STAGED COLLISION AND DAMAGE DATA REPORT FOR ACCIDENT RECONSTRUCTION OF THIRTY (30) TEST VEHICLES VOL. II

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16. Abstract

The thirty (30) test vehicles were impacted tested for compliance with FMVSS 212/219/301-75 and documented in previous submitted reports.

As a parallel non-conflicting effort, the test vehicles were instrumented with accelerometers to measure vehicle acceleration resultants. The vehicles were also identified for residual crush and collision deformation classification (CDC) measurements. The results of this effort are documented herein and presented in three (3) volumes.

17. Key Words	18. Distribution Statement
Frontal and Rear Moving Barrier Impact Tests Vehicle Acceleration Collision Deformation	

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Unclassified	Unclassified	196	

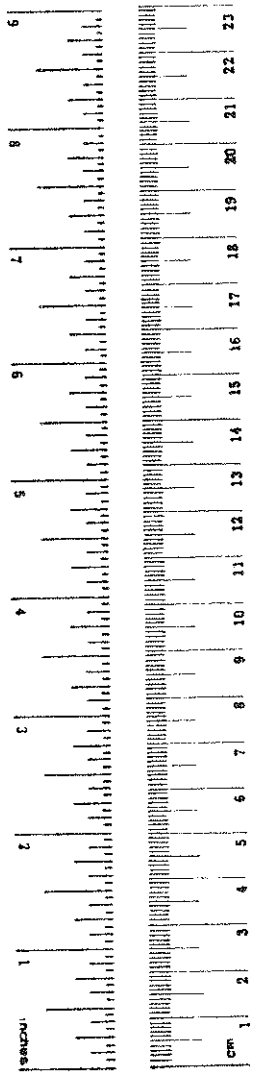
Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

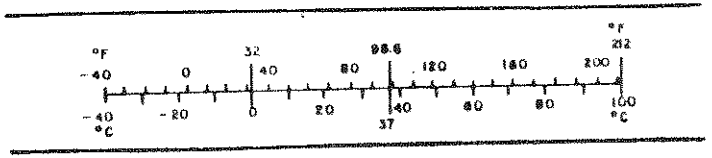
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	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	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures. Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

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



VOLUME THREE (3)

TABLE OF CONTENTS

SECTION 1

SECTION 1

1.0 INTRODUCTION

This report contains information regarding vehicle-to-rigid barrier and moving barrier versus vehicle crash test damage and acceleration data relative to accident reconstruction, as performed under Contract Number DOT-HS-6-01477, by Approved Engineering Test Laboratories, 1536 East Valencia Drive, Fullerton, California.

All tests were performed in accordance with National Highway Traffic Safety Administration, Office of Vehicle Safety Compliance Laboratory Procedures for "Windshield Mounting", "Windshield Zone Intrusion", "Fuel System Integrity", TP212-01 and/or TP219-02, dated March 20, 1979 and January 9, 1979 respectively.

This report presents the residual crush and accelerometer traces along with other related data including post-impact photographs.

SECTION 1

1.1 TEST VEHICLES

Twenty (20) test vehicles were subjected to rear moving barrier impacts and ten (10) test vehicles to frontal fixed barrier impacts. The twenty (20) rear impact test vehicles are listed below followed by the ten (10) frontal impact test vehicles.

MOVING BARRIER VERSUS VEHICLE

Vehicle	VIN	NHTSA No.
1979 Plymouth Horizon - 2 Door Hatchback	ML24A9D200789	790317
1979 Ford Thunderbird - 2 Door Hardtop	9J87H135770	790209
1979 Ford LTD Landau - 2 Door Sedan	9J64F111197	790208
1979 Buick Riviera S Type - 2 Door Coupe	4Y57R9E135116	790120
1979 Dodge Colt - 2 Door Hatchback	4M24J92200265	790532
1979 Cadillac Seville - 4 Door Sedan	6S69B99496005	790121
1979 Mazda GLC Special - 3 Door Hatchback	FA4US547542	790535
1979 Datsun 280ZX - 2 Seater	HS130-108826	790541

SECTION 1

MOVING BARRIER VERSUS VEHICLE

Vehicle	VIN	NHTSA No.
1979 Mazda RX7 "GS" - 2 Seater	SA22C-532292	790554
1979 Subaru DL1600 - 2 Door Coupe	A26L-915666	790540
1979 Plymouth Arrow - 2 Door Hatchback	7L24K92150168	790543
1979 Datsun 310 - 3 Door Sedan	HN10-051875	790533
1979 Toyota Celica ST - 2 Door Coupe	RA42-154861	790552
1979 MG Midget - 2 Door Convertible	GAN6UL218257	790536
1979 Checker Taxicab - 4 Door Sedan	A11361690803E	790545
1979 Fiat Strada Custom - 3 Door Hatchback	138A2-2084657	790534
1979 Volkswagen Scirocco - 2 Door Coupe	5392023399	790538
1979 Volkswagen Dasher - 2 Door Sedan	3292087504	790555
1979 Dodge Omni - 4 Door Hatchback	ZL44A9D340217	790324
1979 Triumph Spitfire - 2 Door Convertible	FM95195UC	790537

VEHICLE-TO-RIGID BARRIER

Vehicle	VIN	NHTSA No.
1979 Chevrolet C20 Beauville - Sportvan	CGL2697137850	791302
1980 Odyssey Mini-Lux - Motor Home	2365	791306
1979 Dodge D50 - Pick Up	9JL4U91104452	790605
1979 Toyota Long Bed 3/4 Ton - Pick Up	RN42-026454	790609
1979 Jeep Wagoneer - 4 Wheel Drive - 4 Door Station Wagon	J9A15NN071784	791301
1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up	CKL2491127124	790607
1979 Ford Custom Style-side F350 - Pick Up	F35HEDG2741	790608
1979 Chinook Gazelle Pop-Top - Motor Home	159496	791303
1979 Mazda B2000 (Long Body) - Pick Up	PE2M7-500074	790606
1979 Champion Trans Van-Motor Home	419-600-4105	791304

SECTION 2

2.0 SUMMARY OF VEHICLE DAMAGE

The following report sheets present damage criteria for each test vehicle. These data show impact speed (mph), speed change (mph), maximum crush (in.), and collision deformation classification (CDC) separately for each test vehicle.

VOLUME THREE (3)

DAMAGE SUMMARY

Vehicle	Impact MPH	MPH Change	Max. Crush In.	CDC
Chevrolet C20	29.2	32.7	16.5	12FEDW4
Odyssey	29.6	30.5	20.0	12FDEW3
Dodge D50	29.8	31.2	16.8	12FDEW2
Toyota 3/4 Ton	29.6	33.7	13.8	12FDEW2
Jeep	29.7	32.4	17.5	12FDEW2
Chevrolet K20	30.4	31.5	23.2	12FDEW3
Ford F350	29.7	29.9	19.3	12FDEW2
Chinook	29.7	30.5	19.3	12FDEW3
Mazda B2000	29.7	30.6	17.8	12FDEW2
Champion	29.5	31.3	19.0	12FDEW6

SECTION 3

3.0 TEST VEHICLE COLLISION AND DAMAGE DATA

The following report sheets present data separately for each test vehicle. This section includes the appropriate accelerometer traces and post-test photographs.

SECTION 3

3.21 CHEVROLET C20 BEAUVILLE SPORTVAN

This section presents information on the 1979 Chevrolet C20 Beauville Sportvan, NHTSA 791302. This test vehicle was subjected to a frontal fixed barrier impact at 29.21 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Chevrolet

Vehicle Model C20 Beauville Sportvan

Vehicle Size Category Multi Purpose

Vehicle Test Weight 5,402 lbs.

Impact Speed 29.21 mph

Speed Change 32.66 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 73.5"

D = 0

C1 = 15.7"

C2 = 16.5"

C3 = 16.0"

C4 = 13.8"

Collision Deformation Classification 12FDEW4

Center of Gravity (Accel.) Location ℄ 60.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

[illegible] CRASH PROGRAM

VEHICLE: CHEV. 1500 VAN
VEHICLE ID: NHTSA 791302
TEST FILE NO: 191 FRONTAL
DATE: JANUARY 25, 1980

IMPACT SPEED

VEHICLE: 29.21 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 32.66 MPH

PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 118 MS

DOT CRASH PROGRAM

VEHICLE: CHEV. C20 VAN
VEHICLE ID: NHTSA 791302
TEST FILE NO: 191 FRONTAL
DATE: JANUARY 25, 1980

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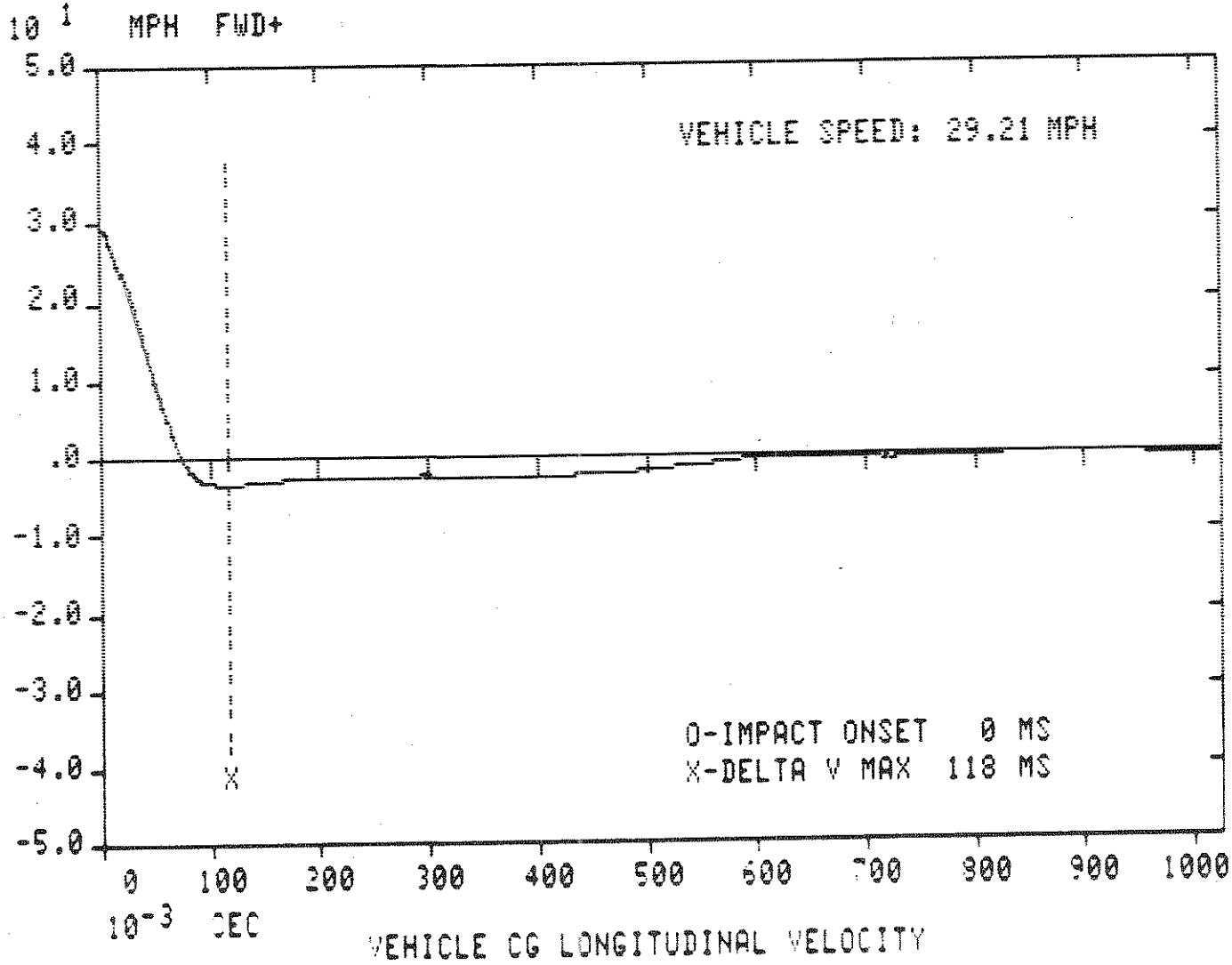
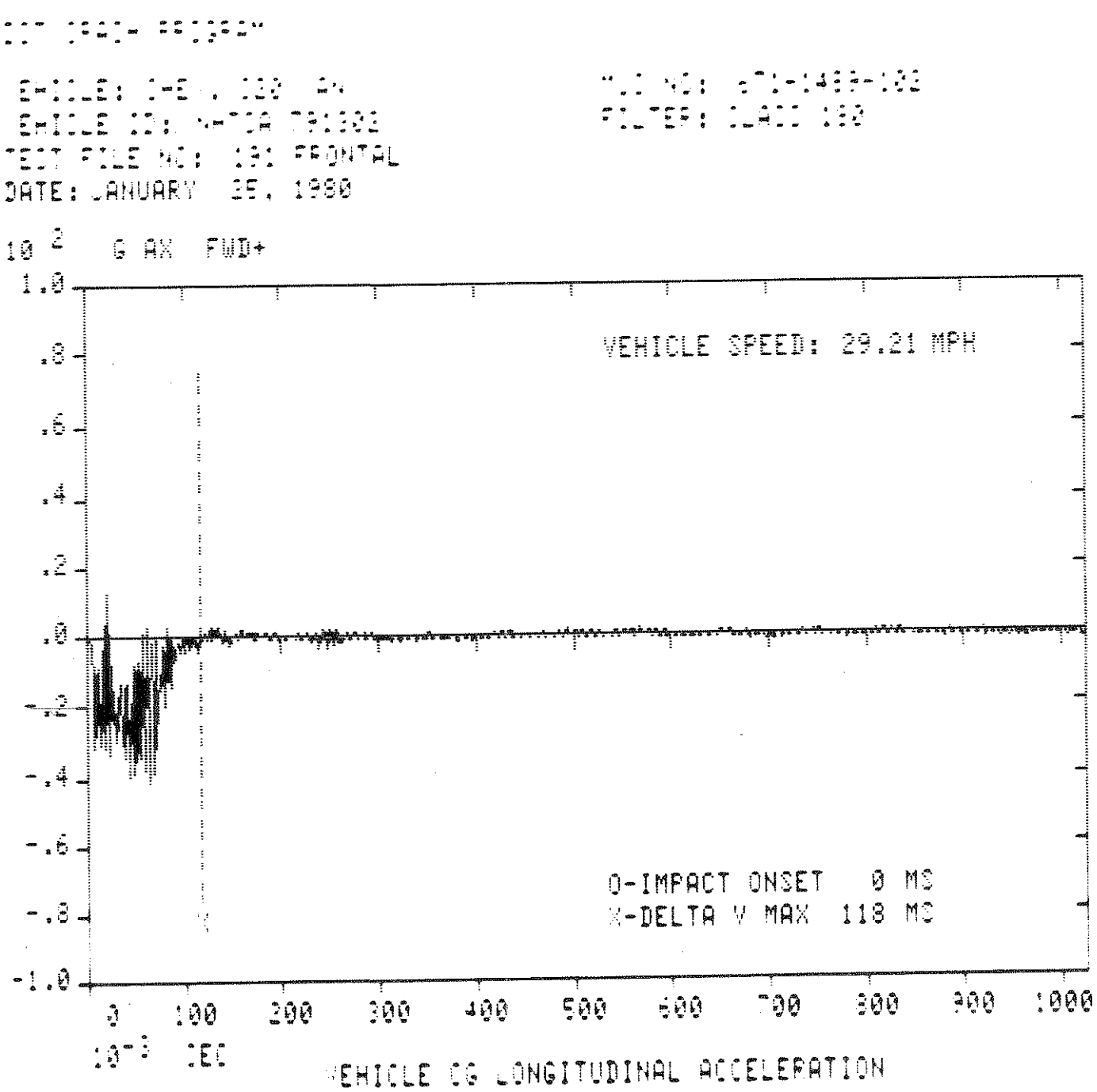
FILTER: CLASS 180

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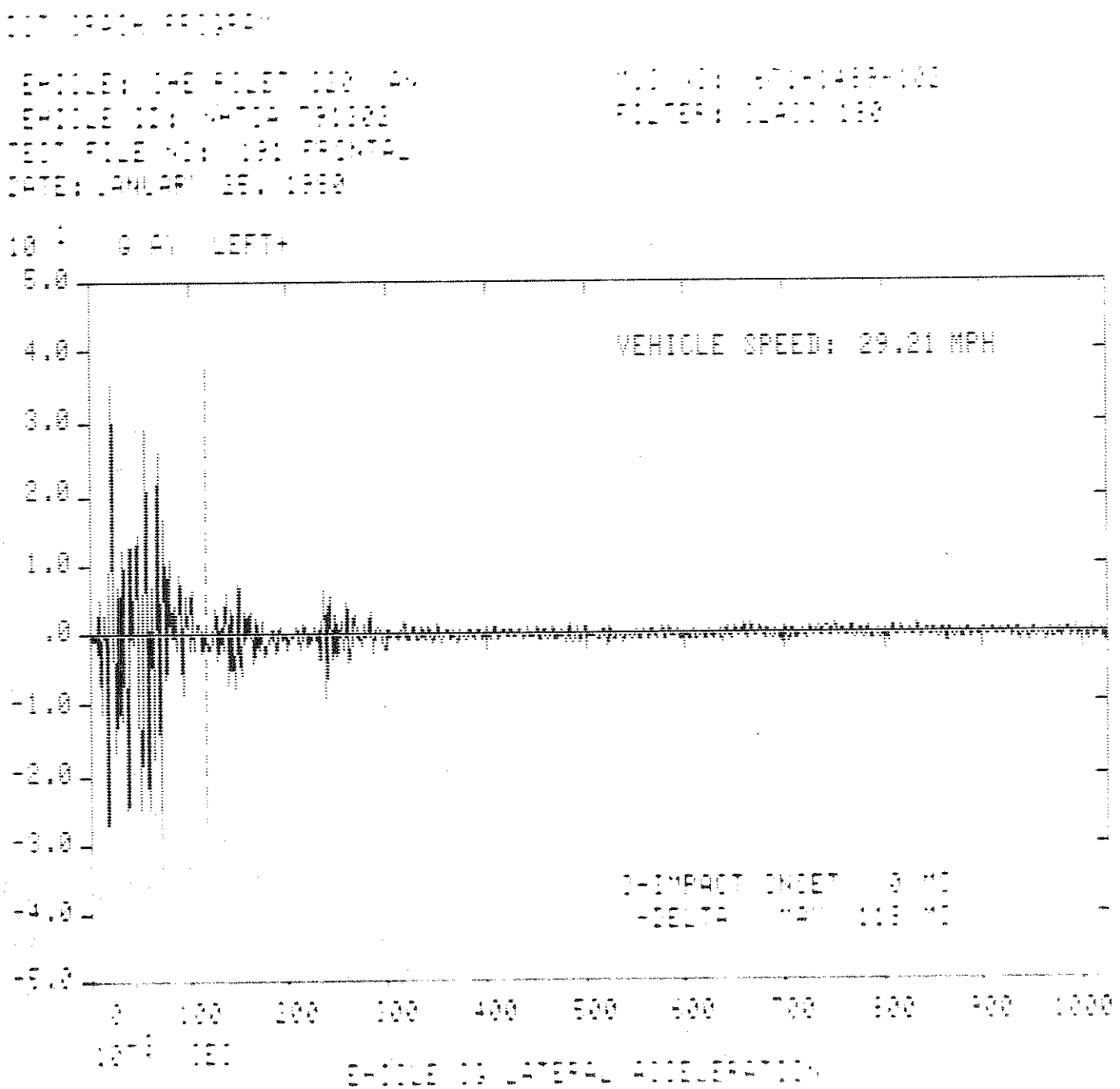
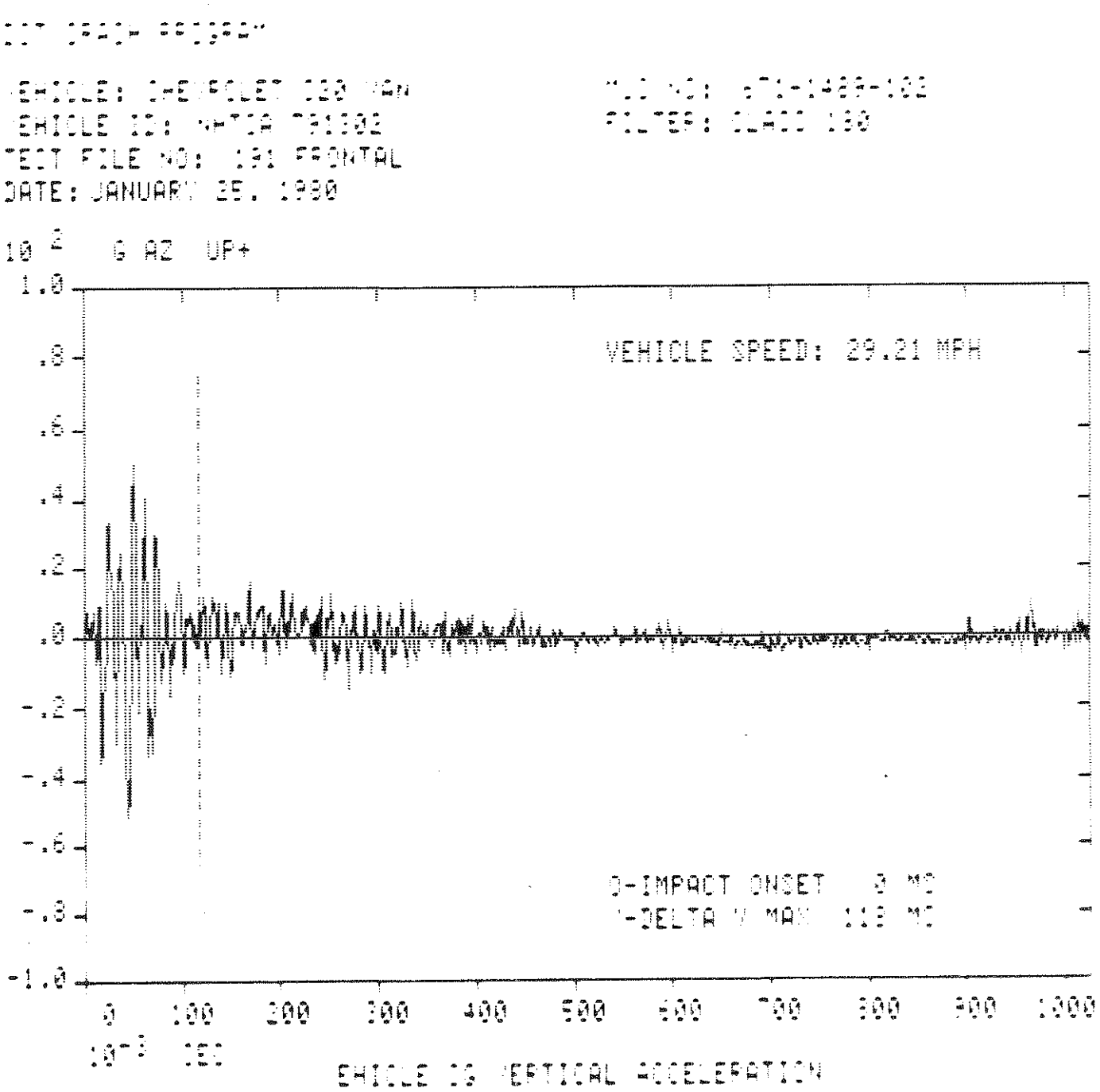
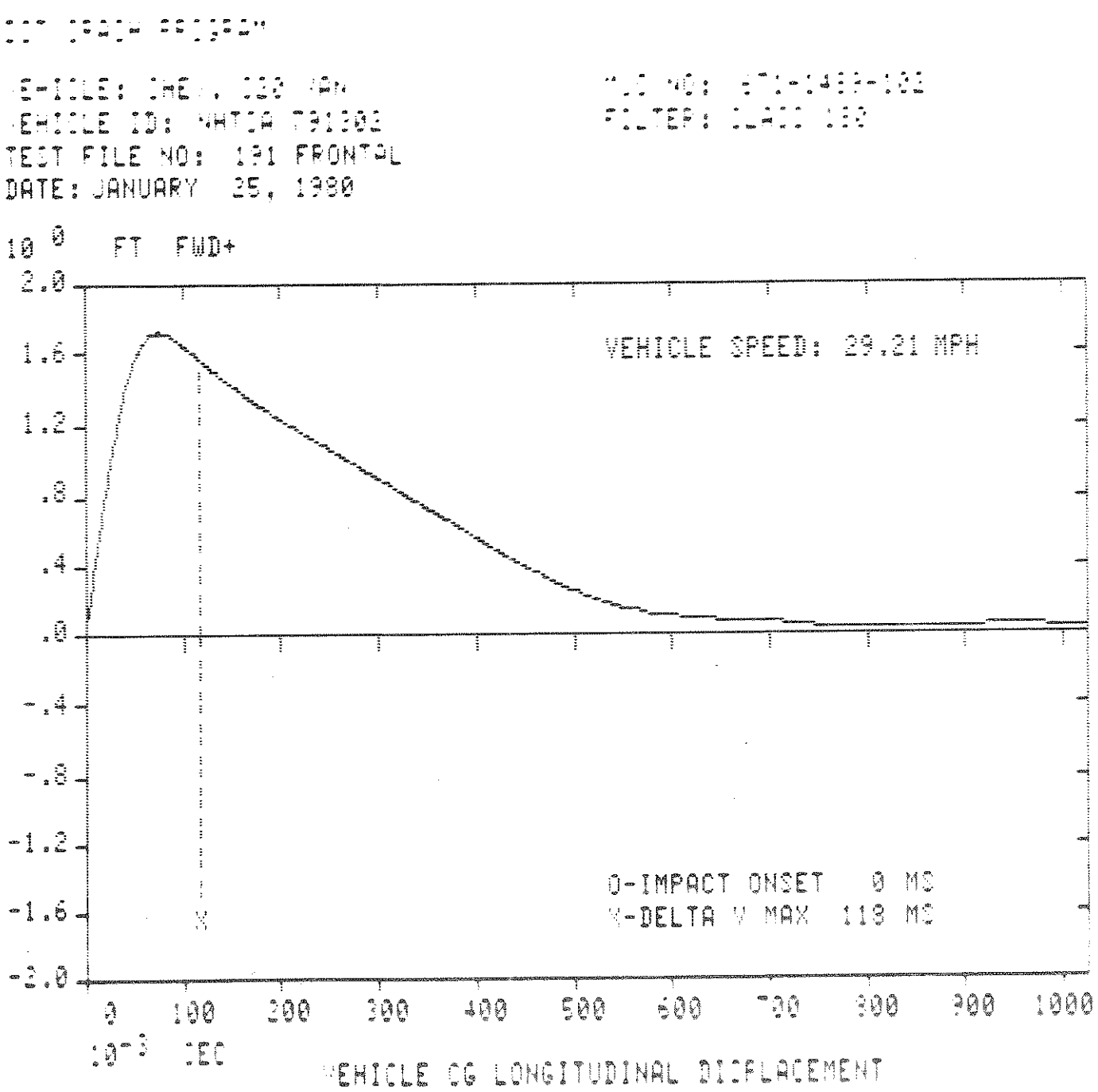
TEST FILE NO: 191 FRONTAL
DATE: JANUARY 25, 1990
10 2 G AX FWD+
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
VEHICLE SPEED: 29.21 MPH
0-IMPACT ONSET 0 MS
X-DELTA V MAX 118 MS
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION


VEHICLE SPEED: 29.21 MPH
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
0
100
200
300
400
500
600
700
800
900
1000


G AZ UP+
VEHICLE SPEED: 29.21 MPH
0-IMPACT ONSET .0 MS
1-DELTA V MAX .113 MS
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
0
100
200
300
400
500
600
700
800
900
1000
10^-3 SEC
VEHICLE LONGITUDINAL ACCELERATION


FILE: CRE , 100 MPH
VEHICLE ID: WHITE T91302
TEST FILE NO: 191 FRONTAL
DATE: JANUARY 25, 1990
FILTER: CLASS 60
10 0 FT FWD+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
VEHICLE SPEED: 29.21 MPH
0-IMPACT ONSET 0 MS
X-DELTA V MAX 113 MS
0 100 200 300 400 500 600 700 800 900 1000
10**-3 SEC
VEHICLE CG LONGITUDINAL DISPLACEMENT

1979 Chevrolet C20 Beauville Sportvan

NHTSA 791302

Post-Impact, Front View

1979 Chevrolet C20 Beauville Sportvan

NHTSA 791302

Post-Impact, Left Side View

791302
NHTSA791302
212 219
301

1979 Chevrolet C20 Beauville Sportvan

NHTSA 791302

Post-Impact, Right Side View

1302
SA791302

1979 Chevrolet C20 Beauville Sportvan

NHTSA 791302

Post-Impact, Overhead View

NHESA, 45-6102

SECTION 3

3.22 ODYSSEY MINI-LUX MOTOR HOME

This section presents information on the 1980 Odyssey Mini-Lux Motor Home, NHTSA 791306. This test vehicle was subjected to a frontal fixed barrier impact at 29.56 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1980

Vehicle Make Odyssey

Vehicle Model Mini-Lux Motor Home

Vehicle Size Category Multi Purpose

Vehicle Test Weight 4,656 lbs.

Impact Speed 29.56 mph

Speed Change 30.52 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 67.3"

D = 0

C1 = 19.3"

C2 = 19.8"

C3 = 20.0"

C4 = 19.8"

Collision Deformation Classification 12FDEW3

Center of Gravity (Accel.) Location ℄ 82.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

[illegible]

[illegible]
[illegible]
TEST FILE NO: 215 FRONTAL
DATE: FEBRUARY 22, 1980

IMPACT SPEED

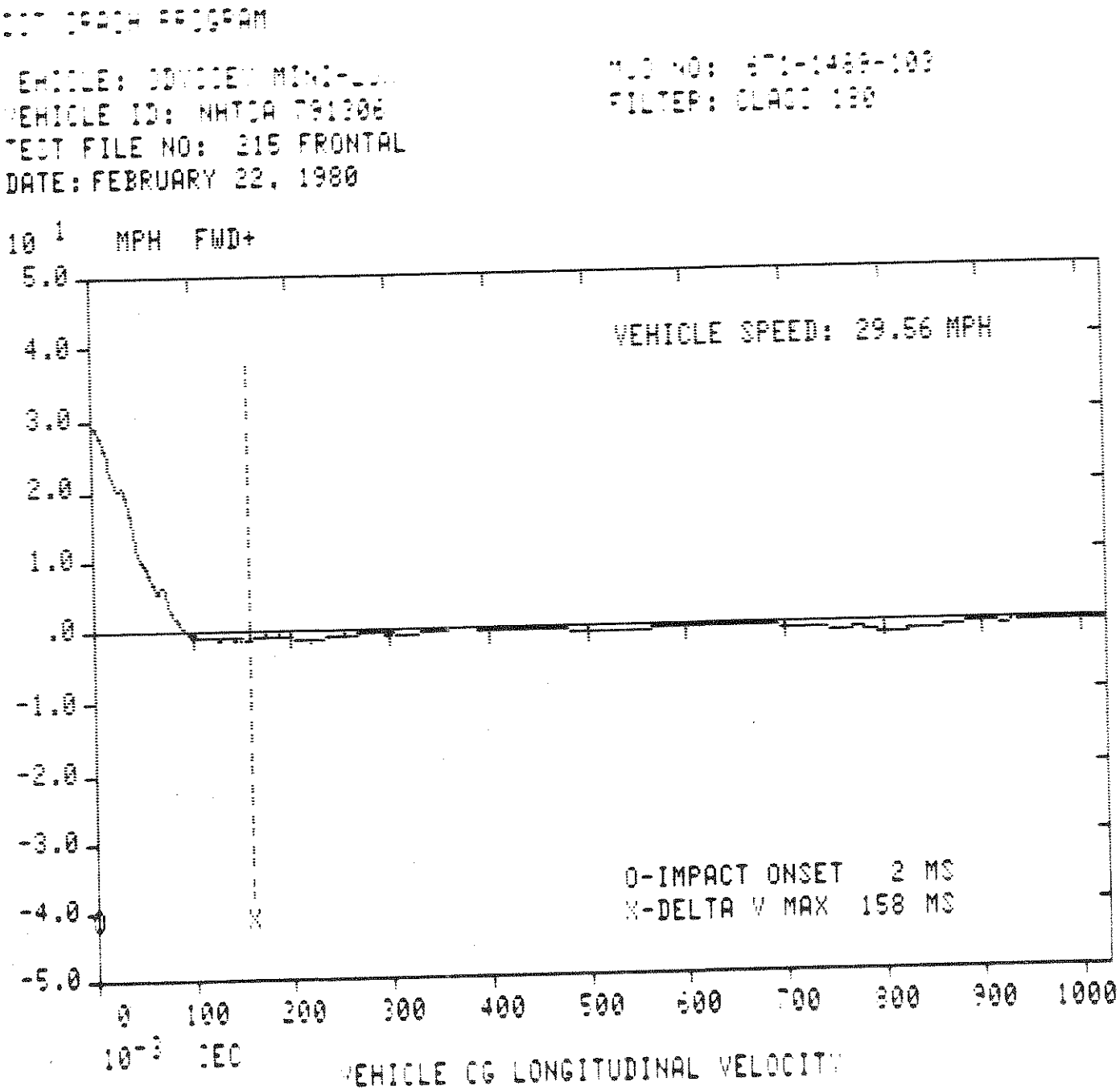
VEHICLE: 29.56 MPH

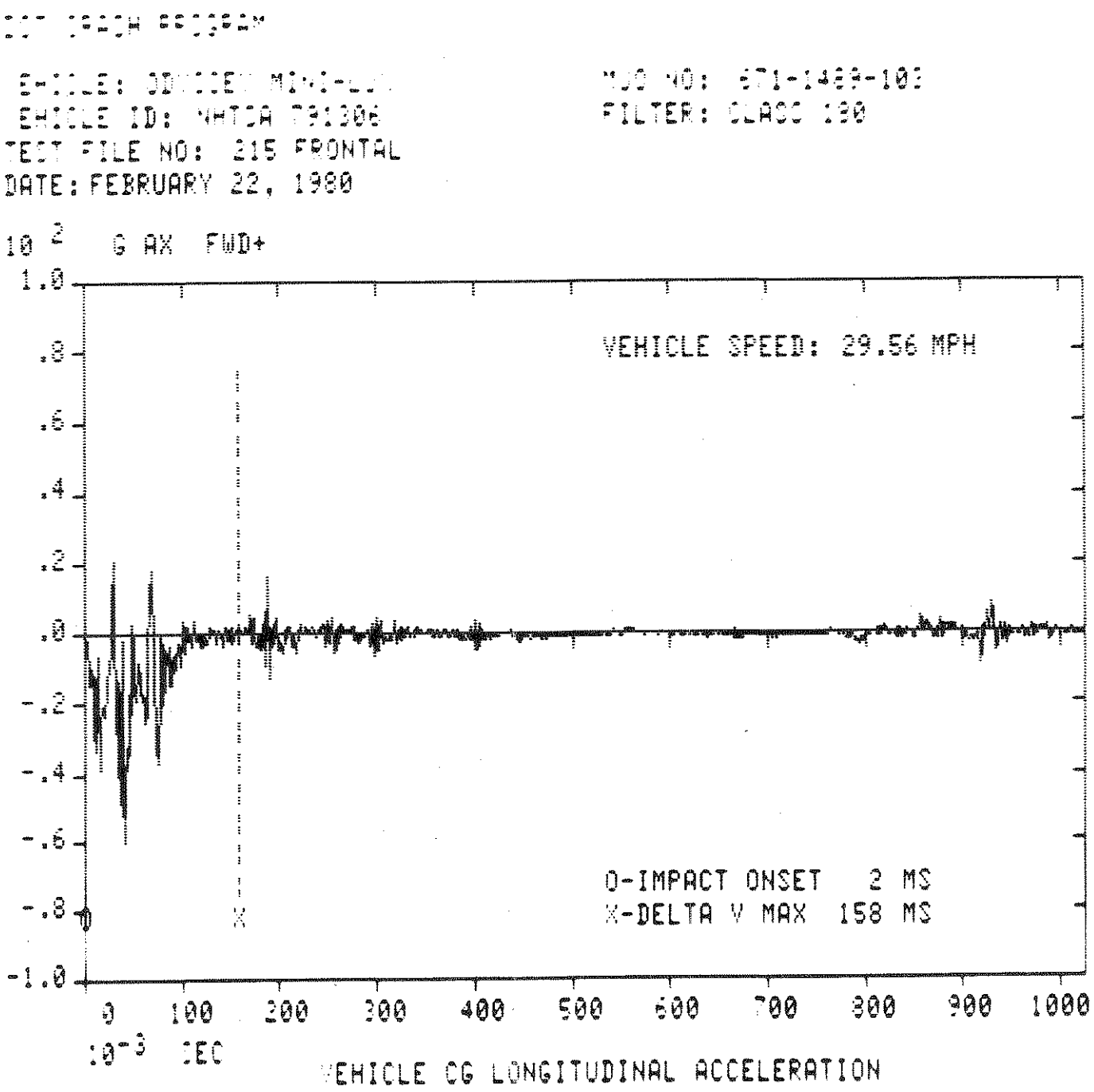
DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 30.52 MPH

PLOT DATA

IMPACT OCCURED AT: 2 MS
DELTA VEL TAKEN AT: 158 MS

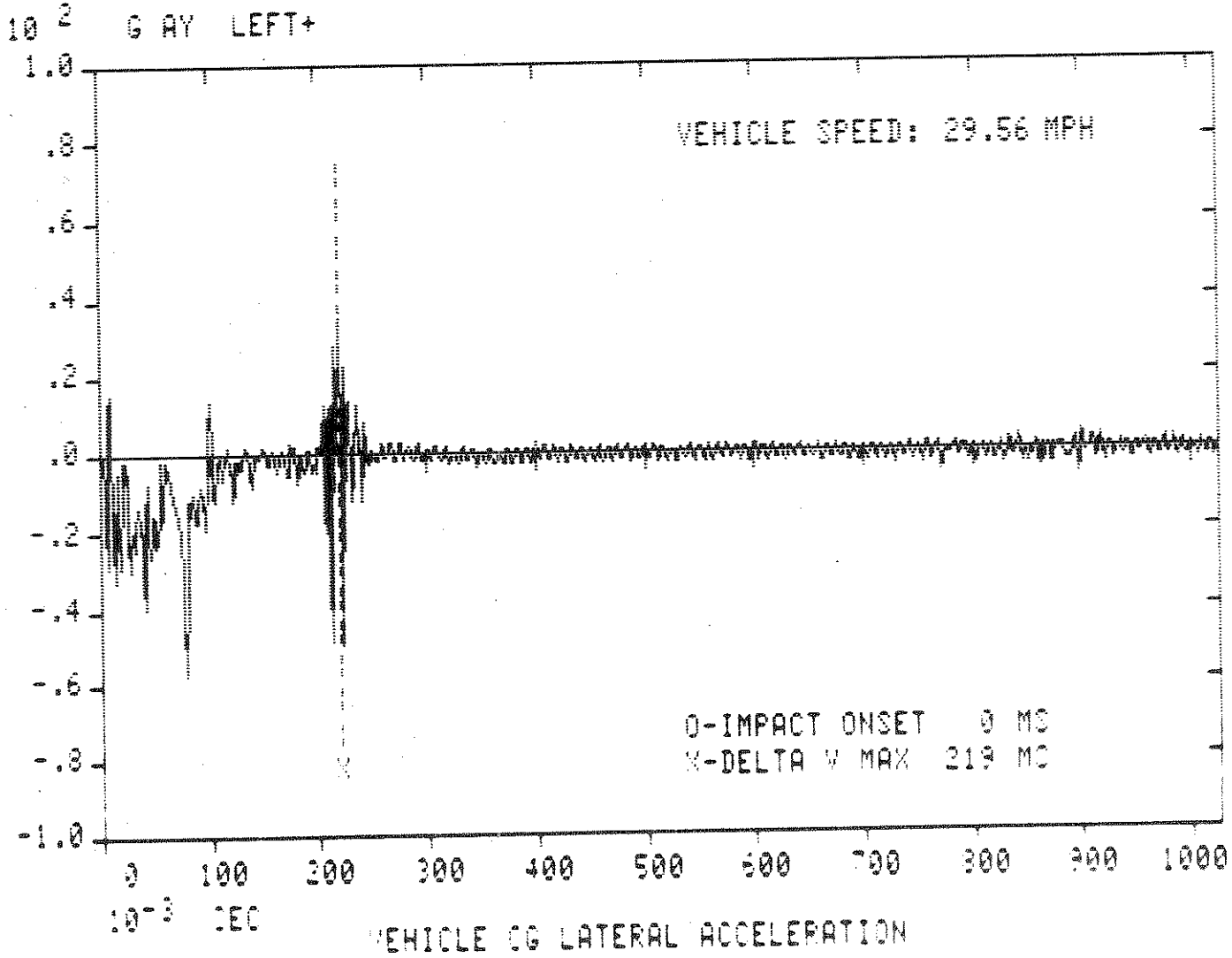

EHICLE ID: NHTSA T91305
EST FILE NO: 315 FRONTAL
DATE: FEBRUARY 22, 1980
10 1 MPH FWD+
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
VEHICLE SPEED: 29.56 MPH
O-IMPACT ONSET 2 MS
X-DELTA V MAX 158 MS
0
100
200
300
400
500
1000
10-3 SEC

