

REPORT NOS. 208-TRC-88-004
212-TRC-88-004
301-TRC-88-004

VEHICLE SAFETY COMPLIANCE TESTING
FOR OCCUPANT CRASH PROTECTION.
WINDSHIELD MOUNTING, WINDSHIELD ZONE
INTRUSION, AND FUEL SYSTEM INTEGRITY

FORD MOTOR COMPANY
1988 FORD TEMPO
4-DOOR SEDAN
NHTSA NO. CJ0206
TRC TEST NO. 880907

THE TRANSPORTATION RESEARCH CENTER OF OHIO
U.S. RT. 33, LOGAN COUNTY
EAST LIBERTY, OHIO 43319

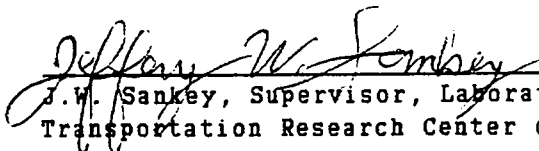


SEPTEMBER 26, 1988
FINAL REPORT

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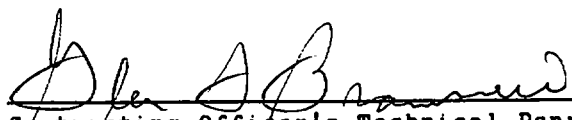
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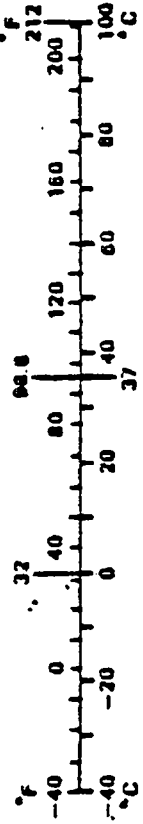
FINAL REPORT ACCEPTED BY:

 Date 12-1-88
Contracting Officer's Technical Representative (COTR),
NHTSA, Office of Vehicle Safety Compliance

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	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
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	2.5	acres	
	(10 000 m ²)			
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton	1.1	short tons	
	(1000 kg)			
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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4. Title and Subtitle FINAL REPORT OF FMVSS NOS. 208, 212, 219 (PARTIAL), AND 301 COMPLIANCE TESTING OF A 1988 FORD TEMPO 4-DOOR SEDAN, NHTSA NO. CJ0206				5. Report Date SEPTEMBER 1988	
				6. Performing Organization Code	
7. Author(s) J.W. Sankey, Supervisor, Laboratory Engineering, TRC				8. Performing Organization Report No. 208-TRC-88-004, 212-TRC-88-004 301-TRC-88-004	
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15. Supplementary Notes					
16. Abstract A 30 mph flat frontal barrier impact compliance test was conducted on a 1988 Ford Tempo 4-door sedan, VIN 1FACP36X0JK189131, NHTSA No. CJ0206, at the Transportation Research Center of Ohio on September 7, 1988. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS No. 208, "Occupant Crash Protection" FMVSS No. 212, "Windshield Mounting" FMVSS No. 219, (Partial), "Windshield Zone Intrusion" FMVSS No. 301, "Fuel System Integrity" The barrier impact velocity was 29.2 mph. The ambient temperature was 65° F. The vehicle appears to comply with the applicable requirements of FMVSS Nos. 212, 219 (partial), and 301. The driver's Head Injury Criteria, (HIC), was 2358, an apparent noncompliance of FMVSS No. 208.					
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"			18. Distribution Statement Available from: Technical Reference Division National Highway Traffic Safety Admin Nassif Building, Room 5108 400 Seventh Street, SW Washington, DC 20590		
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SECTION 1.0

PURPOSE AND TEST SUMMARY

PURPOSE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (Partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center of Ohio (TRC) under Contract No. DTNH22-88-C-11038. The purpose of this test was to determine if the subject vehicle, a 1988 Ford Tempo 4-door sedan, NHTSA No. CJ0206, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity." The test was conducted in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-07.

TEST SUMMARY

The 1988 Ford Tempo 4-door sedan, NHTSA No. CJ0206, was equipped with a 2.3 liter, transverse engine, automatic transmission, power steering, and power brakes. The test weight of the vehicle was 3145 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS test Nos. 212, 219 (partial), and 301. The Head Injury Criteria (HIC) calculation for the driver exceeded 1000, and was less than 1000 for the passenger. The resultant accelerations of the thorax did not exceed 60 g's and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the driver's and right front passenger's seats. There was 100 percent windshield retention. There was no intrusion into the windshield. There was no fluid spillage from the fuel system following the impact. The static rollover test was not conducted per the COTR's instructions.

Two Part 572 B, 50th percentile, adult male anthropomorphic test devices (ATDs) were seated in the front outboard designated seating positions. The dummies were positioned according to the dummy placement procedures specified in Appendices B and C of the Laboratory Test Procedure No. TP-208-07.

Both ATDs were instrumented with head and chest accelerometers oriented to measure accelerations in the longitudinal, lateral, and vertical directions and with right and left femur load cells.

The vehicle was instrumented with seven accelerometers oriented to measure longitudinal axis acceleration.

The crash event was recorded by one (1) real time panning camera and fourteen (14) high speed motion picture cameras operating at approximately 500 frames per second.

The twenty-three (23) channels of data were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per second and digitally processed per sections 12.8 and 12.9 of the Laboratory Procedure.

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on September 7, 1988. The test vehicle's impact speed was 29.2 mph. The vehicle sustained 14.9 inches of static crush.

The FMVSS 208, 212, 219 (partial) and 301 compliance data is presented in Section 2.0. The camera information is presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the vehicle and dummy data plots.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CJ0206

PROJECT: 208 Compliance

DATE: 9/7/88

TIME: 1251 TEMP: 65° F

VEHICLE: 1988 Ford Tempo 4-door sedan

TEST WEIGHT (LBS): 3145

IMPACT ANGLE (DEG)*: 0°

IMPACT VELOCITY (MPH)**: PRIMARY = 29.2 SECONDARY = 29.3

MAXIMUM STATIC CRUSH (IN): 14.9

VEHICLE REBOUND (IN): 15.5

DUMMIES: Driver #353

Passenger #354

TYPE: Part 572 B

Part 572 B

LOCATION: Left front

Right front

RESTRAINT: Airbag

3-point unbelt

NUMBER OF DATA CHANNELS: 23

NUMBER OF HIGH SPEED CAMERAS: 14 and 1 real-time panning camera

*With respect to tow track centerline.

**Speed trap measurement ($\pm$.05 mph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company

MAKE/MODEL: Ford Tempo

VIN: 1FACP36X0JK189131

BODY STYLE: 4-door sedan

MODEL YEAR: 1988

NHTSA NO.: CJ0206

COLOR: graphite

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

TRANSMISSION DATA: 3 SPEED, MANUAL, X AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 6/15/88

ODOMETER READING: 93.7

DEALER'S NAME AND ADDRESS: Bob Chapman Ford/Mercury
1255 Industrial Parkway
Marysville, OH 43040

ACCESSORIES:

POWER STEERING Yes
POWER BRAKES Yes
POWER SEATS No
POWER WINDOWS No
TINTED GLASS Yes
RADIO Yes
CLOCK Yes
OTHER Airbag

AUTOMATIC TRANSMISSION Yes
AUTOMATIC SPEED CONTROL No
TILTING STEERING WHEEL No
TELESCOPING STEERING WHEEL No
AIR CONDITIONING Yes
ANTI-SKID BRAKE No
REAR WINDOW DEFROSTER Yes

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: Ford Motor Company

DATE OF MANUFACTURE: 3/88

GVWR: 3682 LBS

GAWR: FRONT 1999 LBS., REAR 1812 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 30 psi; REAR 30 psi

RECOMMENDED TIRE SIZE: P185/70R14 LOAD RANGE X B, C, D

TIRES ON VEHICLE (MFR., LINE, SIZE): Goodyear Invicta P185/70R14

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: No

VEHICLE CAPACITY: TYPES OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manual adjustable

NUMBER OF OCCUPANTS 2 FRONT 3 REAR 5 TOTAL

CARGO LOAD 100 LBS. TOTAL 850 LBS.

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

RIGHT FRONT	850 lbs.	RIGHT REAR	490 lbs.
LEFT FRONT	880 lbs.	LEFT REAR	513 lbs.
TOTAL FRONT WEIGHT	1730 lbs.	(63.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1003 lbs.	(36.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2733 lbs.			

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2733 LBS)

VCW = VEHICLE CAPACITY WEIGHT (850 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

$RCLW = VCW - 150 (DCS) = 850 - 150(5) = 100 \text{ LBS}$

$TARGET \text{ TEST WEIGHT} = UDW + RCLW + (2 \text{ DUMMIES} \times 164 \text{ LBS/DUMMY})$

$= 2733 + 100 + 328 \text{ LBS}$

TARGET TEST WEIGHT = 3161 LBS

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 84 LBS. CARGO

RIGHT FRONT	915 lbs.	RIGHT REAR	659 lbs.
LEFT FRONT	894 lbs.	LEFT REAR	677 lbs.
TOTAL FRONT WEIGHT	1809 lbs.	(57.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1336 lbs.	(42.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3145 lbs.	(0.5% UNDER TARGET WEIGHT)	
WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.			
COMPONENTS REMOVED TO MEET TARGET WEIGHT: None			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	LF 24.9;	RF 24.8;	LR 24.9;	RR 24.8
PRE-TEST ATTITUDE:	LF 25.9;	RF 25.9;	LR 23.8;	RR 23.8
POST-TEST ATTITUDE:	LF 28.0;	RF 26.9;	LR 23.1;	RR 23.3
WHEELBASE: 100.0 INCHES				

CG = 42.5 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TABLE 3 TEST CONDITIONS

TEST NUMBER: 880907

DATE OF TEST: 9/7/88	TIME OF TEST: 1251
TYPE OF TEST: Frontal barrier impact	IMPACT ANGLE: 0°
AMBIENT TEMPERATURE AT IMPACT AREA:	65° F
TEMPERATURE IN OCCUPANT COMPARTMENT:	72° F
IMPACT VELOCITY: PRIMARY = 29.2 MPH	SECONDARY = 29.3 MPH

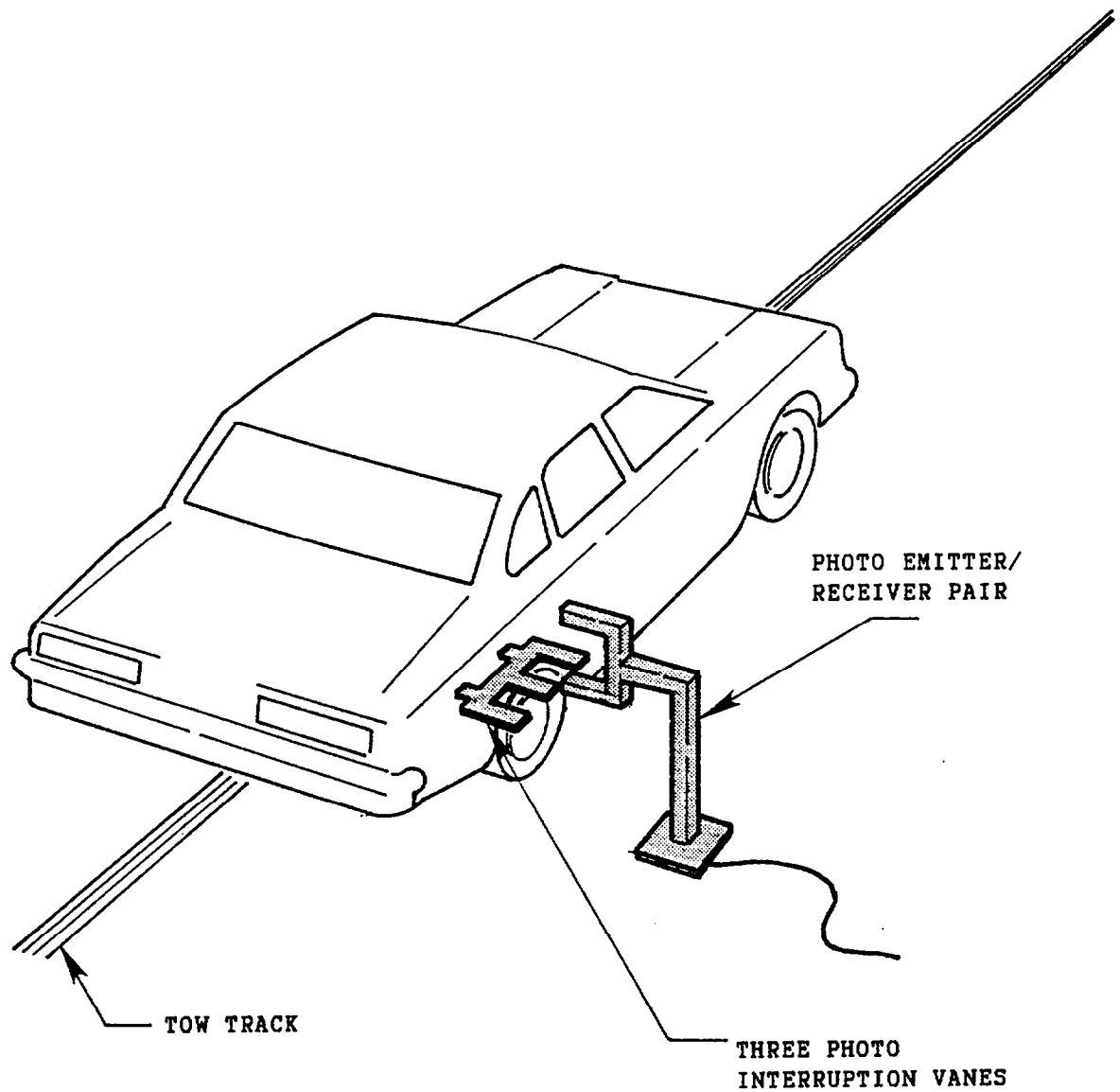
(SPECIFIED RANGE = 28.9 TO 29.9 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST: L 174.0; C 176.7; R 174.1
	POST-TEST: L 159.4; C 161.8; R 159.3
	TOTAL CRUSH: L 14.6; C 14.9; R 14.8

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: L: 16.1; C: 13.9; R: 16.5; AVG: 15.5

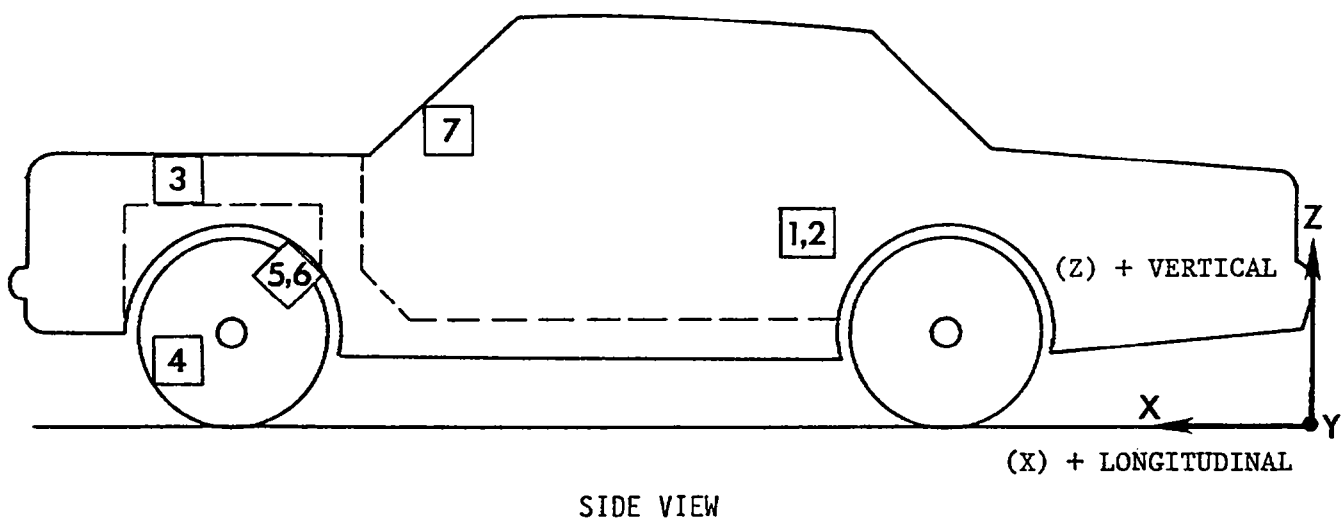
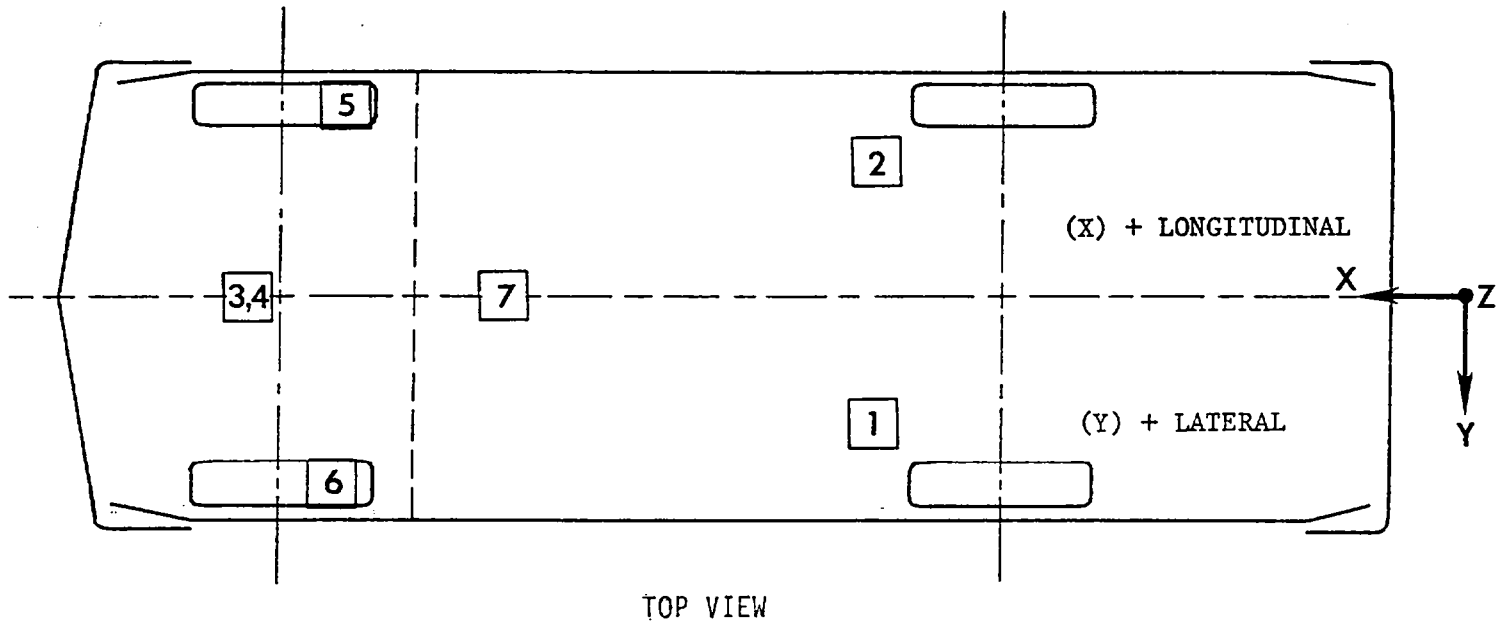
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

FIGURE 2
VEHICLE ACCELEROMETER LOCATIONS



TEST NUMBER 880907

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G	MSEC	MAX G	MSEC
1	REAR SEAT CROSSMEMBER	PRE	71.3	21.2	13.0				
	AT LEFT SIDE	POST	71.2	21.5	14.8				
	LONGITUDINAL					2.2	140.4 Y	37.1	38.8 Y
2	REAR SEAT CROSSMEMBER	PRE	71.1	-21.5	13.3				
	AT RIGHT SIDE	POST	71.0	-21.5	14.4				
	LONGITUDINAL					2.3	140.0	36.6	40.0
3	TOP OF ENGINE BLOCK	PRE	153.2	0.2	27.5				
		POST	147.6	0.2	28.5				
	LONGITUDINAL					---	--- Y	---	--- Y
4	BOTTOM OF ENGINE BLOCK	PRE	151.8	1.8	6.3				
		POST	146.5	0.5	6.1				
	LONGITUDINAL					37.2	40.5	117.3	33.8
5	BRAKE CALIPER	PRE	145.5	-22.8	12.4				
	AT RIGHT SIDE	POST	141.2	-23.5	11.1				
	LONGITUDINAL					28.1	58.4	62.1	33.3
6	BRAKE CALIPER	PRE	145.8	22.8	11.8				
	AT LEFT SIDE	POST	141.9	23.8	10.6				
	LONGITUDINAL					38.4	56.0	82.3	32.4
7	DASH PANEL	PRE	118.5	-0.2	34.4				
		POST	118.4	-0.2	35.3				
	LONGITUDINAL					15.6	52.1	48.8	59.4

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

Y See TEST ANOMALIES

**FIGURE 3 ACCIDENT INVESTIGATION DIVISION DATA
FOR 30 MPH FRONTAL BARRIER IMPACT**

VEHICLE MAKE/MODEL/BODY STYLE: Ford/Tempo/4-door sedan

VEH. NHTSA NO.: CJ0206; VIN: 1FACP36X0JK189131

MODEL YEAR: 1988; BUILD DATE: 3/88; TEST DATE: 9/7/88

VEH. SIZE CATEGORY: Compact; TEST WEIGHT: 3145

VEH. WHEELBASE: 100.0

MAX. WIDTH: 68.8

FRONT OVERHANG: 34.3

COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)
CRUSH DEPTH
DIMENSIONS:

C1 = 14.6 inches

C2 = 14.5 inches

C3 = 14.9 inches

C4 = 14.8 inches

C5 = 14.8 inches

C6 = 14.8 inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline
(Longitudinal)

LENGTH OF DAMAGED
REGION: L = 56.2 inches

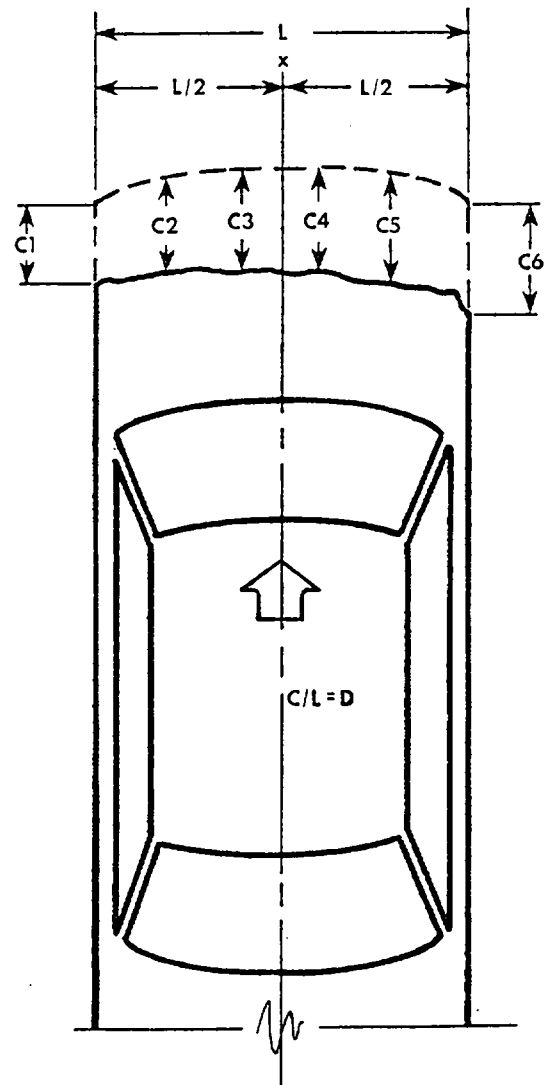


FIGURE 4
PRE-TEST AND POST-TEST MEASUREMENT POINTS

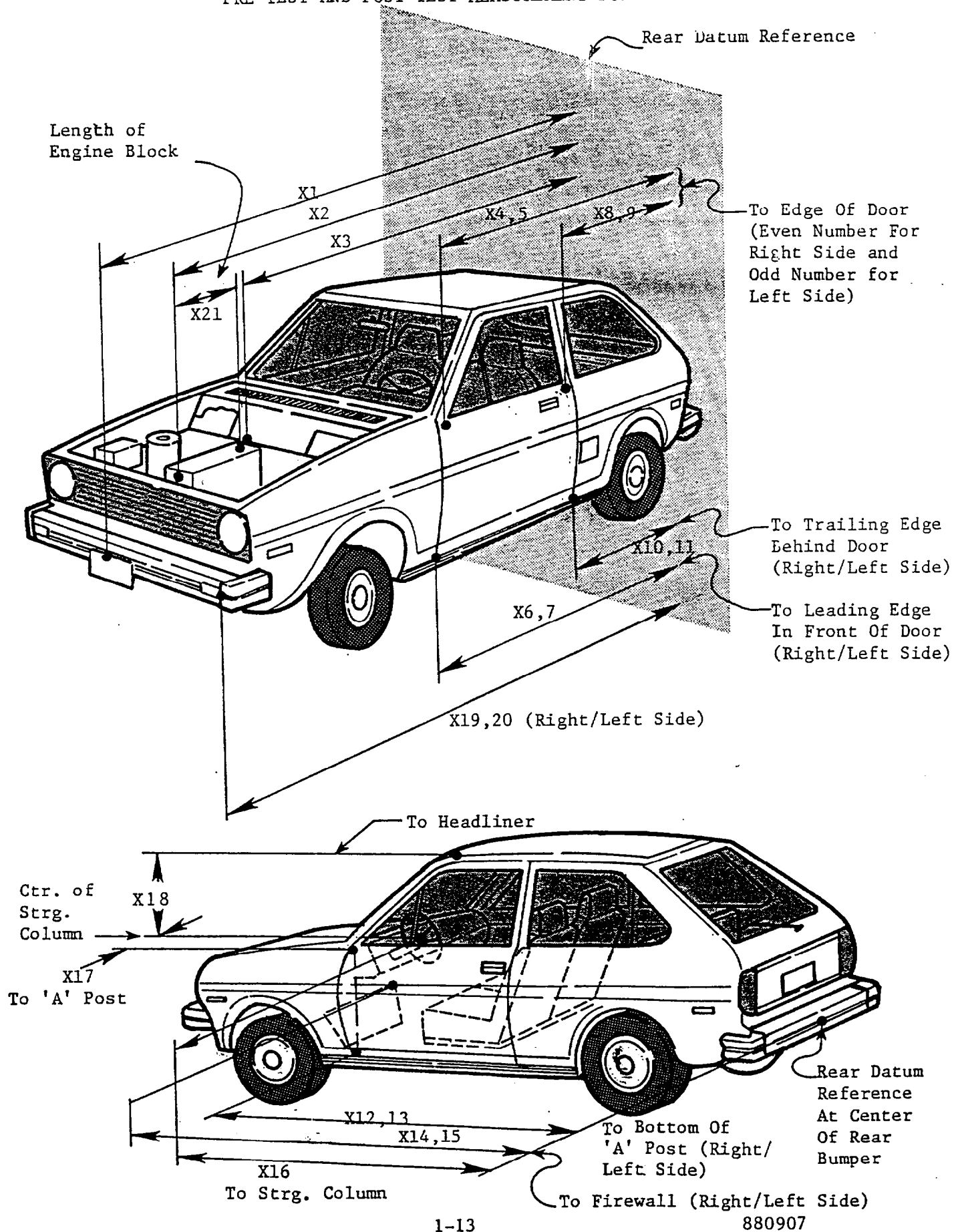
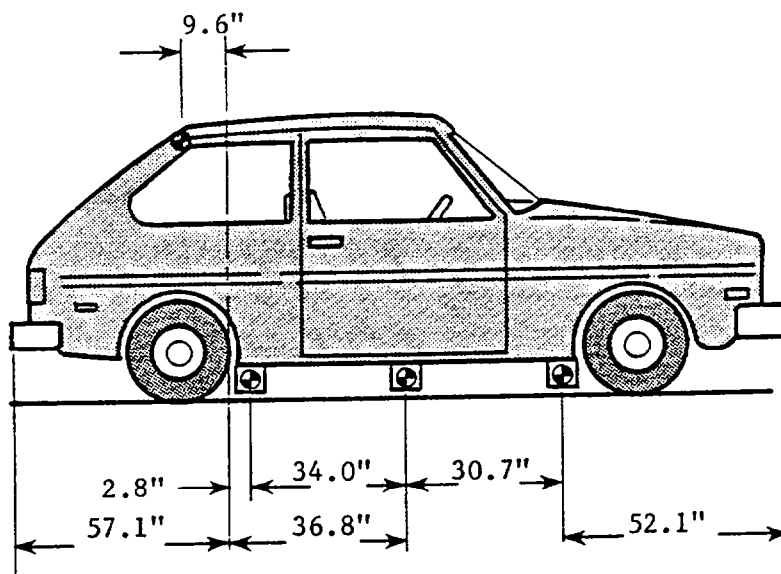
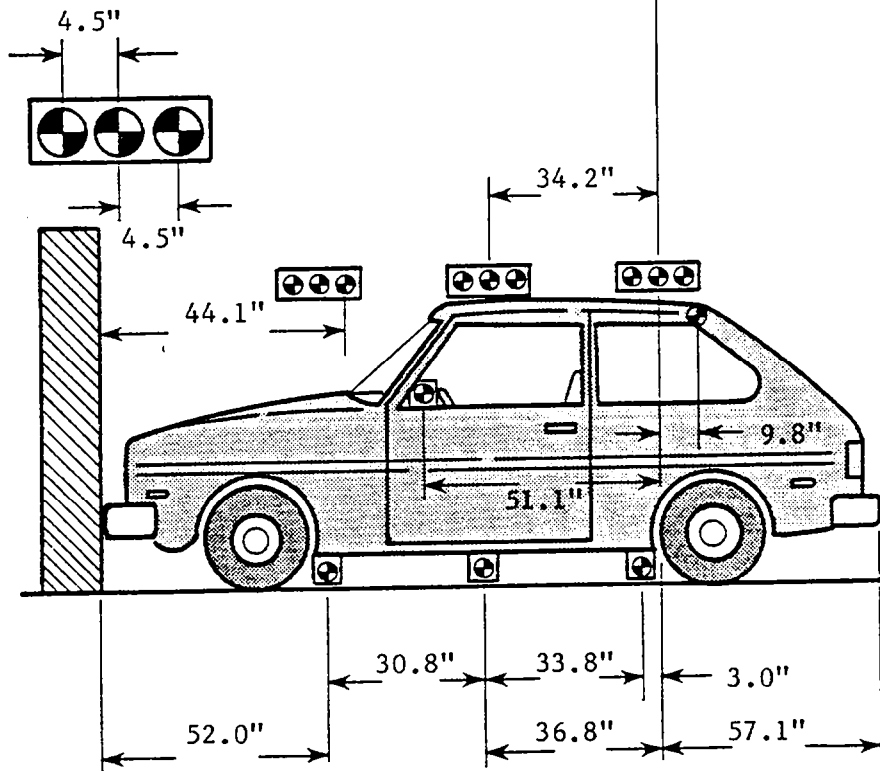
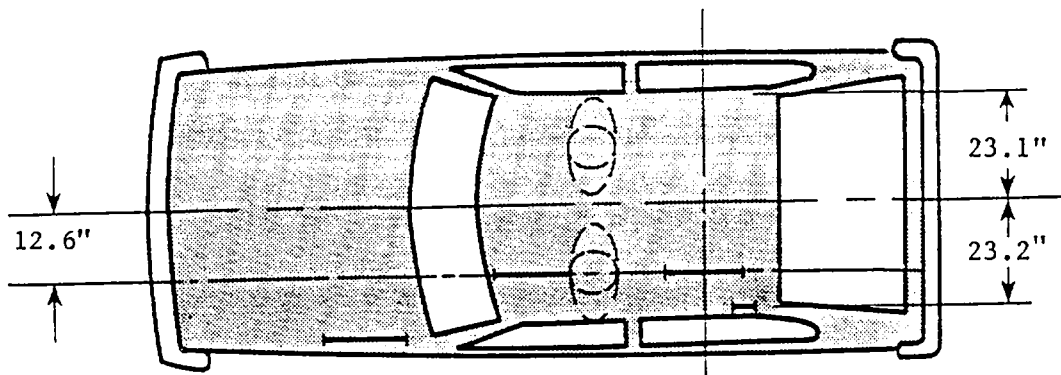


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL:	Ford/Tempo	TEST NUMBER:	880907	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
					PRE-TEST	POST-TEST	DIFF.
X1				TOTAL LENGTH OF VEHICLE AT CENTERLINE	176.7	161.8	14.9
X2				REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	152.2	147.0	5.2
X3				REAR SURFACE OF VEHICLE TO FIREWALL	136.8	133.0	3.8
X4				REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	123.4	123.1	0.3
X5				REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	123.4	123.1	0.3
X6				REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	121.6	121.3	0.3
X7				REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	122.0	121.6	0.4
X8				REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	83.3	83.1	0.2
X9				REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	83.3	83.2	0.1
X10				REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	84.0	83.6	0.4
X11				REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	84.1	83.8	0.3
X12				REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	120.8	120.5	0.3
X13				REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	120.9	120.6	0.3
X14				REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	138.9	137.4	1.5
X15				REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	138.4	137.8	0.6
X16				REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	103.6	105.5	-1.4
X17				CENTER OF STEERING COLUMN TO "A" POST	13.5	15.7	-1.8
X18				CENTER OF STEERING COLUMN TO HEADLINING	17.1	16.1	1.0
X19				REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	174.1	159.3	14.8
X20				REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	174.0	159.4	14.6
X21				LENGTH OF ENGINE BLOCK	17.2	17.2	0.0

VEHICLE TARGET LOCATION



DATA ACQUISITION EXPLANATIONS

The left and right rear seat crossmember X-axis accelerometers, TLRXG1 and TRRXG1, recorded spikes at 178 and 235 milliseconds.

