TEST
V∅92∅

KPC 4/10/86

'79 Dodge Omni-
5 DR HATCHBACK

REPORT NO. TRC-85-N05

DUMMY KINEMATICS IN CONTROLLED ROLLOVER CRASHES

PREPARED BY:
THE TRANSPORTATION RESEARCH CENTER OF OHIO
ST. RT. 33, LOGAN COUNTY
EAST LIBERTY, OHIO 43319

APRIL 1986
TEST REPORT

PREPARED FOR:
OFFICE OF MANAGEMENT SERVICES
GENERAL SERVICES DIVISION, NAD-42
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION
400 SEVENTH STREET, S.W.
WASHINGTON, DC 20590

This research was supported (in part) by the National Highway Traffic Safety Administration (NHTSA), U.S. Department of Transportation, under Contract No. DTNH22-84-R-07298. The opinions, findings and recommendations contained herein are those of the authors, and do not necessarily represent those of the NHTSA.

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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
TRC-85-N05		

4. Title and Subtitle	5. Report Date
DUMMY KINEMATICS IN CONTROLLED ROLLOVER CRASHES	APRIL 1986
	6. Performing Organization Code
	8. Performing Organization Report No.
7. Author(s) J.C. Stultz, Project Engineer, TRCO	TRC
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Transportation Research Center of Ohio St. Rt. 33, Logan County East Liberty, Ohio 43319	11. Contract or Grant No. DTNH22-84-R-07298
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Research, NRD-12 400 Seventh Street, S.W., Washington, DC 20590	FINAL REPORT MARCH-APRIL 1986
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

A controlled rollover test was conducted on March 21, 1986 at the Transportation Research Center of Ohio in East Liberty, Ohio. A 1979 Dodge Omni 5-door hatchback containing one instrumented Hybrid III unrestrained test dummy was placed onto the NHTSA Rollover Device at 41 degrees above the horizontal and was released when the device had reached 23 mph.

The right and left front side windows and windshield were covered by a Polyvinyl Butryl safety glazing. This glazing was attached by a polyester film.

17. Key Words	18. Distribution Statement
Dummy Kinematics Rollover Crash Test	Available from: National Technical Information Service Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	89	

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

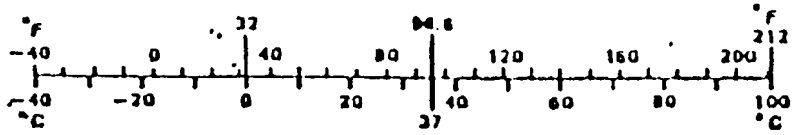
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	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 PROCEDURE

This rollover crash test is the fifth test of a six test series. The main objective of this test series is to document the motion of an instrumented dummy in rollover crash tests using the NHTSA Rollover Test Device.

This test was conducted by placing a 1979 Dodge Omni 5-door hatchback on the rollover cart (developed by MGA Research Corporation under Contract No. DTNH22-82-C-07035) at an angle of 41° to the vertical, crabbed 45° clockwise and towing the rollover cart to 23 mph and releasing the test vehicle. The test vehicle contained an instrumented unrestrained Hybrid III dummy. The right and left front side windows and windshield were covered by a Polyvinyl Butryl safety glazing. This glazing was attached by a polyester film.

SECTION 2.0

SUMMARY OF ROLLOVER CRASH TEST

A 1979 Dodge Omni 5-door hatchback containing one instrumented Hybrid III test dummy was placed upon the rollover test device at 41 degrees above the horizontal and was released when the device had reached 23 mph. The device was attached to the tow cable of the drive system and crabbed 45° clockwise. After the vehicle had been released the device was brought to a stop with an auxiliary brake system. After release the vehicle impacted the ground on its left side. The vehicle rolled onto its roof and skidded on its roof and the right front corner of the hood and came to rest in that orientation. The rollover crash test was conducted by the Transportation Research Center of Ohio in East Liberty, Ohio on March 21, 1986. Post-test photographs of the test vehicle, dummy and device are shown in Appendix A.

The Hybrid III 50th percentile adult male anthropomorphic test device (ATD) was placed in right front designated seating position according to the seating procedure currently accepted by NHTSA. The ATD was instrumented with head and chest triaxial accelerometers, neck, and right/left femur load cells. The dummy was unrestrained. A summary of Dummy Calibration test data can be found in Appendix C.

The crash event was recorded on 27 channels of data on one 14 track tape drive. Appendix B contains the vehicle, rollover device and dummy response data plots.

Photographic coverage of the event included six high-speed cameras.

ROLLOVER TEST DEVICE SUMMARY

	POSITIVE DIRECTION*		NEGATIVE DIRECTION*	
	MAX	TIME (msec)	MAX	TIME (msec)
CENTER OF GRAVITY				
ACCELERATION (g)				
LONGITUDINAL (X-Axis)	7.24	592.00	29.41	185.50
LATERAL (Y-Axis)	8.67	578.00	7.79	738.00
VERTICAL (Z-Axis)	8.67	687.50	6.96	616.00
RESULTANT		29.66 @ 185.50		
CENTER OF GRAVITY				
ANGULAR VELOCITY (Deg/Sec)				
PITCH (Y-Axis)	44.06	591.50	50.67	696.50
PNEUMATIC CYLINDERS				
ROTATIONAL DISPLACEMENT(IN)				
LEFT CYLINDER	17.87	569.00	0.17	30.00
RIGHT CYLINDER	17.54	571.50	0.09	157.00

*Positive X is Forward
Positive Y is Leftward
Positive Z is Upward
Positive Pitch is nose downward

FINAL RESTING PLACES OF PARTS AND CAR

DESCRIPTION OF PART	X (FT)	Y (FT)
1979 DODGE OMNI	73 1/2	-7 1/2

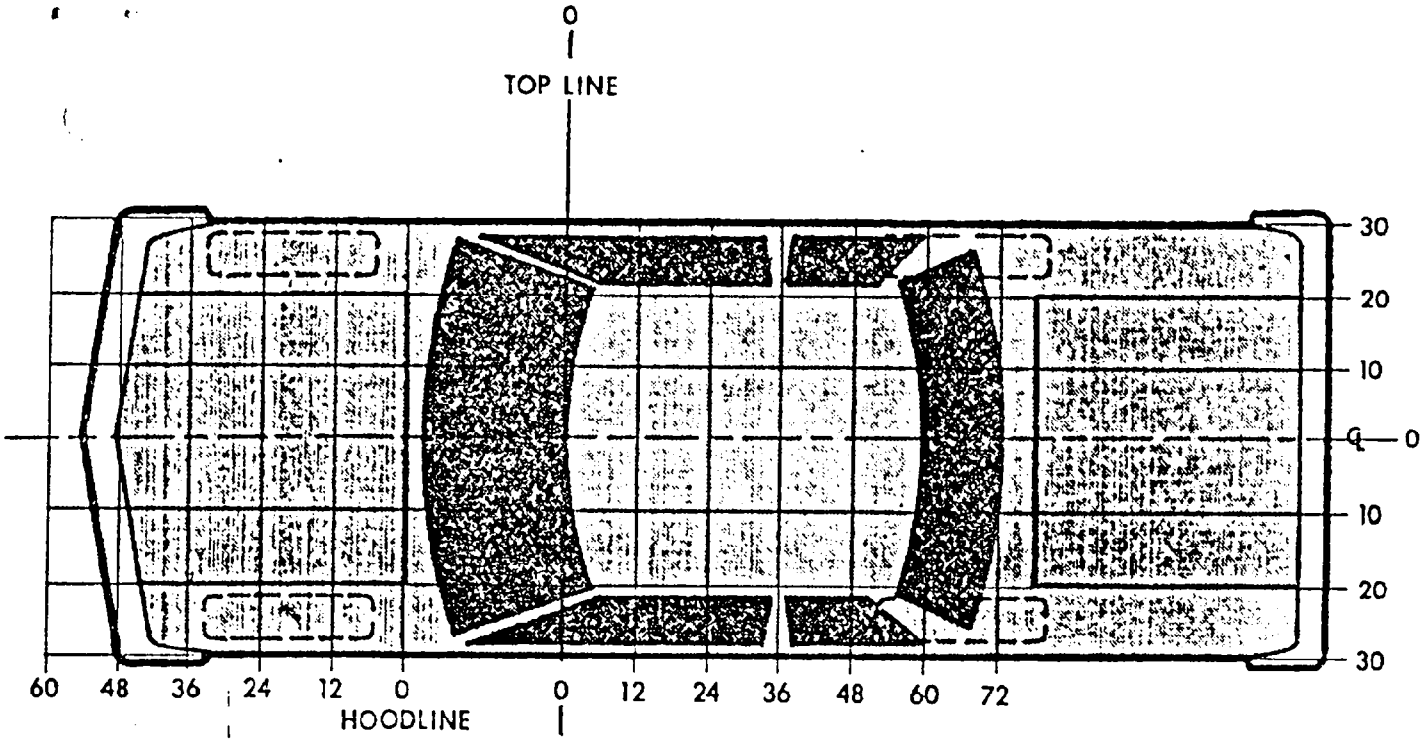
Reference + X = Forward from release block reference point

+ Y = Rightward from release block reference point

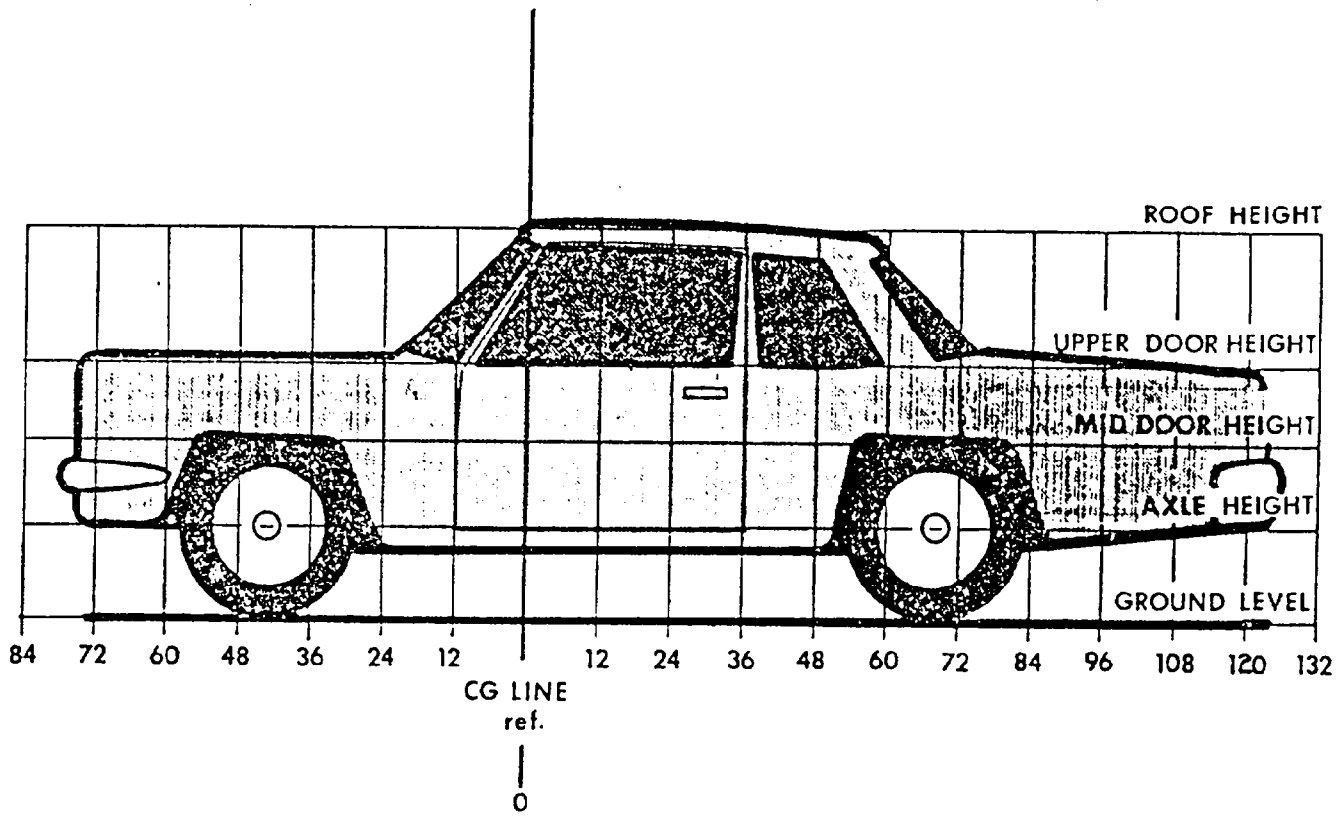
INTERIOR DIMENSIONS TAKEN

DESCRIPTION	PRE	POST	DIFF
Floor board to top of "A" post of left side	41.1	41.3	-0.2
Floor board to top of "A" post of right side	41.1	32.0	9.1
Door sill to top of "B" post of left side	39.0	39.3	-0.3
Door sill to top of "B" post of right side	39.3	37.6	1.7
Door sill to top of door opening of left side	39.0	38.8	0.2
Door sill to top of door opening of right side	39.1	35.8	3.3
Floor tunnel to windshield header	38.5	35.3	3.2
Floor tunnel to center of roof	42.4	42.4	0.0
Rear of floor tunnel to roof	42.3	42.5	-0.2
Maximum width at "B" post	50.6	50.8	-0.2
Maximum width at "A" post	52.3	50.3	2.0
Maximum width at top of door opening	40.6	40.3	0.3

ALL MEASUREMENTS IN INCHES



HOOD AND ROOF STATIC CRUSH LOCATIONS



LEFT AND RIGHT SIDE STATIC CRUSH LOCATIONS

VEHICLE HOOD EXTERIOR PROFILES
ZERO DISTANCE AT VEHICLE HOOD CENTERLINE*

LOCATION	20	10	0	10	20
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Trailing edge of cowl at centerline	36.3	36.1	36.5	36.3	35.9
Trailing edge of cowl + 12 inches	35.3	35.5	36.1	35.6	35.0
Trailing edge of cowl + 24 inches	33.8	34.0	34.8	33.9	33.6
Trailing edge of cowl + 36 inches	31.3	31.3	31.5	31.5	31.5
Trailing edge of cowl + 42 inches	X	X	X	X	X
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Trailing edge of cowl at centerline	36.5	36.8	38.8	38.6	35.6
Trailing edge of cowl + 12 inches	36.0	36.3	36.1	35.4	34.6
Trailing edge of cowl + 24 inches	35.5	35.3	34.6	34.1	32.9
Trailing edge of cowl + 36 inches	33.1	32.7	31.8	30.9	30.0
Trailing edge of cowl + 42 inches	X	X	X	X	X
DIFFERENCE (IN)					
Trailing edge of cowl at centerline	0.2	0.7	2.3	2.3	-0.3
Trailing edge of cowl + 12 inches	0.7	0.8	0.0	-0.2	-0.4
Trailing edge of cowl + 24 inches	1.7	1.3	-0.2	0.2	-0.7
Trailing edge of cowl + 36 inches	1.8	1.4	0.3	-0.6	-1.5
Trailing edge of cowl + 42 inches	X	X	X	X	X

* Column readings are left to right from left to right on vehicle.
** Reference plane is a horizontal plane at ground level.
+ Static crush means vehicle structure is bowed upward.
- Static crush means vehicle structure is crushed.

VEHICLE ROOF EXTERIOR PROFILES
ZERO DISTANCE AT VEHICLE ROOF CENTERLINE*

LOCATION	20	10	0	10	20
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	53.5	54.3	54.3	53.8	53.3
Longitudinal Center of Gravity + 12	54.3	55.0	54.9	54.5	53.5
Longitudinal Center of Gravity + 24	54.1	55.1	55.0	54.8	53.9
Longitudinal Center of Gravity + 36	54.1	54.8	55.1	55.1	53.8
Longitudinal Center of Gravity + 48	53.6	54.3	54.5	54.3	53.3
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	52.5	51.5	51.3	49.5	48.2
Longitudinal Center of Gravity + 12	53.6	54.5	54.1	52.5	50.5
Longitudinal Center of Gravity + 24	53.6	54.4	54.8	54.4	53.1
Longitudinal Center of Gravity + 36	53.5	54.0	54.8	54.8	53.9
Longitudinal Center of Gravity + 48	52.5	53.6	54.3	54.1	53.3
DIFFERENCE (IN)					
Longitudinal Center of Gravity	-1.0	-2.8	-3.0	-4.3	-5.1
Longitudinal Center of Gravity + 12	-0.7	-0.5	-0.8	-2.0	-3.0
Longitudinal Center of Gravity + 24	-0.5	-0.7	-0.2	-0.4	-0.8
Longitudinal Center of Gravity + 36	-0.6	-0.8	-0.3	-0.3	0.1
Longitudinal Center of Gravity + 48	-1.1	-0.7	-0.2	-0.2	0.0

* Column readings are left to right from left to right on vehicle.
** Reference plane is a horizontal plane at ground level.
+ Static crush means vehicle structure is bowed upwards.
- Static crush means vehicle structure is crushed.

VEHICLE LEFT SIDE EXTERIOR PROFILES AND STATIC CRUSH

ZERO DISTANCE AT VEHICLE LONGITUDINAL CENTER OF GRAVITY*

LOCATION	HEIGHT (in)	72	60	48	36	24	12	0	12	24	36	48	60	72	84
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)															
Roof Height	54.0	X	X	X	X	X	X	26.0	25.8	25.6	25.6	26.0	X	X	X
Upper Door	35.0	X	X	20.0	19.0	18.6	18.5	18.3	18.3	18.3	18.3	18.5	18.8	19.4	X
Mid Door	24.0	X	18.9	15.2	15.0	16.3	16.0	15.9	15.9	15.9	16.0	15.4	14.4	17.6	X
Axle Height	14.0	X	X	X	X	17.8	17.8	17.5	17.6	17.4	17.5	X	X	X	X
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)															
Roof Height	54.0	X	X	X	X	X	X	26.3	25.9	25.6	25.5	25.6	X	X	X
Upper Door	35.0	X	X	20.1	19.5	19.1	18.9	18.8	18.8	18.9	18.8	18.9	19.4	19.9	X
Mid Door	24.0	X	19.3	17.0	17.1	17.6	16.5	16.3	16.1	16.4	16.4	16.6	X	18.6	X
Axle Height	14.0	X	X	X	X	18.3	18.0	17.8	17.6	17.8	17.7	X	X	X	X
STATIC CRUSH (IN)															
Roof Height	54.0	X	X	X	X	X	X	0.3	0.1	0.0	-0.1	-0.4	X	X	X
Upper Door	35.0	X	X	0.1	0.5	0.5	0.4	0.5	0.5	0.6	0.5	0.4	0.6	0.5	X
Mid Door	24.0	X	0.4	1.8	2.1	1.3	0.5	0.4	0.2	0.5	0.4	1.2	X	1.0	X
Axle Height	14.0	X	X	X	X	0.5	0.2	0.3	0.0	0.4	0.2	X	X	X	X

* Center of gravity is located 41.5 inches rearward of vehicle front wheels. Column readings are left to right from front to rear on vehicle.

** Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

+ Static crush means that vehicle structure is crushed.

- Static crush means that vehicle structure is bowed outward.

VEHICLE RIGHT SIDE EXTERIOR PROFILES AND STATIC CRUSH

ZERO DISTANCE AT VEHICLE LONGITUDINAL CENTER OF GRAVITY*

LOCATION	HEIGHT (in)	72	60	48	36	24	12	0	12	24	36	48	60	72	84
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)															
Roof Height	54.0	X	X	26.0	25.9	25.9	25.9	26.3	X	X	X	X	X	X	X
Upper Door	35.0	18.4	18.8	18.4	18.4	18.2	18.3	18.3	18.3	18.6	19.3	19.8	X	X	X
Mid Door	24.0	17.3	14.6	16.4	16.4	16.1	16.0	16.3	16.4	16.5	14.8	15.8	19.0	X	X
Axle Height	14.0	X	X	X	17.9	17.8	17.8	18.0	18.0	18.1	X	X	X	X	X
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)															
Roof Height	54.0	X	X	26.3	25.8	25.9	26.3	27.1	X	X	X	X	X	X	X
Upper Door	35.0	19.4	18.7	18.2	17.8	17.3	17.2	17.5	17.8	18.5	19.5	20.5	X	X	X
Mid Door	24.0	17.4	14.8	16.4	16.3	15.8	15.6	15.8	16.0	16.6	15.6	15.8	17.7	X	X
Axle Height	14.0	X	X	X	18.1	18.0	17.1	17.9	18.1	18.0	X	X	X	X	X
STATIC CRUSH (IN)															
Roof Height	54.0	X	X	0.3	-0.1	0.0	0.4	0.8	X	X	X	X	X	X	X
Upper Door	35.0	1.0	-0.1	-0.2	-0.6	-0.9	-1.1	-0.8	-0.5	-0.1	0.2	0.7	X	X	X
Mid Door	24.0	0.1	0.2	0.0	-0.1	-0.3	-0.4	-0.5	-0.4	0.1	0.8	0.0	-1.3	X	X
Axle Height	14.0	X	X	X	0.2	0.2	-0.7	-0.1	0.1	-0.1	X	X	X	X	X

* Center of gravity is located 41.5 inches rearward of vehicle front wheels.
Column readings are left to right from front to rear on vehicle.
** Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.
+ Static crush means that vehicle structure is crushed.
- Static crush means that vehicle structure is bowed outward.

TEST ANOMALIES

The test vehicle's left rear suspension displacement transducer, SRLD1, did not record any data throughout the test.

SECTION 3.0
GENERAL TEST AND VEHICLE PARAMETER DATA

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

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge Omni VIN: ZL44A9D175402

BODY STYLE: 5-door hatchback MODEL YEAR: 1979

NHTSA NO.: R & D COLOR: Gray

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 105 CID

TRANSMISSION DATA: 4-speed manual X FWD, ____ RWD

DATE VEHICLE RECEIVED: 3/10/86 ODOMETER READING: 69,377

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

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: 11/78

GVWR: 3170 LBS.,

GAWR: FRONT 1760 LBS., REAR 1460 LBS.

VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 29 psi; REAR 29 psi

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Mohawk Ultissimo P165/80R13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? No

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	698	LBS.	RIGHT REAR	412	LBS.
LEFT FRONT	678	LBS.	LEFT REAR	383	LBS.
TOTAL FRONT WEIGHT	1376	LBS. (63.4 % OF TOTAL VEHICLE WEIGHT)			
TOTAL REAR WEIGHT	795	LBS. (36.6 % OF TOTAL VEHICLE WEIGHT)			
TOTAL DELIVERED WEIGHT	2171	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 24.7	;LF 25.1	;RR 25.0	;LR 25.4
PRE-TEST ATTITUDE:	RF 24.6	;LF 25.3	;RR 23.5	;LR 24.3
POST-TEST ATTITUDE:	RF 23.2	;LF 25.5	;RR 26.0	;LR 26.3

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 109 LBS. CARGO:

RIGHT FRONT	719	LBS.	RIGHT REAR	538	LBS.
LEFT FRONT	704	LBS.	LEFT REAR	483	LBS.
TOTAL FRONT WEIGHT	1423	LBS. (58.2 % OF TOTAL VEHICLE WEIGHT)			
TOTAL REAR WEIGHT	1021	LBS. (41.8 % OF TOTAL VEHICLE WEIGHT)			
TOTAL TEST WEIGHT	2444	LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE REAR FLOOR PAN AREA: 0 LBS.

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: 0 GALLONS

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

DETAILS OF FUEL SYSTEM: DNA

ELECTRIC FUEL PUMP: No FUEL INJECTION: No

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

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 29 psi; REAR 29 psi

RECOMMENDED TIRE SIZE: P155/80R13 LOAD RANGE X B, C,

VEHICLE CAPACITY: TYPES OF SEATS: front - bucket
rear - bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY: 2 FRONT
2 REAR
4 TOTAL

CARGO LOAD 115 LBS.

TOTAL 715 LBS.

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

TEST CONDITIONS

TEST NUMBER: 860321

DATE OF TEST: March 21, 1986 TIME OF TEST: 15:40

WIND VELOCITY: 2-4 mph @ 72° ENE HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 30°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 68°F

DUMMY TEMPERATURE: 72°F

SUBJECT VEHICLE DATA

	ACTUAL	INTENDED
TEST WEIGHT (LBS.)	2444	2450
VEHICLE ORIENTATION (DEGREES) YAW	45	45
VEHICLE ORIENTATION (DEGREES) ROLL	41	41
VEHICLE VELOCITY (MPH)	23	23

DUMMIES

	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:			Hybrid III		
SERIAL NO.:			61		
INSTRUMENTATION:					
HEAD ACCEL.:			3		
CHEST ACCEL.:			3		
FEMUR L.C.'S:			2		
OTHER:			3 Neck channels		

RESTRAINT SYSTEM: The 3-point production belt system was not used in this test. The driver dummy was unrestrained.

REMARKS:

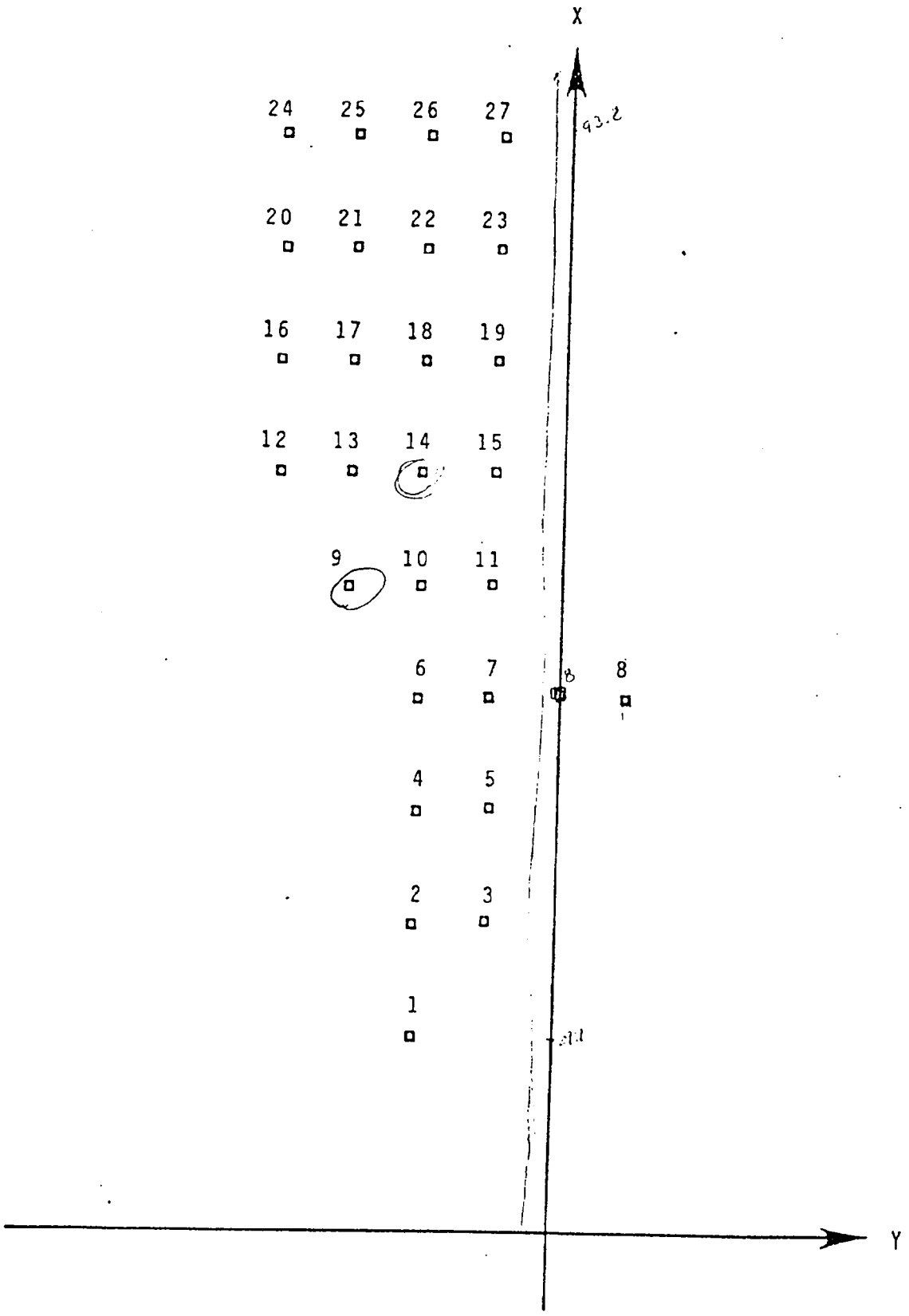
TEST VEHICLE DATA SUMMARY

	POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX	TIME (MSEC)	MAX	TIME (MSEC)
CENTER OF GRAVITY ACCELERATION (g)				
LONGITUDINAL	2.35	1530.00	5.65	844.00
LATERAL	4.00	1376.00	11.97	859.50
VERTICAL	6.96	847.00	14.78	862.00
RESULTANT		18.16 @ 861.50		
CENTER OF GRAVITY ANGULAR VELOCITY (deg/sec)				
ROLL (X-AXIS)	206.04	1014.50	56.17	1897.50
PITCH (Y-AXIS)	93.47	1539.50	85.31	888.00
YAW (Z-AXIS)	80.59	909.50	57.92	1090.50
SUSPENSION DISPLACEMENT (in)				
LEFT FRONT	1.07	858.50	0.22	839.00
RIGHT FRONT	0.43	1476.00	0.49	1516.50
LEFT REAR	---	--- Y	---	--- Y
RIGHT REAR	0.37	694.00	2.80	1449.00

* LONGITUDINAL: FORWARD PITCH: NOSE DOWNWARD
LATERAL: LEFTWARD ROLL: TO RIGHT
VERTICAL: UPWARD YAW: COUNTERCLOCKWISE

** LONGITUDINAL: REARWARD PITCH: NOSE UPWARD
LATERAL: RIGHTWARD ROLL: TO LEFT
VERTICAL: DOWNWARD YAW: CLOCKWISE

YSee TEST ANOMALIES



STADIA POLE LAYOUT AND NUMBERING SYSTEM

STADIA POLE LOCATIONS

POLE NUMBER	X COORDINATE (FT)*	(-25')	Y COORDINATE (FT)*	
1	29.8	357.6	261.6	-10.0	-120.
2	37.8	453.6	357.6	-10.0	-120.
3	37.8	453.6	357.6	-4.0	-48.
4	45.8	549.6	453.6	-10.0	-120.
5	45.8	549.6	453.6	-4.0	-48.
6	53.8	645.6	549.6	-10.0	-120.
7	53.8	645.6	549.6	-4.0	-48.
8	53.8	645.6	549.6	2.0	24.
9	61.8	741.6	645.6	-16.0	-192.
10	61.8	741.6	645.6	-10.0	-120.
11	61.8	741.6	645.6	-4.0	-48.
12	69.8	837.6	741.6	-22.0	-264.
13	69.8	837.6	741.6	-16.0	-192.
14	69.8	837.6	741.6	-10.0	-120.
15	69.8	837.6	741.6	-4.0	-48.
16	77.8	933.6	837.6	-22.0	-264.
17	77.8	933.6	837.6	-16.0	-192.
18	77.8	933.6	837.6	-10.0	-120.
19	77.8	933.6	837.6	-4.0	-48.
20	85.8	1029.6	933.6	-22.0	-264.
21	85.8	1029.6	933.6	-16.0	-192.
22	85.8	1029.6	933.6	-10.0	-120.
23	85.8	1029.6	933.6	-4.0	-48.
24	93.8	1125.6	1029.6	-22.0	-264.
25	93.8	1125.6	1029.6	-16.0	-192.
26	93.8	1125.6	1029.6	-10.0	-120.
27	93.8	1125.6	1029.6	-4.0	-48.