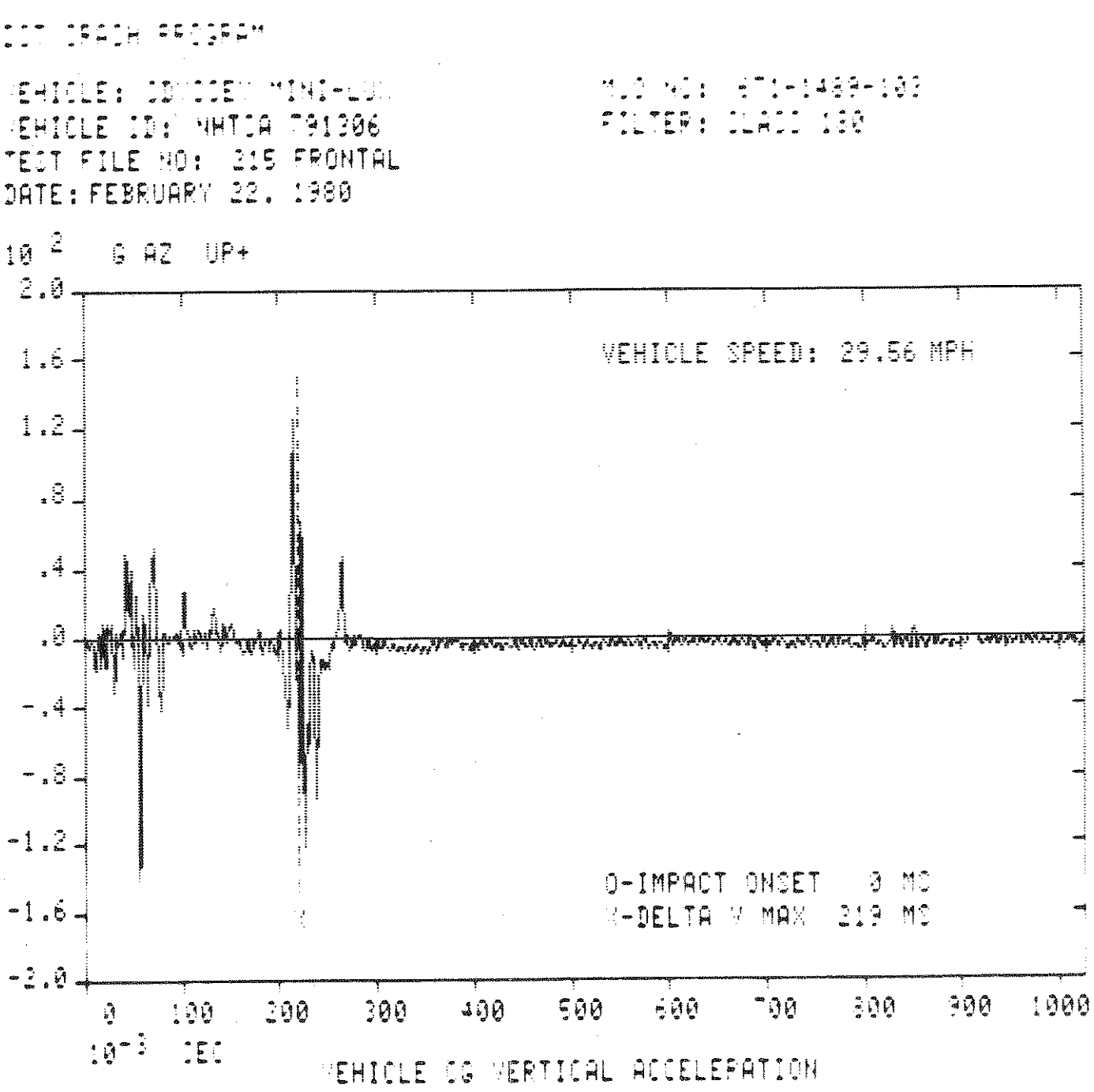

MJC NO: ST1-1469-101
FILTER: CLASS 180
TEST FILE NO: 215 FRONTAL
DATE: FEBRUARY 22, 1980
10 2 G AX FWD+
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
VEHICLE SPEED: 29.56 MPH
O-IMPACT ONSET 2 MS
X-DELTA V MAX 158 MS
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

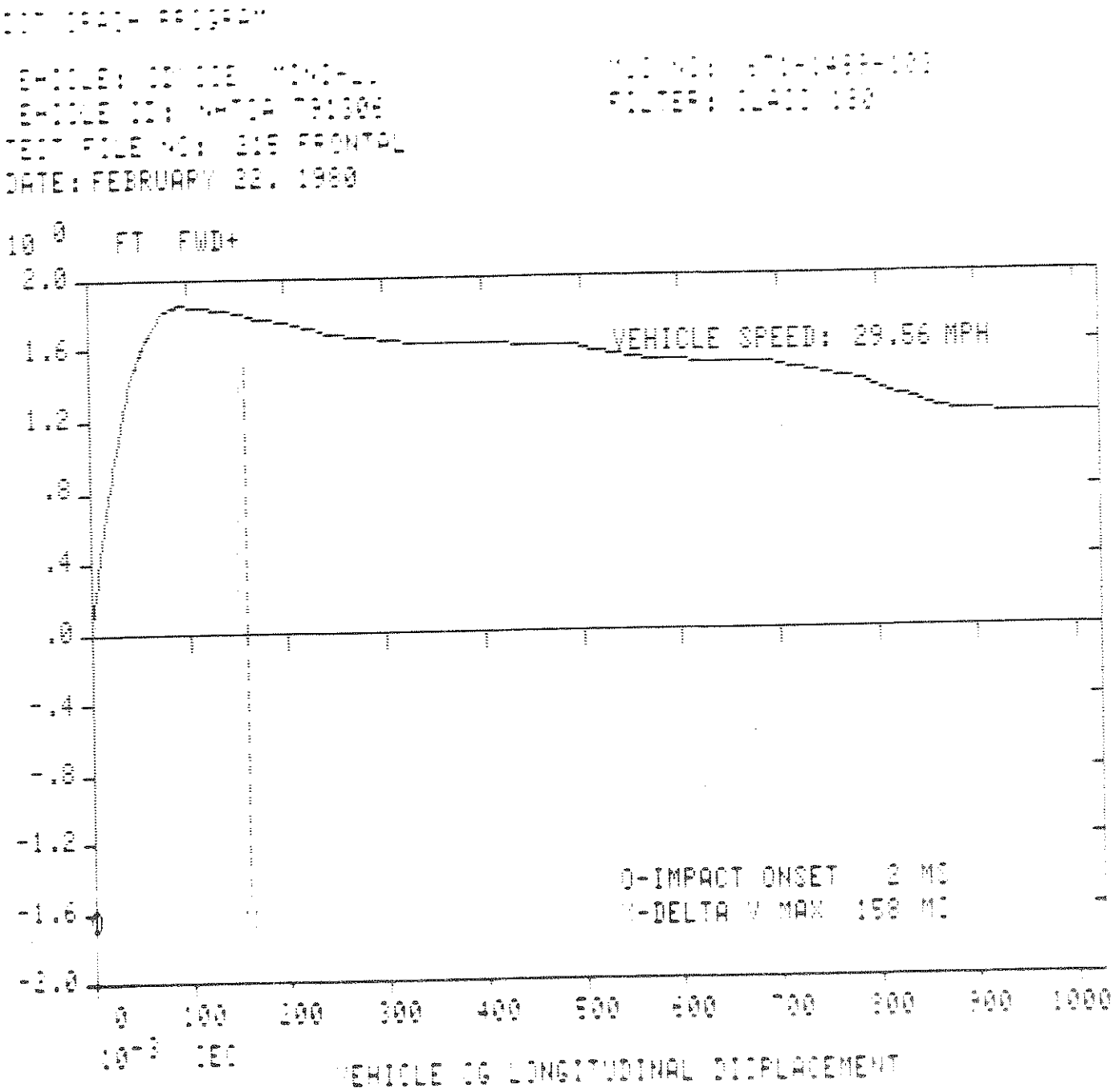
DOT DRACH PROGRAM

VEHICLE: ODYSSEY MINI-LUX
VEHICLE ID: NHTSA 791306
TEST FILE NO: 215 FRONTAL
DATE: FEBRUARY 22, 1980

MJO NO: ET1-1439-103
FILTER: CLASS 180




VEHICLE SPEED: 29.56 MPH
0-IMPACT ONSET 0 MS
10^2 G AZ UP+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
0
100
200
300
400
500
600
700
800
900
1000
10^-3 SEC


FILE:
FILE:
TEST FILE NO: 315 FRONTAL
DATE: FEBRUARY 22, 1980
10 0 FT FWD+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
VEHICLE SPEED: 29.56 MPH
O-IMPACT ONSET 0 MS
Y-DELTA V MAX 150 MS
0
100
200
300
400
500
600
700
800
900
1000
10**-3 SEC
VEHICLE CG LONGITUDINAL DISPLACEMENT

1980 Odyssey Mini-Lux Motor Home

NHTSA 791306

Post-Impact, Left Side View

NHTSA
212 219 301
FMVSS

1980 Odyssey Mini-Lux Motor Home

NHTSA 791306

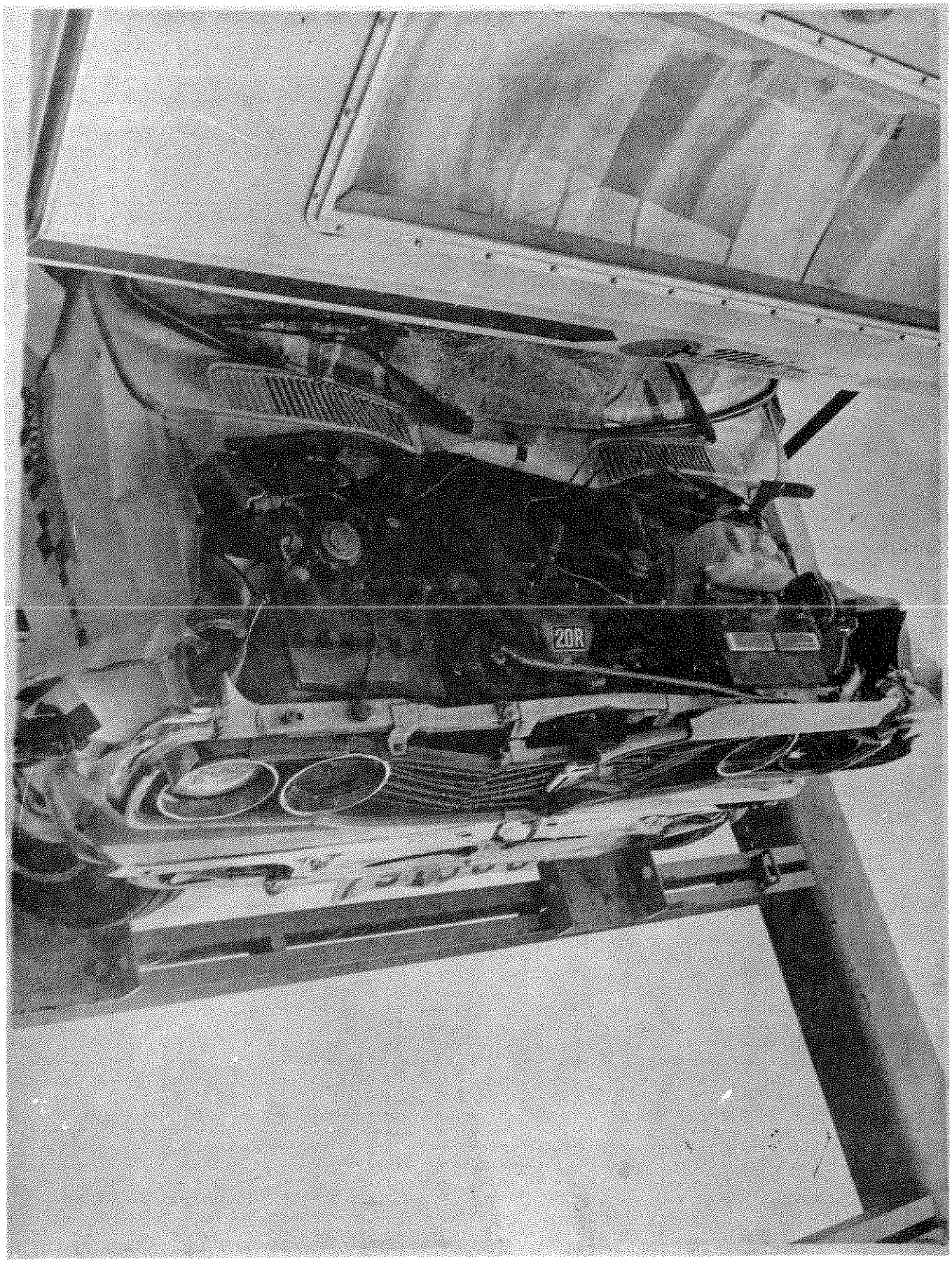
Post-Impact, Right Side View

NH 6A
791306

1980 Odyssey Mini-Lux Motor Home

NHTSA 791306

Post-Impact, Overhead View


20R

SECTION 3

3.23 DODGE D50 PICK UP

This section presents information on the 1979 Dodge D50 - Pick Up, NHTSA 790605. This test vehicle was subjected to a frontal fixed barrier impact at 29.75 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Dodge

Vehicle Model D50 Pick Up

Vehicle Size Category Truck

Vehicle Test Weight 3,113 lbs.

Impact Speed 29.75 mph

Speed Change 31.16 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 59.5"

D = 0

C1 = 14.3"

C2 = 15.9"

C3 = 16.8"

C4 = 14.5"

Collision Deformation Classification 12FDEW2

Center of Gravity (Accel.) Location ℄ 54.9" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

[illegible]

[illegible]
[illegible]
[illegible]
DATE: FEBRUARY 17,1990

IMPACT SPEED

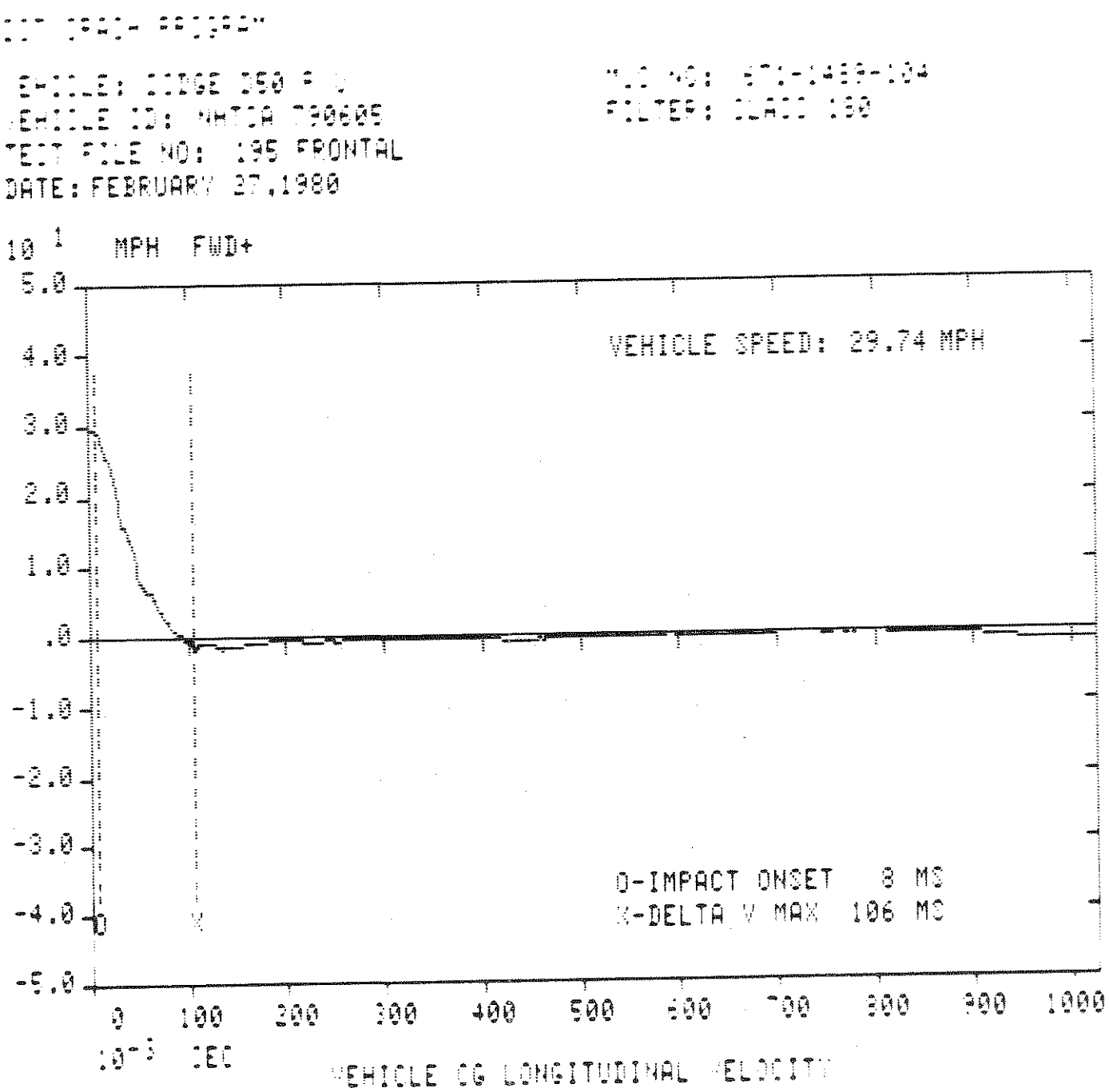
VEHICLE: 29.74 MPH

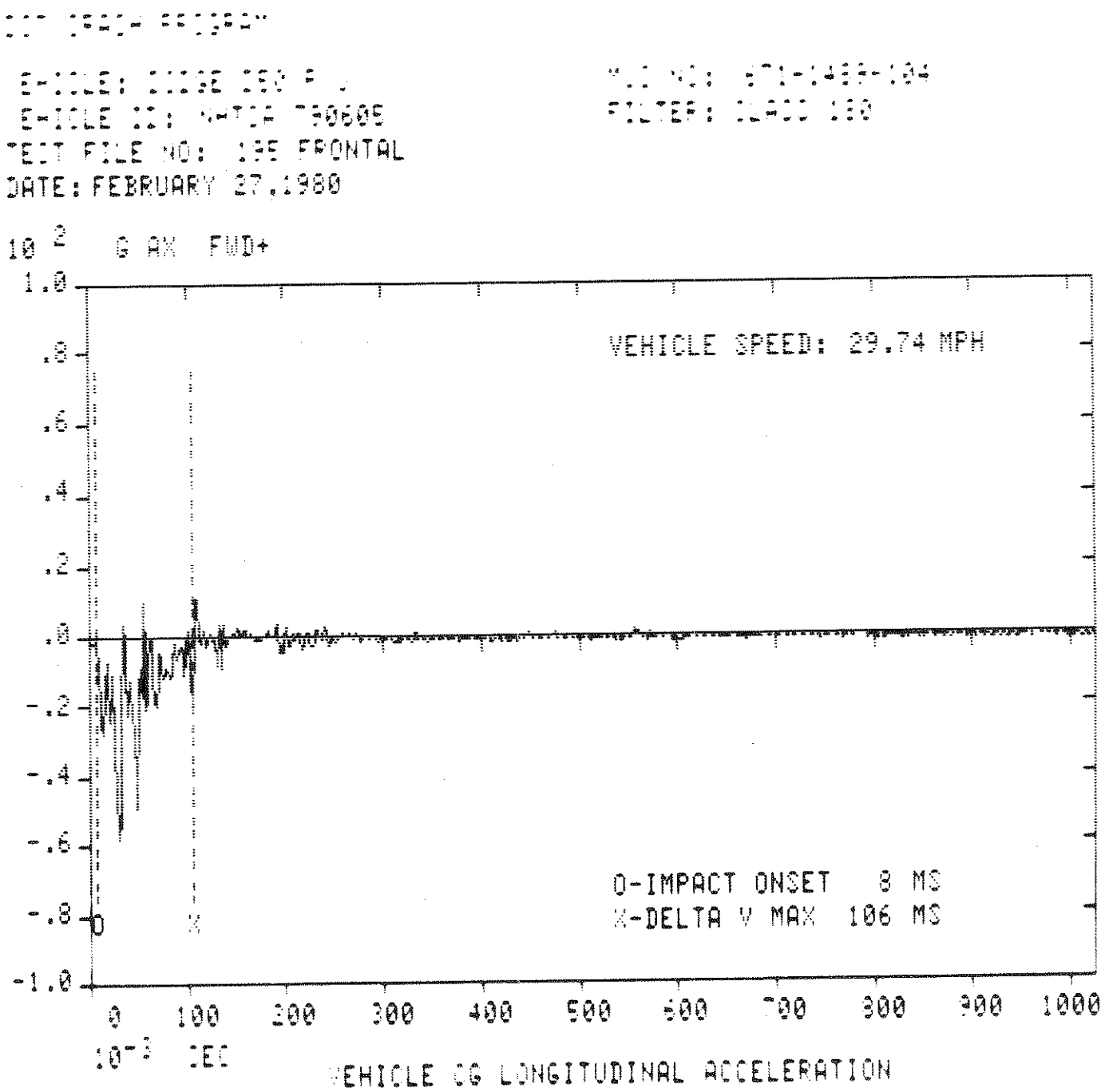
DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 31.16 MPH

PLOT DATA

IMPACT OCCURED AT: 8 MS
DELTA VEL TAKEN AT: 106 MS

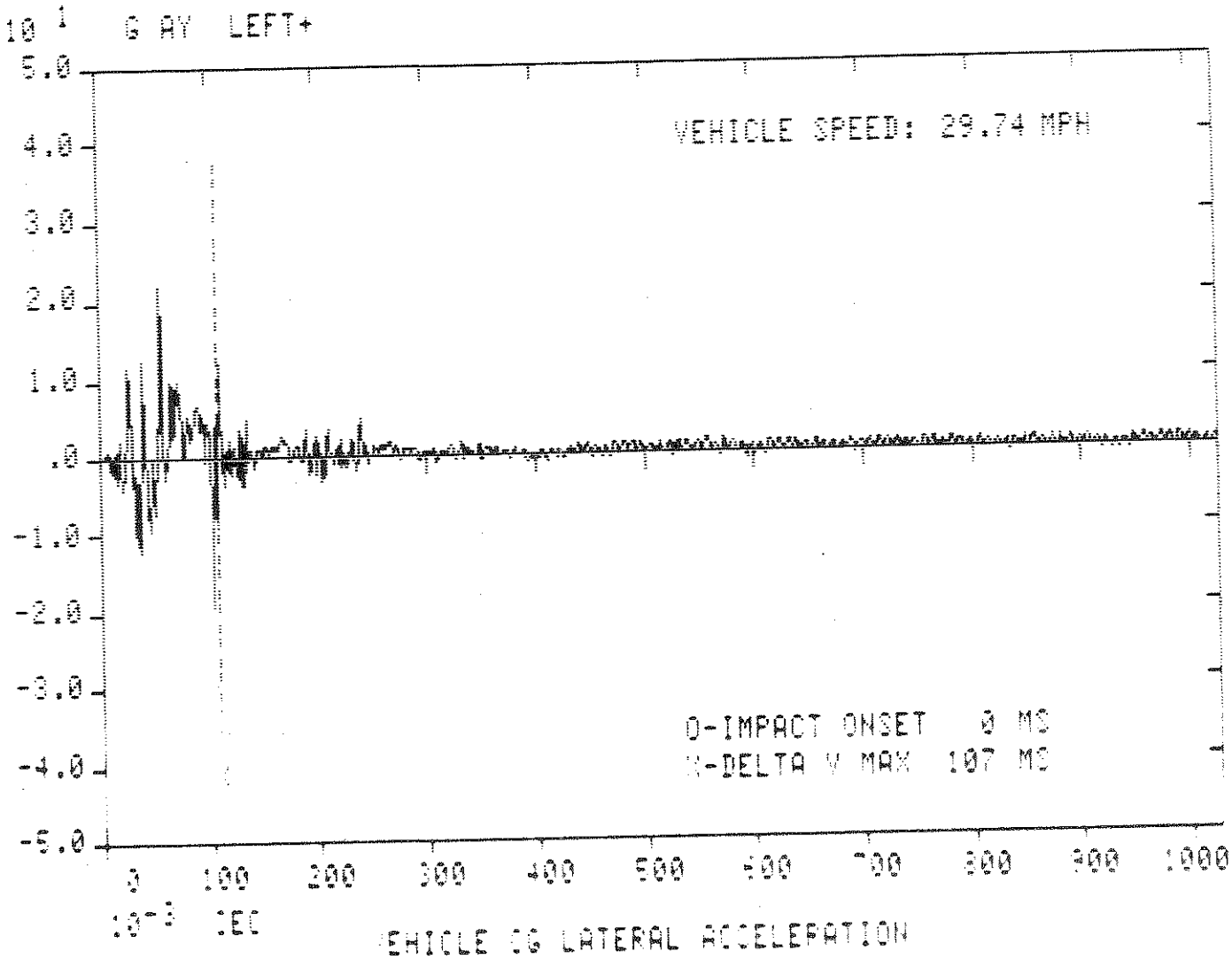

MPH FWD+
VEHICLE SPEED: 29.74 MPH
0-IMPACT ONSET 8 MS
X-DELTA V MAX 106 MS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
0
100
200
300
400
500
600
700
800
900
1000
SEC


E-FILE: [illegible]
E-FILE II: [illegible]
TEST FILE NO: 135 FRONTAL
DATE: FEBRUARY 27,1980
VEHICLE SPEED: 29.74 MPH
O-IMPACT ONSET 8 MS
X-DELTA V MAX 106 MS
10 2 G AX FWD+
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

*** CRASH PROGRAM

VEHICLE: DODGE D50 PICKUP
VEHICLE ID: VMTIA 700405
TEST FILE NO: 195 FRONTAL
DATE: FEBRUARY 27, 1980

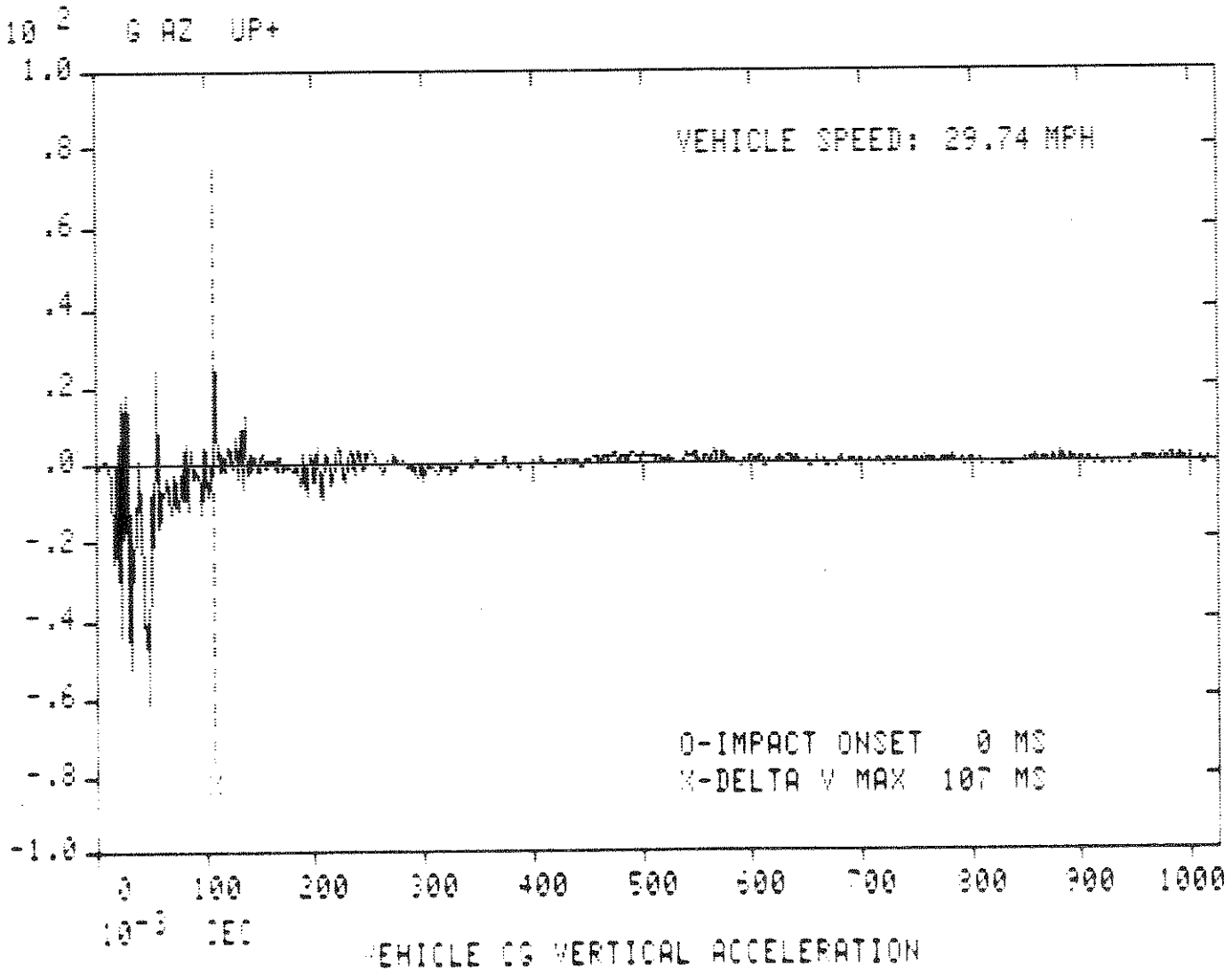
MDC NO: ST1-1499-104
FILTER: CLASS 180

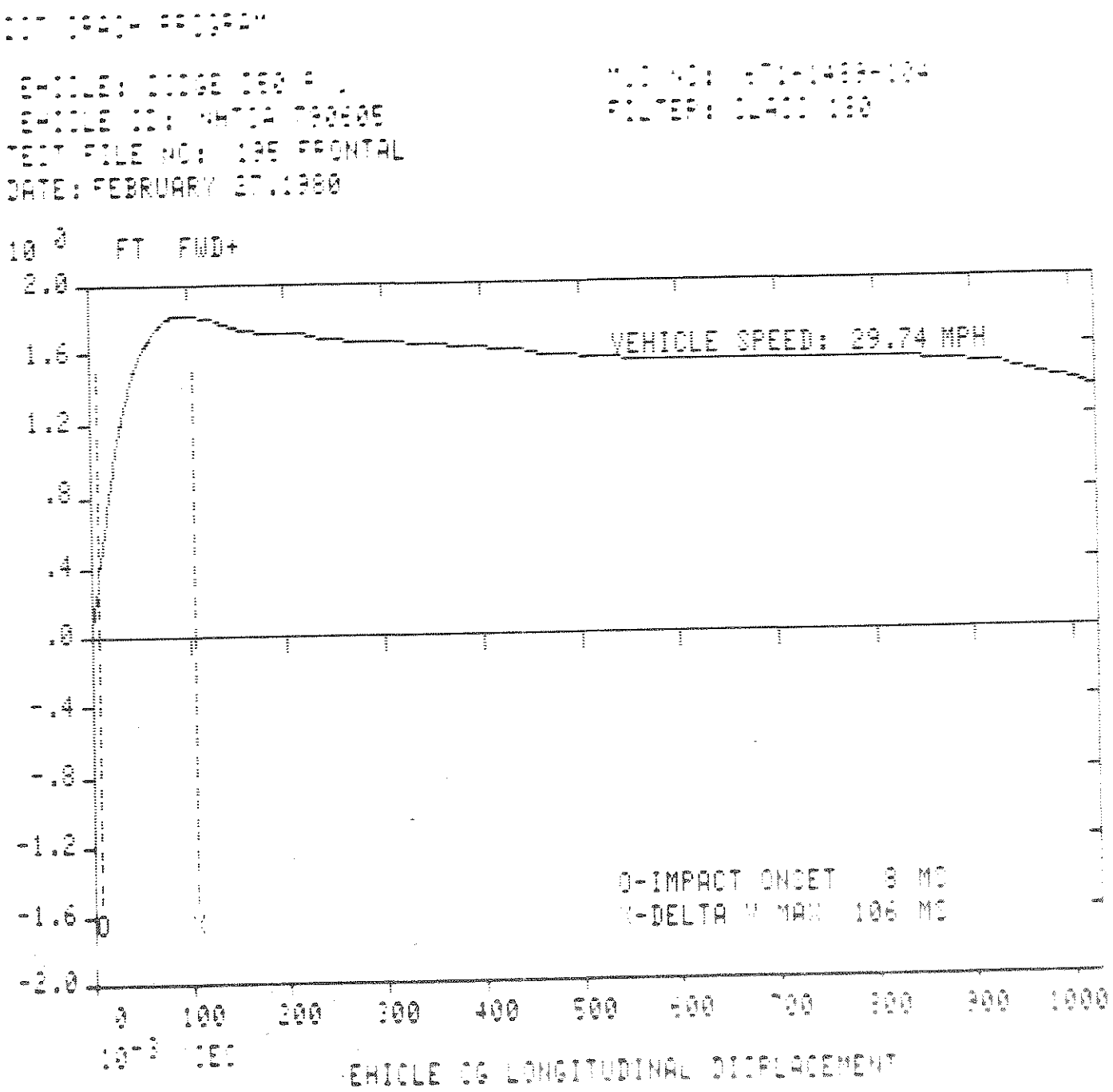


DOT REACH PROGRAM

VEHICLE: DODGE D50 PICKUP
VEHICLE ID: NHTSA 790605
TEST FILE NO: 195 FRONTAL
DATE: FEBRUARY 27, 1980

TDC NO: ST1-1489-104
FILTER: CLASS 180




FILE: 01068 060 F
FILE ID: VEHICLE DISPLACEMENT
TEST FILE NO: 106 FRONTAL
DATE: FEBRUARY 27,1980
10 3 FT FWD+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
VEHICLE SPEED: 29.74 MPH
O-IMPACT ONSET 0 MS
X-DELTA V MAX 105 MS
0
X
0 100 200 300 400 500 600 700 800 900 1000
10-3 SEC
VEHICLE CG LONGITUDINAL DISPLACEMENT

1979 Dodge D50 Pick Up

NHTSA 790605

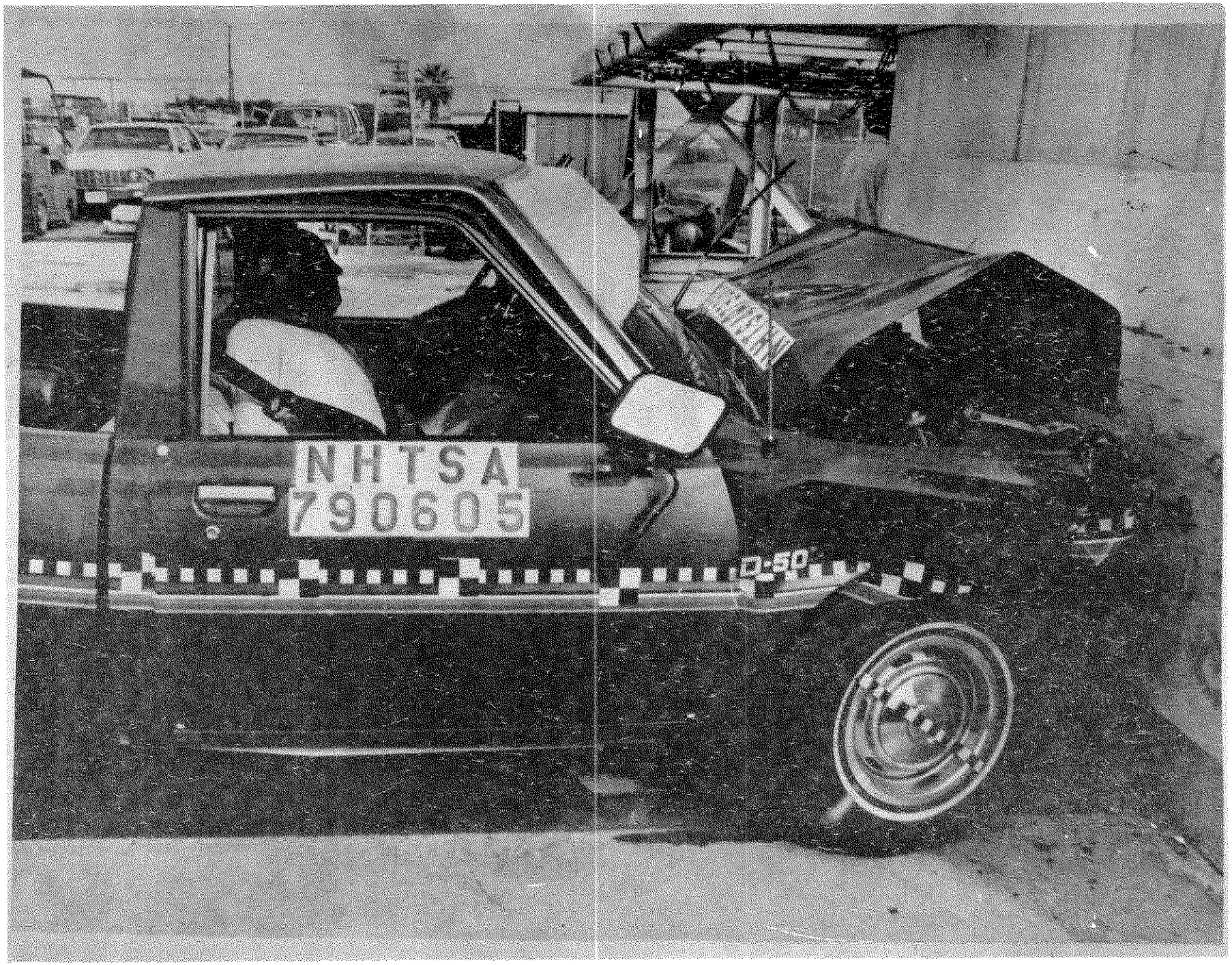
Post-Impact, Left Side View


NHTSA
790605
212 219 301
FMVSS

1979 Dodge D50 Pick Up

NHTSA 790605

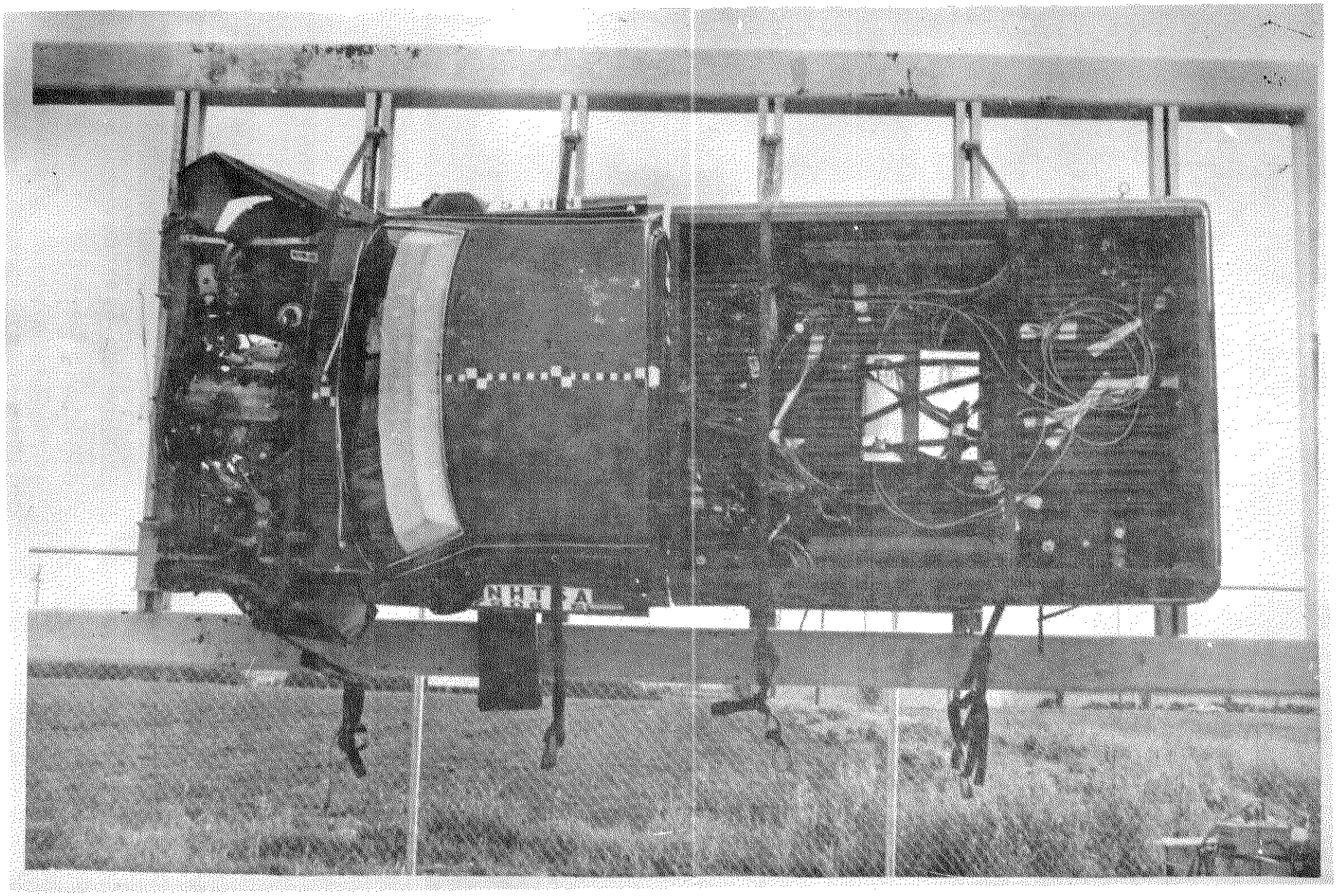
Post-Impact, Right Side View


NHTSA
790605
D-50

1979 Dodge D50 Pick Up

NHTSA 790605

Post-Impact, Overhead View



SECTION 3

3.24 TOYOTA LONG BED 3/4 TON - PICK UP

This section presents information on the 1979 Toyota Long Bed 3/4 Ton - Pick Up, NHTSA 790609. This test vehicle was subjected to a frontal fixed barrier impact at 29.55 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Toyota

Vehicle Model Long Bed 3/4 Ton - Pick Up

Vehicle Size Category Truck

Vehicle Test Weight 3,129 lbs.