The engine upper block X-axis accelerometer, ENGXG1, lost data after 19 milliseconds due to the vehicle's crush cutting the accelerometer cable.

SECTION 2.0

SUMMARY OF RESULTS FOR:

FMVSS 208, "Occupant Crash Protection"

FMVSS 212, "Windshield Mounting"

FMVSS 219, (Partial), "Windshield Zone Intrusion"

FMVSS 301, "Fuel System Integrity"

COMPLIANCE DATA SUMMARY

The test vehicle, a 1988 Ford Tempo 4-door sedan, NHTSA No. CJ0206, appeared to comply with the requirements of FMVSS Nos. 212, 219 (partial), and 301.

The driver's Head Injury Criteria (HIC) was 2358, an apparent noncompliance of FMVSS 208. The driver's maximum chest deceleration over three milliseconds was 46.0 g. The driver's right and left compressive femur loads were 1086 pounds and 1130 pounds, respectively.

The right front passenger's Head Injury Criteria (HIC) was 376. The right front passenger's maximum chest deceleration over three milliseconds was 39.8 g. The right front passenger's right and left compressive femur loads were 457 pounds and 605 pounds, respectively.

The vehicle's restraint system met the comfort and convenience requirements of FMVSS 208.

The windshield retention was 100 percent.

There was no intrusion into the inner surface of the windshield below the protected zone.

There was no Stoddard fluid spillage following the crash test event. The rollover test was not conducted per the COTR's instruction.

TABLE 6 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION ('G')

	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DRIVER	-405.9	123.5	402.5	571.4	-47.5	-5.8	12.8	46.0
PASSENGER	-28.9	-14.7	-48.1	51.3	-40.2	-14.2	-12.2	39.8

MAXIMUM FORCE-FEMUR LOAD (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	1130	1086
PASSENGER	605	457

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC) ¹	TIME t_2 (MSEC) ²
DRIVER	2358	76.1	76.6
PASSENGER	376	66.6	102.6

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest contacted the airbag. As forward motion continued, the dummy's head continued to translate forward over the airbag and impacted into the upper portion of the windshield. Upon rebound, the dummy's head contacted the sun visor and rotated forward and rearward as the dummy rebounded into the seat. The dummy came to rest seated in the driver's seat, leaning to the left.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward, contacting the dummy's chest as the chest was restrained by the three-point unbelt. The dummy's head rotated rearward as the dummy rebounded into the seatback and the head restraint. The dummy came to rest seated upright in the right front passenger's seat, restrained by the three-point unbelt.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #353	PASSENGER #354
Head	<u>Airbag, windshield, sunvisor</u>	<u>Chest</u>
Chest	<u>Airbag</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left knee	<u>Instrument panel</u>	<u>Instrument panel</u>
Right knee	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Easy</u>	<u>Easy</u>
Rear	<u>Easy</u>	<u>Easy</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>None</u>	<u>None</u>
Rear	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

The windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

FIGURE 6 DUMMY POSITIONING DATA FOR 30 MPH FRONTAL BARRIER IMPACT TEST

PRE-IMPACT DATA:

Make/Model: Ford/Tempo
 Body Style: 4-door sedan Model Year: 1988
 NHTSA No.: CJ0206 Color: graphite

DATA FROM CERTIFICATION LABEL:

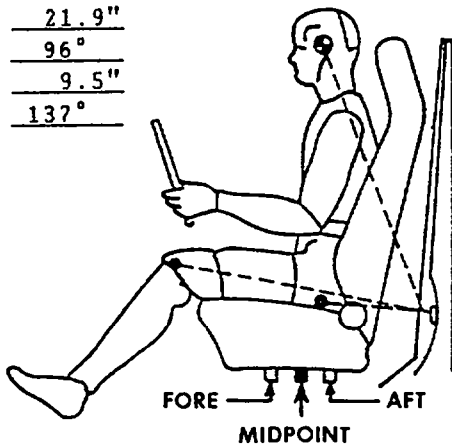
Vehicle Manufacturer: Ford Motor Company
 Date of Manufacture: 3/88 VIN: 1FACP36X0JK189131
 GVWR: 3682 lb; GAWR: Front = 1999 lb; Rear = 1812 lb

POST-IMPACT DATA:

Date of Test: 9/7/88 Time: 1251 Temperature: 65 ° F
 Required Impact Velocity Range: 28.9 to 29.9 mph
 Impact Velocity: Primary = 29.2 mph Secondary = 29.3 mph
 Seat Type: Bucket Adjuster Type: Manual
 Bucket Seat Back Type: Manual adjustable
 Technicians: P. Cummins, D. Carpenter, & N. Kinney

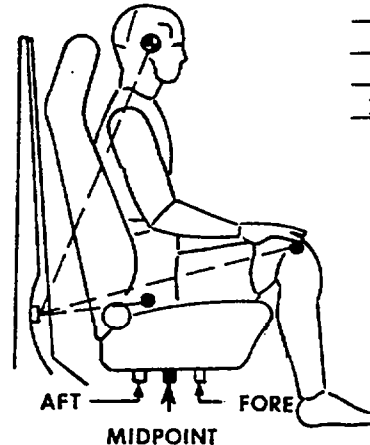
DRIVER DUMMY #353

Head 19.2"
 Target 5°
 Knee 21.9"
 Joint 96°
 Approx-imate 9.5"
 "H" Point 137°



PASSENGER DUMMY #354

19.9" Head
7° Target
21.5" Knee
96° Joint
8.1" Approx-imate
145° "H" Point



A = 50.2"
 B = 38.7"
 C = 25.1"
 D = 11.0"
 E = 11.5"

LATERAL BAR
 ADJUSTABLE
 POINTER

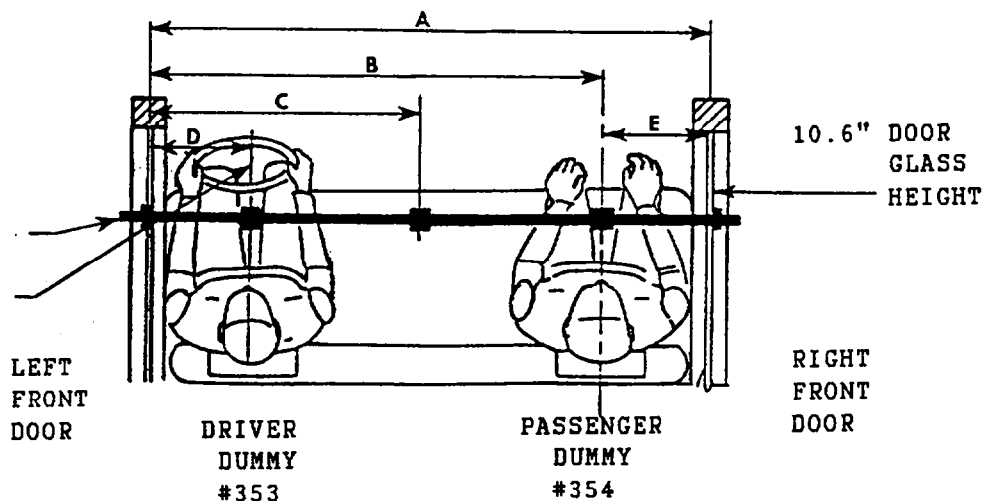
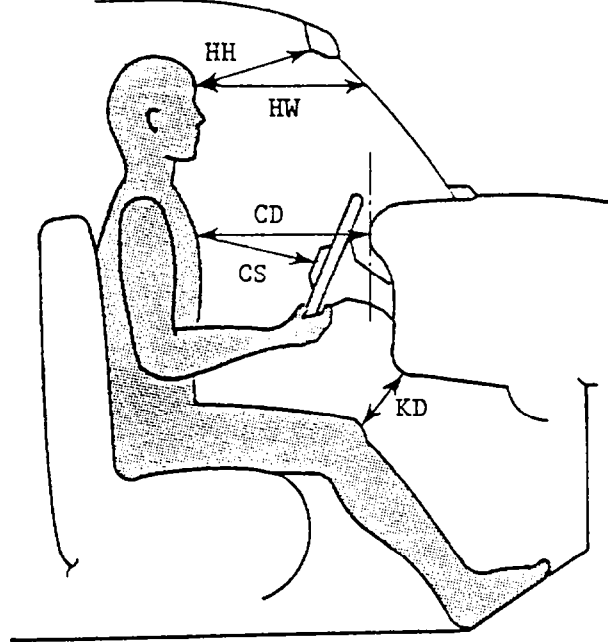


FIGURE 7 DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
HH	9.8	10.2
HW	15.4	16.8
CD	20.8	19.9
CS	10.9	NA
KDL	2.8	3.8
KDR	3.2	4.2
TA	18°	12°
SA	20°	20°
HA	14.5	15.9

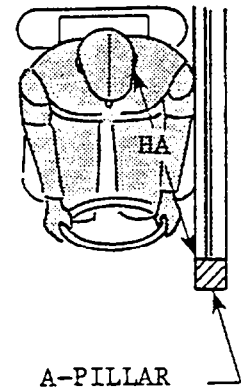
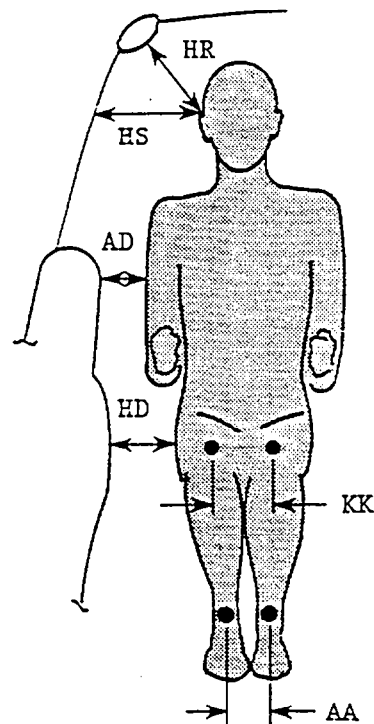


	DRIVER	PASSENGER
HR	4.2	5.0
HS	7.1	8.8
AD	3.3	4.6
HD	4.8	4.4
KK	10.2	8.1
AA	9.5	7.2

Knee outer bolt head to outer bolt head spacing:

Driver = 14.5

Passenger = 11.8



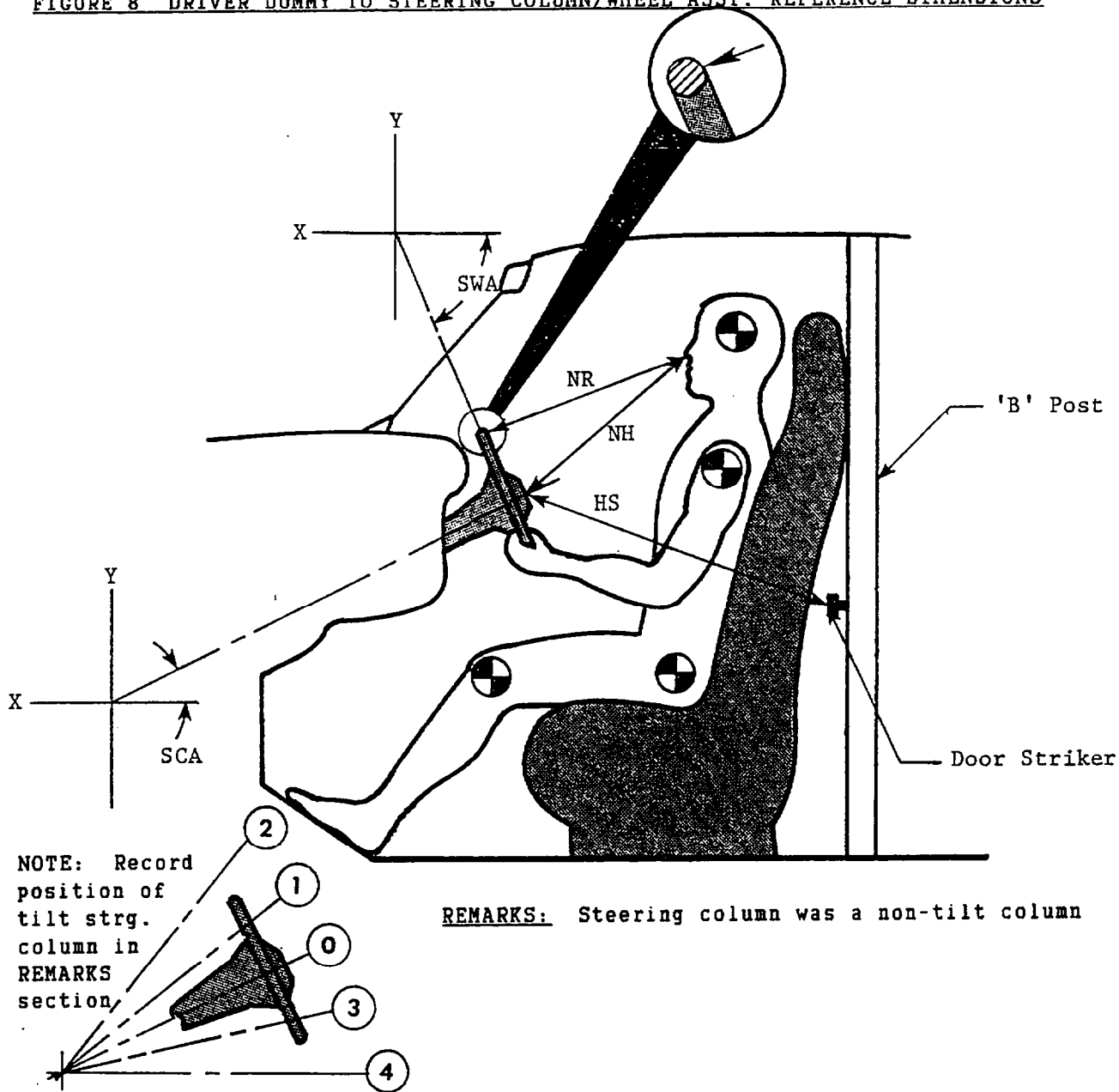
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD = Knee to Dash
 TA = Torso Angle
 SA = Seat Back Angle

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

Torso and seat back angles are relative to vertical.

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

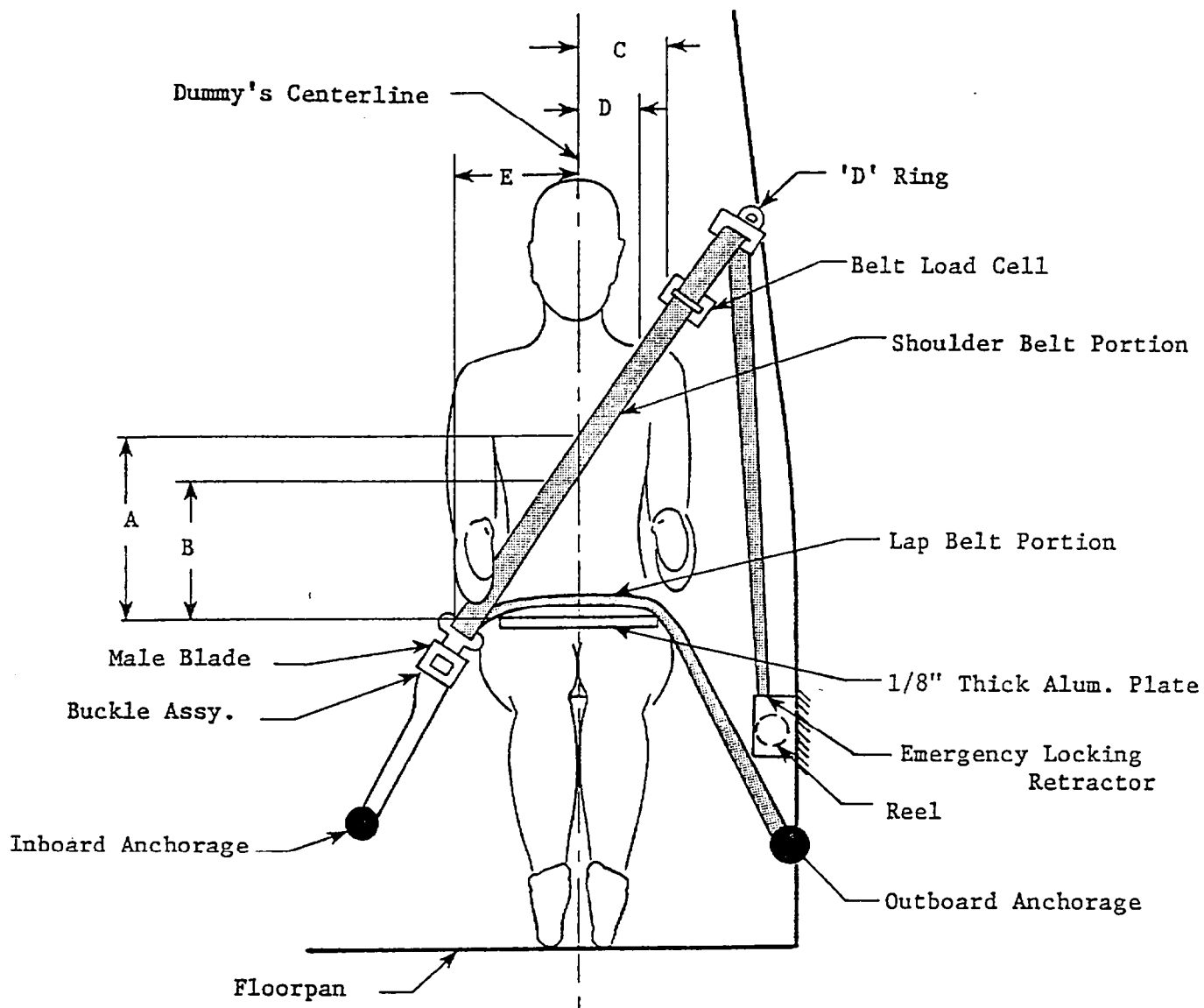
FIGURE 8 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



MEASUREMENTS

NR	- Distance from tip of dummy's nose to top rear surface of steering wheel rim. (in.)	14.6
NH	- Distance from tip of dummy's nose to center of steering column hub. (in.)	15.6
HS	- Distance from center of steering column hub to the forward surface of the door lock striker pin. (in.)	17.4
SCA	- Angle of steering column relative to the horizontal X axis	28°
SWA	- Angle of steering wheel relative to the horizontal X axis	65°

FIGURE 9 SEAT BELT POSITIONING DATA



	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	12.2
B - Top surface of alum. plate to belt lower edge (in)	9.0
C - Dummy centerline to outer edge of belt at chest flesh top (in)	5.0
D - Dummy centerline to inner edge of belt at chest flesh top (in)	2.6
E - Dummy centerline to intersection of upper torso belt and lap belt (in)	9.5

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN: 1FACP36X0JK189131 NHTSA NO: CJ0206
MAKE: Ford MODEL: Tempo
VEHICLE BUILD DATE: 3/88 VEHICLE TYPE: 4-door sedan
FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:
(check one): Automatic belts
 X Type 2 lap/shoulder belts
 Other

CONVENIENCE HOOKS:

DEVICE AUTOMATICALLY RELEASES WHEN IGNITION IS TURNED TO "ON" OR "START"
AND (check one):

 Vehicle's drivetrain is engaged
 Vehicle's parking brake is in the released mode
 X Not applicable, vehicle's restraint system does not
include convenience hooks

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITON BELTS HAVE TENSION - RELIEVING DEVICES?
 Yes

MAXIMUM SLACK RECOMMENDED IN OWNER'S MANUAL: 1.5 INCHES.

DOES OWNER'S MANUAL WARN THAT INTRODUCING SLACK BEYOND THE AMOUNT
SPECIFIED CAN SIGNIFICANTLY REDUCE THE EFFECTIVENESS OF THE SHOULDER
BELT? Yes

IF NO, EXPLAIN:

AUTOMATIC BELTS: IS TENSION - RELIEVING DEVICE CANCELLED EACH TIME THE
ADJACENT DOOR IS OPENED? NA

MANUAL BELTS: THE TENSION - RELIEVING DEVICE IS CANCELLED WHEN
(check one): X The adjacent door is opened
 The latch plate is released from the buckle

OPEN-BODY VEHICLE: DOES THE MANUAL MEANS TO CANCEL THE
TENSION-RELIEVING DEVICE OPERATE PROPERLY? NA
IF NO, EXPLAIN:

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA CONTINUED

VEHICLE VIN: 1FACP36X0JK189131 NHTSA NO: CJ0206

MAKE: Ford MODEL: Tempo

VEHICLE BUILD DATE: 3/88 VEHICLE TYPE: 4-door sedan

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one): Automatic belts
 X Type 2 lap/shoulder belts
 Other

BELT CONTACT FORCE:

FOR BELTS WITHOUT TENSION-RELIEVING DEVICES: BELT CONTACT FORCE:

 POUNDS

 X NOT APPLICABLE, VEHICLE'S RESTRAINT SYSTEM INCLUDED A BELT
TENSION-RELIEVING DEVICE.

LATCHPLATE ACCESS:

ARE SEATBELT LATCHPLATES WITHIN REACH ENVELOPE? Yes

DOES CLEARANCE TEST BLOCK MOVE UNHINDERED TO LATCHPLATE OR BUCKLE?
Yes

RETRACTION:

SEATBELT AUTOMATICALLY RETRACTS WHEN

(check one): Adjacent vehicle door is open and seatbelt
latchplate is released
 X Seatbelt latchplate is released

ARE THE STOWED WEBBING AND HARDWARE PINCHED WHEN THE DOOR IS CLOSED?

No

OPEN-BODY VEHICLE: DOES BELT SYSTEM FULLY RETRACT WHEN THE TENSION-RELIEVING
DEVICE IS MANUALLY DEACTIVATED? NA

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA CONTINUED

VEHICLE VIN: 1FACP36X0JK189131 NHTSA NO: CJ0206

MAKE: Ford MODEL: Tempo

VEHICLE BUILD DATE: 3/88 VEHICLE TYPE: 4-door sedan

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one): Automatic belts
 X Type 2 lap/shoulder belts
 Other

ACCESSIBILITY:

IS SEAT CUSHION REMOVABLE SO THE SEATBACK SERVES A FUNCTION OTHER THAN SEATING? No

IS SEAT REMOVABLE? No

IS SEAT MOVABLE SO THE SPACE CAN BE USED FOR A SECONDARY FUNCTION?
 No

IF WEBBING IS DESIGNED TO PASS THRU THE SEAT CUSHION OR BETWEEN THE CUSHION AND SEAT BACK ARE ONE OF THE FOLLOWING PARTS NORMALLY ON TOP OF OR ABOVE THE SEAT CUSHION: LATCHPLATE, BUCKLE, WEBBING? NA, webbing does not pass through the seat cushion or between the cushion and the seat back.

ARE THE REMAINING TWO PARTS ACCESSIBLE UNDER NORMAL CONDITIONS? NA

DO THE LATCHPLATE AND BUCKLE PASS THRU THE GUIDES PROVIDED AND FALL BEHIND THE SEAT WHEN THE BELT IS COMPLETELY RETRACTED (OR UNATTACHED IF NONRETRACTABLE); THE SEAT IS MOVED TO ANY POSITION; AND THE SEAT BACK, IF FOLDABLE, IS FOLDED FORWARD AS FAR AS POSSIBLE AND THEN MOVED BACKWARD INTO POSITION? No

IS THE INBOARD RECEPTACLE END ACCESSIBLE WITH THE CENTER ARM REST IN ANY POSITION TO WHICH IT CAN BE ADJUSTED WITHOUT MOVING THE ARMREST FOR ACCESS? Yes

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA CONTINUED

VEHICLE VIN: 1FACP36X0JK189131 NHTSA NO: CJ0206

MAKE: Ford MODEL: Tempo

VEHICLE BUILD DATE: 3/88 VEHICLE TYPE: 4-door sedan

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one): Automatic belts
 X Type 2 lap/shoulder belts
 Other

LATCH MECHANISM:

ARE LATCH MECHANISM COMPONENTS ACCESSIBLE TO A SEATED OCCUPANT IN THE
STOWED AND OPERATIONAL POSITIONS? Yes

DOES LATCH MECHANISM RELEASE BOTH TORSO AND LAP BELTS SIMULTANEOUSLY?
 Yes

DOES LATCH MECHANISM RELEASE AT A SINGLE POINT BY A PUSH BUTTON ACTION?
 Yes

TABLE 8 FMVSS NO. 208 - SEAT BELT WARNING SYSTEM DATA

WITH OCCUPANT IN DRIVER'S POSITION AND 3-POINT UNIBELT IN STOWED POSITION
AND IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 6 sec.

Duration of reminder light operation = 6 sec.

WITH OCCUPANT IN DRIVER'S POSITION AND 3-POINT UNIBELT IN USE AND THE
IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 6 sec.

Wording of visual warning:

Fasten Seat Belt

Fasten Belt

Symbol 101-80 X

TABLE 9 FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL DATA

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTION SYSTEM:

The label was located on the right side of the inside of the glove box door.

THE MANUFACTURER'S RECOMMENDED SCHEDULE IS TO: (check one)*

replace _____ or repair _____ this system: (check one)

a. by _____ month, _____ year

b. by _____ miles

c. or after a time interval of _____ months or _____ years.

*Label states that regular maintenance is not required.

WERE APPROPRIATE INSTRUCTIONS CONCERNING MAINTENANCE AND/OR REPLACEMENT OF THIS SYSTEM PROVIDED? Yes

WAS A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEM PROVIDED?
Yes

IS THERE A REFERENCE TO THE INSTRUCTIONS AND DESCRIPTION OF THE SYSTEM ON THE LABEL? Yes

WAS AN OWNER'S MANUAL PROVIDED? Yes

DID THE OWNER'S MANUAL CONTAIN APPROPRIATE INFORMATION CONCERNING MAINTENANCE AND/OR REPLACEMENT AND A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEMS? Yes, in the "Airbag Owner Guide Supplement".

TABLE 10 FMVSS NO. 208 - READINESS INDICATOR DATA

AN OCCUPANT RESTRAINT SYSTEM THAT DEPLOYS IN THE EVENT OF A CRASH SHALL HAVE A MONITORING SYSTEM WITH A READINESS INDICATOR. A TOTALLY MECHANICAL SYSTEM IS EXEMPT FROM THIS REQUIREMENT.

Is the system totally mechanical? No

IF NO:

Describe the location of the readiness indicator:

The indicator light was located on the right side of the
instrument panel below the fuel gage.

Is the readiness indicator clearly visible to the driver? Yes

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided? No

TABLE 11 SUMMARY OF FMVSS 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Ford/Tempo

BODY STYLE: 4-door sedan

MODEL YEAR: 1988

NHTSA NO.: CJ0206

COLOR: graphite

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: Ford Motor Company

DATE OF MANUFACTURE: 3/88

VIN: 1FACP36X0JK189131

GVWR: 3682 LBS., GAWR: FRONT 1999 LBS., REAR 1812 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Barrier Impact

DATE OF TEST: 9/7/88 TIME: 1251 TEMP: 65° F

REQUIRED IMPACT VELOCITY RANGE: 28.9 MPH TO 29.9 MPH

IMPACT VELOCITY: PRIMARY = 29.2 MPH, SECONDARY = 29.3 MPH

TEST WEIGHT = 3145 LBS., STATIC CRUSH MAX. = 14.9 IN., REBOUND = 15.5 IN.

FUEL SYSTEM DATA

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

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: 15.4 GALLONS (FURNISHED BY COTR)

TEST VOLUME: 14.2 GALLONS (92-94% OF USEABLE)

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

DETAILS OF FUEL SYSTEM: Fuel tank is located in front of rear axle.

The fuel filler neck is located on right side and enters the right

front of the fuel tank.

ELECTRIC FUEL PUMP: Yes

FUEL INJECTON: Yes

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

*WITH ENTIRE FUEL SYSTEM FILLED.