* Reference
+X = forward from release block reference point
+Y = rightward from release block reference point

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	X* (ft)	Y* (ft)
1	5.5	477.1
2	130.5	58.0
3	270.5	-2.0
4	3.0	4.5

*Reference

+X = Forward from release block reference point.

+Y = Rightward from release block reference point.

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right wide	Photosonic 1B	50	502	Vehicle Kinematics
2	Right-angle-downstream	Photosonic 1B	13	498	Vehicle Kinematics
3	Downstream	Photosonic 1B	50	493	Vehicle Kinematics
4	Overhead	Photosonic 1B	8	500	Vehicle Kinematics
5	Onboard rear deck	Photosonic 1B	8	498	Vehicle Kinematics
6	Onboard floor	Photosonic 1B	8	495	Vehicle Kinematics

SECTION 4.0
OCCUPANT INFORMATION

VISIBLE DUMMY CONTACT POINTS:

	DRIVER DNA	PASSENGER #61
Head	DNA	Roof, header
Chest	DNA	Side of thorax into roof header
Abdomen	DNA	None
Left Knee	DNA	None
Right Knee	DNA	None

DOOR OPENING:

	LEFT	RIGHT
Front	DNA	No tools required
Rear	DNA	No tools required

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	DNA	None
Rear	DNA	None

GLAZING DAMAGE: Windshield and front side windows shattered but remained with vehicle due to safety glazing. No other glazing damage.

OTHER NOTABLE IMPACT EFFECTS:

HYBRID III DUMMY DATA SUMMARY

DRIVER DUMMY

	POSITIVE DIRECTION* MAX	TIME (msec)		NEGATIVE DIRECTION** MAX	TIME (msec)
HEAD ACCELERATION (g)					
LONGITUDINAL	9.83	1459.50		11.39	2024.00
LATERAL	12.70	792.50		30.71	962.50
VERTICAL	14.92	1032.50		20.86	971.50
RESULTANT			33.18 @ 962.50		
HIC			39.63 from 959.0 msec to 974.0 msec		
NECK LOADS (lb)					
LONGITUDINAL	118.06	1056.00		61.69	980.00
VERTICAL	250.63	1056.00		754.76	982.50
NECK MOVEMENT (lb-ft)					
LATERAL	28.68	1143.00		5.49	801.00
CHEST ACCELERATION (g)					
LONGITUDINAL	5.23	1461.50		5.59	973.00
LATERAL	3.42	967.50		16.46	1045.00
VERTICAL	6.47	1455.50		9.65	980.00
RESULTANT			18.96 @ 1045.00		
FEMUR FORCE* (lb)**					
LEFT	87.13	1130.50		262.48	2026.50
RIGHT	101.61	982.50		129.40	1641.00

* LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

**LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

***COMPRESSION NEGATIVE

DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle and dummy were left inside the temperature controlled building 8 hours prior to the time the dummy was loaded into the vehicle. After the vehicle had been positioned on the rollover device it was towed outside for launch.

The procedure used to position the Hybrid III dummy was a modified version of the GM Hybrid III seating procedure. The GM Procedure is included on the following pages.

Auxiliary heaters were installed in the test vehicle prior to the test to maintain dummy temperature.

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.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

VEHICLE NHTSA NO. R & D

MFR./MAKE/MODEL: Dodge Omni

FRONT SEAT TYPE: ____ BENCH
X BUCKET
____ SPLIT BENCH

ADJUSTER TYPE: X MANUAL
____ POWER

BUCKET SEAT BACK TYPE: X FIXED
____ ADJUSTABLE

TECHNICIANS:
1. Dean Carpenter
2. Kevin Watkins
3. ____

POSITIONING DATE: March 21, 1986

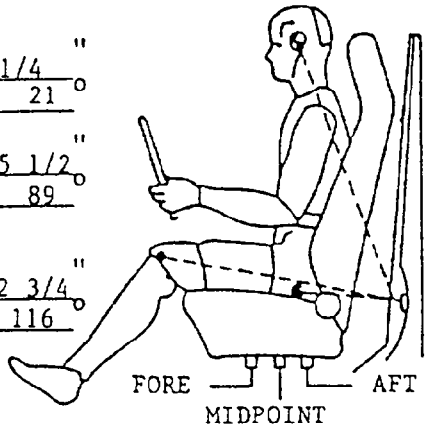
AMBIENT TEMP.: 70° F. TIME: 9:00 AM

RIGHT FRONT DUMMY #61

HEAD TARGET* 20 1/4" / 21°

KNEE JOINT 25 1/2" / 89°

APPROX. "H" POINT 12 3/4" / 116°

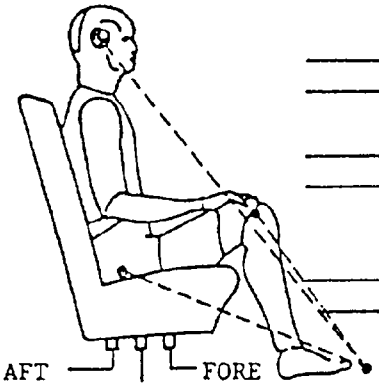


REAR PASSENGER DUMMY # DNA

____"HEAD
____°TARGET**

____"KNEE
____°JOINT

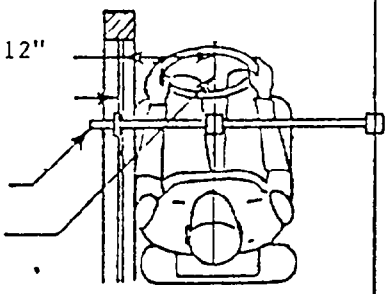
APPROX.
____" "H"
____°POINT



DOOR GLASS HEIGHT*** DNA

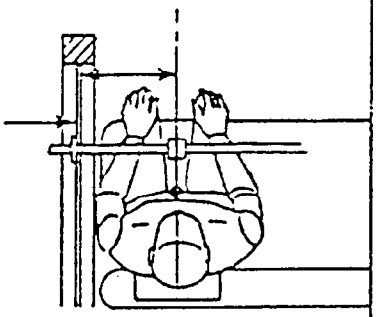
12"

LATERAL BAR ADJUSTABLE POINTER



RIGHT FRONT DUMMY # 61

DOOR GLASS HEIGHT ____



PASSENGER DUMMY # DNA

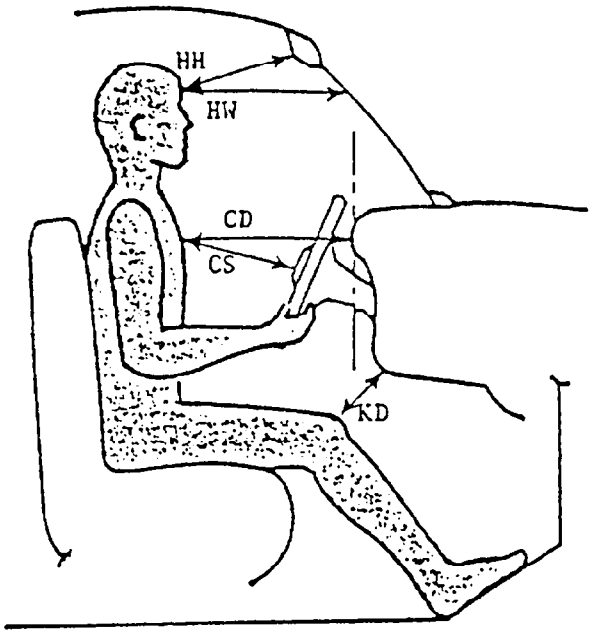
*All driver dummy dimensions referenced to top of striker bolt and all angles referenced to vertical.

**All passenger dummy dimensions referenced to front seat back latch bolt with front seat in mid-position and all angles referenced to vertical.

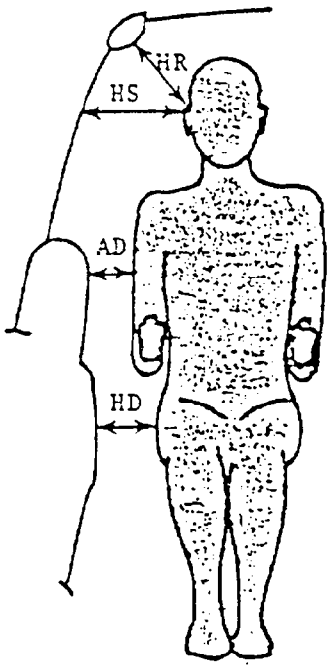
***Not available due to fixed Polyvinyl Butyl safety glazing.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER DNA	PASSENGER #61
HH		9 3/16"
HW		16 7/16"
CD		20 13/16"
CS		DNA
KDL		5 1/2"
KDR		5 1/8"



	DRIVER DNA	PASSENGER #61
HR		7 3/16"
HS		8 5/16"
AD		3 1/4"
HD		5 1/4"



APPENDIX A

PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. PRE-TEST LEFT FRONT THREE-QUARTER VIEW
3. PRE-TEST LEFT SIDE VIEW
4. PRE-TEST LEFT REAR THREE-QUARTER VIEW
5. PRE-TEST REAR VIEW
6. PRE-TEST DUMMY VIEW
7. POST-TEST FRONT VIEW
8. POST-TEST LEFT FRONT THREE-QUARTER VIEW
9. POST-TEST LEFT REAR THREE-QUARTER VIEW
10. POST-TEST REAR VIEW
11. POST-TEST RIGHT REAR VIEW
12. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
13. POST-TEST VEHICLE INTERIOR - VIEW 1
14. POST-TEST VEHICLE INTERIOR - VIEW 2
15. POST-TEST VEHICLE INTERIOR - VIEW 3
16. POST-TEST DUMMY VIEW
17. POST-TEST FRONT VIEW
18. POST-TEST LEFT SIDE VIEW
19. POST-TEST REAR VIEW
20. POST-TEST RIGHT SIDE VIEW
21. POST-TEST GLAZING - VIEW 1
22. POST-TEST GLAZING - VIEW 2
23. POST-TEST GLAZING - VIEW 3
24. POST-TEST GLAZING - VIEW 4

