

October 1984
Final Report

DOT HS-806 686

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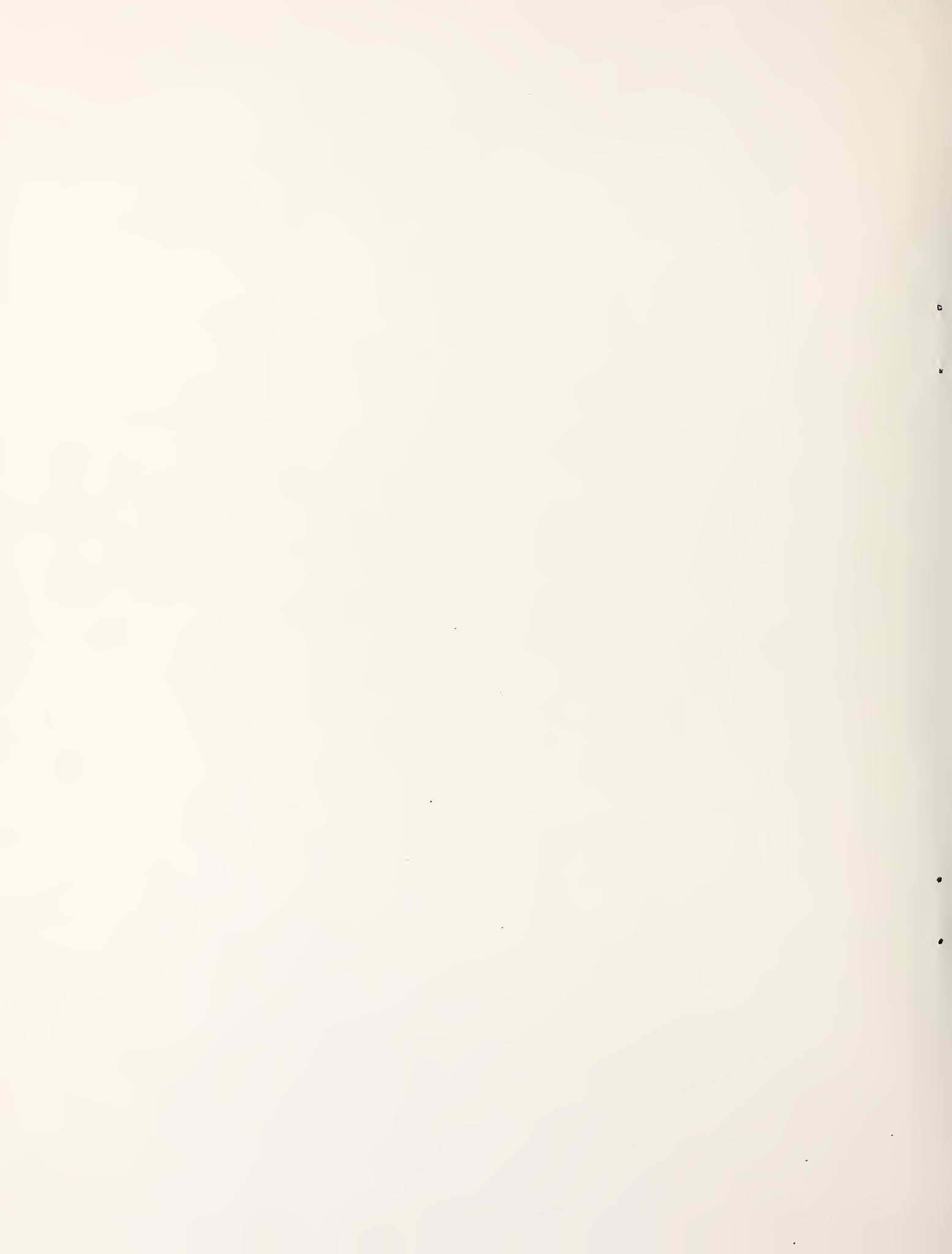
US Department
of Transportation
**National Highway
Traffic Safety
Administration**

AIRBAG SENSOR DEMONSTRATION TEST
1978 DODGE DIPLOMAT INTO A FIXED
BARRIER AT 9.0 AND 29.6 MPH

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Contract No. DTNH22-82-A-08401



72
242
644
984

1. Report No. DOT HS-806 686	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle AIRBAG SENSOR DEMONSTRATION TEST 1978 DODGE DIPLOMAT INTO A FIXED BARRIER AT 9.0 AND 29.6 MPH	5. Report Date OCTOBER 1984	6. Performing Organization Code
7. Author(s) L. Bell & B. Wade, Project Engineers, TRCO	8. Performing Organization Report No. 840914	10. Work Unit No. (TRAIS)
9. Performing Organization Name and Address Vehicle Research and Test Center St. Rt. 33, Logan County East Liberty, Ohio 43319	11. Contract or Grant No. DTNH22-82-A-08401	13. Type of Report and Period Covered FINAL REPORT September-October 1984
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590	14. Sponsoring Agency Code	15. Supplementary Notes
16. Abstract This test report documents two tests that were conducted to assess the performance of the Romeo-Kojyo airbag deployment sensors. Testing was conducted on a 1978 Dodge Diplomat 2-door hardtop at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted into a fixed, rigid barrier at 9.0 mph and then at 29.6 mph. The test date was September 14, 1984.		

17. Key Words Airbag Sensor Deployment Frontal Impacts	18. Distribution Statement Available from: Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161		
19. Security Classification of this report Unclassified	20. Security Classification of this page Unclassified	21. No. of Pages 43	22. Price

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SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

The purpose of these crash tests was to assess the performance of the Romeo-Kojyo air bag deployment sensors. These tests were conducted when the vehicle was frontally impacted into a fixed rigid barrier.

INTRODUCTION

A 1978 Dodge Diplomat 2-door hardtop was towed into a fixed, rigid barrier on September 14, 1984. The first of the two tests was conducted at an ambient temperature of 62° F and at a velocity of 9.0 mph. Following the first test, the two energy absorbers on the front bumper were replaced with new ones. The second test was conducted at an ambient temperature of 64° F and at a velocity of 29.6 mph.

SECTION 2.0
GENERAL TEST AND VEHICLE PARAMETER DATA

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

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge Diplomat

VIN: GH22G8G116112

BODY STYLE: 2-Door

MODEL YEAR: 1978

NHTSA NO.: R & D

COLOR: Red

ENGINE DATA: TYPE: V8 CYLINDERS: 8 DISPLACEMENT 318 In³

TRANSMISSION DATA: Automatic

DATE VEHICLE RECEIVED: 9/11/84

ODOMETER READING: 67317

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

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

VEHICLE MANUFACTURED BY: Chrysler Corporation

DATE OF MANUFACTURE: 8/77

GVWR: 5125 LBS.,

GAWR: FRONT 2525 LBS., REAR 2650 LBS.

FINAL TEST WEIGHT

RIGHT FRONT	1070	LBS.	RIGHT REAR	730	LBS.
LEFT FRONT	1070	LBS.	LEFT REAR	760	LBS.
TOTAL FRONT WEIGHT	2140		LBS. (59.0 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1490		LBS. (41.0 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	3630		LBS.		

TEST 840914A

INTENDED VELOCITY: 9.0 mph

ACTUAL VELOCITY: 9.0 mph

CENTER LENGTH MEASUREMENT

PRE-TEST: 202 5/8"

POST-TEST: 198 3/8"

CRUSH: 4 1/4"

TEST 840914B

INTENDED VELOCITY: 30.0 mph

ACTUAL VELOCITY: 29.6 mph

CENTER LENGTH MEASUREMENT

PRE-TEST: 200 3/4"

POST-TEST: 179 1/2"

CRUSH: 21 1/4"

TEST ANOMALIES

The Left Front Frame Crossmember accelerometer, FFCXGL, and the Right Front Frame Crossmember accelerometer, FFCXGR, measured accelerations which exceeded full scale for both the 9 mph and the 30 mph tests.

The cable for the Right Front accelerometer, FFCXGR, was severed after impact at approximately 50 msec on the 30 mph test.

The Firewall accelerometer, FWLXG, and the Steering Wheel Hub accelerometer, STHPG, measured accelerations which exceeded full scale on the 30 mph test.

SECTION 3.0
DATA REQUIRED BY R & D

The following pages are included in this section:

1. Vehicle accelerometer location and data summary
2. High speed camera information

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY
TEST 840914A

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT FRONT CROSSMEMBER (LONGITUDINAL)	180.9	-16.5	21.9	3.85	17.50 Y	19.39	47.88 Y
2	RIGHT FRONT CROSSMEMBER (LONGITUDINAL)	181.6	16.4	21.6	3.27	16.13 Y	13.29	58.75 Y
3	FIREWALL (LONGITUDINAL)	149.9	-21.0	34.5	1.51	170.88	10.52	14.38
4	STEERING WHEEL HUB (POSTERIOR)	122.3	-14.1	35.4	0.97	168.50	10.07	18.88

No visual actuation of either flashbulb occurred during the crash.

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

ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES

Y See TEST ANOMALIES

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY
TEST 840914B

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT FRONT CROSSMEMBER (LONGITUDINAL)	180.9	-16.5	21.9	72.91	31.25 Y	98.13	24.75 Y
2	RIGHT FRONT CROSSMEMBER (LONGITUDINAL)	181.6	16.4	21.6	26.71	32.71 Y	119.77	39.13 Y
3	FIREWALL (LONGITUDINAL)	149.9	-21.0	34.5	3.15	179.00 Y	41.36	58.75 Y
4	STEERING WHEEL HUB (POSTERIOR)	122.3	-14.1	35.4	60.95	45.63 Y	68.92	39.38 Y

Visual actuation of the flashbulb connected to the left front sensor occurred at approximately 23 milliseconds after impact.

Visual actuation of the flashbulb connected to the right front sensor occurred at approximately 55 milliseconds after impact.

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

ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES

Y See TEST ANOMALIES

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right	Photosonic 1B	25	1000	Assess sensor performance
2	Right	Photosonic 1B	25	1000	Assess sensor performance

NOTE: CAMERAS ARE NUMBERED ACCORDING TO SPLICING SEQUENCE OF FILM.
 (24 fps) REAL TIME MOVIE FILM COVERAGE OF PRE-CRASH, POST-CRASH
 AND CRASH EVENT SPLICED AT START AND END OF FILM.