**Owner's manual did not specify a fuel system capacity.

FIGURE 10 FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

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

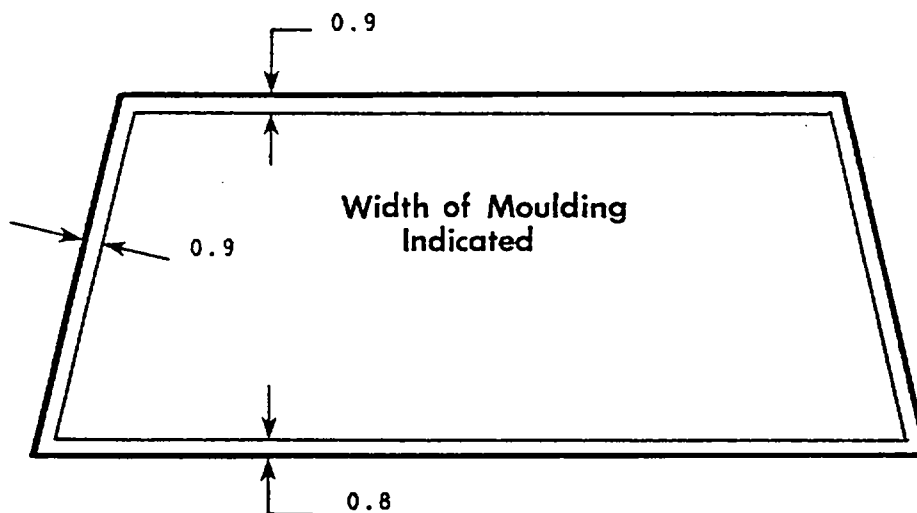
FMVSS 212 REQUIREMENTS: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

WINDSHIELD PERIPHERY

	PRE-TEST (in)	POST-TEST (in)	PERCENT RETENTION
RIGHT SIDE	74.3	74.3	100%
LEFT SIDE	74.3	74.3	100%
TOTAL	148.6	148.6	100%

AREA OF RETENTION FAILURE:



FAILURE DETAILS: None

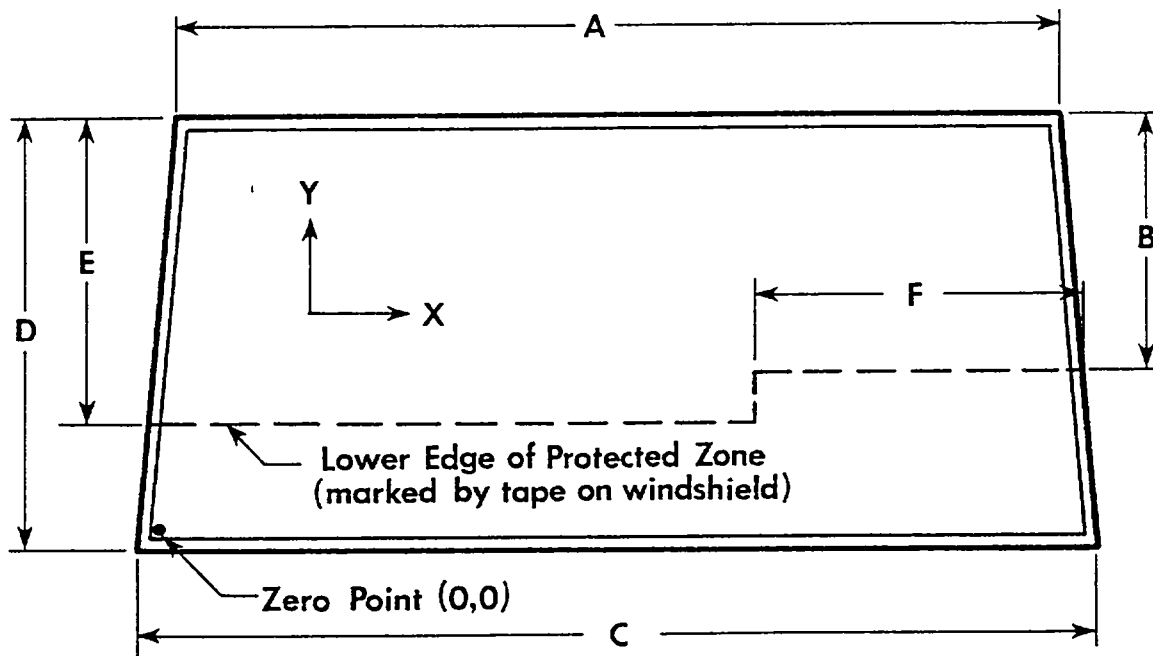
Windshield Temperature: 72° F

FIGURE 11 FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION". DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

FMVSS 219 TEST DATA:



FRONT VIEW

A = 44.5

C = 56.4

E = 20.6

B = 17.9

D = 26.6

F = 21.0

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

COORDINATES
X Y

None

1.

2.

3.

4.

ALL MEASUREMENTS ARE IN INCHES.

TABLE 12 "FUEL SYSTEM INTEGRITY" POST-IMPACT
TEST DATA, FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CJ0206; TEST DATE: 9/7/88

VEH. MFR./MAKE/MODEL: Ford Motor Company/Ford/Tempo

Test vehicle fuel tank filled to 92 to 94% of manufacturer's "useable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

.....

TEST VEHICLE IMPACT TYPE:

- ☒ Frontal (30 mph)
- ☐ Oblique (30 mph) with ☐ barrier face
first contacting ☐ (driver/pass.) side.
- ☐ Rear Moving Barrier (30 mph)
- ☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

	<u>ACTUAL</u>	<u>MAX. ALLOW.</u>
1. From impact until vehicle motion ceases - - -	0	1 oz.
2. For 5 min. period after veh. motion ceases- -	0	5 oz.
3. For next 25 minutes - - - - -	0	1 oz./1 min.

SOLVENT SPILLAGE DETAILS:

None

SECTION 3.0

CAMERA INFORMATION

FIGURE 12 CAMERA POSITIONS

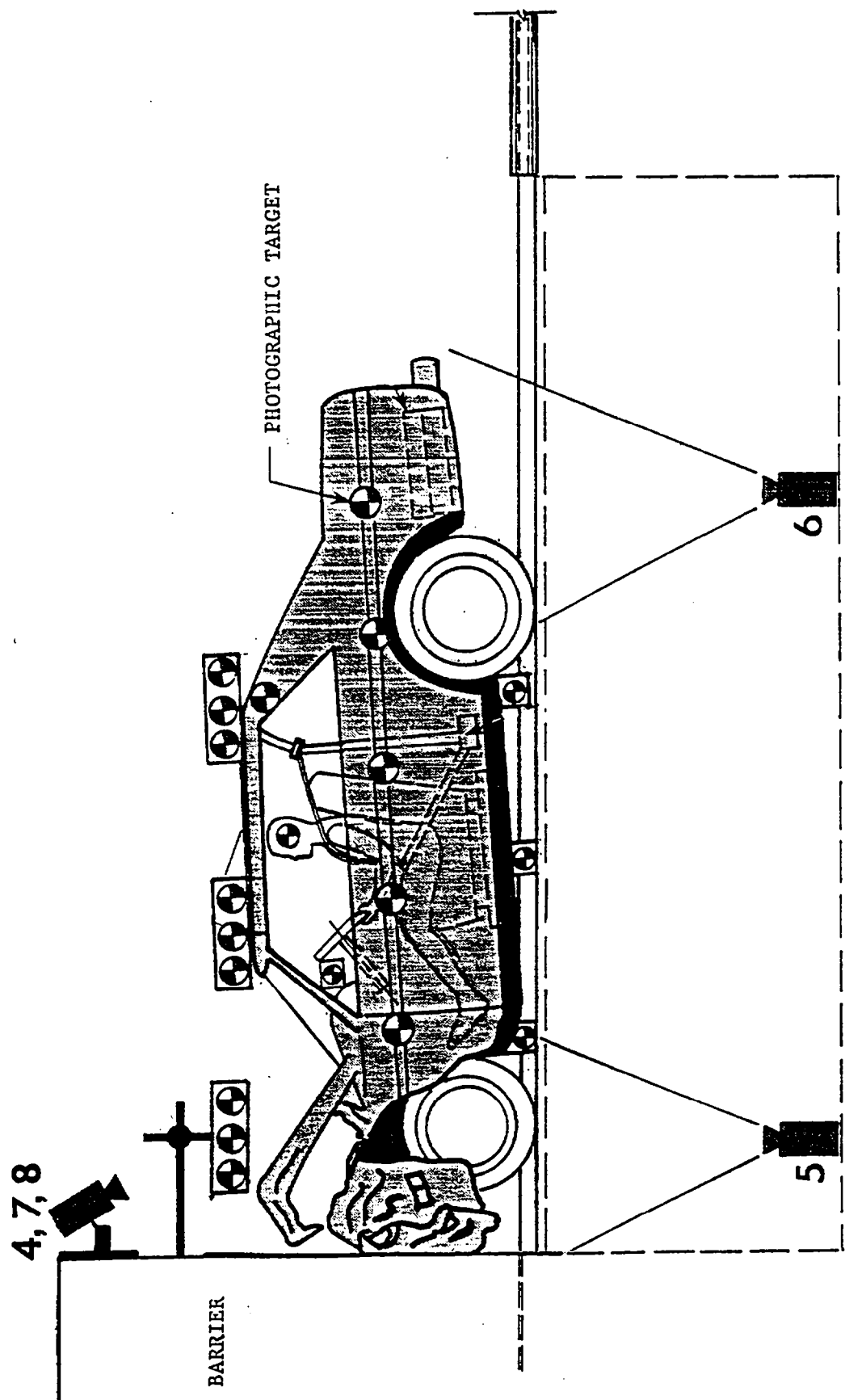


FIGURE 12 CAMERA POSITIONS CONTINUED

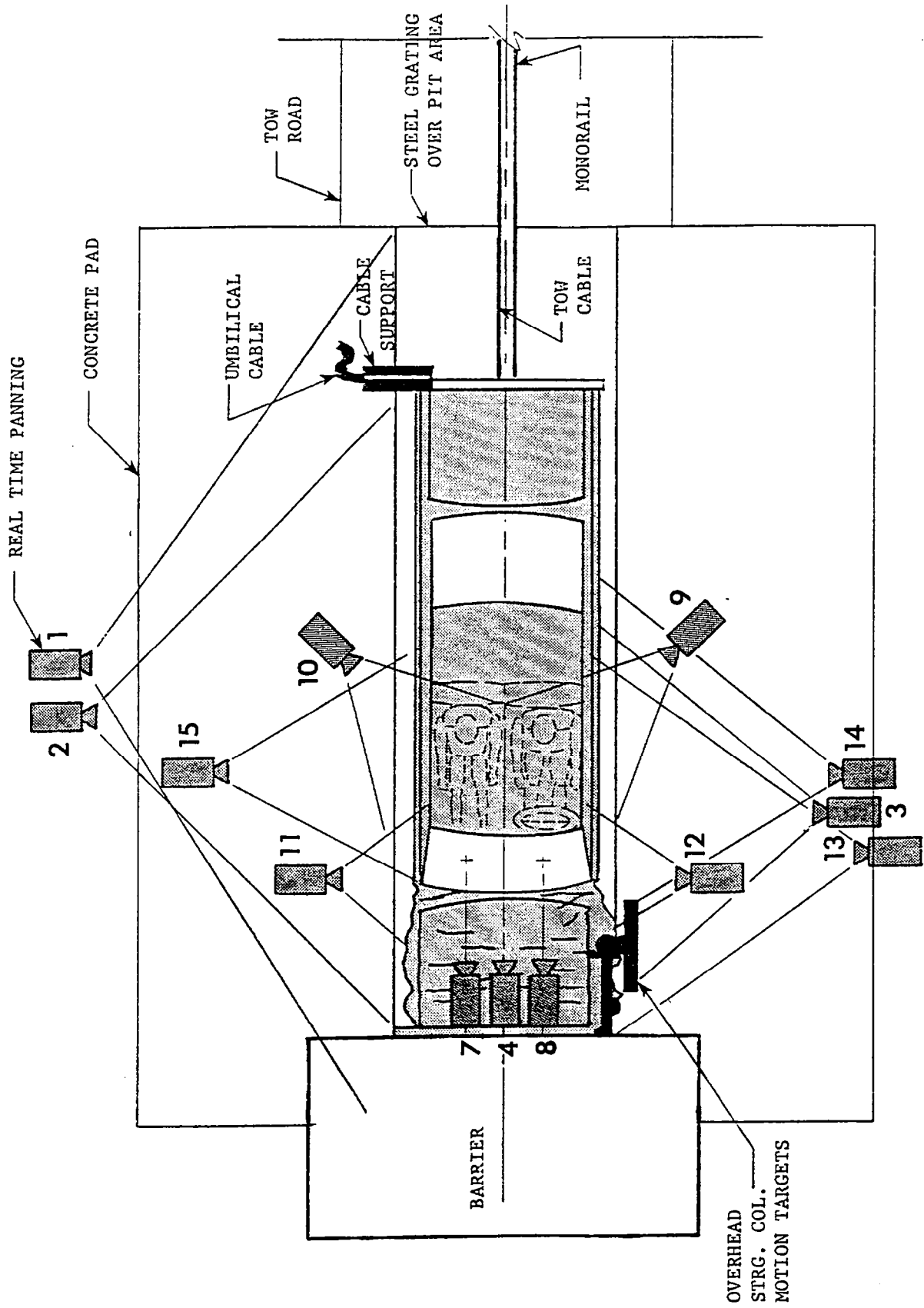


TABLE 13 HIGH SPEED CAMERA LOCATIONS

TEST NO.: 880907		VEHICLE: Ford Tempo			CAMERA POSITIONS (IN)*				ANGLE**	FILM PLANE		SPEED (FPS)
CAMERA NO.	VIEW	X	Y	Z	(DEG)	TO HEAD TARGET	LENS (MM)					
1	Real time panning	-142.0	504.0	61.0	NA	NA	16	24				
2	Vehicle crush	-81.3	266.4	37.1	-2	NA	13	500				
3	Dummy kinematics	-41.5	-295.0	44.0	-4	253.0	25	522				
4	Windshield damage	-6.0	0.0	84.0	-40	NA	13	500				
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1010				
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	1000				
7	Passenger kinematics	-4.5	13.8	93.0	-50	NA	17	497				
8	Driver kinematics	-6.8	-14.5	93.0	-50	NA	17	500				
9	Driver kinematics	-157.3	-116.0	87.0	-27	121.0	25	505				
10	Passenger kinematics	-152.1	116.0	87.0	-26	118.0	25	500				
11	Windshield intrusion	-38.1	306.1	44.0	0	NA	50	500				
12	Windshield intrusion	-53.0	-309.4	42.3	0	NA	50	497				
13	Column movement	-108.0	-286.0	103.0	-14	NA	25	500				
14	Column movement	-108.0	-286.0	75.1	-9	NA	25	500				
15	Passenger kinematics	-38.8	293.0	45.3	-4	265.0	25	512				

*X = Film plane to plane of barrier face

Y = Film plane to monorail centerline

Z = Film plane to ground

**Referenced to horizontal plane

APPENDIX A
PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. POST-TEST FRONT VIEW
3. PRE-TEST LEFT SIDE VIEW
4. POST-TEST LEFT SIDE VIEW
5. PRE-TEST RIGHT SIDE VIEW
6. POST-TEST RIGHT SIDE VIEW
7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW
8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
9. PRE-TEST LEFT REAR THREE-QUARTER VIEW
10. POST-TEST LEFT REAR THREE-QUARTER VIEW
11. PRE-TEST REAR VIEW
12. POST-TEST REAR VIEW
13. PRE-TEST WINDSHIELD VIEW
14. POST-TEST WINDSHIELD VIEW
15. PRE-TEST ENGINE COMPARTMENT VIEW
16. POST-TEST ENGINE COMPARTMENT VIEW
17. PRE-TEST FUEL FILLER CAP VIEW
18. POST-TEST FUEL FILLER CAP VIEW
19. PRE-TEST FRONT UNDERBODY VIEW
20. POST-TEST FRONT UNDERBODY VIEW
21. PRE-TEST REAR UNDERBODY VIEW
22. POST-TEST REAR UNDERBODY VIEW
23. PRE-TEST FUEL TANK VIEW
24. PRE-TEST FUEL LINES VIEW
25. PRE-TEST FUEL FILLER NECK VIEW
26. PRE-TEST DRIVER DUMMY POSITION VIEW
27. POST-TEST DRIVER DUMMY POSITION VIEW
28. PRE-TEST PASSENGER DUMMY POSITION VIEW
29. POST-TEST PASSENGER DUMMY POSITION VIEW
30. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
32. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

PHOTOGRAPHS, CONT'D

- 33. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
- 34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
- 35. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
- 36. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
- 37. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
- 38. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1
- 39. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2
- 40. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 3
- 41. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 4
- 42. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 5
- 43. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 6
- 44. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 1
- 45. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 2
- 46. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW
- 47. PRE-TEST VEHICLE TIRE LOAD LABEL VIEW



Figure A-1. PRE-TEST FRONT VIEW



Figure A-2. POST-TEST FRONT VIEW
A-3

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Figure A-3. PRE-TEST LEFT SIDE VIEW

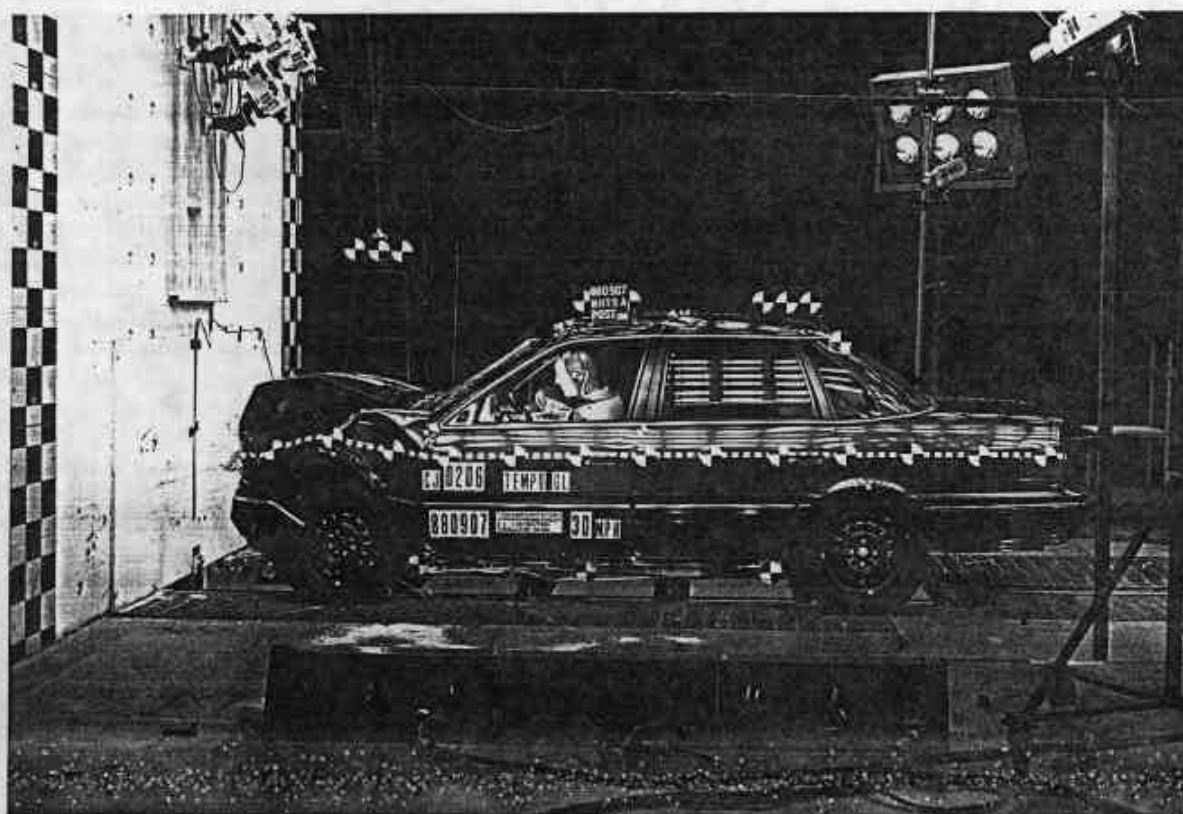


Figure A-4. POST-TEST LEFT SIDE VIEW

A-4

880907

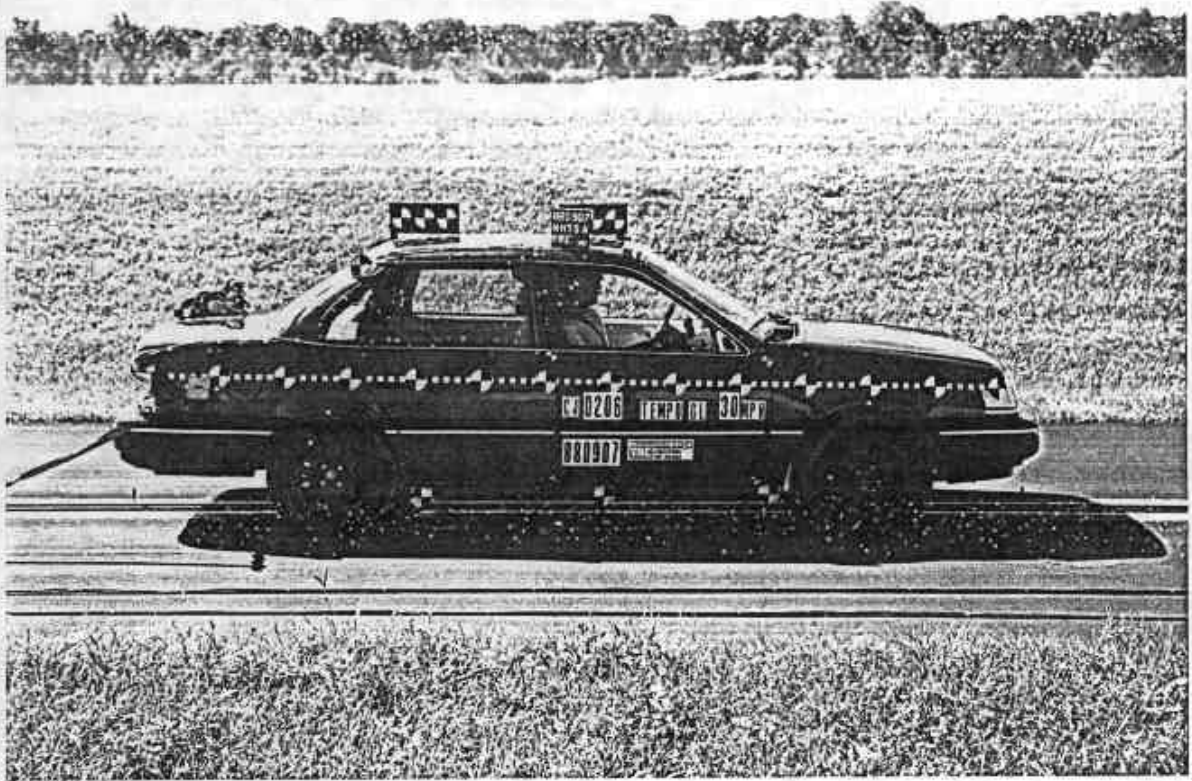


Figure A-5. PRE-TEST RIGHT SIDE VIEW

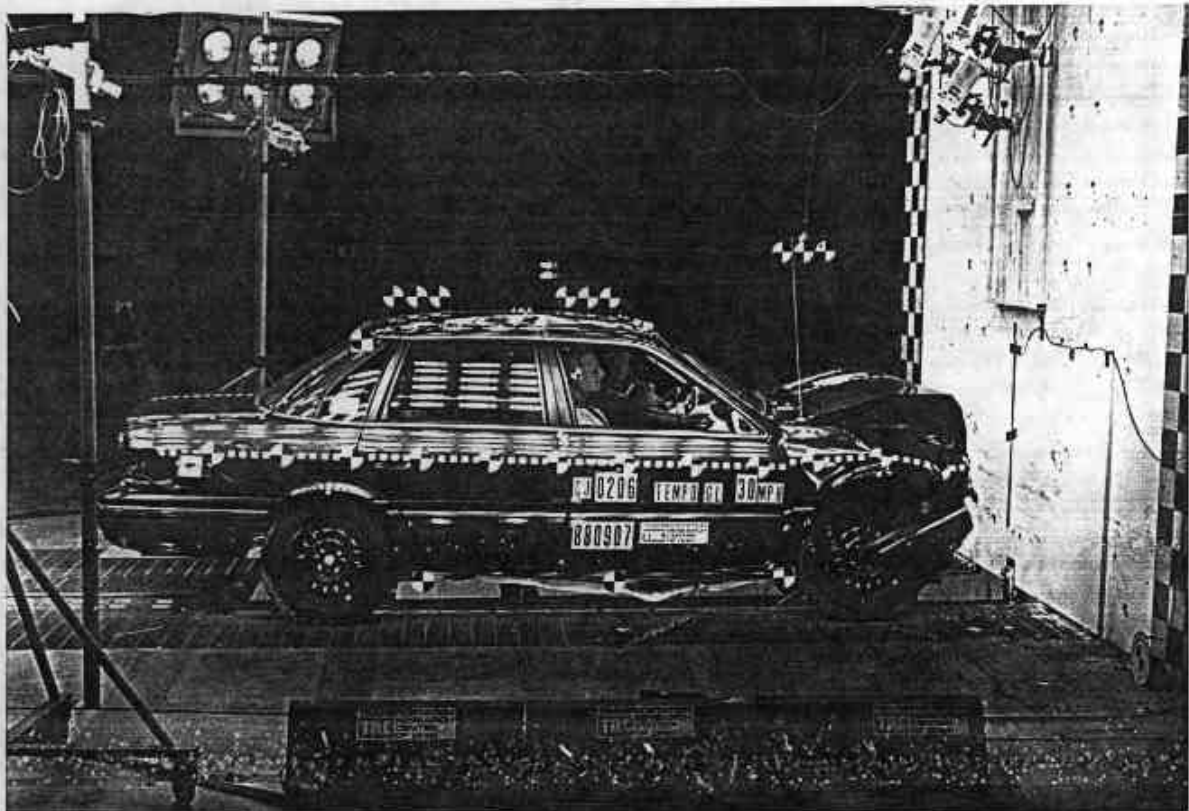


Figure A-6. POST-TEST RIGHT SIDE VIEW
A-5

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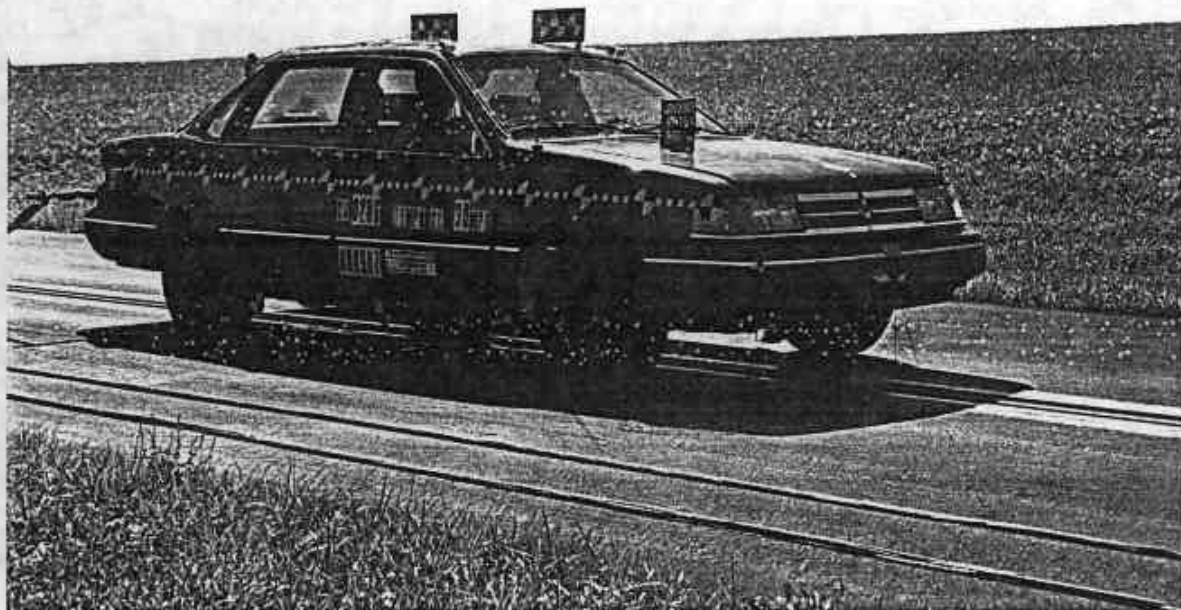


Figure A-7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW



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

A-6

880907

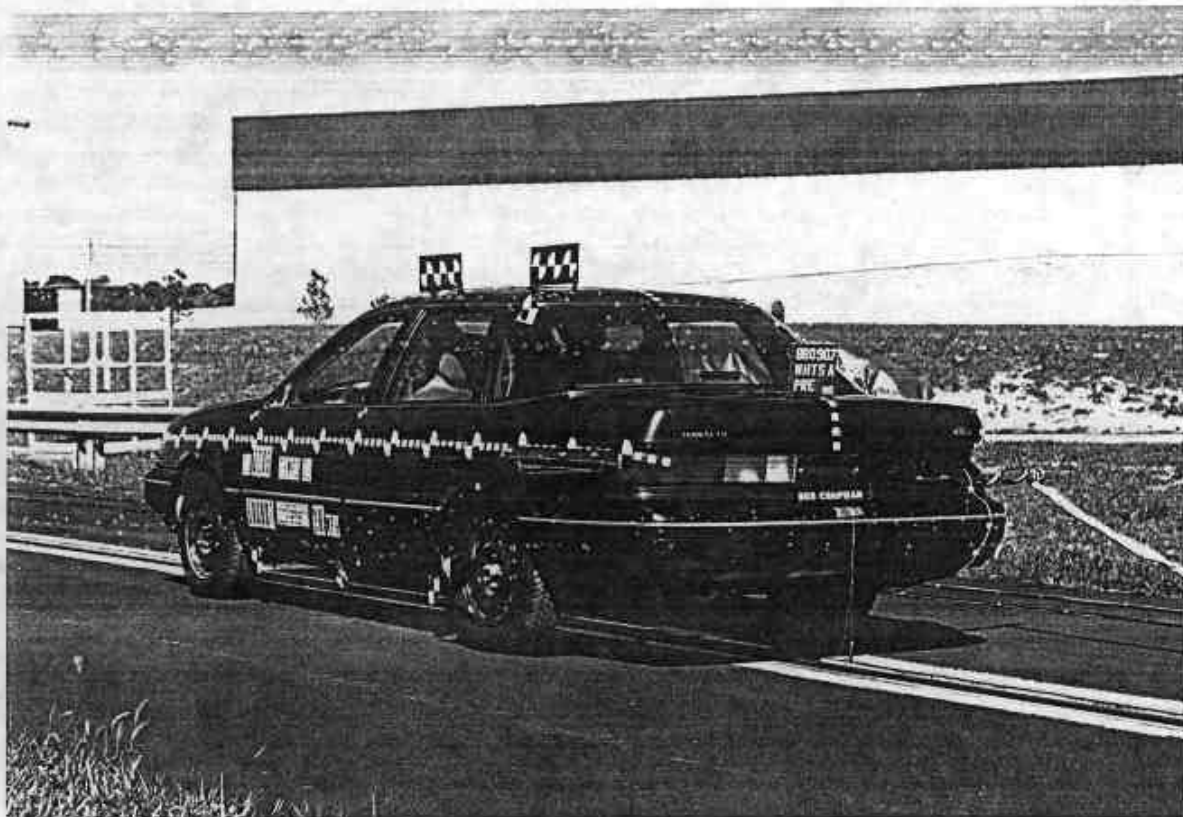


Figure A-9. PRE-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-10. POST-TEST LEFT REAR THREE-QUARTER VIEW
A-7

