

Report No. UM-HSRI-82-33-2

QUANTIFICATION OF THORACIC RESPONSE AND INJURY:  
THE GATHERING OF DATA  
APPENDIX A. INDIVIDUAL TEST REPORTS.  
VOLUME I.

FINAL REPORT. CONTRACT DOT-HS-4-00921

Prepared by:

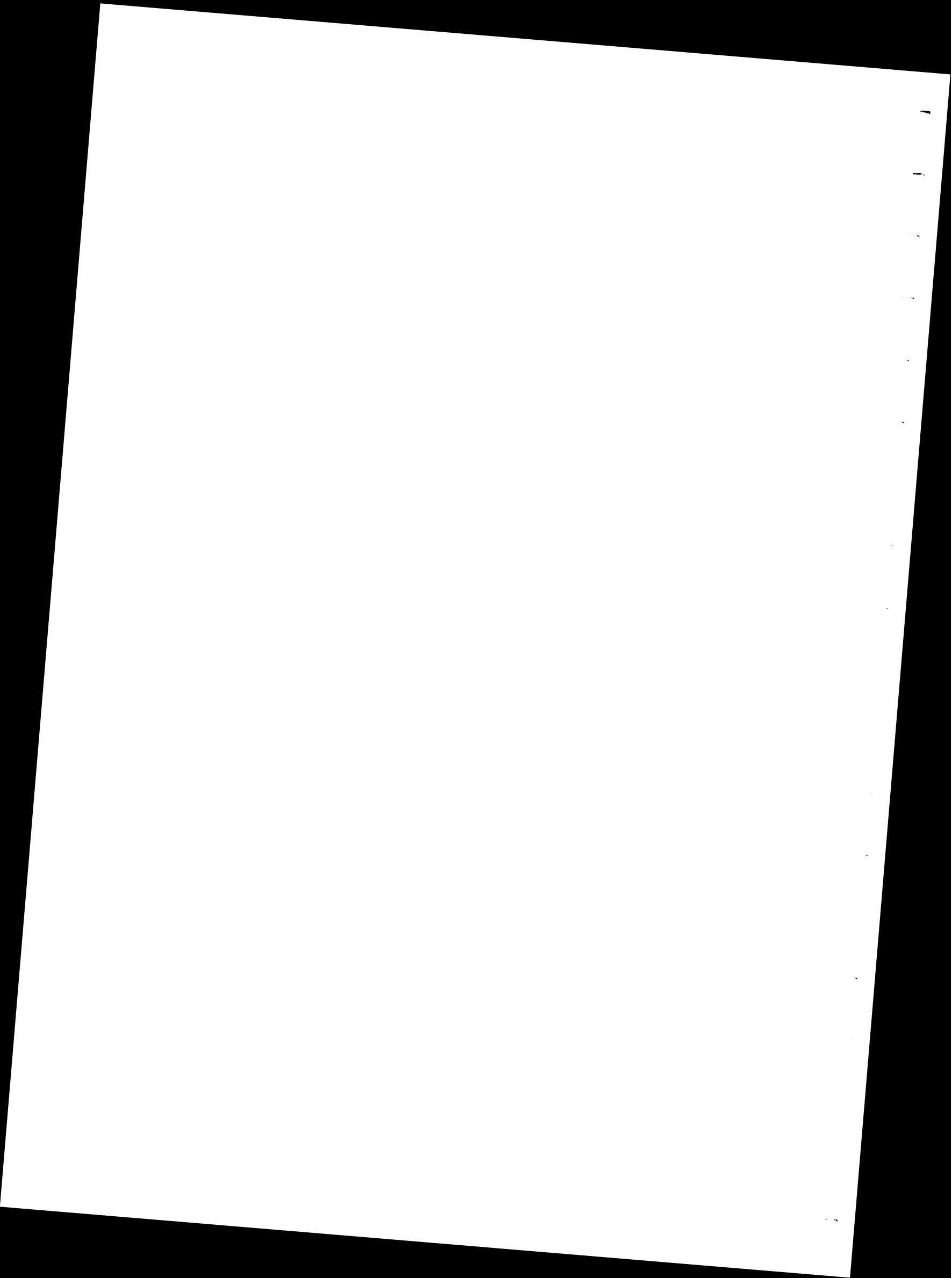
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16. Abstract  This report is Appendix A to the main report entitled "Quantification of Thoracic Response and Injury. The Gathering of Data." Included are individual test descriptions, autopsy results, analog data, and filtered data. In addition to the main report and Appendix A, there is an Appendix B which contains data from rib strength tests. This package of reports presents methods and results for a series of 84 thorax impact tests using human cadaver subjects.					
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## INTRODUCTION. APPENDIX A.

The following pages constitute a complete set of transducer and autopsy data for all of the cadaver tests performed in this project. All test types are included: sled and pendulum; frontal, side and tap. The data are presented in the order in which the tests were performed.

At the time each test was performed, it was assigned a "test number." For the earliest tests (1975), this was the letter "A", followed by a three digit number. The 1975 cadaver tests for this project are in a broken series from A-867 through A-937. Later tests are numbered with a two-digit year identifier ("76", eg), a single letter ("T", for "Thorax" tests), and a three digit number. All tests for this project subsequent to 1975 were numbered in sequence, irrespective of year, hence 76T065 (the last test of 1976) is immediately succeeded by 77T066.

The following data are supplied for each cadaver test:

- a. a test result summary,
- b. an autopsy results summary,
- c. detailed autopsy finding diagrams (as needed),
- d. plots of transducer channels made directly from the analog tape, interpreted and scaled ("Brush recordings"), and
- e. plots made from the digitized, filtered and scaled transducer data, generated and plotted by computer (BSORT Plots), along with interpretive listings of these data.

The test and autopsy summary sheets need no further elaboration.

The autopsy diagrams were made on the basis of records, notes and drawings made at the time of the autopsy along with photographs of specific injuries also taken as the autopsy progressed.

The Brush recordings were made shortly after the test was performed. The analog tape(s) containing the transducer data were played back at





reduced speed, and the tape drive's output was fed directly into the Brush recorder. These data were then scaled, and the values of interesting peaks were recorded on the chart. They were then cut to size, assembled into a presentable form, and labelled with test number and channel name. An arrow, indicating direction of time flow, with a length equivalent to 100 msec was drawn in at the bottom of the presentation page.

Computer generated plots were prepared from the digitized, filtered and scaled transducer data. Each trace on these plots represents one transducer channel from one test. To the left of each trace is a scale from which the signal magnitude can be derived. The numeric value next to the bar is the number of units of signal magnitude per division on the bar. To the right of each trace is its channel number. Time scales in milliseconds and number of points are given at the bottom and top, respectively. The time origin is the arbitrary start-of-digitization, and bears no useful relationship to " $t_0$ " or the "start-of-test." The test number is given at the top of the right edge of the chart. This is usually suffixed with the number "-1" or "-2" indicating the analog tape drive used to record the raw data (1=Honeywell 7600, 2=CEC). These plots were prepared using the BSORT program which is discussed in "Quantification of Thoracic Response and Injury: The Analysis of Data," which is the second report in the series generated from this project.

Following each BSORT plot is a summary table, printed during the scaling/filtering portion of the analog-to-digital process. Among other information, this gives the test number (in the same form as the BSORT plot), and, for each channel digitized, the channel number, name of channel contents and units of measure. Scale factor (units/volt), signal frequency (approximately 1600 hz for all), data of digitization and other general information are also given.



As many BSORT plot/summary table pairs as necessary to provide completeness are supplied for each test.

Those tests which were preceded by taps have only one set of summary and autopsy sheets, but have Brush and BSORT plots for both tap and test.



## Summary Test Report

Thoracic Impact Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No. A-867

Test Date - April 30, 1975

Test Subject

Sex - Female

Age - 67

Stature - 164.3 cm.

Weight - 70.5 kg.

Restraint System

Production three-point belt system.

Velocity

24.6 mph.

Deceleration

10.4 G's

Injuries

Rib fractures - 3 R (with pneumothorax), 2 L.  
Sternum fracture - following line of belt across body.  
Left clavicle dislocation at sternum.

AIS Number Estimate



TEST # 1-867

TEST DATE 4.23.75

TEST DESCRIPTION Lap & shoulder restraint, front sled test VELOCITY 36.1 ft/s

SUBJECT:

AGE 67 SEX F CAUSE OF DEATH Congestive heart failure

INJURY INFORMATION: OVERALL THORACIC AIS 3

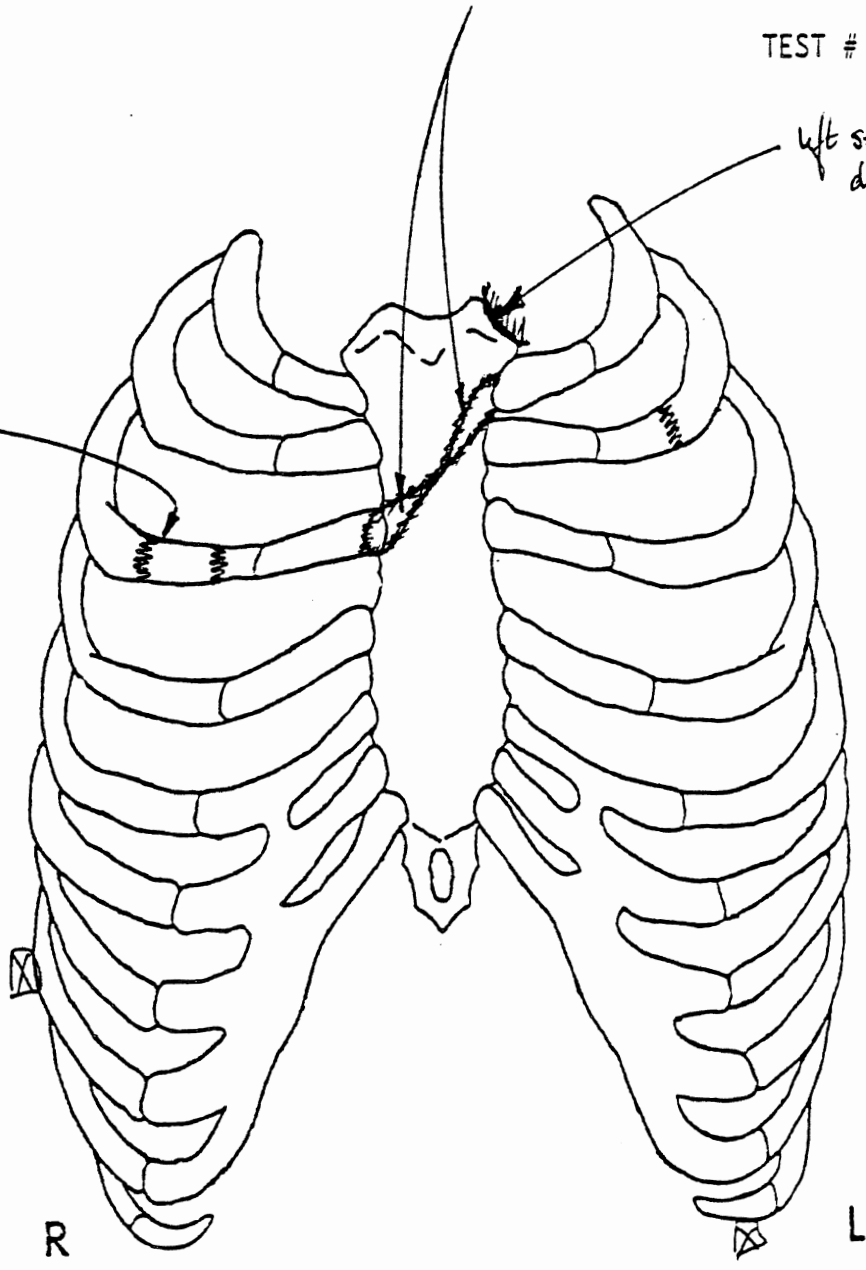
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>3</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>3</u>
	3	<u>C</u>	<u>R</u>	<u>O</u>	<u>P</u>	<u>3</u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>S</u>	<u>R</u>	<u>D</u>	<u>J</u>	<u>3</u>
	2	<u>S</u>	<u>L</u>	<u>A</u>	<u>I</u>	<u>1</u>
	3	<u>P</u>	<u>L</u>	<u>C</u>	<u>I</u>	<u>1</u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

large, comminuted  
sternal fracture

TEST # A-867

left sternoclavicular  
dislocation

traumatic  
Pneumothorax,  
secondary to  
rib fracture



ANTERIOR VIEW RIB CAGE

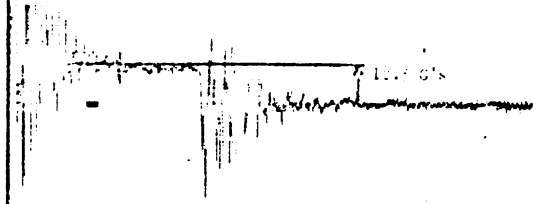
- Also:
- Superficial abrasions left shoulder
  - Contusions on left hip (both due to belts)



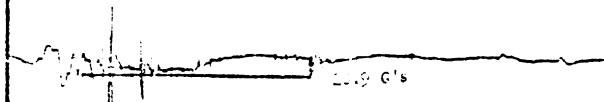
TEST NO. A-867

to 2

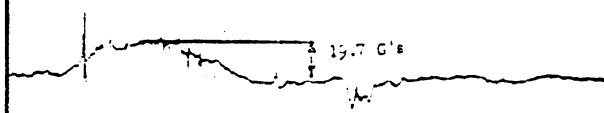
SLED DECELERATION



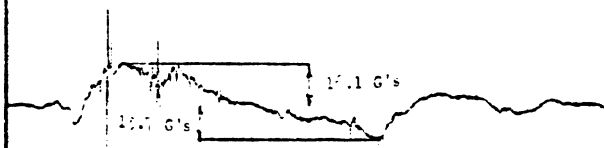
STERNAL ACCELEROMETER



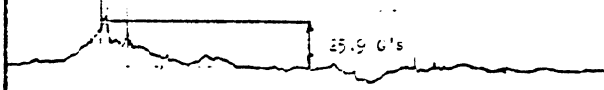
LEFT LOWER RIB  
ACCELEROMETER



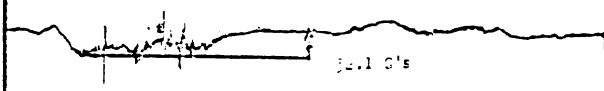
LEFT FRONT RIB  
ACCELEROMETER



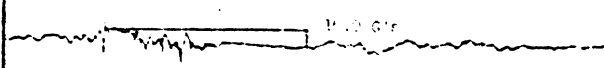
RIGHT LOWER RIB  
ACCELEROMETER



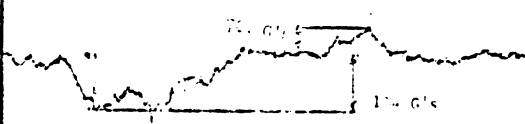
T<sub>1</sub> ACCELEROMETER  
(P-A)



T<sub>1</sub> ACCELEROMETER  
(I-S)



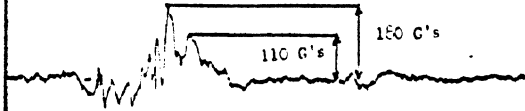
T<sub>12</sub> ACCELEROMETER  
(P-A)



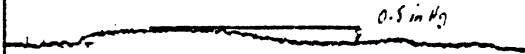
1.00 sec

TEST NO. A-B67

T<sub>12</sub> ACCELEROMETER  
(R-L)



AIRWAY PRESSURE



RIGHT LAP BELT



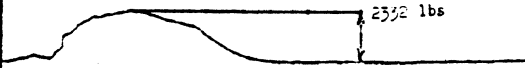
LEFT LAP BELT



UPPER SHOULDER BELT

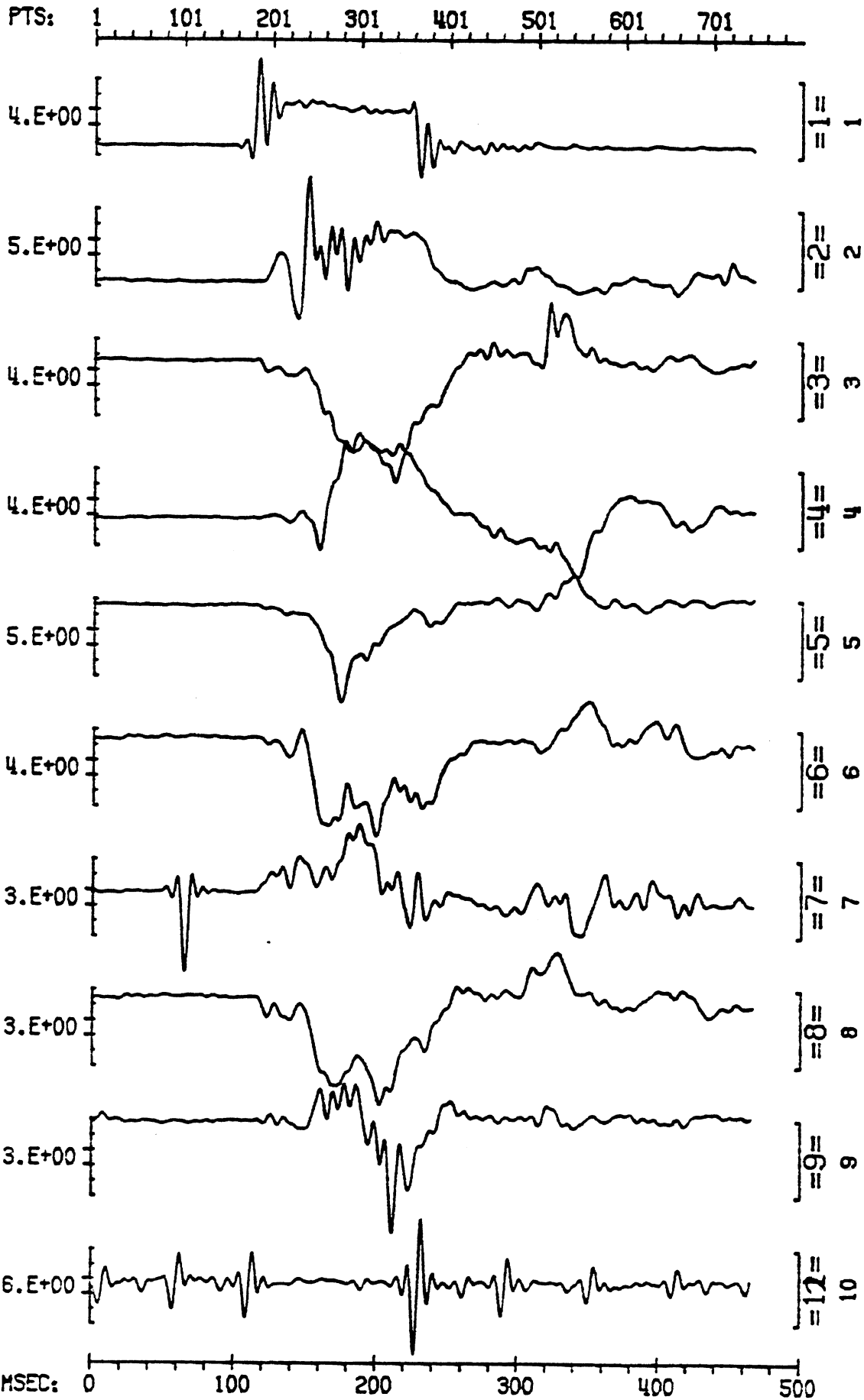


LOWER SHOULDER BELT



$t_0$  →

100 msec



ID: A-867-1:

TAPE: THOR.2

=====

RUN ID: A-867-11

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 25-OCT-76

TEST SIGNALS: 2981 PTS/CH AT 6399.66 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1 - 1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	746 0	1599.91
2 - 2	STERNUM ACCELEROMETER	-46.60	G'S	4+1+ 3	100.0	746 0	1599.91
3 - 3	LEFT LOWER RIB ACCELEROMETER	-47.60	G'S	4+1+ 3	100.0	746 0	1599.91
4 - 4	LEFT FRONT RIB ACCELEROMETER	36.50	G'S	4+1+ 3	100.0	746 0	1599.91
5 - 5	RIGHT LOWR RIB ACCELEROMETER	-48.70	G'S	4+1+ 3	100.0	746 0	1599.91
6 - 6	T1 P-A ACCELEROMETER	69.60	G'S	4+1+ 3	100.0	746 0	1599.91
7 - 7	T1 I-S ACCELEROMETER	57.10	G'S	4+1+ 3	100.0	746 0	1599.91
8 - 8	T12 P-A ACCELEROMETER	62.60	G'S	4+1+ 3	100.0	746 0	1599.91
9 - 9	T12 R-L ACCELEROMETER	-63.80	G'S	4+1+ 3	100.0	745 0	1599.91
10 - 10	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	745 0	1599.91

11  
12  
13  
14

=====

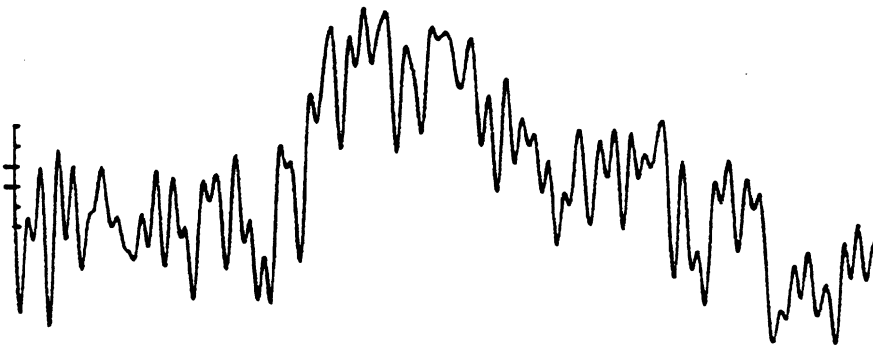
FILTERED FILES: 1 - 10 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-867-11

PTS: 1 101 201 301 401 501 601 701

ID: A-867-1:

*Area*  
*(cm<sup>2</sup>)*

2.E+00



12= 823

MSEC: 0 100 200 300 400 500

TAPE: THOR.2A

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-867-11

\*\*\*\*\*

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 25-OCT-76

TEST SIGNALS: 2981 PTS/CH AT 6399.66 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
10								
20								
30								
40								
50								
60								
70								
80								
90								
100								
110								
120		AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	745.0	1599.91
130								
140								

023 - 120 AIRWAY PRESSURE 209.00 MM-HG 4+1+3 100.0 745.0 1599.91

130  
140

\*\*\*\*\*

FILTERED FILE: 023 - 023 DIGITAL TAPE: THOR.2

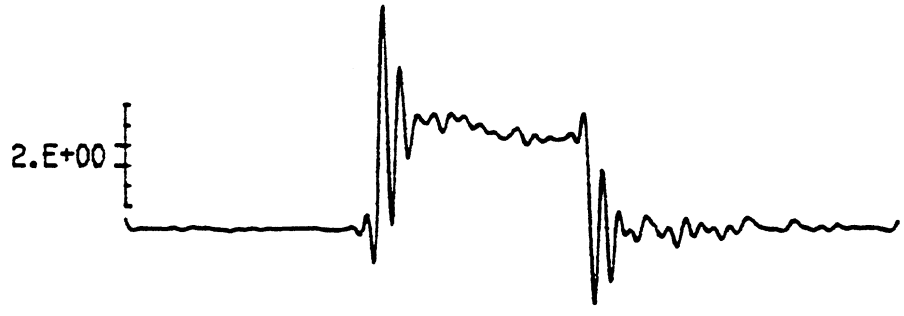
DATE: 26-JAN-77

RUN ID: A-867-11

\*\*\*\*\*

PTS: 1 101 201 301 401 501 601 701

5.0ms  
G's



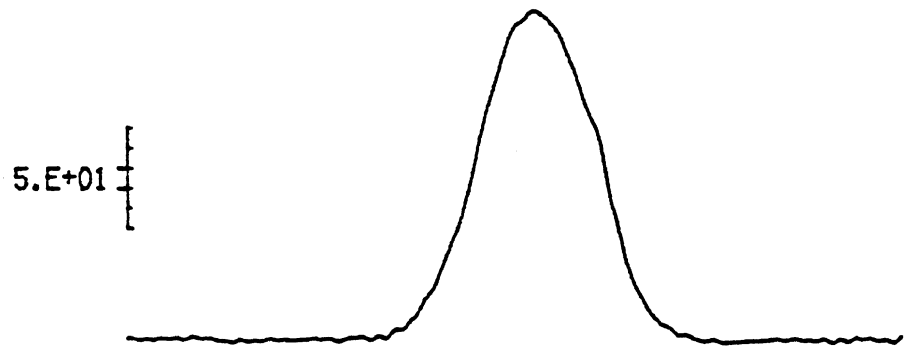
1= 283

2.LAP  
LBS.



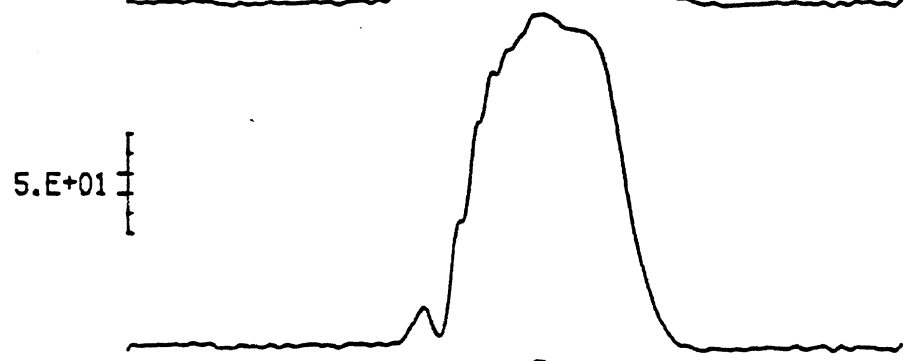
2= 284

4.LAP  
LBS



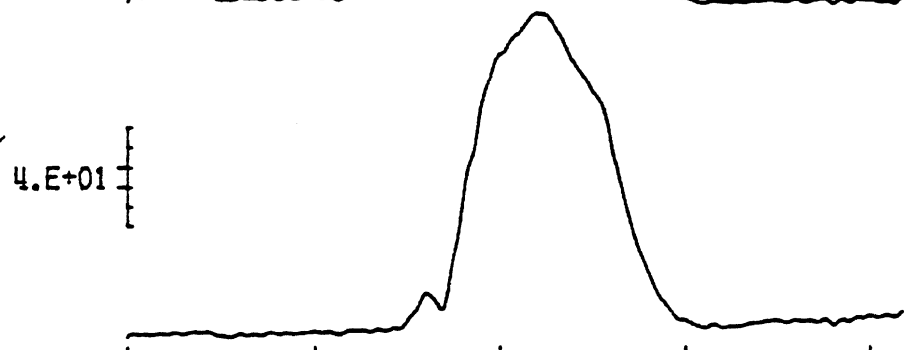
3= 285

UP SHAR  
LBS



4= 286

Lo. SHAR  
LBS.



5= 287

MSEC: 0 100 200 300 400 500

10: A-867-2:RERUN

TAPE: THOR.2

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-867-21RERUN

\*\*\*\*\*

PROJECT: THORAX IMPACT PROJECT--FRONT IMPACT SLED TESTS

ANALOG TAPE: H8RI-137 EXPANDED 16:1, HAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77

TEST SIGNALS: 2649 PTS/CH AT 6310.05 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
283	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	99.4	659	1577.51
284	2	RIGHT LAP BELT LOAD	1000.00	LBS	4+1+ 3	99.4	659	1577.51
285	3	LEFT LAP BELT LOAD	1000.00	LBS	4+1+ 3	99.4	659	1577.51
286	4	UPPER SHOULDER BELT LOAD	1000.00	LBS	4+1+ 3	99.4	659	1577.51
287	5	LOWER SHOULDER BELT LOAD	1000.00	LBS	4+1+ 3	99.4	659	1577.51

61

71

81

91

101

111

121

131

141

\*\*\*\*\*

FILTERED FILES: 283 - 287 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: A-867-21RERUN



Summary Test Report

Thoracic Impact Project (Contract DOT-HS-4-00921)  
Highway Safety Research Institute - The University of Michigan

Test No. A-868

Test Date May 28, 1975

Test Subject

Age - 46

Sex - Male

Stature - 178.1 cm.

Weight - 61.5 kg.

Restraint System

Production three-point belt system

Velocity

32.4 mph.

Deceleration

20.4 G's

Injuries

Minor belt burns.

Simple rib fractures - L3, 4, 5, 6, 7, 8, R 2, 3, 4, 5.

Sternum fracture following line of belt across body.

Fracture of left clavicle approximately 1 inch from sternum.

Torsional rib fractures in back - L 5, 6, 7, 9.

Hemorrhage and inflammation on front side of heart.

Longitudinal tear on front side of left ventricle interior wall.

Minor laceration of liver.

AIS Number Estimation



TEST # A-868

TEST DATE 5-30-75

TEST DESCRIPTION Lap & shoulder belt restraint, Front sled test VELOCITY 47.5 ft/s

SUBJECT:

AGE 46 SEX M CAUSE OF DEATH pulmonary embolism

INJURY INFORMATION: OVERALL THORACIC AIS 5

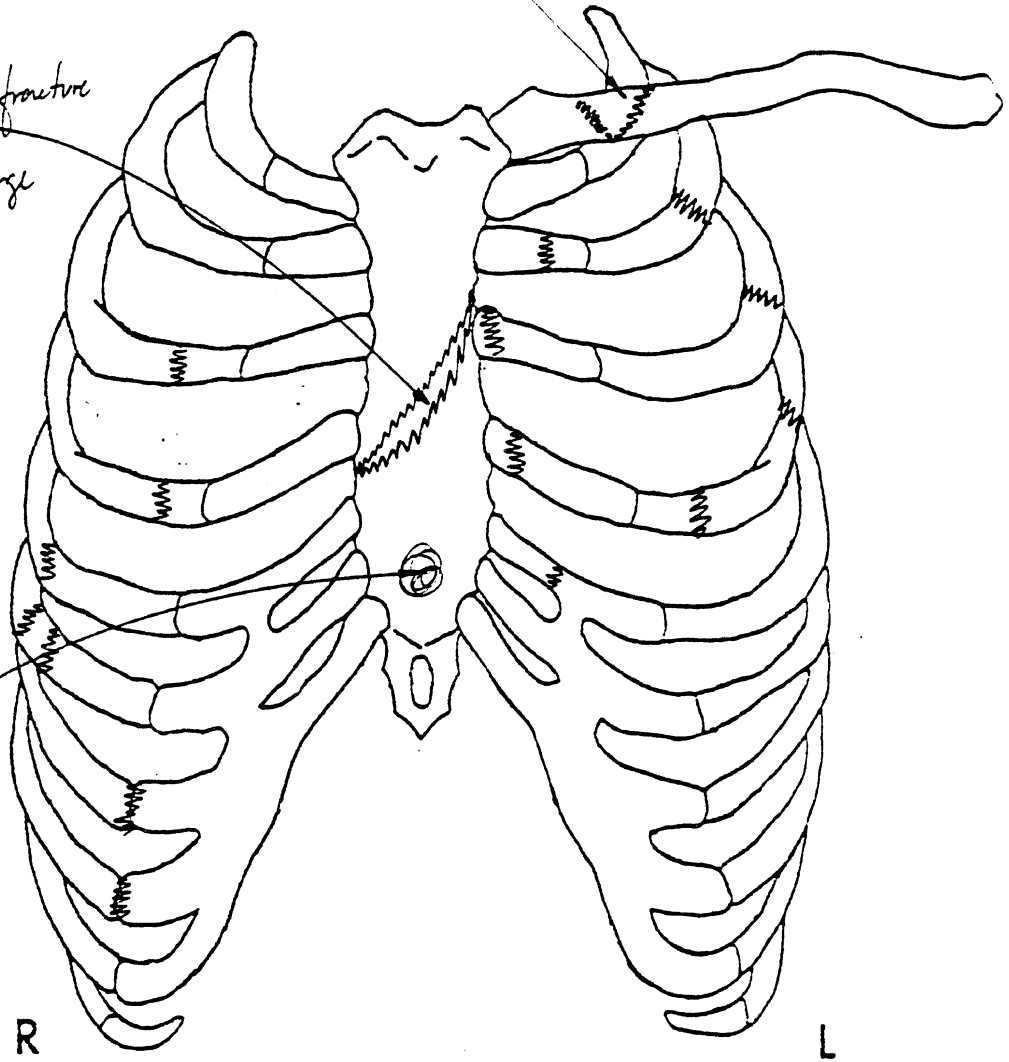
	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S	
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>L</u>	<u>H</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>3</u>
	4					
	5					
	6					
	7					
	8					
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>R</u>	<u>R</u>	<u>L</u>	<u>5</u>
	2	<u>S</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>3</u>
	3	<u>N</u>	<u>L</u>	<u>A</u>	<u>I</u>	<u>1</u>
	4	<u>M</u>	<u>I</u>	<u>C</u>	<u>I</u>	<u>1</u>
	5					

TEST # L-868

comminuted fracture of  
left clavicle, with one  
large fragment.

comminuted fracture  
of sternum,  
with one large  
fragment

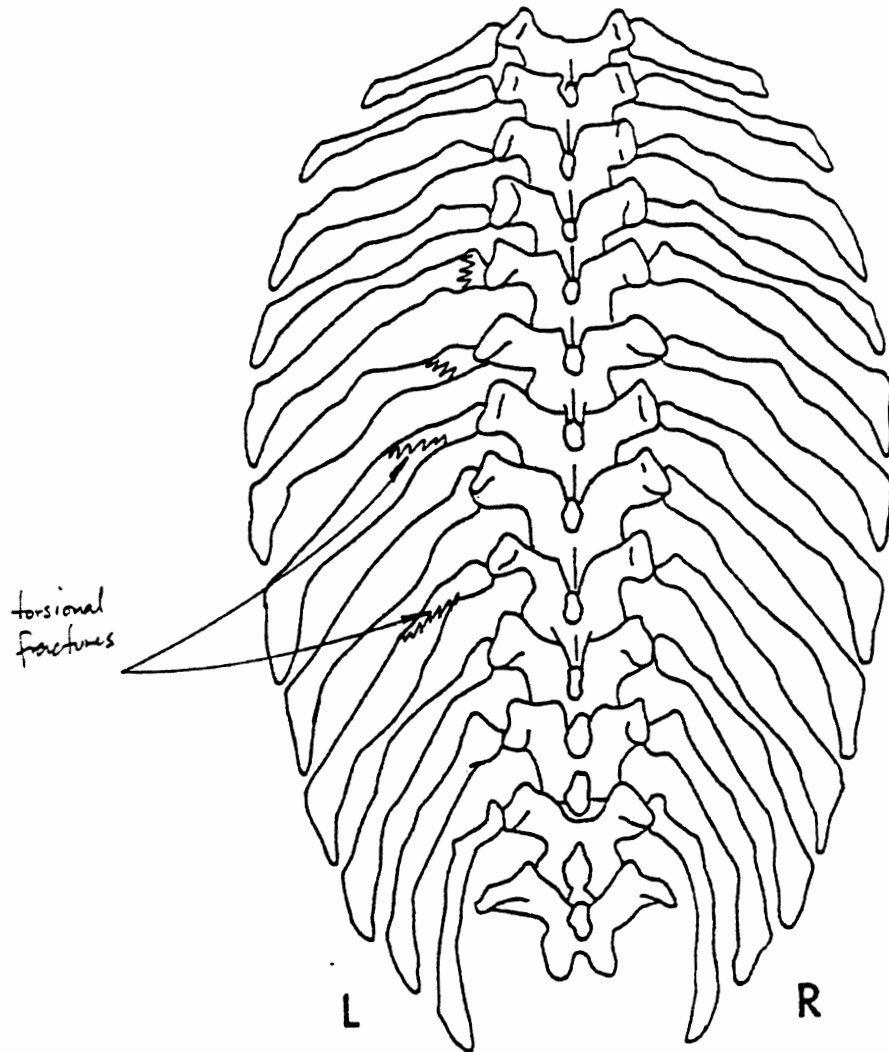
hemorrhage  
on rear  
of sternum



ANTERIOR VIEW RIB CAGE

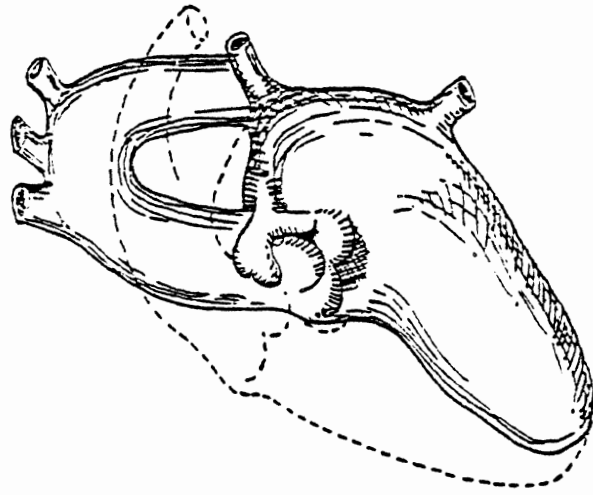
Also:  
• belt bruises/bruises @ neck,  
lower abdomen

TEST # A-88



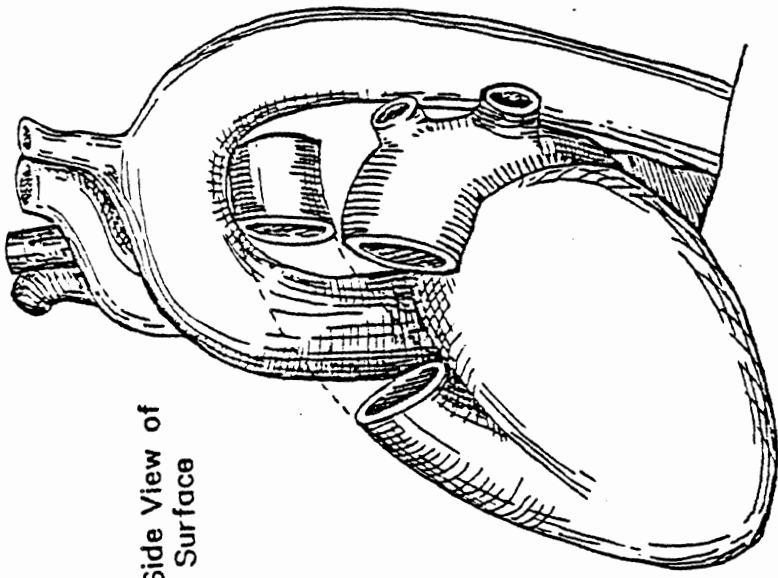
POSTERIOR VIEW RIB CAGE

Left View of Left Side of Heart



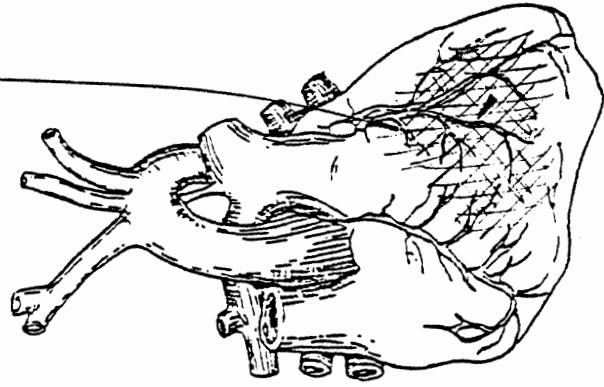
also: Rupture of liver

Left Side View of Heart Surface



hemorrhagic inflammation on front side of heart

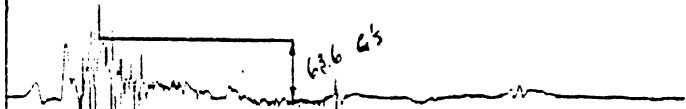
longitudinal tear, inferior (not through), anterior aspect, left ventricle.



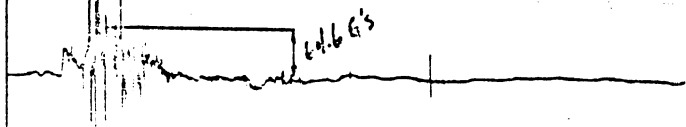
Anterior View of Heart

TEST NO. A-668

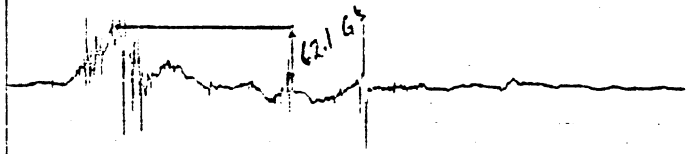
UPPER STERNAL  
ACCELEROMETER



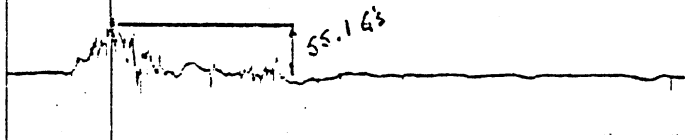
LOWER STERNAL  
ACCELEROMETER



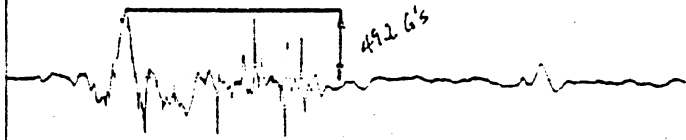
LOWER LEFT RIB  
ACCELEROMETER



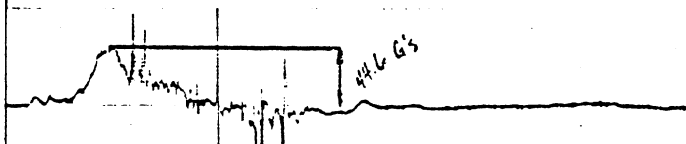
RIGHT LOWER RIB  
ACCELEROMETER



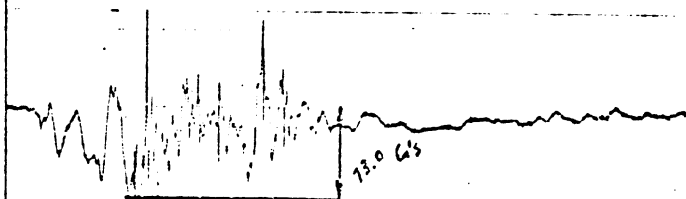
T<sub>1</sub> P-A ACCELEROMETER



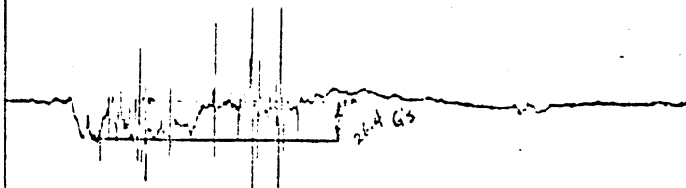
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 MSEC

TEST A-006

SLED DECELERATION PULSE

22.7 G's

RIGHT LAP BELT LOAD

1982 lbs.

LEFT LAP BELT LOAD

1461 lbs.

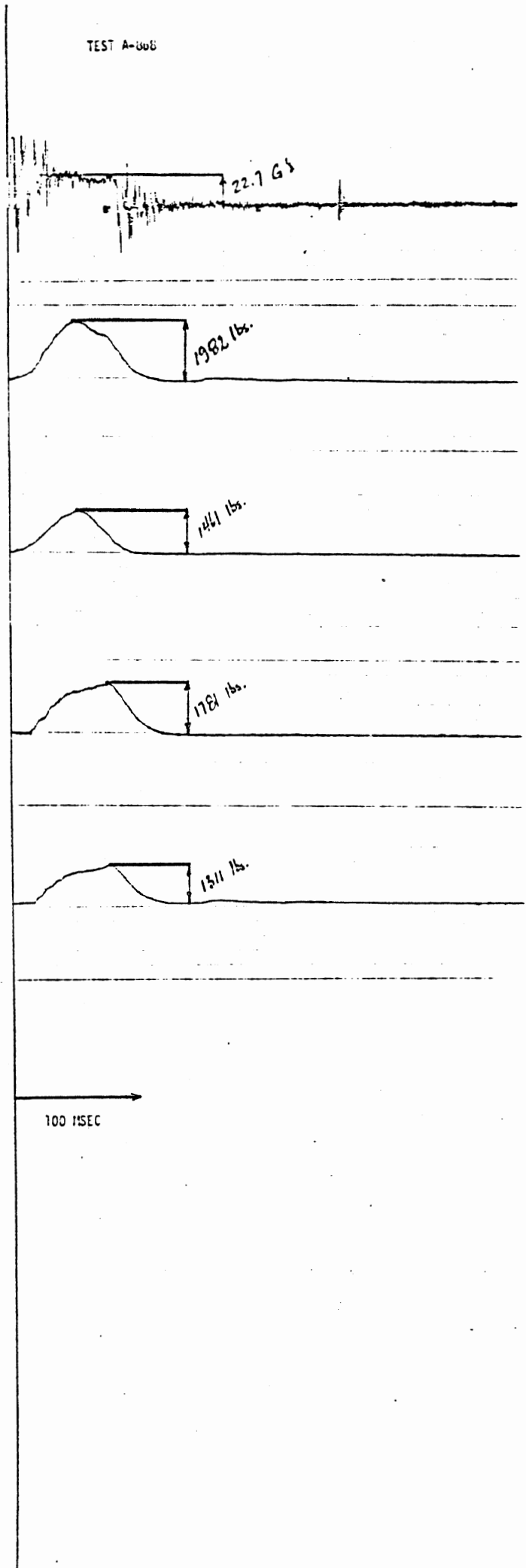
UPPER  
SHOULDER BELT LOAD

1781 lbs.

LOWER  
SHOULDER BELT LOAD

1511 lbs.

100 ISEC





PTS: 1 301 601 901 1201 1501

SLD  
G's



=1=  
11

ST  
G's



=2=  
12

OST  
G's



=3=  
13

LR  
G's



=4=  
14

RLR  
G's



=6=  
15

VEL



=12=  
16

MSEC: 0 200 400 600 800 1000

ID: A-868-1:

TAPE: THOR.2

=====
RUN ID: A-868-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

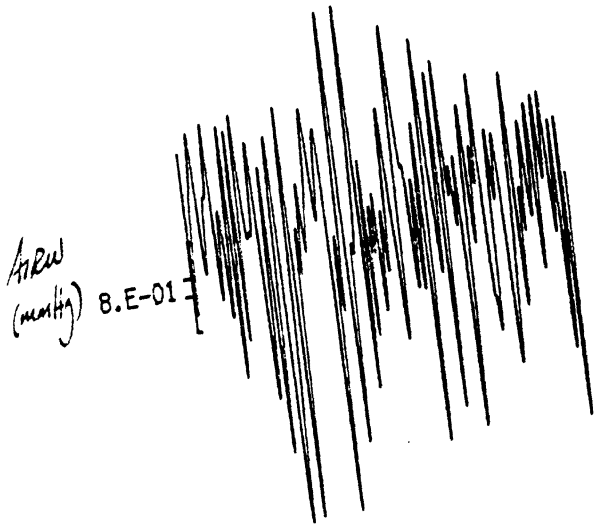
TEST SIGNALS: 3234 PTS/CH AT 6400.16 HZ. CAL SIGNALS; NOT DIGITIZED.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include SLED DECELERATION PULSE, UPPER STERNAL ACCELEROMETER, LOWER STERNAL ACCELEROMETER, LEFT LOWER RIB ACCELEROMETER, RIGHT LOWR RIB ACCELEROMETER, AIRWAY PRESSURE.

=====
FILTERED FILES: 11 - 16 DIGITAL TAPE; JEFF DATE: 16-DEC-76 RUN ID: A-868-11
=====

PTS: 1 301 601 901 1201 1501

ID: A-868-1:



$\frac{=12=}{824}$

MSEC: 0 200 400 600 800 1000

TAPE: THOR.2A

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-868-11

=====

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 25-OCT-76

TEST SIGNALS: 3234 PTS/CH AT 6400.16 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11								
21								
31								
41								
51								
61								
71								
81								
91								
101								
111								
121		AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	805	1600.04
131								
141								

824 - 121 AIRWAY PRESSURE 209.00 MM-HG 4+1+3 100.0 805 1600.04

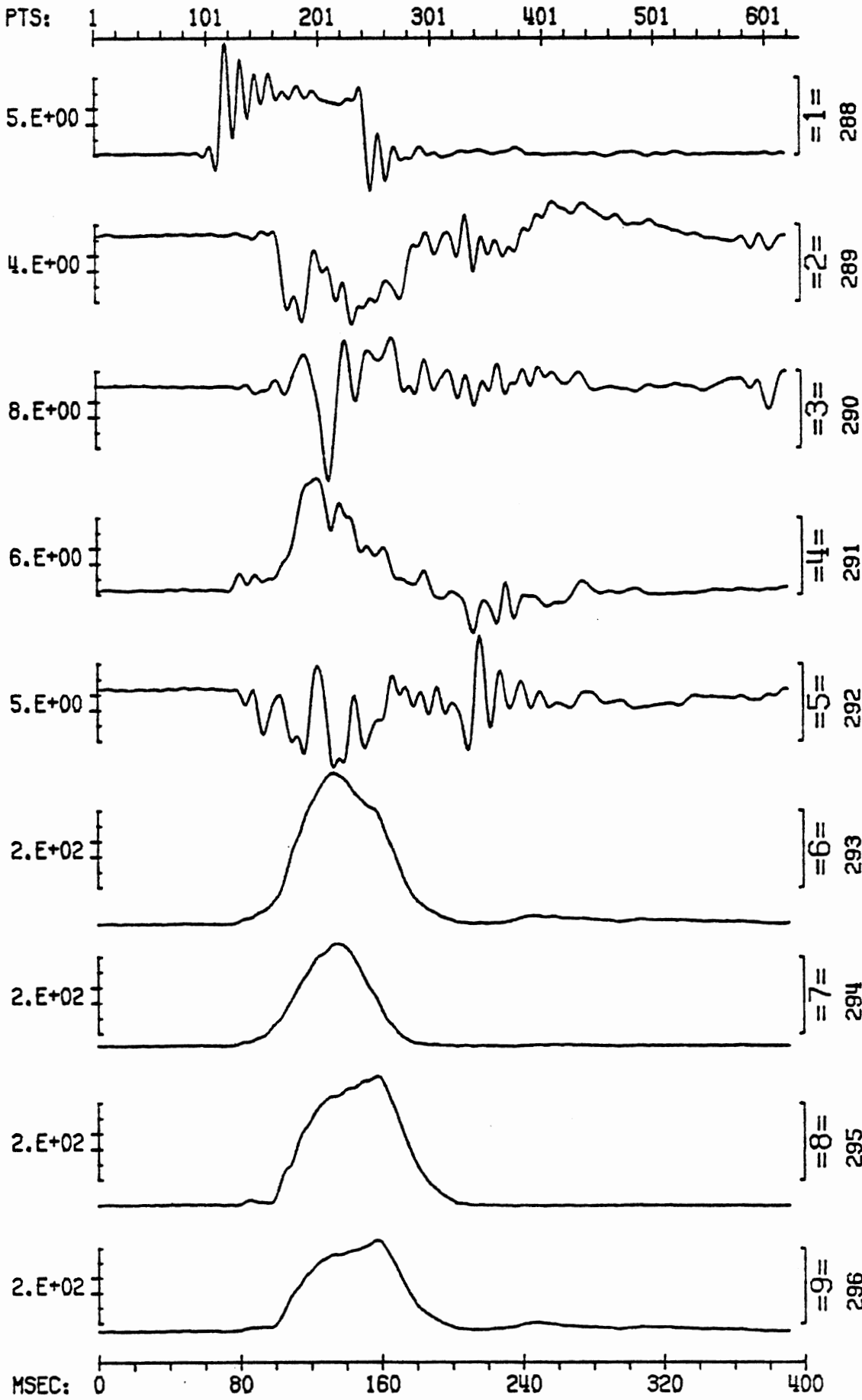
=====

FILTERED FILES: 824 - 824 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-868-11

=====



IO: A-868-2: RERUN

TAPE: THOR.2

=====

RUN ID: A-868-2:RERUN

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--FRONT IMPACT SLED TESTS

ANALOG TAPE: HSRI-137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0016 DATE: 17-JAN-77

TEST SIGNALS: 2485 PTS/CH AT 6310.91 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
288	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	618	1577.73
289	2	T1 P-A ACCELEROMETER	47.20	G'S	4+1+3	99.4	618	1577.73
290	3	T1 I-S ACCELEROMETER	58.60	G'S	4+1+3	99.4	618	1577.73
291	4	T12 P-A ACCELEROMETER	62.90	G'S	4+1+3	99.4	618	1577.73
292	5	T12 R-L ACCELEROMETER	62.90	G'S	4+1+3	99.4	618	1577.73
293	6	RIGHT LAP BELT LOAD	1000.00	LBS	4+1+3	99.4	618	1577.73
294	7	LEFT LAP BELT LOAD	1000.00	LBS	4+1+3	99.4	618	1577.73
295	8	UPPER SHOULDER BELT LOAD	1000.00	LBS	4+1+3	99.4	618	1577.73
296	9	LOWER SHOULDER BELT LOAD	1000.00	LBS	4+1+3	99.4	617	1577.73

100

110

120

130

140

-----

FILTERED FILES: 288 - 296

DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: A-868-2:RERUN

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No. A-876

Test Date - June 17, 1975

Test Subject

Age - 73

Sex - Male

Stature - 176.3 cm

Weight - 68.6 kg

Restraint System

Production EA column and lap belt

Velocity

23.0 mph

Deceleration

10.0 G's

Injuries

Rib fractures - R 5, 6, 7.

Sternum fracture between 4th and 5th rib connections.

AIS Number Estimate

3





TEST # A-876

TEST DATE 6-20-75

TEST DESCRIPTION EAC Sloma, front sled test VELOCITY 33.7 ft/s

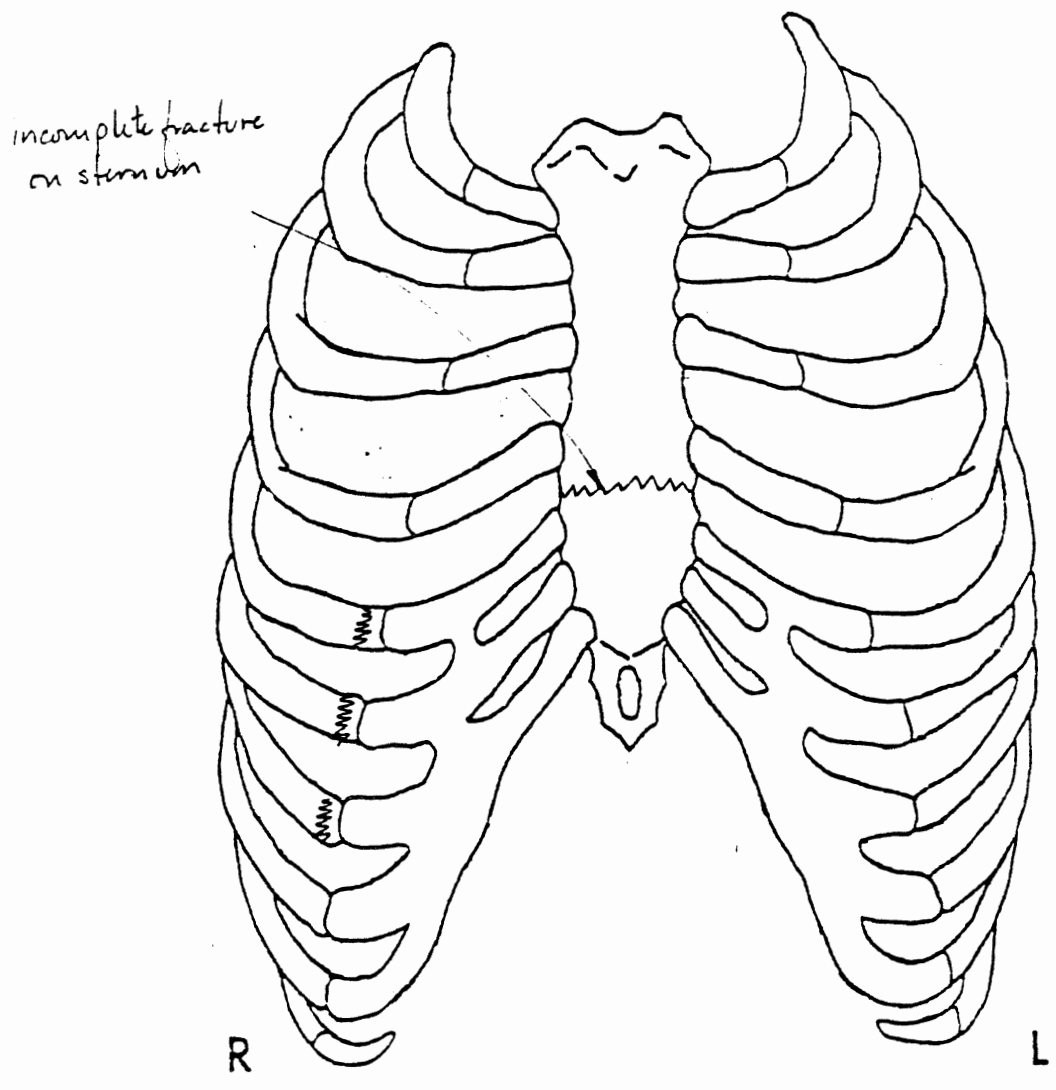
SUBJECT:

AGE 73 SEX M CAUSE OF DEATH Acute cardio-pulmonary arrest,  
secondary to hepatic failure.

INJURY INFORMATION: OVERALL THORACIC AIS 3

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>R</u>	<u>F</u>	<u>S</u>	<u>3</u>
	2	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	3	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	2	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	3	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

TEST # 4-876

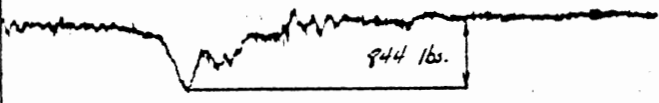


ANTERIOR VIEW RIB CAGE

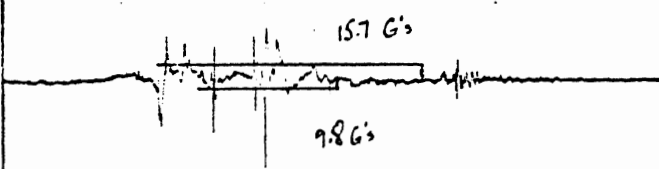
*no thoracic or abdominal organ injuries noted.*

TEST NO. A-376

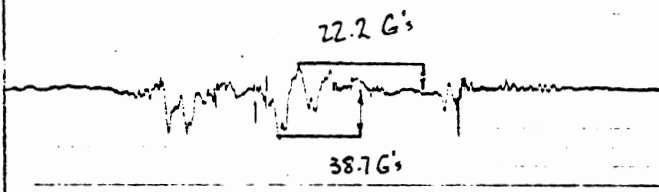
STEERING COLUMN LOAD



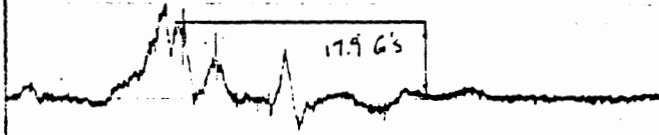
T<sub>1</sub> P-A ACCELEROMETER



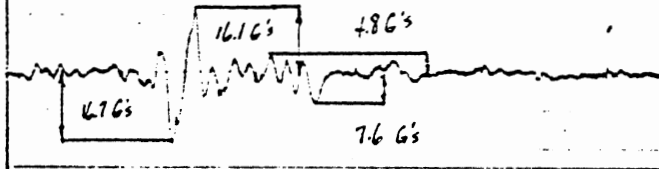
T<sub>1</sub> I-S ACCELEROMETER



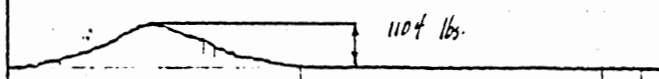
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



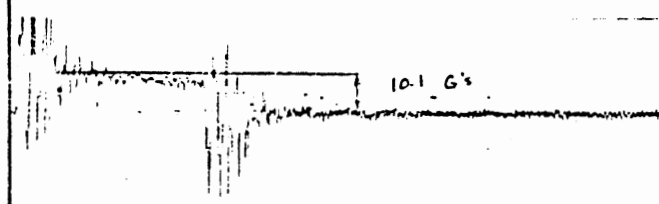
RIGHT LAP BELT LOAD



LEFT LAP BELT LOAD



SLEW DECELERATION PULSE



100 MSEC

1. 103

TEST NO. A-876

UPPER STERNAL  
ACCELEROMETER

13.9 G's

LOWER STERNAL  
ACCELEROMETER

9.5 G's

7.1 G's

LEFT LOWER RIB  
ACCELEROMETER

16.6 G's

LEFT UPPER RIB  
ACCELEROMETER

9.1 G's

RIGHT LOWER RIB  
ACCELEROMETER

13.4 G's

RIGHT UPPER RIB  
ACCELEROMETER

15.9 G's

STEERING COLUMN VERTICAL  
ACCELEROMETER

7.5 G's

40 G's

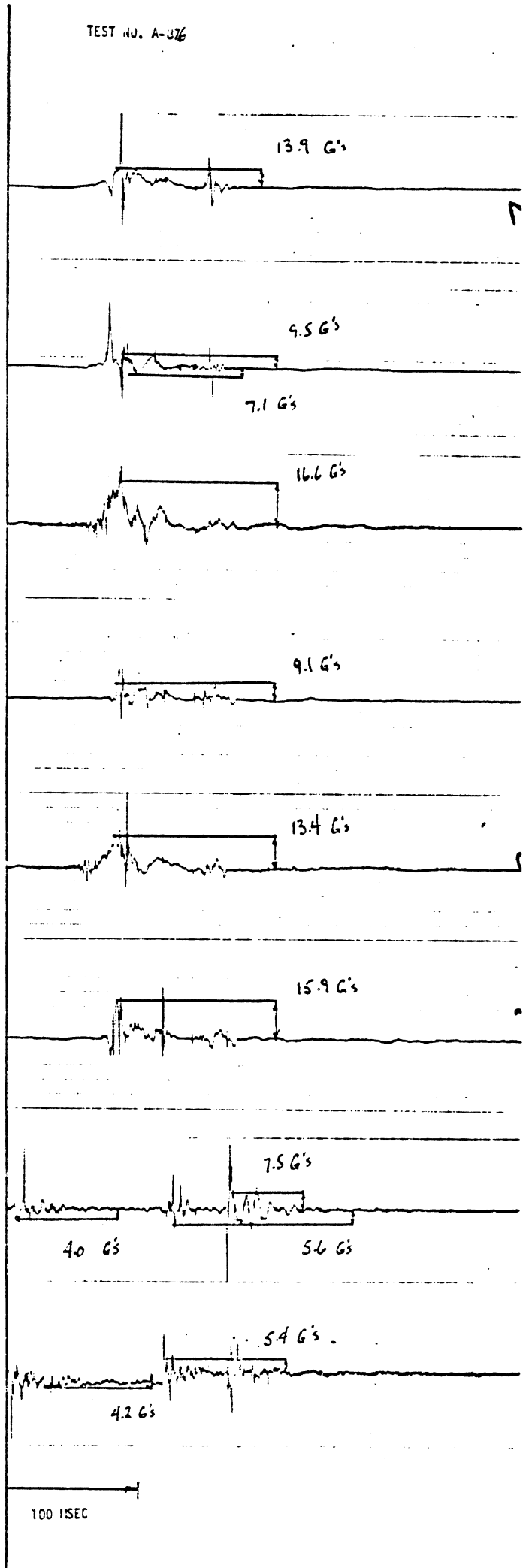
56 G's

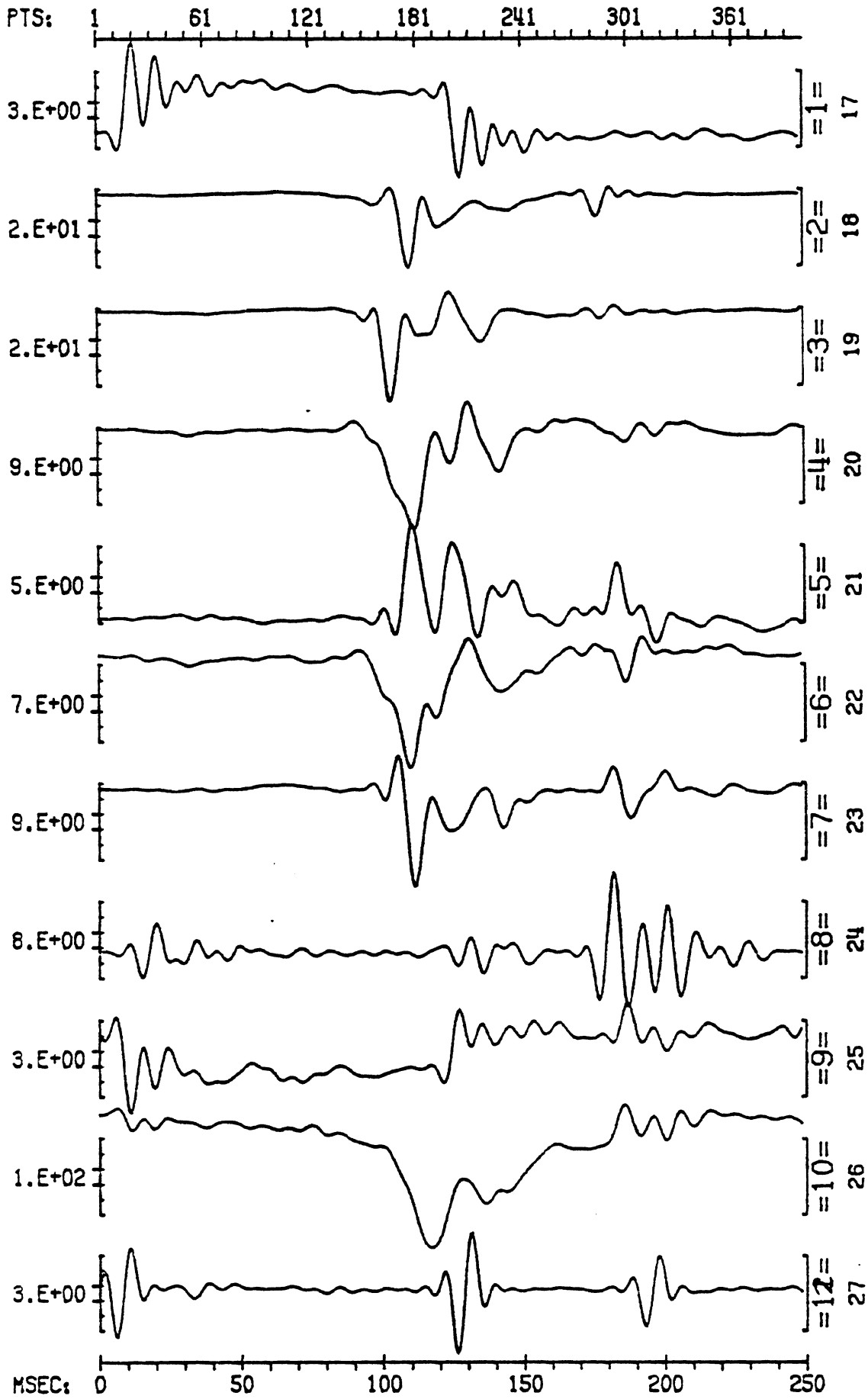
STEERING COLUMN BASE  
ACCELEROMETER

5.4 G's

4.2 G's

100 ISEC





ID: A-876-1:

TAPE: THOR.2

=====

RUN ID: A-876-1;

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1594 PTS/CH AT 6395.67 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
17	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	100.7	398	1598.92
18	2	UPPER STERNAL ACCELEROMETER	-81.70	G'S	4+1+3	100.7	398	1598.92
19	3	LOWER STERNAL ACCELEROMETER	-98.10	G'S	4+1+3	100.7	398	1598.92
20	4	LEFT LOWER RIB ACCELEROMETER	-82.90	G'S	4+1+3	100.7	398	1598.92
21	5	LEFT UPPER RIB ACCELEROMETER	112.50	G'S	4+1+3	100.7	398	1598.92
22	6	RIGHT LOWR RIB ACCELEROMETER	-89.70	G'S	4+1+3	100.7	398	1598.92
23	7	RIGHT UPPR RIB ACCELEROMETER	-95.30	G'S	4+1+3	100.7	398	1598.92
24	8	COLUMN VERTICAL ACCELEROMETER	95.50	G'S	4+1+3	100.7	398	1598.92
25	9	ST. COLUMN BASE ACCELEROMETER	98.60	G'S	4+1+3	100.7	398	1598.92
26	10	STEERING COLUMN LOAD	2222.00	LBS.	4+1+3	100.7	398	1598.92
27	11	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+3	100.7	398	1598.92

12:  
13:  
14:

=====

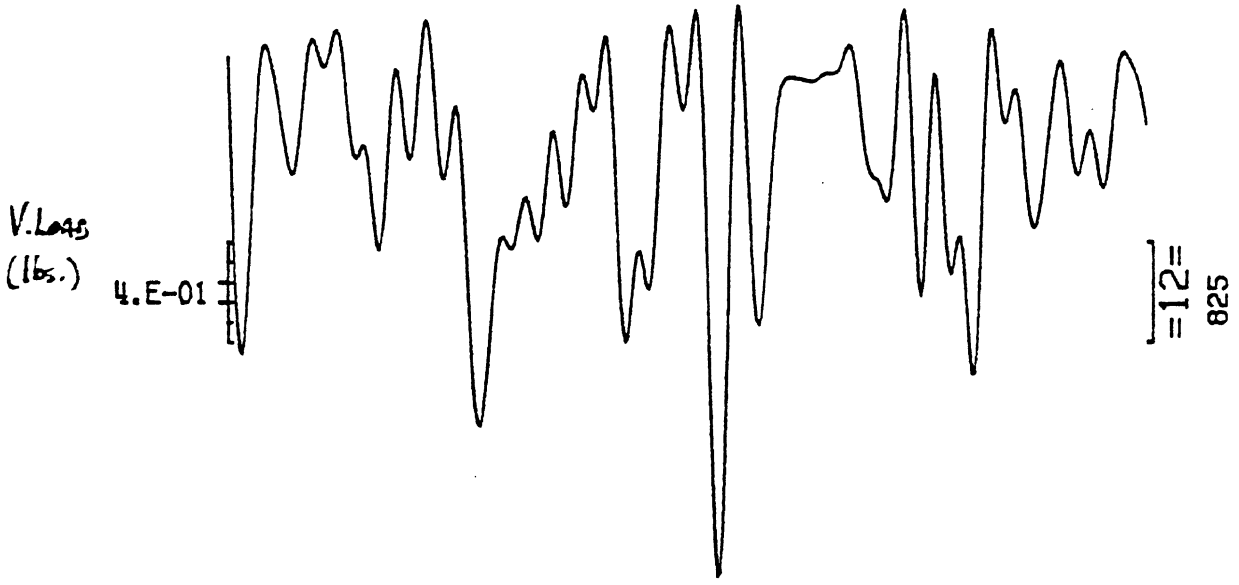
RUN ID: A-876-1;

DATE: 16-DEC-76

FILTERED FILES: 17 - 27 DIGITAL TAPE: JEFF

PTS: 1 61 121 181 241 301 361

ID: A-876-1:



MSEC: 0 50 100 150 200 250

TAPE: THOR. 2A

\*\*\*\*\*

RUN ID: A-876-11

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 25-OCT-76

TEST SIGNALS: 1594 PTS/CH AT 6395.67 HZ. CAL SIGNALS: NOT DIGITIZED.

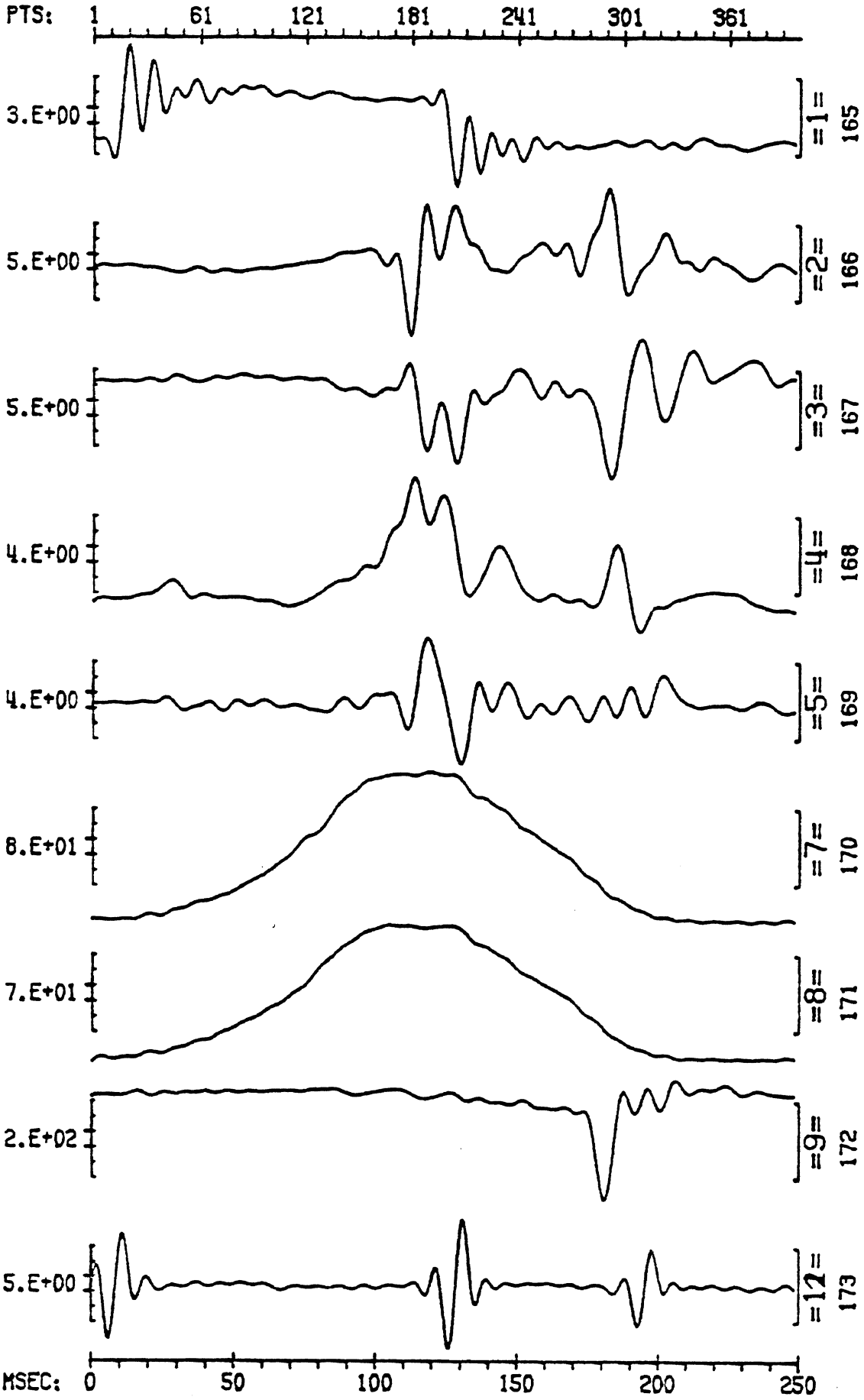
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:								
2:								
3:								
4:								
5:								
6:								
7:								
8:								
9:								
10:								
11:								
12:								
13:								
14:								

025 - 12: STERING COLUMN VERTICAL LOAD 117.60 LBS. 4+1+3 100.7 390 0 1590.92

\*\*\*\*\*

FILTERED FILES: 025 - 025 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-876-11





ID: A-876-2:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-876-2

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 =====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018

DATE: 25-OCT-76

TEST SIGNALS: 1594 PTS/CH AT 6397.59 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
165	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	398	1599.40
166	2	T1 P-A ACCELEROMETER	69.30	G'S	4+1+ 3	100.8	398	1599.40
167	3	T1 I-S ACCELEROMETER	52.80	G'S	4+1+ 3	100.8	398	1599.40
168	4	T12 P-A ACCELEROMETER	69.30	G'S	4+1+ 3	100.8	398	1599.40
169	5	T12 R-L ACCELEROMETER	-49.50	G'S	4+1+ 3	100.8	398	1599.40
	6							
170	7	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	398	1599.40
171	8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	398	1599.40
172	9	COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.8	398	1599.40
	10							
173	11	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.8	398	1599.40
	12							
	13							
	14							

FILTERED FILES: 165 - 173

DIGITAL TAPE: JEFF

DATE: 16-DEC-76

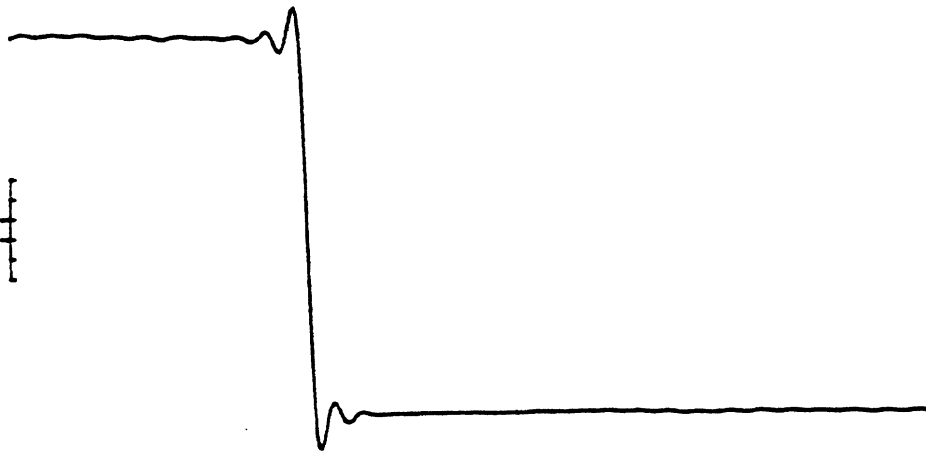
RUN ID: A-876-2

PTS: 1 61 121 181 241 301 361

ID: A-876-2:

APW  
(mV)

2.E+01



12= 836

MSEC: 0 50 100 150 200 250

TAPE: THOR. 2A

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-876-21

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1594 PTS/CH AT 6397.59 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
10								
20								
30								
40								
50								
60								
70								
80								
90								
100								
110								
120		AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	398.0	1599.40
130								
140								

\*\*\*\*\*

FILTERED FILES: 836 - 836 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-876-21

\*\*\*\*\*

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No. A-877

Test Date - June 20, 1975

Test Subject

Age - 76

Sex - Female

Stature - 149.9 cm

Weight - 40.3 kg

Restraint System

Production EA-column and lap belt

Velocity

23.0 mph

Deceleration

9.8 G's

Injuries

Rib fractures - R 3, 4, 5, L 2, 3, 4, 5

Possible tracheal injury in area of tracheal tube insertion  
due to impact.

AIS Number Estimate

TEST # 1-877

TEST DATE 6-20-75

TEST DESCRIPTION EA Column, front sled test VELOCITY 33.7 ft/s

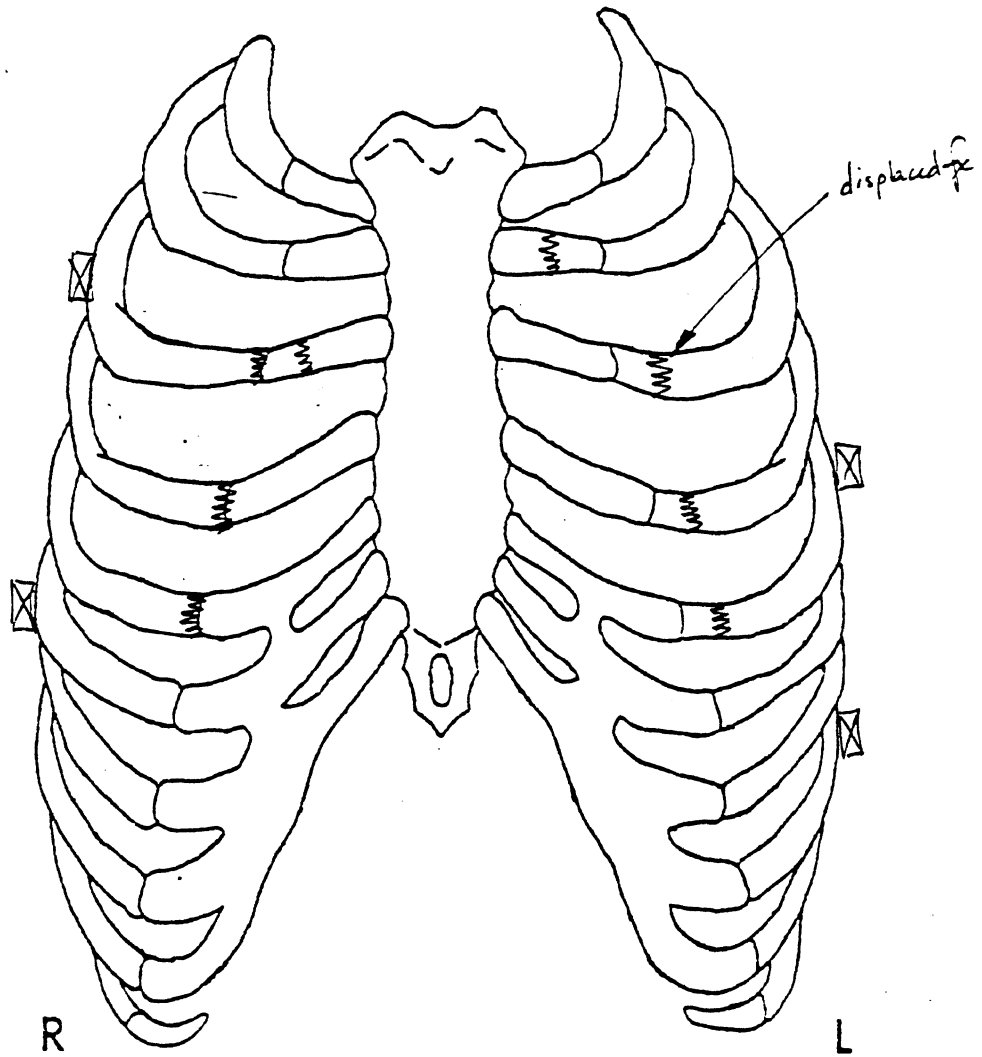
SUBJECT:

AGE 76 SEX F CAUSE OF DEATH Aneurism

INJURY INFORMATION: OVERALL THORACIC AIS 3

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>3</u>
	2	---	---	---	---
	3	---	---	---	---
	4	---	---	---	---
	5	---	---	---	---
	6	---	---	---	---
	7	---	---	---	---
	8	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---
	2	---	---	---	---
	3	---	---	---	---
	4	---	---	---	---
	5	---	---	---	---

TEST # 4.87

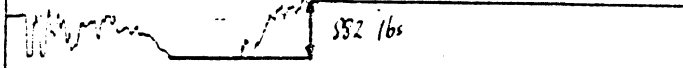


ANTERIOR VIEW RIB CAGE

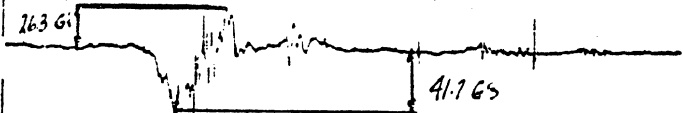
no mandibular,  
cervical, thoracic organ  
or abdominal organ  
injuries noted.

TEST A-877

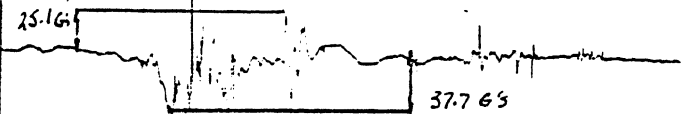
STEERING COLUMN  
VERTICAL LOAD



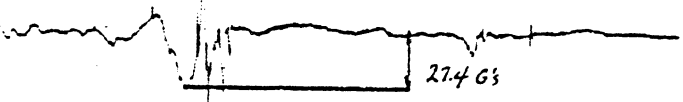
T<sub>1</sub> P-A ACCELEROMETER



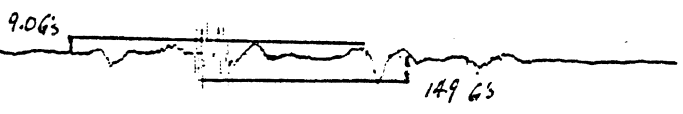
T<sub>1</sub> I-S ACCELEROMETER



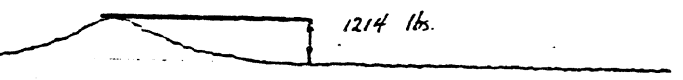
T<sub>12</sub> P-A ACCELEROMETER



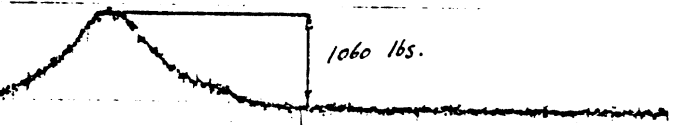
T<sub>12</sub> R-L ACCELEROMETER



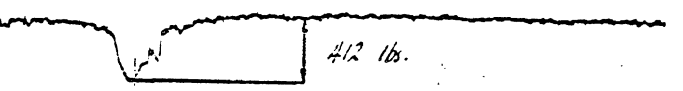
LEFT LAP BELT LOAD



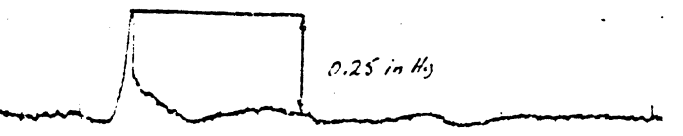
RIGHT LAP BELT LOAD



STEERING COLUMN  
VERTICAL LOAD



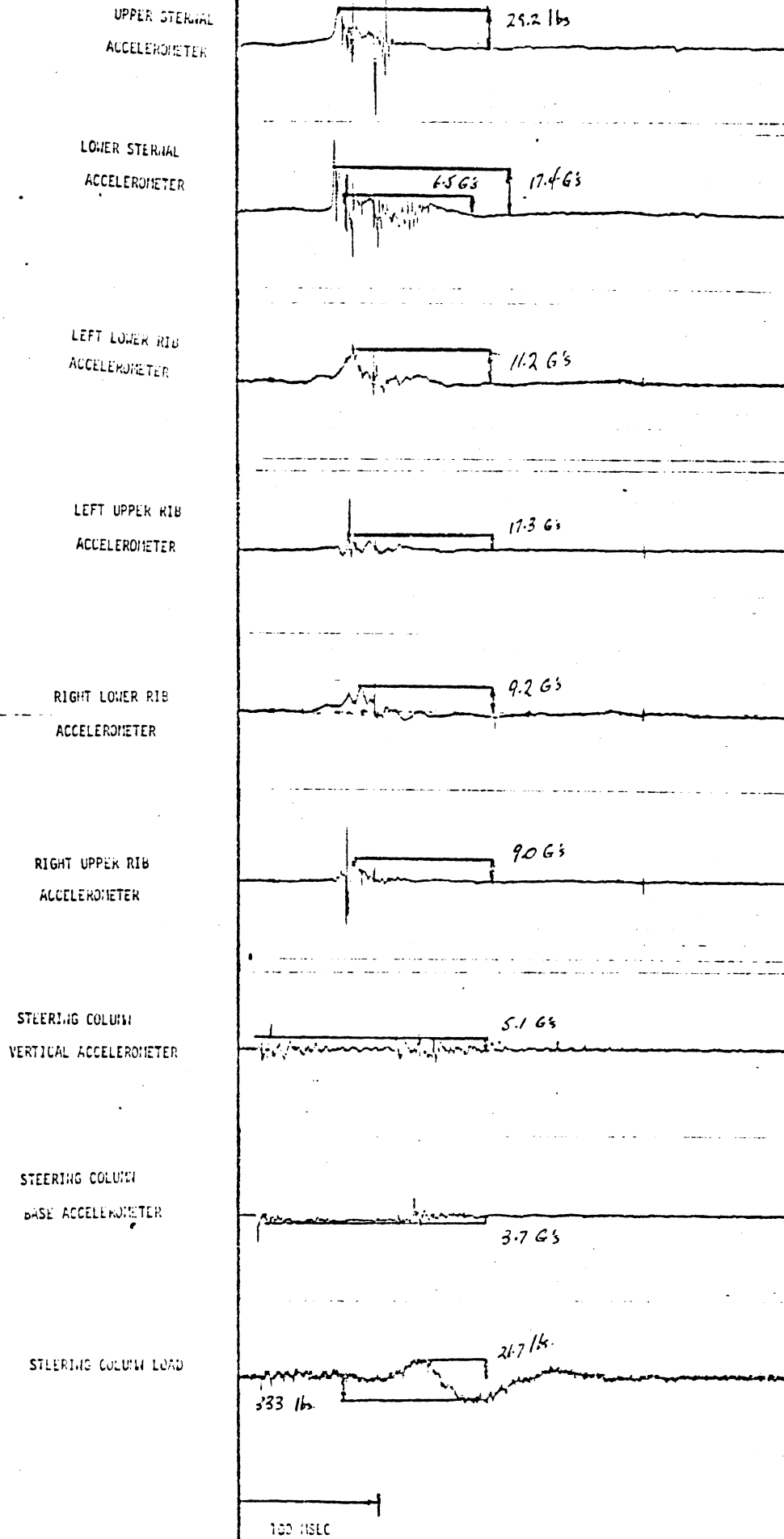
AIRWAY PRESSURE

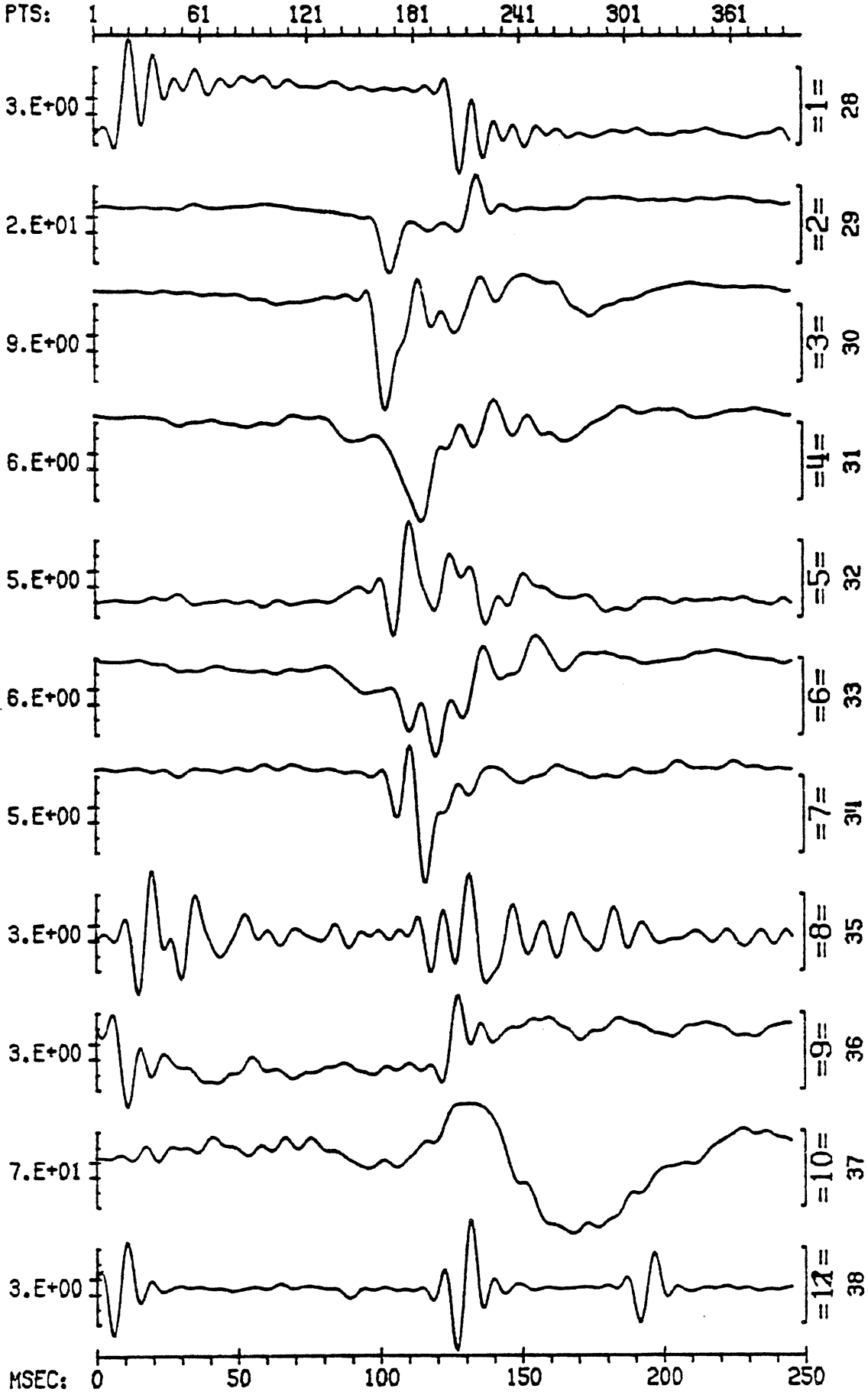


100 MSEC



TEST A-077





ID: A-877-1:

TAPE: THOR.2

=====  
 RUN ID: A-877-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

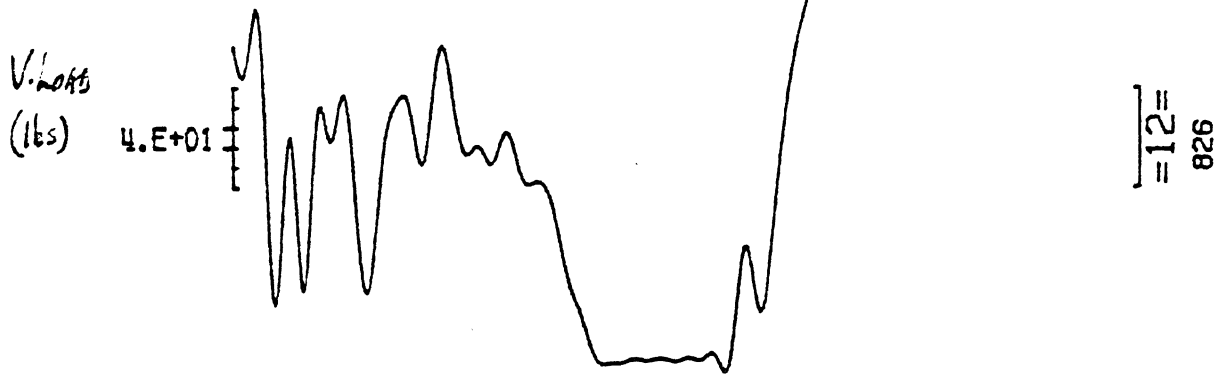
ANALOG TAPE: MSRI#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; MS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1589 PTS/CH AT 6397.10 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILIER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
28	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.7	394	1599.20
29	2	UPPER STERNAL ACCELEROMETER	-83.80	G'S	4+1+ 3	100.7	394	1599.20
30	3	LOWER STERNAL ACCELEROMETER	-101.00	G'S	4+1+ 3	100.7	394	1599.20
31	4	LEFT LOWER RIB ACCELEROMETER	-83.60	G'S	4+1+ 3	100.7	394	1599.20
32	5	LEFT UPPER RIB ACCELEROMETER	116.00	G'S	4+1+ 3	100.7	394	1599.20
33	6	RIGHT LOWR RIB ACCELEROMETER	-89.70	G'S	4+1+ 3	100.7	394	1599.20
34	7	RIGHT UPPR RIB ACCELEROMETER	-94.50	G'S	4+1+ 3	100.7	394	1599.20
35	8	COLUMN VERTICAL ACCELEROMETER	96.30	G'S	4+1+ 3	100.7	394	1599.20
36	9	ST. COLUMN BASE ACCELEROMETER	99.50	G'S	4+1+ 3	100.7	393	1599.20
37	10	STEERING COLUMN LOAD	222.00	LBS.	4+1+ 3	100.7	393	1599.20
38	11	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+ 3	100.7	393	1599.20

12:  
 13:  
 14:

PTS: 1 61 121 181 241 301 361

ID: A-877-1:



MSEC: 0 50 100 150 200 250

TAPE: THOR.2A

\*\*\*\*\*

RUN ID: A-877-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORAX IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRIN136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H90018 DATE: 25-OCT-76

TEST SIGNALS: 1589 PTS/CH AT 6397.10 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:							
2:							
3:							
4:							
5:							
6:							
7:							
8:							
9:							
10:							
11:							
12:	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+3	100.7	393	1599.20
13:							
14:							

1:

2:

3:

4:

5:

6:

7:

8:

9:

10:

11:

626 \* 12: STEERING COLUMN VERTICAL LOAD 117.60 LBS. 4+1+3 100.7 393 1599.20

13:

14:

\*\*\*\*\*

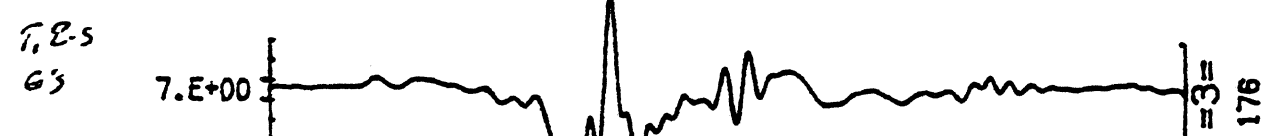
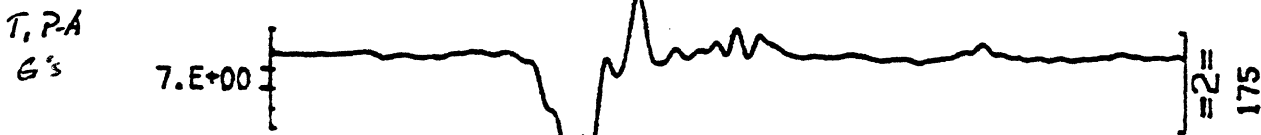
FILTERED FILES: 026 - 026 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-877-11

\*\*\*\*\*

PTS: 1 101 201 301 401 501 601



MSEC: 0 80 160 240 320 400

10: A-877-2:

TAPE: THOR.2

=====  
RUN ID: A-877-2;  
=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

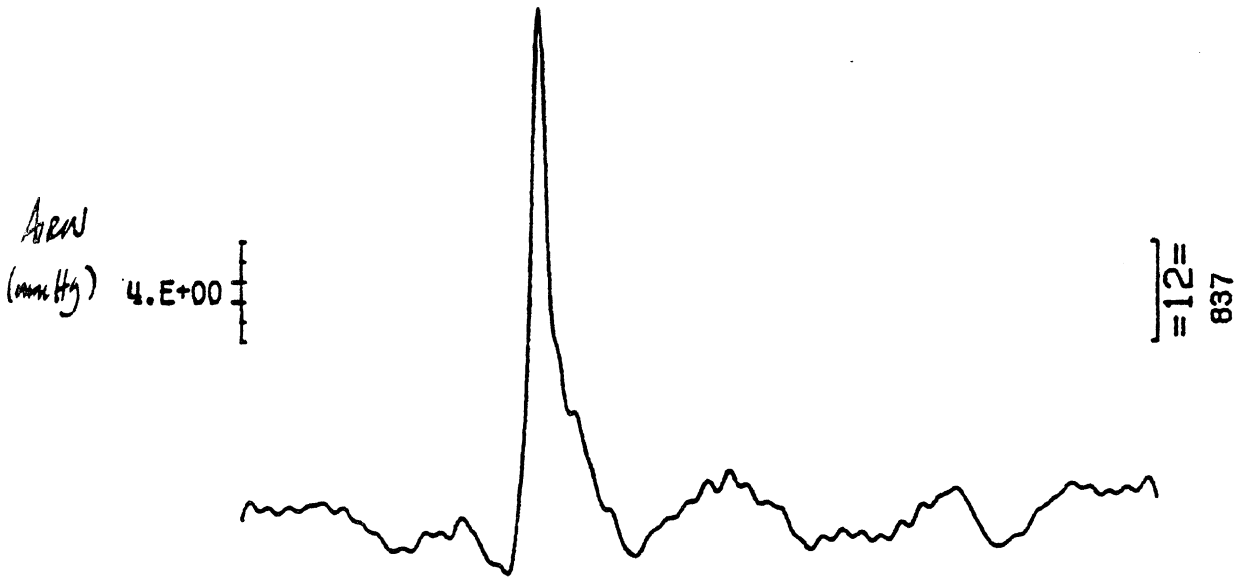
TEST SIGNALS: 2568 PTS/CH AT 6400.50 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
174 - 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	640	1600.12
175 - 2:	T1 P-A ACCELEROMETER	50.20	G'S	4+1+ 3	100.0	640	1600.12
176 - 3:	T1 I-S ACCELEROMETER	48.40	G'S	4+1+ 3	100.0	640	1600.12
177 - 4:	T12 P-A ACCELEROMETER	37.20	G'S	4+1+ 3	100.0	640	1600.12
178 - 5:	T12 R-L ACCELEROMETER	46.30	G'S	4+1+ 3	100.0	640	1600.12
6:							
179 - 7:	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	640	1600.12
180 - 8:	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	640	1600.12
181 - 9:	COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	640	1600.12
10:							
182 - 11:	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	640	1600.12
12:							
13:							
14:							

-----  
FILTERED FILES: 174 - 182 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-877-2;  
-----

PTS: 1 101 201 301 401 501 601

ID: A-877-2:



MSEC: 0 80 160 240 320 400

TAPE: THOR.2A



\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-877-21

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CAPAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 25-OCT-76

TEST SIGNALS: 2568 PTS/CH AT 6400.50 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:								
2:								
3:								
4:								
5:								
6:								
7:								
8:								
9:								
10:								
11:								
12:		AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	6400	1600.12
13:								
14:								

037 - 12: AIRWAY PRESSURE 209.00 MM-HG 4+1+3 100.0 6400 1600.12

13:

14:

\*\*\*\*\*

FILTERED FILES: 037 - 037 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-877-21



Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No. A-880

Test Date June 27, 1975

Test Subject

Age - 74

Sex - M

Stature - 171.0 cm

Weight - 48.3 kg

Restraint System

Production EA Column and lap belt

Velocity

34.5 mph

Deceleration

20.7 G's

Injuries

Rib Fractures - L 2, 3, 4, 5, 6, 7, R 2, 3, 4, 5, 6, 7.  
Spinal Fracture - Through T6 and T12 with transection of  
cord.  
Crushed spleen.  
Slight bruise at lower tip of left ventricle of heart.  
Left posterior laceration.  
Sternal fracture.

AIS Number Estimate

TEST # A-880

TEST DATE 6-27-75

TEST DESCRIPTION EA Column, front sled test VELOCITY 50.6 ft/s

SUBJECT:

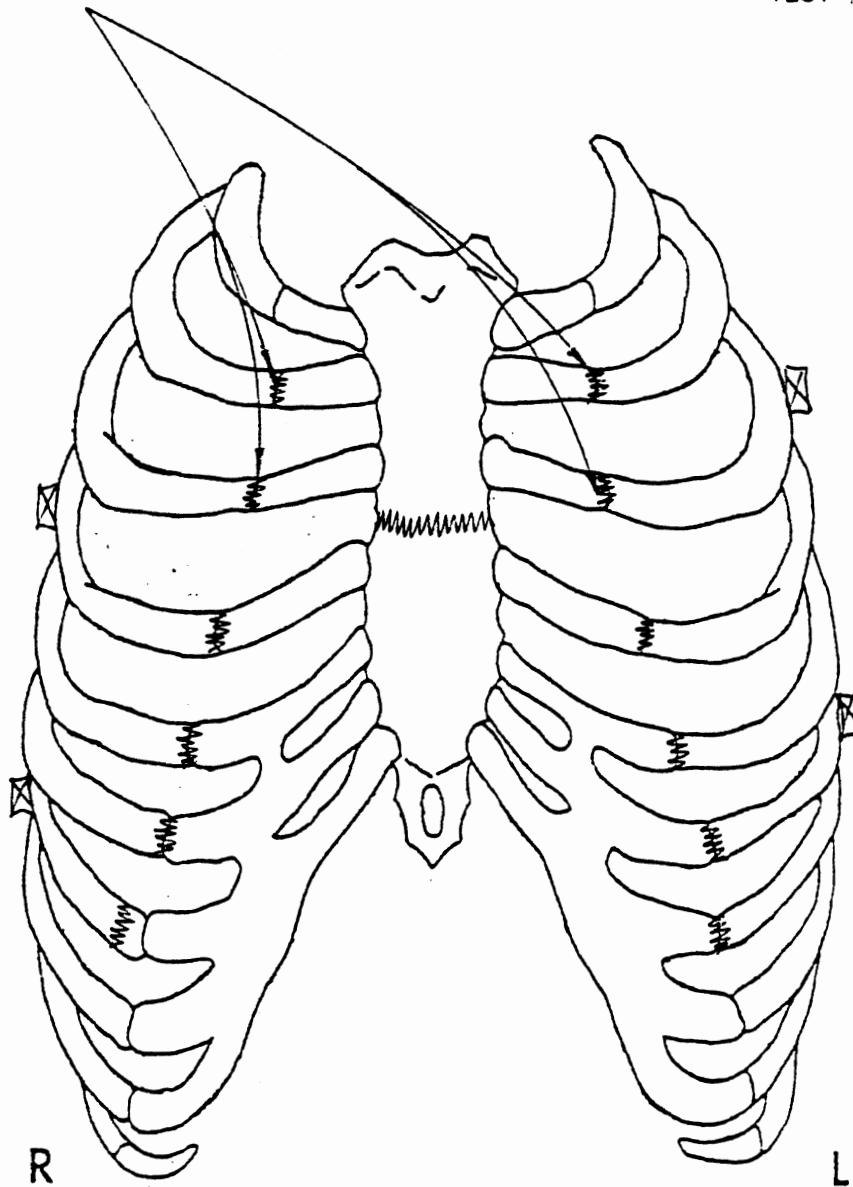
AGE 79 SEX M CAUSE OF DEATH cancer of pancreas (?)

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>B</u>	<u>S</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	4	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>L</u>	<u>N</u>	<u>Q</u>	<u>4</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

severely comminuted fractures

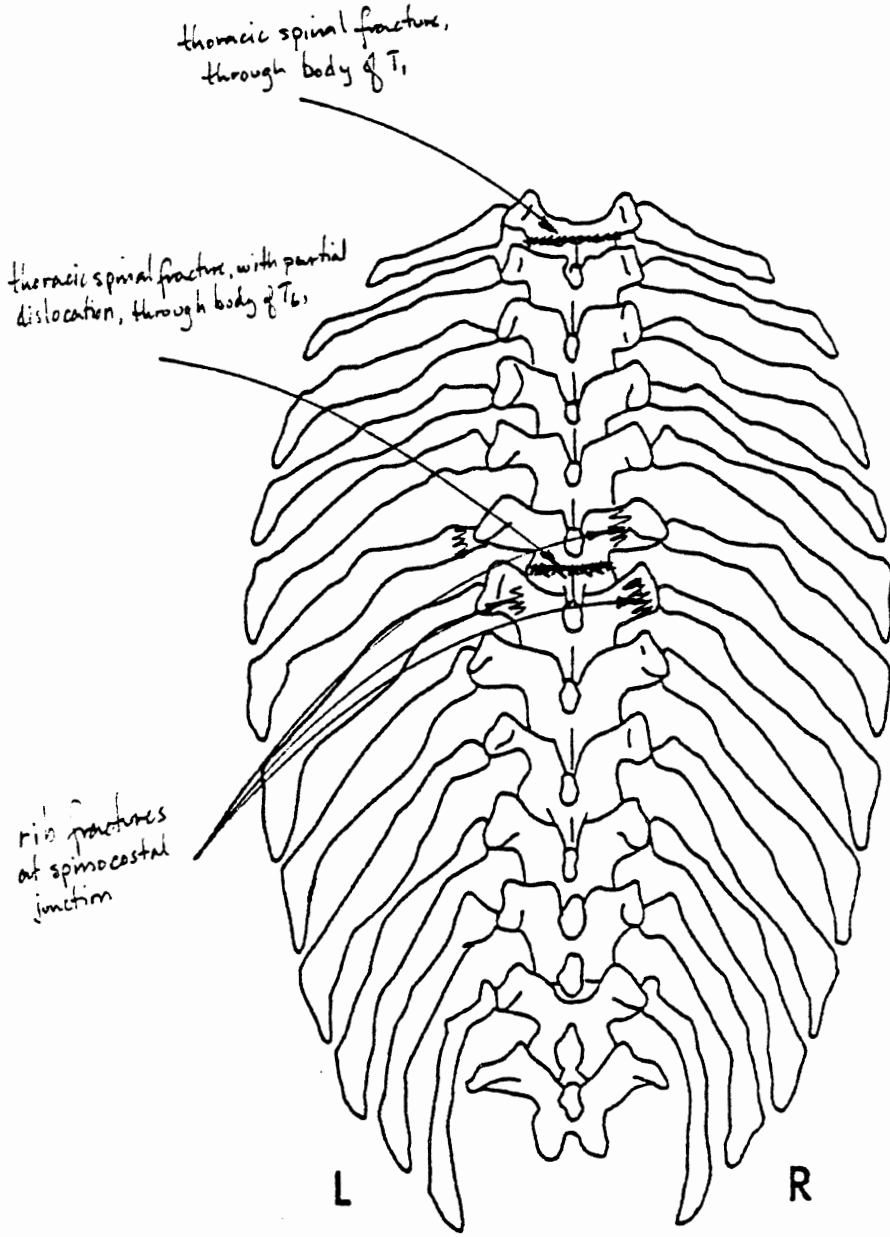
TEST # A-880



ANTERIOR VIEW RIB CAGE

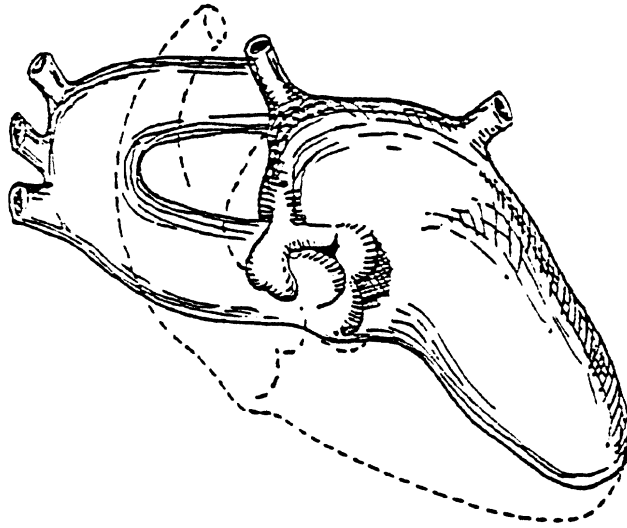
also: spleen crushed

TEST # 480

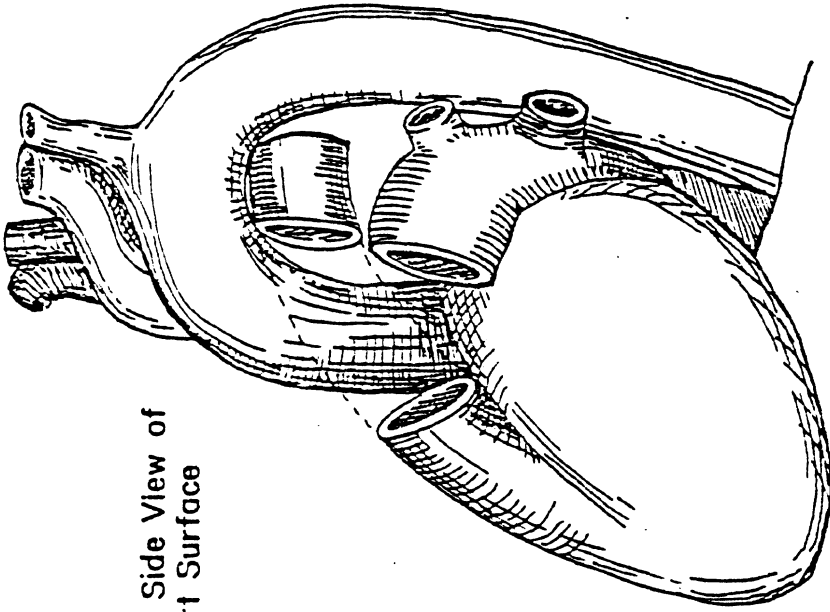


POSTERIOR VIEW RIB CAGE

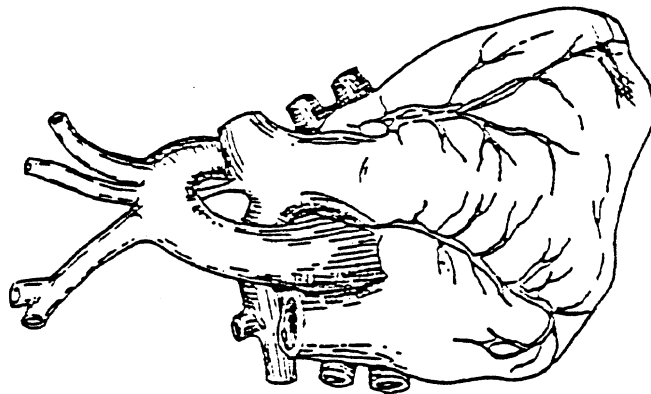
Left View of Left Side of Heart



Left Side View of Heart Surface

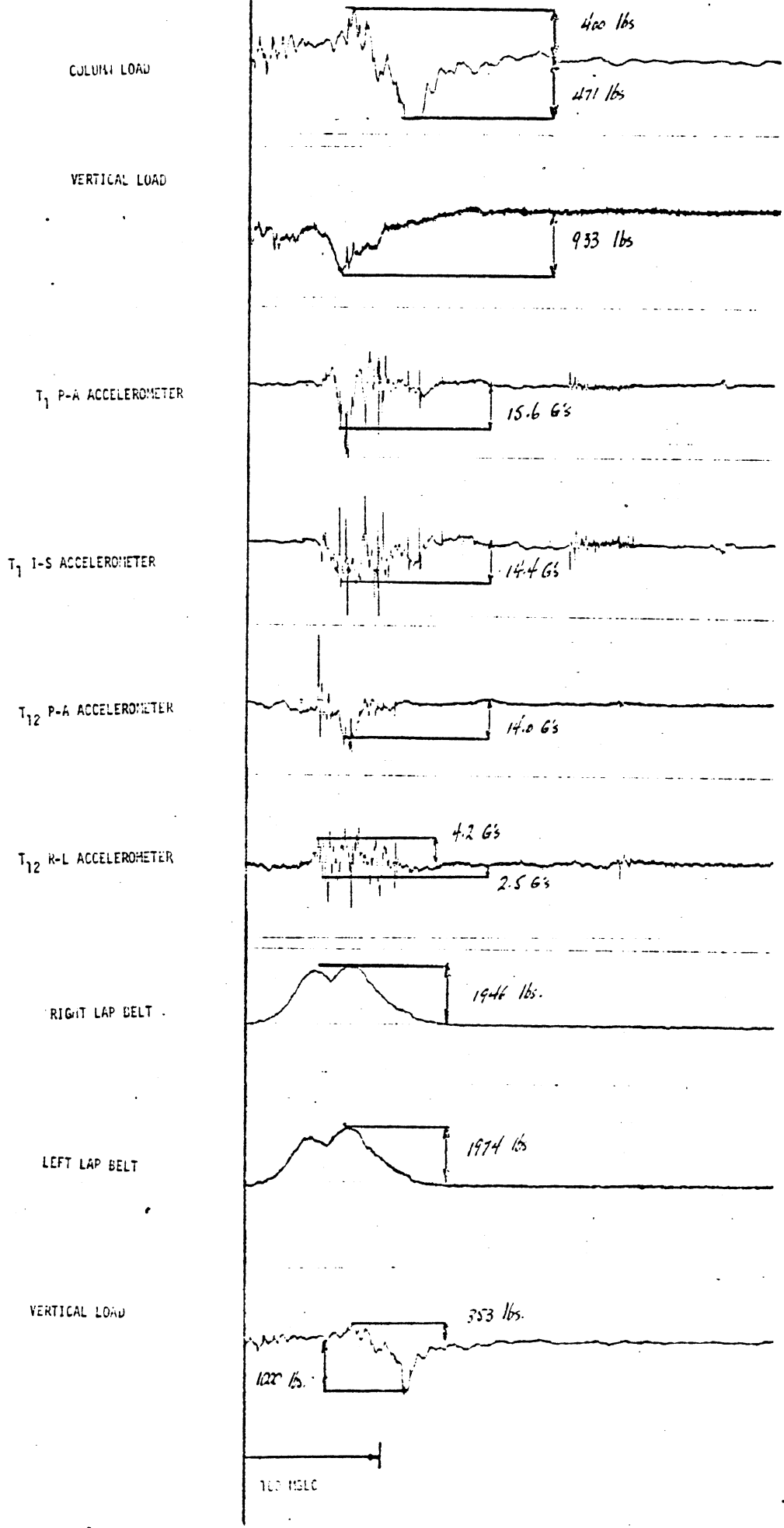


slight bulge  
lower tip. left  
ventricle



Anterior View of Heart

TEST NO. A-000





TEST NO. A-200

UPPER STERIAL  
ACCELEROMETER

31.1 G's

LOWER STERIAL  
ACCELEROMETER

20.9 G's

LOWER LEFT RIB  
ACCELEROMETER

18.9 G's

UPPER LEFT RIB  
ACCELEROMETER

24 G's 26.5 G's

LOWER RIGHT RIB  
ACCELEROMETER

15.1 G's

UPPER RIGHT RIB  
ACCELEROMETER

12.6 G's

VERTICAL ACCELEROMETER

7.2 G's

BASE ACCELEROMETER

6.5 G's

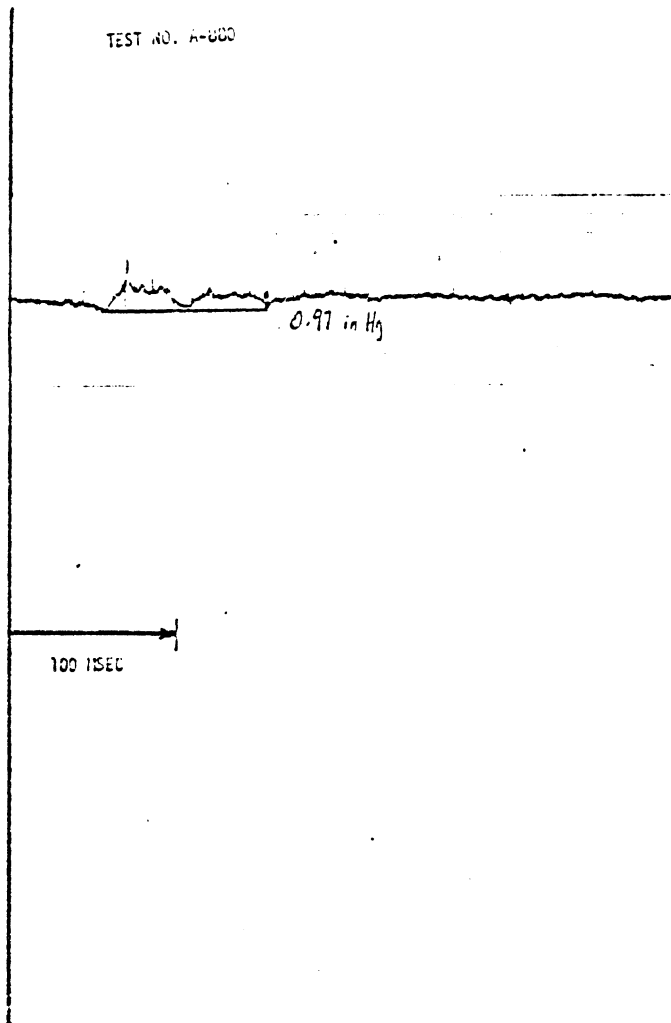
100 USEC

TEST NO. A-000

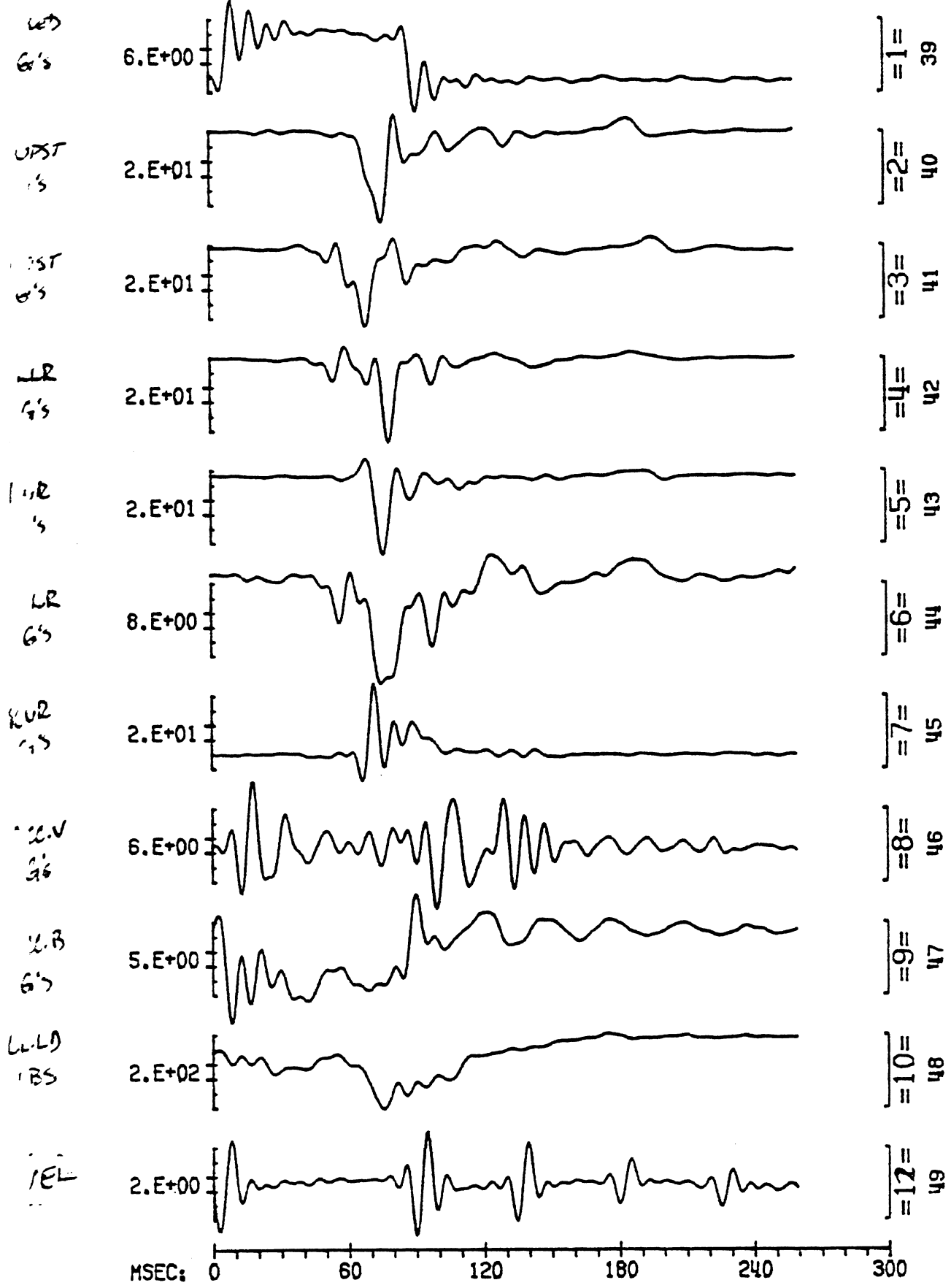
AIRWAY PRESSURE

0.97 in Hg

100 ISEC



PTS: 1 81 161 241 321 401 481



ID: A-880-1:

TAPE: THOR.2

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-880-11

=====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1676 PTS/CH AT 6401.83 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
39 - 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	416 0	1600.46
40 - 2:	UPPER STERNAL ACCELEROMETER	-82.40	G'S	4+1+ 3	100.8	416 0	1600.46
41 - 3:	LOWER STERNAL ACCELEROMETER	-105.00	G'S	4+1+ 3	100.8	416 0	1600.46
42 - 4:	LEFT LOWER RIB ACCELEROMETER	-82.20	G'S	4+1+ 3	100.8	416 0	1600.46
43 - 5:	LEFT UPPER RIB ACCELEROMETER	-113.40	G'S	4+1+ 3	100.8	416 0	1600.46
44 - 6:	RIGHT LOWR RIB ACCELEROMETER	-90.50	G'S	4+1+ 3	100.8	416 0	1600.46
45 - 7:	RIGHT UPPR RIB ACCELEROMETER	99.30	G'S	4+1+ 3	100.8	416 0	1600.46
46 - 8:	COLUMN VERTICAL ACCELEROMETER	99.30	G'S	4+1+ 3	100.8	416 0	1600.46
47 - 9:	ST. COLUMN BASE ACCELEROMETER	89.70	G'S	4+1+ 3	100.8	416 0	1600.46
48 - 10:	STEERING COLUMN LOAD	222.00	LBS.	4+1+ 3	100.8	416 0	1600.46
49 - 11:	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+ 3	100.8	416 0	1600.46

12:

13:

14:

-----

FILTERED FILES: 39 - 49 DIGITAL TAPE: JEFF

DATE: 16-DEC-76

RUN ID: A-880-11

PTS: 1 81 161 241 321 401 481

ID: A-880-1:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-880-11

=====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1676 PTS/CH AT 6401.63 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12		STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+3	100.0	416	1600.46
13								
14								

027 - 12 STEERING COLUMN VERTICAL LOAD 117.60 LBS. 4+1+3 100.0 416 1600.46

13

14

=====

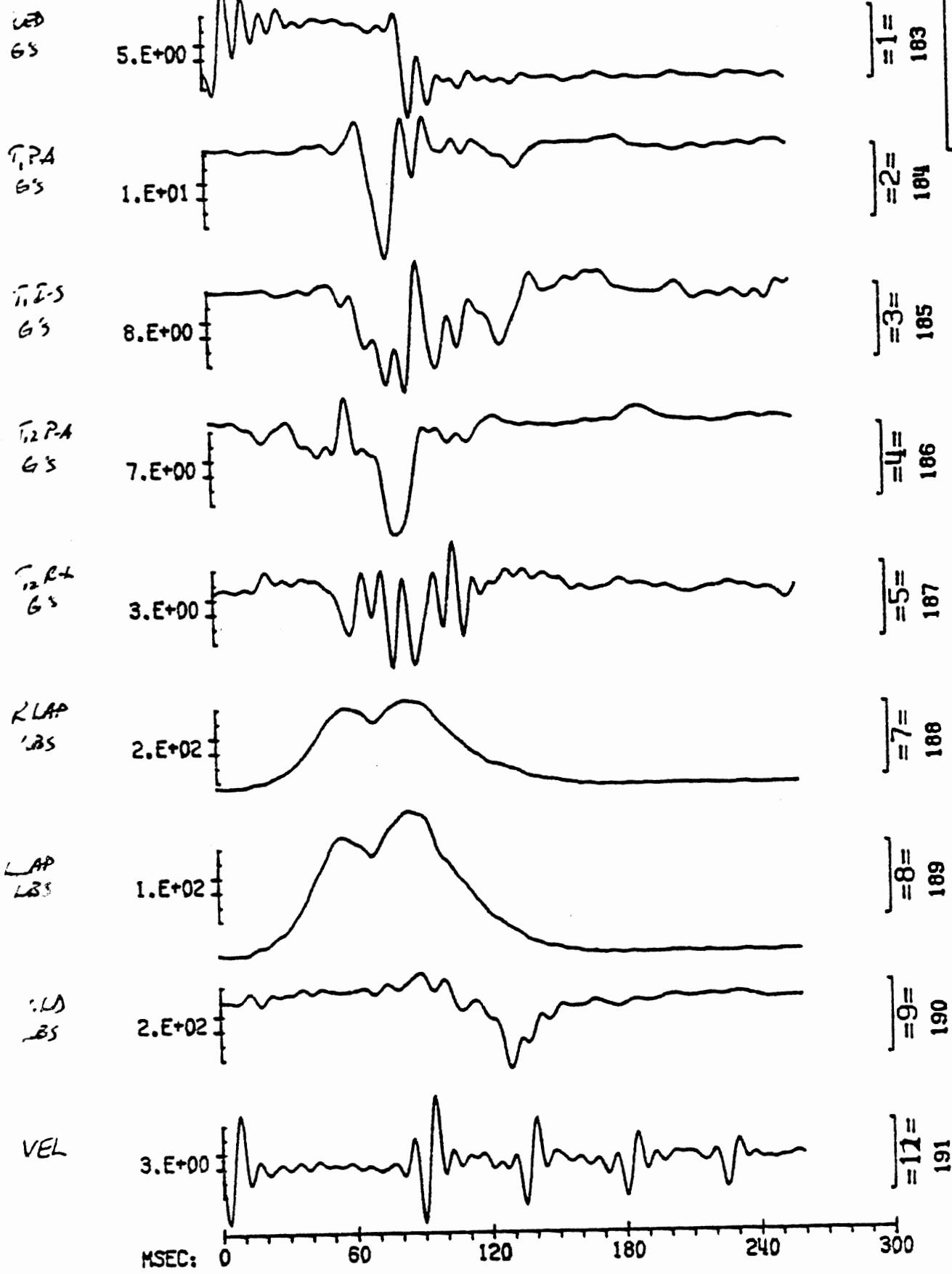
FILTERED FILES: 027 - 027 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-880-11

=====

PTS: 1 81 161 241 321 401



ID: A-880-2:

TAPE: THOR.2

=====  
RUN ID: A-8800-21

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====  
PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: MSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; MS0018 DATE: 25-OCT-76  
TEST SIGNALS: 1673 PTS/CH AT 6397.71 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
183	- 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	416	1599.43
184	- 2:	T1 P-A ACCELEROMETER	80.70	G'S	4+1+ 3	100.0	416	1599.43
185	- 3:	T1 I-8 ACCELEROMETER	85.70	G'S	4+1+ 3	100.0	416	1599.43
186	- 4:	T12 P-A ACCELEROMETER	88.60	G'S	4+1+ 3	100.0	416	1599.43
187	- 5:	T12 R-L ACCELEROMETER	-100.00	G'S	4+1+ 3	100.0	416	1599.43
	6:							
188	- 7:	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	416	1599.43
189	- 8:	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	416	1599.43
190	- 9:	COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	416	1599.43
	10:							
191	- 11:	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	416	1599.43
	12:							
	13:							
	14:							

=====  
FILTERED FILES: 183 - 191 DIGITAL TAPE; JEFF DATE: 16-DEC-76 RUN ID: A-8800-21

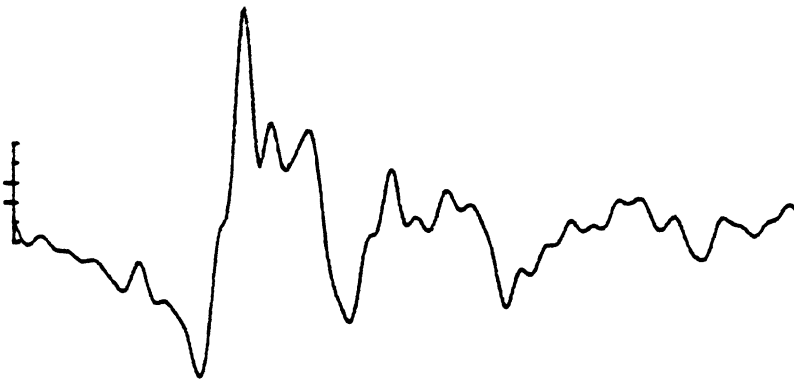


PTS: 1 81 161 241 321 401

ID: A-880-2:

ArRw

(mm Hg) 2.E+00



12= 838

MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-880-21

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 25-OCT-76

TEST SIGNALS: 1673 PTS/CH AT 6397.71 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:
- 12: AIRWAY PRESSURE 209.00 MM-HG 4+1+ 3 100.0 416 0 1599.43
- 13:
- 14:

\*\*\*\*\*

FILTERED FILES: 830 - 836 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-880-21

\*\*\*\*\*

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No.: A-883

Test Date: July 7, 1975

Test Subject:

Age - 74

Sex - Female

Stature - 156.2 cm

Weight - 75.4 kg

Restraint System

Production EA-column and lap belt

Velocity

33.0 mph

Deceleration

19.8 G's

Injuries

Rib fractures - R2, 4, 5, 6, L1, 3, 4, 5, 6, 7

Sternum fracture

Spine through body of T8 and C7

Contusion apex left ventricle

Dislocated left shoulder

Fracture left femoral neck

AIS Number Estimate

5

TEST # A-883

TEST DATE 7-7-75

TEST DESCRIPTION EA Column, front sled test VELOCITY 48.4 ft/s

SUBJECT:

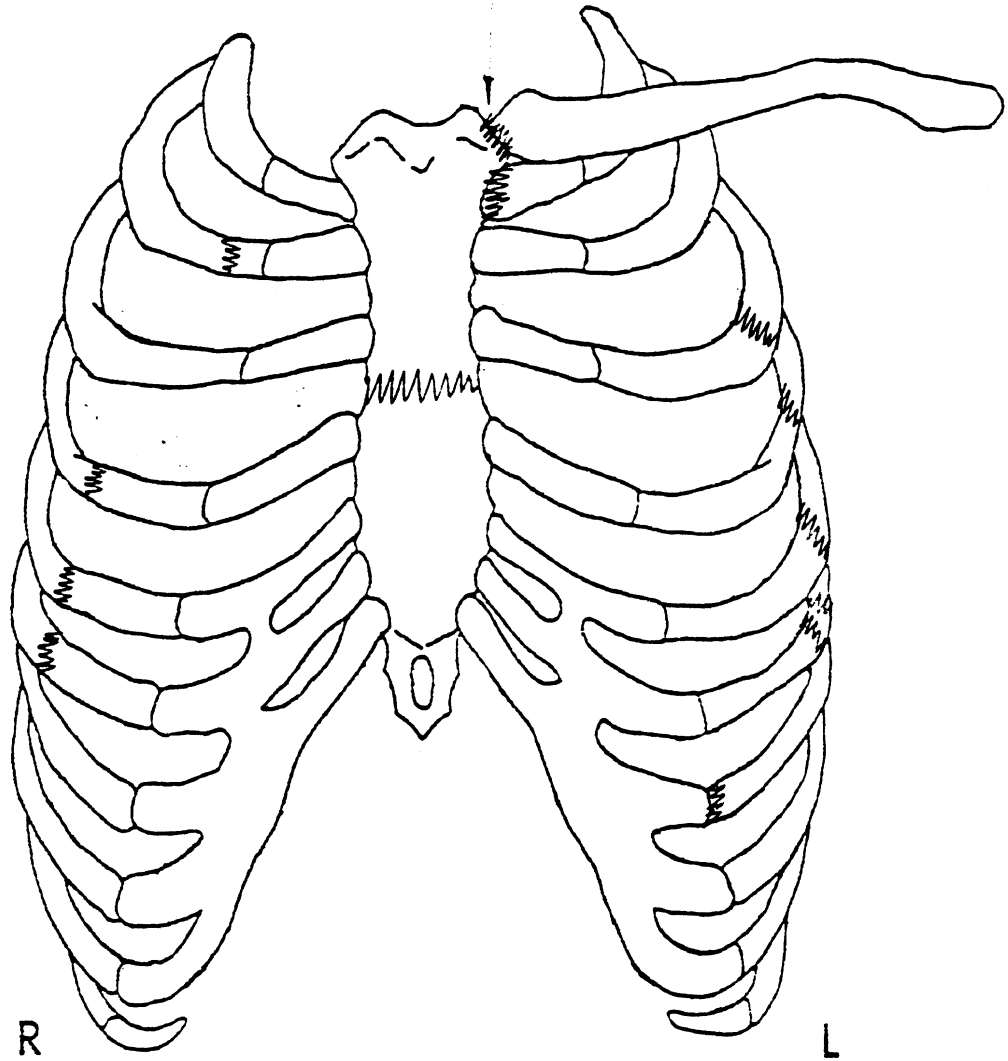
AGE 74 SEX F CAUSE OF DEATH unknown

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>B</u>	<u>S</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	4	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>S</u>	<u>L</u>	<u>D</u>	<u>J</u>	<u>3</u>
	3	<u>T</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>3</u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

TEST # A-883

sterno-clavicular  
dislocation



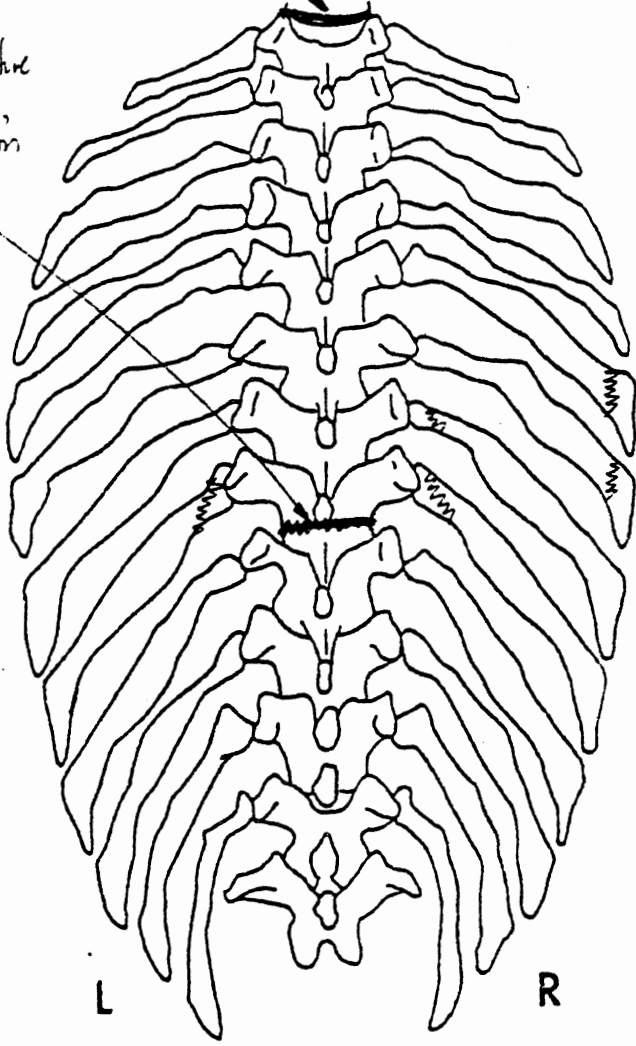
ANTERIOR VIEW RIB CAGE

Also: fracture left femoral neck

cervical spine fracture  
through body of C4: cord severed

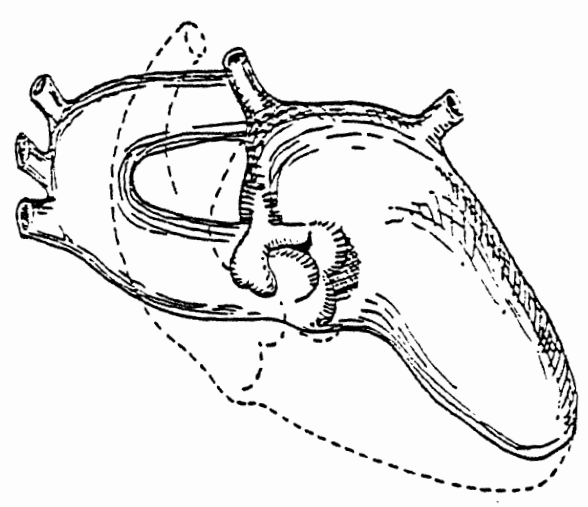
TEST # A-883

thoracic spine fracture  
through body of T8,  
with cord disruption

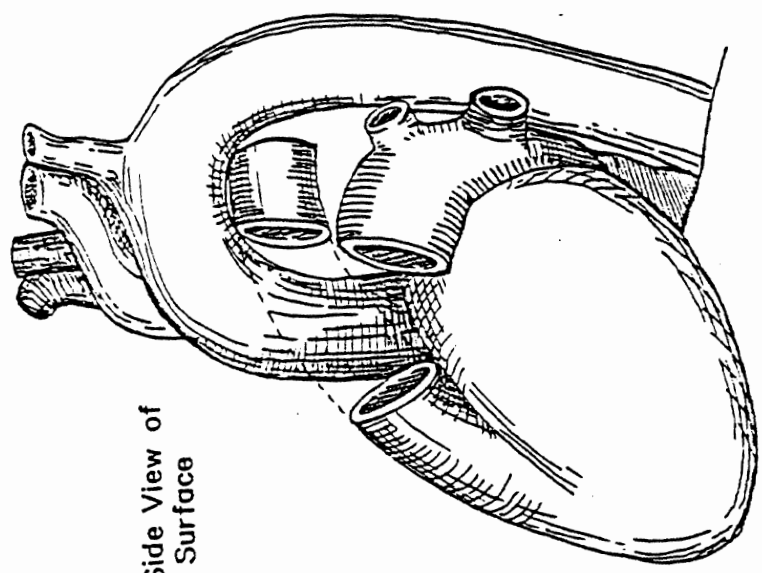


POSTERIOR VIEW RIB CAGE

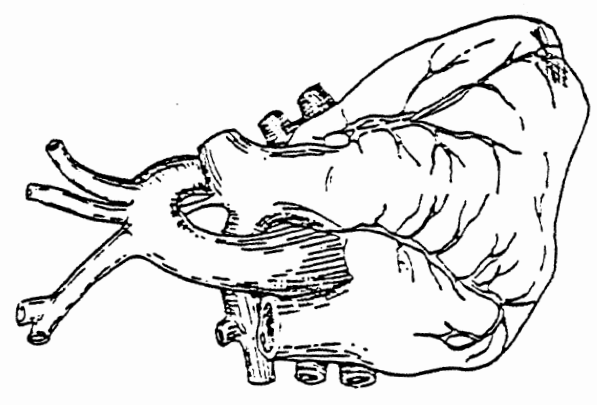
Left View of Left Side of Heart



Left Side View of Heart Surface



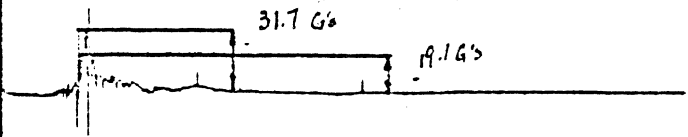
*bruise on tip of left ventricle, anterior*



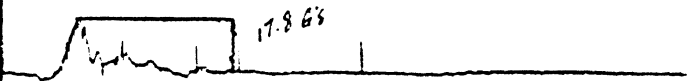
Anterior View of Heart

TEST NO. A-803

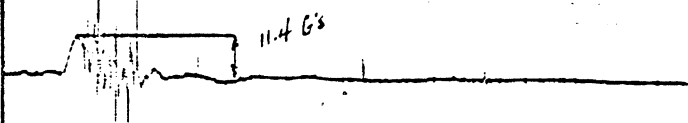
UPPER STERNAL  
ACCELEROMETER



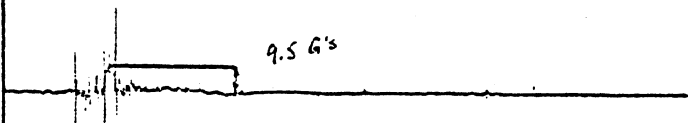
LOWER STERNAL  
ACCELEROMETER



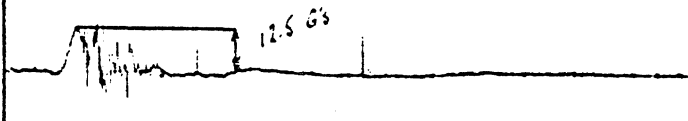
LEFT LOWER RIB  
ACCELEROMETER



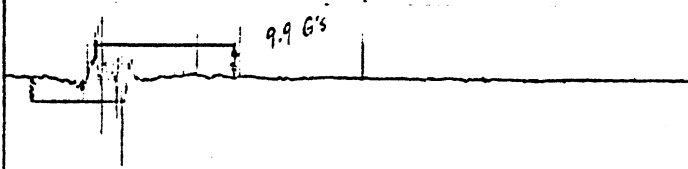
LEFT UPPER RIB  
ACCELEROMETER



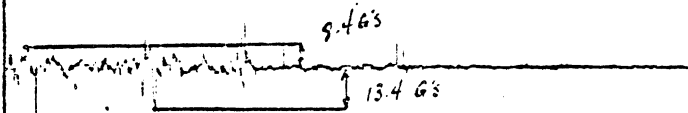
RIGHT LOWER RIB  
ACCELEROMETER



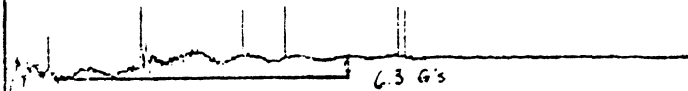
RIGHT UPPER RIB  
ACCELEROMETER



STEERING COLUMN VERTICAL  
ACCELEROMETER



STEERING COLUMN BASE  
ACCELEROMETER

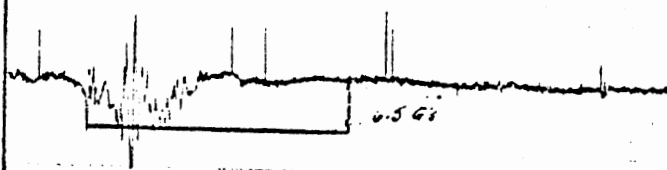


100 msec

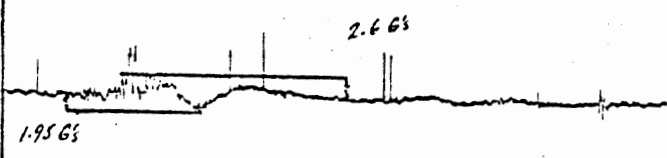


TEST NO. A-603

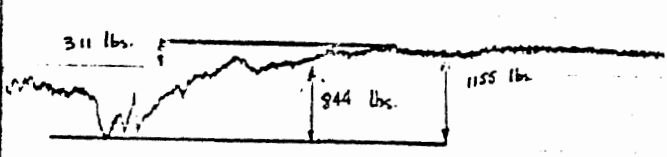
T<sub>12</sub> P-A ACCELEROMETER



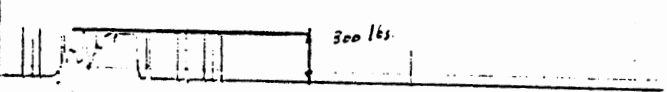
T<sub>12</sub> R-L ACCELEROMETER



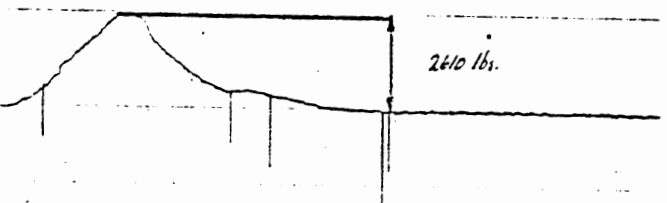
STEERING COLUMN LOAD



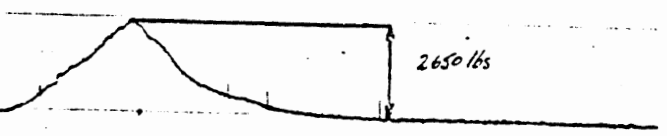
STEERING COLUMN VERTICAL LOAD



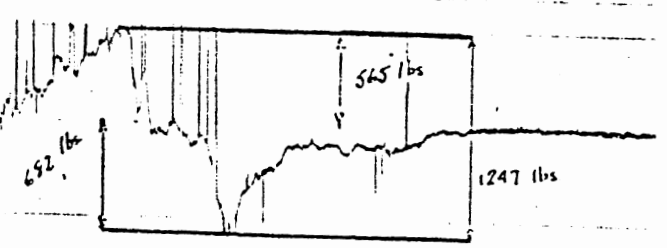
RIGHT LAP BELT LOAD



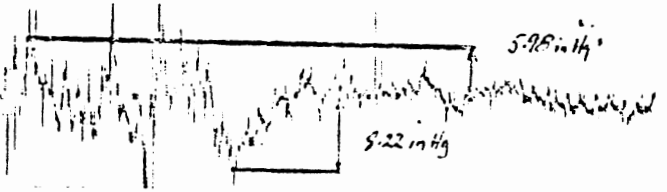
LEFT LAP BELT LOAD



STEERING COLUMN VERTICAL LOAD

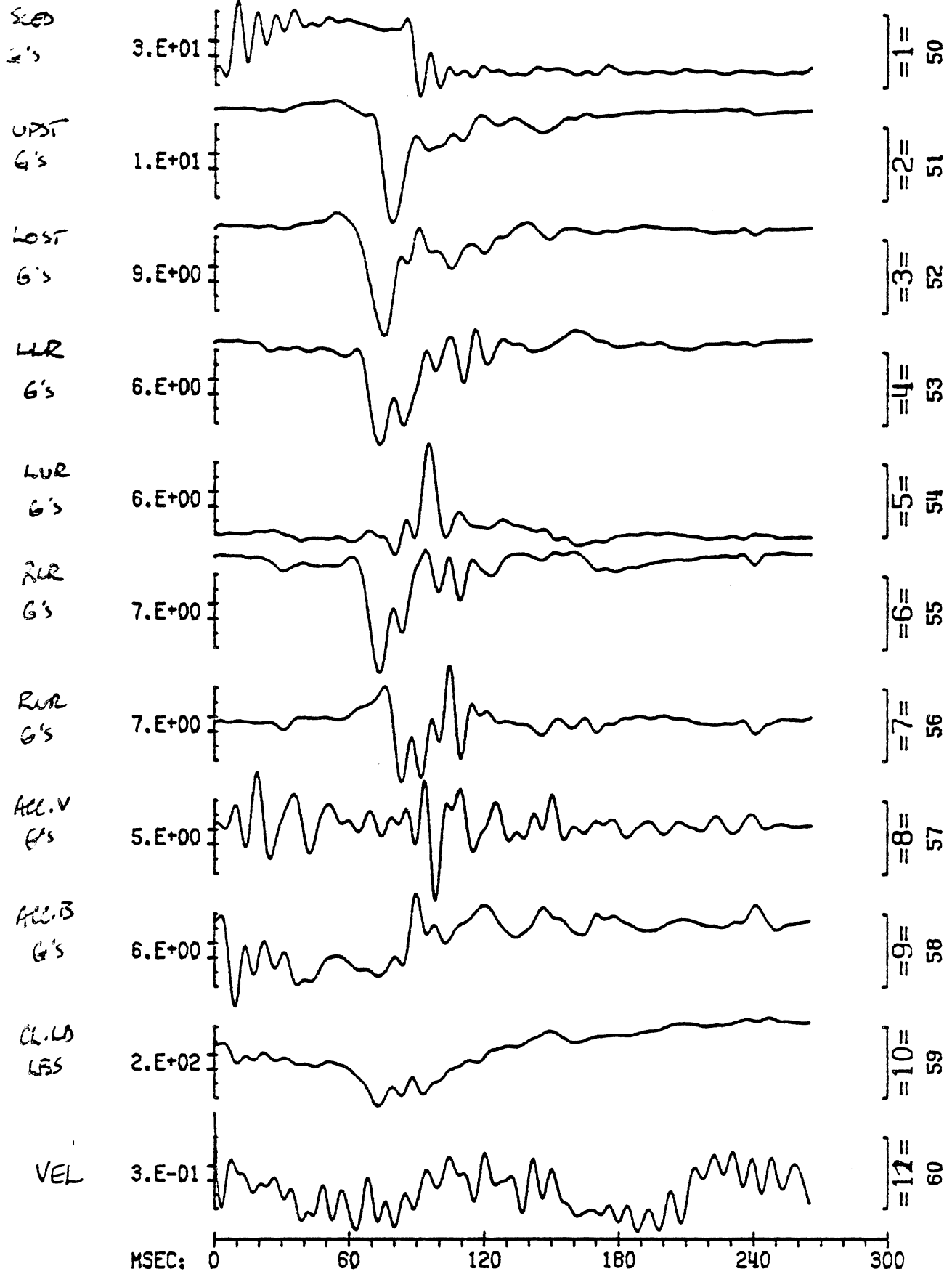


AIRWAY PRESSURE



100 msec

PTS: 1 81 161 241 321 401



IO: A-883-1:

TAPE: THOR.2

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-883-11

=====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1710 PTS/CH AT 6398.65 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
50	11	BLEED DECELERATION PULSE	20.00	G'S	4+1+3	100.8	426	1599.66
51	21	UPPER STERNAL ACCELEROMETER	-82.40	G'S	4+1+3	100.8	426	1599.66
52	31	LOWER STERNAL ACCELEROMETER	-101.00	G'S	4+1+3	100.8	426	1599.66
53	41	LEFT LOWER RIB ACCELEROMETER	-82.90	G'S	4+1+3	100.8	426	1599.66
54	51	LEFT UPPER RIB ACCELEROMETER	113.00	G'S	4+1+3	100.8	426	1599.66
55	61	RIGHT LOWER RIB ACCELEROMETER	-89.70	G'S	4+1+3	100.8	426	1599.66
56	71	RIGHT UPPER RIB ACCELEROMETER	-95.30	G'S	4+1+3	100.8	426	1599.66
57	81	COLUMN VERTICAL ACCELEROMETER	100.00	G'S	4+1+3	100.8	426	1599.66
58	91	ST. COLUMN BASE ACCELEROMETER	89.70	G'S	4+1+3	100.8	425	1599.66
59	101	STEERING COLUMN LOAD	222.00	LBS.	4+1+3	100.8	425	1599.66
60	111	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+3	100.8	425	1599.66

121

131

141

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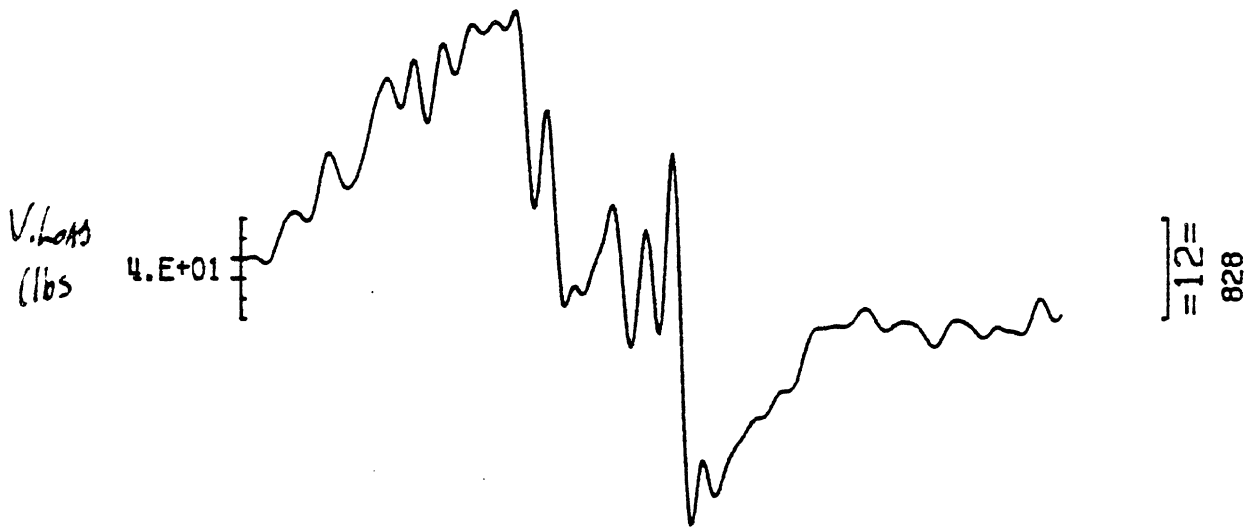
FILTERED FILES: 50 - 60 DIGITAL TAPE: JEFF

DATE: 16-DEC-76

RUN ID: A-883-11

PTS: 1 81 161 241 321 401

ID: A-883-1:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

\*\*\*\*\*  
RUN ID: A-8A3-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; H90010 DATE: 25-OCT-76

TEST SIGNALS: 1710 PTS/CH AT 6396.65 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
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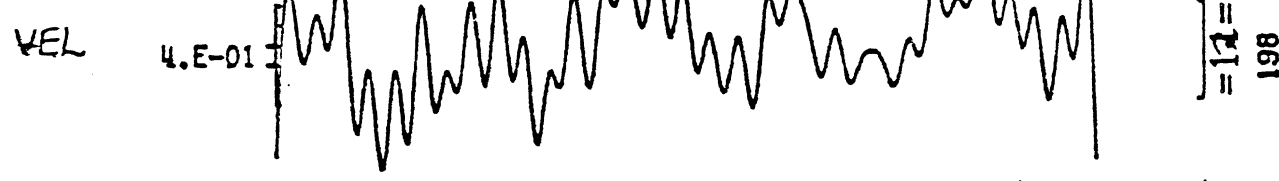
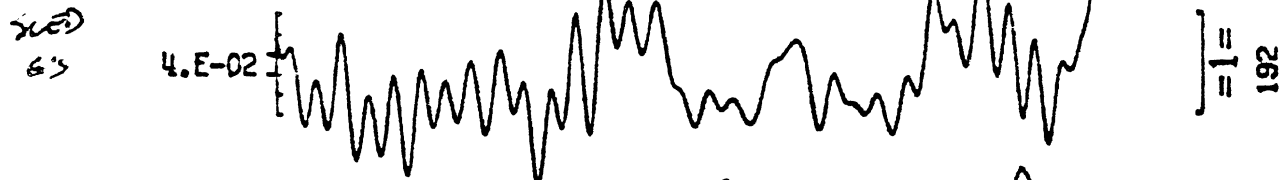
- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:

820 - 12: STEERING COLUMN VERTICAL LOAD 117.60 LBS. 4+1+ 3 100.0 425 0 1599.66

- 13:
- 14:

\*\*\*\*\*  
DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-8A3-11  
\*\*\*\*\*

PTS: 1 81 161 241 321 401



MSEC: 0 60 120 180 240 300

10: A-883-2:

TAPE: THOR.2

=====  
 RUN ID: A-8A3-2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1700 PTS/CH AT 6398.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
192	1	SLED DECELERATION PULSE	20.00 G'S		4+1+3	100.8	426	1599.70
2								
3								
193	4	T12 P-A ACCELEROMETER	89.40 G'S		4+1+3	100.8	426	1599.70
194	5	T12 R-L ACCELEROMETER	-100.00 G'S		4+1+3	100.8	426	1599.70
6								
195	7	RIGHT LAP BELT LOAD	1000.00 LBS.		4+1+3	100.8	426	1599.70
196	8	LEFT LAP BELT LOAD	1000.00 LBS.		4+1+3	100.8	426	1599.70
197	9	COLUMN VERTICAL LOAD	1176.00 LBS.		4+1+3	100.8	425	1599.70
10								
198	11	AIRWAY PRESSURE	209.00 MM-HG		4+1+3	100.8	425	1599.70
12								
13								
14								

-----  
 FILTERED FILES: 192 - 198 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-8A3-2

PTS: 1 81 161 241 321 401

ID: A-883-2:



12= 839

MSEC: 0 60 120 180 240 300

TAPE: THOR.2A



\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-003-21

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1700 PTS/CH AT 6396.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11								
21								
31								
41								
51								
61								
71								
81								
91								
101								
111								

039 - 121 AIRWAY PRESSURE 209.00 MM-HG 4+1+ 3 100.0 425 0 1599.70

131

141

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FILTERED FILES: 039 - 039 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-003-21

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Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No.: A-884

Test Date: July 10, 1975

Test Subject:

Age - 60

Sex - Male

Stature - 177.3 cm

Weight - 90.2 kg

Restraint System

Production EA-column with pad insert and lap belt

Velocity

23.0 mph

Deceleration

10.0 G's

Injuries

All ribs broken along 10 1/2 inch radius where disk hit chest.  
Sternal fracture.

AIS Number Estimate

4

TEST # A-884

TEST DATE 2.10.75

TEST DESCRIPTION LA column, soft insert, front sled test VELOCITY 33.7 ft/s

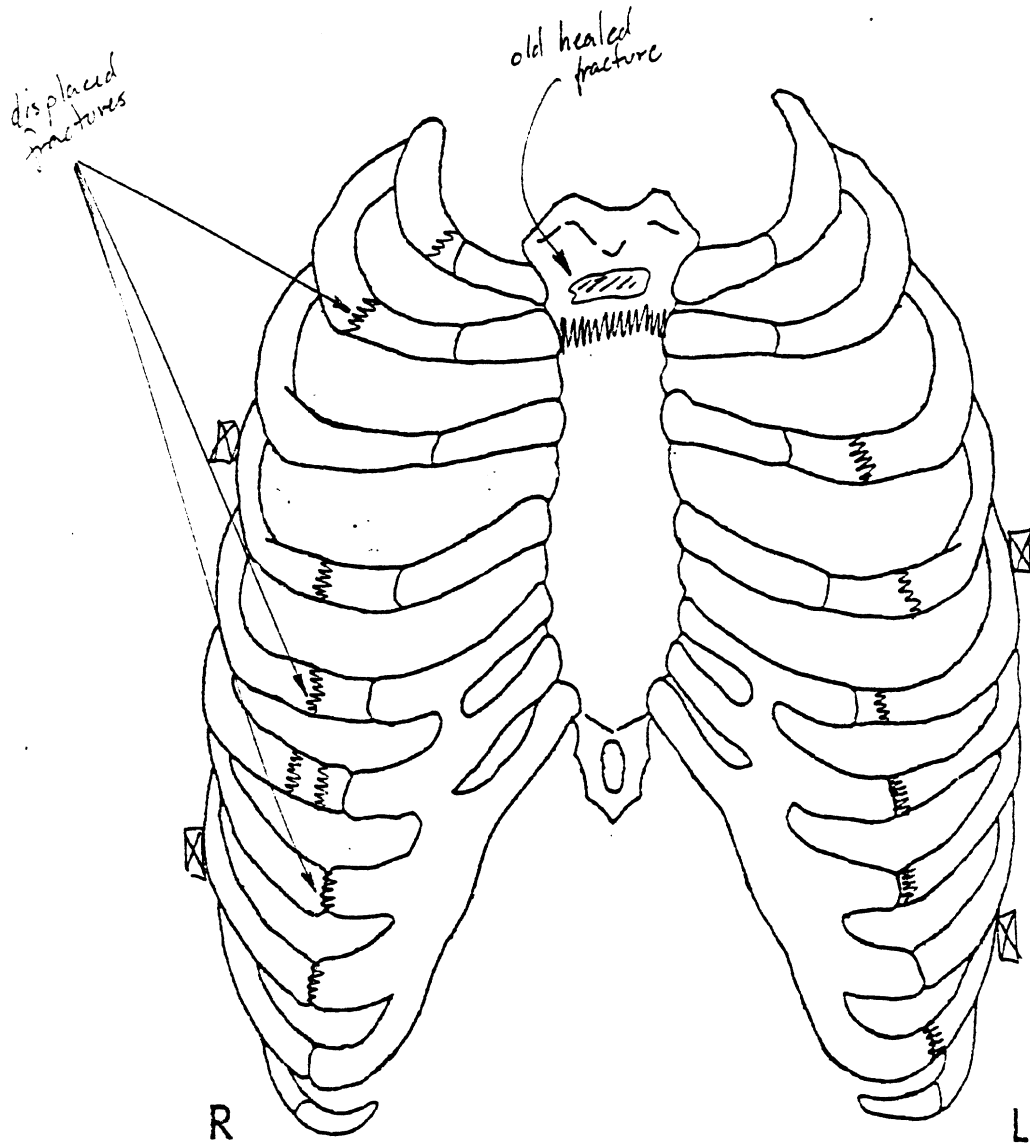
SUBJECT:

AGE \_\_\_\_\_ SEX M CAUSE OF DEATH Coagulopathy; chronic alcoholism

INJURY INFORMATION: OVERALL THORACIC AIS 4

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S	
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____
	6	_____	_____	_____	_____	_____
	7	_____	_____	_____	_____	_____
	8	_____	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____	_____
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____

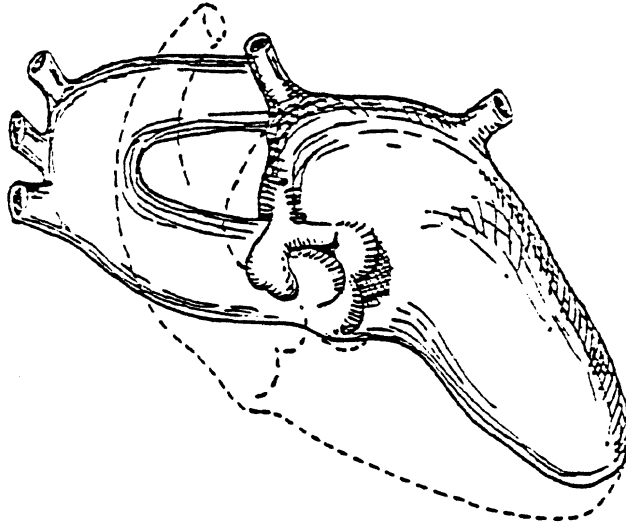
TEST # A-884



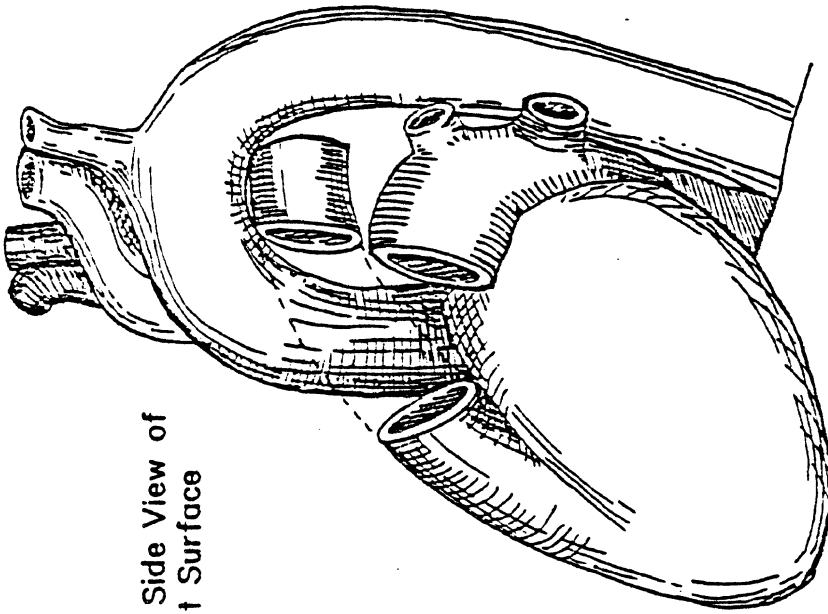
Note: Ribs broken along 10 1/2" circle where steering wheel insert hit chest.

ANTERIOR VIEW RIB CAGE

Left View of Left Side of Heart

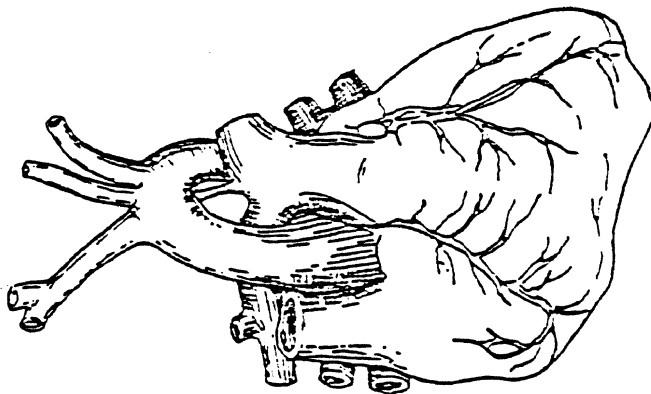


Left Side View of Heart Surface

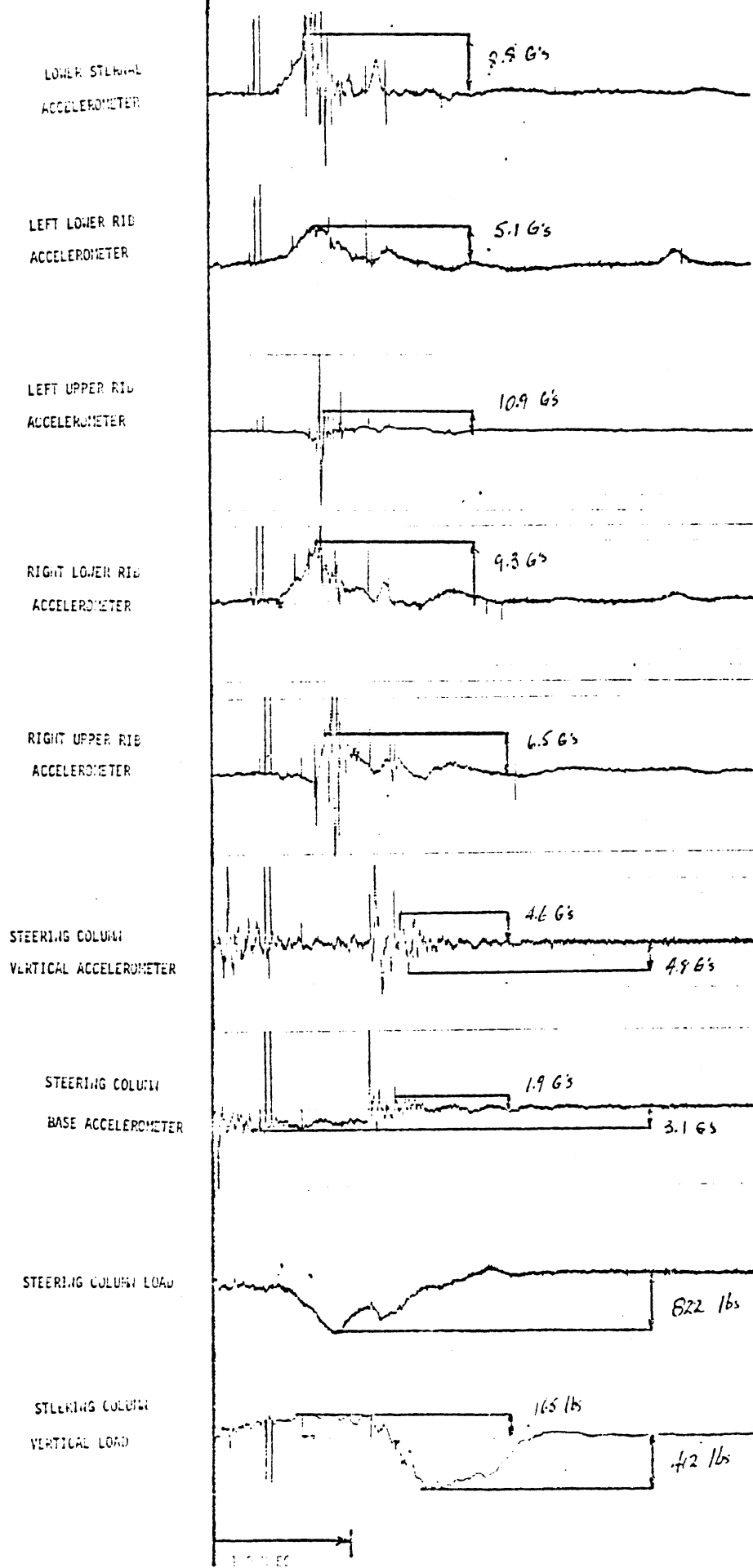


no apparent myocardial damage, but:

- minimal muscle fissure in heart
- 3-4 cc interstitial fluid inside pericardium - probably not from impact.



Anterior View of Heart



TEST NO. A-604

T<sub>1</sub> P-A ACCELEROMETER

9.5 G's

T<sub>1</sub> I-S ACCELEROMETER

2.6 G's

T<sub>12</sub> P-A ACCELEROMETER

4.0 G's

T<sub>12</sub> R-L ACCELEROMETER

1.8 G's

RIGHT LAP BELT LOAD

1420 lbs.

LEFT LAP BELT LOAD

1312 lbs.

STEERING COLUMN  
VERTICAL LOAD

386 lbs.

228 lbs.

SLED PULSE

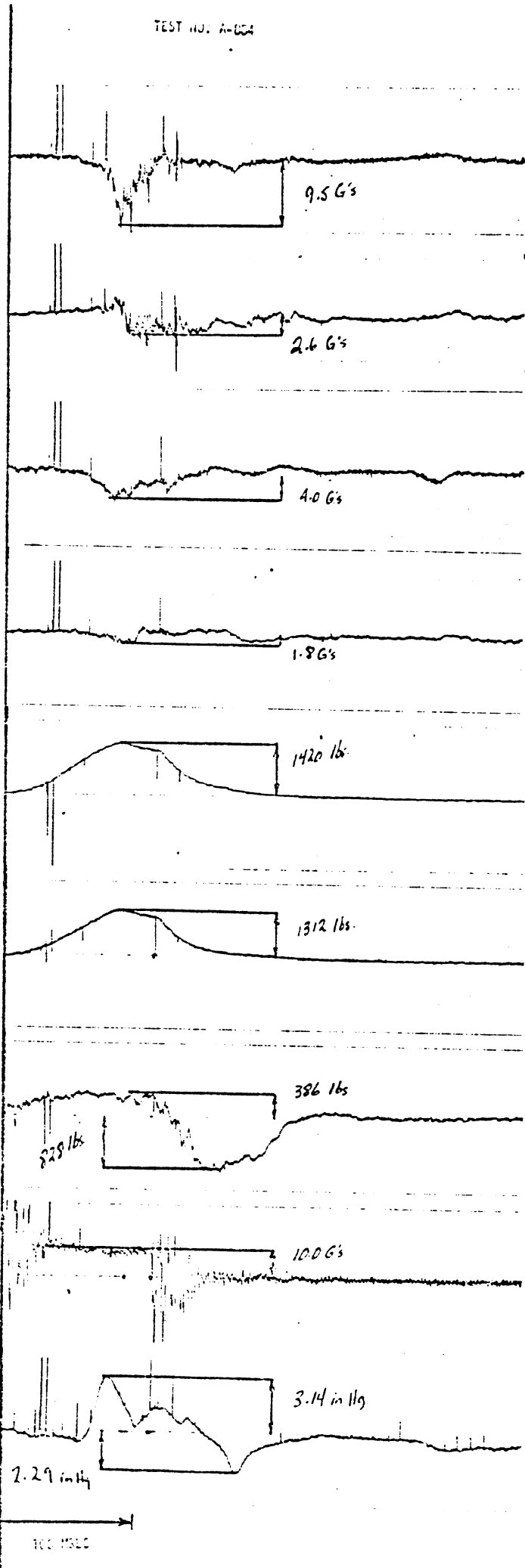
10.0 G's

AIRWAY PRESSURE

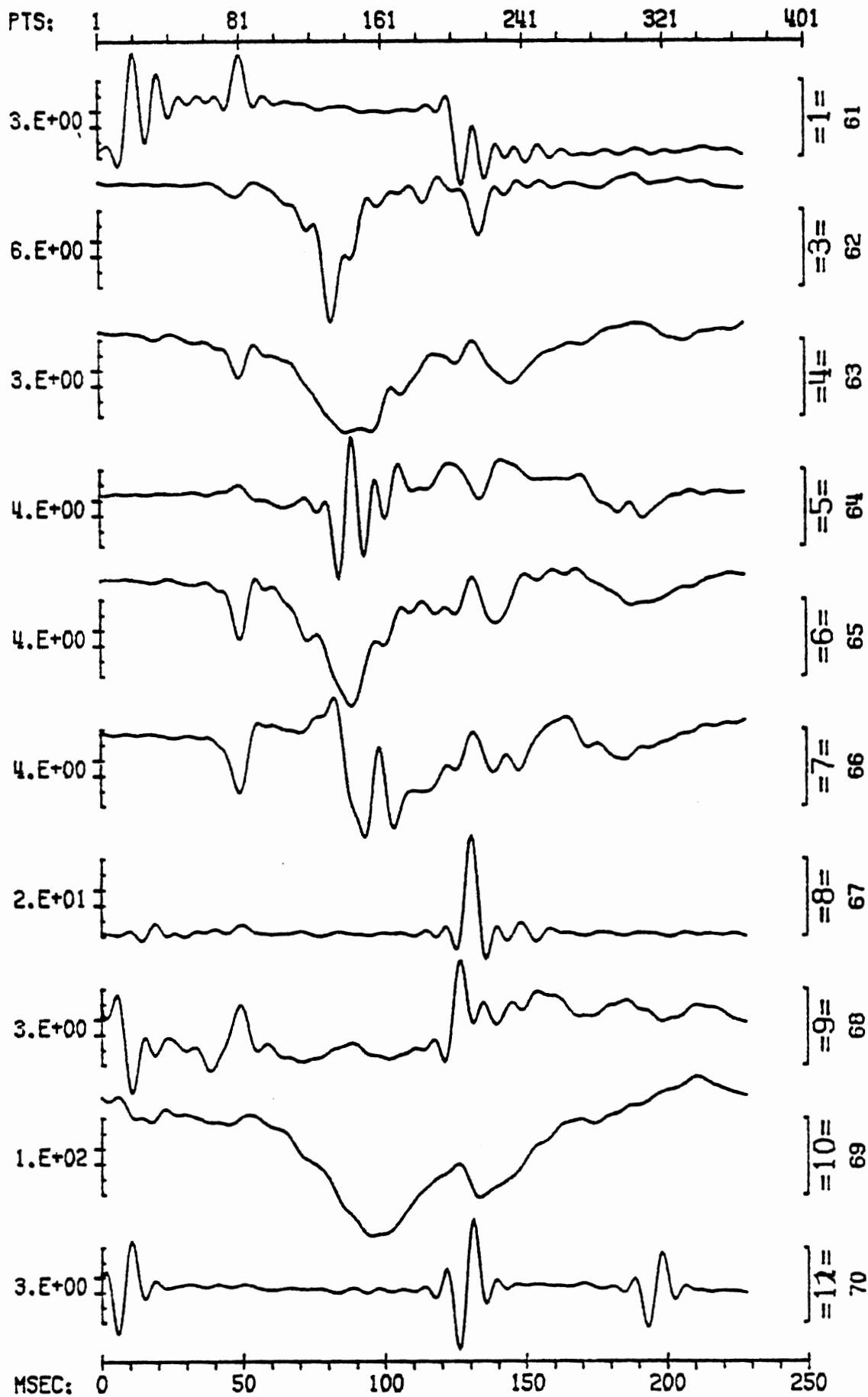
3.14 in Hg

2.29 in Hg

100 MSEC







ID: A-884-1:

TAPE: THOR.2

=====  
 RUN ID: A-884-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====  
 PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1475 PTS/CH AT 6400.35 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
61	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	366	1600.00
62	3	LOWER STERNAL ACCELEROMETER	-97.20	G'S	4+1+ 3	100.0	366	1600.00
63	4	LEFT LOWER RIB ACCELEROMETER	-82.90	G'S	4+1+ 3	100.0	366	1600.00
64	5	LEFT UPPER RIB ACCELEROMETER	114.00	G'S	4+1+ 3	100.0	366	1600.00
65	6	RIGHT LOWR RIB ACCELEROMETER	-90.50	G'S	4+1+ 3	100.0	366	1600.00
66	7	RIGHT UPPR RIB ACCELEROMETER	-95.30	G'S	4+1+ 3	100.0	366	1600.00
67	8	COLUMN VERTICAL ACCELEROMETER	100.00	G'S	4+1+ 3	100.0	366	1600.00
68	9	ST. COLUMN BASE ACCELEROMETER	89.00	G'S	4+1+ 3	100.0	366	1600.00
69	10	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.0	366	1600.00
70	11	STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+ 3	100.0	366	1600.00

12:  
 13:  
 14:

-----  
 FILTERED FILES: 61 - 70 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-884-11

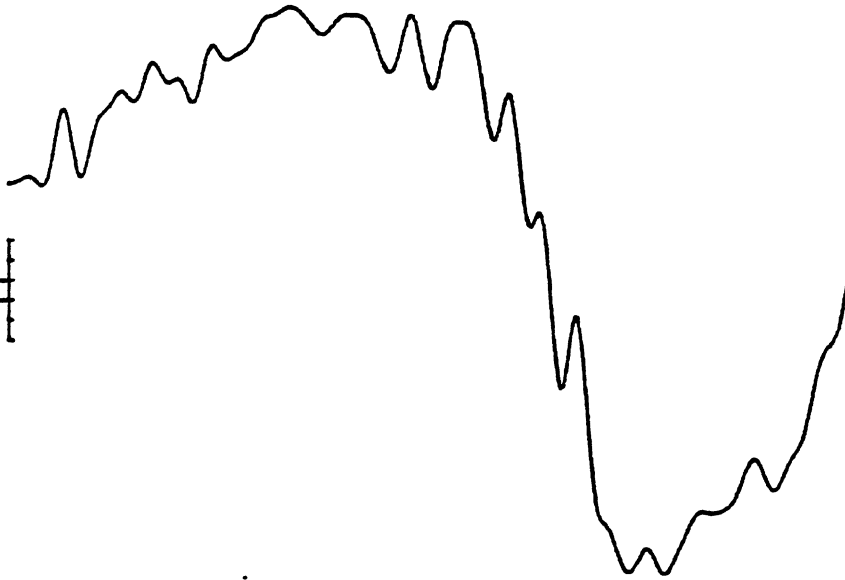
PTS: 1 81 161 241 321 401

A-884-1

ID:

V. LOAD  
(lbs.)

2.E+01



12= 829

MSEC: 0 50 100 150 200 250

TAPE: THOR.2A

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-884-11

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1475 PTS/CH AT 6400.35 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:								
2:								
3:								
4:								
5:								
6:								
7:								
8:								
9:								
10:								
11:								
12:		STEERING COLUMN VERTICAL LOAD	117.60	LBS.	4+1+	3	100.0	366 @ 1600.09
13:								
14:								

029 - 12: STEERING COLUMN VERTICAL LOAD 117.60 LBS. 4+1+ 3 100.0 366 @ 1600.09

13:

14:

\*\*\*\*\*

FILTERED FILES: 029 - 029 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-884-11

PTS: 1 81 161 241 321 401

5.0E+00  
G's

3.E+00

=1=  
199

7.25  
G's

5.E+00

=2=  
200

7.25  
G's

2.E+00

=3=  
201

7.25  
G's

3.E+00

=4=  
202

7.25  
G's

2.E+00

=5=  
203

R.LAP  
BS

2.E+02

=7=  
204

LWR  
BS

9.E+01

=8=  
205

.LD  
BS

7.E+01

=9=  
206

VEL

5.E+00

=12=  
207

MSEC: 0 50 100 150 200 250

ID: A-884-2:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-884-2

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1474 PTS/CH AT 6401.22 HZ. CAL SIGNALS: NOT DIGITIZED.