Impact Speed 29.55 mph

Speed Change 33.72 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 62.2"

D = 0

C1 = 10.8"

C2 = 13.3"

C3 = 13.8"

C4 = 12.2"

Collision Deformation Classification 12FDEW2

Center of Gravity (Accel.) Location ℄ 57.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

CIT CRASH PROGRAM

VEHICLE: TOYOTA 3 4 P...
VEHICLE ID: NHTSA T80609
TEST FILE NO: 219 FRONTAL
DATE: MARCH 1, 1980

IMPACT SPEED

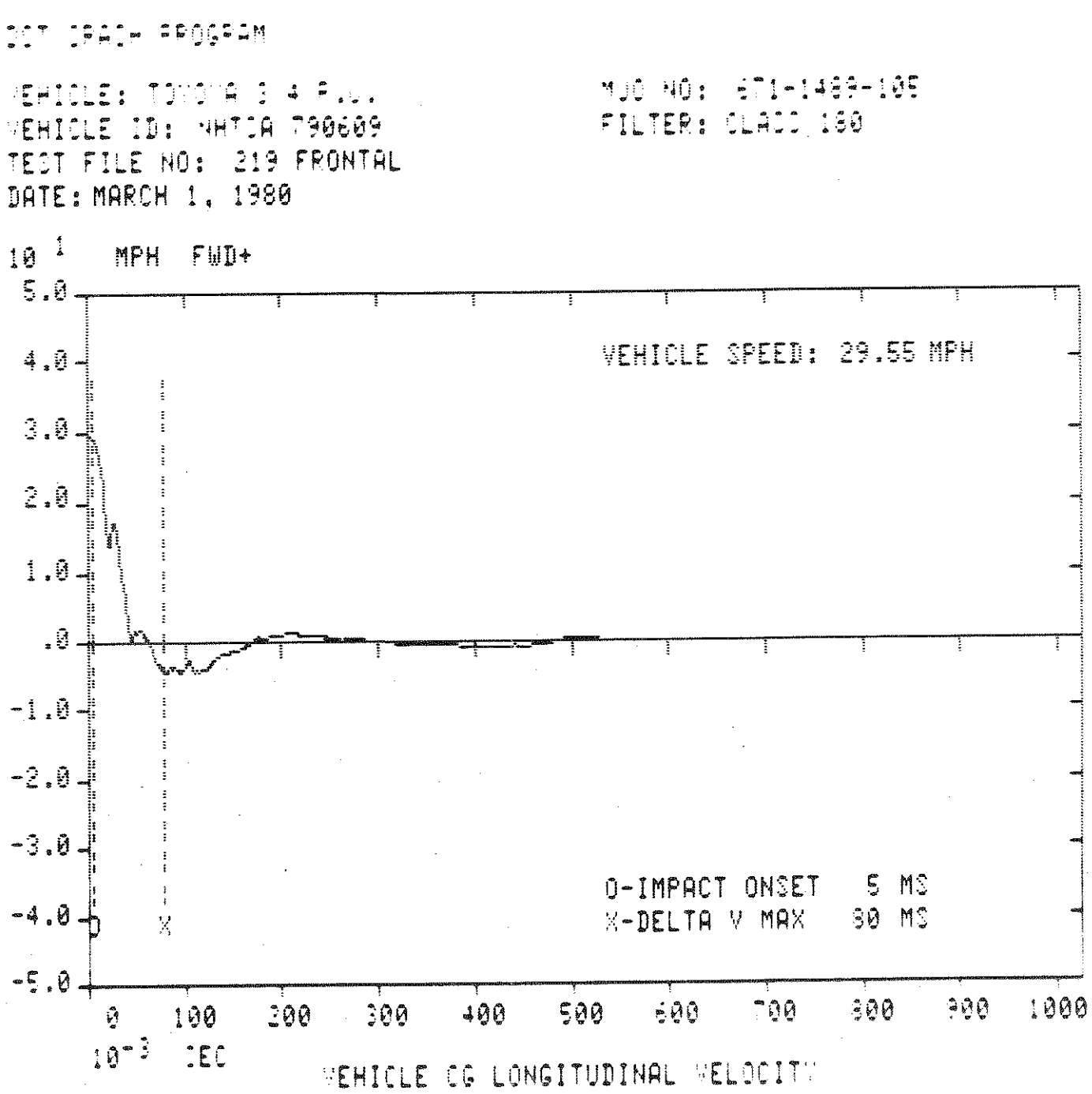
VEHICLE: 29.55 MPH

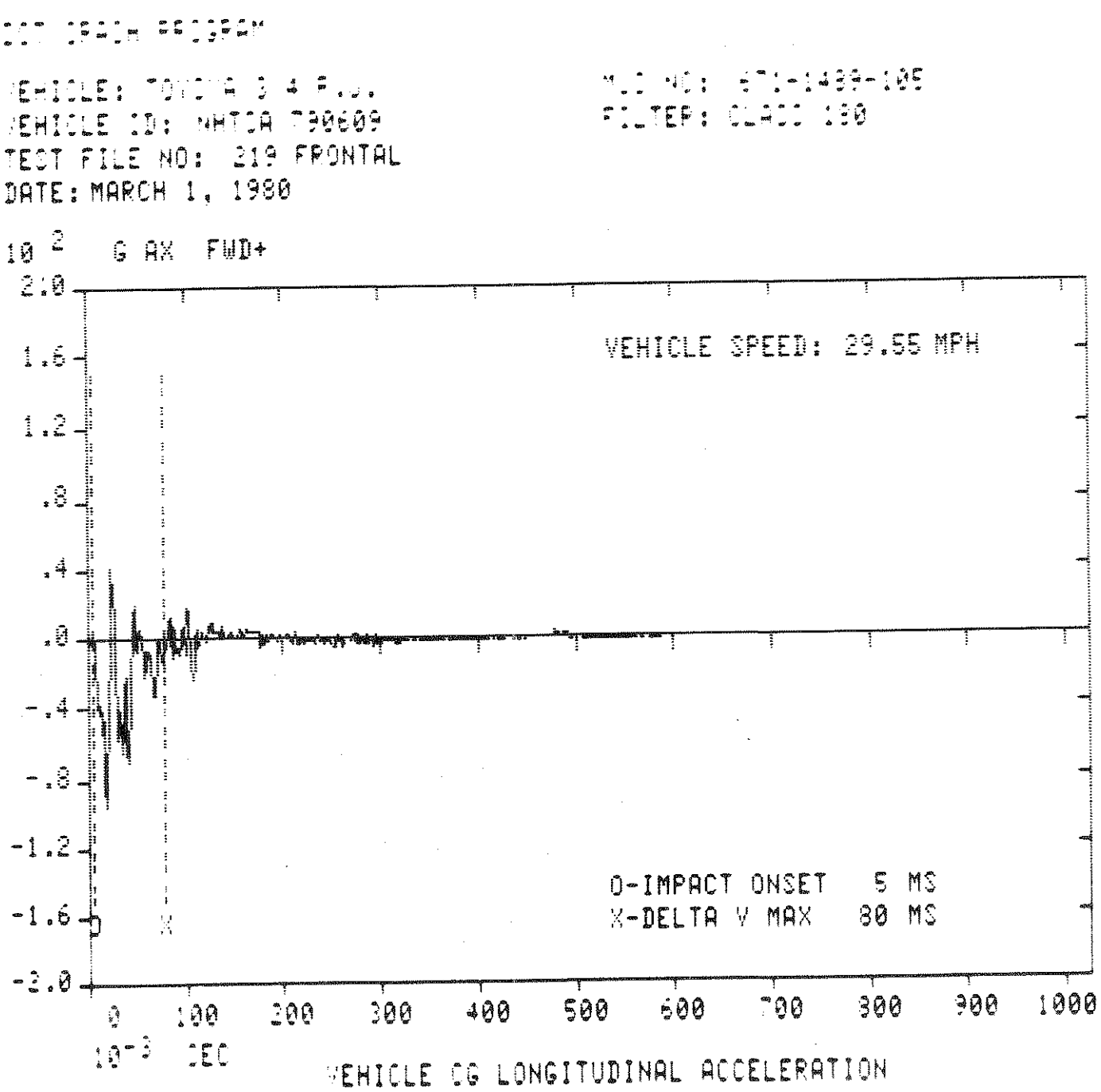
DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

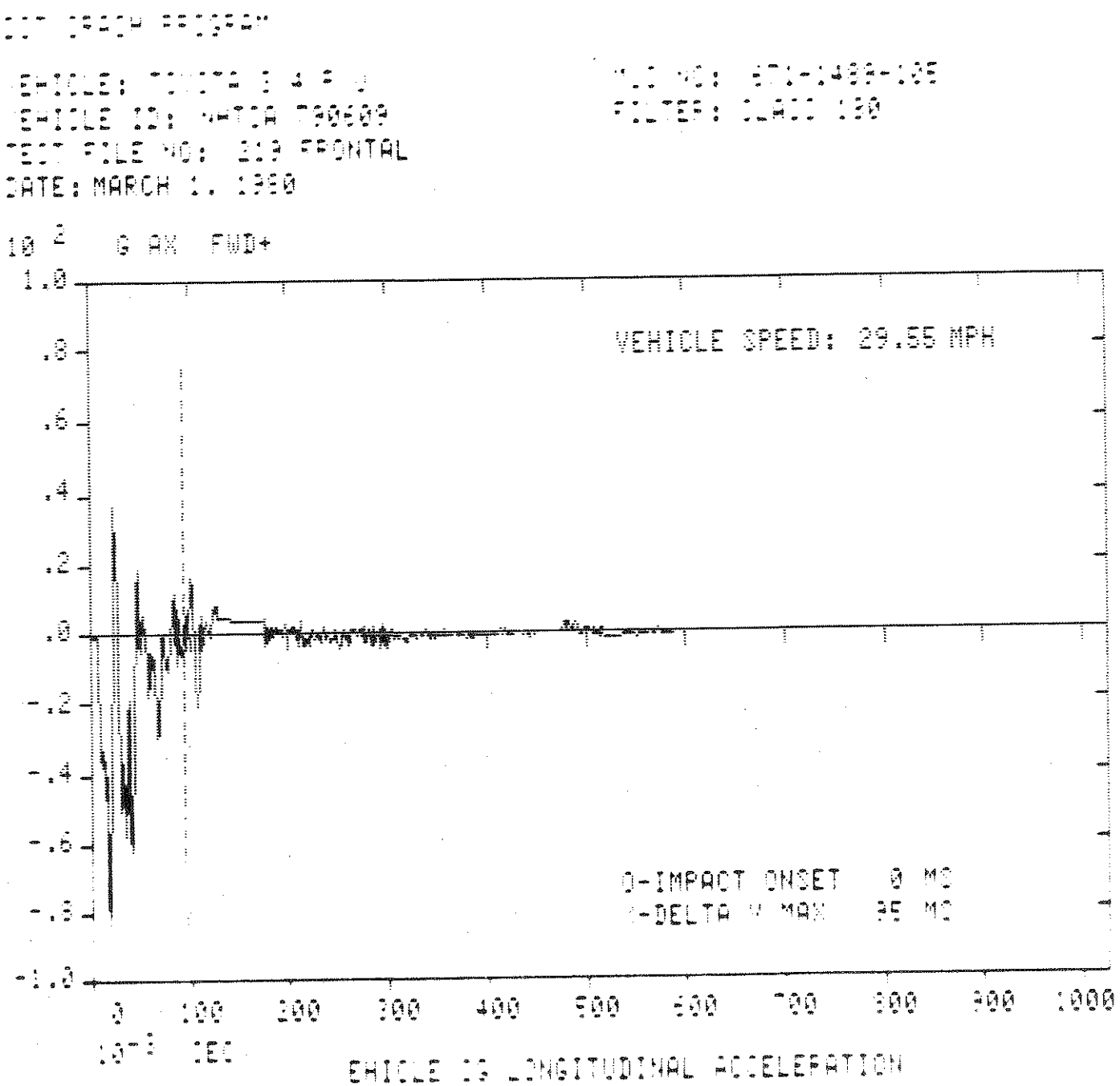
VEHICLE LONGITUDINAL: 33.72 MPH

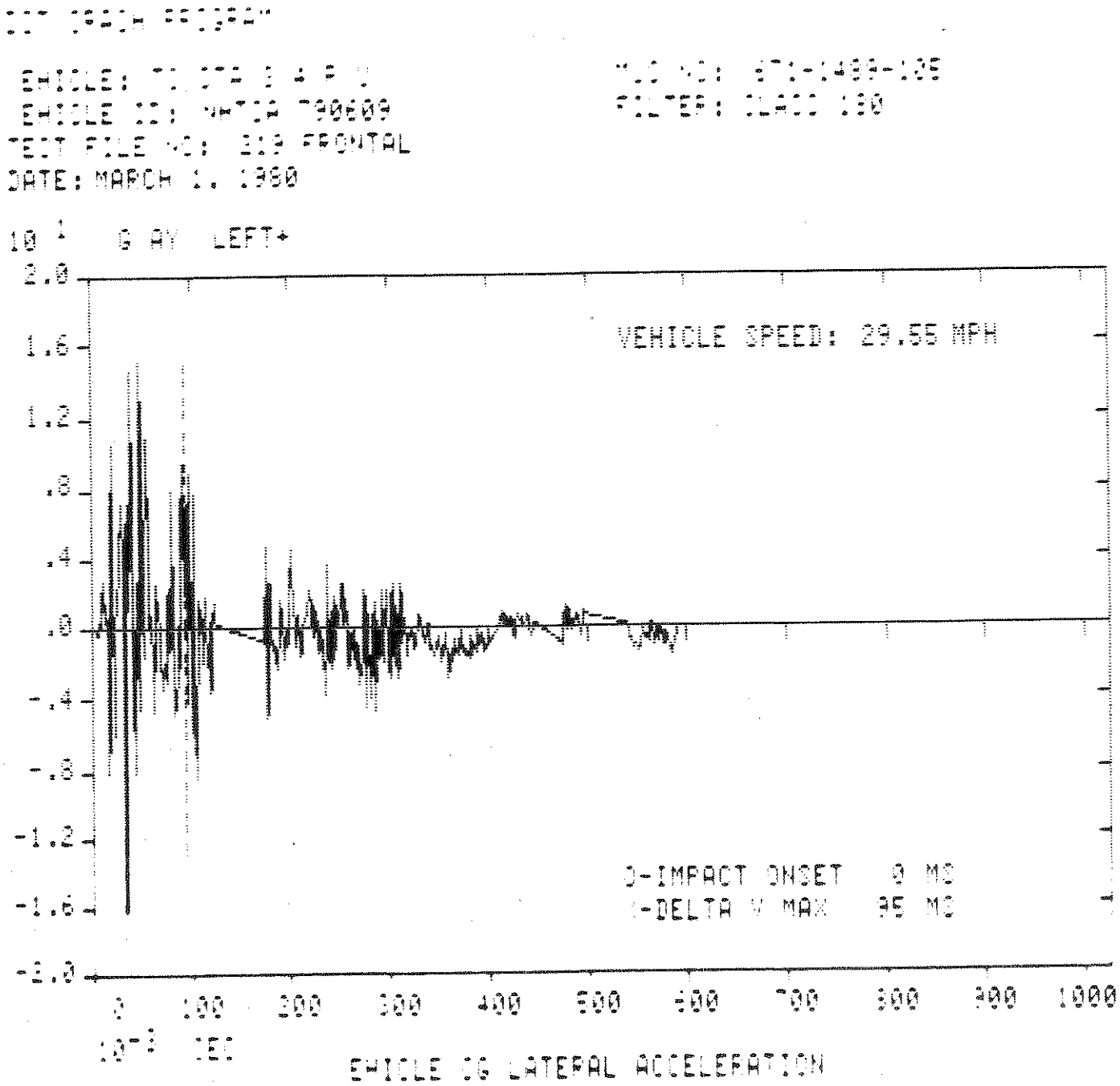
PLOT DATA

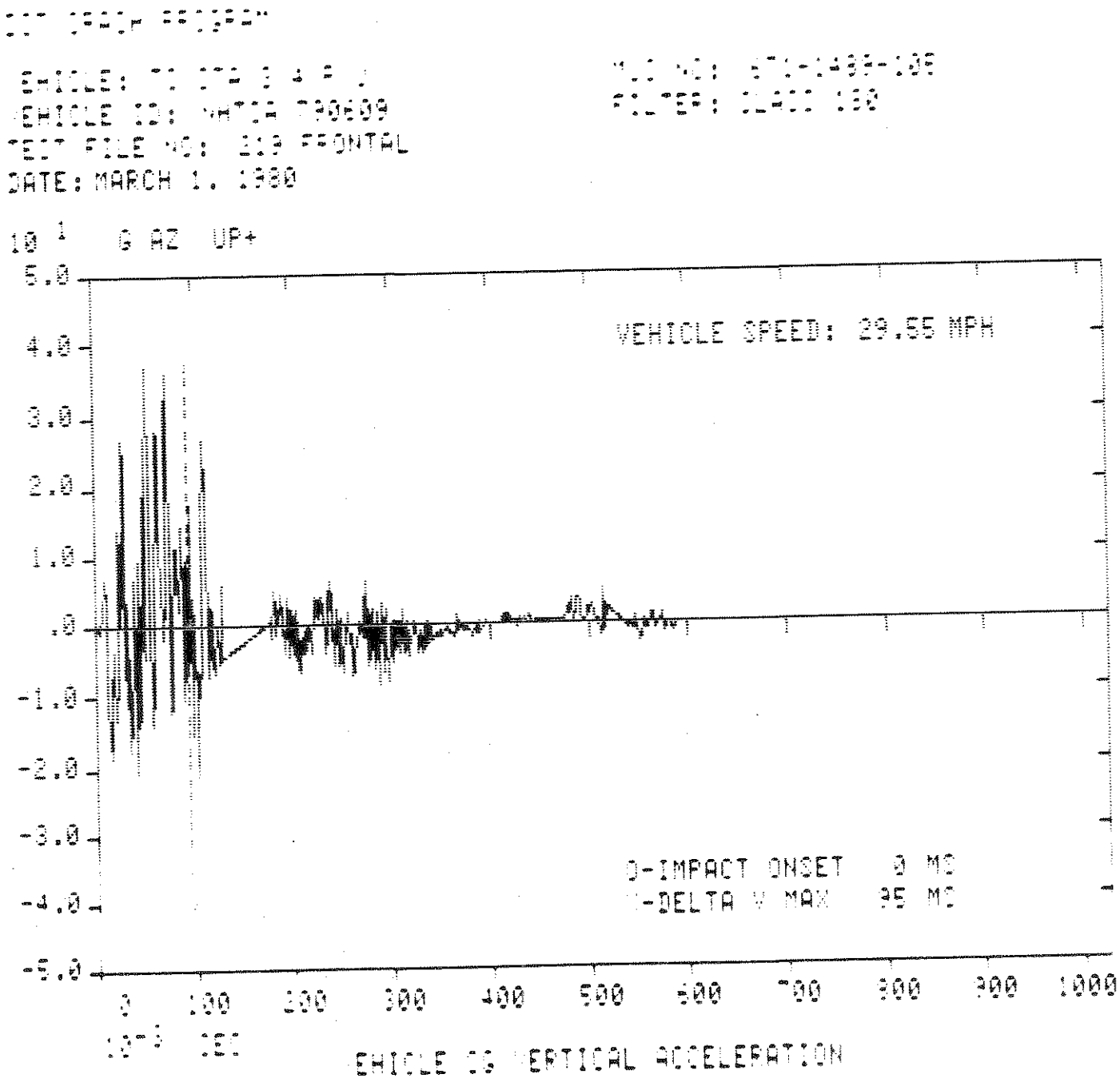
IMPACT OCCURED AT: 5 MS
DELTA VEL TAKEN AT: 80 MS


DCT TRACE PROGRAM
VEHICLE: TOYOTA 3 4 P.U.
VEHICLE ID: VHTCA 790609
TEST FILE NO: 219 FRONTAL
DATE: MARCH 1, 1980
MJC NO: ET1-1469-105
FILTER: CLASS 180
10 1 MPH FWD+
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
VEHICLE SPEED: 29.55 MPH
O-IMPACT ONSET 5 MS
X-DELTA V MAX 80 MS
X
0
100
200
300
400
500
600
700
800
900
1000
10**-3 SEC
VEHICLE CG LONGITUDINAL VELOCITY


VEHICLE SPEED: 29.55 MPH
D-IMPACT ONSET 5 MS
X-DELTA V MAX 80 MS
10 2 G AX FWD+
2.0
1.6
1.2
.8
.4
.0
-.4
-1.2
-1.6
-2.0
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION


VEHICLE SPEED: 29.55 MPH
0-IMPACT ONSET 0 MS
1-DELTA V MAX 35 MS
10 2 G AX FWD+
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE IS LONGITUDINAL ACCELERATION

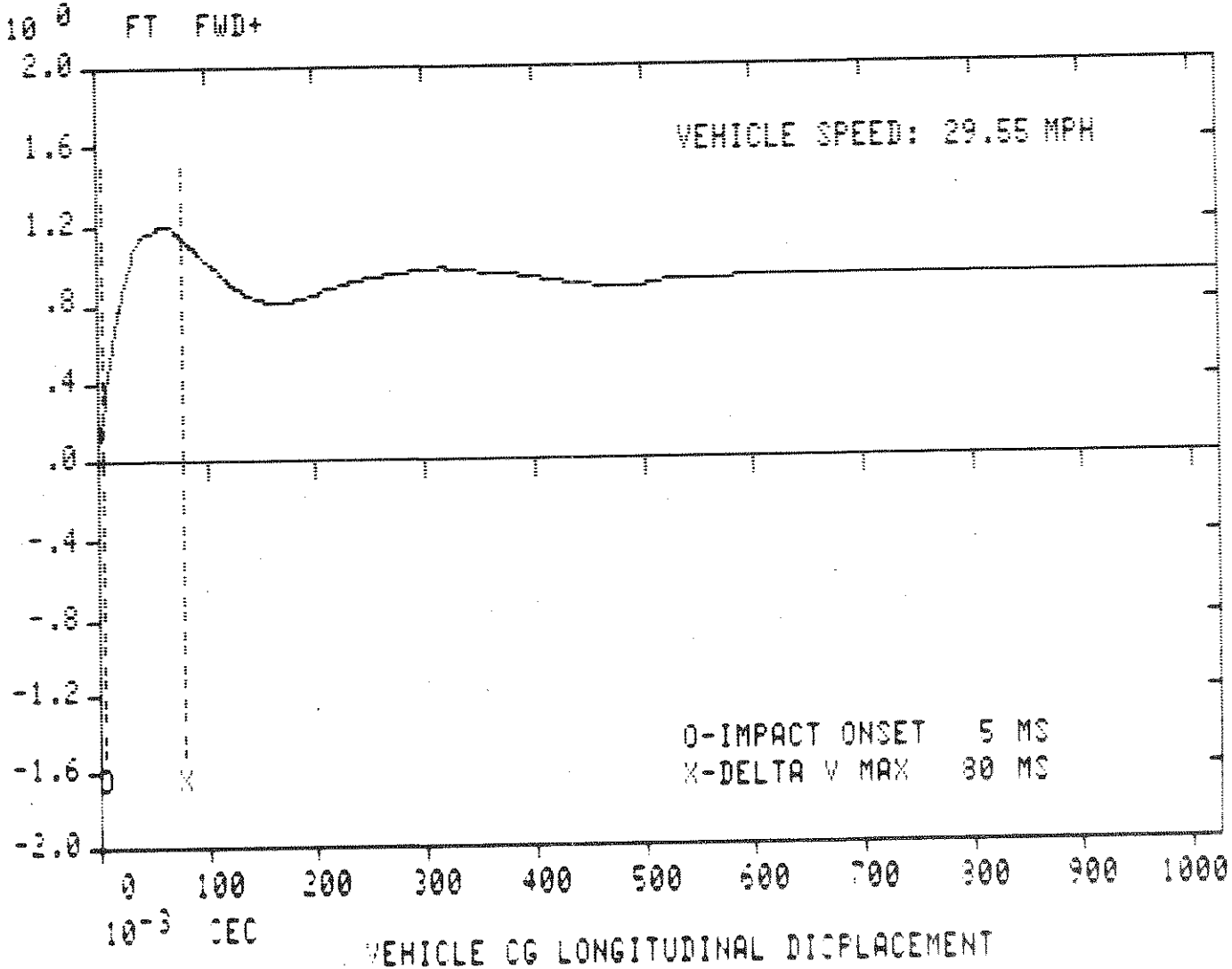

VEHICLE SPEED: 29.55 MPH
G AY LEFT+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
0-IMPACT ONSET 0 MS
MAX 95 MS
0
100
200
300
400
500
600
700
800
900
1000
10^-3 SEC
VEHICLE CG LATERAL ACCELERATION


VEHICLE SPEED: 29.55 MPH
0-IMPACT ONSET 0 MS
1-DELTA V MAX 95 MS
10 1 G AZ UP+
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
0
100
200
300
400
500
600
700
800
900
1000
10**-3 SEC
VEHICLE CG VERTICAL ACCELERATION

[illegible] BEAM

VEHICLE: TOYOTA 3 4 P.U.
VEHICLE ID: NHTSA 780609
TEST FILE NO: 219 FRONTAL
DATE: MARCH 1, 1980

M.I NO: ST1-1119-105
FILTER: CLASS 180



1979 Toyota Long Bed 3/4 Ton - Pick Up

NHTSA 790609

Post-Impact, Left Side View

NHTSA
790609
FMVSS
212 213 301

1979 Toyota Long Bed 3/4 Ton - Pick Up

NHTSA 790609

Post-Impact, Right Side View

1979 Toyota Long Bed 3/4 Ton - Pick Up

NHTSA 790609

Post-Impact, Overhead View

SECTION 3

3.25 JEEP WAGONEER - 4 DOOR STATION WAGON

This section presents information on the 1979 Jeep Wagoneer - 4 Wheel Drive - 4 Door Station Wagon, NHTSA 791301. This test vehicle was subjected to a frontal fixed barrier impact at 29.71 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Jeep

Vehicle Model Wagoneer - 4 Wheel Drive - 4 Door Station Wagon

Vehicle Size Category Multi Purpose

Vehicle Test Weight 5,033 lbs.

Impact Speed 29.71 mph

Speed Change 32.36 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper Guards

Damage Elevation

L = 70.3"

D = 0

C1 = 15.0"

C2 = 16.4"

C3 = 17.5"

C4 = 16.3"

Collision Deformation Classification 12FDEW2

Center of Gravity (Accel.) Location ℄ 53.5" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

DOT IRACH PROGRAM

VEHICLE: JEEP WAGONEER
VEHICLE ID: NHTSA 791301
TEST FILE NO: 199 FRONTAL
DATE: MARCH 7, 1980

IMPACT SPEED

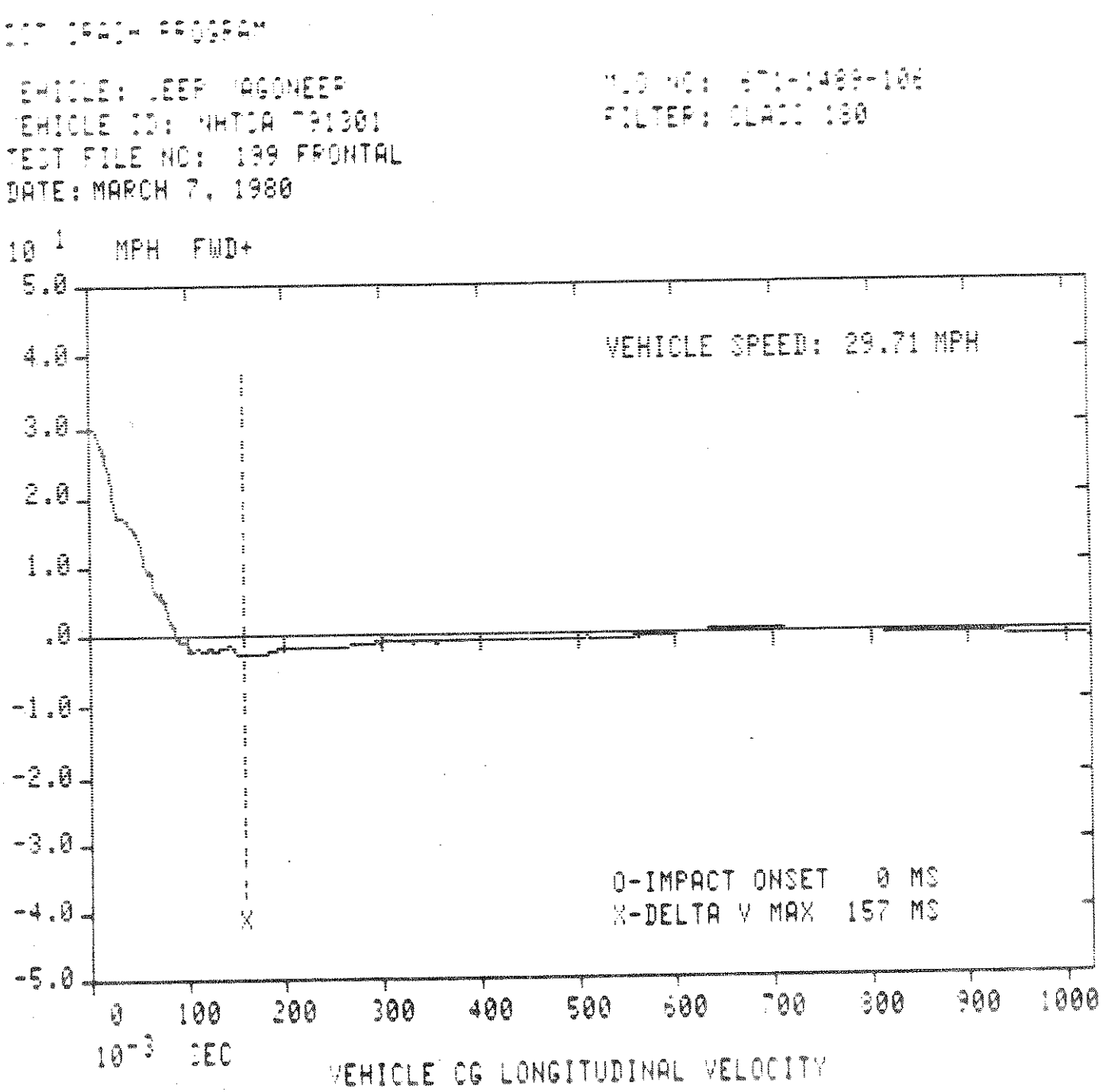
VEHICLE: 29.71 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 32.36 MPH

PLOT DATA

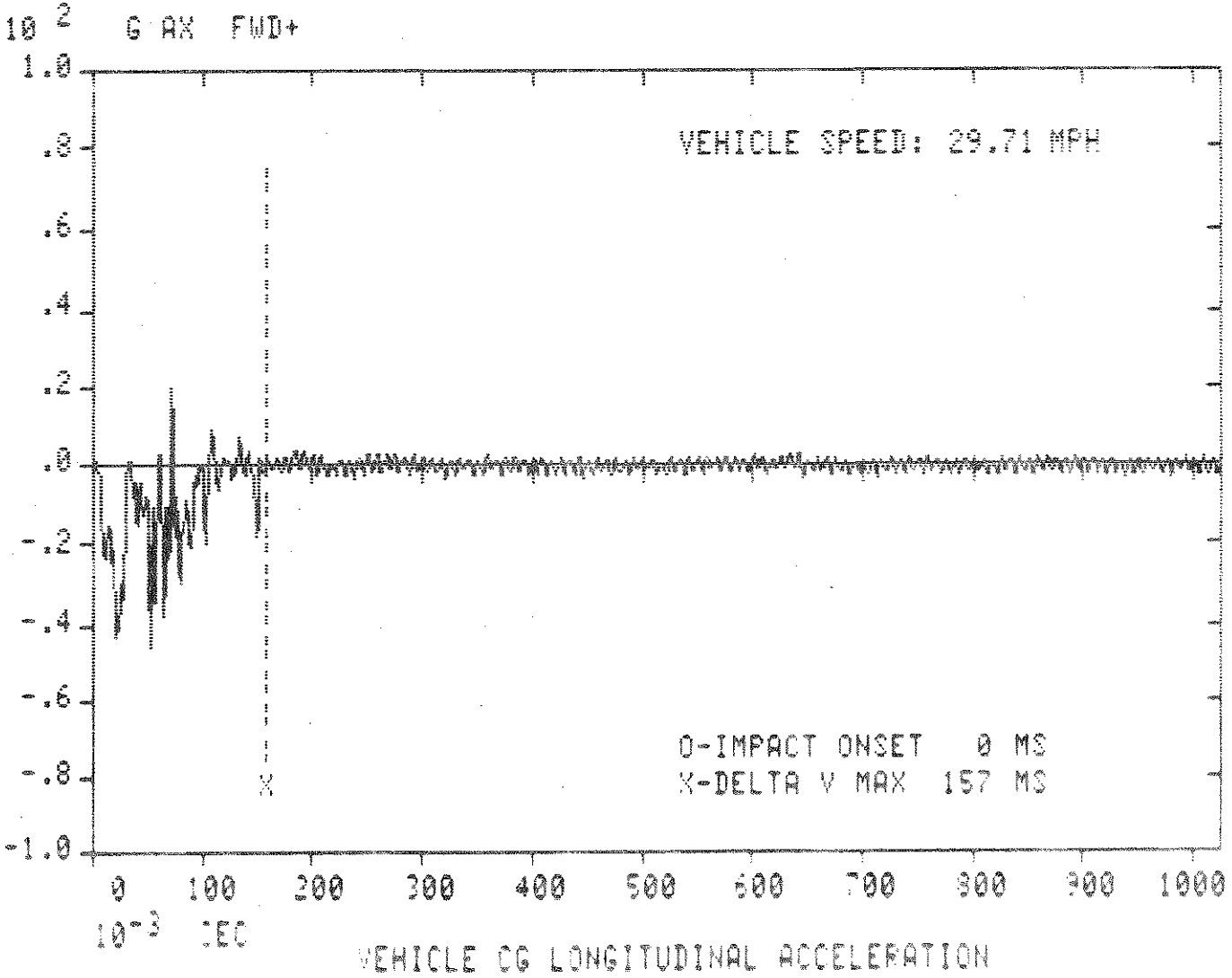
IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 157 MS


*** DEALY PROGRAM ***
VEHICLE: JEEP WAGONEER
VEHICLE ID: WMTCA 791301
TEST FILE NO: 139 FRONTAL
DATE: MARCH 7, 1980
FILTER: CLASS 180
10 1 MPH FWD+
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
VEHICLE SPEED: 29.71 MPH
O-IMPACT ONSET 0 MS
X-DELTA V MAX 157 MS
X
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL VELOCITY

[illegible] [illegible] PROGRAM

VEHICLE: JEEP WAGONEER
VEHICLE ID: WHTCA 791301
TEST FILE NO: 199 FRONTAL
DATE: MARCH 7, 1980

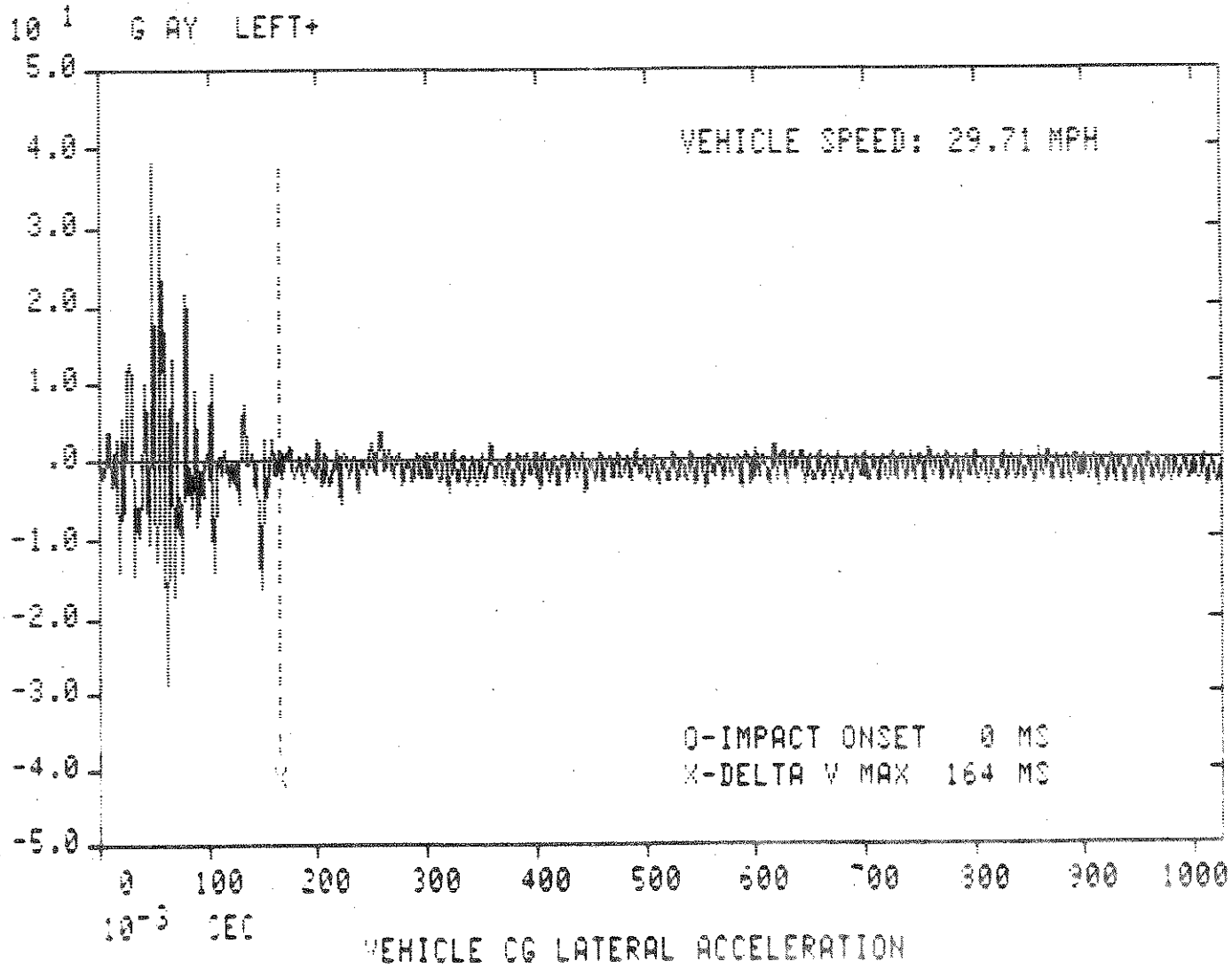
VID NO: [illegible]
FILTER: CLASS 180



DOT CRASH PROGRAM

VEHICLE: JEEP WAGONEER
VEHICLE ID: WHTJA T91301
TEST FILE NO: 199 FRONTAL
DATE: MARCH 7, 1980

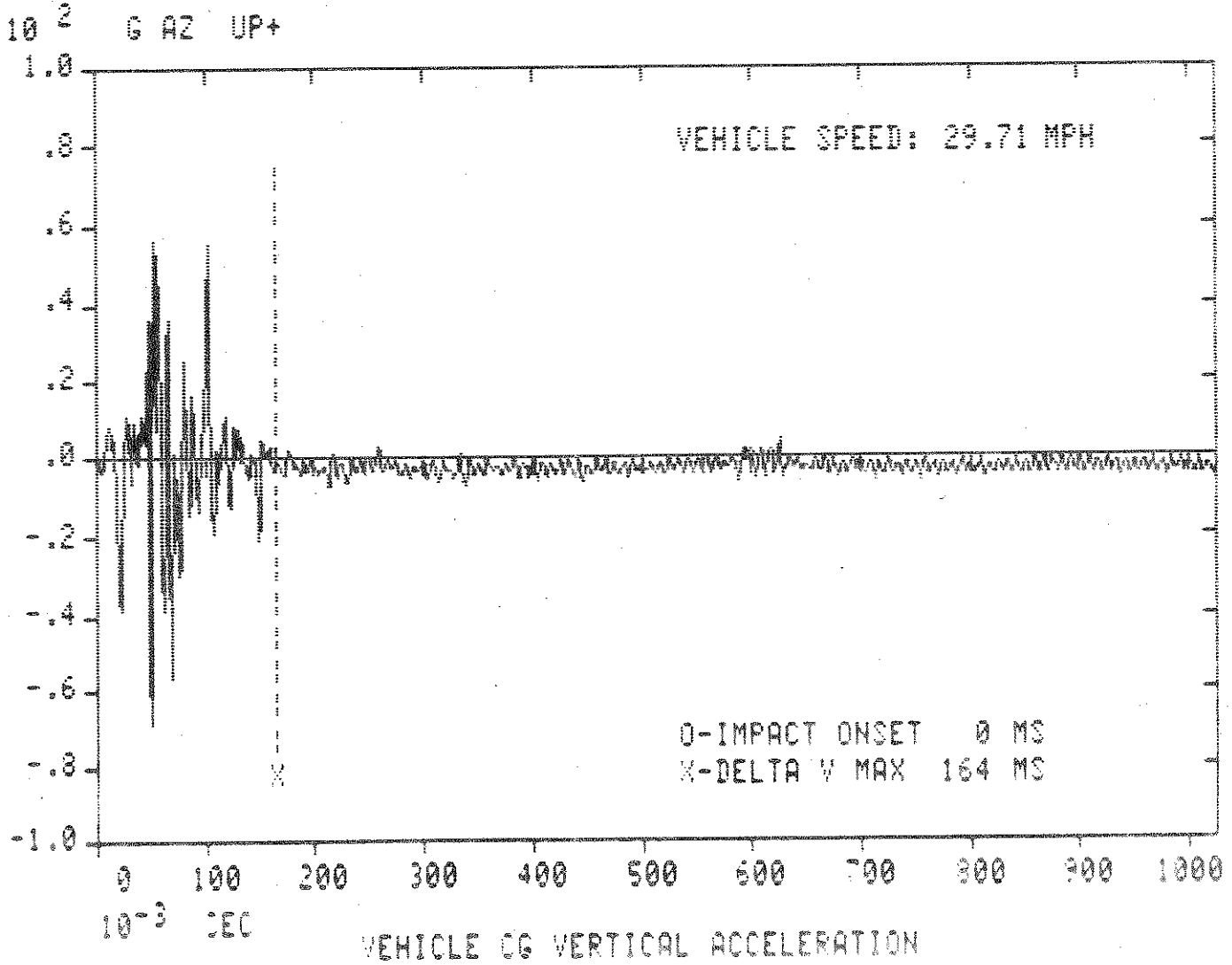
M.O NO: ET1-1488-106
FILTER: CLASS 180



DOT CRASH PROGRAM

VEHICLE: JEEP WAGONEER
VEHICLE ID: NHTSA 791301
TEST FILE NO: 199 FRONTAL
DATE: MARCH 7, 1980

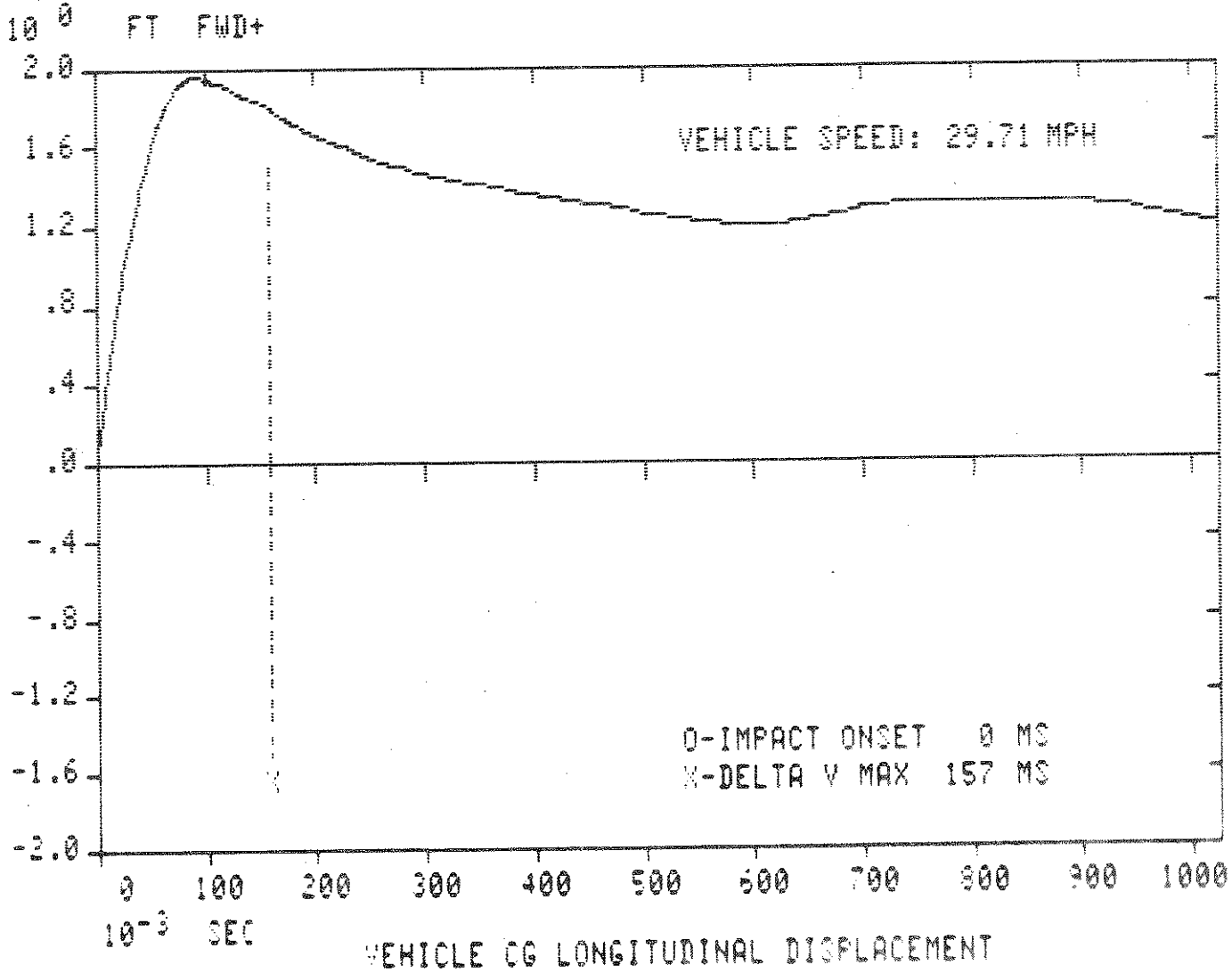
MJO NO: 81-1498-106
FILTER: CLASS 180



??? ???H ??OGRAM

VEHICLE: JEEP WAGONEER
VEHICLE ID: NHTSA 791301
TEST FILE NO: 199 FRONTAL
DATE: MARCH 7, 1980

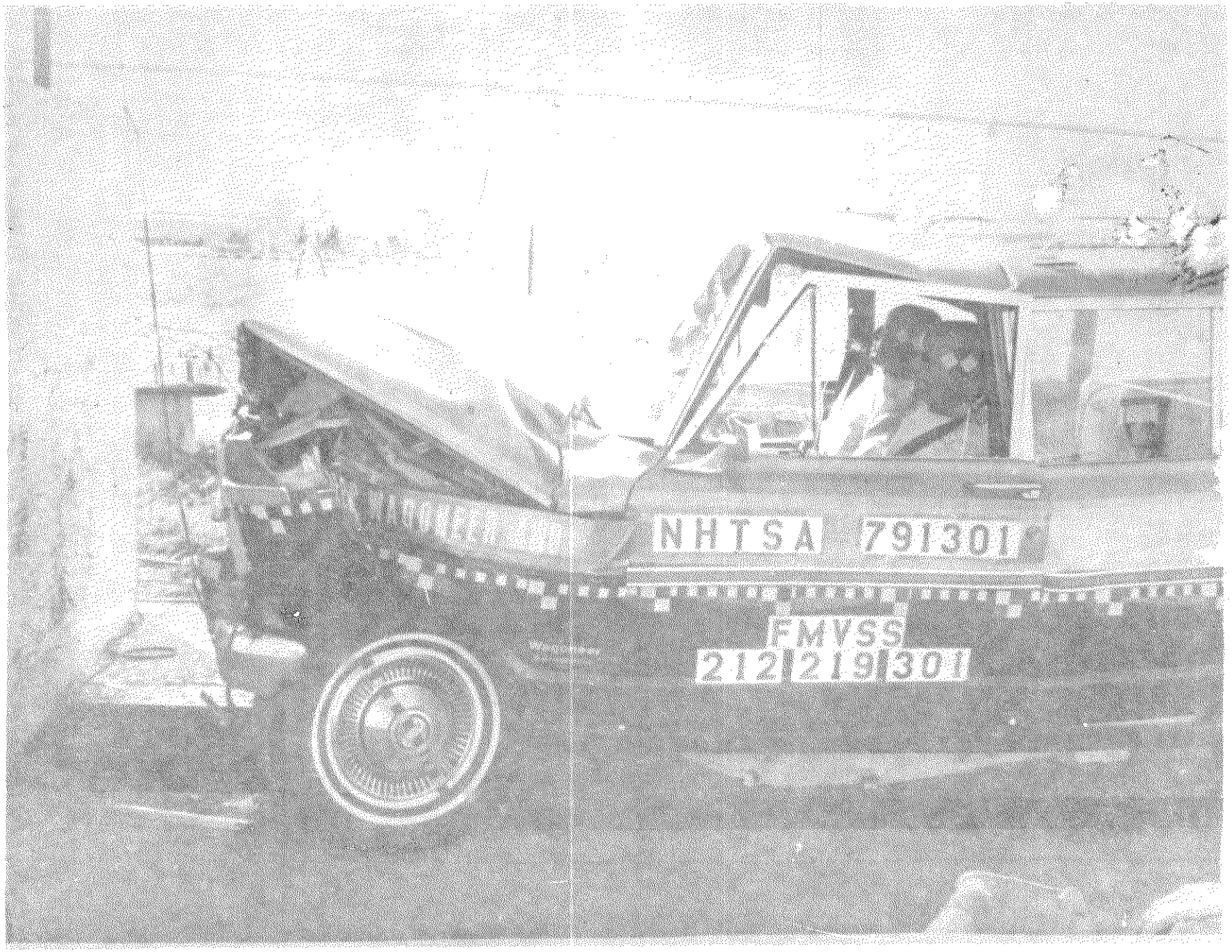
MJD NO: 871-1489-105
FILTER: CLASS 180



1979 Jeep Wagoneer - 4 Wheel Drive - 4 Door Station Wagon

NHTSA 791301

Post-Impact, Left Side View


NHTSA 79130I
FMVSS
212219130I

1979 Jeep Wagoneer - 4 Wheel Drive - 4 Door Station Wagon

NHTSA 791301

Post-Impact, Right Side View

NHTSA 01301

1979 Jeep Wagoneer - 4 Wheel Drive - 4 Door Station Wagon

NHTSA 791301

Post-Impact, Overhead View

SECTION 3

3.26 CHEVROLET SILVERADO K20 (4X4) - PICK UP

This section presents information on the 1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up, NHTSA 790607. This test vehicle was subjected to a frontal fixed barrier impact at 30.44 mph.