880907

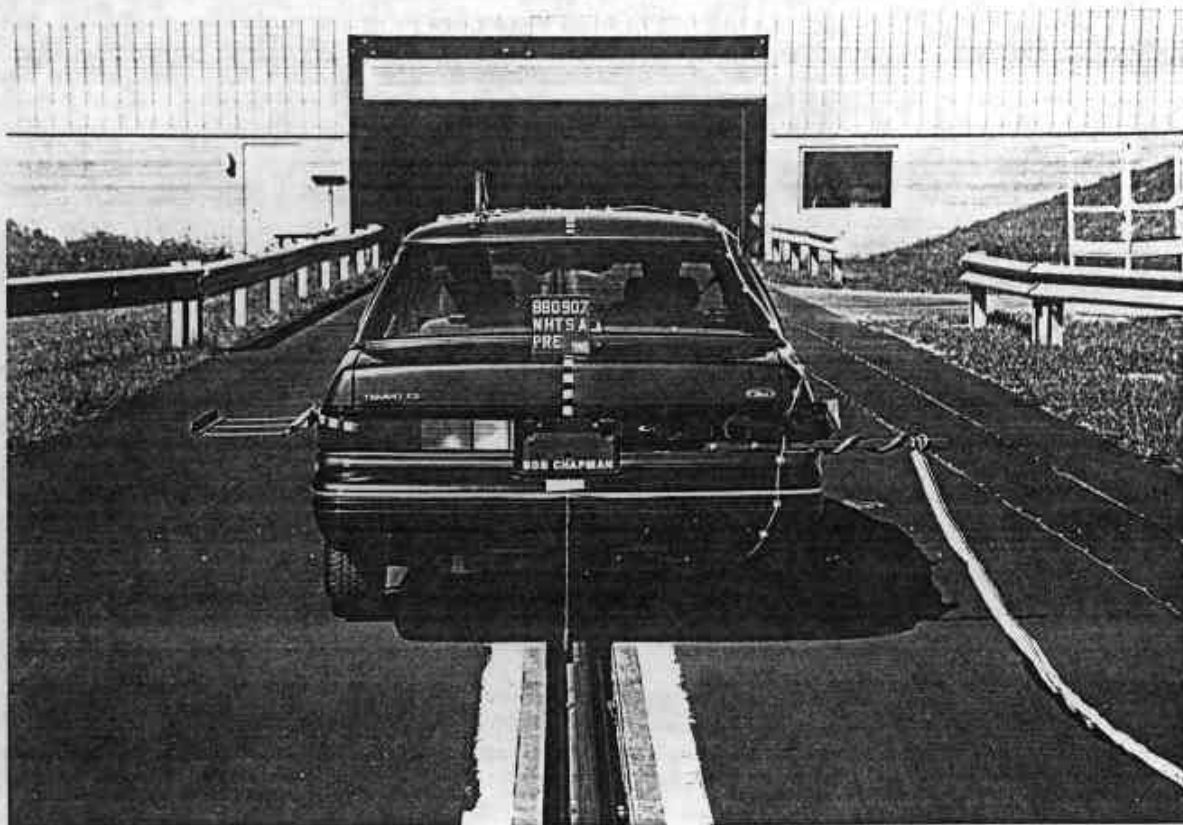


Figure A-11. PRE-TEST REAR VIEW



Figure A-12. POST-TEST REAR VIEW
A-8

880907

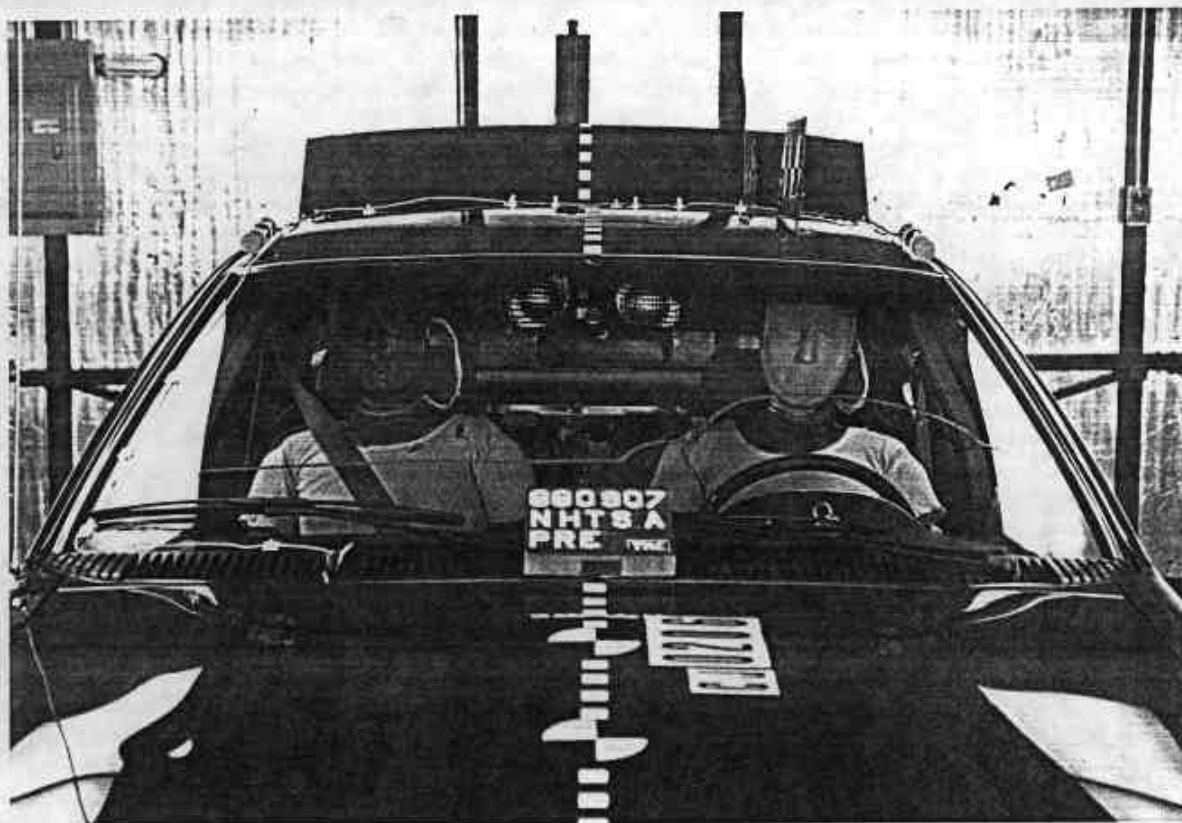


Figure A-13. PRE-TEST WINDSHIELD VIEW

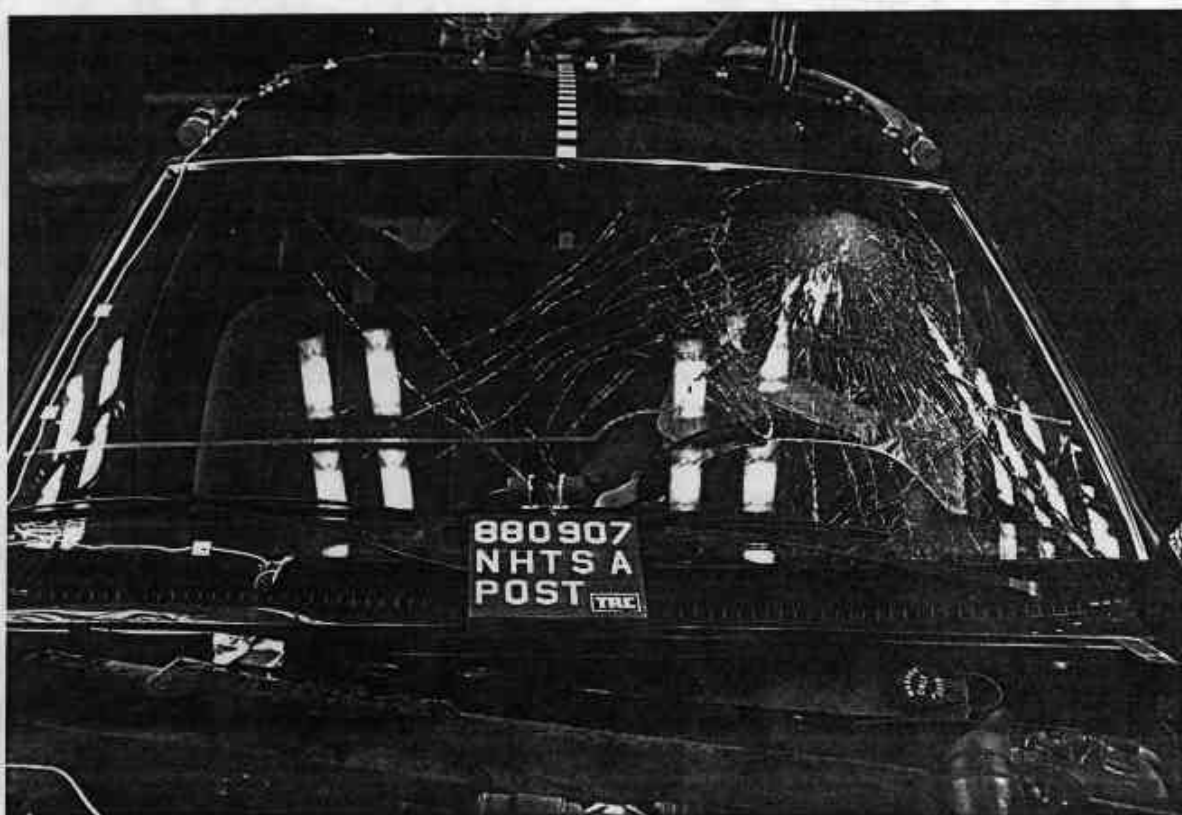


Figure A-14. POST-TEST WINDSHIELD VIEW
A-9

880907

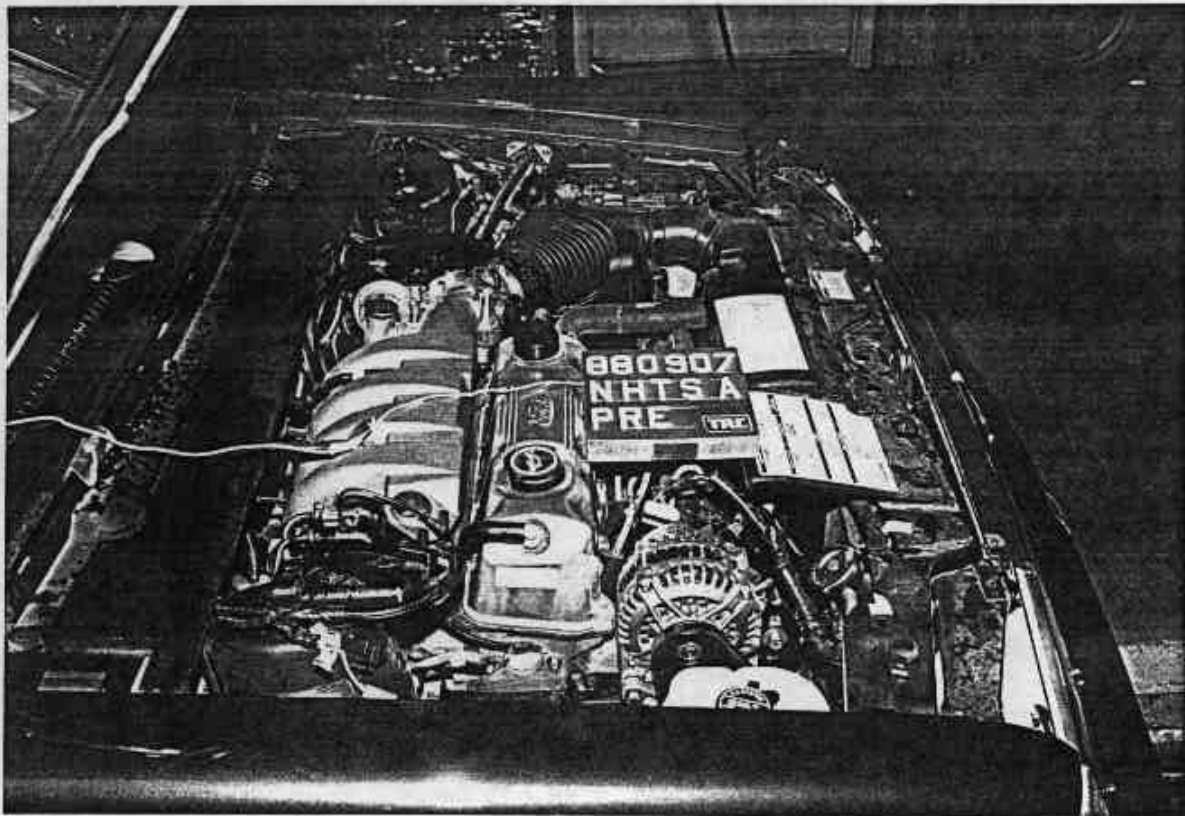


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

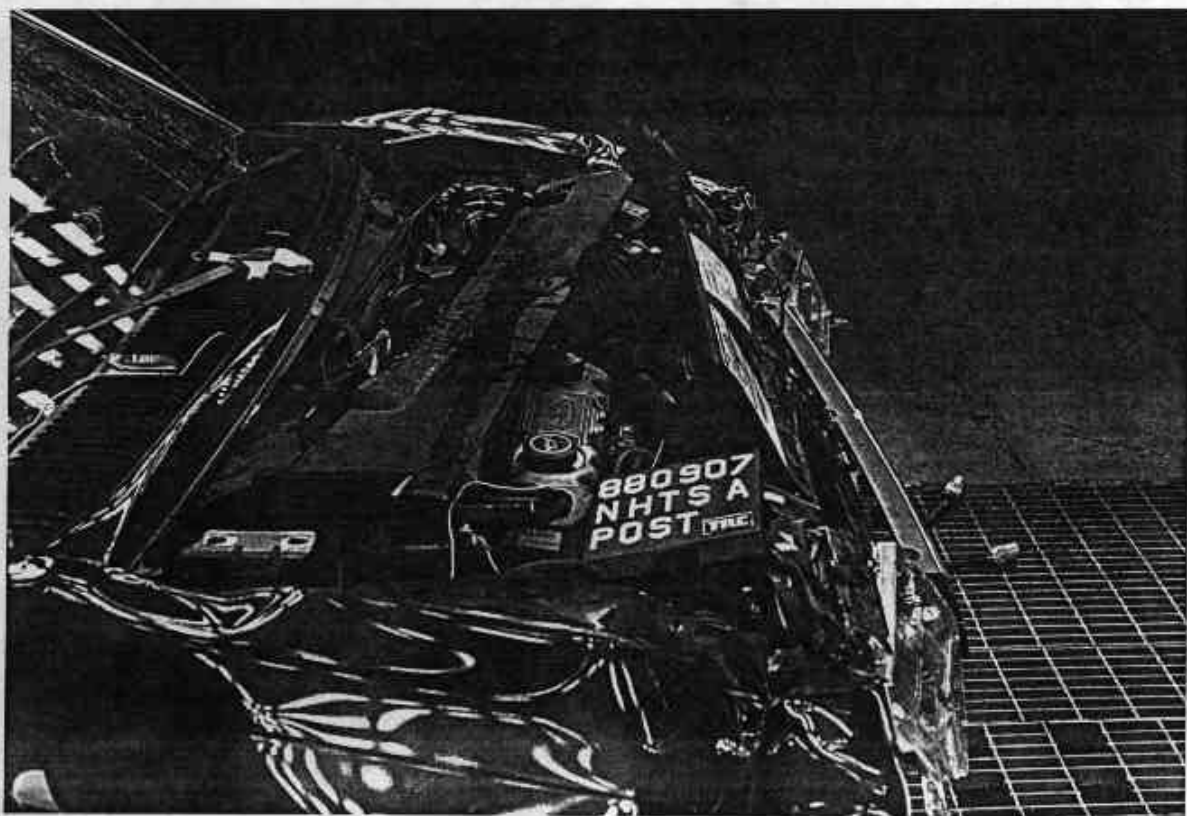


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

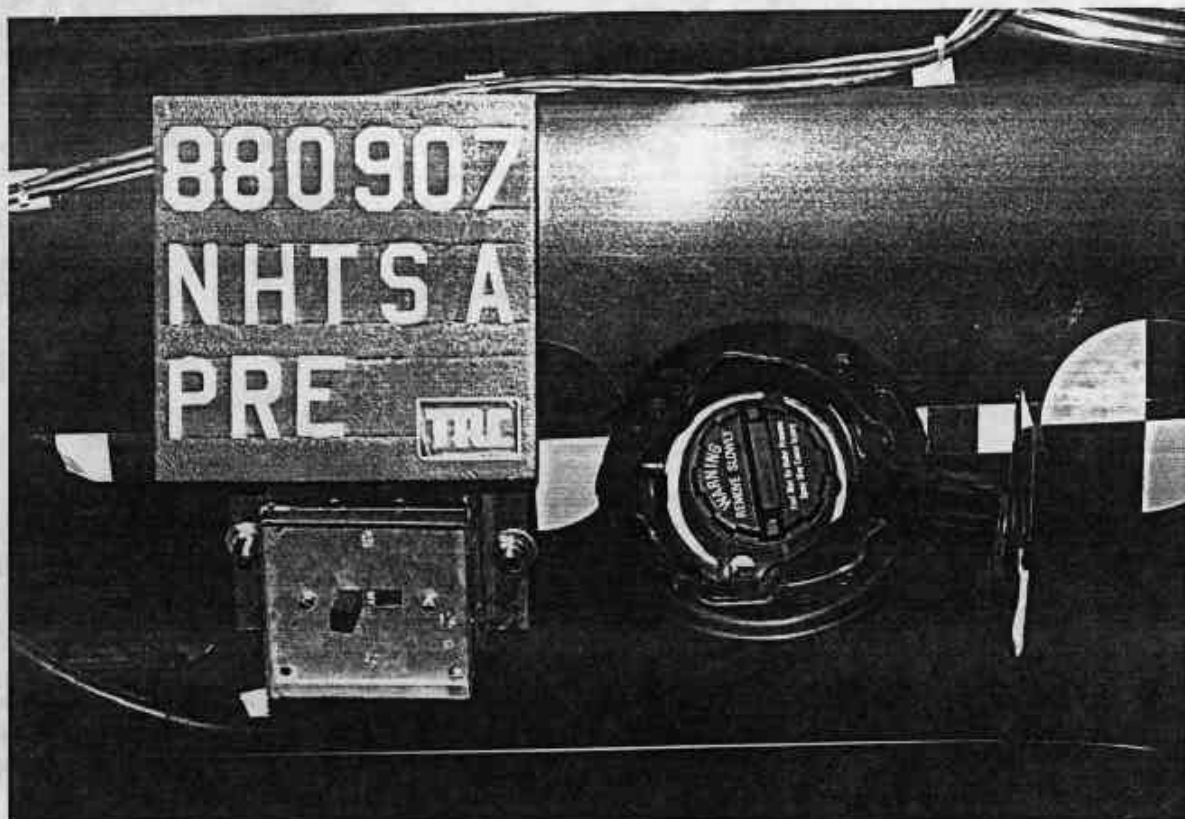


Figure A-17. PRE-TEST FUEL FILLER CAP VIEW



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

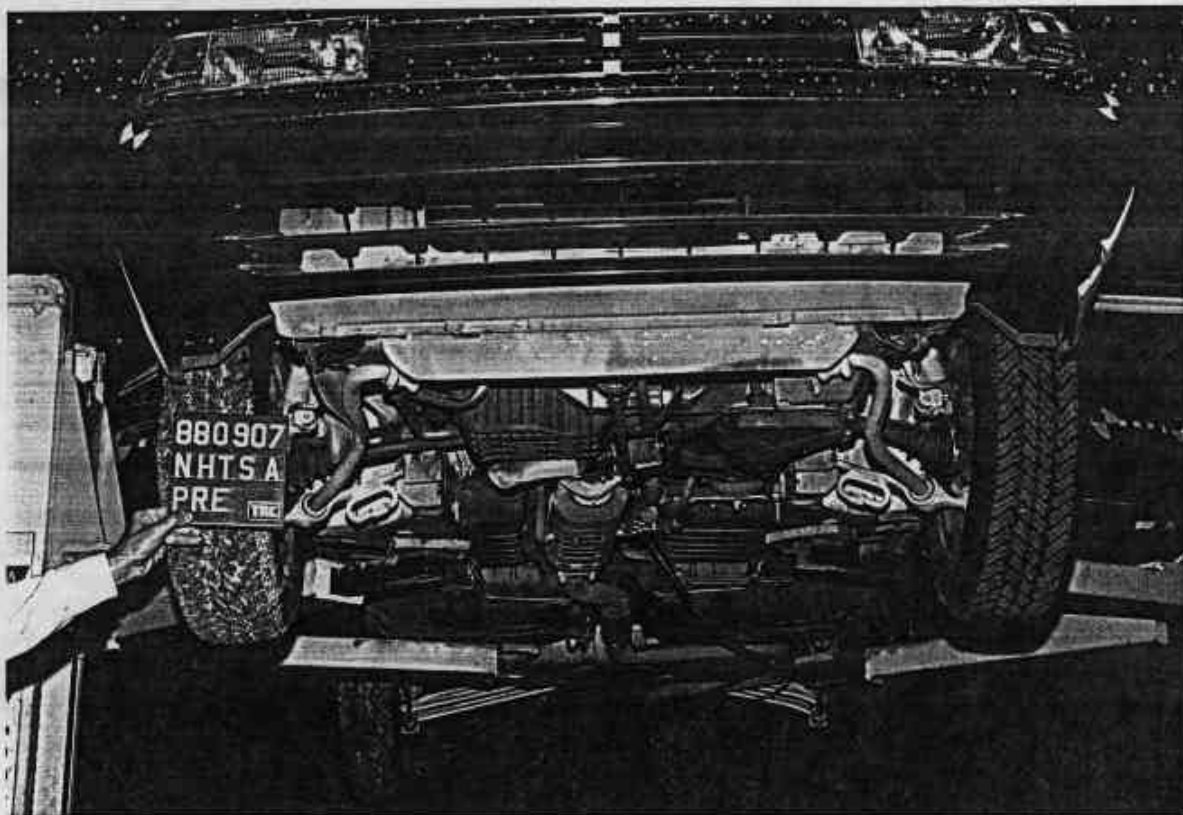


Figure A-19. PRE-TEST FRONT UNDERBODY VIEW

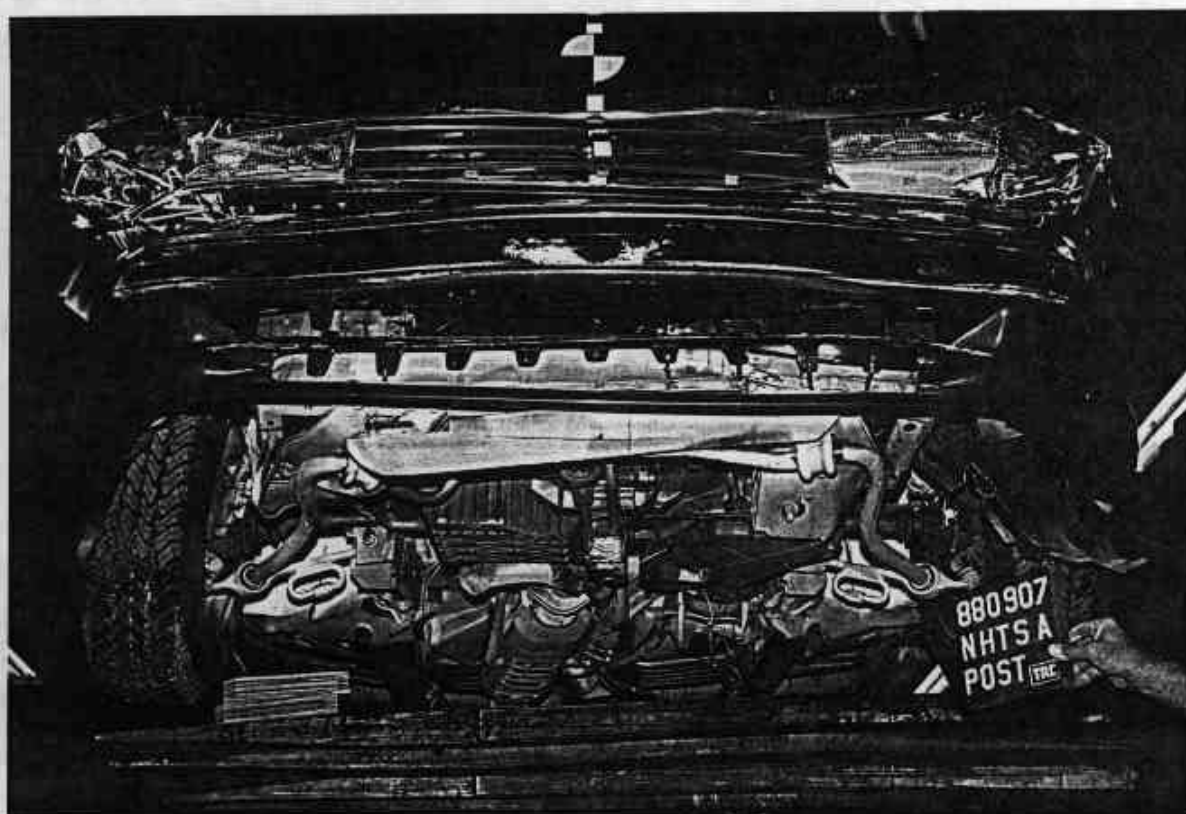


Figure A-20. POST-TEST FRONT UNDERBODY VIEW

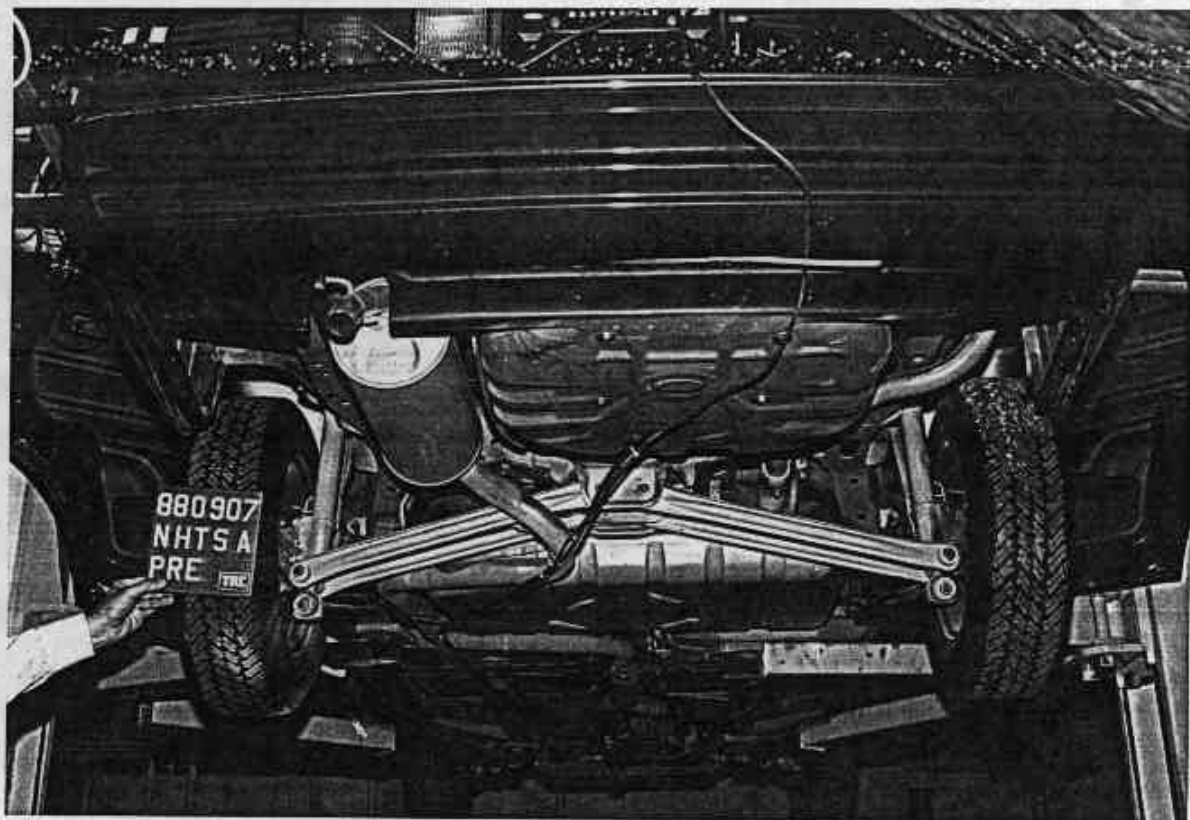


Figure A-21. PRE-TEST REAR UNDERBODY VIEW

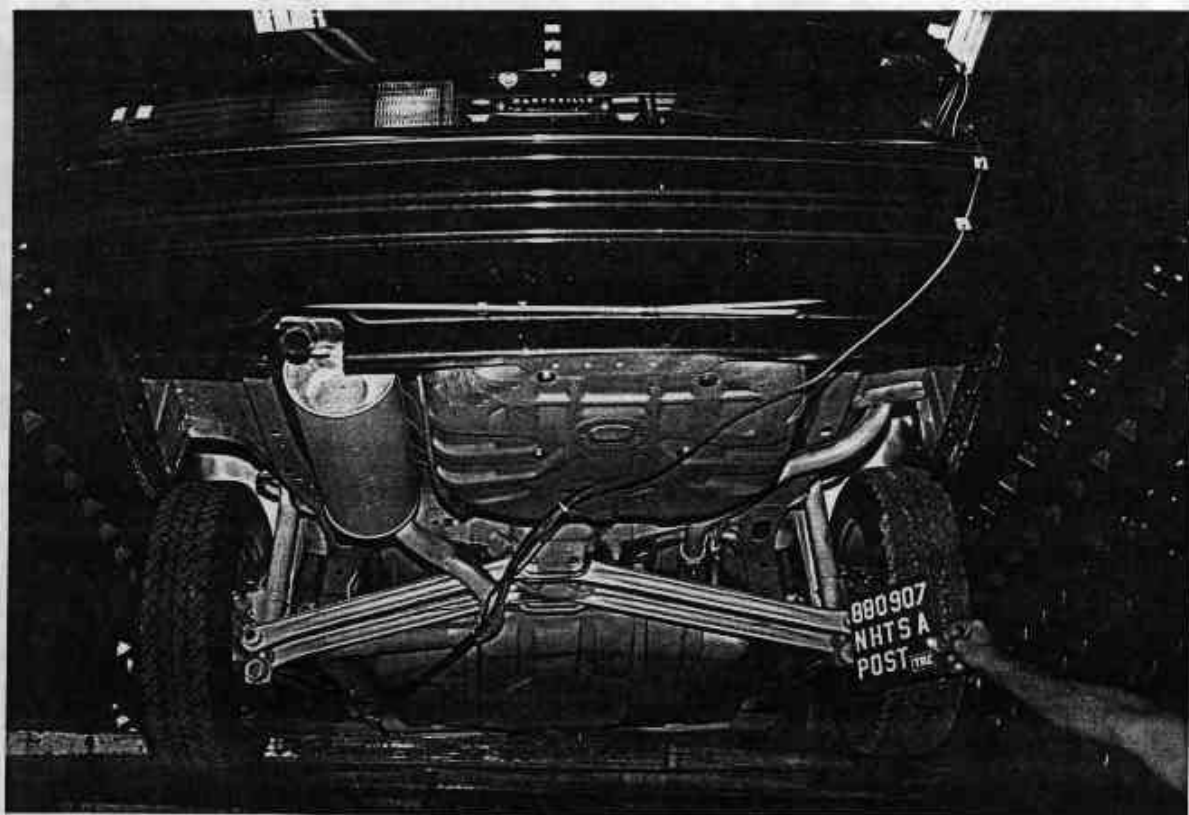


Figure A-22. POST-TEST REAR UNDERBODY VIEW

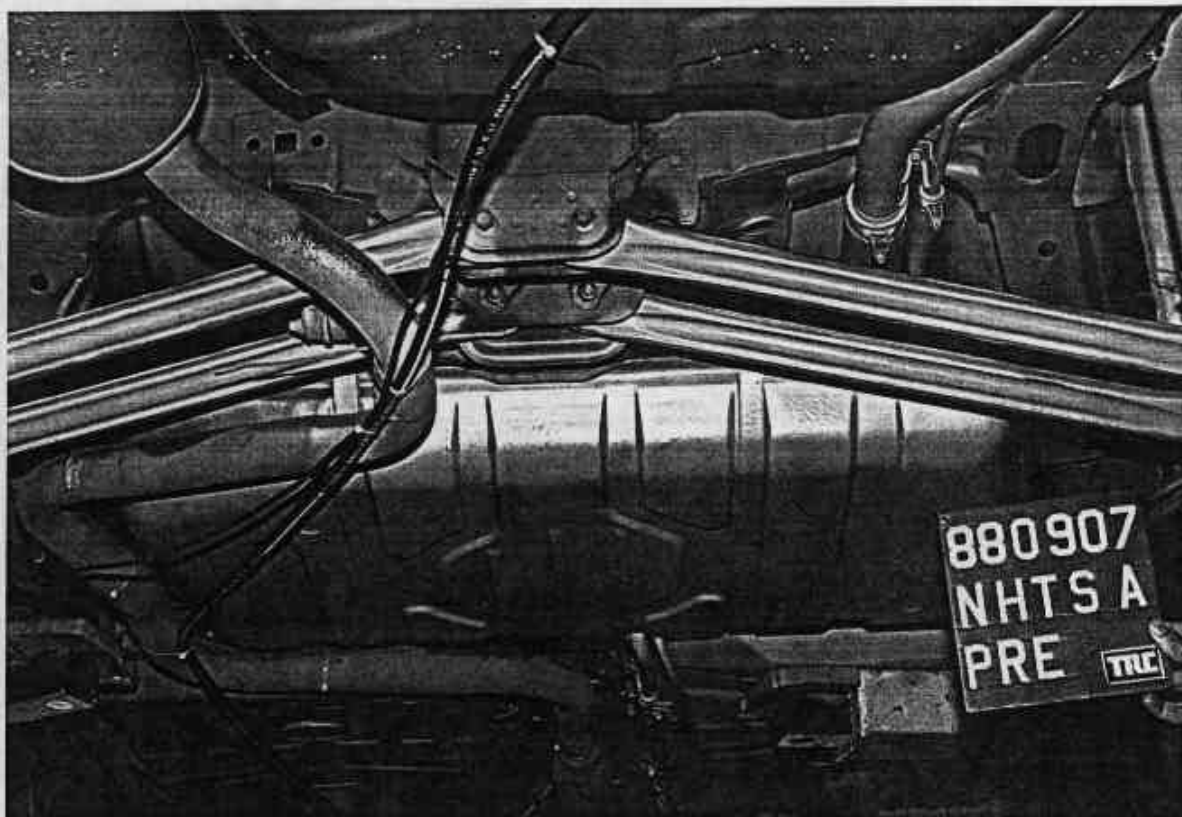


Figure A-23. PRE-TEST FUEL TANK VIEW



Figure A-24. PRE-TEST FUEL LINES VIEW
A-14

880907



Figure A-25. PRE-TEST FUEL FILLER NECK VIEW



Figure A-26. PRE-TEST DRIVER DUMMY POSITION VIEW
A-15

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Figure A-27. POST-TEST DRIVER DUMMY POSITION VIEW