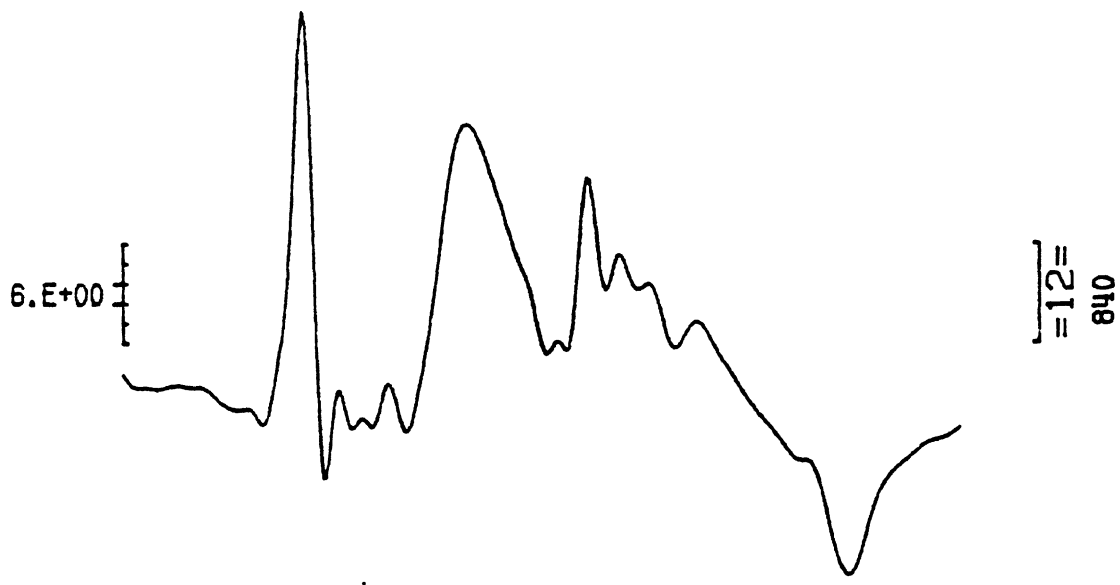
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
199	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	366	1600.30
200	2	T1 P-A ACCELEROMETER	80.00	G'S	4+1+ 3	100.0	366	1600.30
201	3	T1 I-S ACCELEROMETER	85.40	G'S	4+1+ 3	100.0	366	1600.30
202	4	T12 P-A ACCELEROMETER	88.60	G'S	4+1+ 3	100.0	366	1600.30
203	5	T12 R-L ACCELEROMETER	-101.00	G'S	4+1+ 3	100.0	366	1600.30
204	7	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	366	1600.30
205	8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	366	1600.30
206	9	COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	366	1600.30
207	11	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	366	1600.30

101  
121  
131  
141

PTS: 1 81 161 241 321 401

ID: A-884-2:

*Handwritten:*  
A-884  
(mmHg)



TAPE: THOR.2A

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-884-21

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; H80010 DATE: 25-OCT-76

TEST SIGNALS: 1474 PTS/CH AT 6401.22 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
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- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 840 - 120 AIRWAY PRESSURE 209.00 MM-HG 4+1+ 3 100.0 366 0 1600.30
- 130
- 140

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FILTERED FILES: 840 - 840 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-884-21

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Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No.: A-887

Test Date: July 22, 1975

Test Subject

Age - 68

Sex - Male

Stature - 173.7 cm

Weight - 85.5 kg

Restraint System

Production EA-column with airbag insert and lap belt

Velocity

23.0 mph

Deceleration

10.0 G's

Injuries

Factors of R5 left at sternum

Hemorrhage at sternocostal junctions of R6, 7 right and R5, 7 left

AIS Number Estimate

2

TEST # A-887

TEST DATE 7-22-75

TEST DESCRIPTION EA Column, airbag, front sled test VELOCITY 33.7 ft/s

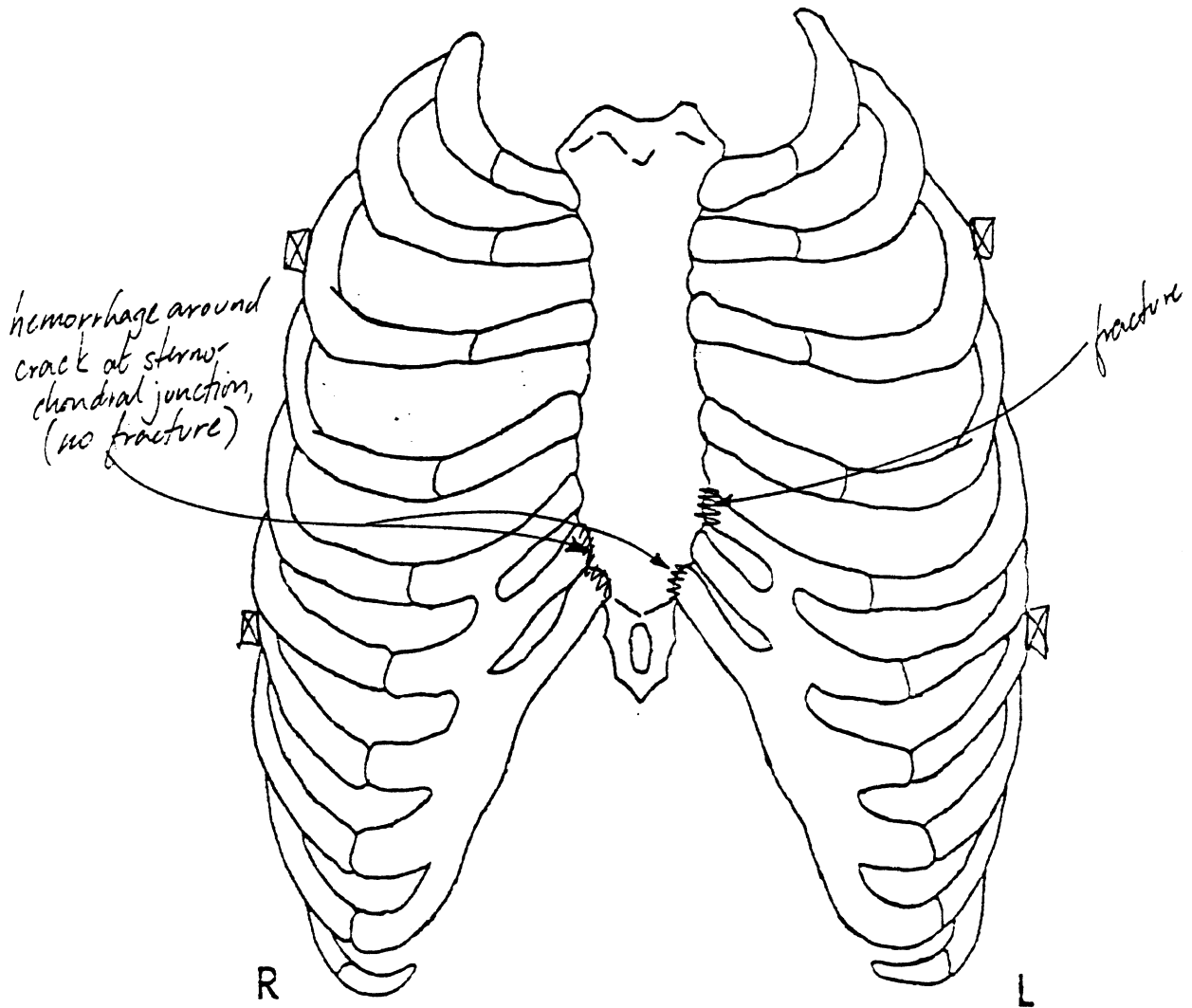
SUBJECT:

AGE 68 SEX M CAUSE OF DEATH Coronary thrombosis

INJURY INFORMATION: OVERALL THORACIC AIS 2

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>2</u>
	2	<u>C</u>	<u>C</u>	<u>H</u>	<u>M</u>	<u>2</u>
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>P</u>	<u>L</u>	<u>C</u>	<u>I</u>	<u>1</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

TEST # A-887



ANTERIOR VIEW RIB CAGE

(25 ml fluid - not hemorrhage - in pericardium.  
• No thoracic organ injuries.  
• Small bruise left hip)

SLED DECELERATION PULSE

8.7 G's

UPPER STERIAL  
ACCELEROMETER

27.7 G's

LOWER STERIAL  
ACCELEROMETER

31.9 G's

17.2 G's

LEFT LOWER RIB  
ACCELEROMETER

31.3 G's

LEFT UPPER RIB  
ACCELEROMETER

19.6 G's

RIGHT LOWER RIB  
ACCELEROMETER

22.1 G's

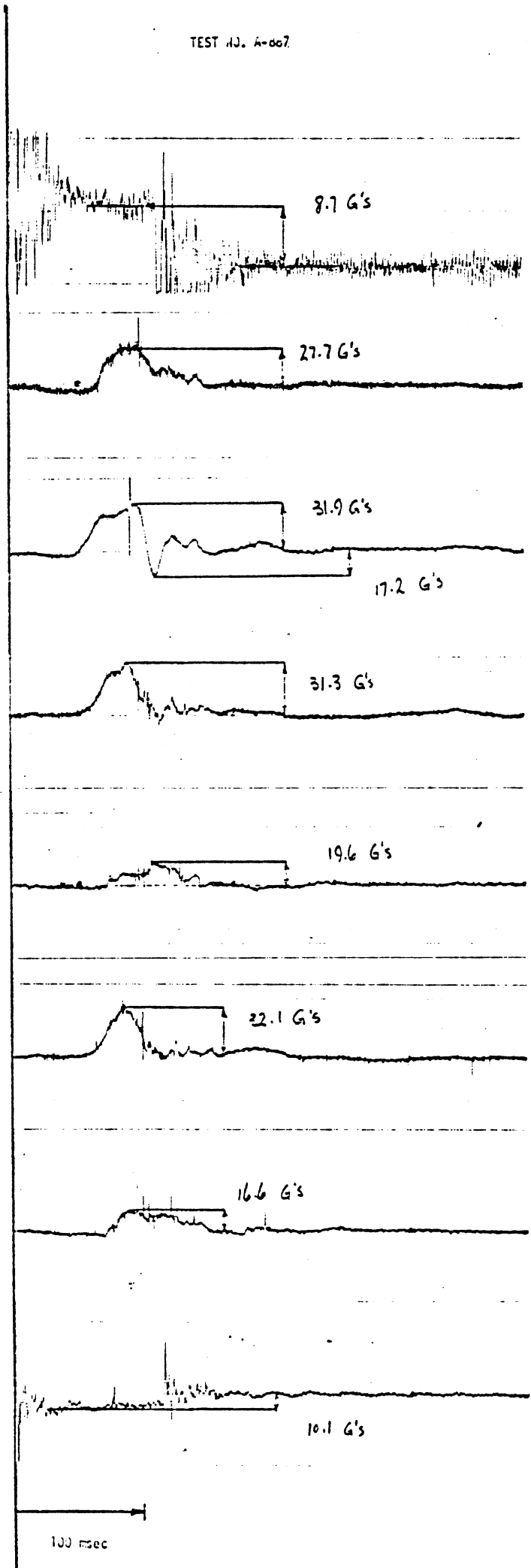
RIGHT UPPER RIB  
ACCELEROMETER

16.6 G's

STEERING COLUMN BASE  
ACCELEROMETER

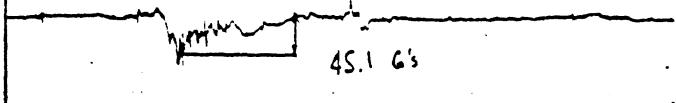
10.1 G's

100 msec

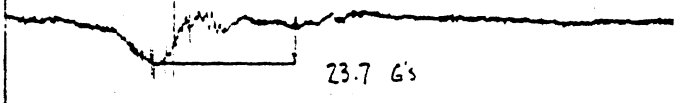


TEST NO. A-887

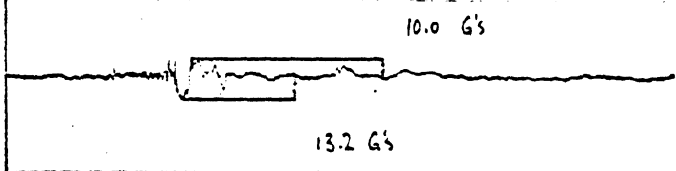
T<sub>1</sub> I-S ACCELEROMETER



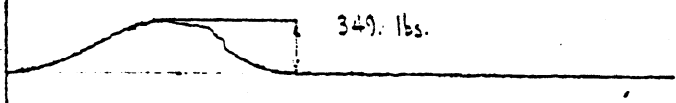
T<sub>12</sub> A-P ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



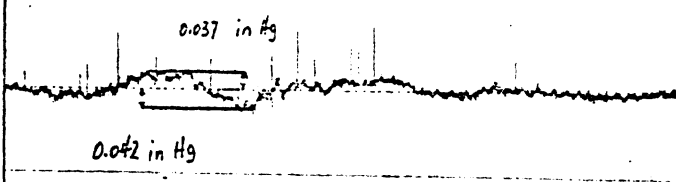
LEFT LAP BELT LOAD



AIRBAG PRESSURE



AIRWAY PRESSURE



100 msec

PTS: 1 61 121 181 241 301 361

LED  
G's



SPST  
G's



EST  
G's



LHR  
G's



LVR  
G's



RHR  
G's



RVR  
G's



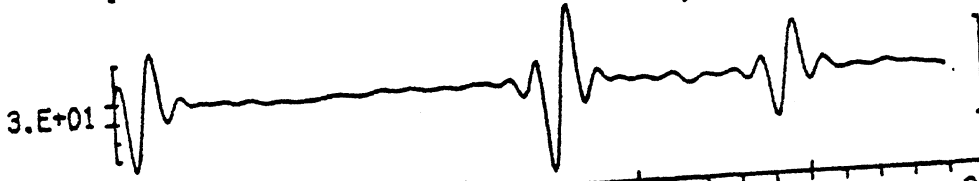
ACC-B  
G's



CLD  
LBS



VEL



MSEC: 0 50 100 150 200 250

ID: A-887-1:

TAPE: THOR.2

=====  
 RUN ID: A-887-1;  
 =====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HSO01A DATE: 25-OCT-76  
 TEST SIGNALS: 1543 PTS/CH AT 6397.84 HZ. CAL SIGNALS: NOT DIGITIZED.

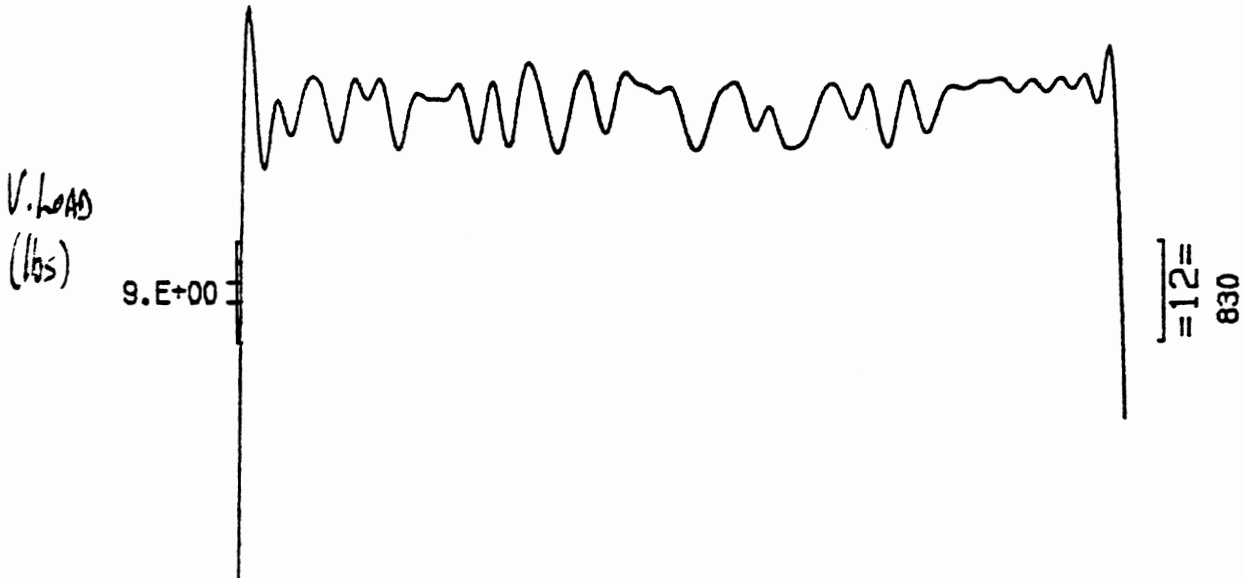
FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
71 - 1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	384	1599.46
72 - 2	UPPER STERNAL ACCELEROMETER*	-107.00	G'S	4+1+ 3	100.0	384	1599.46
73 - 3	LOWER STERNAL ACCELEROMETER	-98.90	G'S	4+1+ 3	100.0	384	1599.46
74 - 4	LEFT LOWER RIB ACCELEROMETER	-82.20	G'S	4+1+ 3	100.0	384	1599.46
75 - 5	LEFT UPPER RIB ACCELEROMETER	113.00	G'S	4+1+ 3	100.0	384	1599.46
76 - 6	RIGHT LOWR RIB ACCELEROMETER	-90.50	G'S	4+1+ 3	100.0	384	1599.46
77 - 7	RIGHT UPPR RIB ACCELEROMETER	-95.30	G'S	4+1+ 3	100.0	384	1599.46
81							
78 - 9	ST. COLUMN BASE ACCELEROMETER	90.50	G'S	4+1+ 3	100.0	384	1599.46
79 - 10	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.0	384	1599.46
80 - 11	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	384	1599.46

12;  
 13;  
 14;

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 FILTERED FILES: 71 - 80 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-887-1;  
 -----

PTS: 1 61 121 181 241 301 361

ID: A-887-1:



MSEC: 0 50 100 150 200 250

TAPE: THOR. 2A



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
\*\*\*\*\*  
RUN ID: A-887-11

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES  
ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 25-OCT-76  
TEST SIGNALS: 1543 PTS/CH AT 6397.84 HZ. CAL SIGNALS: NOT DIGITIZED.

\*\*\*\*\*  
FILE CH CONTENT OF CHANNEL UNITS/VOLT UNITS FILTER STAGES FILTER NO. SAMPLING  
\*\*\*\*\* CUTOFF \*\*\*\*\* PTS \*\*\*\*\* HERTZ \*\*\*\*\*

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111

830 - 121 STEERING COLUMN VERTICAL LOAD 1176.00 LBS. 4+1+ 3 100.0 384 1599.46  
131  
141

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FILTERED FILES: 830 - 830 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-887-11  
\*\*\*\*\*

PTS: 1 81 161 241 321 401



MSEC: 0 50 100 150 200 250

ID: A-887-2:

TAPE: THOR.2

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 ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 -----  
 RUN ID: A-887-2;

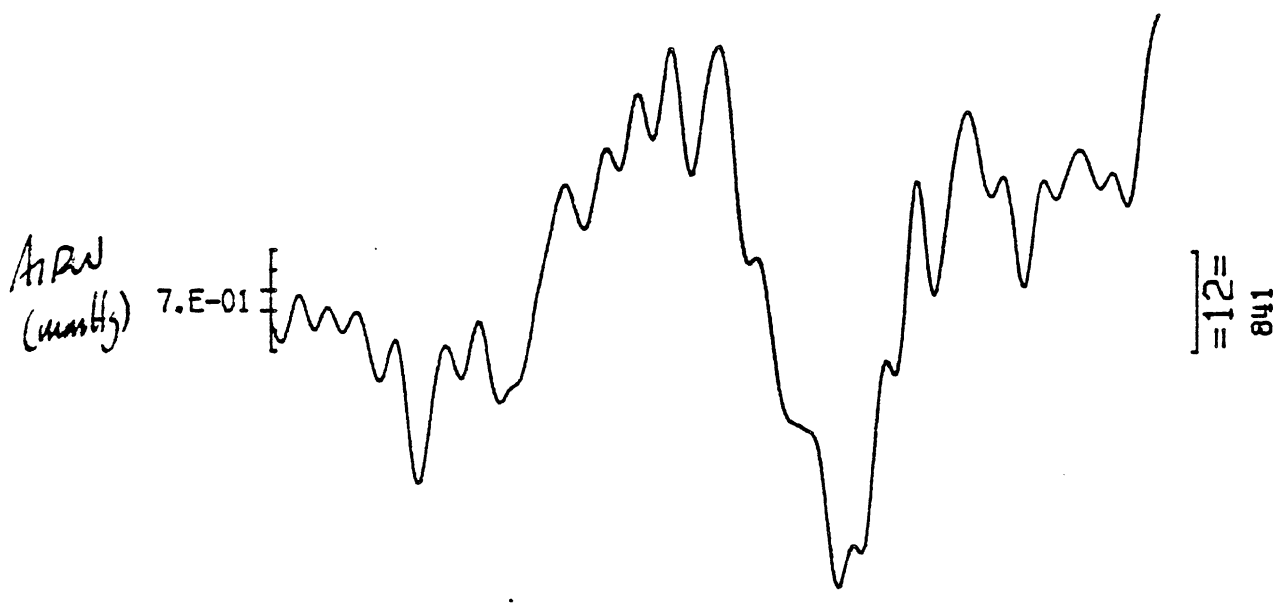
PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES  
 ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1544 PTS/CH AT 6400.00 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
208	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	384	1600.00
209	2	T1 P-A ACCELEROMETER	80.70	G'S	4+1+ 3	100.8	384	1600.00
210	3	T1 I-S ACCELEROMETER	86.70	G'S	4+1+ 3	100.8	384	1600.00
211	4	T12 P-A ACCELEROMETER	89.40	G'S	4+1+ 3	100.8	384	1600.00
212	5	T12 R-L ACCELEROMETER	-102.00	G'S	4+1+ 3	100.8	384	1600.00
6								
7								
213	8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	384	1600.00
9								
214	10	AIRBAG PRESSURE	517.00	MM-HG	4+1+ 3	100.8	384	1600.00
215	11	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.8	384	1600.00
12								
13								
14								

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 FILTERED FILES: 208 - 215 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-887-2;  
 -----

PTS: 1 81 161 241 321 401

ID: A-887-2:



MSEC: 0 50 100 150 200 250

TAPE: THOR. 2A

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-887-21

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: H8RI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1544 PTS/CH AT 6400.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11							
21							
31							
41							
51							
61							
71							
81							
91							
101							
111							
121	AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	384	1600.00
131							
141							

11

21

31

41

51

61

71

81

91

101

111

041 - 121 AIRWAY PRESSURE 209.00 MM-HG 4+1+3 100.0 384 1600.00

131

141

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FILTERED FILES: 841 - 841 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-887-21

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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test No.: A-923

Test Date: September 17, 1975

Test Subject: Age - 69

Sex - Female

Stature - 165.6 cm

Weight - 37 kg

Restraint System

EA column, airbag, lap belt

Velocity

34.8 mph

Deceleration

10.0 G's

Injuries

Rib fractures - L3, L4, R5, R9

AIS Number Estimate

TEST # A-923

TEST DATE 9-17-75

TEST DESCRIPTION EA Column, airbag, front sled test VELOCITY 51.0 ft/s

SUBJECT:

AGE 69 SEX F CAUSE OF DEATH Gastric carcinoma (metastatic)

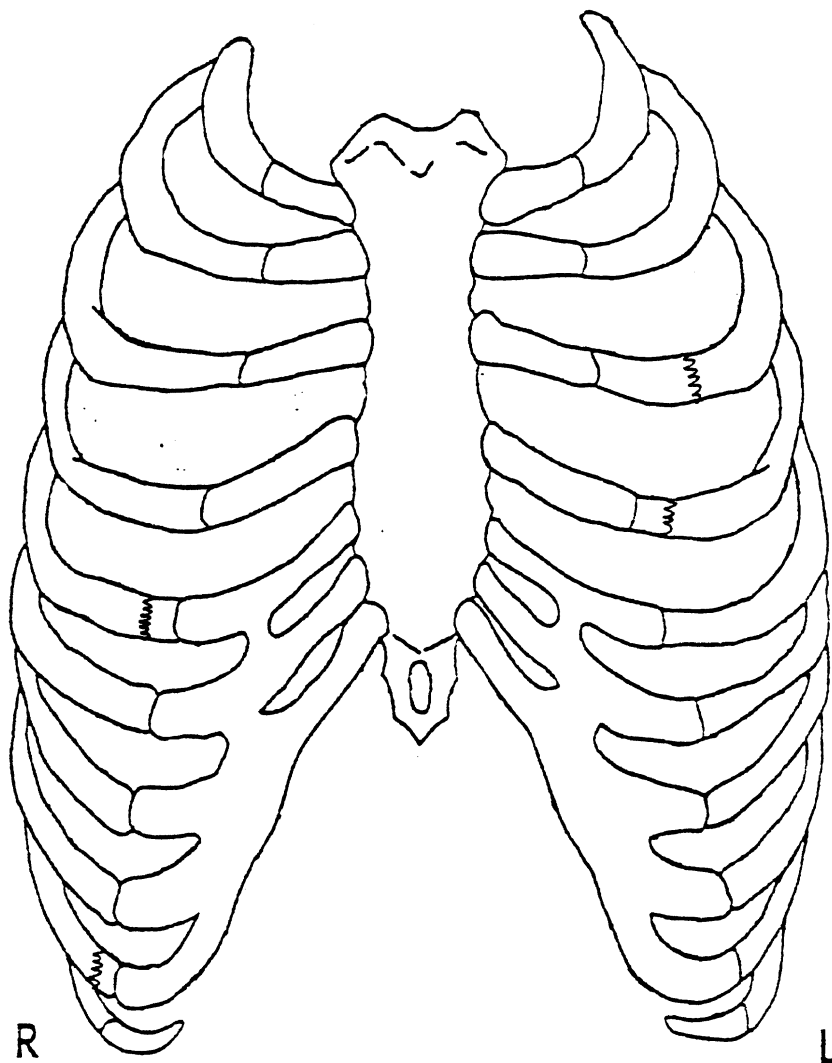
INJURY INFORMATION:

OVERALL THORACIC AIS 3

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>3</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---



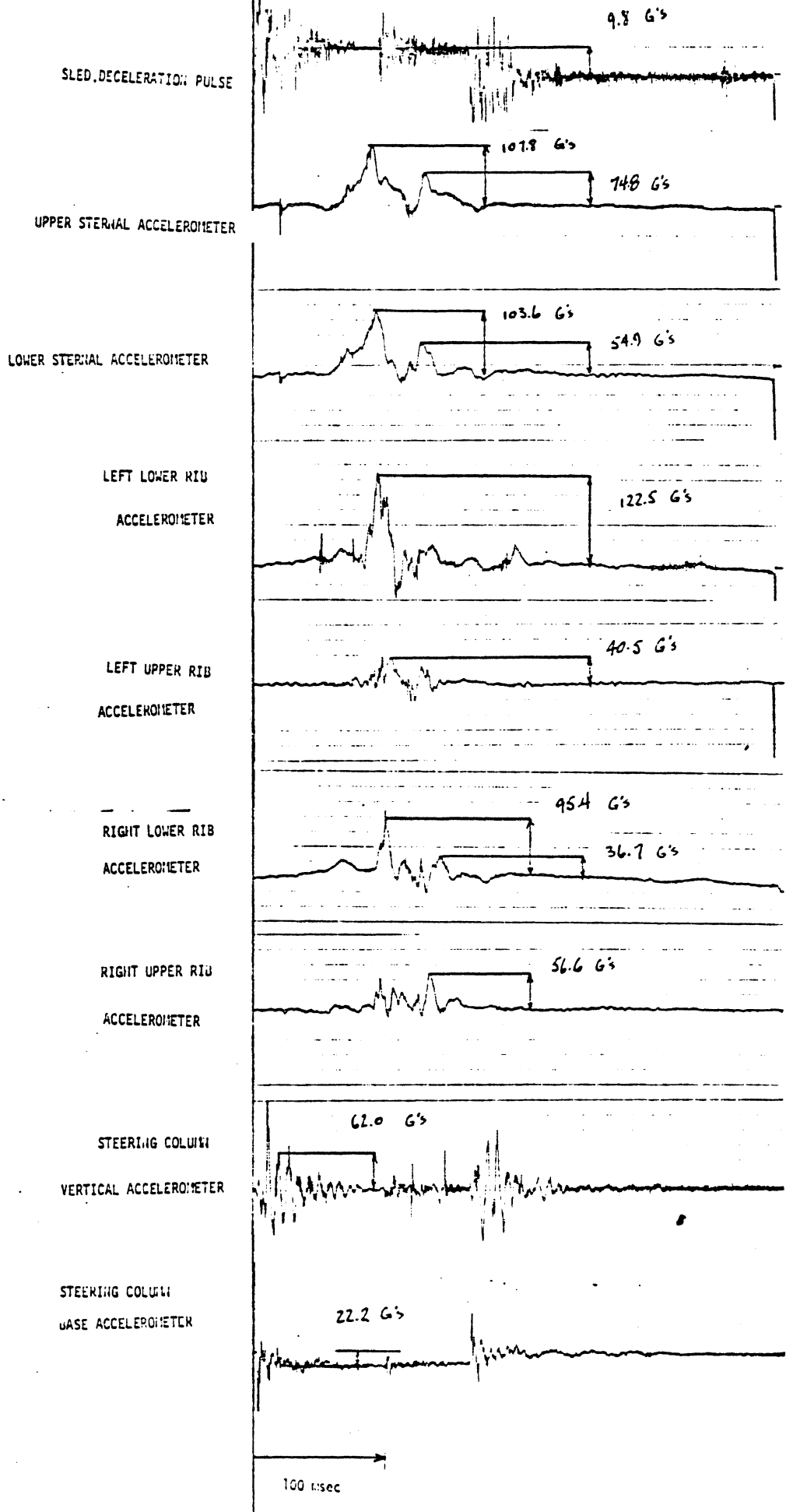
TEST # 1.923



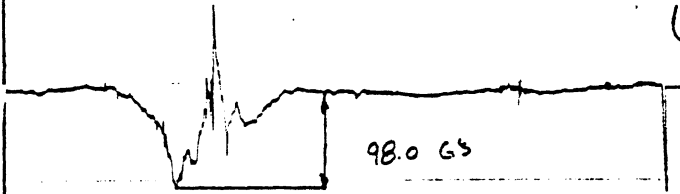
ANTERIOR VIEW RIB CAGE

*no thoracic organ  
injuries observed*

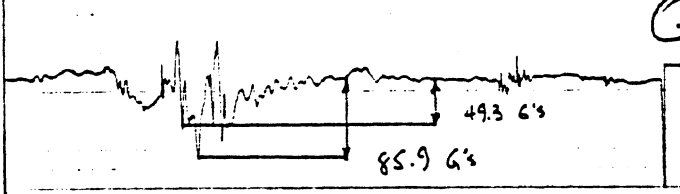
TEST NO. A-923



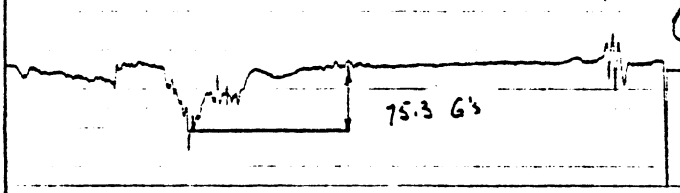
T<sub>1</sub> P-A ACCELEROMETER



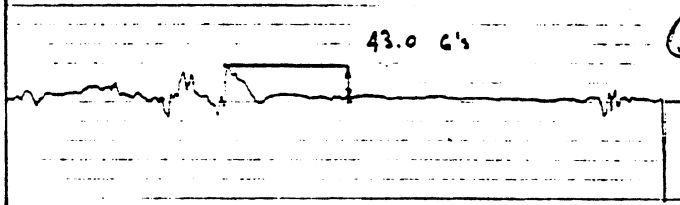
T<sub>1</sub> I-S ACCELEROMETER



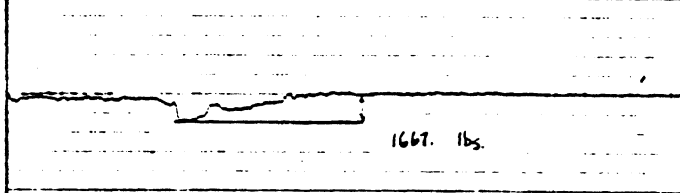
T<sub>12</sub> P-A ACCELEROMETER



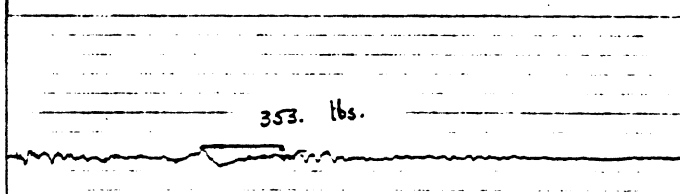
T<sub>12</sub> R-L ACCELEROMETER



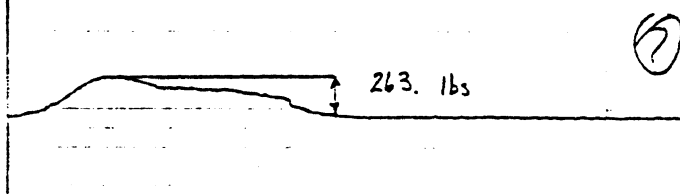
STEERING COLUMN LOAD



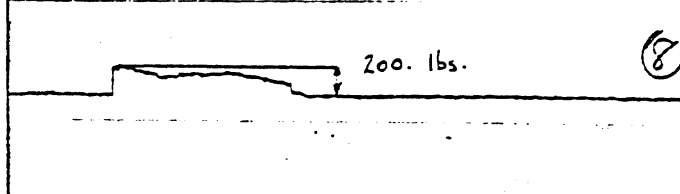
STEERING COLUMN  
VERTICAL LOAD



RIGHT LAP BELT LOAD



LEFT LAP BELT LOAD

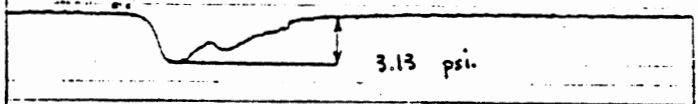


100 msec

TEST NO. A-923

(10)

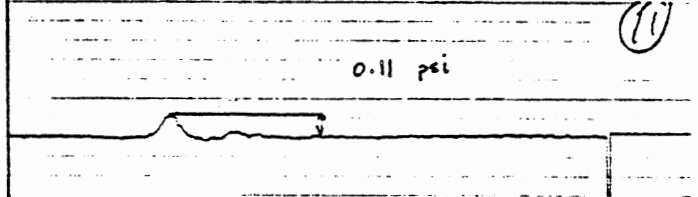
AIRBAG PRESSURE



3.13 psi.

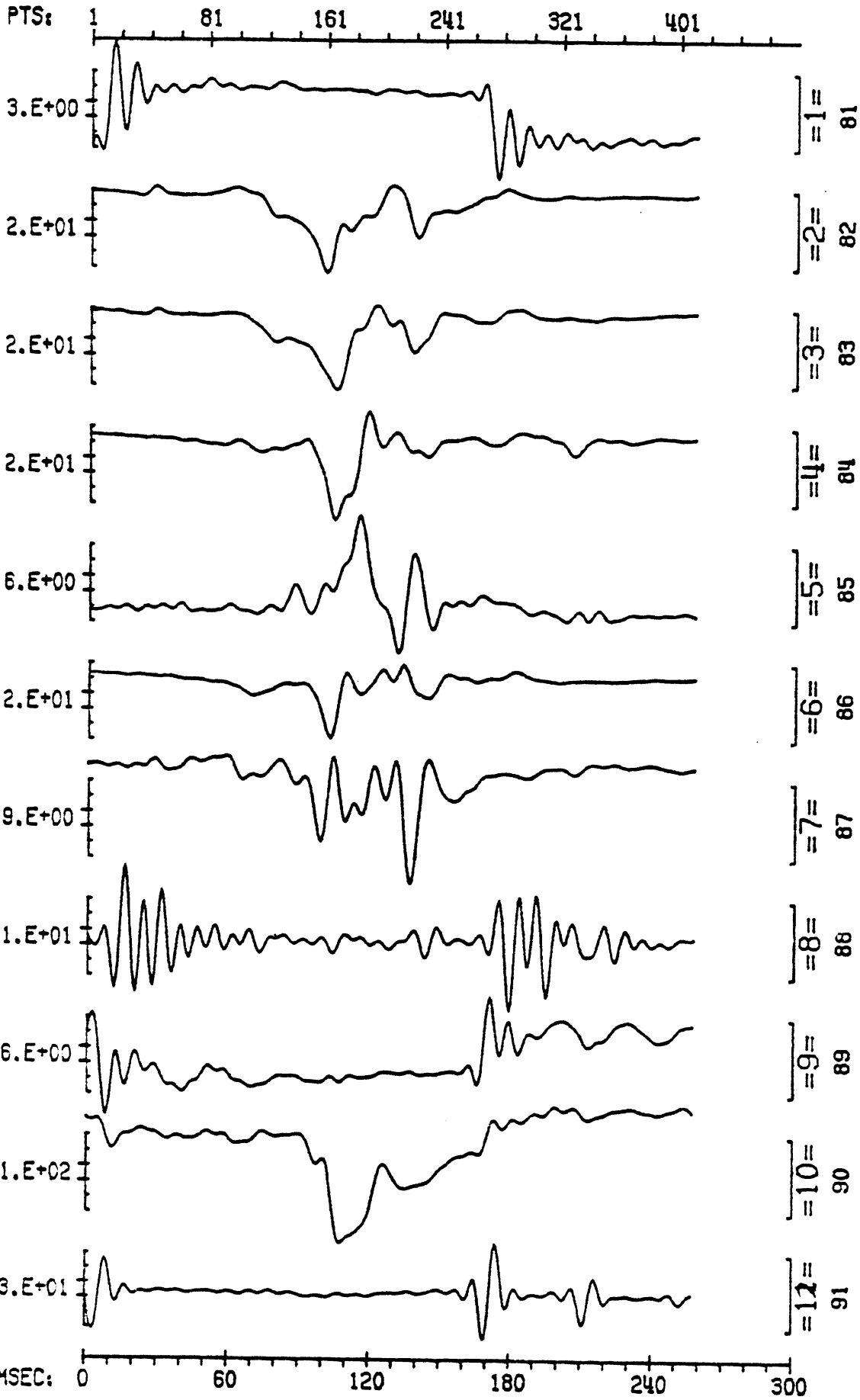
(11)

AIRWAY PRESSURE



0.11 psi

100 msec



ID: A-923-1:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-923-1

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 =====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018

DATE: 25-OCT-76

TEST SIGNALS: 1661 PTS/CH AT 6397.84 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
81	- 1	SLFD DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	412	1599.46
82	- 2	UPPER STERNAL ACCELEROMETER*	-107.00	G'S	4+1+ 3	100.8	412	1599.46
83	- 3	LOWER STERNAL ACCELEROMETER	-96.40	G'S	4+1+ 3	100.8	412	1599.46
84	- 4	LEFT LOWER RIB ACCELEROMETER	-82.20	G'S	4+1+ 3	100.8	412	1599.46
85	- 5	LEFT UPPER RIB ACCELEROMETER	89.90	G'S	4+1+ 3	100.8	412	1599.46
86	- 6	RIGHT LOWR RIB ACCELEROMETER	-89.70	G'S	4+1+ 3	100.8	412	1599.46
87	- 7	RIGHT UPPR RIB ACCELEROMETER	-94.50	G'S	4+1+ 3	100.8	412	1599.46
88	- 8	COLUMN VERTICAL ACCELEROMETER	99.30	G'S	4+1+ 3	100.8	412	1599.46
89	- 9	ST. COLUMN BASE ACCELEROMETER	89.00	G'S	4+1+ 3	100.8	412	1599.46
90	- 10	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.8	412	1599.46
91	- 11	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.8	412	1599.46
		12						
		13						
		14						

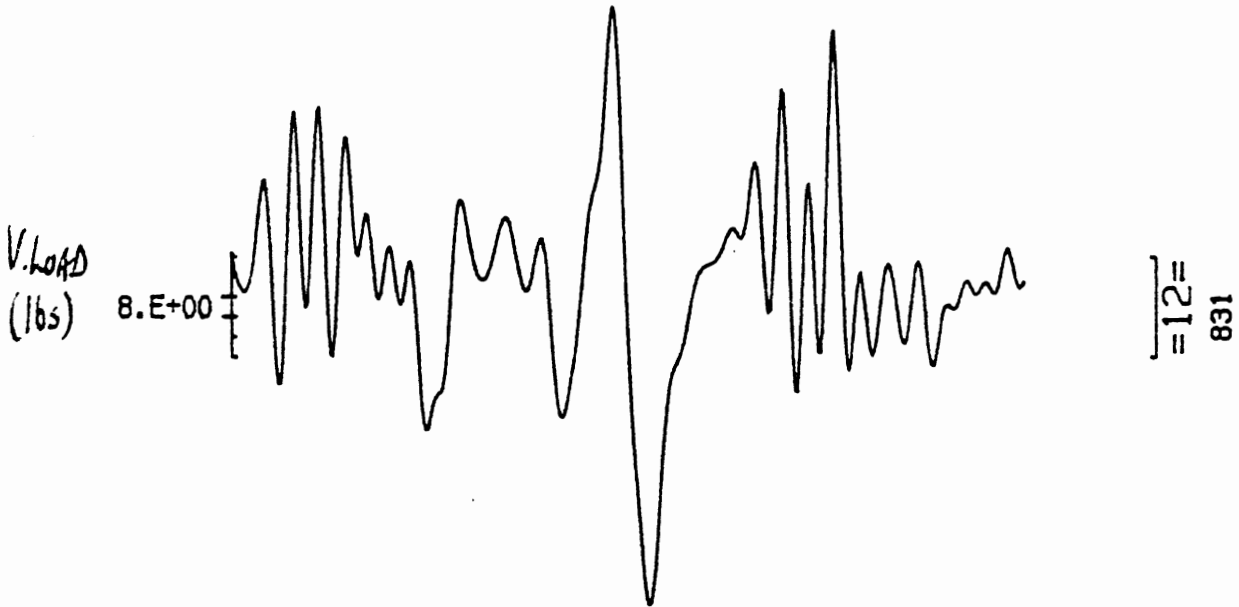
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 FILTERED FILES: 81 - 91 DIGITAL TAPE: JEFF

DATE: 16-DEC-76

RUN ID: A-923-1

PTS: 1 81 161 241 321 401

ID: A-923-1:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-923-11

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1661 PTS/CH AT 6397.64 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILIER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:								
2:								
3:								
4:								
5:								
6:								
7:								
8:								
9:								
10:								
11:								
12:		STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+3	100.0	412	1599.46
13:								
14:								

1:  
2:  
3:  
4:  
5:  
6:  
7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

831 - 12: STEERING COLUMN VERTICAL LOAD 1176.00 LBS. 4+1+3 100.0 412 1599.46

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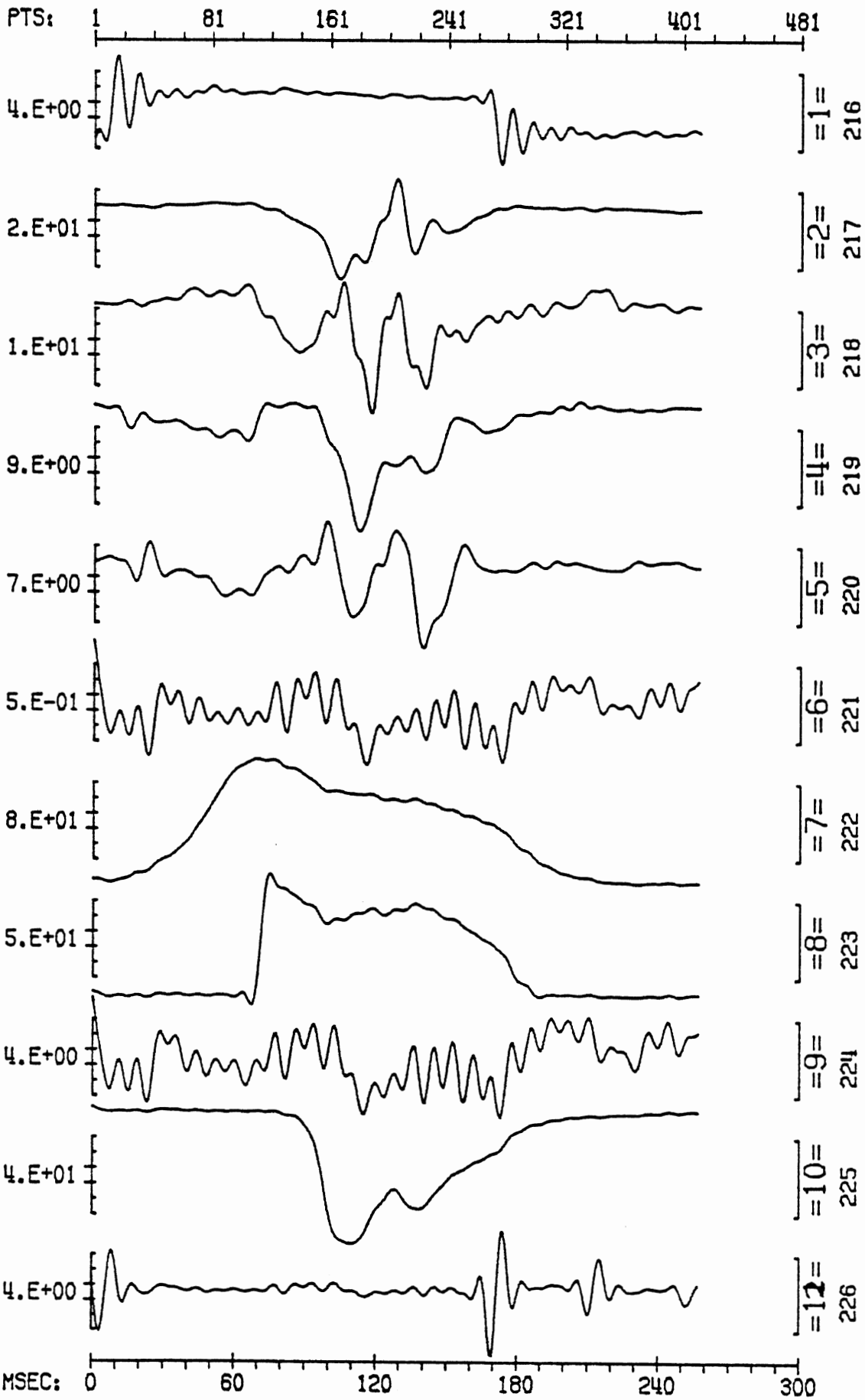
FILTERED FILES: 831 - 831 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-923-11

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ID: A-923-2:

TAPE: THOR.2

=====  
ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
RUN ID: A-923-21

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1662 PTS/CH AT 64001.23 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
216	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	412	1600.31
217	2	T1 P-A ACCELEROMETER	80.00	G'S	4+1+ 3	100.0	412	1600.31
218	3	T1 I-S ACCELEROMETER	85.00	G'S	4+1+ 3	100.0	412	1600.31
219	4	T12 P-A ACCELEROMETER	80.60	G'S	4+1+ 3	100.0	412	1600.31
220	5	T12 R-L ACCELEROMETER	-101.00	G'S	4+1+ 3	100.0	412	1600.31
221	6	VASCULAR PRESSURE	145.60	MM-HG	4+1+ 3	100.0	412	1600.31
222	7	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	412	1600.31
223	8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	412	1600.31
224	9	COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	412	1600.31
225	10	AIRBAG PRESSURE	517.00	MM-HG	4+1+ 3	100.0	412	1600.31
226	11	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	412	1600.31

121

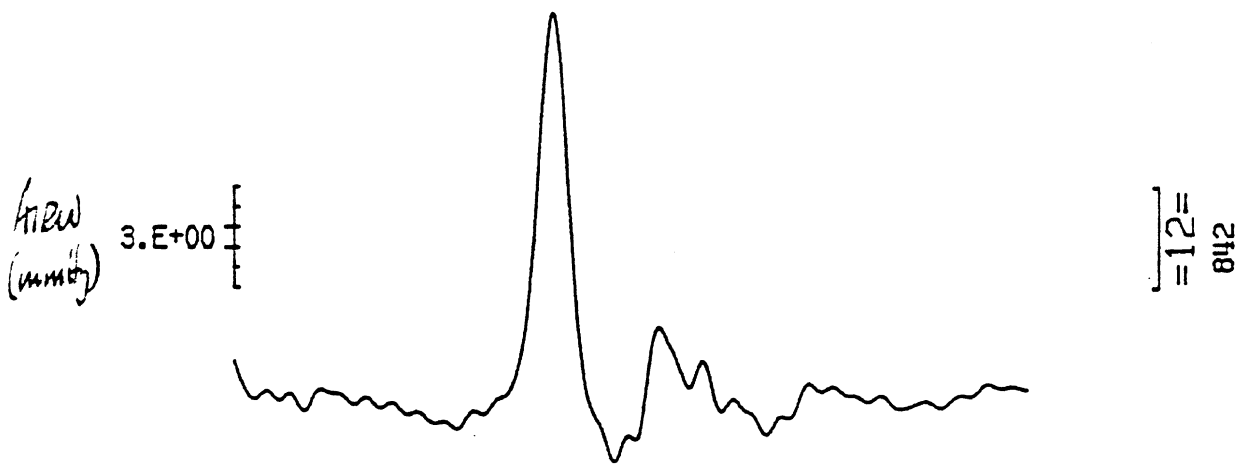
131

141

-----  
FILTERED FILES: 216 - 226 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-923-21

PTS: 1 81 161 241 321 401 481

ID: A-923-2:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

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RUN ID: A-923-21

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: H9RIN#137 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1662 PTS/CH AT 6401.23 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH CONTENT OF CHANNEL UNITS/VOLT UNITS FILTER STAGES FILTER NO. SAMPLING  
-----

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111

842 - 121 AIRWAY PRESSURE 209.00 MM-HG 4+1+ 3 100.6 412 0 1600.31

131

141

\*\*\*\*\*  
FILTERED FILES: 842 - 842 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-923-21  
\*\*\*\*\*

SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test No.: A-924

Test Date: October 1, 1975

Test Subject: Age - 64

Sex - Male

Stature - 171.6 cm

Weight - 76.5 kg

Restraint System

EA Column, Airbag, Lapbelt

Velocity

33.2 mph

Deceleration

10 G's

Injuries

Rib Fractures - L3, 4, 5, 6, 7, 8, R 2, 3, 4, 5, 6, 7

Sternum fracture

1 cm. diameter hemorrhage on pericardium

10 cm<sup>2</sup> hemorrhage on ascending aorta

1 x 0.5 cm tear on tip of capsule of spleen

Transverse spine fracture between T4 and T5

AIS Number Estimate

5

TEST # A-924

TEST DATE 9.30.75

TEST DESCRIPTION EA Column, airbag, front sled test VELOCITY 48.7 ft/s

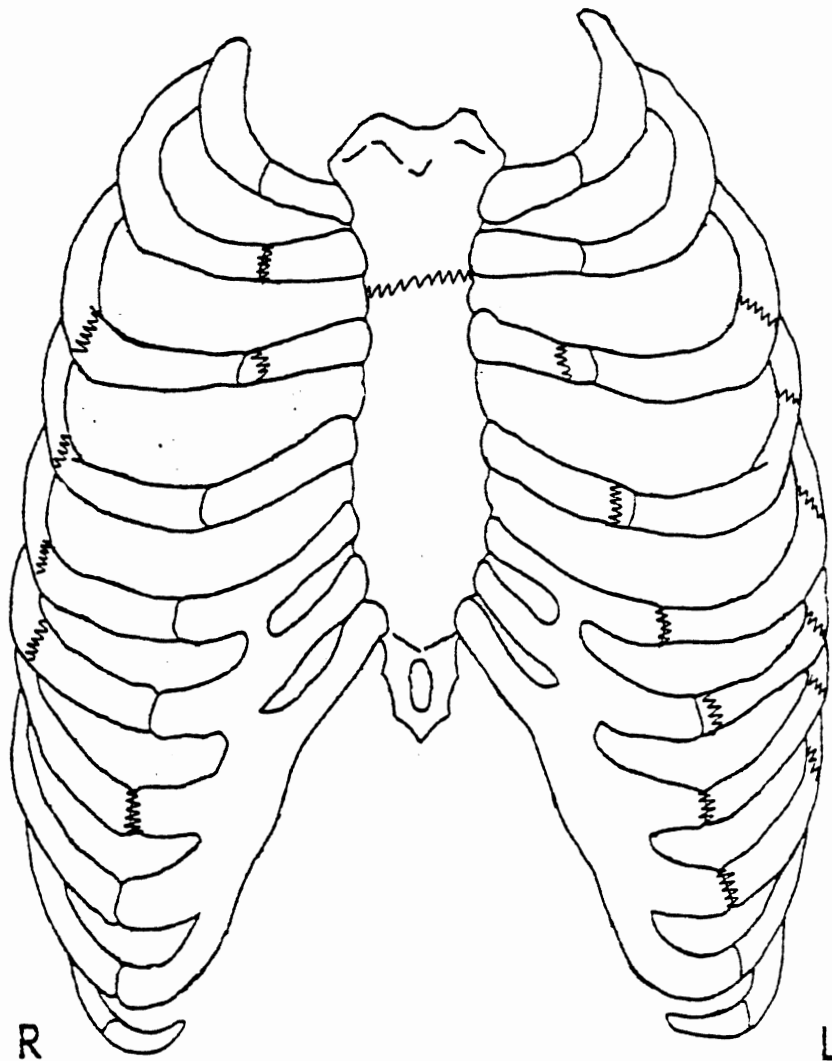
SUBJECT:

AGE 64 SEX M CAUSE OF DEATH Myocardial infarction

INJURY INFORMATION: OVERALL THORACIC AIS 5

	REGION	ASPECT	LESSION	SYSTEM	AIS	
THORACIC INJURIES	1	<u>B</u>	<u>S</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>3</u>
	4	<u>C</u>	<u>C</u>	<u>H</u>	<u>A</u>	<u>3</u>
	5	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>L</u>	<u>L</u>	<u>Q</u>	<u>3</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

TEST # A-924

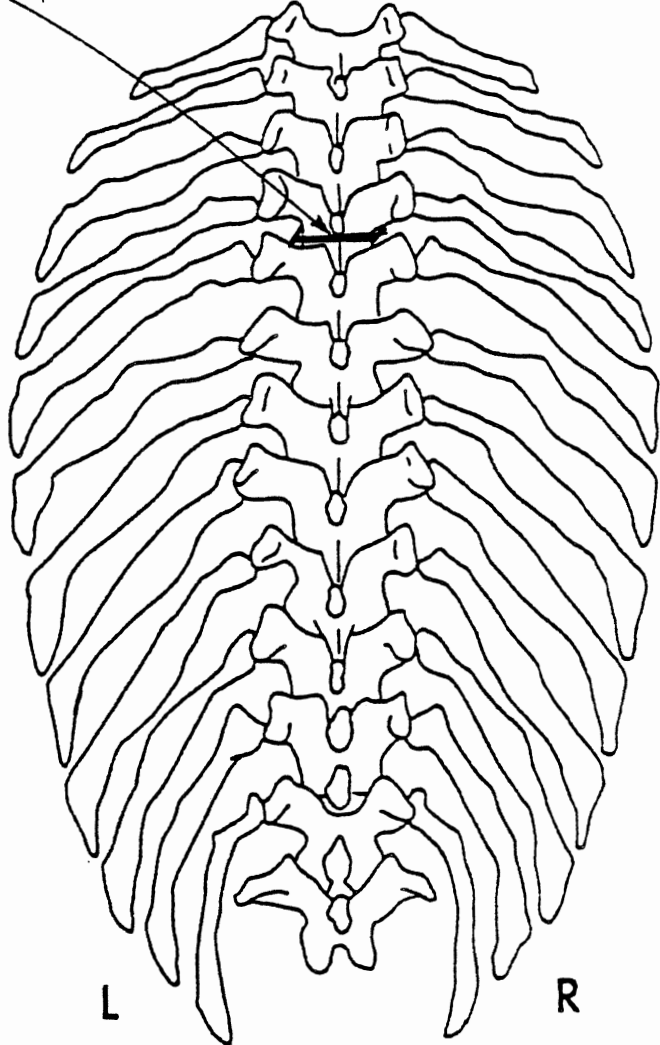


ANTERIOR VIEW RIB CAGE

(also: 1. x0.5 cm tear  
on capsule at tip of  
spleen.)

TEST # 1-924

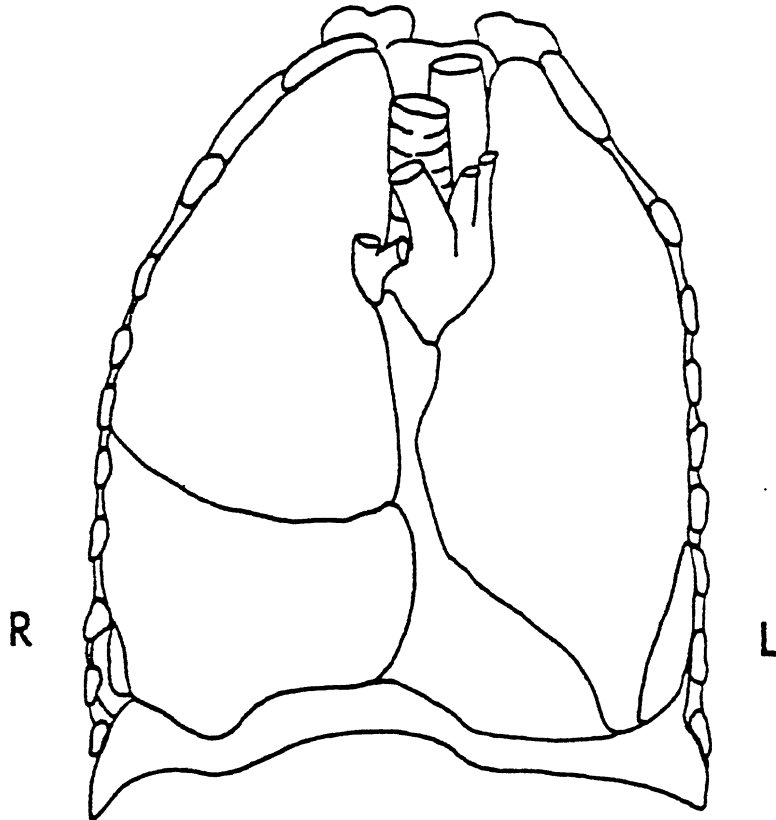
transverse fracture  
between T4 & T5



POSTERIOR VIEW RIB CAGE



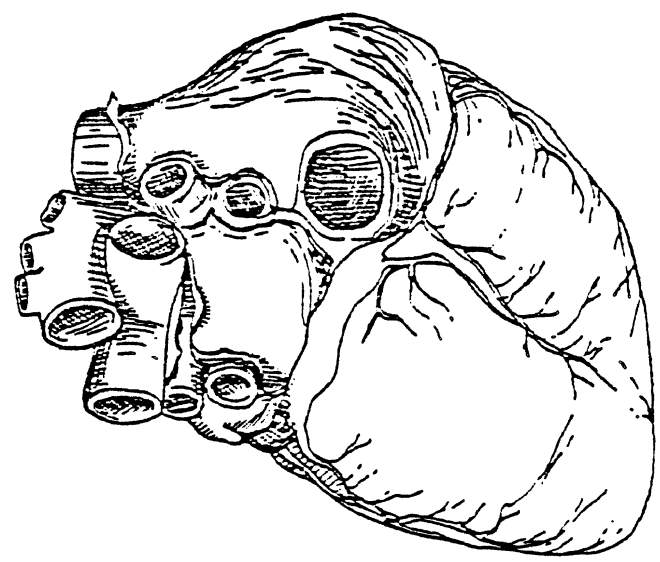
TEST # A-524



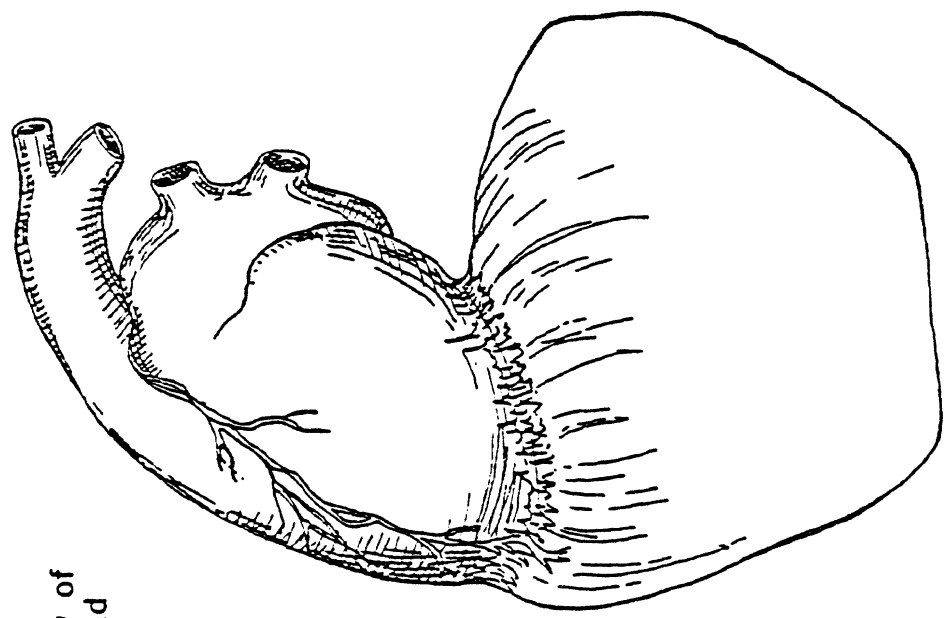
ANTERIOR VIEW THORACIC CAVITY

*Some hemorrhage in  
pulmonary vasculature;  
lungs not badly damaged*

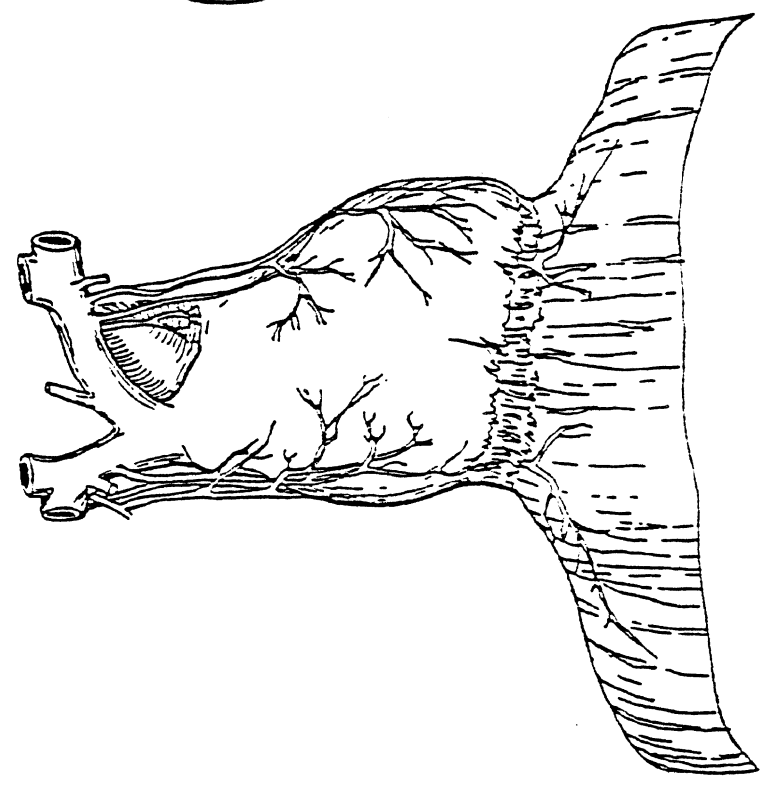
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm



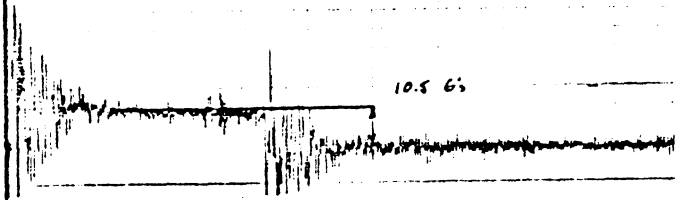
*approx. 11cm<sup>2</sup>  
hemorrhage on pericardium,  
(sites not specified),  
slight hemorrhage on  
ascending aorta*



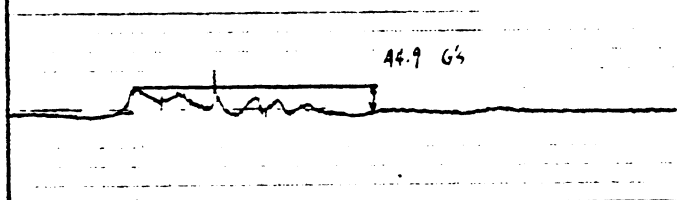
Anterior View of Pericardium and Diaphragm

TEST # A-924

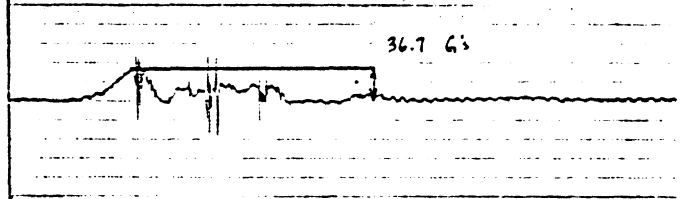
SLED DECELERATION PULSE



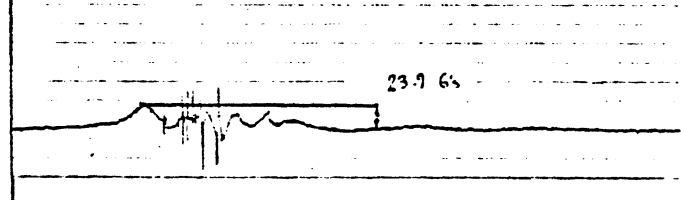
UPPER STERNUM ACCELEROMETER



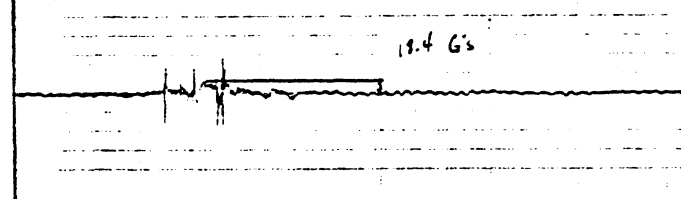
LOWER STERNUM ACCELEROMETER



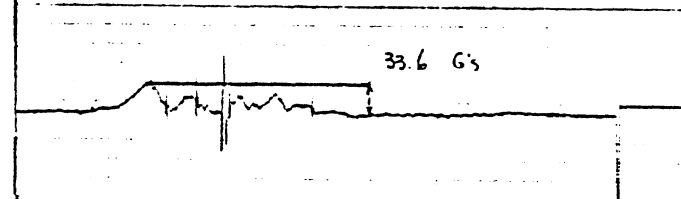
LEFT LOWER RIB ACCELEROMETER



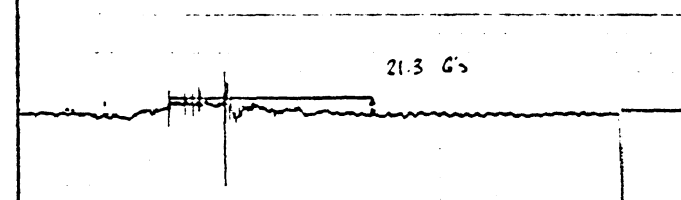
LEFT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



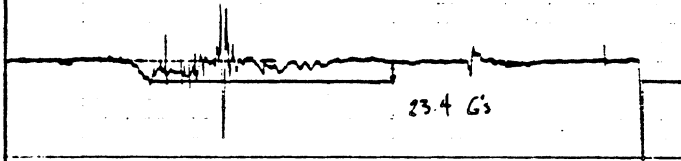
RIGHT UPPER RIB ACCELEROMETER



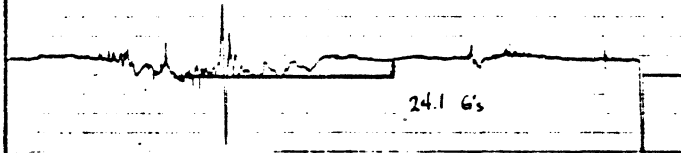
100 msec

TEST # A-924

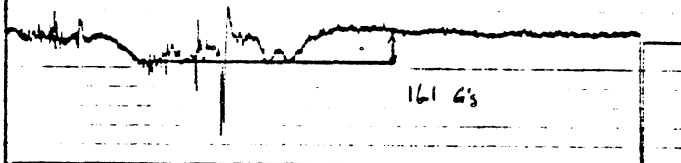
T<sub>1</sub> P-A ACCELEROMETER



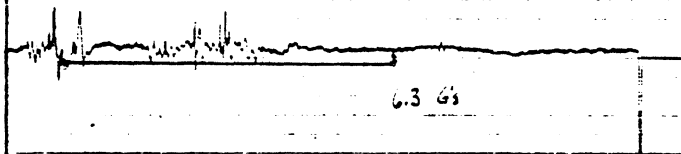
T<sub>1</sub> I-S ACCELEROMETER



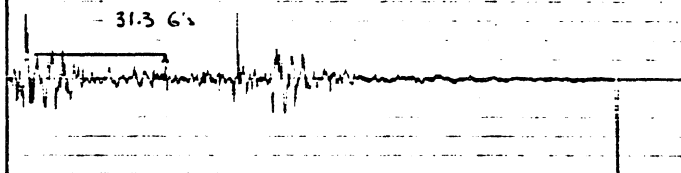
T<sub>12</sub> P-A ACCELEROMETER



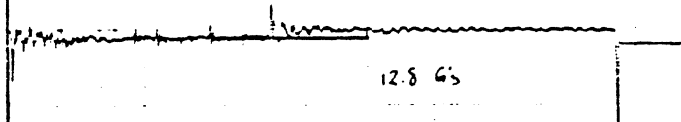
T<sub>12</sub> R-L ACCELEROMETER



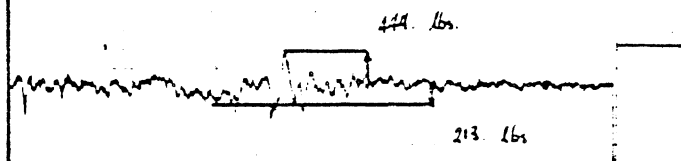
STEERING COLUMN VERTICAL ACCELEROMETER



STEERING COLUMN BASE ACCELEROMETER



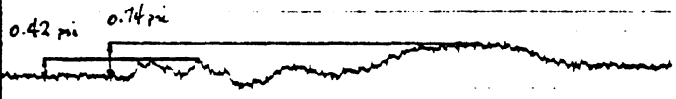
STEERING COLUMN BASE LOAD



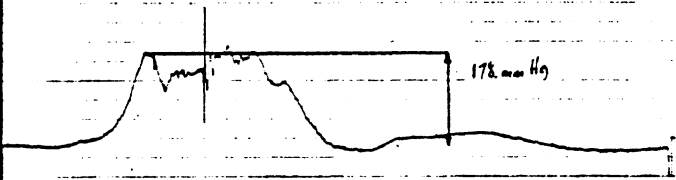
100 msec

TEST # A-924

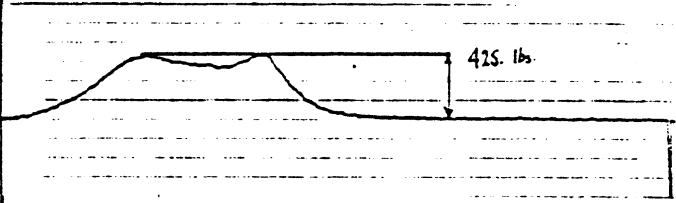
AIRWAY PRESSURE



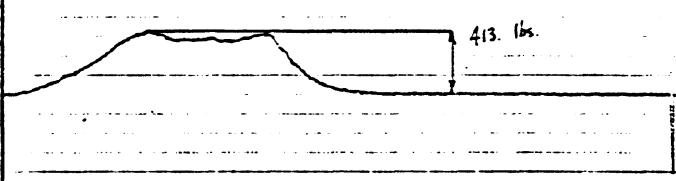
VASCULAR PRESSURE



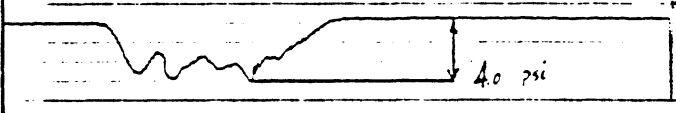
LEFT LAP BELT LOAD



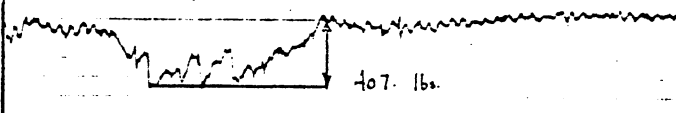
RIGHT LAP BELT LOAD



AIRJAG PRESSURE

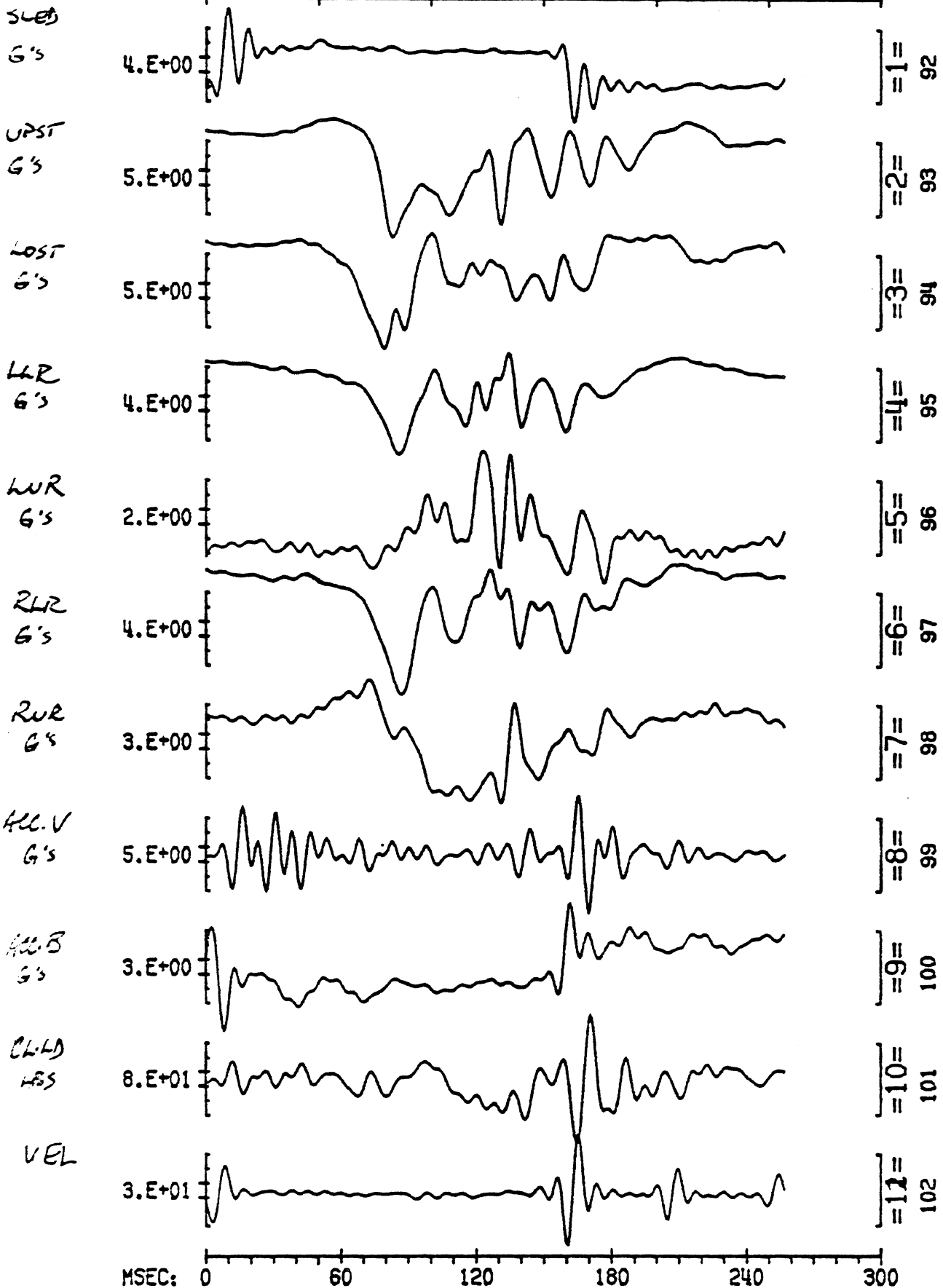


STEERING COLUMN VERTICAL LOAD



100 msec

PTS: 1 81 161 241 321 401 481



10: A-924-1:

TAPE: THOR.2

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-924-11

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HSR018 DATE: 25-OCT-76

TEST SIGNALS: 1653 PTS/CH AT 6400.93 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
92	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	412	1600.23
93	2	UPPER STERNAL ACCELEROMETER*	-107.40	G'S	4+1+ 3	100.0	412	1600.23
94	3	LOWER STERNAL ACCELEROMETER*	-93.40	G'S	4+1+ 3	100.0	412	1600.23
95	4	LEFT LOWR RIB ACCELEROMETER*	-79.70	G'S	4+1+ 3	100.0	412	1600.23
96	5	LEFT UPPER RIB ACCELEROMETER	97.20	G'S	4+1+ 3	100.0	412	1600.23
97	6	RIGHT LOWR RIB ACCELEROMETER	-82.90	G'S	4+1+ 3	100.0	412	1600.23
98	7	RIGHT UPPR RIB ACCELEROMETER	-89.70	G'S	4+1+ 3	100.0	412	1600.23
99	8	COLUMN VERTICAL ACCELEROMETER	89.00	G'S	4+1+ 3	100.0	412	1600.23
100	9	ST. COLUMN BASE ACCELEROMETER	96.70	G'S	4+1+ 3	100.0	412	1600.23
101	10	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.0	412	1600.23
102	11	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	412	1600.23

12

13

14

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FILTERED FILES: 92 - 102 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-924-11

PTS: 1 81 161 241 321 401 481

ID: A-924-1:



TAPE: THOR.2A



\*\*\*\*\*  
RUN ID: A-924-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: MSRI#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 29-OCT-76

TEST SIGNALS: 1653 PTS/CH AT 6400.93 HZ. CAL SIGNALS: NOT DIGITIZED.

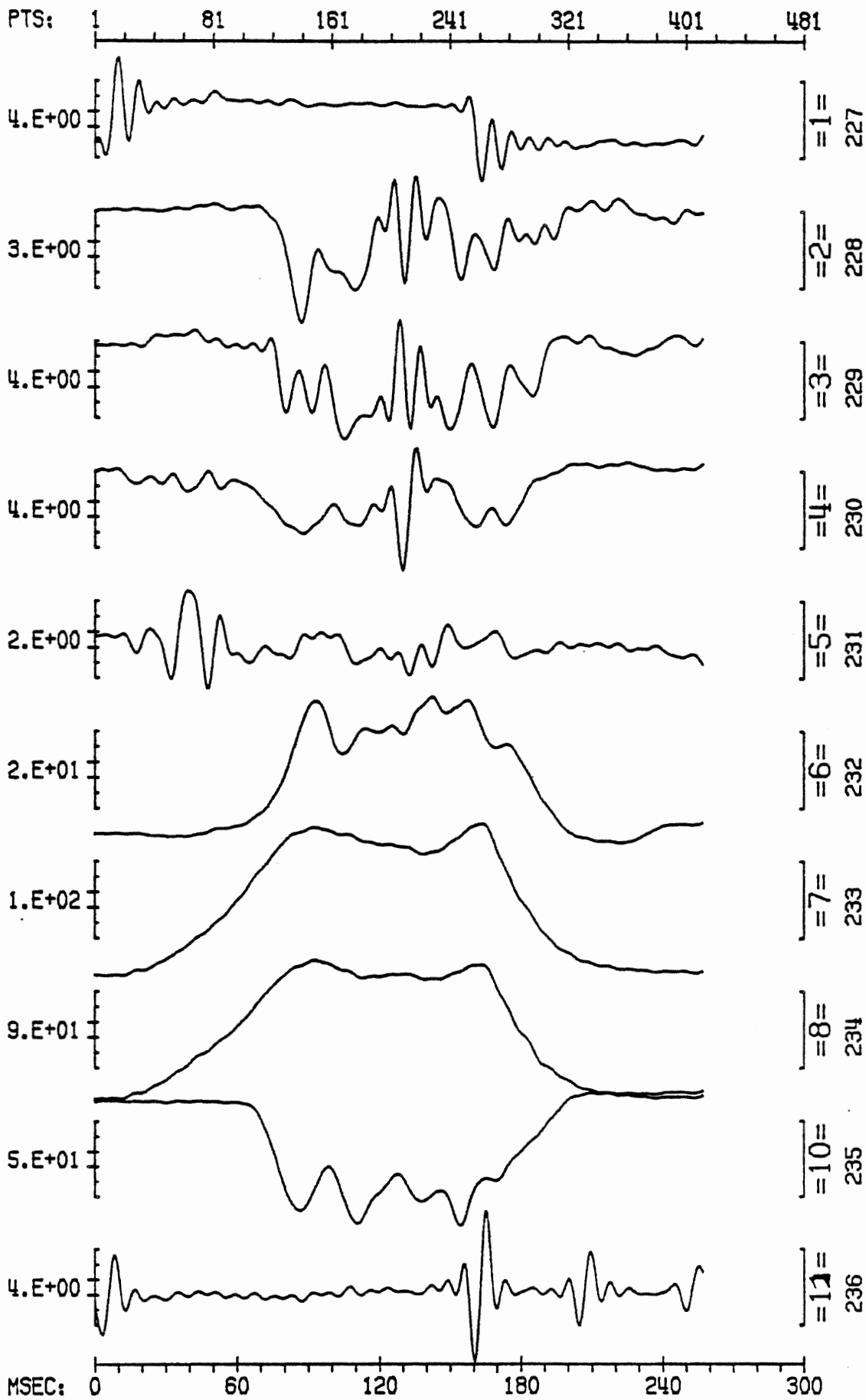
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111

632 - 121 STEERING COLUMN VERTICAL LOAD 1176.00 LBS. 4+1+ 3 100.8 412 0 1600.23

- 131
- 141

\*\*\*\*\*  
FILTERED FILES: 632 - 632 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-924-11  
\*\*\*\*\*



ID: A-924-2:

TAPE: THOR.2

=====  
RUN ID: A-924-2;

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====  
PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS001R DATE: 25-OCT-76  
TEST SIGNALS: 1652 PTS/CH AT 6400.77 HZ. CAL SIGNALS; NOT DIGITIZED.

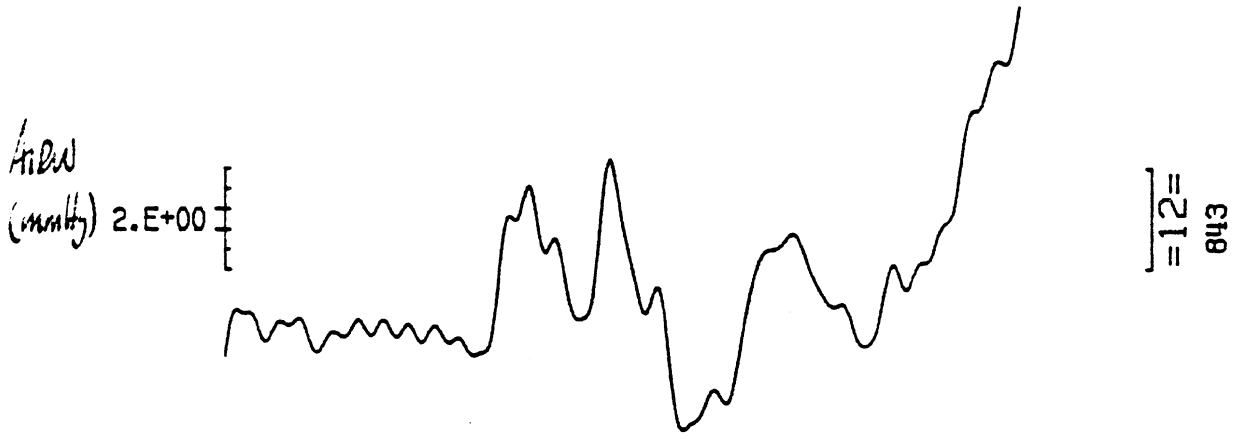
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
227	- 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	412	1600.19
228	- 2:	T1 P-A ACCELEROMETER	85.00	G'S	4+1+ 3	100.8	412	1600.19
229	- 3:	T1 I-B ACCELEROMETER	92.80	G'S	4+1+ 3	100.8	412	1600.19
230	- 4:	T12 P-A ACCELEROMETER	94.60	G'S	4+1+ 3	100.8	412	1600.19
231	- 5:	T12 R-L ACCELEROMETER	80.70	G'S	4+1+ 3	100.8	412	1600.19
232	- 6:	VASCULAR PRESSURE	145.60	MM-HG	4+1+ 3	100.8	412	1600.19
233	- 7:	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	412	1600.19
234	- 8:	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	412	1600.19
235	- 10:	AIRBAG PRESSURE	517.00	MM-HG	4+1+ 3	100.8	412	1600.19
236	- 11:	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.8	412	1600.19

9:  
12:  
13:  
14:

-----  
FILTERED FILES: 227 - 236 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-924-2;  
-----

PTS: 1 81 161 241 321 401 481

ID: A-924-2:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

\*\*\*\*\*  
RUN ID: A-924-2;

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76  
TEST SIGNALS: 1652 PTS/CH AT 6400.77 HZ. CAL SIGNALS: NOT DIGITIZED.

\*\*\*\*\*  
FILE CH CONTENT OF CHANNEL UNITS/VOLT UNITS FILTER STAGES CUTOFF NO. SAMPLING HERTZ  
\*\*\*\*\*

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:

843 - 12: AIRWAY PRESSURE 209.00 MM-HG 4+1+ 3 100.0 412 0 1600.19

- 13:
- 14:

\*\*\*\*\*  
FILTERED FILES: 843 - 843 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-924-2;  
\*\*\*\*\*



SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test No.: A-927

Test Date: October 8, 1975

Test Subject: Age - 72

Sex - Male

Stature - 163.3 cm.

Weight - 80.7 kg.

Restraint System

EA Column, airbag, lapbelt

Velocity

33 mph

Deceleration

20.0 G's

Injuries

Rib fractures - L3, 4, R2, 3, 4, 5, 6

Transverse spinal fractures between C7 and T1 and between T8 and  
T9

AIS Number Estimate

TEST # A-927

TEST DATE 10-9-75

TEST DESCRIPTION EA Column airbag, front sled test VELOCITY 48 ft/s

SUBJECT:

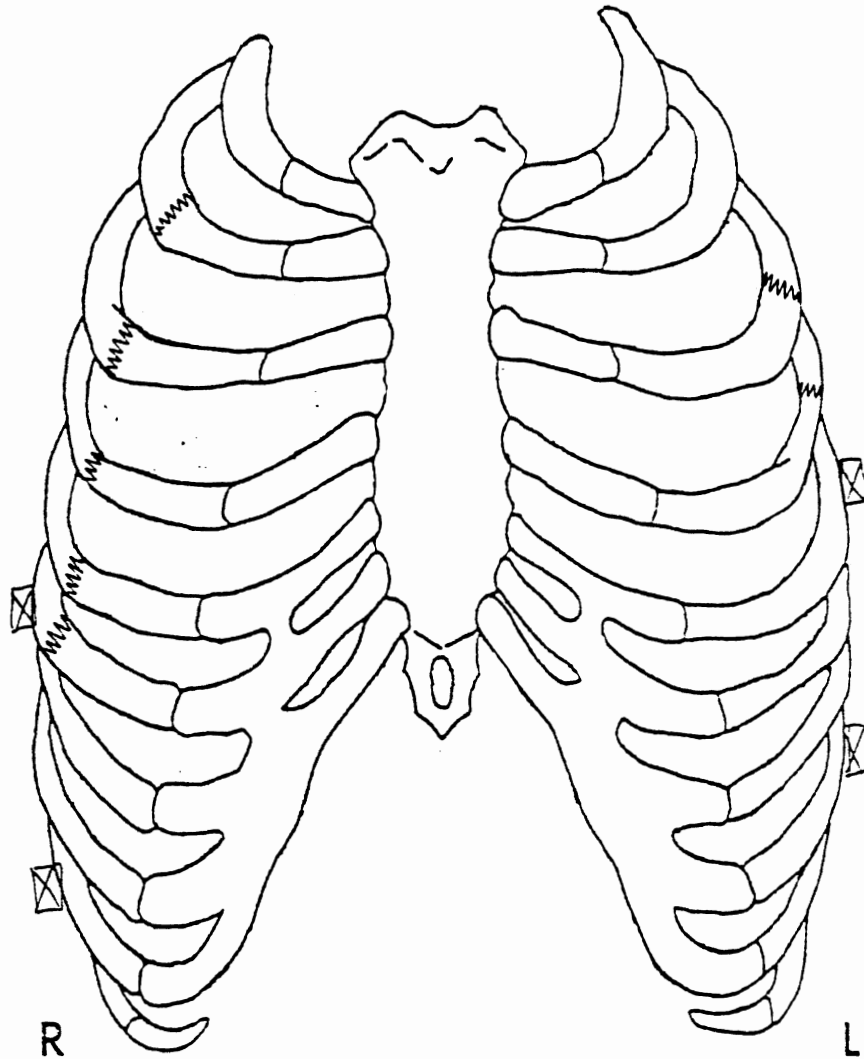
AGE 72 SEX M CAUSE OF DEATH stroke

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>B</u>	<u>S</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>3</u>
	3	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	3	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>



TEST # 4-927



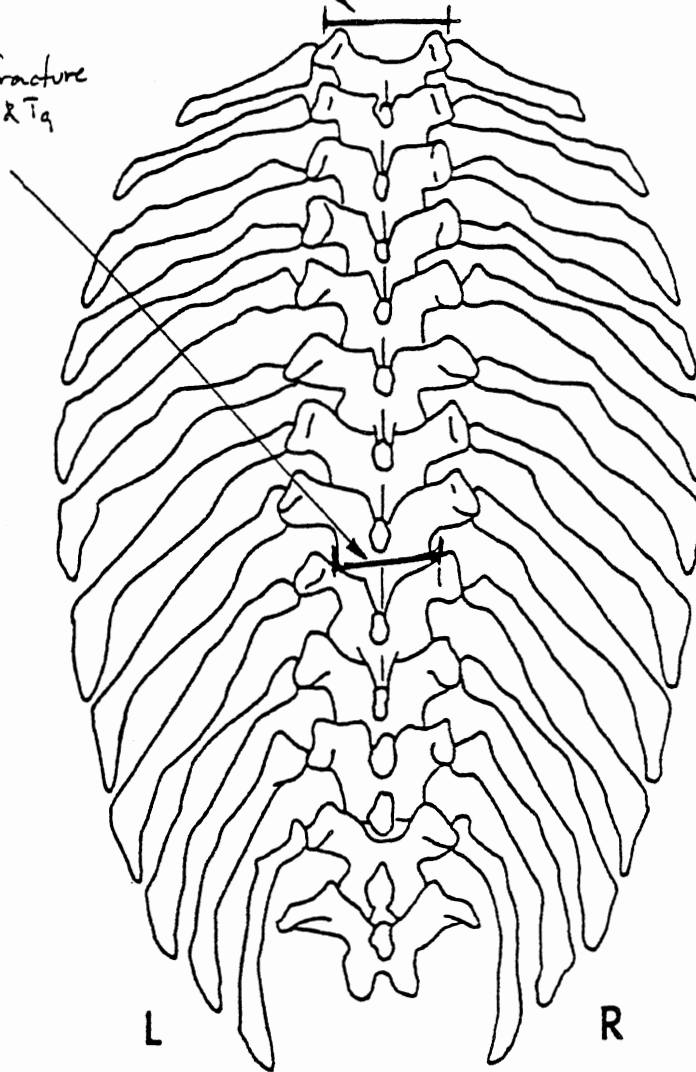
ANTERIOR VIEW RIB CAGE

(no thoracic organ injuries observed)

transverse fracture  
between C<sub>7</sub> & T<sub>1</sub>

TEST # A-927

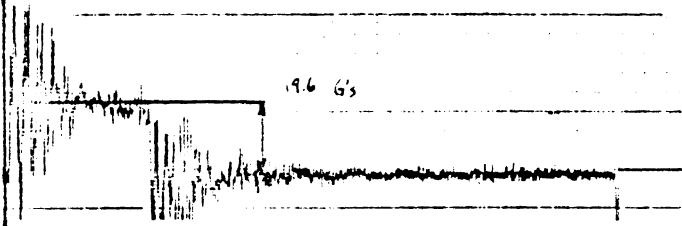
transverse fracture  
between T<sub>8</sub> & T<sub>9</sub>



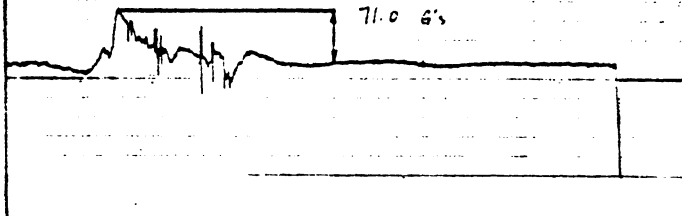
POSTERIOR VIEW RIB CAGE

TEST # A-927

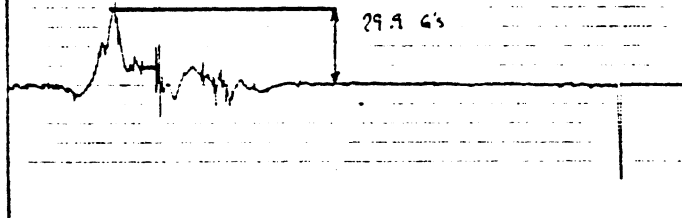
SLED DECELERATION PULSE



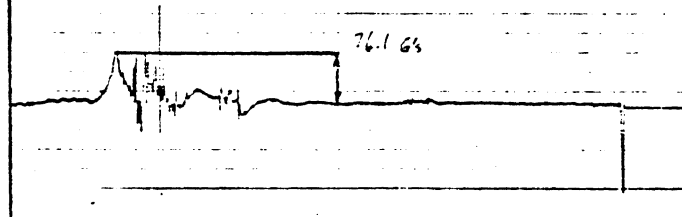
UPPER STERNUM ACCELEROMETER



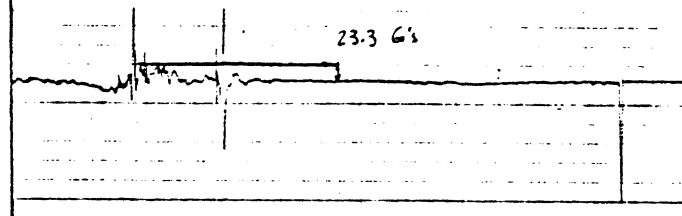
LOWER STERNUM ACCELEROMETER



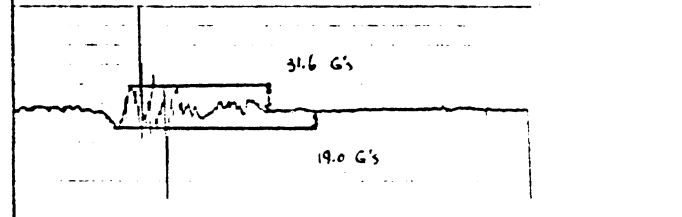
LEFT LOWER RIB ACCELEROMETER



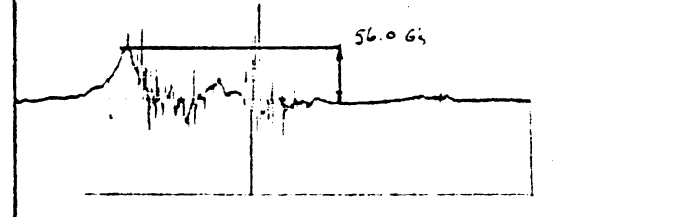
LEFT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



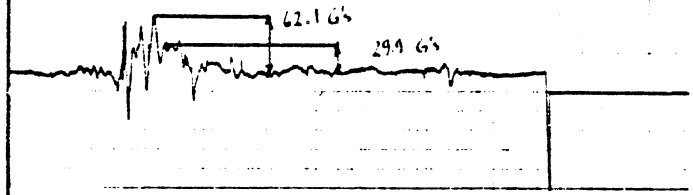
RIGHT UPPER RIB ACCELEROMETER



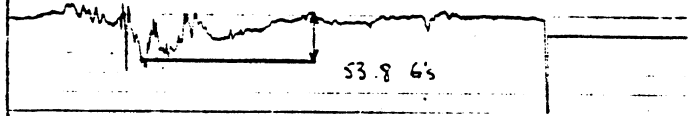
100 msec

TEST # A-927

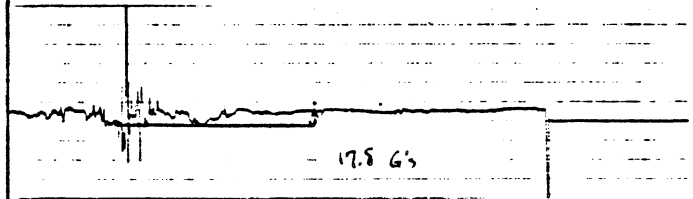
T<sub>1</sub> P-A ACCELEROMETER



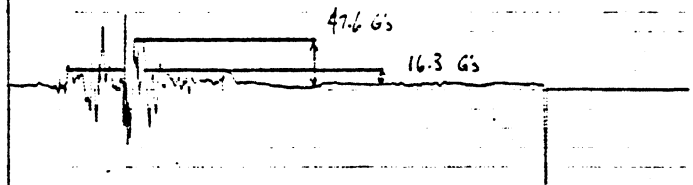
T<sub>1</sub> I-S ACCELEROMETER



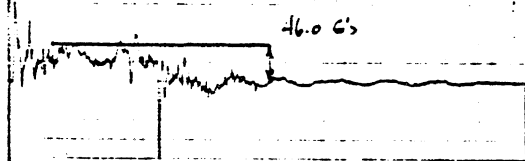
T<sub>12</sub> P-A ACCELEROMETER



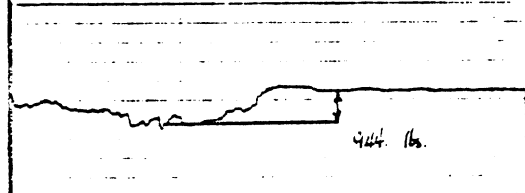
T<sub>12</sub> R-L ACCELEROMETER



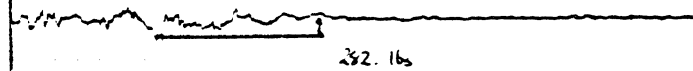
STEERING COLUMN BASE ACCELEROMETER



STEERING COLUMN BASE LOAD



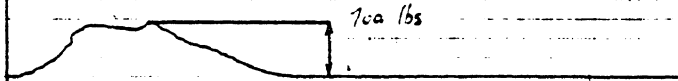
STEERING COLUMN VERTICAL LOAD



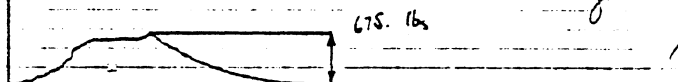
100 msec

TEST # A-927

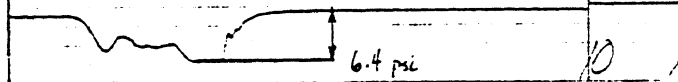
RIGHT LAP BELT LOAD



LEFT LAP BELT LOAD



AIRBAG PRESSURE



100 msec

PTS: 1 81 161 241 321 401 481

SCED  
G's

5.E+00

=1=  
103

UPST  
G's

1.E+01

=2=  
104

LOST  
G's

2.E+01

=3=  
105

LUR  
G's

9.E+00

=4=  
106

LUR  
G's

5.E+00

=5=  
107

RUR  
G's

9.E+00

=6=  
108

RUR  
G's

6.E+00

=7=  
109

ACC.V  
G's

2.E-01

=8=  
110

ACC.B  
G's

9.E+00

=9=  
111

CHLD  
LBS

2.E+02

=10=  
112

VEL

3.E+01

=11=  
113

MSEC: 0 60 120 180 240 300

ID: A-927-1:

TAPE: THOR.2

=====  
 RUN ID: A-927-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1662 PTS/CH AT 6400.62 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
103	11	SLFD DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	412	1600.15
104	21	UPPER STERNAL ACCELEROMETER*	-107.40	G'S	4+1+ 3	100.8	412	1600.15
105	31	LOWER STERNAL ACCELEROMETER*	-93.40	G'S	4+1+ 3	100.8	412	1600.15
106	41	LEFT LOWER RIB ACCELEROMETER	-102.80	G'S	4+1+ 3	100.8	412	1600.15
107	51	LEFT UPPER RIB ACCELEROMETER	97.20	G'S	4+1+ 3	100.8	412	1600.15
108	61	RIGHT LOWR RIB ACCELEROMETER	-82.90	G'S	4+1+ 3	100.8	412	1600.15
109	71	RIGHT UPPR RIB ACCELEROMETER	-90.00	G'S	4+1+ 3	100.8	412	1600.15
110	81	COLUMN VERTICL ACCELEROMETER*	79.70	G'S	4+1+ 3	100.8	412	1600.15
111	91	ST. COLUMN BASE ACCELEROMETER	100.00	G'S	4+1+ 3	100.8	412	1600.15
112	101	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.8	412	1600.15
113	111	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.8	412	1600.15

121  
 131  
 141

-----  
 FILTERED FILES: 103 - 113 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-927-11

PTS: 1 81 161 241 321 401 481

ID: A-927-1:



12= 833

MSEC: 0 60 120 180 240 300

TAPE: THOR. 2A



\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-927-11

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 25-OCT-76

TEST SIGNALS: 1662 PTS/CH AT 6400.62 HZ. CAL SIGNALS: NOT DIGITIZED.

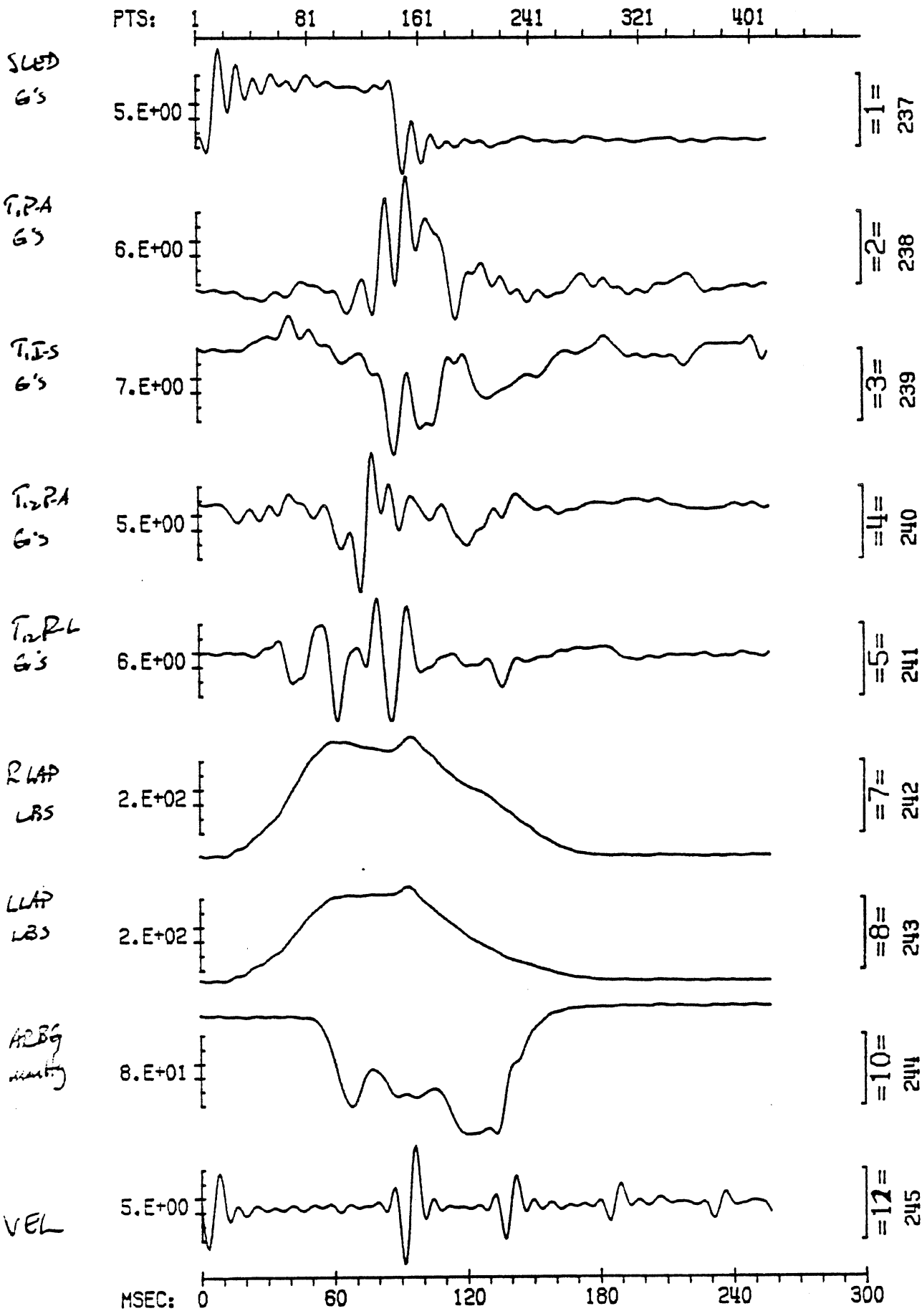
FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:							
2:							
3:							
4:							
5:							
6:							
7:							
8:							
9:							
10:							
11:							
12:	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+3	100.0	412	1600.15
13:							
14:							

833 - 12: STEERING COLUMN VERTICAL LOAD 1176.00 LBS. 4+1+3 100.0 412 1600.15

13:

14:

\*\*\*\*\*  
FILTERED FILES: 833 - 833 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-927-11  
\*\*\*\*\*



IO: A-927-2:

TAPE: THOR.2

=====

RUN ID: A-927-21

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 1601, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1660 PTS/CH AT 6399.23 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
237	- 1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	412	1599.01
238	- 2	T1 P-A ACCELEROMETER	85.70	G'S	4+1+ 3	100.0	412	1599.01
239	- 3	T1 I-S ACCELEROMETER	92.00	G'S	4+1+ 3	100.0	412	1599.01
240	- 4	T12 P-A ACCELEROMETER	89.00	G'S	4+1+ 3	100.0	412	1599.01
241	- 5	T12 R-L ACCELEROMETER	81.40	G'S	4+1+ 3	100.0	412	1599.01
6								
242	- 7	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	412	1599.01
243	- 8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.0	412	1599.01
9								
244	- 10	AIRBAG PRESSURE	517.00	MM-HG	4+1+ 3	100.0	412	1599.01
245	- 11	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	412	1599.01
12								
13								
14								

-----  
 FILTERED FILES: 237 - 245 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-927-21  
 -----

PTS: 1 81 161 241 321 401

ID: A-927-2:

Area  
(units)

8.E+01



12= 844

MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

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RUN ID: A-927-21

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 25-OCT-76

TEST SIGNALS: 1660 PTS/CH AT 6399.23 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:								
2:								
3:								
4:								
5:								
6:								
7:								
8:								
9:								
10:								
11:								
12:		AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.0	412	1599.01
13:								
14:								

1:

2:

3:

4:

5:

6:

7:

8:

9:

10:

11:

12: AIRWAY PRESSURE

209.00 MM-HG

4+1+3

100.0

412

1599.01

13:

14:

\*\*\*\*\*

FILTERED FILES: 644 - 644 DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-927-21

\*\*\*\*\*



SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test No.: A-928

Test Date: October 9, 1975

Test Subject: Age - 50's

Sex - F

Stature - 163.5 cm

Weight - 56.8 kg

Restraint System

EA column with soft insert, lap belt

Velocity

16.5 mph

Deceleration

10 G's

Injuries

Rib fracture - L5

AIS Number Estimate

2

TEST # A-928

TEST DATE 10.9.75

TEST DESCRIPTION EA Column, soft insert, front sled test VELOCITY 242 ft/s

SUBJECT:

AGE 55 SEX F CAUSE OF DEATH Cardiac Arrest; Pulmonary Hemorrhage

INJURY INFORMATION:

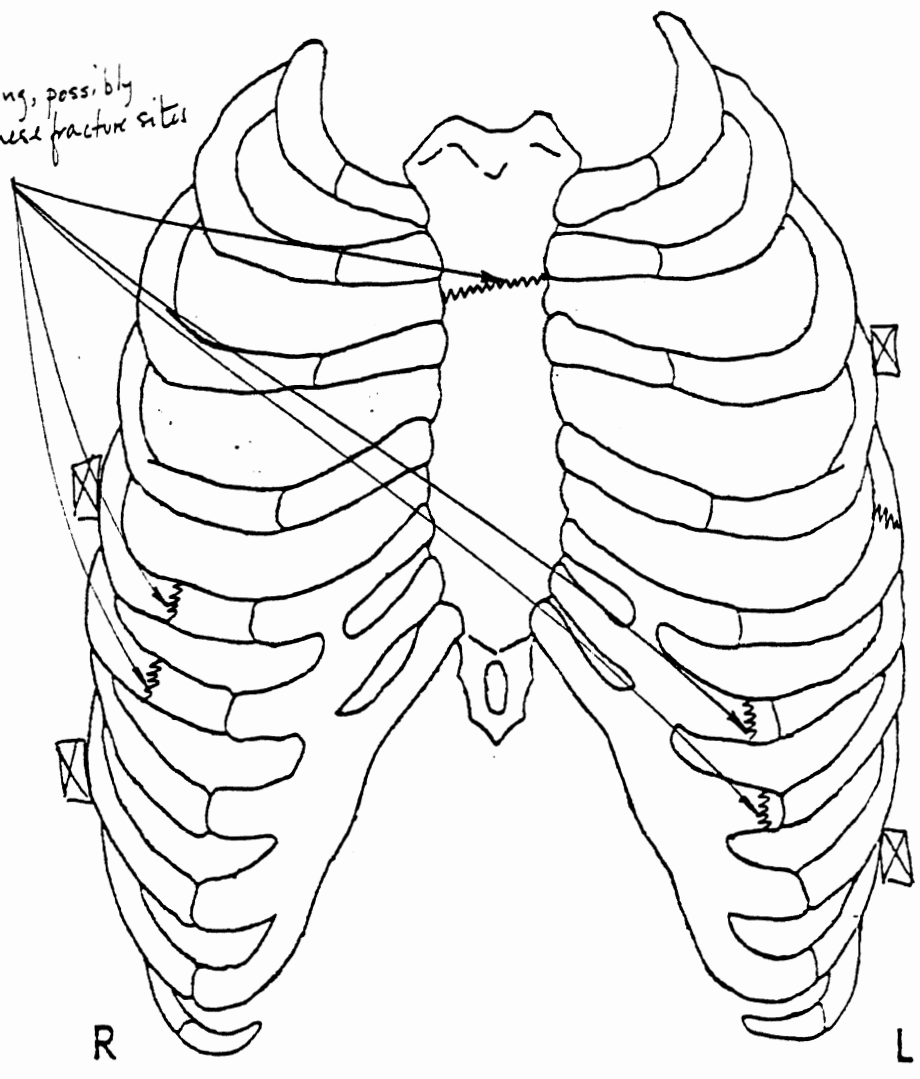
OVERALL THORACIC AIS 2

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>2</u>
	2					
	3					
	4					
	5					
	6					
	7					
	8					
MAJOR NON-THORACIC INJURIES NOTED	1					
	2					
	3					
	4					
	5					



TEST # A-928

*much clothing, possibly  
e.g., at these fracture sites*

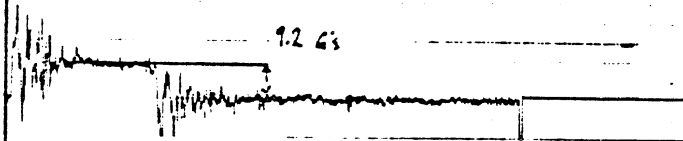


ANTERIOR VIEW RIB CAGE

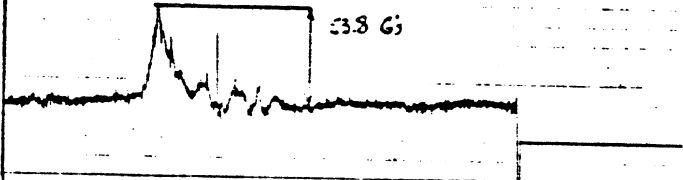
*(no thoracic organ injuries  
noted: possibly obscured  
due to cause of death.)*

TEST # A-92a

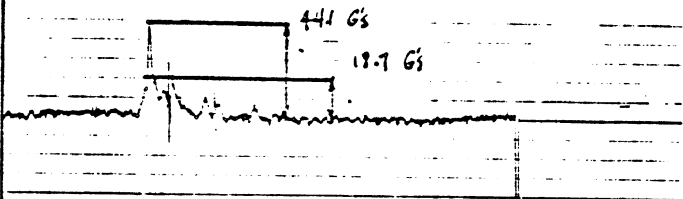
SLED DECELERATION PULSE



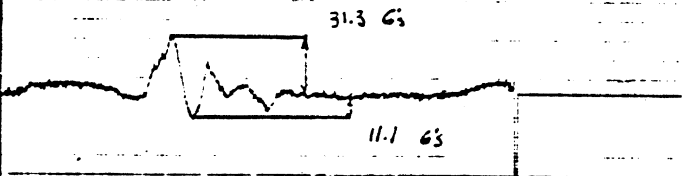
UPPER STERNUM ACCELEROMETER



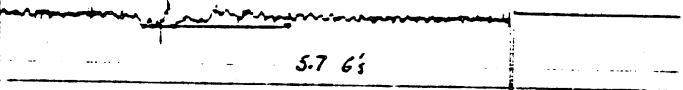
LOWER STERNUM ACCELEROMETER



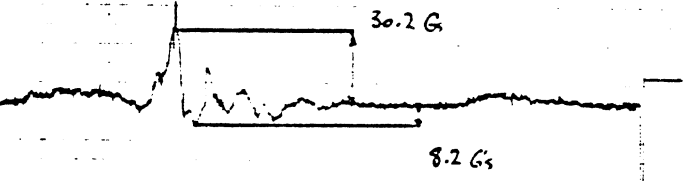
LEFT LOWER RIB ACCELEROMETER



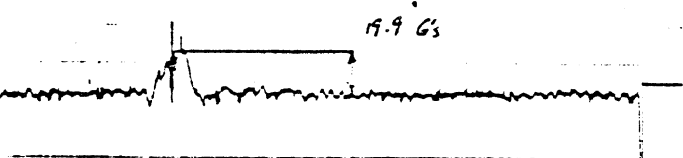
LEFT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



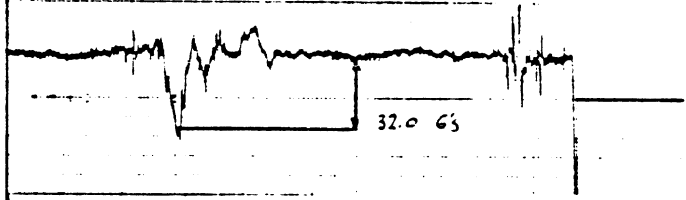
RIGHT UPPER RIB ACCELEROMETER



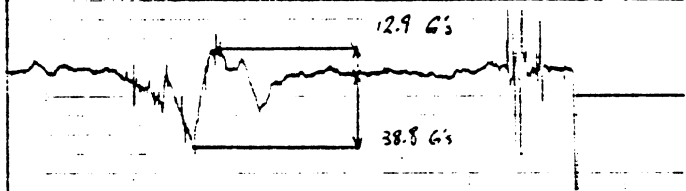
100 msec

TEST # A-928

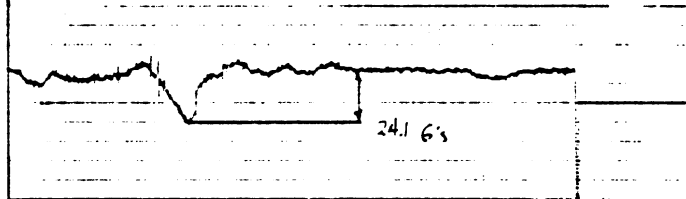
T<sub>1</sub> P-A ACCELEROMETER



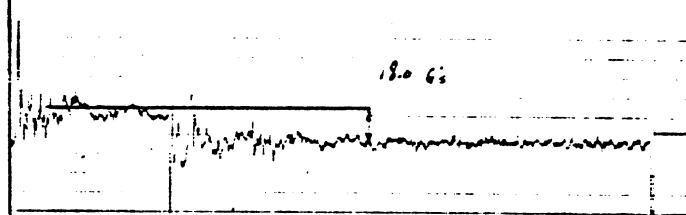
T<sub>1</sub> I-S ACCELEROMETER



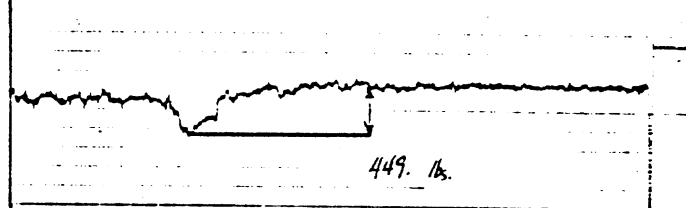
T<sub>12</sub> P-A ACCELEROMETER



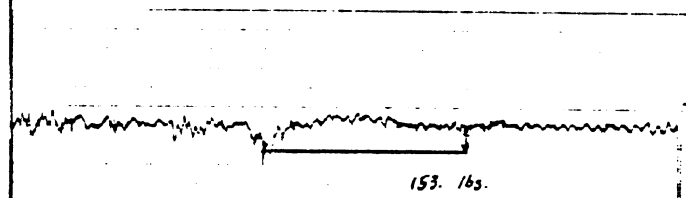
STEERING COLUMN BASE ACCELEROMETER



STEERING COLUMN BASE LOAD



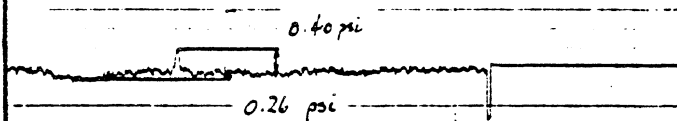
STEERING COLUMN VERTICAL LOAD



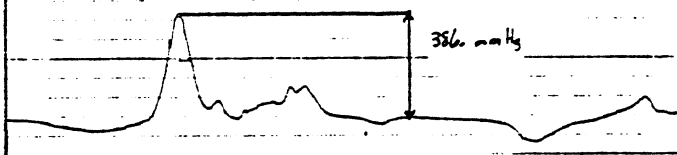
100 msec

11  
20

AIRWAY PRESSURE



VASCULAR PRESSURE



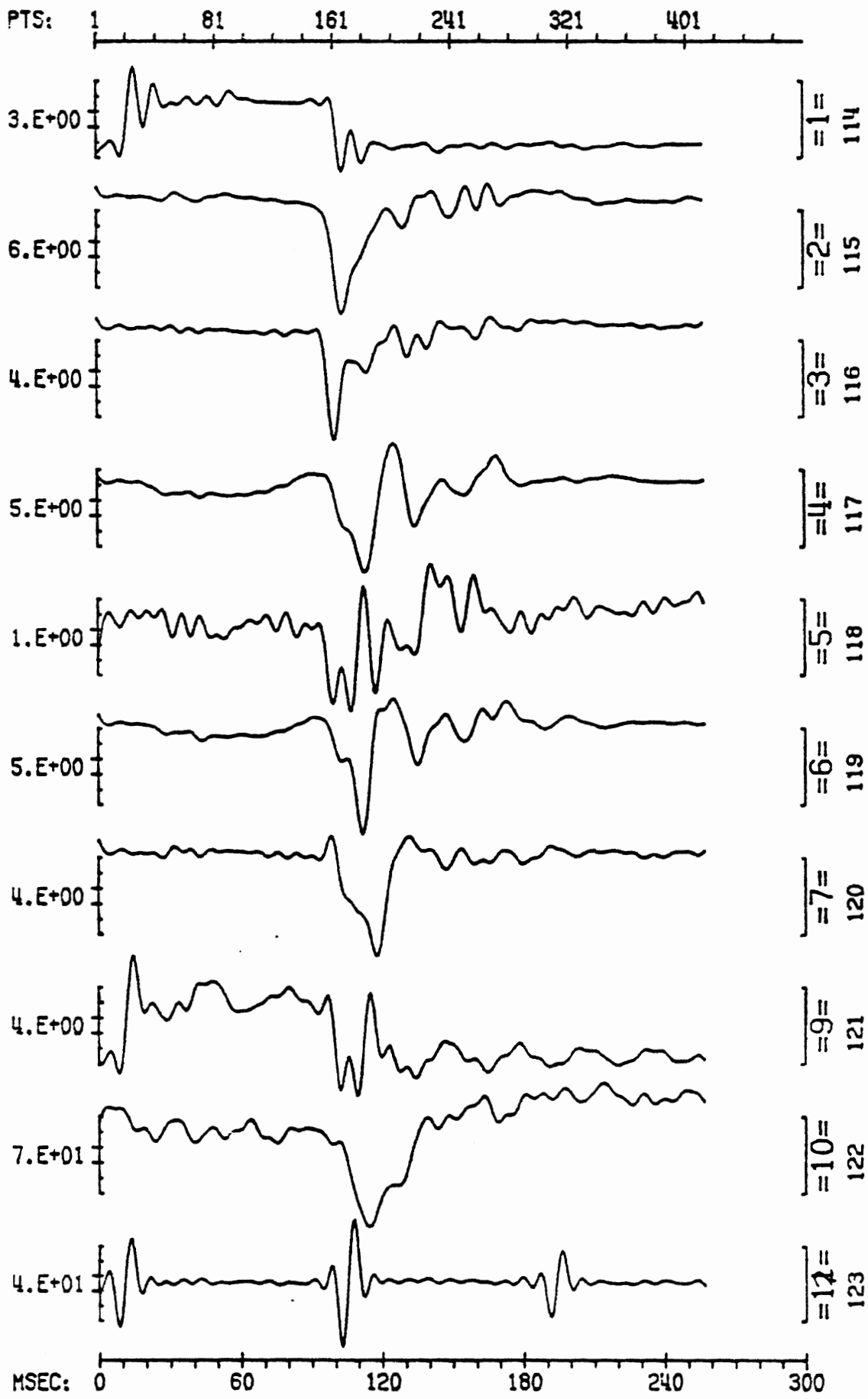
RIGHT LAP BELT LOAD



LEFT LAP BELT LOAD



100 msec



10: A-928-1:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-928-11

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1649 PTS/CH AT 6398.60 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
114	- 1:	SLFD DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	412	1599.65
115	- 2:	UPPER STERNAL ACCELEROMETER*	-107.40	G'S	4+1+ 3	100.8	412	1599.65
116	- 3:	LOWER STERNAL ACCELEROMETER*	-93.40	G'S	4+1+ 3	100.8	412	1599.65
117	- 4:	LEFT LOWER RIB ACCELEROMETER	-102.10	G'S	4+1+ 3	100.8	412	1599.65
118	- 5:	LEFT UPPER RIB ACCELEROMETER	95.60	G'S	4+1+ 3	100.8	412	1599.65
119	- 6:	RIGHT LOWR RIB ACCELEROMETER	-81.50	G'S	4+1+ 3	100.8	412	1599.65
120	- 7:	RIGHT UPPR RIB ACCELEROMETER	-90.00	G'S	4+1+ 3	100.8	412	1599.65
121	- 9:	ST. COLUMN BASE ACCELEROMETER	100.00	G'S	4+1+ 3	100.8	412	1599.65
122	- 10:	STFERING COLUMN LOAD	222.00	LBS.	4+1+ 3	100.8	412	1599.65
123	- 11:	STFERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.8	412	1599.65

12:

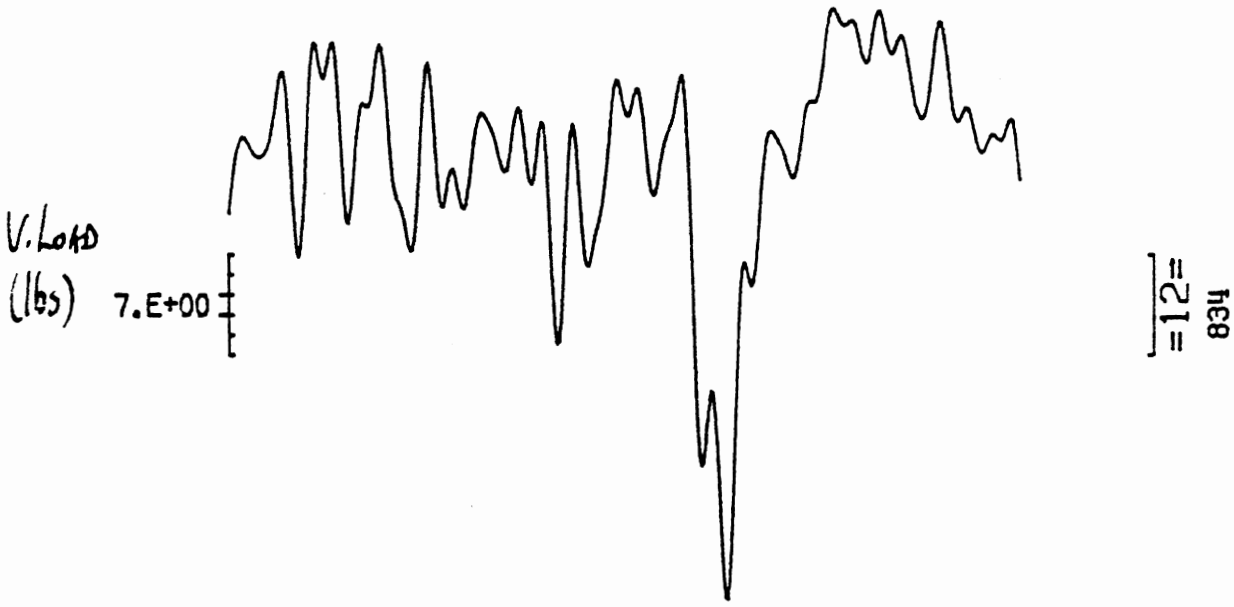
13:

14:

FILTERED FILES: 114 - 123 DIGITAL TAPE; JEFF DATE: 16-DEC-76 RUN ID: A-928-11

PTS: 1 81 161 241 321 401

ID: A-928-1:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

\*\*\*\*\*  
RUN ID: A-928-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 25-OCT-76

TEST SIGNALS: 1649 PTS/CH AT 6398.60 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111

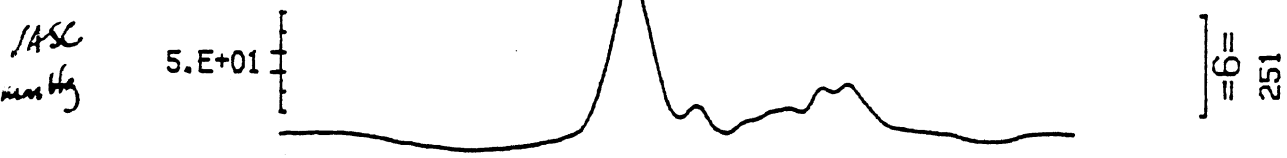
830 - 121 STEERING COLUMN VERTICAL LOAD 1176.00 LBS. 4+1+ 3 100.0 412 0 1599.65

- 131
- 141

\*\*\*\*\*  
FILTERED FILES: 834 - 834 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: A-928-11



PTS: 1 81 161 241 321 401 481



MSEC: 0 60 120 180 240 300

ID: A-928-2:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-928-2;

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1648 PTS/CH AT 6400.24 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
246	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	100.8	412	1600.31
247	2	T1 P-A ACCELEROMETER	84.20	G'S	4+1+3	100.8	412	1600.31
248	3	T1 I-S ACCELEROMETER	99.70	G'S	4+1+3	100.8	412	1600.31
249	4	T12 P-A ACCELEROMETER	86.00	G'S	4+1+3	100.8	412	1600.31
250	5	T12 R-L ACCELEROMETER	80.00	G'S	4+1+3	100.8	412	1600.31
251	6	VASCULAR PRESSURE	145.60	MM-HG	4+1+3	100.8	412	1600.31
252	7	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+3	100.8	412	1600.31
253	8	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+3	100.8	412	1600.31
254	11	AIRWAY PRESSURE	209.00	MM-HG	4+1+3	100.8	412	1600.31

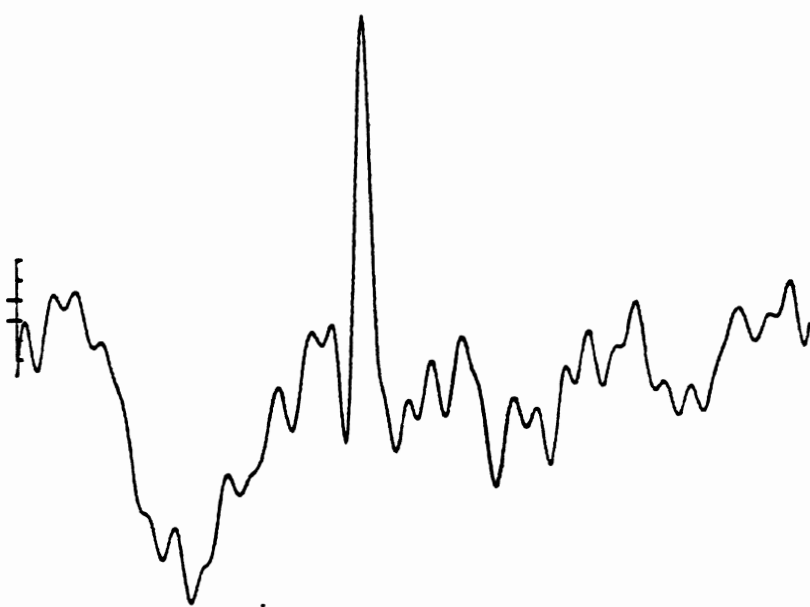
9:  
10:  
12:  
13:  
14:

PTS: 1 81 161 241 321 401 481

ID: A-928-2:

Amplitude  
(mV)

8.E-01



12  
845

MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-928-2

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PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#137 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018

DATE: 25-OCT-76

TEST SIGNALS: 1648 PTS/CH AT 6401.24 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
----	--	-----	-----	-----	-----	-----	---	-----
	1i							
	2i							
	3i							
	4i							
	5i							
	6i							
	7i							
	8i							
	9i							
	10i							
	11i							
845	12i	AIRWAY PRESSURE	209.00	MM-HG	4+1+ 3	100.0	412	1600.31
	13i							
	14i							

-----  
 FILTERED FILES: 845 - 845      DIGITAL TAPE: THOR.2      DATE: 26-JAN-77      RUN ID: A-928-2

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No.: A-937

Test Date: December 11, 1975

Test Subject:

Age - 48

Sex - Female

Stature - 162.7 cm

Weight - 67.7 kg

Restraint System

EA column with insert, lap belt

Velocity

23.2 mph

Deceleration

9.8 G's

Injuries

Bruise on left ventricle, 25 mm diameter, 2 mm deep

AIS Number Estimate

TEST # A-937

TEST DATE 12.11.75

TEST DESCRIPTION EA Column, soft insert, front sled test VELOCITY 34.0 ft/s

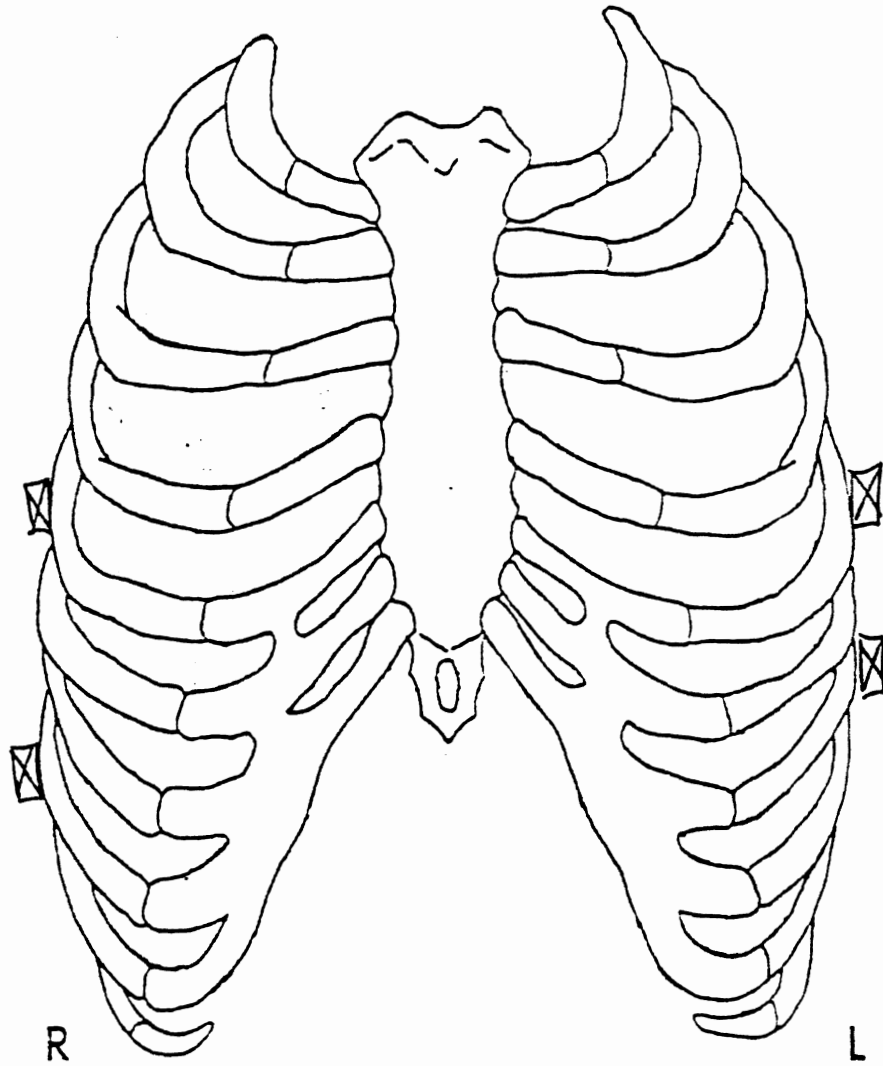
SUBJECT:

AGE 48 SEX F CAUSE OF DEATH colon cancer

INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

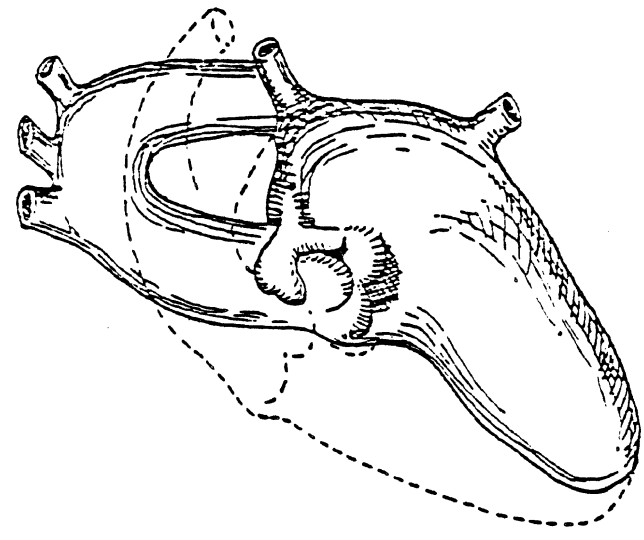
TEST # A-937



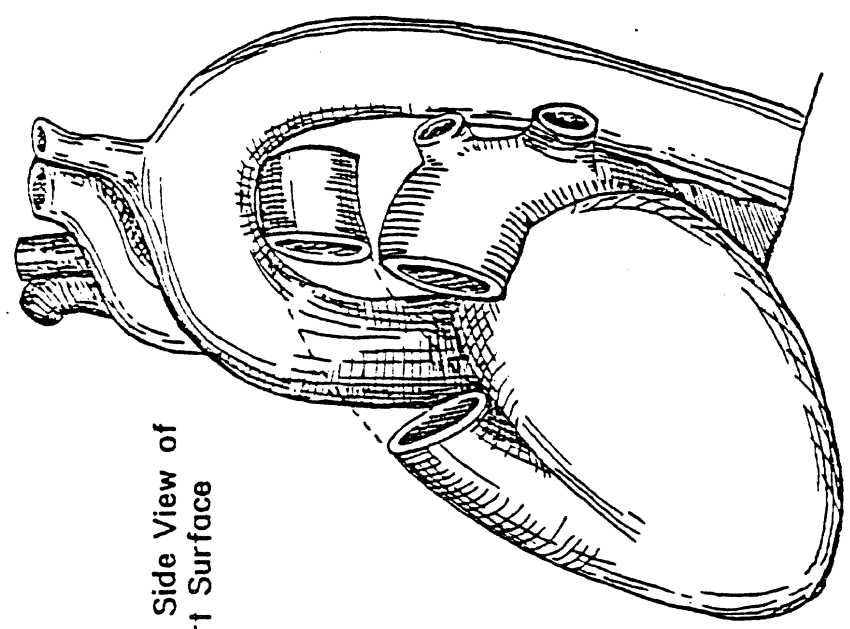
ANTERIOR VIEW RIB CAGE

- no fractures
- lung injuries undetectable due to advanced decomposition

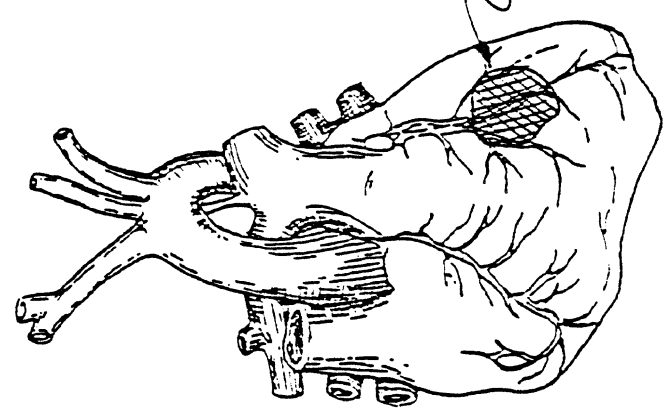
Left View of Left Side of Heart



Left Side View of Heart Surface



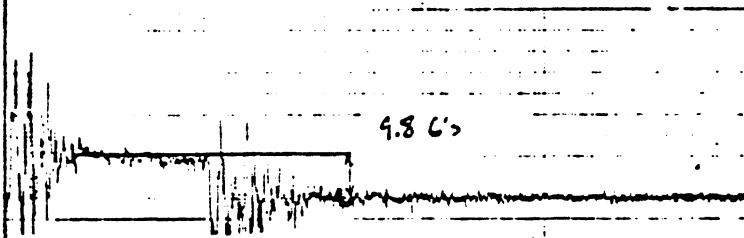
bruise on heart 1" diameter, 1/16 deep



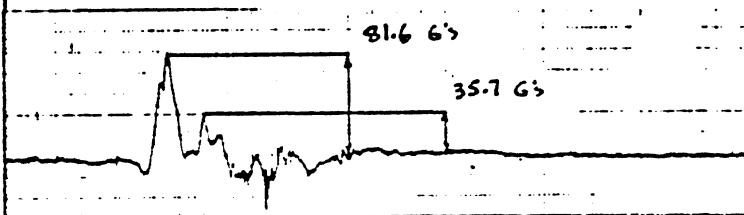
Anterior View of Heart



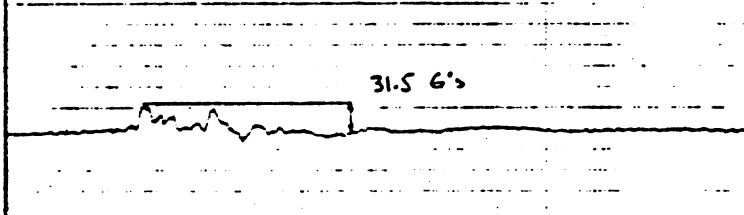
SLED DECELERATION



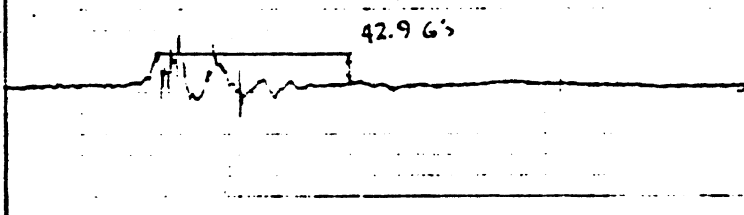
UPPER STERNAL ACCELEROMETER



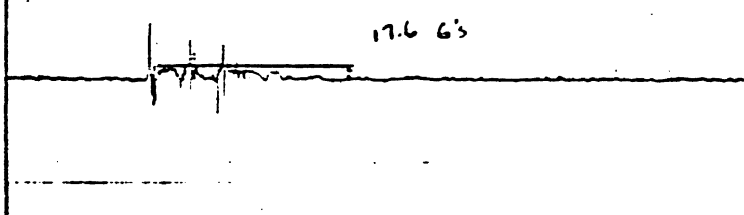
LOWER STERNAL ACCELEROMETER



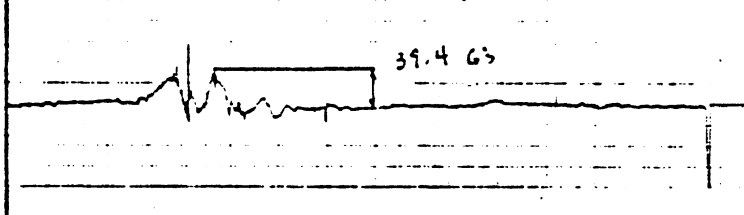
LEFT UPPER RIB ACCELEROMETER



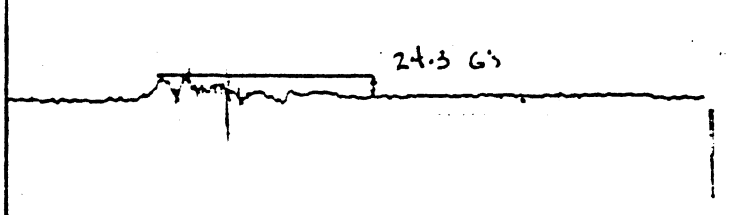
LEFT LOWER RIB ACCELEROMETER



RIGHT UPPER RIB ACCELEROMETER

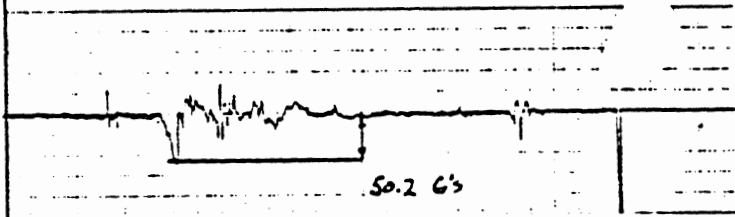


RIGHT LOWER RIB ACCELEROMETER

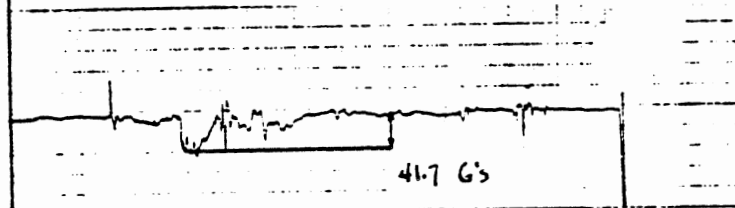


100 msec

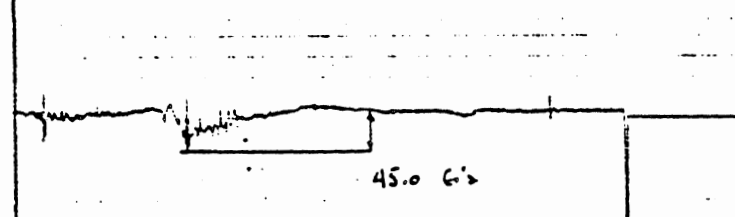
T<sub>1</sub> P-A ACCELEROMETER



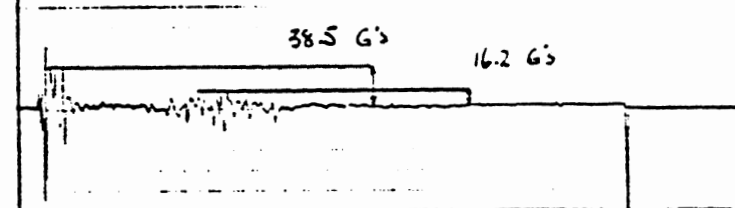
T<sub>1</sub> I-S ACCELEROMETER



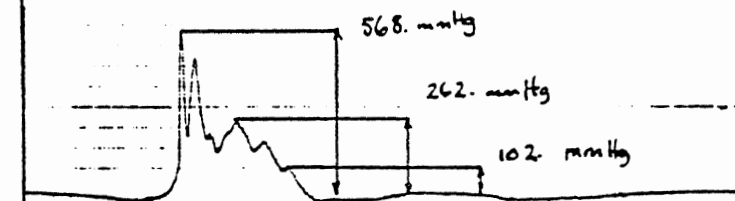
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER

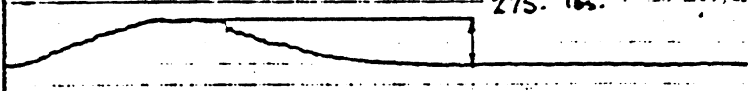


VASCULAR PRESSURE

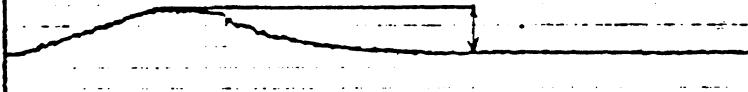


100 msec

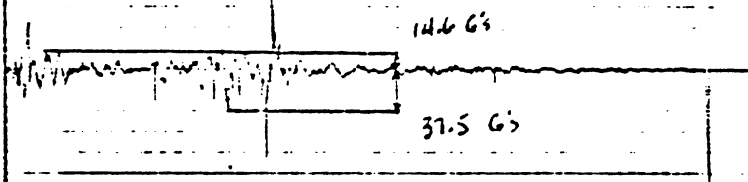
RIGHT LAP BELT LOAD



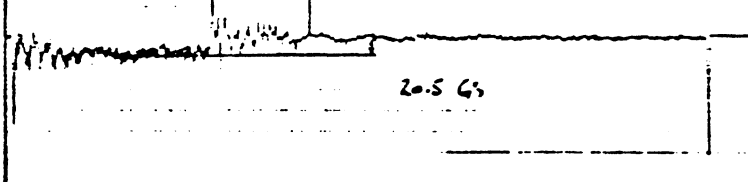
LEFT LAP BELT LOAD



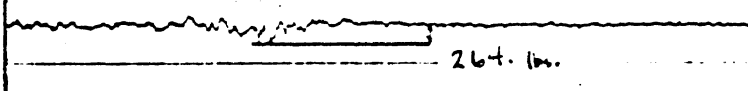
STEERING COLUMN VERTICAL ACCELEROMETER



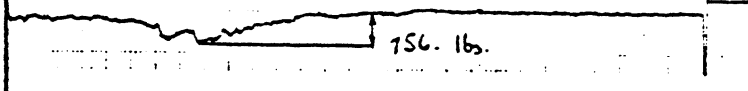
STEERING COLUMN BASE ACCELEROMETER



STEERING COLUMN VERTICAL LOAD

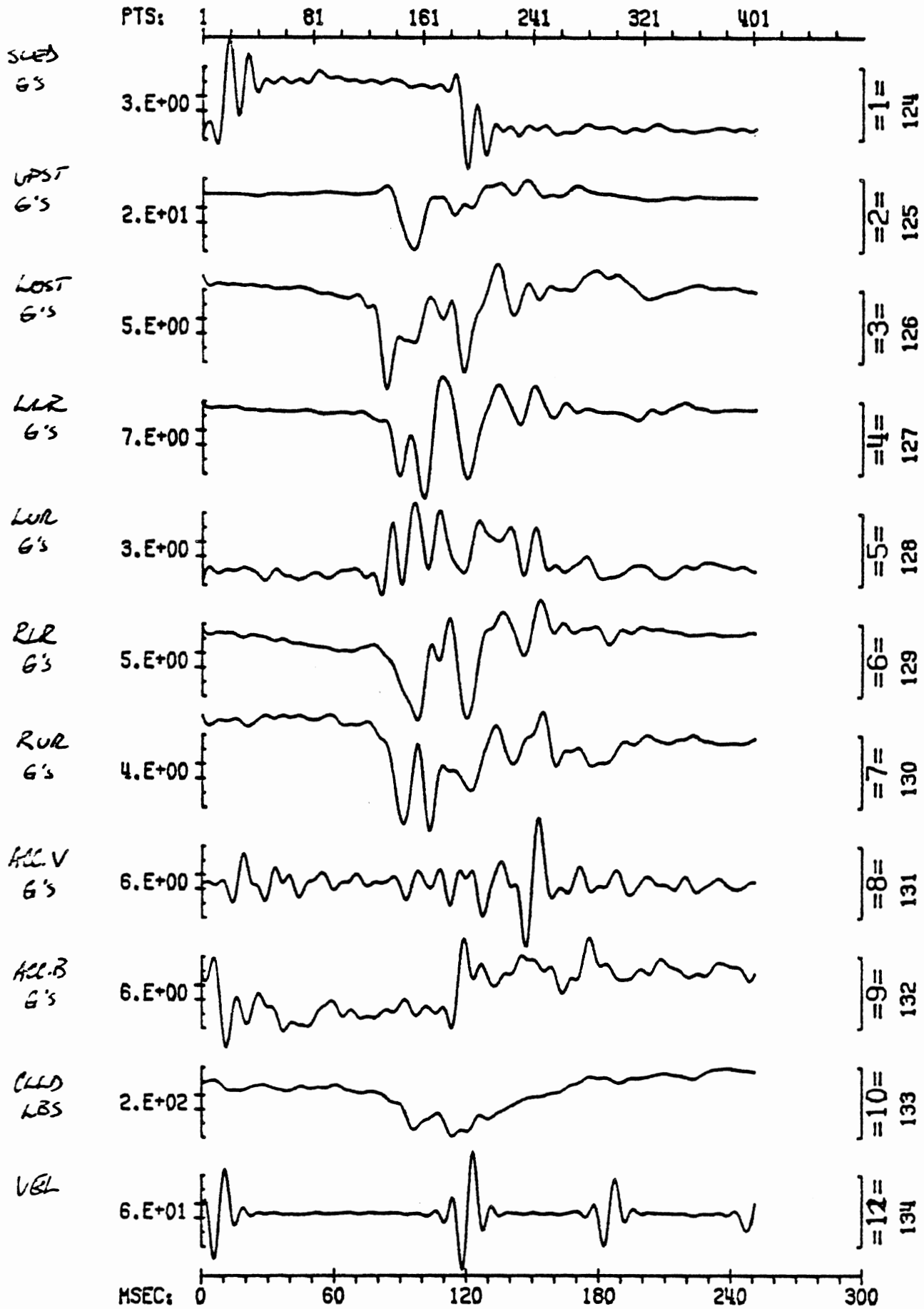


STEERING COLUMN BASE LOAD



100 msec





ID: A-937-1:

TAPE: THOR.2

=====  
 RUN ID: A-937-1;  
 =====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 -----

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRJ#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
 TEST SIGNALS: 1620 PTS/CH AT 6399.53 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
124	- 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	403	1599.00
125	- 2:	UPPER STERNAL ACCELEROMETER	-68.10	G'S	4+1+ 3	100.0	403	1599.00
126	- 3:	LOWER STERNAL ACCELEROMETER*	-93.40	G'S	4+1+ 3	100.0	403	1599.00
127	- 4:	LEFT LOWER RIB ACCELEROMETER	-101.00	G'S	4+1+ 3	100.0	403	1599.00
128	- 5:	LEFT UPPER RIB ACCELEROMETER	98.10	G'S	4+1+ 3	100.0	403	1599.00
129	- 6:	RIGHT LOWER RIB ACCELEROMETER	-82.90	G'S	4+1+ 3	100.0	403	1599.00
130	- 7:	RIGHT UPPER RIB ACCELEROMETER	-89.70	G'S	4+1+ 3	100.0	403	1599.00
131	- 8:	COLUMN VERTICAL ACCELEROMETER	75.00	G'S	4+1+ 3	100.0	403	1599.00
132	- 9:	ST. COLUMN BASE ACCELEROMETER	100.00	G'S	4+1+ 3	100.0	403	1599.00
133	- 10:	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.0	403	1599.00
134	- 11:	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	403	1599.00

12:  
 13:  
 14:

-----  
 FILTERED FILES: 124 - 134 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: A-937-1;  
 -----

PTS: 1 81 161 241 321 401

ID: A-937-1:



12= 835

MSEC: 0 60 120 180 240 300

TAPE: THOR.2A

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-937-1

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018

DATE: 25-OCT-76

TEST SIGNALS: 1620 PTS/CH AT 6399.53 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
835	12	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+3	100.0	403	1599.00
	13							
	14							

FILTERED FILES: 835 - 835

DIGITAL TAPE: THOR.2

DATE: 26-JAN-77

RUN ID: A-937-1





## SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety  
Research Institute - The University of Michigan

TEST NO.: 76T003

TEST DATE: January 27, 1976

TEST SUBJECT:

Age: 60's

Sex: Male

Stature - 180.5 cm.

Subject Weight - 102.1 kg

RESTRAINT SYSTEM:

None: Lateral impact into rigid flat surface.

VELOCITY:

Closing velocity between subject and surface = 13.5 mph

INJURIES:

Minor fracture directly under fourth rib accelerometer  
mount. Whether this is related to the mount is not discernable.

AIS Number Estimate:

TEST # 967003

TEST DATE 1.27.76

TEST DESCRIPTION Rigid Barrier Side Sled Impact VELOCITY 9.8 ft/s

SUBJECT:

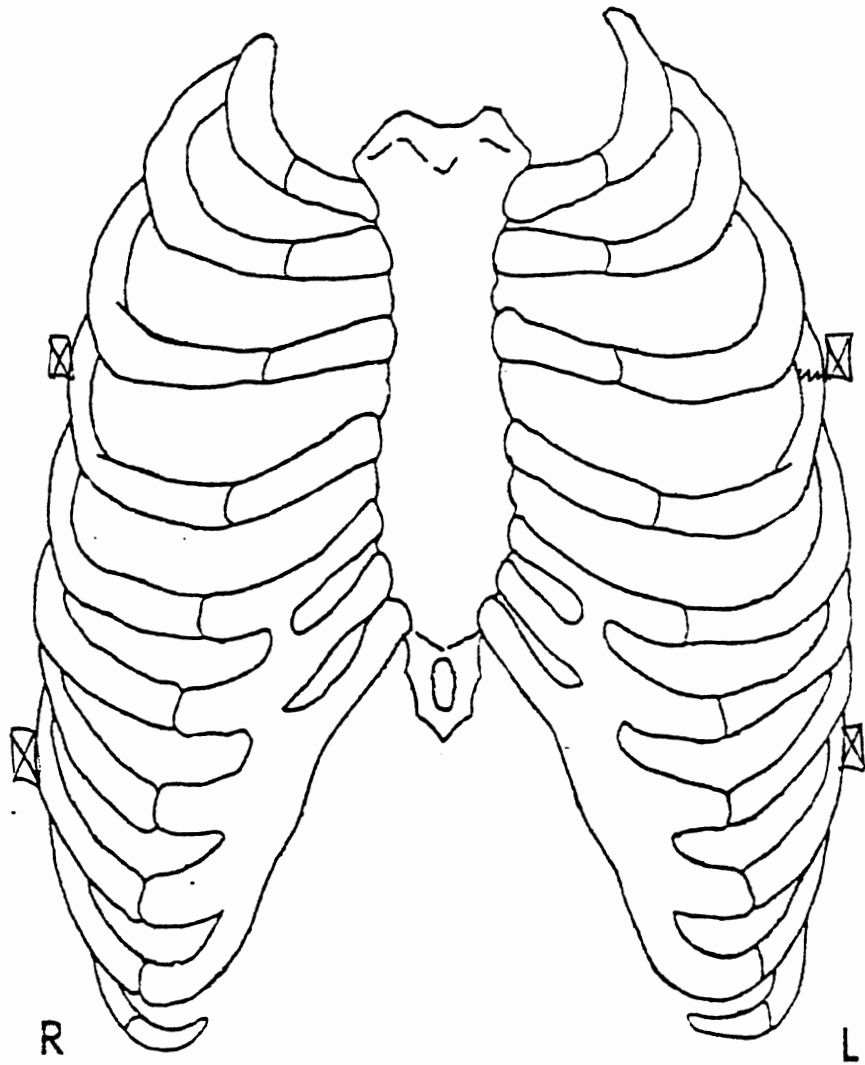
AGE 53 SEX M CAUSE OF DEATH Uremia

INJURY INFORMATION:

OVERALL THORACIC AIS 2

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>2</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

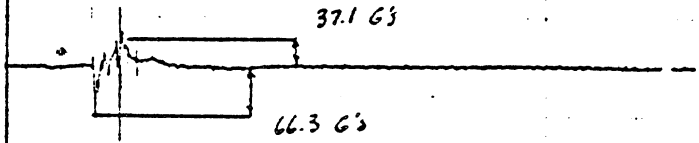
TEST # 767003



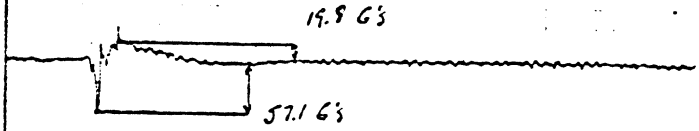
ANTERIOR VIEW RIB CAGE

*(no organ injuries)*

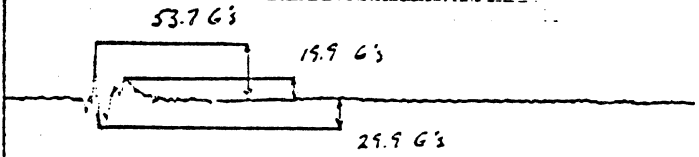
UPPER STERNAL ACCELEROMETER



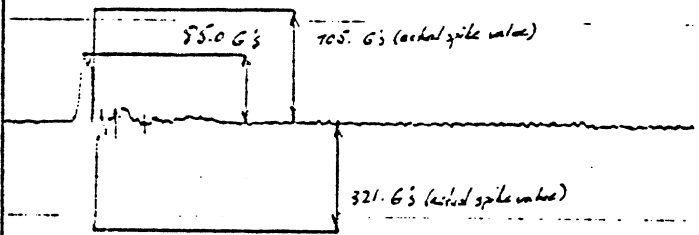
LOWER STERNAL ACCELEROMETER



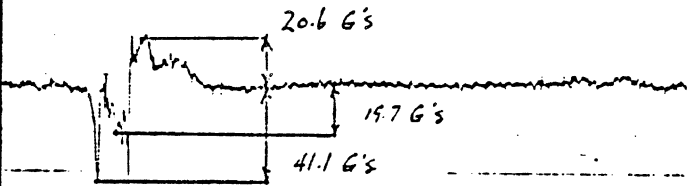
LEFT LOWER RIB ACCELEROMETER



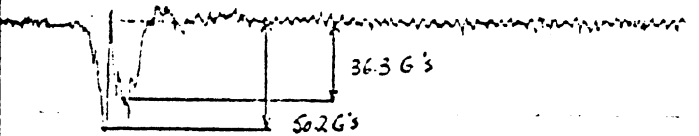
LEFT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



RIGHT UPPER RIB ACCELEROMETER

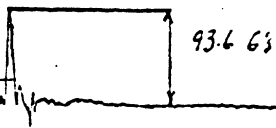


100 msec

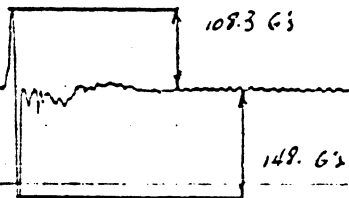
11-1-63

TEST # 761003

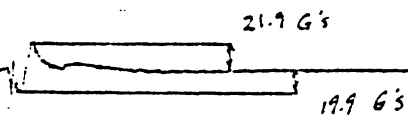
T<sub>1</sub> P-A ACCELEROMETER



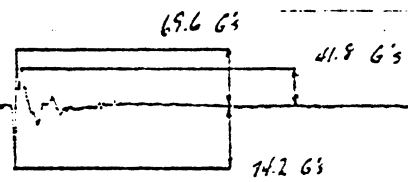
T<sub>1</sub> I-S ACCELEROMETER



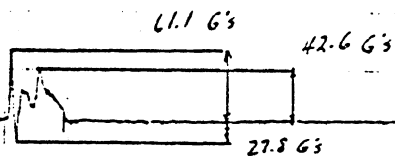
PELVIS P-A ACCELEROMETER



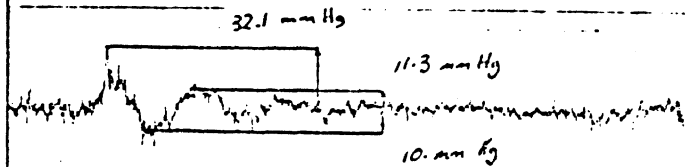
PELVIS I-S ACCELEROMETER



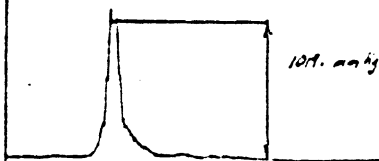
PELVIS R-L ACCELEROMETER



AIRWAY PRESSURE

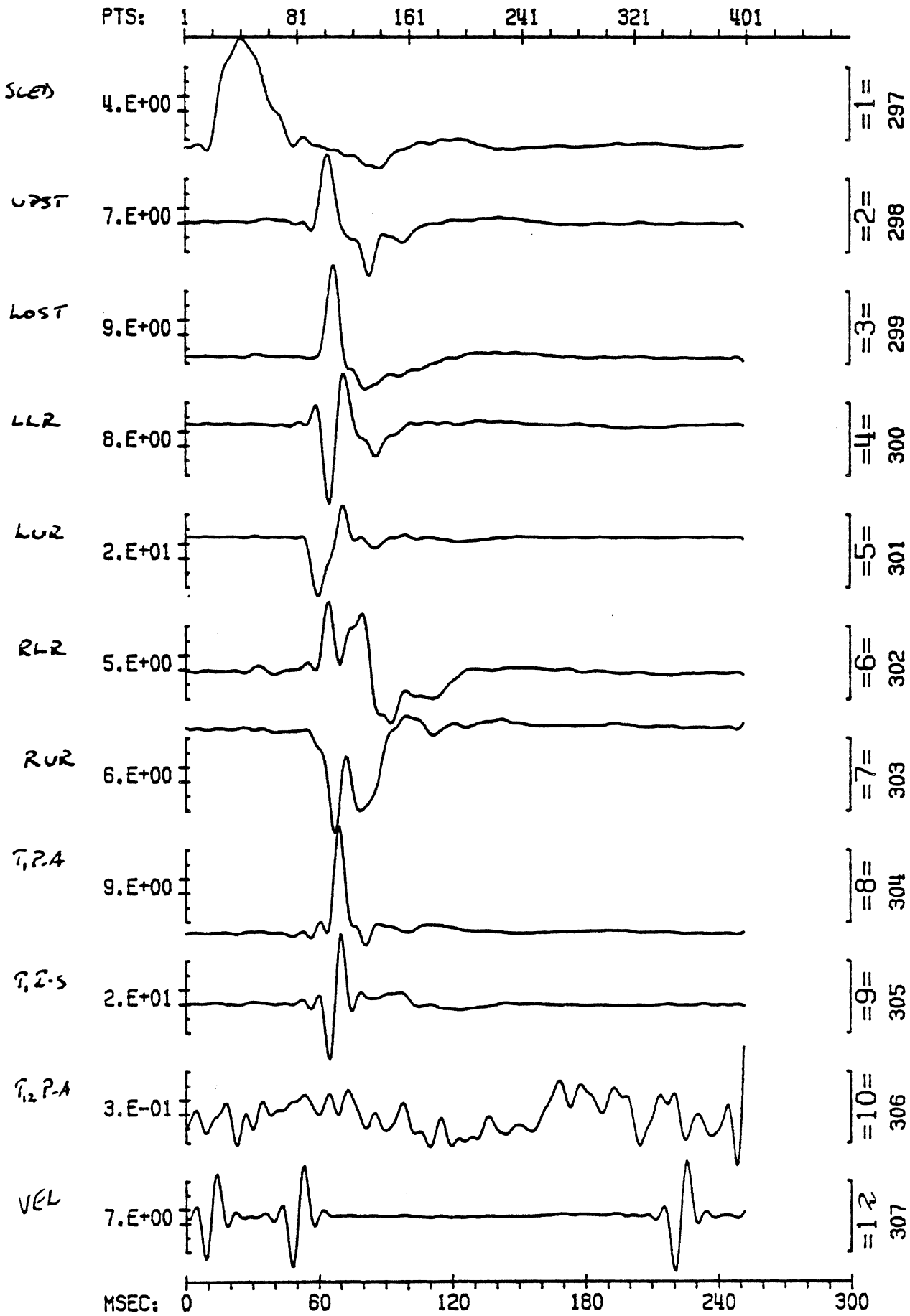


VASCULAR PRESSURE



100 msec

1.1.18



ID: 76T003-1:

TAPE: THOR.2

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T003-11

PROJECT: THORAX IMPACT PROJECT--

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018

DATE: 17-JAN-77

TEST SIGNALS: 1601 PTS/CH AT 6306.72 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
297	1	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	99.3	398	1576.68
298	2	UPPER STERNAL ACCELEROMETER	-106.00	G'S	4+1+ 3	99.3	398	1576.68
299	3	LOWER STERNAL ACCELEROMETER	-87.00	G'S	4+1+ 3	99.3	398	1576.68
300	4	LEFT LOWER RIB ACCELEROMETER	-79.60	G'S	4+1+ 3	99.3	398	1576.68
301	5	LEFT UPPER RIB ACCELEROMETER	-97.20	G'S	4+1+ 3	99.3	398	1576.68
302	6	RIGHT LOWER RIB ACCELEROMETR	-82.20	G'S	4+1+ 3	99.3	398	1576.68
303	7	RIGHT UPPER RIB ACCELEROMETR	93.00	G'S	4+1+ 3	99.3	398	1576.68
304	8	T1 P-A ACCELEROMETER	78.00	G'S	4+1+ 3	99.3	398	1576.68
305	9	T1 I-S ACCELEROMETER	-106.00	G'S	4+1+ 3	99.3	398	1576.68
306	10	T12 P-A ACCELEROMETER	125.00	G'S	4+1+ 3	99.3	398	1576.68
307	11	T12 R-L ACCELEROMETER	124.00	G'S	4+1+ 3	99.3	398	1576.68

121

131

141

FILTERED FILES: 297 - 307

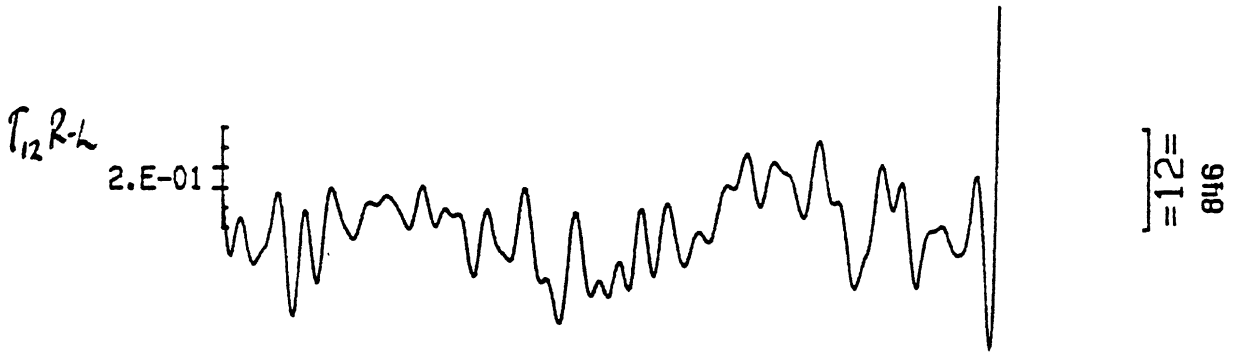
DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T003-11

PTS: 1 81 161 241 321 401

ID: 76T003-1:



MSEC: 0 60 120 180 240 300

TAPE: THOR.2A



\*\*\*\*\*  
RUN ID: 76T003-11

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
-----

PROJECT: THORAX IMPACT PROJECT\*\*

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1601 PTS/CH AT 6306.72 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
---------	--------------------	------------	-------	---------------	---------------	---------	----------------

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:
- 12: T12 R-L ACCELEROMETER
- 13:
- 14:

846 - 120 T12 R-L ACCELEROMETER 124.00 G'S 4+1+ 3 99.3 398 0 1576.68

-----  
FILTERED FILE: 846 - 846 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T003-11  
-----

PTS: 1 101 201 301 401 501 601



=1=  
609



=2=  
610



=6=  
611



=7=  
612



=8=  
613



=9=  
614

MSEC: 0 80 160 240 320 400

76T003-2:SS

ID:

TAPE: THOR.2

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T003-2100

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 1913 PTS/CH AT 6311.06 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
609	- 1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	476	1577.76
610	- 2	VASCULAR PRESSURE	145.60	MM-HG	4+1+3	99.4	476	1577.76
3								
4								
5								
611	- 6	PELVIC P-A ACCELEROMETER	67.50	G'S	4+1+3	99.4	476	1577.76
612	- 7	PELVIC I-O ACCELEROMETER	-92.00	G'S	4+1+3	99.4	476	1577.76
613	- 8	PELVIC R-L ACCELEROMETER	74.10	G'S	4+1+3	99.4	476	1577.76
614	- 9	AIRWAY PRESSURE	378.00	MM-HG	4+1+3	99.4	476	1577.76
10								
11								
12								
13								
14								

\*\*\*\*\*

FILTERED FILES: 609 - 614 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T003-2100

\*\*\*\*\*



Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test No.: 76T008

Test Date: March 25, 1976

Test Subject:

Age - 74

Sex - Female

Stature - 163.0 cm

Weight - 71.1 kg

Restraint System:

Three-point uncharged inflatable belt with Mini-Car Energy-Absorbing anchor links.

Velocity:

38.9 mph

Sled Deceleration:

17 G's

Injuries:

Neck - Left transverse process of C6 fractured.

Rib Cage - Left - 2, 3, 4

Right - 2 - 9

Sternum - Fracture near junction with left 1st rib.

T1 - Around anterior surface was a 4 cm by 1.5 cm bruise corresponding to region where belt applied marked pressure.

Heart - Slight bruise on right front tip of left ventricle.

