

VØ754

BREED AIR BAG PROGRAM

1979 FORD LTD BUMPER TEST AT 4.5 MPH AND
CRASH TEST INTO A FIXED BARRIER AT 30.0 MPH

PREPARED BY:
VEHICLE RESEARCH AND TEST CENTER
ST. RT. 33 LOGAN COUNTY
EAST LIBERTY, OHIO 43319



FINAL REPORT
JULY 1984

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590

Prepared By: Laura J. Bell

L. J. Bell

Project Engineer

Transportation Research Center of Ohio

Approved By: Richard W. Runyon

R. W. Runyon

Project Manager

Transportation Research Center of Ohio

Report Accepted By: Andrew S. Detrick

A. G. Detrick

Vehicle Research & Test Center

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle BREED AIR BAG PROGRAM 1979 FORD LTD BUMPER TEST AT 4.5 MPH AND CRASH TEST INTO A FIXED BARRIER AT 30.0 MPH		5. Report Date JULY 1984	
		6. Performing Organization Code	
7. Author(s) L. Bell, Project Engineer, TRCO		8. Performing Organization Report No. 840626	
9. Performing Organization Name and Address Vehicle Research and Test Center St. Rt. 33, Logan County East Liberty, Ohio 43319		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTNH22-82-A-08401	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590		13. Type of Report and Period Covered FINAL REPORT June 1984	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract This test report documents a crash test conducted under NHTSA Contract DTNH22-82-A-08401 involving a 1979 Ford LTD 4-door sedan retrofitted with a Breed air bag and a knee bolster. The test vehicle underwent a 4.5 mph bumper test on June 25, 1984 at an ambient temperature of 78°F. The vehicle was then impacted into a fixed, non-yielding barrier at 30 mph on June 26, 1984 at an ambient temperature of 81°F. Vehicle accelerations and air bag sensors were measured for the bumper test. For the barrier crash, vehicle accelerations, air bag sensors and occupant responses were measured. All testing was conducted at the TRCO Crash Test Facility in East Liberty, Ohio.			
17. Key Words Breed Air Bag Occupant Response		18. Distribution Statement Available from: Technical Reference Division, National Highway Traffic Safety Administration Room 5108, Nassif Building 400 Seventh Street, S.W. Washington, DC 20590	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 120	22. Price

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	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 degrees add 32)	degrees Fahrenheit	°F

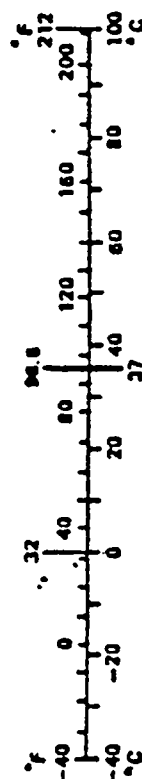


TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND INTRODUCTION	1-1
2.0 GENERAL TEST AND VEHICLE PARAMETER DATA	2-1
3.0 DATA REQUIRED BY R&D	3-1
APPENDIX A PHOTOGRAPHS - TEST 840625	A-1
APPENDIX B PHOTOGRAPHS - TEST 840626	B-1
APPENDIX C DATA PLOT PRESENTATION - TEST 840625	C-1
APPENDIX D DATA PLOT PRESENTATION - TEST 840626	D-1
APPENDIX E DUMMY CERTIFICATION	E-1

LIST OF PHOTOGRAPHS

<u>Figure</u>	<u>Page</u>
A-1. PRE-TEST DRIVER SIDE VIEW	A-2
A-2. PRE-TEST PASSENGER SIDE VIEW	A-2
A-3. POST-TEST DRIVER SIDE VIEW	A-3
A-4. POST-TEST PASSENGER SIDE VIEW	A-3
A-5. POST-TEST CLOSE-UP	A-4
B-1. PRE-TEST DRIVER SIDE VIEW	B-2
B-2. PRE-TEST REAR VIEW	B-2
B-3. PRE-TEST PASSENGER SIDE VIEW	B-3
B-4. PRE-TEST DRIVER SIDE CLOSE-UP	B-3
B-5. PRE-TEST PASSENGER SIDE CLOSE-UP	B-4
B-6. PRE-TEST DUMMY - VIEW 1	B-4
B-7. PRE-TEST DUMMY - VIEW 2	B-5
B-8. PRE-TEST DUMMY - VIEW 3	B-5
B-9. PRE-TEST DUMMY - VIEW 4	B-6
B-10. PRE-TEST DUMMY - VIEW 5	B-6
B-11. PRE-TEST DUMMY - VIEW 6	B-7
B-12. POST-TEST DRIVER SIDE VIEW	B-7
B-13. POST-TEST REAR VIEW	B-8
B-14. POST-TEST PASSENGER SIDE VIEW	B-8
B-15. POST-TEST DUMMY - VIEW 1	B-9
B-16. POST-TEST DUMMY - VIEW 2	B-9
B-17. POST-TEST DUMMY - VIEW 3	B-10
B-18. POST-TEST DUMMY - VIEW 4	B-10

LIST OF PHOTOGRAPHS CONTD

<u>Figure</u>	<u>Page</u>
B-19. POST-TEST STEERING COLUMN - VIEW 1	B-11
B-20. POST-TEST STEERING COLUMN - VIEW 2	B-11
B-21. POST-TEST STEERING COLUMN - VIEW 3	B-12
B-22. POST-TEST KNEE BOLSTER - VIEW 1	B-12
B-23. POST-TEST KNEE BOLSTER - VIEW 2	B-13
B-24. WINDSHIELD DAMAGE	B-13

SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

The purpose of this crash test was to demonstrate the effectiveness of the Breed All Mechanical Air Bag System and knee restraint when retrofitted in an otherwise unmodified vehicle. The vehicle was tested using conditions in excess of those currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A 1979 Ford LTD 4-door Sedan which was supplied by NHTSA underwent a 4.5 mph bumper test on June 25, 1984 and then was towed into a fixed, rigid barrier at 30 mph on June 26, 1984. These tests were conducted to determine the firing velocity of the air bag and to demonstrate the effectiveness of the Breed air bag and knee restraint system when used without the vehicle's production belt restraint. Additionally, a standard Romeo-Kojyo air bag sensor was mounted on the left front inner fender wall to determine firing time and acceleration levels for this non-standard position. The intended test speeds were 4.8 and 30 mph respectively; actual speeds were 4.5 and 30 mph.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains data required by R & D. Appendix A contains pre-test and post-test vehicle and dummy photographs for test 840625. Appendix B contains pre-test and post-test vehicle and dummy photographs for test 840626. Appendix C contains Data Plots for test 840625. Appendix D contains Data Plots for test 840626. Appendix E contains Dummy Certification Data.

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: Ford Motor Company

MAKE/MODEL: Ford LTD

VIN: 9U63F169437

BODY STYLE: 4-Door Sedan

MODEL YEAR: 1979

NHTSA NO.: R & D

COLOR: Grey

ENGINE DATA: TYPE: V8 CYLINDERS: 8 DISPLACEMENT 302 CID

TRANSMISSION DATA: 3-speed Automatic

DATE VEHICLE RECEIVED: 5/16/84

ODOMETER READING: 77238

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

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

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

VEHICLE MANUFACTURED BY: Ford Motor Company

DATE OF MANUFACTURE: 1/79

GVWR: 5347 LBS.,

GAWR: FRONT 2714 LBS., REAR 2683 LBS.

VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 28 psi; REAR 32 psi

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Goodyear Tiempo P 205/75 R 14

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 4

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	1030	LBS.	RIGHT REAR	840	LBS.
LEFT FRONT	1080	LBS.	LEFT REAR	850	LBS.
TOTAL FRONT WEIGHT	2110		LBS. (55.5 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1690		LBS. (44.5 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	3800		LBS.		

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 28	;LF 27 13/16	;RR 26	;LR 26 1/16
PRE-TEST ATTITUDE:	RF 27 3/16	;LF 27 7/8	;RR 23 15/16	;LR 24 1/16
POST-TEST ATTITUDE:	RF 30 1/4	;LF 29 1/2	;RR 23 3/4	;LR 25 1/2

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 200 LBS. CARGO:

RIGHT FRONT	1050	LBS.	RIGHT REAR	1000	LBS.
LEFT FRONT	1100	LBS.	LEFT REAR	1000	LBS.
TOTAL FRONT WEIGHT	2150		LBS. (51.8 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	2000		LBS. (48.2 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	4150		LBS.		

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 25 LBS.

TEST FLUID DATA

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

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: NA GALLONS

TEST VOLUME: 17.7 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 19.0 GALLONS

DETAILS OF FUEL SYSTEM: DNA

ELECTRIC FUEL PUMP: No

FUEL INJECTION: No

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

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES)

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: R 209.75 ;L 209.75

POST-TEST: R 187.55 ;L 193.65

TOTAL CRUSH: R 22.2 ;L 16.1

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER
IMPACT: CENTER: NA ;R 47 1/2 ;L 46 3/8

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 28 psi; REAR 32 psi

RECOMMENDED TIRE SIZE: P205/75R14 LOAD RANGE X B, C,

VEHICLE CAPACITY: TYPES OF SEATS: Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 3 FRONT

 3 REAR

CARGO LOAD NA LBS.

 6 TOTAL

TOTAL NA LBS.

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

TEST CONDITIONS

TEST NUMBER: 840625

DATE OF TEST: 6/25/84

TIME OF TEST: 16:15

WIND VELOCITY: DNA

HUMIDITY: DNA

AMBIENT TEMPERATURE AT IMPACT AREA:

78°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	4150	4164
VEHICLE ORIENTATION (DEGREES)	0	0
VEHICLE VELOCITY (mph)	4.5	4.8

DUMMIES - DNA

TEST CONDITIONS

TEST NUMBER: 840626

DATE OF TEST: 6/26/84

TIME OF TEST: 16:15

WIND VELOCITY: DNA

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA:

81°F

TEMPERATURE IN OCCUPANT COMPARTMENT:

78°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	4150	4164
VEHICLE ORIENTATION (DEGREES)	0	0
VEHICLE VELOCITY (mph)	30.0	30.0

DUMMIES

	<u>DRIVER</u>	<u>MIDDLE PASSENGER</u>	<u>RT. FRONT PASSENGER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	572				
SERIAL NO.:	187				
INSTRUMENTATION:					
HEAD ACCEL.:	Yes				
CHEST ACCEL.:	Yes				
FEMUR L.C.'S:	Yes				
OTHER:	Pelvis				
RESTRAINT SYSTEM:	Breed Air Bag and Knee Bolster				

REMARKS:

VISIBLE DUMMY CONTACT POINTS:

	DRIVER 187	PASSENGER DNA
Head	<u>Air Bag</u>	<u></u>
Chest	<u>Air Bag</u>	<u></u>
Abdomen	<u>Lower Steering Wheel Rim</u>	<u></u>
Left Knee	<u>Bolster</u>	<u></u>
Right Knee	<u>Bolster</u>	<u></u>

DOOR OPENING:

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

SEAT MOVEMENT:

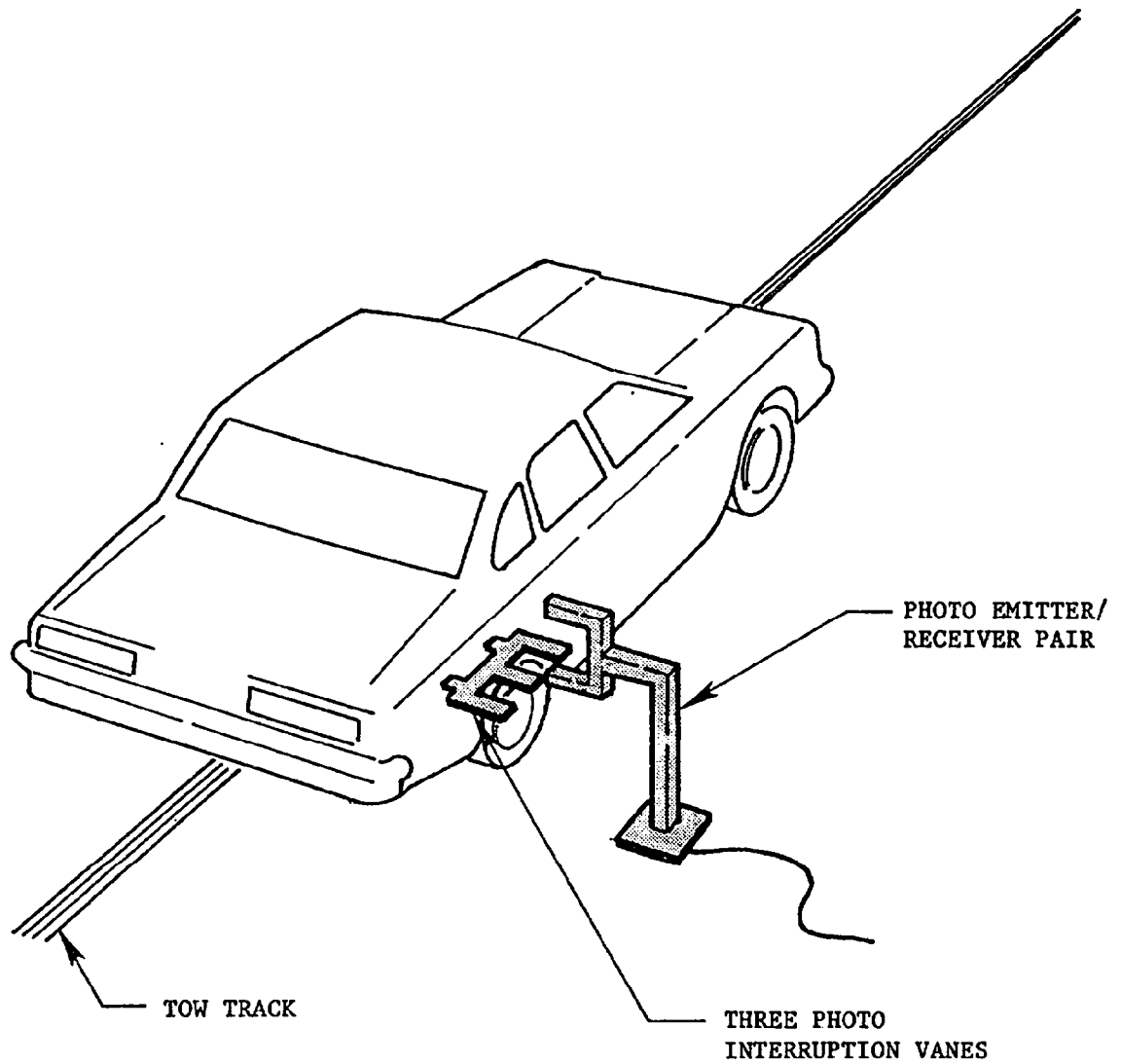
	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>No</u>	<u>No</u>
Rear	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

Shattered Windshield

OTHER NOTABLE IMPACT EFFECTS:

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane is located two inches before impact.

The vanes have one foot spacing.

VEHICLE TEST WEIGHT CALCULATION

Test Weight = Unloaded Delivered Weight +
 Number of Dummies X 164 lbs. +
 Cargo Weight
 = 3800 + 1 X 164 + 200 lbs.
 = 4164 lbs.

To achieve test weight, 25 pounds of sand ballast was added in the trunk.
The weight of the test vehicle was measured by placing each wheel on a
Loadmeter Corporation Hiway Loadometer.

TEST ANOMALIES

The following accelerometer cables were severed during impact in the 30 mph test:

LPBZG - Left B Pillar, "Z" Axis

FILXG - Left Inner Fender Well, "X" Axis

FILZG - Left Inner Fender Well, "Z" Axis

The change in velocity and distance for the Left Inner Fender Well are therefore not reported.

The "Y" accelerometer mounted in the dummy head, HEDYG1, was found to be defective. The plot from this channel is not included in the report. Therefore, the resultant was calculated using only the "X" and "Z" axis accelerometers.

SECTION 3.0
DATA REQUIRED BY R&D

The following pages are included in this section:

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

DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle was kept inside the temperature controlled crash test building until approximately 30 minutes prior to the test. Temperature inside the vehicle and ambient temperature in the crash building were recorded. Dummy temperature while outside the crash test building was maintained portably until approximately 1 minute prior to the test.

The following table summarizes the steps taken to position the instrumented, calibrated dummy in the test vehicle.

DUMMY PLACEMENT AND POSITIONING

PART 572

DUMMY

DRIVER DSP

PASSENGER DSP

HEAD	Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.
UPPER TORSO	Placed against seat back. Midsagittal plane is vertical & longitudinal & passes through center point of steering wheel rim.
UPPER ARMS	Initially placed against seat back & tangent to side of upper torso. Push arms rearward into seat back with bending at elbows.
LOWER ARMS	Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.
HAND PALMS	Palms contact outer part of steering wheel rim at horizontal centerline.
HAND THUMBS	Placed over steering wheel rim.
HAND LITTLE FINGERS	
LOWER TORSO	Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical & longitudinal & passes through center point of plane described by steering wheel rim.
UPPER LEGS (thighs or femurs)	Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.
RIGHT KNEE	Knees initially set 14.5" apart between pivot bolt head outer surfaces.

Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.
Placed against seat back. Midsagittal plane is vertical, longitudinal, & the same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.
Initially placed against seat back & tangent to side of upper torso. Push arms rearward into seat back with bending at elbows. Remains tangent.
Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.
Palms contact the outsides of the thighs.
Barely in contact with the seat cushion.
Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical, and same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.
Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.
Located so that plane defined by femur and tibia centerlines is as close as possible to vertical.

DUMMY PLACEMENT AND POSITIONING (CONTINUED)

PART 572
DUMMY

DRIVER DSP

PASSENGER DSP

LEFT KNEE	Outer surface of pivot bolt head is 5.9" from midsagittal plane of dummy.
LOWER LEGS	Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.
RIGHT FOOT	Placed on undepressed accelerometer pedal -- rearmost point of heel on floorpan in plane of pedal.
LEFT FOOT	Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan. Centerline falls in vertical longitudinal plane.

Located as above.

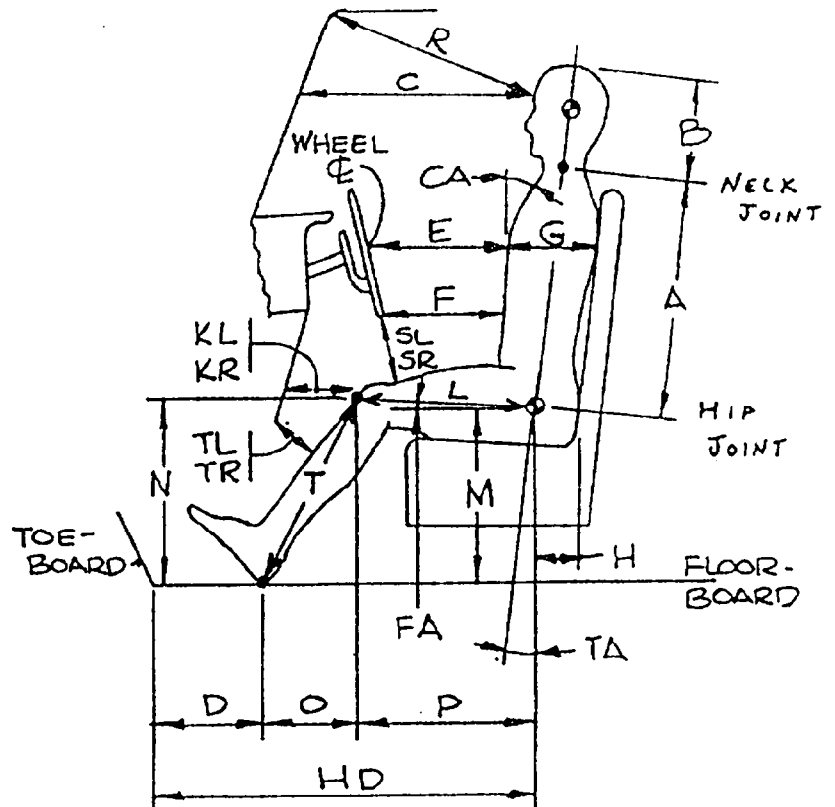
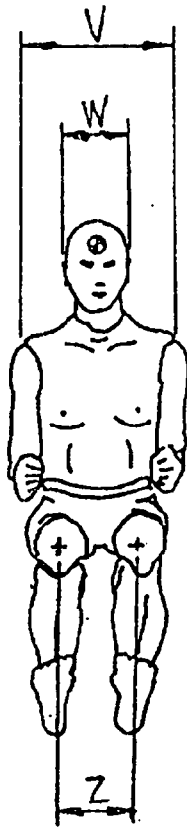
Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.

Centerline falls in vertical longitudinal plane. Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.

Centerline falls in vertical longitudinal plane. Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

BREED VERSION (Not Standard)



Seat @ Mid-Postion

ALL MEASUREMENTS TO THE NEAREST 1/4 INCH, AND WHOLE DEGREE.

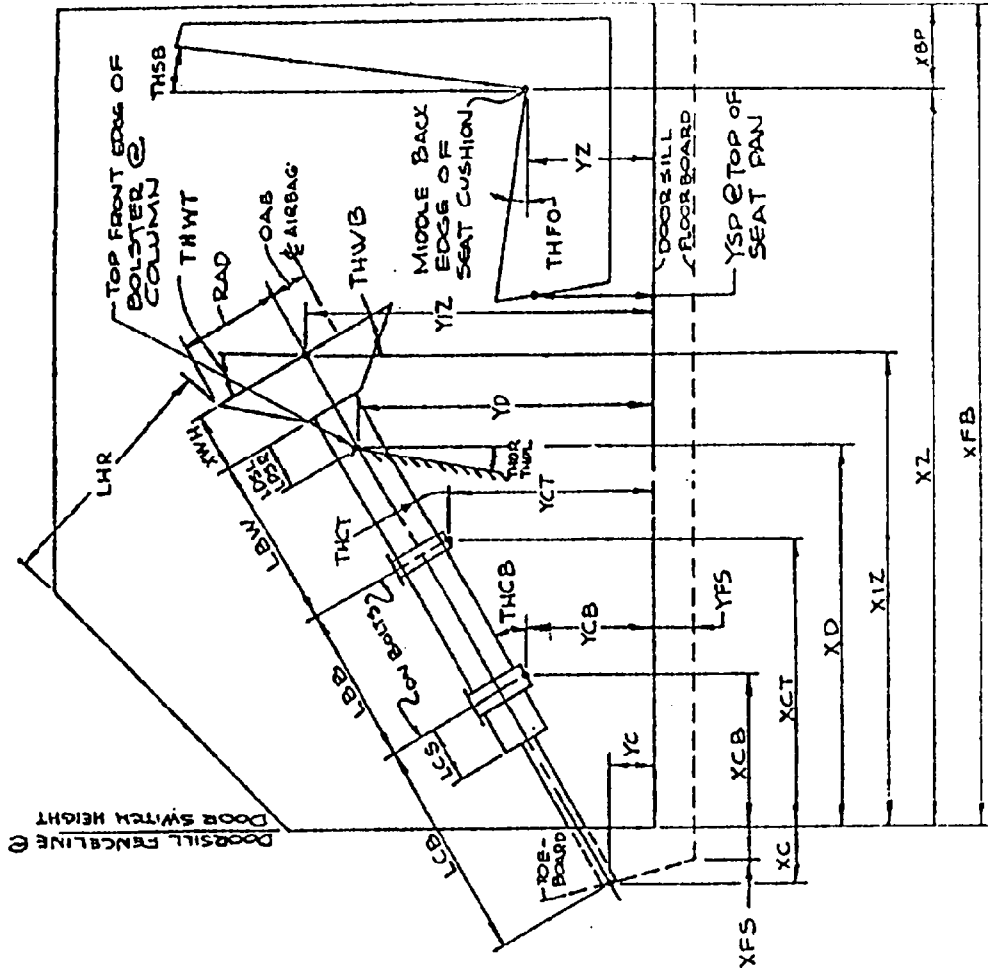
Measurements A,B,L are parallel to the dummy inclination; SL,SR,TL,TR,R are "shortest distance" measurements; all the rest are horizontal and vertical.

A = 21.5	B = 10	KL = 5.5	L = 18	T = N/A
C = 20	E = 11	KR = 6	G = 9.3	
M = 6.5	N = 12	F = 5.5	P = 18	
R = 17	V = 14	O = 12	Z = 10	
HD = 27.5	CA = 23 °	W = 6	FA = 15 °	
D = N/A	TR = 4	TA = 18 °	SR = 4.5	
H = 4	TL = 3.5	LA = N/A	SL = 4	

	PRE	POST		PRE	POST
LBW=	23.5	22.5	YD=	8.0	6.25
LB=			YD=	17.0	17.5
LCB=	7.5	3.0	LDL=	9.5	---
XC=	8.75	---	LDL=	N/A	N/A
YC=	9.0	10.5	YBP=	3.0	---
YLZ=	23.0	25.5	YFB=	36.0	35.0
YLZ=	17.5	13.0	YFS=	3.0	---
YLZ=	32.0	32.0	LHR=	10.0	9.5
YZ=	5.0	5.0	YSP=	3.0	2.5
THCT=	N/A	N/A	XFS=	N/A	N/A
THCB=	23°	40°	LC5=	1.0	2.75
THWT=	23°	36°	QAB=	1.0	---
THWB=	N/A	N/A	XC8=	N/A	N/A
THFO=	14°	10°	YC8=	N/A	N/A
THSB=	20°	26°	XCT=	N/A	N/A
THDX=	33°	32°	YCT=	N/A	N/A
THDR=	35°	35°			

	POST			
	N	S	E	W
ROAD=	7.0	6.5	7.5	7.5
XWH=	3.75	2.75	N/A	N/A

ALL DIMENSIONS TO NEAREST 1/4 INCH ± WHOLE DEGREE



DUMMY KINEMATIC SUMMARY

DRIVER

During impact, the dummy rotated forward until the upper torso and head contacted and were enfolded by the air bag. The dummy rebounded from the air bag, striking the head restraint and the top of the seat back with the back of his head.

Also during impact, the dummy's knees were forced forward into the knee bolster. As the dummy rebounded from the air bag, the knees came upward, still in contact with the knee bolster.

The dummy came to rest sitting upright and facing forward with the air bag touching the upper torso. Contact was maintained between the knees and the knee bolster.

PART 572 DUMMY DATA SUMMARY

TEST NO. 840626

	DRIVER DUMMY			
	POSITIVE DIRECTIONS*		NEGATIVE DIRECTIONS**	
	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
HEAD ACCELERATION				
LONGITUDINAL	4.04	147.63	38.42	75.13
LATERAL	---	---	---	---
VERTICAL	11.06	53.75	19.62	112.88
RESULTANT		38.42 max @	75.13	
HIC		246.63 from	63.63 to	122.13
DELTA V (MPH)		-37.7 @	133.63	
DELTA X (INCHES)		-40.9 @	180.00	

CHEST ACCELERATION				
LONGITUDINAL	1.07	174.25	46.53	99.38
LATERAL	5.05	106.00	2.55	129.00
VERTICAL	6.51	94.75	12.30	141.50
RESULTANT		46.69 max @	99.38	
DELTA V (MPH)		-40.2 @	143.00	
DISPLACEMENT (IN.)		-41.7 @	180.00	

PELVIS ACCELERATION				
LONGITUDINAL	0.66	147.63	53.64	83.88
LATERAL	6.75	72.63	5.84	56.00
VERTICAL	6.04	96.63	17.87	94.50
RESULTANT		53.74 @	83.88	
DELTA V (MPH)		-35.2 @	180.00	
DELTA X (INCHES)		-40.5 @	180.00	

	MAX (lb)	TIME (msec)	MAX (lb)	TIME (msec)
FEMUR FORCE***				
LEFT	438.53	42.25	1453.66	82.50
RIGHT	570.46	42.38	1822.33	83.88

* LONGITUDINAL: FORWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

** LONGITUDINAL: REARWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

*** COMPRESSION: NEGATIVE

Y See TEST ANOMALIES

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY
TEST NO. 840625

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT INNER FENDER WELL (LONGITUDINAL)	187.31	-29.25	32.75				
		$\Delta V = -5.49 @ 161.00$			1.02	175.25	5.32	26.75
		$\Delta X = -8.59 @ 180.00$						
	(LATERAL)				1.11	39.13	2.22	26.75
	(VERTICAL)				4.75	38.63	1.81	141.13
	(RESULTANT)					5.94 @	26.75	
2	LOWER STEERING COLUMN (POSTERIOR)	144.00	-15.38	25.25				
		$\Delta V = -5.24 @ 109.88$			0.91	126.25	4.62	50.63
		$\Delta X = -7.95 @ 180.00$						
	(LATERAL)				1.31	62.00	0.79	40.75
	(INFERIOR)				3.89	27.63	0.46	180.00
	(RESULTANT)					5.61 @	29.38	
3	UPPER STEERING COLUMN (POSTERIOR)	126.75	-15.13	35.38				
		$\Delta V = -4.88 @ 107.88$			1.30	126.25	4.64	49.50
		$\Delta X = -7.41 @ 180.00$						
	(INFERIOR)				3.22	54.50	2.28	99.13
4	LEFT B-PILLAR (LONGITUDINAL)	103.25	-30.25	18.00				
		$\Delta V = -5.33 @ 102.88$			0.50	169.50	4.33	52.13
		$\Delta X = -8.33 @ 180.00$						
	(LATERAL)				1.19	56.38	0.66	21.75
	(VERTICAL)				0.63	27.25	1.00	54.50
	(RESULTANT)					4.45 @	52.38	

* REFERENCE: X - REAR BUMPER (+ FORWARD), Y - VEHICLE CENTERLINE (+ TO RIGHT)
Z - GROUND (+ UP)
ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY
TEST NO. 840626

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT INNER FENDER WELL (LONGITUDINAL)	187.31	-29.25	32.75				
		$\Delta V =$ ---	--- γ		---	---	---	---
		$\Delta X =$ ---	---					
	(LATERAL)				70.93	42.25	38.77	37.00
	(VERTICAL)				---	---	---	---
	(RESULTANT)					@	---	---
2	LOWER STEERING COLUMN (POSTERIOR)	144.00	-15.38	25.25				
		$\Delta V =$ -32.59 @ 167.88			19.29	80.38	43.40	72.88
		$\Delta X =$ -39.67 @ 180.00						
	(LATERAL)				36.34	69.13	14.48	76.00
	(INFERIOR)				21.64	73.38	15.55	99.63
	(RESULTANT)					48.77 @	72.75	
3	UPPER STEERING COLUMN (POSTERIOR)	126.75	-15.13	35.38				
		$\Delta V =$ -30.68 @ 166.50			12.01	76.75	41.18	96.25
		$\Delta X =$ -36.30 @ 180.00						
	(INFERIOR)				39.84	98.50	18.77	66.13
4	LEFT B-PILLAR (LONGITUDINAL)	103.25	-30.25	18.00				
		$\Delta V =$ -35.79 @ 165.50			2.67	179.13	27.30	63.38
		$\Delta X =$ -45.27 @ 180.00						
	(LATERAL)				6.12	34.75	4.56	84.25
	(VERTICAL)				---	---	---	---
	(RESULTANT)					@	---	---

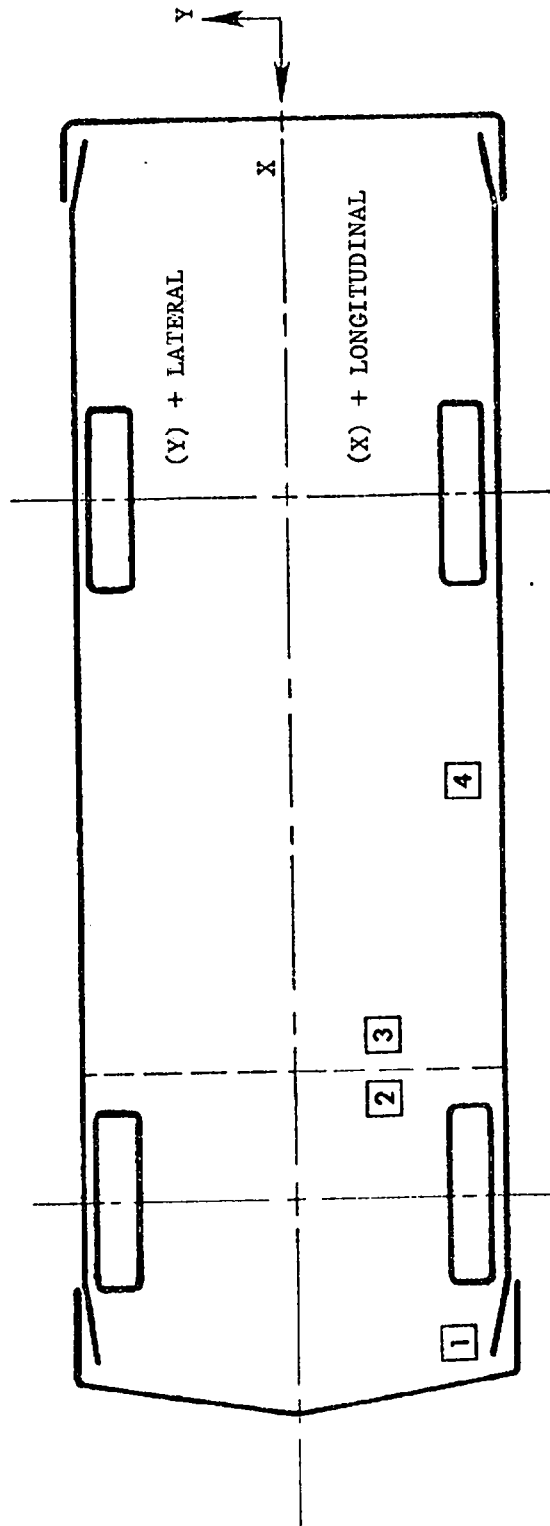
SENSOR FIRING TIME = 52.63 msec

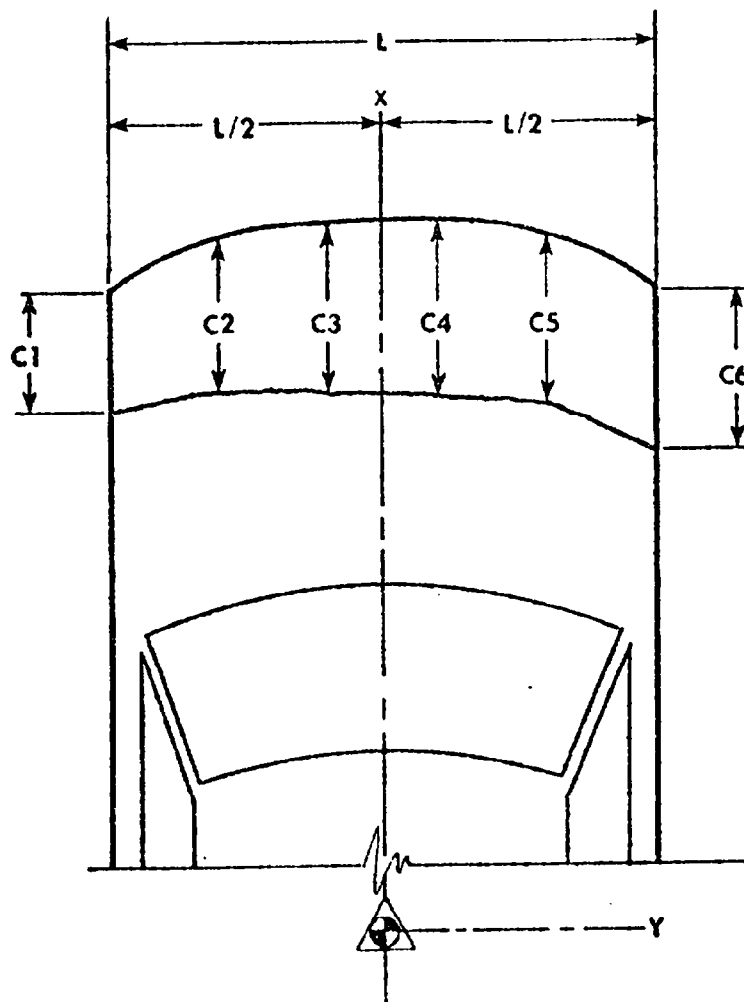
* REFERENCE: X - REAR BUMPER (+ FORWARD), Y - VEHICLE CENTERLINE (+ TO RIGHT)
Z - GROUND (+ UP)

ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS IN INCHES

γ See TEST ANOMALIES

VEHICLE ACCELEROMETER LOCATIONS





NOTE: C1 through C6 are spaced equally apart

VEHICLE 1979 Ford LTD

<u>PRE-TEST</u>		<u>POST-TEST</u>		<u>CRUSH</u>	
L	<u>76.6</u>	L	<u>76.6</u>	L	<u>0</u>
C1	<u>47.6</u>	C1	<u>63.7</u>	C1	<u>16.1</u>
C2	<u>40</u>	C2	<u>61.1</u>	C2	<u>21.1</u>
C3	<u>38.3</u>	C3	<u>61.2</u>	C3	<u>22.9</u>
C4	<u>38</u>	C4	<u>62.2</u>	C4	<u>24.2</u>
C5	<u>40</u>	C5	<u>63.2</u>	C5	<u>23.2</u>
C6	<u>47.2</u>	C6	<u>69.4</u>	C6	<u>22.2</u>
D	<u>0</u>	D	<u>0</u>	D	<u>0</u>

NOTE: Reference line 16' forward of rear axle (192 inches)

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right Side	Kodak	16	24	Vehicle approach & crash
2	Onboard - Window	Photosonic 1B	8	1000	Dummy kinematics
3	Onboard - Roof	Photosonic 1B	8	1000	Dummy kinematics
4	Left - Wide View	Photosonic 1B	13	1000	Overall view at crash area