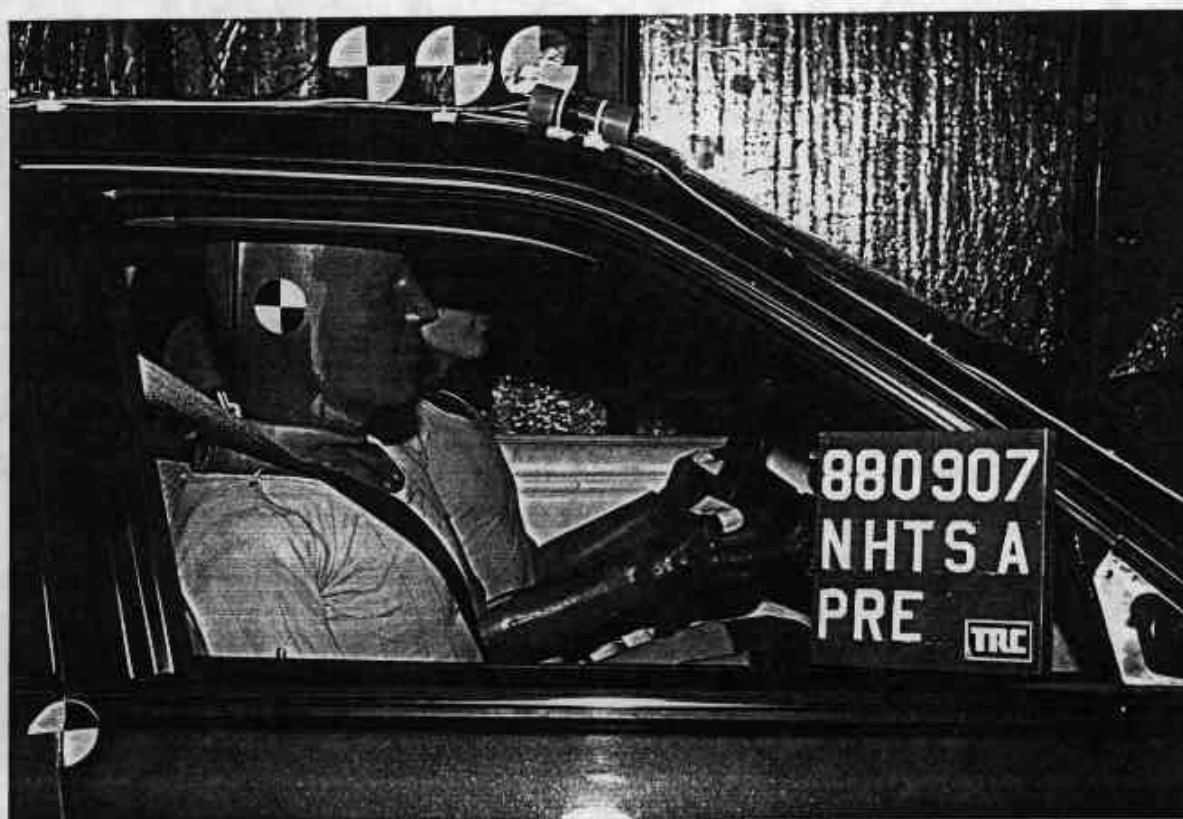


Figure A-28. PRE-TEST PASSENGER DUMMY POSITION VIEW

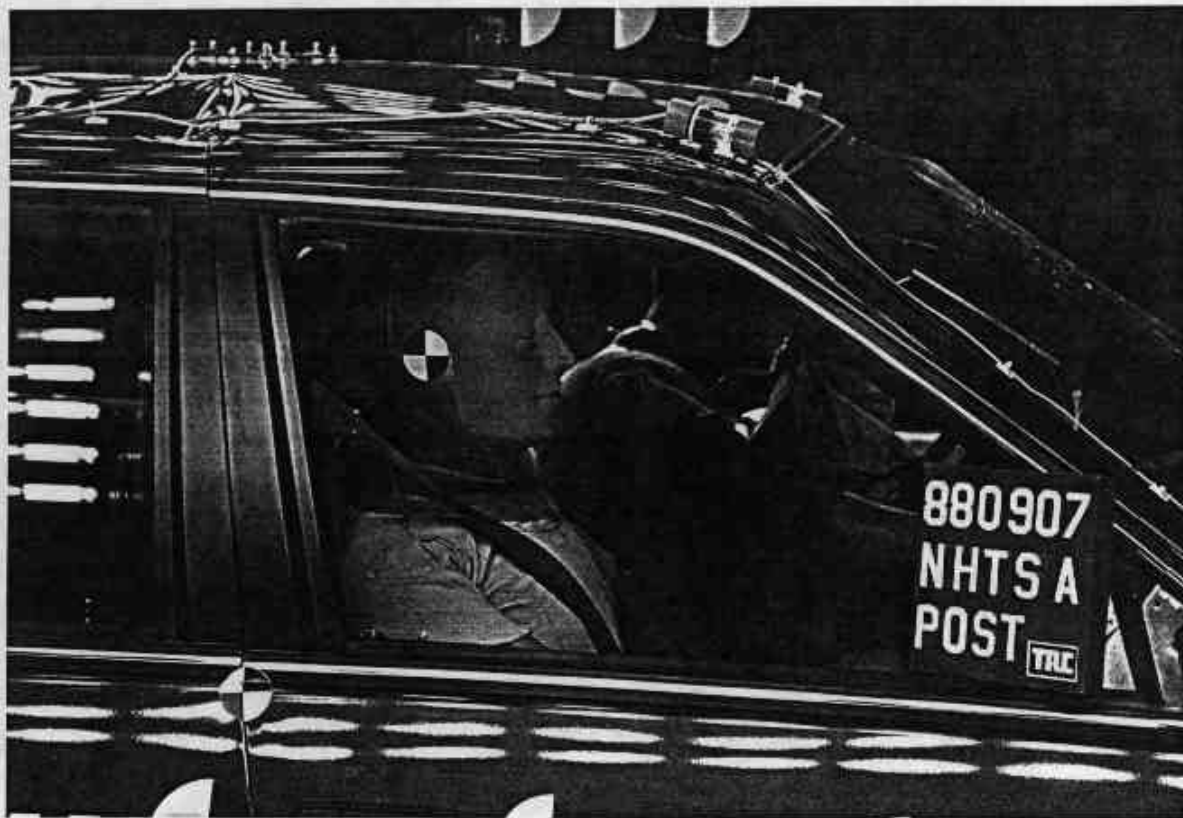


Figure A-29. POST-TEST PASSENGER DUMMY POSITION VIEW



Figure A-30. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
A-17 880907

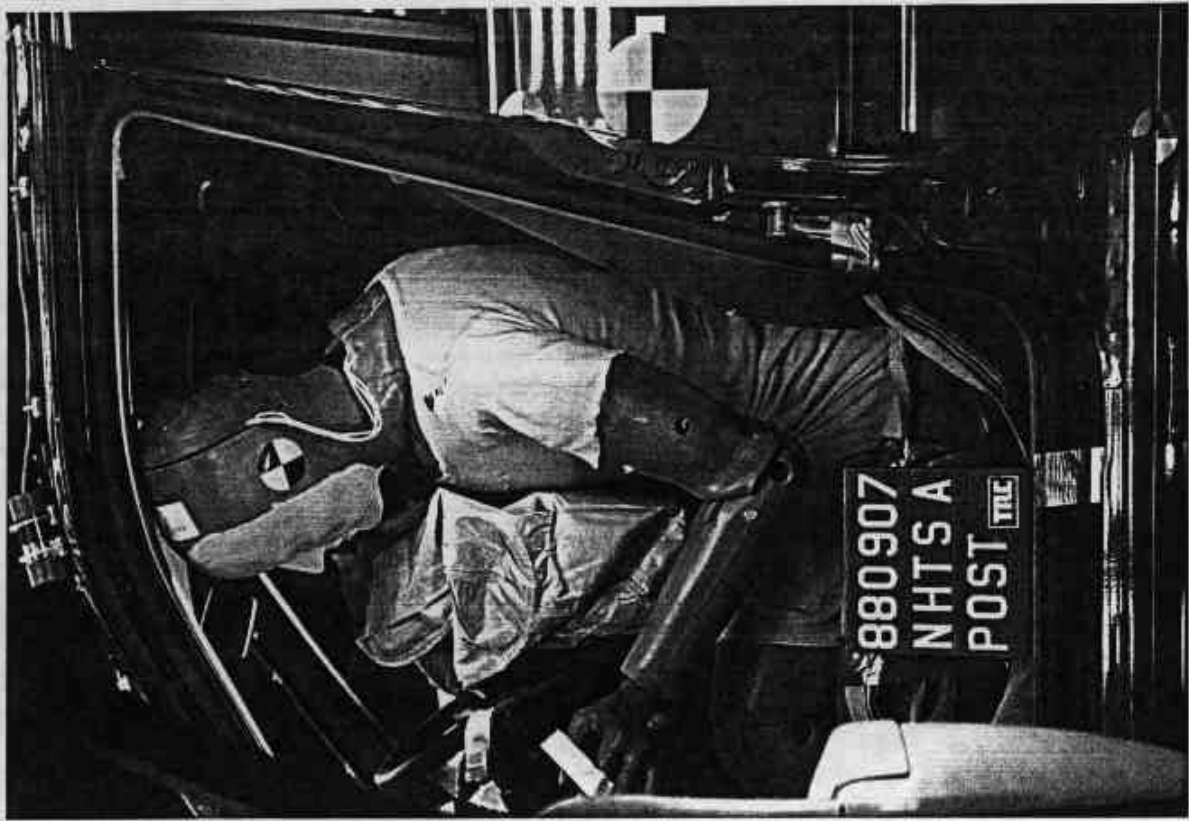


Figure A-31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

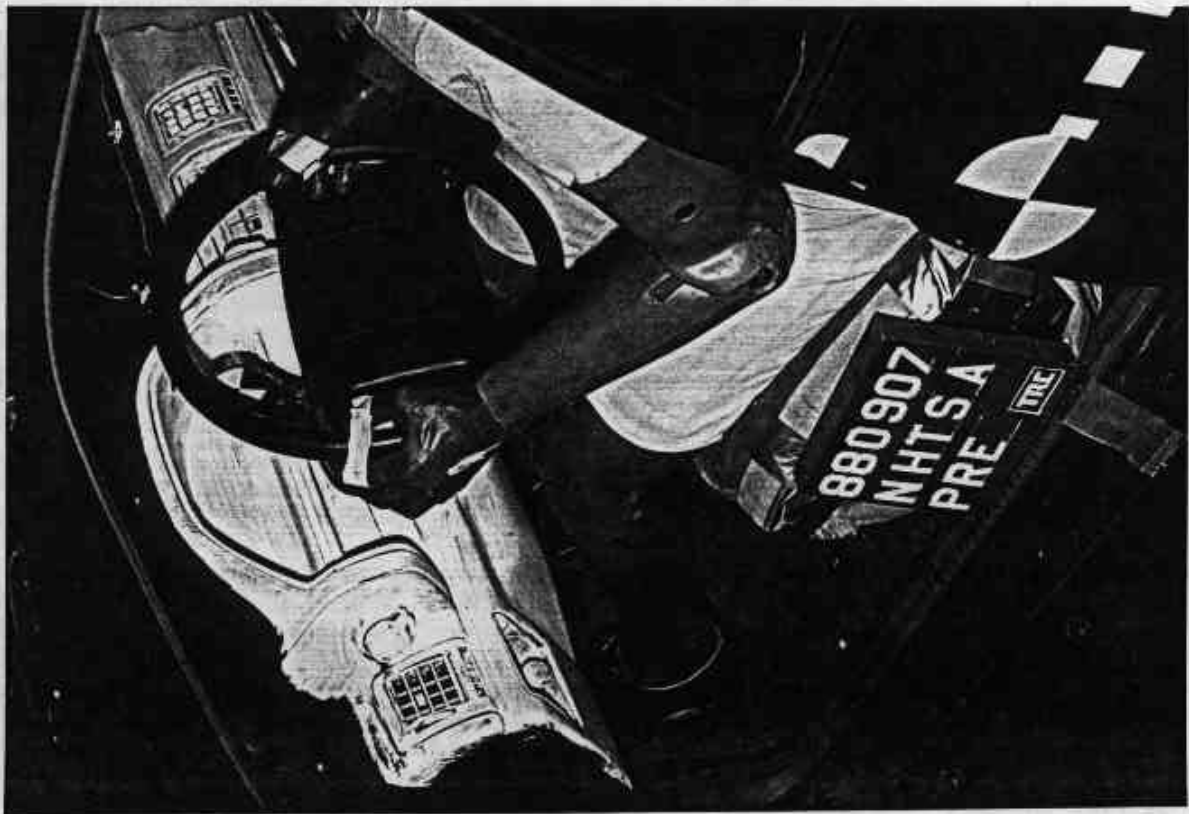


Figure A-32. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-18 880907



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



Figure A-34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1



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



Figure A-36. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-37. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

