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Traffic Safety
Administration**

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Test Report

July 1985

Frontal Crash Responses: A Frontal Crash Test of a 1983 Dodge Omni Centered Into a Rigid Pole With a Closing Velocity of 29.8 mph.

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15. Supplementary Notes

This test conducted as a part of VRTC Project No. SRL-98 Frontal Crash Responses

16. Abstract

This test report documents one of a series of crash tests conducted to evaluate Part 572 and Hybrid III dummy responses in both the restrained and unrestrained environment, and to catalog vehicle structural responses from a variety of crash configurations. Testing was conducted with a 1983 Dodge Omni 5-door Hatchback at the TRCO Crash Test Facility, East Liberty, Ohio. The Dodge Omni was towed into the centerline of the rigid pole at 0^{o} with a closing velocity of 29.8 mph. One Hybrid III dummy was located in the driver's designated seating position and one Hybrid III dummy was located in the right front seating position in the vehicle. The test date was June 14, 1985 and the ambient temperature was 71^{o}F.

17. Key Words	18. Distribution Statement
Occupant Response Crashworthiness Hybrid III Dummy	Available to the U.S. public through the National Technical Information Service, Springfield, Viriginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	160	

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SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

This test was conducted as part of an overall test matrix with the purpose of evaluating Part 572 and Hybrid III dummies in both the restrained and unrestrained crash environments. Vehicle structural responses from a variety of crash configurations are also being cataloged.

INTRODUCTION

A 1983 Dodge Omni 5-door hatchback was used in a frontal impact with a rigid pole at a closing velocity of 29.8 mph on June 14, 1985. The intended impact speed of the Dodge Omni was 30.0 mph. The actual test speed of the Dodge Omni was 29.8 mph.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains vehicle crush and dummy response data. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains data plots. Appendix C contains dummy certification. Appendix D contains miscellaneous test information.

SECTION 2.0

GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge Omni VIN: 1B3B218C9DD300705

BODY STYLE: 5-door Hatchback MODEL YEAR: 1983

NHTSA NO.: R & D COLOR: Blue

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 2.2 Liter

TRANSMISSION DATA: Manual

DATE VEHICLE RECEIVED: 5/30/85 ODOMETER READING: 952

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	No
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	Yes	REAR WINDOW DEFROSTER	No
OTHER	Spare Tire & Wheel		

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

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

VEHICLE MANUFACTURED BY: Chrysler Corporation

DATE OF MANUFACTURE: 7/83

GVWR: 3305 LBS.,

GAWR: FRONT 1770 LBS., REAR 1585 LBS.

VEHICLE TIRE DATA

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

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Firestone Champion P175/75R13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	697	LBS.	RIGHT REAR	394	LBS.
LEFT FRONT	728	LBS.	LEFT REAR	426	LBS.
TOTAL FRONT WEIGHT	1425	LBS. (63.0 % OF TOTAL VEHICLE WEIGHT)			
TOTAL REAR WEIGHT	820	LBS. (37.0 % OF TOTAL VEHICLE WEIGHT)			
TOTAL DELIVERED WEIGHT	2245*	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 24 3/4	;LF 24 3/4	;RR 25 7/8	;LR 25 9/16
PRE-TEST ATTITUDE:	RF 23 1/2	;LF 23	;RR 23 1/4	;LR 22 5/8
POST-TEST ATTITUDE:	RF 23 5/8	;LF 23	;RR 22 9/16	;LR 22 1/2

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 309 LBS. CARGO:

RIGHT FRONT	807	LBS.	RIGHT REAR	643	LBS.
LEFT FRONT	797	LBS.	LEFT REAR	641	LBS.
TOTAL FRONT WEIGHT	1604	LBS. (56.0 % OF TOTAL VEHICLE WEIGHT)			
TOTAL REAR WEIGHT	1284	LBS. (44.0 % OF TOTAL VEHICLE WEIGHT)			
TOTAL TEST WEIGHT	2888	LBS.			

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

*This weight is taken from a previous Omni which was weighed early in the program. Delivered weight was not required to achieve target weight, and therefore, was not recorded.

VEHICLE TEST WEIGHT CALCULATION

Calculated Test Weight = Unloaded Delivered Weight +
(Number of Hybrid III Dummies X 167 lbs.) +
Cargo Weight
= 2245 + (2 X 167) + 115 lbs.
= 2694 lbs.*

Actual Test Weight = 2888 lbs.

Target Test Weight = 2930 lbs.

To achieve test weight, 13.5 gallons of stoddard solvent were added in the fuel tank. The weight of the test vehicle was measured by placing each wheel on a Force Plate manufactured by K.J. Law Engineers, Inc., Detroit, Michigan.

*This weight is a calculated test weight based on the unloaded delivered weight (curb weight) plus two dummies, plus the calculated cargo weight from the label on each vehicle. This weight would normally be used as the target test weight, with instrumentation, camera, etc. in place. The vehicle would have to be adjusted to match the calculated weight to a 5% tolerance. The target weight was determined from one car in each class. The small car target weight was determined for the Dodge Omnis, Honda Accords, and Renault Fuegos by getting the heaviest small car, Fuego, to its lowest possible test ready weight. The same was done for the large cars, Chevrolet Celebrity and AMC Concord, and the Concord was used to determine target weight. Both target weights were given a range of $\pm$ 5% for the other car to achieve as final weight.

VEHICLE TEST FLUID DATA

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

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

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

TEST VOLUME: 13.5 GALLONS (92-94% OF USEABLE)

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

DETAILS OF FUEL SYSTEM: Carburetor with mechanical fuel pump.

ELECTRIC FUEL PUMP: No FUEL INJECTION: No

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

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

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

RECOMMENDED TIRE SIZE: P 175/75 R 13 LOAD RANGE X B, C, A

VEHICLE CAPACITY: TYPES OF SEATS: Front - Bucket
Rear - Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT
3 REAR
5 TOTAL

CARGO LOAD 115 LBS.

TOTAL 865 LBS.

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

VEHICLE TEST CONDITIONS

TEST NUMBER: 850614

DATE OF TEST: June 14, 1985 TIME OF TEST: 14:30

WIND VELOCITY: 0-2 mph 261° HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 71°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 73°F

DRIVER DUMMY TEMPERATURE 78°F

PASSENGER DUMMY TEMPERATURE 74°F

VEHICLE DATA

	ACTUAL	INTENDED
TEST WEIGHT (LBS.)	2888	2930*
VEHICLE ORIENTATION (DEGREES)	0	0
VEHICLE VELOCITY (MPH)	29.8	30
MAXIMUM CRUSH (INCHES)	30.25	DNA

DUMMIES

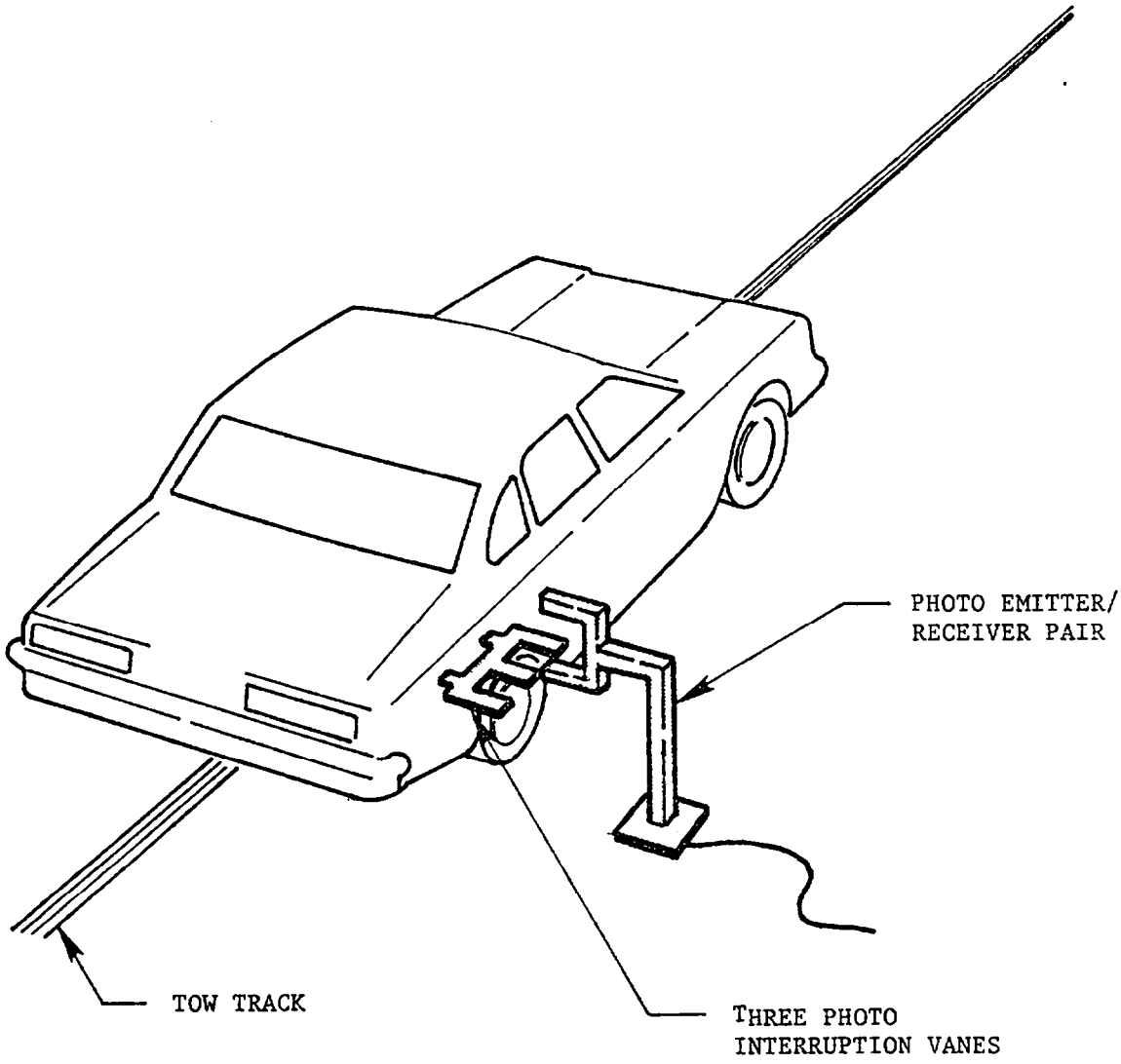
	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:	HIII		HIII		
SERIAL NO.:	43		48		
INSTRUMENTATION:					
HEAD ACCEL.:	3		9		
CHEST ACCEL.:	3		3		
FEMUR L.C.'S:	2		2		
OTHER:	3 Neck Channels 1 Chest Disp.		6 Neck Channels 1 Chest Disp. 14 Lower Leg Channels 2 Knee Shear		

RESTRAINT SYSTEM: Driver dummy was restrained, Passenger dummy was unrestrained.

REMARKS: Chamois on dummy heads per chamois procedure in Appendix D.

*INTENDED TEST WEIGHT IS BASED ON THE WEIGHT OF A RENAULT FUEGO.

IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

SECTION 3.0

DATA REQUIRED BY R & D

The following pages are included in this section:

1. Dummy temperature control and position data
2. Dummy kinematic summary
3. Vehicle crush data
4. Dummy and vehicle accelerometer location and data summary
5. High speed camera information

DUMMY DATA SUMMARY

	DRIVER DUMMY SN: 43				PASSENGER DUMMY SN: 48			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME	MAX	TIME	MAX	TIME	MAX	TIME
HEAD ACCELERATION (g)								
LONGITUDINAL	12.30	250.25	65.21	107.25	7.60	175.75	87.74	111.88
LATERAL	17.17	115.50	19.46	89.25	11.34	111.25	12.97	125.50
VERTICAL	---	--- ×	27.03	77.50	82.49	120.38	54.09	100.13
RESULTANT		68.92 @ 107.25				106.00 @ 111.00		
HIC	509.68	from 84.63 to 123.00 msec			913.61	from 98.63 to 132.00 msec		
HEAD ANGULAR ACCELERATION								
POSITION 1								
LONGITUDINAL	---	--- α	---	--- α	86.16	62.38	57.74	42.00
VERTICAL	---	--- α	---	--- α	7.28	211.38	76.94	53.88
POSITION 2								
LATERAL	---	--- α	---	--- α	11.06	52.38	12.59	79.50
VERTICAL	---	--- α	---	--- α	69.09	57.75	41.71	41.63
POSITION 3								
LONGITUDINAL	---	--- α	---	--- α	8.92	211.50	65.39	52.00
LATERAL	---	--- α	---	--- α	14.69	58.75	16.00	74.00
NECK LOADS (lb)								
SHEAR (X)	269.31	113.50	26.96	243.63	234.20	83.75	56.60	71.63
SHEAR (Y)	---	--- α	---	--- α	78.19	92.63	44.65	77.88
AXIAL (Z)	566.92	114.00	9.85	321.75	---	---Y	---	--- Y
NECK MOMENTS (lb-ft)								
ABOUT LONGITUDINAL	---	---α	---	---α	33.66	90.50	0.92	18.38
ABOUT LATERAL	9.44	188.25	30.04	90.50	8.44	140.00	134.83	84.75
ABOUT VERTICAL	---	---α	---	---α	1.29	42.13	19.87	90.13
CHEST ACCELERATION (g)								
LONGITUDINAL	4.15	227.25	44.75	84.25	2.76	190.00	59.62	114.25
LATERAL	10.45	108.00	2.78	164.00	17.61	114.25	5.95	104.63
VERTICAL	6.72	109.38	9.84	78.38	2.58	65.88	27.32	126.00
RESULTANT		45.74 @ 84.38				62.74 @ 114.25		
3 MSEC CLIP		41.28				53.86		
CHEST DISPLACEMENT (in)		0.71 @ 119.88				0.38 @ 125.63		
FEMUR LOADS (lb)								
LEFT	87.90	60.88	936.86	72.63	55.61	271.88	1960.89	81.88
RIGHT	103.25	63.75	767.99	75.25	294.25	120.75	1054.17	94.75

DUMMY DATA SUMMARY CONTD

	PASSENGER DUMMY SN: 48			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME	MAX	TIME
KNEE LOADS (lb)				
LEFT LEG				
LEFT SENSOR	182.81	63.13	281.85	78.75
RIGHT SENSOR	78.27	231.38	357.33	88.38
RIGHT LEG				
LEFT SENSOR	54.65	205.63	335.21	129.38
RIGHT SENSOR	121.26	135.38	384.71	79.13
KNEE DISPLACEMENT (in)				
LEFT KNEE	0.11	38.25	---	--- ε
RIGHT KNEE	0.06	36.13	---	--- ε
TIBIA MOMENTS (lb-ft)				
LEFT LEG				
ABOUT LONGITUDINAL	18.42	75.25	47.42	98.13
ABOUT LATERAL	69.51	51.38	49.96	73.63
RIGHT LEG				
ABOUT LONGITUDINAL	60.96	133.13	11.31	189.38
ABOUT LATERAL	78.43	56.13	41.17	82.88
ANKLE LOADS (lb)				
LEFT LEG				
LATERAL	111.43	106.00	34.22	66.00
VERTICAL	516.08	72.25	60.30	63.75
RIGHT LEG				
LATERAL	176.94	78.75	72.40	66.00
VERTICAL	776.33	78.63	64.22	66.13
ANKLE MOMENTS (lb-ft)				
LEFT LEG				
ABOUT LONGITUDINAL	73.61	75.75	12.73	54.13
RIGHT LEG				
ABOUT LONGITUDINAL	118.06	83.25	4.27	55.75

* LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

**LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

×There were no positive values in the time interval of interest.

αThere was no instrumentation at this location.

γSee TEST ANOMALIES

εThere were no negative values in the time interval of interest.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER 43	PASSENGER 48
Head	Instrument Panel Steering Wheel Rim	Windshield
Chest	Steering Wheel	Dashboard
Abdomen	Steering Wheel	Dashboard
Left Knee	Dashboard	Dashboard
Right Knee	Dashboard	Dashboard

DOOR OPENING:

	LEFT	RIGHT
Front	No Tools Required	No Tools Required
Rear	Good	Good

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	None	None
Rear	DNA	DNA

GLAZING DAMAGE: Windshield Shattered

OTHER NOTABLE IMPACT EFFECTS:

Dash broken in center

Column through floor board

DUMMY KINEMATIC SUMMARY

DRIVER

Upon impact, the driver moved forward on the seat cushion until his knees impacted the lower dash. At the same time the dummy was moving forward, the steering column assembly moved rearward. The upper torso rotated forward until it contacted the lower rim of the steering wheel. Next, the head impacted the steering wheel hub and the upper rim. The steering wheel then collapsed to the inside of the vehicle. This permitted the dummy to continue forward until the head contacted the upper instrument panel. On rebound, the driver rotated back into the seat back. The driver came to rest seated in the driver's seat in an upright position.

PASSENGER

During impact, the passenger moved forward on the seat cushion as his knees struck the glove box on the lower dash. As the dummy continued its forward motion, the dash came rearward and the chest impacted the dash. Further forward motion caused the dummy's forehead to impact the windshield. The head then rotated rearward with the neck striking the top of the dash. On rebound, the dummy did not rotate away from the dash but moved downward slightly. The passenger came to rest leaning forward in the seat with his knees in the dash, head against the windshield and with a piece of dash stuck in the front opening of the neck.

DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle was taken outside to be hooked up to the tow cable between 14:00 and 14:05 PM the day of the test. At this point air conditioners were placed into the side windows to maintain the temperature. The vehicle remained in this position until approximately 14:25. The vehicle was then launched into the barrier building to impact the load cell pole at 14:30.

The Hybrid III dummies were seated per the General Motors Procedure but no coordinates for the H-point were used to seat the dummy because the H-point coordinates are unique to General Motors testing. The GM seating procedure is in Appendix D of this report.

DUMMY IN-VEHICLE POSITION

RECORDING SHEET

VEHICLE NHTSA NO. R&D MFR./MAKE/MODEL: Dodge Omni

SEAT TYPE: ___ Bench
X Bucket
___ Split Bench

ADJUSTER TYPE: X Manual
___ Power

BUCKET SEAT BACK TYPE: ___ Fixed
X Adjustable Reclining

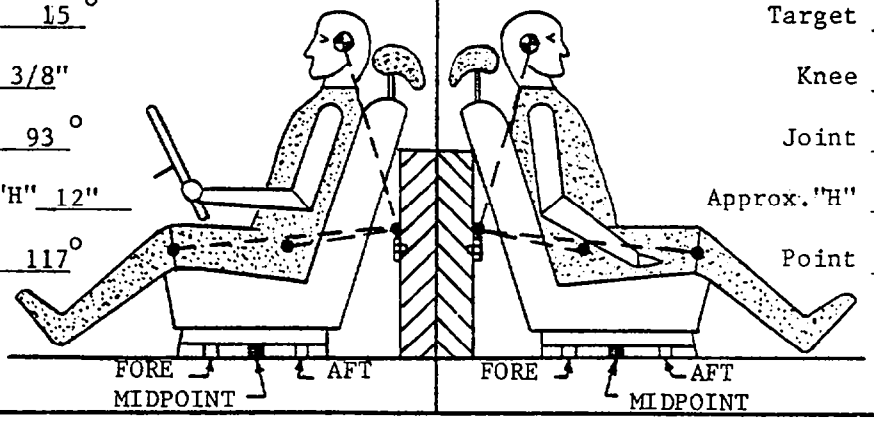
POSITIONING DATE: 6-14-85

AMBIENT TEMP.: 70° F. TIME: 10:30

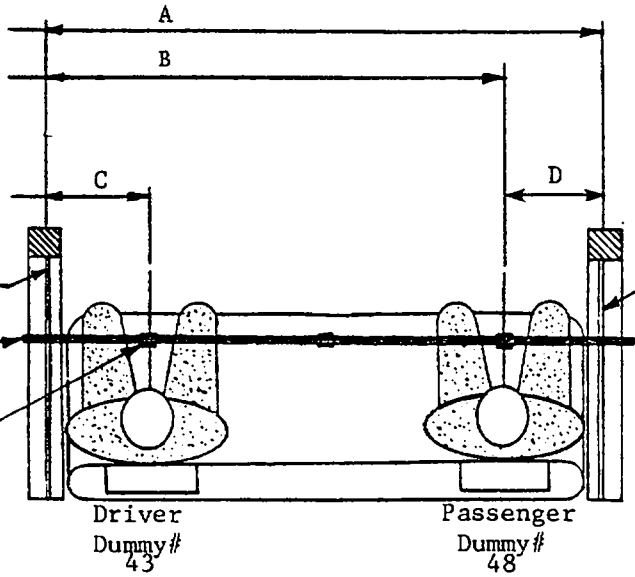
TECHNICIANS:
1. D. Carpenter
2. B. Fishbaugh
3.
4.

DRIVER DUMMY # 43 TYPE HIII
Head 20"
Seat Back Angle 23°
Pelvis Angle 23°
Target 15°
Knee 26 3/8"
Joint 93°
Approx."H" 12"
Point 117°

PASSENGER DUMMY # 48 TYPE HIII
Seat Back Angle 23°
Head 20 1/4"
Pelvis Angle 25°
Target 15°
Knee 27 1/4"
Joint 92°
Approx."H" 13 3/8"
Point 118°



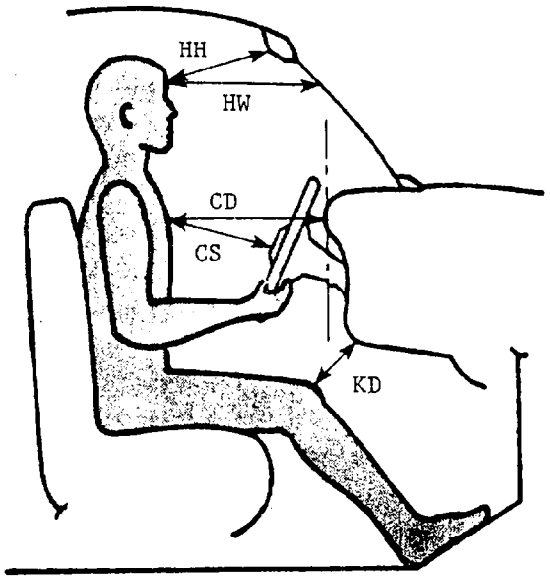
A = 49 7/8"
B = 38"
C = 12 13/16"
D = 11 7/8"



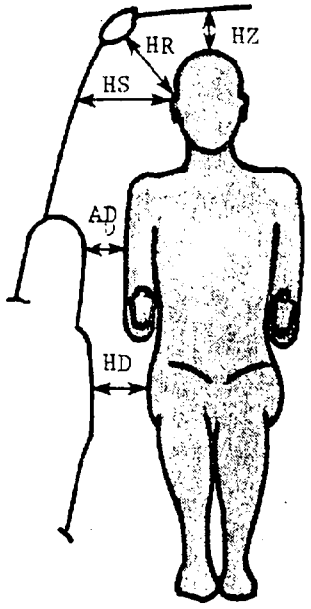
* Door glass height is equal on the right and left side of vehicle.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER 43	PASSENGER 48
HH	10 3/8	9 3/4
HW	17 3/8	17 3/8
CD	19 7/8	21
CS	15 5/16	DNA
KDL	5 7/8	5 3/8
KDR	6 3/8	5 3/16

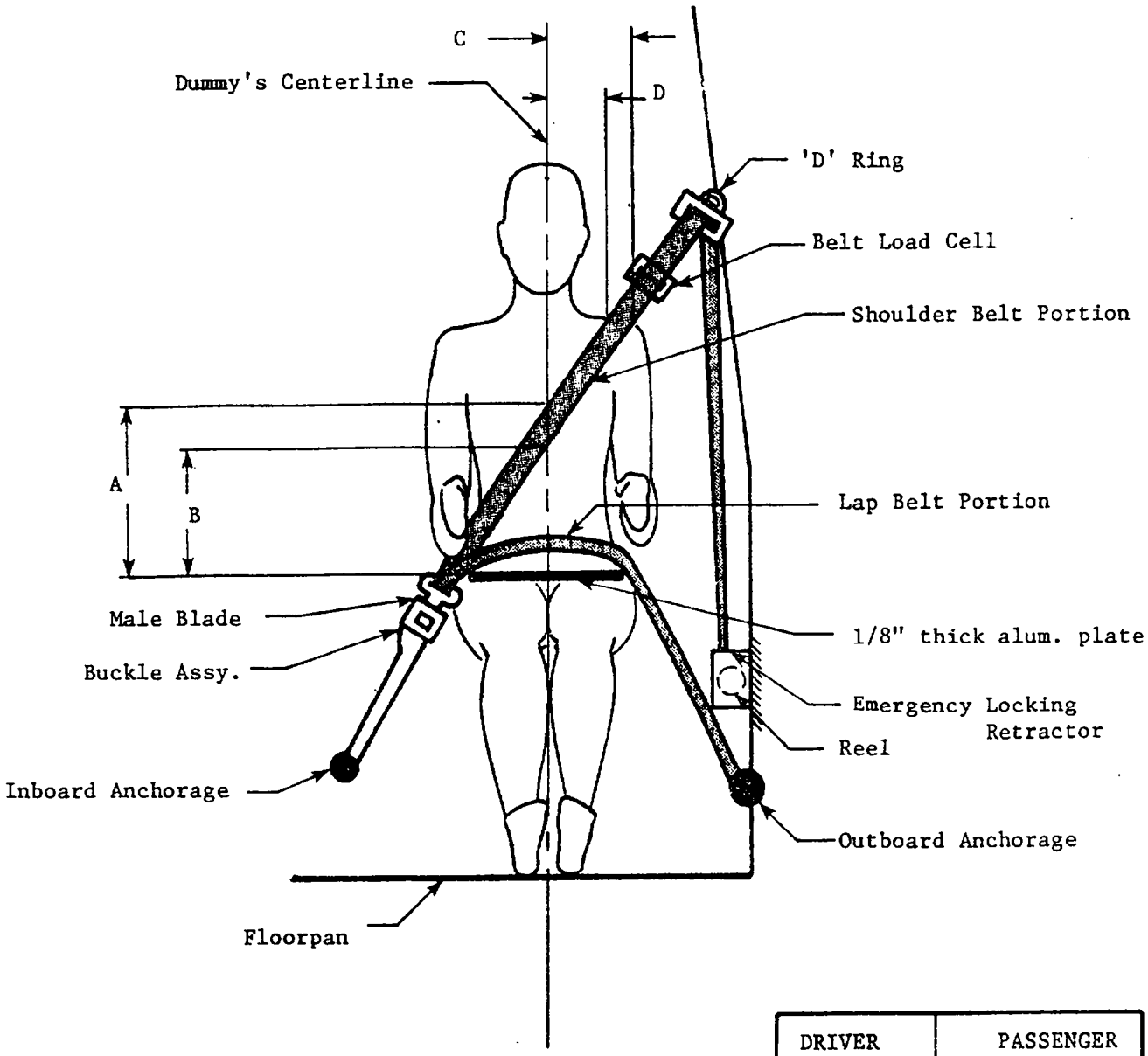


	DRIVER 43	PASSENGER 48
HR	7 3/4	7 1/4
HS	9 7/8	9 1/8
AD	3 3/4	4
HD	7 1/4	6 5/8
HZ	4 1/4	4

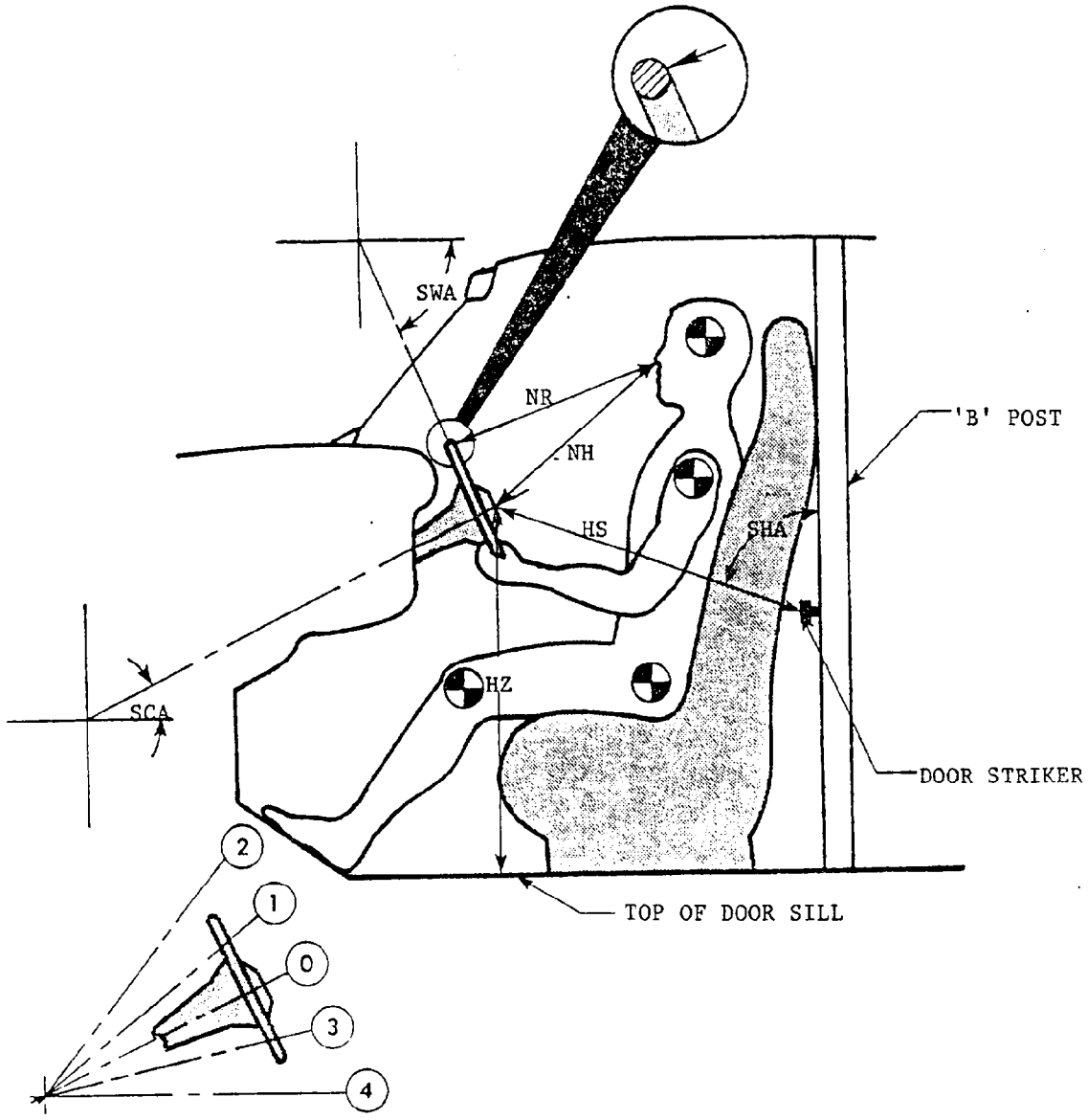


ALL MEASUREMENTS IN INCHES

SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	12"	DNA
B - Top surface of alum. plate to belt lower edge (in)	9"	DNA
C - Dummy centerline to outer edge of belt at chest flesh top (in)	5 1/2"	DNA
D - Dummy centerline to inner edge of belt at chest flesh top (in)	3"	DNA
LAP BELT TENSION (lbs)	3	DNA
SHOULDER BELT TENSION (lbs)	2	DNA



	PRE-TEST	POST-TEST
NR	15"	DNA
NH	19 1/4"	DNA
HS	28 5/8"	21 5/8"
SCA	26°	32°
SWA	73°	DNA
HZ	19 1/2"	21 3/4"
SHA	85°	79°

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	FORWARD FRAME RAIL (LONGITUDINAL)	149.8	-20.0	19.4	13.24	11.50Y	79.23	47.69 Y
2	FRONT FRAME CROSSMEMBER (LONGITUDINAL)	128.0	0.0	4.6	---	--- Y	---	--- Y
3	BRAKE CALIPER; FRONT RIGHT (LONGITUDINAL)	133.7	-24.1	10.0	35.38	73.85	105.38	15.00
4	ENGINE BOTTOM (LONGITUDINAL)	139.6	0.0	5.8	22.06	57.75	105.14	40.00
5	ENGINE BLOCK TOP (LONGITUDINAL)	138.1	1.0	32.0	24.80	26.13	167.65	45.50
6	STEERING COLUMN; LOWER (A-P AXIS)	116.5	14.0	20.6	39.13	70.25	70.12	53.00
7	STEERING WHEEL HUB (A-P AXIS)	100.5	13.5	31.7	106.32	100.63	63.99	76.88
	(I-S AXIS)				26.95	99.88	66.44	54.63
8	STEERING COLUMN DISPLACEMENT (A-P AXIS)				---	--- α	---	--- α
9	DASH PANEL (LONGITUDINAL)	106.8	0.0	34.7	60.18	88.13	102.02	82.13
	(VERTICAL)				56.73	115.00Y	95.53	93.50Y
10	PITCH RATE GYRO	91.3	0.0	17.5	380.07	61.00	56.64	17.75
11	B-PILLAR SILL - LEFT (LONGITUDINAL)	73.6	23.8	10.4	---	--- Y	25.00	45.00Y
	(VERTICAL)	ΔV = 35.1 mph @ 149.00 msec			23.58	54.88	19.56	74.88
12	B-PILLAR SILL - RIGHT (LONGITUDINAL)	73.1	23.8	12.0	2.09	203.88	37.52	69.75
		ΔV = 34.2 mph @ 139.00 msec						
13	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)P**	60.1	15.4	16.6	2.83	168.25	25.30	71.25
	(VERTICAL)	ΔV = 34.4 mph @ 152.25 msec			14.07	54.75	7.35	72.25
14	REAR SEAT LEFT CROSSMEMBER (LONGITUDINAL)R**	49.4	14.6	14.2	3.51	167.13	24.92	71.25

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTD

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION*** MAX (g)	POSITIVE DIRECTION*** TIME (msec)	NEGATIVE DIRECTION*** MAX (g)	NEGATIVE DIRECTION*** TIME (msec)
15	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)P**	59.6	-15.1	16.0	---	--- γ	---	--- γ
16	REAR SEAT RIGHT CROSSMEMBER (LONGITUDINAL)R**	49.1	-14.2	13.8	1.92	170.00γ	27.69	69.61γ
17	REAR AXLE CENTERLINE (LONGITUDINAL)	42.5	0.0	5.6	5.06	160.25	43.88	101.88

* REFERENCE: X - REAR BUMPER (+ FORWARD), Y - VEHICLE CENTERLINE (+ TO LEFT), Z - GROUND LEVEL (+ UP)

** (P) = PRIMARY SENSOR, (R) = REDUNDANT SENSOR

*** POSITIVE DIRECTION LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD
NEGATIVE DIRECTION LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

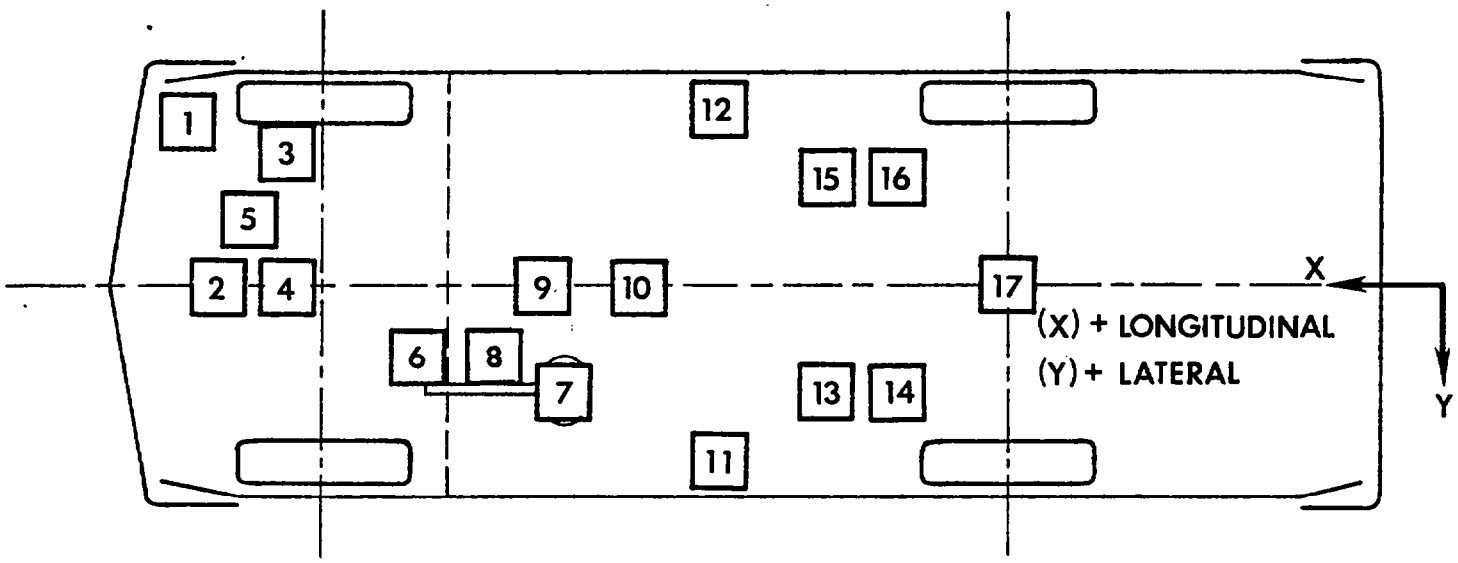
ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES.

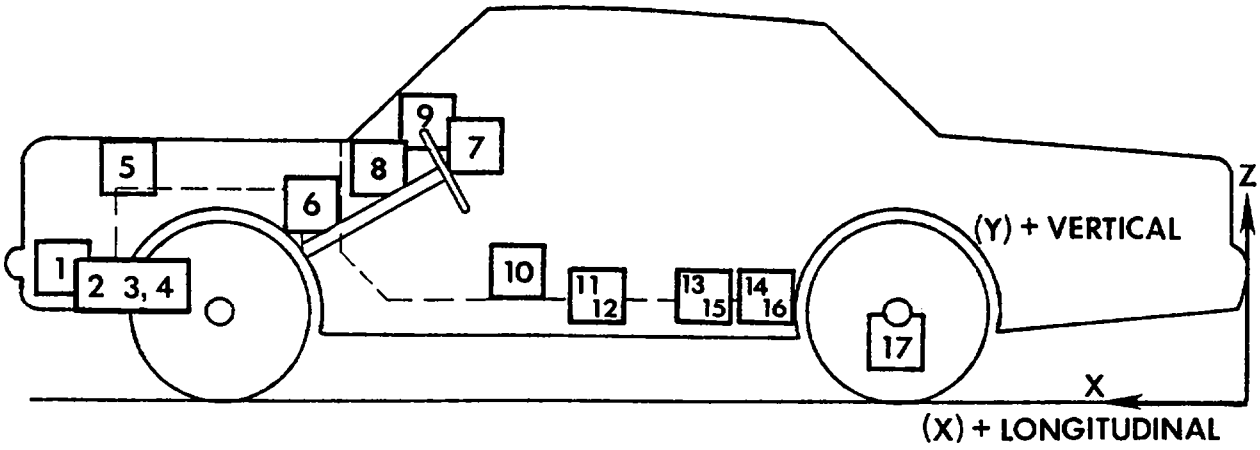
γ See TEST ANOMALIES

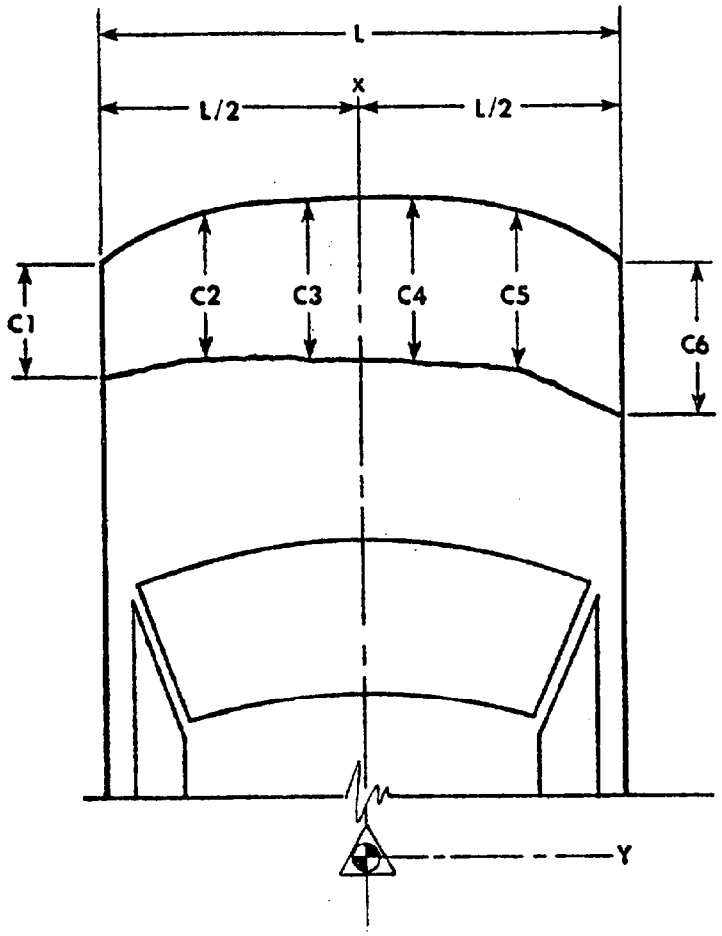
α There was no instrumentation at this location.

× There were no positive values in the time interval of interest.

VEHICLE ACCELEROMETER LOCATIONS







NOTE: C1 through C6 are spaced equally apart
All measurements in inches

VEHICLE Dodge Omni

	PRE-TEST	POST-TEST	CRUSH
L	51 3/4	19 1/2	32 1/4
C1	162 5/8	153 5/8	9
C2	163 3/8	143 3/8	20
C3	163 11/16	134 7/8	28 13/16
C4	163 3/4	135 1/2	28 1/4
C5	163 3/16	145 1/4	17 15/16
C6	162 5/8	154 5/8	8
D	0	0	0

Reference point is from the rear bumper forward.

IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Dodge Omni TEST NUMBER 850614

DIMENSIONS IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST
X 1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	163 3/4	133 1/2
X 2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	139 7/8	128 3/4
X 3	REAR SURFACE OF VEHICLE TO FIREWALL	125 3/8	115 3/8
X 4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	107 7/8	107 1/2
X 5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	107 9/16	108
X 6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	110 5/16	109
X 7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	110 5/16	109 1/4
X 8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	71 3/4	71 5/8
X 9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	71 9/16	71 1/2
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	71 9/16	70 5/8
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	71 5/8	70 5/8
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF RIGHT SIDE	110 7/16	109 1/2
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF LEFT SIDE	110 5/8	109 1/2
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	125 3/8	118 1/16
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	125 3/8	119 7/8
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	100 1/8	93 1/2
Y17	STEERING COLUMN TO "A" POST	14 3/8	13 1/4

IMPACTED VEHICLE MEASUREMENTS CONTD

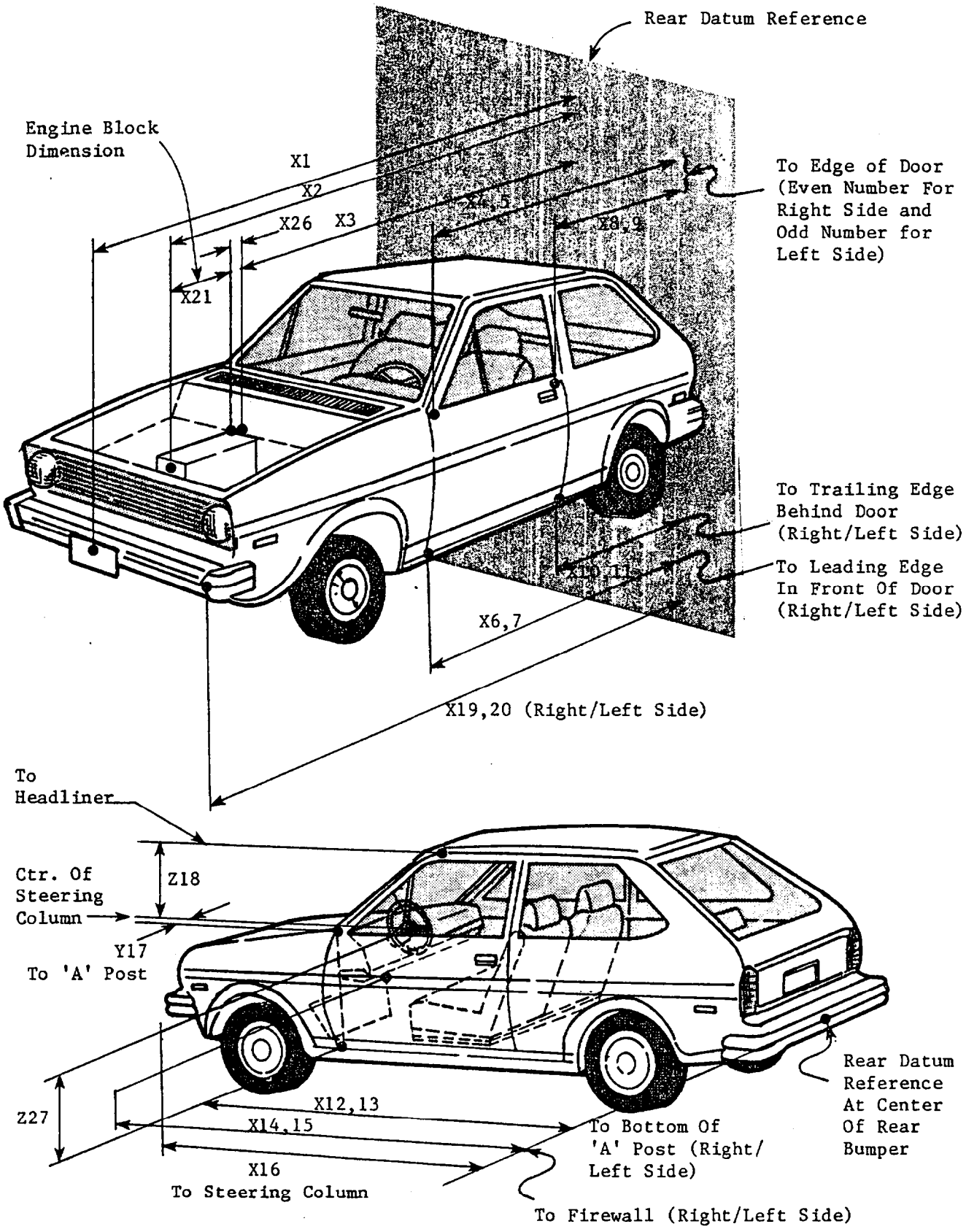
VEHICLE MAKE/MODEL Dodge Omni TEST NUMBER 850614

DIMENSIONS IN INCHES

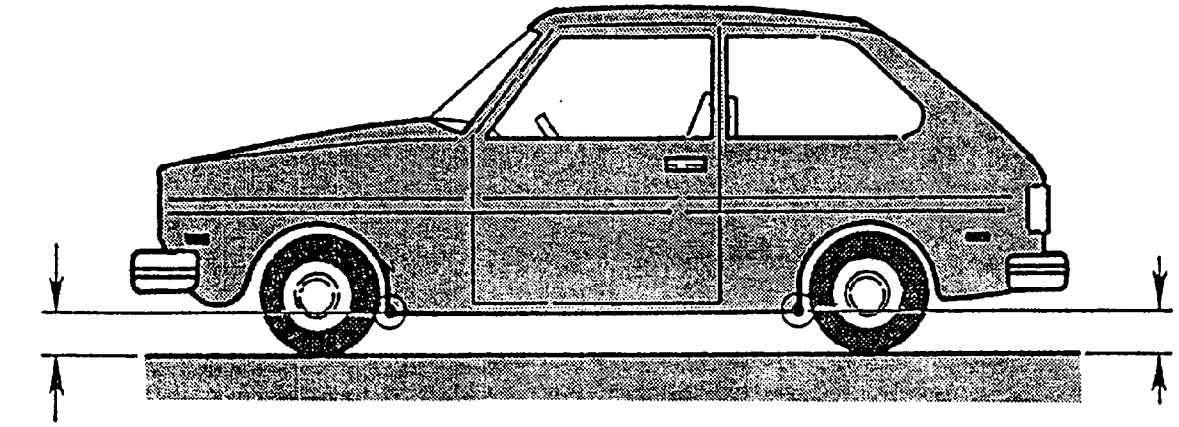
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST
Z18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	20 3/4	17 1/2
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	162 5/8	154 5/8
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	162 5/8	153 5/8
X21	WIDTH OF ENGINE BLOCK	7	7
Z22	RIGHT FRONT SILL TO GROUND PLANE	8 3/4	5 11/16
Z23	LEFT FRONT SILL TO GROUND PLANE	8 3/8	6 3/16
Z24	RIGHT REAR SILL TO GROUND PLANE	9 1/4	7 13/16
Z25	LEFT REAR SILL TO GROUND PLANE	8 3/4	8 1/4
X26	FIREWALL TO ENGINE OR TRANSAXLE	11	8 7/8
Z27	VERTICAL DIMENSION FROM DOOR SILL TO CENTERLINE OF STEERING COLUMN	19 3/4	21
X28	WHEELBASE OF VEHICLE	99 1/4	94 1/2
Y29	WIDTH OF VEHICLE AT MAXIMUM WIDTH POINT	66 1/2	66 1/2
X30	REAR SURFACE OF VEHICLE TO ENGINE TARGET	NR*	NR*
X31	REAR SURFACE OF VEHICLE TO COMPARTMENT TARGET	NR*	NR*
X32	REAR SURFACE OF VEHICLE TO BUMPER TARGET	NR*	NR*
X33	REAR SURFACE OF VEHICLE TO FRAME CROSSMEMBER	NR*	NR*

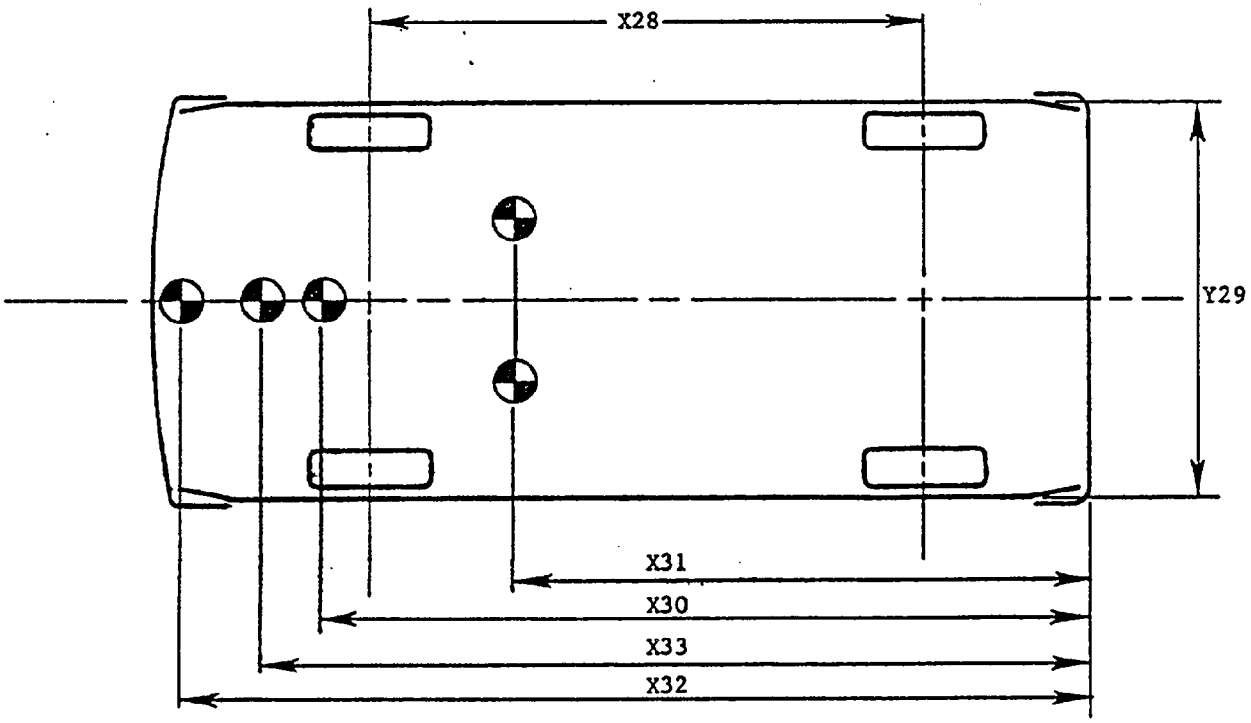
*This vehicle did not have targets at this location

PRE-TEST AND POST-TEST MEASUREMENT POINTS



PRE-TEST AND POST-TEST MEASUREMENT POINTS CONTD.