APPENDIX A

PHOTOGRAPHS

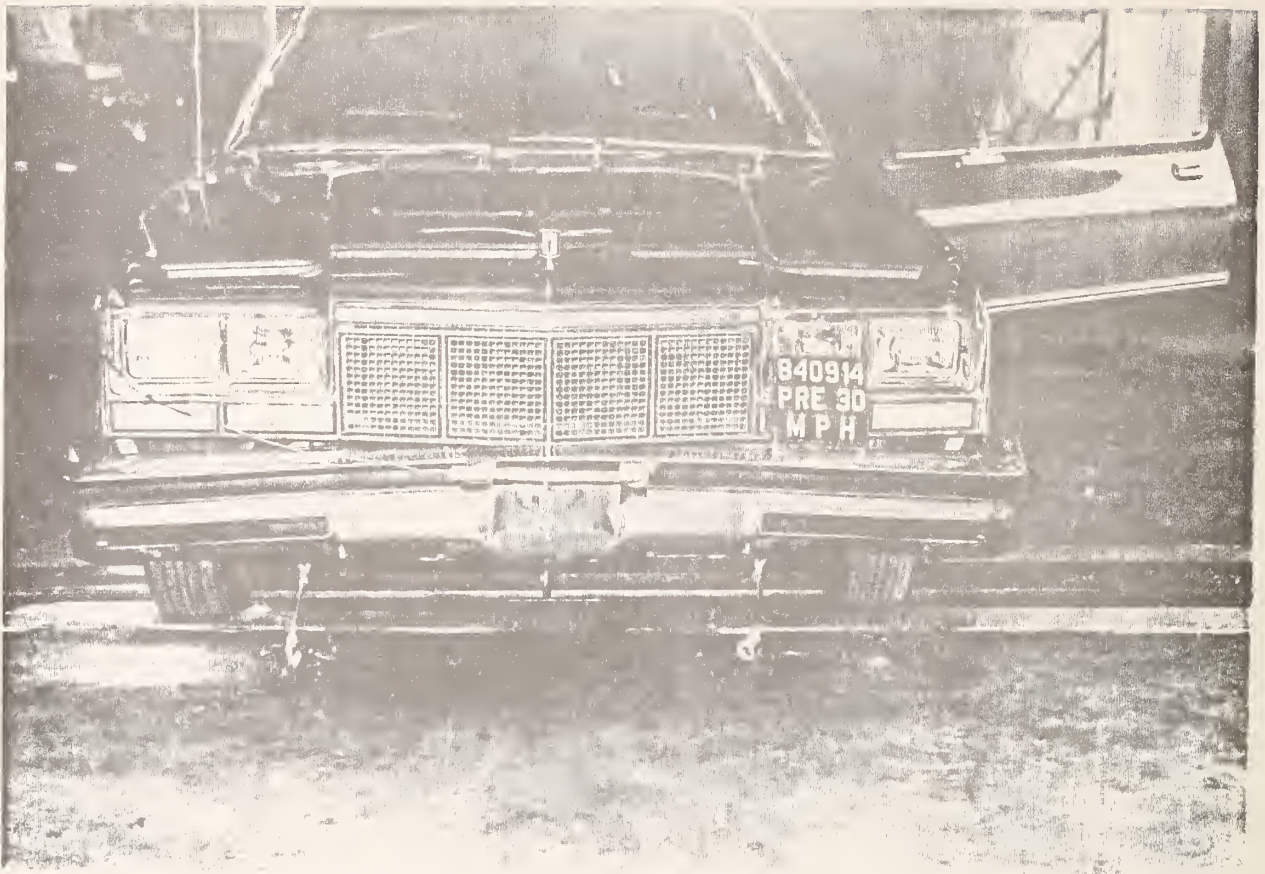


Figure A-1. PRE-TEST VEHICLE FRONT

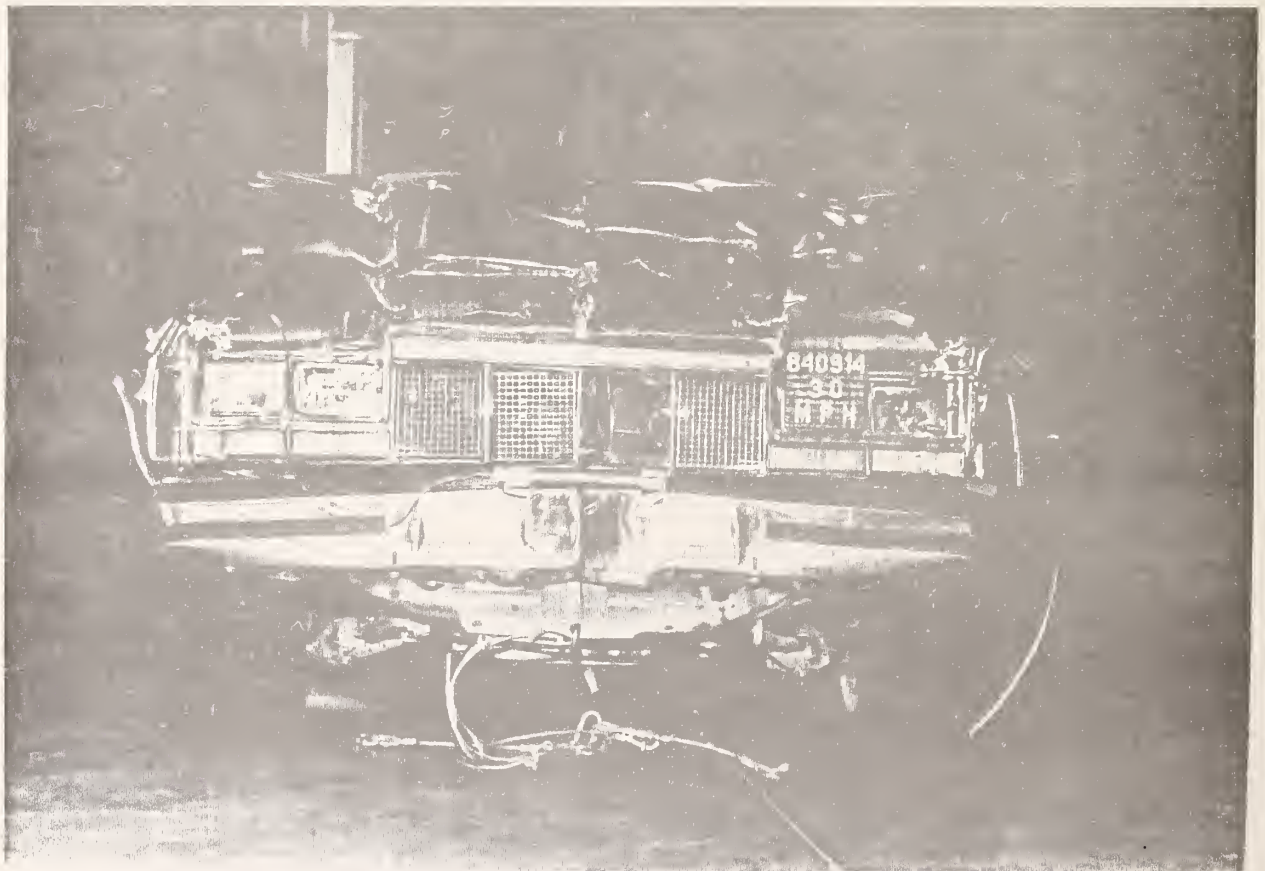


Figure A-2. POST-TEST VEHICLE FRONT
A-2

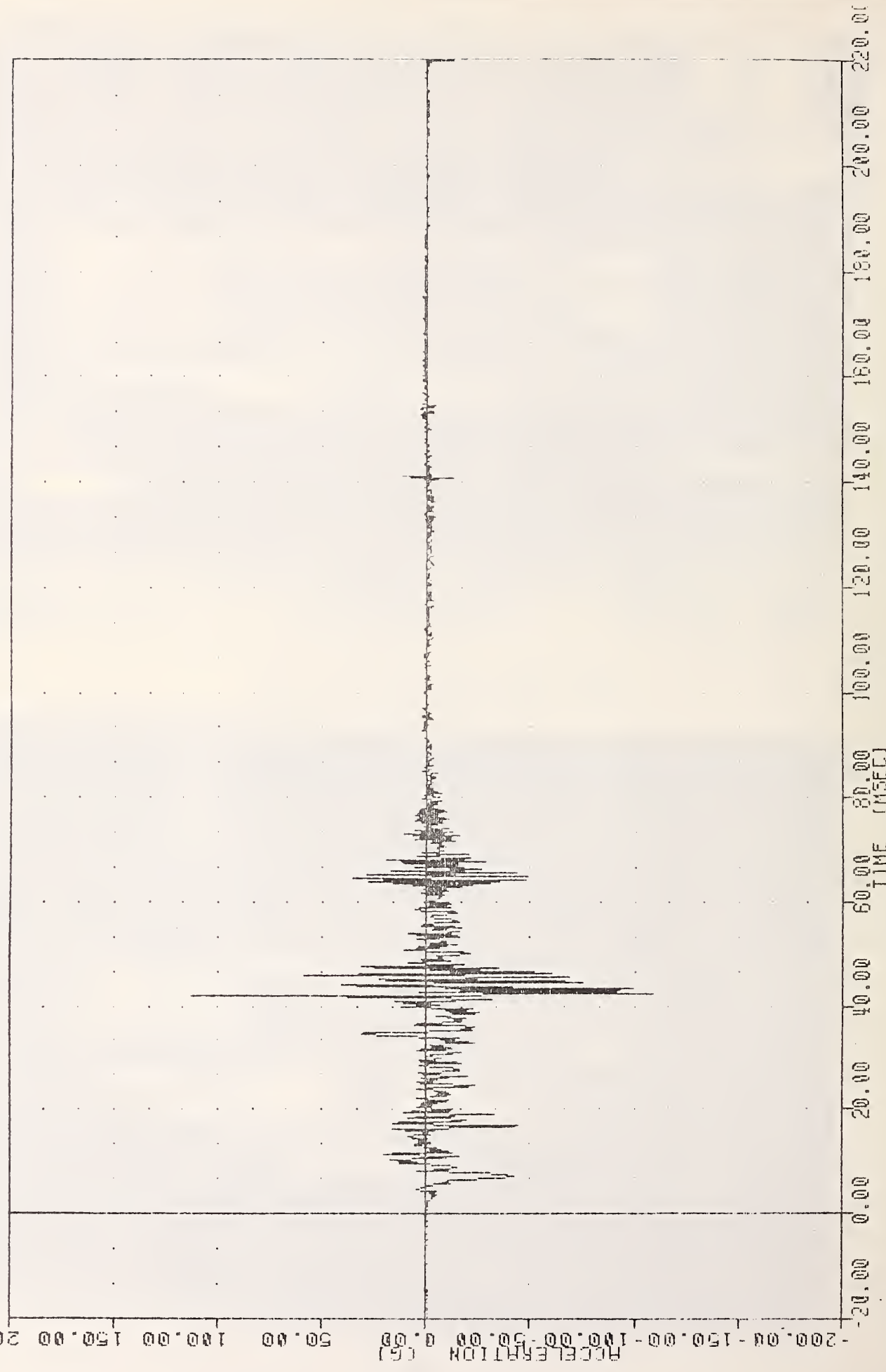
APPENDIX B

DATA PLOT PRESENTATION

Data plots generated from the crash test data are presented on the following pages. All data is unfiltered to show that accelerations exceeded full scale.

1 1 9 MPH 240914 24-SEP-84 15:05:20
RDNEO-KUJYO SENSOR TESTS
84258
FFCXGL

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -108.75 42.25 113.19 41.88



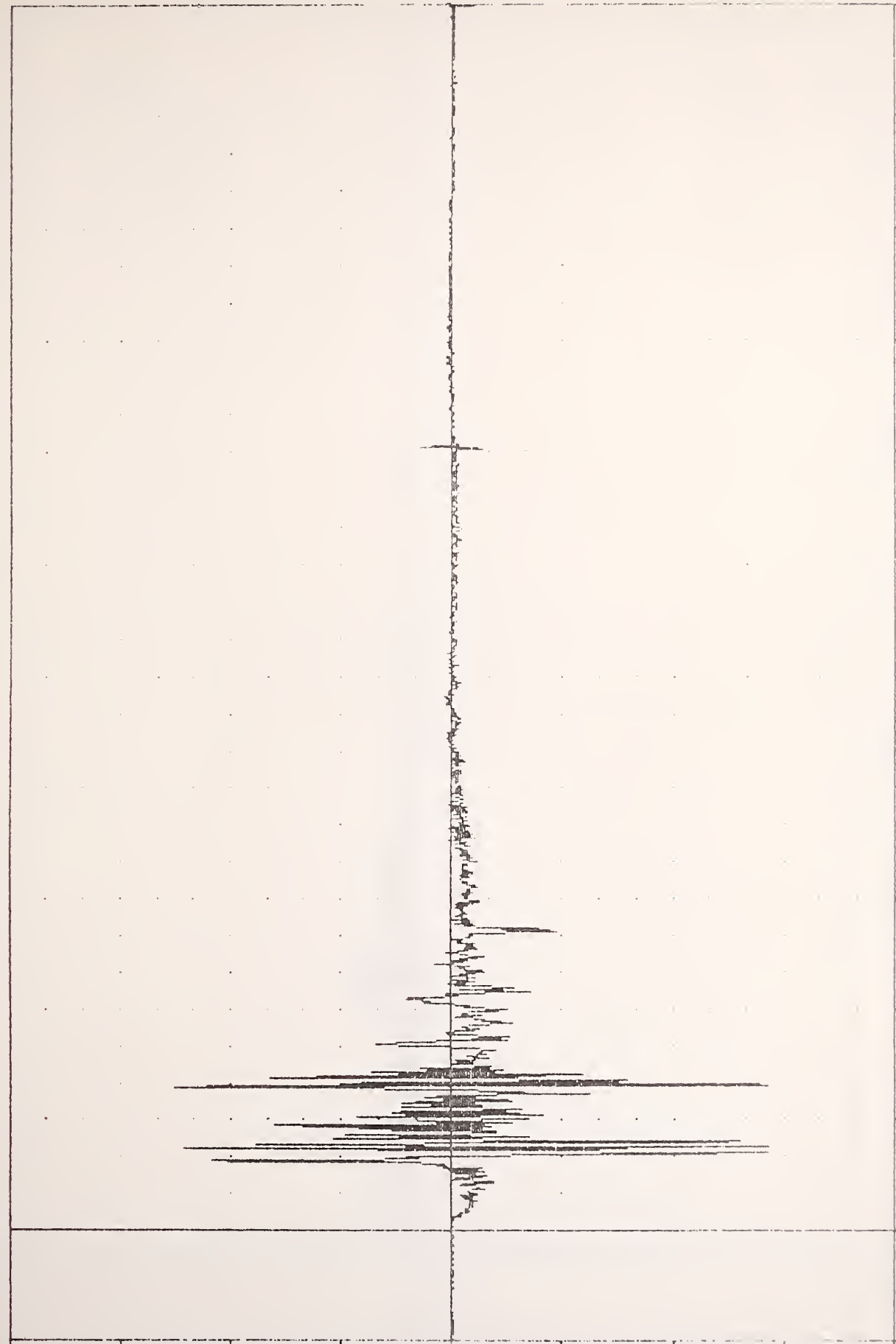
DODGE DIPLOMAT INTO FIXED BARRIER
LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

840914
RONEO-KOJYO SENSOR TESTS
84258
FFCXGR

PLUI DATE 24-SEP-84 15:05:20

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -143.40e 13.88. 125.31 e 25.75

ACCELERATION (G)
-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00

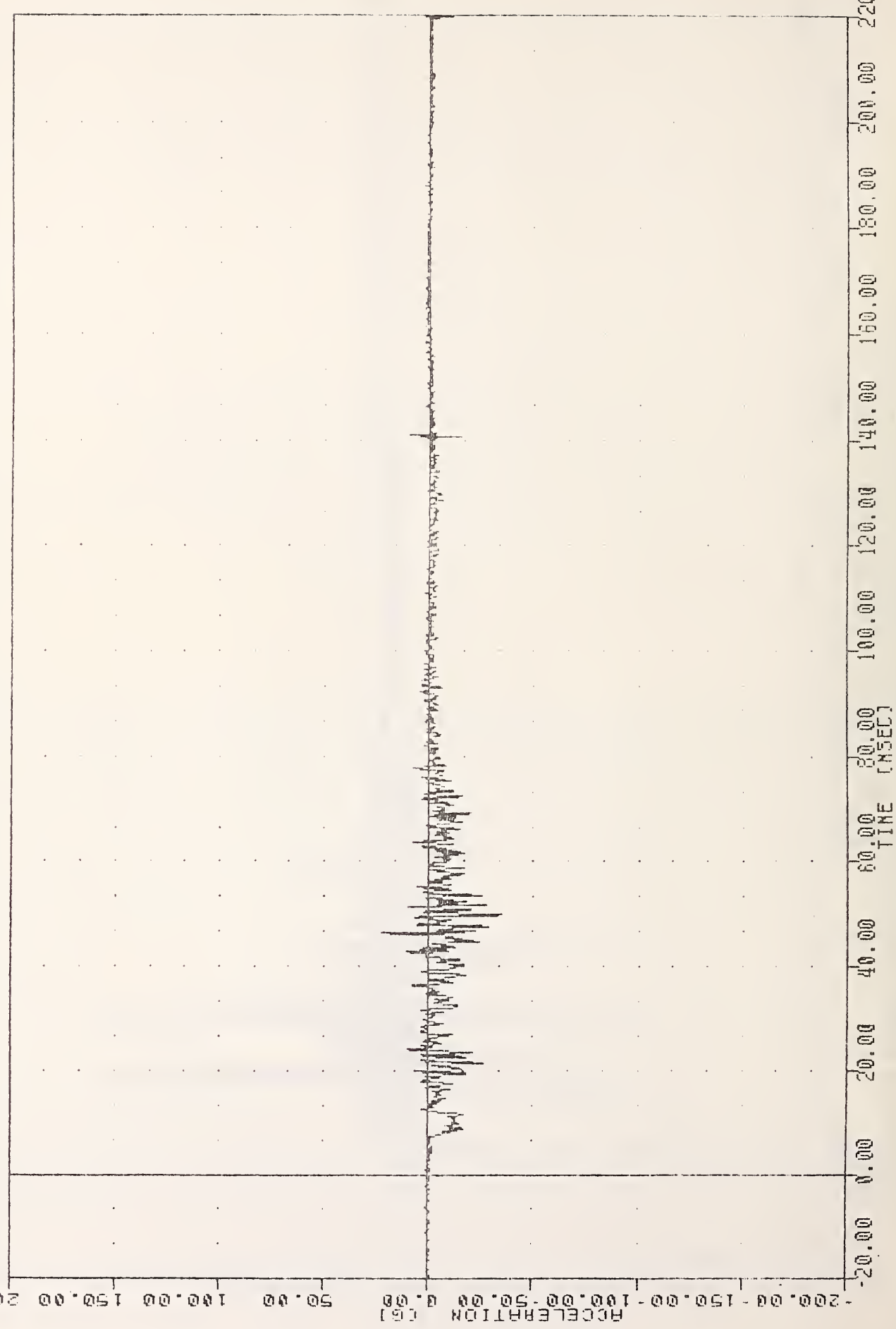


20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

DODGE DIPLOMAT INTO FIXED BARRIER
RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

