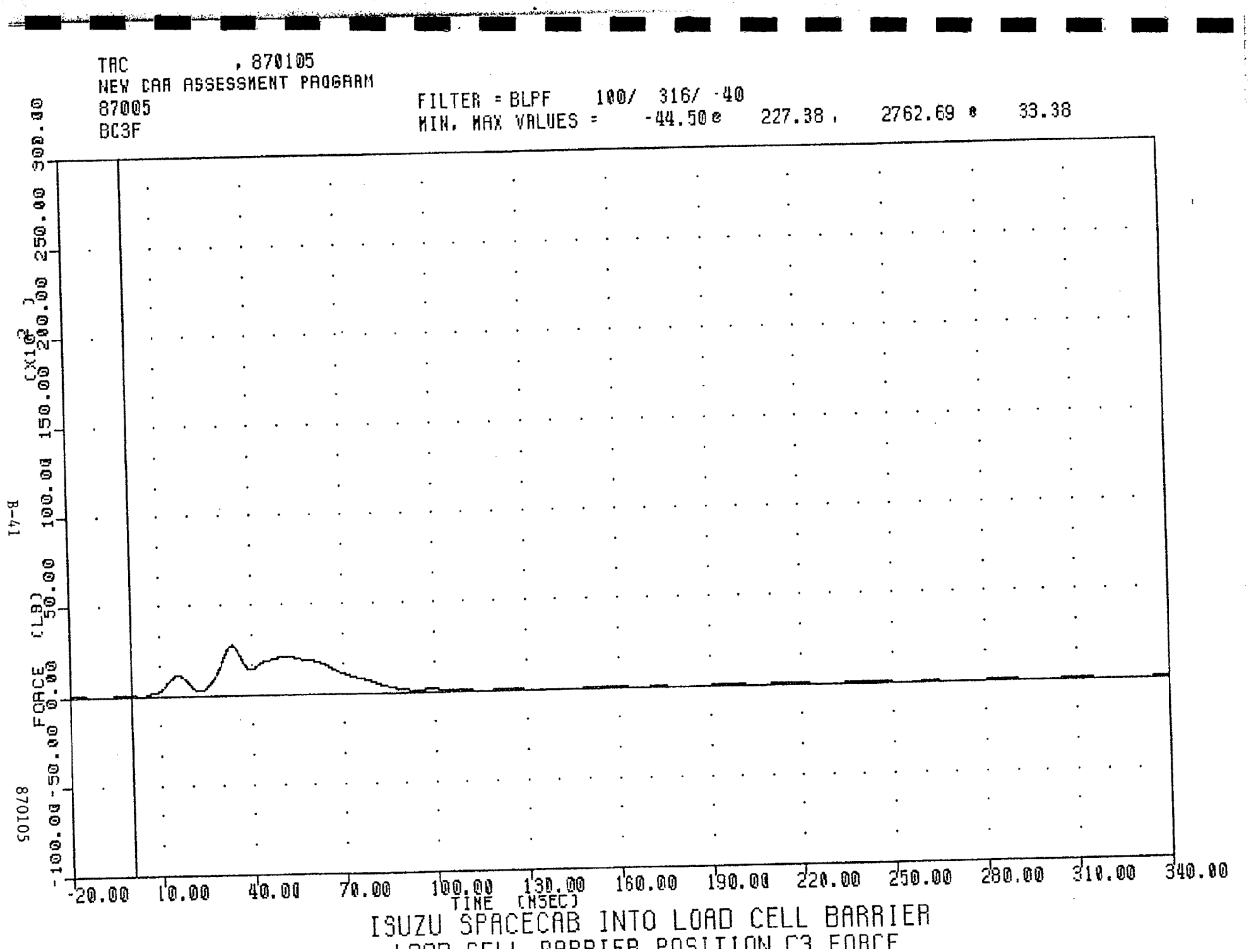
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER

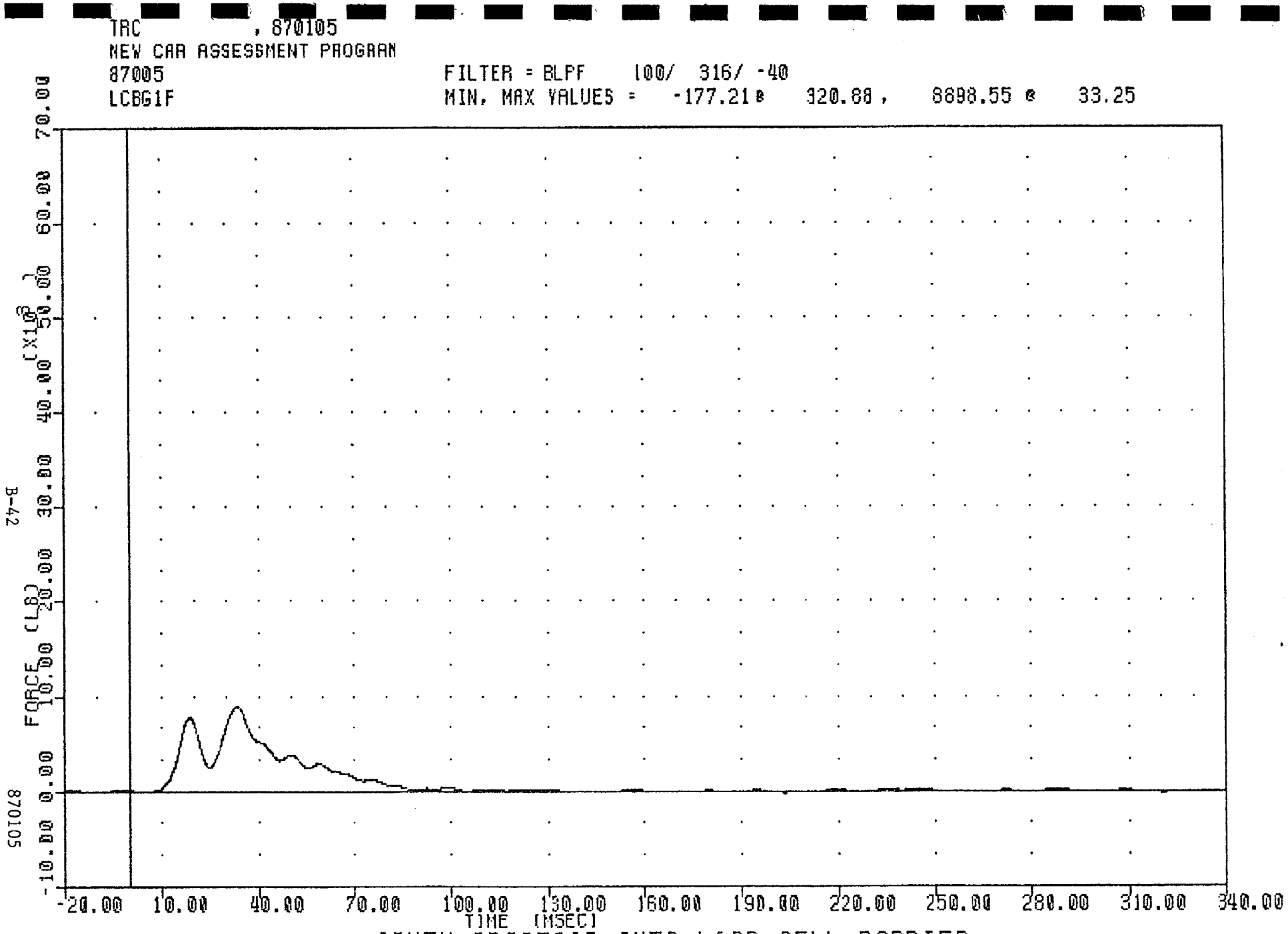
LOAD CELL BARRIER POSITION C2 FORCE

870105



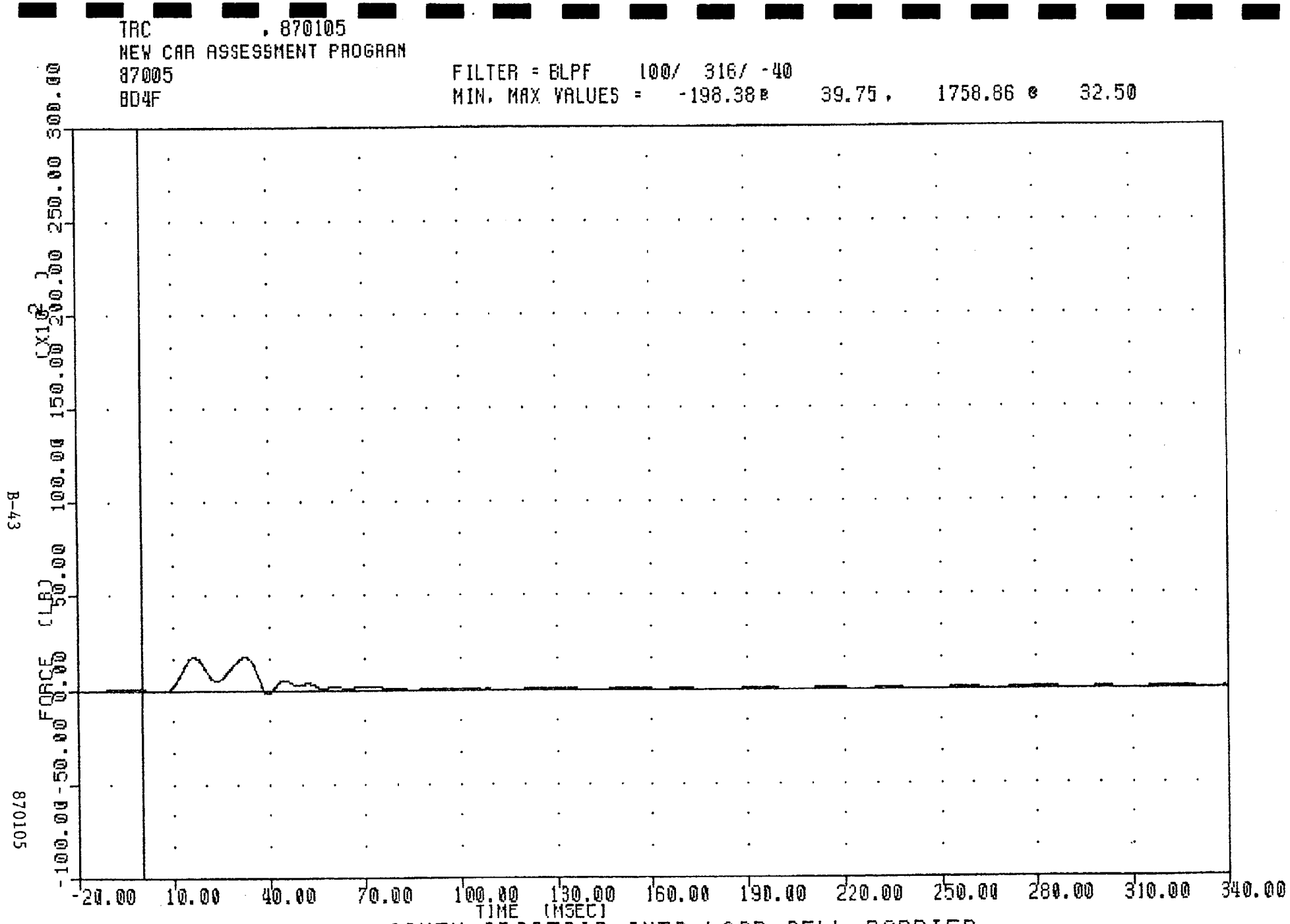
ISUZU SPACECAB INTO LOAD CELL BARRIER

LOAD CELL BARRIER POSITION C3 FORCE



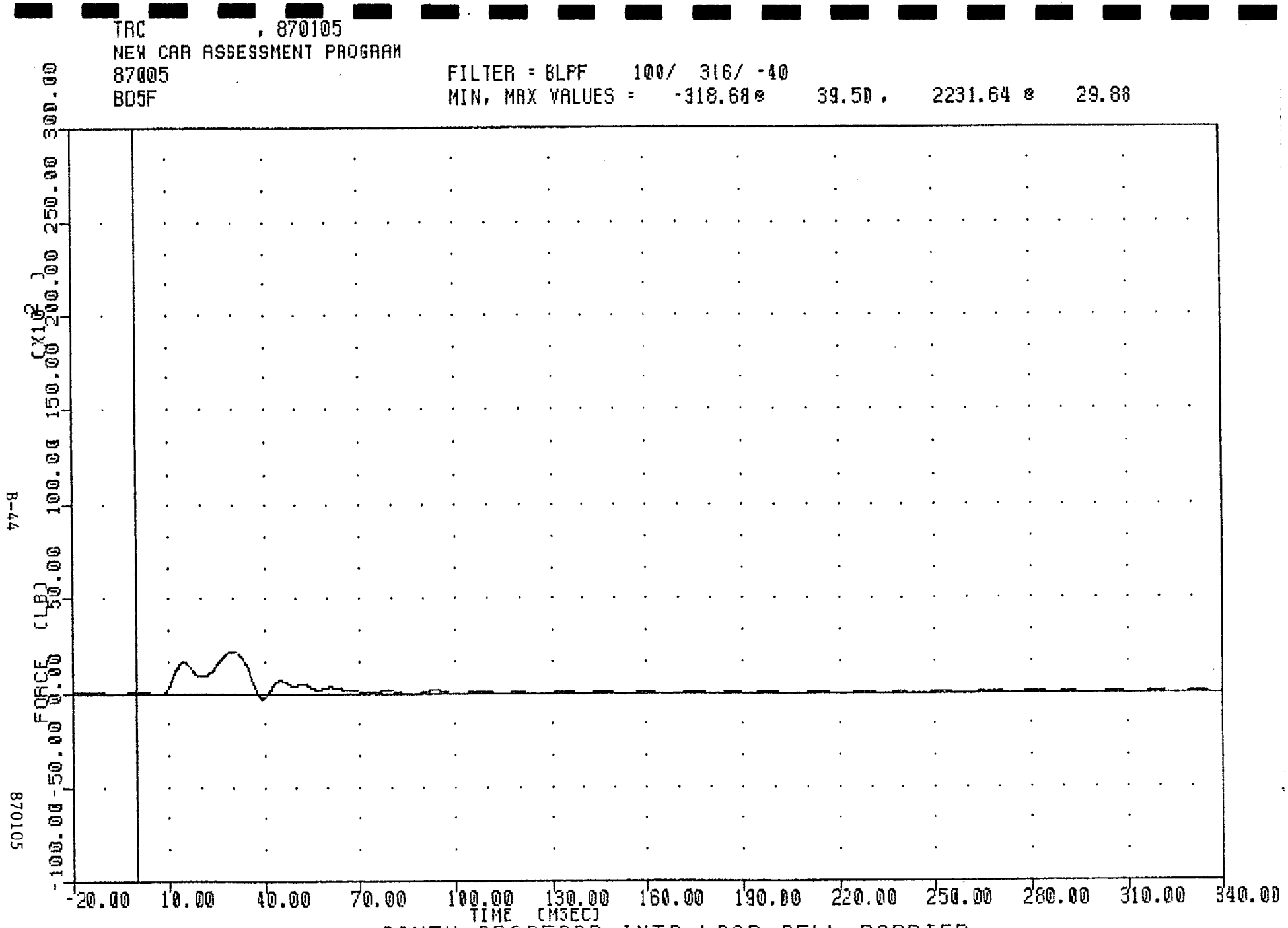
ISUZU SPACECAB INTO LOAD CELL BARRIER

LOAD CELL BARRIER GROUP - 1 FORCE TOTAL



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D4 FORCE

870105

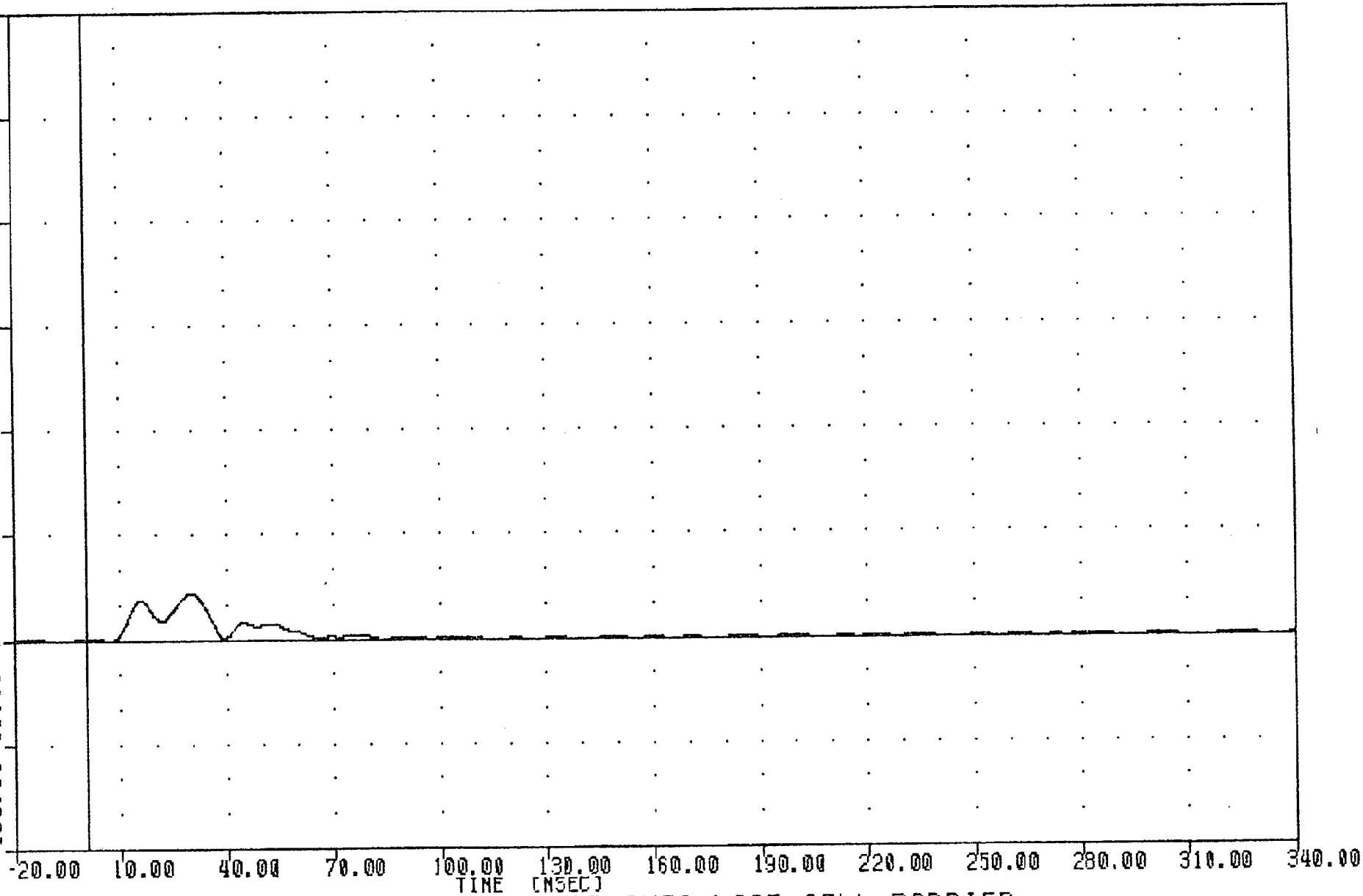


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D5 FORCE

870105

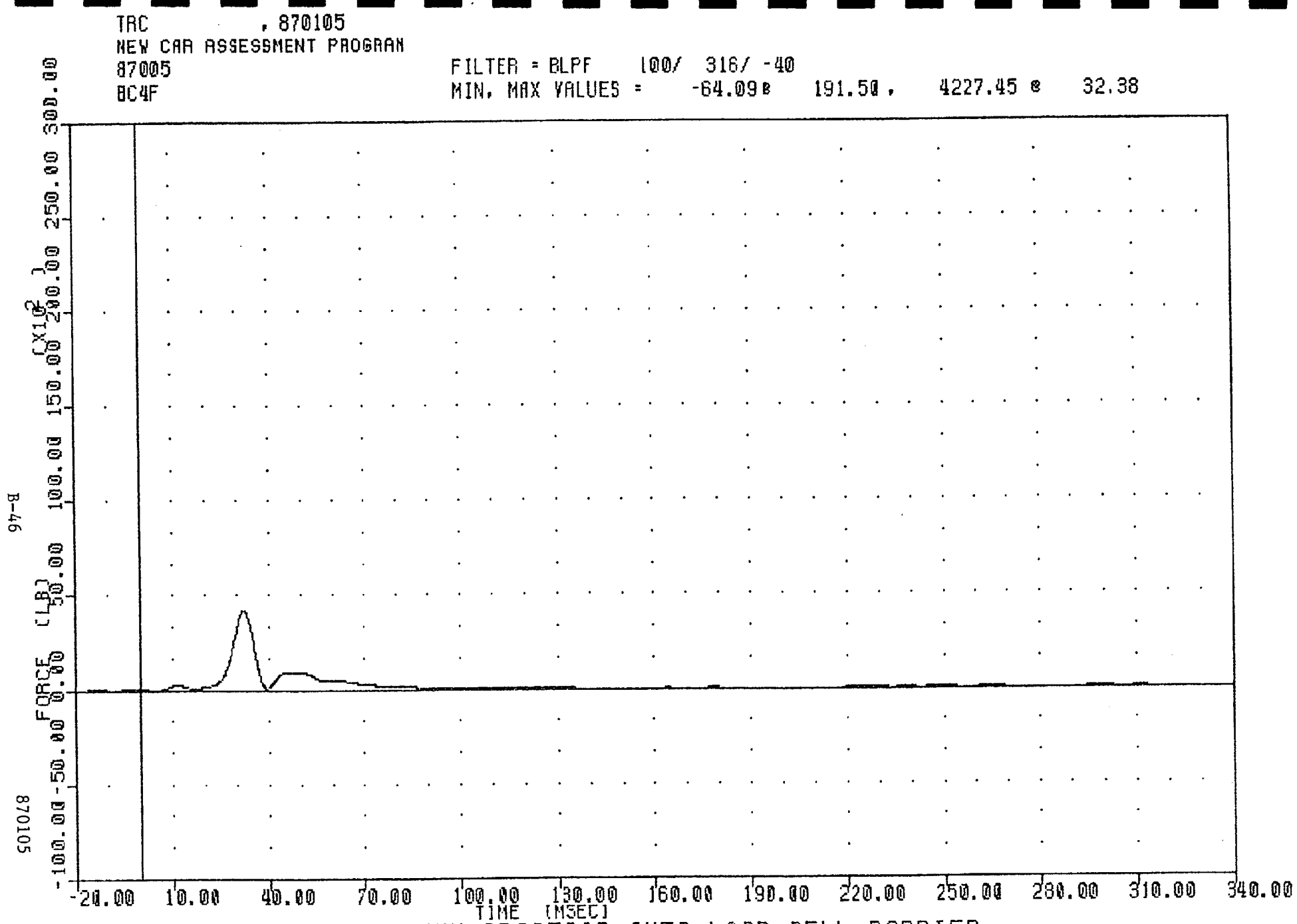
TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
B06F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -89.02 @ 115.25 , 2224.52 @ 29.63