POLE LOAD CELL DATA SUMMARY

NO.	LOCATION (FACING POLE)	POSITIVE DIRECTION MAX (g)	POSITIVE DIRECTION TIME (msec)	NEGATIVE DIRECTION MAX (g)	NEGATIVE DIRECTION TIME (msec)
1	TOP LEFT	4480.35	57.75	12603.44	48.50
2	TOP RIGHT	719.85	185.50	13581.54	49.75
3	BOTTOM RIGHT	988.54	329.88	37029.15	45.13
4	BOTTOM LEFT	2688.57	206.38	35647.84	45.50

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right Wide	Photosonic 1B	13	985	Vehicle Dynamics
2	Right Rear	Photosonic 1B	25	1003	Vehicle Crush
3	Right Tight Passenger	Photosonic 1B	50	997	Dummy Kinematics
4	Right Angle	Hycam	50	1037	Dummy Kinematics
5	Left Wide	Photosonic 1B	17	995	Vehicle Crush
6	Left Front	Photosonic 1B	25	995	Dummy Kinematics
7	Left Tight Driver	Photosonic 1B	50	1000	Dummy Kinematics
8	Onboard Driver	Photosonic 1B	8	1000	Dummy Kinematics
9	Pole Top	Photosonic 1B	13	1000	Dummy Kinematics
10	Overhead	Photosonic 1B	17	1125	Vehicle Crush
11	Right	Bolex	18	24	Real Time
12	Onboard Passenger	Photosonic 1B	8	995	Dummy Kinematics

NOTE: See page D-11 for camera LED information.

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	X*	Y*	Z*
1	76"	280"	35 1/2"
2	128"	172"	32"
3	70"	374"	66"
4	225"	29'7"	77"
5	64"	-27'1"	31"
6	43"	-251"	40 1/4"
7	87"	-27'7"	68 3/4"
8		NA	
9	0	0	81"
10	19"	6"	18'6"
11	2'	39'	60"
12		NA	

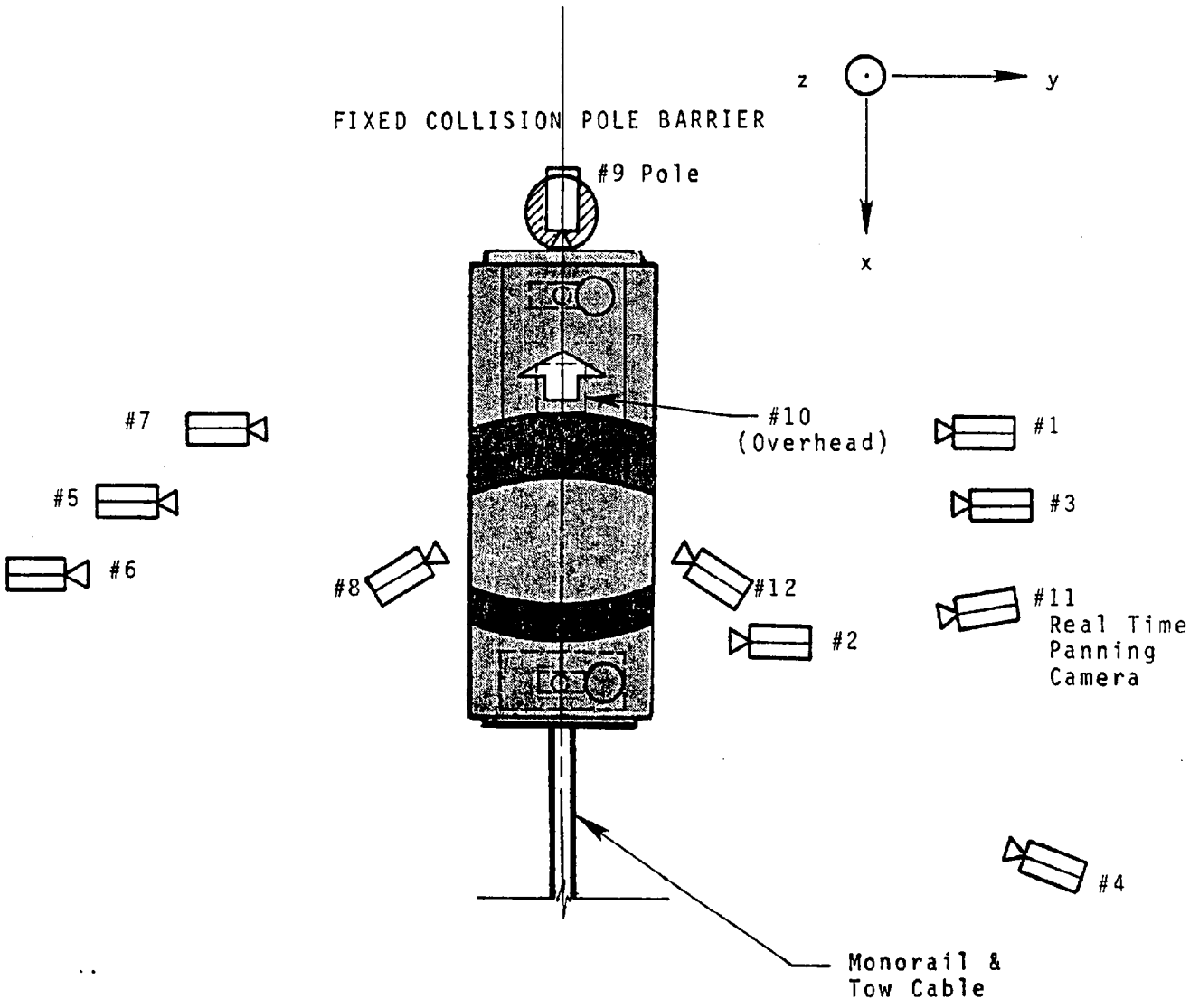
*Reference

+X = Rearward with respect to the vehicle impact point.

+Y = Rightward from intended vehicle centerline.

+Z = Upward from ground level

CAMERA POSITIONS



TEST ANOMALIES

The steering wheel hub accelerometer, SH1PG, was found to have triangle pulse shapes from 90 to 105 msec. This would indicate a problem in the electronic card.

The front frame crossmember, FFCXG, lost all data after 15 msec into the test. This was caused by the cable of the accelerometer being cut during the test.

The right rear crossmember, TRRXG3, was found to have square pulses at 0-20 msec, 180 msec, and after 200 msec. This would indicate a problem in the electronic card.

The neck channel measuring the force in the Z axis, NEKZF2, in the passenger had no data after 100 msec. This was caused by a connector failure.

All channels of MUX 4, box 6, DPCZG, LPBXG, FFCXG, BCRXG, FFRXG, TRRXG3, and TRRXGC, had no data after 260 msec. This was caused by a broken part of the umbilical cable.

APPENDIX A

PHOTOGRAPHS

Figure A-1. PRE-TEST RIGHT SIDE OVERALL

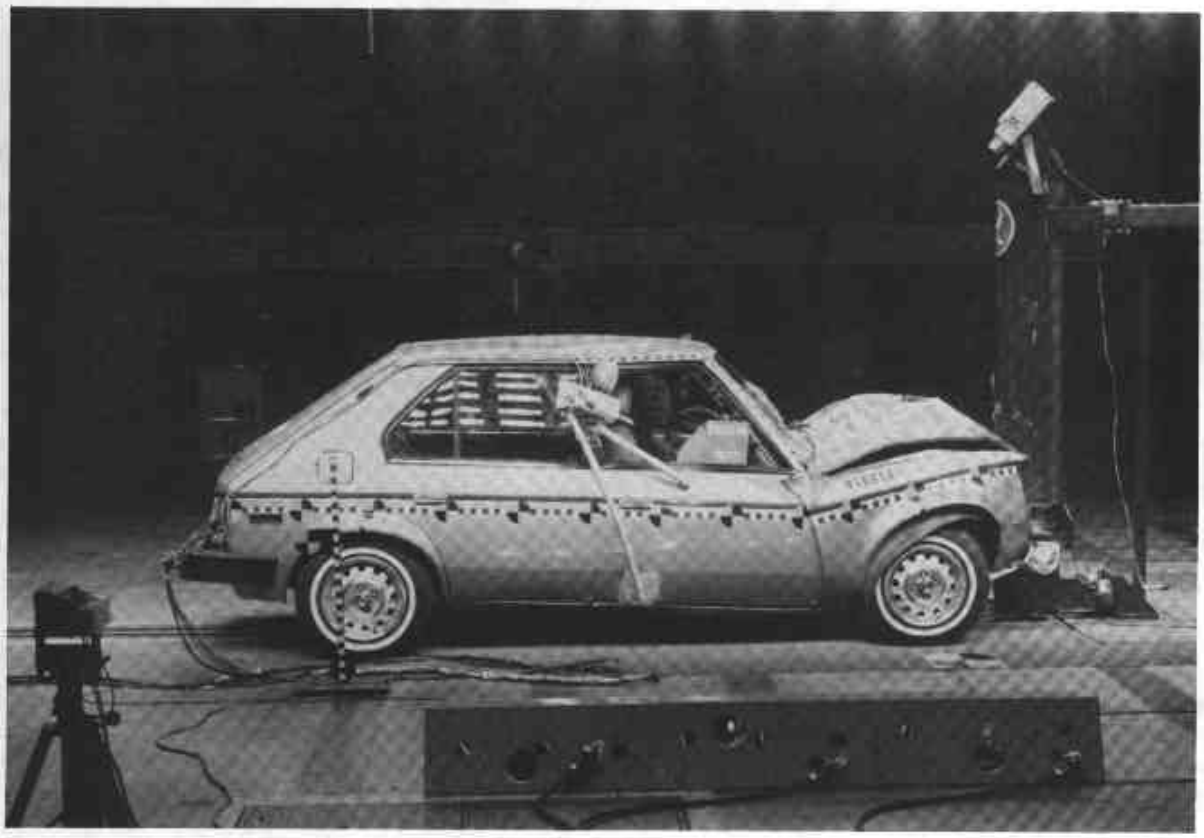


Figure A-2. POST-TEST RIGHT SIDE OVERALL

Figure A-3. PRE-TEST LEFT SIDE OVERALL

Figure A-4. POST-TEST LEFT SIDE OVERALL

Figure A-5. PRE-TEST VEHICLE FRONT - VIEW 1

Figure A-6. POST-TEST VEHICLE FRONT - VIEW 1

Figure A-7. PRE-TEST VEHICLE FRONT - VIEW 2

Figure A-8. POST-TEST VEHICLE FRONT - VIEW 2

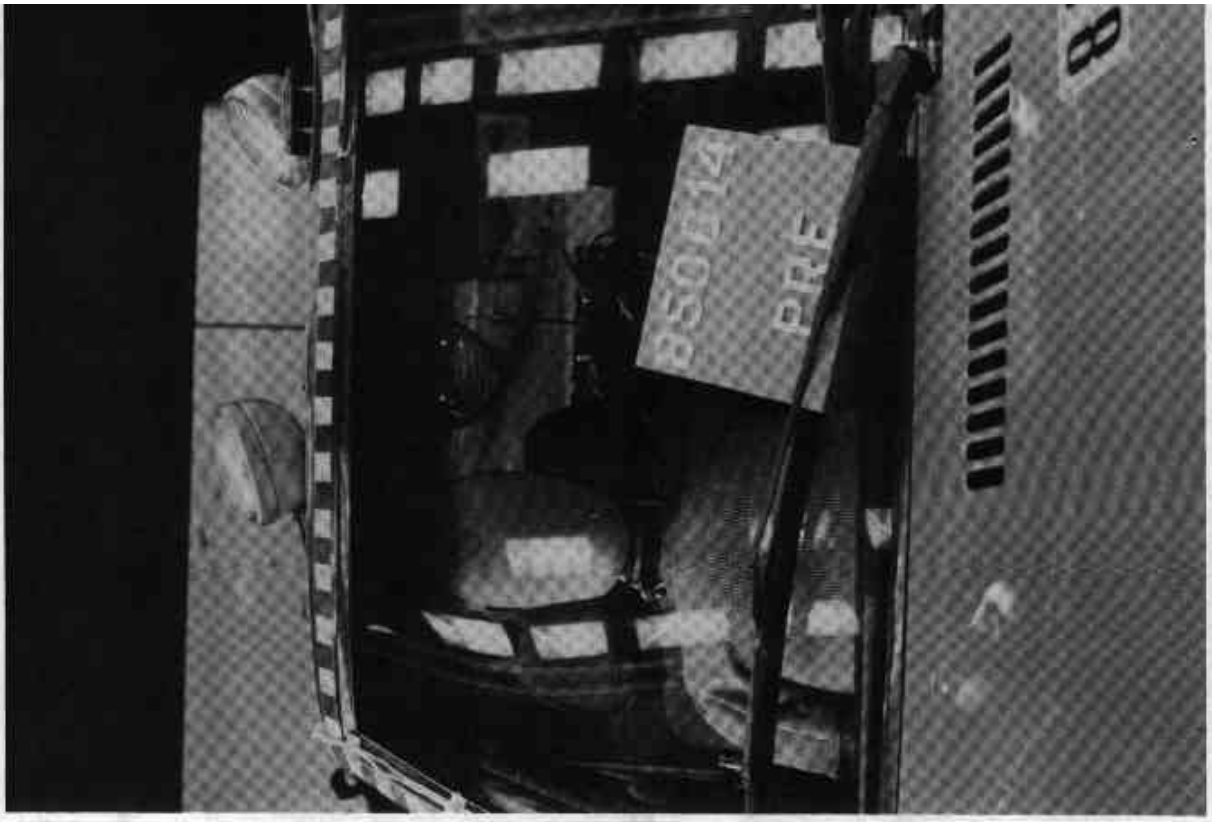


Figure A-9. PRE-TEST VEHICLE GLAZING

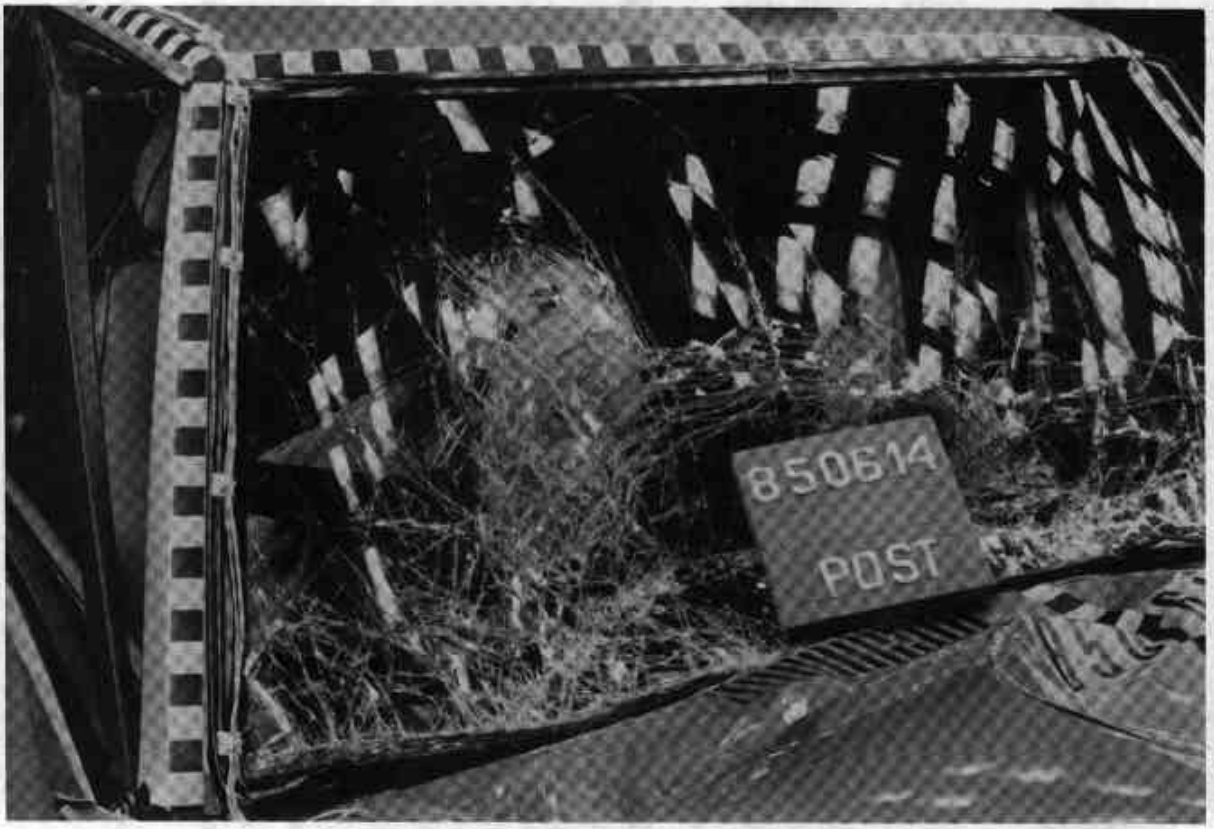


Figure A-10. POST-TEST VEHICLE GLAZING

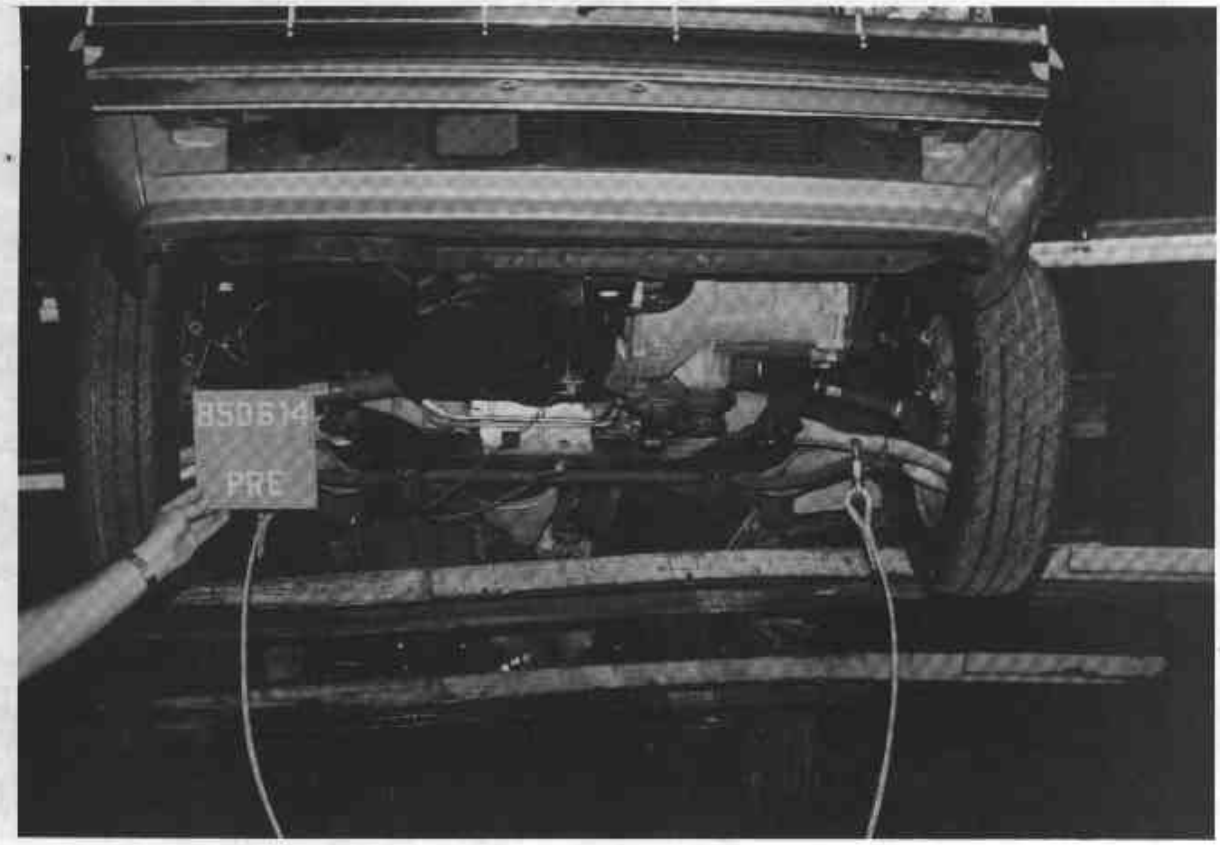


Figure A-11. PRE-TEST VEHICLE UNDERBODY - VIEW 1

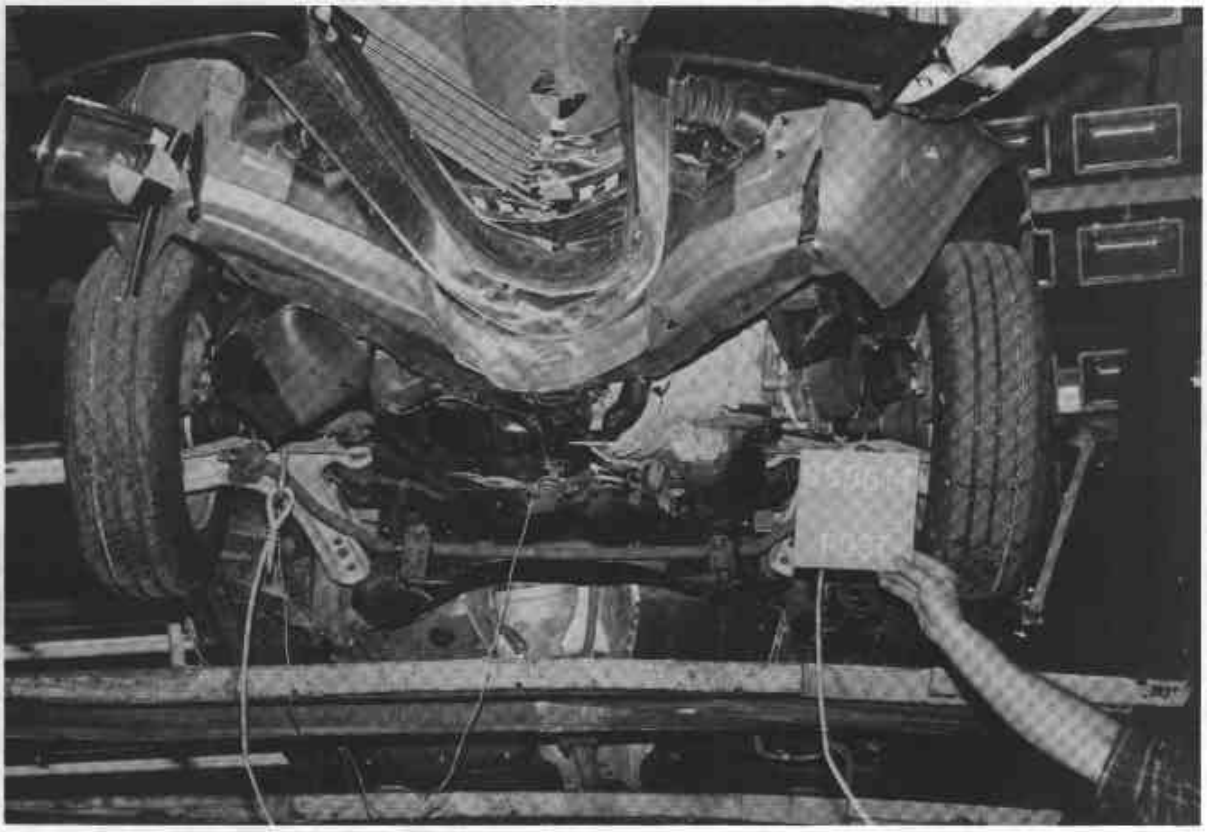


Figure A-12. POST-TEST VEHICLE UNDERBODY - VIEW 1

Figure A-13. PRE-TEST DRIVER DUMMY - VIEW 1

Figure A-14. POST-TEST DRIVER DUMMY - VIEW 1

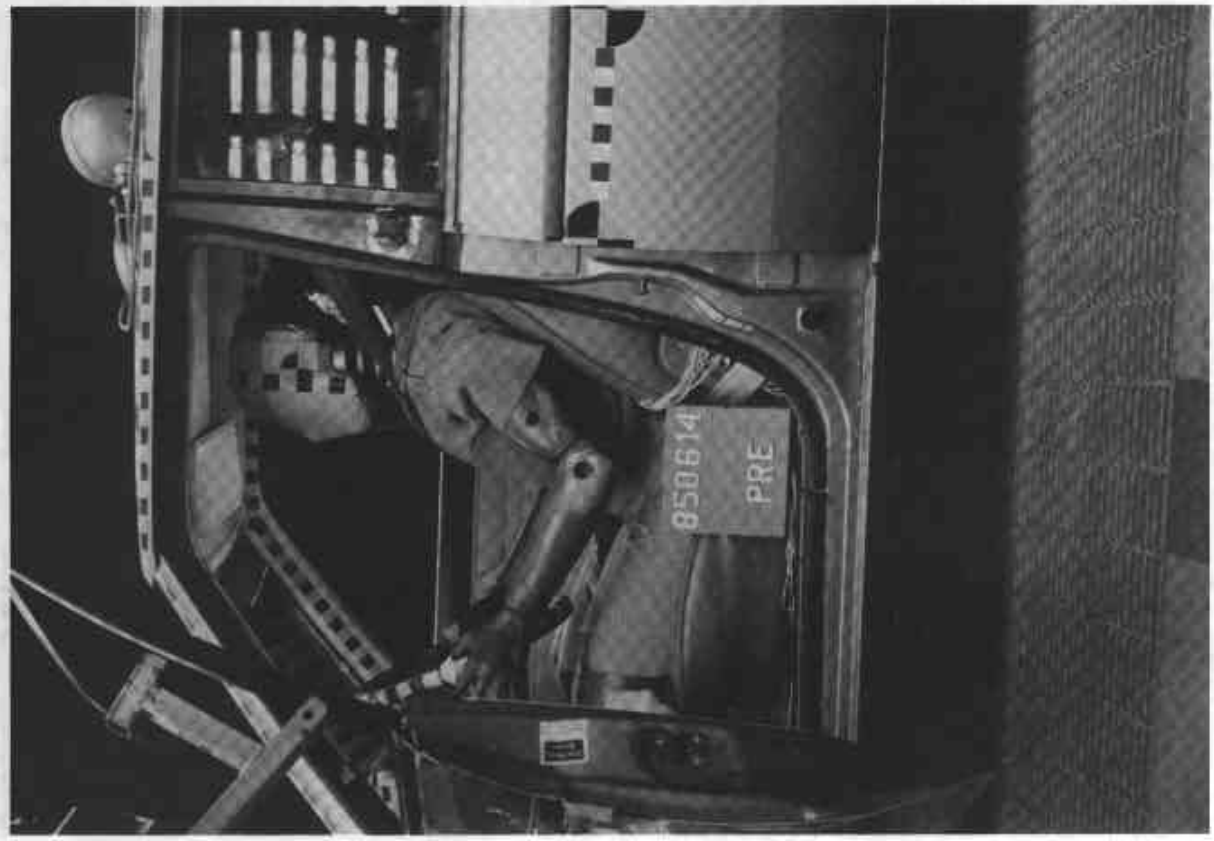


Figure A-15. PRE-TEST DRIVER DUMMY - VIEW 2

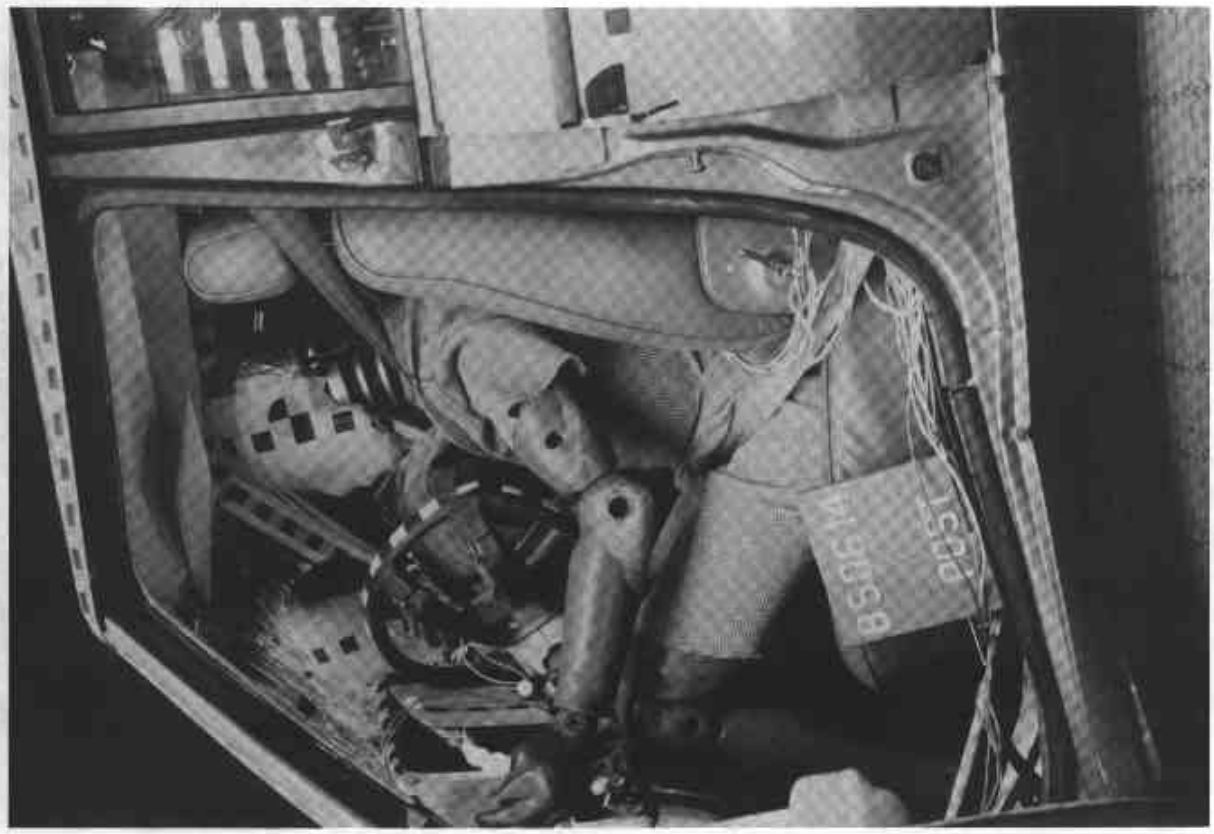


Figure A-16. POST-TEST DRIVER DUMMY - VIEW 2

Figure A-17. PRE-TEST DRIVER DUMMY - VIEW 3

Figure A-18. POST-TEST DRIVER DUMMY - VIEW 3

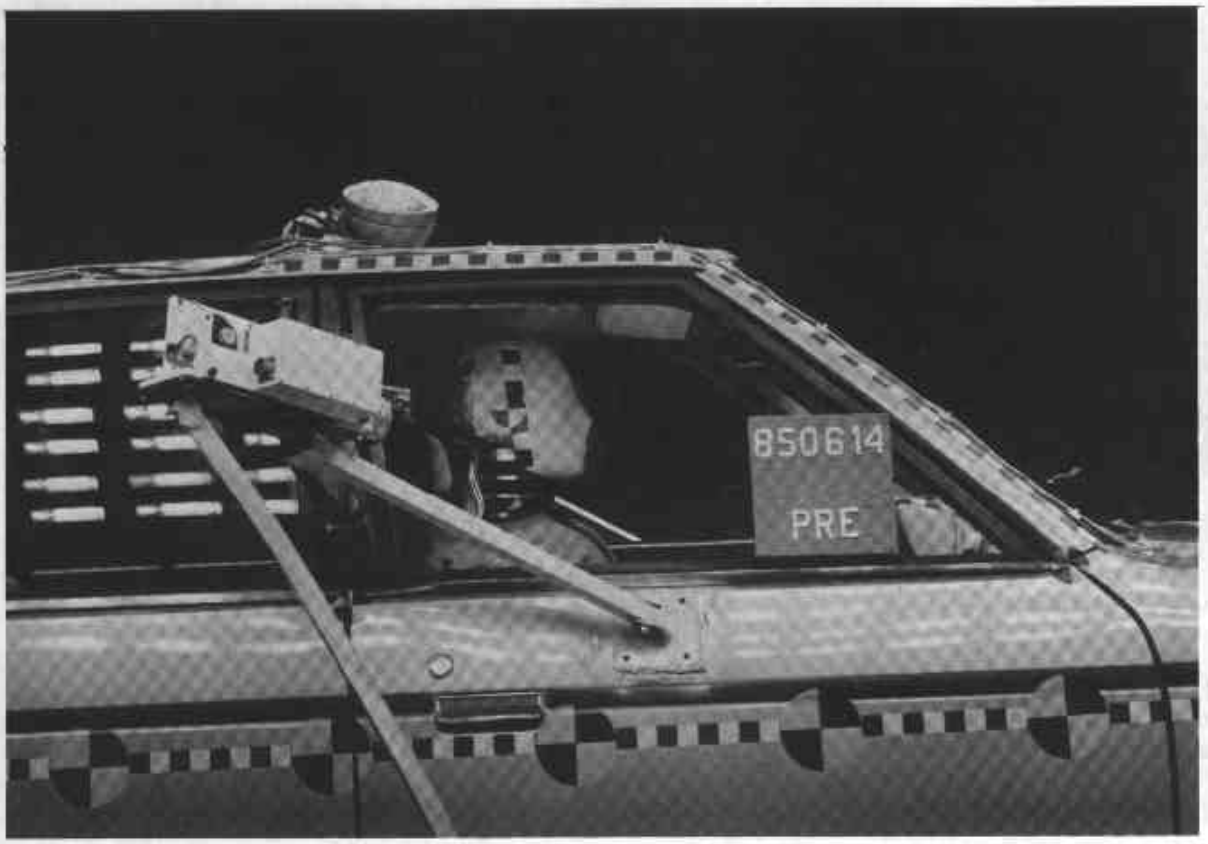


Figure A-19. PRE-TEST PASSENGER DUMMY - VIEW 1

Figure A-20. POST-TEST PASSENGER DUMMY - VIEW 1

Figure A-21. PRE-TEST PASSENGER DUMMY - VIEW 2

Figure A-22. POST-TEST PASSENGER DUMMY - VIEW 2

Figure A-23. PRE-TEST PASSENGER DUMMY - VIEW 3

Figure A-24. POST-TEST PASSENGER DUMMY - VIEW 3

Figure A-25. POST-TEST DRIVER DUMMY

Figure A-26. POST-TEST DRIVER SIDE INTERIOR - VIEW 1

Figure A-27. POST-TEST DRIVER SIDE INTERIOR - VIEW 2

Figure A-28. POST-TEST DRIVER SIDE INTERIOR - VIEW 3

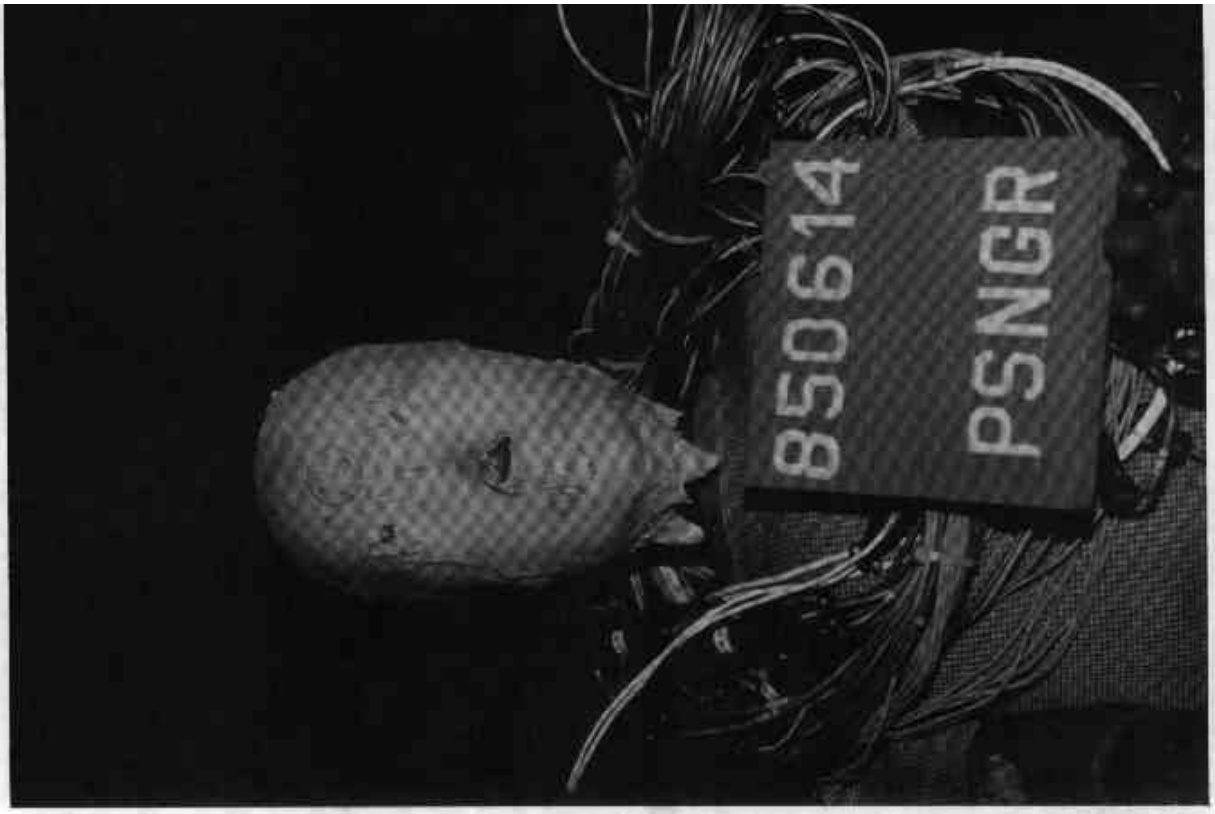


Figure A-29. POST-TEST PASSENGER DUMMY

Figure A-30. POST-TEST PASSENGER DUMMY - VIEW 4

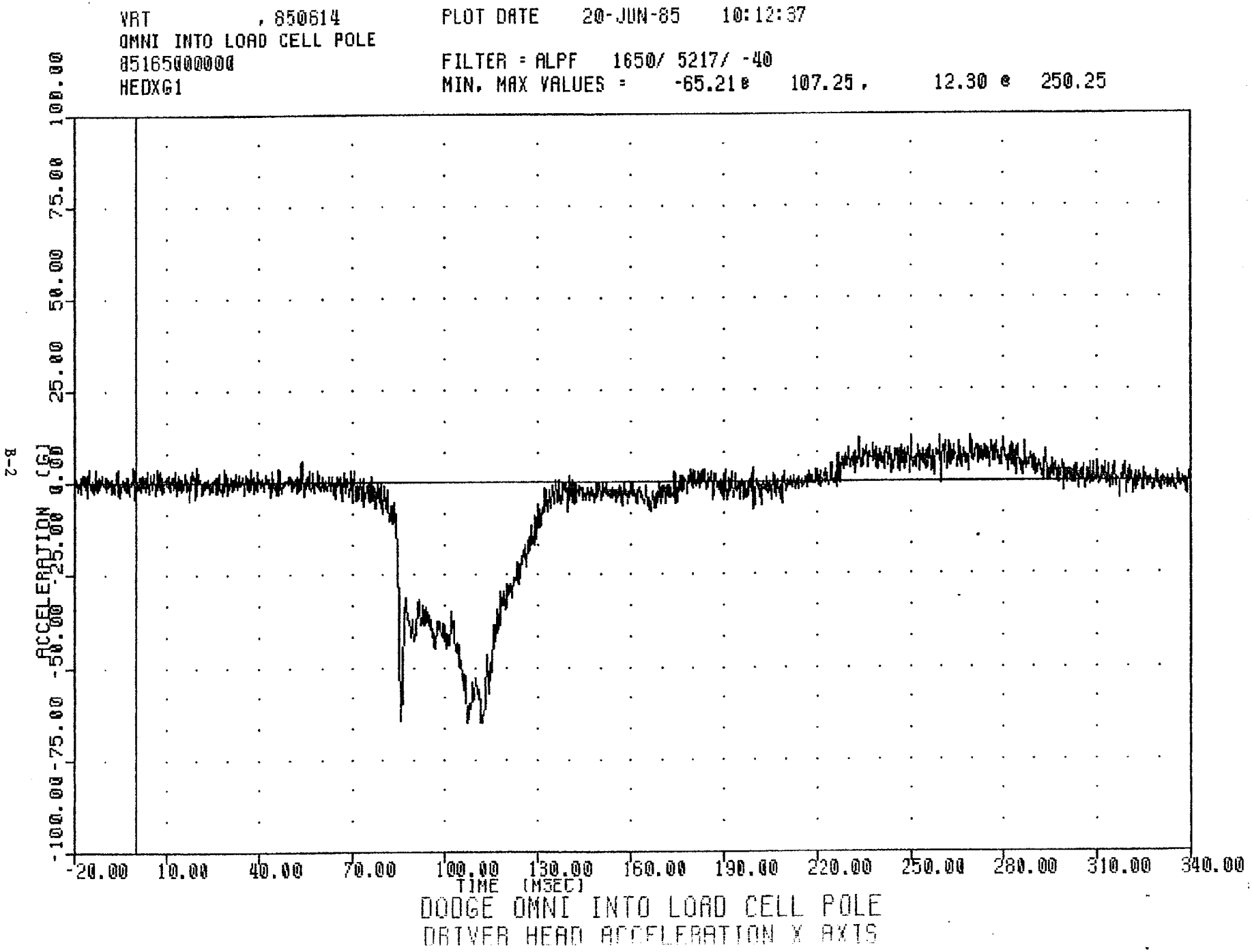
Figure A-31. POST-TEST PASSENGER SIDE INTERIOR - VIEW 1

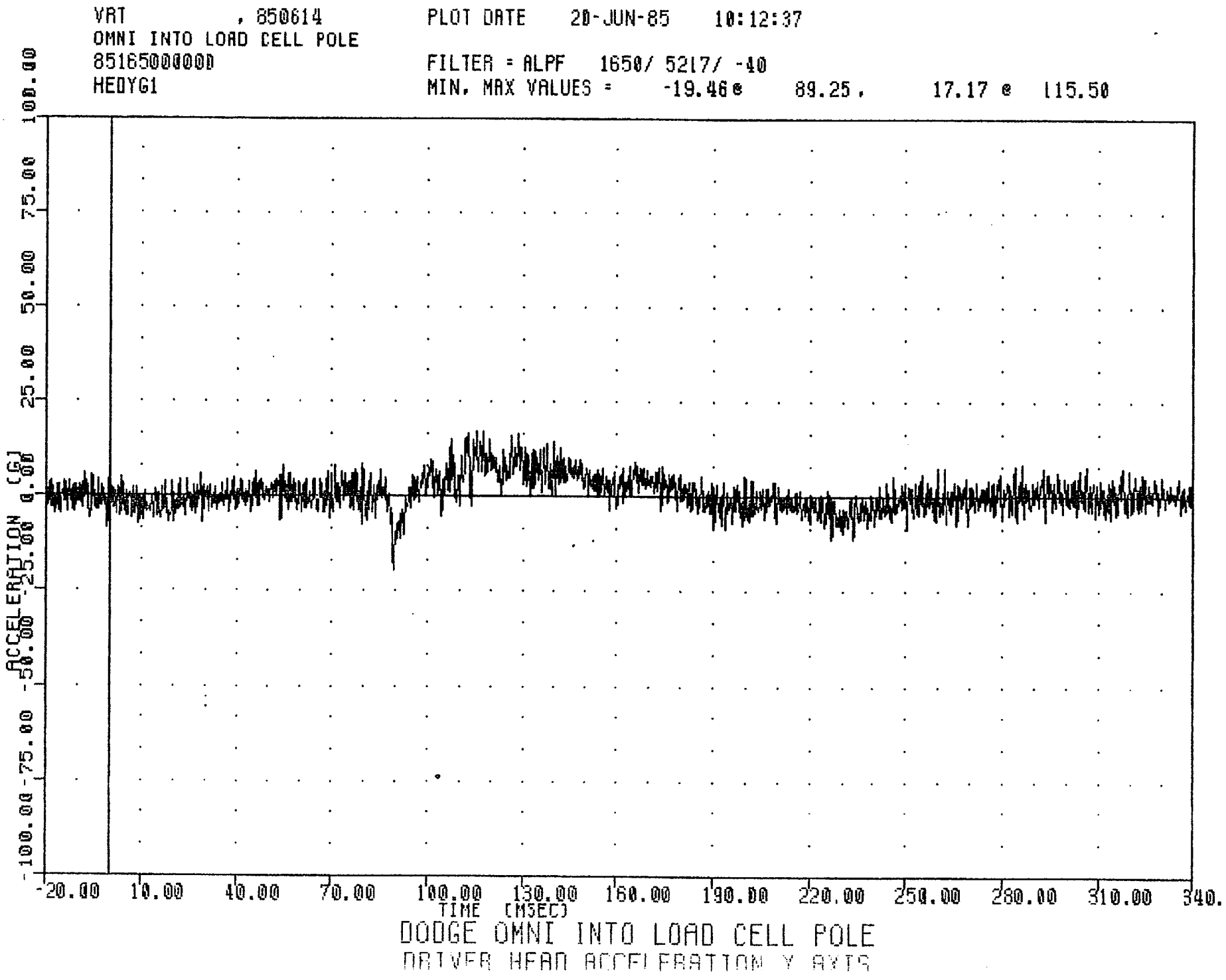
Figure A-32 POST-TEST PASSENGER SIDE INTERIOR - VIEW 2

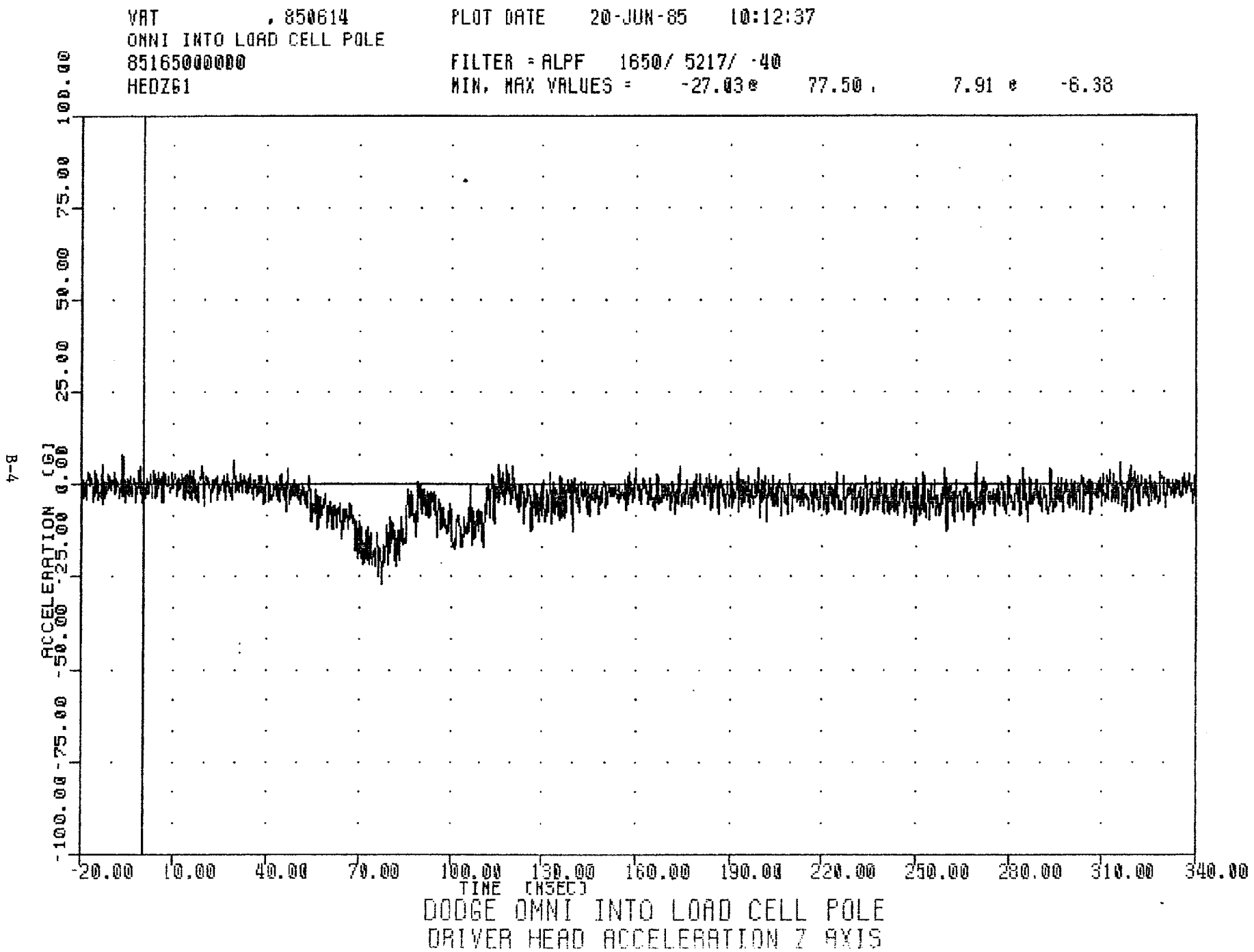
APPENDIX B

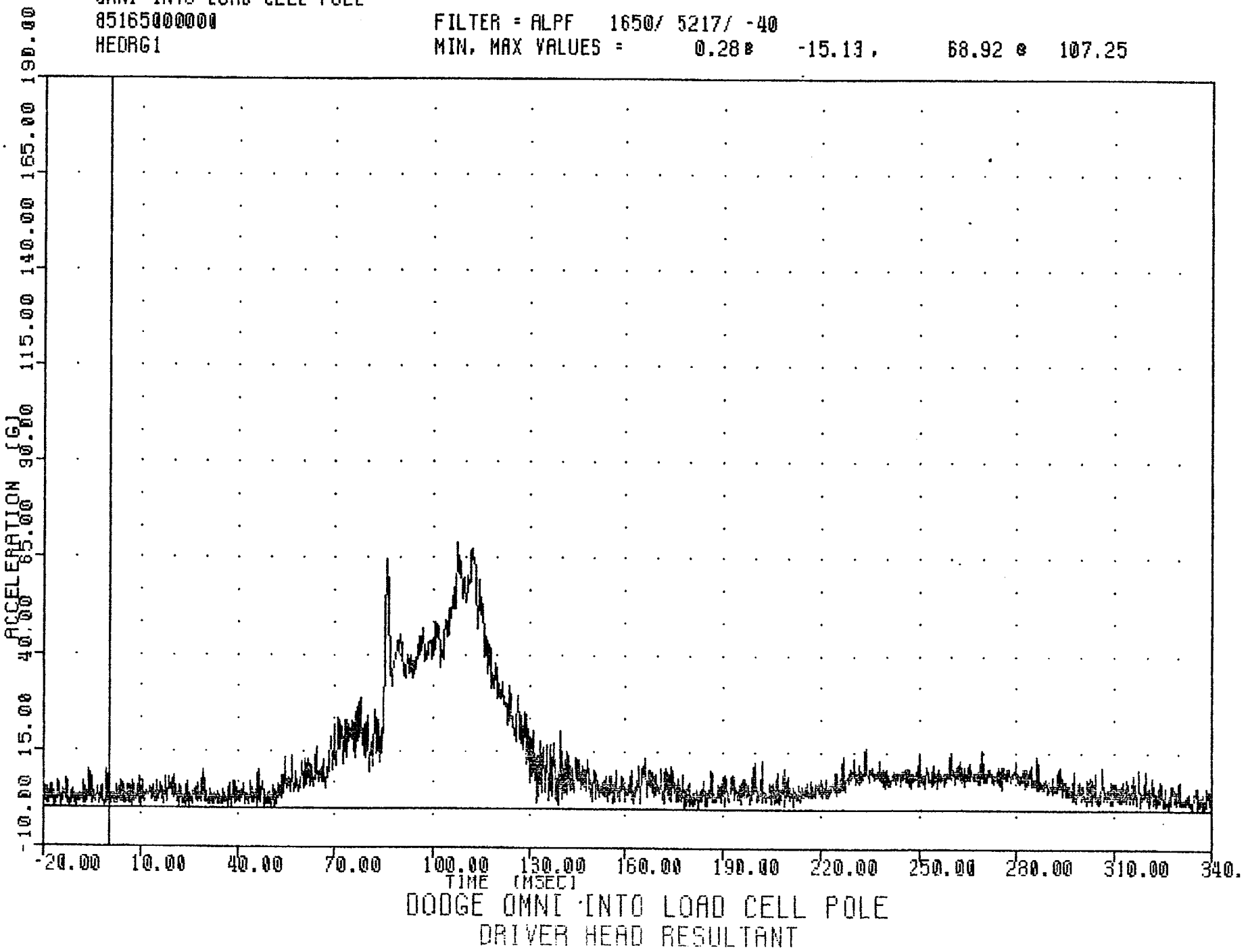
DATA PLOT PRESENTATION

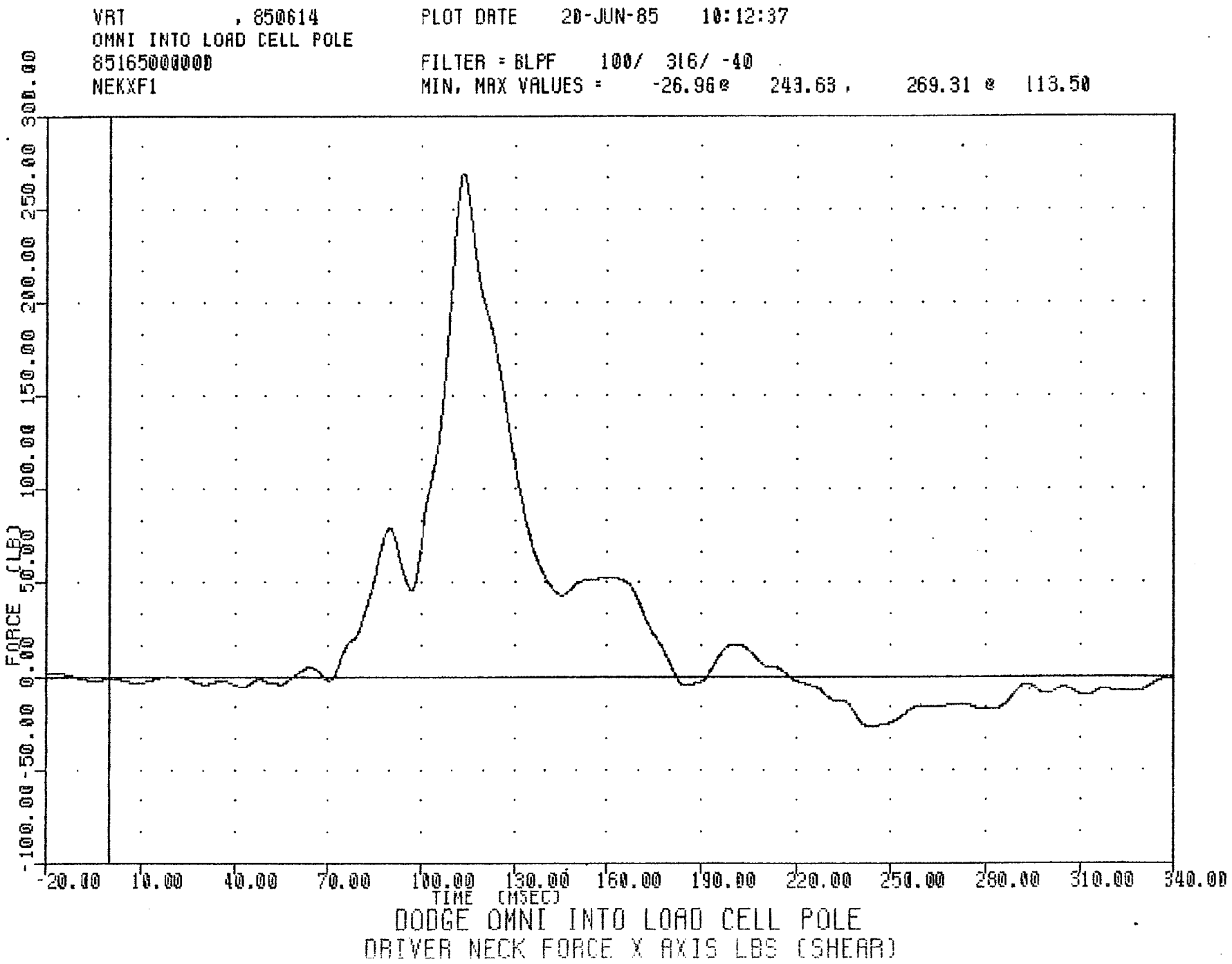
Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. The data was filtered according to SAE J211.