9 MPH
840914
ROMEO-KOJYO SENSOR TESTS
84258
FWLXE

PLOT DATE 24-SEP-84 15:05:20
FILTER = ALPF 1650/ 5214/ .40
MIN, MAX VALUES = -34.64 49.75 22.19 46.13



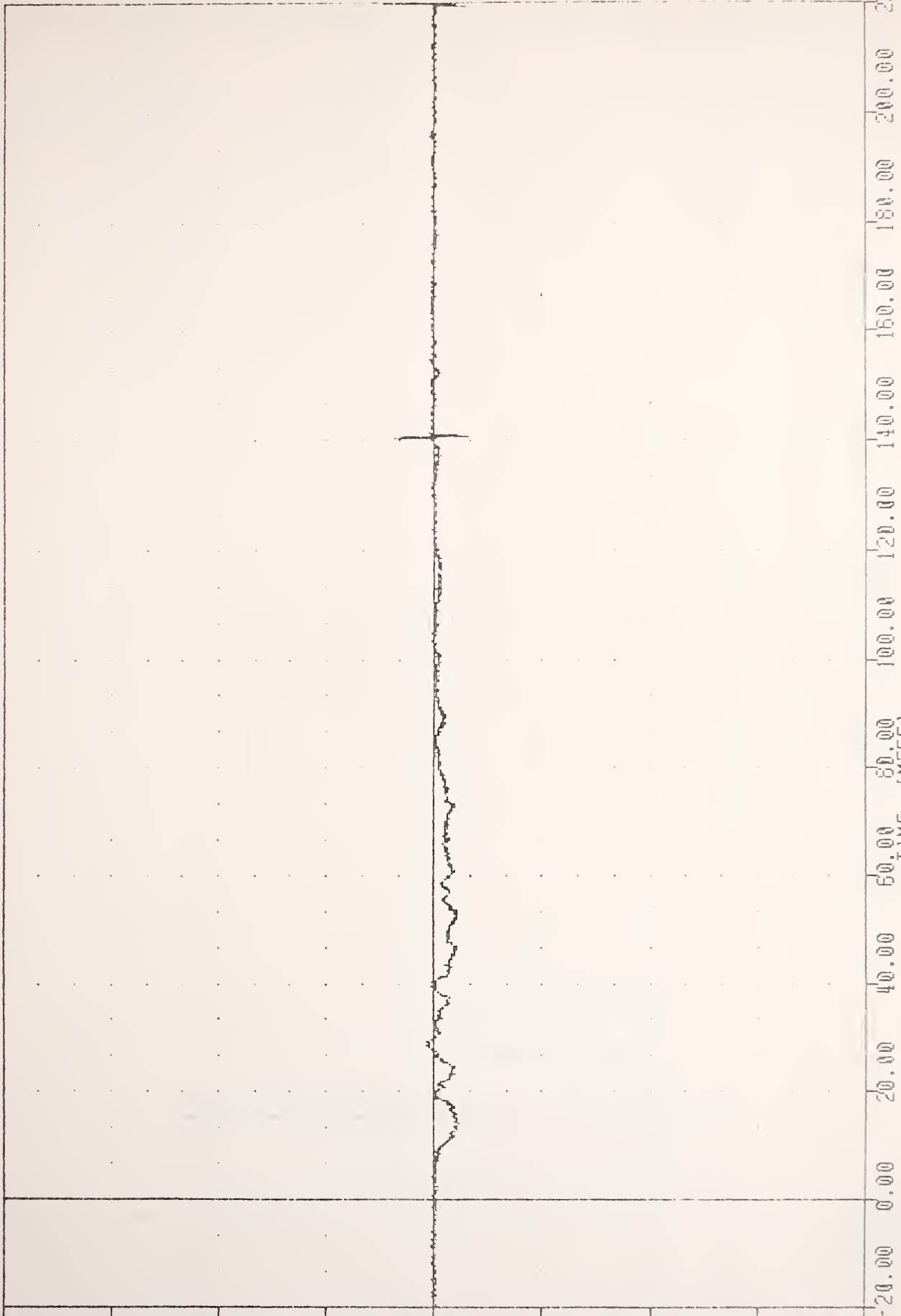
DODGE DIPLOMAT INTO FIXED BARRIER
FIREWALL ACCELERATION X AXIS

8 MPH
840914
ROME0-KUJYO SENSOR TESTS
84258
5THPG

PLU1 DATE 24-SEP-84 10:05:20

FILTER = ALFF 1650/ 5214/ -40
MIN. MAX VALUES = -16.12 140.75, 23.35 219.63

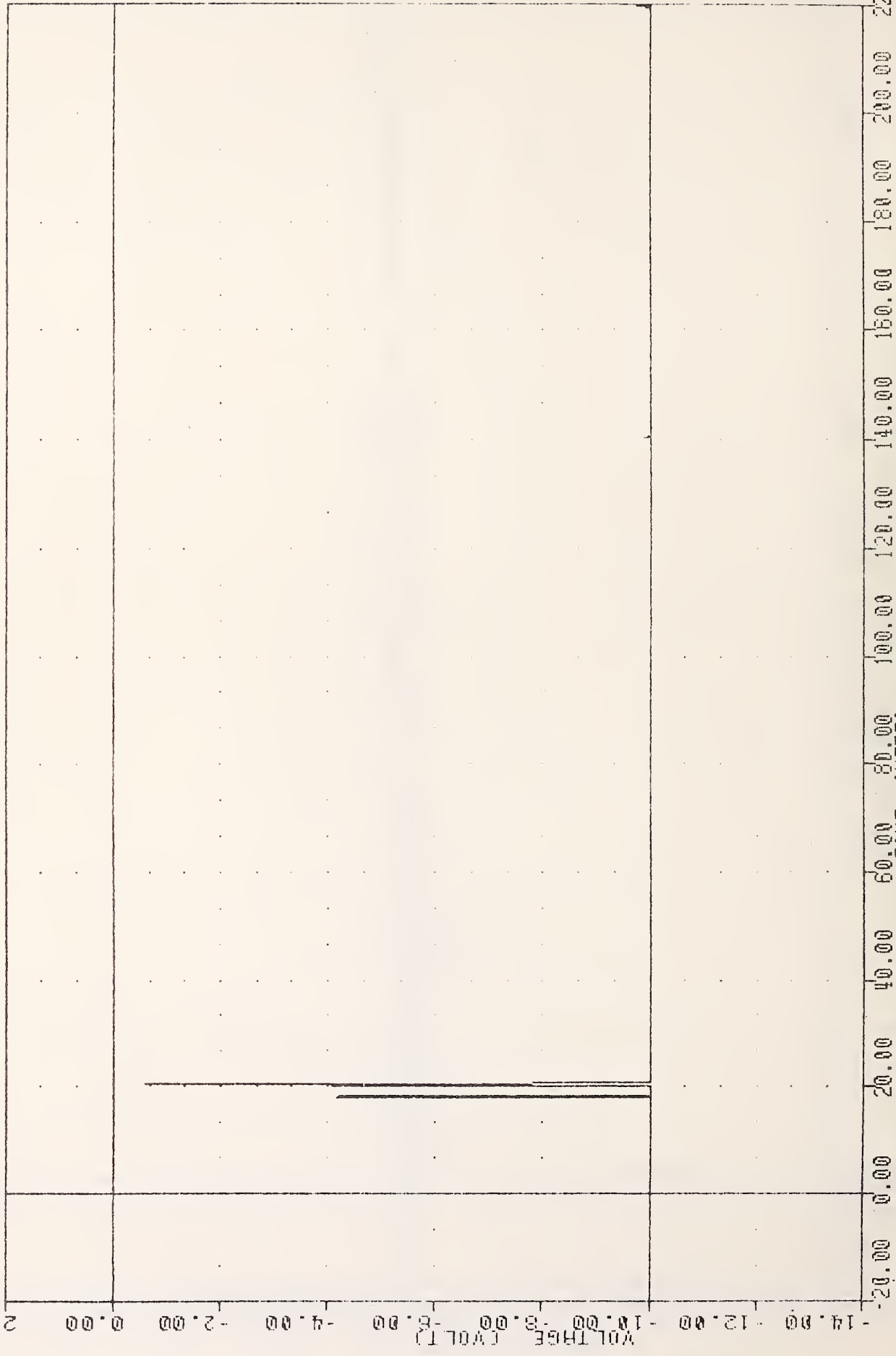
ACCELERATION (G)



DODGE DIPLOMAT INTO FIXED BARRIER
STEERING WHEEL HUB ACCELERATION

8 MPH
 840914
 ROMEQ-KOJYO SENSOR TESTS
 84258
 ABT1

PLUI DATE 24-SEP-84 15:05:20
 FILTER = ALFF 1650/ 5214/ -40
 MIN. MAX VALUES = -10.00e -20.00, -0.60 e 20.38

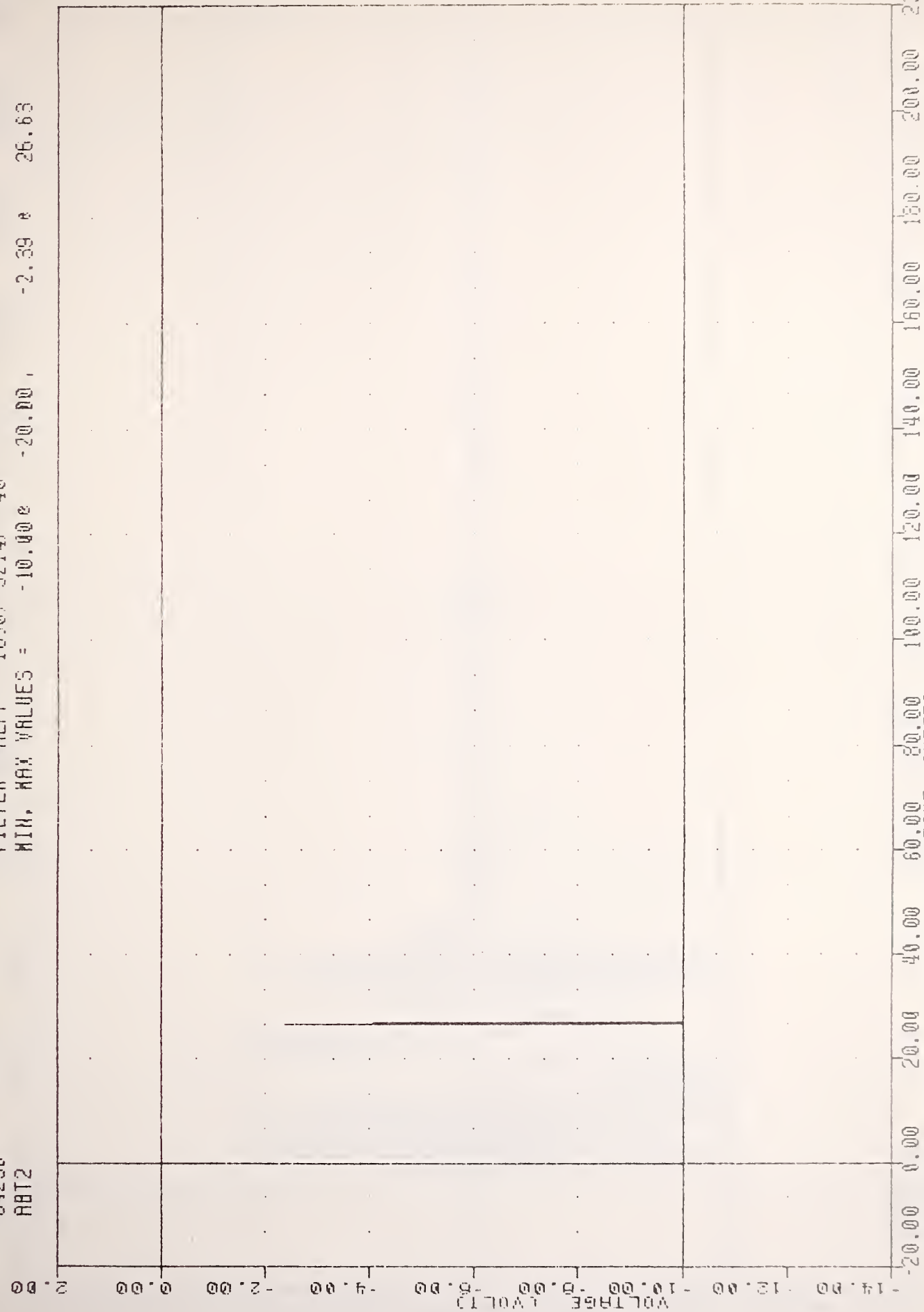


DODGE DIPLOMAT INTO FIXED BARRIER
 AIR BAG LEFT FRONT SENSOR

3 MPH
840914
ROMED-KOJYO SENSOR TESTS
84258
RBT2

PLU1 DATE 24-SEP-84 10:05:20

FILTER = ALFF 1650/ 5214/ -40
MIN. MAX VALUES = -10.00e -20.00, -2.39 * 26.63



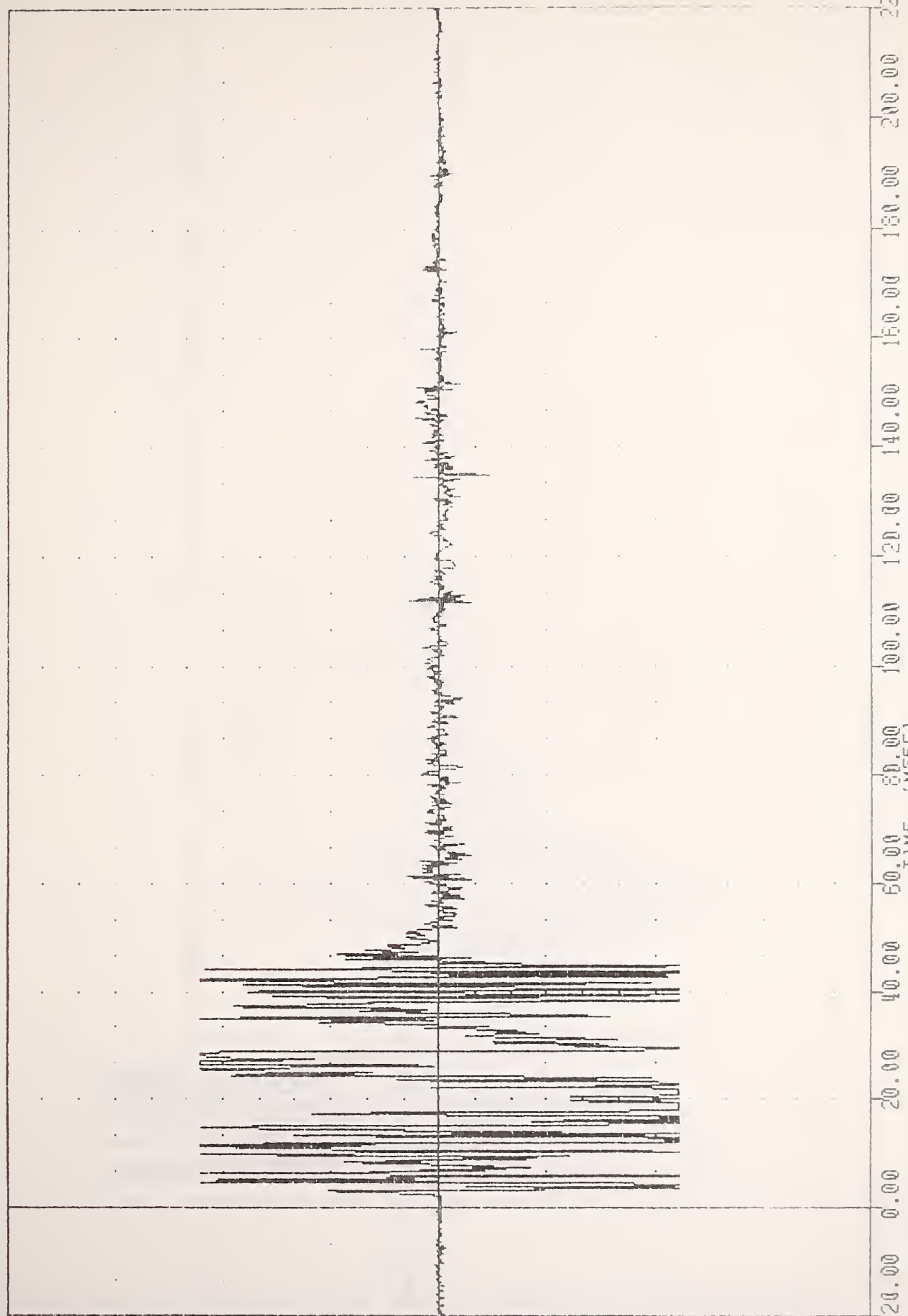
DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG RIGHT FRONT FRAME SENSOR

PLOT DATE 24-SEP-84 15:06:41

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -111.59e 3.38, 110.35 e 4.63

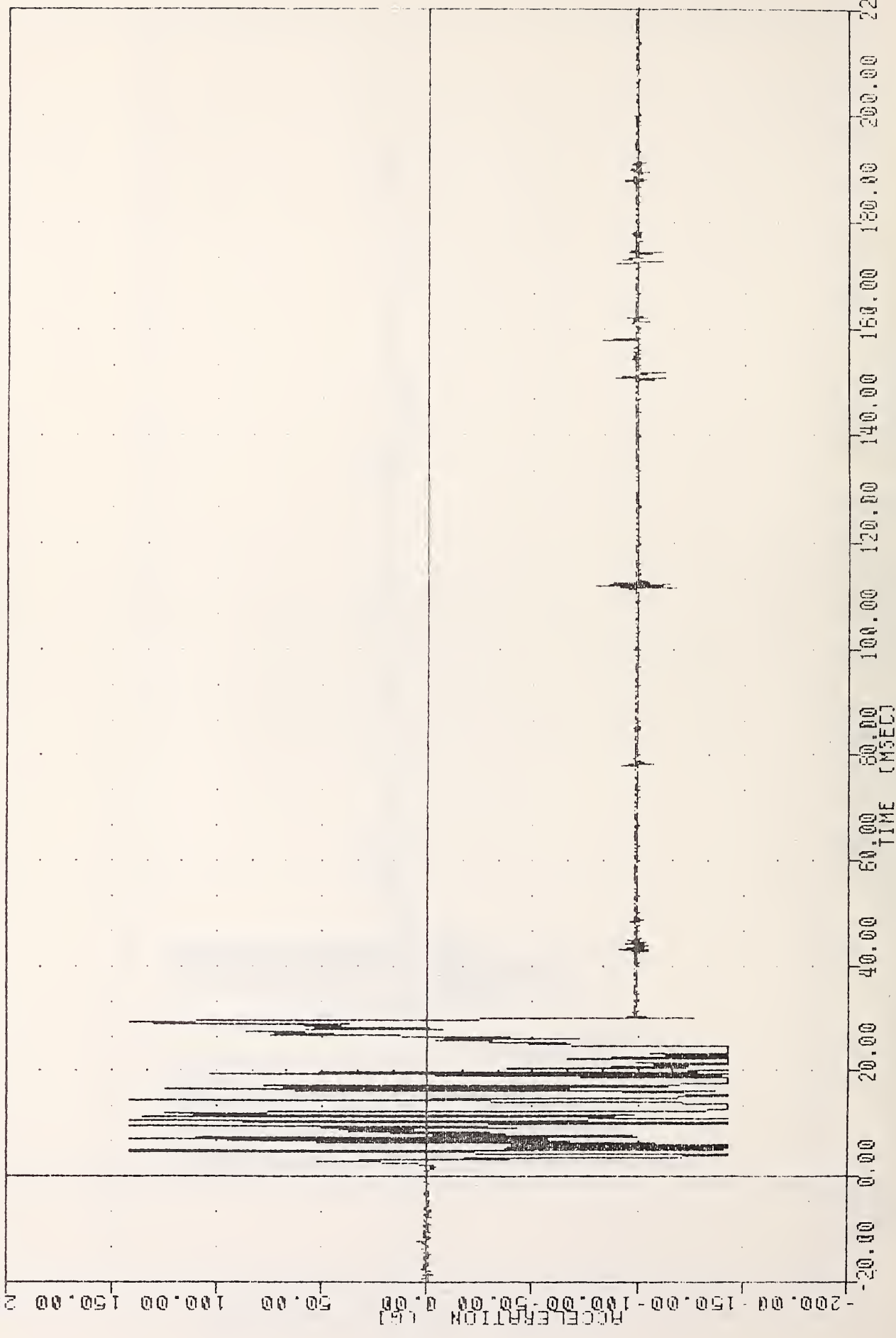
30 MPH , 840914
ADNEO-KOJYO SENSOR TESTS
84258
FFCXGL