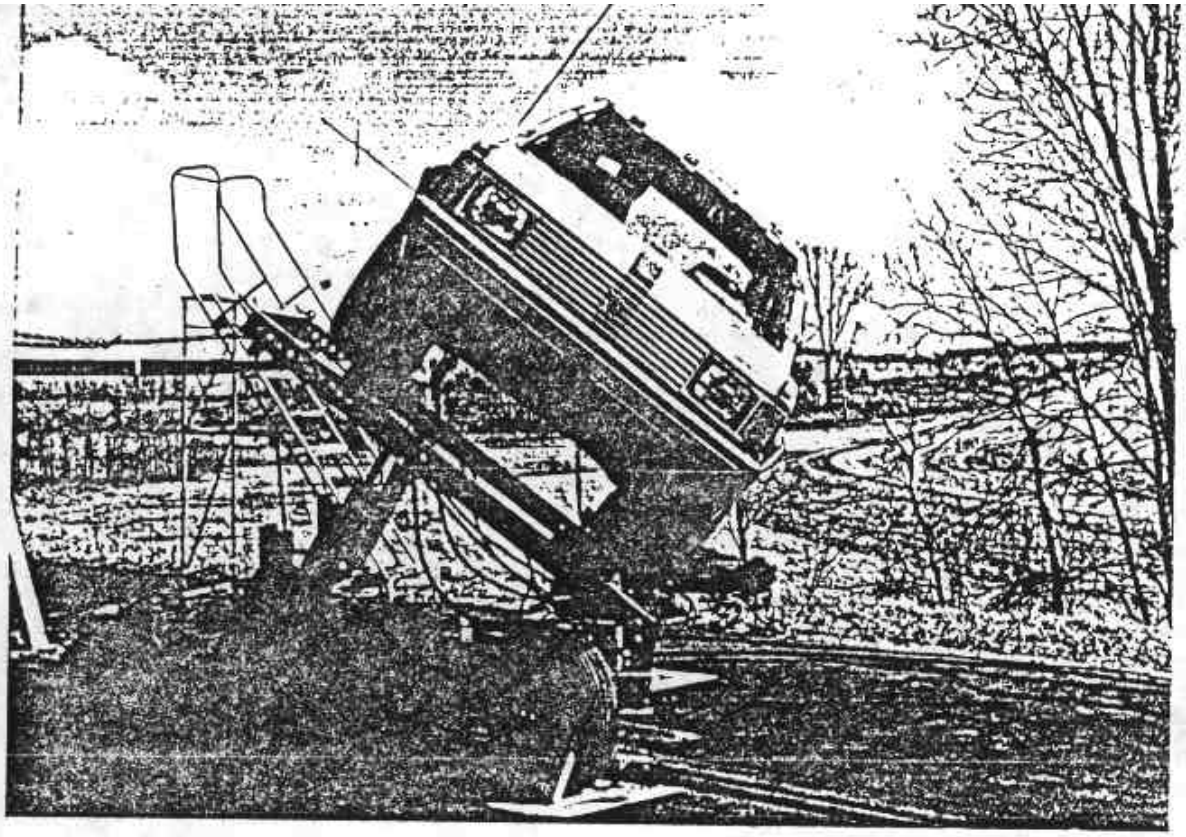


Figure A-1. PRE-TEST FRONT VIEW

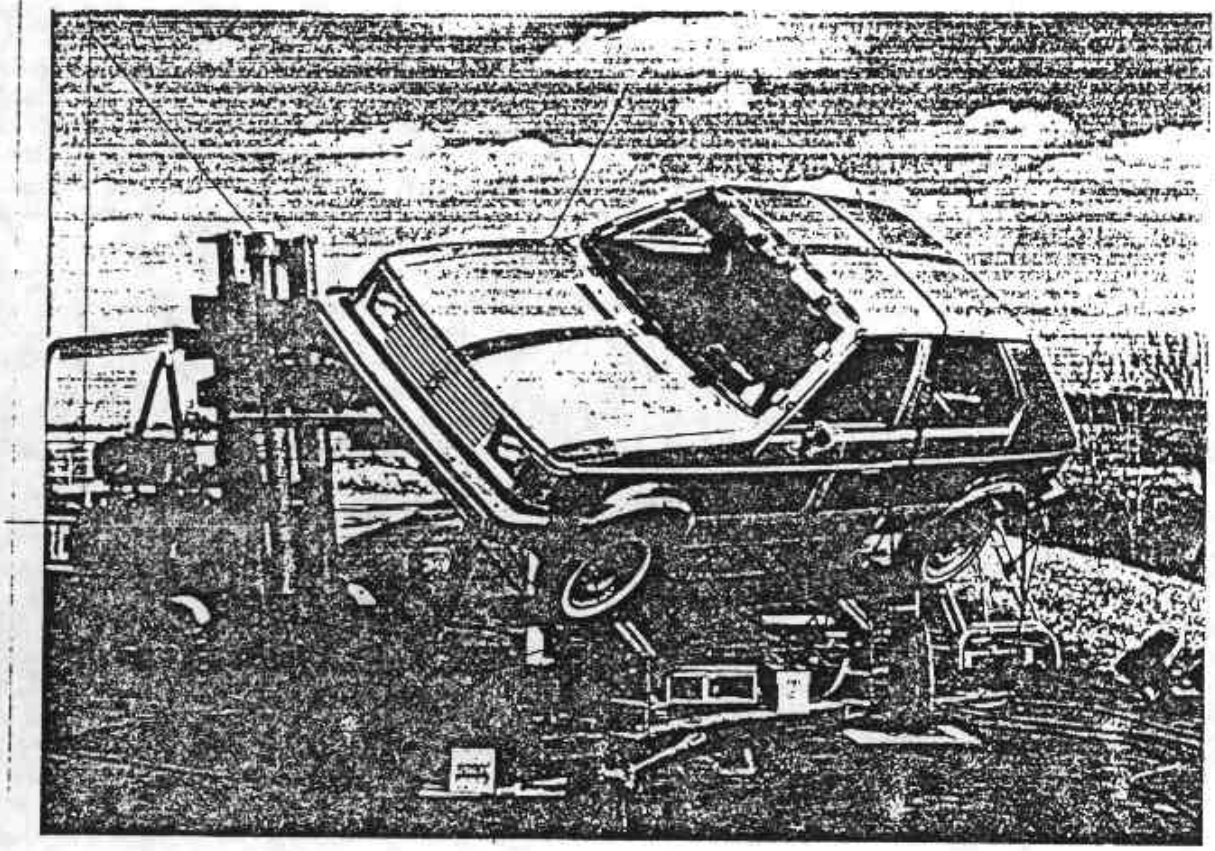


Figure A-2. PRE-TEST LEFT FRONT THREE-QUARTER VIEW

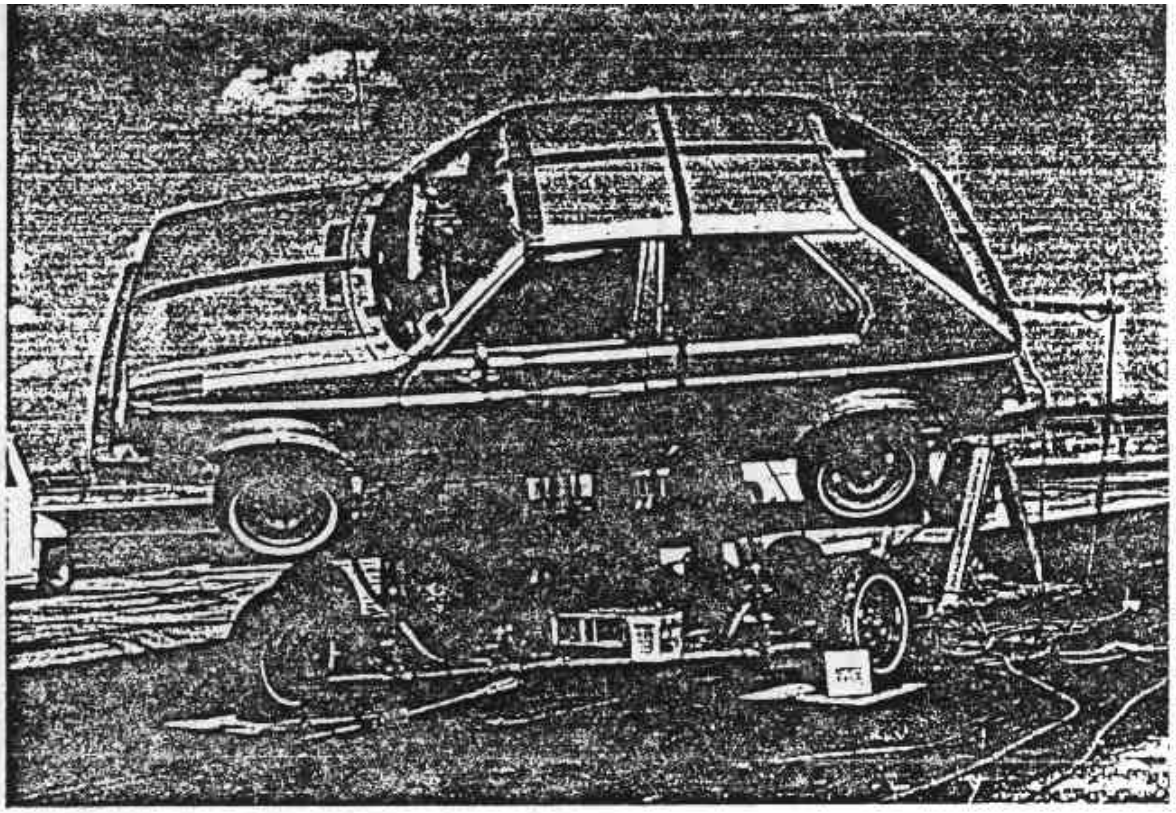


Figure A-3. PRE-TEST LEFT SIDE VIEW

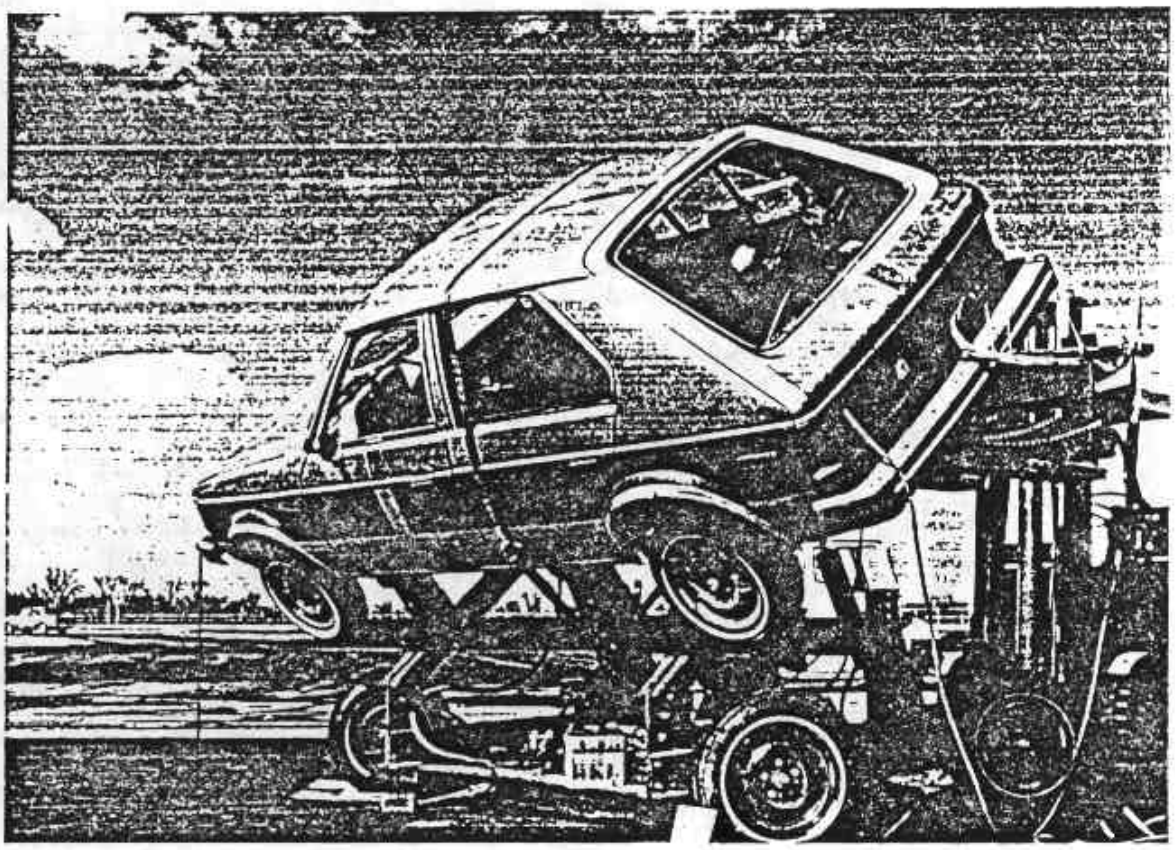


Figure A-4. PRE-TEST LEFT REAR THREE-QUARTER VIEW

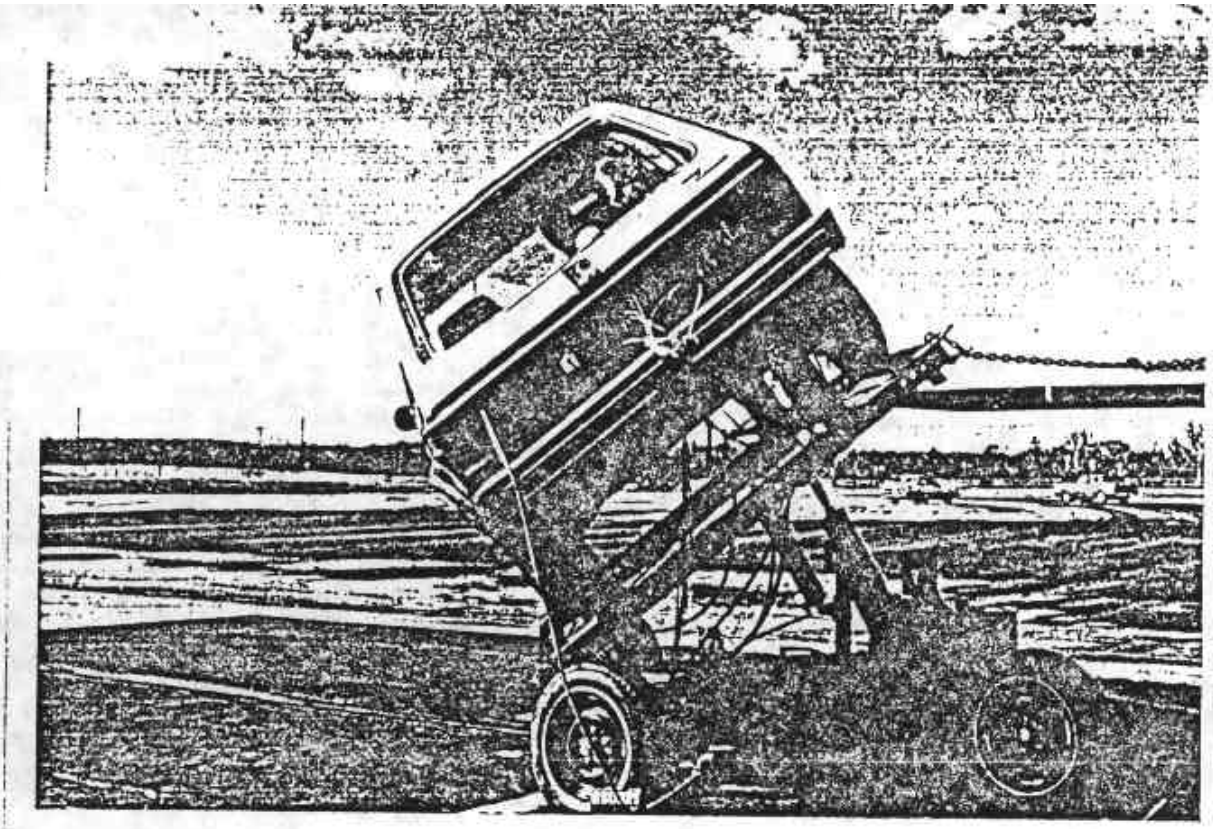


Figure A-5. PRE-TEST REAR VIEW

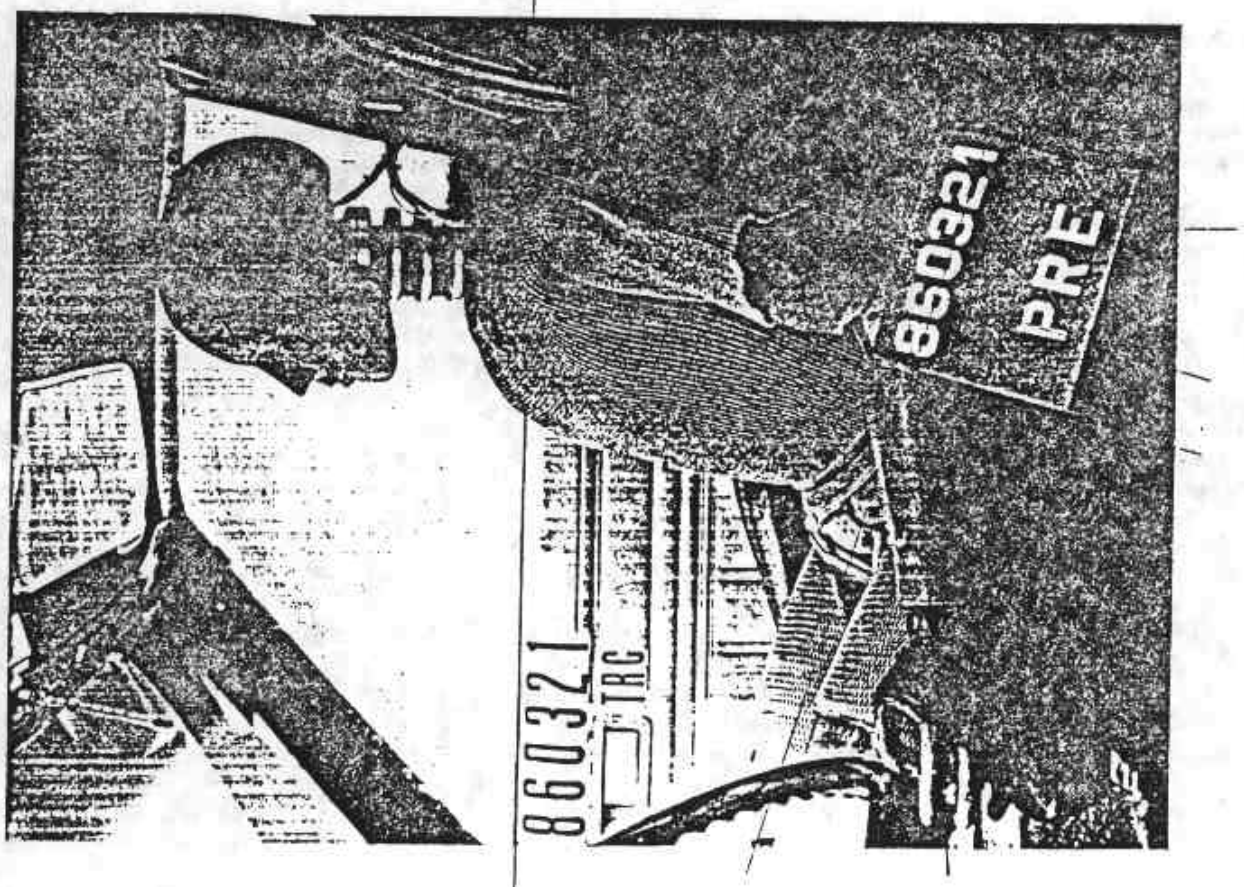


Figure A-6. PRE-TEST DUMMY VIEW

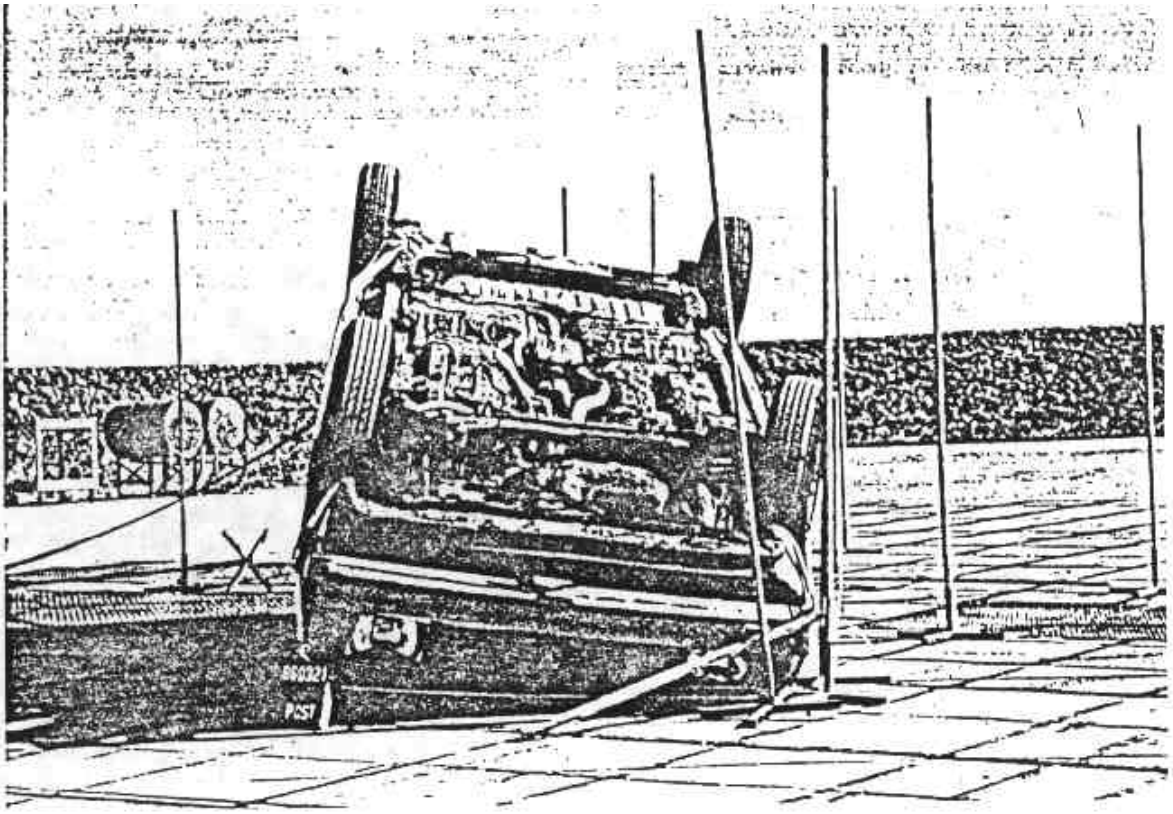


Figure A-7. POST-TEST FRONT VIEW

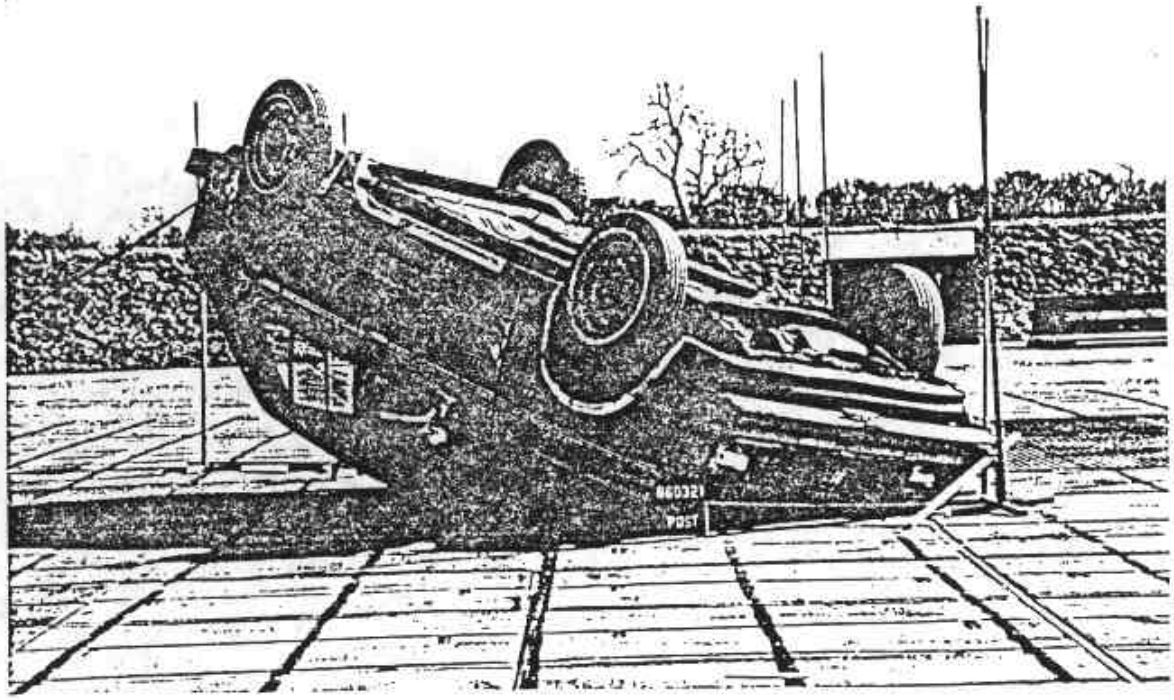


Figure A-8. POST-TEST LEFT FRONT THREE-QUARTER VIEW

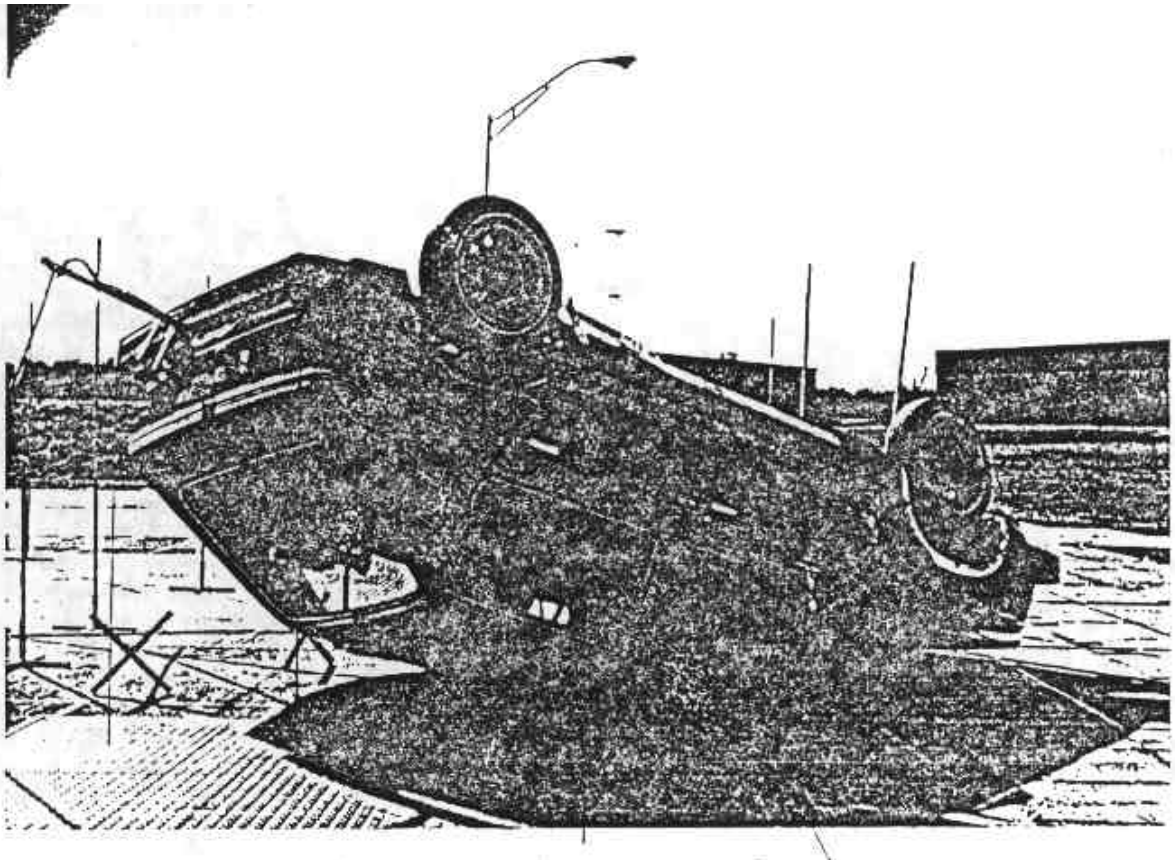


Figure A-9. POST-TEST LEFT REAR THREE-QUARTER VIEW

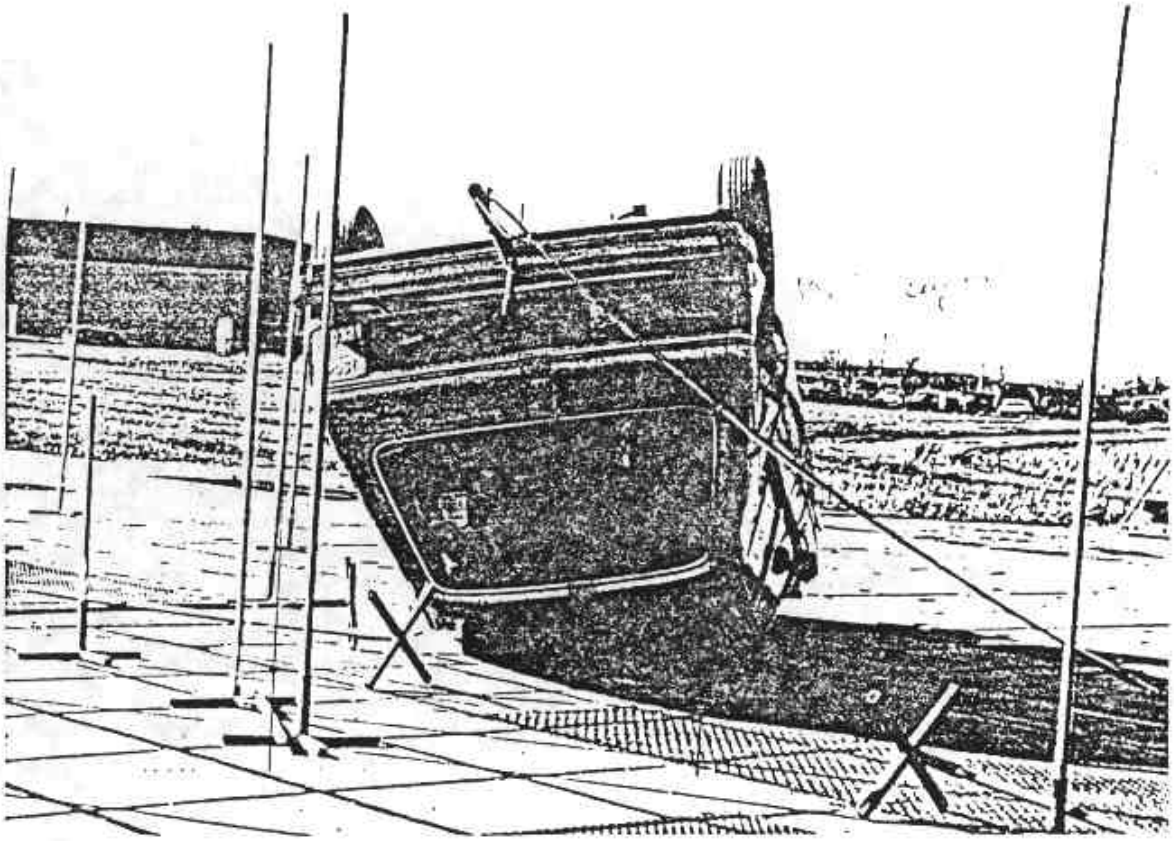


Figure A-10. POST-TEST REAR VIEW

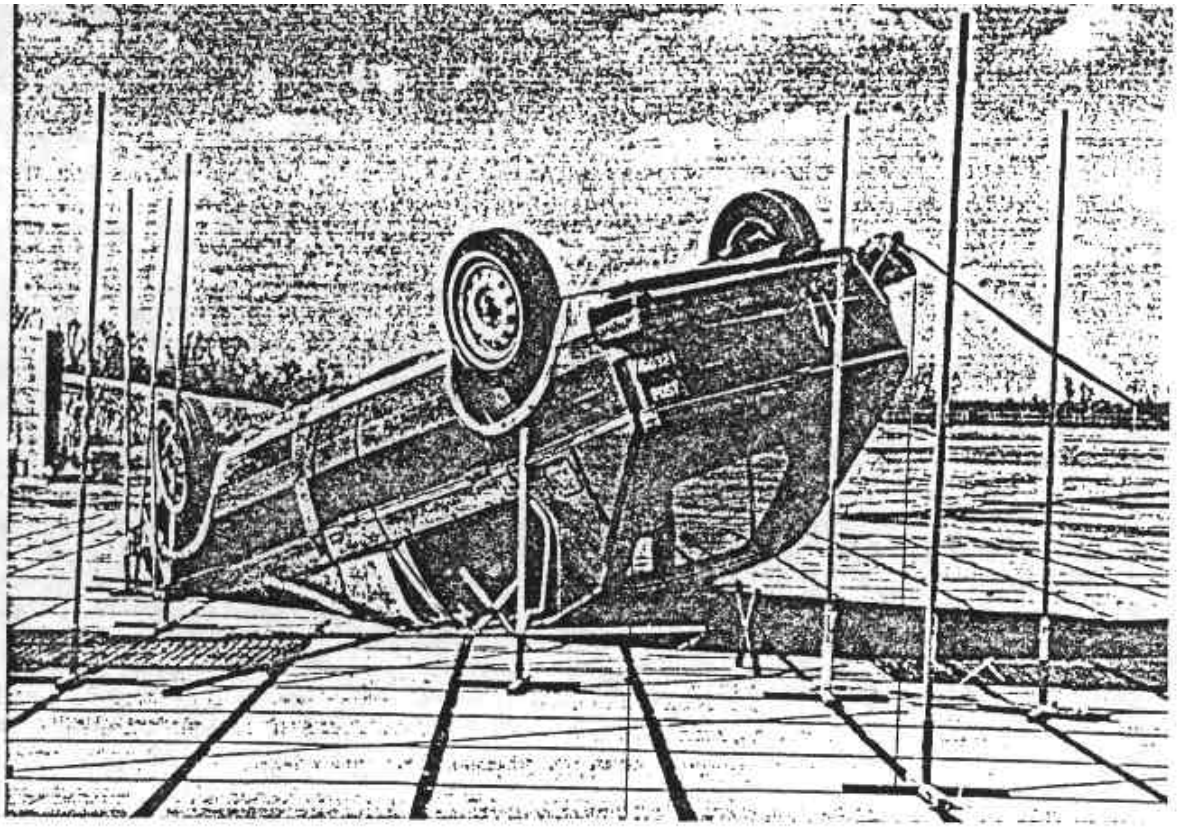


Figure A-11. POST-TEST RIGHT REAR VIEW

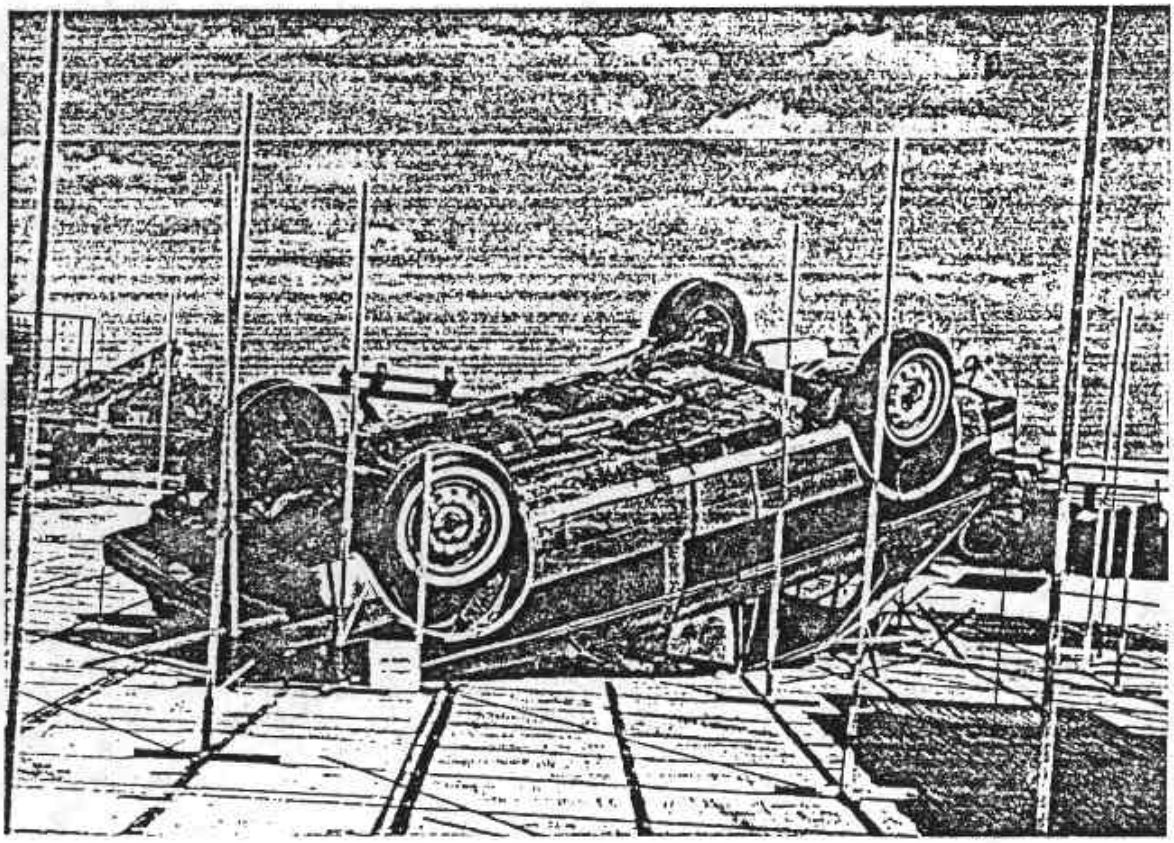


Figure A-12. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

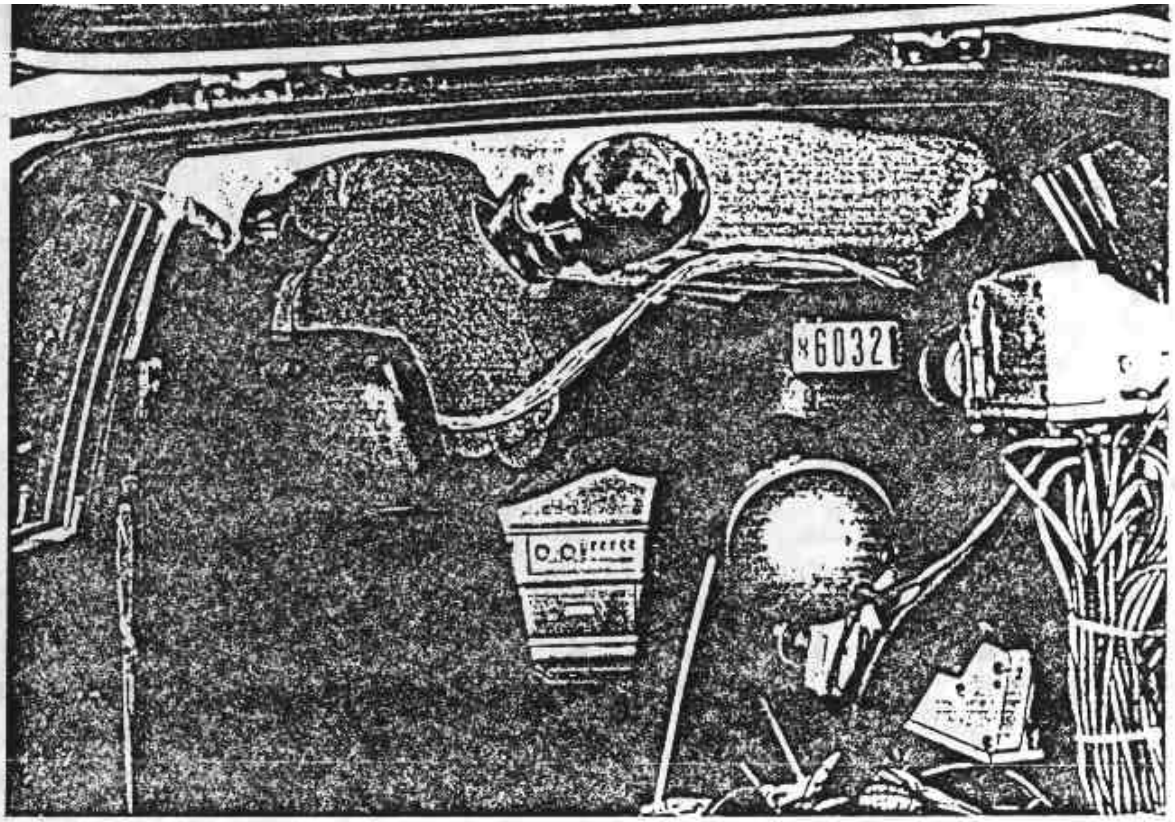


Figure A-13. POST-TEST VEHICLE INTERIOR - VIEW 1