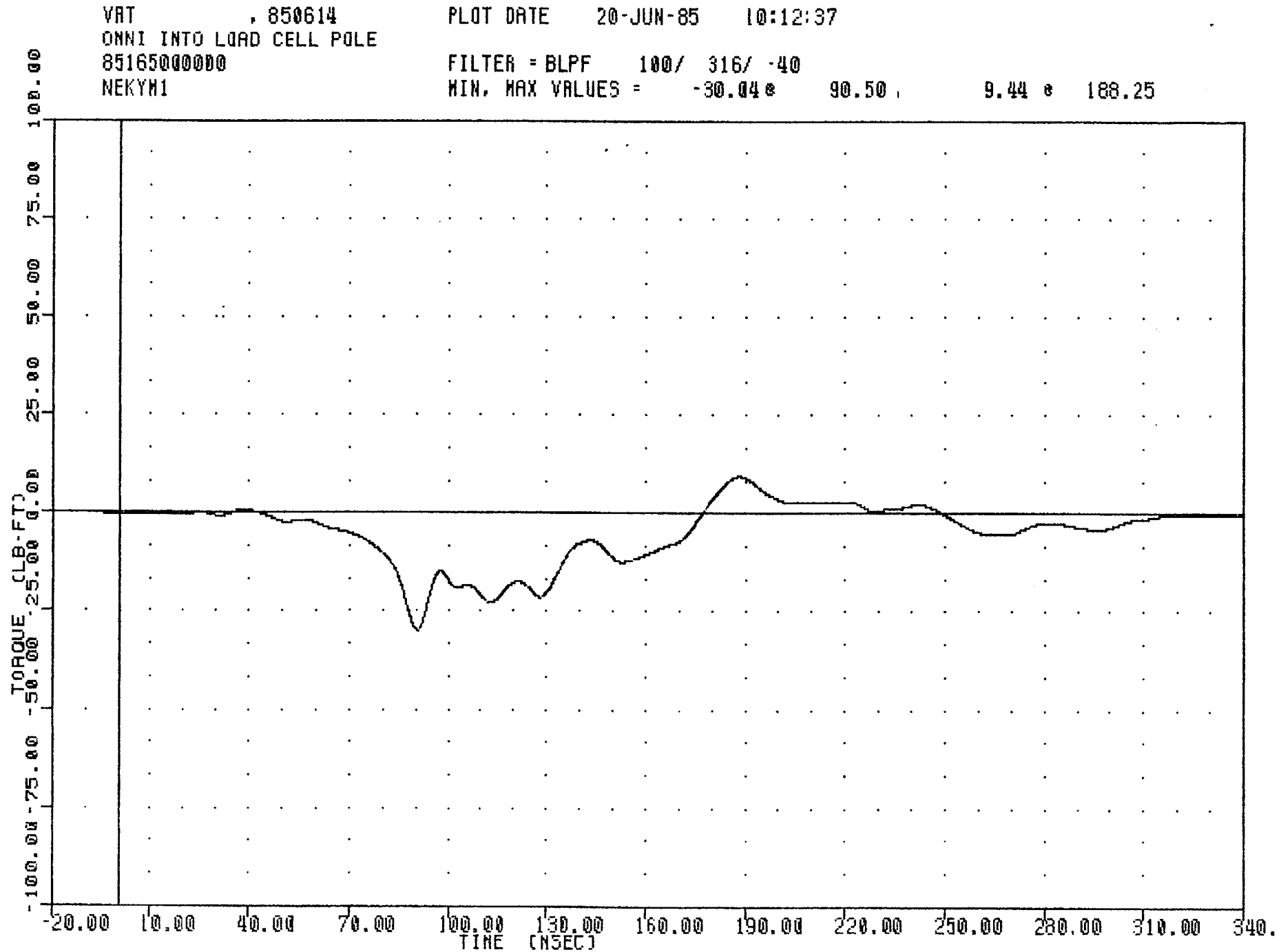

VRT , 850614
OMNI INTO LOAD CELL POLE
85165000000
HEDXG1
PLOT DATE 20-JUN-85 10:12:37
FILTER = ALPF 1650/ 5217/ -40
MIN. MAX VALUES = -65.21 @ 107.25 , 12.30 @ 250.25
ACCELERATION (G)
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER HEAD ACCELERATION X AXIS


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = ALPF 1650/ 5217/ -40
HEDYG1
MIN, MAX VALUES = -19.46 @ 89.25 , 17.17 @ 115.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER HEAD ACCELERATION Y AXIS

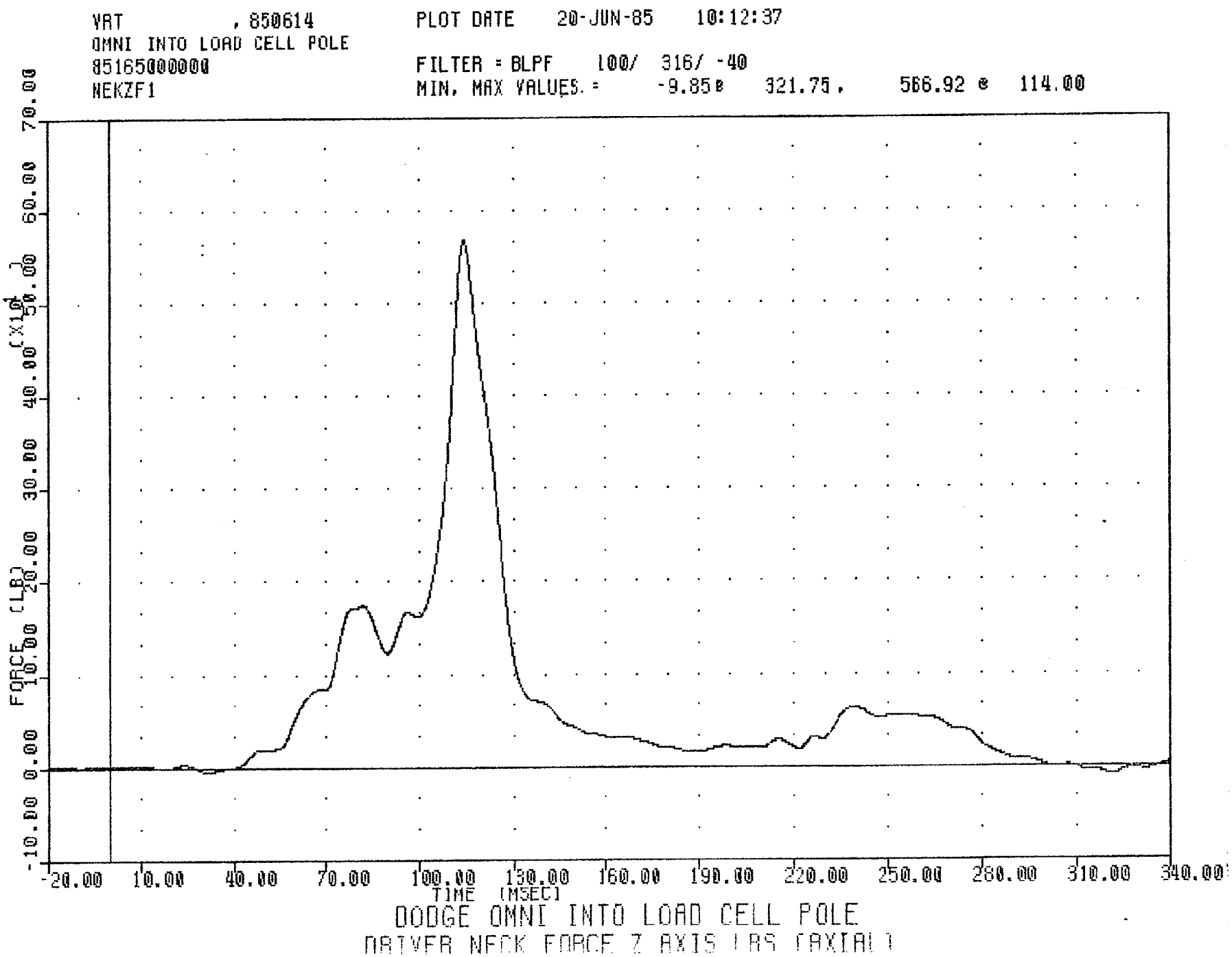

VAT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
851650000000
FILTER = ALPF 1650/ 5217/ -40
HEDZ61
MIN, MAX VALUES = -27.03 @ 77.50 , 7.91 @ -6.38
ACCELERATION [G]
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME [MSEC]
DODGE OMNI INTO LOAD CELL POLE
DRIVER HEAD ACCELERATION Z AXIS

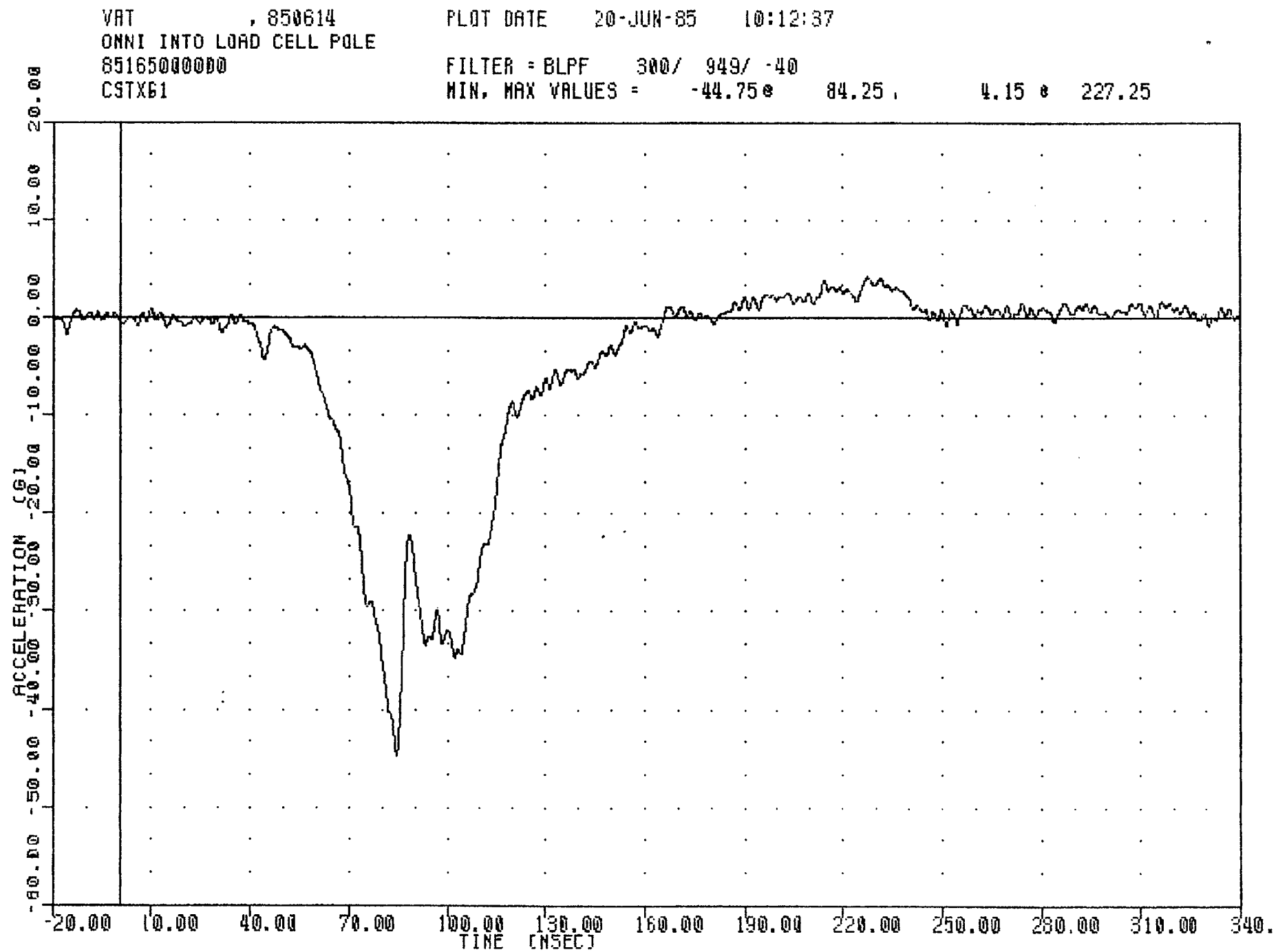

VRT , 850614
OMNI INTO LOAD CELL POLE
851650000001
HEDRG1
PLOT DATE 20-JUN-85 10:12:37
FILTER = ALPF 1650/ 5217/ -40
MIN, MAX VALUES = 0.28 @ -15.13 , 68.92 @ 107.25
ACCELERATION (G)
-10.00 15.00 40.00 65.00 90.00 115.00 140.00 165.00 190.00
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER HEAD RESULTANT


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
851650000000
FILTER = BLPF 100/ 316/ -40
NEKXF1
MIN, MAX VALUES = -26.96 @ 243.63 , 269.31 @ 113.50
FORCE (LB)
300.00
250.00
200.00
150.00
100.00
50.000
0.000
-50.000
-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)
DODGE OMNI INTO LOAD CELL POLE
DRIVER NECK FORCE X AXIS LBS (SHEAR)

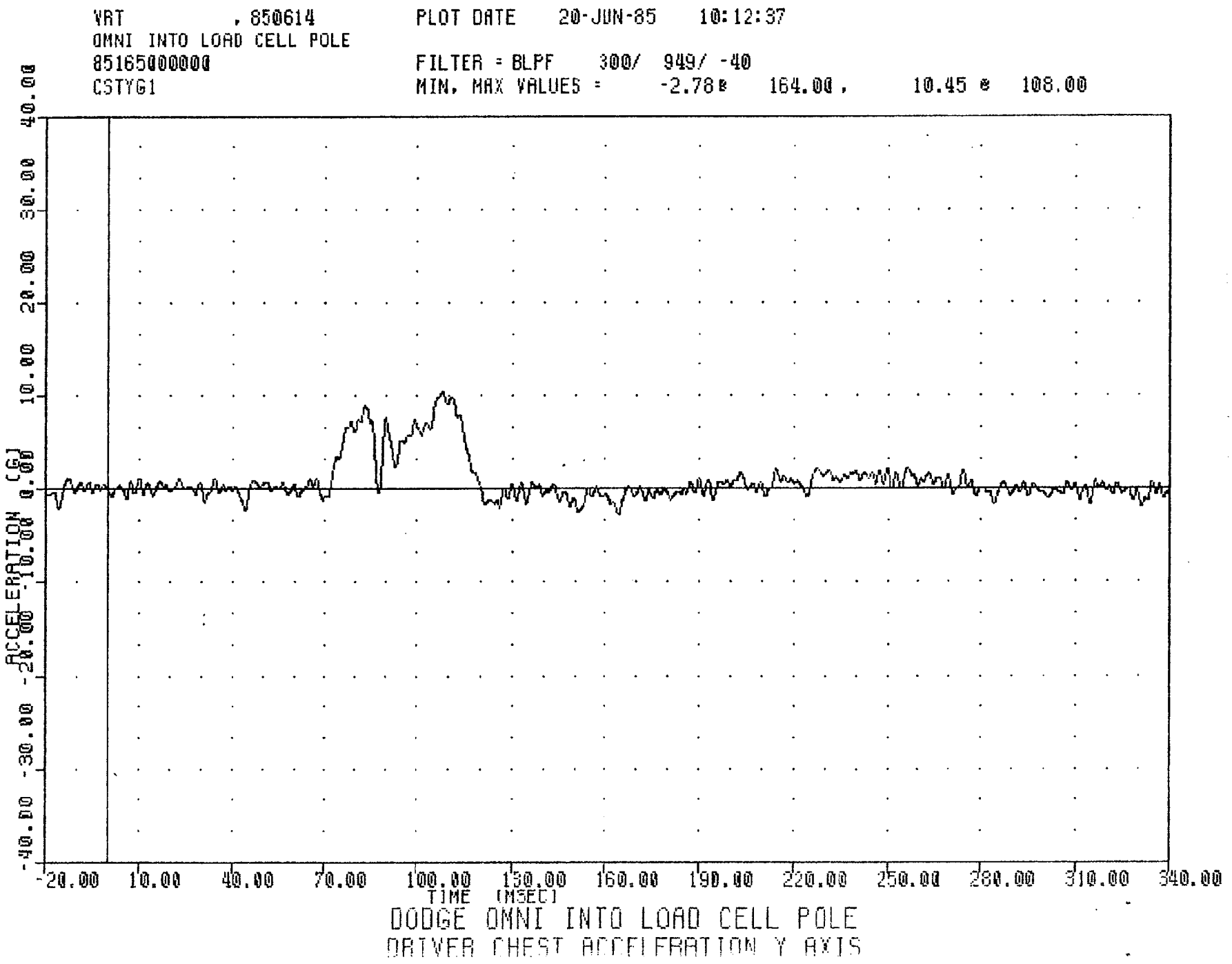


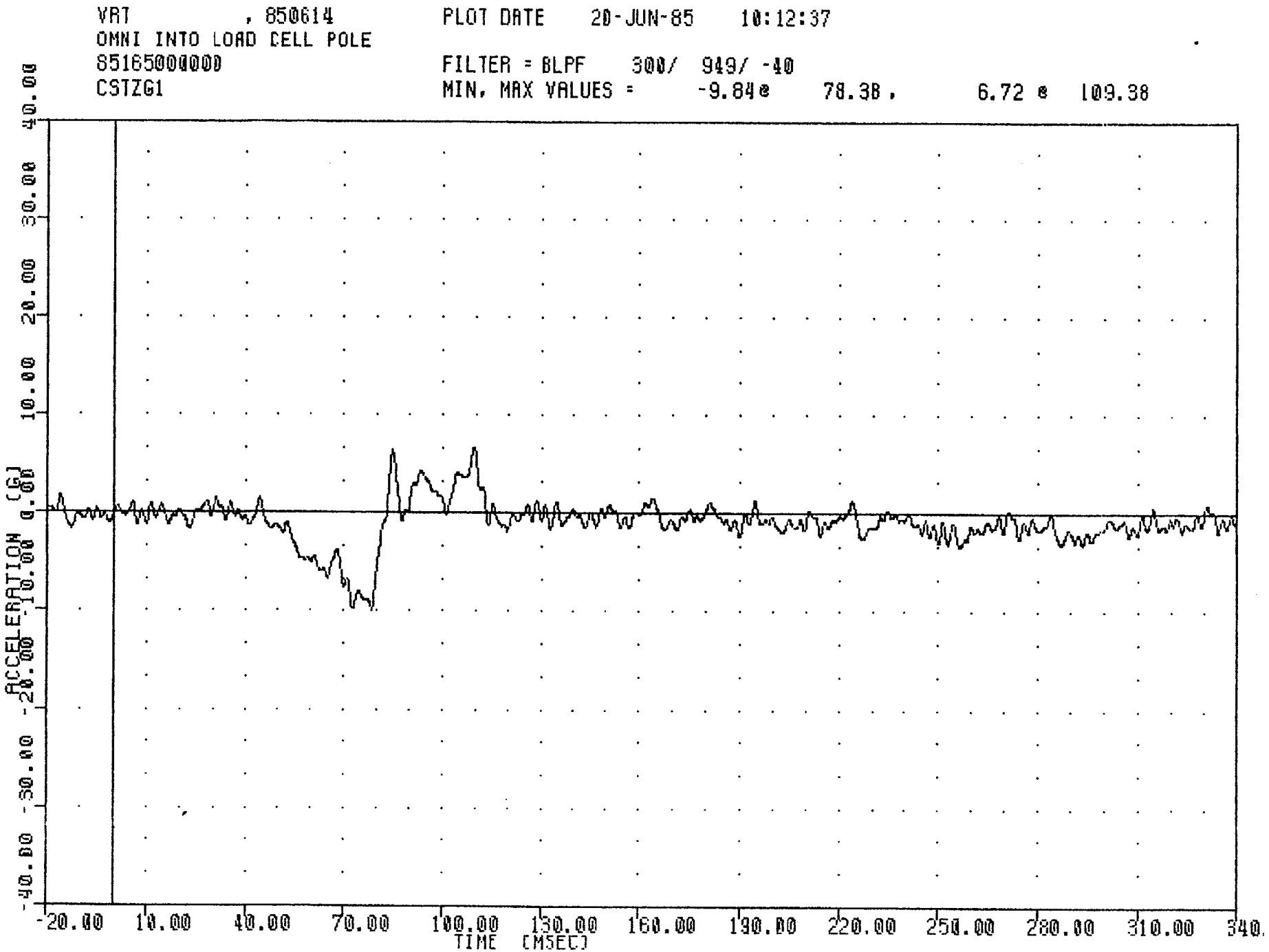
DODGE OMNI INTO LOAD CELL POLE
DRIVER NECK MOMENT Y AXIS FT-LBS


VRT , 850614
OMNI INTO LOAD CELL POLE
85165000000
NEKZF1
PLOT DATE 20-JUN-85 10:12:37
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES. = -9.85 @ 321.75 , 566.92 @ 114.00
FORCE (LB) (X10^1)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
-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)
DODGE OMNI INTO LOAD CELL POLE
DRIVER NECK FORCE Z AXIS (RS (AXIAL)



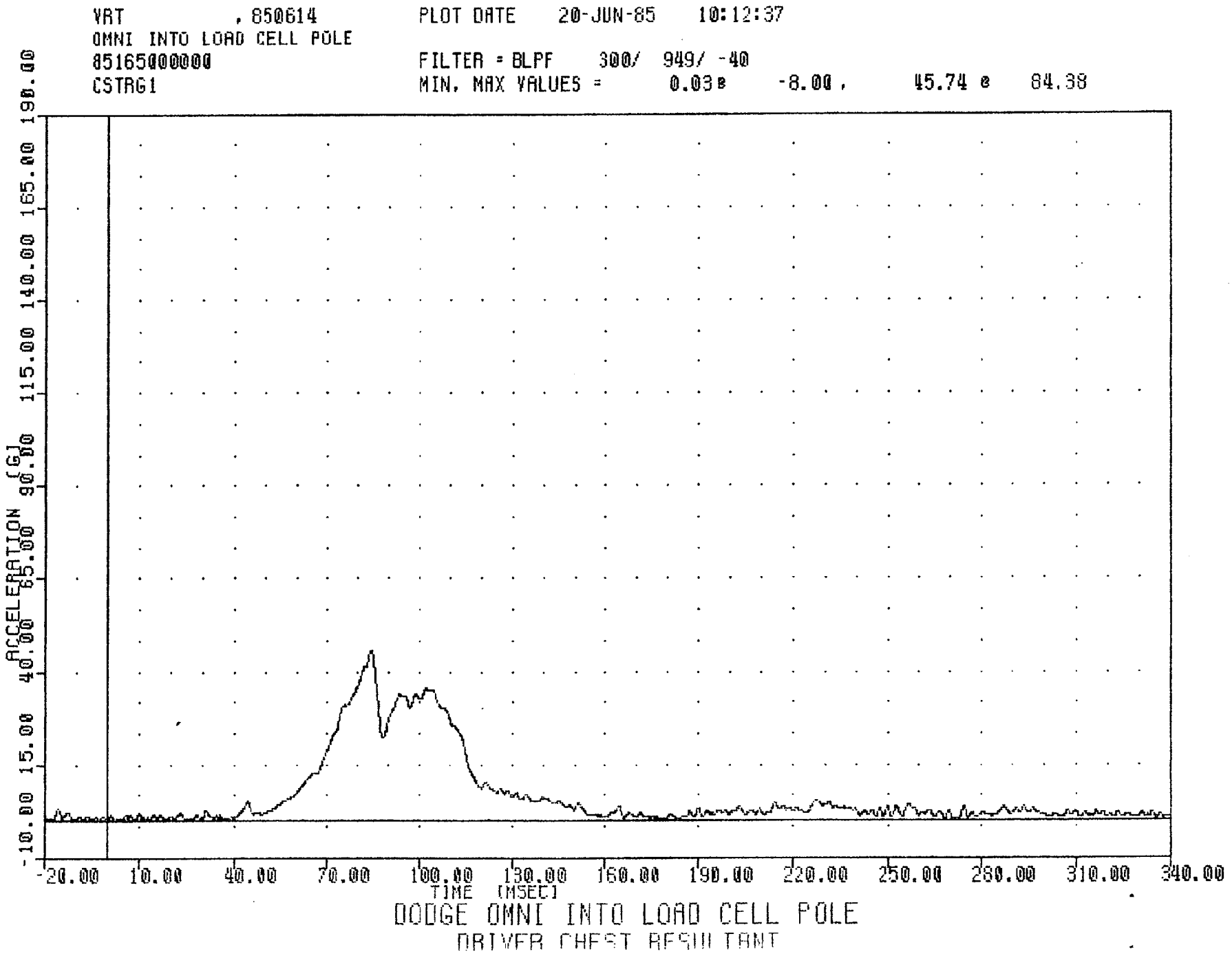
DODGE OMNI INTO LOAD CELL POLE
DRIVER CHEST ACCELERATION X AXIS

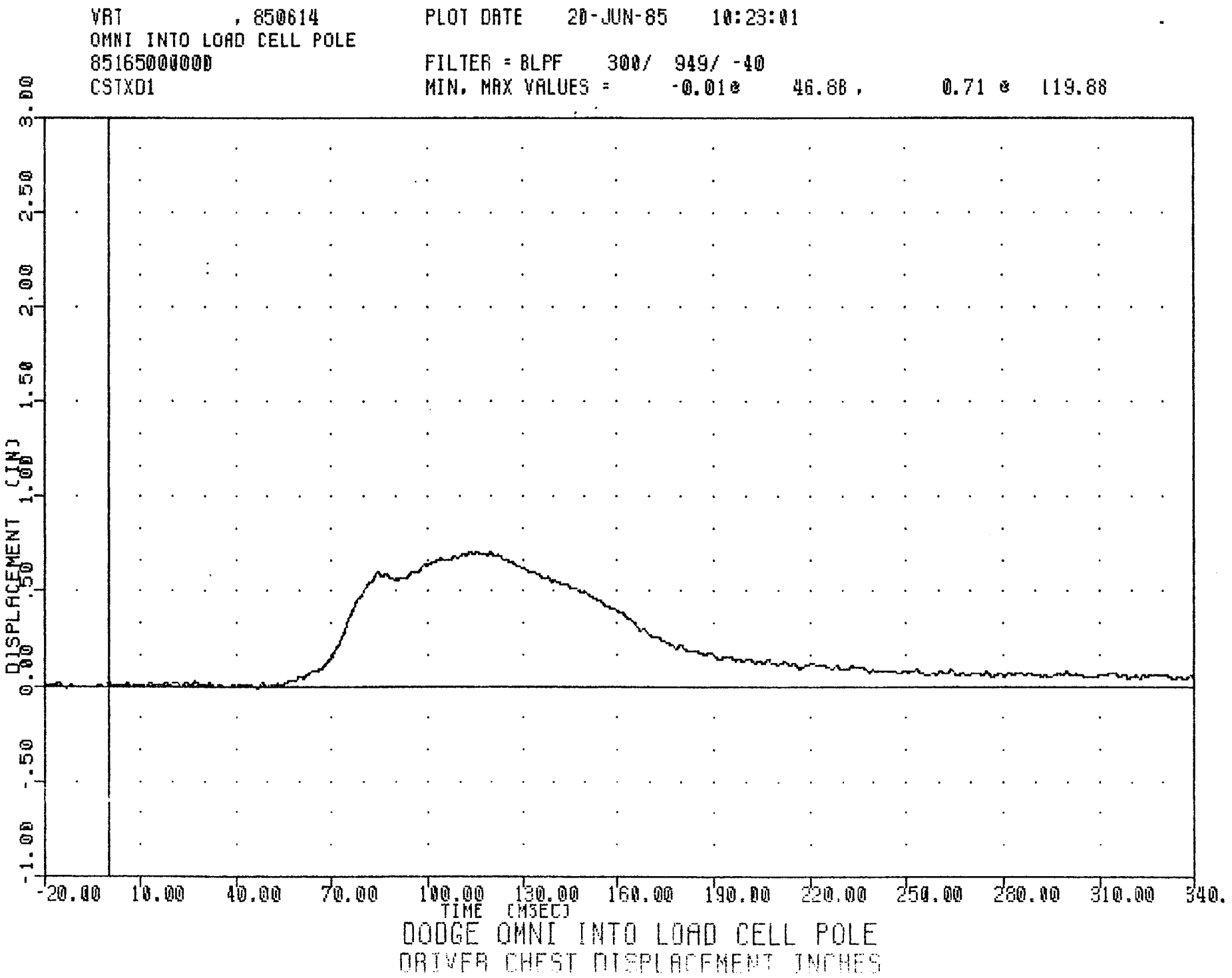

VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 300/ 949/ -40
CSTYG1
MIN, MAX VALUES = -2.78 @ 164.00 , 10.45 @ 108.00
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER CHEST ACCELERATION Y AXIS

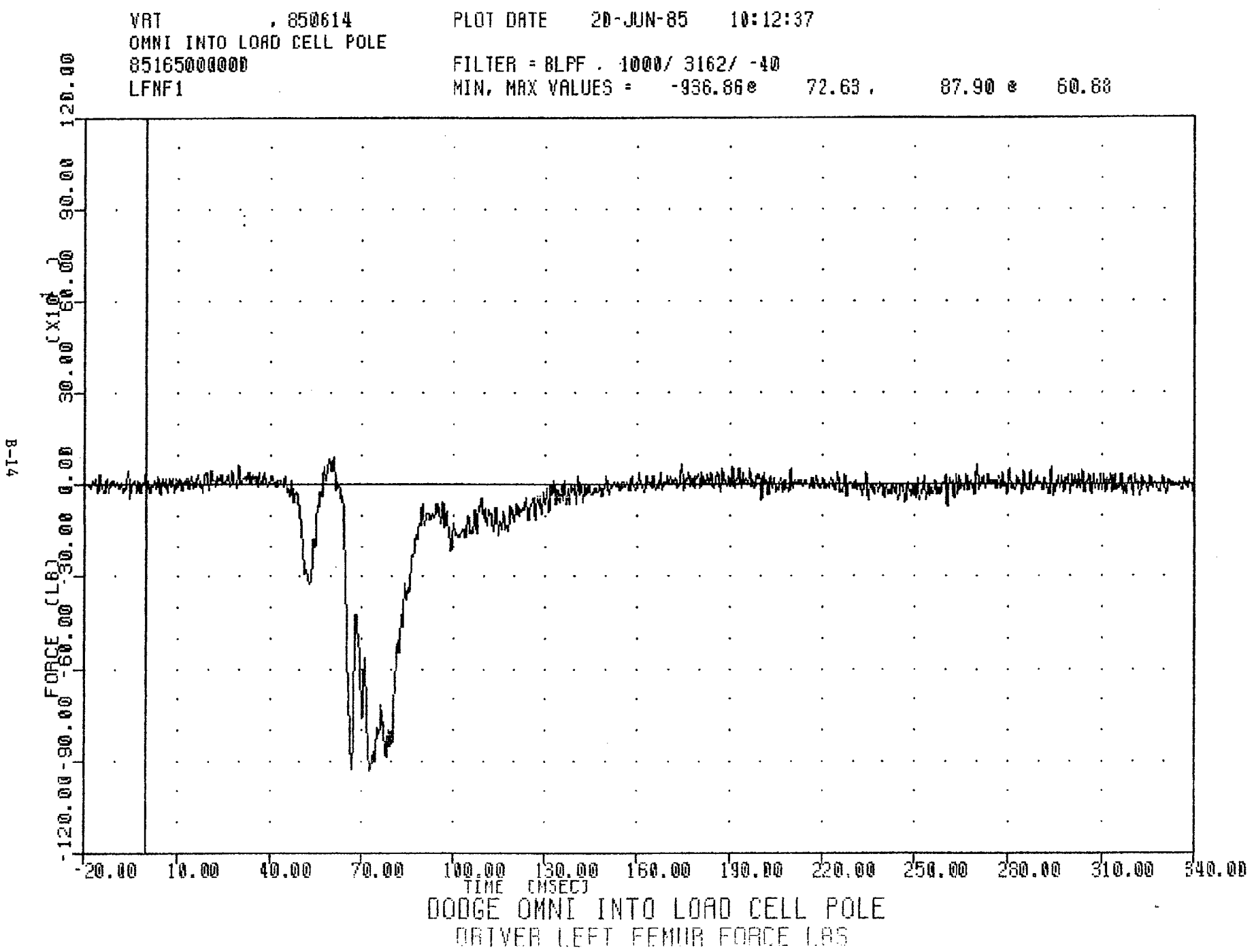


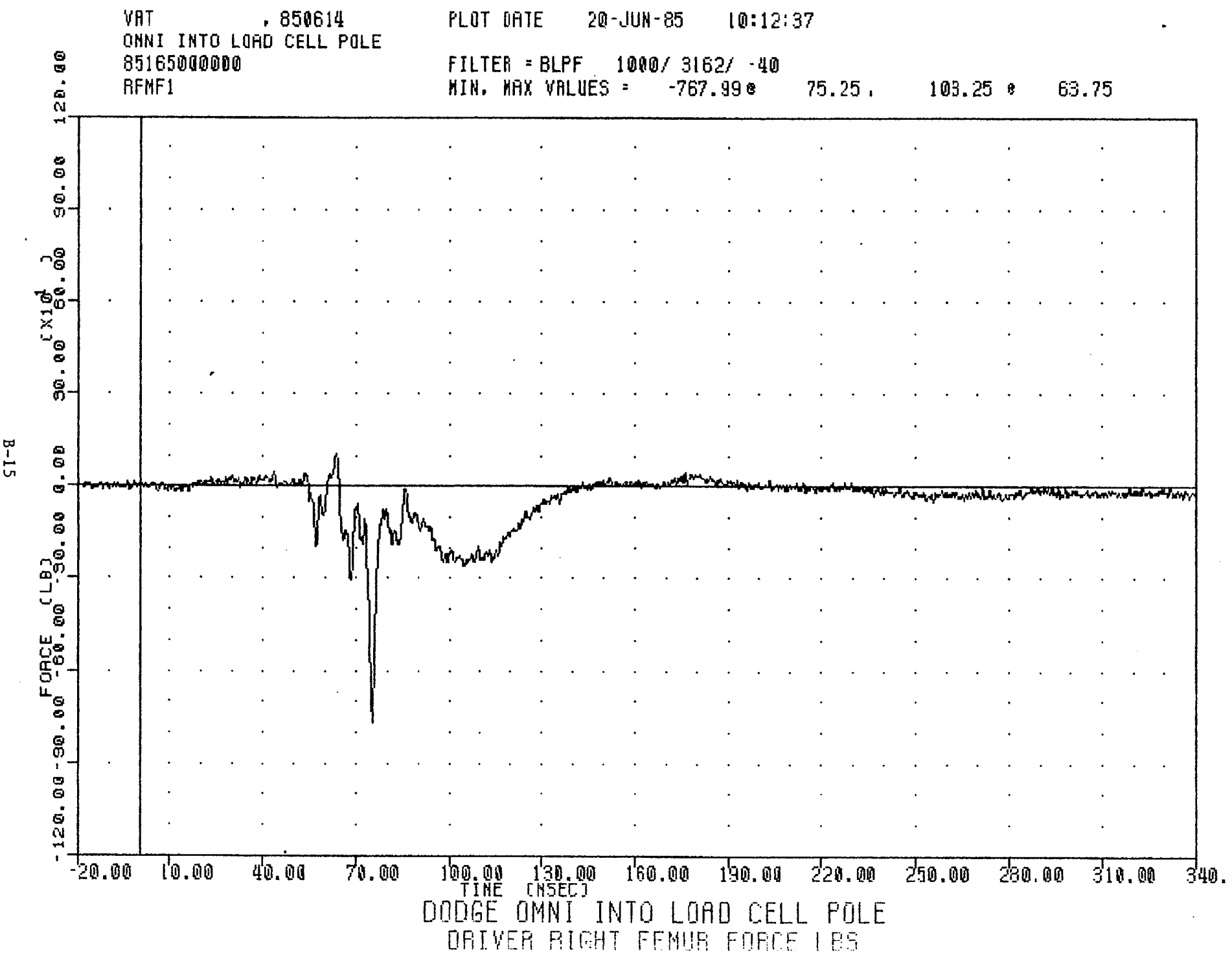
DODGE OMNI INTO LOAD CELL POLE

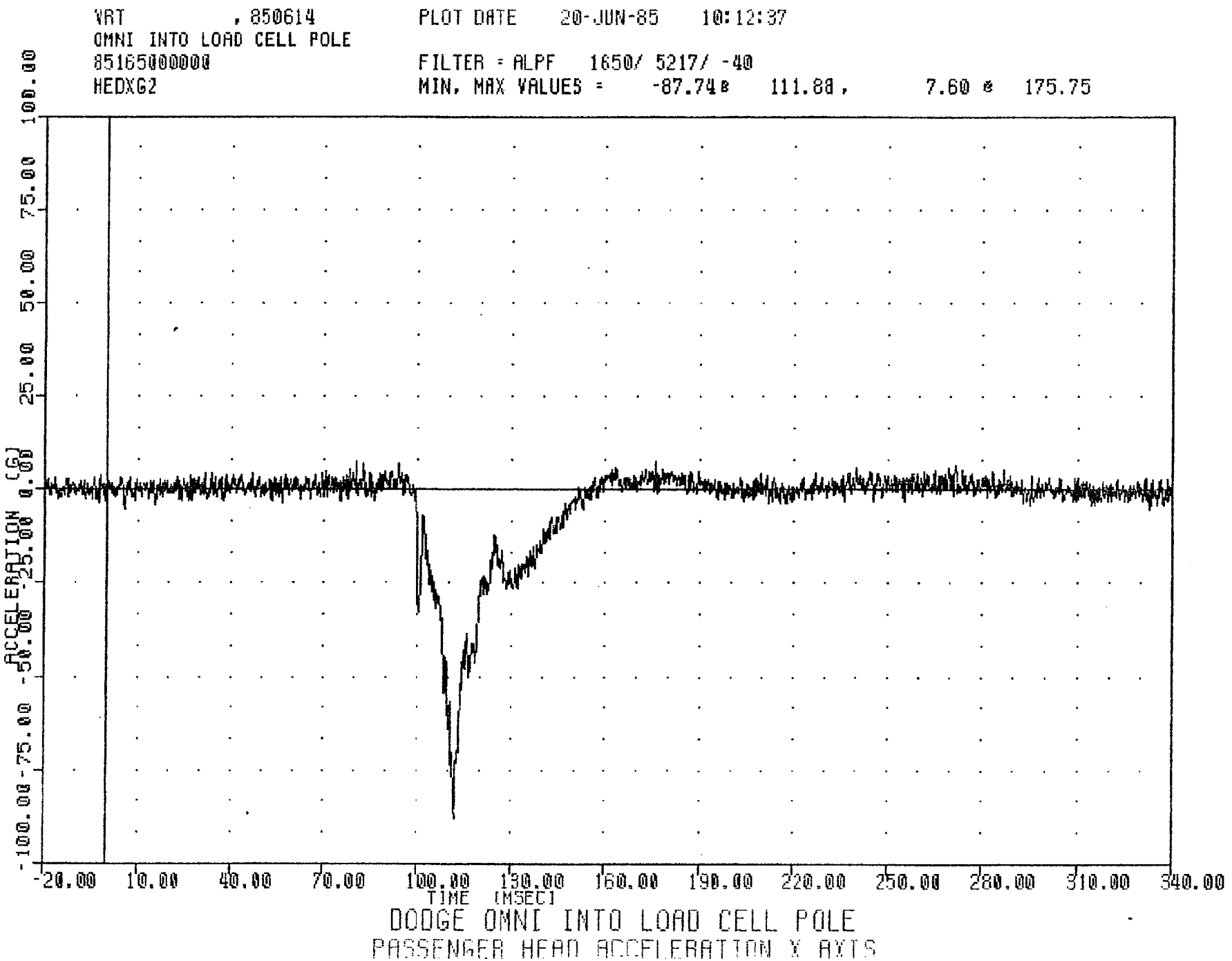
DRIVER CHEST ACCELERATION Z AXIS

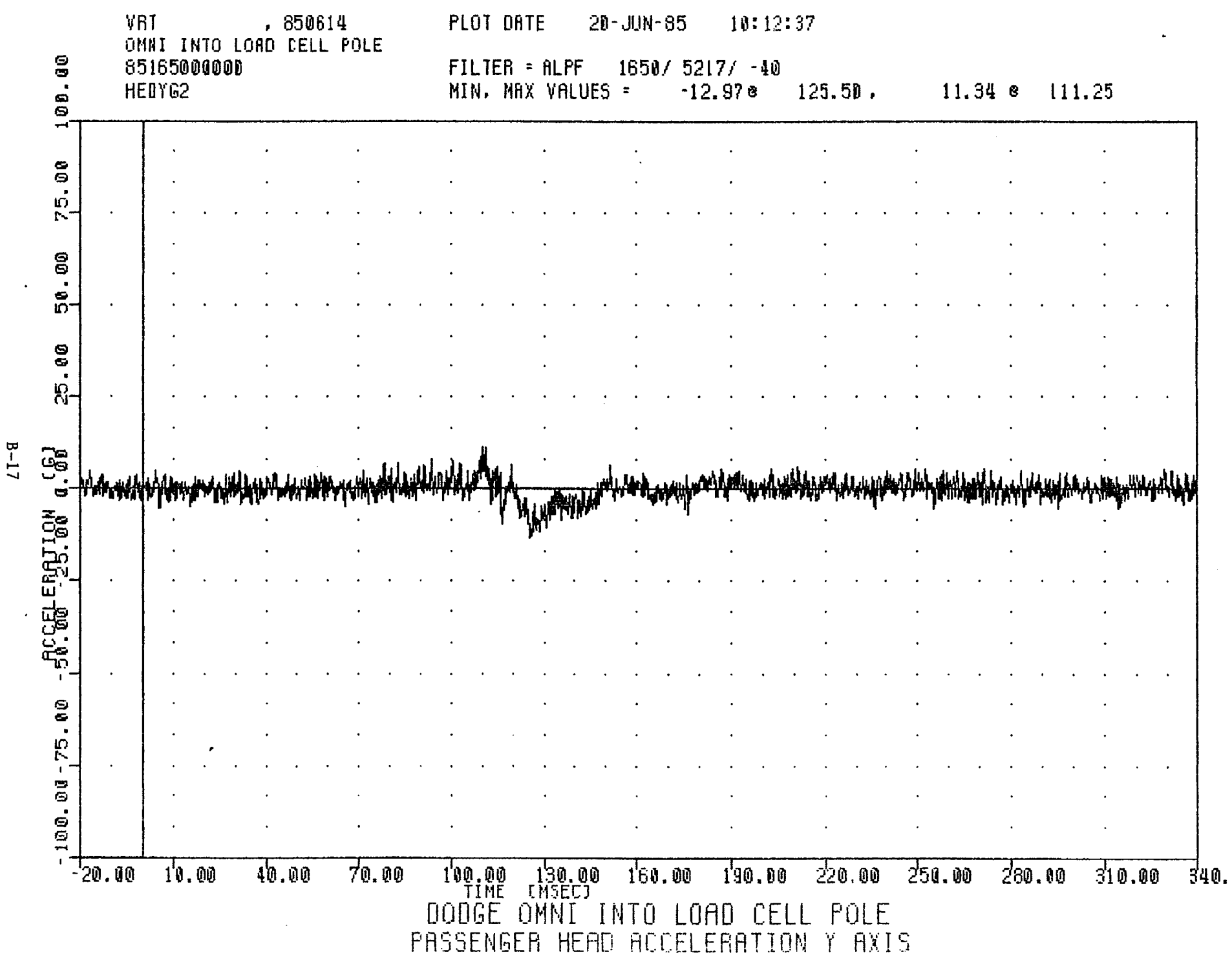

VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
851650000000
FILTER = BLPF 300/ 949/ -40
CSTRG1
MIN, MAX VALUES = 0.03 @ -8.00 , 45.74 @ 84.38
ACCELERATION [G]
-10.00 15.00 40.00 65.00 90.00 115.00 140.00 165.00 190.00
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [MSEC]
DODGE OMNI INTO LOAD CELL POLE
DRIVER CHEST RESULTANT


VRT , 850614
PLOT DATE 20-JUN-85 10:23:01
OMNI INTO LOAD CELL POLE
851650000D
FILTER = BLPF 300/ 949/ -40
CSTXD1
MIN, MAX VALUES = -0.01@ 46.88 , 0.71 @ 119.88
DISPLACEMENT (IN)
3.00
2.50
2.00
1.50
1.00
.50
0.00
-.50
-1.00
-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.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER CHEST DISPLACEMENT INCHES


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = 8LPF . 1000/ 3162/ -40
LFNF1
MIN, MAX VALUES = -936.86@ 72.63 , 87.90 @ 60.88
120.00
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
FORCE (LB) (X10)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER LEFT FEMUR FORCE LBS

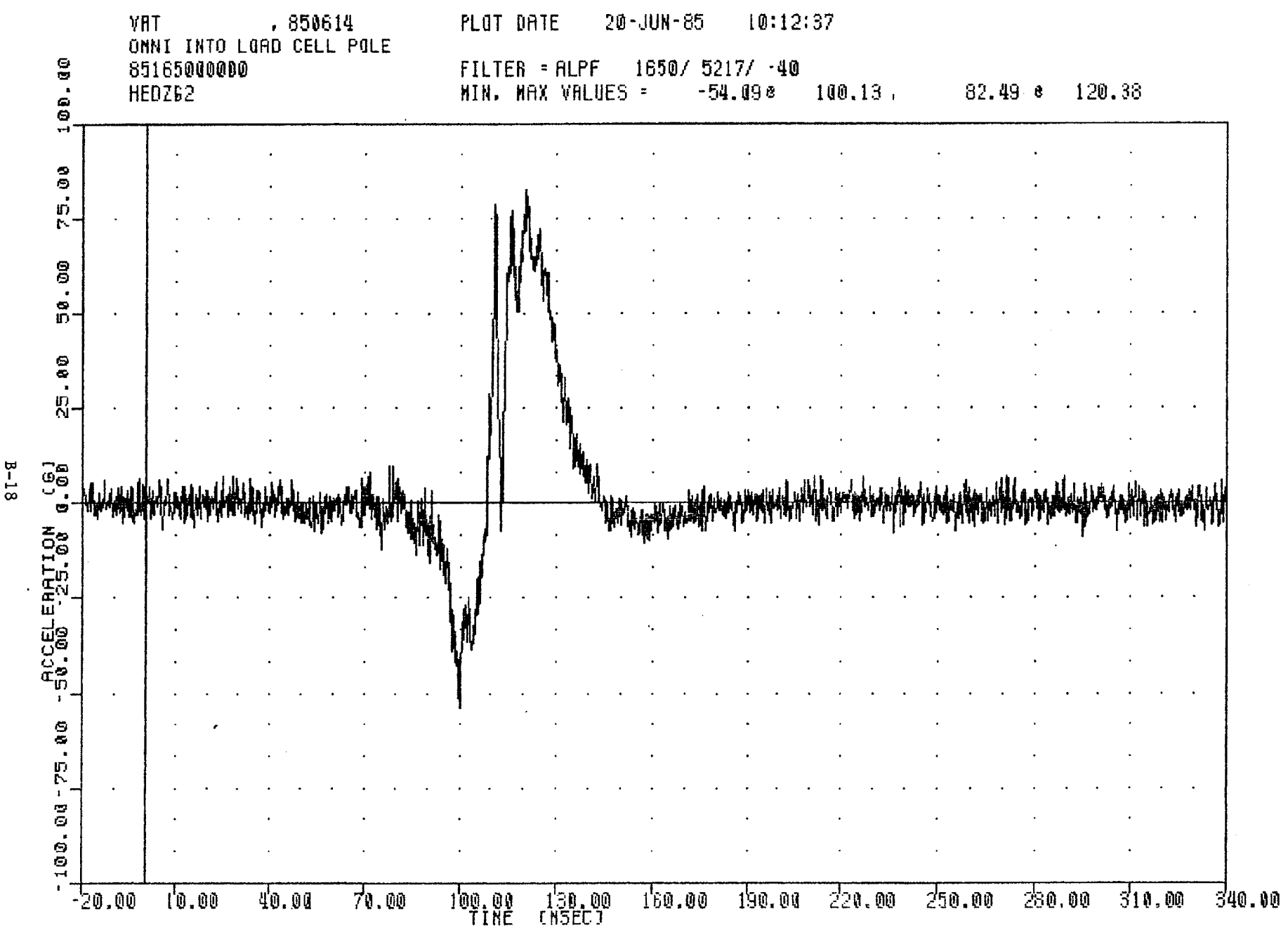

VAT , 850614
PLOT DATE 20-JUN-85 10:12:37
ONNI INTO LOAD CELL POLE
851650000D0
FILTER = BLPF 1000/ 3162/ -40
RFMF1
MIN. MAX VALUES = -767.99 @ 75.25 , 103.25 @ 63.75
120.00
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
FORCE (LB) (X10)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DRIVER RIGHT FEMUR FORCE LBS


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = ALPF 1650/ 5217/ -40
HEDXG2
MIN, MAX VALUES = -87.74 @ 111.88 , 7.60 @ 175.75
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD ACCELERATION X AXIS