ACCELERATION (G)



DODGE DIPLOMAT INTO FIXED BARRIER
LEFT FRONT FRAME X MEMBER ACCEL X AXIS

30 MPH
 84258
 FFCXGR
 840914
 RONEO-KOJYO SENSOR TESTS
 FLUJ DATE 24-SEP-84 10:06:41
 FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -142.548 3.75, 141.38 e 4.63

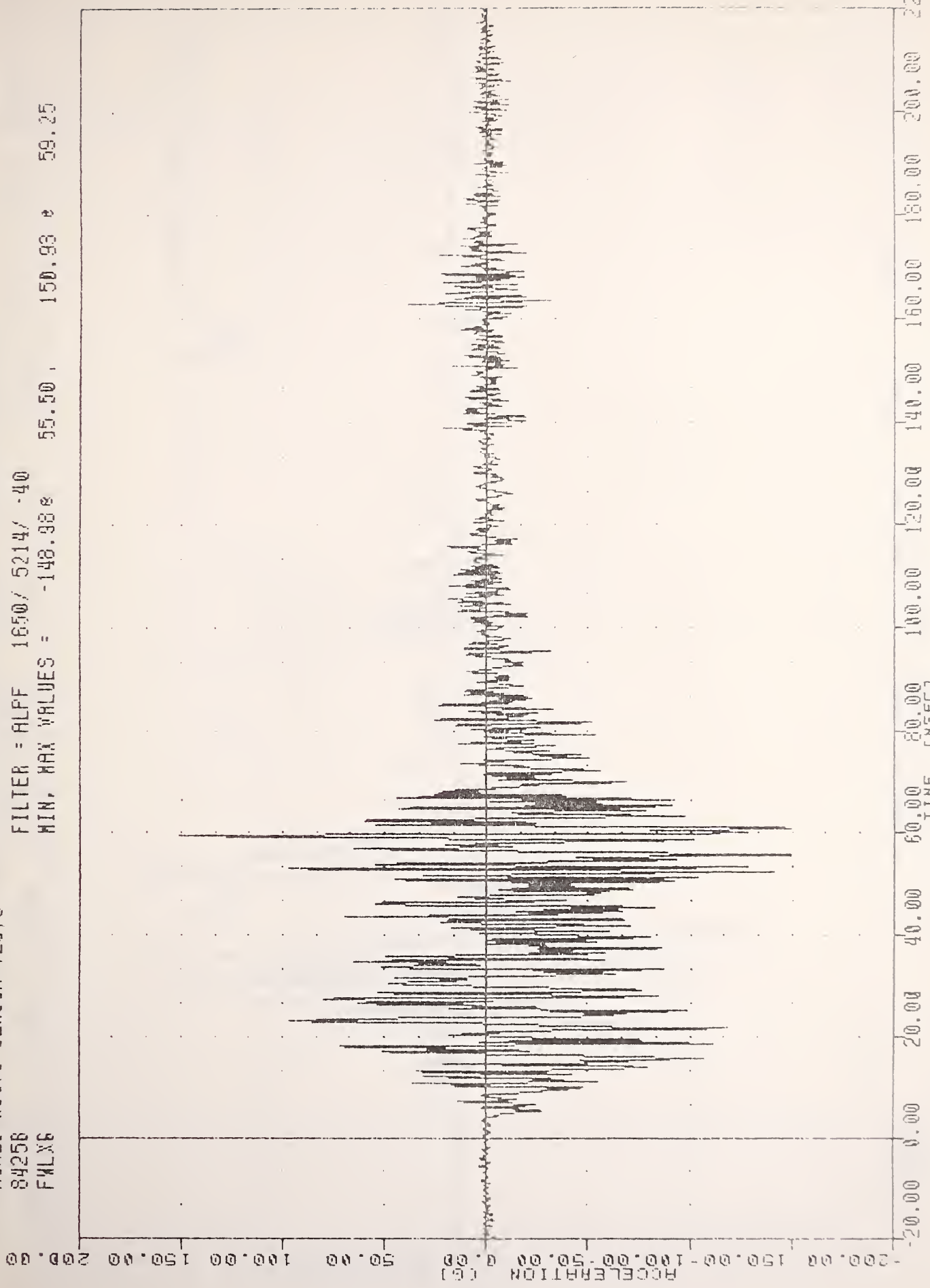


DODGE DIPLOMAT INTO FIXED BARRIER
 RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

PLU1 DATE 24-SEP-84 15:06:41

30 MPH
840914
ROMEO-KOJYO SENSOR TESTS
84258
FMLX6

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -148.98e 55.50, 150.93 e 59.25



DODGE DIPLOMAT INTO FIXED BARRIER
FIREWALL ACCELERATION X AXIS

30 MPH

84258

STHPG

840914

ROMEO-KOJYO SENSOR TESTS

PLOT DATE

24-SEP-84

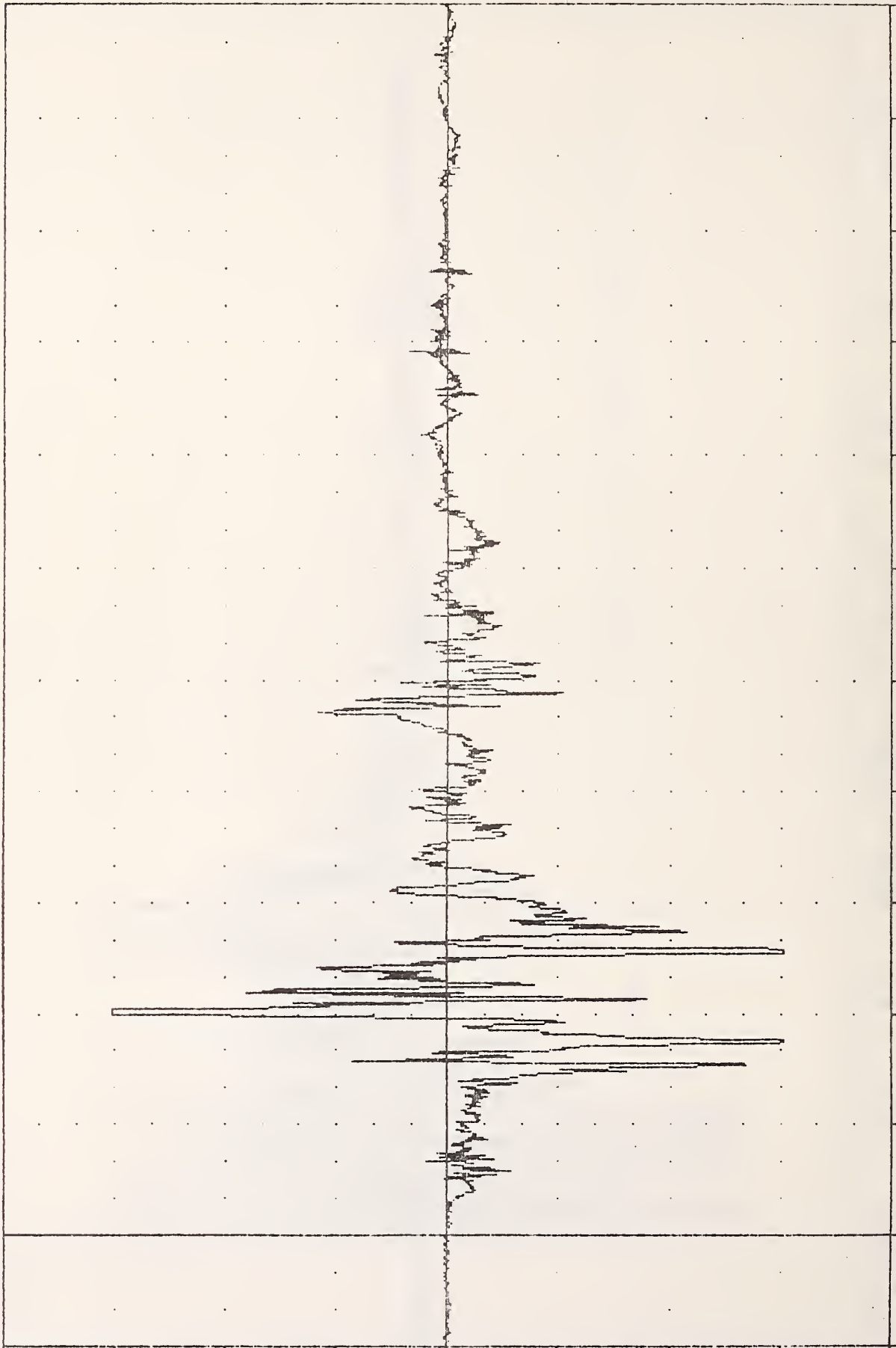
15:06:41

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -150.958 34.63,

150.96 e 39.88

ACCELERATION (G)



200.00 150.00 100.00 50.00 0.00 -50.00 -100.00 -150.00 -200.00

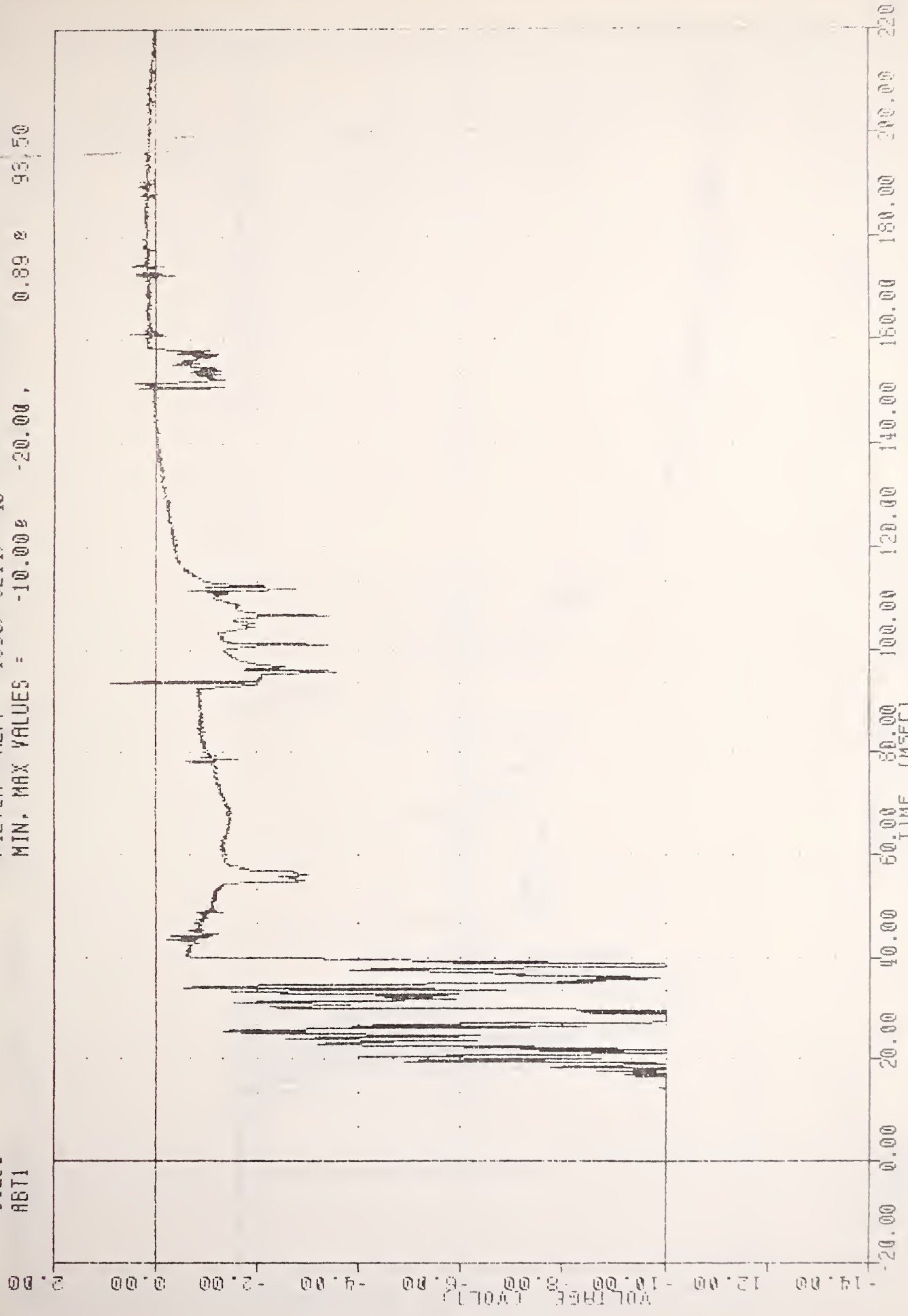
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

DODGE DIPLOMAT INTO FIXED BARRIER
STEERING WHEEL HUB ACCELERATION

30 MPH , 840914 , 24-SEP-84 15:06:41

ROMEQ-KOJYO SENSOR TESTS
84258
ABT1

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.00% -20.00 , 0.89 % 93.50

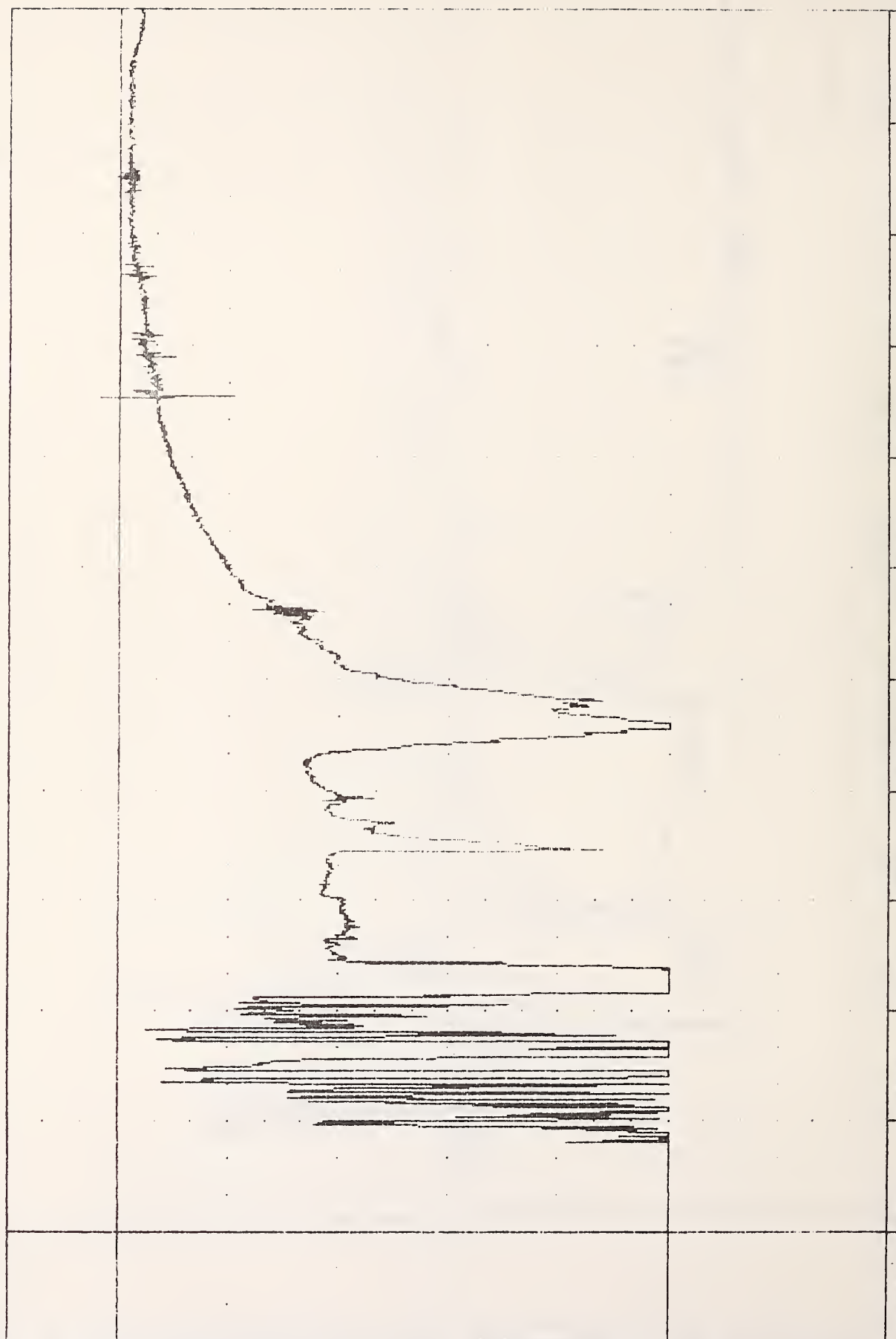


DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG LEFT FRONT FRAME SENSOR

30 MPH
84256
ABT2
PLUT DATE 24-SEP-84 15:06:41
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.00% -20.00 0.35 * 150.38