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Chevrolet

Vehicle Model Silverado K20 (4X4) Fleetside - Pick Up

Vehicle Size Category Truck

Vehicle Test Weight 6,044 lbs.

Impact Speed 30.44 mph

Speed Change 31.47 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 76.0"

D = 0

C1 = 22.6"

C2 = 23.2"

C3 = 23.2"

C4 = 22.6"

Collision Deformation Classification 12FDEW3

Center of Gravity (Accel.) Location ℄ 59.3" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

SCT BASIC PROGRAM

VEHICLE: CHEV. SILVERADO K20 P U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 203 FRONTAL
DATE: MARCH 13,1980

IMPACT SPEED

VEHICLE: 30.44 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 31.47 MPH

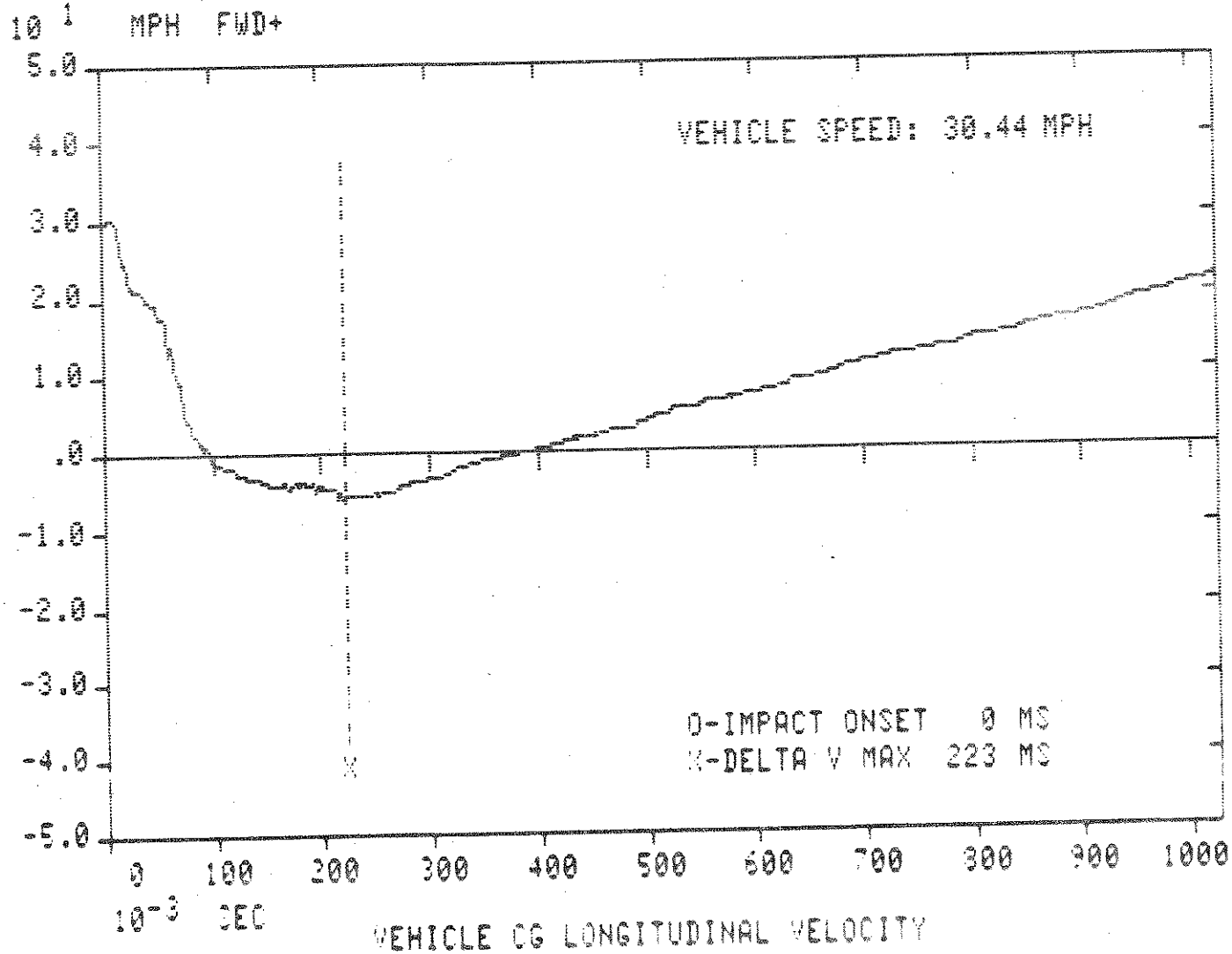
PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 265 MS

SCT CRASH PROGRAM

VEHICLE: CHEV. SILVERADO K20 P-U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 303 FRONTAL
DATE: MARCH 13, 1980

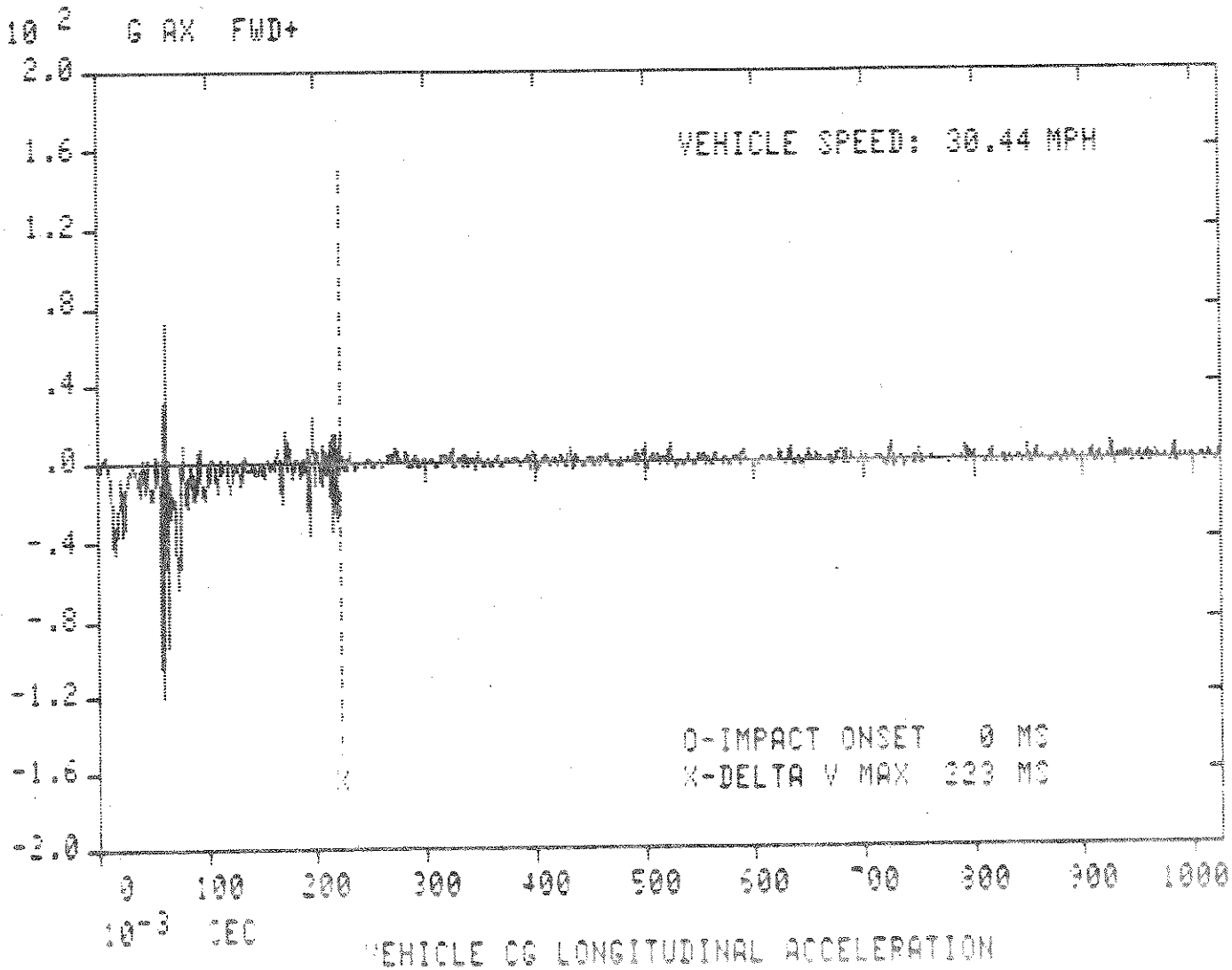
MJO NO: ST1-1469-10
FILTER: CLASS 180



TEST SPECIFICATION PROGRAM

VEHICLE: CHEV. SILVERADO 1/2 T P U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 203 FRONTAL
DATE: MARCH 13, 1980

MDB NO: 571-1489-1MT
FILTER: CLASS 180

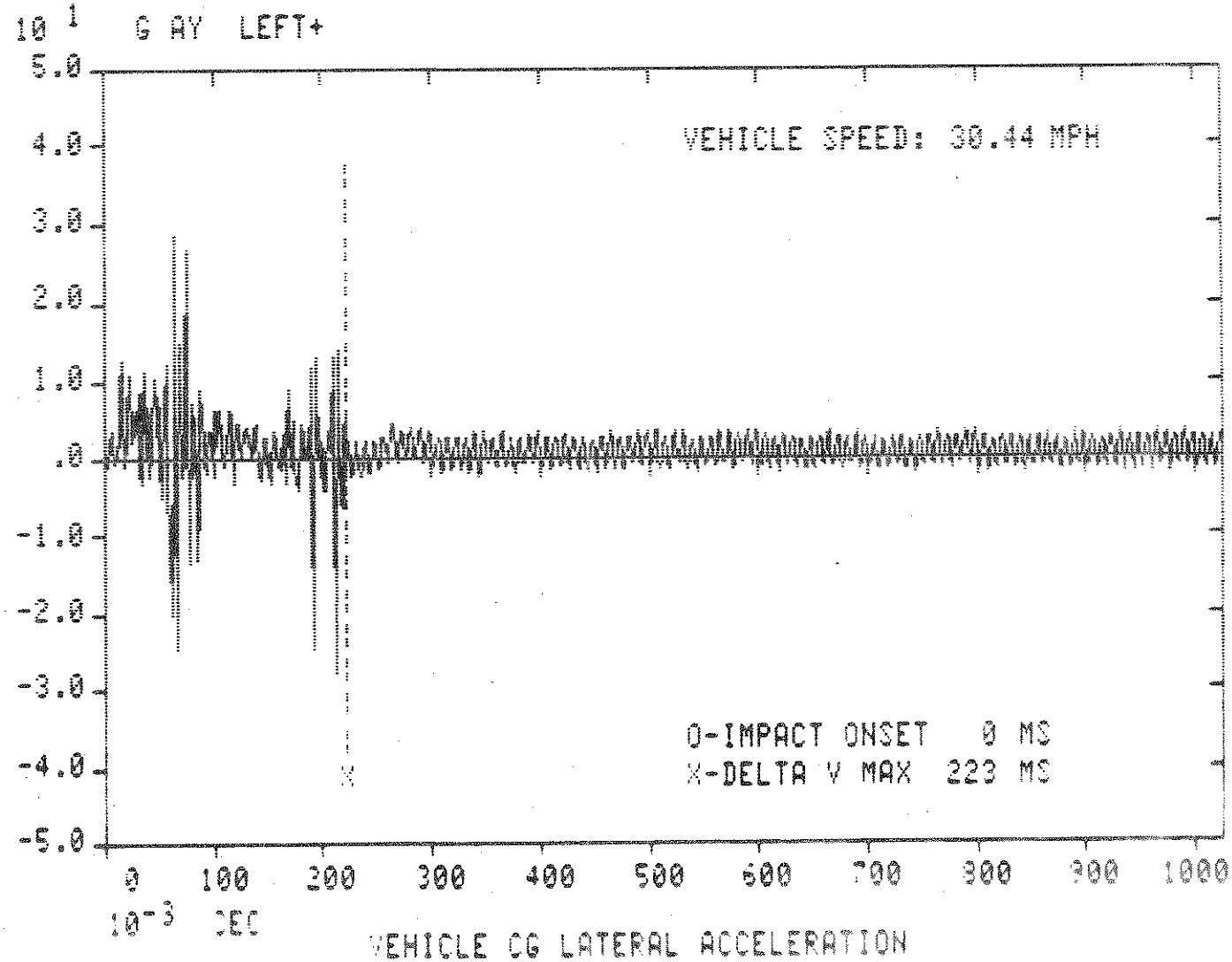


VEHICLE CG LONGITUDINAL ACCELERATION

DOT CRASH PROGRAM

VEHICLE: CHEV. SILVERADO K20 P/U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 203 FRONTAL
DATE: MARCH 13, 1980

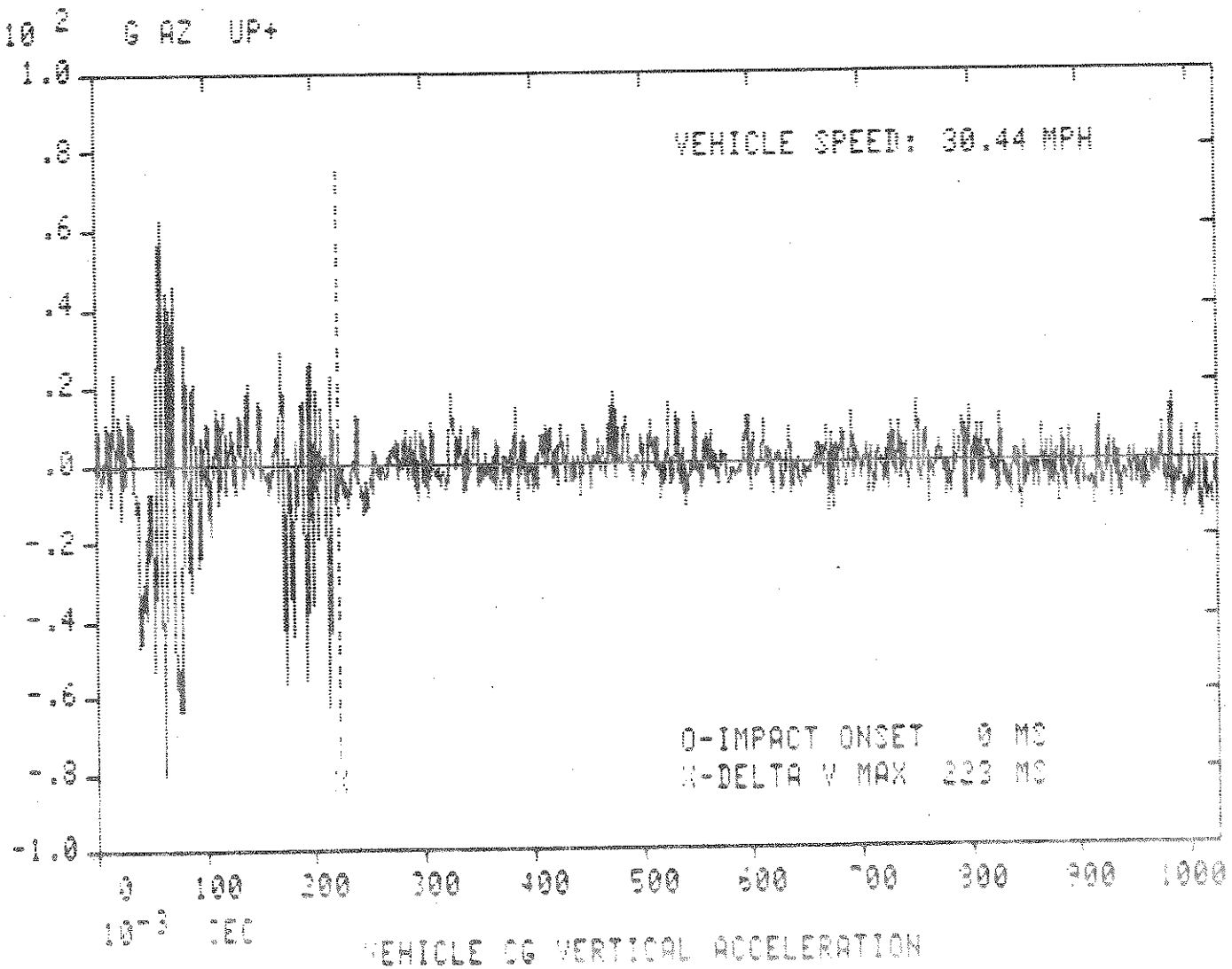
MJO NO: ST1-1439-107
FILTER: CLASS 180



SOT SPEECH PROGRAM

VEHICLE: CHEV. SILVERADO K30 P U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 203 FRONTAL
DATE: MARCH 13, 1980

MDB NO: STI-1439-1ST
FILTER: SAE J 211

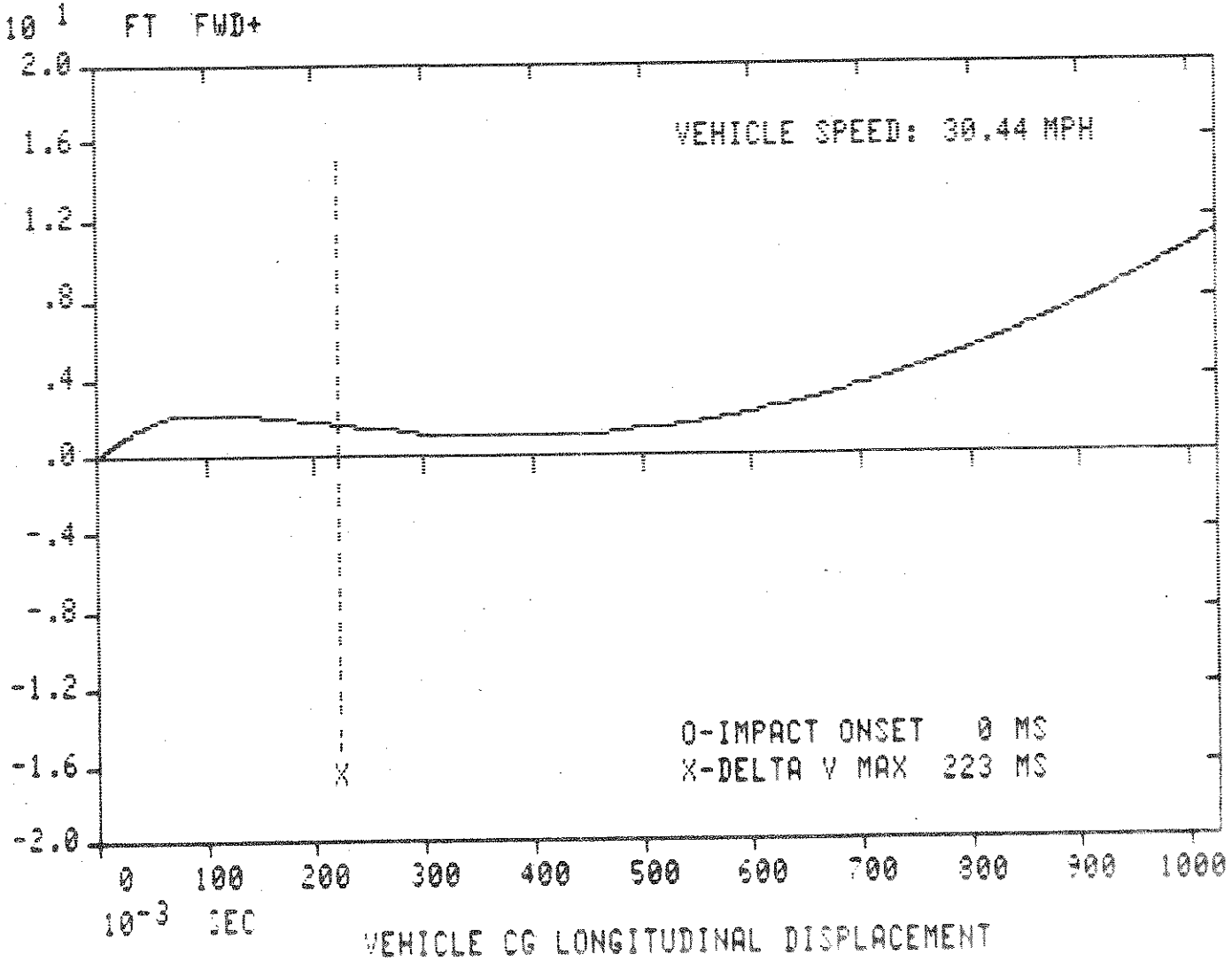


VEHICLE CG VERTICAL ACCELERATION

DOT CRASH PROGRAM

VEHICLE: CHEV. SILVERADO K20 P U
VEHICLE ID: NHTSA 790607
TEST FILE NO: 203 FRONTAL
DATE: MARCH 13, 1990

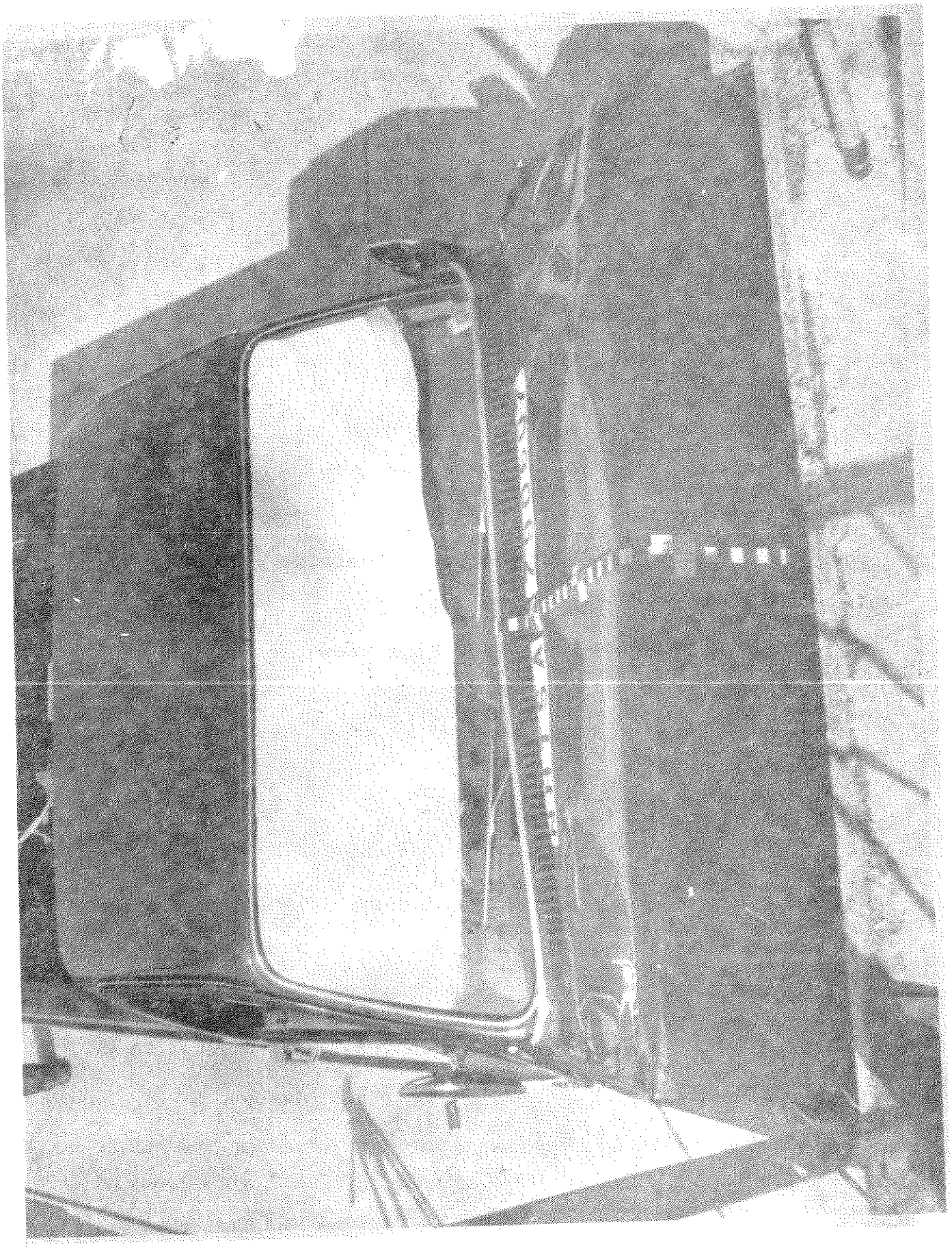
MJO NO: 671-1489-10T
FILTER: CLASS 180



1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up

NHTSA 790607

Post-Impact, Front View



1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up

NHTSA 790607

Post-Impact, Left Side View


NHTSA
790607
FMVSS
212 219 301

1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up

NHTSA 790607

Post-Impact, Right Side View

NHTSA
790607

1979 Chevrolet Silverado K20 (4X4) Fleetside - Pick Up

NHTSA 790607

Post-Impact, Overhead View

SECTION 3

3.27 FORD CUSTOM STYLESIDE F350 - PICK UP

This section presents information on the 1979 Ford Custom Styleside F350 - Pick Up, NHTSA 790608. This test vehicle was subjected to a frontal fixed barrier impact at 29.70 mph.

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Ford

Vehicle Model Custom Styleside F350 - Pick Up

Vehicle Size Category Truck

Vehicle Test Weight 5,217 lbs.

Impact Speed 29.70 mph

Speed Change 29.94 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 76.1"

D = 0

C1 = 18.6"

C2 = 19.3"

C3 = 19.1"

C4 = 16.2"

Collision Deformation Classification 12FDEW2

Center of Gravity (Accel.) Location ℄ 65.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

[illegible] CRASH PROGRAM

VEHICLE: FORD F350 P.U.
VEHICLE ID: NHTSA T90608
TEST FILE NO: 223 FRONTAL
DATE: MARCH 20, 1980

IMPACT SPEED

VEHICLE: 29.70 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 29.94 MPH

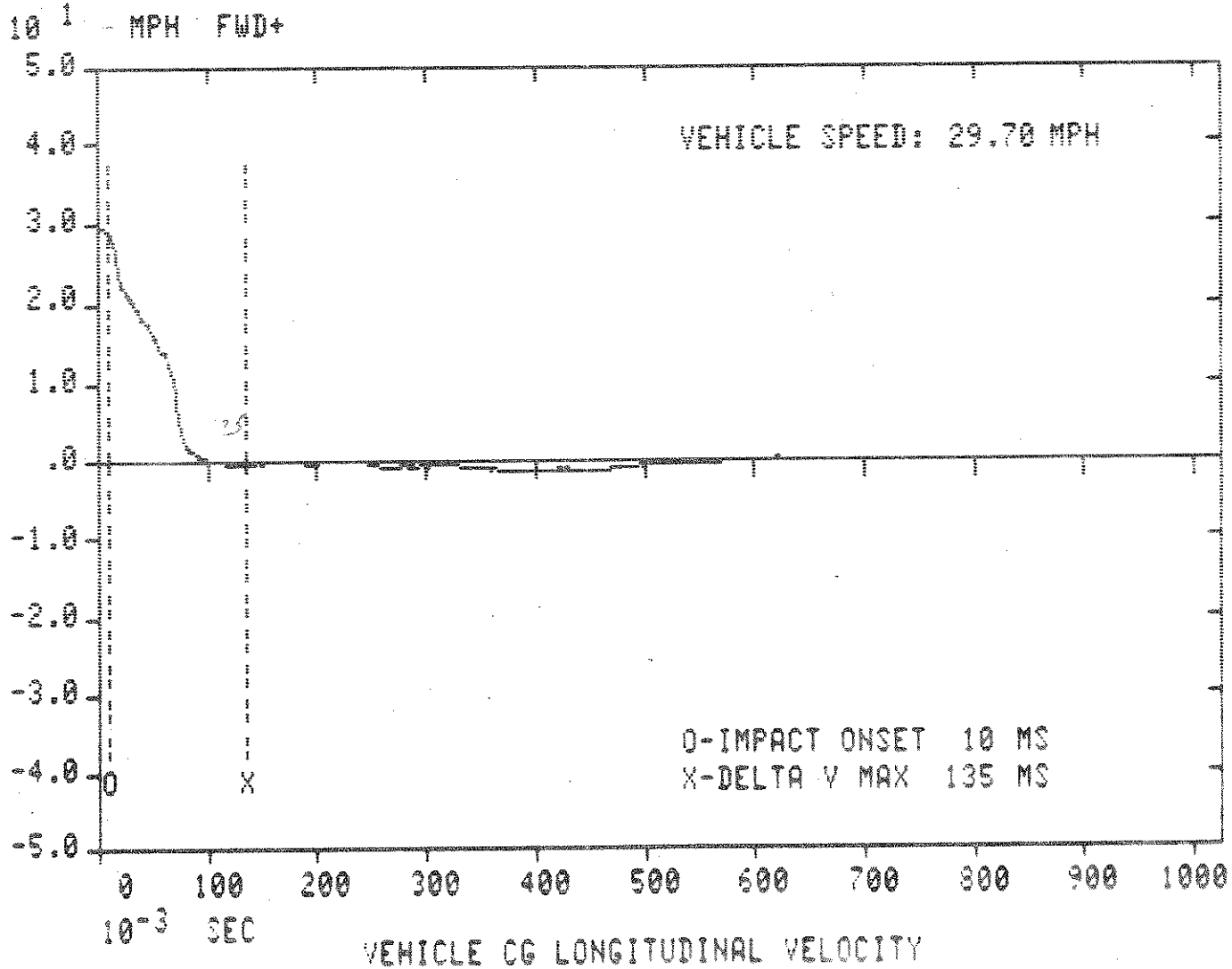
PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 135 MS

DOT CRASH PROGRAM

VEHICLE: FORD F350 P.U.
VEHICLE ID: NHTSA 790608
TEST FILE NO: 223 FRONTAL
DATE: MARCH 20, 1990

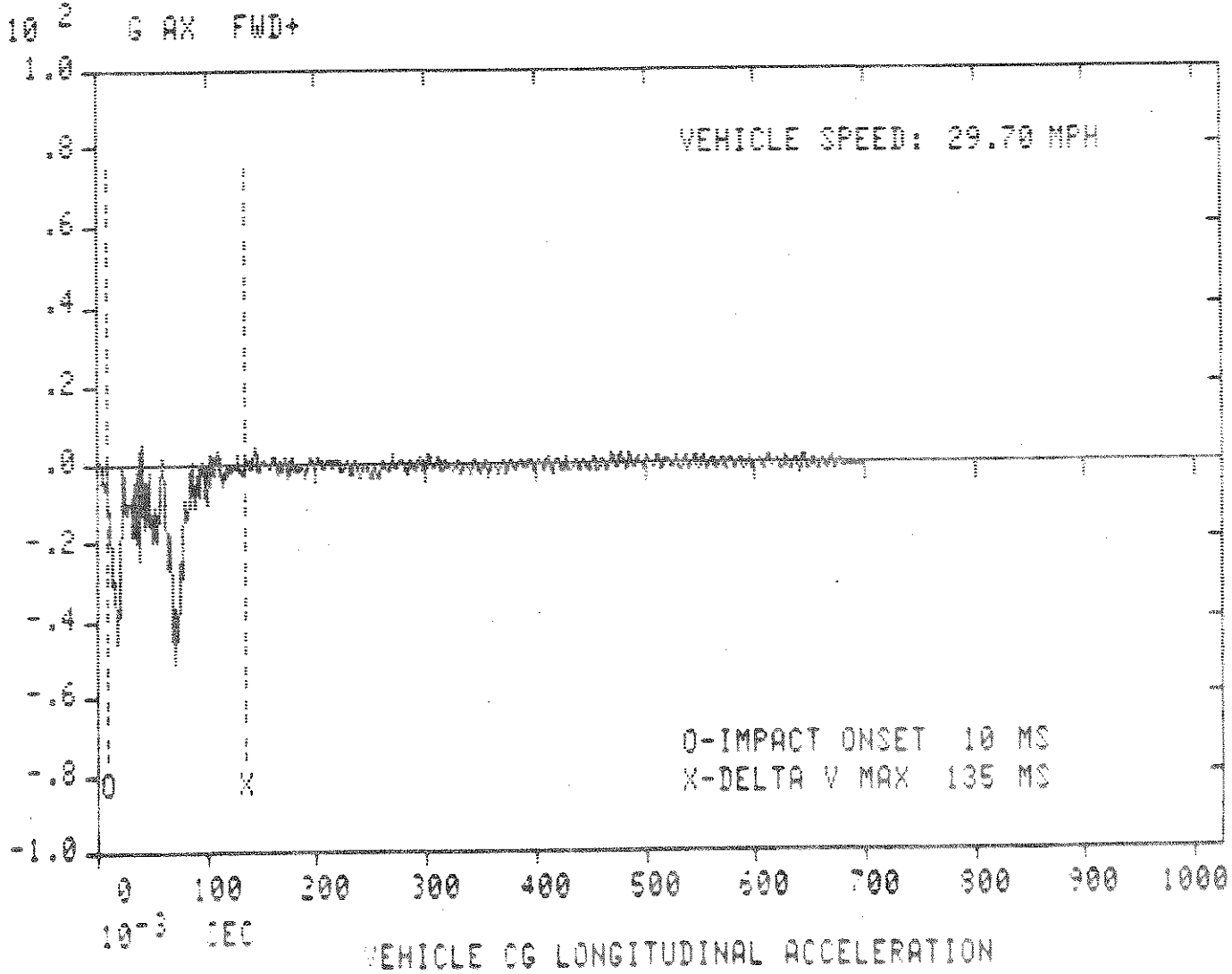
MJC NO: ST1-1439-108
FILTER: CLASS 180

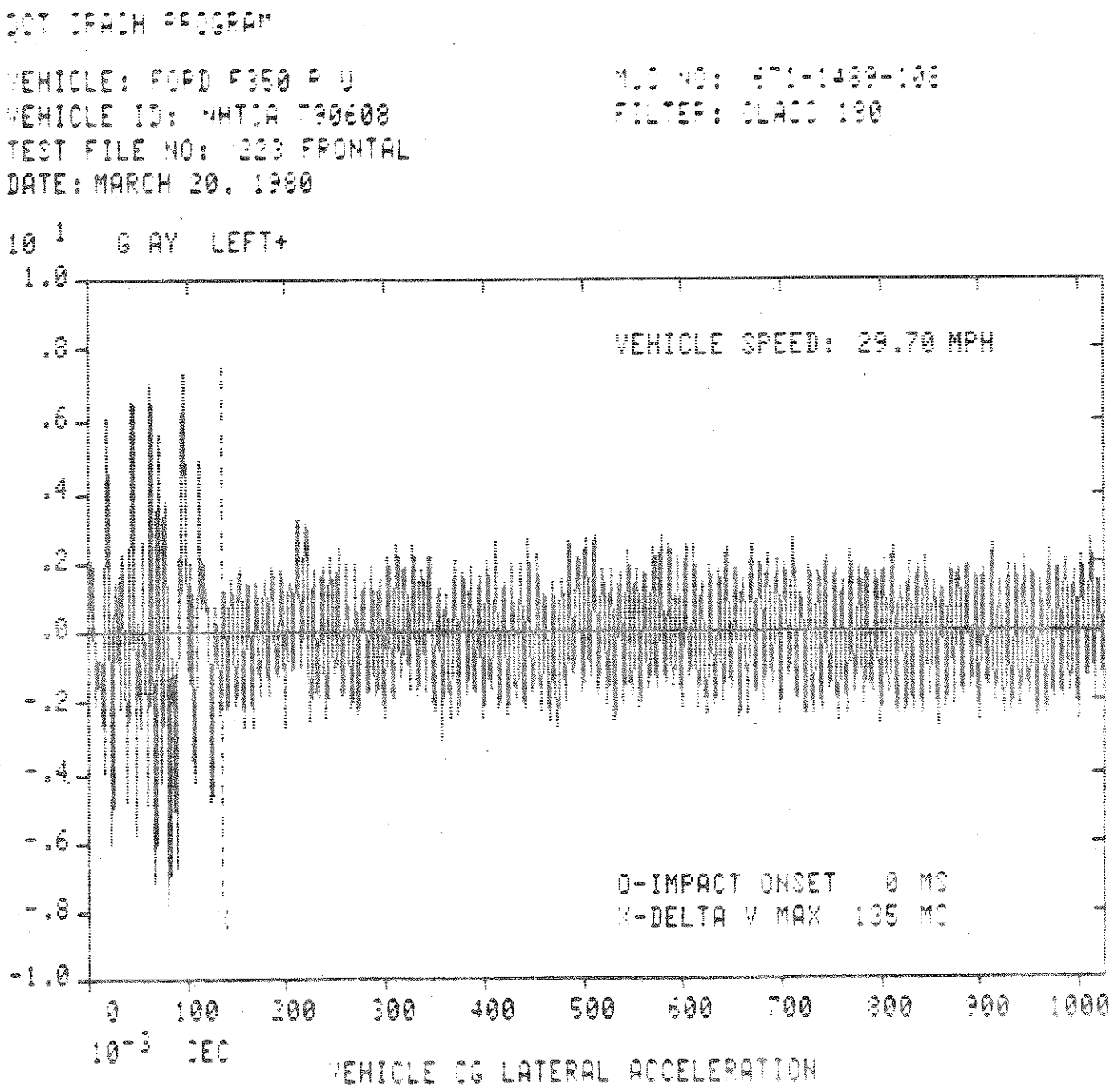


*** TEST RESULTS ***

VEHICLE: FORD FIESTA ...
VEHICLE ID: WHTIM 900608
TEST FILE NO: 222 FRONTAL
DATE: MARCH 20, 1980

DAS NO: 671-444-100
FILTER: CFC 180

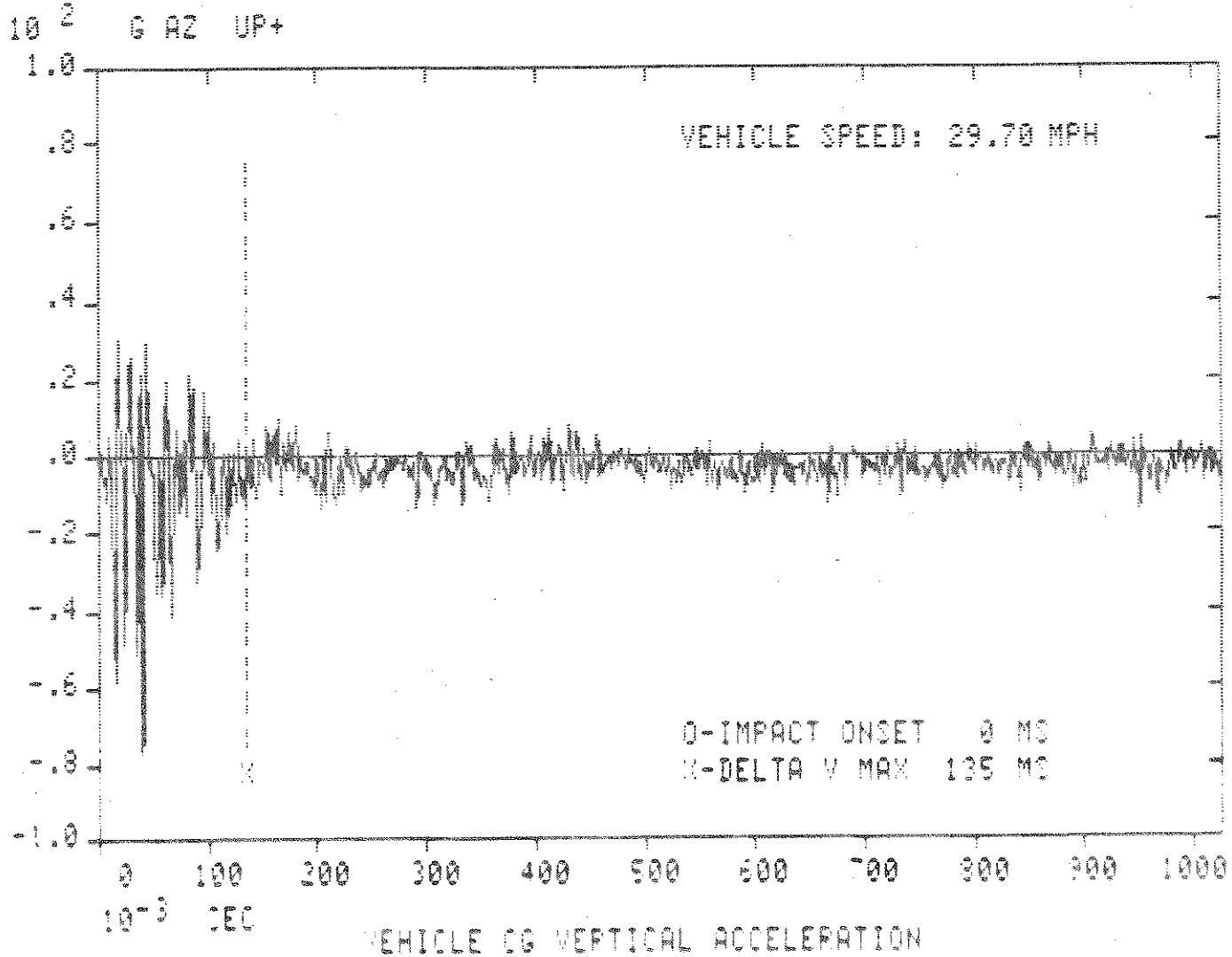



VEHICLE: FORD F350 P U
VEHICLE ID: AWTJA 730E08
TEST FILE NO: 223 FRONTAL
DATE: MARCH 20, 1980
FILTER: CLASS 180
10 1
G AY LEFT+
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
VEHICLE SPEED: 29.70 MPH
0-IMPACT ONSET 0 MS
X-DELTA V MAX 135 MS
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LATERAL ACCELERATION