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 - TEST 840625

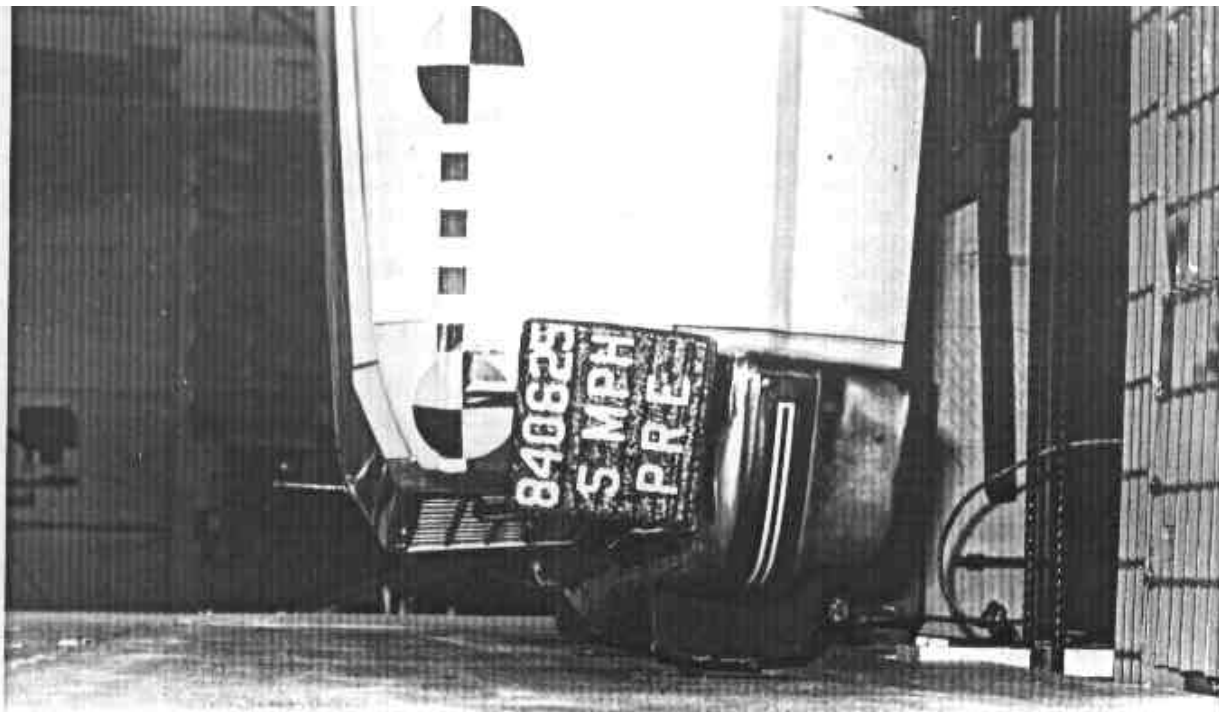


Figure A-1. PRE-TEST DRIVER SIDE VIEW

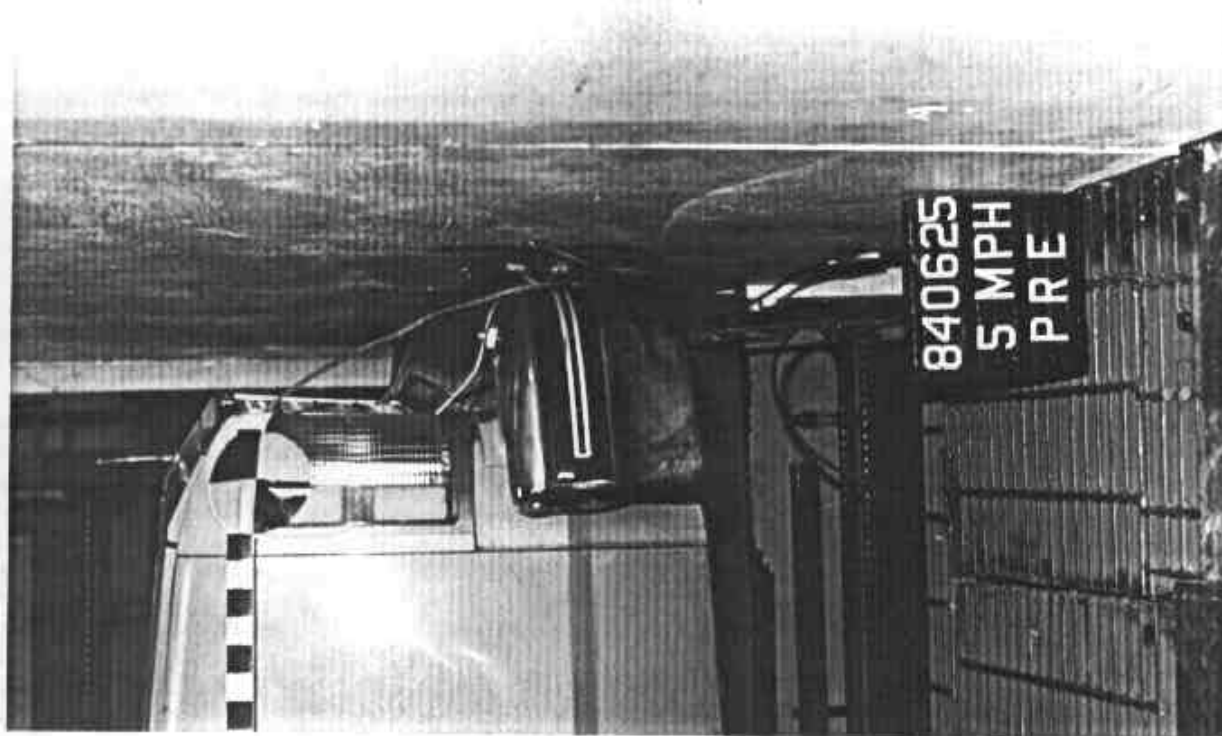


Figure A-2. PRE-TEST PASSENGER SIDE VIEW
A-2

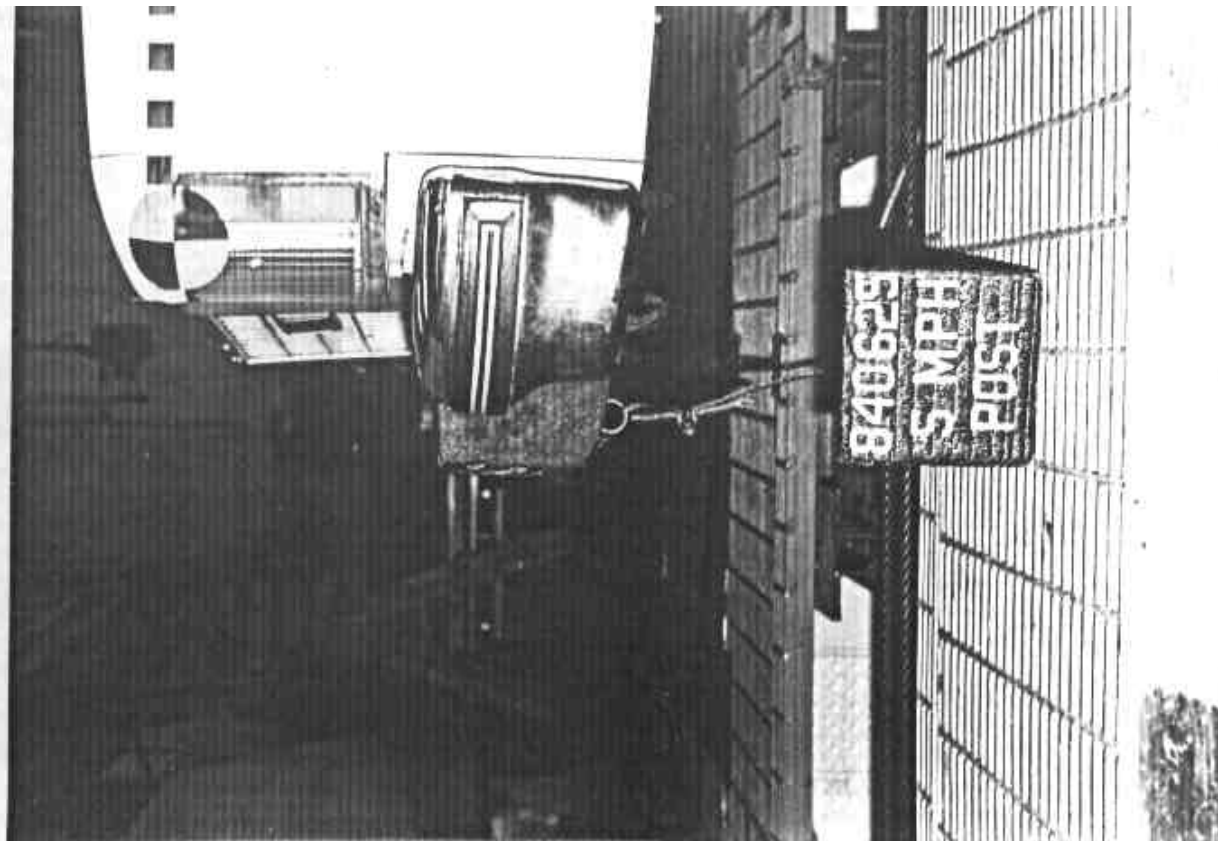


Figure A-3. POST-TEST DRIVER SIDE VIEW



Figure A-4. POST-TEST PASSENGER SIDE VIEW
A-3



Figure A-5. POST-TEST CLOSEUP



Figure B-1. PRE-TEST DRIVER SIDE VIEW

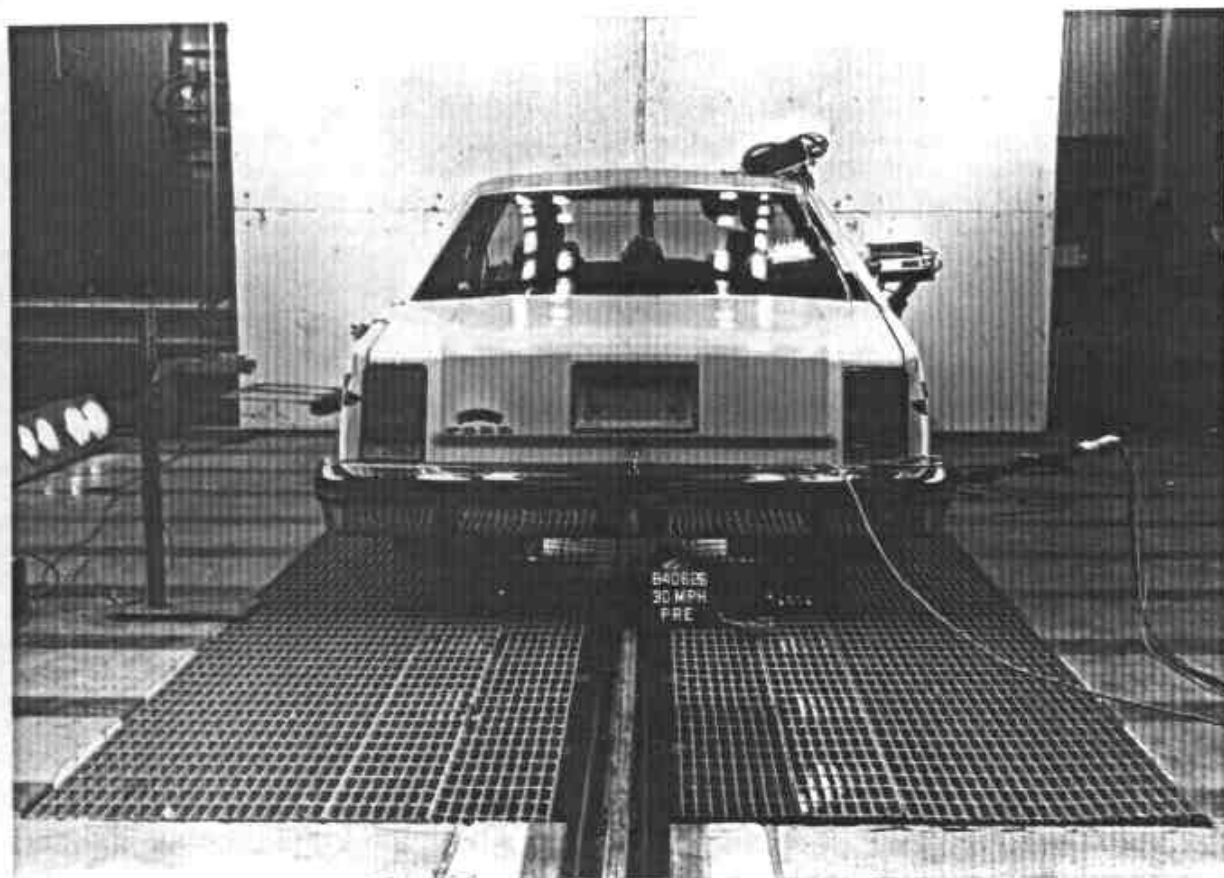


Figure B-2. PRE-TEST REAR VIEW
B-2

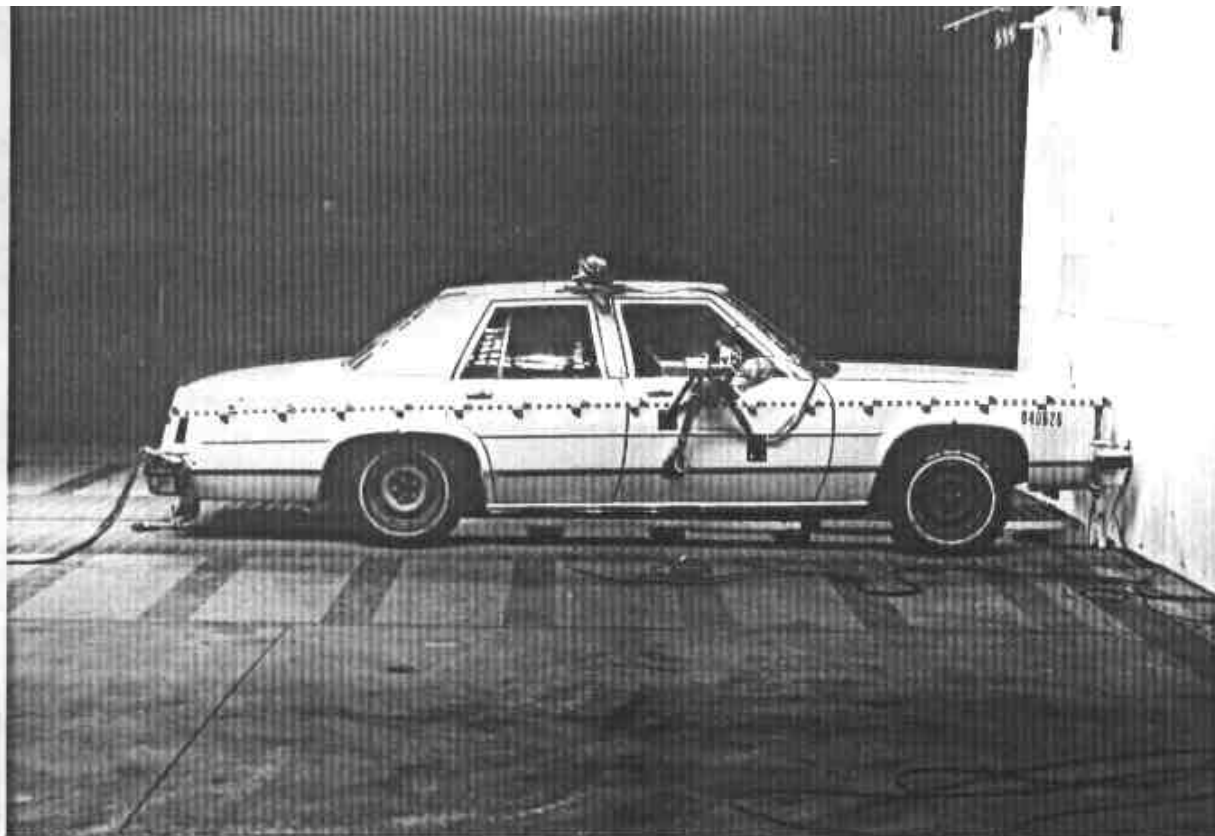


Figure B-3. PRE-TEST PASSENGER SIDE VIEW

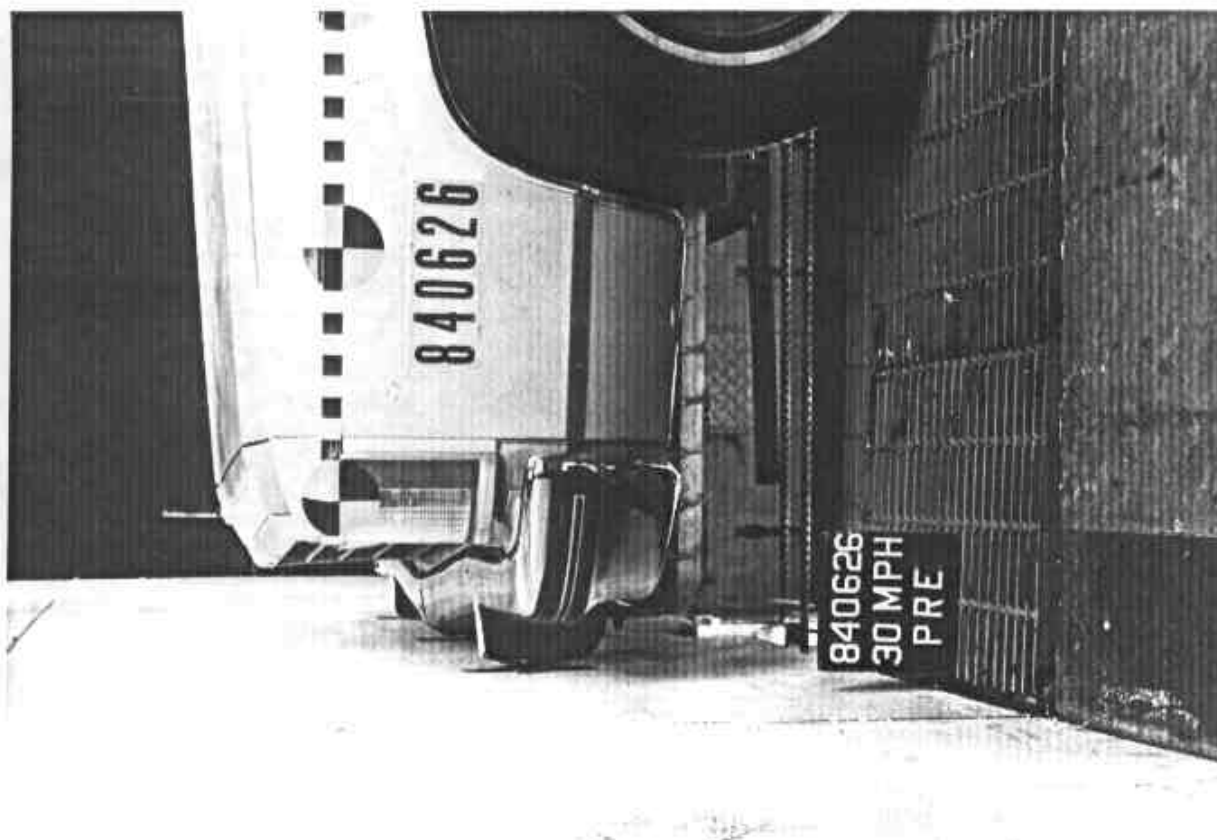


Figure B-4. PRE-TEST DRIVER SIDE CLOSE-UP
B-3

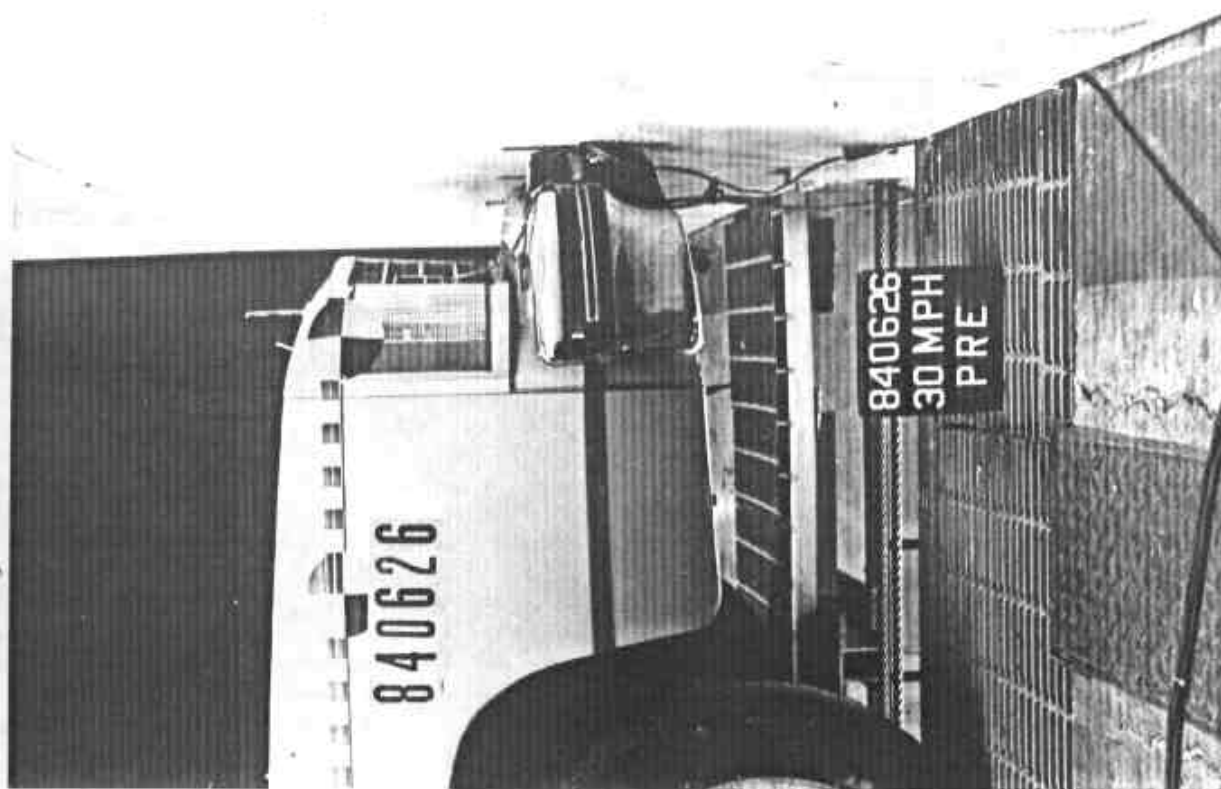


Figure B-5. PRE-TEST PASSENGER SIDE CLOSE-UP



Figure B-6. PRE-TEST DUMMY - VIEW 1
B-11

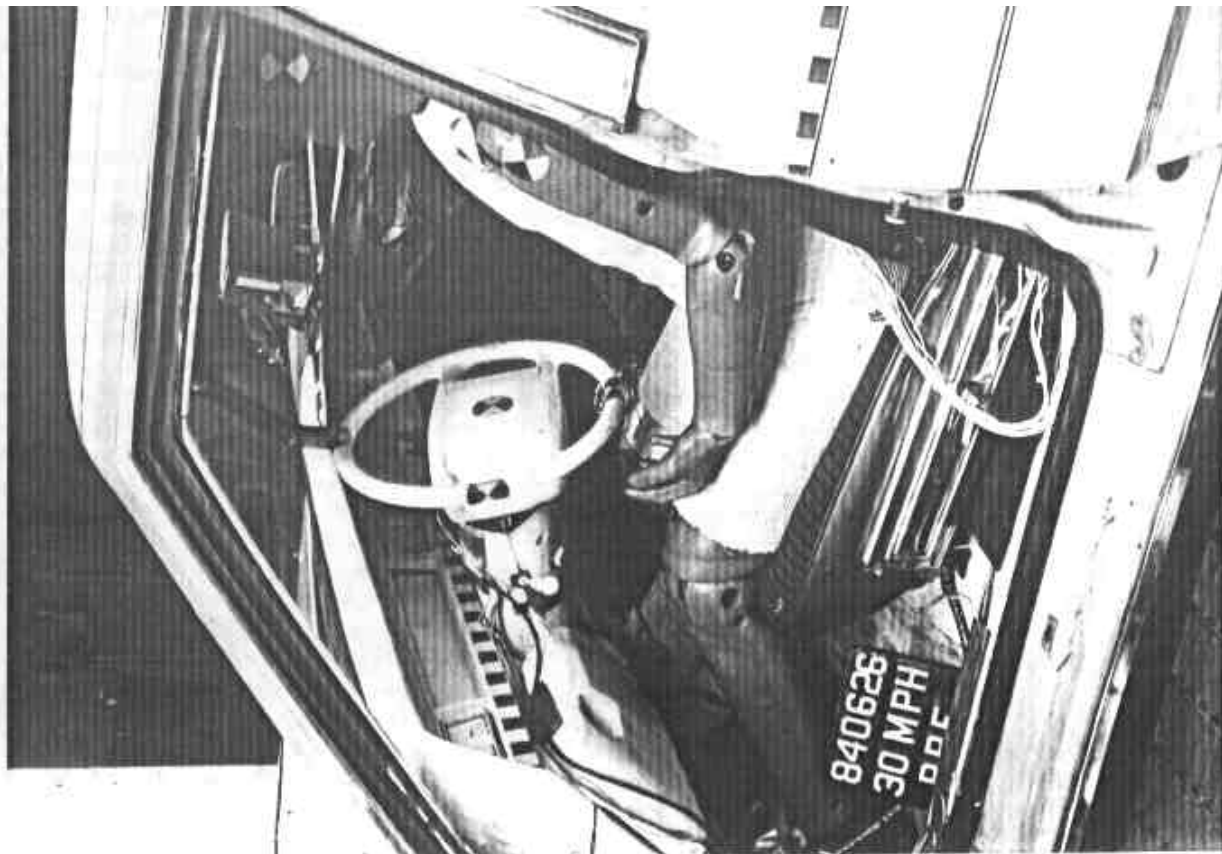


Figure B-7. PRE-TEST DUMMY - VIEW 2



Figure B-8. PRE-TEST DUMMY - VIEW 3
B-5

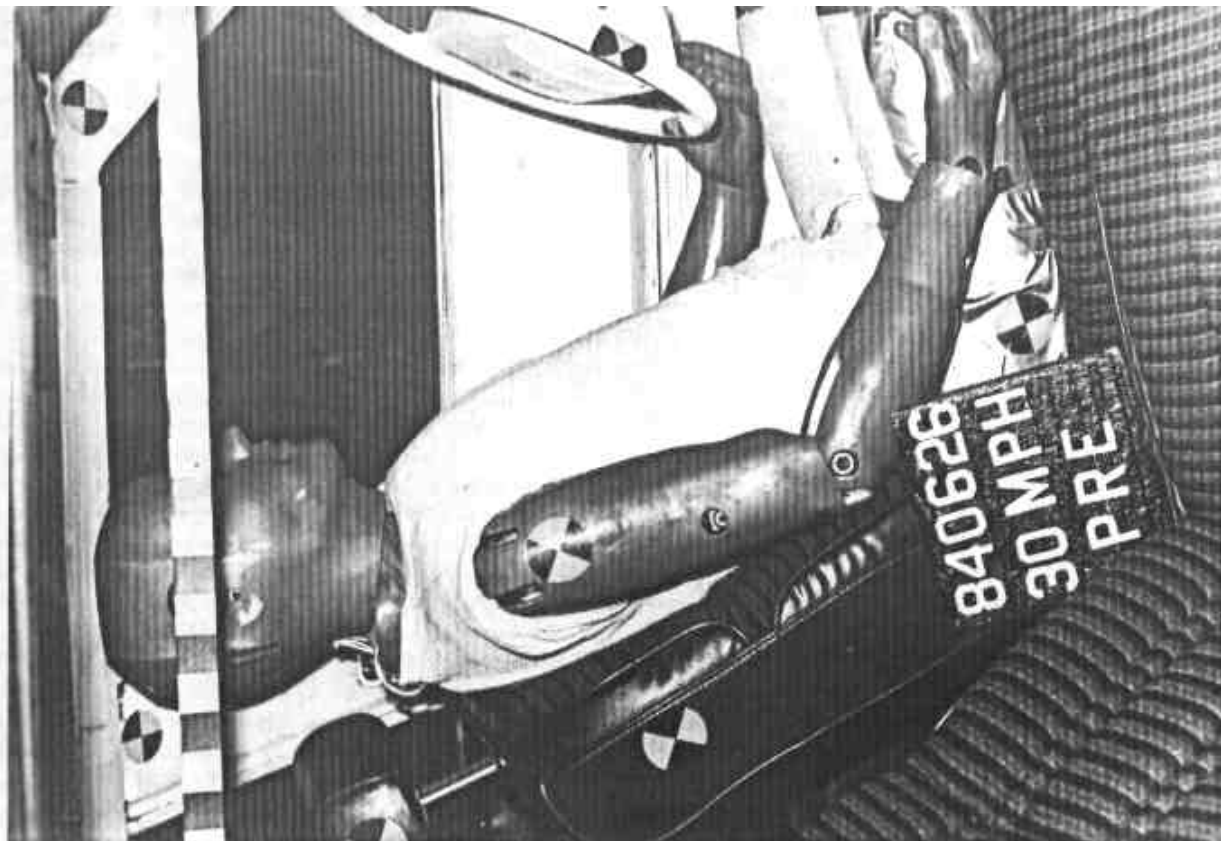


Figure B-9. PRE-TEST DUMMY - VIEW 4

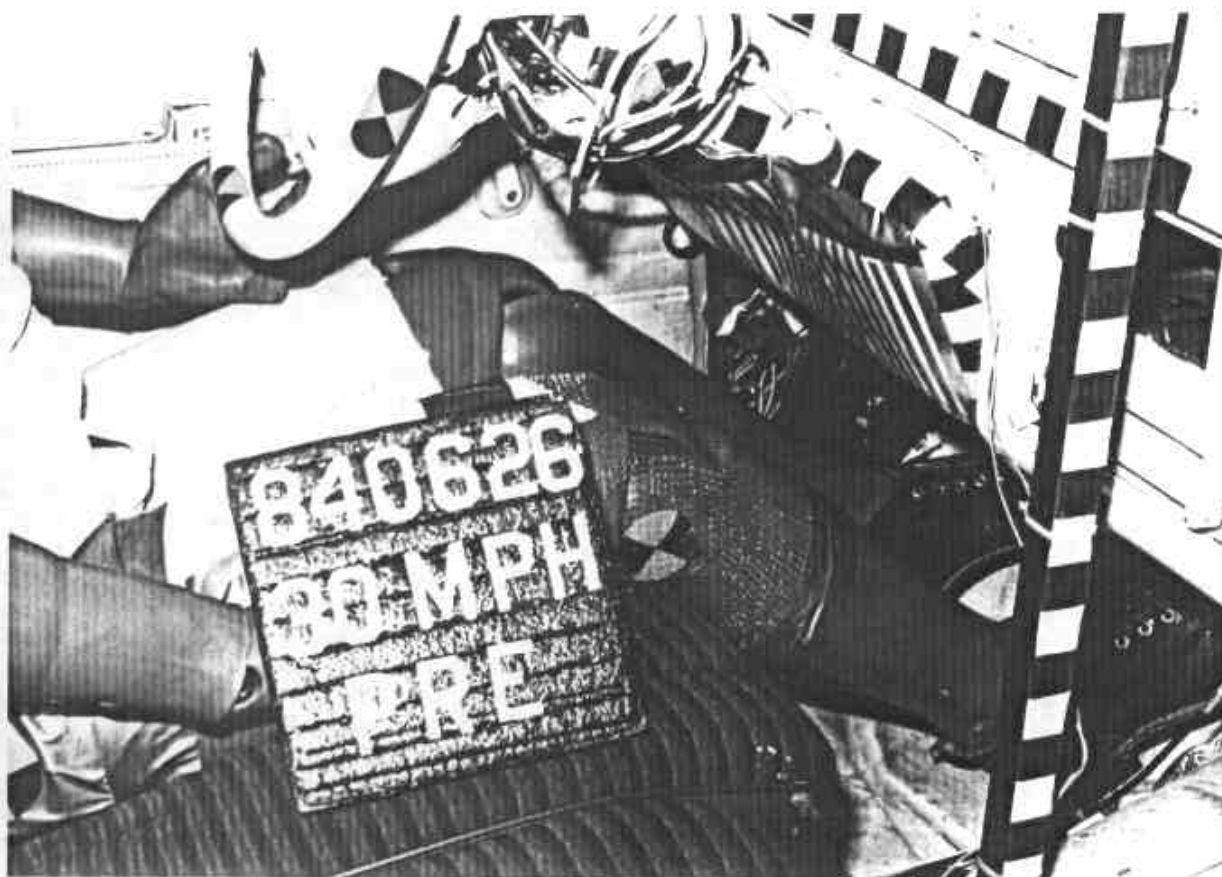


Figure B-10. PRE-TEST DUMMY - VIEW 5
B-6

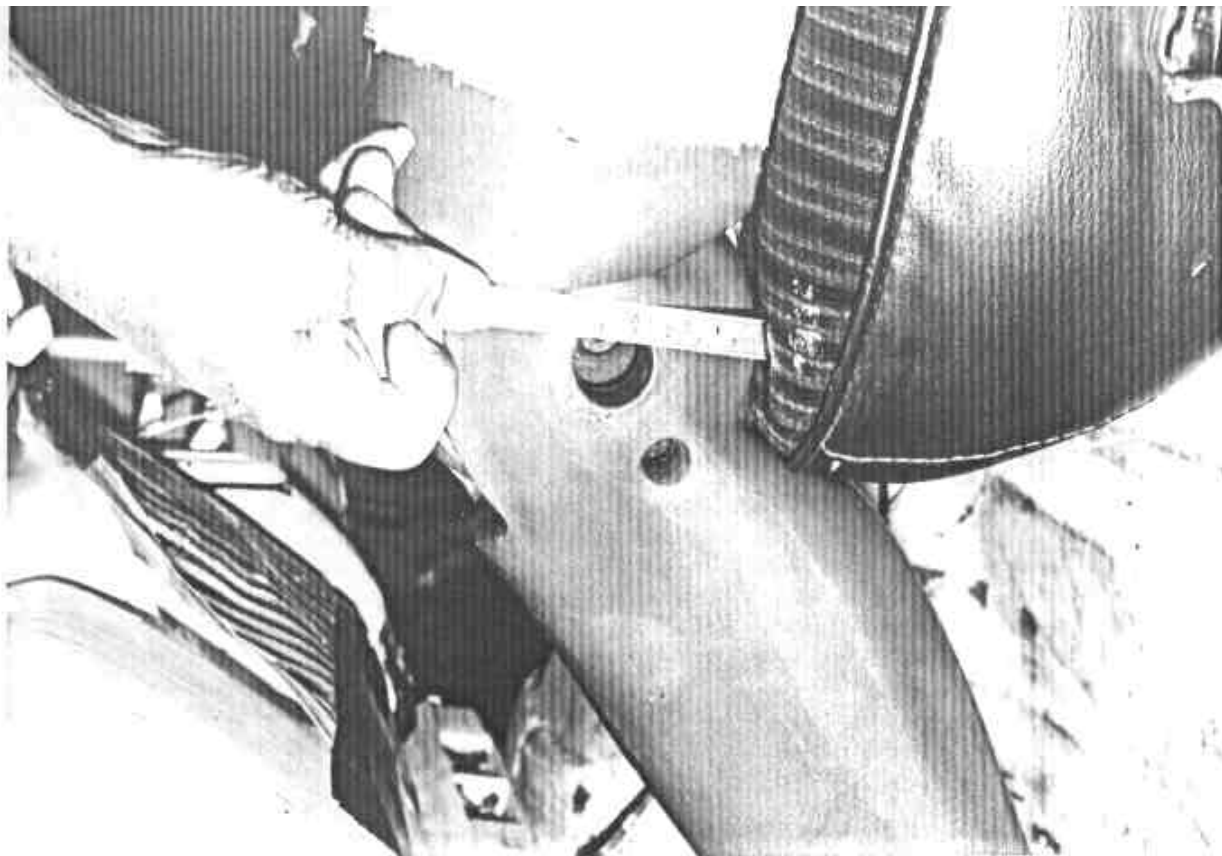


Figure B-11. PRE-TEST DUMMY - VIEW 6



Figure B-12. POST-TEST DRIVER SIDE VIEW
B-7

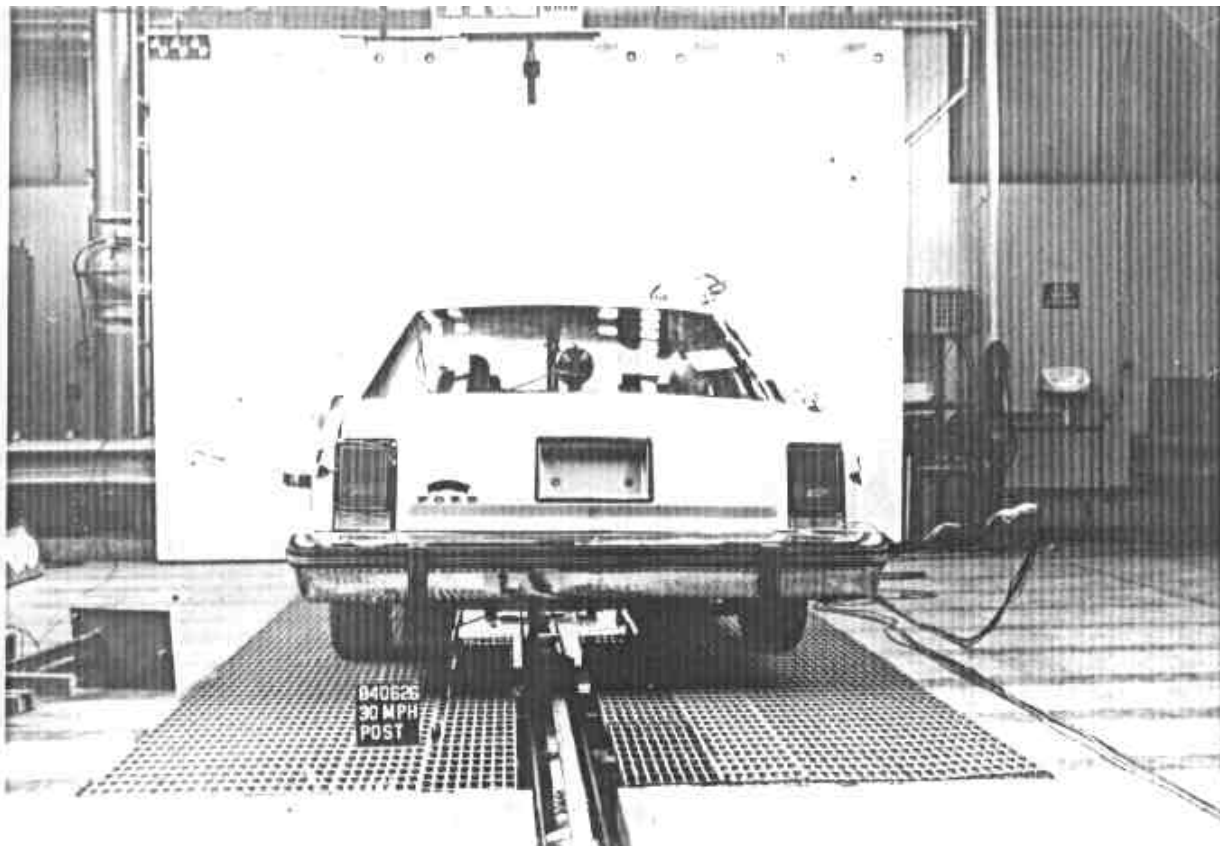


Figure B-13. POST-TEST REAR VIEW



Figure B-14. POST-TEST PASSENGER SIDE VIEW
B-8



Figure B-15. POST-TEST DUMMY - VIEW 1

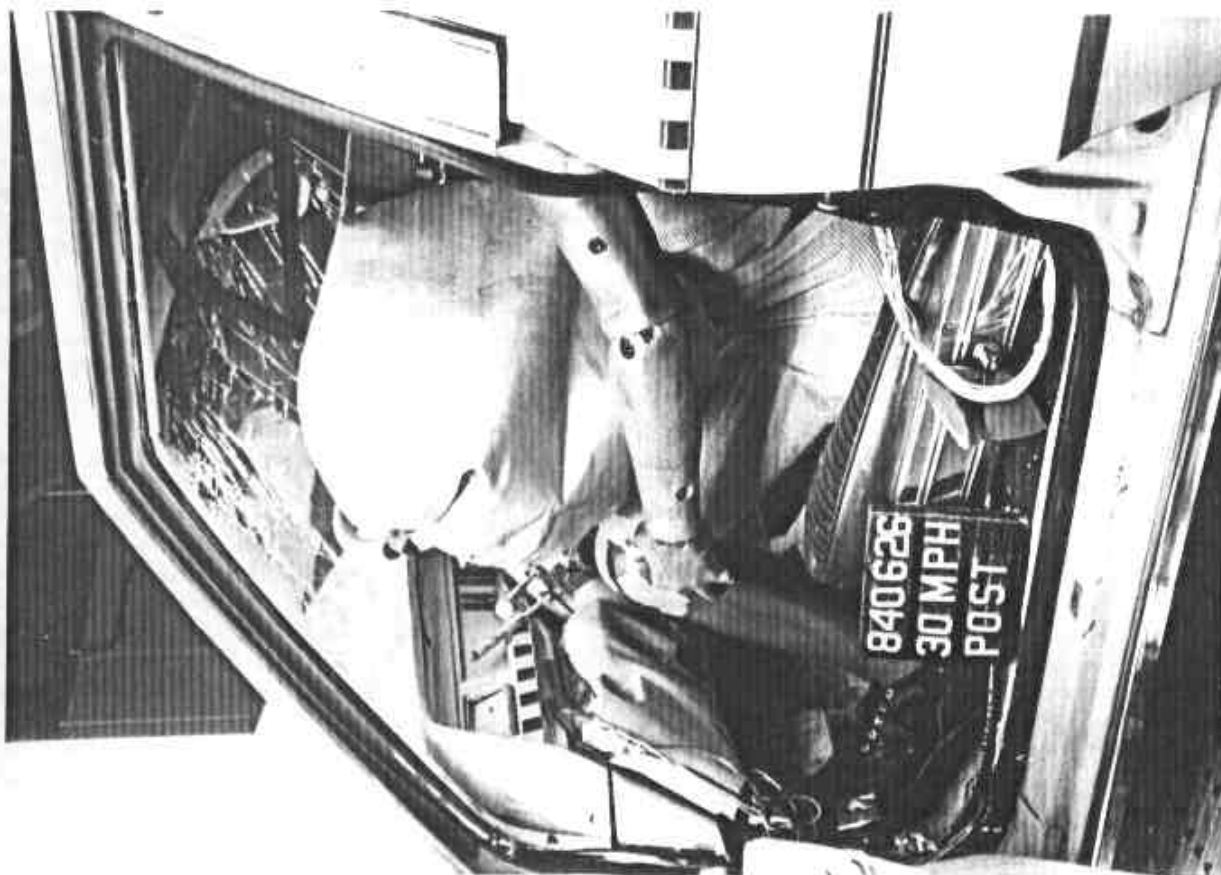


Figure B-16. POST-TEST DUMMY - VIEW 2
B-9

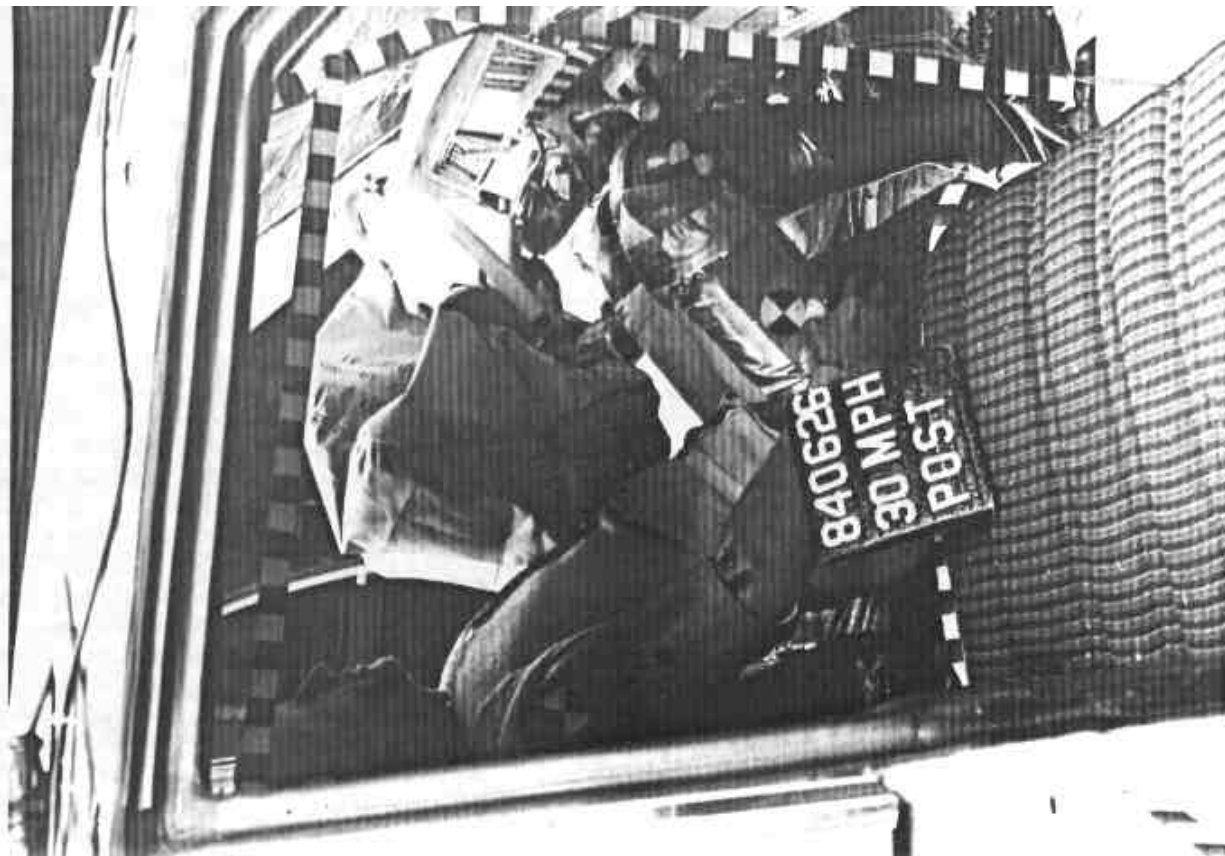


Figure B-17. POST-TEST DUMMY - VIEW 3



Figure B-18. POST-TEST DUMMY - VIEW 4
B-10

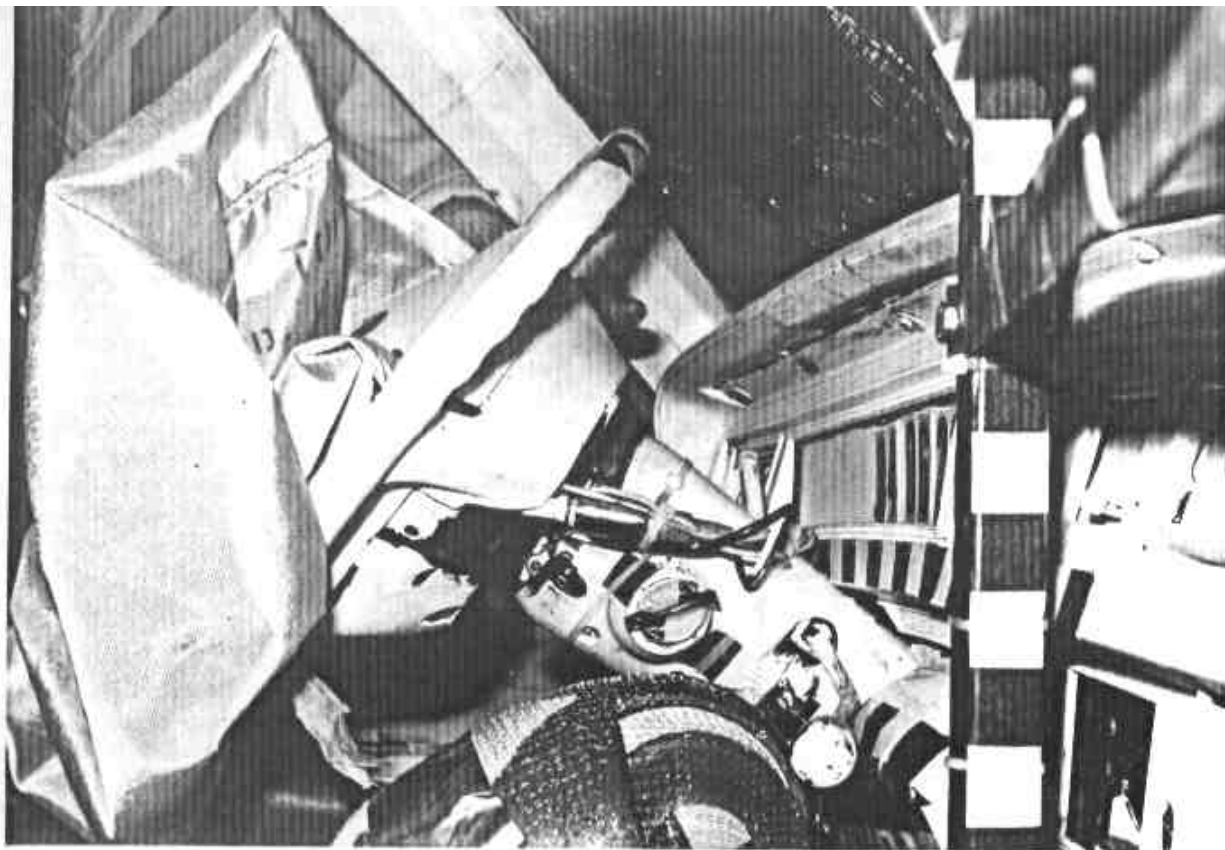


Figure B-19. POST-TEST STEERING COLUMN - VIEW 1

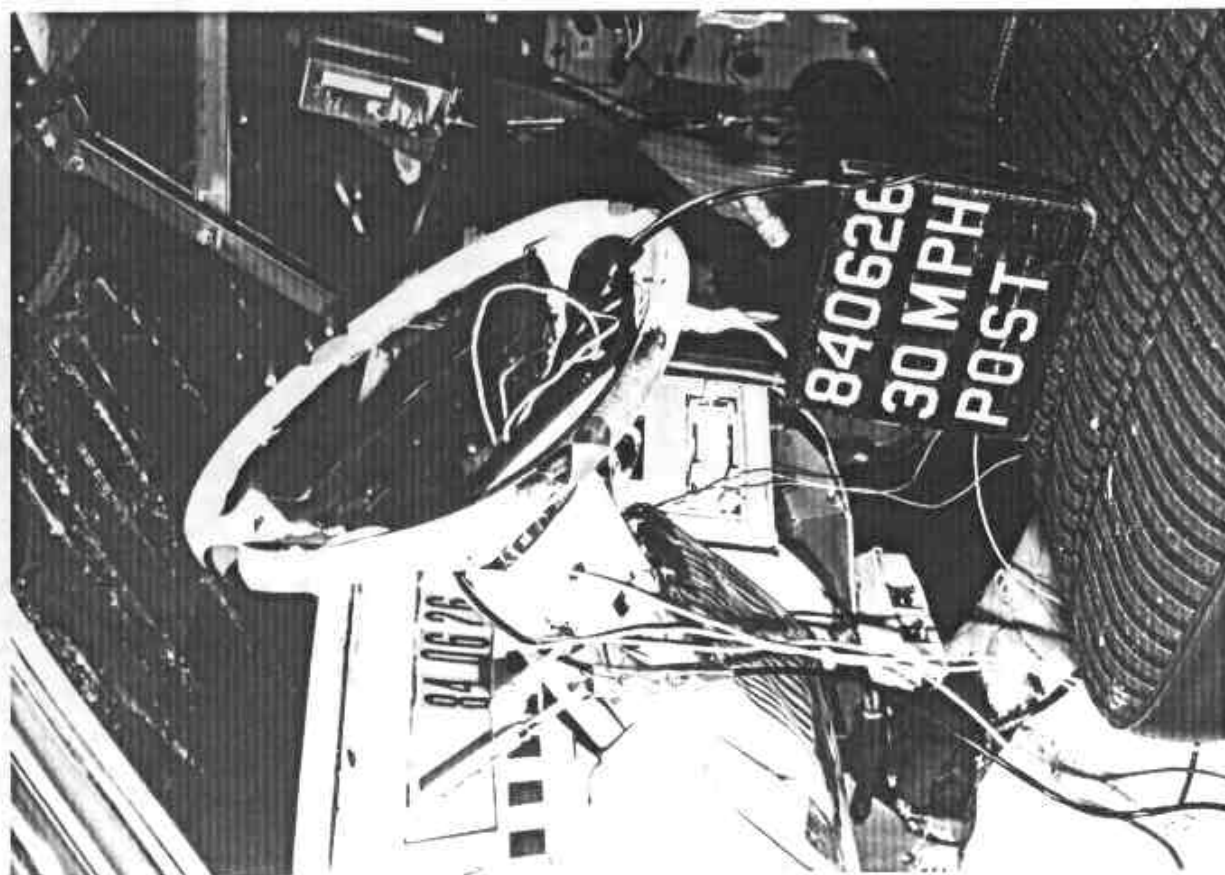


Figure B-20. POST-TEST STEERING COLUMN - VIEW 2

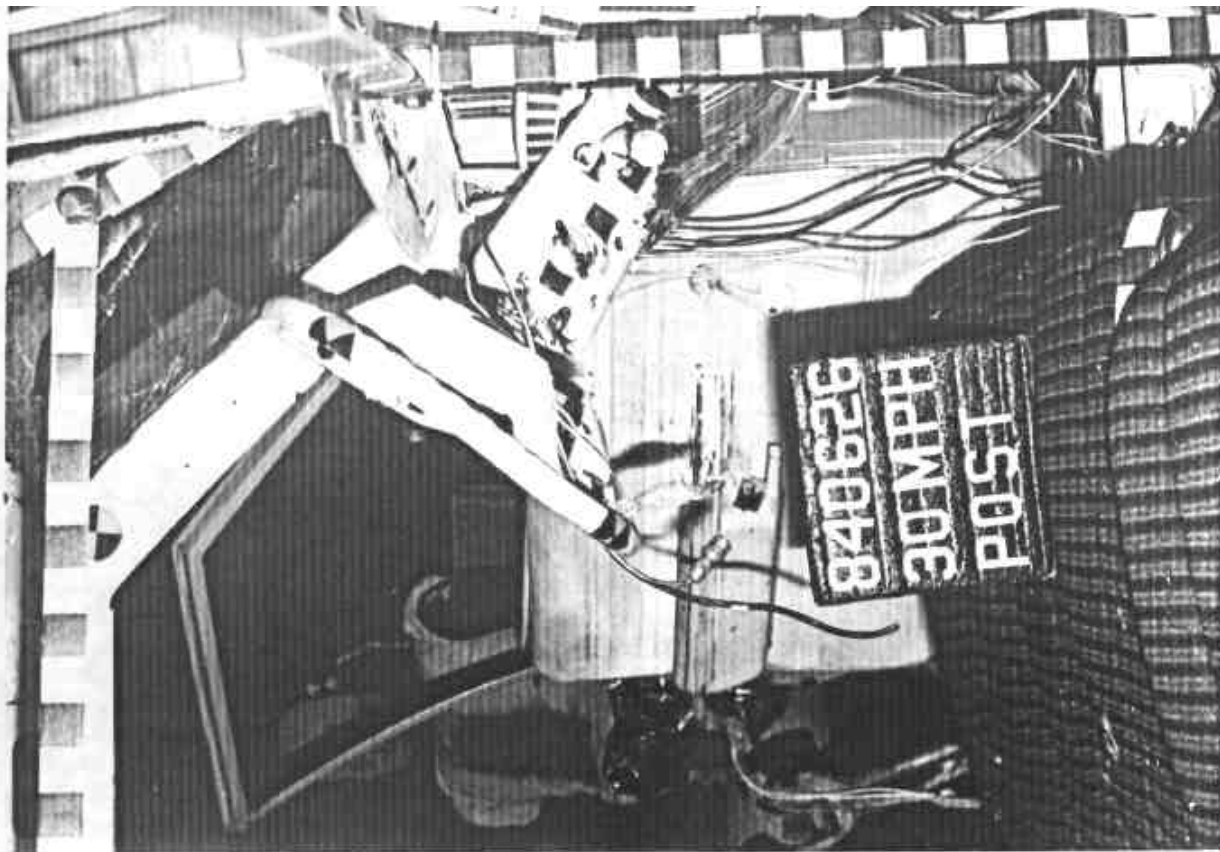


Figure B-21. POST-TEST STEERING COLUMN - VIEW 3

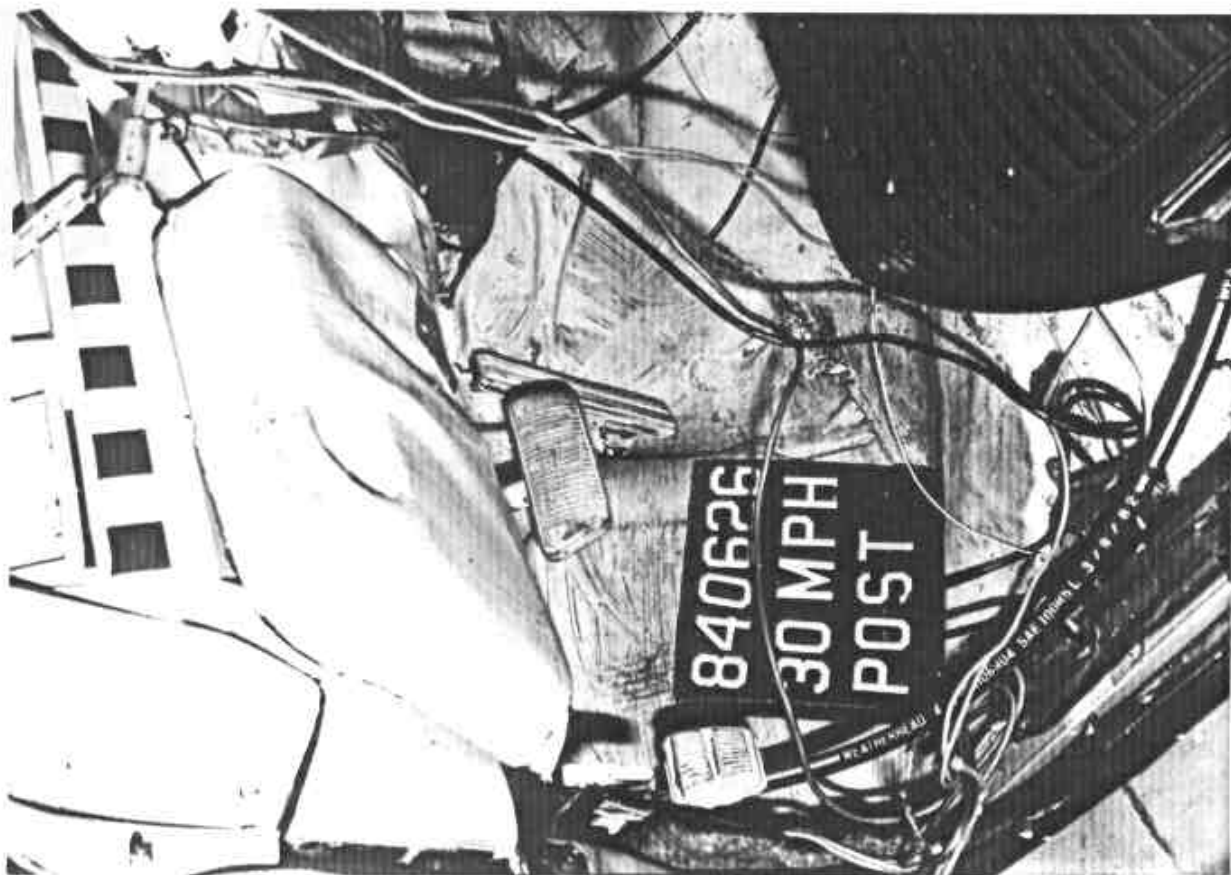


Figure B-22. POST-TEST KNEE BOLSTER - VIEW 1



Figure B-23. POST-TEST KNEE BOLSTER - VIEW 2



Figure B-24. WINDSHIELD DAMAGE
B-13

APPENDIX C

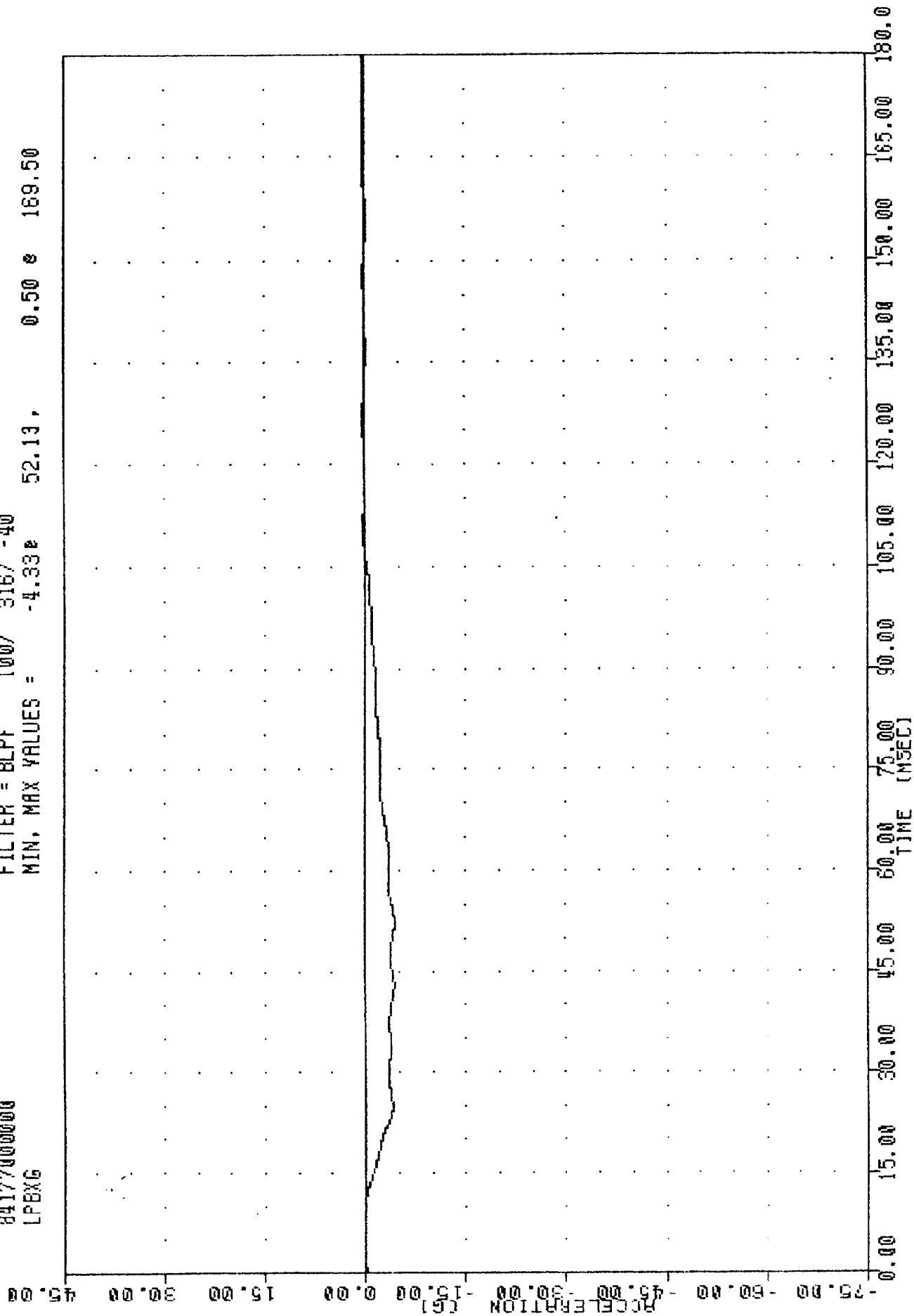
DATA PLOT PRESENTATION - TEST 840625

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

TRC
BREED AIR BAG PROGRAM
84177000000
LPBXG

PLOT DATE 17-HUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -4.33e 52.13, 0.50 e 189.50