ROMED-KOJYO SENSOR TESTS

VOLTAGE (VOLTS)



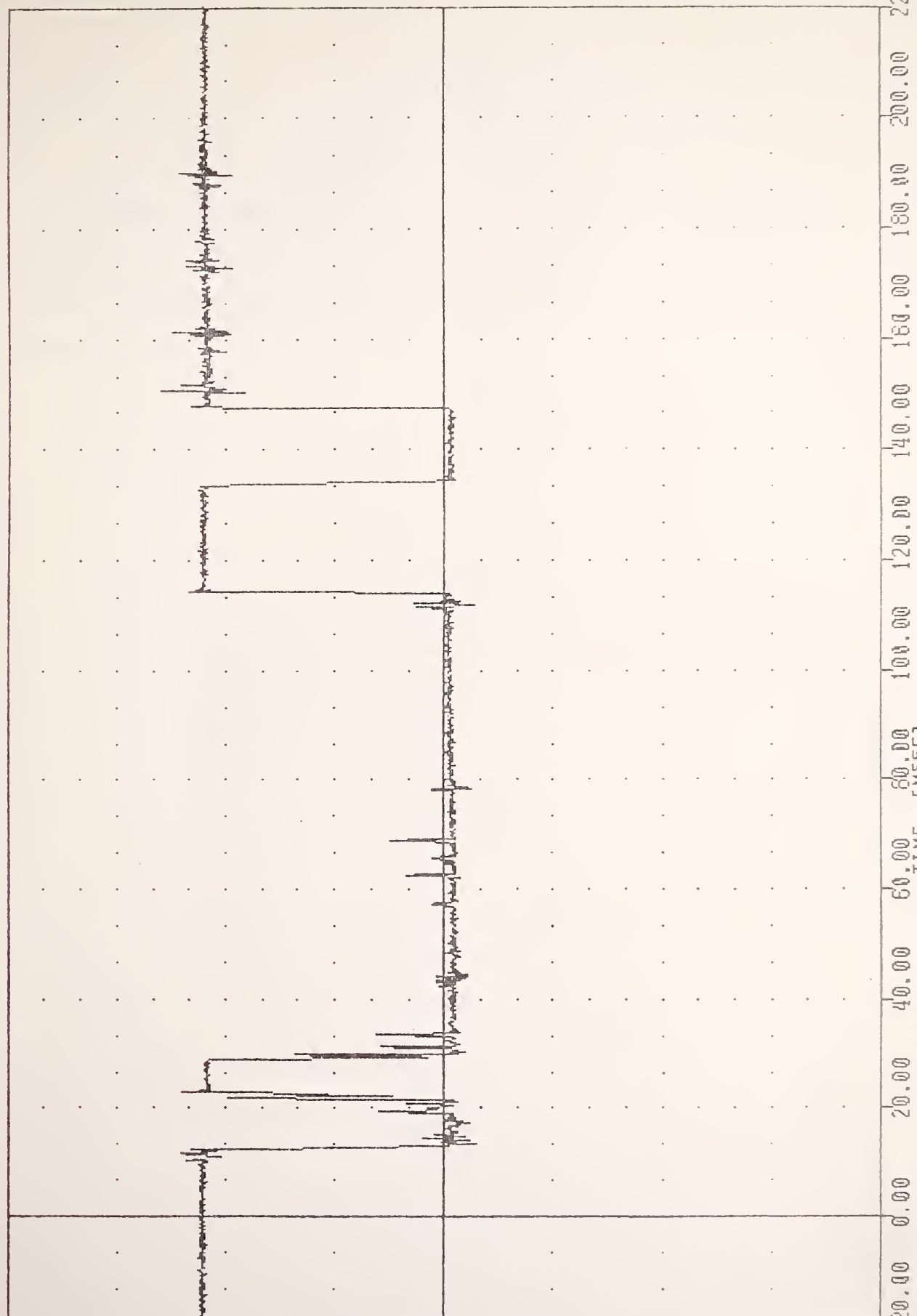
TIME (MSECS)
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00
DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG RIGHT FRONT FRAME SENSOR

PLUI DATE 24-SEP-84 15:05:41

30 MPH , 840914
ACNEO-K0JYD SENSOR TESTS
84258
AB13

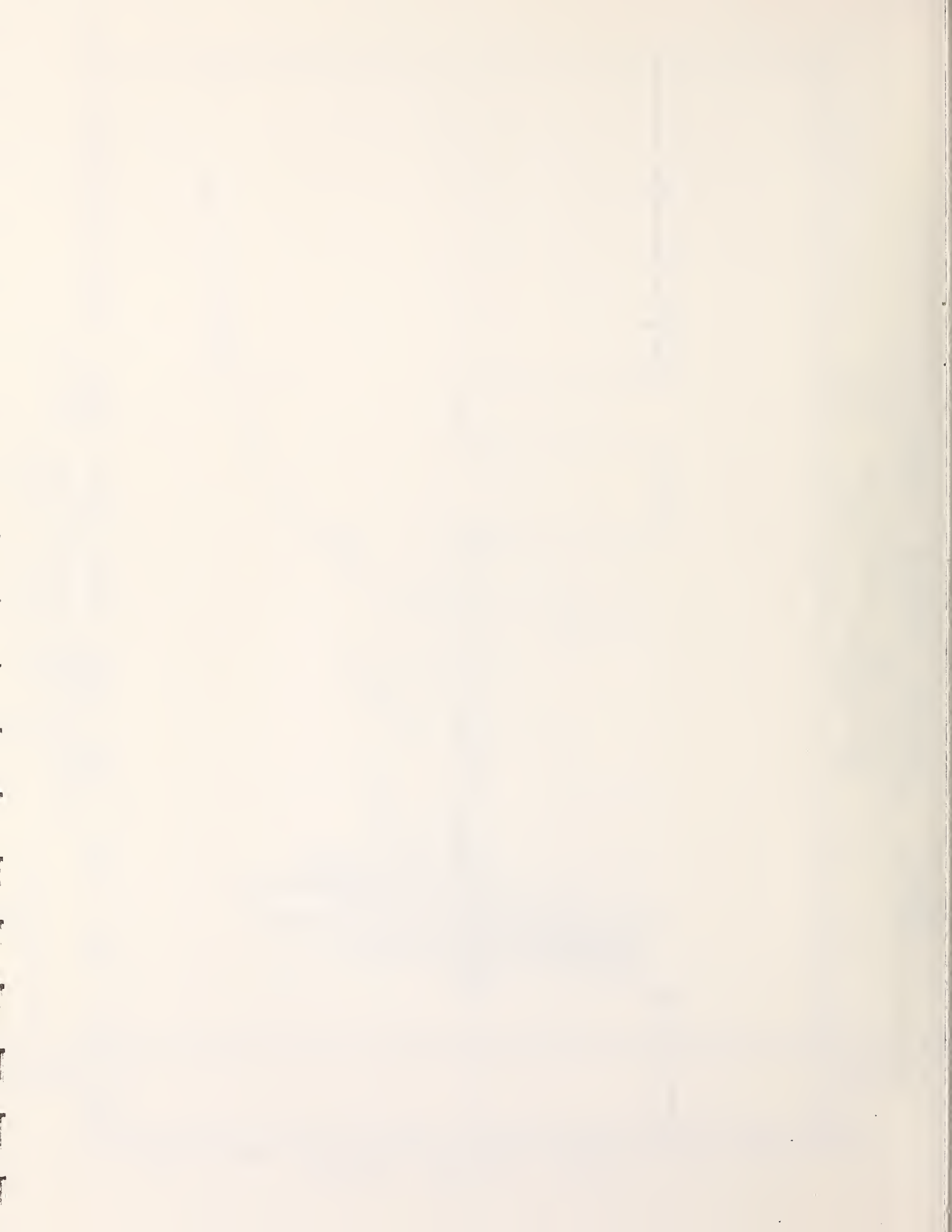
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -0.57e 13.38, 5.18 e 150.50

VOLTAGE (VOLTS)



B-15

DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG SAFETY SENSOR

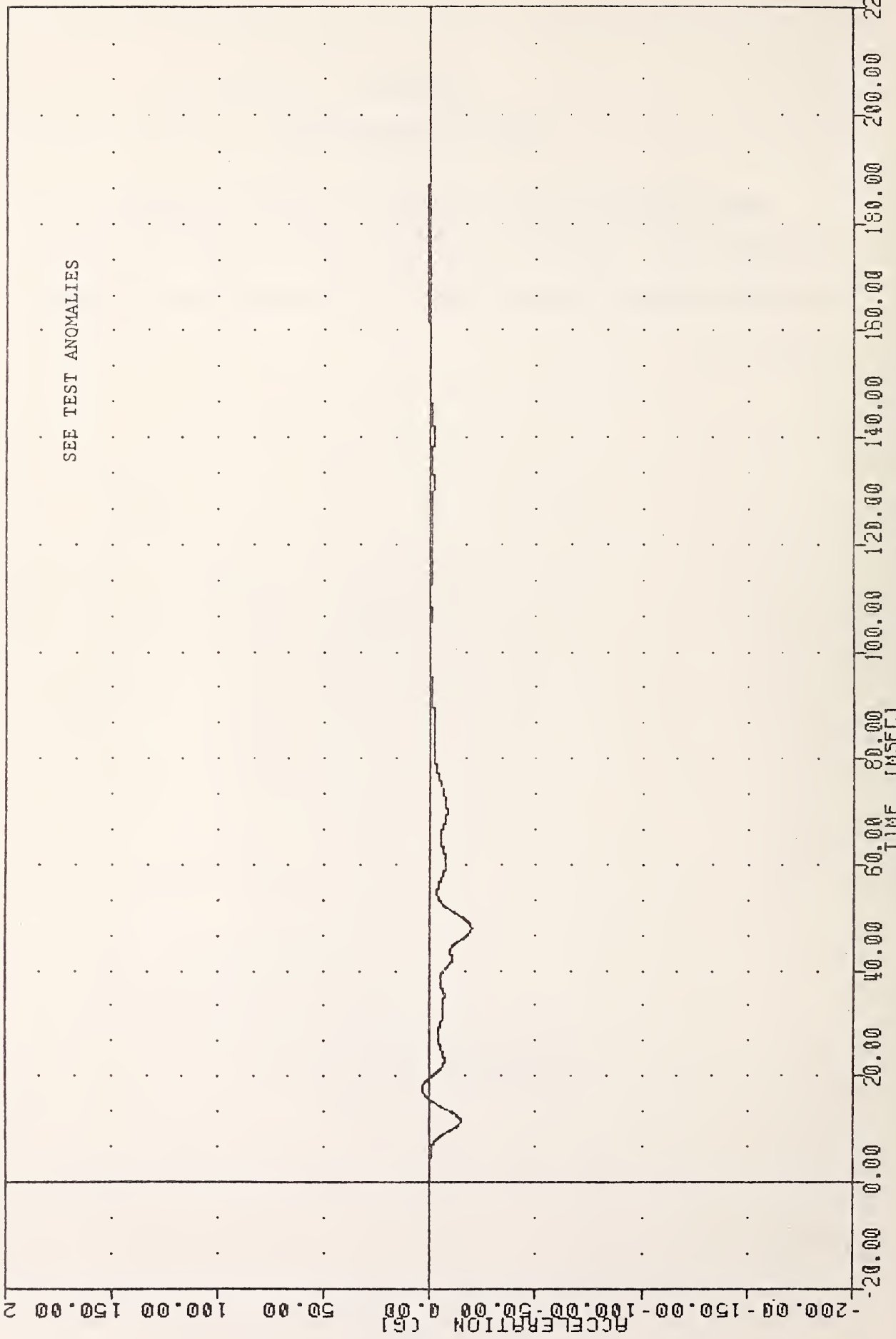


APPENDIX C

DATA PLOT PRESENTATION

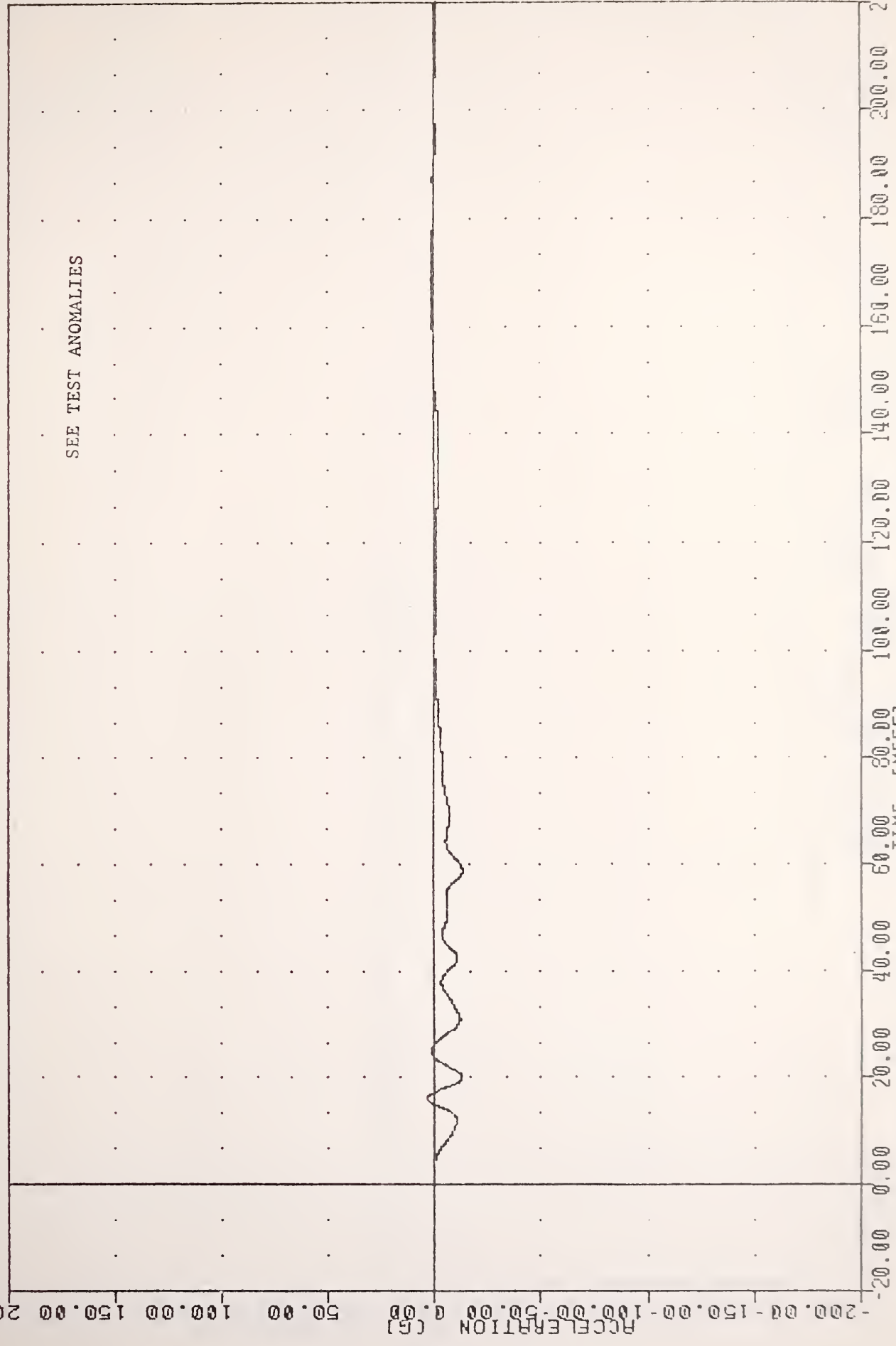
Data plots generated from the crash test data are presented on the following pages. All data is recorded on magnetic tape for inclusion in the NHTSA crash test data base system. The data was filtered according to SAE J211.