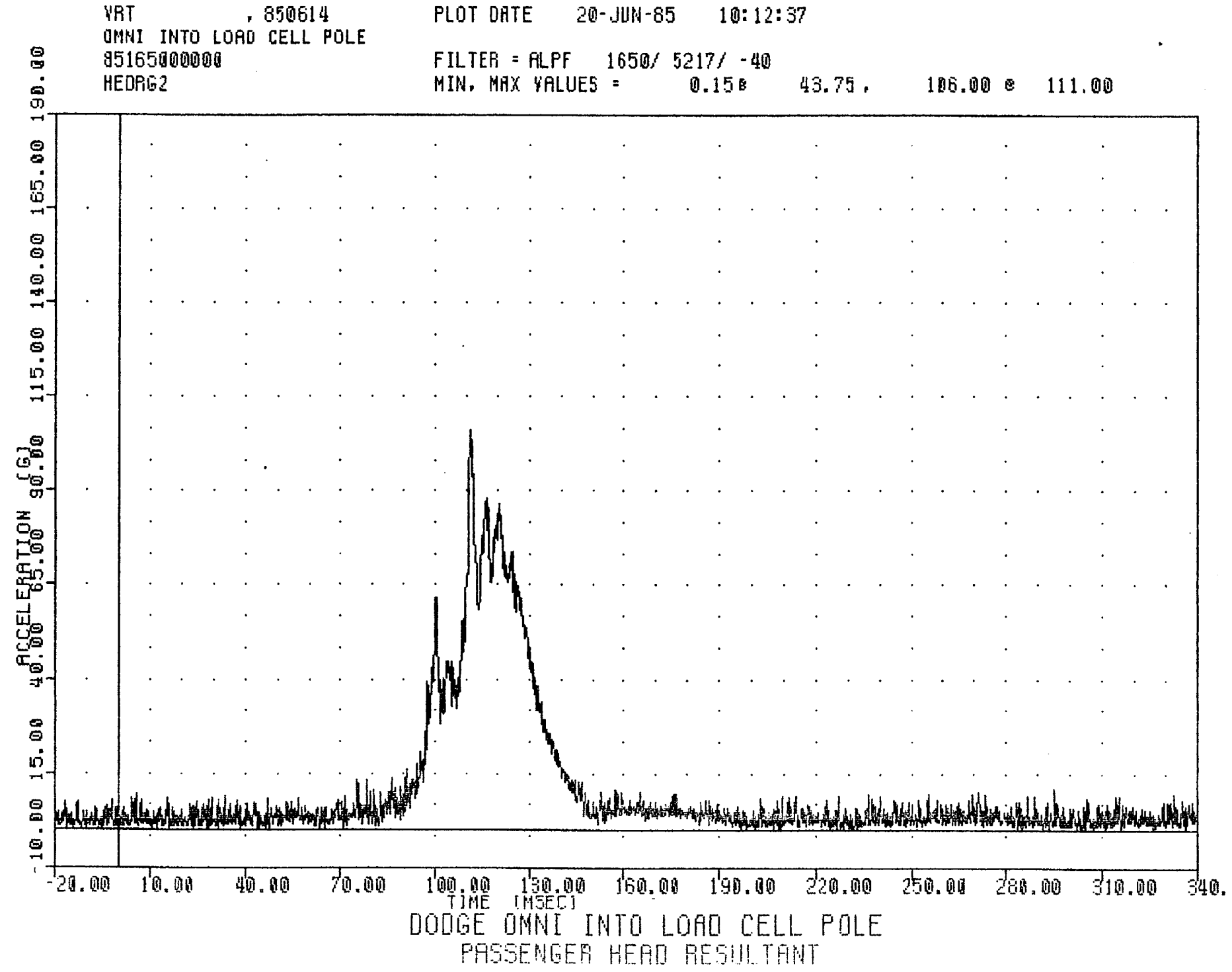


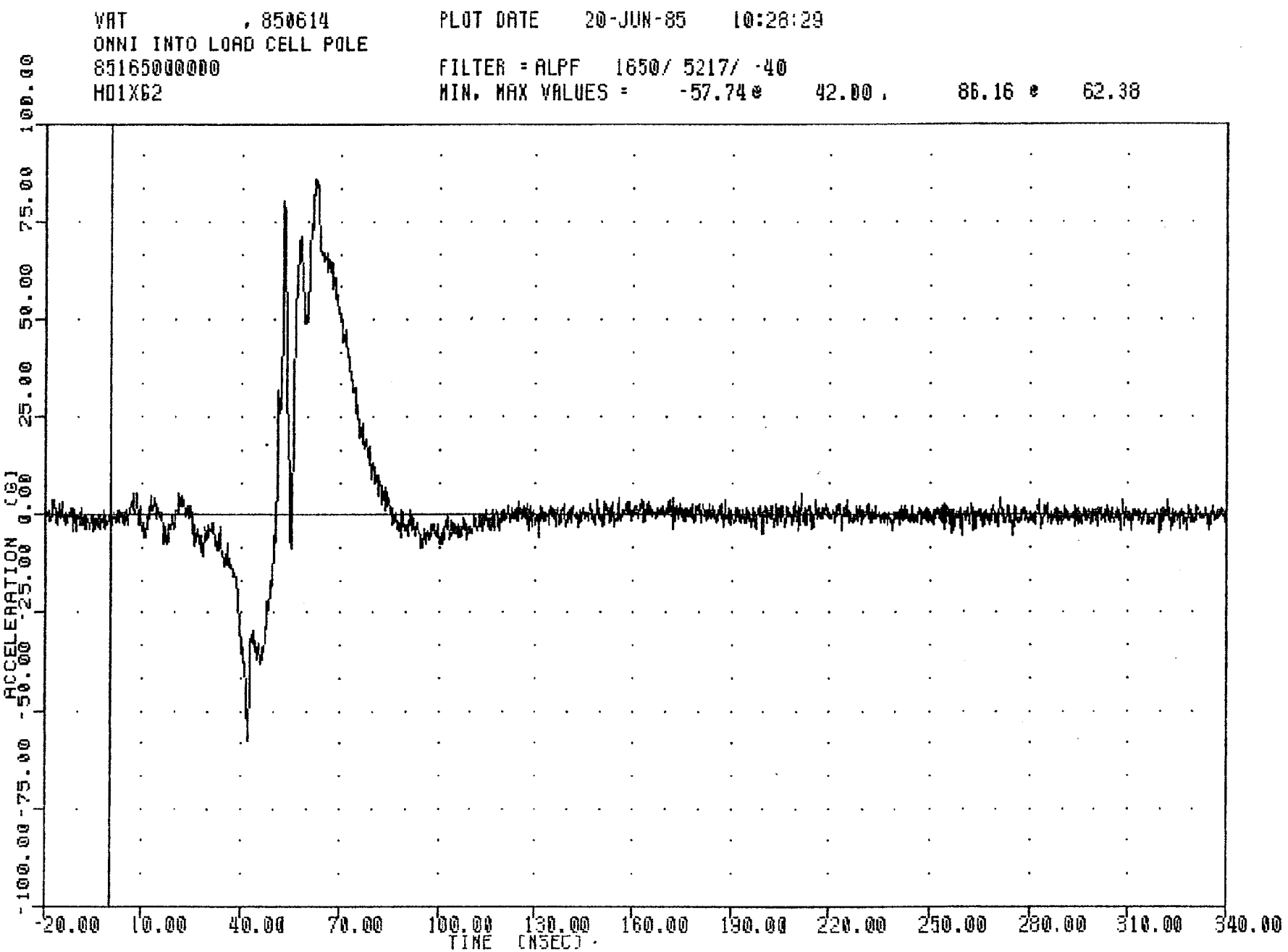
DODGE OMNI INTO LOAD CELL POLE

PASSENGER HEAD ACCELERATION Y AXIS



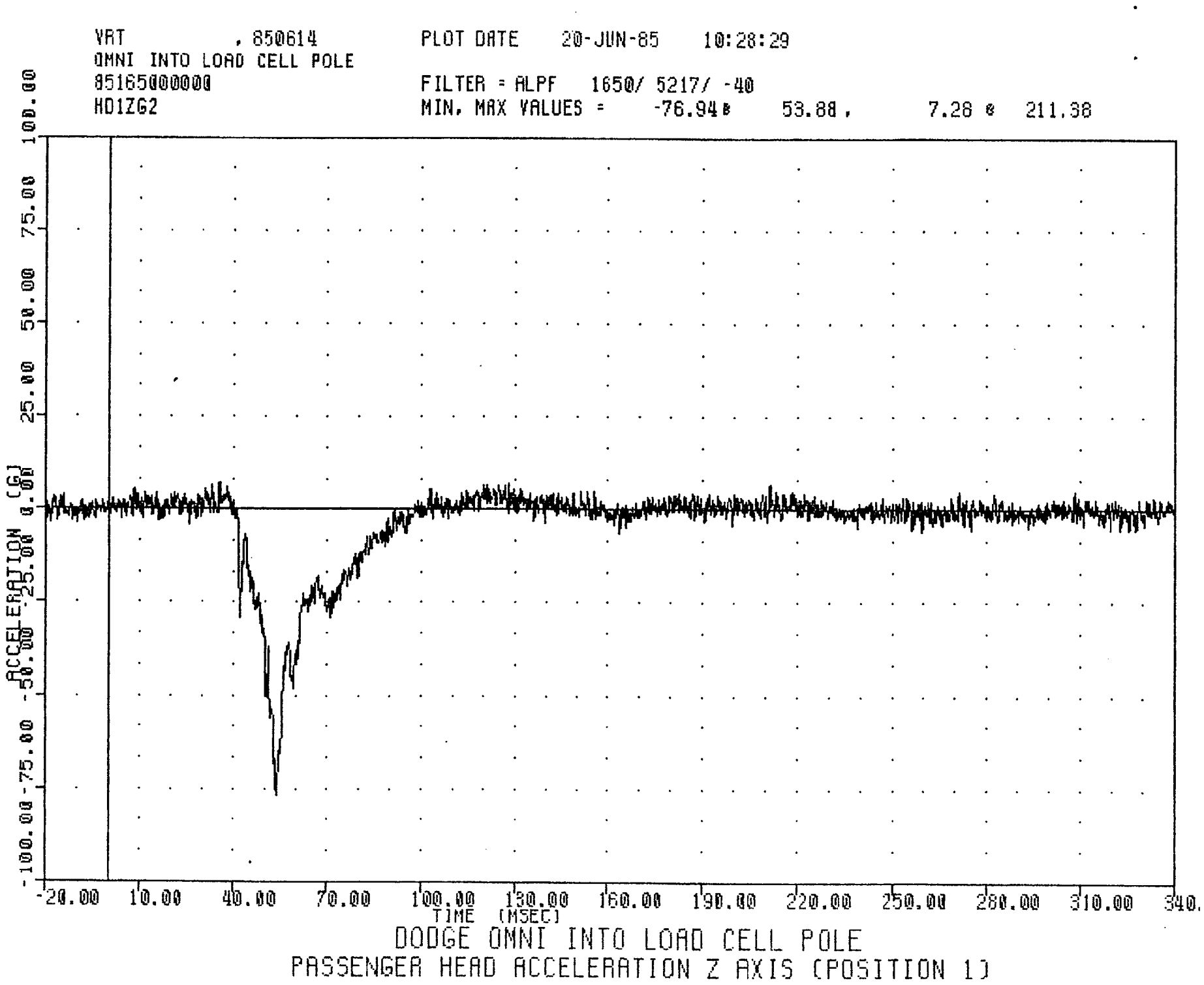
DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD ACCELERATION Z AXIS


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
851650000000
FILTER = ALPF 1650/ 5217/ -40
HEDRG2
MIN, MAX VALUES = 0.15 @ 43.75 , 106.00 @ 111.00
ACCELERATION (G)
-10.00
15.00
40.00
65.00
90.00
115.00
140.00
165.00
190.00
-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.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD RESULTANT

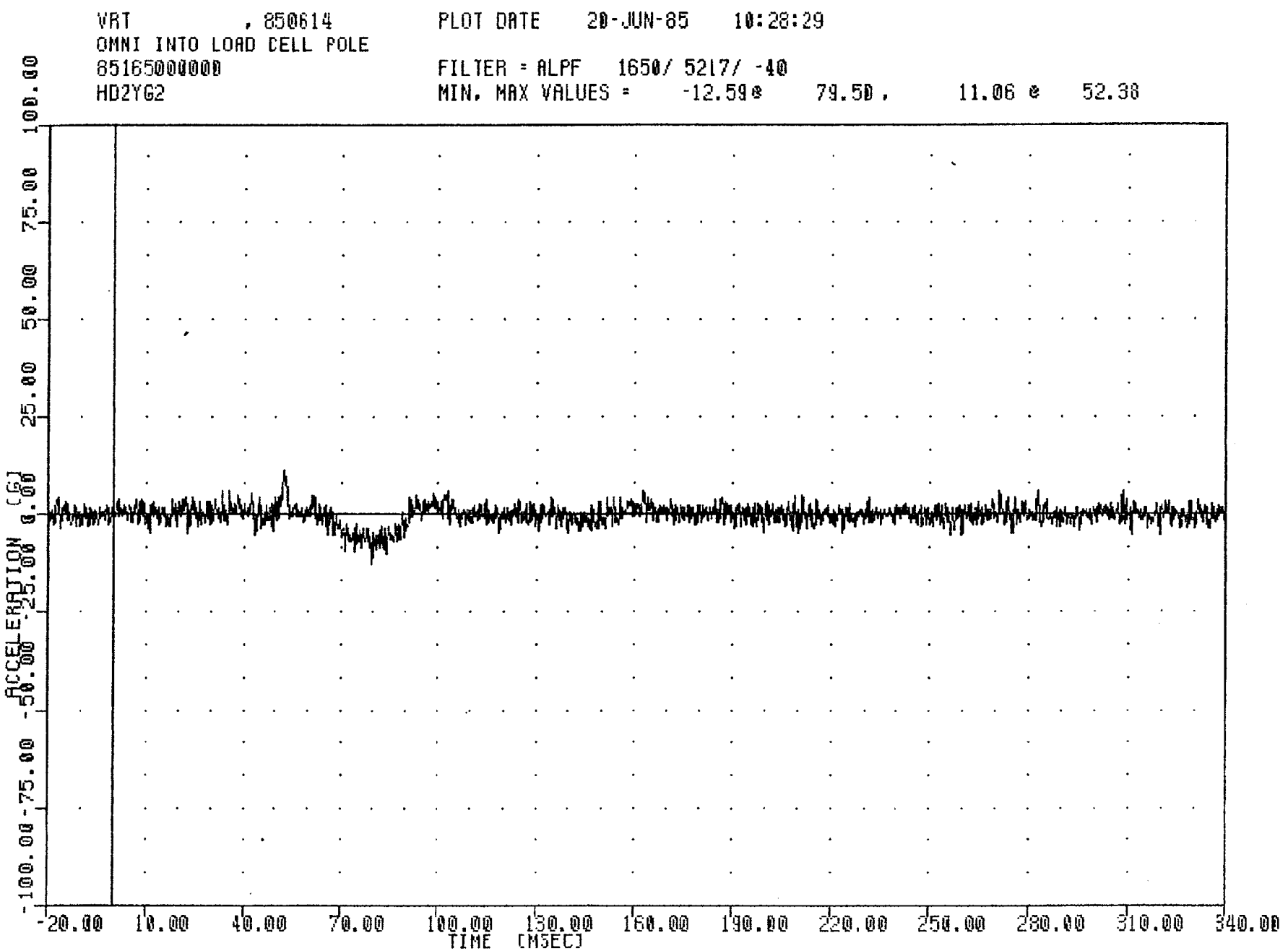


DODGE OMNI INTO LOAD CELL POLE

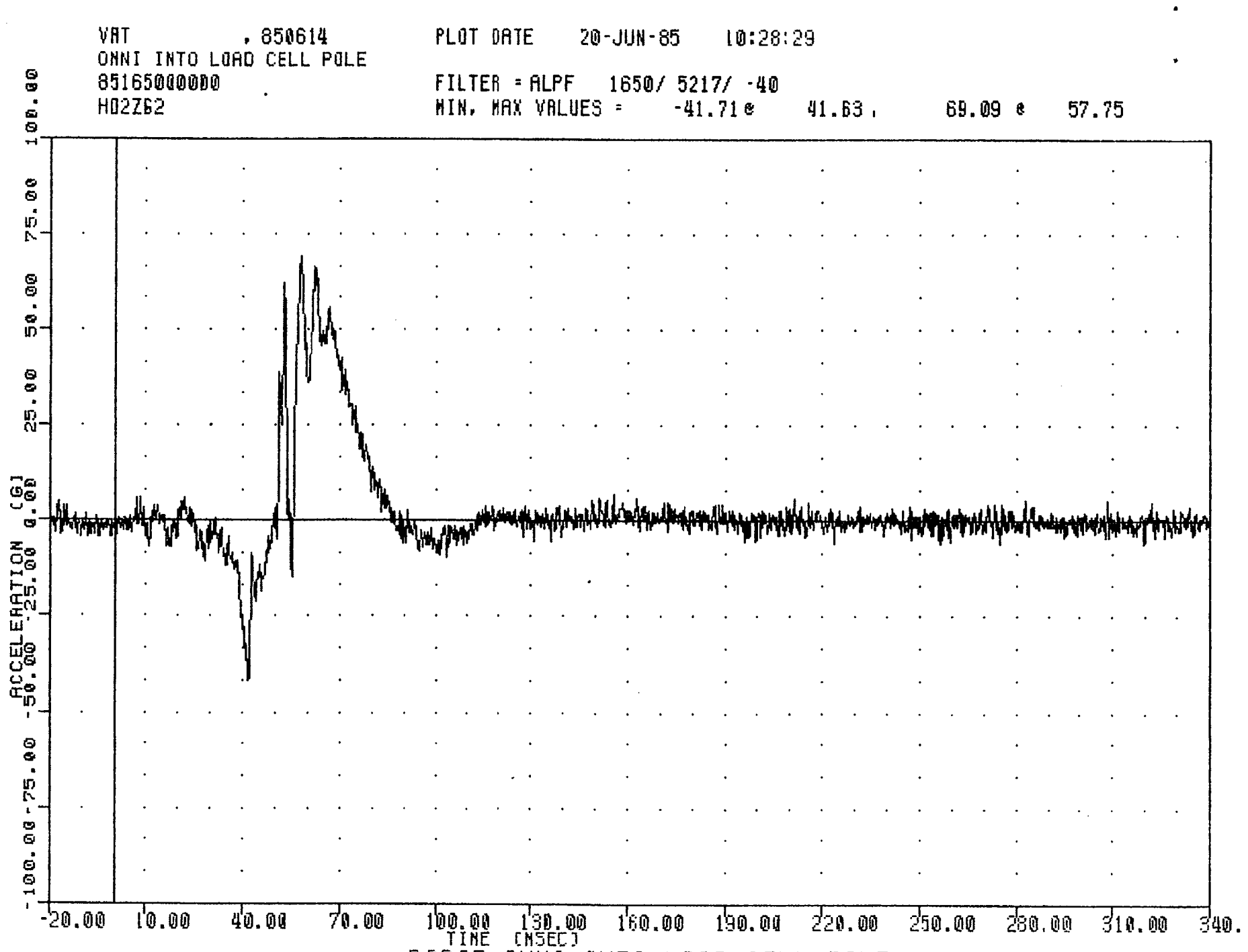
PASSENGER HEAD ACCELERATION X AXIS (POSITION 1)



DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD ACCELERATION Z AXIS (POSITION 1)

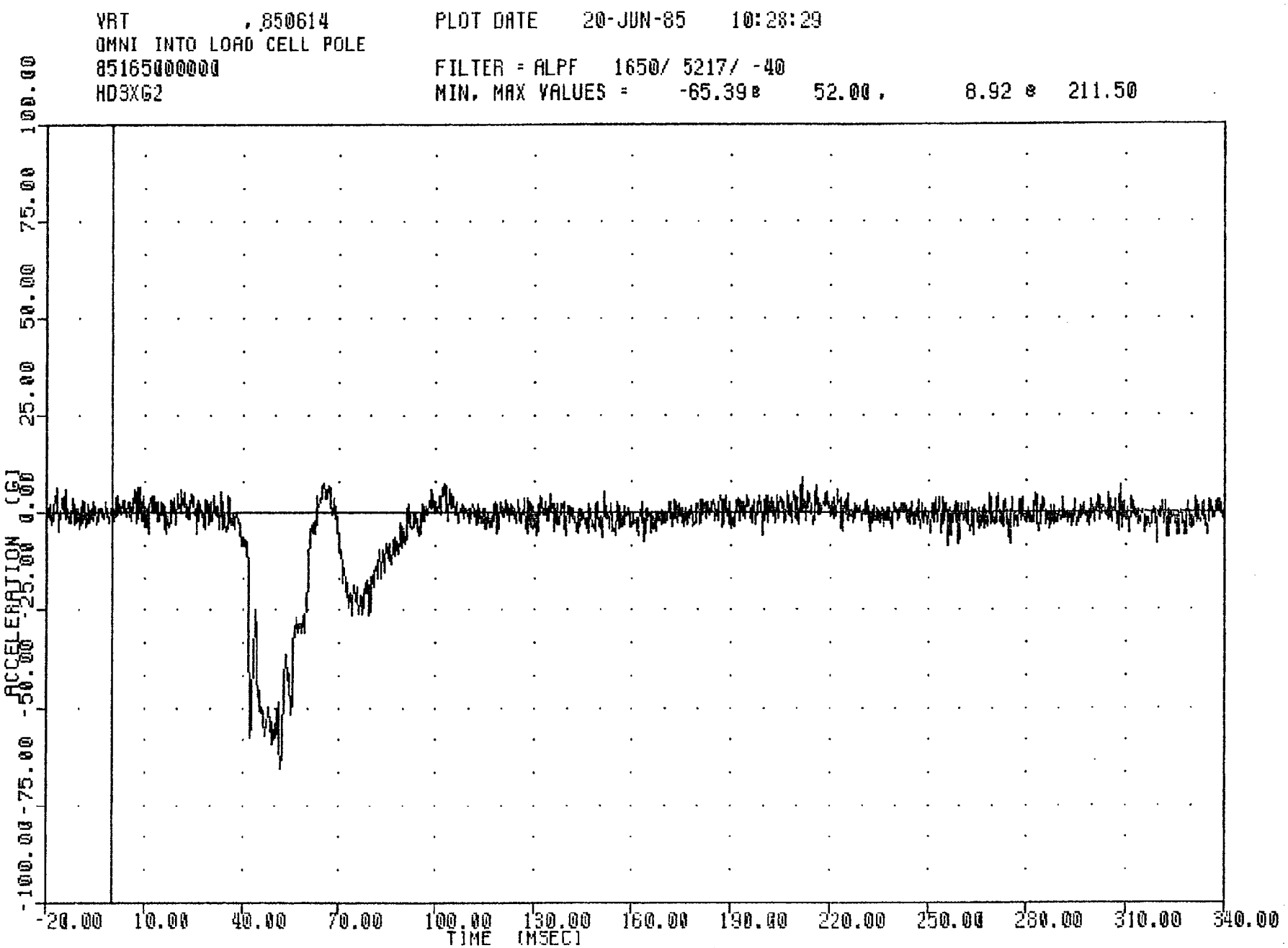


DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD ACCELERATION Y AXIS (POSITION 2)



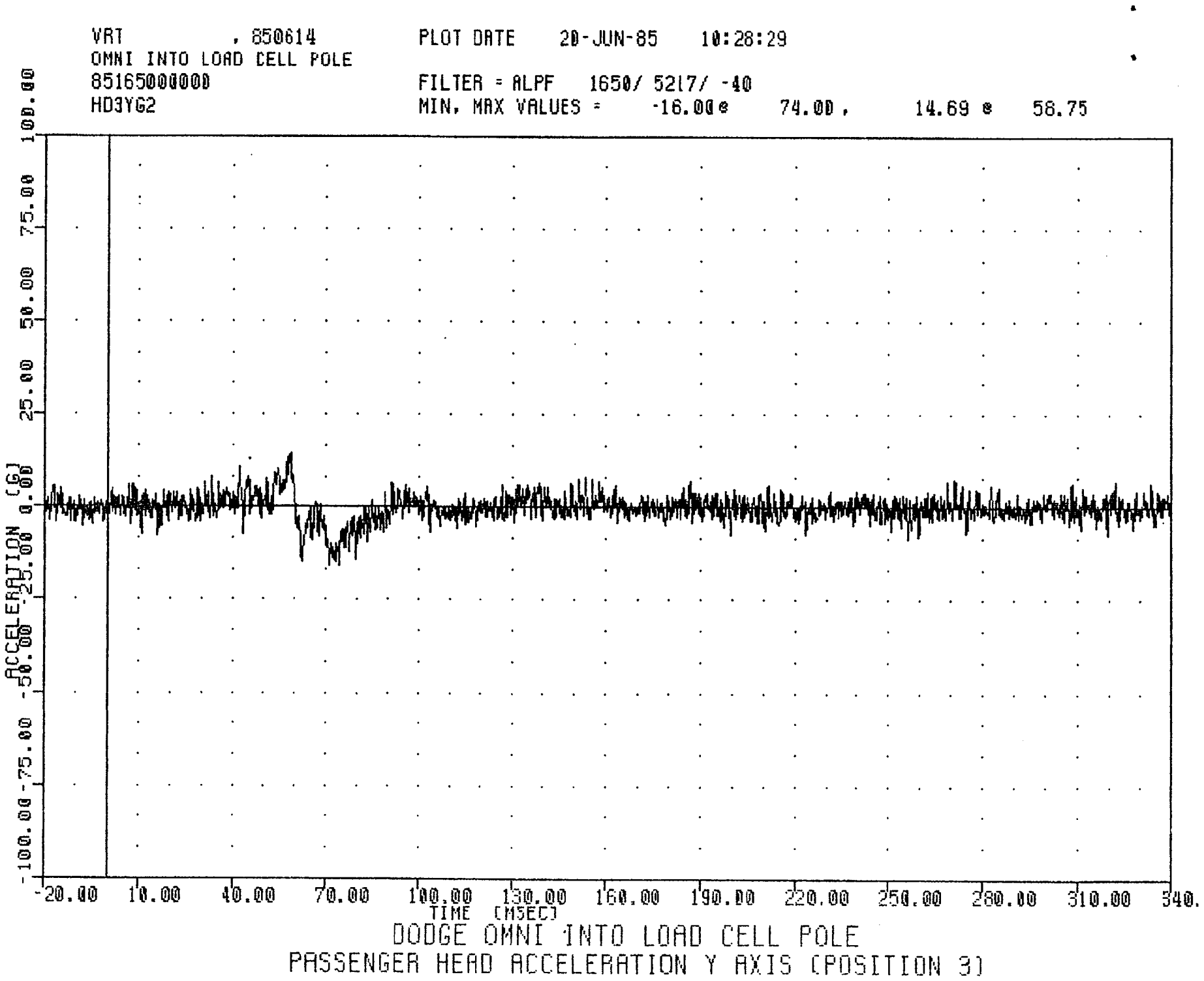
DODGE OMNI INTO LOAD CELL POLE

PASSENGER HEAD ACCELERATION Z AXIS (POSITION 2)

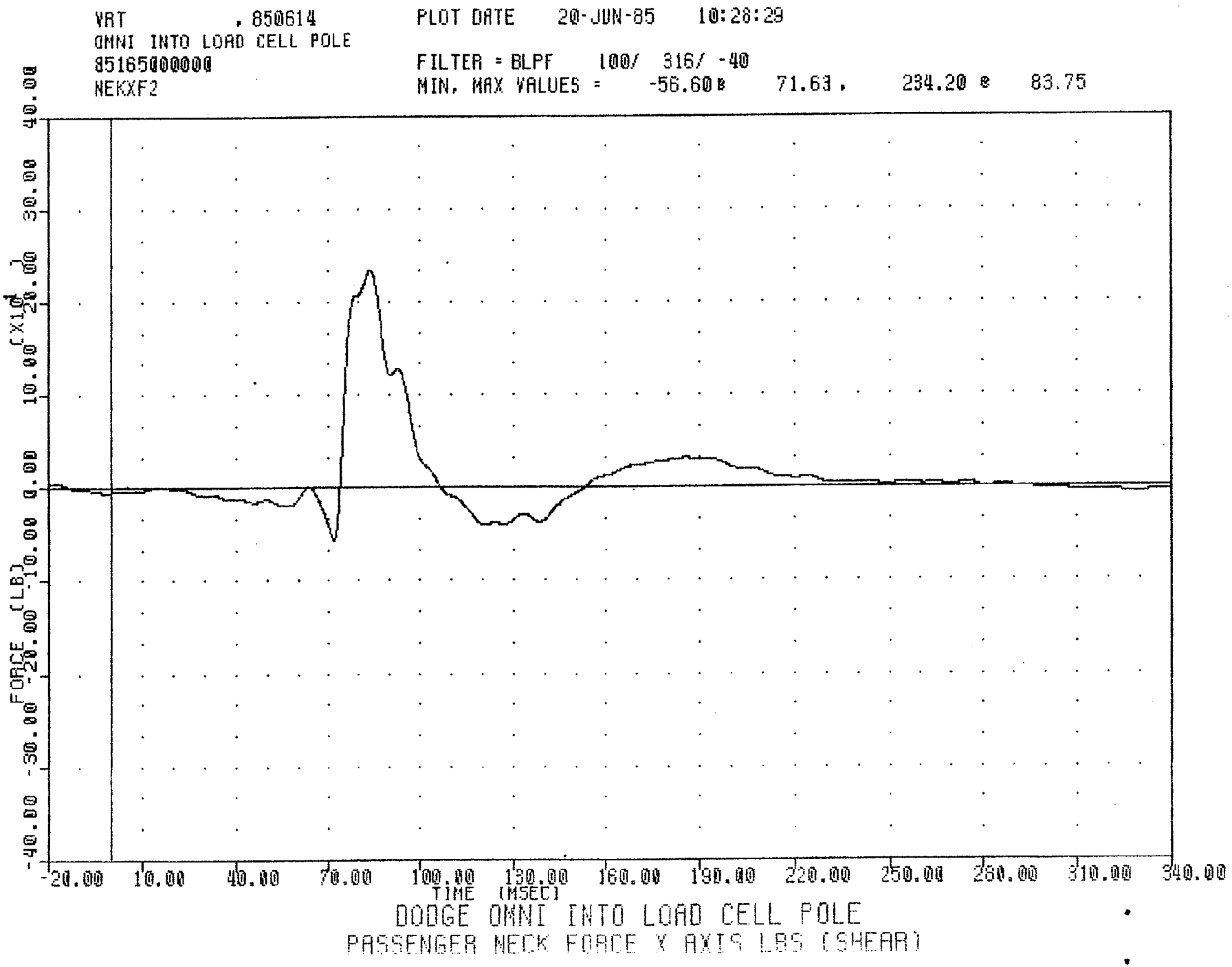


DODGE OMNI INTO LOAD CELL POLE

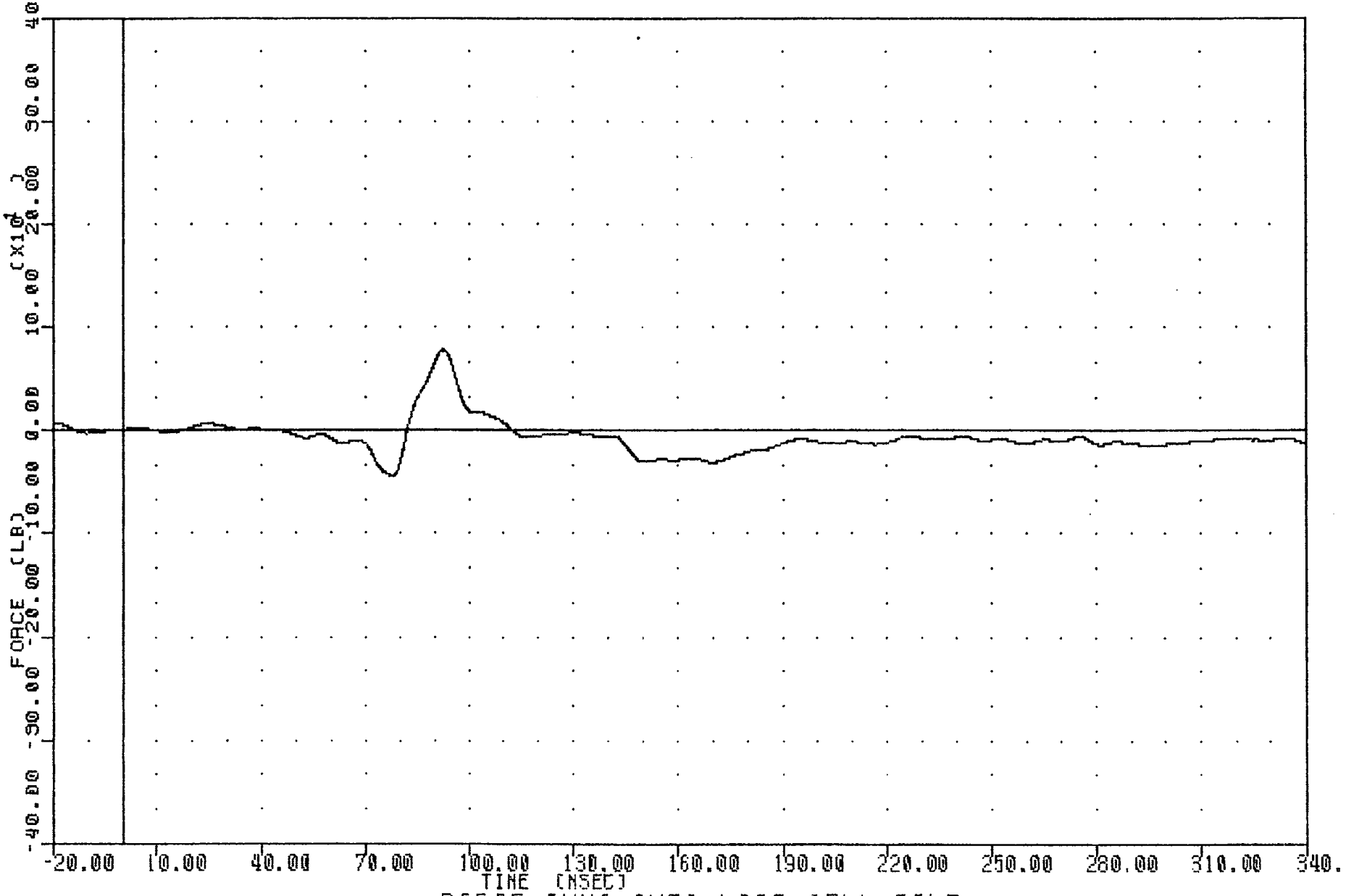
PASSENGER HEAD ACCELERATION X AXIS (POSITION 3)



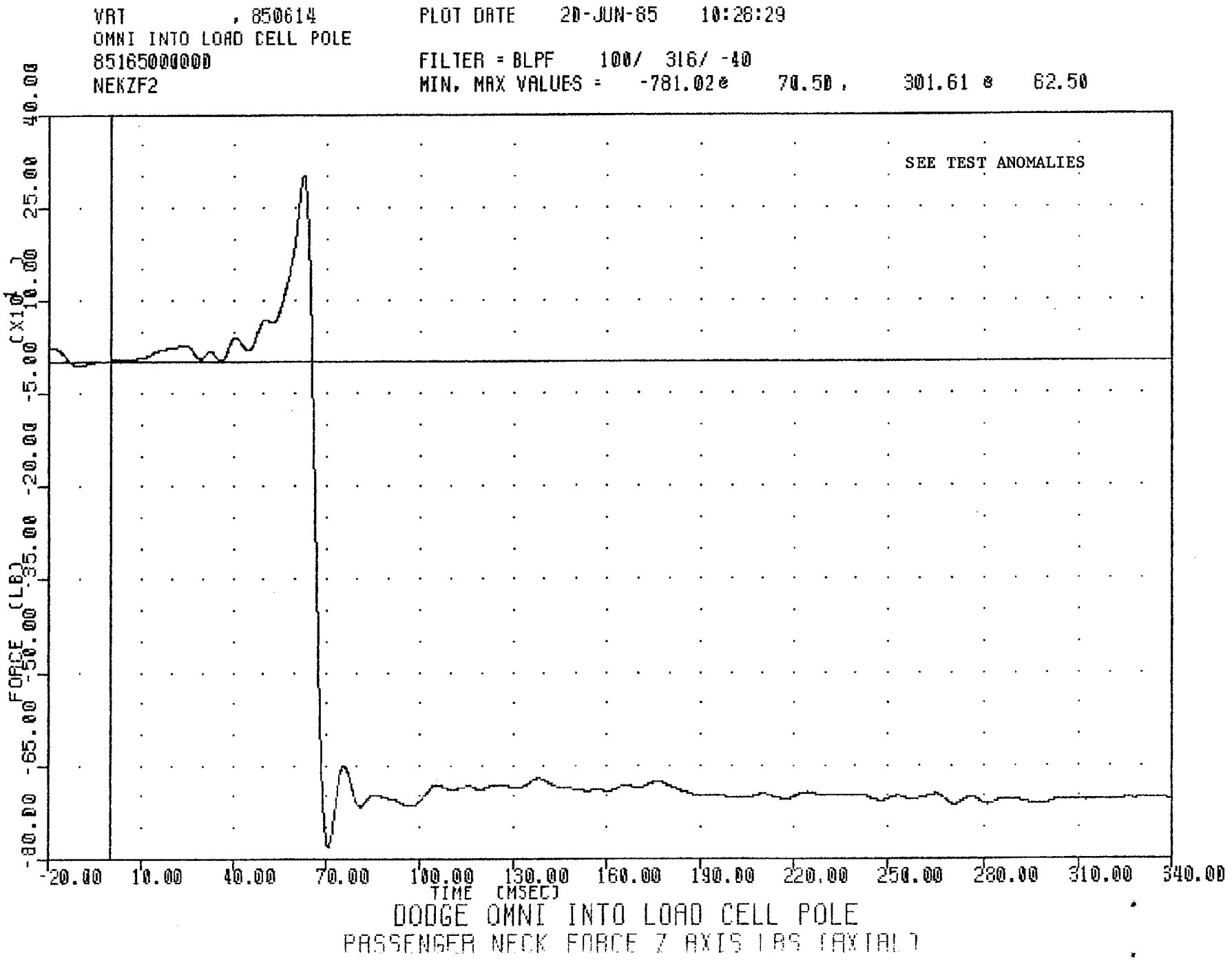
DODGE OMNI INTO LOAD CELL POLE
PASSENGER HEAD ACCELERATION Y AXIS (POSITION 3)

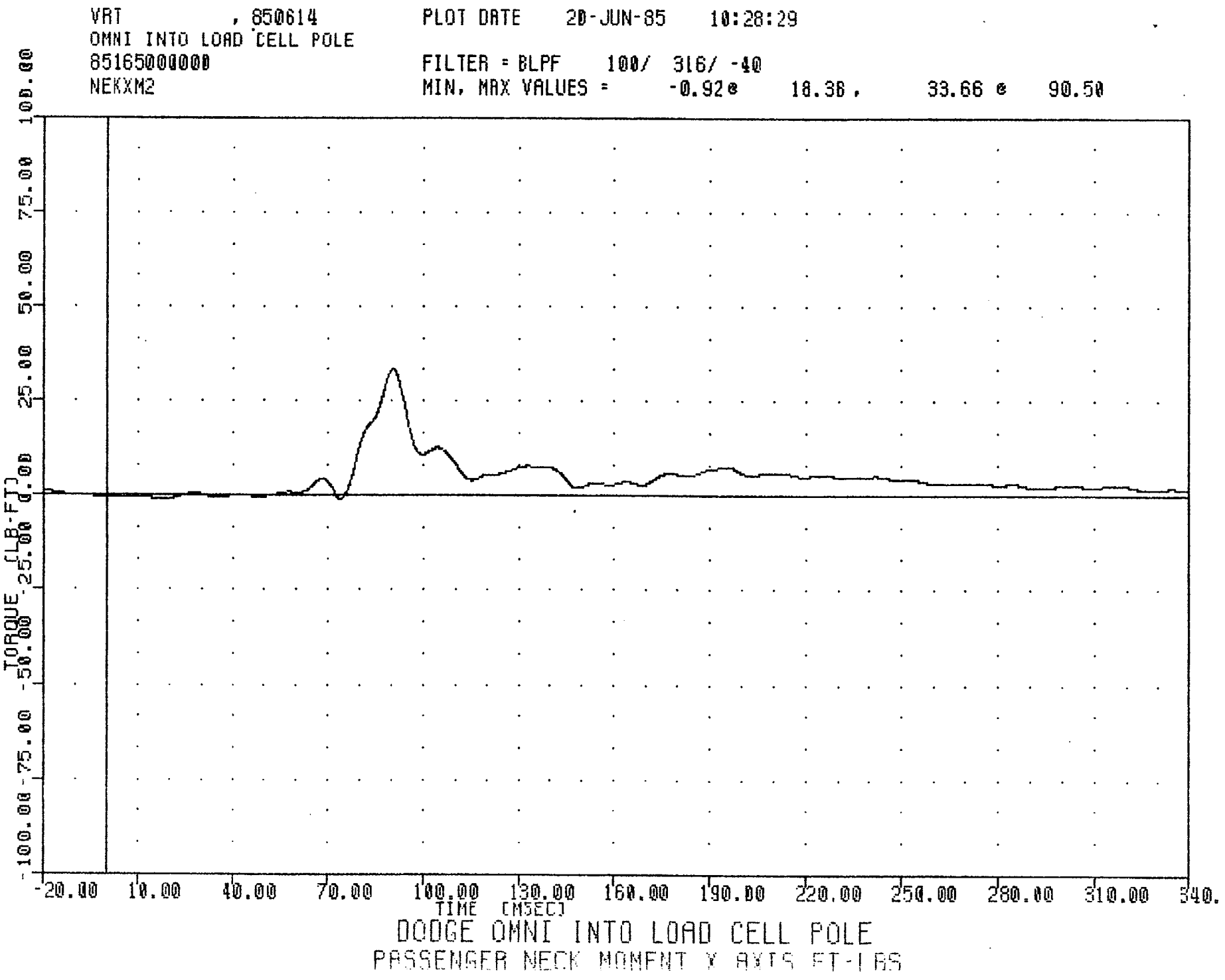

VRT , 850614
OMNI INTO LOAD CELL POLE
851650000000
NEKXF2
PLOT DATE 20-JUN-85 10:28:29
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -56.60 @ 71.63 , 234.20 @ 83.75
FORCE (LB) (X10^1)
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK FORCE X AXIS LBS (SHEAR)

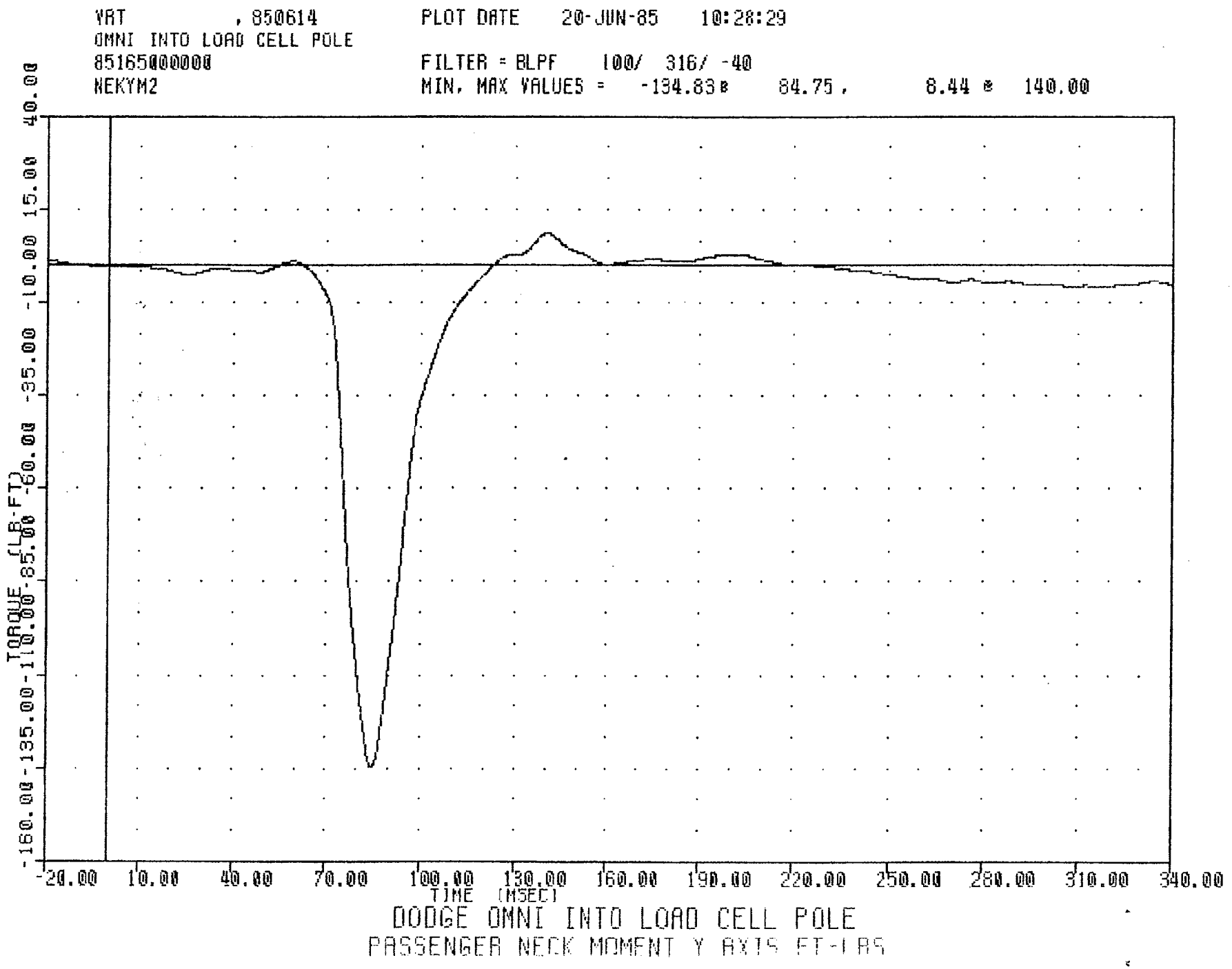
VAT , 850614 PLOT DATE 20-JUN-85 10:28:29
ONNI INTO LOAD CELL POLE
851650000D0 FILTER = BLPF 100/ 316/ -40
NEKYF2 MIN, MAX VALUES = -44.65 @ 77.88 , 78.19 @ 92.63

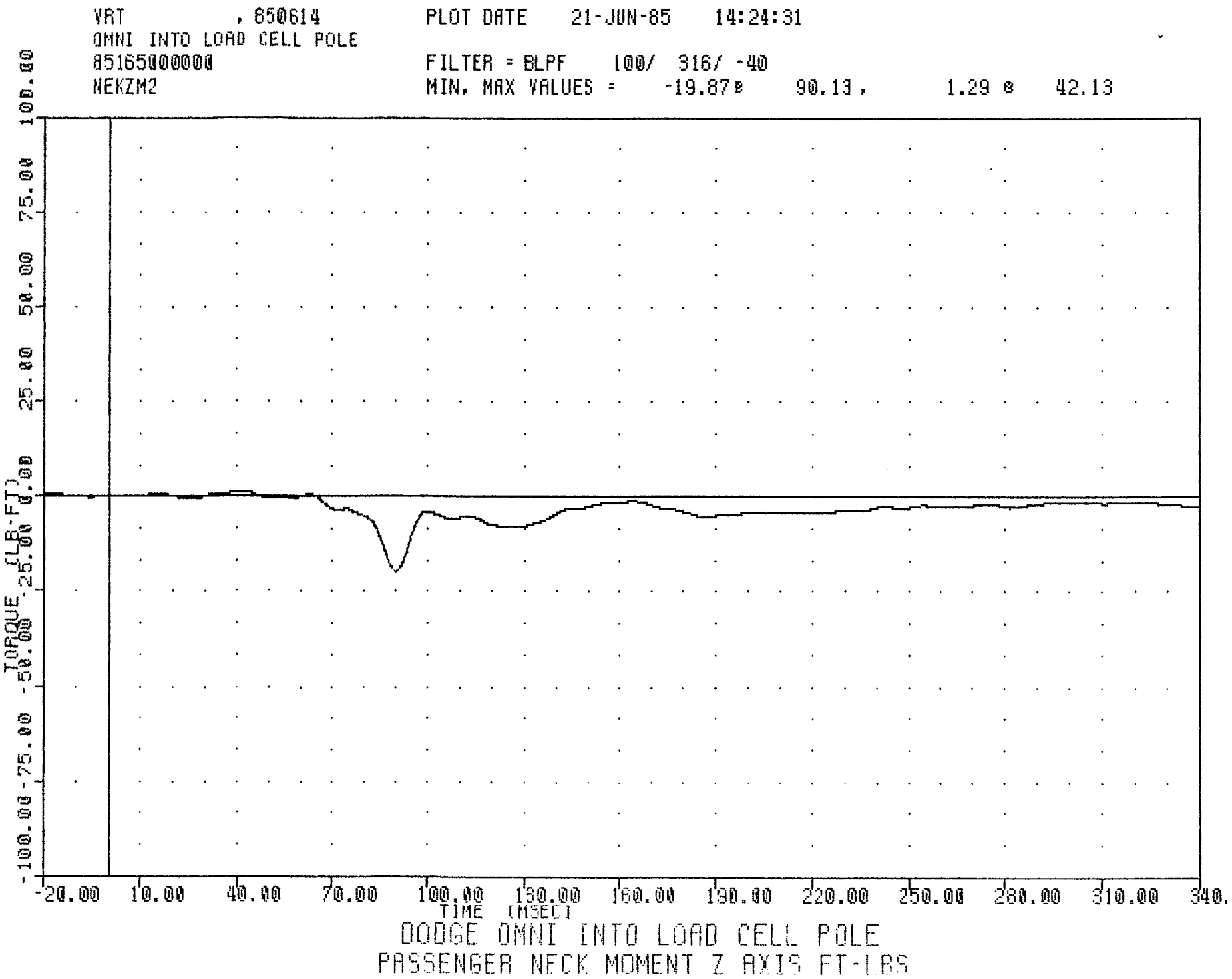


DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK FORCE Y AXIS LBS

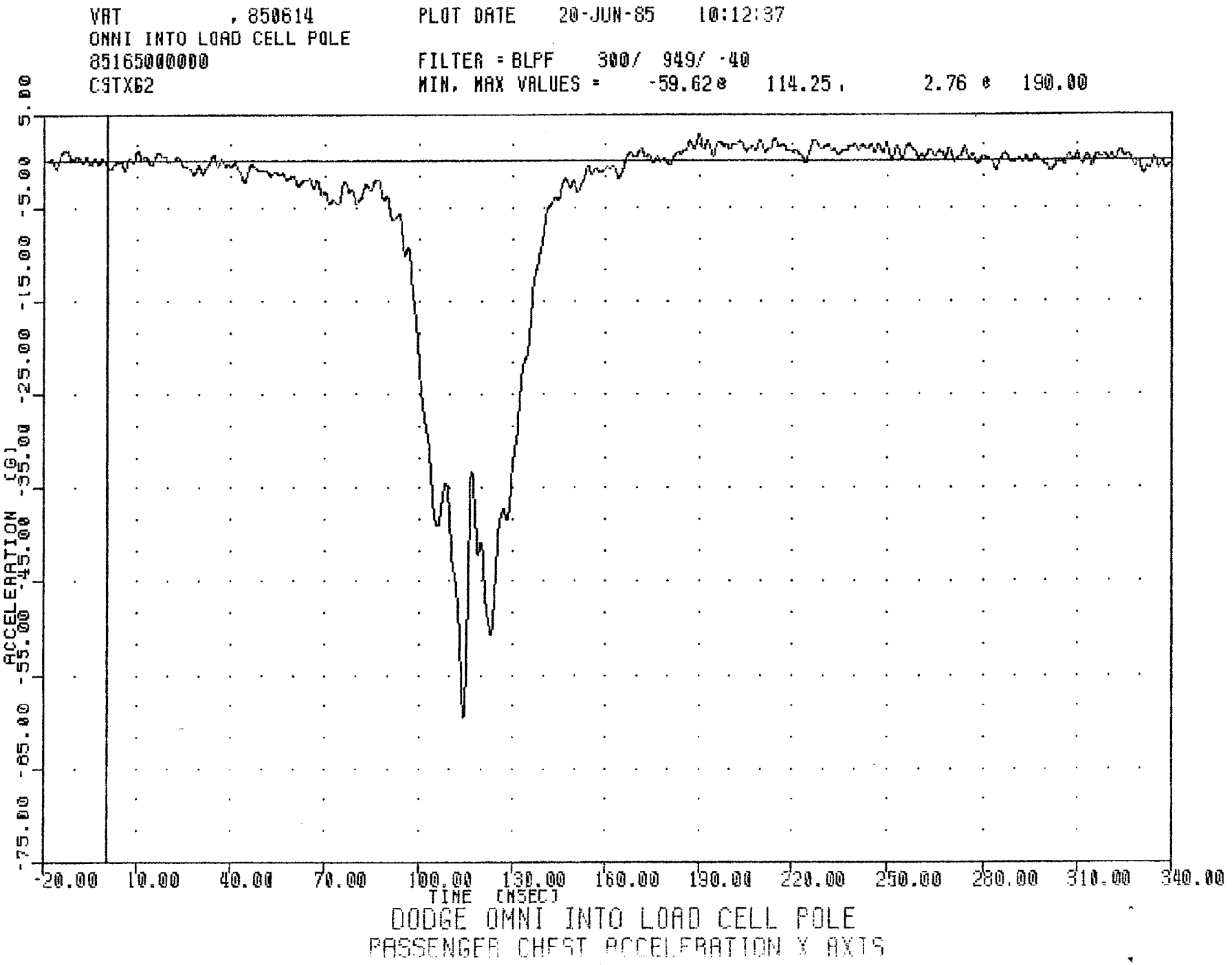

VRT , 850614
PLOT DATE 20-JUN-85 10:28:29
OMNI INTO LOAD CELL POLE
8516500000D
FILTER = BLPF 100/ 316/ -40
NEKZF2
MIN, MAX VALUES = -781.02@ 70.50 , 301.61 @ 62.50
SEE TEST ANOMALIES
FORCE (LB) (X10^1)
40.00
25.00
10.00
-5.00
-20.00
-35.00
-50.00
-65.00
-80.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK FORCE Z AXIS (BS (AXIAL)