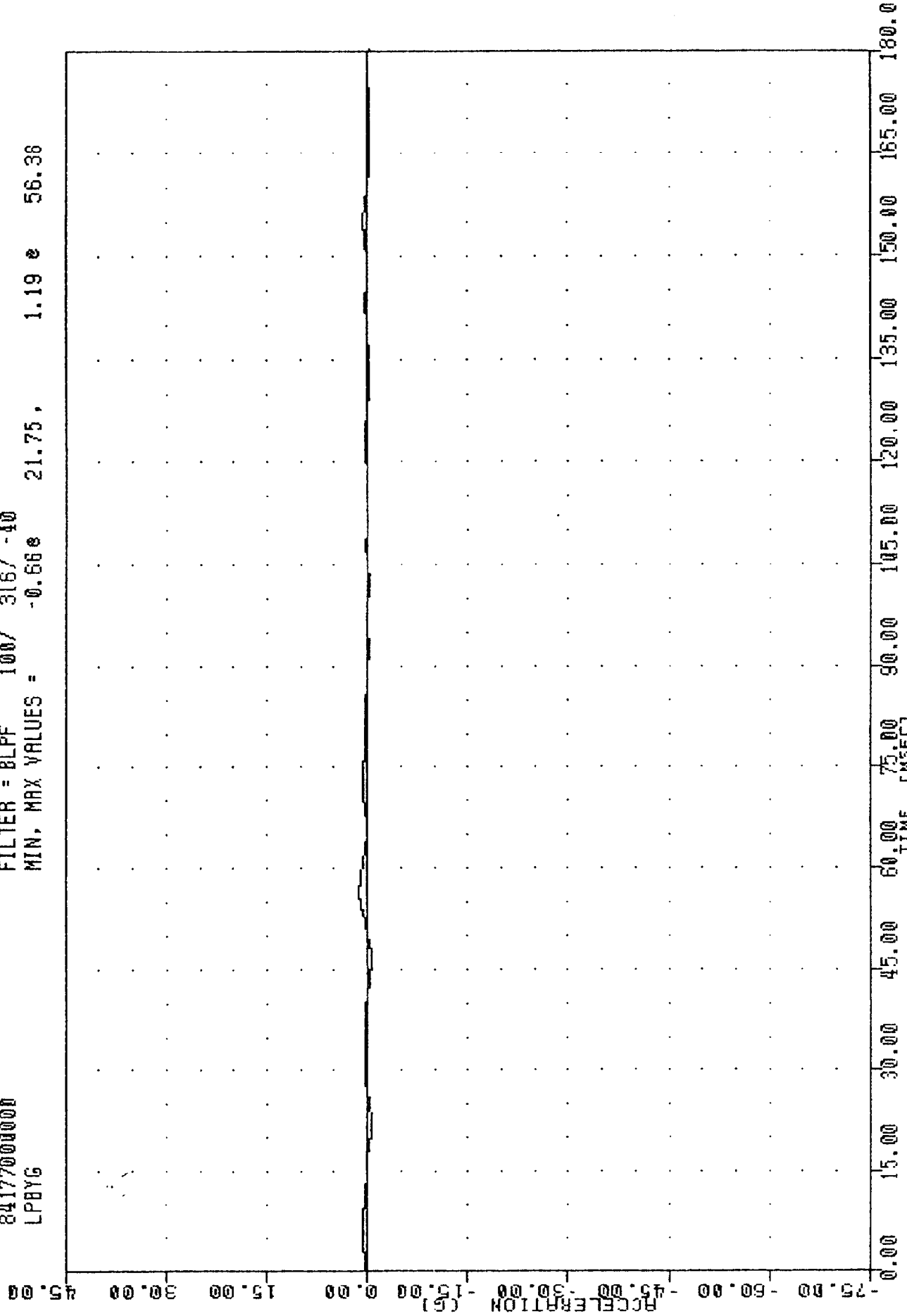
FORD LTD INTO FIXED BARRIER
LEFT B PILLAR ACCELERATION X AXIS

TRC 840625
BREED AIR BAG PROGRAM
84177000000
LPBYG

PLOT DATE 17-AUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -0.66e 21.75, 1.19 e 56.38



FORD LTD INTO FIXED BARRIER
LEFT B PILLAR ACCELERATION Y AXIS

TRC
BREED AIR BAG PROGRAM
84177000000
LPBZ6

PLUT DATE 17-AUG-84

14:16:17

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -1.00e 54.50, 0.63 e 27.25

45.00

30.00

15.00

0.00

-15.00

-30.00

-45.00

-60.00

-75.00

C-4

ACCELERATION (G)

0.00

15.00

30.00

45.00

60.00

75.00

90.00

105.00

120.00

135.00

150.00

165.00

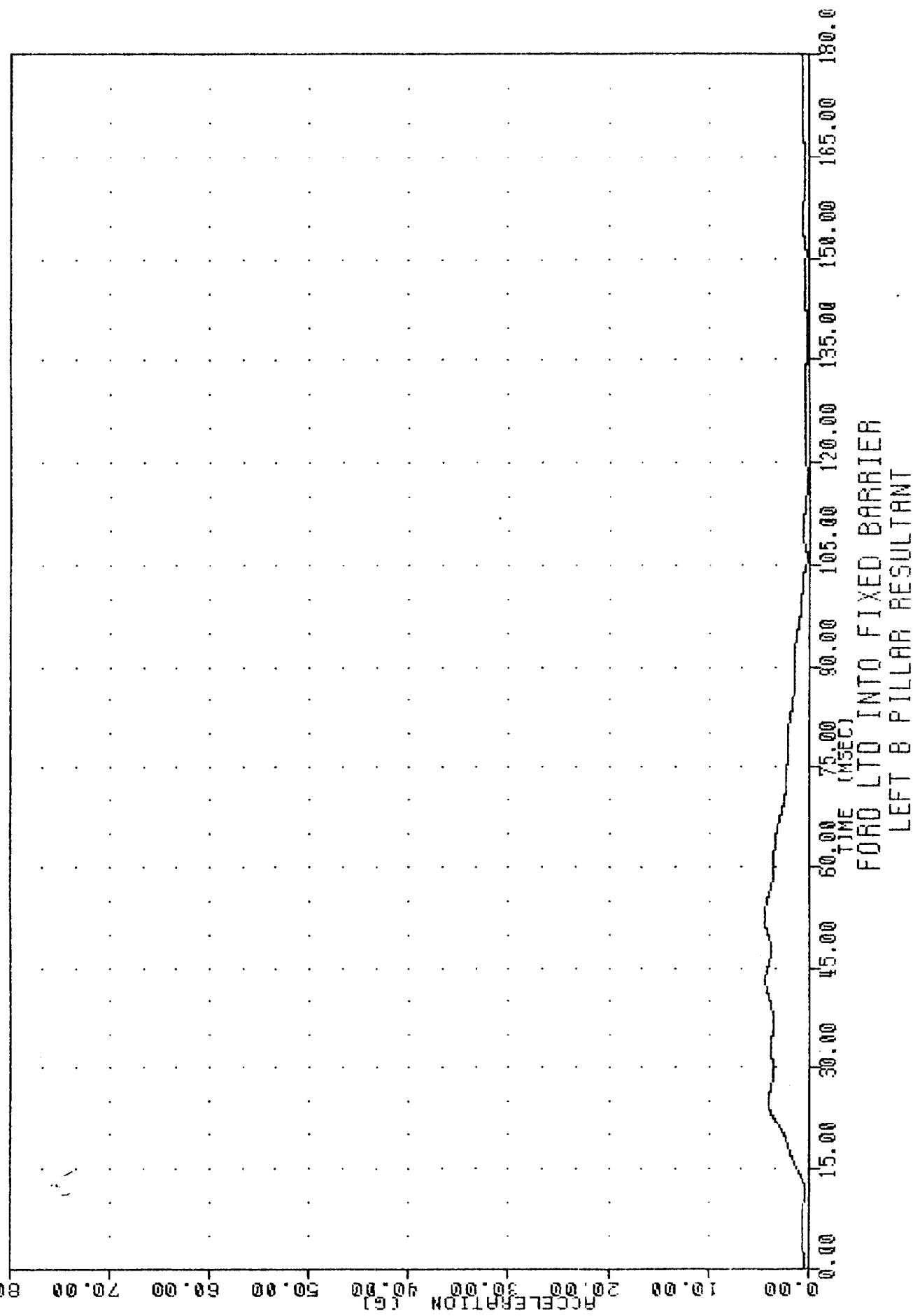
180.00

TIME (MSEC)

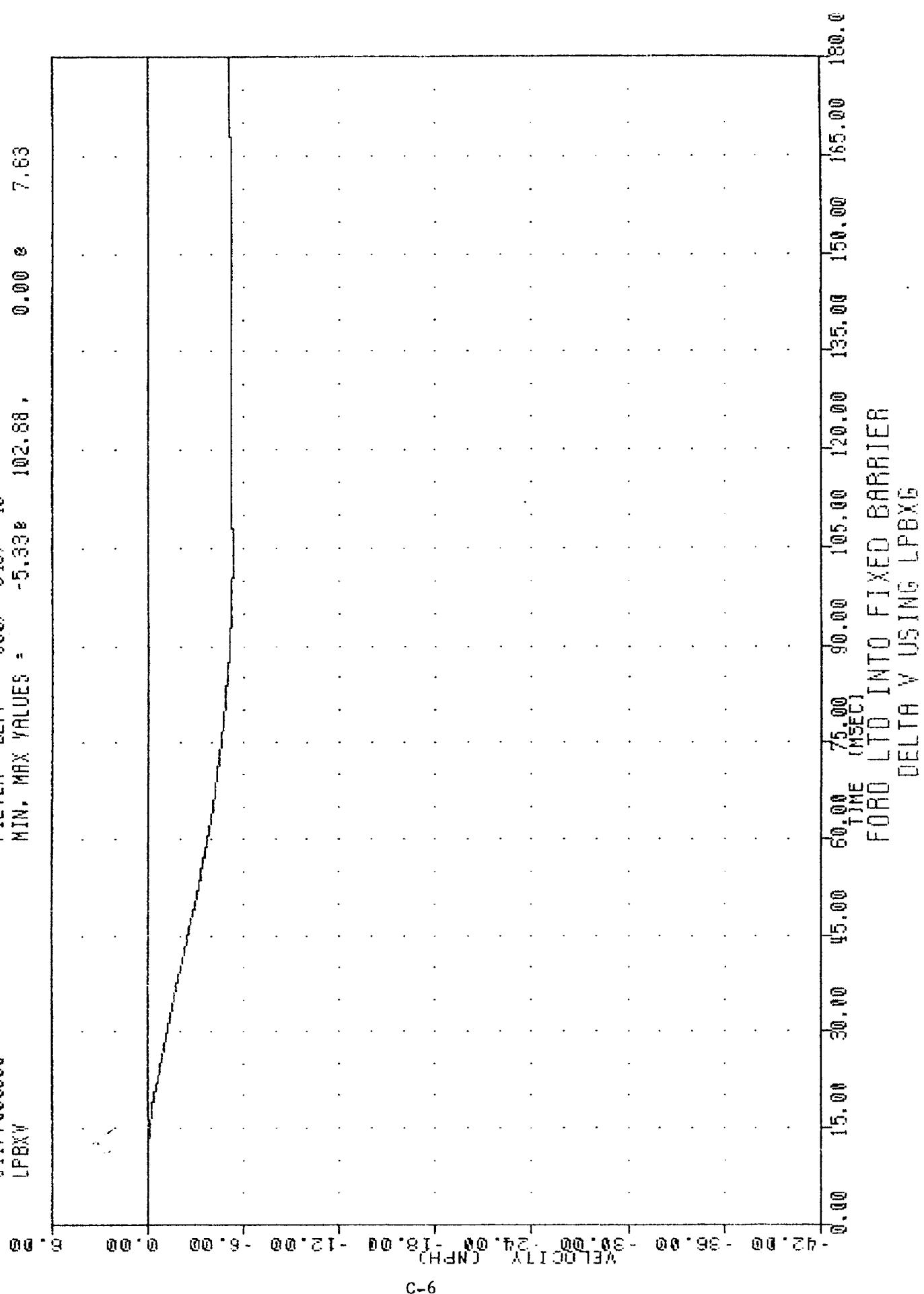
FORD LTD INTO FIXED BARRIER

LEFT B PILLAR ACCELERATION Z AXIS

TRC
 BREED AIR BAG PROGRAM
 84177000000
 LPBAG
 840625
 17-AUG-84
 14:16:17
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = 0.13 117.38, 4.45 52.38



INL 841062J 17 AUG 84 14:17:33
 BREED AIR BAG PROGRAM
 84177000000
 LPBXV
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -5.33e 102.88, 0.00 e 7.63



FORD LTD INTO FIXED BARRIER
 DELTA V USING LPBXG

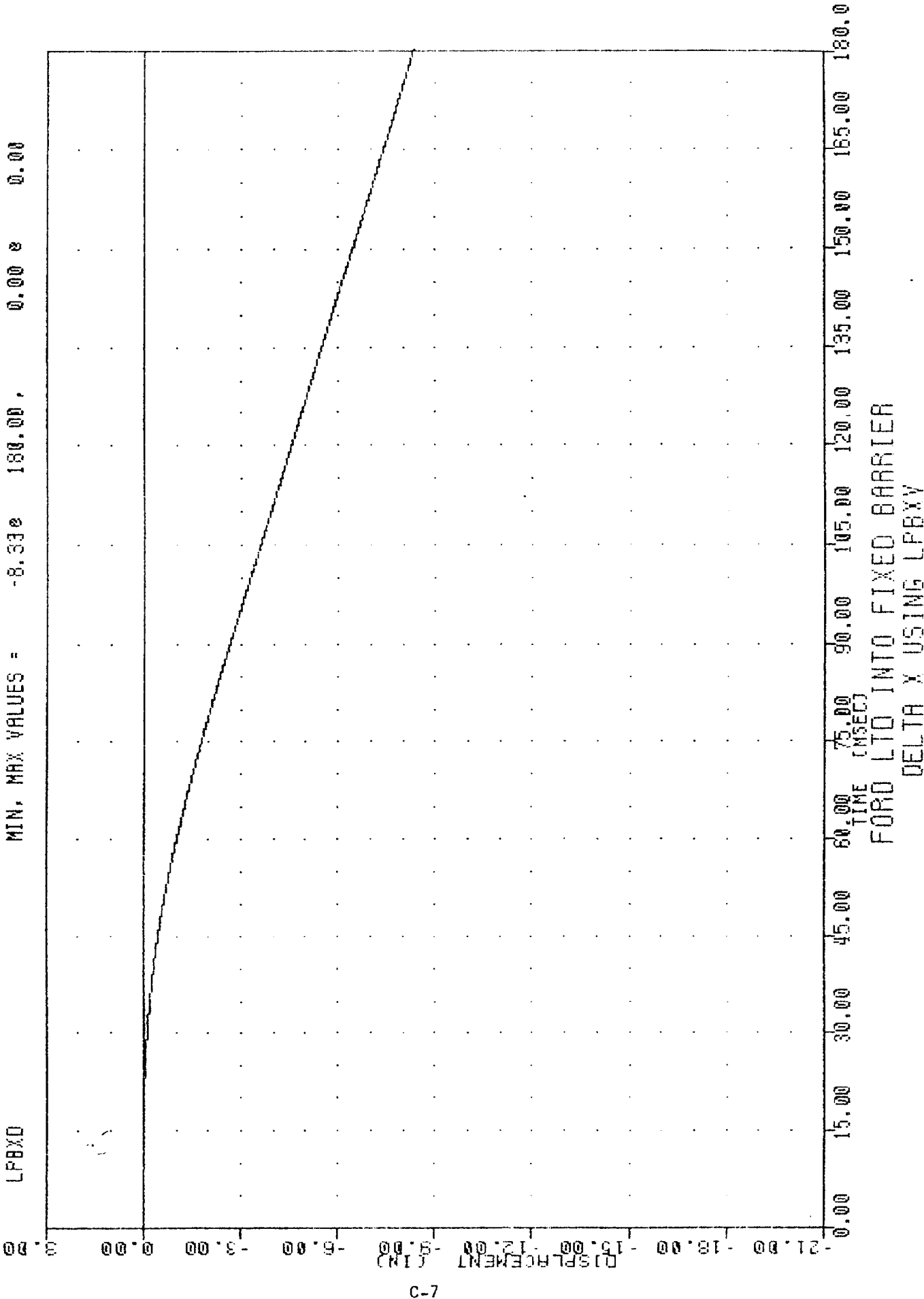
TRC
BREED AIR BAG PROGRAM
84177000000
LPBXD

PLOT DATE 17-HUG-84

14:17:35

FILTER = BLPF 300/ 949/ -40

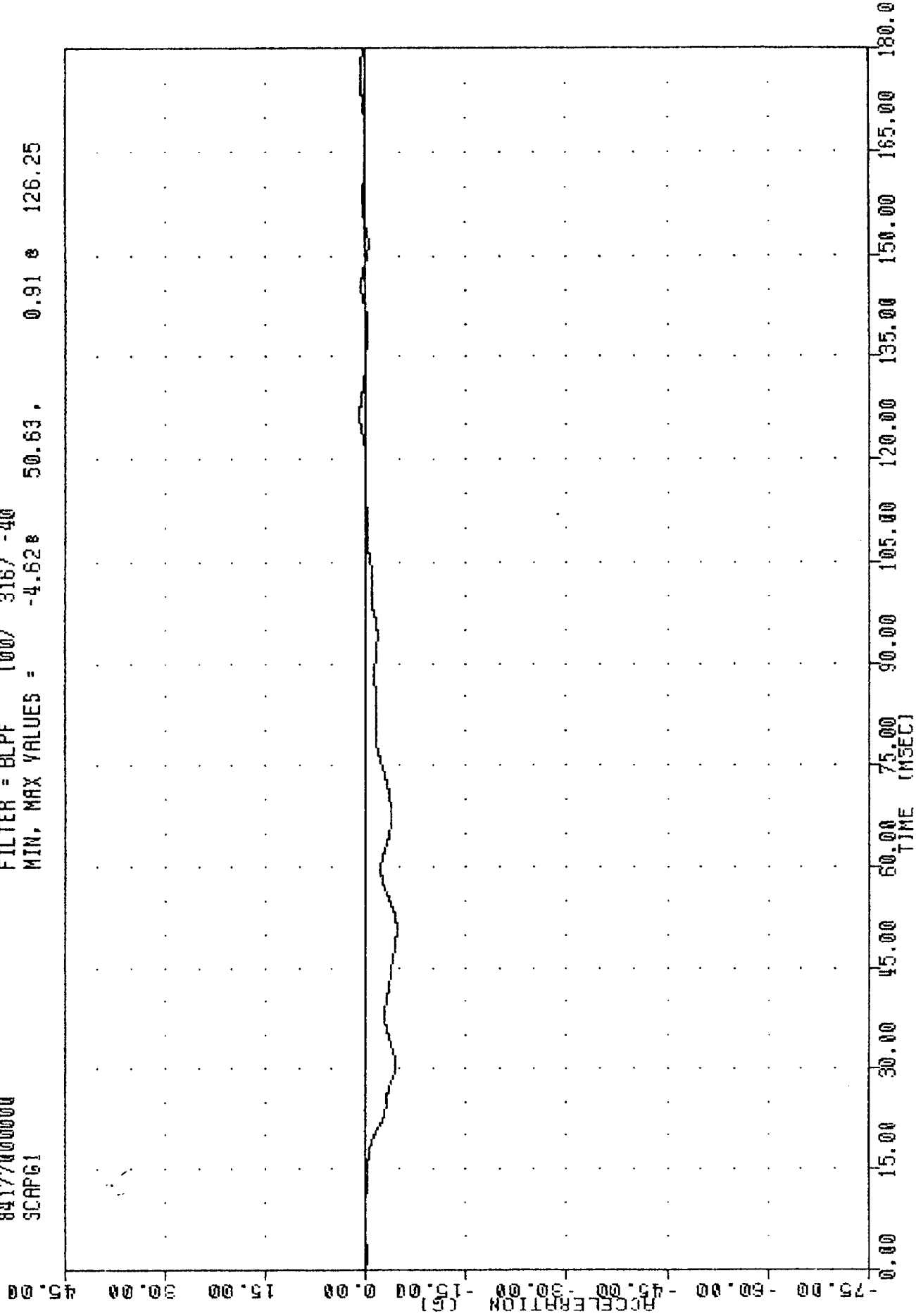
MIN, MAX VALUES = -8.33e 180.00, 0.00 e 0.00



TPL
 BREED AIR BAG PROGRAM
 84177000000
 SCAPG1

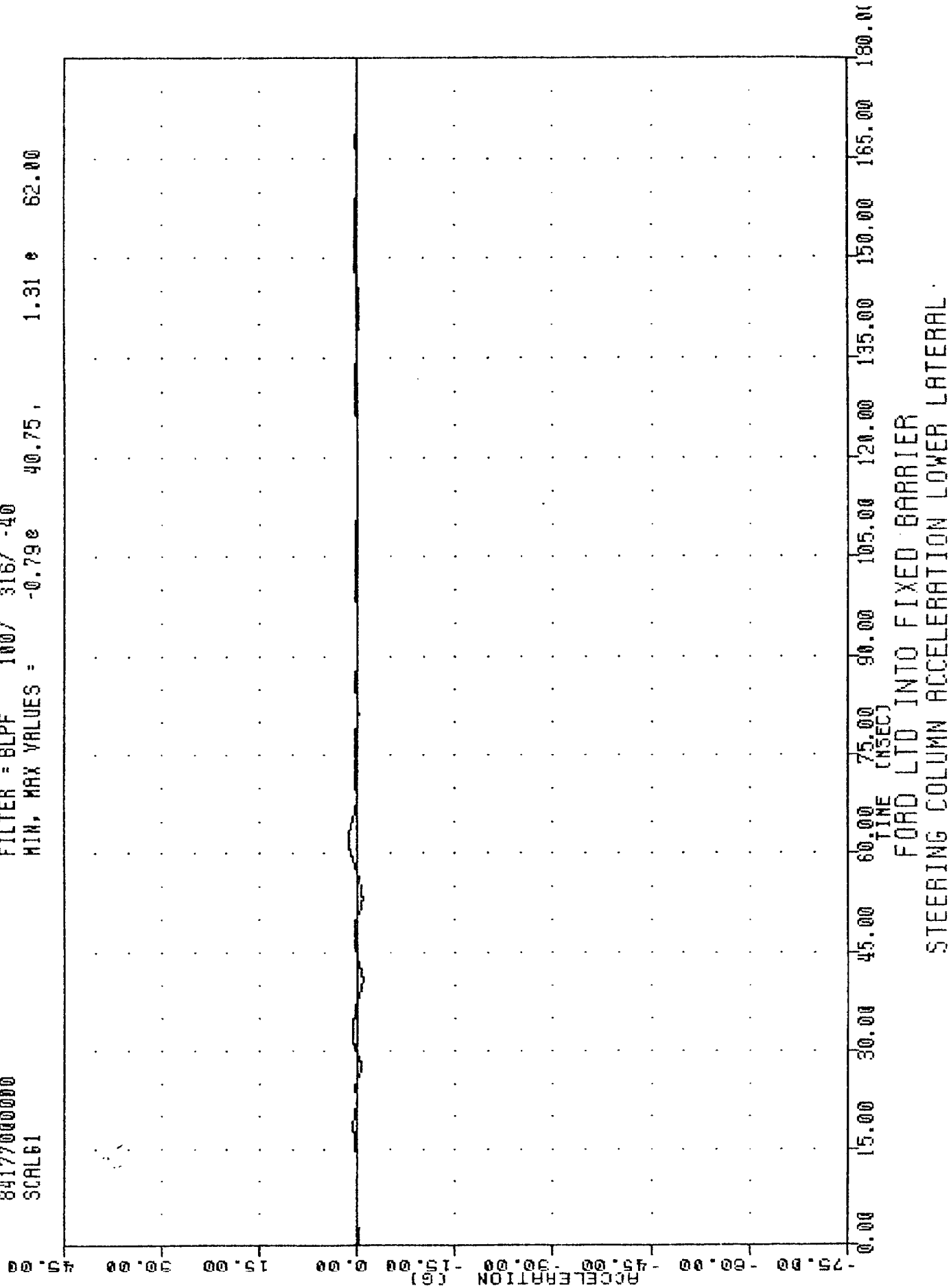
PLOT DATE 17-AUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -4.628 50.63, 0.91 8 126.25



FORD LTD INTO FIXED BARRIER
 STEERING COLUMN ACCELERATION LOWER POSTERIOR

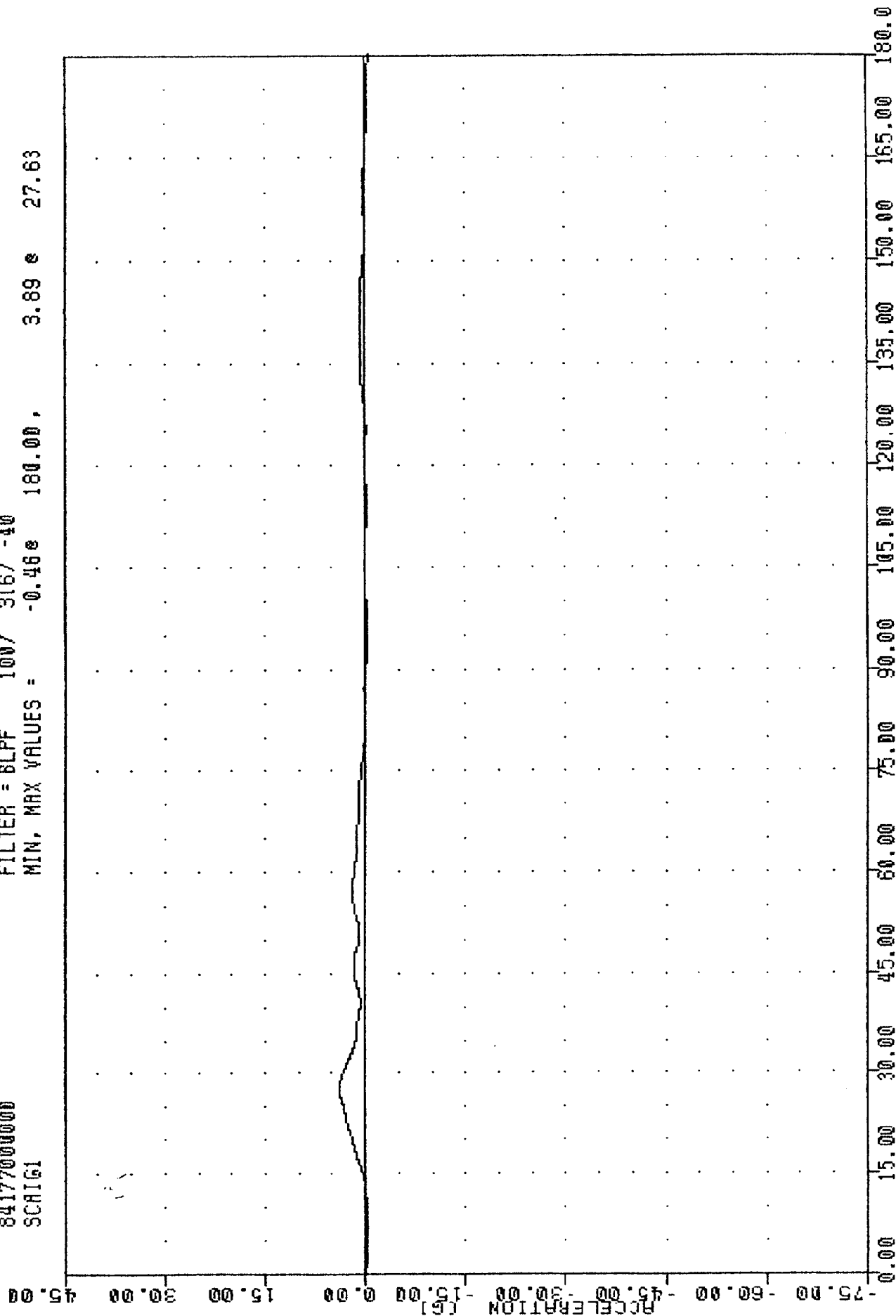
THC
 BREED AIR BAG PROGRAM
 84177000000
 SCALE1
 PLUT DATE 17-AUG-84 14:16:17
 FILTER = 6LPF 100/ 316/ -40
 MIN, MAX VALUES = -0.79e 40.75, 1.31 e 62.00



TRC
 BREED AIR BAG PROGRAM
 84177000000
 SCRI61

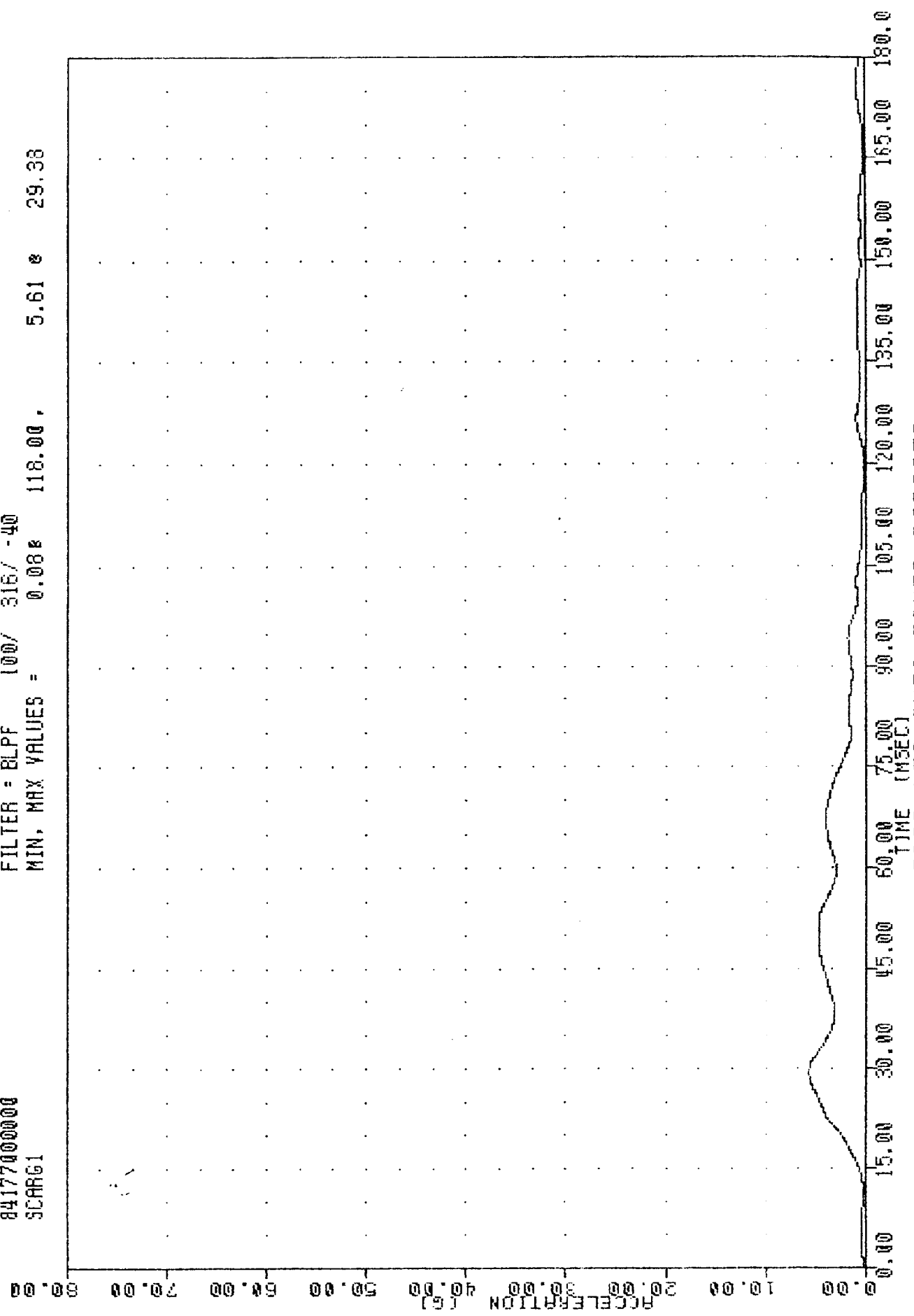
PLOT DATE 17-AUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -0.46e 180.00, 3.89 e 27.63



FORO LTD INTO FIXED BARRIER
 STEERING COLUMN ACCELERATION LOWER INFERIOR

TRC
 BREED AIR BAG PROGRAM
 84177000000
 SCARG1
 840625
 PLOT DATE 20-HUG-84 15:34:48
 FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = 0.08g 118.00, 5.61 g 29.38

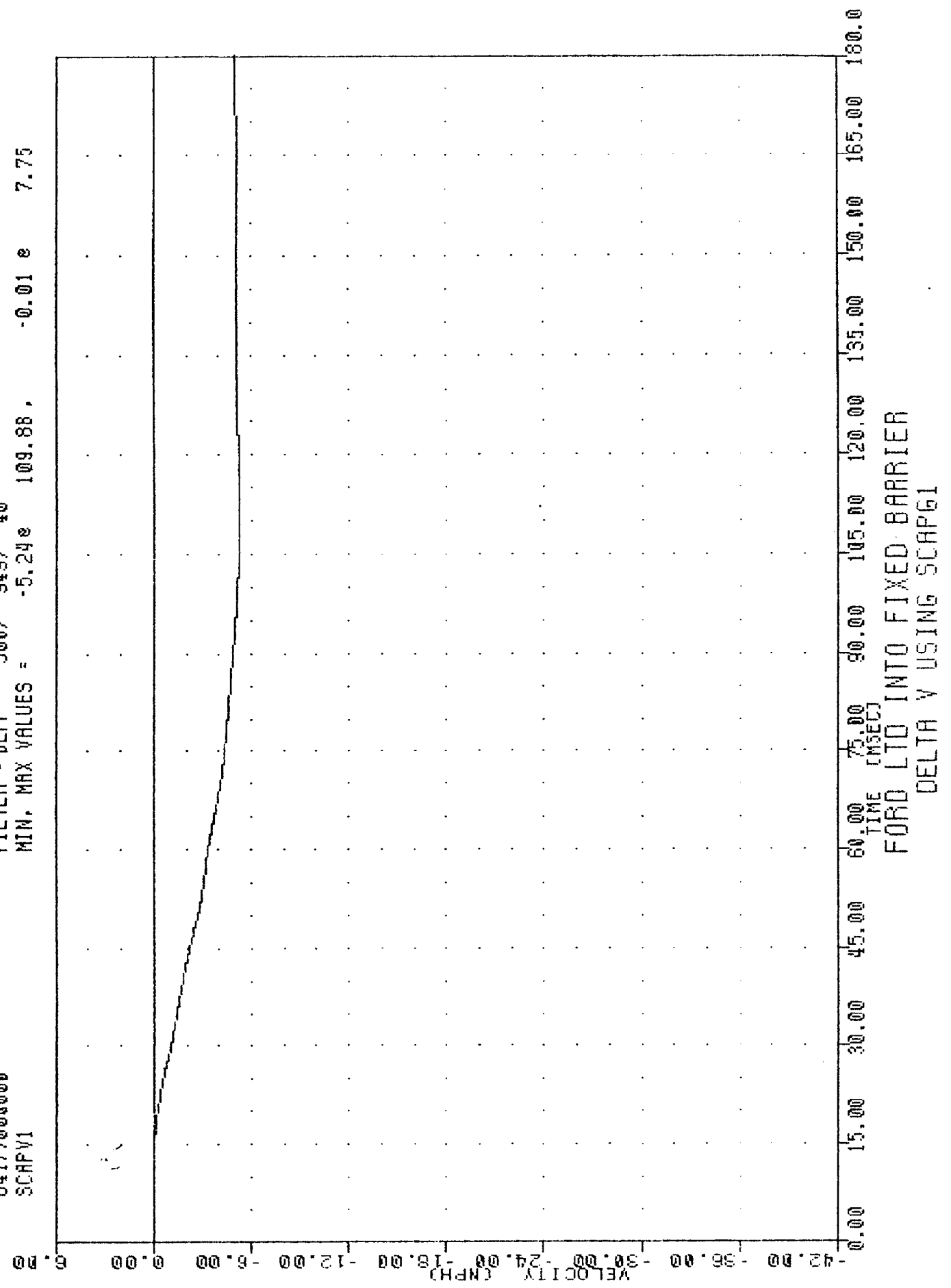


FORD LTD INTO FIXED BARRIER
 LOWER STEERING COLUMN RESULTANT

TRC
 BREED AIR BAG PROGRAM
 84177000000
 SCAPV1

PLOT DATE 17 AUG 84 14:17:33

FILTER = BLPF 300/ 945/ -40
 MIN. MAX VALUES = -5.24e 109.88, -0.01 e 7.75



FORD LTD INTO FIXED BARRIER
 DELTA V USING SCAPG1

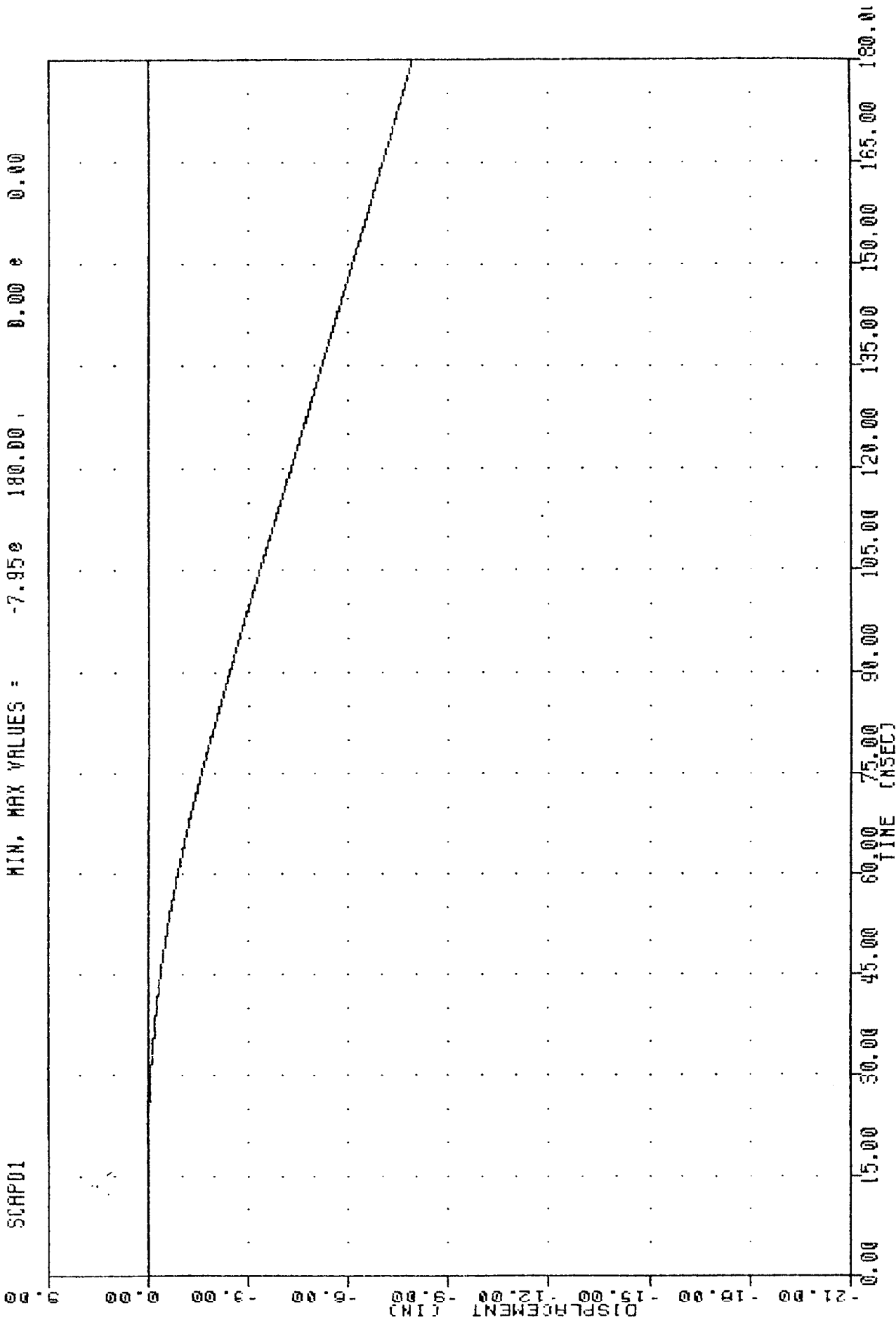
THC
BREED AIR BAG PROGRAM
84177000000
SCAP01