NHTSA CRASH PROGRAM

VEHICLE: FORD F150 P U
VEHICLE ID: NHTSA 790608
TEST FILE NO: 223 FRONTAL
DATE: MARCH 30, 1980

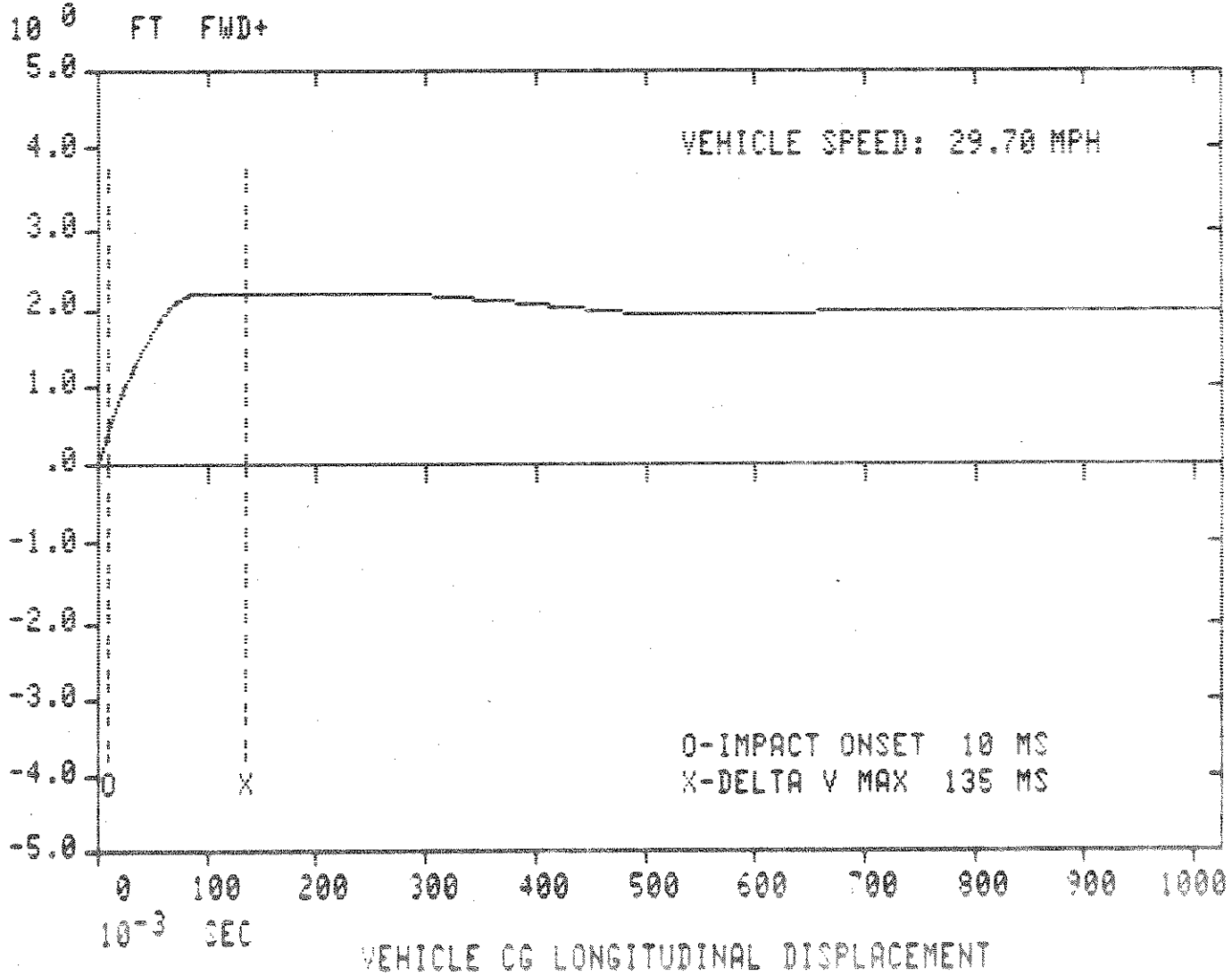
MJO NO: ET1-1423-102
FILTER: CLASS 180



DOT CRASH PROGRAM

VEHICLE: FORD F350 P.U.
VEHICLE ID: NHTSA 790608
TEST FILE NO: 223 FRONTAL
DATE: MARCH 20, 1980

MJC NO: 571-1489-108
FILTER: CLASS 180

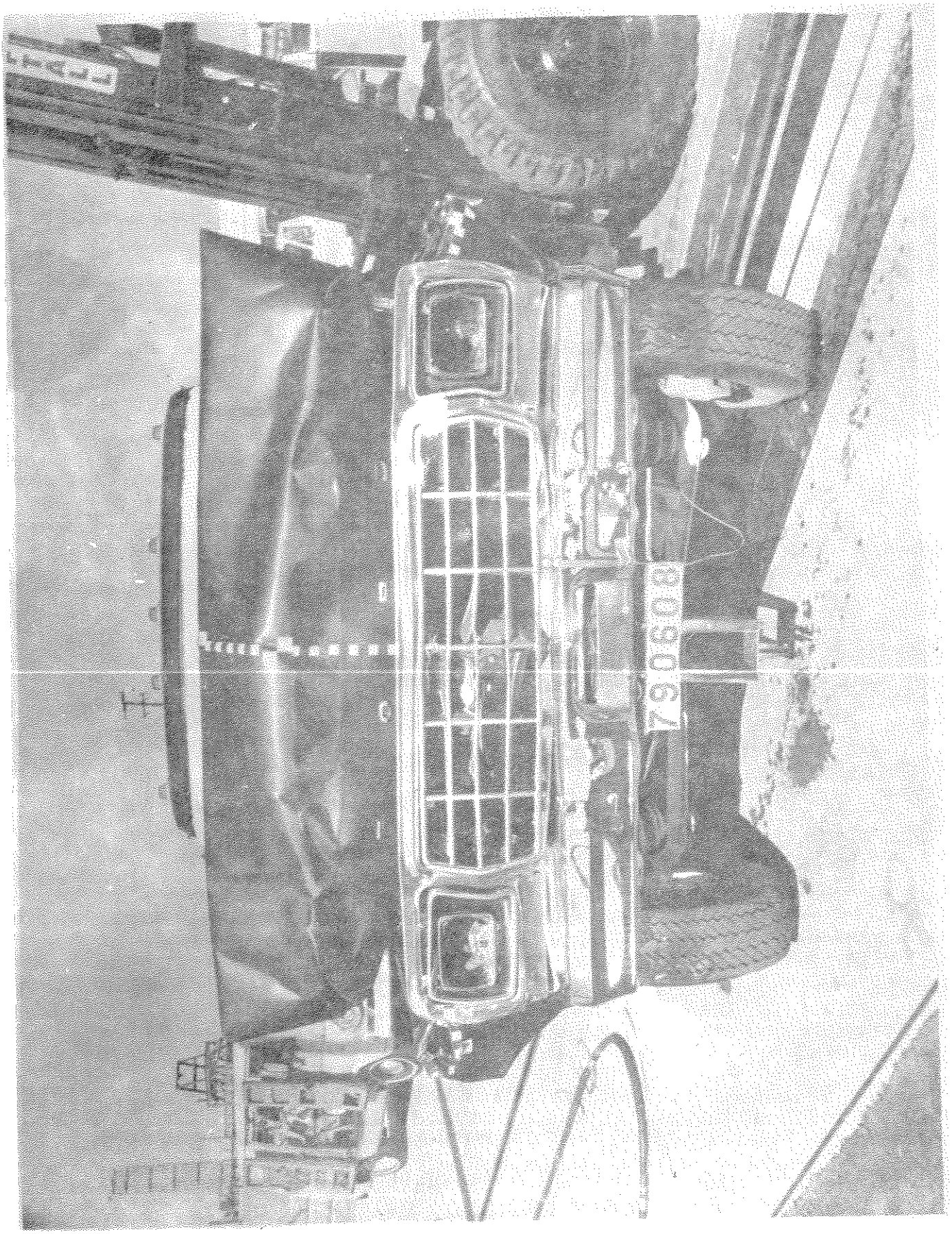


VEHICLE CG LONGITUDINAL DISPLACEMENT

1979 Ford Custom Styleside F350 - Pick Up

NHTSA 790608

Post-Impact, Full Front View



1979 Ford Custom Styleside F350 - Pick Up

NHTSA 790608

Post-Impact, Left Side View

1979 Ford Custom Styleside F350 - Pick Up

NHTSA 790608

Post-Impact, Right Side View

1979 Ford Custom Styleside F350 - Pick Up

NHTSA 790608

Post-Impact, Overhead View

SECTION 3

3.28 CHINOOK GAZELLE POP-TOP - MOTOR HOME

This section presents information on the 1979 Chinook Gazelle Pop-Top - Motor Home, NHTSA 791303. This test vehicle was subjected to a frontal fixed barrier impact at 29.68 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Chinook

Vehicle Model Gazelle Pop-Top Motor Home

Vehicle Size Category Multi-Purpose

Vehicle Test Weight 3,996 lbs.

Impact Speed 29.68 mph

Speed Change 30.45 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 62.2"

D = 0

C1 = 16.9"

C2 = 18.7"

C3 = 19.3"

C4 = 19.0"

Collision Deformation Classification 12FDEW3

Center of Gravity (Accel.) Location ℄ 66.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

[illegible]

VEHICLE: [illegible] - MINI
VEHICLE ID: WHITE T91303
TEST FILE NO: 210 FRONTAL
DATE: MARCH 27, 1980

IMPACT SPEED

VEHICLE: 29.68 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 30.45 MPH

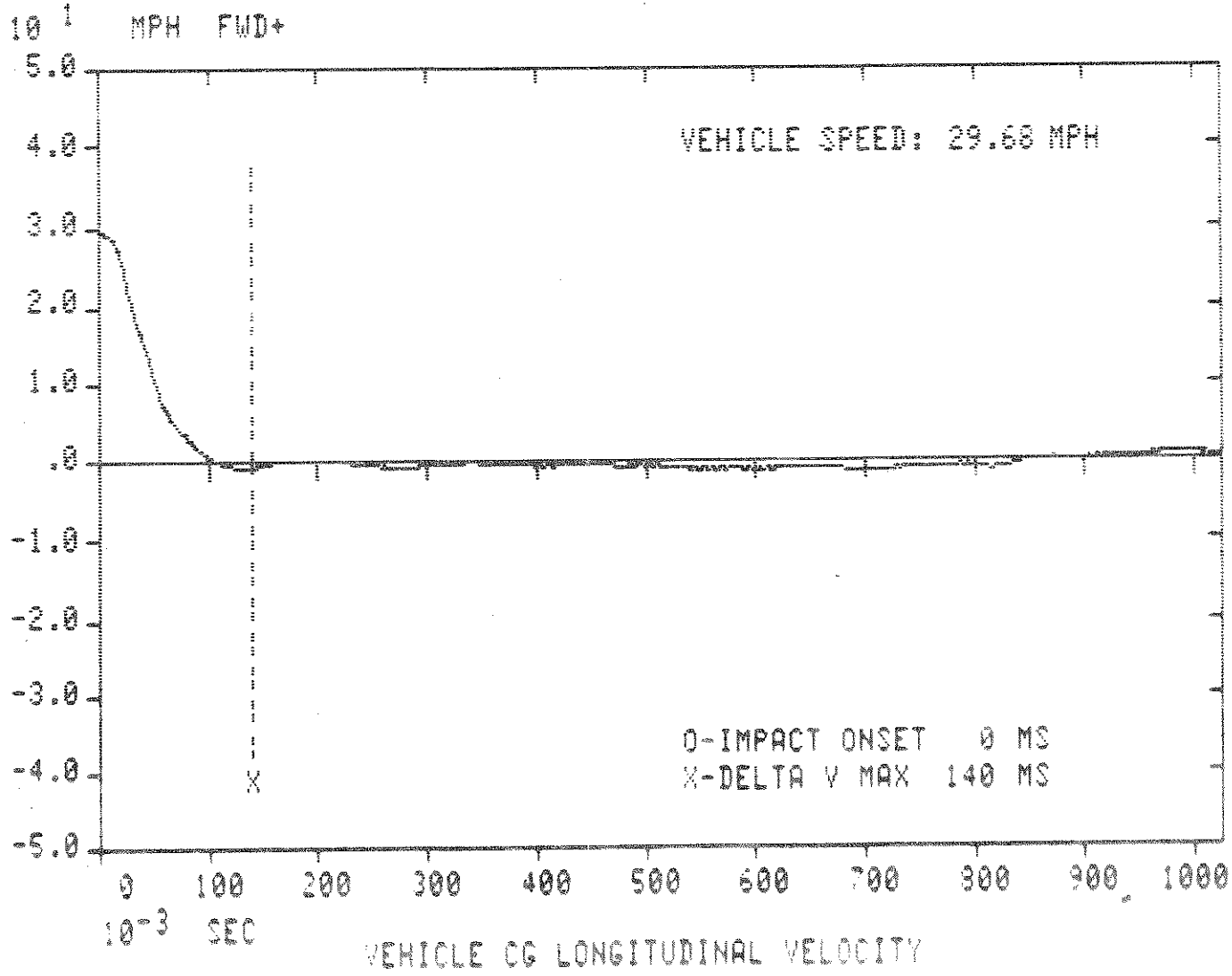
PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 140 MS

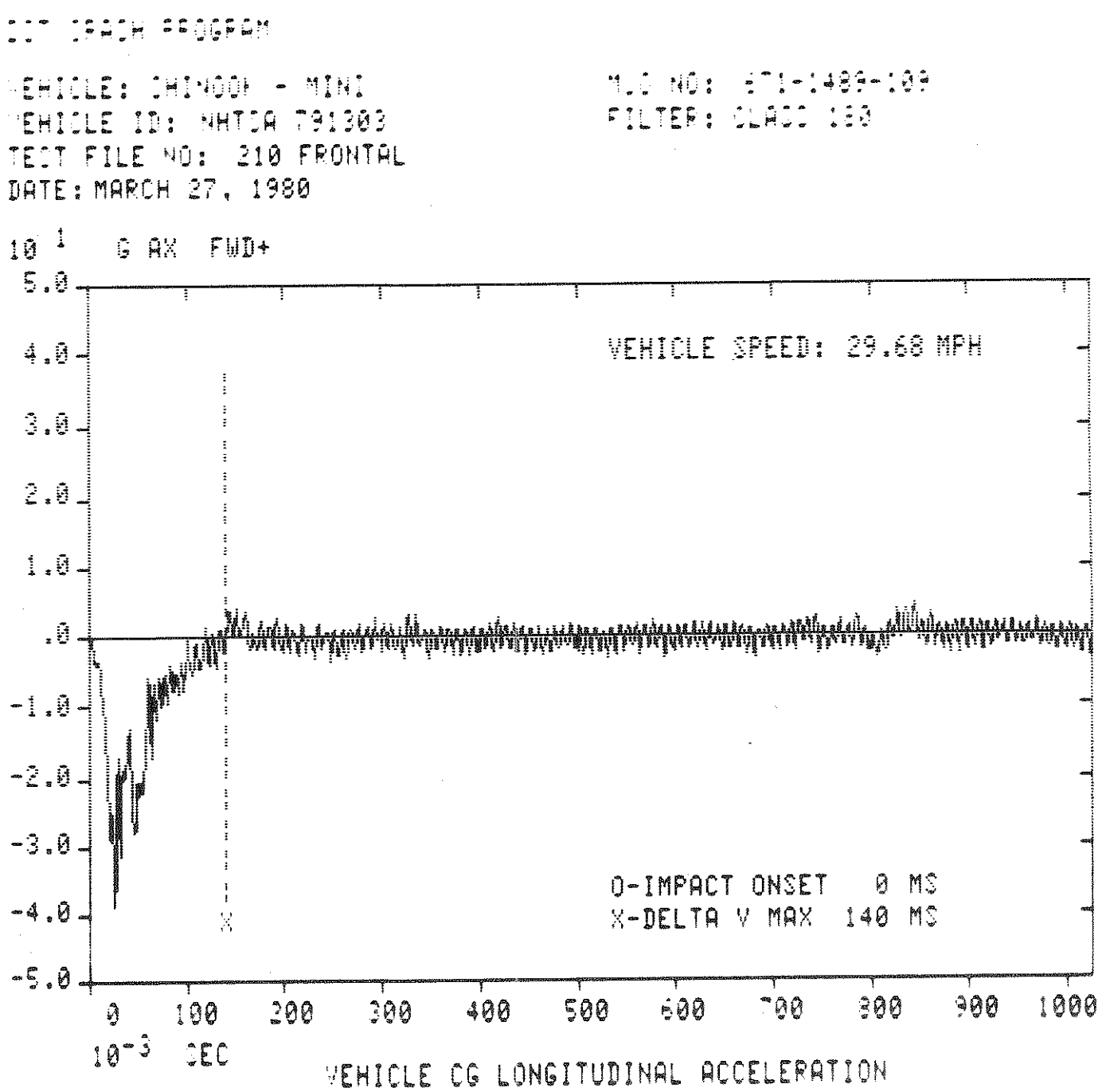
EDT SPACH PROGRAM

VEHICLE: CHINOOK - MINI
VEHICLE ID: NHTSA 791303
TEST FILE NO: 210 FRONTAL
DATE: MARCH 27, 1980

JOB NO: 571-1439-109
FILTER: CLASS 180



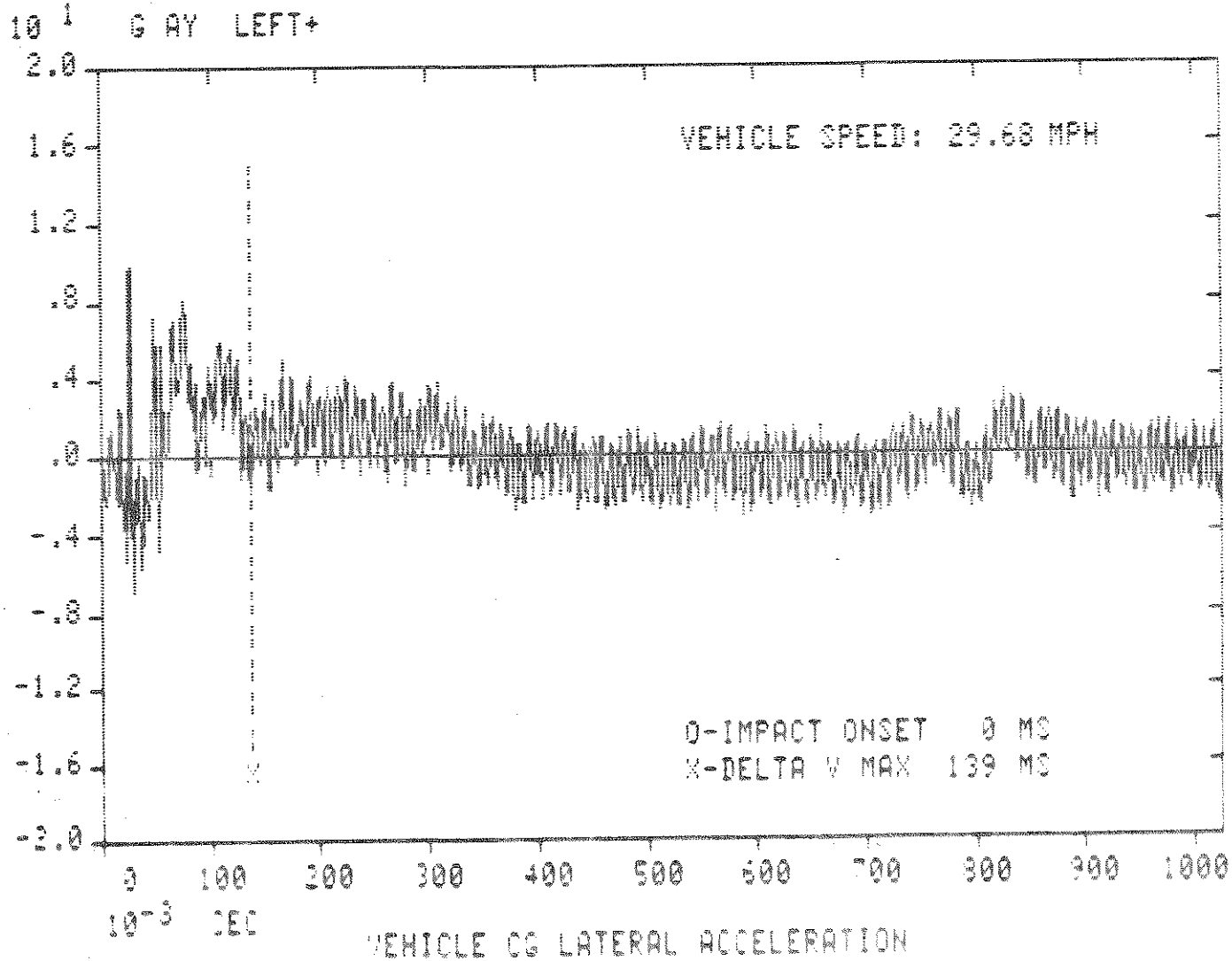
VEHICLE CG LONGITUDINAL VELOCITY


DYNA RESEARCH PROGRAM
VEHICLE: CHEVROLET - MINI
VEHICLE ID: NHTSA T91303
TEST FILE NO: 210 FRONTAL
DATE: MARCH 27, 1980
M.C NO: ET1-1489-109
FILTER: CLASS 180
10 1 G AX FWD+
VEHICLE SPEED: 29.68 MPH
0-IMPACT ONSET 0 MS
X-DELTA V MAX 140 MS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

DOT CRASH PROGRAM

VEHICLE: CHINOOK MINI
VEHICLE ID: NHTSA 791303
TEST FILE NO: 307 FRONTAL
DATE: MARCH 27, 1980

MDB NO: MDB-1489-109
FILTER: CLASS 180

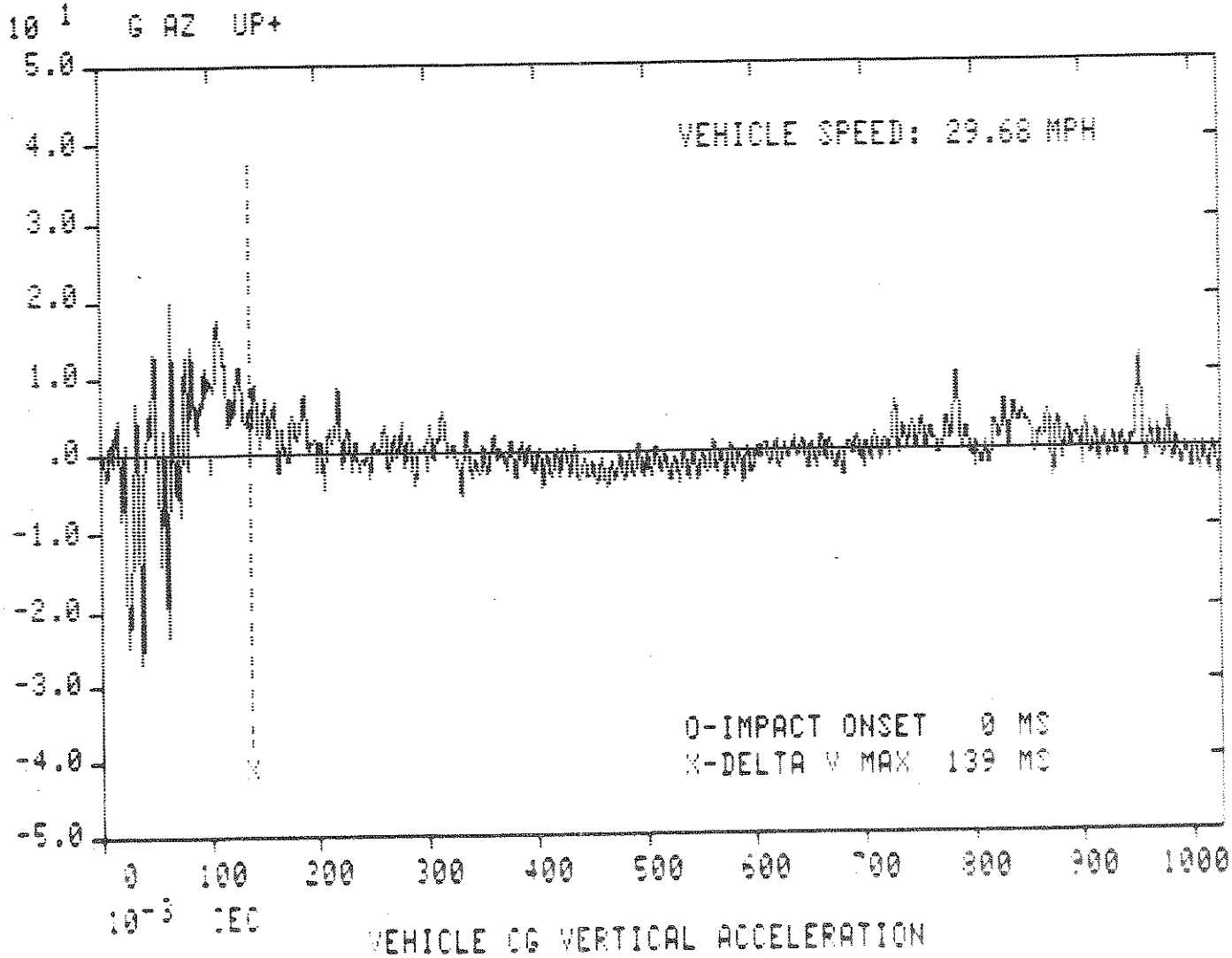


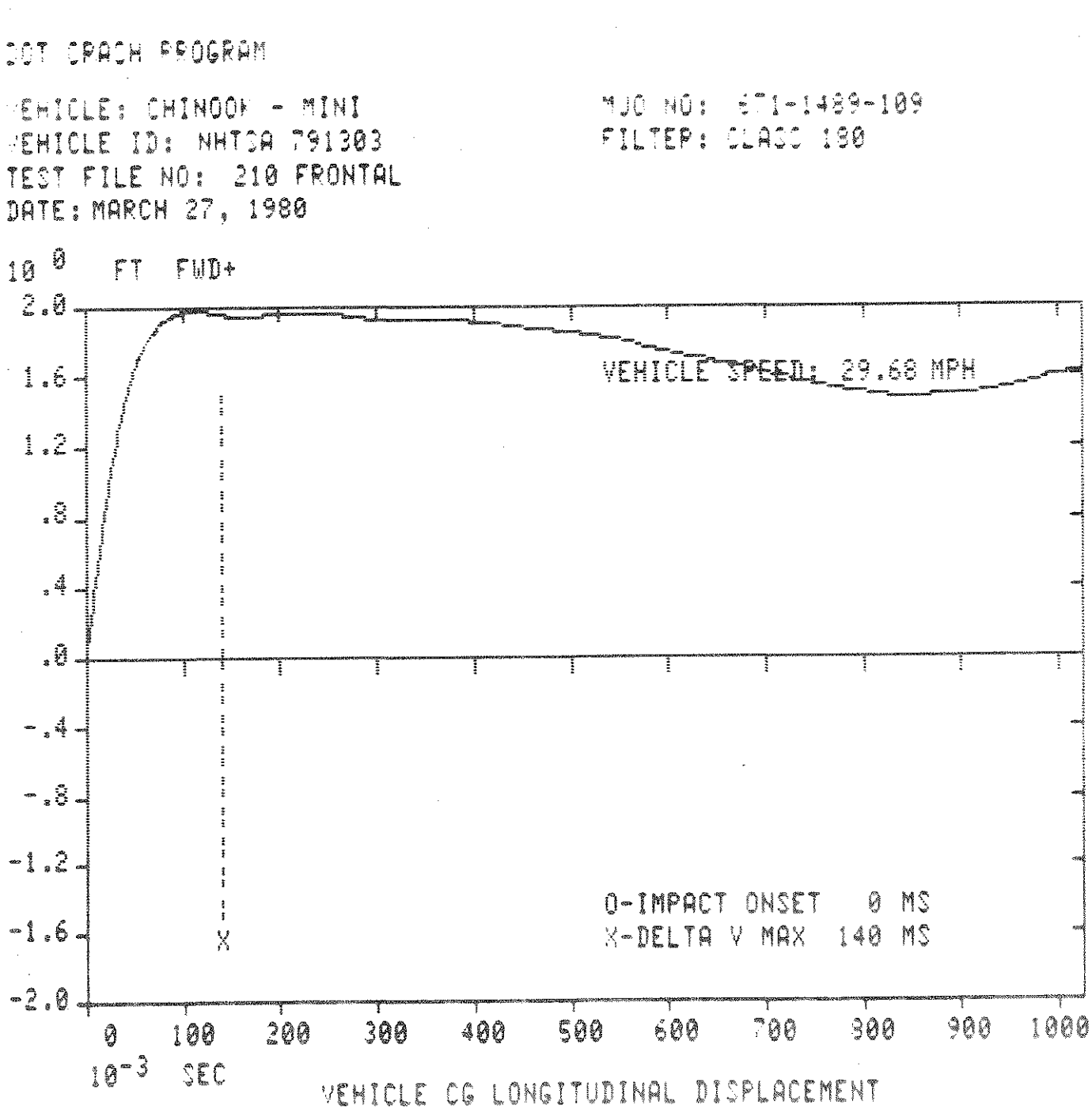
VEHICLE CG LATERAL ACCELERATION

DOT CRASH PROGRAM

VEHICLE: CHINOOK MINI
VEHICLE ID: NHTSA 791303
TEST FILE NO: 207 FRONTAL
DATE: MARCH 27, 1980

MJD NO: ET1-1489-109
FILTER: CLASS 180




DOT CRASH PROGRAM
VEHICLE: CHINOOK - MINI
VEHICLE ID: NHTSA 791303
TEST FILE NO: 210 FRONTAL
DATE: MARCH 27, 1980
MJC NO: ST1-1489-109
FILTER: CLASS 180
10 0 FT FWD+
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
VEHICLE SPEED: 29.60 MPH
X
O-IMPACT ONSET 0 MS
X-DELTA V MAX 140 MS
0 100 200 300 400 500 600 700 800 900 1000
10-3 SEC
VEHICLE CG LONGITUDINAL DISPLACEMENT

1979 Chinook Gazelle Pop-Top - Motor Home

NHTSA 791303

Post-Impact, Full Front View

E01387

1979 Chinook Gazelle Pop-Top - Motor Home

NHTSA 791303

Post-Impact, Left Side View

NHTSA
79130
2R2219-301
RN65-301

1979 Chinook Gazelle Pop-Top - Motor Home

NHTSA 791303

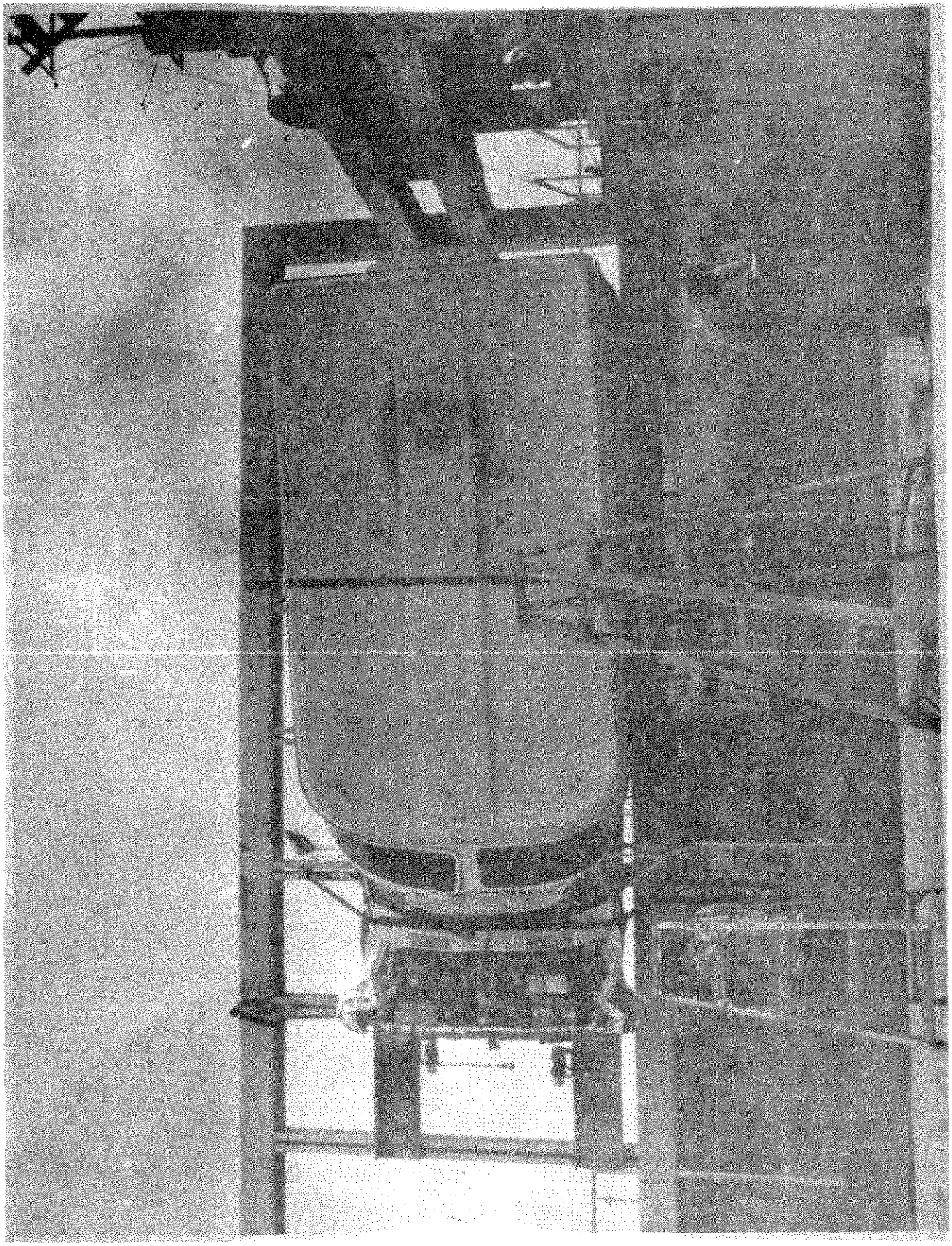
Post-Impact, Right Side View


CHINOOK
NHTSA
791303

1979 Chinook Gazelle Pop-Top - Motor Home

NHTSA 791303

Post-Impact, Overhead View



SECTION 3

3.29 MAZDA B2000 - PICK UP

This section presents information on the 1979 Mazda B2000 (Long Body) - Pick Up, NHTSA 790606. This test vehicle was subjected to a frontal fixed barrier impact at 29.73 mph.

TEST SUMMARY

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Mazda

Vehicle Model B2000 (Long Body) - Pick Up

Vehicle Size Category Truck

Vehicle Test Weight 3,184 lbs.