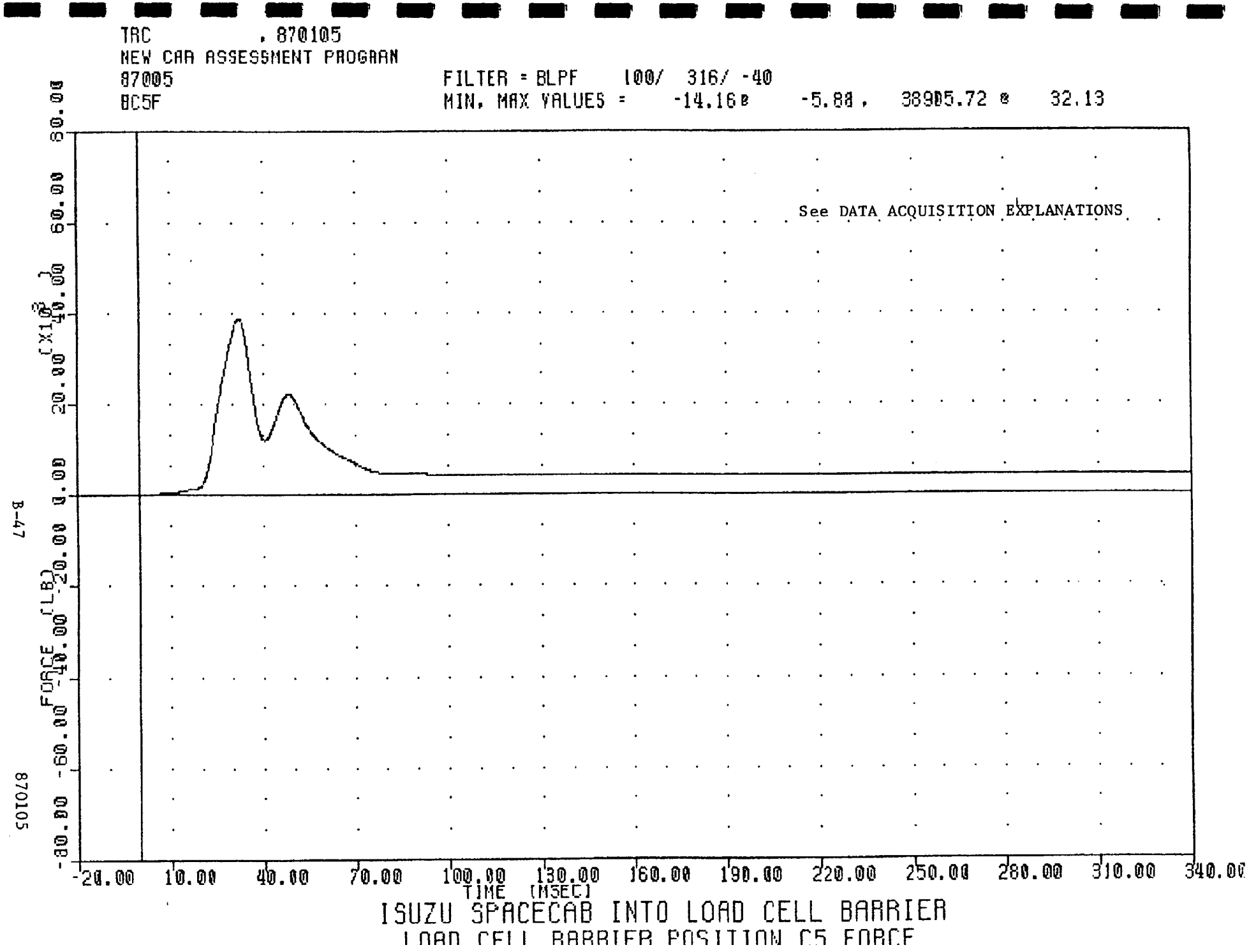
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION 06 FORCE

870105

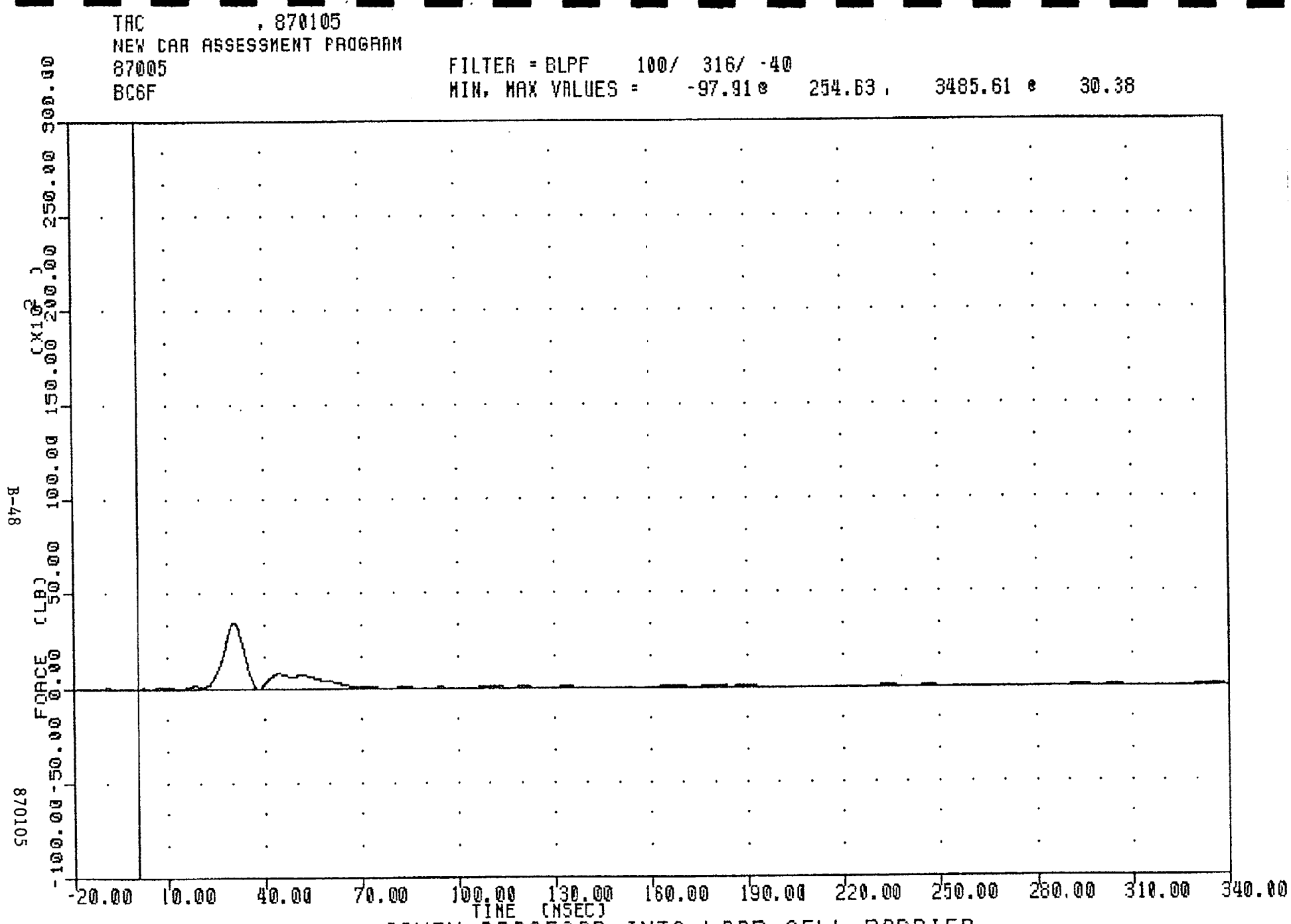


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C4 FORCE

870105


TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
8C5F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -14.16 @ -5.88 , 38905.72 @ 32.13
See DATA ACQUISITION EXPLANATIONS
FORCE (LB) (X10^2)
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE

870105

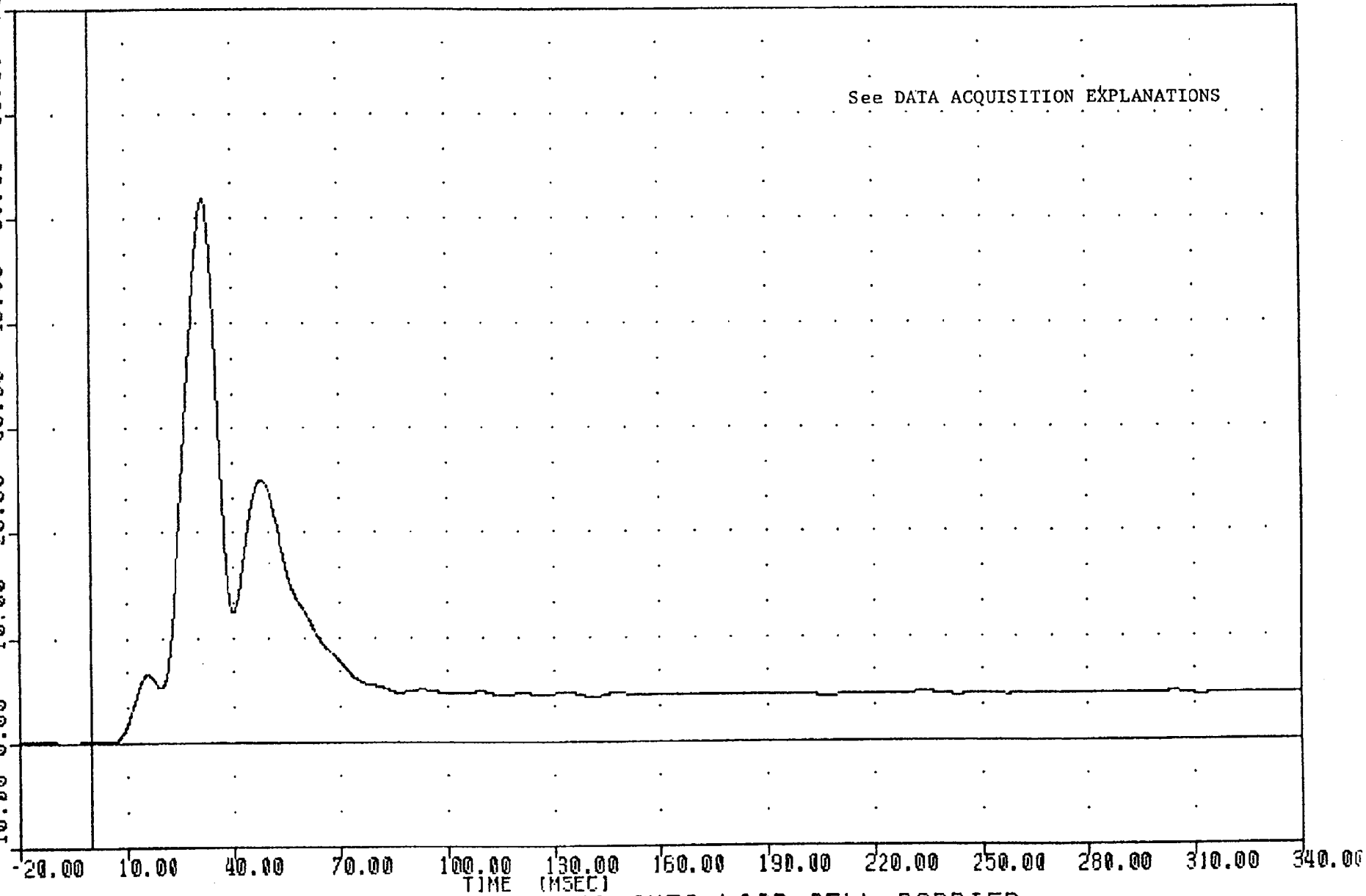


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C6 FORCE

870105

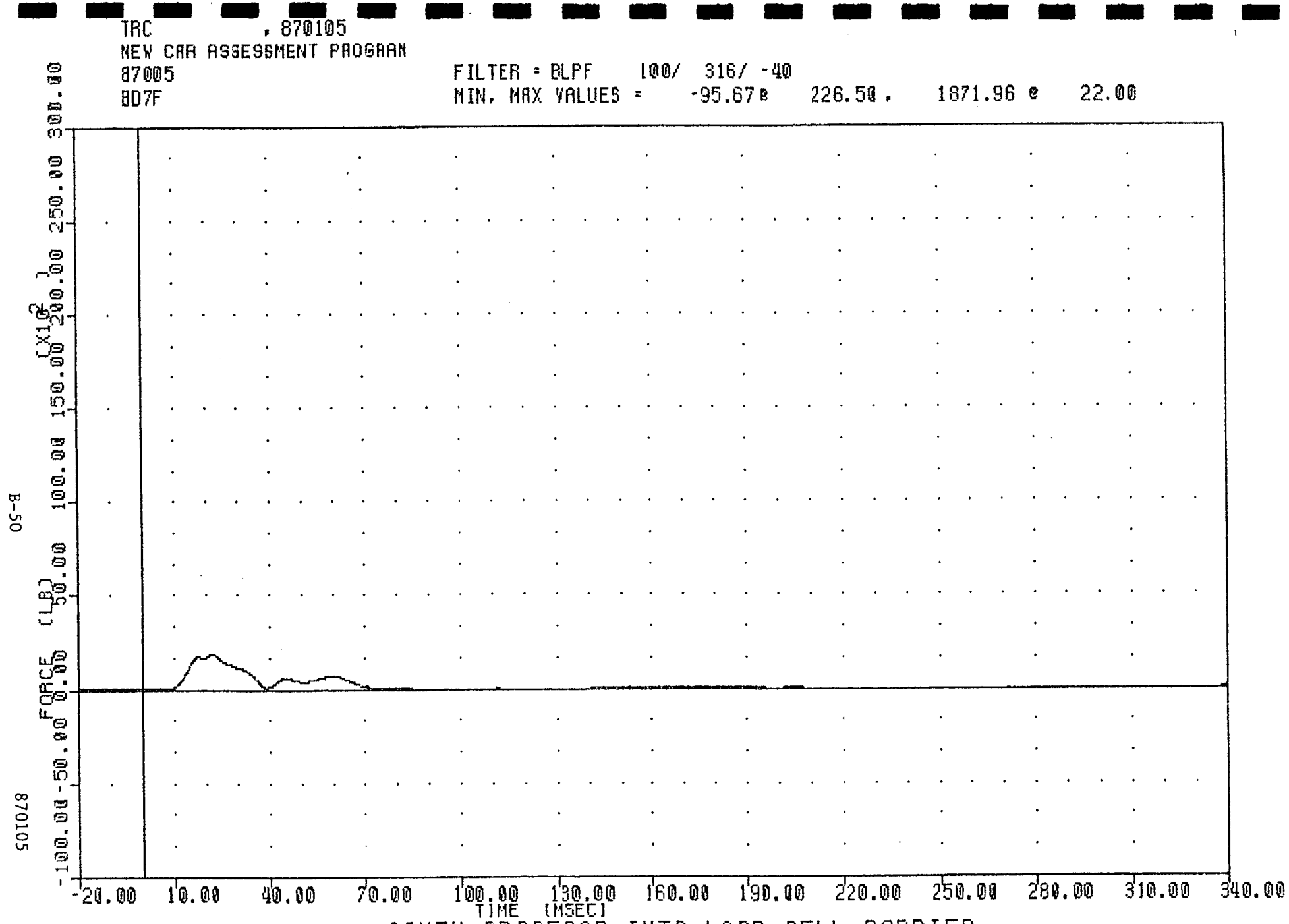
TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
LCBG2F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -72.87 @ -6.63 , 51833.46 @ 31.88