PLUT DATE 17-AUG-84

14:17:35

FILTER = 8LFF 300/ 949/ -40

MIN, MAX VALUES = -7.95e 180.00, 0.00 e 0.00

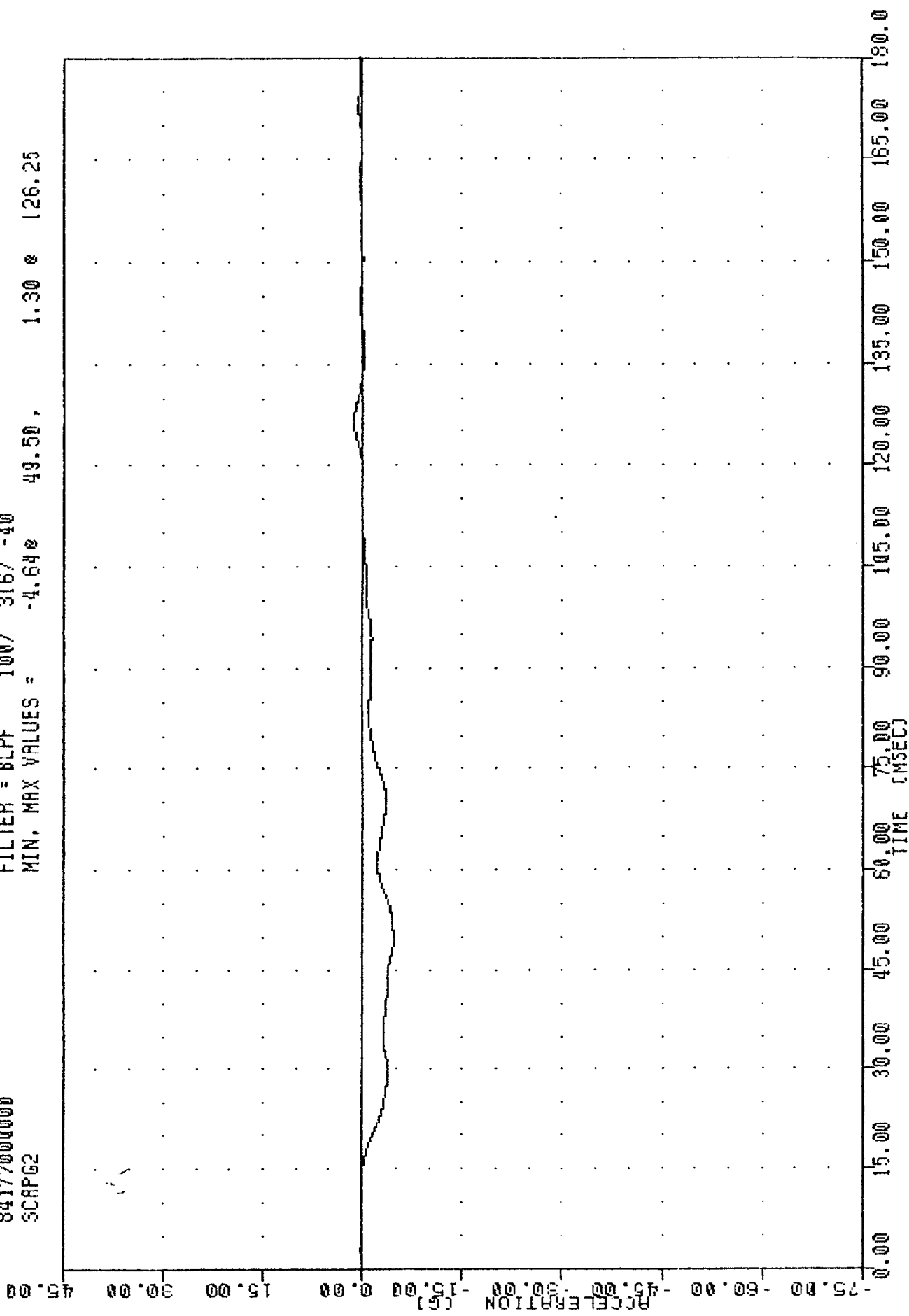


FORD LTD INTO FIXED BARRIER
DELTA X USING SCAPVI

TRC
84177000000
SCAP62
BREED AIR BAG PROGRAM

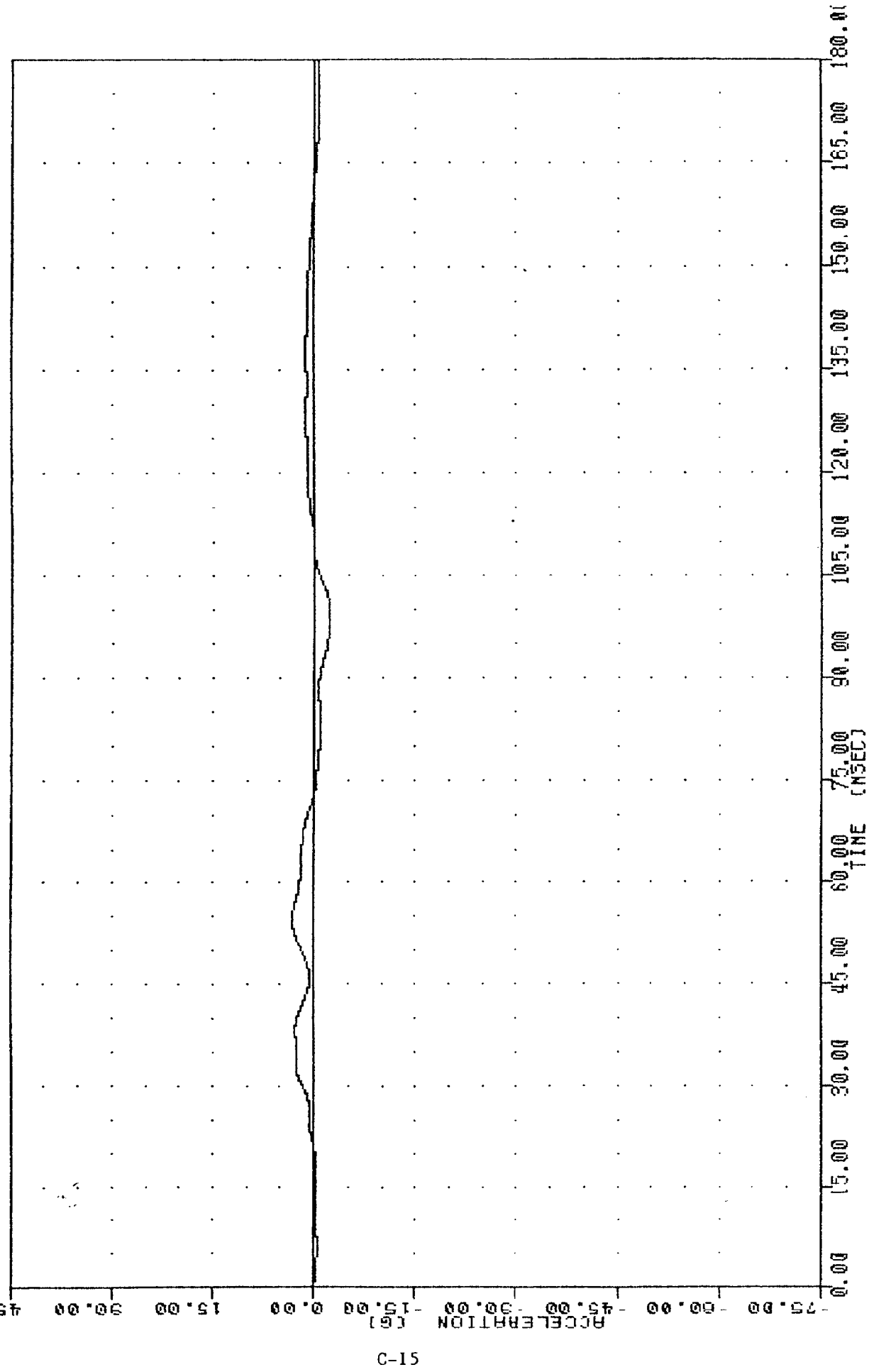
PLUT DATE 17 AUG 84 14:16:17

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -4.64e 49.50, 1.30 e 126.25



FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER POSTERIOR

THE 040623 17 NOV 84 14:16:17
 BREED AIR BAG PROGRAM
 84177000000
 SCRI62
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -2.28e 99.13 , 3.22 e 54.50

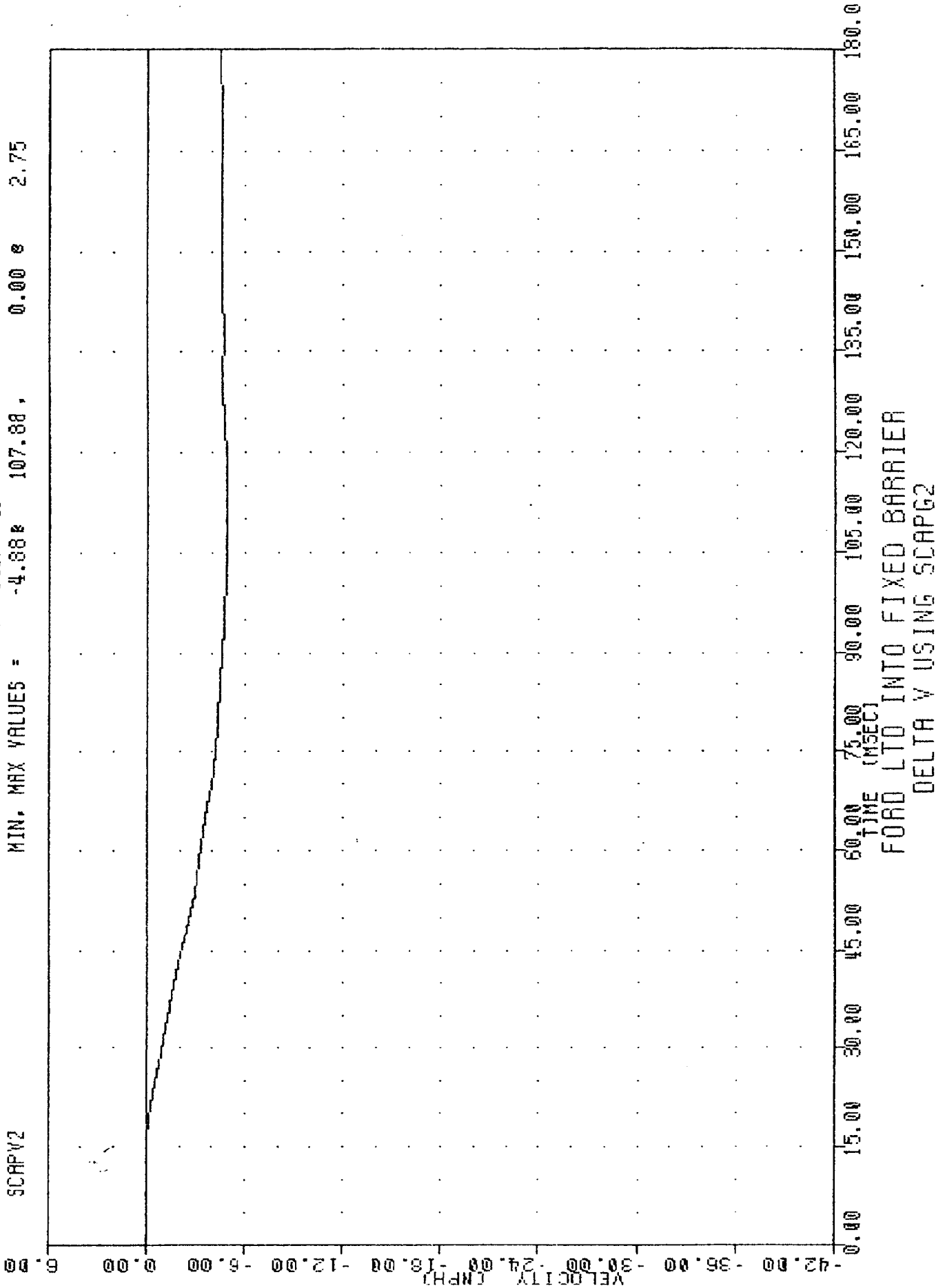


FORD LTD INTO FIXED BARRIER
 STEERING COLUMN ACCELERATION UPPER INFERIOR

IRC
 8410625
 BREED AIR BAG PROGRAM
 84177000000
 SCAPV2

PLOT DATE 17-AUG-84 14:17:35

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -4.88e 107.88, 0.00 e 2.75

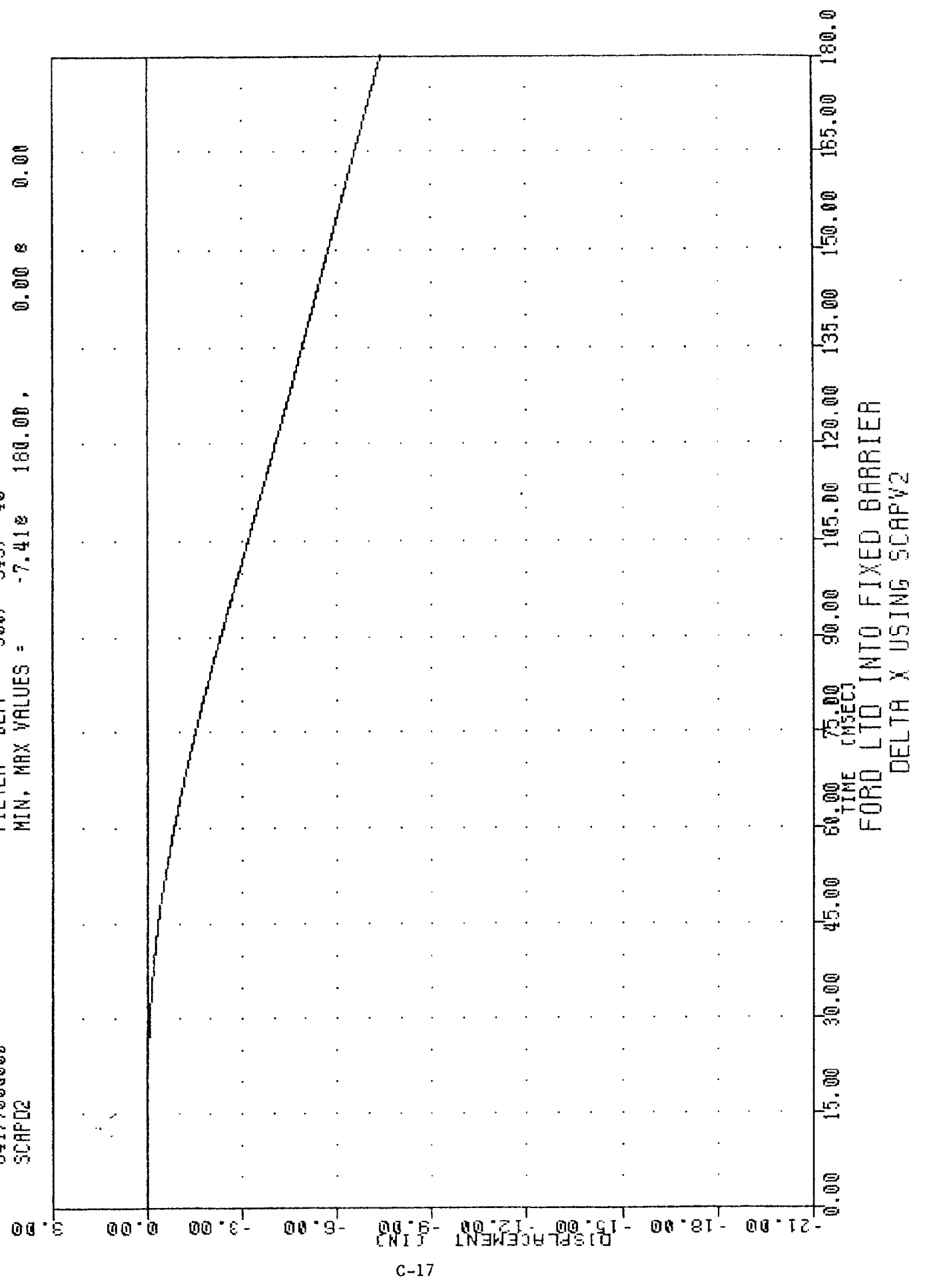


FORD LTD INTO FIXED BARRIER
 DELTA V USING SCAPG2

INC 840823
 BREED AIR BAG PROGRAM
 84177000000
 SCAPD2

PCOT DATE 17 AUG 84 14:17:33

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -7.41% 180.00 0.00 % 0.00

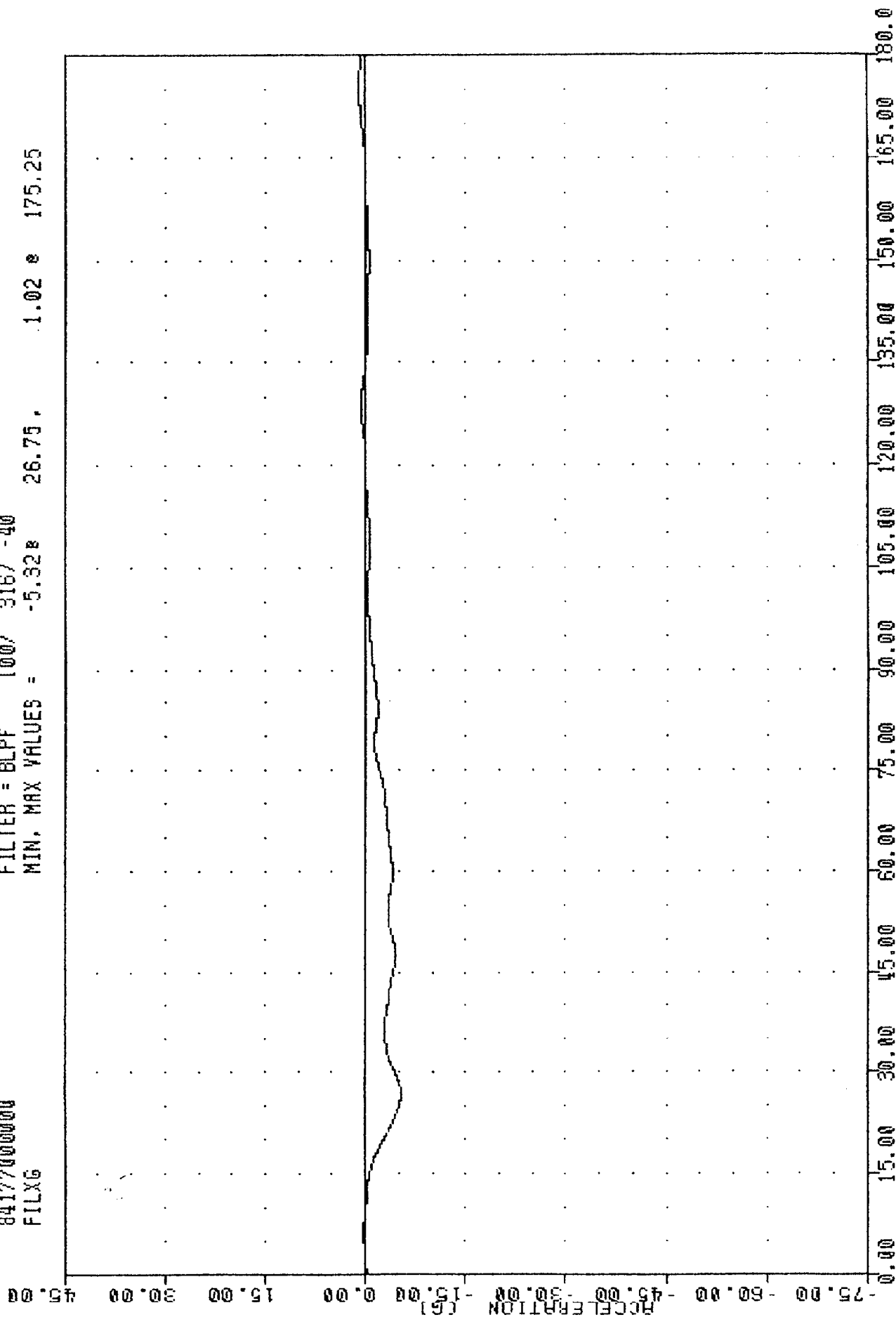


FORD LTD INTO FIXED BARRIER
 DELTA X USING SCAPV2

TRC
 BREED AIR BAG PROGRAM
 84177000000
 FILXG

PLOT DATE 17-AUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -5.32 26.75 1.02 175.25

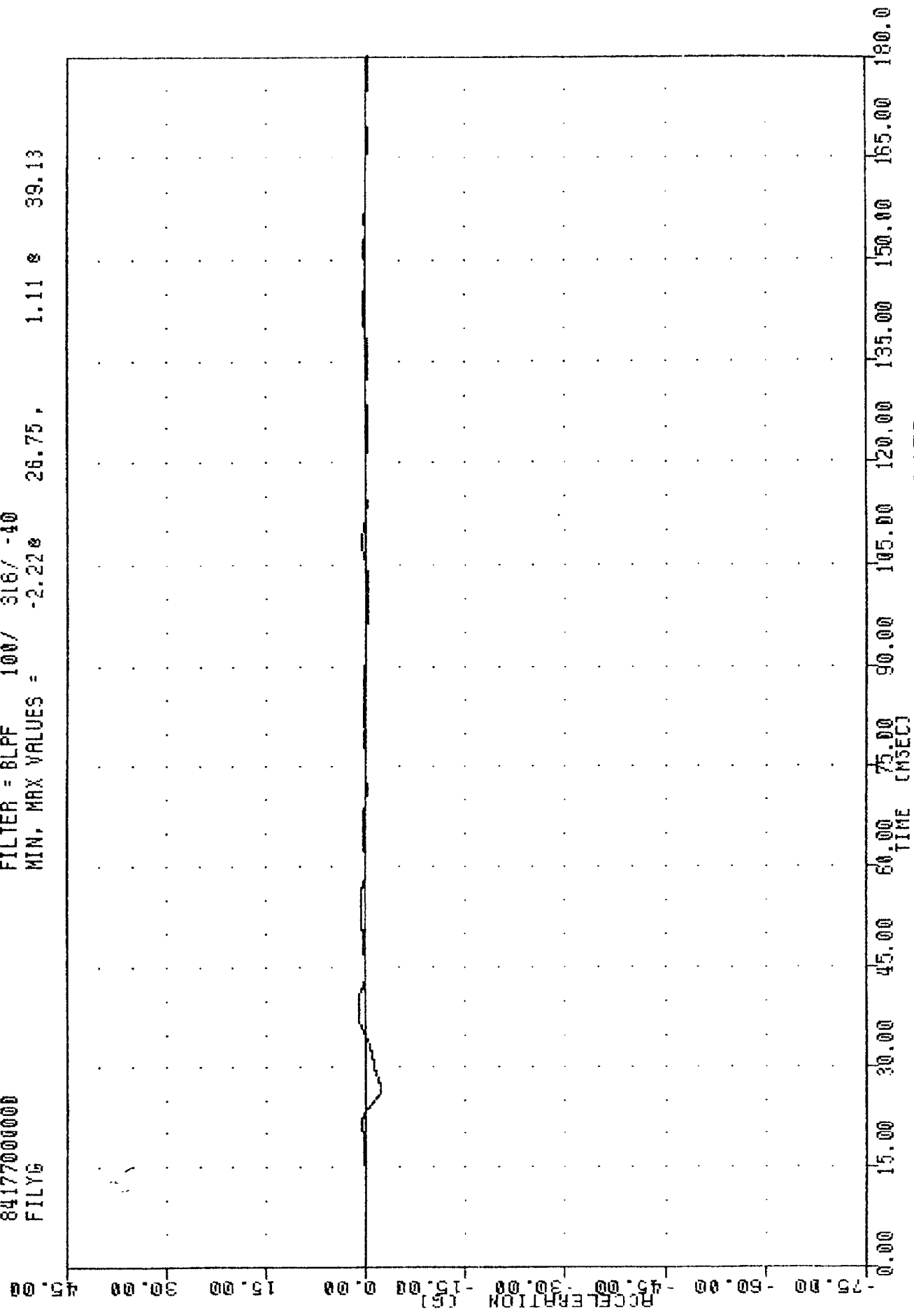


FORD LTD INTO FIXED BARRIER
 LEFT FENDER WELL INNER ACCELERATION X AXIS

INC 840623
 BREED AIR BAG PROGRAM
 84177000000
 FILYG

PLUT DATE 17-AUG-84 14:16:17

FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -2.228 26.75, 1.118 39.13

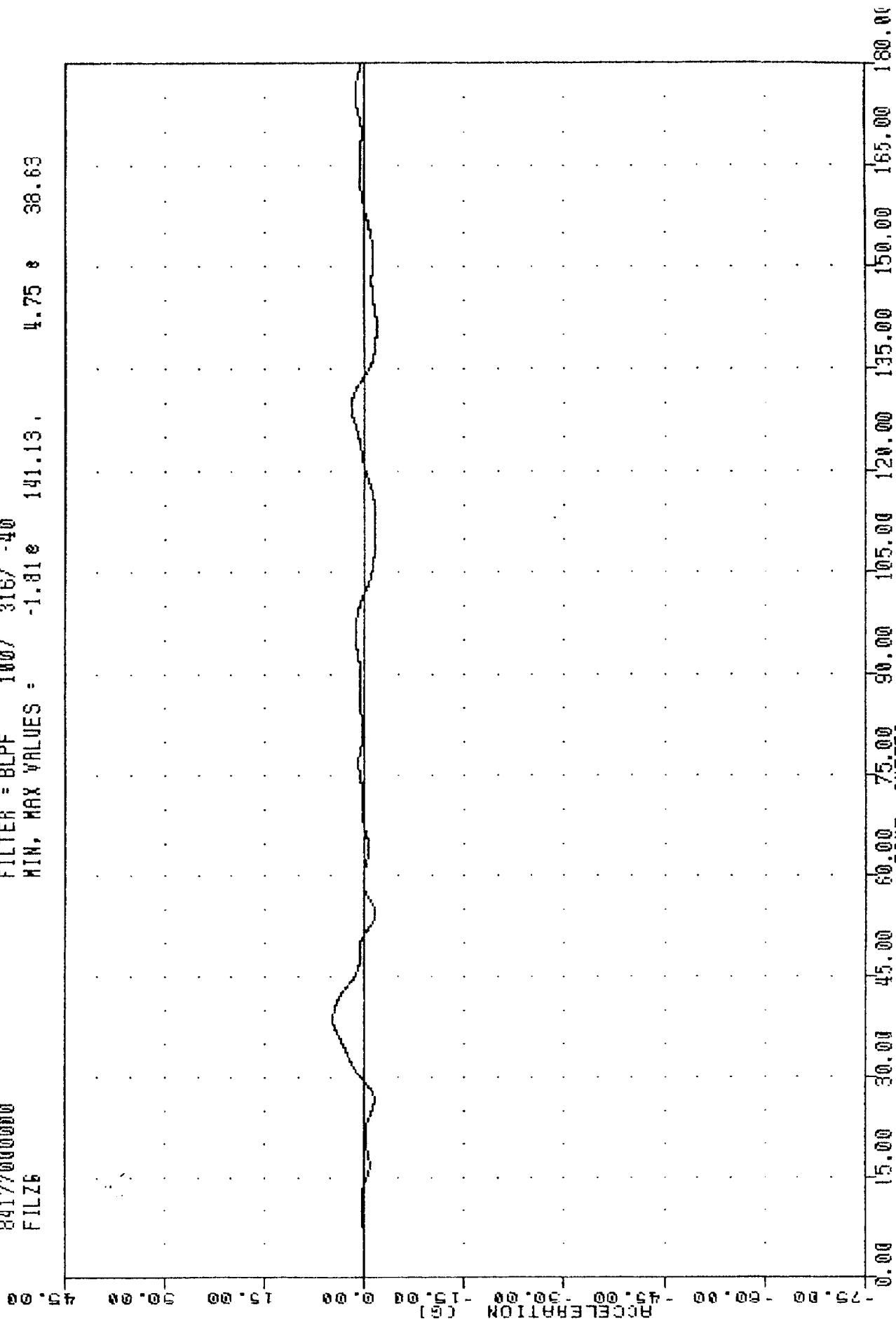


FORD LTD INTO FIXED BARRIER
 LEFT FENDER WELL INNER ACCELERATION Y AXIS

THC
BREED AIR BAG PROGRAM
84177000000
FILZ6

PLUT DATE 17-AUG-84 14:18:17

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -1.81e 141.13, 4.75 e 38.63

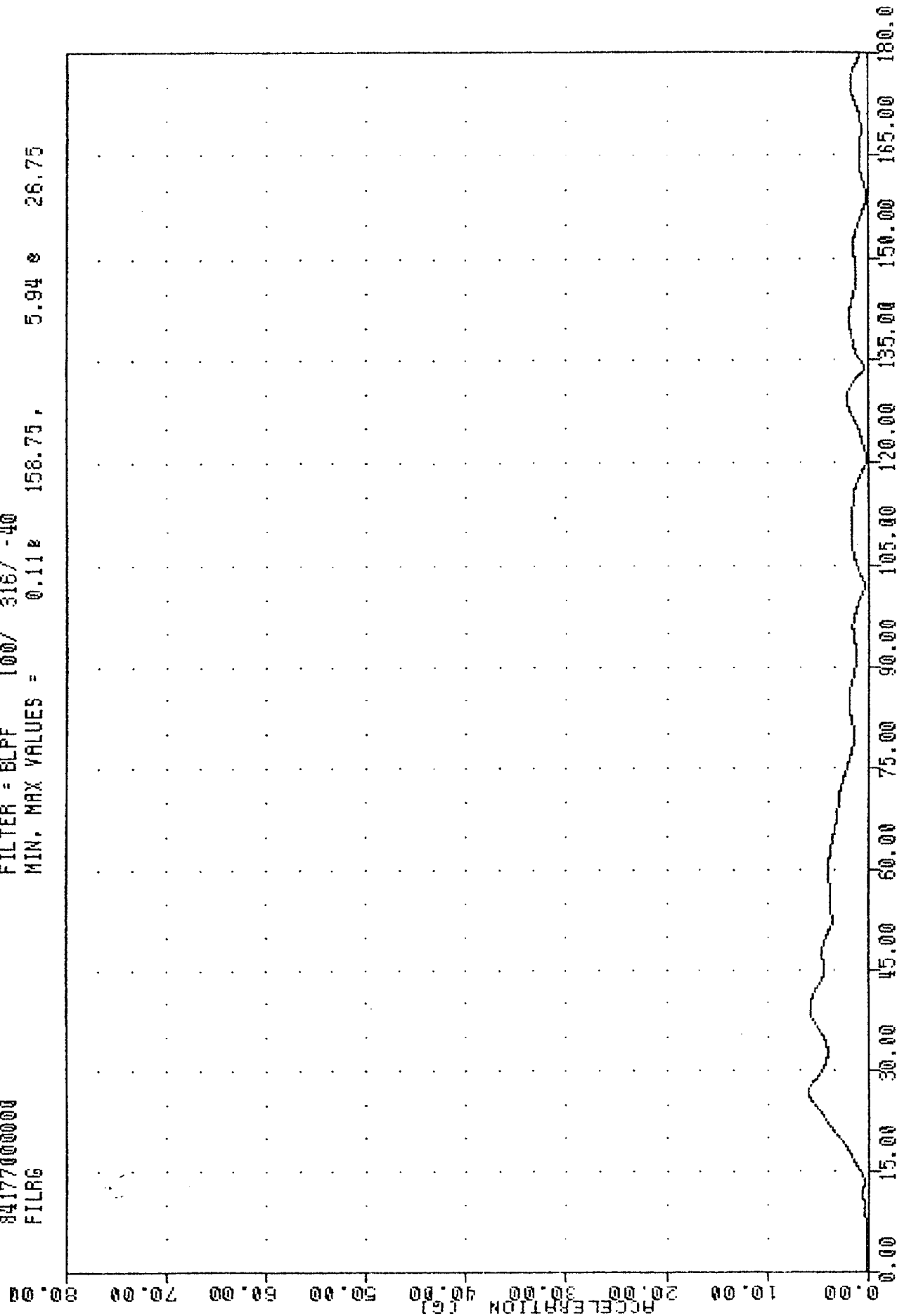


FORD LTD INTO FIXED BARRIER
LEFT FENDER WELL INNER ACCELERATION Z AXIS

TRC 8410625
BREED AIR BAG PROGRAM
84177000000
FILRG

PLOT DATE 17-AUG-84 14:16:17

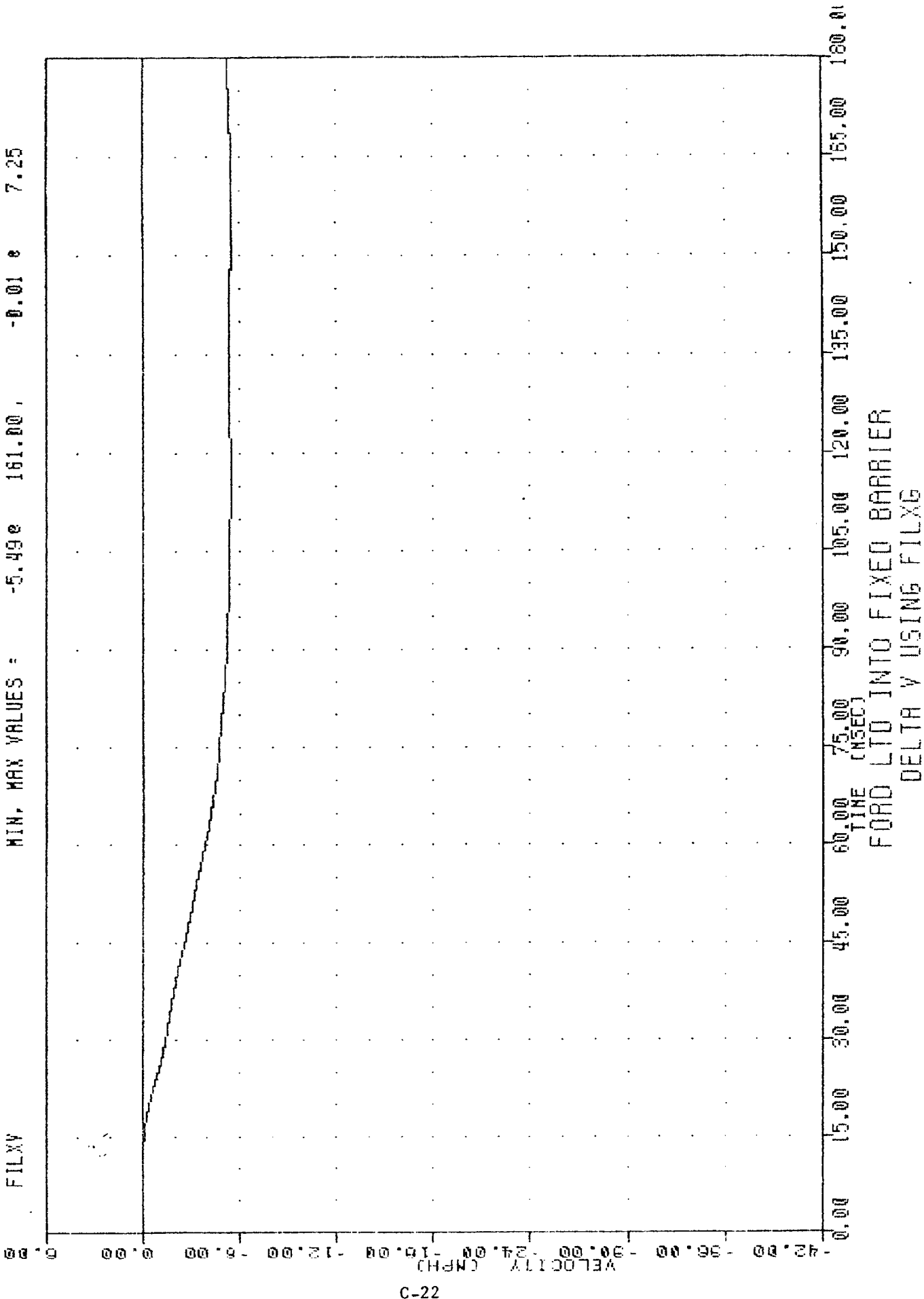
FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = 0.11% 158.75, 5.94% 26.75



TBC
 BREED AIR BAG PROGRAM
 84177000000
 FILXY

PLUT DATE 17-AUG-84 14:17:35

FILTER = 8LPP 300/ 949/ -40
 MIN, MAX VALUES = -5.49e 161.00, -0.01 e 7.25



TRC

840625

17-AUG-84

14:17:35

BREED AIR BAG PROGRAM

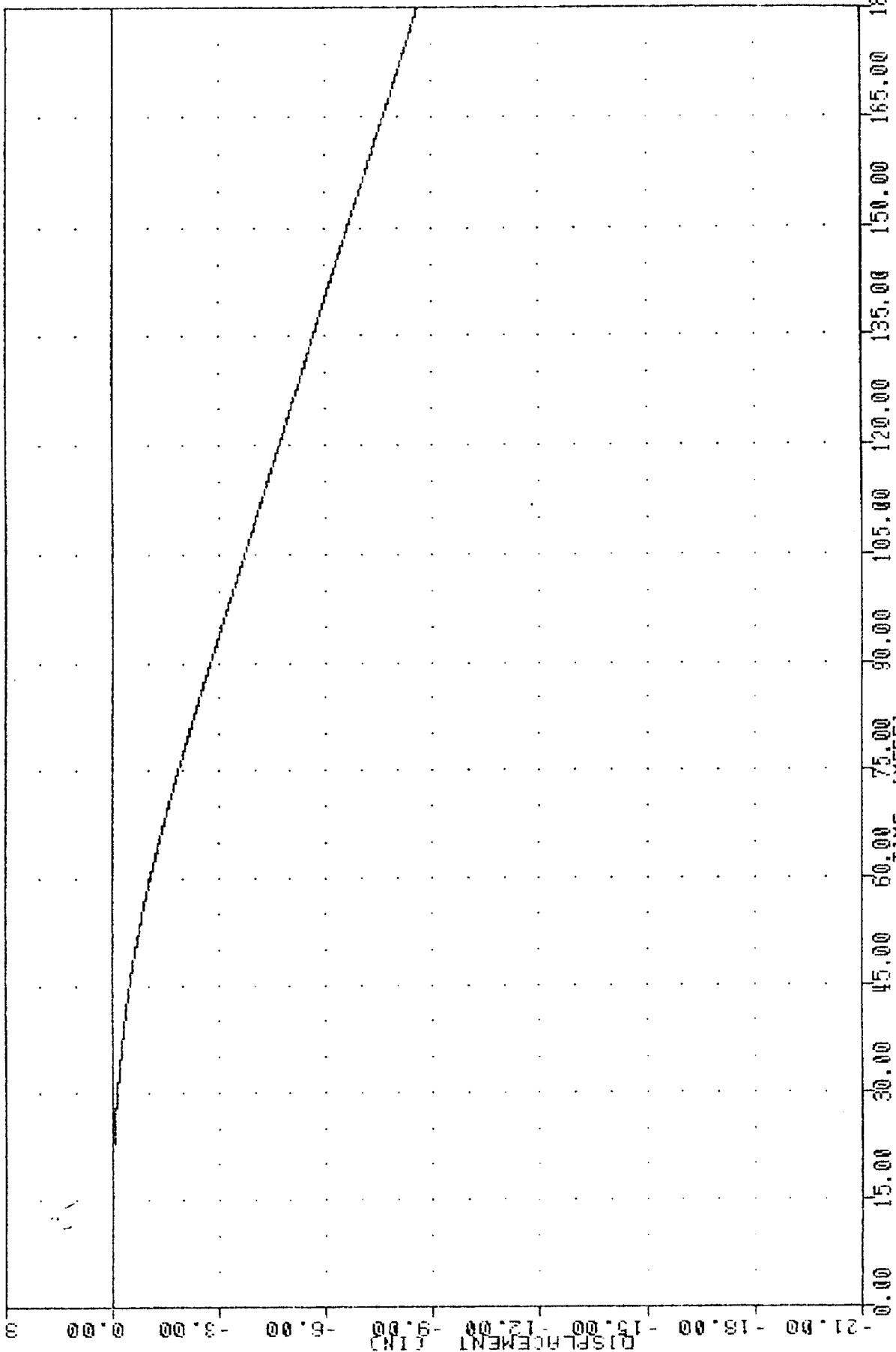
84177000000

FILXD

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -8.59E 180.00, 0.00E 0.00

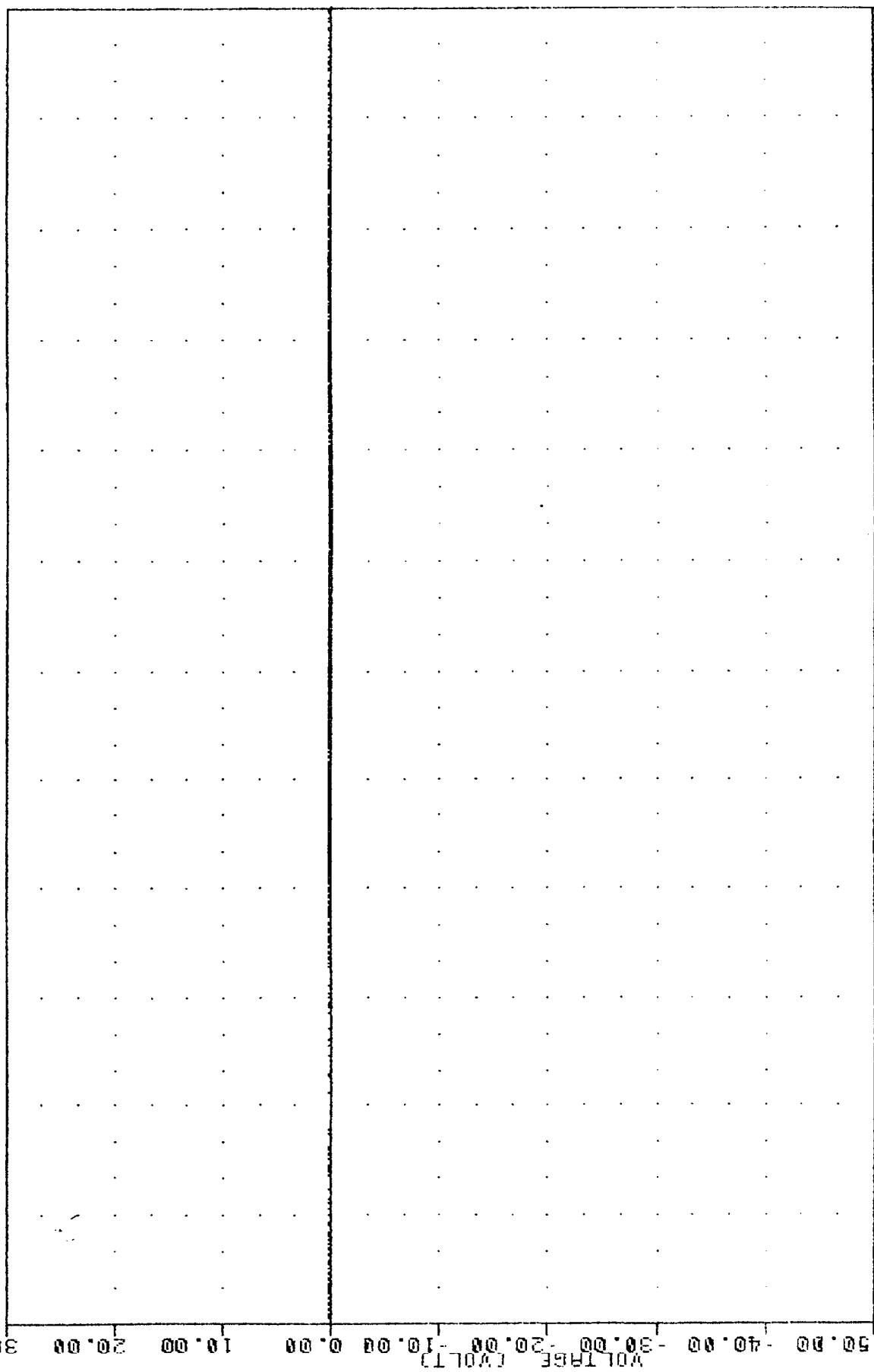
DISPLACEMENT (IN)



FORD LTD INTO FIXED BARRIER

DELTA X USING FILXX

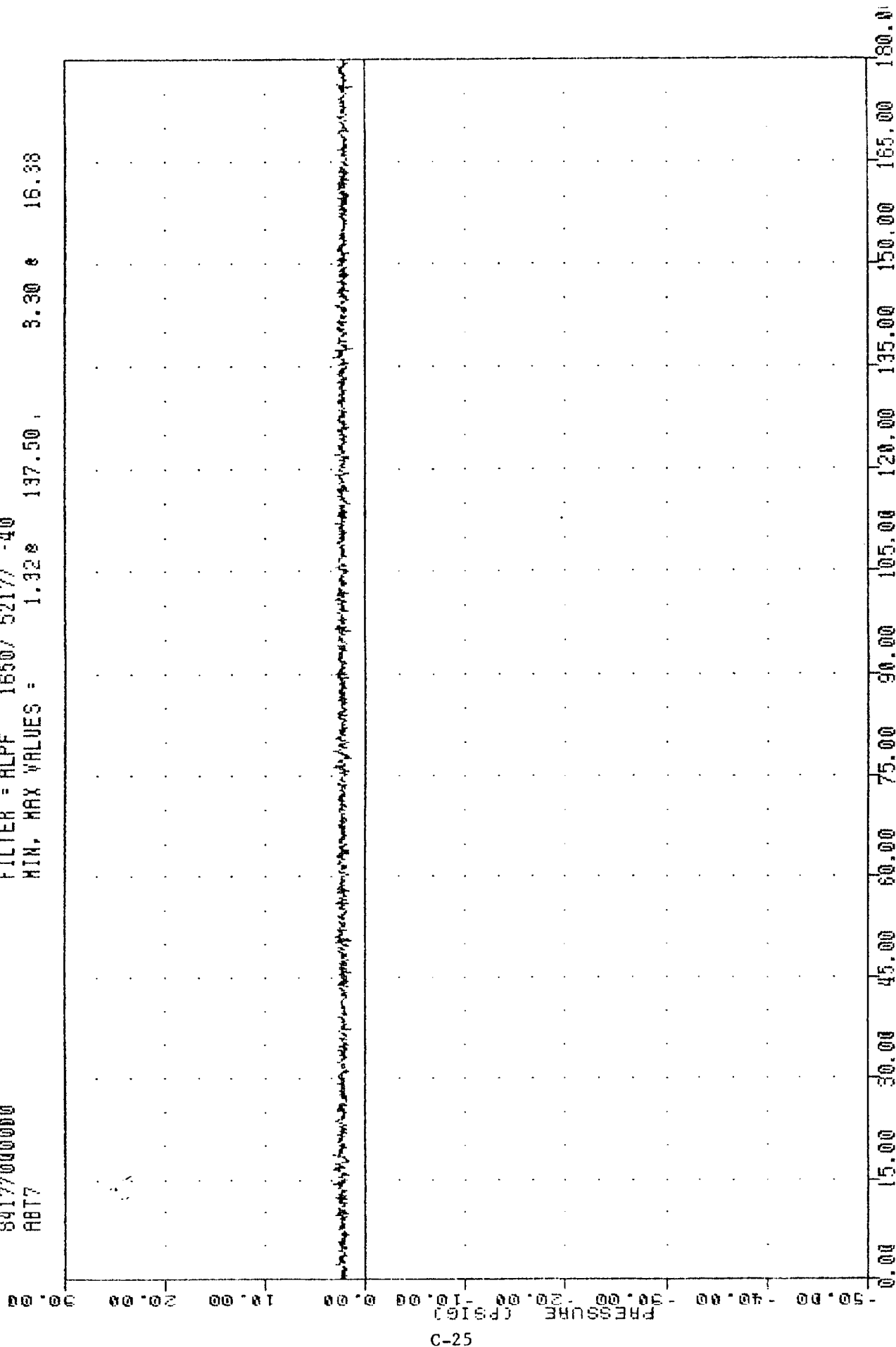
TAC 840623 PLOT DATE 17 AUG 84 14:16:17
 BREED AIR BAG PROGRAM
 84177000000
 RST1
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = 0.078 174.50, 0.198 92.25



0.00 15.00 30.00 45.00 60.00 75.00 90.00 105.00 120.00 135.00 150.00 165.00 180.00
 TIME (MSEC)
 FORD LTD INTO FIXED BARRIER
 ROMEO LEFT FRONT SENSOR