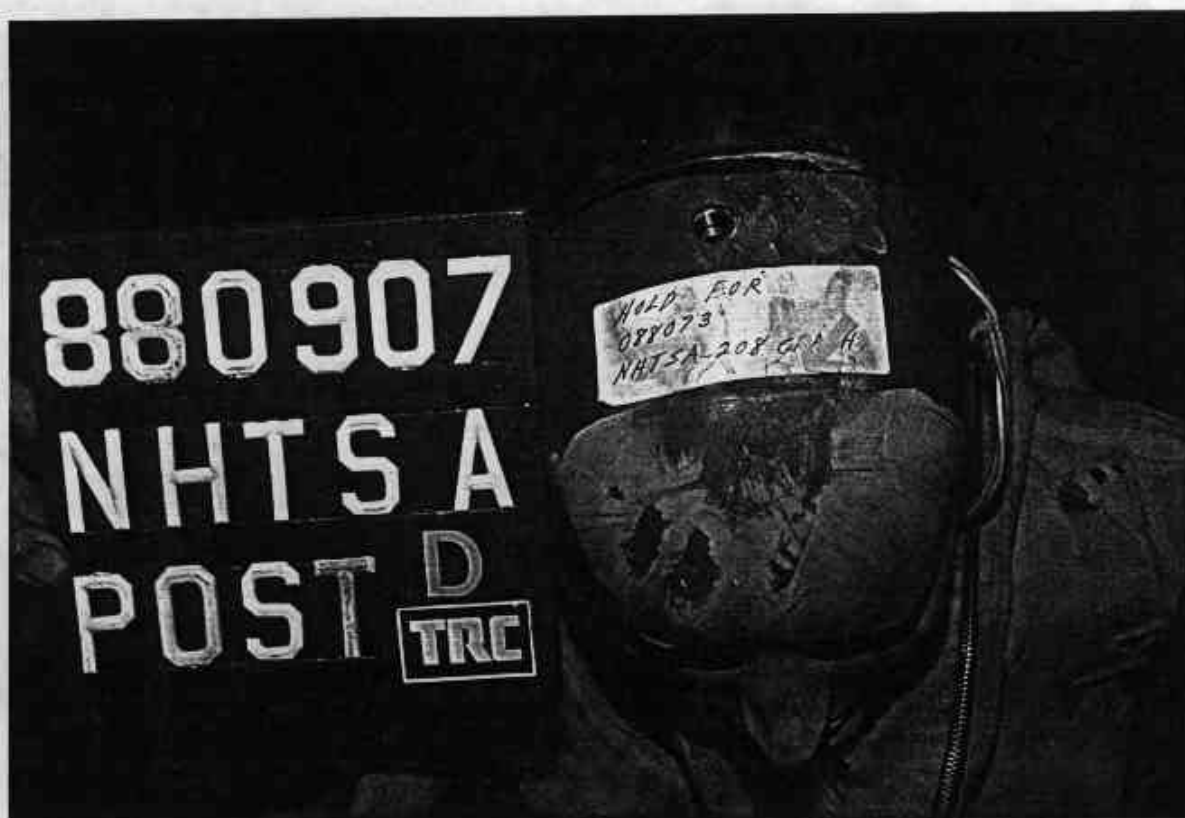


Figure A-38. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1

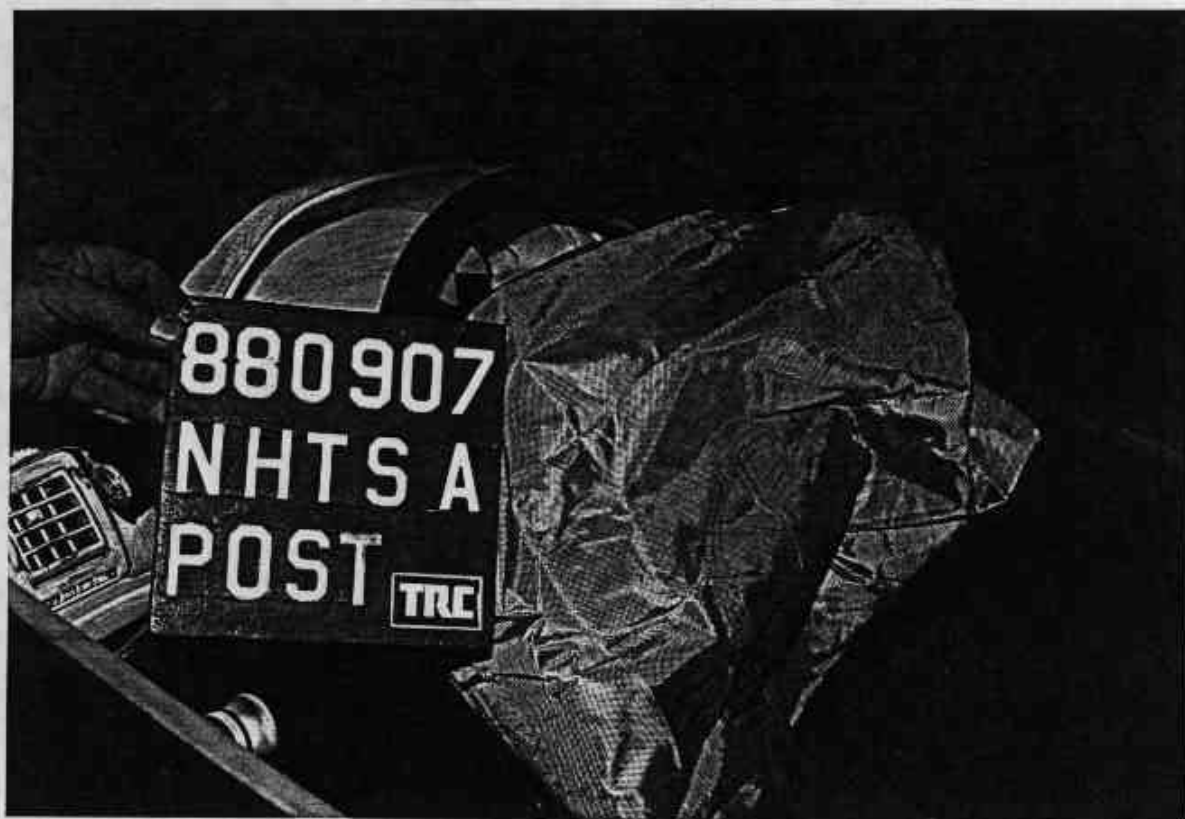


Figure A-39. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2



Figure A-40. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 3



Figure A-41. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 4

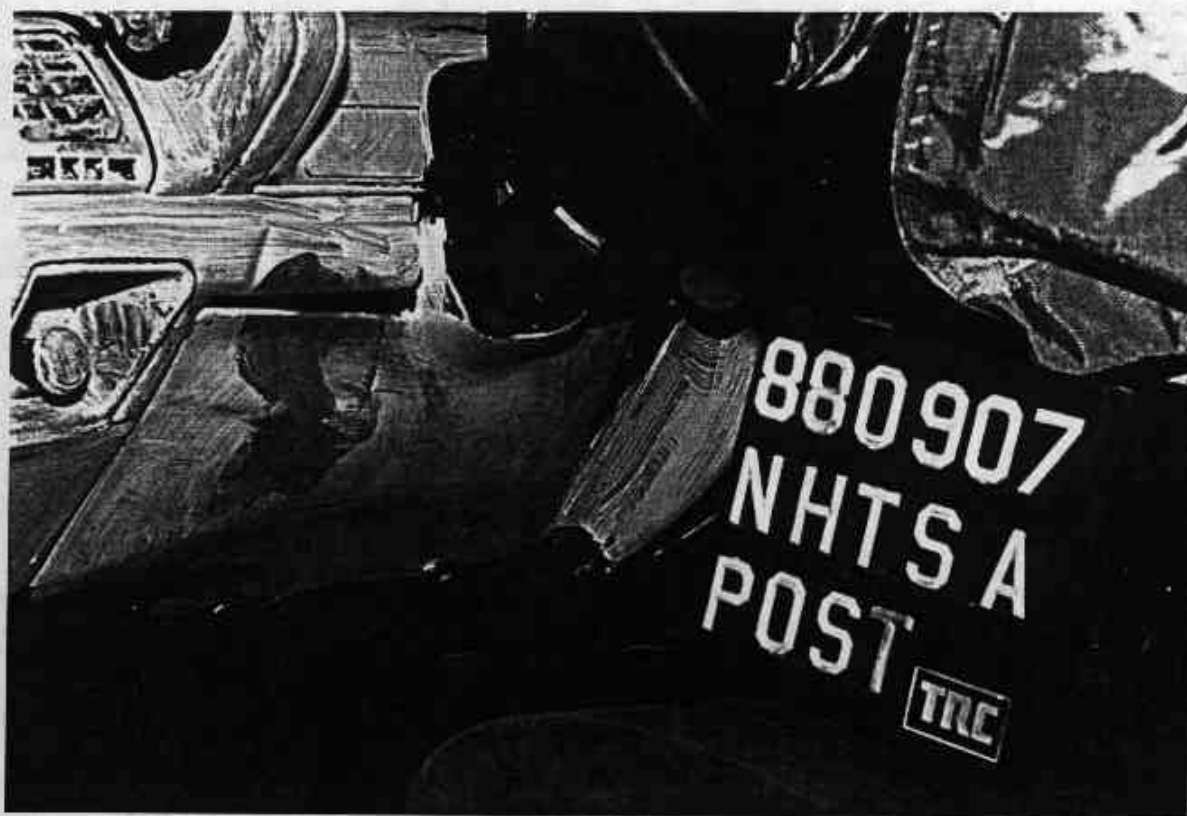


Figure A-42. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 5

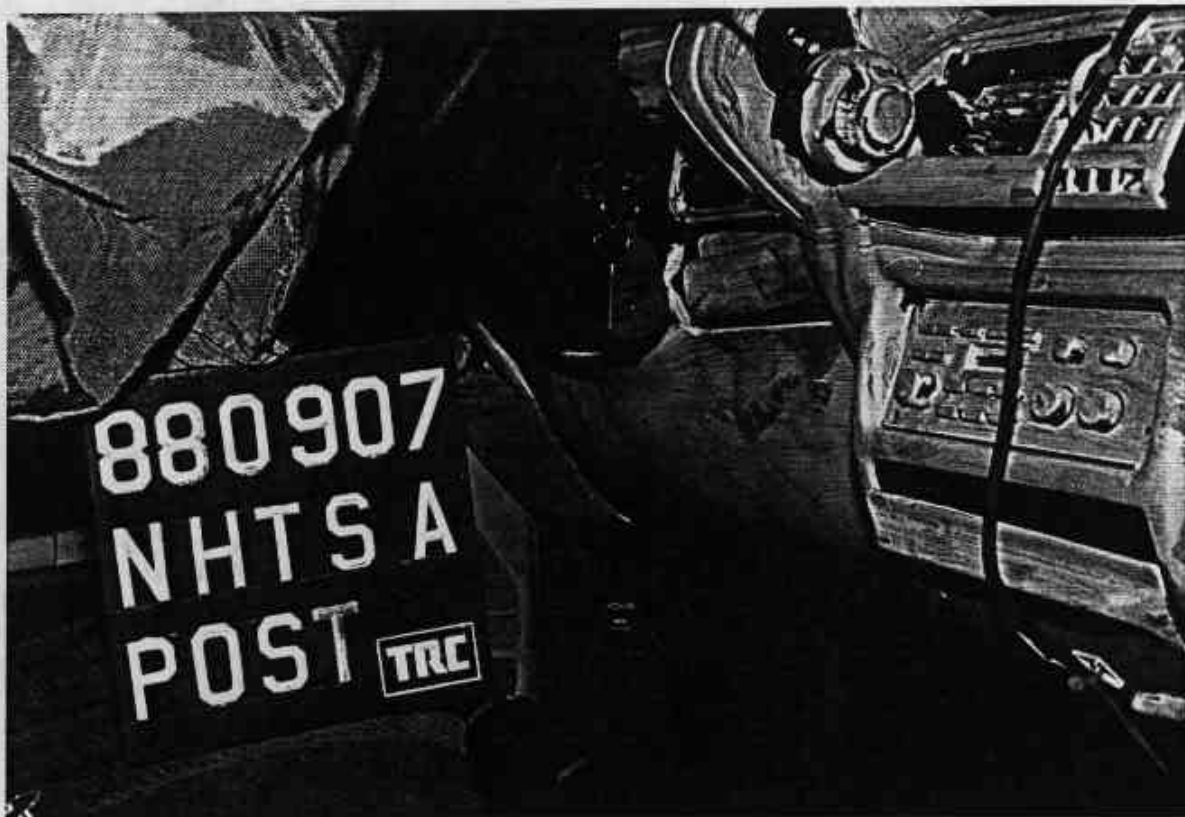


Figure A-43. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 6



Figure A-44. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 1



Figure A-45. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 2

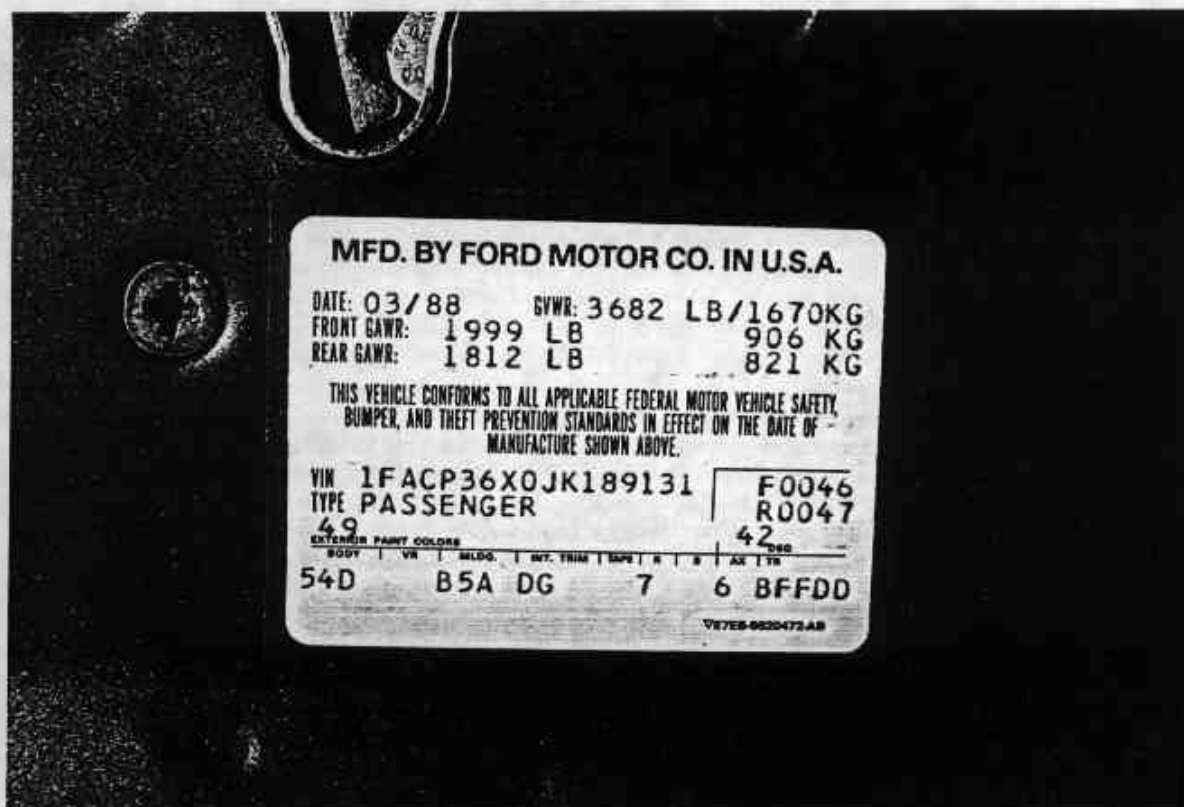


Figure A-46. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

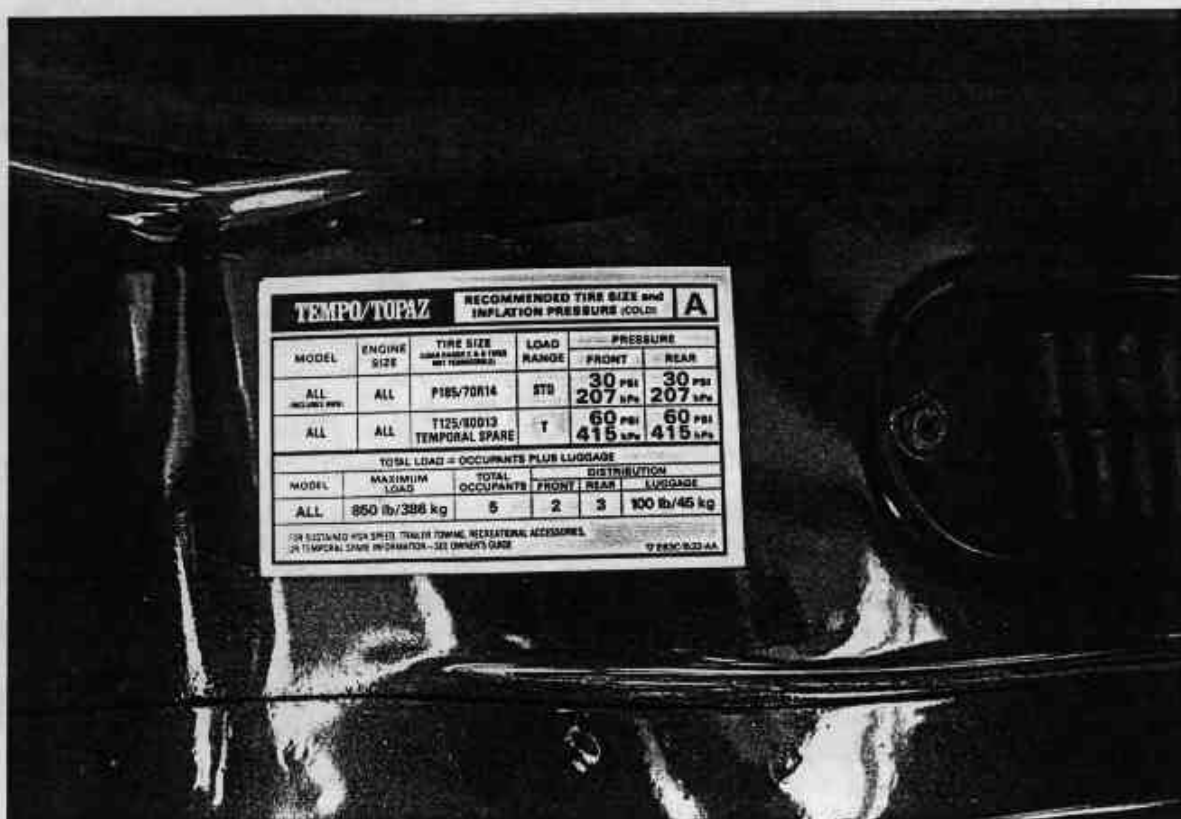


Figure A-47. PRE-TEST VEHICLE TIRE LOAD LABEL VIEW

APPENDIX B

DATA PLOTS

DUMMY AND VEHICLE AXES: X: FRONT/REAR
Y: LEFT/RIGHT
Z: UP/DOWN

200 COMPLIANCE TEST

88251

HEDXG1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -405.95g

12.44 @ 224.13

60.00

0.00

-60.00

-120.00

-180.00

-240.00

-300.00

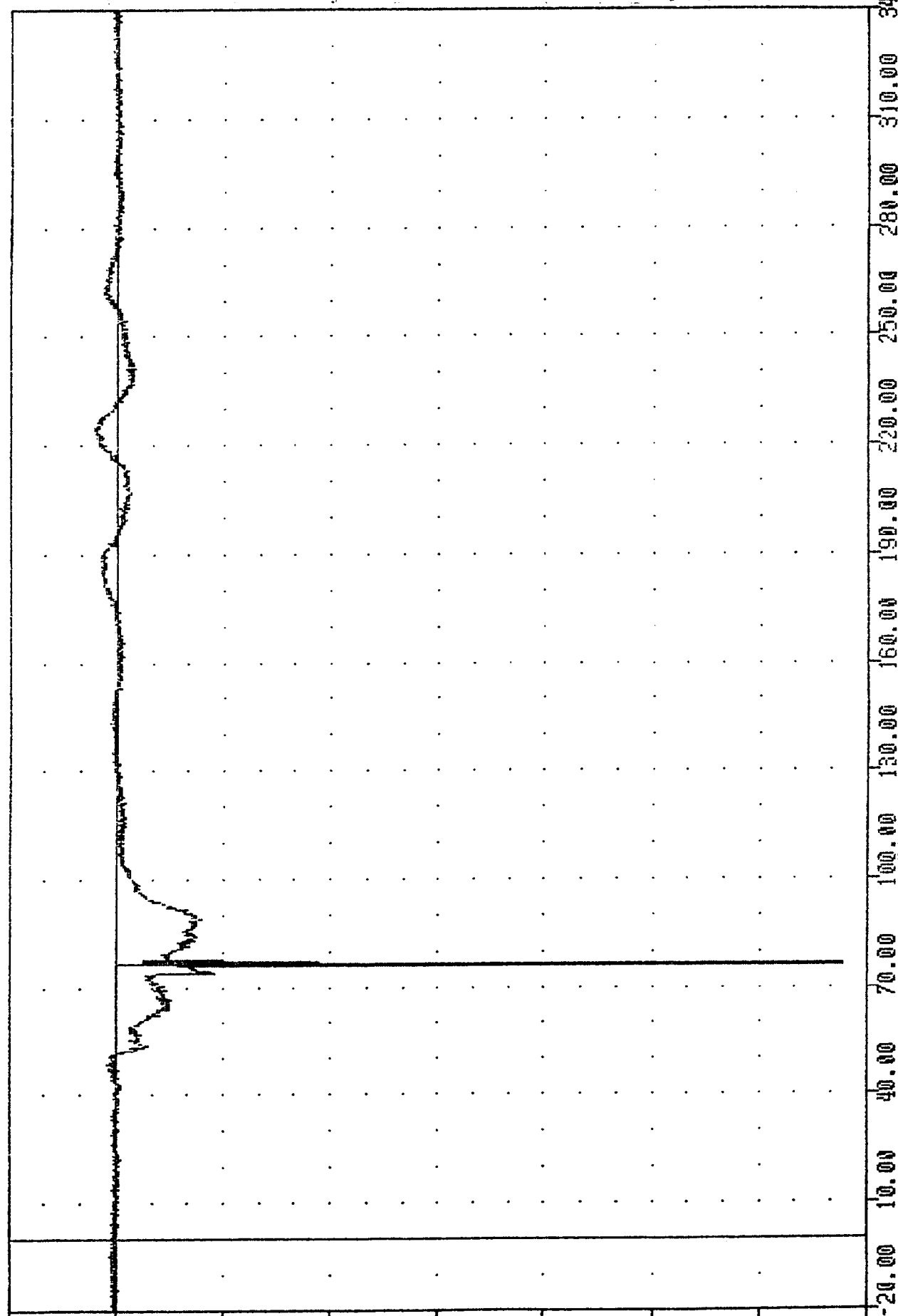
-360.00

-420.00

ACCELERATION (G)

B-2

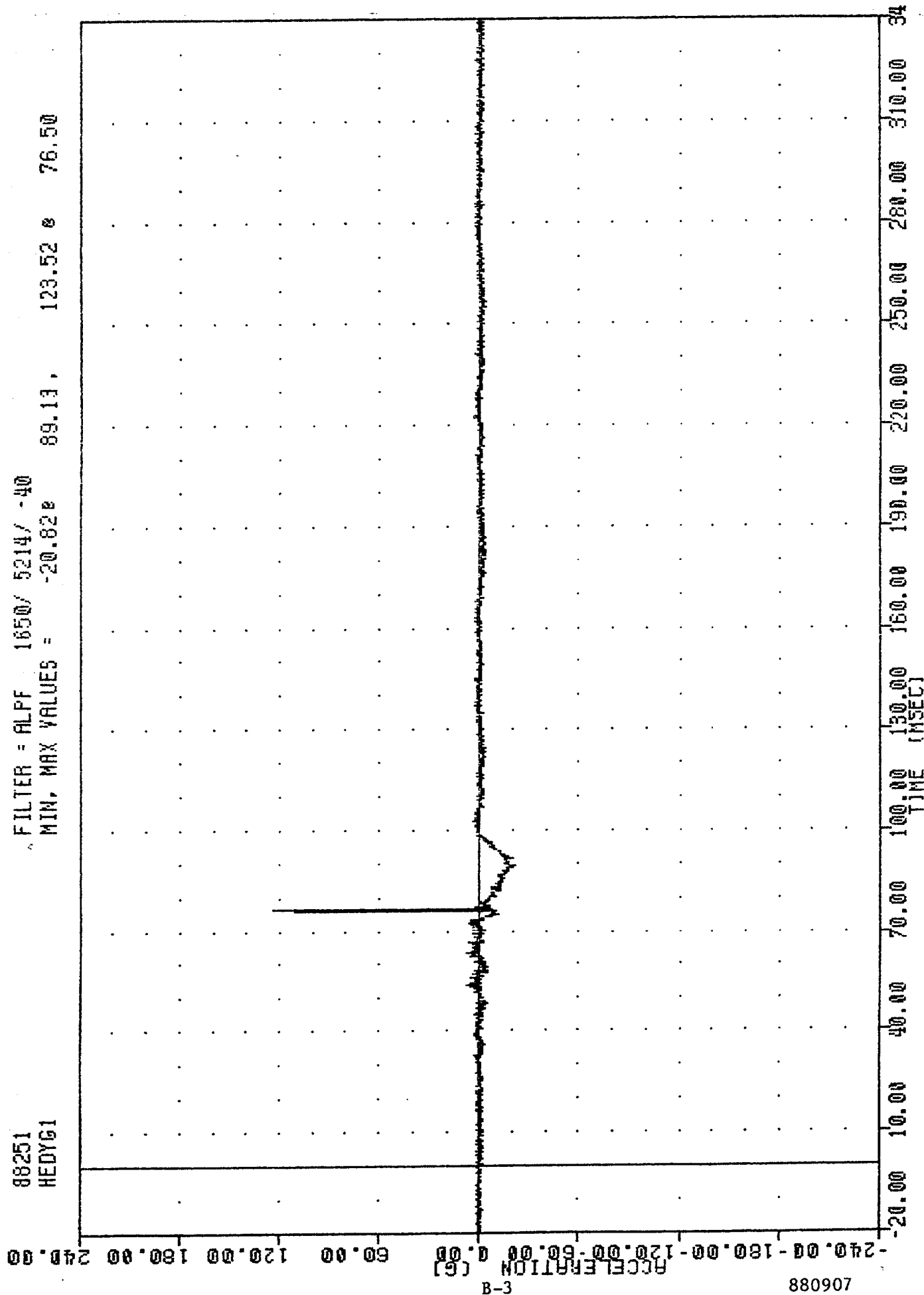
880907



FORD TEMPO INTO FRONTAL BARRIER
DRIVER HEAD X AXIS ACCELERATION

88251
HEDYG1

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -20.82e 89.13, 123.52 e 76.50



B-3

880907

FORD TEMPO INTO FRONTAL BARRIER
DRIVER HEAD Y AXIS ACCELERATION

208 COMPLIANCE TEST

88251

HEDZ61

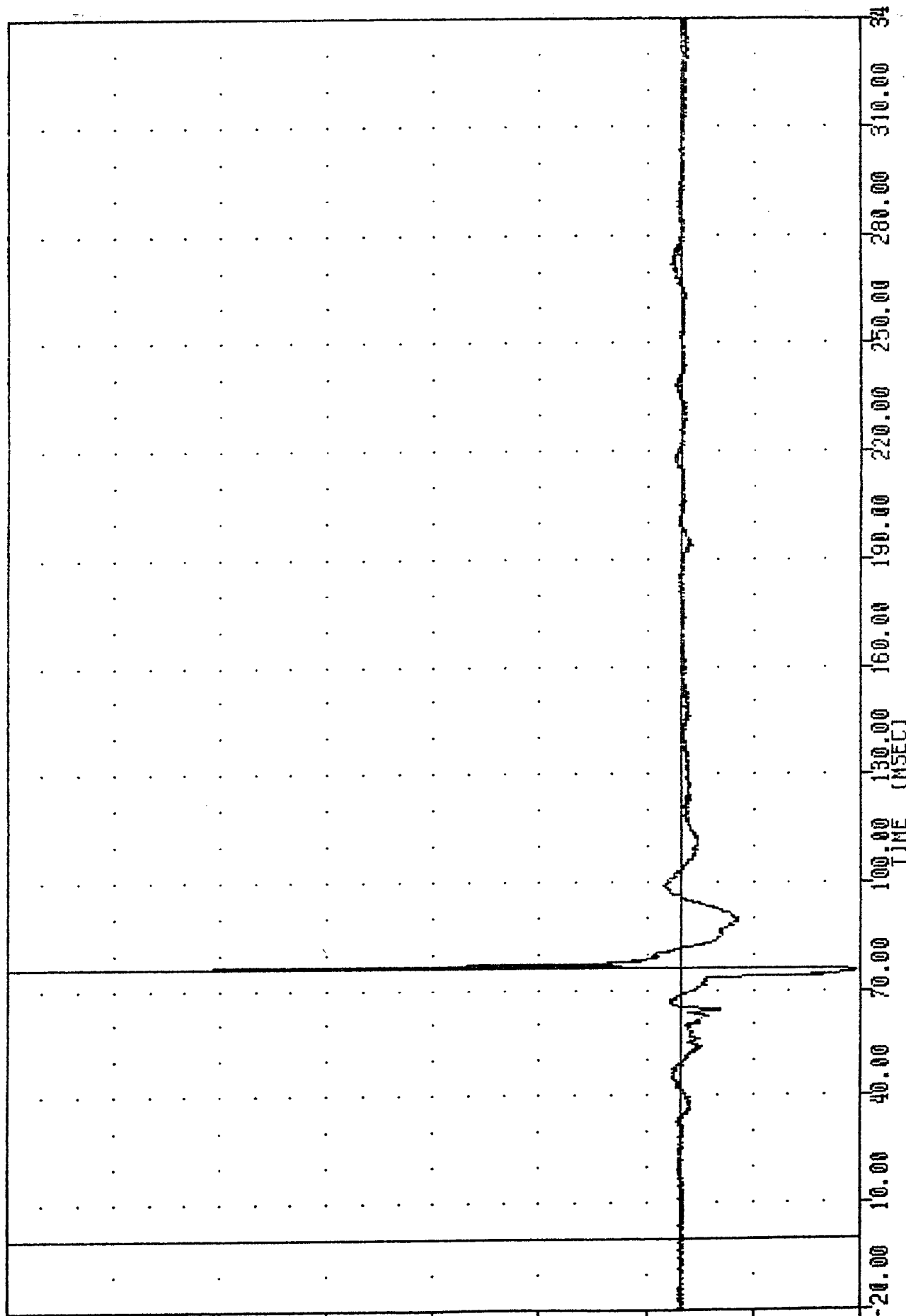
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -97.64 75.75 , 402.49 76.25

ACCELERATION (G)

B-4

880907



FORD TEMPO INTO FRONTAL BARRIER
DRIVER HEAD Z AXIS ACCELERATION

200 COMPLIANCE TEST

88251

HEDRG1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 0.18g

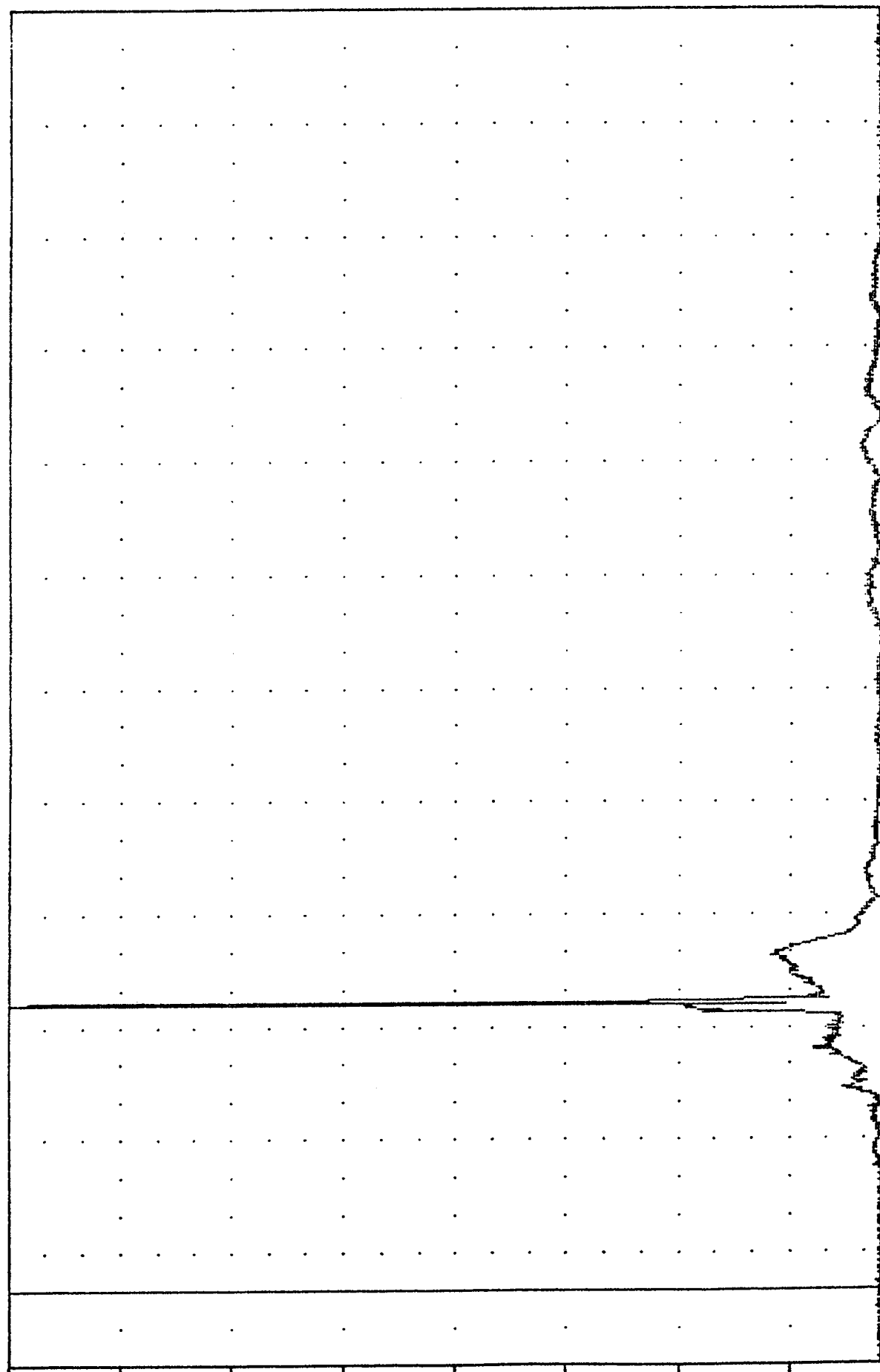
571.36 g

76.38

ACCELERATION (g)

B-5

880907



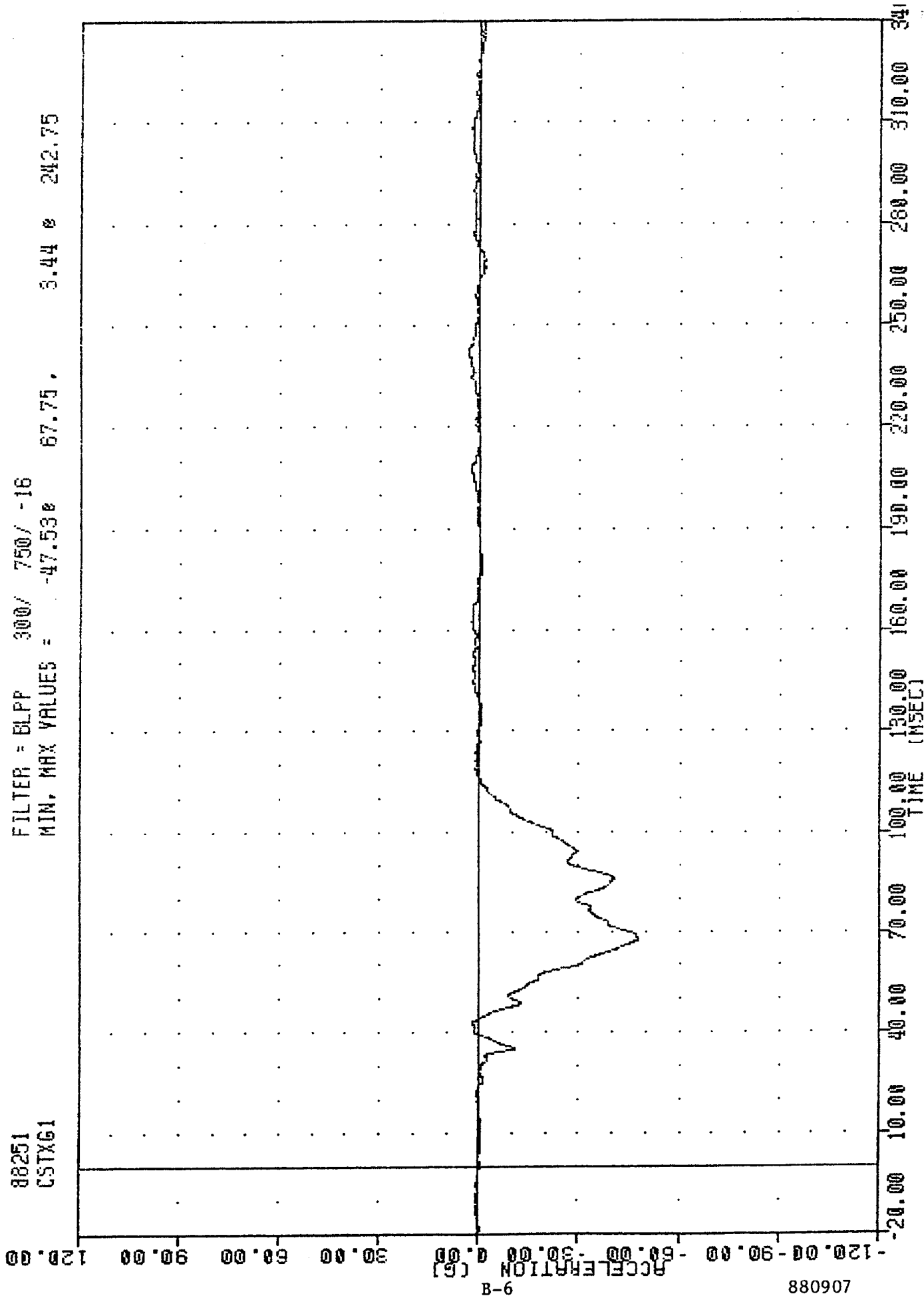
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (msec)

FORD TEMPO INTO FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

88251
CSTXG1

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -47.53 67.75, 3.44 242.75



B-6

880907

FORD TEMPO INTO FRONTAL BARRIER
DRIVER CHEST X AXIS ACCELERATION

88251

CSTY61

FILTER = BLPP 300/ 750/ -18

MIN, MAX VALUES =

-5.75%

79.30,

3.62 %

57.13

120.00

90.00

60.00

30.00

0.00

-30.00

-60.00

-90.00

-120.00

ACCELERATION (G)

B-7

880907

TIME (MSEC)
FORD TEMPO INTO FRONTAL BARRIER
DRIVER CHEST Y AXIS ACCELERATION

-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

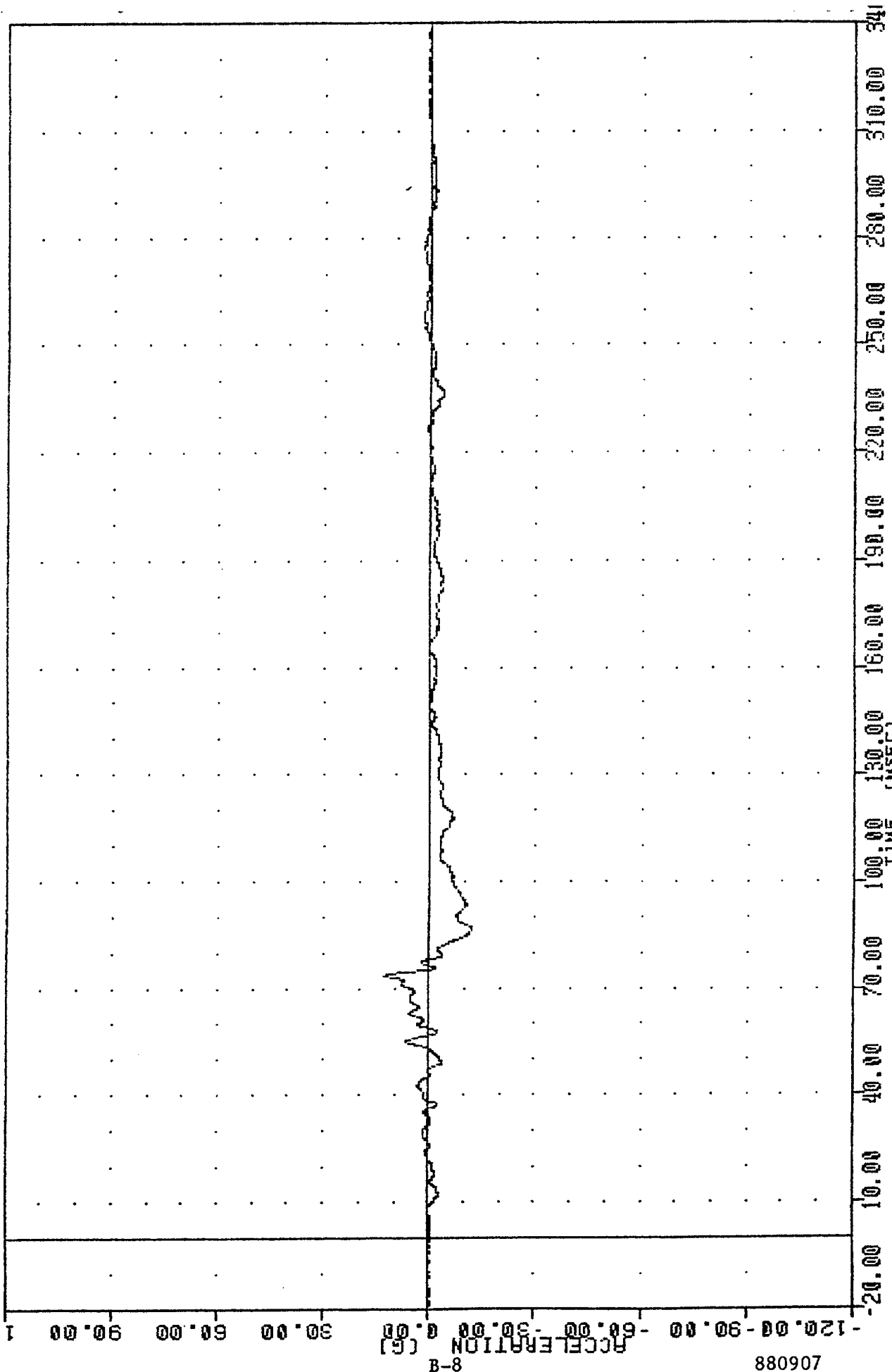
880907

88251

CSTZG1

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -11.84 86.75, 12.78 0 73.63



FORD TEMPO INTO FRONTAL BARRIER
DRIVER CHEST Z AXIS ACCELERATION

88251
CSTRG1

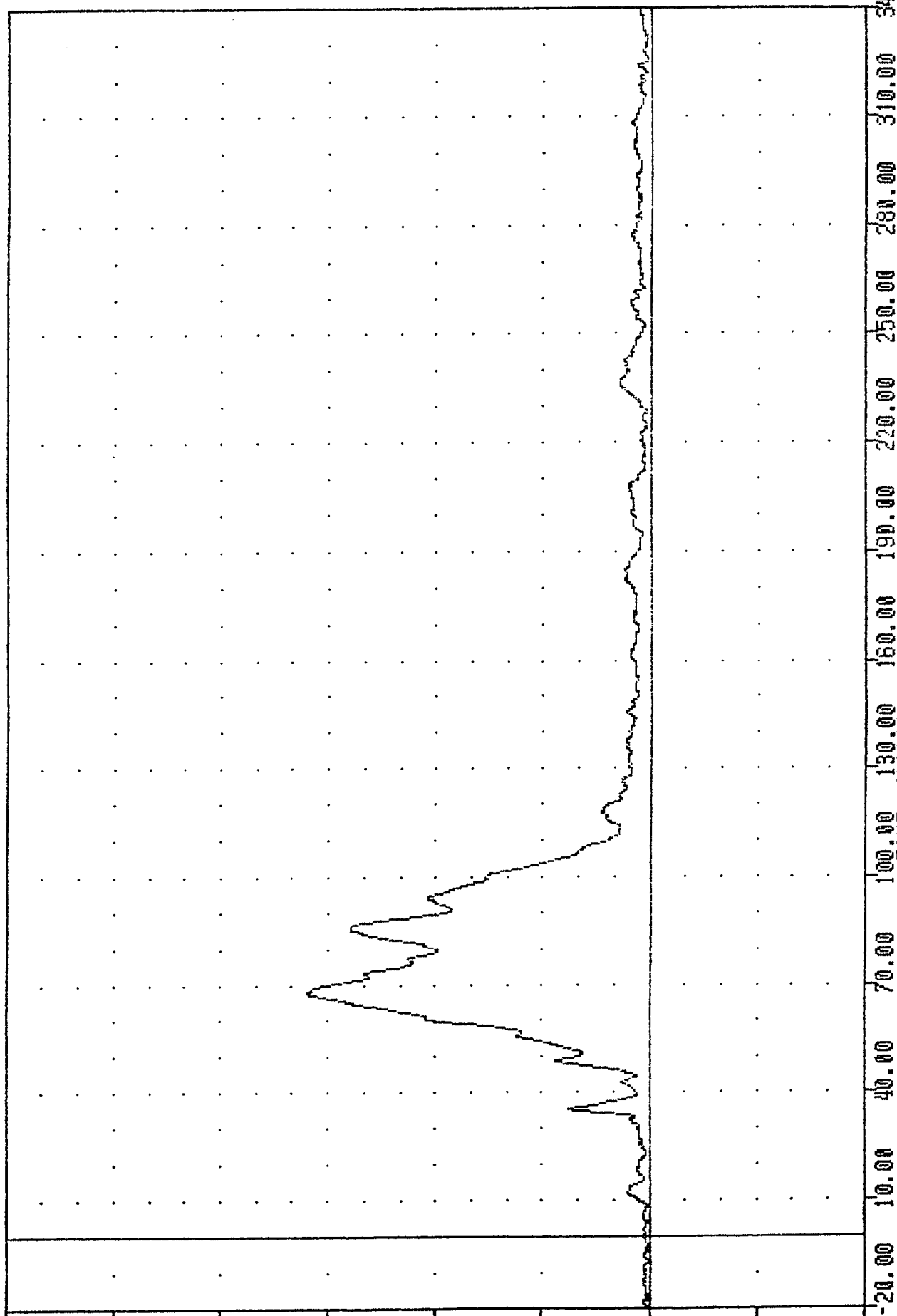
FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = 0.072 -20.00, 47.82 0 67.75