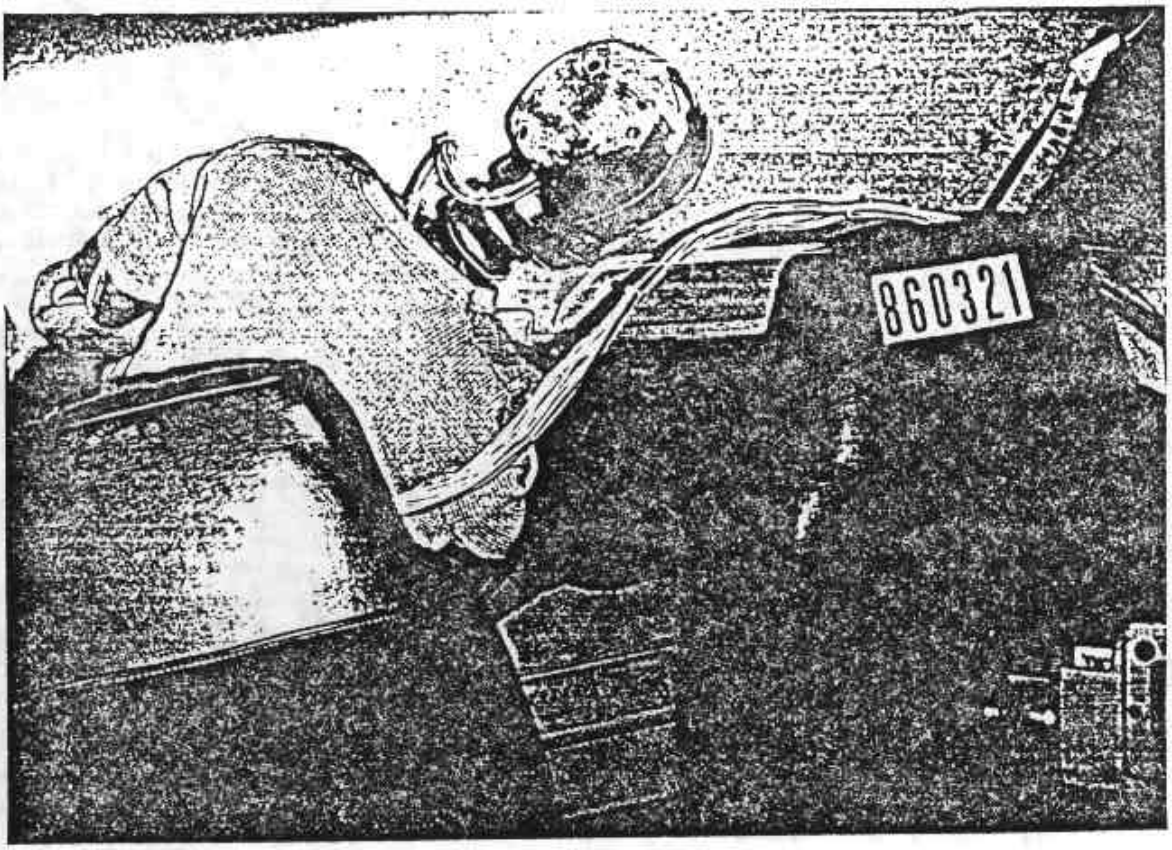


Figure A-14. POST-TEST VEHICLE INTERIOR - VIEW 2

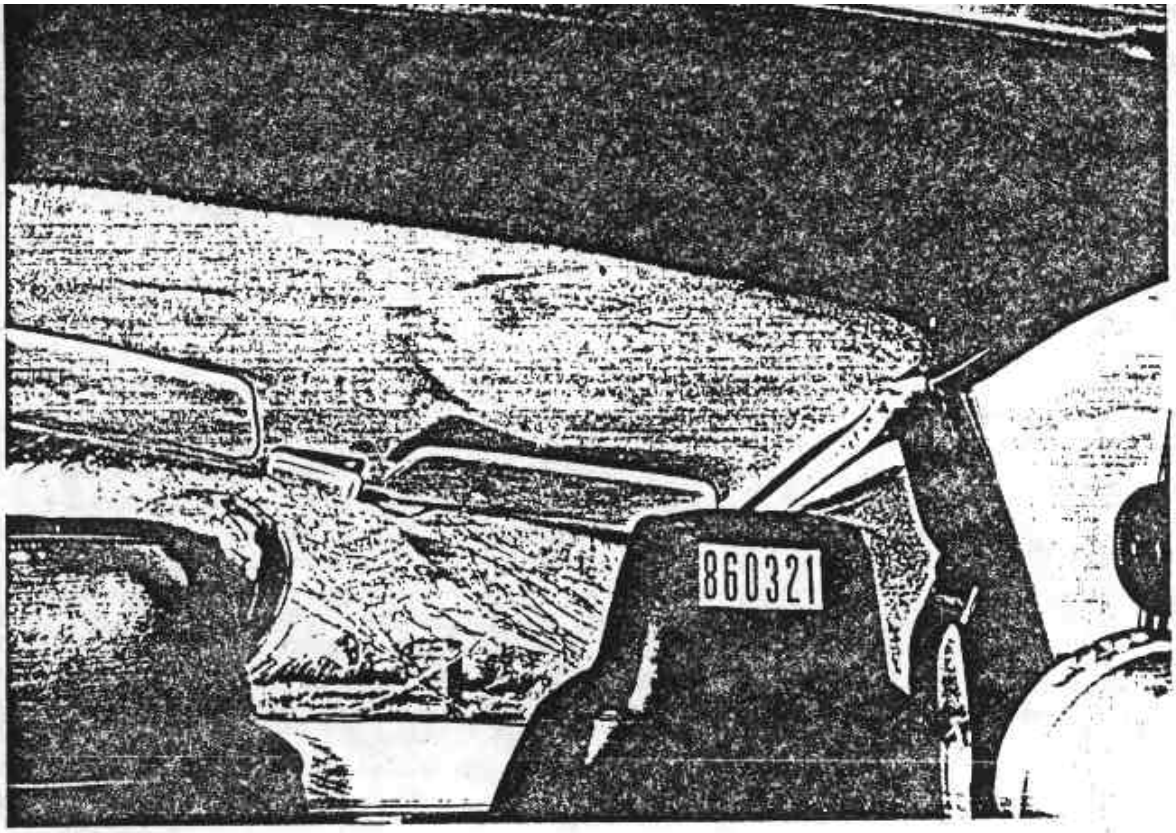


Figure A-15. POST-TEST VEHICLE INTERIOR - VIEW 3

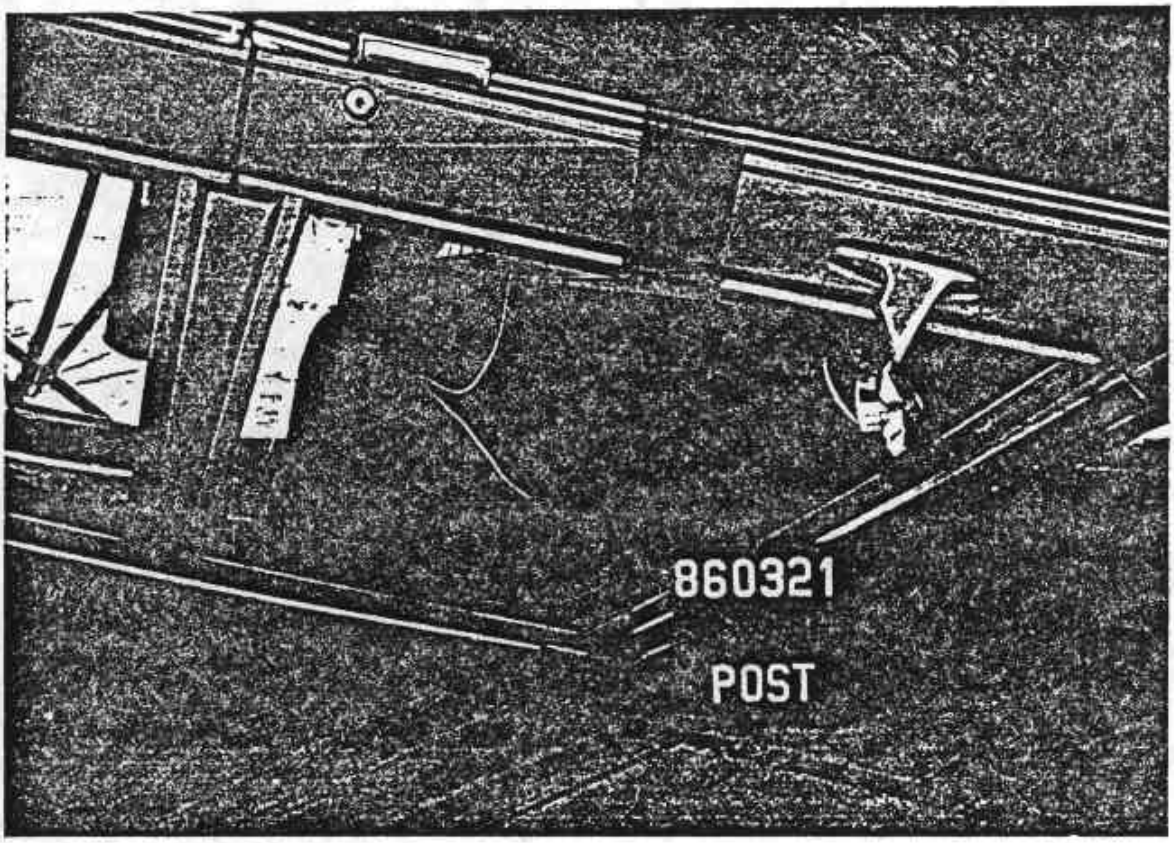


Figure A-16. POST-TEST DUMMY VIEW

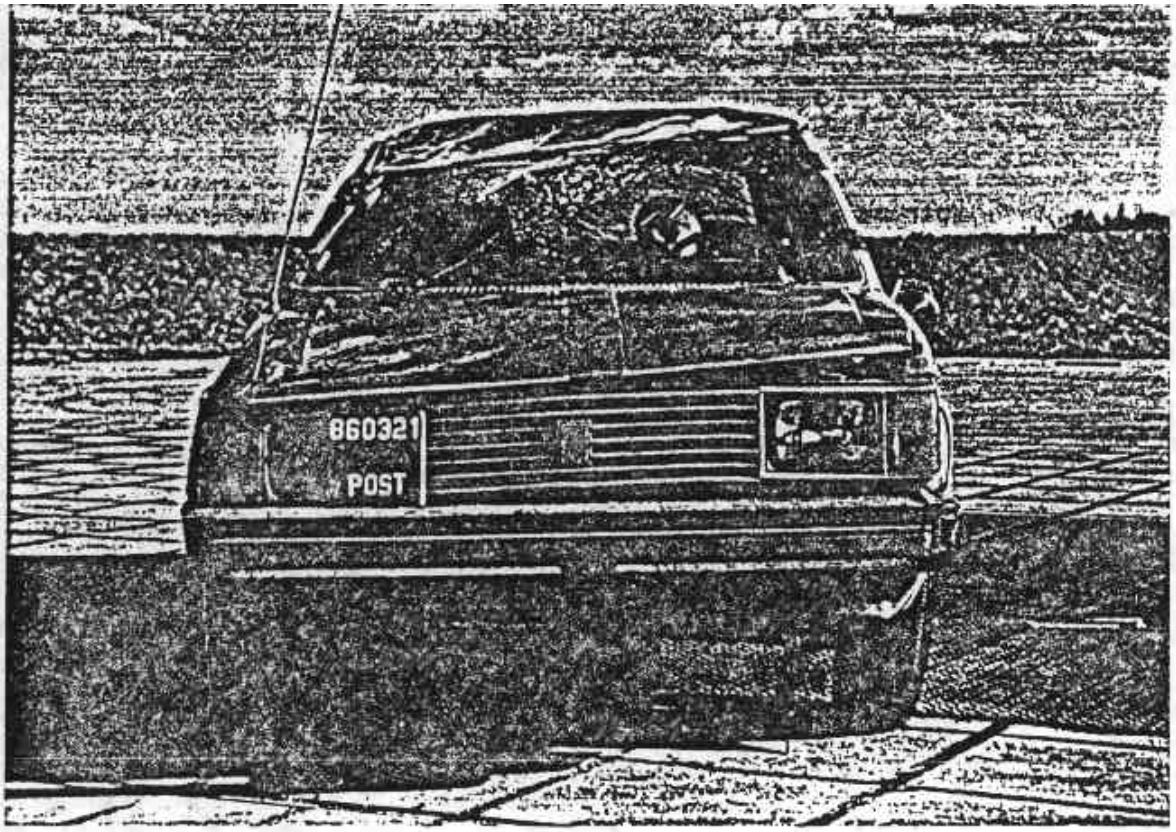


Figure A-17. POST-TEST FRONT VIEW

Figure A-18. POST-TEST LEFT SIDE VIEW

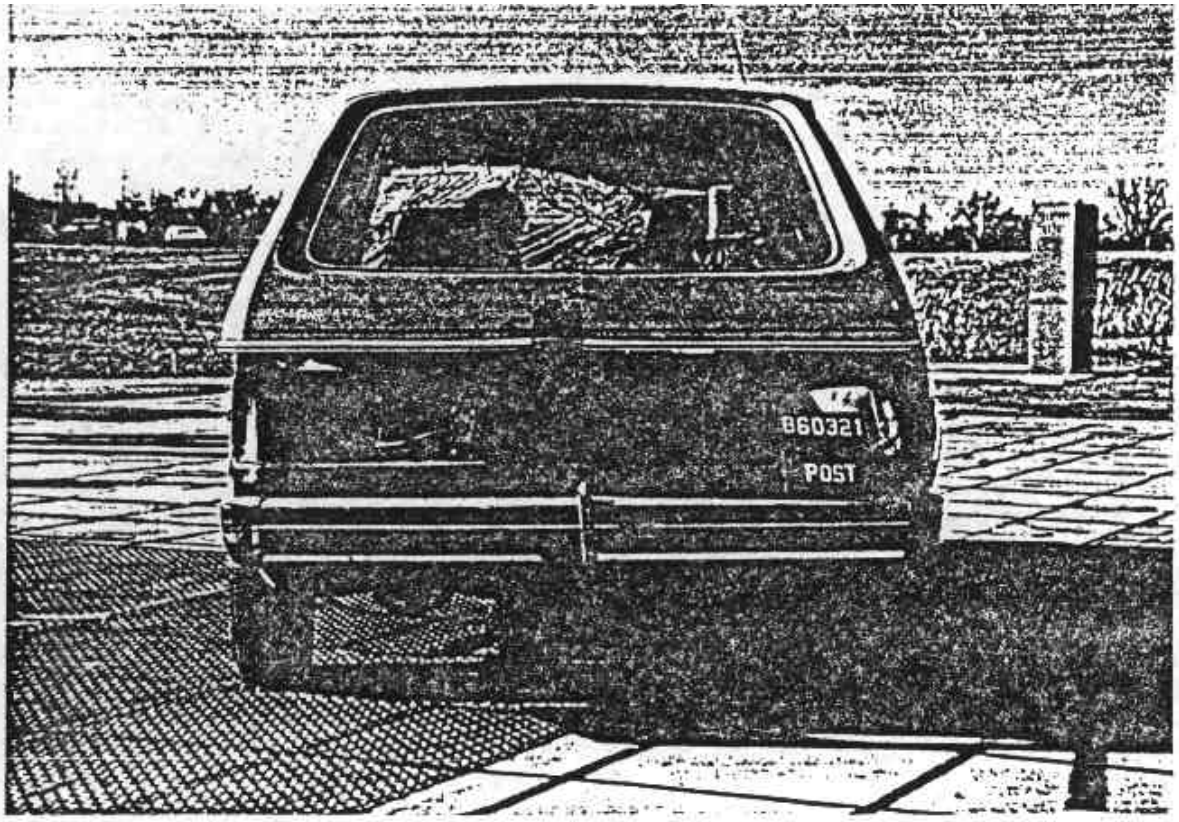


Figure A-19. POST-TEST REAR VIEW

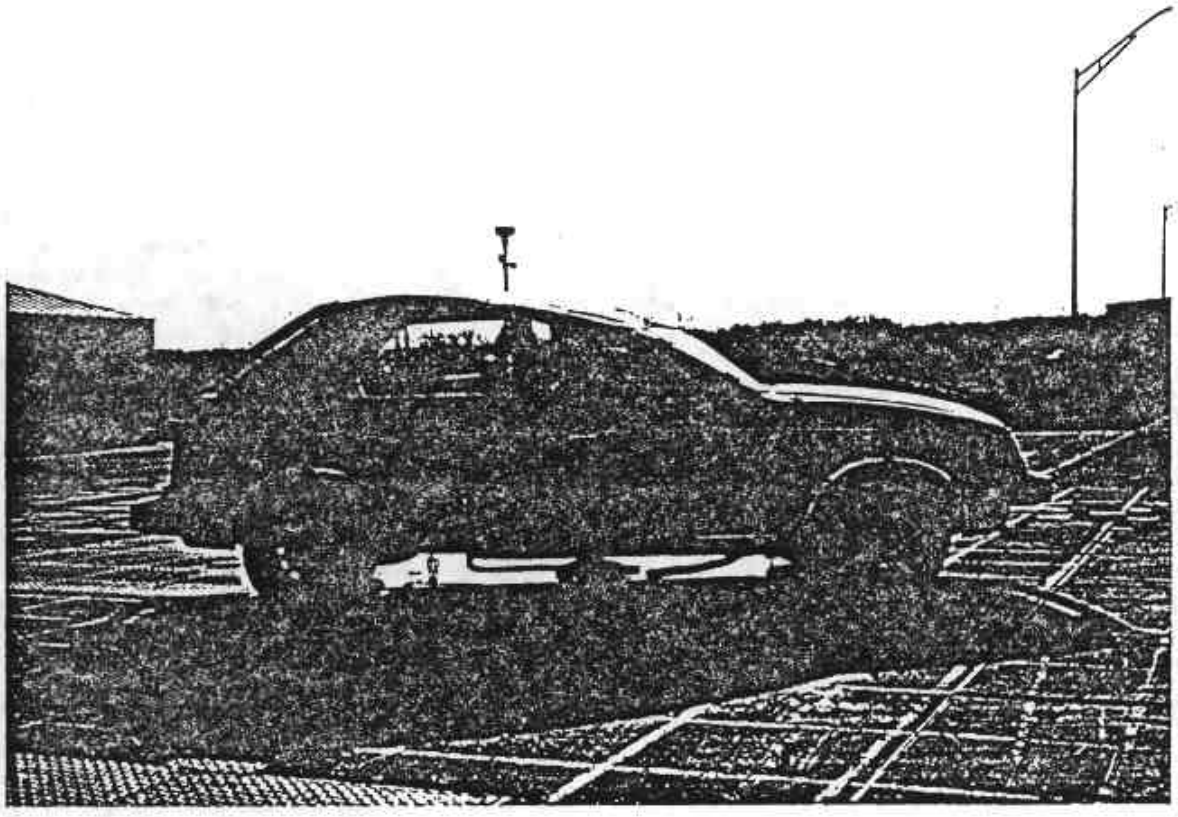


Figure A-20. POST-TEST RIGHT SIDE VIEW

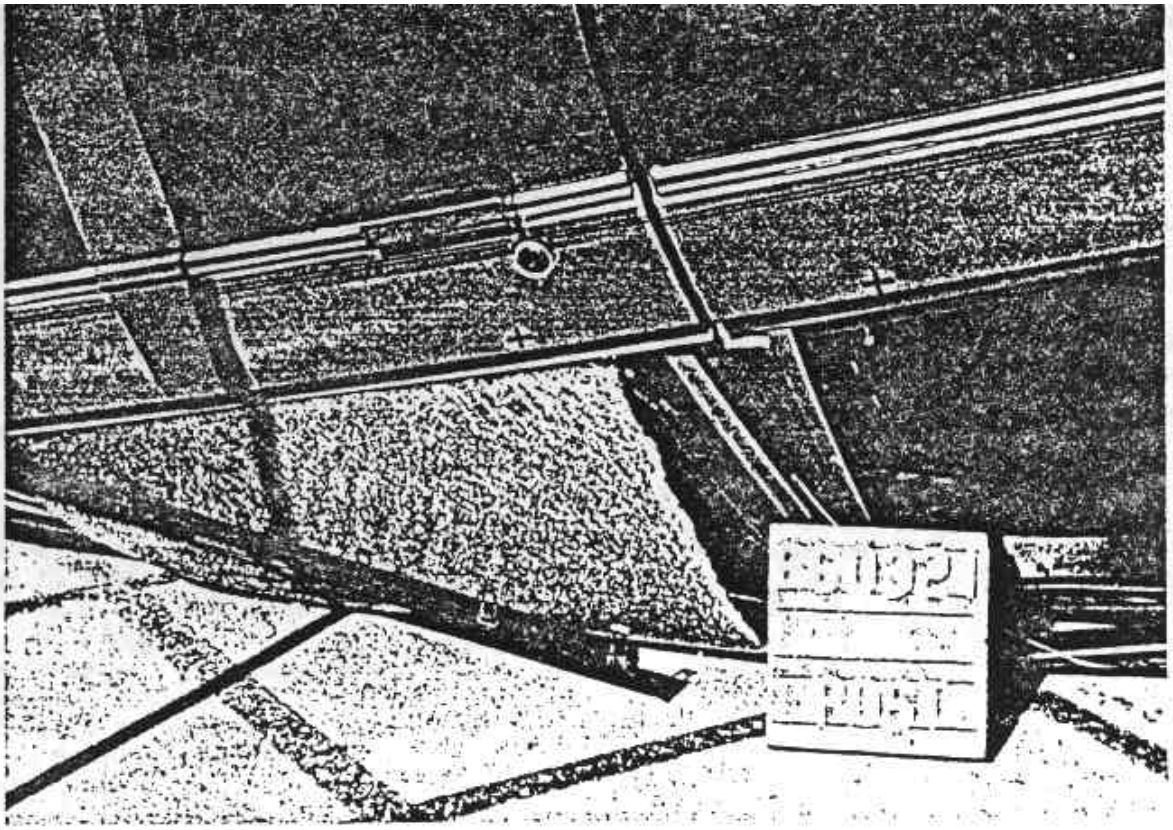


Figure A-21. POST-TEST GLAZING - VIEW 1

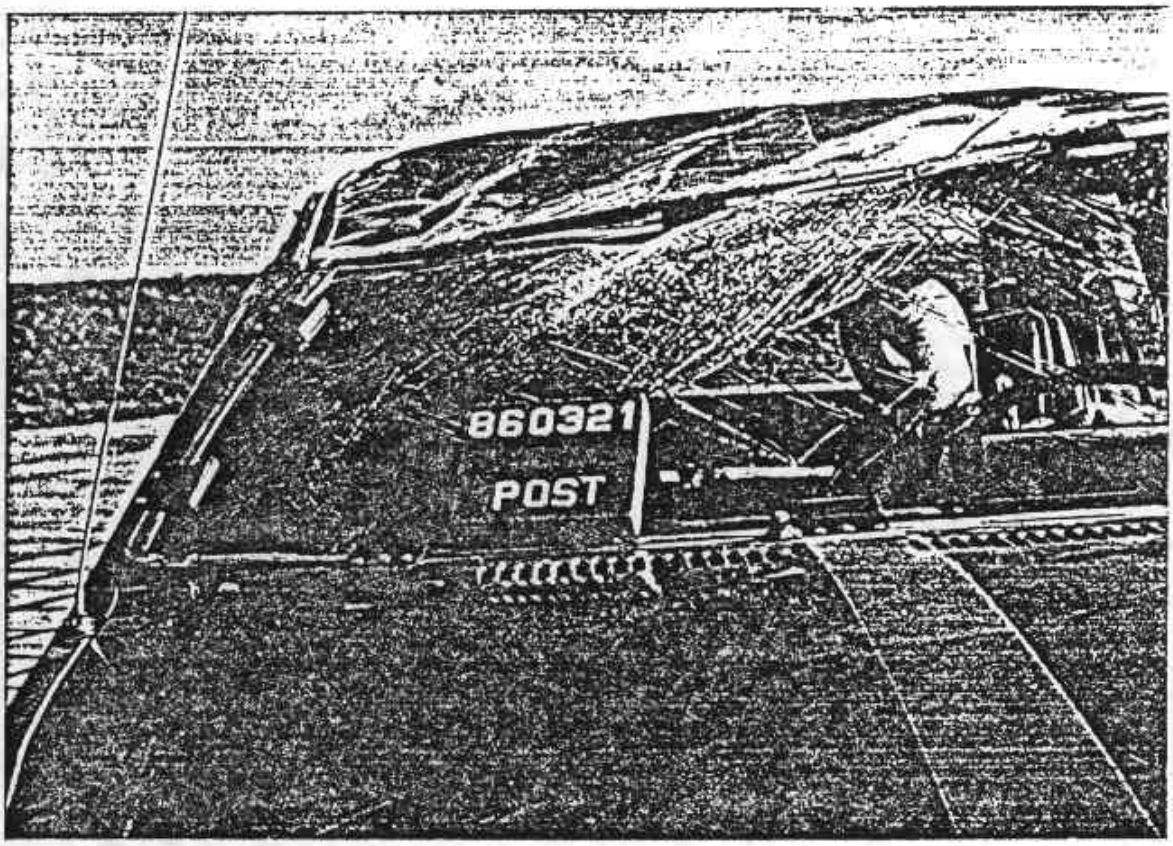


Figure A-22. POST-TEST GLAZING - VIEW 2

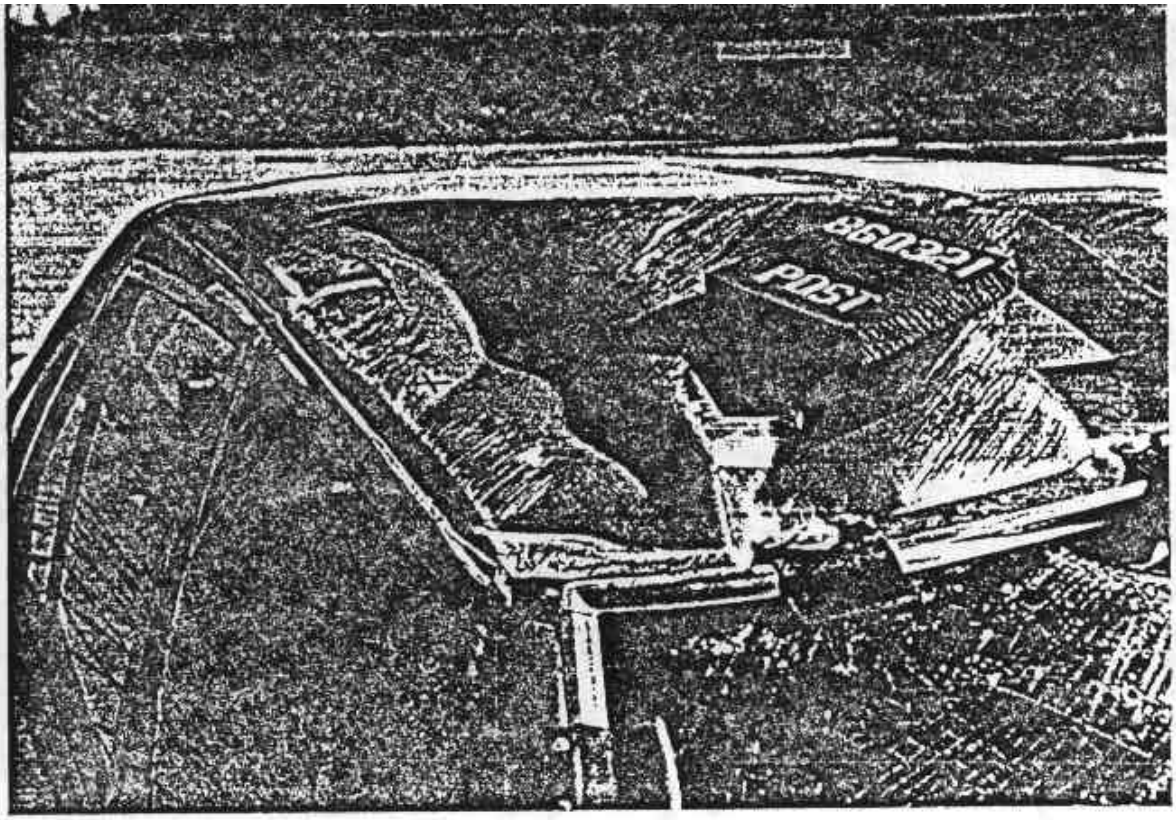


Figure A-23. POST-TEST GLAZING - VIEW 3

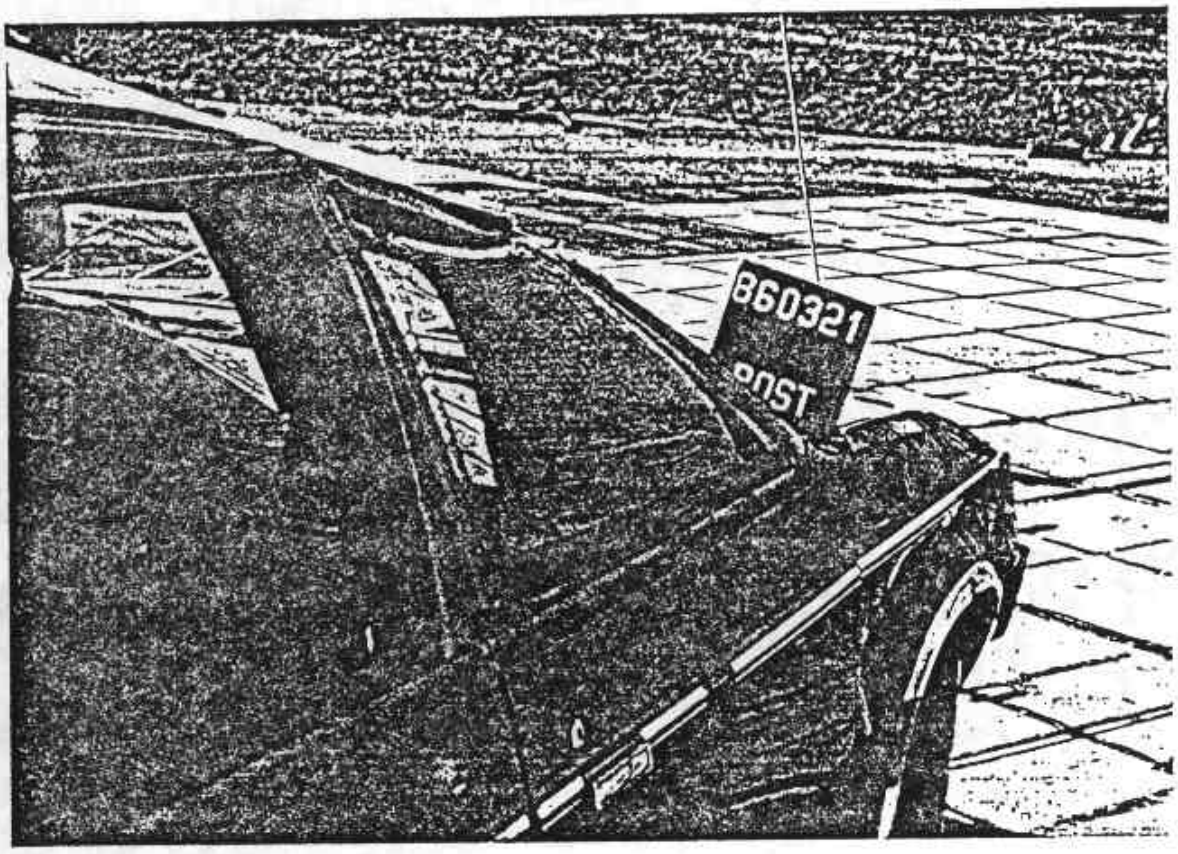
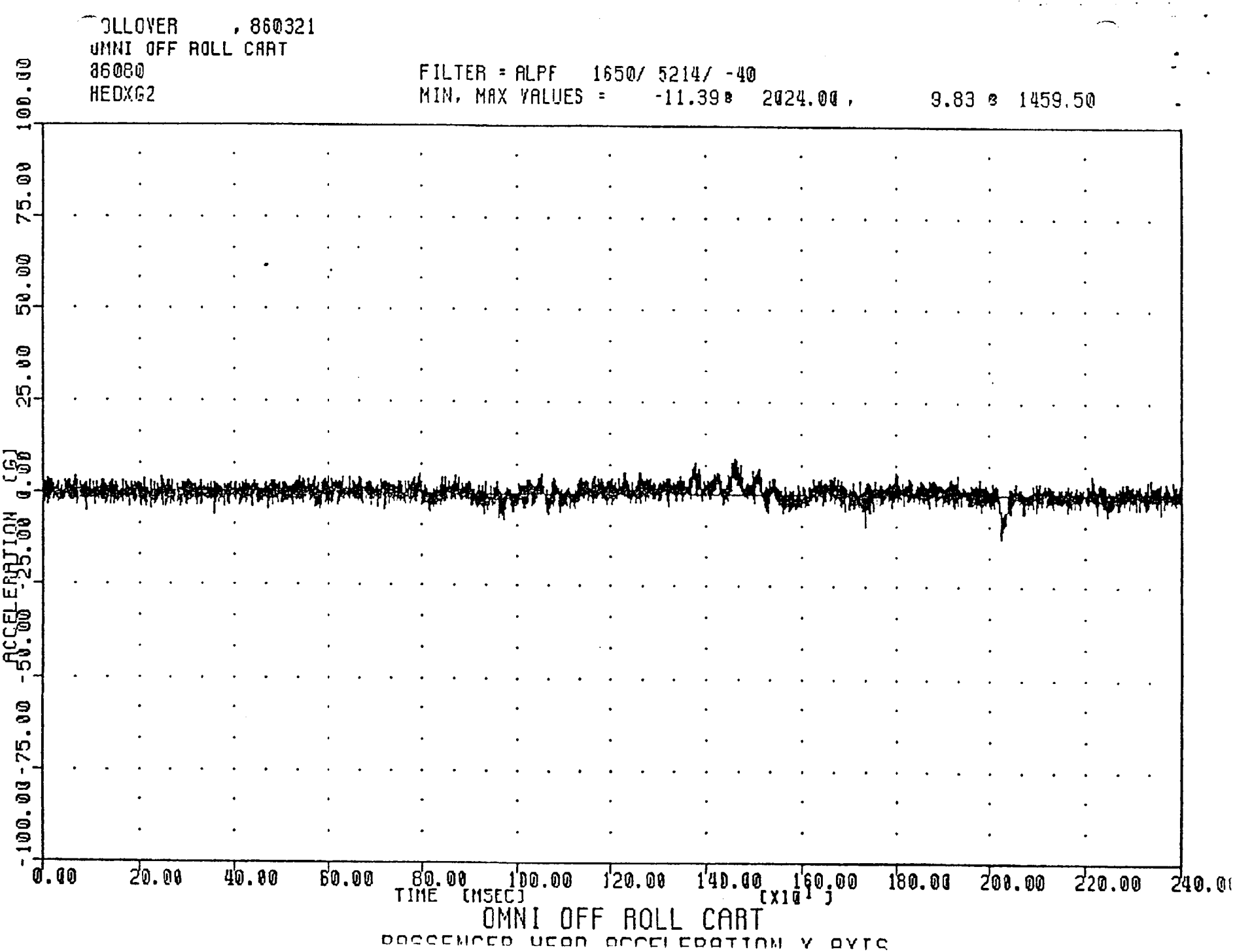
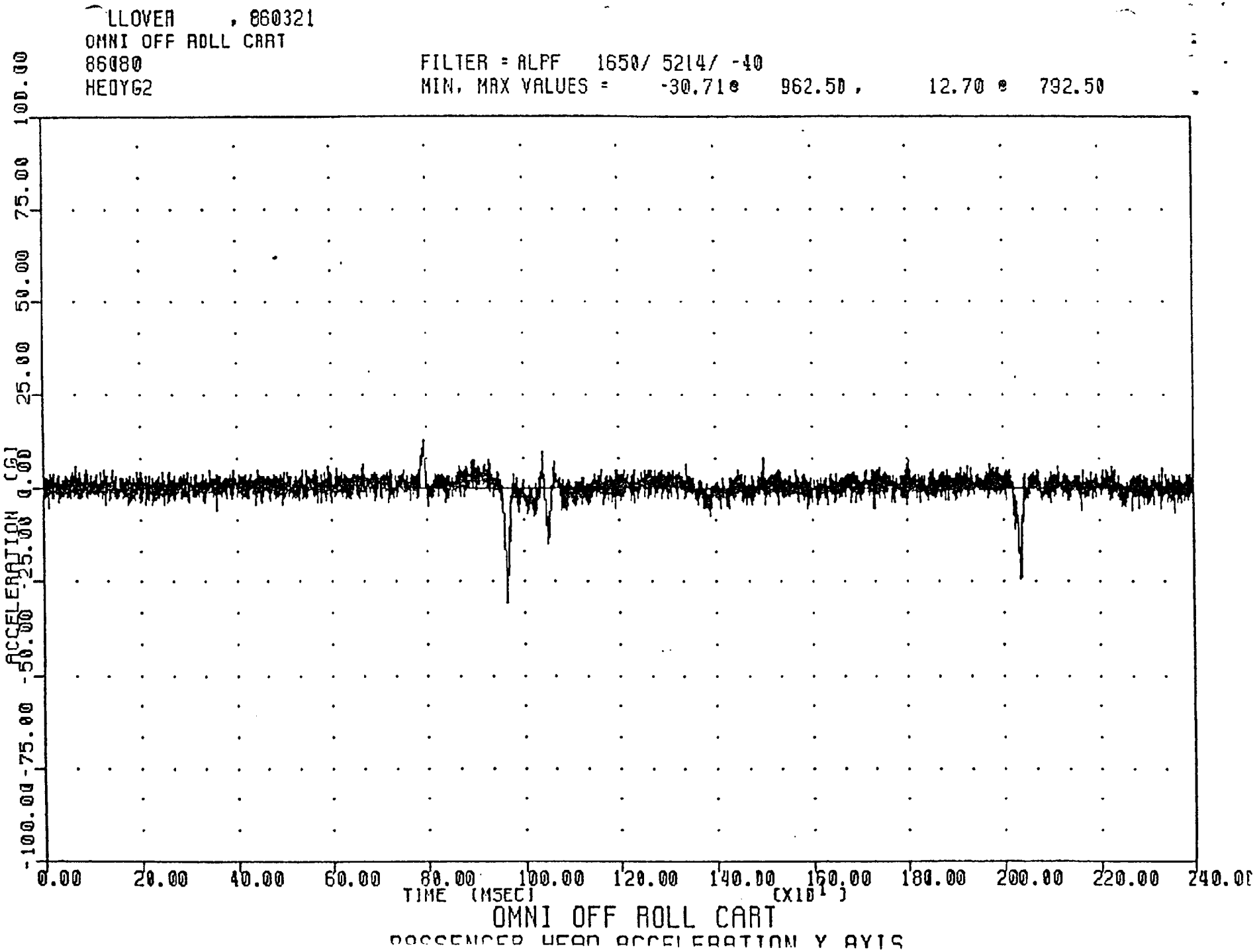


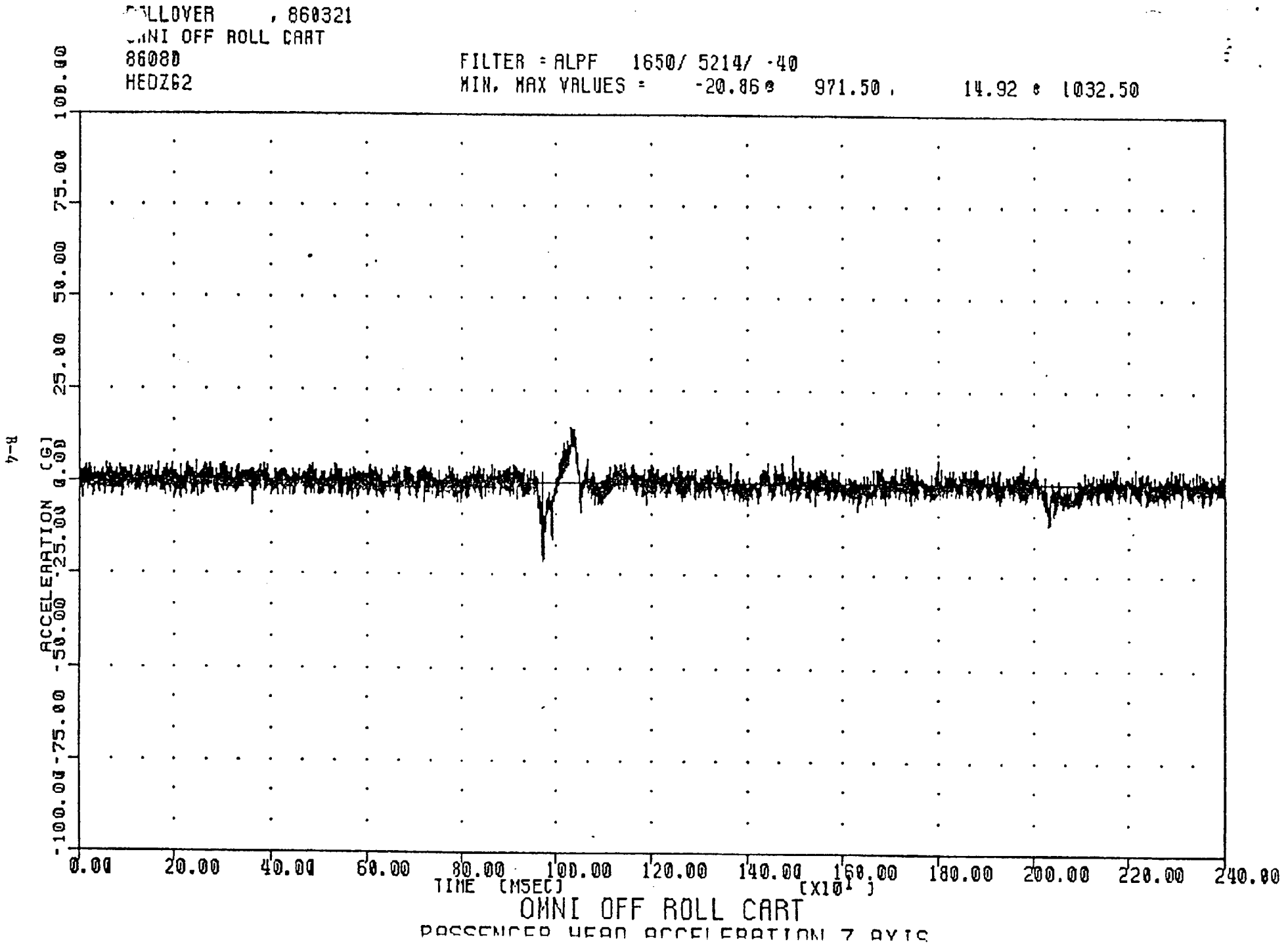
Figure A-24. POST-TEST GLAZING - VIEW 4

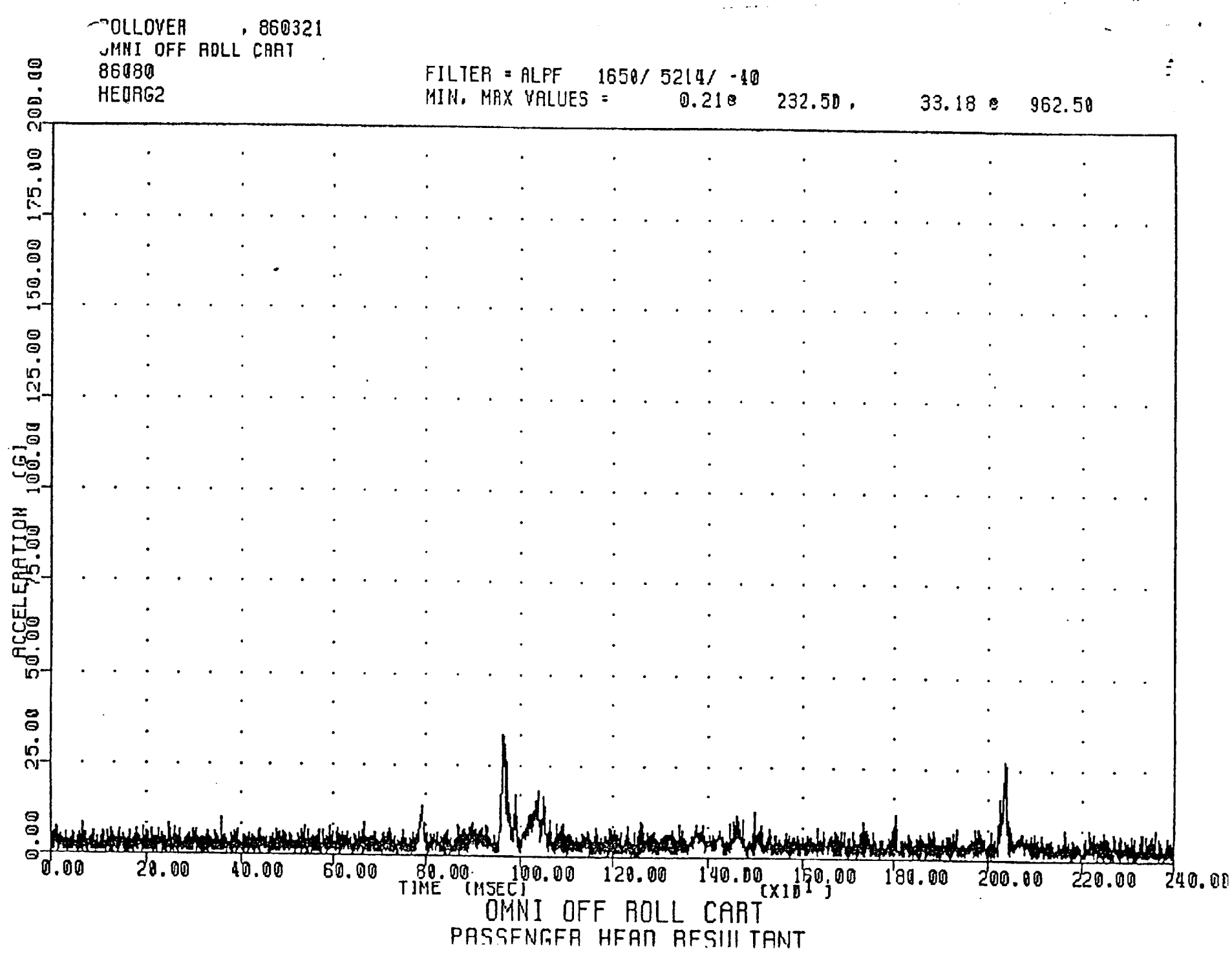
APPENDIX B

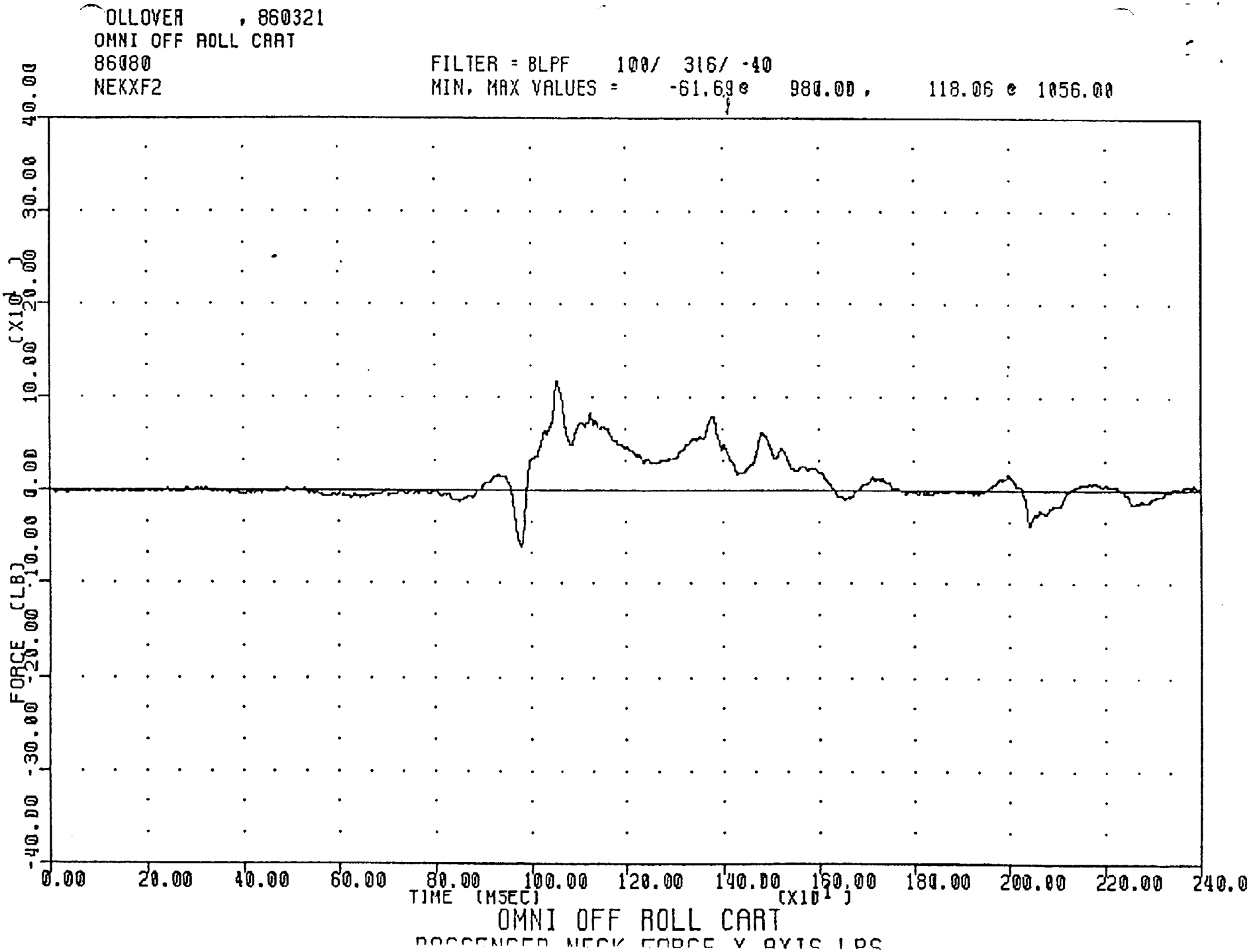