Impact Speed 29.73 mph

Speed Change 30.58 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 60.5"

D = 0

C1 = 16.5"

C2 = 17.3"

C3 = 17.8"

C4 = 16.7"

Collision Deformation Classification 12FDEW2

Center of Gravity (Accel.) Location ℄ 55.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

::: :BEGIN ==:::PM

VEHICLE: MAZDA R[illegible]
VEHICLE ID: JM1TC[illegible]
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

IMPACT SPEED

VEHICLE: 29.73 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 30.58 MPH

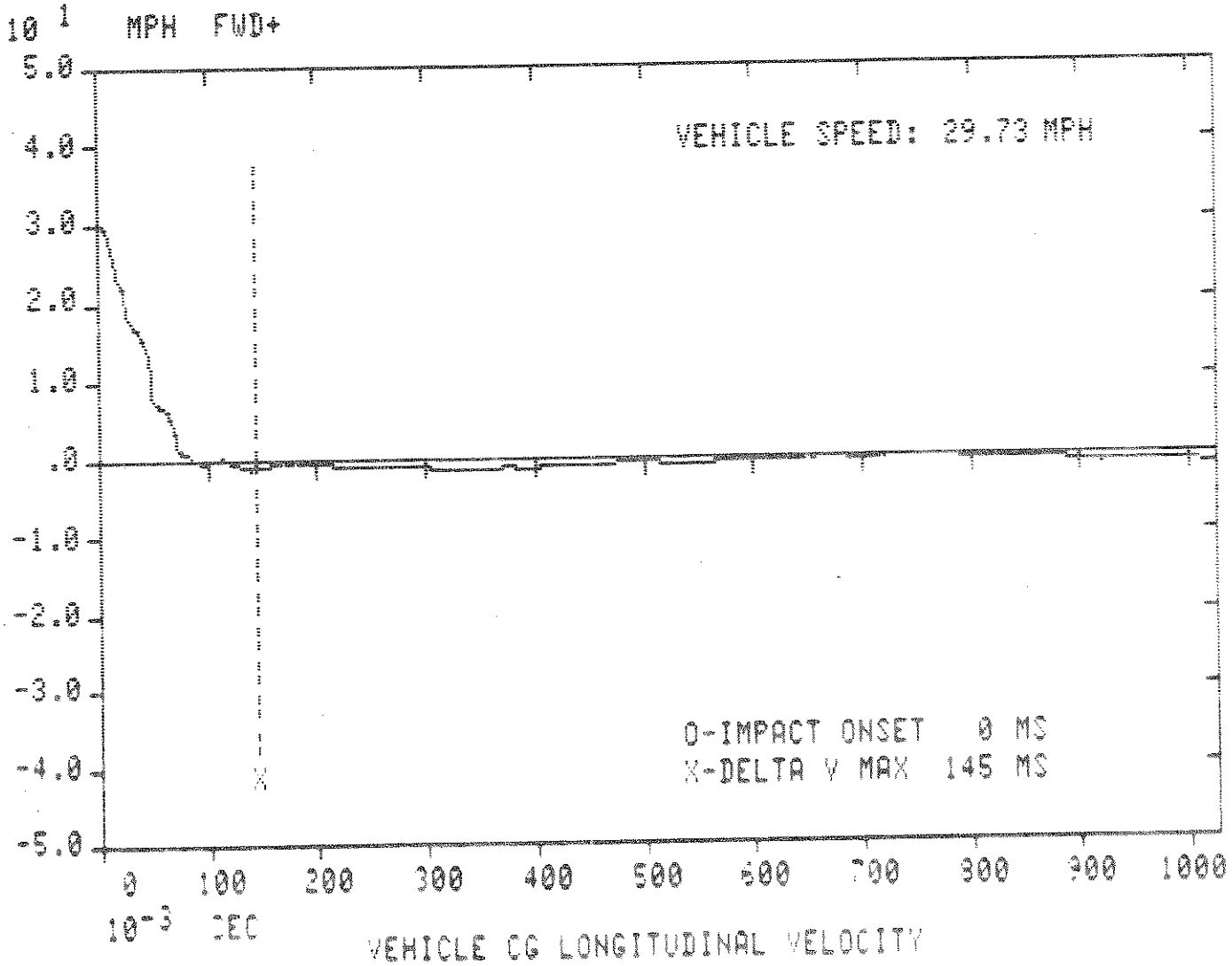
PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 145 MS

DOT CRASH PROGRAM

VEHICLE: MAZDA P-U
VEHICLE ID: NHTSA 790606
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

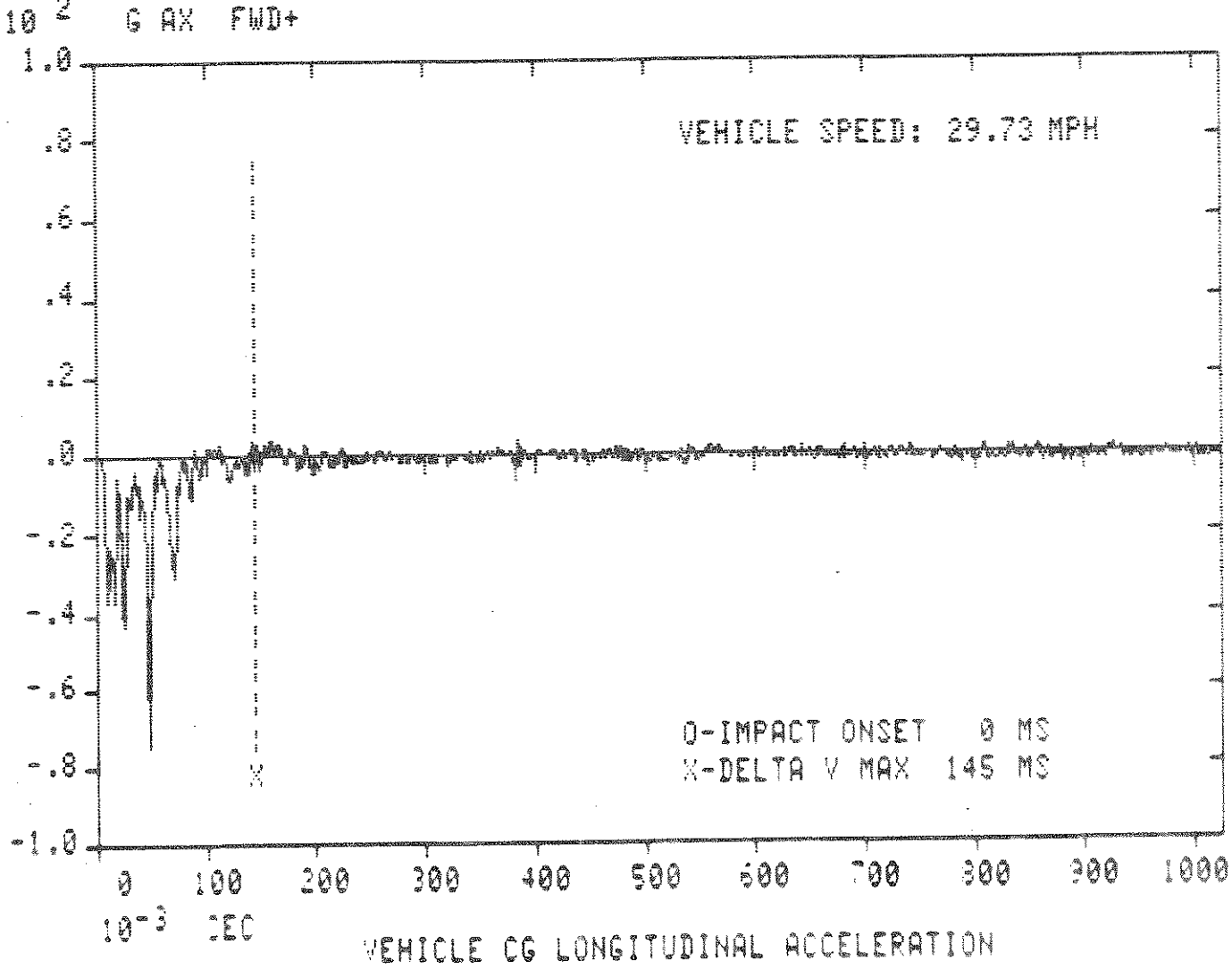
MJO NO: 6R1-1483-1X
FILTER: CLASS 180



DOT CRASH PROGRAM

VEHICLE: MAZDA P-U
VEHICLE ID: NHTSA 790606
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

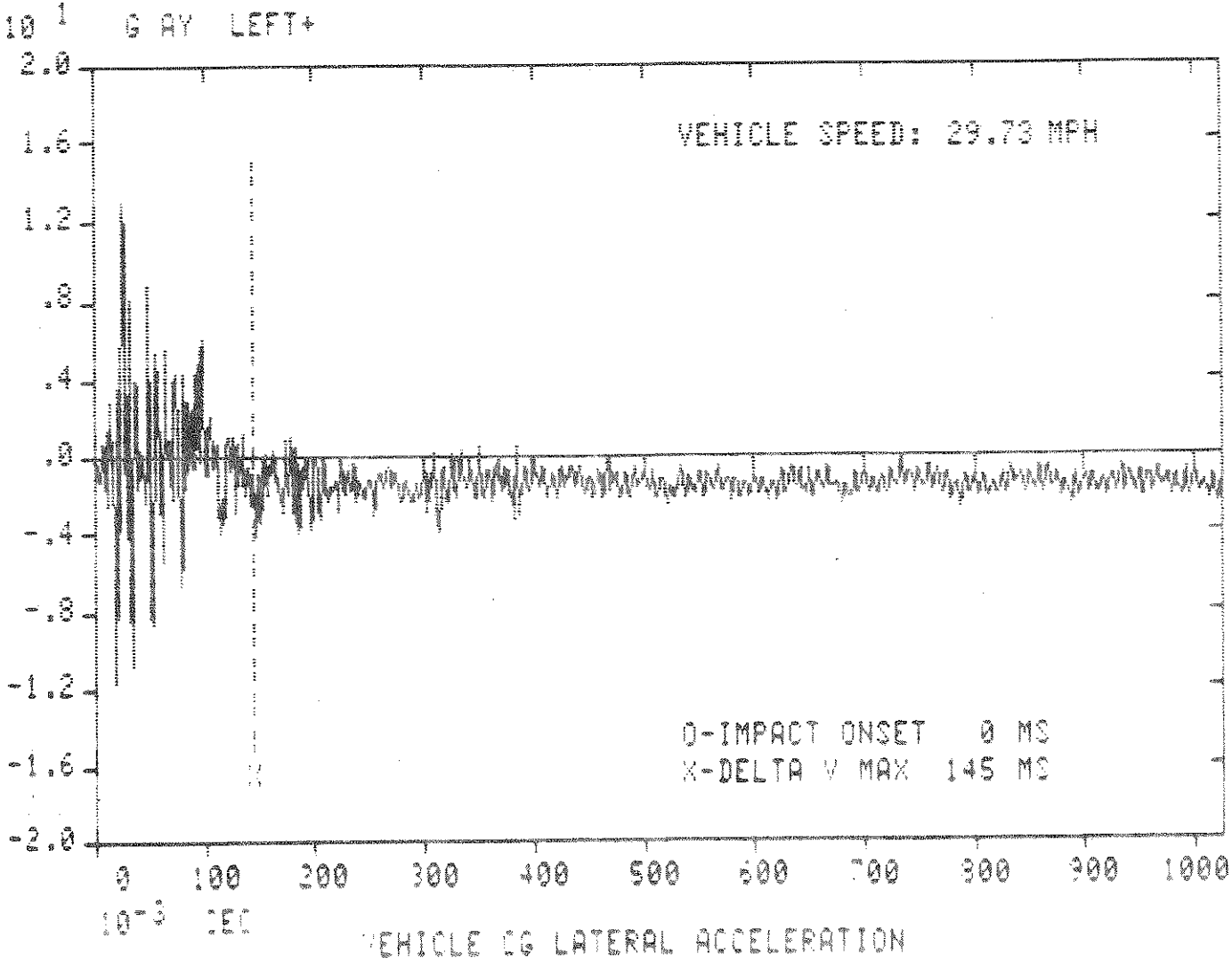
M.I. NO: ST1-1489-110
FILTER: CLASS 180



DOT DRACH PROGRAM

VEHICLE: MAZDA P U
VEHICLE ID: NHTSA 790606
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

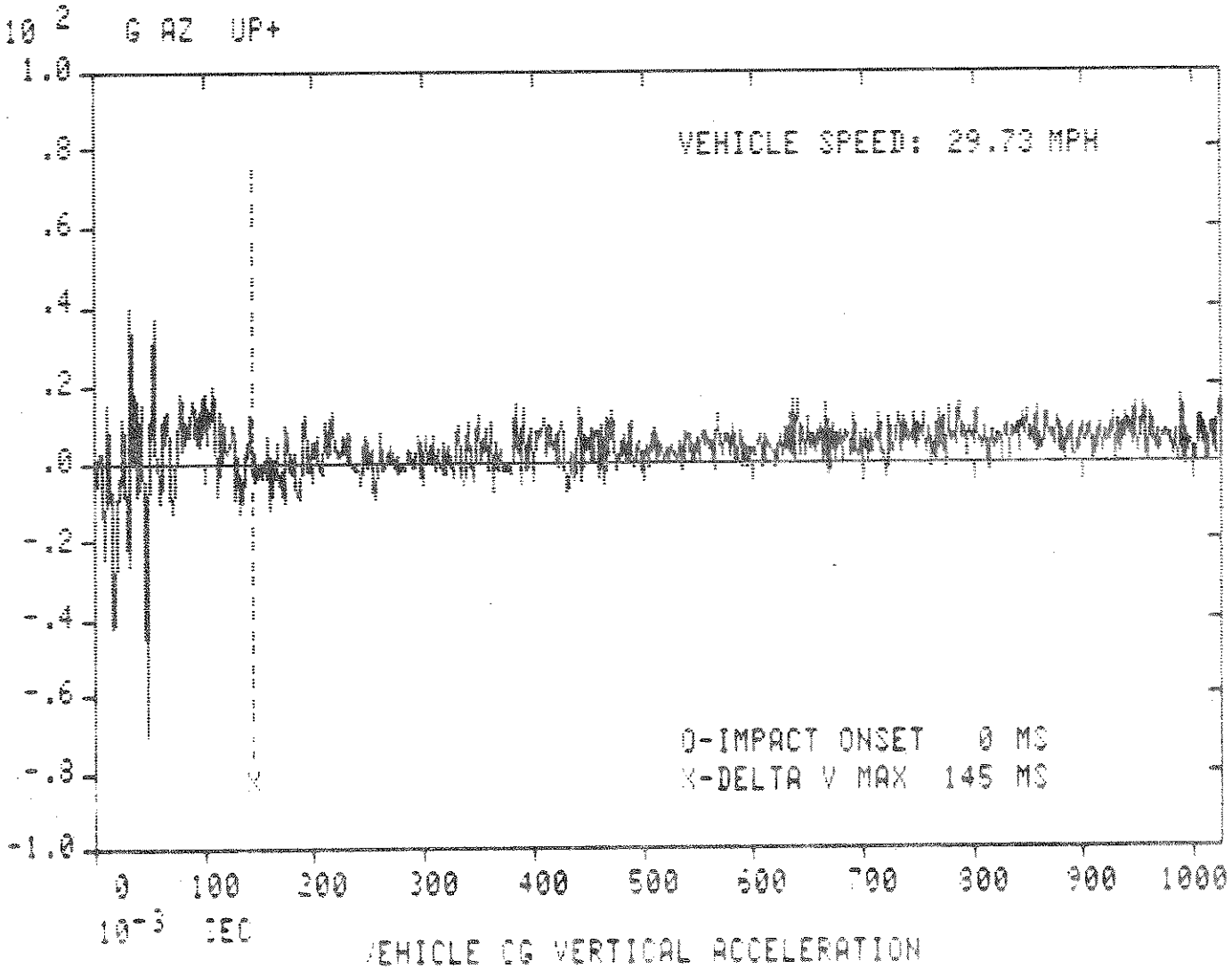
MJO NO: 6P1-1489-110
FILTER: CLASS 180



DOT DSACM PROGRAM

VEHICLE: MAZDA P.U
VEHICLE ID: NHTSA 790606
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

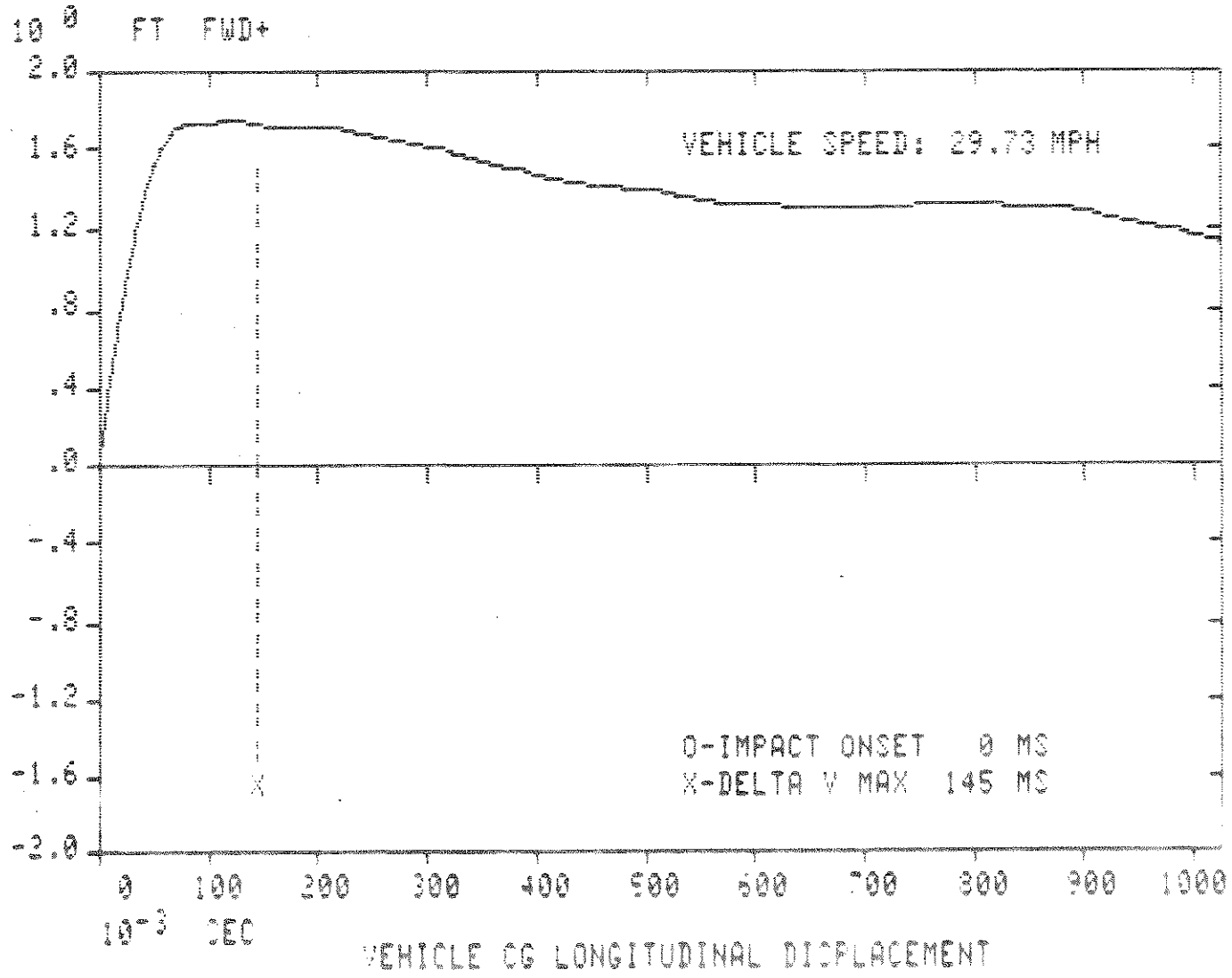
MDB NO: 571-1439-110
FILTER: CLASS 180



*** DEACH PROGRAM

VEHICLE: MAZDA P U
VEHICLE ID: NHTSA 790606
TEST FILE NO: 227 FRONTAL
DATE: APRIL 3, 1980

MJD NO: ET1-1427-113
FILTER: CLASS 180



1979 Mazda B2000 (Long Body) - Pick Up

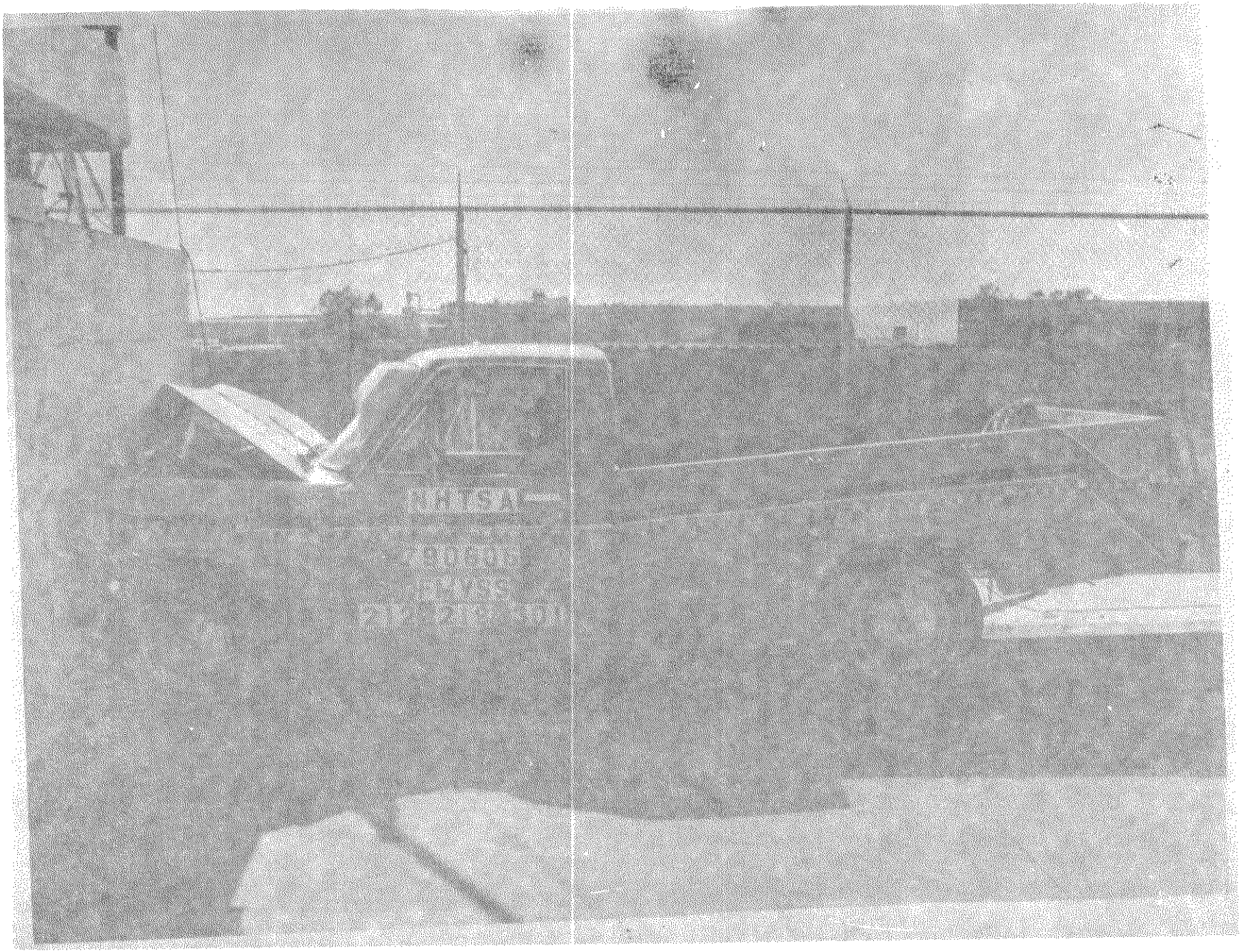
NHTSA 790606

Post-Impact, Full Front View

1979 Mazda B2000 (Long Body) - Pick Up

NHTSA 790606

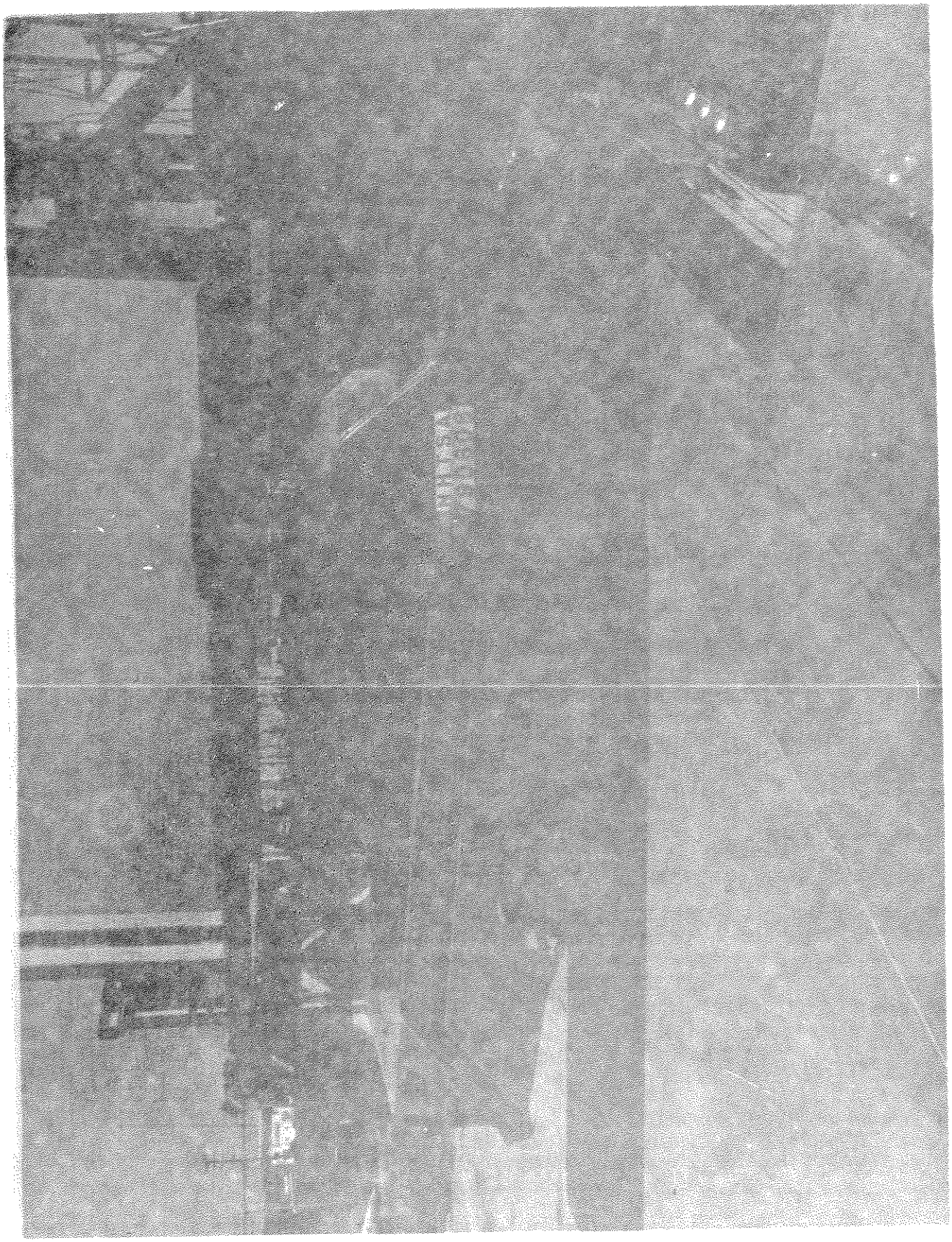
Post-Impact, Left Side View



1979 Mazda B2000 (Long Body) - Pick Up

NHTSA 790606

Post-Impact, Right Side View



1979 Mazda B2000 (Long Body) - Pick Up

NHTSA 790606

Post-Impact, Overhead View

SECTION 3

3.30 CHAMPION TRANS VAN - MOTOR HOME

This section presents information on the 1979 Champion Trans Van - Motor Home, NHTSA 791304. This vehicle was subjected to a frontal fixed barrier impact at 29.48 mph.

STAGED COLLISION AND DAMAGE DATA

Impact Configuration Vehicle Into Frontal Fixed Barrier

Vehicle Model Year 1979

Vehicle Make Champion

Vehicle Model Trans Van - Motor Home

Vehicle Size Category Multi-Purpose

Vehicle Test Weight 5,912 lbs.

Impact Speed 29.48 mph

Speed Change 31.26 mph

Principal Direction of Force 0 deg.

Initial Contact Front Bumper

Damage Elevation

L = 78.0"

D = 0

C1 = 16.8"

C2 = 19.0"

C3 = 18.3"

C4 = 14.4"

Collision Deformation Classification 12FDEW6

Center of Gravity (Accel.) Location ℄ 65.0" Behind Front Axle

Moving Barrier Model N/A

Moving Barrier Weight N/A lbs.

Impact Speed N/A mph

Speed Change N/A mph

Center of Gravity (Accel.) Location N/A

Test Track Dry Concrete

DOT CRASH PROGRAM

VEHICLE: CHAMPION TRANS VAN
VEHICLE ID: NHTSA T91304
TEST FILE NO: 211 FRONTAL
DATE: APRIL 24, 1980

IMPACT SPEED

VEHICLE: 29.48 MPH

DELTA VELOCITIES (AT TIME OF MAX NEGATIVE VEHICLE LONGITUDINAL VELOCITY)