ACCELERATION [G]

B-9

706088



FORD TEMPO INTO FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

200 COMPLIANCE 1631

88251

LFMF1

FILTER = BLPP 1000/ 2500/ -16

MIN, MAX VALUES = -1129.99 58.38 , 167.45 25.50

240.00 180.00 120.00 60.00 0.00 -60.00 -120.00 -180.00 -240.00

(X10³)

B-10

FORCE (LB)

880907

-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)

FORD TEMPO INTO FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE

88251

FILTER = BLPP 1000/ 2500/ -16

AFMF1

MIN, MAX VALUES = -1085.76 56.00 ,

55.02 134.50

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

-240.00

FORCE (LB)

(X10³)

11-B

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

-240.00

TIME (MSEC)

20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

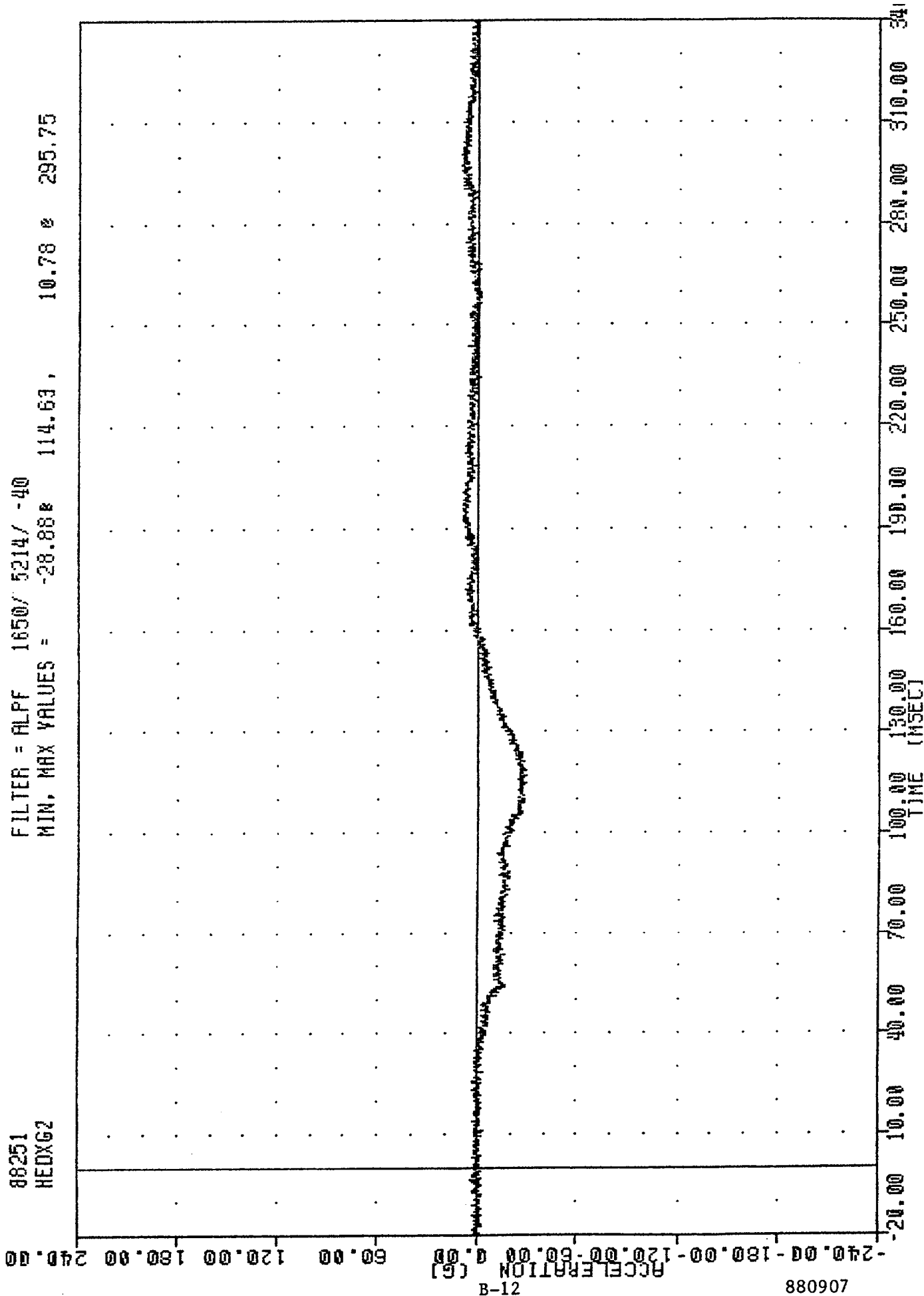
340.00

880907

FORD TEMPO INTO FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

88251
HEDXG2

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -28.88 114.63, 10.78 295.75



200 COMPLIANCE (E3)

88251

CSTRG2

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES =

0.048 -11.00,

41.10 2 68.75

90.00

75.00

60.00

45.00

30.00

B-19

15.00

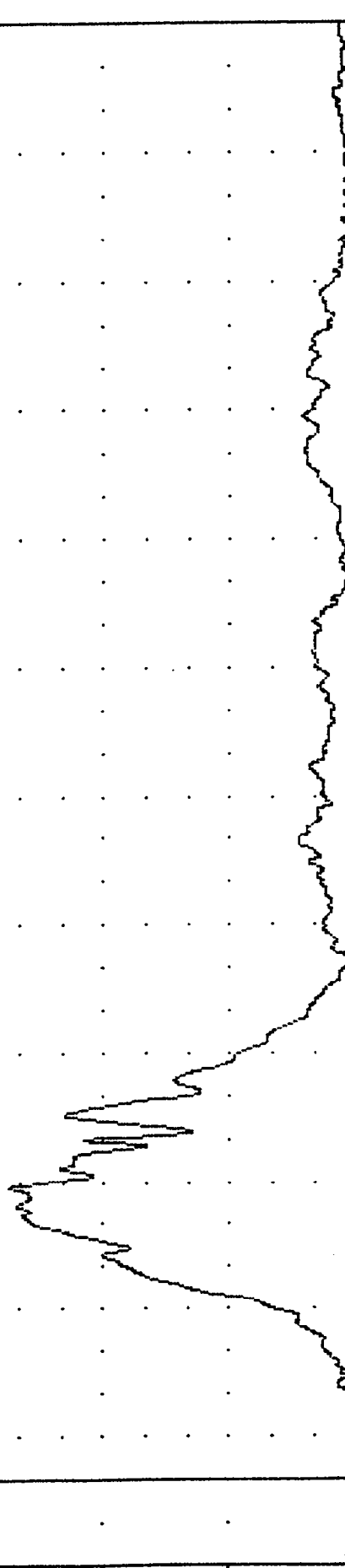
0.00

-15.00

-30.00

880907

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)

FORD TEMPO INTO FRONTAL BARRIER

RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

200 COMPLIANCE (CST)

08251

CSTYG2

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -14.16 89.00 ,

12.48 79.75

120.00

90.00

60.00

30.00

0.00

-30.00

-60.00

-90.00

-120.00

B-17

880907

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)

FORD TEMPO INTO FRONTAL BARRIER

RIGHT FRONT PASSENGER CHEST Y AXIS ACCELERATION

FILTER = HLPF 1650/ 5214/ -40

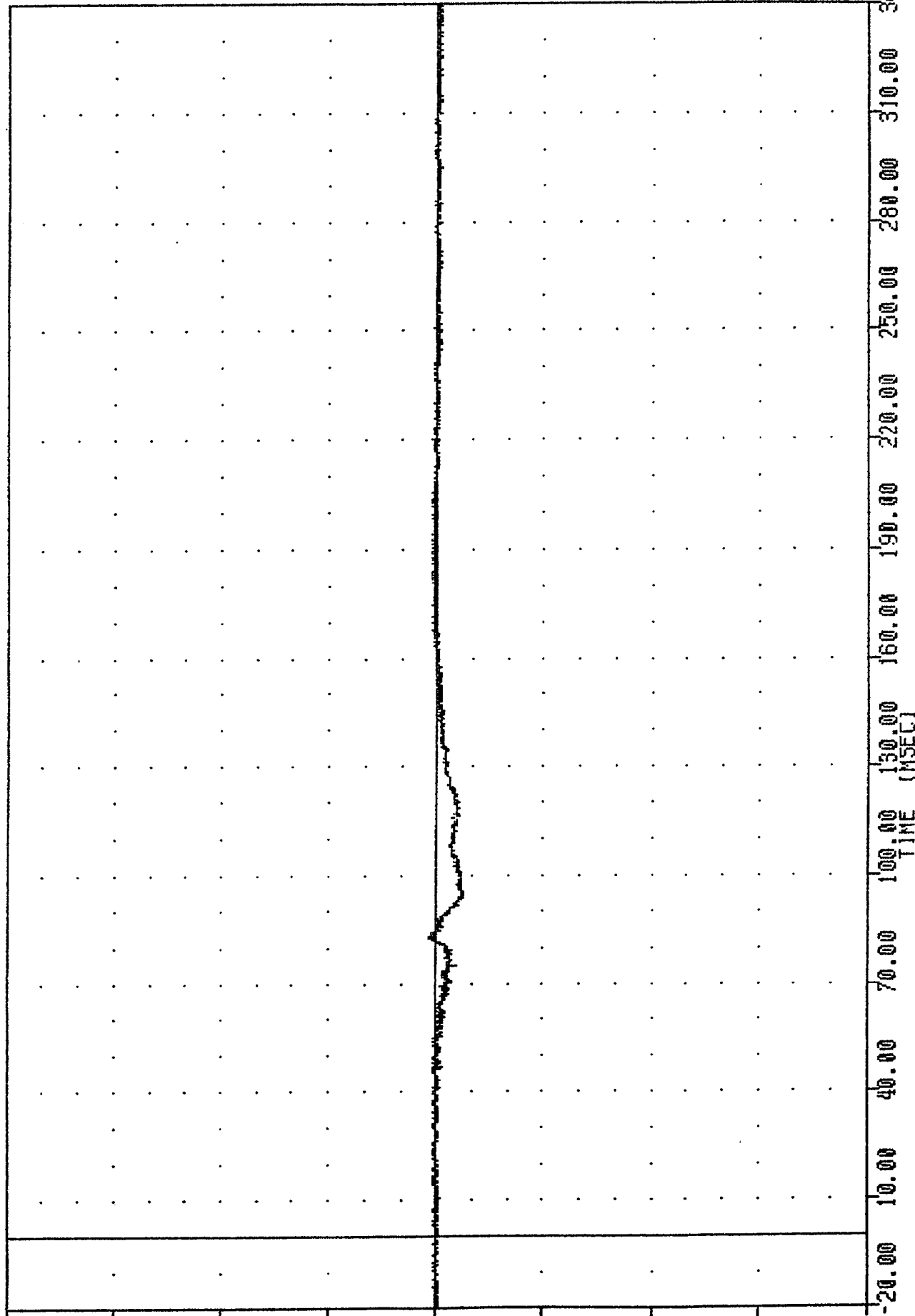
MIN. MAX VALUES = -14.74e 94.13,

3.98 e 82.75

ACCELERATION (G)

B-13

880907



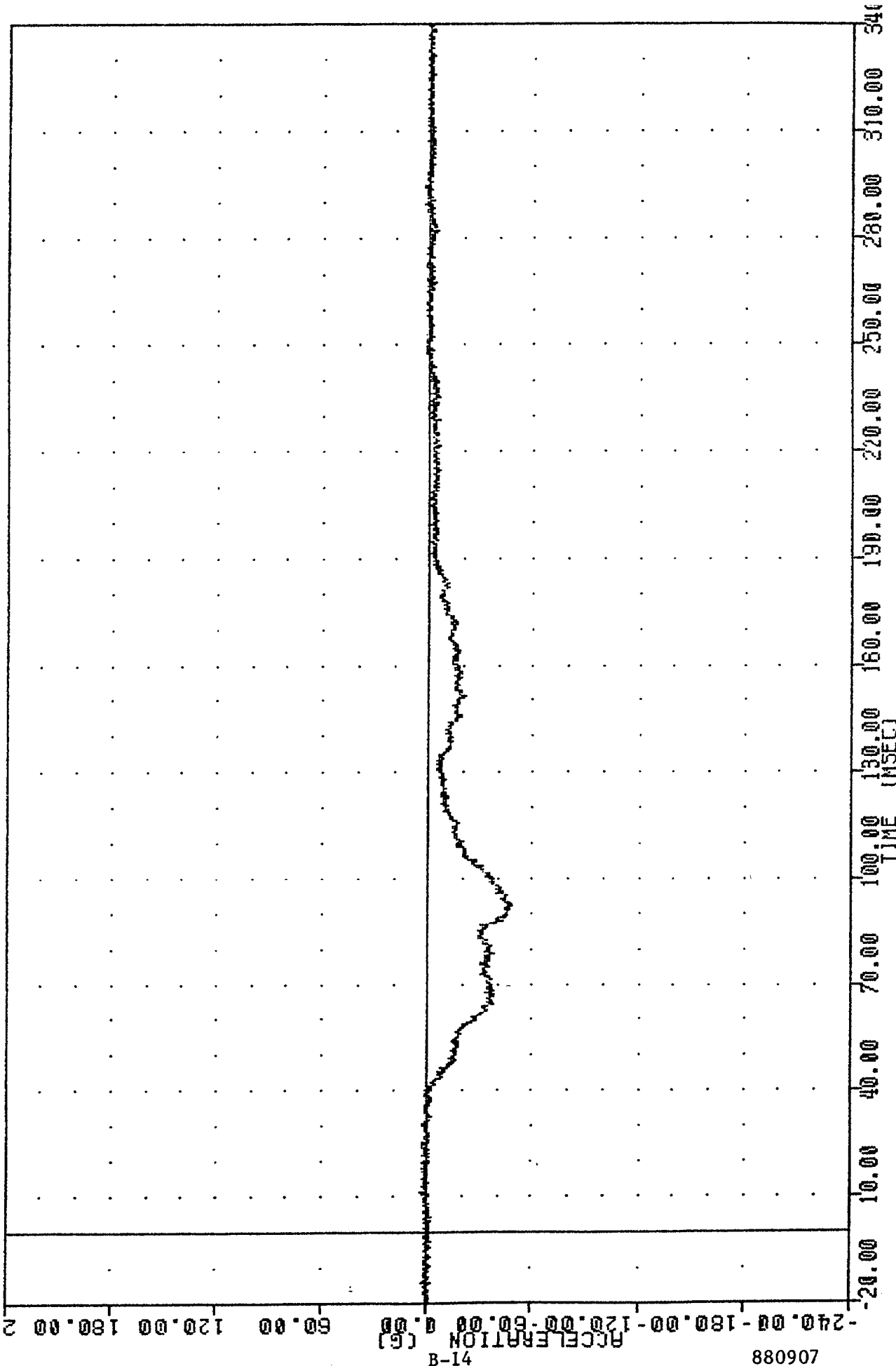
FORD TEMPO INTO FRONTAL BARRIER

RIGHT FRONT PASSENGER HEAD Y AXIS ACCELERATION

880907 880907

88251
HEDZG2

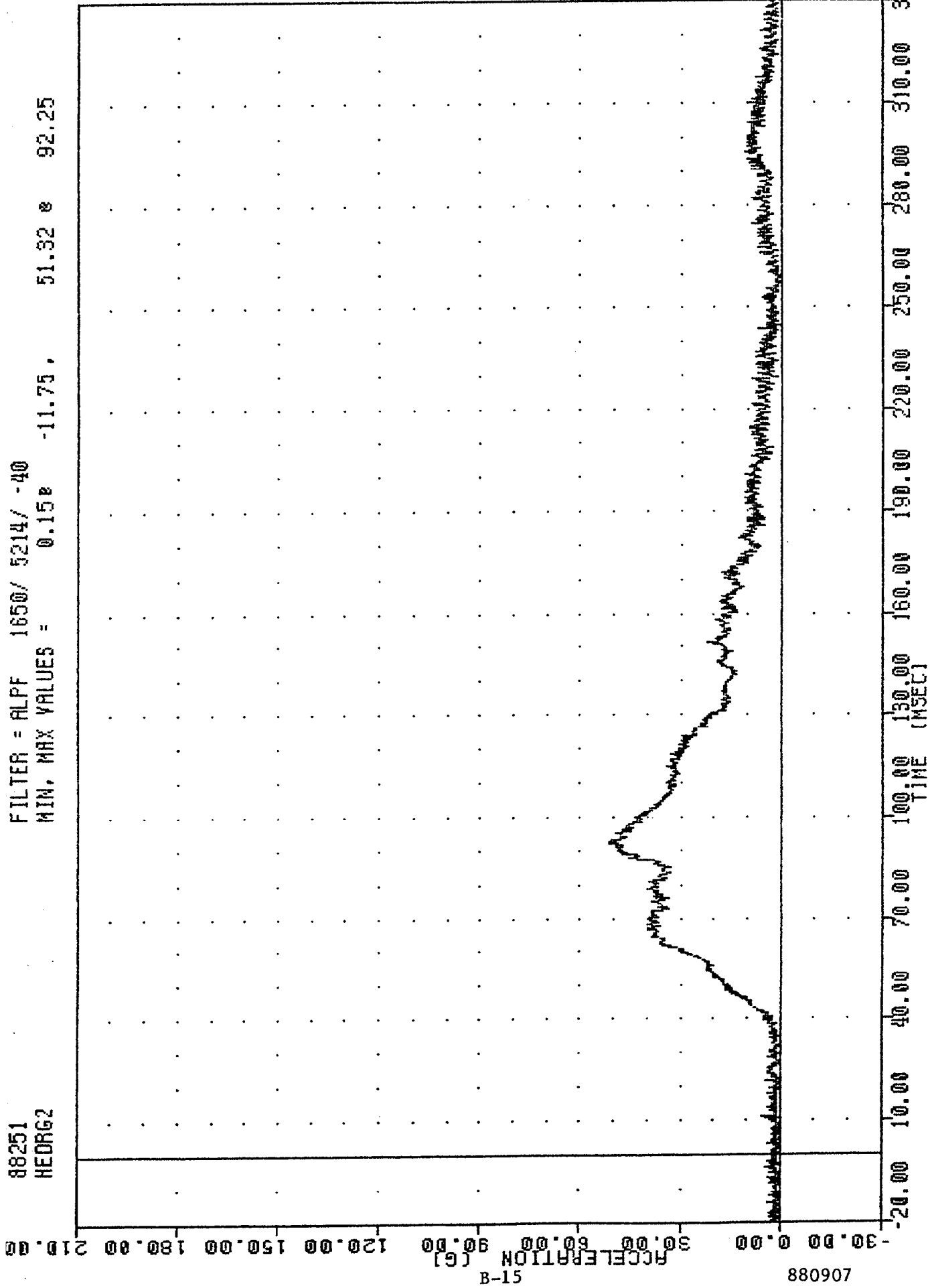
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -48.07% 92.25, 3.77 % 10.88



FORD TEMPO INTO FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z AXIS ACCELERATION