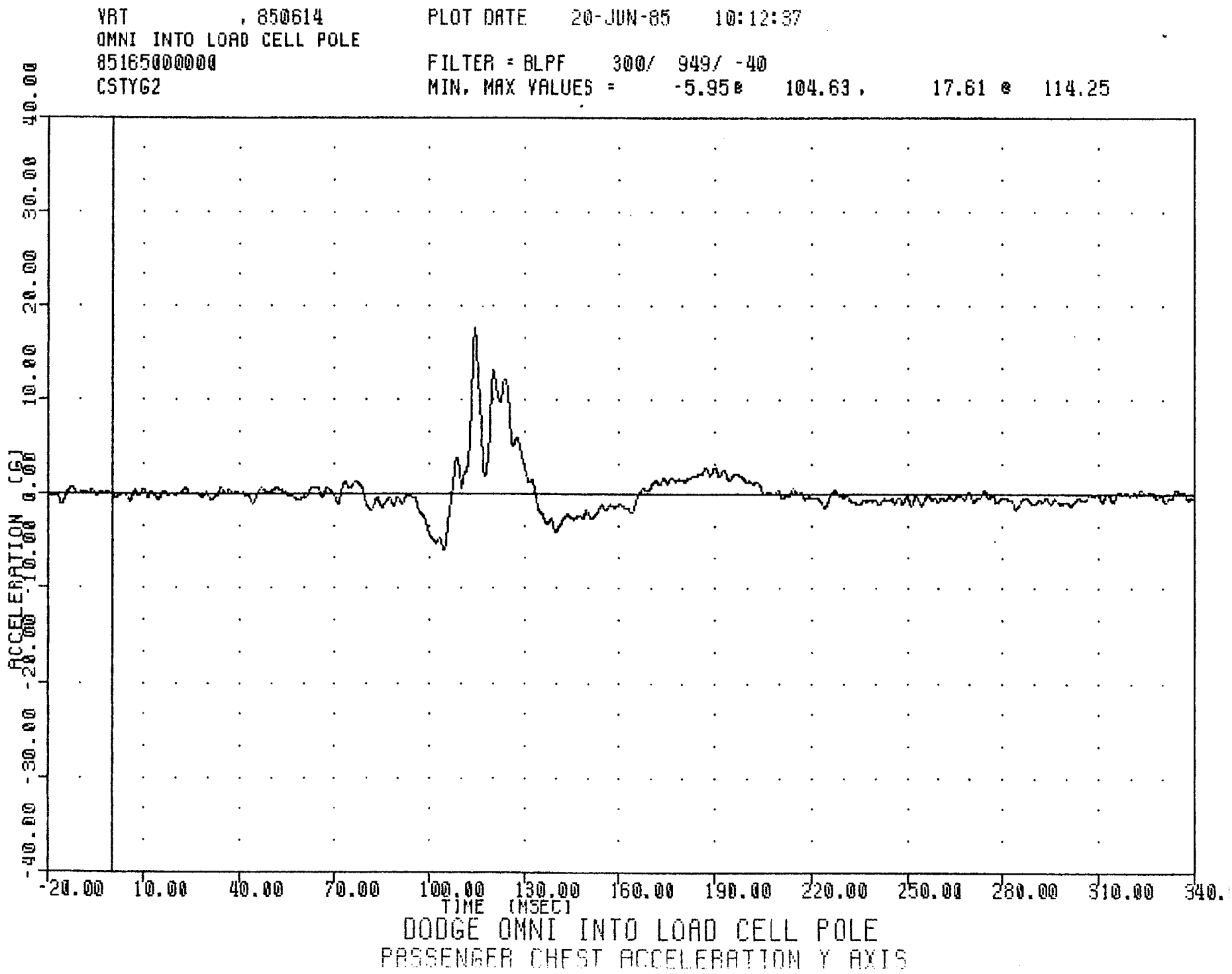

VRT , 850614
PLOT DATE 20-JUN-85 10:28:29
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 100/ 316/ -40
NEKXM2
MIN, MAX VALUES = -0.92@ 18.38, 33.66 @ 90.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
TORQUE [LB-FT]
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.
TIME [MSEC]
DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK MOMENT Y AXIS FT-LBS


YRT , 850614
PLOT DATE 20-JUN-85 10:28:29
OMNI INTO LOAD CELL POLE
851650000000
FILTER = BLPF 100/ 316/ -40
NEKYM2
MIN, MAX VALUES = -134.83 @ 84.75 , 8.44 @ 140.00
40.00
15.00
-10.00
-35.00
-60.00
-85.00
-110.00
-135.00
-160.00
TORQUE (LB-FT)
-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)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK MOMENT Y AXIS FT-LBS



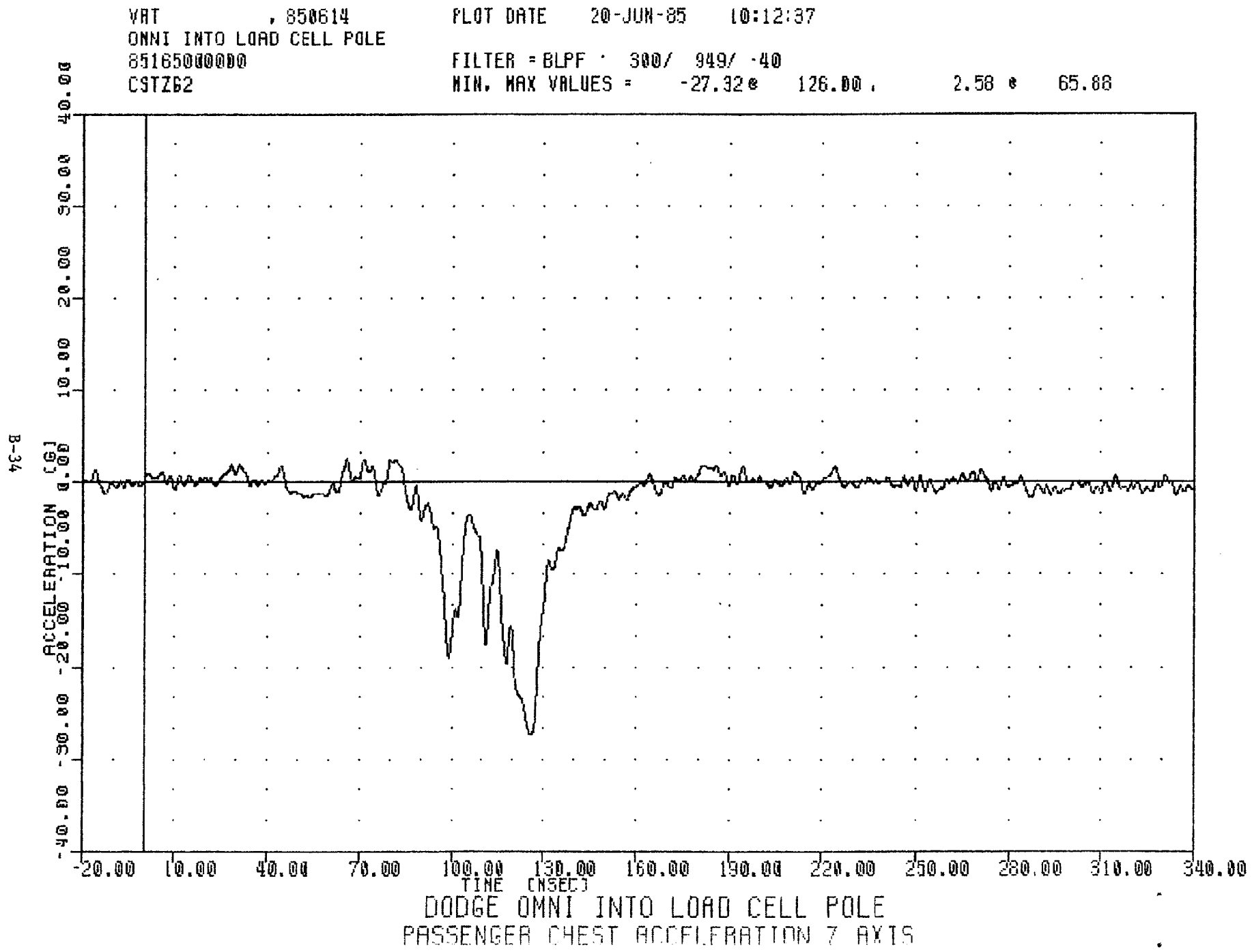
DODGE OMNI INTO LOAD CELL POLE
PASSENGER NECK MOMENT Z AXIS FT-LBS

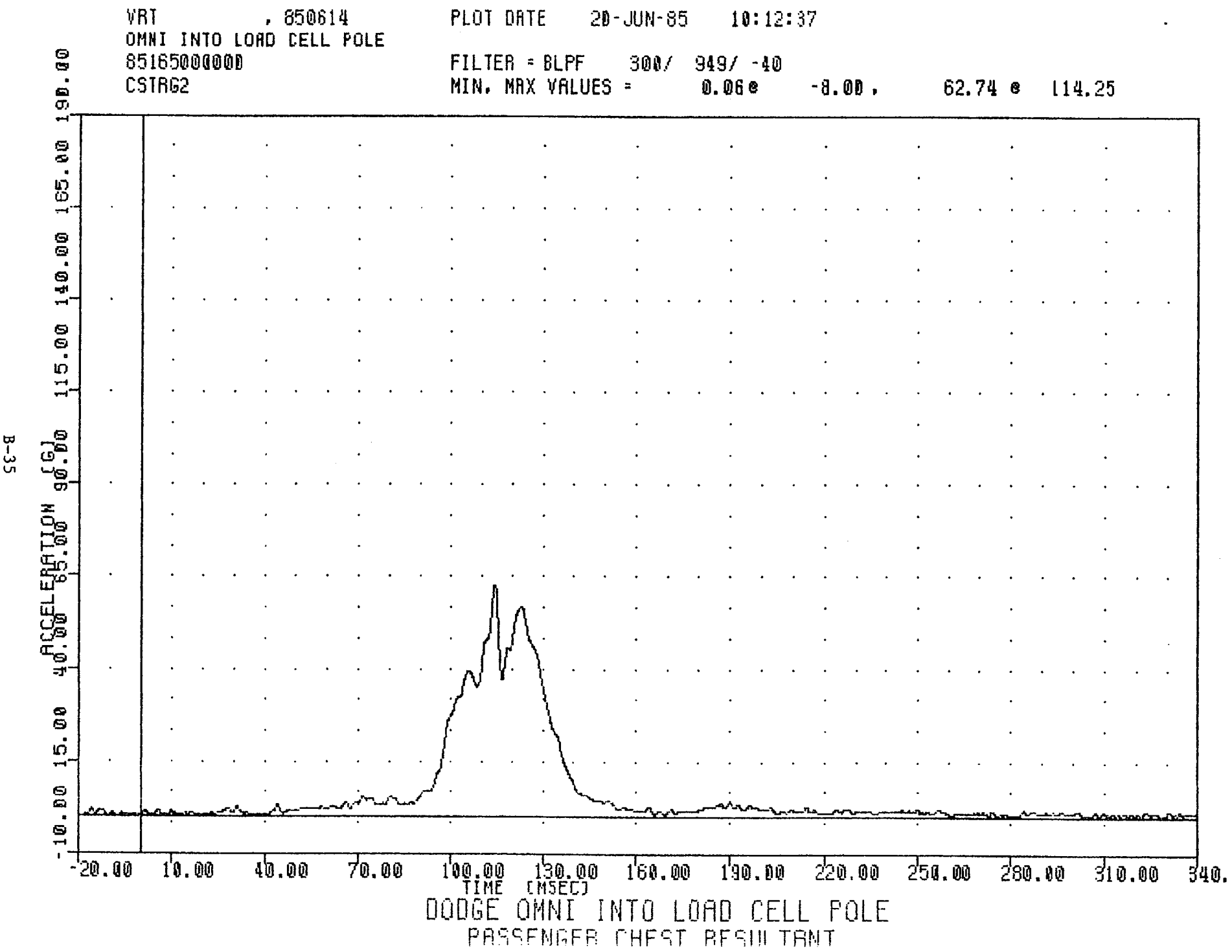

VAT , 850614
PLOT DATE 20-JUN-85 10:12:37
ONNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 300/ 949/ -40
CSTXG2
MIN, MAX VALUES = -59.62 @ 114.25 , 2.76 @ 190.00
ACCELERATION (G)
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
-65.00
-75.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER CHEST ACCELERATION X AXIS

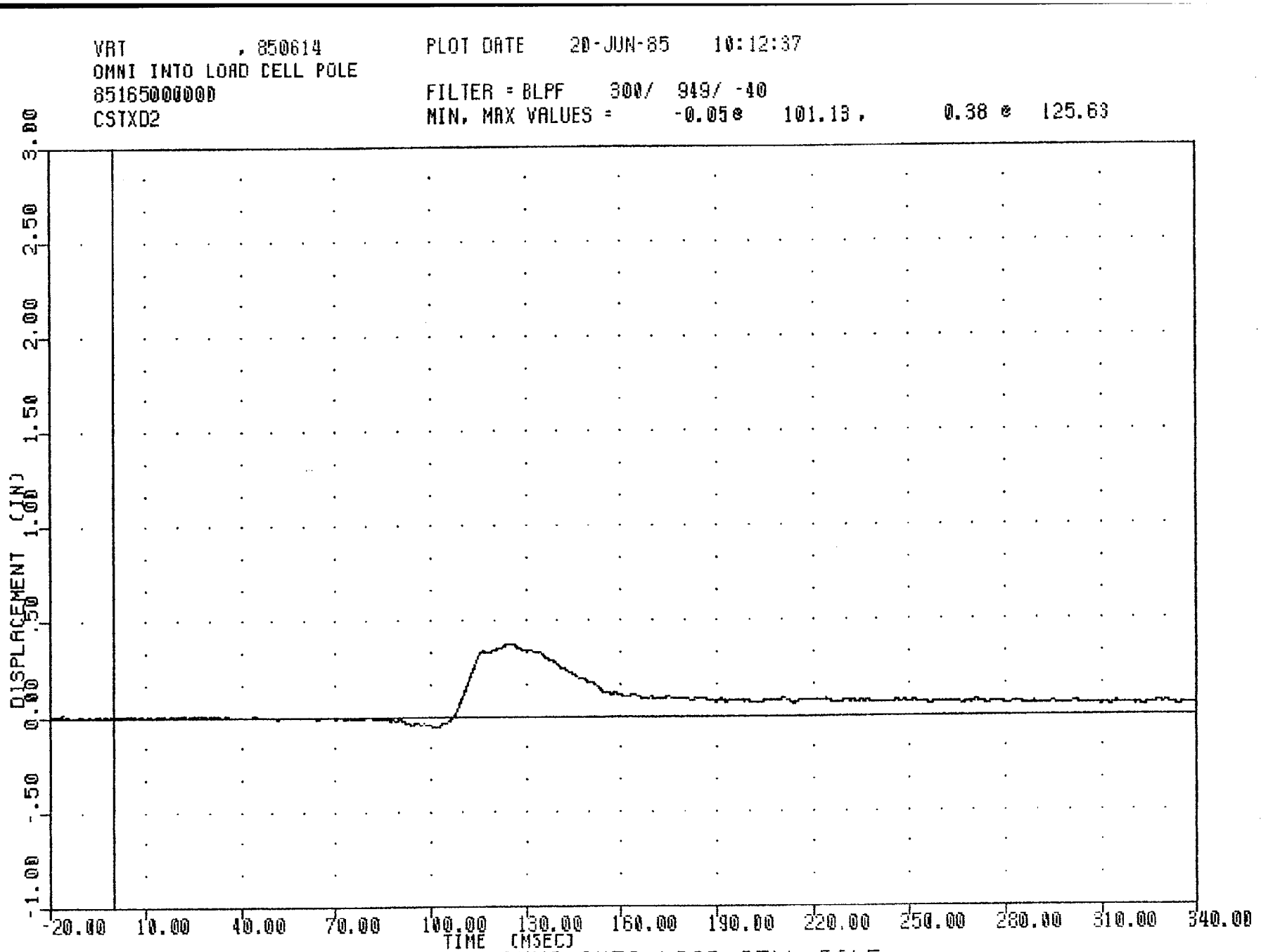


DODGE OMNI INTO LOAD CELL POLE

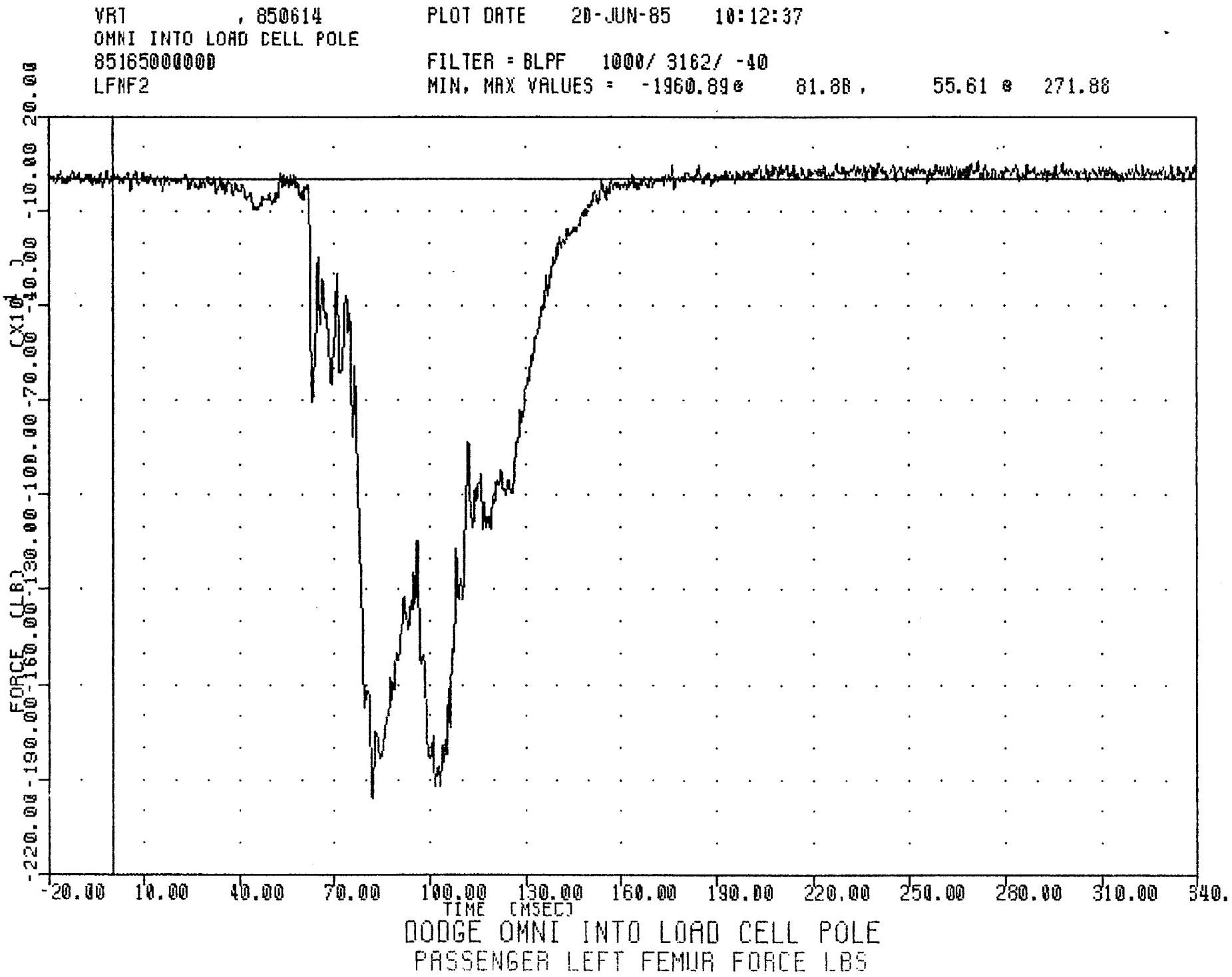
PASSENGER CHEST ACCELERATION Y AXIS

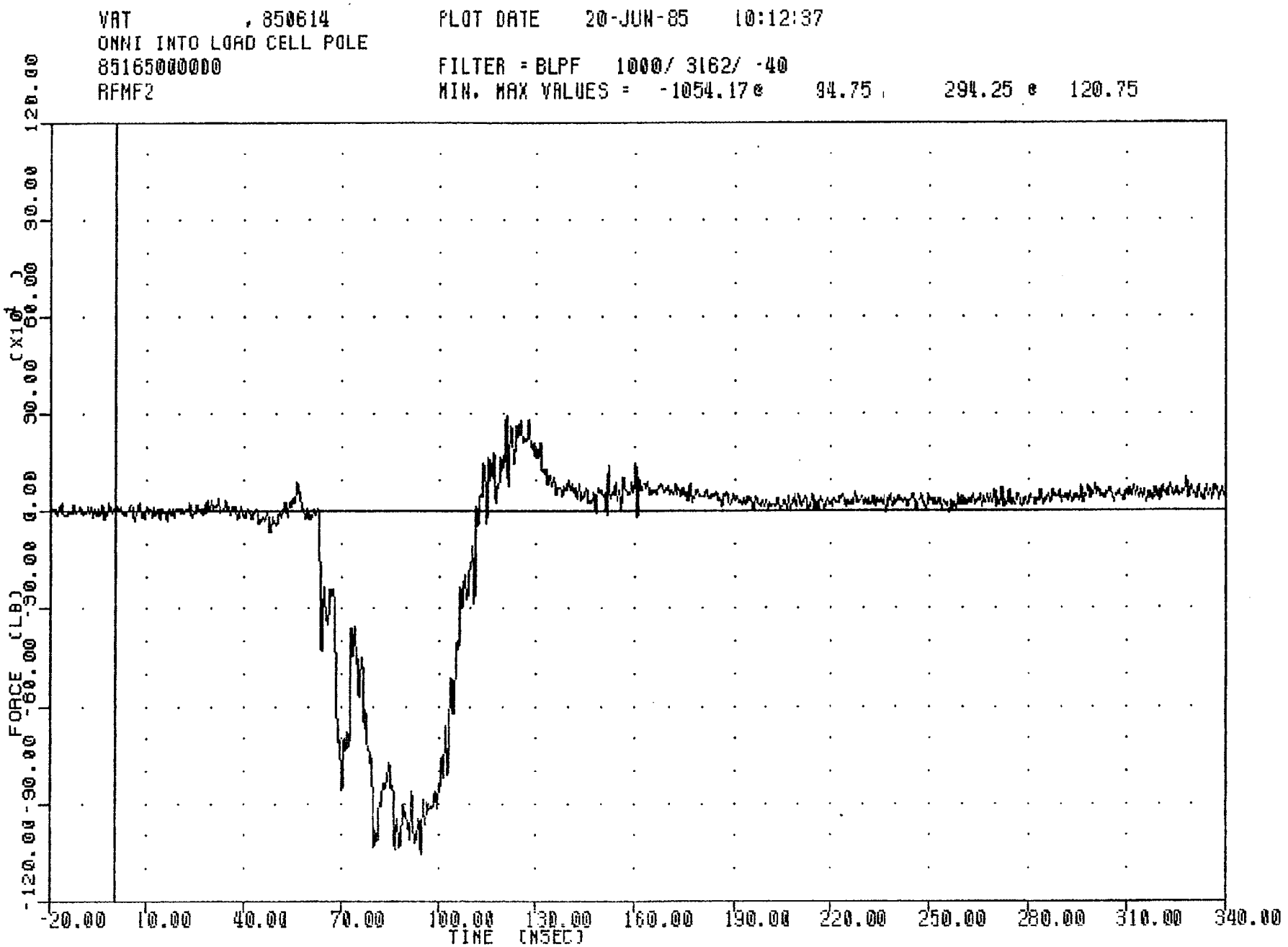

VRT , 850614
ONNI INTO LOAD CELL POLE
85165000000
CSTZG2
PLOT DATE 20-JUN-85 10:12:37
FILTER = BLPF · 300/ 949/ -40
MIN. MAX VALUES = -27.32 @ 126.00 , 2.58 @ 65.88
ACCELERATION [G]
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME [MSEC]
DODGE OMNI INTO LOAD CELL POLE
PASSENGER CHEST ACCELERATION Y AXIS


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
851650000000
FILTER = BLPF 300/ 949/ -40
CSTRG2
MIN, MAX VALUES = 0.06 @ -8.00 , 62.74 @ 114.25
ACCELERATION (G)
190.00
165.00
140.00
115.00
90.00
65.00
40.00
15.00
-10.00
-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.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER CHEST RESULTANT

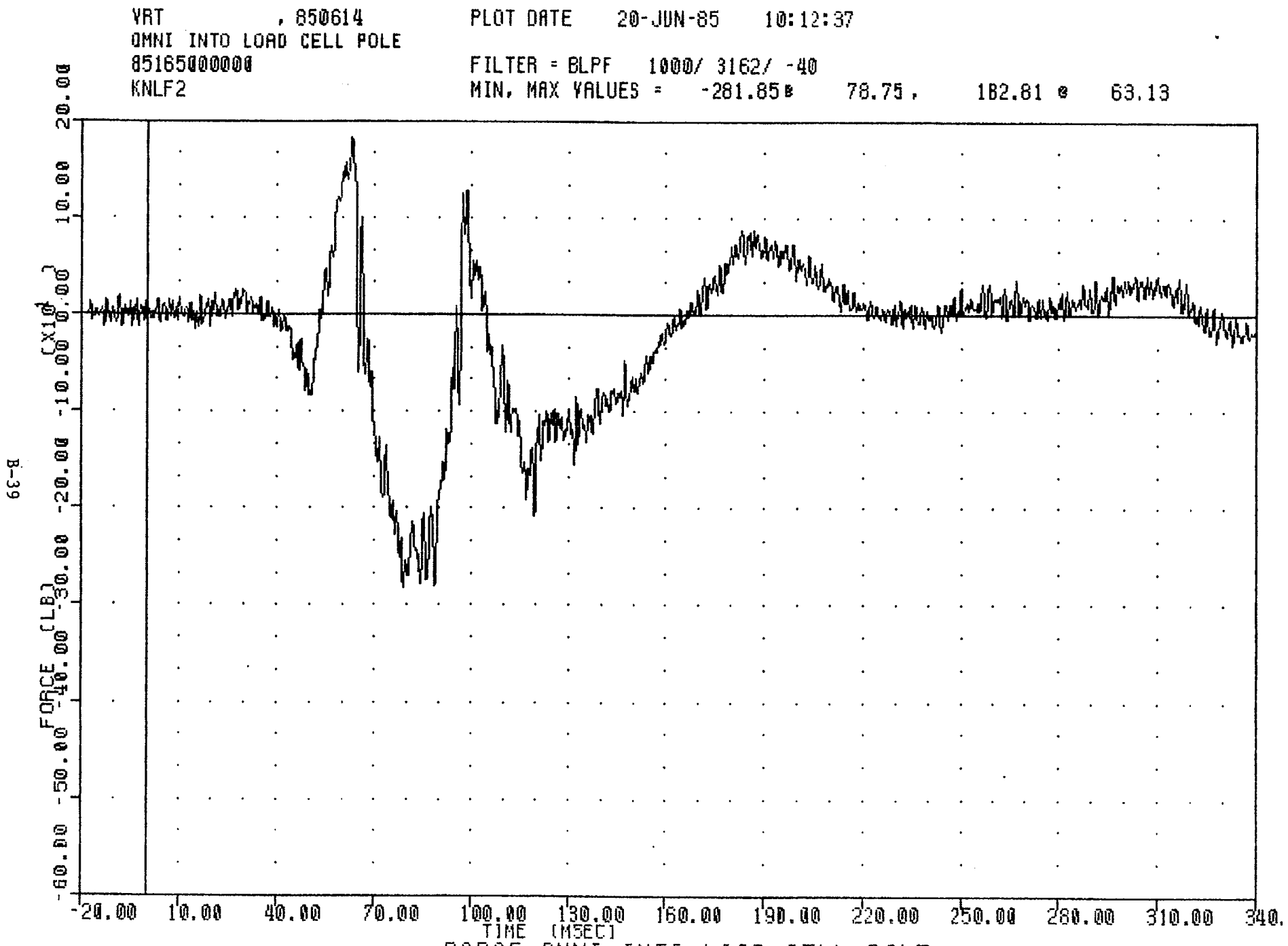


DODGE OMNI INTO LOAD CELL POLE
PASSENGER CHEST DISPLACEMENT INCHES


VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 1000/ 3162/ -40
LFMF2
MIN, MAX VALUES = -1960.89 @ 81.88 , 55.61 @ 271.88
FORCE (LB) (X10)
20.00
-10.00
-40.00
-70.00
-100.00
-130.00
-160.00
-190.00
-220.00
-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.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER LEFT FEMUR FORCE LBS