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 2 FORCE TOTAL

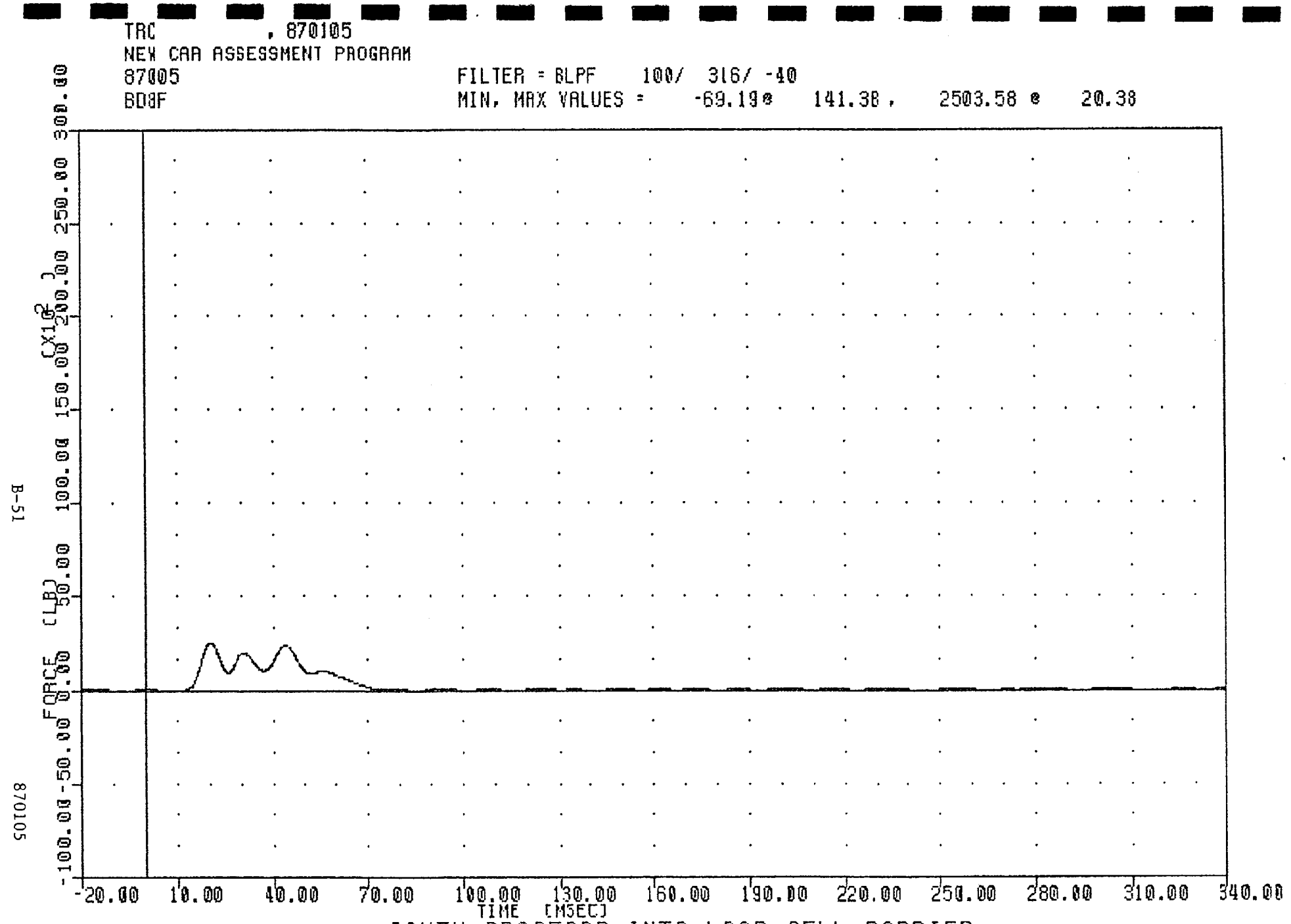
87005



B-50

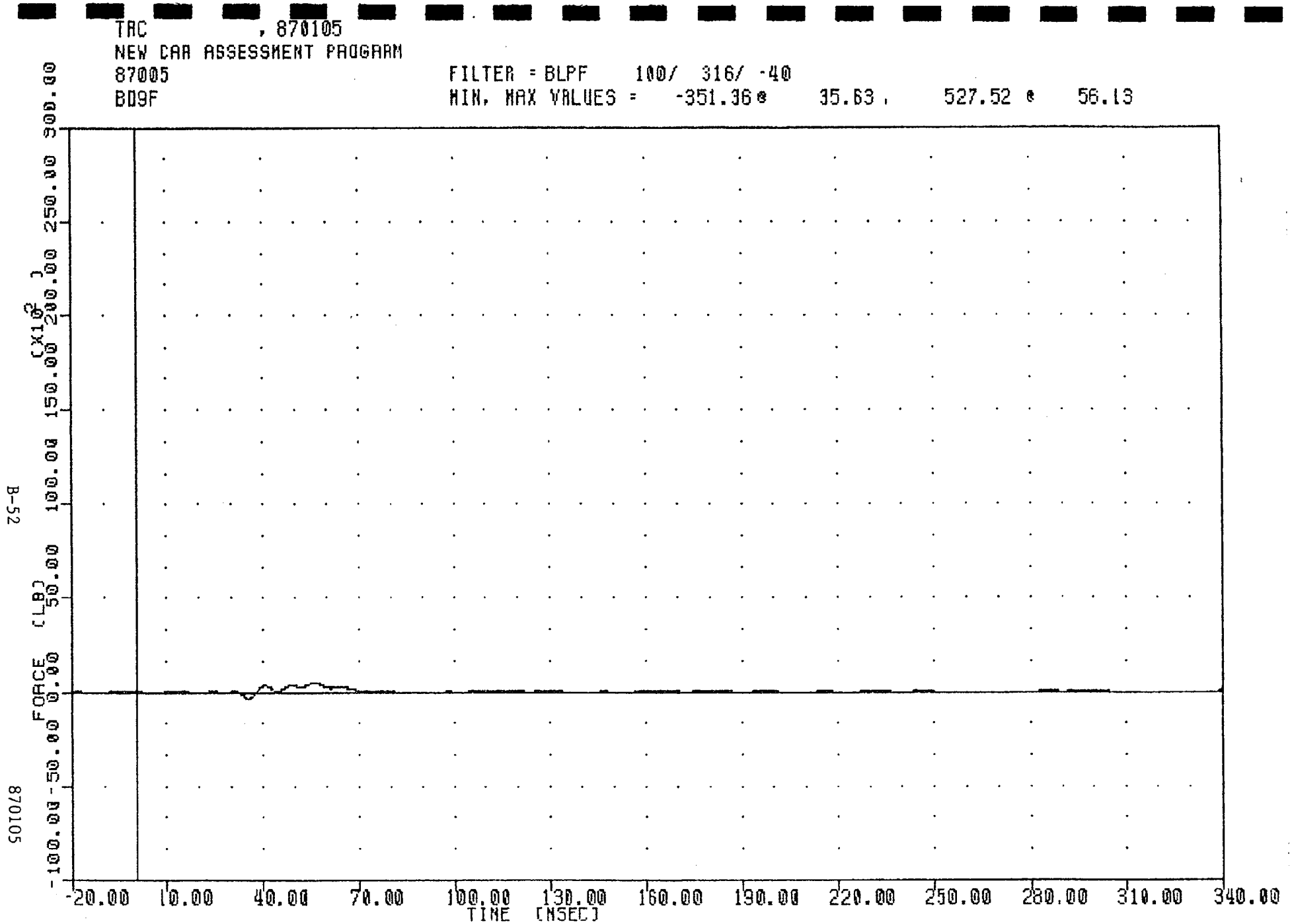
870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D7 FORCE



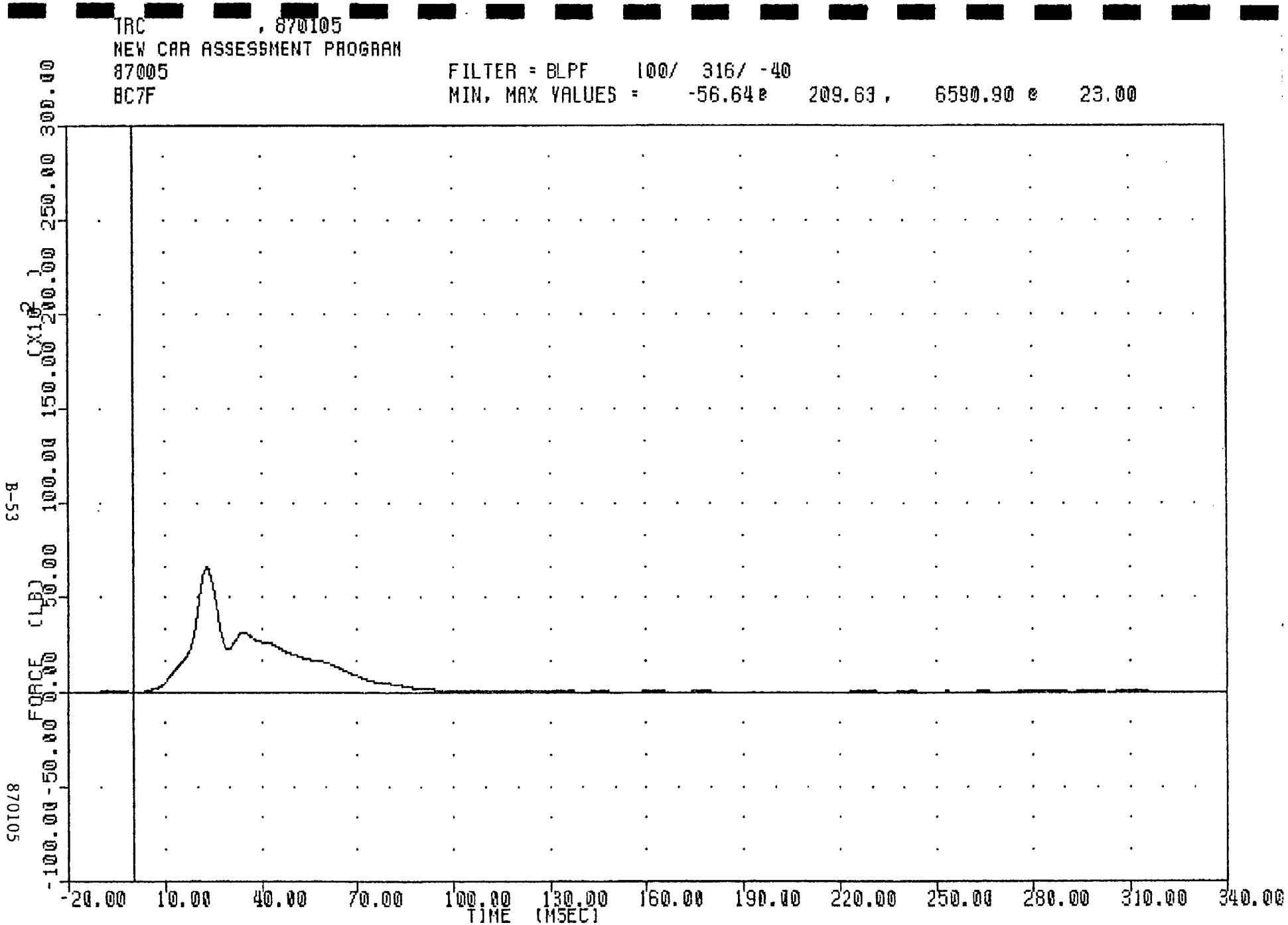
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D8 FORCE

870105



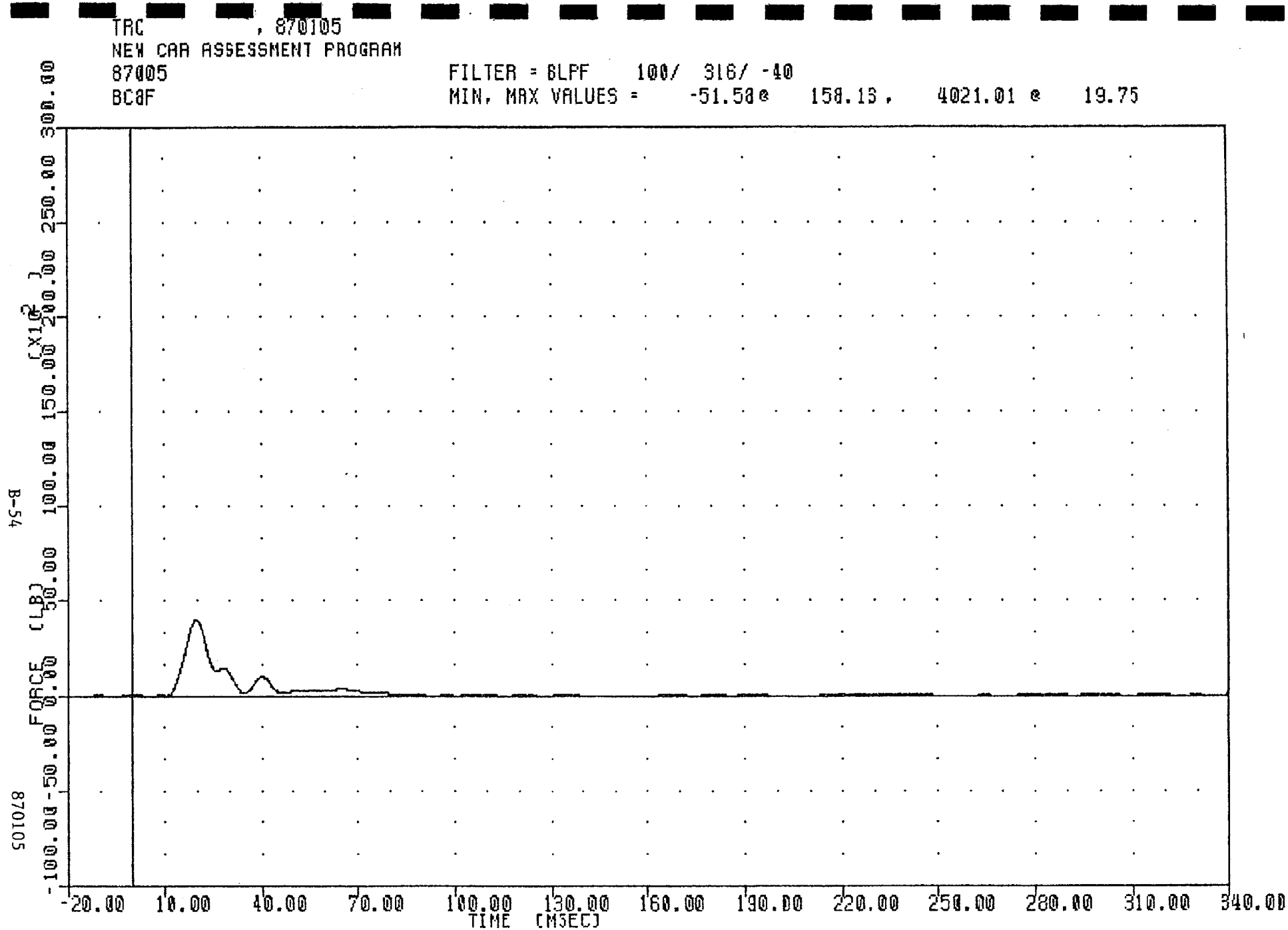
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D9 FORCE

870105



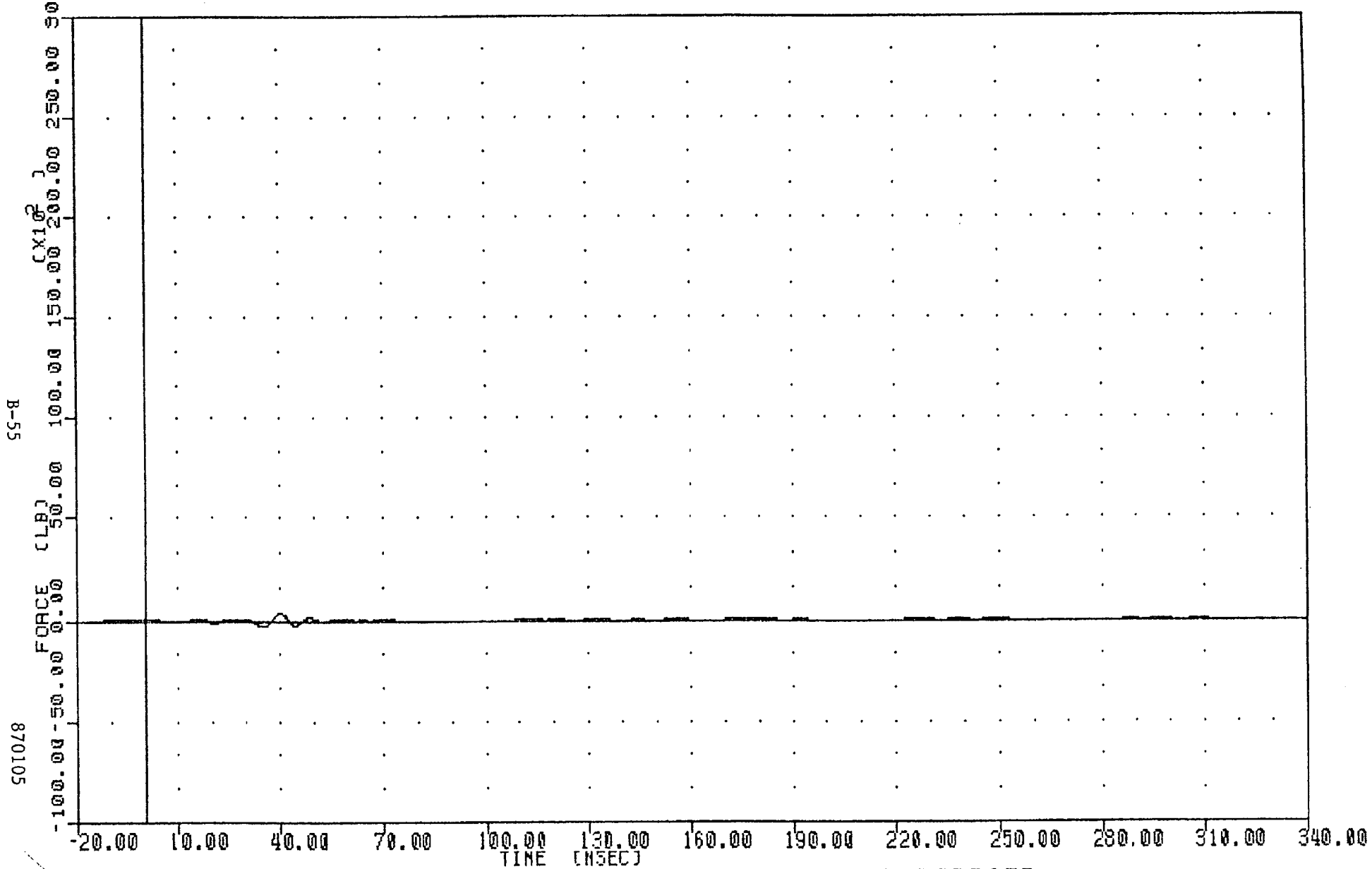
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE

870105



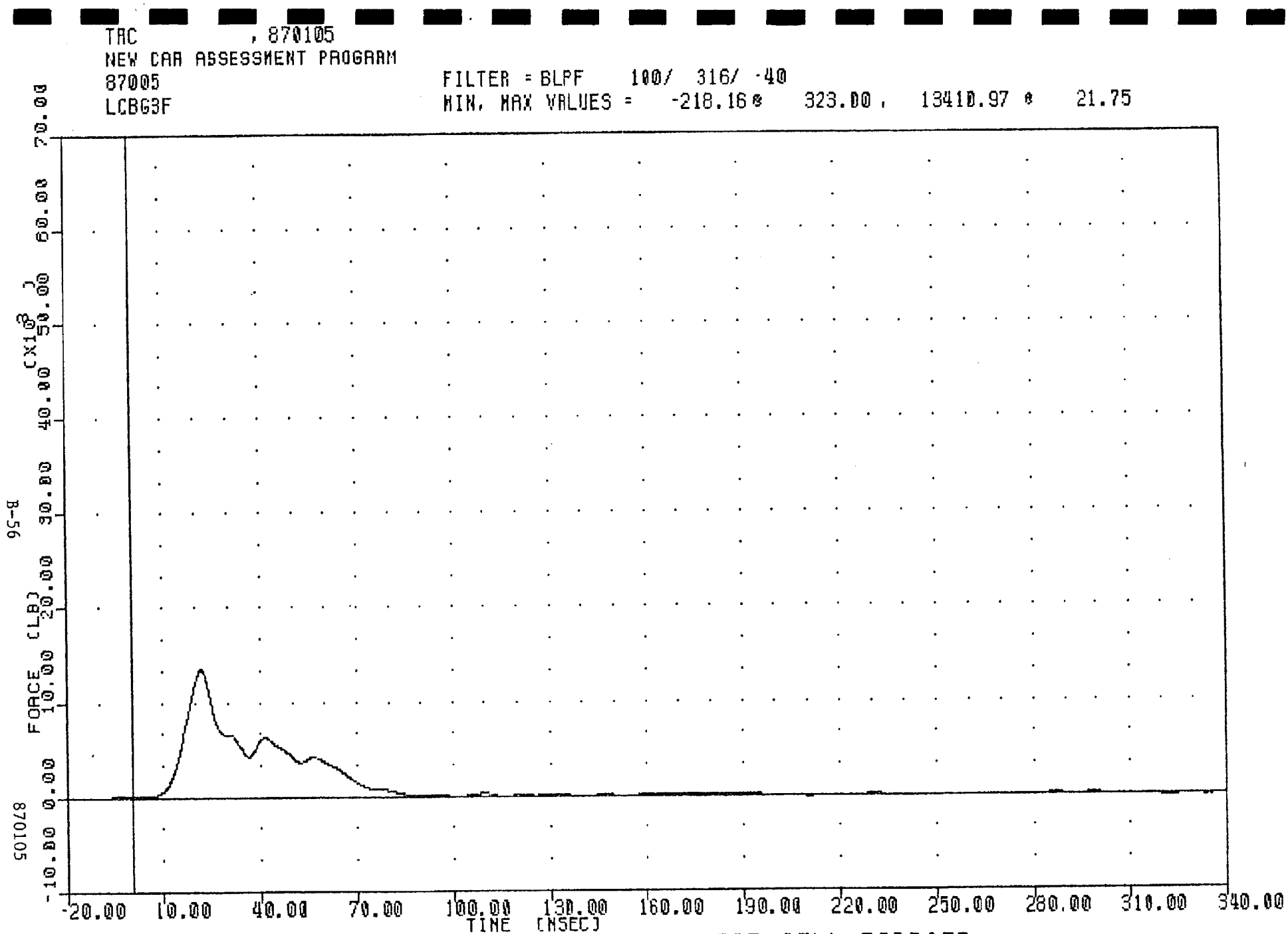
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C8 FORCE

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BC9F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -311.82 @ 35.13 , 369.88 @ 39.88