8 MPH
 ROME0-KOJYO SENSOR TESTS
 84258
 FFCXGL
 PLU1 DATE 24-SEP-64 10:06:09
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -19.39 47.88 3.85 17.50



DODGE DIPLOMAT INTO FIXED BARRIER
 LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

1 9 MPH
 84258
 FFCXGR
 RONEO-KOJYO SENSOR TESTS
 840914
 PLOT DATE 24-SEP-84 15:06:09
 FILTER = 8LPF 100/ 316/ -40
 MIN. MAX VALUES = -13.29e 58.75, 3.27 e 16.13



DODGE DIPLOMAT INTO FIXED BARRIER
 RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

9 MPH
84258
FWLX6

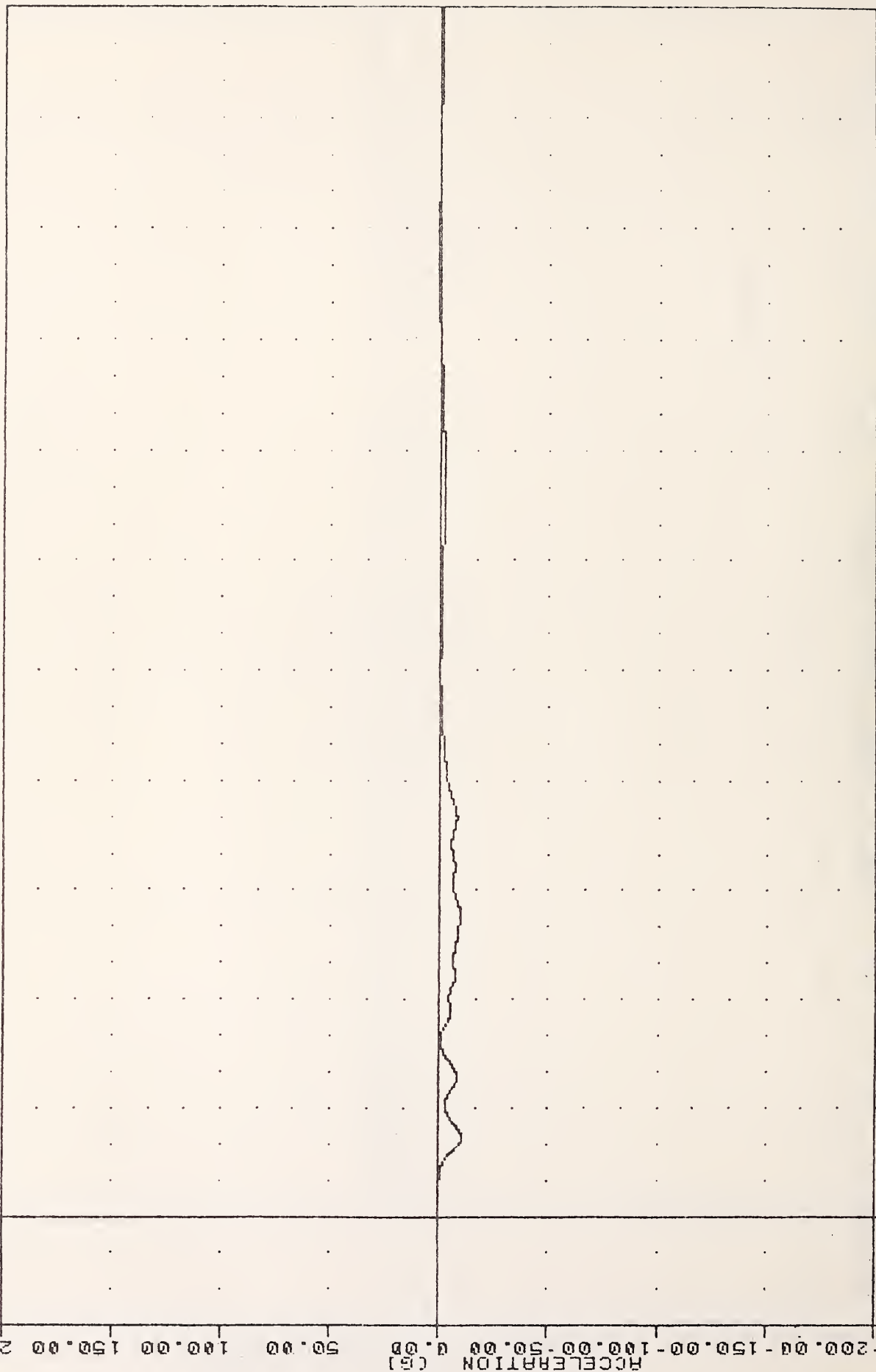
840914
ROMED-KOJYO SENSOR TESTS

PLOT DATE 24-SEP-84 15:06:09

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -10.52e 14.38e

1.51e 170.88

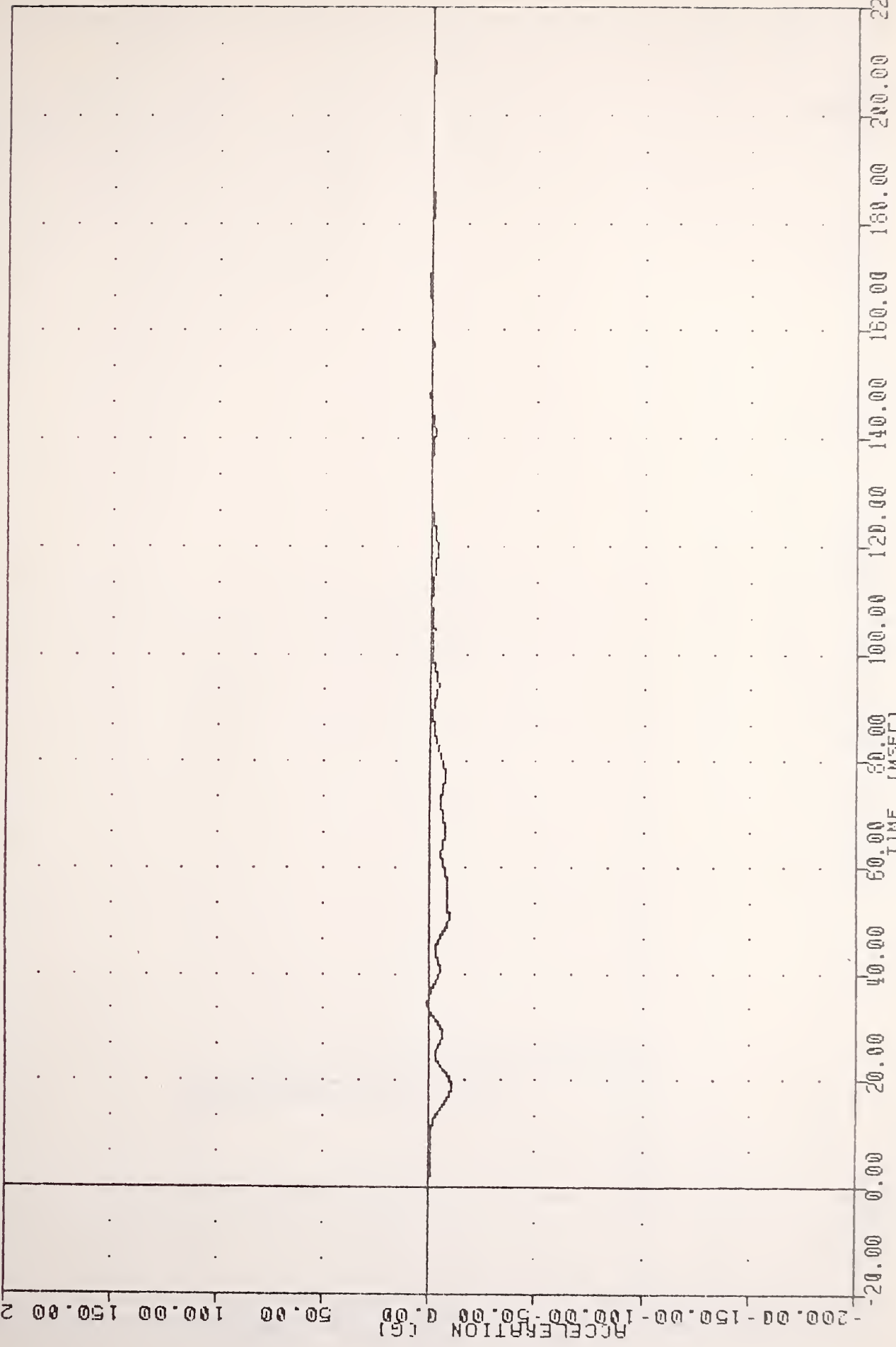


ACCELERATION (G)
-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00 220.00
TIME (MSEC)
0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00
DODGE DIPLOMAT INTO FIXED BARRIER
FIREWALL ACCELERATION X AXIS

9 MPH
840914
ROMEO-KOJYO SENSOR TESTS
84258
STHPC

PLU1 DATE 24-SEP-84 10:06:09

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -10.078 18.88 0.97 e 168.50



DODGE DIPLOMAT INTO FIXED BARRIER
STEERING WHEEL HUB ACCELERATION

y MFH
84258
ABTI

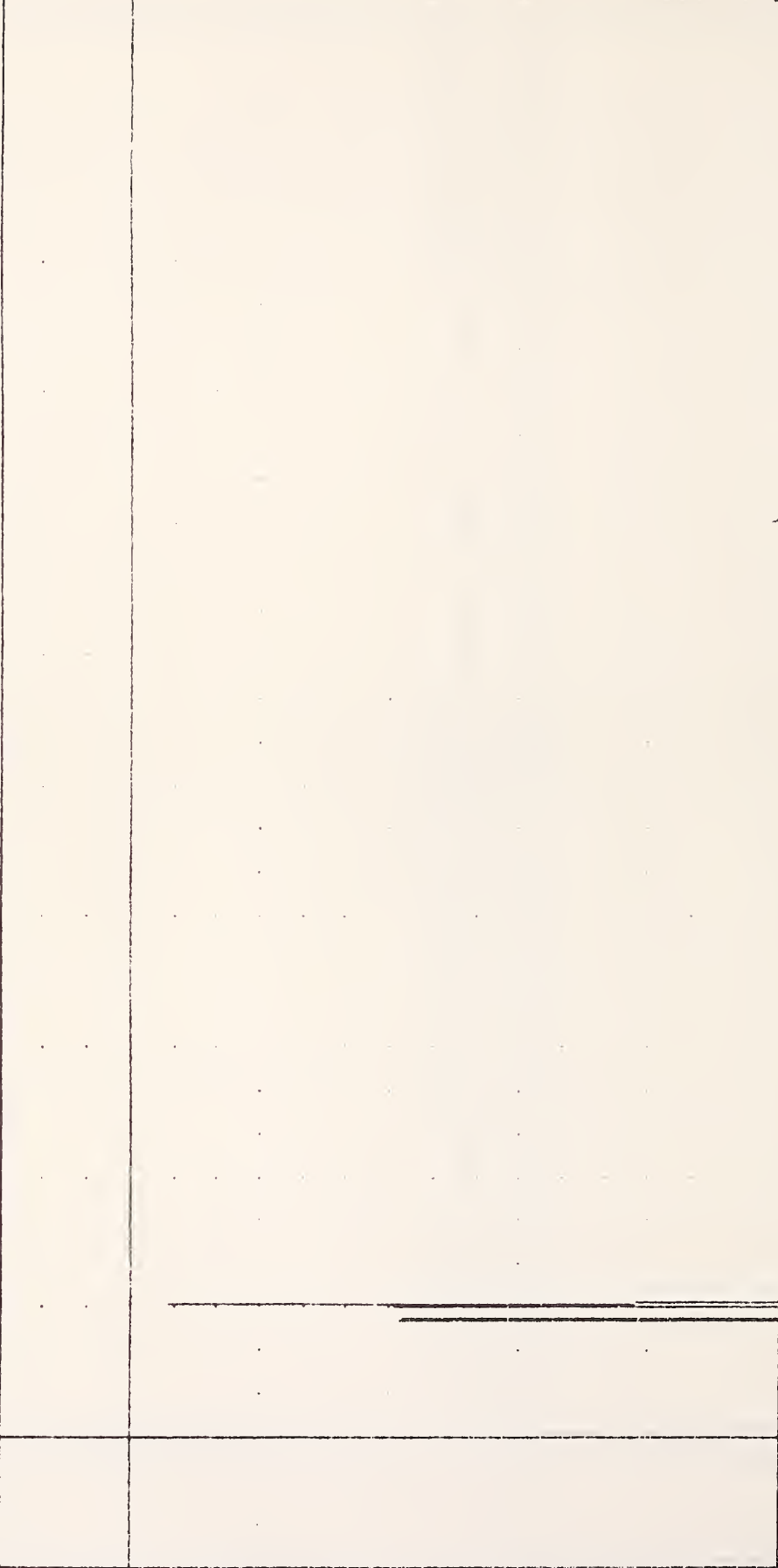
ROME0-KOJYO SENSOR TESTS

PLOT DATE 24-SEP-84 15:06:09

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.00e -20.00. -0.60 e 20.38

2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00



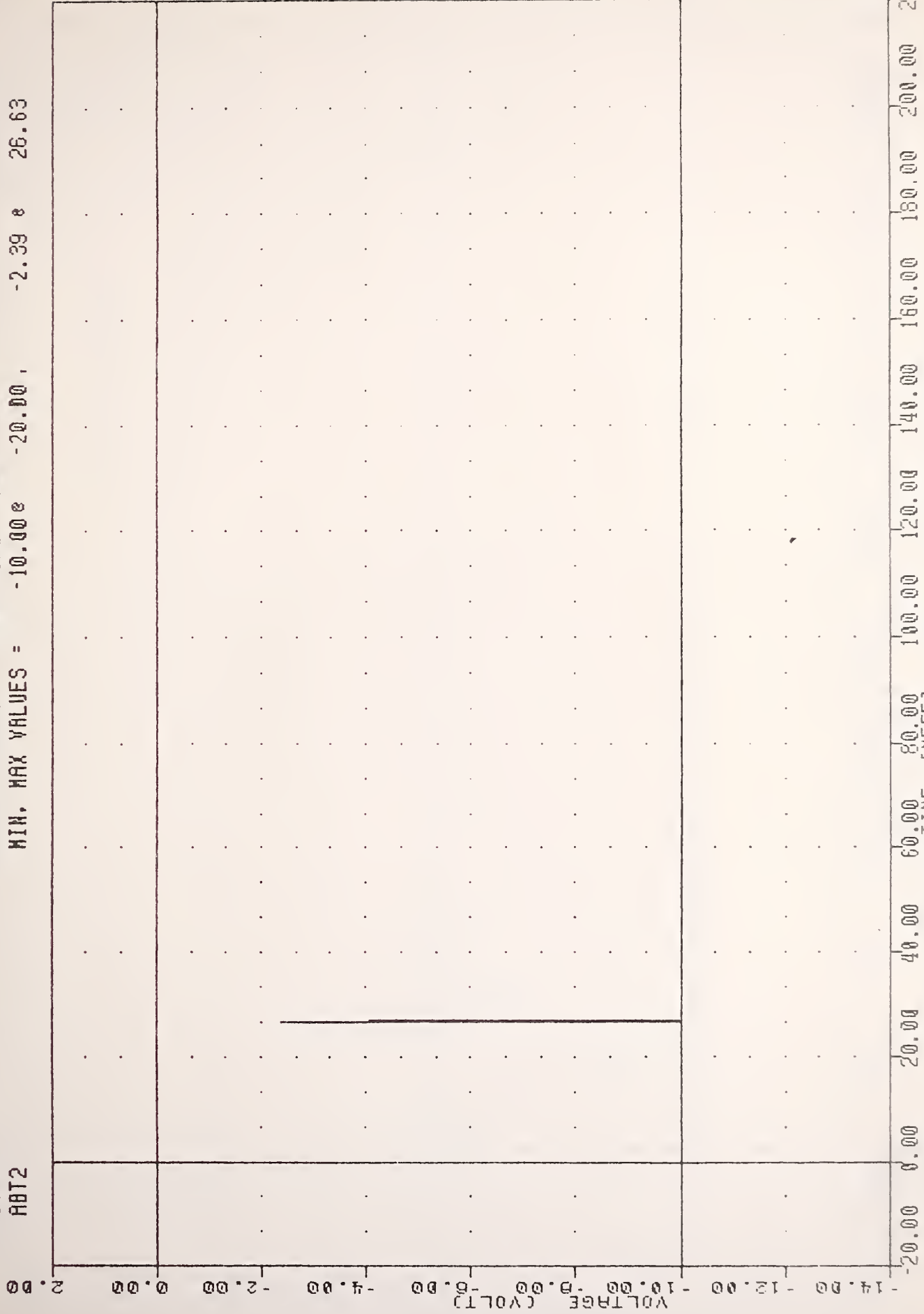
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG LEFT FRONT SENSOR