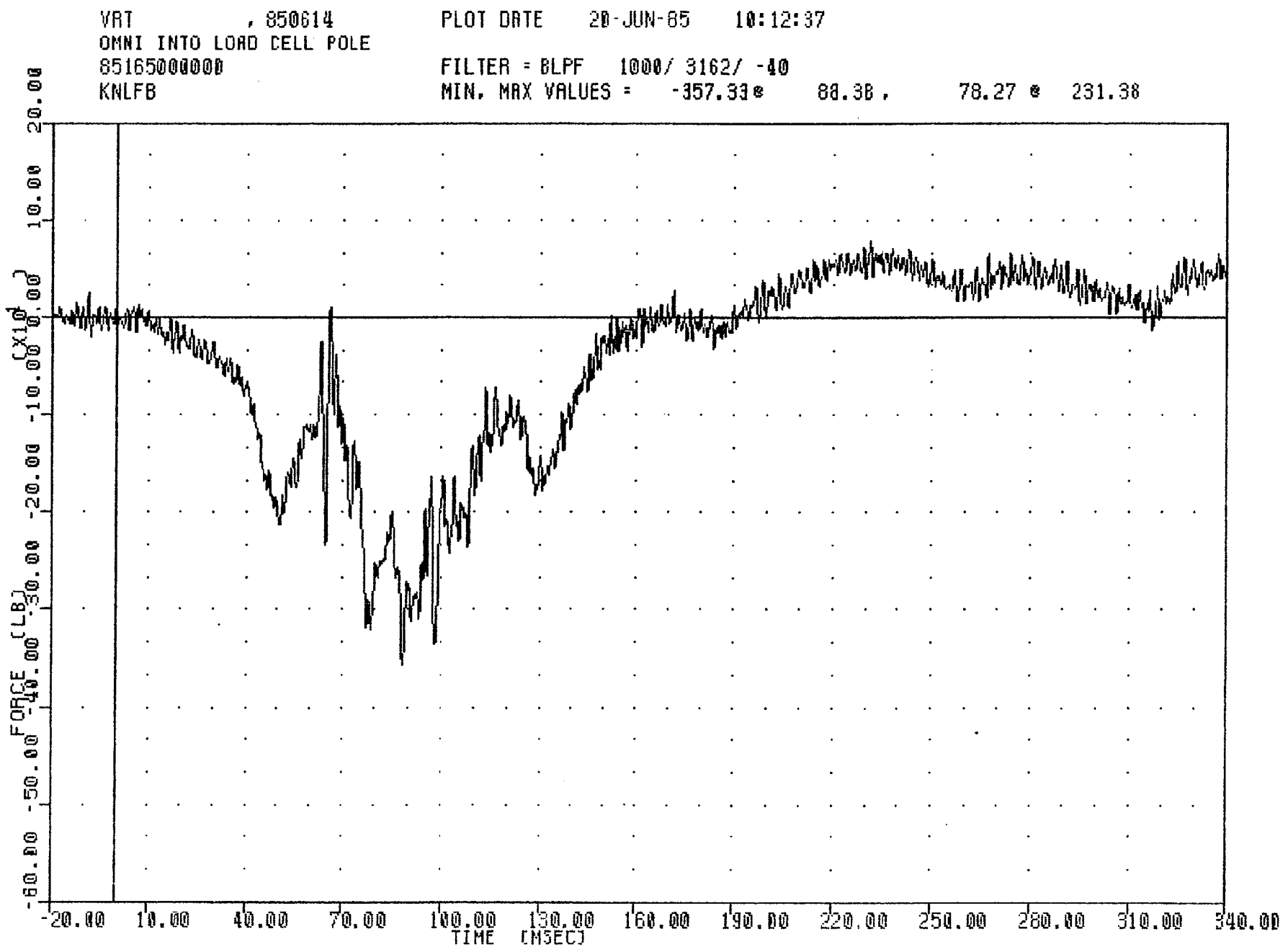


DODGE OMNI INTO LOAD CELL POLE
PASSENGER RIGHT FEMUR FORCE LBS

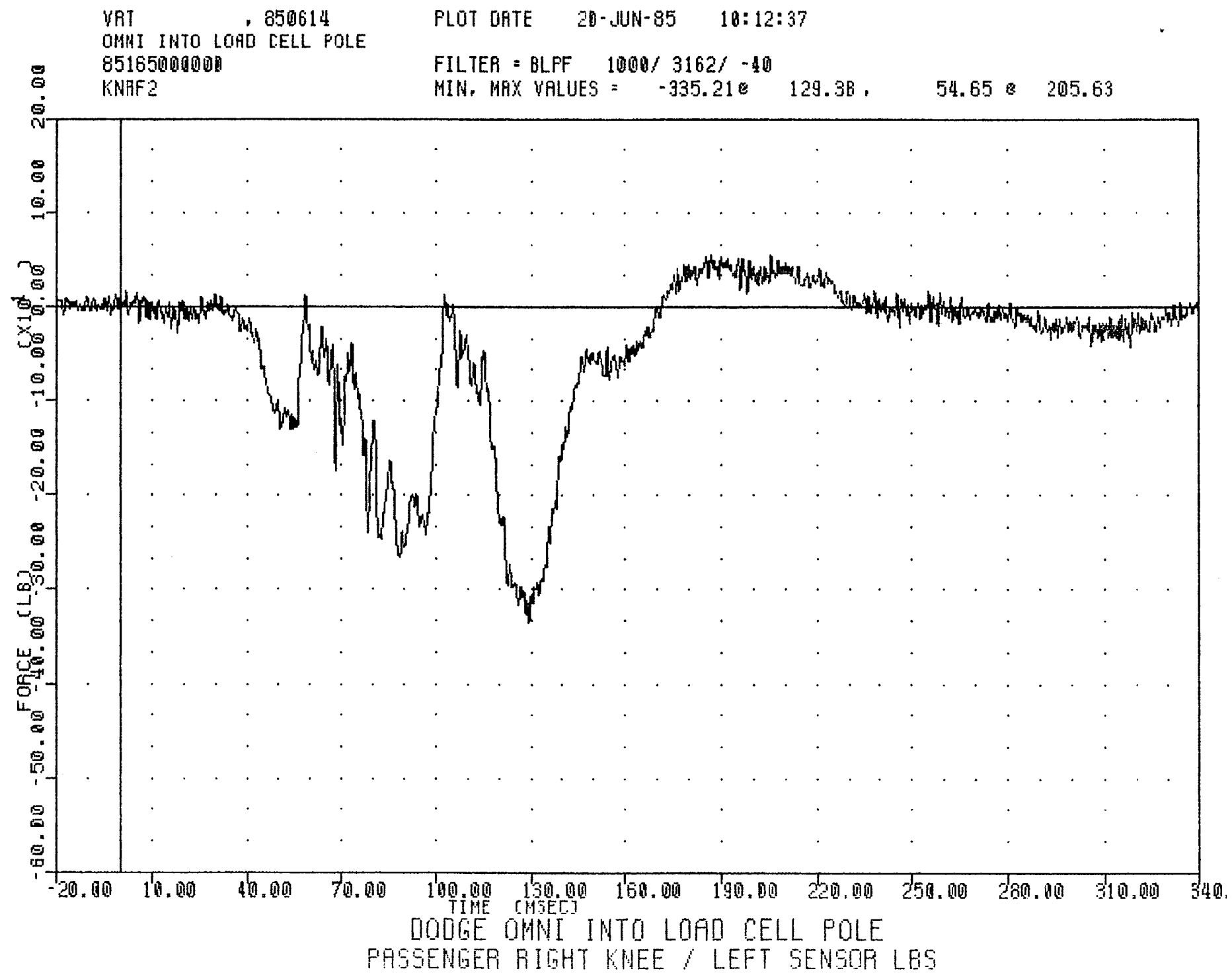


DODGE OMNI INTO LOAD CELL POLE

PASSENGER LEFT KNEE / LEFT SENSOR LBS

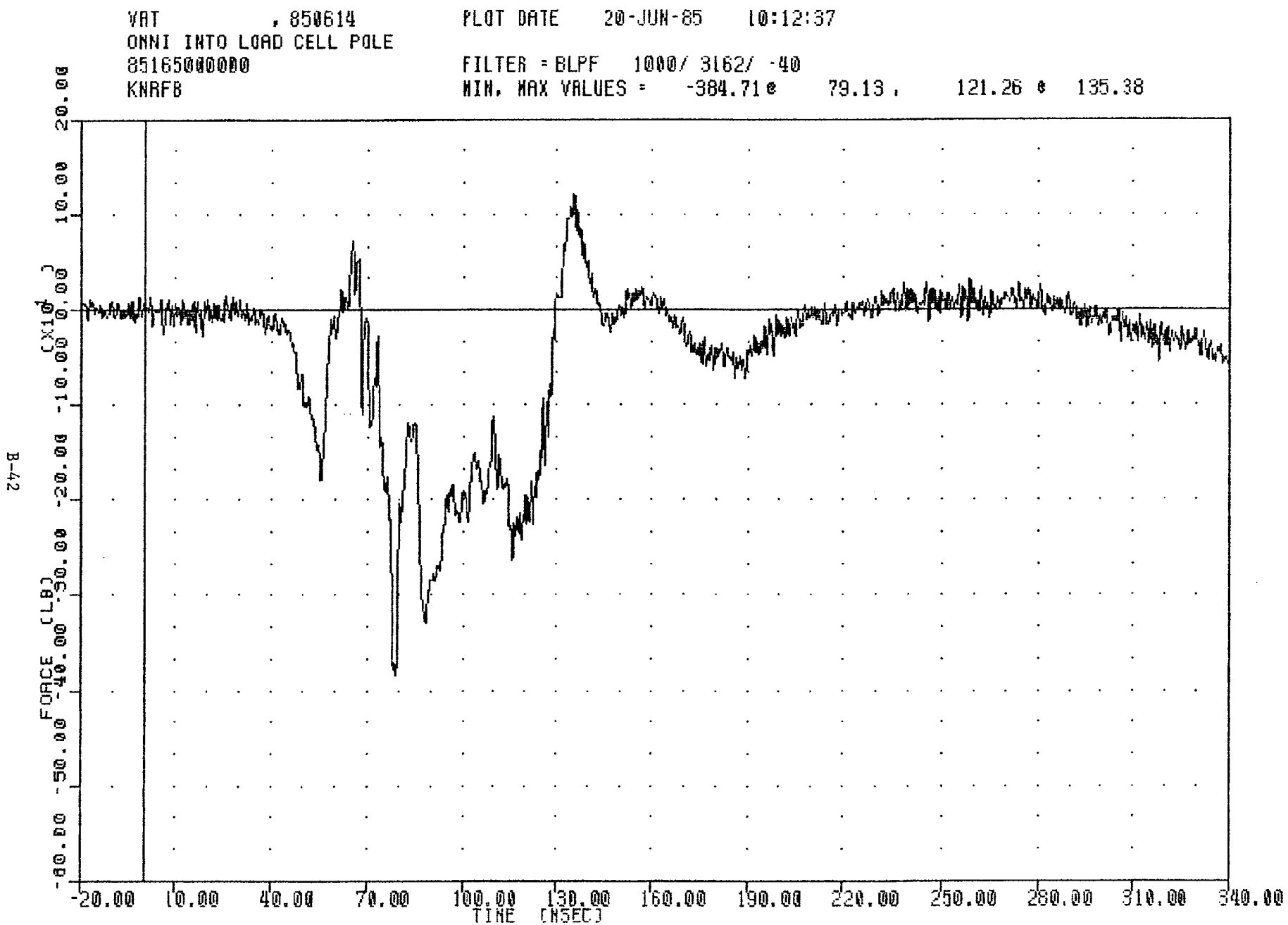


DODGE OMNI INTO LOAD CELL POLE
PASSENGER LEFT KNEE / RIGHT SENSOR LBS

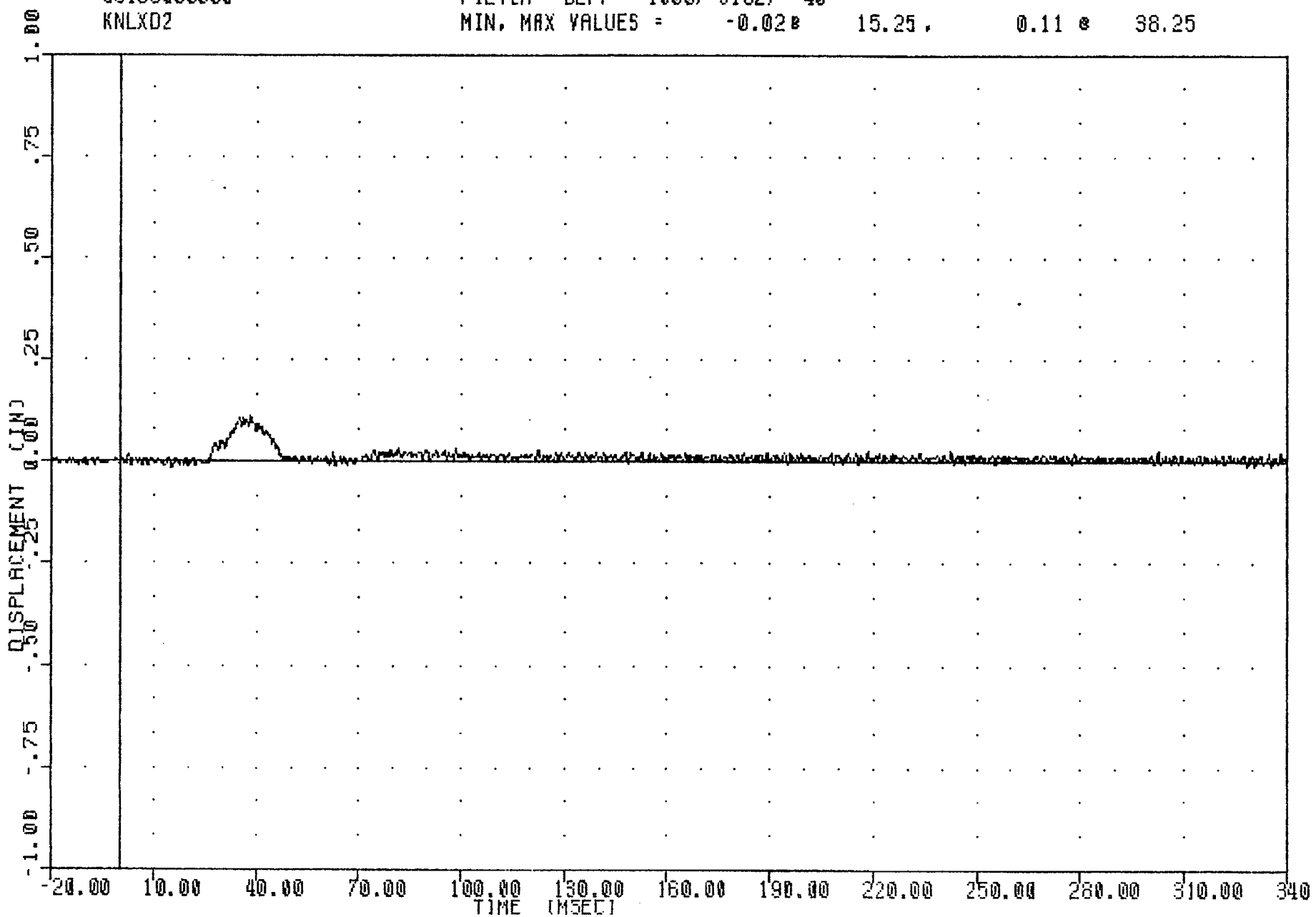


DODGE OMNI INTO LOAD CELL POLE

PASSENGER RIGHT KNEE / LEFT SENSOR LBS

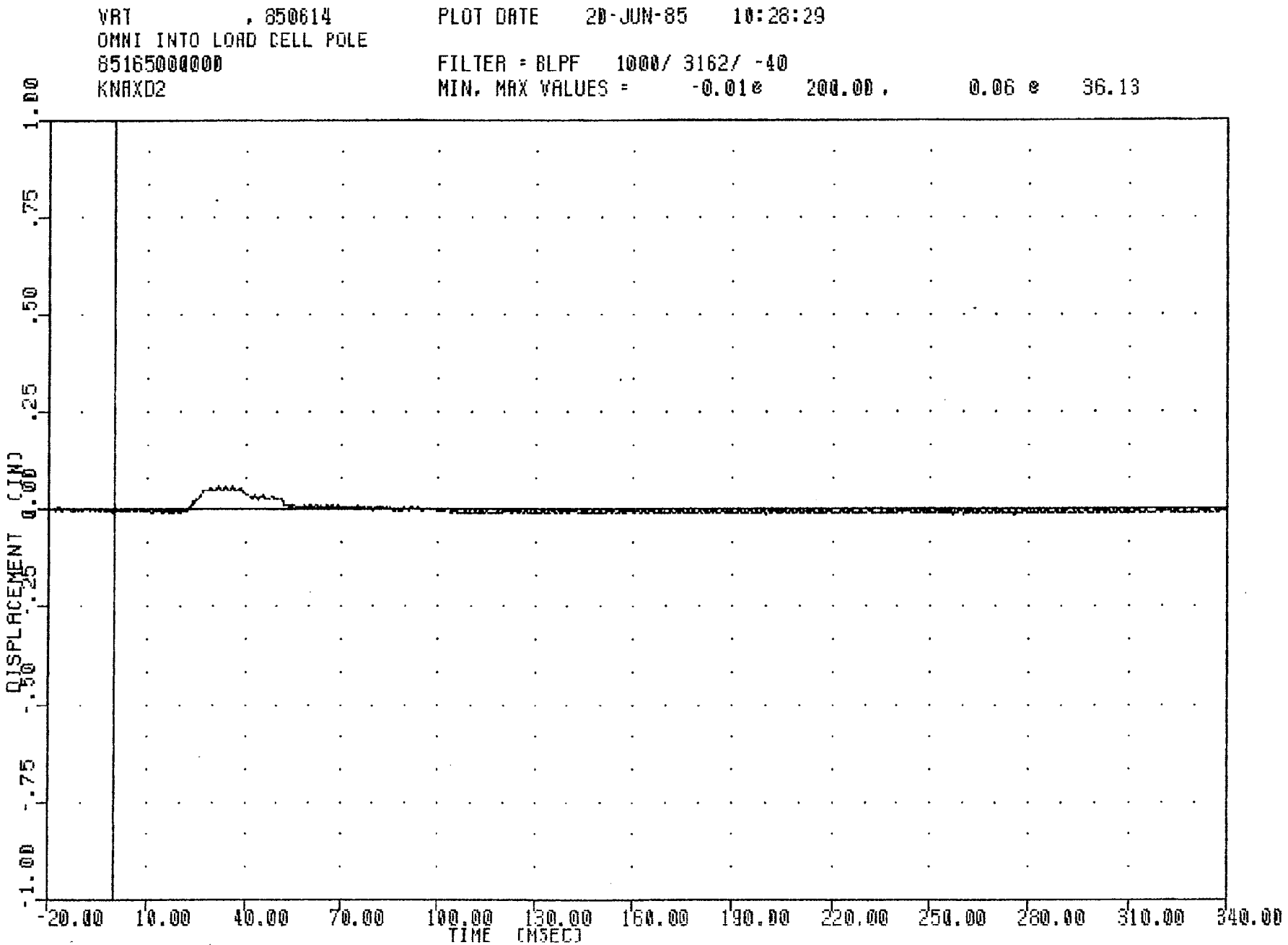


DODGE OMNI INTO LOAD CELL POLE
PASSENGER RIGHT KNEE / RIGHT SENSOR LBS



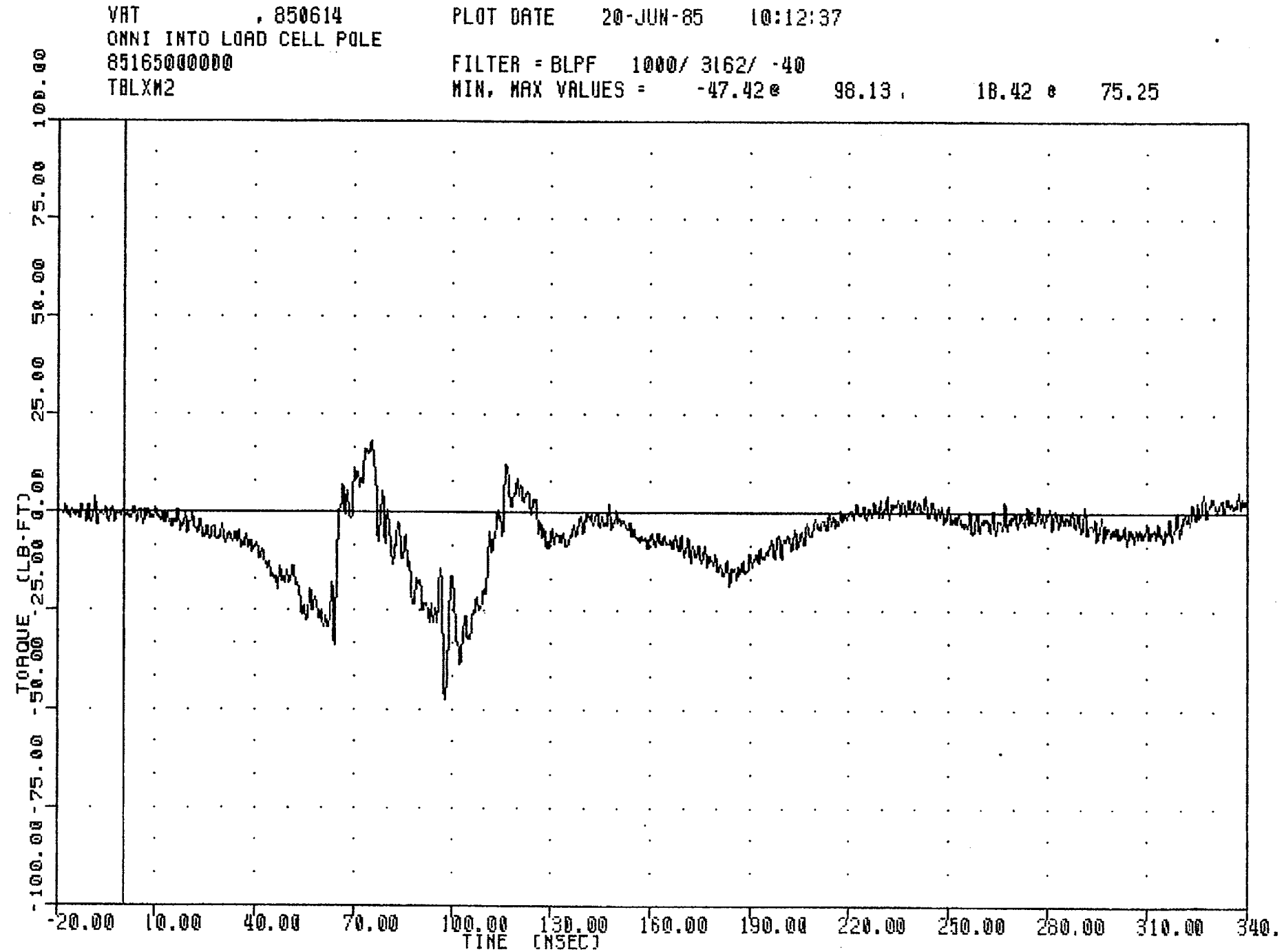
DODGE OMNI INTO LOAD CELL POLE

PASSENGER LEFT KNEE DISPLACEMENT INCHES



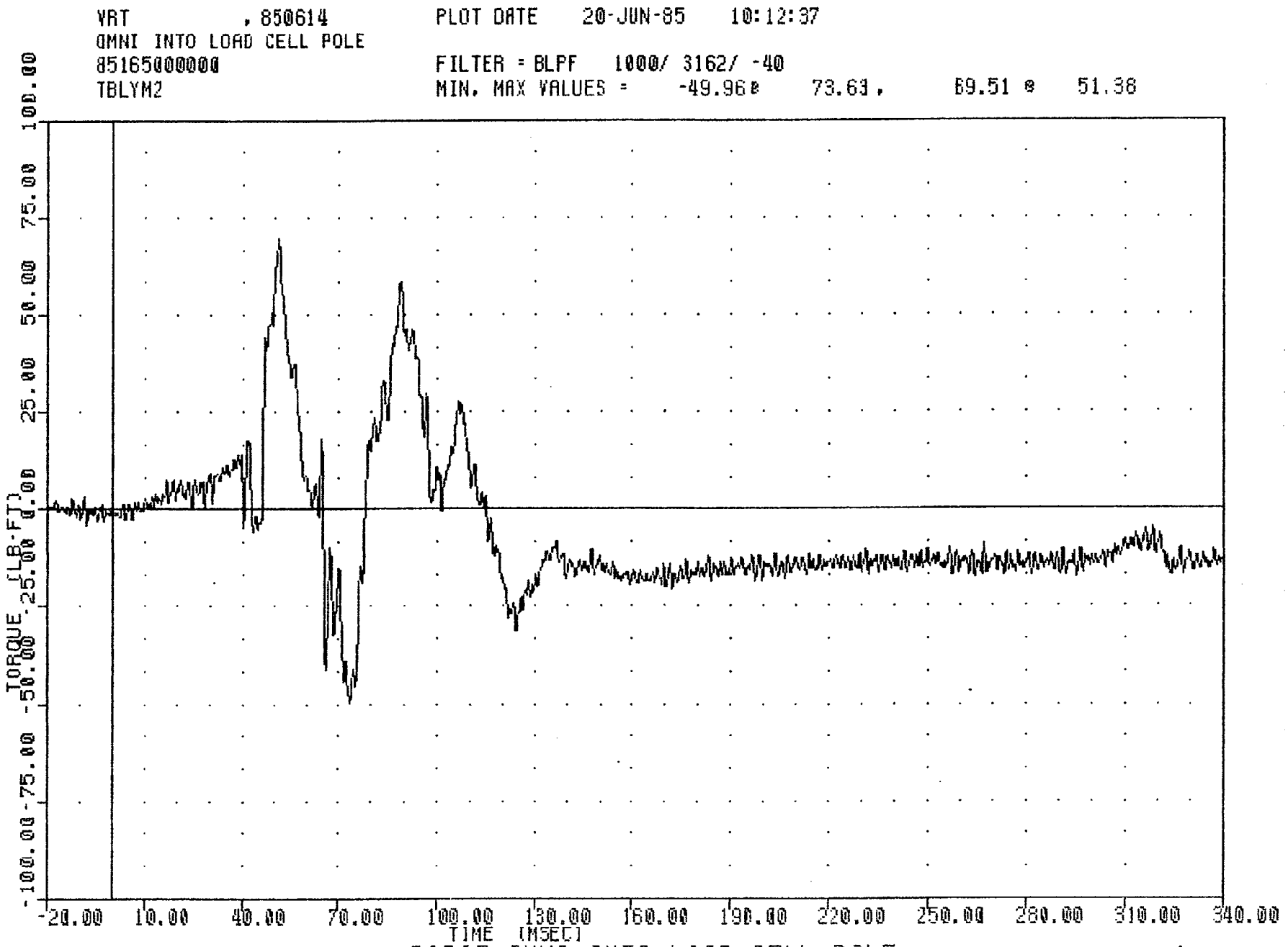
DODGE OMNI INTO LOAD CELL POLE

PASSENGER RIGHT KNEE DISPLACEMENT INCHES

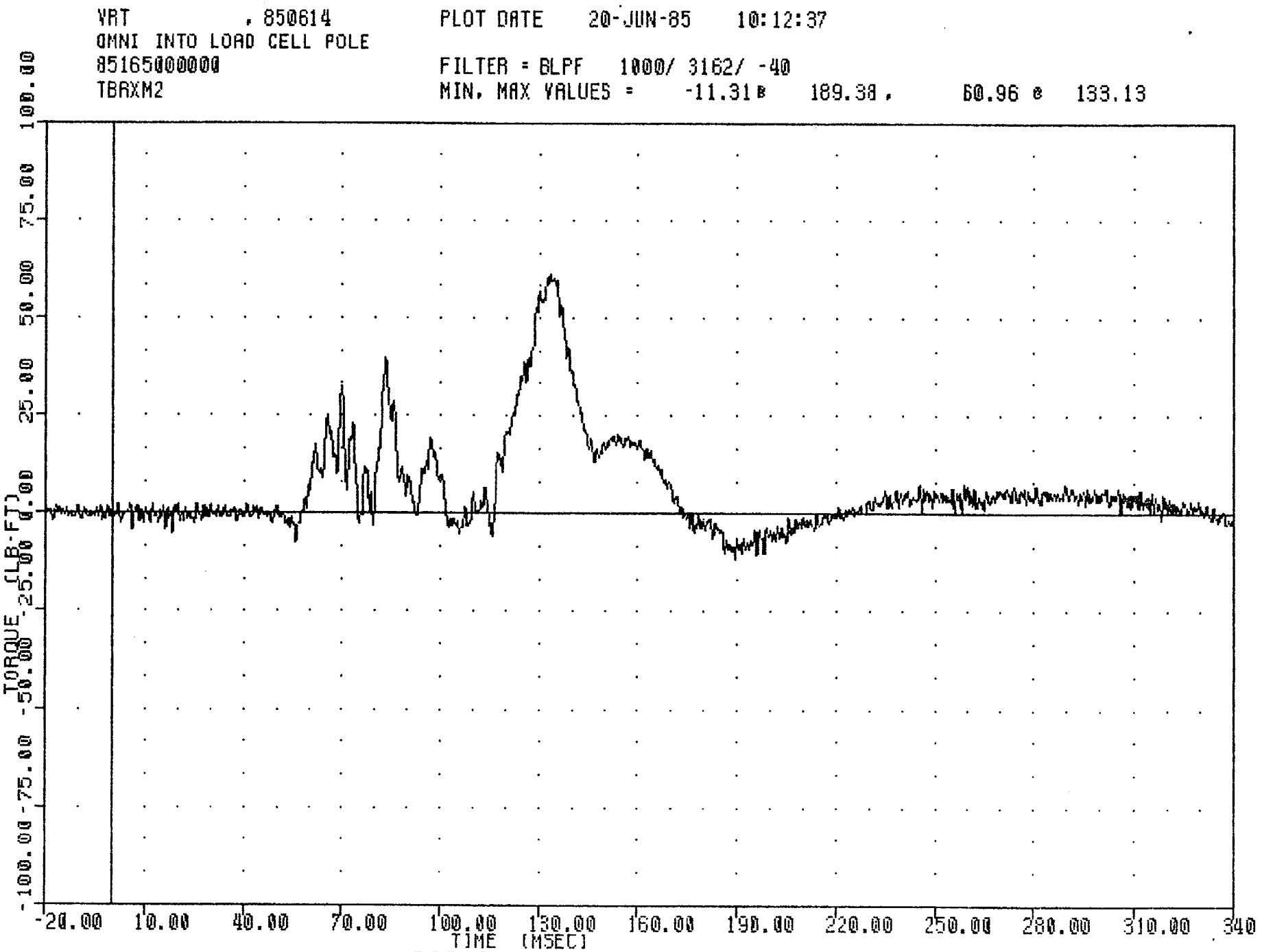


DODGE OMNI INTO LOAD CELL POLE

PASSENGER LEFT UPPER TIBIA MOMENT X AXIS LB-FT

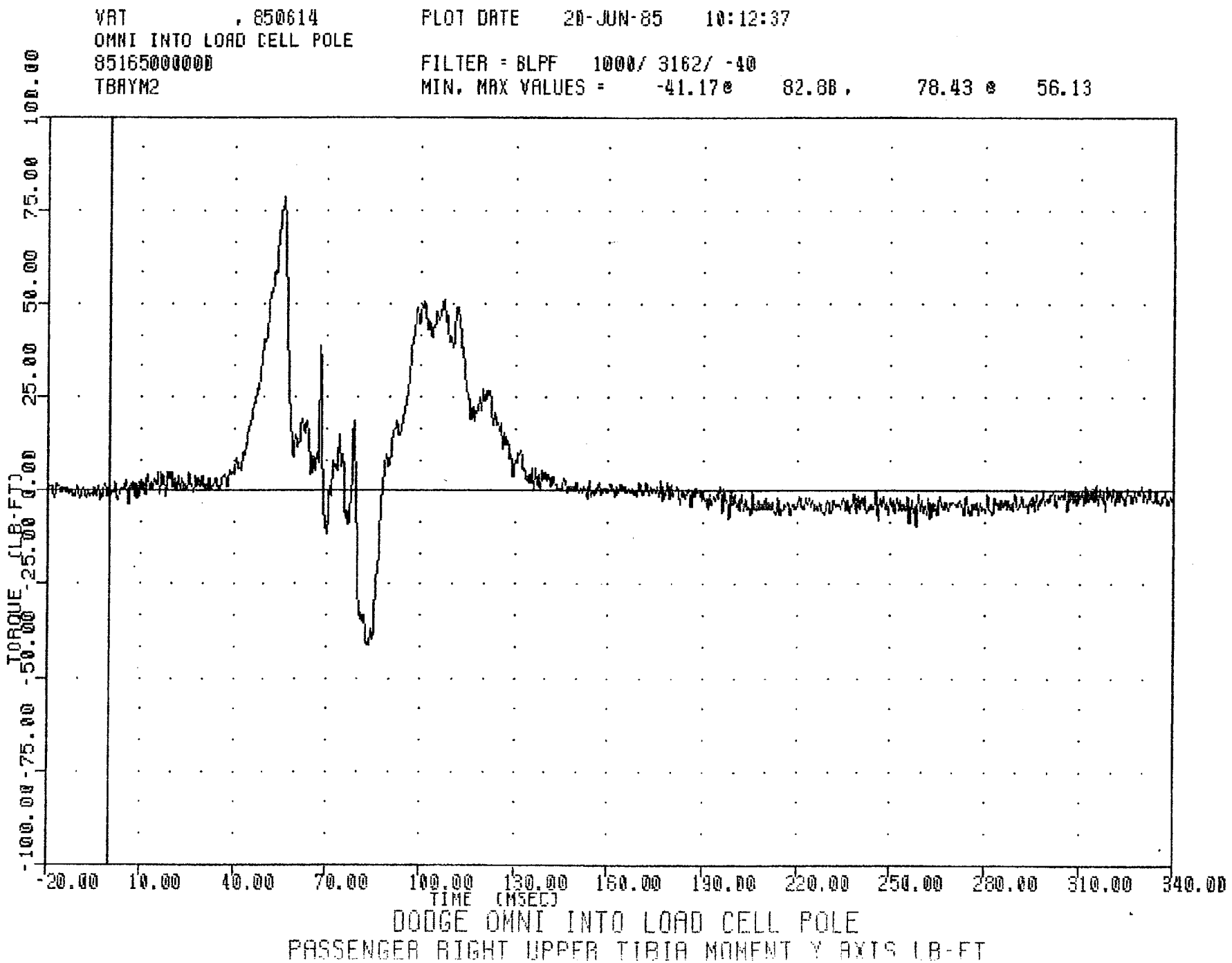


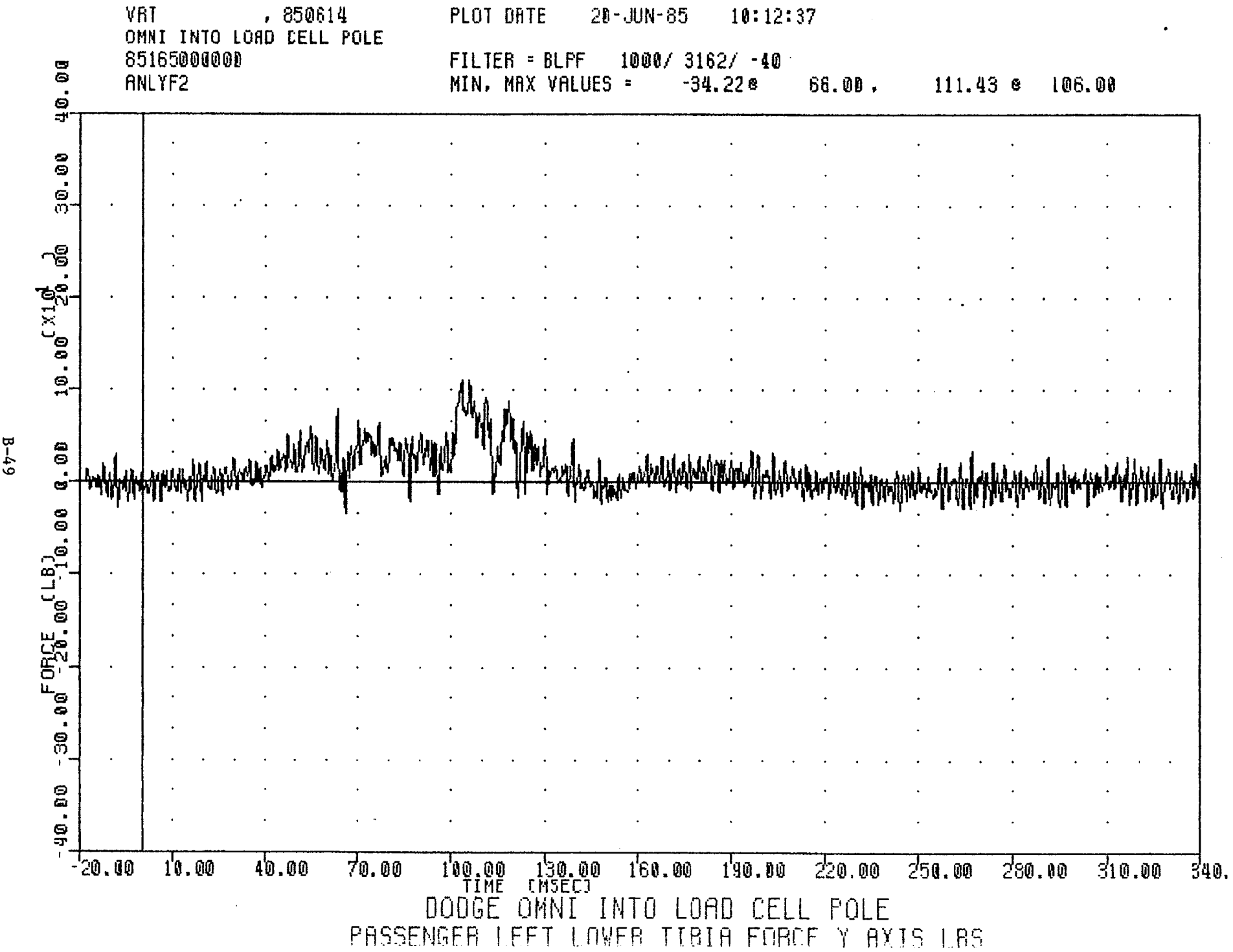
DODGE OMNI INTO LOAD CELL POLE
PASSENGER LEFT UPPER TIBIA MOMENT Y AXIS LB-FT



DODGE OMNI INTO LOAD CELL POLE

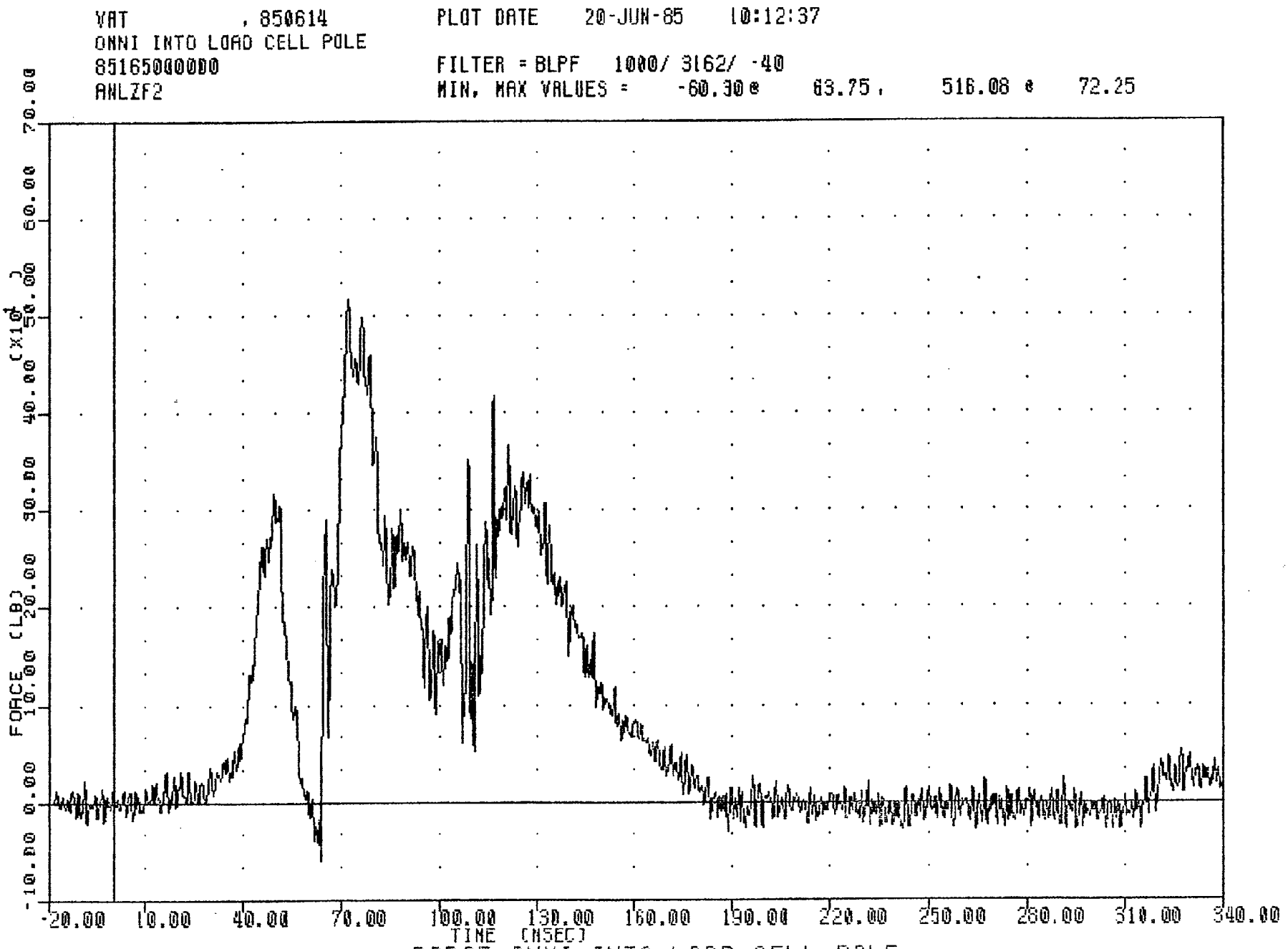
PASSENGER RIGHT UPPER TIBIA MOMENT X AXIS LB-FT

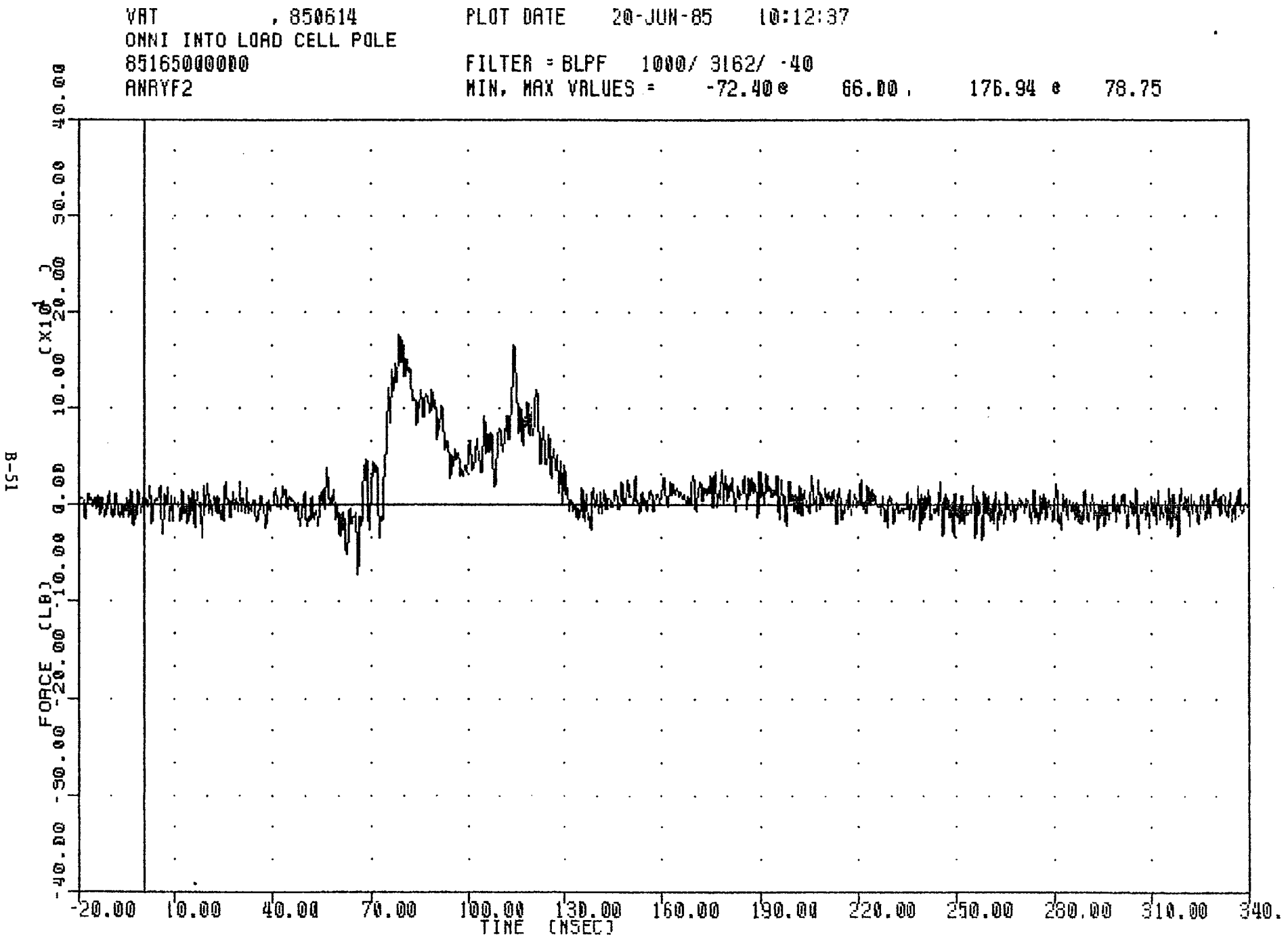

VRT , 850614
PLOT DATE 20-JUN-85 10:12:37
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 1000/ 3162/ -40
TBRYM2
MIN, MAX VALUES = -41.17@ 82.88, 78.43 @ 56.13
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
TORQUE (LB-FT)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER RIGHT UPPER TIBIA MOMENT Y AXIS LB-FT



DODGE OMNI INTO LOAD CELL POLE

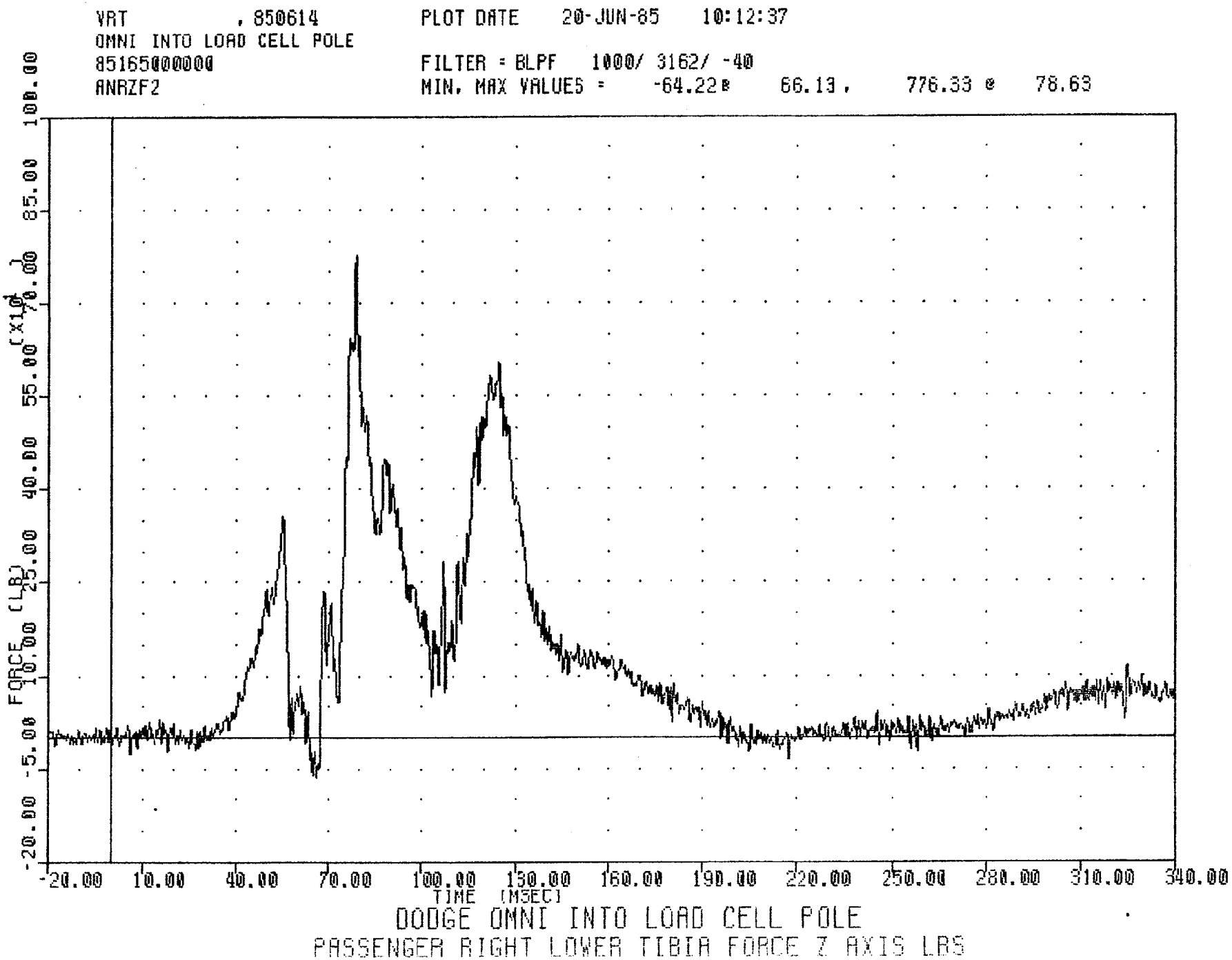
PASSENGER LEFT LOWER TIBIA FORCE Y AXIS LBS

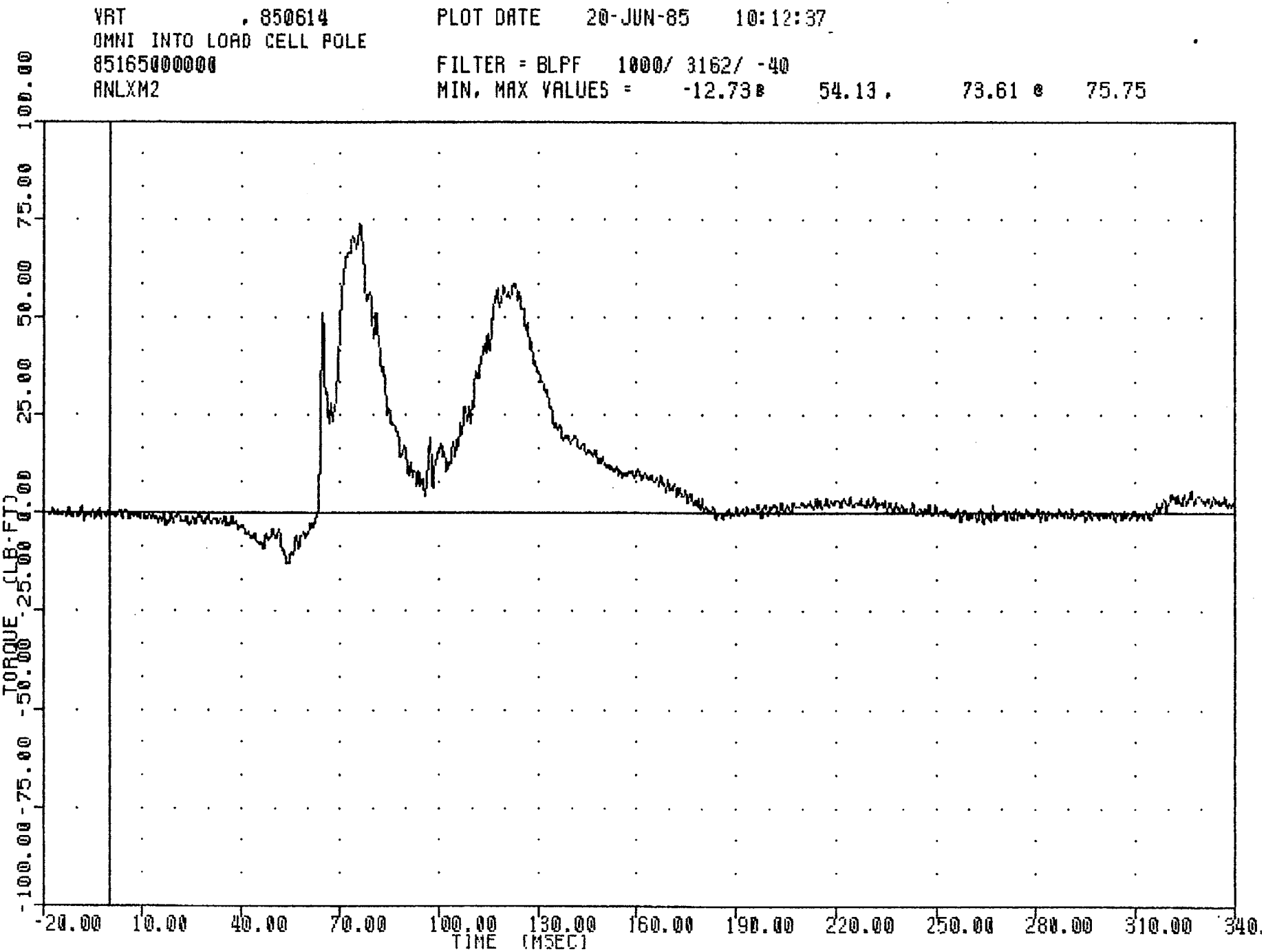

VAT , 850614
ONNI INTO LOAD CELL POLE
851650Q0DD0
ANLZF2
PLOT DATE 20-JUN-85 10:12:37
FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = -60.30 @ 63.75 , 516.08 @ 72.25
FORCE (LB) (X10)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER LEFT LOWER TIBIA FORCE Z AXIS LBS



DODGE OMNI INTO LOAD CELL POLE

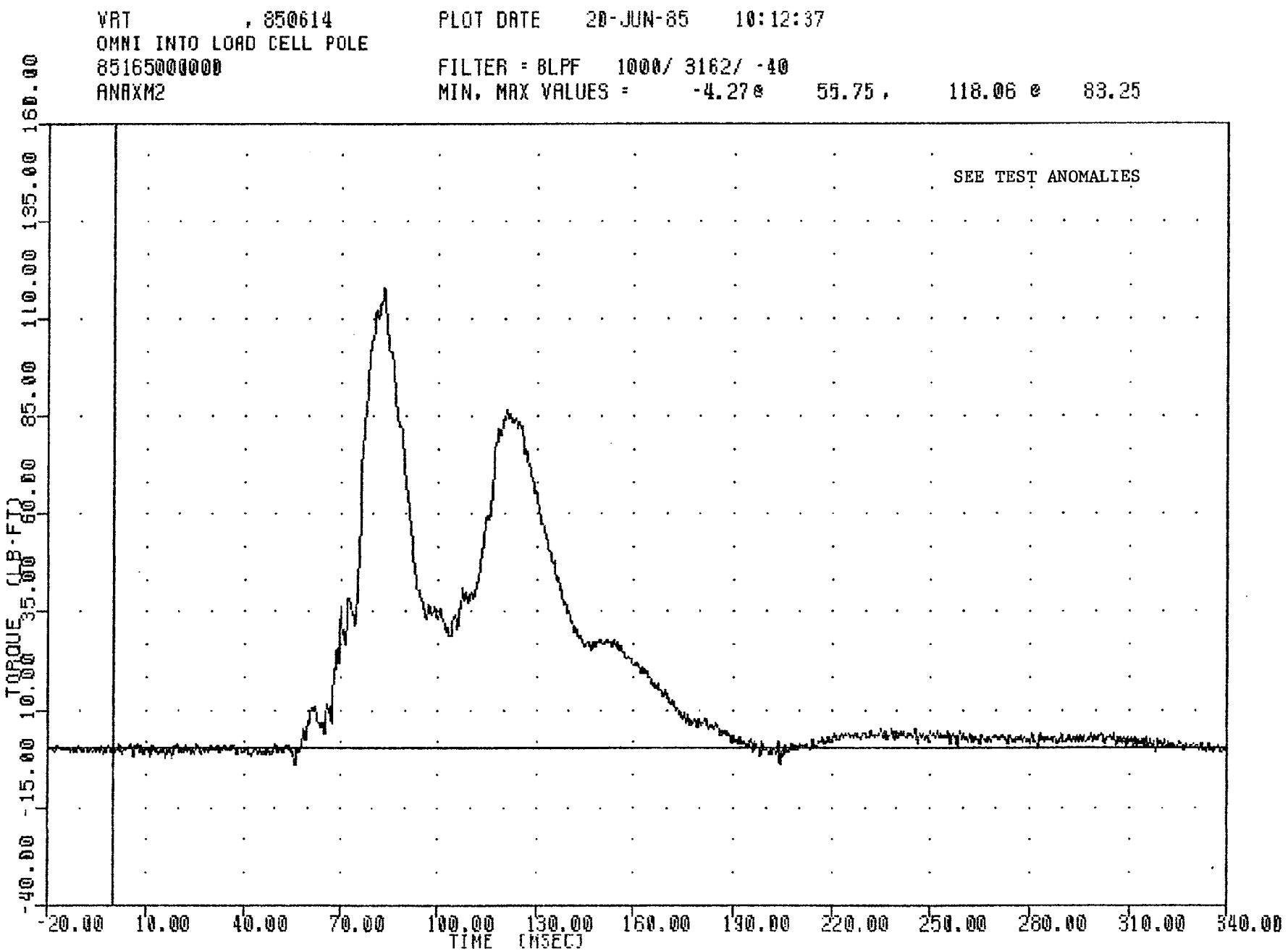
PASSENGER RIGHT LOWER TIBIA FORCE Y AXIS LBS


VRT , 850614
OMNI INTO LOAD CELL POLE
851650000000
ANRZF2
PLOT DATE 20-JUN-85 10:12:37
FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = -64.22 @ 66.13 , 776.33 @ 78.63
FORCE (LB) (X10)
100.00
85.00
70.00
55.00
40.00
25.00
10.00
-5.00
-20.00
-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)
DODGE OMNI INTO LOAD CELL POLE
PASSENGER RIGHT LOWER TIBIA FORCE Z AXIS LBS



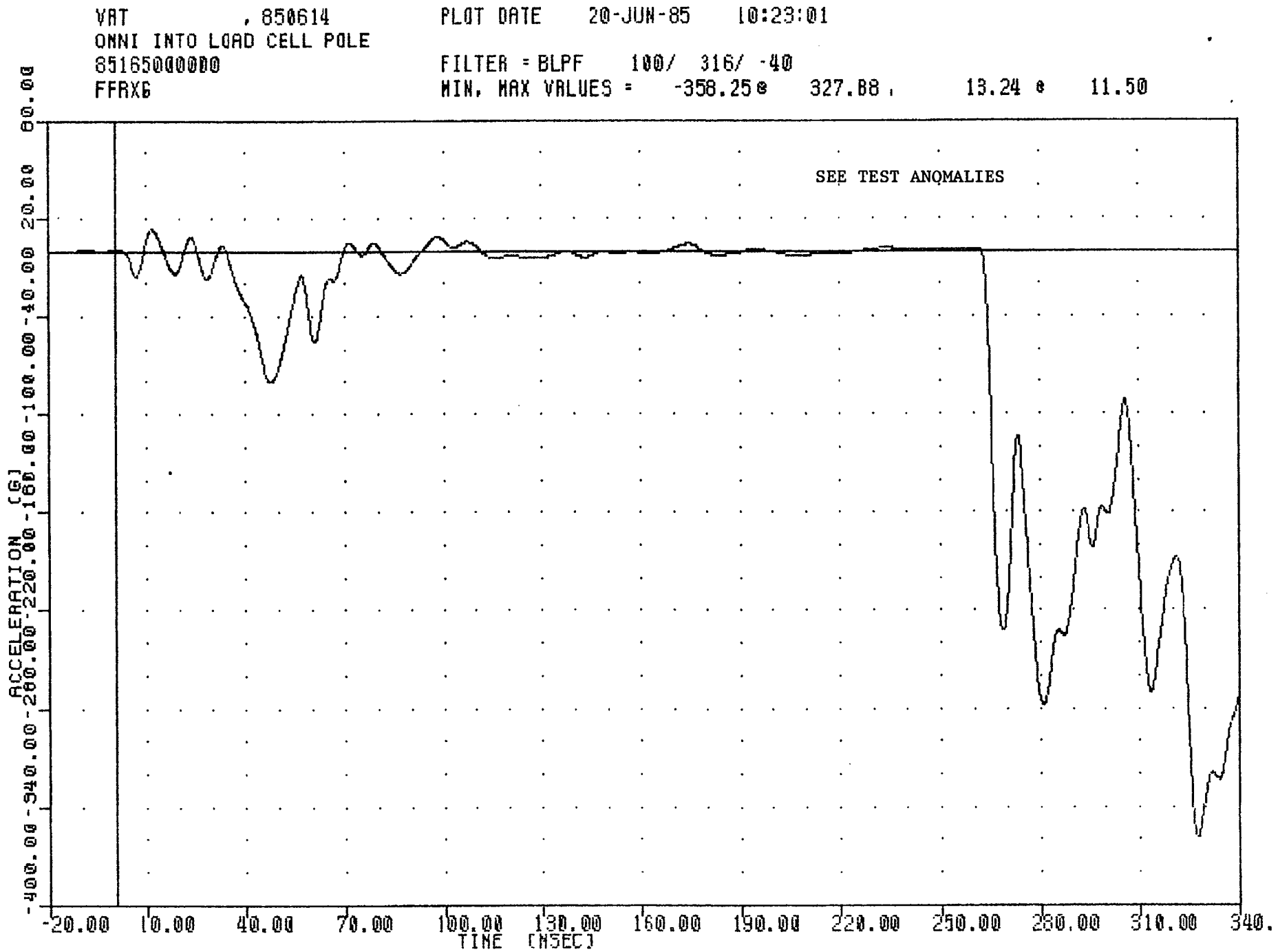
DODGE OMNI INTO LOAD CELL POLE

PASSENGER LEFT LOWER TIBIA MOMENT X AXIS LB-FT



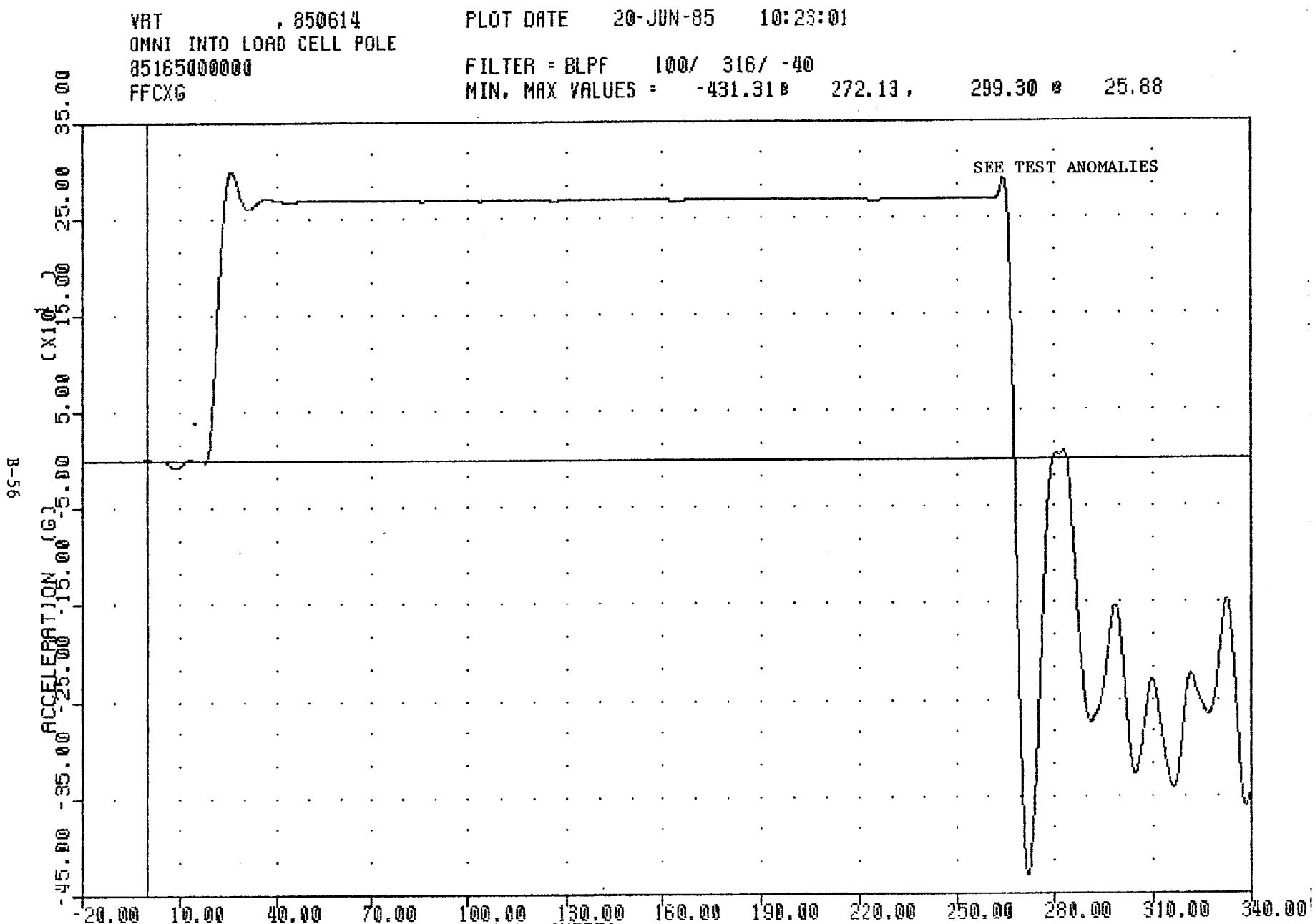
DODGE OMNI INTO LOAD CELL POLE

PASSENGER RIGHT LOWER TIBIA MOMENT X AXIS LB-FT



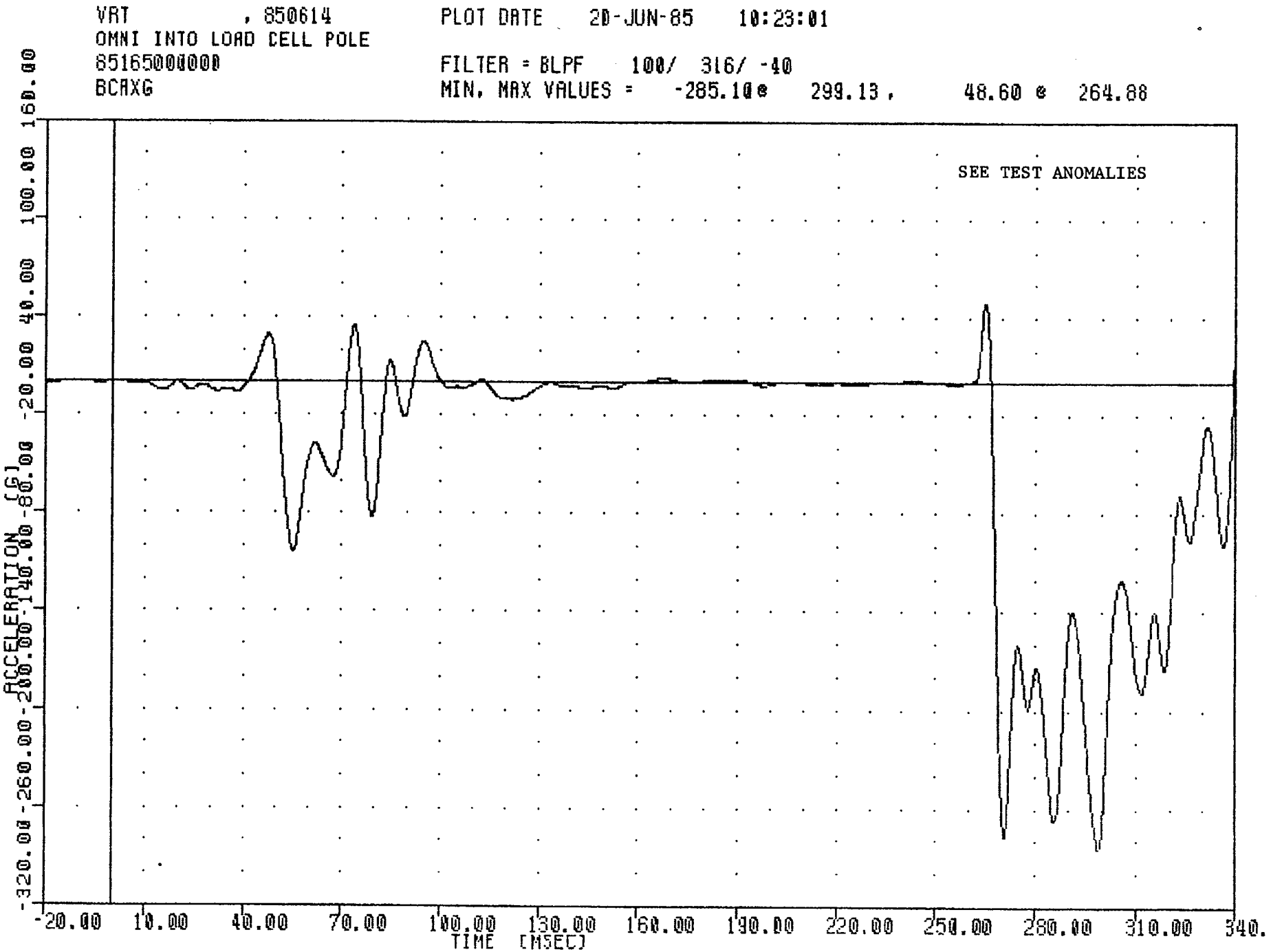
DODGE OMNI INTO LOAD CELL POLE

RIGHT FRONT FRAME RAIL ACCELERATION X AXIS

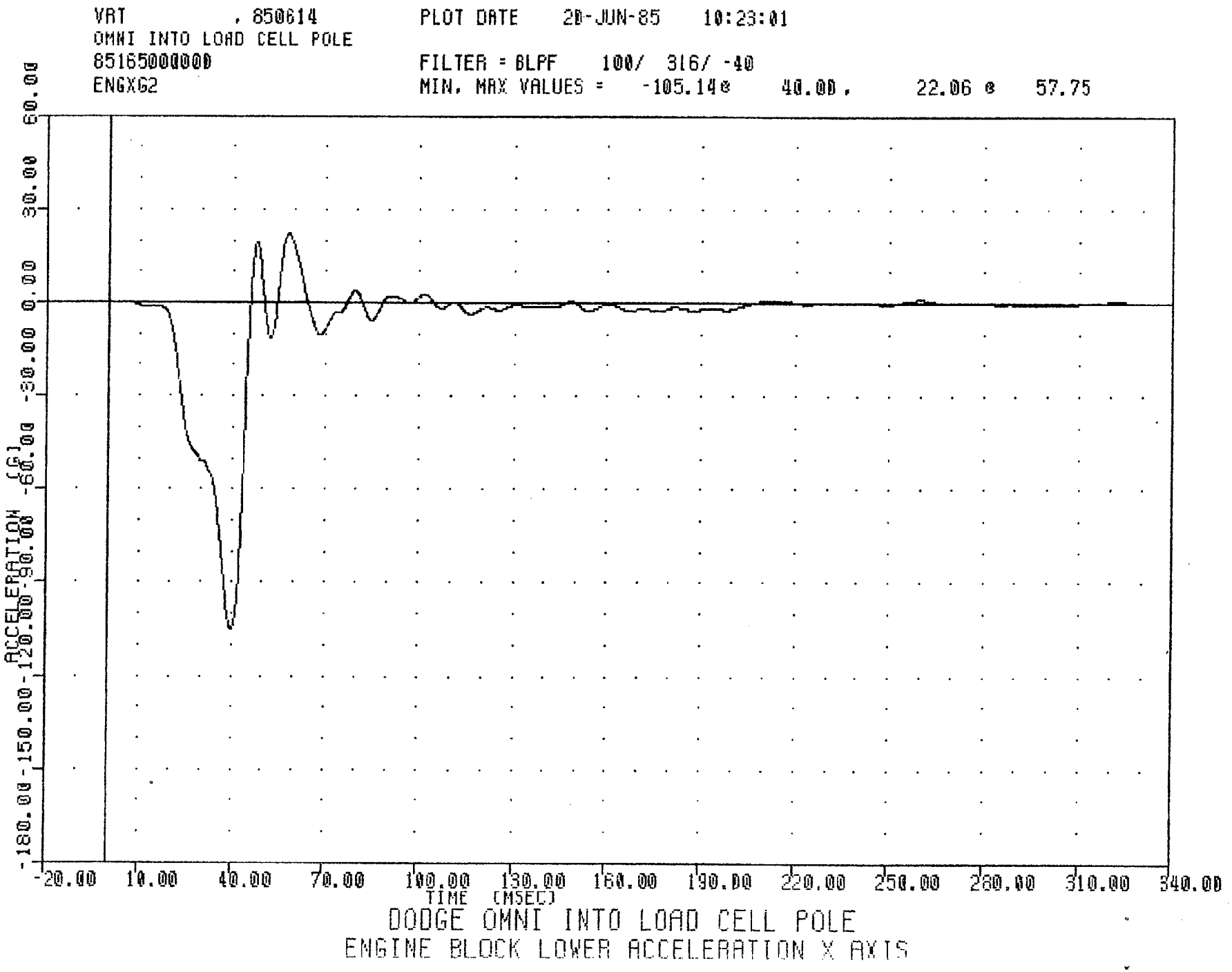


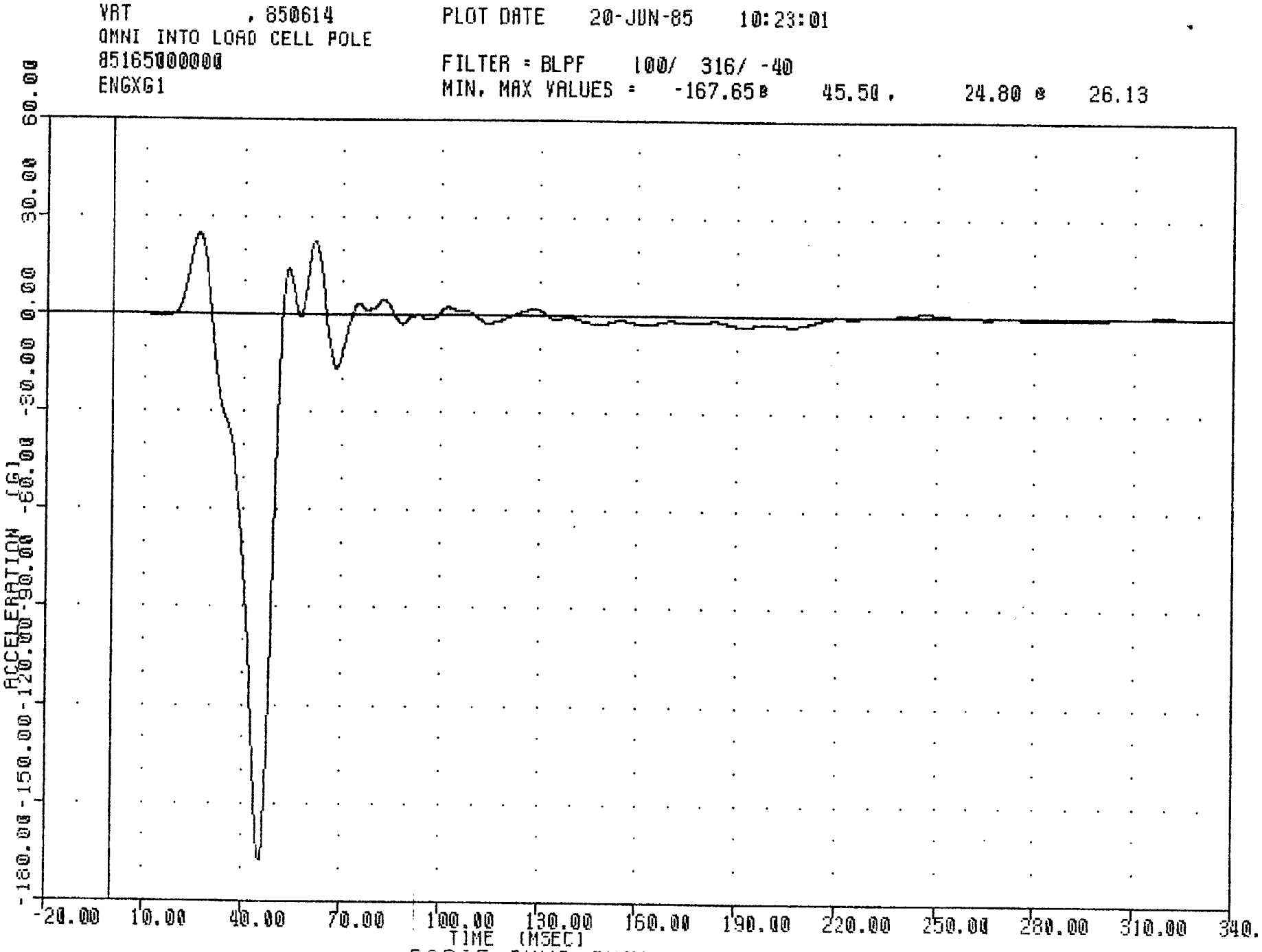
DODGE OMNI INTO LOAD CELL POLE

FRONT FRAME CROSSMEMBER ACCELERATION X AXIS



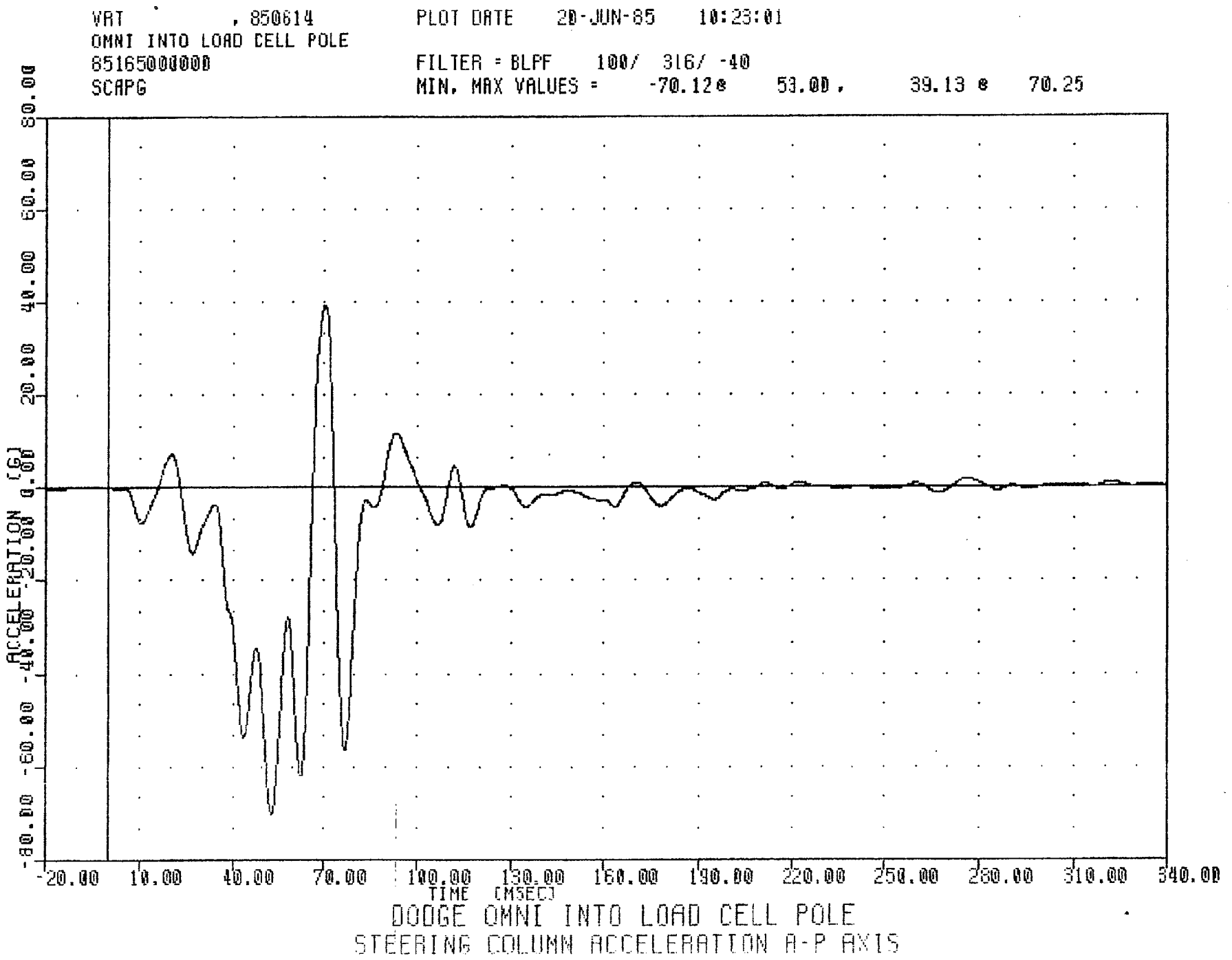
DODGE OMNI INTO LOAD CELL POLE
RIGHT BRAKE CALIPER ACCELERATION X AXIS

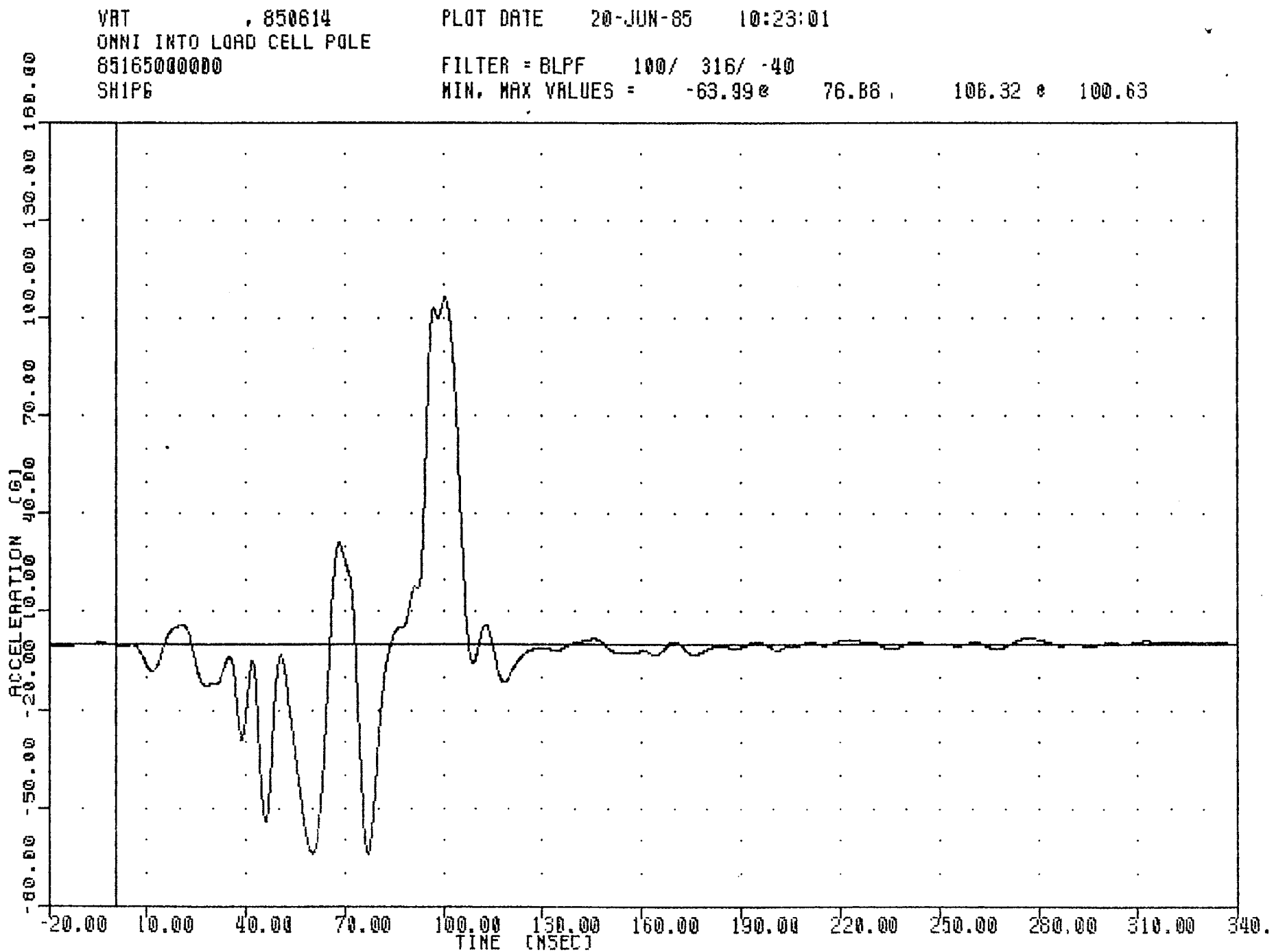

VRT , 850614
PLOT DATE 20-JUN-85 10:23:01
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 100/ 316/ -40
ENGXG2
MIN, MAX VALUES = -105.14@ 40.00 , 22.06 @ 57.75
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
-150.00
-180.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
ENGINE BLOCK LOWER ACCELERATION X AXIS