DATA PLOT PRESENTATION

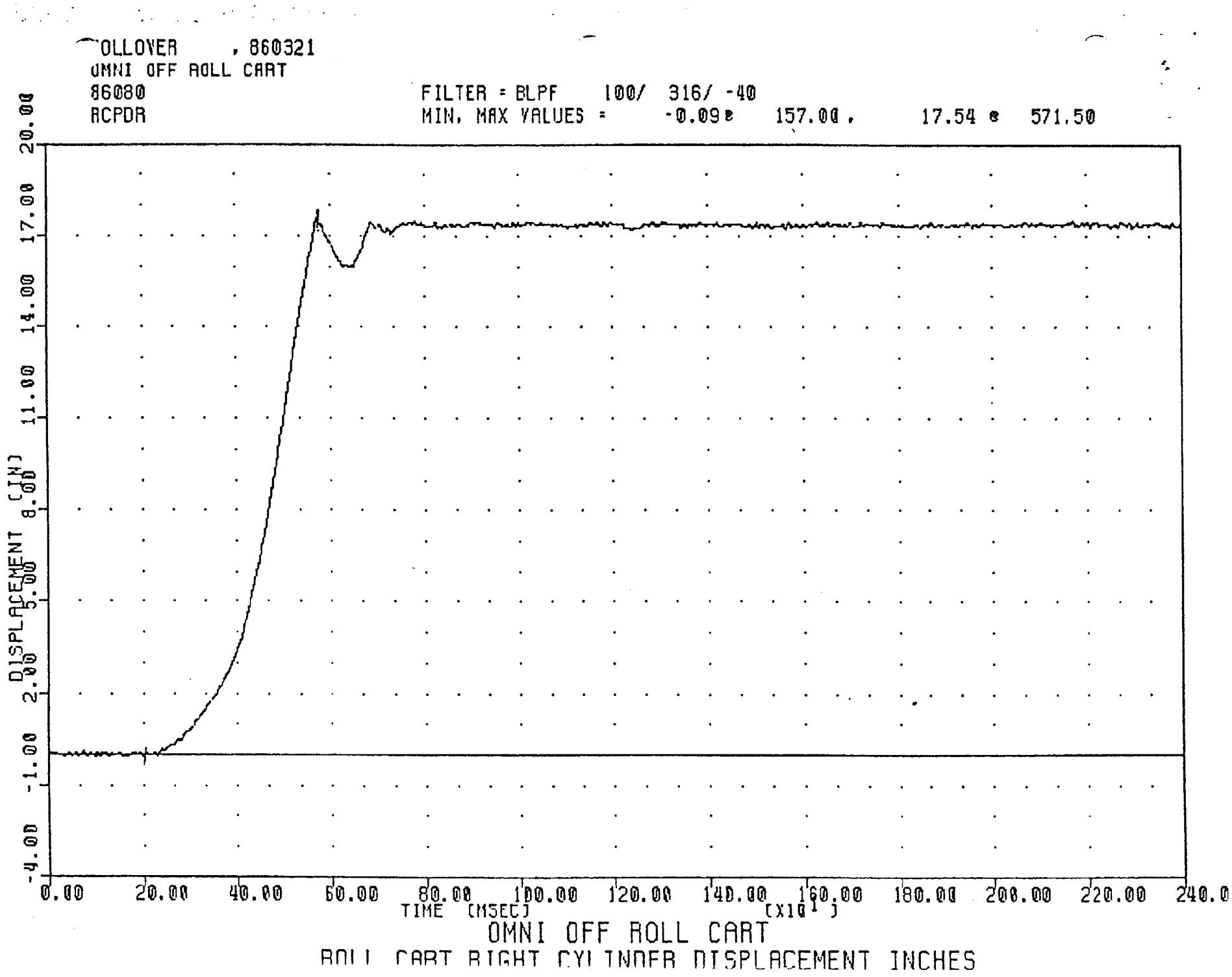

OLLOVER , 860321
OMNI OFF ROLL CART
86080
HEDXG2
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -11.39 @ 2024.00 , 9.83 @ 1459.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ACCELERATION (G)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME (MSEC)
OMNI OFF ROLL CART

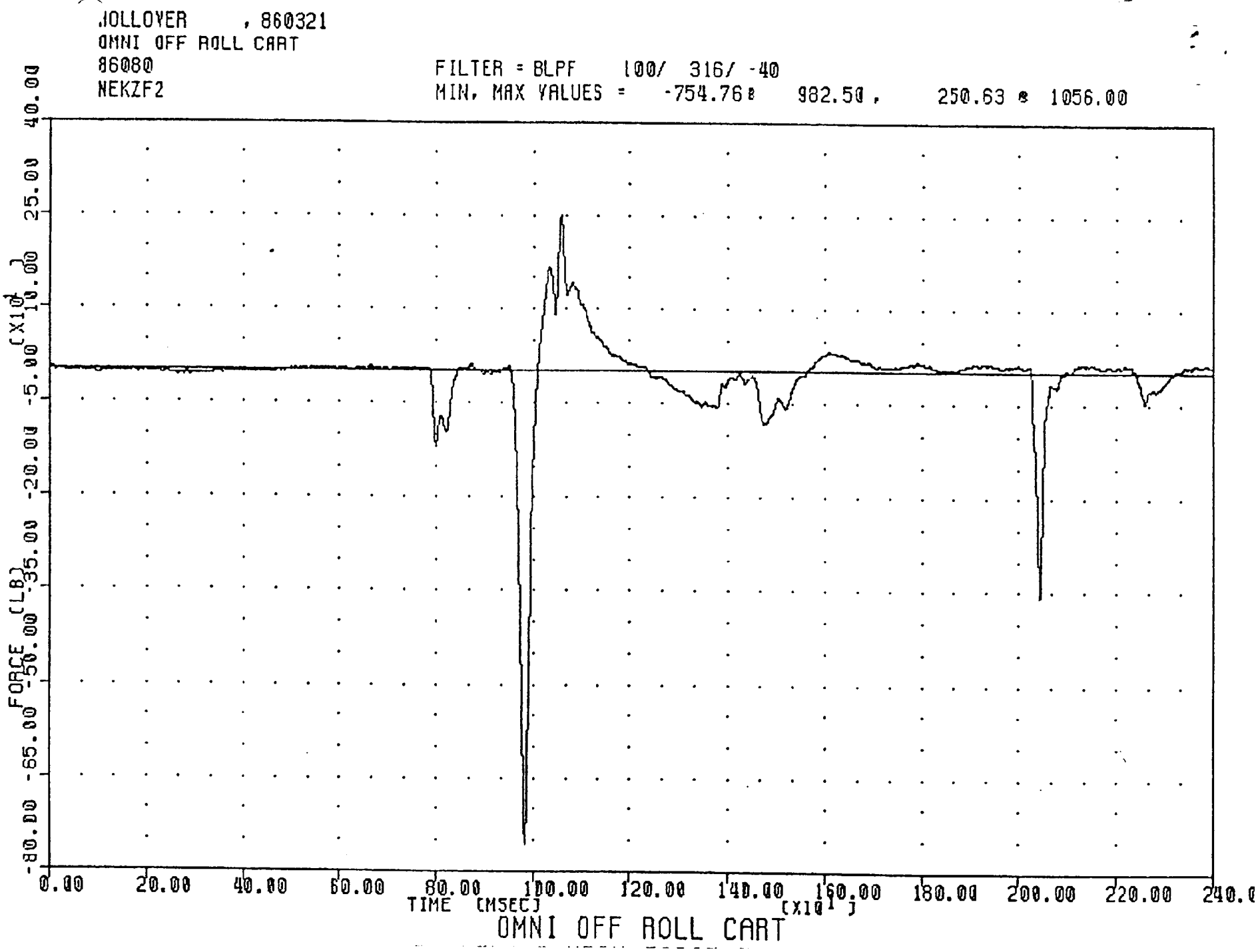

LLOVER , 860321
OMNI OFF ROLL CART
86080
HEOYG2
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -30.71 @ 962.50 , 12.70 @ 792.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ACCELERATION (G)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME (MSEC)
(X10 1)
OMNI OFF ROLL CART
PASSENGER HEAD ACCELERATION Y AXIS

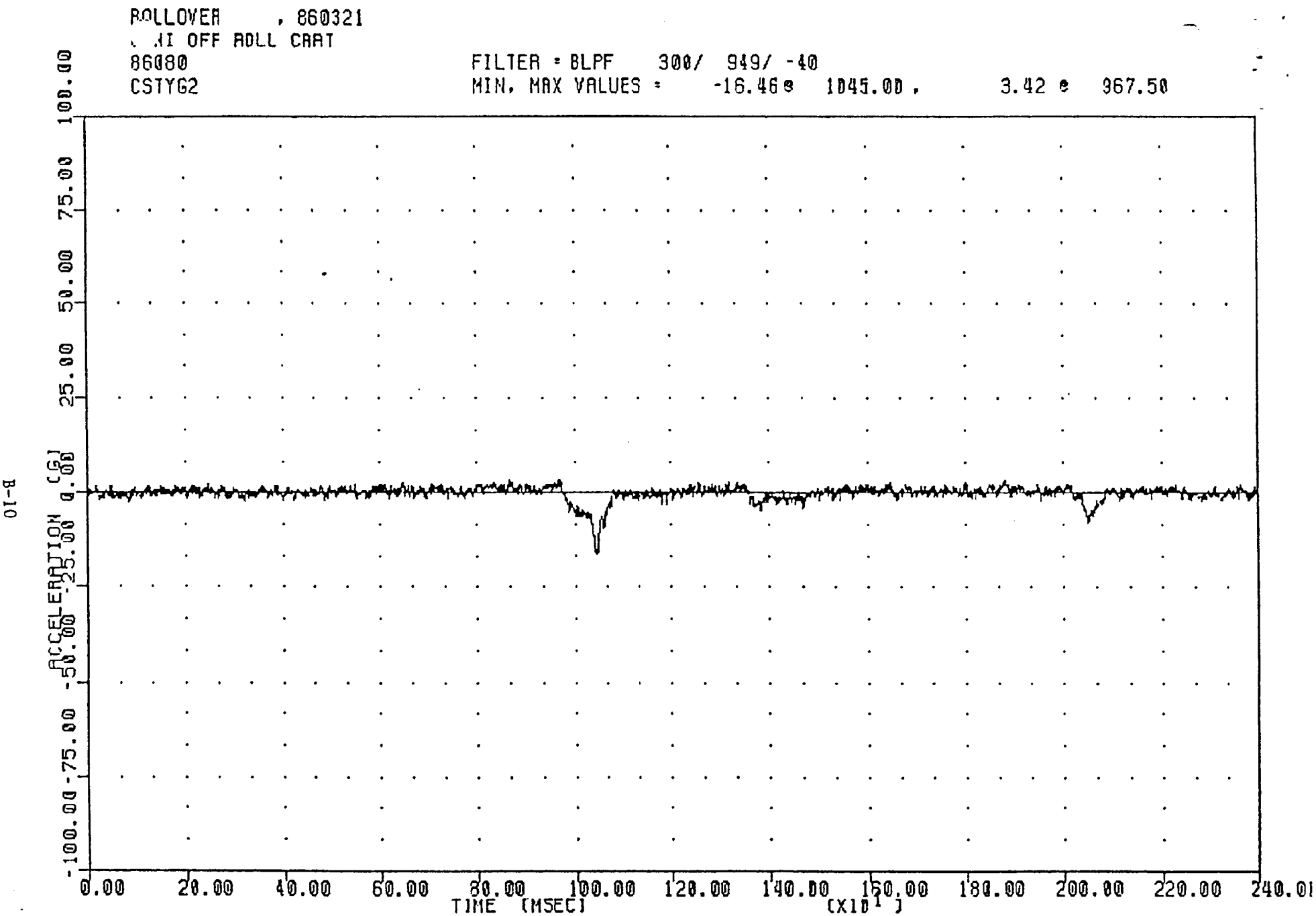

ROLLOVER , 860321
OMNI OFF ROLL CART
86080
HEDZ62
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -20.86 @ 971.50 , 14.92 @ 1032.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ACCELERATION [G]
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME [MSEC]
[X10¹]
OMNI OFF ROLL CART
PASSENGER HEAD ACCELERATION Z AXIS