9 MPH
ROME0-KOJYO SENSOR TESTS
84258
RBT2

PLOT DATE 24-SEP-84 15:06:09

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.00e -20.00, -2.39 e 26.63



DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG RIGHT FRONT FRAME SENSOR

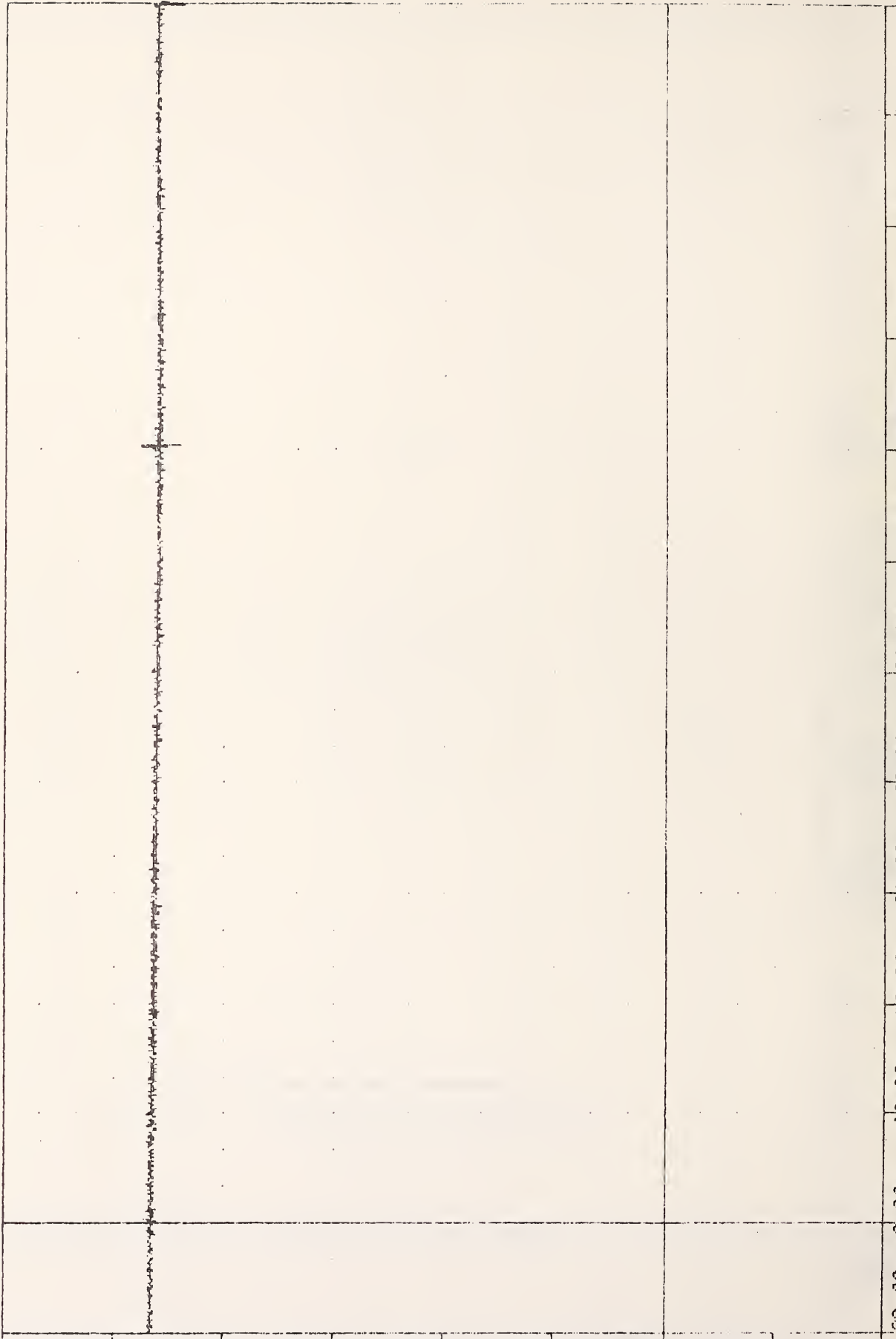
9 MPH
84258
RBT3

840914
RONEO-KOJYO SENSOR TESTS

PLOT DATE 24-SEP-84 15:06:09

FILTER = ALFF 1650/ 5214/ -40
MIN, MAX VALUES = 8.77e 219.50, 9.91e 219.83

12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00

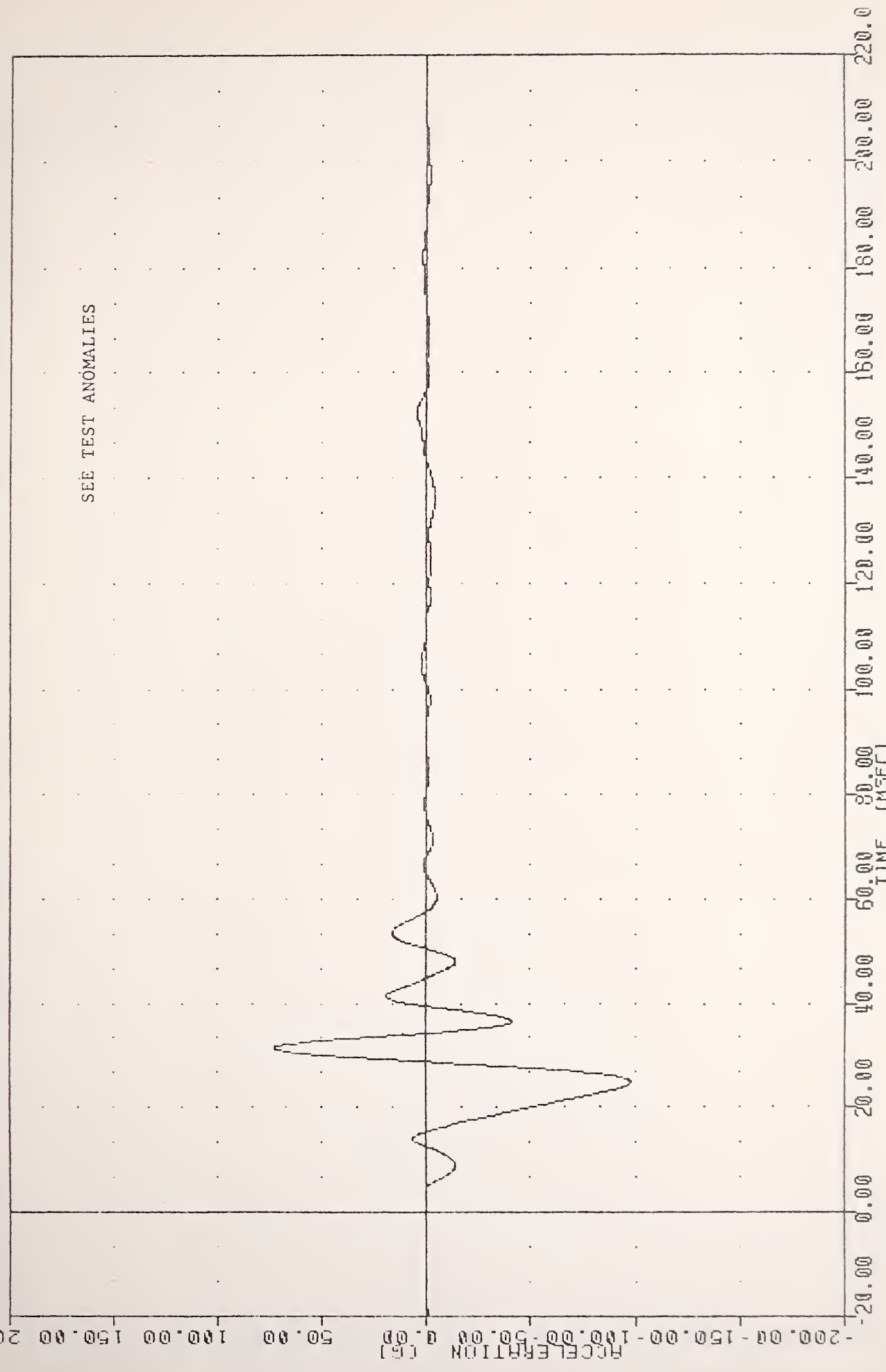


-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

TIME (MSEC)
DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG SAFETY SENSOR

TEST DATE: 10:00:11
RONEO-KOJYO SENSOR TESTS
84258
FFCX6L

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -98.13e 24.75 , 72.91 e 31.25

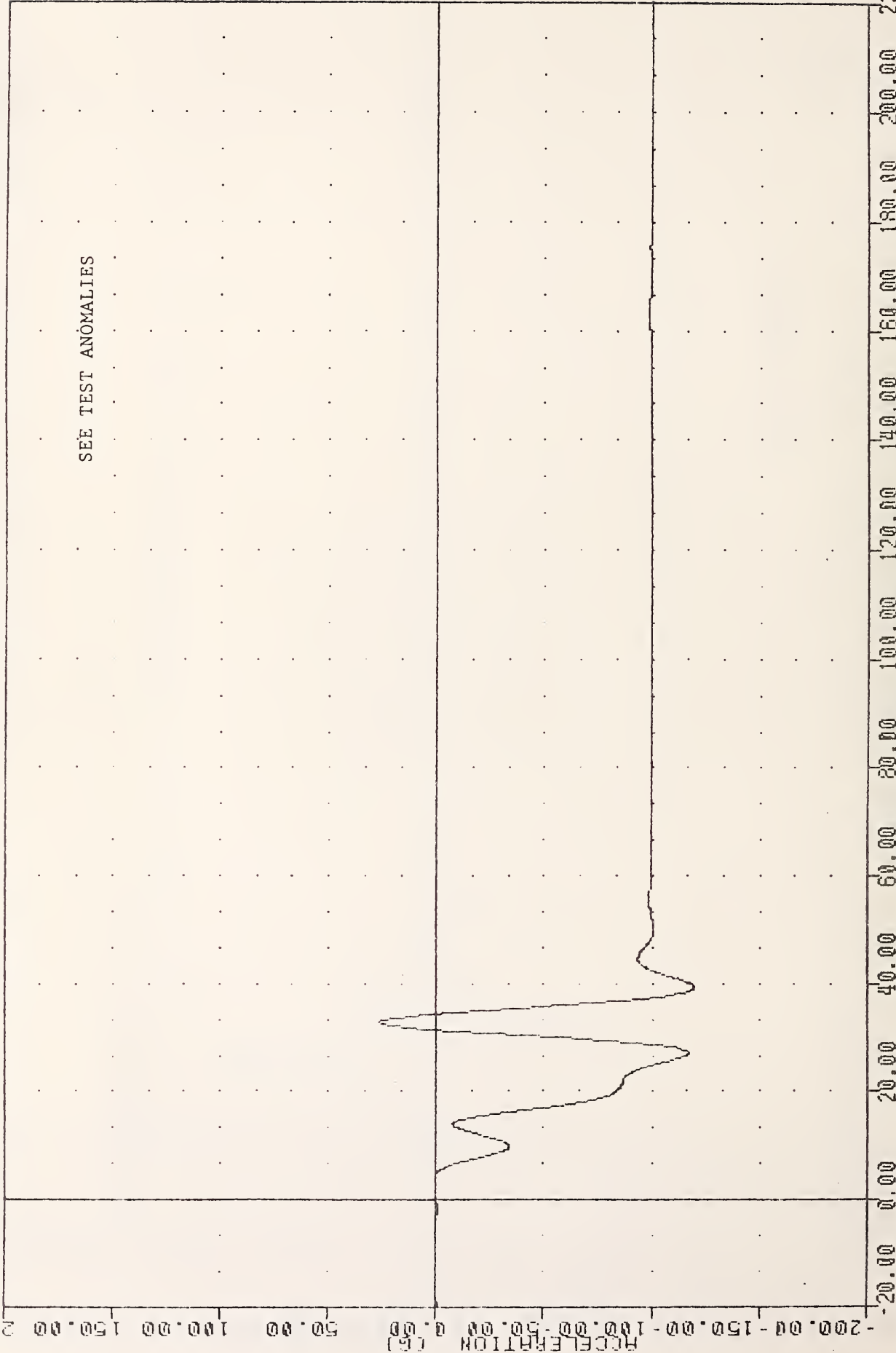


DODGE DIPLOMAT INTO FIXED BARRIER
LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

36 MPH
RONEO-KOJYO SENSOR TESTS
84258
FFCXGR

PLU1 DATE 24-JEP-64 10:07:11

FILTER = 8LFF 100/ 316/ -40
MIN, MAX VALUES = -119.77 39.13 26.71 32.75



DODGE DIPLOMAT INTO FIXED BARRIER
RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