VEHICLE LONGITUDINAL: 31.26 MPH

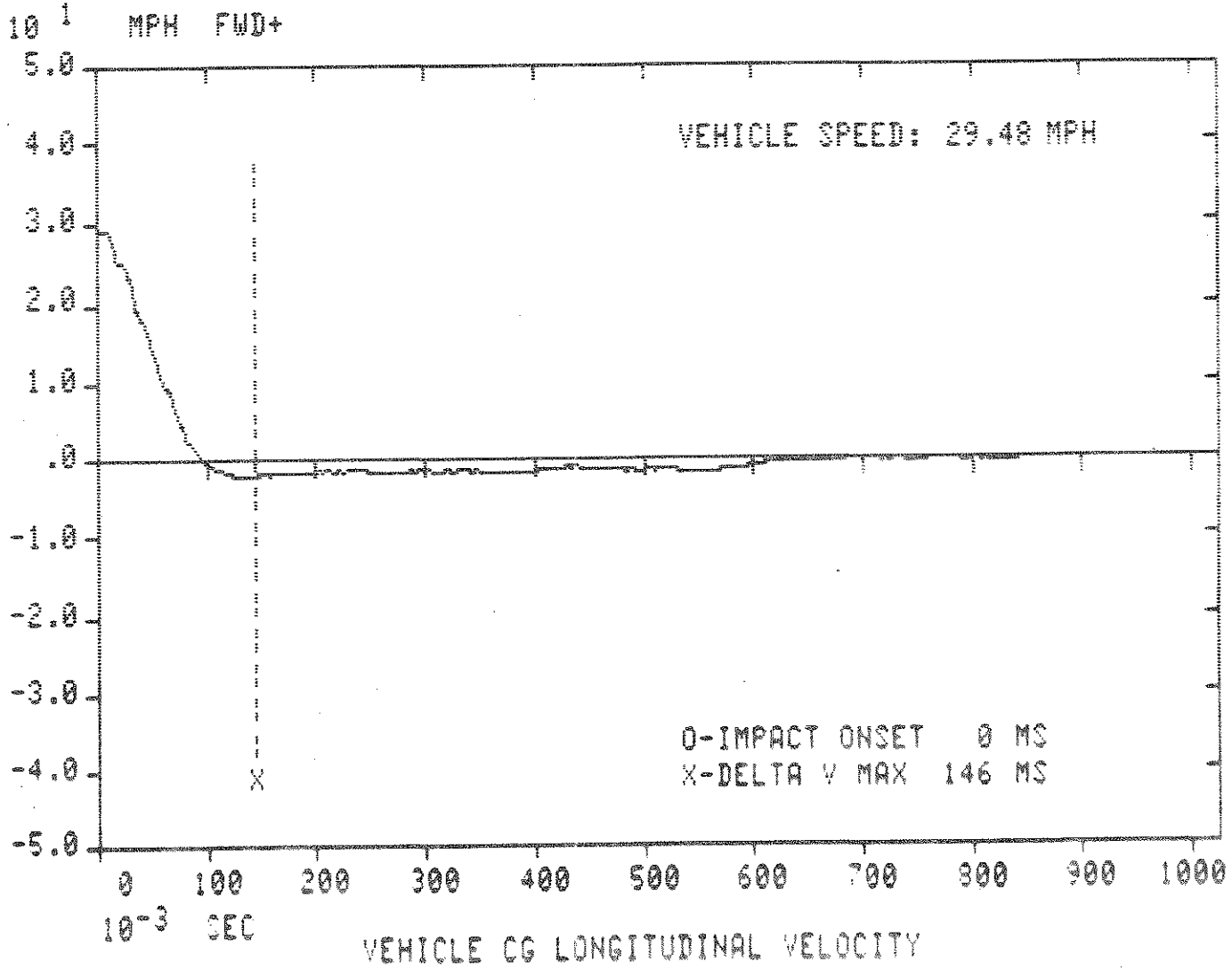
PLOT DATA

IMPACT OCCURED AT: 0 MS
DELTA VEL TAKEN AT: 146 MS

SCT PLOT PROGRAM

VEHICLE: CHAMPION PANEL VAN
VEHICLE ID: NHTSA 791304
TEST FILE NO: 211 FRONTAL
DATE: APRIL 24, 1980

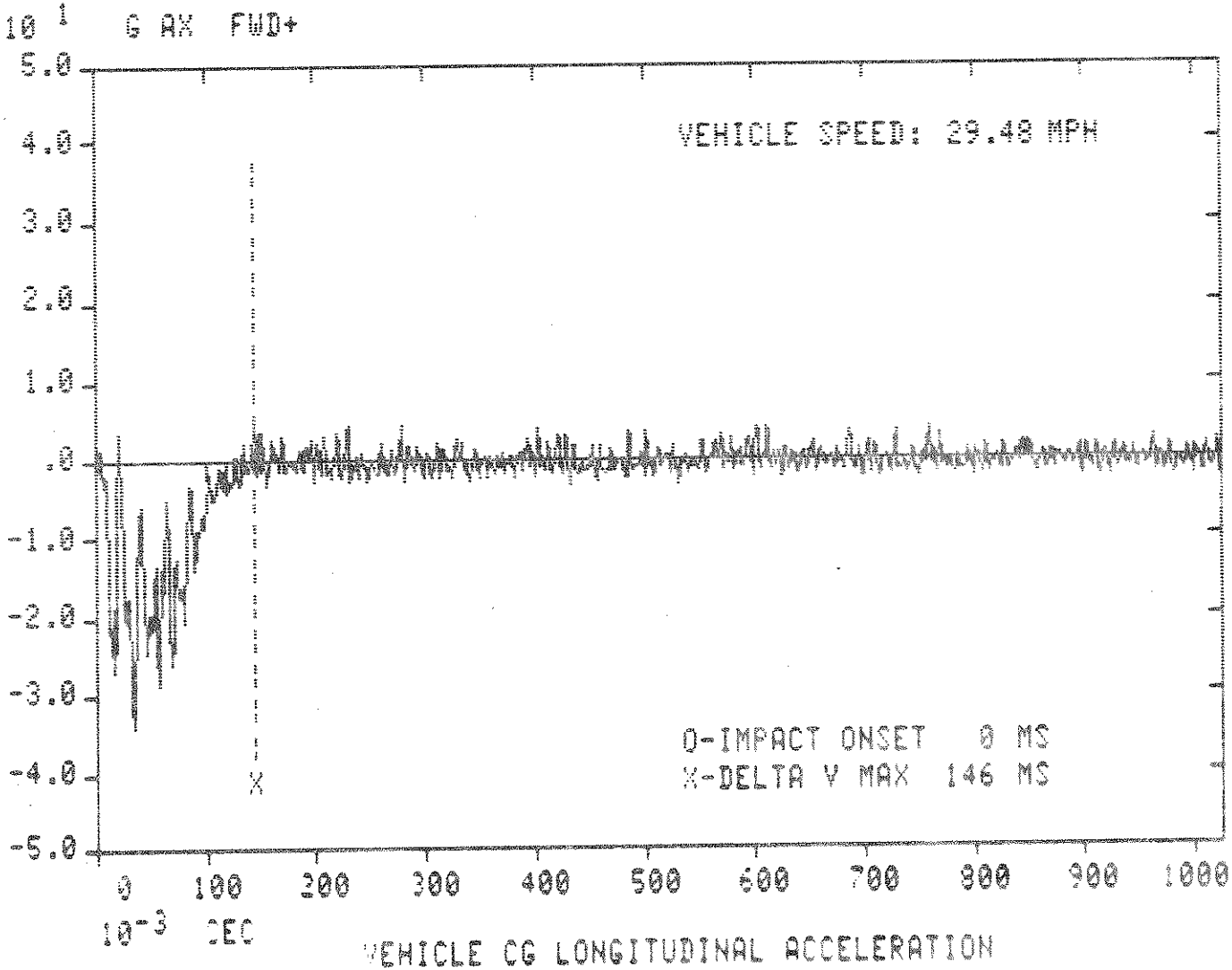
MJO NO: ST1-1483-111
FILTER: CLASS 180



*** TRAP PROGRAM

VEHICLE: CHAMPION VANS VAN
VEHICLE ID: NHTSA 791304
TEST FILE NO: 211 FRONTAL
DATE: APRIL 24, 1980

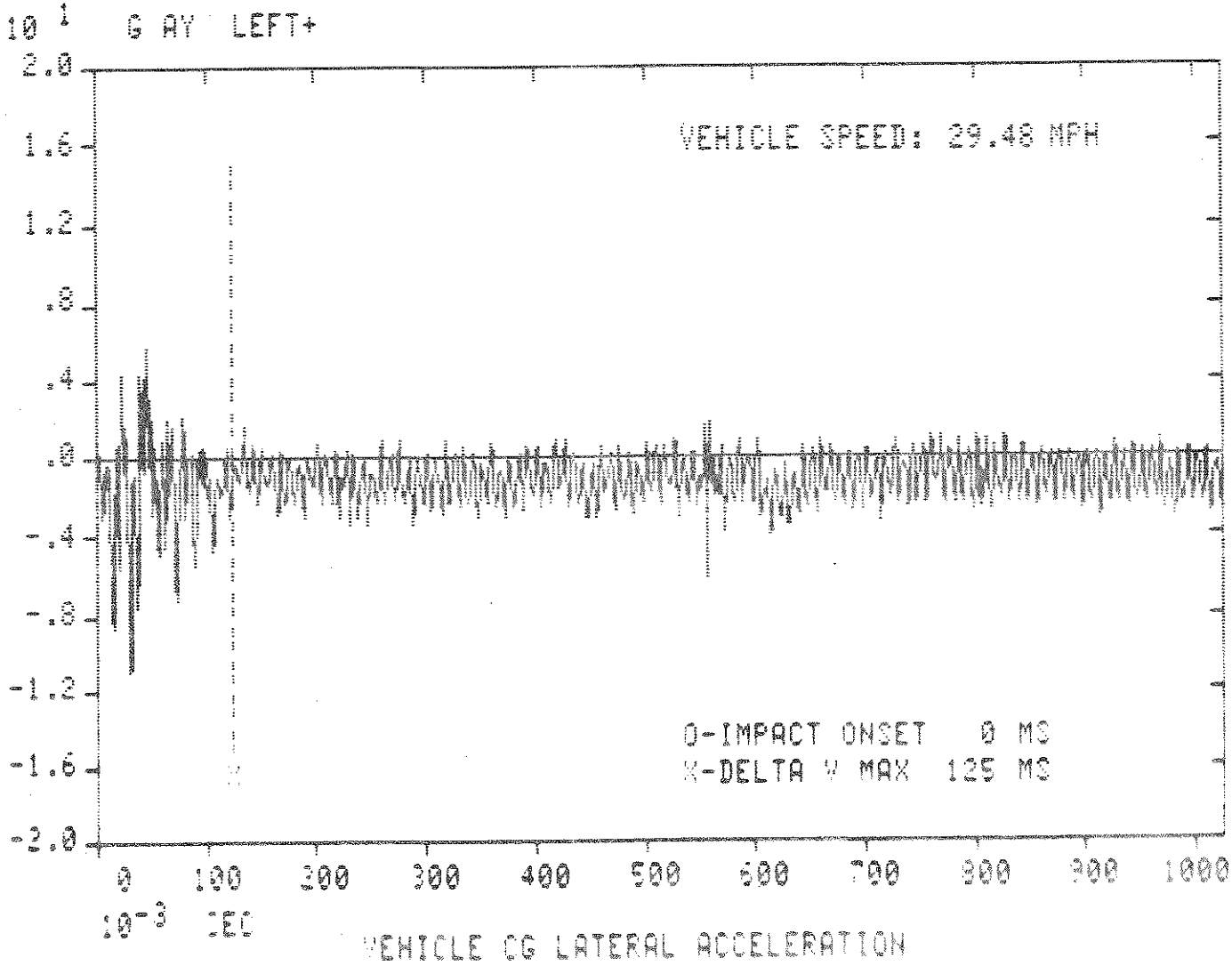
MJO NO: ST1-1469-111
FILTER: CLASS 180



SOT CRASH PROGRAM

VEHICLE: CHAMPION TRANS VAN
VEHICLE ID: NHTSA 791304
TEST FILE NO: 211 FRONTAL
DATE: APRIL 24, 1980

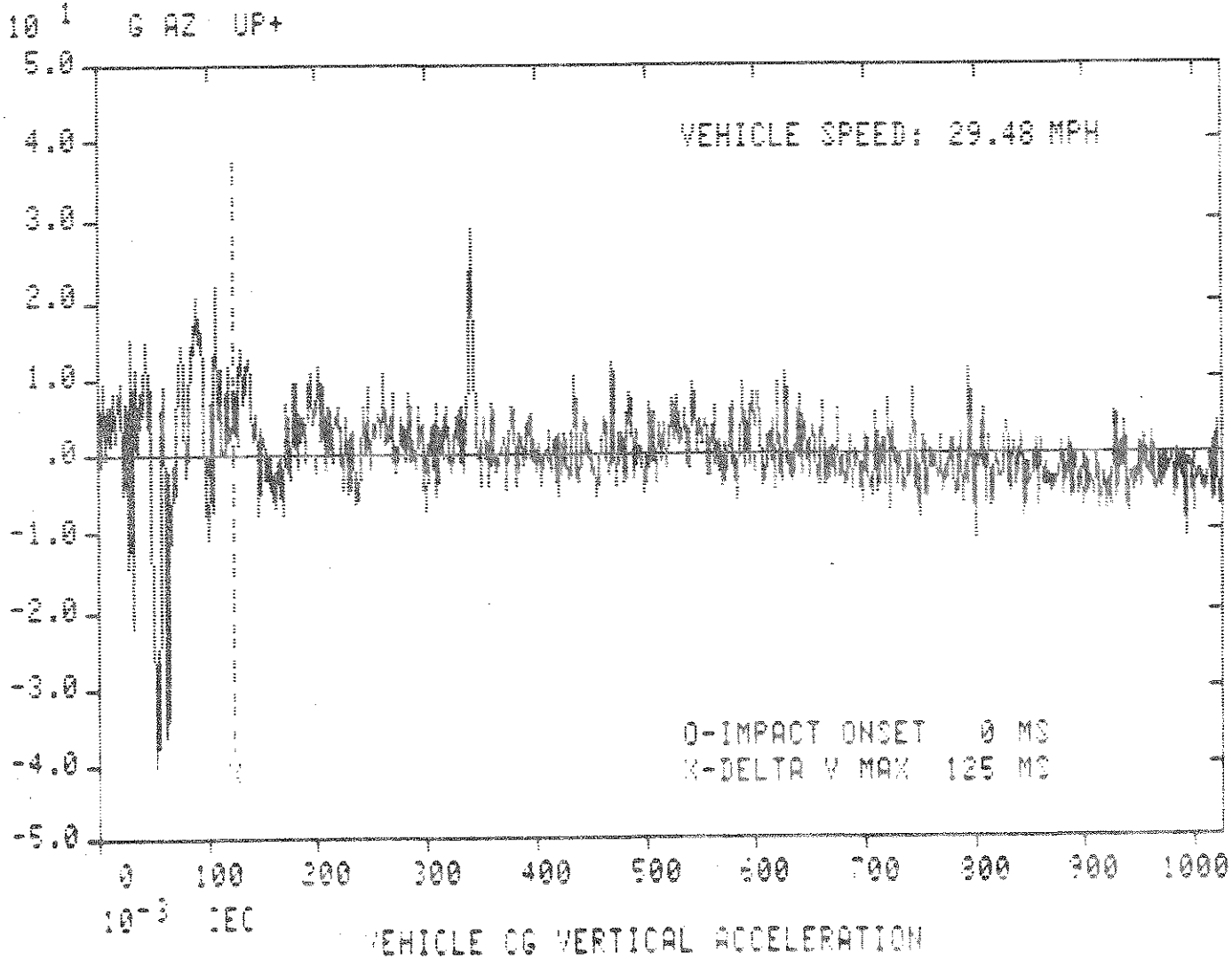
MJC NO: 871-1423-111
FILTER: CLASS 180



DOT CRASH PROGRAM

VEHICLE: CHAMPION TRANS VAN
VEHICLE ID: NHTSA 791304
TEST FILE NO: 211 FRONTAL
DATE: APRIL 24, 1980

MJO NO: ET1-1484-111
FILTER: CLASS 180

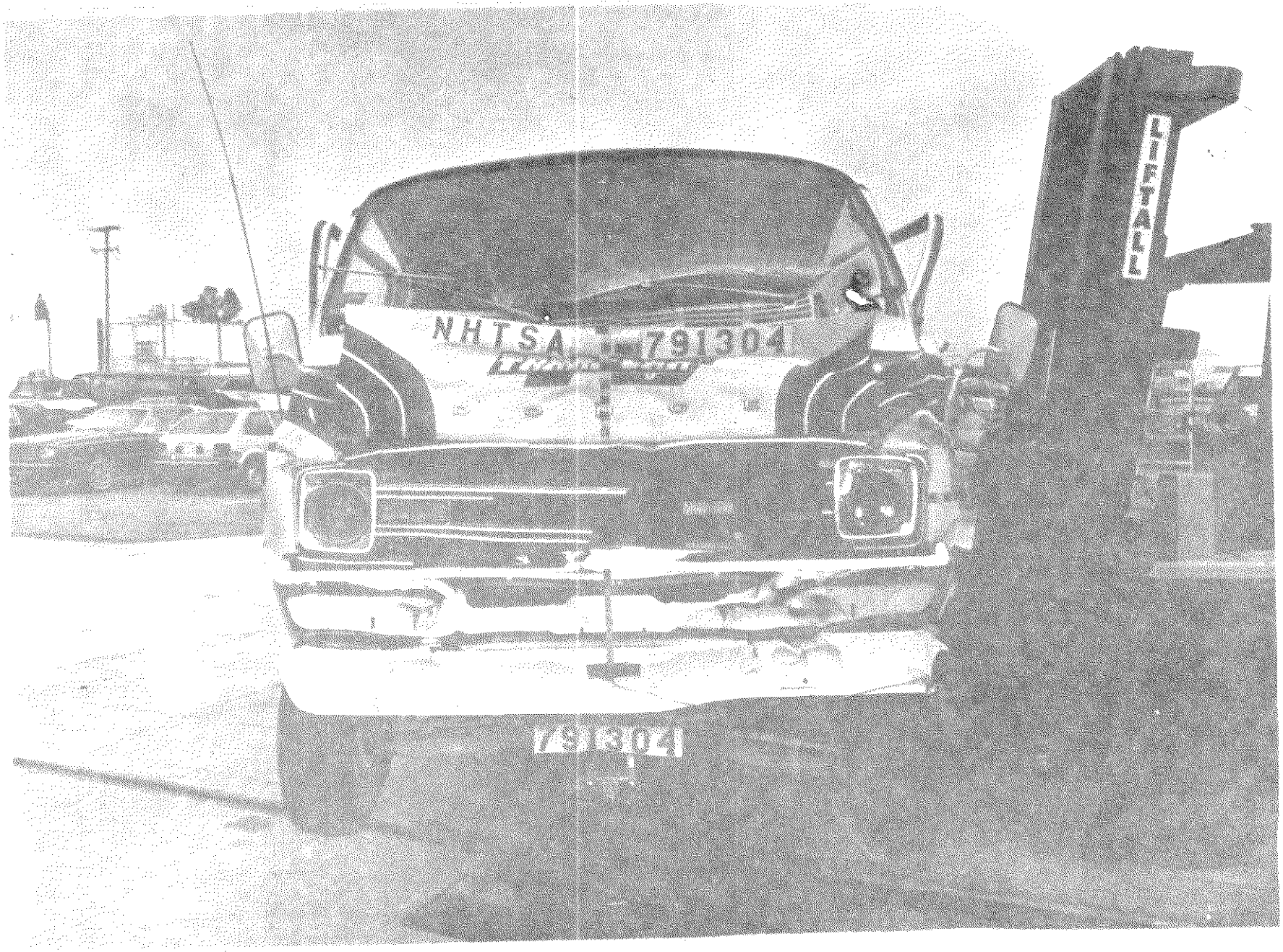


VEHICLE CG VERTICAL ACCELERATION

1979 Champion Trans Van - Motor Home

NHTSA 791304

Post-Impact, Full Front View


NHTSA 791304
791304

1979 Champion Trans Van - Motor Home

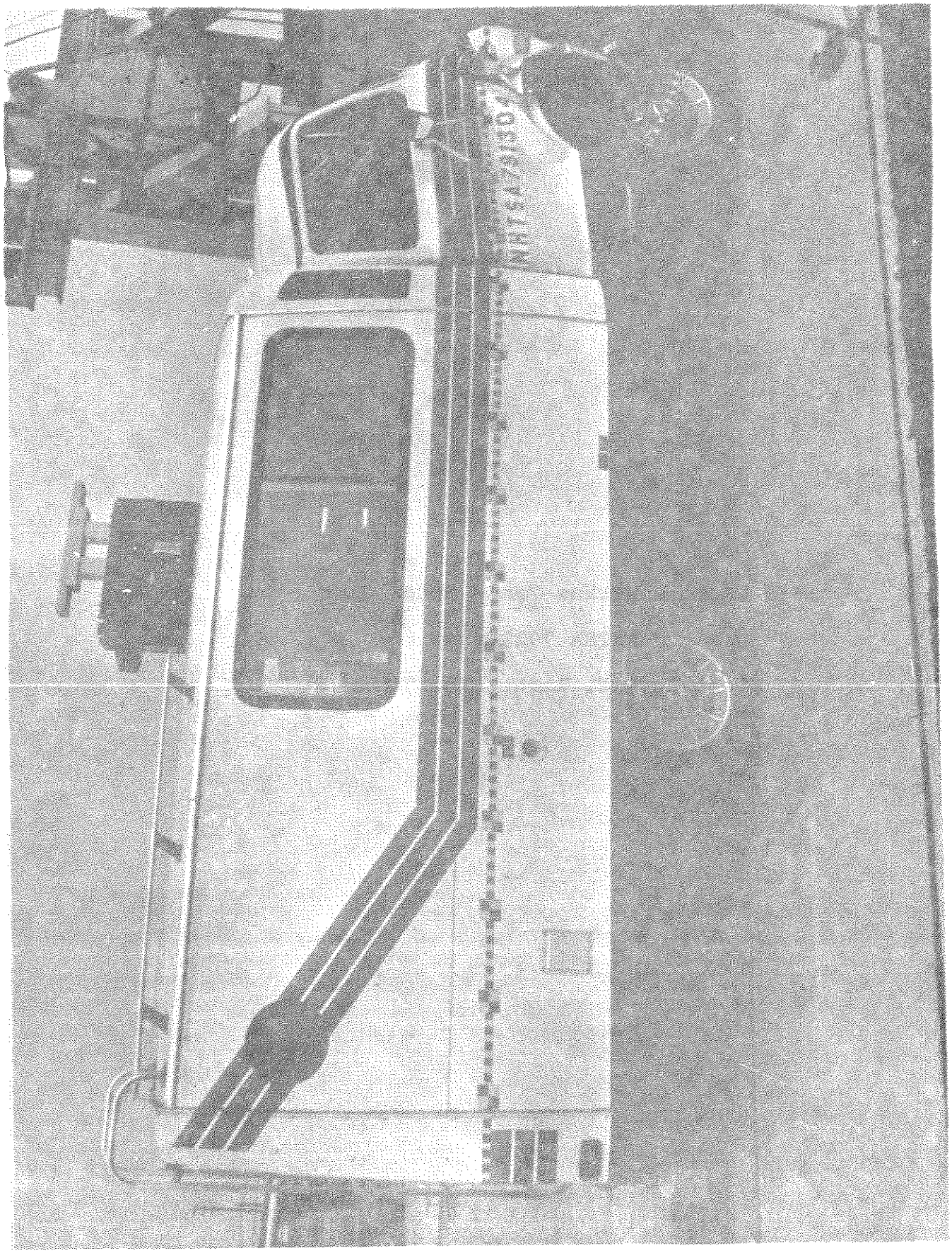
NHTSA 791304

Post-Impact, Left Side View

1979 Champion Trans Van - Motor Home

NHTSA 791304

Post-Impact, Right Side View



1979 Champion Trans Van - Motor Home

NHTSA 791304

Post-Impact, Overhead View

SECTION 4

4.0 DATA ACQUISITION AND REDUCTION

The data acquisition and analysis system used for acquiring barrier and vehicle accelerations is shown schematically in Figure 4-1. A complete list of instrumentation is shown in Table 4-1. An itemized procedure for acquiring data is provided in Table 4-2.

Prior to the vehicle impact test, onboard instrumentation is installed and a calibration and null reference check is performed to check out all data analog devices including FM magnetic tape recorders. Immediately following vehicle impact a post-impact calibration and null reference check is performed.

Analog data is replayed and digitized using a Hewlett Packard Digital Fourier Analyzer (DFA). The data is digitized three channels at a time and placed into permanent storage on magnetic disc. The only modifications to the data at the time of permanent storage are: the application of a 250 Hz predigitizing analog filter (60 db/octave rolloff), the filtering and digitizing

process of the FM tape recorder (2500 Hz) and the DFA (1000 Hz sampling for a 1 second window), and the application of the appropriate calibration scale factors.

As the data is recalled for integration or plotting, the appropriate SAE filter is applied. These filters are in accordance with SAE J211a, Instrumentation for Impact Tests. Acceleration data is plotted after the application of an SAE class 60 filter. Velocity and displacement data is plotted after the application of an SAE class 180 filter. The filters are shown in Figure 4-2.

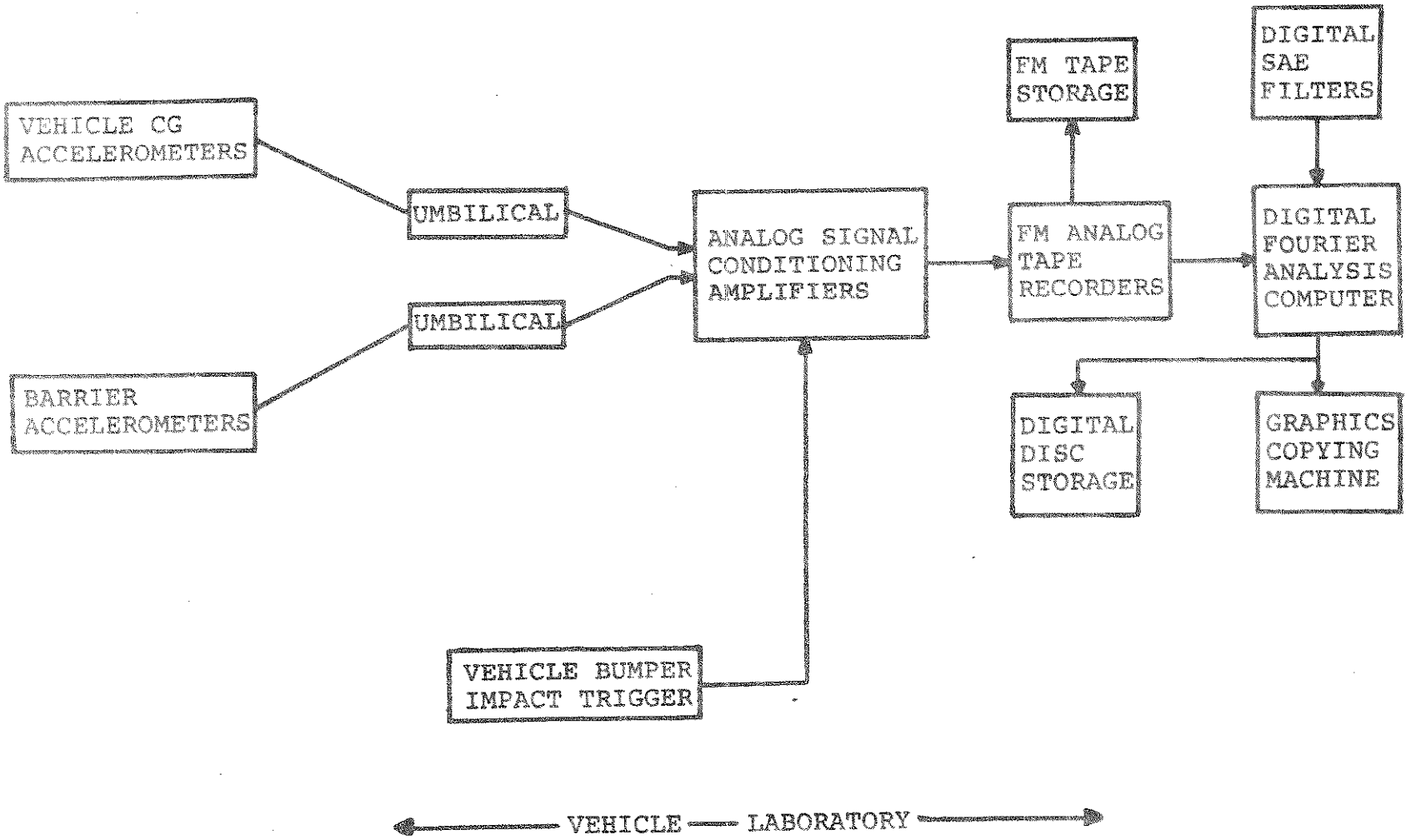
Before plotting, the test engineer determines vehicle onset and vehicle separation times. This is done by looking for characteristics contained in both the vehicle and barrier acceleration signals which indicate when these events occured. Impact onset is verified with the trigger signal. When a velocity, or displacement trace is to be plotted, integration of the appropriate acceleration signal is performed digitally in the DFA.

SECTION 4

All impact data is presented in computer plots of a 1 second time window. Impact onset and vehicle separation times are shown, as well as appropriate labels defining the test vehicle, filter class and data plotted. The descriptions on the plots are self explanetory, noting that the velocity plot of the barrier vs vehicle is a plot of the vehicle velocity subtracted from the barrier velocity.

In addition to the data plots, a table listing the barrier closing speed, impact and vehicle separation times and delta velocities is given. Delta velocity is taken as the difference between the velocity at the moment of impact and the velocity at the moment of separation for the barrier or vehicle.

The aforesaid process from digitizing data through plotting data is controlled with standard Hewlett Packard Fourier software in conjunction with AETL designed software written specifically for crash data reduction.



VEHICLE AND OCCUPANT CRASH IMPACT DATA ACQUISITION SYSTEM

FIGURE 4-1

COMPARISON PLOT OF SAE CLASS 60, 180, 600, 1000 FILTERS AND THE DATA ANALYSIS 1250 HZ PREDIGITIZING ANALOG FILTER.

SAE FILTERS ROLL OFF IS 12DB/OCT, ANALOG FILTER ROLL OFF IS 60DB/OCT

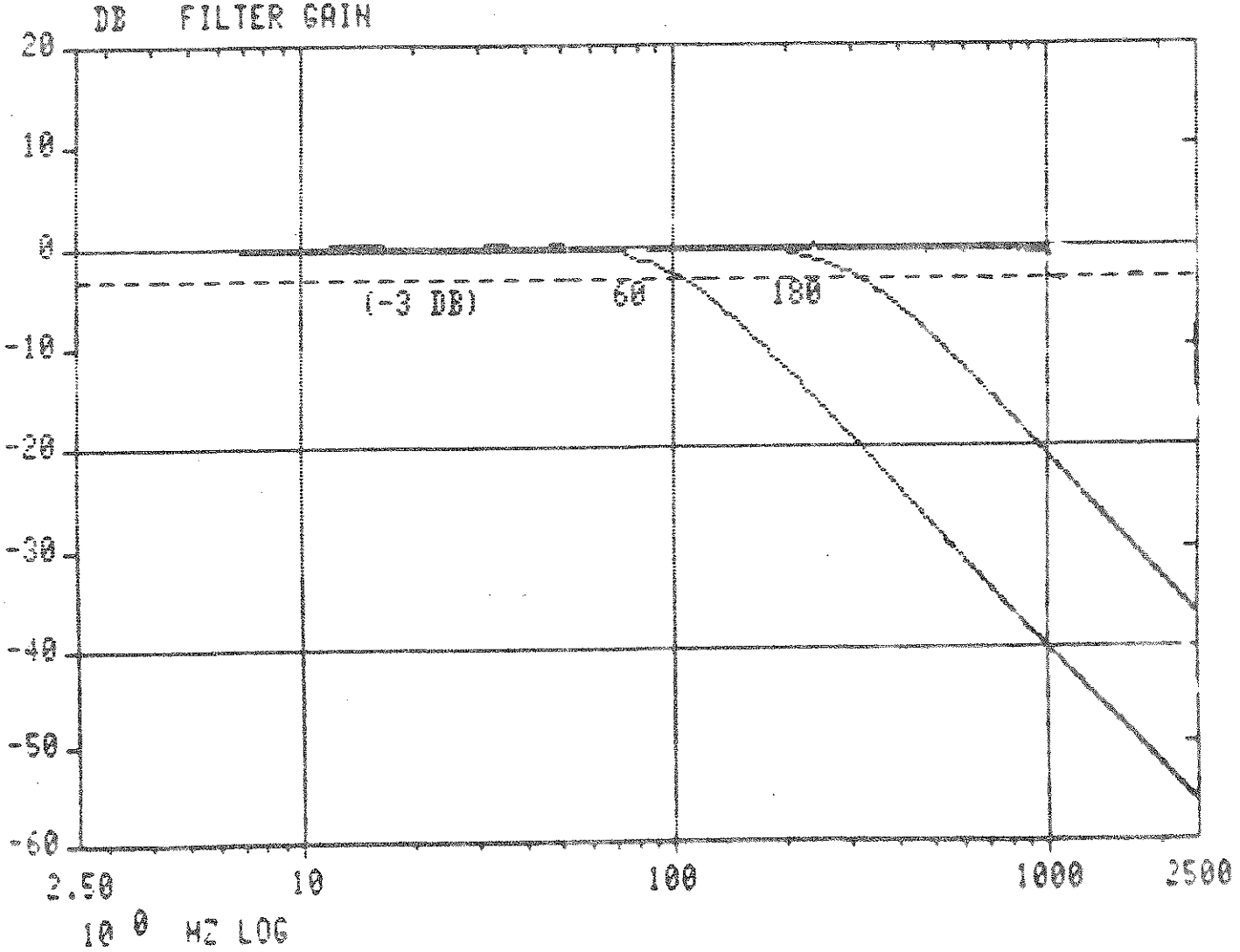


FIGURE 4-2

TABLE 4-1 INSTRUMENTATION FOR CRASH TEST

Instrument	Manufacturer	Model No.	Full Scale	Accuracy	Frequency Max.
Accelerometers, Vehicle, Barrier	Endevco	2262C-200	200g	±1%	3600 Hz
Contact Switch, Impact	AETL	-	2 V	-	<200 us rise time
FM Tape Recorder	Bell & Howell	4020	±2.8 V	47 db SNR	2500 Hz WB
Programmable Filter, All Data	Hewlett Packard	54440A	-	0.5%	1250 Hz, 60 db/oct
Analog-Digital Converter, All Data	Hewlett Packard	5466B	-	0.5%	200 us sampling
Analysis Computer, All Analysis	Hewlett Packard	2100S	32 K Words	16 Bit Word	-
Disc Drive	Hewlett Packard	7900A	5 Meg Words	-	-

TABLE 4-2

DATA ACQUISITION AND REDUCTION PROCESS

STEP	DESCRIPTION
1	DA System Installation
2	DA System Pre-Impact Calibration
3	Impact Trigger Checkout
4	Vehicle Impact Performed
5	DA System Post-Impact Calibration
6	Data Reproduced From FM Tape Into Computer a) Data analog filtered at 250 Hz b) Data digitized at 100 ms sample rate c) Data sychronized by impact trigger signal
7	Digitized Data Examined
8	Data Transfered Permanent Disc Storage
9	Appropriate SAE Filters Are Applied
10	Each Data Signal Plotted With Labels

SECTION 4

4.1 FRONTAL FIXED BARRIER IMPACT DELTA VELOCITY CALCULATION

The data acquisition and reduction process for a frontal fixed barrier impact delta velocity calculation is outlined in the step by step discussion which follows. Figures 4-3 through 4-7 illustrate each step in the process. Reflected in the processed data is:

1) Relying on the optical speed trap data as the most accurate source of the test vehicle impact speed, the calibration factor, which converts the vehicle longitudinal acceleration signal from volts to g's, is forced to produce a velocity consistant with the optical speed trap data.

Step 1: Acquire a two (2) second time history of the test vehicle longitudinal acceleration signal at a sample rate and with a pre-digitizing filter that is in accordance with the guideline established by SAE J211b. (Figure 4-3)

Step 2: Remove bias from the longitudinal acceleration signal. Bias removal is based on the assumption that the test vehicle comes to rest at some point in time prior to the end of the two (2) second time history window. From this point in time through the end of the two (2) second window, the acceleration signal should be at zero, and the velocity trace should exhibit no change (flat). (Figure 4-4 and 4-5)

Step 3: Calculate the test vehicle longitudinal acceleration calibration factor. The optical speed trap reading is used in this step, along with the knowledge that the test vehicle comes to rest, i.e. a known delta velocity from impact to rest. (Figure 4-6)

Step 4: Calculate the delta velocity at the time of test vehicle and barrier separation. The time of separation is determined by examining the test vehicle longitudinal acceleration signal and velocity trace while noting that:

1) Since any external force acting to decelerate the test vehicle in the positive forward direction become zero upon separation, the vehicle should reach its maximum negative velocity (rebound velocity) immediately prior to separation and should exhibit no further deceleration in the positive forward direction after this time.

2) After separation, the vehicle is slowed from its rebound velocity to a stop by the friction forces. The vehicle velocity trace should exhibit a slight positive slope (max 1 G) immediately after separation until the vehicle comes to rest. (Figure 4-7)

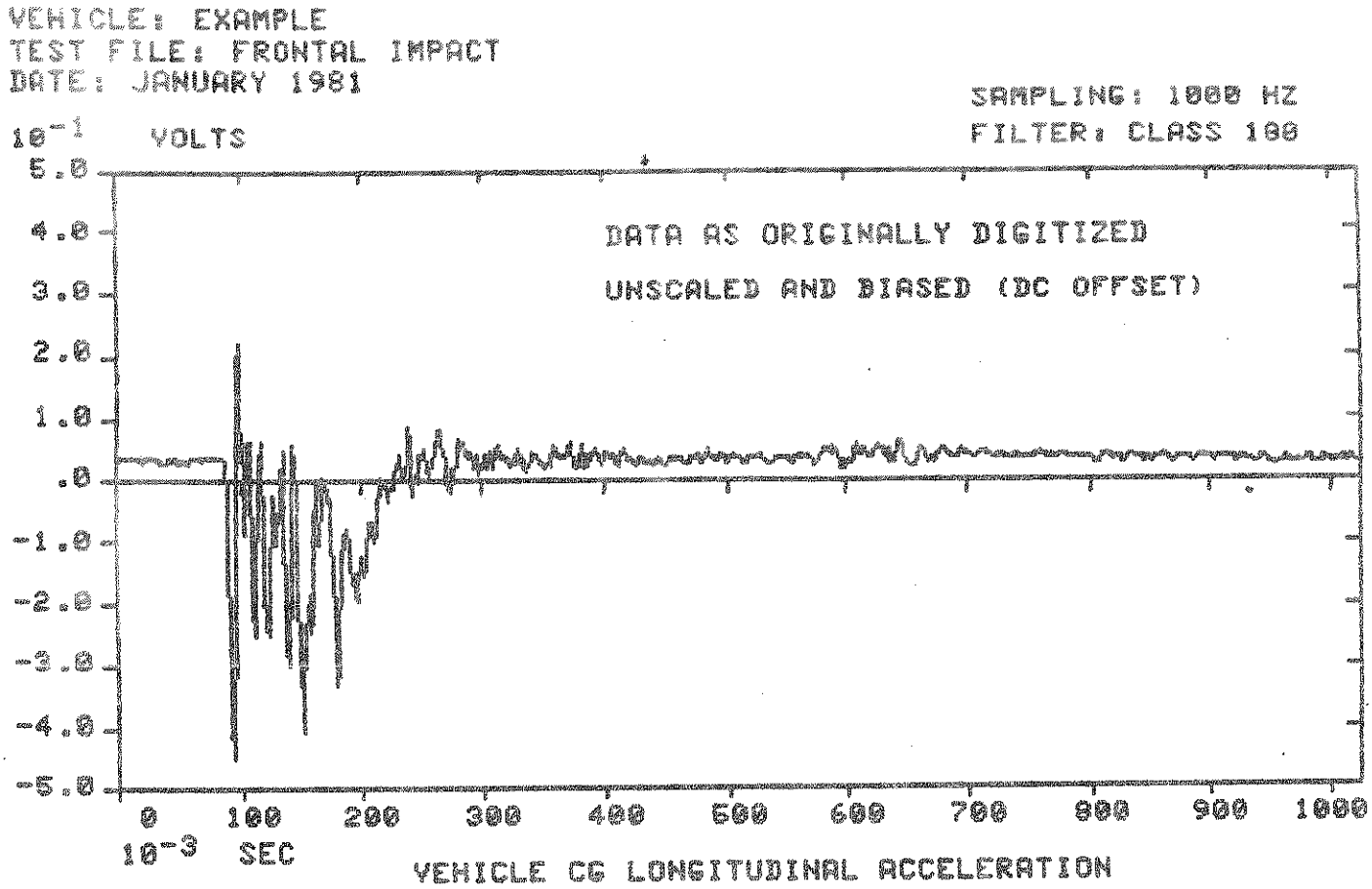

VEHICLE: EXAMPLE
TEST FILE: FRONTAL IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10^-1 VOLTS
DATA AS ORIGINALLY DIGITIZED
UNSCALED AND BIASED (DC OFFSET)
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
0
100
200
300
400
500
600
700
800
900
1000
10^-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

FIGURE 4-3

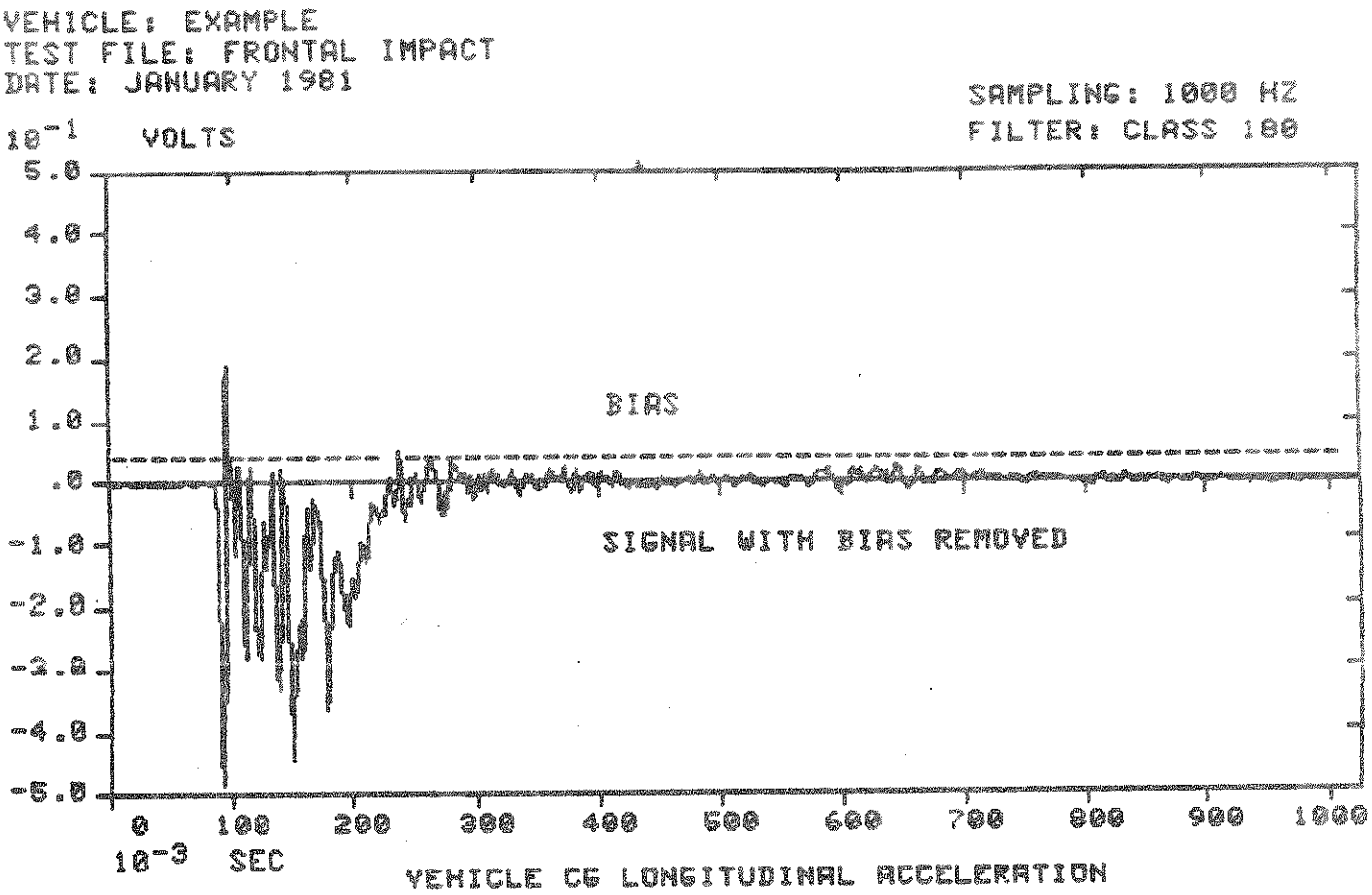

VEHICLE: EXAMPLE
TEST FILE: FRONTAL IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10^-1 VOLTS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
BIAS
SIGNAL WITH BIAS REMOVED
0
100
200
300
400
500
600
700
800
900
1000
10^-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

FIGURE 4-4

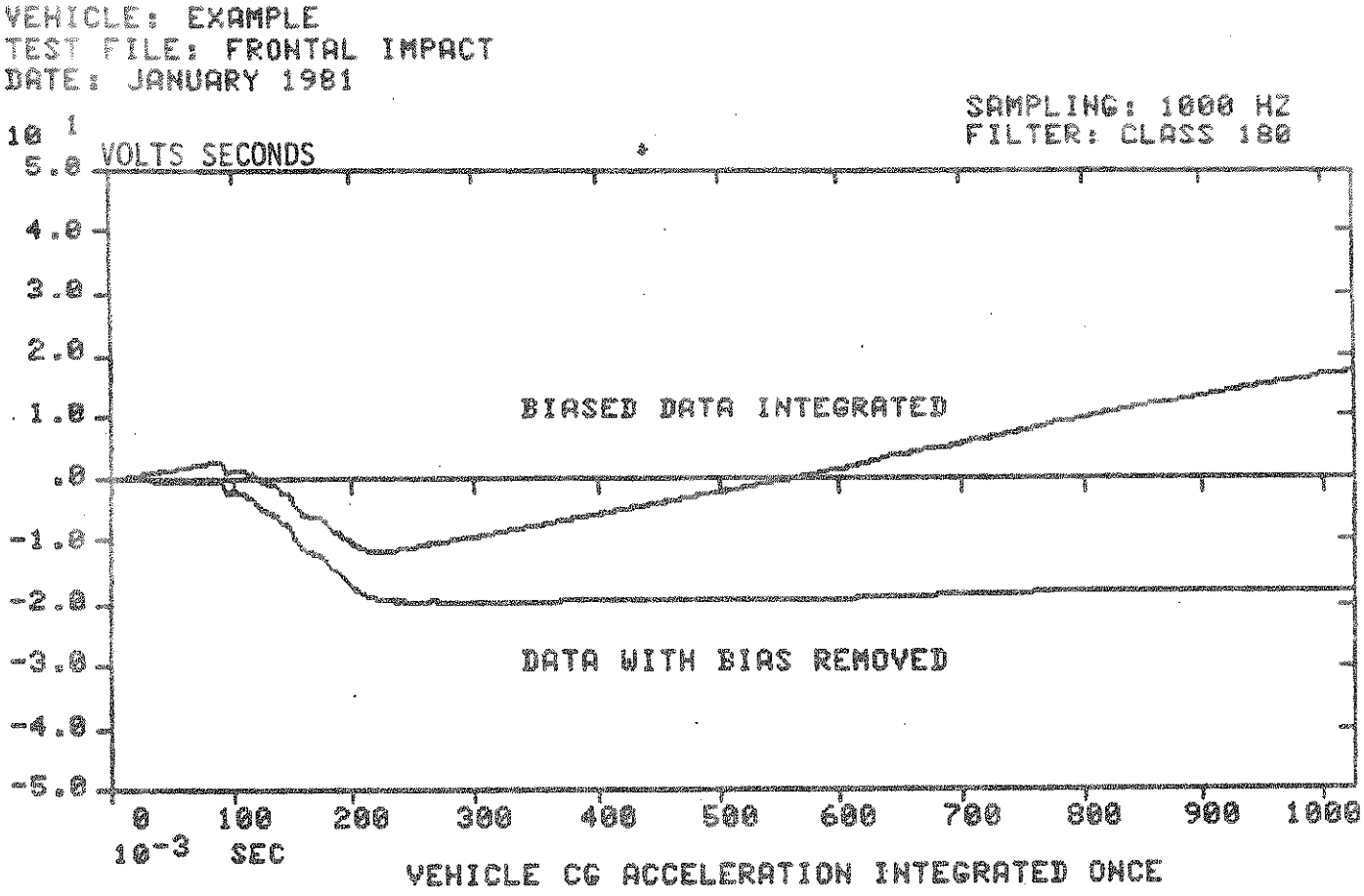

VEHICLE: EXAMPLE
TEST FILE: FRONTAL IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 1
VOLTS SECONDS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
BIASED DATA INTEGRATED
DATA WITH BIAS REMOVED
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG ACCELERATION INTEGRATED ONCE

FIGURE 4-5

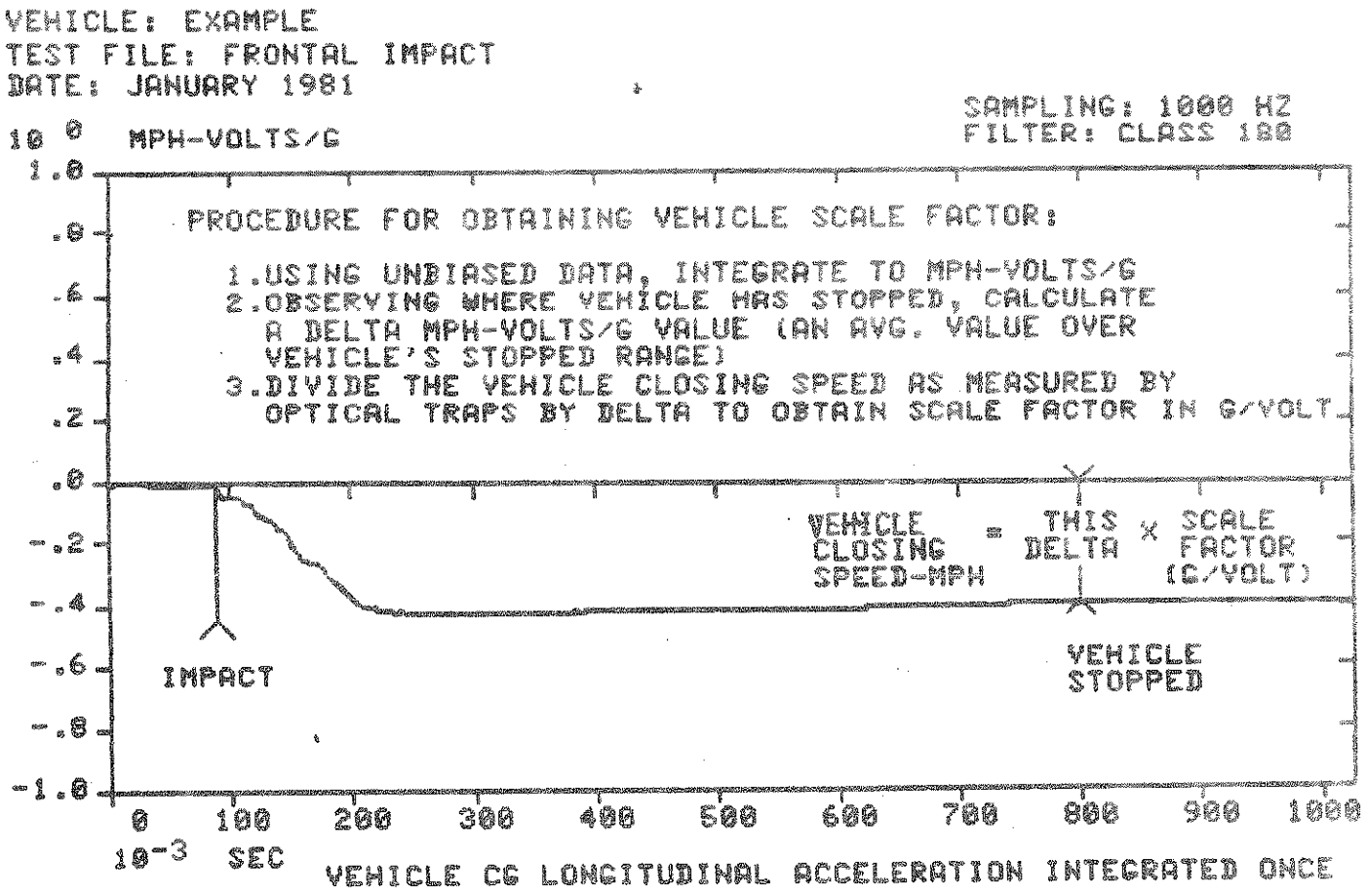

VEHICLE: EXAMPLE
TEST FILE: FRONTAL IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 0 MPH-VOLTS/G
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
PROCEDURE FOR OBTAINING VEHICLE SCALE FACTOR:
1.USING UNBIASED DATA, INTEGRATE TO MPH-VOLTS/G
2.OBSERVING WHERE VEHICLE HAS STOPPED, CALCULATE A DELTA MPH-VOLTS/G VALUE (AN AVG. VALUE OVER VEHICLE'S STOPPED RANGE)
3.DIVIDE THE VEHICLE CLOSING SPEED AS MEASURED BY OPTICAL TRAPS BY DELTA TO OBTAIN SCALE FACTOR IN G/VOLT
VEHICLE CLOSING SPEED-MPH = THIS DELTA × SCALE FACTOR (G/VOLT)
IMPACT
VEHICLE STOPPED
0 100 200 300 400 500 600 700 800 900 1000
10-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION INTEGRATED ONCE

FIGURE 4-6

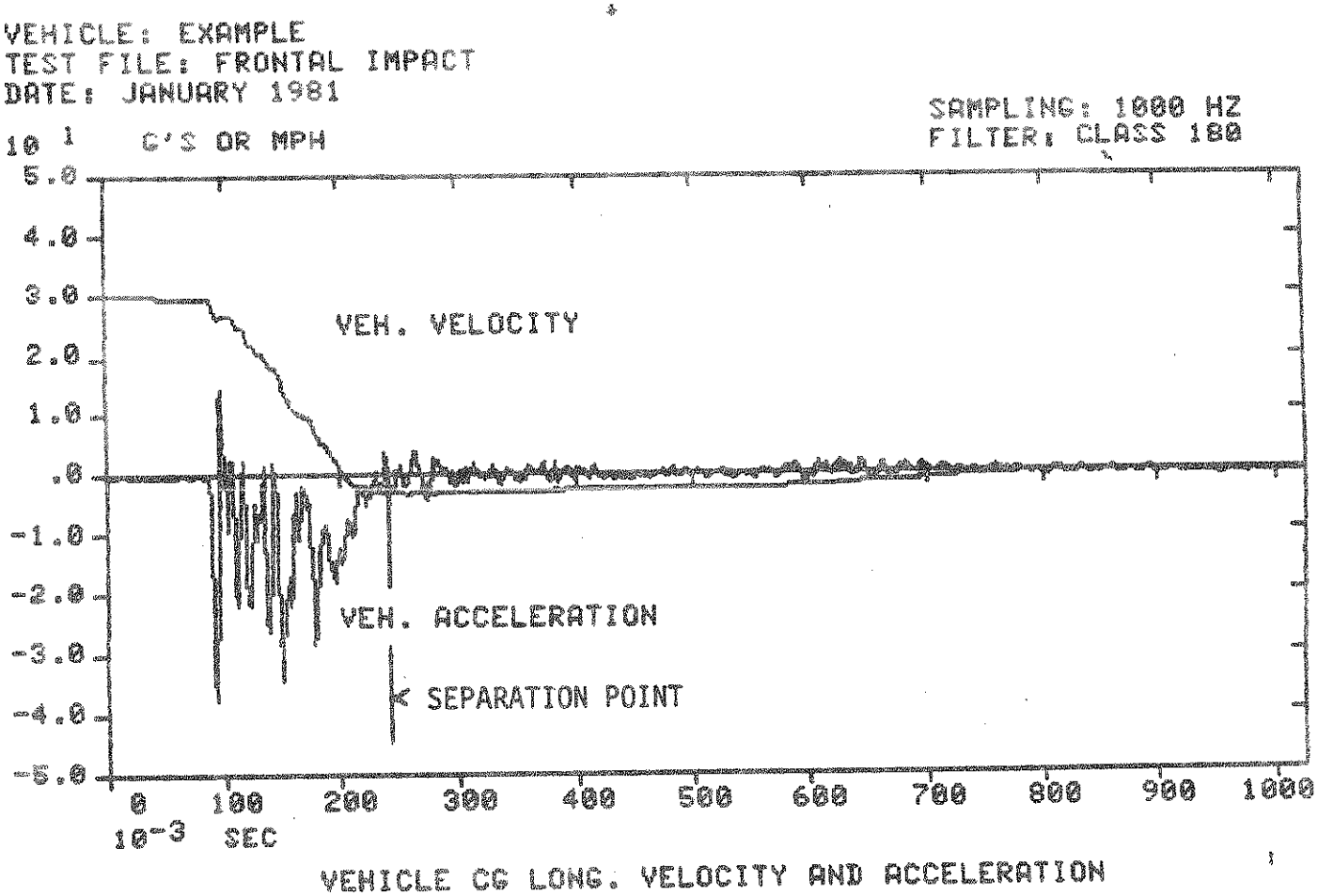

VEHICLE: EXAMPLE
TEST FILE: FRONTAL IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 1 G'S OR MPH
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
VEH. VELOCITY
VEH. ACCELERATION
SEPARATION POINT
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
VEHICLE CG LONG. VELOCITY AND ACCELERATION

FIGURE 4-7

4.2 REAR MOVING BARRIER IMPACT DELTA VELOCITY CALCULATION

The data acquisition and reduction process for a rear moving barrier impact delta velocity calculation is outlined in the step by step discussion which follows. Figure 4-8 through 4-17 illustrate each step in the process. Reflected in the processed data is:

1) Relying on the optical speed trap data as the most accurate source of the moving barrier impact speed, the calibration factor, which converts the moving barrier longitudinal acceleration signal from volts to g's, is forced to produce a velocity consistant with the optical speed trap data.

2) Since there is no comparable method of forcing a calibration factor on the test vehicle longitudinal acceleration signal, calibration factor for the test vehicle data are the result of the pre-test accelerometer calibration.

Step 1: Acquire a five (5) second time history of the moving barrier longitudinal and test vehicle longitudinal acceleration signal. (Figure 4-8 and 4-9)

Step 2: Remove bias from the longitudinal acceleration signals. Bias removal is based on the assumption that once the moving barrier and test vehicle come to rest, the acceleration trace should remain at zero and the velocity trace should exhibit no change (flat) from the "stop" time through the remainder of the five (5) second time history window. (Figure 4-10 through 4-13) The five (5) second time history was selected to allow sufficient time for both the moving barrier and the test vehicle to come completely to rest.