ROLLOVER , 860321
OMNI OFF ROLL CART
86080
HEORG2
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.21@ 232.50 , 33.18 @ 962.50
ACCELERATION (G)
0.00
25.00
50.00
75.00
100.00
125.00
150.00
175.00
200.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME (MSEC)
(X10^1)
OMNI OFF ROLL CART
PASSENGER HEAD RESULTANT


OLLOVER , 860321
OMNI OFF ROLL CART
86080
NEKXF2
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -61.69 @ 980.00 , 118.06 @ 1056.00
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
(X10)
FORCE (LB)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME (MSEC)
(X10)
OMNI OFF ROLL CART

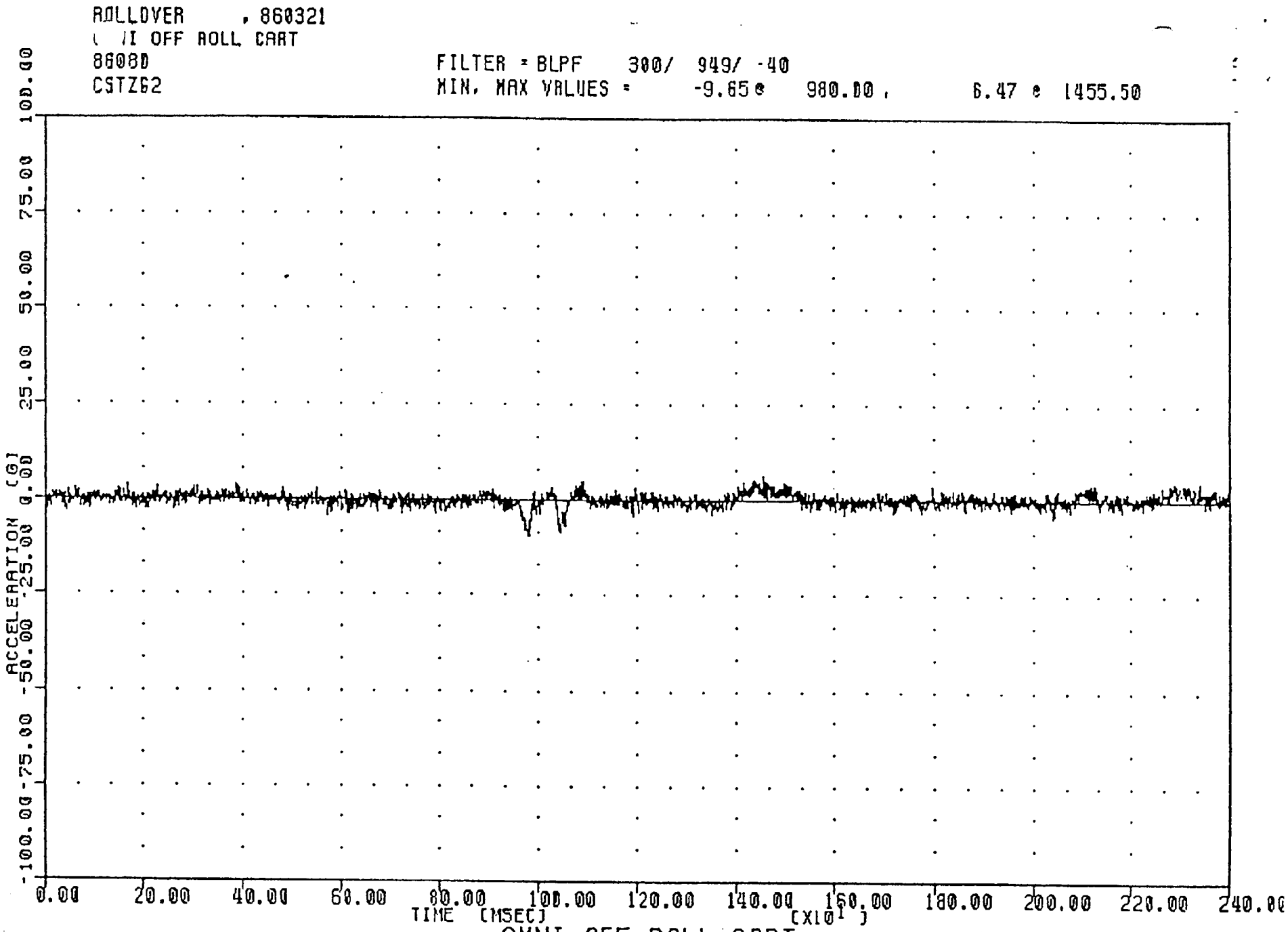

OLLOVER , 860321
OMNI OFF ROLL CART
86080
RCPDR
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -0.09 @ 157.00 , 17.54 @ 571.50
20.00
17.00
14.00
11.00
8.00
5.00
2.00
-1.00
-4.00
DISPLACEMENT (IN)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME (MSEC)
(X10 1)
OMNI OFF ROLL CART
ROLL CART RIGHT CYLINDER DISPLACEMENT INCHES


.IOLLOYER , 860321
OMNI OFF ROLL CART
86080
NEKZF2
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -754.76 @ 982.50 , 250.63 @ 1056.00
40.00
25.00
10.00
-5.00
-20.00
-35.00
-50.00
-65.00
-80.00
FORCE (LB) (X10)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME (MSEC) (X10)
OMNI OFF ROLL CART