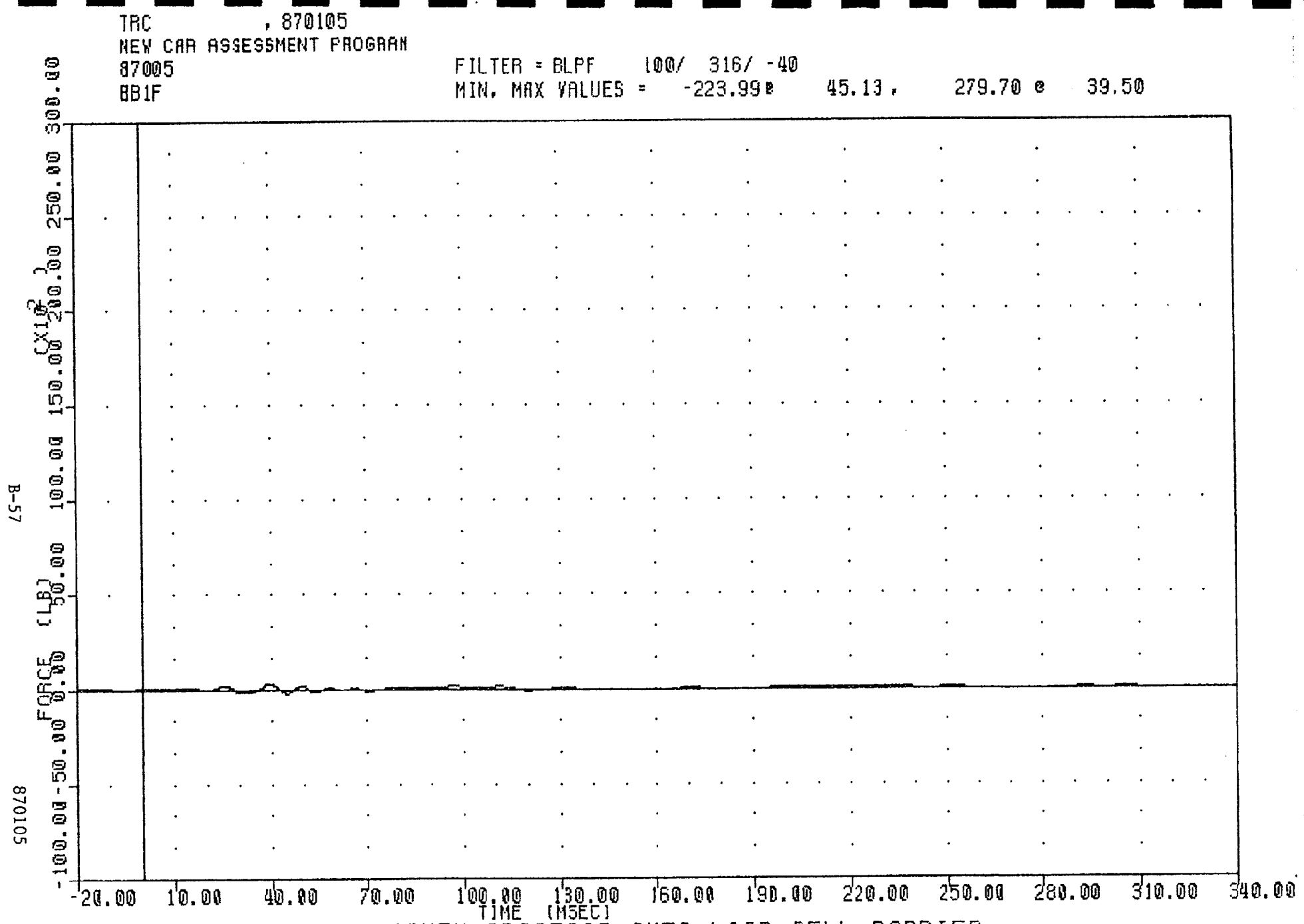


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE

870105

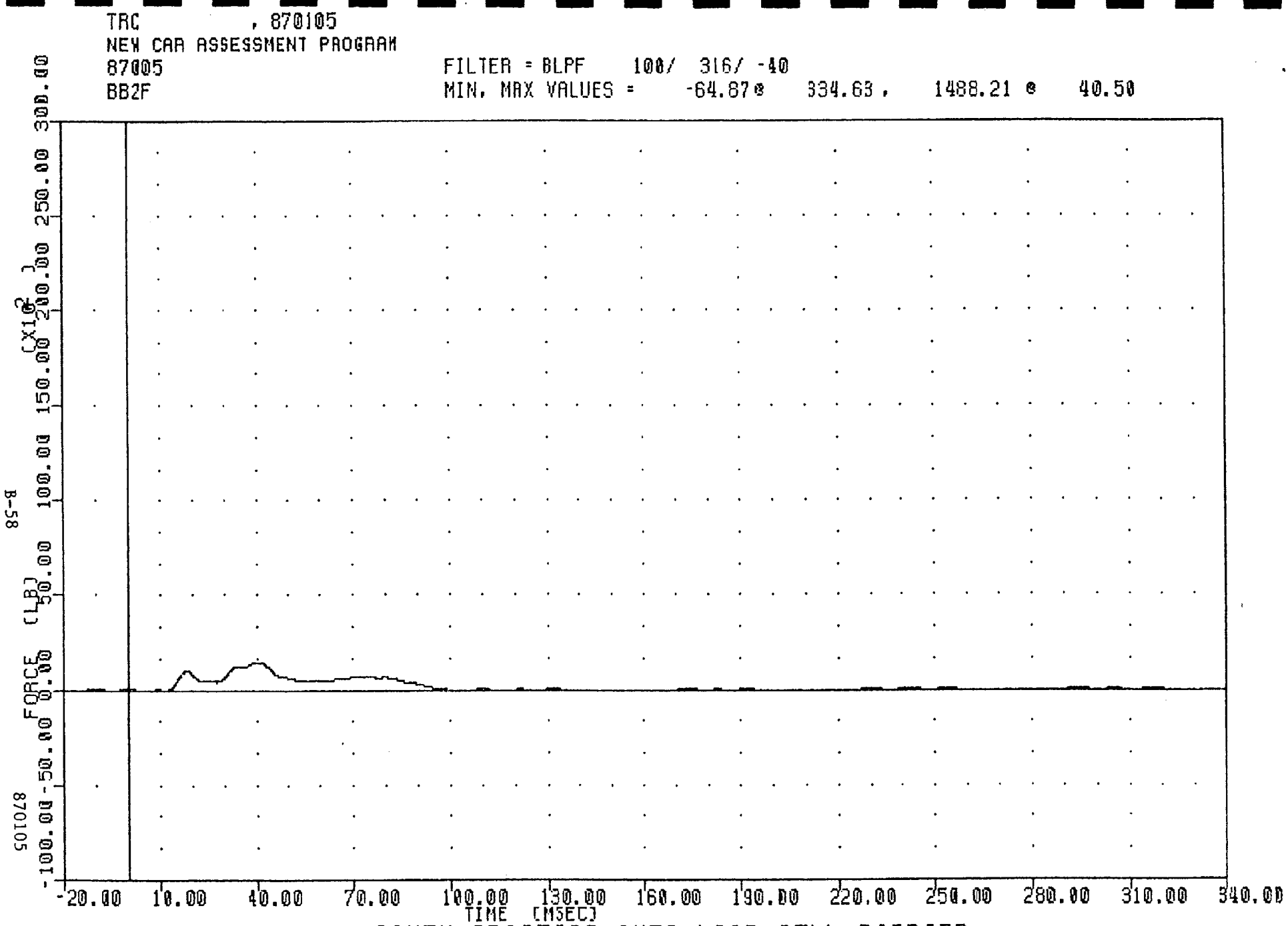


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 3 FORCE TOTAL



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B1 FORCE

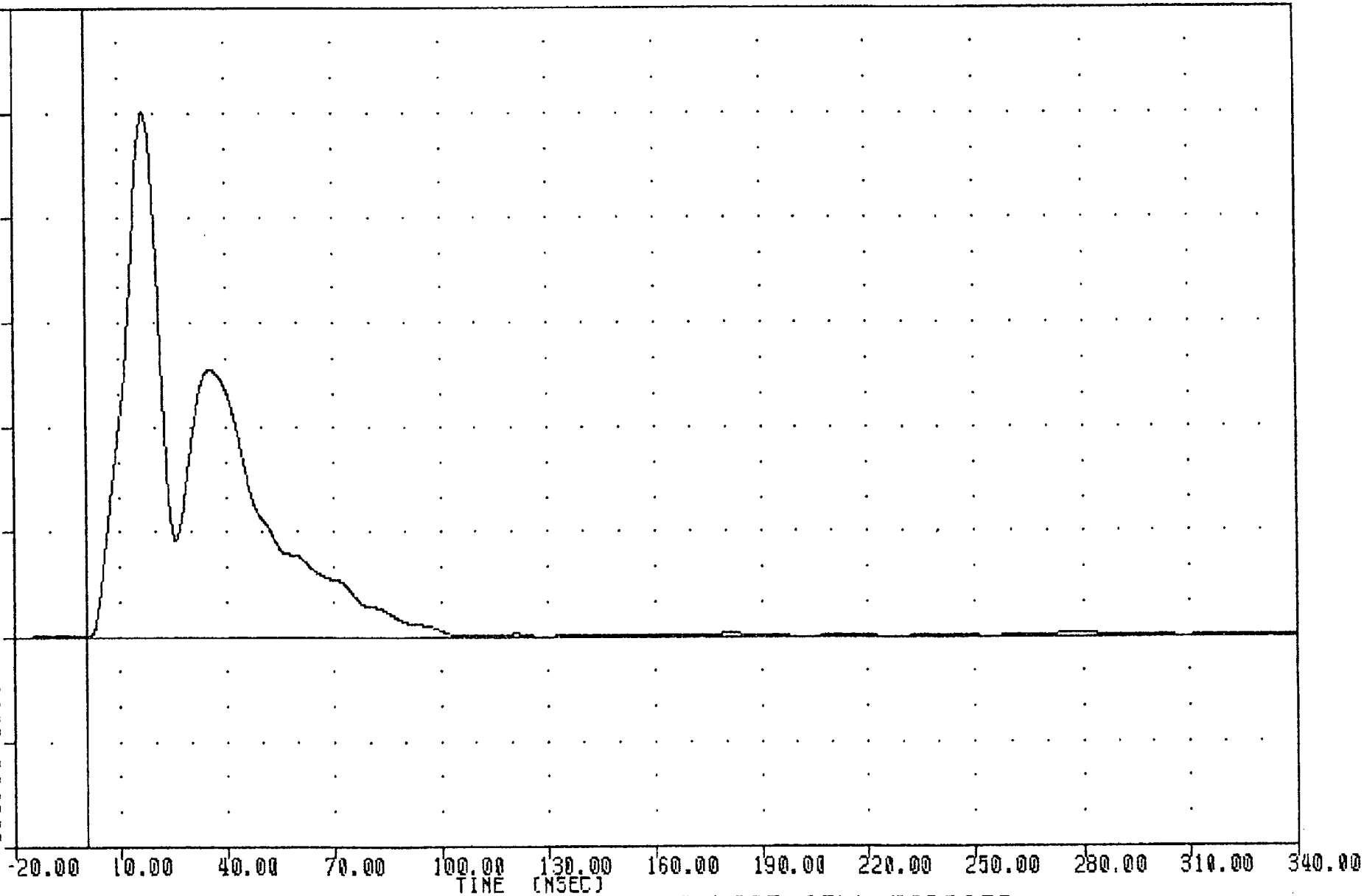
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
B83F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -70.03 @ 227.50 , 25040.39 @ 16.63

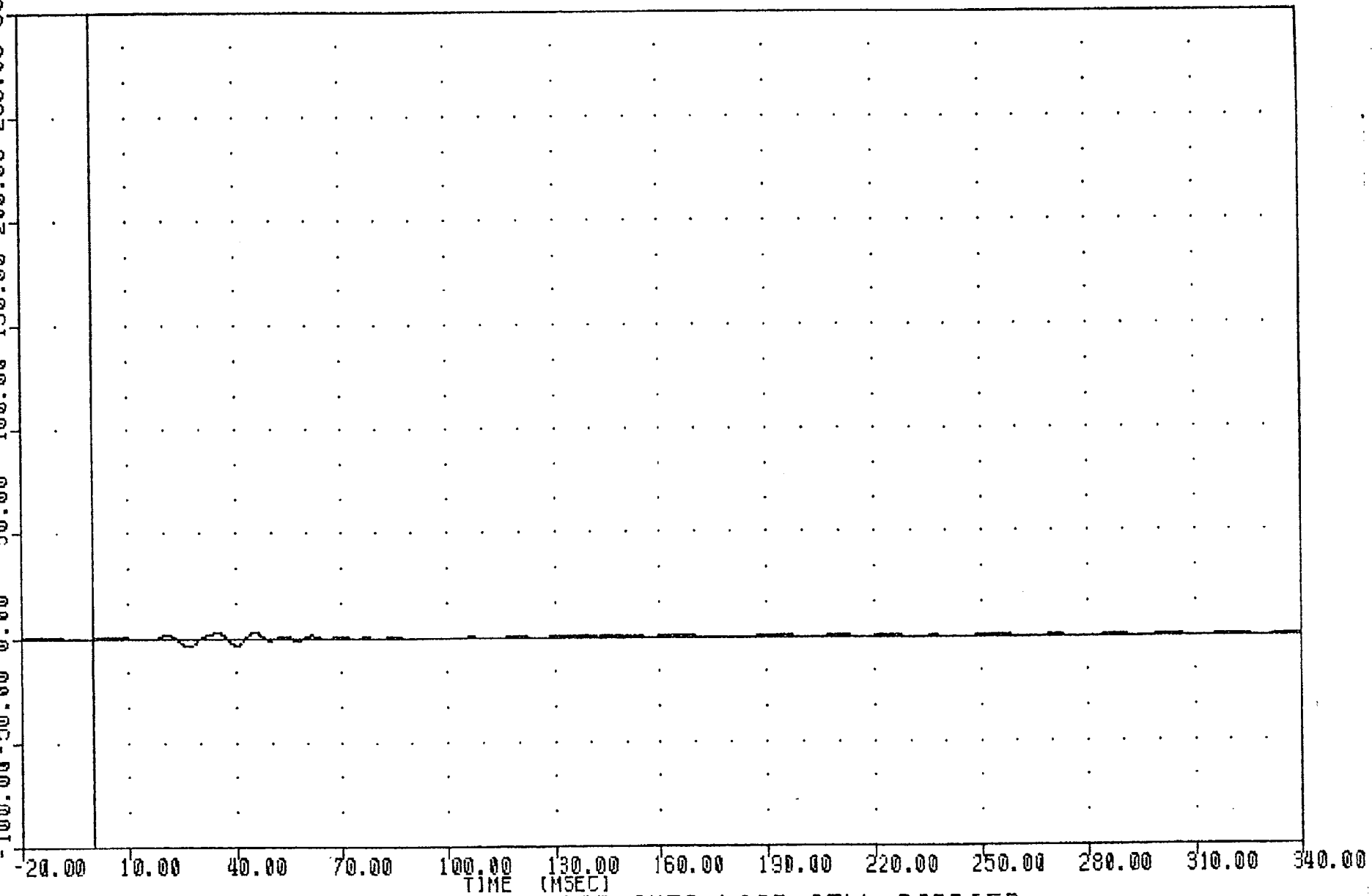


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B3 FORCE

870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BA1F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -410.06 @ 26.75 , 279.58 @ 45.25



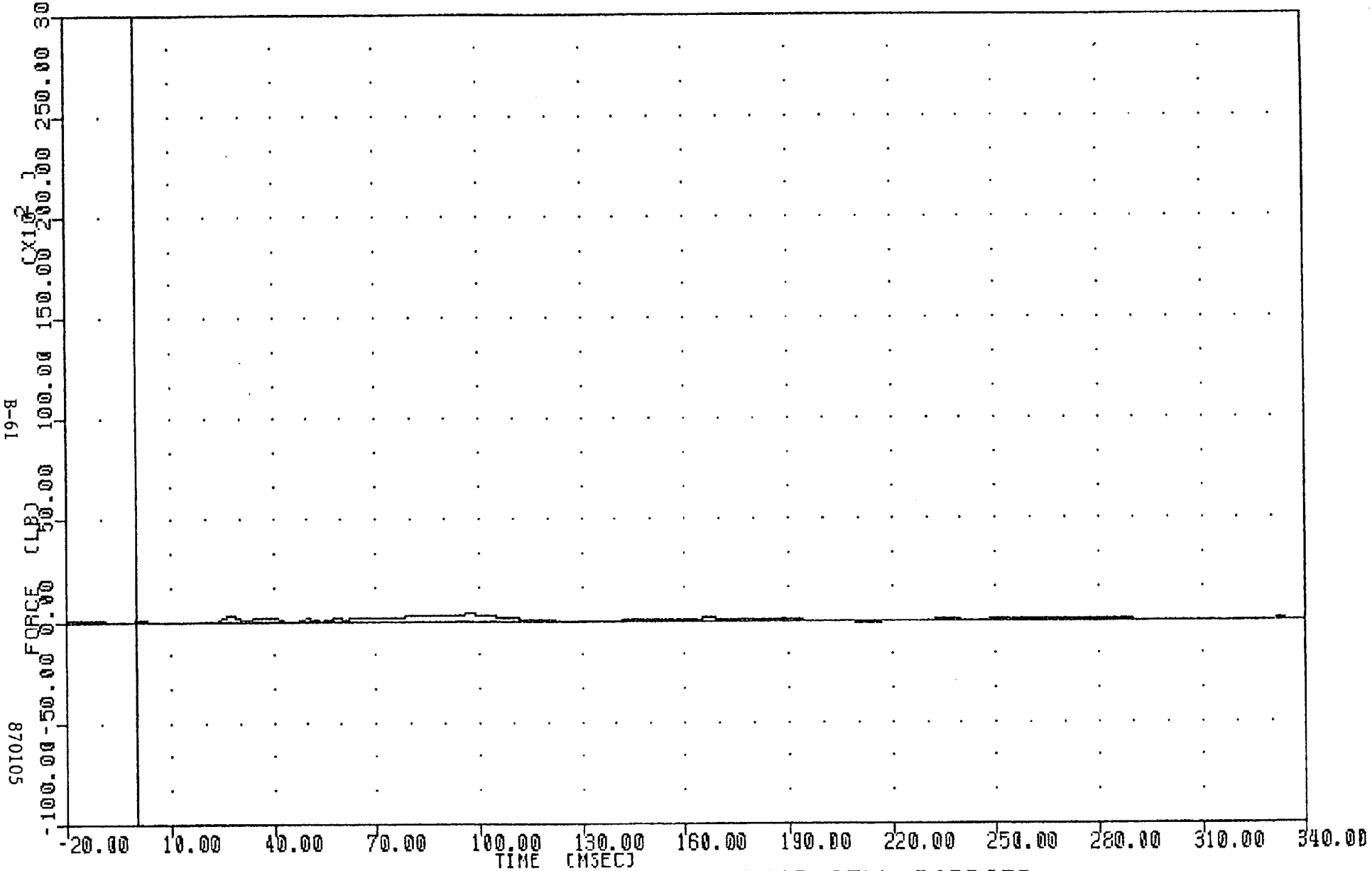
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A1 FORCE

B-60

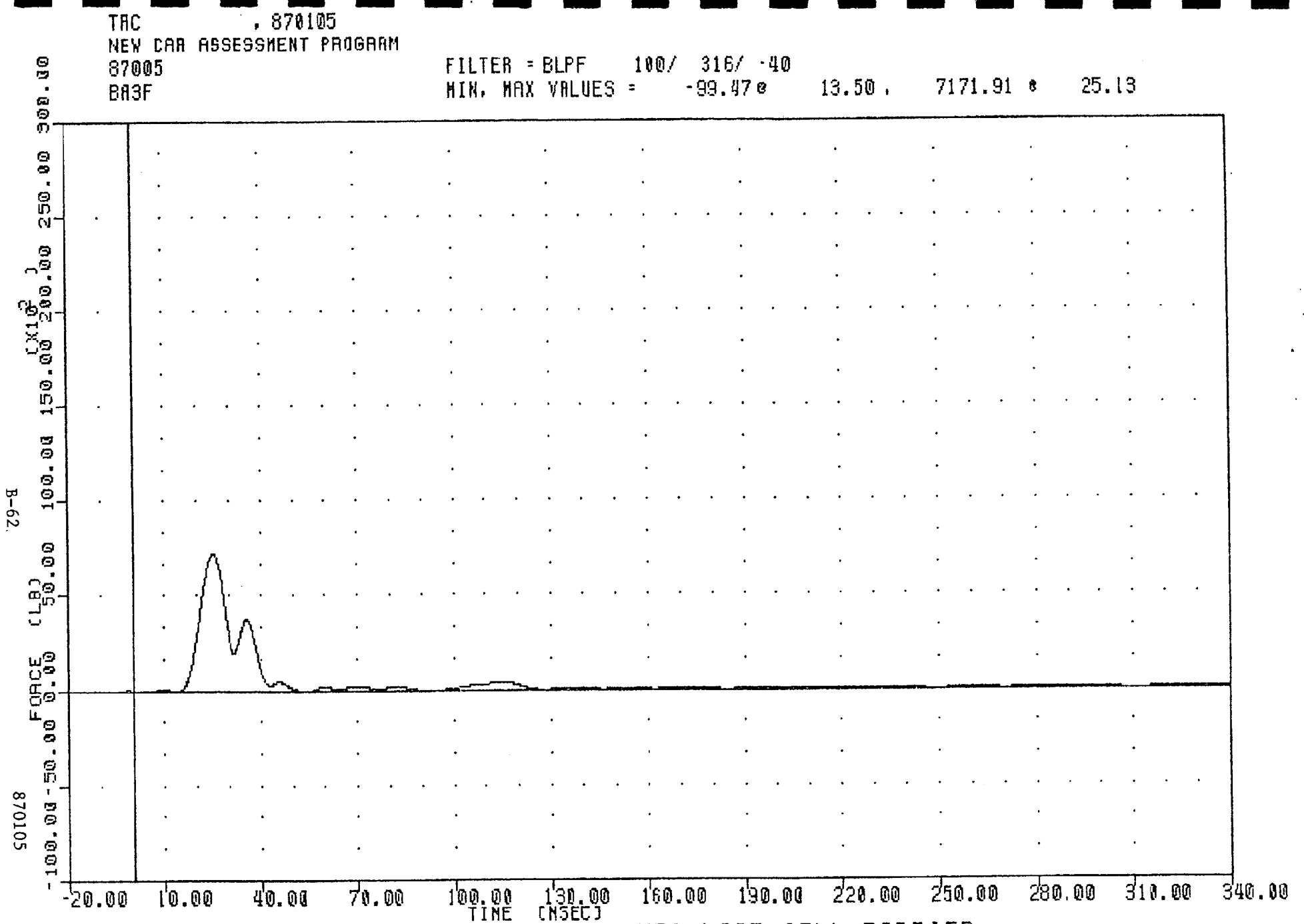
870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BR2F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -117.83 @ 214.25 , 342.54 @ 97.50