THE [REDACTED] 040623 [REDACTED] 17 AUG 84 14:16:17 [REDACTED]
 BREED AIR BAG PROGRAM
 S4177000000
 A8T7

FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = 1.328 137.50, 3.30 16.33



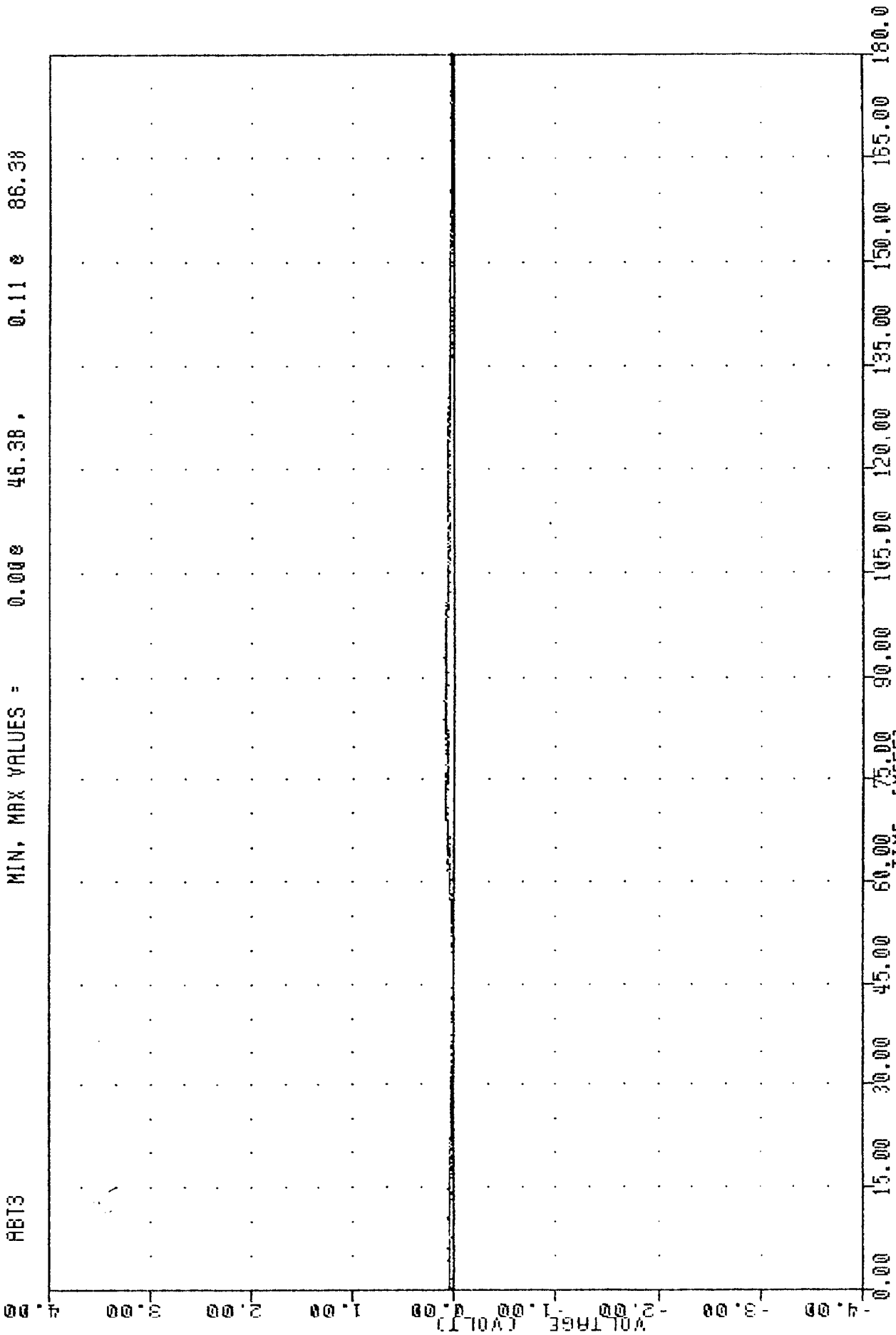
FORD LTD INTO FIXED BARRIER
 PRESSURE TRANSDUCER

TRC
BREED AIR BAG PROGRAM
8417000000
RBT3

PLOT DATE 20-HUG-84 15:34:48

FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = 0.00e 46.38. 0.11e 86.38



FORD LTD INTO FIXED BARRIER
ACOUSTICAL SENSOR

APPENDIX D

DATA PLOT PRESENTATION - TEST 840626

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

PLOT DATE 20-AUG-84 15:38:22

TRC 840626

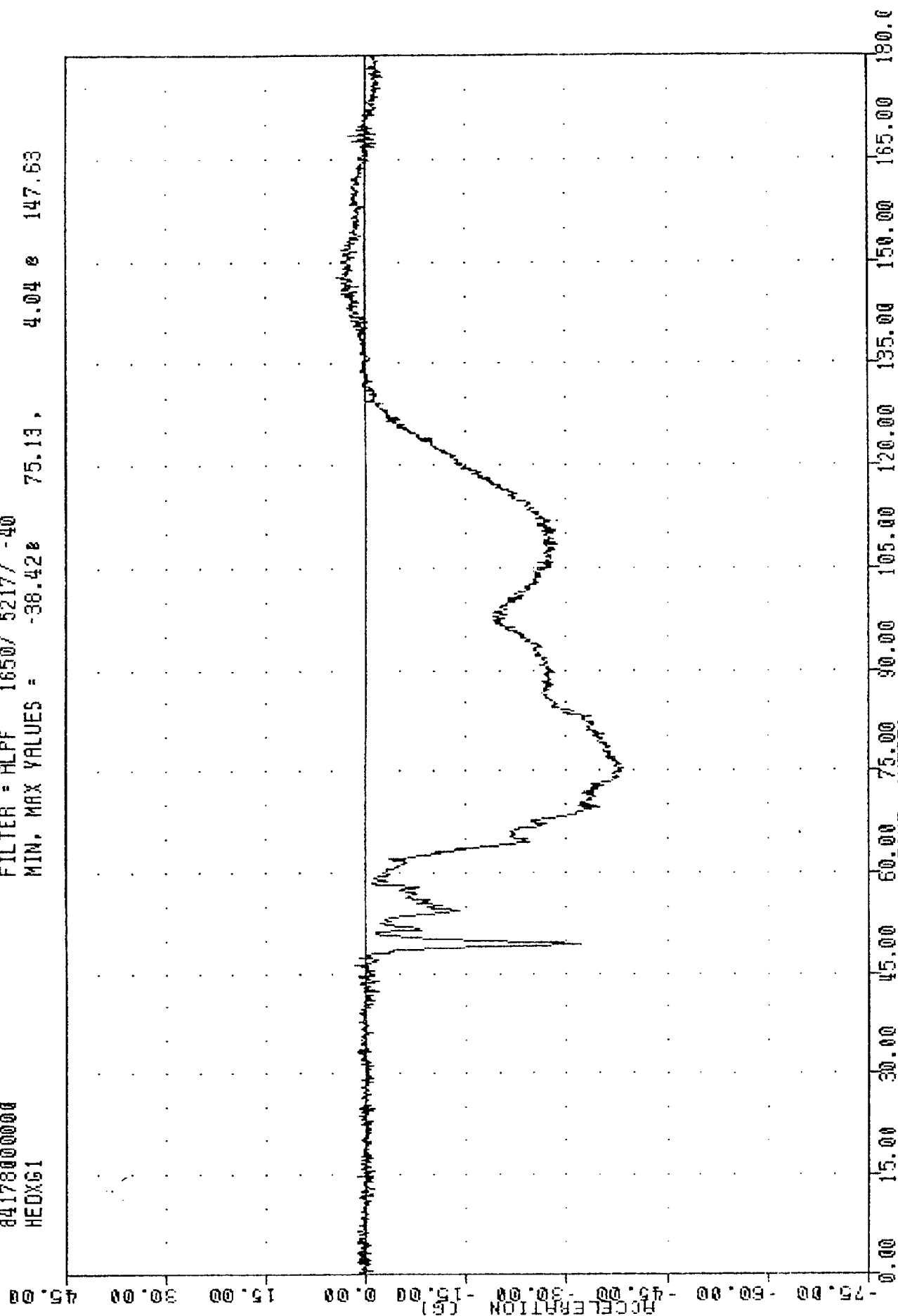
BREED AIR BAG PROGRAM

84178000000

HEDXG1

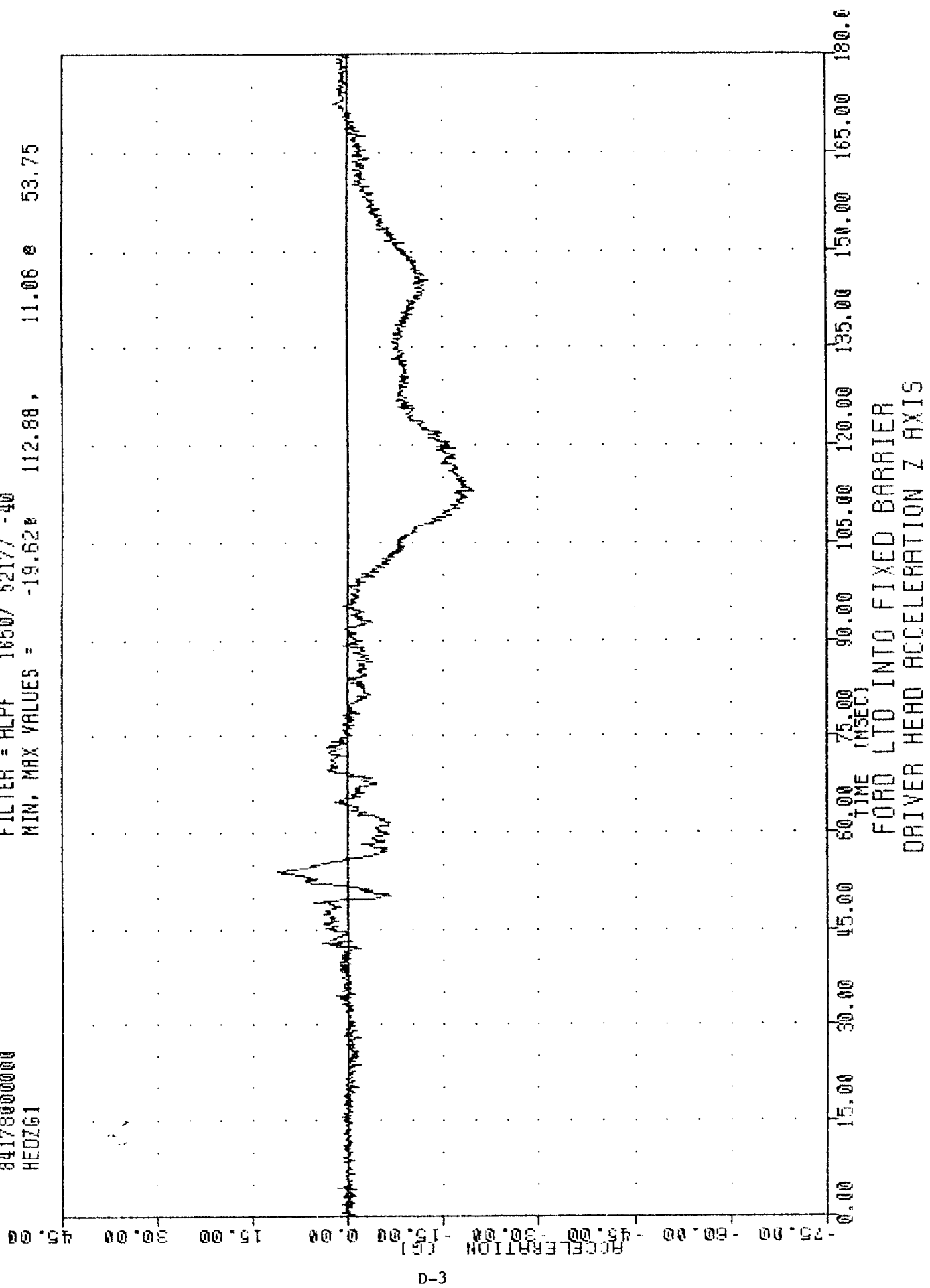
FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = -38.42 75.13 4.04 147.63



FORD LTD INTO FIXED BARRIER
DRIVER HEAD ACCELERATION X AXIS

INC 040620
 BREED AIR BAG PROGRAM
 84178000000
 HEADZ61
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -19.62 112.88 11.06 e 53.75
 PLOT DATE 20 AUG 84 10:08:23

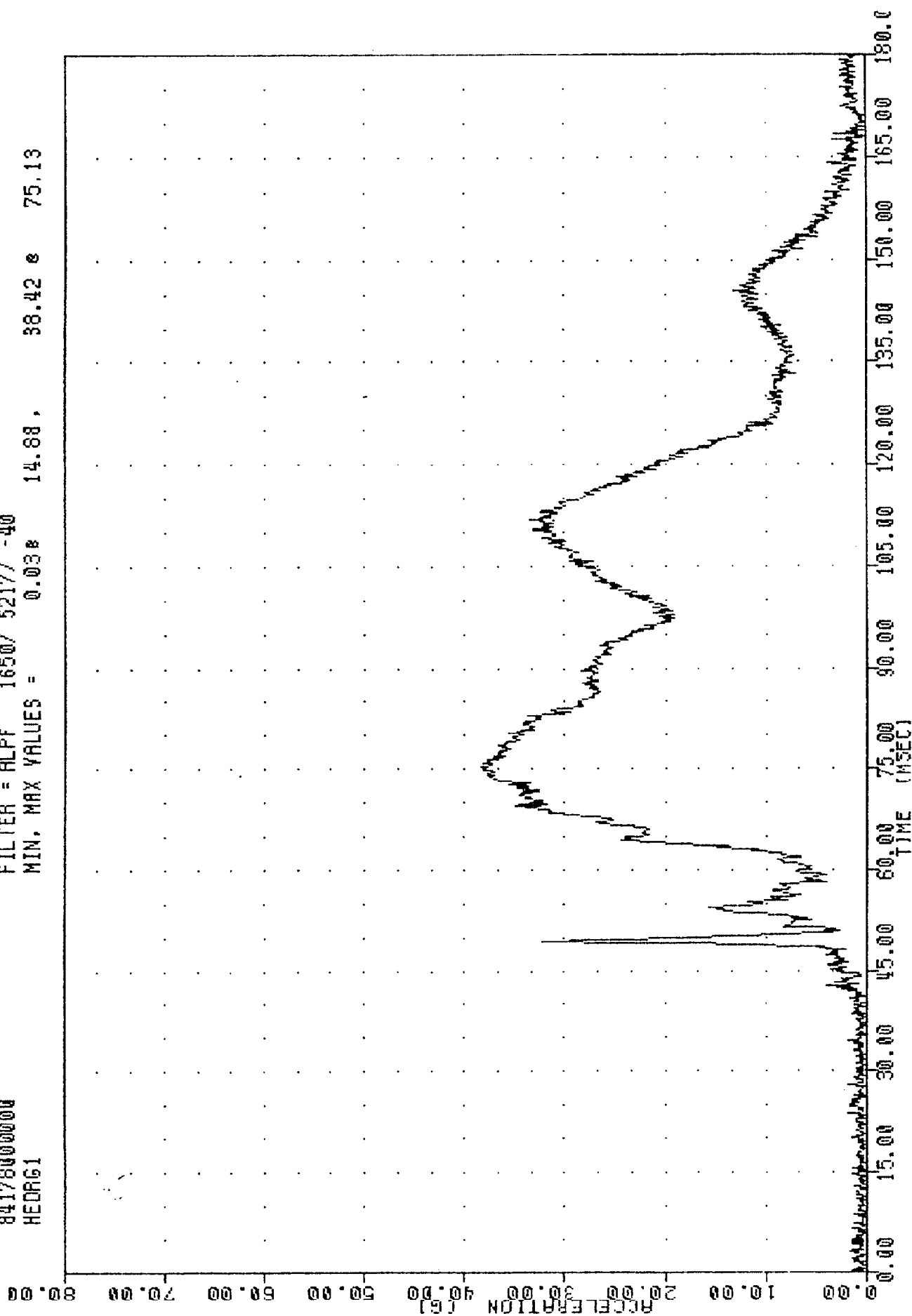


TRC
BREED AIR BAG PROGRAM
8417800000
HEAD61

PLOT DATE 17-AUG-84 11:34:03

FILTER = ALPF 1650/ 5217/ -40

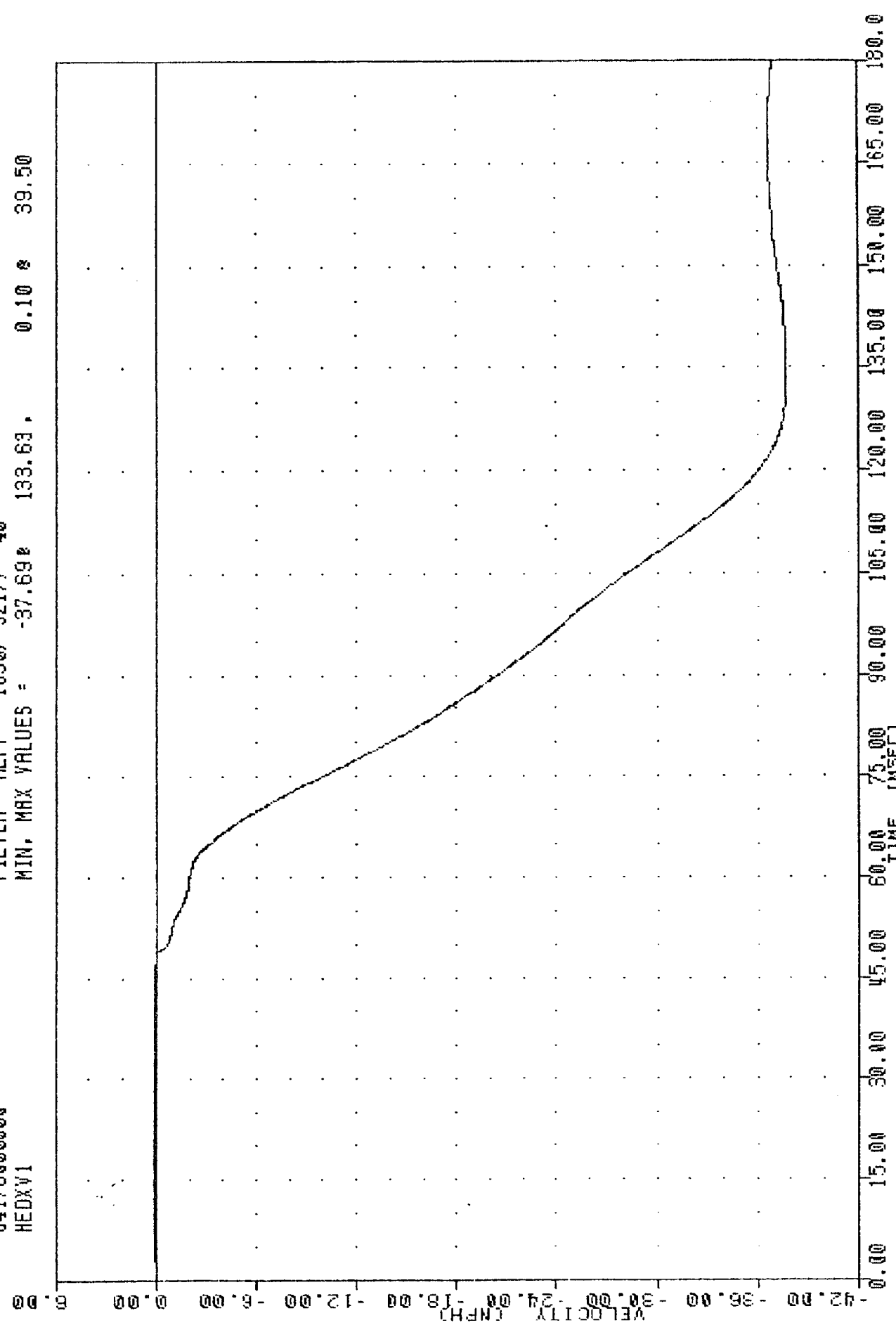
MIN. MAX VALUES = 0.038 14.88, 38.42 & 75.13



FORD LTO INTO FIXED BARRIER
DRIVER HEAD RESULTANT USING ONLY X AND Z

TRC
 BREED AIR BAG PROGRAM
 84178000000
 HEDXV1

PLUT DATE 17-HUG-84 11:40:34
 FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -37.69 133.63 0.10 39.50

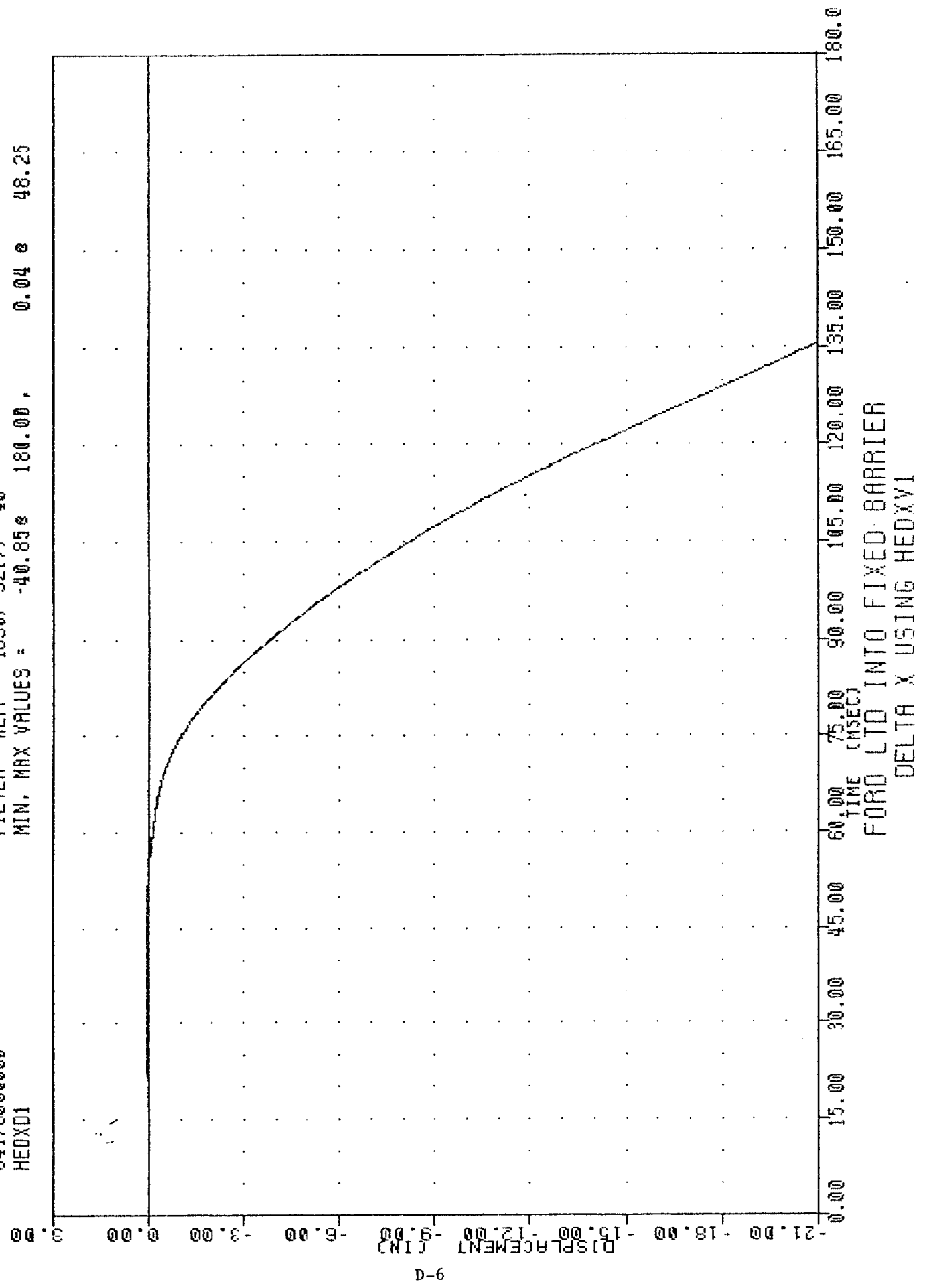


FORD LTD INTO FIXED BARRIER
 DELTA V USING HEDXG1

INC 0620
 BREED AIR BAG PROGRAM
 84178000000
 HEDXD1

PLOT DATE 17 AUG 84 11:40:34

FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -40.85 180.00 0.04 48.25

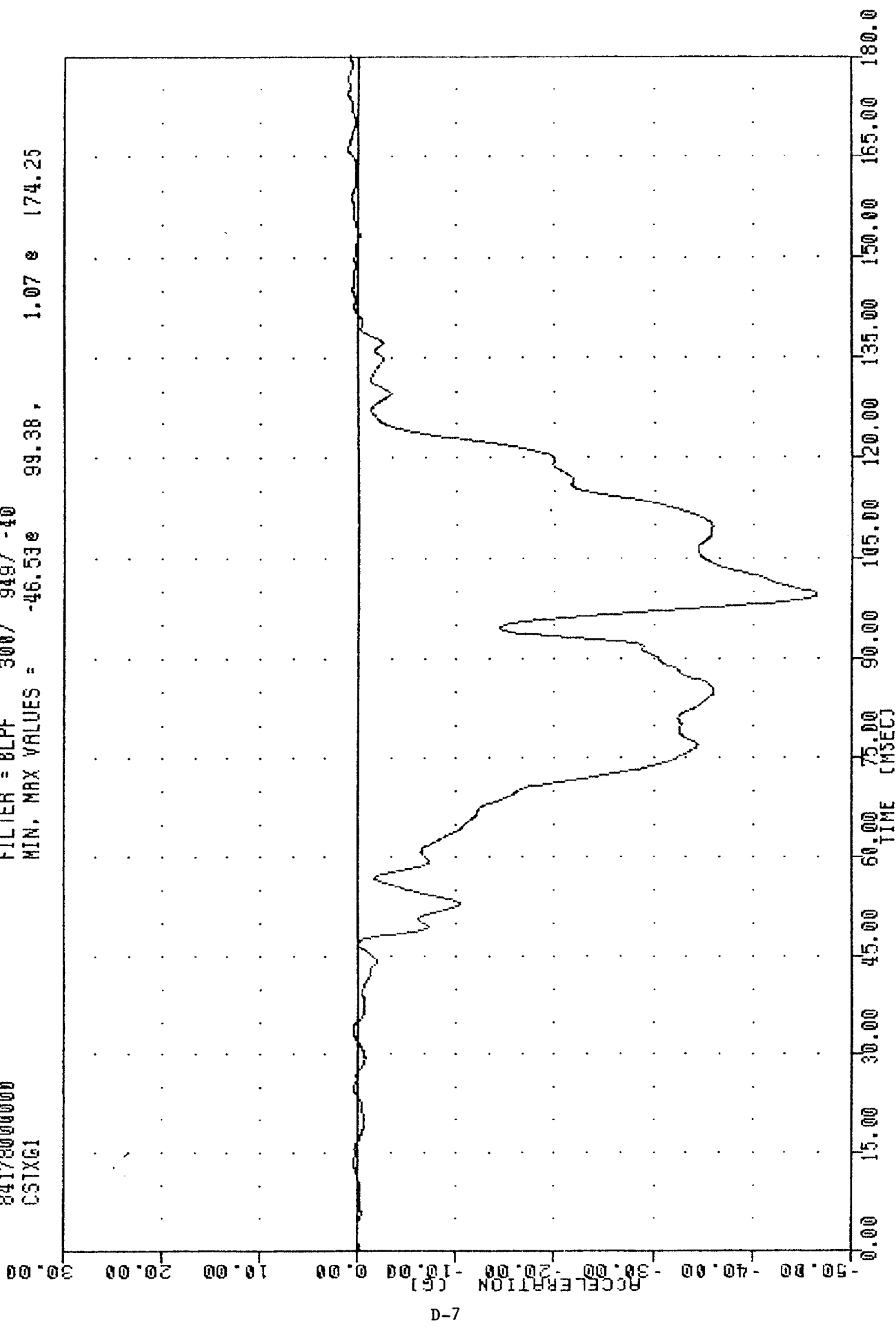


FORD LTD INTO FIXED BARRIER
 DELTA X USING HEDXVI

INC 840626
BREED AIR BAG PROGRAM
84178000000
CSTXG1

PLOT DATE 16-AUG-84 13:02:39

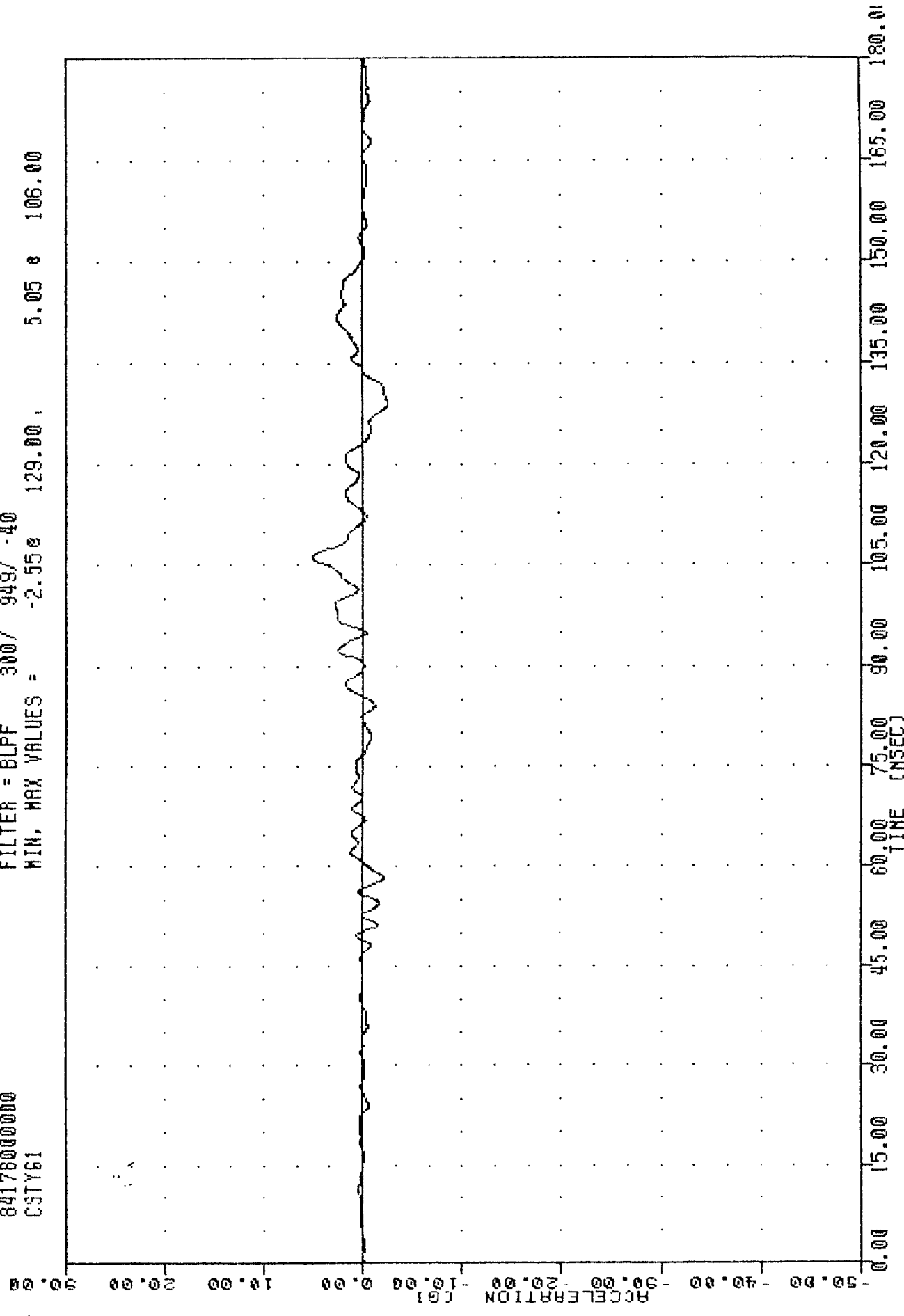
FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = -46.53e 99.38, 1.07 e 174.25



D-7

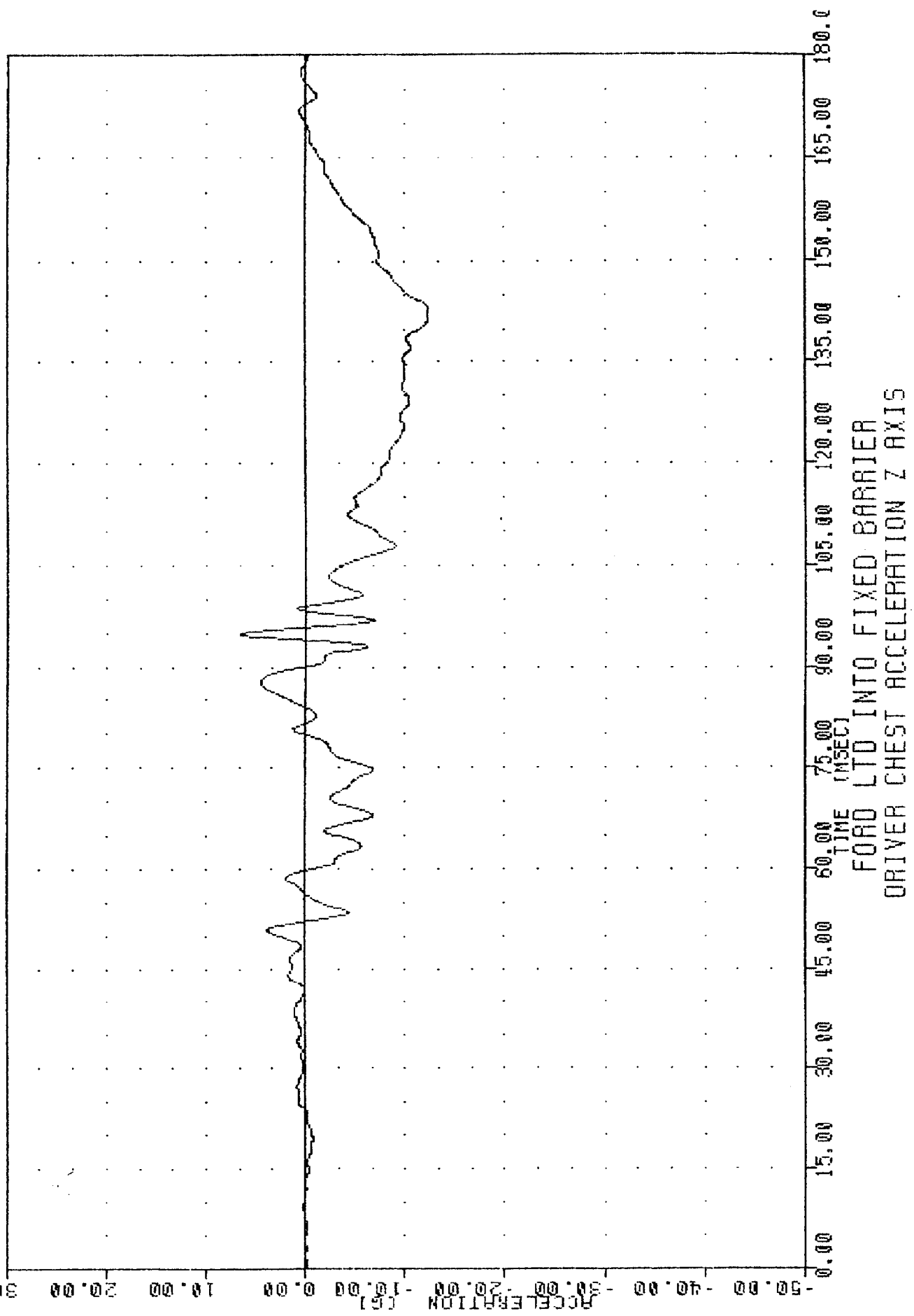
FORD LTD INTO FIXED BARRIER
DRIVER CHEST ACCELERATION X AXIS

TAC 040620
 BREED AIR BAG PROGRAM
 84176000000
 CSTY61
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -2.55 129.00 5.05 106.00
 PLOT DATE 18 NOV 84 15:02:35

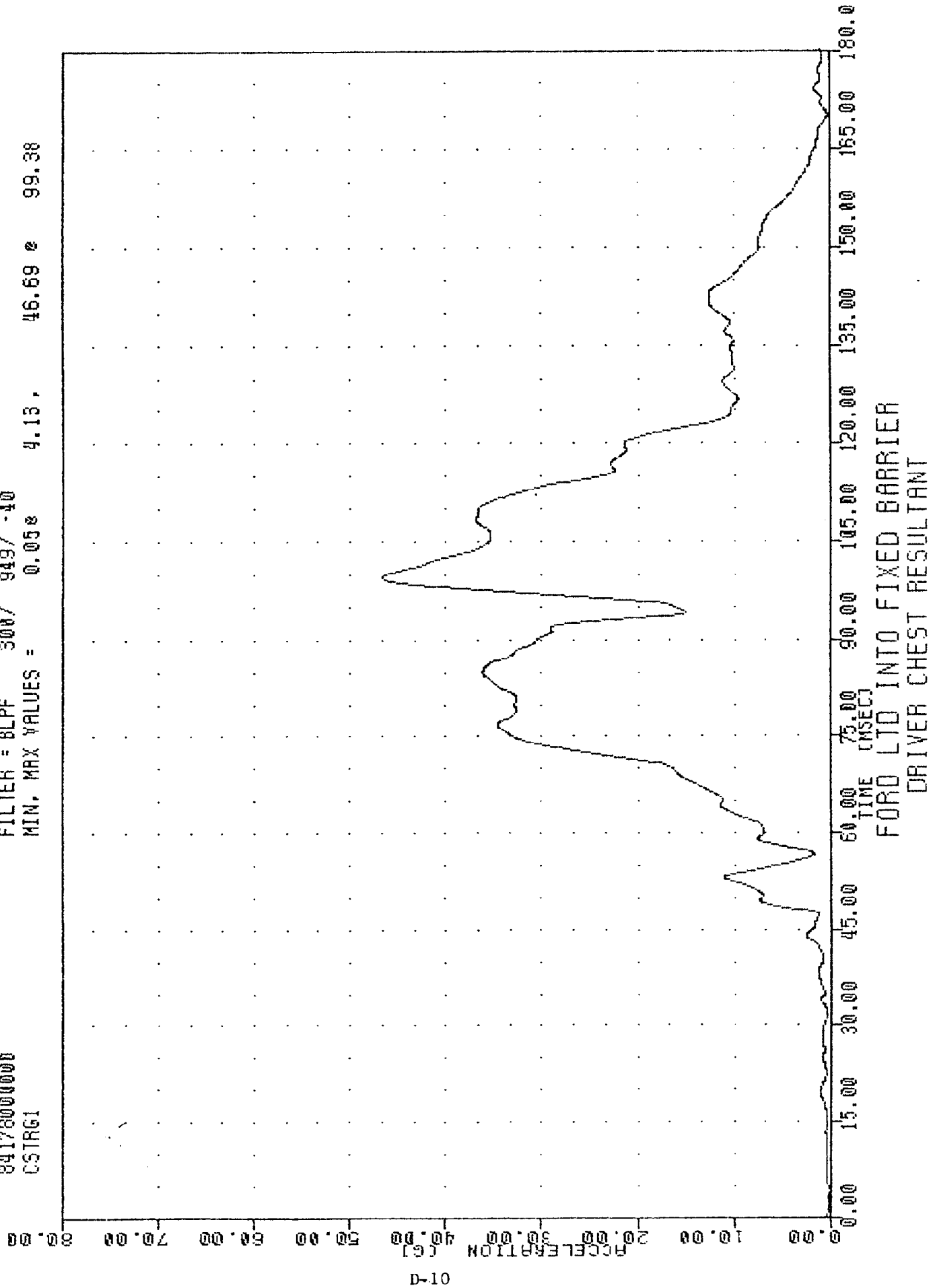


FORD LTD INTO FIXED BARRIER
 DRIVER CHEST ACCELERATION Y AXIS

INC 840620 16 AUG 64 13:02:58
 BREED AIR BAG PROGRAM
 84178000000
 CSTZG1
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -12.30e 141.50, 6.51 e 94.75

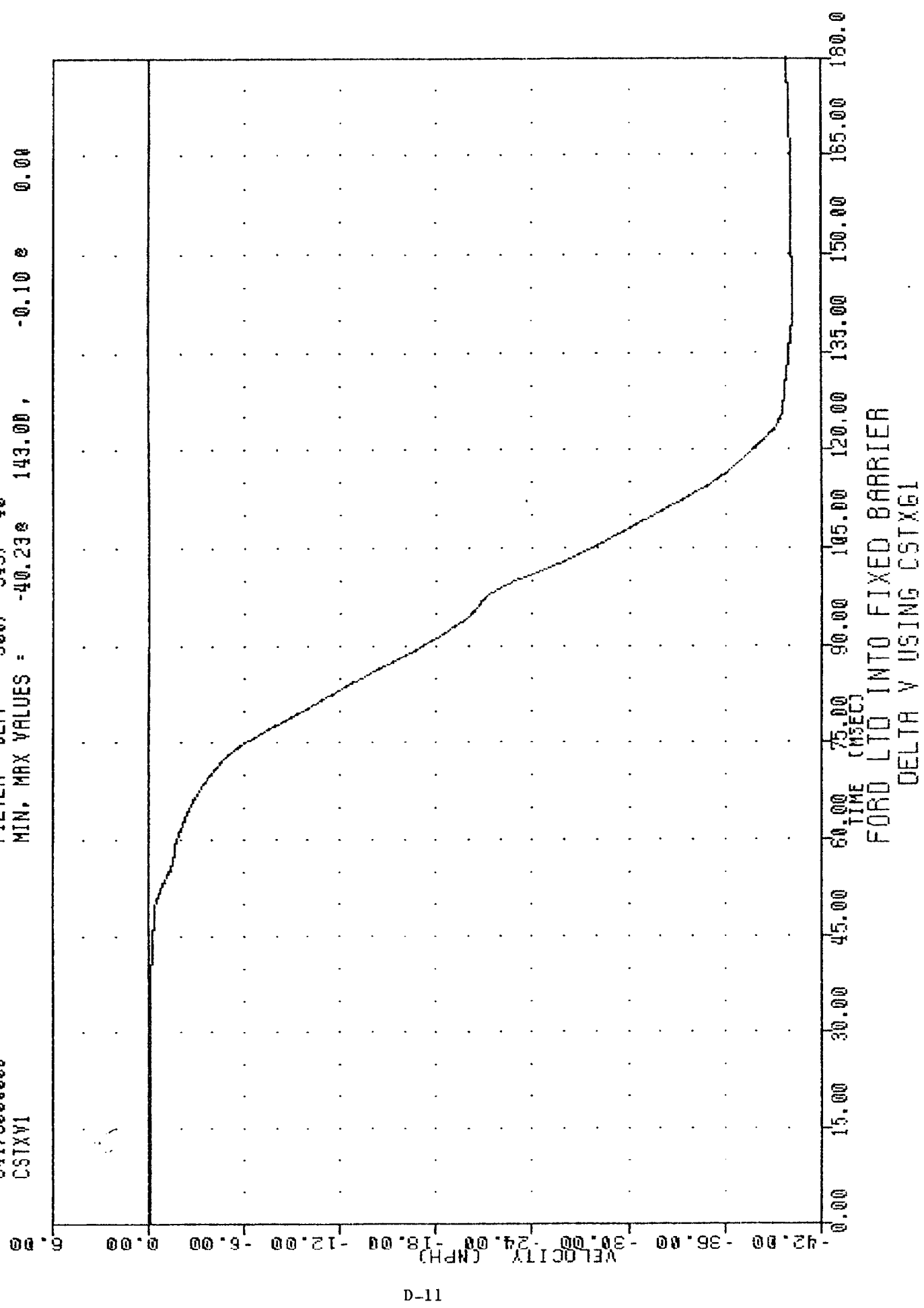


FILE # 840620
 BREED AIR BAG PROGRAM
 84178000000
 CSTRG1
 FILTER = BLPF 300/ 949/ -10
 MIN, MAX VALUES = 0.058 4.13, 46.69 e 99.38
 PLOT DATE 16 AUG 84 13:02:38



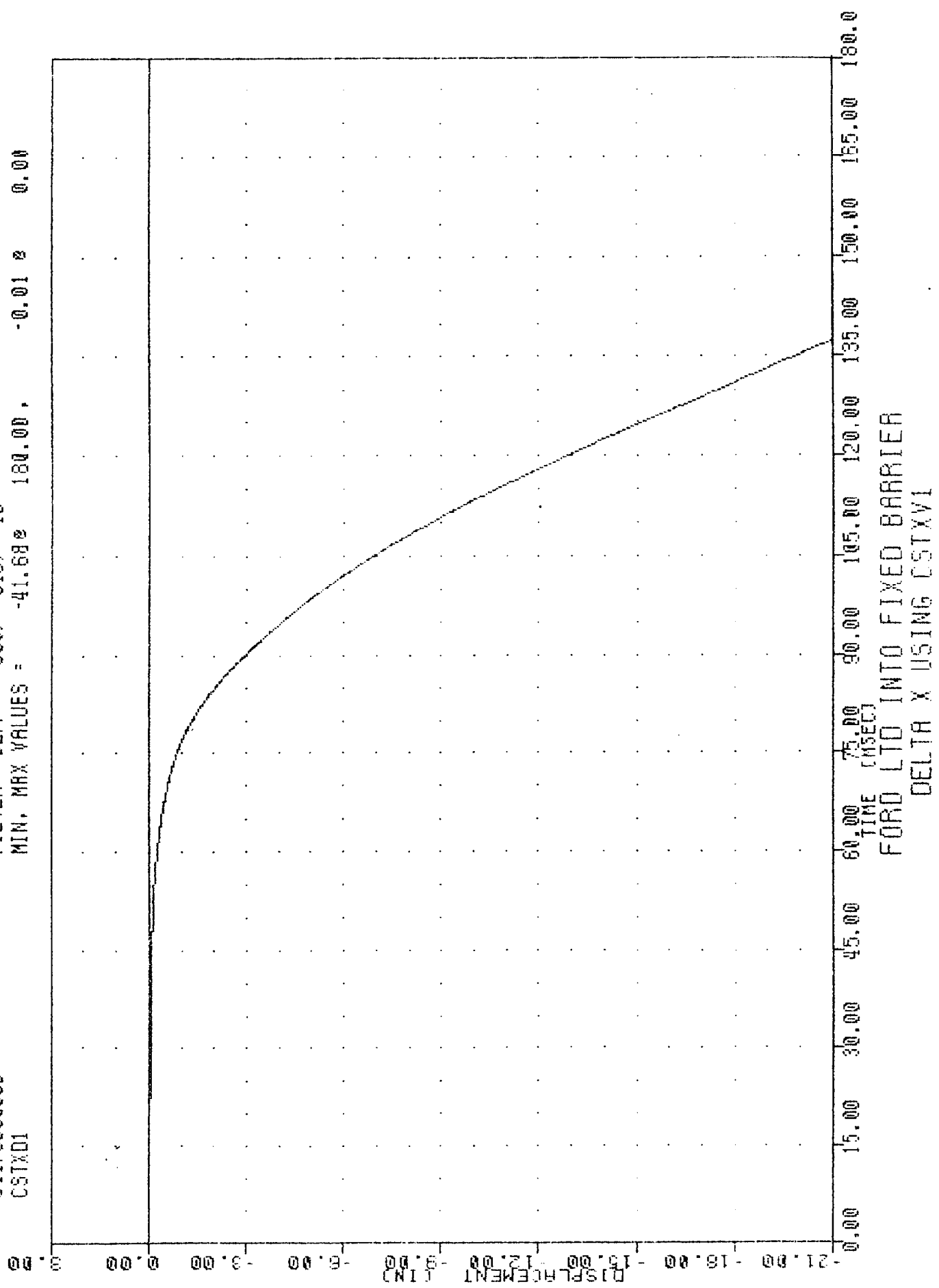
FORD LTD INTO FIXED BARRIER
 DRIVER CHEST RESULTANT

THC
 BREED AIR BAG PROGRAM
 84178000000
 CSTXV1
 840626
 17-AUG-84
 11:40:34
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -40.23e 143.00, -0.10 e 0.00



FORD LTD INTO FIXED BARRIER
 DELTA V USING CSTXG1

THE [REDACTED] 040620 [REDACTED] 20 JUN 84 [REDACTED] 10:08:40
 BREED AIR BAG PROGRAM
 84178000000
 CSTXD1
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -41.682 180.00 -0.012 0.00