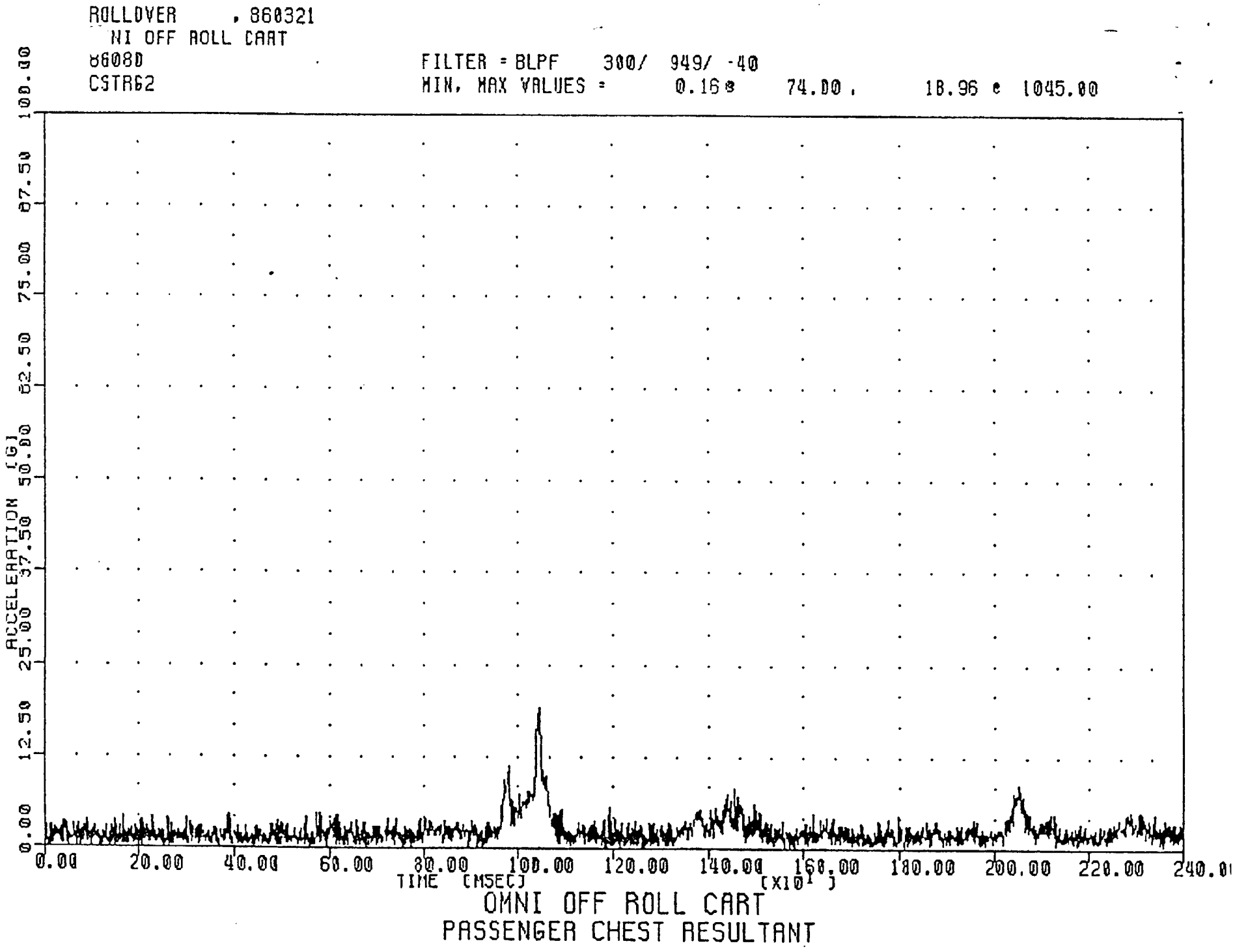
OMNI OFF ROLL CART

PASSENGER CHEST ACCELERATION Y AXIS

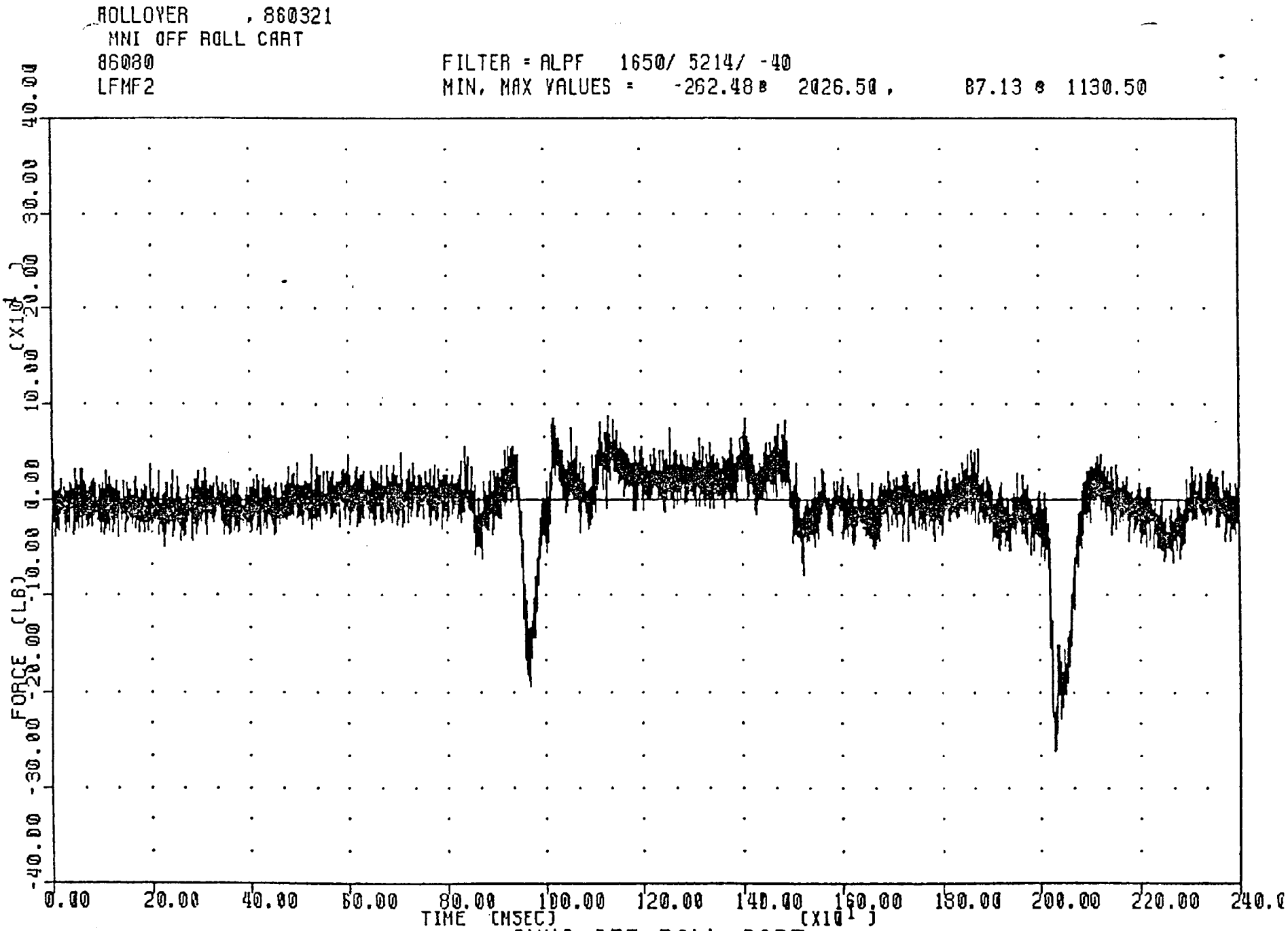


OMNI OFF ROLL CART

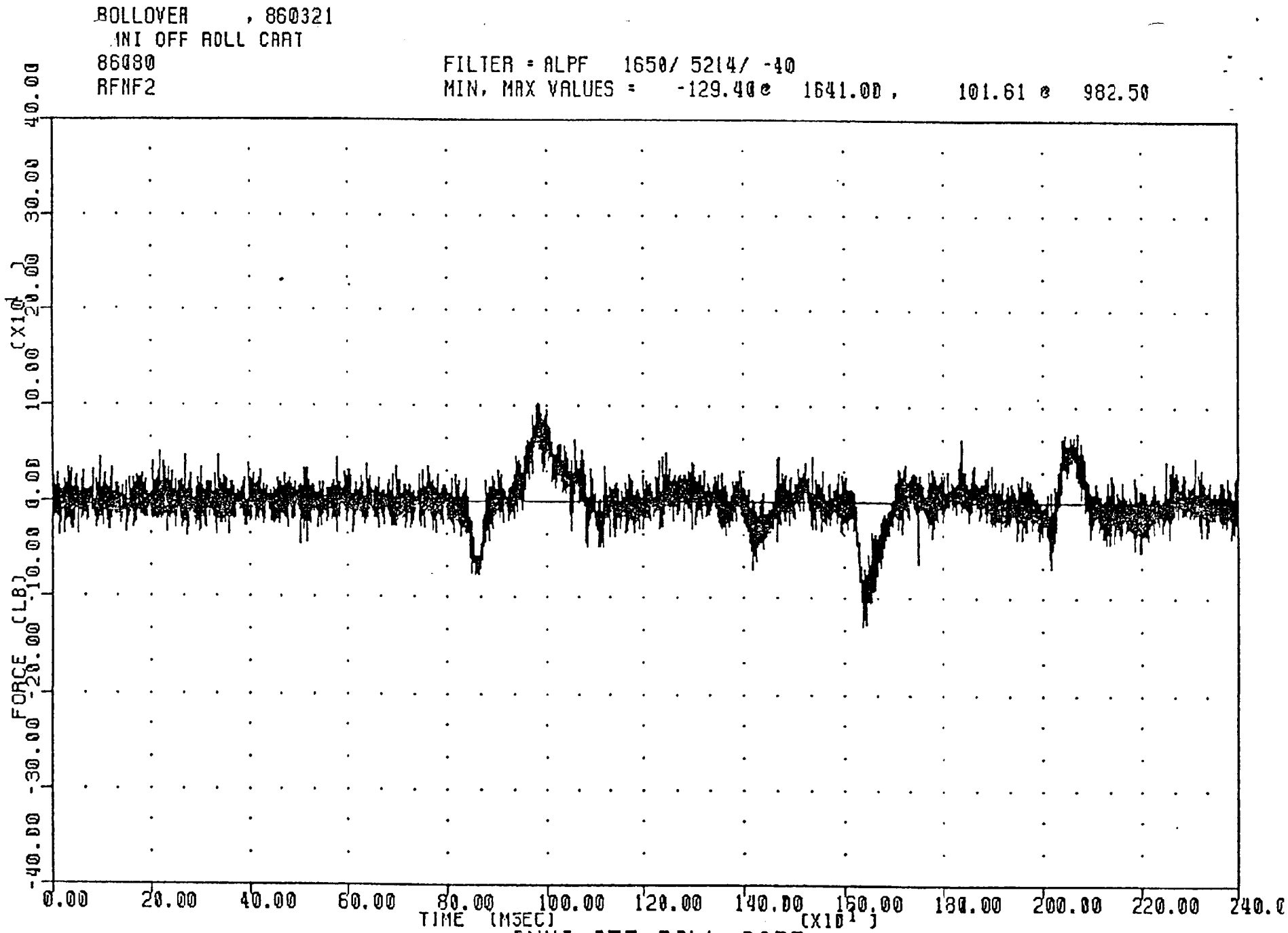
PASSENGER CHEST ACCELERATION Z AXIS



OMNI OFF ROLL CART
PASSENGER CHEST RESULTANT

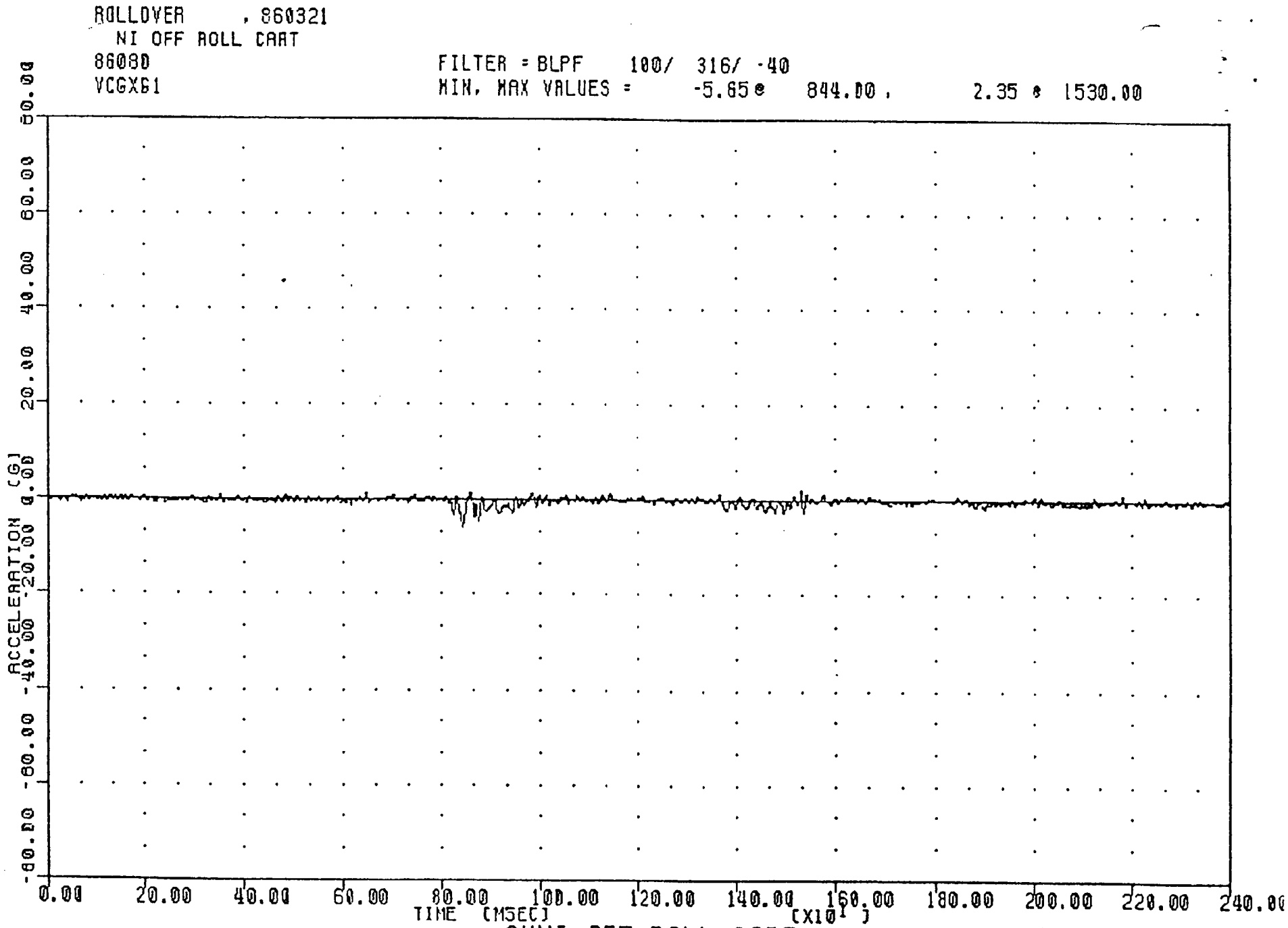


OMNI OFF ROLL CART
PASSENGER LEFT FEMUR FORCE LBS



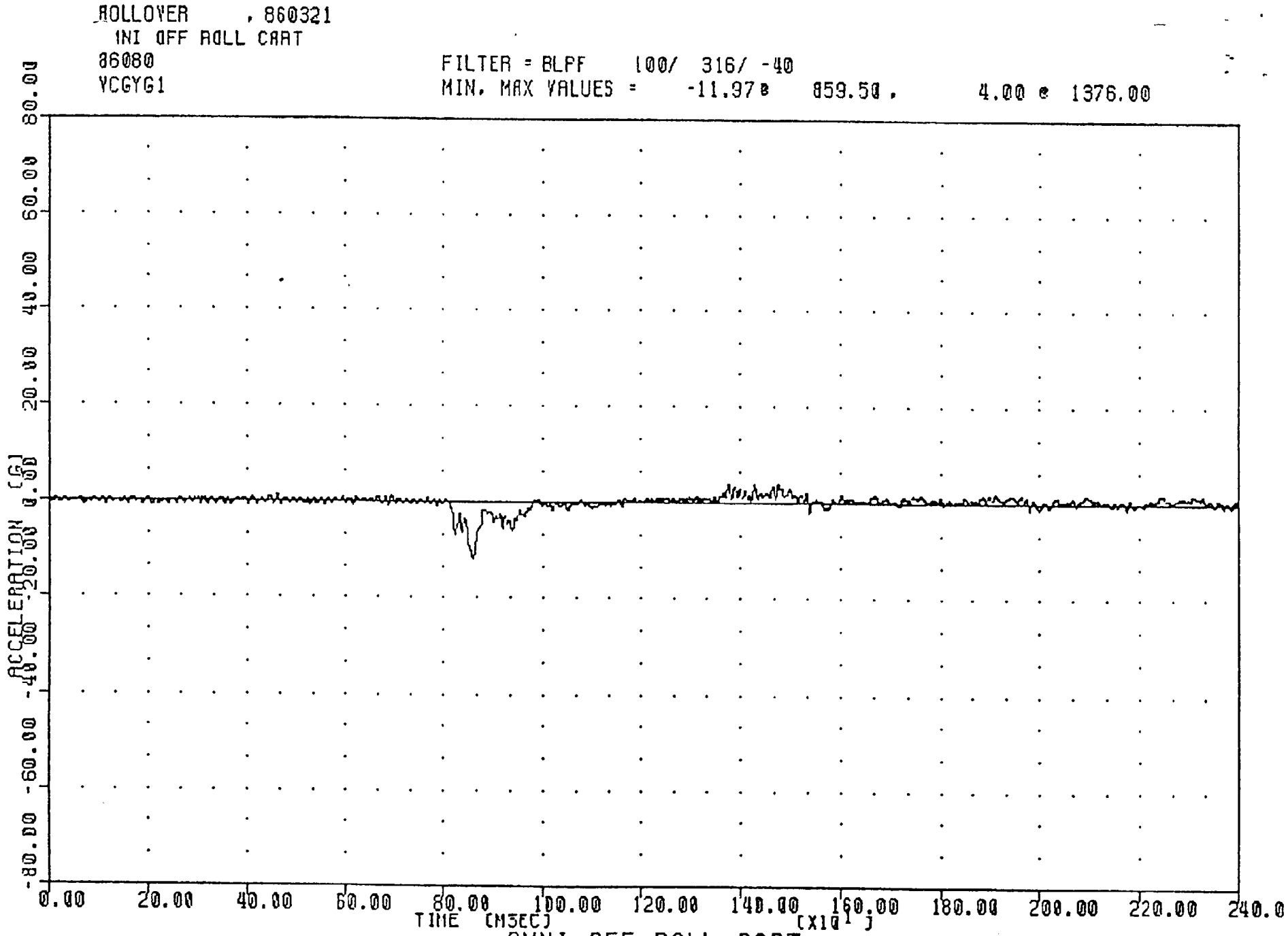
OMNI OFF ROLL CART

PASSENGER RIGHT FEMUR FORCE LBS



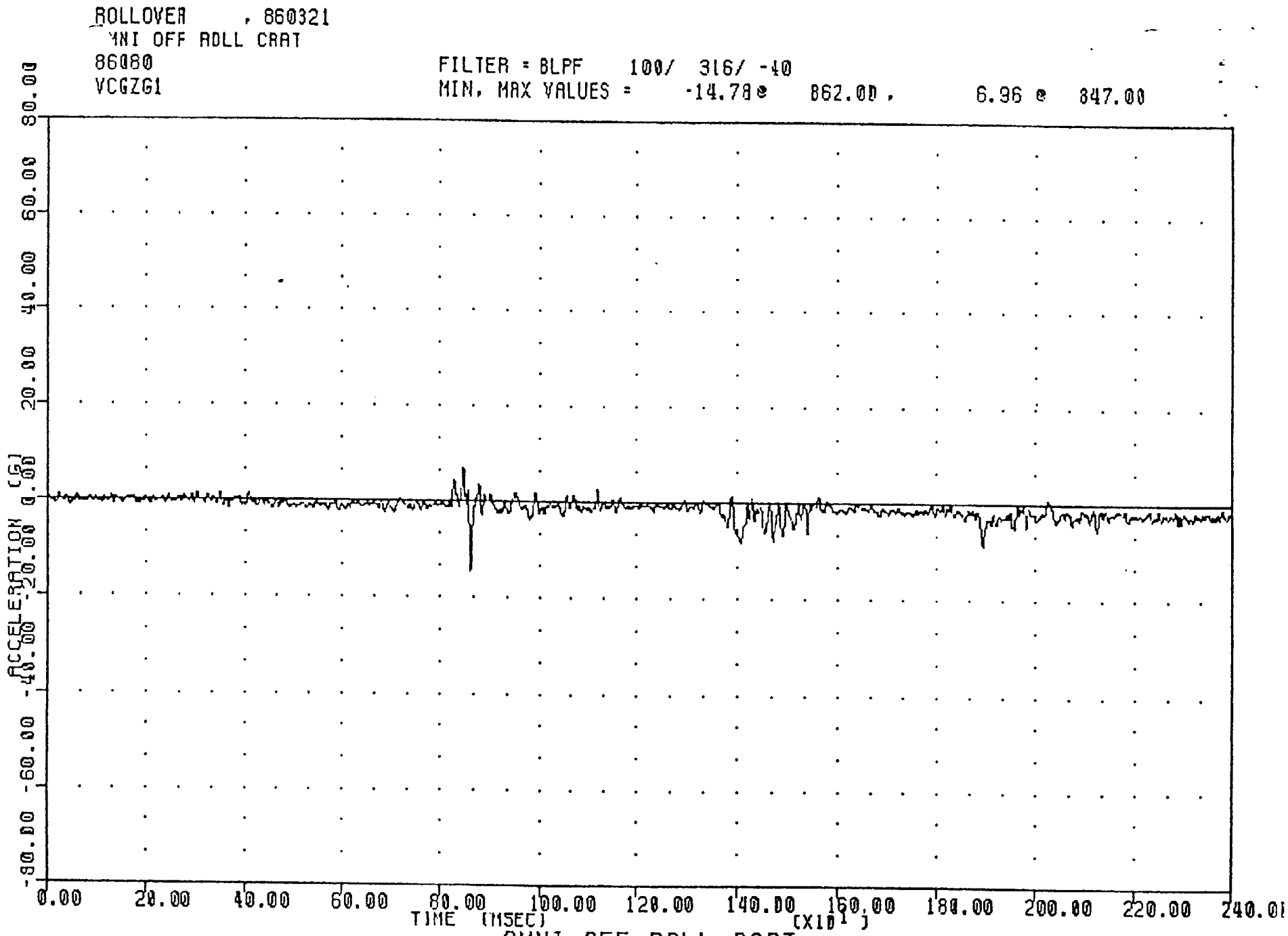
OMNI OFF ROLL CART

VEHICLE CENTER OF GRAVITY ACCELERATION X AXIS

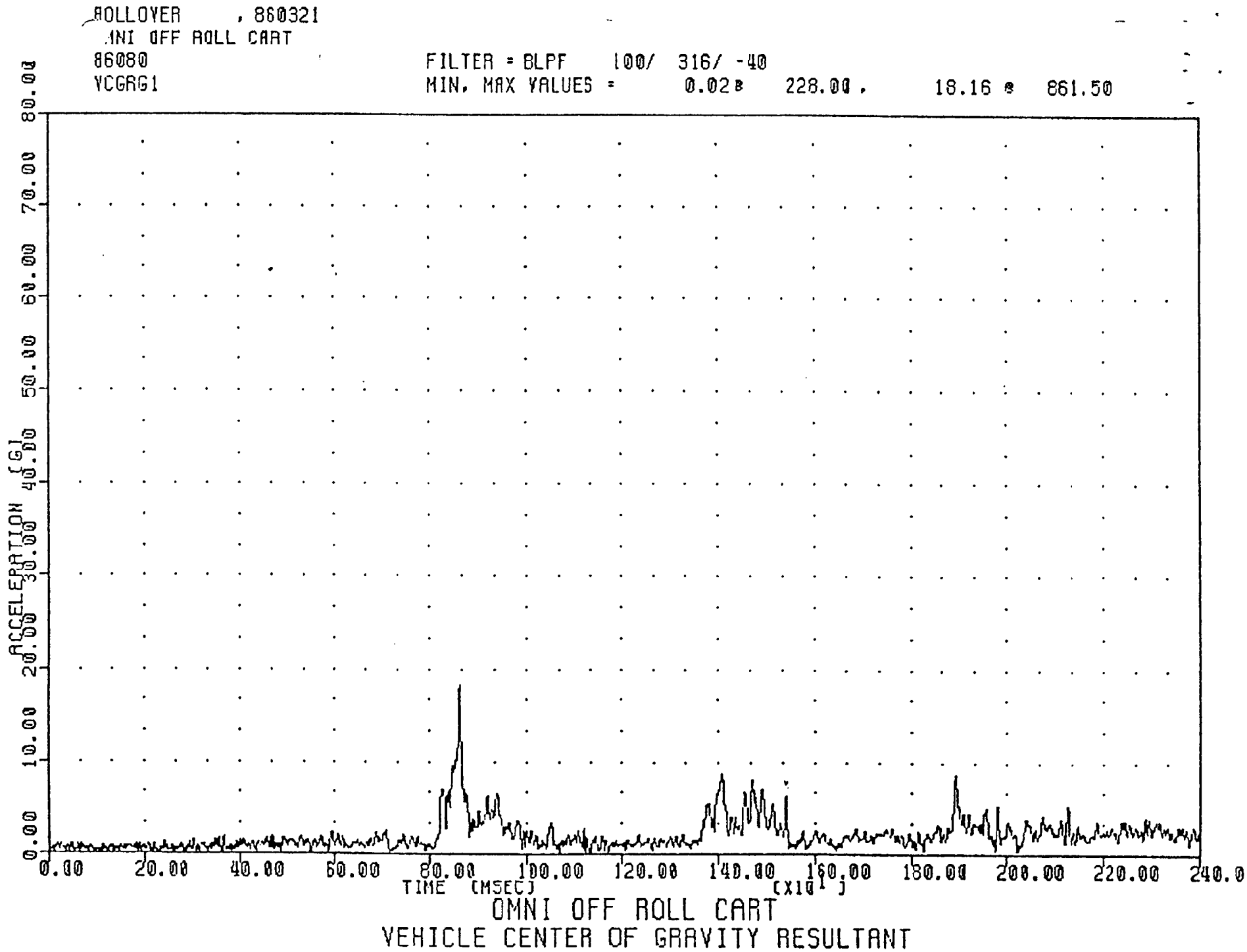


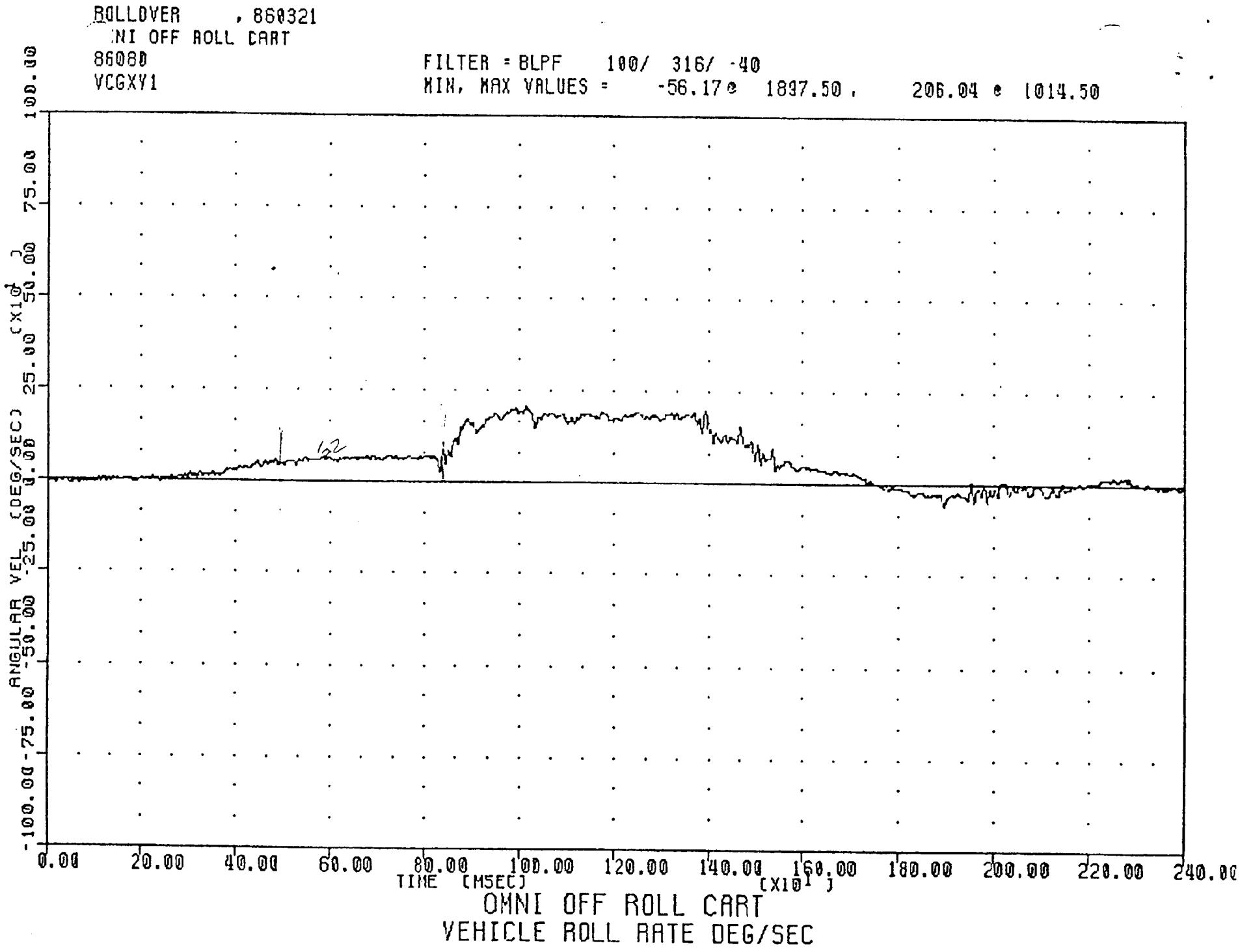
OMNI OFF ROLL CART

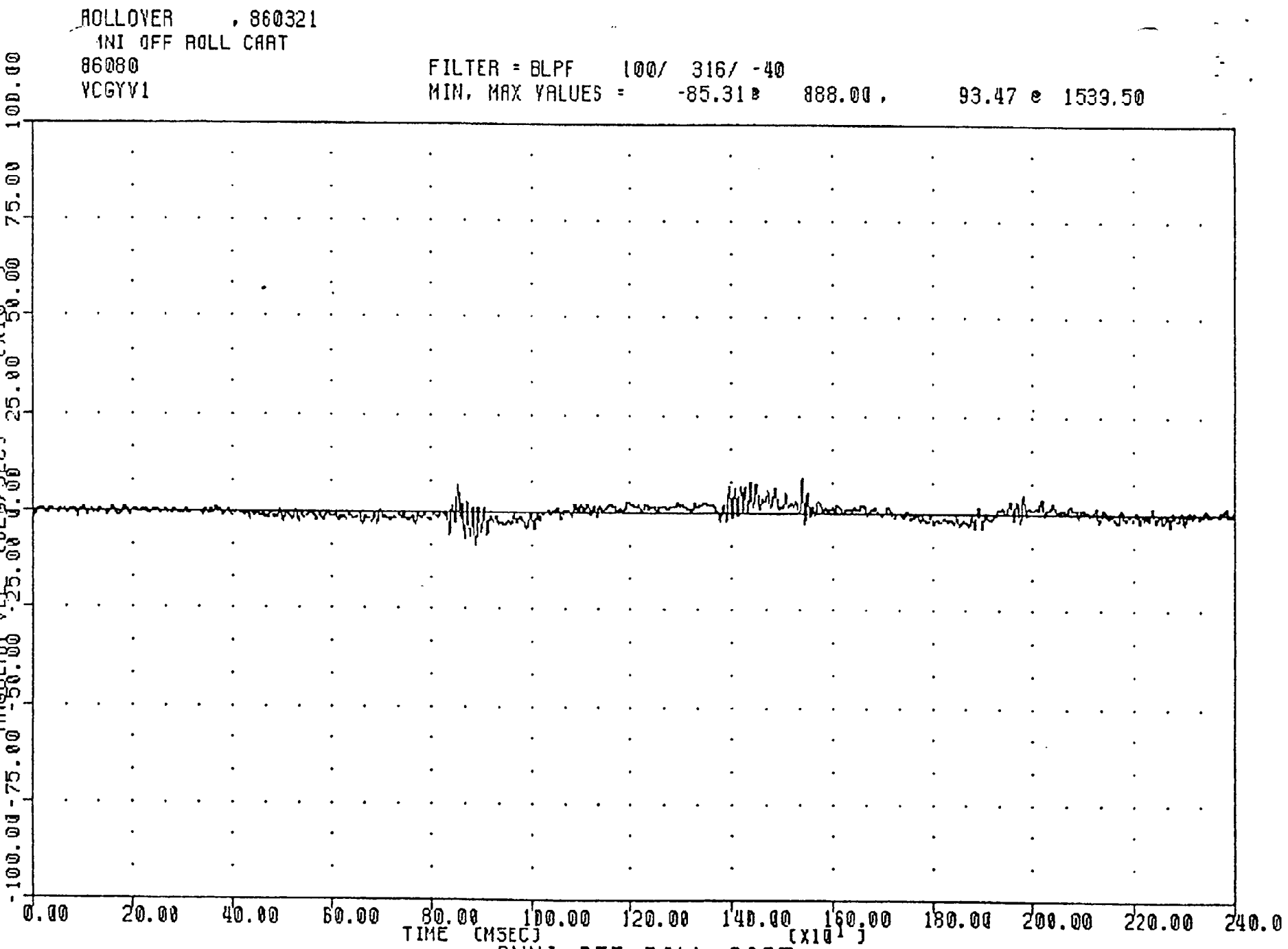
VEHICLE CENTER OF GRAVITY ACCELERATION Y AXIS



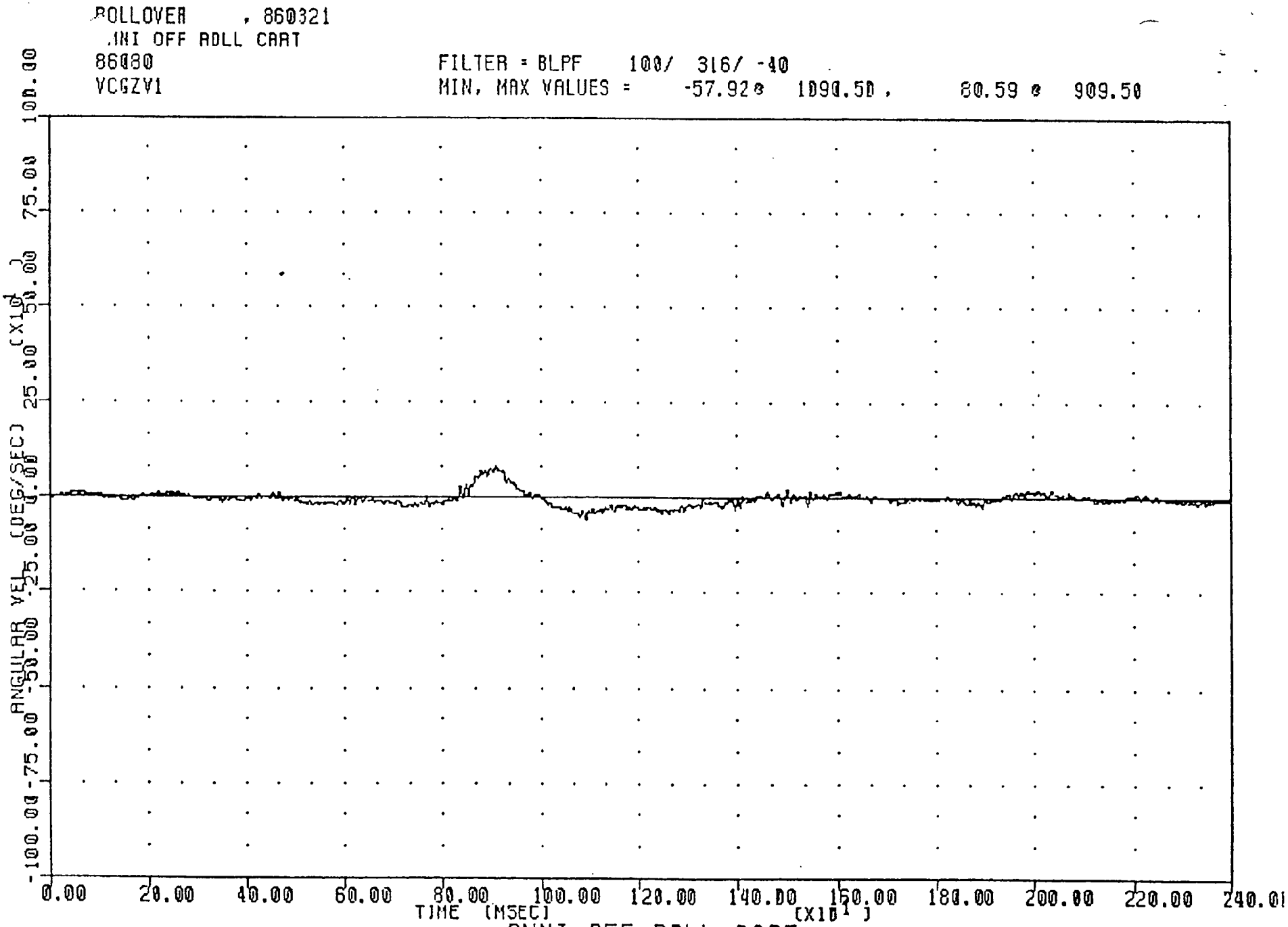
OMNI OFF ROLL CART
VEHICLE CENTER OF GRAVITY ACCELERATION Z AXIS


ROLLOYER , 860321
MNI OFF ROLL CART
86080
YCGRG1
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = 0.02 228.00 , 18.16 861.50
ACCELERATION (G)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME (MSEC)
(X10)
OMNI OFF ROLL CART
VEHICLE CENTER OF GRAVITY RESULTANT

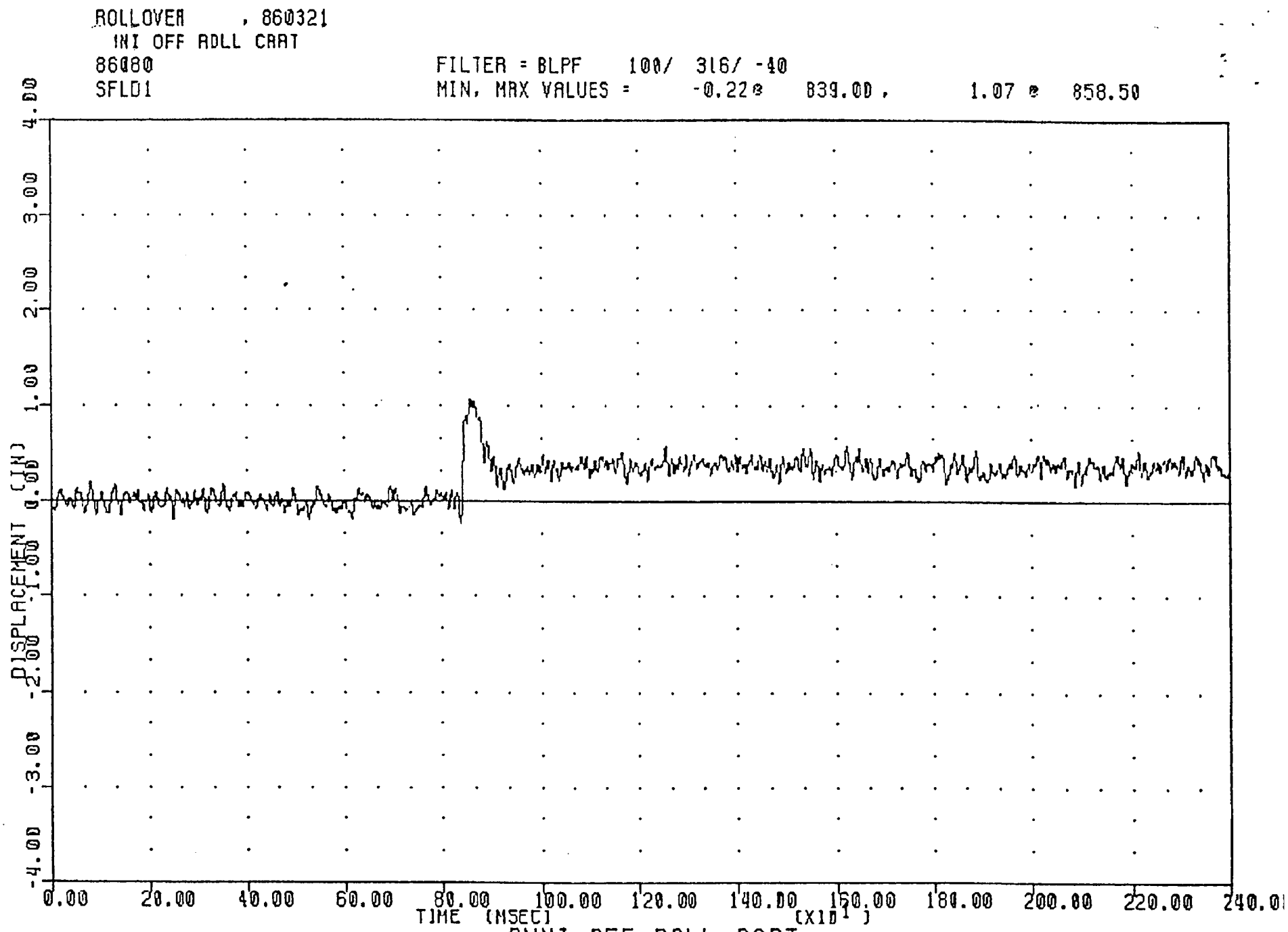

ROLLOVER , 860321
NI OFF ROLL CART
86080
VCGXY1
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -56.17 @ 1897.50 , 206.04 @ 1014.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ANGULAR VEL (DEG/SEC) (X10)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME (MSEC) (X10)
OMNI OFF ROLL CART
VEHICLE ROLL RATE DEG/SEC