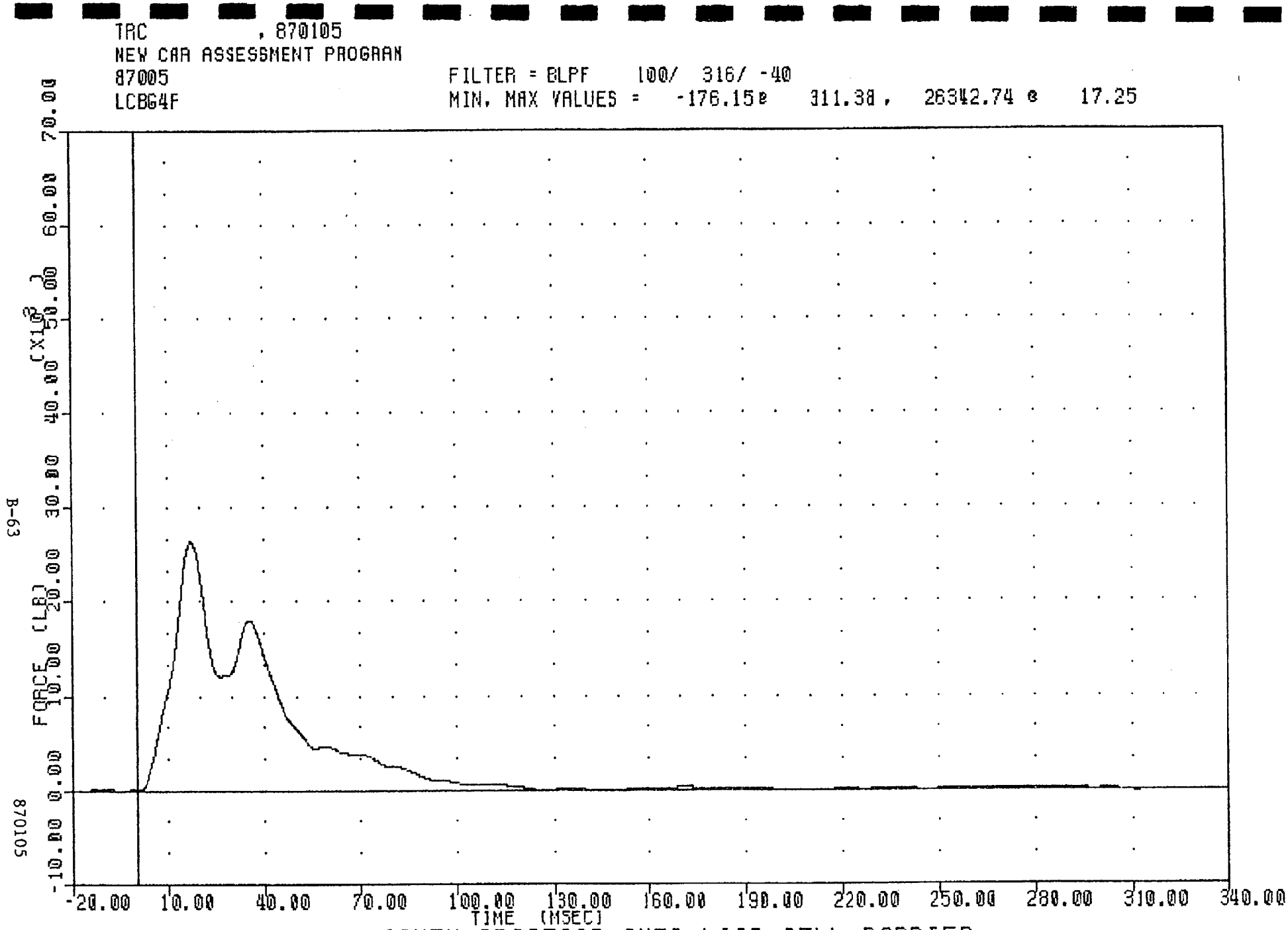


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION R2 FORCE



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A3 FORCE

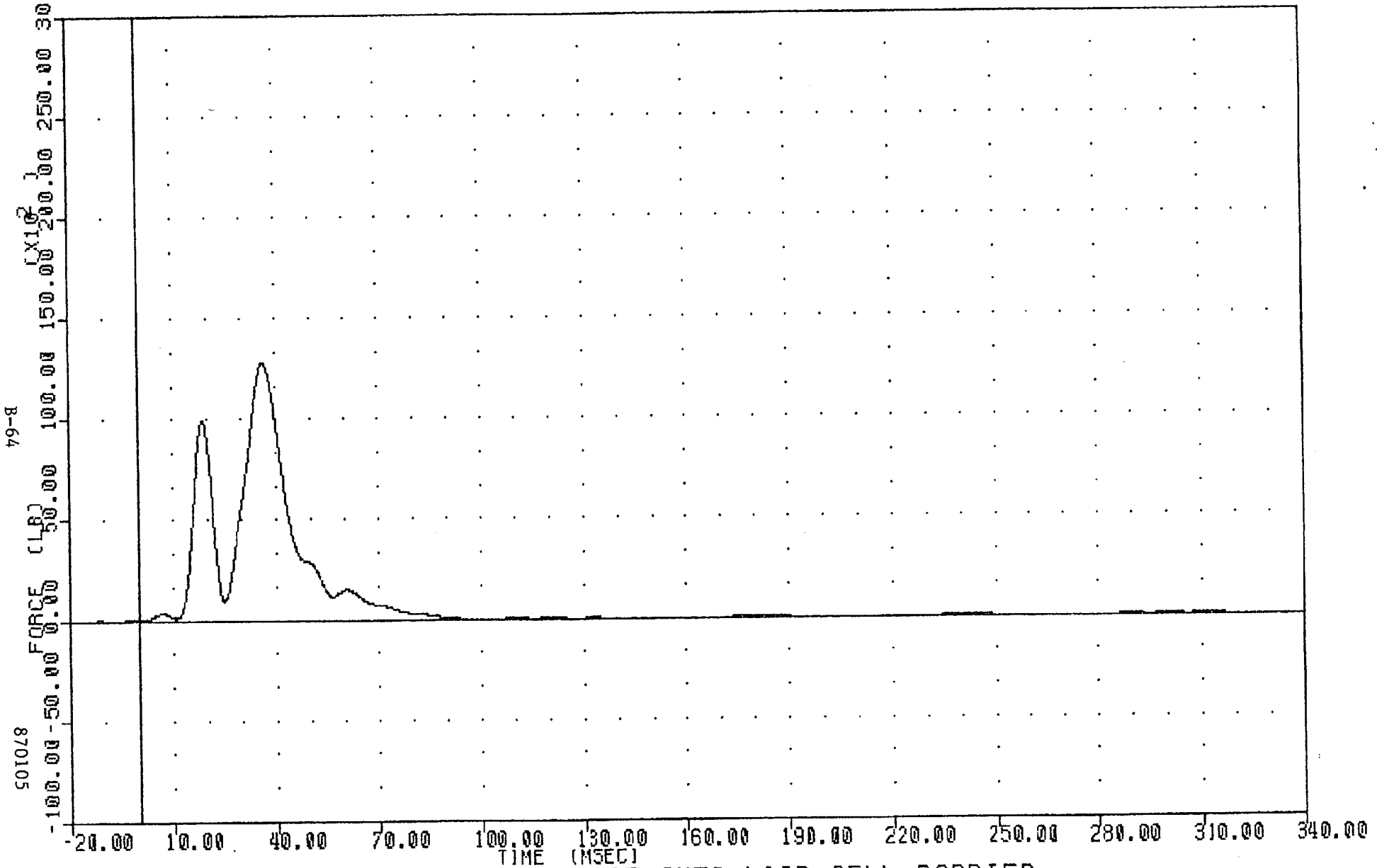
870105



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 4 FORCE TOTAL

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
8B4F

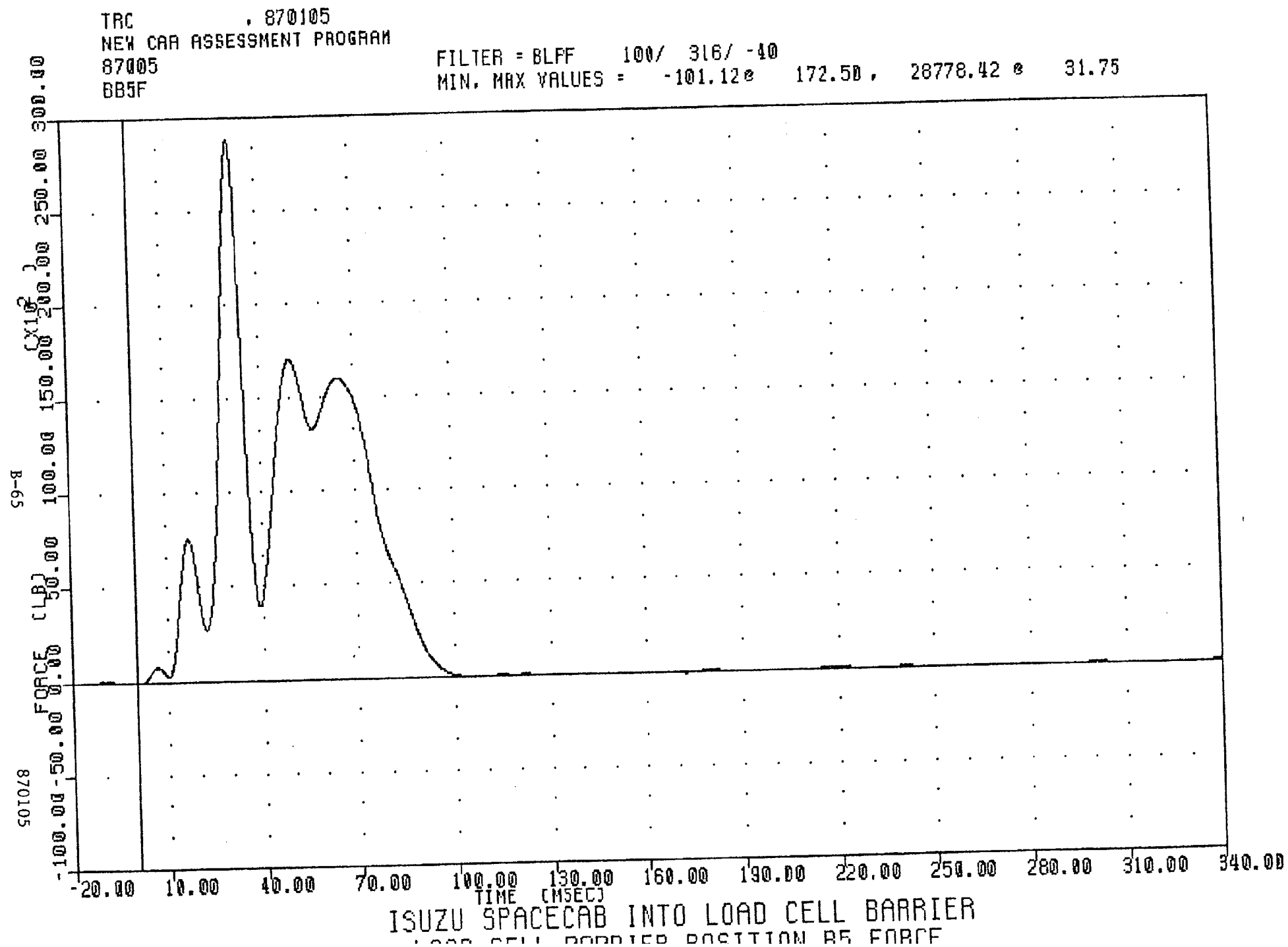
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -57.52 @ 263.00 , 12792.05 @ 36.50



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE

B-64

870105

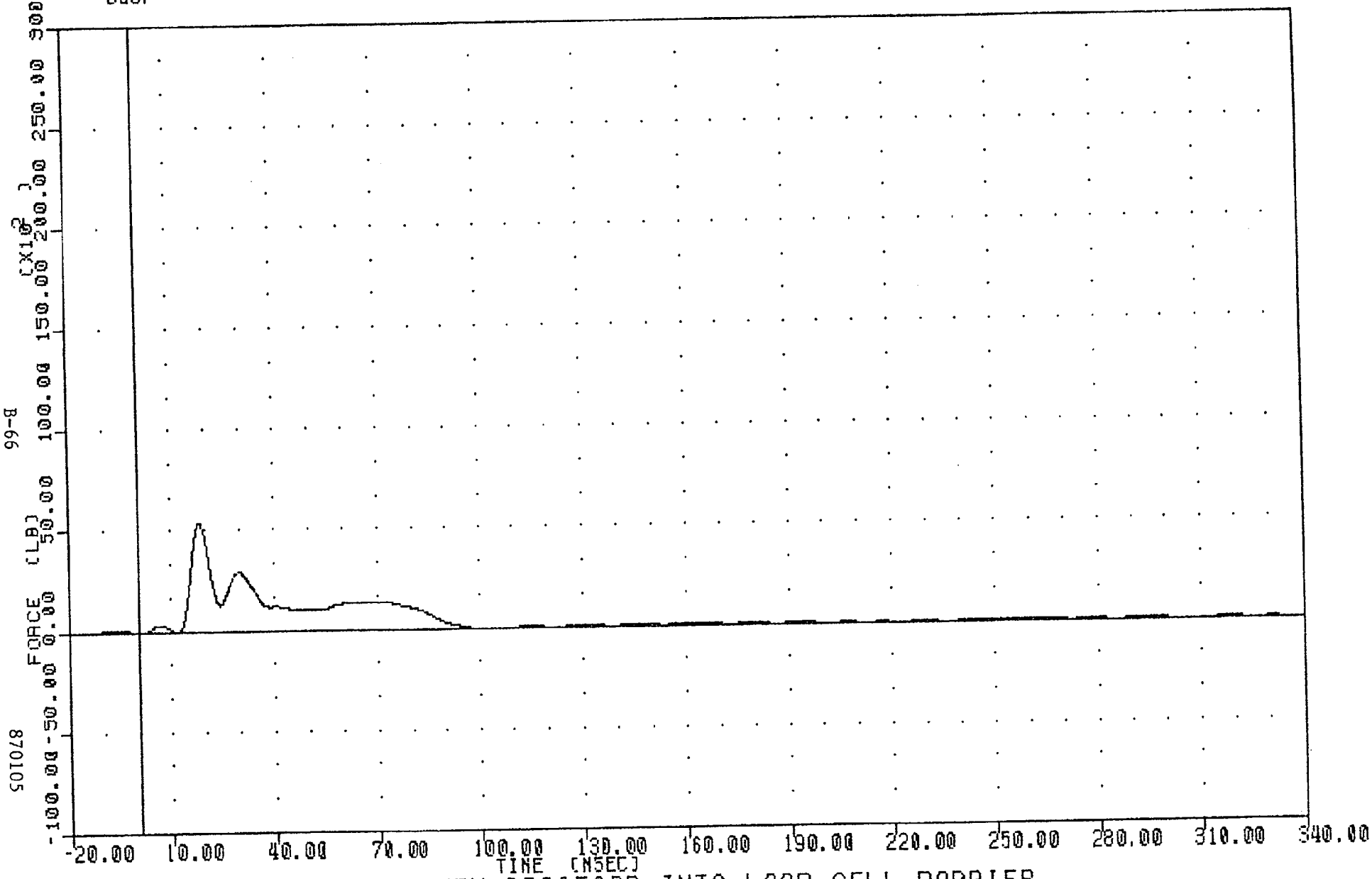


ISUZU SPACECAB INTO LOAD CELL BARRIER

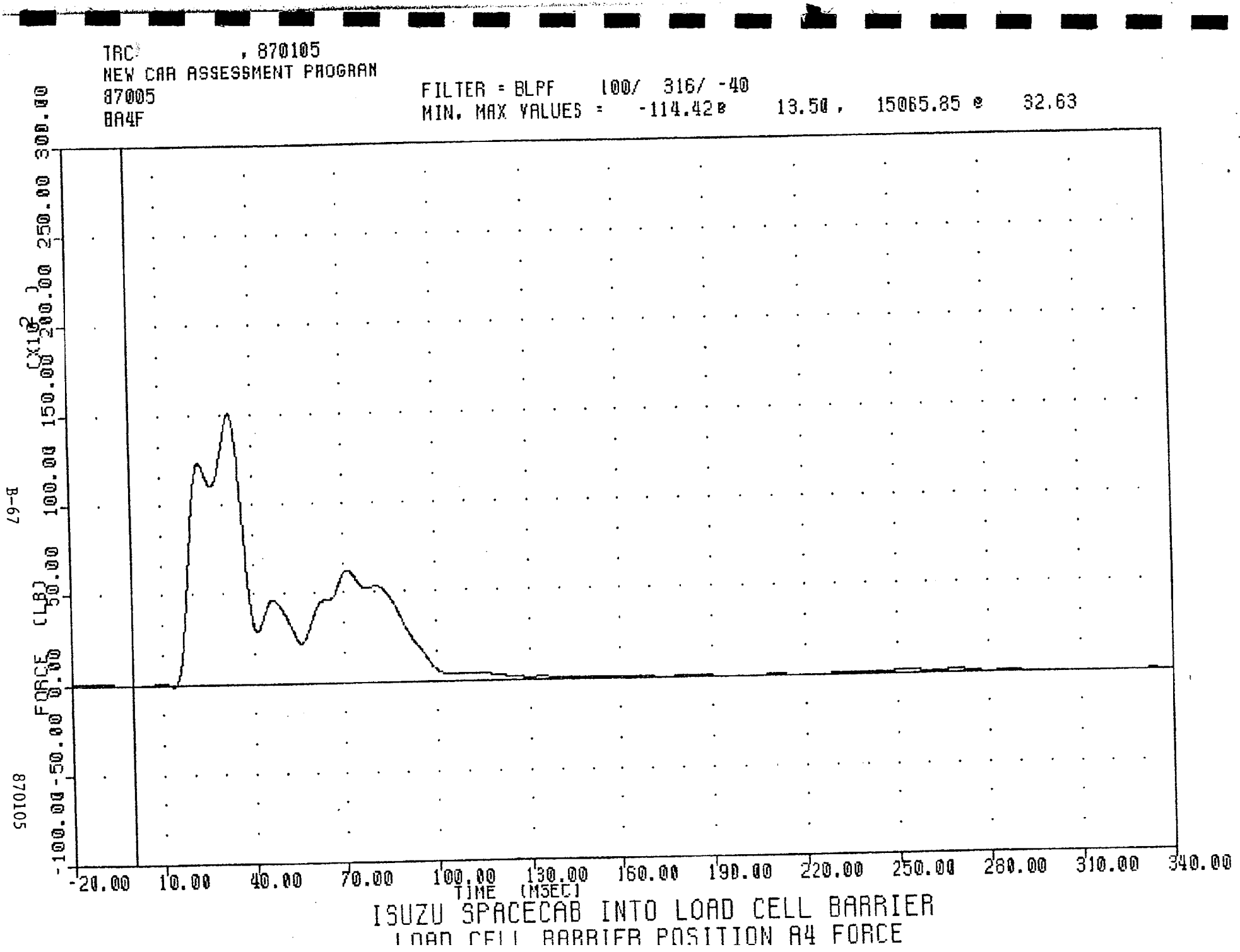
LOAD CELL BARRIER POSITION B5 FORCE

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
B86F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -76.92 @ 11.63 , 5397.48 @ 18.25