THC 840626 16-AUG-84 13:02:39

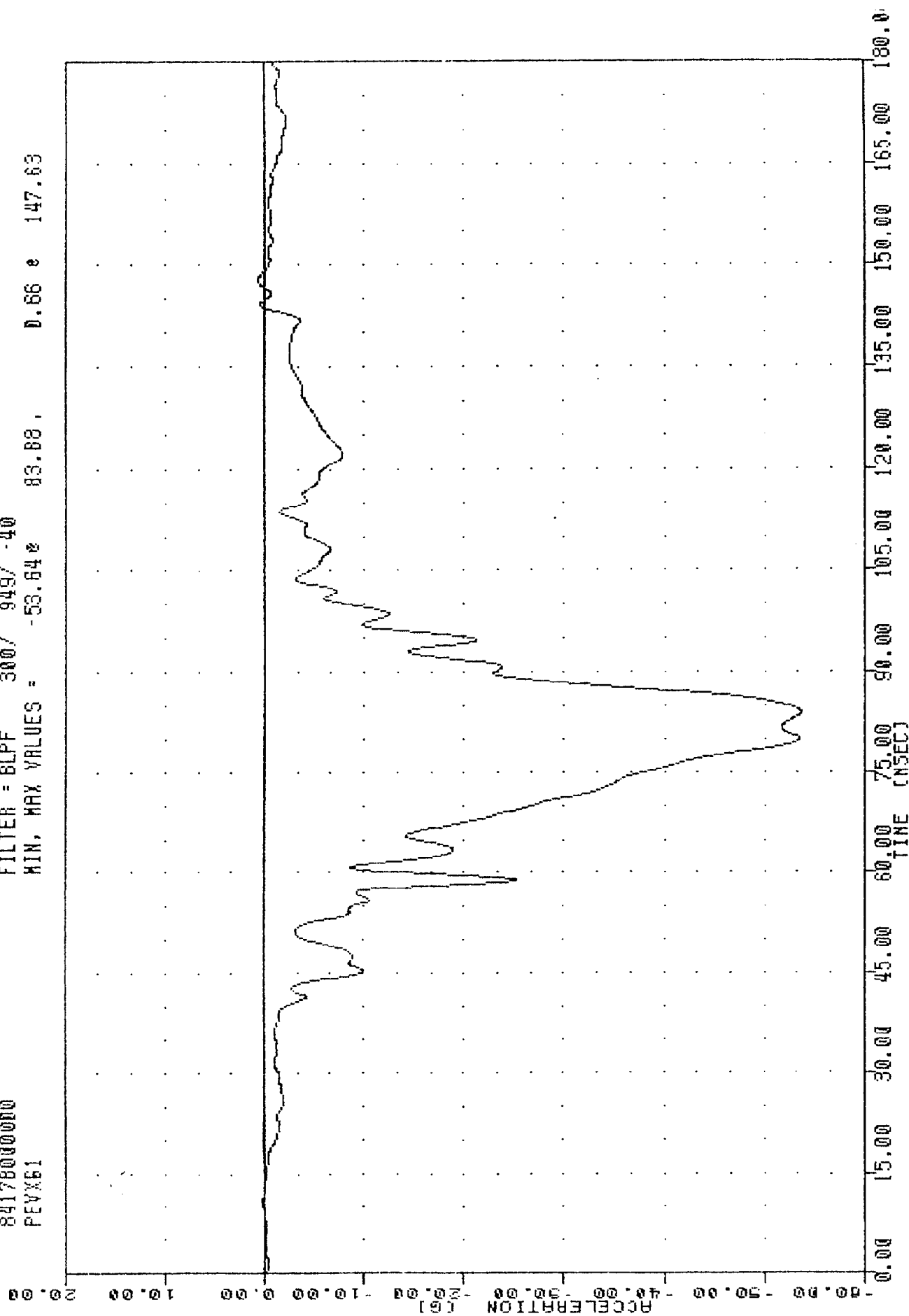
BREED AIR BAG PROGRAM

84178000000

PEVX61

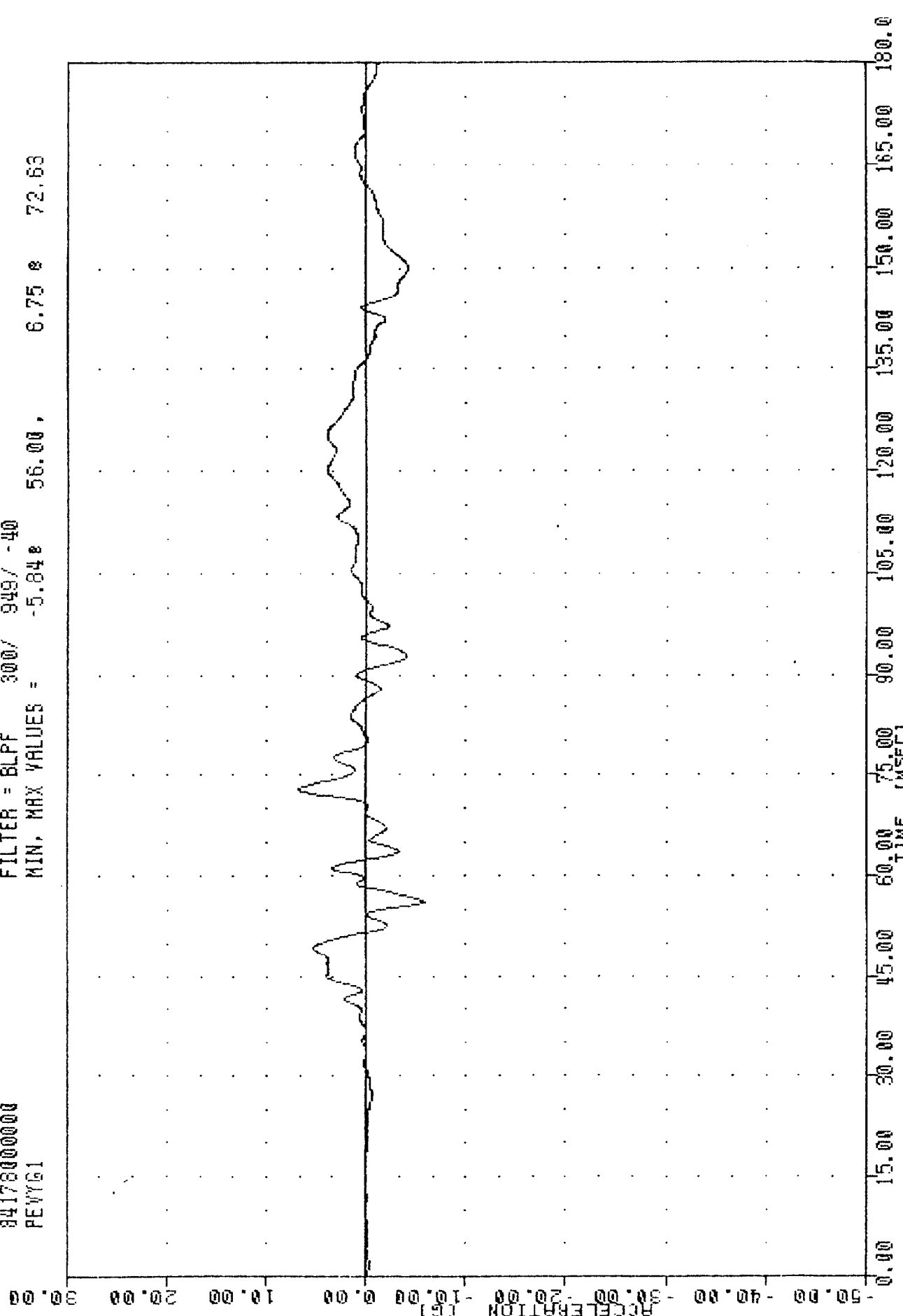
FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -53.64 83.88, 0.66 e 147.63



FORD LTD INTO FIXED BARRIER
DRIVER PELVIS ACCELERATION X AXIS

TRC
 BREED AIR BAG PROGRAM
 84178000000
 PEVYG1
 840626
 16-HUG-84
 13:02:38
 FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -5.84e 56.00, 6.75 e 72.63



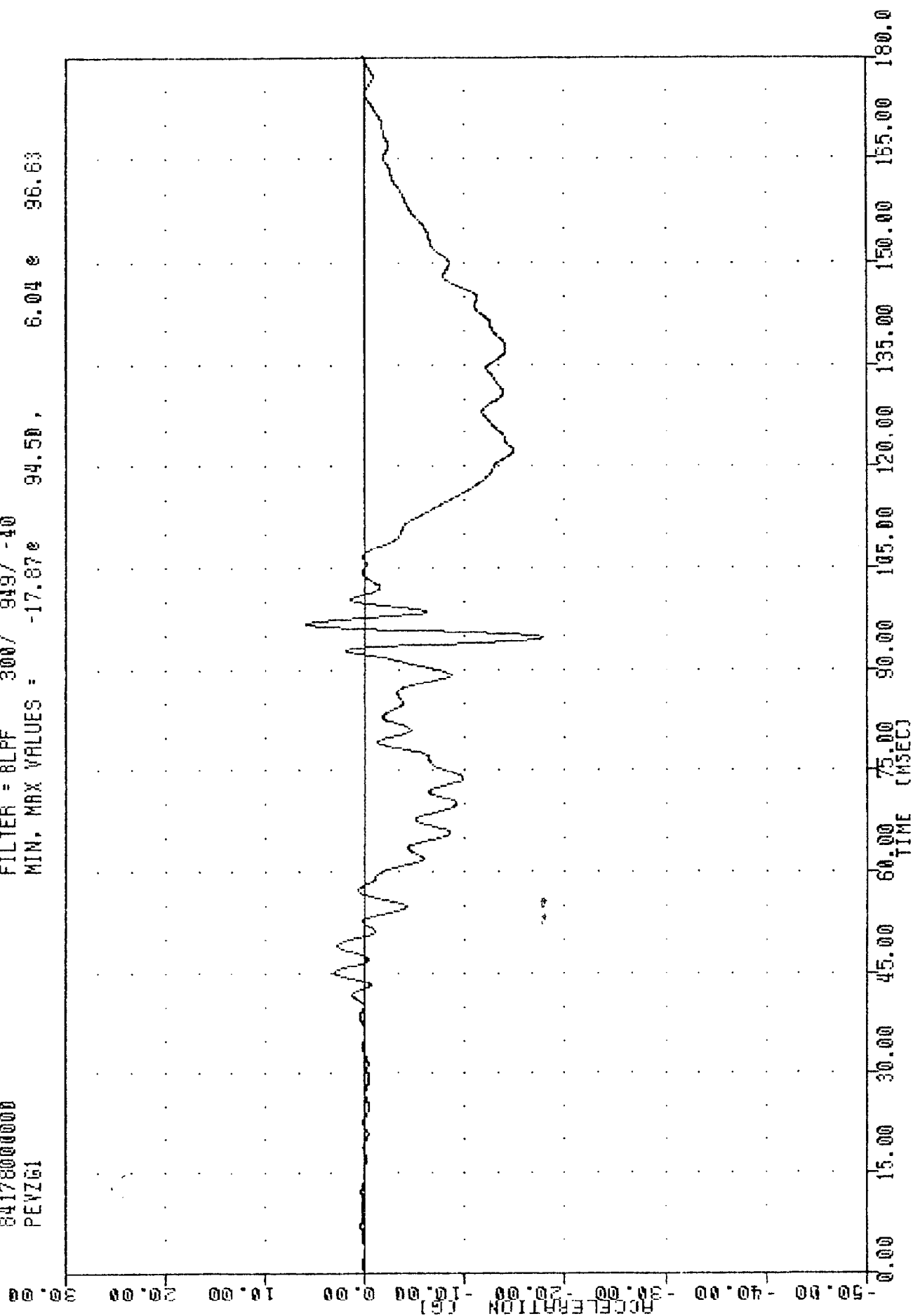
FORD LTD INTO FIXED BARRIER
 DRIVER PELVIS ACCELERATION Y AXIS

TRC
BREED AIR BAG PROGRAM
84178000000
PEVZG1

PLOT DATE 16-AUG-84 13:02:39

FILTER = 8LPF 300/ 949/ -40

MIN. MAX VALUES = -17.87e 94.50, 6.04 e 96.63



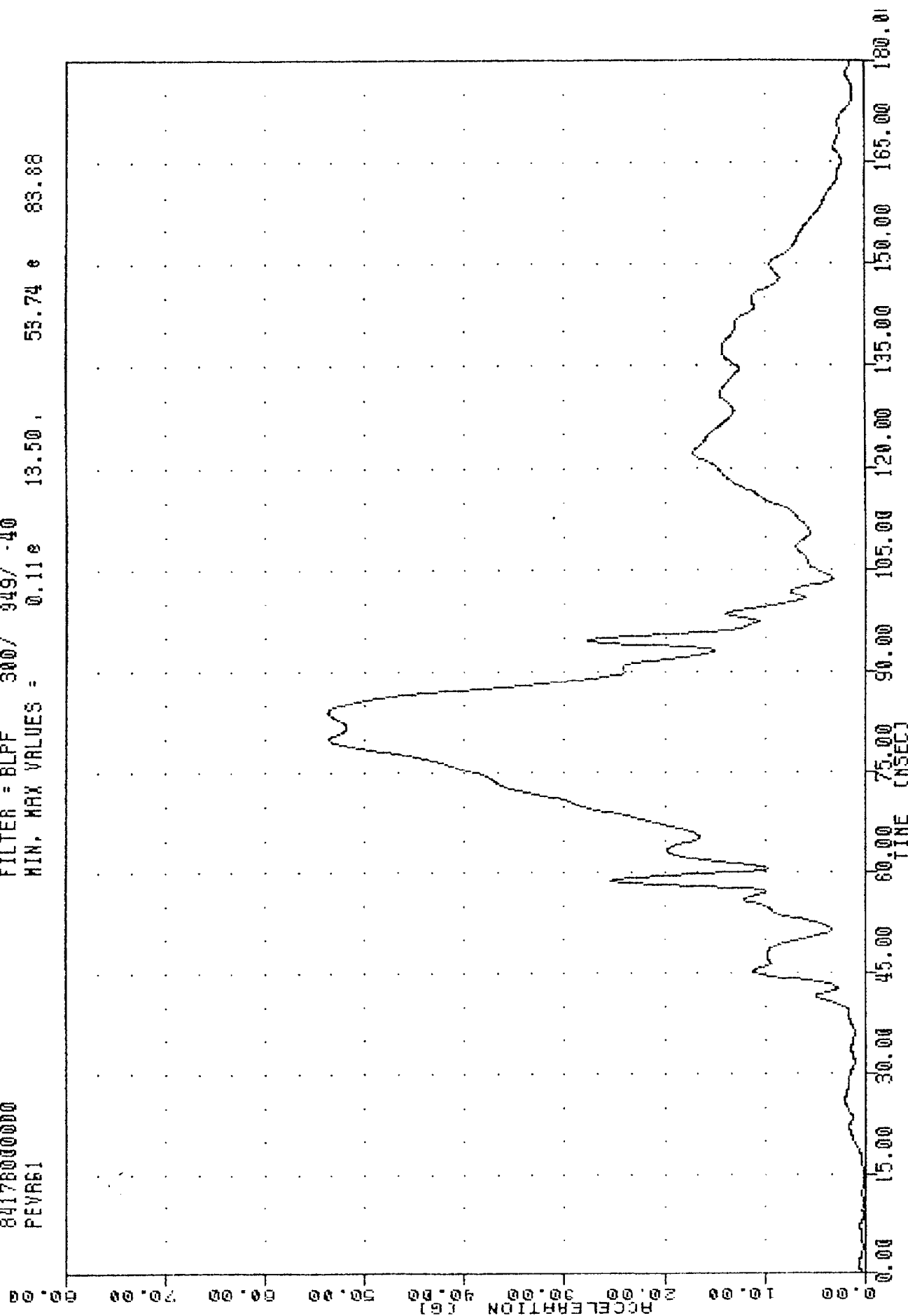
FORD LTD INTO FIXED BARRIER
DRIVER PELVIS ACCELERATION Z AXIS

PLOT DATE 16-AUG-84 13:02:39

TAC
BREED AIR BAG PROGRAM
84178000000
PEVR61

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.11e 13.50, 53.74 e 83.88



FORD LTD INTO FIXED BARRIER
DRIVER PELVIS RESULTANT

THC 840626 17-AUG-84 11:40:34

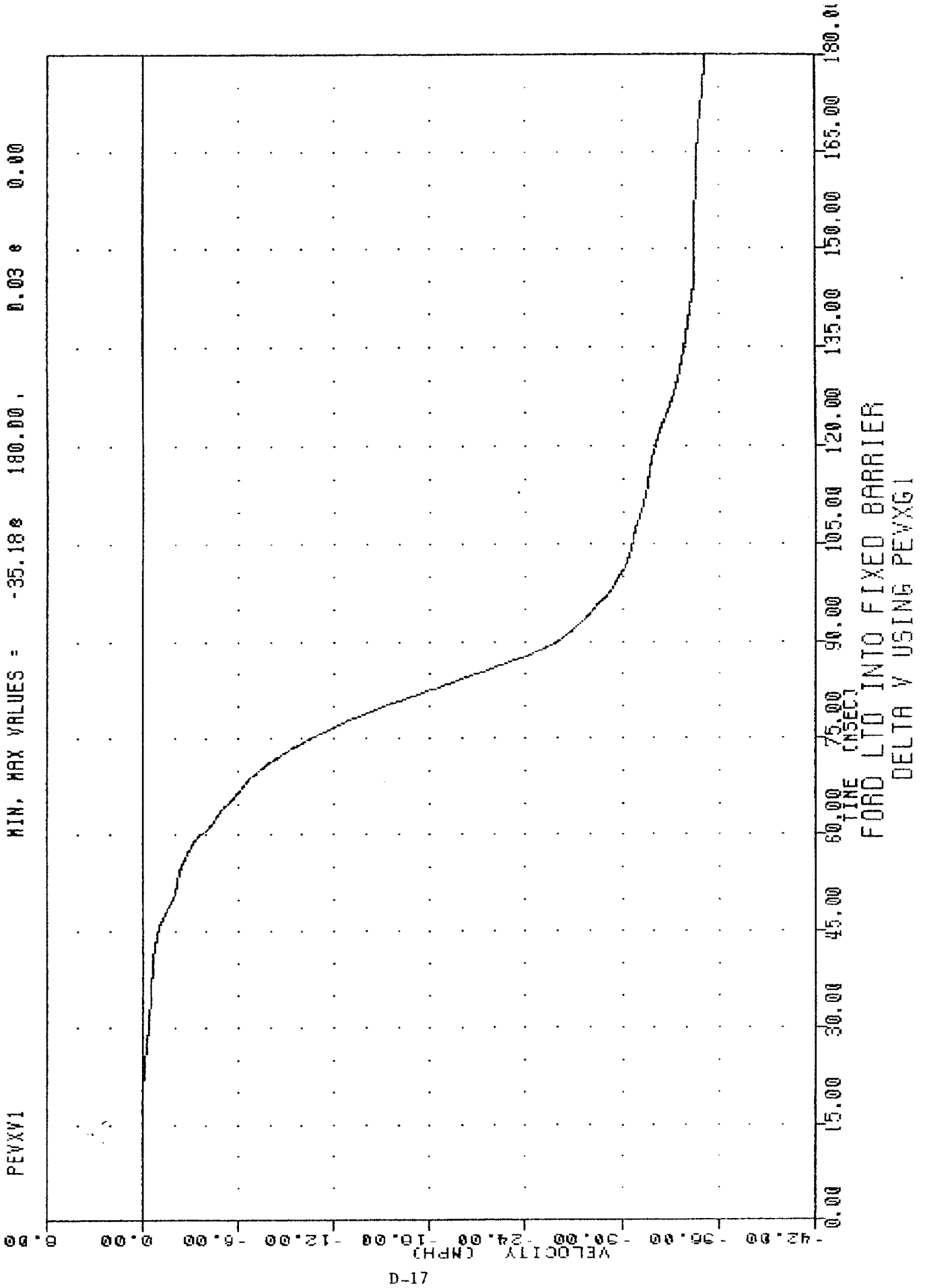
BREED AIR BAG PROGRAM

841780000000

PEVXY1

FILTER = BLPF 300/ 949/ -40

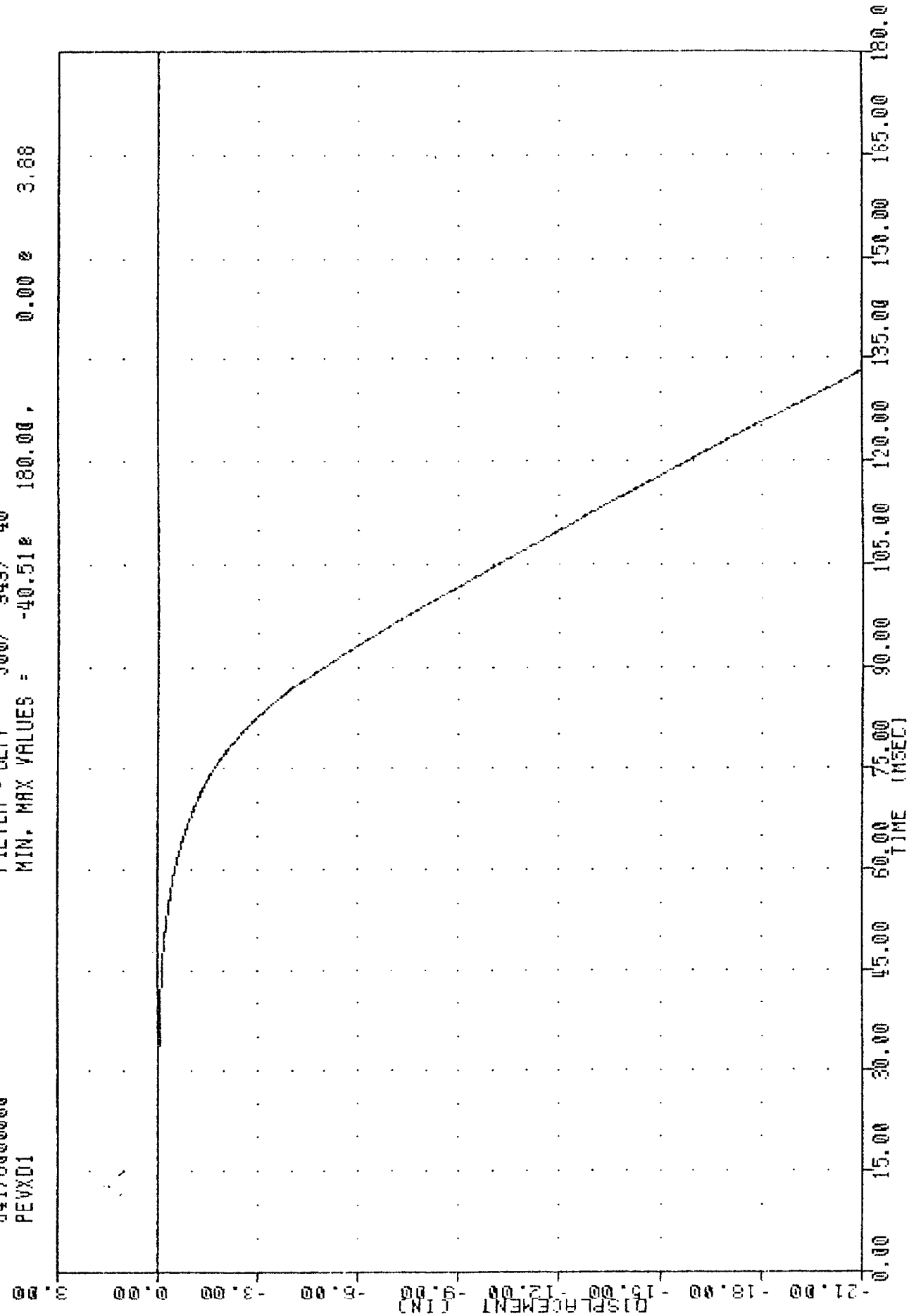
MIN, MAX VALUES = -35.18 180.00, 0.03 0.00



TAC
 BREED AIR BAG PROGRAM
 84178000000
 PEVXD1

PLOT DATE 20-AUG-84 16:08:40

FILTER = BLFF 300/ 949/ -40
 MIN. MAX VALUES = -40.512 180.00, 0.00 3.68

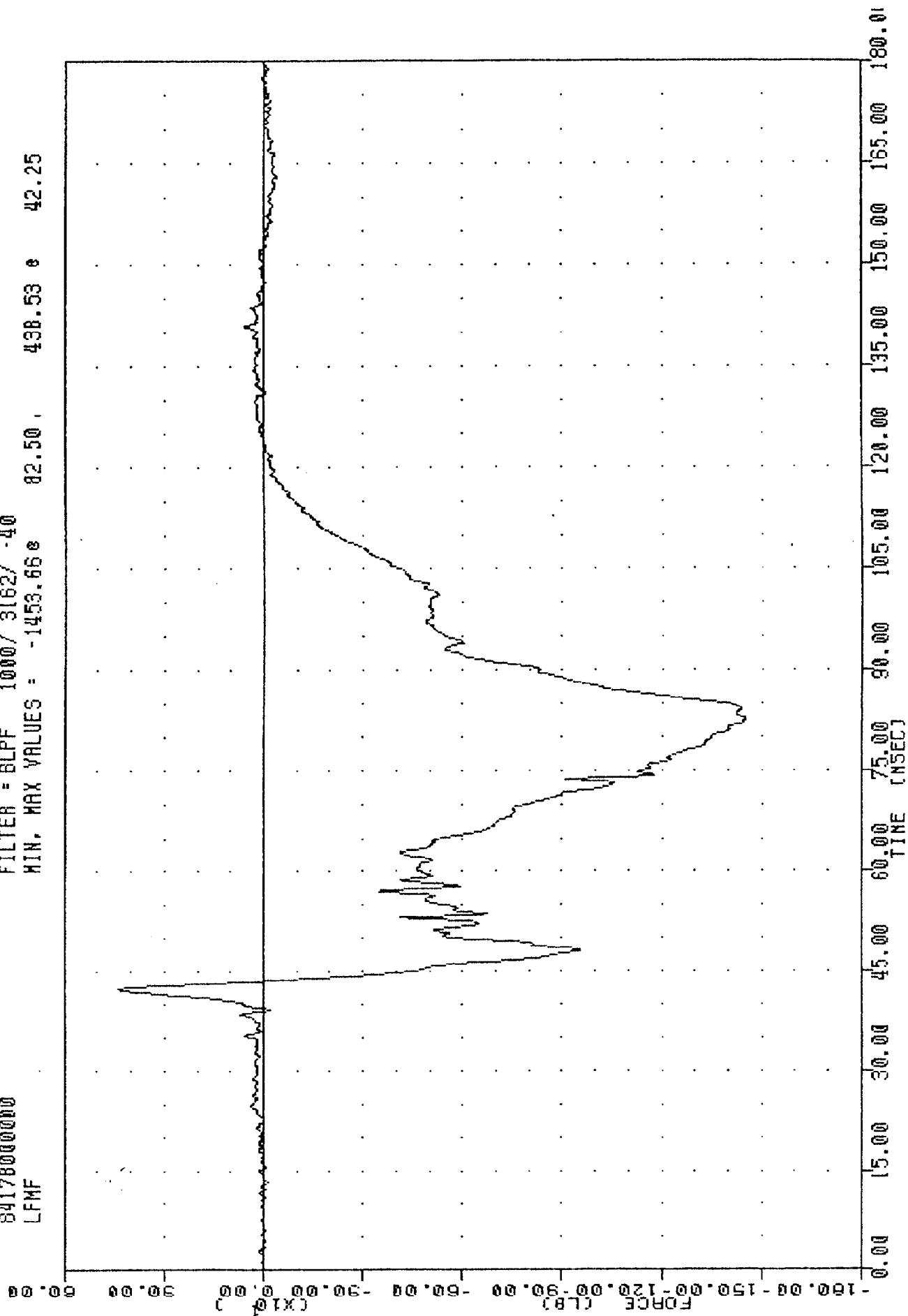


FORD LTD INTO FIXED BARRIER
 DELTA X USING PEVXV1

THC 840628
 BREED AIR BAG PROGRAM
 84178000000
 LFMF

PLOT DATE 16-AUG-84 13:02:39

FILTER = 8LFF 1000/ 3162/ -40
 MIN. MAX VALUES = -1453.66 82.50 438.53 42.25

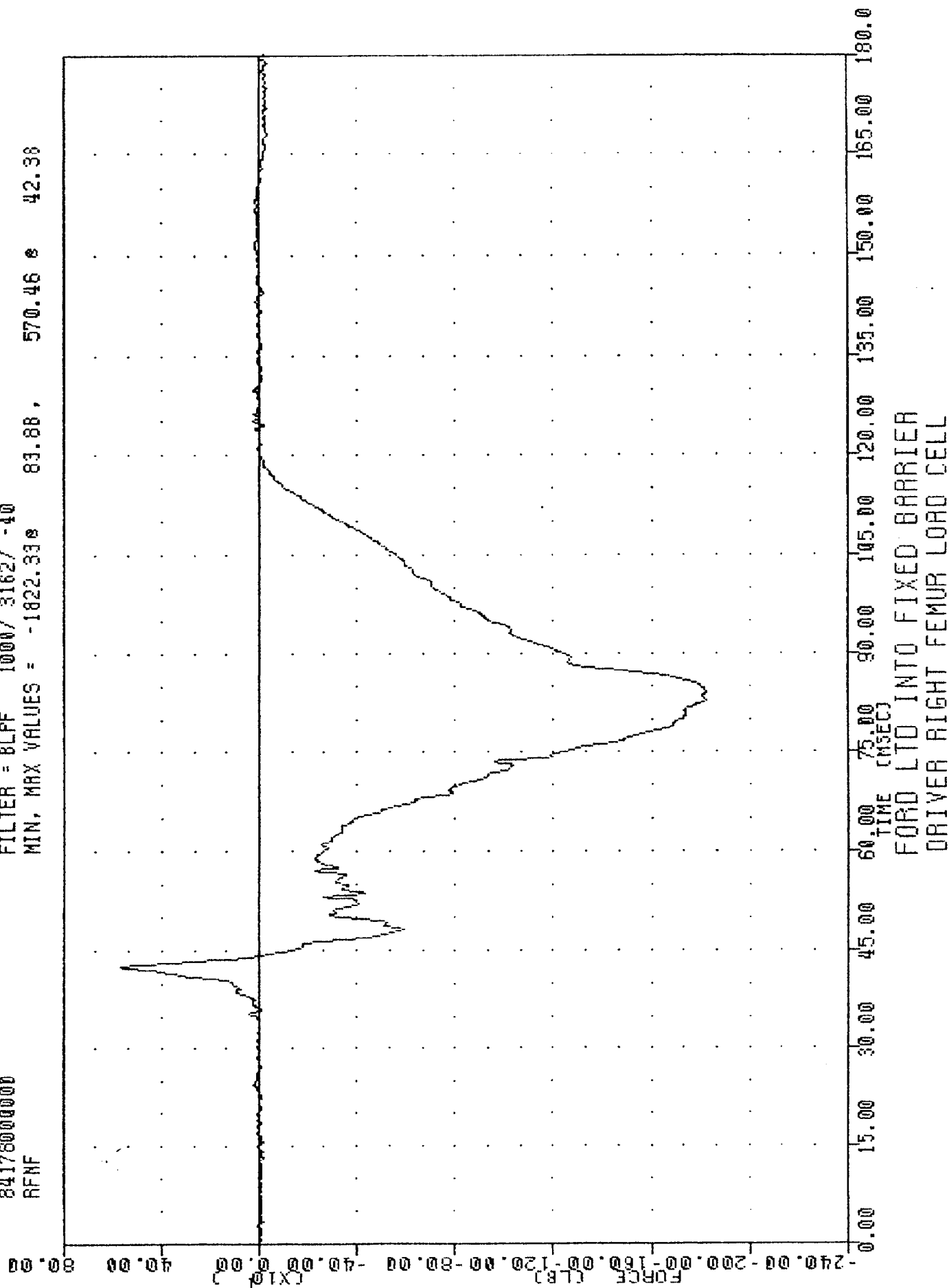


FORD LTD INTO FIXED BARRIER
 DRIVER LEFT FEMUR LOAD CELL

TRC
BREED AIR BAG PROGRAM
84176000000
RFNF

PLOT DATE 16-AUG-84 13:02:39

FILTER = BLPF 1000/ 3162/ -40
MIN, MAX VALUES = -1822.33 83.88, 570.46 42.38



THU

840626

16-HUG-84

13:02:39

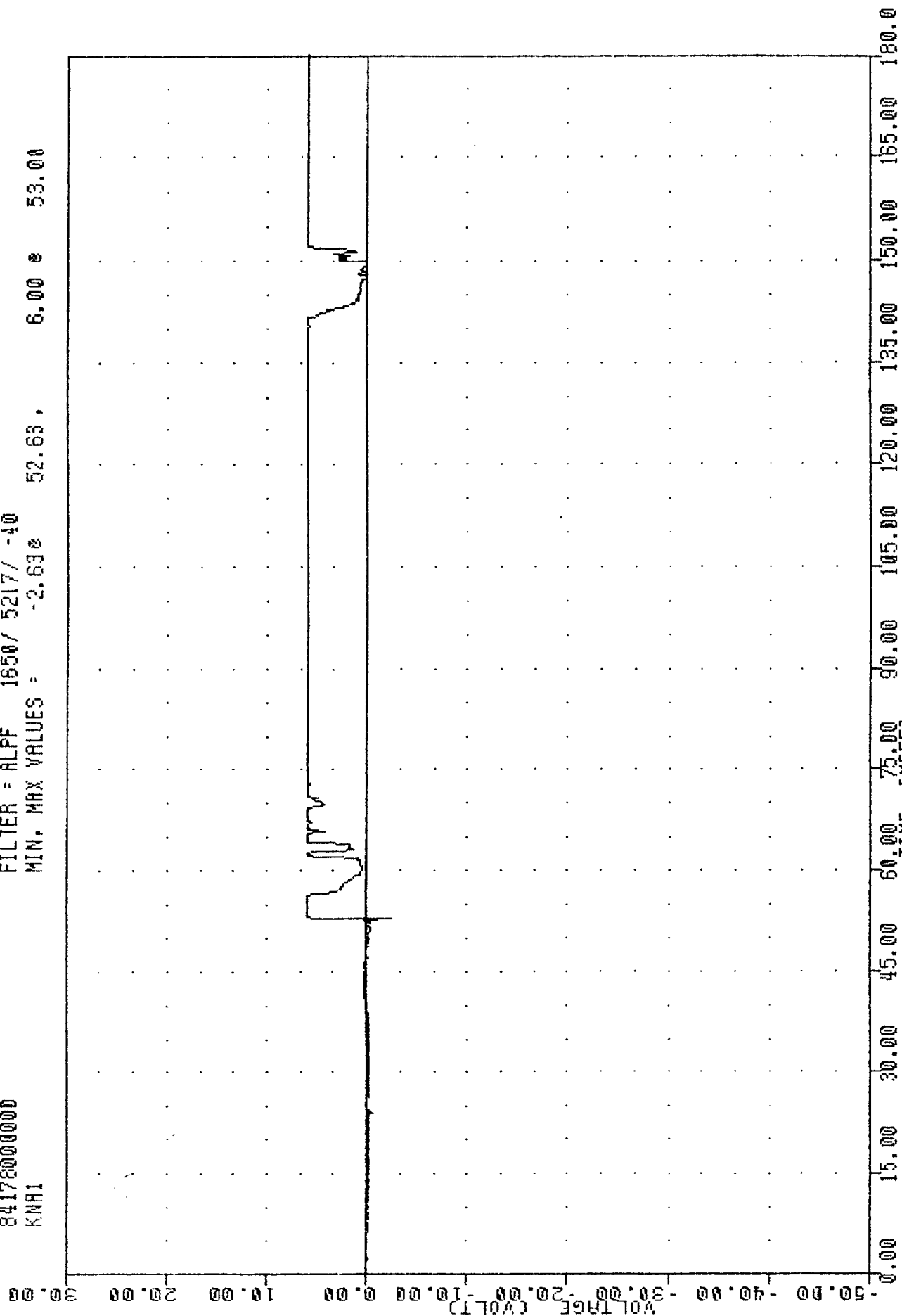
BREED AIR BAG PROGRAM

84178000000

KNR1

FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = -2.63e 52.63, 6.00e 53.00

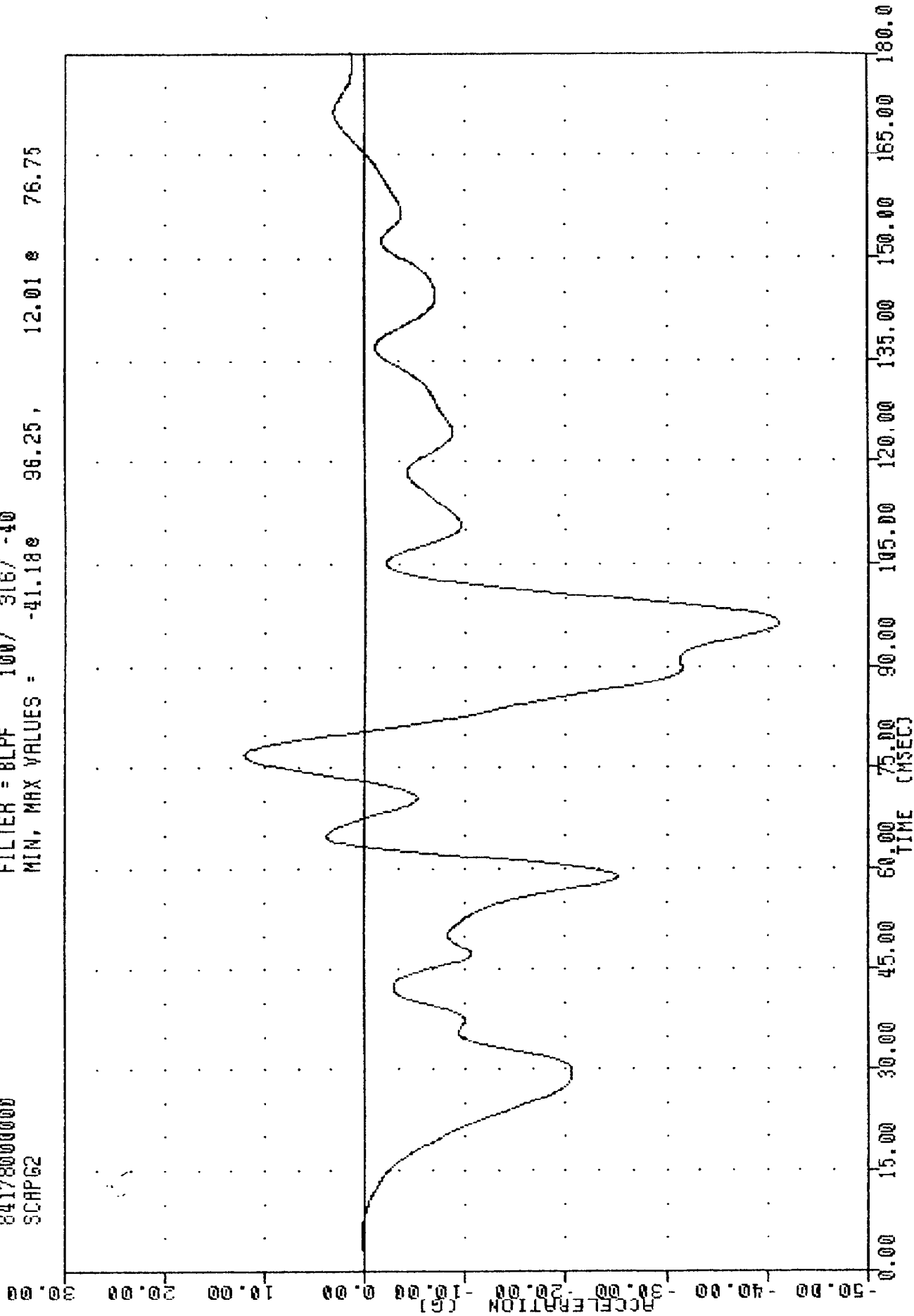


FORD LTD INTO FIXED BARRIER
RIGHT KNEE CONTACT SWITCH

THU 840626
BREED AIR BAG PROGRAM
84178000000
SCAP62

PLOT DATE 16-AUG-84 13:02:39

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -41.18e 96.25, 12.01 e 76.75



FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER POSTERIOR

TAC 840626 16-AUG-84 13:02:39

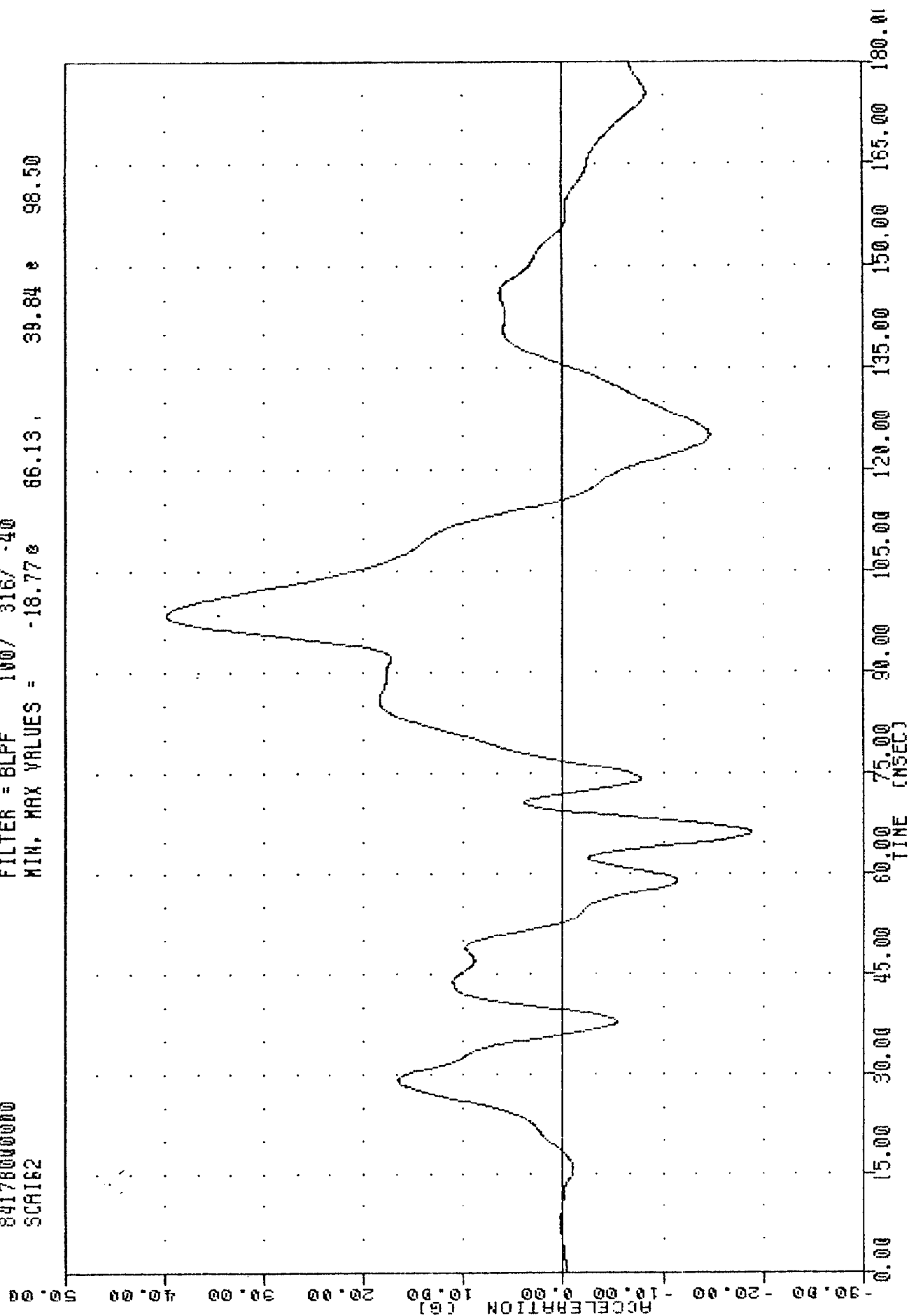
BREED AIR BAG PROGRAM

84178000000

SCR162

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -18.77 66.13 39.84 98.50

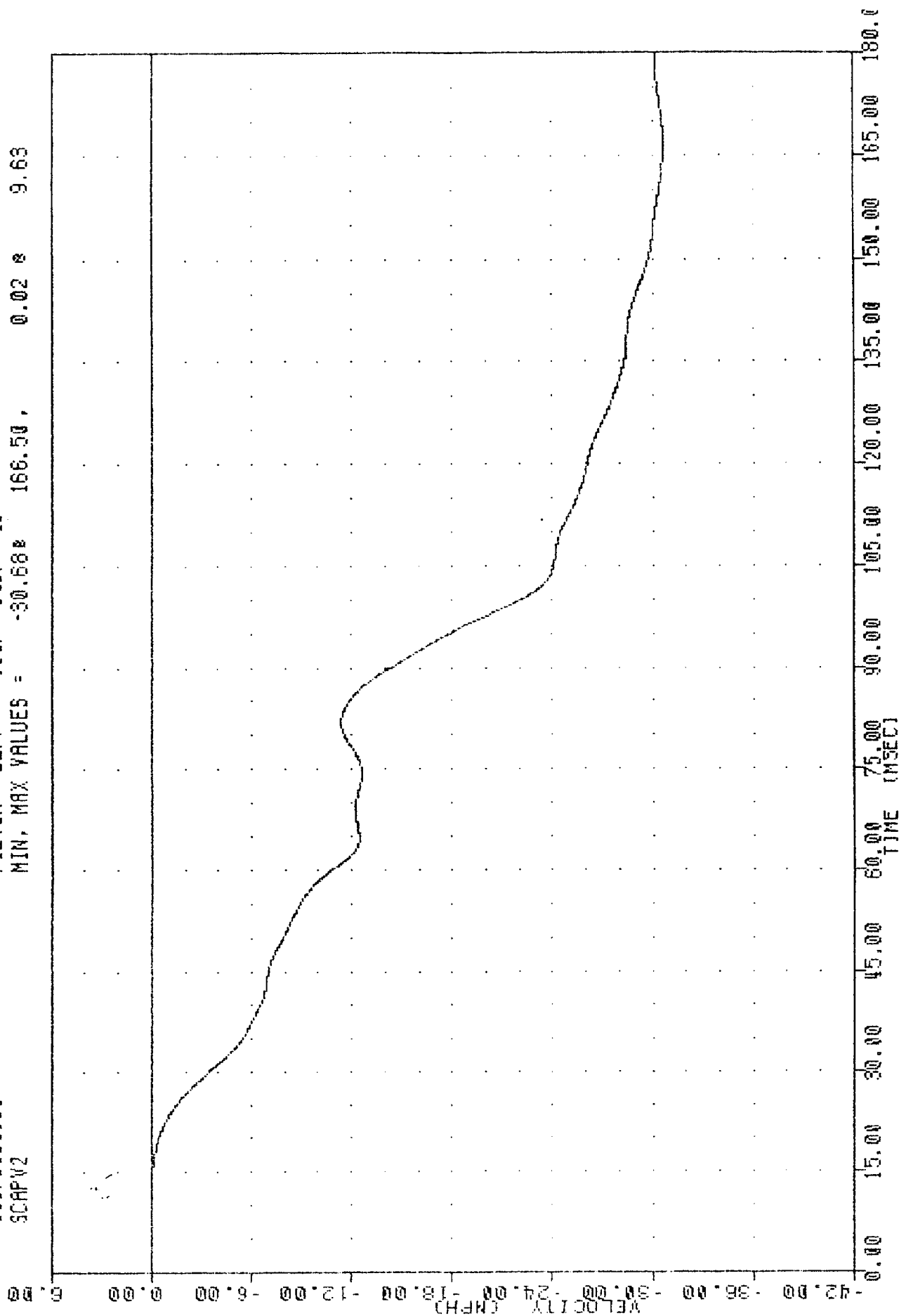


FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER INTERIOR

TRC
BREED AIR BAG PROGRAM
84178000000
SCAPV2

PLOT DATE 17-AUG-84 11:40:34

FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -30.58 166.50 0.02 9.63

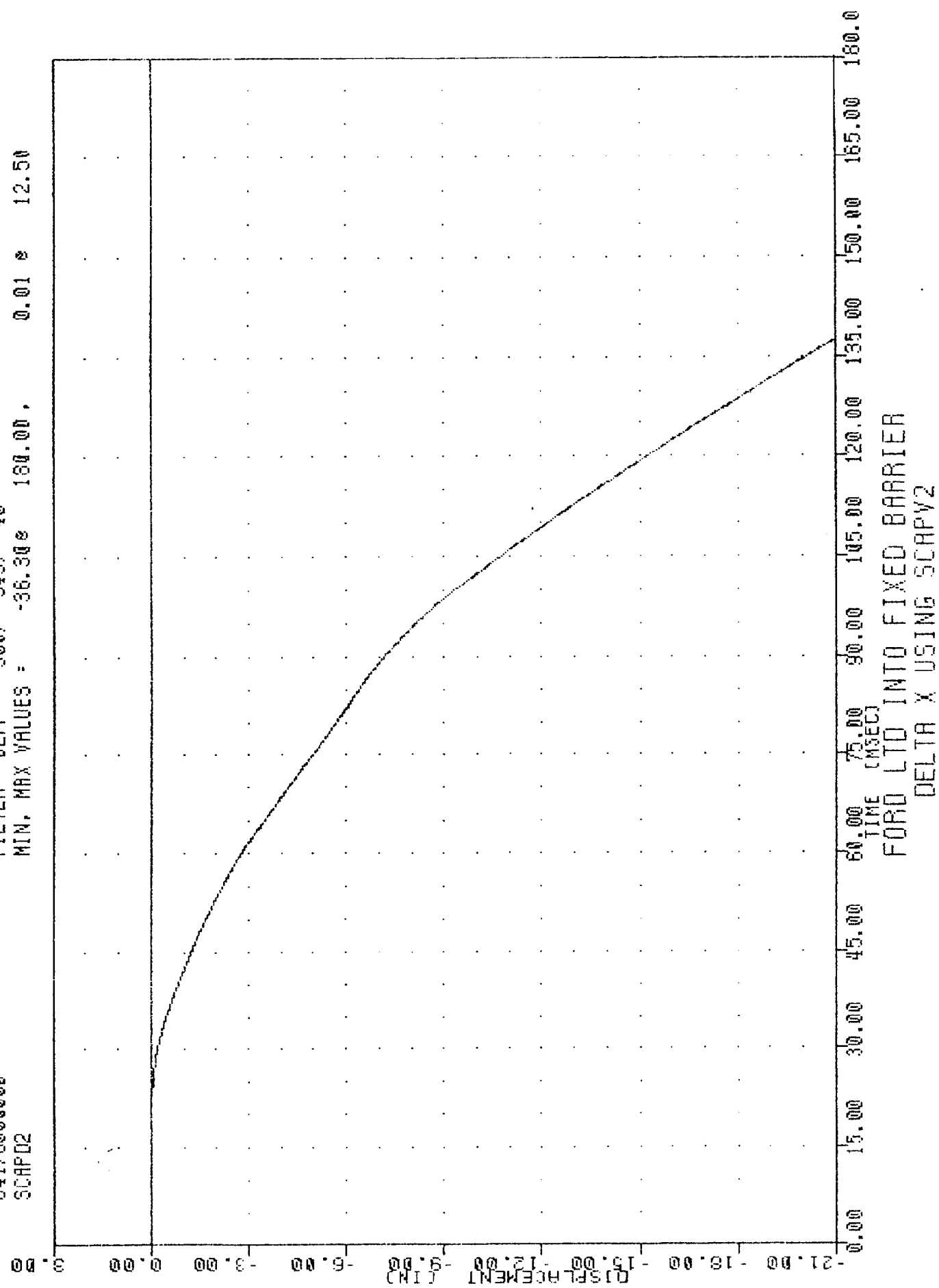


FORD LTD INTO FIXED BARRIER
DELTA V USING SCAPG2

TRC
 BREED AIR BAG PROGRAM
 84178000000
 SCAPD2

PLOT DATE 17-AUG-84 11:40:34

FILTER = BLFF 300/ 949/ -40
 MIN. MAX VALUES = -36.30s 180.00, 0.01 s 12.50

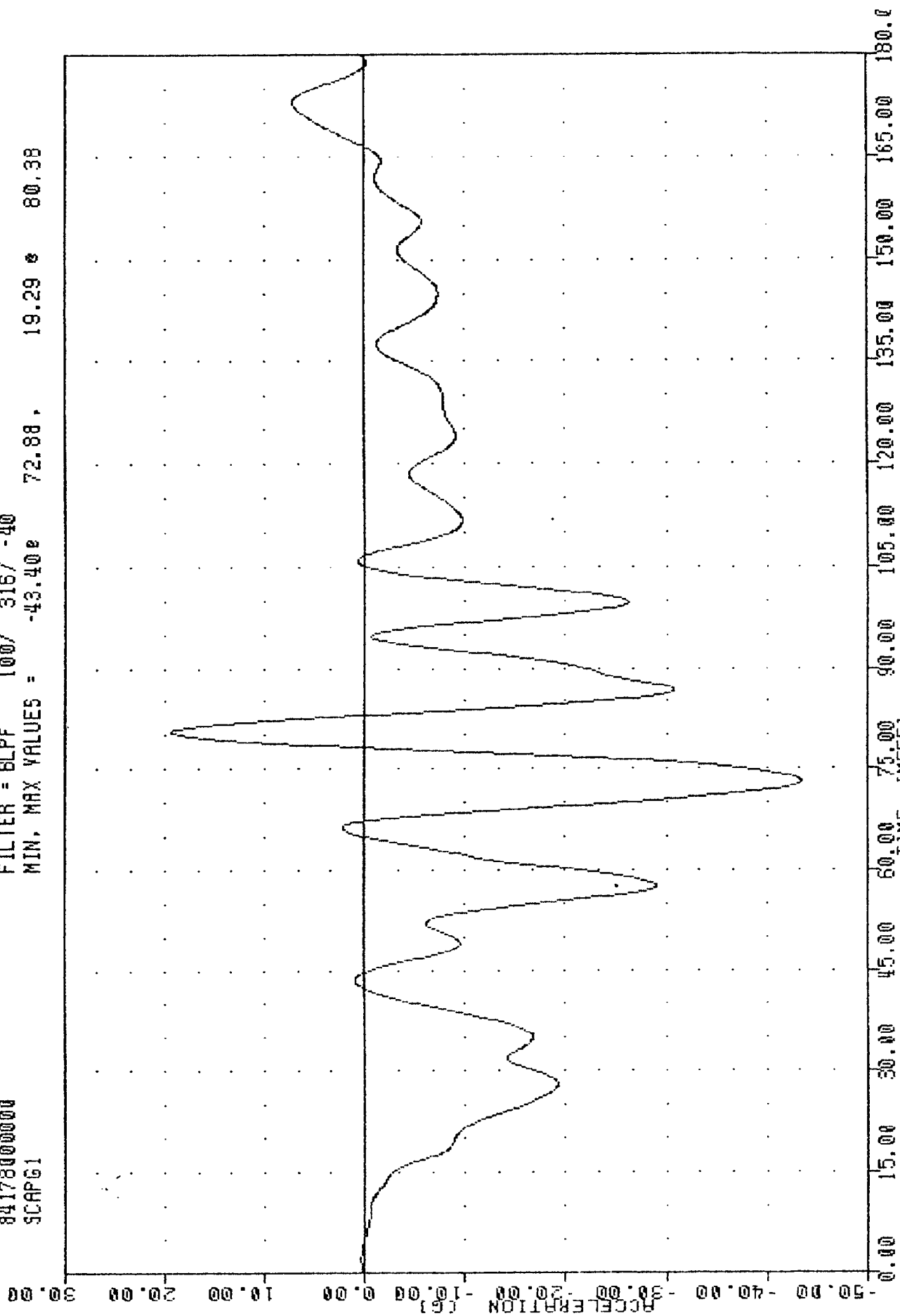


FORD LTD INTO FIXED BARRIER
 DELTA X USING SCAPV2

TRC
BREED AIR BAG PROGRAM
84178000000
SCAPG1

PLOT DATE 16-AUG-84 13:02:39

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -43.40e 72.88, 19.29 e 80.38

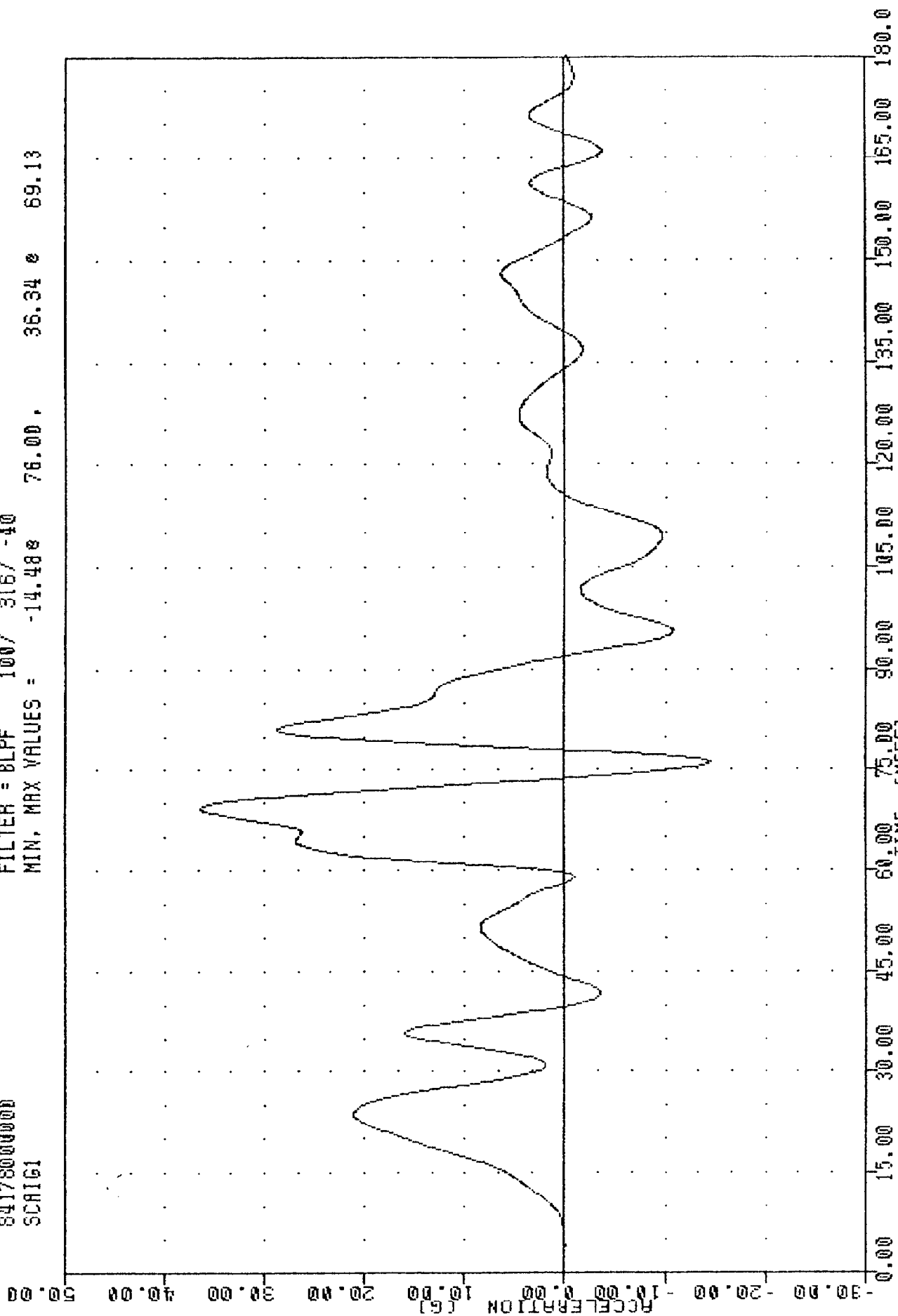


FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER POSTERIOR

TRC
BREED AIR BAG PROGRAM
84178000000
SCA161

PLOT DATE 16-AUG-84 13:02:39

FILTER = 8LPF 100/ 316/ -40
MIN, MAX VALUES = -14.48 76.00, 36.34 69.13

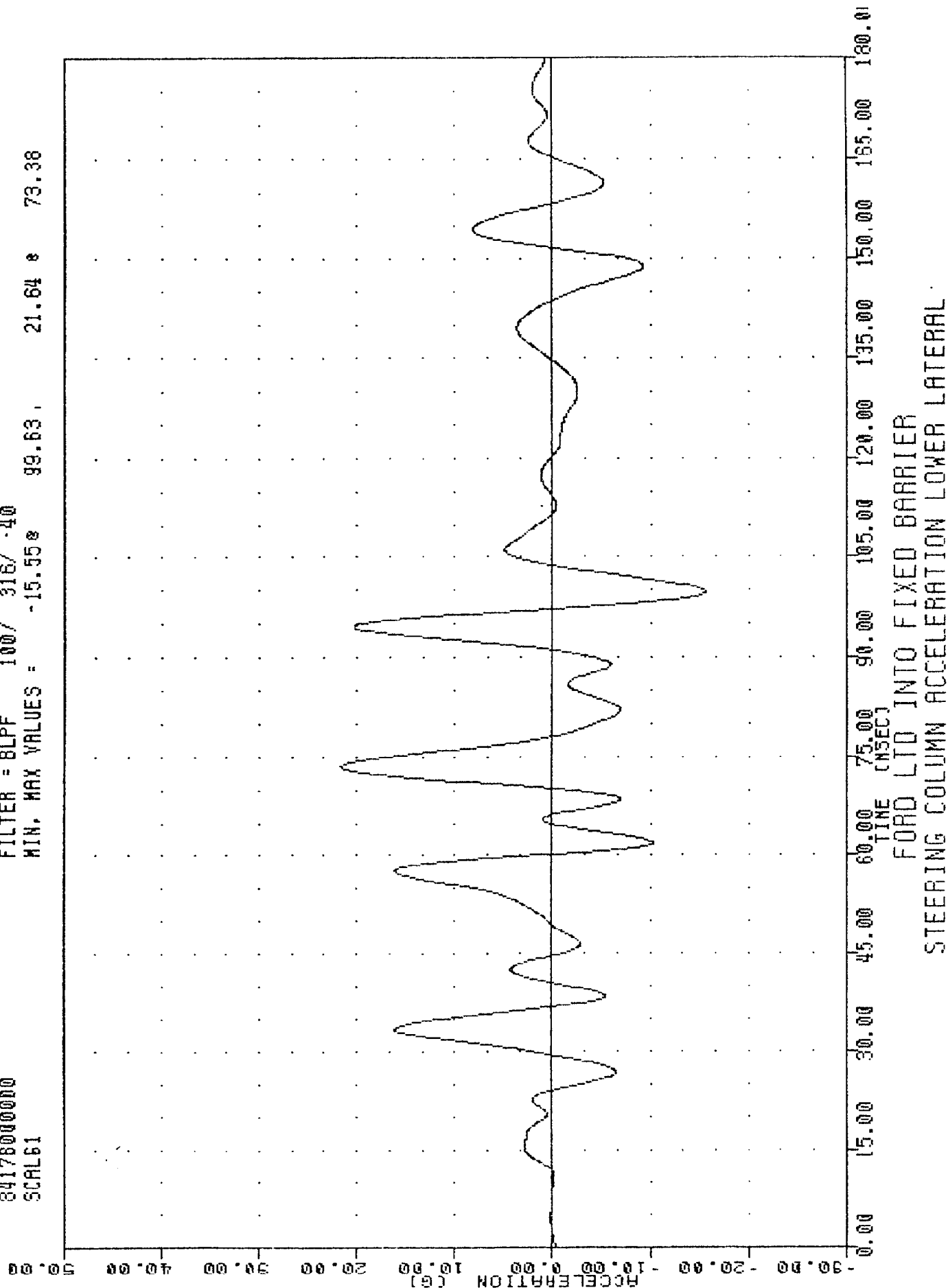


FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER INFERIOR

TAC
BREED AIR BAG PROGRAM
84178000000
SCAL61

PLOT DATE 16-AUG-84 13:02:39

FILTER = 8LPF 100/ 316/ -40
MIN. MAX VALUES = -15.558 99.63 21.64 73.38



TRC

840626

20-AUG-84

15:54:04

BREED AIR BAG PROGRAM

84178000000

SCARG1

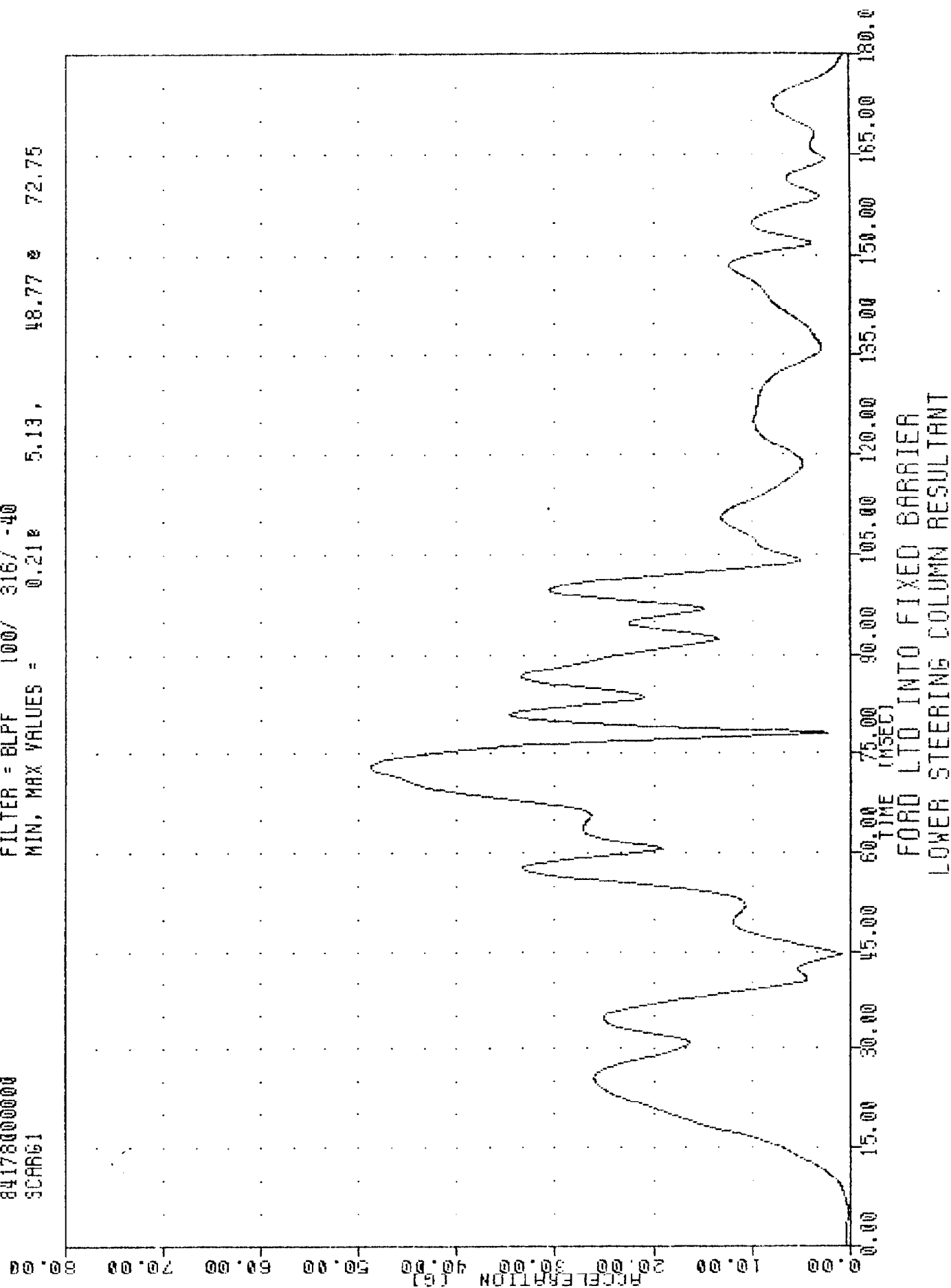
FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = 0.21e

5.13,

48.77 e

72.75

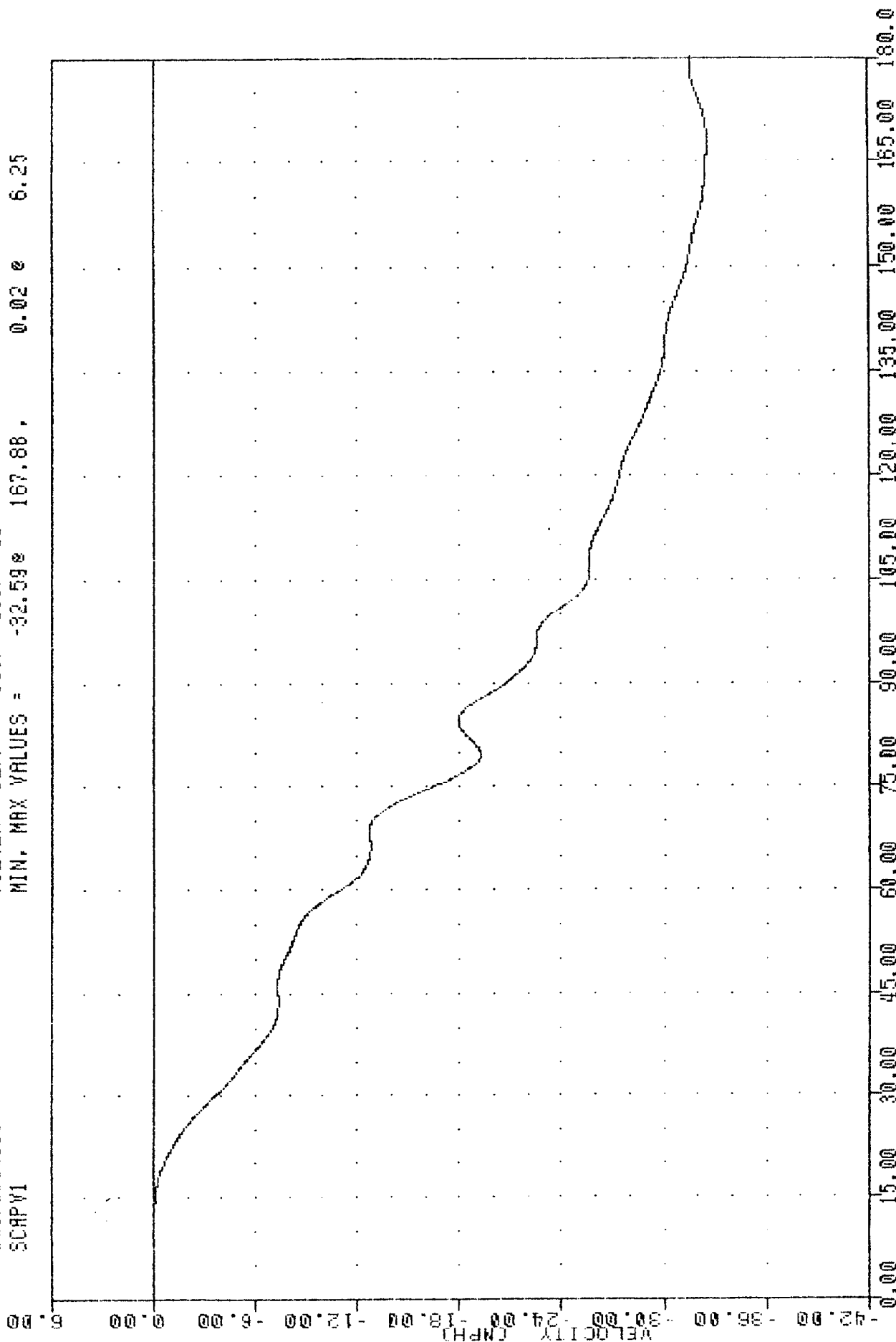


TRC
BREED AIR BAG PROGRAM
84178000000
SCRPV1

PLOT DATE 17-AUG-84 11:40:34

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -32.59 167.88, 0.02 6.25



FORD LTD INTO FIXED BARRIER
DELTA V USING SCAP61

PLOT DATE 17-AUG-84 11:40:34

TAC 840626

BREED AIR BAG PROGRAM

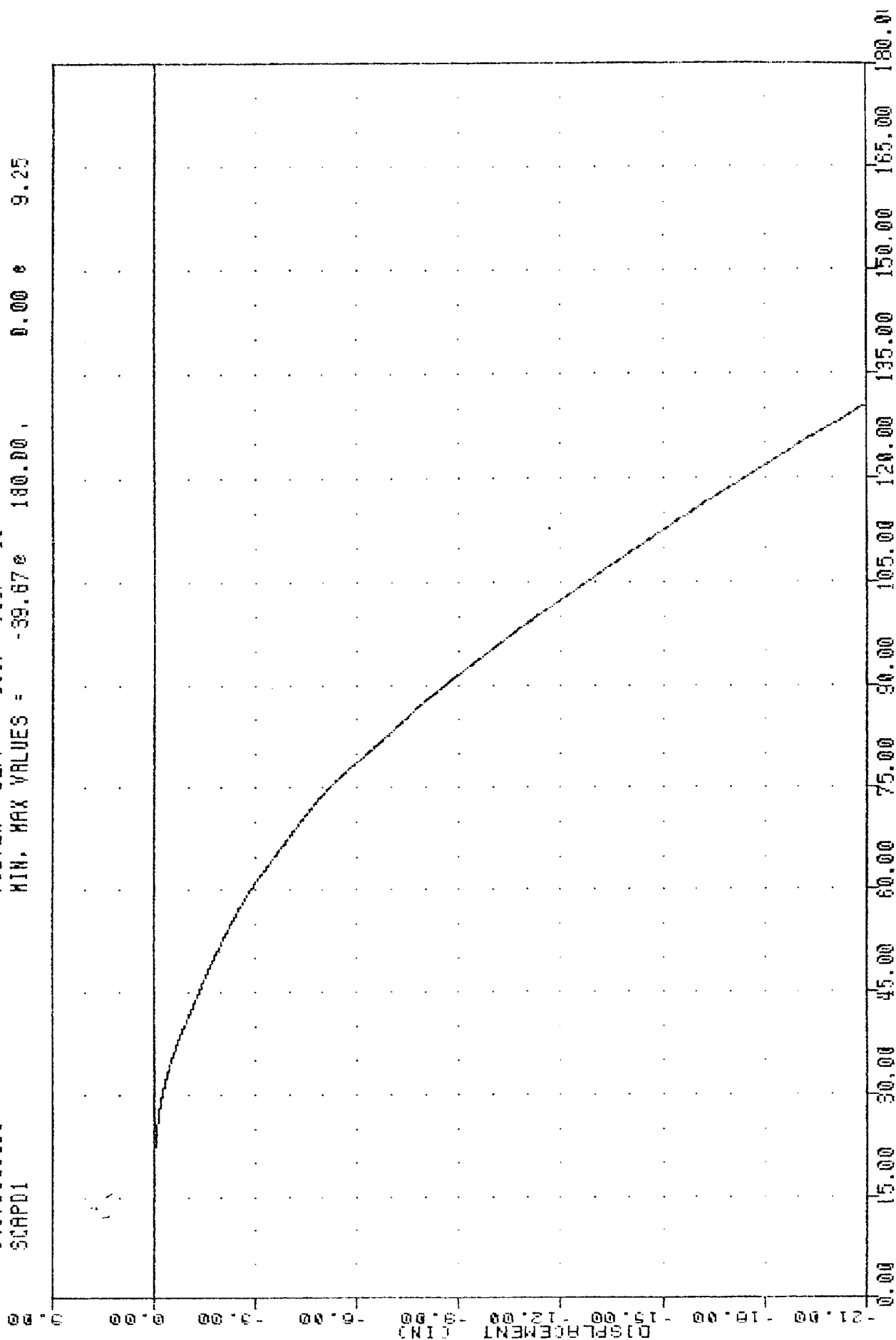
84176000000

SCAPD1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -39.67 180.00

0.00 9.25



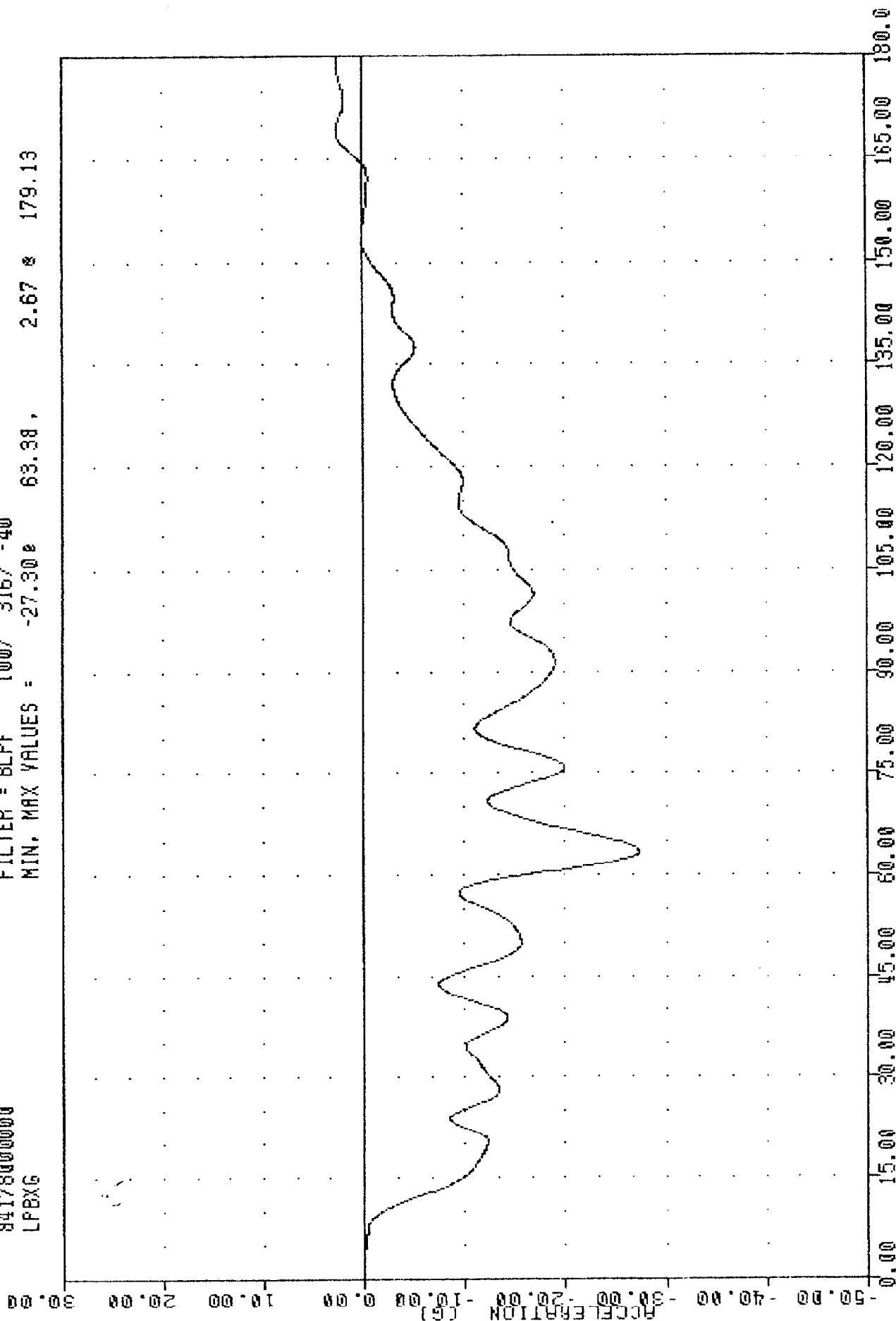
D-31

FORD LTD INTO FIXED BARRIER
DELTA X USING SCAPV1

TRC
BREED AIR BAG PROGRAM
84178000000
LPBXG

PLOT DATE 16-AUG-84 13:02:39

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -27.30e 63.38, 2.67 e 179.13

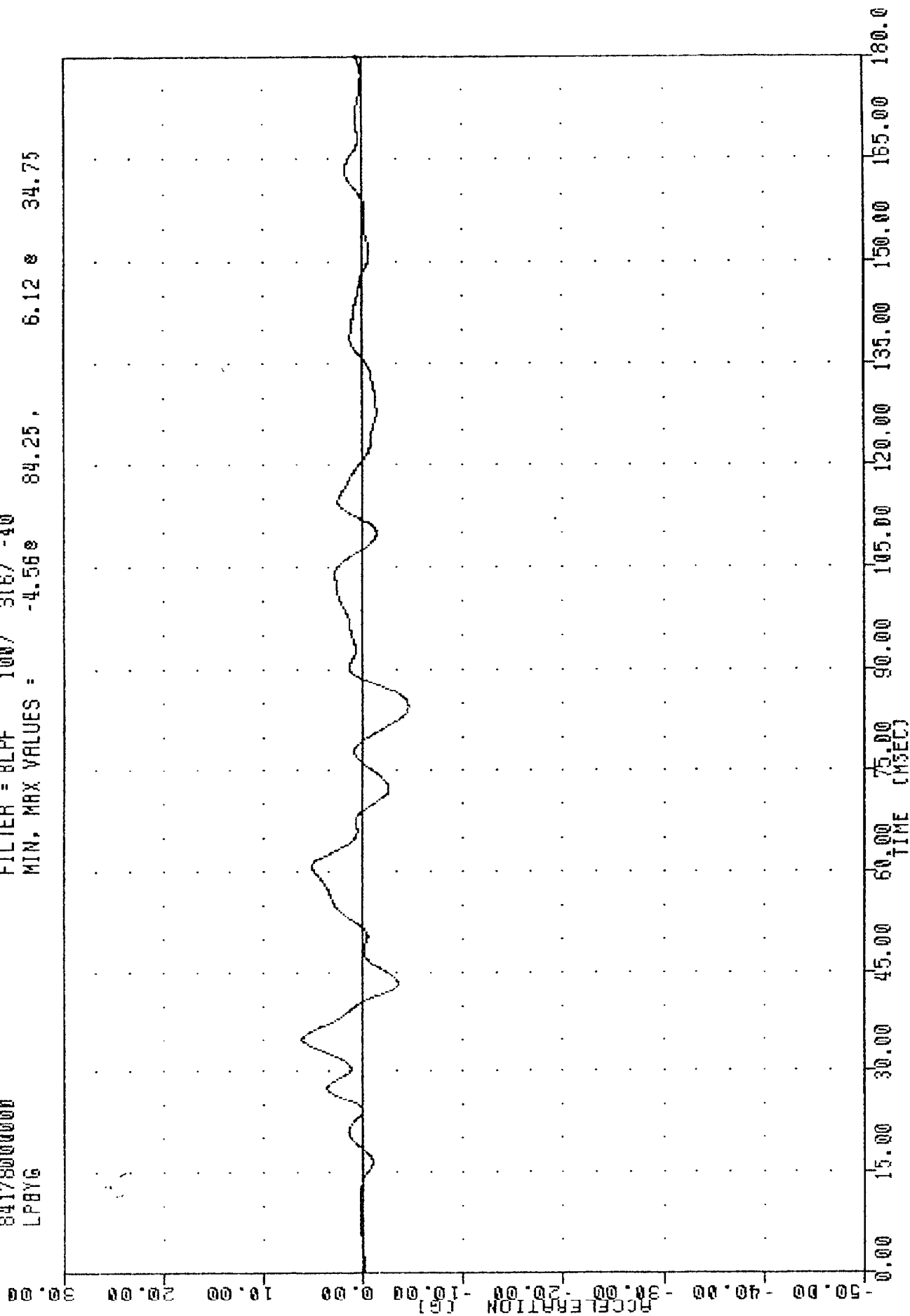


FORD LTD INTO FIXED BARRIER
LEFT B PILLAR ACCELERATION X AXIS

TRC 840625
 BREED AIR BAG PROGRAM
 84178000000
 LPBYG

PLOT DATE 16-AUG-84 13:02:39

FILTER = 8LPF 100/ 316/ -40
 MIN. MAX VALUES = -4.56e 84.25, 6.12 e 34.75

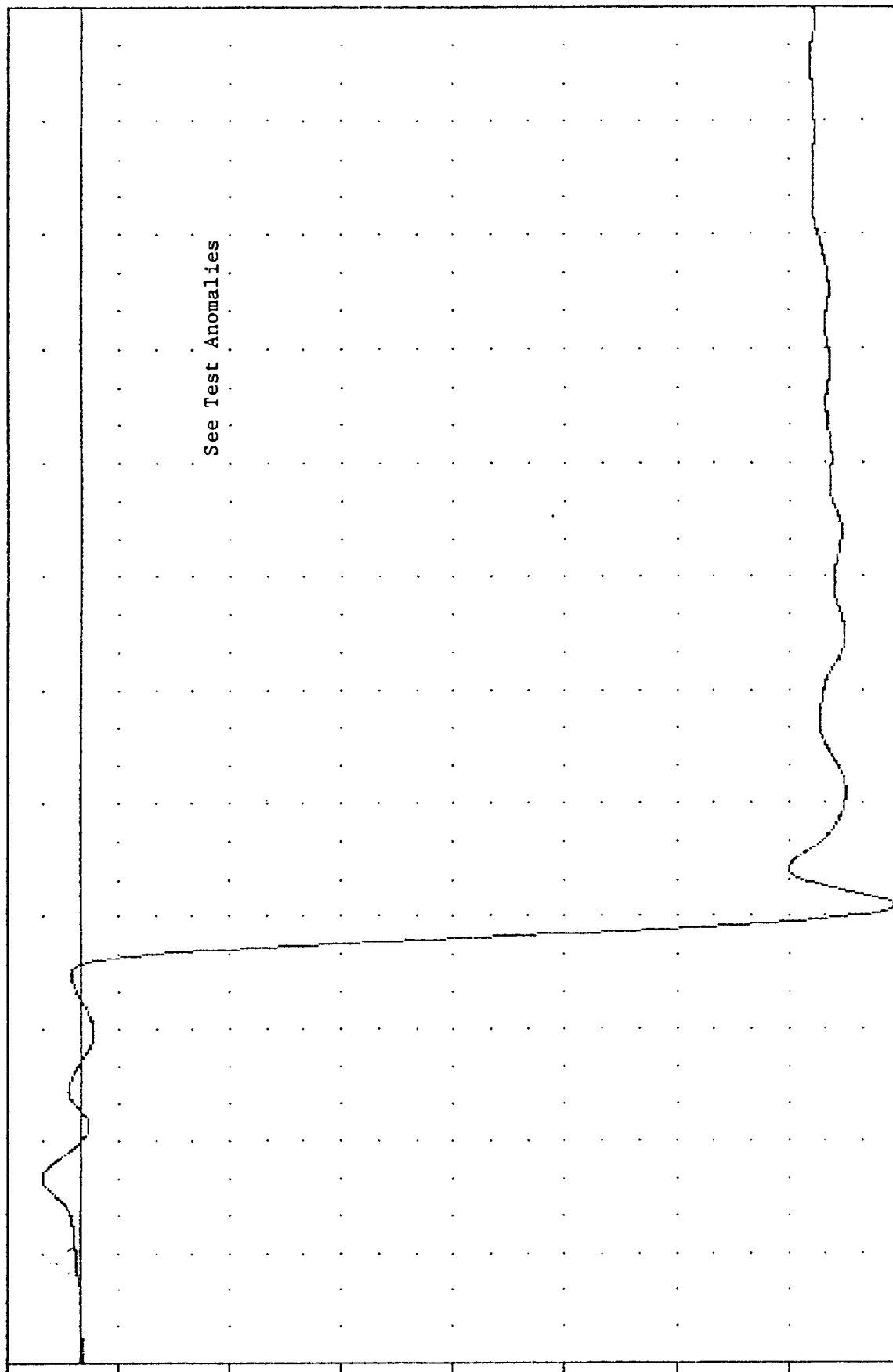


TAC 840626
 BREED AIR BAG PROGRAM
 84178000000
 LPBZ6

PLOT DATE 16-AUG-84 13:02:39

FILTER = BLPF 100/ 316/ .40
 MIN. MAX VALUES = -218.66 61.25 10.53 24.88

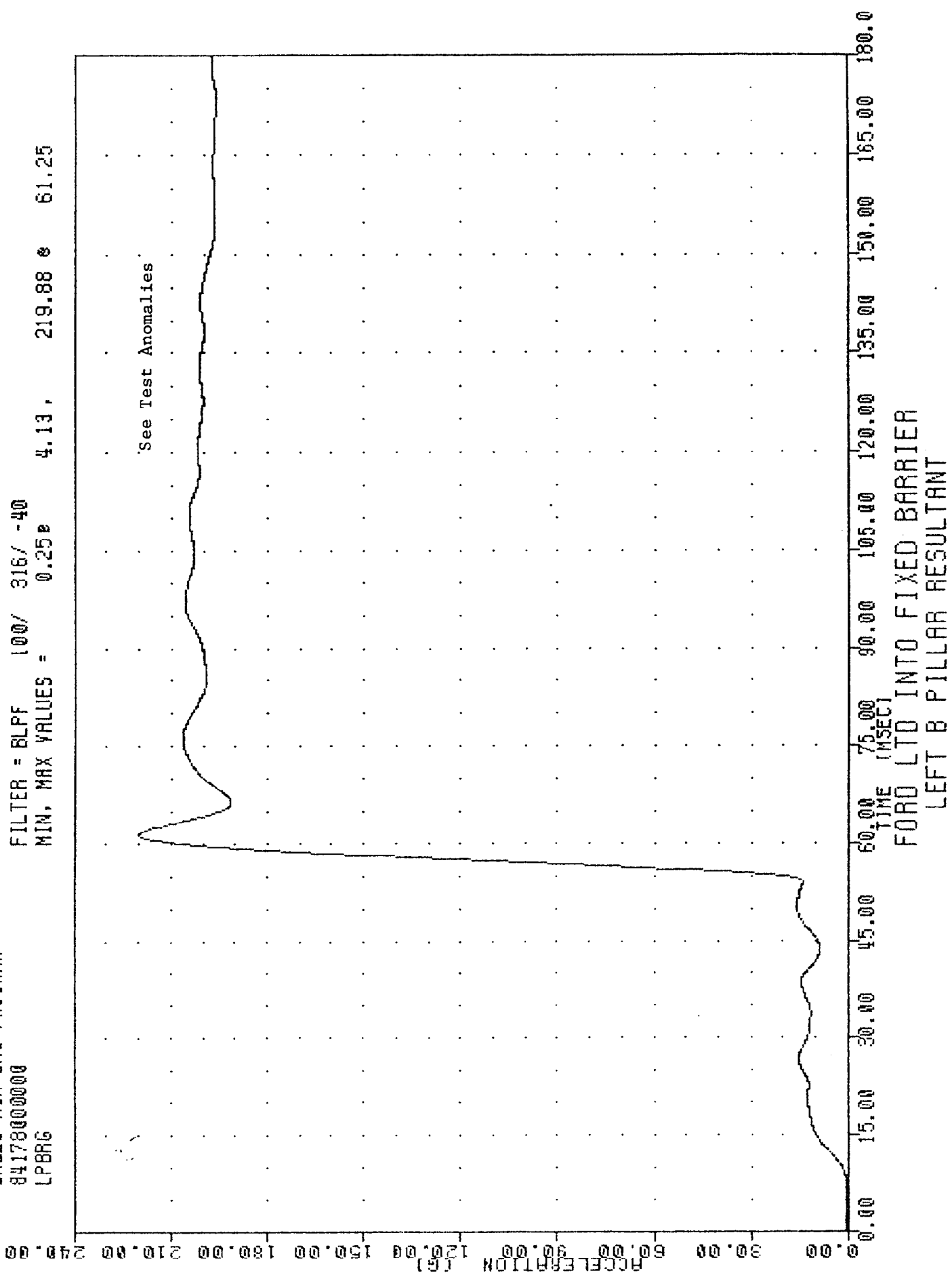
ACCELERATION (G)



0.00 15.00 30.00 45.00 60.00 75.00 90.00 105.00 120.00 135.00 150.00 165.00 180.00
 TIME (MSEC)

FORD LTD INTO FIXED BARRIER
 LEFT B PILLAR ACCELERATION Z AXIS

TRC
 BREED AIR BAG PROGRAM
 84178000000
 LPBRG
 , 840626
 PLOT DATE 16-AUG-84 13:02:39
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = 0.25e 4.13, 219.88 e 61.25



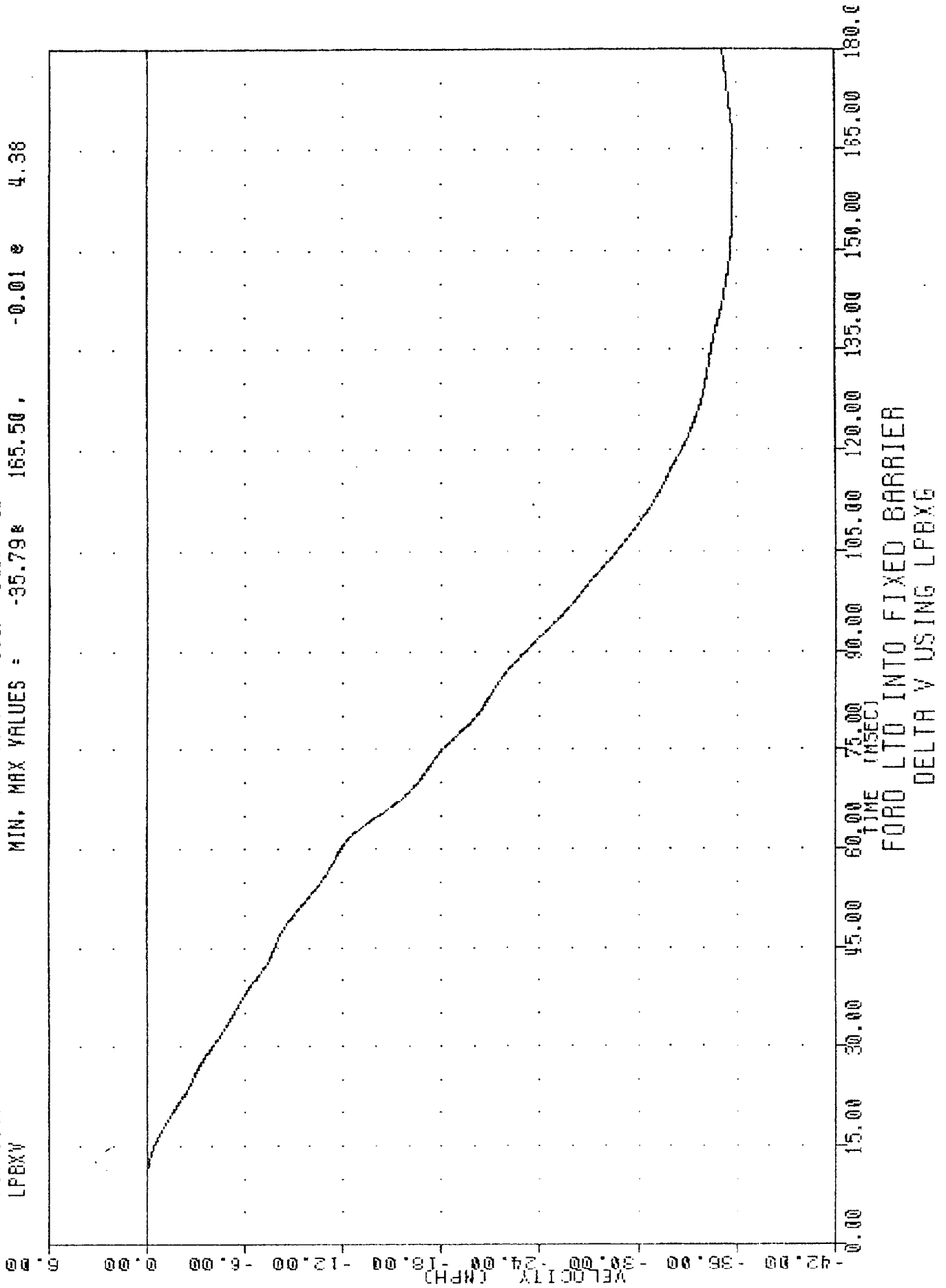
FORD LTD INTO FIXED BARRIER
 LEFT B PILLAR RESULTANT