Step 3: Calculate the moving barrier longitudinal acceleration calibration factor. The optical speed trap reading is used in this step, along with the knowledge that the moving barrier comes to rest, i.e. a known delta velocity from impact to rest. (Figure 4-14).

Step 4: Acquire a one (1) second time history of the moving barrier longitudinal and test vehicle longitudinal acceleration signal at a sample rate and with a*pre-digitizing filter that is in accordance with the guideline established by SAE J211b. Remove bias and apply calibration factor calculated from the five (5) second time history data. (Figure 4-15 and 4-16)

Step 5: Calculate the delta velocity at the time of moving barrier/test vehicle separation. The time of separation is determined by examining the moving barrier and test vehicle longitudinal acceleration signal and velocity traces while noting that:

1) The moving barrier exhibits no apprecible deceleration from the time of separation until the moment the moving barrier brakes are applied, i.e. a period of constant velocity should be exhibited by the moving barrier immediately following barrier/test vehicle separation.

2) Since any external force acting to accelerate the test vehicle in the positive forward direction becomes zero at separation, the test vehicle should exhibit maximum velocity immediately prior to separation and only deceleration due to friction forces thereafter. (Figure 4-17)

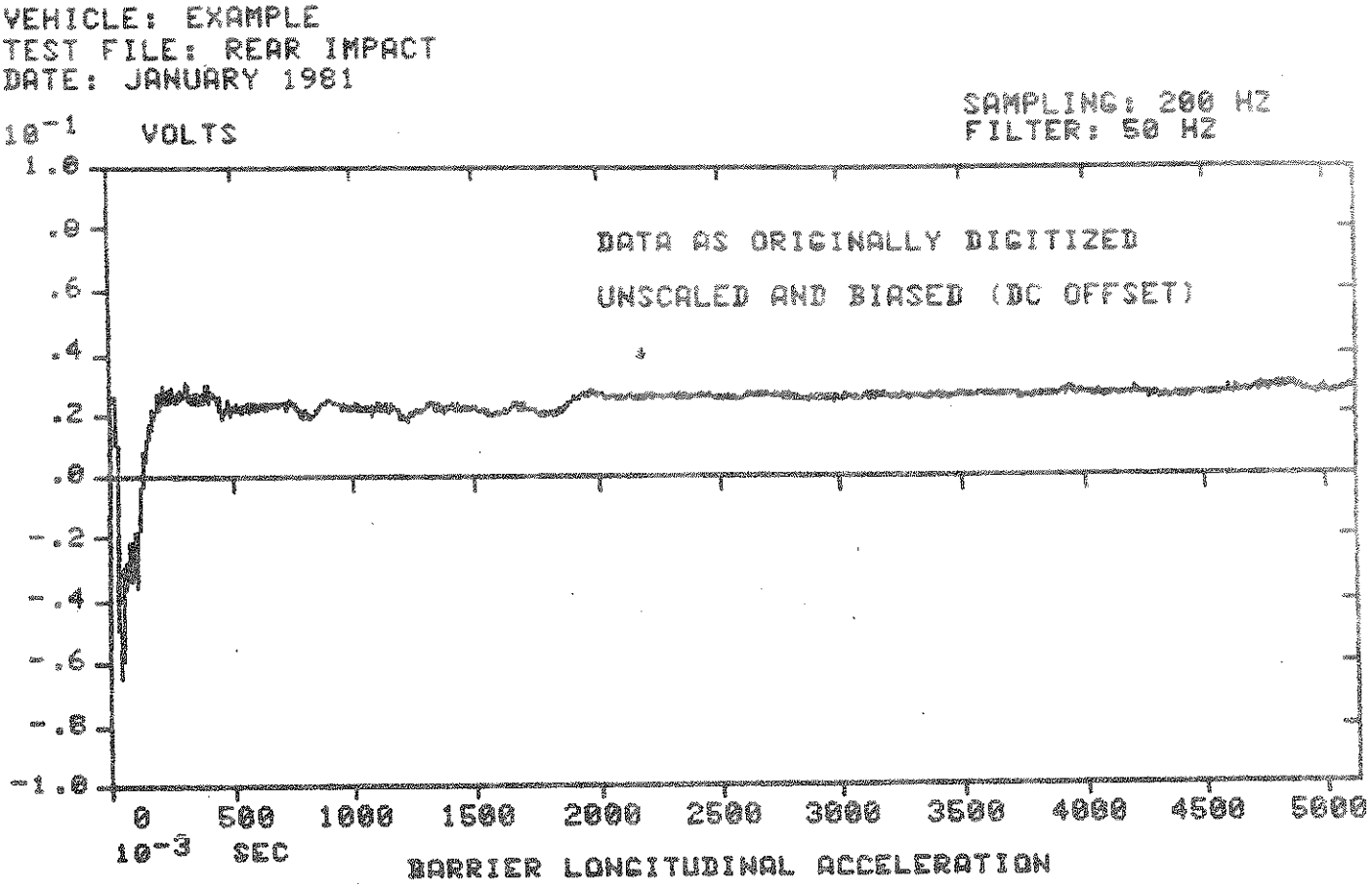

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10^-1 VOLTS
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
DATA AS ORIGINALLY DIGITIZED
UNSCALED AND BIASED (DC OFFSET)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10^-3 SEC
BARRIER LONGITUDINAL ACCELERATION

FIGURE 4-8

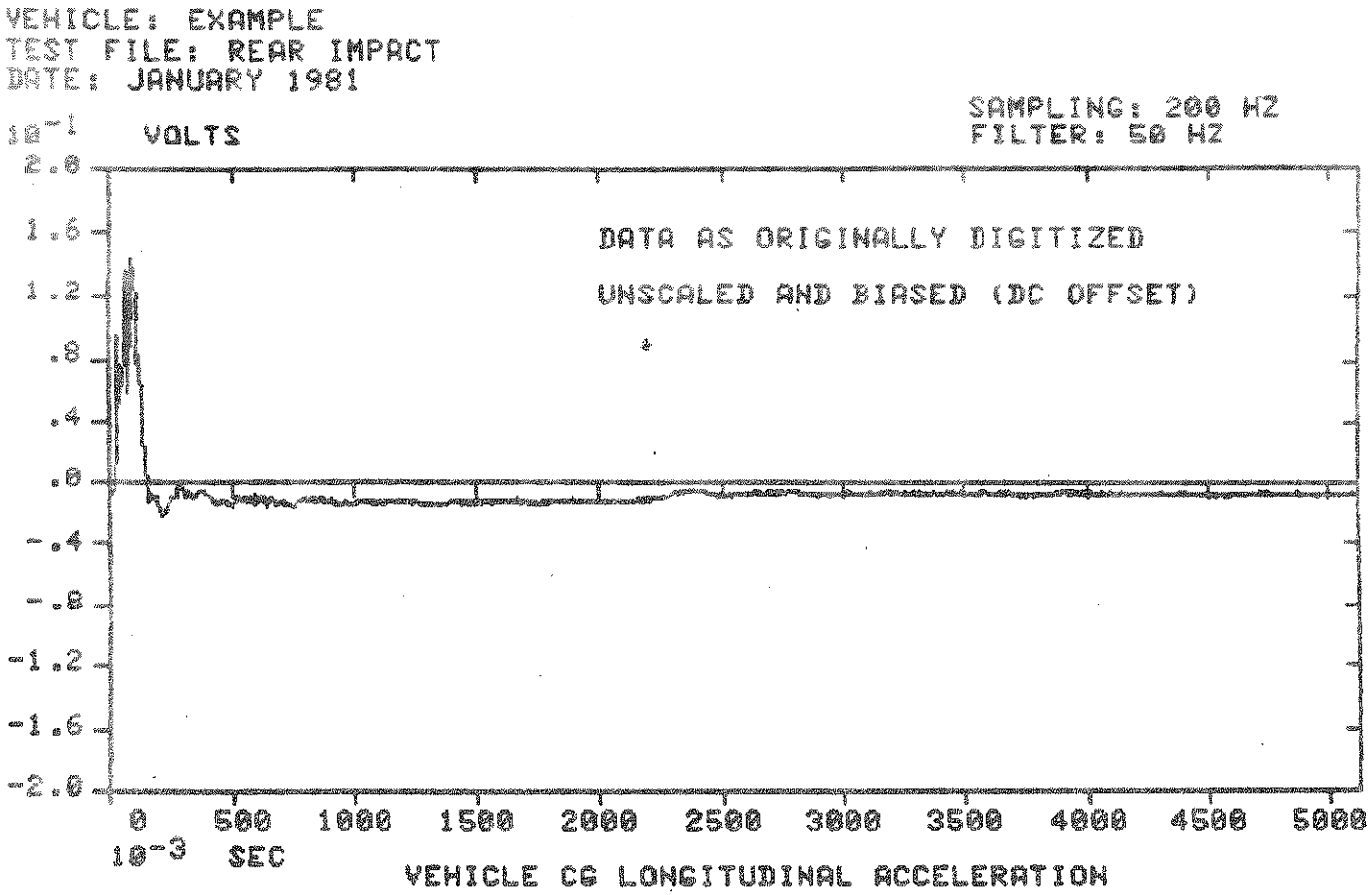

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10^-1 VOLTS
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
DATA AS ORIGINALLY DIGITIZED
UNSCALED AND BIASED (DC OFFSET)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10^-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

FIGURE 4-9

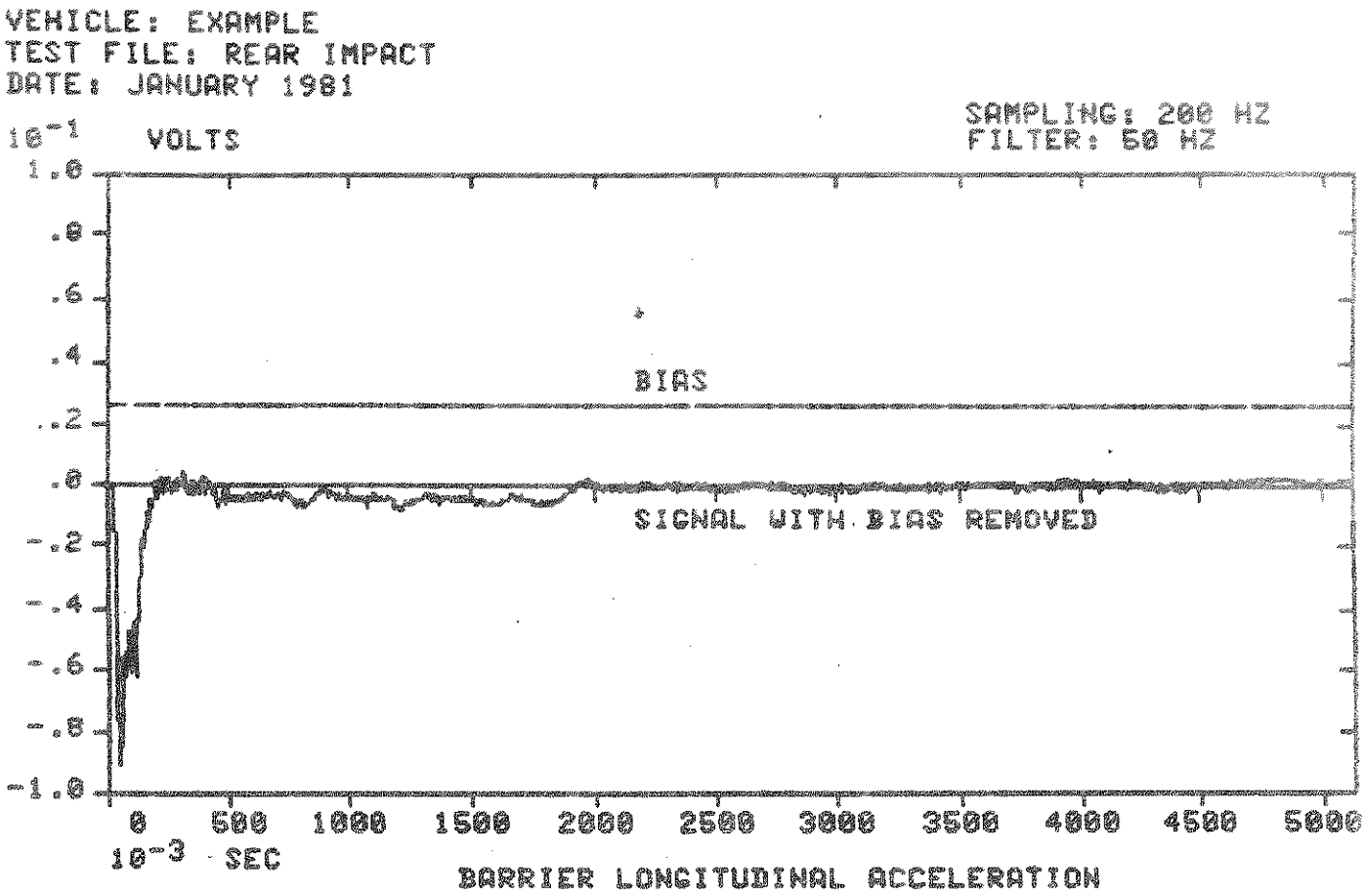

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 60 HZ
10^-1 VOLTS
1.0
.8
.6
.4
.2
0
-.2
-.4
-.6
-.8
-1.0
BIAS
SIGNAL WITH BIAS REMOVED
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10^-3 SEC
BARRIER LONGITUDINAL ACCELERATION

FIGURE 4-10

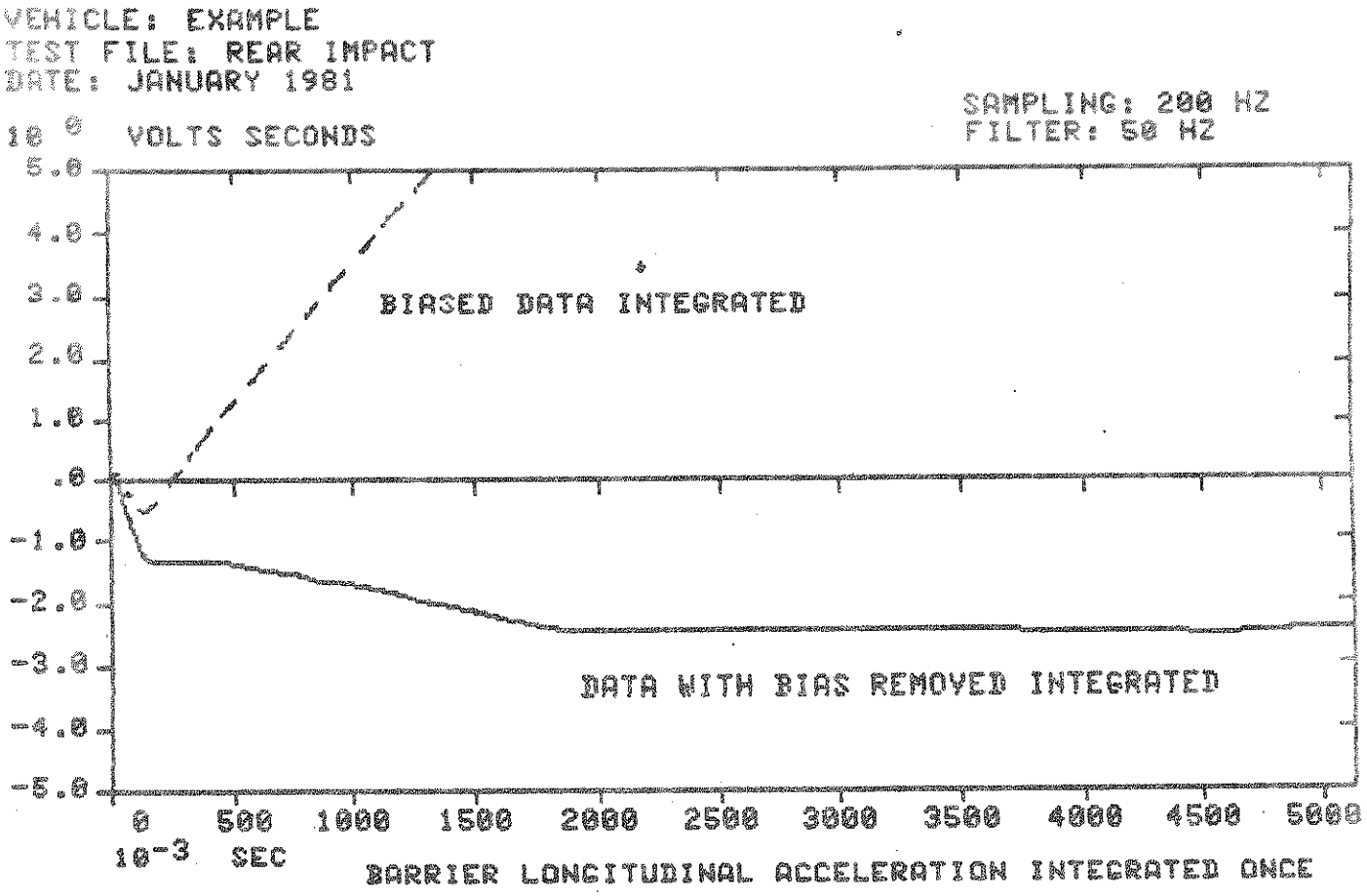

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10 0 VOLTS SECONDS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
BIASED DATA INTEGRATED
DATA WITH BIAS REMOVED INTEGRATED
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10-3 SEC
BARRIER LONGITUDINAL ACCELERATION INTEGRATED ONCE

FIGURE 4-11

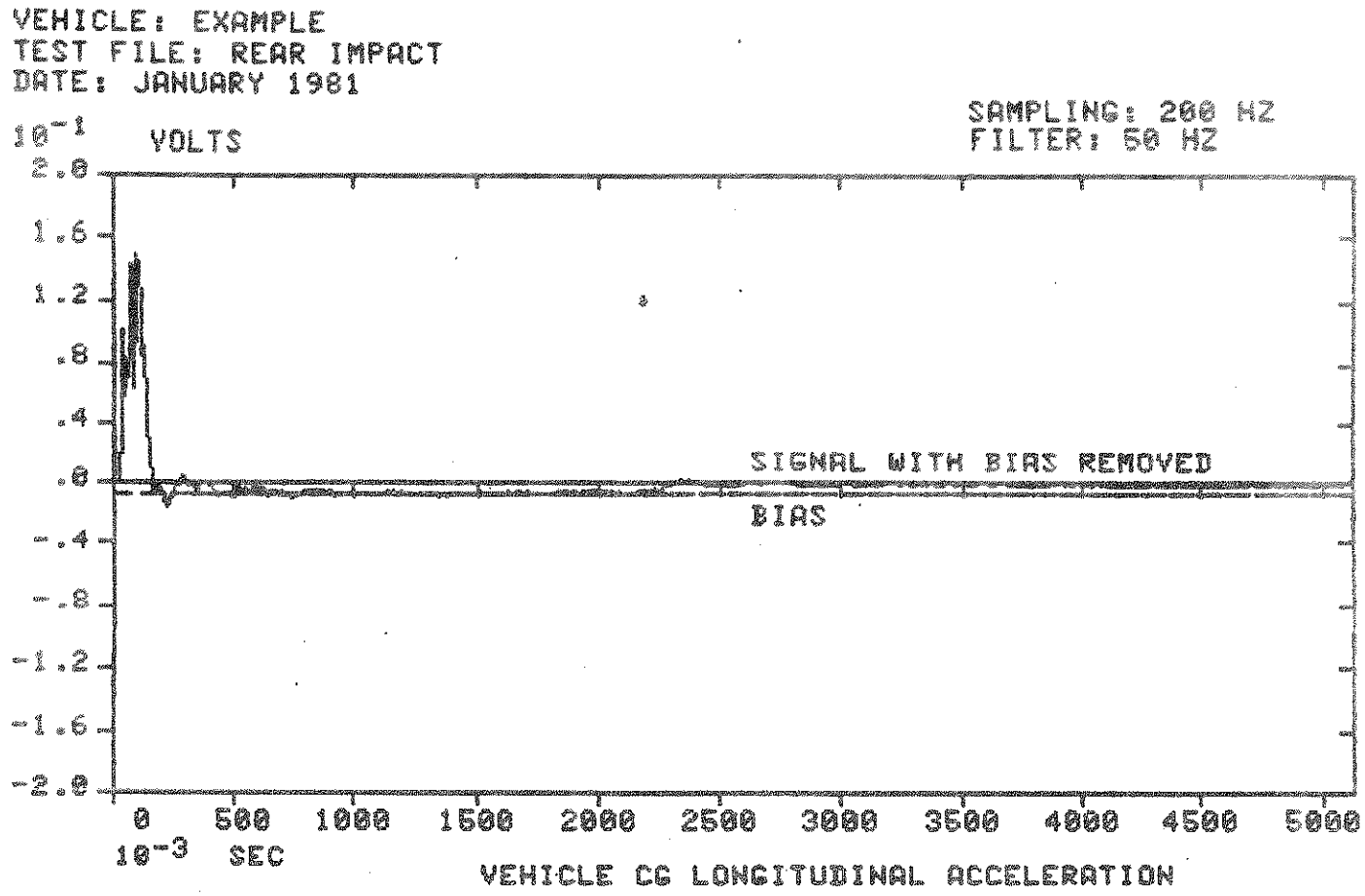

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10^-1 VOLTS
2.0
1.6
1.2
.8
.4
.0
-.4
-.8
-1.2
-1.6
-2.0
SIGNAL WITH BIAS REMOVED
BIAS
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10^-3 SEC
VEHICLE CG LONGITUDINAL ACCELERATION

FIGURE 4-12

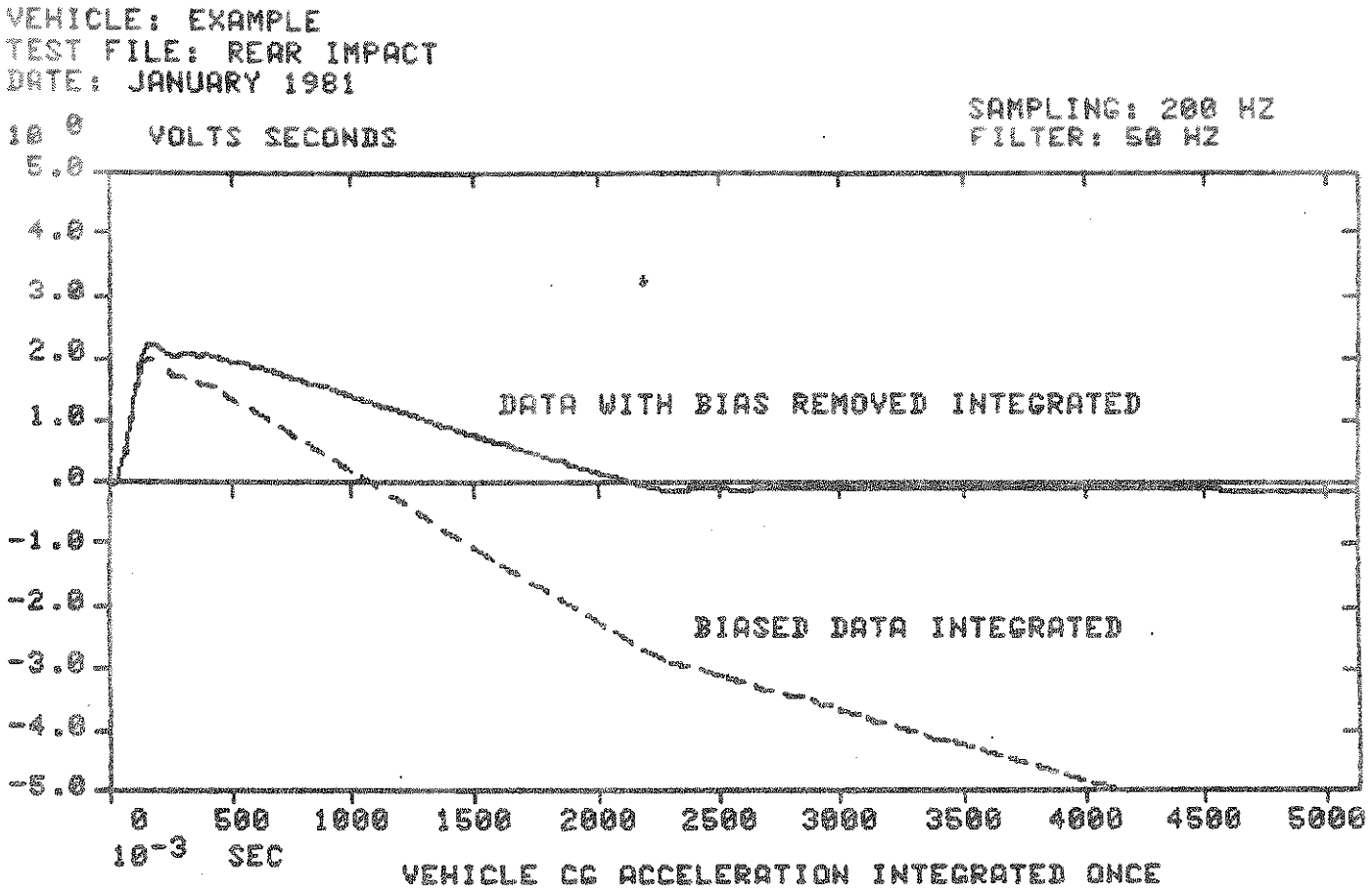

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10 0 VOLTS SECONDS
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
DATA WITH BIAS REMOVED INTEGRATED
BIASED DATA INTEGRATED
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
10-3 SEC
VEHICLE CG ACCELERATION INTEGRATED ONCE

FIGURE 4-13

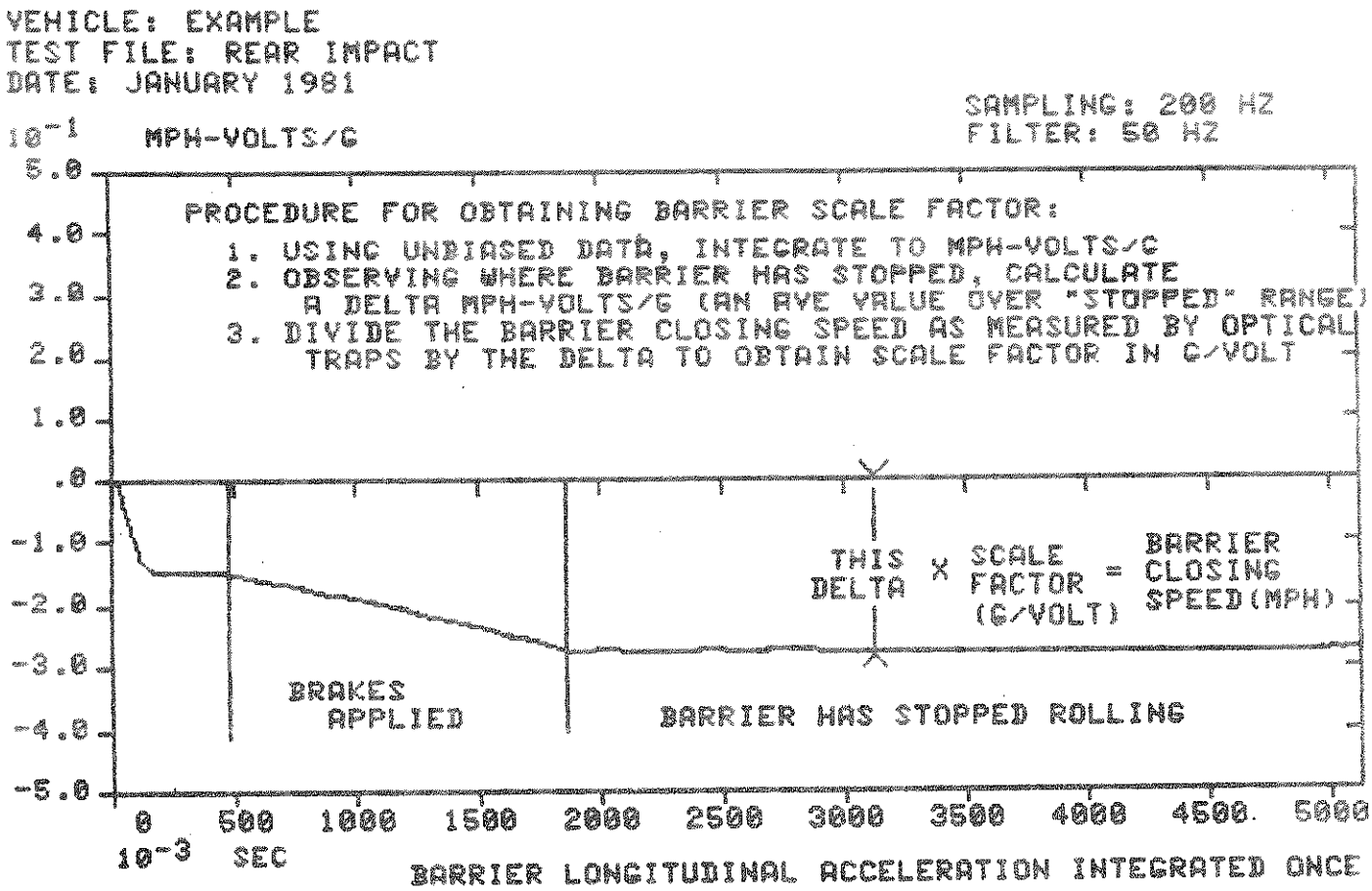

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 200 HZ
FILTER: 50 HZ
10^-1 MPH-VOLTS/G
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
PROCEDURE FOR OBTAINING BARRIER SCALE FACTOR:
1. USING UNBIASED DATA, INTEGRATE TO MPH-VOLTS/G
2. OBSERVING WHERE BARRIER HAS STOPPED, CALCULATE A DELTA MPH-VOLTS/G (AN AVE VALUE OVER "STOPPED" RANGE)
3. DIVIDE THE BARRIER CLOSING SPEED AS MEASURED BY OPTICAL TRAPS BY THE DELTA TO OBTAIN SCALE FACTOR IN G/VOLT
THIS DELTA
X
SCALE FACTOR (G/VOLT)
=
BARRIER CLOSING SPEED(MPH)
BRAKES APPLIED
BARRIER HAS STOPPED ROLLING
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10^-3 SEC
BARRIER LONGITUDINAL ACCELERATION INTEGRATED ONCE

FIGURE 4-14

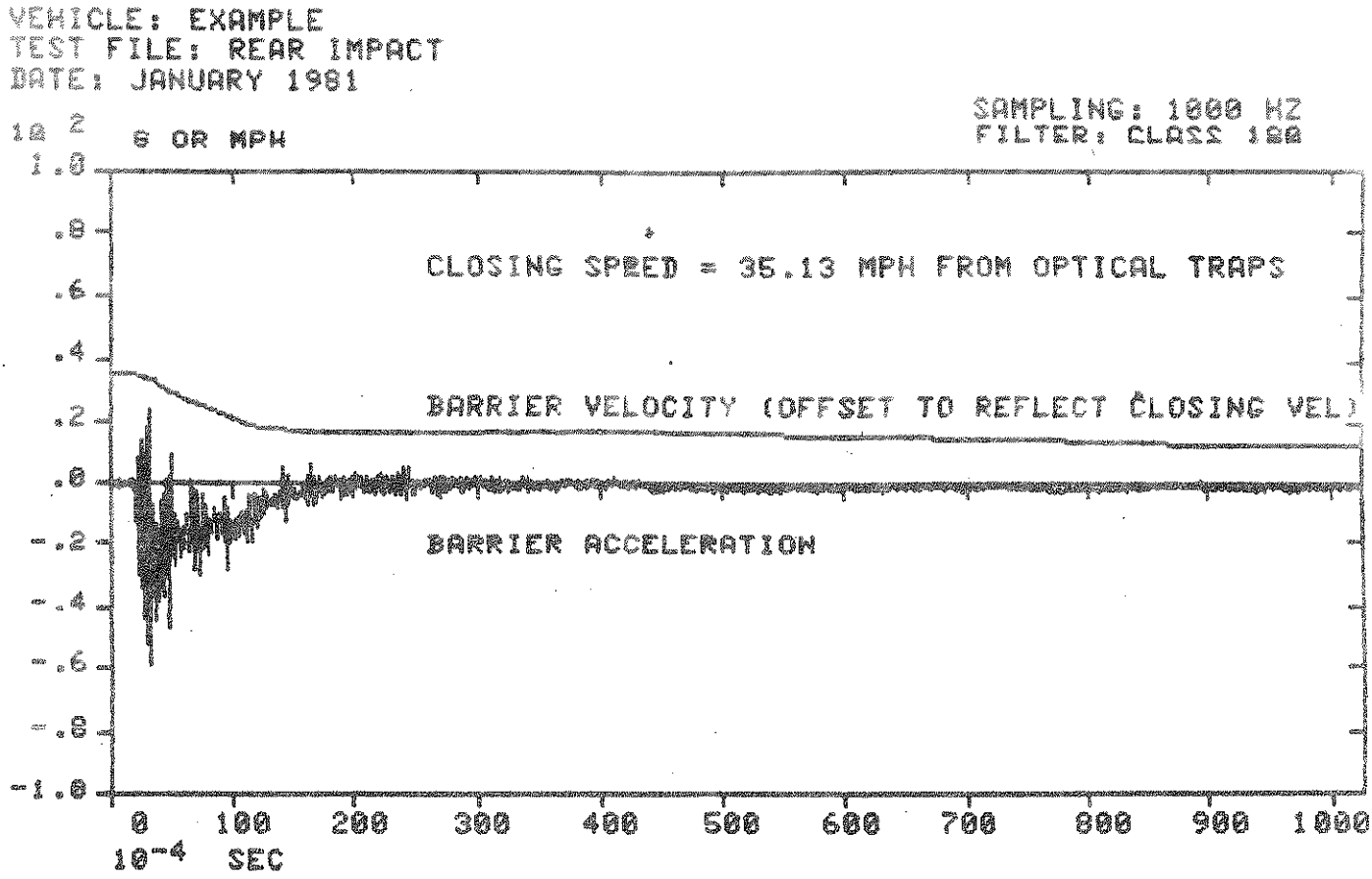

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 2
G OR MPH
1.0
.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
-1.0
CLOSING SPEED = 35.13 MPH FROM OPTICAL TRAPS
BARRIER VELOCITY (OFFSET TO REFLECT CLOSING VEL)
BARRIER ACCELERATION
0
100
200
300
400
500
600
700
800
900
1000
10**-4 SEC

FIGURE 4-15

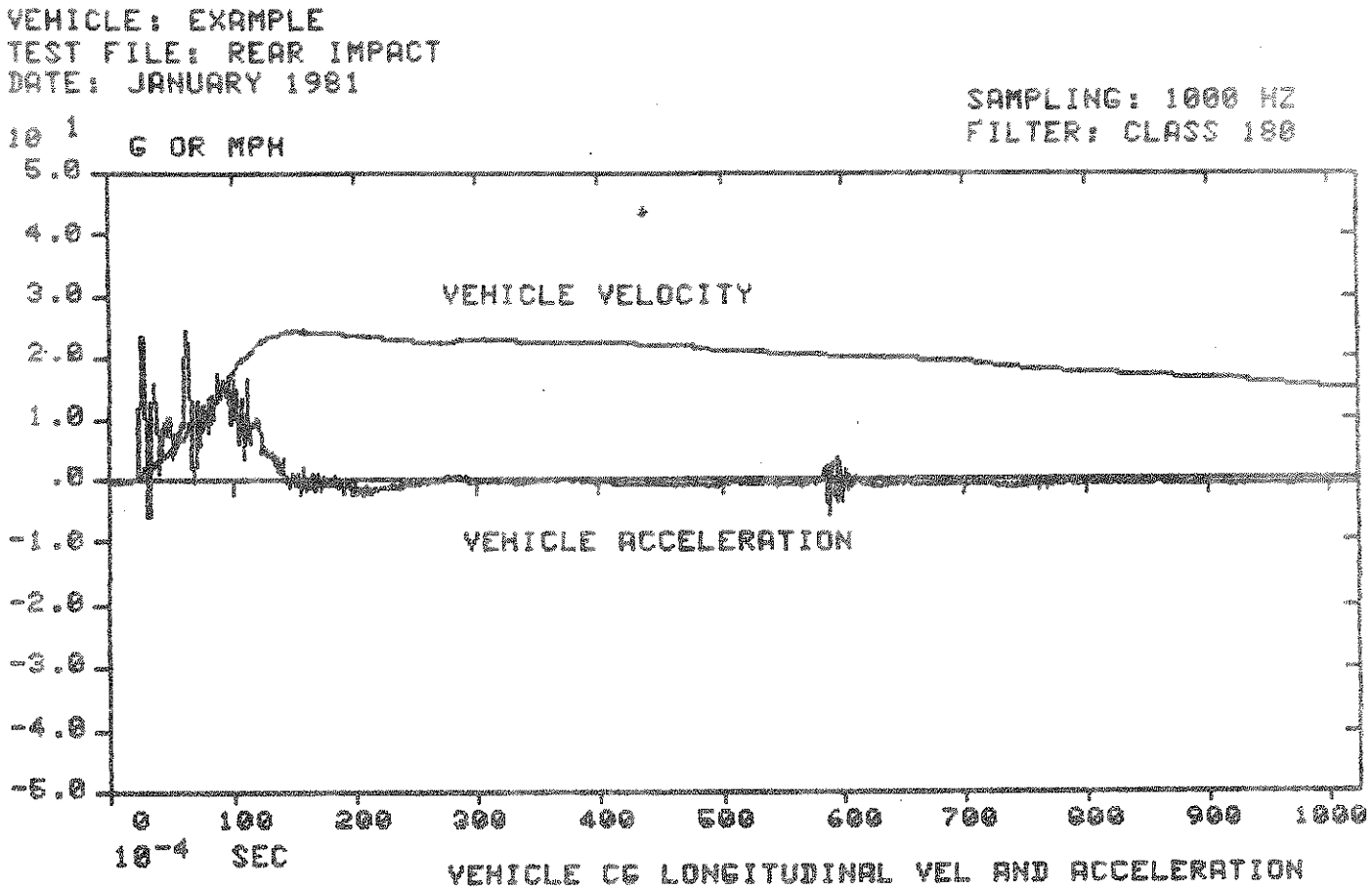

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 1
G OR MPH
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
VEHICLE VELOCITY
VEHICLE ACCELERATION
0
100
200
300
400
500
600
700
800
900
1000
10-4 SEC
VEHICLE CG LONGITUDINAL VEL AND ACCELERATION

FIGURE 4-16

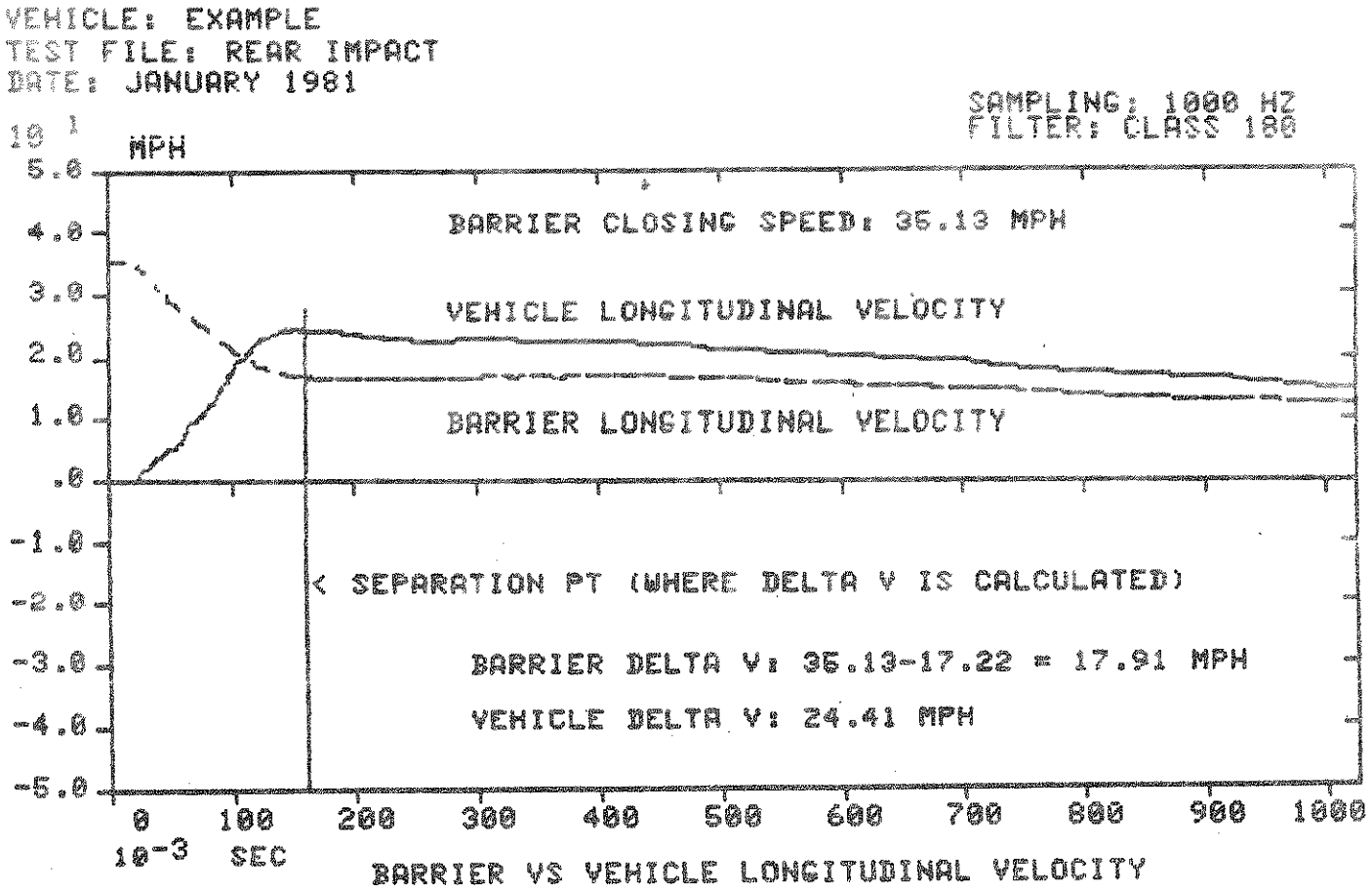

VEHICLE: EXAMPLE
TEST FILE: REAR IMPACT
DATE: JANUARY 1981
SAMPLING: 1000 HZ
FILTER: CLASS 180
10 1
MPH
5.0
4.0
3.0
2.0
1.0
.0
-1.0
-2.0
-3.0
-4.0
-5.0
BARRIER CLOSING SPEED: 35.13 MPH
VEHICLE LONGITUDINAL VELOCITY
BARRIER LONGITUDINAL VELOCITY
< SEPARATION PT (WHERE DELTA V IS CALCULATED)
BARRIER DELTA V: 35.13-17.22 = 17.91 MPH
VEHICLE DELTA V: 24.41 MPH
0
100
200
300
400
500
600
700
800
900
1000
10-3 SEC
BARRIER VS VEHICLE LONGITUDINAL VELOCITY

FIGURE 4-17