AIS Number Estimate

Thorax - 4

TEST # 76008

TEST DATE 3.25.76

TEST DESCRIPTION Lap & shoulder restraint, front sled impact VELOCITY 57.1 ft/s

SUBJECT:

AGE 74 SEX F CAUSE OF DEATH liver coma

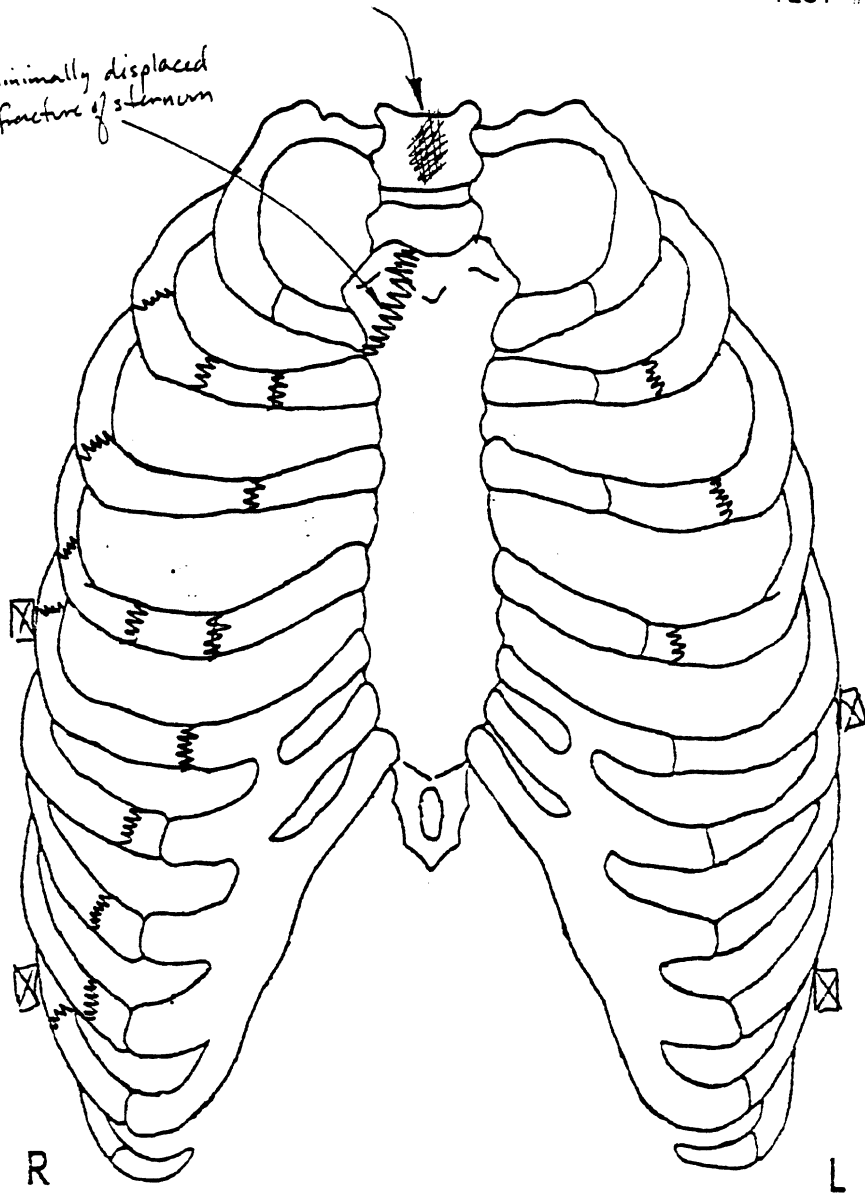
INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>3</u>
	4	<u>B</u>	<u>S</u>	<u>C</u>	<u>V</u>	<u>1</u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>F</u>	<u>V</u>	<u>3</u>
	2	<u>H</u>	<u>L</u>	<u>H</u>	<u>I</u>	<u>1</u>
	3	<u>N</u>	<u>L</u>	<u>B</u>	<u>I</u>	<u>1</u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

4.X1.5 on bruising, on inferior aspect, T<sub>1</sub>

TEST # 76T008

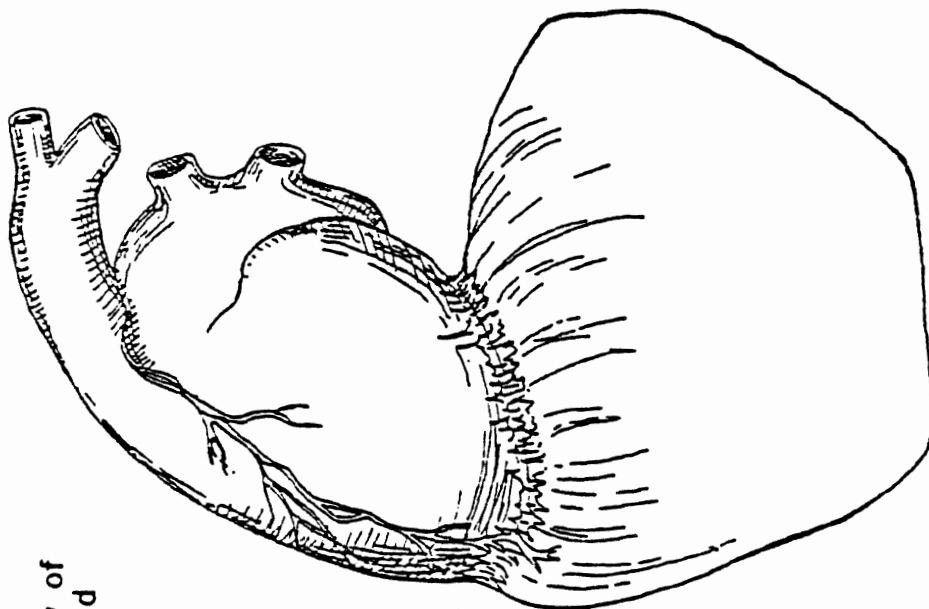
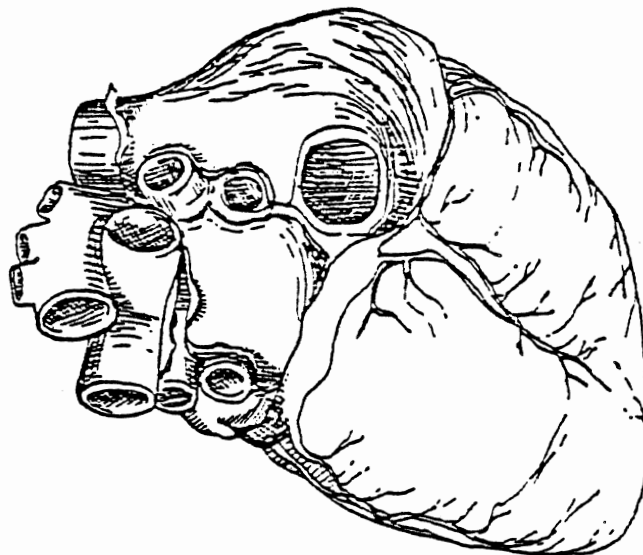
minimally displaced fracture of sternum



ANTERIOR VIEW RIB CAGE

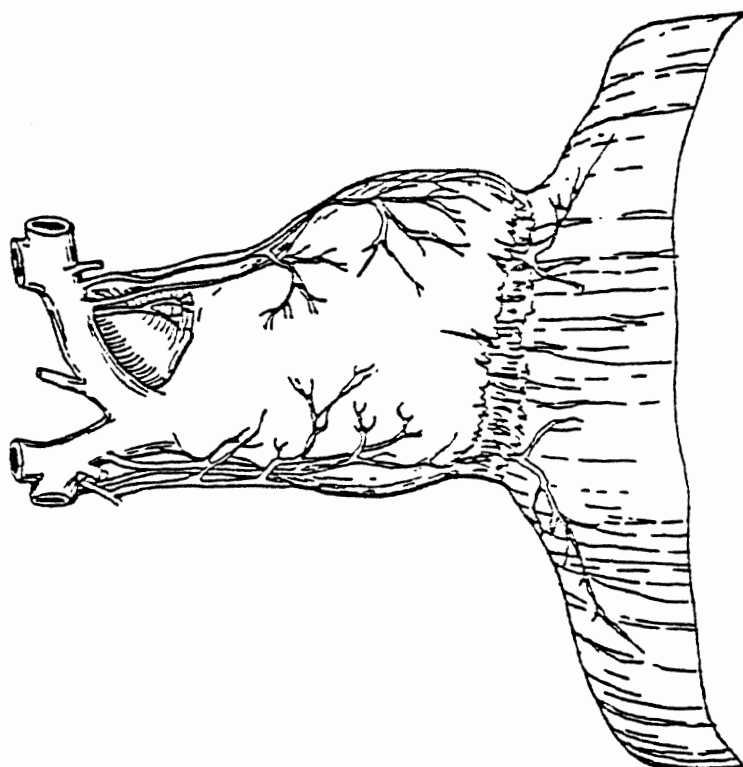
- (Also:
- belt burn, left side of neck
  - 3 cm dia hematoma, right parietal scalp
  - fracture through left process C<sub>6</sub>)

Diaphragmatic View of Heart



*some free fluid not blood  
in pericardium*

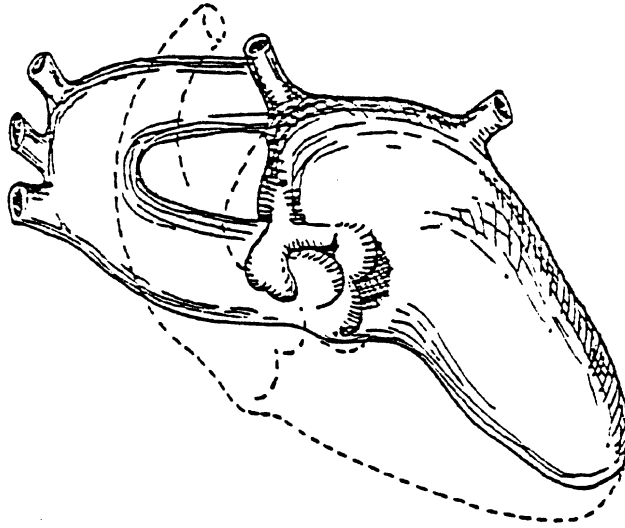
Left Side View of  
Pericardium and  
Diaphragm



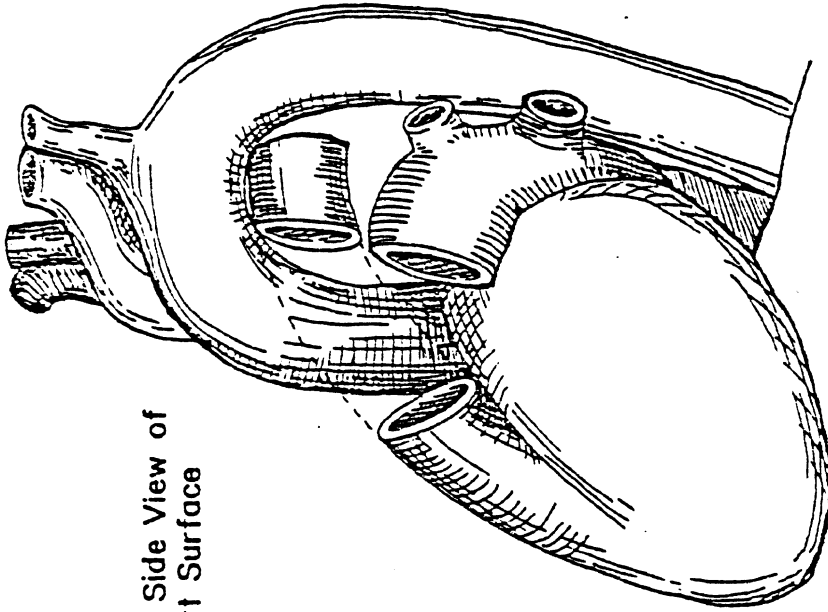
Anterior View of Pericardium and Diaphragm



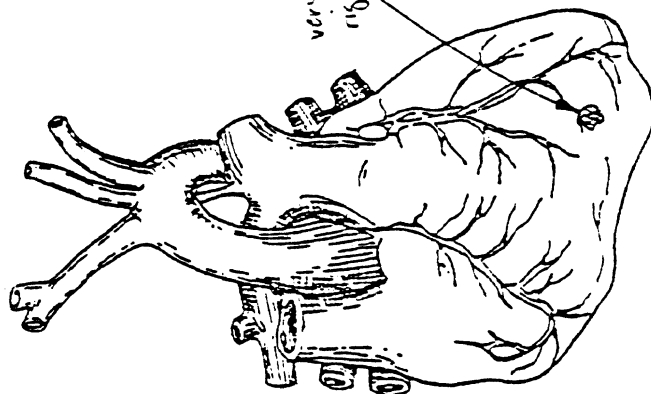
Left View of Left Side of Heart



Left Side View of Heart Surface

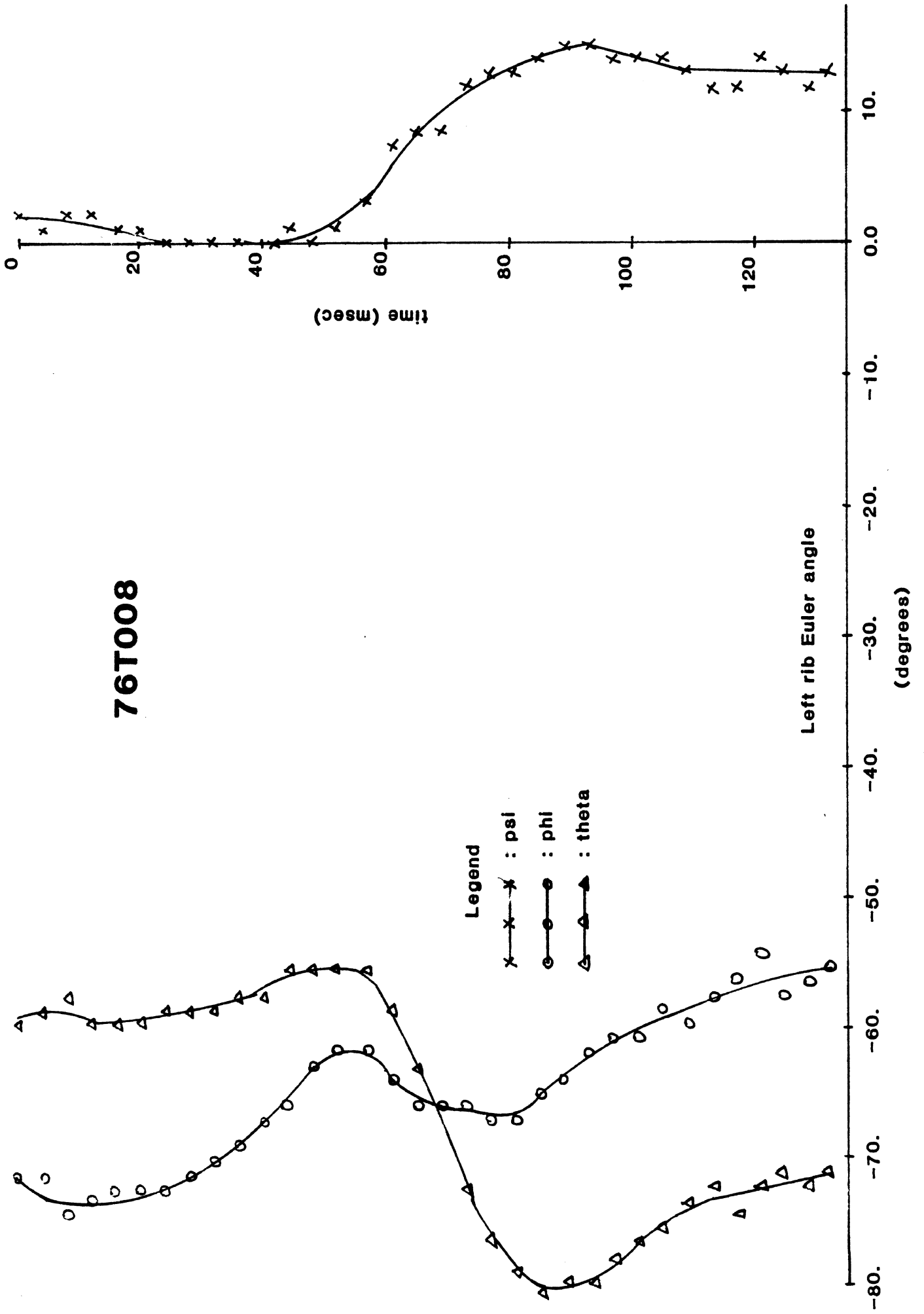


very slight bruising,  
right front tip,  
left ventricle



Anterior View of Heart

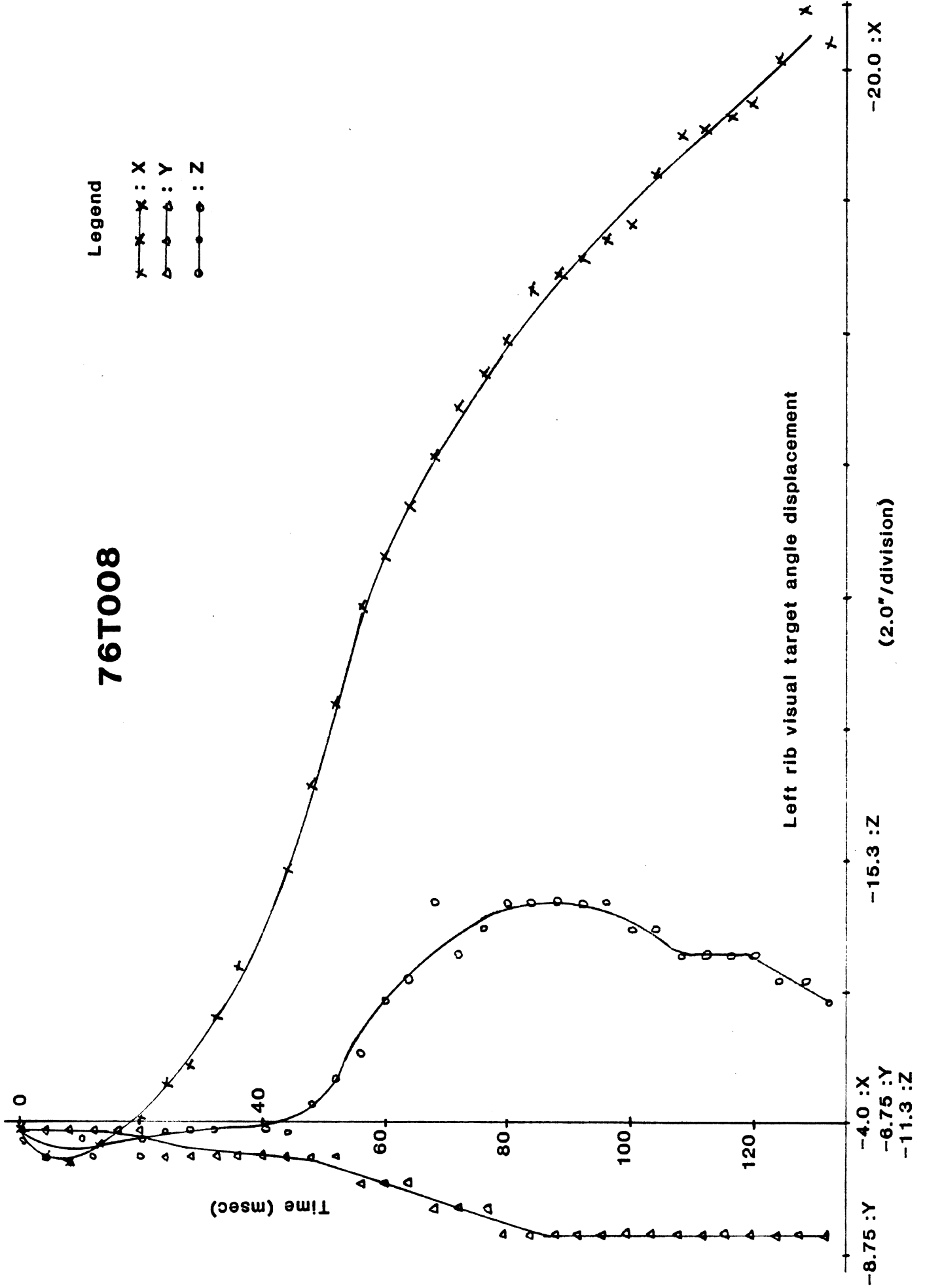
76T008

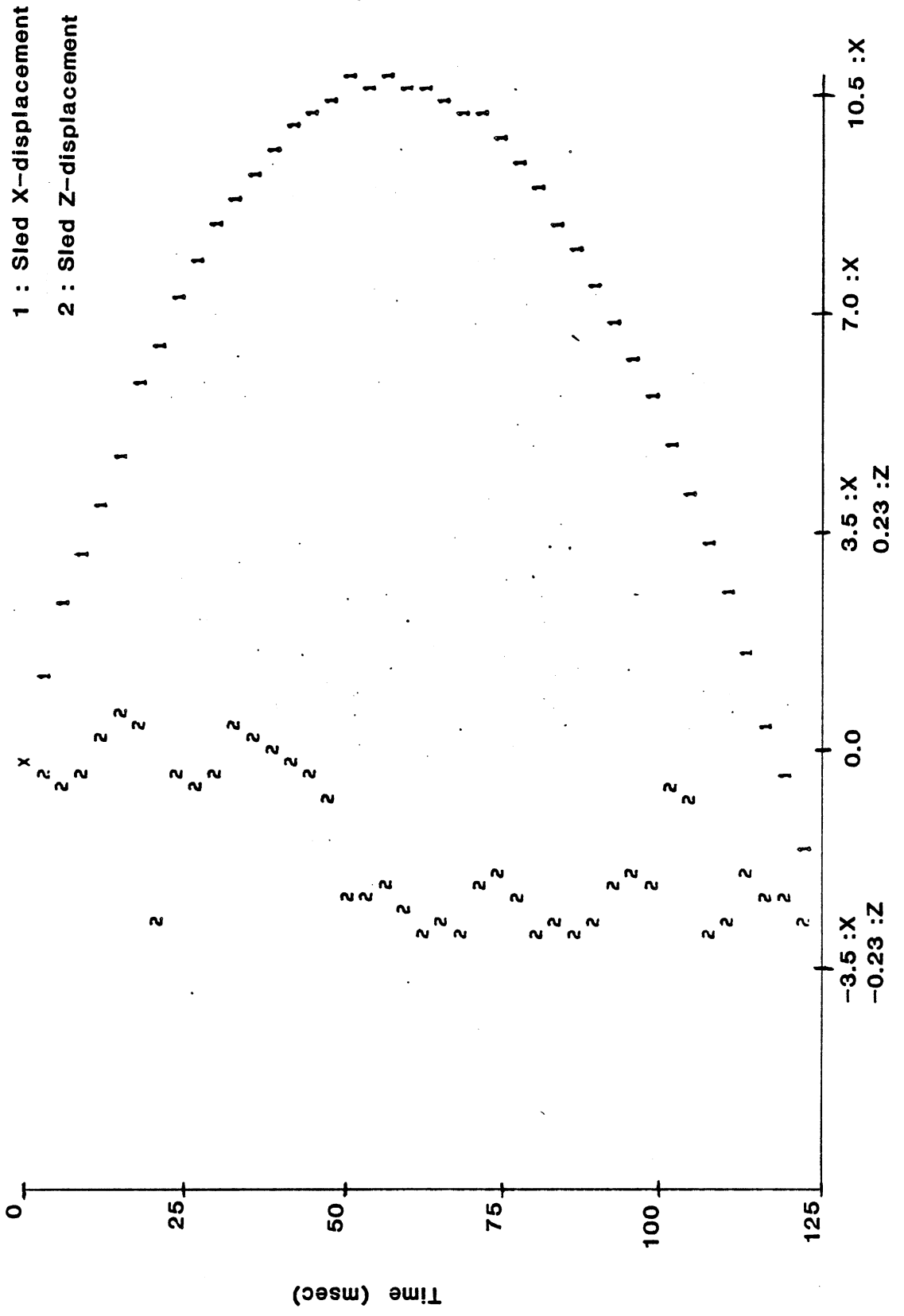


76T008

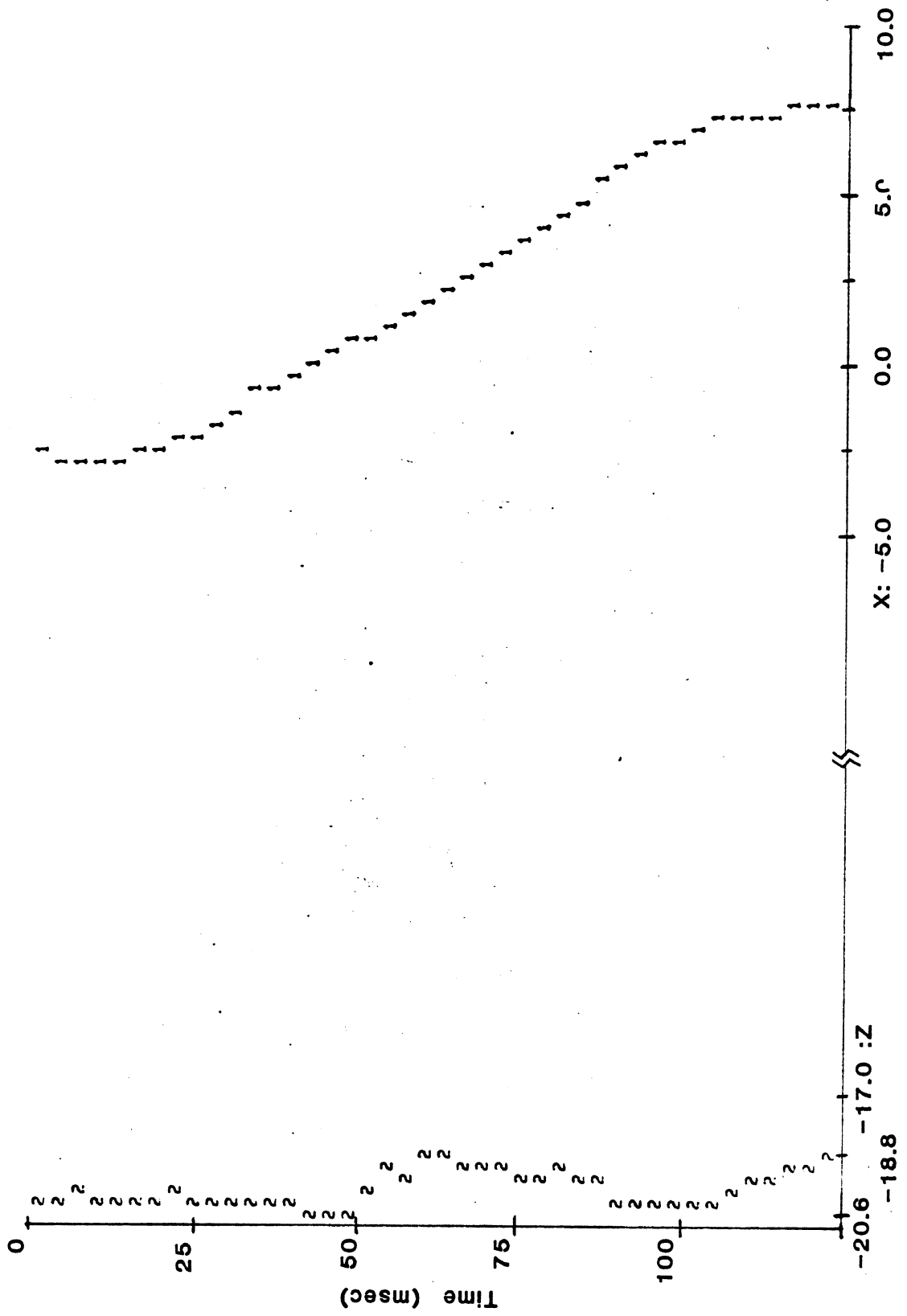
Legend

- x : X
- △ : Y
- : Z

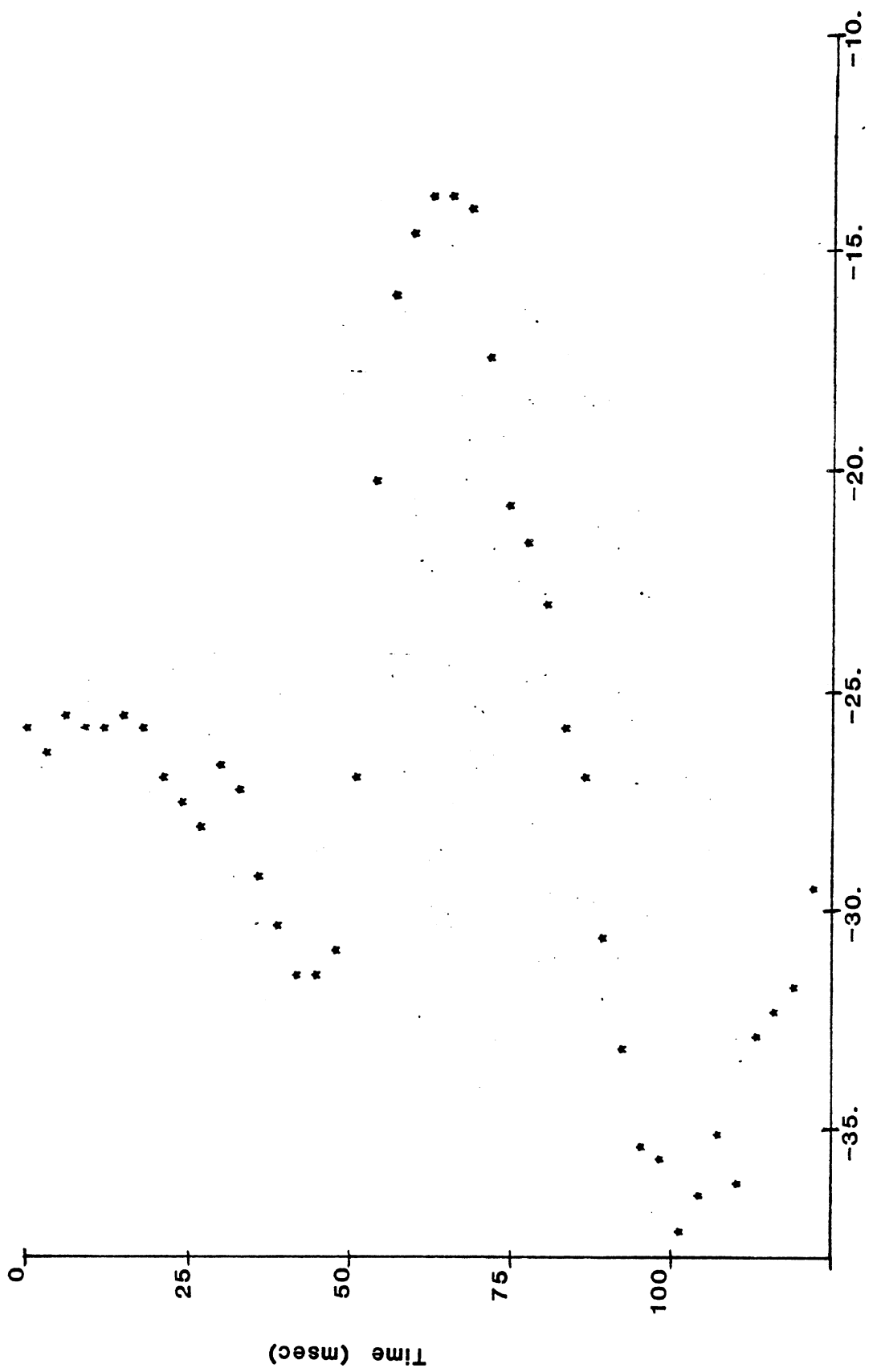




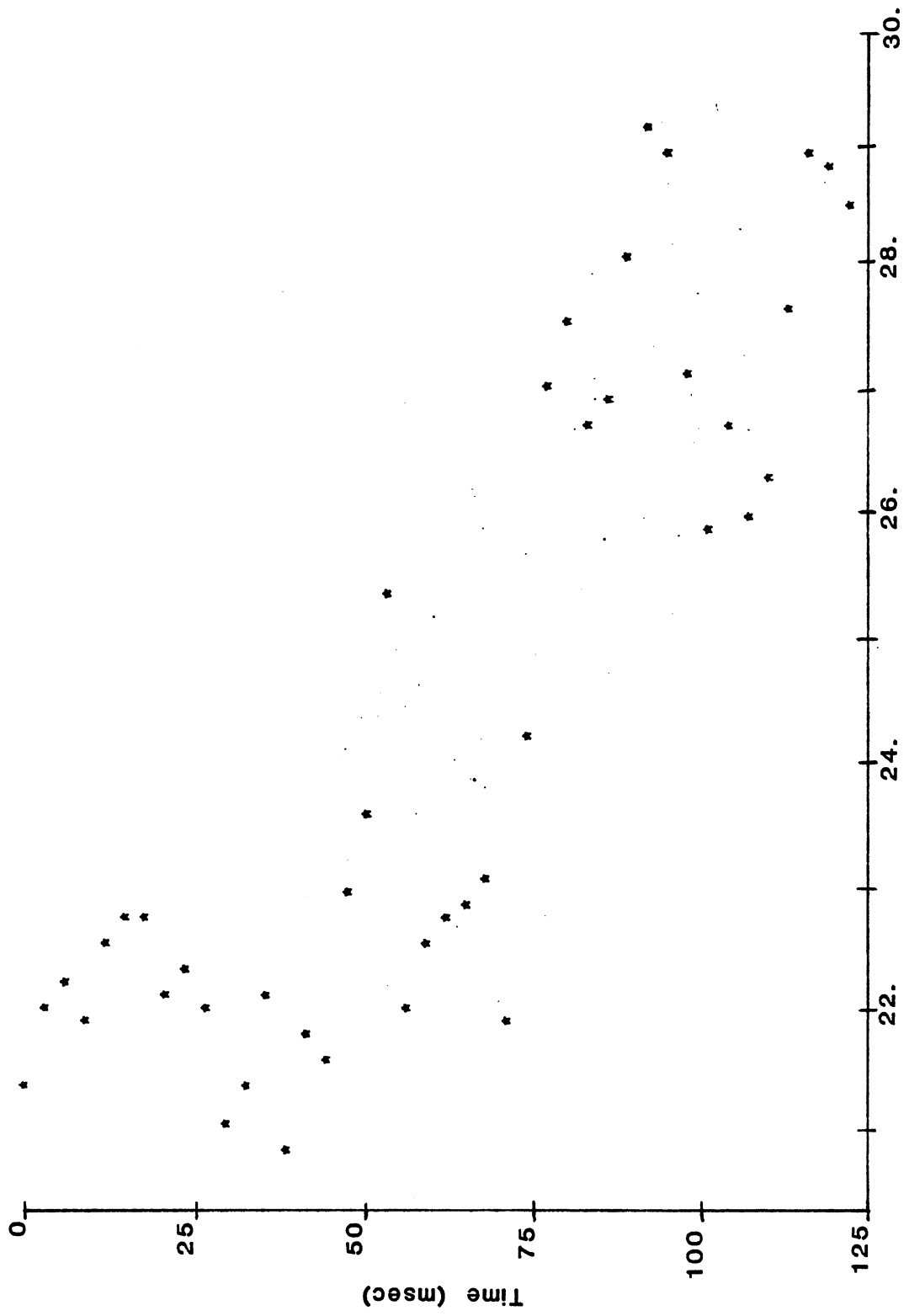
76T008 --- Sled displacement (inches)



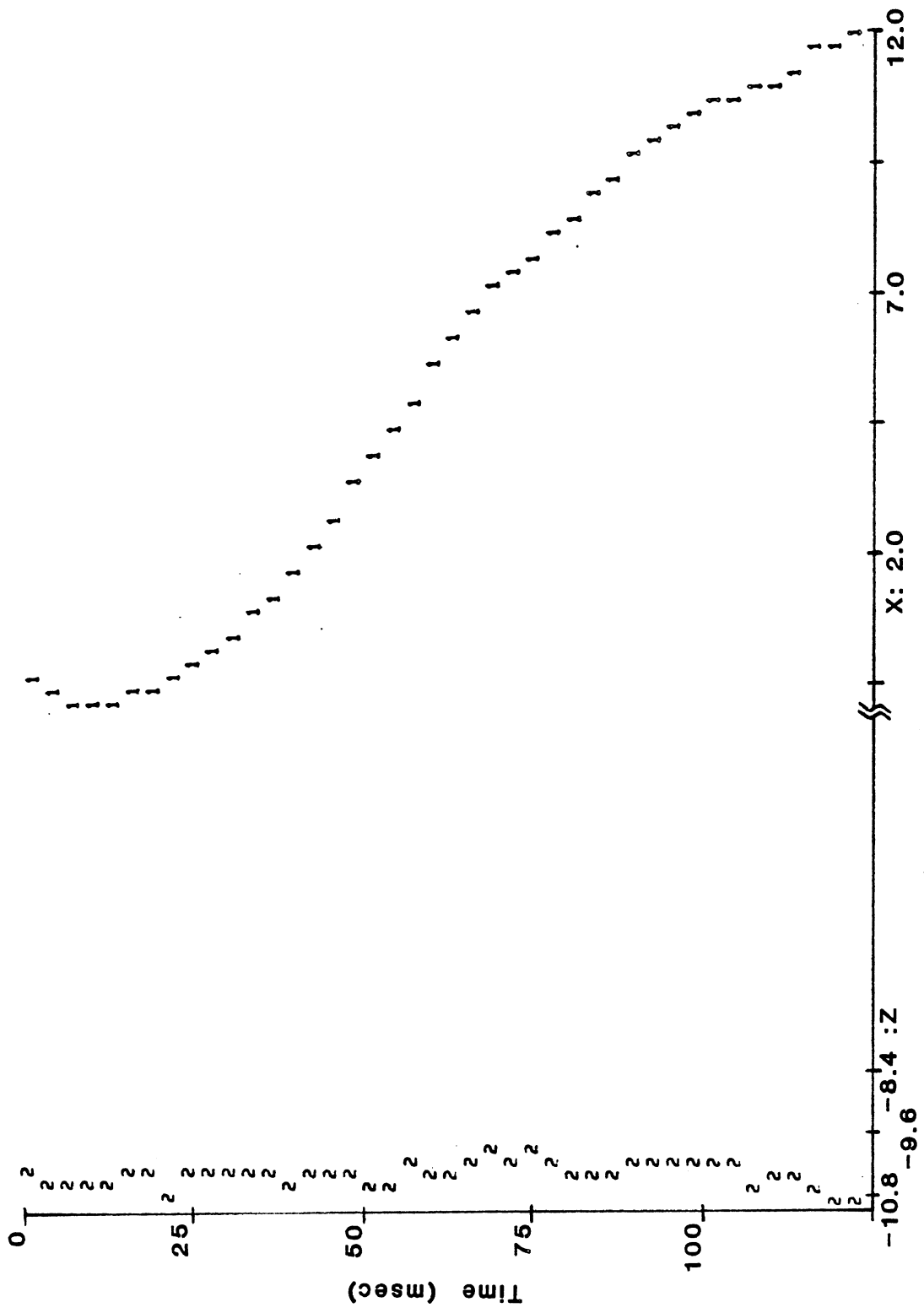
76T008 -- T-2 visual target center displacement (inches)



76T008 -- T-2 plane angle (degrees)

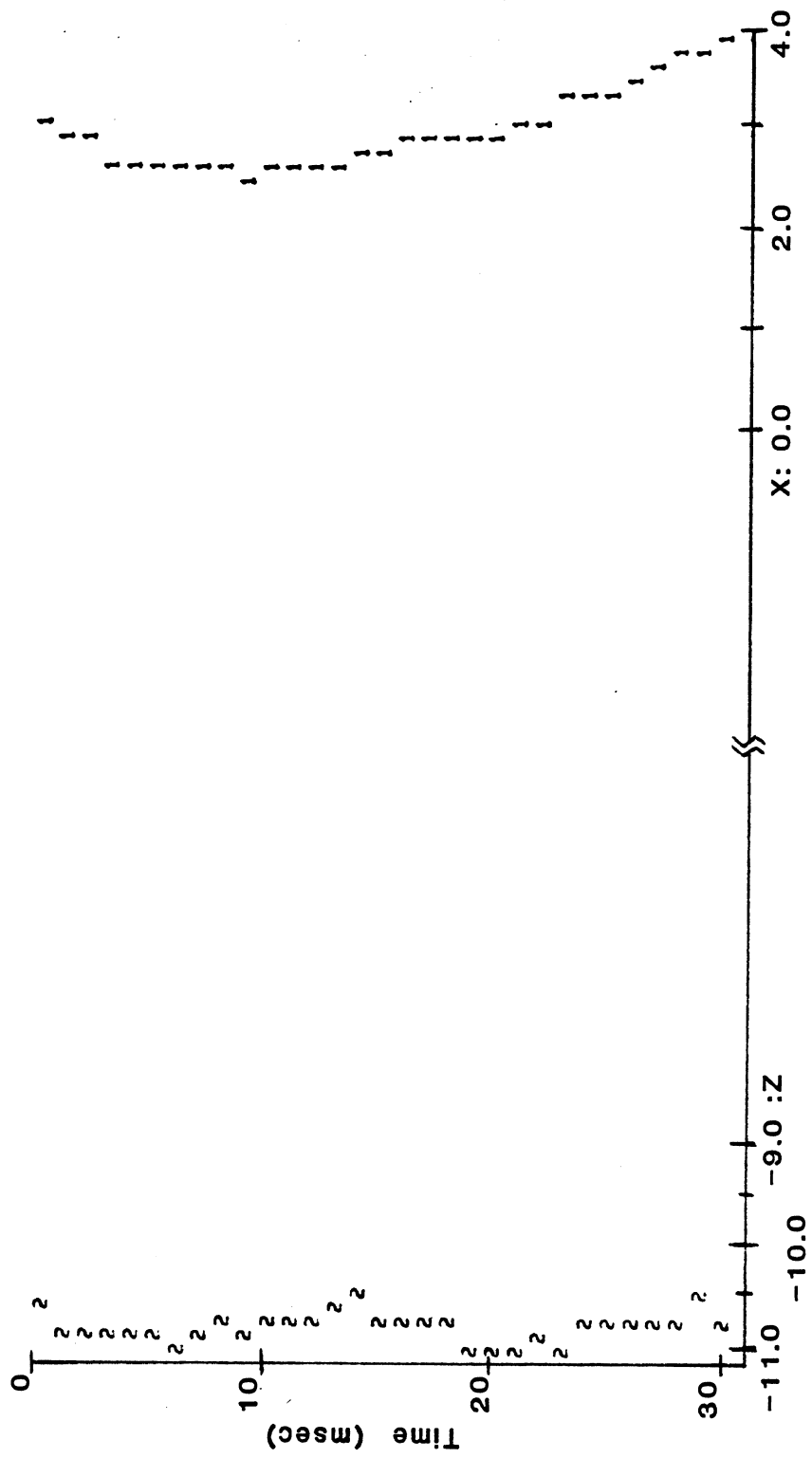


76T008 -- T-11 plane angle (degrees)

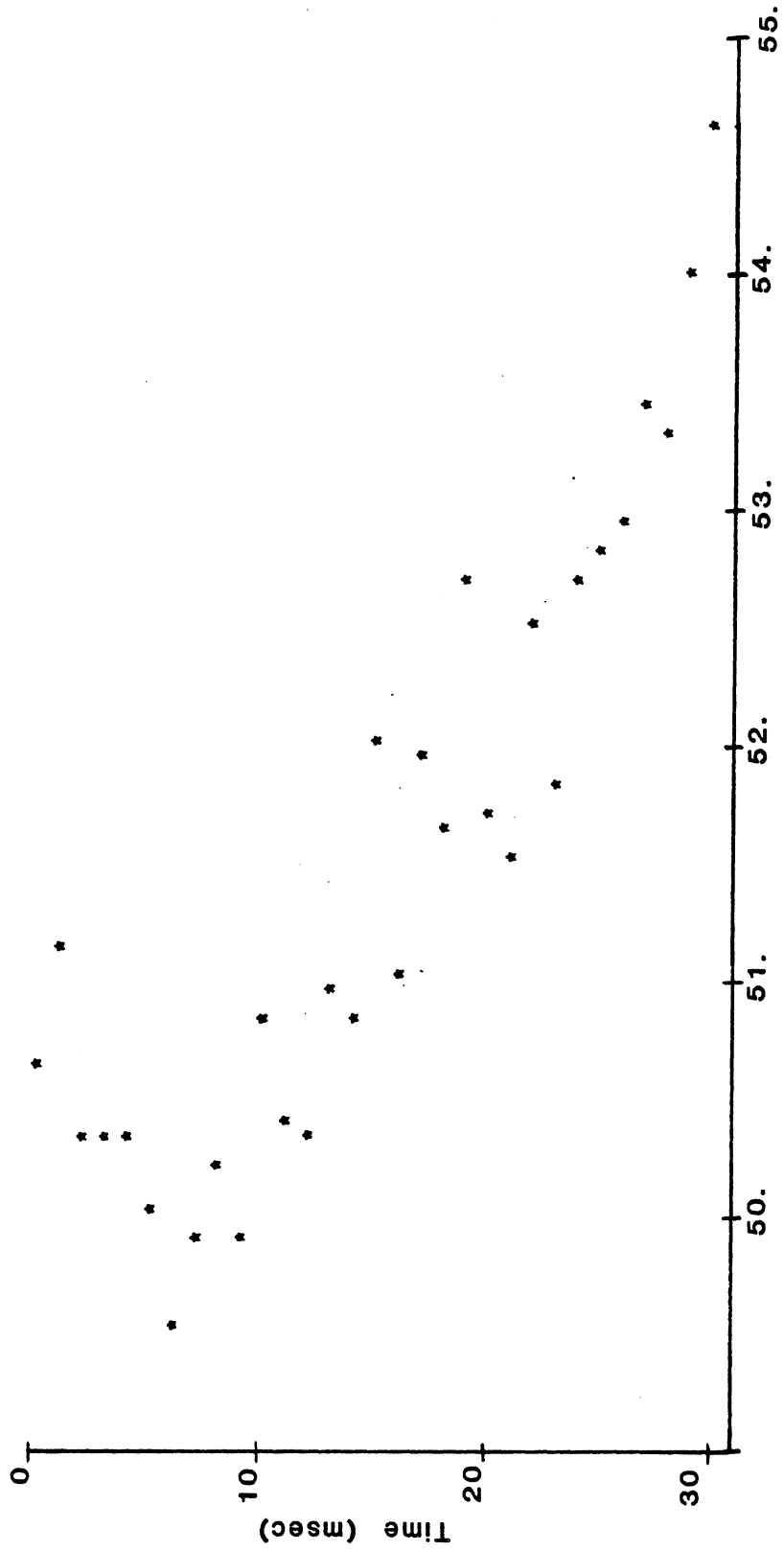


76T008 -- T-11 visual target center displacement (inches)





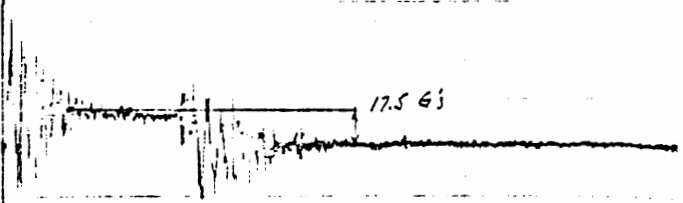
76T008 -- Right lower rib visual target displacement (inches)



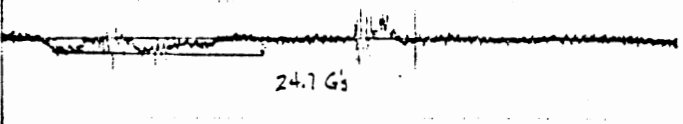
76T008 -- Right lower rib visual target angle (degrees)

TEST # 76 T 006

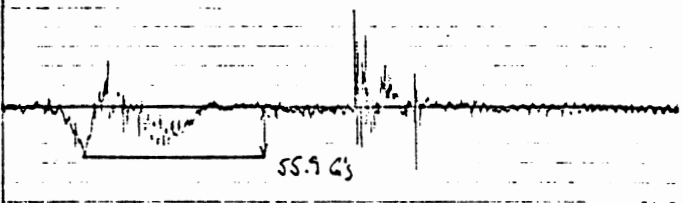
SLED DECELERATION PULSE



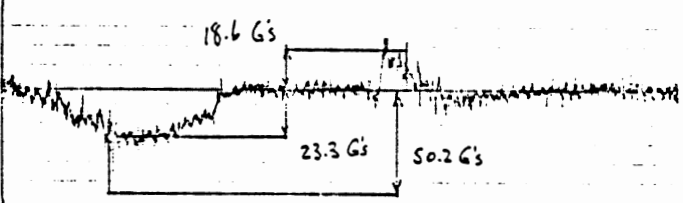
T<sub>1</sub> P-A ACCELEROMETER



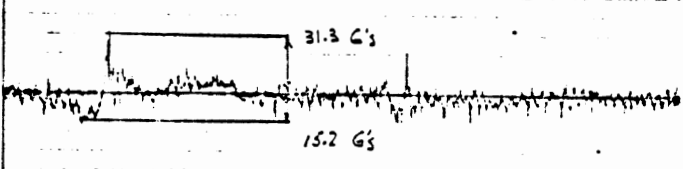
T<sub>1</sub> I-S ACCELEROMETER



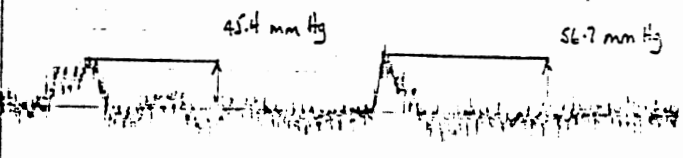
T<sub>12</sub> P-A ACCELEROMETER



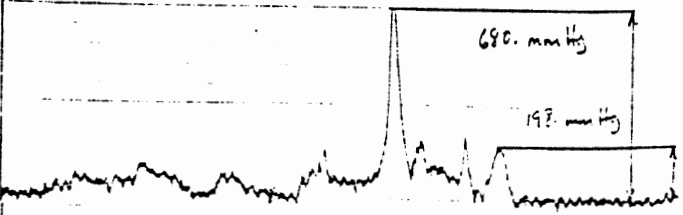
T<sub>12</sub> R-L ACCELEROMETER



AIRWAY PRESSURE



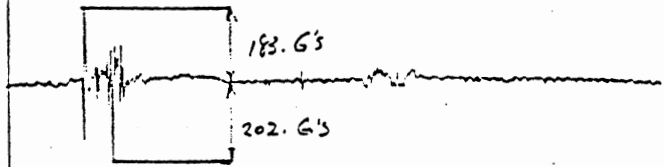
VASCULAR PRESSURE



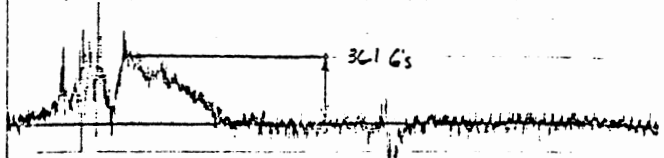
100 msec

TEST # 76 T 002

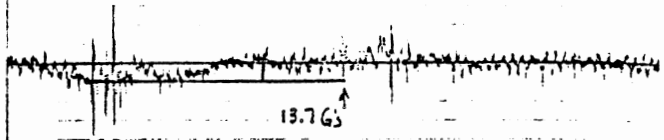
RIGHT UPPER RIB ACCELEROMETER



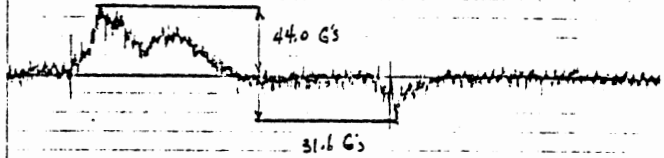
RIGHT LOWER RIB ACCELEROMETER



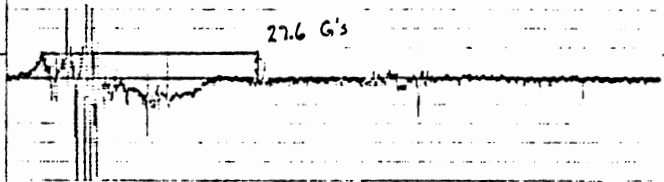
LEFT UPPER RIB ACCELEROMETER



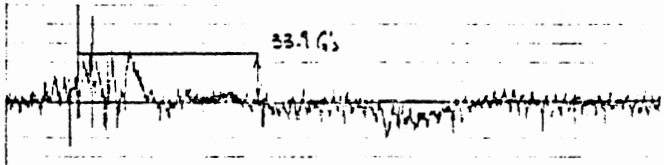
LEFT LOWER RIB ACCELEROMETER



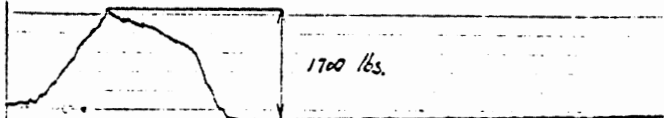
UPPER STERNAL ACCELEROMETER



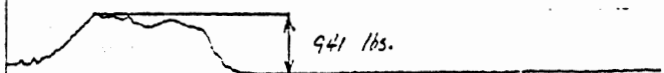
LOWER STERNAL ACCELEROMETER



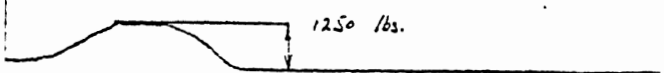
RIGHT LAP BELT LOAD



LEFT LAP BELT LOAD

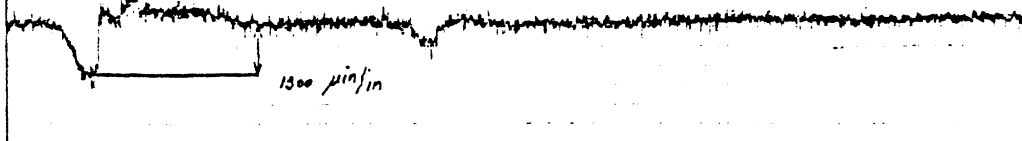


SHOULDER BELT LOAD



100 msec

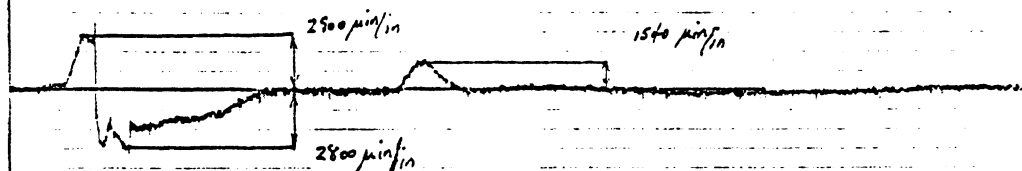
FRONT ROSETTE #1



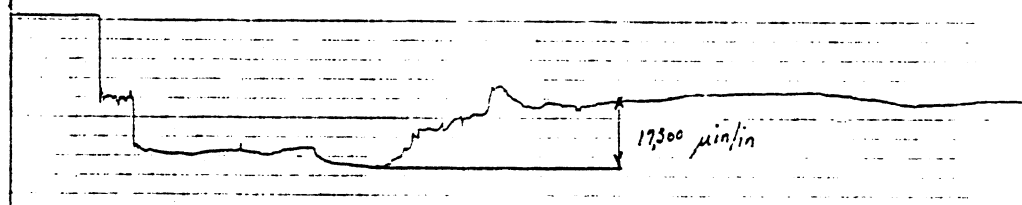
FRONT ROSETTE #2



FRONT ROSETTE #3



LATERAL ROSETTE #1



LATERAL ROSETTE #2

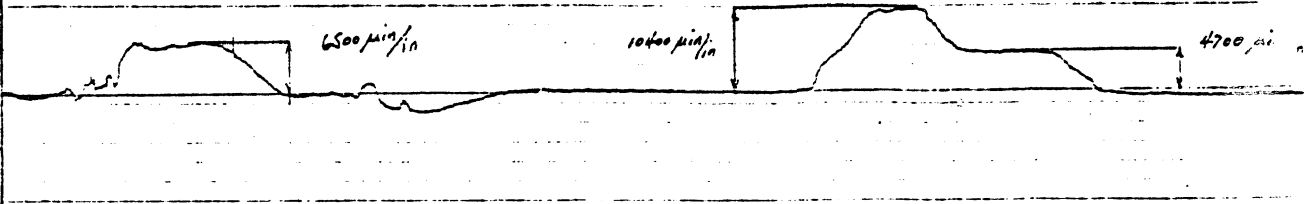


LATERAL ROSETTE #3

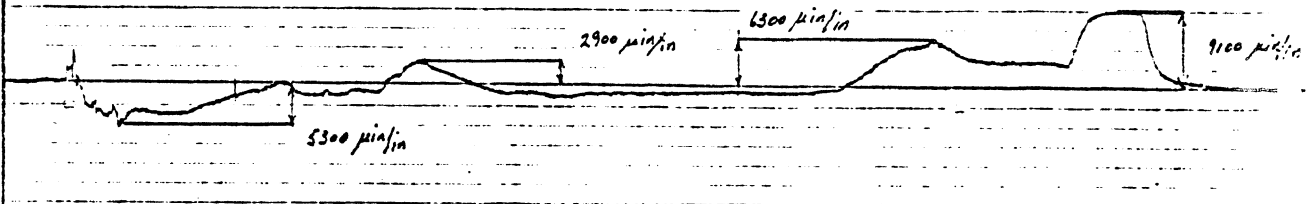


100 msec

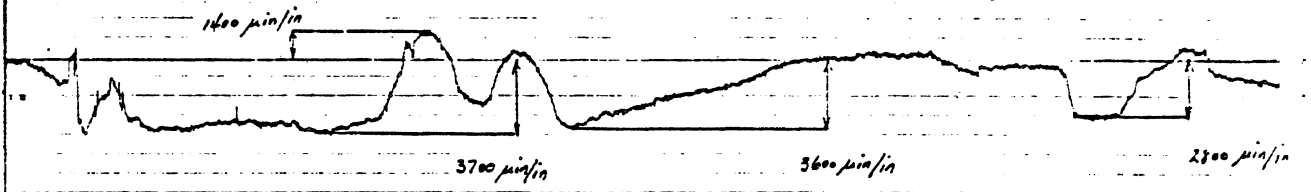
REAR ROSETTE #1



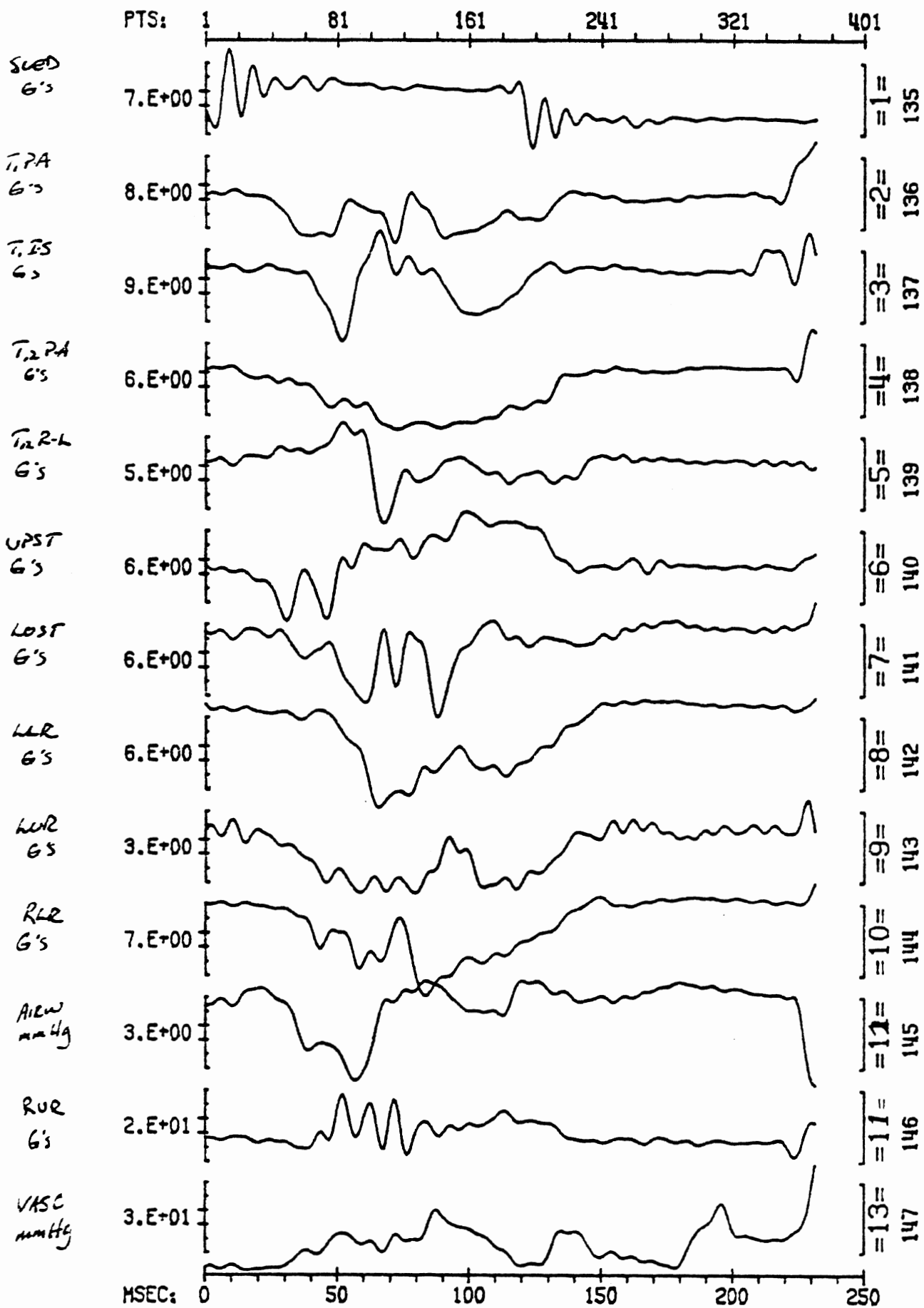
REAR ROSETTE #2



REAR ROSETTE #3



100 nsec



ID: 76T008-1:

TAPE: THOR.2

=====  
ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
RUN ID: 761008-11

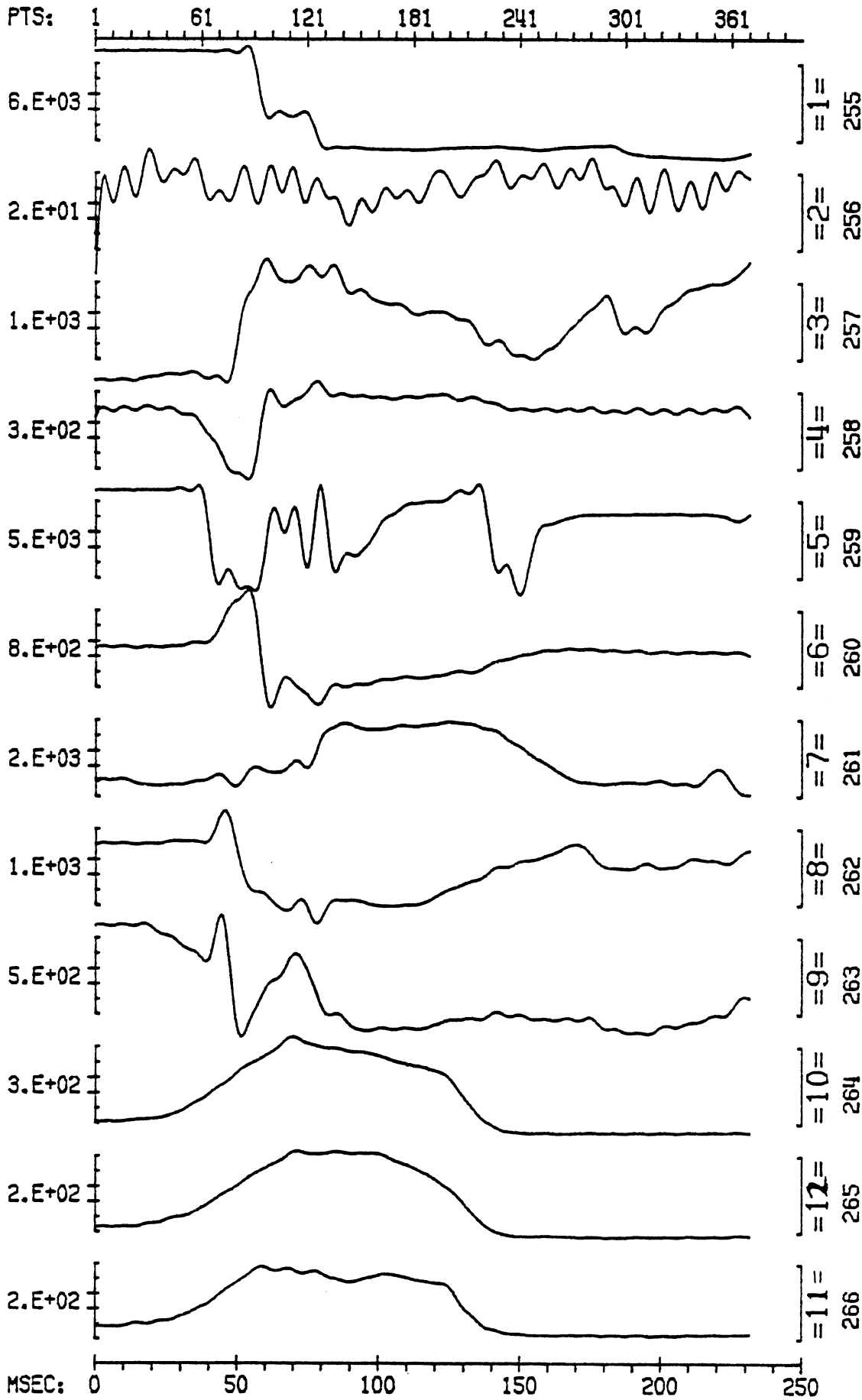
=====  
PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSRI#136 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76  
TEST SIGNALS: 1409 PTS/CH AT 6400.17 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
135	- 1:	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.8	371	1600.00
136	- 2:	T1 P-A ACCELEROMETER	344.00	G'S	4+1+ 3	100.8	371	1600.00
137	- 3:	T1 I-S ACCELEROMETER	207.00	G'S	4+1+ 3	100.8	371	1600.00
138	- 4:	T12 P-A ACCELEROMETER	186.00	G'S	4+1+ 3	100.8	371	1600.00
139	- 5:	T12 R-L ACCELEROMETER	-202.00	G'S	4+1+ 3	100.8	371	1600.00
140	- 6:	UPPER STERNAL ACCELEROMETER	-212.00	G'S	4+1+ 3	100.8	371	1600.00
141	- 7:	LOWER STERNAL ACCELEROMETER	-251.00	G'S	4+1+ 3	100.8	371	1600.00
142	- 8:	LEFT LOWER RIB ACCELEROMETER	-250.00	G'S	4+1+ 3	100.8	371	1600.00
143	- 9:	LEFT UPPER RIB ACCELEROMETER	274.00	G'S	4+1+ 3	100.8	371	1600.00
144	- 10:	RIGHT LOWR RIB ACCELEROMETER	-206.00	G'S	4+1+ 3	100.8	371	1600.00
145	- 11:	RIGHT UPPR RIB ACCELEROMETER	-193.00	G'S	4+1+ 3	100.8	371	1600.00
146	- 12:	AIRWAY PRESSURE	376.00	MM-HG	4+1+ 3	100.8	371	1600.00
147	- 13:	VASCULAR PRESSURE	708.00	MM-HG	4+1+ 3	100.8	371	1600.00

=====  
FILTERED FILES: 135 - 147 DIGITAL TAPE; JEFF DATE: 16-DEC-76 RUN ID: 761008-11  
=====





ID: 76T008-2:

ID:

TAPE: THOR.2

=====  
RUN ID: 761008-21

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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=====  
DATE: 25-OCT-76

PROJECT: THORACIC IMPACT PROJECT; FRONTAL IMPACT TEST SERIES

ANALOG TAPE: HSR1#141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; MS0018

TEST SIGNALS: 1488 PTS/CH AT 6397.25 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
255	- 1:	SIDE ROSETTE GAGE #1	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
256	- 2:	SIDE ROSETTE GAGE #2	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
257	- 3:	SIDE ROSETTE GAGE #3	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
258	- 4:	FRONT ROSETTE GAGE #1	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
259	- 5:	FRONT ROSETTE GAGE #2	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
260	- 6:	FRONT ROSETTE GAGE #3	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
261	- 7:	REAR ROSETTE GAGE #1	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
262	- 8:	REAR ROSETTE GAGE #2	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
263	- 9:	REAR ROSETTE GAGE #3	9629.00	UIN/IN	4+1+3	100.0	371	1599.31
264	- 10:	RIGHT LAP BELT LOAD	1176.00	LBS.	4+1+3	100.0	371	1599.31
265	- 11:	LEFT LAP BELT LOAD	1176.00	LBS.	4+1+3	100.0	371	1599.31
266	- 12:	SHOULDER BELT LOAD	1190.00	LBS.	4+1+3	100.0	371	1599.31

13:

14:

-----  
FILTERED FILES: 255 - 266 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: 761008-21  
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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NO.: 76T009

TEST DATE: April 6, 1976

TEST SUBJECT:

Age: 75

Sex: Female

Stature: 155.5 cm.

Weight: 44.1 kg.

RESTRAINT SYSTEM

None: Lateral impact into rigid flat surface

VELOCITY:

Closing velocity between subject and surface = 25.8 mph.

INJURIES:

Massive depressed skull fractures and extensive hemorrhaging in skin, scalp, muscle, dura.

Thoracic skeleton - 15 fractures left front. 11 fractures left rear. 13 fractures right front. 2 fractures right rear.

7 cm. tear of right lung with free blood.

2 cm. tear of right pulmonary artery.

Crushed left kidney.

Cervical spine fractures at C1 and C2.

Left pelvis iliac crushed very severely with soft tissue damage.

76T009 (continued)

AIS NUMBER ESTIMATES:

Thorax - 5

Head - 6

Neck - 6

Abdomen - 5

Pelvis - 3

TEST # 76T009

TEST DATE 4.6.76

TEST DESCRIPTION Rigid Barrier Side Sled Impact VELOCITY 37.8 ft/s

SUBJECT:

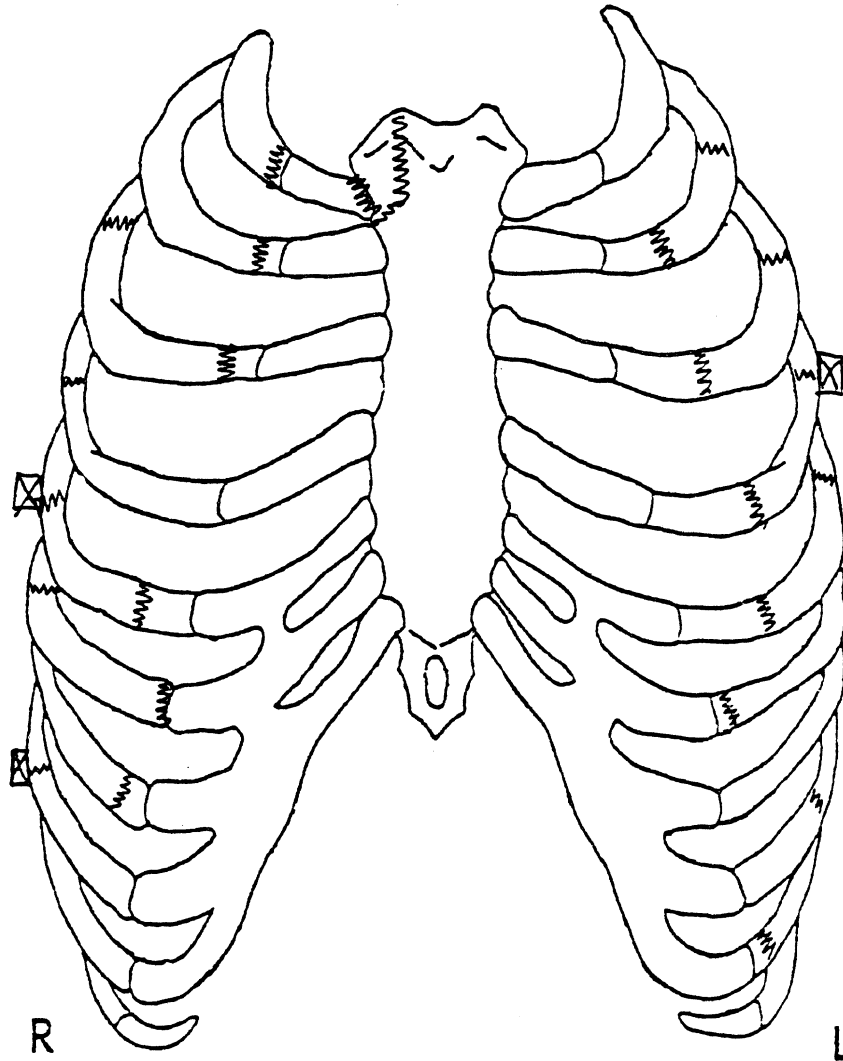
AGE 75 SEX F CAUSE OF DEATH Congestive Heart Failure

INJURY INFORMATION:

OVERALL THORACIC AIS 5

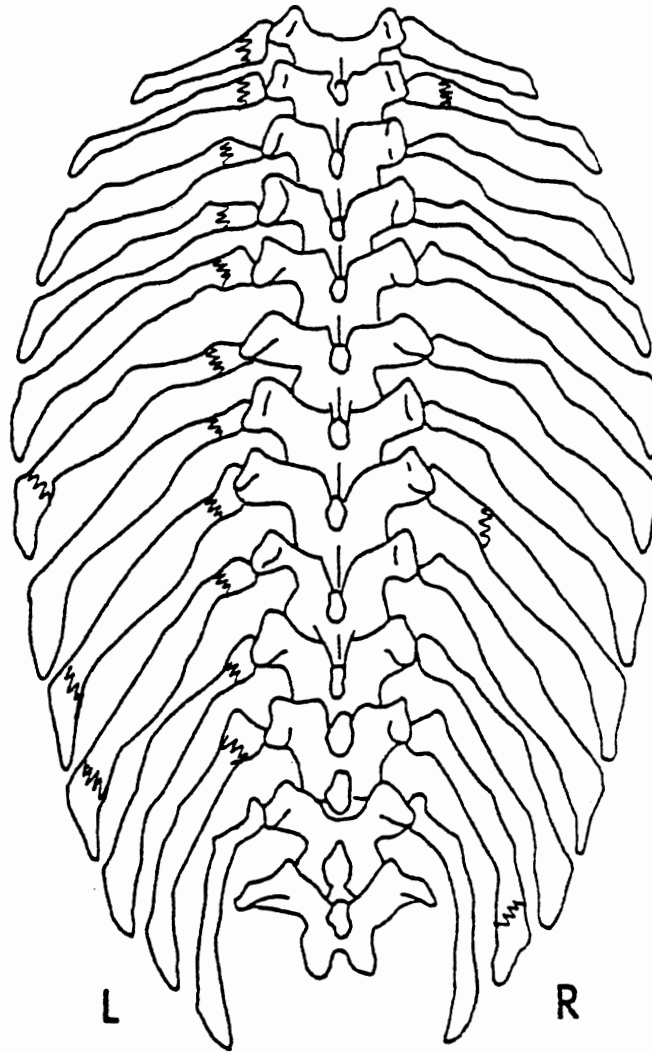
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>L</u>	<u>P</u>	<u>5</u>
	2	<u>C</u>	<u>C</u>	<u>L</u>	<u>A</u>	<u>5</u>
	3	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	4	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	<u>C</u>	<u>L</u>	<u>H</u>	<u>P</u>	<u>3</u>
	6	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	7	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	8	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>D</u>	<u>V</u>	<u>6</u>
	2	<u>H</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>6</u>
	3	<u>M</u>	<u>L</u>	<u>R</u>	<u>K</u>	<u>5</u>
	4	<u>P</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>3</u>
	5	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>

TEST # 767009



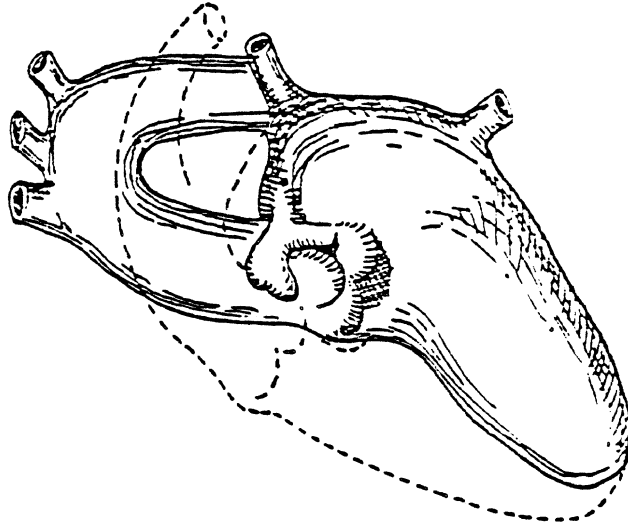
ANTERIOR VIEW RIB CAGE (In addition,  
• fracture dislocation through C<sub>1</sub> & C<sub>2</sub>  
• massive, bilateral "eggshell"  
skull fractures  
• left kidney crushed  
• severe, comminuted left  
iliac crest fracture)

TEST # 76T009

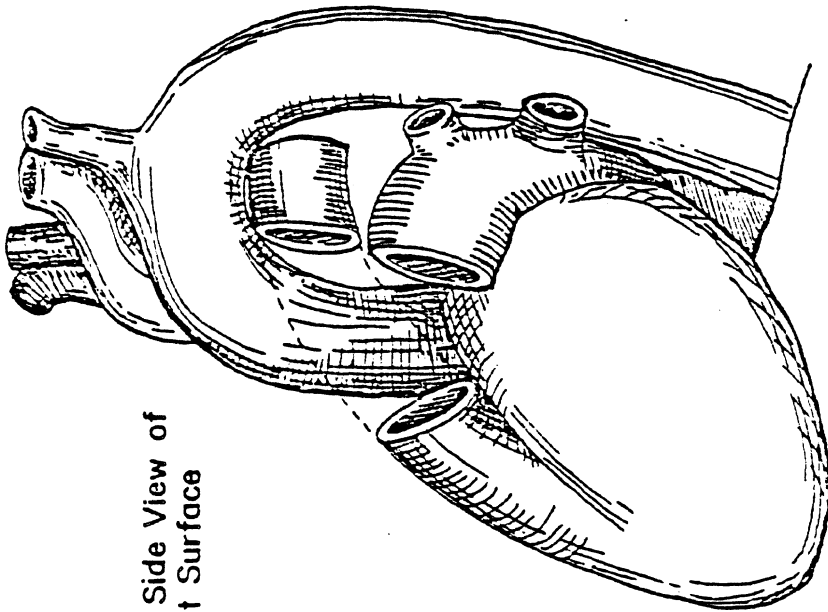


POSTERIOR VIEW RIB CAGE

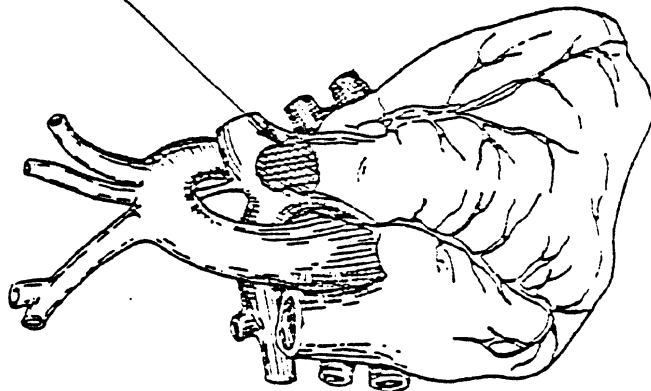
Left View of Left Side of Heart



Left Side View of Heart Surface



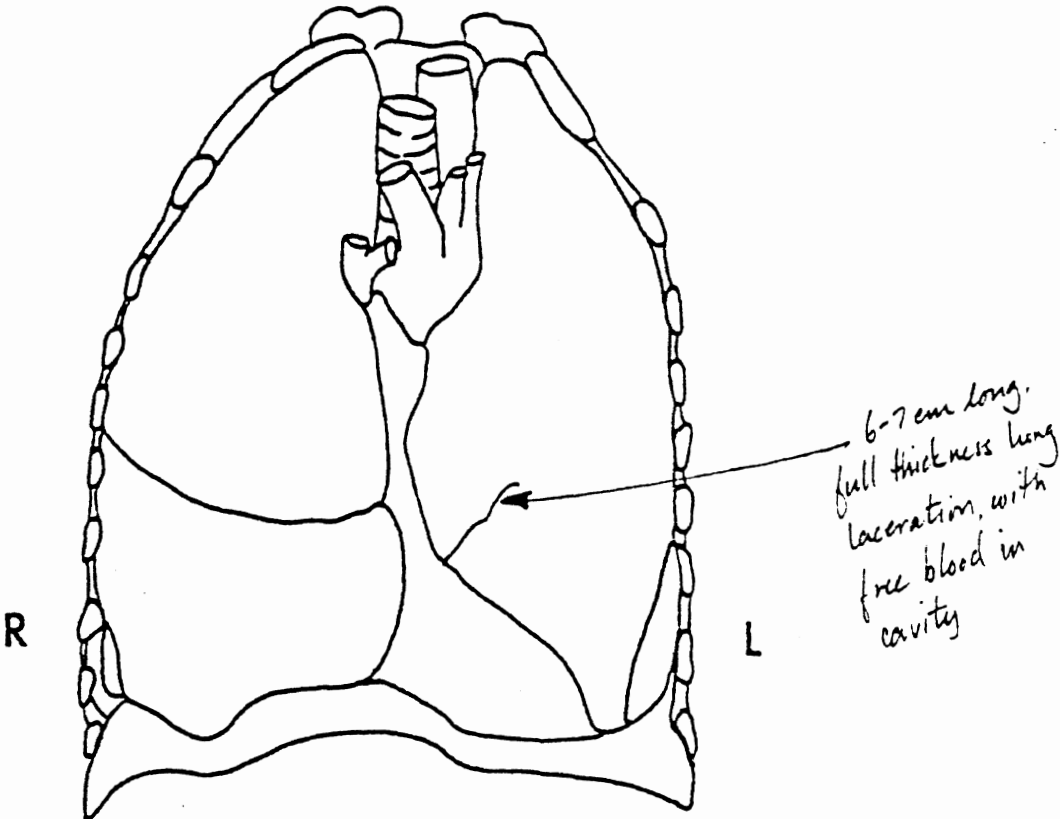
2x2 cm  
bar in  
pulmonary  
artery



Anterior View of Heart



TEST # 767009



ANTERIOR VIEW THORACIC CAVITY

TEST NO. 76 T 009

SLED DECELERATION PULSE

52.5 G's

UPPER STERNAL ACCELEROMETER

167. G's

LOWER STERNAL ACCELEROMETER

329. G's

262. G's

RIGHT UPPER RIB ACCELEROMETER

129. G's

426. G's

RIGHT LOWER RIB ACCELEROMETER

277. G's

55.4 G's

LEFT UPPER RIB ACCELEROMETER

916. G's

125. G's

LEFT LOWER RIB ACCELEROMETER

104. G's

215. G's

100 msec

TEST NO. 75 T 099

T<sub>1</sub> P-A ACCELEROMETER

155.6 G's

T<sub>1</sub> I-S ACCELEROMETER

152.6 G's

46.3 G's

44.1 G's

T<sub>12</sub> P-A ACCELEROMETER

258.6 G's

50.3 G's

T<sub>12</sub> R-L ACCELEROMETER

309.6 G's

AIRWAY PRESSURE

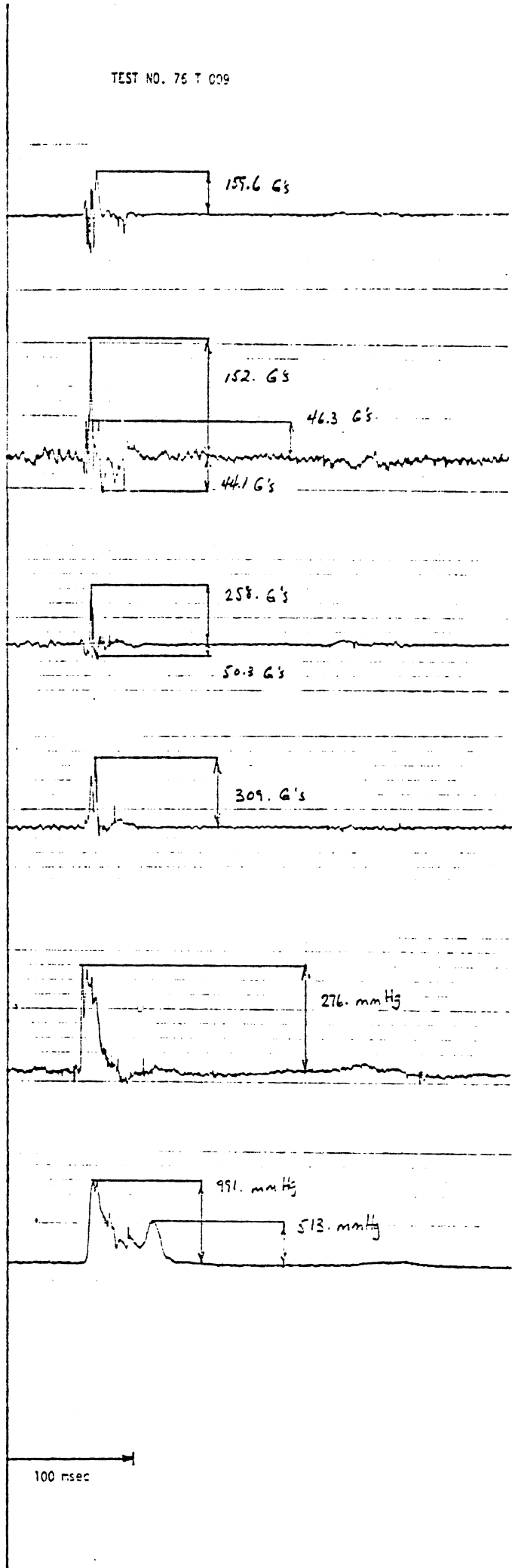
276. mmHg

VASCULAR PRESSURE

991. mmHg

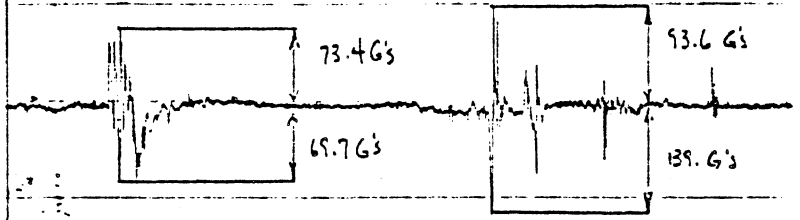
513. mmHg

100 msec

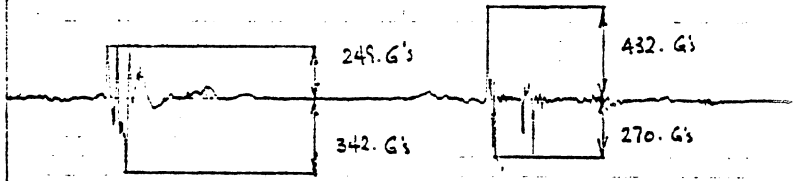


TEST NO. 76 T 009

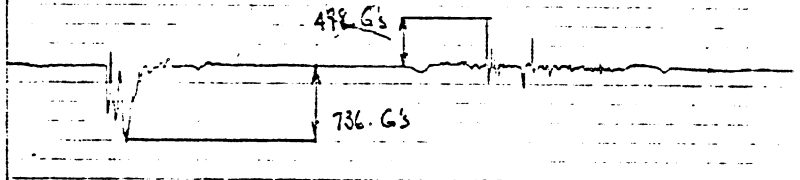
PELVIS P-A ACCELEROMETER



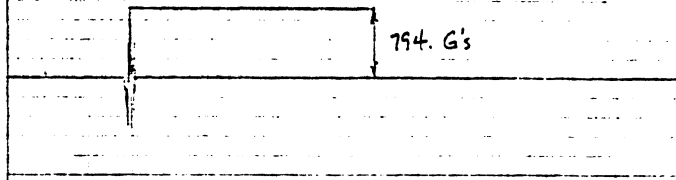
PELVIS I-S ACCELEROMETER



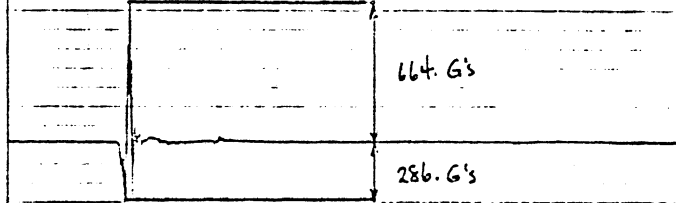
PELVIS R-L ACCELEROMETER



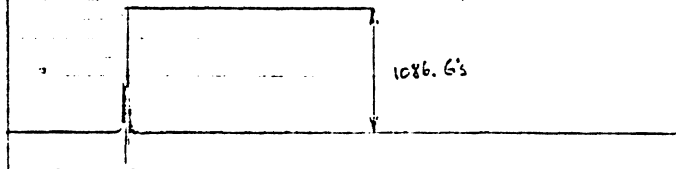
HEAD P-A ACCELEROMETER



HEAD I-S ACCELEROMETER



HEAD R-L ACCELEROMETER



100 msec

100

PTS: 1 301 601 901 1201 1501

SLED

6.E+00

=1=  
308

UPST

2.E+01

=2=  
309

WOST

5.E+01

=3=  
310

LLR

2.E+01

=4=  
311

LUR

7.E+01

=5=  
312

RLR

2.E+01

=6=  
313

RUR

2.E+01

=7=  
314

P1 P-A

2.E+01

=8=  
315

P1 I-S

2.E+01

=9=  
316

P2 P-A

2.E+01

=10=  
317

VEL

8.E+00

=11=  
318

MSEC: 0 200 400 600 800 1000

ID: 76T009-1:55

TAPE: THOR.2

\*\*\*\*\*  
RUN ID: 76T009-1188

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

\*\*\*\*\*

PROJECT: THORAX IMPACT PROJECT--

ANALOG TAPE: HSRI-140 EXPANDED 16ii, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 3517 PTS/CH AT 6309.23 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
308	1	8LED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	836	1577.31
309	2	UPPER STERNAL ACCELEROMETER	-163.00	G'S	4+1+3	99.4	836	1577.31
310	3	LOWER STERNAL ACCELEROMETER	-198.00	G'S	4+1+3	99.4	836	1577.31
311	4	LEFT LOWER RIB ACCELEROMETER	-282.00	G'S	4+1+3	99.4	836	1577.31
312	5	LEFT UPPER RIB ACCELEROMETER	-242.00	G'S	4+1+3	99.4	836	1577.31
313	6	RIGHT LOWER RIB ACCELEROMETER	-218.00	G'S	4+1+3	99.4	836	1577.31
314	7	RIGHT UPPER RIB ACCELEROMETER	238.00	G'S	4+1+3	99.4	836	1577.31
315	8	T1 P-A ACCELEROMETER	248.00	G'S	4+1+3	99.4	836	1577.31
316	9	T1 I-S ACCELEROMETER	-213.00	G'S	4+1+3	99.4	836	1577.31
317	10	T12 P-A ACCELEROMETER	291.00	G'S	4+1+3	99.4	836	1577.31
318	11	T12 R-L ACCELEROMETER	-209.00	G'S	4+1+3	99.4	836	1577.31

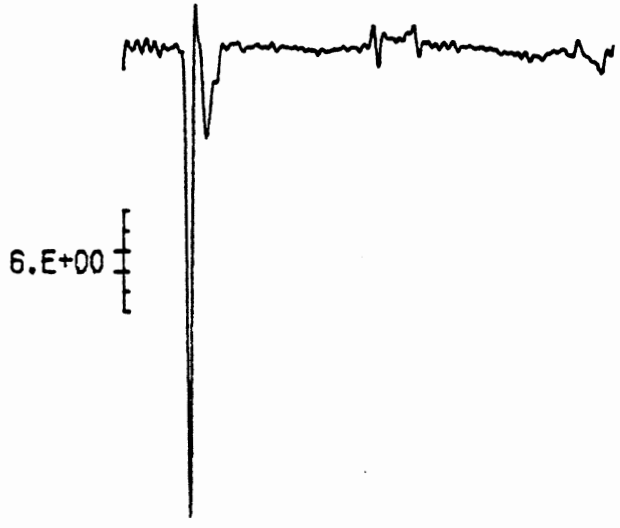
12i  
13i  
14i

\*\*\*\*\*  
FILTERED FILES: 308 - 318 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T009-1188

PTS: 1 301 601 901 1201 1501

ID: 76T009-1:SS

*T<sub>12</sub>R<sub>12</sub>*



12=  
847

MSEC: 0 200 400 600 800 1000

TAPE: THOR.2A

\*\*\*\*\*  
RUN ID: 76T009-1188  
\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
-----

PROJECT: THORAX IMPACT PROJECT--

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77  
TEST SIGNALS: 3517 PTS/CH AT 6309.23 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:

847	12	T12 R-L ACCELEROMETER	-209.00	G'S	4+1+ 3	99.4	836	1577.31
	13:							
	14:							

-----  
FILTERED FILES: 847 - 847 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T009-1188  
-----



PTS: 1 101 201 301 401 501 601 701

SLED

4.E+00



=1=  
615

VASC  
(monthly)

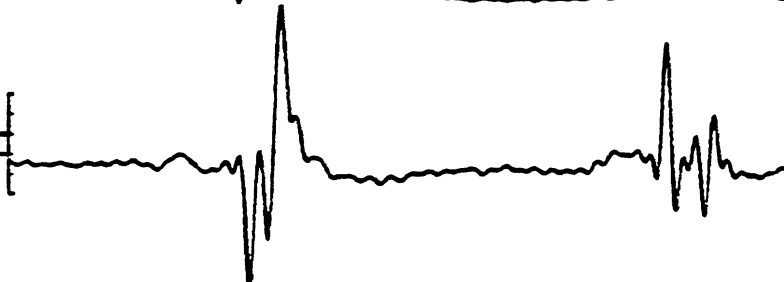
7.E+01



=2=  
616

PP-A

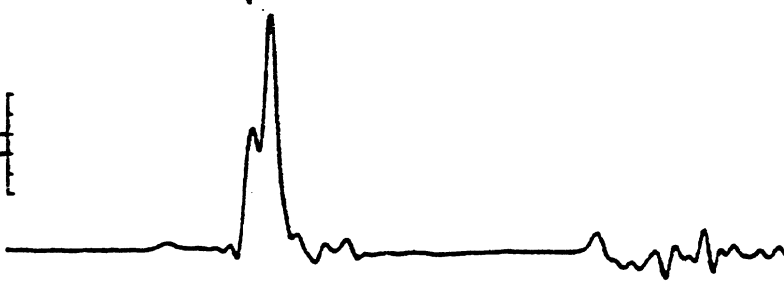
6.E+00



=6=  
617

PI-S

5.E+01



=7=  
618

PR-L

2.E+01



=8=  
619

APW  
(monthly)

2.E+01



=9=  
620

MSEC: 0 100 200 300 400 500

76T009-2:55

ID:

TAPE: THOR.2

\*\*\*\*\*  
 RUN ID: 76T009-2188  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 \*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HBRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2664 PTS/CH AT 6309.06 HZ; CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
615	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	663	1577.26
616	2	VASCULAR PRESSURE	700.00	G'S	4+1+3	99.4	663	1577.26
3								
4								
5								
617	6	PELVIC P-A ACCELEROMETER	-104.00	G'S	4+1+3	99.4	663	1577.26
618	7	PELVIC R-L ACCELEROMETER	-199.00	G'S	4+1+3	99.4	663	1577.26
619	8	PELVIC I-S ACCELEROMETER	-233.00	G'S	4+1+3	99.4	663	1577.26
620	9	AIRWAY PRESSURE	367.00	MM-HG	4+1+3	99.4	663	1577.26

10  
11  
12  
13  
14

\*\*\*\*\*  
 FILTERED FILE: 615 - 620 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T009-2188  
 \*\*\*\*\*

SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NO.: 76T010

TEST DATE: April 15, 1976

TEST SUBJECT:

Age - 84

Sex - Male

Stature - 162.2 cm.

Weight - 87.8 kg.

RESTRAINT SYSTEM:

None: Lateral impact into rigid flat surface.

VELOCITY:

19.6 mph

INJURIES:

Brain - Bruising at base of frontal lobe (10 x 5 cm). Superficial.

Rib Cage - Right side - 1, 2, 3, 4, 5 in front. Left side - 1-8  
in front, 3 and 4 in back.

AIS NUMBER ESTIMATE:

Brain - 5

Thorax - 4

TEST # 76T010

TEST DATE 4-15-76

TEST DESCRIPTION Rigid Barrier Slad Impact VELOCITY 28.8 ft/s

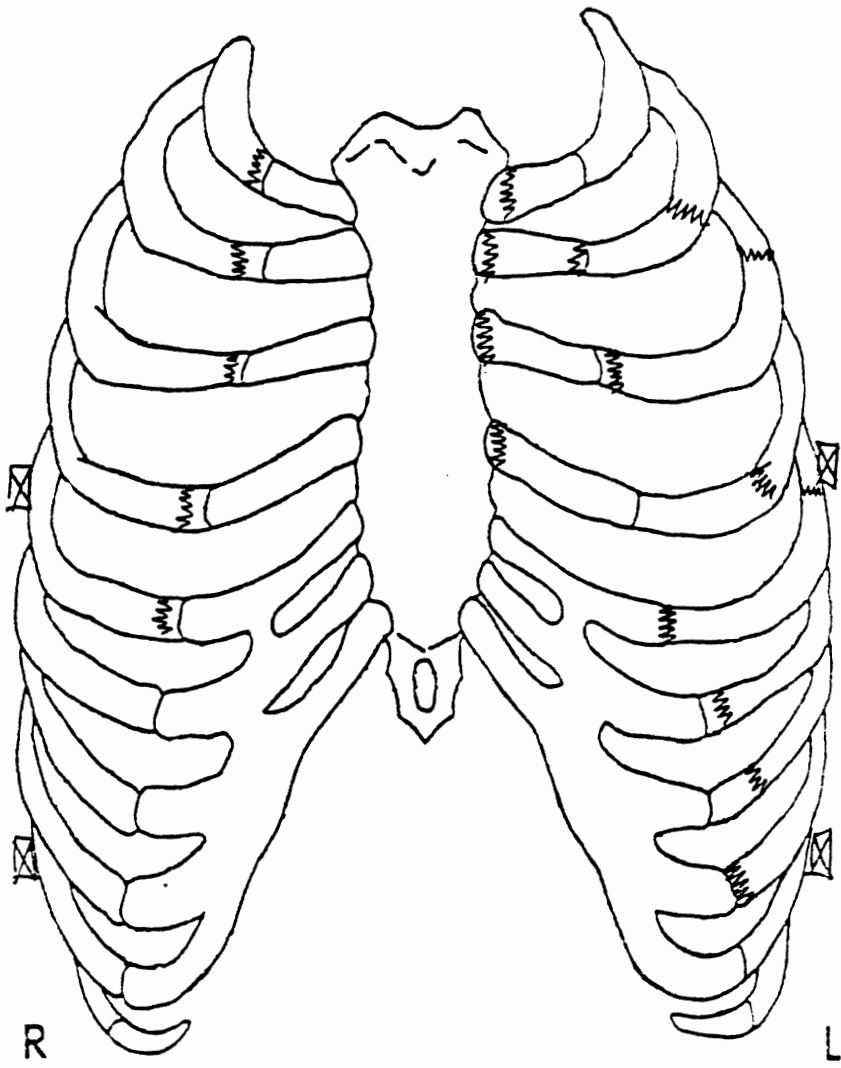
SUBJECT:

AGE 84 SEX M CAUSE OF DEATH Myocardial Infarction

INJURY INFORMATION: OVERALL THORACIC AIS 4

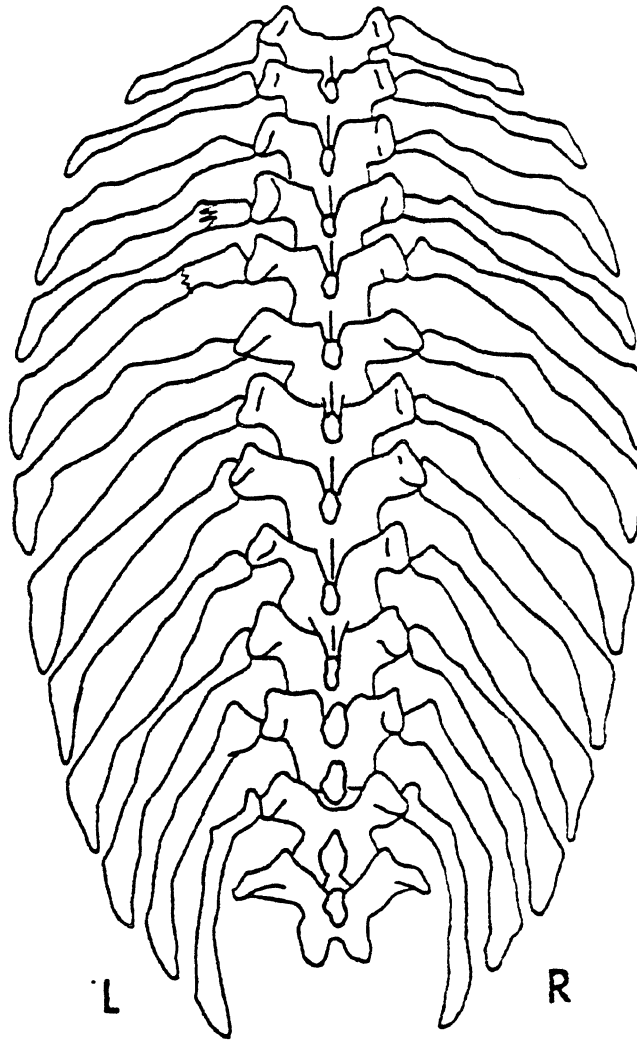
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	—	—	—	—	—
	3	—	—	—	—	—
	4	—	—	—	—	—
	5	—	—	—	—	—
	6	—	—	—	—	—
	7	—	—	—	—	—
	8	—	—	—	—	—
MAJOR NON-THORACIC INJURIES NOTED	1	<u>H</u>	<u>S</u>	<u>C</u>	<u>B</u>	<u>5</u>
	2	—	—	—	—	—
	3	—	—	—	—	—
	4	—	—	—	—	—
	5	—	—	—	—	—

TEST # 76T010



ANTERIOR VIEW RIB CAGE

TEST # 76T010



POSTERIOR VIEW RIB CAGE

(no thoracic organ  
injuries, but,  
bruising at base of  
frontal lobe, shallow,  
10x5 cm in extent)

TEST NO. 76 T 010

SLED DECELERATION PULSE

33.0 G's

UPPER STERNAL ACCELEROMETER

166. G's

LOWER STERNAL ACCELEROMETER

25.8 G's

103.1 G's

RIGHT UPPER RIB ACCELEROMETER

112.4 G's

57.3 G's

182. G's (actual spike value)

RIGHT LOWER RIB ACCELEROMETER

27.3 G's

106.7 G's

LEFT UPPER RIB ACCELEROMETER

415. G's

163. G's

314. G's

LEFT LOWER RIB ACCELEROMETER

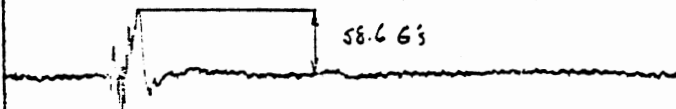
158. G's

199. G's

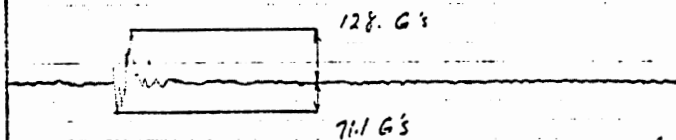
100 msec

TEST NO. 76 T 010

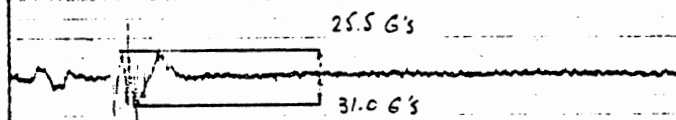
T<sub>1</sub> P-A ACCELEROMETER



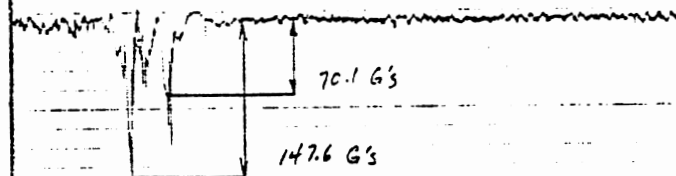
T<sub>1</sub> I-S ACCELEROMETER



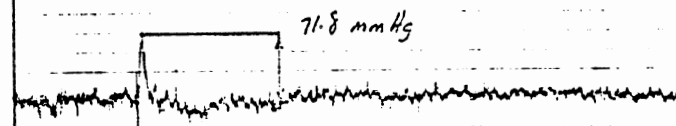
T<sub>12</sub> P-A ACCELEROMETER



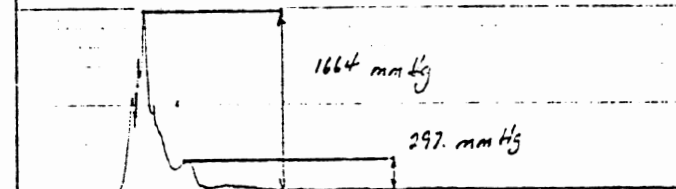
T<sub>12</sub> R-L ACCELEROMETER



AIRWAY PRESSURE



VASCULAR PRESSURE



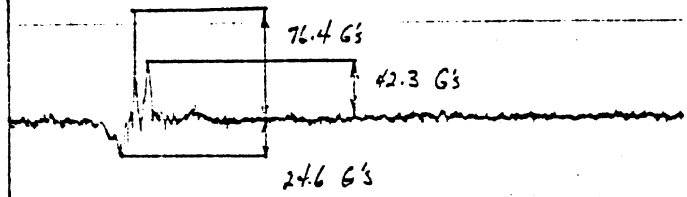
100 msec

5.2.9

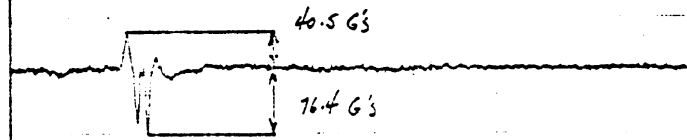


TEST NO. 76 T 010

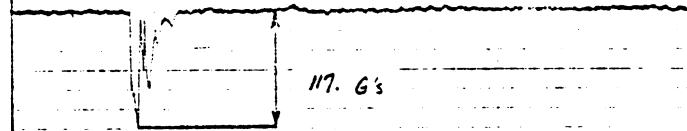
PELVIS P-A ACCELEROMETER



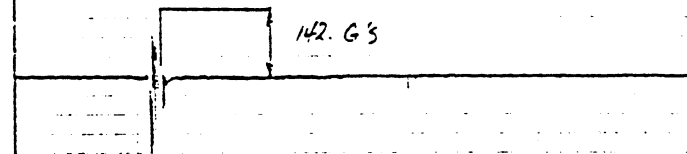
PELVIS I-S ACCELEROMETER



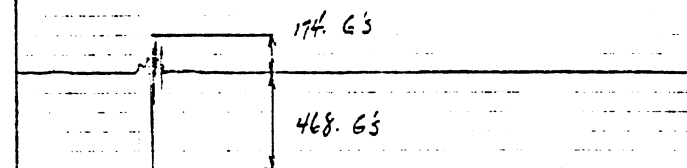
PELVIS R-L ACCELEROMETER



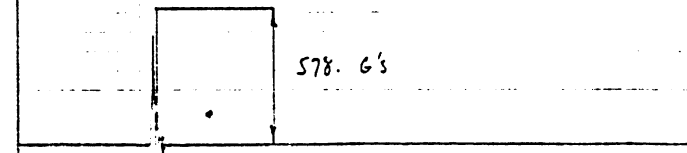
HEAD P-A ACCELEROMETER



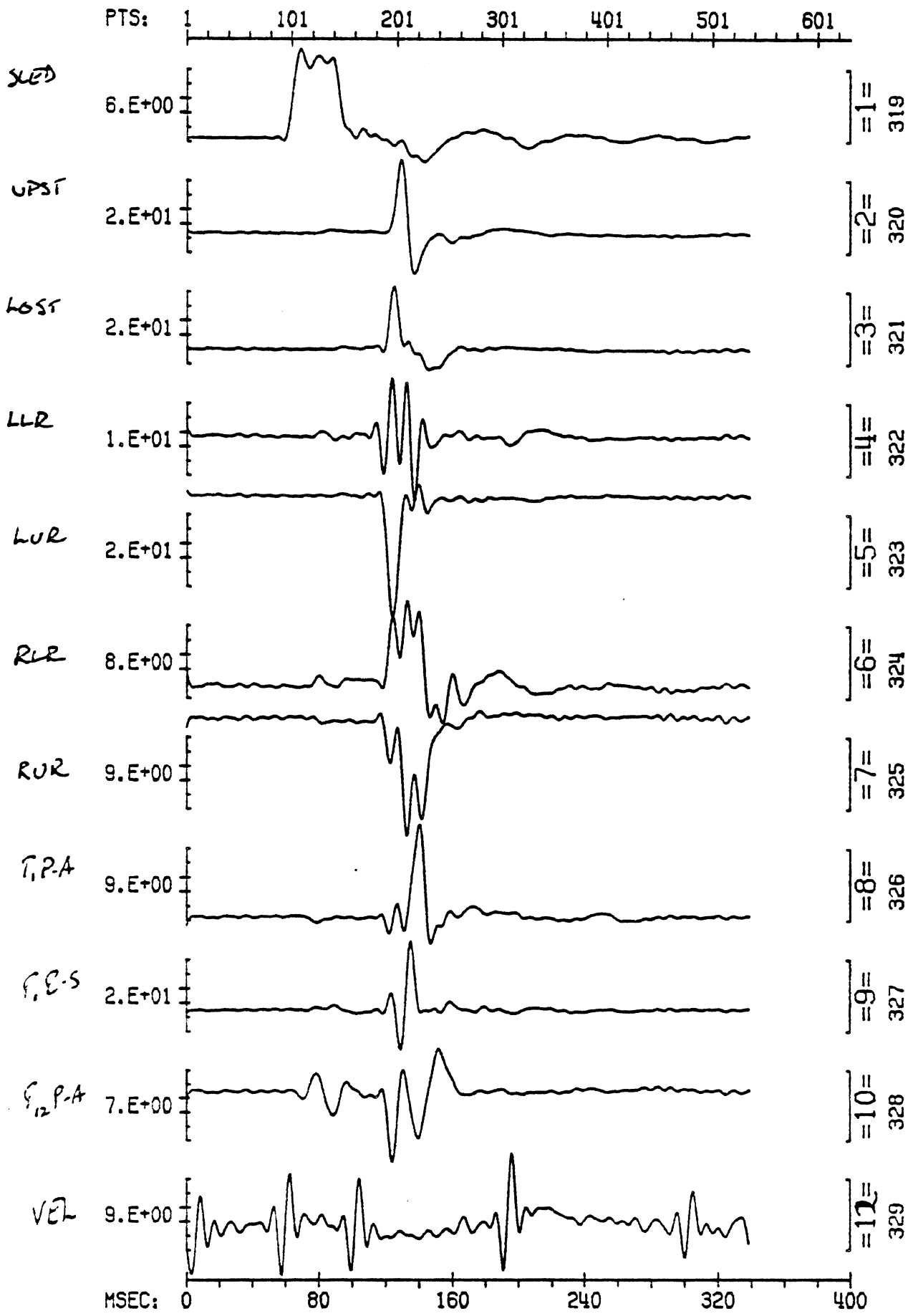
HEAD I-S ACCELEROMETER



HEAD R-L ACCELEROMETER



100 msec



ID: 76T010-1:SS

TAPE: THOR.2

\*\*\*\*\*  
 RUN ID: 76T010-1189  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT==

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2152 PTS/CH AT 6309.46 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE NO	CH NO	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
319	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	535	1577.37
320	2	UPPER STERNAL ACCELEROMETER	-242.00	G'S	4+1+3	99.4	535	1577.37
321	3	LOWER STERNAL ACCELEROMETER	-230.00	G'S	4+1+3	99.4	535	1577.37
322	4	LEFT LOWER RIB ACCELEROMETER	-246.00	G'S	4+1+3	99.4	535	1577.37
323	5	LEFT UPPER RIB ACCELEROMETER	-291.00	G'S	4+1+3	99.4	535	1577.37
324	6	RIGHT LOWER RIB ACCELEROMETER	-290.00	G'S	4+1+3	99.4	535	1577.37
325	7	RIGHT UPPER RIB ACCELEROMETER	250.00	G'S	4+1+3	99.4	535	1577.37
326	8	T1 P-A ACCELEROMETER	196.00	G'S	4+1+3	99.4	535	1577.37
327	9	T1 I-S ACCELEROMETER	216.00	G'S	4+1+3	99.4	535	1577.37
328	10	T12 P-A ACCELEROMETER	213.00	G'S	4+1+3	99.4	535	1577.37
329	11	T12 R-L ACCELEROMETER	214.00	G'S	4+1+3	99.4	535	1577.37

121  
 131  
 141

\*\*\*\*\*  
 FILTERED FILES: 319 - 329 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T010-1189  
 \*\*\*\*\*

PTS: 1 101 201 301 401 501 601

ID: 76T010-1:SS

T<sub>12</sub>R-k

4.E+00

12= 848



MSEC: 0 80 160 240 320 400

TAPE: THOR.2A

\*\*\*\*\*  
RUN ID: 76T010-1189

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

\*\*\*\*\*

PROJECT: THORAX IMPACT PROJECT--

ANALOG TAPE: HSRI-140 EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 2152 PTS/CH AT 6309.46 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:

848 - 12: T12 R-L ACCELEROMETER 214.00 G'S 4+1+ 3 99.4 535 0 1577.37

13:

14:

\*\*\*\*\*  
FILTERED FILE: 848 - 848 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T010-1188

PTS: 1 101 201 301 401 501 601 701

SLED

3.E+00

=1= 621

PP.A

3.E+00

=5= 622

PI-S

5.E+00

=6= 623

PR-L

6.E+00

=7= 624

ATRW  
(mm/ty)

4.E+00

=8= 625

VASC  
(mm/ty)

8.E+01

=9= 626

MSEC: 0 100 200 300 400 500

ID: 76T010-2:SS

TAPE: THOR.2

\*\*\*\*\*  
 RUN ID: 76T010-2188  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77  
 TEST SIGNALS: 2729 PTS/CH AT 6300.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
621 - 10	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.3	682	1577.02
20							
30							
40							
622 - 50	PELVIC P-A ACCELEROMETER	260.00	G'S	4+1+3	99.3	682	1577.02
623 - 60	PELVIC I-S ACCELEROMETER	-233.00	G'S	4+1+3	99.3	682	1577.02
624 - 70	PELVIC R-L ACCELEROMETER	199.00	G'S	4+1+3	99.3	682	1577.02
625 - 80	AIRWAY PRESSURE	370.00	MM-HG	4+1+3	99.3	682	1577.02
626 - 90	VASCULAR PRESSURE	700.00	MM-HG	4+1+3	99.3	681	1577.02

100  
 110  
 120  
 130  
 140

\*\*\*\*\*  
 FILTERED FILES: 621 - 626 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T010-2188  
 \*\*\*\*\*





## SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NO.: 76T011

TEST DATE: April 23, 1976

### TEST SUBJECT:

Age - 69

Sex - Male

Stature - 170.2 cm.

Weight - 74.9 kg.

### RESTRAINT SYSTEM:

None: Lateral impact into rigid flat surface.

### VELOCITY:

Closing velocity between subject and surface = 20 mph.

### INJURIES:

Skull - Depressed fracture left side. Free blood in cavity.

Spine - Fracture between C4 and C5.

Liver - Small tear on surface.

Rib Cage - Fractures. Left side - 2, 3, 4, 5, 6, 7, 9.  
Right side - 2, 3, 4, 5, 6.

Spleen - crushed.

### AIS NUMBER ESTIMATES:

Head - 6

Thorax - 4

Abdomen - 4

TEST # 76T011

TEST DATE 4.23.76

TEST DESCRIPTION Rigid Side Barrier Sled Impact VELOCITY 29.3 ft/s

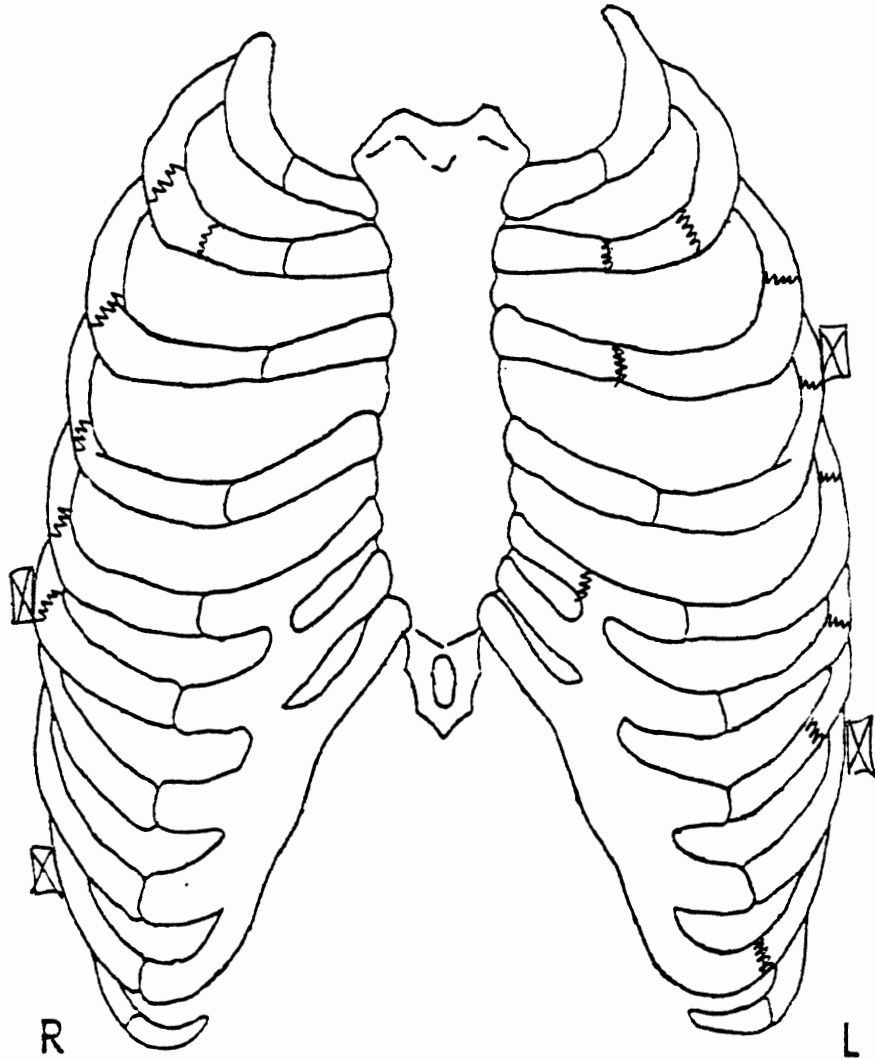
SUBJECT:

AGE 64 SEX M CAUSE OF DEATH ROVAL SHUT DOWN, STROKE

INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>H</u>	<u>B</u>	<u>H</u>	<u>B</u>	<u>6</u>
	2	<u>H</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>6</u>
	3	<u>N</u>	<u>P</u>	<u>F</u>	<u>V</u>	<u>5</u>
	4	<u>M</u>	<u>L</u>	<u>R</u>	<u>G</u>	<u>4</u>
	5	<u>M</u>	<u>R</u>	<u>L</u>	<u>L</u>	<u>4</u>

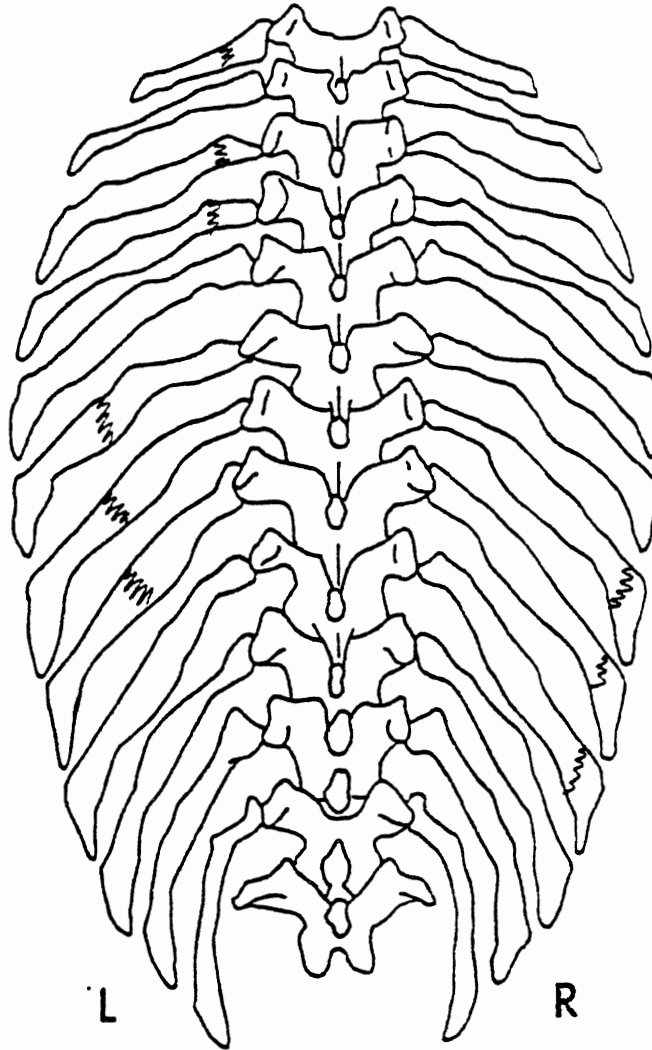
TEST # 767011



ANTERIOR VIEW RIB CAGE

(no thoracic organ injuries, but:  
• bilateral cerebral hemorrhage  
• fracture through body of C5  
• crushed spleen  
• liver laceration  
• massive left side depressed skull fracture)

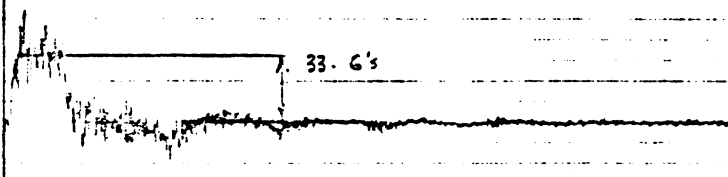
TEST # 76T011



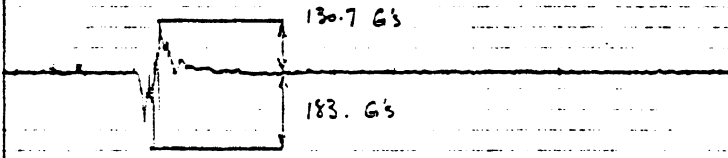
POSTERIOR VIEW RIB CAGE

TEST 76T011

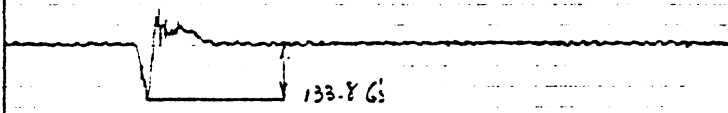
SLED DECELERATION PULSE



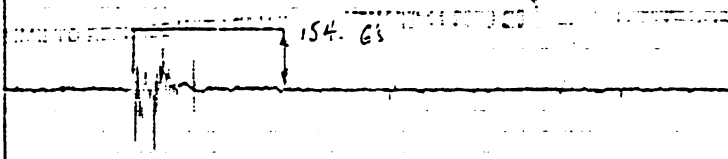
UPPER STERNAL ACCELEROMETER



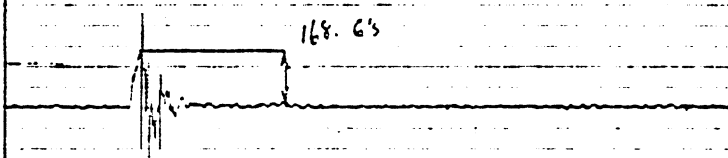
LOWER STERNAL ACCELEROMETER



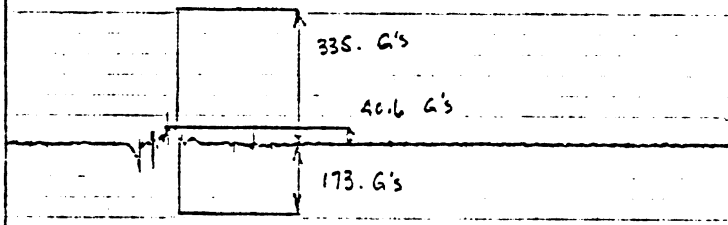
LEFT LOWER RIB ACCELEROMETER



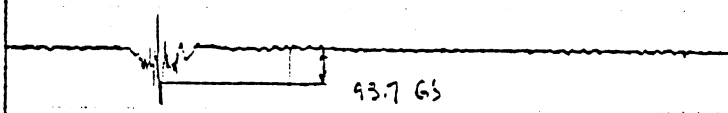
LEFT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



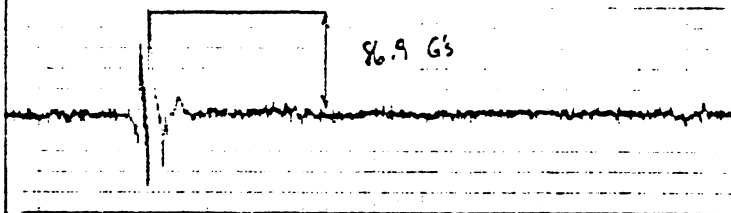
RIGHT UPPER RIB ACCELEROMETER



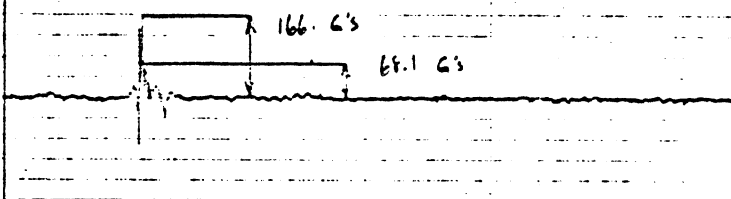
100 msec

TEST 76T011

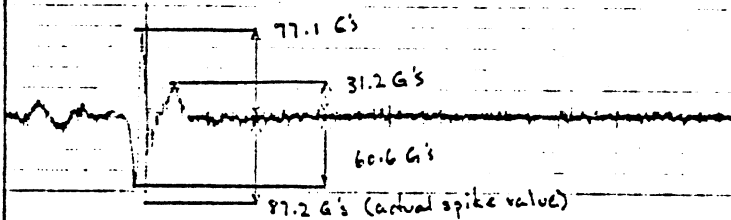
T<sub>1</sub>P-A ACCELEROMETER



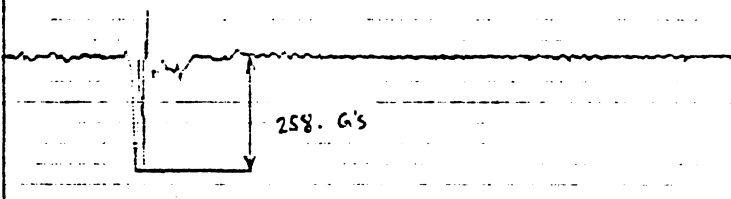
T<sub>1</sub>I-S ACCELEROMETER



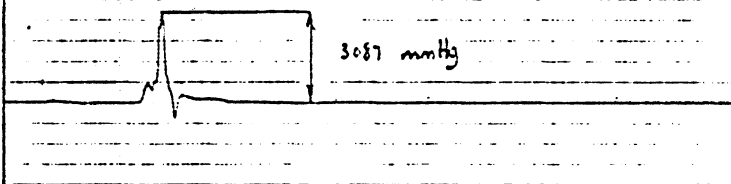
T<sub>12</sub>P-A ACCELEROMETER



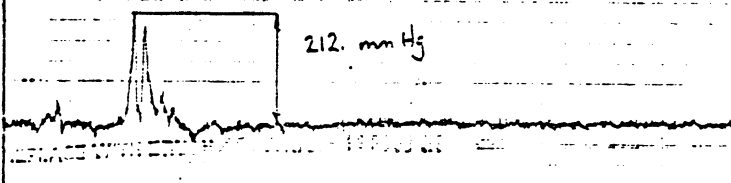
T<sub>12</sub>R-L ACCELEROMETER



VASCULAR PRESSURE



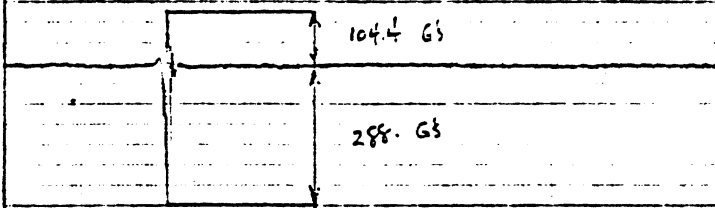
AIRWAY PRESSURE



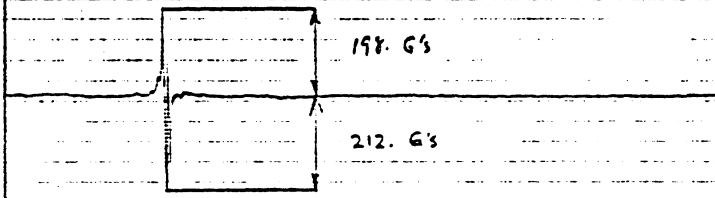
100 msec

TEST 76T011

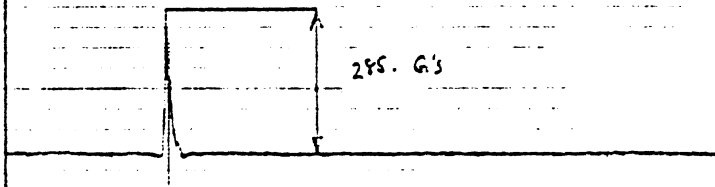
SKULL P-A ACCELEROMETER



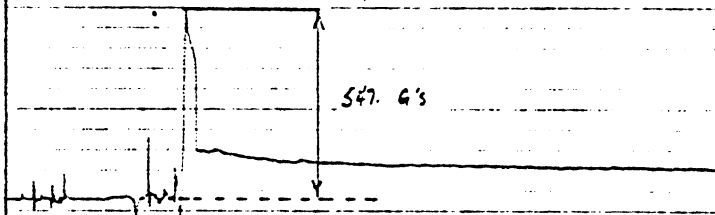
SKULL I-S ACCELEROMETER



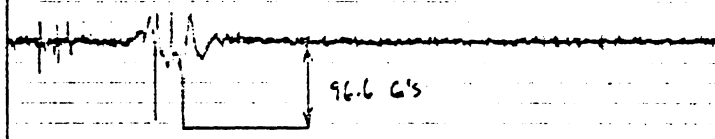
SKULL R-L ACCELEROMETER



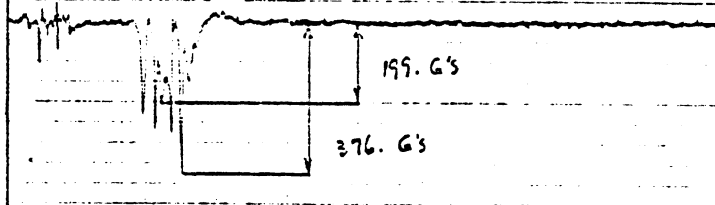
FELVIS P-A ACCELEROMETER



FELVIS I-S ACCELEROMETER



FELVIS R-L ACCELEROMETER



100 msec

PTS: 1 101 201 301 401 501 601

SUB

6.E+00



=1=  
330

UPST

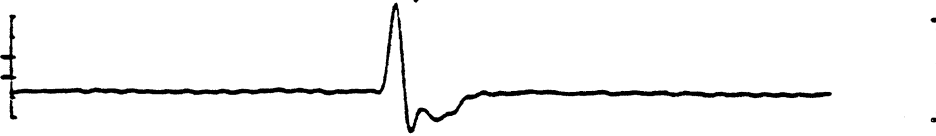
2.E+01



=2=  
331

WOST

3.E+01



=3=  
332

LHR

9.E+00



=4=  
333

LUR

3.E+01



=5=  
334

RUR

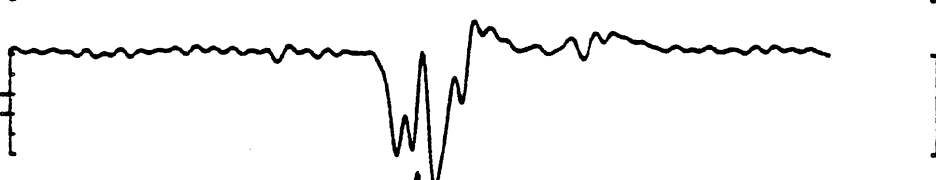
2.E+01



=6=  
335

RUR

7.E+00



=7=  
336

P<sub>1</sub>P<sub>1</sub>A

9.E+00



=8=  
337

P<sub>1</sub>E-S

2.E+01



=9=  
338

P<sub>12</sub>P<sub>1</sub>A

2.E+01



=10=  
339

VEL

1.E+01



=11=  
340

MSEC: 0 80 160 240 320 400

ID: 76T011-1:SS

TAPE: THOR.2



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RUN ID: 76T011-1188

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT

ANALOG TAPE: H9R1-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77

TEST SIGNALS: 2236 PTS/CH AT 6300.70 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
330	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	550	1577.17
331	2	UPPER STERNAL ACCELEROMETER	-242.00	G'S	4+1+3	99.4	550	1577.17
332	3	LOWER STERNAL ACCELEROMETER	+230.00	G'S	4+1+3	99.4	550	1577.17
333	4	LEFT LOWER RIB ACCELEROMETER	-240.00	G'S	4+1+3	99.4	550	1577.17
334	5	LEFT UPPER RIB ACCELEROMETER	+296.00	G'S	4+1+3	99.4	550	1577.17
335	6	RIGHT LOWER RIB ACCELEROMETER	-250.00	G'S	4+1+3	99.4	550	1577.17
336	7	RIGHT UPPER RIB ACCELEROMETER	213.00	G'S	4+1+3	99.4	550	1577.17
337	8	T1 P-A ACCELEROMETER	197.00	G'S	4+1+3	99.4	550	1577.17
338	9	T1 I-S ACCELEROMETER	210.00	G'S	4+1+3	99.4	550	1577.17
339	10	T12 P-A ACCELEROMETER	213.00	G'S	4+1+3	99.4	550	1577.17
340	11	T12 R-L ACCELEROMETER	214.00	G'S	4+1+3	99.4	550	1577.17

12

13

14

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FILTERED FILES: 330 - 340 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T011-1188

\*\*\*\*\*

PTS: 1 101 201 301 401 501 601

ID: 76T011-1:SS

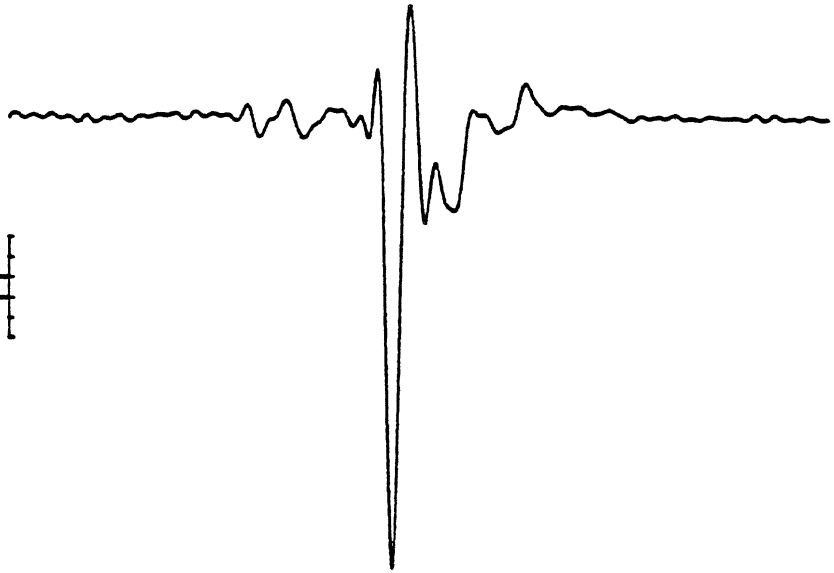
P<sub>12</sub>R/L

7.E+00

12= 849

MSEC: 0 80 160 240 320 400

TAPE: THOR.2A



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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RUN ID: 76T011-1188

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PROJECT: THORAX IMPACT PROJECT\*\*

ANALOG TAPE: HSRI-140 EXPANDED 16X, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2236 PTS/CH AT 6308.70 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1:							
2:							
3:							
4:							
5:							
6:							
7:							
8:							
9:							
10:							
11:							
12:	T12 R-L ACCELEROMETER	214.00 G'S		4+1+3	99.4	550	1577.17
13:							
14:							

849 - 12: T12 R-L ACCELEROMETER 214.00 G'S 4+1+3 99.4 550 1577.17

13:  
14:

-----

FILTERED FILES: 849 - 849 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T011-1188

PTS: 1 101 201 301 401 501 601

S&D

3.E+00

=1= 627

PP-A

4.E+01

=5= 628

P2-S

5.E+00

=6= 629

PR-L

5.E+00

=7= 630

PRW  
(numth)

9.E+00

=8= 631

VASC  
(numth)

2.E+02

=9= 632

MSEC: 0 80 160 240 320 400

ID: 76T011-2:55

TAPE: THOR.2

\*\*\*\*\*  
RUN ID: 76T011-2189

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77  
TEST SIGNALS: 2153 PTS/CH AT 6309.62 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
627	-	1: SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	99.4	535	1577.40
21								
31								
41								
628	-	5: PELVIC P-A ACCELEROMETER	268.00	G'S	4+1+ 3	99.4	535	1577.40
629	-	6: PELVIC I-S ACCELEROMETER	-233.00	G'S	4+1+ 3	99.4	535	1577.40
630	-	7: PELVIC R-L ACCELEROMETER	199.00	G'S	4+1+ 3	99.4	535	1577.40
631	-	8: AIRWAY PRESSURE	370.00	MM-HG	4+1+ 3	99.4	535	1577.40
632	-	9: VASCULAR PRESSURE	700.00	MM-HG	4+1+ 3	99.4	535	1577.40
101								
111								
121								
131								
141								

\*\*\*\*\*  
FILTERED FILES: 627 - 632 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T011-2189



SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test Number: 76T020

Test Date: June 3, 1976

Test Subject:

Age - 78

Sex - Female

Stature - 158.8 cm.

Weight - 140 lbs.

Restraint System:

Energy-absorbing steering column with airbag and lap belt.

Velocity

24.4 mph

Sled Deceleration

17 G's

Injuries

1. 14 rib fractures from R2 through R6 on left and R8 on right outlining the wheel rim.
2. Fracture between T3 and T4 severing cord.

AIS Number Estimate

5

TEST # 76T020

TEST DATE 6.3.76

TEST DESCRIPTION EA Column, air bag, front sled test VELOCITY 35.8 ft/s

SUBJECT:

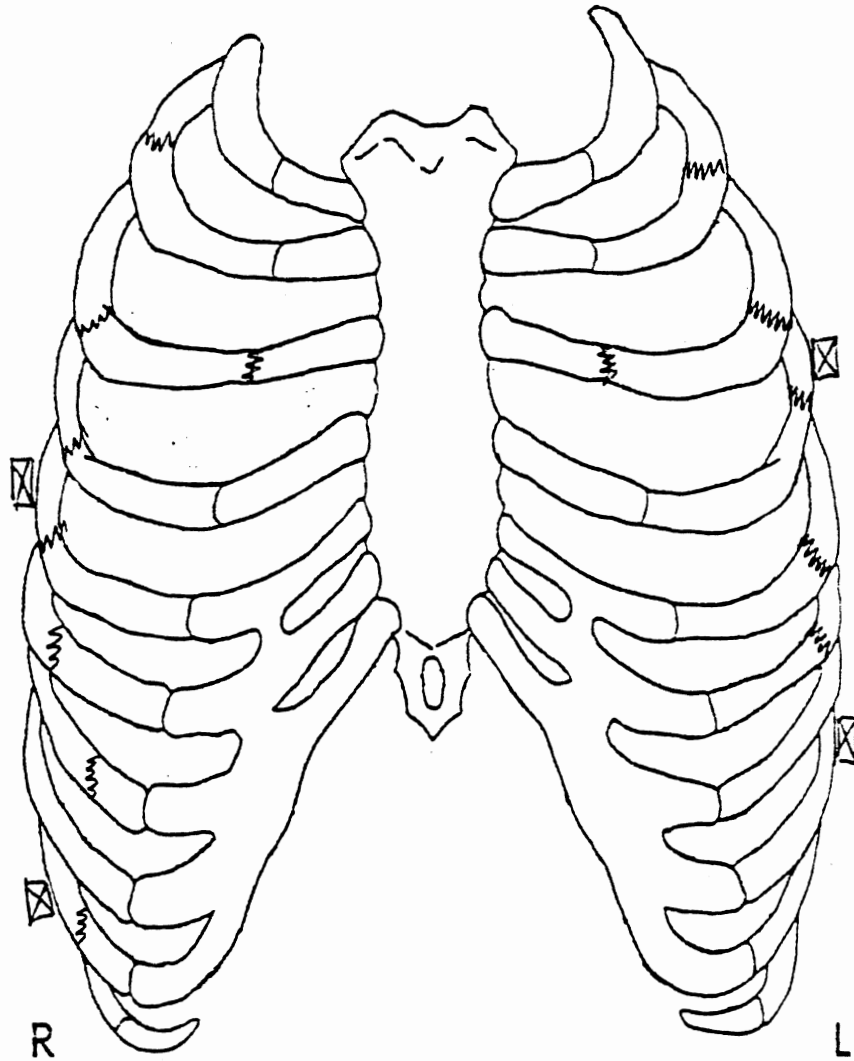
AGE 78 SEX F CAUSE OF DEATH Renal failure

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>B</u>	<u>L</u>	<u>F</u>	<u>V</u>	<u>5</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>F</u>	<u>S</u>	<u>C</u>	<u>R</u>	<u>1</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---



TEST # 767020

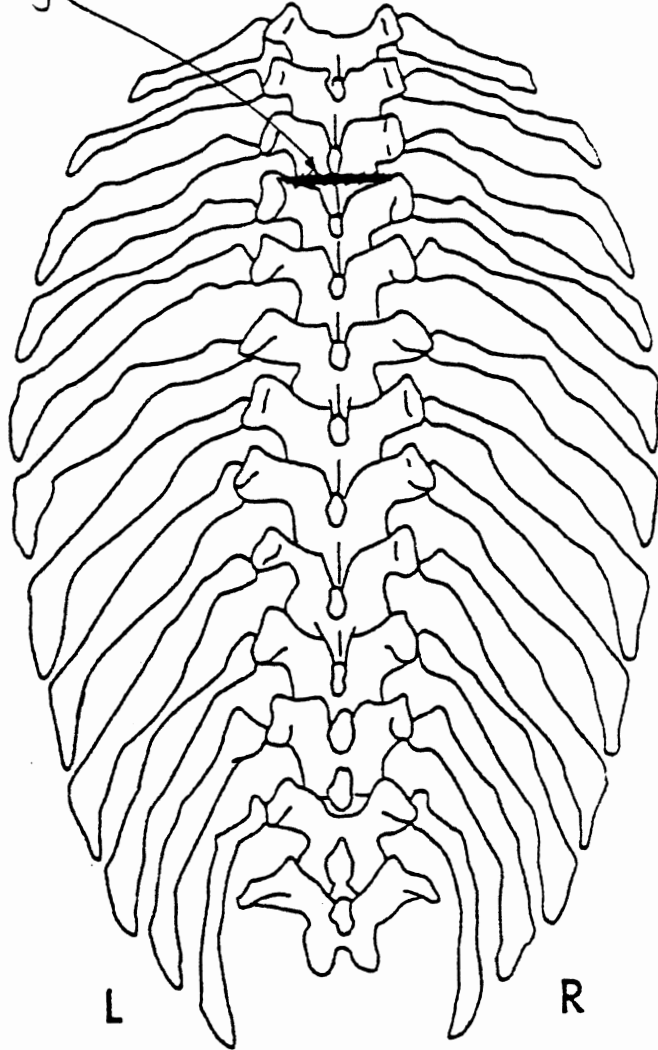


ANTERIOR VIEW RIB CAGE

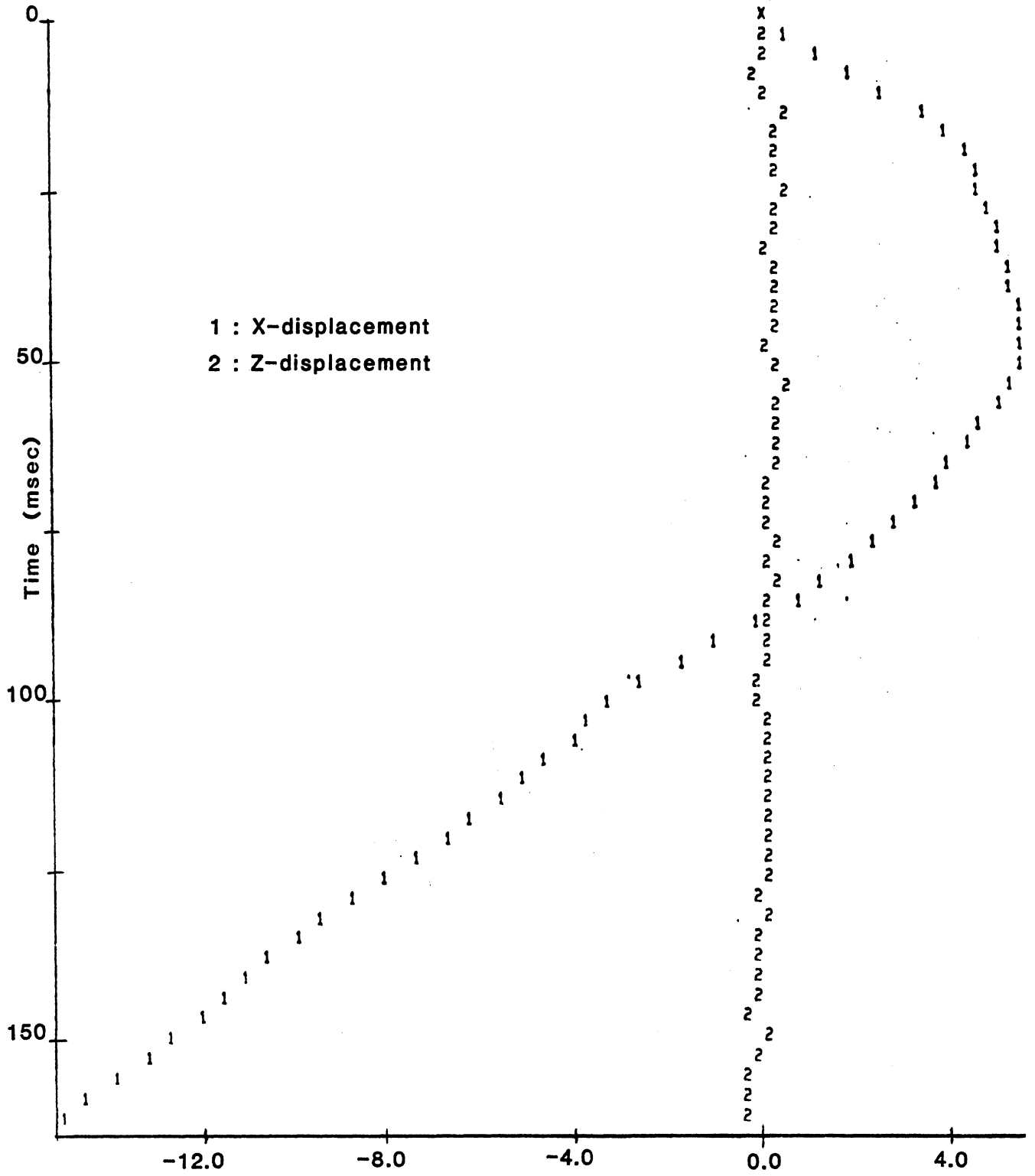
Also:  
• Contusion @ forehead  
• No thoracic organ injured

TEST # 767020

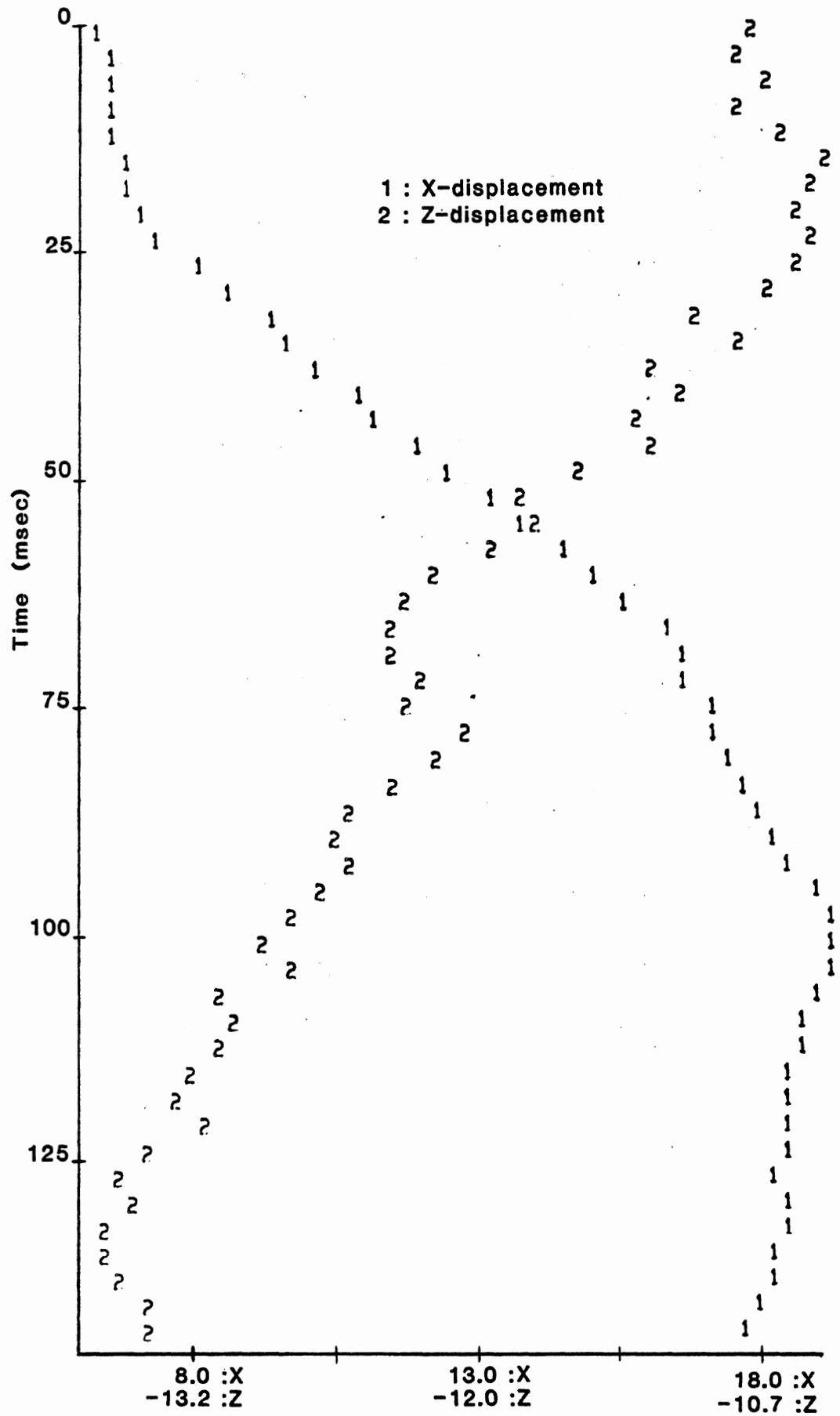
Thoracic spine fracture  
between T3&T4, completely  
severing cord.



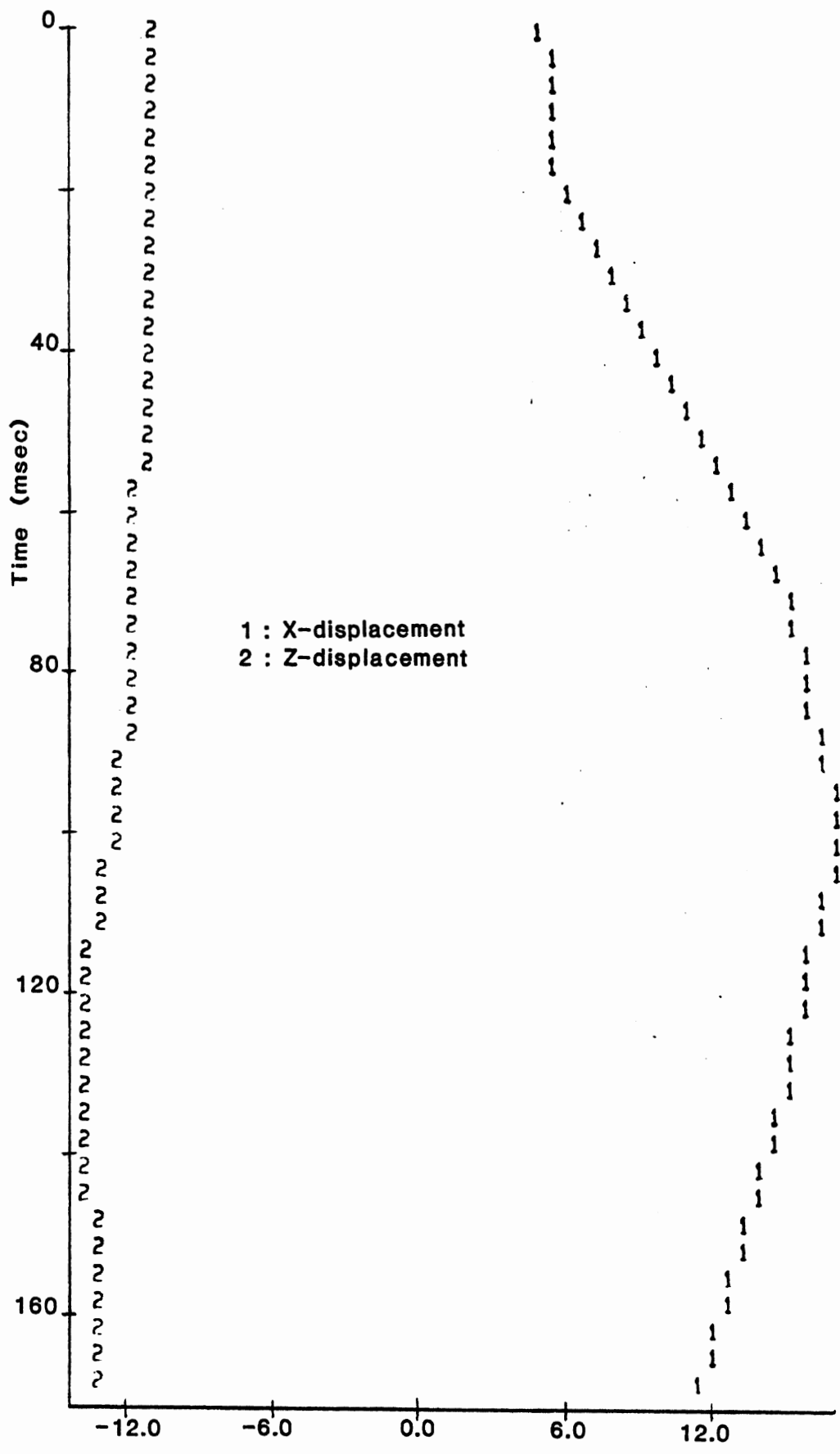
POSTERIOR VIEW RIB CAGE



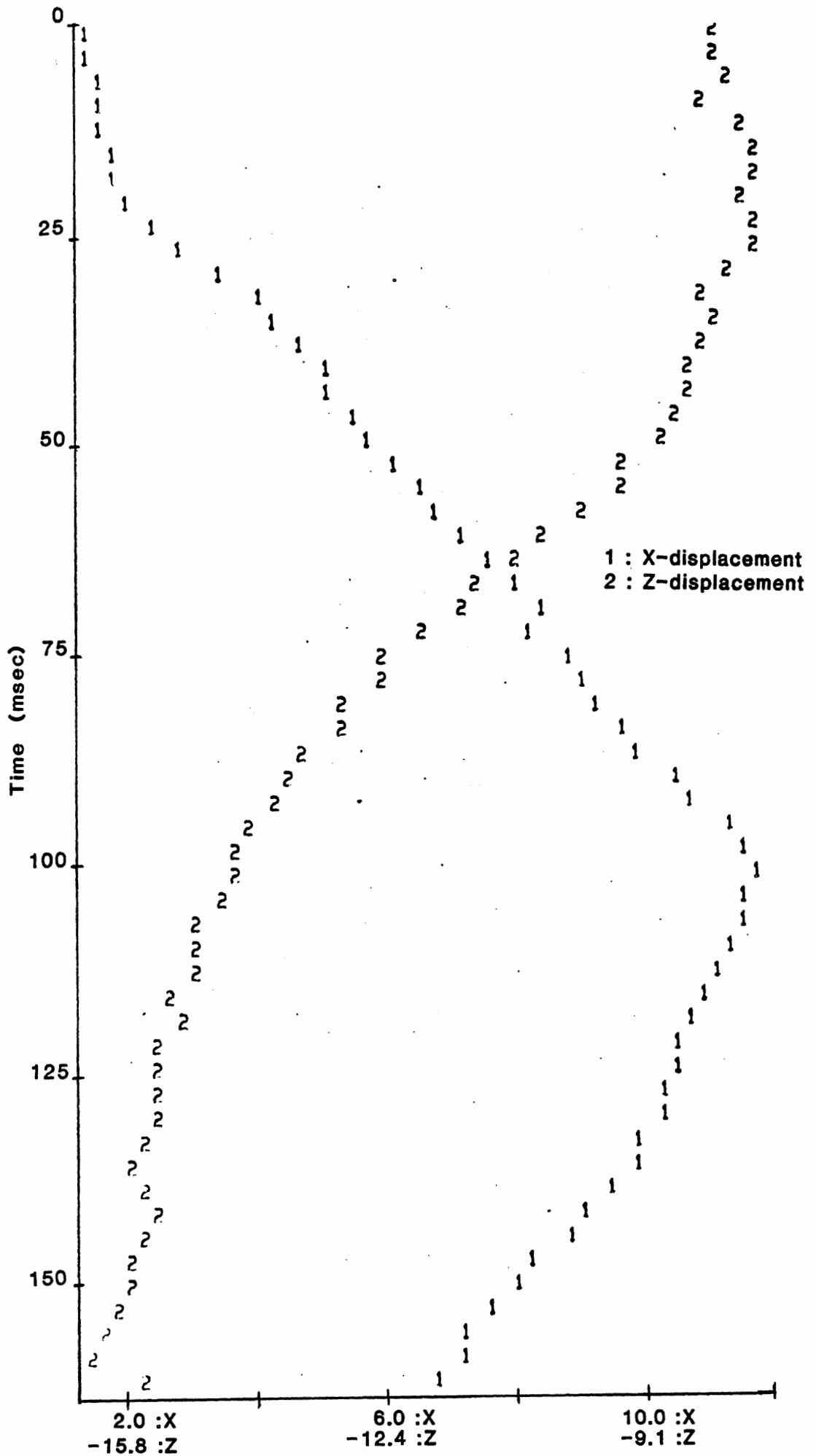
76T020 -- Sled displacement (inches)



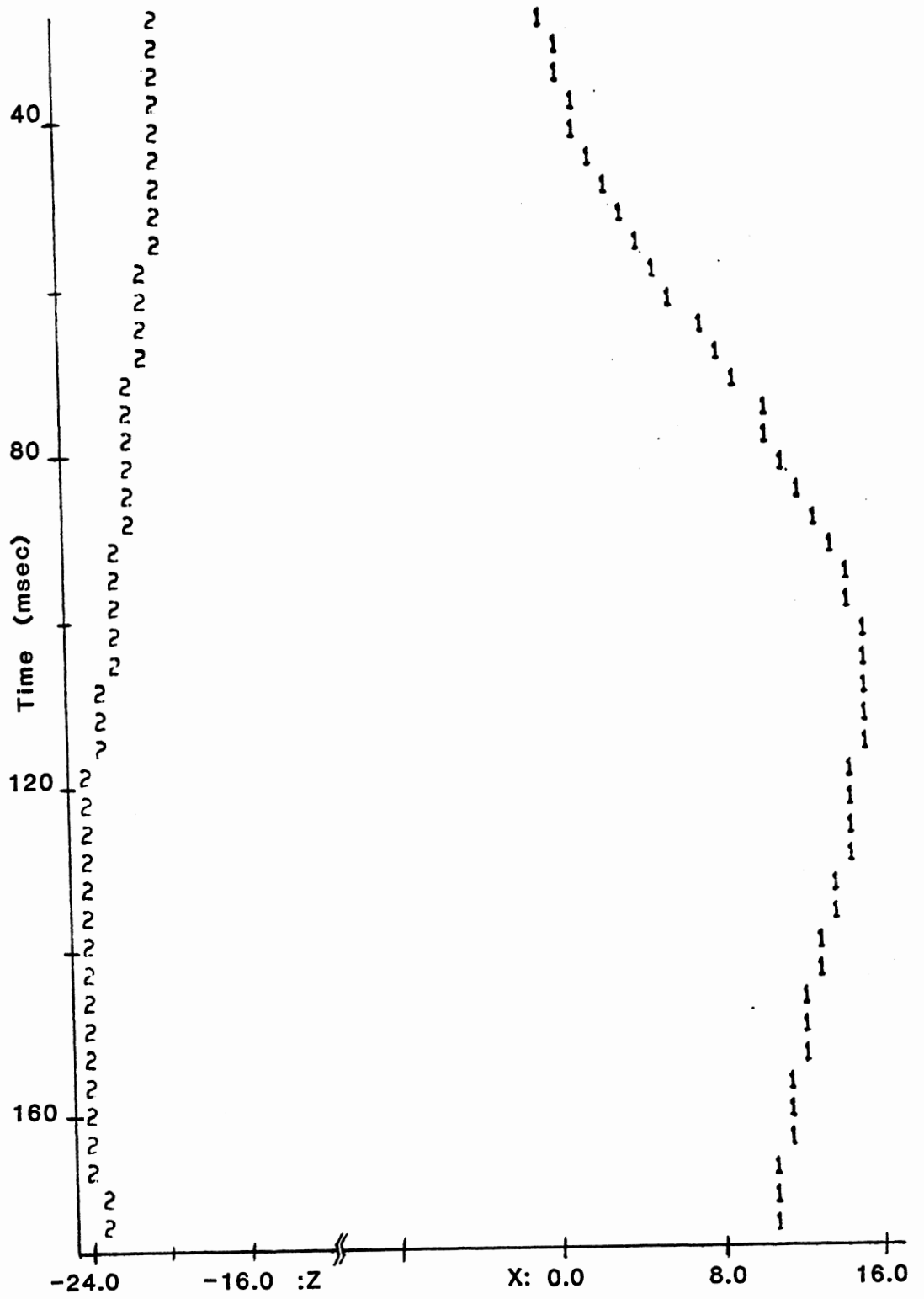
76T020 -- Right rib target displacement (inches)



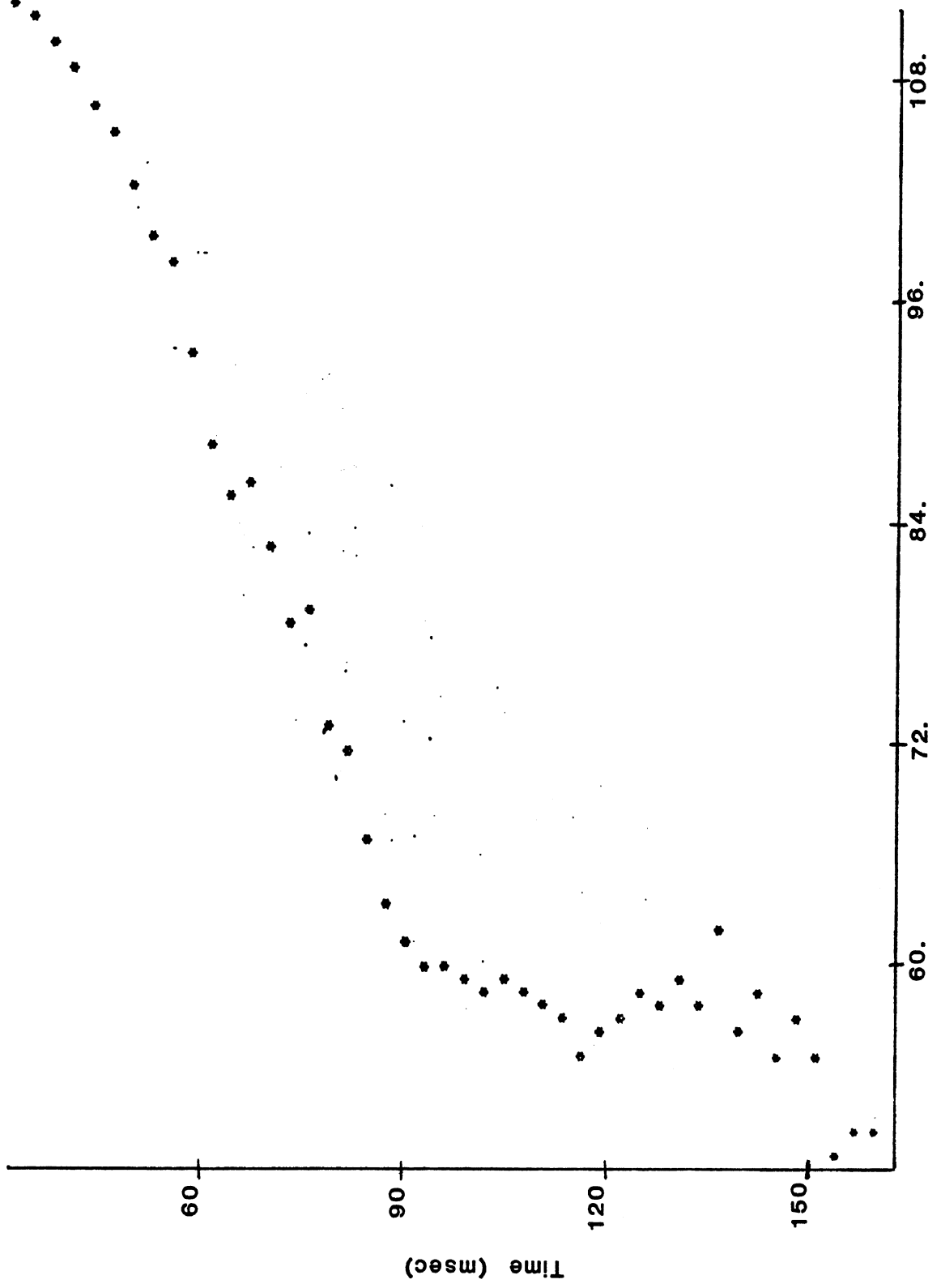
76T020 — Left rib target displacement (inches)



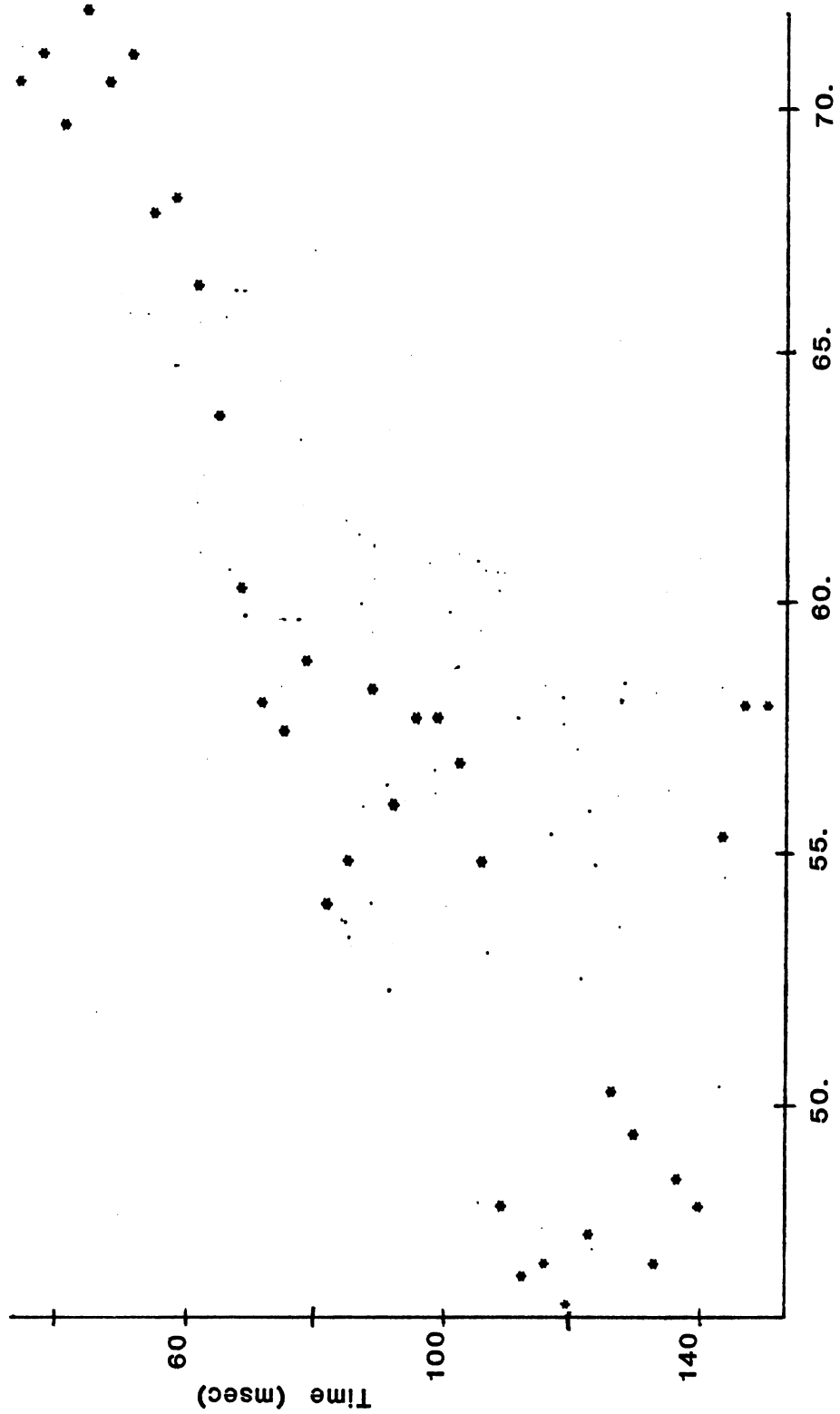
76T020 -- T-11 visual target center displacement (inches)



76T020 -- T-1 visual target center displacement (inches)

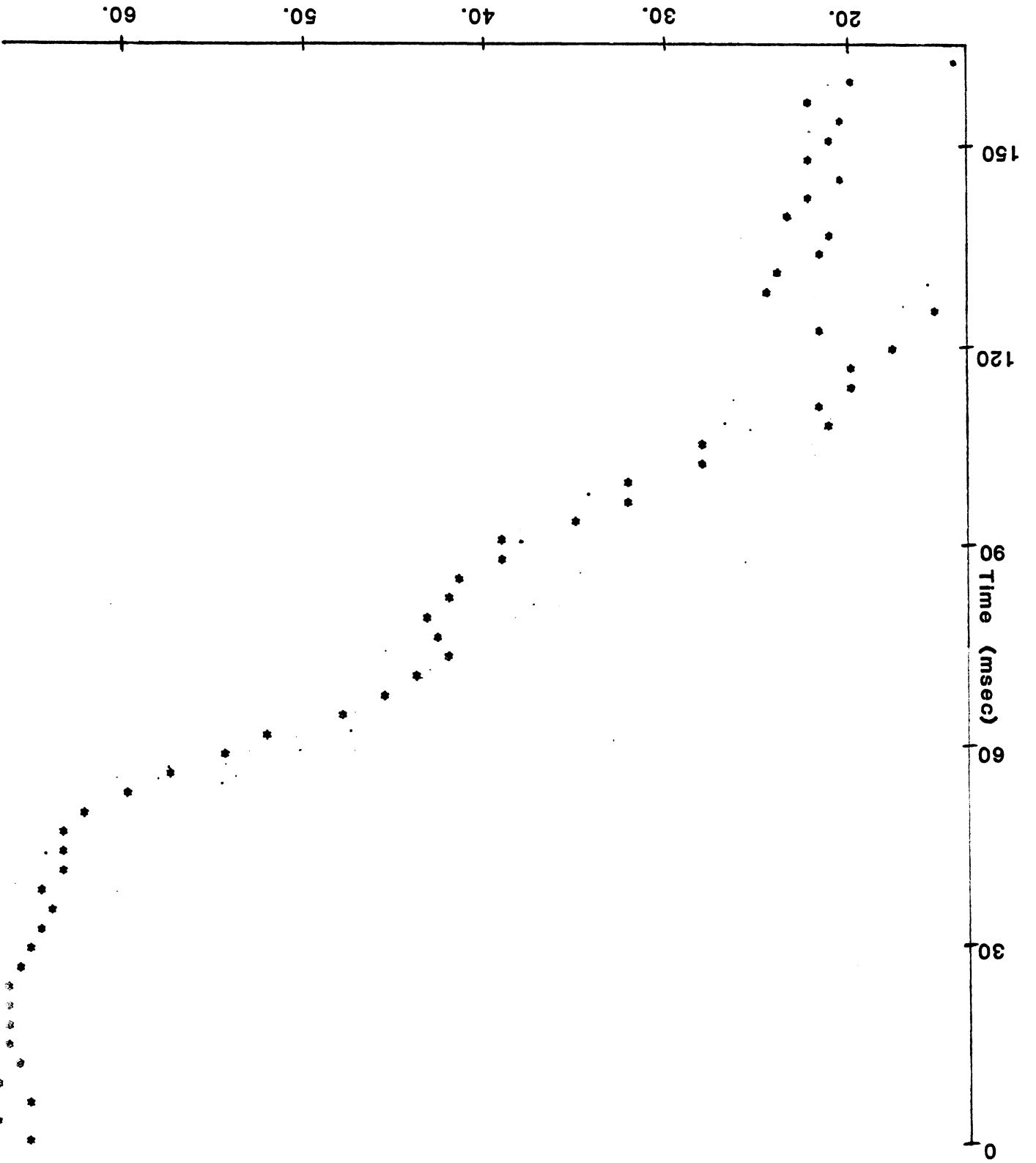


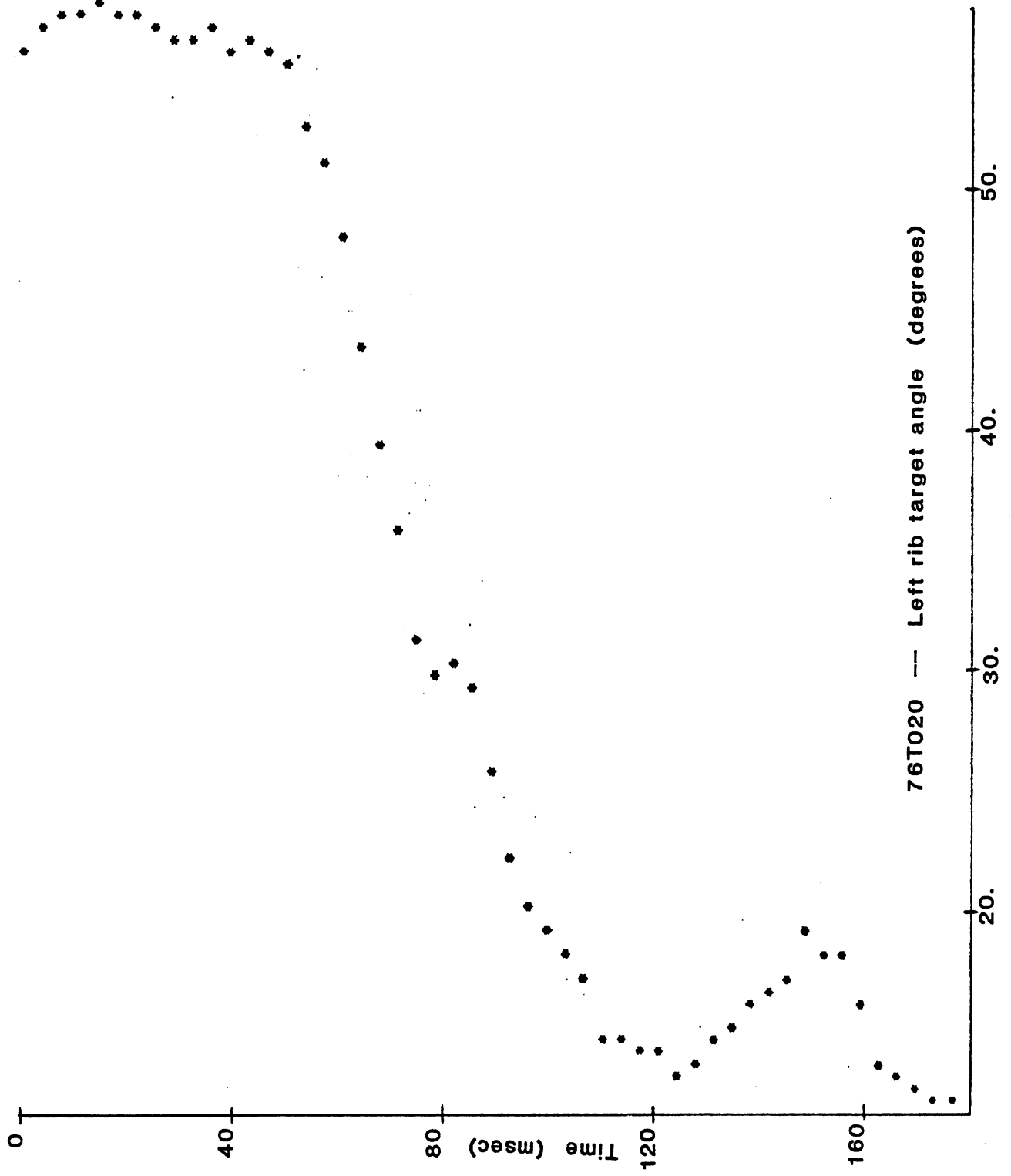




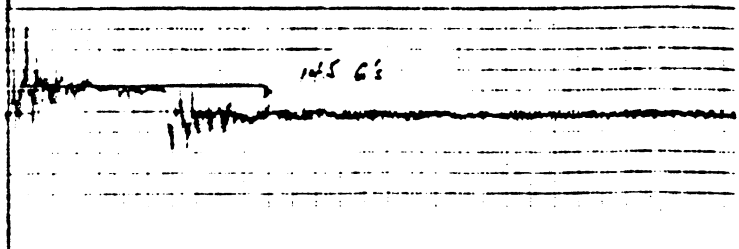
76T020 -- T-1 target angle (degrees)

76T020 -- Right rib target angle (degrees)

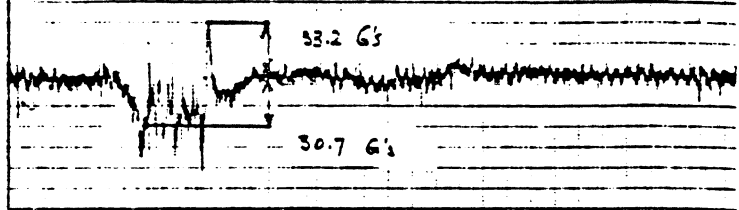




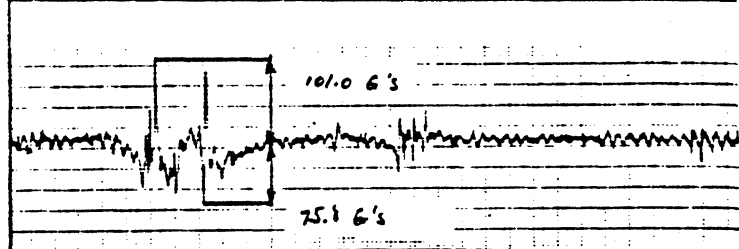
Sled Deceleration Pulse



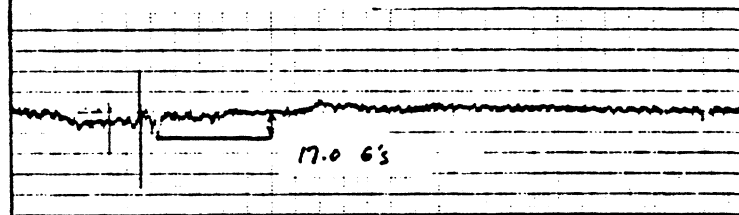
T<sub>1</sub> P-A Accelerometer



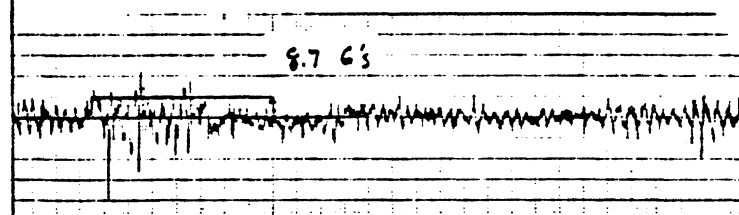
T<sub>1</sub> I-S Accelerometer



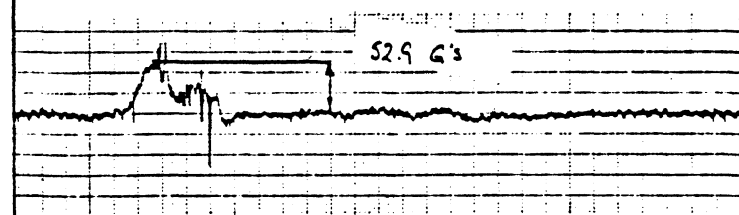
T<sub>12</sub> P-A Accelerometer



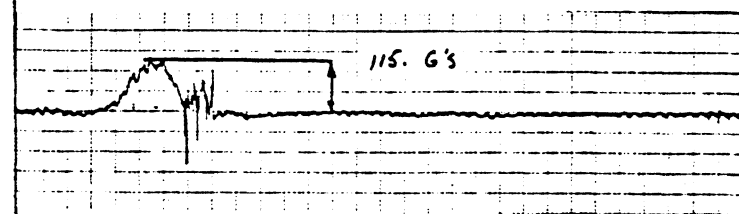
T<sub>12</sub> R-L Accelerometer



Upper Sternal Accelerometer



Lower Sternal Accelerometer



100 msec

Left Lower Rib Accelerometer

35.1 G's

Left Upper Rib Accelerometer

31.2 G's

Right Lower Rib Accelerometer

33.4 G's

Right Upper Rib Accelerometer

111.8 G's

Airway Pressure

5.7 mmHg

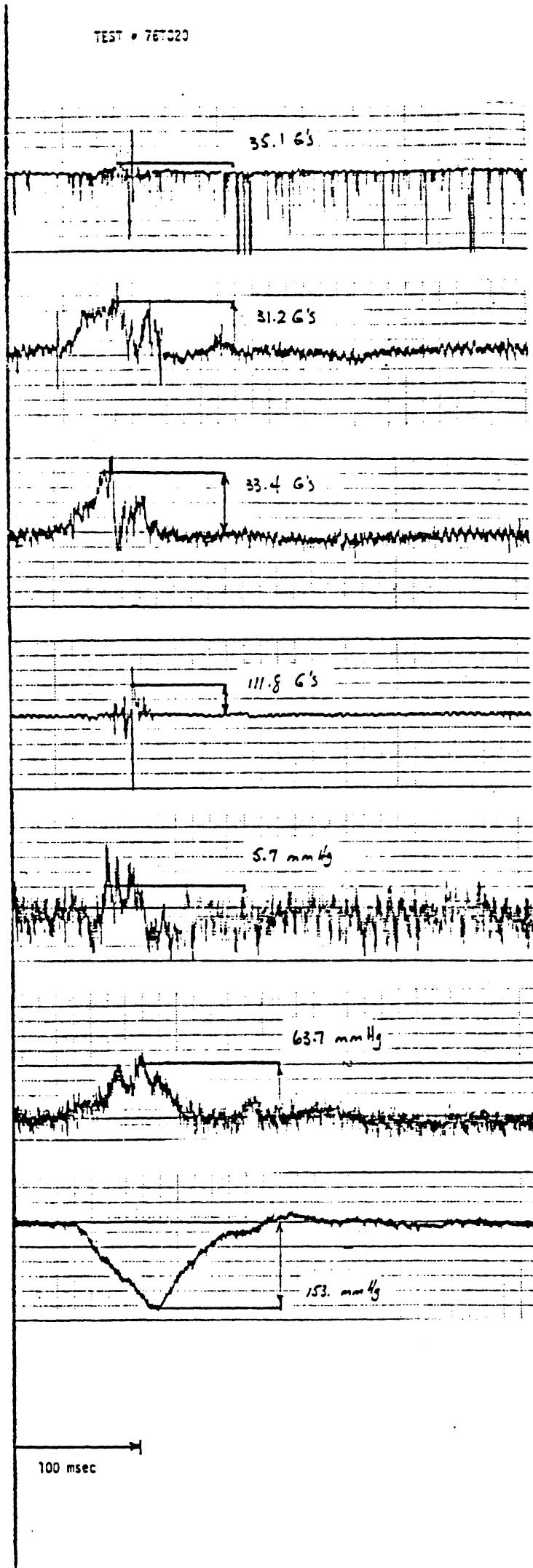
Vascular Pressure

63.7 mmHg

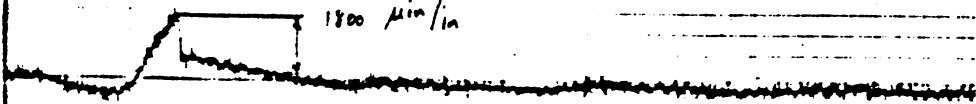
Airbag Pressure

153. mmHg

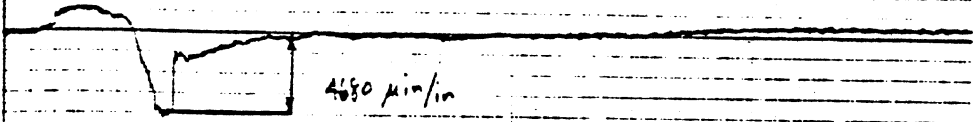
100 msec



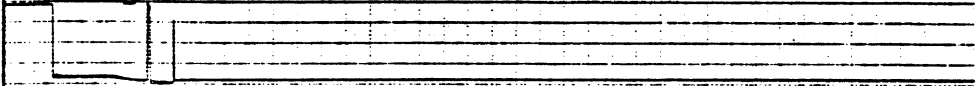
Front Rosette Gauge #1



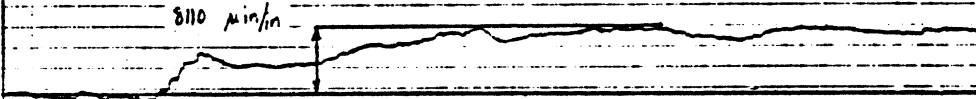
Front Rosette Gauge #2



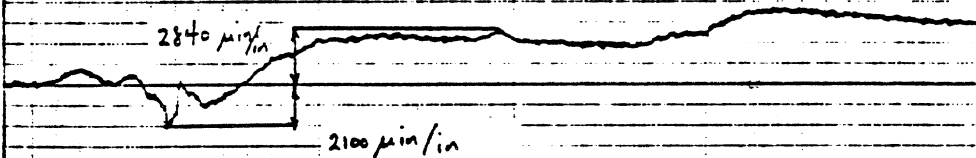
Front Rosette Gauge #3



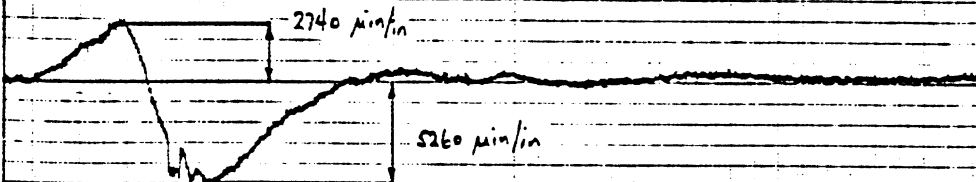
Lateral Rosette Gauge #1



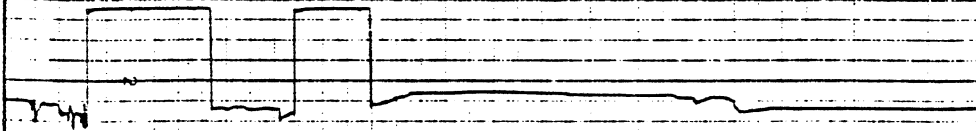
Lateral Rosette Gauge #2



Lateral Rosette Gauge #3



Rear Rosette Gauge #1

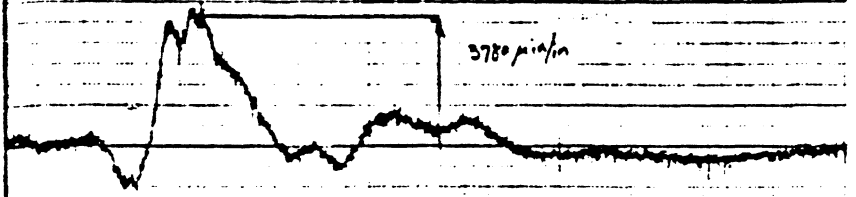


100 msec

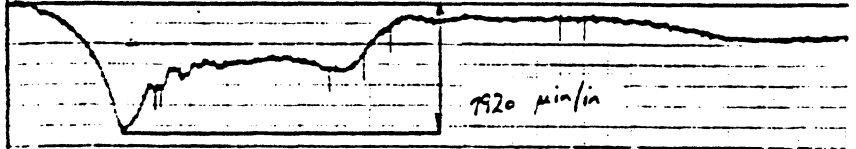


TEST # 76TC20

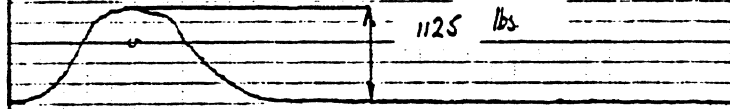
Rear Fosette Gauge #2



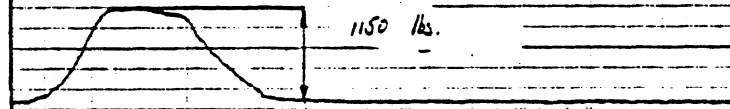
Rear Fosette Gauge #3



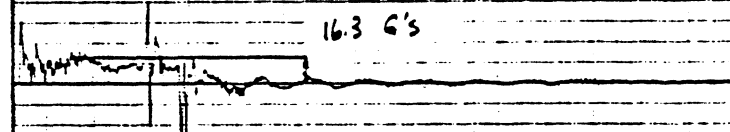
Left Lap Belt Load



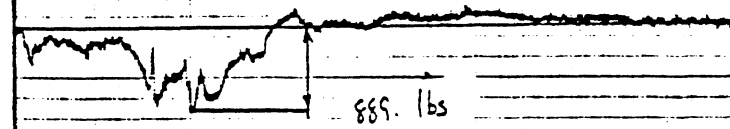
Right Lap Belt Load



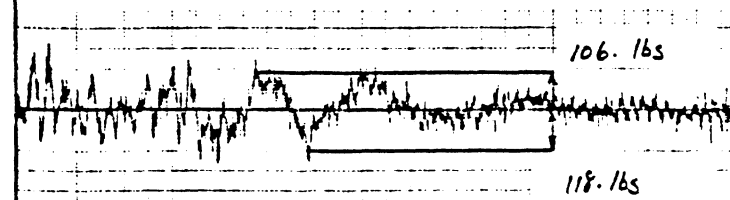
Steering Column Accelerometer



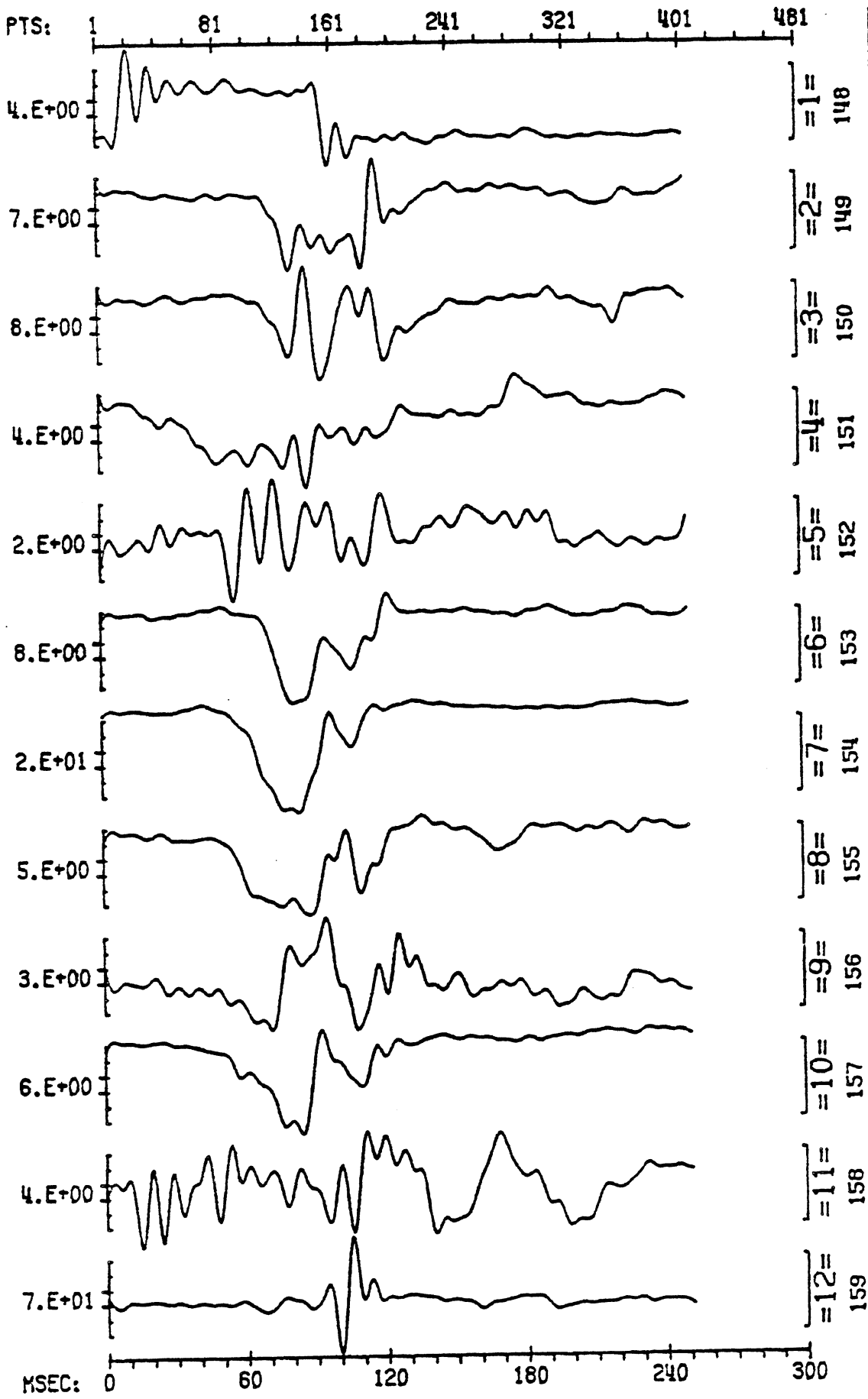
Steering Column Load



Steering Column Vertical Load



100 msec



ID: 76T020-1:

TAPE: THOR.2



=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 761020-11

PROJECT: THORACIC IMPACT PROJECT; FRONTAL CADAVER IMPACT TEST SERIES

ANALOG TAPE: HSR1#136 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HSR0018 DATE: 25-OCT-76

TEST SIGNALS: 1615 PTS/CH AT 6400.40 HZ. CAL SIGNALS: NOT DIGITIZED.

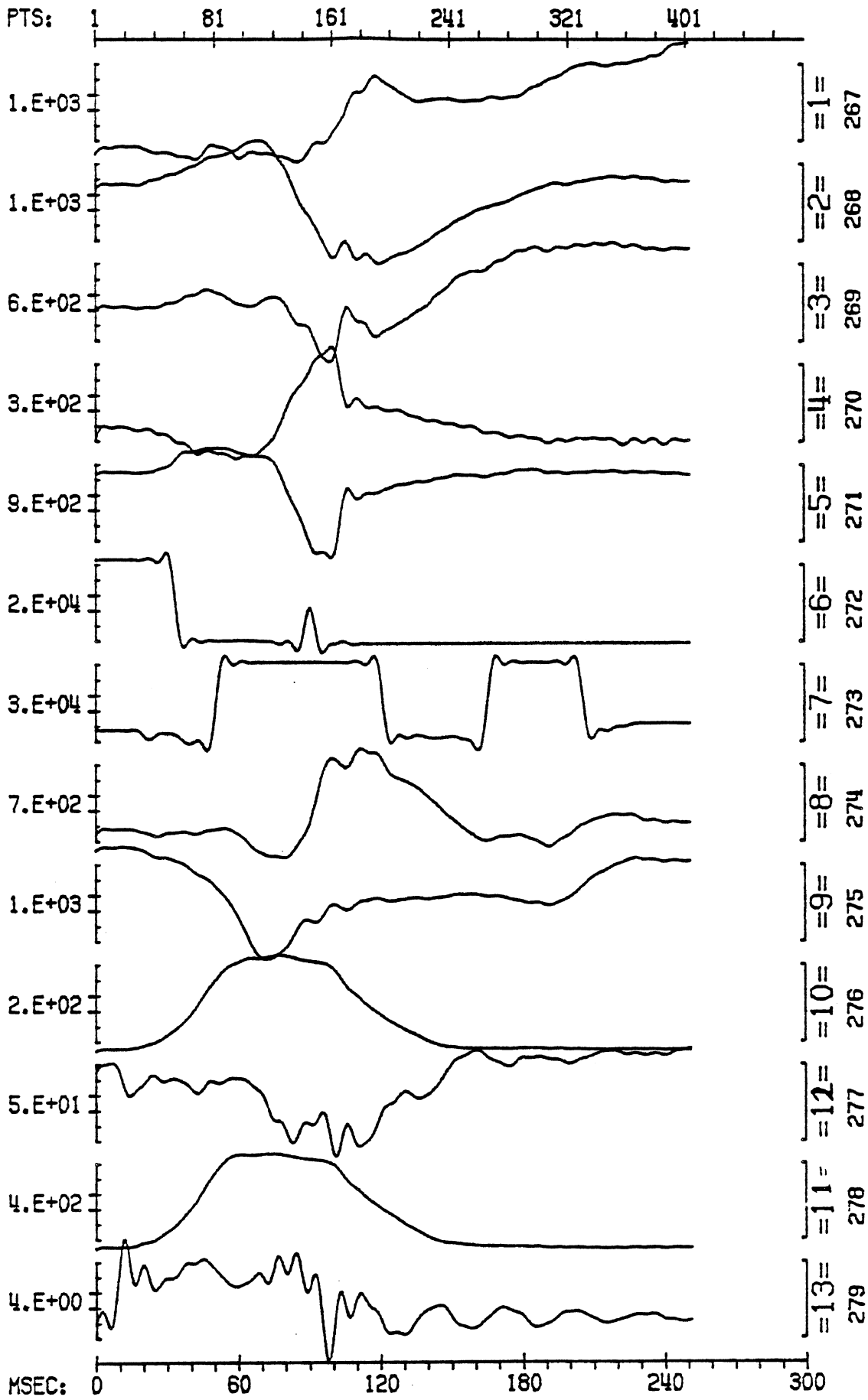
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
148	11	SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	100.0	403	1600.12
149	21	T1 P-A ACCELEROMETER	256.00	G'S	4+1+ 3	100.0	403	1600.12
150	31	T1 I-S ACCELEROMETER	226.00	G'S	4+1+ 3	100.0	403	1600.12
151	41	T12 P-A ACCELEROMETER	211.00	G'S	4+1+ 3	100.0	403	1600.12
152	51	T12 R-L ACCELEROMETER	-175.00	G'S	4+1+ 3	100.0	403	1600.12
153	61	UPPER STERNAL ACCELEROMETER	-204.00	G'S	4+1+ 3	100.0	403	1600.12
154	71	LOWER STERNAL ACCELEROMETER	-192.00	G'S	4+1+ 3	100.0	403	1600.12
155	81	LEFT LOWER RIB ACCELEROMETER	-184.00	G'S	4+1+ 3	100.0	403	1600.12
156	91	LEFT UPPER RIB ACCELEROMETER	186.00	G'S	4+1+ 3	100.0	403	1600.12
157	101	RIGHT LOWR RIB ACCELEROMETER	-167.00	G'S	4+1+ 3	100.0	403	1600.12
158	111	RIGHT UPPR RIB ACCELEROMETER	-213.00	G'S	4+1+ 3	100.0	403	1600.12
159	121	STEERING COLUMN VERTICAL LOAD	1176.00	LBS.	4+1+ 3	100.0	403	1600.12

131

141

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FILTERED FILES: 148 - 159 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: 761020-11



ID: 76T020-2:

TAPE: THOR.2

=====

RUN ID: 76T020-21

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====

PROJECT: THORACIC IMPACT PROJECT; FRONTAL IMPACT TEST SERIES

ANALOG TAPE: HSR1#141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HSR0018 DATE: 25-OCT-76

TEST SIGNALS: 1614 PTS/CH AT 6398.57 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
267	- 1:	SIDE ROSETTE GAGE #1	9836.00	UIN/IN	4+1+ 3	100.8	403	1599.64
268	- 2:	SIDE ROSETTE GAGE #3	10526.00	UIN/IN	4+1+ 3	100.8	403	1599.64
269	- 3:	SIDE ROSETTE GAGE #2	10909.00	UIN/IN	4+1+ 3	100.8	403	1599.64
270	- 4:	FRONT ROSETTE GAGE #1	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
271	- 5:	FRONT ROSETTE GAGE #2	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
272	- 6:	FRONT ROSETTE GAGE #3	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
273	- 7:	REAR ROSETTE GAGE #1	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
274	- 8:	REAR ROSETTE GAGE #2	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
275	- 9:	REAR ROSETTE GAGE #3	12000.00	UIN/IN	4+1+ 3	100.8	403	1599.64
276	- 10:	RIGHT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	403	1599.64
277	- 11:	LEFT LAP BELT LOAD	1000.00	LBS.	4+1+ 3	100.8	403	1599.64
278	- 12:	STEERING COLUMN LOAD	2222.00	LBS.	4+1+ 3	100.8	403	1599.64
279	- 13:	STEERING COLUMN ACCELEROMETER	50.00	G'S	4+1+ 3	100.8	403	1599.64

=====

FILTERED FILES: 267 - 279 DIGITAL TAPE: JEFF

DATE: 16-DEC-76

RUN ID: 76T020-21

PTS: 1 81 161 241 321 401

*2.5g  
2.5Hz*

7.E+00

1= 280

ID: 76T020-3:

*VISE  
2.5Hz*

3.E+00

2= 281

*3.5g  
2.5Hz*

8.E-01

3= 282

MSEC: 0 60 120 180 240 300

TAPE: THOR.2

=====  
RUN ID: 76T020-31

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT; FRONTAL IMPACT TEST SERIES

ANALOG TAPE: HSR#141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 25-OCT-76

TEST SIGNALS: 1715 PTS/CH AT 6397.02 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
200	1	AIRBAG PRESSURE	517.00	MM-HG	4+1+ 3	100.7	426 0	1599.25
201	2	VASCULAR PRESSURE	708.00	MM-HG	4+1+ 3	100.7	426 0	1599.25
202	3	AIRWAY PRESSURE	378.00	MM-HG	4+1+ 3	100.7	426 0	1599.25

41  
51  
61  
71  
81  
91  
101  
111  
121  
131  
141

-----  
FILTERED FILES: 200 - 202 DIGITAL TAPE: JEFF DATE: 16-DEC-76 RUN ID: 76T020-31  
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## SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test Number: 76T021

Test Date: June 14, 1976

Test Subject:

Age - 55

Sex - Female

Stature - 160.9 cm.

Weight - 43.2 kg.

Test Description:

Thoracic impact using HSRI cannon to simulate Part 572 test.

Velocity:

Piston velocity = 22 ft/sec.

Injuries:

1. 21 rib fractures roughly in a circle matching the diameter of the piston and centered at the bottom of the sternum.
2. Sternum fracture (at top of circle described above).
3. Several small contusions on lungs.
4. Liver. Several hemorrhages, approximately 0.5 cm. diameter on capsule.