88251
HEORG2

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.150 -11.75, 51.32 0 92.25



FORD TEMPO INTO FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

B-15

880907

880907 1200

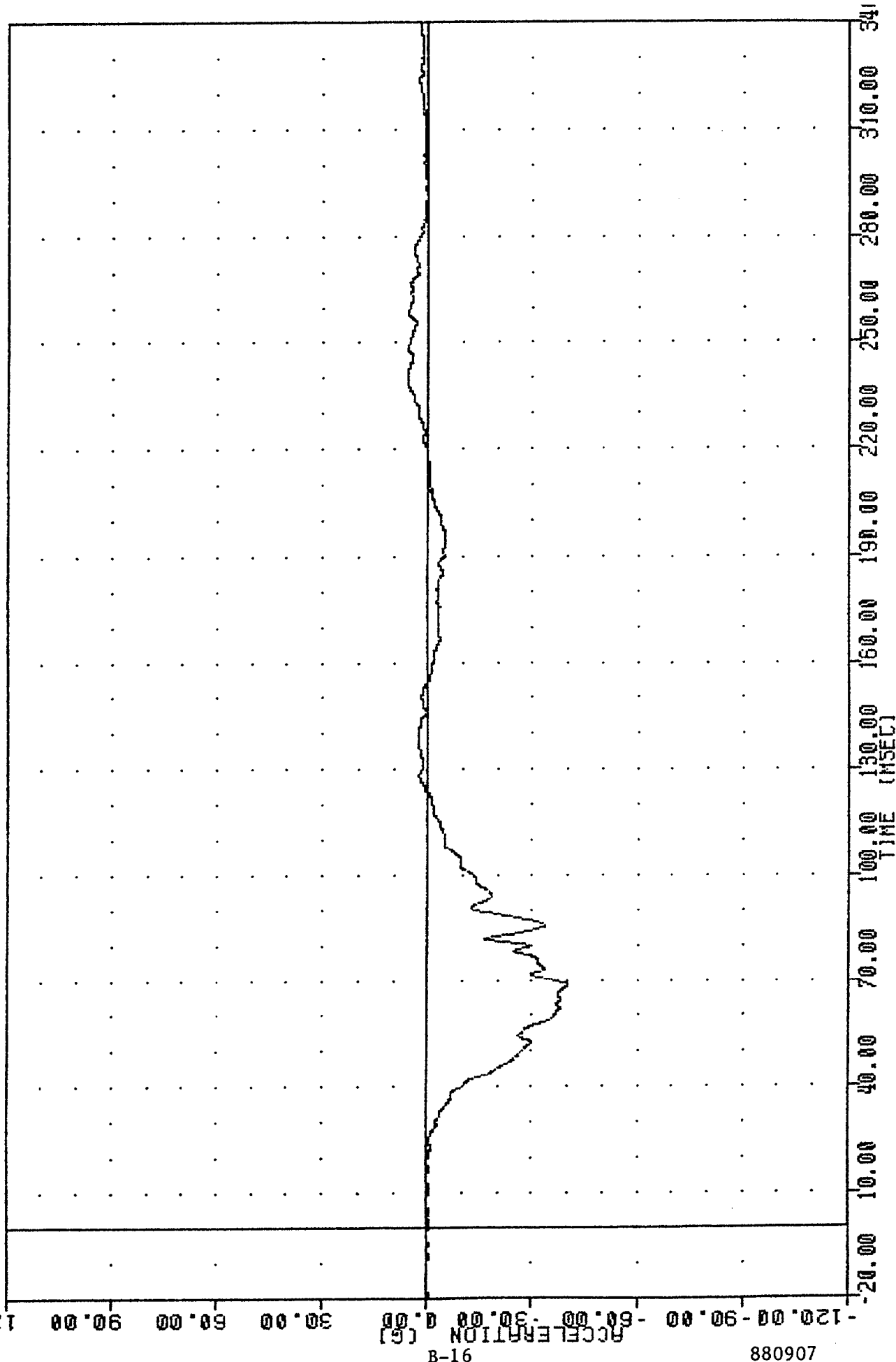
88251

CSTXG2

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -40.16 68.63

6.17 248.50



FORD TEMPO INTO FRONTAL BARRIER

RIGHT FRONT PASSENGER CHEST X AXIS ACCELERATION

88251

FILTER = BLPP 300/ 750/ -16

CSTZG2

MIN. MAX VALUES = -12.17 57.25

9.61 81.50

120.00

90.00

60.00

30.00

0.00

-30.00

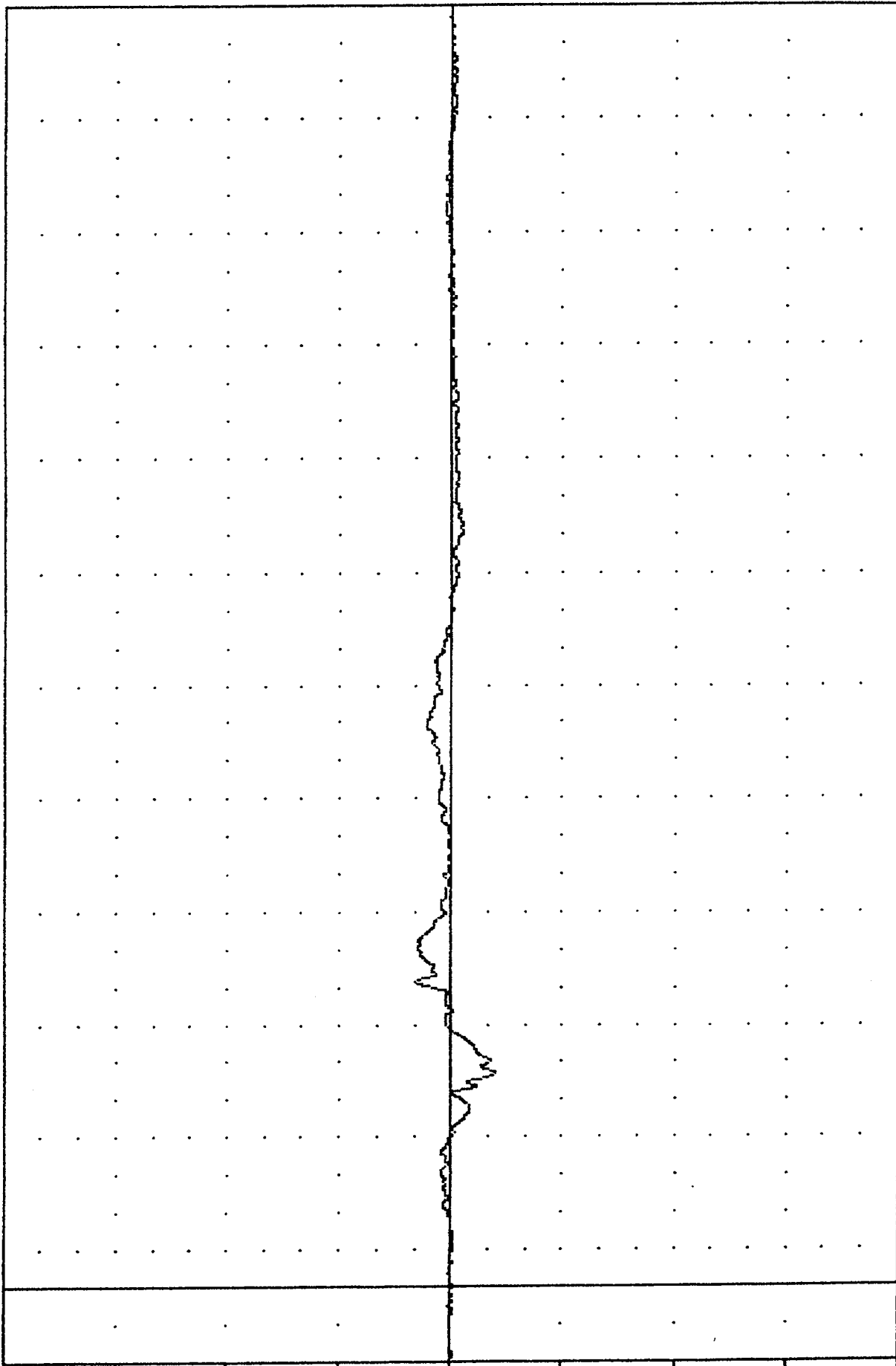
-60.00

-90.00

-120.00

B-18

880907



-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

FORD TEMPO INTO FRONTAL BARRIER

RIGHT FRONT PASSENGER CHEST Z AXIS ACCELERATION

200 COMPLIANCE TEST

88251

LFMF2

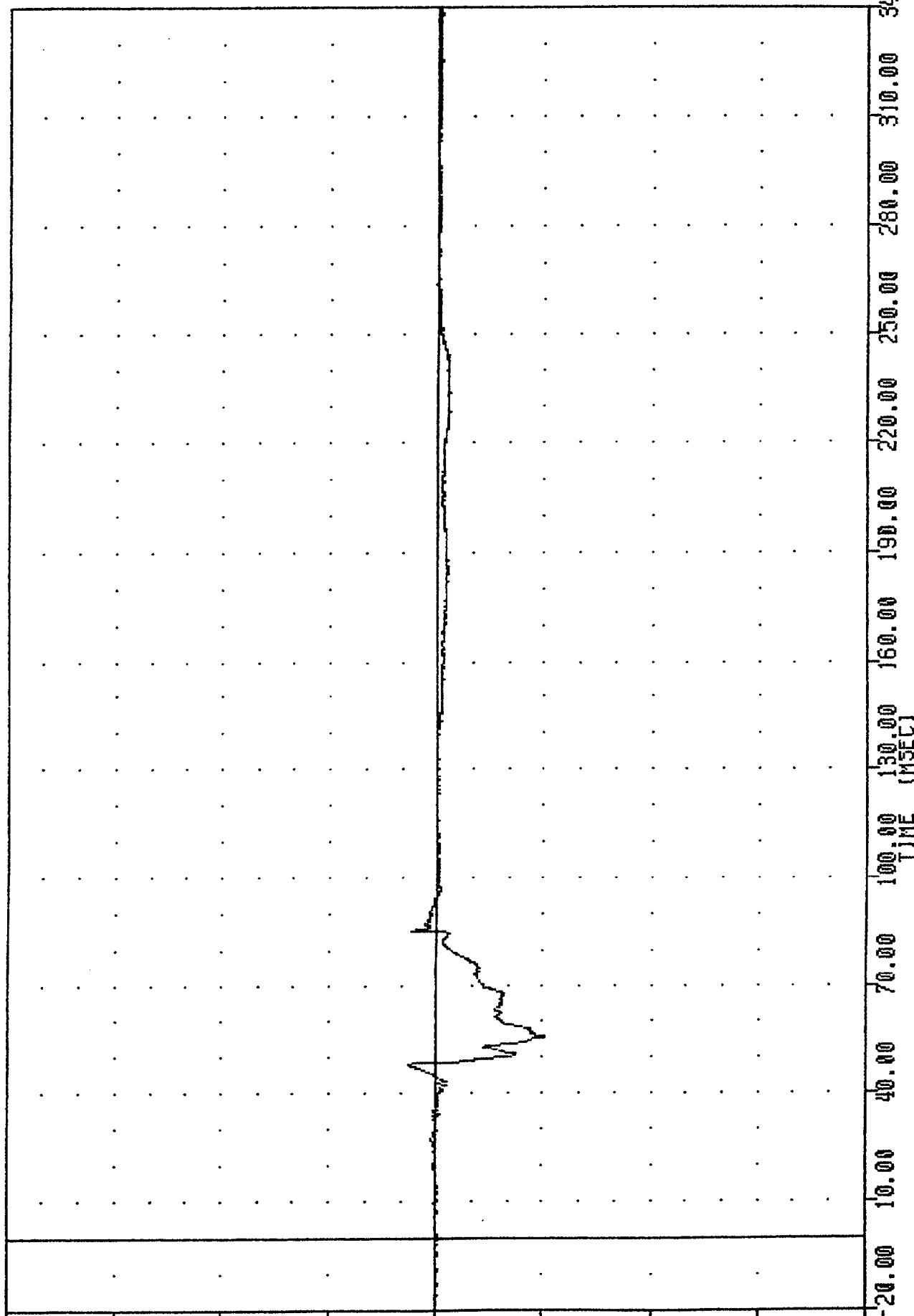
FILTER = BLPP 1000/ 2500/ -16

MIN, MAX VALUES = -605.35 55.75, 156.53 48.13

240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00

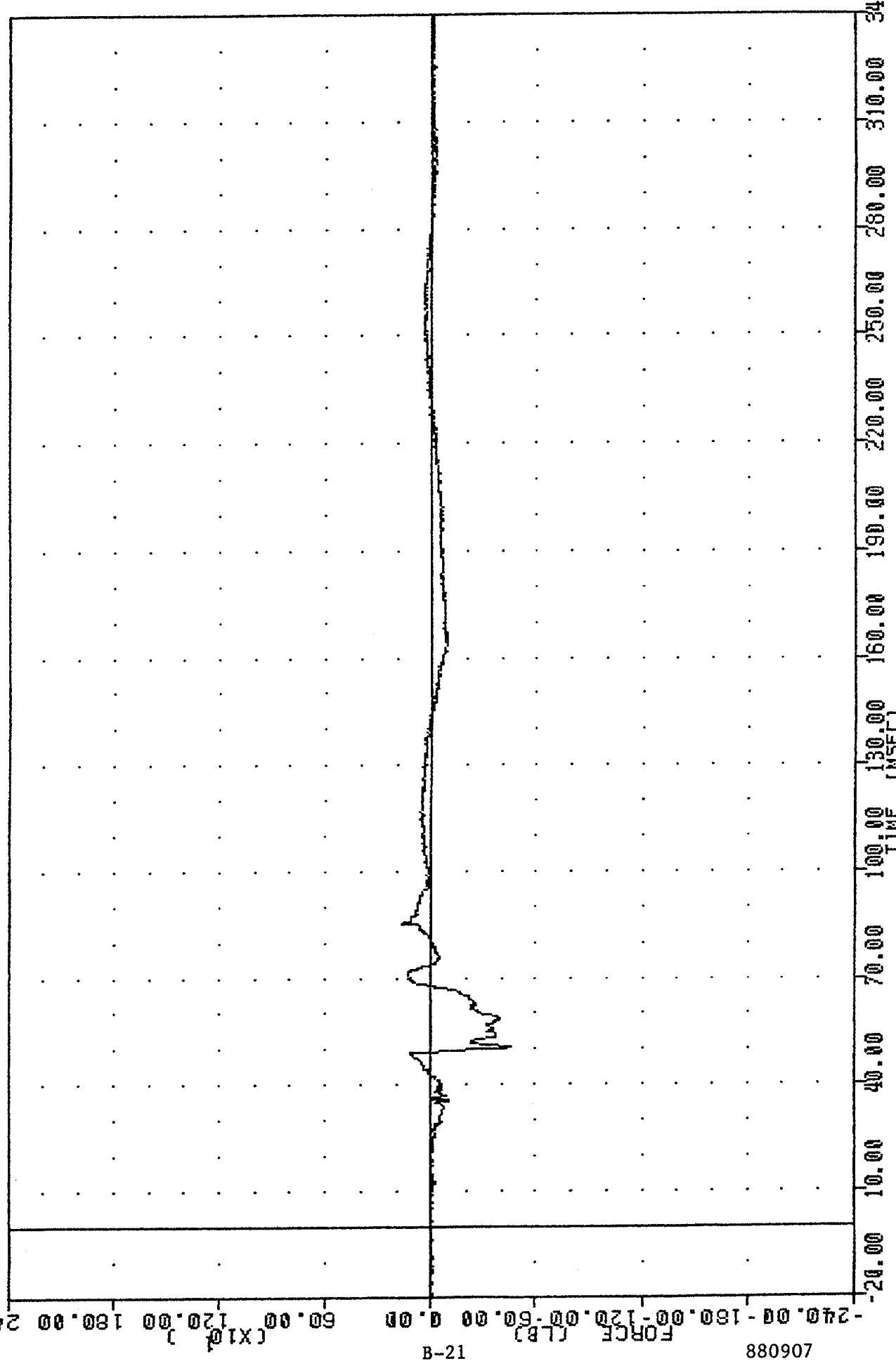
B-20

880907



FORD TEMPO INTO FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

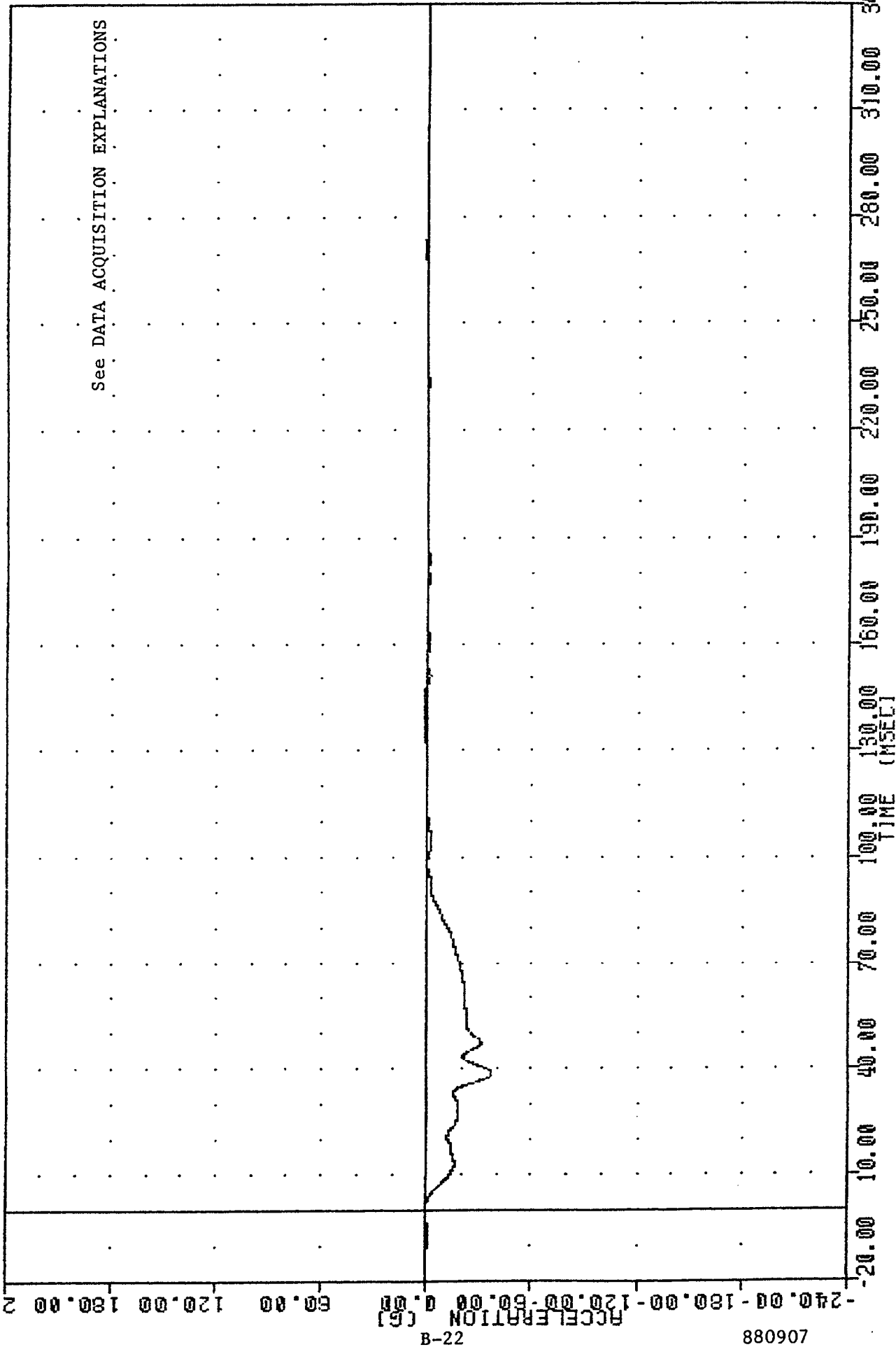
88251
 FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -457.02 50.50 169.80 85.25
 RFMF2



FORD TEMPO INTO FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

88251
TLRXG1

FILTER = BLPP 100/ 250/ -18
MIN, MAX VALUES = -37.14e 38.75, 2.20 e 140.38

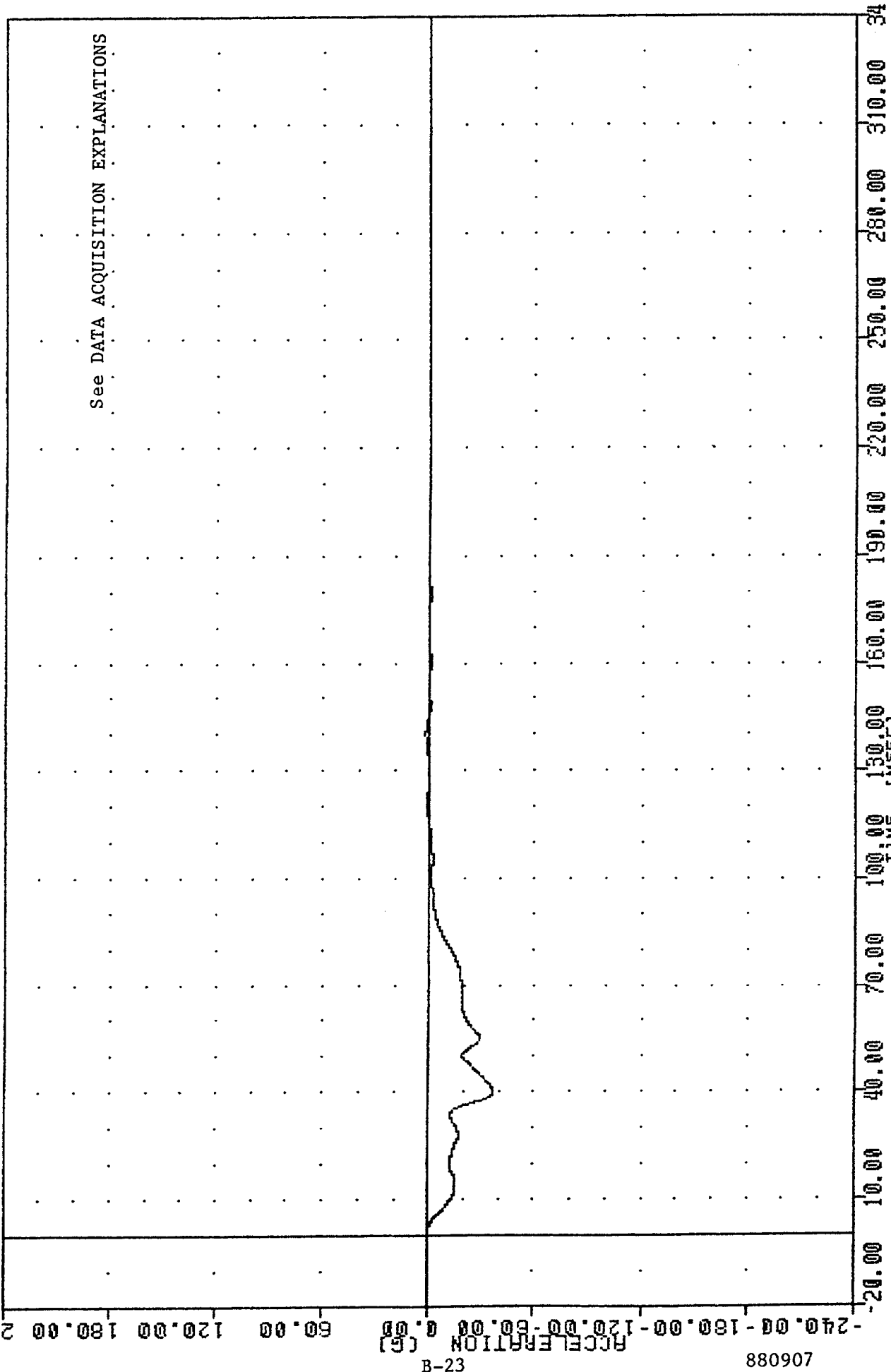


B-22

880907

FORD TEMPO INTO FRONTAL BARRIER
LEFT REAR SEAT X AXIS ACCELERATION

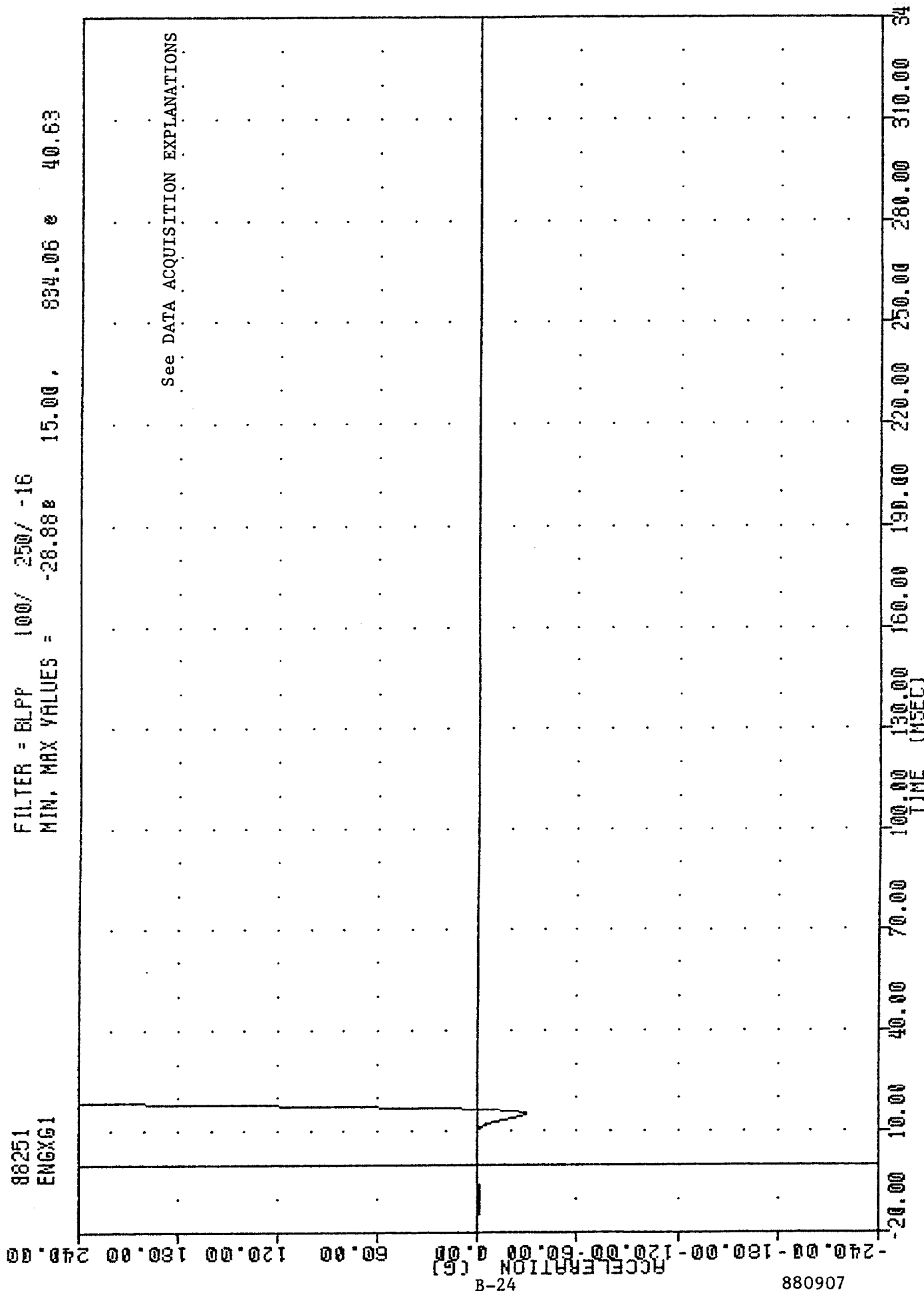
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -36.60 40.00, 2.25 140.00



FORD TEMPO INTO FRONTAL BARRIER
 RIGHT REAR SEAT X AXIS ACCELERATION

88251
ENGX61

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -28.88 15.00, 834.06 e 40.63



B-24

880907

FORD TEMPO INTO FRONTAL BARRIER
ENGINE UPPER BLOCK X AXIS ACCELERATION

88251

BCRXG1

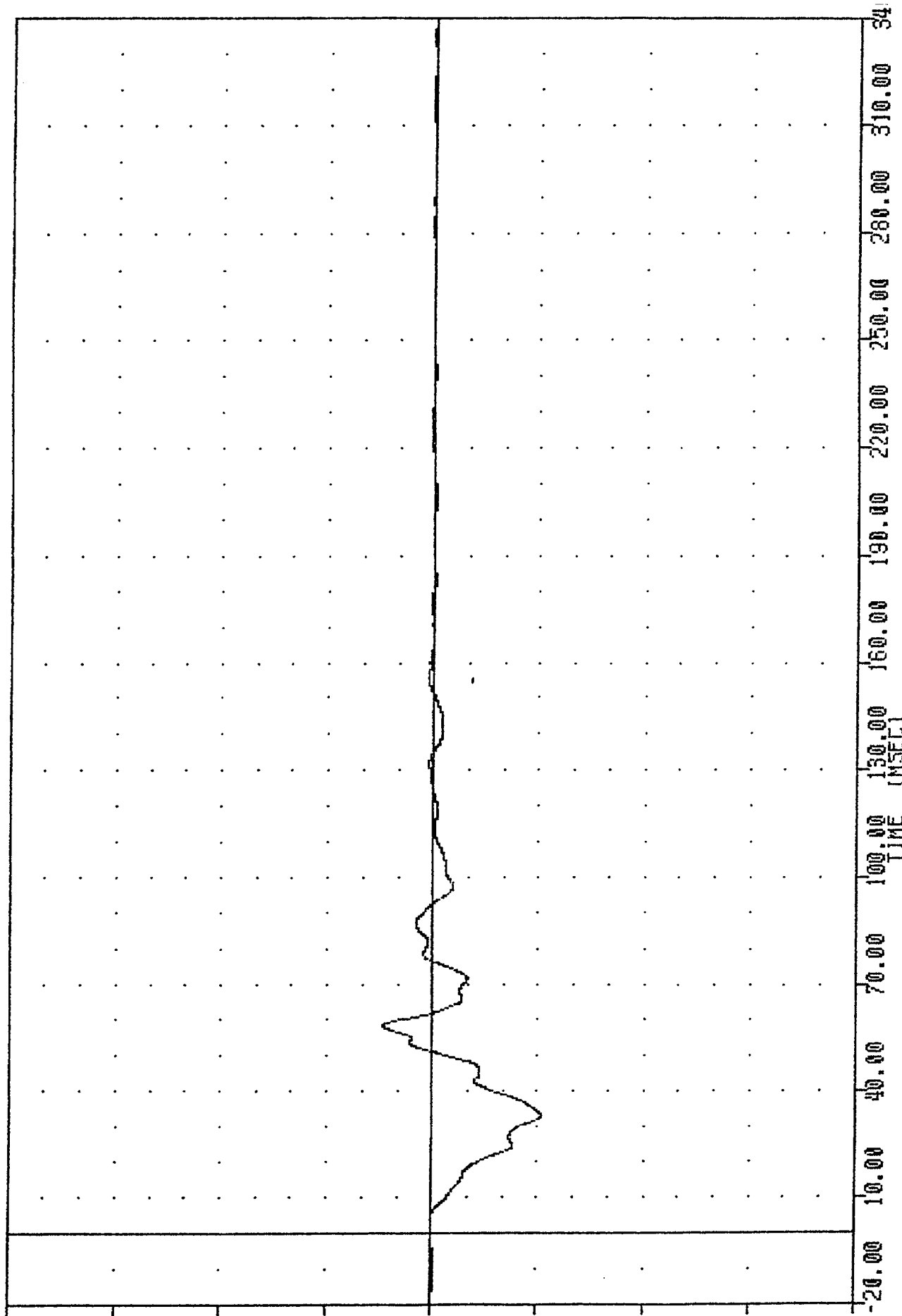
FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -62.12 33.25, 28.14 58.38

ACCELERATION (G)

B-26

880907



FORD TEMPO INTO FRONTAL BARRIER
RIGHT BRAKE CALIPER X AXIS ACCELERATION

88251

BCLX61

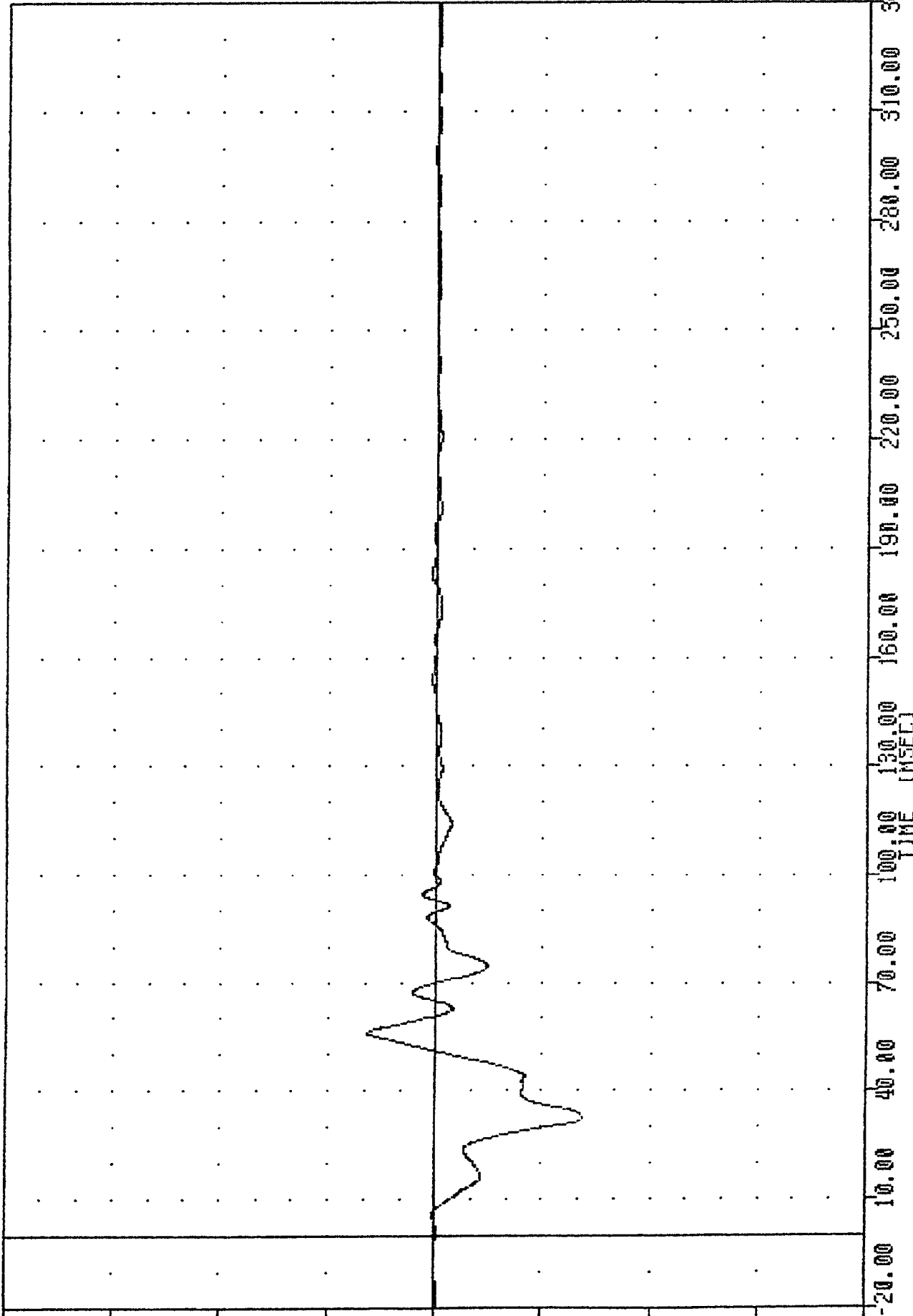
FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -82.34 38.43 56.00

ACCELERATION (G)

B-27

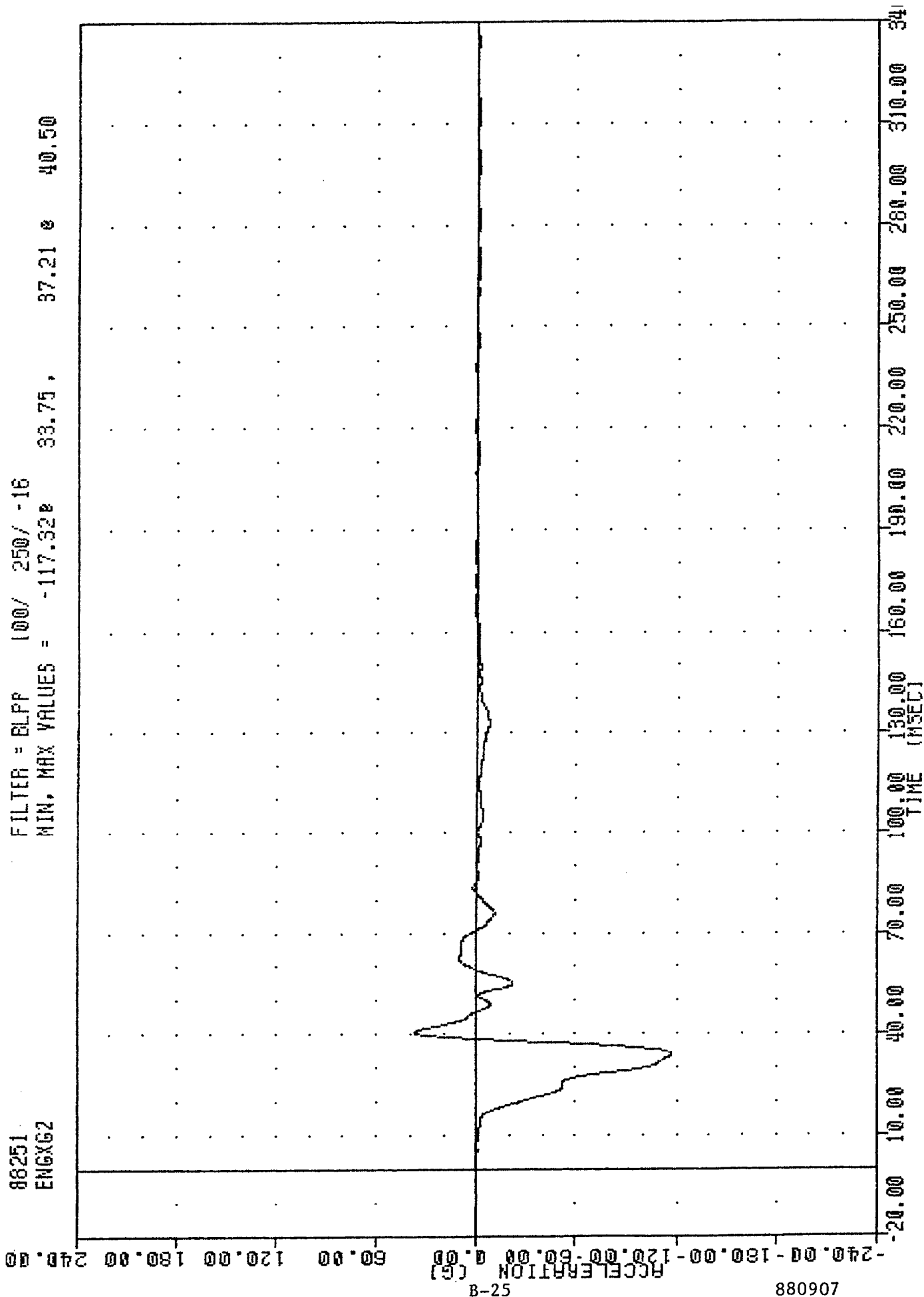
880907



FORD TEMPO INTO FRONTAL BARRIER
LEFT BRAKE CALIPER X AXIS ACCELERATION

88251
ENGXG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -117.32 33.75 , 37.21 3 40.50



FORD TEMPO INTO FRONTAL BARRIER
ENGINE BOTTOM BLOCK X AXIS ACCELERATION

880 COMPLIANCE (E3)

88251

0PCX61

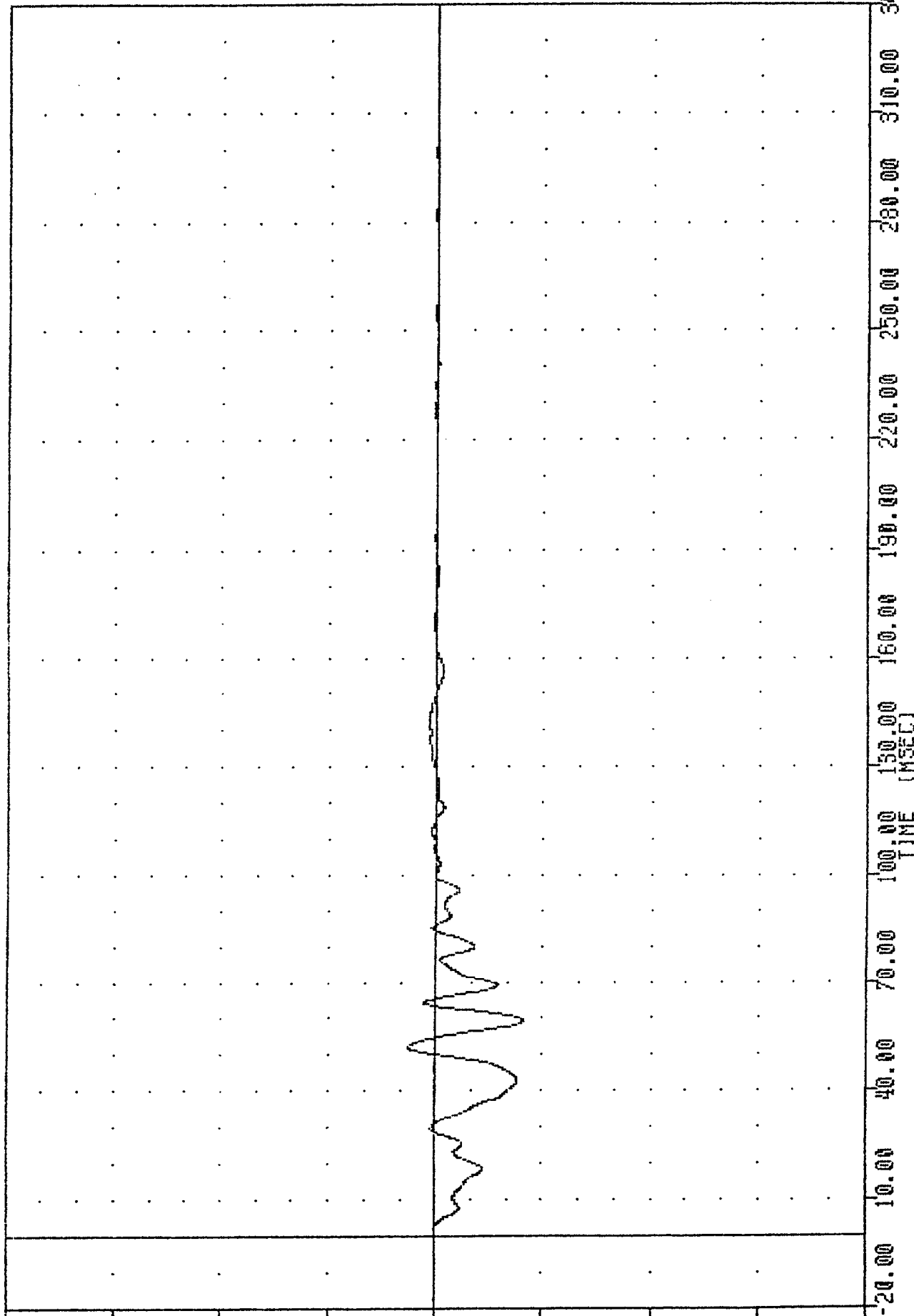
FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -48.77 59.38 15.56 0 52.13

ACCELERATION (G)

B-28

880907



FORD TEMPO INTO FRONTAL BARRIER
DASH PANEL CENTER X AXIS ACCELERATION