OMNI OFF ROLL CART
VEHICLE PITCH RATE DEG/SEC

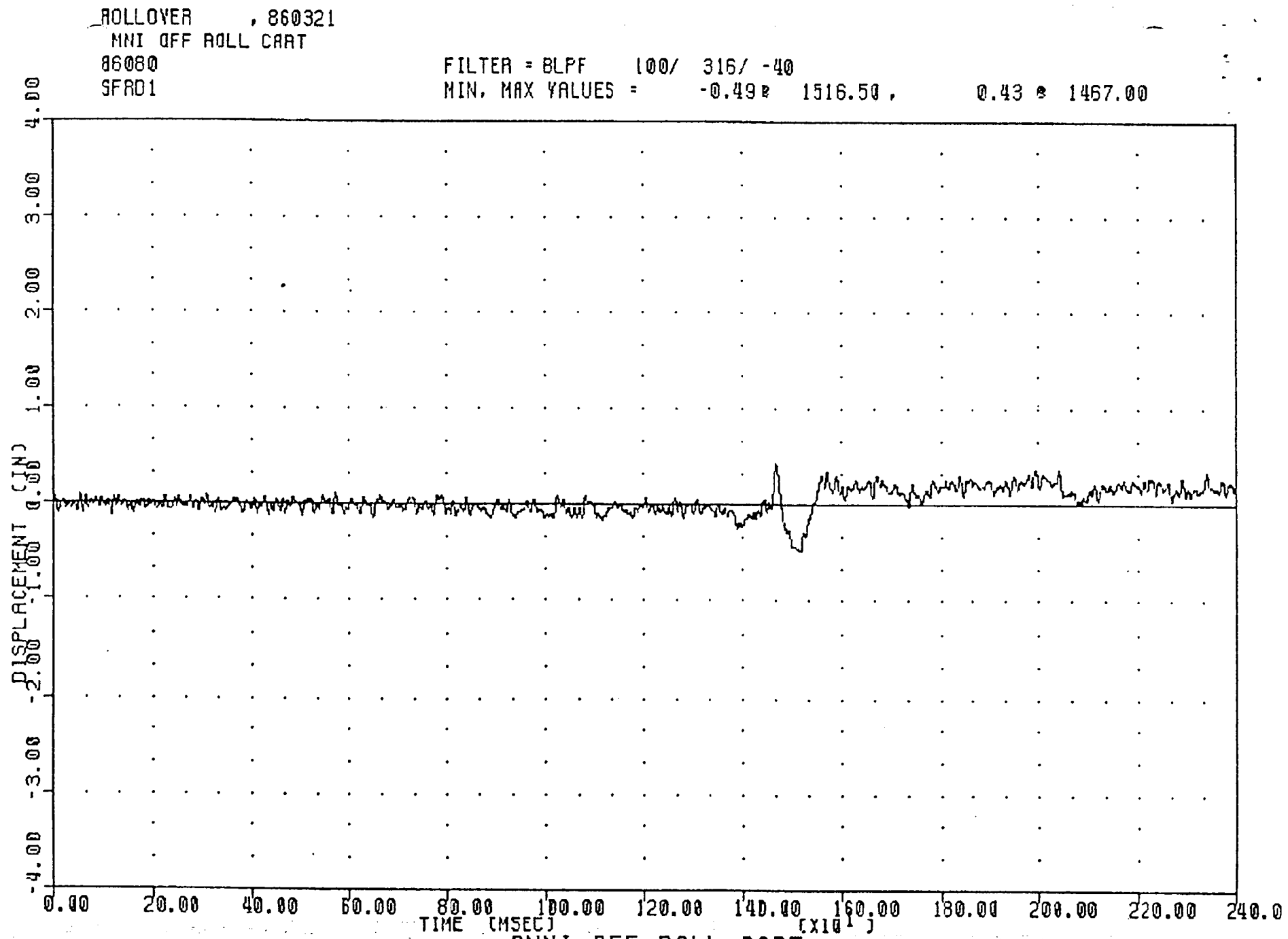


OMNI OFF ROLL CART
VEHICLE YAW RATE DEG/SEC



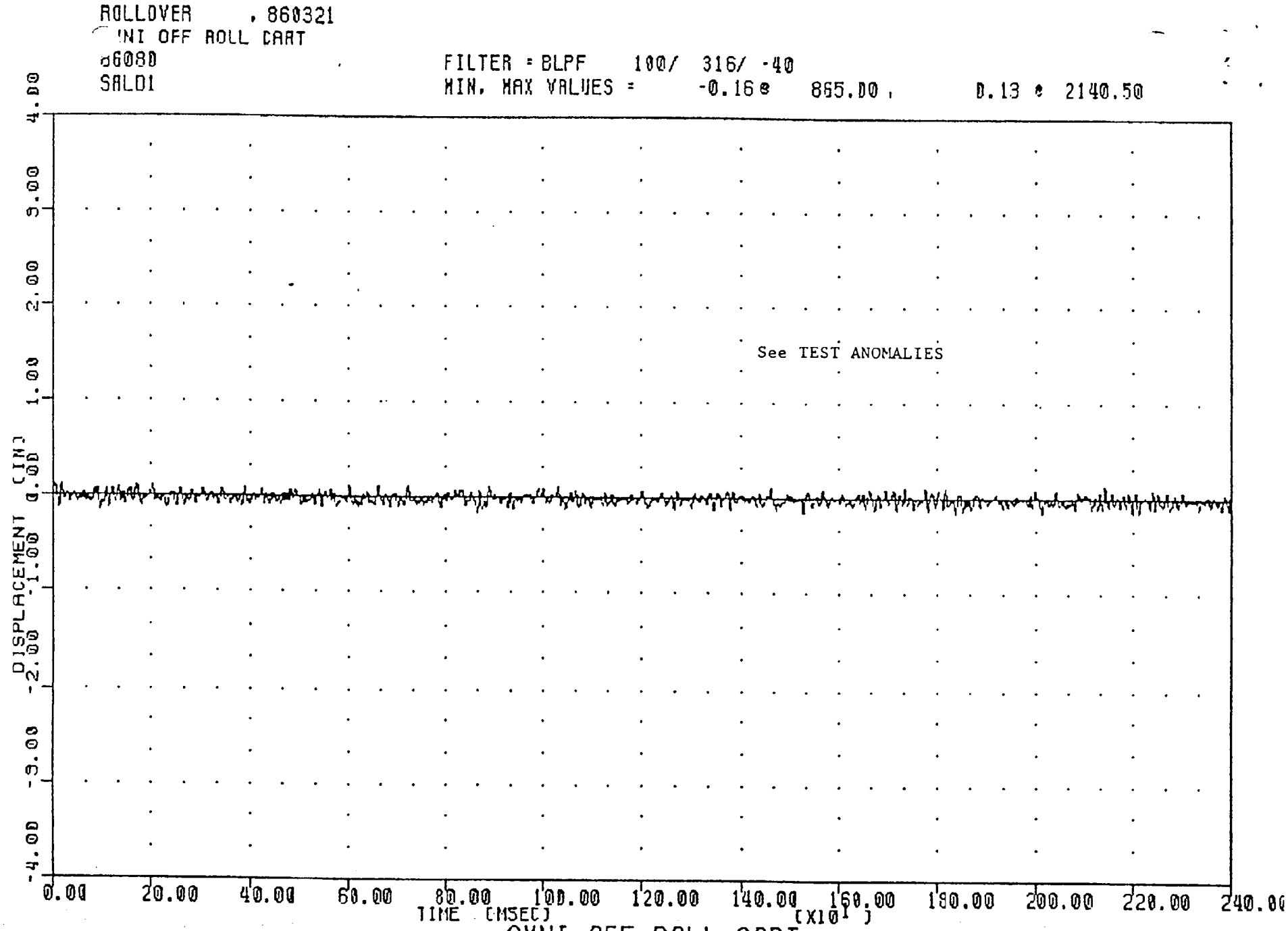
OMNI OFF ROLL CART

VEHICLE LEFT FRONT SUSPENSION DISPLACEMENT INCHES



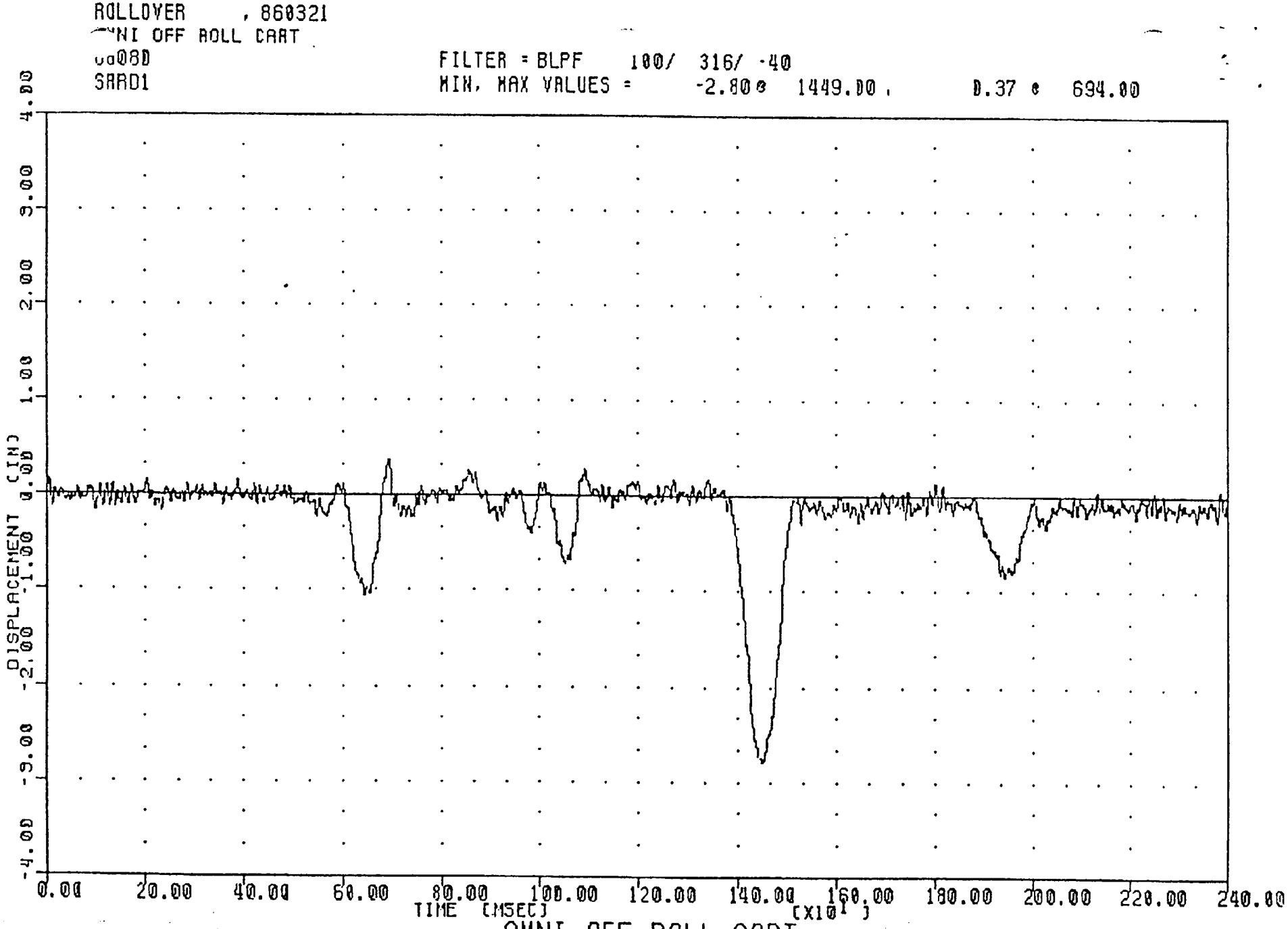
OMNI OFF ROLL CART

VEHICLE RIGHT FRONT SUSPENSION DISPLACEMENT INCHES



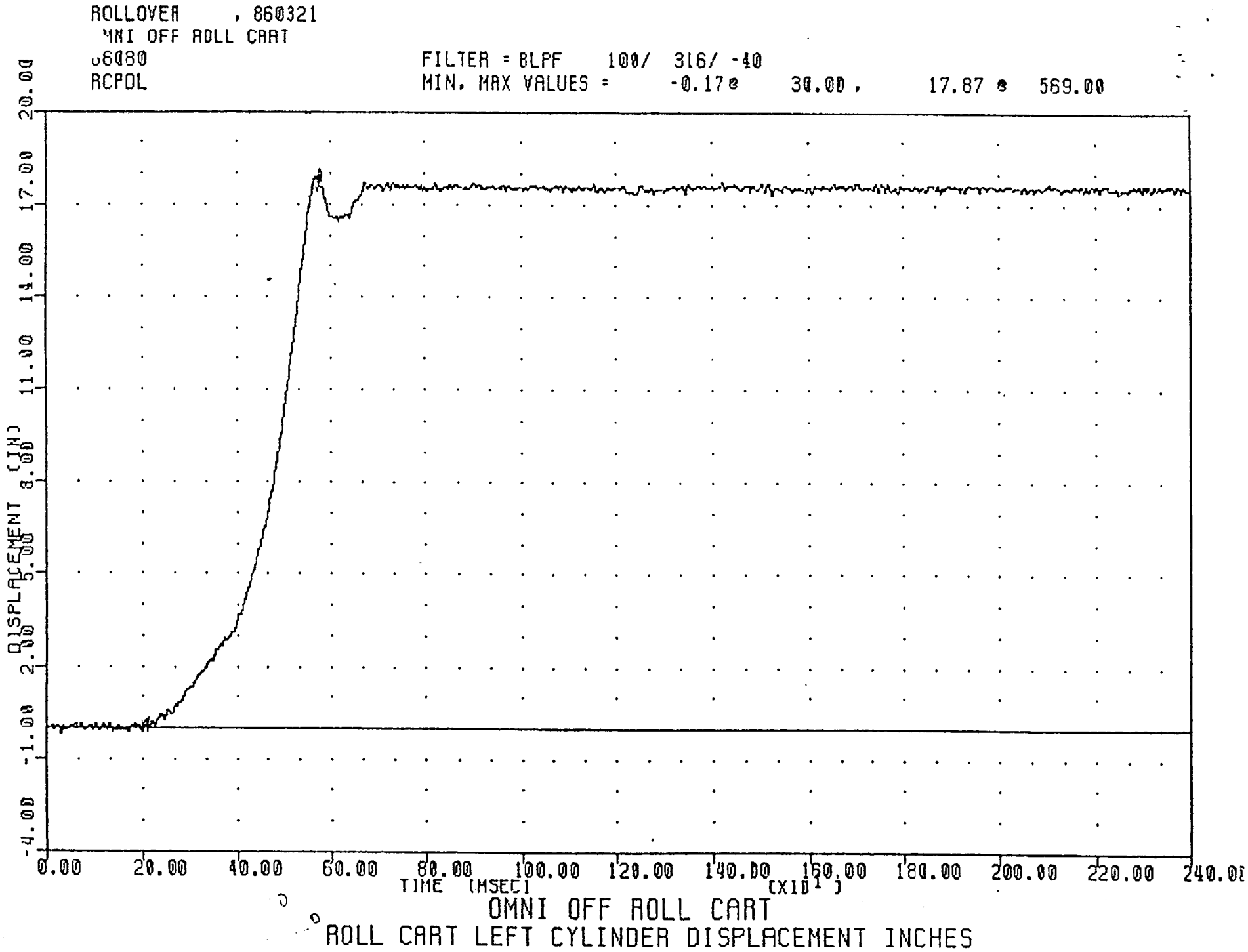
OMNI OFF ROLL CART

VEHICLE LEFT REAR SUSPENSION DISPLACEMENT INCHES



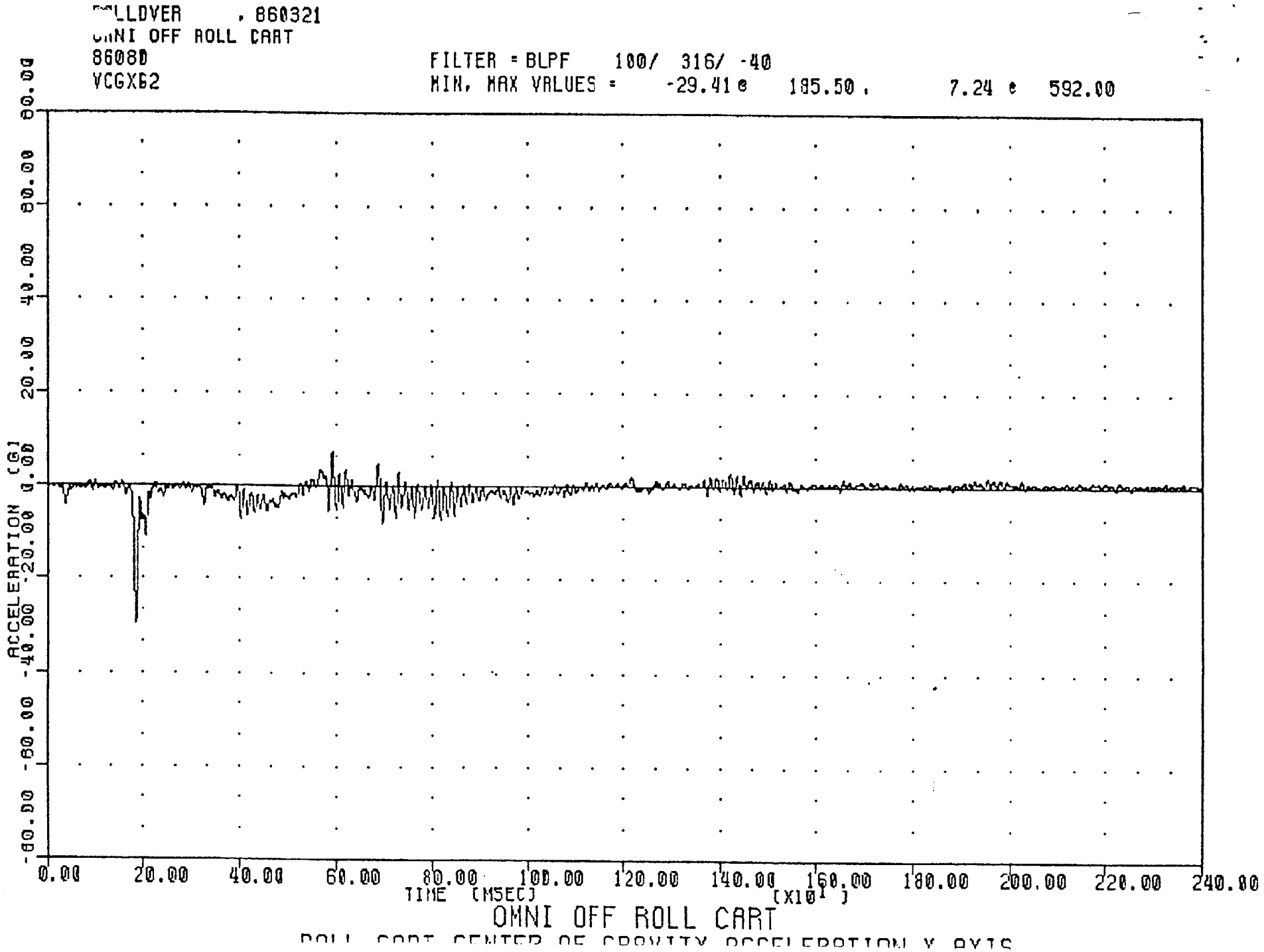
OMNI OFF ROLL CART

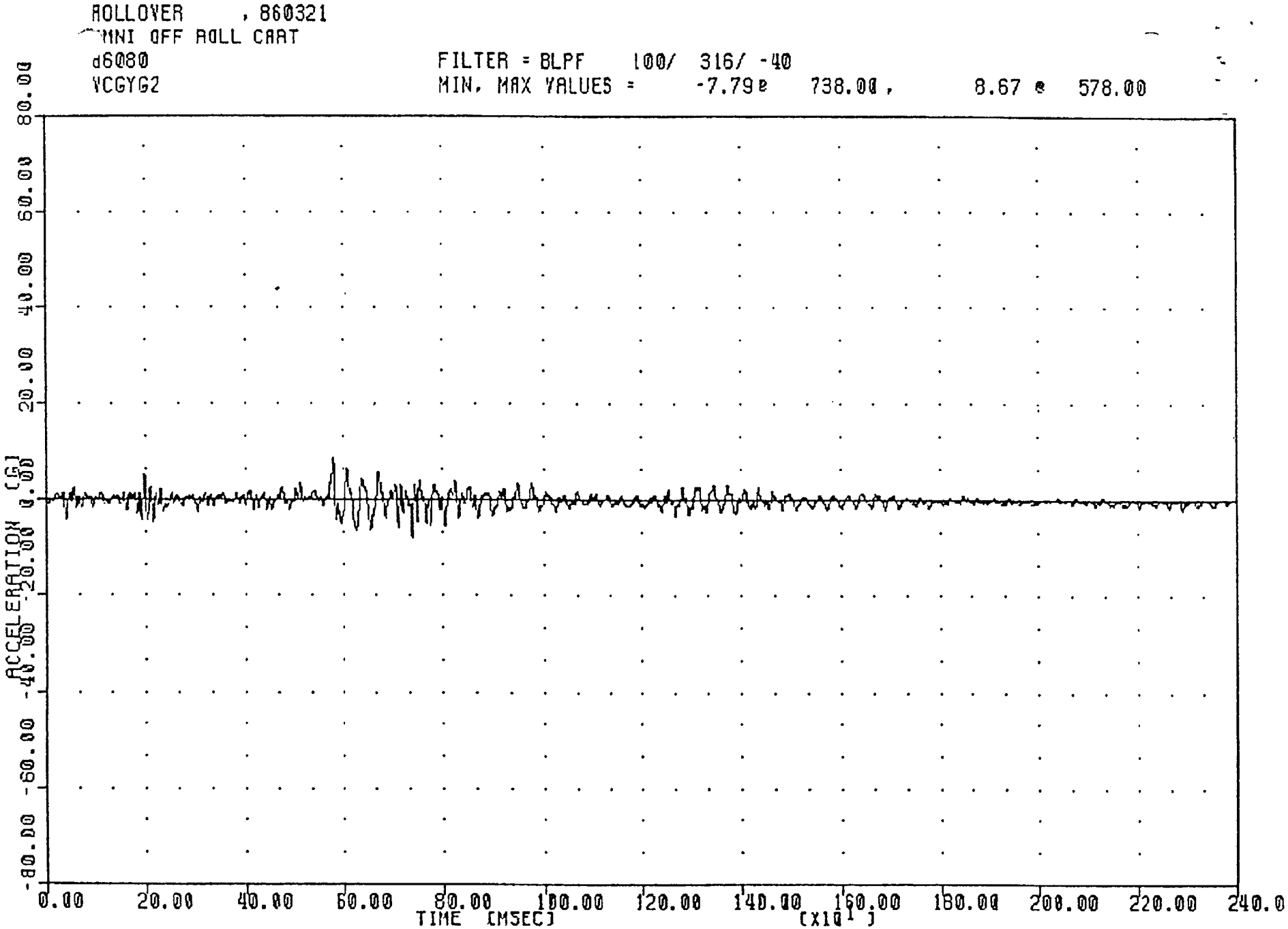
VEHICLE RIGHT REAR SUSPENSION DISPLACEMENT INCHES



OMNI OFF ROLL CART

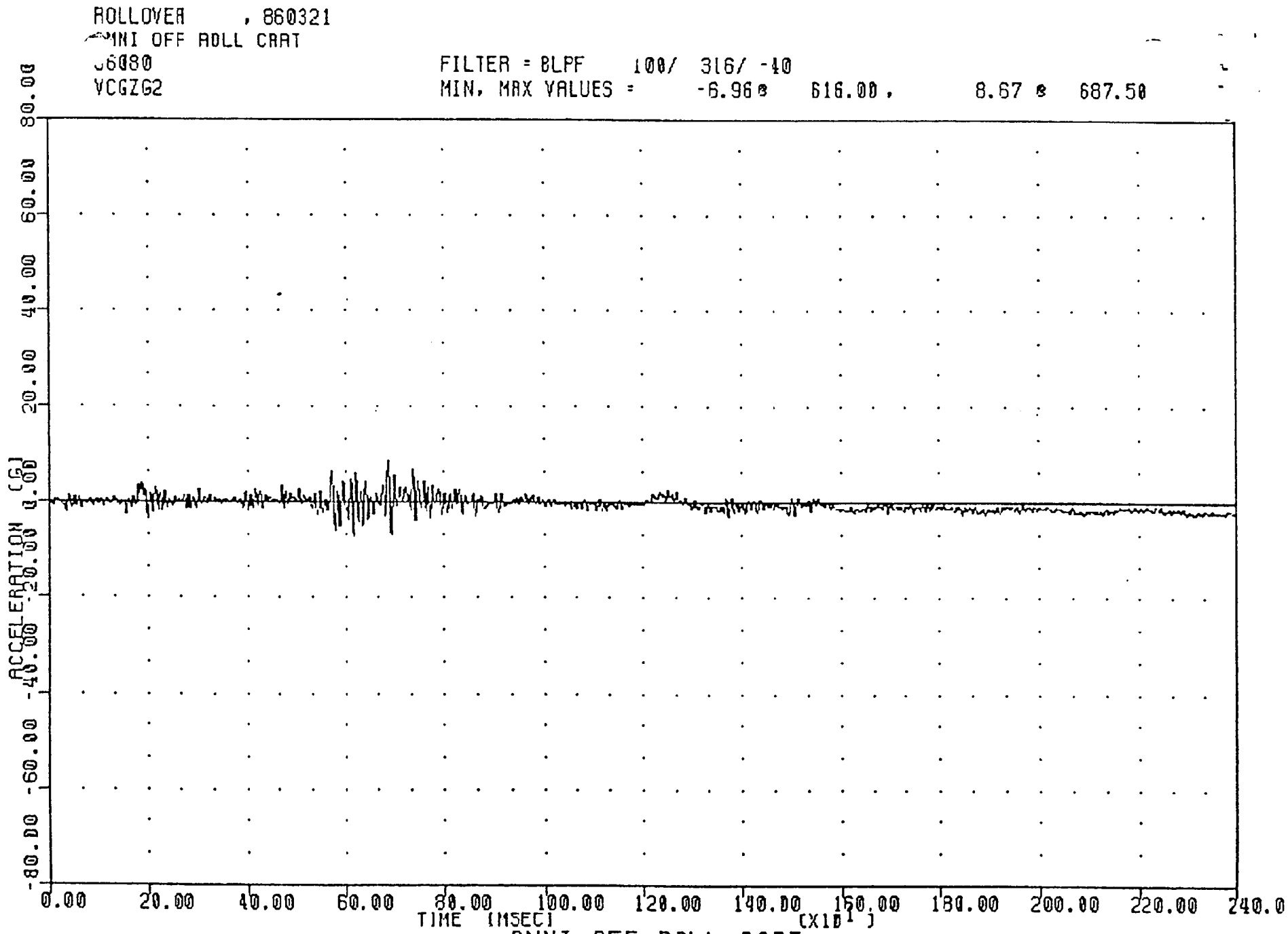
ROLL CART LEFT CYLINDER DISPLACEMENT INCHES


ROLLOVER , 860321
OMNI OFF ROLL CART
86080
VCGXB2
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -29.41 @ 185.50 , 7.24 @ 592.00
ACCELERATION (G)
80.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-80.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
TIME (MSEC)
(X10^1)
OMNI OFF ROLL CART
ROLL CART CENTER OF GRAVITY ACCELERATION Y AXIS



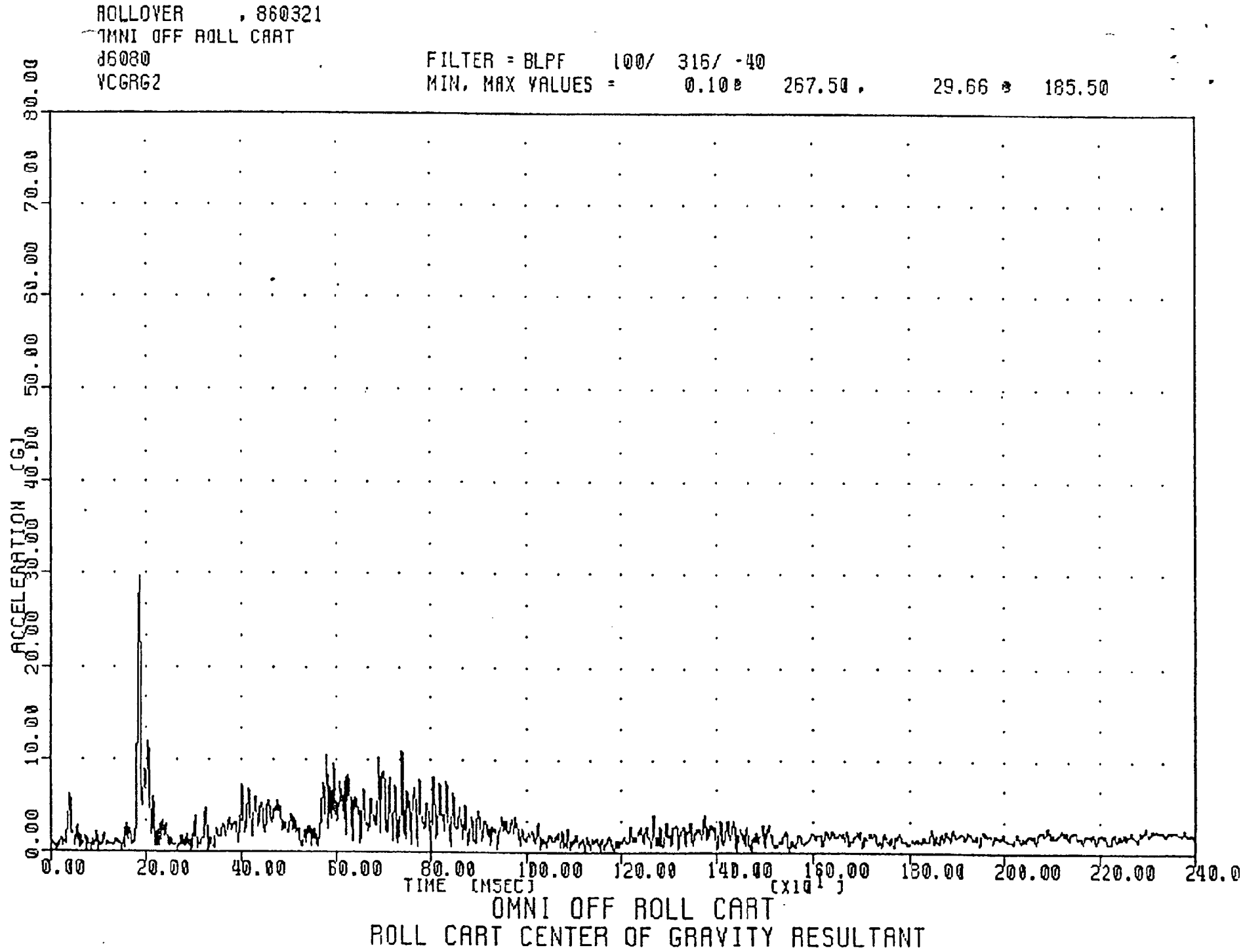
OMNI OFF ROLL CART

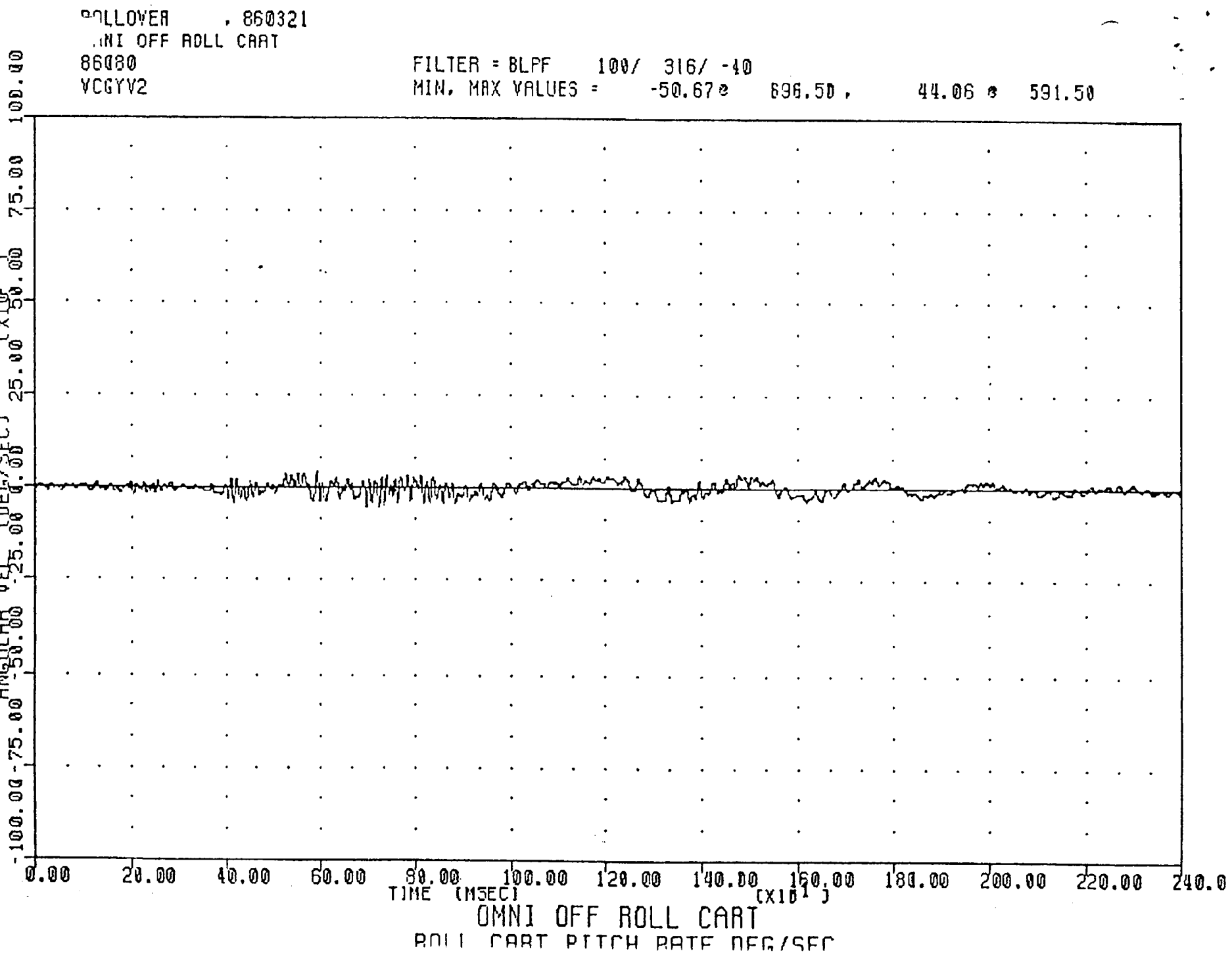
ROLL CART CENTER OF GRAVITY ACCELERATION Y AXIS



OMNI OFF ROLL CART

ROLL CART CENTER OF GRAVITY ACCELERATION Z AXIS


ROLLOVER , 860321
OMNI OFF ROLL CART
d6080
VCGRG2
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = 0.10 , 267.50 , 29.66 , 185.50
ACCELERATION [G]
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME [MSEC]
[X10 1]
OMNI OFF ROLL CART
ROLL CART CENTER OF GRAVITY RESULTANT


ROLLOVER , 860321
OMNI OFF ROLL CART
86080
VCGYV2
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -50.67 @ 696.50 , 44.06 @ 591.50
100.00
75.00
50.00
25.00
0.00
-25.00
-50.00
-75.00
-100.00
ANGULAR VEL (DEG/SEC) (X10)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.0
TIME (MSEC) (X10)
OMNI OFF ROLL CART
ROLL CART PITCH RATE DEG/SEC

APPENDIX C
DUMMY CERTIFICATION

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III 12-MAR-86

NHTSA ROLL 61C16HD1 HY3 SN61 HEAD DROP CAL 16

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	48.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	264.90 G
PEAK LATERAL ACCELERATION	15 G MAX	3.99 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Gary L Phelps

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSDUCER 12-MAR-86

NHTSA ROLL 61C16NF1 HY3 SN61 CAL16 NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY		10% - 70%	48.00 %
IMPACT VELOCITY		22.53 - 22.97 FPS	22.97 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.19 G
	20 MS	17.40 - 22.60 G	21.24 G
	30 MS	12.50 - 18.50 G	15.79 G
MAXIMUM PENDULUM G		29 G MAX	27.96 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 46 MS	44.38 MS
D PLANE ROTATION	MAX	67 - 79 DEGREES	65.69 DEGREES **
	TIME	54 - 64 MS	62.63 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	70 - 90 FT.LBS	71.14 FT.LBS
	TIME	46 - 56 MS	56.50 MS **
	MIN	-22.2/-14.0 FT.LBS	-13.02 FT.LBS **
	TIME	12 - 16 MS	14.63 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	105.13 MS **

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Gary L. Phelps

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER 12-MAR-86

NHTSA ROLL 61C16NE1 HY3 SN61 CAL16 NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66 - 78 DEGREES	71.00 DEGREES
RELATIVE HUMIDITY		10% - 70%	48.00 %
IMPACT VELOCITY		19.50 - 19.90 FPS	19.61 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	19.31 G
	20 MS	14.00 - 19.00 G	18.34 G
	30 MS	11.00 - 16.00 G	14.14 G
MAXIMUM PENDULUM G		22 G MAX	20.81 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 50 MS	43.63 MS
D PLANE ROTATION	MAX	94 - 106 DEGREES	85.95 DEGREES **
	TIME	72 - 82 MS	74.00 MS
MOMENT ABOUT OCCIPITAL CONDYLES	MAX	11.75 - 17.75 FT.LB	13.55 FT.LBS
	TIME	12 - 18 MS	15.00 MS
	MIN	-61.2/-50.8 FT.LBS	-46.09 FT.LBS **
	TIME	69 - 77 MS	73.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		151 - 167 MS	157.88 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 144 MS	134.50 MS

*** TEST DOES NOT MEET SPECIFICATIONS ***

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THORAX IMPACT TEST

HYBRID III 12-MAR-86

NHTSA ROLL 61C16TH1 HY3 SN61 CAL 16 H.S.THORAX 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	48.00 %
PENDULUM VELOCITY	21.78-22.22 FT/SEC	22.06 FT/SEC
DEFLECTION AT 25 MSEC	2.51 - 2.75 INCHES	2.811 INCHES *
RESISTIVE FORCE AT 19 MSEC	1186 - 1298 POUNDS	1192.8 POUNDS
INTERNAL HYSTERESIS	75% - 85%	72.3% *

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN Mary L. Reyes

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III 13-MAR-86

LEFT KNEE
NHTSA ROLL 61C16LK1 HY3 SN61 L.KNEE 11LB CAL 16

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	54.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.84 FT/SEC
PEAK KNEE IMPACT FORCE	1000 - 1560 LBS.	1174.46 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

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KNEE IMPACT TEST

HYBRID III 13-MAR-86

RIGHT KNEE
NHTSA ROLL 61C16RK1 HY3 SN61 R.KNEE 11LB CAL 16

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEGREES	70.00 DEGREES
RELATIVE HUMIDITY	10% - 70%	54.00 %
PROBE VELOCITY	6.83 - 6.96 FT/SEC	6.96 FT/SEC
PEAK KNLE IMPACT FORCE	1000 - 1560 LBS.	1447.69 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

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