AIS Number Estimate

TEST # 767021

TEST DATE 6.16.76

TEST DESCRIPTION Cannon front impact VELOCITY 22 ft/s

SUBJECT:

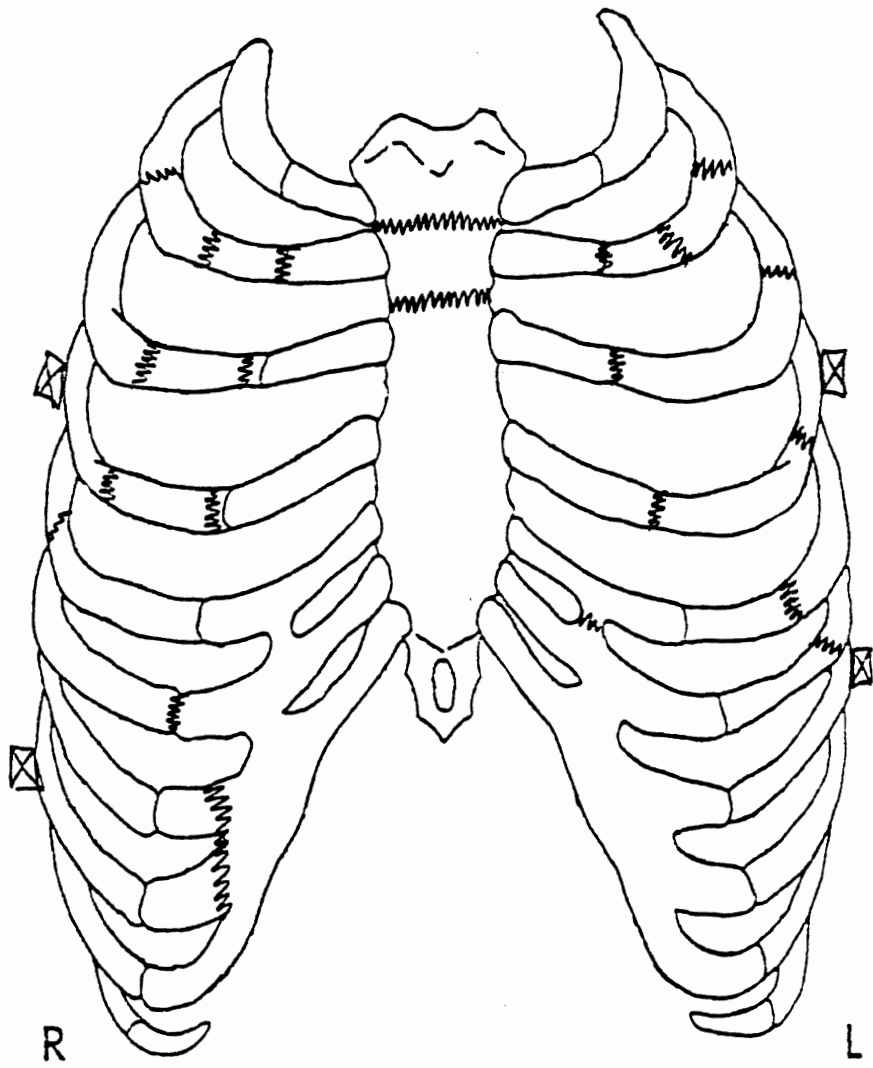
AGE 55 SEX F CAUSE OF DEATH unknown

INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	<u>C</u>	<u>B</u>	<u>C</u>	<u>P</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>3</u>
	4	<u>C</u>	<u>B</u>	<u>H</u>	<u>M</u>	<u>2</u>
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>R</u>	<u>H</u>	<u>L</u>	<u>3</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---



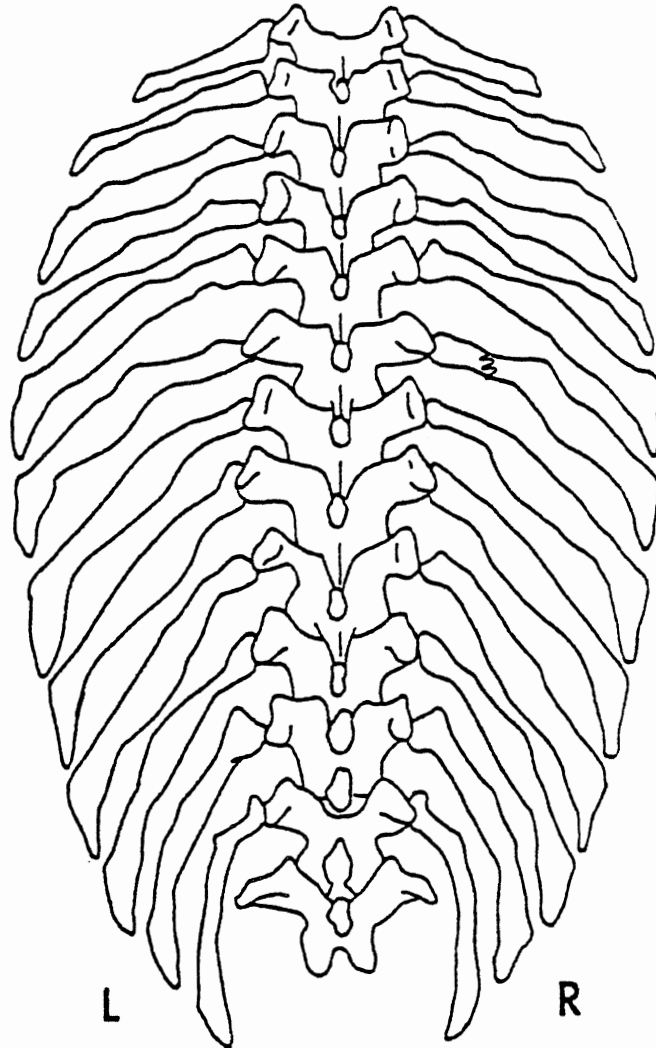
TEST # 76T024



ANTERIOR VIEW RIB CAGE

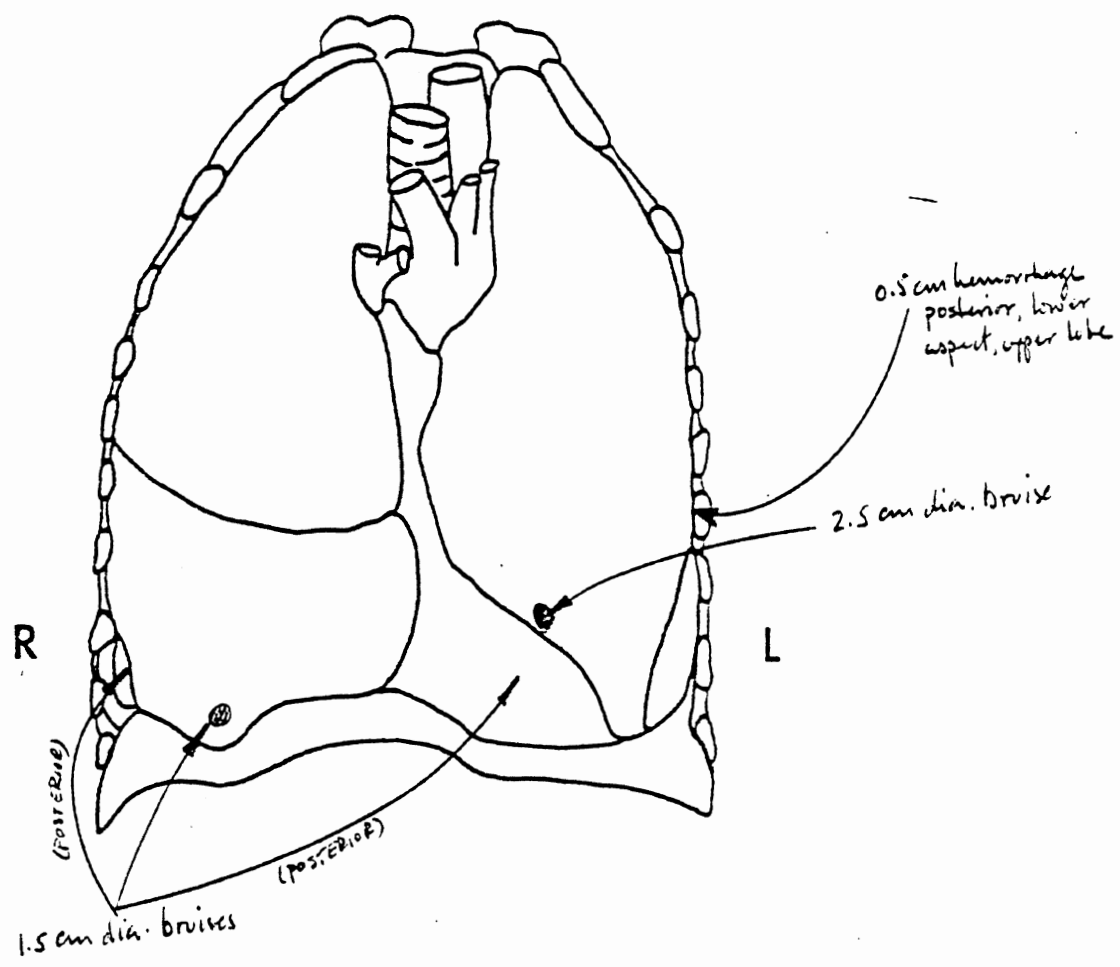
(Also:  
• several small (0.5cm) hemorrhages on liver capsule  
• 3 large areas of intra-muscular hemorrhage bilateral chest. (4-10 cm dia))

TEST # 76T021



POSTERIOR VIEW RIB CAGE

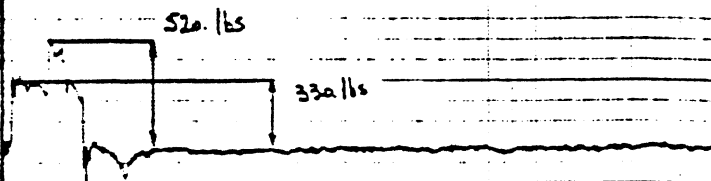
TEST # 767021



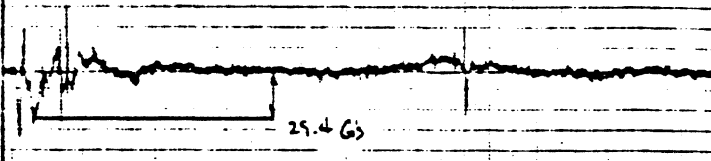
ANTERIOR VIEW THORACIC CAVITY

TEST # 76TC21

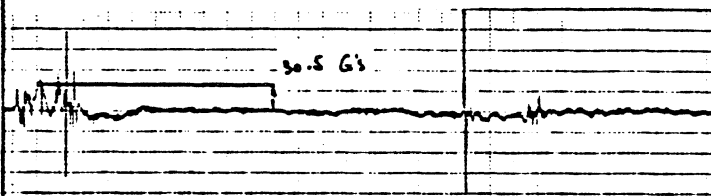
PISTON FORCE



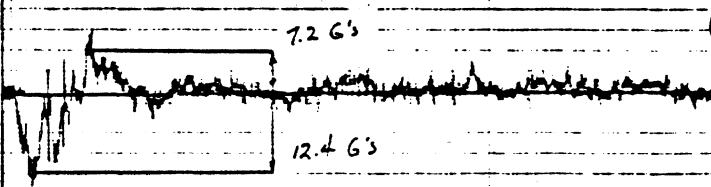
T<sub>1</sub> P-A ACCELEROMETER



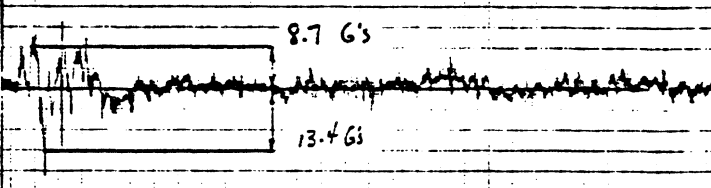
T<sub>1</sub> I-S ACCELEROMETER



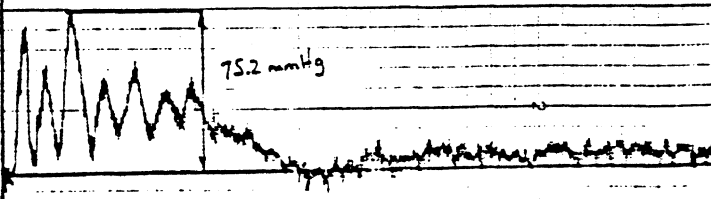
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



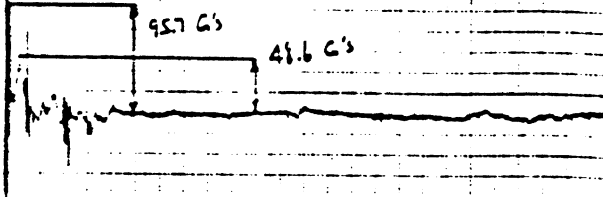
AIRWAY PRESSURE



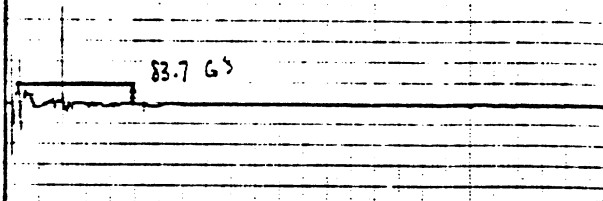
100 msec

TEST # 76TC27

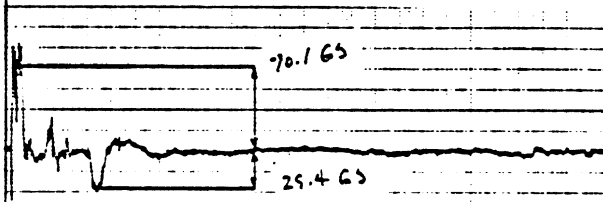
LEFT LOWER RIB ACCELEROMETER



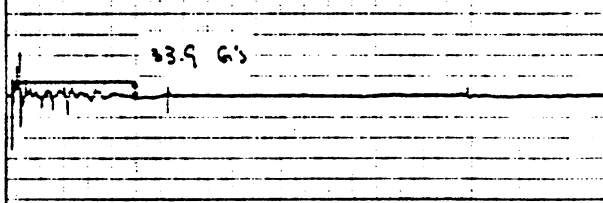
LEFT UPPER RIB ACCELEROMETER



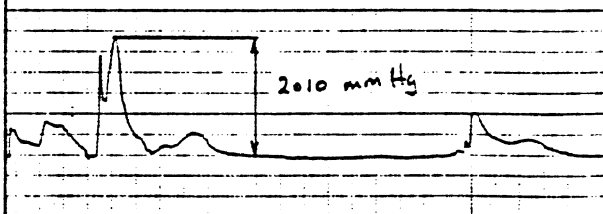
RIGHT LOWER RIB ACCELEROMETER



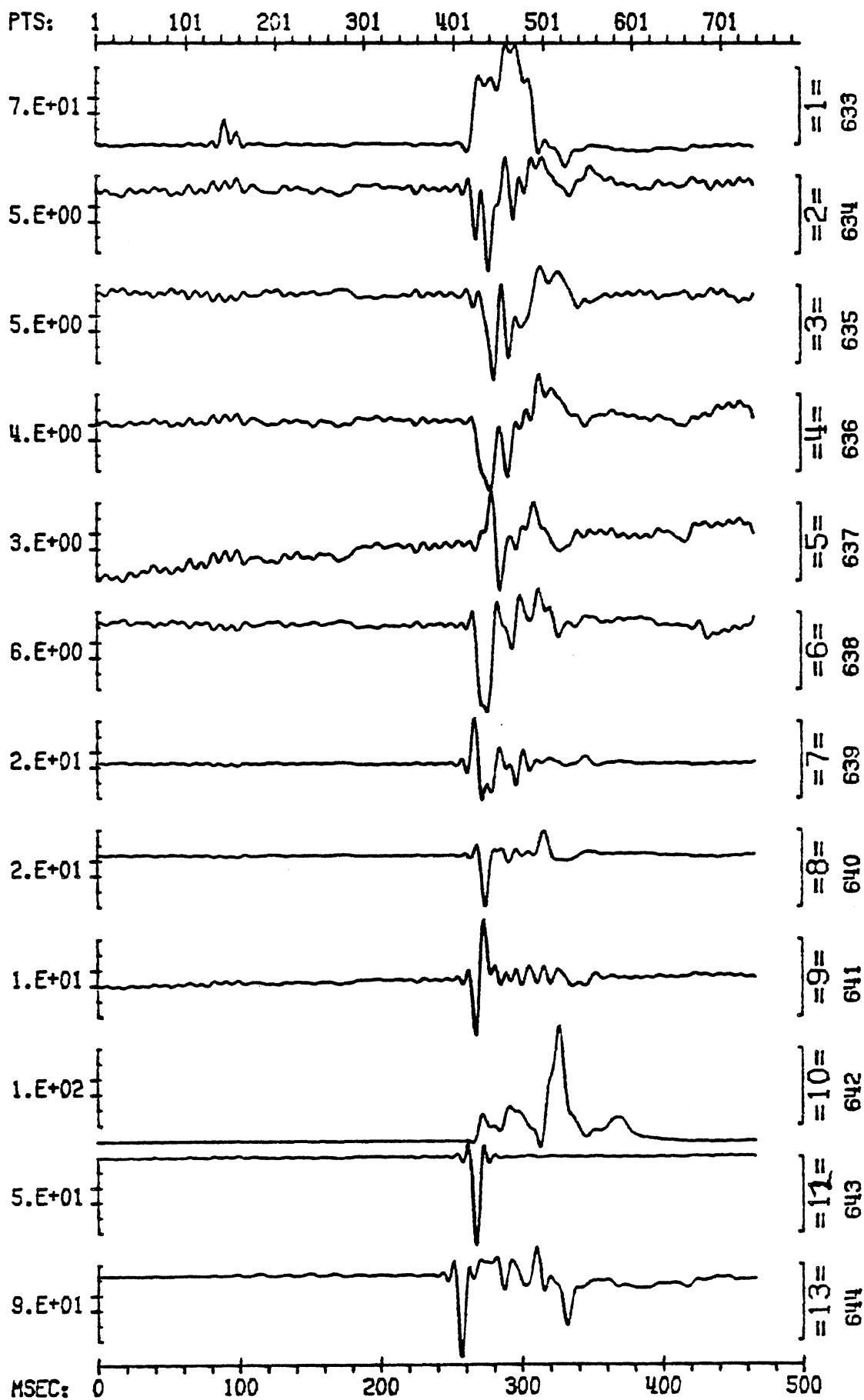
RIGHT UPPER RIB ACCELEROMETER



VASCULAR PRESSURE



100 msec



ID: 76T021-2:C

TAPE: THOR.2

\*\*\*\*\*  
 RUN ID: 76T021-21C  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 \*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77  
 TEST SIGNALS: 2950 PTS/CH AT 6307.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
633	- 1	COMP. FORCE	1000.00	LBS.	4+1+ 3	99.3	736 0	1576.97
634	- 2	T1 P-A ACCELEROMETER	292.00	G'S	4+1+ 3	99.3	736 0	1576.97
635	- 3	T1 I-S ACCELEROMETER	-250.00	G'S	4+1+ 3	99.3	736 0	1576.97
636	- 4	T12 P-A ACCELEROMETER	211.00	G'S	4+1+ 3	99.3	736 0	1576.97
637	- 5	T12 R-L ACCELEROMETER	190.00	G'S	4+1+ 3	99.3	736 0	1576.97
638	- 6	LEFT LOWER RIB ACCELEROMETER	-213.00	G'S	4+1+ 3	99.3	736 0	1576.97
639	- 7	LEFT UPPER RIB ACCELEROMETER	-214.00	G'S	4+1+ 3	99.3	736 0	1576.97
640	- 8	RIGHT LOWER RIB ACCELEROMETER	-167.00	G'S	4+1+ 3	99.3	736 0	1576.97
641	- 9	RIGHT UPPER RIB ACCELEROMETER	212.00	G'S	4+1+ 3	99.3	736 0	1576.97
642	- 10	VASCULAR PRESSURE	203.00	MM-HG	4+1+ 3	99.3	736 0	1576.97
643	- 11	AIRWAY PRESSURE	370.00	MM-HG	4+1+ 3	99.3	736 0	1576.97
644	- 12	PISTON DECELERATION PULSE	500.00	G'S	4+1+ 3	99.3	736 0	1576.97

12

14

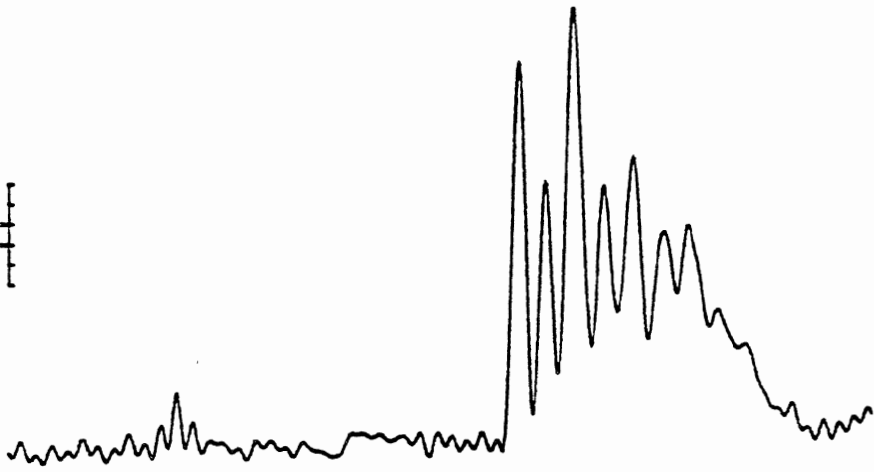
\*\*\*\*\*  
 FILTERED FILES: 633 \* 644 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T021-21C  
 \*\*\*\*\*

PTS: 1 101 201 301 401 501 601 701

ID: 76T021-2:C

AREW  
(multi)

3.E+00



=12=  
852

MSEC: 0 100 200 300 400 500

TAPE: THOR.2X



=====

RUN ID: 76T021-21C

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 2950 PTS/CH AT 6307.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							
120	AIRWAY PRESSURE	370.00	MM-HG	4+1	3	99.3	736 @ 1576.97
130							
140							

852 - 120 AIRWAY PRESSURE 370.00 MM-HG 4+1 3 99.3 736 @ 1576.97

130

140

=====

FILTERED FILES: 852 - 892 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T021-21C



SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test Number: 76T022

Test Date: June 22, 1976

Test Subject:

Age - 85

Sex - Male

Stature - 164.6 cm.

Weight - 60.1 kg.

Test Description:

Thoracic impact using HSRI cannon to simulate Part 572 test.

Velocity:

Piston velocity = 15 ft/sec

Injuries:

6 rib fractures - left - R5, R6  
right - R3, R4, R5, R6

AIS Number Estimate:

3

TEST # 76T022

TEST DATE 6.22.79

TEST DESCRIPTION Cannon front impact VELOCITY 15.4/s

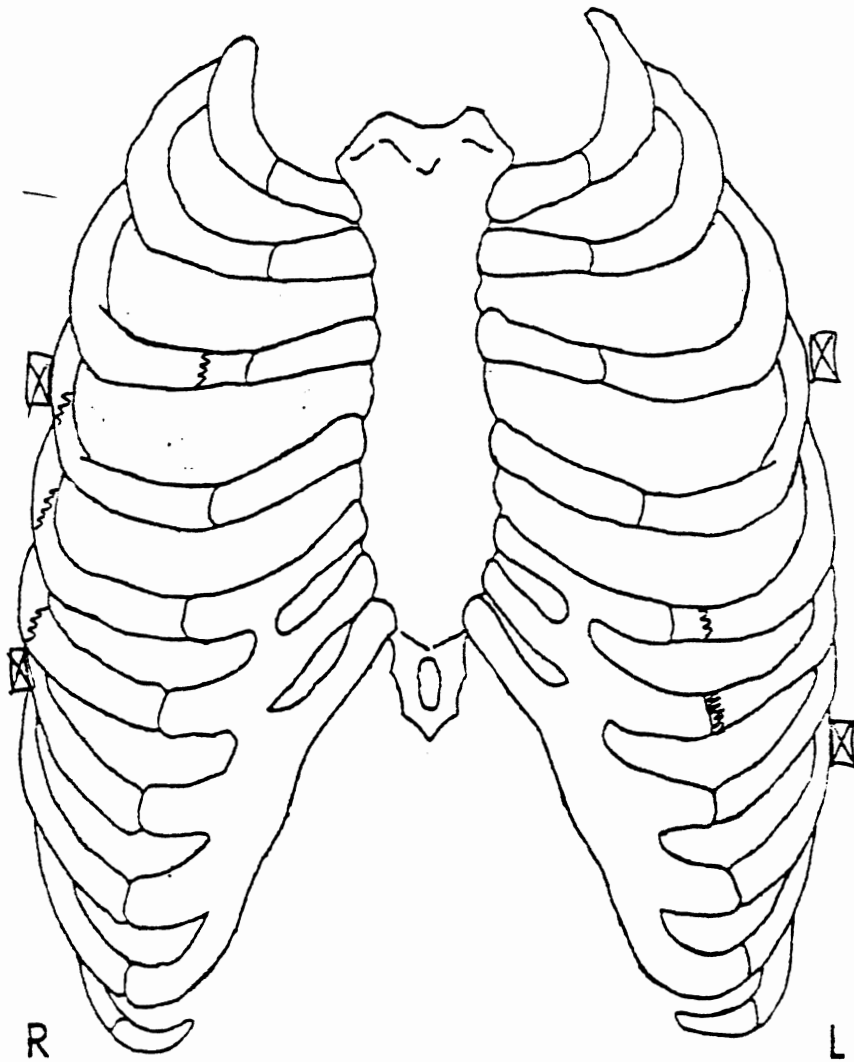
SUBJECT:

AGE 85 SEX M CAUSE OF DEATH pulmonary embolism

INJURY INFORMATION: OVERALL THORACIC AIS 3

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>3</u>
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____
	6	_____	_____	_____	_____	_____
	7	_____	_____	_____	_____	_____
	8	_____	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____	_____
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____

TEST # 767022

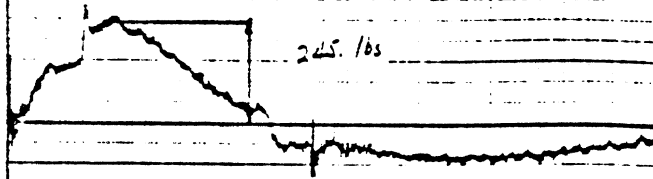


ANTERIOR VIEW RIB CAGE

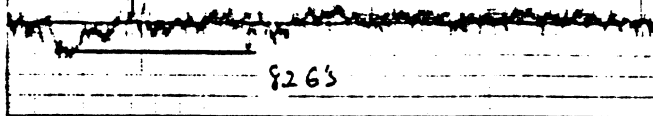
*no thoracic organ  
injuries observed.*

TEST #76TC23

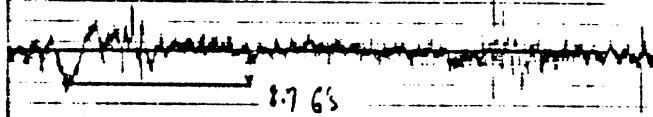
PISTON FORCE



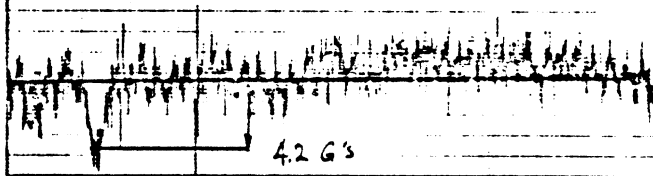
T<sub>1</sub> P-A ACCELEROMETER



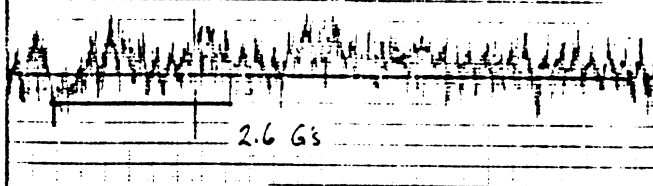
T<sub>1</sub> I-S ACCELEROMETER



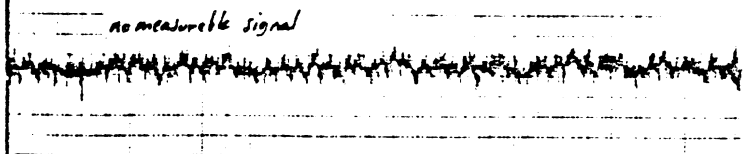
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



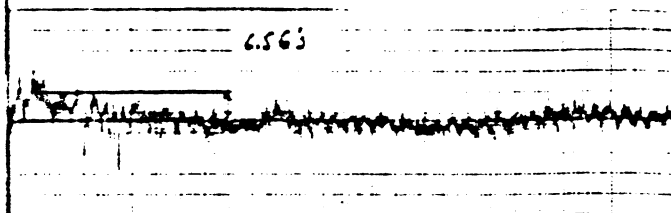
AIRWAY PRESSURE



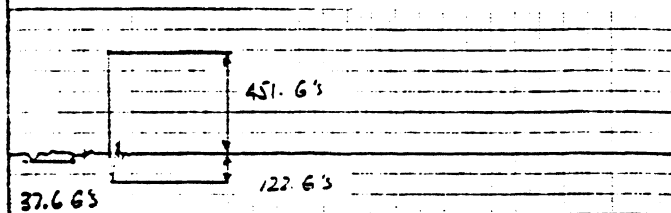
100 msec

TEST #76T023

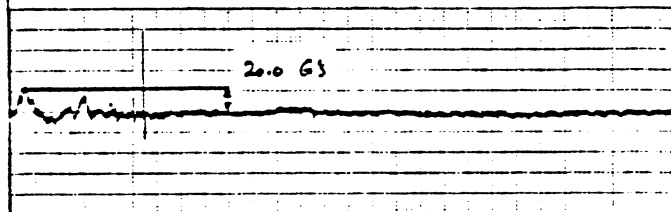
LEFT LOWER RIB ACCELEROMETER



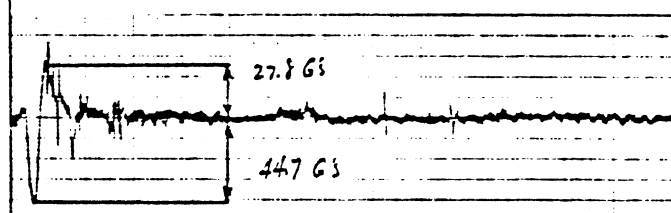
LEFT UPPER RIB ACCELEROMETER



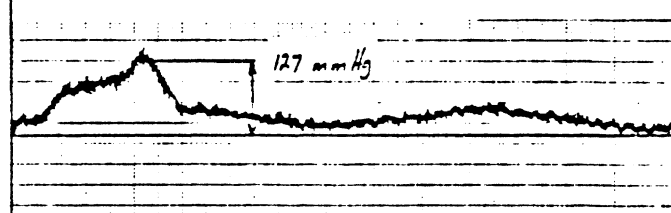
RIGHT LOWER RIB ACCELEROMETER



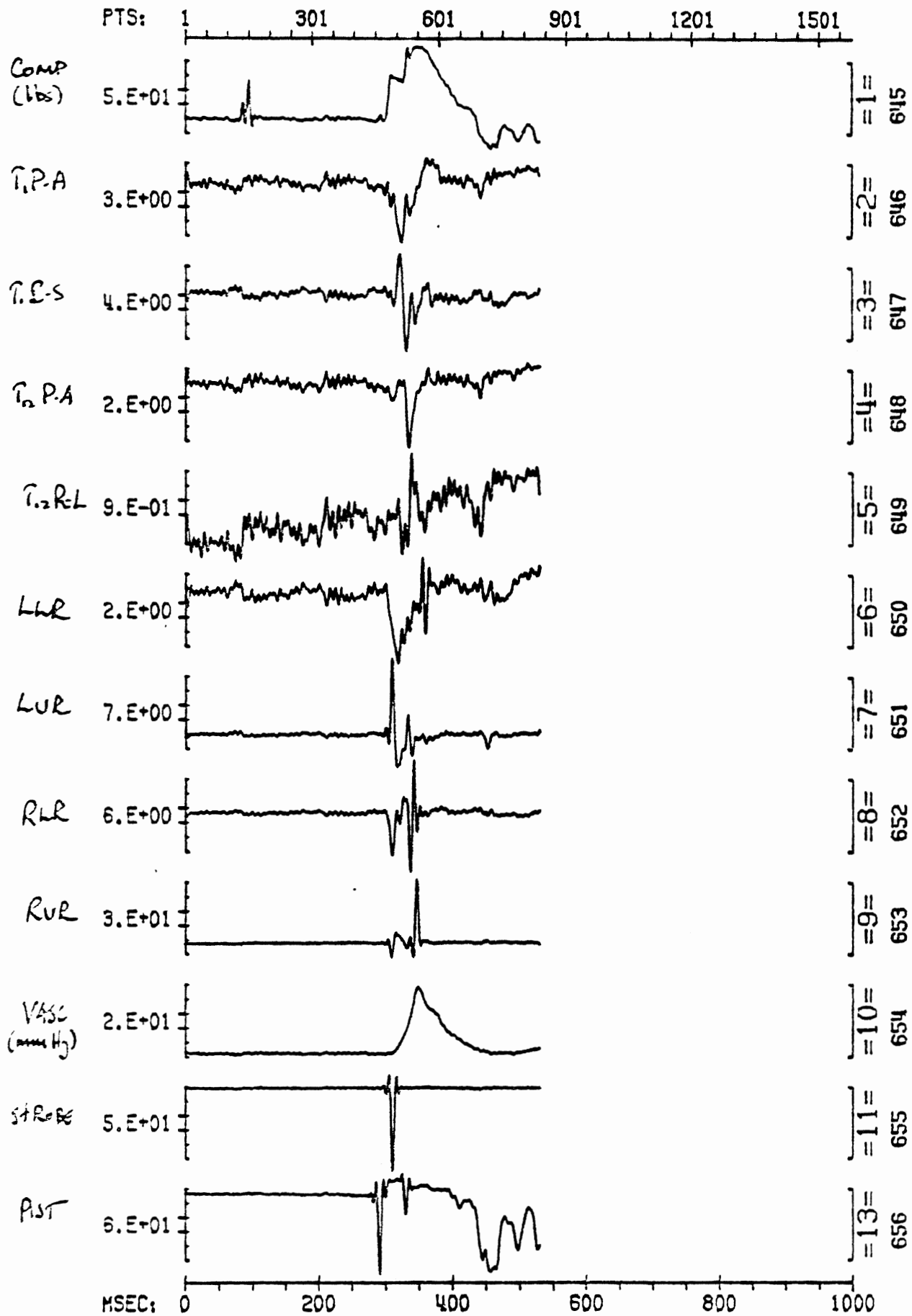
RIGHT UPPER RIB ACCELEROMETER



VASCULAR PRESSURE



100 msec



ID: 76T022-2:0

TAPE: THOR.2



=====

RUN ID: 76T022-21C

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 4174 PTS/CH AT 6310.02 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
645	- 11	COMP. FORCE	1000.00	LOB.	4+1+ 3	99.4	836 0	1577.51
646	- 21	T1 P-A ACCELEROMETER	292.00	G'S	4+1+ 3	99.4	836 0	1577.51
647	- 31	T1 I-S ACCELEROMETER	-256.00	G'S	4+1+ 3	99.4	836 0	1577.51
648	- 41	T12 P-A ACCELEROMETER	211.00	G'S	4+1+ 3	99.4	836 0	1577.51
649	- 51	T12 R-L ACCELEROMETER	198.00	G'S	4+1+ 3	99.4	836 0	1577.51
650	- 61	LEFT LOWER RIB ACCELEROMETER	-213.00	G'S	4+1+ 3	99.4	836 0	1577.51
651	- 71	LEFT UPPER RIB ACCELEROMETER	-214.00	G'S	4+1+ 3	99.4	836 0	1577.51
652	- 81	RIGHT LOWER RIB ACCELEROMETER	-167.00	G'S	4+1+ 3	99.4	836 0	1577.51
653	- 91	RIGHT UPPER RIB ACCELEROMETER	212.00	G'S	4+1+ 3	99.4	836 0	1577.51
654	- 101	VASCULAR PRESSURE	203.00	MM-HG	4+1+ 3	99.4	836 0	1577.51
655	- 111	AIRWAY PRESSURE	376.00	MM-HG	4+1+ 3	99.4	836 0	1577.51
		121						
656	- 131	PISTON DECELERATION PULSE	500.00	G'S	4+1+ 3	99.4	836 0	1577.51
		141						

=====

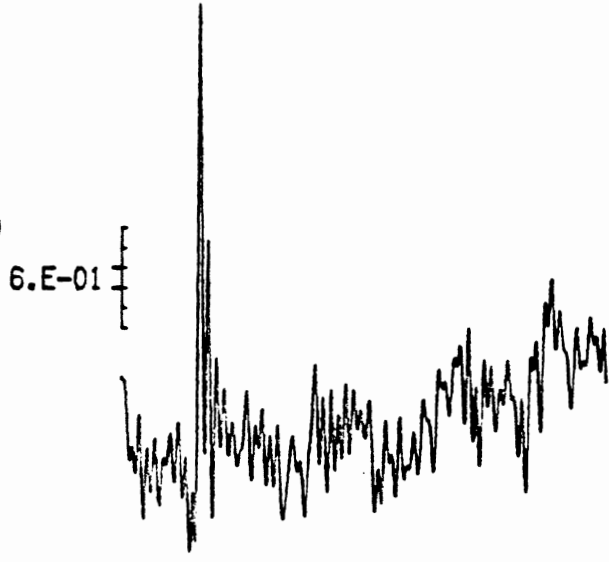
FILE: 645 - 656 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T022-21C

=====

PTS: 1 301 601 901 1201 1501

ID: 76T022-2:C

*Area  
(units)*



$\overline{=12=}$   
853

MSEC: 0 200 400 600 800 1000

TAPE: THOR.2X

\*\*\*\*\*

RUN ID: 76T022-21C

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 4174 PTS/CH AT 6310.02 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11								
21								
31								
41								
51								
61								
71								
81								
91								
101								
111								
121		AIRWAY PRESSURE	370.00	MM-HG	4+1+3	99.4	836	1577.51
131								
141								

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111
- 121 - AIRWAY PRESSURE
- 131
- 141

\*\*\*\*\*

FILTERED FILE: 853 - 053 DIGITAL TAPE: THOR,2 DATE: 26-JAN-77 RUN ID: 76T022-21C

\*\*\*\*\*

SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

Test Number: 76T024

Test Date: June 25, 1976

Test Subject:

Age - 75

Sex - Female

Stature - 169.0 cm.

Weight - 76.1 kg.

Test Description:

Thoracic impact using HSRI cannon to simulate Part 572 test.  
Piston impact centered on sternum.

Velocity:

Piston velocity = 15 ft/sec

Injuries:

1. 15 rib fractures forming circle roughly matching impactor.
2. 2 small lung contusions.

AIS Number Estimate:

TEST # 767024

TEST DATE 6.25.79

TEST DESCRIPTION Cannon Front impact VELOCITY 15. ft/s

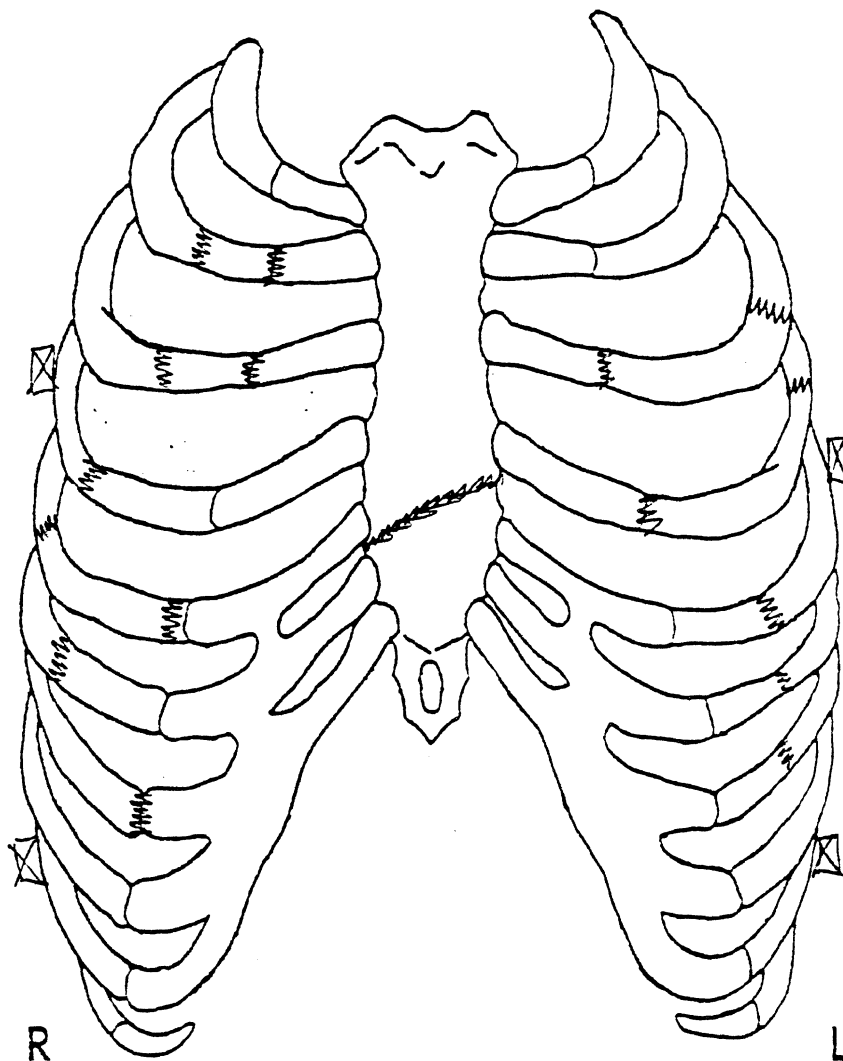
SUBJECT:

AGE 75 SEX F CAUSE OF DEATH ventricular fibrillation

INJURY INFORMATION: OVERALL THORACIC AIS 4

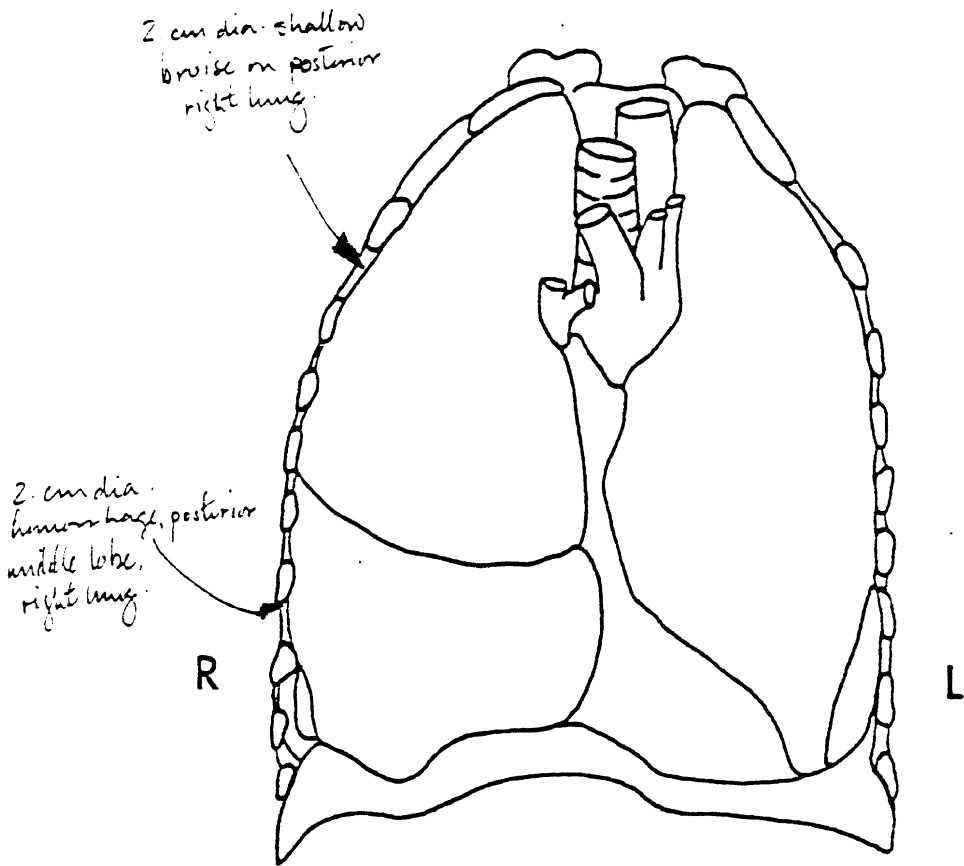
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	<u>C</u>	<u>R</u>	<u>C</u>	<u>P</u>	<u>3</u>
	3	<u>C</u>	<u>R</u>	<u>H</u>	<u>P</u>	<u>3</u>
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

TEST # 76T024



ANTERIOR VIEW RIB CAGE

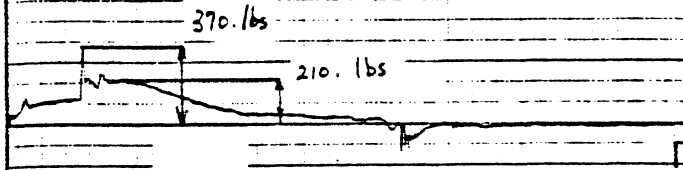
TEST # 767024



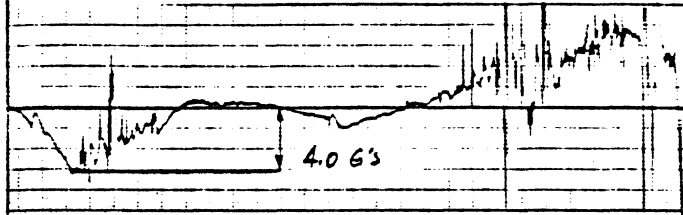
ANTERIOR VIEW THORACIC CAVITY

TEST #76T024

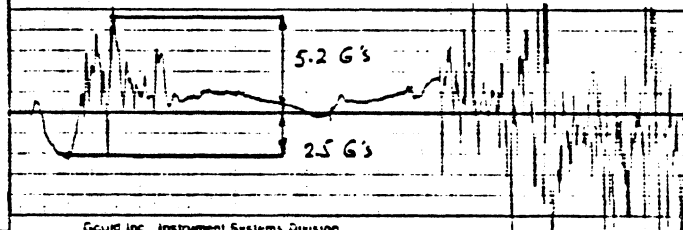
PISTON FORCE



T<sub>1</sub> P-A ACCELEROMETER

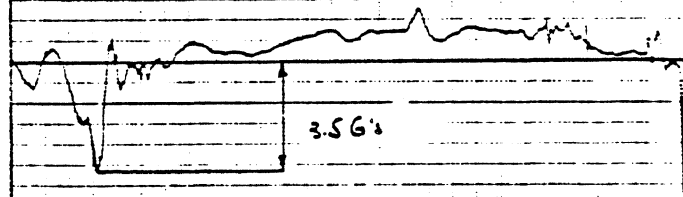


T<sub>1</sub> I-S ACCELEROMETER

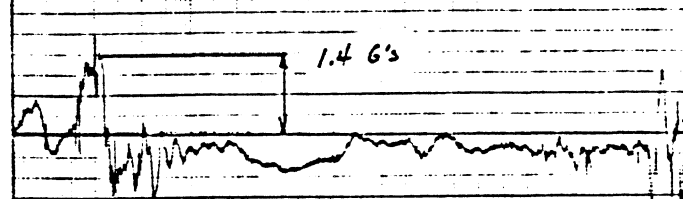


GoULD Inc., Instrument Systems Division

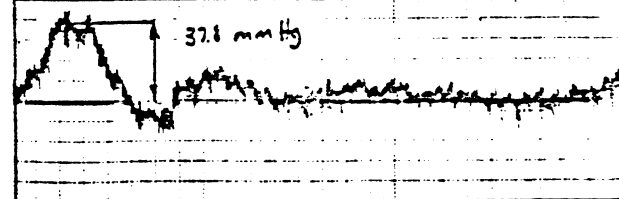
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



AIRWAY PRESSURE

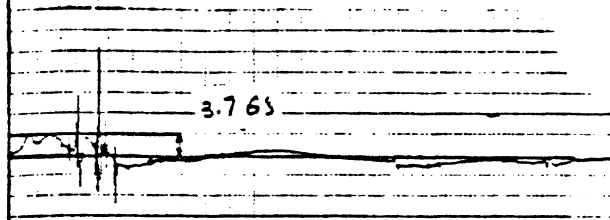


100 msec

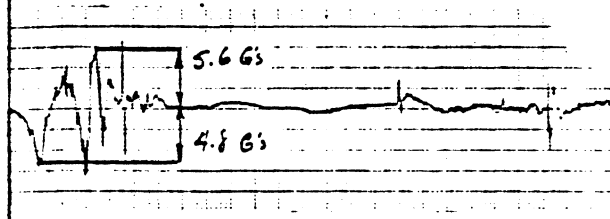


TEST #76T024

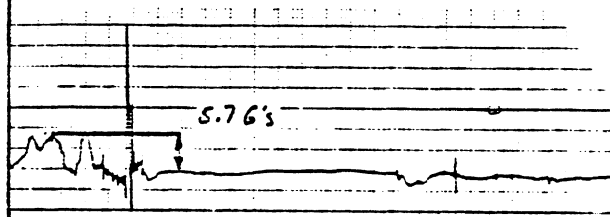
LEFT LOWER RIB ACCELEROMETER



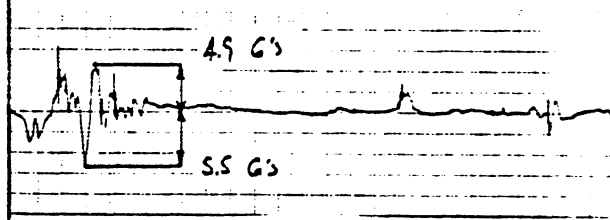
LEFT UPPER RIB ACCELEROMETER



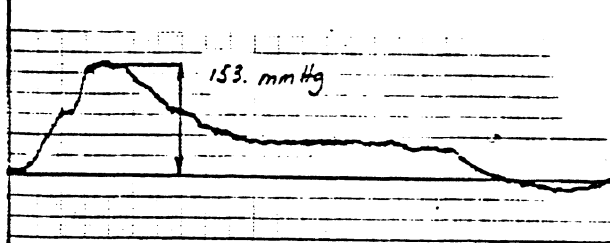
RIGHT LOWER RIB ACCELEROMETER



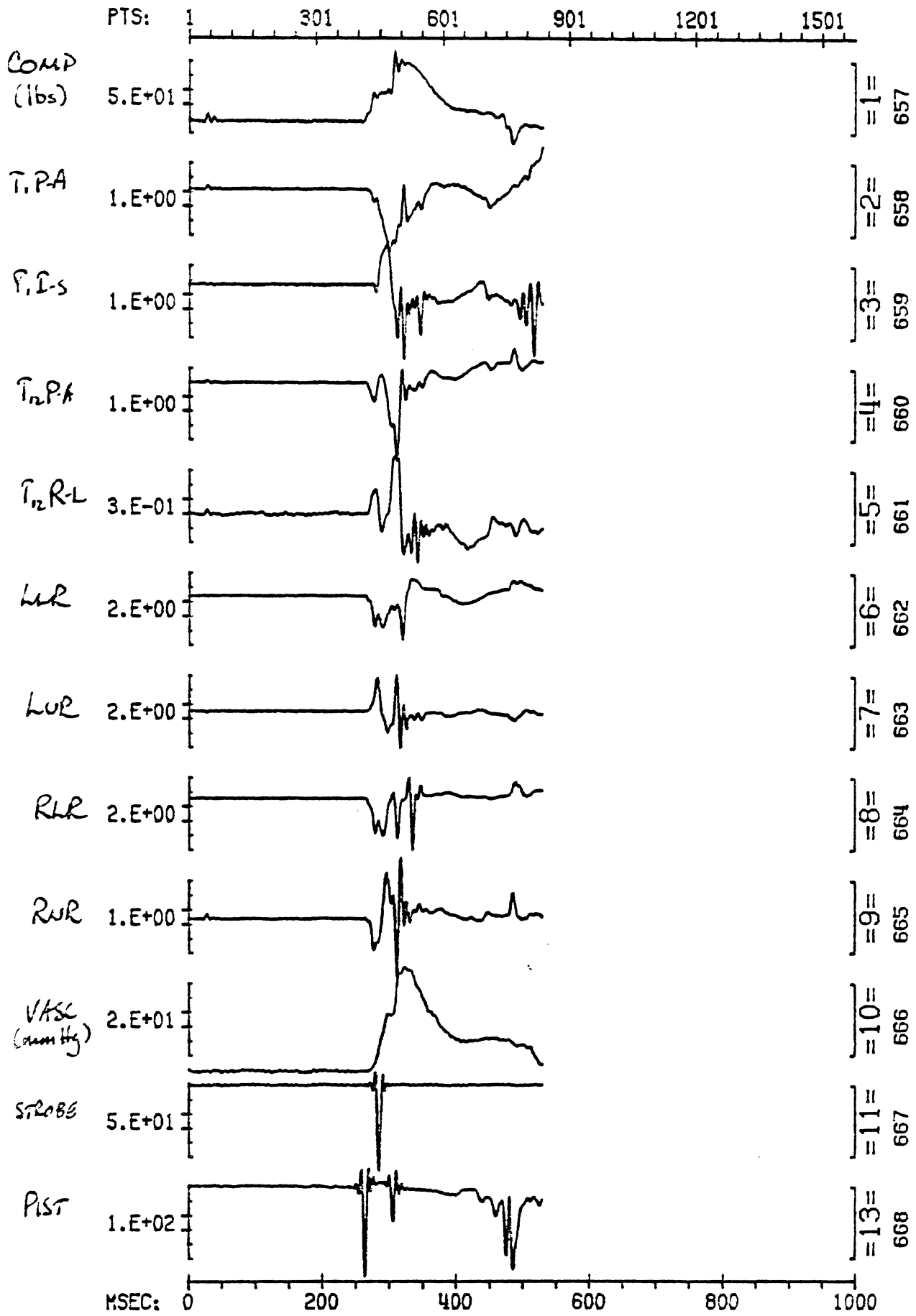
RIGHT UPPER RIB ACCELEROMETER



VASCULAR PRESSURE



100 msec



ID: 76T024-2:C

TAPE: THOR.2

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RUN ID: 76T024-2IC

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 17-JAN-77

TEST SIGNALS: 3840 PTS/CH AT 6310.21 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
657	11 COMP. FORCE	400.00	LBS.	4+1+ 3	99.4	836	1577.55
658	21 T1 P-A ACCELEROMETER	5.80	G'S	4+1+ 3	99.4	836	1577.55
659	31 T1 I-S ACCELEROMETER	-5.20	G'S	4+1+ 3	99.4	836	1577.55
660	41 T12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	99.4	836	1577.55
661	51 T12 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	99.4	836	1577.55
662	61 LEFT LOWER RIB ACCELEROMETER	-4.30	G'S	4+1+ 3	99.4	836	1577.55
663	71 LEFT UPPER RIB ACCELEROMETER	-4.30	G'S	4+1+ 3	99.4	836	1577.55
664	81 RIGHT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+ 3	99.4	836	1577.55
665	91 RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+ 3	99.4	836	1577.55
666	101 VASCULAR PRESSURE	203.00	MM-HG	4+1+ 3	99.4	836	1577.55
667	111 AIRWAY PRESSURE	378.00	MM-HG	4+1+ 3	99.4	836	1577.55

121

668 - 131 PISTON DECELERATION PULSE

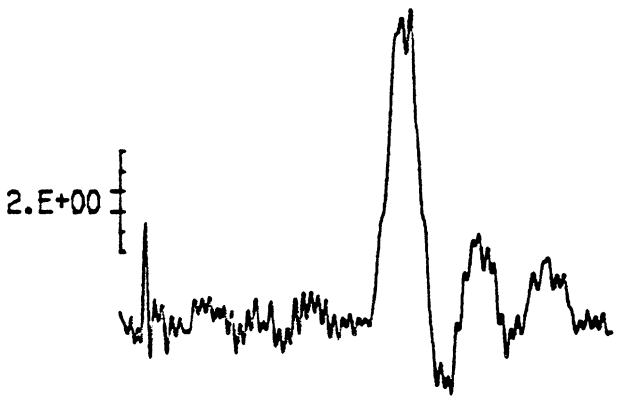
141

\*\*\*\*\*  
FILTERED FILES: 657 - 668 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T024-2IC  
\*\*\*\*\*

PTS: 1 301 601 901 1201 1501

ID: 76T024-2:C

Area  
(units)



=12=  
854

MSEC: 0 200 400 600 800 1000

TAPE: THOR.2X

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RUN ID: 76T024-21C

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 3840 PTS/CH AT 6310.21 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
------	----	--------------------	------------	-------	---------------	---------------	---------	----------------

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:

854 - 12: AIRWAY PRESSURE 378.00 MM-HG 4+1+ 3 99.4 836 0 1577.55

- 13:
- 14:

\*\*\*\*\*  
FILTERED FILES: 854 - 854 DIGITAL TAPE: THOR,2 DATE: 26-JAN-77 RUN ID: 76T024-21C

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Number: 76T025

Test Date: June 30, 1976

Test Subject:

Age - 66

Sex - Male

Stature - 174.6 cm

Weight - 69.7 kg

Test Description:

Thoracic Impact using HSRI cannon to simulate Part 572 test.  
Piston impact centered on sternum.

Velocity:

Piston velocity - 24 ft/sec.

Injuries:

1. 9 rib fracture outlining impactor
2. Sternum fracture.
3. Bruising on left dorsal side of heart at depth of 1 - 2 mm,  
also, 2 cm. x 5 cm. bruise in heart muscle.
4. 2 cm. hemorrhage on pericardium.
5. Several small hemorrhages on diaphragm

AIS Number Estimate

TEST # 767025

TEST DATE 6.30.76

TEST DESCRIPTION Common front impact VELOCITY 24 ft/s

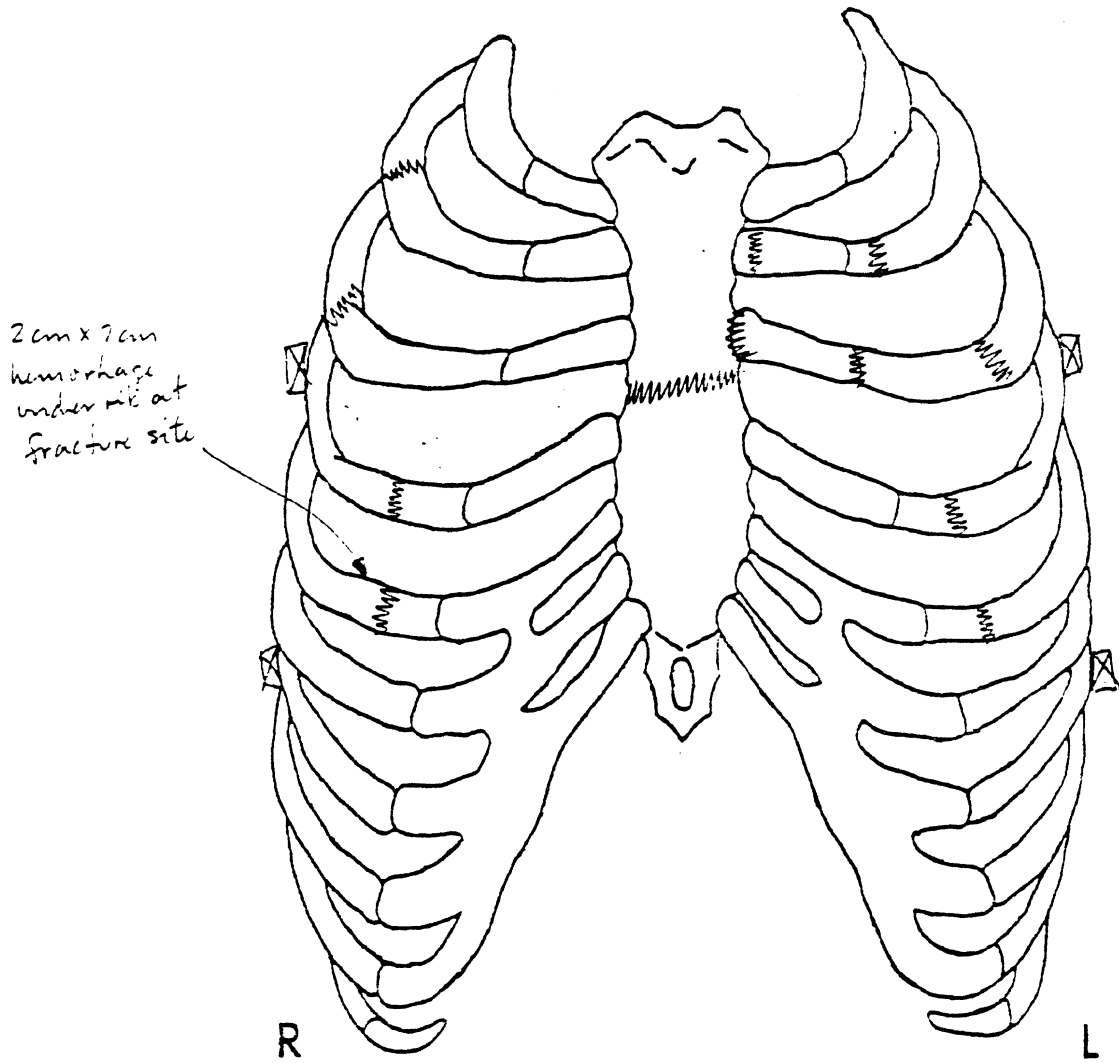
SUBJECT:

AGE 66 SEX M CAUSE OF DEATH post. pulmonary embolism

INJURY INFORMATION: OVERALL THORACIC AIS 1

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>3</u>
	4	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>S</u>	<u>C</u>	<u>M</u>	<u>2</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

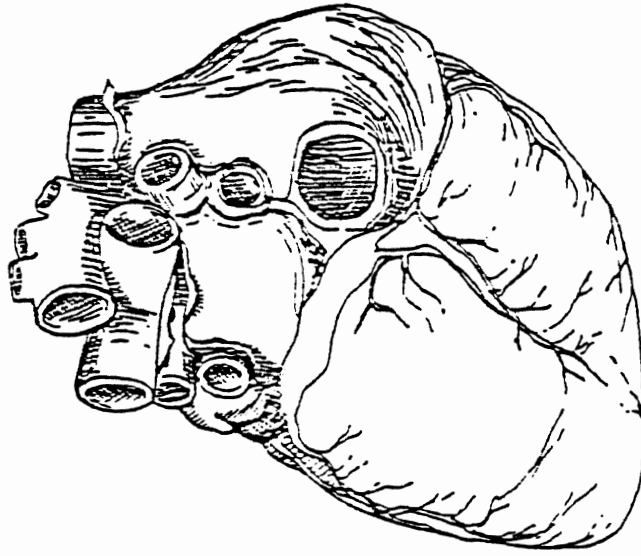
TEST # 76705



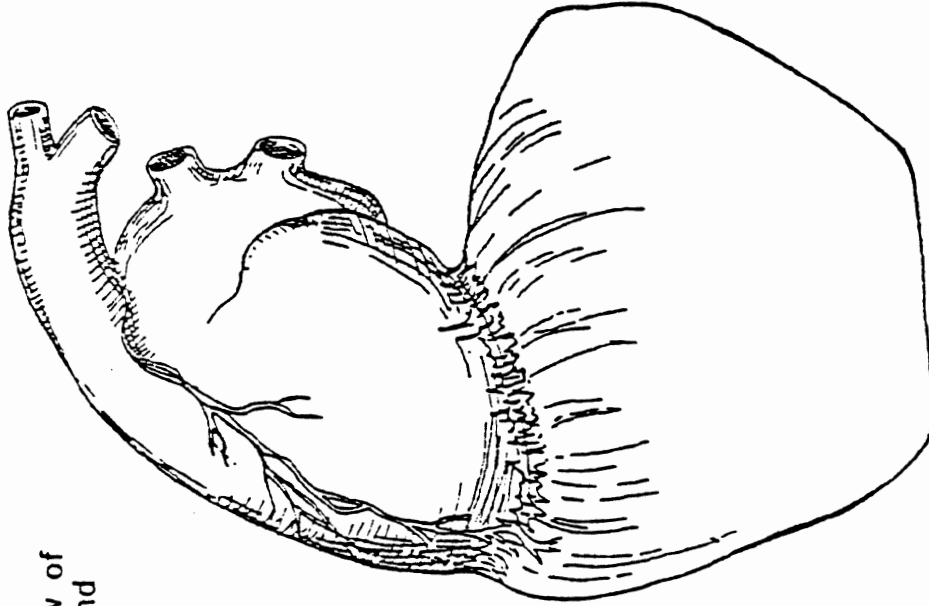
ANTERIOR VIEW RIB CAGE



Diaphragmatic View of Heart

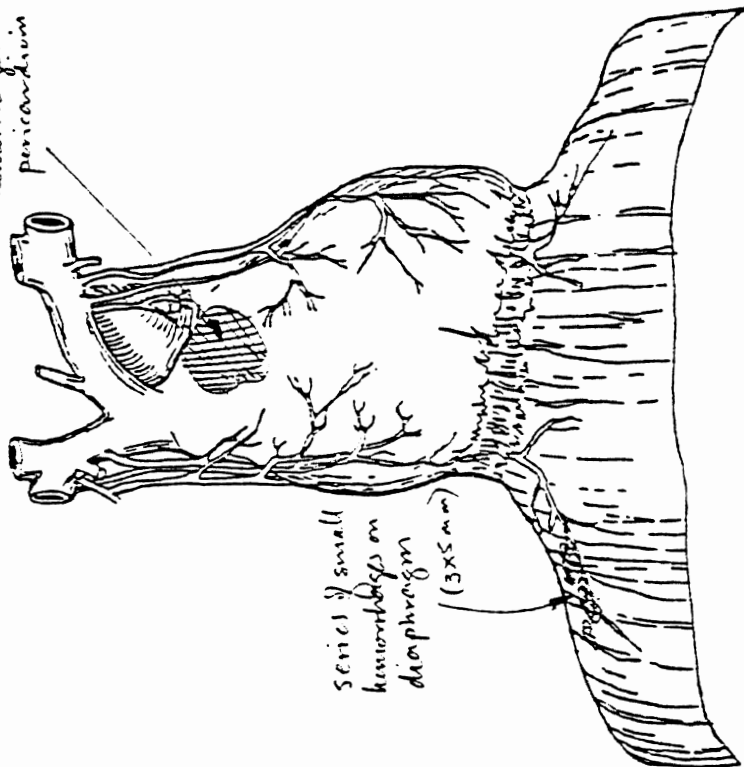


Left Side View of Pericardium and Diaphragm



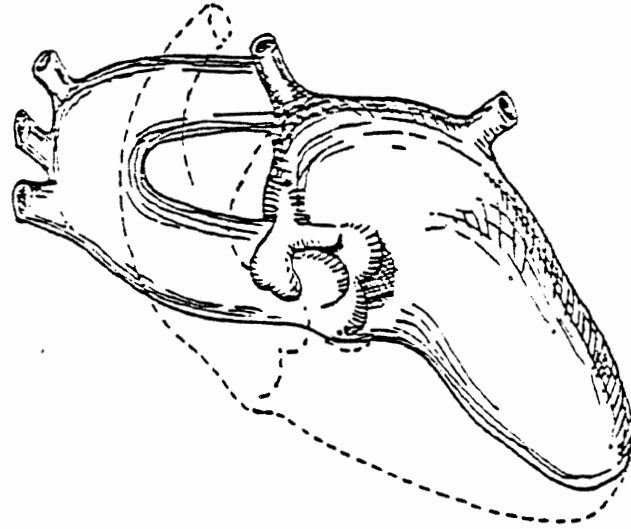
2 cm diameter hemorrhage on pericardium

Series of small hemorrhages on diaphragm (3x5 mm)

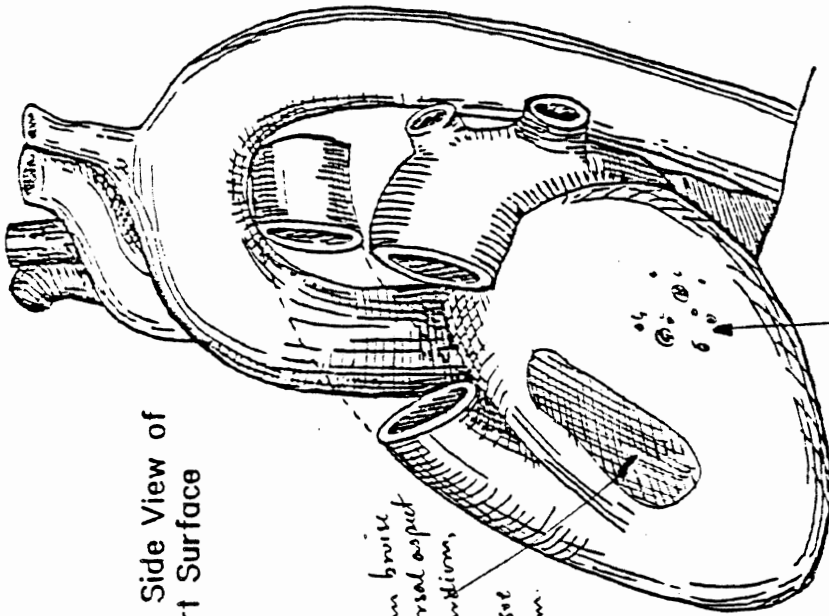


Anterior View of Pericardium and Diaphragm

Left View of Left Side of Heart

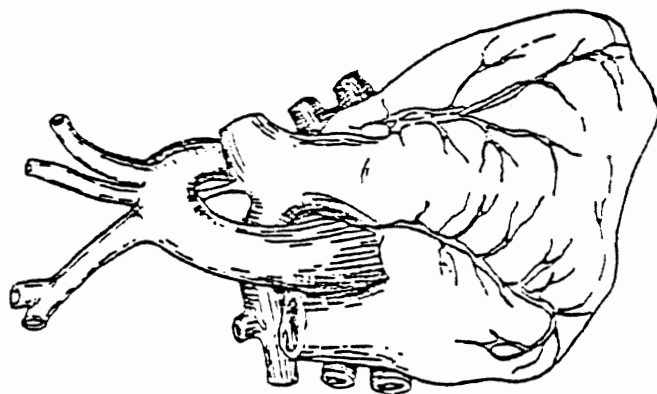


Left Side View of Heart Surface



2 cm x 5 cm brivie on left dorsal aspect of myocardium, through tissue to last 1 mm.

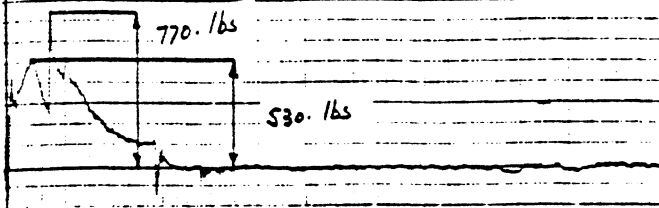
several small brivies mediobasal aspect of myocardium. 2 @ 5 mm dia, plus several smaller. (1-2 mm depth)



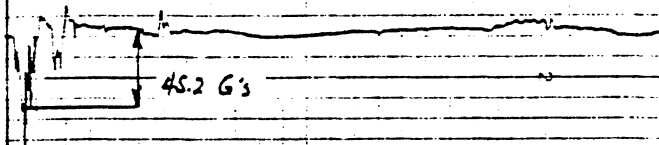
Anterior View of Heart

TEST #767025

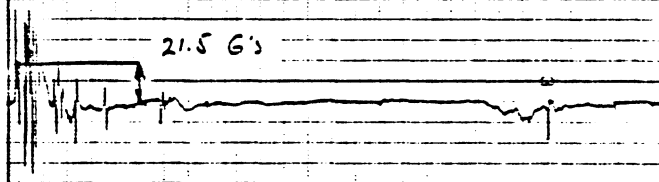
PISTON FORCE



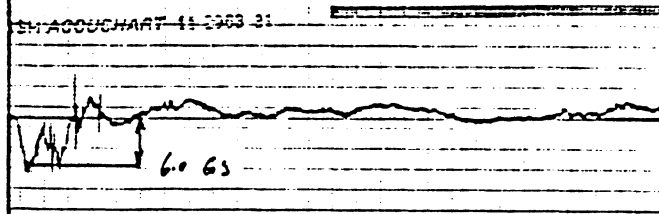
T<sub>1</sub> P-A ACCELEROMETER



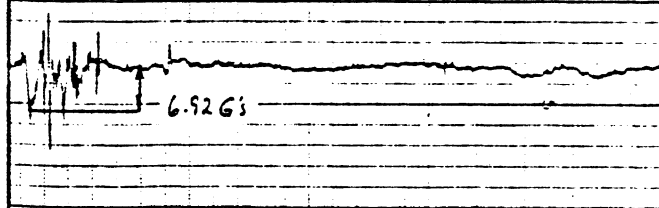
T<sub>1</sub> I-S ACCELEROMETER



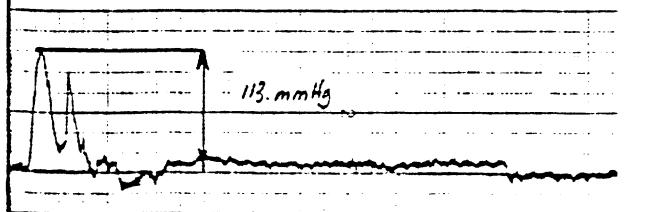
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



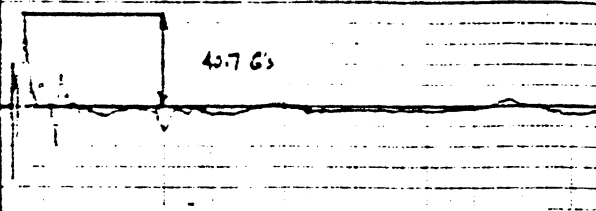
AIRWAY PRESSURE



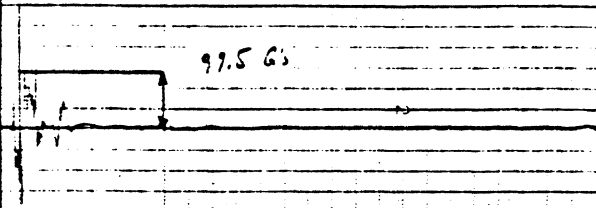
100 msec

TEST #76T025

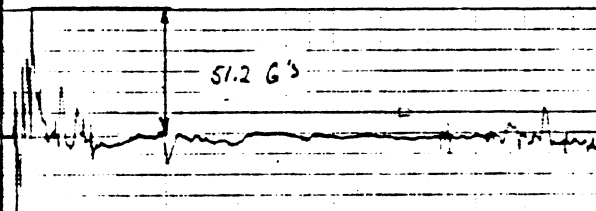
LEFT LOWER RIB ACCELEROMETER



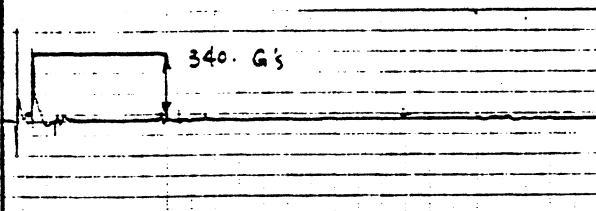
LEFT UPPER RIB ACCELEROMETER



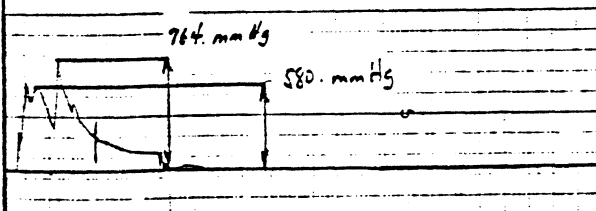
RIGHT LOWER RIB ACCELEROMETER



RIGHT UPPER RIB ACCELEROMETER



VASCULAR PRESSURE



100 msec

PTS: 1 101 201 301 401 501 601 701

COMP  
(lbs.)

7.E+01

=1=  
669

P<sub>1</sub>P-A

7.E+00

=2=  
670

P<sub>1</sub>S-S

5.E+00

=3=  
671

P<sub>12</sub>P-A

2.E+00

=4=  
672

P<sub>12</sub>R-t

2.E+00

=5=  
673

L<sub>1</sub>R

5.E+00

=6=  
674

L<sub>2</sub>R

2.E+01

=7=  
675

L<sub>3</sub>R

5.E+00

=8=  
676

L<sub>4</sub>R

2.E+01

=9=  
677

VASC  
(mmHg)

8.E+01

=10=  
678

STROBE

5.E+01

=11=  
679

PIST

9.E+01

=13=  
680

MSEC: 0 100 200 300 400 500

ID: 76T025-2:C

TAPE: THOR.2

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RUN ID: 76T025-21C

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HBRI-141 EXPANDED 1611, HAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 2926 PTS/CH AT 6309.43 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
669	1	COMP. FORCE	1000.00	LBS.	4+1+3	99.4	732	1577.36
670	2	T1 P-A ACCELEROMETER	50.30	G'S	4+1+3	99.4	732	1577.36
671	3	T1 I-S ACCELEROMETER	51.60	G'S	4+1+3	99.4	732	1577.36
672	4	T12 P-A ACCELEROMETER	42.20	G'S	4+1+3	99.4	732	1577.36
673	5	T12 R-L ACCELEROMETER	39.50	G'S	4+1+3	99.4	732	1577.36
674	6	LEFT LOWER RIB ACCELEROMETER	42.60	G'S	4+1+3	99.4	732	1577.36
675	7	LEFT UPPER RIB ACCELEROMETER	42.00	G'S	4+1+3	99.4	732	1577.36
676	8	RIGHT LOWER RIB ACCELEROMETER	33.60	G'S	4+1+3	99.4	732	1577.36
677	9	RIGHT UPPER RIB ACCELEROMETER	42.50	G'S	4+1+3	99.4	732	1577.36
678	10	VASCULAR PRESSURE	203.00	MM-HG	4+1+3	99.4	732	1577.36
679	11	AIRWAY PRESSURE	370.00	MM-HG	4+1+3	99.4	732	1577.36

121

680 - 131 PISTON DECELERATION PULSE

141

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FILTERED FILES: 669 - 680 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T025-21C

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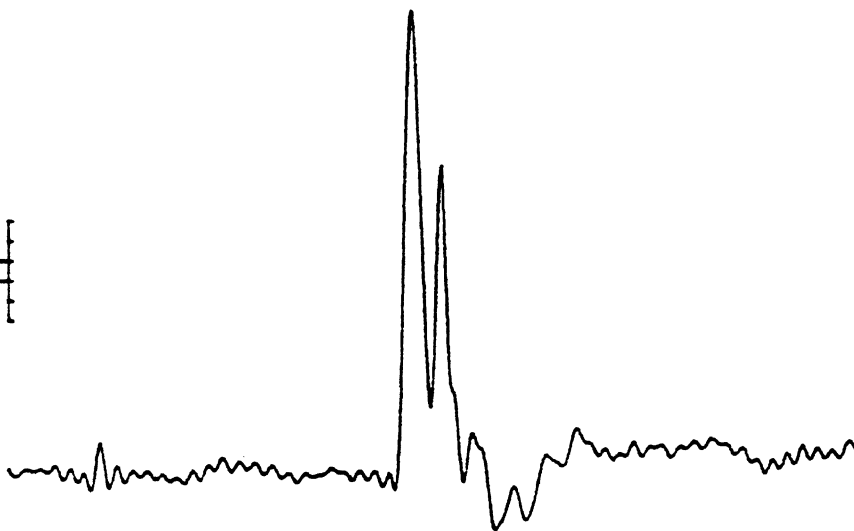
PTS: 1 101 201 301 401 501 601 701

76T025-2:C

ID:

*low*  
*(unit)*

4.E+00



12= 855

MSEC: 0 100 200 300 400 500

TAPE: THOR.2X

\*\*\*\*\*  
RUN ID: 76T025-21C

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS  
ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77  
TEST SIGNALS: 2926 PTS/CH AT 6309.43 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH CONTENT OF CHANNEL UNITS/VOLT UNITS FILTER STAGES FILTER CUTOFF NO. SAMPLING  
PTS HERTZ

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111

855 - 121 AIRWAY PRESSURE 378.00 MM-HG 411.3 99.4 732.0 1577.36

- 131
- 141

\*\*\*\*\*  
FILTERED FILES: 855 - 855 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T025-21C



SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER: 76T029

TEST DATE: July 28, 1976

TEST SUBJECT: Age - 67

Sex - Male

Stature - 167.1 cm.

Weight - 62.5 kg.

RESTRAINT SYSTEM

None: Impact with padded door side structure

VELOCITY: 15 mph change in velocity

INJURIES: 4 rib fractures on left side.

AIS NUMBER ESTIMATE:

TEST # 96T029

TEST DATE 7.26.76

TEST DESCRIPTION Sculptured Foam Padded Slide Sted Impact VELOCITY 22.0 ft/s

SUBJECT:

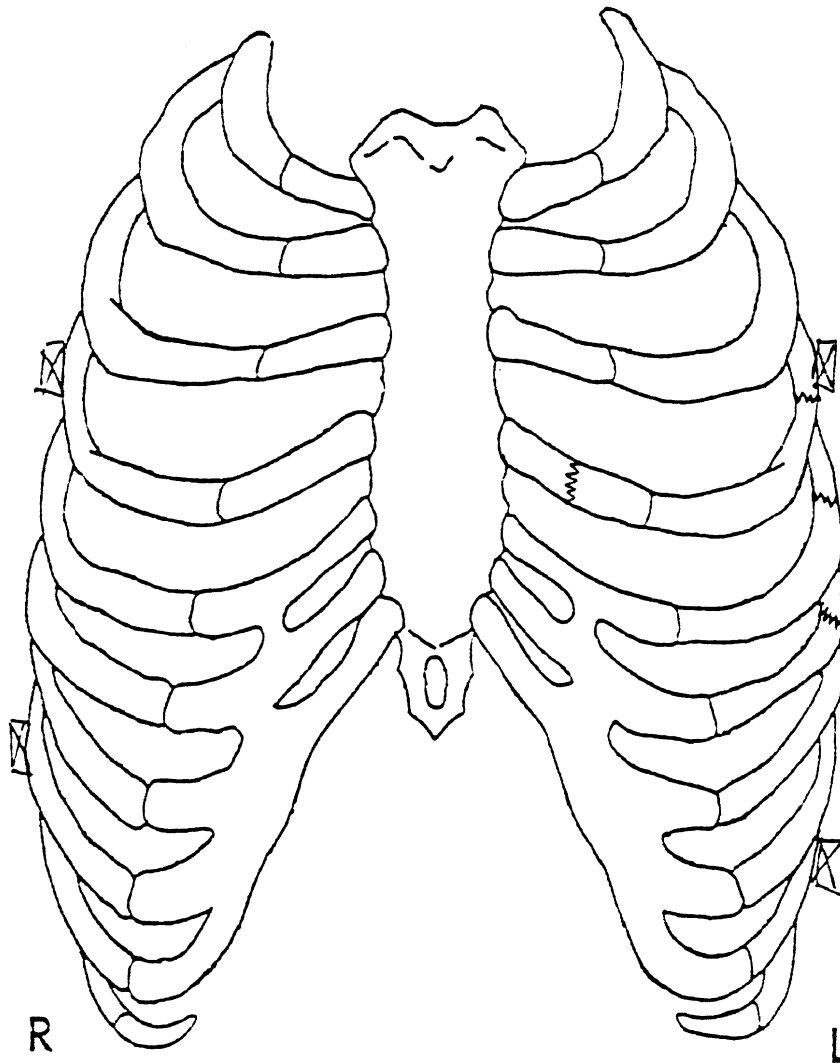
AGE 67 SEX M CAUSE OF DEATH Acute Cardiac & Resp. Arrest

INJURY INFORMATION:

OVERALL THORACIC AIS 3

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>F</u>	<u>J</u>	<u>3</u>
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____
	6	_____	_____	_____	_____	_____
	7	_____	_____	_____	_____	_____
	8	_____	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____	_____
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____

TEST # 16T029



ANTERIOR VIEW RIB CAGE

(no organ injuries;  
no posterior rib fractures.)

TEST • 76T029

VASCULAR PRESSURE

364 mm Hg

T<sub>1</sub> P-A ACCELEROMETER

13.8 G's

T<sub>1</sub> I-S ACCELEROMETER

20.2 G's

T<sub>12</sub> P-A ACCELEROMETER

25.9 G's

T<sub>12</sub> R-L ACCELEROMETER

61.4 G's

PELVIC P-A ACCELEROMETER

33.4 G's

43.4 G's

PELVIC I-S ACCELEROMETER

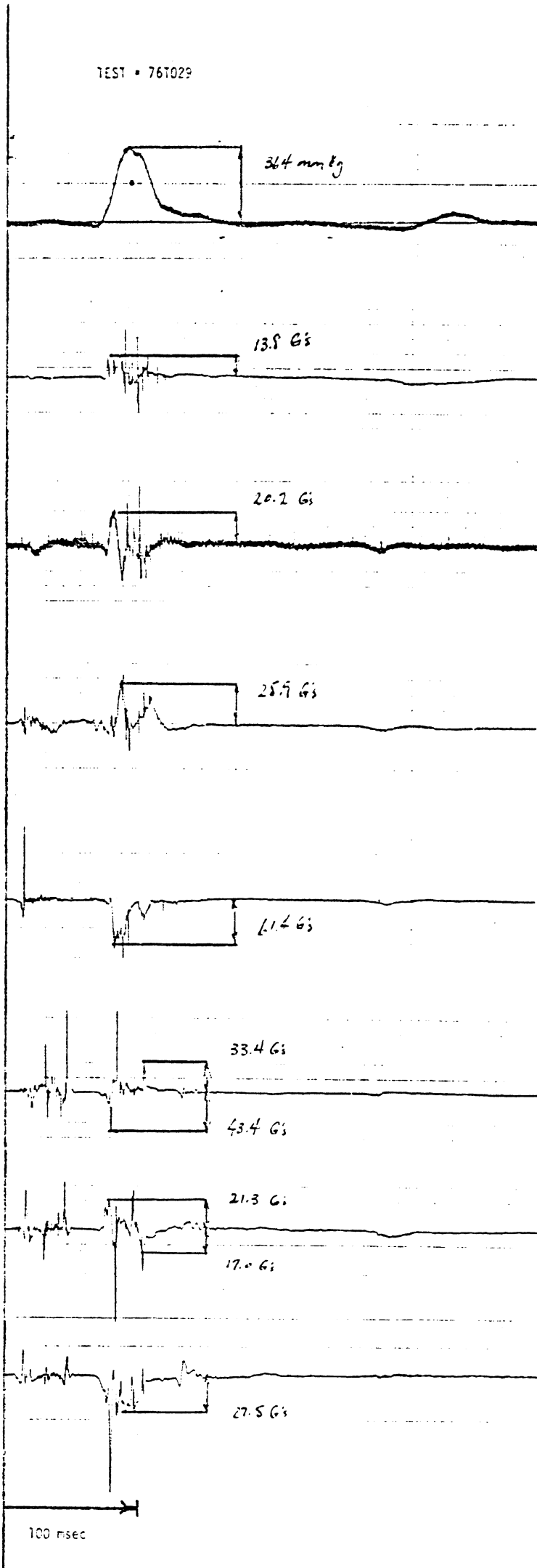
21.3 G's

17.0 G's

PELVIC R-L ACCELEROMETER

27.5 G's

100 msec



TEST # 767029

SLED DECELERATION PULSE

30.6's

UPPER STERNAL ACCELEROMETER

22.1 G's

30.9 G's

LOWER STERNAL ACCELEROMETER

35.9 G's

LEFT LOWER RIB ACCELEROMETER

20.8 G's

LEFT UPPER RIB ACCELEROMETER

81.4 G's

RIGHT LOWER RIB ACCELEROMETER

16.4 G's

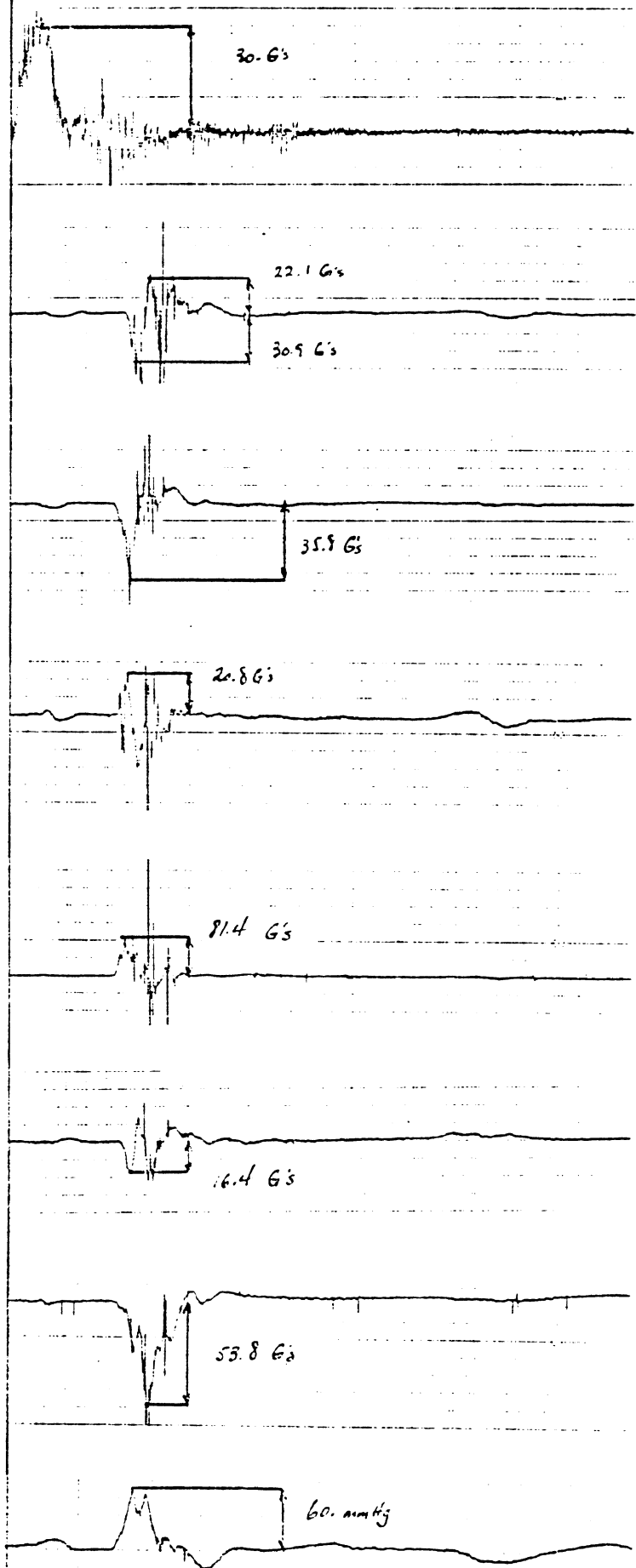
RIGHT UPPER RIB ACCELEROMETER

53.8 G's

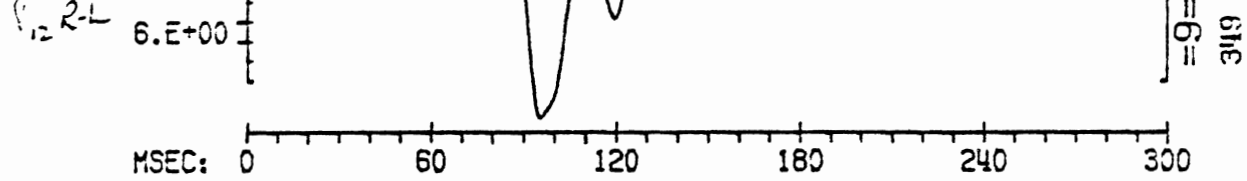
AIRWAY PRESSURE

60. mmHg

100 msec



PTS: 1 81 161 241 321 401



MSEC: 0 60 120 180 240 300

ID: 76T029-1:55

TAPE: THOR.2

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RUN ID: 761029-1188

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE, AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1779 PTS/CH AT 6305.50 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
341	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.3	444	1576.39
342	2	LEFT LOWER RIB ACCELEROMETER	34.60	G'S	4+1+3	99.3	444	1576.39
343	3	LEFT UPPER RIB ACCELEROMETER	37.00	G'S	4+1+3	99.3	444	1576.39
344	4	RIGHT LOWER RIB ACCELEROMETER	38.70	G'S	4+1+3	99.3	444	1576.39
345	5	RIGHT UPPER RIB ACCELEROMETER	37.10	G'S	4+1+3	99.3	444	1576.39
346	6	T1 P-A ACCELEROMETER	40.00	G'S	4+1+3	99.3	444	1576.39
347	7	T1 I-S ACCELEROMETER	36.70	G'S	4+1+3	99.3	444	1576.39
348	8	T12 P-A ACCELEROMETER	38.30	G'S	4+1+3	99.3	444	1576.39
349	9	T12 R-L ACCELEROMETER	40.90	G'S	4+1+3	99.3	444	1576.39

10:  
11:  
12:  
13:  
14:

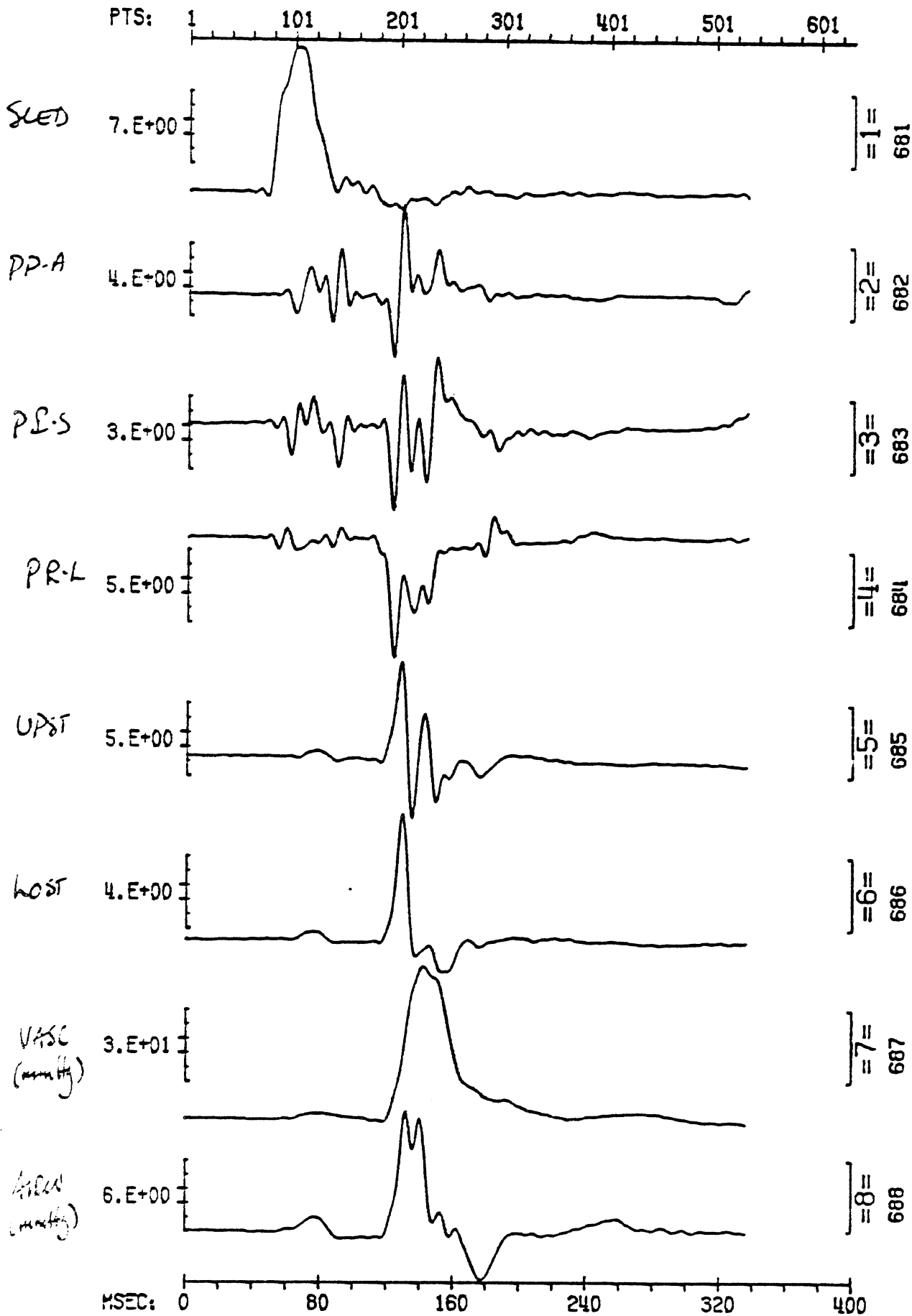
=====

FILTERED FILES: 341 - 349 DIGITAL TAPE: THOR, 2

DATE: 21-JAN-77

RUN ID: 761029-1188

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ID: 76T029-2:55

TAPE: THOR.2



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T029-2188

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PROJECT: THORAX IMPACT PROJECT-SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI=141 EXPANDED 1611, HAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 2123 PTS/CH AT 6310.59 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
681	1	SLED DECELERATION PULSE	50.00	G'S	4+1+3	99.4	531	1577.65
682	2	PELVIC P-A ACCELEROMETER	33.40	G'S	4+1+3	99.4	531	1577.65
683	3	PELVIC I-B ACCELEROMETER	42.50	G'S	4+1+3	99.4	531	1577.65
684	4	PELVIC R-L ACCELEROMETER	50.00	G'S	4+1+3	99.4	531	1577.65
685	5	UPPER STERNAL ACCELEROMETER	44.10	G'S	4+1+3	99.4	531	1577.65
686	6	LOWER STERNAL ACCELEROMETER	42.20	G'S	4+1+3	99.4	531	1577.65
687	7	VASCULAR PRESSURE	203.00	MM-HG	4+1+3	99.4	531	1577.65
688	8	AIRWAY PRESSURE	70.70	MM-HG	4+1+3	99.4	531	1577.65

- 9
- 10
- 11
- 12
- 13
- 14

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FILTERED FILES: 681 - 688 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T029-2188

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Number: 76T032 - Low Energy Frontal Impact

76T033 - Low Energy Side Impact

76T034 - Sled

Test Date: August 12, 1976

Test Subject:

Age - 62

Sex - Male

Stature - 183.5 cm

Weight - 59 kg

Restraint System:

None: Impact with padded door side structure.

Velocity:

19.6 mph. Change in velocity.

Injuries:

(Skeleton of subject was more spongy than normal)

24 rib fractures

Left shoulder blade fracture

Bruise and fracture on left parietal area

Fracture dislocation C3 - C4

AIS Number Estimate:

Thorax: 4

Head: 4

Neck: 6

TEST # 76T034

TEST DATE 8.12.76

TEST DESCRIPTION Sculptured Foam Padded Side Sled Impact VELOCITY 28.8 ft/s

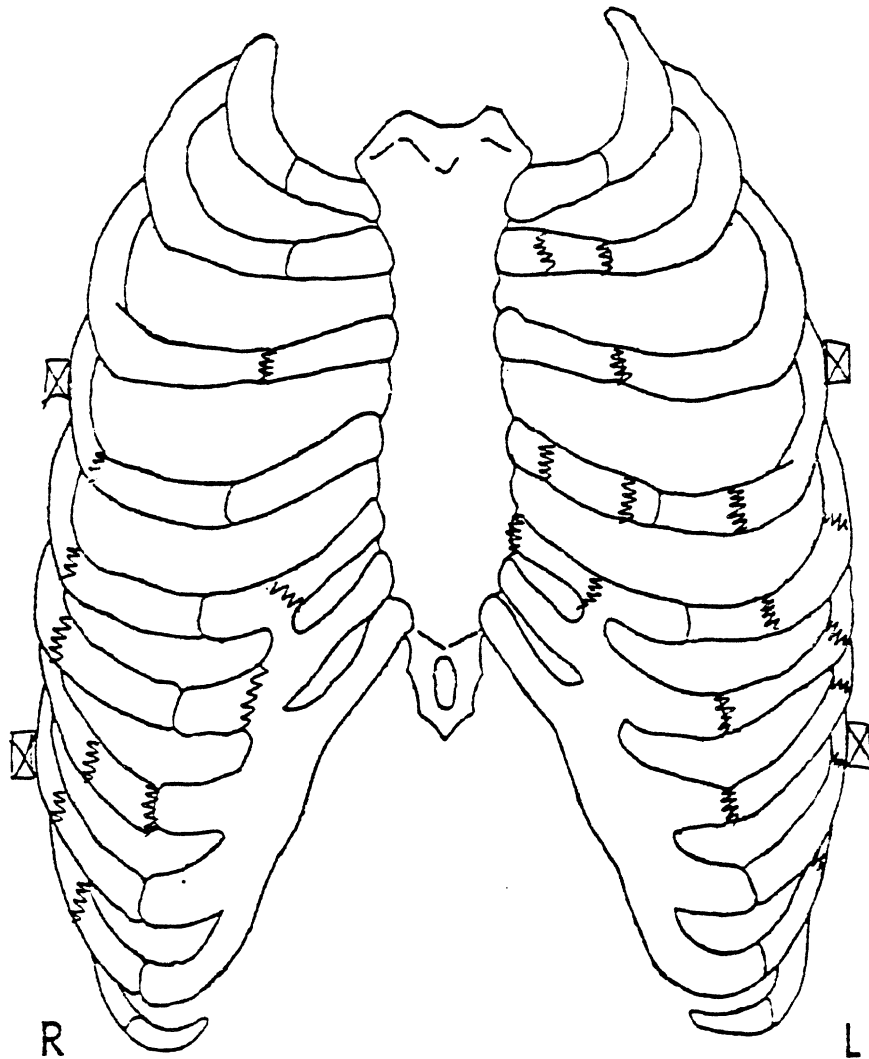
SUBJECT:

AGE 62 SEX M CAUSE OF DEATH Respiratory Arrest

INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>D</u>	<u>V</u>	<u>6</u>
	2	<u>H</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>S</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>3</u>
	4	---	---	---	---	---
	5	---	---	---	---	---

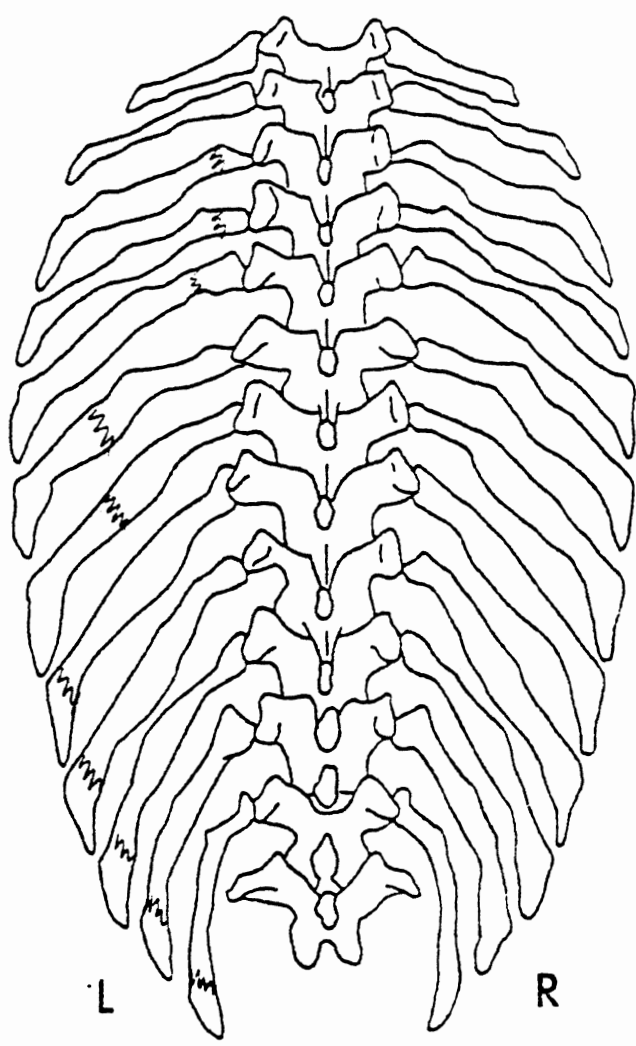
TEST # 767034



ANTERIOR VIEW RIB CAGE

- (no thoracic organ injuries, but:
- fracture dislocation C<sub>3</sub>-C<sub>4</sub>
  - stellate left parietal skull fracture
  - displaced, comminuted left scapula fracture)

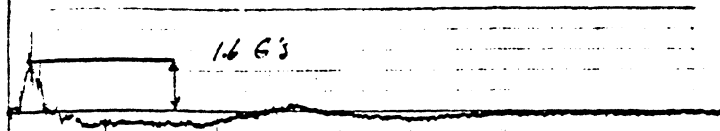
TEST # 76703



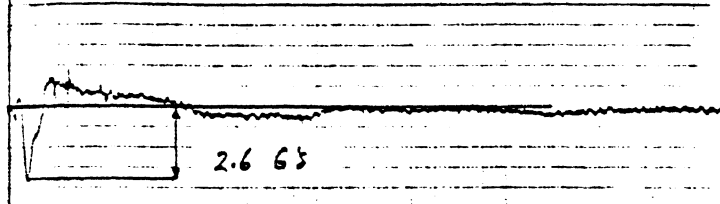
POSTERIOR VIEW RIB CAGE

TEST # 76T 022

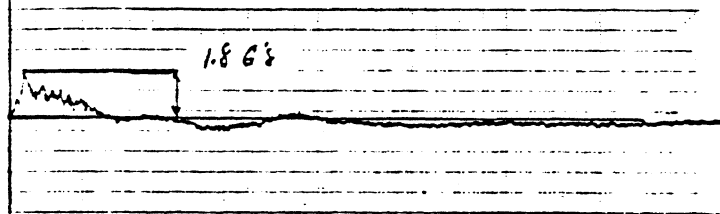
LEFT LOWER RIB ACCELEROMETER



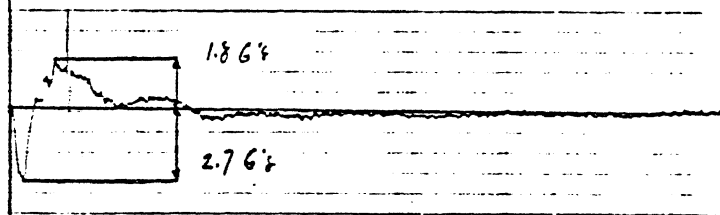
LEFT UPPER RIB ACCELEROMETER



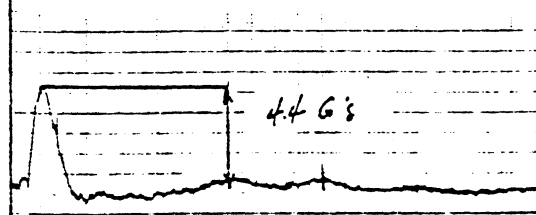
RIGHT LOWER RIB ACCELEROMETER



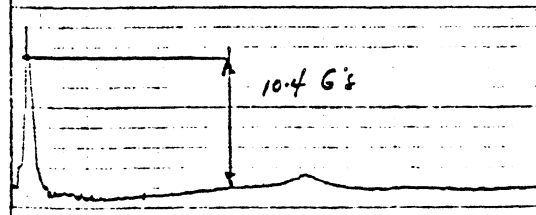
RIGHT UPPER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



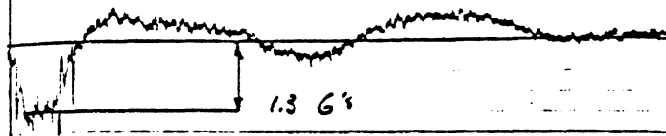
LOWER STERNAL ACCELEROMETER



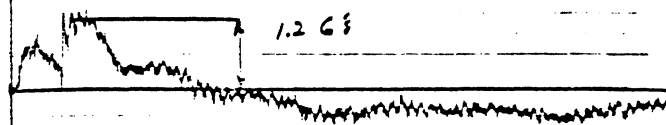
100 msec

TEST # 76T 032

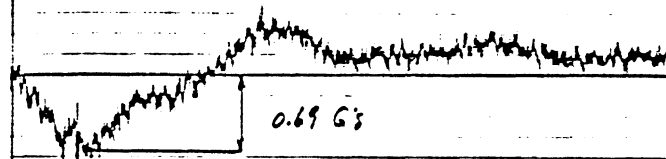
T<sub>7</sub> P-A ACCELEROMETER



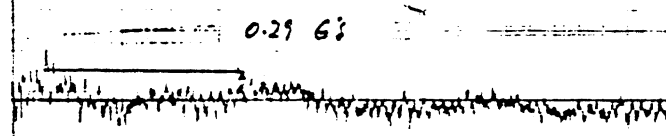
T<sub>7</sub> I-S ACCELEROMETER



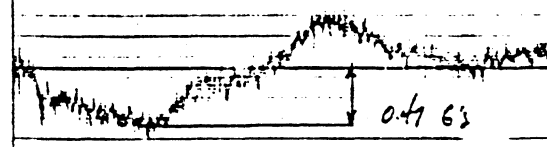
T<sub>12</sub> P-A ACCELEROMETER



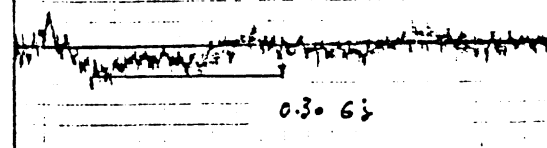
T<sub>12</sub> R-L ACCELEROMETER



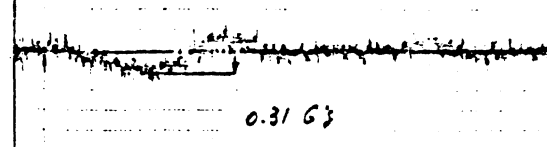
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



PELVIS R-L ACCELEROMETER



100 msec

PTS: 1 301 601 901 1201 1501

P15r

8.E-02

=1=  
350

LLR

2.E-01

=2=  
351

LUR

3.E-01

=3=  
352

RLR

2.E-01

=4=  
353

RUR

4.E-01

=5=  
354

T.P.A

2.E-01

=6=  
355

T.D.S

2.E-01

=7=  
356

T<sub>12</sub>PA

2.E-01

=8=  
357

F<sub>12</sub>R-L

4.E-02

=9=  
358

MSEC: 0 200 400 600 800 1000

ID: 76T032-1:PS

TAPE: THOR.2



\*\*\*\*\*  
 RUN ID: 76T032-11P8  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77  
 TEST SIGNALS: 3332 PTS/CH AT 6300.07 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
350	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.3	832	1577.02
351	2	LEFT LOWER RIB ACCELEROMETER	-6.00	G'S	4+1+ 3	99.3	832	1577.02
352	3	LEFT UPPER RIB ACCELEROMETER	-7.40	G'S	4+1+ 3	99.3	832	1577.02
353	4	RIGHT LOWER RIB ACCELEROMETER	-7.70	G'S	4+1+ 3	99.3	832	1577.02
354	5	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+ 3	99.3	832	1577.02
355	6	T1 P=A ACCELEROMETER	7.50	G'S	4+1+ 3	99.3	832	1577.02
356	7	T1 I=S ACCELEROMETER	-7.30	G'S	4+1+ 3	99.3	832	1577.02
357	8	T12 P=A ACCELEROMETER	7.70	G'S	4+1+ 3	99.3	832	1577.02
358	9	T12 R=L ACCELEROMETER	0.20	G'S	4+1+ 3	99.3	832	1577.02

10:  
 11:  
 12:  
 13:  
 14:

\*\*\*\*\*  
 FILTERED FILES: 350 - 358 DIGITAL TAPE: THOR,2 DATE: 21-JAN-77 RUN ID: 76T032-11P8  
 \*\*\*\*\*

PTS: 1 101 201 301 401 501 601 701

P15T

6.E-01

=1=  
689

PP-A

5.E-02

=2=  
690

PE-S

3.E-02

=3=  
691

PR-L

3.E-02

=4=  
692

UPST

4.E-01

=5=  
693

LOST

8.E-01

=6=  
694

MSEC: 0 100 200 300 400 500

76T032-2:PT

ID:

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T032-21PT

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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI=141 EXPANDED 16ii, HAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 2067 PTS/CH AT 6309.07 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
689	1i	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	714	1577.27
690	2i	PELVIC P-A ACCELEROMETER	6.70	G'S	4+1+ 3	99.4	714	1577.27
691	3i	PELVIC I-S ACCELEROMETER	-8.50	G'S	4+1+ 3	99.4	714	1577.27
692	4i	PELVIC R-L ACCELEROMETER	11.70	G'S	4+1+ 3	99.4	714	1577.27
693	5i	UPPER STERNAL ACCELEROMETER	-10.30	G'S	4+1+ 3	99.4	714	1577.27
694	6i	LOWER STERNAL ACCELEROMETER	-8.40	G'S	4+1+ 3	99.4	714	1577.27

7i

8i

9i

10i

11i

12i

13i

14i

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FILTERED FILES: 689 - 694 DIGITAL TAPE: THOR,2

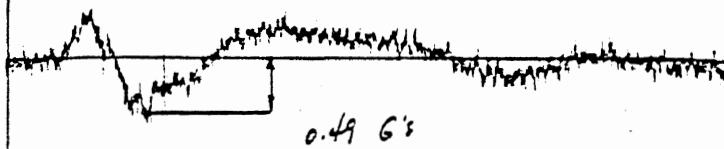
DATE: 21-JAN-77

RUN ID: 76T032-21PT

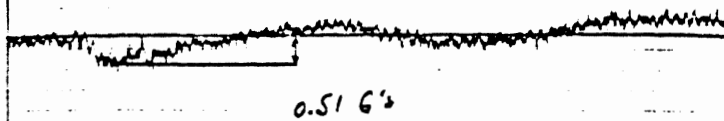
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TEST # 76T 033

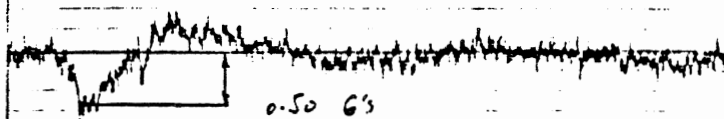
T<sub>1</sub> P-A ACCELEROMETER



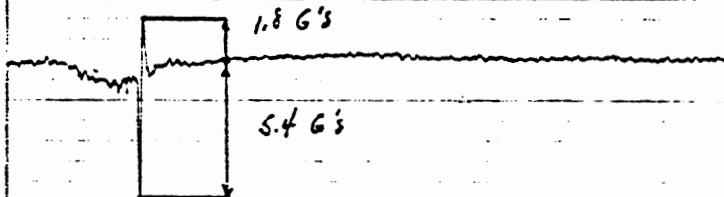
T<sub>1</sub> I-S ACCELEROMETER



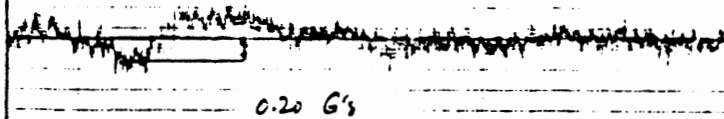
T<sub>12</sub> P-A ACCELEROMETER



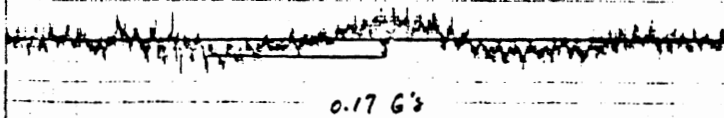
T<sub>12</sub> R-L ACCELEROMETER



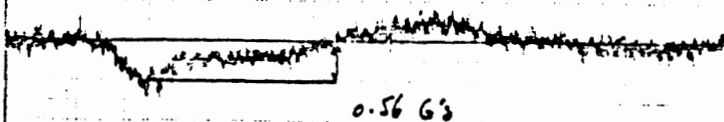
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



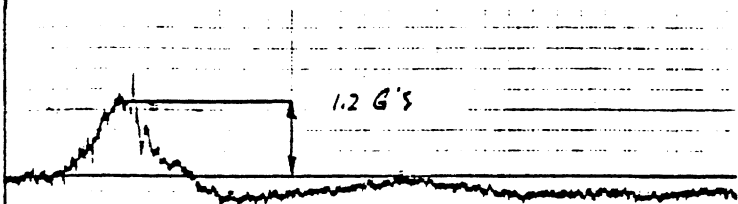
PELVIS R-L ACCELEROMETER



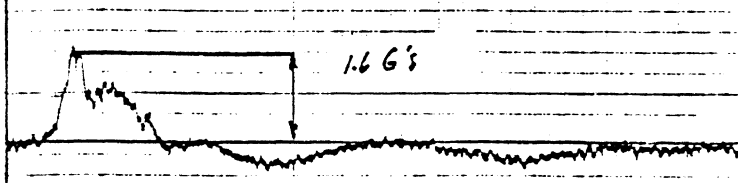
100 msec →

TEST # 76T 033

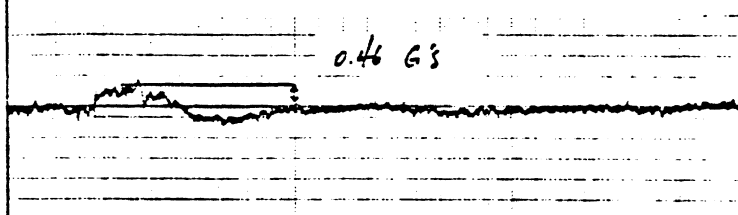
LEFT LOWER RIB ACCELEROMETER



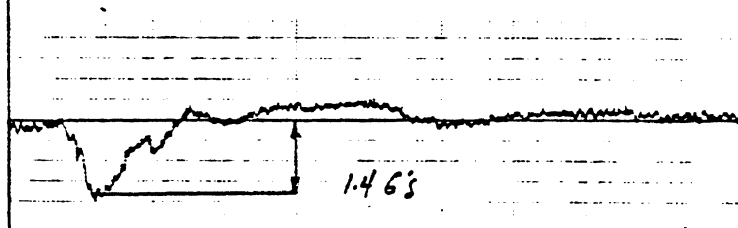
LEFT UPPER RIB ACCELEROMETER



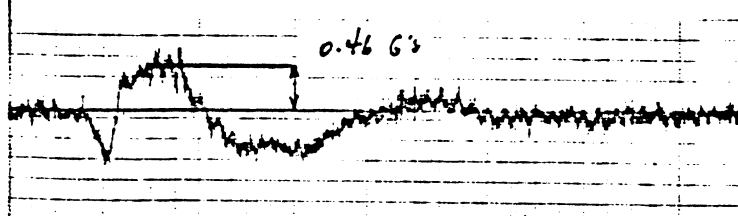
RIGHT LOWER RIB ACCELEROMETER



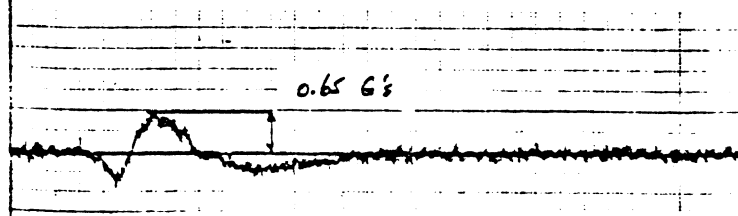
RIGHT UPPER RIB ACCELEROMETER



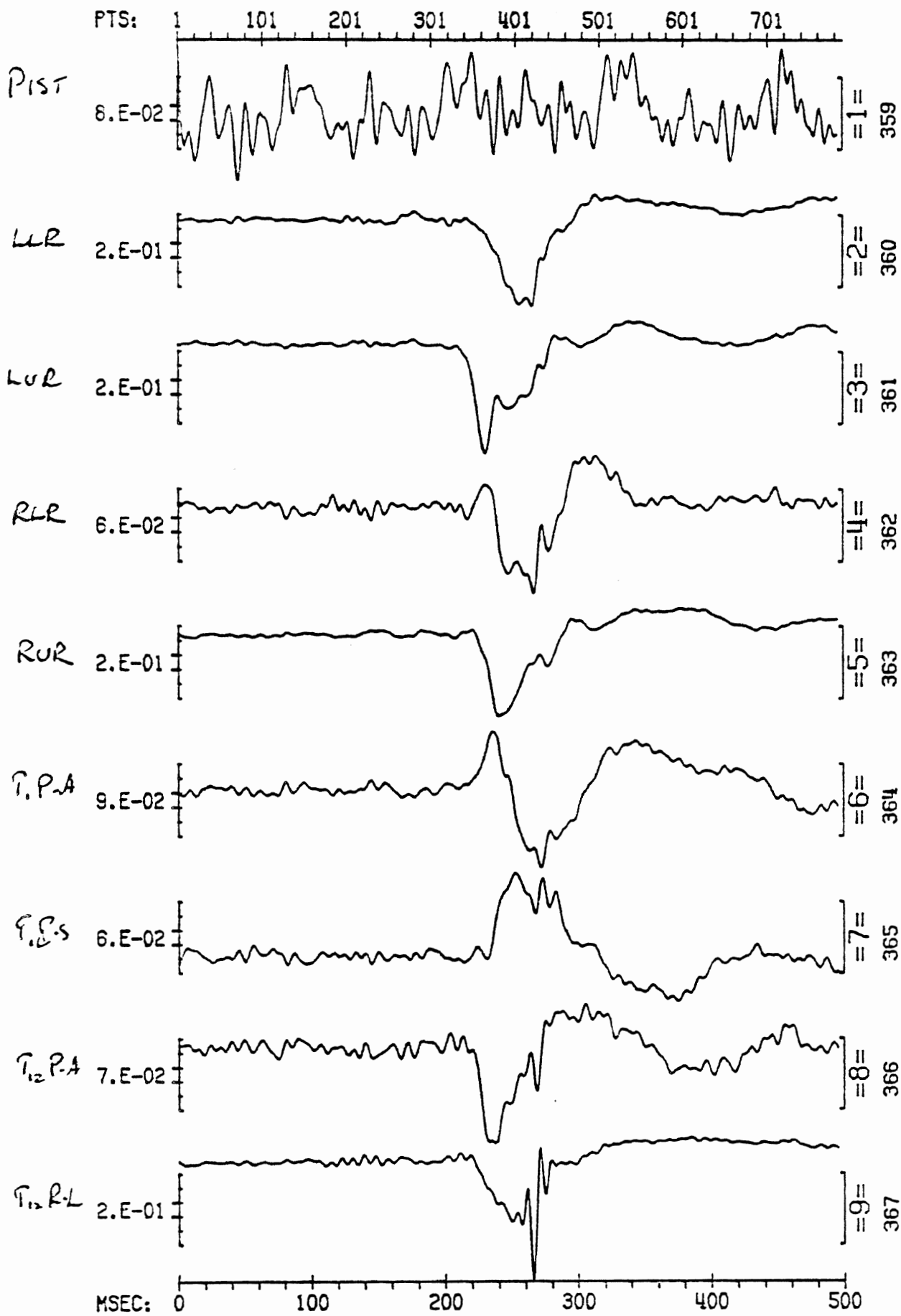
UPPER STERNAL ACCELEROMETER



LOWER STERNAL ACCELEROMETER



100 msec



ID: 76T033-1:PF

TAPE: THOR.2

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RUN ID: 76T033-18PF

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: H8RI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80016 DATE: 17-JAN-77

TEST SIGNALS: 3144 PTS/CH AT 6300.30 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
359	- 1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	782	1577.09
360	- 2	LEFT LOWER RIB ACCELEROMETER	-6.80	G'S	4+1+3	99.4	782	1577.09
361	- 3	LEFT UPPER RIB ACCELEROMETER	-7.40	G'S	4+1+3	99.4	782	1577.09
362	- 4	RIGHT LOWER RIB ACCELEROMETER	-7.70	G'S	4+1+3	99.4	782	1577.09
363	- 5	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+3	99.4	782	1577.09
364	- 6	T1 P-A ACCELEROMETER	7.50	G'S	4+1+3	99.4	782	1577.09
365	- 7	T1 I-S ACCELEROMETER	-7.30	G'S	4+1+3	99.4	782	1577.09
366	- 8	T12 P-A ACCELEROMETER	7.70	G'S	4+1+3	99.4	782	1577.09
367	- 9	T12 R=L ACCELEROMETER	8.20	G'S	4+1+3	99.4	782	1577.09

101  
111  
121  
131  
141

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FILTERED FILES: 359 - 367

DIGITAL TAPE: THOR.2

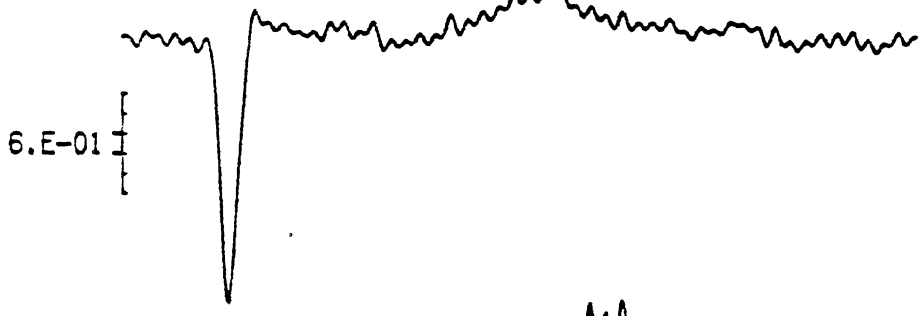
DATE: 21-JAN-77

RUN ID: 76T033-18PF

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PTS: 1 101 201 301 401 501 601 701

P15F



6.E-01

1= 695

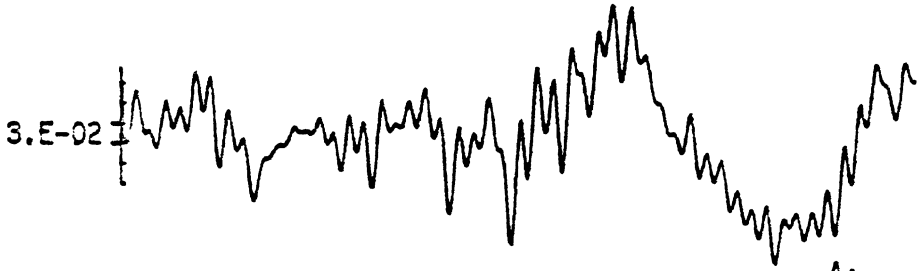
P2A



3.E-02

2= 696

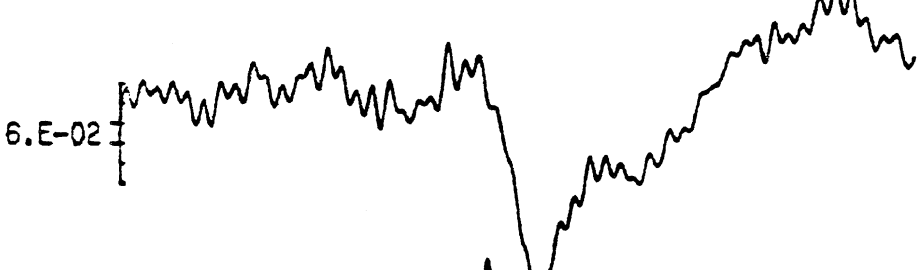
P3->



3.E-02

3= 697

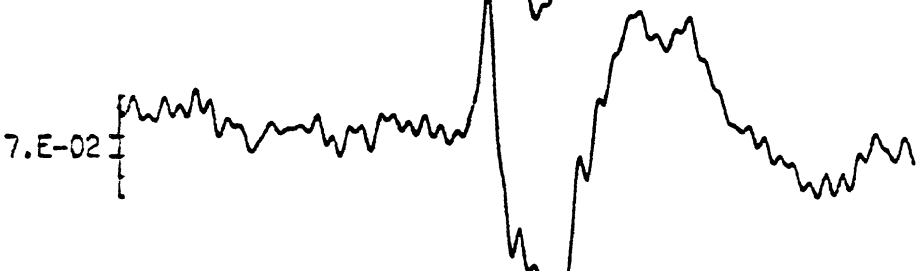
PR-L



6.E-02

4= 698

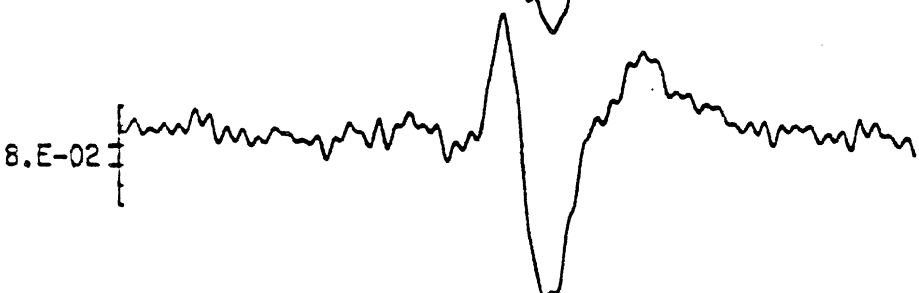
UPST



7.E-02

5= 699

LOST



8.E-02

6= 700

MSEC: 0 100 200 300 400 500

76T033-2:PT

ID:

TAPE: THOR.2



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 RUN ID: 76T033=2:PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT-SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI=141 EXPANDED 16ii, HAS A/D CONVERTED TO DIGITAL TAPE: H90010 DATE: 17-JAN-77  
 TEST SIGNALS: 2713 PTS/CH AT 6311.14 HZ, CAL SIGNALS: NOT DIGITIZED.

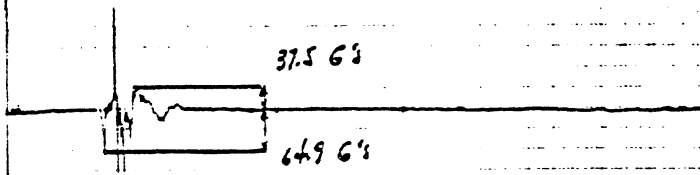
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
695	1i	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	677	1577.70
696	2i	PELVIC P-A ACCELEROMETER	6.70	G'S	4+1+3	99.4	677	1577.70
697	3i	PELVIC I-R ACCELEROMETER	-8.50	G'S	4+1+3	99.4	677	1577.70
698	4i	PELVIC R-L ACCELEROMETER	11.70	G'S	4+1+3	99.4	677	1577.70
699	5i	UPPER STERNAL ACCELEROMETER	-10.30	G'S	4+1+3	99.4	677	1577.70
700	6i	LOWER STERNAL ACCELEROMETER	-6.40	G'S	4+1+3	99.4	677	1577.70

7i  
 8i  
 9i  
 10i  
 11i  
 12i  
 13i  
 14i

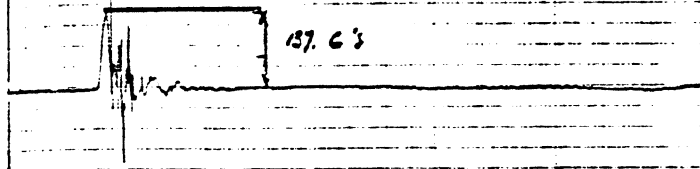
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 FILTERED FILES: 695 - 700 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T033=2:PT

TEST # 76T 034

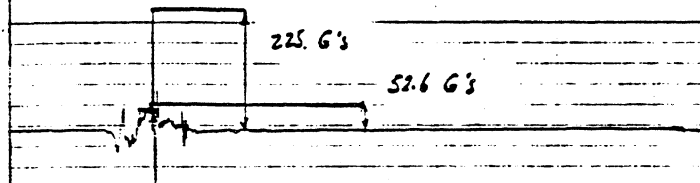
LEFT LOWER RIB ACCELEROMETER



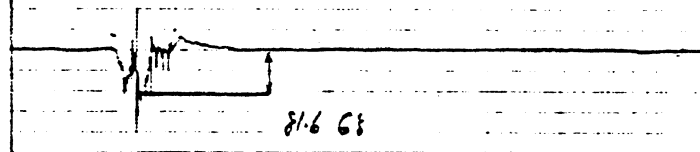
LEFT UPPER RIB ACCELEROMETER



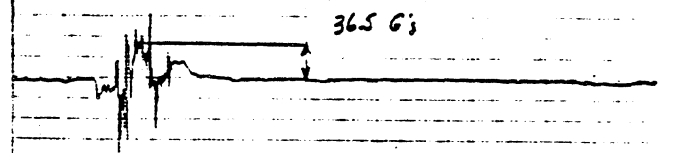
RIGHT LOWER RIB ACCELEROMETER



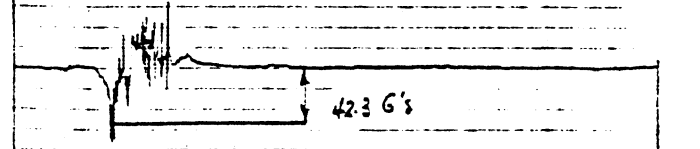
RIGHT UPPER RIB ACCELEROMETER



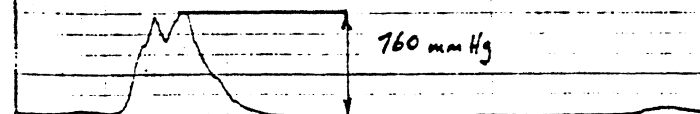
UPPER STERNAL ACCELEROMETER



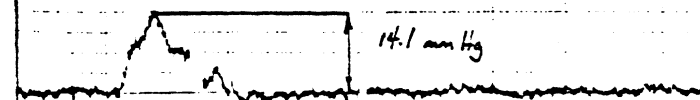
LOWER STERNAL ACCELEROMETER



VASCULAR PRESSURE



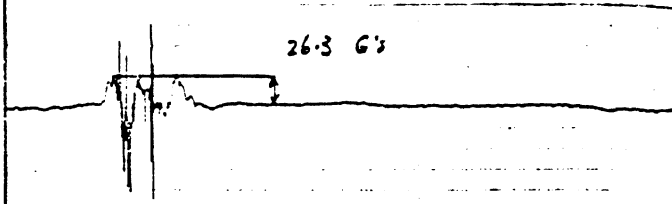
AIRWAY PRESSURE



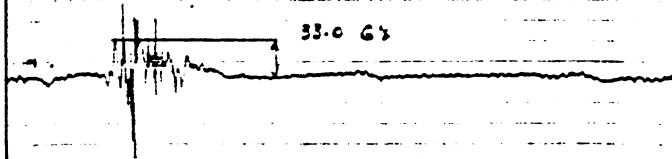
100 msec

TEST # 76T 034

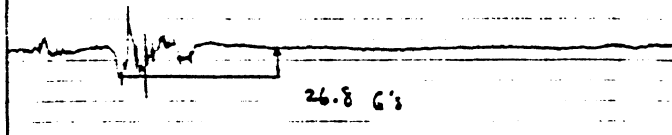
T<sub>1</sub> P-A ACCELEROMETER



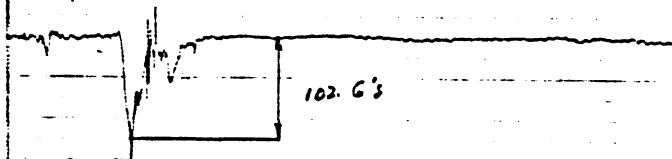
T<sub>1</sub> I-S ACCELEROMETER



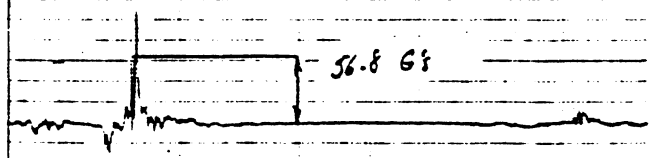
T<sub>12</sub> P-A ACCELEROMETER



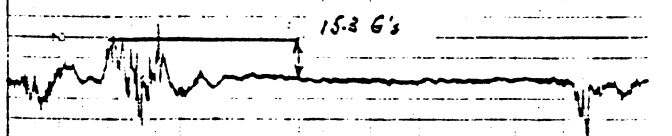
T<sub>12</sub> R-L ACCELEROMETER



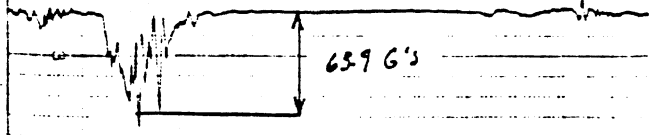
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER

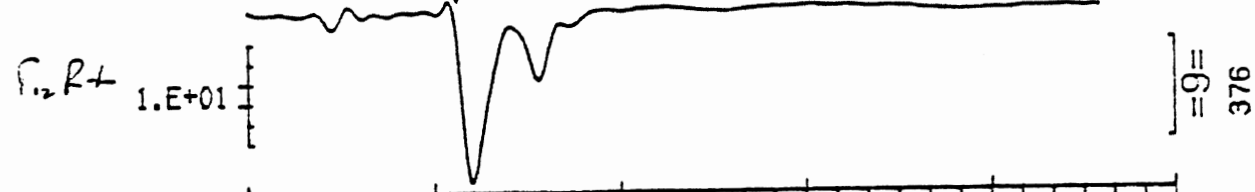
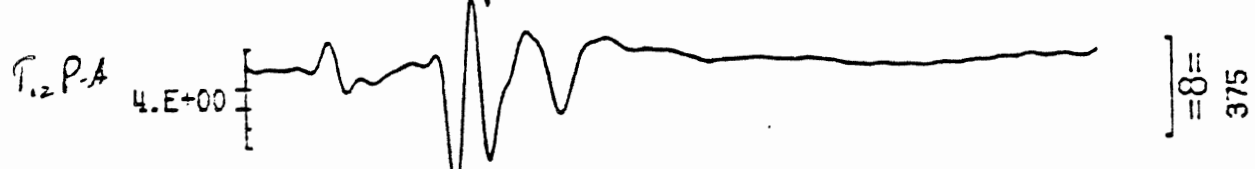
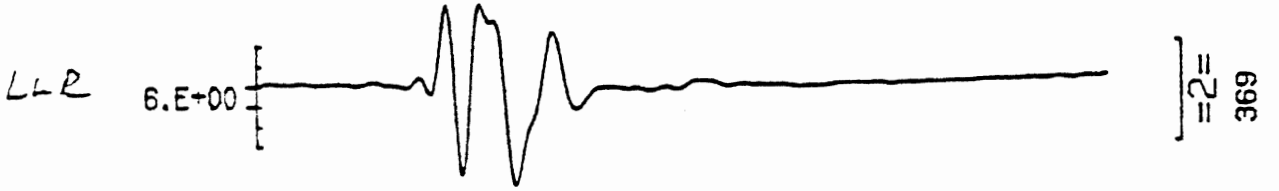


PELVIS R-L ACCELEROMETER



100 msec

PTS: 1 81 161 241 321 401



MSEC: 0 60 120 180 240 300

76T034-1:SS

ID:

TAPE: THOR.2

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RUN ID: 76T034-1188

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1747 PTS/CH AT 6305.86 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
368	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.3	435	1576.47
369	2	LEFT LOWER RIB ACCELEROMETER	68.10	G'S	4+1+3	99.3	435	1576.47
370	3	LEFT UPPER RIB ACCELEROMETER	74.10	G'S	4+1+3	99.3	435	1576.47
371	4	RIGHT LOWER RIB ACCELEROMETER	77.40	G'S	4+1+3	99.3	435	1576.47
372	5	RIGHT UPPER RIB ACCELEROMETER	74.20	G'S	4+1+3	99.3	435	1576.47
373	6	T1 P-A ACCELEROMETER	75.10	G'S	4+1+3	99.3	435	1576.47
374	7	T1 I-S ACCELEROMETER	73.40	G'S	4+1+3	99.3	435	1576.47
375	8	T12 P-A ACCELEROMETER	76.60	G'S	4+1+3	99.3	435	1576.47
376	9	T12 R-L ACCELEROMETER	61.00	G'S	4+1+3	99.3	435	1576.47

101

111

121

131

141

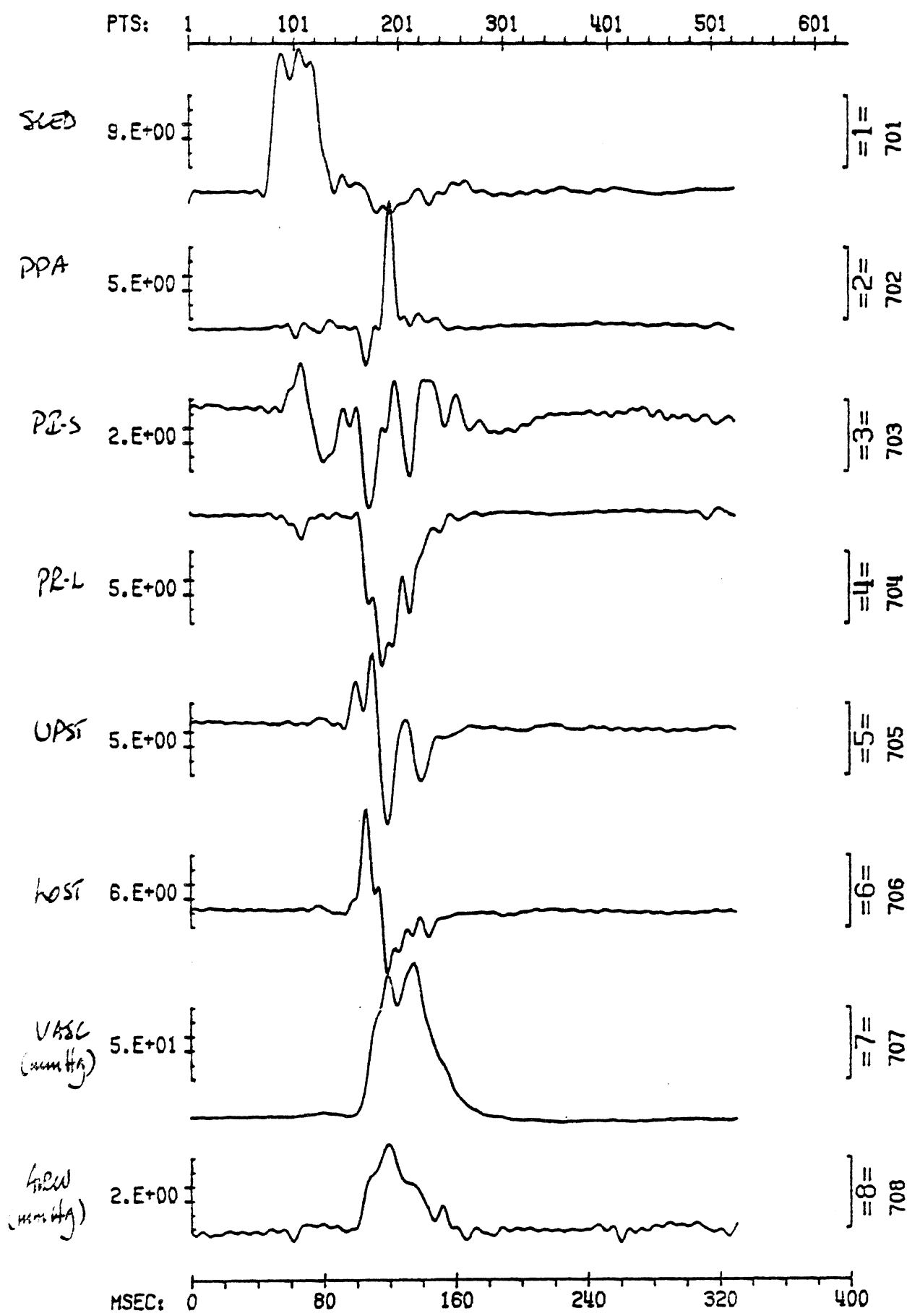
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FILTERED FILES: 368 \* 376 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T034-1188

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ID: 76T034-2:SS

TAPE: THOR.2

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RUN ID: 76T034-2168

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77  
TEST SIGNALS: 2090 PTS/CH AT 6309.20 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTB	SAMPLING HERTZ
701	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	522	1577.30
702	2	PELVIC P-A ACCELEROMETER	66.00	G'S	4+1+3	99.4	522	1577.30
703	3	PELVIC I-S ACCELEROMETER	85.00	G'S	4+1+3	99.4	522	1577.30
704	4	PELVIC R-L ACCELEROMETER	98.30	G'S	4+1+3	99.4	522	1577.30
705	5	UPPER STERNAL ACCELEROMETER	91.20	G'S	4+1+3	99.4	522	1577.30
706	6	LOWER STERNAL ACCELEROMETER	84.40	G'S	4+1+3	99.4	522	1577.30
707	7	VASCULAR PRESSURE	291.00	MM-HG	4+1+3	99.4	522	1577.30
708	8	AIRWAY PRESSURE	70.70	MM-HG	4+1+3	99.4	522	1577.30

91

101

111

121

131

141

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FILTERED FILES: 701 - 708

DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T034-2168

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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER: 76T037 - Low Energy Frontal Impact  
76T038 - Low Energy Side Impact  
76T039 - Sled

TEST DATE: August 19, 1976

TEST SUBJECT: Age - 72  
Sex - M  
Stature - 186.8 cm.  
Weight - 73.9 kg.

RESTRAINT SYSTEM: None: Impact with padded door side structure.

VELOCITY: 20 mph change in velocity

INJURIES: 11 rib fractures  
Very slight surface hemorrhage on heart

AIS NUMBER ESTIMATE:



TEST # 767039

TEST DATE 8.19.76

TEST DESCRIPTION Sculptured foam padded Sidesled test VELOCITY 29.3 ft/s

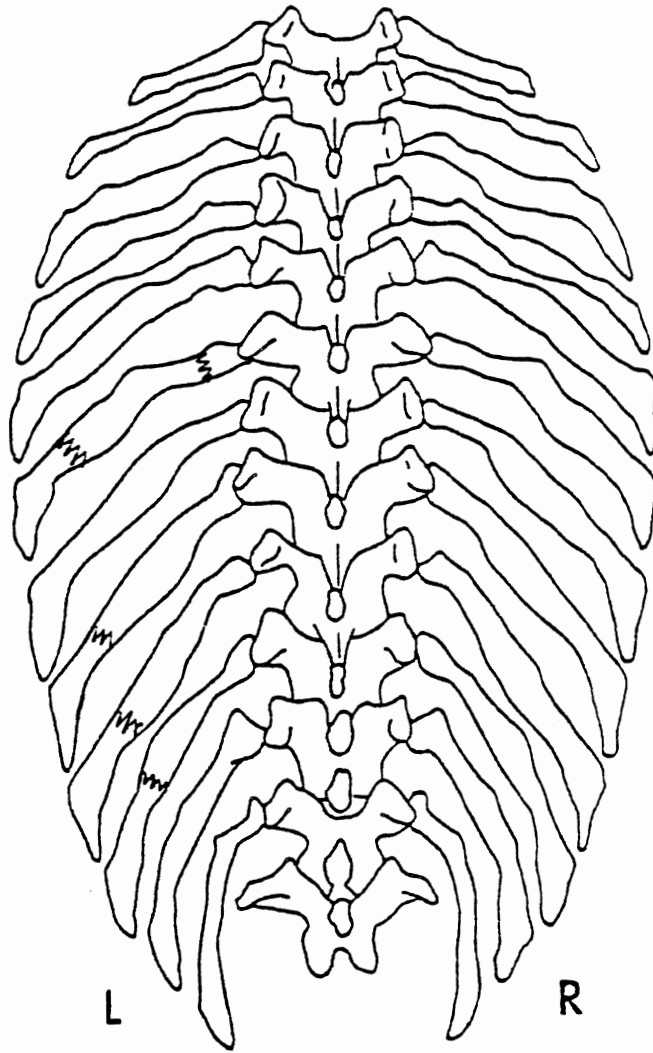
SUBJECT:

AGE 72 SEX M CAUSE OF DEATH Renal failure

INJURY INFORMATION: OVERALL THORACIC AIS 3

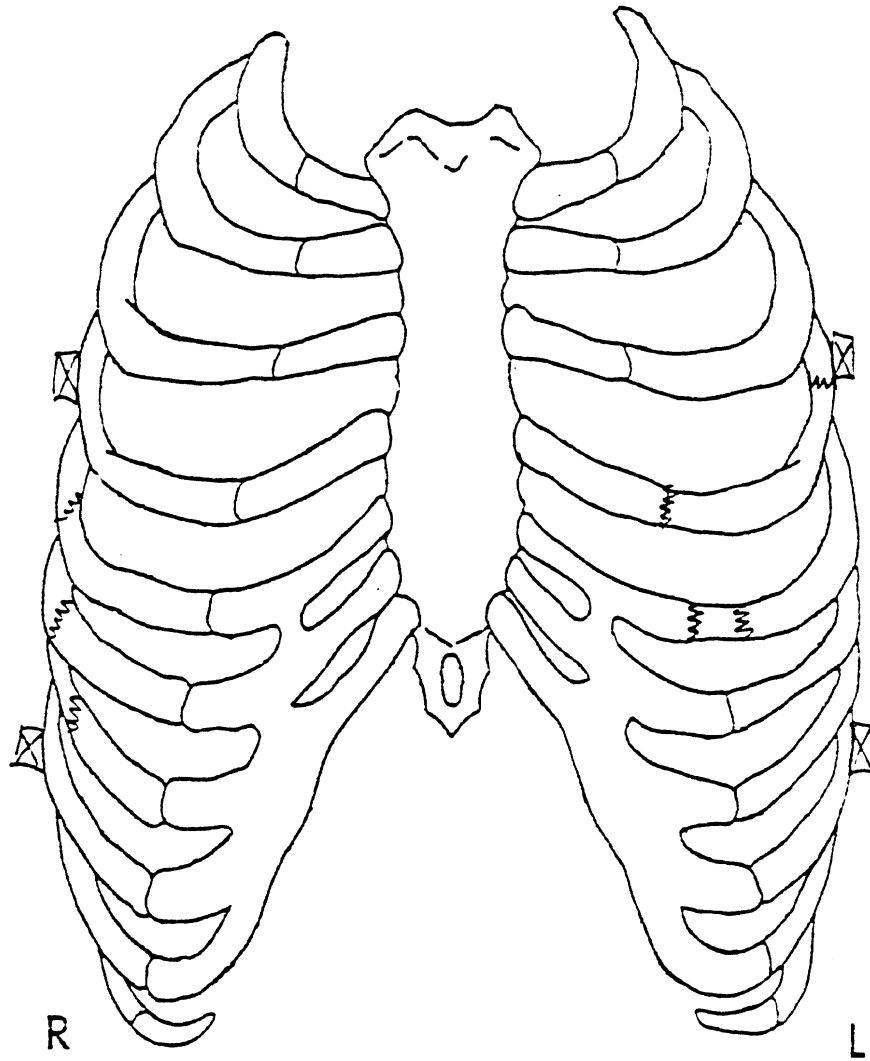
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>R</u>	<u>F</u>	<u>S</u>	<u>3</u>
	2	<u>C</u>	<u>C</u>	<u>H</u>	<u>H</u>	<u>3</u>
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

TEST # 767039



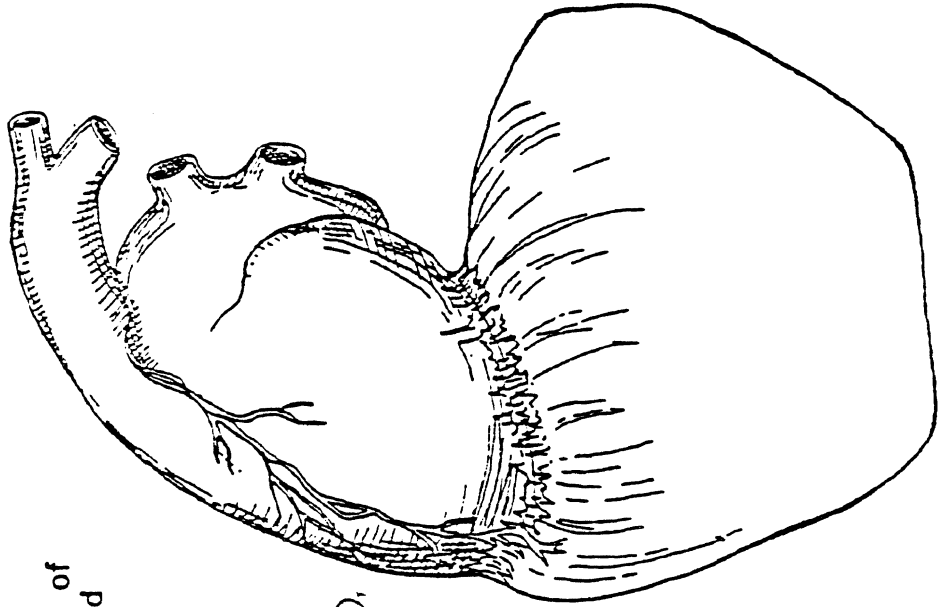
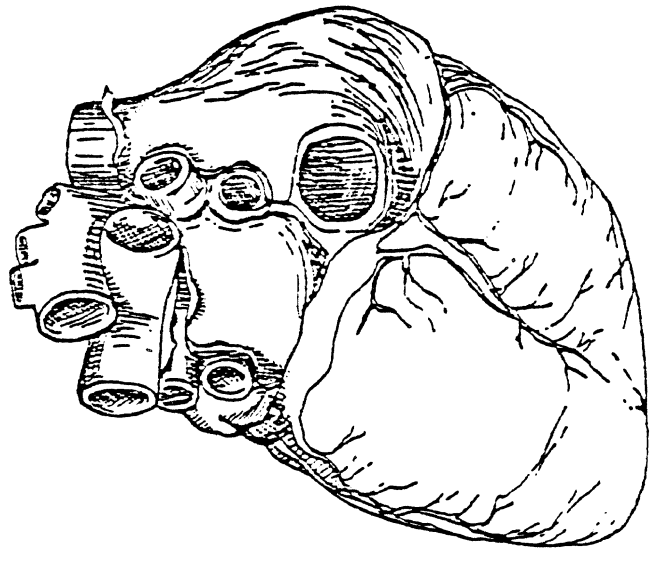
POSTERIOR VIEW RIB CAGE

TEST # 76T039



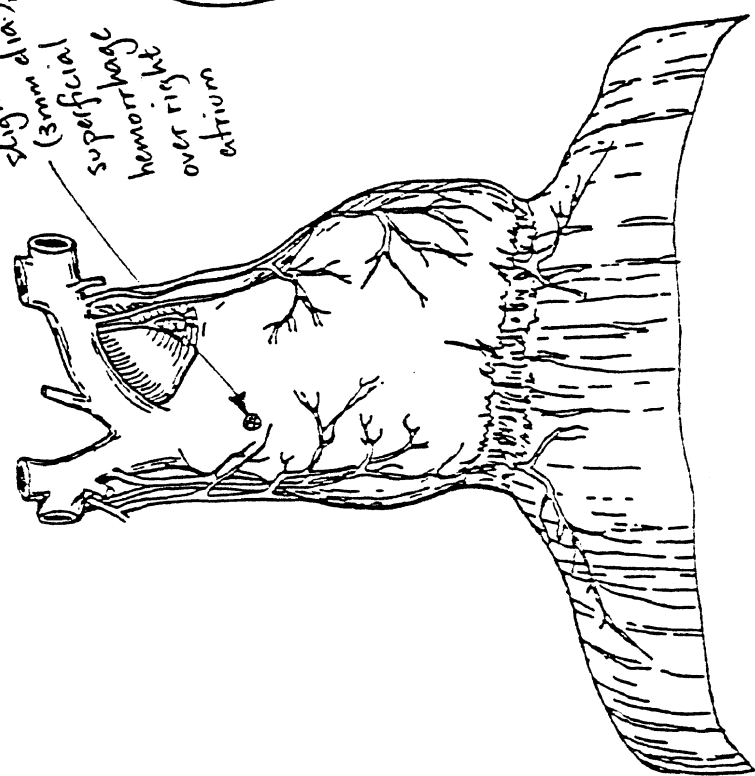
ANTERIOR VIEW RIB CAGE

Diaphragmatic View of Heart



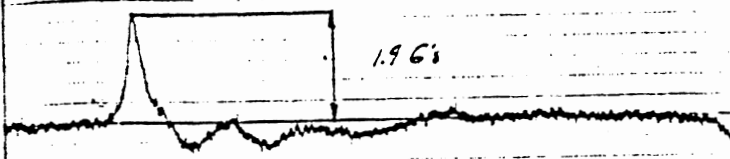
Left Side View of Pericardium and Diaphragm

right  
supra  
diaphragmatic  
hemorrhage  
over right  
atrium

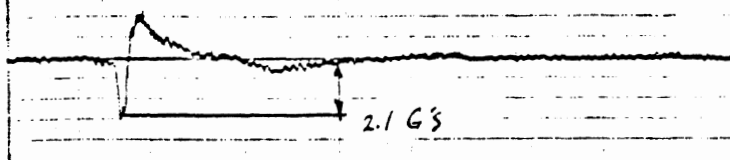


Anterior View of Pericardium and Diaphragm

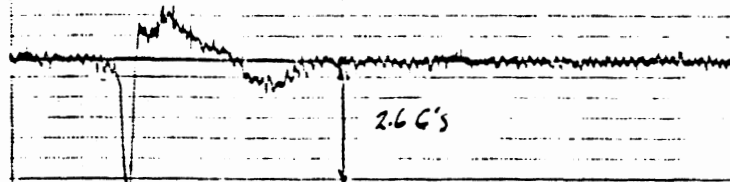
LEFT LOWER RIB ACCELEROMETER



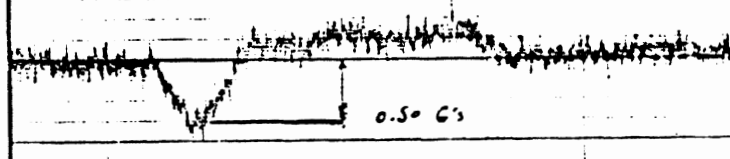
LEFT UPPER RIB ACCELEROMETER



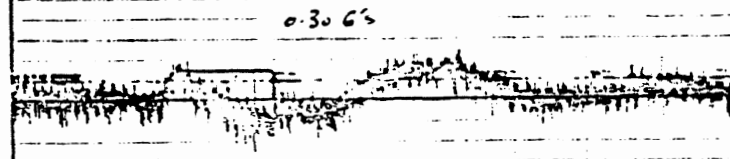
RIGHT UPPER RIB ACCELEROMETER



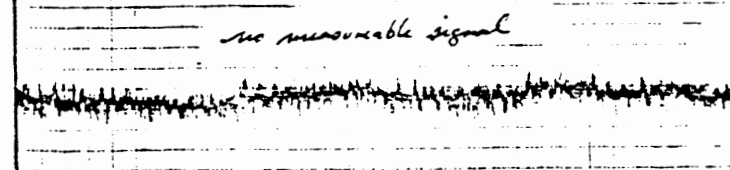
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



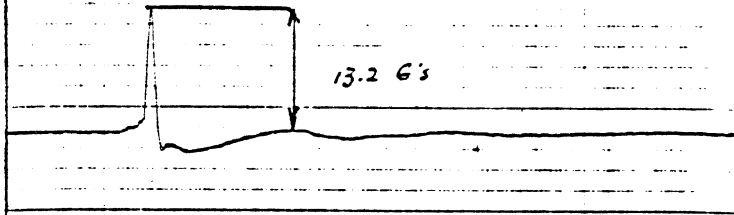
PELVIS R-L ACCELEROMETER



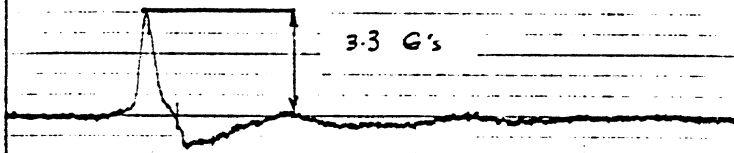
100 msec

TEST # 76T037

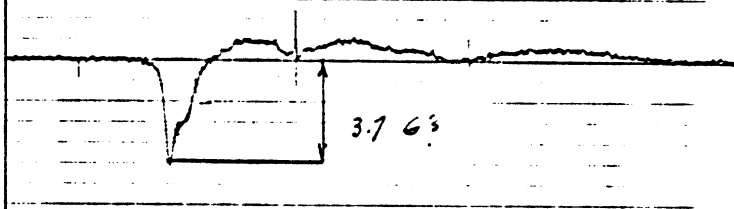
UPPER STERNAL ACCELEROMETER



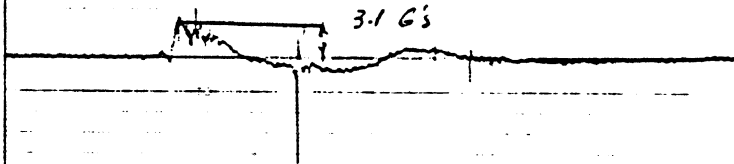
LOWER STERNAL ACCELEROMETER



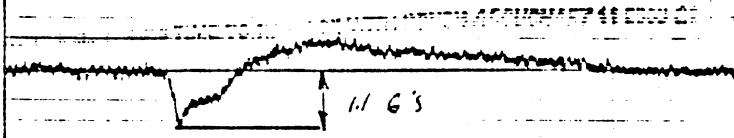
T<sub>1</sub> P-A ACCELEROMETER



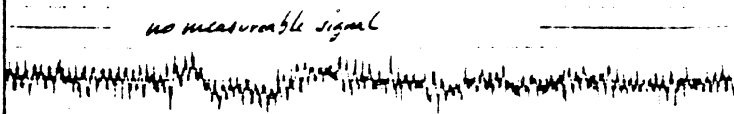
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 msec

PTS: 1 81 161 241 321 401

P15r

2.E-01

=1= 377

LUR

2.E-01

=2= 378

LUR

3.E-01

=3= 379

RUR

3.E-01

=5= 380

P1P-A

4.E-01

=6= 381

P1L-S

3.E-01

=7= 382

P12P-A

2.E-01

=8= 383

P12P-L

3.E-02

=9= 384

MSEC: 0 60 120 180 240 300

ID: 76T037-1:PF

TAPE: THOR.2

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RUN ID: 76T037-11PF

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1601, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1740 PTS/CH AT 6311.21 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
377	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	435	1577.00
378	2	LEFT LOWER RIB ACCELEROMETER	7.00	G'S	4+1+3	99.4	435	1577.00
379	3	LEFT UPPER RIB ACCELEROMETER	7.30	G'S	4+1+3	99.4	435	1577.00
4								
380	5	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+3	99.4	435	1577.00
381	6	T1 P-A ACCELEROMETER	7.40	G'S	4+1+3	99.4	435	1577.00
382	7	T1 I-S ACCELEROMETER	7.30	G'S	4+1+3	99.4	435	1577.00
383	8	T12 P-A ACCELEROMETER	7.70	G'S	4+1+3	99.4	435	1577.00
384	9	T12 R-L ACCELEROMETER	8.50	G'S	4+1+3	99.4	435	1577.00

101  
111  
121  
131  
141

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FILTERED FILES: 377 - 384 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T037-11PF

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PTS: 1 101 201 301 401 501 601 701

P1ST

3.E+01

=1= 709

P-P.A

5.E-02

=2= 710

P2.S

4.E-02

=3= 711

P2-L

2.E-02

=4= 712

UPST

1.E+00

=5= 713

LOST

3.E-01

=6= 714

MSEC: 0 100 200 300 400 500

ID: 76T037-2:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T037-21PT

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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 2752 PTS/CH AT 6307.86 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
709	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	686	1576.96
710	2	PELVIC P=A ACCELEROMETER	6.70	G'S	4+1+3	99.3	686	1576.96
711	3	PELVIC I=S ACCELEROMETER	6.50	G'S	4+1+3	99.3	686	1576.96
712	4	PELVIC R=L ACCELEROMETER	10.05	G'S	4+1+3	99.3	686	1576.96
713	5	UPPER STERNAL ACCELEROMETER	10.30	G'S	4+1+3	99.3	686	1576.96
714	6	LOWER STERNAL ACCELEROMETER	8.40	G'S	4+1+3	99.3	686	1576.96

7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

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FILTERED FILES: 709 - 714 DIGITAL TAPE: THOR.2

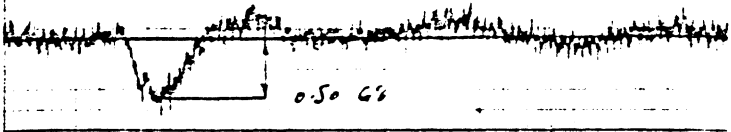
DATE: 21-JAN-77

RUN ID: 76T037-21PT

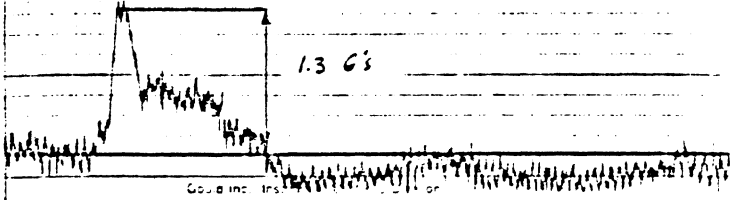
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TEST # 76T038

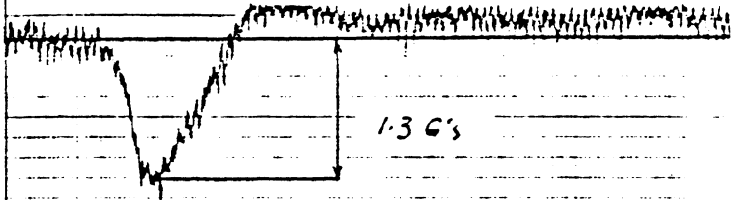
LEFT LOWER RIB ACCELEROMETER



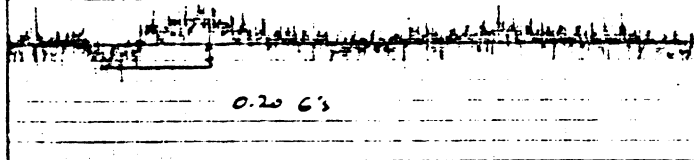
LEFT UPPER RIB ACCELEROMETER



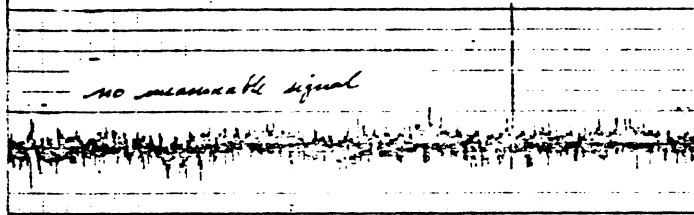
RIGHT UPPER RIB ACCELEROMETER



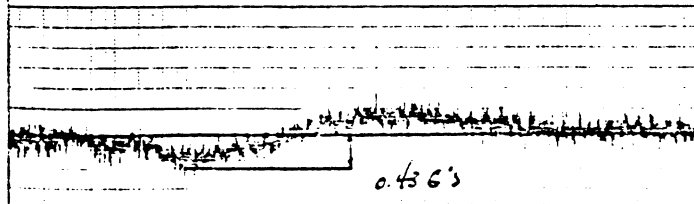
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



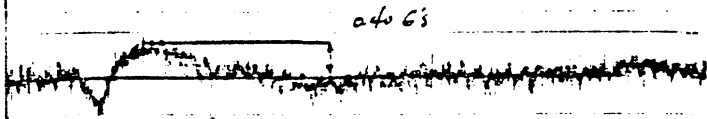
PELVIS R-L ACCELEROMETER



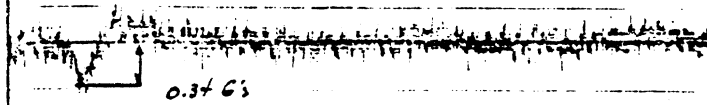
100 msec

TEST #76T 03B

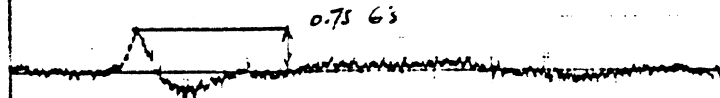
UPPER STERNAL ACCELEROMETER



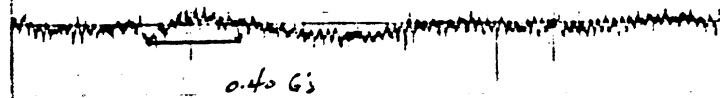
LOWER STERNAL ACCELEROMETER



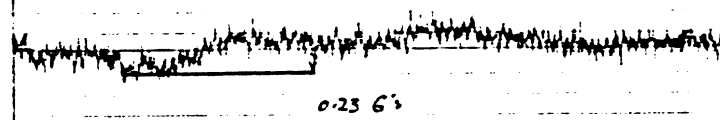
T<sub>1</sub> P-A ACCELEROMETER



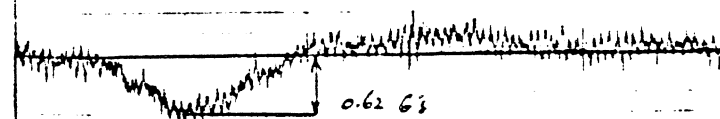
T<sub>1</sub> I-S ACCELEROMETER



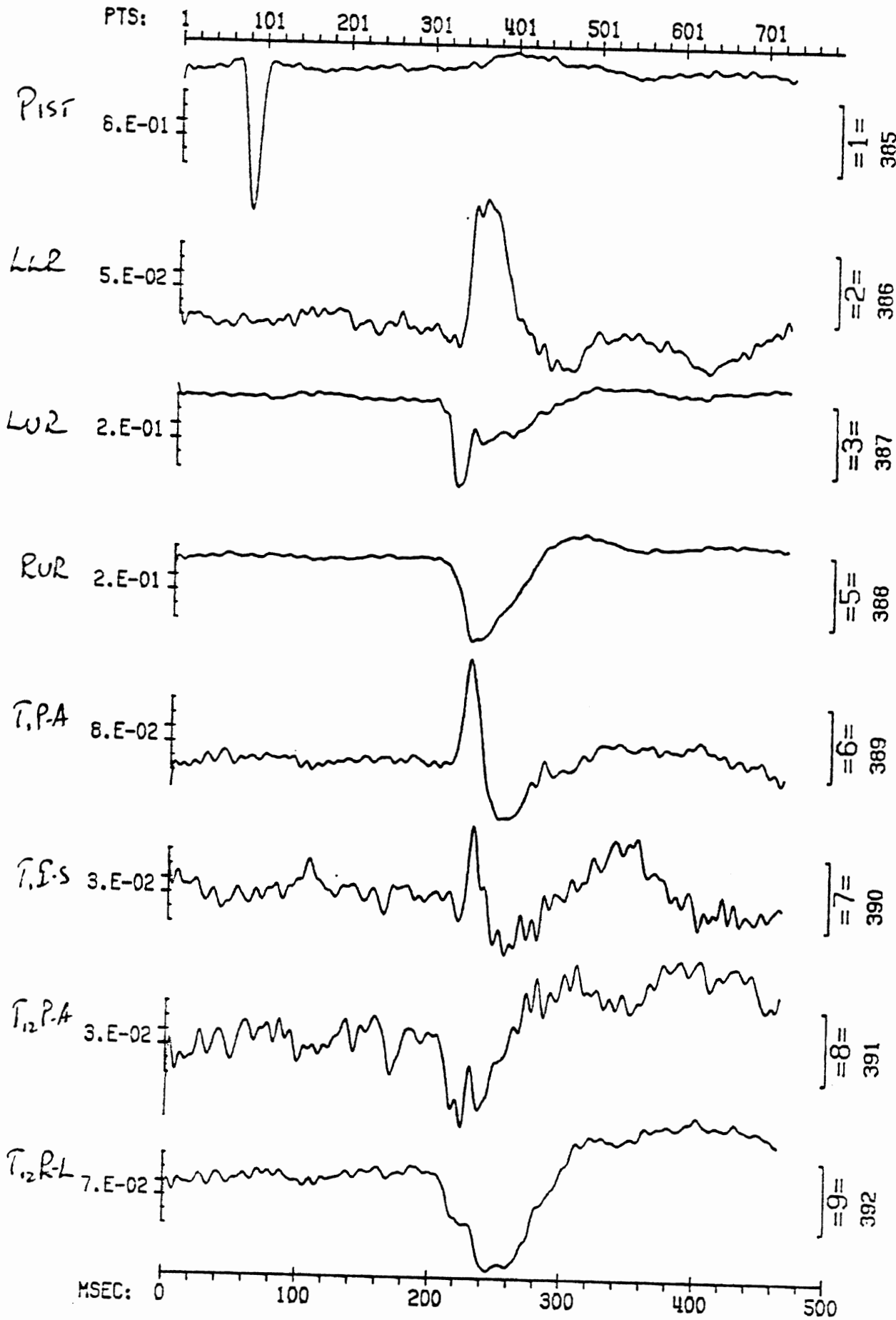
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 msec



ID: 76T038-1:PT

TAPE: THOR.2

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 RUN ID: 76T038-1IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77

TEST SIGNALS: 2934 PTS/CH AT 6300.41 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
385	11	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	732	1577.10
386	21	LEFT LOWER RIB ACCELEROMETER	7.00	G'S	4+1+3	99.4	732	1577.10
387	31	LEFT UPPER RIB ACCELEROMETER	7.30	G'S	4+1+3	99.4	732	1577.10
41								
388	51	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+3	99.4	732	1577.10
389	61	T1 P-A ACCELEROMETER	7.40	G'S	4+1+3	99.4	732	1577.10
390	71	T1 I-S ACCELEROMETER	7.30	G'S	4+1+3	99.4	732	1577.10
391	81	T12 P-A ACCELEROMETER	7.70	G'S	4+1+3	99.4	732	1577.10
392	91	T12 R-L ACCELEROMETER	6.50	G'S	4+1+3	99.4	732	1577.10

101  
 111  
 121  
 131  
 141

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 FILTERED FILES: 385 - 392 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T038-1IPT

PTS: 1 301 601 901 1201 1501

P1ST

3.E+01

=1=  
715

P-PA

2.E-02

=2=  
716

P1-S

8.E-02

=3=  
717

P2-L

5.E-02

=4=  
718

U1ST

5.E-02

=5=  
719

LOST

4.E-02

=6=  
720

MSEC: 0 200 400 600 800 1000

76T038-2:PT

ID:

TAPE: THOR.2

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RUN ID: 76T030-21PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 3268 PTS/CH AT 6309.57 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
715	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	814	1577.39
716	2	PELVIC P-A ACCELEROMETER	6.70	G'S	4+1+3	99.4	814	1577.39
717	3	PELVIC I-S ACCELEROMETER	8.50	G'S	4+1+3	99.4	814	1577.39
718	4	PELVIC R-L ACCELEROMETER	11.70	G'S	4+1+3	99.4	814	1577.39
719	5	UPPER STERNAL ACCELEROMETER	10.30	G'S	4+1+3	99.4	814	1577.39
720	6	LOWER STERNAL ACCELEROMETER	8.40	G'S	4+1+3	99.4	814	1577.39

- 7i
- 8i
- 9i
- 10i
- 11i
- 12i
- 13i
- 14i

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FILTERED FILES: 715 - 720 DIGITAL TAPE: THOR.2

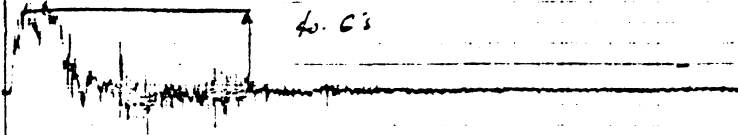
DATE: 21-JAN-77

RUN ID: 76T030-21PT

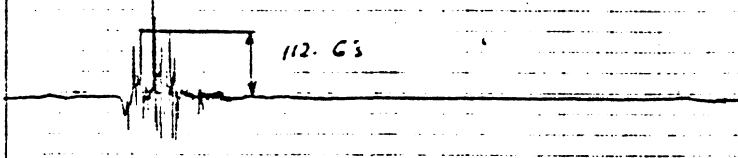
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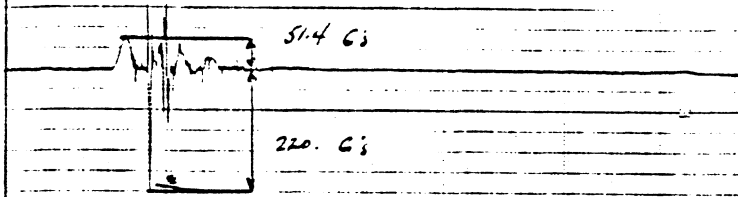
SLED DECELERATION PULSE



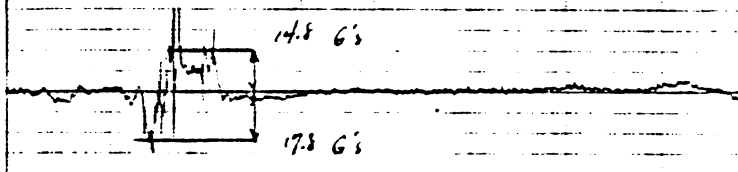
LEFT UPPER RIB ACCELEROMETER



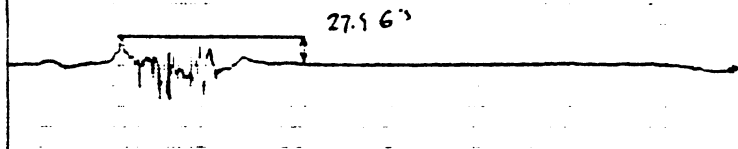
LEFT LOWER RIB ACCELEROMETER



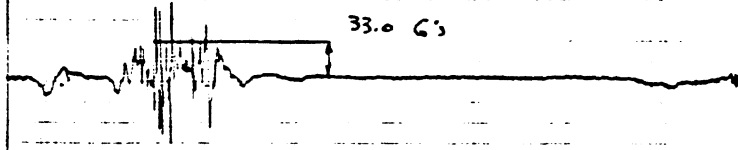
RIGHT UPPER RIB ACCELEROMETER



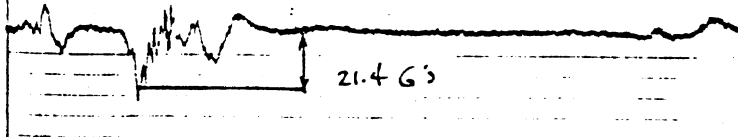
T<sub>1</sub> P-A ACCELEROMETER



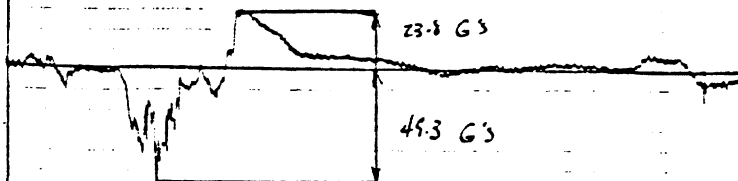
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



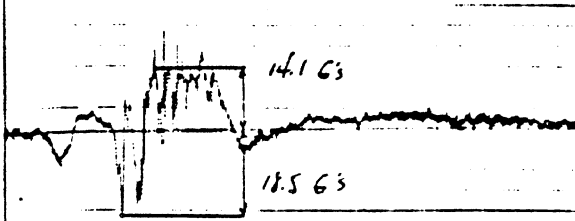
T<sub>12</sub> R-L ACCELEROMETER



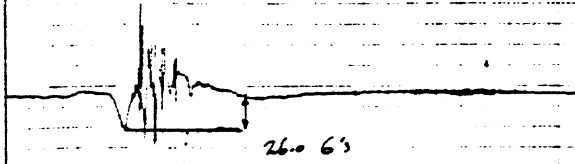
100 msec

TEST #76T 039

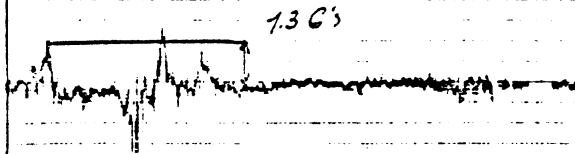
UPPER STERNAL ACCELEROMETER



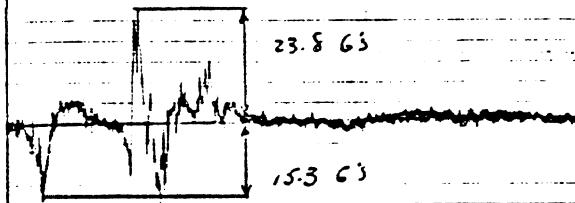
LOWER STERNAL ACCELEROMETER



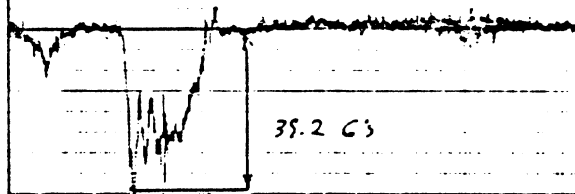
PELVIS P-A ACCELEROMETER



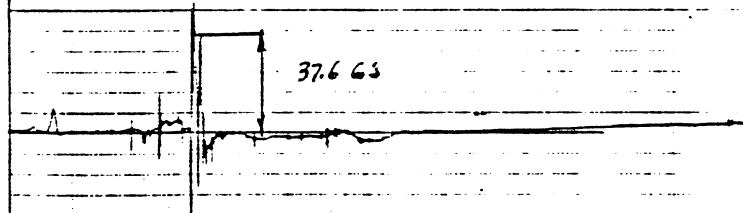
PELVIS I-S ACCELEROMETER



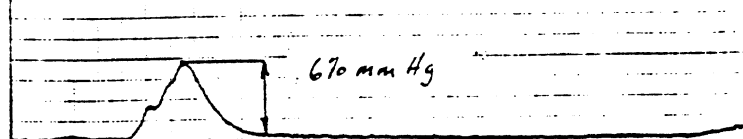
PELVIS R-L ACCELEROMETER



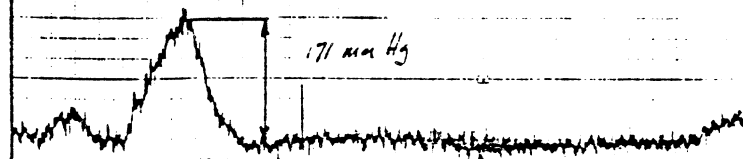
HEAD P-A ACCELEROMETER



VASCULAR PRESSURE



AIRWAY PRESSURE



100 msec

PTS: 1 61 161 241 321 401

Suo

4.E+00

=1=  
393

LUR

5.E+00

=2=  
394

LUR

7.E+00

=3=  
395

RUR

3.E+00

=5=  
396

T<sub>1</sub>PA

3.E+00

=6=  
397

T<sub>1</sub>E-S

3.E+00

=7=  
398

T<sub>2</sub>PA

3.E+00

=8=  
399

T<sub>2</sub>R-L

5.E+00

=9=  
400

MSEC: 0 60 120 180 240 300

ID: 76T039-1:SS

TAPE: THOR.2

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 RUN ID: 76T039-1188

ANALOG TO DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS  
 ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77  
 TEST SIGNALS: 1748 PTS/CH AT 6311.18 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
393	1	SLED DECELERATION PULSE	20.00	G'S	4+1+3	99.4	435	1577.00
394	2	LEFT LOWER RIB ACCELEROMETER	69.90	G'S	4+1+3	99.4	435	1577.00
395	3	LEFT UPPER RIB ACCELEROMETER	73.40	G'S	4+1+3	99.4	435	1577.00
400	4							
396	5	RIGHT UPPER RIB ACCELEROMETER	74.20	G'S	4+1+3	99.4	435	1577.00
397	6	T1 P-A ACCELEROMETER	74.40	G'S	4+1+3	99.4	435	1577.00
398	7	T1 I-S ACCELEROMETER	73.40	G'S	4+1+3	99.4	435	1577.00
399	8	T12 P-A ACCELEROMETER	76.60	G'S	4+1+3	99.4	435	1577.00
400	9	T12 R-L ACCELEROMETER	85.00	G'S	4+1+3	99.4	435	1577.00

101  
 111  
 121  
 131  
 141

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 FILTERED FILES: 393 - 400 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T039-1188  
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PTS: 1 101 201 301 401 501 601



MSEC: 0 80 160 240 320 400

ID: 76T039-2:SS

TAPE: THOR.2

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RUN ID: 76T039-2188

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 2050 PTS/CH AT 6307.45 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
721	1	SLED DECELERATION PULSE	50.00	G'S	4+1+3	99.3	512	1576.86
722	2	PELVIC P-A ACCELEROMETER	66.80	G'S	4+1+3	99.3	512	1576.86
723	3	PELVIC I-S ACCELEROMETER	85.00	G'S	4+1+3	99.3	512	1576.86
724	4	PELVIC R-L ACCELEROMETER	100.50	G'S	4+1+3	99.3	512	1576.86
725	5	UPPER STERNAL ACCELEROMETER	88.20	G'S	4+1+3	99.3	512	1576.86
726	6	LOWER STERNAL ACCELEROMETER	84.40	G'S	4+1+3	99.3	512	1576.86
727	7	VASCULAR PRESSURE	720.00	MM-HG	4+1+3	99.3	512	1576.86
728	8	AIRWAY PRESSURE	14.10	MM-HG	4+1+3	99.3	512	1576.86

9:  
10:  
11:  
12:  
13:  
14:

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FILTERED FILES: 721 - 728 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T039-2188  
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Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Number: 76T040 - Low Energy Frontal Impact

76T041 - Low Energy Side Impact

76T042 - Sled

Test Date: August 23, 1976

Test Subject: Age - 58

Sex: Female

Stature - 177.7 cm

Weight - 64.5 kg

Restraint System:

None: Impact with padded door side structures.

Velocity:

25 mph change in velocity

Injuries:

12 rib fractures

massive depressed left skull fracture with massive fore brain injuries

Left humerus fracture in middle

AIS Number Estimate:

Head: 6

Thorax: 4

TEST # 76T042

TEST DATE 8.24.76

TEST DESCRIPTION Sculptured Foam Padded Side Sled VELOCITY 36.7 ft/s.