DODGE OMNI INTO LOAD CELL POLE

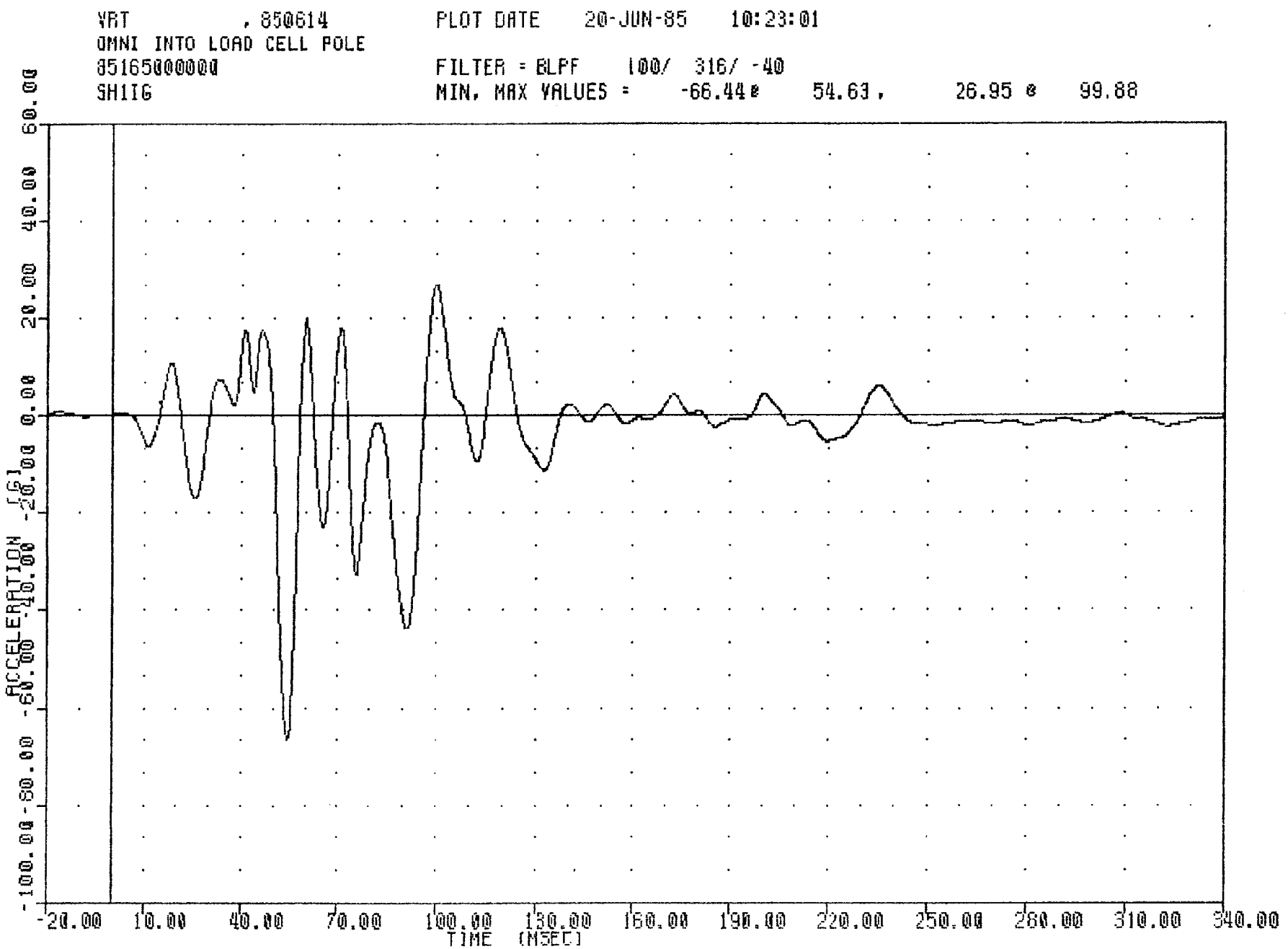
ENGINE BLOCK UPPER ACCELERATION Y AXIS


VRT , 850614
PLOT DATE 20-JUN-85 10:23:01
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 100/ 316/ -40
SCAPG
MIN, MAX VALUES = -70.12 @ 53.00 , 39.13 @ 70.25
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
ACCELERATION [G]
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME [MSEC]
DODGE OMNI INTO LOAD CELL POLE
STEERING COLUMN ACCELERATION A-P AXIS

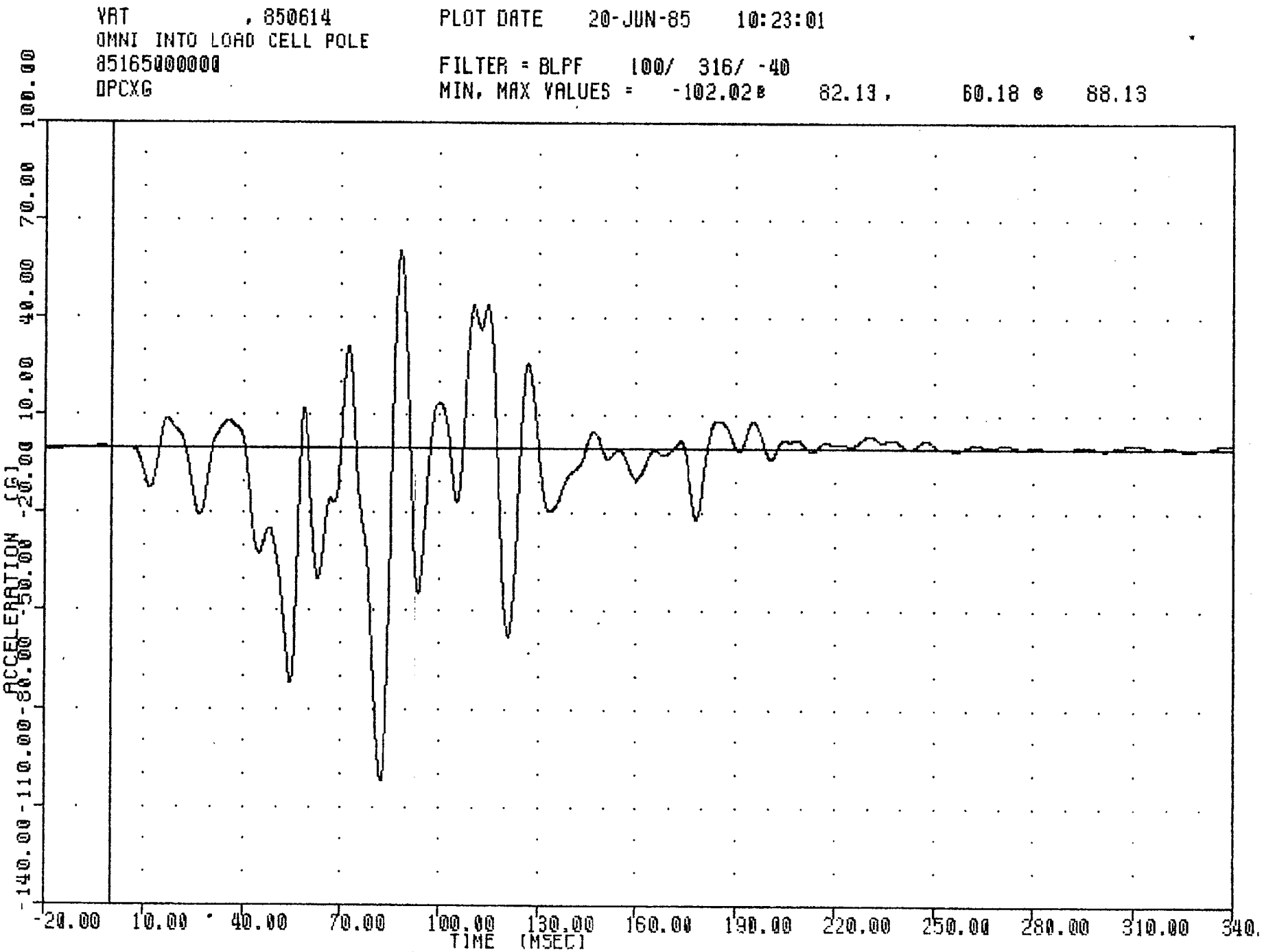


DODGE OMNI INTO LOAD CELL POLE

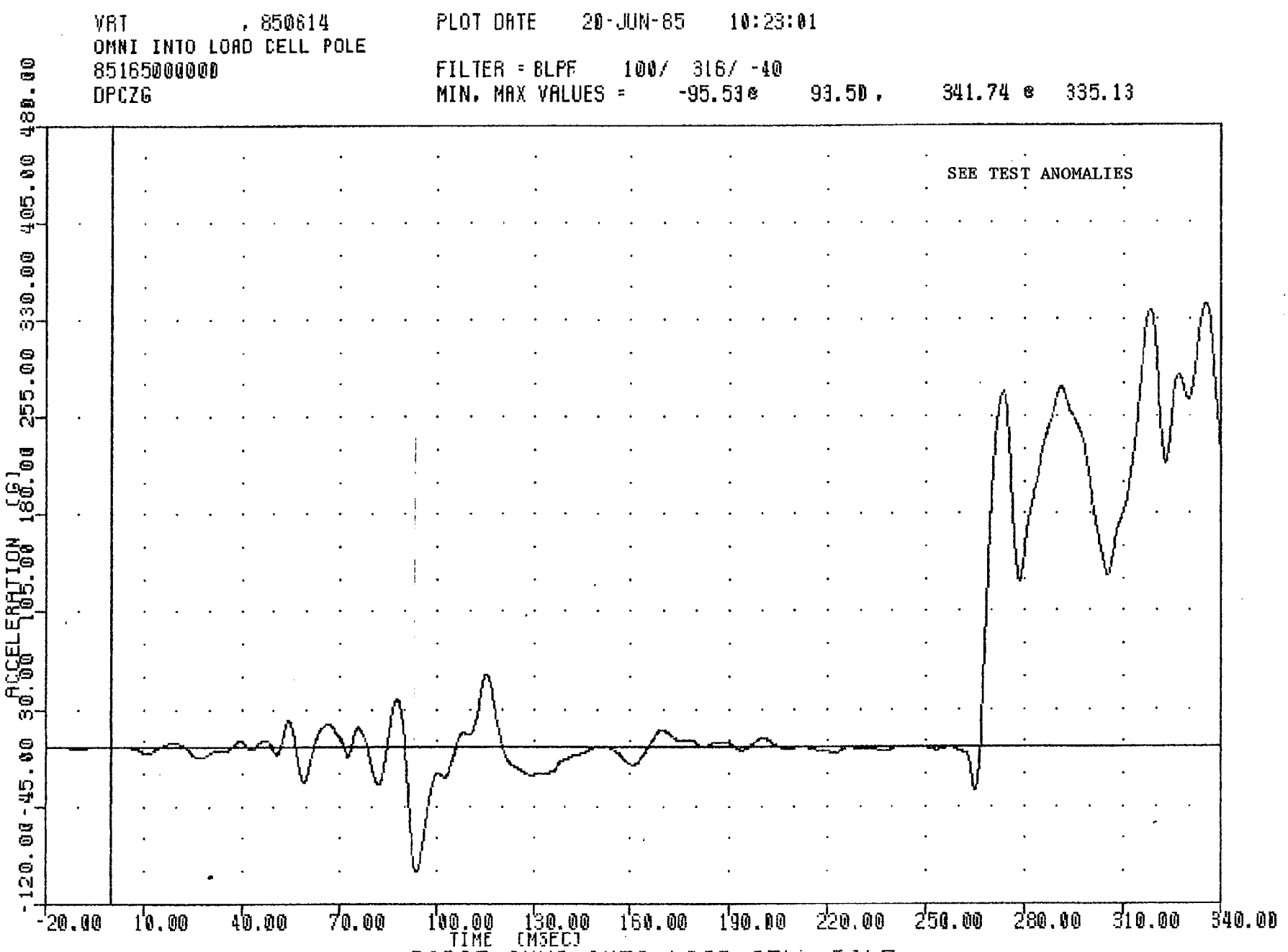
STEERING WHEEL HUB ACCELERATION A-P AXIS



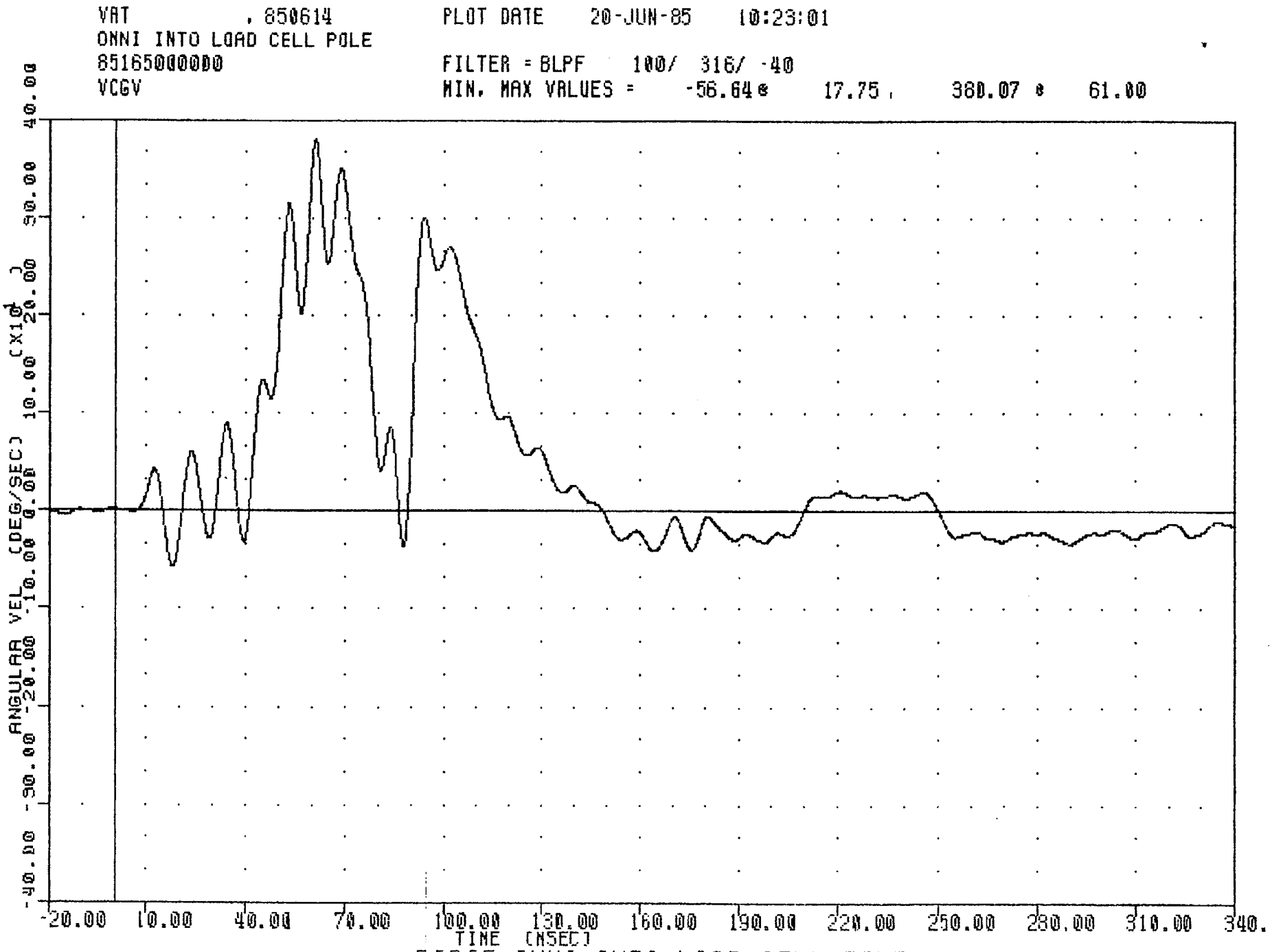
DODGE OMNI INTO LOAD CELL POLE
STEERING WHEEL HUB ACCELERATION I-S AXIS



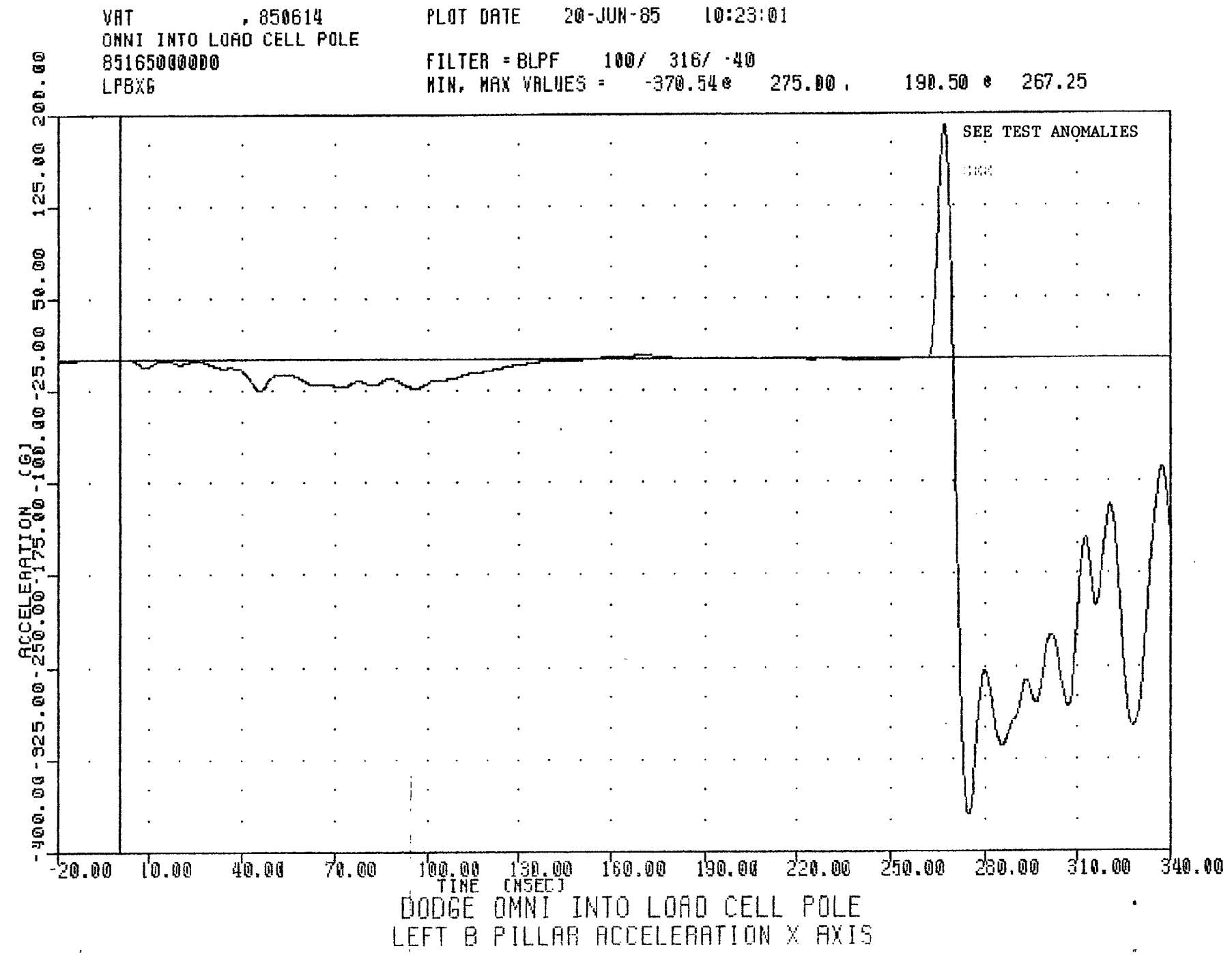
DODGE OMNI INTO LOAD CELL POLE
DASH PANEL CENTER ACCELERATION X AXIS

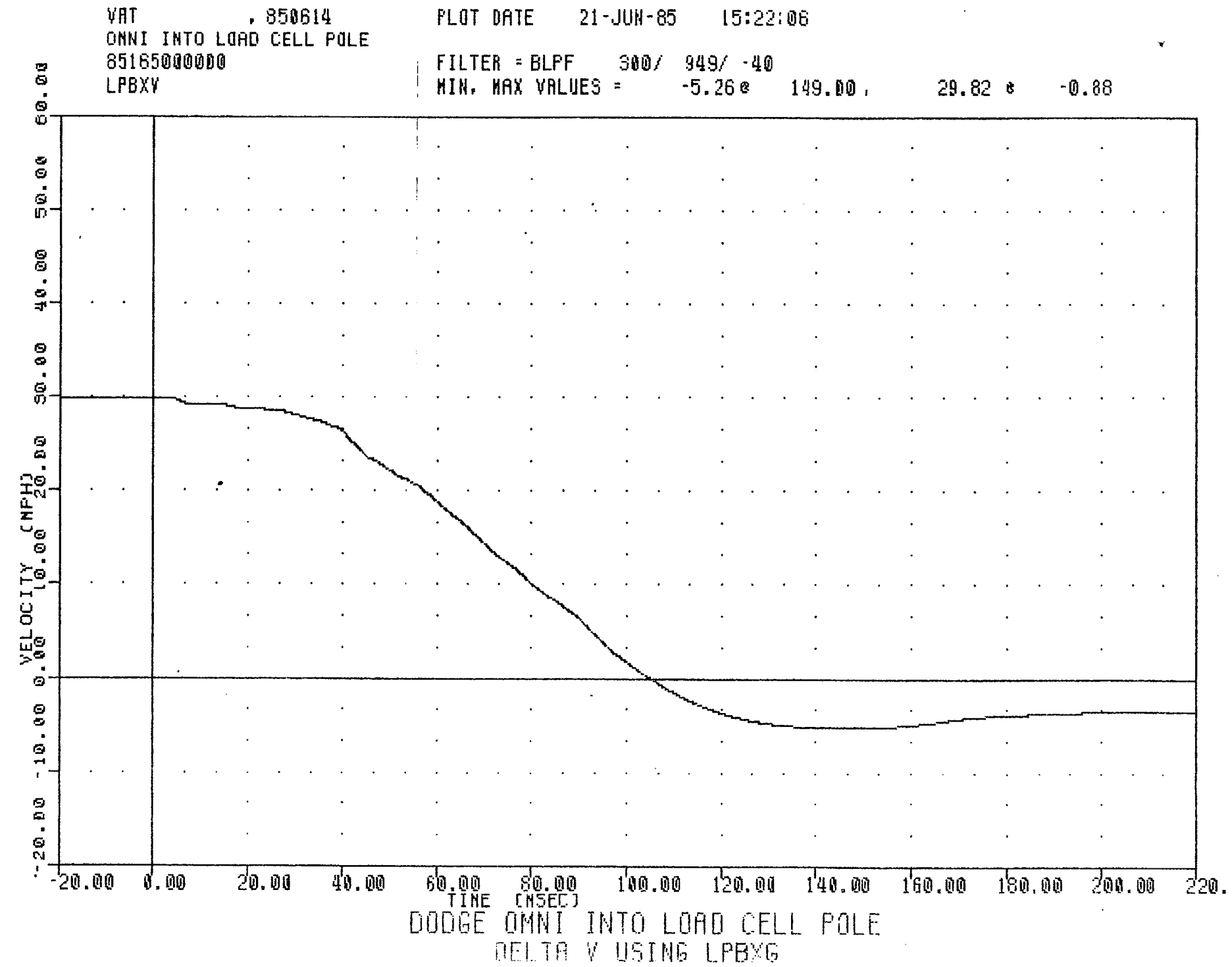


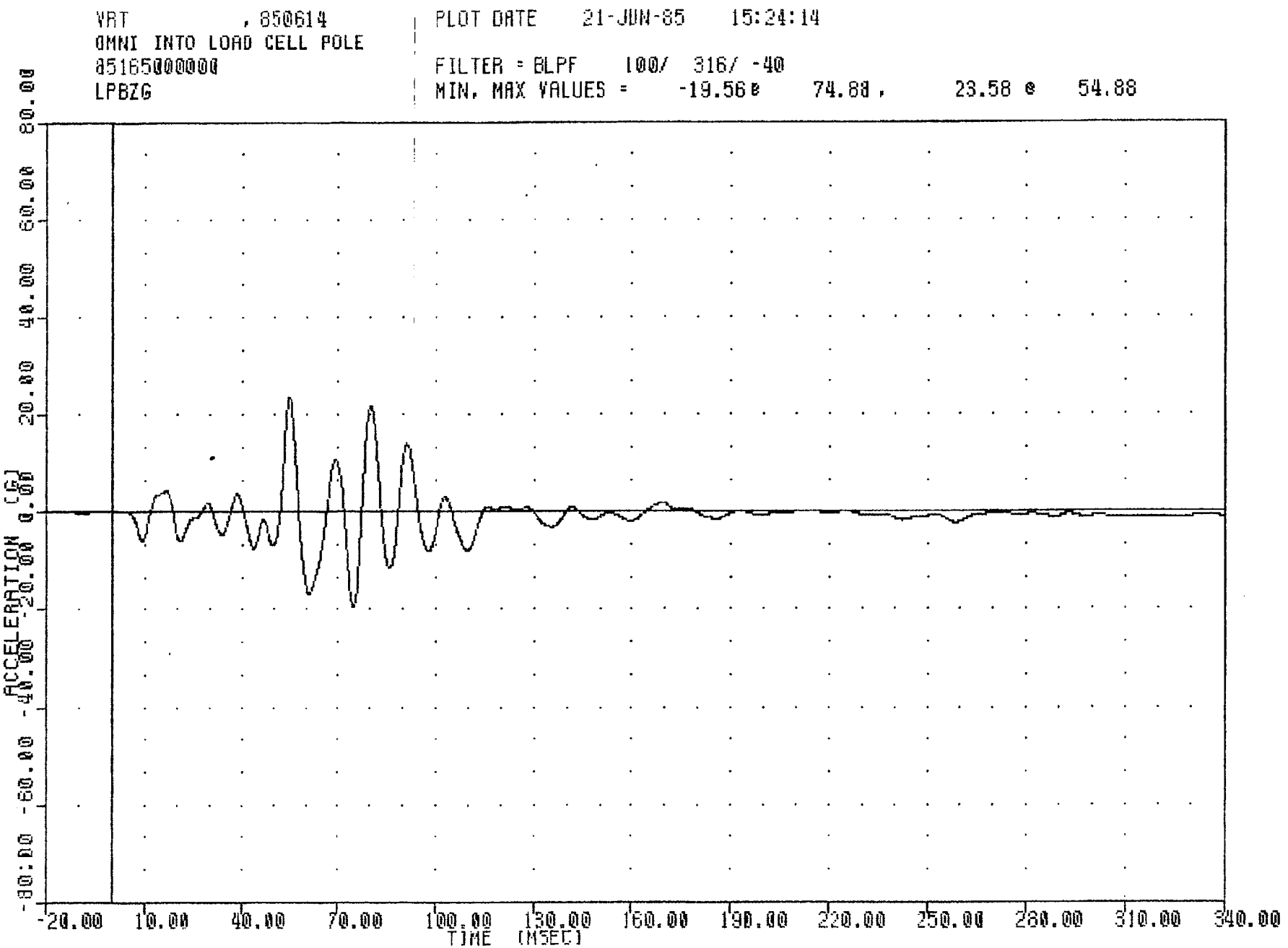
DODGE OMNI INTO LOAD CELL POLE
DASH PANEL CENTER ACCELERATION Z AXIS



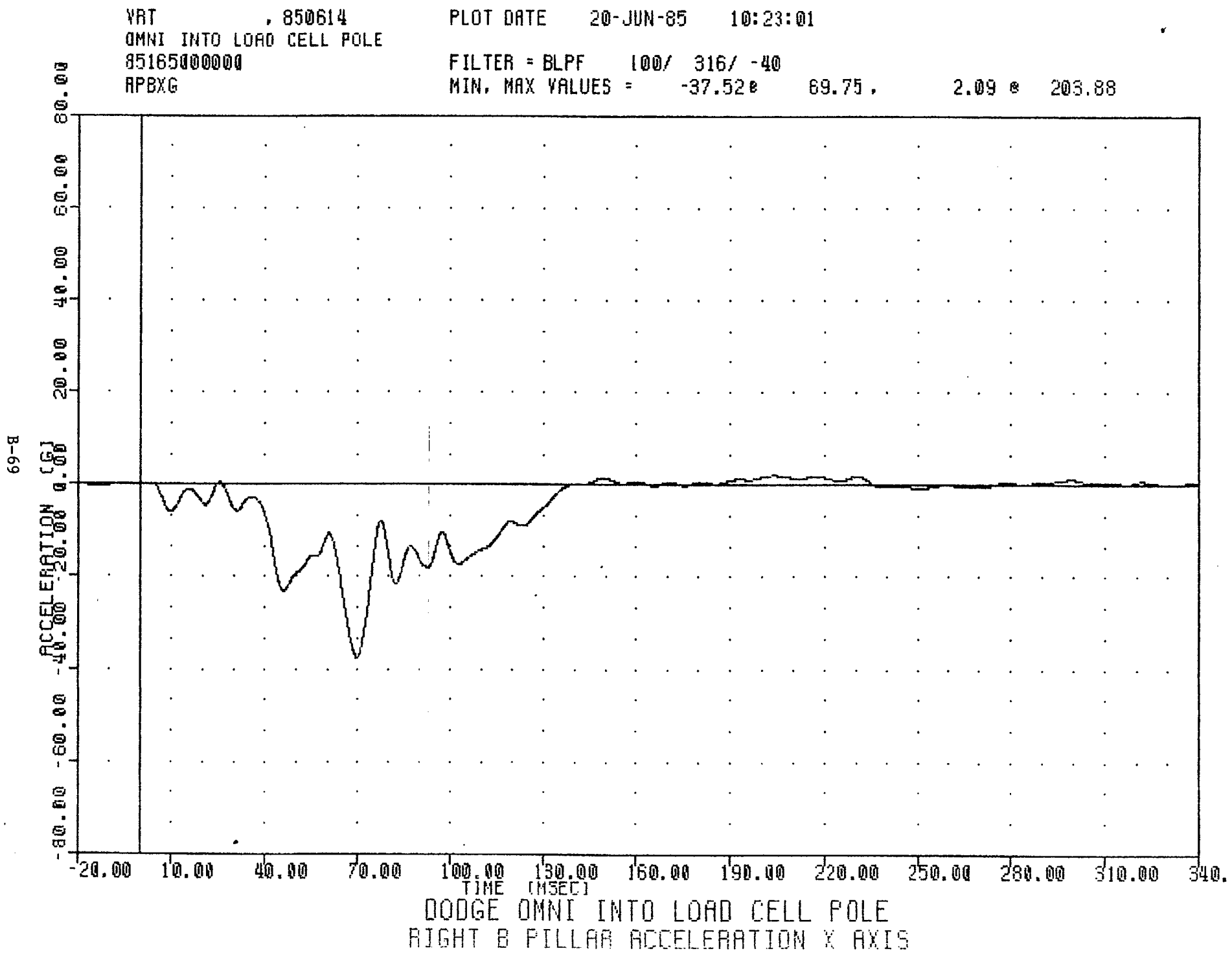
DODGE OMNI INTO LOAD CELL POLE
VEHICLE PITCH RATE DEGREES/SECOND


VAT , 850614
PLOT DATE 20-JUN-85 10:23:01
ONNI INTO LOAD CELL POLE
FILTER = BLPF 100/ 316/ -40
851650000D0
MIN, MAX VALUES = -370.54 @ 275.00 , 190.50 @ 267.25
LPBX6
SEE TEST ANOMALIES
ACCELERATION (G)
-400.00 -325.00 -250.00 -175.00 -100.00 -25.00 50.00 125.00 200.00
-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)
DODGE OMNI INTO LOAD CELL POLE
LEFT B PILLAR ACCELERATION X AXIS


VAT , 850614
PLOT DATE 21-JUN-85 15:22:06
ONNI INTO LOAD CELL POLE
851650000D0
FILTER = BLPF 300/ 949/ -40
LPBXV
MIN, MAX VALUES = -5.26 @ 149.00 , 29.82 @ -0.88
VELOCITY (MPH)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
DELTA V USING LPBXG

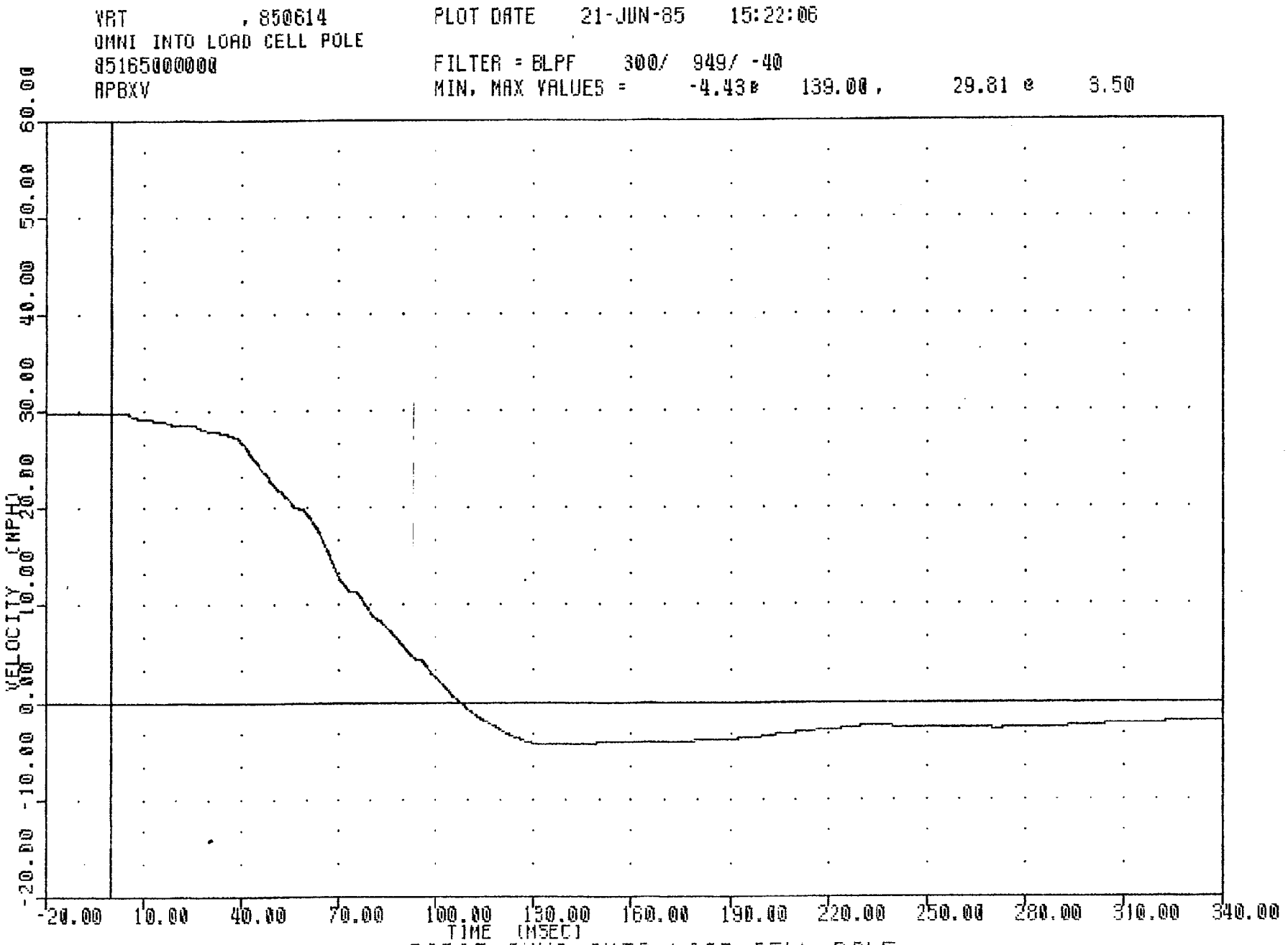


DODGE OMNI INTO LOAD CELL POLE
LEFT B PILLAR ACCELERATION Z AXIS

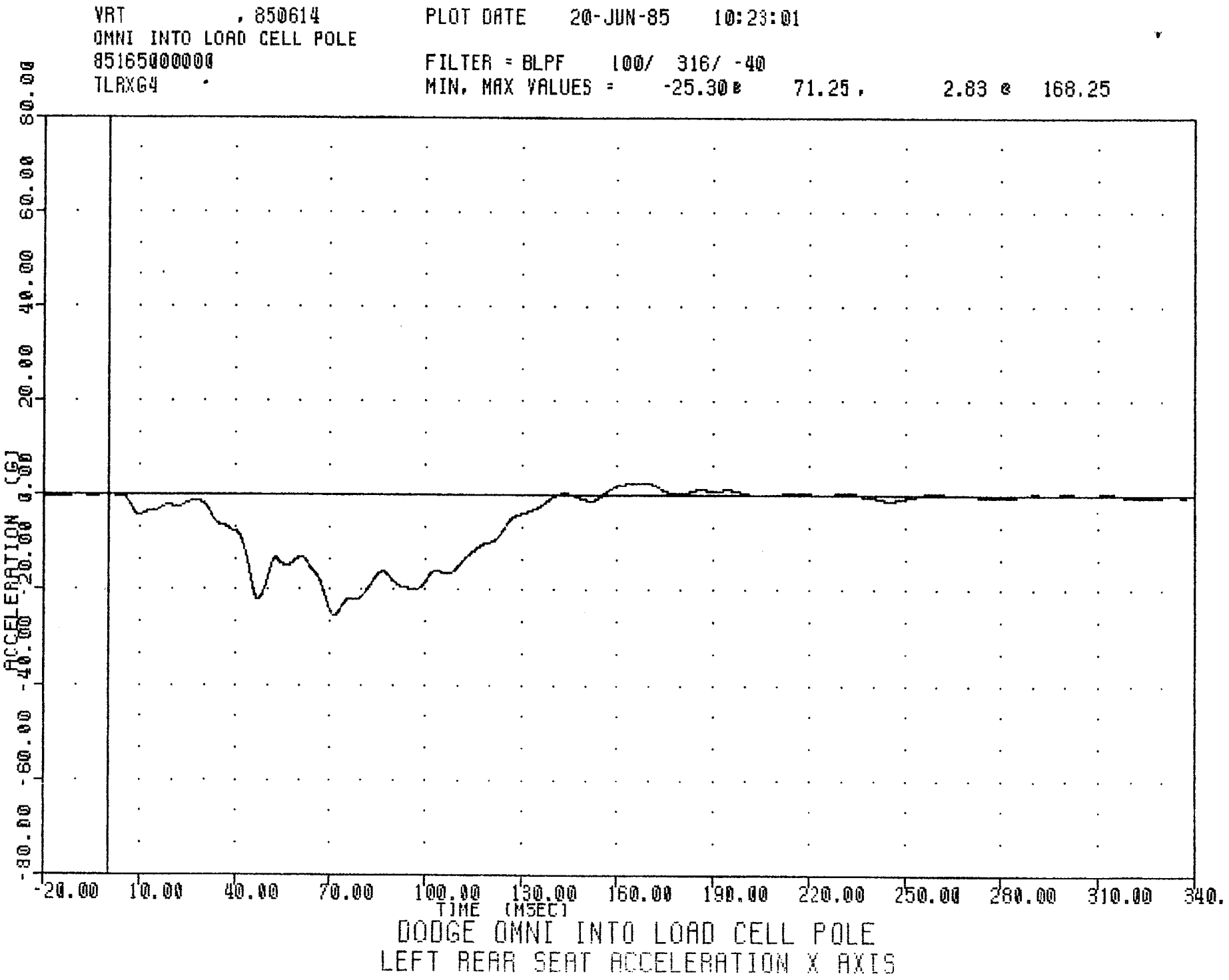


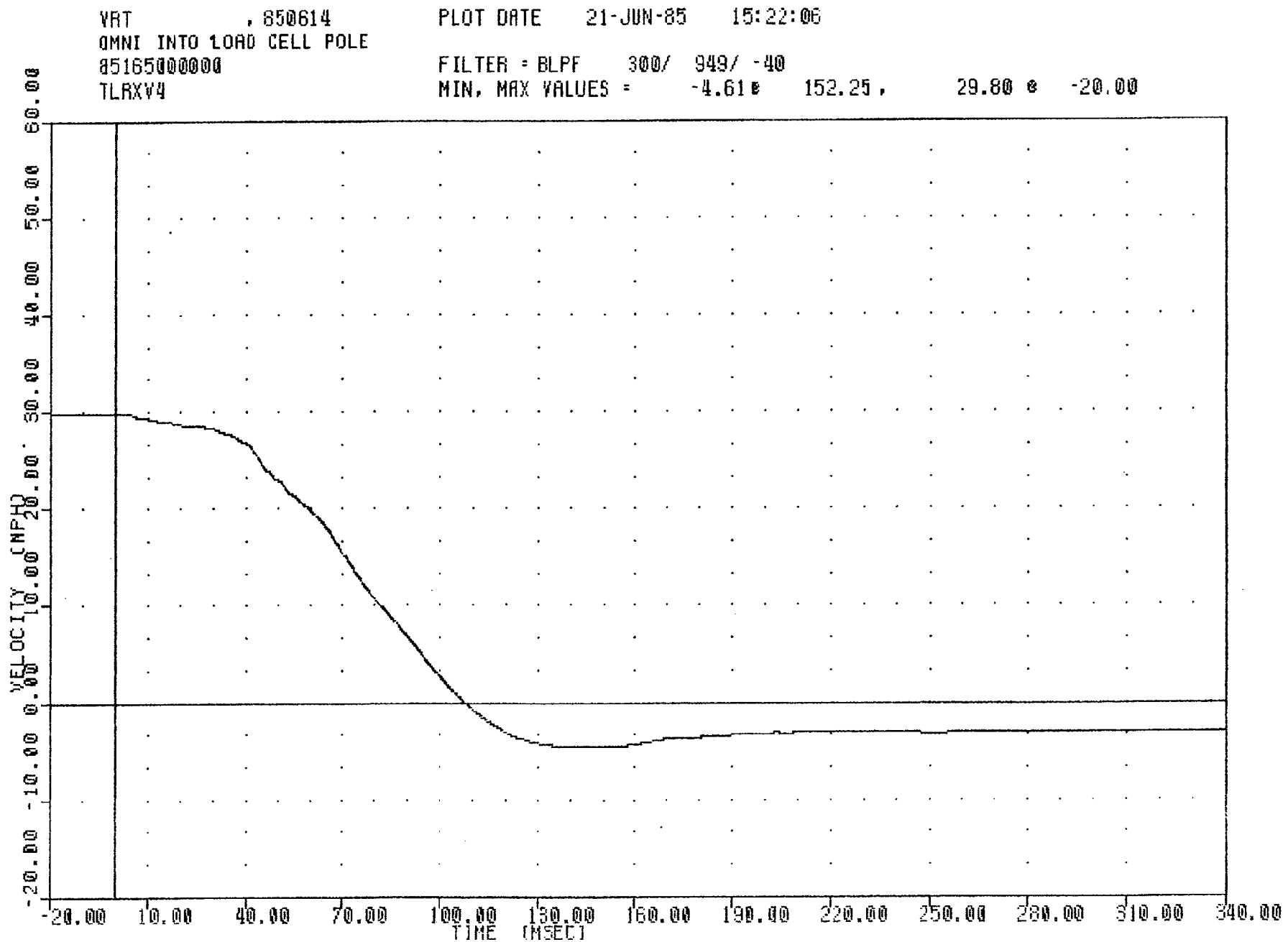
DODGE OMNI INTO LOAD CELL POLE

RIGHT B PILLAR ACCELERATION X AXIS

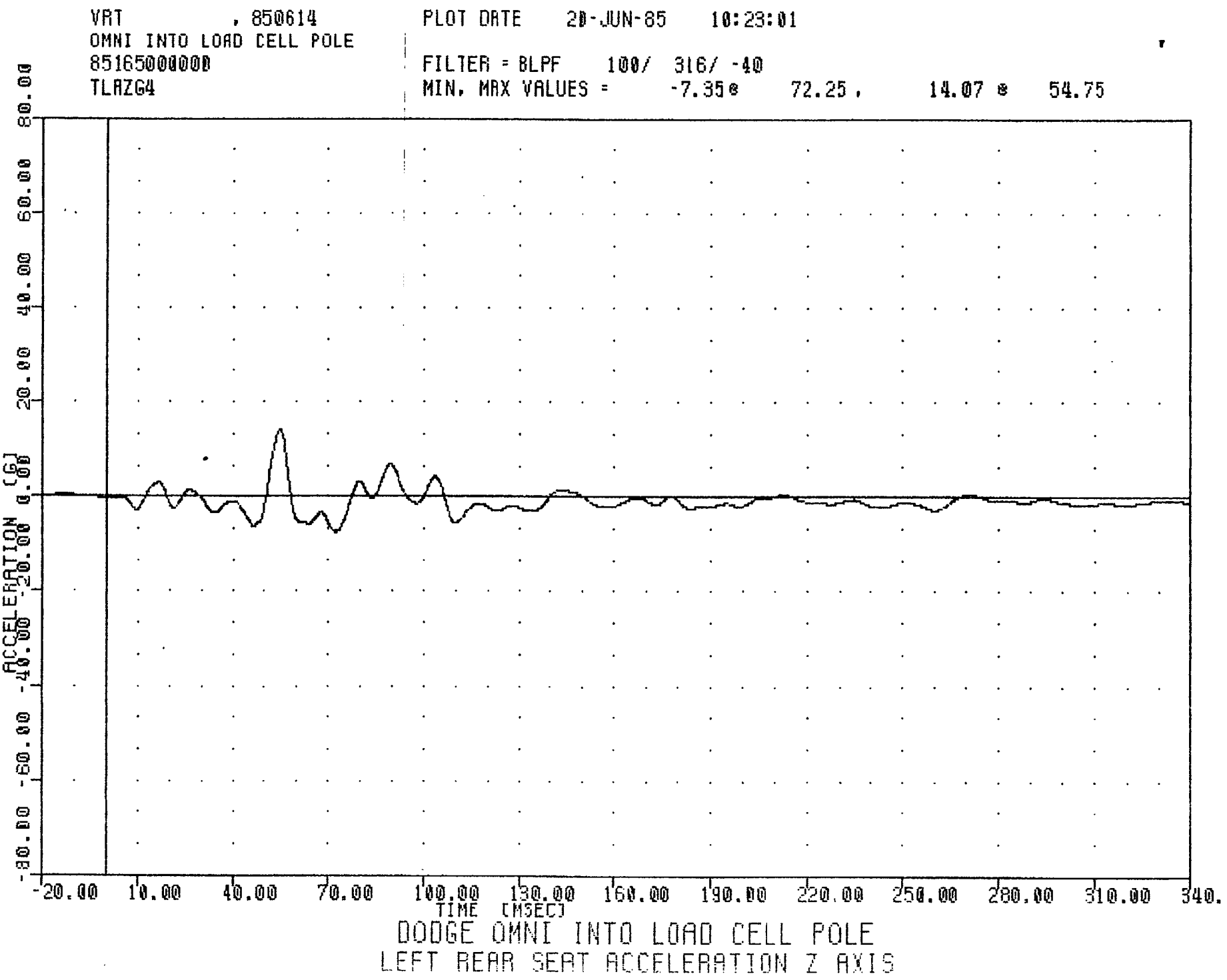


DODGE OMNI INTO LOAD CELL POLE
DELTA V USING RPBXG


VRT , 850614
PLOT DATE 20-JUN-85 10:23:01
OMNI INTO LOAD CELL POLE
85165000000
FILTER = BLPF 100/ 316/ -40
TLRXG4
MIN, MAX VALUES = -25.30 @ 71.25 , 2.83 @ 168.25
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
LEFT REAR SEAT ACCELERATION X AXIS