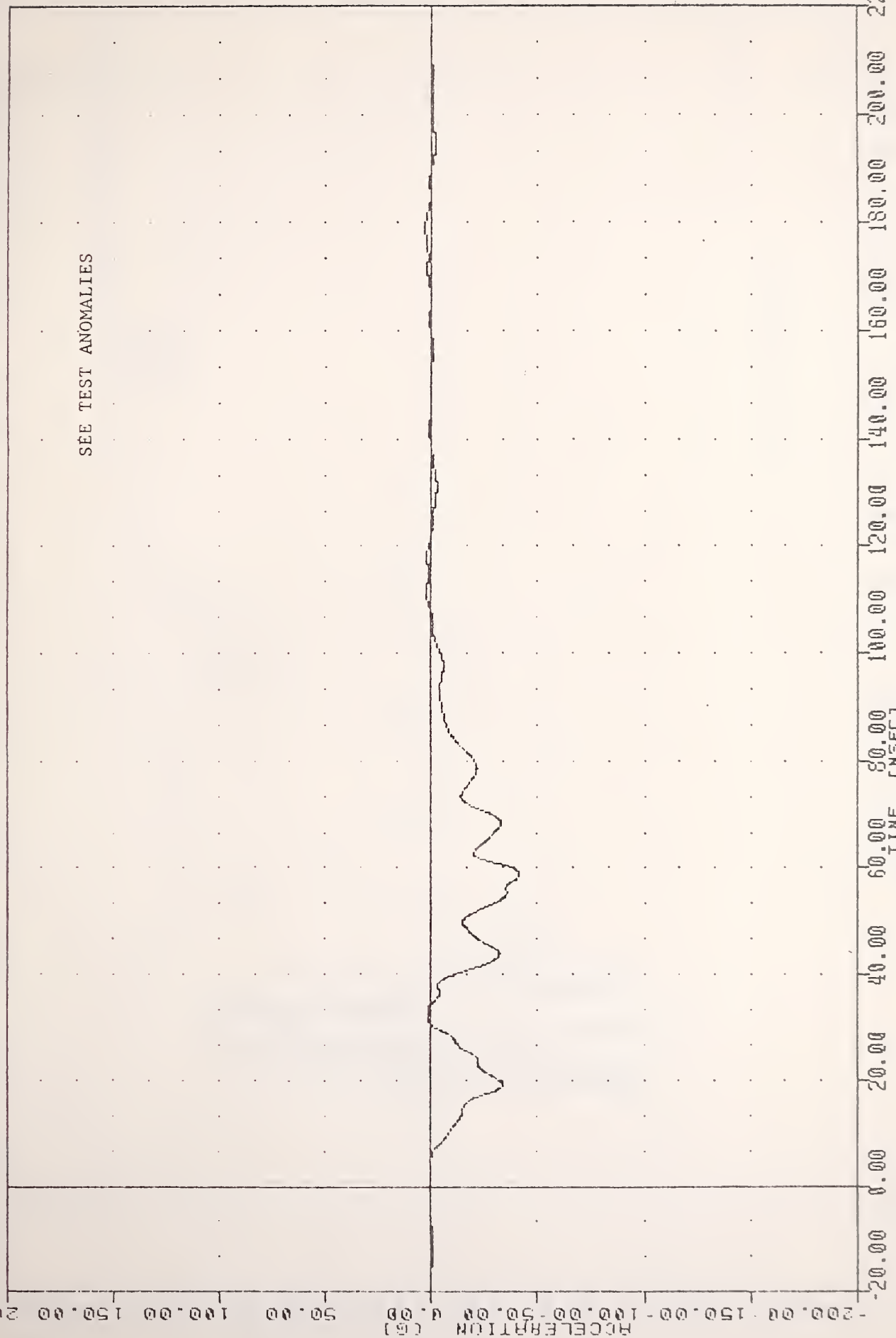
30 MPH
PLU1 DATE 24-SEP-84 10:07:11

840914
HOMED-KOJYO SENSOR TESTS

84258

FWLX6

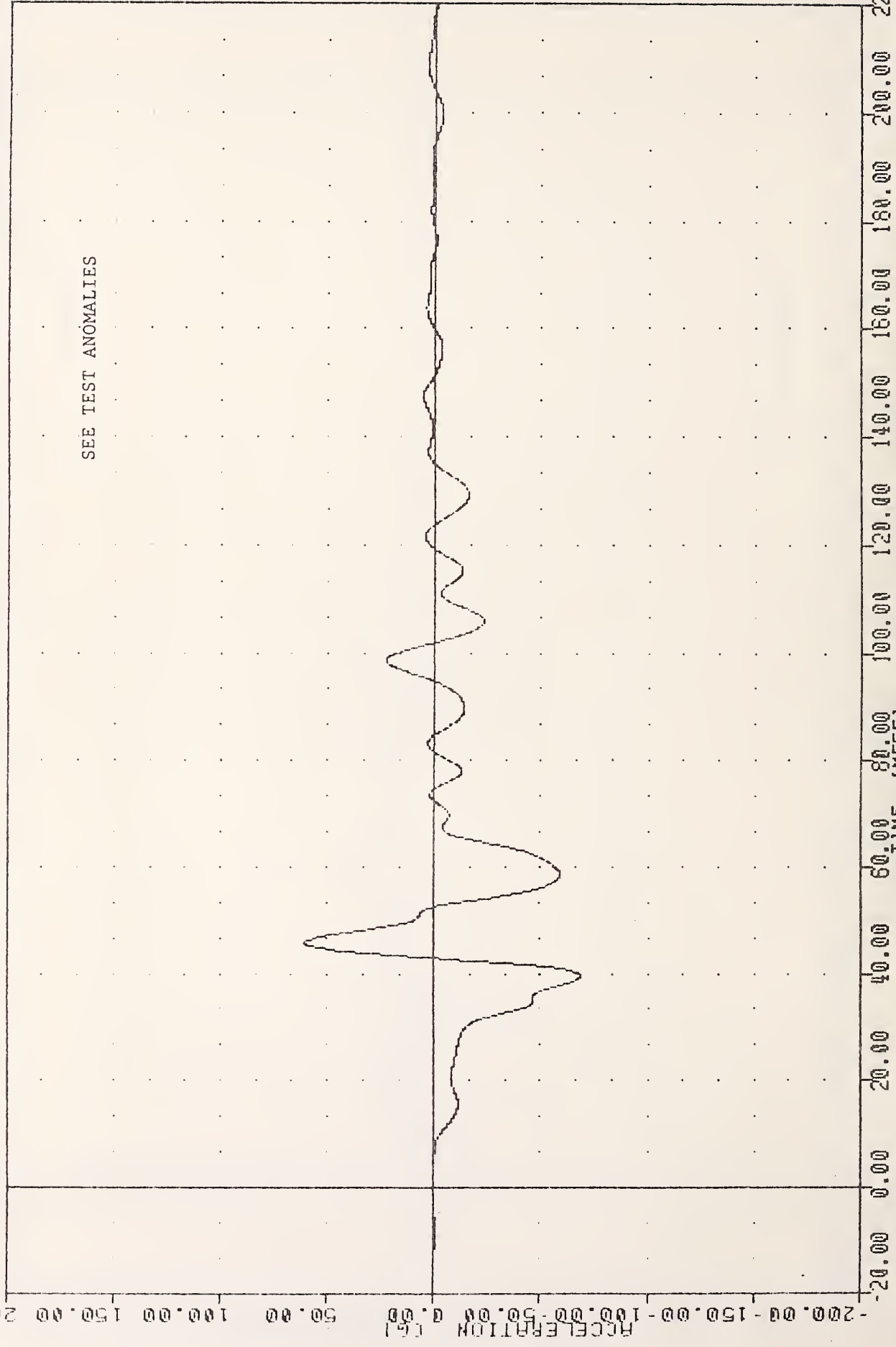
FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -41.36e 58.75, 3.15 e 179.00



DODGE DIPLOMAT INTO FIXED BARRIER
FIREWALL ACCELERATION X AXIS

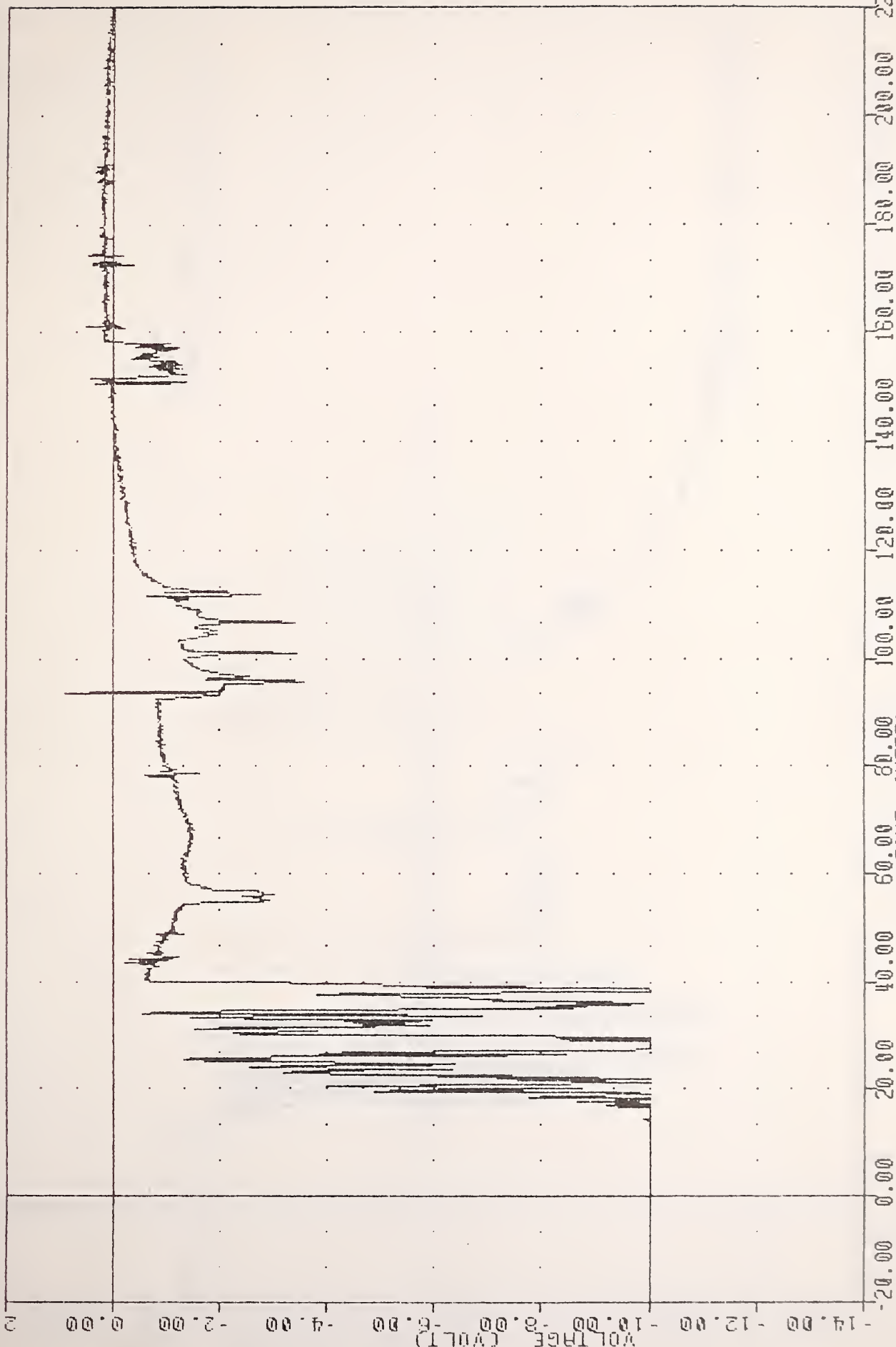
36 MPH
84258
5THPG

PLU1 DATE 24-JUL-84 15:07:11
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -68.92 60.95 45.63



DODGE DIPLOMAT INTO FIXED BARRIER
STEERING WHEEL HUB ACCELERATION

30 APR 84 0914 PLU1 DATÉ 24-JEP-54 10.07:11
ROME0-KOJYO SENSOR TESTS
84258
ART1
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.00e -20.00, 0.89 e 93.50



DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG LEFT FRONT FRAME SENSOR

30 MPH
84258
ABT2

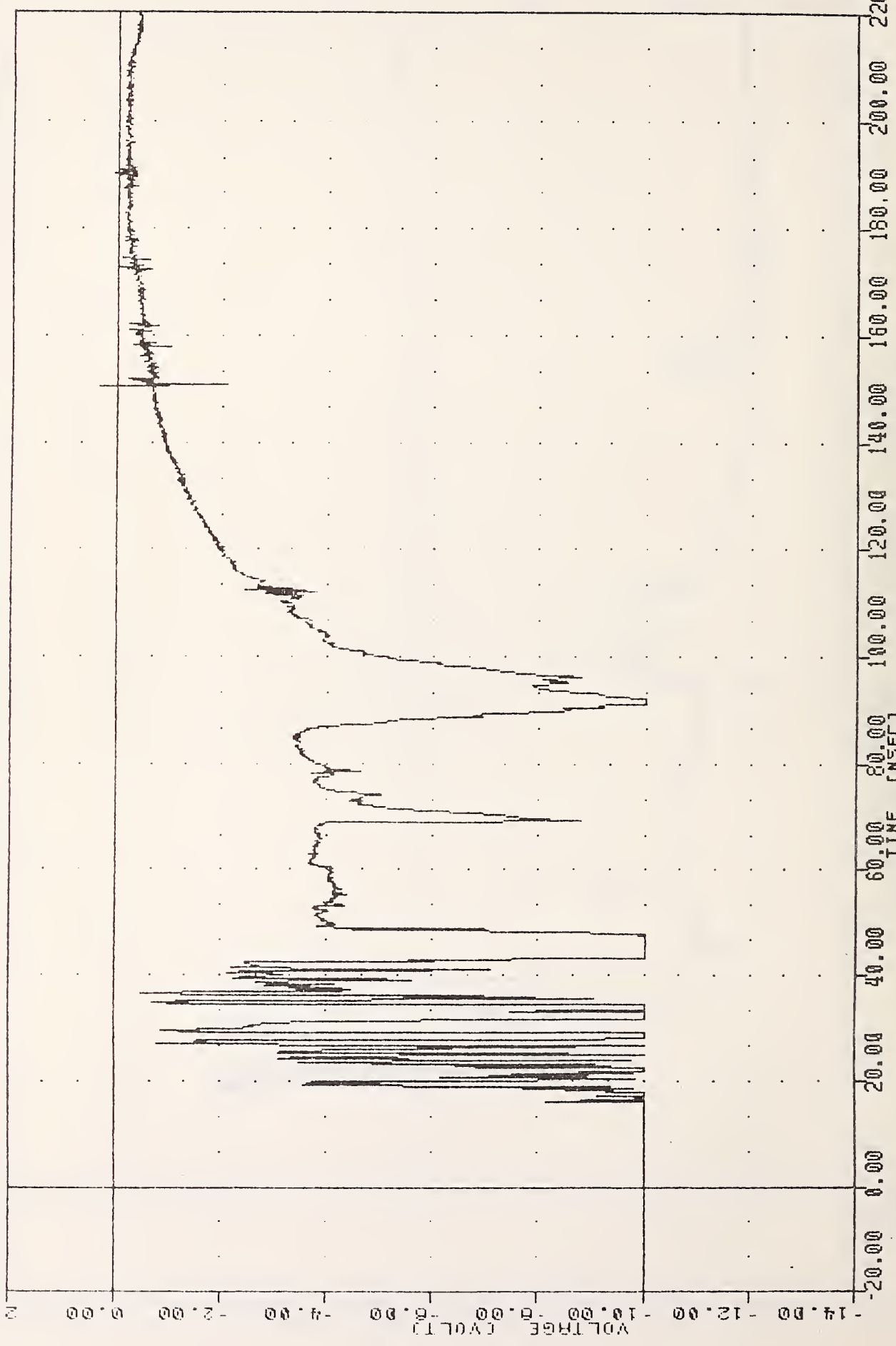
840914
ROMEO-KOJYO SENSOR TESTS

PLT DATE 24-SEP-84 15:07:11

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.00 20.00

D.35 e 150.36

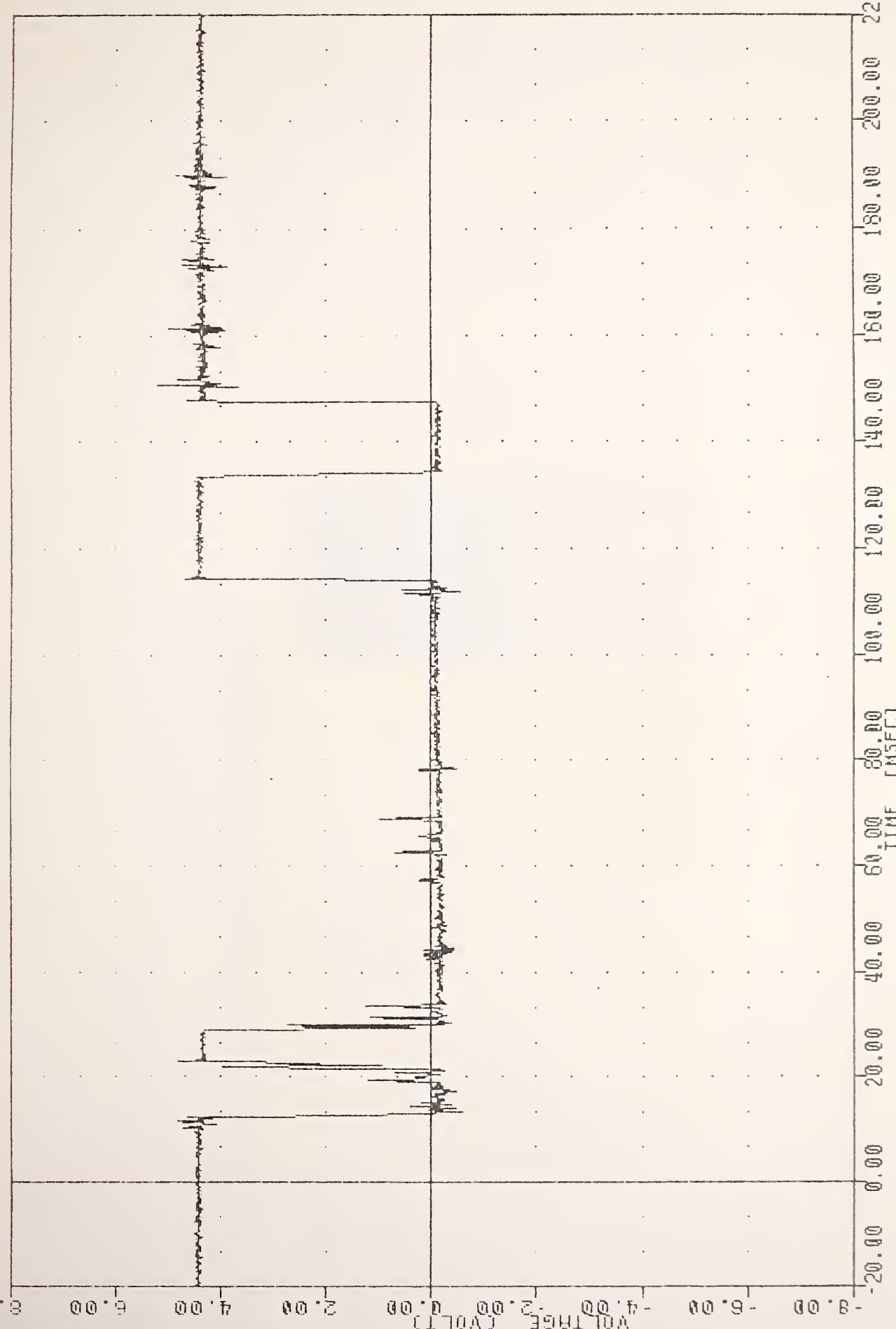


DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG RIGHT FRONT FRAME SENSOR

36 nrH
RONED-KOJYO SENSOR TESTS
84256
ABTS

PLU1 DATE 24 JLP-d4 15.07:11

FILTER = ALPF 1650/5214/ -40
MIN. MAX VALUES = -0.578 13.38, 5.18 150.50



DODGE DIPLOMAT INTO FIXED BARRIER
AIR BAG SAFETY SENSOR



TL 242 .R44

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