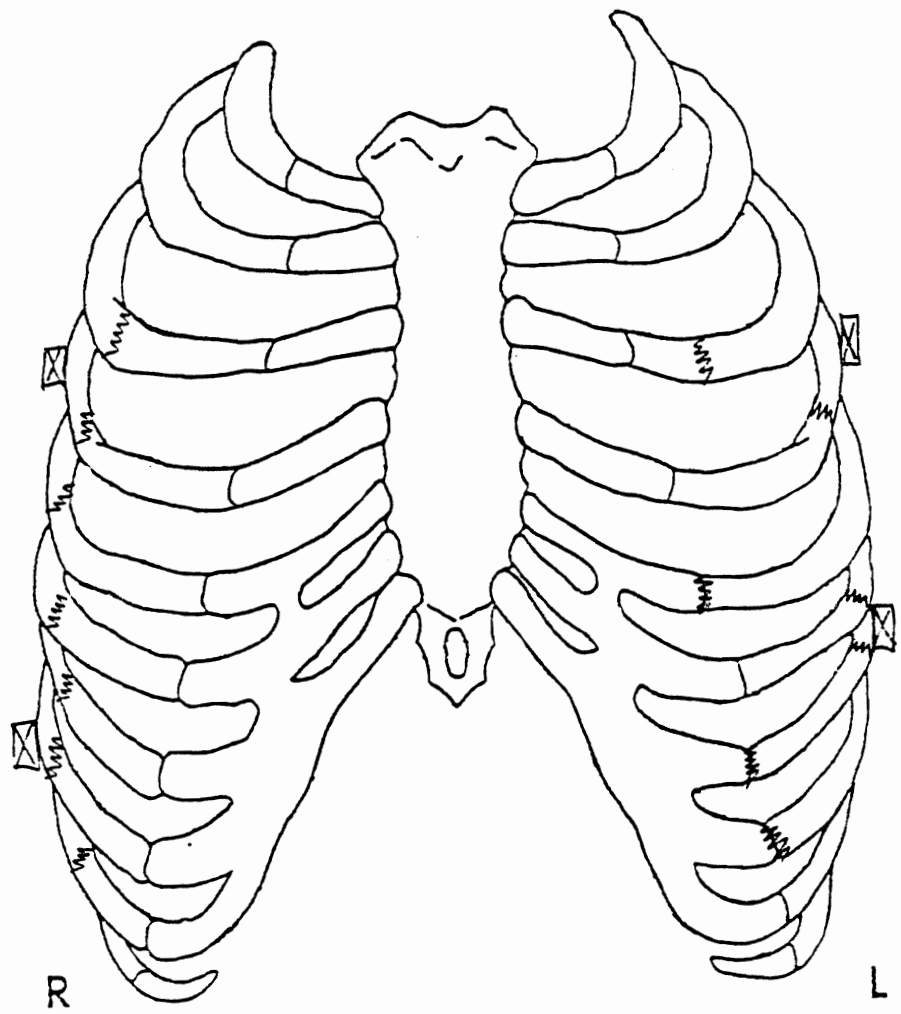
SUBJECT:

AGE 58 SEX F CAUSE OF DEATH Generalized Carcinoma

INJURY INFORMATION: OVERALL THORACIC AIS 4

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S	
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	<u>H</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>6</u>
	2	<u>H</u>	<u>B</u>	<u>H</u>	<u>B</u>	<u>6</u>
	3	<u>A</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>2</u>
	4	---	---	---	---	---
	5	---	---	---	---	---

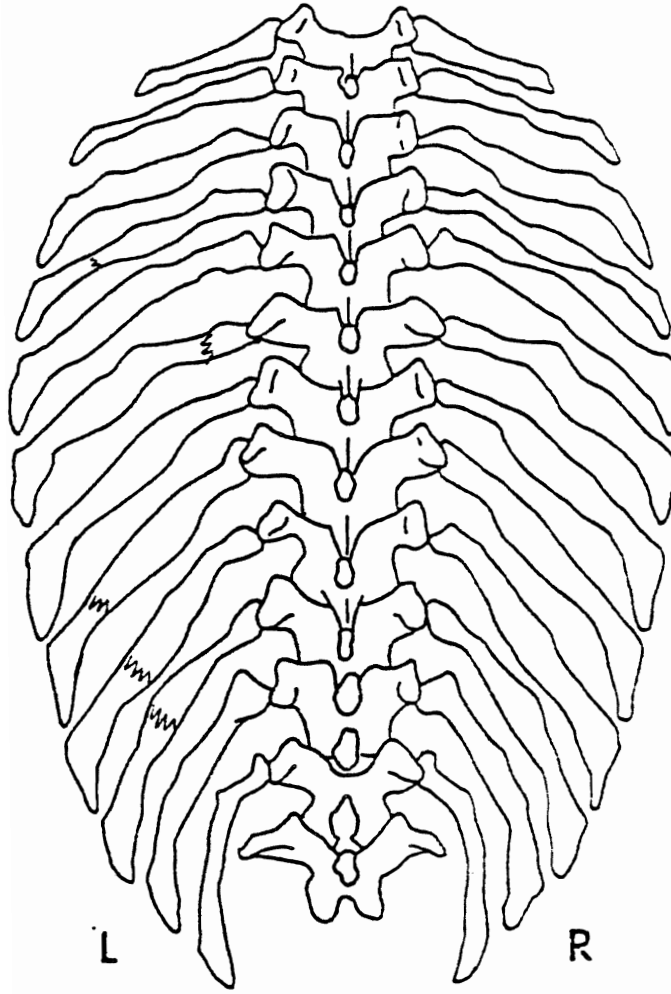
TEST # 767042



ANTERIOR VIEW RIB CAGE

(no organ injuries noted, possibly due to advanced decomposition.  
but:  
• massive, depressed left skull fracture  
• massive fore brain injuries  
• mid-shaft fracture, left humerus )

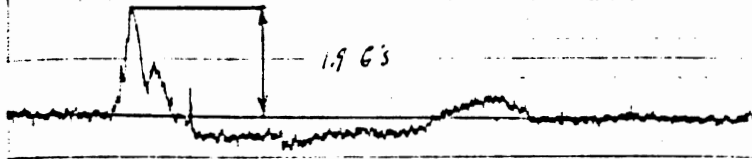
TEST # 767042



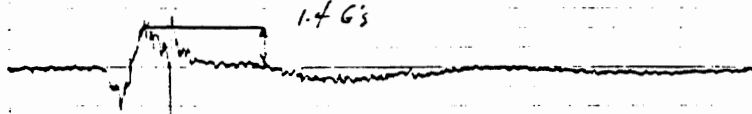
POSTERIOR VIEW RIB CAGE

TEST #767 040

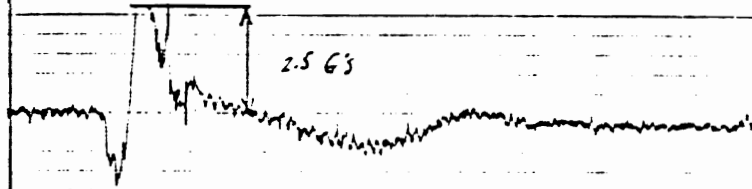
LEFT LOWER RIB ACCELEROMETER



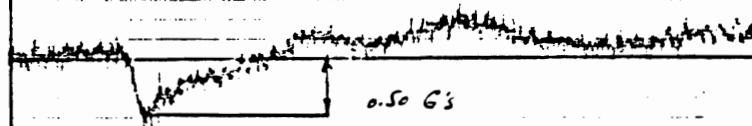
LEFT UPPER RIB ACCELEROMETER



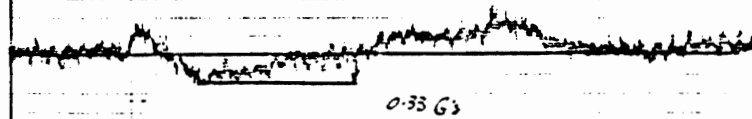
RIGHT UPPER RIB ACCELEROMETER



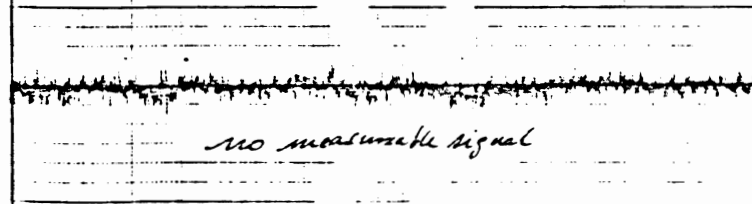
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



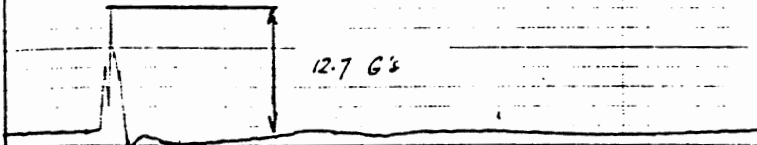
PELVIS R-L ACCELEROMETER



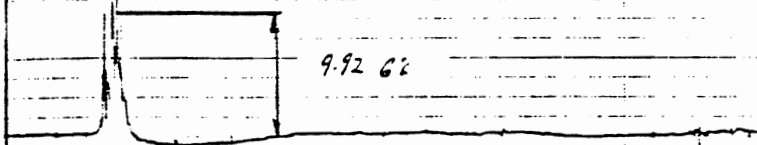
100 msec

TEST # 76T 040

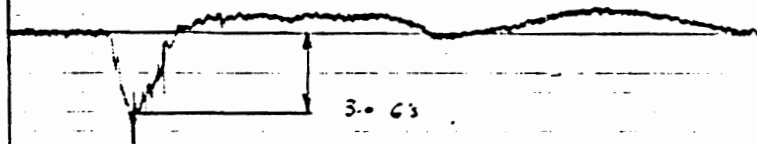
UPPER STERNAL ACCELEROMETER



LOWER STERNAL ACCELEROMETER



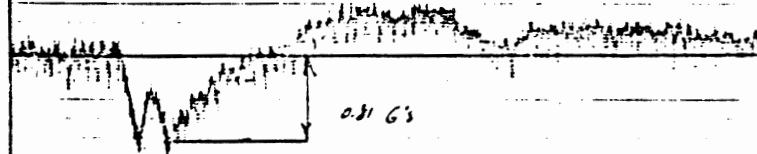
T<sub>L</sub> P-A ACCELEROMETER



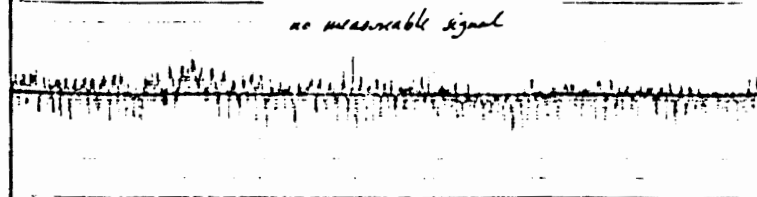
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 msec

PTS: 1 101 201 301 401 501 601

P1ST



LLR



WR



RUR



T1PA



T1E-S



T2PA



T2R-L



MSEC: 0 80 160 240 320 400

ID: 76T040-1:PT

TAPE: THOR.2

\*\*\*\*\*  
 RUN ID: 76T040-1IPT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 2390 PTS/CH AT 6314.29 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
401	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	595	1570.57
402	2	LEFT LOWER RIB ACCELEROMETER	-7.00	G'S	4+1+3	99.4	595	1570.57
403	3	LEFT UPPER RIB ACCELEROMETER	-7.30	G'S	4+1+3	99.4	595	1570.57
404	5	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+3	99.4	595	1570.57
405	6	T1 P-A ACCELEROMETER	7.40	G'S	4+1+3	99.4	595	1570.57
406	7	T1 I-S ACCELEROMETER	-7.30	G'S	4+1+3	99.4	595	1570.57
407	8	T12 P-A ACCELEROMETER	7.70	G'S	4+1+3	99.4	595	1570.57
408	9	T12 R-L ACCELEROMETER	6.50	G'S	4+1+3	99.4	595	1570.57

101  
 111  
 121  
 131  
 141

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 FILTERED FILES: 401 - 408 DIGITAL TAPE: THOR,2 DATE: 21-JAN-77 RUN ID: 76T040-1IPT  
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PTS: 1 301 601 901 1201 1501

P1ST

7.E-01

=1= 729

P2A

4.E-02

=2= 730

P2.S

4.E-02

=3= 731

PR-L

2.E-02

=4= 732

UPST

8.E-01

=5= 733

LOST

6.E-01

=6= 734

MSEC: 0 200 400 600 800 1000

76T040-2:PT

ID:

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T040-2IPT

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 4565 PTS/CH AT 6306.77 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
729	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	836	1576.69
730	2	PELVIC P=A ACCELEROMETER	6.70	G'S	4+1+3	99.3	836	1576.69
731	3	PELVIC I=S ACCELEROMETER	6.50	G'S	4+1+3	99.3	836	1576.69
732	4	PELVIC R=L ACCELEROMETER	10.05	G'S	4+1+3	99.3	836	1576.69
733	5	UPPER STERNAL ACCELEROMETER	10.30	G'S	4+1+3	99.3	836	1576.69
734	6	LOWER STERNAL ACCELEROMETER	6.40	G'S	4+1+3	99.3	836	1576.69

7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

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FILTERED FILES: 729-734 DIGITAL TAPE: THOR,2

DATE: 21-JAN-77

RUN ID: 76T040-2IPT

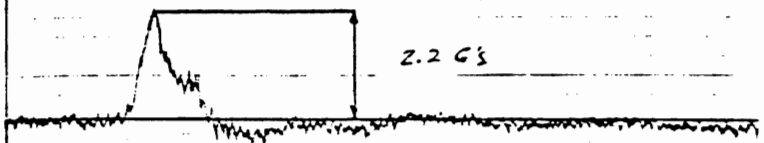
\*\*\*\*\*

TEST # 76T041

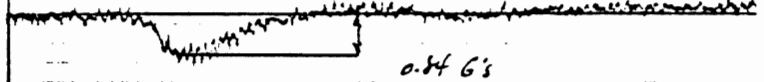
LEFT LOWER RIB ACCELEROMETER



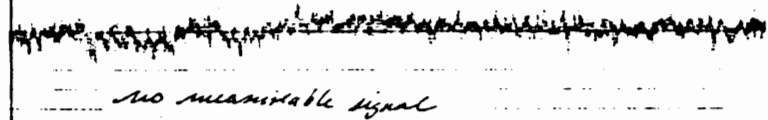
LEFT UPPER RIB ACCELEROMETER



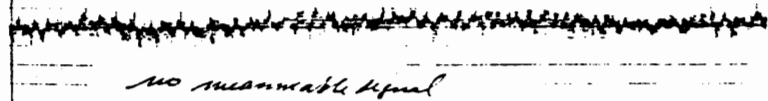
RIGHT UPPER RIB ACCELEROMETER



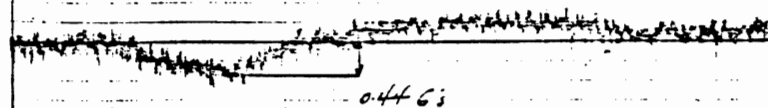
PELVIS P-A ACCELEROMETER



PELVIS I-S ACCELEROMETER



PELVIS R-L ACCELEROMETER



100 msec

TEST # 76T 041

UPPER STERNAL ACCELEROMETER

0.49 G's

LOWER STERNAL ACCELEROMETER

0.19 G's

0.26 G's

T<sub>1</sub> P-A ACCELEROMETER

0.74 G's

T<sub>1</sub> I-S ACCELEROMETER

0.62 G's

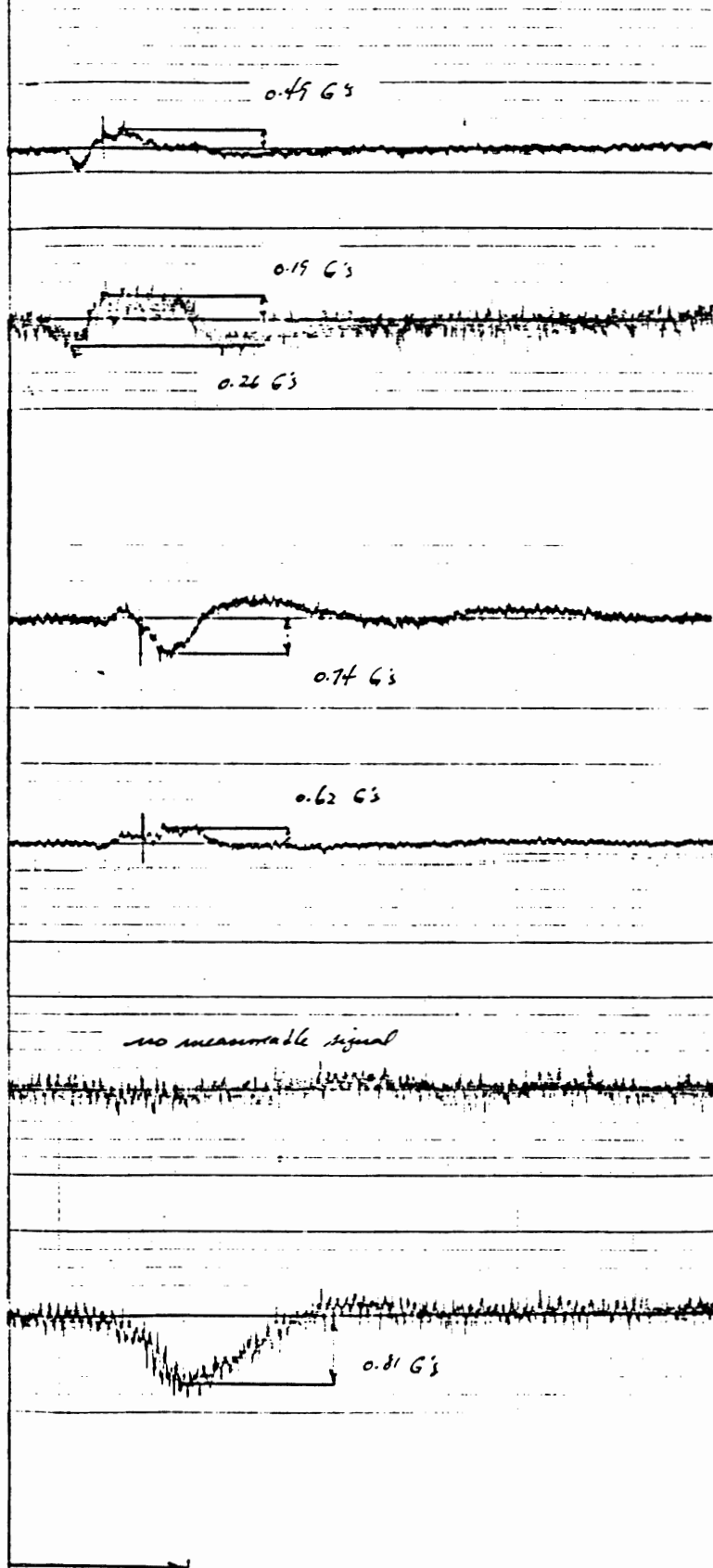
T<sub>12</sub> P-A ACCELEROMETER

no measurable signal

T<sub>12</sub> R-L ACCELEROMETER

0.81 G's

100 msec



PTS: 1 301 601 901 1201 1501

P15r

9.E-01

=1=  
409

L1r

7.E-02

=2=  
410

L1R

2.E-01

=3=  
411

R1R

9.E-02

=5=  
412

T.P.A

8.E-02

=6=  
413

T.I-S

6.E-02

=7=  
414

P12PA

2.E-02

=8=  
415

P12R-L

8.E-02

=9=  
416

MSEC: 0 200 400 600 800 1000

ID: 76T041-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T041-11PT

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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: H8RI--140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H9010 DATE: 17-JAN-77

TEST SIGNALS: 3346 PTS/CH AT 6309.34 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
409	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	836	1577.33
410	2	LEFT LOWER RIB ACCELEROMETER	-7.00	G'S	4+1+ 3	99.4	836	1577.33
411	3	LEFT UPPER RIB ACCELEROMETER	-7.30	G'S	4+1+ 3	99.4	836	1577.33
412	5	RIGHT UPPER RIB ACCELEROMETER	7.40	G'S	4+1+ 3	99.4	836	1577.33
413	6	T1 P-A ACCELEROMETER	7.40	G'S	4+1+ 3	99.4	836	1577.33
414	7	T1 I-B ACCELEROMETER	-7.30	G'S	4+1+ 3	99.4	836	1577.33
415	8	T12 P-A ACCELEROMETER	7.70	G'S	4+1+ 3	99.4	836	1577.33
416	9	T12 R-L ACCELEROMETER	8.50	G'S	4+1+ 3	99.4	836	1577.33

101  
111  
121  
131  
141

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FILTERED FILES: 409 - 416 DIGITAL TAPE: THOR.2

RUN ID: 76T041-11PT

DATE: 21-JAN-77

\*\*\*\*\*

PTS: 1 301 601 901 1201 1501

POST

6.E-01

=1= 735

PPA

2.E-02

=2= 736

PI-S

2.E-02

=3= 737

PR-L

5.E-02

=4= 738

UPST

7.E-02

=5= 739

LOST

4.E-02

=6= 740

MSEC: 0 200 400 600 800 1000

76T041-2:PT

ID:

TAPE: THOR.2

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RUN ID: 76T041-2IPT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT-SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 4451 PTS/CH AT 6309.50 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
735	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	836	1577.30
736	2	PELVIC P-A ACCELEROMETER	6.70	G'S	4+1+3	99.4	836	1577.30
737	3	PELVIC I-S ACCELEROMETER	-0.50	G'S	4+1+3	99.4	836	1577.30
738	4	PELVIC R-L ACCELEROMETER	11.70	G'S	4+1+3	99.4	836	1577.30
739	5	UPPER STERNAL ACCELEROMETER	-10.30	G'S	4+1+3	99.4	836	1577.30
740	6	LOWER STERNAL ACCELEROMETER	-0.40	G'S	4+1+3	99.4	836	1577.30

71

81

91

101

111

121

131

141

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FILTERED FILES: 735 - 740 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T041-2IPT

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TEST # 76T 042

SLED DECELERATION PULSE

37 G's

LEFT LOWER RIB ACCELEROMETER

170. G's

LEFT UPPER RIB ACCELEROMETER

102. G's

RIGHT UPPER RIB ACCELEROMETER

178. G's

T<sub>1</sub> P-A ACCELEROMETER

43 G's

T<sub>1</sub> I-S ACCELEROMETER

51.4 G's

T<sub>12</sub> P-A ACCELEROMETER

77.9 G's

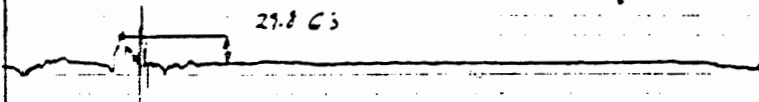
T<sub>12</sub> R-L ACCELEROMETER

72.3 G's

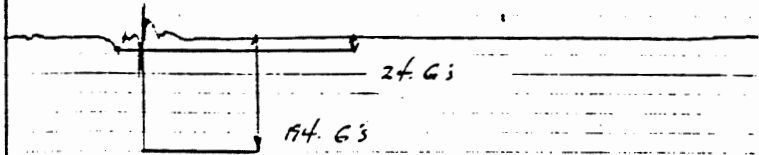
100 msec

TEST # 76T 042

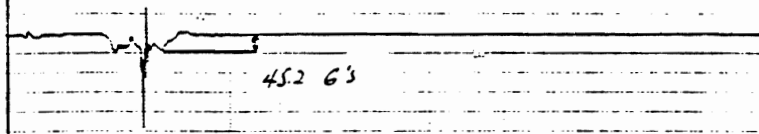
UPPER STERNAL ACCELEROMETER



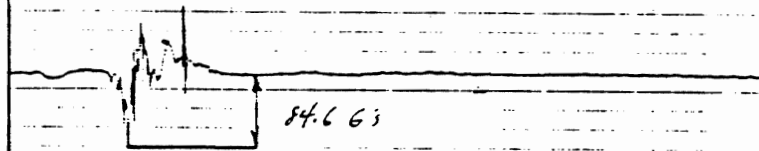
LOWER STERNAL ACCELEROMETER



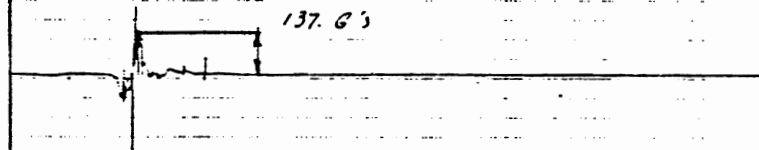
PELVIS P-A ACCELEROMETER



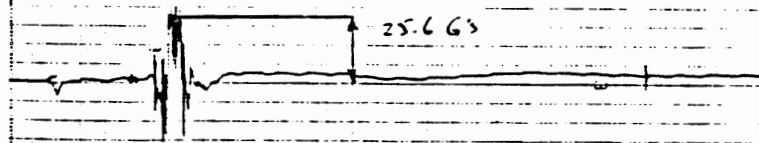
PELVIS I-S ACCELEROMETER



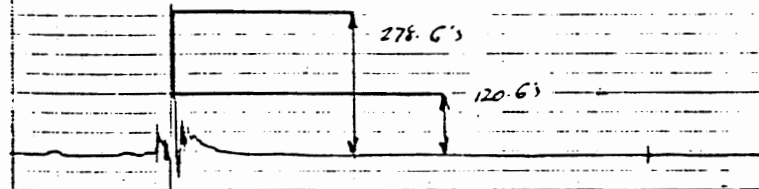
PELVIS R-L ACCELEROMETER



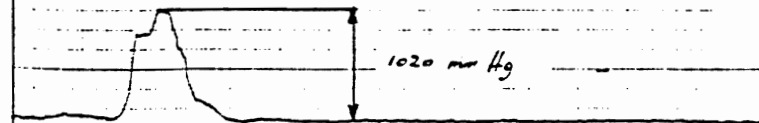
HEAD P-A ACCELEROMETER



HEAD I-S ACCELEROMETER



VASCULAR PRESSURE



100 msec

PTS: 1 101 201 301 401 501 601



MSEC: 0 80 160 240 320 400

ID: 76T042-1:55

TAPE: THOR.2

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RUN ID: 76T042-1188

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI--140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2043 PTS/CH AT 6309.62 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
417	1: SLED DECELERATION PULSE	20.00	G'S	4+1+ 3	99.4	500	1577.45
418	2: LEFT LOWER RIB ACCELEROMETER	69.90	G'S	4+1+ 3	99.4	500	1577.45
419	3: LEFT UPPER RIB ACCELEROMETER	73.40	G'S	4+1+ 3	99.4	500	1577.45
420	5: RIGHT UPPER RIB ACCELEROMETER	74.20	G'S	4+1+ 3	99.4	500	1577.45
421	6: T1 P-A ACCELEROMETER	74.40	G'S	4+1+ 3	99.4	500	1577.45
422	7: T1 I-S ACCELEROMETER	73.40	G'S	4+1+ 3	99.4	500	1577.45
423	8: T12 P-A ACCELEROMETER	76.60	G'S	4+1+ 3	99.4	500	1577.45
424	9: T12 R-L ACCELEROMETER	65.00	G'S	4+1+ 3	99.4	500	1577.45

101  
111  
121  
131  
141

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FILTERED FILES: 417 - 424 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T042-1188

PTS: 1 81 161 241 321 401

SUED

9.E+00

=1=  
741

PPA

4.E+00

=2=  
742

PI-S

3.E+00

=3=  
743

PR-L

7.E+00

=4=  
744

UPST

6.E+00

=5=  
745

LOST

2.E+01

=6=  
746

VASC  
(mmHg)

7.E+01

=7=  
747

MSEC: 0 60 120 180 240 300

ID: 76T042-2:55

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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RUN ID: 76T042-2188

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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 18-JAN-77  
TEST SIGNALS: 1725 PTS/CH AT 6306.41 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
741	1	SLED DECELERATION PULSE	50.00	G'S	4+1+3	99.3	430	1576.60
742	2	PELVIC P-A ACCELEROMETER	66.00	G'S	4+1+3	99.3	430	1576.60
743	3	PELVIC I-S ACCELEROMETER	85.00	G'S	4+1+3	99.3	430	1576.60
744	4	PELVIC R-L ACCELEROMETER	100.50	G'S	4+1+3	99.3	430	1576.60
745	5	UPPER STERNAL ACCELEROMETER	86.20	G'S	4+1+3	99.3	430	1576.60
746	6	LOWER STERNAL ACCELEROMETER	84.40	G'S	4+1+3	99.3	430	1576.60
747	7	VASCULAR PRESSURE	720.00	MM-HG	4+1+3	99.3	430	1576.60

8i  
9i  
10i  
11i  
12i  
13i  
14i

\*\*\*\*\*  
FILTERED FILES: 741 - 747 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T042-2188  
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SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER: 76T048 - Low Energy Frontal Pendulum Impact  
76T049 - Low Energy Side Pendulum Impact  
76T050 - Pendulum 14 ft/sec Front Impact

TEST DATE: October 28, 1976

TEST SUBJECT: Age - 61  
Sex - Male  
Stature - 176.8 cm.  
Weight - 83.7 kg.

RESTRAINT SYSTEM:  
None: Thoracic Pendulum Impact

VELOCITY:  
For Test No. 76T050, velocity was 14 ft/sec

INJURIES:  
Sternum fracture  
13 rib fractures forming ring in shape of transfer piston head.

AIS NUMBER ESTIMATE:

TEST # 76T050

TEST DATE 10-28-76

TEST DESCRIPTION Pendulum front impact VELOCITY 14 ft/s

SUBJECT:

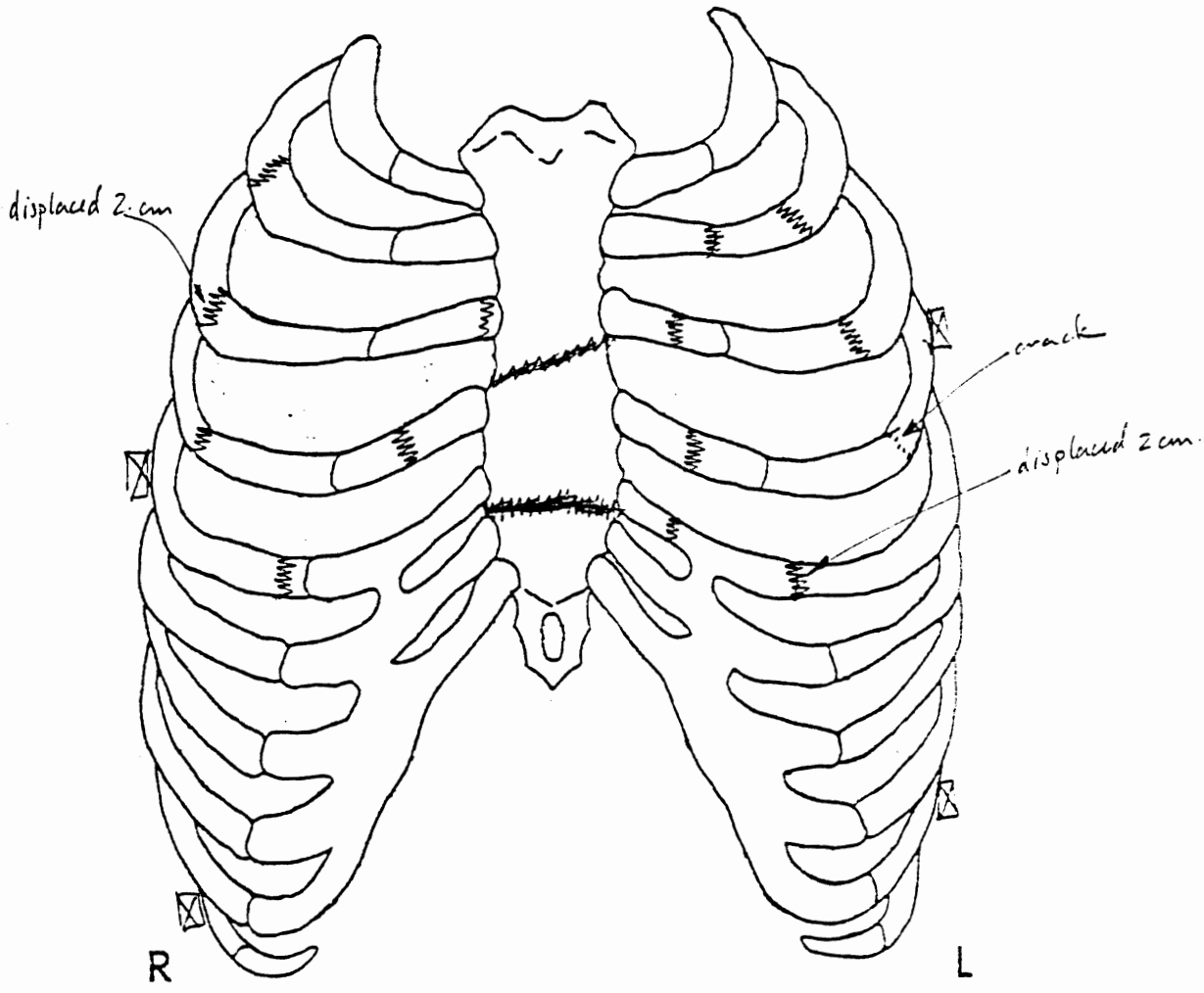
AGE 61 SEX M CAUSE OF DEATH Acute myocardial infarction

INJURY INFORMATION: OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>3</u>
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

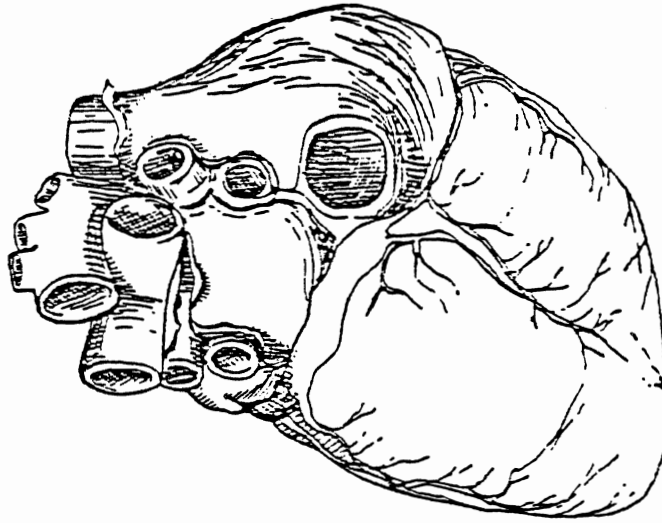


TEST # 96Te50

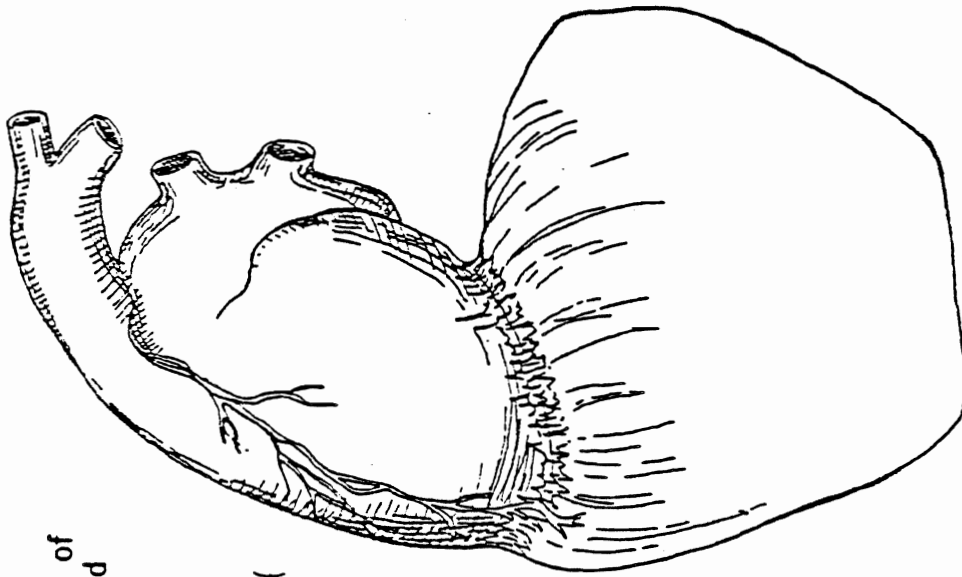


ANTERIOR VIEW RIB CAGE

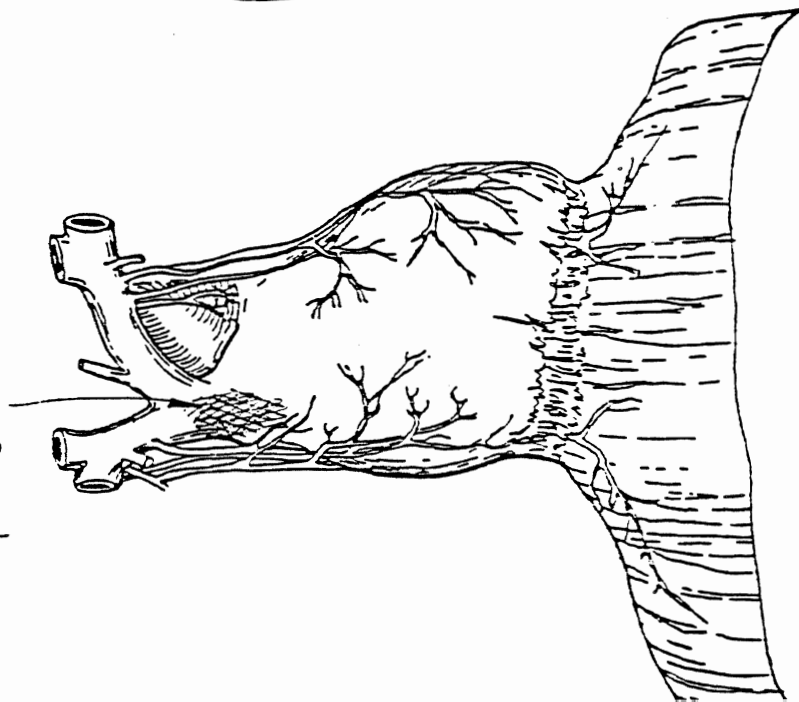
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm



*Some hemorrhage, probably not from test: appears old, well clothed*



Anterior View of Pericardium and Diaphragm

TEST 76T048

PISTON DECELERATION PULSE

2.0 G's

LEFT UPPER RIB ACCELEROMETER

0.9 G's

LEFT LOWER RIB ACCELEROMETER

1.1 G's

0.5 G's

RIGHT UPPER RIB ACCELEROMETER

0.7 G's

RIGHT LOWER RIB ACCELEROMETER

0.6 G's

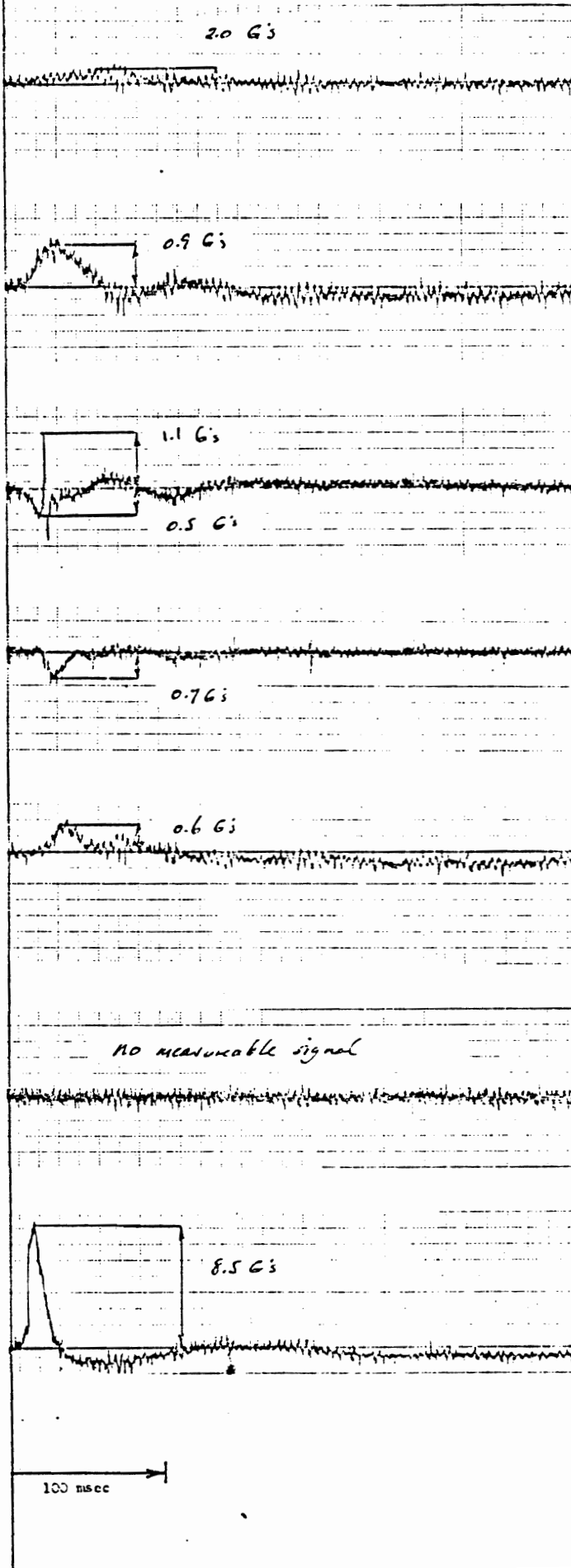
UPPER STERNAL ACCELEROMETER

no measurable signal

LOWER STERNAL ACCELEROMETER

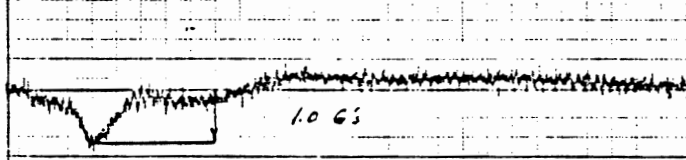
8.5 G's

100 nsec

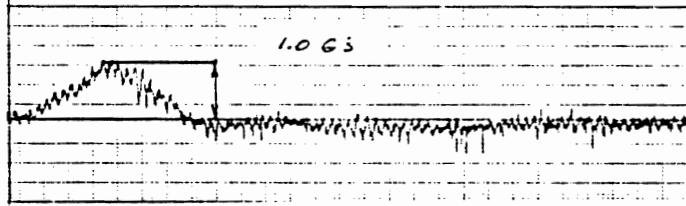


TEST 76T048

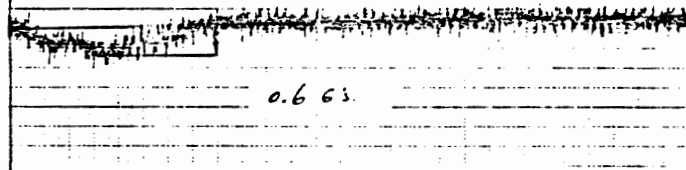
T<sub>1</sub> P-A ACCELEROMETER



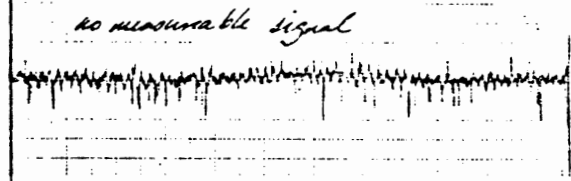
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 msec

PTS: 1 101 201 301 401 501 601

P1ST

9.E-01

=1=  
425

LUR

8.E-02

=2=  
426

LLR

2.E-01

=3=  
427

RUR

9.E-02

=4=  
428

RLR

9.E-02

=5=  
429

UPST

3.E-02

=6=  
430

LOST

8.E-01

=7=  
431

T<sub>1</sub>P-A

2.E-01

=8=  
432

T<sub>1</sub>E-S

2.E-01

=9=  
433

T<sub>12</sub>P-A

7.E-02

=10=  
434

VEL

2.E-02

=11=  
435

MSEC: 0 80 160 240 320 400

ID: 76T048-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T048-11PT

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PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI--140 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2189 PTS/CH AT 6312.45 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
425	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	544	1570.11
426	2	LEFT UPPER RIB ACCELEROMETER	6.50	G'S	4+1+3	99.4	544	1570.11
427	3	LEFT LOWER RIB ACCELEROMETER	6.70	G'S	4+1+3	99.4	544	1570.11
428	4	RIGHT UPPER RIB ACCELEROMETER	6.50	G'S	4+1+3	99.4	544	1570.11
429	5	RIGHT LOWER RIB ACCELEROMETER	7.70	G'S	4+1+3	99.4	544	1570.11
430	6	UPPER STERNAL ACCELEROMETER	13.40	G'S	4+1+3	99.4	544	1570.11
431	7	LOWER STERNAL ACCELEROMETER	11.20	G'S	4+1+3	99.4	544	1570.11
432	8	T1 P-A ACCELEROMETER	7.40	G'S	4+1+3	99.4	544	1570.11
433	9	T1 I-S ACCELEROMETER	7.30	G'S	4+1+3	99.4	544	1570.11
434	10	T12 P-A ACCELEROMETER	6.50	G'S	4+1+3	99.4	544	1570.11
435	11	T12 R-L ACCELEROMETER	6.20	G'S	4+1+3	99.4	544	1570.11

12

13

14

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FILTERED FILES: 425 - 435 DIGITAL TAPE: THOR,2

DATE: 21-JAN-77

RUN ID: 76T048-11PT

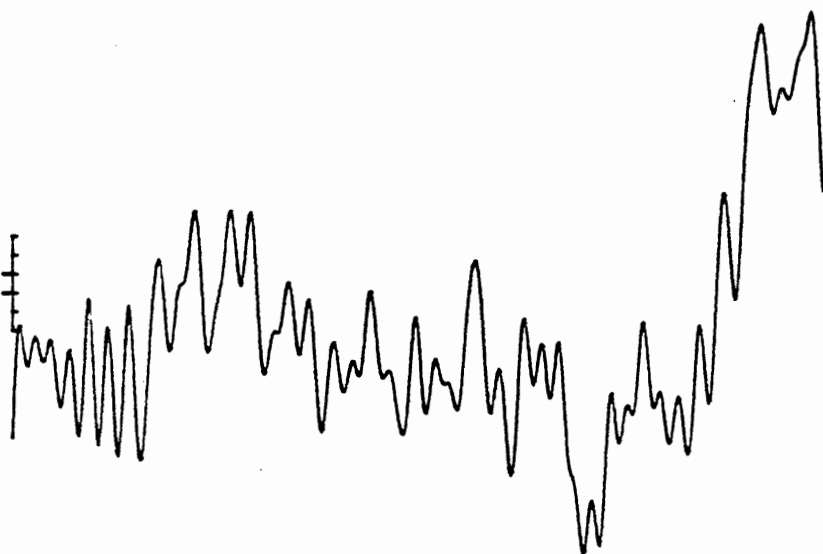
\*\*\*\*\*

PTS: 1 101 201 301 401 501 601

ID: 76T048-1:PT

$T_{12} R_{12}$

8.E-03



$\overline{=12=}$   
850

MSEC: 0 80 160 240 320 400

TAPE: THOR.2A

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RUN ID: 76T040-11PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI--140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 2189 PTS/CH AT 6312.45 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11								
21								
31								
41								
51								
61								
71								
81								
91								
101								
111								

050 - 121 T12 R-L ACCELEROMETER 0.20 G'S 4+1+ 3 99.4 504 0 1578.11

131

141

\*\*\*\*\*

FILTERED FILES: 050 - 050 DIGITAL TAPE: THOR,2 DATE: 26-JAN-77

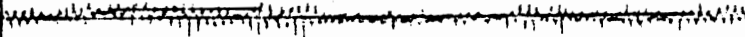
RUN ID: 76T040-11PT

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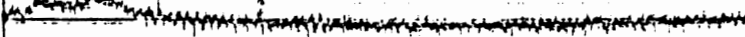
PISTON DECELERATION PULSE

1.3 G's



LEFT UPPER RIB ACCELEROMETER

2.4 G's



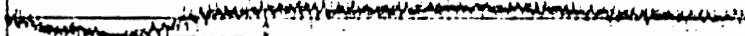
LEFT LOWER RIB ACCELEROMETER

0.3 G's



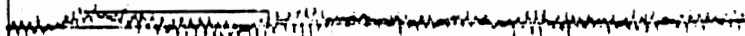
RIGHT UPPER RIB ACCELEROMETER

0.4 G's



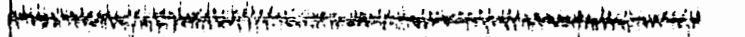
RIGHT LOWER RIB ACCELEROMETER

0.3 G's



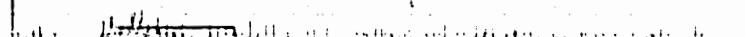
UPPER STERNAL ACCELEROMETER

*no measurable signal*



LOWER STERNAL ACCELEROMETER

0.5 G's



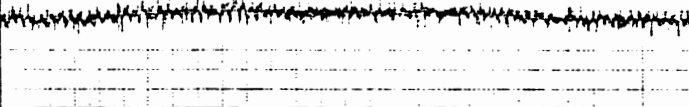
100 msec



TEST 76TC-9

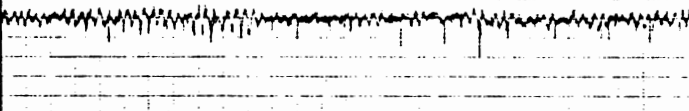
*no measurable signal*

T<sub>1</sub> P-A ACCELEROMETER



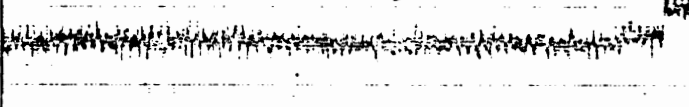
*no measurable signal*

T<sub>1</sub> I-S ACCELEROMETER

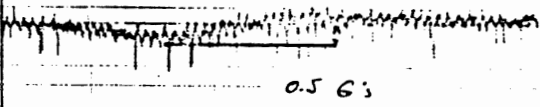


*no measurable signal*

T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



0.5 G

100 msec



PTS: 1 101 201 301 401 501 601 701

PIST

9.E-01

=1=  
436

LUR

6.E-02

=2=  
437

LRZ

5.E-02

=3=  
438

RUR

7.E-02

=4=  
439

RLR

4.E-02

=5=  
440

UPST

4.E-02

=6=  
441

LOST

6.E-02

=7=  
442

T<sub>1</sub> PA

4.E-02

=8=  
443

T<sub>2</sub> S

3.E-02

=9=  
444

T<sub>1,2</sub> PA

3.E-02

=10=  
445

VEL

4.E-02

=11=  
446

MSEC: 0 100 200 300 400 500

ID: 76T049-1:PT

TAPE: THOR.2

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RUN ID: 76T049-1IPT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 3076 PTS/CH AT 6307.13 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
436	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	768	1576.70
437	2	LEFT UPPER RIB ACCELEROMETER	-6.50	G'S	4+1+3	99.3	768	1576.70
438	3	LEFT LOWER RIB ACCELEROMETER	-6.70	G'S	4+1+3	99.3	768	1576.70
439	4	RIGHT UPPER RIB ACCELEROMETER	0.50	G'S	4+1+3	99.3	768	1576.70
440	5	RIGHT LOWER RIB ACCELEROMETER	-7.70	G'S	4+1+3	99.3	768	1576.70
441	6	UPPER STERNAL ACCELEROMETER	-13.40	G'S	4+1+3	99.3	768	1576.70
442	7	LOWER STERNAL ACCELEROMETER	-11.20	G'S	4+1+3	99.3	768	1576.70
443	8	T1 P-A ACCELEROMETER	7.40	G'S	4+1+3	99.3	768	1576.70
444	9	T1 I-S ACCELEROMETER	-7.30	G'S	4+1+3	99.3	768	1576.70
445	10	T12 P-A ACCELEROMETER	0.50	G'S	4+1+3	99.3	768	1576.70
446	11	T12 R-L ACCELEROMETER	0.20	G'S	4+1+3	99.3	768	1576.70

12:

13:

14:

FILTERED FILES: 436 - 446 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T049-1IPT

PTS: 1 101 201 301 401 501 601 701

ID: 76T049-1:PT

*P<sub>12</sub>R.L*

2.E-02

12= 851

MSEC: 0 100 200 300 400 500

TAPE: THOR.2X

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T049-11PT

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: H8RI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77

TEST SIGNALS: 3076 PTS/CH AT 6307.13 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
11							
21							
31							
41							
51							
61							
71							
81							
91							
101							
111							
121	T12 R=L ACCELEROMETER	8.20	0.8	4+1+3	99.3	768	1576.78
131							
141							

- 11
- 21
- 31
- 41
- 51
- 61
- 71
- 81
- 91
- 101
- 111
- 121
- 131
- 141

851 - 121 T12 R=L ACCELEROMETER 8.20 0.8 4+1+3 99.3 768 1576.78

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FILTERED FILES: 851 \* 851 DIGITAL TAPE: THOR.2 DATE: 26-JAN-77 RUN ID: 76T049-11PT

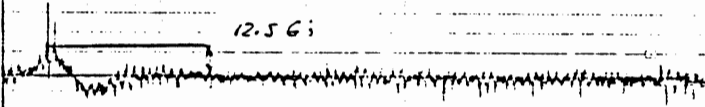
PISTON DECELERATION PULSE



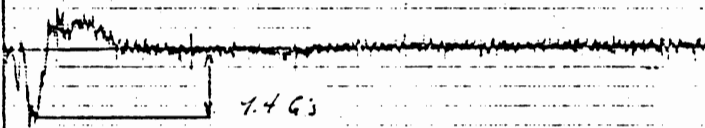
LEFT UPPER RIB ACCELEROMETER



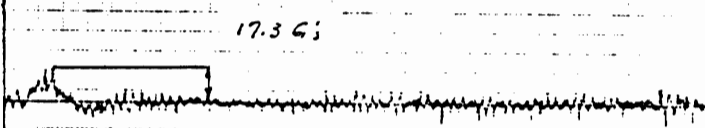
LEFT LOWER RIB ACCELEROMETER



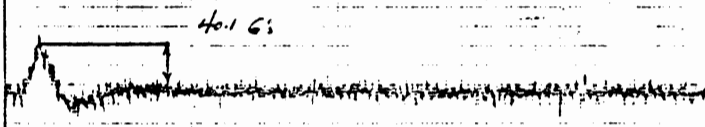
RIGHT UPPER RIB ACCELEROMETER



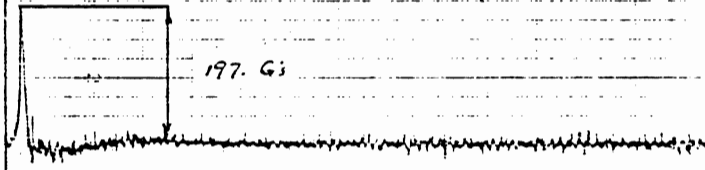
RIGHT LOWER RIB ACCELEROMETER



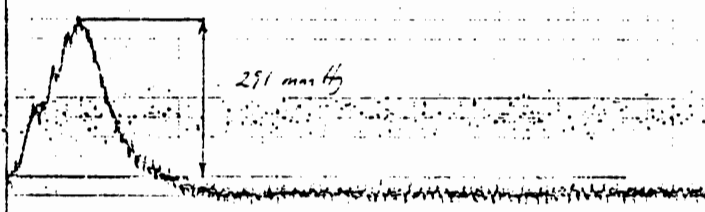
UPPER STERNAL ACCELEROMETER



LOWER STERNAL ACCELEROMETER



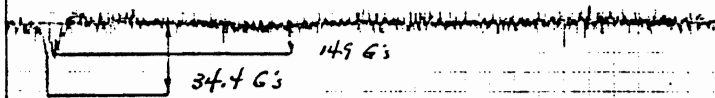
VASCULAR PRESSURE



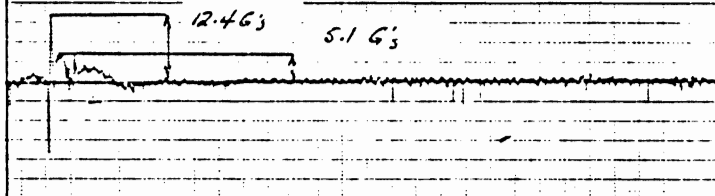
100 msec

TEST 70T050

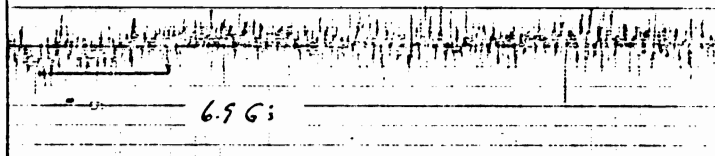
T<sub>1</sub> P-A ACCELEROMETER



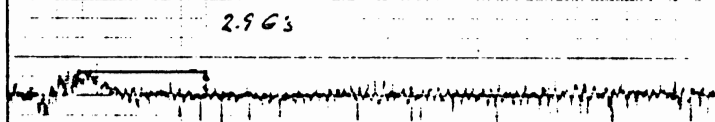
T<sub>1</sub> I-S ACCELEROMETER



T<sub>12</sub> P-A ACCELEROMETER



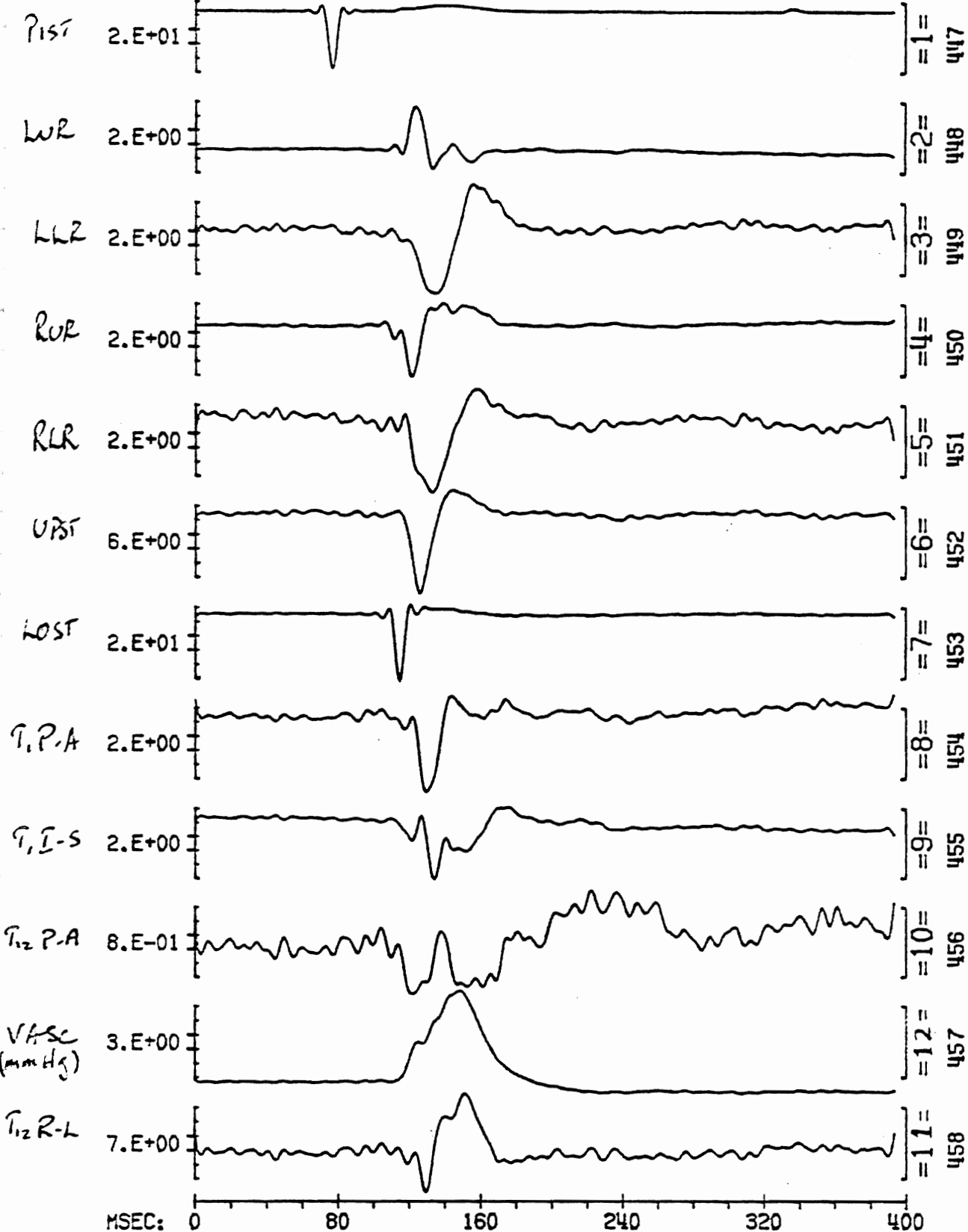
T<sub>12</sub> R-L ACCELEROMETER



100 msec



PTS: 1 101 201 301 401 501 601



ID: 76T050-1:PP

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T050-11PP

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0016 DATE: 17-JAN-77

TEST SIGNALS: 2490 PTS/CH AT 6313.49 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
447	1: PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	622	1576.37
448	2: LEFT UPPER RIB ACCELEROMETER	-32.50	G'S	4+1+ 3	99.4	622	1576.37
449	3: LEFT LOWER RIB ACCELEROMETER	-167.00	G'S	4+1+ 3	99.4	622	1576.37
450	4: RIGHT UPPER RIB ACCELEROMETER	42.50	G'S	4+1+ 3	99.4	622	1576.37
451	5: RIGHT LOWER RIB ACCELEROMETER	-192.00	G'S	4+1+ 3	99.4	622	1576.37
452	6: UPPER STERNAL ACCELEROMETER	-334.00	G'S	4+1+ 3	99.4	622	1576.37
453	7: LOWER STERNAL ACCELEROMETER	-281.00	G'S	4+1+ 3	99.4	622	1576.37
454	8: T1 P-A ACCELEROMETER	106.00	G'S	4+1+ 3	99.4	622	1576.37
455	9: T1 I-S ACCELEROMETER	-73.00	G'S	4+1+ 3	99.4	622	1576.37
456	10: T12 R-L ACCELEROMETER	213.00	G'S	4+1+ 3	99.4	622	1576.37
457	11: T12 R-L ACCELEROMETER	40.90	G'S	4+1+ 3	99.4	622	1576.37
458	12: VASCULAR PRESSURE	728.00	MM-HG	4+1+ 3	99.4	622	1576.37

13:

14:

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FILTERED FILES: 447 - 458 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T050-11PP

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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER:

76T051 - Low Energy Side Pendulum Impact  
76T052 - Low Energy Frontal Pendulum Impact  
76T053 - Pendulum 14 ft/sec Frontal Impact

TEST DATE:

November 11, 1976

TEST SUBJECT:

Age - 63  
Sex - Male  
Stature - 174.3 cm.  
Weight - 105 kg.

RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

VELOCITY:

For Test No. 76T053, velocity was 14 ft/sec.

INJURIES:

NONE

AIS NUMBER ESTIMATE:

0

TEST # 771053

TEST DATE 11.12.76

TEST DESCRIPTION Pendulum front impact VELOCITY 14.0 ft/s

SUBJECT:

AGE 63 SEX M CAUSE OF DEATH stroke of basal ganglia

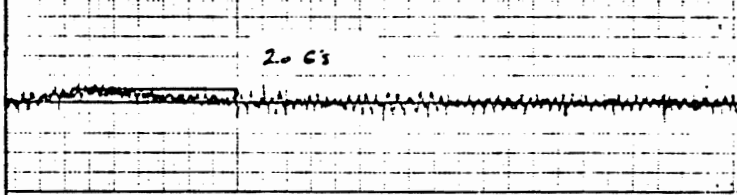
INJURY INFORMATION: OVERALL THORACIC AIS 0

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____
	6	_____	_____	_____	_____
	7	_____	_____	_____	_____
	8	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____

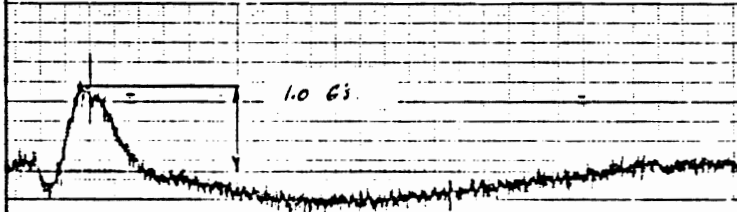
*no injuries observed*

TEST 76T051

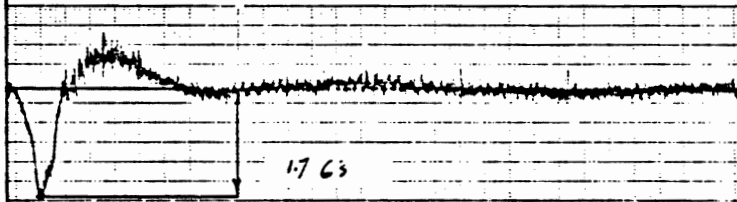
PISTON DECELERATION PULSE



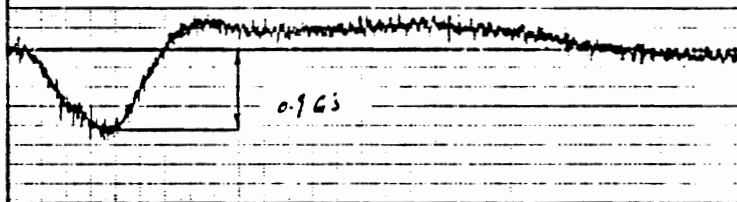
LEFT UPPER RIB ACCELEROMETER



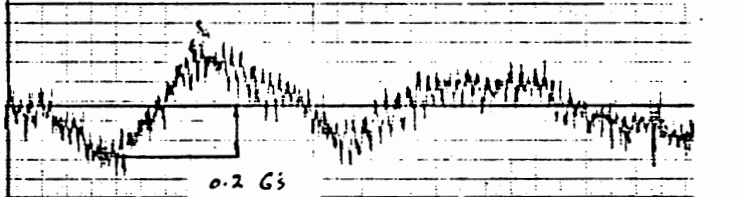
LEFT LOWER RIB ACCELEROMETER



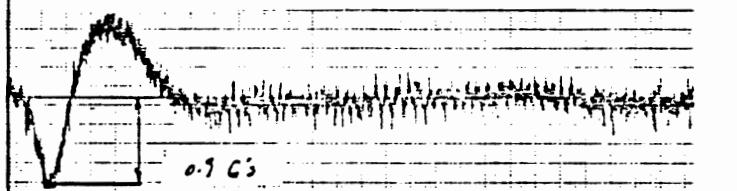
RIGHT UPPER RIB ACCELEROMETER



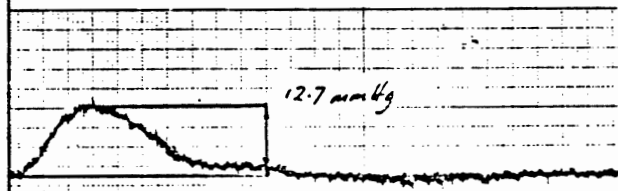
RIGHT LOWER RIB ACCELEROMETER



LOWER STERNAL ACCELEROMETER



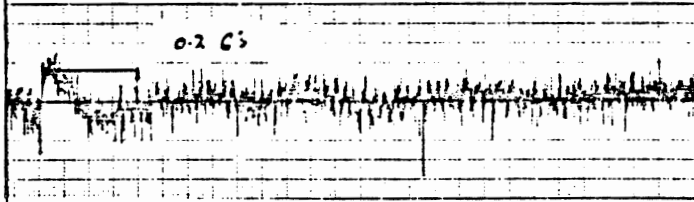
AIRWAY PRESSURE



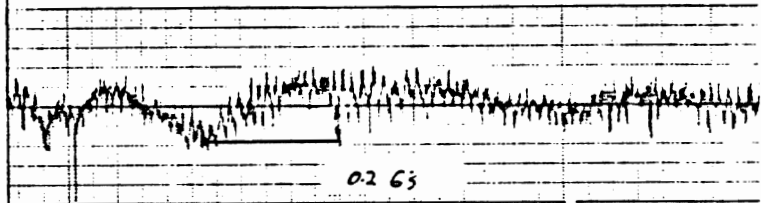
100 msec

TEST 76T051

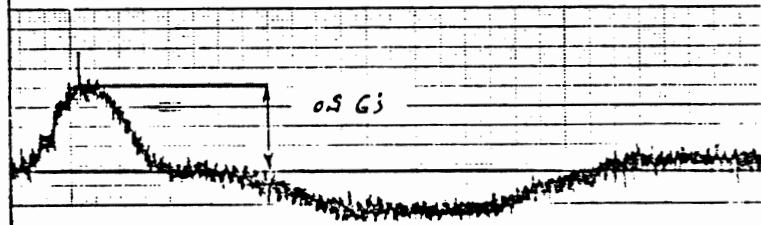
T<sub>1</sub> P-A ACCELEROMETER



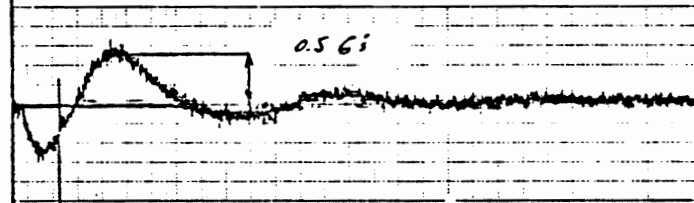
T<sub>1</sub> I-S ACCELEROMETER



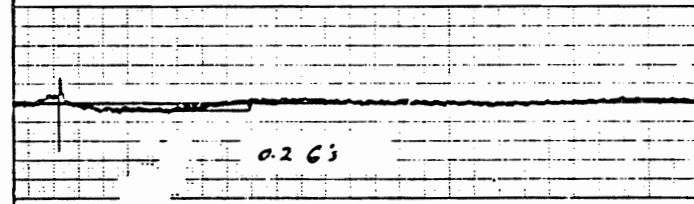
T<sub>1</sub> R-L ACCELEROMETER



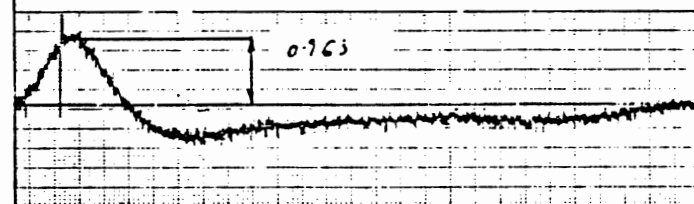
T<sub>12</sub> P-A ACCELEROMETER



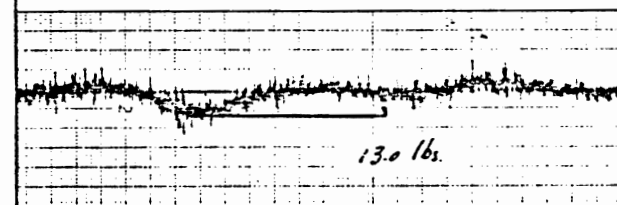
T<sub>12</sub> I-S ACCELEROMETER



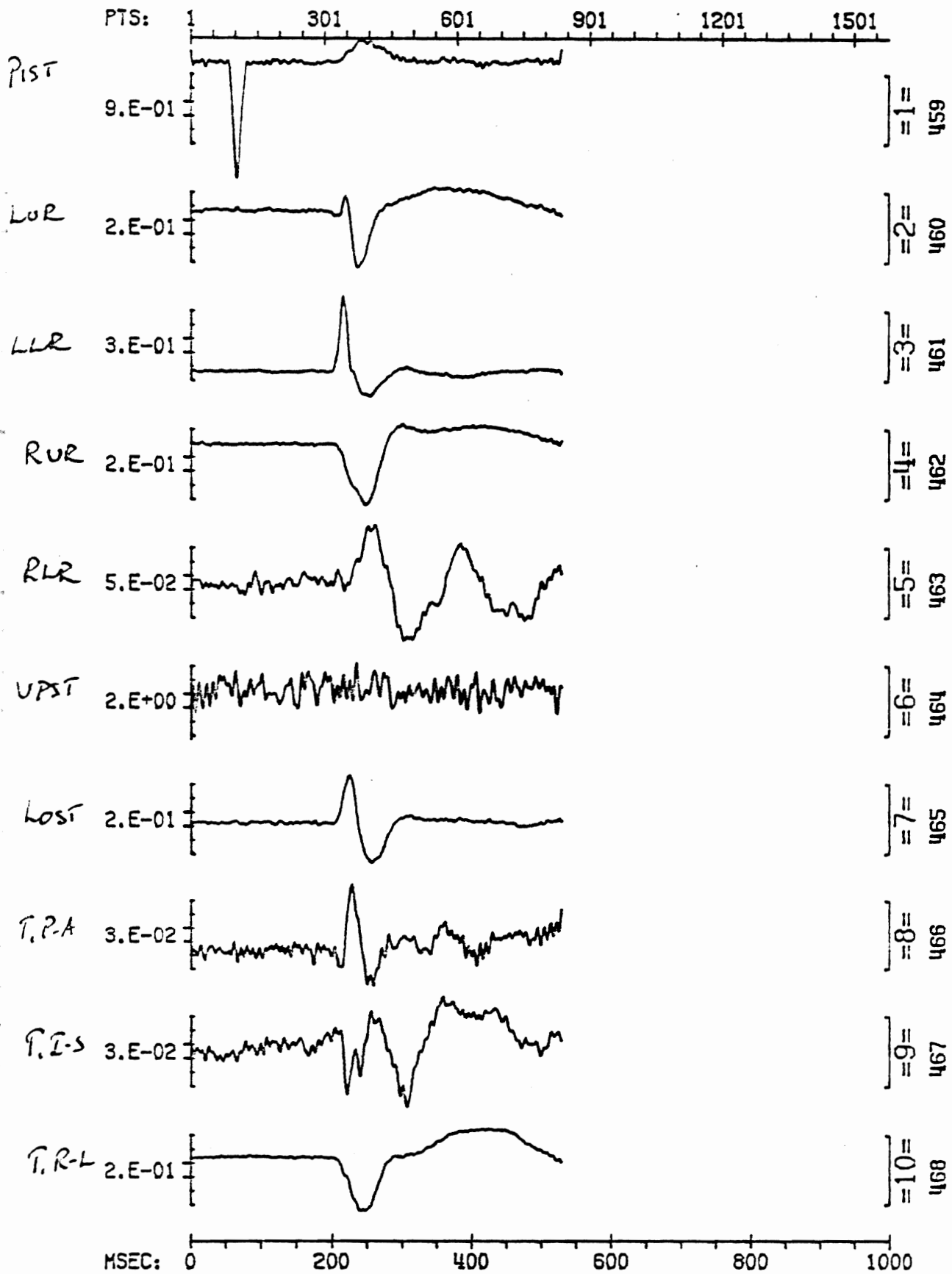
T<sub>12</sub> R-L ACCELEROMETER



VERTICAL SUPPORT FORCE



100 msec



ID: 76T051-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T051-1IPT

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 17-JAN-77

TEST SIGNALS: 3657 PTS/CH AT 6310.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
459	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	836	1577.72
460	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+3	99.4	836	1577.72
461	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+3	99.4	836	1577.72
462	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.72
463	5	RIGHT LOWER RIB ACCELEROMETER	-3.80	G'S	4+1+3	99.4	836	1577.72
464	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+3	99.4	836	1577.72
465	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+3	99.4	836	1577.72
466	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.72
467	9	T1 I-S ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.72
468	10	T1 R-L ACCELEROMETER	-4.30	G'S	4+1+3	99.4	836	1577.72

111

121

131

141

\*\*\*\*\*

FILTERED FILES: 459 - 468 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77

RUN ID: 76T051-1IPT

\*\*\*\*\*



PTS: 1 301 601 901 1201 1501

P15T

5.E-01

=1=  
748

T12 P-A

6.E-02

=2=  
749

T12 I-S

2.E-02

=3=  
750

T12 R-L

8.E-02

=4=  
751

Area  
(units)

8.E-01

=5=  
752

MSEC: 0 200 400 600 800 1000

ID: 76T051-2:PT

TAPE: THOR.2

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RUN ID: 76T051-2IPT

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORAX IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 18-JAN-77

TEST SIGNALS: 4203 PTS/CH AT 6309.14 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
748	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	836 0	1577.29
749	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+ 3	99.4	836 0	1577.29
750	3	T12 I-B ACCELEROMETER	4.30	G'S	4+1+ 3	99.4	836 0	1577.29
751	4	T12 R-L ACCELEROMETER	5.40	G'S	4+1+ 3	99.4	836 0	1577.29
752	5	AIRWAY PRESSURE	72.00	MM-HG	4+1+ 3	99.4	836 0	1577.29

- 61
- 71
- 81
- 91
- 101
- 111
- 121
- 131
- 141

\*\*\*\*\*

FILTERED FILES: 748 - 752 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T051-2IPT

\*\*\*\*\*

TEST 76T052

PISTON DECELERATION PULSE

1.7 G's

LEFT UPPER RIB ACCELEROMETER

0.6 G's

LEFT LOWER RIB ACCELEROMETER

1.7 G's

RIGHT UPPER RIB ACCELEROMETER

0.9 G's

RIGHT LOWER RIB ACCELEROMETER

0.4 G's

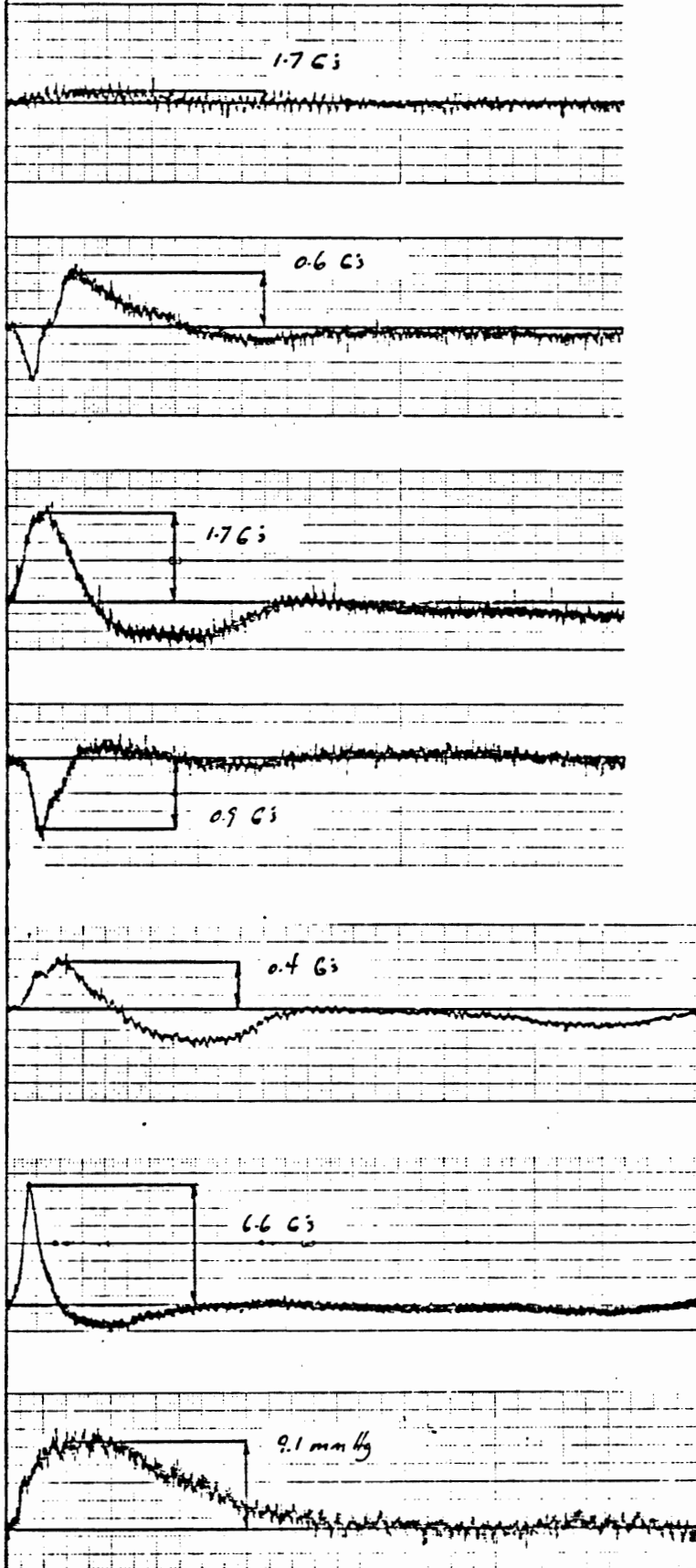
LOWER STERNAL ACCELEROMETER

6.6 G's

VASCULAR PRESSURE

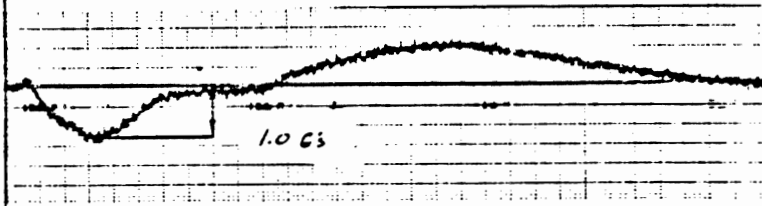
9.1 mm Hg

100 msec

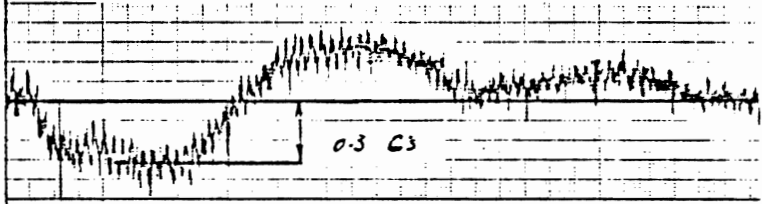


TEST 76T052

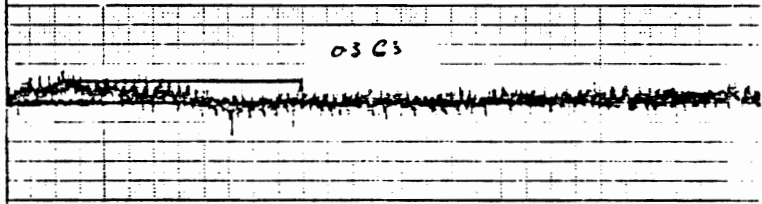
T<sub>1</sub> P-A ACCELEROMETER



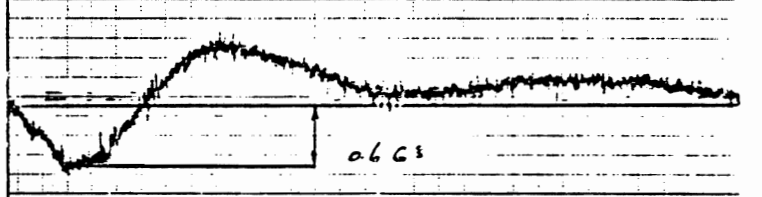
T<sub>1</sub> I-S ACCELEROMETER



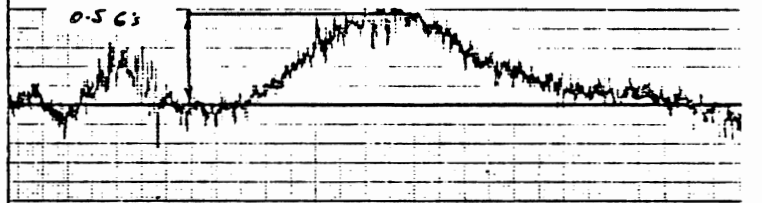
T<sub>1</sub> R-L ACCELEROMETER



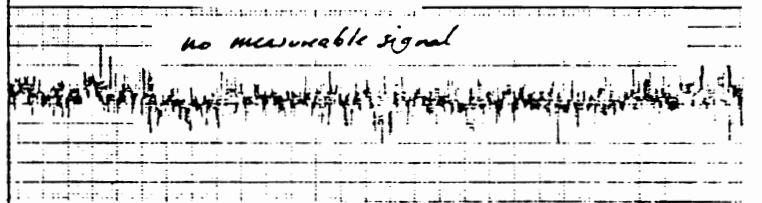
T<sub>12</sub> P-A ACCELEROMETER



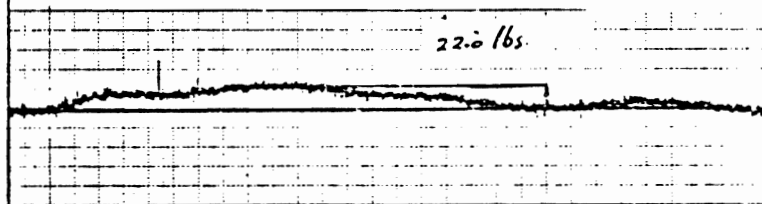
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



VERTICAL SUPPORT FORCE



100 msec

PTS: 1 301 601 901 1201 1501

PIST

9.E-01

=1=  
469

LUR

2.E-01

=2=  
470

LLR

3.E-01

=3=  
471

RUR

1.E-01

=4=  
472

RLR

2.E-01

=5=  
473

UPST

2.E+00

=6=  
474

LOST

6.E-01

=7=  
475

P.P.A

2.E-01

=8=  
476

P.I-S

6.E-02

=9=  
477

P.R-L

3.E-02

=10=  
478

MSEC: 0 200 400 600 800 1000

10: 76T052-1:PT

TAPE: THOR.2

\*\*\*\*\*  
RUN ID: 76T052-10PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 4264 PTS/CH AT 6310.90 HZ. CAL SIGNALS: NOT DIGITIZED.

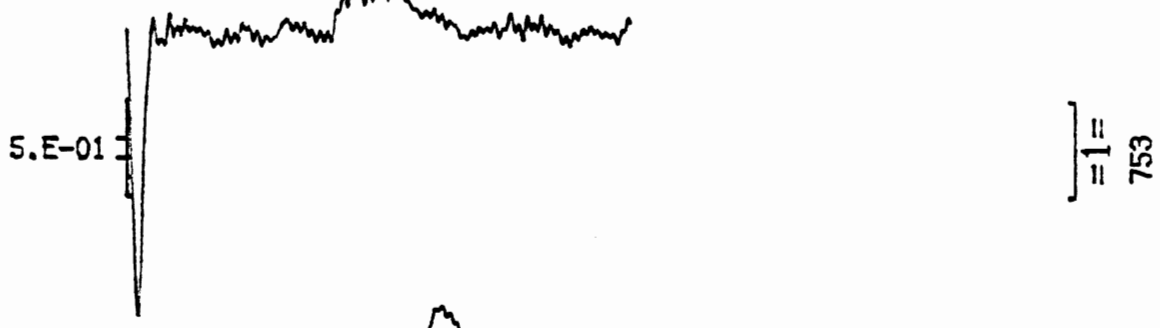
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
469	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	836	1577.73
470	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	99.4	836	1577.73
471	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+ 3	99.4	836	1577.73
472	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+ 3	99.4	836	1577.73
473	5	RIGHT LOWER RIB ACCELEROMETER	-3.80	G'S	4+1+ 3	99.4	836	1577.73
474	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+ 3	99.4	836	1577.73
475	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+ 3	99.4	836	1577.73
476	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+ 3	99.4	836	1577.73
477	9	T1 I-S ACCELEROMETER	3.70	G'S	4+1+ 3	99.4	836	1577.73
478	10	T1 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	99.4	836	1577.73

111  
121  
131  
141

\*\*\*\*\*  
DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T052-10PT  
\*\*\*\*\*  
FILTERED FILES: 469 - 478

PTS: 1 301 601 901 1201 1501

P15T



753  
=1=

T<sub>12</sub> PA



754  
=2=

T<sub>12</sub> I-S



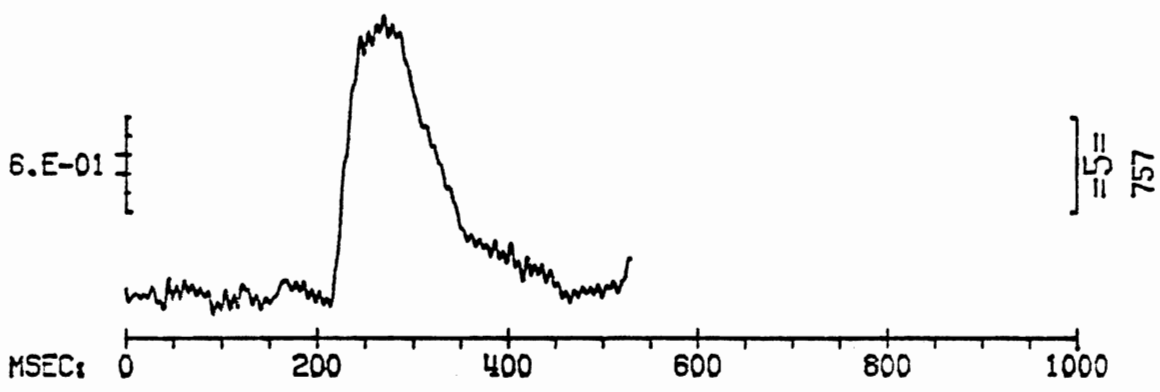
755  
=3=

T<sub>12</sub> R-L



756  
=4=

AIRW  
(msec)



757  
=5=

MSEC: 0 200 400 600 800 1000

ID: 76T052-2:PT

TAPE: THOR.2

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RUN ID: 76T052-2IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORAX IMPACT PROJECT-SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, HAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4256 PTS/CH AT 6306.97 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
753	11	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	836	1577.24
754	21	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.4	836	1577.24
755	31	T12 I-B ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.24
756	41	T12 R-L ACCELEROMETER	5.40	G'S	4+1+3	99.4	836	1577.24
757	51	AIRWAY PRESSURE	72.00	MM-HG	4+1+3	99.4	836	1577.24

61

71

81

91

101

111

121

131

141

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FILTERED FILES: 753 - 757 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

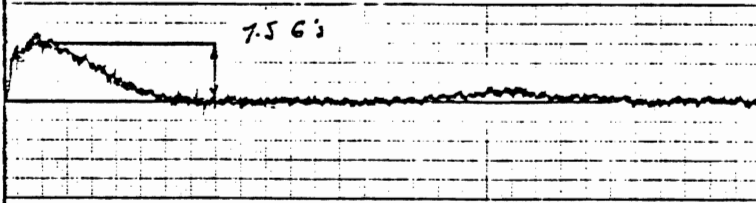
RUN ID: 76T052-2IPT

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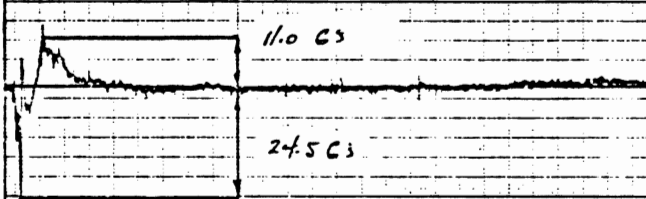


TEST 76TC53

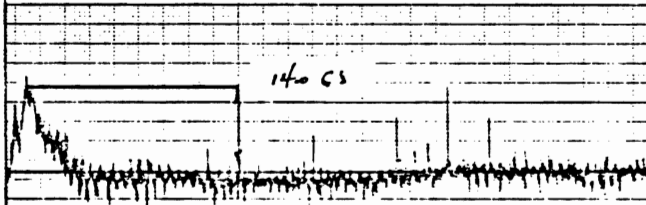
PISTON DECELERATION PULSE



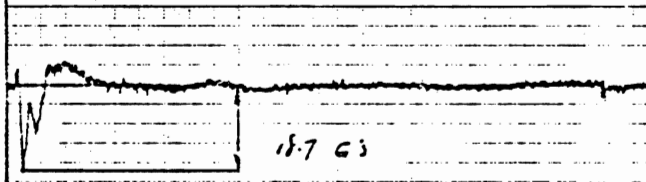
LEFT UPPER RIB ACCELEROMETER



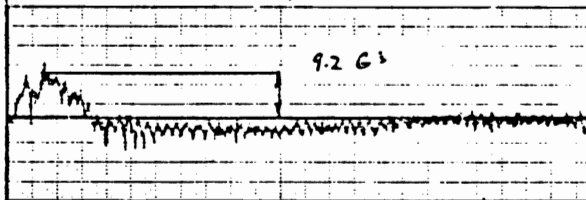
LEFT LOWER RIB ACCELEROMETER



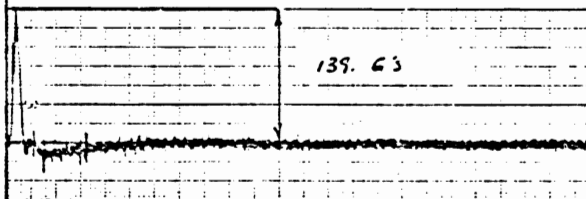
RIGHT UPPER RIB ACCELEROMETER



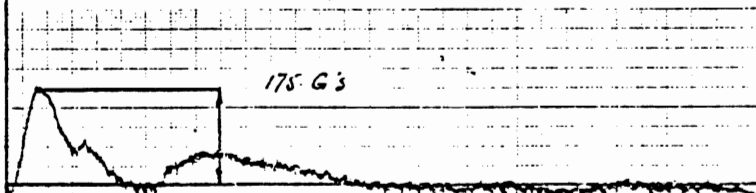
RIGHT LOWER RIB ACCELEROMETER



LOWER STERNAL ACCELEROMETER



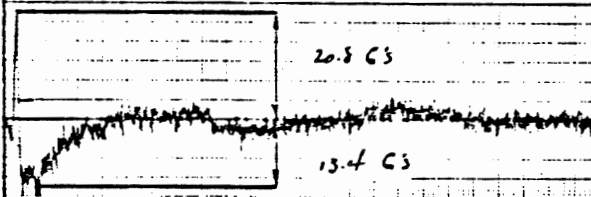
VASCULAR PRESSURE



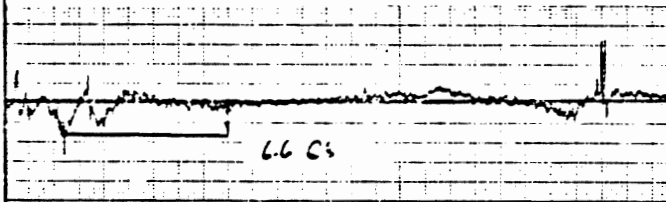
100 msec

Test 76T053

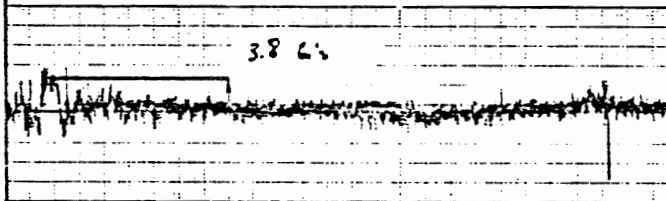
T<sub>1</sub> P-A ACCELEROMETER



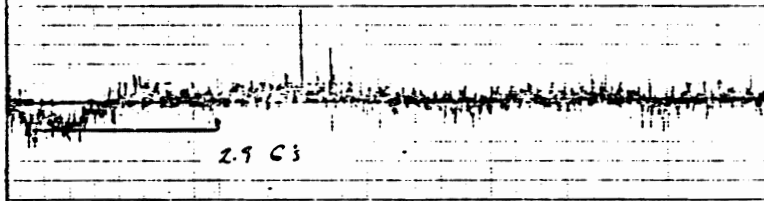
T<sub>1</sub> I-S ACCELEROMETER



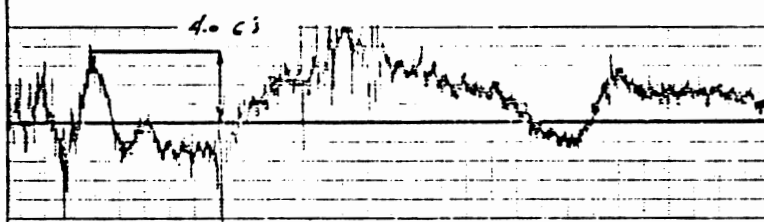
T<sub>1</sub> R-L ACCELEROMETER



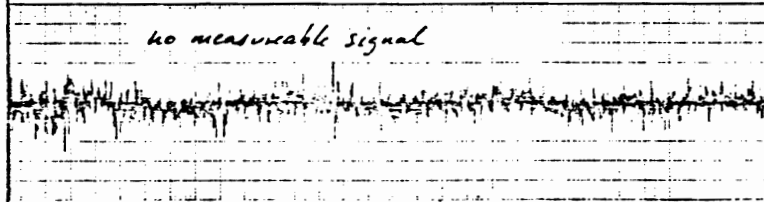
T<sub>12</sub> P-A ACCELEROMETER



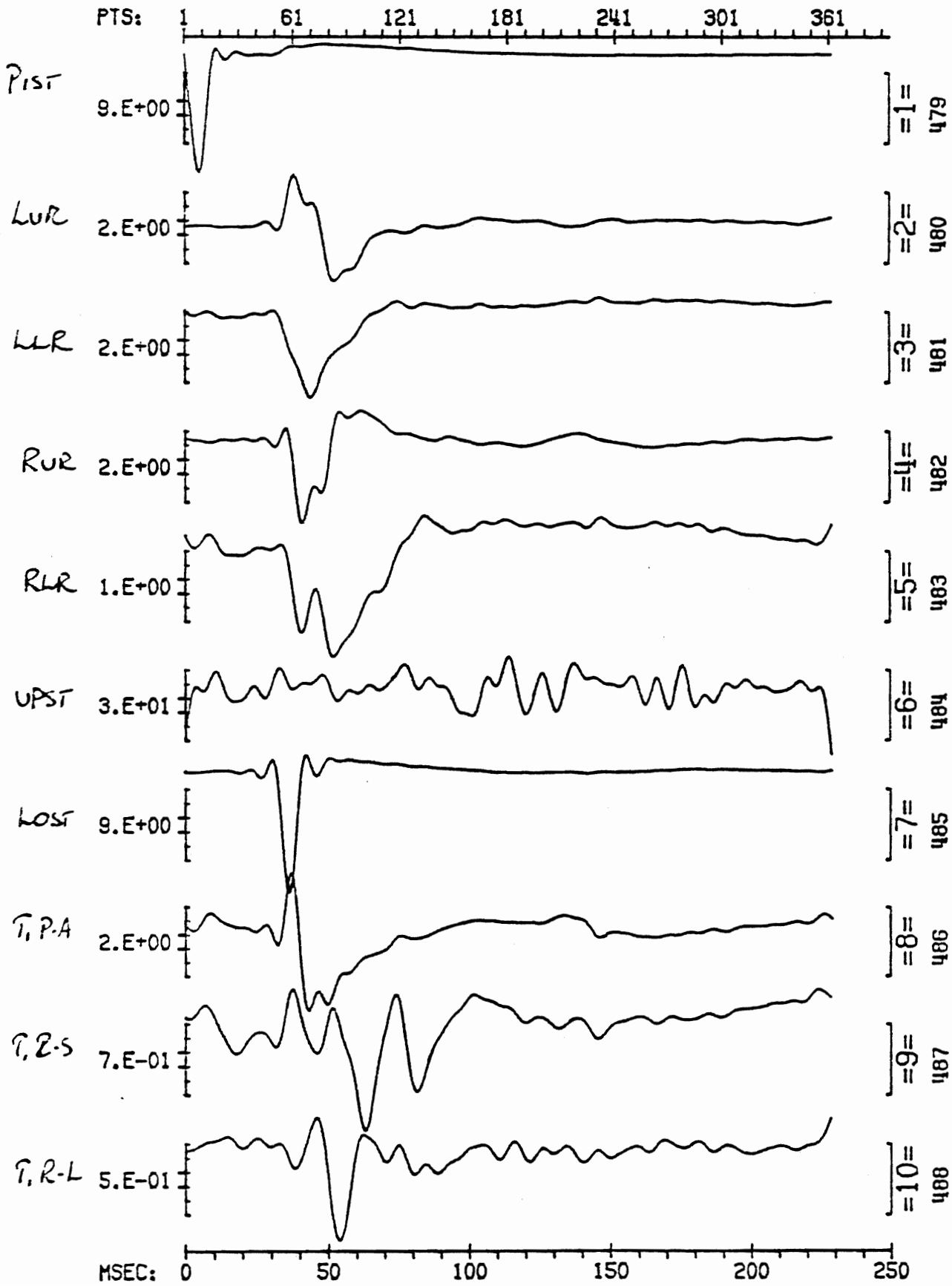
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



100 msec



ID: 76T053-1:PP

TAPE: THOR.2

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RUN ID: 76T053-11PP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--SIDE AND PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1450 PTS/CH AT 6305.89 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
479	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.3	362 0	1576.47
480	2	LEFT UPPER RIB ACCELEROMETER	-42.20	G'S	4+1+ 3	99.3	362 0	1576.47
481	3	LEFT LOWER RIB ACCELEROMETER	-66.80	G'S	4+1+ 3	99.3	362 0	1576.47
482	4	RIGHT UPPER RIB ACCELEROMETER	42.50	G'S	4+1+ 3	99.3	362 0	1576.47
483	5	RIGHT LOWER RIB ACCELEROMETER	-76.60	G'S	4+1+ 3	99.3	362 0	1576.47
484	6	UPPER STERNAL ACCELEROMETER	-93.40	G'S	4+1+ 3	99.3	362 0	1576.47
485	7	LOWER STERNAL ACCELEROMETER	-79.60	G'S	4+1+ 3	99.3	362 0	1576.47
486	8	T1 P-A ACCELEROMETER	74.20	G'S	4+1+ 3	99.3	362 0	1576.47
487	9	T1 I-S ACCELEROMETER	36.70	G'S	4+1+ 3	99.3	361 0	1576.47
488	10	T1 R-L ACCELEROMETER	-42.50	G'S	4+1+ 3	99.3	361 0	1576.47

11

12

13

14

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FILTERED FILES: 479 - 488 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T053-11PP

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PTS: 1 61 121 181 241 301 361

P1ST

5.E+00

=1= 758

P12P-A

3.E-01

=2= 759

P12P-S

5.E-01

=3= 760

P12P-L

8.E-02

=4= 761

VASC  
(amplitude)

1.E+01

=5= 762

MSEC: 0 50 100 150 200 250

76T053-2:PP

ID:

TAPE: THOR.2

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RUN ID: 76T053-2IPP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI=141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 1450 PTS/CH AT 6310.52 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
758	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	362	1577.63
759	2	T12 P-A ACCELEROMETER	61.80	G'S	4+1+3	99.4	362	1577.63
760	3	T12 I-S ACCELEROMETER	42.50	G'S	4+1+3	99.4	362	1577.63
761	4	T12 R-L ACCELEROMETER	53.70	G'S	4+1+3	99.4	362	1577.63
762	5	VASCULAR PRESSURE	720.00	MM-HG	4+1+3	99.4	362	1577.63

- 6:
- 7:
- 8:
- 9:
- 10:
- 11:
- 12:
- 13:
- 14:

\*\*\*\*\*

FILTERED FILE: 758 - 762 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T053-2IPP

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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER:

76T054 - Low Energy Side Pendulum Impact  
76T055 - Low Energy Front Pendulum Impact  
76T056 - Pendulum 14 ft/sec Frontal Impact

TEST DATE:

December 3, 1976

TEST SUBJECT:

Age - 40  
Sex - Female  
Weight - 70 kg.

RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

VELOCITY:

For Test No 76T056, velocity was 14 ft/sec.

INJURIES:

None

AIS NUMBER ESTIMATE:

0

TEST # 767056

TEST DATE 9-12-76

TEST DESCRIPTION Pendulum front impact VELOCITY 14.4 ft/s

SUBJECT:

AGE 40 SEX F CAUSE OF DEATH Epileptic seizure

INJURY INFORMATION: OVERALL THORACIC AIS 0

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____
	6	_____	_____	_____	_____
	7	_____	_____	_____	_____
	8	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____

*no injuries observed*



TEST 76T054

PISTON DECELERATION

2.0 G's

LEFT UPPER RIB ACCELEROMETER

1.0 G's

LEFT LOWER RIB ACCELEROMETER

2.3 G's

RIGHT UPPER RIB ACCELEROMETER

1.8 G's

RIGHT LOWER RIB ACCELEROMETER

0.5 G's

UPPER STERNAL ACCELEROMETER

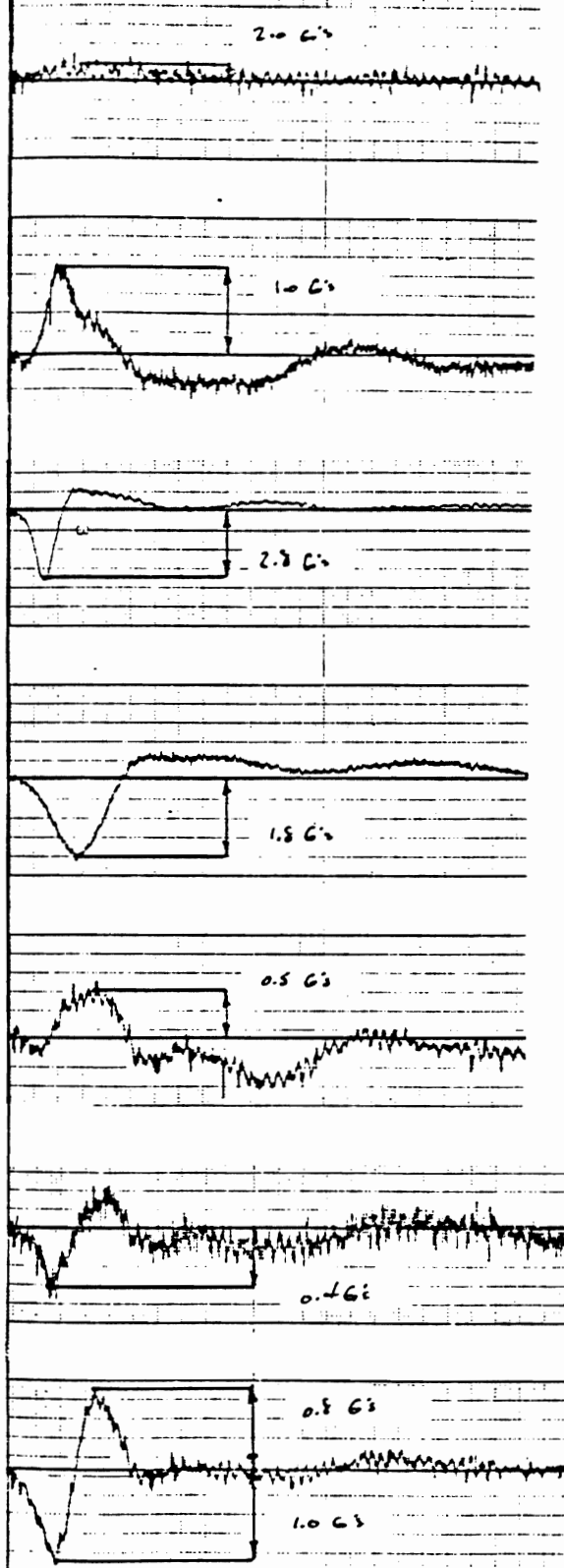
0.4 G's

LOWER STERNAL ACCELEROMETER

0.8 G's

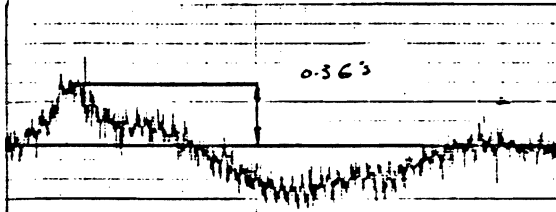
1.0 G's

100 msec

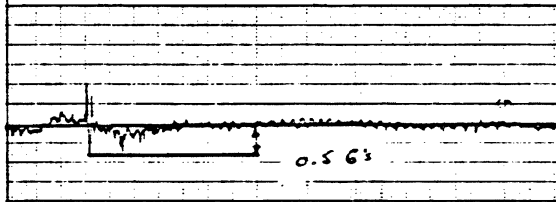


TEST 76T054

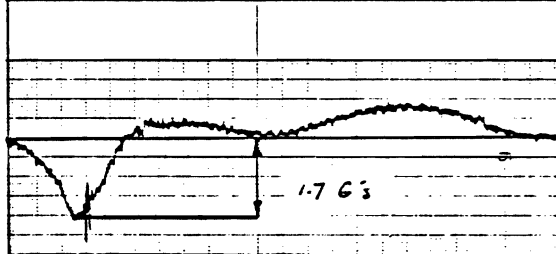
T<sub>1</sub> P-A ACCELEROMETER



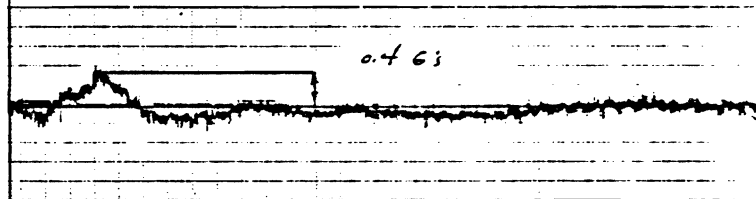
T<sub>1</sub> I-S ACCELEROMETER



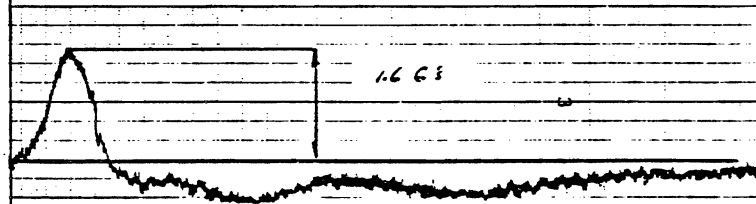
T<sub>1</sub> R-L ACCELEROMETER



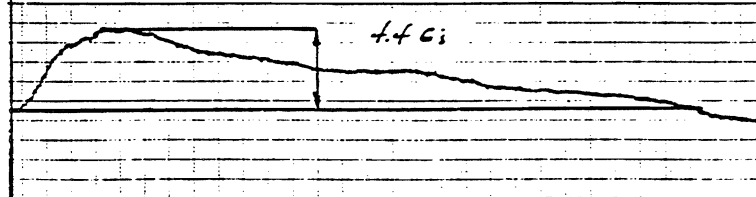
T<sub>12</sub> P-A ACCELEROMETER



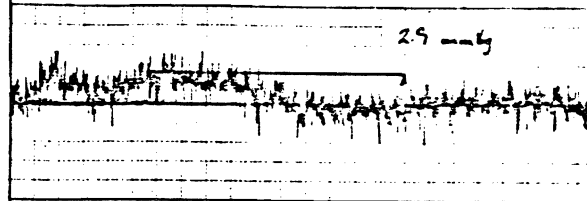
T<sub>12</sub> I-S ACCELEROMETER



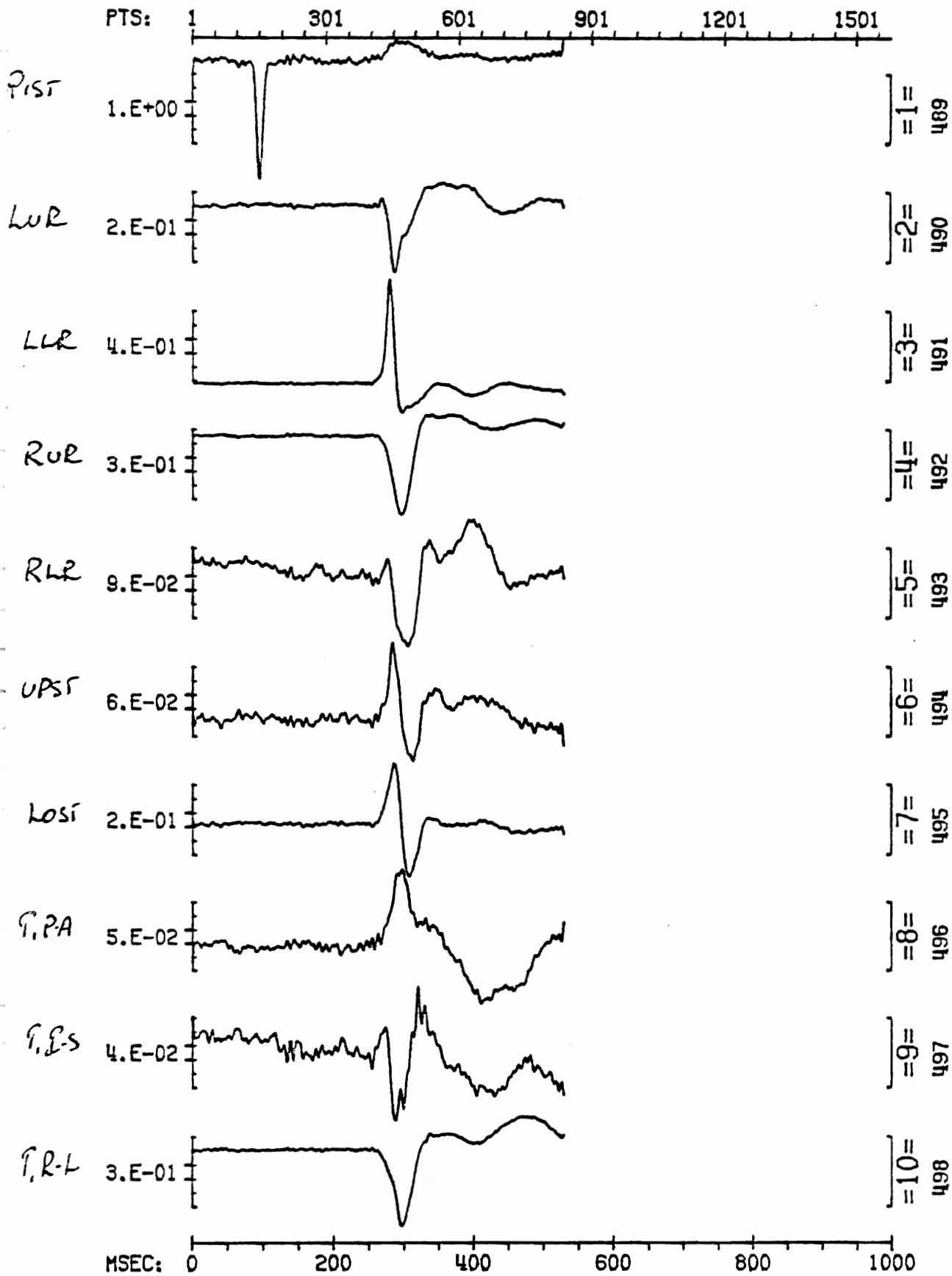
T<sub>12</sub> R-L ACCELEROMETER



AIRWAY PRESSURE



100 msec



ID: 76T054-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T054-11PT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: H8RI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 3586 PTS/CH AT 6309.00 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
489	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	836	1577.27
490	2	LEFT UPPER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	99.4	836	1577.27
491	3	LEFT LOWER RIB ACCELEROMETER	3.30	G'S	4+1+ 3	99.4	836	1577.27
492	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+ 3	99.4	836	1577.27
493	5	RIGHT LOWER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	99.4	836	1577.27
494	6	UPPER STERNAL ACCELEROMETER	4.70	G'S	4+1+ 3	99.4	836	1577.27
495	7	LOWER STERNAL ACCELEROMETER	4.00	G'S	4+1+ 3	99.4	836	1577.27
496	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+ 3	99.4	836	1577.27
497	9	T1 I-B ACCELEROMETER	3.70	G'S	4+1+ 3	99.4	836	1577.27
498	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+ 3	99.4	836	1577.27

110

120

130

140

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FILTERED FILES: 489 - 498 DIGITAL TAPE: THOR.2

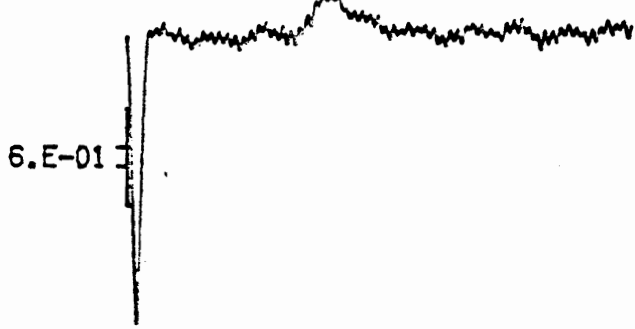
DATE: 21-JAN-77

RUN ID: 76T054-11PT

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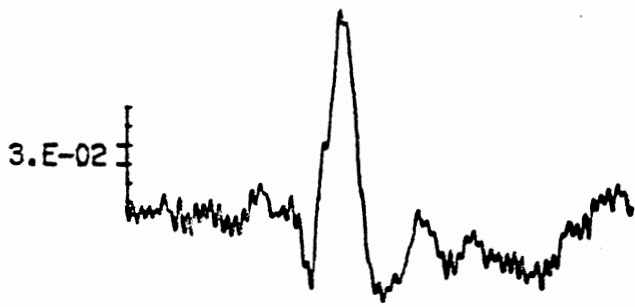
PTS: 1 301 601 901 1201 1501

*P15T*



1= 763

*T12P-A*



2= 764

*T12B-S*



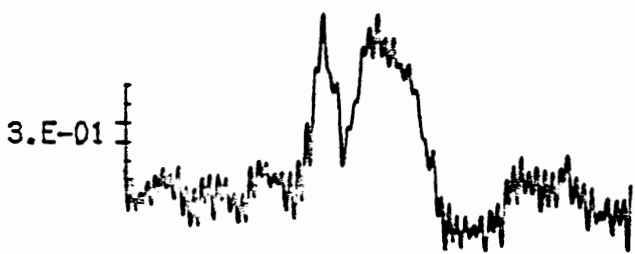
3= 765

*F12R-L*



4= 766

*NEW (contin)*



6= 767

MSEC: 0 200 400 600 800 1000

ID: 76T054-2:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T054-2IPT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 18-JAN-77

TEST SIGNALS: 4200 PTS/CH AT 6307.05 HZ. CAL SIGNALS: NOT DIGITIZED,

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
763	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	836	1576.96
764	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.3	836	1576.96
765	3	T12 I-B ACCELEROMETER	5.40	G'S	4+1+3	99.3	836	1576.96
766	4	T12 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.3	836	1576.96

5i

767 - 6i AIRWAY PRESSURE 72.00 MM-HG 4+1+3 99.3 836 1576.96

7i

8i

9i

10i

11i

12i

13i

14i

=====

FILTERED FILES: 763 - 767 DIGITAL TAPE: THOR.2

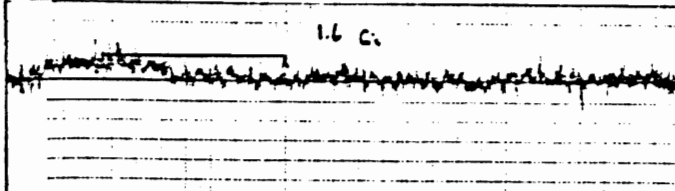
DATE: 21-JAN-77

RUN ID: 76T054-2IPT

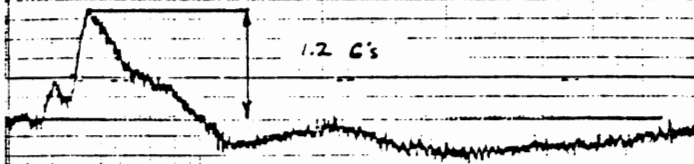
=====

TEST 76T055

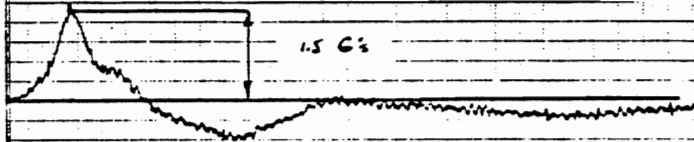
PISTON DECELERATION:



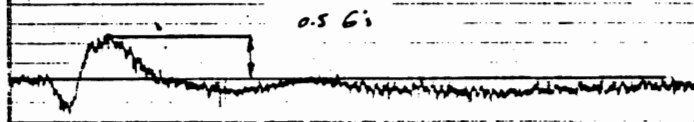
LEFT UPPER RIB ACCELEROMETER



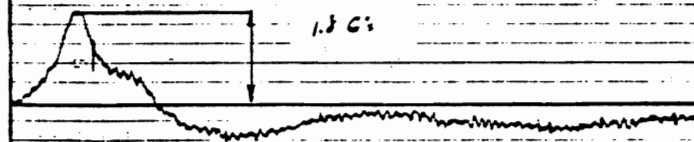
LEFT LOWER RIB ACCELEROMETER



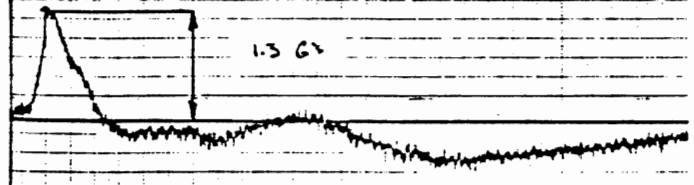
RIGHT UPPER RIB ACCELEROMETER



RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER

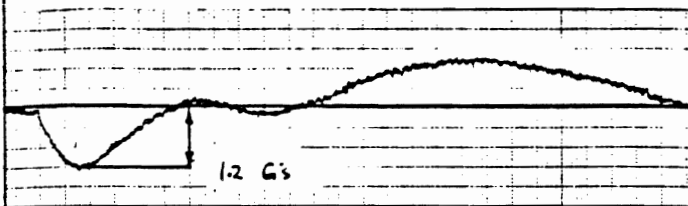


LOWER STERNAL ACCELEROMETER

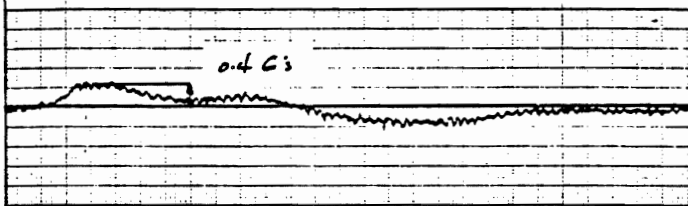


100 msec

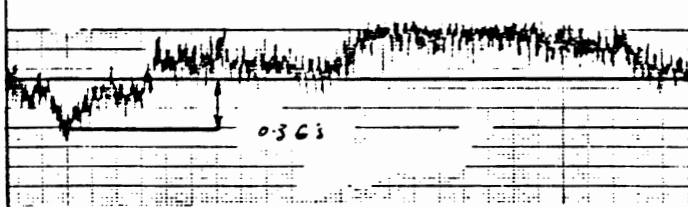
T<sub>1</sub> P-A ACCELEROMETER



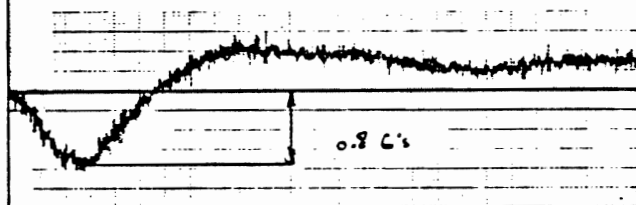
T<sub>1</sub> I-S ACCELEROMETER



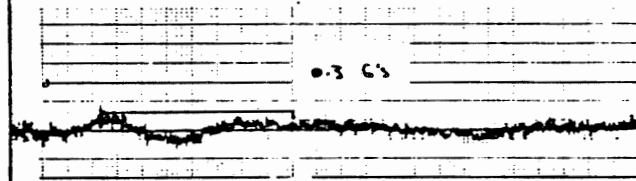
T<sub>1</sub> R-L ACCELEROMETER



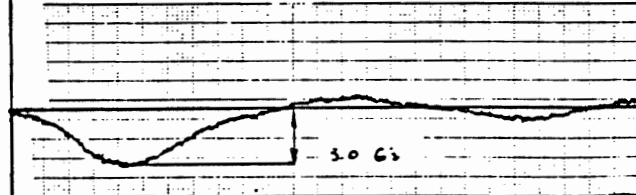
T<sub>12</sub> P-A ACCELEROMETER



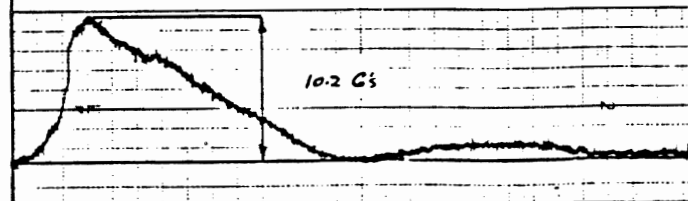
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> ACCELEROMETER



AIRWAY PRESSURE



100 msec



PTS: 1 301 601 901 1201 1501

P1ST

1.E+00

=1=  
499

LWR

2.E-01

=2=  
500

LHR

2.E-01

=3=  
501

RUR

7.E-02

=4=  
502

RLR

3.E-01

=5=  
503

UPST

2.E-01

=6=  
504

LOST

5.E-01

=7=  
505

P.P-A

3.E-01

=8=  
506

P.D-S

7.E-02

=9=  
507

P.R-L

6.E-02

=10=  
508

MSEC: 0 200 400 600 800 1000

ID: 76T055-1:PT

TAPE: THOR.2

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RUN ID: 76T055-1IPT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H0018 DATE: 17-JAN-77

TEST SIGNALS: 4239 PTS/CH AT 6310.03 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
499	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	036 0	1577.51
500	2	LEFT UPPER RIB ACCELEROMETER	4.20	G'S	4+1+3	99.4	036 0	1577.51
501	3	LEFT LOWER RIB ACCELEROMETER	3.30	G'S	4+1+3	99.4	036 0	1577.51
502	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.4	036 0	1577.51
503	5	RIGHT LOWER RIB ACCELEROMETER	3.80	G'S	4+1+3	99.4	036 0	1577.51
504	6	UPPER STERNAL ACCELEROMETER	4.70	G'S	4+1+3	99.4	036 0	1577.51
505	7	LOWER STERNAL ACCELEROMETER	4.00	G'S	4+1+3	99.4	036 0	1577.51
506	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.4	036 0	1577.51
507	9	T1 I-B ACCELEROMETER	3.70	G'S	4+1+3	99.4	036 0	1577.51
508	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.4	036 0	1577.51

11

12

13

14

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FILTERED FILES: 499 - 508 DIGITAL TAPE: THOR.2

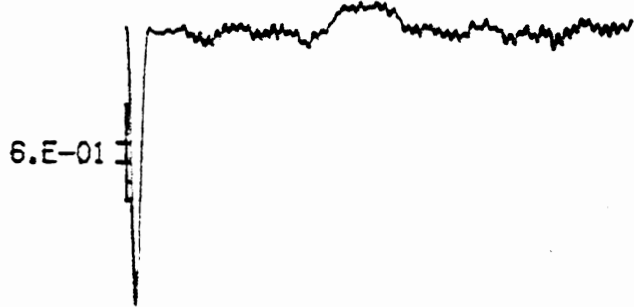
DATE: 21-JAN-77

RUN ID: 76T055-1IPT

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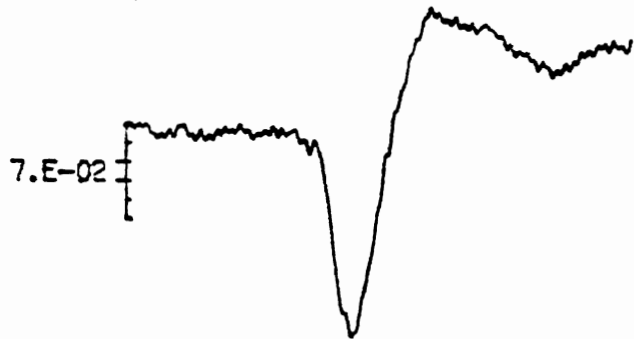
PTS: 1 301 601 901 1201 1501

P15T



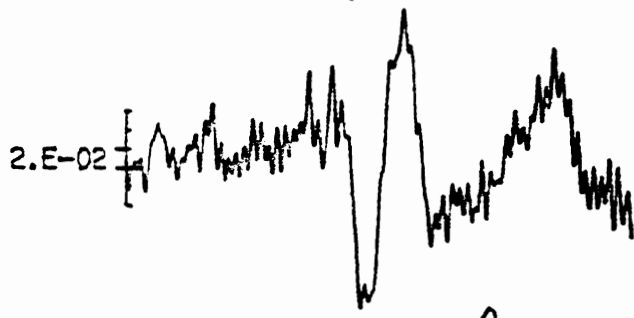
=1=  
768

T12P-A



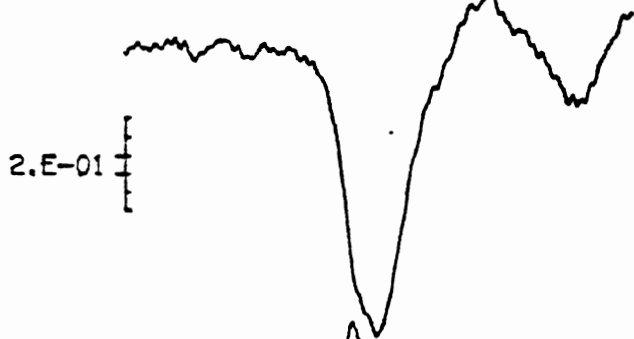
=2=  
769

T12L-S



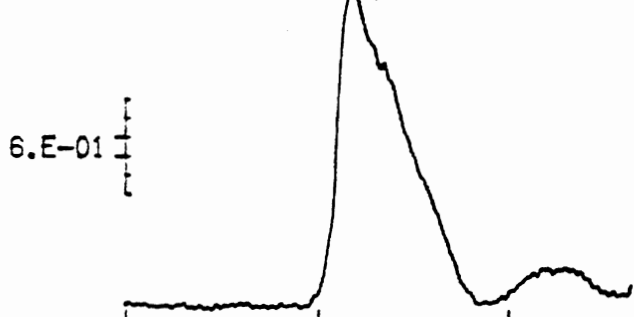
=3=  
770

T12R-L



=4=  
771

(FILW  
amplitude)



=6=  
772

MSEC: 0 200 400 600 800 1000

ID: 76T055-2:PT

TAPE: THOR.2

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RUN ID: 76T055-2IPT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4260 PTS/CH AT 6309.42 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PT8	SAMPLING HERTZ
768	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	036	1577.35
769	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.4	036	1577.35
770	3	T12 I-S ACCELEROMETER	5.40	G'S	4+1+3	99.4	036	1577.35
771	4	T12 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.4	036	1577.35

5								
772	6	AIRWAY PRESSURE	14.10	MM-HG	4+1+3	99.4	036	1577.35

- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

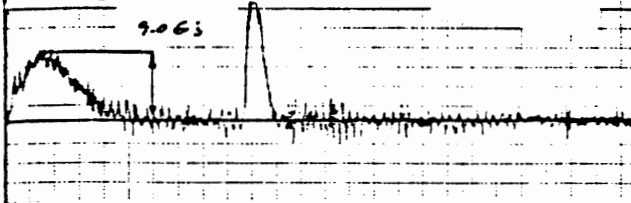
\*\*\*\*\*

FILTERED FILES: 760 - 772 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T055-2IPT

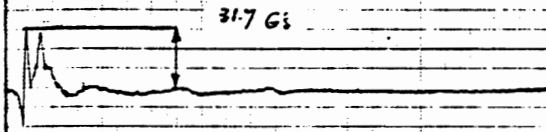
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TEST 76T056

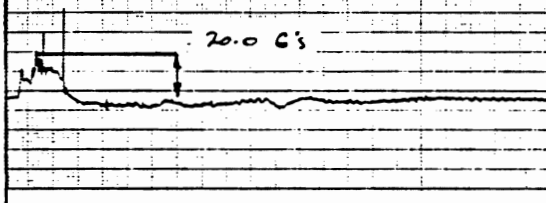
PISTON DECELERATION



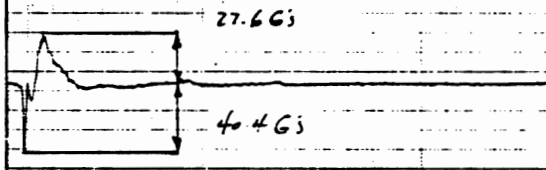
LEFT UPPER RIB ACCELEROMETER



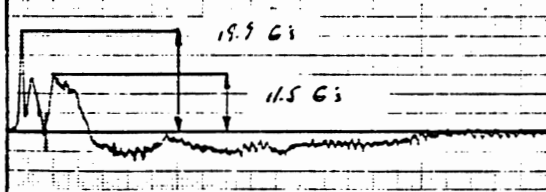
LEFT LOWER RIB ACCELEROMETER



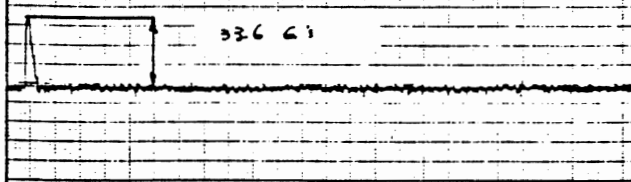
RIGHT UPPER RIB ACCELEROMETER



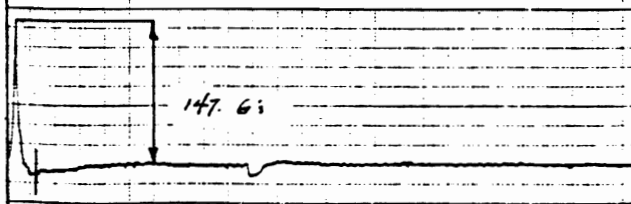
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



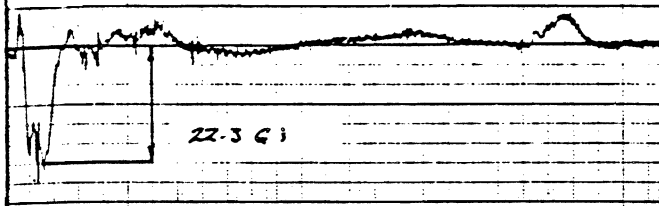
LOWER STERNAL ACCELEROMETER



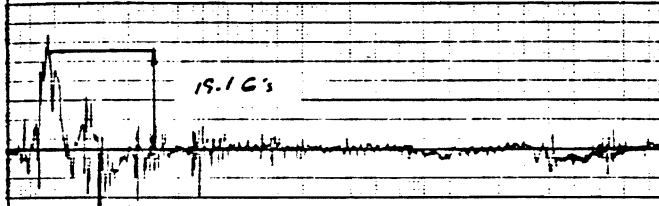
100 msec

TEST 76T056

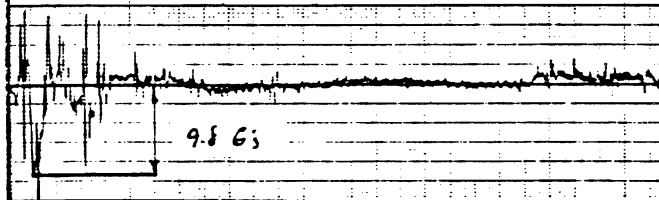
T<sub>1</sub> P-A ACCELEROMETER



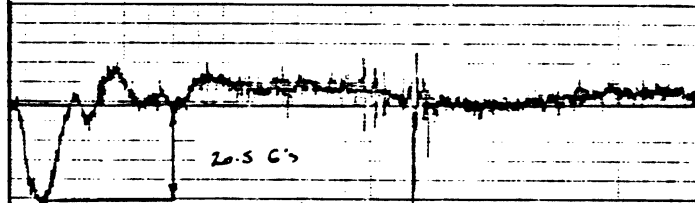
T<sub>1</sub> I-S ACCELEROMETER



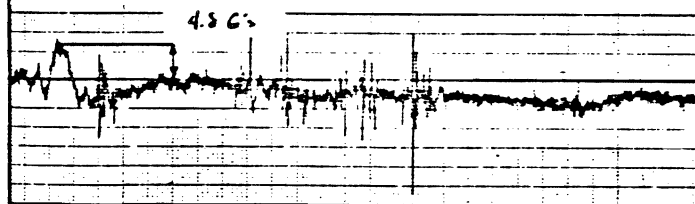
T<sub>1</sub> R-L ACCELEROMETER



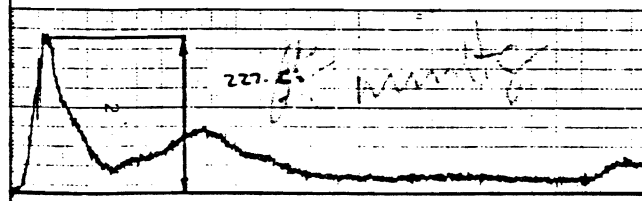
T<sub>12</sub> P-A ACCELEROMETER



T<sub>12</sub> I-S ACCELEROMETER

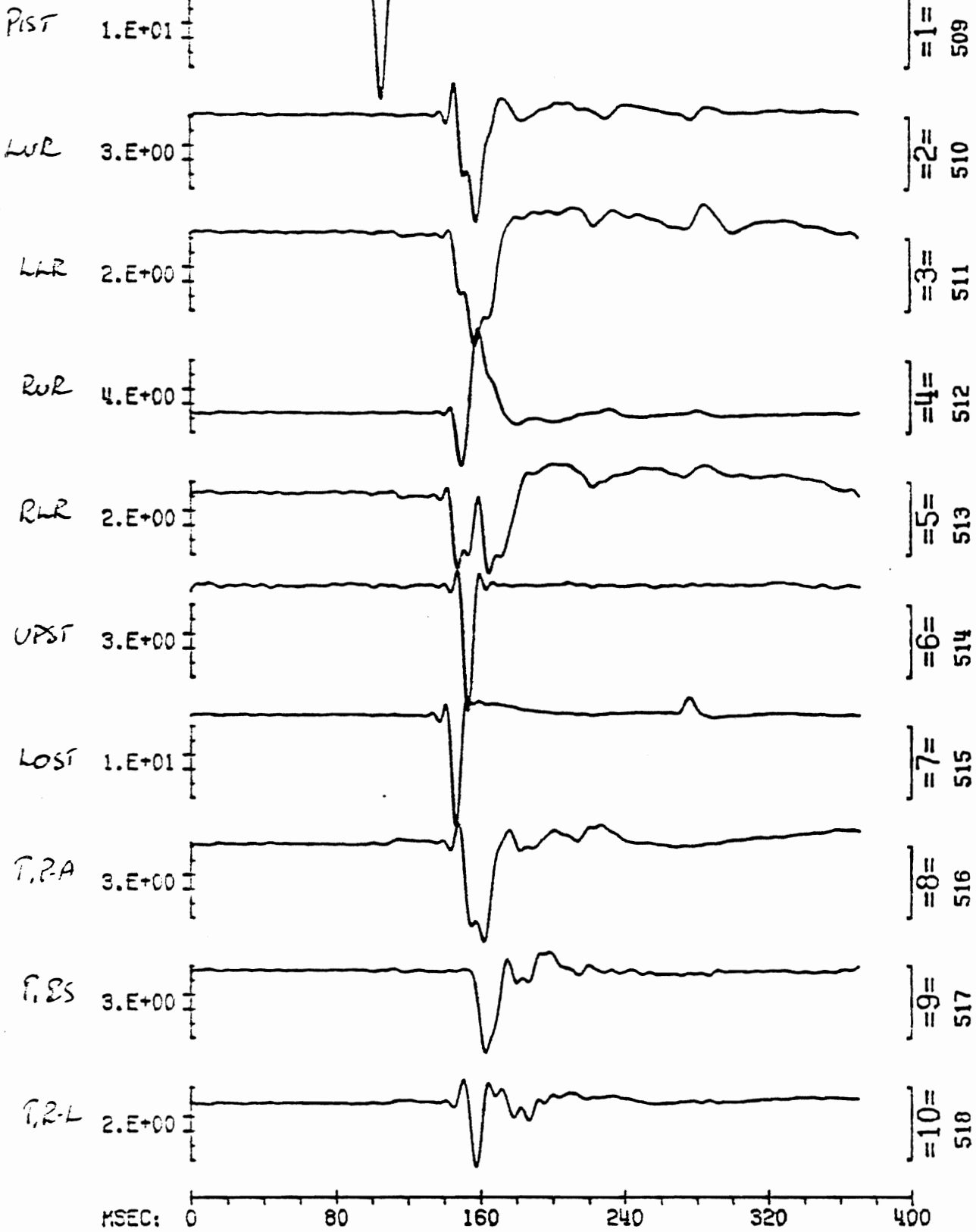


VASCULAR PRESSURE



100 msec

PTS: 1 101 201 301 401 501 601



ID: 76T056-1:PP

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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RUN ID: 76T056-1IPP

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 2342 PTS/CH AT 6311.07 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
509	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	586	1577.77
510	2	LEFT UPPER RIB ACCELEROMETER	-42.20	G'S	4+1+3	99.4	586	1577.77
511	3	LEFT LOWER RIB ACCELEROMETER	-33.40	G'S	4+1+3	99.4	586	1577.77
512	4	RIGHT UPPER RIB ACCELEROMETER	42.50	G'S	4+1+3	99.4	586	1577.77
513	5	RIGHT LOWER RIB ACCELEROMETER	-38.30	G'S	4+1+3	99.4	586	1577.77
514	6	UPPER STERNAL ACCELEROMETER	93.40	G'S	4+1+3	99.4	586	1577.77
515	7	LOWER STERNAL ACCELEROMETER	-79.60	G'S	4+1+3	99.4	586	1577.77
516	8	T1 P-A ACCELEROMETER	37.10	G'S	4+1+3	99.4	586	1577.77
517	9	T1 I-S ACCELEROMETER	-36.70	G'S	4+1+3	99.4	585	1577.77
518	10	T1 R-L ACCELEROMETER	21.30	G'S	4+1+3	99.4	585	1577.77

11

12

13

14

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FILTERED FILE: 509 - 518 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T056-1IPP

\*\*\*\*\*



PTS: 1 301 601 901 1201 1501

P155

6.E+00

=1=  
773

T<sub>12</sub>P-A

8.E-01

=2=  
774

T<sub>12</sub>E-S

5.E-01

=3=  
775

T<sub>12</sub>R-L

5.E+00

=4=  
776

HRW  
(minity)

7.E+00

=6=  
777

MSEC: 0 200 400 600 800 1000

ID: 76T056-2:PP

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T056-2IPP

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 3233 PTS/CH AT 6305.99 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
773	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	805	1576.50
774	2	T12 P-A ACCELEROMETER	40.90	G'S	4+1+3	99.3	805	1576.50
775	3	T12 I-S ACCELEROMETER	53.70	G'S	4+1+3	99.3	805	1576.50
776	4	T12 R-L ACCELEROMETER	42.50	G'S	4+1+3	99.3	805	1576.50
777	6	AIRWAY PRESSURE	141.00	MM-HG	4+1+3	99.3	805	1576.50

5  
7  
8  
9  
10  
11  
12  
13  
14

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FILTERED FILES: 773 - 777 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T056-2IPP

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## SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

### TEST NUMBER:

76T057 - Low Energy Side Pendulum Impact  
76T058 - Low Energy Front Pendulum Impact  
76T059 - Pendulum 14 ft/sec Frontal Impact

### TEST DATE:

December 7, 1976

### TEST SUBJECT:

Age - 76  
Sex - Male  
Weight - 88 kg

### RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

### VELOCITY:

For Test No. 76T059, velocity was 15 ft/sec.

### INJURIES:

Speckled hemorrhage on pericardium

### AIS NUMBER ESTIMATE:

3

TEST # 76T059

TEST DATE 12.10.76

TEST DESCRIPTION Pendulum front impact VELOCITY 14.2/s

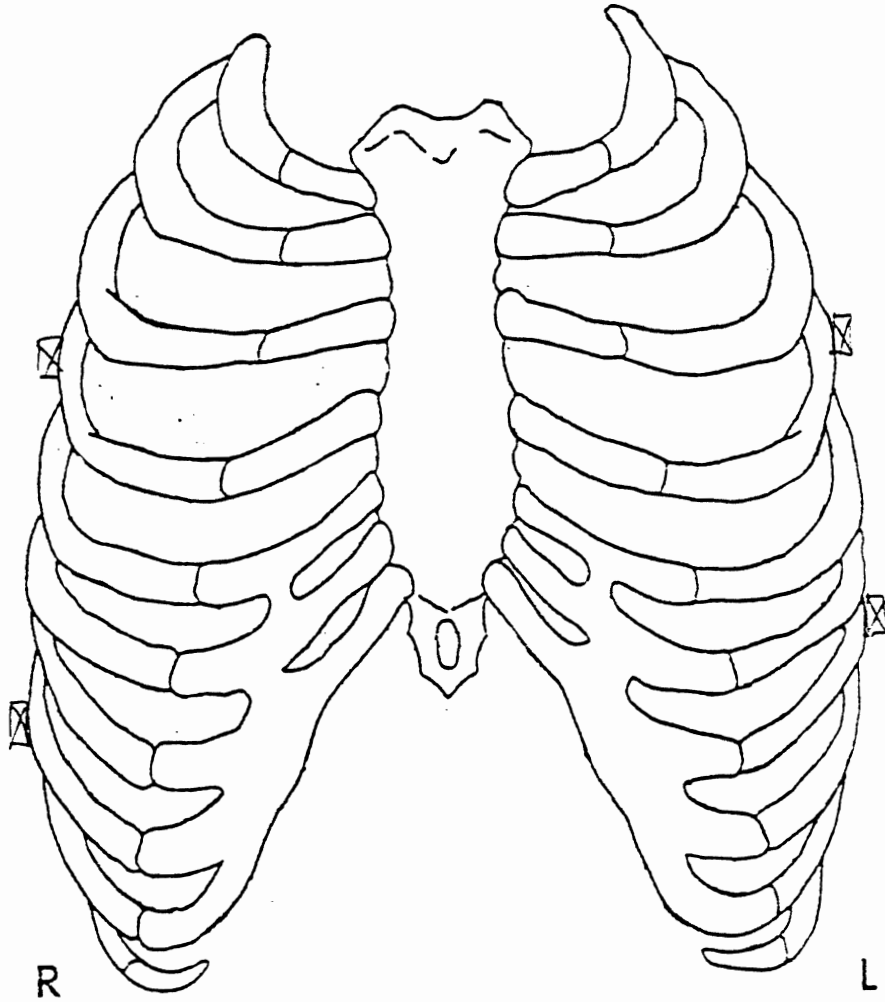
SUBJECT:

AGE 76 SEX M CAUSE OF DEATH heart failure

INJURY INFORMATION: OVERALL THORACIC AIS 3

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>H</u>	<u>H</u>	<u>3</u>
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____
	6	_____	_____	_____	_____	_____
	7	_____	_____	_____	_____	_____
	8	_____	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____	_____
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____

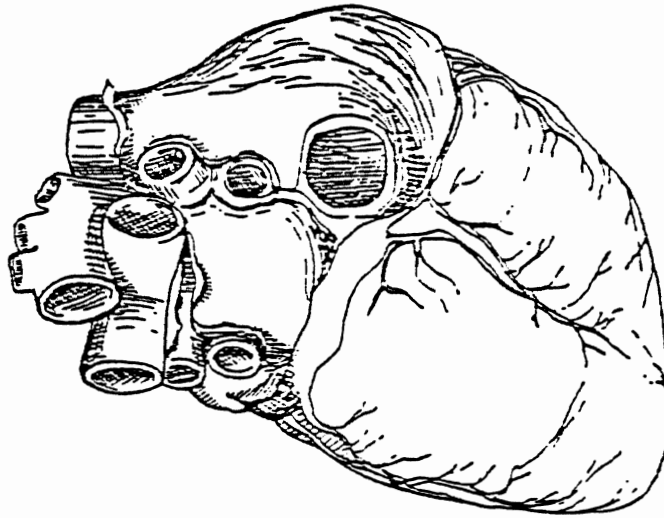
TEST # 767059



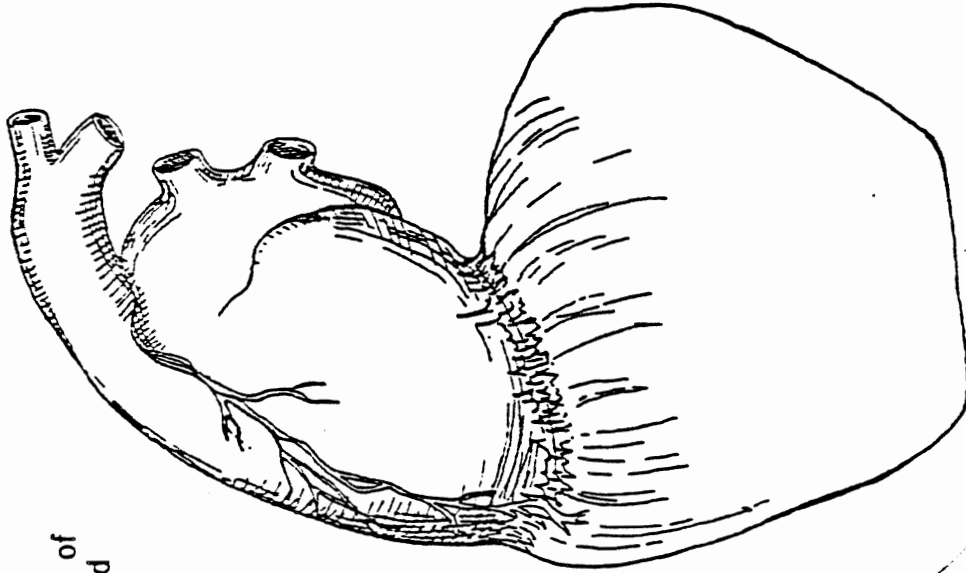
ANTERIOR VIEW RIB CAGE

*no fractures*

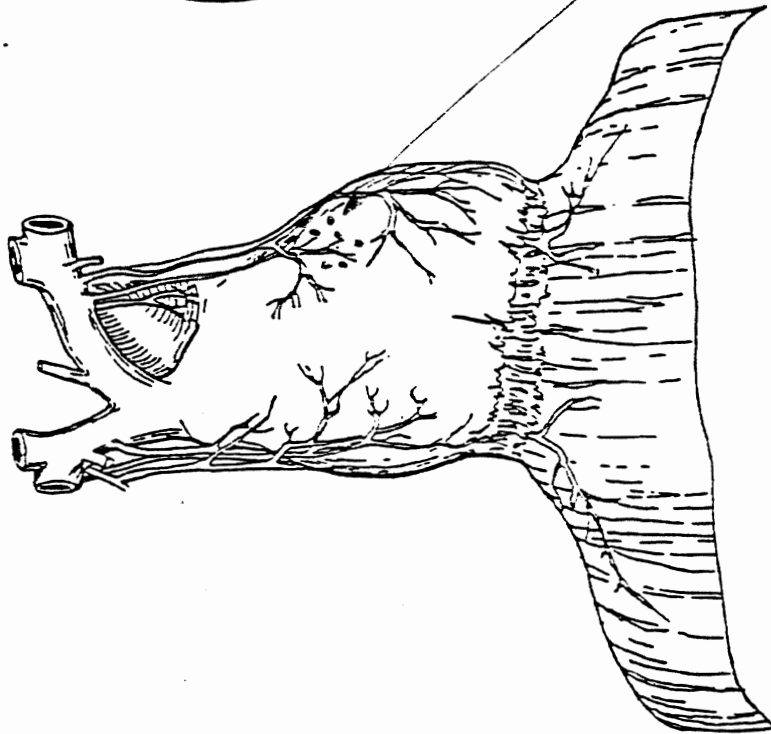
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm



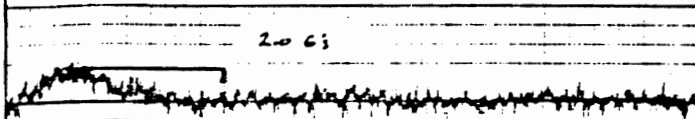
stippled hemorrhage  
on pericardium. Approx. 10 spots.  
1mm - 3mm diameter



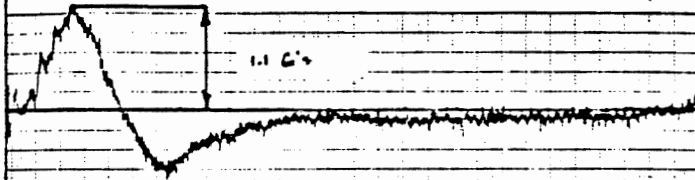
Anterior View of Pericardium and Diaphragm

TEST 76T057

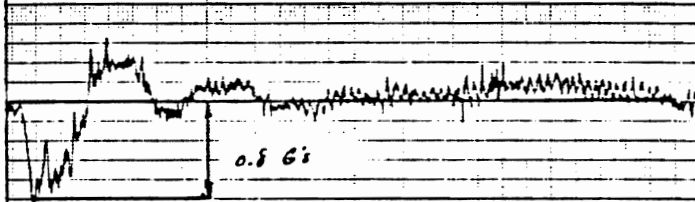
PISTON DECELERATION



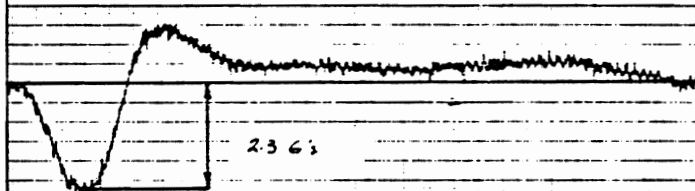
LEFT UPPER RIB ACCELEROMETER



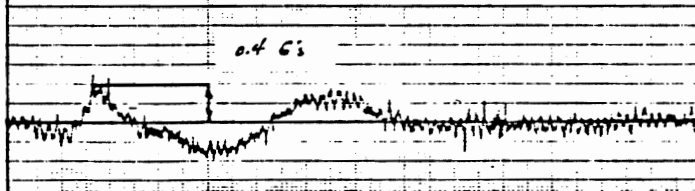
LEFT LOWER RIB ACCELEROMETER



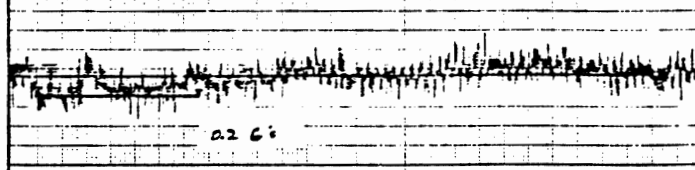
RIGHT UPPER RIB ACCELEROMETER



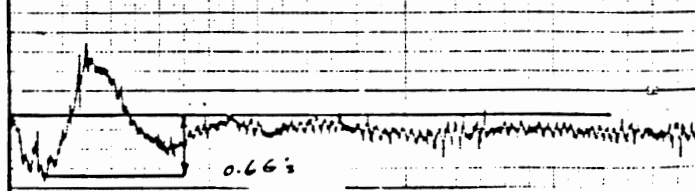
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



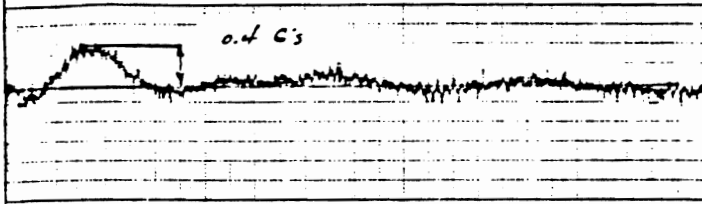
LOWER STERNAL ACCELEROMETER



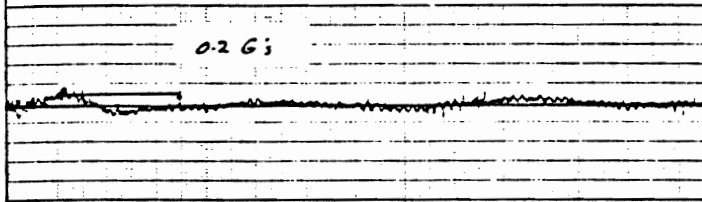
100 msec

TEST 76T057

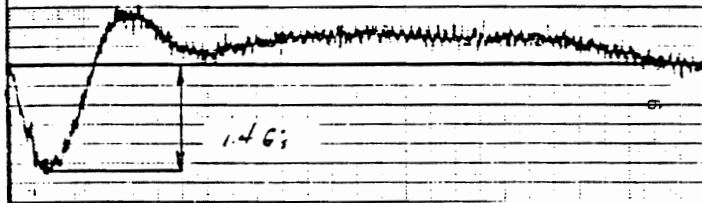
T<sub>1</sub> P-A ACCELEROMETER



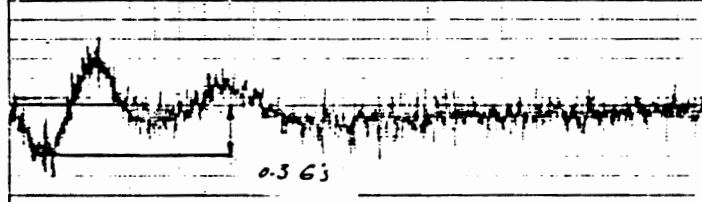
T<sub>1</sub> I-S ACCELEROMETER



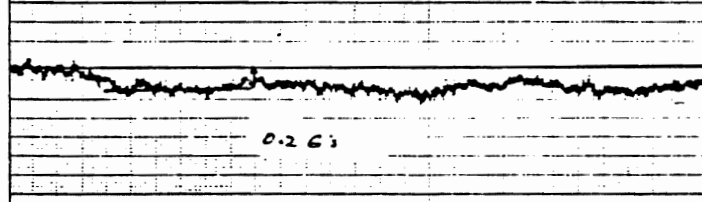
T<sub>1</sub> R-L ACCELEROMETER



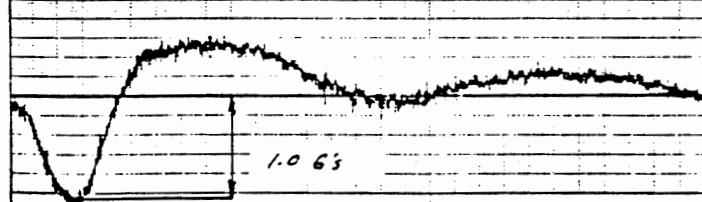
T<sub>12</sub> P-A ACCELEROMETER



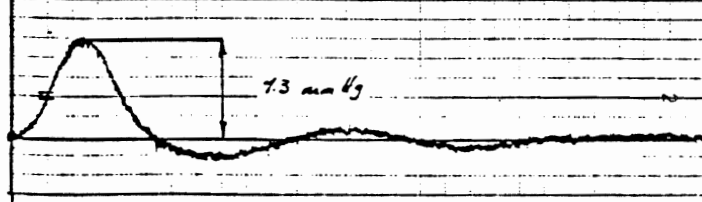
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



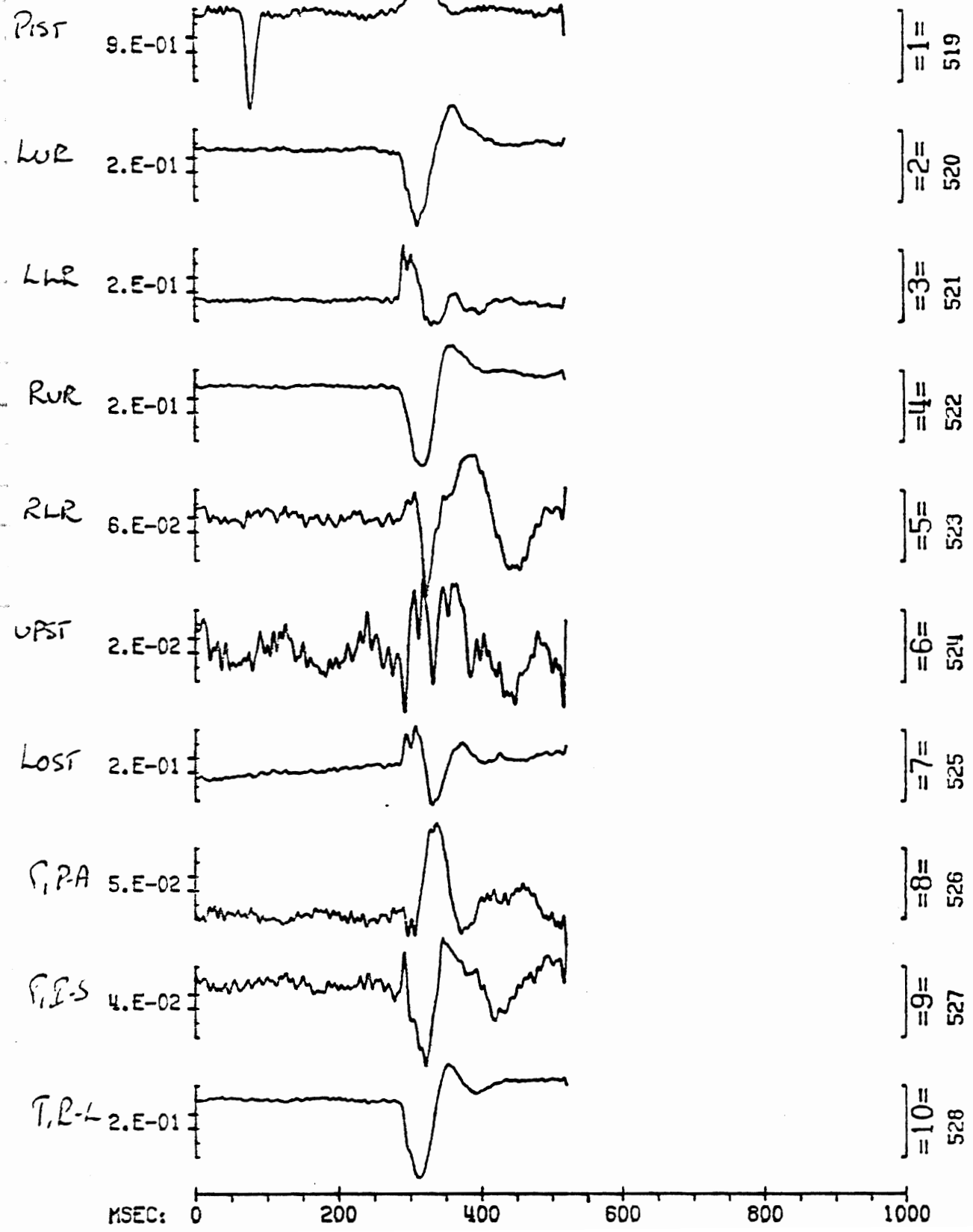
AIRWAY PRESSURE



100 msec



PTS: 1 301 601 901 1201 1501



ID: 76T057-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T057-1IPT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 1611, HAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 3293 PTS/CH AT 6310.92 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
519	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	823	1577.73
520	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+3	99.4	823	1577.73
521	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+3	99.4	823	1577.73
522	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.4	823	1577.73
523	5	RIGHT LOWER RIB ACCELEROMETER	-3.60	G'S	4+1+3	99.4	823	1577.73
524	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+3	99.4	823	1577.73
525	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+3	99.4	823	1577.73
526	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.4	823	1577.73
527	9	T1 I-S ACCELEROMETER	-3.70	G'S	4+1+3	99.4	823	1577.73
528	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.4	823	1577.73

11

12

13

14

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FILTERED FILES: 519 - 528 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T057-1IPT

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PTS: 1 301 601 901 1201 1501

*P<sub>12</sub>T*

5.E-01

]=1=  
778

*P<sub>12</sub>P-A*

3.E-02

]=2=  
779

*P<sub>12</sub>B-S*

2.E-02

]=3=  
780

*P<sub>12</sub>R-L*

9.E-02

]=4=  
781

*NEW  
(mostly)*

5.E-01

]=6=  
782

MSEC: 0 200 400 600 800 1000

ID: 76T057-2:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T057-21PT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4273 PTS/CH AT 6307.65 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
778	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	836	1576.91
779	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.3	836	1576.91
780	3	T12 I-S ACCELEROMETER	-3.60	G'S	4+1+3	99.3	836	1576.91
781	4	T12 R-L ACCELEROMETER	3.70	G'S	4+1+3	99.3	836	1576.91
782	6	AIRWAY PRESSURE	14.10	MM-HG	4+1+3	99.3	836	1576.91

5i

7i

8i

9i

10i

11i

12i

13i

14i

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FILTERED FILES: 778 - 782

DIGITAL TAPE: THOR.2

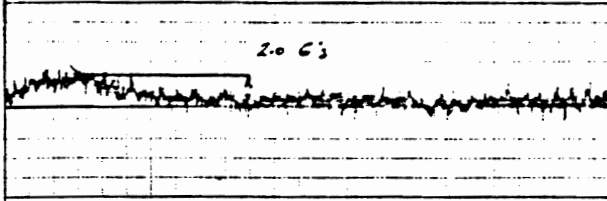
DATE: 21-JAN-77

RUN ID: 76T057-21PT

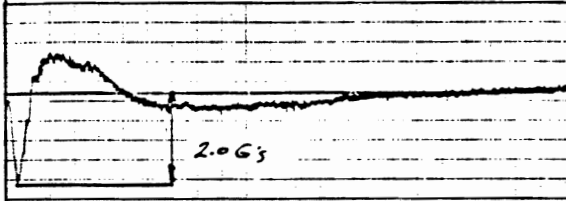
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TEST 76T05E

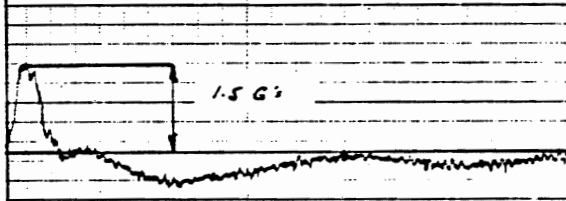
PISTON DECELERATION



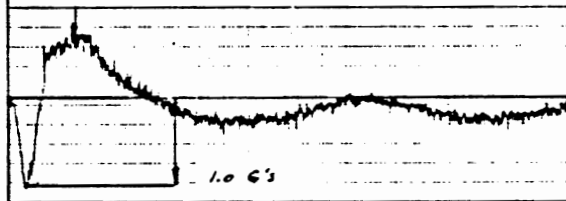
LEFT UPPER RIB ACCELEROMETER



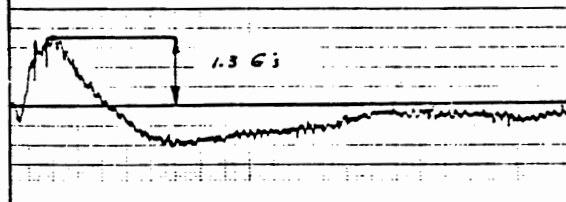
LEFT LOWER RIB ACCELEROMETER



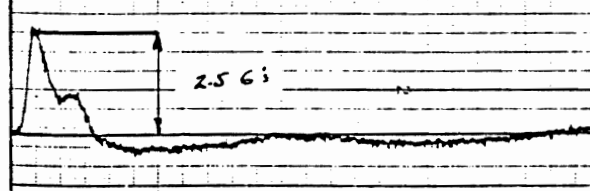
RIGHT UPPER RIB ACCELEROMETER



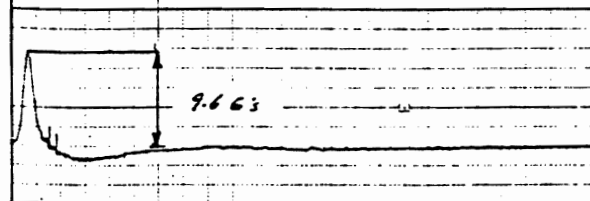
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



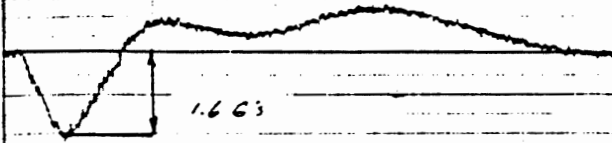
LOWER STERNAL ACCELEROMETER



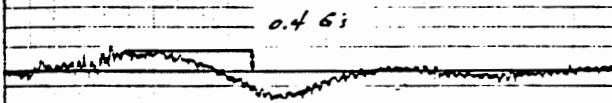
100 msec

TEST 76T058

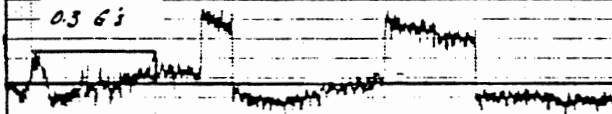
T<sub>1</sub> P-A ACCELEROMETER



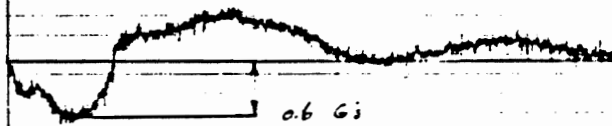
T<sub>1</sub> I-S ACCELEROMETER



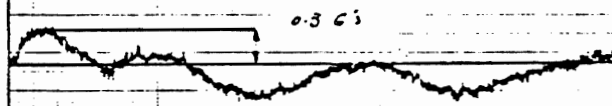
T<sub>1</sub> R-L ACCELEROMETER



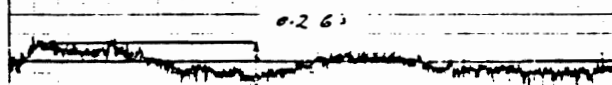
T<sub>12</sub> P-A ACCELEROMETER



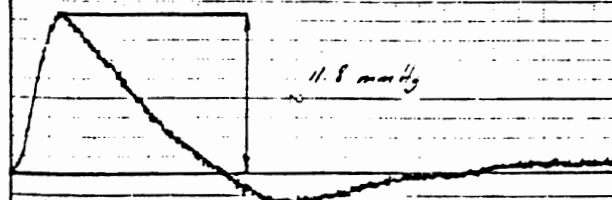
T<sub>12</sub> I-S ACCELEROMETER



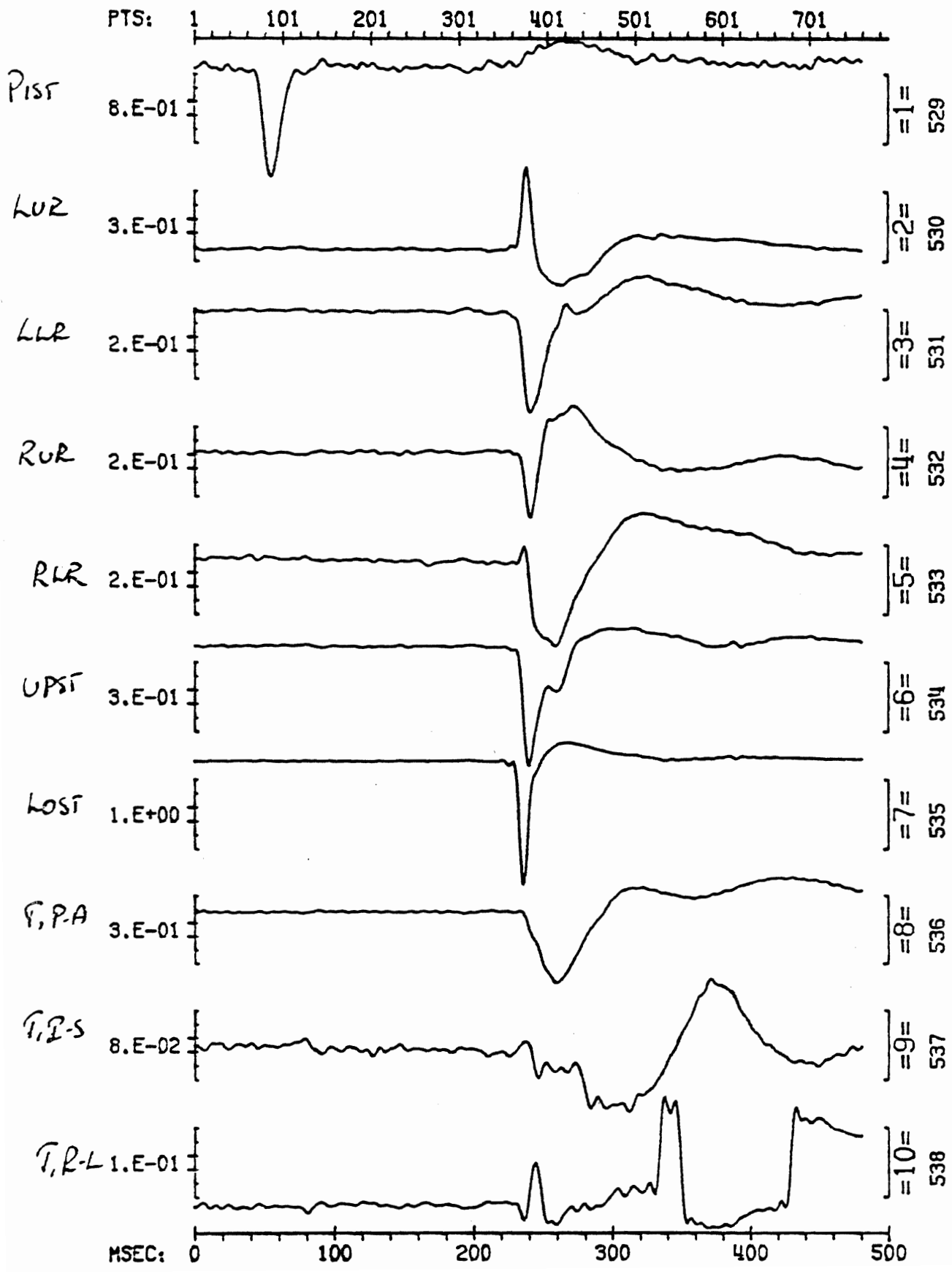
T<sub>12</sub> R-L ACCELEROMETER



AIRWAY PRESSURE



100 msec



ID: 76T058-1:PT

TAPE: THOR.2

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RUN ID: 76T050-1IPT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77  
TEST SIGNALS: 3049 PTS/CH AT 6307.16 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
529	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.3	759	1576.79
530	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	99.3	759	1576.79
531	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+ 3	99.3	759	1576.79
532	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+ 3	99.3	759	1576.79
533	5	RIGHT LOWER RIB ACCELEROMETER	-3.80	G'S	4+1+ 3	99.3	759	1576.79
534	6	UPPER STERNAL ACCELEROMETER	4.70	G'S	4+1+ 3	99.3	759	1576.79
535	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+ 3	99.3	759	1576.79
536	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+ 3	99.3	759	1576.79
537	9	T1 I-B ACCELEROMETER	-3.70	G'S	4+1+ 3	99.3	759	1576.79
538	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+ 3	99.3	759	1576.79

111  
121  
131  
141

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FILTERED FILES: 529 - 538 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T050-1IPT  
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PTS: 1 301 601 901 1201 1501

P1ST

5.E-01

=1=  
783

T12P-A

6.E-02

=2=  
784

T12P-S

4.E-02

=3=  
785

T12P-L

2.E-02

=4=  
786

A1PW  
(msec Hz)

8.E-01

=6=  
787

MSEC: 0 200 400 600 800 1000

76T058-2:PT

ID:

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T050-2IPT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4273 PTS/CH AT 6300.12 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
783	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.3	036	1577.03
784	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.3	036	1577.03
785	3	T12 I-B ACCELEROMETER	-3.60	G'S	4+1+3	99.3	036	1577.03
786	4	T12 R-L ACCELEROMETER	3.70	G'S	4+1+3	99.3	036	1577.03
787	6	AIRWAY PRESSURE	14.10	MM-HG	4+1+3	99.3	036	1577.03

5:  
7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

=====

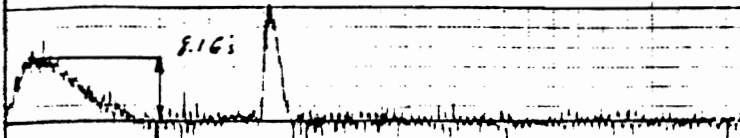
FILTERED FILES: 783 - 787 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77

RUN ID: 76T050-2IPT

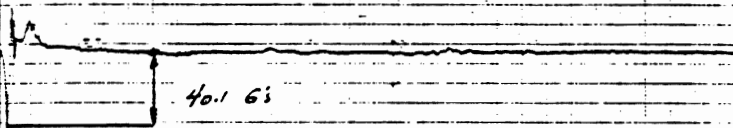
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TEST 70T059

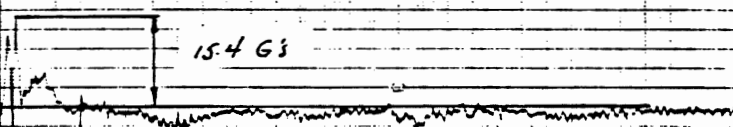
PISTON DECELERATION



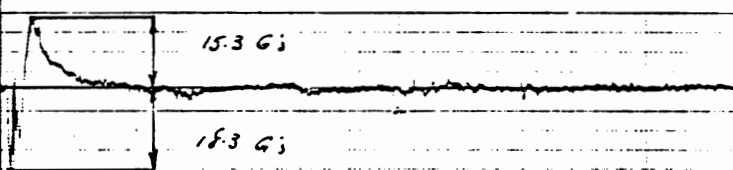
LEFT UPPER RIB ACCELEROMETER



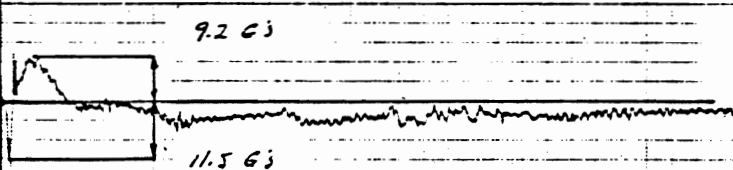
LEFT LOWER RIB ACCELEROMETER



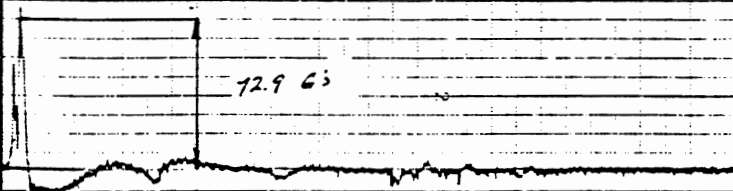
RIGHT UPPER RIB ACCELEROMETER



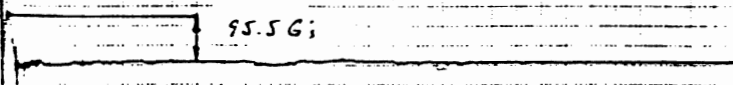
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



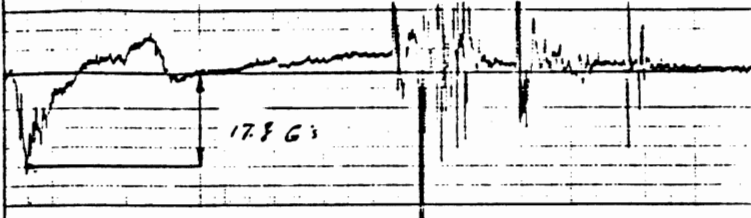
LOWER STERNAL ACCELEROMETER



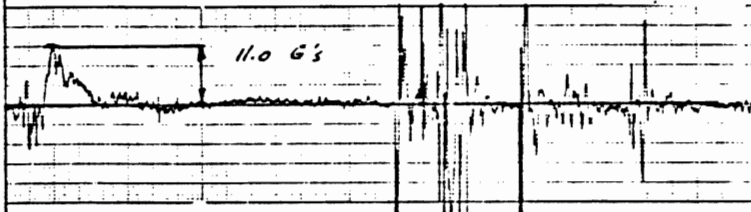
100 msec

TEST 76T059

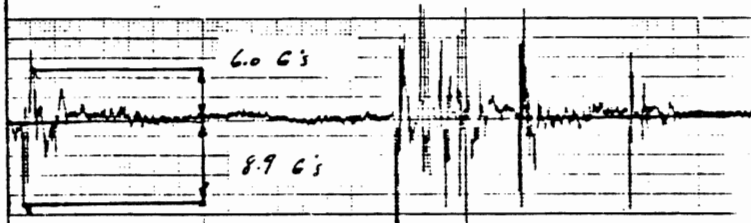
T<sub>1</sub> P-A ACCELEROMETER



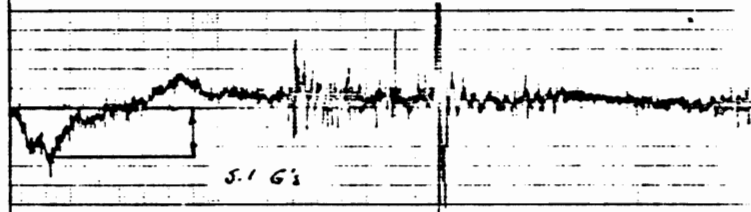
T<sub>1</sub> I-S ACCELEROMETER



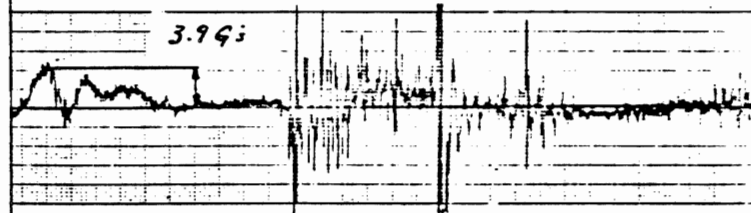
T<sub>1</sub> R-L ACCELEROMETER



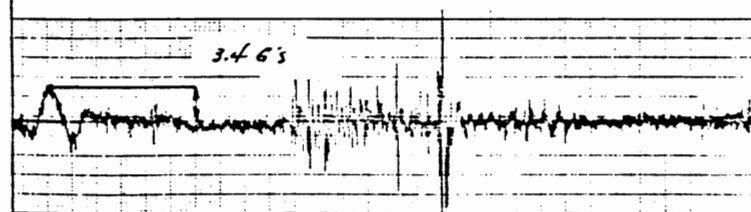
T<sub>12</sub> P-A ACCELEROMETER



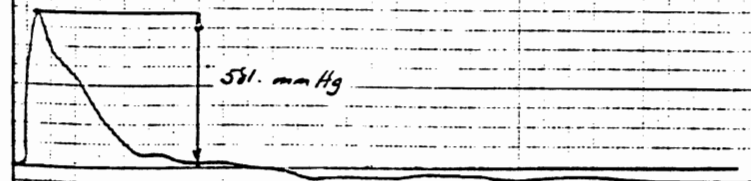
T<sub>12</sub> I-S ACCELEROMETER



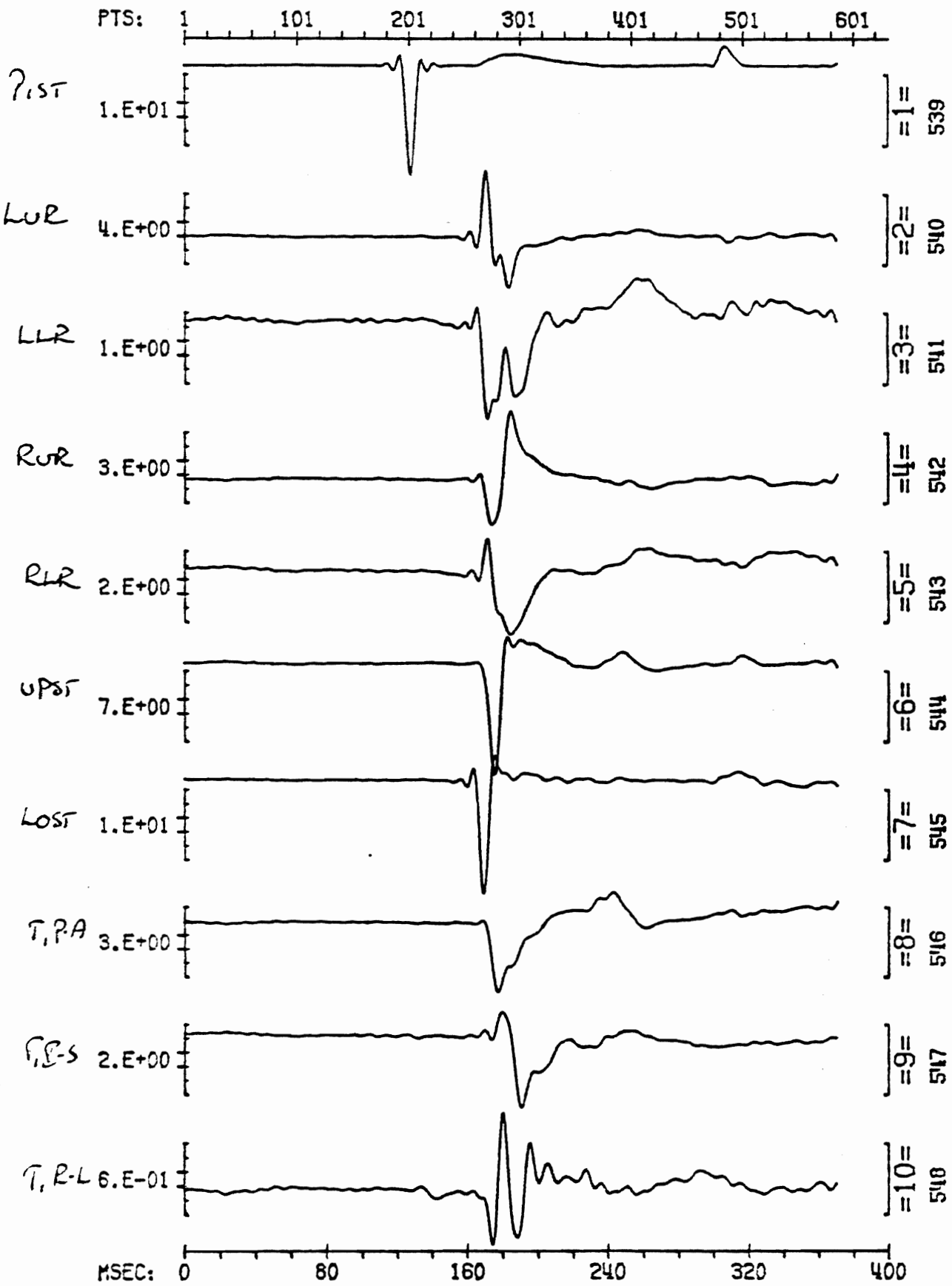
T<sub>12</sub> R-L ACCELEROMETER



VASCULAR PRESSURE



100 msec



76T059-1:PP

ID:

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T059-11PP

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: H8RI-140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 17-JAN-77

TEST SIGNALS: 2343 PTS/CH AT 6312.39 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
539	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+ 3	99.4	506	1570.10
540	2	LEFT UPPER RIB ACCELEROMETER	42.20	G'S	4+1+ 3	99.4	506	1570.10
541	3	LEFT LOWER RIB ACCELEROMETER	33.40	G'S	4+1+ 3	99.4	506	1570.10
542	4	RIGHT UPPER RIB ACCELEROMETER	42.50	G'S	4+1+ 3	99.4	506	1570.10
543	5	RIGHT LOWER RIB ACCELEROMETER	30.30	G'S	4+1+ 3	99.4	506	1570.10
544	6	UPPER STERNAL ACCELEROMETER	93.40	G'S	4+1+ 3	99.4	506	1570.10
545	7	LOWER STERNAL ACCELEROMETER	79.60	G'S	4+1+ 3	99.4	506	1570.10
546	8	T1 P-A ACCELEROMETER	37.10	G'S	4+1+ 3	99.4	506	1570.10
547	9	T1 I-R ACCELEROMETER	36.70	G'S	4+1+ 3	99.4	505	1570.10
548	10	T1 R-L ACCELEROMETER	21.30	G'S	4+1+ 3	99.4	505	1570.10

11

12

13

14

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FILTERED FILES: 539 - 548

DIGITAL TAPE: THOR,2

DATE: 21-JAN-77

RUN ID: 76T059-11PP

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PTS: 1 101 201 301 401 501 601

P15T

6.E+00

=1=  
788

T12 P-A

5.E-01

=2=  
789

T12 P-S

4.E-01

=3=  
790

T12 P-L

3.E-01

=4=  
791

VASC  
(msec)

4.E+01

=6=  
792

MSEC: 0 80 160 240 320 400

ID: 76T059-2:PP

TAPE: THOR.2

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RUN ID: 76T059-2IPP  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 16-JAN-77

TEST SIGNALS: 1954 PTS/CH AT 6310.48 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
788	1	PISTON DECELERATION PULSE	50.00	G'S	4+1+3	99.4	405	1577.62
789	2	T12 P-A ACCELEROMETER	40.90	G'S	4+1+3	99.4	405	1577.62
790	3	T12 I-S ACCELEROMETER	35.50	G'S	4+1+3	99.4	405	1577.62
791	4	T12 R-L ACCELEROMETER	37.30	G'S	4+1+3	99.4	405	1577.62
792	6	VASCULAR PRESSURE	141.70	MM-HG	4+1+3	99.4	405	1577.62

- 5:
- 7:
- 8:
- 9:
- 10:
- 11:
- 12:
- 13:
- 14:

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FILTERED FILES: 788 - 792 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T059-2IPP  
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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER:

76T060 - Low Energy Front Pendulum Impact

76T061 - Low Energy Side Pendulum Impact

76T062 - Pendulum 14 ft/sec Side Impact

TEST DATE:

December 16, 1976

TEST SUBJECT:

Age - 69

Sex - Male

Stature - 174.3 cm.

Weight - 50.1 kg.

RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

VELOCITY:

For Test No. 76T062, velocity was 14 ft/sec.

INJURIES:

7 rib fractures on left side and back.