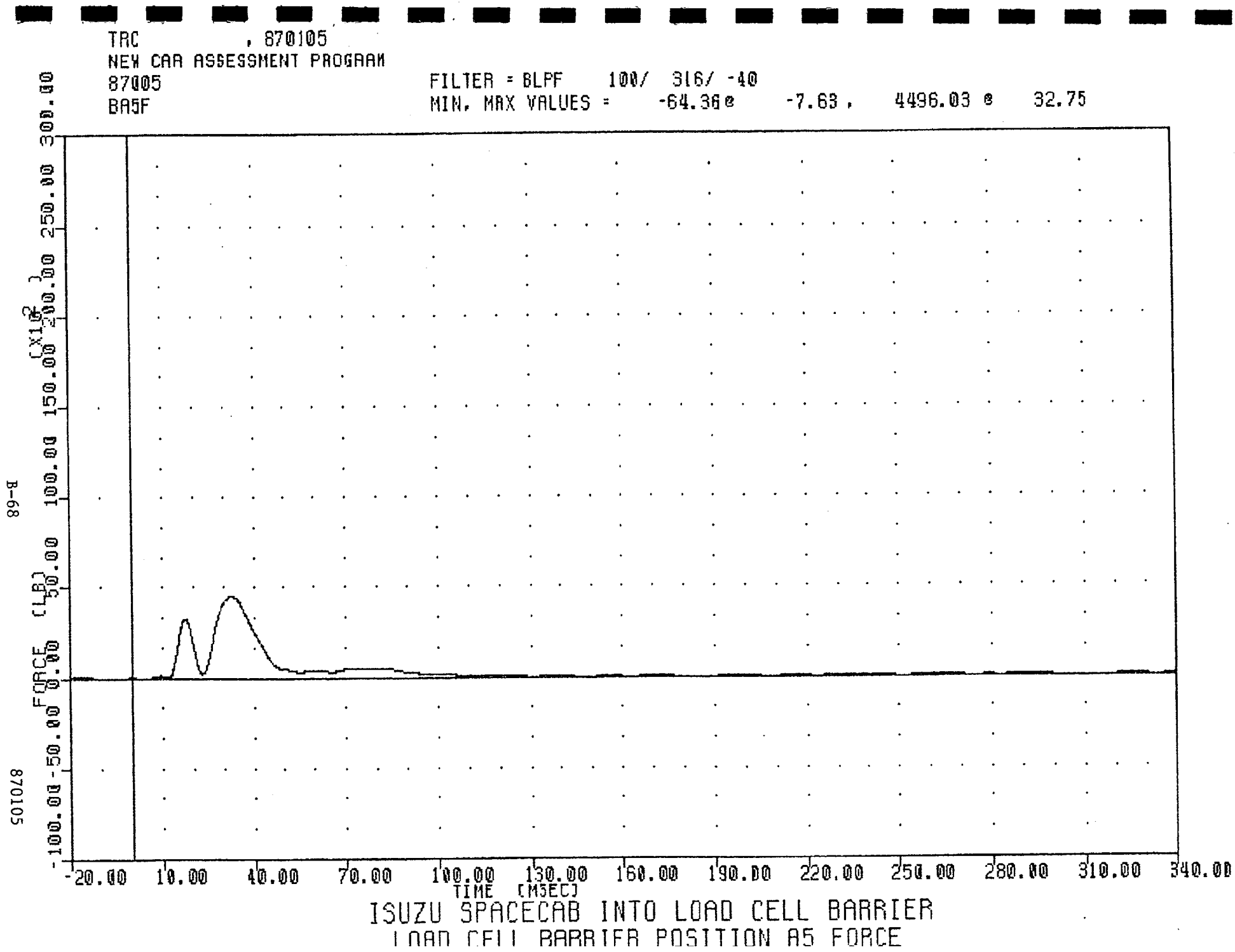


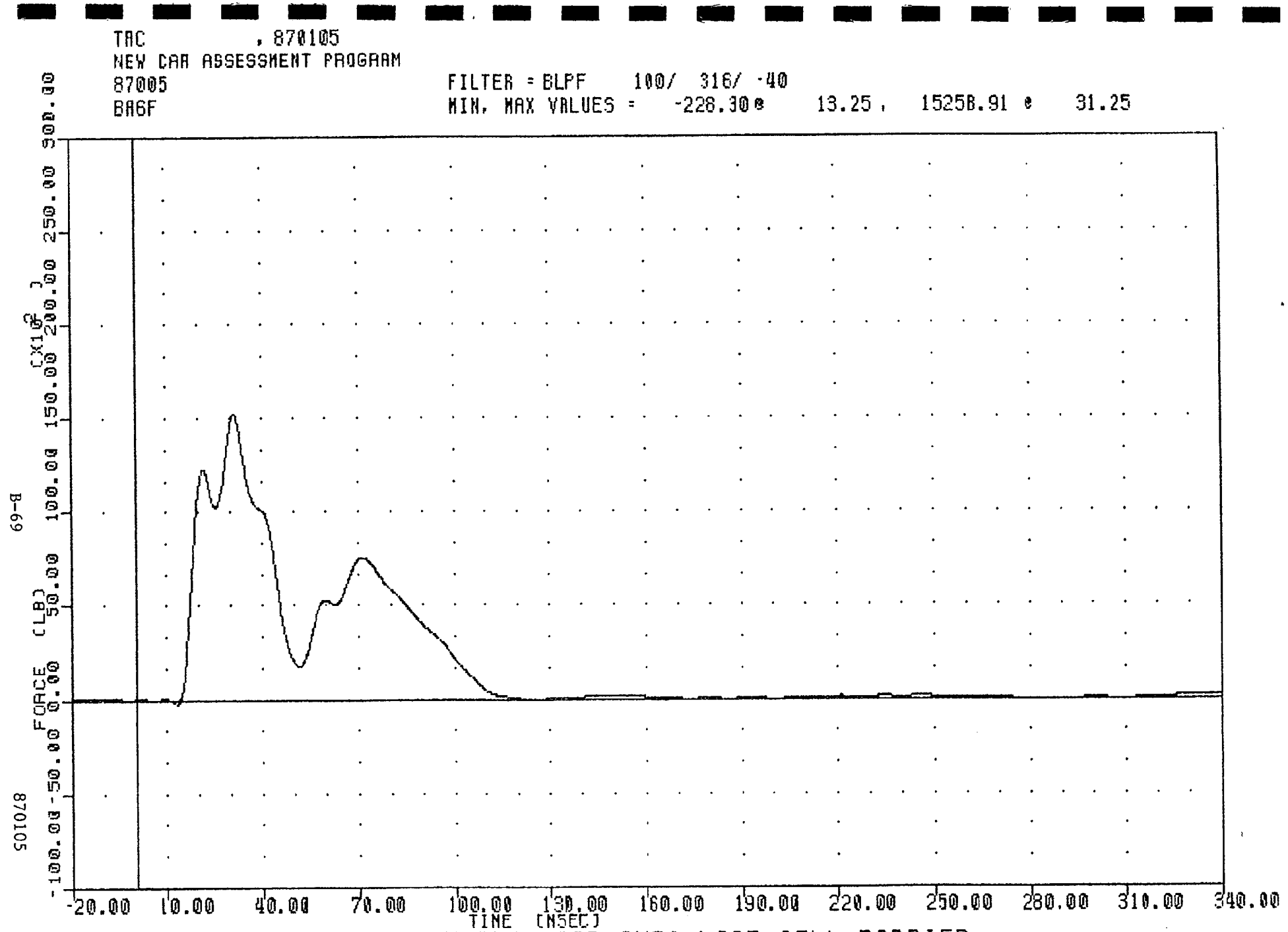
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE



ISUZU SPACECAB INTO LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A4 FORCE

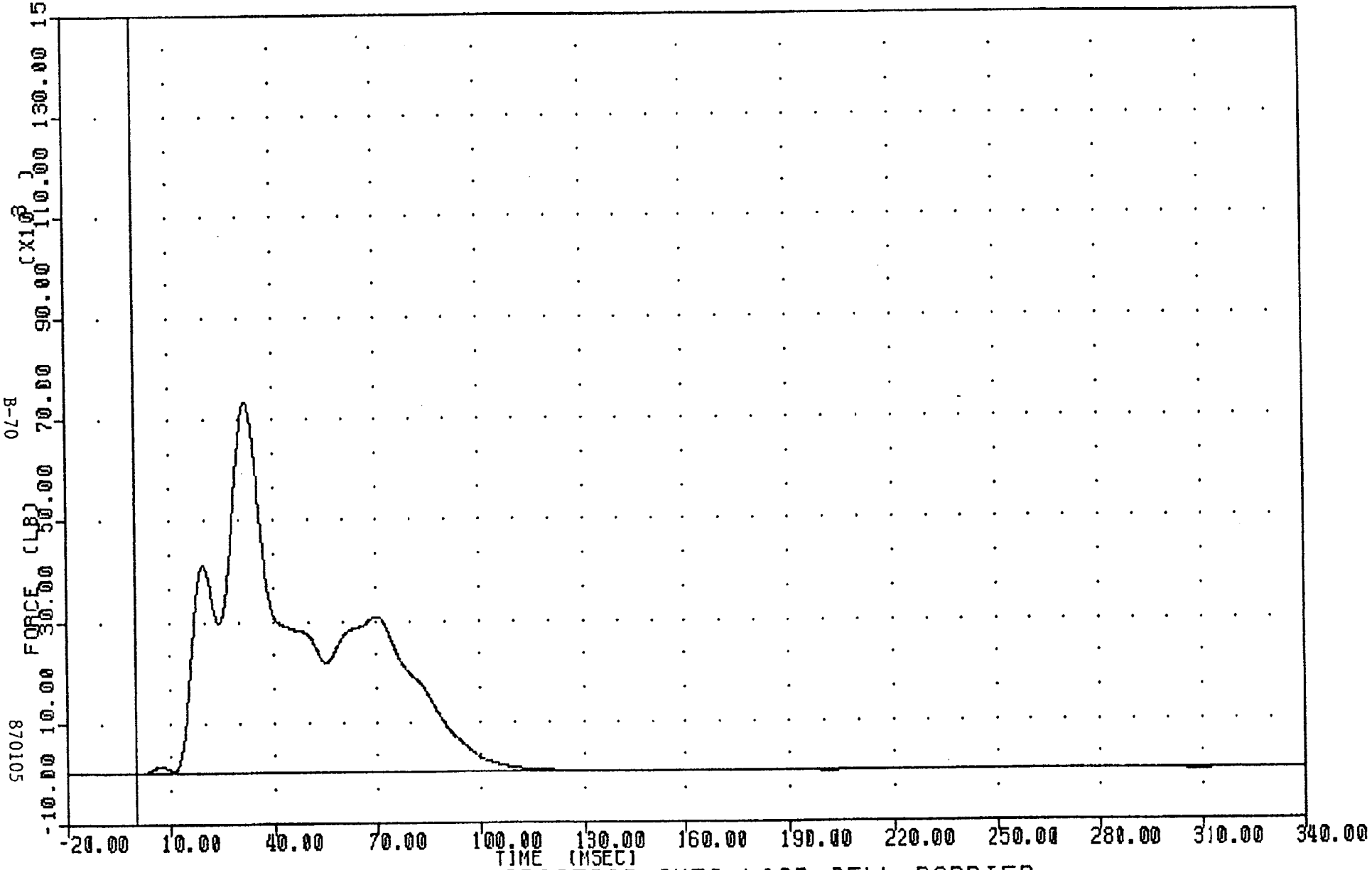

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BA5F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -64.36 @ -7.63 , 4496.03 @ 32.75
FORCE (LB) (X10^2)
300.00
250.00
200.00
150.00
100.00
50.00
0.00
-50.00
-100.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
B-68
870105
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A5 FORCE



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
LCBG5F

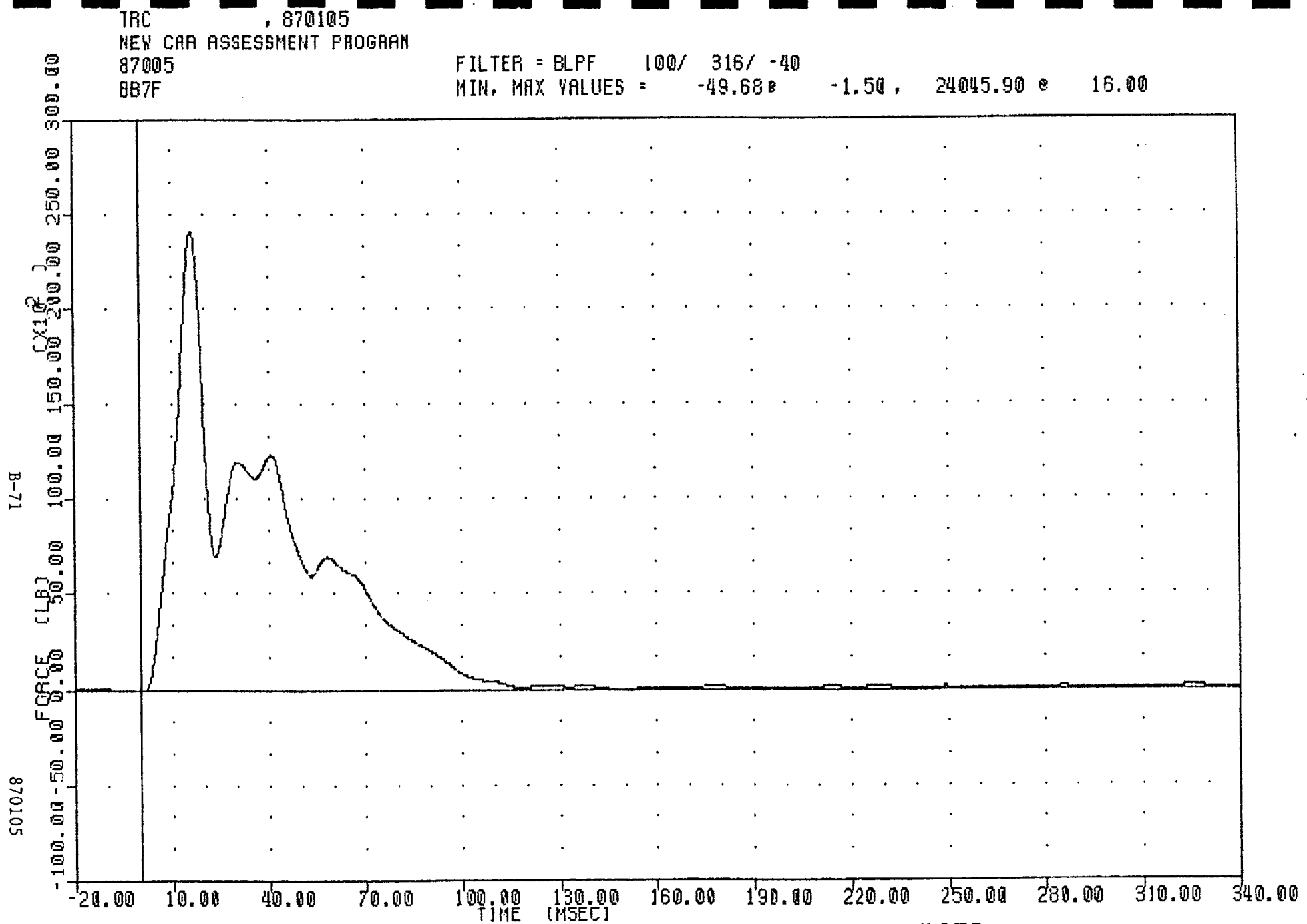
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -173.99 @ 308.63 , 73604.94 @ 32.00



B-70

870105

ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 5 FORCE TOTAL

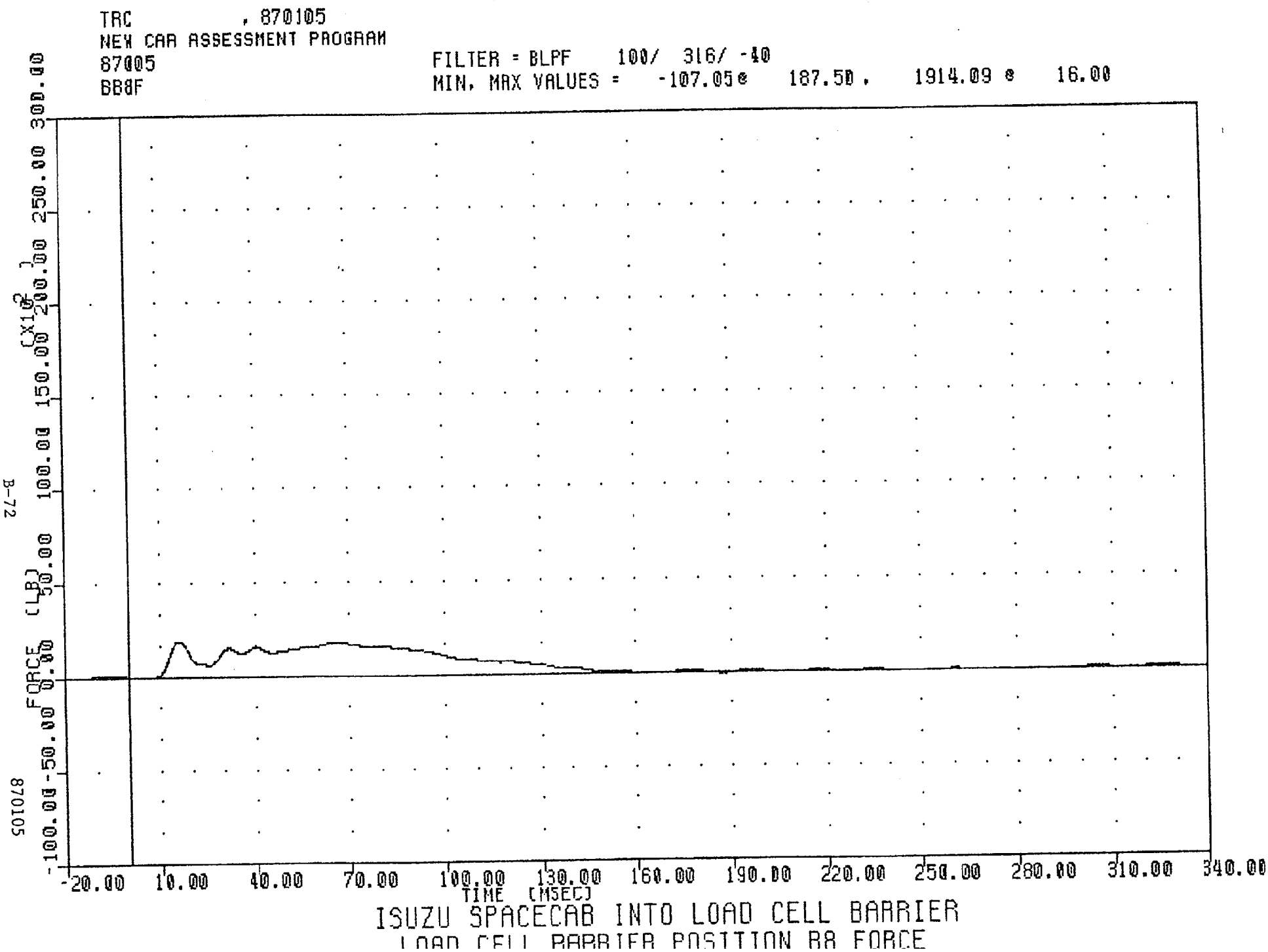


B-71

870105

ISUZU SPACECAB INTO LOAD CELL BARRIER

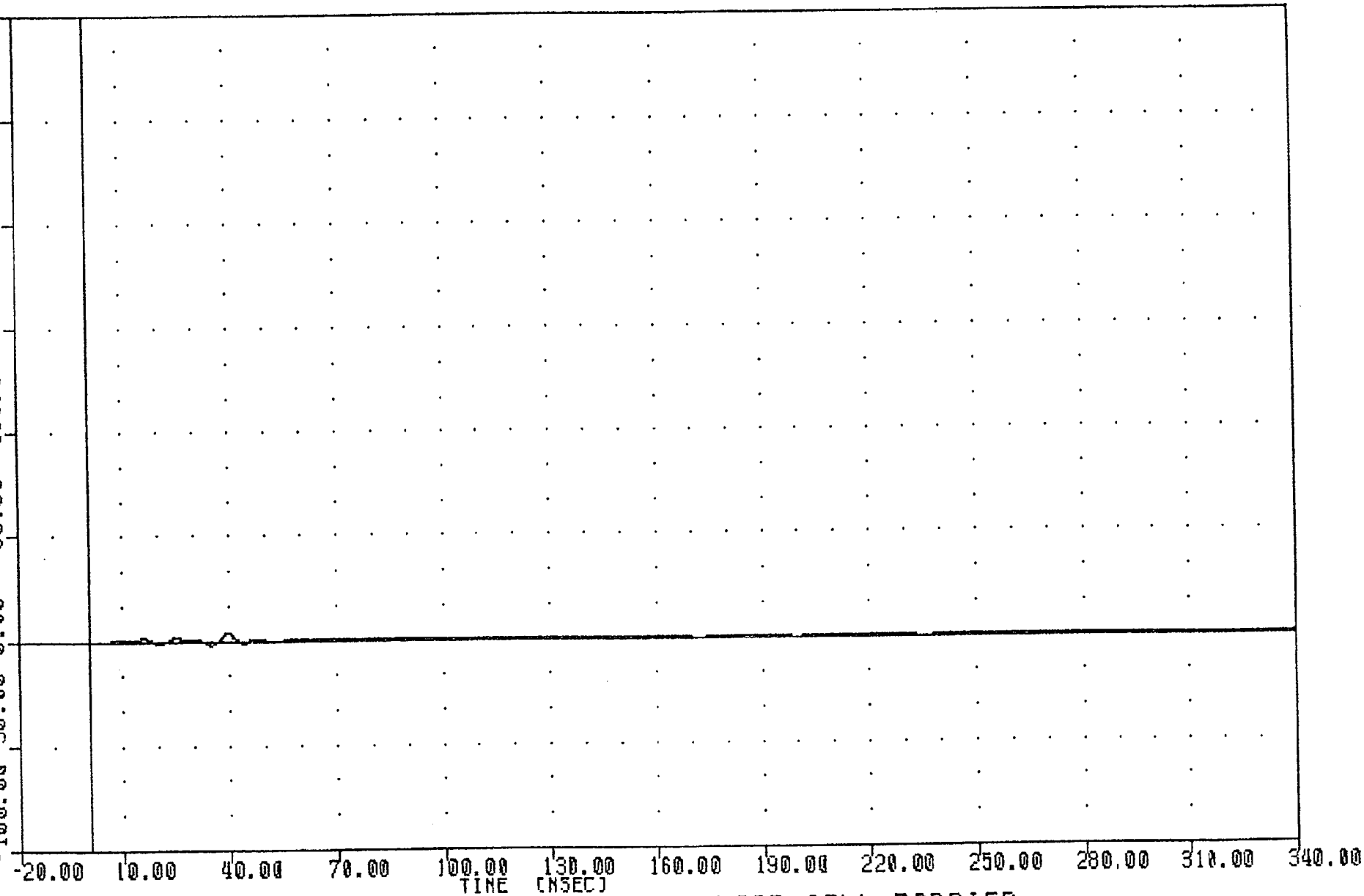
LOAD CELL BARRIER POSITION B7 FORCE


TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
BB8F
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -107.05 @ 187.50 , 1914.09 @ 16.00
FORCE (LB) (X10^2)
300.00
250.00
200.00
150.00
100.00
50.00
0.00
-50.00
-100.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION RR FORCE