TRC
840626
BREED AIR BAG PROGRAM
84176000000
LPBXV

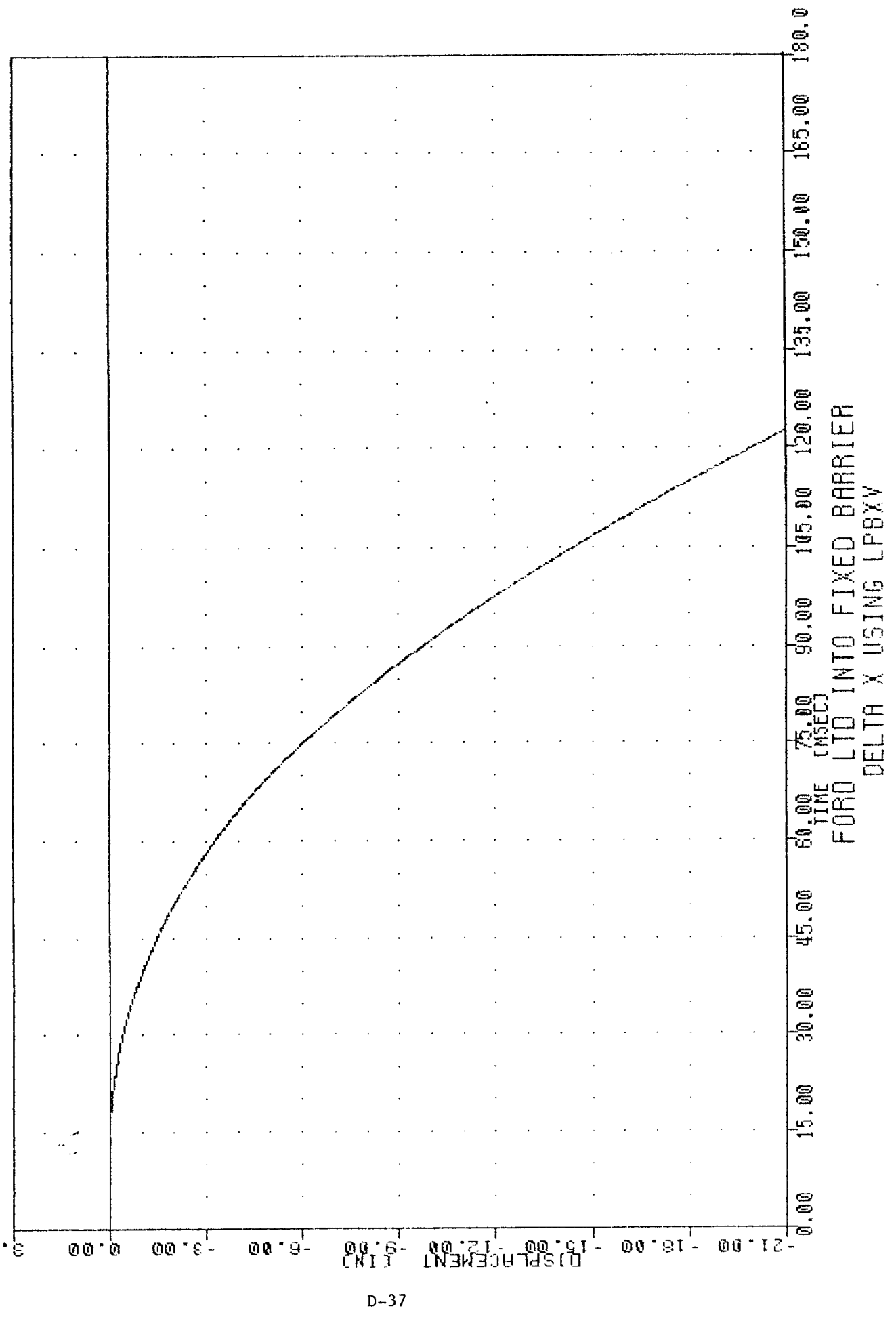
PLOT DATE 17-AUG-84 11:40:34

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -35.79 165.50, -0.01 4.38



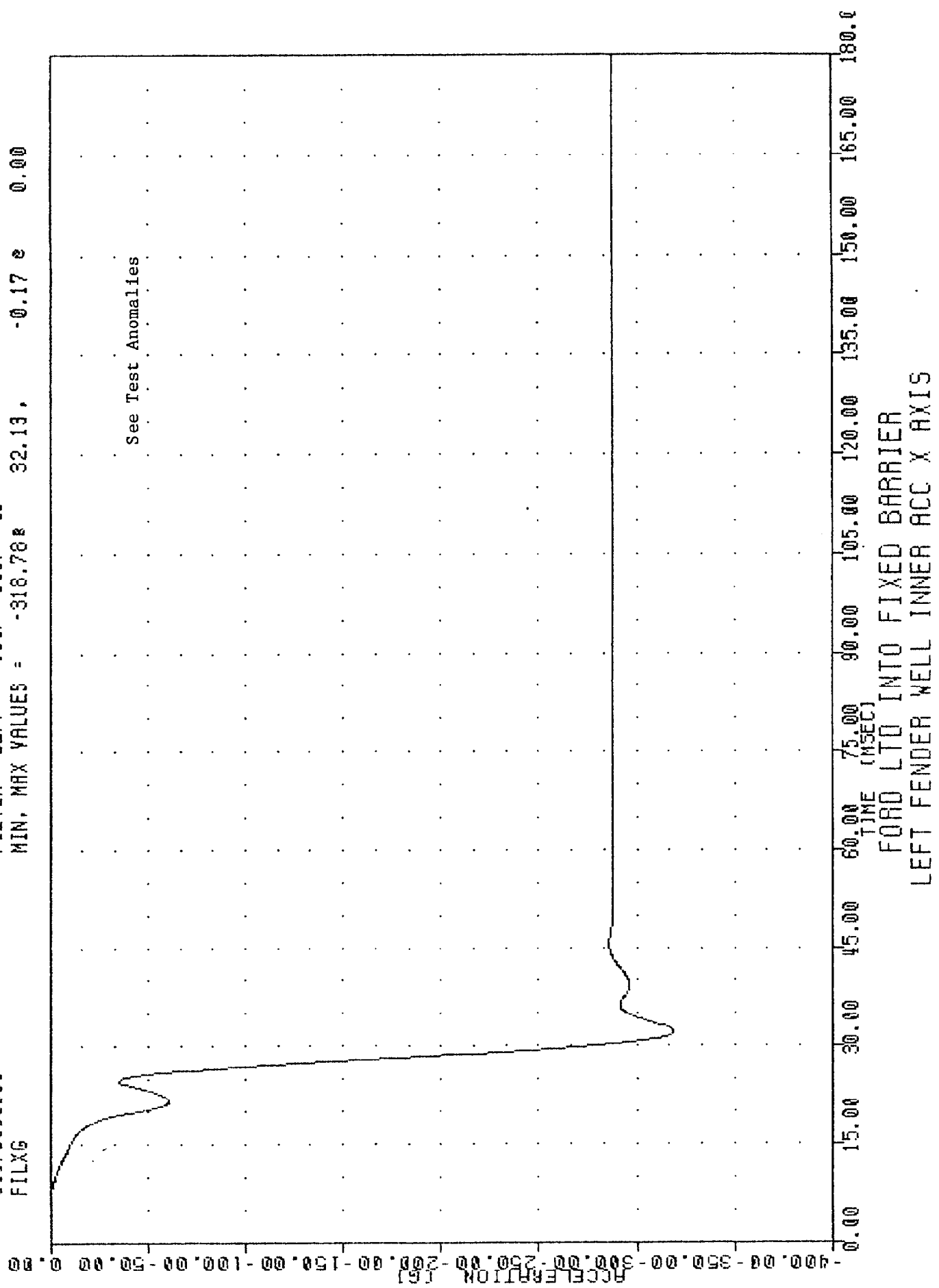
INC 040620
 BREED AIR BAG PROGRAM
 84178000000
 LPBXD
 FILTER = 8LPF 300/ 949/ -40
 MIN. MAX VALUES = -45.278 180.00, 0.00 8 0.00
 PLOT DATE 1/ NOG-84 11:40:34



TRC
BREED AIR BAG PROGRAM
84178000000
FILXG

PLOT DATE 16-AUG-84 13:02:39

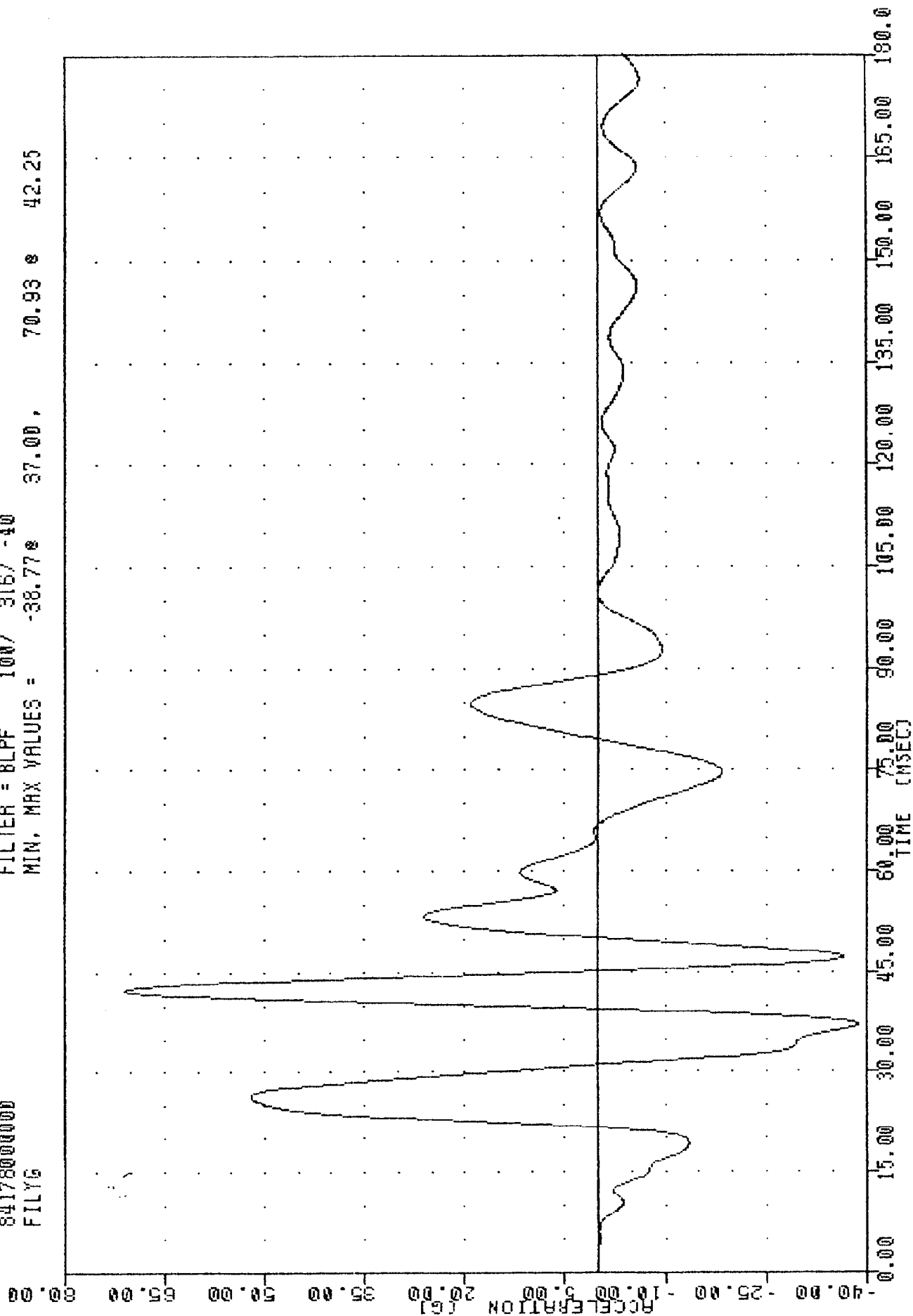
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -318.78 32.13, -0.17 0.00



TRC
840626
BREED AIR BAG PROGRAM
8417800000
FILYG

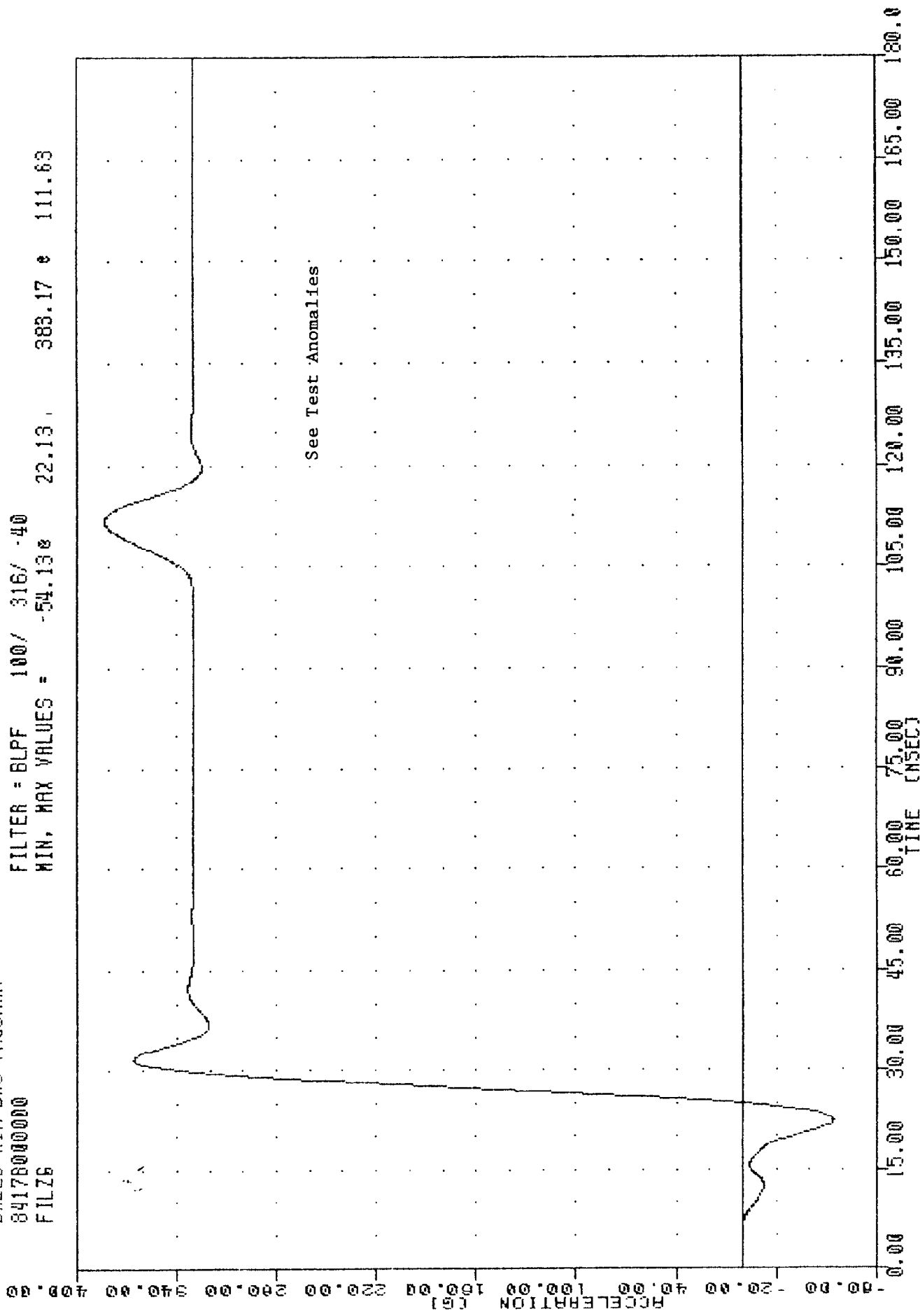
PLOT DATE 16-HUG-84 13:02:39

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -38.77* 37.00, 70.93 * 42.25



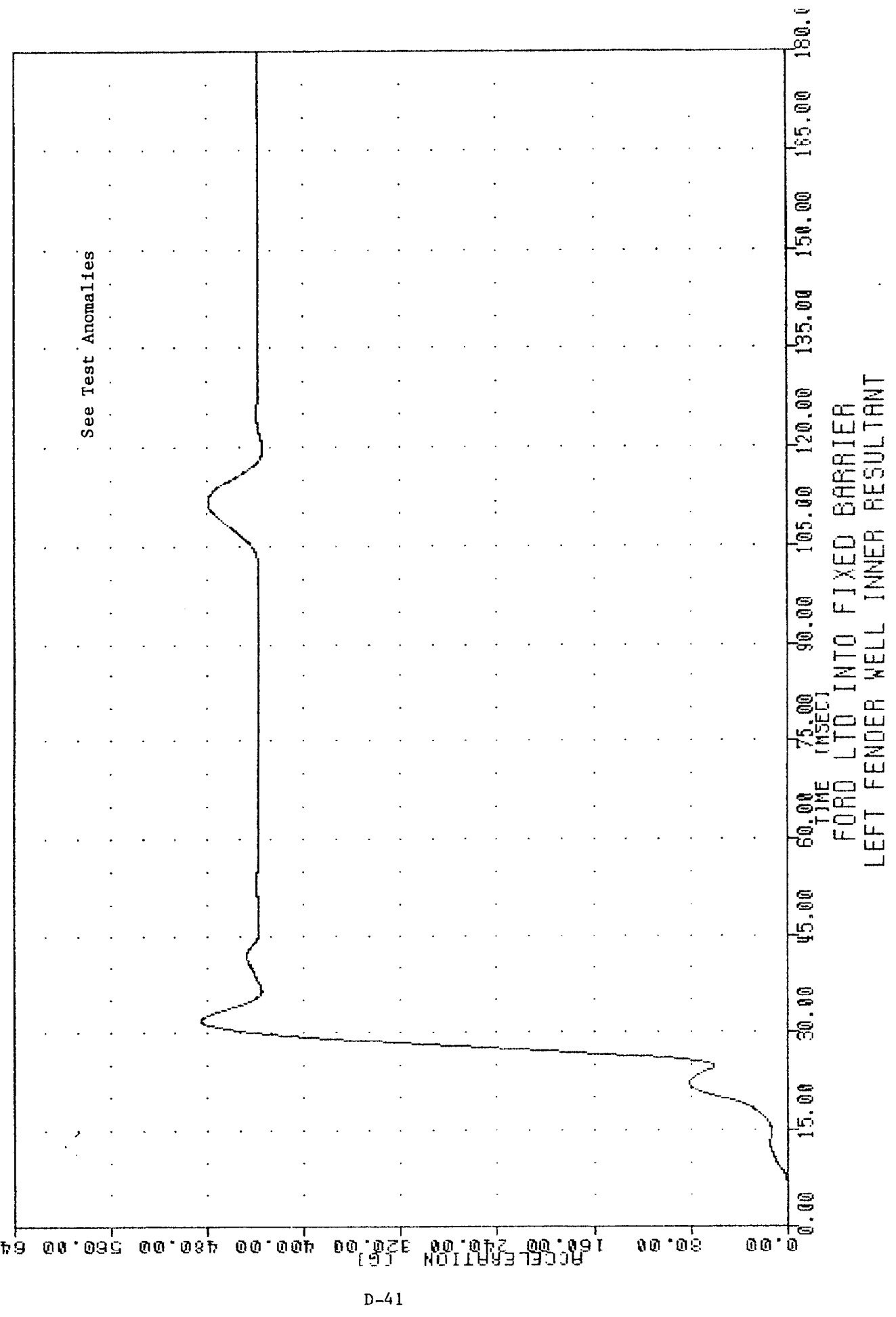
FORD LTD INTO FIXED BARRIER
LEFT FENDER WELL INNER ACC Y AXIS

TMC 040620
 BREED AIR BAG PROGRAM
 84178000000
 FILZ6
 FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -54.13 22.13 383.17 111.63
 PLOT DATE 16 NOV 84 13:02:39



FORD LTD INTO FIXED BARRIER
 LEFT FENDER WELL INNER ACC Z AXIS

TRC
 BREED AIR BAG PROGRAM
 84178000000
 FILRG
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = 0.00, 484.62 s 31.75
 PLOT DATE 16 AUG 84 13:02:59

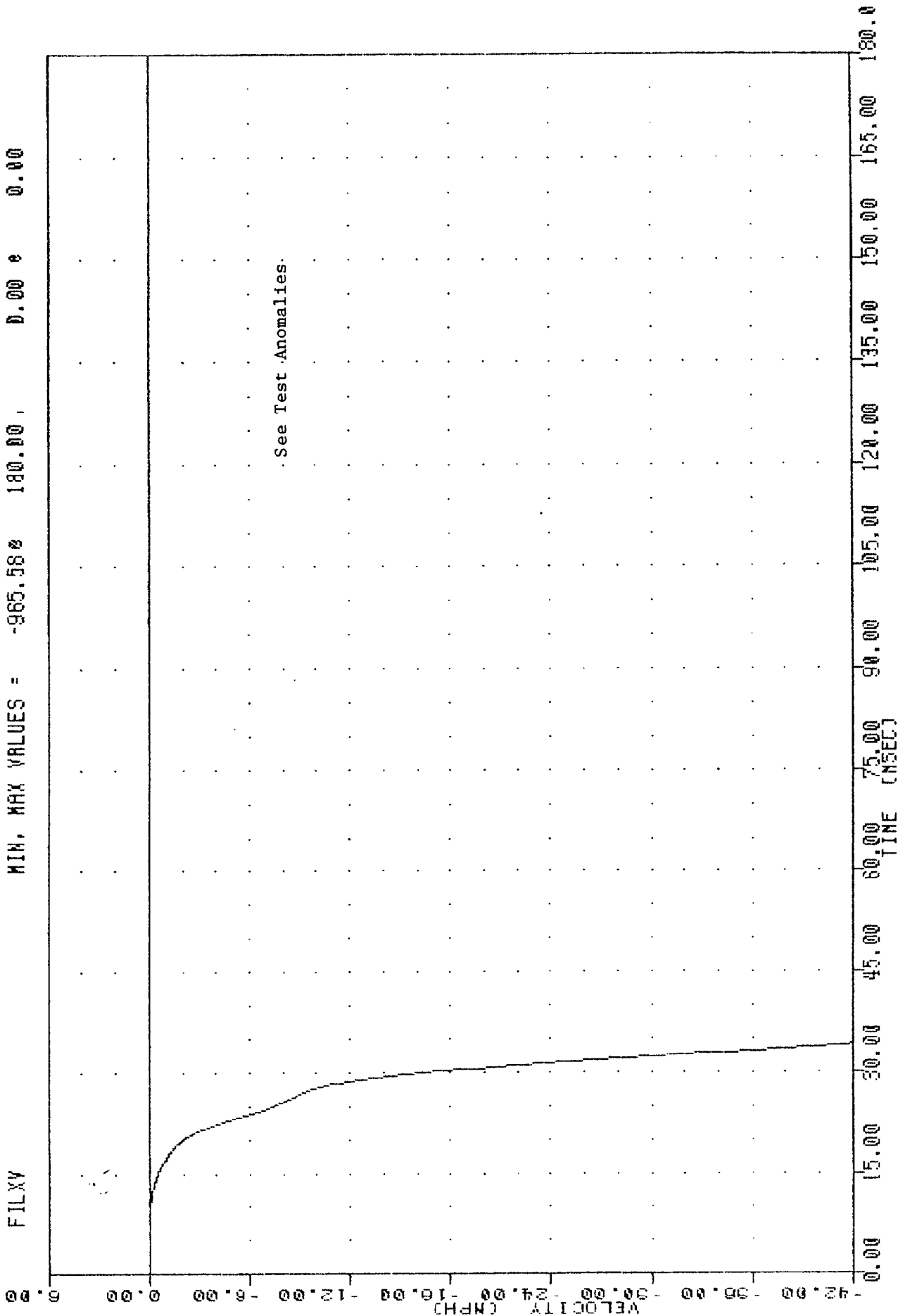


FORD LTD INTO FIXED BARRIER
 LEFT FENDER WELL INNER RESULTANT

TAC
840626
BREED AIR BAG PROGRAM
84178000000
FILXY

PLOT DATE 17-AUG-84 11:40:34

FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -965.582 180.00, 0.00 e 0.00

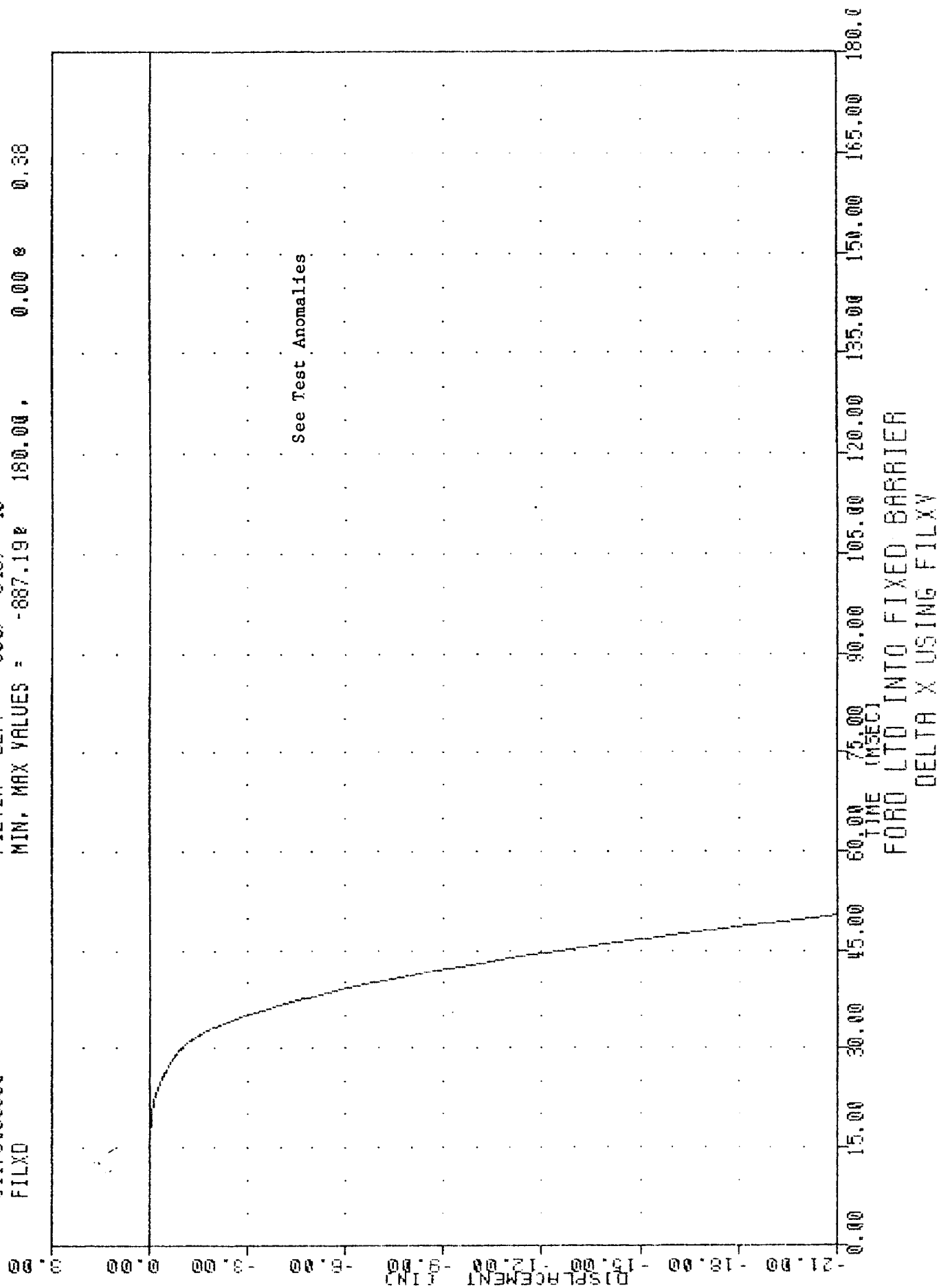


FORD LTD INTO FIXED BARRIER
DELTA V USING FILYG

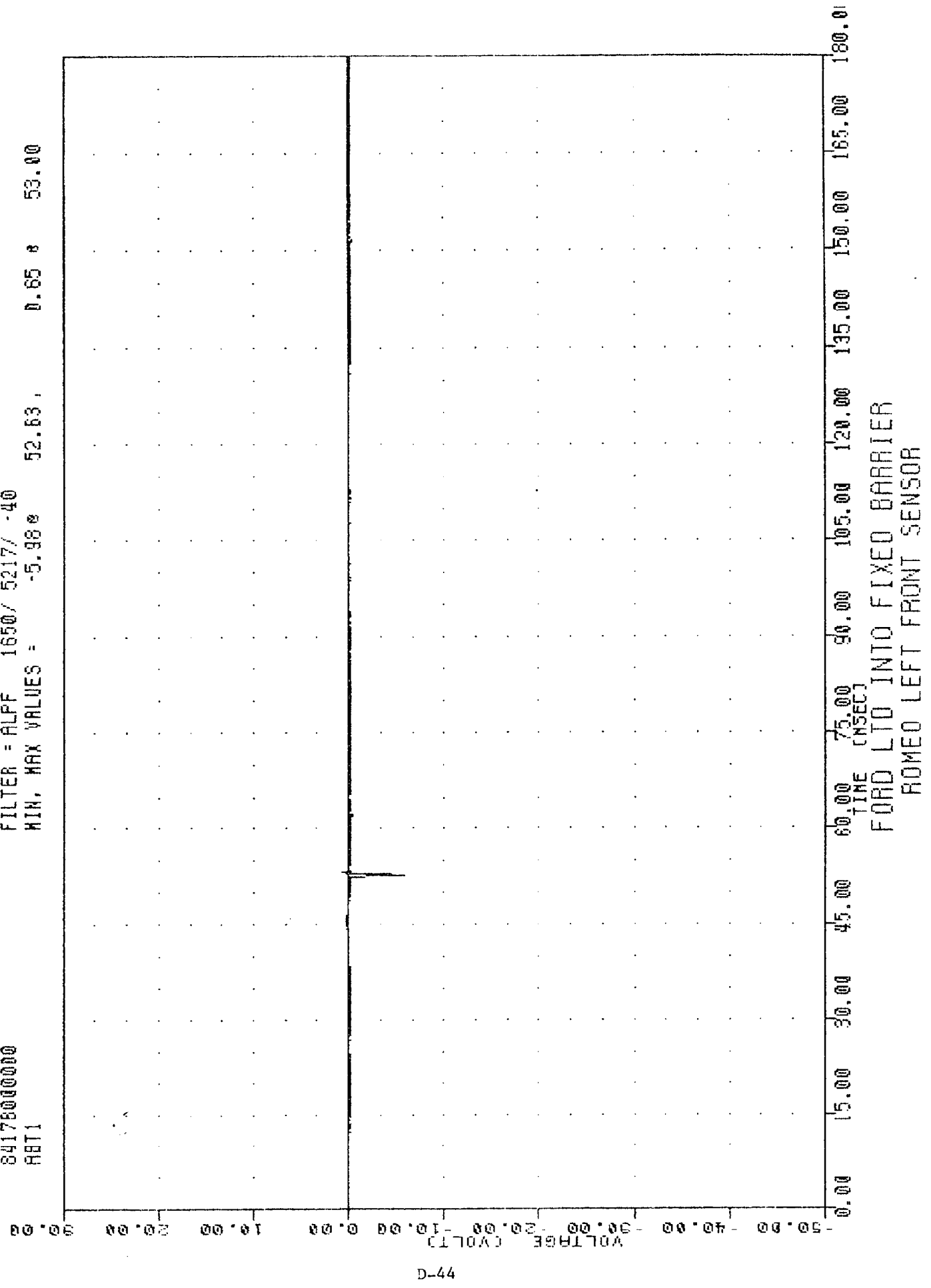
TRC
BREED AIR BAG PROGRAM
84178000000
FILXD

PLOT DATE 17-AUG-84 11:40:34

FILTER = BLPF 300/ 849/ -40
MIN, MAX VALUES = -887.19e 180.00, 0.00 e 0.38

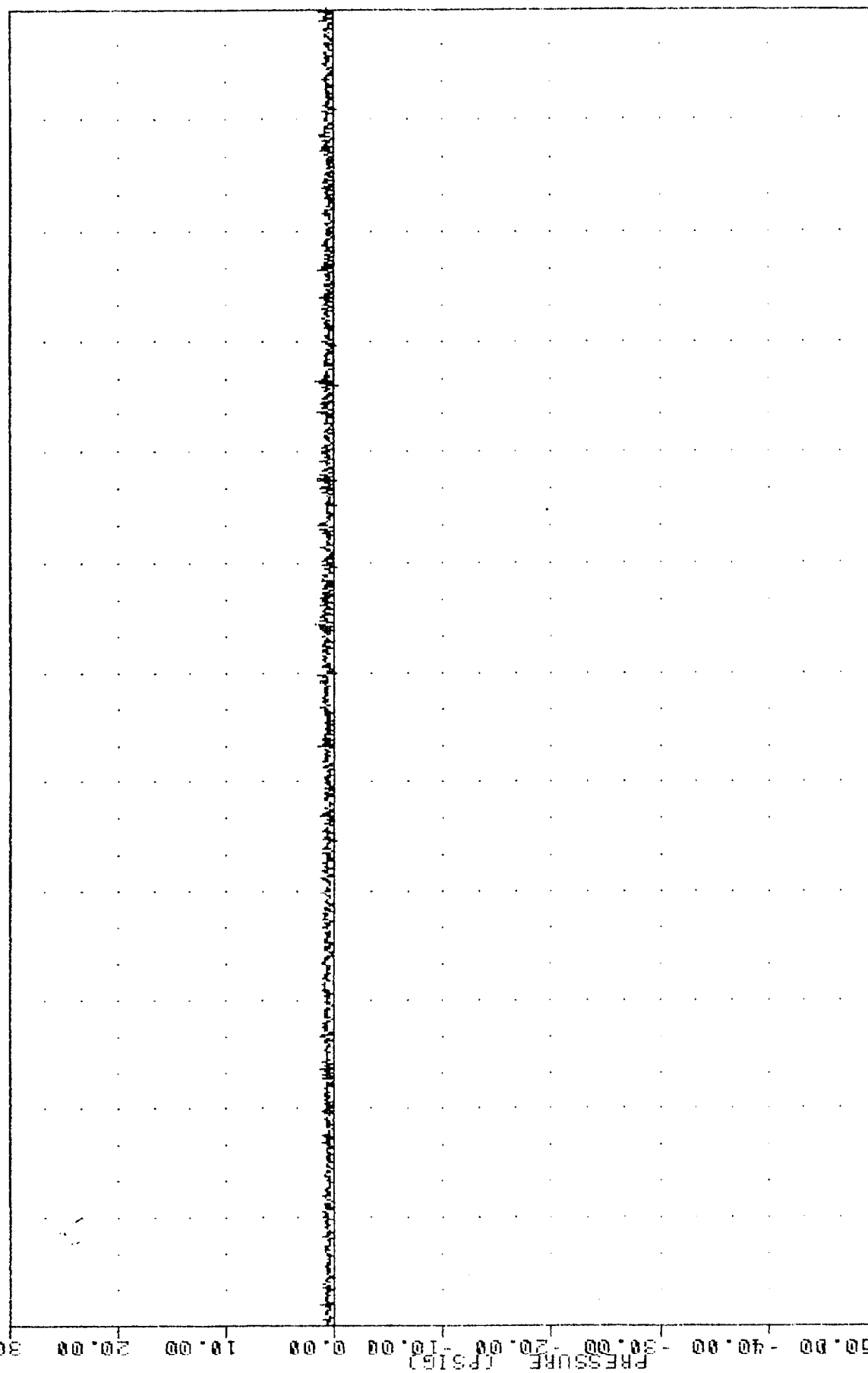


TMC
 BREED AIR BAG PROGRAM
 84178000000
 HBT1
 FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -5.98 52.63 0.65 53.00
 PLOT DATE 16 MAR 84 15:02:33



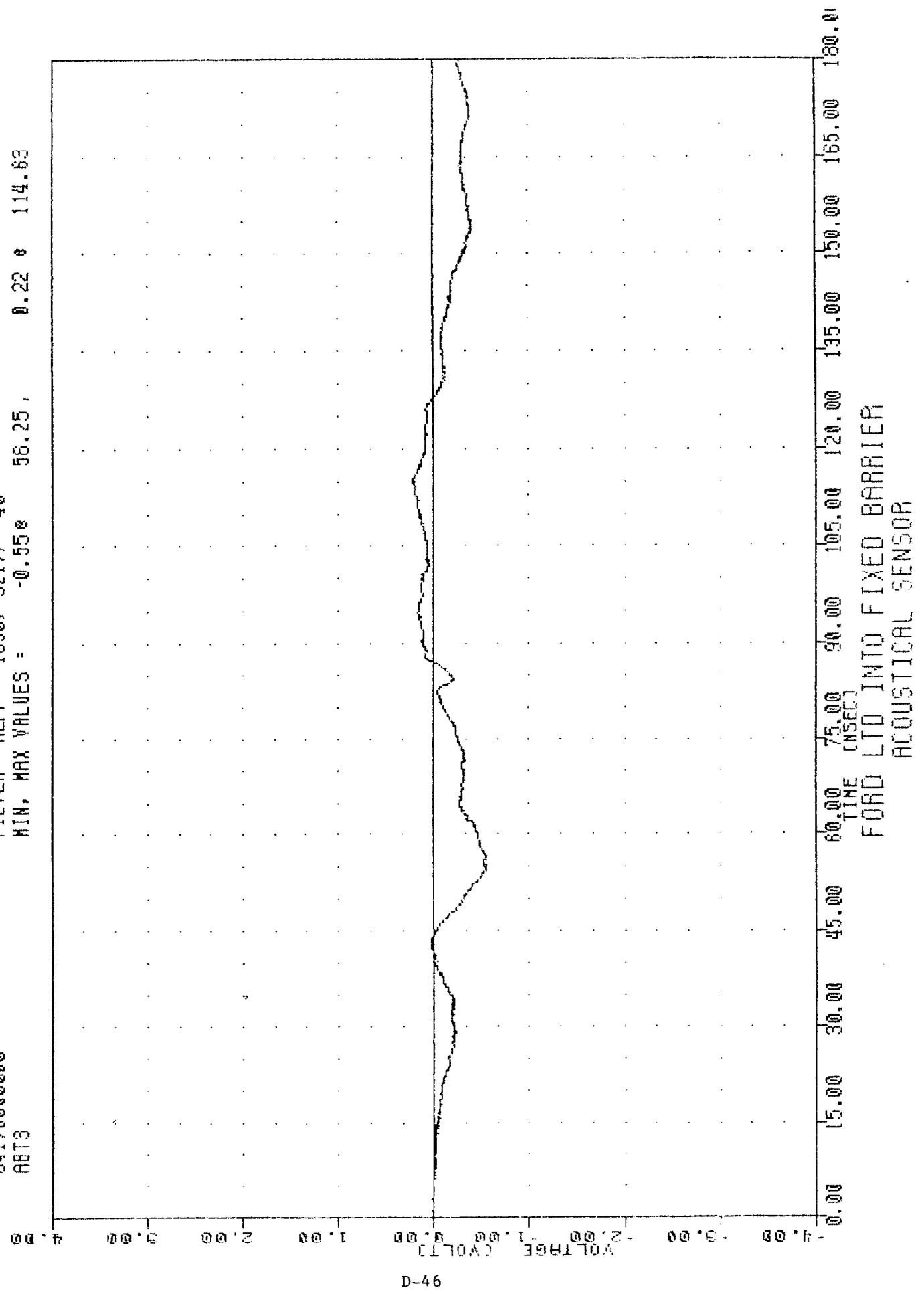
FORD LTD INTO FIXED BARRIER
 ROMEO LEFT FRONT SENSOR

TMC 040620 040620 20 JUN 64 13:38:22
 BREED AIR BAG PROGRAM
 34178000000
 ABT7
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -0.468 129.00, 1.68 96.38



FORD LTD INTO FIXED BARRIER
 PRESSURE TRANSDUCER

TMC
 BREED AIR BAG PROGRAM
 84178000000
 ABT3
 FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -0.55% 58.25, 0.22 & 114.63
 PLOT DATE 20 AUG 84 13:38:22



APPENDIX E
DUMMY CERTIFICATION

TRANSPORTATION RESEARCH CENTER OF OHIO
DUMMY CALIBRATION LABORATORY

MEASUREMENTS, TEST DATA, PARTS IDENTIFICATIONS AND CERTIFICATIONS

PART 572
HYBRID II DUMMY

SERIAL NO.: 187

DATE: June 22, 1984

PART 572 - HYBRID II DUMMY

Serial No.: 187

Date of Calibration: 6-15-84

HEAD DROP TEST

RESULTS

Parameter	Specification	1st Test	2nd Test	3rd Test	Mean
Peak Resultant Accel	<u>210 - 260g</u>	<u>223.70</u>	<u> </u>	<u> </u>	<u> </u>
Peak Lateral Accel	<u>10g max.</u>	<u>-4.95</u>	<u> </u>	<u> </u>	<u> </u>
Time Above 100g (Resultant)	<u>0.9 - 1.5ms</u>	<u>1.30</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78^o F</u>	<u>76</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>51</u>	<u> </u>	<u> </u>	<u> </u>

NECK TEST

RESULTS

Parameter	Specification	1st Test	2nd Test	3rd Test	Mean
Pendulum Velocity	<u>21.5-25.5 fps</u>	<u>23.53</u>	<u> </u>	<u> </u>	<u> </u>
Average Decel t_2-t_3	<u>20 - 24g</u>	<u>23.51</u>	<u> </u>	<u> </u>	<u> </u>
Pendulum Decel t_2-t_1	<u>3 ms max.</u>	<u>1.76</u>	<u> </u>	<u> </u>	<u> </u>
Pendulum Decel t_3-t_2	<u>25 - 30 ms</u>	<u>28.35</u>	<u> </u>	<u> </u>	<u> </u>
Pendulum Decel t_4-t_3	<u>10 ms max.</u>	<u>3.28</u>	<u> </u>	<u> </u>	<u> </u>
Pendulum Reversal	<u>123 ms min.</u>	<u>>123</u>	<u> </u>	<u> </u>	<u> </u>
Peak Head Resultant	<u>26g max.</u>	<u>24.78</u>	<u> </u>	<u> </u>	<u> </u>
Peak Head Rotation	<u>63 - 73^o F</u>	<u>66.70</u>	<u> </u>	<u> </u>	<u> </u>

NECK TEST (continued)RESULTS

Parameter		Specification	1st Test	2nd Test	3rd Test	Mean
Chordal Displacement:						
<u>Head Angle</u>						
0°	Time	2.0 - 2.0ms	0.0			
	Displ	0.5 - 0.5in	.01			
30°	Time	25.6 - 34.4ms	28.08			
	Displ	2.1 - 3.1in	2.38			
60°	Time	40.3 - 51.7ms	43.17			
	Displ	4.3 - 5.3in	4.38			
Max (73°)	Time	53.2 - 66.8ms	57.63			
	Displ	5.0 - 6.0in	5.11			
60°	Time	67.0 - 83.0ms	69.08			
	Displ	4.3 - 5.3in	4.63			
30°	Time	85.4 - 104.6ms	89.24			
	Displ	2.1 - 3.1in	2.24			
0°	Time	101.0 - 123.0ms	102.59			
	Displ	0.5 - 0.5in	.15			
Temperature		66 - 78° F	72			
Relative Humidity		10 - 70%	54			

ABDOMINAL COMPRESSION TESTRESULTS

Parameter	Specification	1st Test	2nd Test	3rd Test	Mean
Force at 0.0 in	10 lbs.	10			
Force at 1.0 in	50 - 63 lbs.	54.8			
Force at 1.3 in	73 - 88 lbs.	78.7			
Temperature	66 - 78° F	76			
Relative Humidity	10 - 70%	51			

THORAX IMPACT TESTRESULTS

Parameter	Specification	1st Test	2nd Test	3rd Test	Mean
<u>High Speed:</u>					
Probe Velocity	<u>21.78-22.22fps</u>	<u>22.22</u>	<u> </u>	<u> </u>	<u> </u>
Peak Sternum					
Deflection	<u>1.7 in. max.</u>	<u>1.68</u>	<u> </u>	<u> </u>	<u> </u>
Peak Resistive Force	<u>2250 lb. max.</u>	<u>1889</u>	<u> </u>	<u> </u>	<u> </u>
Internal Hysteresis	<u>50 - 70%</u>	<u>53.4</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78° F</u>	<u>74</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>46</u>	<u> </u>	<u> </u>	<u> </u>
<u>Low Speed:</u>					
Probe Velocity	<u>13.86-14.14fps</u>	<u>14.04</u>	<u> </u>	<u> </u>	<u> </u>
Peak Sternum					
Deflection	<u>1.1 in. max.</u>	<u>1.076</u>	<u> </u>	<u> </u>	<u> </u>
Peak Resistive Force	<u>1450 lb. max.</u>	<u>1221</u>	<u> </u>	<u> </u>	<u> </u>
Internal Hysteresis	<u>50 - 70%</u>	<u>52.9</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78° F</u>	<u>73</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>45</u>	<u> </u>	<u> </u>	<u> </u>

LUMBAR FLEXION TESTRESULTS

Parameter	Specification	1st Test	2nd Test	3rd Test	Mean
Force at 20°	<u>22 - 34 lbs</u>	<u>31</u>	<u> </u>	<u> </u>	<u> </u>
Force at 30°	<u>34 - 46 lbs</u>	<u>40</u>	<u> </u>	<u> </u>	<u> </u>
Force at 40°	<u>46 - 58 lbs</u>	<u>49</u>	<u> </u>	<u> </u>	<u> </u>
Return Angle	<u>12° max.</u>	<u>6.2</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78° F</u>	<u>76</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>51</u>	<u> </u>	<u> </u>	<u> </u>

RIGHT KNEE IMPACT RESPONSERESULTS

<u>Parameter</u>	<u>Specification</u>	<u>1st Test</u>	<u>2nd Test</u>	<u>3rd Test</u>	<u>Mean</u>
Probe Velocity	<u>6.76-7.04fps</u>	<u>6.83</u>	<u> </u>	<u> </u>	<u> </u>
Peak Force	<u>1850-2500lbs</u>	<u>1996</u>	<u> </u>	<u> </u>	<u> </u>
Time Above 1000 Lbs.	<u>1.7 ms min.</u>	<u>1.85</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78° F</u>	<u>74</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>45</u>	<u> </u>	<u> </u>	<u> </u>

LEFT KNEE IMPACT RESPONSERESULTS

<u>Parameter</u>	<u>Specification</u>	<u>1st Test</u>	<u>2nd Test</u>	<u>3rd Test</u>	<u>Mean</u>
Probe Velocity	<u>6.76-7.04fps</u>	<u>6.84</u>	<u> </u>	<u> </u>	<u> </u>
Peak Force	<u>1850-2500lbs</u>	<u>2213.4</u>	<u> </u>	<u> </u>	<u> </u>
Time Above 1000 Lbs.	<u>1.7 ms min.</u>	<u>1.84</u>	<u> </u>	<u> </u>	<u> </u>
Temperature	<u>66 - 78° F</u>	<u>74</u>	<u> </u>	<u> </u>	<u> </u>
Relative Humidity	<u>10 - 70%</u>	<u>46</u>	<u> </u>	<u> </u>	<u> </u>

TRANSPORTATION RESEARCH CENTER OF OHIO
EXTERNAL DIMENSIONS
50TH PERCENTILE ADULT MALE (PART 572)

Dummy S/N 187

Manufacturer _____

Date 13 June 1984

Description	Specification	Actual
Sitting Height	35.7" $\pm$.1"	35.65
Shoulder Pivot Height	22.1" $\pm$.3"	22.4"
Hip Pivot Height	3.9" (ref.)	3.9"
Hip Pivot From Backline	4.8" (ref.)	4.8"
Knee Pivot From Backline	20.4" $\pm$.3"	20.5"
Rear of Head From Backline	1.7" (ref.)	1.7"
Chest Depth	9.3" $\pm$.2"	9.5"
Shoulder Width	18.1" $\pm$.3"	18.2"
Chest Circumference Over Nipples	37.4" $\pm$.6"	37.7"
Waist Circumference at Min. Girth	32.0" $\pm$.6"	32.0"
Hip Width	14.7" $\pm$.7"	14.9"
Knee Pivot From Floor	19.6" $\pm$.3"	19.5"

Pass/Fail Pass

COMMENTS: Adjust height by adding spacer. 35.5"/35.65"

Technician _____ Date _____

Test Engineer Mike Bode Date _____