Pressure tear (1 cm.) in heart muscle tissue

AIS NUMBER ESTIMATE:

TEST # 76T062

TEST DATE 12.16.76

TEST DESCRIPTION Pendulum Side Impact VELOCITY 14.0 ft/s

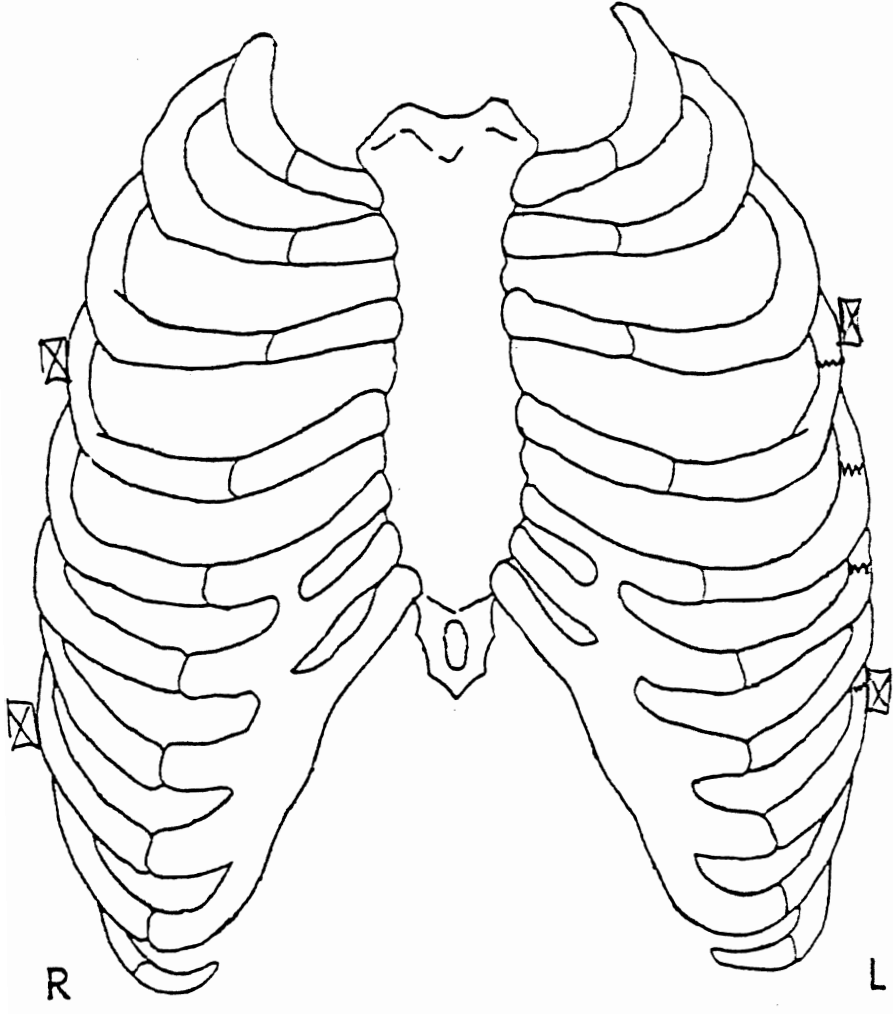
SUBJECT:

AGE 69 SEX M CAUSE OF DEATH Cancer, Throat

INJURY INFORMATION: OVERALL THORACIC AIS 5

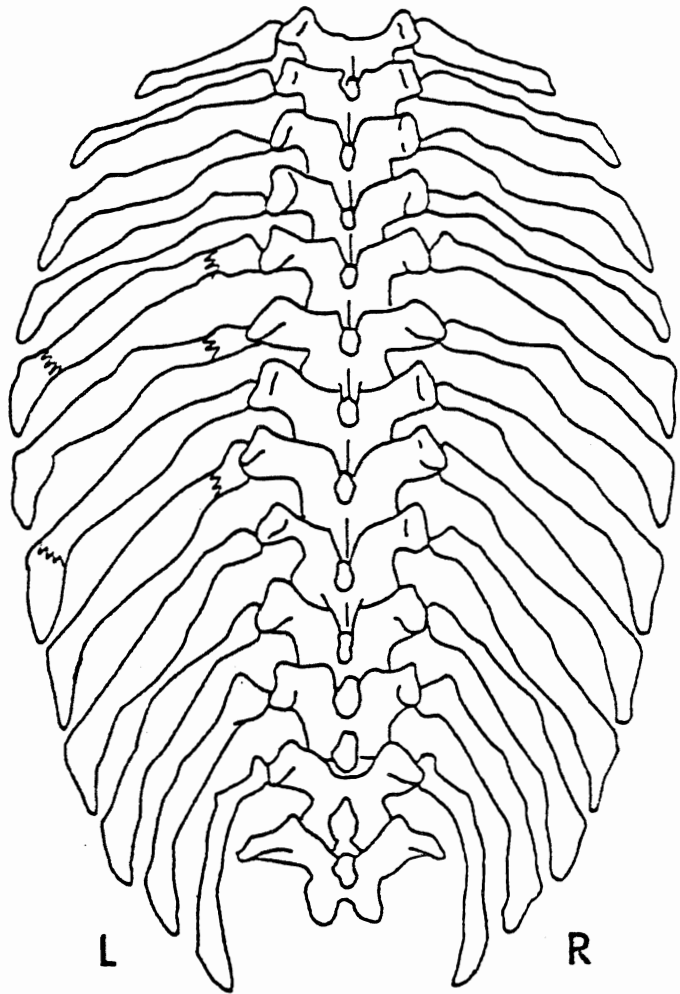
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>R</u>	<u>H</u>	<u>5</u>
	2	<u>C</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>3</u>
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

TEST # 76T062



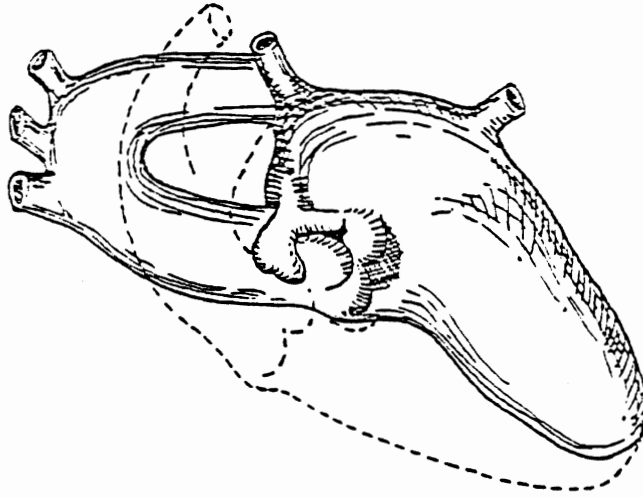
ANTERIOR VIEW RIB CAGE

TEST # 76T062

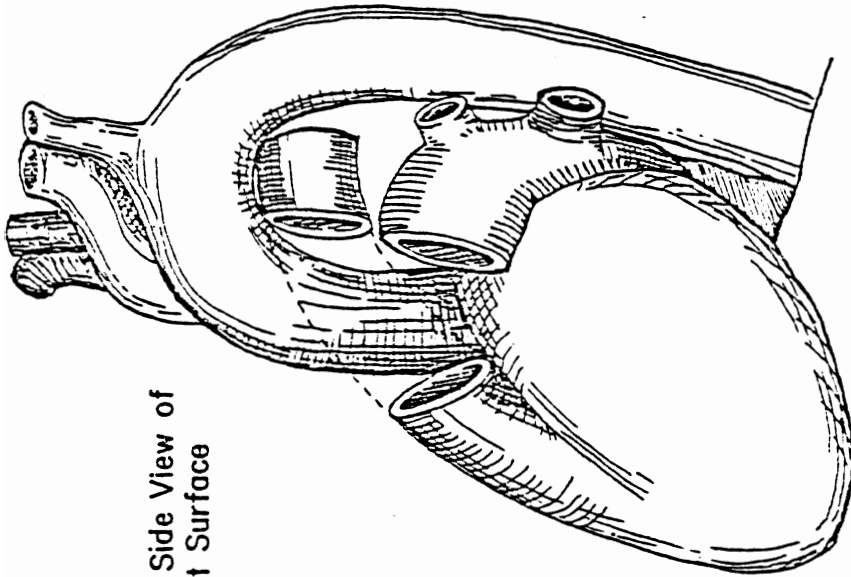


POSTERIOR VIEW RIB CAGE

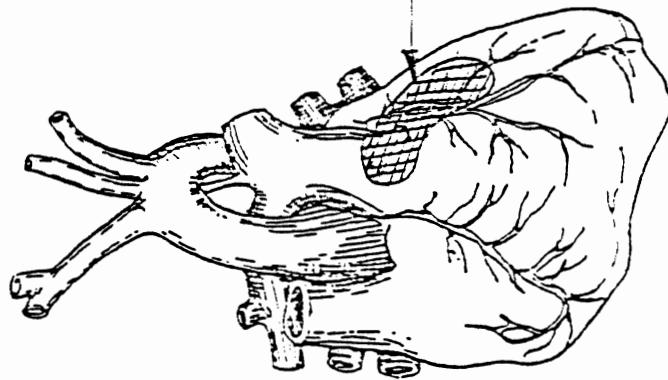
Left View of Left Side of Heart



Left Side View of Heart Surface



hemorrhage, 3 cm x .8 cm x .5 cm deep;  
with 1 cm laceration in myocardium  
under hemorrhage.

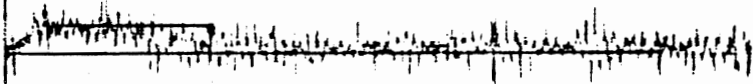


Anterior View of Heart

TEST 76T000

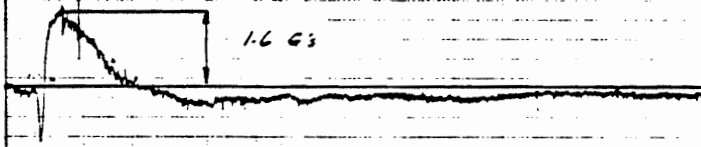
PISTON DECELERATION

1.2 G's



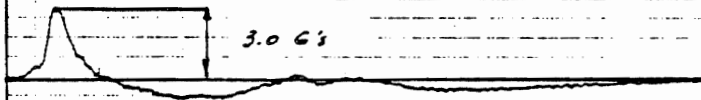
LEFT UPPER RIB ACCELEROMETER

1.6 G's



LEFT LOWER RIB ACCELEROMETER

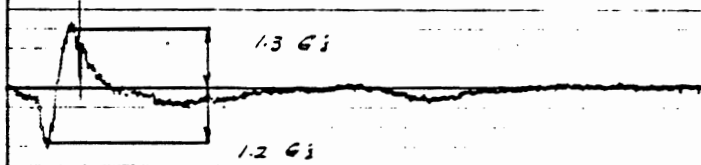
3.0 G's



RIGHT UPPER RIB ACCELEROMETER

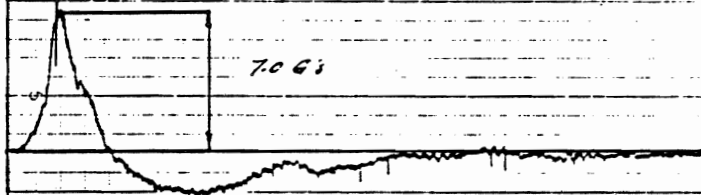
1.3 G's

1.2 G's



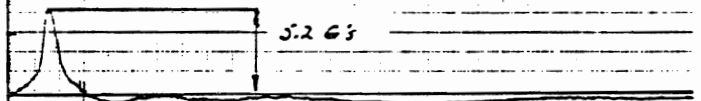
RIGHT LOWER RIB ACCELEROMETER

7.0 G's



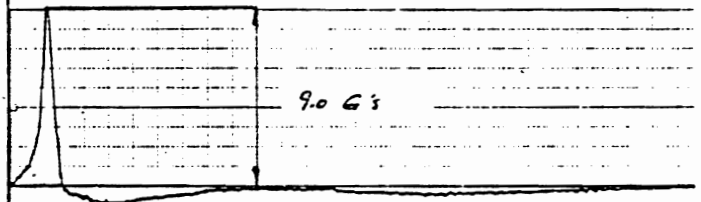
UPPER STERNAL ACCELEROMETER

5.2 G's



LOWER STERNAL ACCELEROMETER

9.0 G's

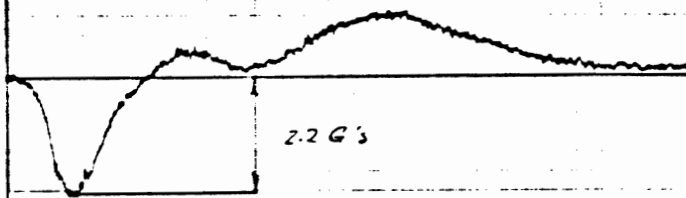


100 msec

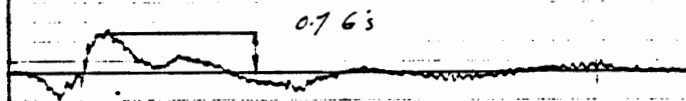


TEST 76T060

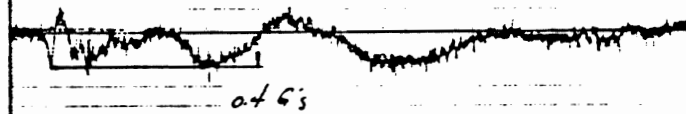
T<sub>1</sub> P-A ACCELEROMETER



T<sub>1</sub> I-S ACCELEROMETER



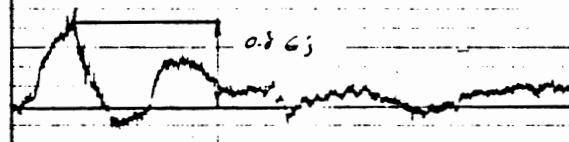
T<sub>1</sub> R-L ACCELEROMETER



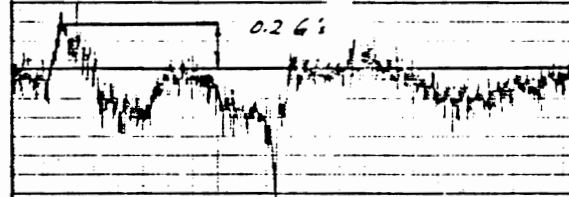
T<sub>12</sub> P-A ACCELEROMETER



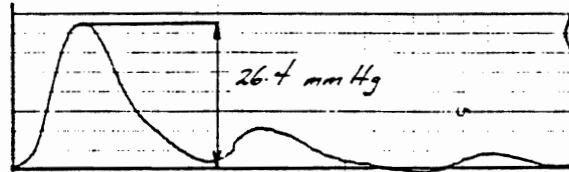
T<sub>12</sub> I-S ACCELEROMETER



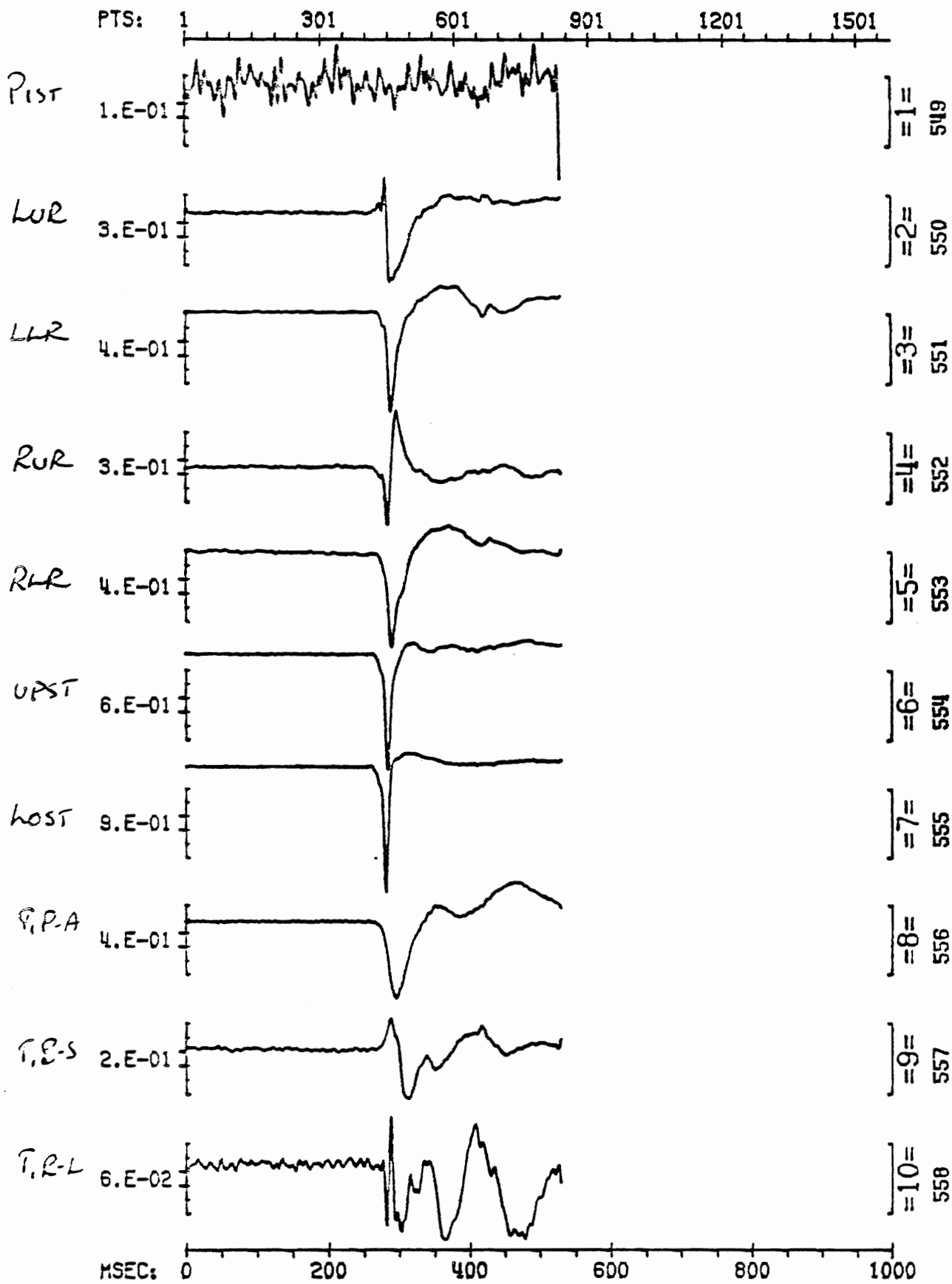
T<sub>12</sub> R-L ACCELEROMETER



VASCULAR PRESSURE



100 msec



ID: 76T060-1:PT

TAPE: THOR.2



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RUN ID: 76T060-11PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 4262 PTS/CH AT 6309.05 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
549	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.4	836	1577.26
550	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+3	99.4	836	1577.26
551	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+3	99.4	836	1577.26
552	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.26
553	5	RIGHT LOWER RIB ACCELEROMETER	-3.00	G'S	4+1+3	99.4	836	1577.26
554	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+3	99.4	836	1577.26
555	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+3	99.4	836	1577.26
556	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.26
557	9	T1 I-S ACCELEROMETER	-3.70	G'S	4+1+3	99.4	836	1577.26
558	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.26

11i

12i

13i

14i

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FILTERED FILES: 549 - 558

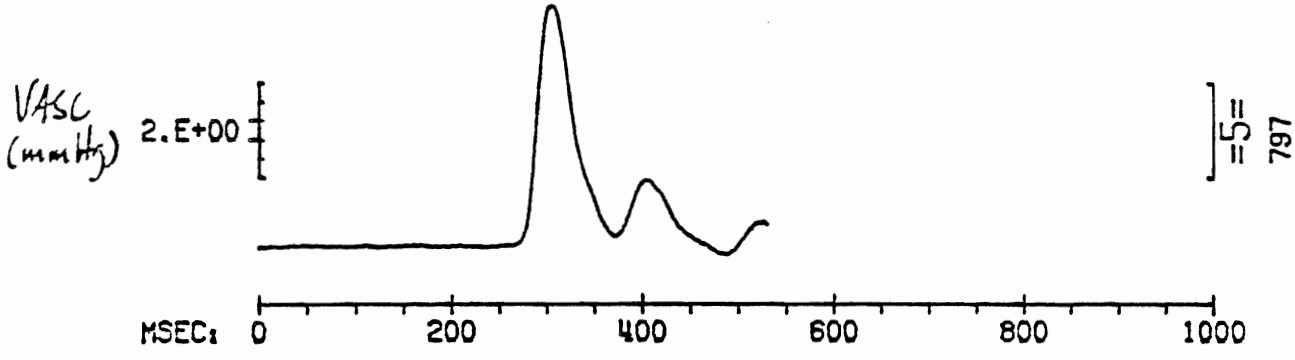
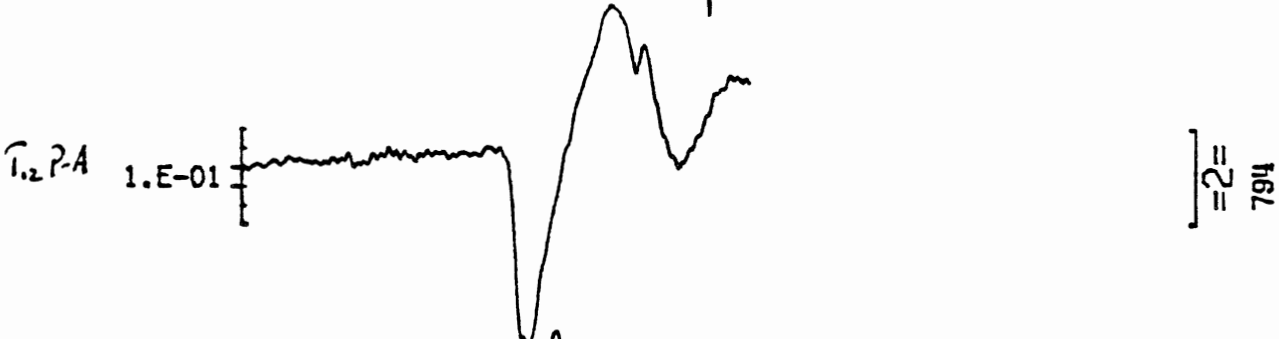
DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T060-11PT

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PTS: 1 301 601 901 1201 1501



MSEC: 0 200 400 600 800 1000

ID: 76T060-2:PT

TAPE: THOR.2

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RUN ID: 76T060-2IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS  
ANALOG TAPE: H8RI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 10-JAN-77  
TEST SIGNALS: 4261 PT8/CH AT 6310.55 HZ. CAL SIGNALS: NOT DIGITIZED.

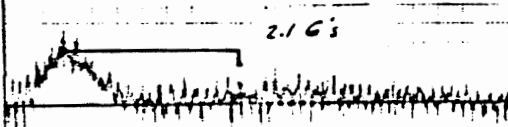
FILE #	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
793	11	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.4	836	1577.64
794	21	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.4	836	1577.64
795	31	T12 I-S ACCELEROMETER	3.60	G'S	4+1+3	99.4	836	1577.64
796	41	T12 R-L ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.64
797	51	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	99.4	836	1577.64

61  
71  
81  
91  
101  
111  
121  
131  
141

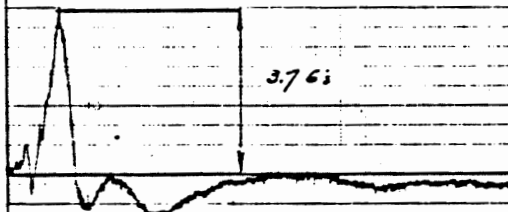
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FILTERED FILE: 793 - 797 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T060-2IPT

TEST 76T061

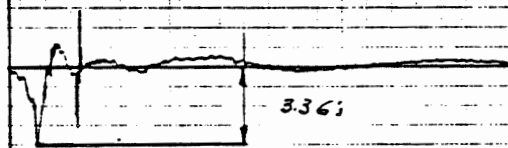
PISTON DECELERATION



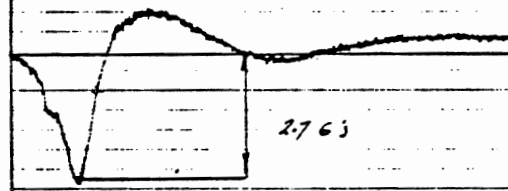
LEFT UPPER RIB ACCELEROMETER



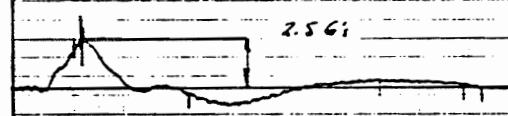
LEFT LOWER RIB ACCELEROMETER



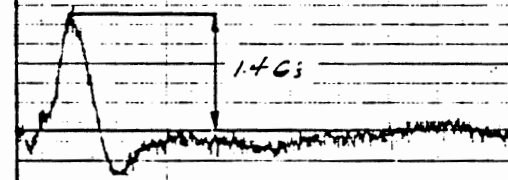
RIGHT UPPER RIB ACCELEROMETER



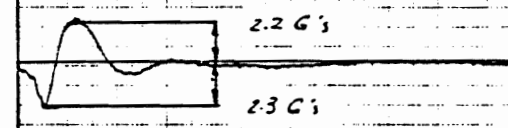
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



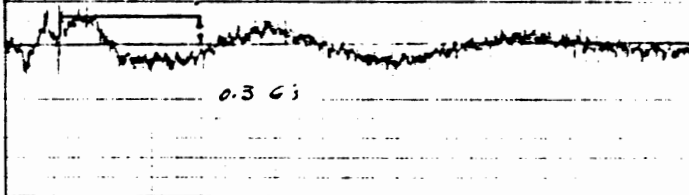
LOWER STERNAL ACCELEROMETER



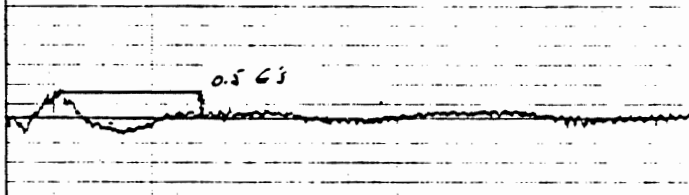
100 msec

TEST 76T001

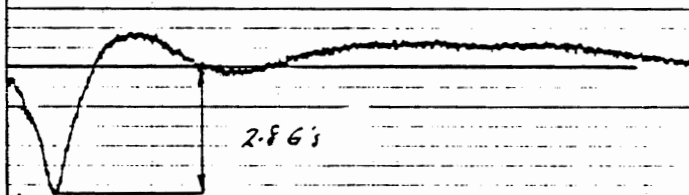
T<sub>1</sub> P-A ACCELEROMETER



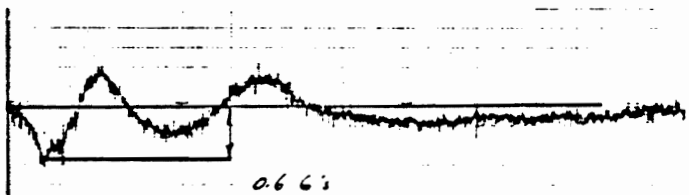
T<sub>1</sub> I-S ACCELEROMETER



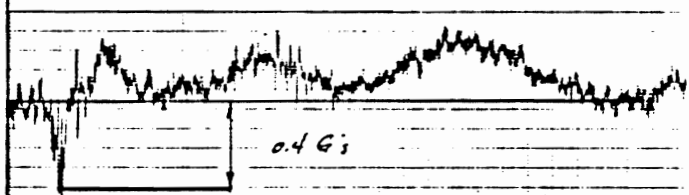
T<sub>1</sub> R-L ACCELEROMETER



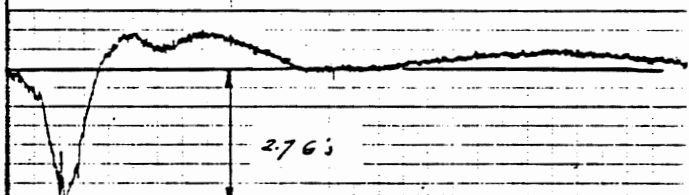
T<sub>12</sub> P-A ACCELEROMETER



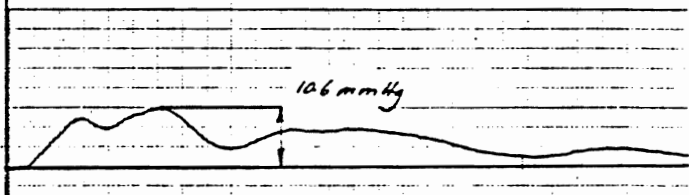
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER



VASCULAR PRESSURE



100 msec

PTS: 1 301 601 901 1201 1501

P1ST

1.E+00

=1=  
559

LUR

5.E-01

=2=  
560

LRL

4.E-01

=3=  
561

RUR

4.E-01

=4=  
562

RRL

4.E-01

=5=  
563

UPST

2.E-01

=6=  
564

LOST

5.E-01

=7=  
565

P.P.A

5.E-02

=8=  
566

T.R-S

8.E-02

=9=  
567

T.R-L

4.E-01

=10=  
568

MSEC: 0 200 400 600 800 1000

76T061-1:PT

ID:

TAPE: THOR.2

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RUN ID: 76T061-1IPT

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ANALOG TO DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-146 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 4255 PTS/CH AT 6307.97 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
559	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+ 3	99.3	836	1576.99
560	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	99.3	836	1576.99
561	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+ 3	99.3	836	1576.99
562	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+ 3	99.3	836	1576.99
563	5	RIGHT LOWER RIB ACCELEROMETER	-3.80	G'S	4+1+ 3	99.3	836	1576.99
564	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+ 3	99.3	836	1576.99
565	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+ 3	99.3	836	1576.99
566	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+ 3	99.3	836	1576.99
567	9	T1 I-S ACCELEROMETER	-3.70	G'S	4+1+ 3	99.3	836	1576.99
568	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+ 3	99.3	836	1576.99

11

12

13

14

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RUN ID: 76T061-1IPT

DATE: 21-JAN-77

DIGITAL TAPE: THOR.2

FILTERED FILES: 559 - 568

PTS: 1 301 601 901 1201 1501

P1ST

6.E-01

=1=  
798

T12PA

5.E-02

=2=  
799

T12IS

4.E-02

=3=  
800

T12RL

2.E-01

=4=  
801

VASC  
(mmHg)

6.E-01

=5=  
802

MSEC: 0 200 400 600 800 1000

ID: 76T061-2:PT

TAPE: THOR.2



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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RUN ID: 76T061-2IPT

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4253 PT8/CH AT 6307.75 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PT8	SAMPLING HERTZ
798	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.3	036 0	1576.94
799	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.3	036 0	1576.94
800	3	T12 I-S ACCELEROMETER	3.60	G'S	4+1+3	99.3	036 0	1576.94
801	4	T12 R-L ACCELEROMETER	3.70	G'S	4+1+3	99.3	036 0	1576.94
802	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	99.3	036 0	1576.94

- 6i
- 7i
- 8i
- 9i
- 10i
- 11i
- 12i
- 13i
- 14i

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FILTERED FILES: 798 - 802

DIGITAL TAPE: THOR.2

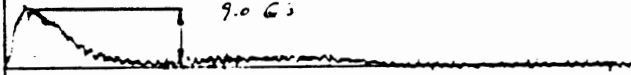
DATE: 21-JAN-77

RUN ID: 76T061-2IPT

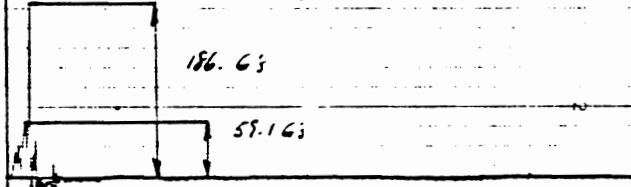
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TEST 76T062

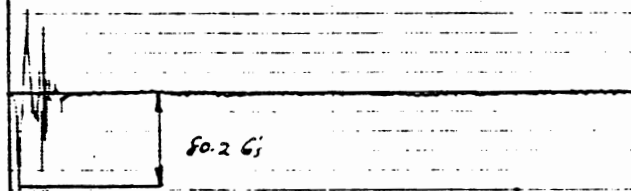
PISTON DECELERATION



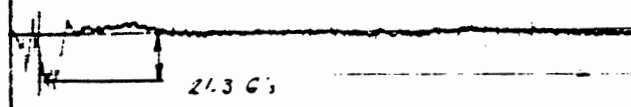
LEFT UPPER RIB ACCELEROMETER



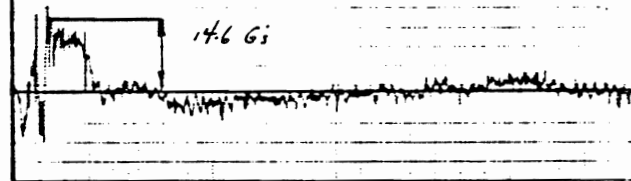
LEFT LOWER RIB ACCELEROMETER



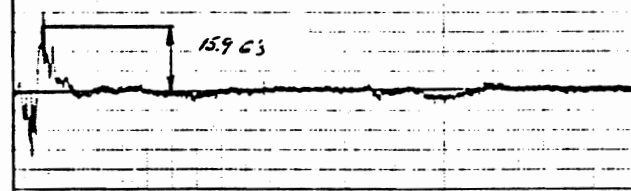
RIGHT UPPER RIB ACCELEROMETER



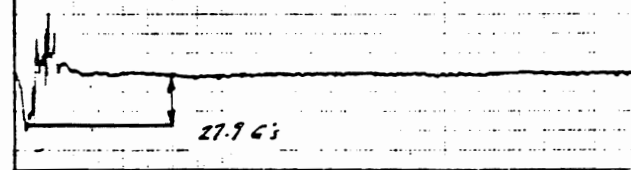
RIGHT LOWER RIB ACCELEROMETER



UPPER STERNAL ACCELEROMETER



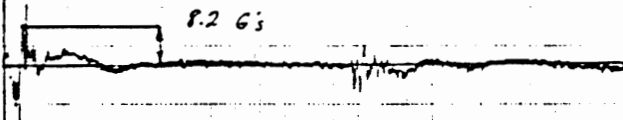
LOWER STERNAL ACCELEROMETER



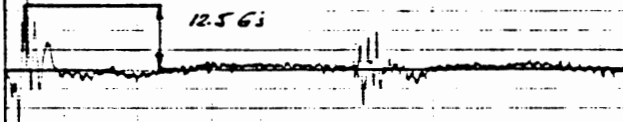
100 msec

TEST 76T062

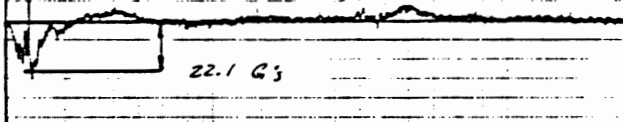
T<sub>1</sub> P-A ACCELEROMETER



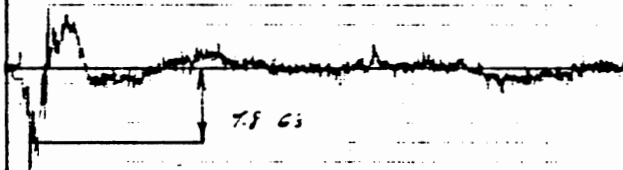
T<sub>2</sub> I-S ACCELEROMETER



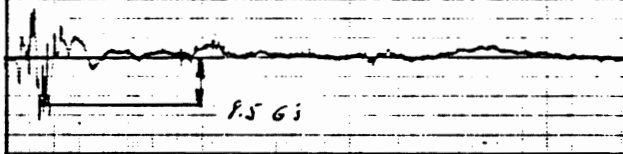
T<sub>1</sub> R-L ACCELEROMETER



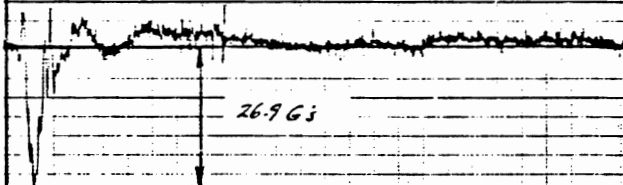
T<sub>12</sub> P-A ACCELEROMETER



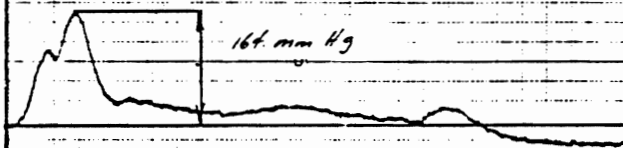
T<sub>12</sub> I-S ACCELEROMETER



T<sub>12</sub> R-L ACCELEROMETER

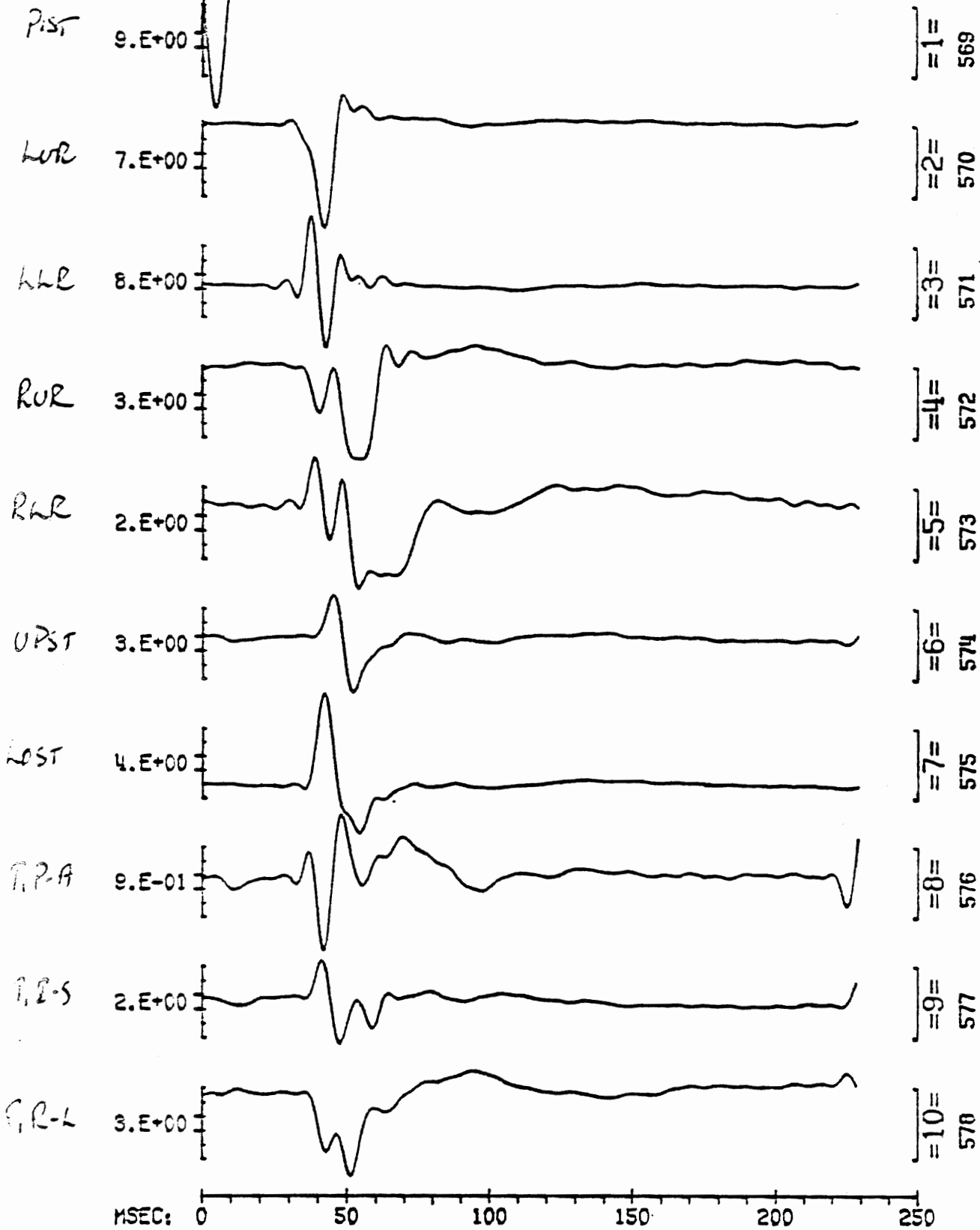


VASCULAR PRESSURE



100 msec

PTS: 1 61 121 181 241 301 361



ID: 76T062-1:PP

TAPE: THOR.2

\*\*\*\*\*

RUN ID: 76T062-11PP

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-146 EXPANDED 16ii, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 1447 PTS/CH AT 6307.42 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
569	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+ 3	99.3	362	1576.85
570	2	LEFT UPPER RIB ACCELEROMETER	84.40	G'S	4+1+ 3	99.3	362	1576.85
571	3	LEFT LOWER RIB ACCELEROMETER	66.80	G'S	4+1+ 3	99.3	362	1576.85
572	4	RIGHT UPPER RIB ACCELEROMETER	85.00	G'S	4+1+ 3	99.3	362	1576.85
573	5	RIGHT LOWER RIB ACCELEROMETER	76.60	G'S	4+1+ 3	99.3	362	1576.85
574	6	UPPER STERNAL ACCELEROMETER	46.70	G'S	4+1+ 3	99.3	362	1576.85
575	7	LOWER STERNAL ACCELEROMETER	39.80	G'S	4+1+ 3	99.3	362	1576.85
576	8	T1 P-A ACCELEROMETER	37.10	G'S	4+1+ 3	99.3	362	1576.85
577	9	T1 I-S ACCELEROMETER	36.70	G'S	4+1+ 3	99.3	361	1576.85
578	10	T1 R-L ACCELEROMETER	85.00	G'S	4+1+ 3	99.3	361	1576.85

111

121

131

141

\*\*\*\*\*

FILTERED FILES: 569 - 578

DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T062-11PP

\*\*\*\*\*

PTS: 1 61 121 181 241 301 361

P1ST

5.E+00

=1=  
803

T12PA

7.E-01

=2=  
804

T12LS

7.E-01

=3=  
805

P12R-L

2.E+00

=4=  
806

VHSL  
(max Hz)

9.E+00

=5=  
807

MSEC: 0 50 100 150 200 250

76T:062-2:PP

ID:

TAPE: THOR.2

\*\*\*\*\*  
RUN ID: 76T1062-2IPP  
\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HBRI-141 EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: H90010 DATE: 18-JAN-77  
TEST SIGNALS: 1446 PTS/CH AT 6306.84 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
003	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+ 3	99.3	362	1576.71
004	2	T12 P-A ACCELEROMETER	40.90	G'S	4+1+ 3	99.3	362	1576.71
005	3	T12 I-S ACCELEROMETER	-39.50	G'S	4+1+ 3	99.3	362	1576.71
006	4	T12 R-L ACCELEROMETER	74.60	G'S	4+1+ 3	99.3	362	1576.71
007	5	VASCULAR PRESSURE	283.00	MM-HG	4+1+ 3	99.3	362	1576.71

- 61
- 71
- 81
- 91
- 101
- 111
- 121
- 131
- 141

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FILTERED FILES: 003 - 007 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T1062-2IPP  
\*\*\*\*\*

SUMMARY TEST REPORT

THORACIC INJURY PROJECT (CONTRACT DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBER

76T063 - Low Energy Front Pendulum Impact

76T064 - Low Energy Side Pendulum Impact

76T065 - Pendulum 14 ft/sec Side Impact

TEST DATE

December 21, 1976

TEST SUBJECT

Age - 63

Sex - Male

Weight - 95 kg

RESTRAINT SYSTEM

None: Thoracic Pendulum Impact

VELOCITY

For Test No. 76T065, velocity was 14 ft/sec.

INJURIES

Superficial hemorrhages on pericardium

AIS NUMBER ESTIMATE

1



TEST # 767065

TEST DATE 12-21-76

TEST DESCRIPTION Pendulum Side Impact VELOCITY 140 ft/s

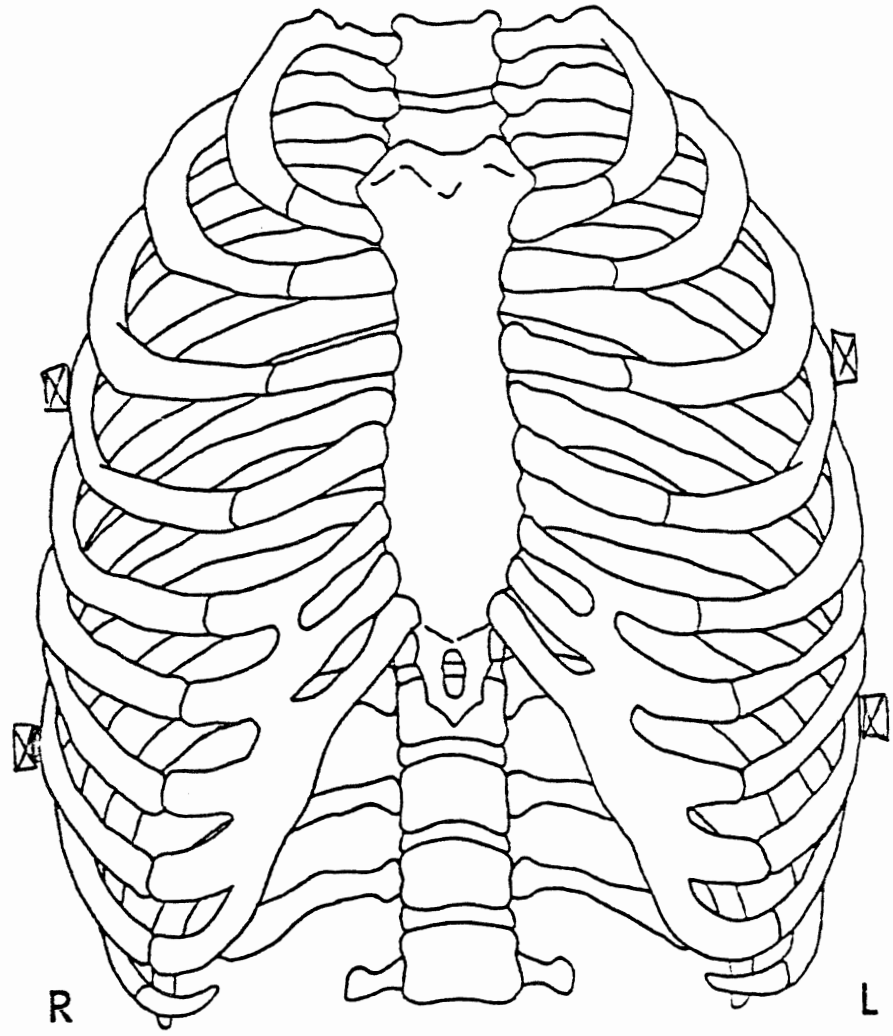
SUBJECT:

AGE 63 SEX M CAUSE OF DEATH Unknown

INJURY INFORMATION: OVERALL THORACIC AIS 1

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>H</u>	<u>A</u>	<u>1</u>
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____
	6	_____	_____	_____	_____	_____
	7	_____	_____	_____	_____	_____
	8	_____	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____	_____
	2	_____	_____	_____	_____	_____
	3	_____	_____	_____	_____	_____
	4	_____	_____	_____	_____	_____
	5	_____	_____	_____	_____	_____

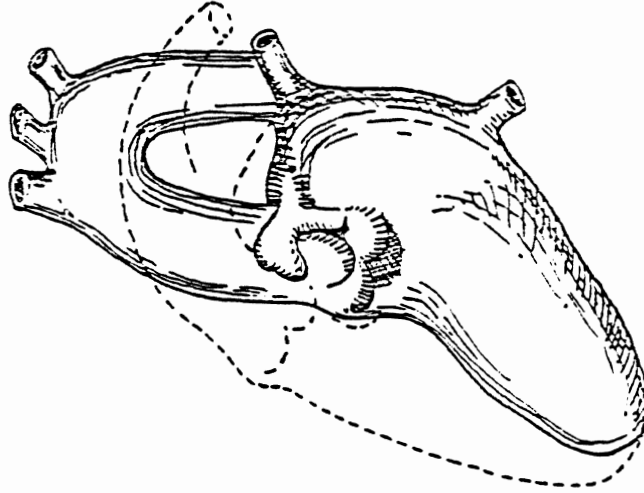
TEST # 767065



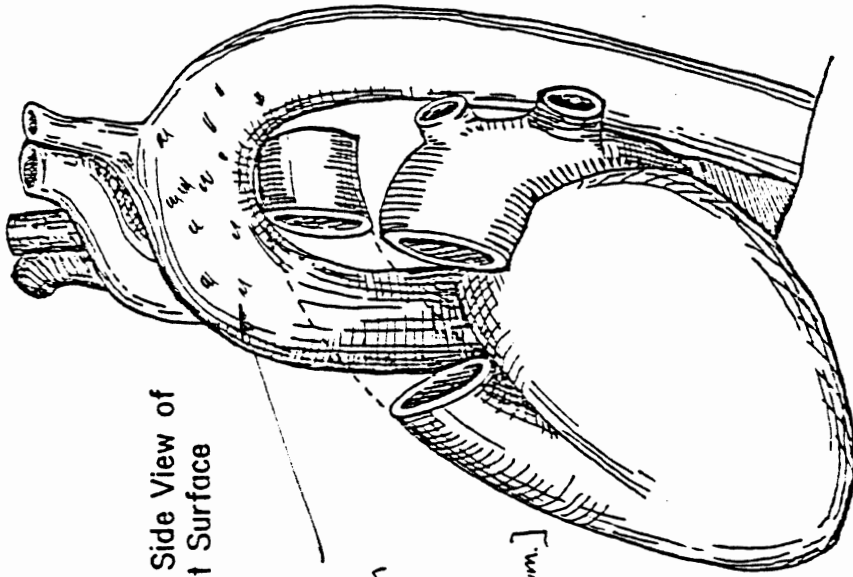
ANTERIOR VIEW RIB CAGE

*(no fractures)*

Left View of Left Side of Heart

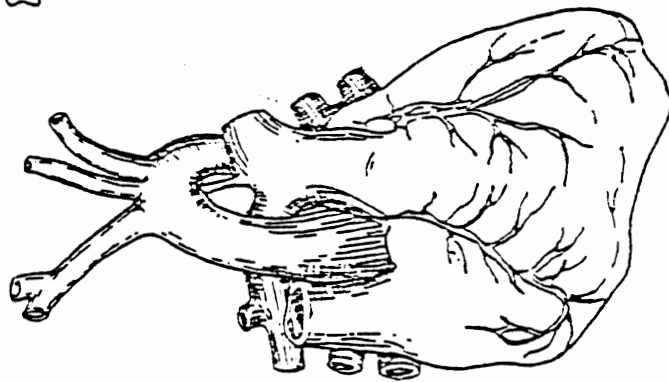


Left Side View of Heart Surface



very slight hemorrhage on aortic arch.

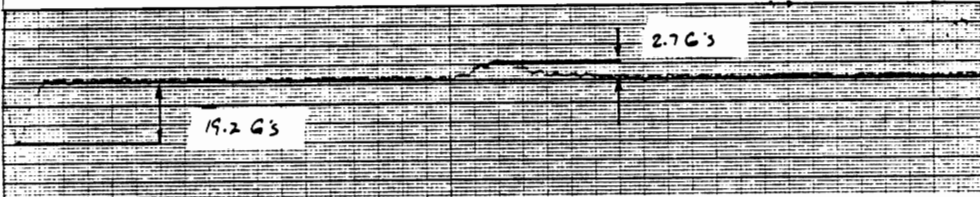
{NOTE: very weak myocardium.}



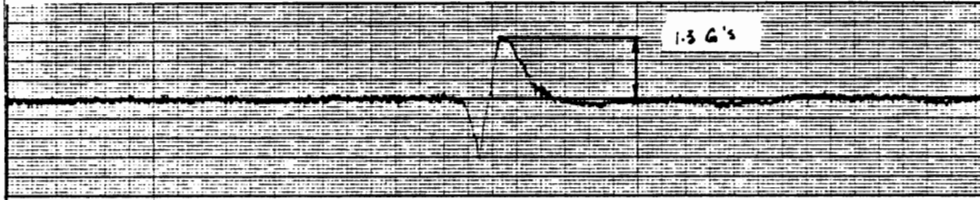
Anterior View of Heart

76T063

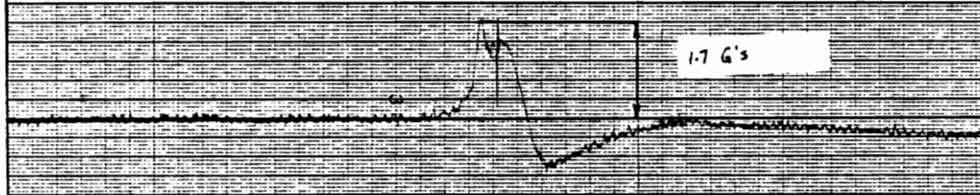
PISTON PULSE



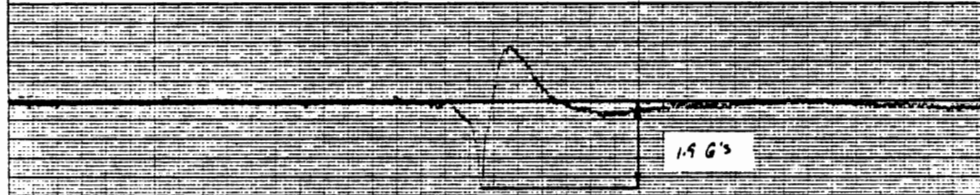
LEFT UPPER RIB  
ACCELEROMETER



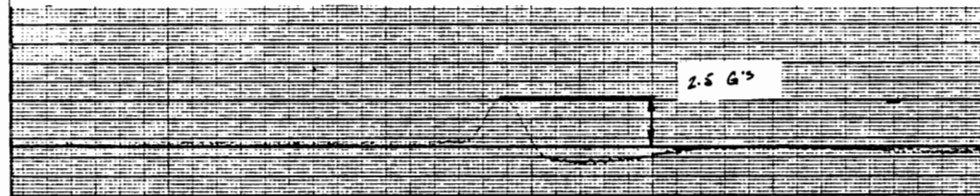
LEFT LOWER RIB  
ACCELEROMETER



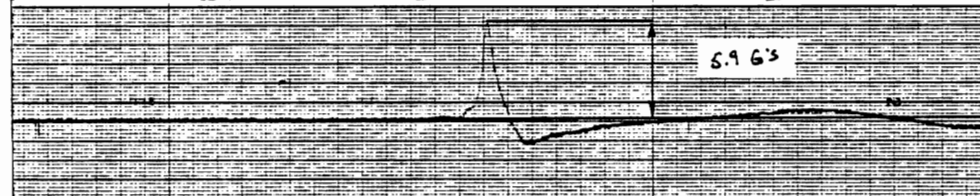
RIGHT UPPER RIB  
ACCELEROMETER



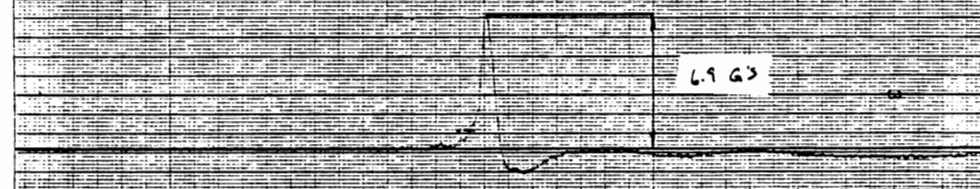
RIGHT LOWER RIB  
ACCELEROMETER



UPPER STERNAL  
ACCELEROMETER

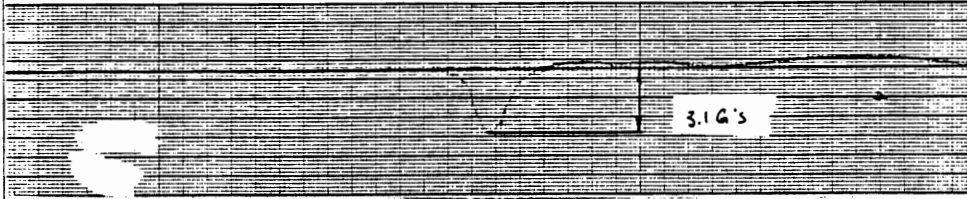


LOWER STERNAL  
ACCELEROMETER

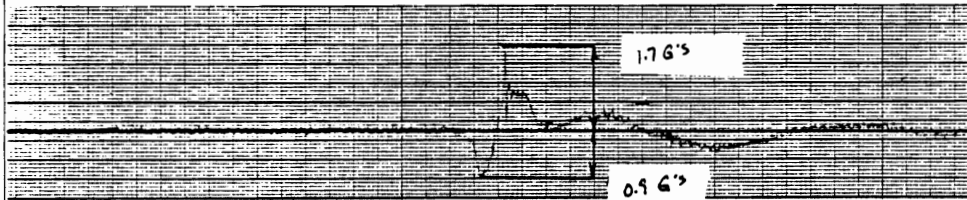


100 msec

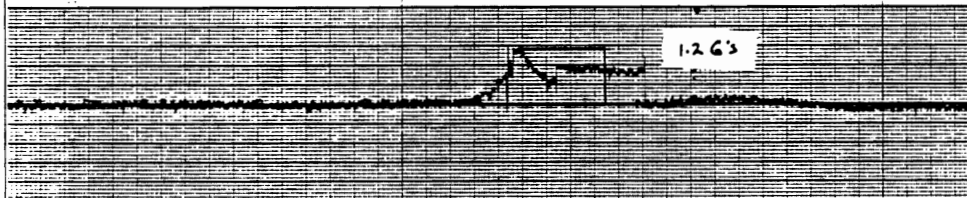
T-1 P-A Accelerometer



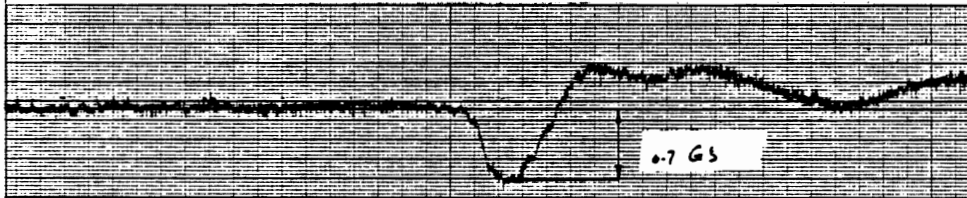
T-1 I-S Accelerometer



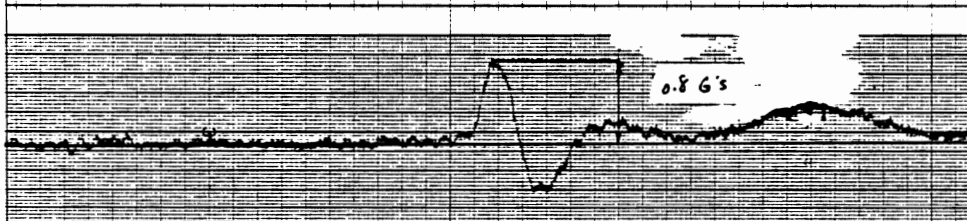
T-1 R-L Accelerometer



T-12 P-A Accelerometer



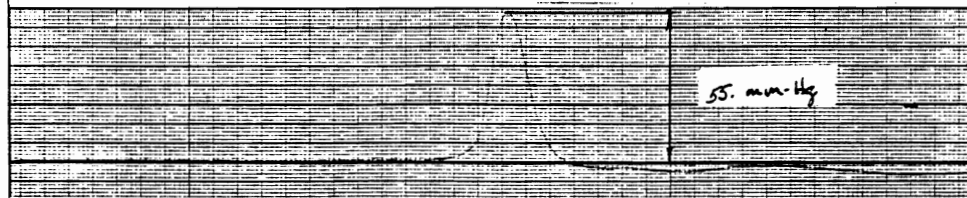
T-12 I-S Accelerometer



T-12 R-L Accelerometer



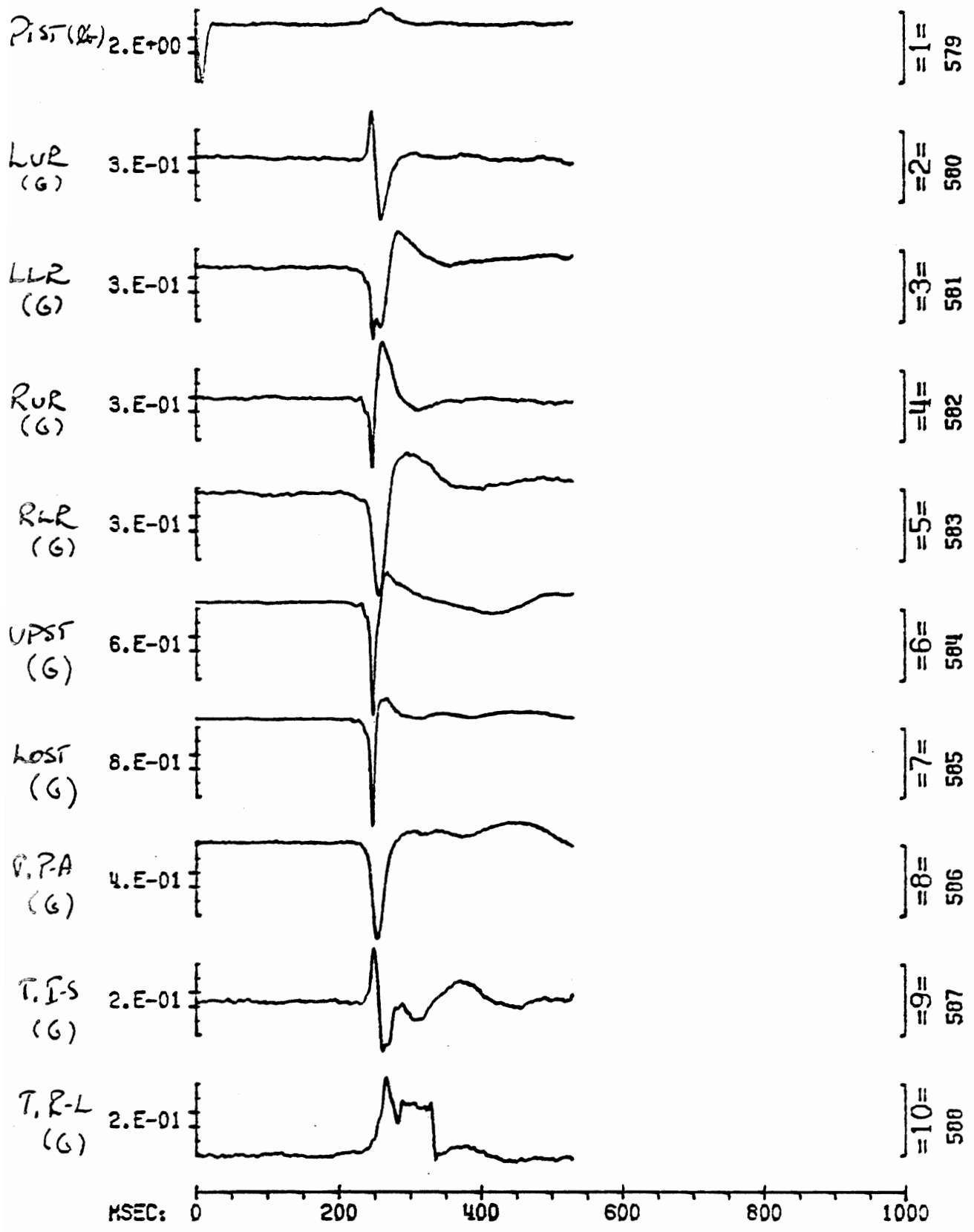
VASCULAR PRESSURE



100 msec



PTS: 1 301 601 901 1201 1501



ID: 76T063-1:PT

TAPE: THOR.2

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RUN ID: 761063-11PT

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ANALOG TO DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT - PENDULUM TESTS

ANALOG TAPE: HSRI-146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77

TEST SIGNALS: 4250 PTS/CH AT 6309.32 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
579	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.4	836	1577.33
580	2	LEFT UPPER RIB ACCELEROMETER	4.20	G'S	4+1+3	99.4	836	1577.33
581	3	LEFT LOWER RIB ACCELEROMETER	3.30	G'S	4+1+3	99.4	836	1577.33
582	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.33
583	5	RIGHT LOWER RIB ACCELEROMETER	3.80	G'S	4+1+3	99.4	836	1577.33
584	6	UPPER STERNAL ACCELEROMETER	4.70	G'S	4+1+3	99.4	836	1577.33
585	7	LOWER STERNAL ACCELEROMETER	4.00	G'S	4+1+3	99.4	836	1577.33
586	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.33
587	9	T1 I-S ACCELEROMETER	3.70	G'S	4+1+3	99.4	836	1577.33
588	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.4	836	1577.33

11:

12:

13:

14:

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FILTERED FILES: 579 - 588

DIGITAL TAPE: THDR.2

DATE: 21-JAN-77

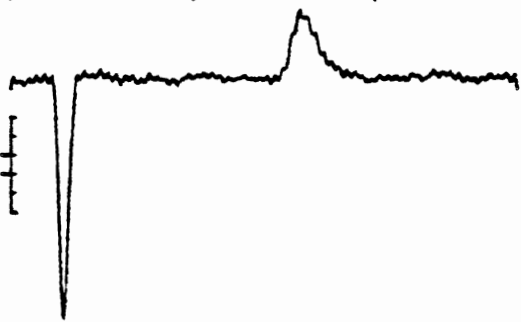
RUN ID: 761063-11PT

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PTS: 1 301 601 901 1201 1501

P<sub>1ST</sub>  
(lb)

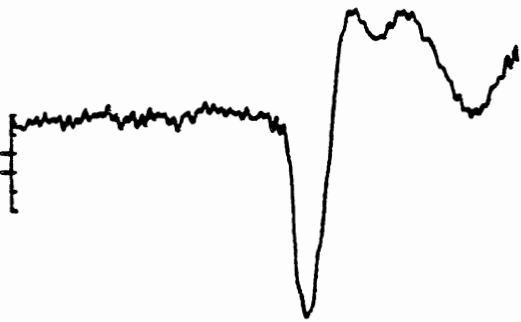
7.E-01



=1=  
808

T<sub>12</sub> PA  
(G)

7.E-02



=2=  
809

T<sub>12</sub> I-S  
(G)

7.E-02



=3=  
810

T<sub>12</sub> R-L  
(G)

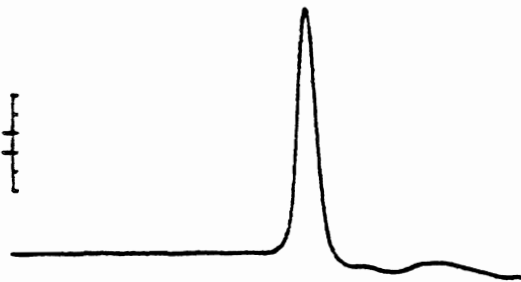
2.E-02



=4=  
811

VASC  
(mm/s)

4.E+00



=5=  
812

MSEC: 0 200 400 600 800 1000

ID: 76T063-2:PT

TAPE: THOR.2



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RUN ID: 76T063-2IPT

ANALOG TO DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 18-JAN-77

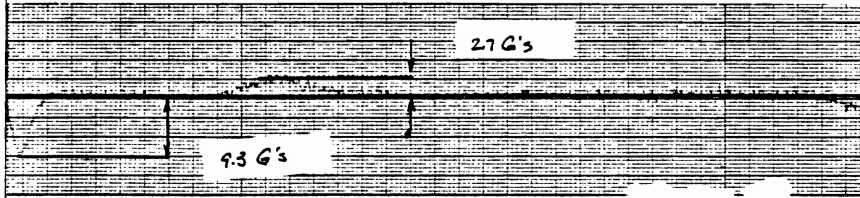
TEST SIGNALS: 4443 PTS/CH AT 6309.18 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
000	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.4	036 0	1577.29
009	2	T12 P-A ACCELEROMETER	4.10	G'S	4+1+3	99.4	036 0	1577.29
010	3	T12 I-S ACCELEROMETER	3.60	G'S	4+1+3	99.4	036 0	1577.29
011	4	T12 R-L ACCELEROMETER	3.70	G'S	4+1+3	99.4	036 0	1577.29
012	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	99.4	036 0	1577.29

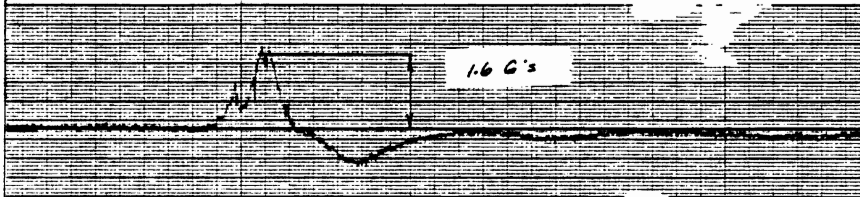
6:  
7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

\*\*\*\*\*  
FILTERED FILES: 000 - 012 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77  
\*\*\*\*\*  
RUN ID: 76T063-2IPT

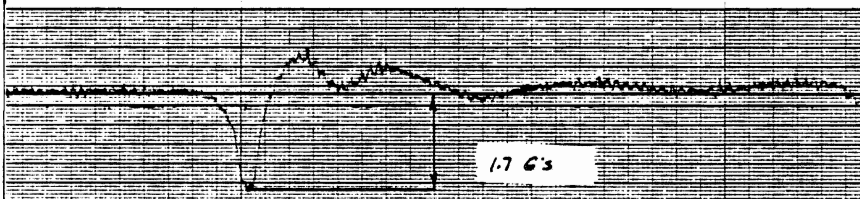
PISTON PULSE



LEFT UPPER RIB  
ACCELEROMETER



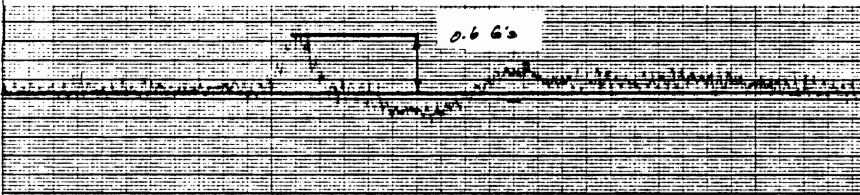
LEFT LOWER RIB  
ACCELEROMETER



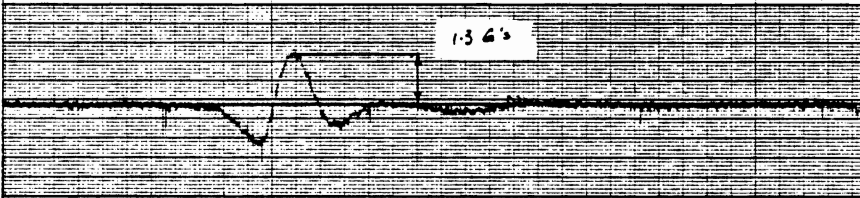
RIGHT UPPER RIB  
ACCELEROMETER



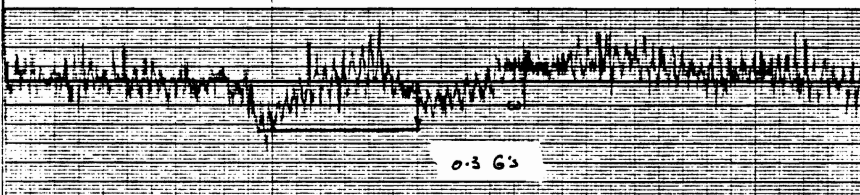
RIGHT LOWER RIB  
ACCELEROMETER



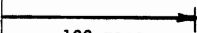
UPPER STERNAL  
ACCELEROMETER



LOWER STERNAL  
ACCELEROMETER

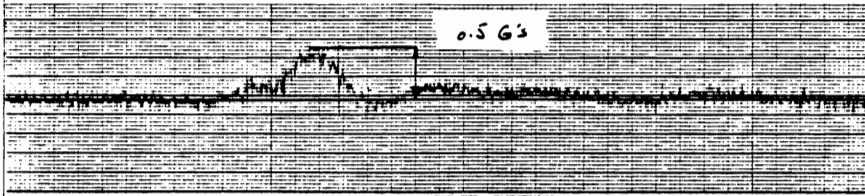


100 msec



76T064

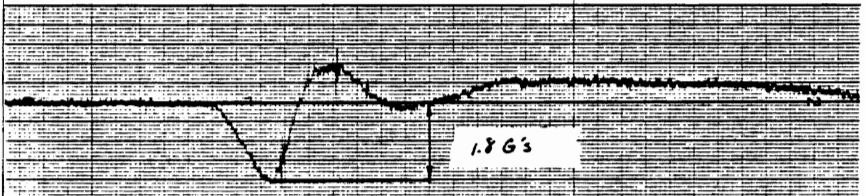
T-1 P-A Accelerometer



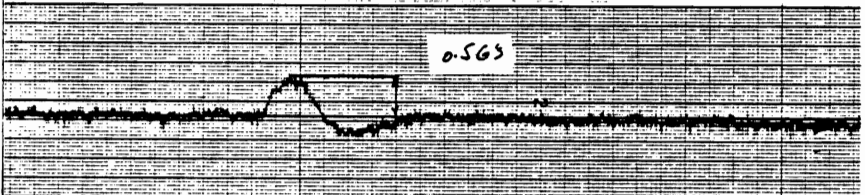
T-1 I-S Accelerometer



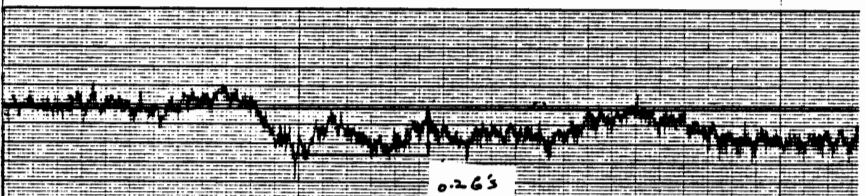
T-1 R-L Accelerometer



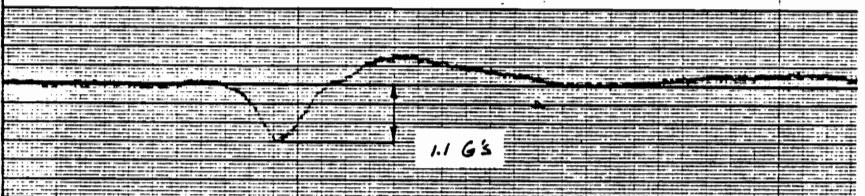
T-12 P-A Accelerometer



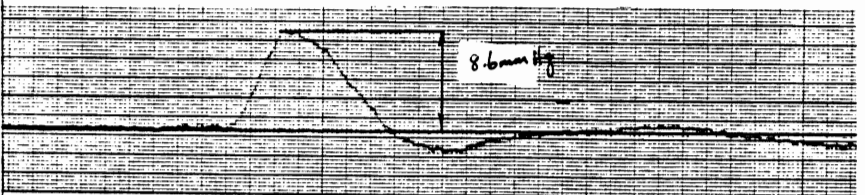
T-12 I-S Accelerometer



T-12 R-L Accelerometer

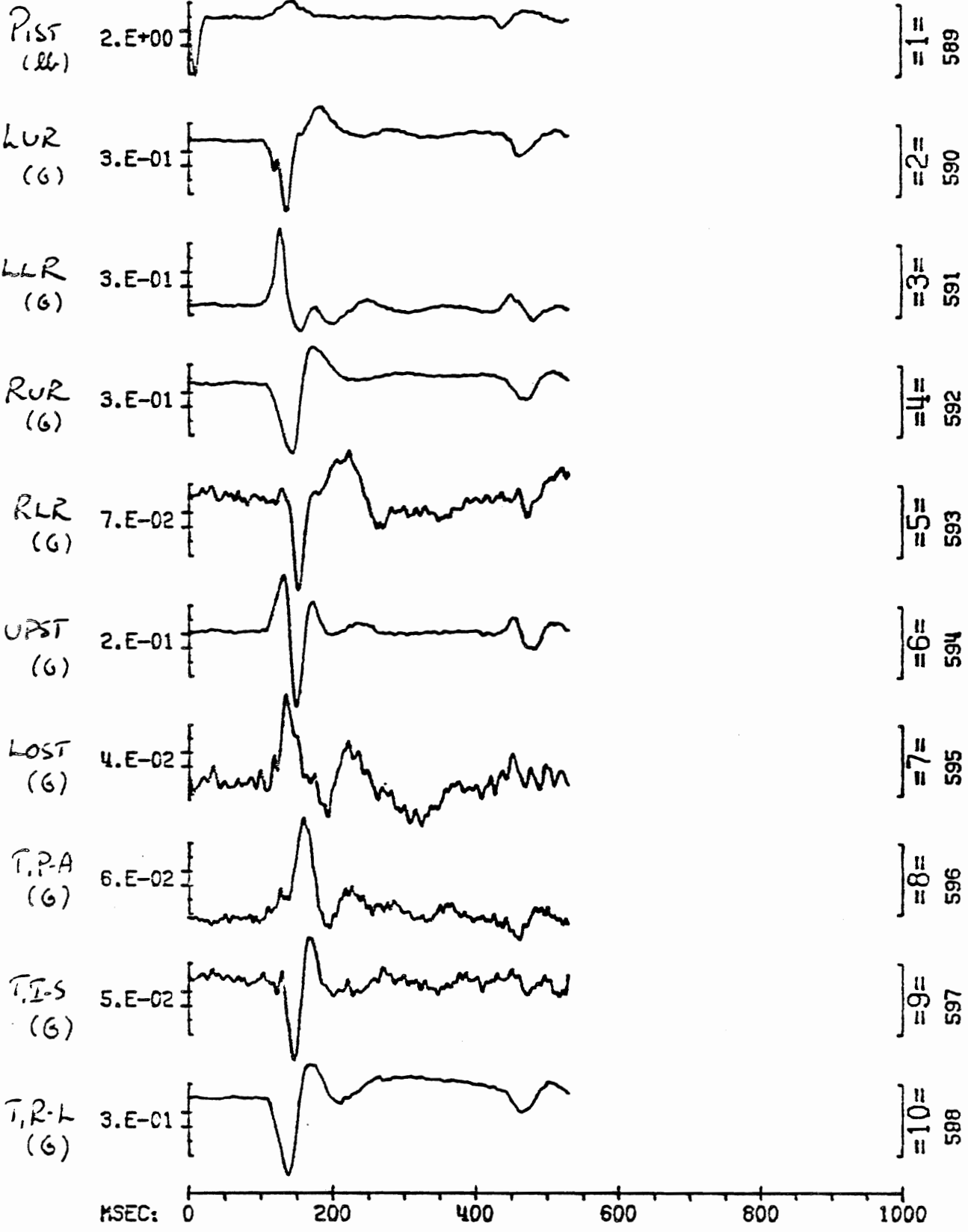


VASCULAR PRESSURE



100 msec

PTS: 1 301 601 901 1201 1501



ID: 76T064-1:PT

TAPE: THOR.2

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76T064-11PT

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PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-146 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 17-JAN-77

TEST SIGNALS: 4201 PTS/CH AT 6300.11 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
589	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.3	836	1577.03
590	2	LEFT UPPER RIB ACCELEROMETER	-4.20	G'S	4+1+3	99.3	836	1577.03
591	3	LEFT LOWER RIB ACCELEROMETER	-3.30	G'S	4+1+3	99.3	836	1577.03
592	4	RIGHT UPPER RIB ACCELEROMETER	4.30	G'S	4+1+3	99.3	836	1577.03
593	5	RIGHT LOWER RIB ACCELEROMETER	-3.80	G'S	4+1+3	99.3	836	1577.03
594	6	UPPER STERNAL ACCELEROMETER	-4.70	G'S	4+1+3	99.3	836	1577.03
595	7	LOWER STERNAL ACCELEROMETER	-4.00	G'S	4+1+3	99.3	836	1577.03
596	8	T1 P-A ACCELEROMETER	3.70	G'S	4+1+3	99.3	836	1577.03
597	9	T1 I-S ACCELEROMETER	-3.70	G'S	4+1+3	99.3	836	1577.03
598	10	T1 R-L ACCELEROMETER	4.30	G'S	4+1+3	99.3	836	1577.03

111

121

131

141

\*\*\*\*\*

FILTERED FILES: 509 - 598 DIGITAL TAPE: THOR.2

DATE: 21-JAN-77

RUN ID: 76T064-11PT

\*\*\*\*\*

PTS: 1 301 601 901 1201 1501

P<sub>15</sub>r  
(lb)

7.E-01

=1=  
813

T<sub>12</sub>P-A  
(G)

3.E-02

=2=  
814

T<sub>12</sub>I-S  
(G)

2.E-02

=3=  
815

F<sub>12</sub>R-L  
(G)

9.E-02

=4=  
816

V<sub>KSL</sub>  
(mV)

5.E-01

=5=  
817

MSEC: 0 200 400 600 800 1000

76T064-2:PT

ID:

TAPE: THOR.2

\*\*\*\*\*  
RUN ID: 761064-21PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 10-JAN-77

TEST SIGNALS: 4059 PTS/CH AT 6300.10 HZ. CAL SIGNALS: NOT DIGITIZED.

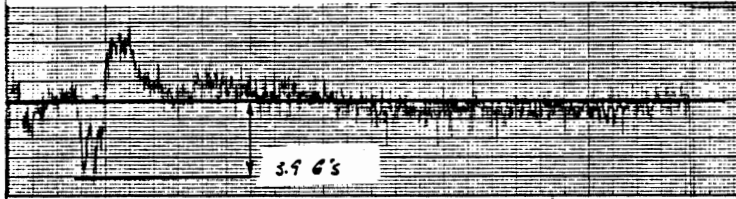
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
013	1	PISTON DECELERATION PULSE	30.00 G'S		4+1+3	99.3	036 0	1577.05
014	2	T12 P-A ACCELEROMETER	4.10 G'S		4+1+3	99.3	036 0	1577.05
015	3	T12 I-S ACCELEROMETER	-3.60 G'S		4+1+3	99.3	036 0	1577.05
016	4	T12 R=L ACCELEROMETER	3.70 G'S		4+1+3	99.3	036 0	1577.05
017	5	VASCULAR PRESSURE	14.10 MM-HG		4+1+3	99.3	036 0	1577.05

6:  
7:  
8:  
9:  
10:  
11:  
12:  
13:  
14:

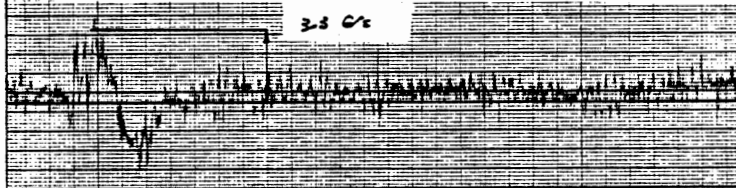
\*\*\*\*\*  
FILTERED FILES: 013 - 017 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 761064-21PT

76T065

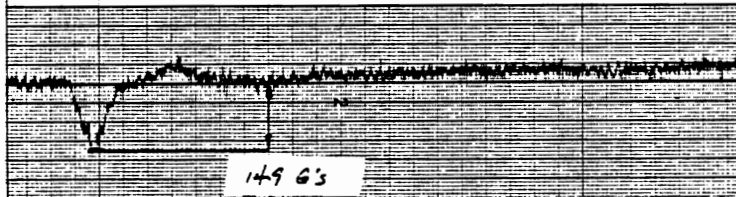
T-1 P-A Accelerometer



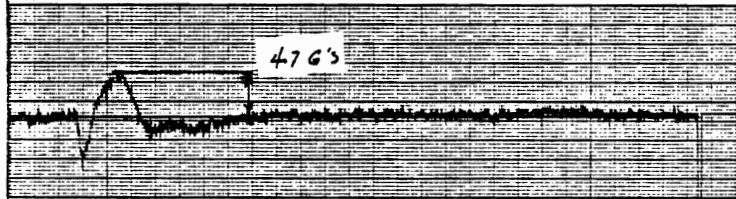
T-1 I-S Accelerometer



T-1 R-L Accelerometer



T-12 P-A Accelerometer



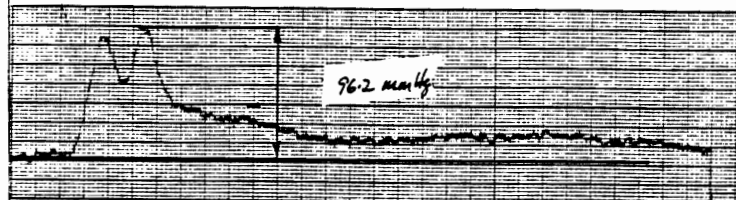
T-12 I-S Accelerometer



T-12 R-L Accelerometer



VASCULAR PRESSURE

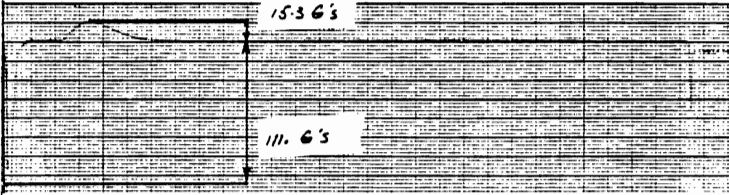


100 msec

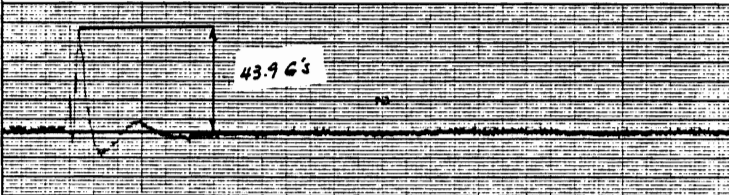


76T065

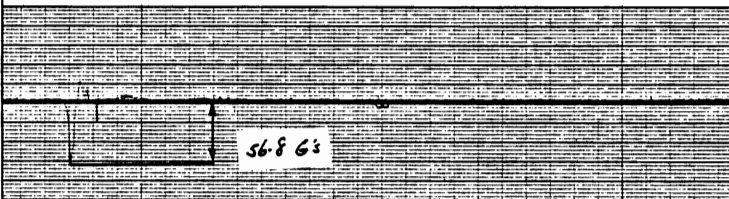
PISTON PULSE



LEFT UPPER RIB  
ACCELEROMETER



LEFT LOWER RIB  
ACCELEROMETER



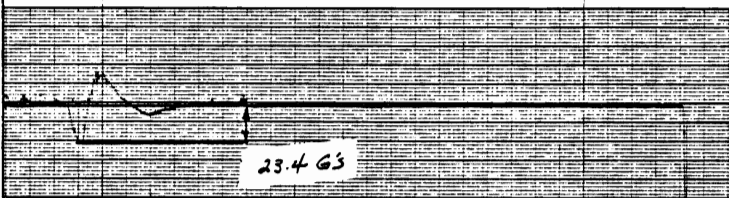
RIGHT UPPER RIB  
ACCELEROMETER



RIGHT LOWER RIB  
ACCELEROMETER



UPPER STERNAL  
ACCELEROMETER



LOWER STERNAL  
ACCELEROMETER



100 msec

PTS: 1 61 121 181 241 301 361

Pist  
(ll)

1.E+01

=1= 599

LR

5.E+00

=2= 600

5.E+00

=3= 601

00

=4= 602

=5= 603

=6= 604

=7= 605

=8= 606

=9= 607

=10= 608

76T065-1:PP

ID:

TAFE: THOR.2

100 150 200 250

MSD

\*\*\*\*\*  
 RUN ID: 76T065-1IPP  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 \*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

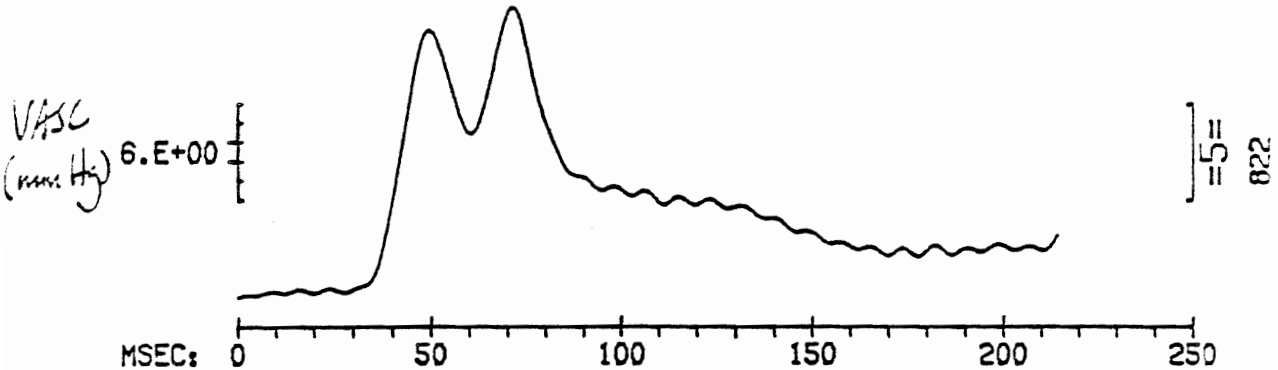
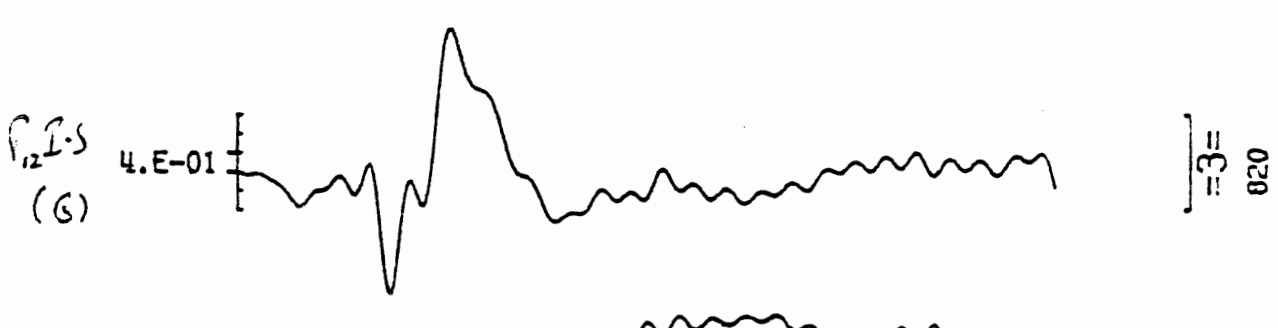
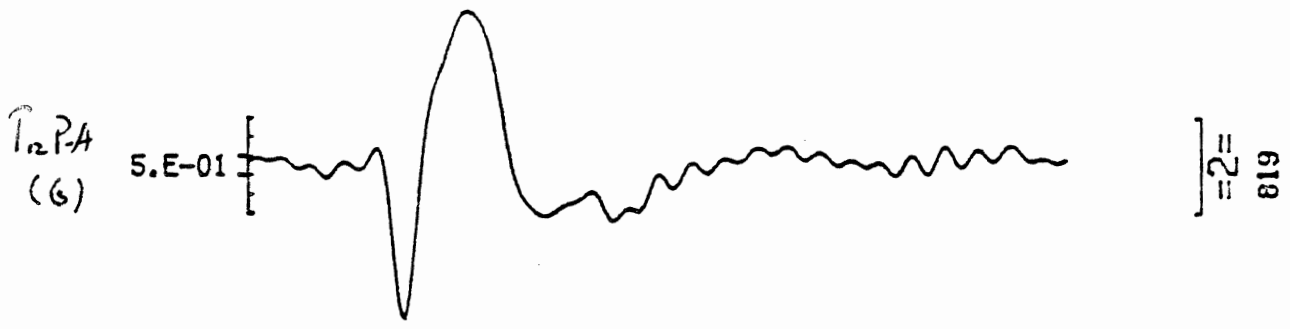
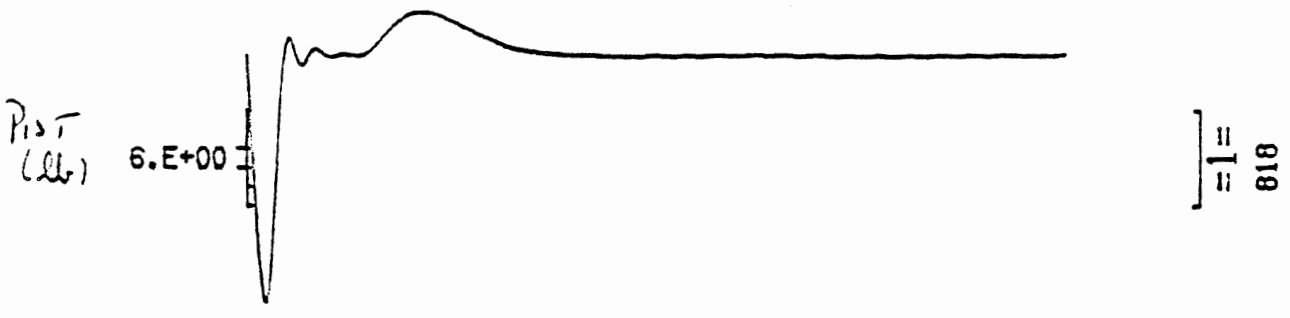
ANALOG TAPE: HSRI-146 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 17-JAN-77  
 TEST SIGNALS: 1368 PTS/CH AT 6307.42 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
599	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+ 3	99.3	339	1576.05
600	2	LEFT UPPER RIB ACCELEROMETER	-84.40	G'S	4+1+ 3	99.3	339	1576.05
601	3	LEFT LOWER RIB ACCELEROMETER	-66.80	G'S	4+1+ 3	99.3	339	1576.05
602	4	RIGHT UPPER RIB ACCELEROMETER	85.00	G'S	4+1+ 3	99.3	339	1576.05
603	5	RIGHT LOWER RIB ACCELEROMETER	-76.60	G'S	4+1+ 3	99.3	339	1576.05
604	6	UPPER STERNAL ACCELEROMETER	-46.70	G'S	4+1+ 3	99.3	339	1576.05
605	7	LOWER STERNAL ACCELEROMETER	-39.60	G'S	4+1+ 3	99.3	339	1576.05
606	8	T1 P-A ACCELEROMETER	37.10	G'S	4+1+ 3	99.3	339	1576.05
607	9	T1 I-S ACCELEROMETER	-36.70	G'S	4+1+ 3	99.3	339	1576.05
608	10	T1 R-L ACCELEROMETER	85.00	G'S	4+1+ 3	99.3	339	1576.05

111  
 121  
 131  
 141

\*\*\*\*\*  
 FILTERED FILES: 599 - 608 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T065-1IPP  
 \*\*\*\*\*

PTS: 1 61 121 181 241 301 361



MSEC: 0 50 100 150 200 250

ID: 76T065-2:PP

TAPE: THOR.2

=====

RUN ID: 76T065-2IPP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT--PENDULUM TESTS

ANALOG TAPE: HSRI-141 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 18-JAN-77

TEST SIGNALS: 1368 PTS/CH AT 6311.05 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
010	1	PISTON DECELERATION PULSE	30.00	G'S	4+1+3	99.4	339	1577.76
019	2	T12 P=A ACCELEROMETER	40.90	G'S	4+1+3	99.4	339	1577.76
020	3	T12 I=8 ACCELEROMETER	35.50	G'S	4+1+3	99.4	339	1577.76
021	4	T12 R=L ACCELEROMETER	74.60	G'S	4+1+3	99.4	339	1577.76
022	5	VASCULAR PRESSURE	203.00	MMHG	4+1+3	99.4	339	1577.76

- 61
- 71
- 81
- 91
- 101
- 111
- 121
- 131
- 141

=====

FILTERED FILES: 010 - 022 DIGITAL TAPE: THOR.2 DATE: 21-JAN-77 RUN ID: 76T065-2IPP

Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Number:

77T066 - Low Energy Side Pendulum Impact

77T067 - Low Energy Front Pendulum Impact

77T068 - Pendulum 14.33 ft/sec Frontal Impact

Test Date:

July 8, 1977

Test Subject:

Age - 52

Sex - Male

Weight - 62.1 kg

Stature - 174.5 cm

Restraint System:

None: Thoracic Pendulum Impact

Velocity:

For Test No. 77T068, velocity was 14.33 ft/sec

Injuries:

Laceration on aortic arch

Hemorrhages on arch and pericardium

Sternal fracture

Rib fracture

AIS Number Estimate:

5

TEST # 277068

TEST DATE 7.8.77

TEST DESCRIPTION Pendulum front Impact VELOCITY 14.3 ft/s

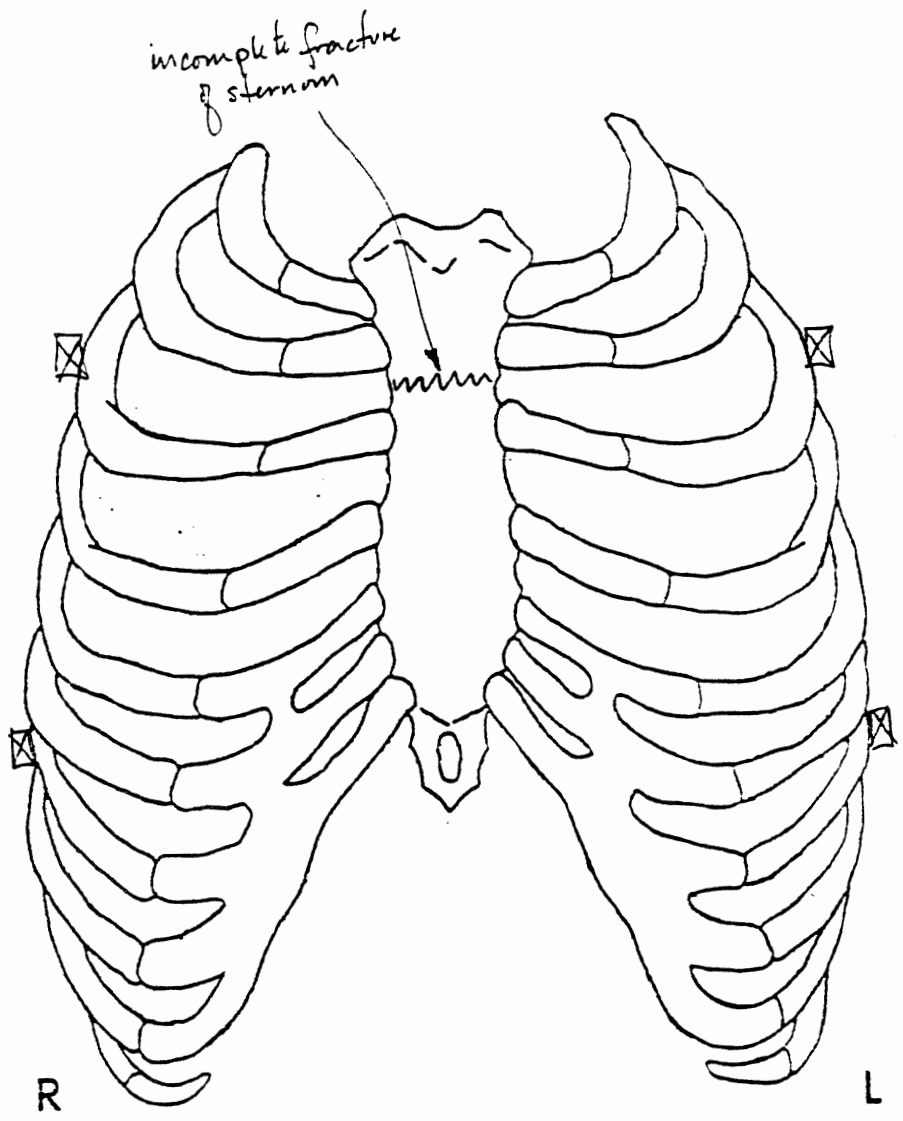
SUBJECT:

AGE 52 SEX M CAUSE OF DEATH unknown

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>L</u>	<u>A</u>	<u>5</u>
	2	<u>C</u>	<u>C</u>	<u>H</u>	<u>H</u>	<u>3</u>
	3	<u>C</u>	<u>C</u>	<u>H</u>	<u>A</u>	<u>3</u>
	4	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	<u>C</u>	<u>u</u>	<u>F</u>	<u>S</u>	<u>2</u>
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

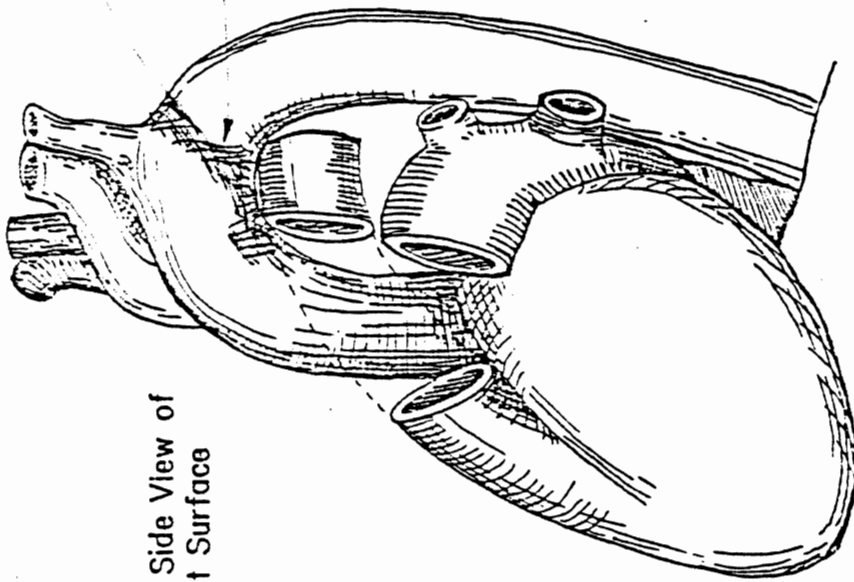
TEST # 77068



ANTERIOR VIEW RIB CAGE

(one fractured rib:  
not specified)

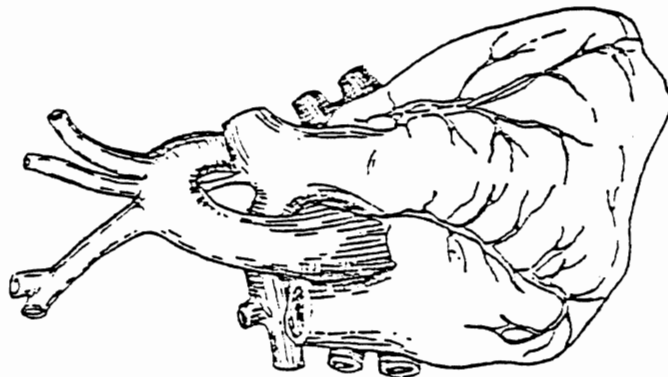
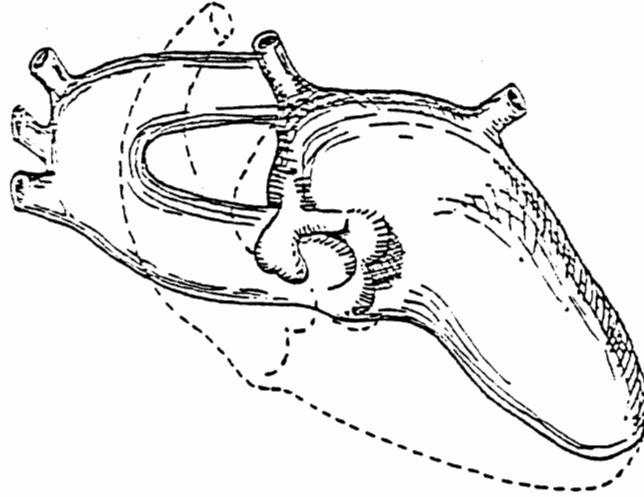




Left Side View of Heart Surface

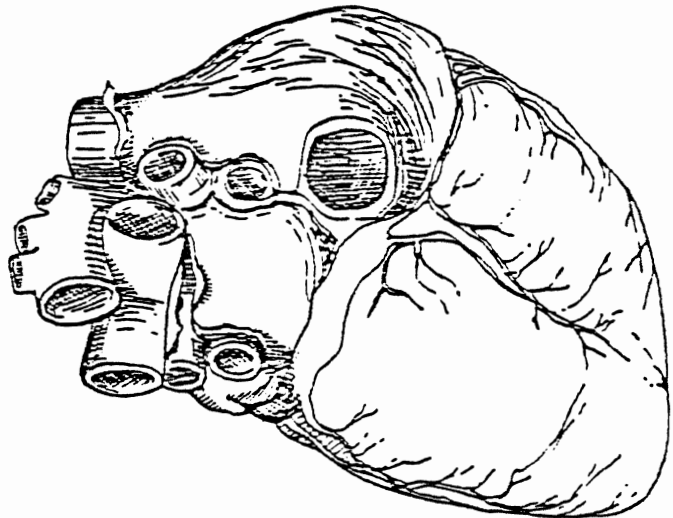
hemorrhage on arch, near healed scars  
laceration on inferior surface of arch (not through), below evicted sternum

Left View of Left Side of Heart

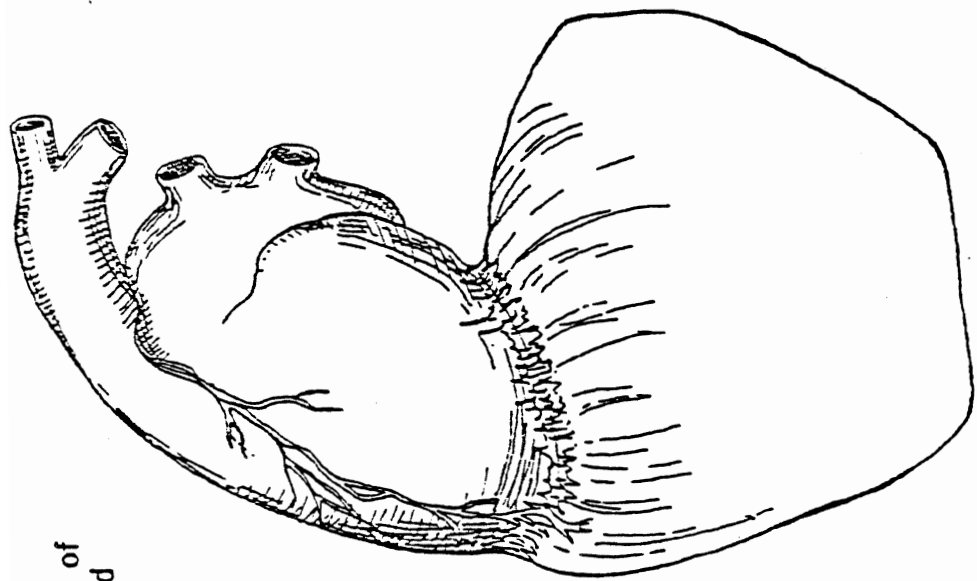


Anterior View of Heart

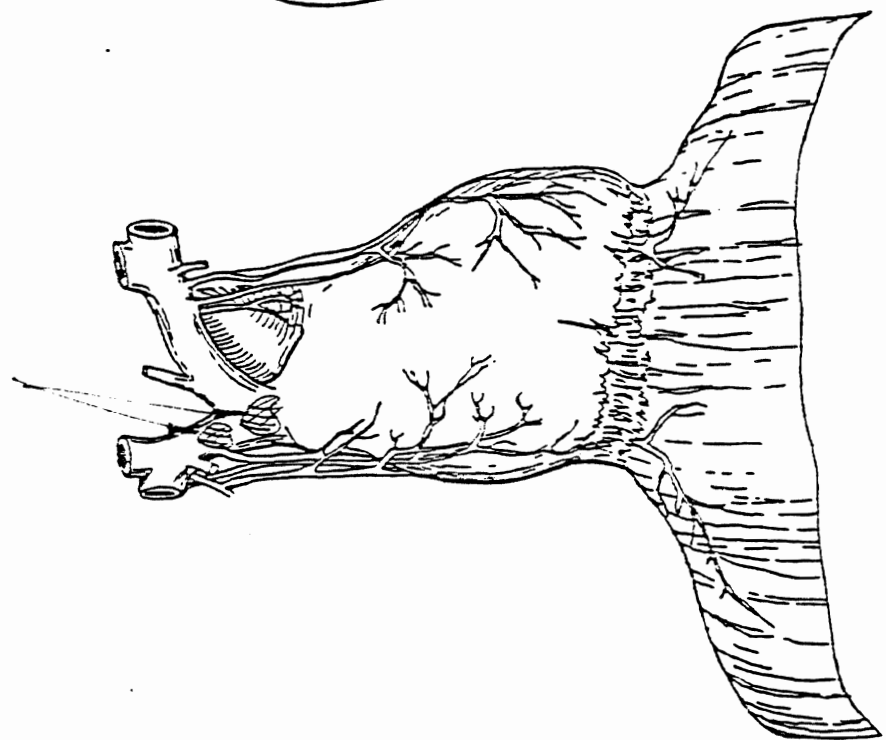
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm



*brine in fact above pericardium*



Anterior View of Pericardium and Diaphragm

TEST NO: 77T066

PISTON  
ACCELERATION

1.95 G's

LEFT UPPER RIB  
ACCELEROMETER

2.7 G's

LEFT LOWER RIB  
ACCELEROMETER

4.83 G's

RIGHT UPPER RIB  
ACCELEROMETER

1.67 G's

RIGHT LOWER RIB  
ACCELEROMETER

.78 G's

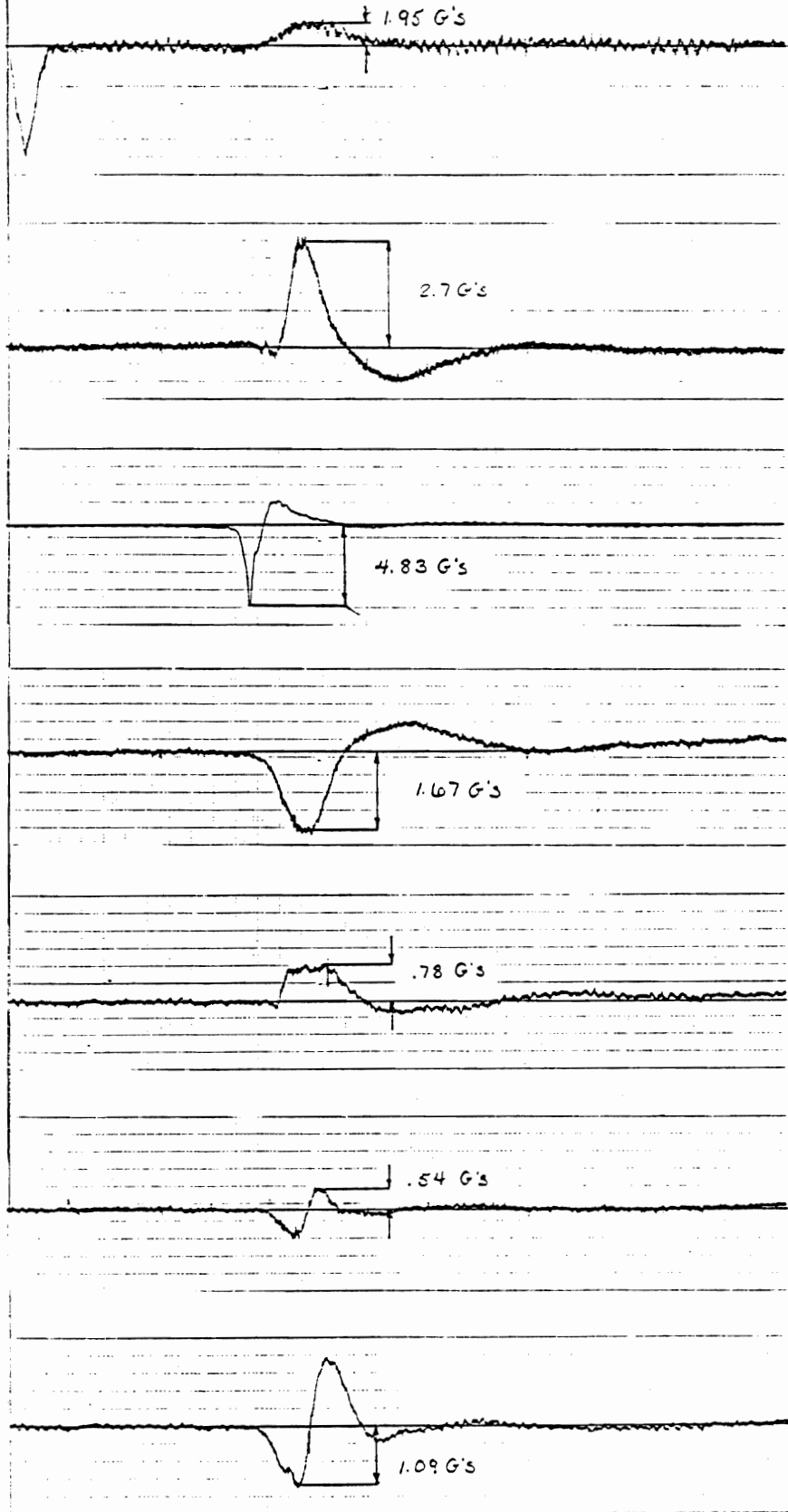
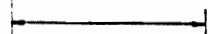
STERNUM UPPER  
ACCELEROMETER

.54 G's

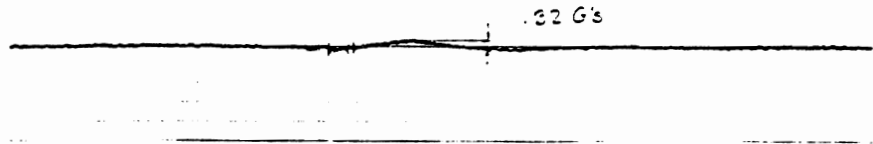
STERNUM LOWER  
ACCELEROMETER

1.09 G's

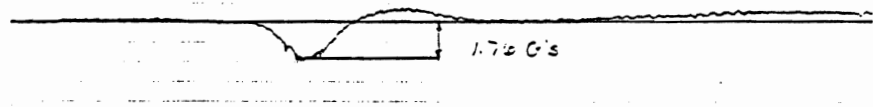
100 msec



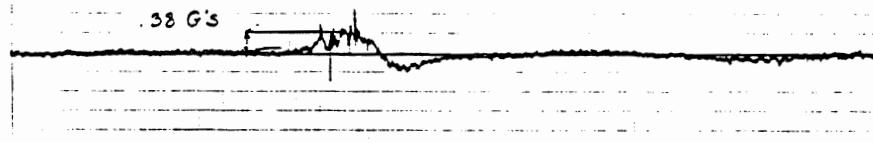
T<sub>1</sub> ACCELEROMETER  
(P-A)



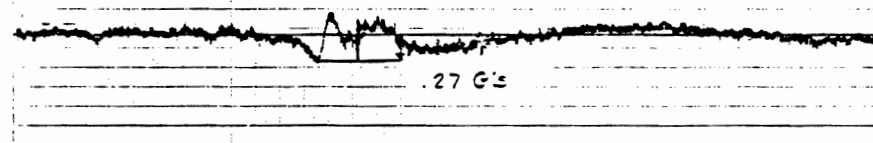
T<sub>1</sub> ACCELEROMETER  
(E-L)



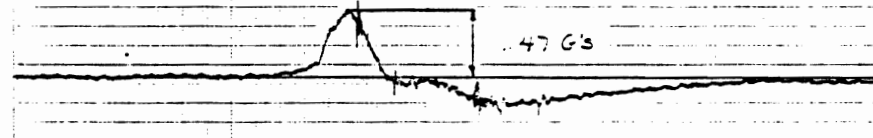
T<sub>1</sub> ACCELEROMETER  
(I-S)



T<sub>12</sub> ACCELEROMETER  
(P-A)



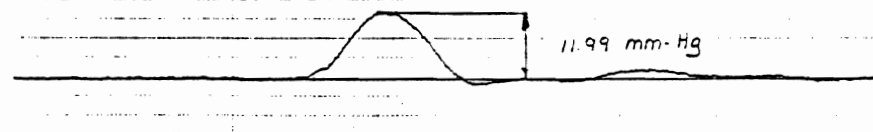
T<sub>12</sub> ACCELEROMETER  
(E-L)



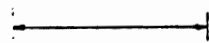
T<sub>12</sub> ACCELEROMETER  
(I-S)

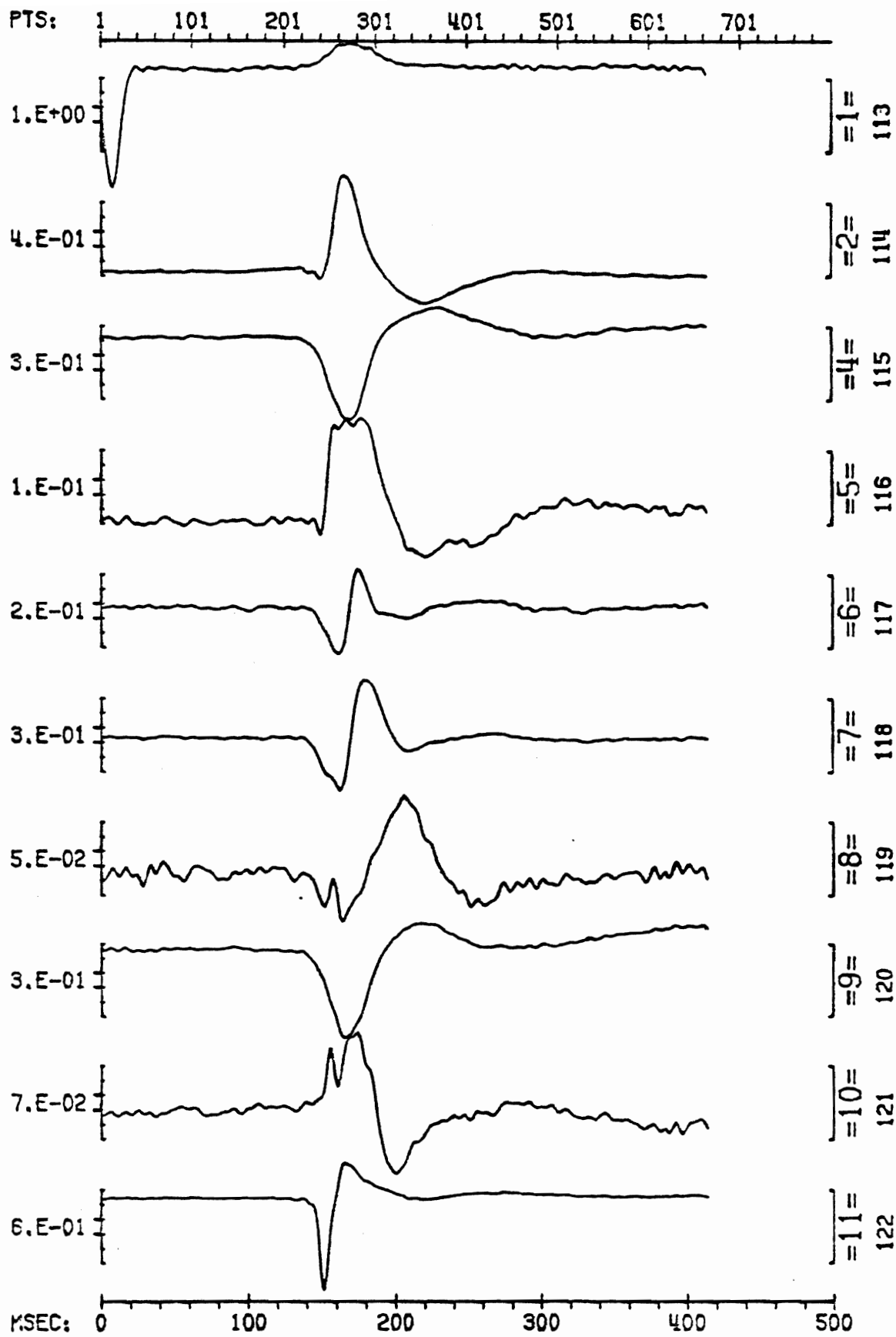


VASCULAR  
PRESSURE



100 msec





ID: 77T066-1:PT

TAPE: PEND. TEST

\*\*\*\*\*  
RUN ID: 77T066-1IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 12-AUG-77

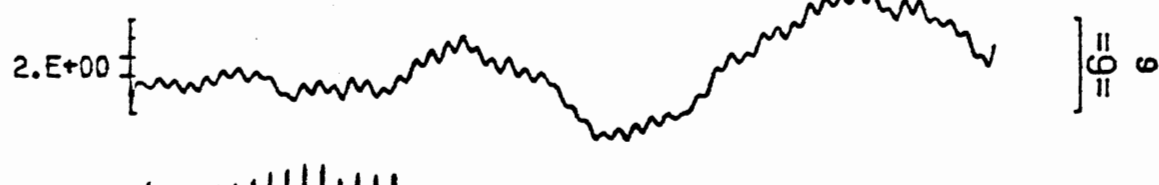
TEST SIGNALS: 2660 PTS/CH AT 6399.71 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
113	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	663	1599.93
114	2	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+3	100.0	663	1599.93
3								
115	4	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+3	100.0	663	1599.93
116	5	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+3	100.0	663	1599.93
117	6	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+3	100.0	663	1599.93
118	7	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+3	100.0	663	1599.93
119	8	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+3	100.0	663	1599.93
120	9	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+3	100.0	663	1599.93
121	10	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+3	100.0	663	1599.93
122	11	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+3	100.0	663	1599.93

12:  
13:  
14:

\*\*\*\*\*  
FILTERED FILES: 113 - 122 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T066-1IPT  
\*\*\*\*\*

PTS: 1 101 201 301 401 501 601 701



MSEC: 0 100 200 300 400 500

ID: 77T066-2:PT

TAPE: PEND. TEST

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T066-21PT

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 2907 PTS/CH AT 6396.22 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
1	1	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	727	1599.05
2	2	T-12 P-A ACCELEROMETER	4.10	G'S	4+1+	3 100.7	727	1599.05
3	3	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3 100.7	727	1599.05
4	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.7	727	1599.05
5	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+	3 100.7	727	1599.05
6	6	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 100.7	727	1599.05

7:

8:

9:

10:

11:

7 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 727 1599.05

13:

14:

\*\*\*\*\*

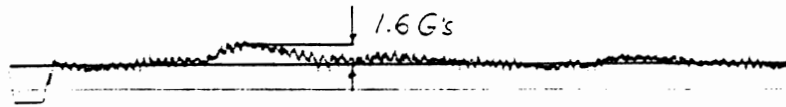
FILTERED FILES: 1 7 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77

RUN ID: 77T066-21PT

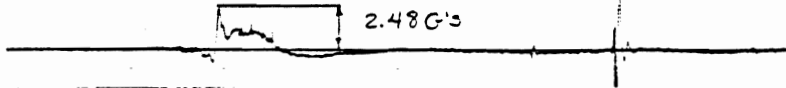
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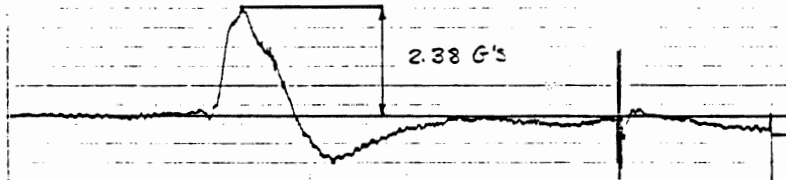
PISTON  
ACCELERATION



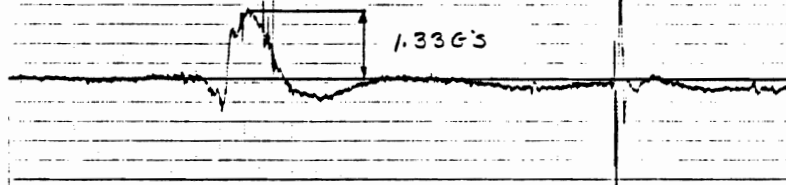
LEFT UPPER RIB  
ACCELEROMETER



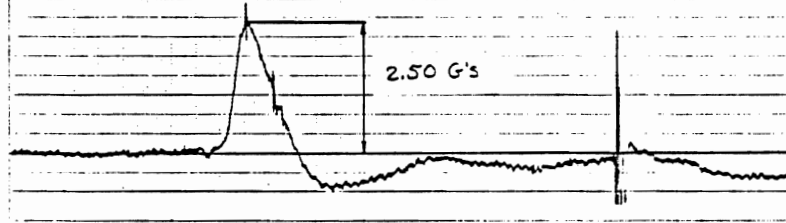
LEFT LOWER RIB  
ACCELEROMETER



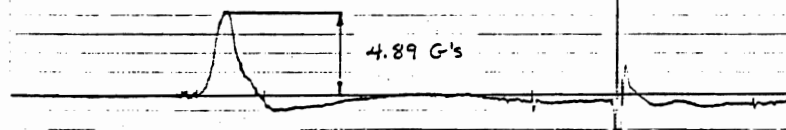
RIGHT UPPER RIB  
ACCELEROMETER



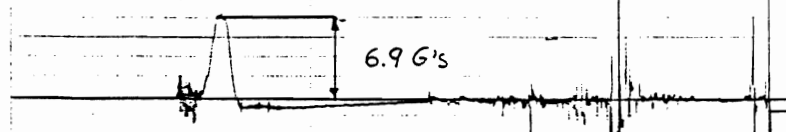
RIGHT LOWER RIB  
ACCELEROMETER



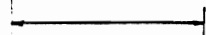
STERNUM UPPER  
ACCELEROMETER



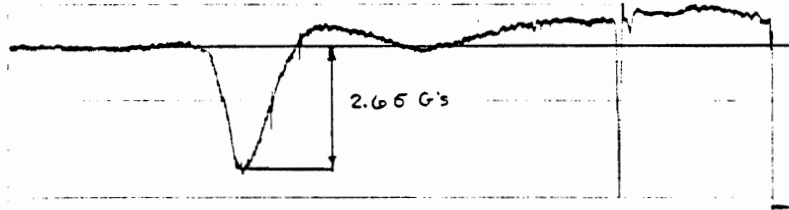
STERNUM LOWER  
ACCELEROMETER



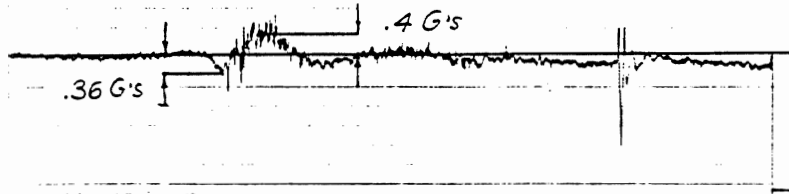
100 msec



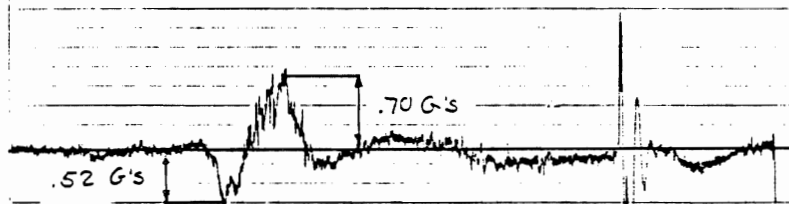
T<sub>1</sub> ACCELEROMETER  
(P-A)



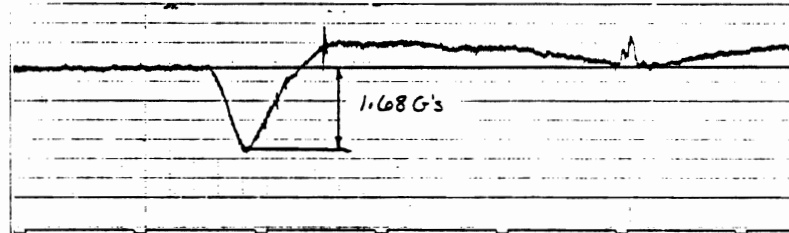
T<sub>1</sub> ACCELEROMETER  
(R-L)



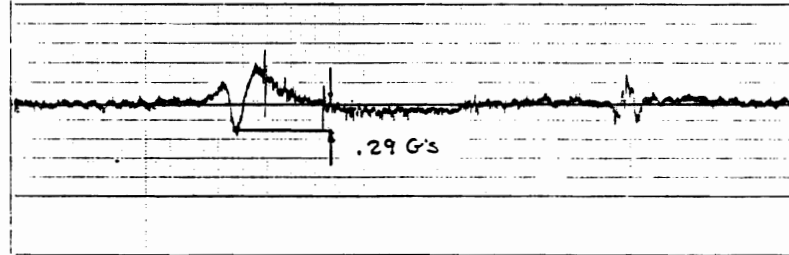
T<sub>1</sub> ACCELEROMETER  
(I-S)



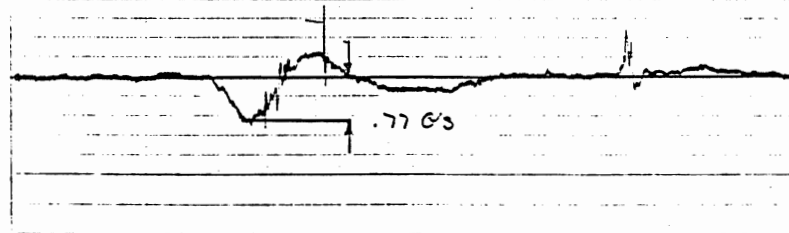
T<sub>12</sub> ACCELEROMETER  
(P-A)



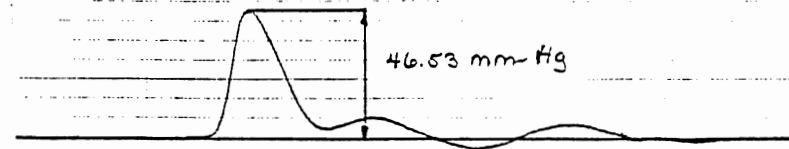
T<sub>12</sub> ACCELEROMETER  
(R-L)



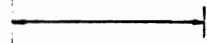
T<sub>12</sub> ACCELEROMETER  
(I-S)



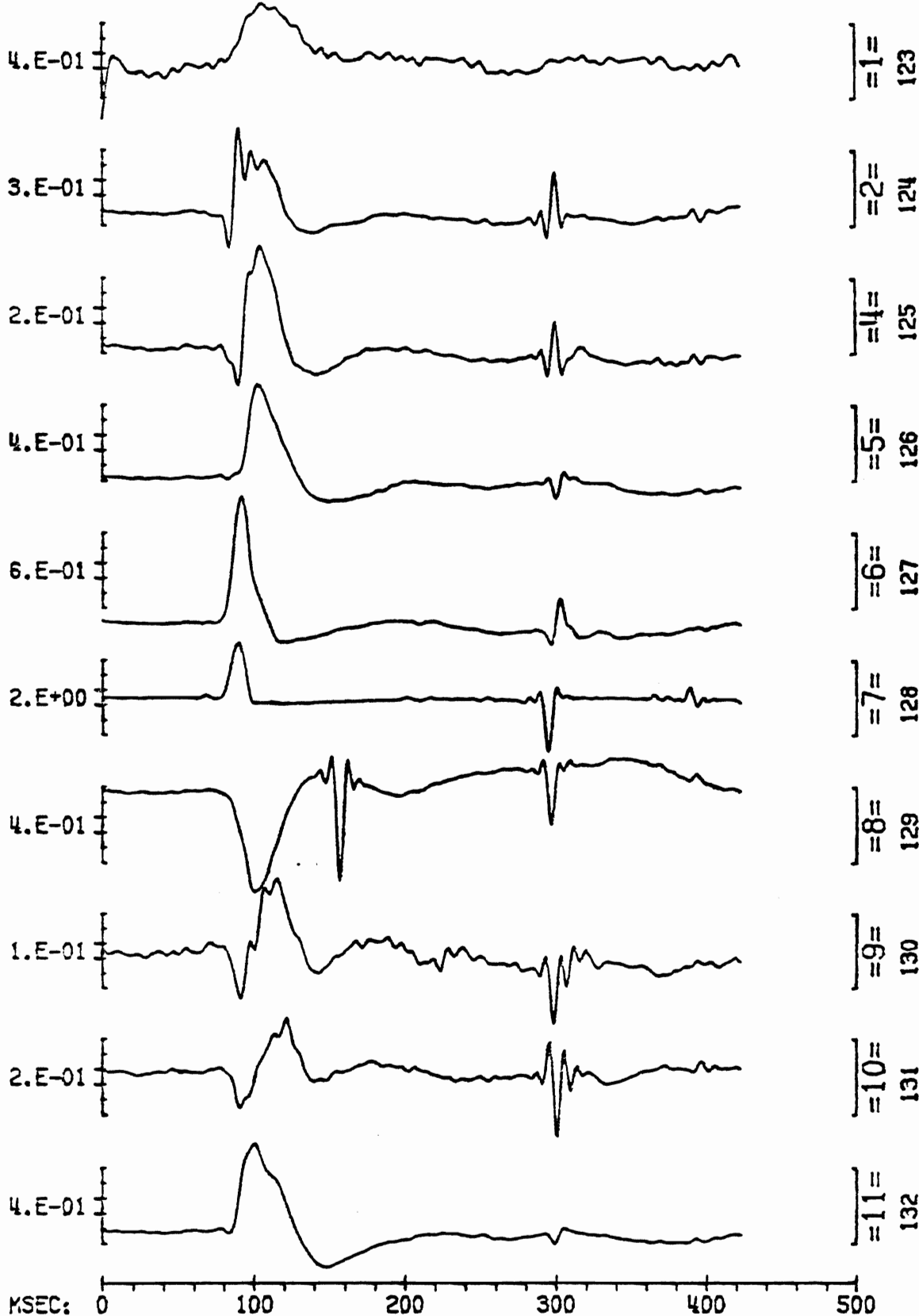
VASCULAR  
PRESSURE



100 msec



PTS: 1 101 201 301 401 501 601 701



ID: 77T067-1:PT

TAPE: PEND. TEST

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T067-10PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSR1#14R EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 12-AUG-77

TEST SIGNALS: 2724 PTS/CH AT 6397.75 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
123	- 1	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	677 0	1599.44
124	- 2	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	677 0	1599.44
31								
125	- 4	RIGHT UPPER RIB ACCELEROMETER	3.00	G'S	4+1+ 3	100.0	677 0	1599.44
126	- 5	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.0	677 0	1599.44
127	- 6	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	677 0	1599.44
128	- 7	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.0	677 0	1599.44
129	- 8	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.0	677 0	1599.44
130	- 9	T-1 R-L ACCELEROMETER	3.00	G'S	4+1+ 3	100.0	677 0	1599.44
131	- 10	T-1 I-S ACCELEROMETER	3.00	G'S	4+1+ 3	100.0	677 0	1599.44
132	- 11	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.0	677 0	1599.44

12:

13:

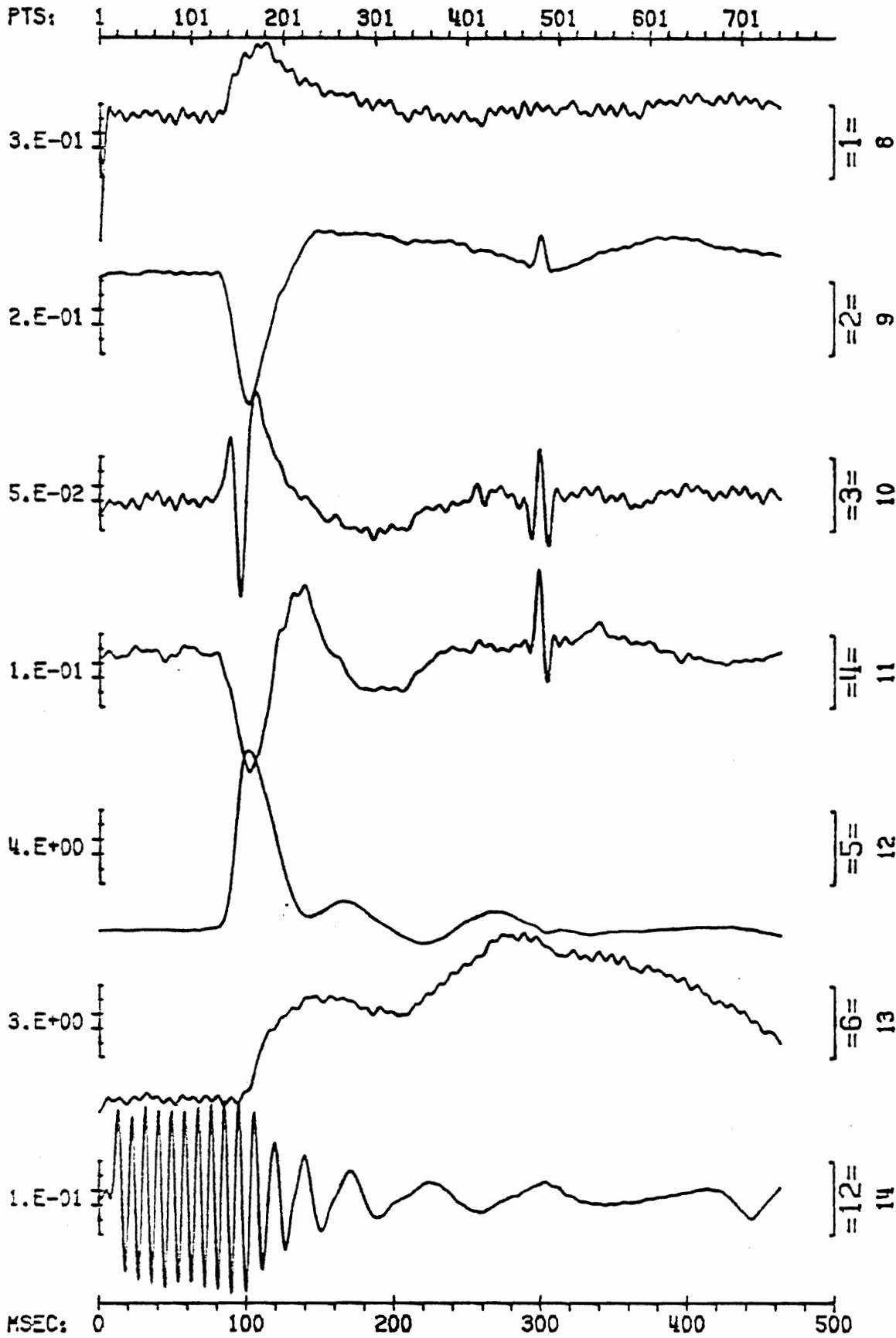
14:

----- FILTERED FILES: 123 - 132 DIGITAL TAPE: JEFLEH

DATE: 17-AUG-77

RUN ID: 77T067-10PT

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10: 77T067-2:PT

TAPE: PEND. TEST

\*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T067-2IPT

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

TEST SIGNALS: 2965 PTS/CH AT 6395.25 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
8	11	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	741	1598.01
9	21	T-12 P-A ACCELEROMETER	4.10	G'S	4+1+	3 100.7	741	1598.01
10	31	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3 100.7	741	1598.01
11	41	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.7	741	1598.01
12	51	VASCULAR PRESSURE	14.10	MM-HG	4+1+	3 100.7	741	1598.01
13	61	VERTICAL SUPPORT FORCE	200.00	LB8.	4+1+	3 100.7	741	1598.01

7:

8:

9:

10:

11:

14 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 741 1598.01

13:

14:

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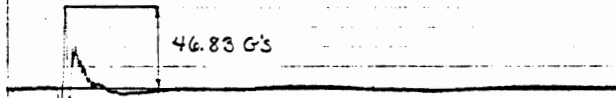
\*\*\*\*\* FILTERED FILES: 8 - 14 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T067-2IPT \*\*\*\*\*

TEST NO: 77T068

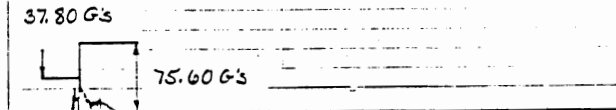
PISTON  
ACCELERATION



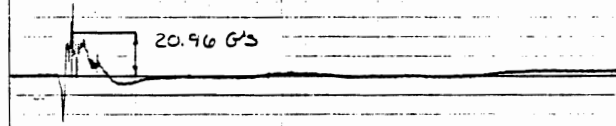
LEFT UPPER RIB  
ACCELEROMETER



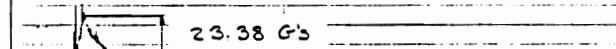
LEFT LOWER RIB  
ACCELEROMETER



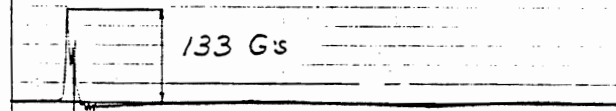
RIGHT UPPER RIB  
ACCELEROMETER



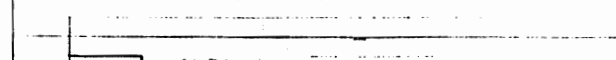
RIGHT LOWER RIB  
ACCELEROMETER



STERNUM UPPER  
ACCELEROMETER



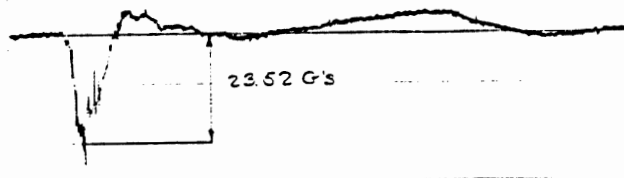
STERNUM LOWER  
ACCELEROMETER



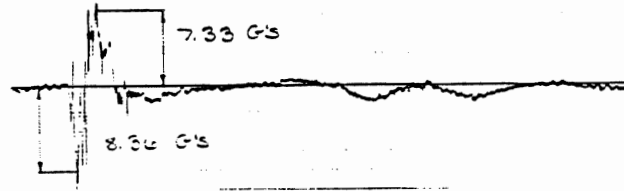
100 nsec



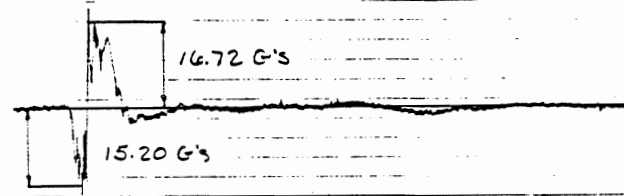
T<sub>1</sub> ACCELEROMETER  
(P-A)



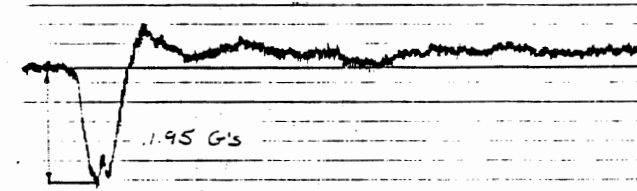
T<sub>1</sub> ACCELEROMETER  
(R-L)



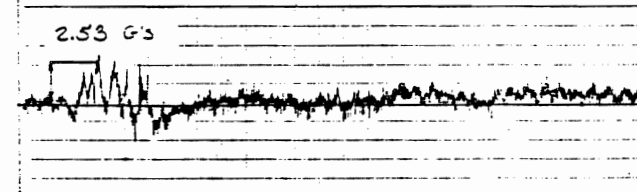
T<sub>1</sub> ACCELEROMETER  
(I-S)



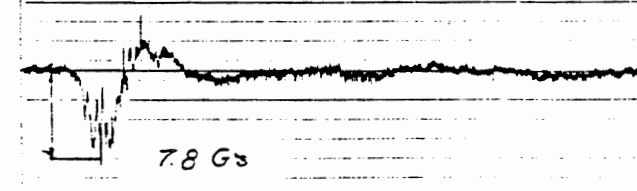
T<sub>12</sub> ACCELEROMETER  
(P-A)



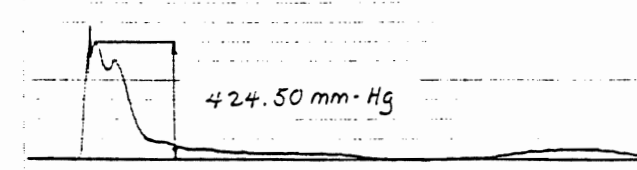
T<sub>12</sub> ACCELEROMETER  
(R-L)



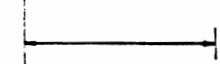
T<sub>12</sub> ACCELEROMETER  
(I-S)



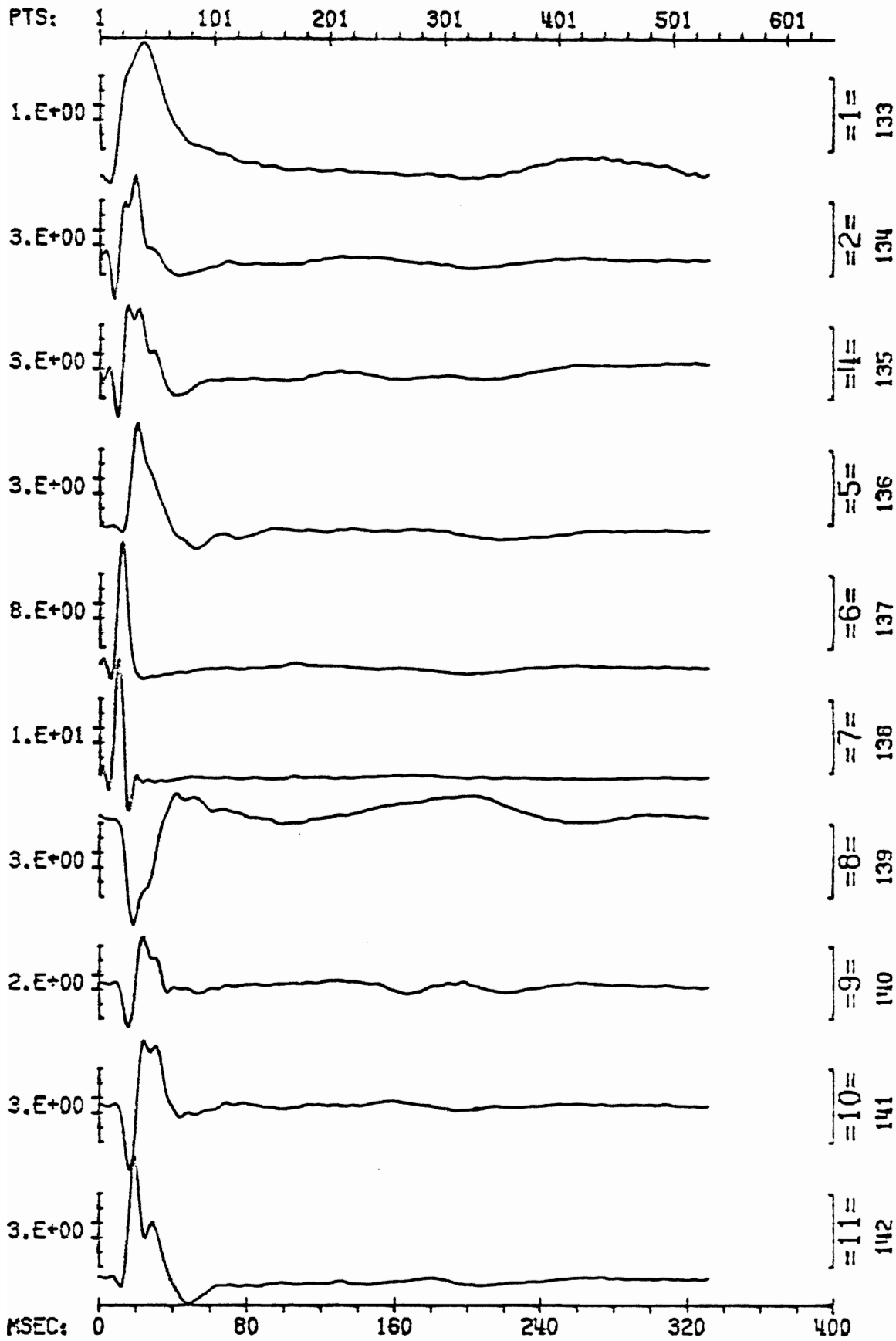
VASCULAR  
PRESSURE



100 msec







77T068-1:PP

ID:

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T068-11PP

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 2136 PTS/CH AT 6398.68 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
133	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	531	1599.67
134	- 2:	LEFT UPPER RIB ACCELEROMETER	44.60	G'S	4+1+ 3	100.0	531	1599.67
3:								
135	- 4:	RIGHT UPPER RIB ACCELEROMETER	38.10	G'S	4+1+ 3	100.0	531	1599.67
136	- 5:	RIGHT LOWER RIB ACCELEROMETER	37.40	G'S	4+1+ 3	100.0	531	1599.67
137	- 6:	UPPER STERNAL ACCELEROMETER	69.40	G'S	4+1+ 3	100.0	531	1599.67
138	- 7:	LOWER STERNAL ACCELEROMETER	66.40	G'S	4+1+ 3	100.0	531	1599.67
139	- 8:	T-1 P-A ACCELEROMETER	42.00	G'S	4+1+ 3	100.0	531	1599.67
140	- 9:	T-1 R-L ACCELEROMETER	19.00	G'S	4+1+ 3	100.0	531	1599.67
141	- 10:	T-1 I-S ACCELEROMETER	38.00	G'S	4+1+ 3	100.0	531	1599.67
142	- 11:	LEFT LOWER RIB ACCELEROMETER	42.00	G'S	4+1+ 3	100.0	531	1599.67

12:  
13:  
14:

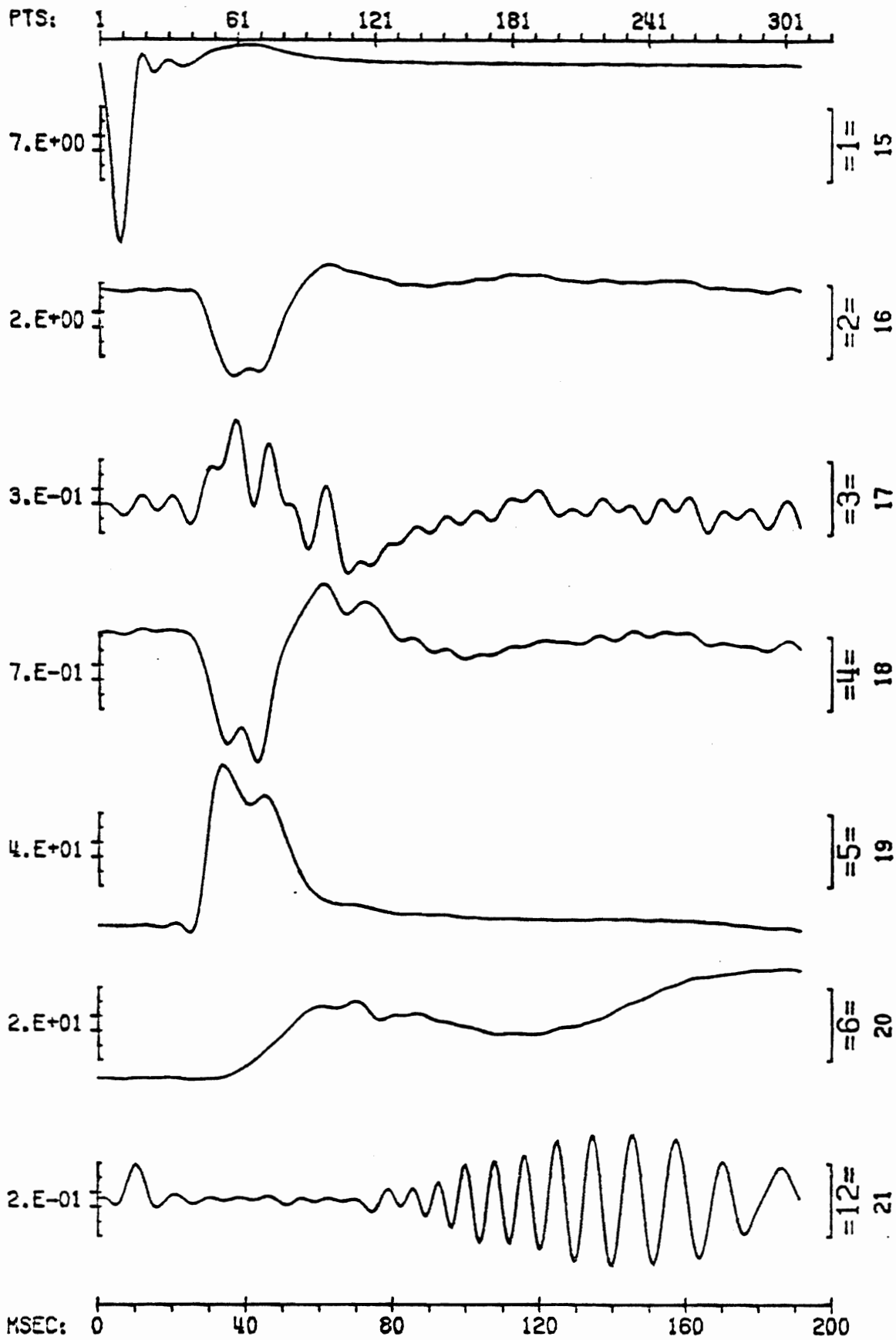
#####

FILTERED FILES: 133 - 142 DIGITAL TAPE: JEFLEH

DATE: 17-AUG-77

RUN ID: 77T068-11PP

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ID: 77T068-2:PP

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T068-21PP

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

TEST SIGNALS: 1240 PTS/CH AT 6401.65 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
15	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	307	1600.41
16	2	T-12 P-A ACCELEROMETER	40.50	G'S	4+1+3	100.0	307	1600.41
17	3	T-12 R-L ACCELEROMETER	42.20	G'S	4+1+3	100.0	307	1600.41
18	4	T-12 I-S ACCELEROMETER	34.60	G'S	4+1+3	100.0	307	1600.41
19	5	VASCULAR PRESSURE	203.00	MM-HG	4+1+3	100.0	307	1600.41
20	6	VERTICAL SUPPORT FORCE	200.00	LB0.	4+1+3	100.0	307	1600.41

7:

8:

9:

10:

11:

21 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 100.0 307 1600.41

13:

14:

\*\*\*\*\*

FILTERED FILES: 15 - 21 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T068-21PP

Summary Test Report

Thoracic Injury Project - Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Number:

77T069 - Low Energy Front Pendulum Impact

77T070 - Low Energy Side Pendulum Impact

77T071 - Pendulum 14.3 ft/sec Side Impact

Test Date:

July 13, 1977

Test Subject:

Age - 60

Sex - Male

Weight - 80.2 kg

Stature - 172.2 cm

Restraint System:

None: Thoracic Pendulum Impact

Velocity:

In Test No. 77T071, velocity was 14.3 ft/sec

Injuries:

Pericardial hemorrhage over left ventricle (approx. 4 cm<sup>2</sup>)  
Minor spotted hemorrhages on diaphragm below heart

AIS Number Estimate:

3

TEST # 77T071

TEST DATE 7.13.77

TEST DESCRIPTION Pendulum Side Impact VELOCITY 143 ft/s

SUBJECT:

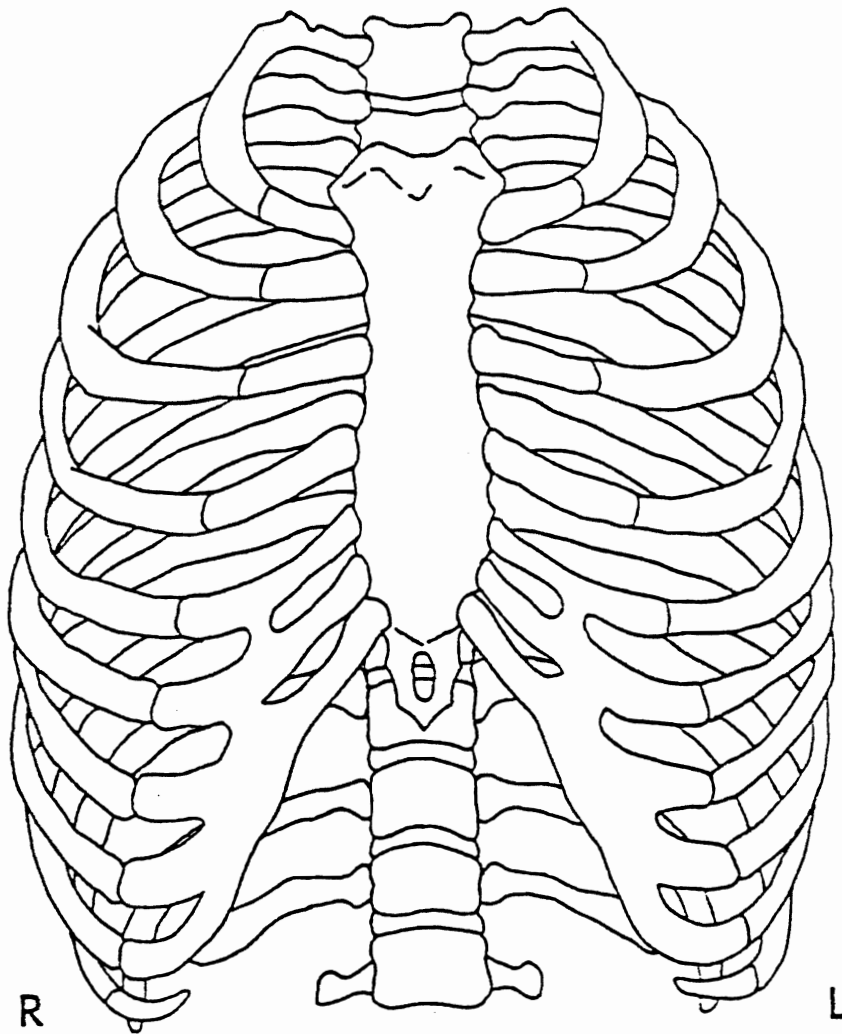
AGE 60 SEX M CAUSE OF DEATH Acute Myocardial Infarction

INJURY INFORMATION:

OVERALL THORACIC AIS 3

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>H</u>	<u>3</u>
	2	—	—	—	—
	3	—	—	—	—
	4	—	—	—	—
	5	—	—	—	—
	6	—	—	—	—
	7	—	—	—	—
	8	—	—	—	—
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>S</u>	<u>R</u>	<u>1</u>
	2	—	—	—	—
	3	—	—	—	—
	4	—	—	—	—
	5	—	—	—	—

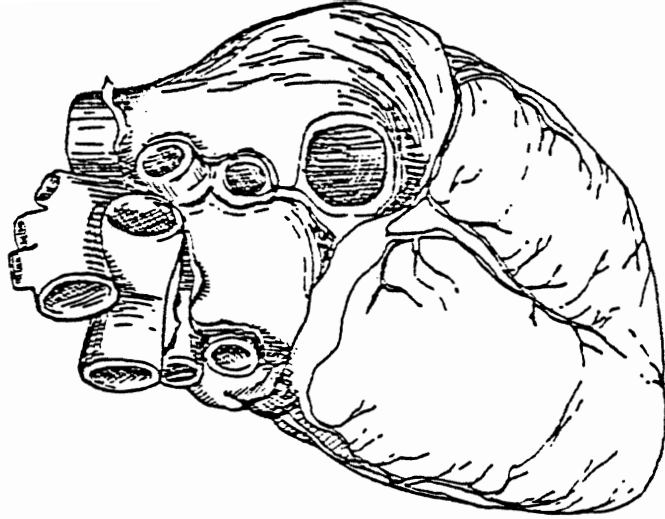
TEST # 77T021



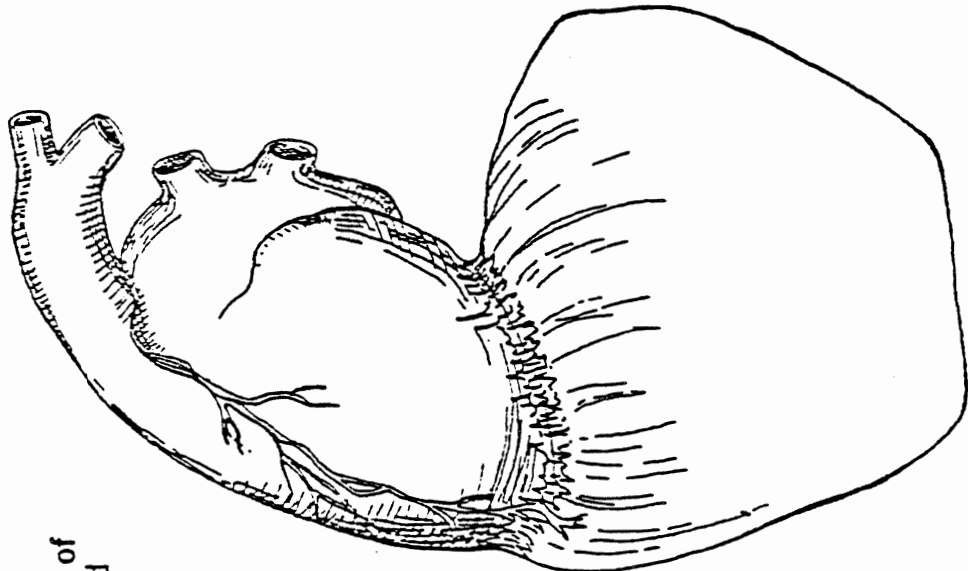
ANTERIOR VIEW RIB CAGE

*(no fractures)*

Diaphragmatic View of Heart



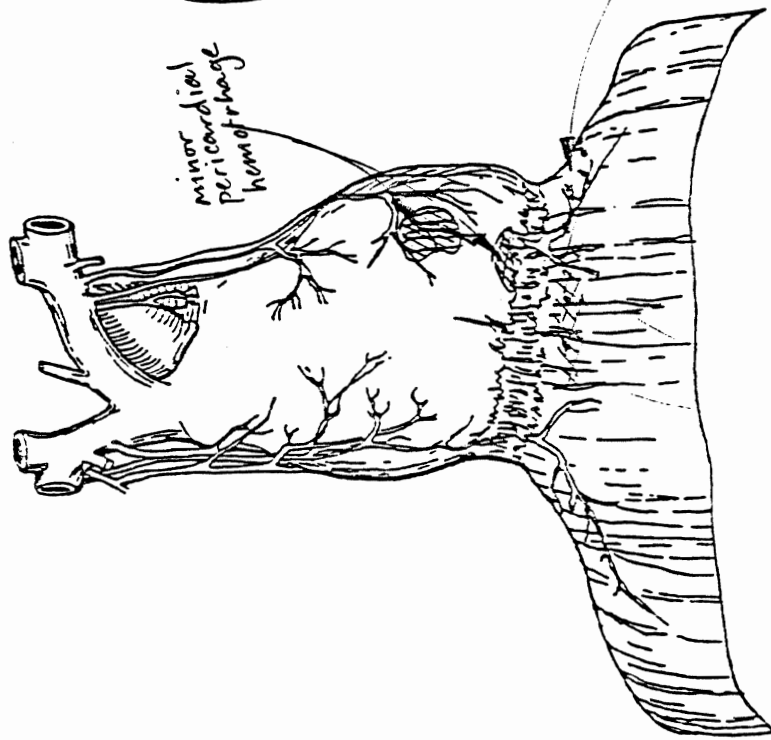
Left Side View of Pericardium and Diaphragm



minor spotted hemorrhage on diaphragm

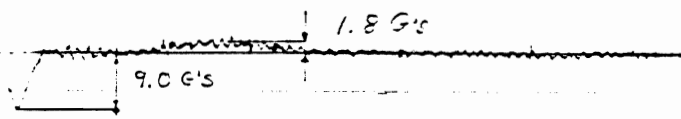
minor pericardial hemorrhage

Anterior View of Pericardium and Diaphragm

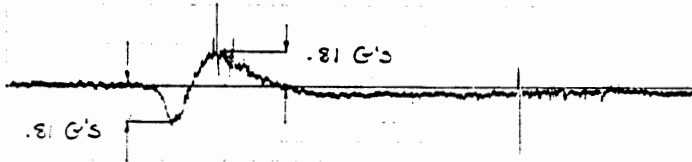




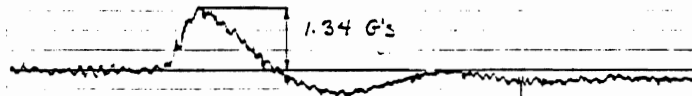
PISTON  
ACCELERATION



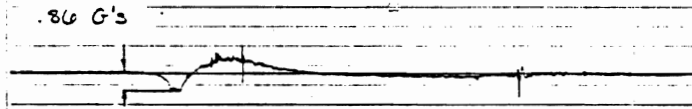
LEFT UPPER RIB  
ACCELEROMETER



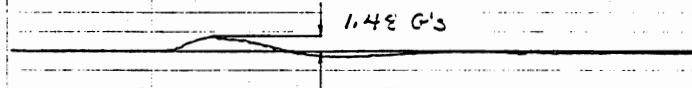
LEFT LOWER RIB  
ACCELEROMETER



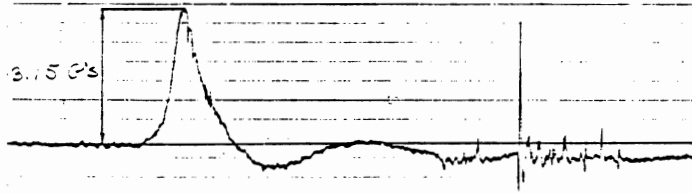
RIGHT UPPER RIB  
ACCELEROMETER



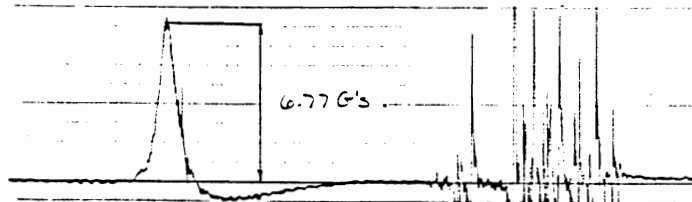
RIGHT LOWER RIB  
ACCELEROMETER



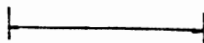
STERNUM UPPER  
ACCELEROMETER



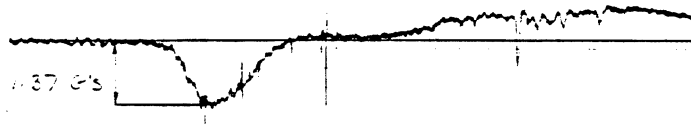
STERNUM LOWER  
ACCELEROMETER



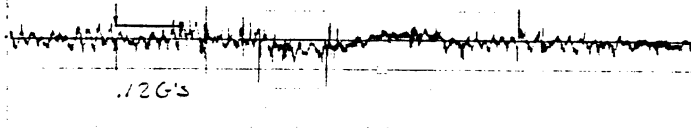
100 msec



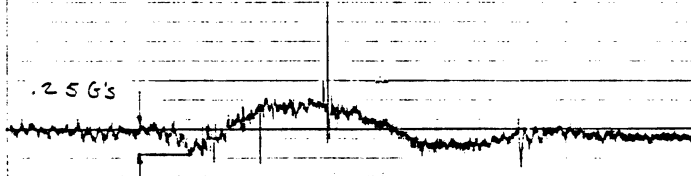
T<sub>1</sub> ACCELEROMETER  
(P-A)



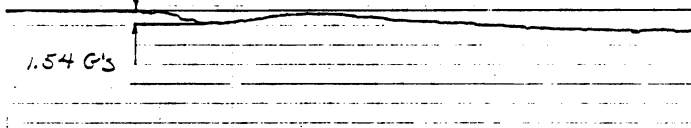
T<sub>1</sub> ACCELEROMETER  
(R-L)



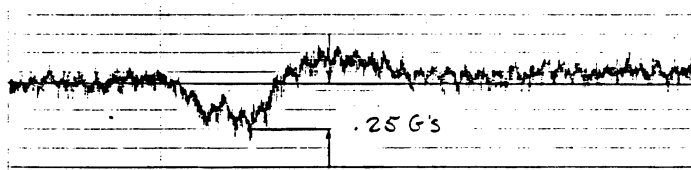
T<sub>1</sub> ACCELEROMETER  
(I-S)



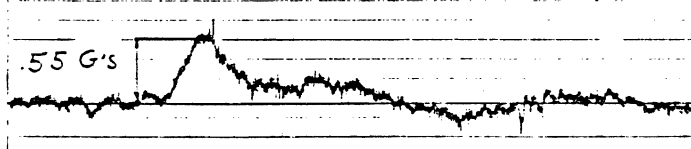
T<sub>12</sub> ACCELEROMETER  
(P-A)



T<sub>12</sub> ACCELEROMETER  
(R-L)



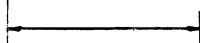
T<sub>12</sub> ACCELEROMETER  
(I-S)

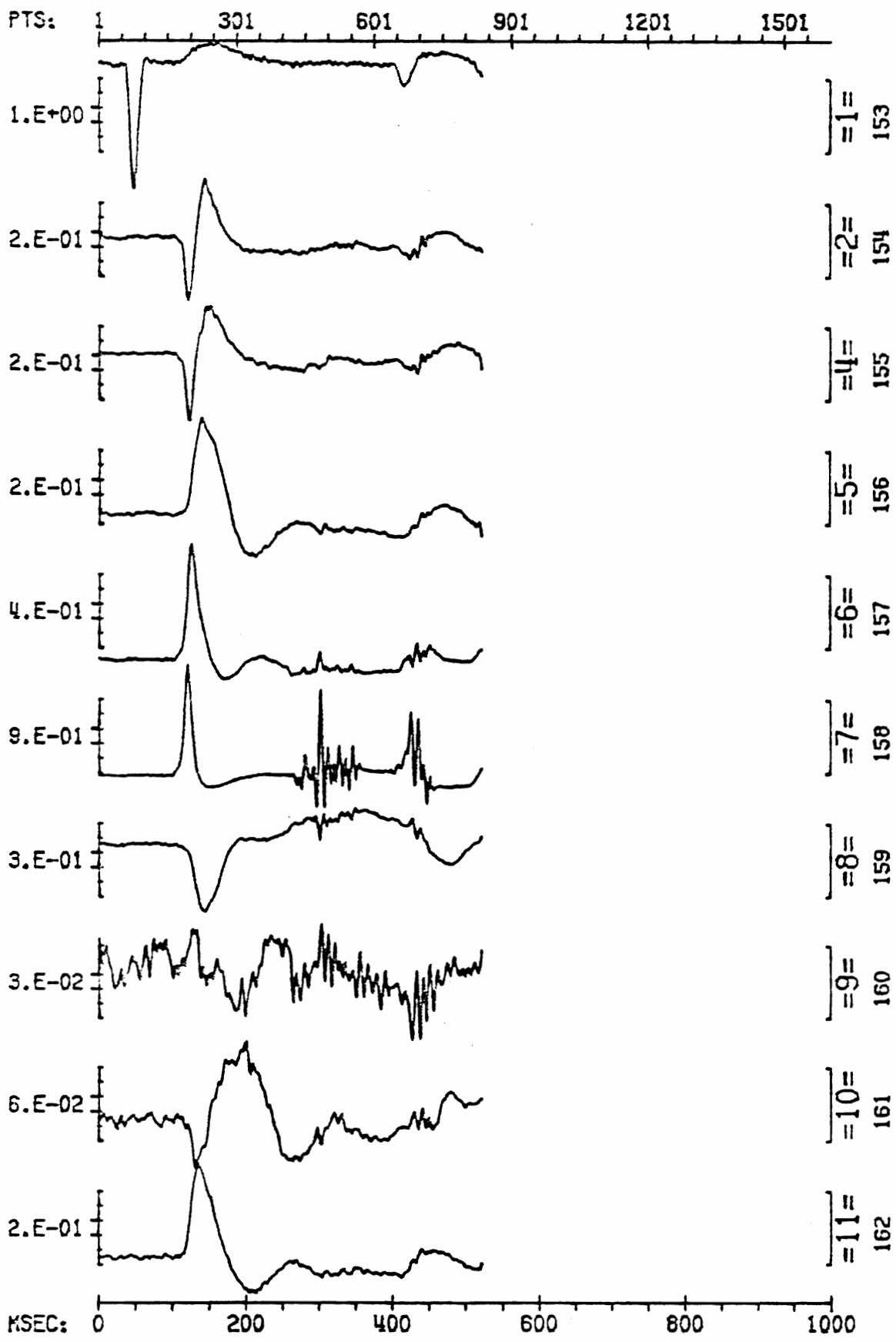


VASCULAR  
PRESSURE



100 msec





ID: 77T069B-1:PT

69A

TAPE: PEND. TEST

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 RUN ID: 77T0698-1IPT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

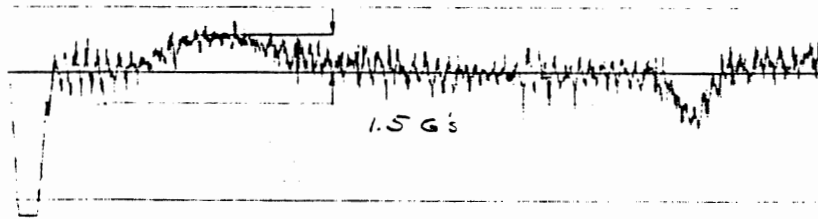
ANALOG TAPE: HSRI#140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 12-AUG-77  
 TEST SIGNALS: 3349 PTS/CH AT 6394.00 HZ, CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
153	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.7	836	1598.72
154	2	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+3	100.7	836	1598.72
	3							
155	4	RIGHT UPPER RIB ACCELEROMETER	3.00	G'S	4+1+3	100.7	836	1598.72
156	5	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+3	100.7	836	1598.72
157	6	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+3	100.7	836	1598.72
158	7	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+3	100.7	836	1598.72
159	8	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+3	100.7	836	1598.72
160	9	T-1 R-L ACCELEROMETER	3.00	G'S	4+1+3	100.7	836	1598.72
161	10	T-1 I-S ACCELEROMETER	3.00	G'S	4+1+3	100.7	836	1598.72
162	11	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+3	100.7	836	1598.72

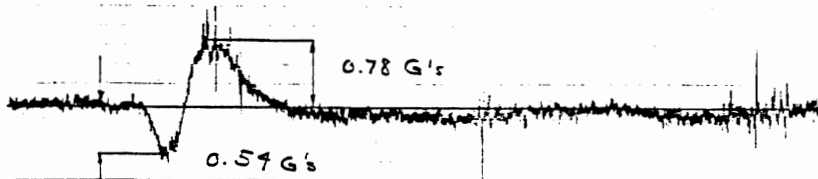
121  
 131  
 141

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 FILTERED FILES: 153 - 162 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T0698-1IPT  
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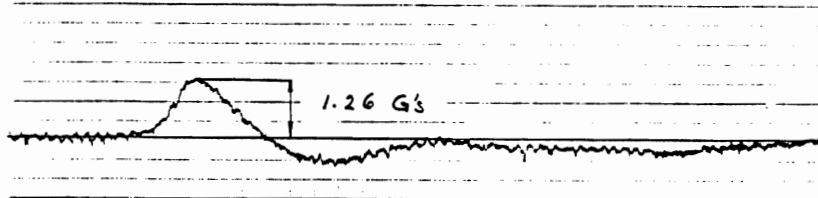
PISTON  
ACCELERATION



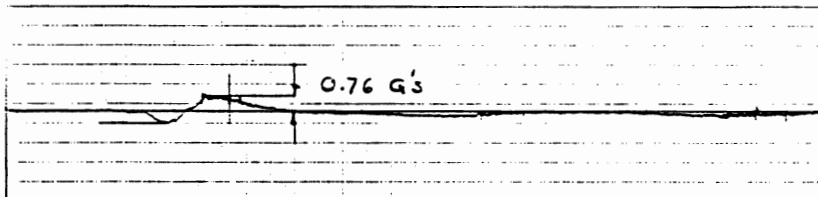
LEFT UPPER RIB  
ACCELEROMETER



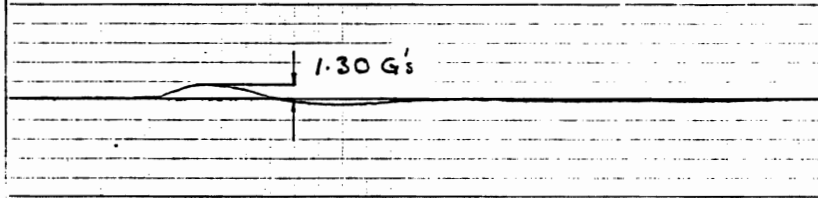
LEFT LOWER RIB  
ACCELEROMETER



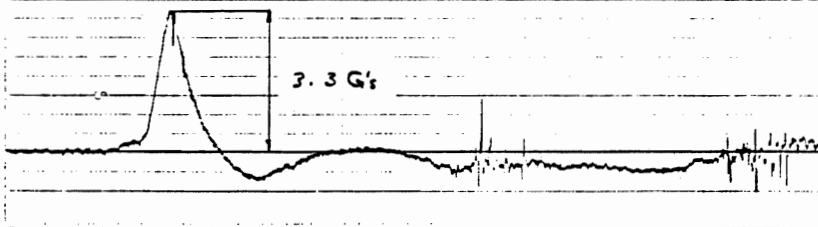
RIGHT UPPER RIB  
ACCELEROMETER



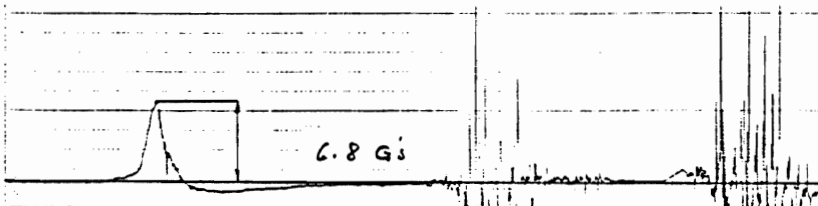
RIGHT LOWER RIB  
ACCELEROMETER



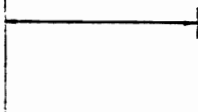
STERNUM UPPER  
ACCELEROMETER



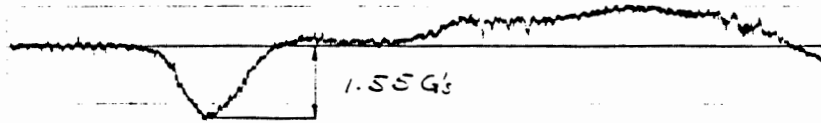
STERNUM LOWER  
ACCELEROMETER



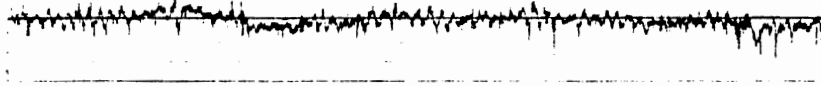
100 msec



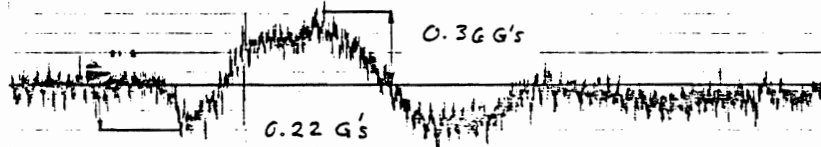
T<sub>1</sub> ACCELEROMETER  
(P-A)



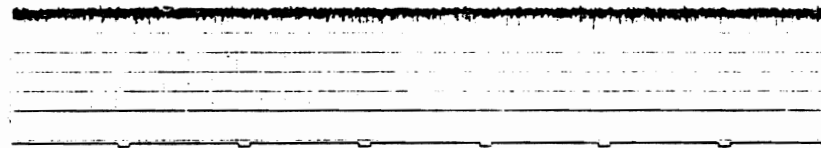
T<sub>1</sub> ACCELEROMETER  
(R-L)



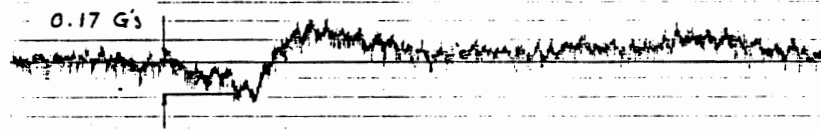
T<sub>1</sub> ACCELEROMETER  
(I-S)



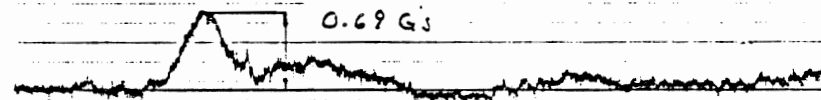
T<sub>12</sub> ACCELEROMETER  
(P-A)



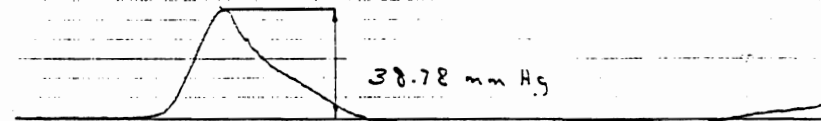
T<sub>12</sub> ACCELEROMETER  
(R-L)



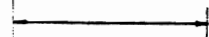
T<sub>12</sub> ACCELEROMETER  
(I-S)

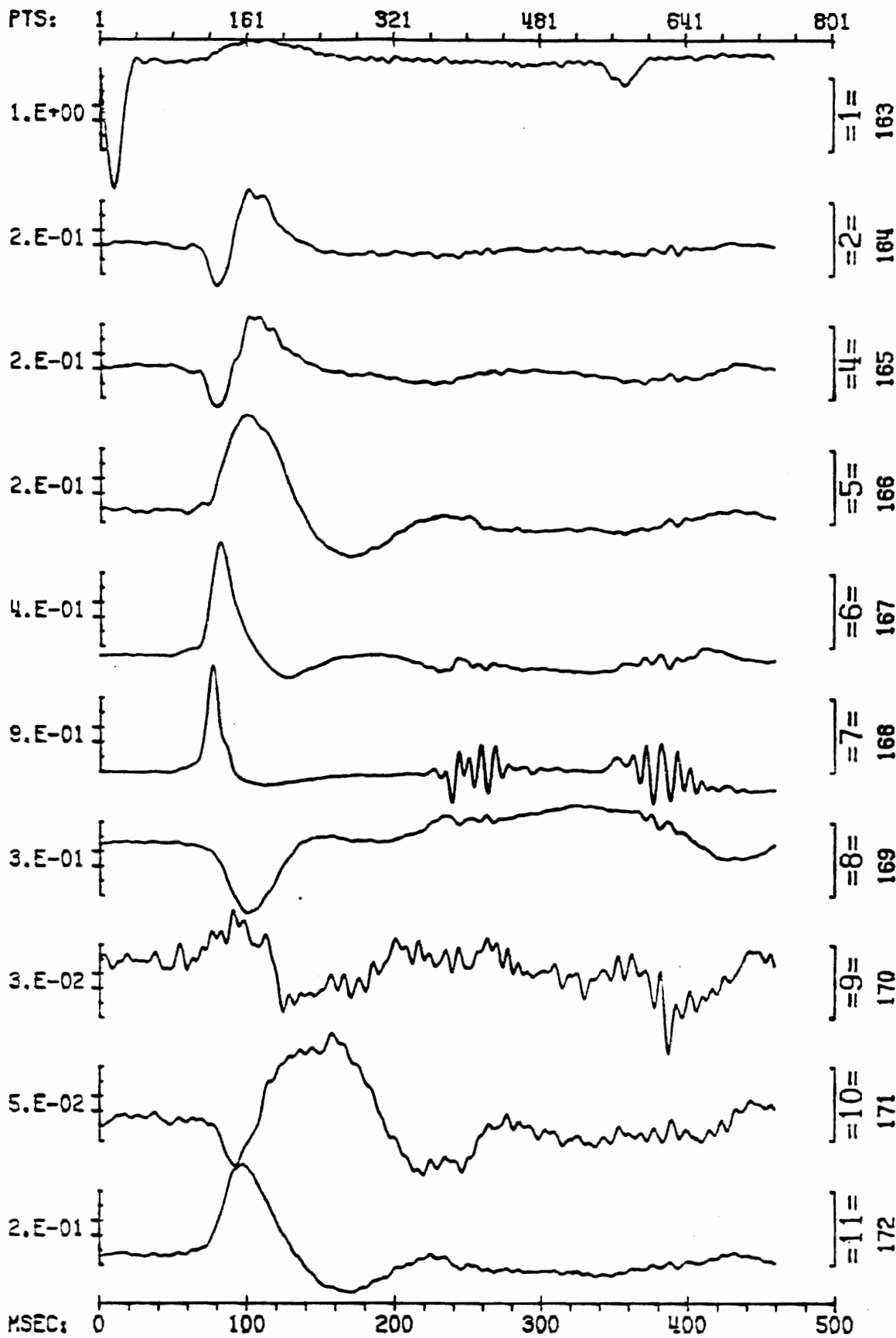


VASCULAR  
PRESSURE



100 msec





ID: 77P070-1:PT

69B

TAPE: PEND. TEST

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 RUN ID: 77P070-11PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 2963 PTS/CH AT 6407.35 HZ. CAL SIGNALS: NOT DIGITIZED.