870105

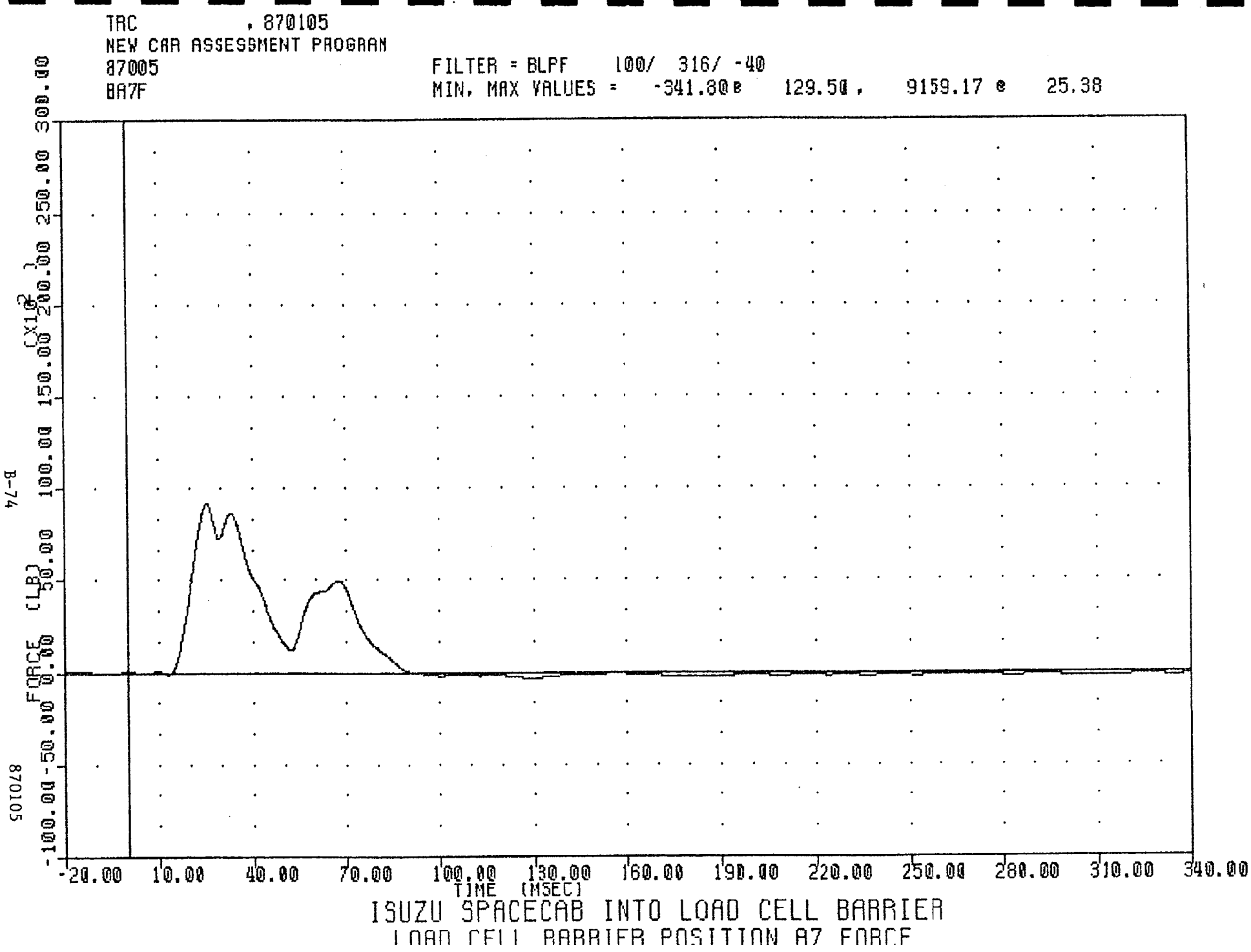
TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
B89F

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -213.66 @ 35.13 , 356.65 @ 39.63



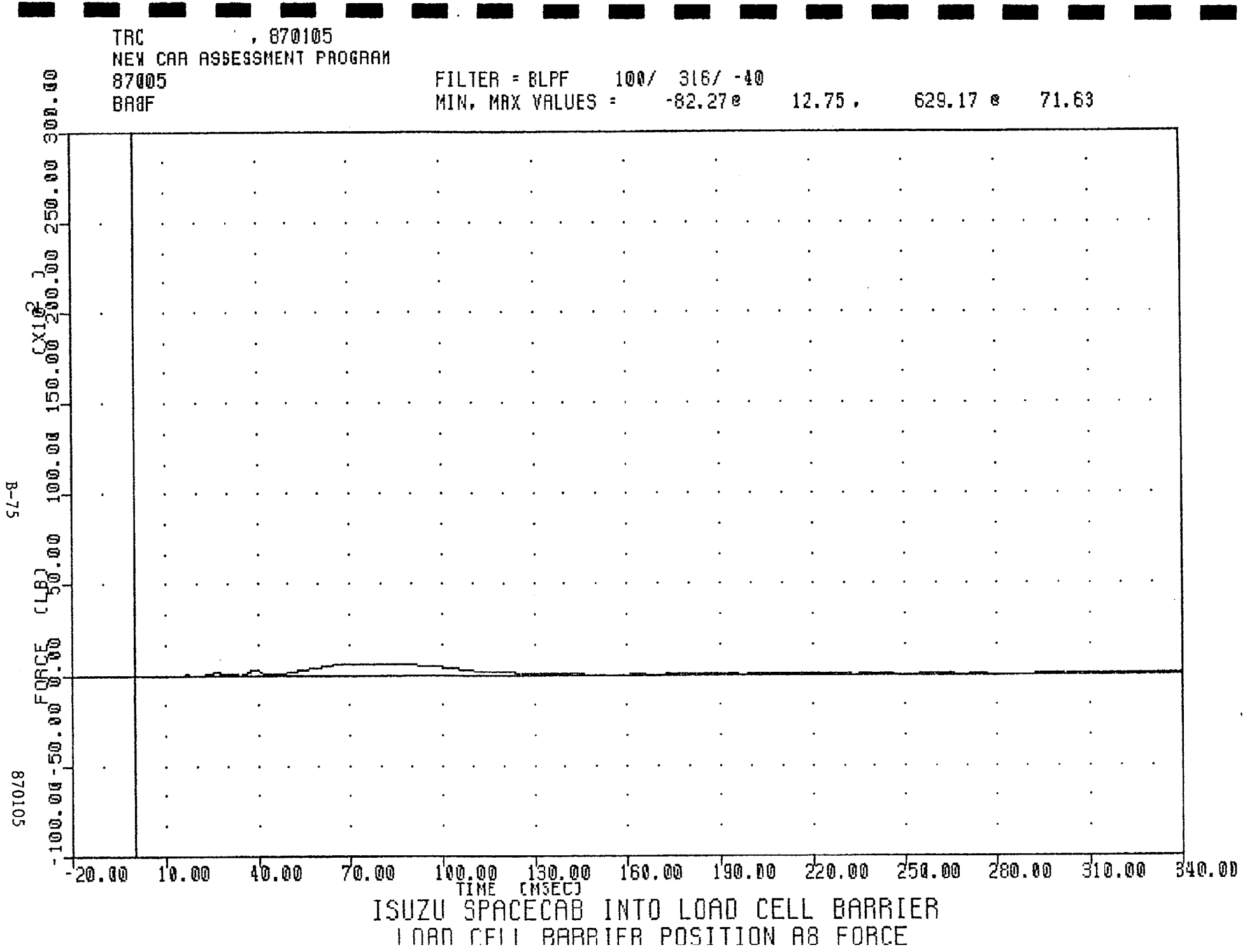
ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B9 FORCE

870105



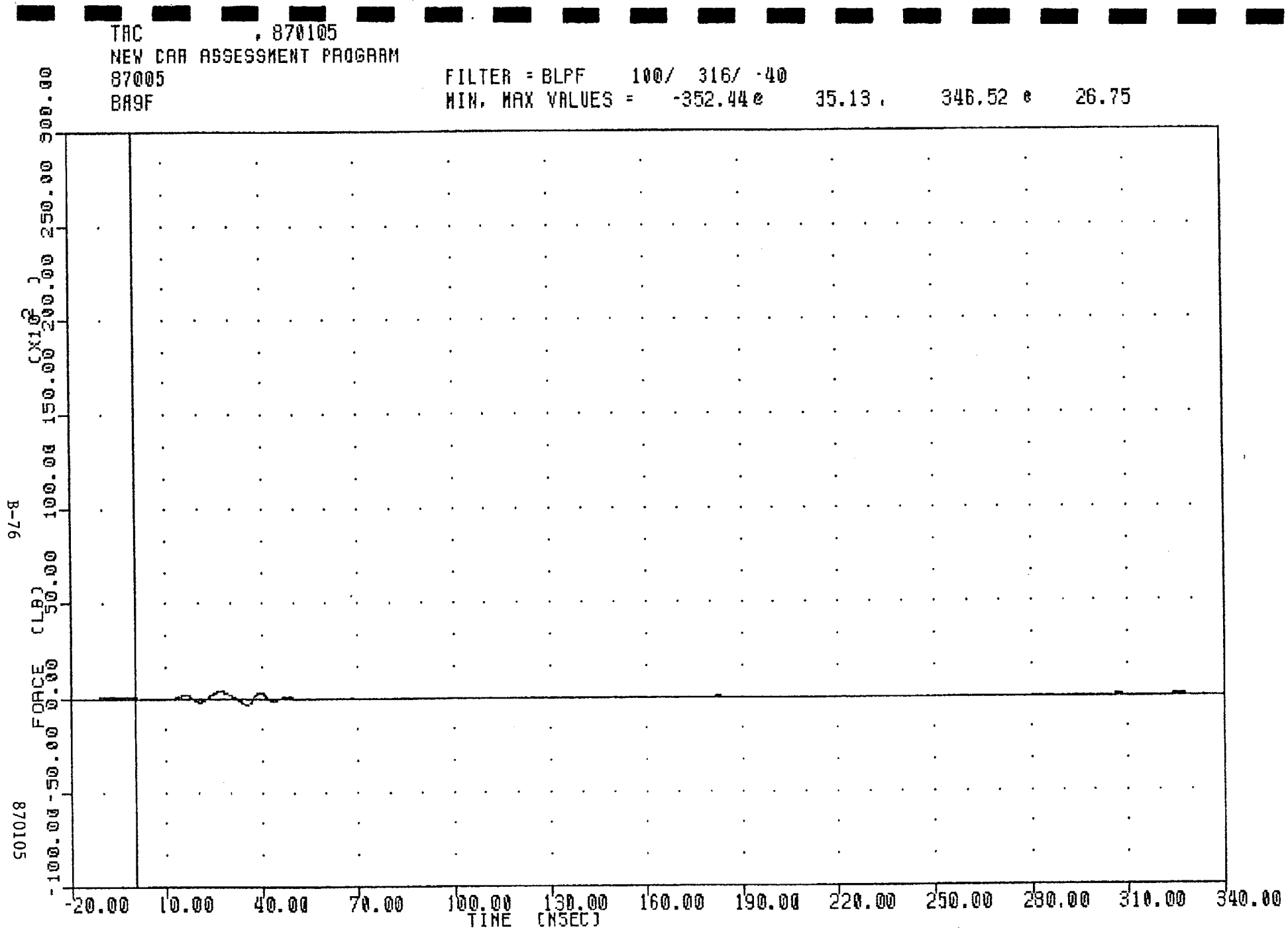
ISUZU SPACECAB INTO LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A7 FORCE



ISUZU SPACECAB INTO LOAD CELL BARRIER

LOAD CELL BARRIER POSITION A8 FORCE

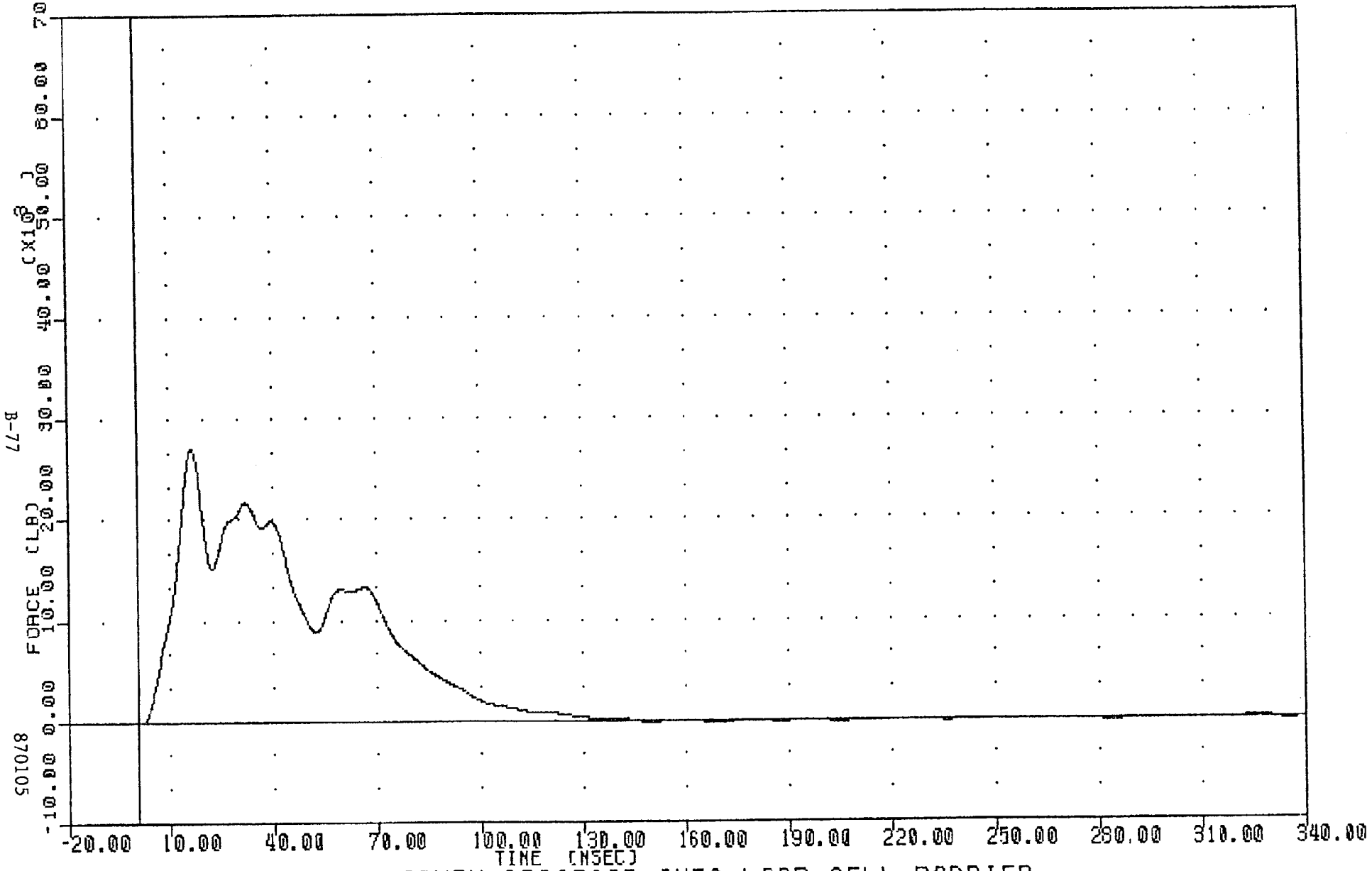


ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A9 FORCE

870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005
LCBG6F

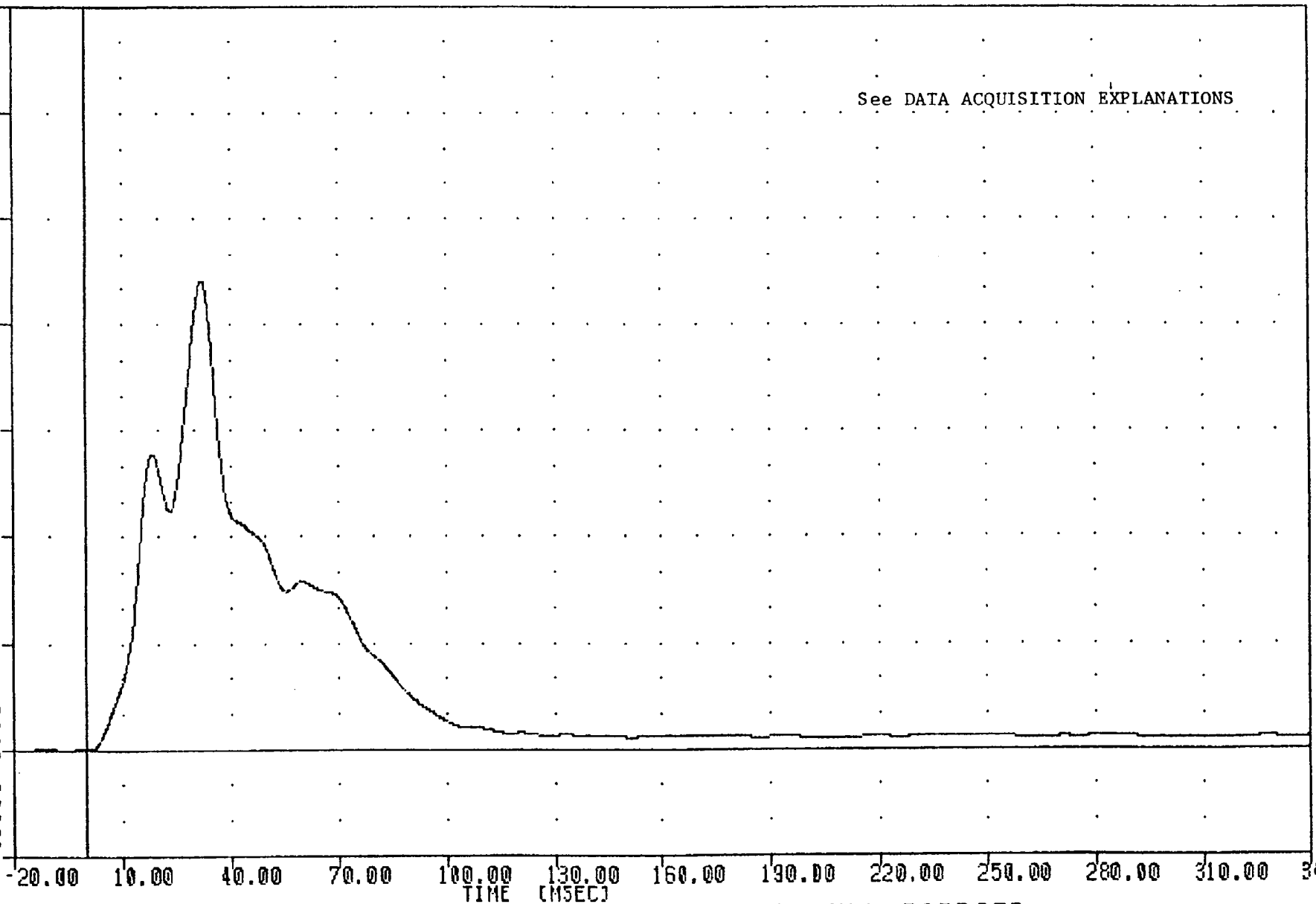
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -299.44 @ 169.25 , 27153.31 @ 16.38



ISUZU SPACECAB INTO LOAD CELL BARRIER
LOAD CELL BARRIER GROUP - 6 FORCE TOTAL

870105

TRC , 870105
NEW CAR ASSESSMENT PROGRAM
87005 FILTER = BLPF 100/ 316/ -40
LCBGT MIN, MAX VALUES = -28.90 @ -5.63 , 176535.92 @ 32.25



ISUZU SPACECAB INTO LOAD CELL BARRIER
SUM OF LOAD CELL BARRIER FORCES

87015

APPENDIX C

DUMMY CERTIFICATION

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

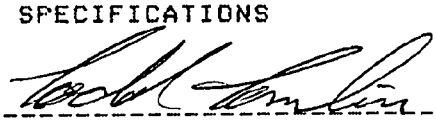
PART 572 31-DEC-86

TEMPERATURE 70.00 F
NCA ED41112

RELATIVE HUMIDITY 27.00 %
572 SN 411 EXT.DIMENSION CAL12

DESCRIPTION SN HUMANOID 411	SPECIFICATION	TEST RESULTS
Sitting Height	35.6 - 35.8IN	35.6 INS
Shoulder Pivot Height	21.8 - 22.4IN	22.3 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7IN	20.6 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6IN	9.4 INS
Shoulder Width	17.8 - 18.4IN	18.0 INS
Chest Circumference Over Nipples	36.8 - 40.0IN	37.5 INS
Waist Circumference at Min. Girth	31.4 - 32.6IN	32.4 INS
Hip Width	14.0 - 15.4IN	14.8 INS
Knee Pivot From Floor	19.3 - 19.9IN	19.6 INS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572 31-DEC-86

TEMPERATURE 71.00 F RELATIVE HUMIDITY 28.00 %
NCA LF41112 572 SN 411 LUMBAR FLEX CAL12

DEFLECTION	SPECIFICATION	TEST RESULTS
0 Deg.	0 LBS	0.00 LBS
20 Deg	22.00 - 34.00 LBS	24.00 LBS
30 Deg	34.00 - 46.00 LBS	34.00 LBS
40 Deg	46.00 - 58.00 LBS	47.00 LBS
NET RETURN ANGLE	< 12 DEG	11.40 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