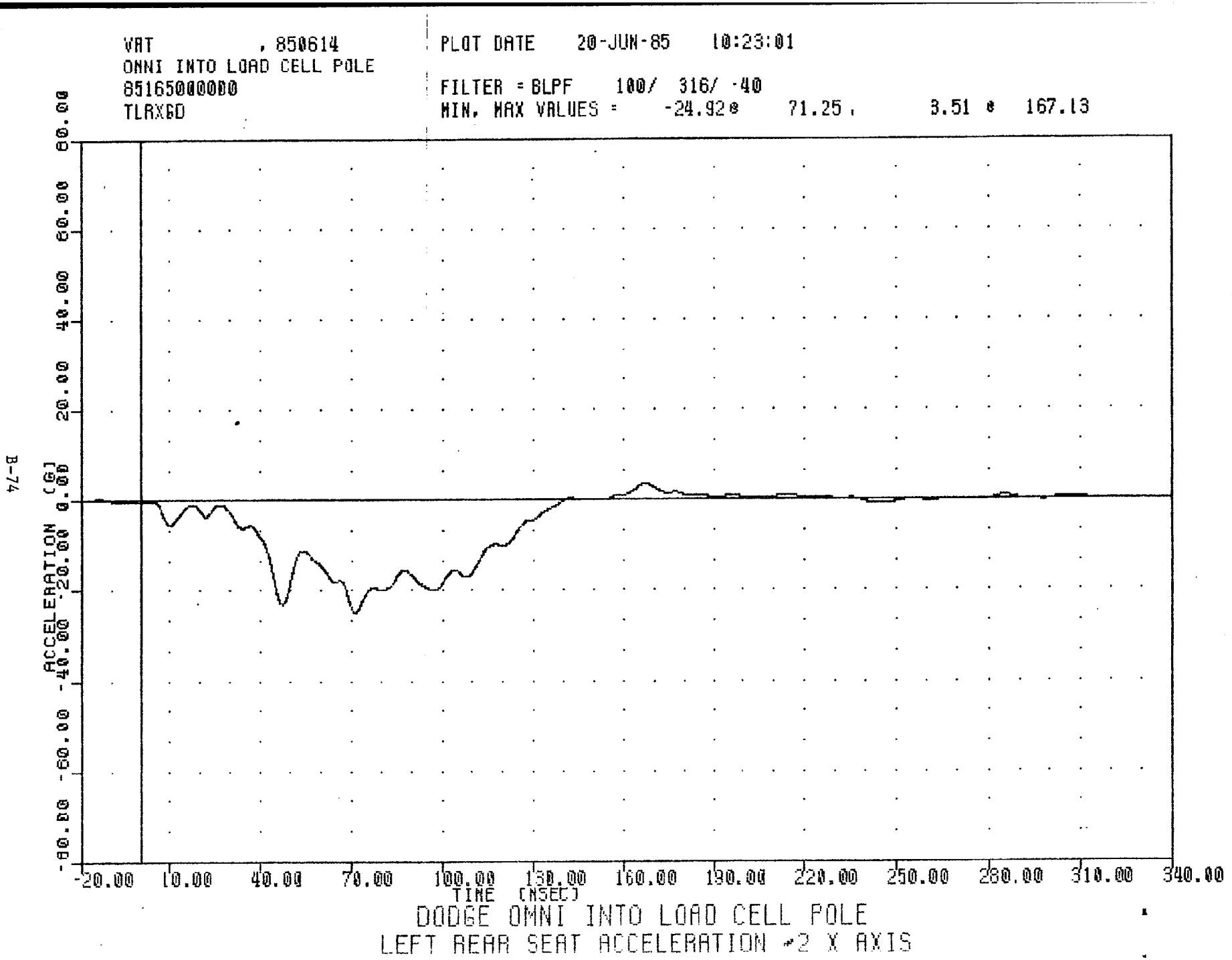


DODGE OMNI INTO LOAD CELL POLE
DELTA V USING TLRXG4

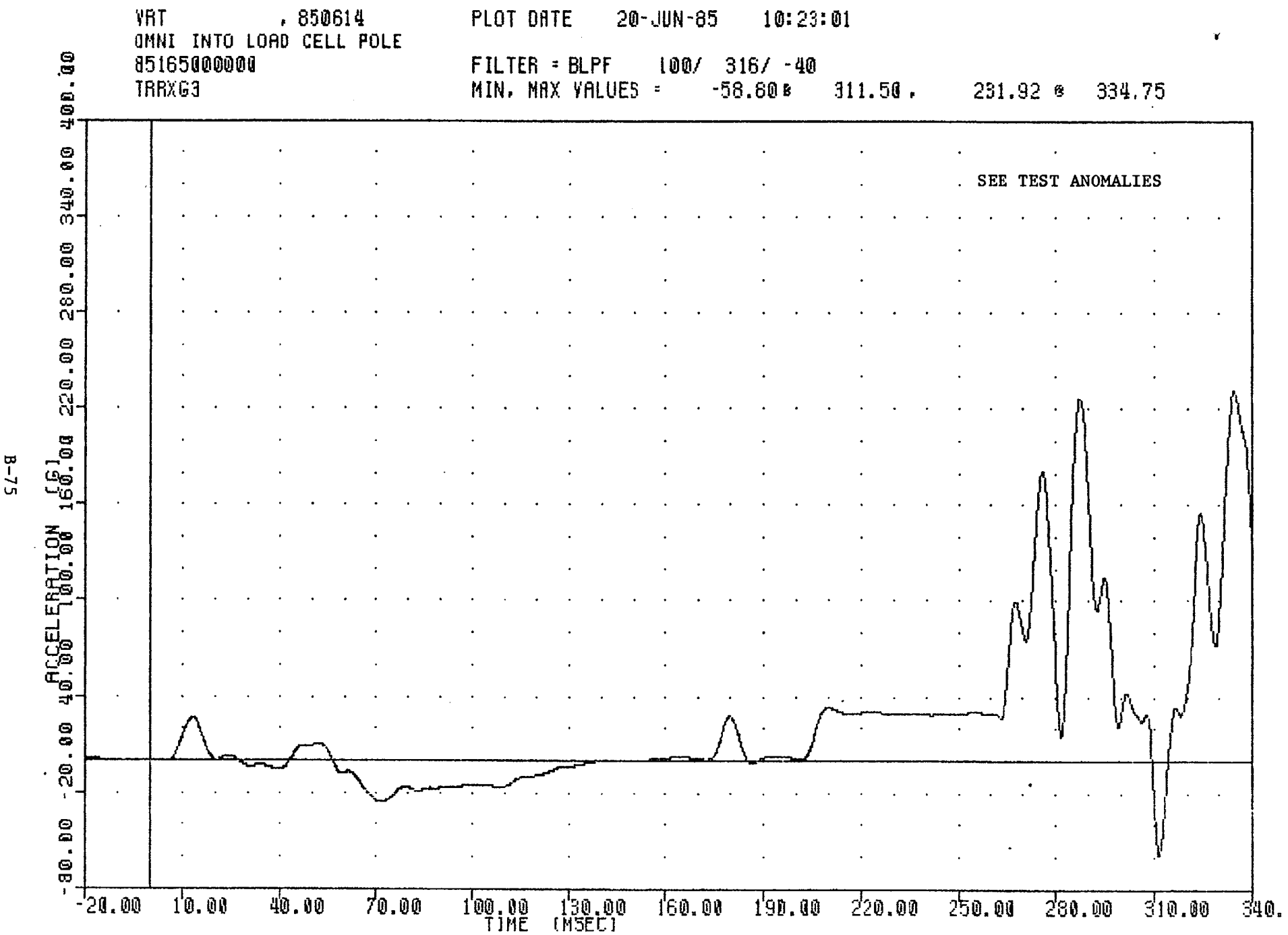


DODGE OMNI INTO LOAD CELL POLE

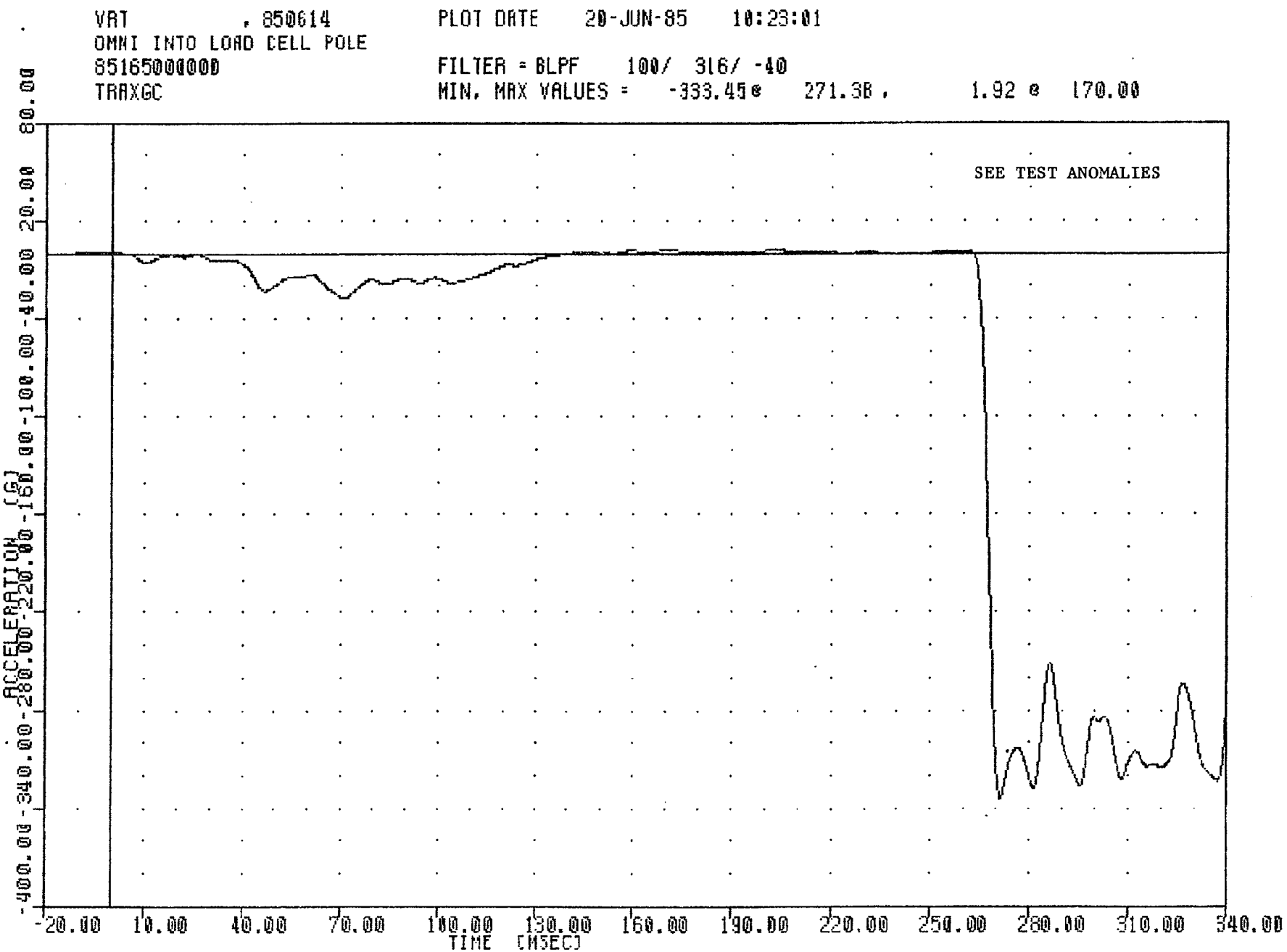
LEFT REAR SEAT ACCELERATION Z AXIS



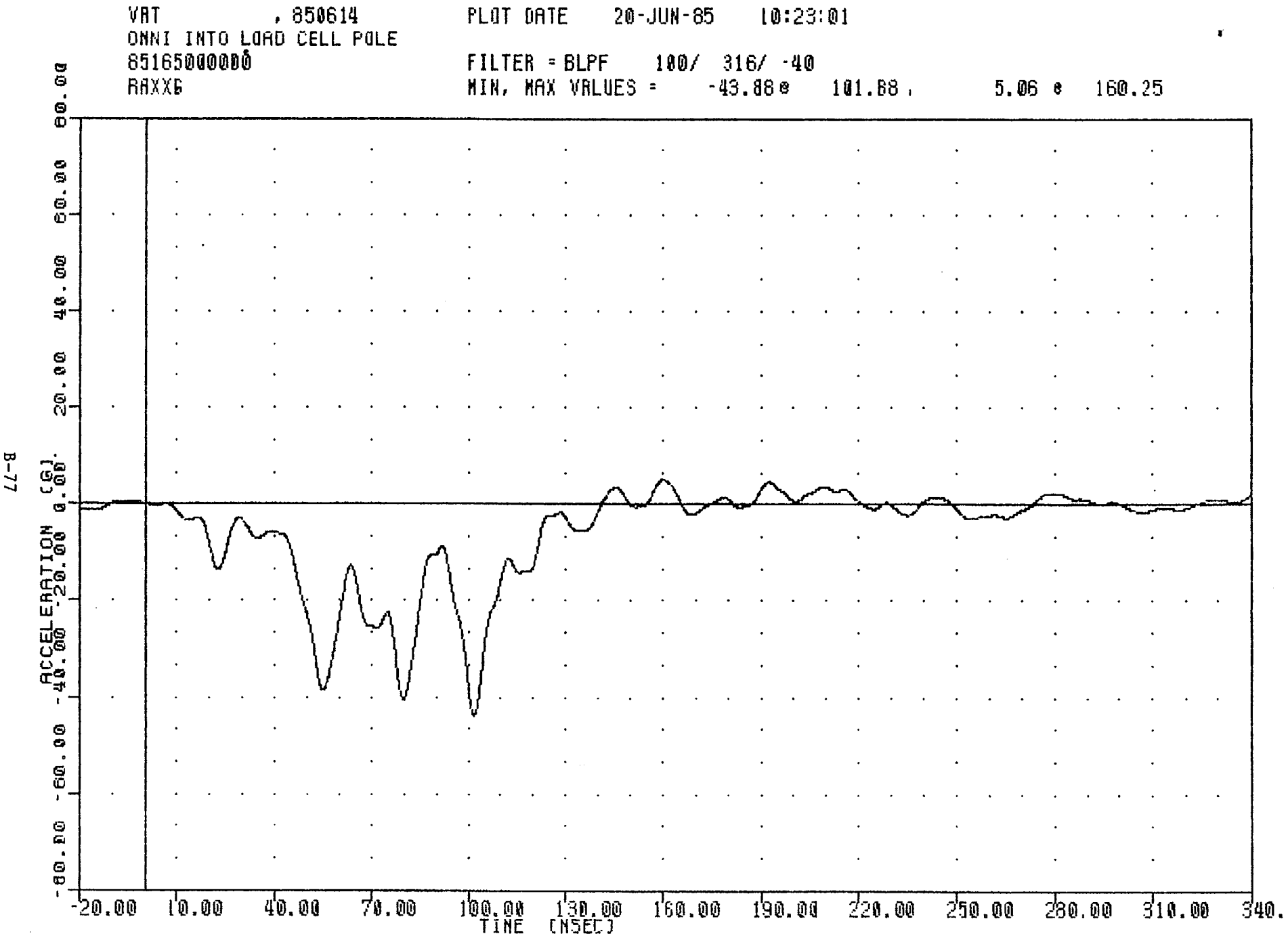
DODGE OMNI INTO LOAD CELL POLE
LEFT REAR SEAT ACCELERATION #2 X AXIS



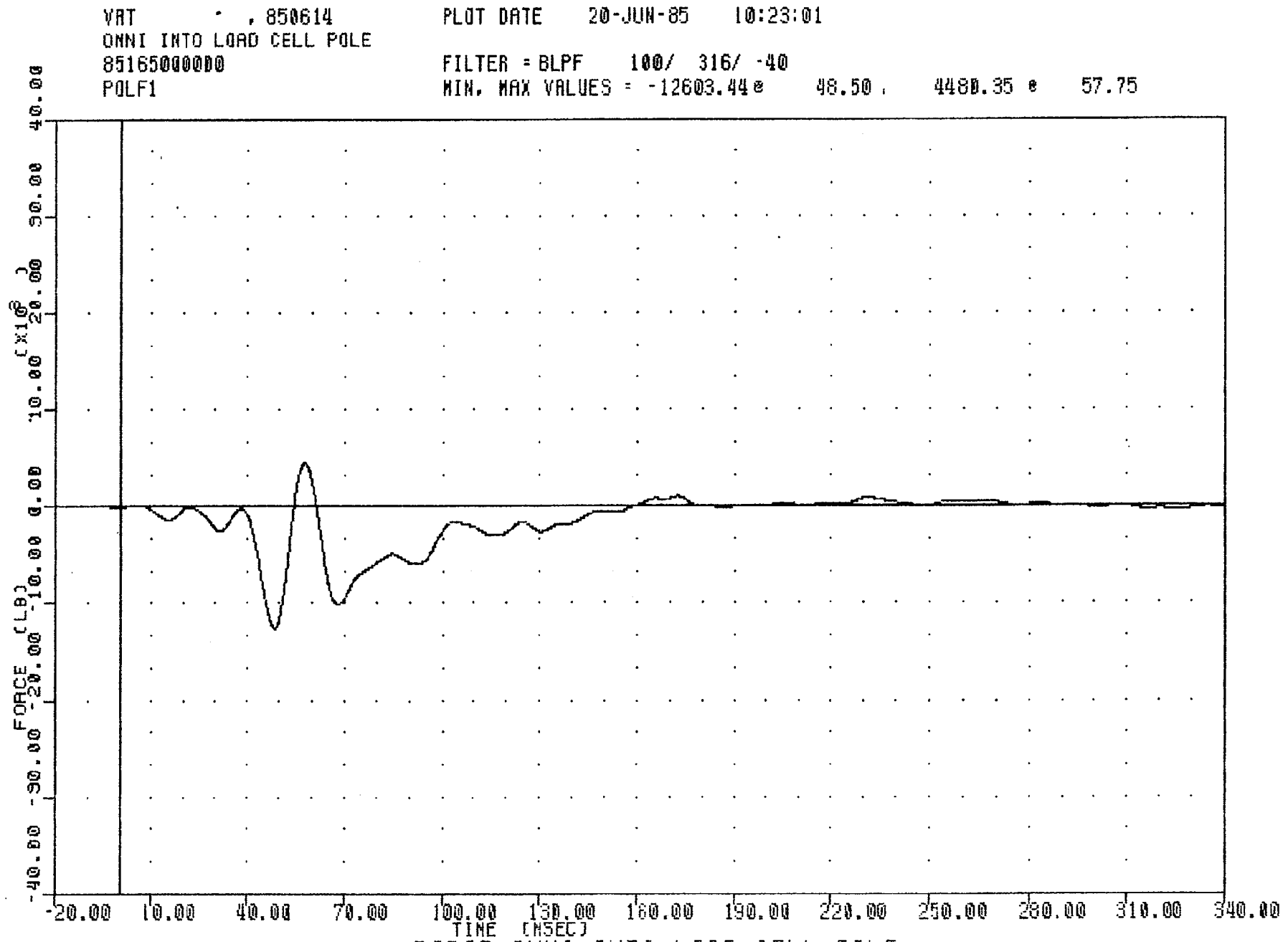
DODGE OMNI INTO LOAD CELL POLE
RIGHT REAR SEAT ACCELERATION X AXIS



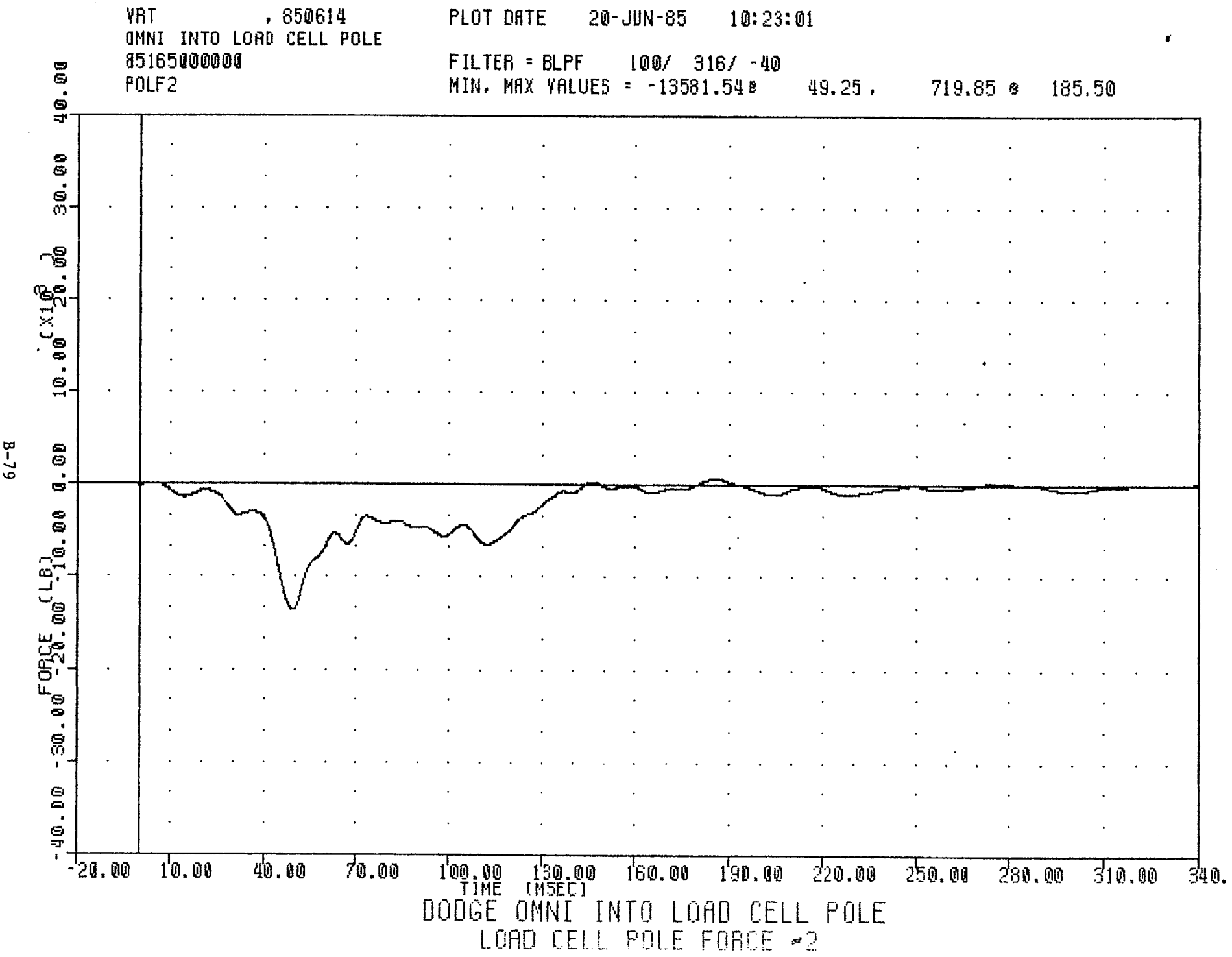
DODGE OMNI INTO LOAD CELL POLE
RIGHT REAR SEAT ACCELERATION #2 X AXIS

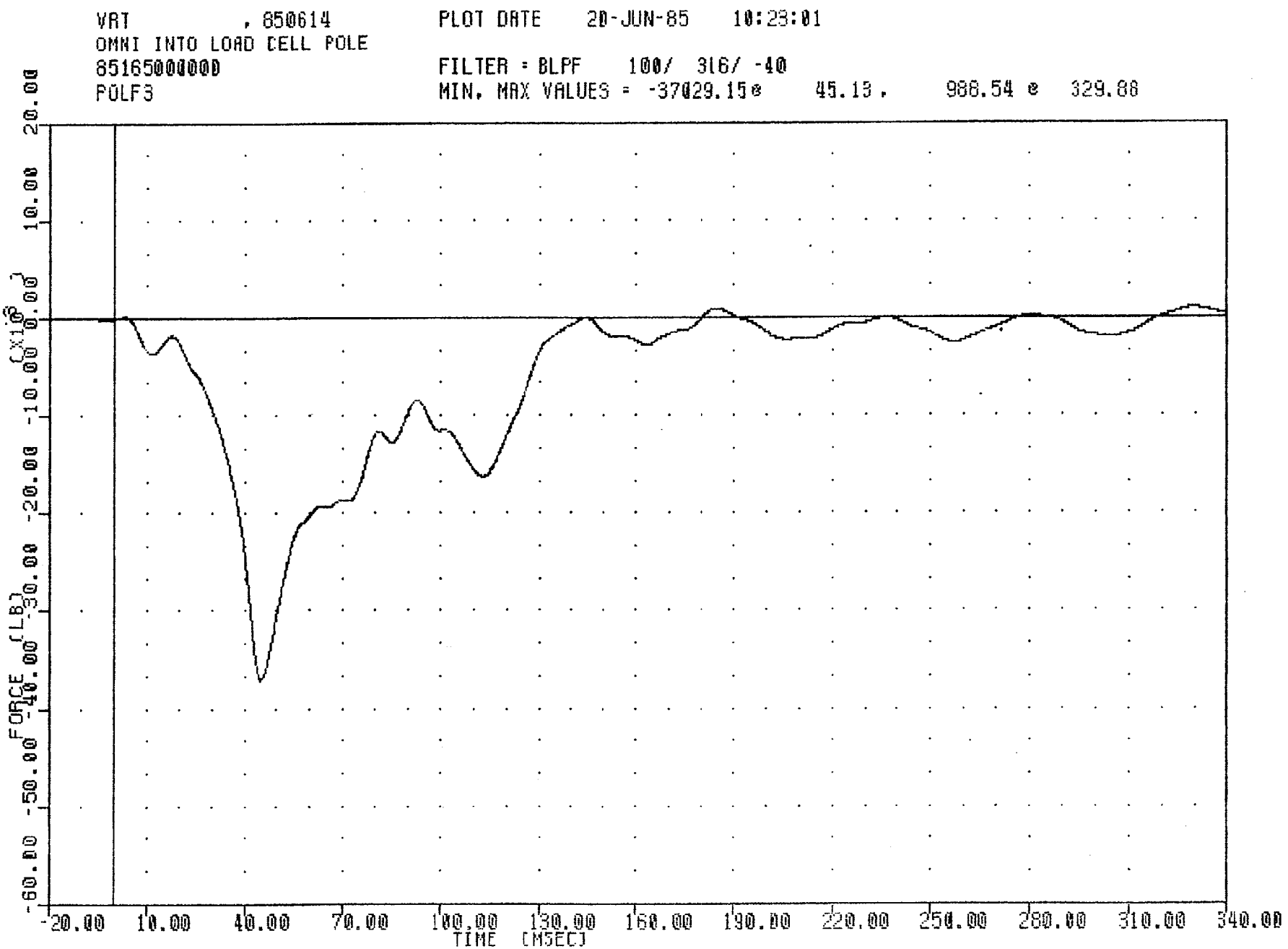


DODGE OMNI INTO LOAD CELL POLE
REAR AXLE ACCLERATION X AXIS

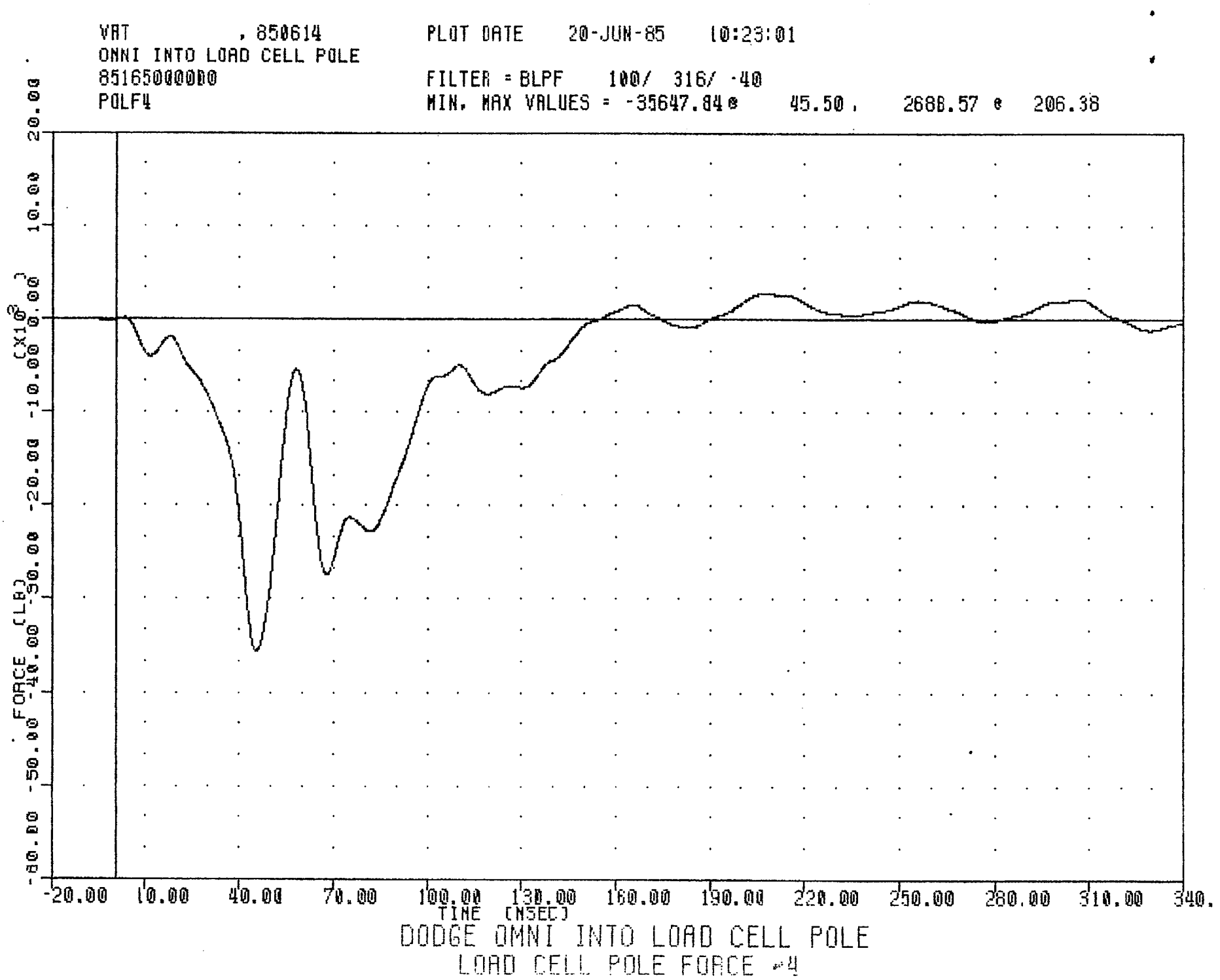


DODGE OMNI INTO LOAD CELL POLE
LOAD CELL POLE FORCE #1


VRT , 850614
OMNI INTO LOAD CELL POLE
85165000000
POLF2
PLOT DATE 20-JUN-85 10:23:01
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -13581.54 @ 49.25 , 719.85 @ 185.50
FORCE (LB) (X10^2)
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.
TIME (MSEC)
DODGE OMNI INTO LOAD CELL POLE
LOAD CELL POLE FORCE #2



DODGE OMNI INTO LOAD CELL POLE
LOAD CELL POLE FORCE #3



DODGE OMNI INTO LOAD CELL POLE

LOAD CELL POLE FORCE #4

APPENDIX C

DUMMY CERTIFICATION

This section contains dummy calibration data for the passenger dummy. The driver dummy was not calibrated prior to this test. The dummies used in this program are now scheduled for recalibration after each dummy has been through two crash tests. Between times in which the dummy is not scheduled to be calibrated a post-test inspection is completed. If no parts are needed, the dummy is ready to be used in the next crash test.

PRE-TEST CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III 03-JUN-85

VRTC SRL98 48C13HD1 HY3 SN48/HEAD#48 CAL 13

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	70.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	259.13 G
PEAK LATERAL ACCELERATION	15 G MAX	-2.31 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Mary L. Phelps

TEST SUPERVISOR V. L. Watters

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

6 AXIS NECK TRANSDUCER 04-JUN-85

VRTC SRL98 48C13NF1 HY3 SN48 CAL13 NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY		10% - 70%	64.00 %
IMPACT VELOCITY		22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	25.06 G
	20 MS	17.40 - 22.60 G	21.52 G
	30 MS	12.50 - 18.50 G	17.79 G
MAXIMUM PENDULUM G		29 G MAX	26.90 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 46 MS	41.75 MS
D PLANE ROTATION	MAX	67 - 79 DEGREES	76.02 DEGREES
	TIME	54 - 64 MS	59.50 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	70 - 90 FT.LBS	75.80 FT.LBS
	TIME	46 - 56 MS	55.25 MS
	MIN	-22.2/-14.0 FT.LBS	-13.72 FT.LBS **
	TIME	12 - 16 MS	15.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		109 - 119 MS	118.00 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		95 - 105 MS	103.13 MS

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR K. L. Mathews

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

6 AXIS NECK TRANSDUCER 04-JUN-85

VRTC SRL98 48C13NE1 HY3 SN48 CAL13 NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY		10% - 70%	64.00 %
IMPACT VELOCITY		19.50 - 19.90 FPS	19.51 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	19.39 G
	20 MS	14.00 - 19.00 G	18.19 G
	30 MS	11.00 - 16.00 G	14.95 G
MAXIMUM PENDULUM G		22 G MAX	20.35 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 50 MS	41.75 MS
D PLANE ROTATION	MAX	94 - 106 DEGREES	94.91 DEGREES
	TIME	72 - 82 MS	79.88 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	11.75 - 17.75 FT.LB	14.57 FT.LBS
	TIME	12 - 18 MS	14.88 MS
	MIN	-61.2/-50.8 FT.LBS	-48.50 FT.LBS **
	TIME	69 - 77 MS	74.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		151 - 167 MS	162.50 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 144 MS	140.63 MS

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR K. L. Walters

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III 06-JUN-85

VRTC SRL98 48C13TH2 HY3 SN48 CAL13 H.S.THORAX 02

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	64.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.22 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.590 INCHES
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1148.3 POUNDS *
INTERNAL HYSTERESIS	75% - 85%	75.6%

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR K.L. Walters

NOTE: New rib set #297 installed.

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III 04-JUN-85

RIGHT KNEE
VRTC SRL98 48C13RK1 HY3 SN48 R.KNEE 11LB CAL 13

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	65.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1447.13 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR K. L. Walters

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III 04-JUN-85

LEFT KNEE
VRTC SRL98 48C13LK1 HY3 SN48 L.KNEE 11LB CAL 13

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	65.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1298.44 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Mary L. Phelps

TEST SUPERVISOR V. L. Walters

POST-TEST CALIBRATION

BEST COPY

Dummy Damage Checklist

HyB III 4/5

OK	Damaged	
		Outer skin on entire dummy (gashes, rips, etc.)
		Head - Gashes, rips, general appearance, etc.
		Neck - broken or cracks in rubber
		Spine - broken or cracks in rubber
		Ribs - check all ribs for damage (bent or broken), damping material separation.
		Bourns Pot. - bent shaft - electrical discontinuity
		Accelerometer Leads - torn cables
		Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting
	✓	Other KNEESKIN SMALL CUTS

If upon visual examination, damage is apparent in any of these areas, a VRTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

Signature Date

Comments on repair or replacement of parts:

RIBS, RH CRACKED

2345 SMALL CRACKS

LH #1 LARGE CRACK ⇒ SEPARATION OF DAMPING MATERIAL

TRC Personnel
Checked By:

Signature Date 17 JUNE 85

VRTC Personnel
Checked and Approved for Testing BY:

Signature Date

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III 19-JUN-85

VRTC SRL98 43C9HD1 HY3 SN43/HEAD#45 CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	67.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	255.85 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.02 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR K. L. Walters

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSDUCER 19-JUN-85

VRTC SRL98 43C9NF1 HY3 SN43 CAL9 NECK FLEXION 01

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY		10% - 70%	66.00 %
IMPACT VELOCITY		22.53 - 22.97 FPS	22.86 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	25.56 G
	20 MS	17.40 - 22.60 G	21.85 G
	30 MS	12.50 - 48.50 G	16.57 G
MAXIMUM PENDULUM G		29 G MAX	26.41 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 46 MS	42.88 MS
D PLANE ROTATION	MAX	67 - 79 DEGREES	77.15 DEGREES
	TIME	54 - 64 MS	60.75 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	70 - 90 FT.LBS	71.46 FT.LBS
	TIME	46 - 56 MS	55.38 MS
	MIN	-22.2/-14.0 FT.LBS	-14.21 FT.LBS
	TIME	12 - 16 MS	15.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		109 - 119 MS	120.75 MS **
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		95 - 105 MS	102.50 MS

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR V. L. Walters

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER 19-JUN-85

VRTC SRL98 43C9NE1 HY3 SN43 CAL9 NECK EXTEN. 01

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	69 00 DEGREES
RELATIVE HUMIDITY		10% - 70%	65.00 %
IMPACT VELOCITY		19.50 - 19.90 FPS	19.85 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	19.85 G
	20 MS	14.00 - 19.00 G	17.56 G
	30 MS	11.00 - 16.00 G	14.71 G
MAXIMUM PENDULUM G		22 G MAX	20.39 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 50 MS	42.38 MS
D PLANE ROTATION	MAX	94 - 106 DEGREES	96.74 DEGREES
	TIME	72 - 82 MS	81.13 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	11.75 - 17.75 FT.LB	15.04 FT.LBS
	TIME	12 - 18 MS	15.00 MS
	MIN	-61.2/-50.8 FT.LBS	-42.35 FT.LBS **
	TIME	69 - 77 MS	76.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		151 - 167 MS	168.75 MS **
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 144 MS	143.75 MS

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR D. L. Watters

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III 25-JUN-85

VRTC SRL98 43C9TH1 HY3 SN43 CAL09 H.S.THORAX 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	69.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	64.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.18 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.704 INCHES
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1146.0 POUNDS *
INTERNAL HYSTERESIS	75% - 85%	74.9% *

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Mary L. Phelps

TEST SUPERVISOR P. L. Watts

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

25-JUN-85

RIGHT KNEE
VRTC SRL98 43C9RK1

HY3 SN43 R.KNEE 11LB CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	61.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1507.73 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR V. L. Watters

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III 25-JUN-85

LEFT KNEE
VRTC SRL98 43C9LK1 HY3 SN43 L.KNEE 11LB CAL 09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	61.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1278.36 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR V. L. Watters

OK	Damaged	
		Outer skin on entire dummy (tashes, rips, etc.)
		Head - Gashes, rips, general appearance, etc.
		Neck - broken or cracks in rubber
		Spine - broken or cracks in rubber
		Ribs - check all ribs for damage (bent or broken), damping material separation.
		Pot. - boot shift - electrical discontinuity
		Accelerometer Leads - torn cables
		Accelerometer Mountings (Head, Thorax, Pelvis) - check for secure mounting
		Other

If upon visual examination, damage is apparent in any of these areas, a VRTC representative is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement Approved By:

_____ _____

Signature Date

Comments on repair or replacement of parts:

ALL OK. USUAL

TRC Personnel
Checked By:

Gregg Wills 19 JUNE 85

Signature Date

VRTC Personnel
Checked and Approved for Testing BY:

_____ _____

Signature Date

APPENDIX D

MISCELLANEOUS TEST INFORMATION

GM HYBRID III DUMMY POSITIONING

The following procedure was used for positioning a Hybrid III dummy (GM50H) in the vehicle seat for impact testing. The procedure utilizes seat parameters for a specific vehicle body style, and if available, parameters for the individual seat being used in the test. The dummy head is positioned to keep the longitudinal accelerometers horizontal.

1. Preliminary Data

1.1 Obtain the body coordinates for the S.A.E. three dimensional manikin (Oscar) H-point at the specific seat travel location used for the test. Typically when using the Hybrid III dummy, this will be the manual seat adjuster mid travel position. If no detent is available at mid travel, use the position which would lock the seat adjuster one notch rear of mid.

1.2 If specific Oscar data is not available, design drawing information will be used to determine the design H-point location at a specified seat adjuster position.

2. Initial Dummy Placement

2.1 The Hybrid III dummies are placed in the seats of the test buck or vehicle. The pelvis is positioned such that a lateral line passing through the dummy H-point is perpendicular to the longitudinal centerplane of the vehicle.

2.1.1 Vehicle equipped with front bucket seats. The dummy is centered on the seat cushion of the bucket seat and its midsagittal plane is vertical and longitudinal.

2.1.1.1 Driver position placement. At the driver's position, the knees of the dummy are initially set 370 mm apart, measured between the outer surfaces of the knee pivot bolt heads, with the left outer surface 150 mm from the midsagittal plane of the dummy.

2.1.1.2 Passenger position placement. At the right front designated seating positon, the femur, tibia, and foot centerlines of each of the dummy's legs fall in a vertical longitudinal plane. The knees are spaced 215 mm centerline to centerline.

2.1.2 Vehicle equipped with bench seating.

2.1.2.1 Driver position placement. The dummy is placed at the left front outboard designated seating position so that its midsagittal plane is vertical and longitudinal, and passes through the center point of the plane described by the steering wheel rim.

2.1.2.2 Passenger position placement. The dummy is placed at the right front outboard designated seating position as specified in 2.1.1.2, except that the midsaggital plane of the dummy is vertical, longitudinal, and the same distance from the longitudinal centerline as the midsagittal plane of the dummy at the driver's position.

2.2 Measure the seat back angle by placing an inclinometer against the rear of the seat back cushion. Measure the angle at a point midway up the cushion and supported by a rigid portion of the seat back pan.

3. Initial Dummy Positioning

3.1 H-point positioning.

3.1.1 With the dummy laterally positioned as described in Section 2, insert the pelvis angle indicator bar in the hole provided above, and to the rear of the dummy H-point. Position the longitudinal pelvis angle betweeen 20° and 25° to the horizontal. This may be accomplished by raising the legs or flexing the upper torso forward and allowing the pelvis to rotate. The lateral pelvis angle should be horizontal.

3.1.2 Apply sufficient force on the lower torso in a horizontal and vertical direction to place the dummy H-point at the coordinates obtained in Section 1.

3.1.3 If the H-point cannot be placed at the desired coordinates, adjust the pelvis angle within the 5^{o} band and reposition to the coordinates. After repositioning the H-point, any deviation from the desired coordinates should be recorded and used to indicate actual H-point locations.

3.2 Head CG positioning. While maintaining the H-point location, adjust the Hybrid III upper torso so as to place the head accelerometer mounting surface level.

3.2.1 Remove the rear skull cap to expose the machined surface of the head. Place an inclinometer on this surface. The skull surface should be within $.5^{o}$ of vertical to maintain a proper head orientation.

4. Final Positioning

4.1 Place the dummy feet in contact with the toe pan with the heel placed at the intersection of the toe pan and floor pan. The driver right foot should be placed on the undepressed accelerator pedal, with the heel in contact with the floor pan.

If the feet cannot be placed against the toe pan without causing hip and head movement, the knee will have to be positioned first. Press down on the knees until the underside of knee joint contacts the seat cushion, or the thighs behind the joint depress the seat cushion. Place the foot perpendicular to the tibia and allow the lower leg to pivot at the knee until the heel rests on the floor pan.

4.2 The driver dummy hands are raised from the seat and, without moving the dummy are placed on the steering wheel. The hands are placed at the horizontal centerline of the steering wheel with the thumbs over the wheel rim. The wrists are outside of the steering wheel plane. Planes described by each upper and lower arm should be at or near vertical.

4.3 Prior to conducting the test, the dummy is visually checked to make certain the dummy midsagittal plane is vertical and longitudinal, the desired head, hip and knee coordinates have been maintained, the pelvis is laterally horizontal and longitudinally within the pelvis angle range, and the engineer responsible for the test is satisfied with the dummy position.

HEAD CHAMOIS USE PROCEDURE

1. Using the GM template, two 0.125 inch thick chamois from Hydra-Sponge, St. Louis, MO. were cut.

2. The chamois were soaked in water to make them soft and pliable.

3. The chamois were molded around the facial features of the dummy head and pulled taut. Both pieces of chamois were placed in the same manner.

4. Periphery of chamois were taped to the dummy's head.

5. Both chamois were allowed to dry prior to the test.

ACCELEROMETER PLACEMENT

Dummy Chest Humanoid (MFR) 43 (S/N), in Body Humanoid (MFR) 43 (S/N)

Mnenomic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
LFML2	718	Left Femur	Tension	718	2430
RFMF2	761	Right Femur	Tension	761	2430
CSTXG2	W	Chest (X)	Rear	AK58	7264
CSTYG2	X	Chest (Y)	Right	AE04	7264
CSTZG2	Y	Chest (Z)	Up	AA33	7264
HEDXG2	A	Head (X)	Front	AK29	7264
HEDYG2	B	Head (Y)	Right	A034	7264
HEDZG2	C	Head (Z)	Up	AH89	7264
NEKXF2		Neck (X)	Front	050	186
NEKYM2		Neck (Y)	Left	050	186
NEKZF2		Neck (Z)	Tension	050	186

*With 10 Vdc input (2000 g range).

ACCELEROMETER PLACEMENT

Dummy Chest Humanoid (MFR) 48 (S/N), In Body Humanoid (MFR) 48 (S/N)

Mnenomic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
LFMF2	756	Left Femur	Tension	756	2430
RFMF2	721	Right Femur	Tension	721	2430
CSTXG2	10	Chest (X)	Rear	AB62	7264
CSTYG2	11	Chest (Y)	Right	AL08	7264
CSTZG2	12	Chest (Z)	Up	AL46	7264
HEDXG2	8	Head (X)	Front	AH58	7264
HEDYG2	9	Head (Y)	Left	AH77	7264
HEDZG2	13	Head (Z)	Up	AH88	7264
HD1XG	4	Head (X)	Front	AK52	7264
HD1ZG	6	Head (Z)	Up	AU49	7264
HD2YG	2	Head (Y)	Left	AC88	7264
HD2ZG	3	Head (Z)	Up	AK48	7264
HD3XG	1	Head (X)	Front	AJ37	7264
HD3YG	5	Head (Y)	Left	AK30	7264
NEKXF2		Neck (X)	Front	076	1716
NEKXM2		Neck (X)	Right	076	1716

*With 10 Vdc input (2000 g range).

ACCELEROMETER PLACEMENT CONTD

Dummy Chest Humanoid (MFR) 48 (S/N), in Body Humanoid (MFR) 48 (S/N)

Mnenomic	Label No.	Location	Orientation (+Sensing)	Serial No.	Mfr/Model
NEKYM2		Neck (Y)	Front	076	1716
NEKYF2		Neck (Y)	Left	076	1716
NEKZF2		Neck (Z)	Tension	076	1716
NEKZM2		Neck (Z)	Tension	076	1716
KNLF2	14L	Left Knee	Tension	014	1587
KNLFB	14R	Left Knee	Tension	014	1587
KNLZD		Left Knee			Carter
KNRF2	221	Right Knee	Tension	022	1587
KNRFB	22R	Right Knee	Tension	022	1587
KNRXD		Right Knee			Carter
TBLXM2	16X	Left Tibia	Left	016	1583
TMLYM2	16Y	Left Tibia	Rear	016	1583
TBRXM2	23X	Right Tibia	Left	023	1583
TBRYM2	23Y	Right Tibia	Rear	023	1583
ANLYF2	12Y	Left Ankle	Left	012	1584
ANLZF2	12Z	Left Ankle	Tension	012	1584
ANLZF2	12Z	Left Ankle	Left	012	1584
ANRYF2	19Y	Right Ankle	Left	019	1584
ANRZF2	19Z	Right Ankle	Tension	019	1584
ANRXM2	19X	Right Ankle	Left	019	1584
CSTXD2		Chest			Bournes

*With 10 Vdc input (2000 g range).

VEHICLE ACCELEROMETER INFORMATION

MNEMONIC	DESCRIPTION	SERIAL NO.	MODEL NO.
FFRXG	FRONT FRAME RAIL X-DIR	AL31	2264
FFCXG	FRONT CROSS MEMBER X-DIR	AL43	2264
BCRXG	BRAKE CALIPER; RIGHT X-DIR	AN06	2264
ENGXG2	ENGINE BOTTOM X-DIR	AZ81	2264
ENGXG1	ENGINE BLOCK TOP X-DIR	AK87	7264
SCAPG	STEERING COLUMN LOWER A-P AXIS	AJ02	2264
SH1PG	STEERING WHEEL HUB A-P AXIS	AJ92	2264
SH1IG	STEERING WHEEL HUB I-S AXIS	AJ97	2264
DPCXG	DASH PANEL X-DIR	AS58	7264
DPCZG	DASH PANEL Z-DIR	AS86	2264
VCGV	PITCH RATE GYRO		
LPBXG	LEFT B-PILLAR X-DIR	BA99	2264
LPBZG	LEFT B-PILLAR Z-DIR	AK61	2264
RPBXG	RIGHT B-PILLAR X-DIR	AJ45	2264
TLRXG4	LEFT REAR CROSS MEMBER X-DIR	AR87	2264
TLRZG4	LEFT REAR CROSS MEMBER Z-DIR	AF22	2264
TLRXGD	LEFT REAR CROSS MEMBER RED.	AG05	2264
TRRXG3	RIGHT REAR CROSS MEMBER X-DIR	AU15	2264
TRRXGC	RIGHT REAR CROSS MEMBER RED.	BA51	2264
RAXXG	REAR AXLE X-DIR	AK66	2264

POLE LOAD CELL INFORMATION

MNEMONIC	DESCRIPTION	SERIAL NO.	MFR/MODEL
POLF1	POLE FORCE POSITION 1	15797	Interface
POLF2	POLE FORCE POSITION 2	15793	Interface
POLF3	POLE FORCE POSITION 3	15769	Interface
POLF4	POLE FORCE POSITION 4	15774	Interface

CAMERA INFORMATION

CAMERA IDENTIFICATION	TIME ZERO ON HIGH SPEED FILM
Photosonics	
Circular timing pulses on one side, verticle event bar on other side.	Back 4 frames from frame where verticle event bar stops.
Hycam	
Square shaped timing pulses on one side, verticle event bar on other side.	Back 5 frames from frame where vertical event bar stops.
Stalex	
Square shaped timing pulses on one side, verticle event bar on other side.	Back 2 frames from frame where vertical event bar stops.

SIGN CONVENTION

Sign convention for SRL 98 neck load cells and transducers.
Compression (-) on femur load cells and load cells in barrier face.

Neck Transducer Notation

3 channel neck transducer

F_x (shear force)	(+) head translating forward
	(-) head translating rearward
F_z (axial force)	(+) tension on neck
	(-) compression on neck
M_y (moment)	(+) forward rotation about neck (chin to thorax, flexion)
	(-) rearward rotation about neck (back of head to spine, extension)

6 channel neck transducers

F_x (shear force)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
F_y (latereal force)	(+) head translating to left relative to top of neck
	(-) head translating to right relative to top of neck
F_z (axial force)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
M_x (moment)	(+) head rotation toward right shoulder
	(-) head rotation toward left shoulder
M_y (moment)	(+) same as 3 channel transducer
	(-) same as 3 channel transducer
M_z (moment)	(+) chin rotation to left shoulder
	(-) chin rotation to right shoulder

All other channels in dummies or vehicle are to follow right hand rule.

(+) Forward	X
(+) Left	Y
(+) Up	Z

(+) Pitch Rate (nose down)

Knee loads are measusred along a line between the knee pivot and the ankle pivot.

F_z (axial force)	(+) tension
	(-) compression

Tibia Moments

M_x (moment about X)	(+) tibia rotation to dummy's left
	(-) tibia rotation to dummy's right
M_y (moment about Y)	(+) tibia rotation reaward
	(-) tibia rotation forward

Ankle Loads

F_y (force in Y dir.)	(+) ankle translation to dummy's left
	(-) ankle translation to dummy's right
F_z (force in Z dir.)	(+) tension
	(-) compression

Ankle Moments

M_x (moment about X)	(+) ankle rotation to dummy's left
	(-) ankle rotation to dummy's right

FILTERING DATA

J211 SAE

Vehicle structual accelerations Class 60

Occupant

- Head Accelerometer Class 1000
- Chest Accelerometer Class 180
- Chest Deflection Class 180
- Femur Force Class 600
- Pelvis Accelerometer Class 180
- Lower Leg Class 600