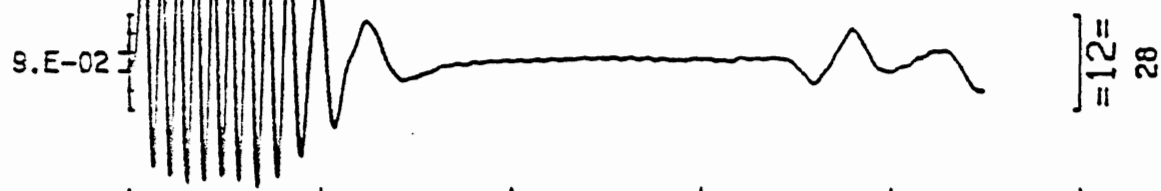
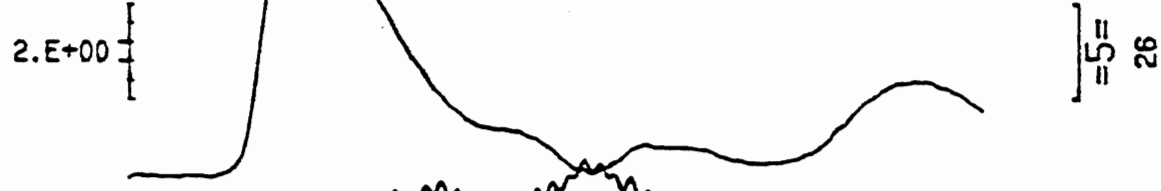
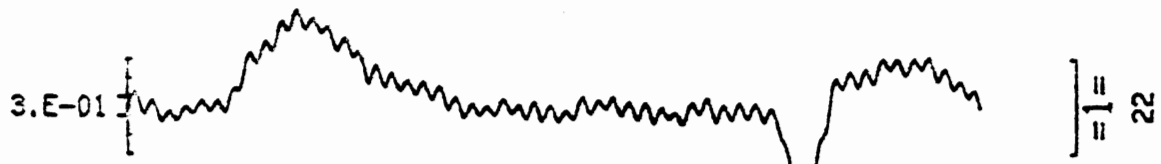
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
163	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.9	736	1601.04
164	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.9	736	1601.04
	3:							
165	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.9	736	1601.04
166	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.9	736	1601.04
167	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.9	736	1601.04
168	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.9	736	1601.04
169	- 8:	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.9	736	1601.04
170	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.9	736	1601.04
171	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.9	736	1601.04
172	- 11:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.9	736	1601.04

12:  
 13:  
 14:

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 FILTERED FILES: 163 - 172 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77P070-11PT



PTS: 1 101 201 301 401 501 601 701



MSEC: 0 100 200 300 400 500

10: 77T069-2:PT

TAPE: PEND. TEST

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RUN ID: 77T069-21PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H0010 DATE: 12-AUG-77

TEST SIGNALS: 2005 PTS/CH AT 6397.25 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
22	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	710	1599.31
23	2	T-12 P-A ACCELEROMETER	4.10	G'S	4+1+3	100.0	710	1599.31
24	3	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+3	100.0	710	1599.31
25	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+3	100.0	710	1599.31
26	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	100.0	710	1599.31
27	6	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+3	100.0	710	1599.31

7:

8:

9:

10:

11:

28 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 100.0 710 1599.31

13:

14:

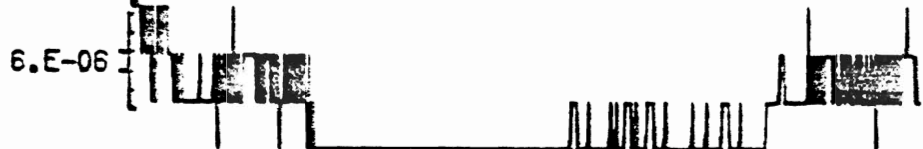
=====

FILTERED FILES: 22 - 28 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T069-21PT

PTS: 1 101 201 301 401 501 601 701



=1=  
29



=2=  
30



=3=  
31



=4=  
32



=5=  
33



=6=  
34



=12=  
35

MSEC: 0 100 200 300 400 500

10: 77T069B-2:PT

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T0698-2IPT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

TEST SIGNALS: 2683 PTS/CH AT 6399.24 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
29	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	660	1599.01
30	2	T-12 P-A ACCELEROMETER	4.10	G'S	4+1+3	100.0	660	1599.01
31	3	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+3	100.0	660	1599.01
32	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+3	100.0	660	1599.01
33	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	100.0	660	1599.01
34	6	VERTICAL SUPPORT FORCE	200.00	LB0.	4+1+3	100.0	660	1599.01

71

81

91

101

111

35 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 100.0 660 1599.01

131

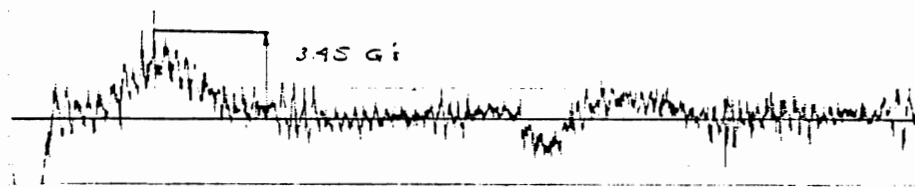
141

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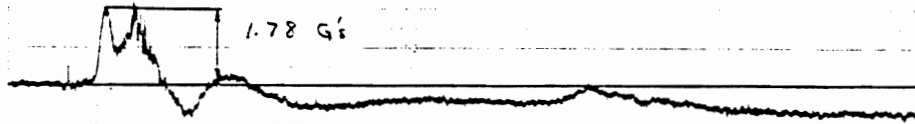
FILTERED FILES: 29 - 35 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T0698-2IPT

TEST NO: 77T070

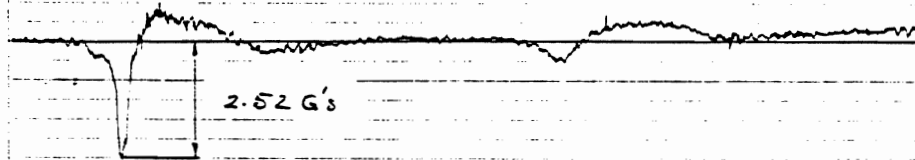
PISTON  
ACCELERATION



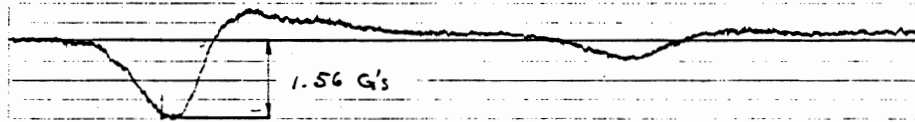
LEFT UPPER RIB  
ACCELEROMETER



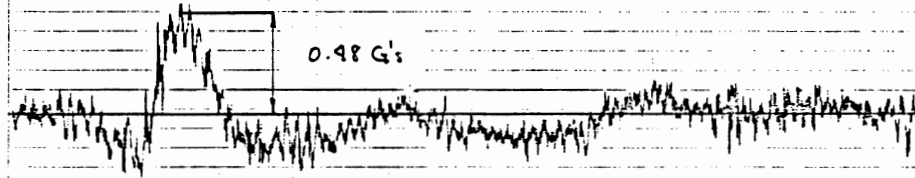
LEFT LOWER RIB  
ACCELEROMETER



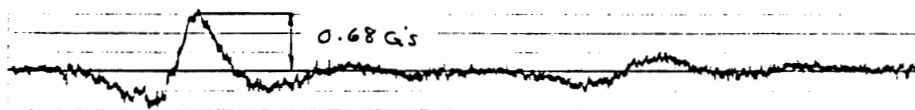
RIGHT UPPER RIB  
ACCELEROMETER



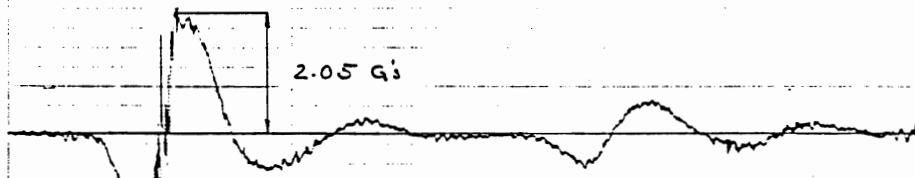
RIGHT LOWER RIB  
ACCELEROMETER



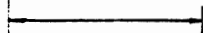
STERNUM UPPER  
ACCELEROMETER



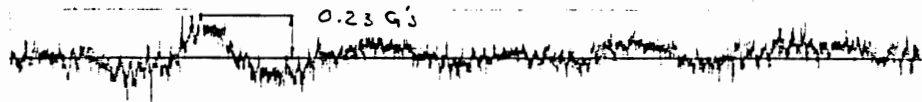
STERNUM LOWER  
ACCELEROMETER



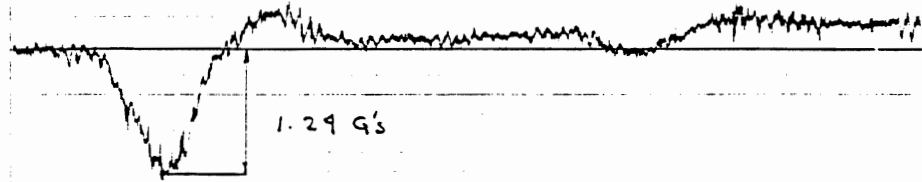
100 msec



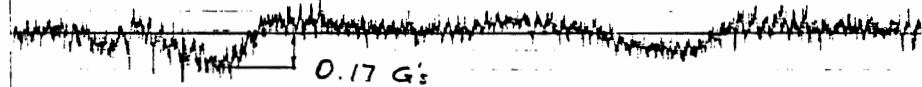
T<sub>1</sub> ACCELEROMETER  
(P-A)



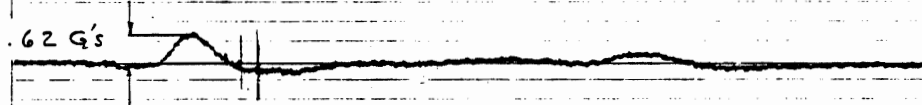
T<sub>1</sub> ACCELEROMETER  
(R-L)



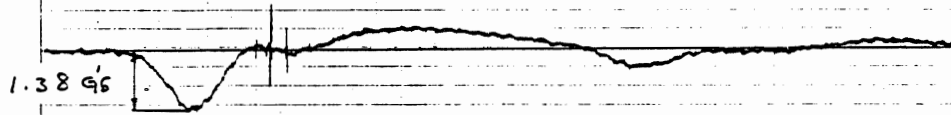
T<sub>1</sub> ACCELEROMETER  
(I-S)



T<sub>12</sub> ACCELEROMETER  
(P-A)



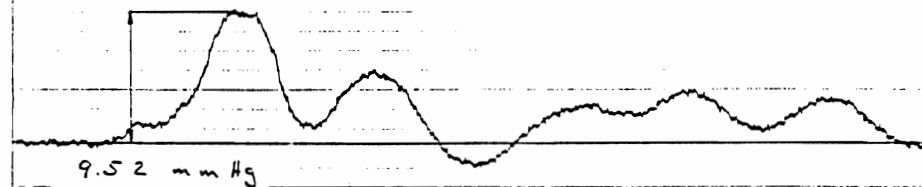
T<sub>12</sub> ACCELEROMETER  
(R-L)



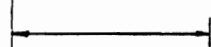
T<sub>12</sub> ACCELEROMETER  
(I-S)

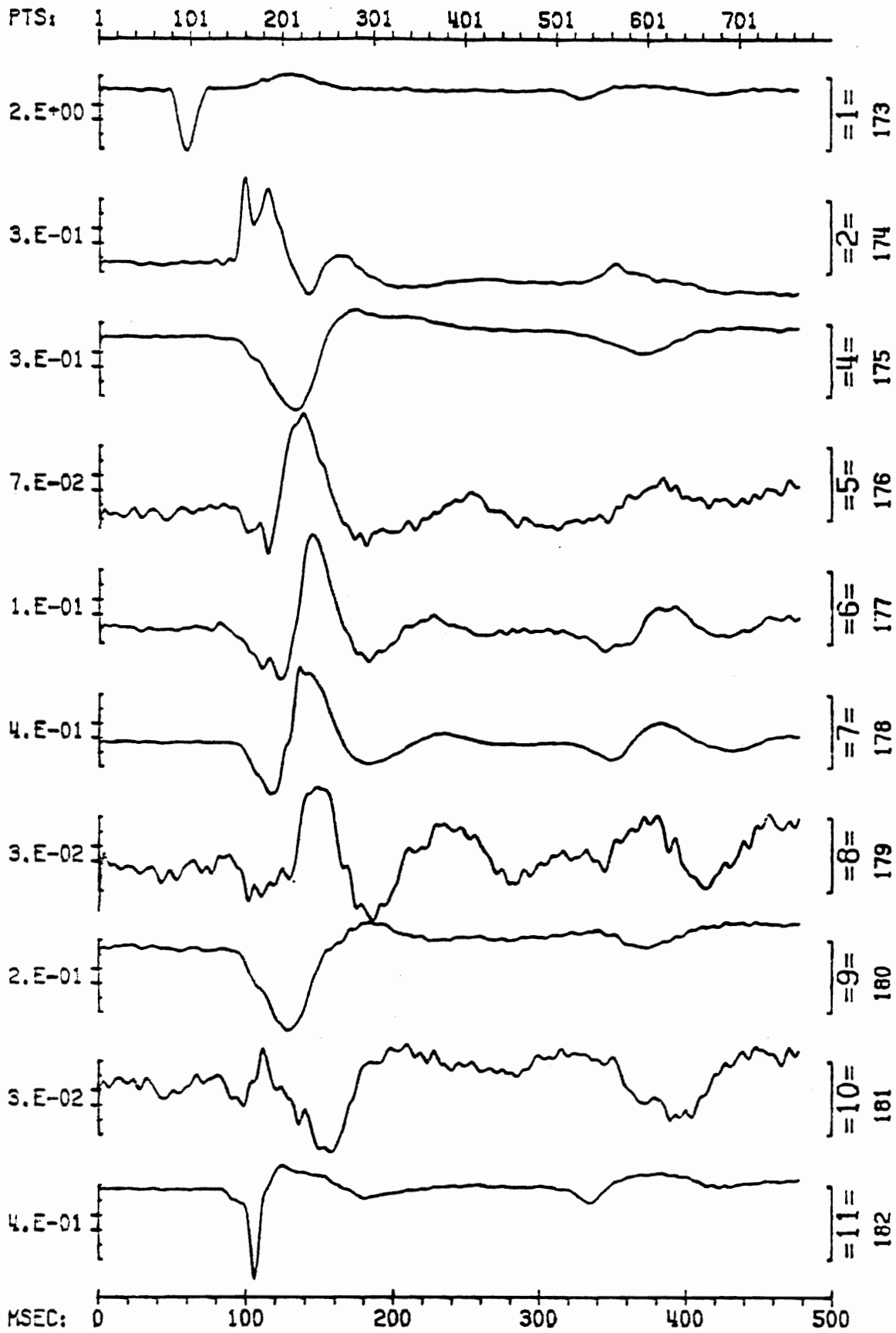


VASCULAR  
PRESSURE



100 msec





10: 771071-1:PP

070

TAPE: PEND. TEST

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RUN ID: 77T071-10PP

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

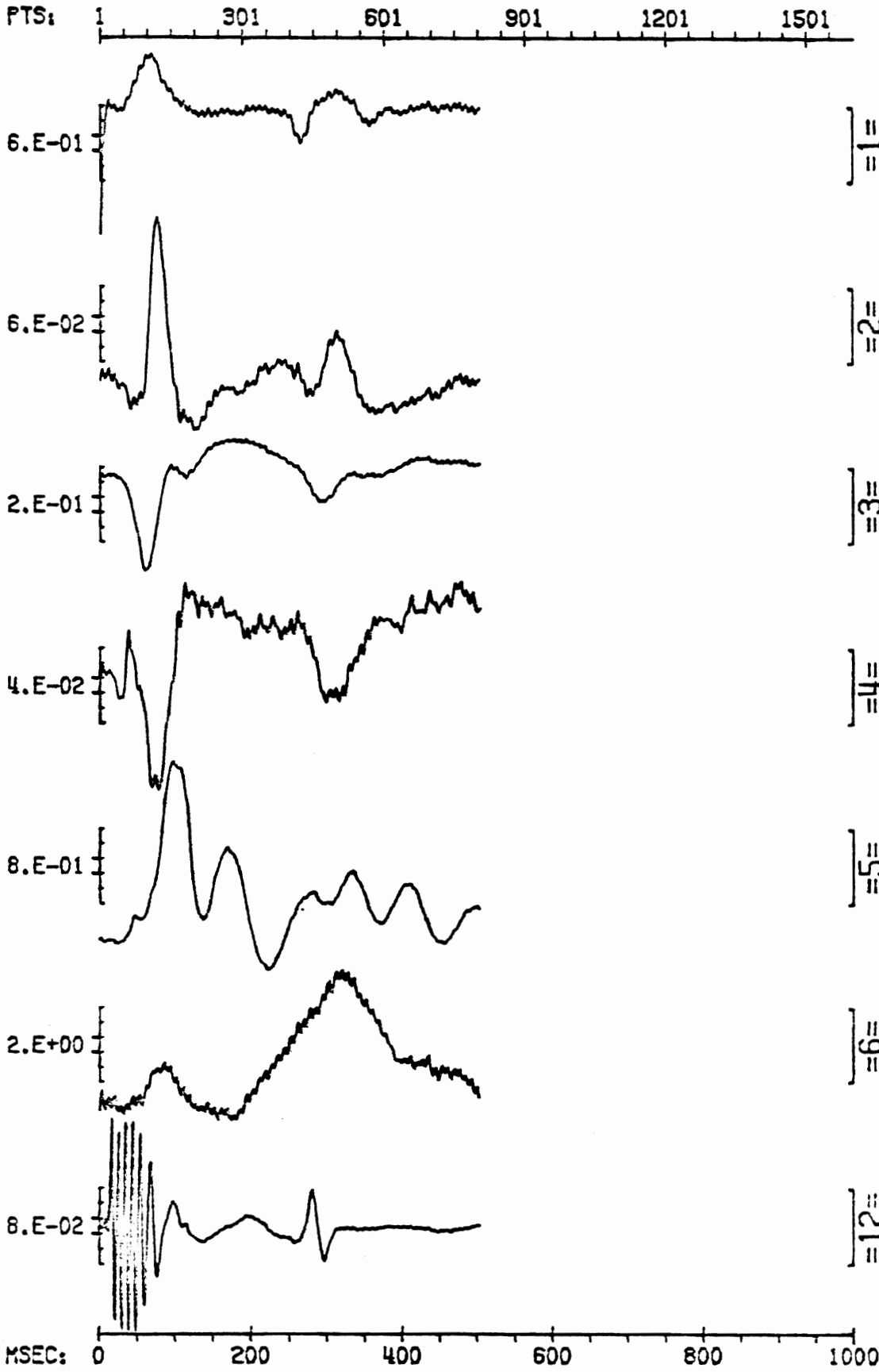
TEST SIGNALS: 3068 PTS/CH AT 6395.33 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
173	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	764	1598.83
174	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	764	1598.83
3:								
175	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	764	1598.83
176	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.7	764	1598.83
177	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	764	1598.83
178	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.7	764	1598.83
179	- 8:	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	764	1598.83
180	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	764	1598.83
181	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	764	1598.83
182	- 11:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	764	1598.83

12:  
13:  
14:

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FILTERED FILES: 173 - 182 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T071-10PP





ID: 77T070-2:PT

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T070-21PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSR1#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: H80010 DATE: 12-AUG-77

TEST SIGNALS: 3235 PTS/CH AT 6396.34 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
36	1	PISTON DECELERATION	30.00	G'S	4+1+	3 100.0	805	1599.50
37	2	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+	3 100.0	805	1599.50
38	3	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3 100.0	805	1599.50
39	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.0	805	1599.50
40	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+	3 100.0	805	1599.50
41	6	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 100.0	805	1599.50

71

81

91

101

111

42 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.0 805 1599.50

131

141

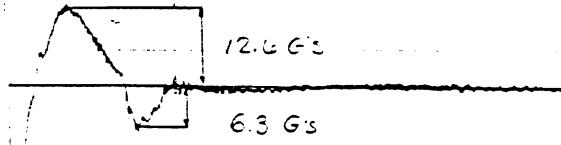
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FILTERED FILES: 36 - 42 DIGITAL TAPE: JEFLEH

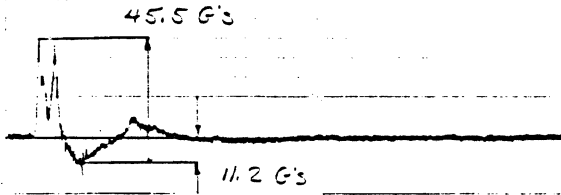
DATE: 17-AUG-77 RUN ID: 77T070-21PT

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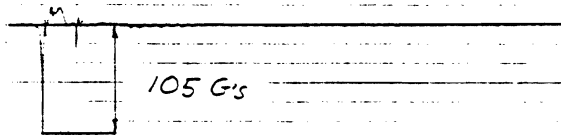
PISTON  
ACCELERATION



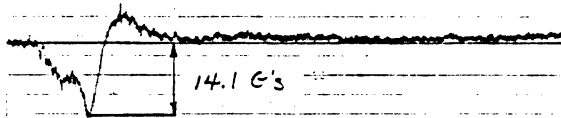
LEFT UPPER RIB  
ACCELEROMETER



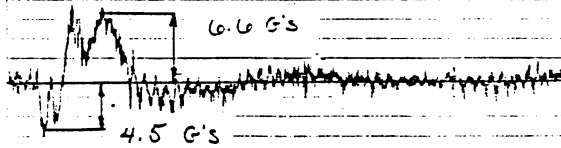
LEFT LOWER RIB  
ACCELEROMETER



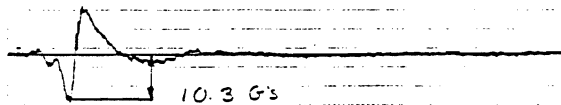
RIGHT UPPER RIB  
ACCELEROMETER



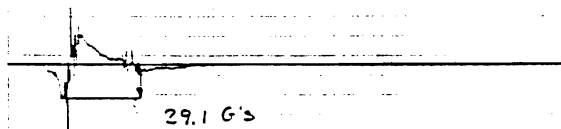
RIGHT LOWER RIB  
ACCELEROMETER



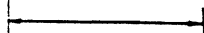
STERNUM UPPER  
ACCELEROMETER



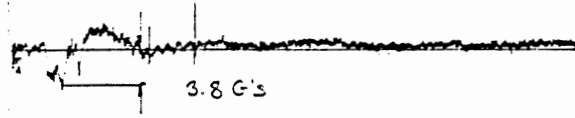
STERNUM LOWER  
ACCELEROMETER



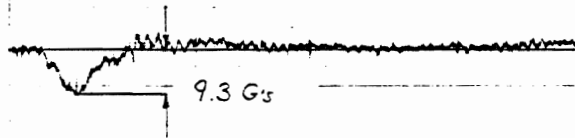
100 msec



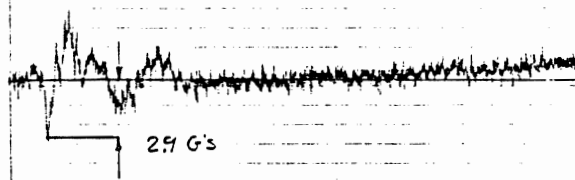
T<sub>1</sub> ACCELEROMETER  
(P-A)



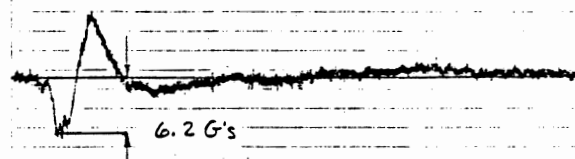
T<sub>1</sub> ACCELEROMETER  
(R-L)



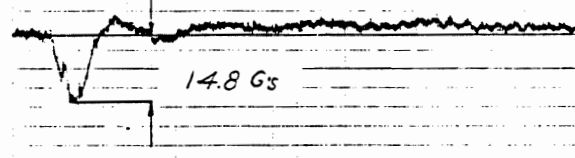
T<sub>1</sub> ACCELEROMETER  
(I-S)



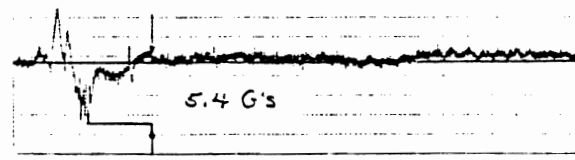
T<sub>12</sub> ACCELEROMETER  
(P-A)



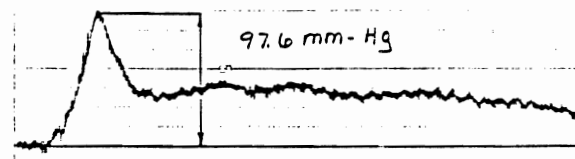
T<sub>12</sub> ACCELEROMETER  
(R-L)



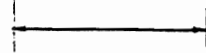
T<sub>12</sub> ACCELEROMETER  
(I-S)

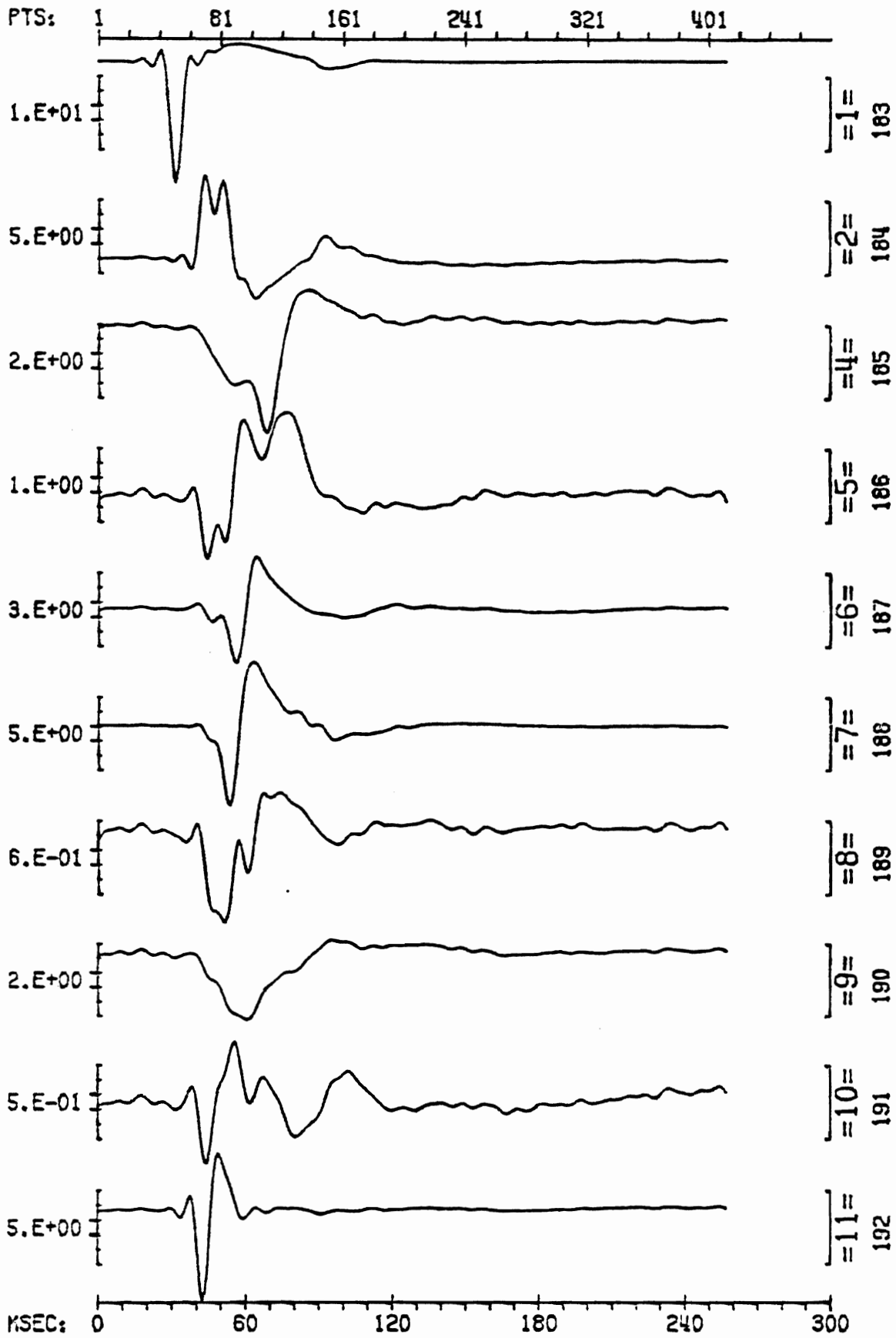


VASCULAR  
PRESSURE



100 msec





77T071-1:PP

ID:

TAPE: PEND. TEST

*WR*  
*FOR*

*FF*

\*\*\*\*\*  
 RUN ID: 77T071-1:PP-REAL  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

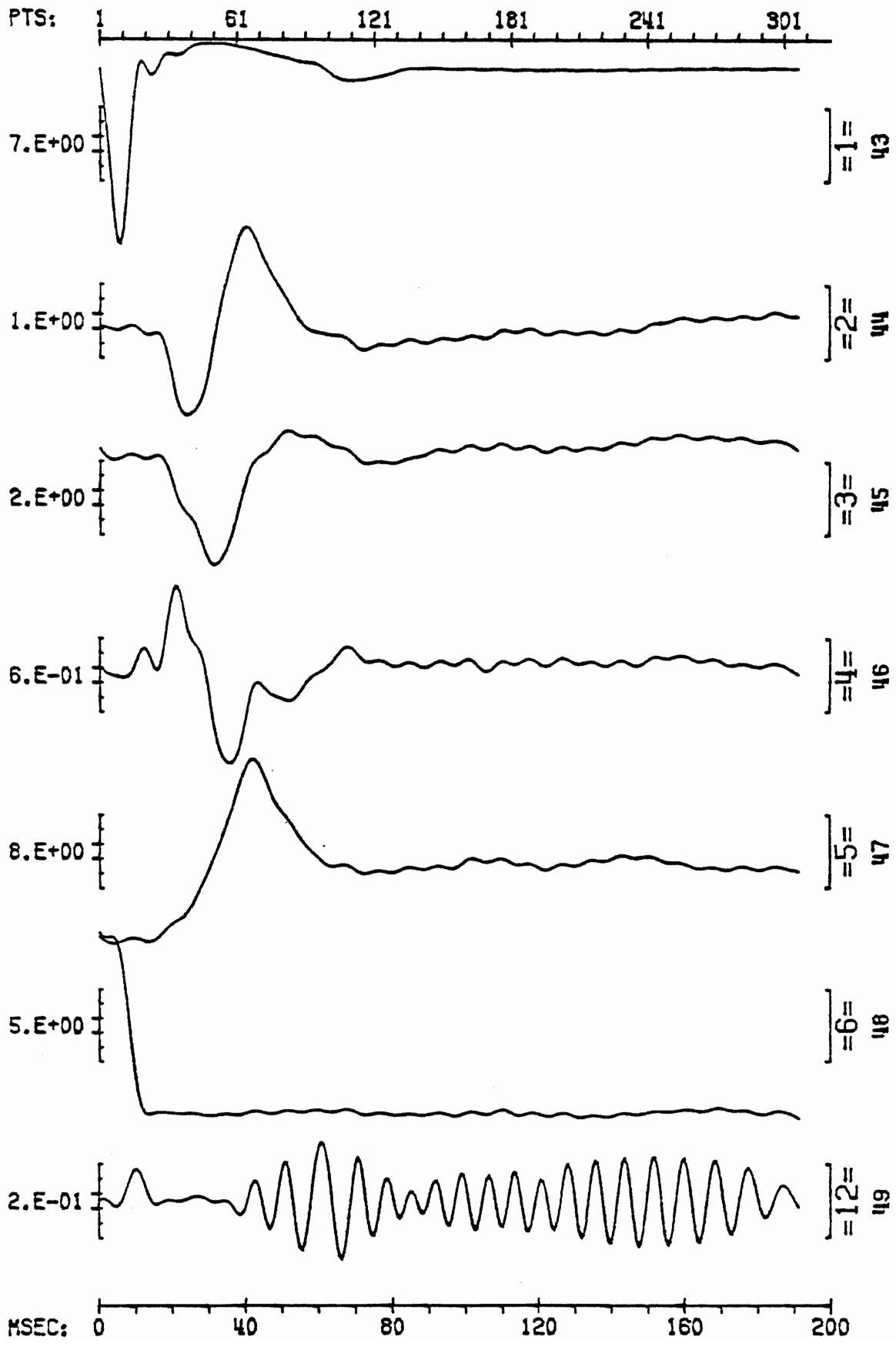
ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 1657 PTS/CH AT 6394.13 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
183	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	412	1598.53
184	- 2:	LEFT UPPER RIB ACCELEROMETER	69.20	G'S	4+1+ 3	100.7	412	1598.53
3:								
185	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	100.7	412	1598.53
186	- 5:	RIGHT LOWER RIB ACCELEROMETER	74.80	G'S	4+1+ 3	100.7	412	1598.53
187	- 6:	UPPER STERNAL ACCELEROMETER	44.70	G'S	4+1+ 3	100.7	412	1598.53
188	- 7:	LOWER STERNAL ACCELEROMETER	33.20	G'S	4+1+ 3	100.7	412	1598.53
189	- 8:	T-1 P-A ACCELEROMETER	42.00	G'S	4+1+ 3	100.7	412	1598.53
190	- 9:	T-1 R-L ACCELEROMETER	76.00	G'S	4+1+ 3	100.7	412	1598.53
191	- 10:	T-1 I-S ACCELEROMETER	38.00	G'S	4+1+ 3	100.7	412	1598.53
192	- 11:	LEFT LOWER RIB ACCELEROMETER	64.00	G'S	4+1+ 3	100.7	412	1598.53

12:  
 13:  
 14:

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 FILTERED FILES: 183 - 192 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T071-1:PP-REAL  
 -----



ID: 77T071-2:PP

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T071-2IPP

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 12-AUG-77

TEST SIGNALS: 1241 PTS/CH AT 6399.79 HZ, CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
43	*	1: PISTON DECELERATION	30.00	G'S	4+1+	3	100.0	307 @ 1599.95
44	-	2: T-12 P-A ACCELEROMETER	42.90	G'S	4+1+	3	100.0	307 @ 1599.95
45	-	3: T-12 R-L ACCELEROMETER	64.40	G'S	4+1+	3	100.0	307 @ 1599.95
46	-	4: T-12 I-S ACCELEROMETER	34.60	G'S	4+1+	3	100.0	307 @ 1599.95
47	-	5: VASCULAR PRESSURE	283.00	MM-HG	4+1+	3	100.0	307 @ 1599.95
48	-	6: VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3	100.0	307 @ 1599.95

7:

8:

9:

10:

11:

49 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.0 307 @ 1599.95

13:

14:

=====

FILTERED FILES: 43 - 49 DIGITAL TAPE: JEFLEH

DATE: 17-AUG-77 RUN ID: 77T071-2IPP

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SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

TEST NUMBERS:

77T072 - Low Energy Front Pendulum Impact

77T073 - Low Energy Side Pendulum Impact

77T074 - Pendulum 14.32 ft/sec Side Impact

TEST DATE:

July 18, 1977

TEST SUBJECT:

Age - about 60

Sex - Male

Weight - 54 kg.

Stature - 176.9 cm

RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

VELOCITY:

In test No. 77T074, velocity was 14.32 ft/sec.

INJURIES:

Left rib No. 4 fracture adjacent to accelerometer mount.

Direct impact on mount.

AIS NUMBER ESTIMATE:

2

TEST # 77T074

TEST DATE 7.18.77

TEST DESCRIPTION Pendulum Side Impact VELOCITY 14.3 ft/s

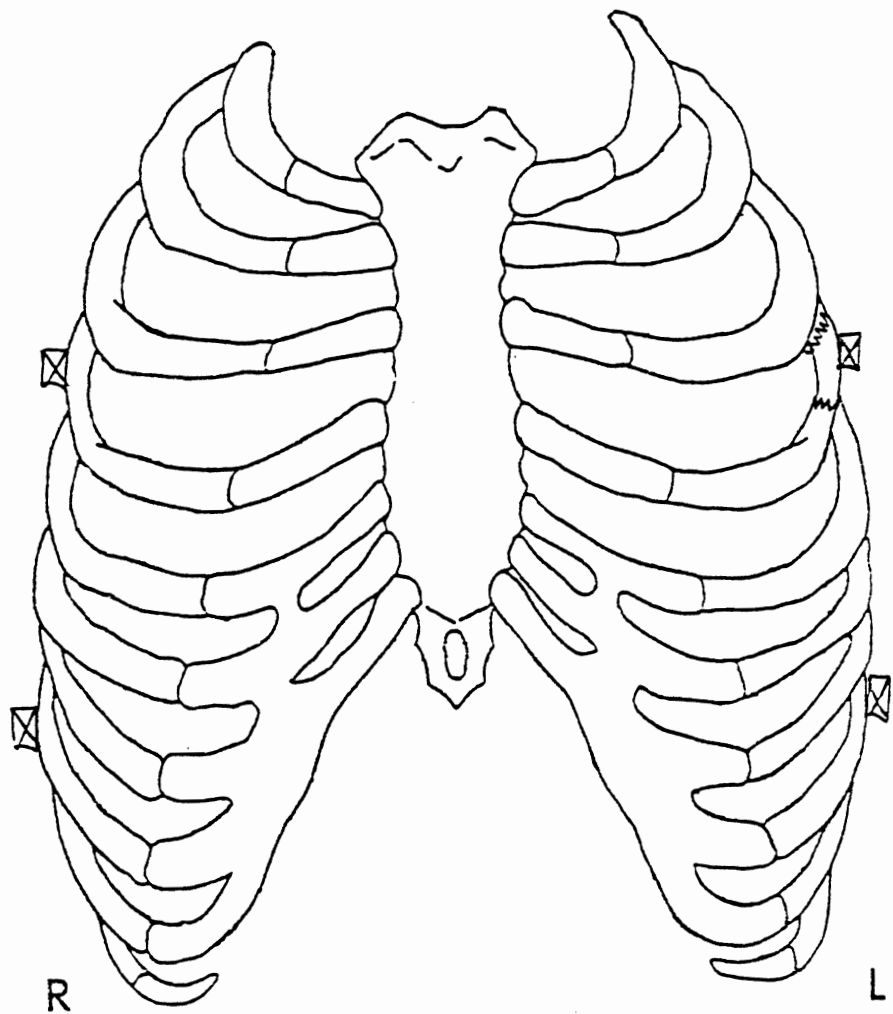
SUBJECT:

AGE ca. 59 SEX M CAUSE OF DEATH Congestive heart failure

INJURY INFORMATION: OVERALL THORACIC AIS 2

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>F</u>	<u>5</u>
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____
	6	_____	_____	_____	_____
	7	_____	_____	_____	_____
	8	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____

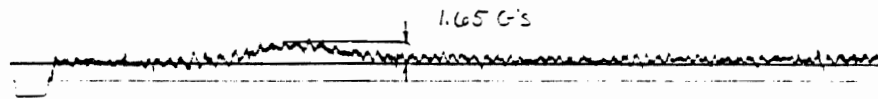
TEST # 777074



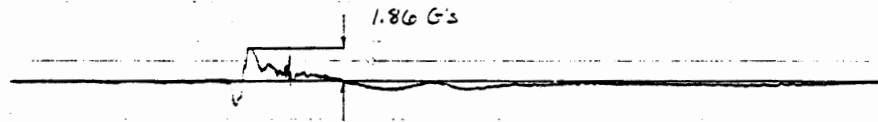
ANTERIOR VIEW RIB CAGE

(no other injuries)

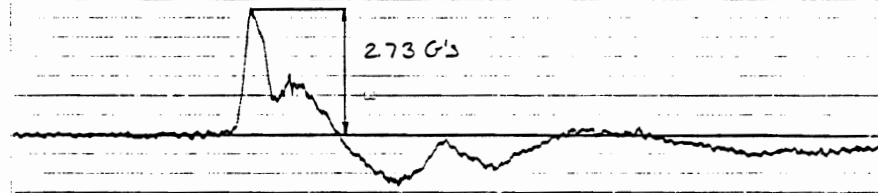
PISTON  
ACCELERATION



LEFT UPPER RIB  
ACCELEROMETER



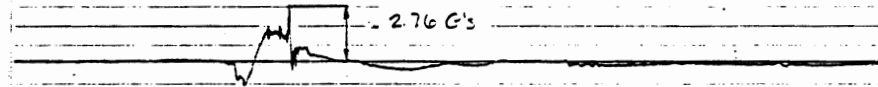
LEFT LOWER RIB  
ACCELEROMETER



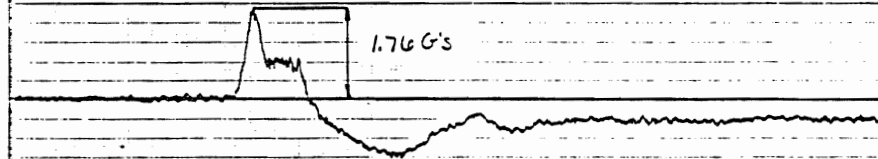
BRUSH ACCUCHART

Gold Inc. Instrument

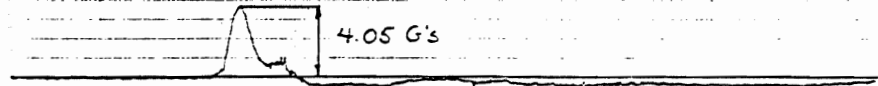
RIGHT UPPER RIB  
ACCELEROMETER



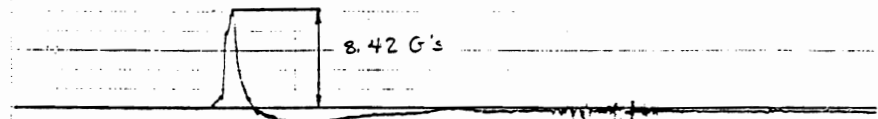
RIGHT LOWER RIB  
ACCELEROMETER



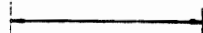
STERNUM UPPER  
ACCELEROMETER



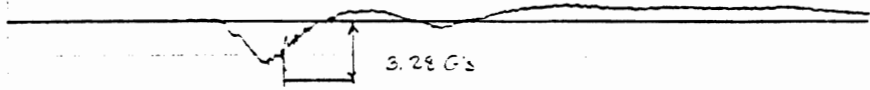
STERNUM LOWER  
ACCELEROMETER



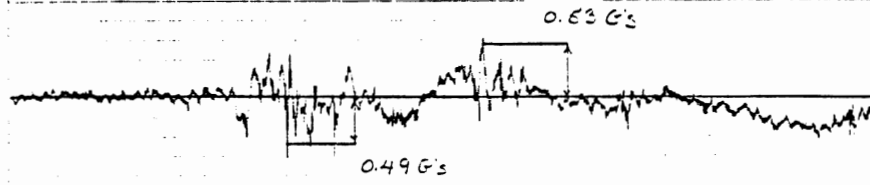
100 msec



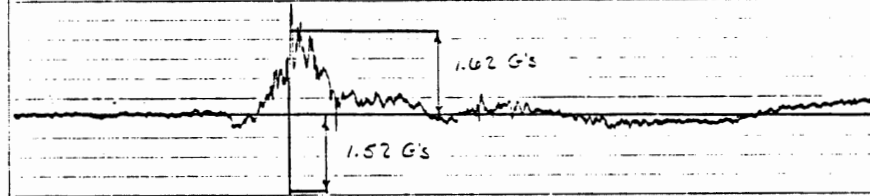
T<sub>1</sub> ACCELEROMETER  
(P-A)



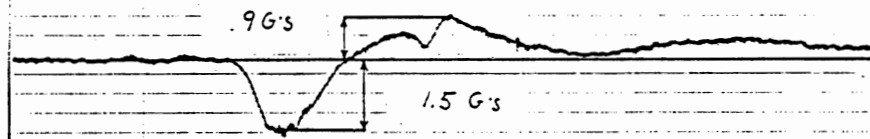
T<sub>1</sub> ACCELEROMETER  
(R-L)



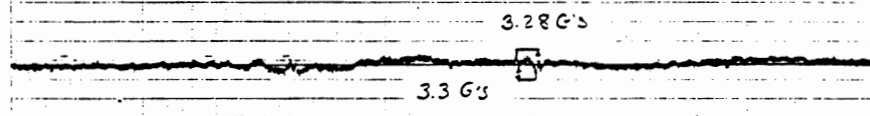
T<sub>1</sub> ACCELEROMETER  
(I-S)



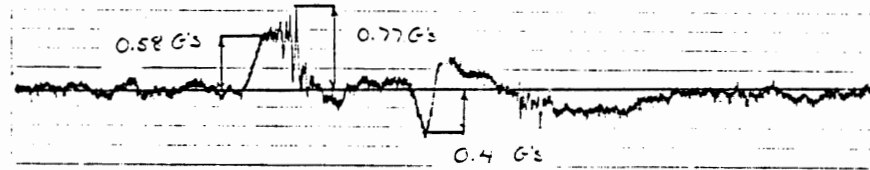
T<sub>12</sub> ACCELEROMETER  
(P-A)



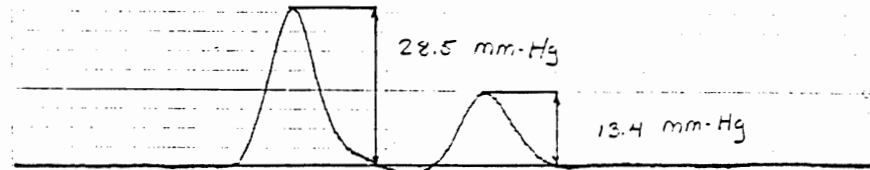
T<sub>12</sub> ACCELEROMETER  
(R-L)



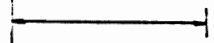
T<sub>12</sub> ACCELEROMETER  
(I-S)

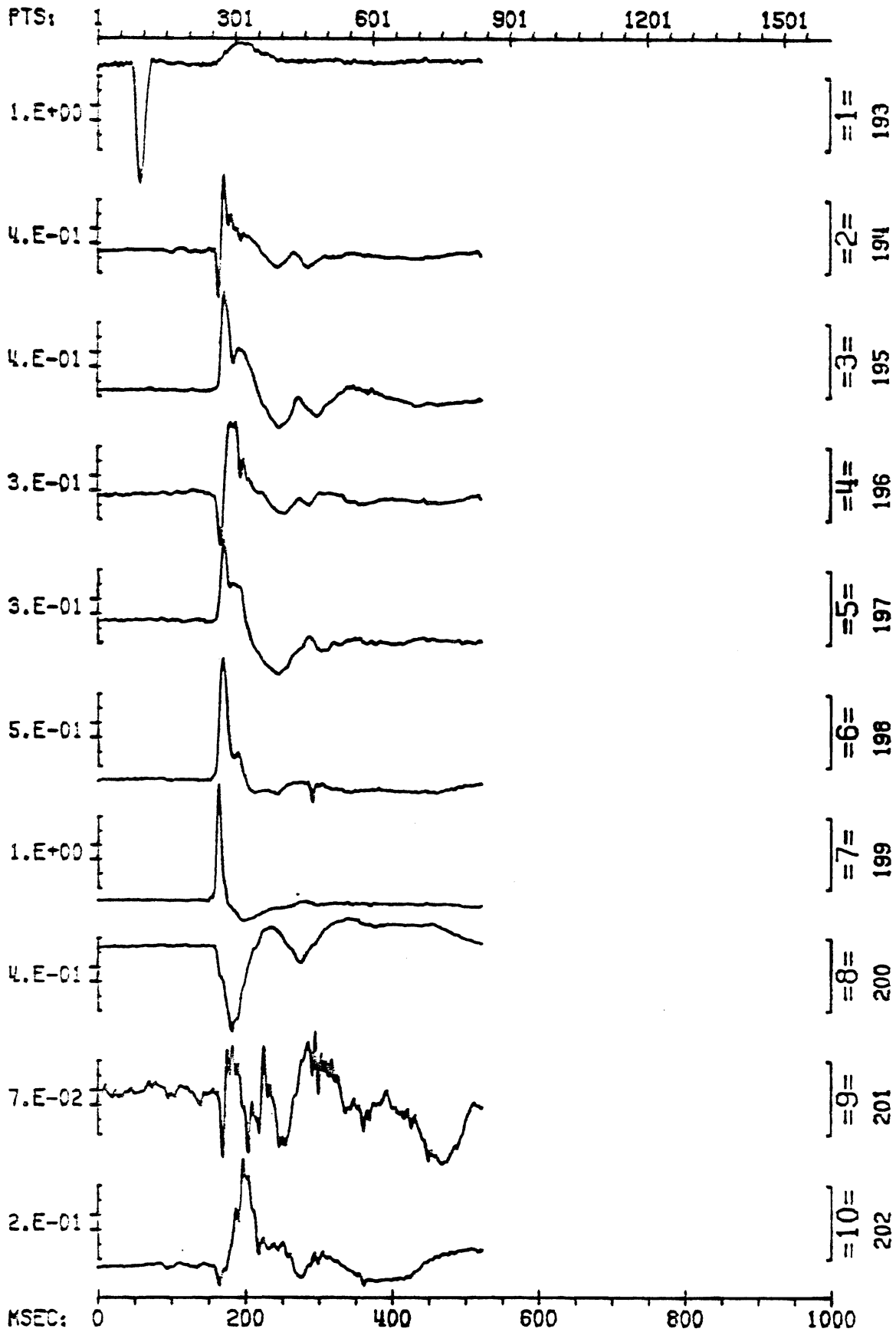


VASCULAR  
PRESSURE



100 msec





IO: 77T072-1:PT

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 771072-11PT

\*\*\*\*\*

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H90010 DATE: 12-AUG-77

TEST SIGNALS: 3939 PTS/CH AT 6397.99 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
193	- 1:	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	836	1599.50
194	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+3	100.0	836	1599.50
195	- 3:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+3	100.0	836	1599.50
196	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+3	100.0	836	1599.50
197	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+3	100.0	836	1599.50
198	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+3	100.0	836	1599.50
199	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+3	100.0	836	1599.50
200	- 8:	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+3	100.0	836	1599.50
201	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+3	100.0	836	1599.50
202	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+3	100.0	836	1599.50

11:

12:

13:

14:

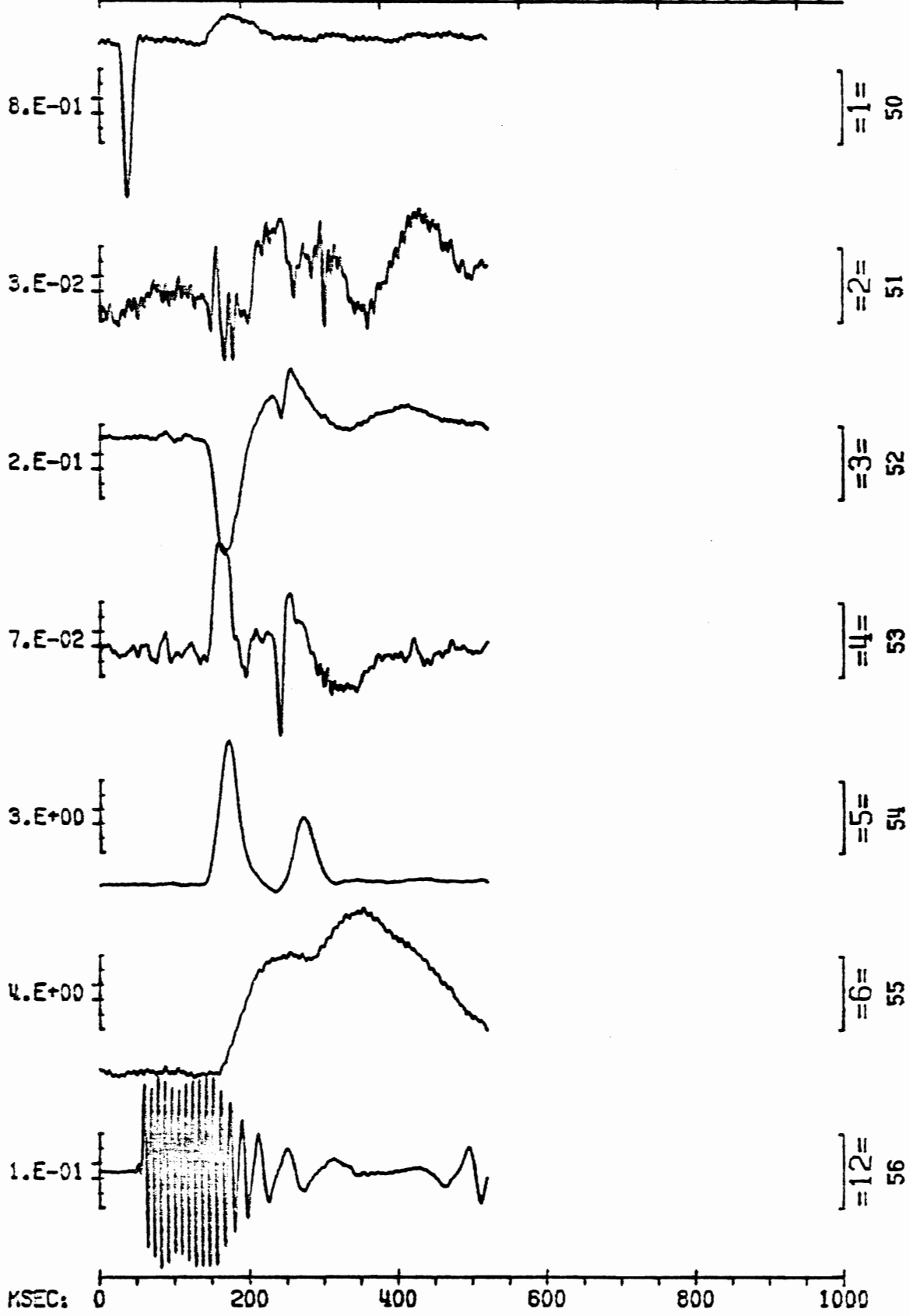
\*\*\*\*\*

FILTERED FILES: 193 - 202 DIGITAL TAPE: JEFLEH

RUN ID: 771072-11PT

DATE: 19-AUG-77

PTS: 1 301 601 901 1201 1501



ID: 77T072-2:PT

TAPE: PEND. TEST



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T072-2:PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSR1#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 12-AUG-77

TEST SIGNALS: 3332 PTS/CH AT 6395.32 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
50	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.7	832	1598.83
51	2	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+3	100.7	832	1598.83
52	3	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+3	100.7	832	1598.83
53	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+3	100.7	832	1598.83
54	5	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	100.7	832	1598.83
55	6	VERTICAL SUPPORT FORCE	200.00	LB'S	4+1+3	100.7	832	1598.83

7:

8:

9:

10:

11:

56	12	PISTON VELOCITY	1.00	VOLTS	4+1+3	100.7	832	1598.83
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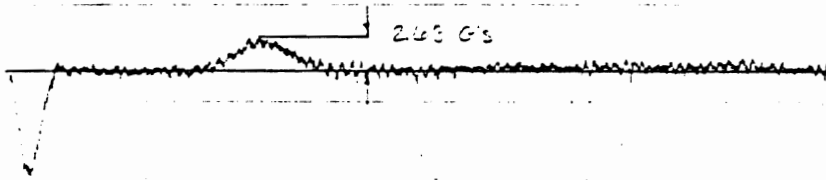
13:

14:

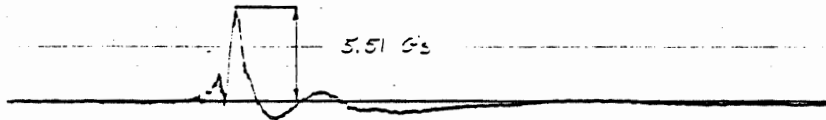
\*\*\*\*\*

FILTERED FILES: 50 - 56 DIGITAL TAPE: JEPLEH DATE: 17-AUG-77 RUN ID: 77T072-2:PT

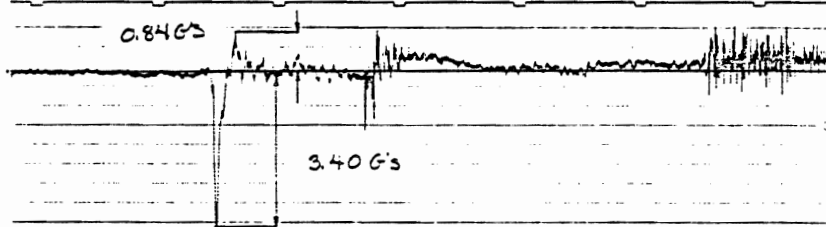
PISTON  
ACCELERATION



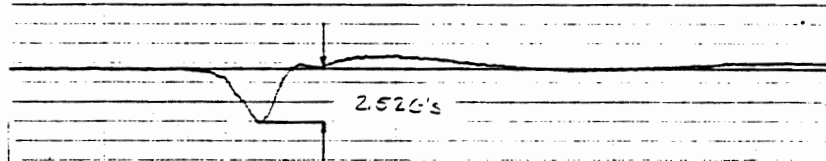
LEFT UPPER RIB  
ACCELEROMETER



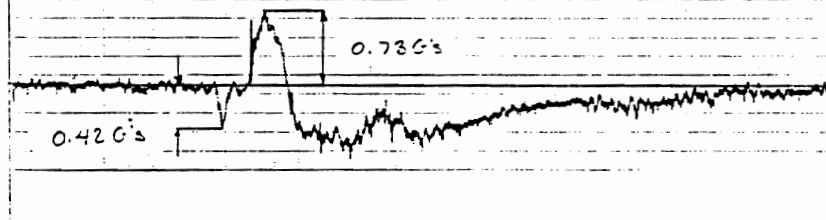
LEFT LOWER RIB  
ACCELEROMETER



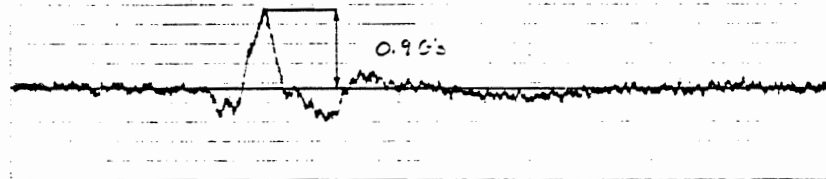
RIGHT UPPER RIB  
ACCELEROMETER



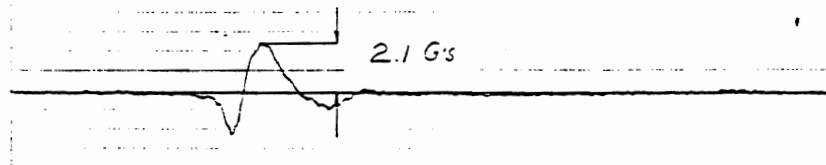
RIGHT LOWER RIB  
ACCELEROMETER



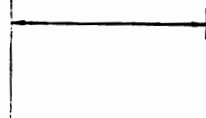
STERNUM UPPER  
ACCELEROMETER



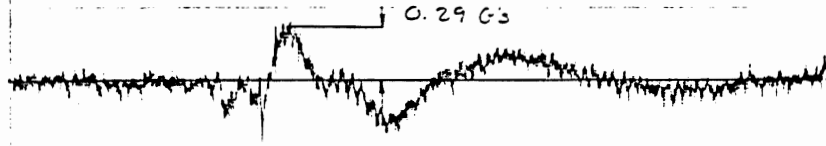
STERNUM LOWER  
ACCELEROMETER



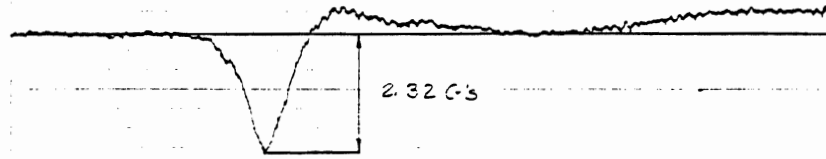
100 msec



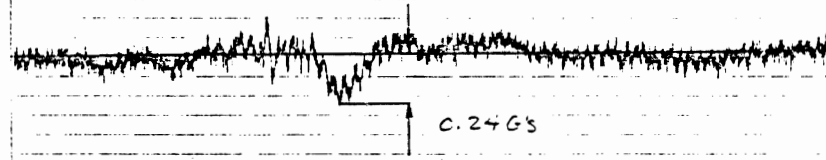
T<sub>1</sub> ACCELEROMETER  
(P-A)



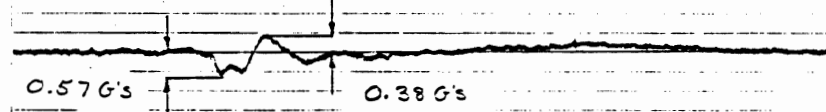
T<sub>1</sub> ACCELEROMETER  
(E-L)



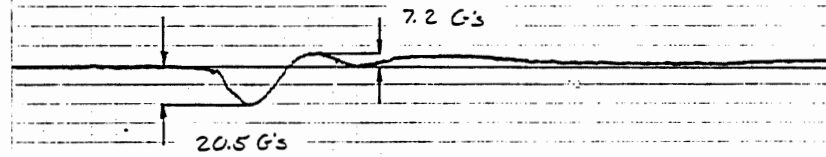
T<sub>1</sub> ACCELEROMETER  
(I-S)



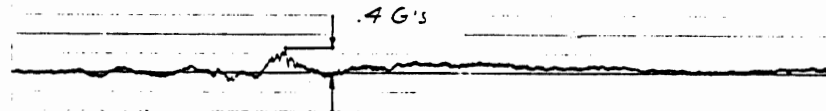
T<sub>12</sub> ACCELEROMETER  
(P-A)



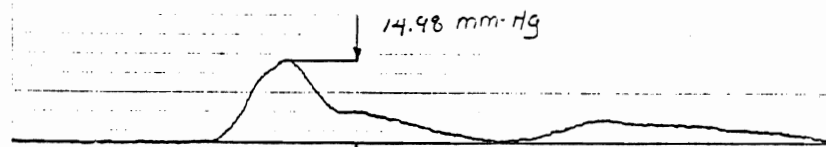
T<sub>12</sub> ACCELEROMETER  
(E-L)



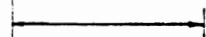
T<sub>12</sub> ACCELEROMETER  
(I-S)

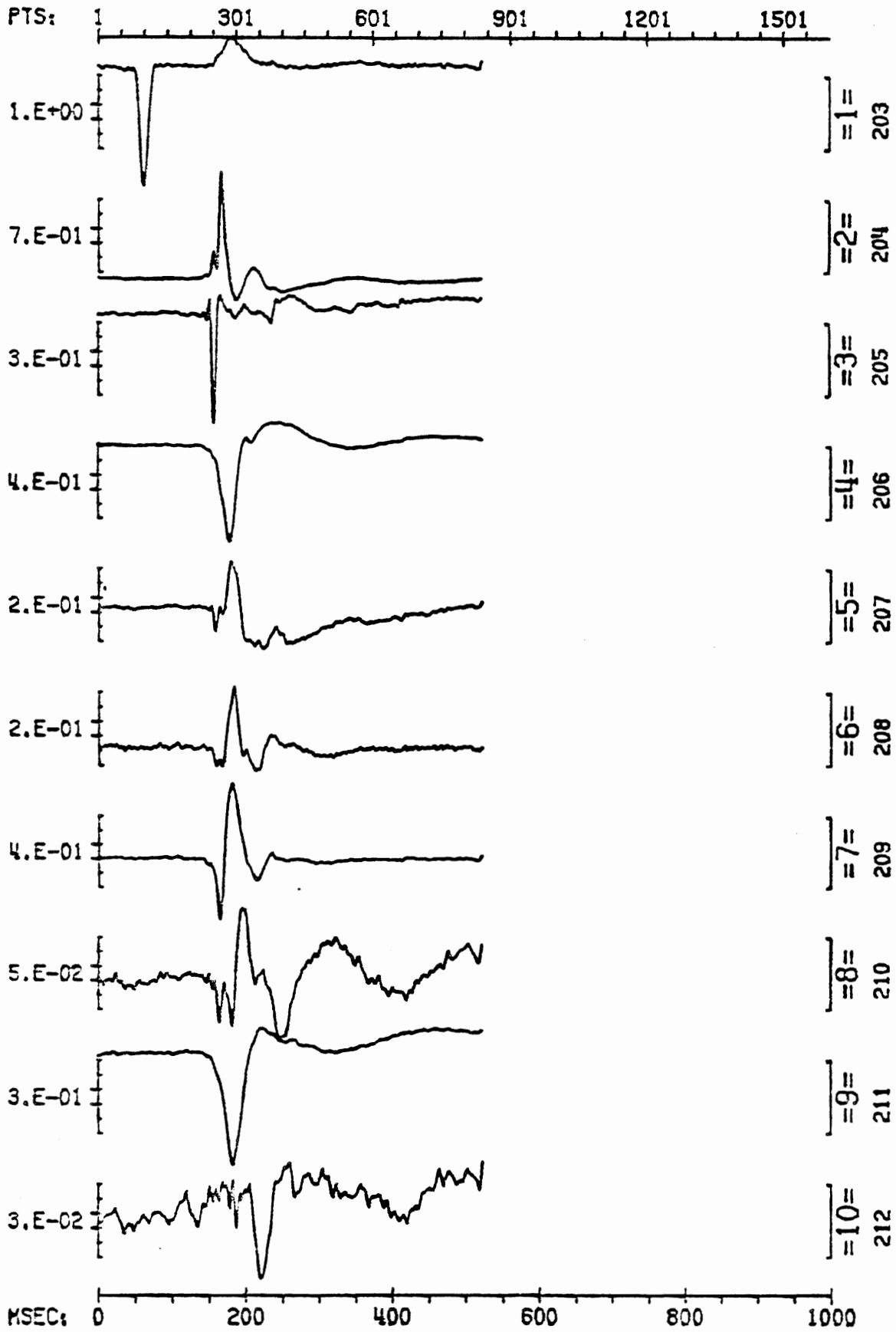


VASCULAR  
PRESSURE



100 msec





IO: 77T073-1:PT

TAPE: PEND. TEST

\*\*\*\*\*  
 RUN ID: 77T073-11PT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

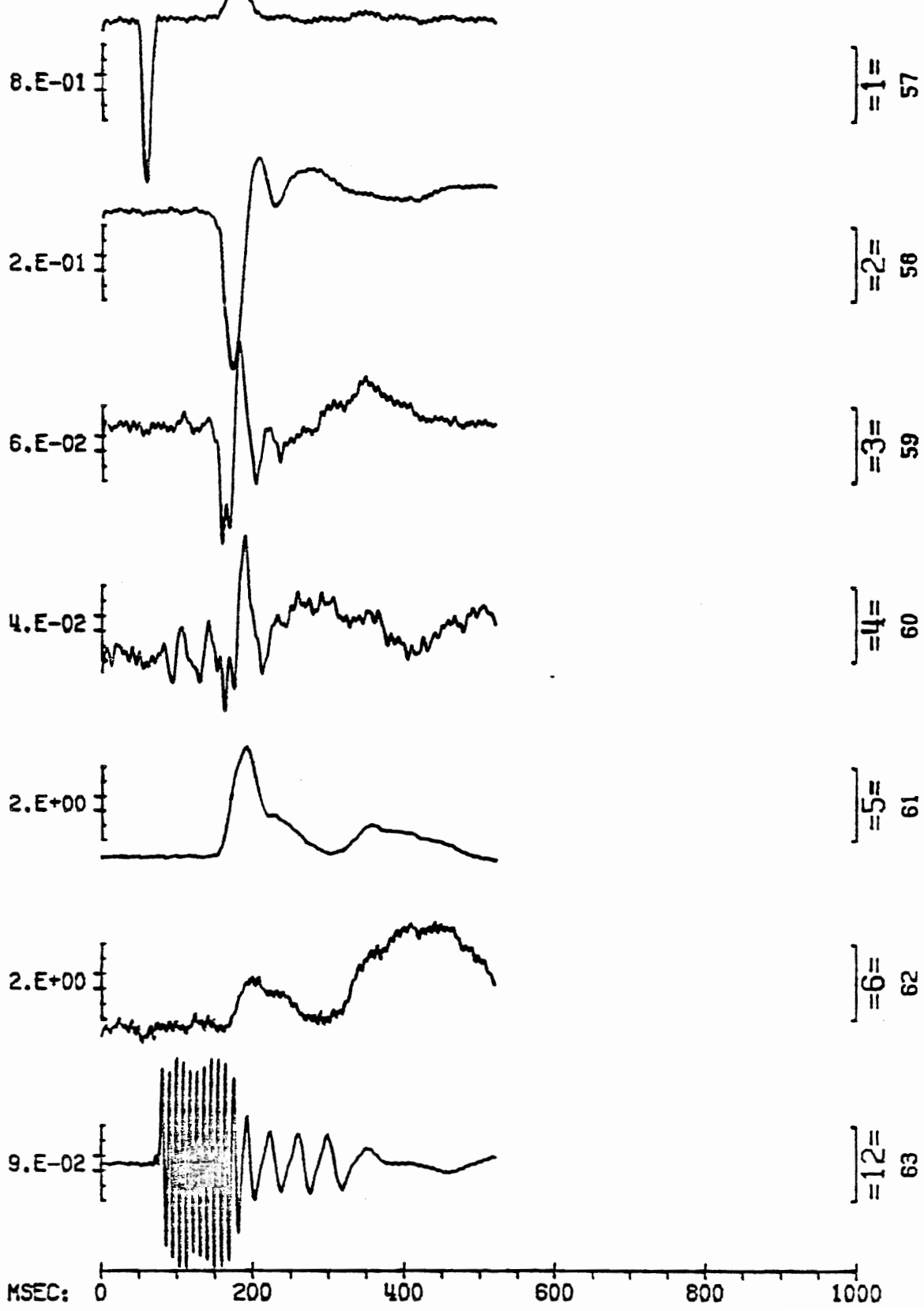
TEST SIGNALS: 3476 PTS/CH AT 6397.06 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
203	1	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	836	1599.26
204	2	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	836	1599.26
205	3	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	836	1599.26
206	4	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	836	1599.26
207	5	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.7	836	1599.26
208	6	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	836	1599.26
209	7	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.7	836	1599.26
210	8	T-1 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	836	1599.26
211	9	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	836	1599.26
212	10	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	836	1599.26

111  
 121  
 131  
 141

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 FILTERED FILES: 203 - 212 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T073-11PT  
 -----

PTS: 1 301 601 901 1201 1501



ID: 77T073-2:PT

TAPE: PEND. TEST

\*\*\*\*\*  
 RUN ID: 771073-21PT  
 \*\*\*\*\*

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

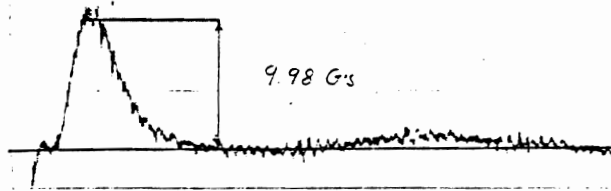
ANALOG TAPE: HSR1#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77  
 TEST SIGNALS: 3342 PTS/CH AT 6397.70 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
57	1: PISTON DECELERATION	30.00	G'S	4+1+	3 100.0	832	1599.43
58	2: T-12 P-A ACCELEROMETER	4.30	G'S	4+1+	3 100.0	832	1599.43
59	3: T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3 100.0	832	1599.43
60	4: T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.0	832	1599.43
61	5: VASCULAR PRESSURE	14.10	MM-HG	4+1+	3 100.0	832	1599.43
62	6: VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 100.0	832	1599.43
71							
81							
91							
101							
111							
63	12: PISTON VELOCITY	1.00	VOLTS	4+1+	3 100.0	832	1599.43
131							
141							

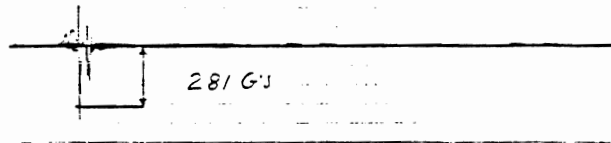
\*\*\*\*\*  
 FILTERED FILES: 57 - 63 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 771073-21PT  
 \*\*\*\*\*

TEST NO: 77T074

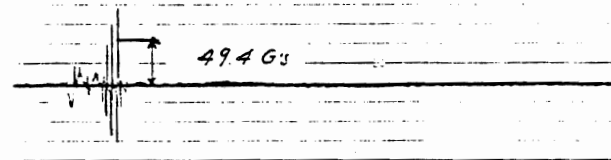
PISTON  
ACCELERATION



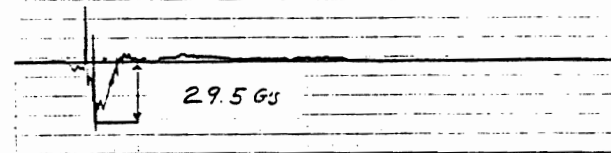
LEFT UPPER RIB  
ACCELEROMETER



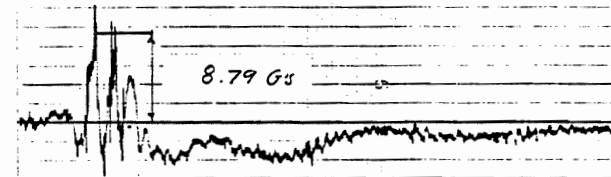
LEFT LOWER RIB  
ACCELEROMETER



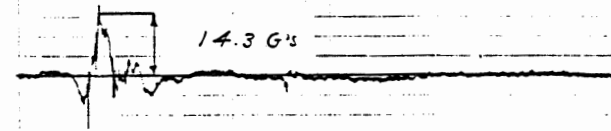
RIGHT UPPER RIB  
ACCELEROMETER



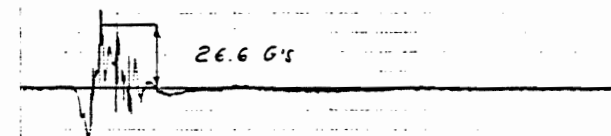
RIGHT LOWER RIB  
ACCELEROMETER



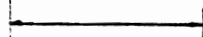
STERNUM UPPER  
ACCELEROMETER



STERNUM LOWER  
ACCELEROMETER

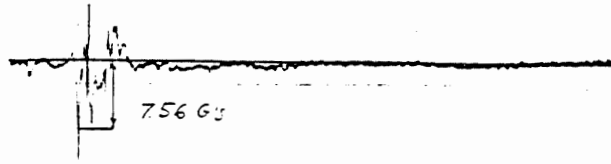


100 msec

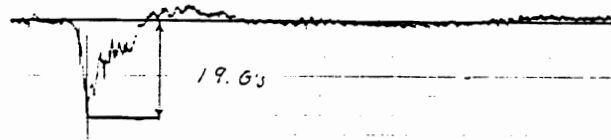




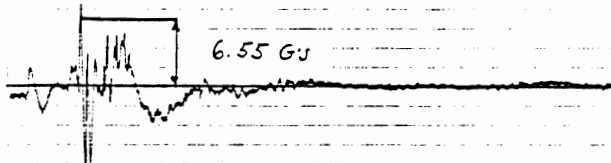
T<sub>1</sub> ACCELEROMETER  
(P-A)



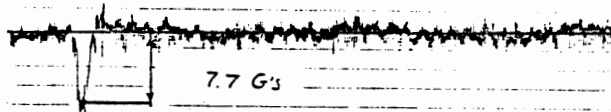
T<sub>1</sub> ACCELEROMETER  
(E-L)



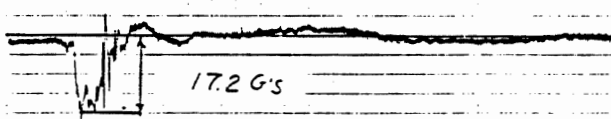
T<sub>1</sub> ACCELEROMETER  
(I-S)



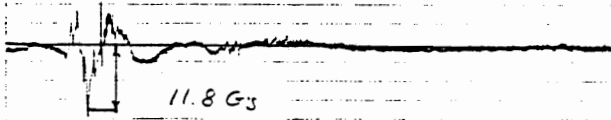
T<sub>12</sub> ACCELEROMETER  
(P-A)



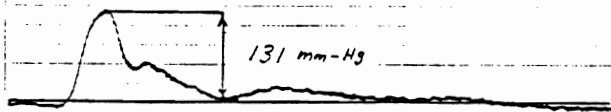
T<sub>12</sub> ACCELEROMETER  
(E-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)

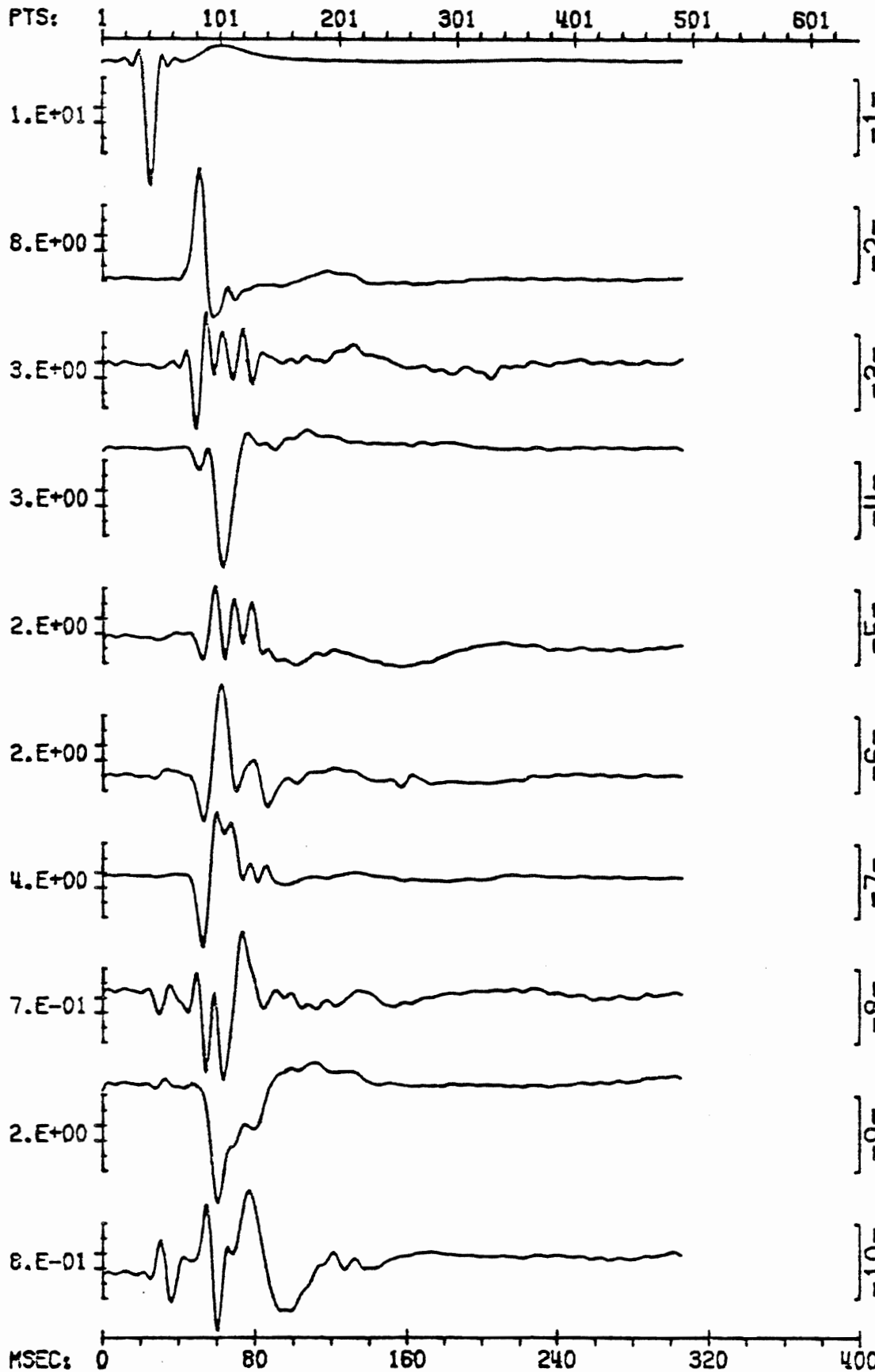


VASCULAR  
PRESSURE



100 msec





ID: 77T074-1:PP

LCR

TCR

LCST

TAPE: PEND. TEST

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RUN ID: 77T074-1:PP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0018 DATE: 12-AUG-77

TEST SIGNALS: 1972 PTS/CH AT 6398.83 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
213	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	490	1599.71
214	- 2:	LEFT UPPER RIB ACCELEROMETER	89.20	G'S	4+1+ 3	100.0	490	1599.71
215	- 3:	LEFT LOWER RIB ACCELEROMETER	84.00	G'S	4+1+ 3	100.0	490	1599.71
216	- 4:	RIGHT UPPER RIB ACCELEROMETER	38.10	G'S	4+1+ 3	100.0	490	1599.71
217	- 5:	RIGHT LOWER RIB ACCELEROMETER	37.40	G'S	4+1+ 3	100.0	490	1599.71
218	- 6:	UPPER STERNAL ACCELEROMETER	44.70	G'S	4+1+ 3	100.0	490	1599.71
219	- 7:	LOWER STERNAL ACCELEROMETER	33.20	G'S	4+1+ 3	100.0	490	1599.71
220	- 8:	T-1 P-A ACCELEROMETER	21.00	G'S	4+1+ 3	100.0	490	1599.71
221	- 9:	T-1 H-L ACCELEROMETER	38.00	G'S	4+1+ 3	100.0	489	1599.71
222	- 10:	T-1 I-S ACCELEROMETER	19.00	G'S	4+1+ 3	100.0	489	1599.71

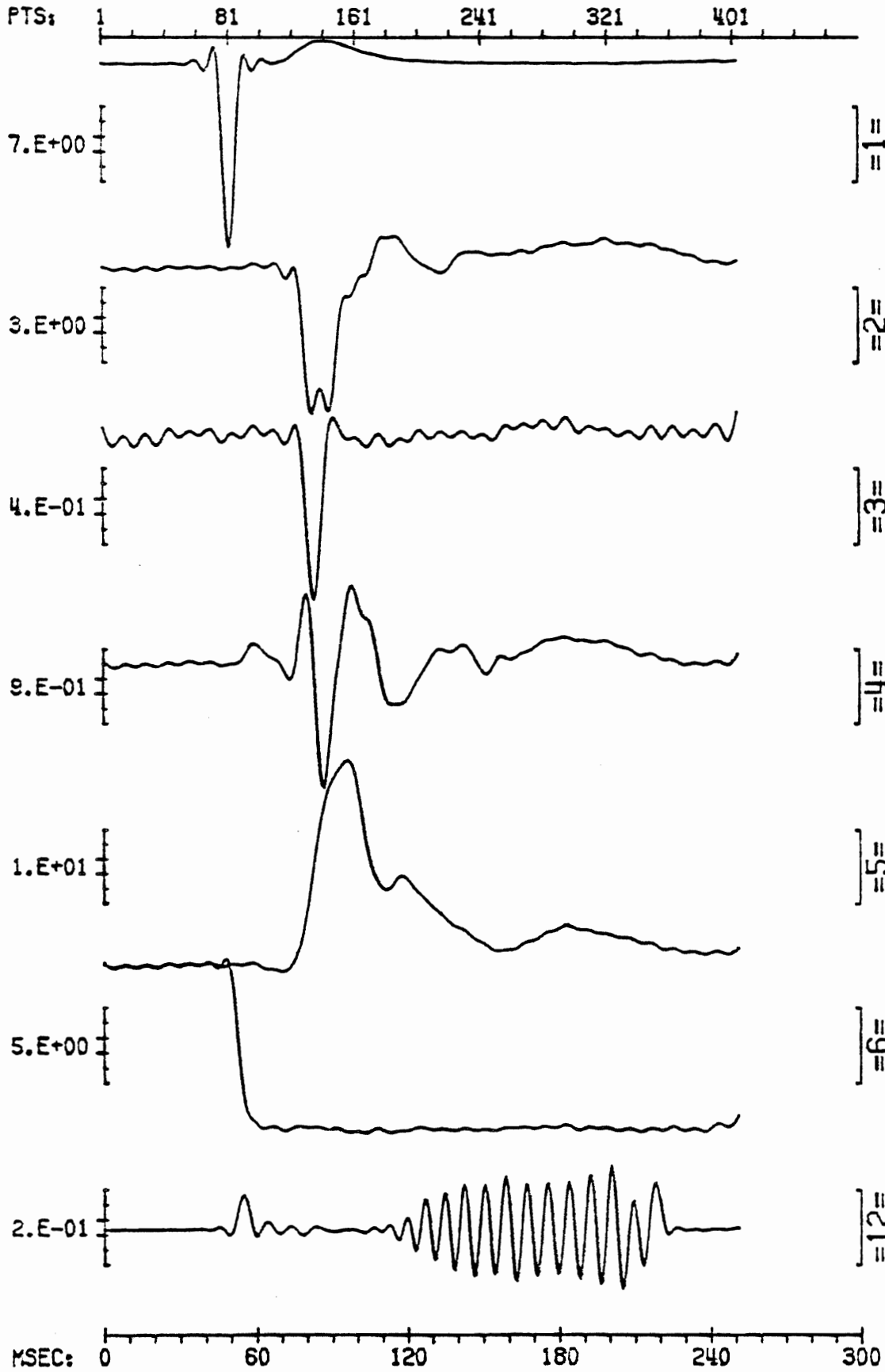
11:

12:

13:

14:

FILTFRED FILES: 213 - 222 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T074-1:PP



64  
77T074-2:PP

ID: 77T074:PP

=1=  
65  
=2=  
66  
=3=  
67  
=4=  
68  
=5=  
69  
=6=  
70  
=12=

TAPE: PEND. TEST

\*\*\*\*\*  
RUN ID: 77T074IPP

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 1613 PTS/CH AT 6397.46 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
64	- 18	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	403	1599.37
65	- 21	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+3	100.0	403	1599.37
66	- 31	T-12 R-L ACCELEROMETER	42.90	G'S	4+1+3	100.0	403	1599.37
67	- 41	T-12 I-S ACCELEROMETER	34.60	G'S	4+1+3	100.0	403	1599.37
68	- 51	VASCULAR PRESSURE	283.00	MM-HG	4+1+3	100.0	403	1599.37
69	- 61	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+3	100.0	403	1599.37

71  
81  
91  
101  
111

70 - 12: PISTON VELOCITY 1.00 VOLT8 4+1+3 100.0 403 1599.37

131  
141

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FILTERED FILES: 64 - 70 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T074IPP

## SUMMARY TEST REPORT

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

### TEST NUMBERS:

- 77T075 - Low Energy Front Pendulum Impact
- 77T076 - Low Energy Side Pendulum Impact
- 77T077 - Pendulum 19.99 ft/sec Side Impact

### TEST DATE:

July 22, 1977

### TEST SUBJECT:

- Age - 79
- Sex - M
- Weight - 73.7 kg
- Stature - 175.5 cm.

### RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

### VELOCITY:

In Test No. 77T077, velocity was 19.99 ft/sec

### INJURIES:

Fractures of left ribs 4, 5 and 6 with hemorrhaging. Small bruises in pericardium, heart muscle (associated with scar), surface bruises on diaphragm and on lower region of left lung. External bruise on side at impact location.

### AIS NUMBER ESTIMATE:

TEST # 77To77

TEST DATE 7.20.77

TEST DESCRIPTION Pendulum Side Impact VELOCITY 20. ft/s

SUBJECT:

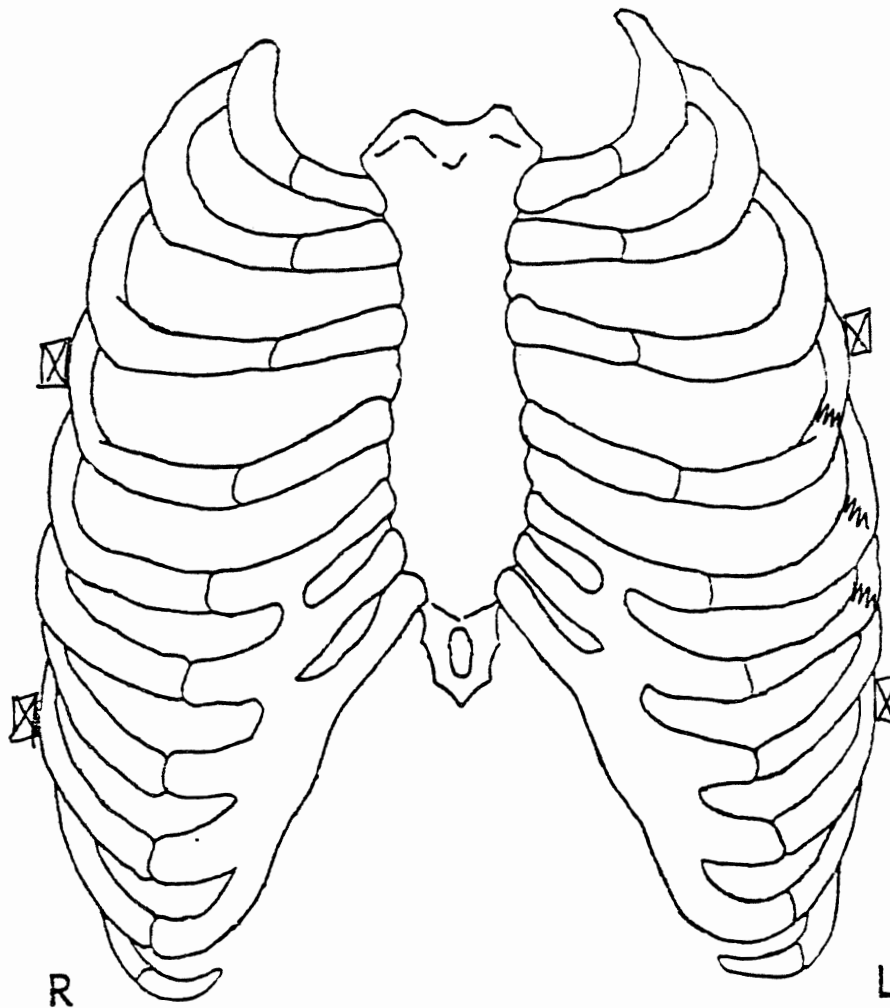
AGE 79 SEX M CAUSE OF DEATH Unknown

INJURY INFORMATION:

OVERALL THORACIC AIS 4

	REGION	ASPECT	LESION	SYSTEM	AIS
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>C</u>	<u>4</u>
	2	<u>C</u>	<u>L</u>	<u>F</u>	<u>S</u>
	3	<u>C</u>	<u>L</u>	<u>C</u>	<u>P</u>
	4	<u>C</u>	<u>L</u>	<u>C</u>	<u>I</u>
	5	—	—	—	—
	6	—	—	—	—
	7	—	—	—	—
	8	—	—	—	—
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>S</u>	<u>C</u>	<u>R</u>
	2	—	—	—	—
	3	—	—	—	—
	4	—	—	—	—
	5	—	—	—	—

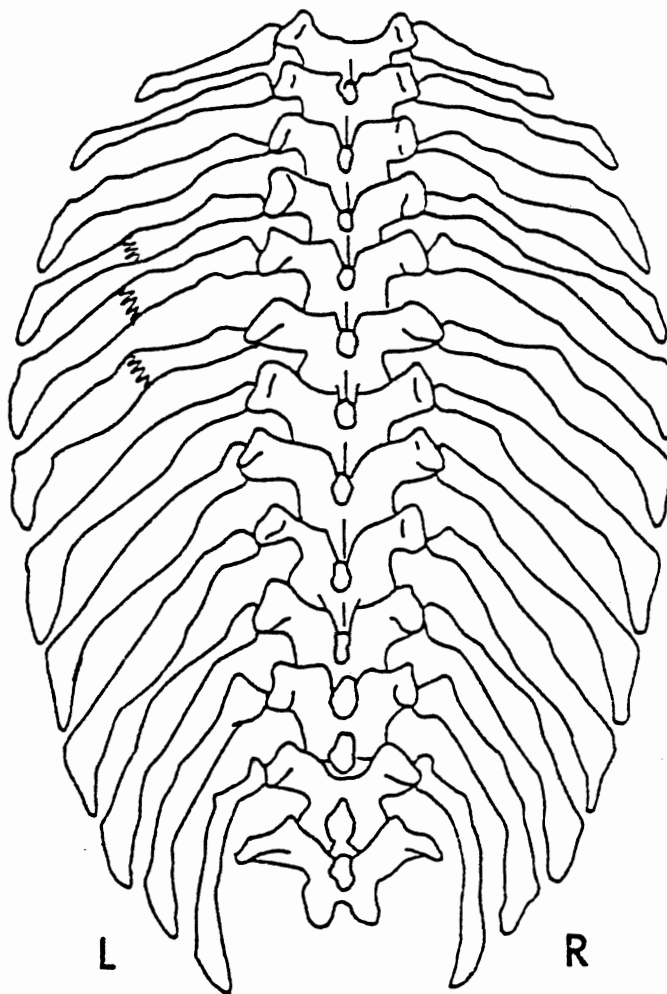
TEST # 77077



ANTERIOR VIEW RIB CAGE (Also: Chest wall contusions)

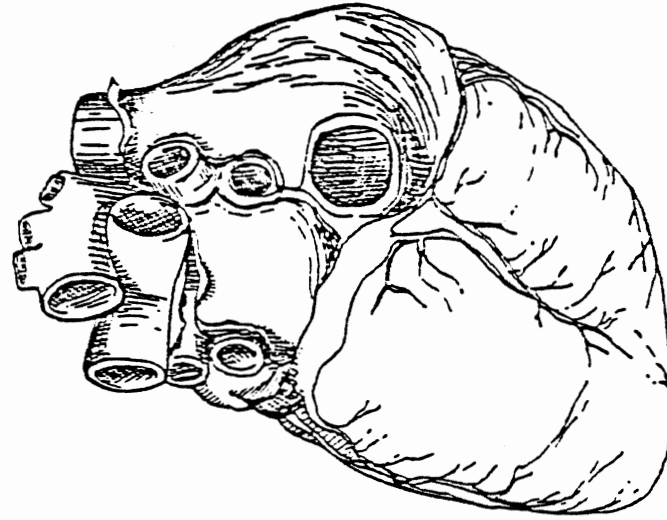


TEST # 77077

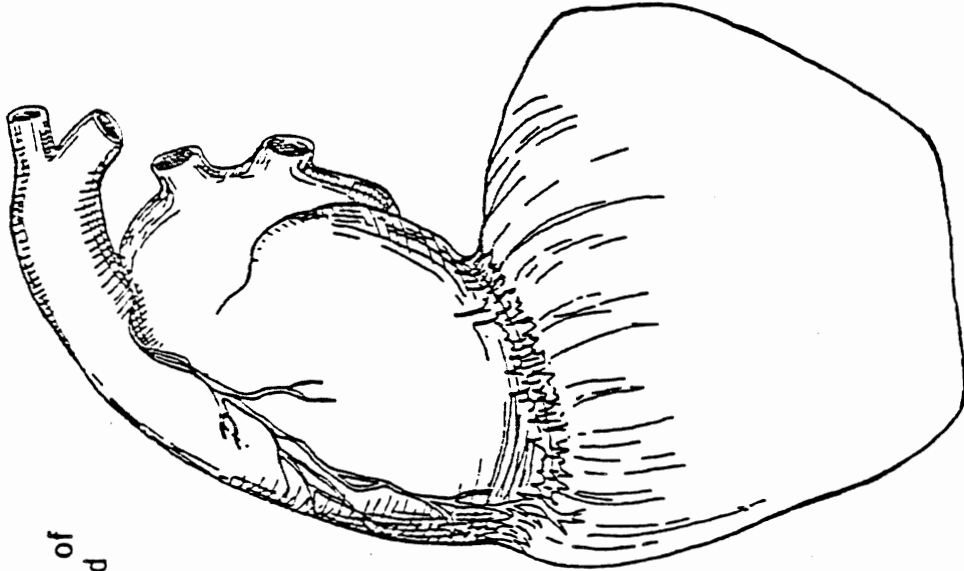


POSTERIOR VIEW RIB CAGE

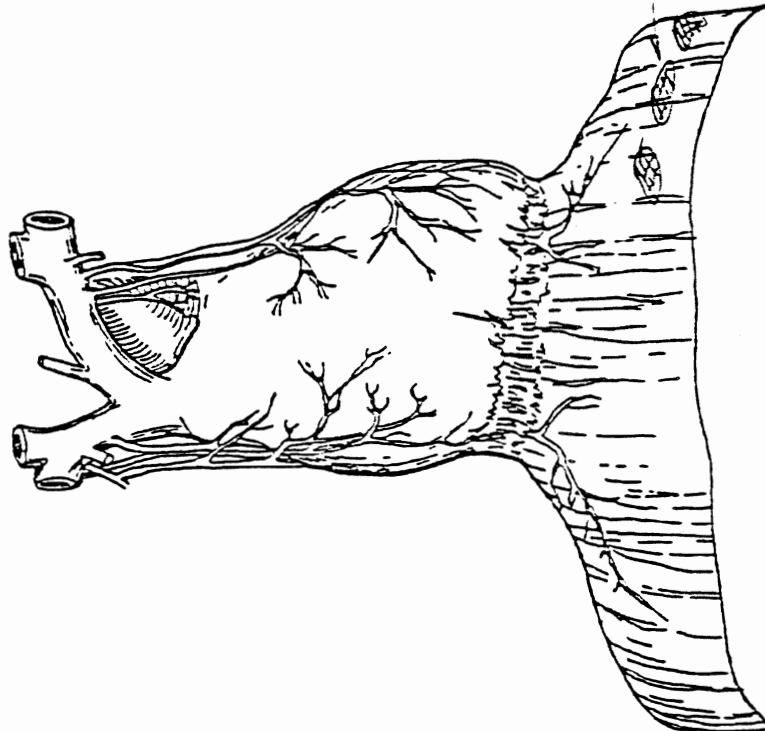
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm

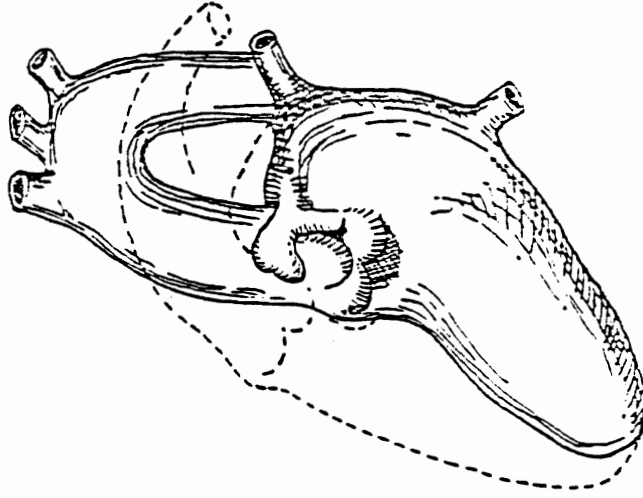


— bris on diaphragm

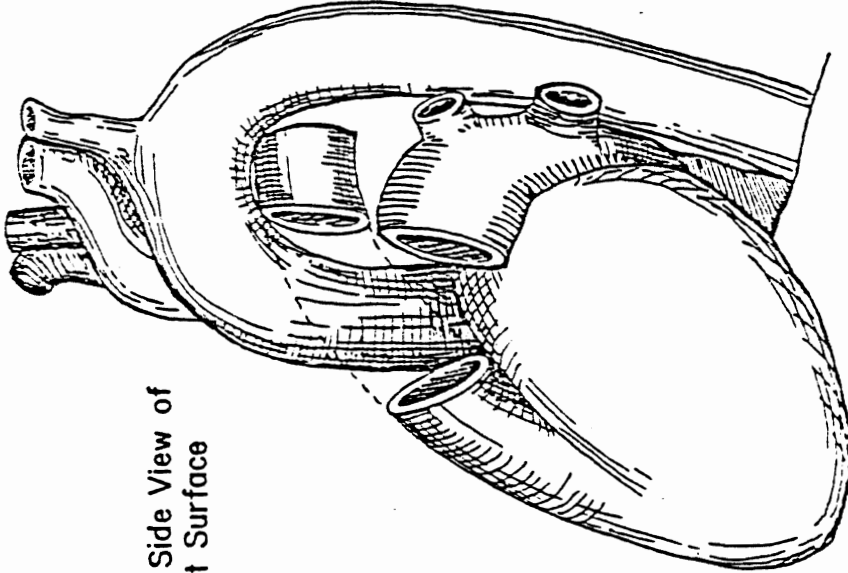


Anterior View of Pericardium and Diaphragm

Left View of Left Side of Heart

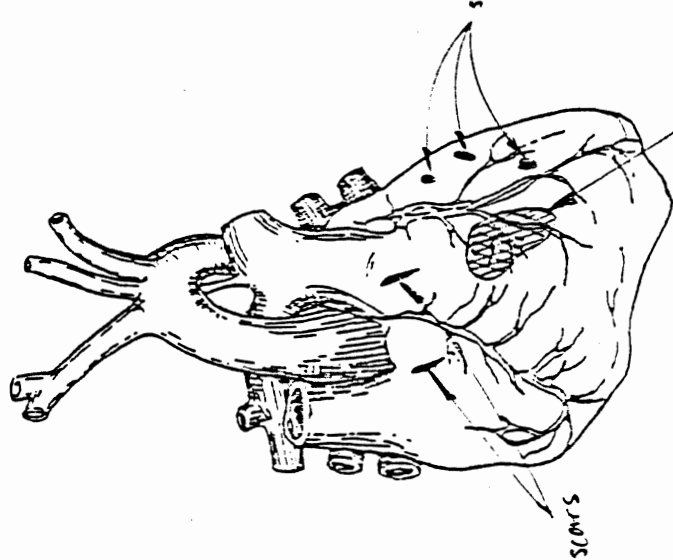


Left Side View of Heart Surface



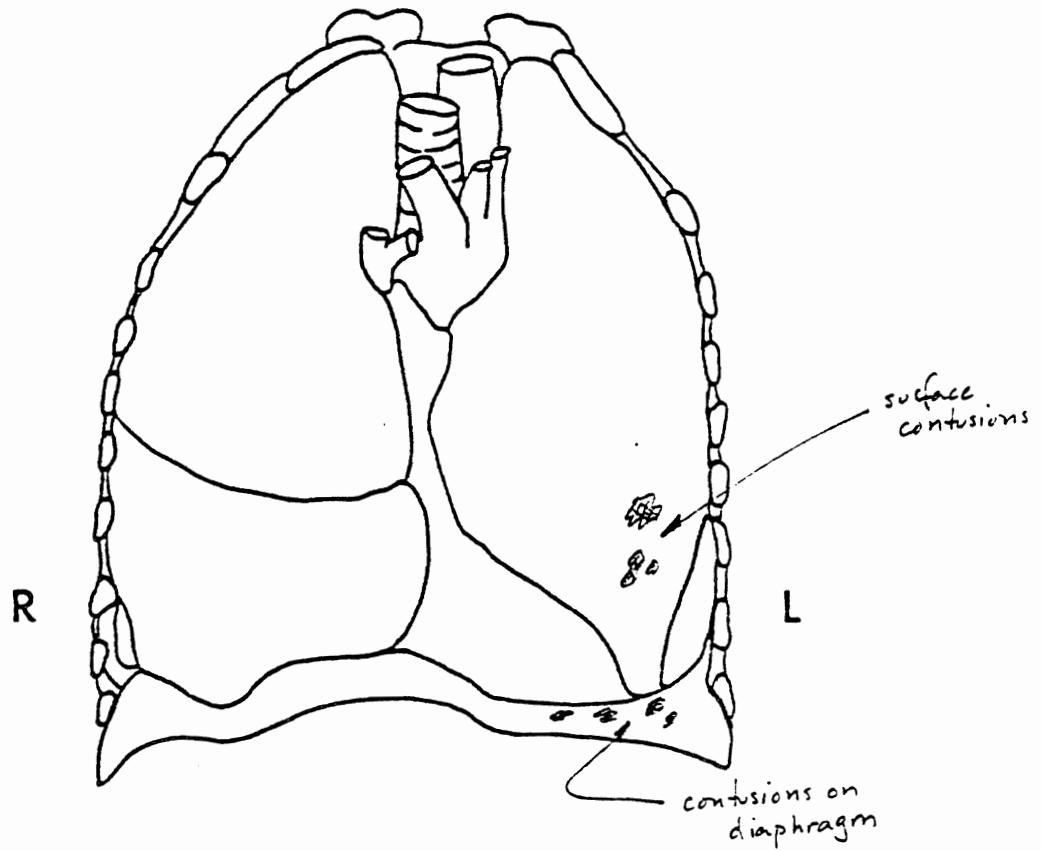
small bruits on pericardium

large surface bruise with associated scar

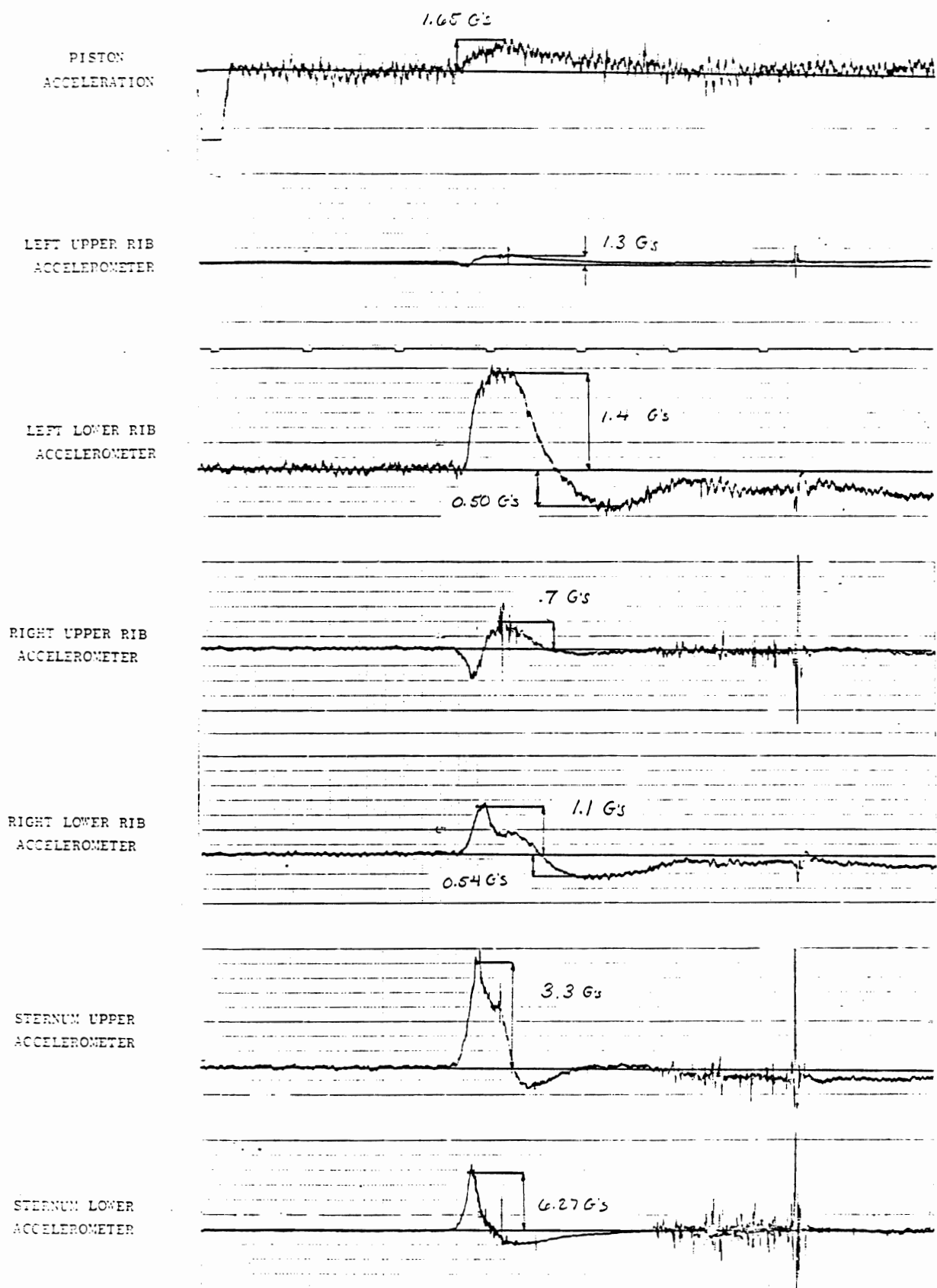


Anterior View of Heart

TEST # 77T077

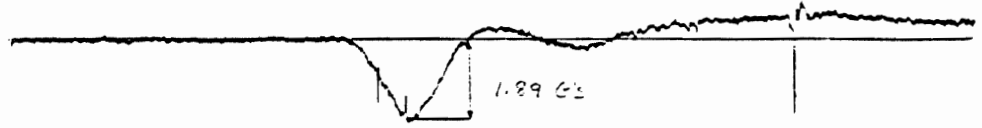


ANTERIOR VIEW THORACIC CAVITY

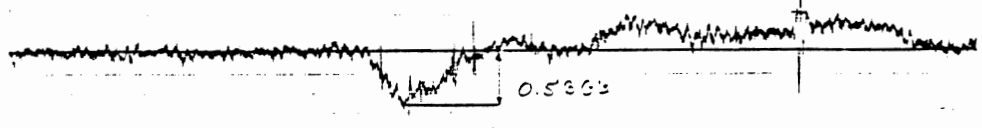


100 msec

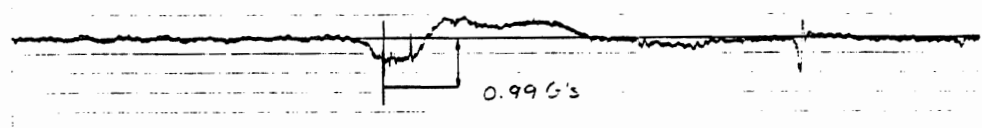
T<sub>1</sub> ACCELEROMETER  
(F-A)



T<sub>1</sub> ACCELEROMETER  
(F-L)



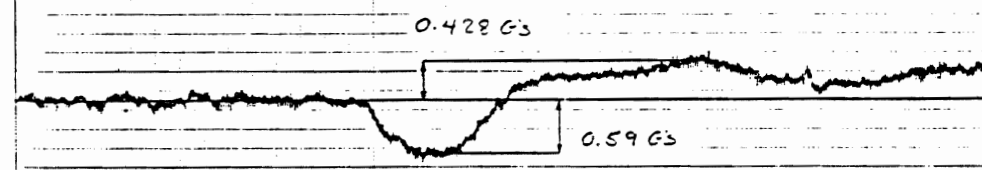
T<sub>1</sub> ACCELEROMETER  
(I-S)



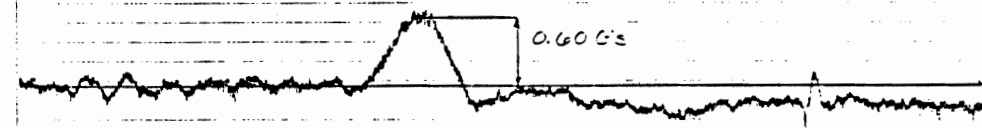
T<sub>12</sub> ACCELEROMETER  
(F-A)



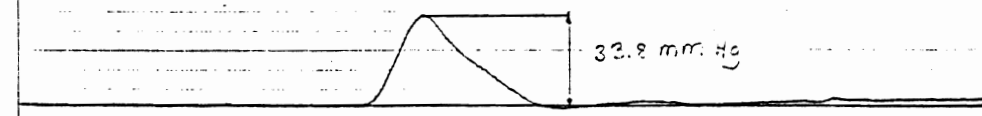
T<sub>12</sub> ACCELEROMETER  
(F-L)



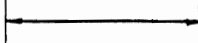
T<sub>12</sub> ACCELEROMETER  
(I-S)

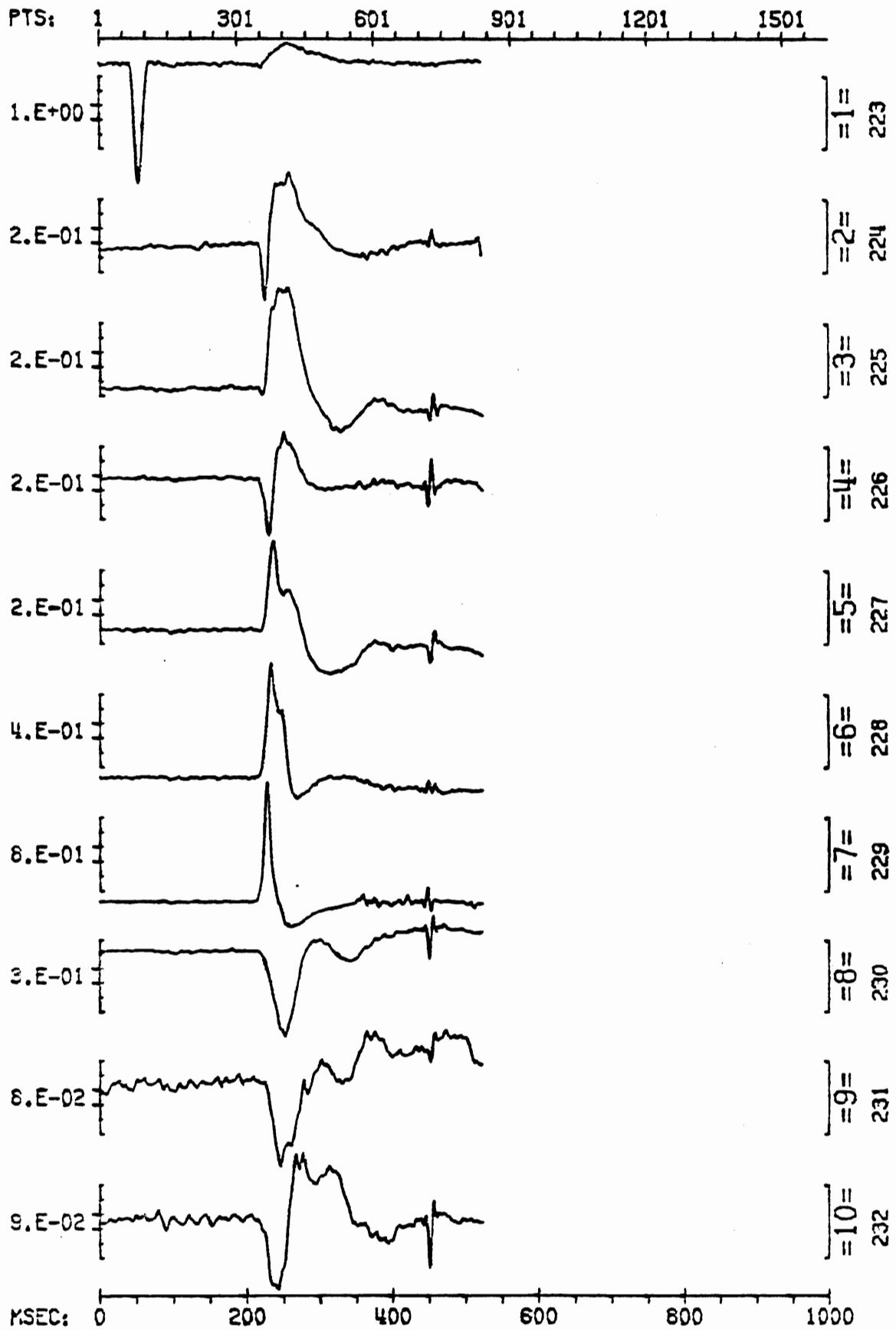


VASCULAR  
PRESSURE



100 msec





ID: 77T075-1:PT

TAPE: PEND. TEST

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RUN ID: 77T075-11PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; H80010 DATE: 12-AUG-77

TEST SIGNALS: 3972 PTS/CH AT 6398.33 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
223	1	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	836	1599.50
224	2	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	836	1599.50
225	3	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.0	836	1599.50
226	4	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	836	1599.50
227	5	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.0	836	1599.50
228	6	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	836	1599.50
229	7	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.0	836	1599.50
230	8	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	836	1599.50
231	9	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	836	1599.50
232	10	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	836	1599.50

11:

12:

13:

14:

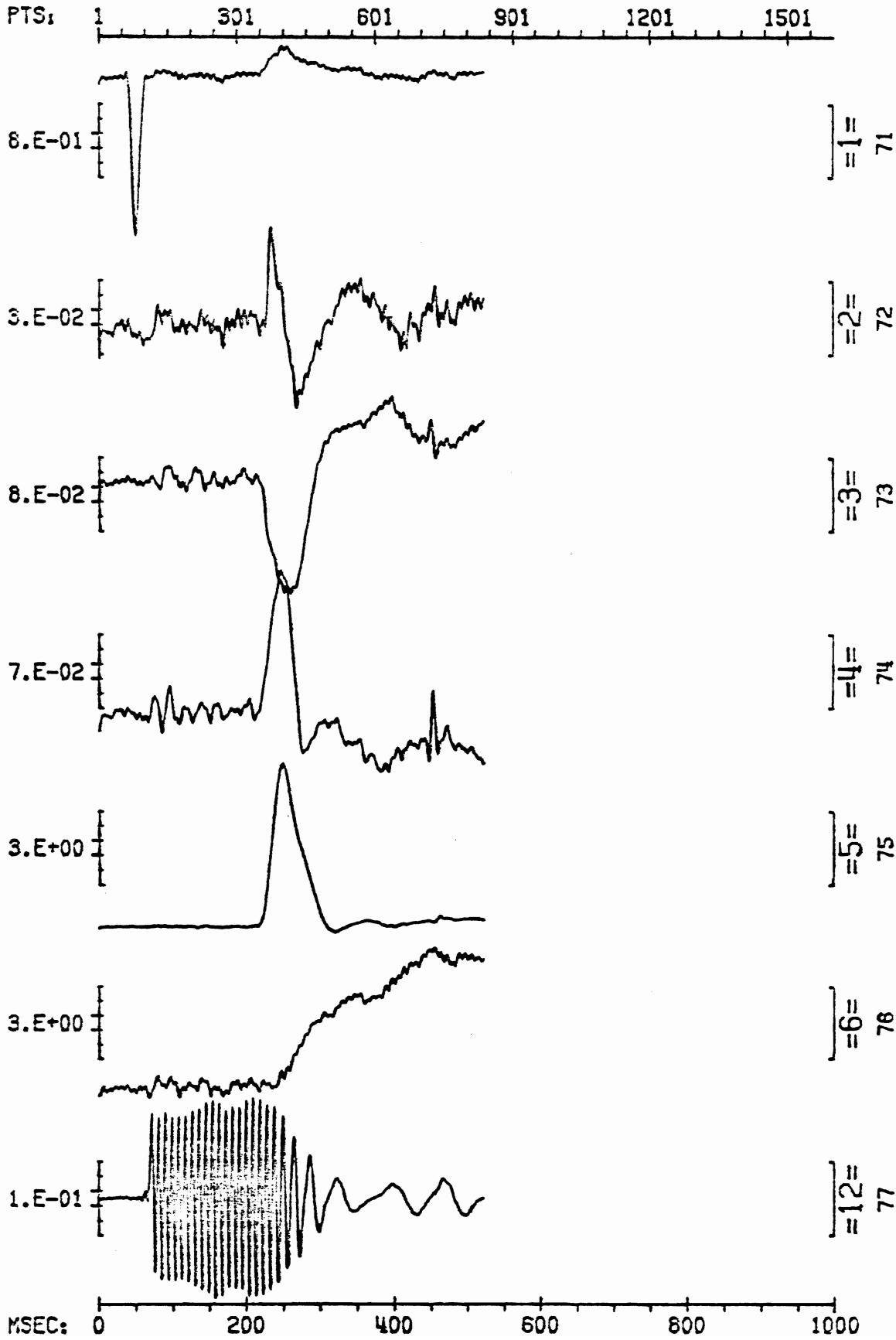
DIGITAL TAPE: JEFLEH

RUN ID: 77T075-11PT

DATE: 19-AUG-77

FILED FILES: 223 - 232





ID: 77T075-2:PT

TAPE: PEND. TEST

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 RUN ID: 771075-21PT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT - PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77  
 TEST SIGNALS: 3444 PTS/CH AT 6397.47 HZ. CAL SIGNALS: NOT DIGITIZED.

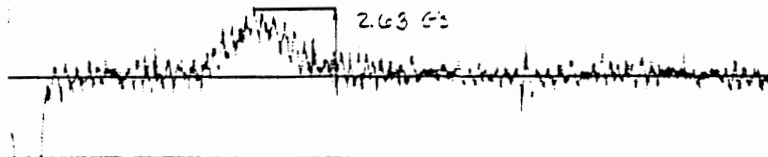
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
71	11	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	036 0	1599.37
72	21	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+3	100.0	036 0	1599.37
73	31	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+3	100.0	036 0	1599.37
74	41	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+3	100.0	036 0	1599.37
75	51	VASCULAR PRESSURE	14.10	MM-HG	4+1+3	100.0	036 0	1599.37
76	61	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+3	100.0	036 0	1599.37

77	121	PISTON VELOCITY	1.00	VOLTS	4+1+3	100.0	036 0	1599.37
131								
141								

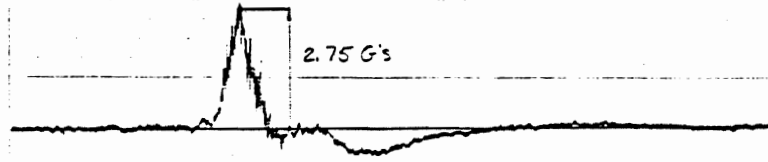
\*\*\*\*\*  
 FILTERED FILES: 71 - 77 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 771075-21PT  
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TEST NO: 77T076

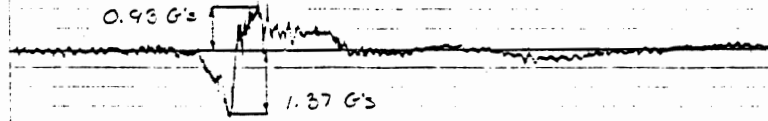
PISTON  
ACCELERATION



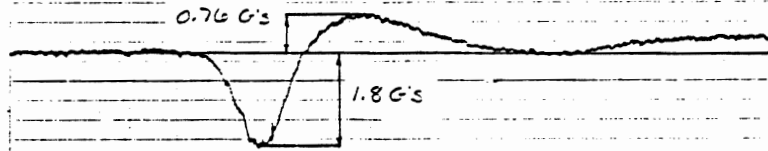
LEFT UPPER RIB  
ACCELEROMETER



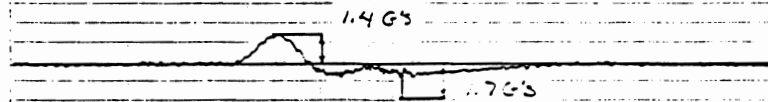
LEFT LOWER RIB  
ACCELEROMETER



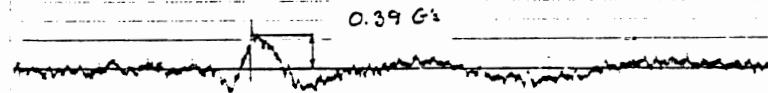
RIGHT UPPER RIB  
ACCELEROMETER



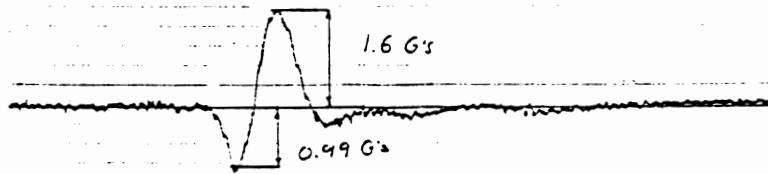
RIGHT LOWER RIB  
ACCELEROMETER



STERNUM UPPER  
ACCELEROMETER



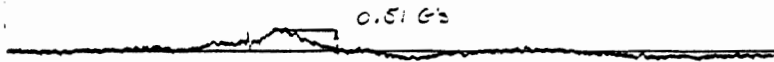
STERNUM LOWER  
ACCELEROMETER



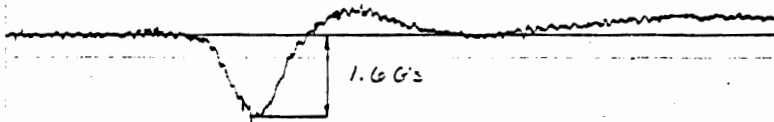
100 msec



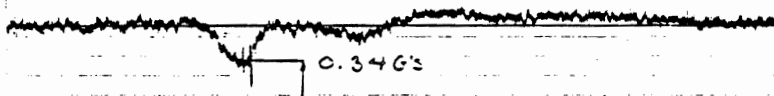
T<sub>1</sub> ACCELEROMETER  
(P-A)



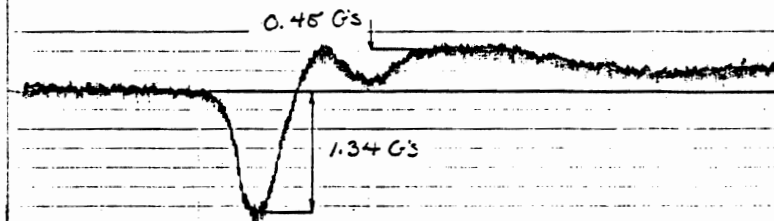
T<sub>1</sub> ACCELEROMETER  
(R-L)



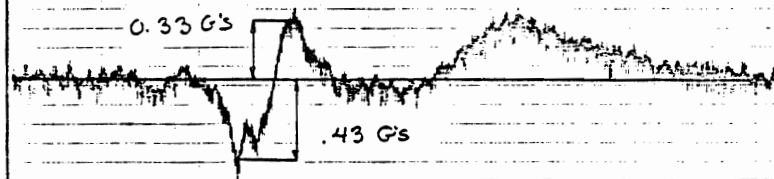
T<sub>1</sub> ACCELEROMETER  
(I-S)



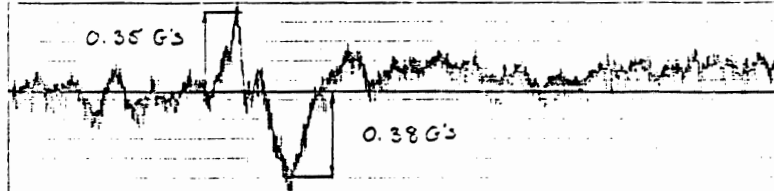
T<sub>12</sub> ACCELEROMETER  
(P-A)



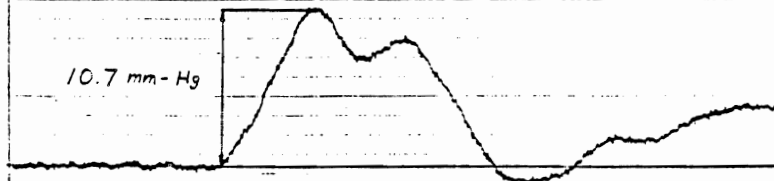
T<sub>12</sub> ACCELEROMETER  
(R-L)



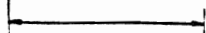
T<sub>12</sub> ACCELEROMETER  
(I-S)



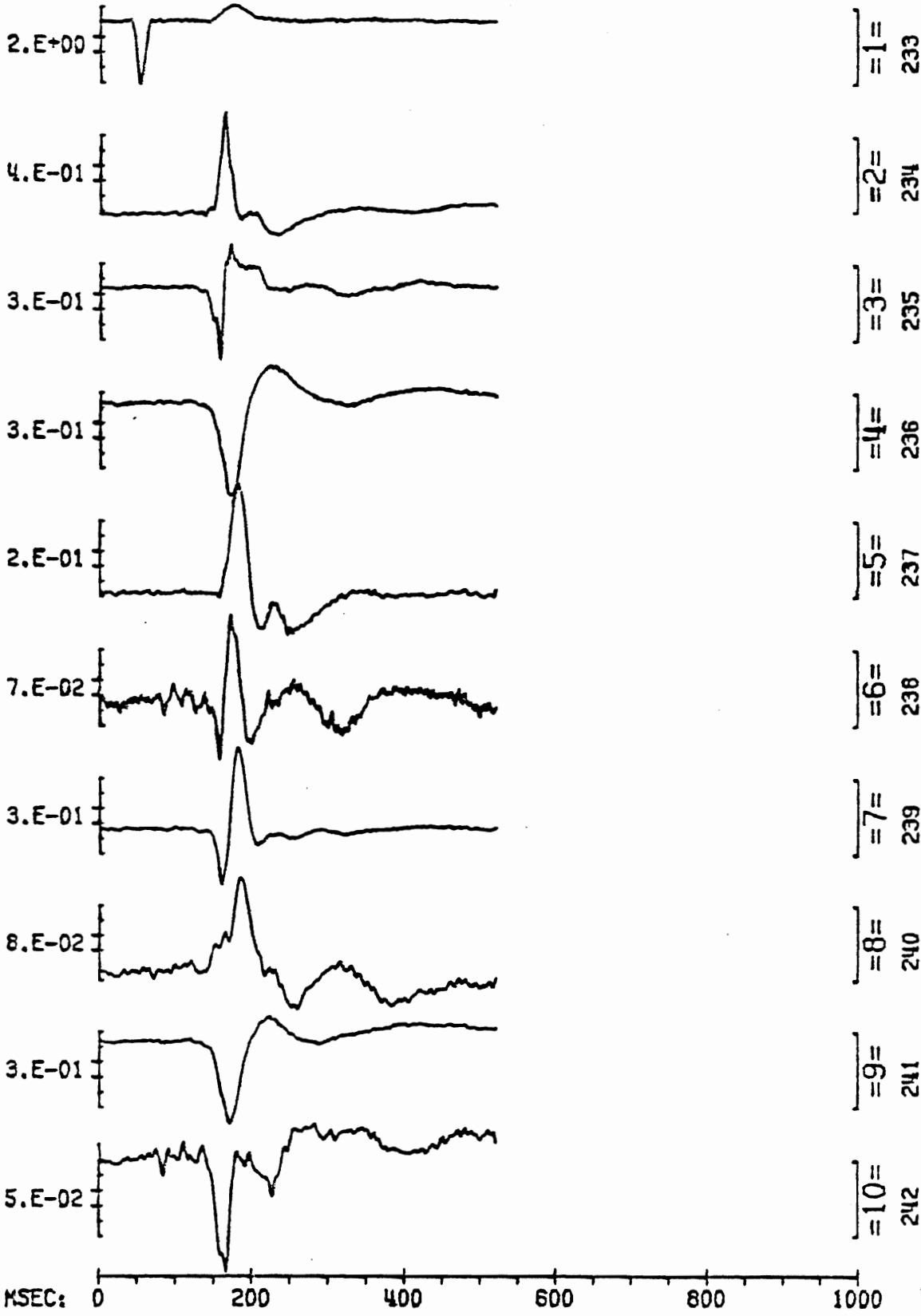
VASCULAR  
PRESSURE



100  $\mu$ sec



PTS: 1 301 601 901 1201 1501



ID: 77T076-1:PT

TAPE: PEND. TEST

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RUN ID: 77T076-11PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 12-AUG-77

TEST SIGNALS: 3438 PTS/CH AT 6397.10 HZ. CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
233	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	836	1599.27
234	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	836	1599.27
235	- 3:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	836	1599.27
236	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	836	1599.27
237	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+ 3	100.7	836	1599.27
238	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	836	1599.27
239	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+ 3	100.7	836	1599.27
240	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+ 3	100.7	836	1599.27
241	- 9:	T-1 R-L ACCELEROMETER	3.00	G'S	4+1+ 3	100.7	836	1599.27
242	- 10:	T-1 I-S ACCELEROMETER	3.00	G'S	4+1+ 3	100.7	836	1599.27

11:

12:

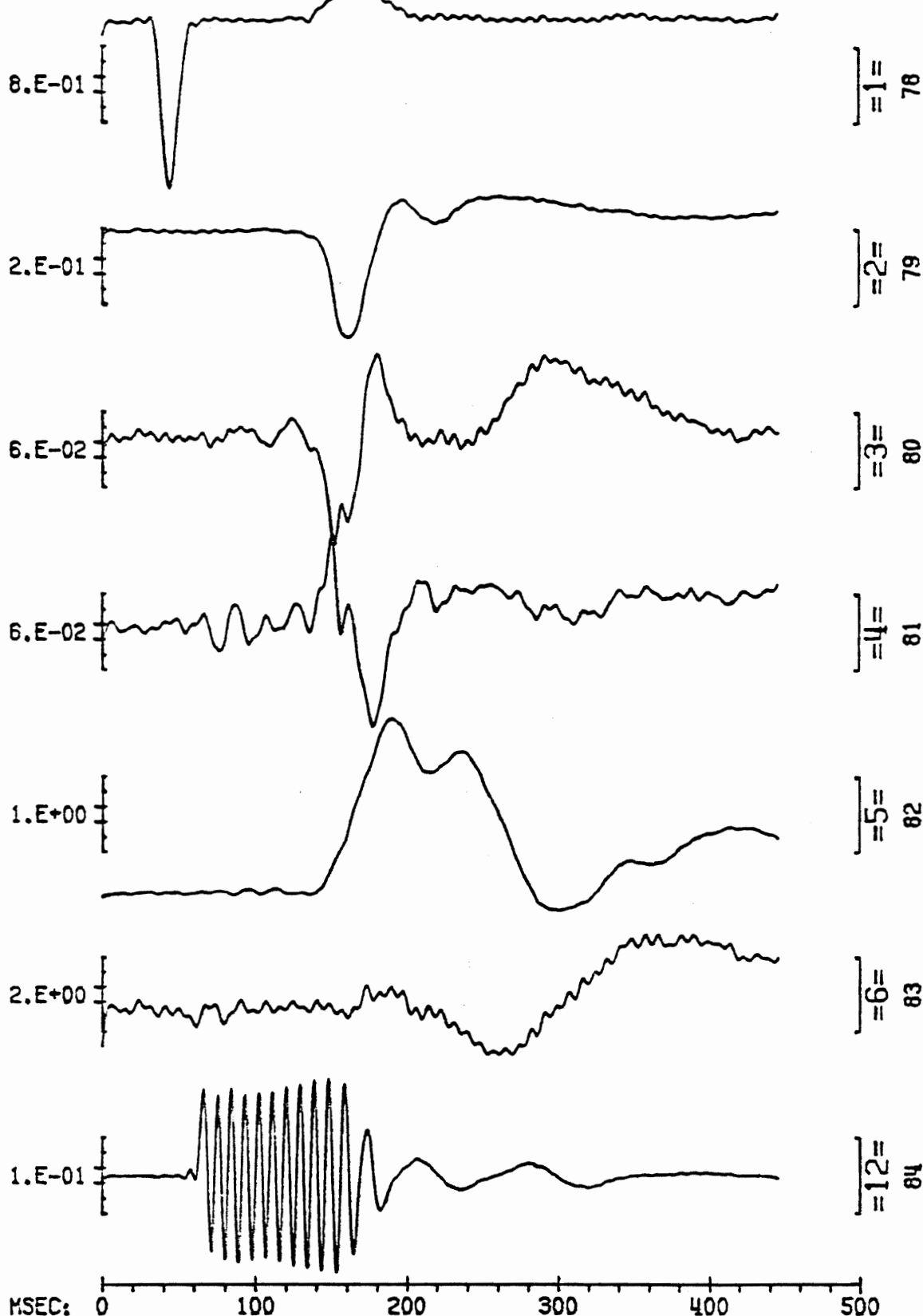
13:

14:

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FILTERED FILES: 233 - 242 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T076-11PT

PTS: 1 101 201 301 401 501 601 701



ID: 77T076-2:PT

TAPE: PEND. TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T076-2IPT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16BIT, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

TEST SIGNALS: 2861 PTS/CH AT 6397.85 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
78 - 11	PISTON DECELERATION	30.00	G'S	4+1+	3	100.0	714 @ 1599.46
79 - 21	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+	3	100.0	714 @ 1599.46
80 - 31	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3	100.0	714 @ 1599.46
81 - 41	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3	100.0	714 @ 1599.46
82 - 51	VASCULAR PRESSURE	14.10	MM-HG	4+1+	3	100.0	714 @ 1599.46
83 - 61	VERTICAL SUPPORT FORCE	200.00	LB8.	4+1+	3	100.0	714 @ 1599.46

71

81

91

101

111

84 - 121 PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.0 713 @ 1599.46

131

141

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FILTERED FILES: 78 - 84 DIGITAL TAPE: JEFLEH

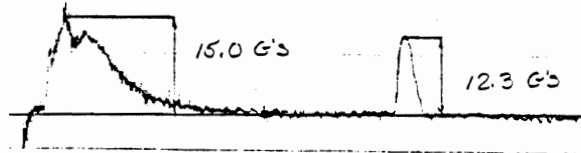
DATE: 17-AUG-77

RUN ID: 77T076-2IPT

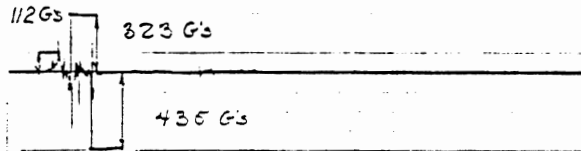
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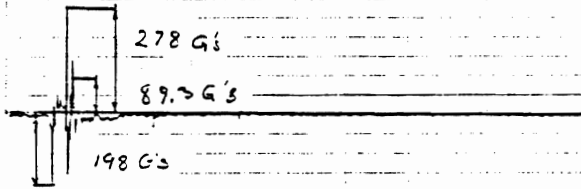
PISTON  
ACCELERATION



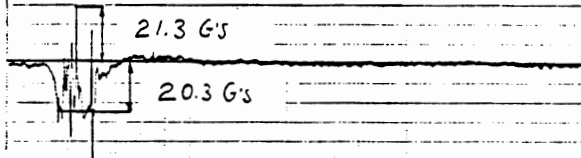
LEFT UPPER RIB  
ACCELEROMETER



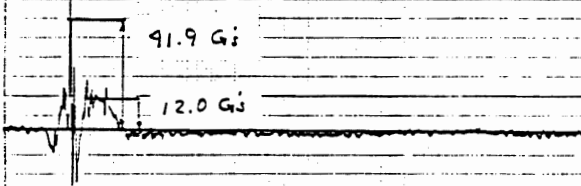
LEFT LOWER RIB  
ACCELEROMETER



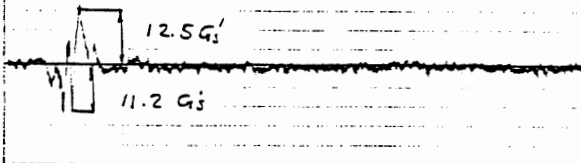
RIGHT UPPER RIB  
ACCELEROMETER



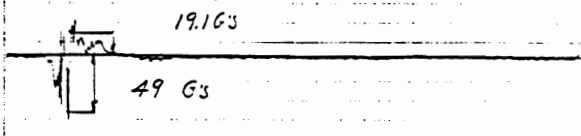
RIGHT LOWER RIB  
ACCELEROMETER



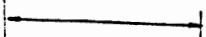
STERNUM UPPER  
ACCELEROMETER



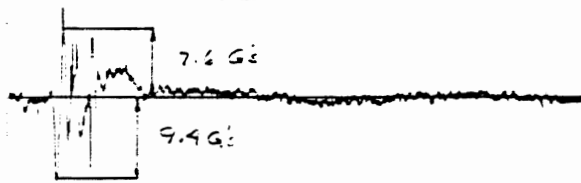
STERNUM LOWER  
ACCELEROMETER



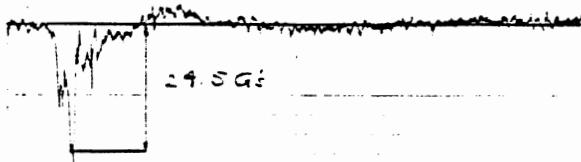
100 msec



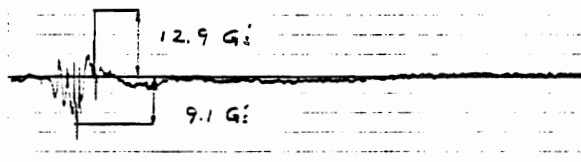
T<sub>1</sub> ACCELEROMETER  
(P-A)



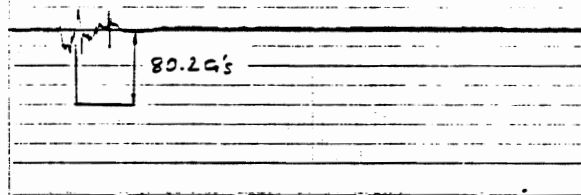
T<sub>2</sub> ACCELEROMETER  
(R-L)



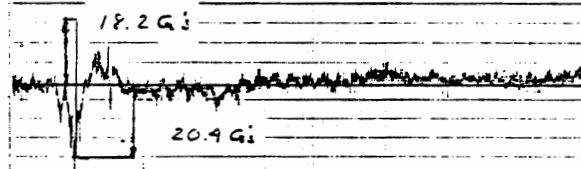
T<sub>1</sub> ACCELEROMETER  
(I-S)



T<sub>12</sub> ACCELEROMETER  
(P-A)

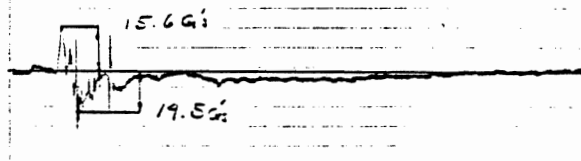


T<sub>12</sub> ACCELEROMETER  
(R-L)

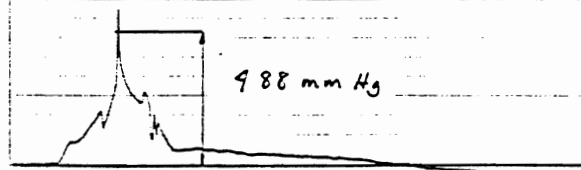


Goody Inc., Instrument Systems Division

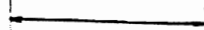
T<sub>12</sub> ACCELEROMETER  
(I-S)



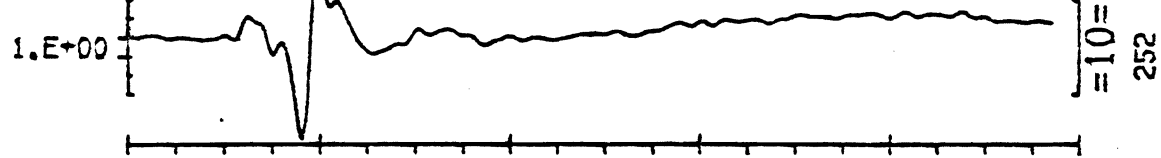
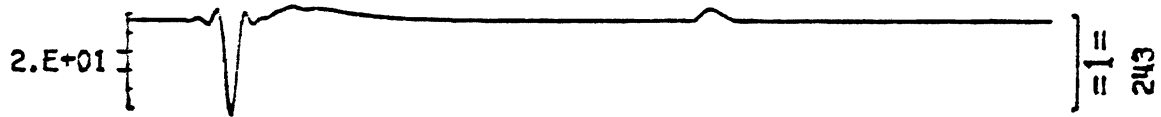
VASCULAR  
PRESSURE



100 msec



PTS: 1 101 201 301 401 501 601



KSEC: 0 80 160 240 320 400

77T077-1:PP

ID:

TAPE: PEND. TEST

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 RUN ID: 77T077-11PP  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

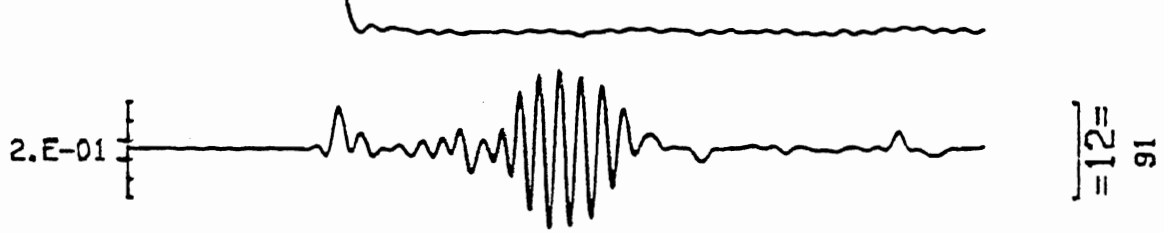
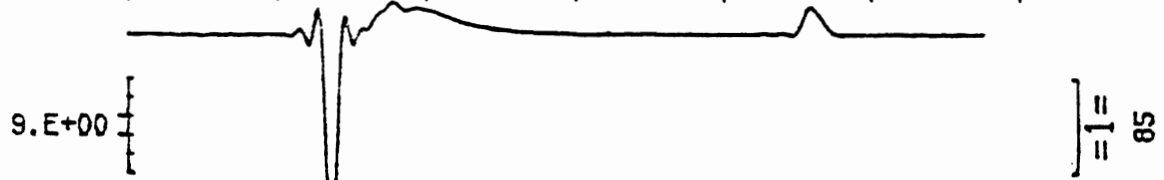
TEST SIGNALS: 2500 PTS/CH AT 6396.52 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
243	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	622	1599.13
244	- 2:	LEFT UPPER RIB ACCELEROMETER	223.00	G'S	4+1+	3 100.7	622	1599.13
245	- 3:	LEFT LOWER RIB ACCELEROMETER	210.00	G'S	4+1+	3 100.7	622	1599.13
246	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+	3 100.7	622	1599.13
247	- 5:	RIGHT LOWER RIB ACCELEROMETER	74.80	G'S	4+1+	3 100.7	622	1599.13
248	- 6:	UPPER STERNAL ACCELEROMETER	89.40	G'S	4+1+	3 100.7	622	1599.13
249	- 7:	LOWER STERNAL ACCELEROMETER	66.40	G'S	4+1+	3 100.7	622	1599.13
250	- 8:	T-1 P-A ACCELEROMETER	44.50	G'S	4+1+	3 100.7	622	1599.13
251	- 9:	T-1 R-L ACCELEROMETER	76.00	G'S	4+1+	3 100.7	622	1599.13
252	- 10:	T-1 I-S ACCELEROMETER	38.00	G'S	4+1+	3 100.7	622	1599.13

11:  
 12:  
 13:  
 14:

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 FILTERED FILES: 243 - 252 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T077-11PP  
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PTS: 1 101 201 301 401 501 601



MSEC: 0 80 160 240 320 400

ID: 77T077-2:PP

TAPE: PEND. TEST

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RUN ID: 77T077-21PP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 2314 PTS/CH AT 6397.24 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
85	1: PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	576	1999.31
86	2: T-12 P-A ACCELEROMETER	85.00	G'S	4+1+ 3	100.0	576	1999.31
87	3: T-12 R-L ACCELEROMETER	211.00	G'S	4+1+ 3	100.0	576	1999.31
88	4: T-12 I-S ACCELEROMETER	69.20	G'S	4+1+ 3	100.0	576	1999.31
89	5: VASCULAR PRESSURE	283.00	MM-HG	4+1+ 3	100.0	576	1999.31
90	6: VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.0	576	1999.31
91	12: PISTON VELOCITY	1.00	VOLTS	4+1+ 3	100.0	576	1999.31

131  
141

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FILTERED FILES: 85 - 91 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T077-21PP

## SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

### TEST NUMBERS

77T078 - Low Energy Front Pendulum Impact

77T079 - Low Energy Side Pendulum Impact

77T080 - Pendulum 20 ft/sec Side Impact

### TEST DATE

Age - 64

Sex - Male

Weight - 40.8 kg.

Stature - 170.2 cm.

### RESTRAINT SYSTEM:

None: Thoracic Pendulum Impact

### VELOCITY:

In Test No. 77T080, velocity was 20 ft/sec.

### INJURIES:

Fractures (costo-chondral) of left ribs 5-9 with additional  
fractures in rear.

Fractures (costo-chondral) of right ribs 5-6.

A few small speckled hemorrhages near where pericardium intersects  
diaphragm and on surface of membrane where aorta enters heart.

### AIS NUMBER ESTIMATE:

4

TEST # 771080

TEST DATE 8.10.77

TEST DESCRIPTION Pendulum Side Impact VELOCITY 20 ft/s

SUBJECT:

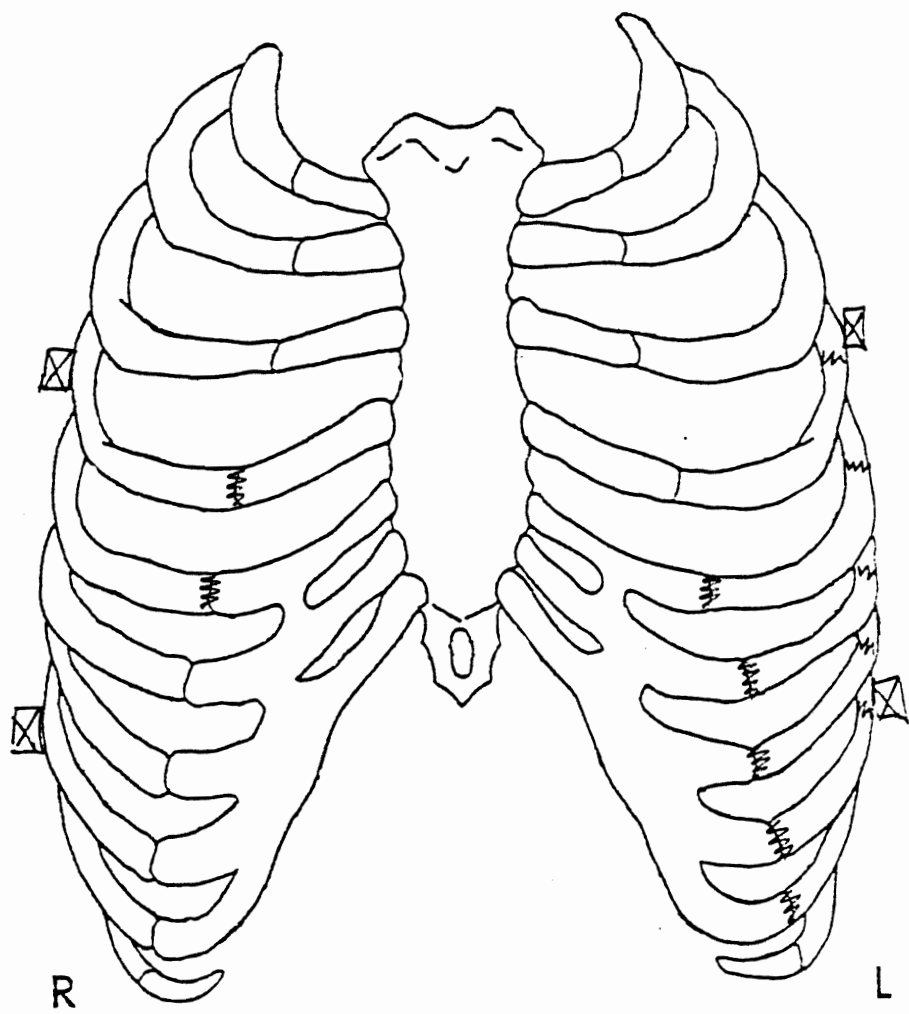
AGE 64 SEX M CAUSE OF DEATH Stroke

INJURY INFORMATION: OVERALL THORACIC AIS 4

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>4</u>
	2	<u>C</u>	<u>H</u>	<u>A</u>	<u>3</u>
	3	<u>C</u>	<u>H</u>	<u>H</u>	<u>3</u>
	4	---	---	---	---
	5	---	---	---	---
	6	---	---	---	---
	7	---	---	---	---
	8	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---
	2	---	---	---	---
	3	---	---	---	---
	4	---	---	---	---
	5	---	---	---	---



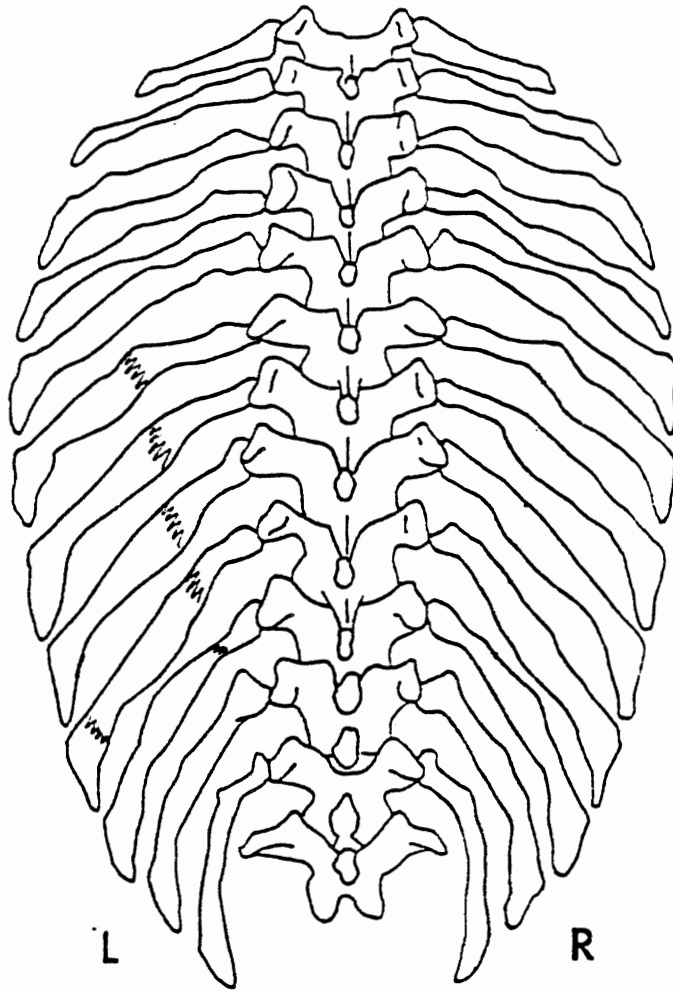
TEST # 777080



(some hemorrhage  
at each break)

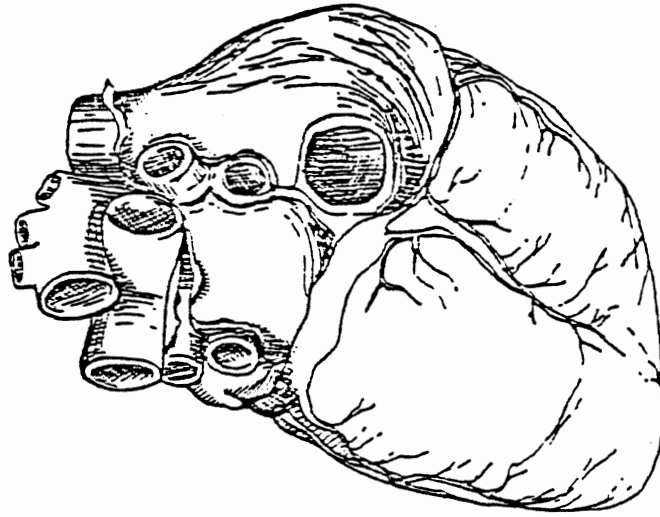
ANTERIOR VIEW RIB CAGE

TEST # 777080

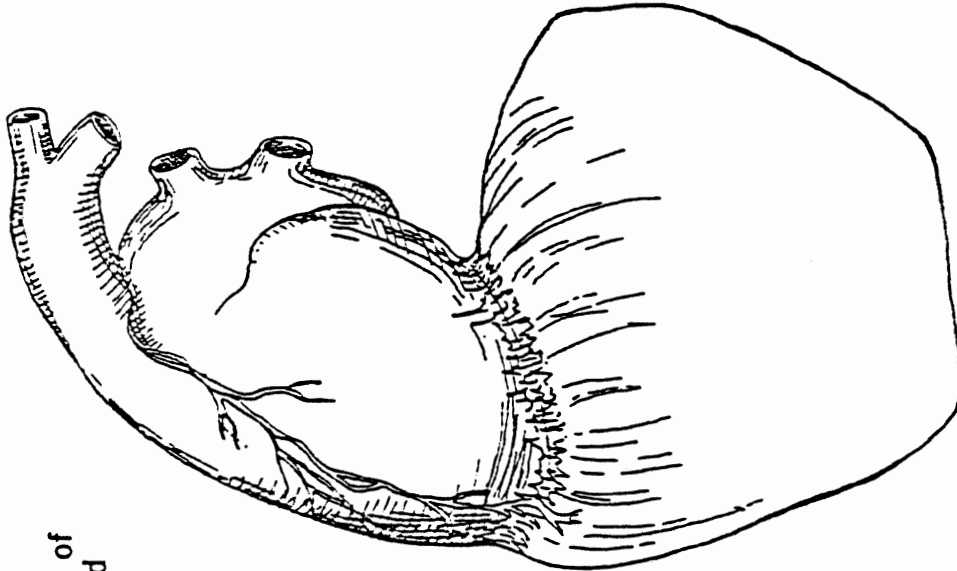


POSTERIOR VIEW RIB CAGE

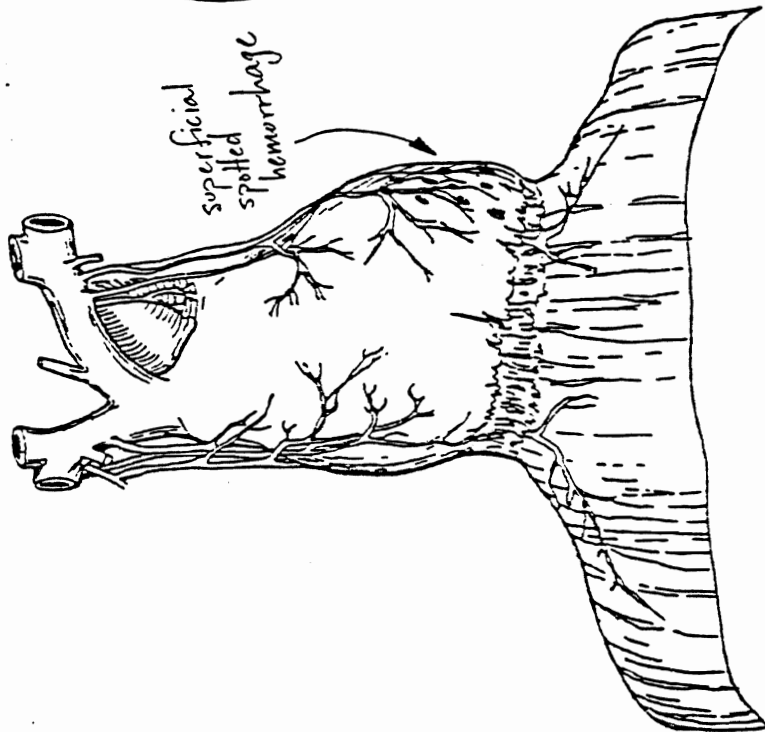
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm

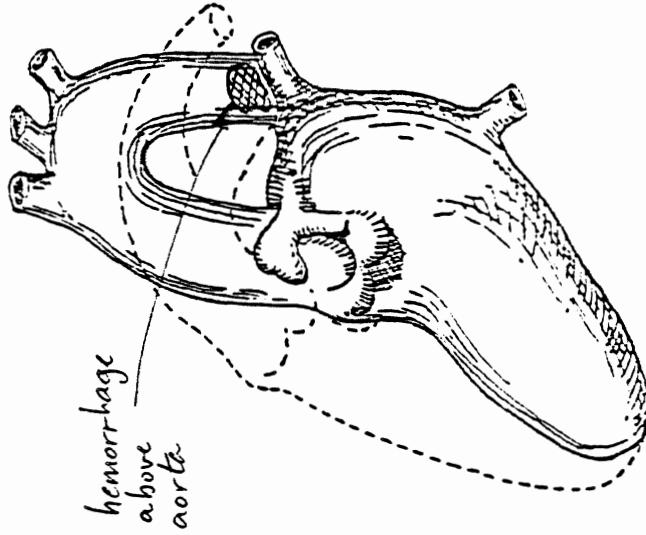


superficial spotted hemorrhage

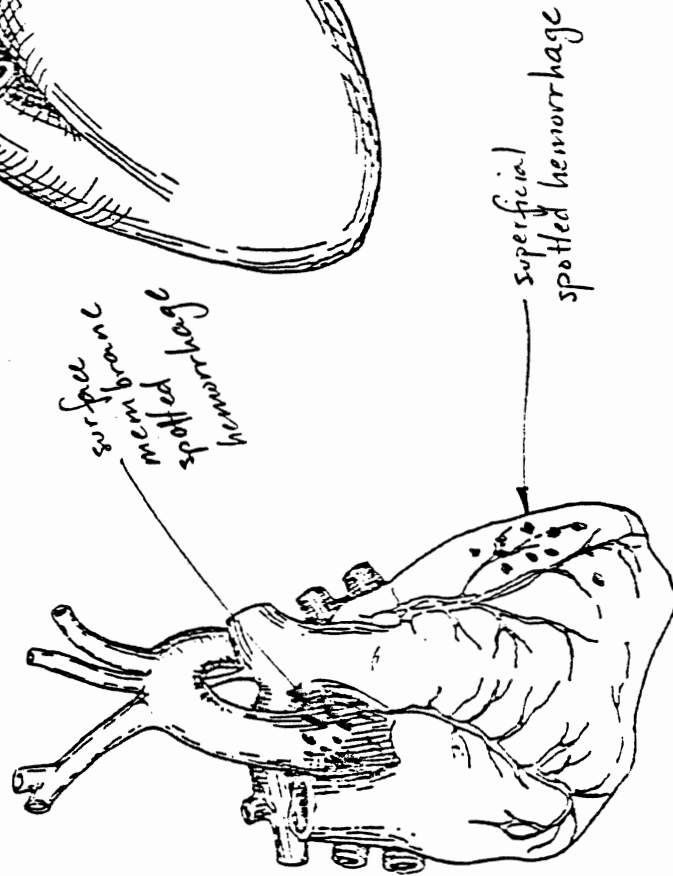
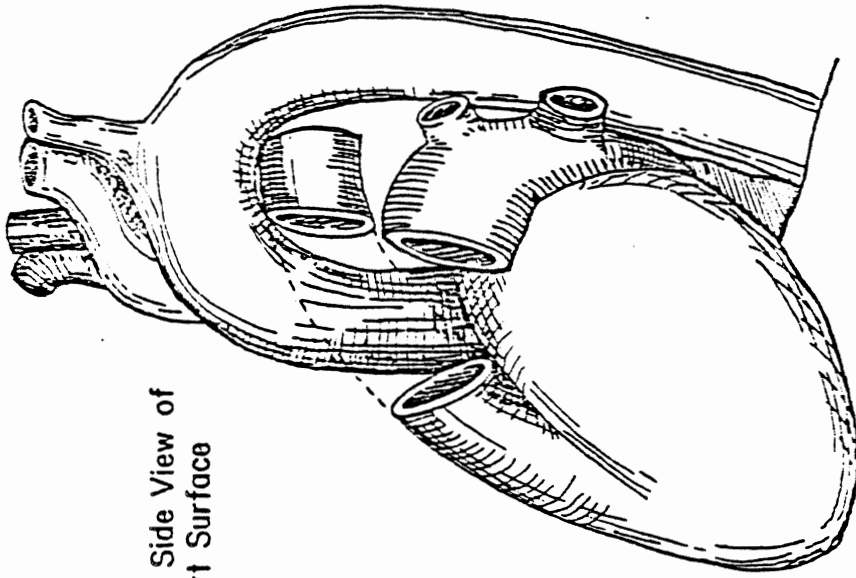


Anterior View of Pericardium and Diaphragm

Left View of Left Side of Heart

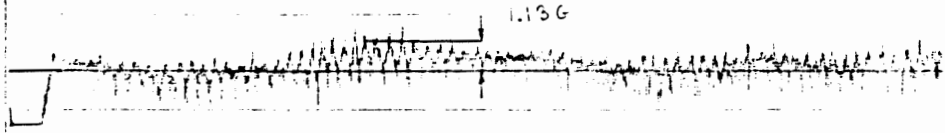


Left Side View of Heart Surface

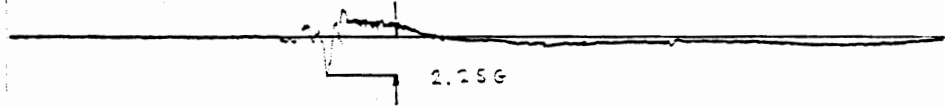


Anterior View of Heart

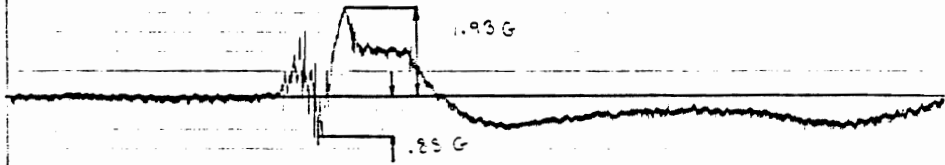
PISTON  
ACCELERATION



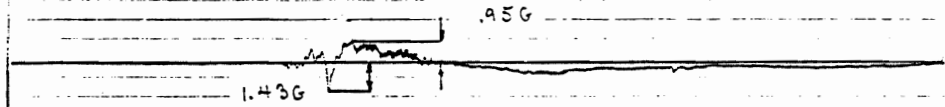
LEFT UPPER RIB  
ACCELEROMETER



LEFT LOWER RIB  
ACCELEROMETER



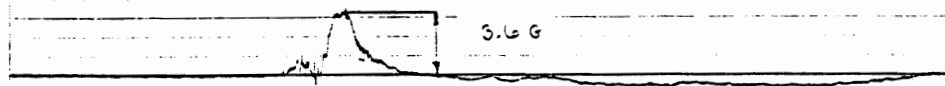
RIGHT UPPER RIB  
ACCELEROMETER



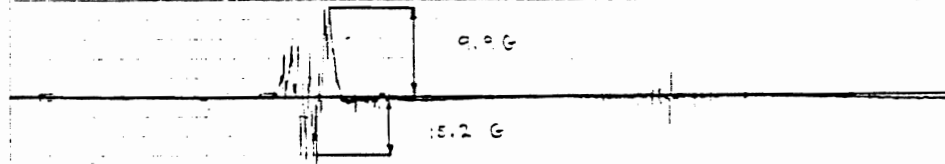
RIGHT LOWER RIB  
ACCELEROMETER



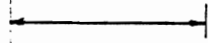
STERNUM UPPER  
ACCELEROMETER



STERNUM LOWER  
ACCELEROMETER

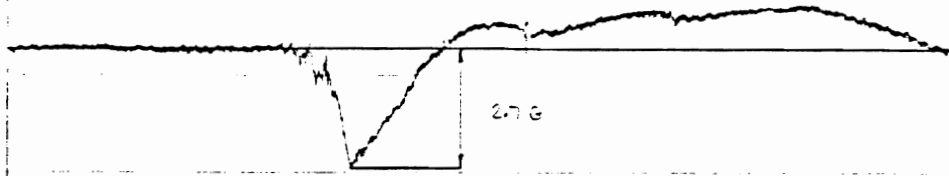


100 msec

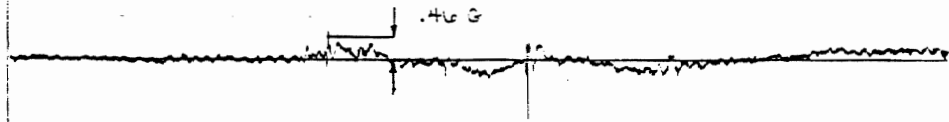


TEST NO: 77T078

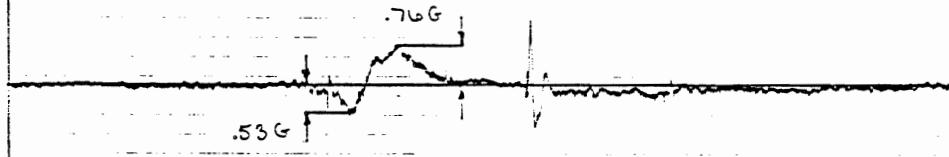
1<sub>1</sub> ACCELEROMETER  
(P-L)



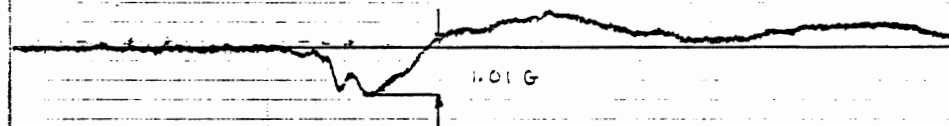
1<sub>1</sub> ACCELEROMETER  
(R-L)



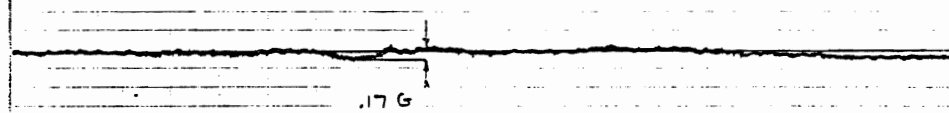
1<sub>1</sub> ACCELEROMETER  
(I-S)



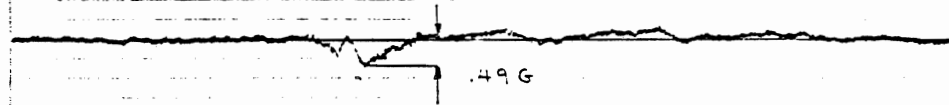
1<sub>2</sub> ACCELEROMETER  
(P-A)



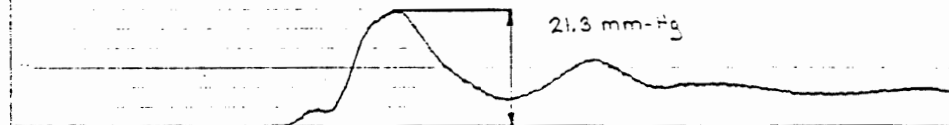
1<sub>2</sub> ACCELEROMETER  
(R-L)



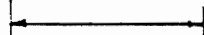
1<sub>2</sub> ACCELEROMETER  
(I-S)

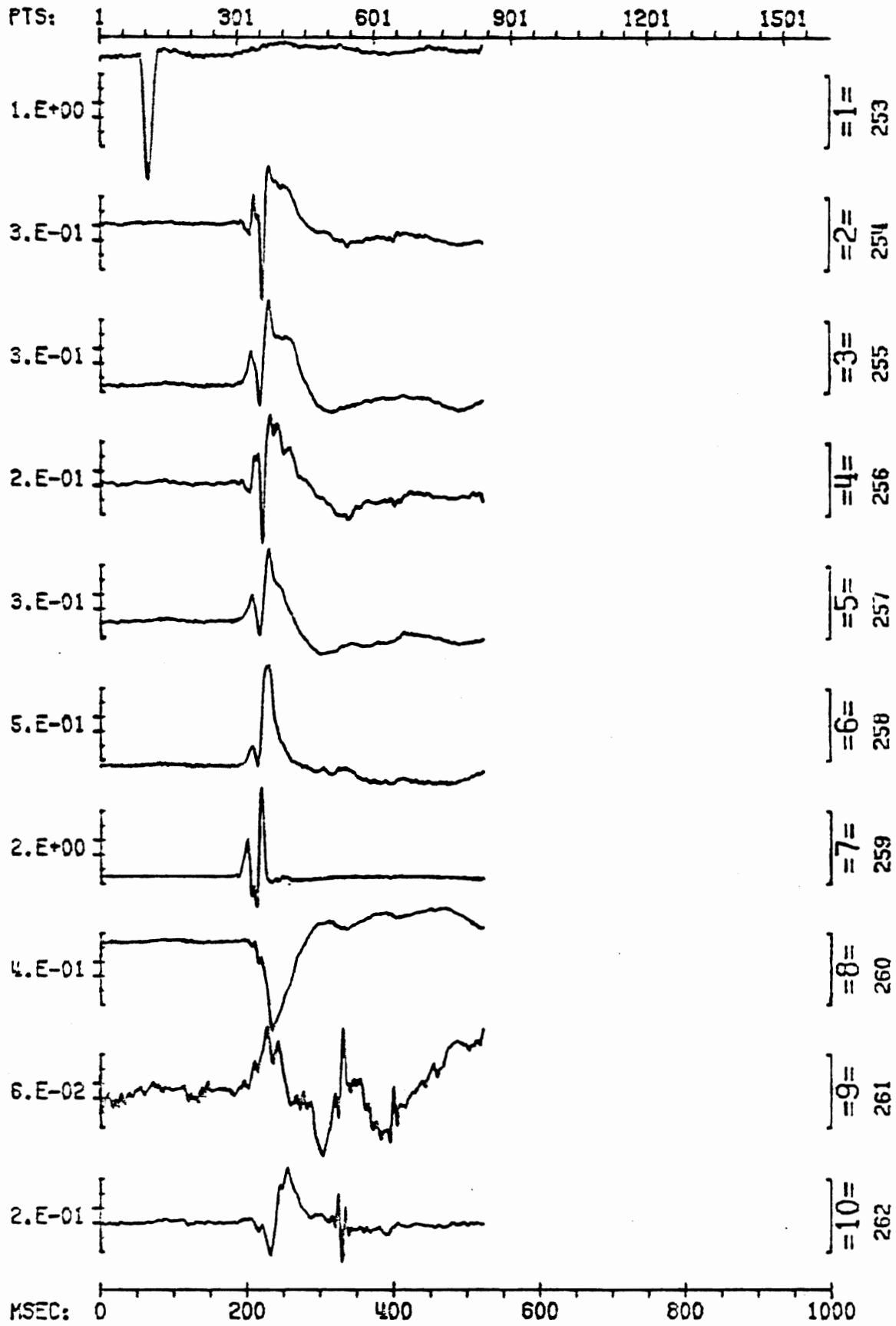


VASCULAR  
PRESSURE



10<sup>-1</sup> msec





77T078-1:PT

10:

TAPE: PEND. TEST

=====

RUN ID: 77T078-11PT

ANALOG TO DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 3911 PTS/CH AT 6398.10 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
253	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.0	836	1599.53
254	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+	3 100.0	836	1599.53
255	- 3:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+	3 100.0	836	1599.53
256	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+	3 100.0	836	1599.53
257	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+	3 100.0	836	1599.53
258	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+	3 100.0	836	1599.53
259	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+	3 100.0	836	1599.53
260	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+	3 100.0	836	1599.53
261	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+	3 100.0	836	1599.53
262	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+	3 100.0	836	1599.53

11:

12:

13:

14:

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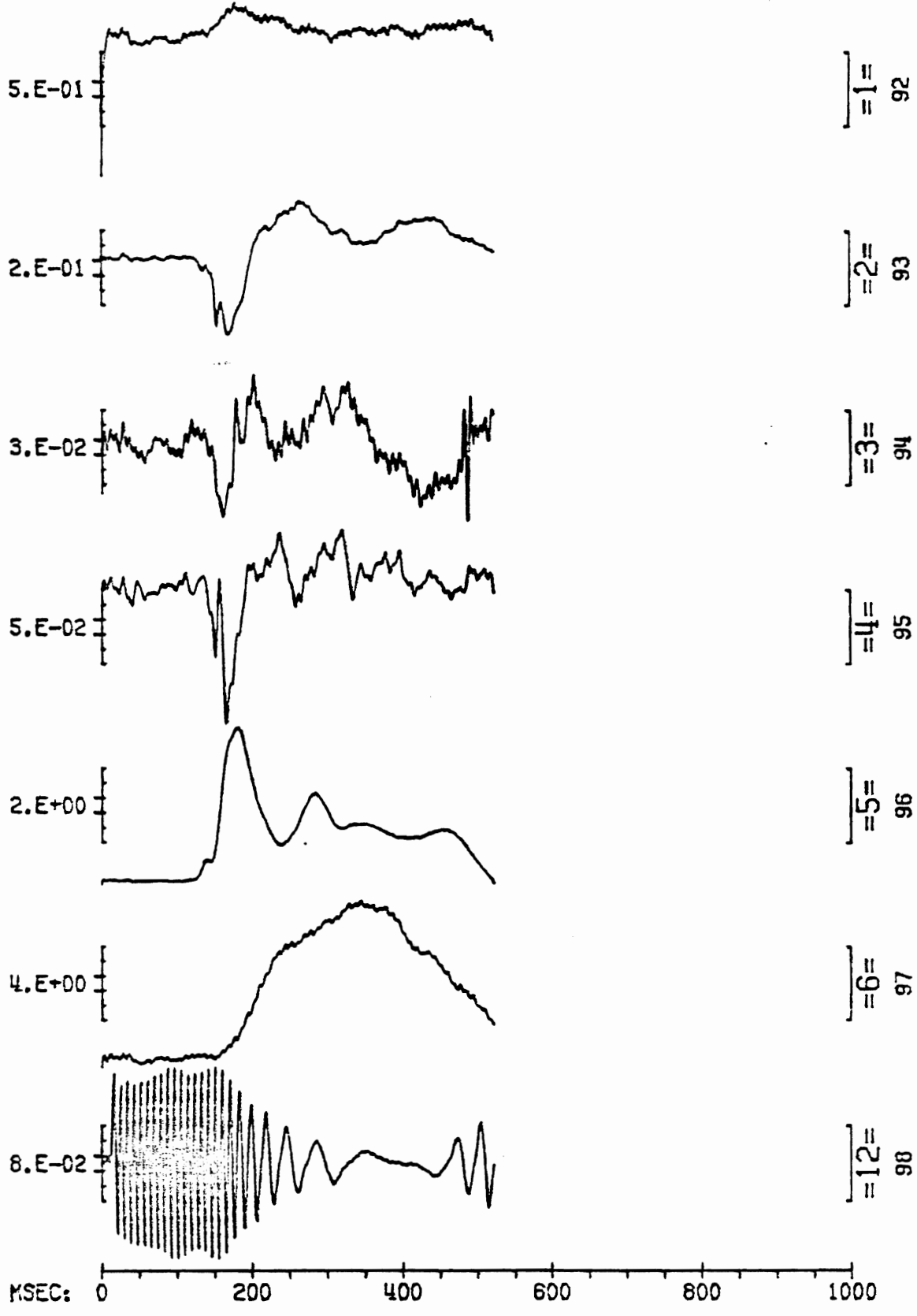
FILTERED FILES: 253 - 262 DIGITAL TAPE: JEFLEH

RUN ID: 77T078-11PT

DATE: 19-AUG-77



PTS: 1 301 601 901 1201 1501



ID: 77T078-2:PP

TAPE: PEND. TEST

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RUN ID: 77T078-2IPP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSR1#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 3539 PTS/CH AT 6396.60 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
92 - 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	836	1599.15
93 - 2:	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+	3 100.7	836	1599.15
94 - 3:	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+	3 100.7	836	1599.15
95 - 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.7	836	1599.15
96 - 5:	VASCULAR PRESSURE	14.10	MM-HG	4+1+	3 100.7	836	1599.15
97 - 6:	VERTICAL SUPPORT FORCE	200.00	LB.	4+1+	3 100.7	836	1599.15

7:

8:

9:

10:

11:

98 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 836 1599.15

13:

14:

=====

FILTERED FILES: 92 - 98 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T078-2IPP

=====

TEST NO: 77T079

WINDTUNNEL  
ACCELERATION

1.5G

LEFT UPPER RIB  
ACCELEROMETER

2.5G

LEFT LOWER RIB  
ACCELEROMETER

5.9G

RIGHT UPPER RIB  
ACCELEROMETER

2.5G

RIGHT LOWER RIB  
ACCELEROMETER

.96G

.74G

STERNUM UPPER  
ACCELEROMETER

.54G

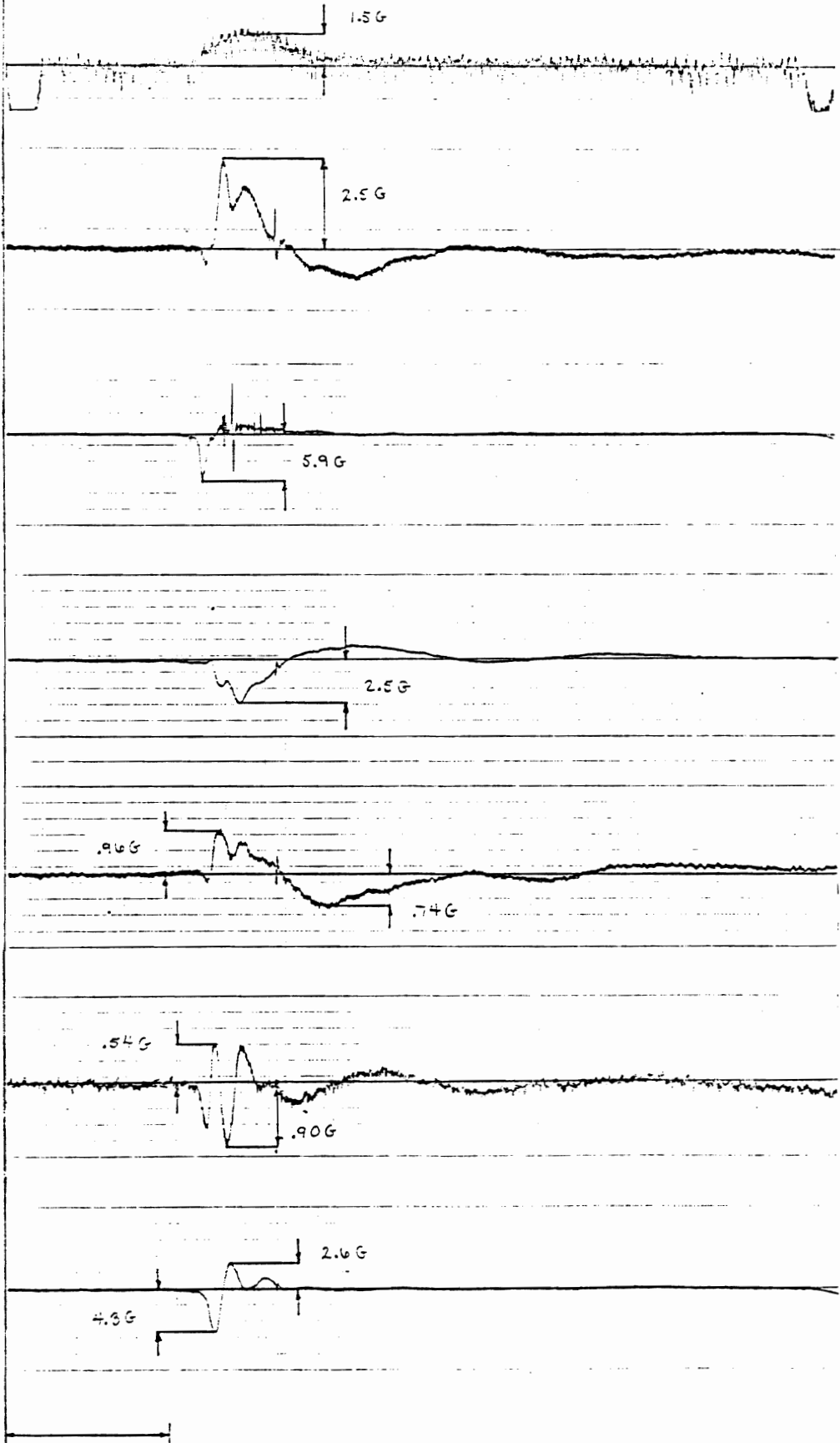
.90G

STERNUM LOWER  
ACCELEROMETER

2.6G

4.3G

100 msec



1 ACCELEROMETER  
(I-A)

.90 G

1 ACCELEROMETER  
(R-L)

1.8 G

.68 G

1 ACCELEROMETER  
(I-S)

.38 G

.46 G

12 ACCELEROMETER  
(P-A)

1.6 G

12 ACCELEROMETER  
(R-L)

2.1 G

12 ACCELEROMETER  
(I-S)

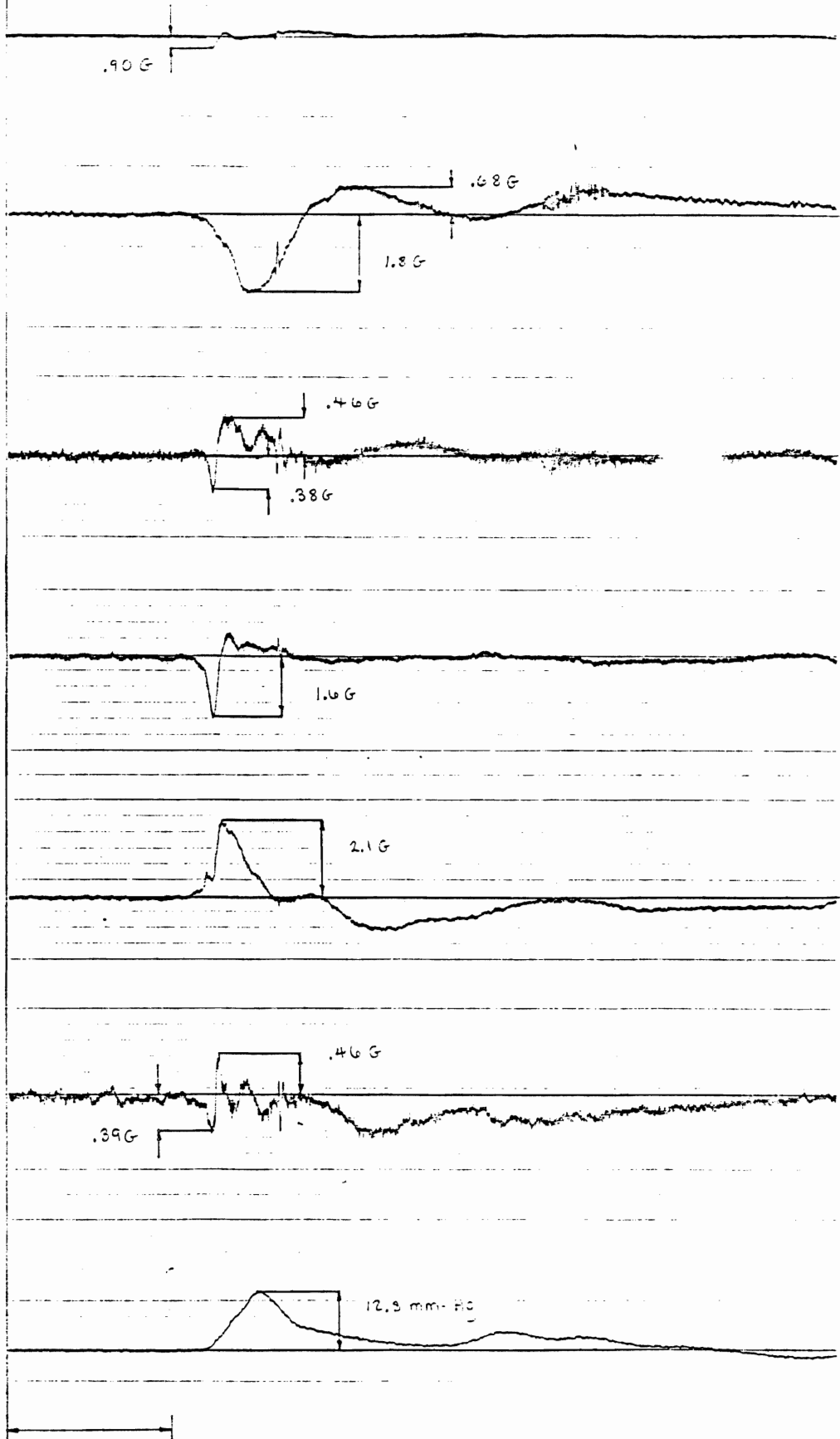
.39 G

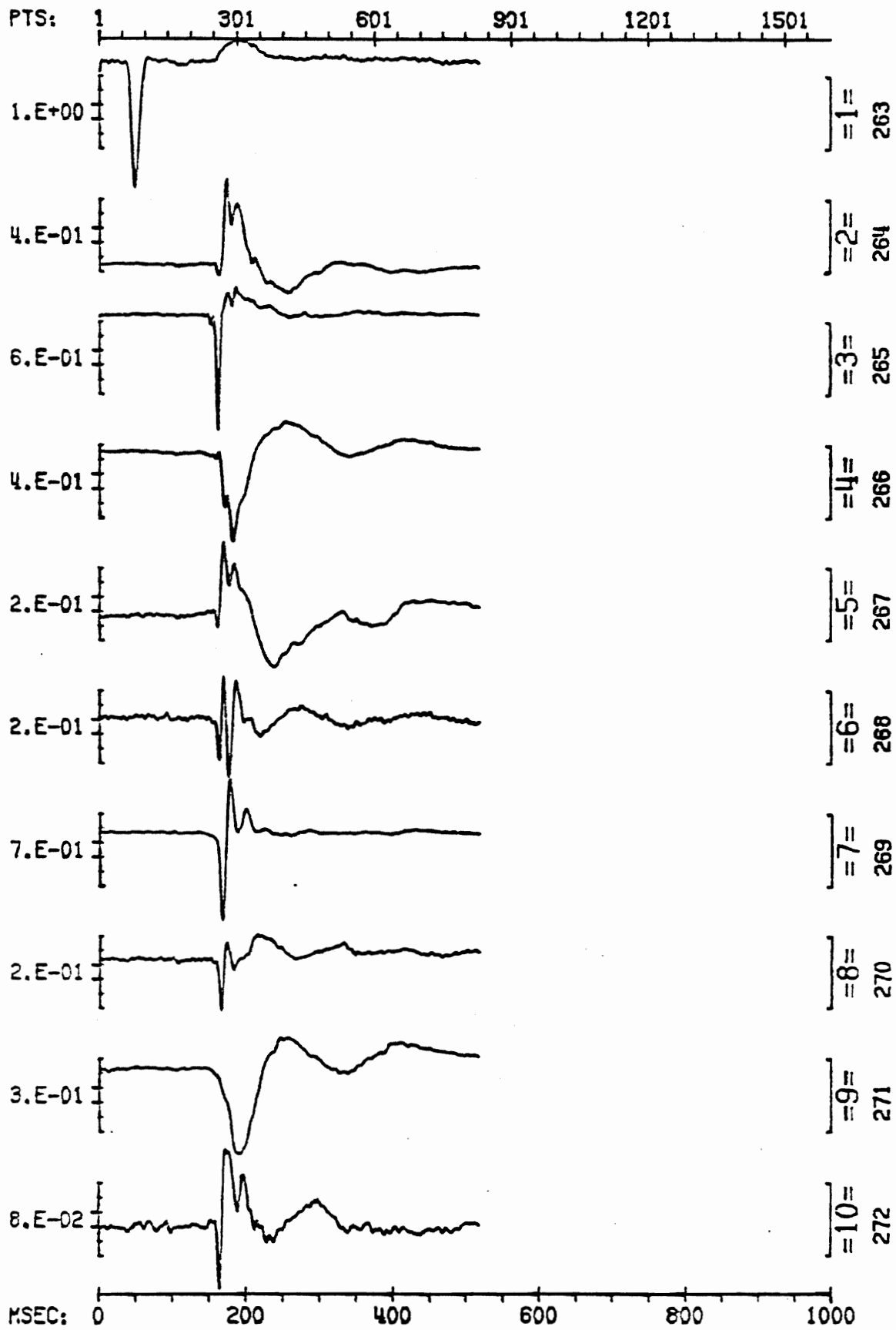
.46 G

VASCULAR  
PRESSURE

12.3 mm-Hg

100 msec





ID: 77T079-1:PT

TAPE: PEND. TEST

=====

RUN ID: 77T079-11PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0010 DATE: 12-AUG-77

TEST SIGNALS: 3313 PTS/CH AT 6395.83 HZ, CAL SIGNALS; NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
---	---	-----	-----	-----	-----	-----	---	-----
263	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	828	1598.96
264	- 2:	LEFT UPPER RIB ACCELEROMETER	4.50	G'S	4+1+	3 100.7	828	1598.96
265	- 3:	LEFT LOWER RIB ACCELEROMETER	4.20	G'S	4+1+	3 100.7	828	1598.96
266	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+	3 100.7	828	1598.96
267	- 5:	RIGHT LOWER RIB ACCELEROMETER	3.70	G'S	4+1+	3 100.7	828	1598.96
268	- 6:	UPPER STERNAL ACCELEROMETER	4.50	G'S	4+1+	3 100.7	828	1598.96
269	- 7:	LOWER STERNAL ACCELEROMETER	3.30	G'S	4+1+	3 100.7	828	1598.96
270	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+	3 100.7	828	1598.96
271	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+	3 100.7	828	1598.96
272	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+	3 100.7	828	1598.96

11:

12:

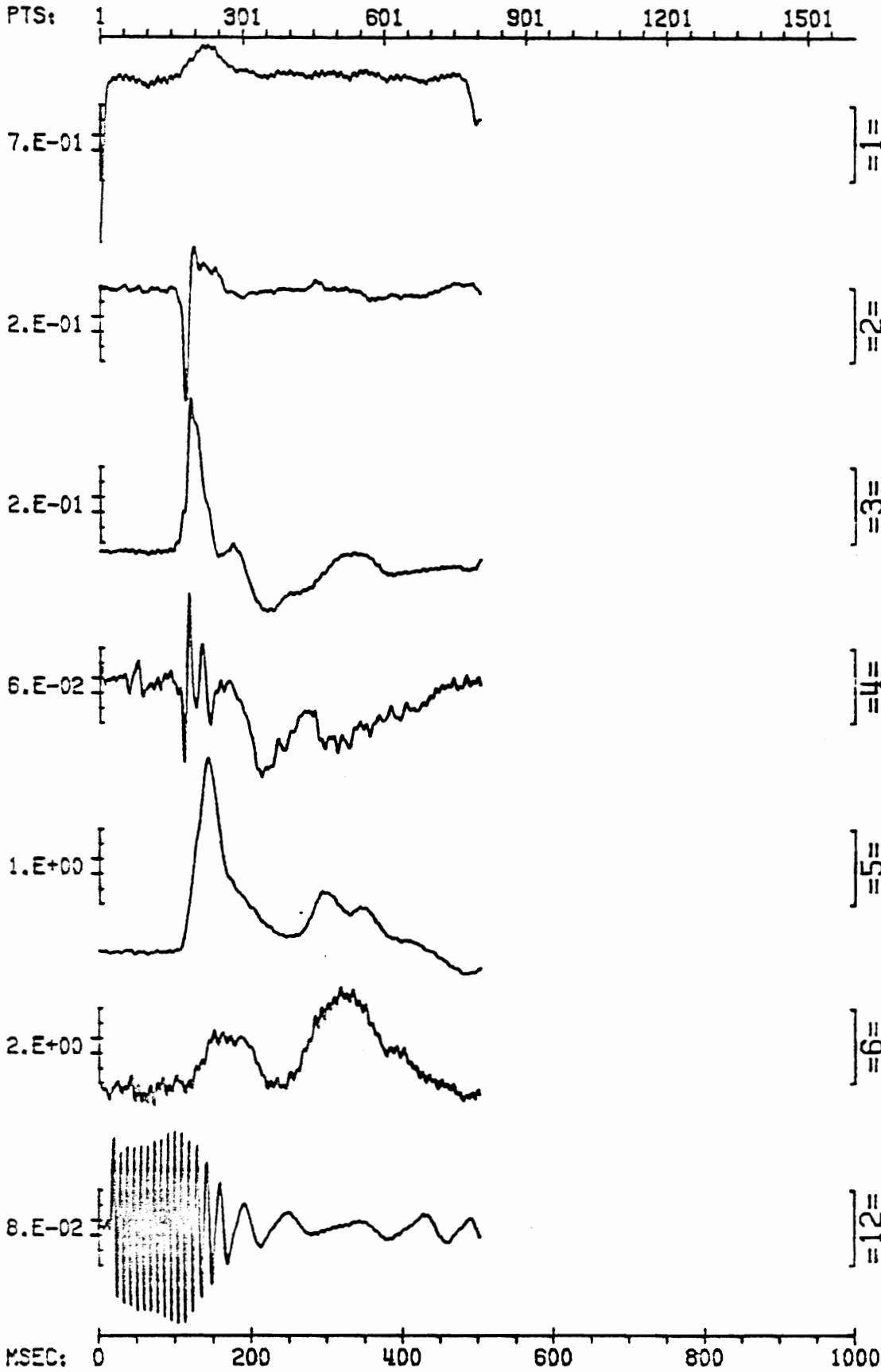
13:

14:

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FILTERED FILES: 263 + 272 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77 RUN ID: 77T079-11PT

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ID: 77T079-2:PT

TAPE: PEND. TEST

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RUN ID: 77T079-2IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 12-AUG-77

TEST SIGNALS: 3235 PTS/CH AT 6396.60 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
99	11	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	805	1599.15
100	21	T-12 P-A ACCELEROMETER	4.30	G'S	4+1+ 3	100.7	805	1599.15
101	31	T-12 R-L ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	805	1599.15
102	41	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.7	805	1599.15
103	51	VASCULAR PRESSURE	14.10	MM-HG	4+1+ 3	100.7	805	1599.15
104	61	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.7	805	1599.15

71

81

91

101

111

105 - 121 PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 805 1599.15

131

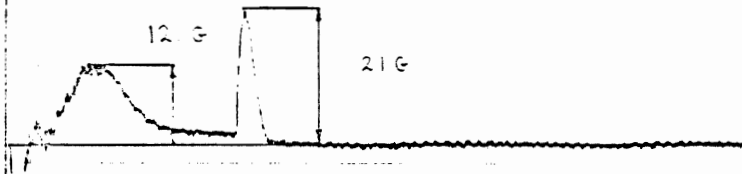
141

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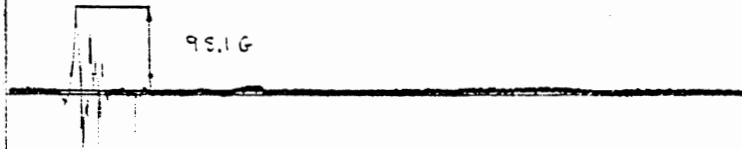
FILTERED FILES: 99 - 105 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T079-2IPT



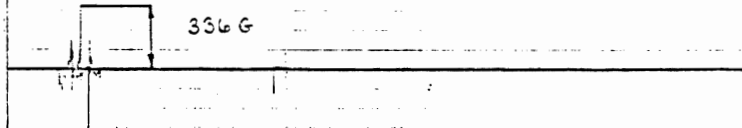
SHOCK  
CONSTRUCTION



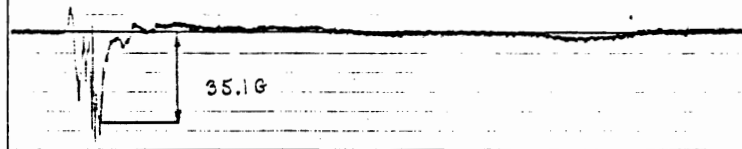
LEFT UPPER RIB  
ACCELEROMETER



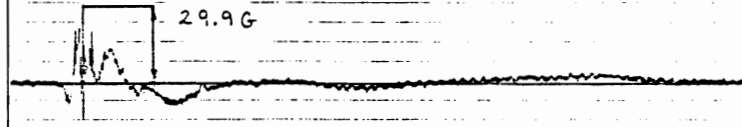
LEFT LOWER RIB  
ACCELEROMETER



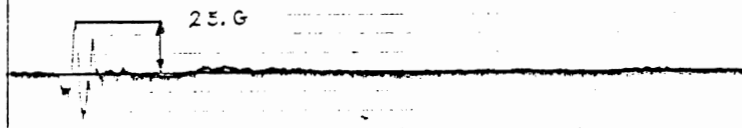
RIGHT UPPER RIB  
ACCELEROMETER



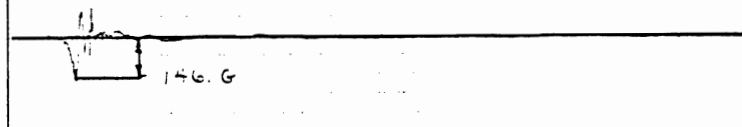
RIGHT LOWER RIB  
ACCELEROMETER



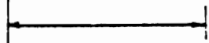
STERNUM UPPER  
ACCELEROMETER



STERNUM LOWER  
ACCELEROMETER



100 msec



TEST NO: 77T080

ACCELEROMETER  
(I-A)

20.5 G

ACCELEROMETER  
(E-L)

25.1 G

ACCELEROMETER  
(I-S)

25.8 G

ACCELEROMETER  
(P-A)

18.6 G

ACCELEROMETER  
(E-L)

39.5 G

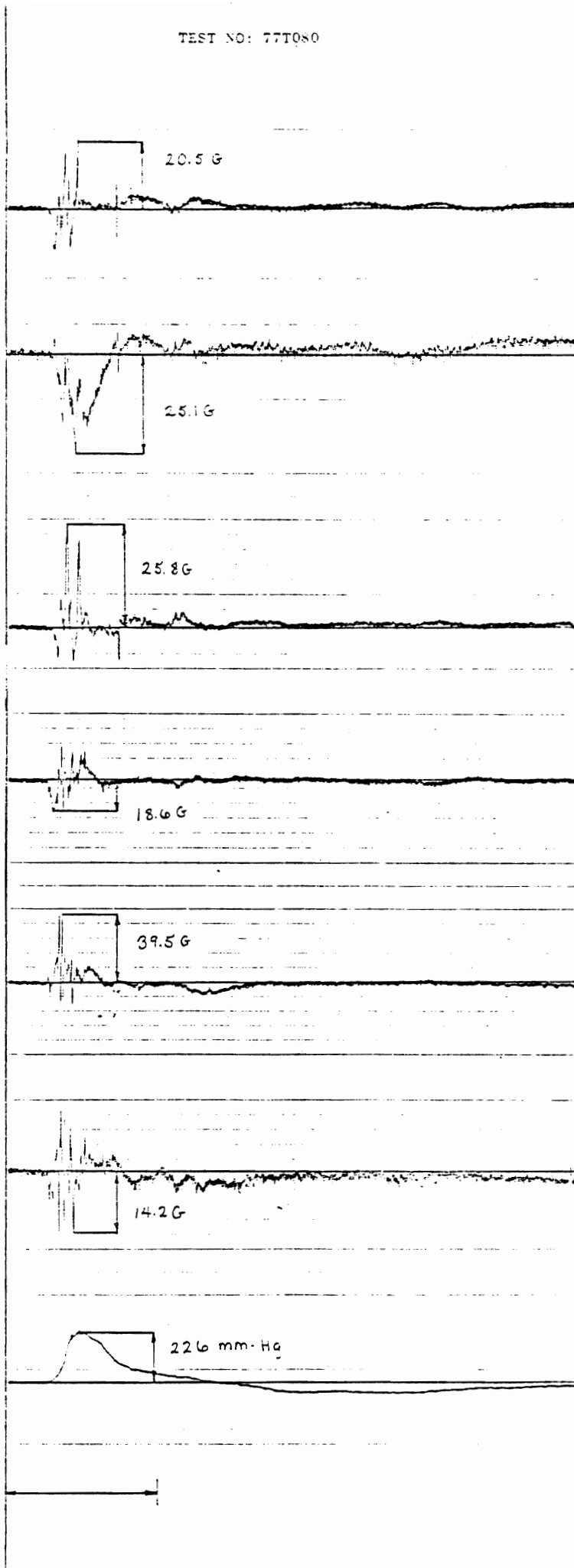
ACCELEROMETER  
(I-S)

14.2 G

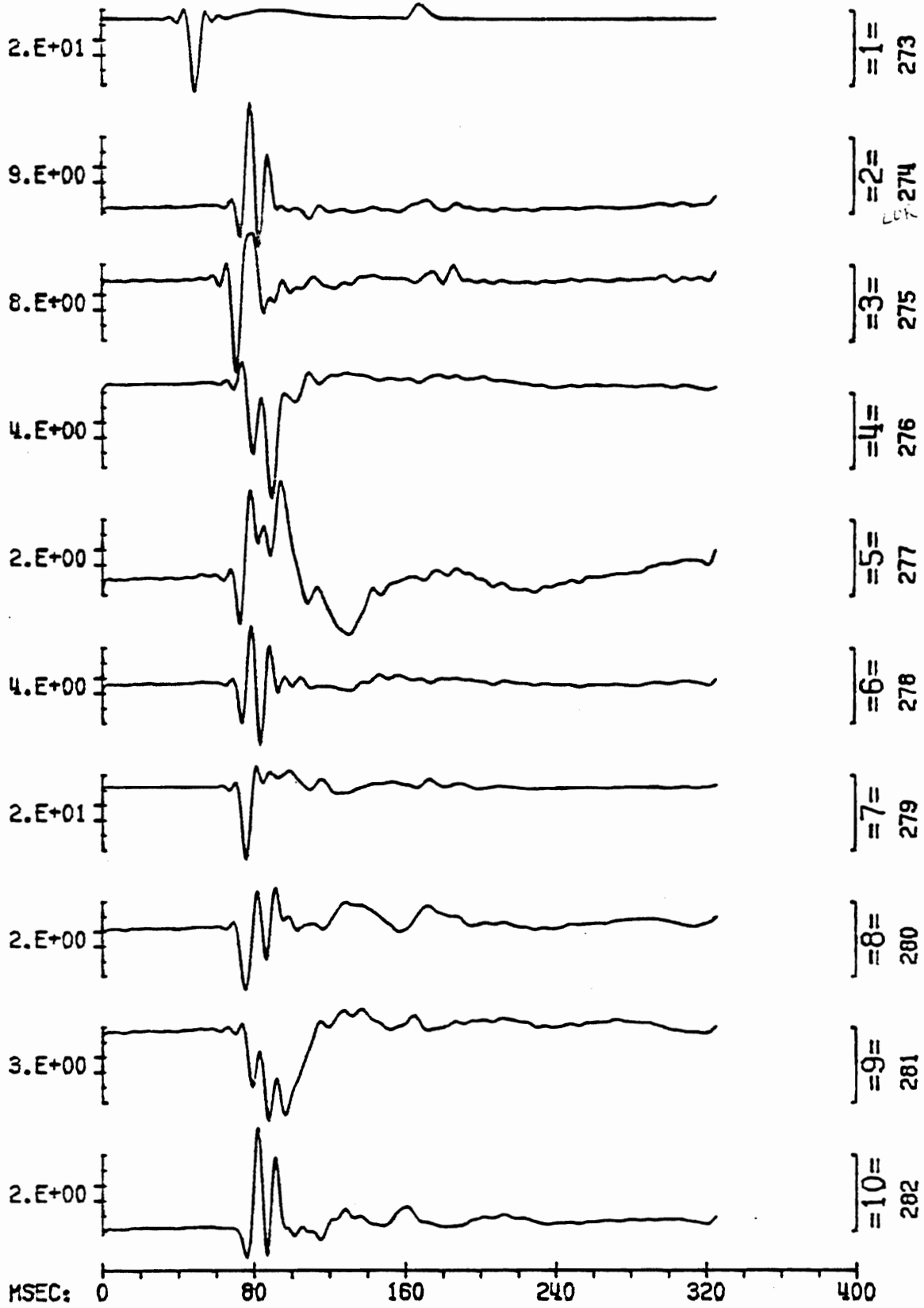
VASCULAR  
PRESSURE

226 mm-Hg

100 msec



PTS: 1 101 201 301 401 501 601



ID: 77T080-1:PP

274

275

276

277

278

279

280

281

282

TAPE: PEND. TEST

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RUN ID: 77T080-1:PP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#140 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 12-AUG-77

TEST SIGNALS: 2092 PTS/CH AT 6398.65 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
273	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	522	1599.66
274	- 2:	LEFT UPPER RIB ACCELEROMETER	223.00	G'S	4+1+ 3	100.0	522	1599.66
275	- 3:	LEFT LOWER RIB ACCELEROMETER	210.00	G'S	4+1+ 3	100.0	522	1599.66
276	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	100.0	522	1599.66
277	- 5:	RIGHT LOWER RIB ACCELEROMETER	74.80	G'S	4+1+ 3	100.0	522	1599.66
278	- 6:	UPPER STERNAL ACCELEROMETER	89.40	G'S	4+1+ 3	100.0	522	1599.66
279	- 7:	LOWER STERNAL ACCELEROMETER	66.40	G'S	4+1+ 3	100.0	522	1599.66
280	- 8:	T-1 P-A ACCELEROMETER	44.50	G'S	4+1+ 3	100.0	522	1599.66
281	- 9:	T-1 R-L ACCELEROMETER	76.00	G'S	4+1+ 3	100.0	521	1599.66
282	- 10:	T-1 I-S ACCELEROMETER	38.00	G'S	4+1+ 3	100.0	521	1599.66

11:

12:

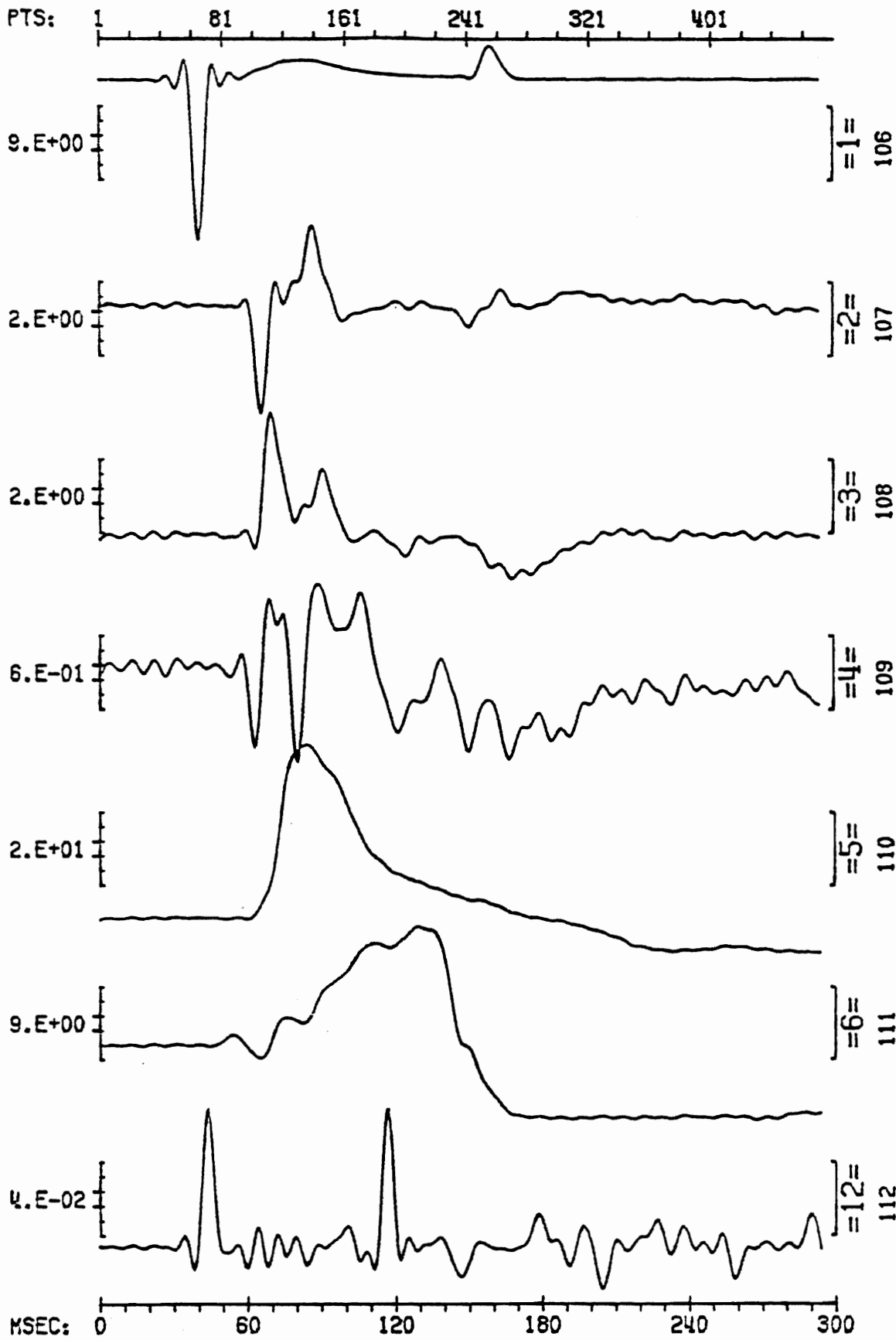
13:

14:

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FILED FILES: 273 - 282 DIGITAL TAPE: JEFLEH DATE: 19-AUG-77

RUN ID: 77T080-1:PP



IO: 77T080-2:PP

TAPE: PEND.TEST

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T080-2:PP

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H80018 DATE: 12-AUG-77

TEST SIGNALS: 1884 PTS/CH AT 6394.84 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
106	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.7	471	1598.71
107	2	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+3	100.7	471	1598.71
108	3	T-12 R-L ACCELEROMETER	85.80	G'S	4+1+3	100.7	471	1598.71
109	4	T-12 I-S ACCELEROMETER	69.20	G'S	4+1+3	100.7	471	1598.71
110	5	VASCULAR PRESSURE	283.00	MM-HG	4+1+3	100.7	471	1598.71
111	6	VERTICAL SUPPORT FORCE	200.00	LSB	4+1+3	100.7	471	1598.71

7:

8:

9:

10:

11:

112 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 100.7 471 1598.71

13:

14:

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FILTERED FILES: 106 - 112 DIGITAL TAPE: JEFLEH DATE: 17-AUG-77 RUN ID: 77T080-2:PP

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Summary Test Report

Thoracic Injury Project (Contract DOT-HS-4-00921)

Highway Safety Research Institute - The University of Michigan

Test Numbers:

77T081 - Low Energy Side Pendulum Impact

77T082 - Low Energy Front Pendulum Impact

77T083 - Pendulum 20 ft/sec Front Impact

Test Date:

August 30, 1977

Test Subject:

Age - 60

Sex - Female

Weight - 63.8 kg

Stature - 156 cm

Restraint System:

None: Thoracic Pendulum Impact

Velocity:

In Test 77T083, velocity was 20 ft/sec

Injuries:

Tears in aortic surface, secondary to calcification, distributed over ascending aorta

Small, superficial bruise on ascending aorta

Sternal fracture

R3 right fracture

AIS Number Estimate:

TEST # 77083

TEST DATE 8-30-77

TEST DESCRIPTION Pendulum front impact VELOCITY 20 ft/s

SUBJECT:

AGE 60 SEX F CAUSE OF DEATH brain stem infarction

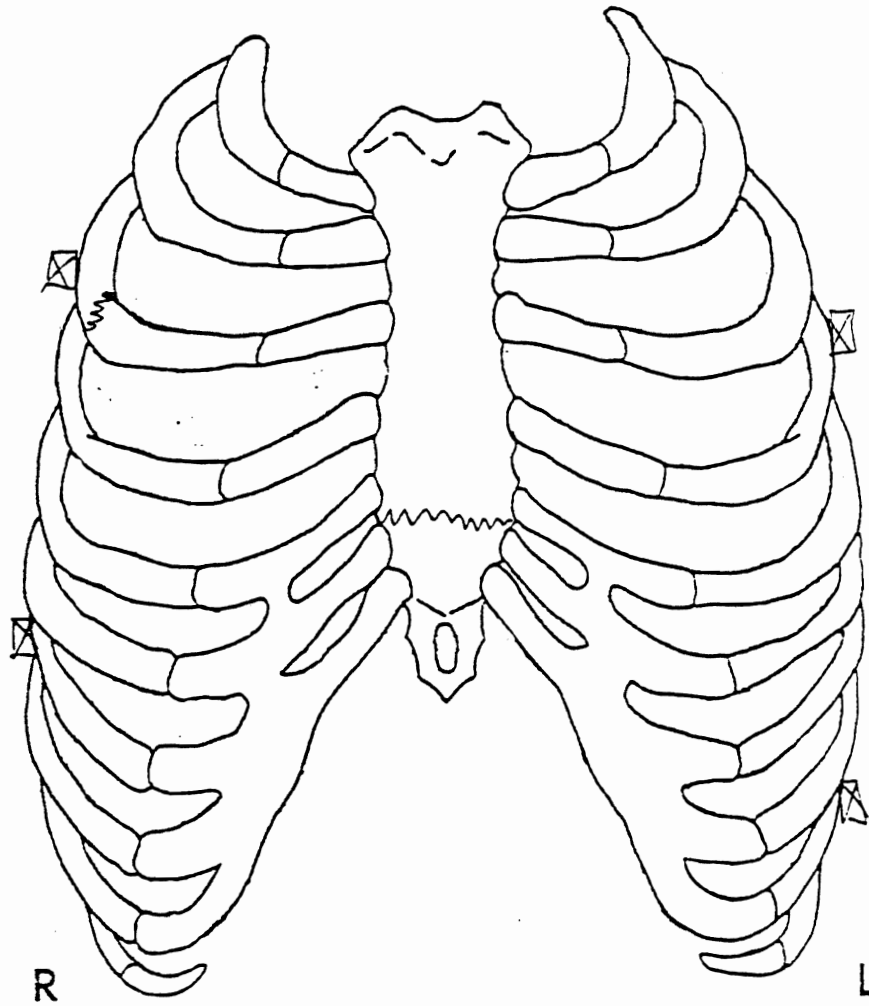
INJURY INFORMATION:

OVERALL THORACIC AIS 4

	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S	
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>L</u>	<u>A</u>	<u>4</u>
	2	<u>C</u>	<u>C</u>	<u>H</u>	<u>A</u>	<u>3</u>
	3	<u>C</u>	<u>C</u>	<u>F</u>	<u>S</u>	<u>2</u>
	4	<u>C</u>	<u>R</u>	<u>F</u>	<u>S</u>	<u>2</u>
	5	---	---	---	---	---
	6	---	---	---	---	---
	7	---	---	---	---	---
	8	---	---	---	---	---
MAJOR NON-THORACIC INJURIES NOTED	1	---	---	---	---	---
	2	---	---	---	---	---
	3	---	---	---	---	---
	4	---	---	---	---	---
	5	---	---	---	---	---

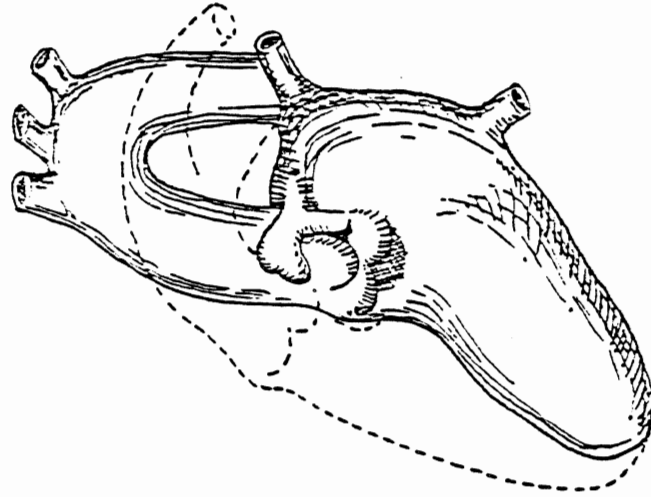


TEST # 777083

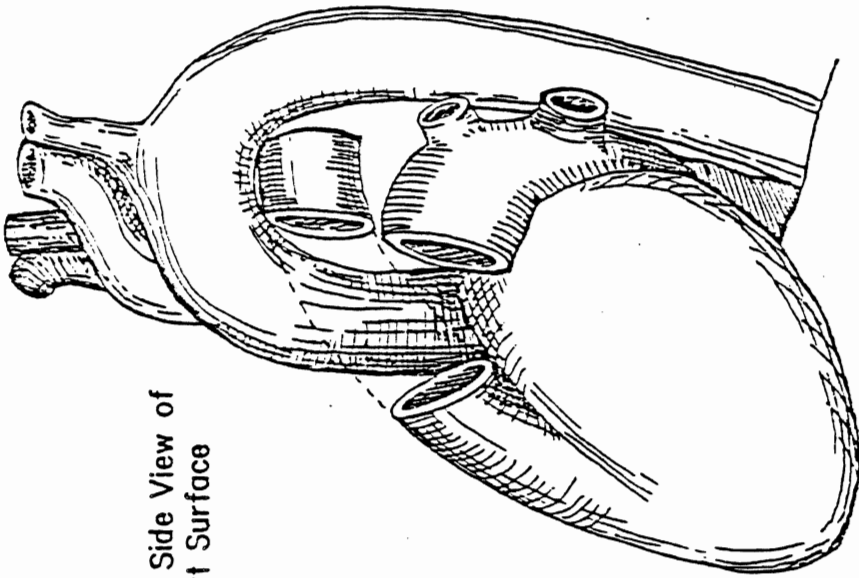


ANTERIOR VIEW RIB CAGE

Left View of Left Side of Heart

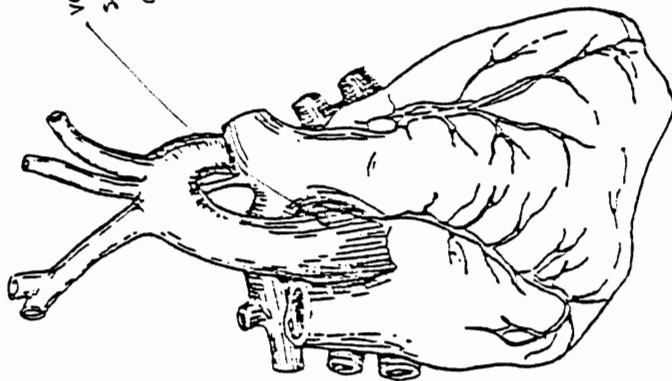


Left Side View of Heart Surface



*Pears in aortic surface, secondary to calcification, distributed over ascending aorta.*

*very small, superficial groove on aortic surface*



Anterior View of Heart

TEST No.