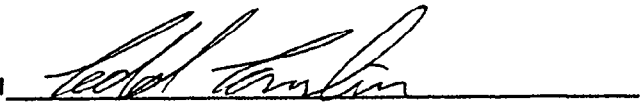
PART 572 31-DEC-86

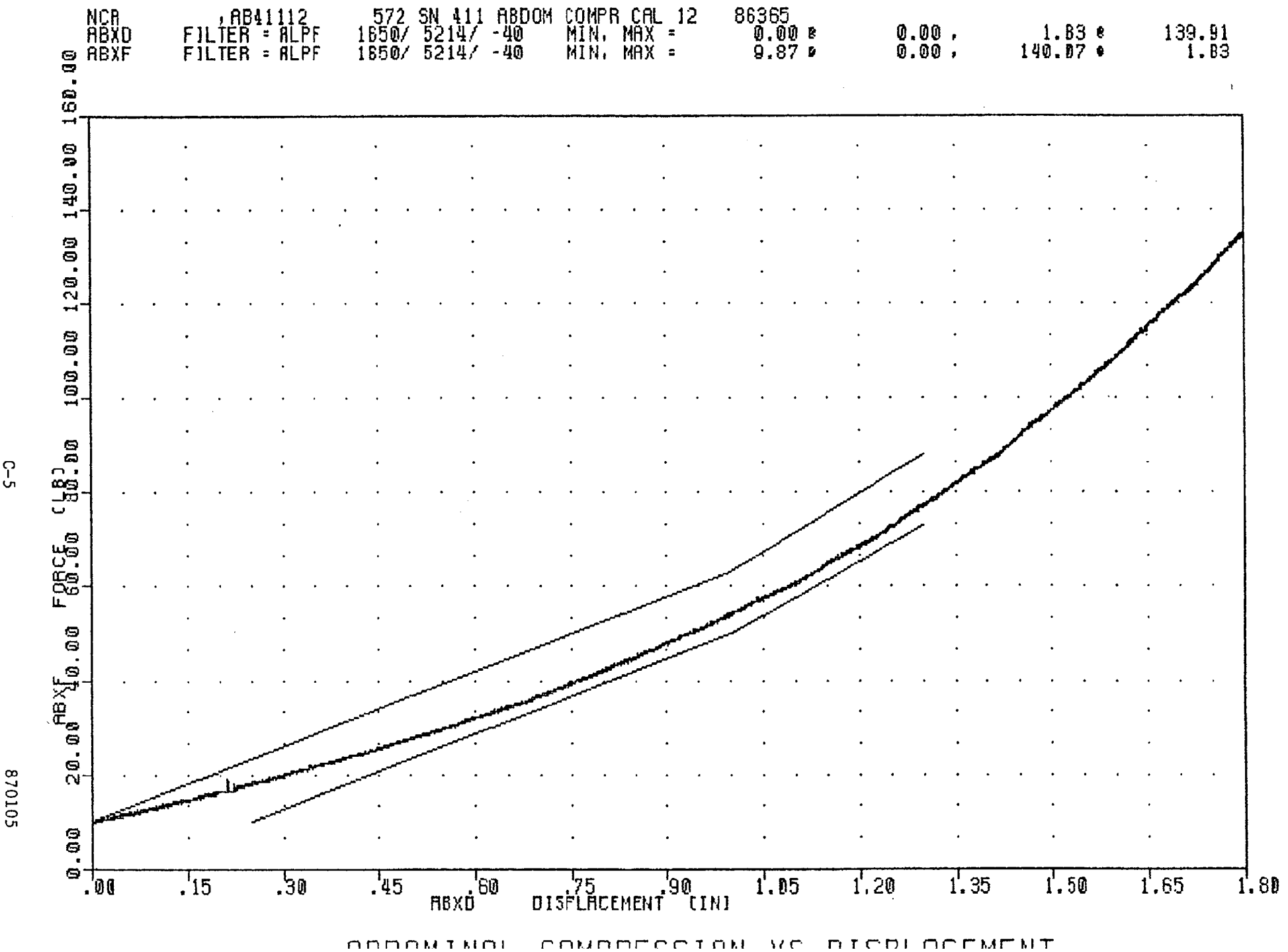
TEMPERATURE 70.00 F
NCA AB41112

RELATIVE HUMIDITY 28.00 %
572 SN 411 ABDOM COMPR CAL 12

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0 IN.	10 LBS	10 LBS
.50 IN.	23.00 - 36.00 LBS	27.69 LBS
.75 IN.	36.00 - 50.00 LBS	39.16 LBS
1.00 IN.	50.00 - 63.00 LBS	54.35 LBS
1.30 IN.	73.00 - 88.00 LBS	76.67 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 



ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572 31-DEC-86

TEMPERATURE 70 F RELATIVE HUMIDITY 27 %
NCA HD41112 572 SN 411 HEAD DROP CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	239.22 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MS	1.24 MS
PEAK LATERAL ACCELERATION	10 G MAX	-2.21 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Todd Tomlin

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572 31-DEC-86

TEMPERATURE 71.00 F RELATIVE HUMIDITY 26.00 %
NCA HN41112 572 SN 411 HEAD/NECK CAL 12

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.37 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	2.71 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	28.07 ms.
T3 - T4: 20 - 5 G	10 ms. max	6.70 ms.
Avg. G level T2 - T3	20 - 24 G	23.41 G
Maximum Rotation Angle	63 - 73 deg.	68.19 deg.
Peak Head Resultant Accel	26 G max	21.50 G

Test Parameter	Specification		Test Results	
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)	Time (ms.)	Chordal Disp. (in.)
0	-2.0 - +2.0	-0.5 - +0.5	0.25	0.01
30	25.6 - 34.4	2.1 - 3.1	31.24	2.53
60	40.3 - 51.7	4.3 - 5.3	48.26	4.76
max	53.2 - 66.8	5.0 - 6.0	62.75	5.53
60	67.0 - 83.0	4.3 - 5.3	76.33	4.91
30	85.4 - 104.6	2.1 - 3.1	95.36	2.39
0	101.0 - 123.0	-0.5 - +0.5	109.07	0.11

* DUMMY MEETS SPECIFICATIONS

TECHNICAN _____

TRANSPORTATION RESEARCH CENTER OF OHIO

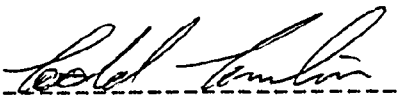
KNEE IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 70 F RELATIVE HUMIDITY 21 %
LEFT KNEE
NCA LK41112 572 SN 411 L.KNEE IMP CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.95 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1948.06 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.70 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

02-JAN-87

TEMPERATURE 70 F
RIGHT KNEE
NCA RK41112

RELATIVE HUMIDITY 20 %

572 SN 411 R.KNEE IMP CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.95 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	1877.42 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.72 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

870105

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 70 F RELATIVE HUMIDITY 18 %
NCA TL41112 572 SN 411 L.S.THORAX CAL 12

TEST PARAMETER	LOW SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.06 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.98 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1328. POUNDS
INTERNAL HYSTERESIS	50% - 70%	60.7%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Todd Conklin

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 71 F RELATIVE HUMIDITY 18 %
NCA TH41112 572 SN 411 H.S.THORAX CAL 12

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.46 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2058. POUNDS
INTERNAL HYSTERESIS	50% - 70%	56.7%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572 31-DEC-86

TEMPERATURE 71.00 F RELATIVE HUMIDITY 28.00 %
NCA ED88009 572 SN 880 EXT.DIMENSION CAL09

DESCRIPTION SN ALDERSON 880	SPECIFICATION	TEST RESULTS
Sitting Height	35.6 - 35.8IN	35.6 INS
Shoulder Pivot Height	21.8 - 22.4IN	22.3 INS
Hip Pivot Height	3.9 IN (ref.)	3.9 INS
Hip Pivot From Backline	4.8 IN (ref.)	4.8 INS
Knee Pivot From Backline	20.1 - 20.7IN	20.5 INS
Rear of Head From Backline	1.7 IN (ref)	1.7 INS
Chest Depth	9.1 - 9.6IN	9.2 INS
Shoulder Width	17.8 - 18.4IN	18.1 INS
Chest Circumference Over Nipples	36.8 - 40.0IN	38.0 INS
Waist Circumference at Min. Girth	31.4 - 32.6IN	32.0 INS
Hip Width	14.0 - 15.4IN	14.8 INS
Knee Pivot From Floor	19.3 - 19.9IN	19.6 INS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572 31-DEC-86

TEMPERATURE 71.00 F RELATIVE HUMIDITY 27.00 %
NCA LF88009 572 SN 880 LUMBAR FLEX CAL09

DEFLECTION	SPECIFICATION	TEST RESULTS
0 Deg.	0 LBS	0.00 LBS
20 Deg	22.00 - 34.00 LBS	26.00 LBS
30 Deg	34.00 - 46.00 LBS	35.00 LBS
40 Deg	46.00 - 58.00 LBS	46.00 LBS
NET RETURN ANGLE	< 12 DEG	9.77 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

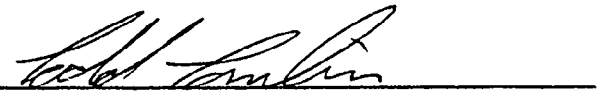
ABDOMINAL COMPRESSION TEST

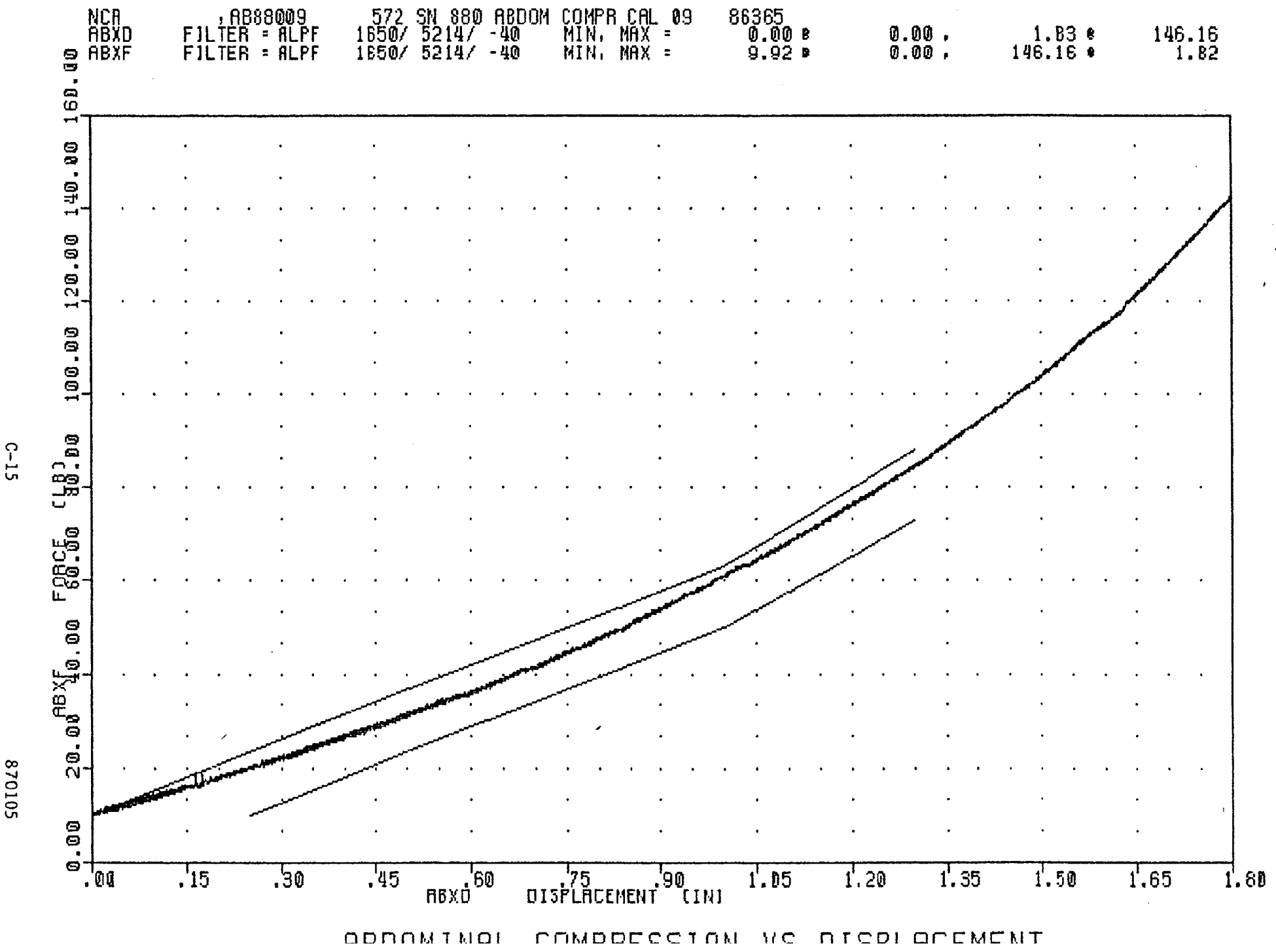
PART 572 31-DEC-86

TEMPERATURE 71.00 F RELATIVE HUMIDITY 28.00 %
NCA AB88009 572 SN 880 ABDOM COMPR CAL 09

TEST CORRIDORS DISPLACEMENT	FORCE	TEST RESULTS
0 IN.	10 LBS	10 LBS
.50 IN.	23.00 - 36.00 LBS	31.46 LBS
.75 IN.	36.00 - 50.00 LBS	44.48 LBS
1.00 IN.	50.00 - 63.00 LBS	61.07 LBS
1.30 IN.	73.00 - 88.00 LBS	84.78 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 


NCR ,AB88009 572 SN 880 ABDOM COMPR CAL 09 86365
ABXD FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 0.00 @ 0.00 , 1.83 @ 146.16
ABXF FILTER = ALPF 1650/ 5214/ -40 MIN, MAX = 9.92 @ 0.00 , 146.16 @ 1.82
ABXF FORCE (LB)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
.00
.15
.30
.45
.60
.75
.90
1.05
1.20
1.35
1.50
1.65
1.80
ABXD DISPLACEMENT (IN)
ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572 31-DEC-86

TEMPERATURE 70 F RELATIVE HUMIDITY 28 %
NCA HD88009 572 SN 880 HEAD DROP CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	253.00 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MS	1.15 MS
PEAK LATERAL ACCELERATION	10 G MAX	-8.54 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572 31-DEC-86

TEMPERATURE 70.00 F RELATIVE HUMIDITY 26.00 %
NCA HN88009 572 SN 880 HEAD/NECK CAL 09

Test Parameter	Specification	Test Results
Pendulum velocity	21.5 to 25.5 fps	23.26 fps
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 ms. max	2.88 ms.
T2 - T3: 20 - 20 G	25 - 30 ms.	26.95 ms.
T3 - T4: 20 - 5 G	10 ms. max	7.01 ms.
Avg. G level T2 - T3	20 - 24 G	24.12 G **
Maximum Rotation Angle	63 - 73 deg.	71.30 deg.
Peak Head Resultant Accel	26 G max	22.01 G

Test Parameter	Specification		Test Results	
Rotation Angle (degrees)	Time (ms.)	Chordal Disp. (in.)	Time (ms.)	Chordal Disp. (in.)
0	-2.0 - +2.0	-0.5 - +0.5	0.00	0.01
30	25.6 - 34.4	2.1 - 3.1	31.35	2.48
60	40.3 - 51.7	4.3 - 5.3	47.78	4.62
max	53.2 - 66.8	5.0 - 6.0	64.13	5.64
60	67.0 - 83.0	4.3 - 5.3	81.60	4.68
30	85.4 - 104.6	2.1 - 3.1	100.28	2.23
0	101.0 - 123.0	-0.5 - +0.5	114.17	0.18

* DUMMY DOES NOT MEET ALL SPECIFICATIONS

TECHNICAN _____

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 70 F RELATIVE HUMIDITY 20 %
RIGHT KNEE
NCA RK88009 572 SN 880 R.KNEE IMP CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.93 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	2202.52 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.91 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 70 F RELATIVE HUMIDITY 19 %
LEFT KNEE
NCA LK88009 572 SN 880 L.KNEE IMF CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.95 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LBS.	2173.65 LBS.
DURATION ABOVE 1000 LBS.	>=1.7 MS.	1.82 MS.

DUMMY MEETS SPECIFICATIONS

TECHNICIAN_____

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 71 F RELATIVE HUMIDITY 19 %
NCA TL88009 572 SN 880 L.S.THORAX CAL 09

TEST PARAMETER	LOW SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.07 FT/SEC
PEAK DEFLECTION	1.1 INCHES MAX.	0.89 INCHES
PEAK RESISTIVE FORCE	1,450. POUNDS MAX.	1385. POUNDS
INTERNAL HYSTERESIS	50% - 70%	63.4%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572 02-JAN-87

TEMPERATURE 70 F RELATIVE HUMIDITY 19 %
NCA TH88009 572 SN 880 H.S.THORAX CAL 09

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.90 FT/SEC
PEAK DEFLECTION	1.7 INCHES MAX.	1.38 INCHES
PEAK RESISTIVE FORCE	2,250. POUNDS MAX.	2118. POUNDS
INTERNAL HYSTERESIS	50% - 70%	62.4%

DUMMY MEETS SPECIFICATIONS

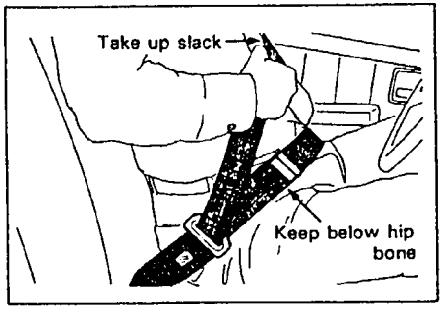
TECHNICIAN 

APPENDIX D

RESTRAINT INSTRUCTIONS FROM OWNER'S MANUAL

Lap-Shoulder Belt

1



- Adjust the seat as needed. Sit up straight and well back in the seat.
- Take hold of the seat belt latch plate and pull the lap-shoulder belt across your body. Push the latch plate into the buckle until it clicks.
- 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. A snug fit reduces the risk of sliding under the belt during an accident.
- A close fit with the lap belt positioned low on the hips will lower the probability, and/or severity, of injury in an accident. This spreads the force of the lap belt over the strong hip bone instead of across the soft abdomen.

CAUTION:

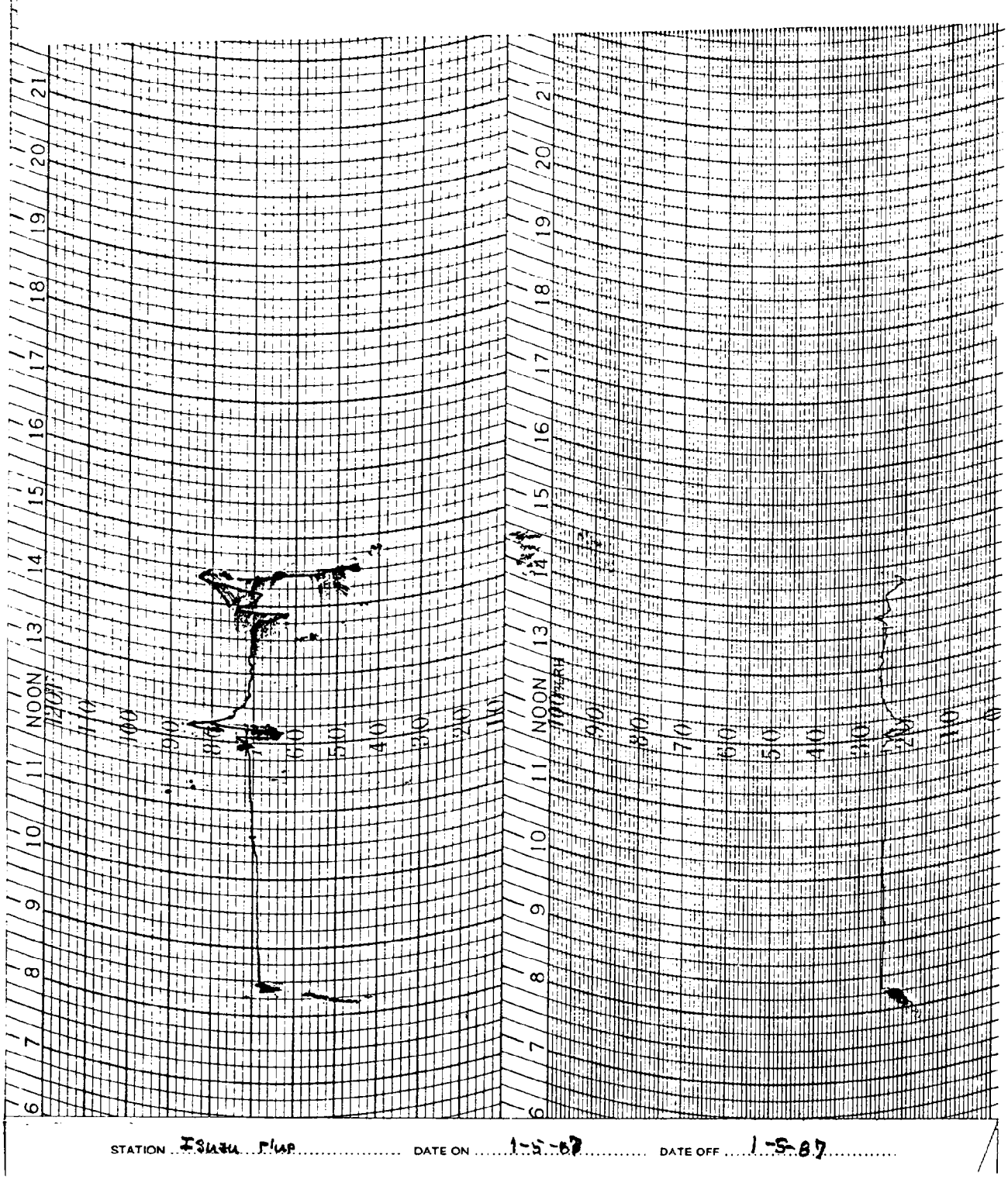
- *Never use the same belt for more than one person at a time, do not wear belts that are twisted, and do not let belts or belt hardware become damaged by pinching them in the seat or door.*

- The lap-shoulder belts are designed to permit free, normal forward body movement, but to resist sudden, hard vehicle movement such as might occur in an impact.

CAUTION:

- *Too much shoulder belt slack could reduce the amount of protection because the belt may not be able to properly restrain you in an accident.*
- *Do not wear the shoulder portion of the belt under your arm nearest the door or otherwise out of position. Such use could increase the chance and/or the severity of injury in an accident.*

- To unfasten the belt, push in the button in the center of the buckle.
- The retractor is designed to rewind the belt automatically when the buckle is unlatched.


NOON
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DATE ON 1-5-87
DATE OFF 1-5-87