77.51

PISTON  
ACCELERATION

2.3 G's

LEFT UPPER RIB  
ACCELEROMETER

1.9 G's

LEFT LOWER RIB  
ACCELEROMETER

0.8 G's

RIGHT UPPER RIB  
ACCELEROMETER

1.4 G's

RIGHT LOWER RIB  
ACCELEROMETER

0.6 G's

STERNUM UPPER  
ACCELEROMETER

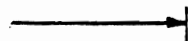
0.5 G

STERNUM LOWER  
ACCELEROMETER

1.2 G

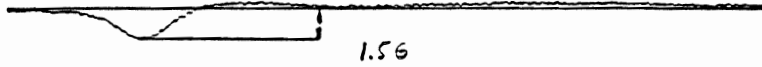
1.0 G

0.1 sec

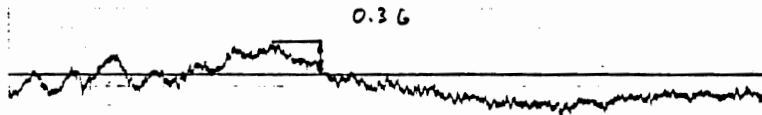


TEST TGT-001

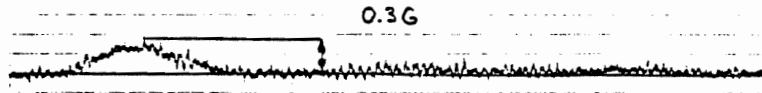
T<sub>1</sub> ACCELEROMETER  
(P-A)



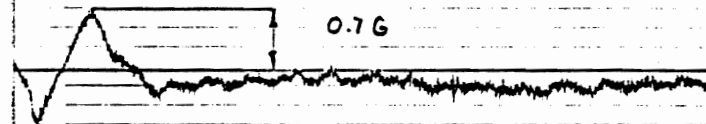
T<sub>1</sub> ACCELEROMETER  
(P-L)



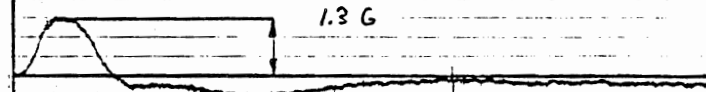
T<sub>1</sub> ACCELEROMETER  
(I-S)



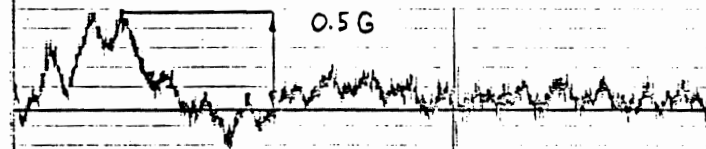
T<sub>12</sub> ACCELEROMETER  
(P-A)



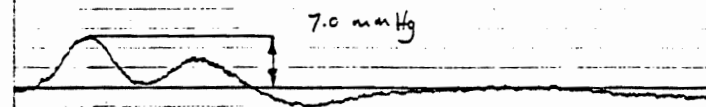
T<sub>12</sub> ACCELEROMETER  
(R-L)



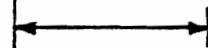
T<sub>12</sub> ACCELEROMETER  
(I-S)



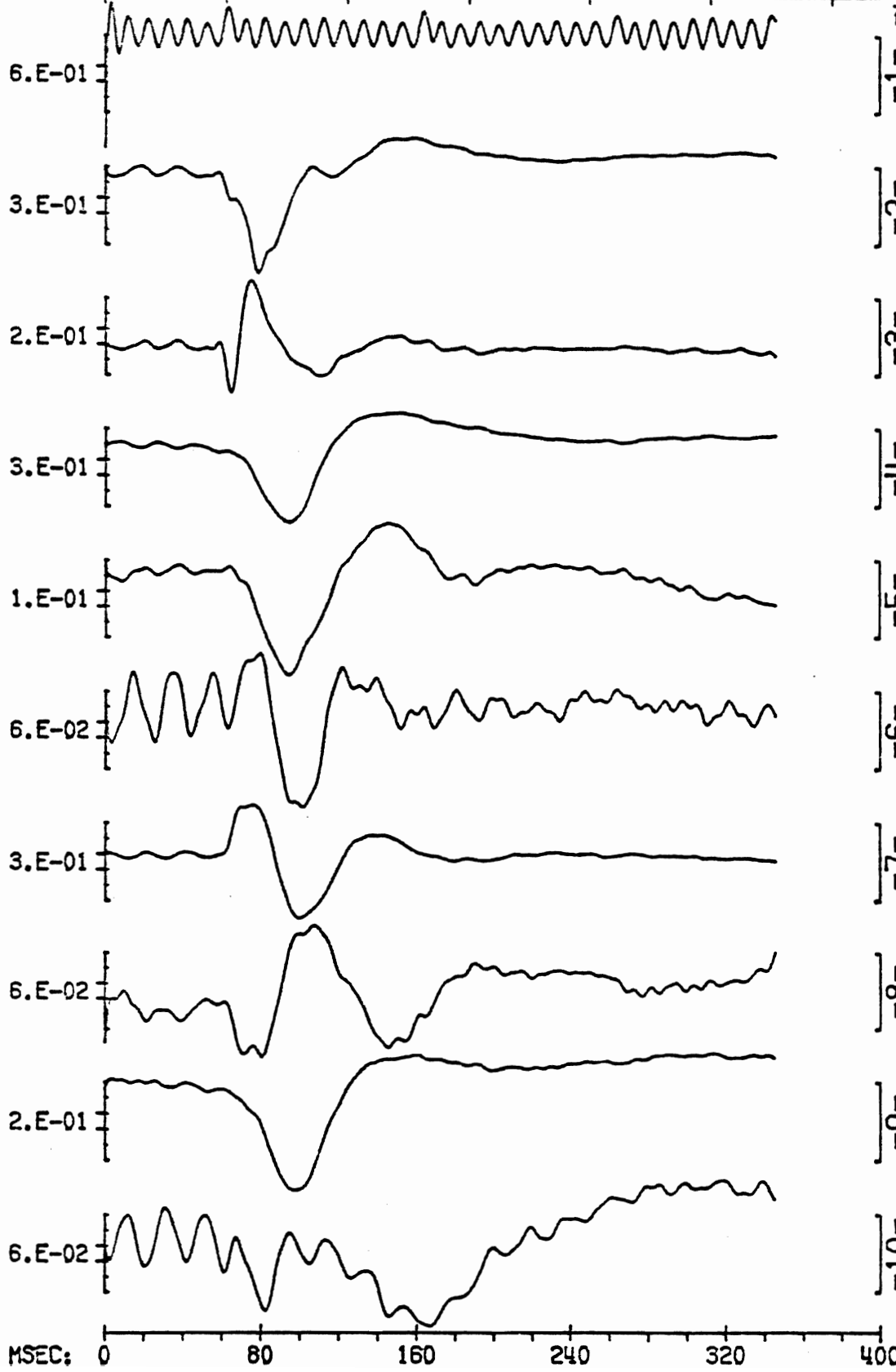
VASCULAR  
PRESSURE



50 msec



PTS: 1 101 201 301 401 501 601



=1= *WR*  
 283  
 =2= *WR*  
 284  
 =3= *WR*  
 285  
 =4= *WR*  
 286  
 =5= *WR*  
 287  
 =6= *WR*  
 288  
 =7= *WR*  
 289  
 =8= *WR*  
 290  
 =9= *WR*  
 291  
 =10= *WR*  
 292

ID: 77T081-1:PT

TAPE: PEND 'M TESTS

=====  
RUN ID: 77T081-10PT  
=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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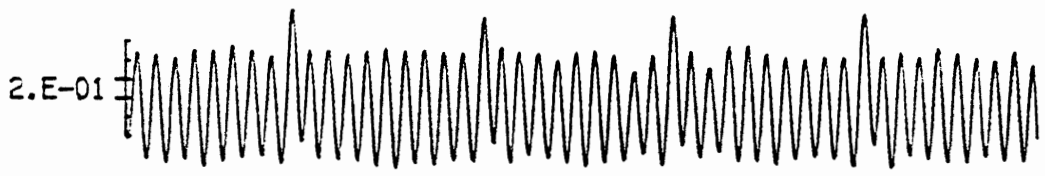
PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS  
ANALOG TAPE: HSRI#146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77  
TEST SIGNALS: 2223 PTS/CH AT 6399.08 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
283	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	554	1599.77
284	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.0	554	1599.77
285	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.0	554	1599.77
286	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	554	1599.77
287	- 5:	RIGHT LOWER RIB ACCELEROMETER	-3.70	G'S	4+1+ 3	100.0	554	1599.77
288	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.0	554	1599.77
289	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.0	554	1599.77
290	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	554	1599.77
291	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	553	1599.77
292	- 10:	T-1 I-S ACCELEROMETER	-3.80	G'S	4+1+ 3	100.0	553	1599.77

11:  
12:  
13:  
14:

-----  
FILTERED FILES: 283 - 292 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T081-10PT  
-----

PTS: 1 101 201 301 401 501 601 701



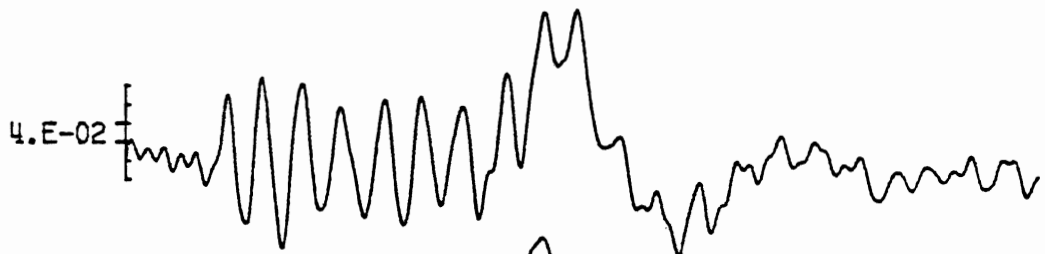
=1=  
313



=2=  
314



=3=  
315



=4=  
316



=5=  
317



=6=  
318



=12=  
319

MSEC: 0 100 200 300 400 500

ID: 77T081-2:PT

TAPE: PEND'M TESTS

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RUN ID: 77T081-21PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 3082 PTS/CH AT 6394.85 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
343	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	768	1598.71
344	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	768	1598.71
345	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	100.7	768	1598.71
346	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.7	768	1598.71
347	- 5:	VASCULAR PRESSURE	29.20	MM-HG	4+1+ 3	100.7	768	1598.71
348	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.7	768	1598.71

7:  
8:  
9:  
10:  
11:

349 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 768 1598.71

13:  
14:

-----  
FILTERED FILES: 343 - 349 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T081-21PT



TEST No.  
771-001

PISTON  
ACCELERATION

2.3G

LEFT UPPER RIB  
ACCELEROMETER

0.8G

LEFT LOWER RIB  
ACCELEROMETER

1.3G

RIGHT UPPER RIB  
ACCELEROMETER

0.9G

RIGHT LOWER RIB  
ACCELEROMETER

0.7G

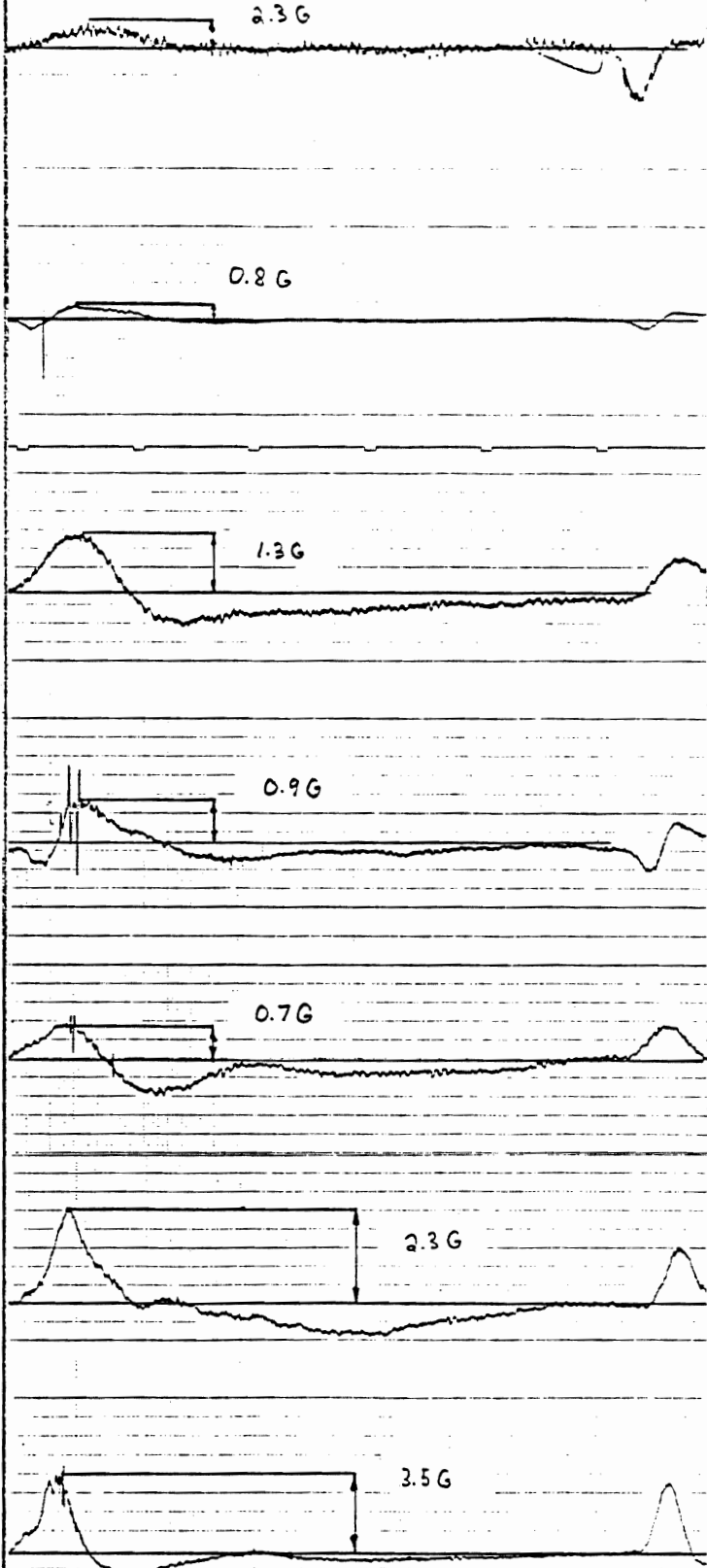
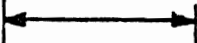
STERNUM UPPER  
ACCELEROMETER

2.3G

STERNUM LOWER  
ACCELEROMETER

3.5G

100 msec



TEST No.  
77-001

T<sub>1</sub> ACCELEROMETER  
(P-A)

2.0G

T<sub>1</sub> ACCELEROMETER  
(R-L)

less than 0.2G's

T<sub>1</sub> ACCELEROMETER  
(I-S)

0.5G

T<sub>12</sub> ACCELEROMETER  
(P-A)

1.2G

T<sub>12</sub> ACCELEROMETER  
(R-L)

0.2G

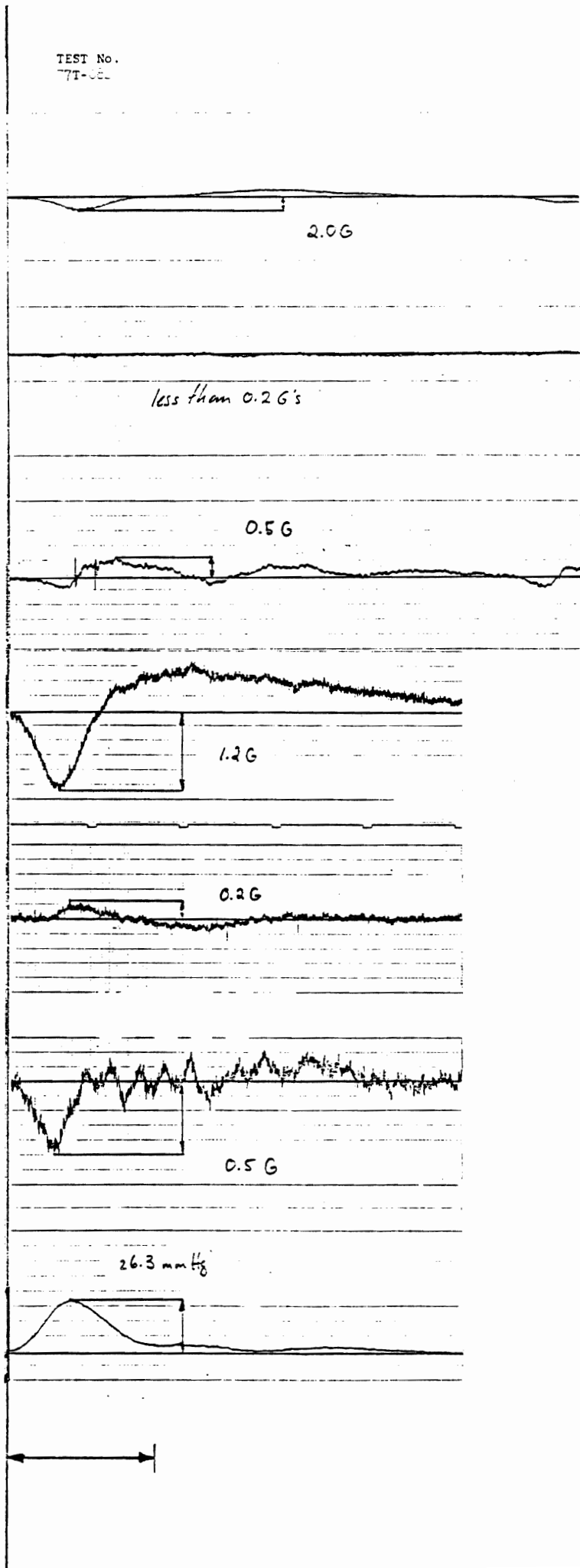
T<sub>12</sub> ACCELEROMETER  
(I-S)

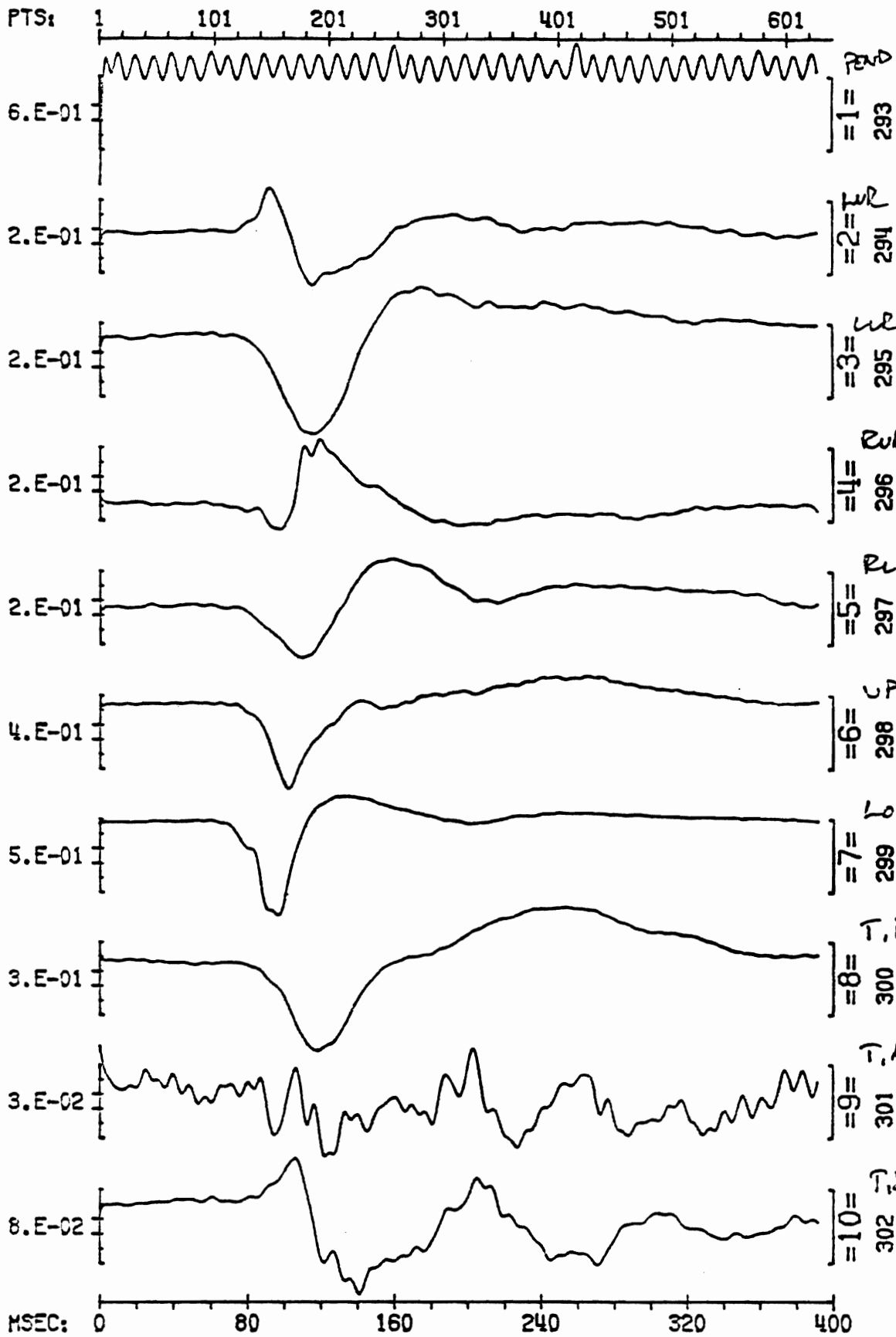
0.5G

VASCULAR  
PRESSURE

26.3 mm Hg

100 msec





77T082-1:PT

ID:

TAPE: PEND 'M TESTS

=====

RUN ID: 77T082-11PT

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 2514 PTS/CH AT 6398.37 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
293	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.8	627	1599.59
294	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.8	627	1599.59
295	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.8	627	1599.59
296	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.8	627	1599.59
297	- 5:	RIGHT LOWER RIB ACCELEROMETER	-3.70	G'S	4+1+ 3	100.8	627	1599.59
298	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.8	627	1599.59
299	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.8	627	1599.59
300	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+ 3	100.8	627	1599.59
301	- 9:	T-1 R-L ACCELEROMETER	3.80	G'S	4+1+ 3	100.8	627	1599.59
302	- 10:	T-1 I-S ACCELEROMETER	-3.80	G'S	4+1+ 3	100.8	627	1599.59

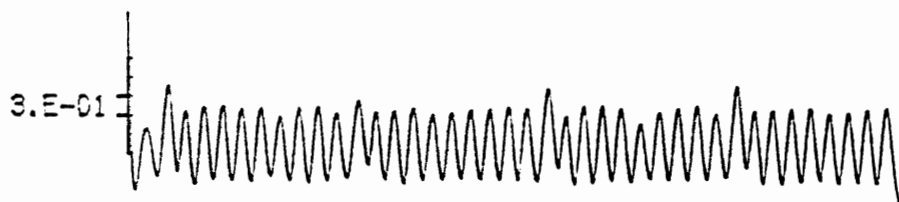
11:  
12:  
13:  
14:

-----

FILTERED FILES: 293 - 302 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T082-11PT

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PTS: 1 101 201 301 401 501 601 701



1=  $\tau_{12}$  350



2=  $\tau_{12}$  351



3=  $\tau_{12}$  352



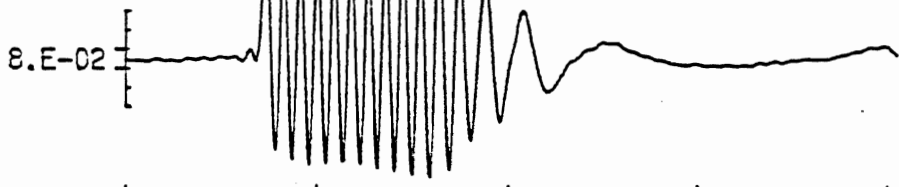
4=  $\tau_{12}$  353



5=  $\tau_{12}$  354



6=  $\tau_{12}$  355



12=  $\tau_{12}$  356

MSEC: 0 100 200 300 400 500

ID: 77T082-2:PT

TAPE: PEND 'M TESTS

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T082-2:PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 2611 PTS/CH AT 6398.04 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
350	1	PISTON DECELERATION	30.00	G'S	4+1+3	100.0	650	1599.51
351	2	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+3	100.0	650	1599.51
352	3	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+3	100.0	650	1599.51
353	4	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+3	100.0	650	1599.51
354	5	VASCULAR PRESSURE	29.20	MM-HG	4+1+3	100.0	650	1599.51
355	6	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+3	100.0	650	1599.51

7:

8:

9:

10:

11:

356 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 100.0 649 1599.51

13:

14:

-----  
FILTERED FILES: 350 - 356 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T082-2:PT

TEST 771-063

PISTON  
ACCELERATION

15.8 G

LEFT UPPER RIB  
ACCELEROMETER

32.1 G

LEFT LOWER RIB  
ACCELEROMETER

29.4 G

RIGHT UPPER RIB  
ACCELEROMETER

38.1 G

RIGHT LOWER RIB  
ACCELEROMETER

24.7 G

STERNUM UPPER  
ACCELEROMETER

116 G

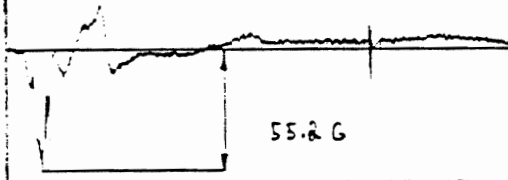
STERNUM LOWER  
ACCELEROMETER

153 G

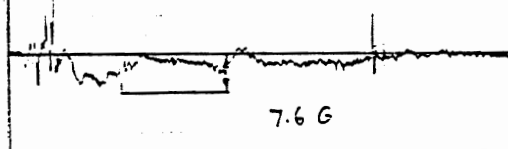
100 msec



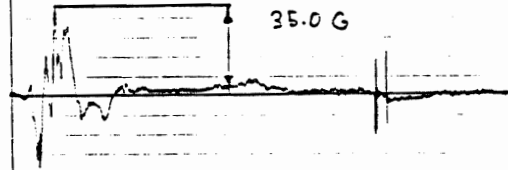
T<sub>1</sub> ACCELEROMETER  
(P-A)



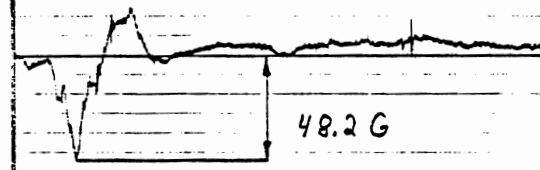
T<sub>1</sub> ACCELEROMETER  
(R-L)



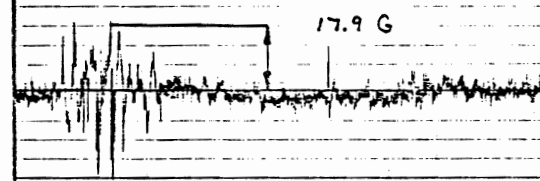
T<sub>1</sub> ACCELEROMETER  
(I-S)



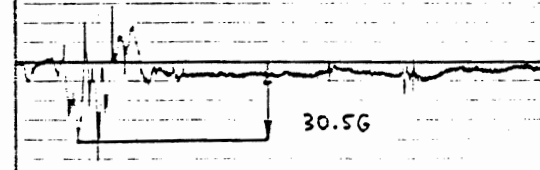
T<sub>12</sub> ACCELEROMETER  
(P-A)



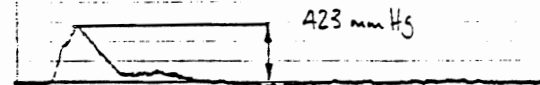
T<sub>12</sub> ACCELEROMETER  
(R-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE

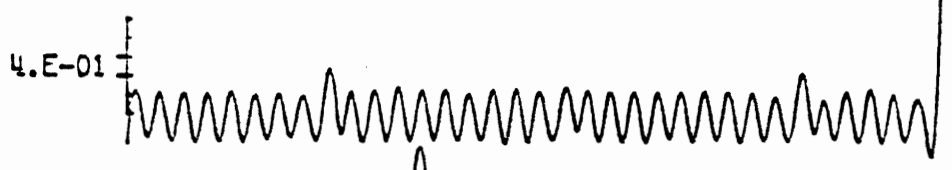


100 msec





PTS: 1 101 201 301 401 501 601



=1= *770*  
303



=2= *LR*  
304



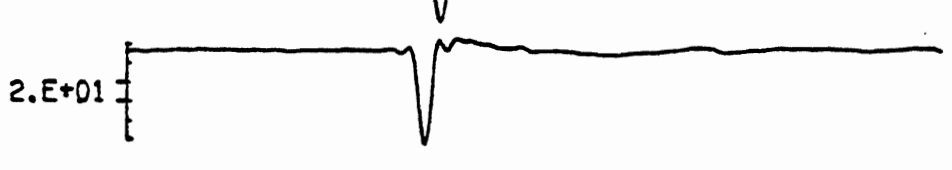
=3= *LR*  
305



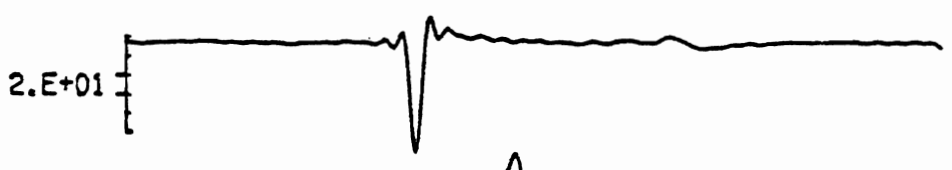
=4= *LR*  
306 *LR*



=5= *LR*  
307



=6= *LR*  
308



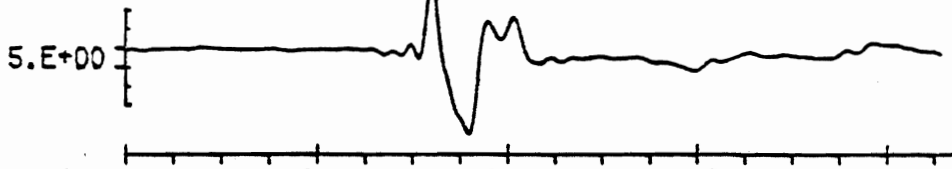
=7= *LR*  
309



=8= *LR*  
310



=9= *LR*  
311



=10= *LR*  
312

MSEC: 0 80 160 240 320 400

ID: 77T083-1:PP

TAPE: PEND 'M TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T083-1:PP

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

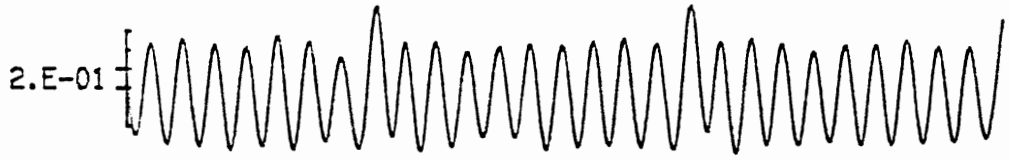
TEST SIGNALS: 2211 PTS/CH AT 6398.61 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
303	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	549 0	1599.65
304	- 2:	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+ 3	100.0	549 0	1599.65
305	- 3:	LEFT LOWER RIB ACCELEROMETER	-210.00	G'S	4+1+ 3	100.0	549 0	1599.65
306	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	100.0	549 0	1599.65
307	- 5:	RIGHT LOWER RIB ACCELEROMETER	-74.80	G'S	4+1+ 3	100.0	549 0	1599.65
308	- 6:	UPPER STERNAL ACCELEROMETER	-224.00	G'S	4+1+ 3	100.0	549 0	1599.65
309	- 7:	LOWER STERNAL ACCELEROMETER	-332.00	G'S	4+1+ 3	100.0	549 0	1599.65
310	- 8:	T-1 P-A ACCELEROMETER	89.00	G'S	4+1+ 3	100.0	549 0	1599.65
311	- 9:	T-1 R-L ACCELEROMETER	38.00	G'S	4+1+ 3	100.0	549 0	1599.65
312	- 10:	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+ 3	100.0	549 0	1599.65

11:  
12:  
13:  
14:

\*\*\*\*\*  
FILTERED FILES: 303 - 312 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T083-1:PP

PTS: 1 81 161 241 321 401



=1=  $\tau_{21}$   
357



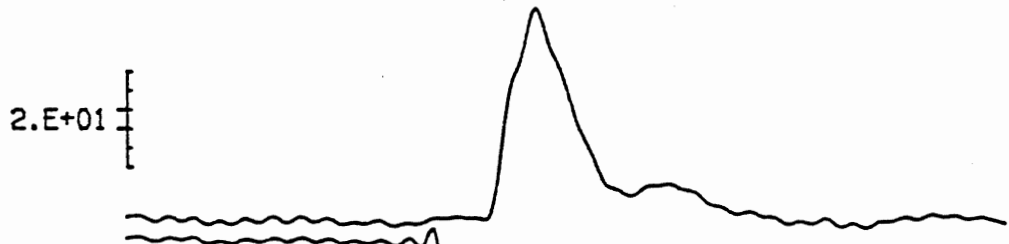
=2=  $\tau_{12}$   
358



=3=  $\tau_{22}$   
359



=4=  $\tau_{23}$   
360



=5=  $\sqrt{V_{AC}}$   
361



=6=  $\sqrt{V_F}$   
362



=12=  $\sqrt{I}$   
363

MSEC: 0 60 120 180 240 300

ID: 77T083-2:PP

TAPE: PEND 'M TESTS

=====
RUN ID: 77T083-2:PP

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

=====

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 1789 PTS/CH AT 6397.71 HZ. CAL SIGNALS: NOT DIGITIZED.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include PISTON DECELERATION, ACCELEROMETER (P-A, R-L, I-S), VASCULAR PRESSURE, and VERTICAL SUPPORT FORCE.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include PISTON VELOCITY.

=====
FILTERED FILES: 357 - 363 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T083-2:PP
=====

SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

TEST NUMBERS

77T084 - Low Energy Side Pendulum Impact

77T085 - Low Energy Front Pendulum Impact

77T086 - Pendulum 20 ft/sec Front Impact

TEST DATE

September 8, 1977

TEST SUBJECT

Age - 54

Sex - Female

Weight - 78.4 kg

Stature - 163 cm.

RESTRAINT SYSTEM

None: Thoracic Pendulum Impact

VELOCITY

In Test No. 77T086, velocity was 20 ft/sec.

INJURIES

Fractures - Left ribs 4, 8  
Right ribs 4, 5, 8

Small bruise in membrane surrounding aorta

AIS NUMBER ESTIMATE

3

TEST # 77T086

TEST DATE 9.8.77

TEST DESCRIPTION Pendulum front impact VELOCITY 20 ft/s

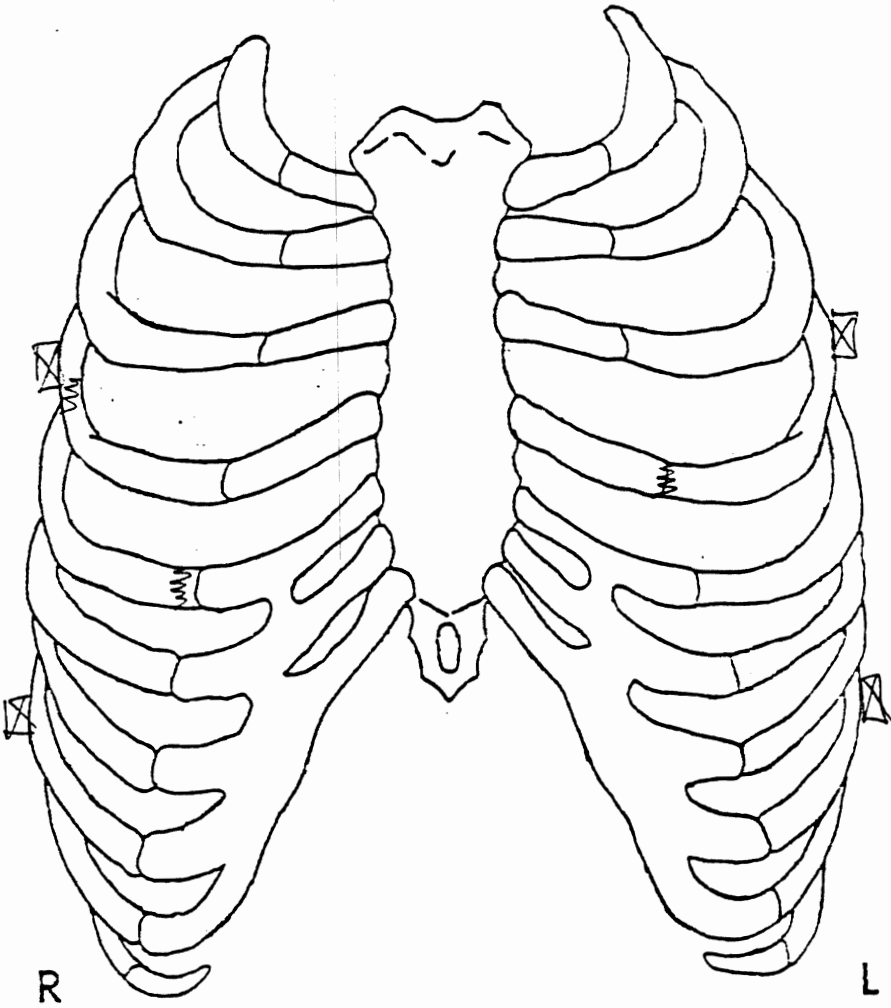
SUBJECT:

AGE 54 SEX F CAUSE OF DEATH multiple sclerosis

INJURY INFORMATION: OVERALL THORACIC AIS 3

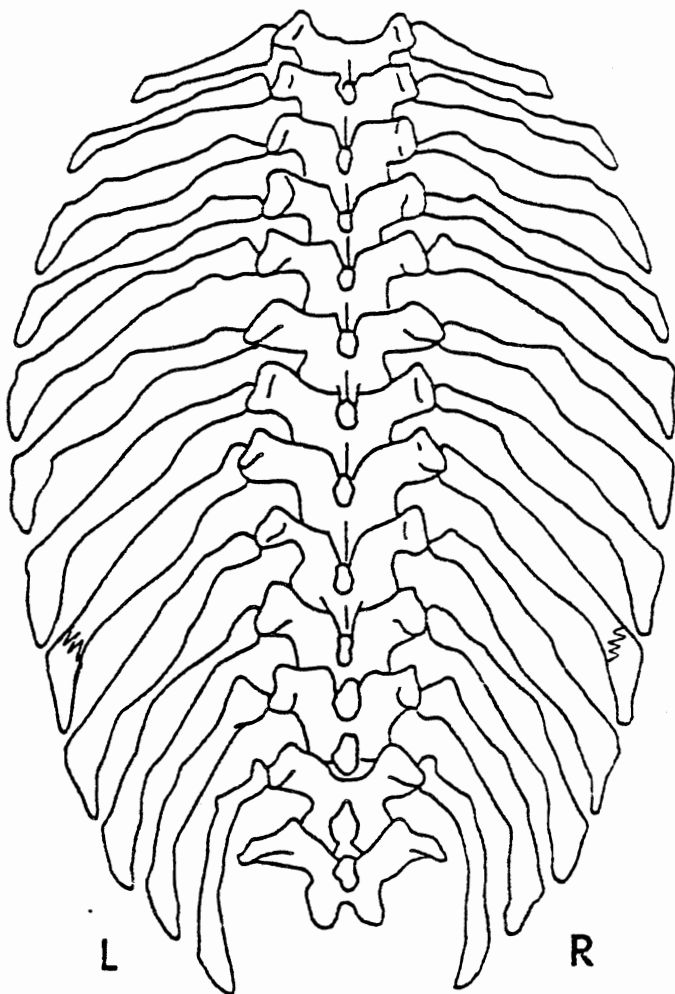
	R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>3</u>
	2	<u>C</u>	<u>H</u>	<u>A</u>	<u>2</u>
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____
	6	_____	_____	_____	_____
	7	_____	_____	_____	_____
	8	_____	_____	_____	_____
MAJOR NON-THORACIC INJURIES NOTED	1	_____	_____	_____	_____
	2	_____	_____	_____	_____
	3	_____	_____	_____	_____
	4	_____	_____	_____	_____
	5	_____	_____	_____	_____

TEST # 77T086



ANTERIOR VIEW RIB CAGE

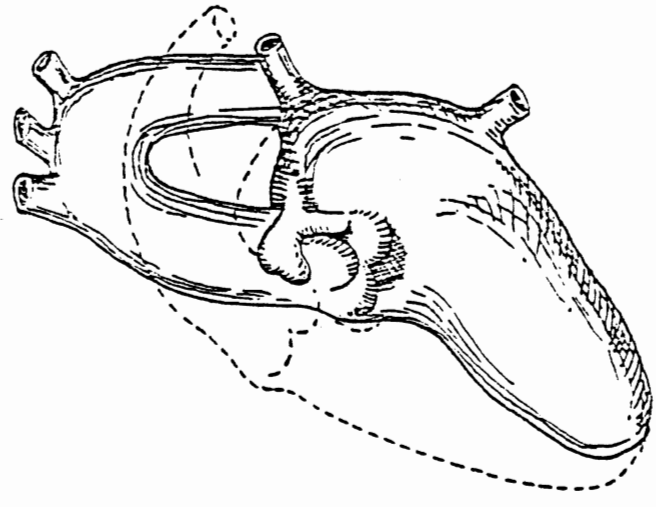
TEST # 7708



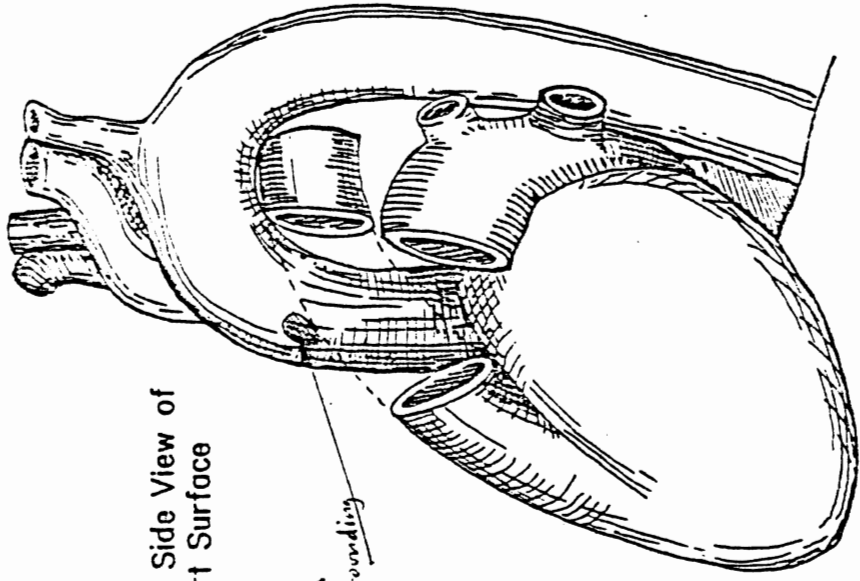
POSTERIOR VIEW RIB CAGE



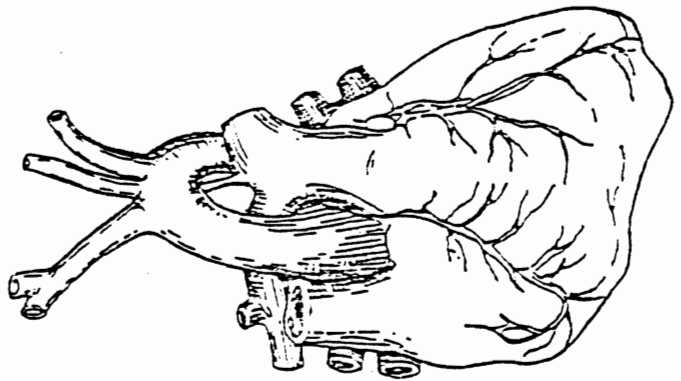
Left View of Left Side of Heart



Left Side View of Heart Surface



hemorrhage in membrane surrounding aorta



Anterior View of Heart

TEST TTT-084

PISTON  
ACCELERATION

1.5G

LEFT UPPER RIB  
ACCELEROMETER

1.2G

LEFT LOWER RIB  
ACCELEROMETER

0.6G

RIGHT UPPER RIB  
ACCELEROMETER

1.1G

RIGHT LOWER RIB  
ACCELEROMETER

0.3G

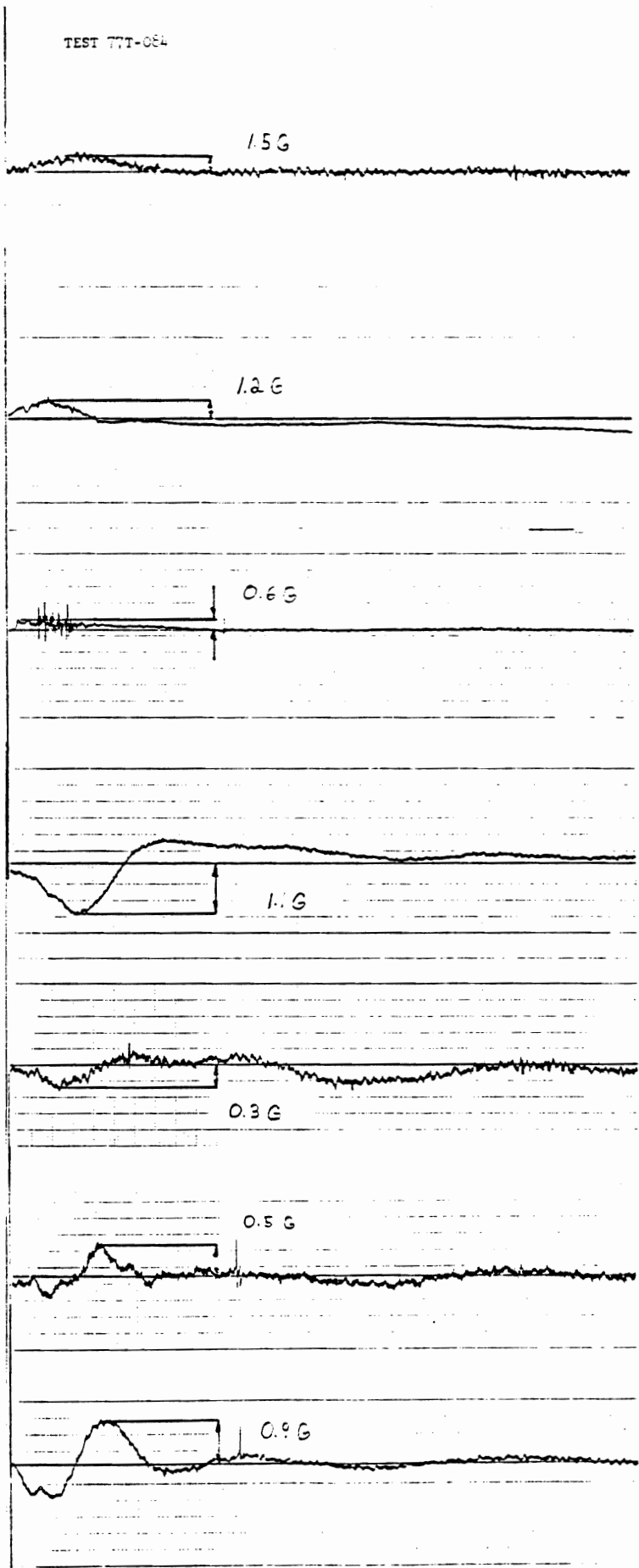
STERNUM UPPER  
ACCELEROMETER

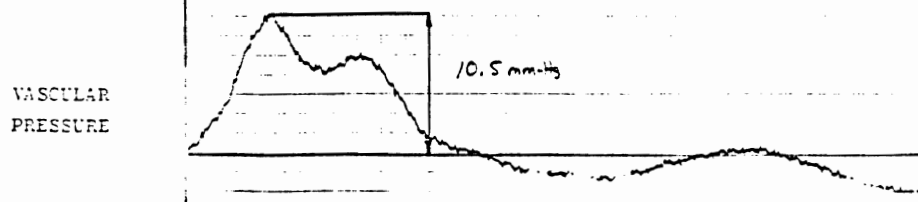
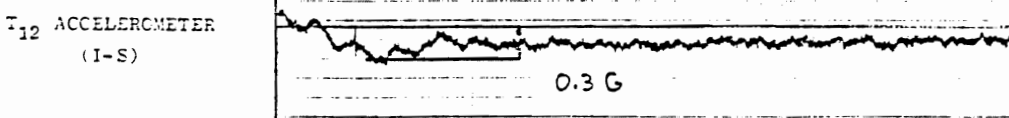
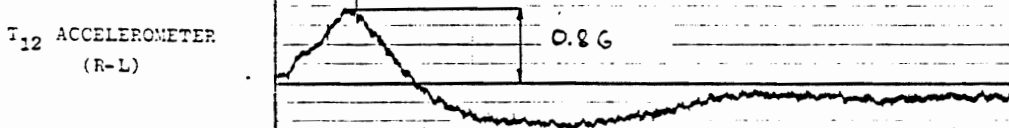
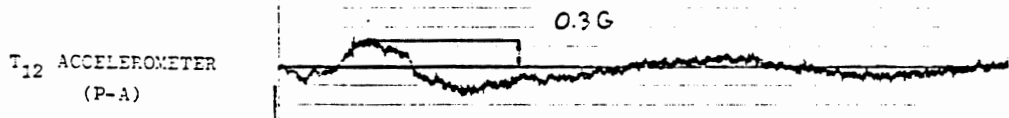
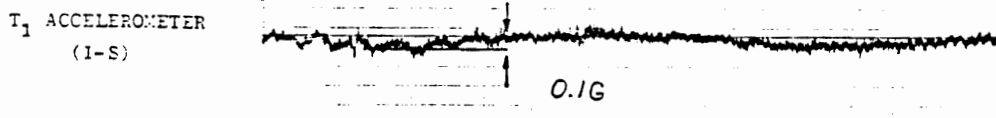
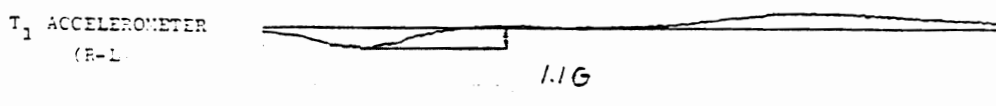
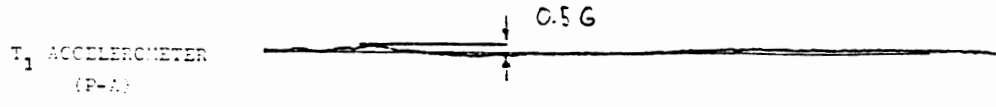
0.5G

STERNUM LOWER  
ACCELEROMETER

0.9G

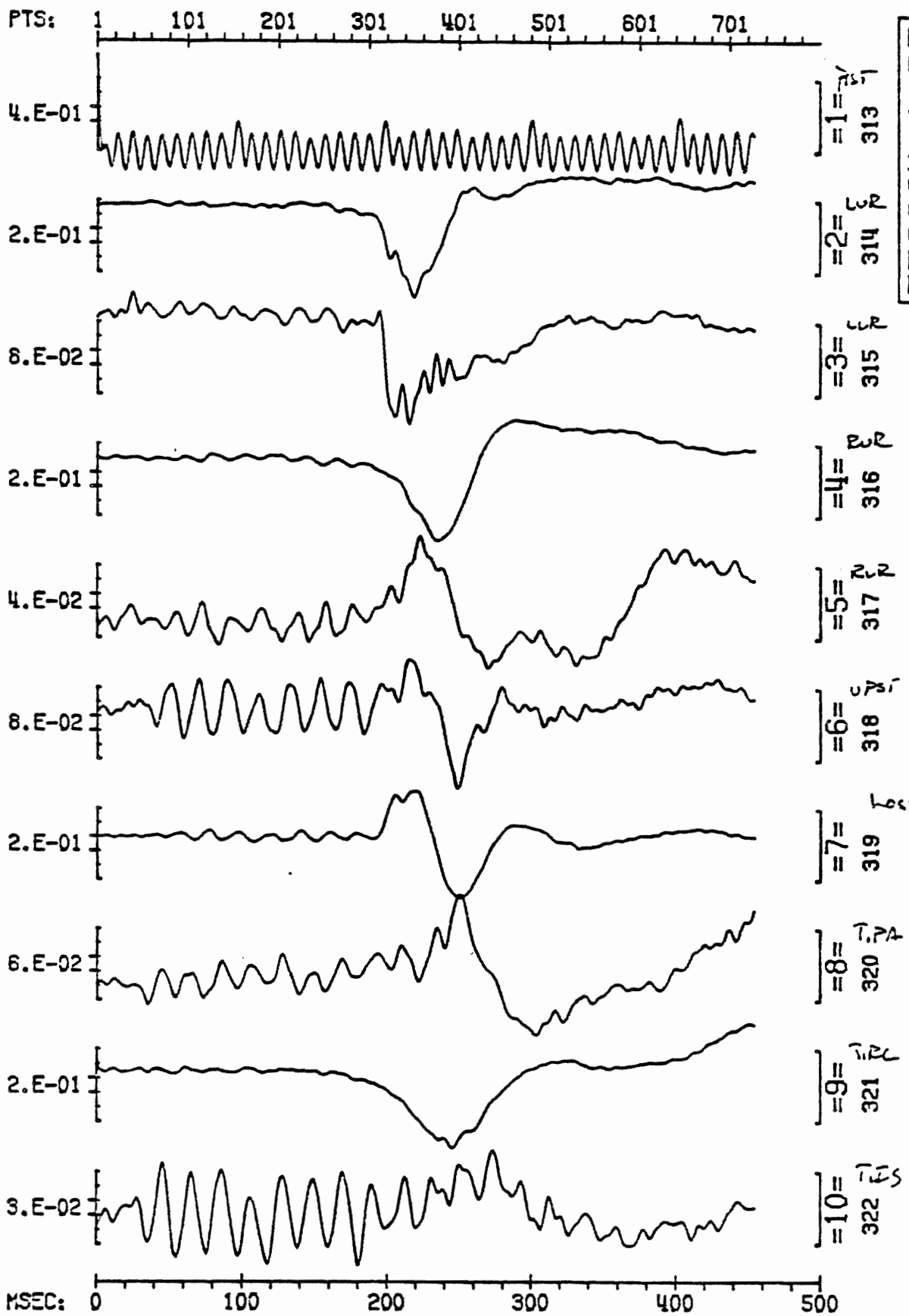
100 msec





1 msec

A horizontal double-headed arrow indicating a time scale of 1 msec.



ID: 778084-1:PT

TAPE: PEND 'M TESTS

=====
RUN ID: 770084-1:PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#146 EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

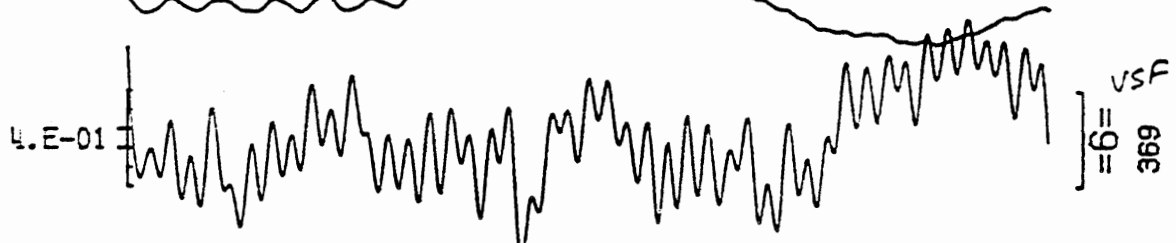
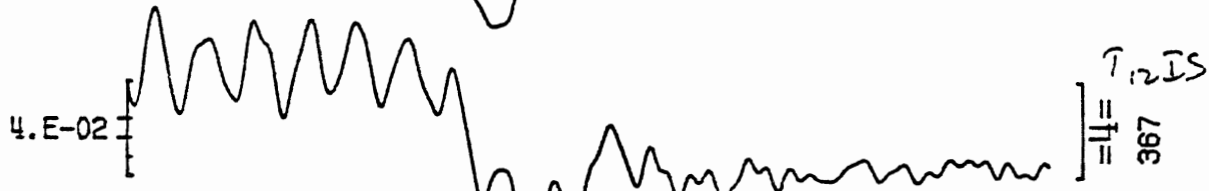
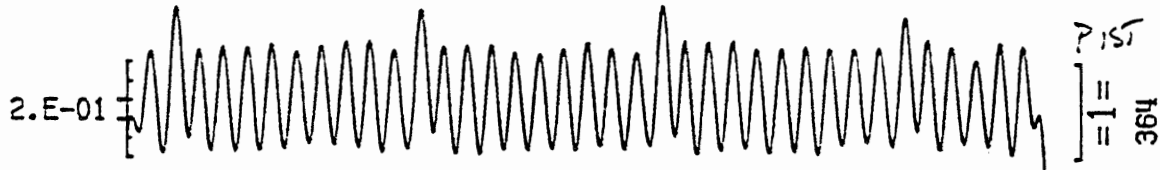
TEST SIGNALS: 2914 PTS/CH AT 6395.26 HZ. CAL SIGNALS: NOT DIGITIZED.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT, UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows 313-322 list various accelerometer channels and their parameters.

11:
12:
13:
14:

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FILTERED FILES: 313 - 322 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 770084-1:PT

PTS: 1 101 201 301 401 501 601



MSEC: 0 80 160 240 320 400

ID: 77T084-2:PT

TAPE: PEND'M TESTS

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RUN ID: 77T084-21PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 2476 PTS/CH AT 6399.69 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
364	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	618	1599.92
365	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.0	618	1599.92
366	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	100.0	618	1599.92
367	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.0	618	1599.92
368	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+ 3	100.0	618	1599.92
369	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.0	618	1599.92

7:

8:

9:

10:

11:

370 - 12: PISTON VELOCITY

13:

14:

370 - 12: PISTON VELOCITY

4+1+ 3

100.0

617

1599.92

=====

FILTERED FILES: 364 - 370 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T084-21PT

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TEST 77-005

PISTON  
ACCELERATION

1.2G

LEFT UPPER RIB  
ACCELEROMETER

1.1G

LEFT LOWER RIB  
ACCELEROMETER

1.7G

RIGHT UPPER RIB  
ACCELEROMETER

0.9G

1.0G

RIGHT LOWER RIB  
ACCELEROMETER

1.0G

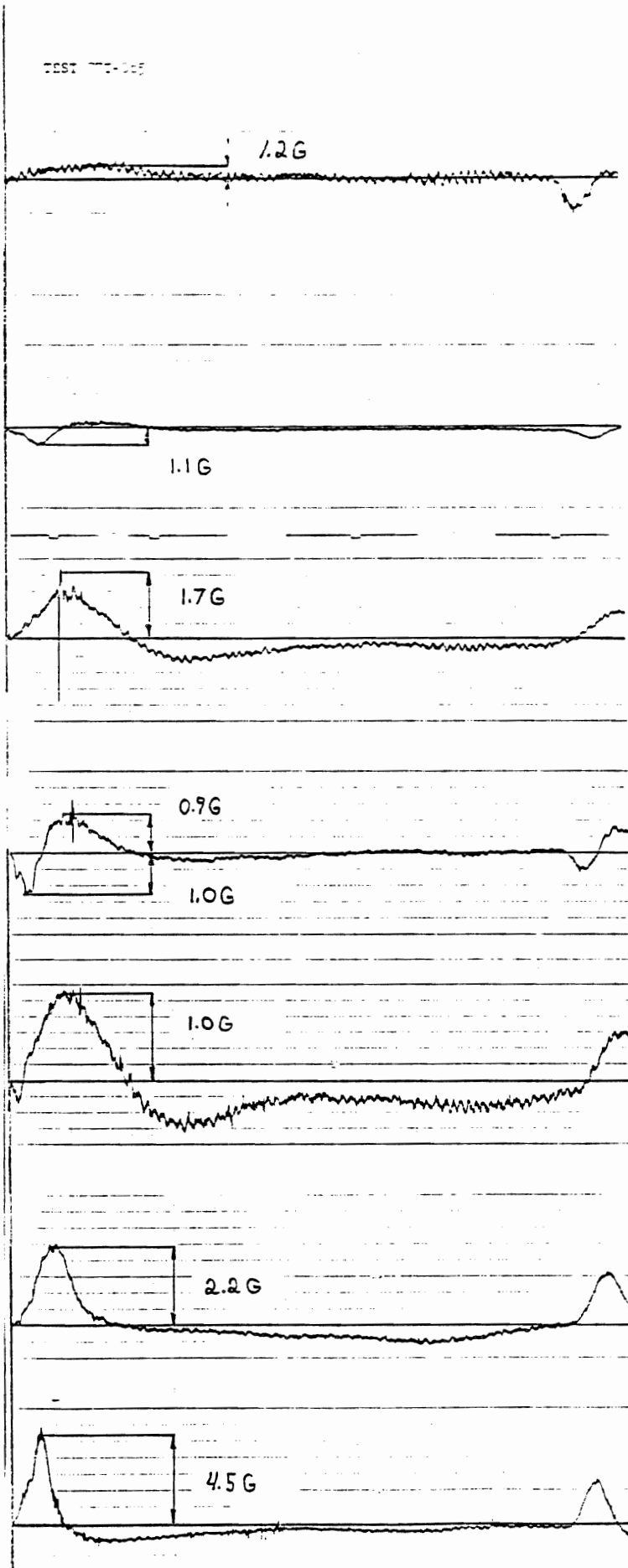
STERNUM UPPER  
ACCELEROMETER

2.2G

STERNUM LOWER  
ACCELEROMETER

4.5G

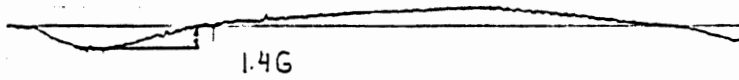
100 msec



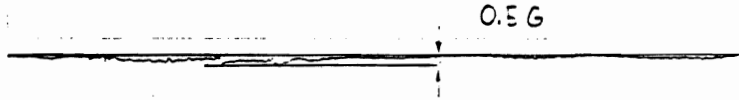


TEST WT-005

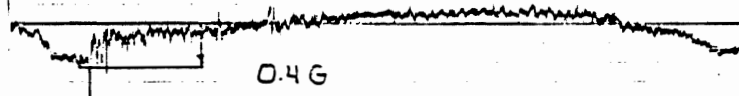
T<sub>1</sub> ACCELEROMETER  
(P-A)



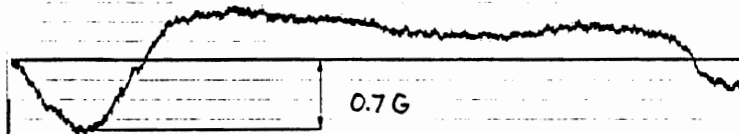
T<sub>1</sub> ACCELEROMETER  
(R-L)



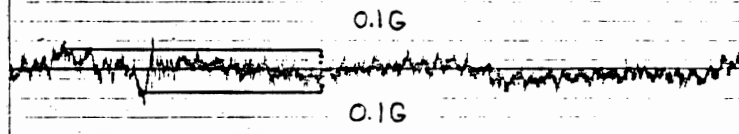
T<sub>1</sub> ACCELEROMETER  
(I-S)



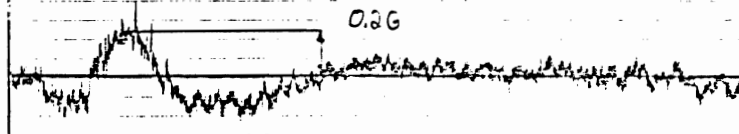
T<sub>12</sub> ACCELEROMETER  
(P-A)



T<sub>12</sub> ACCELEROMETER  
(R-L)

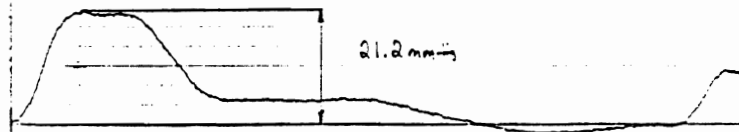


T<sub>12</sub> ACCELEROMETER  
(I-S)



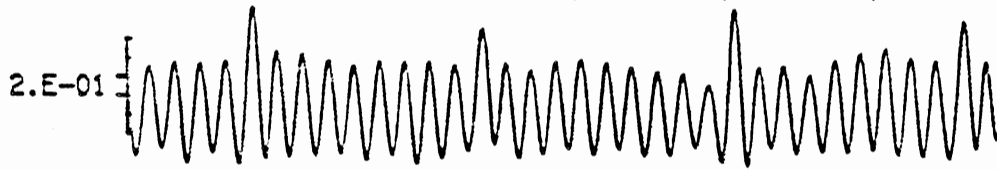
TRIM ACCORD HART

VASCULAR  
PRESSURE



100 nsec

PTS: 1 101 201 301 401 501 601



=1= 323



=2= 324



=3= 325



=4= 326



=5= 327



=6= 328



=7= 329



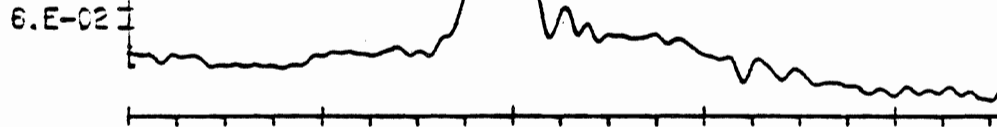
=8= 330



=9= 331



=10= 332



MSEC: 0 80 160 240 320 400

ID: 77T085-1:PT

TAPE: PEND 'M TESTS

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RUN ID: 77T085-1:PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: H9RI#146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: H90452 DATE: 15-SEP-77

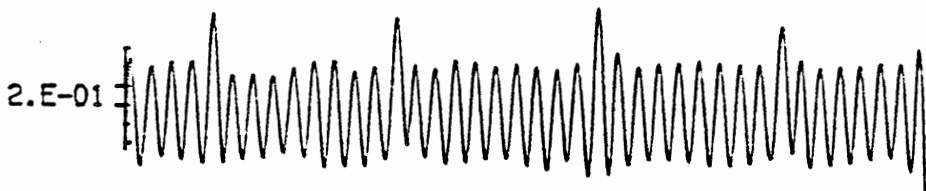
TEST SIGNALS: 2354 PTS/CH AT 6400.54 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
323	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	586	1600.14
324	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.0	586	1600.14
325	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.0	586	1600.14
326	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.0	586	1600.14
327	- 5:	RIGHT LOWER RIB ACCELEROMETER	-3.70	G'S	4+1+ 3	100.0	586	1600.14
328	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.0	586	1600.14
329	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.0	586	1600.14
330	- 8:	T-1 P-A ACCELEROMETER	4.50	G'S	4+1+ 3	100.0	586	1600.14
331	- 9:	T-1 R-L ACCELEROMETER	3.90	G'S	4+1+ 3	100.0	585	1600.14
332	- 10:	T-1 I-S ACCELEROMETER	-3.60	G'S	4+1+ 3	100.0	585	1600.14

11:  
12:  
13:  
14:

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FILTERED FILES: 323 - 332 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T085-1:PT

PTS: 1 101 201 301 401 501 601 701



=1=  
371



=2=  
372



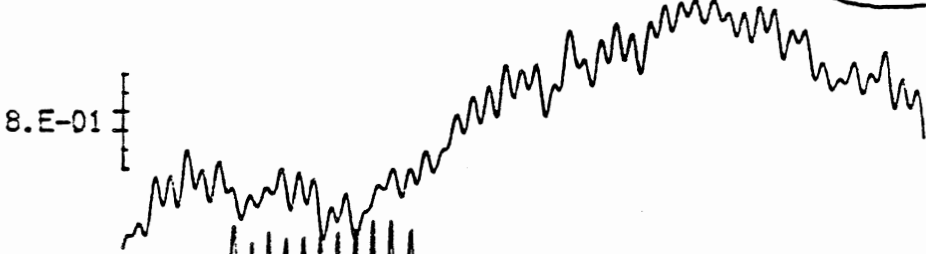
=3=  
373



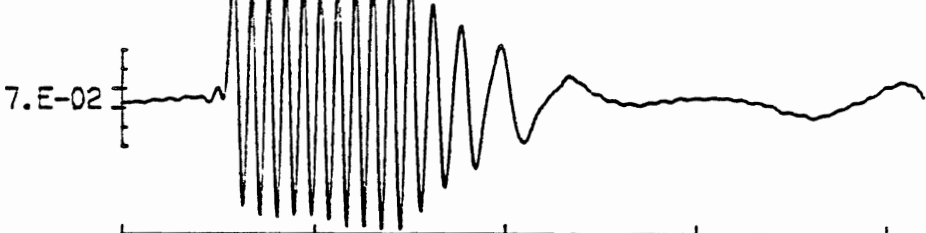
=11=  
374



=5=  
375



=6=  
376



=12=  
377

MSEC: 0 100 200 300 400 500

ID: 77T085-2:PT

TAPE: PEND 'M TESTS

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RUN ID: 77T085-2IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 2693 PTS/CH AT 6398.38 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
371	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.0	672	1599.60
372	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.0	672	1599.60
373	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	100.0	672	1599.60
374	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.0	672	1599.60
375	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+ 3	100.0	672	1599.60
376	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.0	672	1599.60

7:

8:

9:

10:

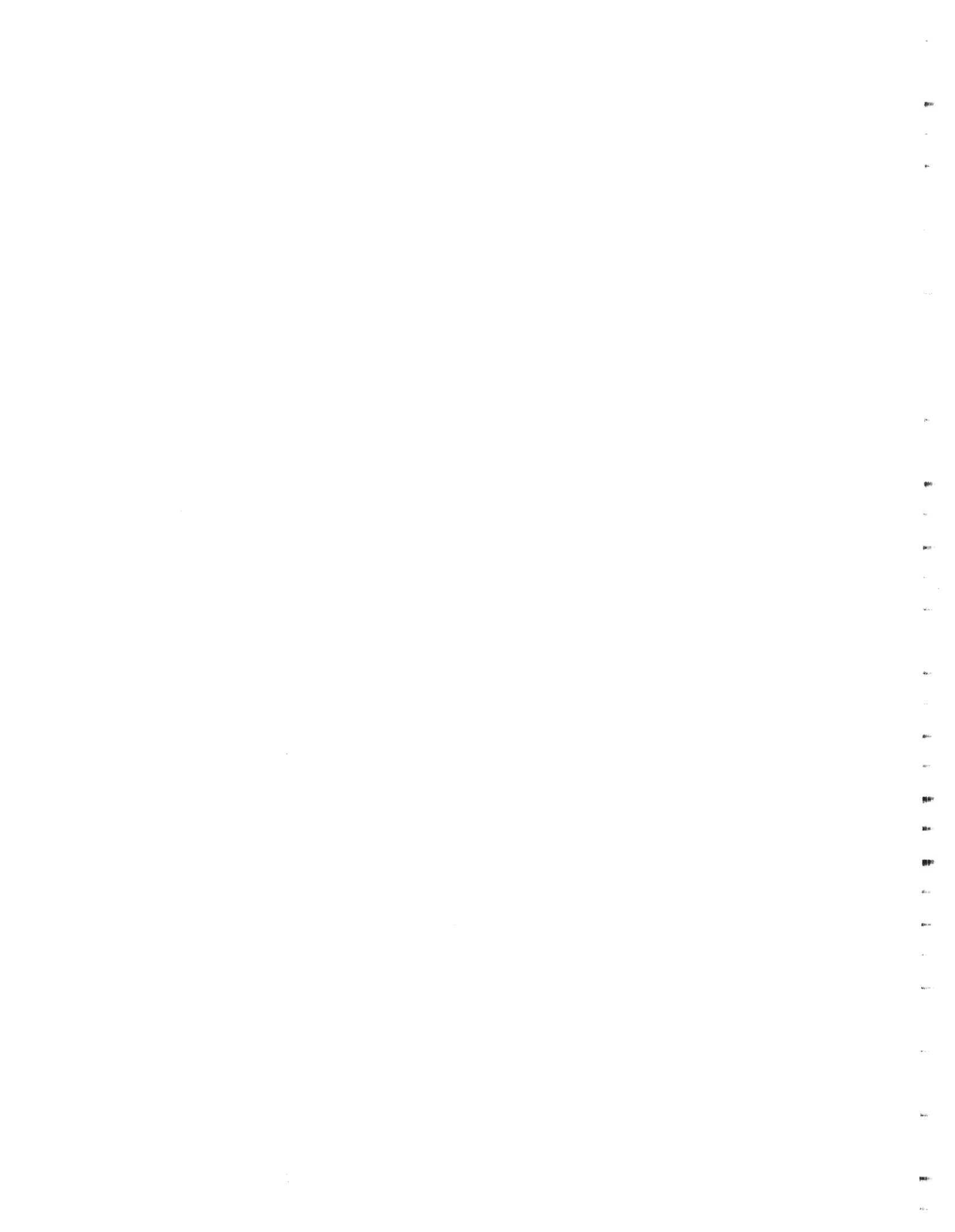
11:

377 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.0 672 1599.60

13:

14:

\*\*\*\*\*  
FILTERED FILES: 371 - 377 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T085-2IPT



TEST WT-30

PISTON  
ACCELERATION

21.0G

LEFT UPPER RIB  
ACCELEROMETER

49.1G

73.6G

LEFT LOWER RIB  
ACCELEROMETER

39.9G

RIGHT UPPER RIB  
ACCELEROMETER

95.5G

RIGHT LOWER RIB  
ACCELEROMETER

54.2G

STERNUM UPPER  
ACCELEROMETER

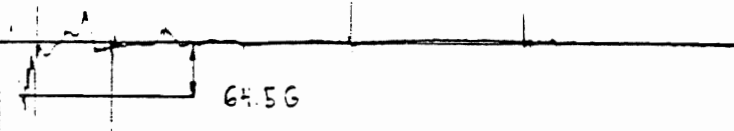
177G

STERNUM LOWER  
ACCELEROMETER

183G

100 msec

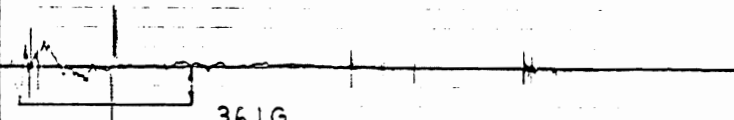
T<sub>1</sub> ACCELEROMETER  
(P-A)



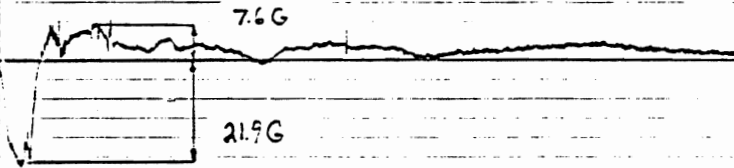
T<sub>1</sub> ACCELEROMETER  
(R-L)



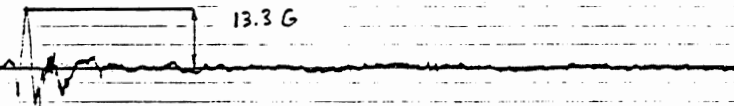
T<sub>1</sub> ACCELEROMETER  
(I-S)



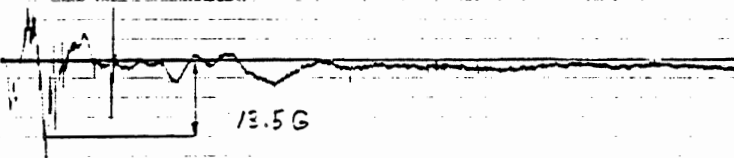
T<sub>12</sub> ACCELEROMETER  
(P-A)



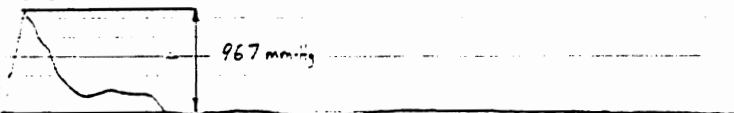
T<sub>12</sub> ACCELEROMETER  
(R-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)



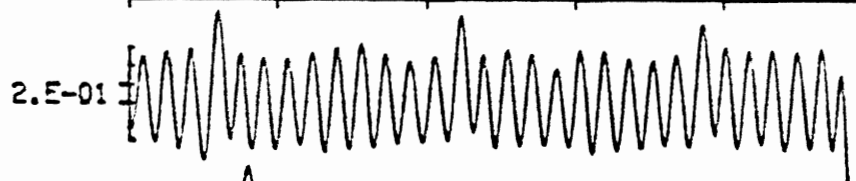
VASCULAR  
PRESSURE



100 msec



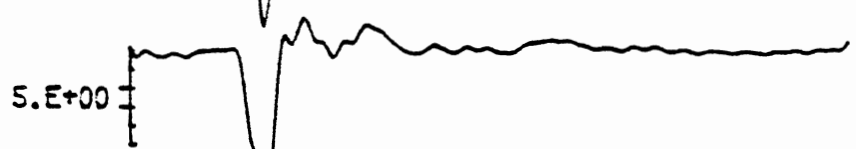
PTS: 1 101 201 301 401 501 601



=1=  
333



=2=  
334



=3=  
335



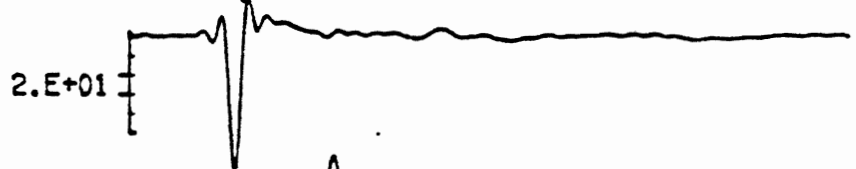
=4=  
336



=5=  
337



=6=  
338



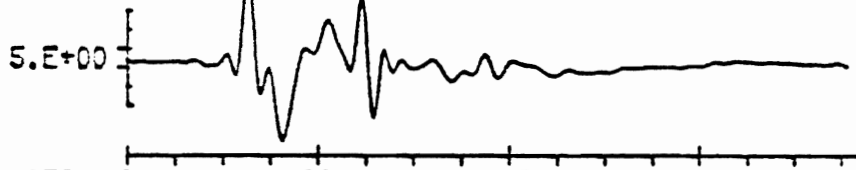
=7=  
339



=8=  
340



=9=  
341



=10=  
342

MSEC: 0 80 160 240 320 400

ID: 77T086-1:PP

TAPE: PEND'M TESTS

=====

RUN ID: 77T086-1:PP

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#146 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 15-SEP-77

TEST SIGNALS: 1943 PTS/CH AT 6399.74 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
333	- 1	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.8	485	1599.93
334	- 2	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+ 3	100.8	485	1599.93
335	- 3	LEFT LOWER RIB ACCELEROMETER	-210.00	G'S	4+1+ 3	100.8	485	1599.93
336	- 4	RIGHT UPPER RIB ACCELEROMETER	191.00	G'S	4+1+ 3	100.8	485	1599.93
337	- 5	RIGHT LOWER RIB ACCELEROMETER	-74.80	G'S	4+1+ 3	100.8	485	1599.93
338	- 6	UPPER STERNAL ACCELEROMETER	-224.00	G'S	4+1+ 3	100.8	485	1599.93
339	- 7	LOWER STERNAL ACCELEROMETER	-332.00	G'S	4+1+ 3	100.8	485	1599.93
340	- 8	T-1 P-A ACCELEROMETER	89.00	G'S	4+1+ 3	100.8	485	1599.93
341	- 9	T-1 R-L ACCELEROMETER	39.00	G'S	4+1+ 3	100.8	485	1599.93
342	- 10	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+ 3	100.8	485	1599.93

11

12

13

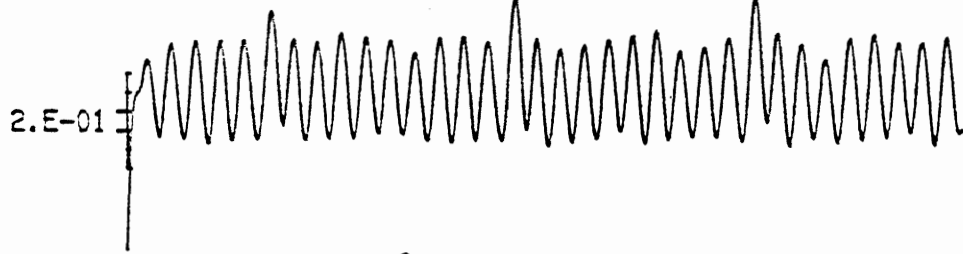
14

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FILTERED FILES: 333 - 342 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T086-1:PP

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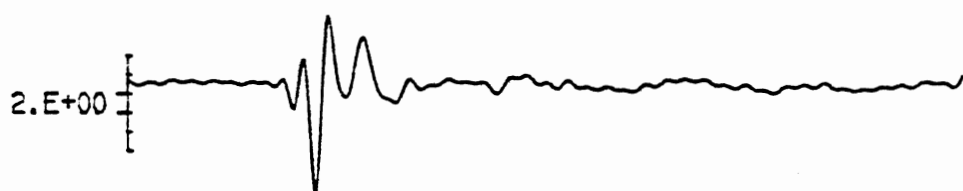
PTS: 1 101 201 301 401 501 601



$\hat{1} = 378$   
 $\hat{2} = 378$



$\hat{1} = 379$   
 $\hat{2} = 379$



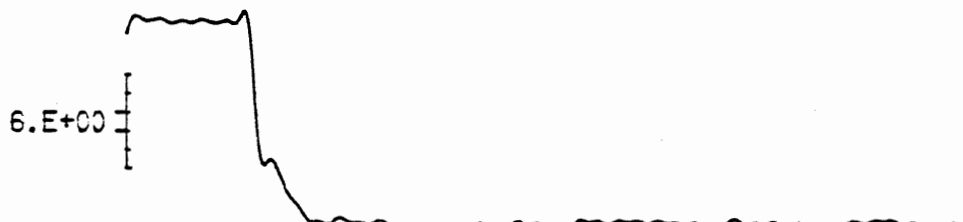
$\hat{1} = 380$   
 $\hat{2} = 380$



$\hat{1} = 381$   
 $\hat{2} = 381$



$\hat{1} = 382$   
 $\hat{2} = 382$



$\hat{1} = 383$   
 $\hat{2} = 383$



$\hat{1} = 384$   
 $\hat{2} = 384$

MSEC: 0 80 160 240 320 400

ID: 77T086-2:PP

TAPE: PEND 'M TESTS

=====
RUN ID: 77T086-20PP

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TESTS

ANALOG TAPE: HSRI#147 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0452 DATE: 15-SEP-77

TEST SIGNALS: 2261 PTS/CH AT 6400.57 HZ. CAL SIGNALS: NOT DIGITIZED.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT, UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include PISTON DECELERATION, T-12 P-A ACCELEROMETER, T-12 R-L ACCELEROMETER, T-12 I-S ACCELEROMETER, VASCULAR PRESSURE, VERTICAL SUPPORT FORCE.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT, UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include PISTON VELOCITY.

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FILTERED FILES: 378 - 384 DIGITAL TAPE: JEFLEH DATE: 15-SEP-77 RUN ID: 77T086-20PP
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## SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

### TEST NUMBERS

77T087 - Low Energy Front Pendulum Impact

77T088 - Low Energy Side Pendulum Impact

77T089 - Rigid wall side impact - 20 mph

### TEST DATE

September 19, 1977

### TEST SUBJECT

Age - 66

Sex - Male

Weight - 55.1 kg

Stature - 173.5 cm

### RESTRAINT SYSTEM

None - Side Impact with Rigid Flat Surface

### VELOCITY

In Test No. 77T089, closing velocity was about 20 mph.

### INJURIES

Fractures - Right ribs 1, 2; Left ribs 2-8; Temporal bone

Small bruise on posterior of aorta; Torn vessel connections in heart.

### AIS NUMBER ESTIMATE

4 5

*See handwritten notes on page 6. 10/1/77*

TEST # 777089

TEST DATE 9.12.77

TEST DESCRIPTION Rigid Barrier Side Sled Impact VELOCITY 29.3 ft/sec

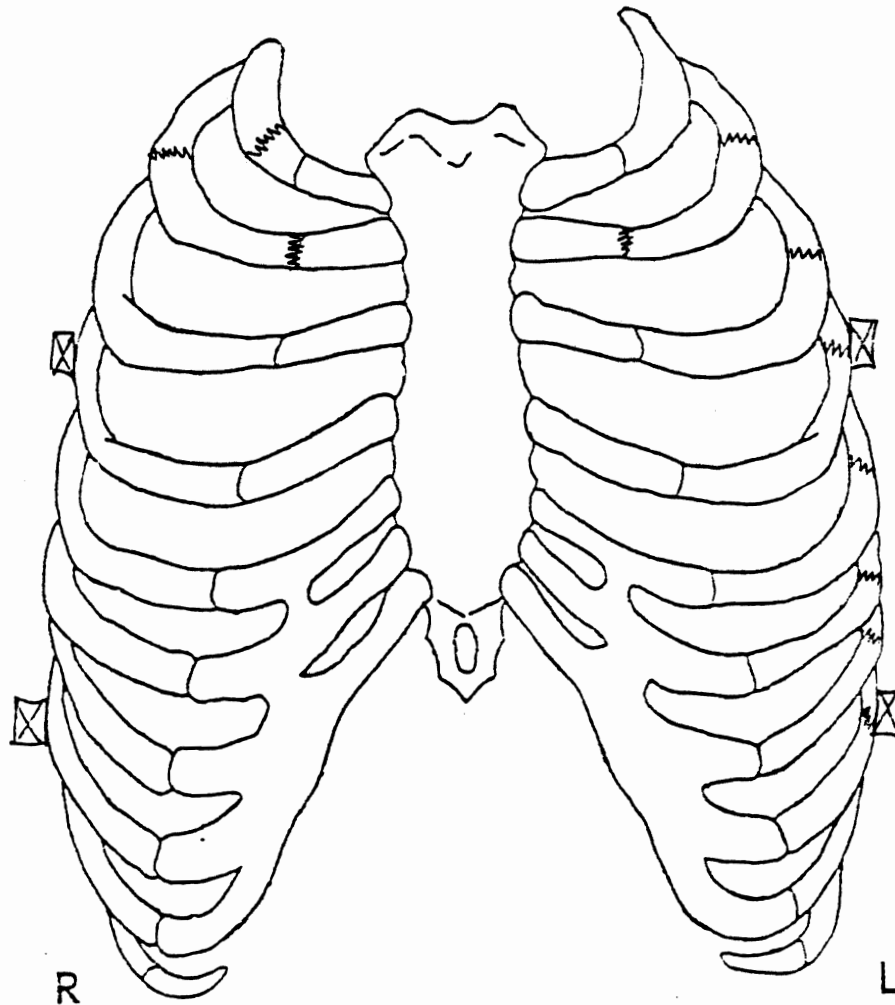
SUBJECT:

AGE 66 SEX M CAUSE OF DEATH Respiratory failure, 2° to Pulmonary metastases

INJURY INFORMATION: OVERALL THORACIC AIS 5

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>C</u>	<u>R</u>	<u>A</u>	<u>5</u>
	2	<u>C</u>	<u>L</u>	<u>R</u>	<u>P</u>	<u>4</u>
	3	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	4	<u>C</u>	<u>L</u>	<u>H</u>	<u>P</u>	<u>3</u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	6	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	7	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	8	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>H</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>5</u>
	2	<u>H</u>	<u>L</u>	<u>C</u>	<u>E</u>	<u>1</u>
	3	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	4	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
	5	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

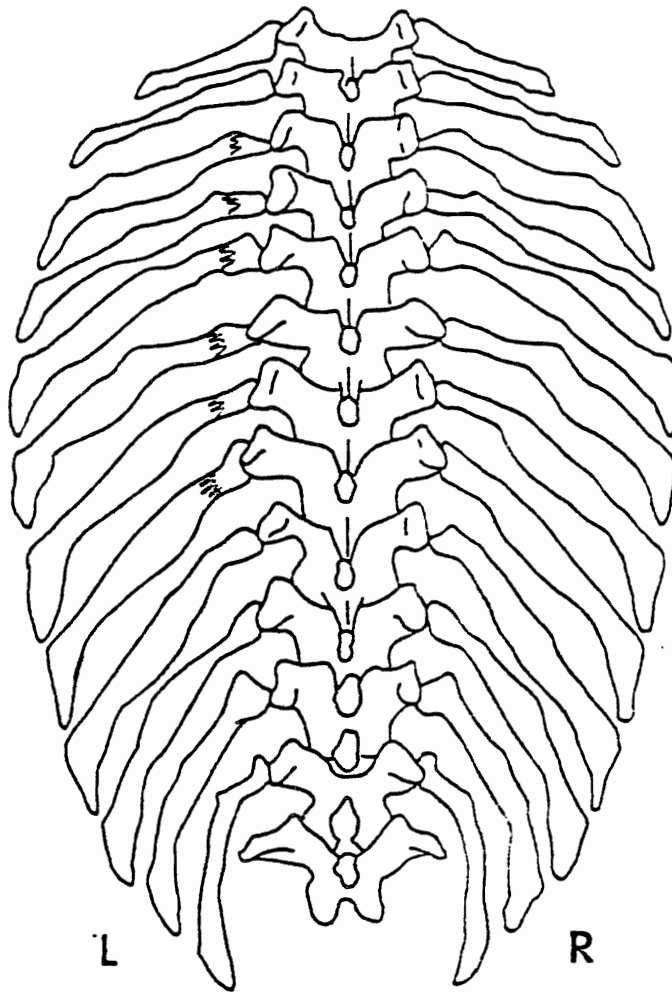
TEST # 777089



ANTERIOR VIEW RIB CAGE

- (In addition,
- left temporal skull fracture with hemorrhage of left temporal lobe,
  - large left lateral scalp (contusion.)

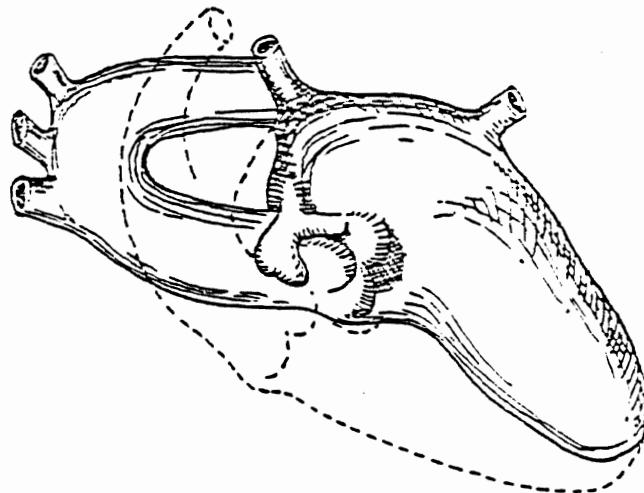
TEST # 777089



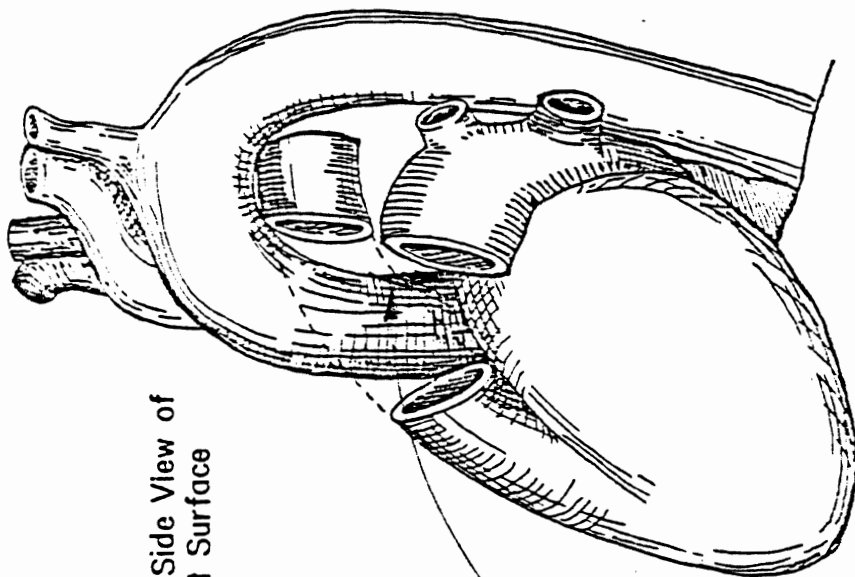
POSTERIOR VIEW RIB CAGE



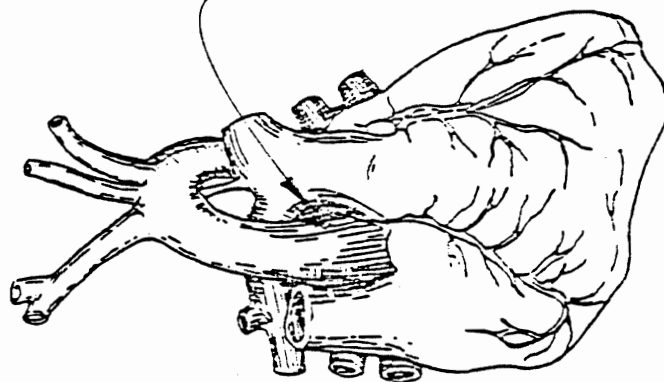
Left View of Left Side of Heart



Left Side View of Heart Surface

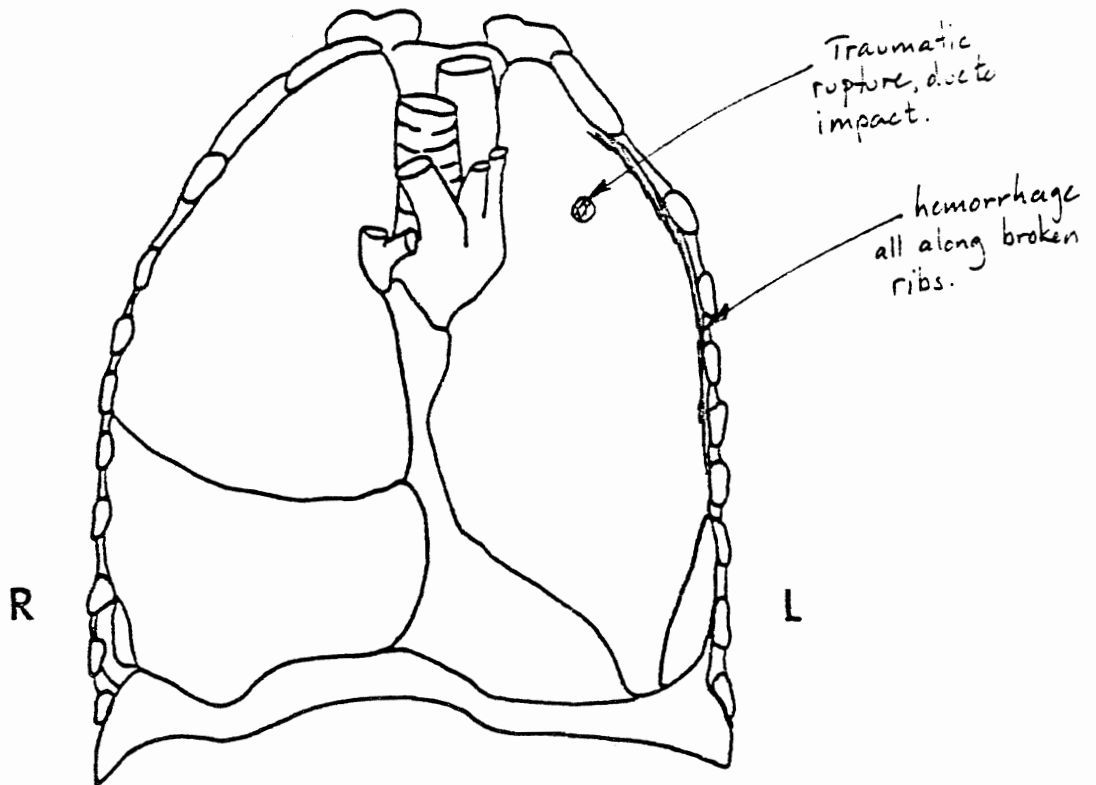


Plaque blown off aortic wall.  
Ruptures at junction of vessels  
and heart.



Anterior View of Heart

TEST # 777089



ANTERIOR VIEW THORACIC CAVITY

TEST 100-100

PISTON  
ACCELERATION

1.2 G

LEFT UPPER RIB  
ACCELEROMETER

2.3 G

LEFT LOWER RIB  
ACCELEROMETER

2.9 G

RIGHT UPPER RIB  
ACCELEROMETER

1.6 G

RIGHT LOWER RIB  
ACCELEROMETER

1.4 G's

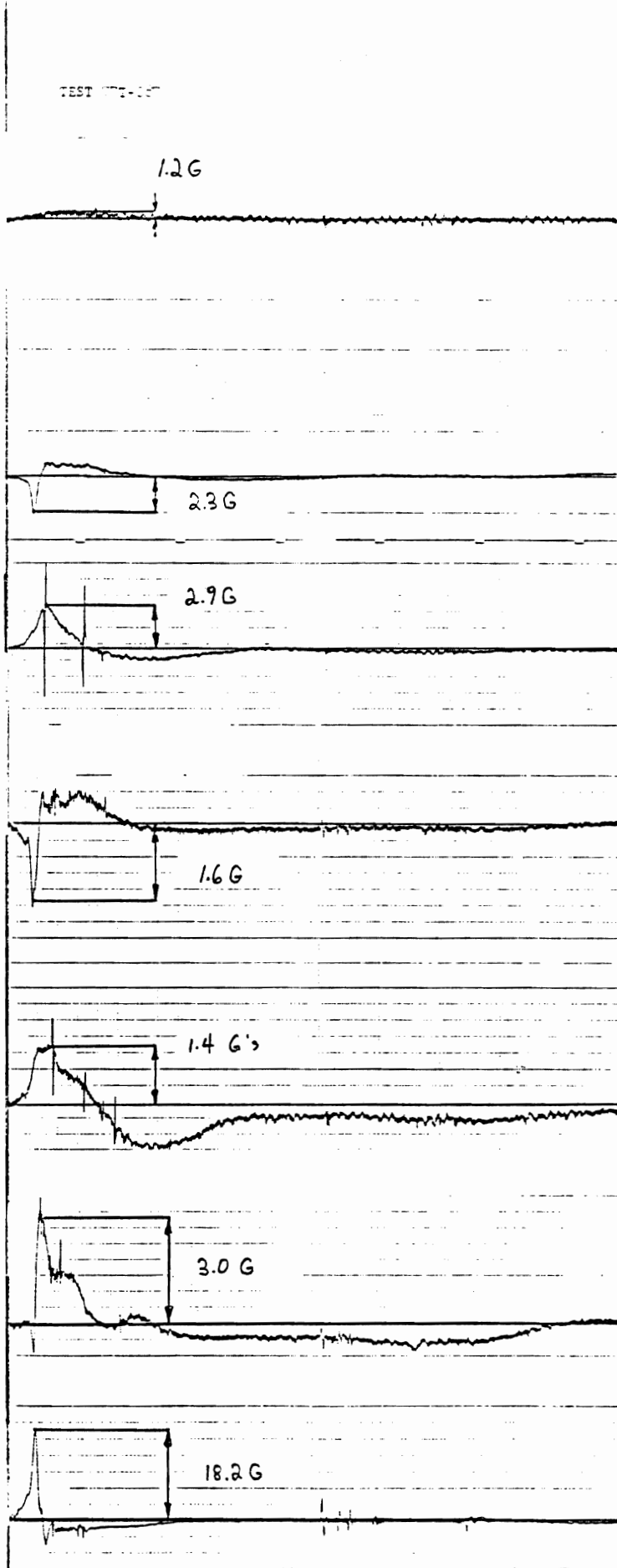
STERNUM UPPER  
ACCELEROMETER

3.0 G

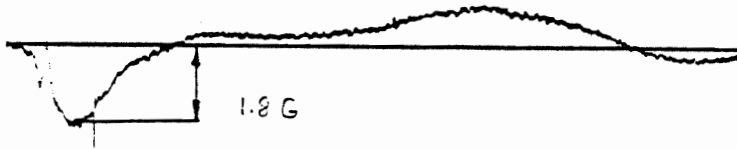
STERNUM LOWER  
ACCELEROMETER

18.2 G

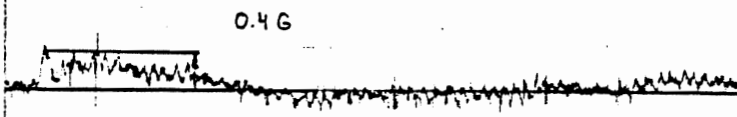
100 msec



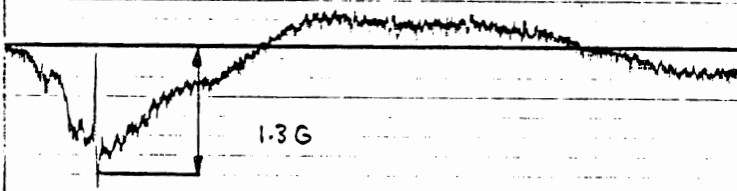
T<sub>1</sub> ACCELEROMETER  
(P-A)



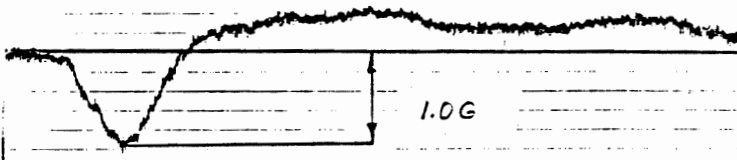
T<sub>1</sub> ACCELEROMETER  
(R-L)



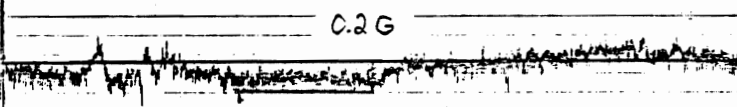
T<sub>1</sub> ACCELEROMETER  
(I-S)



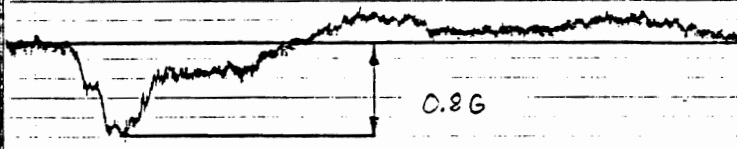
T<sub>12</sub> ACCELEROMETER  
(P-A)



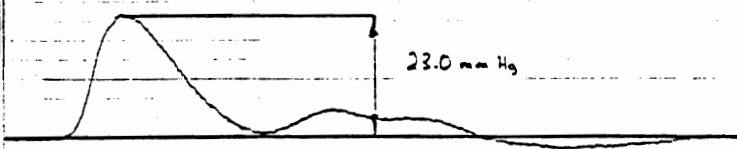
T<sub>12</sub> ACCELEROMETER  
(R-L)



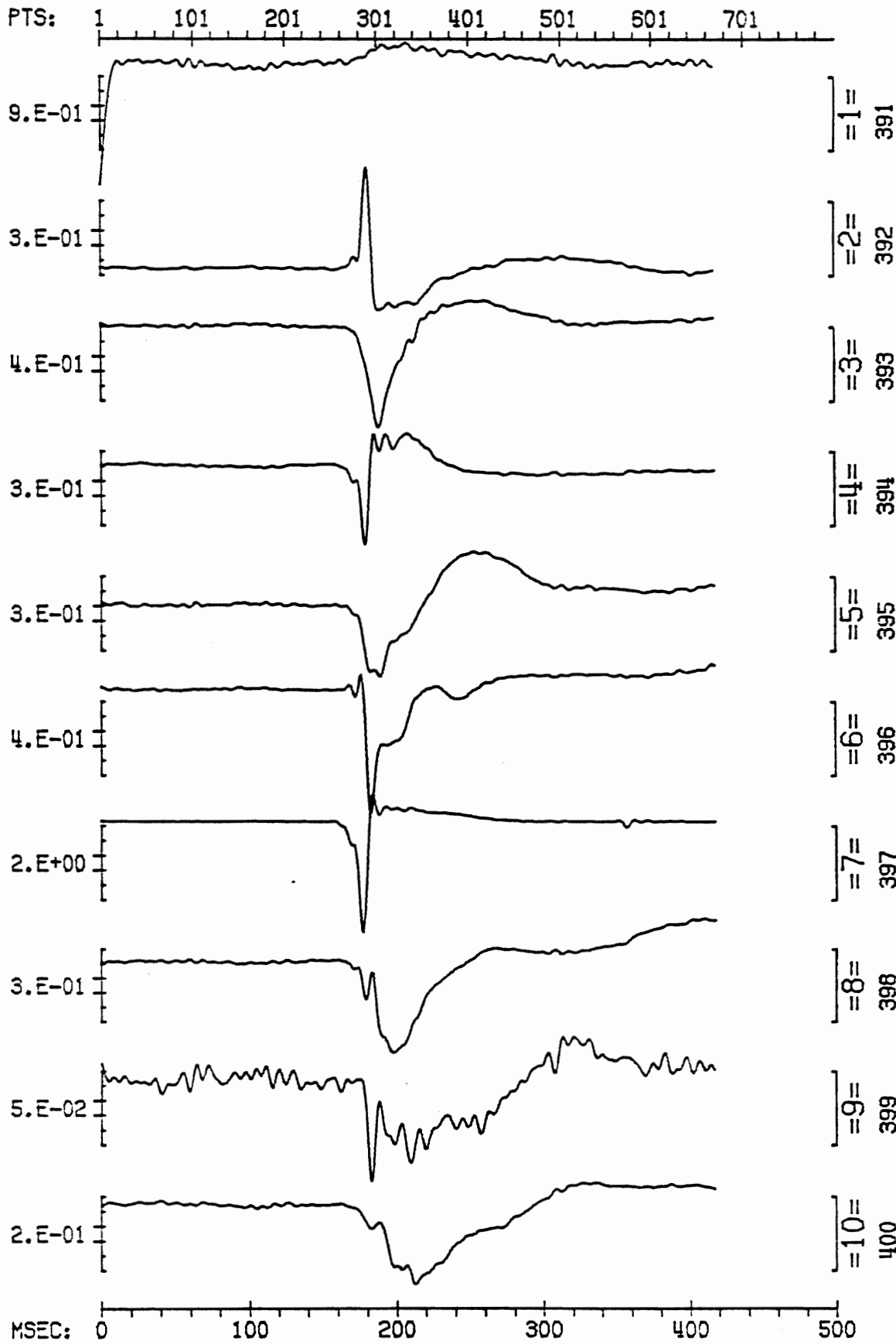
T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE



100 msec



77T087-1:PT

ID:

TAPE: THORAX TESTS

\*\*\*\*\*  
RUN ID: 77T087-11PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16BIT, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

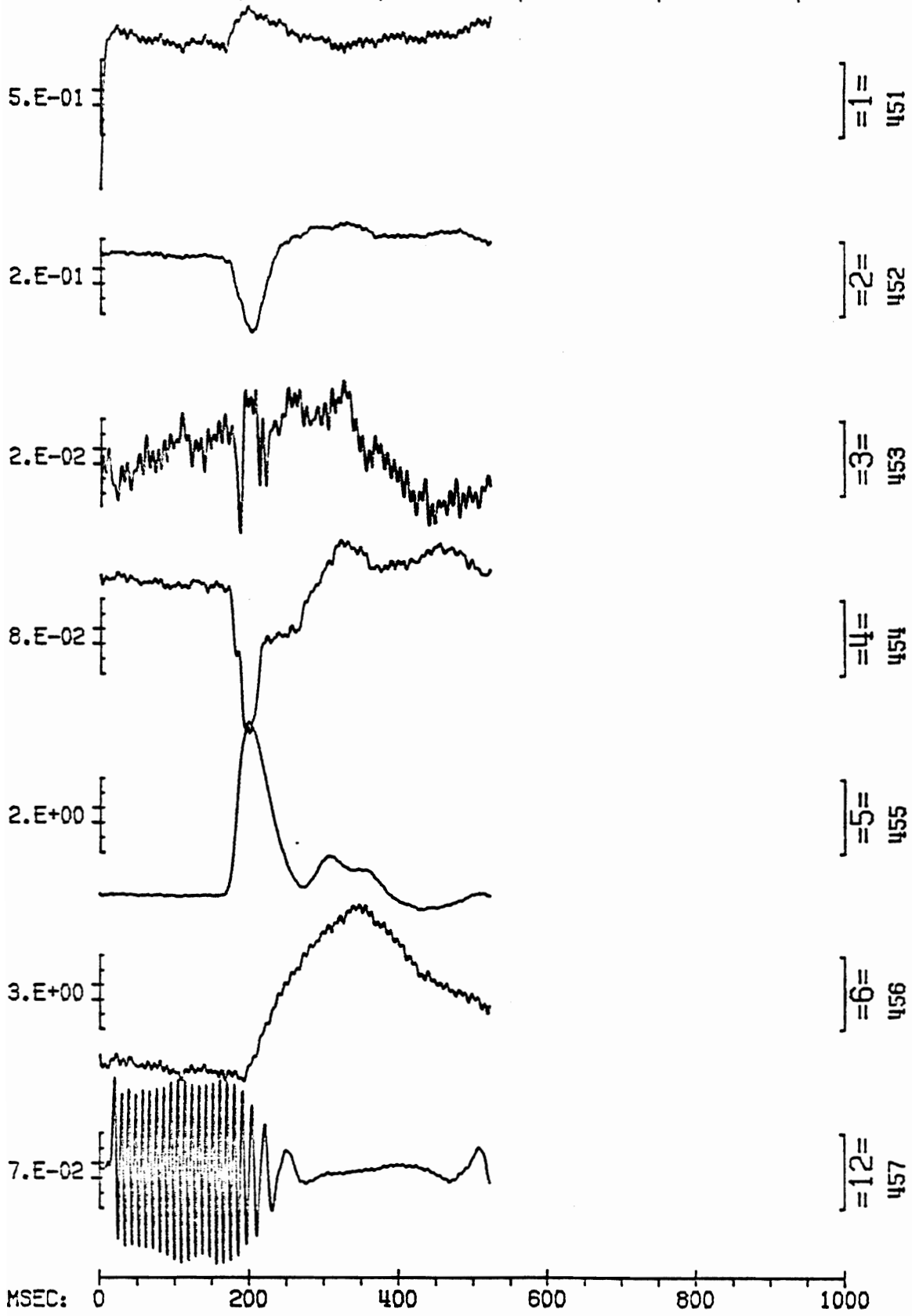
TEST SIGNALS: 2683 PTS/CH AT 6397.81 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
391	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.8	668	1599.45
392	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.8	668	1599.45
393	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.8	668	1599.45
394	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.8	668	1599.45
395	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	100.8	668	1599.45
396	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.8	668	1599.45
397	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.8	668	1599.45
398	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	100.8	668	1599.45
399	- 9:	T-1 R-L ACCELEROMETER	-3.90	G'S	4+1+ 3	100.8	668	1599.45
400	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.8	668	1599.45

11:  
12:  
13:  
14:

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FILTERED FILES: 391 - 400 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T087-11PT

PTS: 1 301 601 901 1201 1501



ID: 77T087-2:PT

TAPE: THORAX TESTS

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RUN ID: 77T087-2:PT

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THOPACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3370 PTS/CH AT 6395.60 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
451	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	836	0 1598.90
452	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+	3 100.7	836	0 1598.90
453	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+	3 100.7	836	0 1598.90
454	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.7	836	0 1598.90
455	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+	3 100.7	836	0 1598.90
456	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 100.7	836	0 1598.90

7:

8:

9:

10:

11:

457 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 836 0 1598.90

13:

14:

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FILTERED FILES: 451 - 457 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T087-2:PT



TEST 701-000

PISTON  
ACCELERATION

1.8 G

LEFT UPPER RIB  
ACCELEROMETER

2.8 G

LEFT LOWER RIB  
ACCELEROMETER

3.4 G

RIGHT UPPER RIB  
ACCELEROMETER

1.7 G

RIGHT LOWER RIB  
ACCELEROMETER

0.8 G

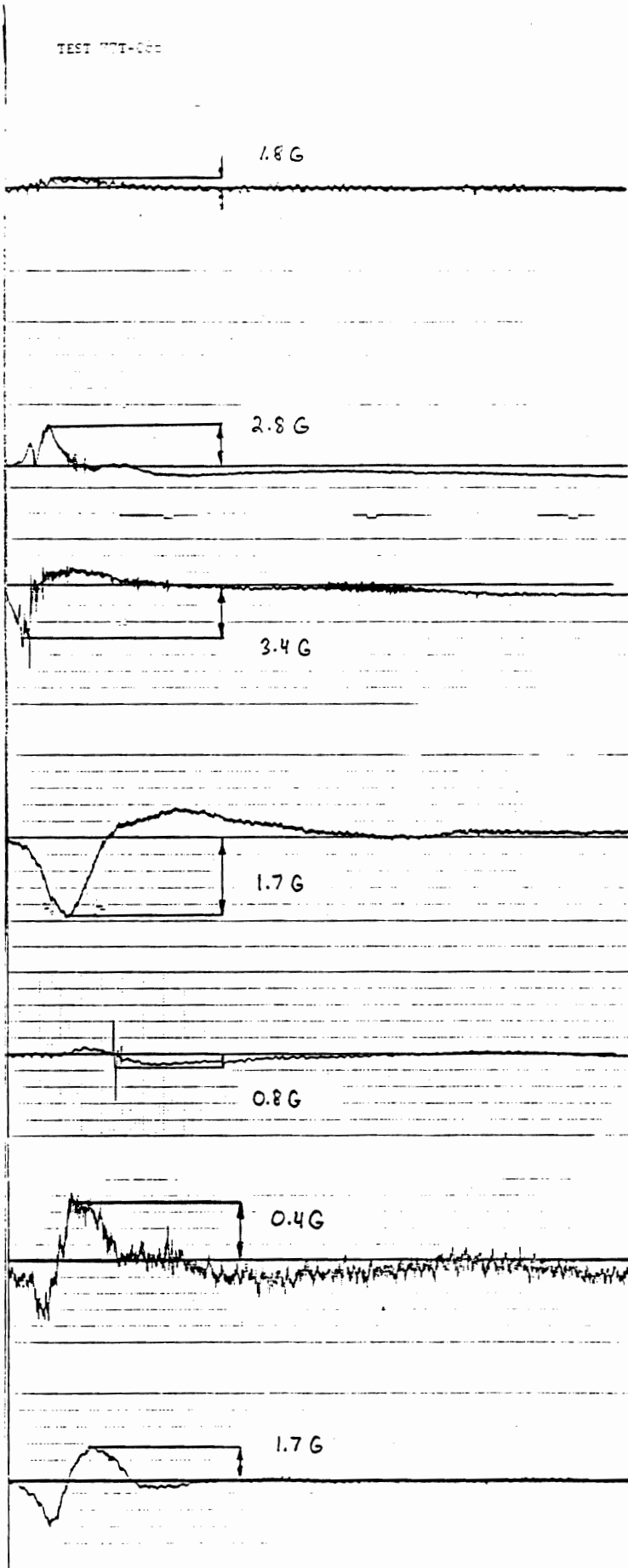
STERNUM UPPER  
ACCELEROMETER

0.4 G

STERNUM LOWER  
ACCELEROMETER

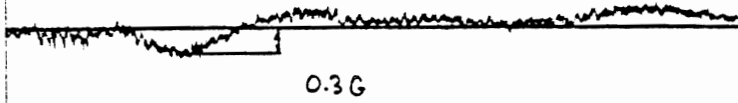
1.7 G

100 msec

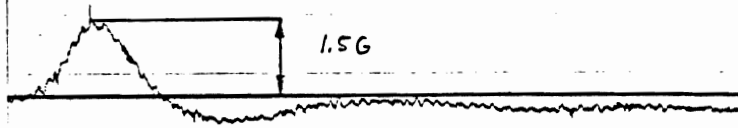


TEST TTT-006

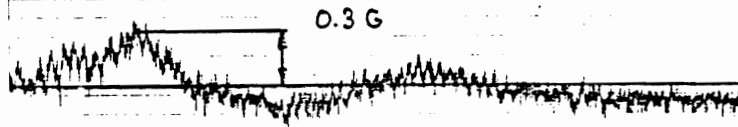
T<sub>1</sub> ACCELEROMETER  
(P-A)



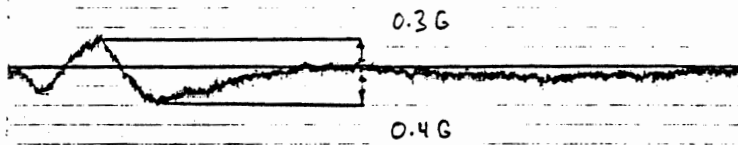
T<sub>1</sub> ACCELEROMETER  
(R-L)



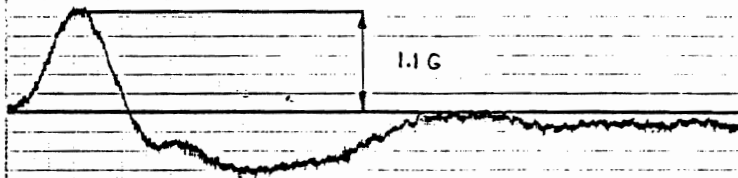
T<sub>1</sub> ACCELEROMETER  
(I-S)



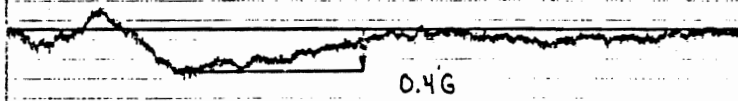
T<sub>12</sub> ACCELEROMETER  
(P-A)



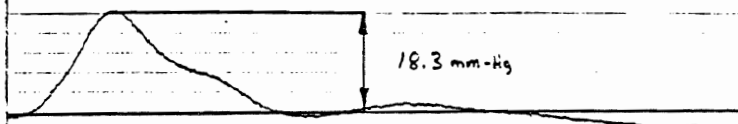
T<sub>12</sub> ACCELEROMETER  
(R-L)



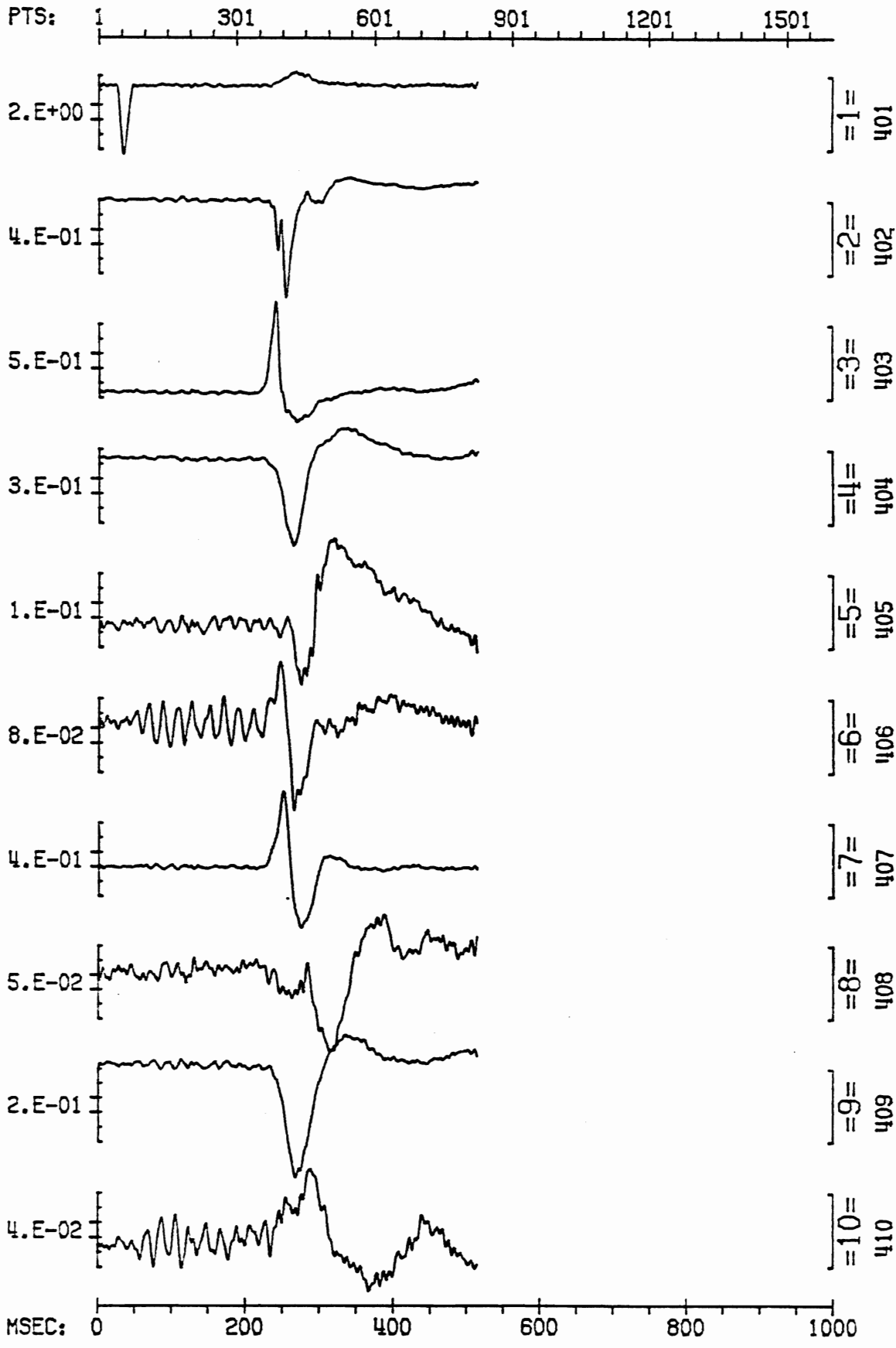
T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE



100 msec



ID: 77T088-1:PT

TAPE: THORAX TESTS

=====  
RUN ID: 77T088-11PT  
=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

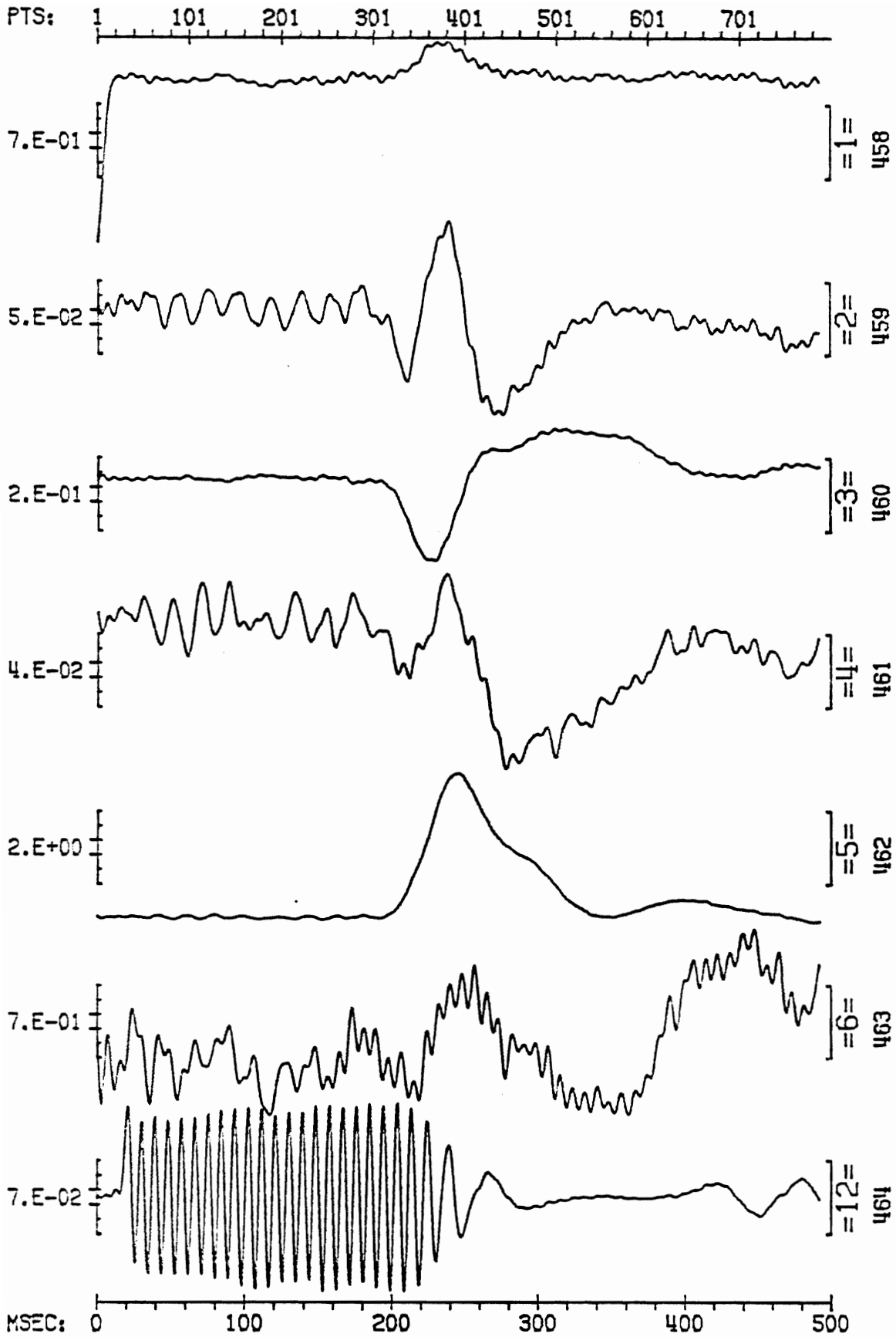
ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3307 PTS/CH AT 6396.13 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
401	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	823	1599.03
402	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	823	1599.03
403	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.7	823	1599.03
404	- 4:	RIGHT UPPER RIB ACCELEROMETR	3.80	G'S	4+1+ 3	100.7	823	1599.03
405	- 5:	RIGHT LOWER RIB ACCELEROMETR	-4.00	G'S	4+1+ 3	100.7	823	1599.03
406	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	823	1599.03
407	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.7	823	1599.03
408	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	100.7	823	1599.03
409	- 9:	T-1 R-L ACCELEROMETER	-3.90	G'S	4+1+ 3	100.7	823	1599.03
410	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	823	1599.03

11:  
12:  
13:  
14:

-----  
FILTERED FILES: 401 - 410 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T088-11PT  
-----



ID: 77T088-2:PT

TAPE: THORAX TESTS

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RUN ID: 77T088-2:PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3159 PTS/CH AT 6393.52 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
458	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	787	1598.38
459	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	787	1598.38
460	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	100.7	787	1598.38
461	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.7	787	1598.38
462	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+ 3	100.7	787	1598.38
463	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.7	787	1598.38

7:  
8:  
9:  
10:  
11:

464 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 787 1598.38

13:  
14:

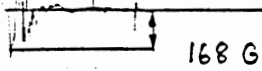
\*\*\*\*\*  
FILTERED FILES: 458 - 464 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T088-2:PT

TEST 77T-089

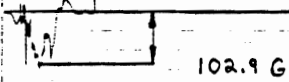
LEFT UPPER RIB  
ACCELEROMETER



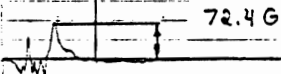
LEFT LOWER RIB  
ACCELEROMETER



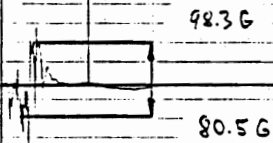
RIGHT UPPER RIB  
ACCELEROMETER



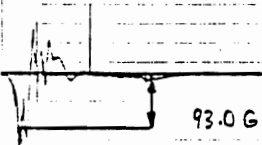
RIGHT LOWER RIB  
ACCELEROMETER



STERNUM UPPER  
ACCELEROMETER



STERNUM LOWER  
ACCELEROMETER



100 msec

TEST 100-100

T<sub>1</sub> ACCELEROMETER  
(P-A)

88.8 G

T<sub>1</sub> ACCELEROMETER  
(R-L)

141.5

T<sub>1</sub> ACCELEROMETER  
(I-S)

76.0 G

T<sub>12</sub> ACCELEROMETER  
(P-A)

57.0 G's

T<sub>12</sub> ACCELEROMETER  
(R-L)

124. G's

T<sub>12</sub> ACCELEROMETER  
(I-S)

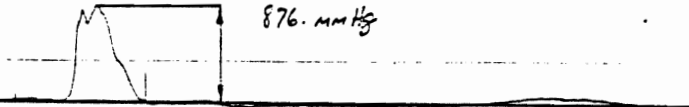
20.8 G's

100 msec

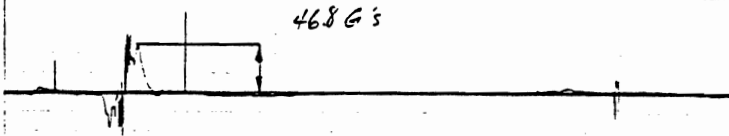


TEST TTT-0-9

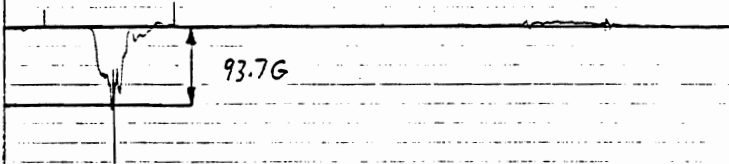
VASCULAR PRESSURE



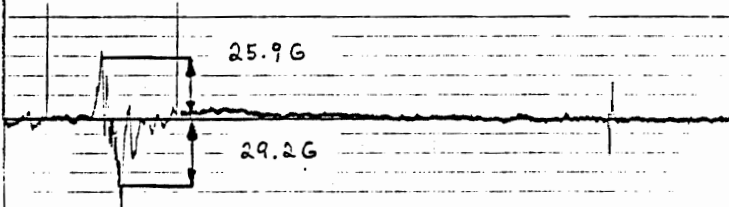
PELVIC P-A ACCELEROMETER



PELVIC I-S ACCELEROMETER

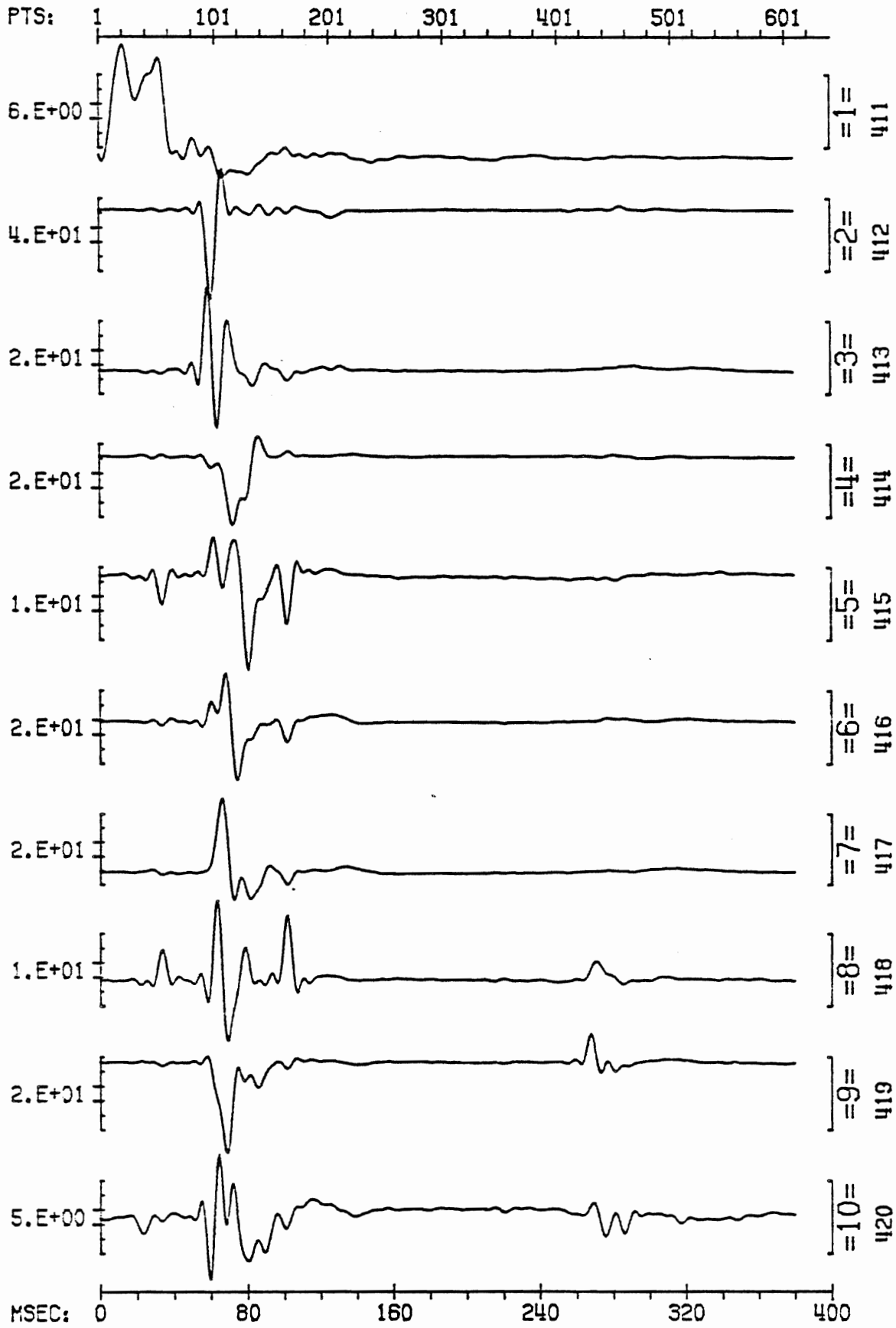


PELVIC R-L ACCELEROMETER



100 msec

A horizontal scale bar with arrows at both ends, labeled '100 msec'.



ID: 77T089-1:55

TAPE: THORAX TESTS

=====  
ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
-----  
RUN ID: 77T089-1189  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE; HS0452 DATE: 06-OCT-77

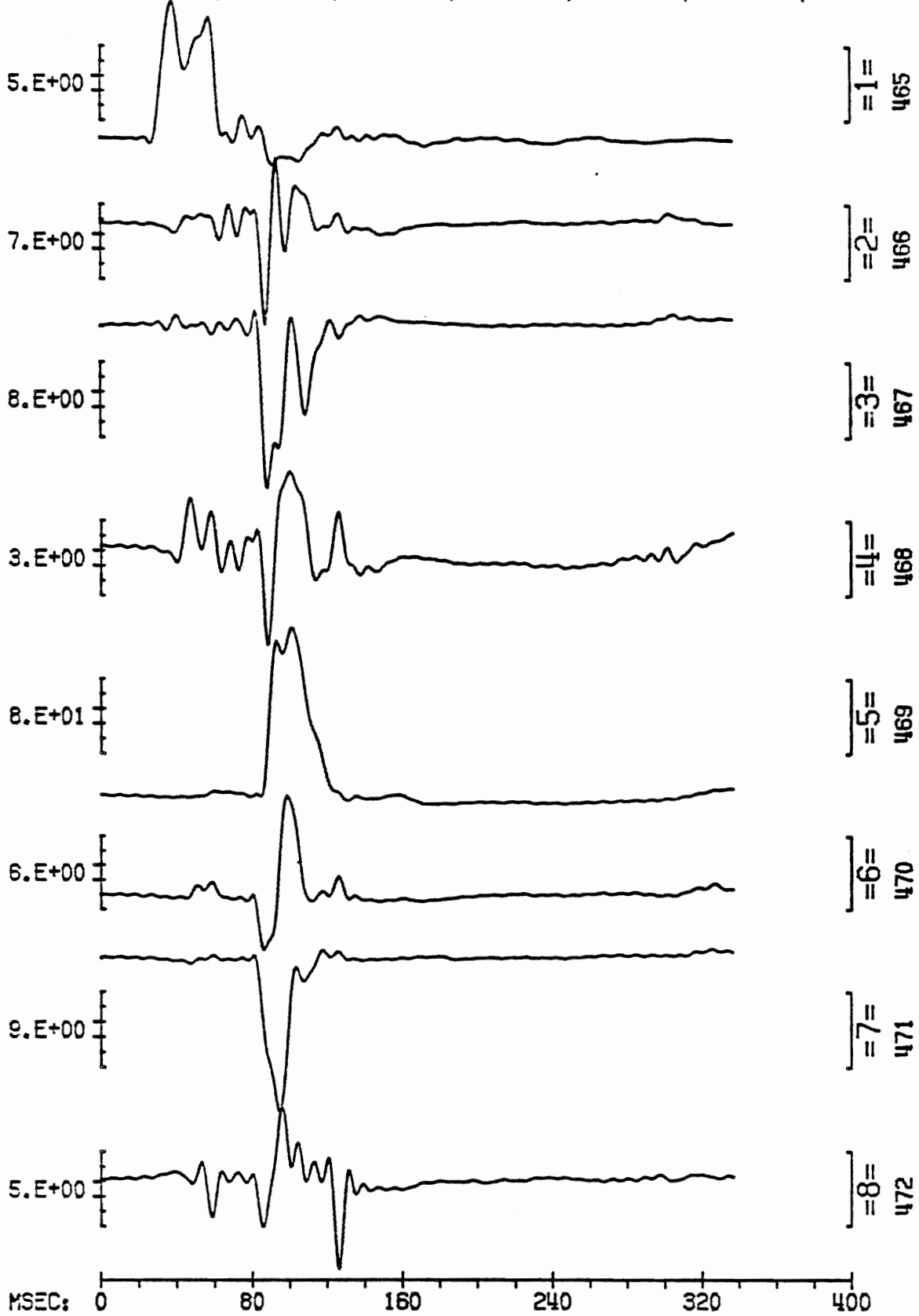
TEST SIGNALS: 2447 PTS/CH AT 6398.33 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
411	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	100.0	608	1599.50
412	- 2:	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+ 3	100.0	608	1599.50
413	- 3:	LEFT LOWER RIB ACCELEROMETER	-84.00	G'S	4+1+ 3	100.0	608	1599.50
414	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	100.0	608	1599.50
415	- 5:	RIGHT LOWER RIB ACCELEROMETER	-80.40	G'S	4+1+ 3	100.0	608	1599.50
416	- 6:	UPPER STERNAL ACCELEROMETER	-89.40	G'S	4+1+ 3	100.0	608	1599.50
417	- 7:	LOWER STERNAL ACCELEROMETER	-66.40	G'S	4+1+ 3	100.0	608	1599.50
418	- 8:	T-1 P-A ACCELEROMETER	88.00	G'S	4+1+ 3	100.0	608	1599.50
419	- 9:	T-1 R-L ACCELEROMETER	-78.60	G'S	4+1+ 3	100.0	608	1599.50
420	- 10:	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+ 3	100.0	608	1599.50

11:  
12:  
13:  
14:

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FILTERED FILES: 411 - 420 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T089-1188  
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PTS: 1 101 201 301 401 501 601



ID: 77T089-2:55

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
RUN ID: 77T089-2ISS

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#14A EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 2165 PTS/CH AT 6399.17 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
465	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	100.0	540	1599.79
466	- 2:	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+ 3	100.0	540	1599.79
467	- 3:	T-12 R-L ACCELEROMETER	-85.80	G'S	4+1+ 3	100.0	540	1599.79
468	- 4:	T-12 I-S ACCELEROMETER	69.20	G'S	4+1+ 3	100.0	540	1599.79
469	- 5:	VASCULAR PRESSURE	730.00	MM-HG	4+1+ 3	100.0	540	1599.79
470	- 6:	PELVIS P-A ACCELEROMETER	74.80	G'S	4+1+ 3	100.0	540	1599.79
471	- 7:	PELVIS R-L ACCELEROMETER	91.40	G'S	4+1+ 3	100.0	540	1599.79
472	- 8:	PELVIS I-S ACCELEROMETER	-83.40	G'S	4+1+ 3	100.0	540	1599.79

- 9:
- 10:
- 11:
- 12:
- 13:
- 14:

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FILTERED FILES: 465 - 472 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T089-2ISS

Summary Test Report

Thoracic Injury Project - Contract DOT-HS-4-00921

Highway Safety Research Institute - The University of Michigan

Test Numbers:

77T090 - Low Energy Front Pendulum Impact

77T091 - Low Energy Side Pendulum Impact

77T092 - Rigid Wall Side Impact - 20 mph

Test Date:

September 28, 1977

Test Subject:

Age - 45

Sex - Female

Weight - 58.3 cm

Stature - 176.7 cm

Restraint System

None - Side Impact with Rigid Flat Surface

Velocity:

In Test No. 77T092, closing velocity was about 20 mph

Injuries:

Multiple fractures of left ribs 1-10; Fractures of right ribs 1-3  
Speckled pericardial hemorrhages on left lower side  
Hemorrhages at heart muscle and aorta  
Lung puncture by left ribs 4 and 6  
Depressed left temporoparietal fracture  
Left subarachnoid hemorrhage

AIS Number Estimate:

4

TEST # 777092

TEST DATE 9-22-79

TEST DESCRIPTION Rigid Barrier Side Sled Impact VELOCITY 29.3 ft/s

SUBJECT:

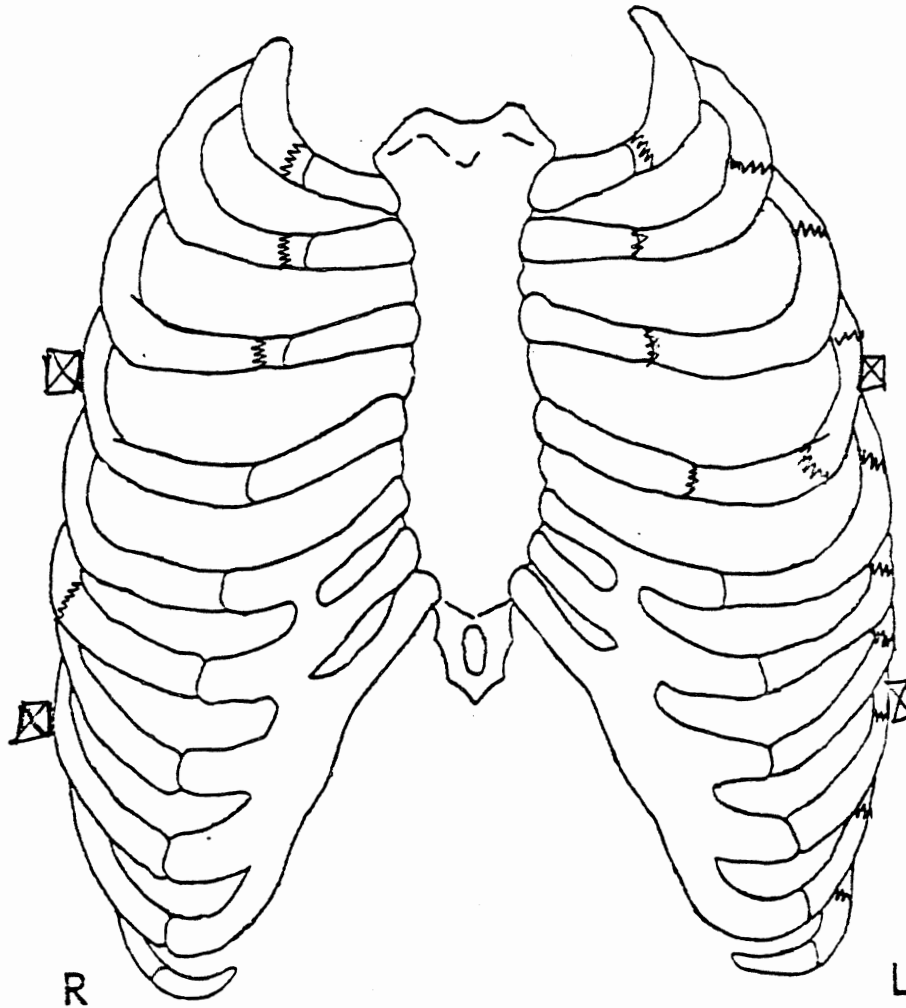
AGE 45 SEX F CAUSE OF DEATH Carcinoma of right tonsillar fossa

INJURY INFORMATION:

OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>L</u>	<u>P</u>	<u>4</u>
	2	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	3	<u>C</u>	<u>CB</u>	<u>H</u>	<u>A</u>	<u>3</u>
	4	<u>C</u>	<u>C</u>	<u>H</u>	<u>H</u>	<u>3</u>
	5	<u>C</u>	<u>L</u>	<u>0</u>	<u>P</u>	<u>3</u>
	6	—	—	—	—	—
	7	—	—	—	—	—
	8	—	—	—	—	—
MAJOR NON-THORACIC INJURIES NOTED	1	<u>H</u>	<u>L</u>	<u>H</u>	<u>B</u>	<u>5</u>
	2	<u>H</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>5</u>
	3	—	—	—	—	—
	4	—	—	—	—	—
	5	—	—	—	—	—

TEST # MT092

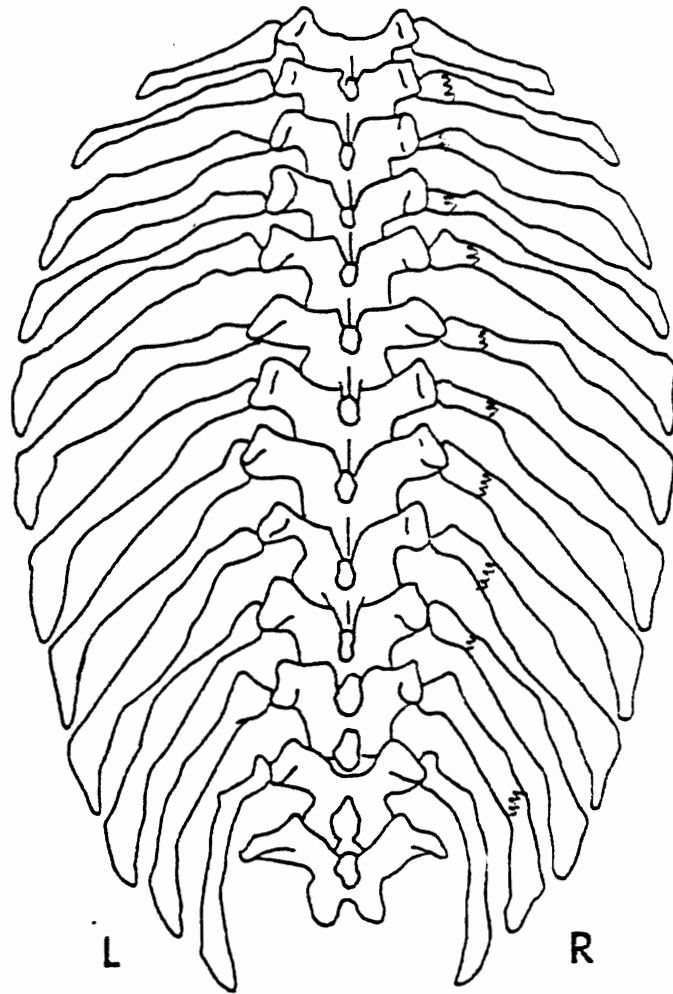


ANTERIOR VIEW RIB CAGE

- (In addition,
- depressed left temporo-parietal skull fracture
  - left subarachnoid hemorrhage)

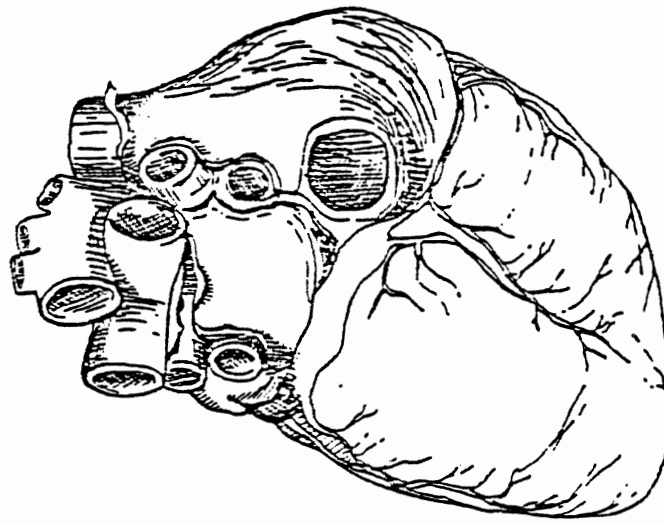


TEST # 777092

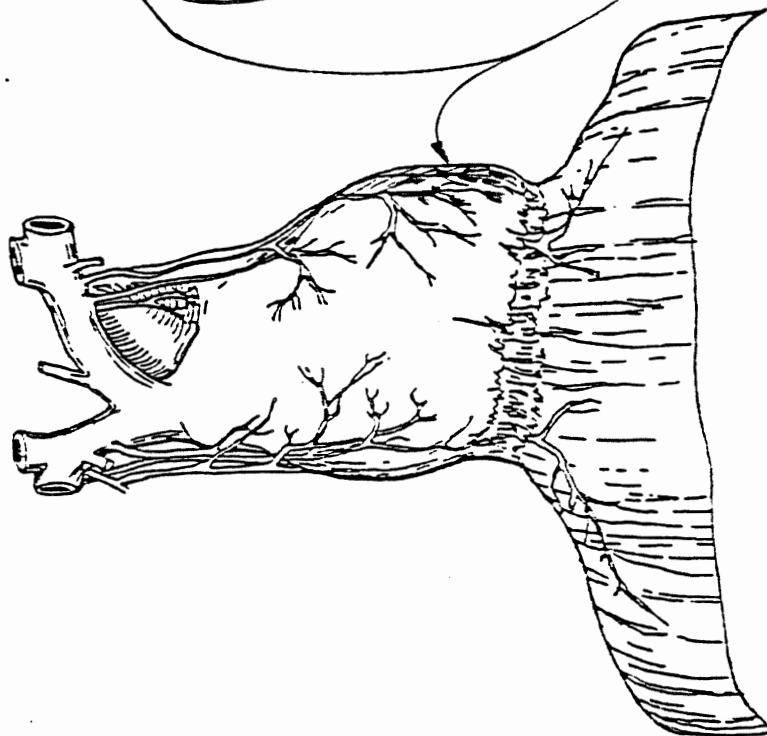
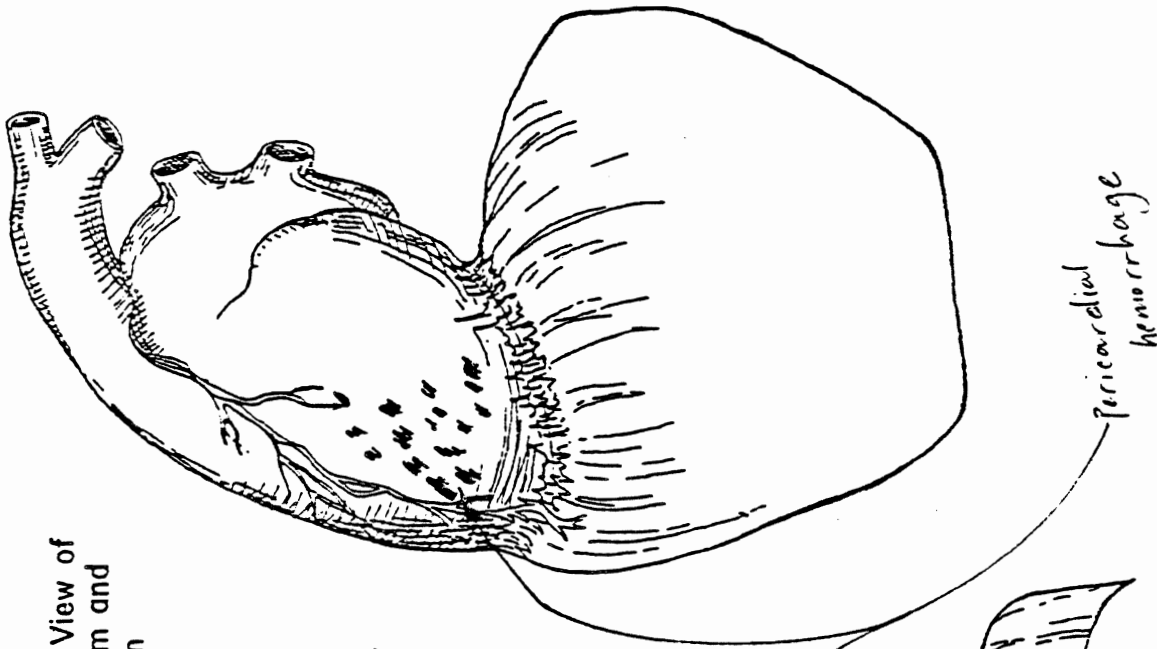


POSTERIOR VIEW RIB CAGE

Diaphragmatic View of Heart

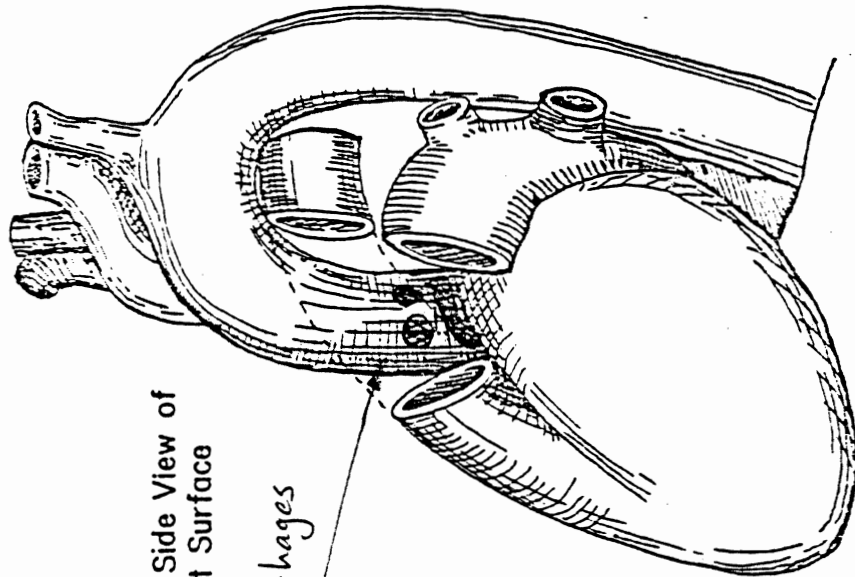
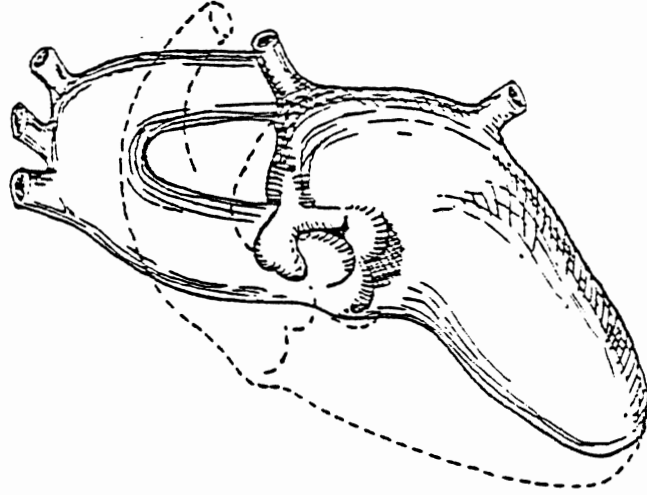


Left Side View of Pericardium and Diaphragm



Anterior View of Pericardium and Diaphragm

Left View of Left Side of Heart

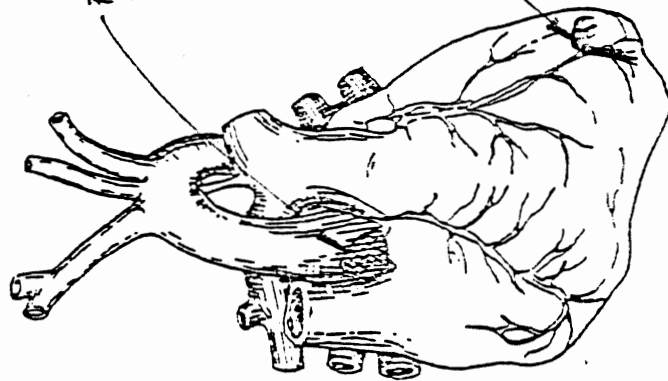


Left Side View of Heart Surface

minor aortic hemorrhages

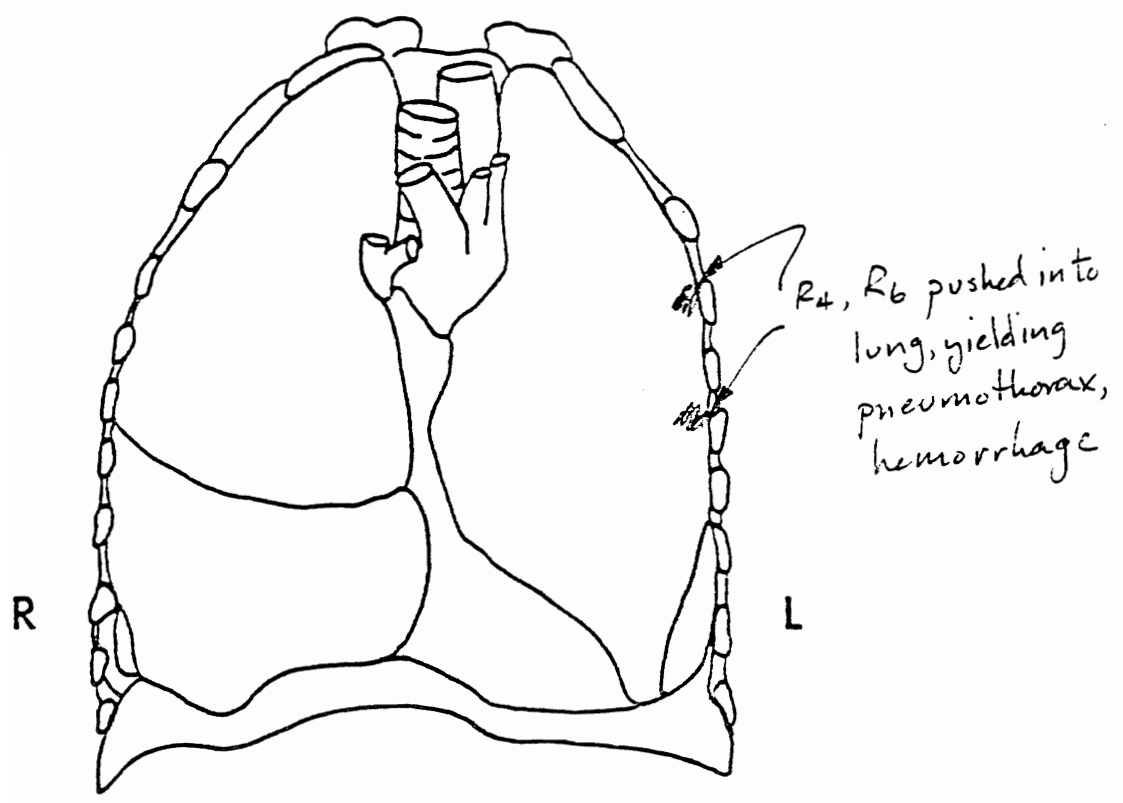
pulmonary artery hemorrhage

hemorrhages around old scar on heart



Anterior View of Heart

TEST # 77T092



ANTERIOR VIEW THORACIC CAVITY

TEST 77T-090

PISTON  
ACCELERATION

2.1 G's

LEFT UPPER RIB  
ACCELEROMETER

0.5 G's

LEFT LOWER RIB  
ACCELEROMETER

1.3 G's

RIGHT UPPER RIB  
ACCELEROMETER

0.3 G's

RIGHT LOWER RIB  
ACCELEROMETER

1.1 G's

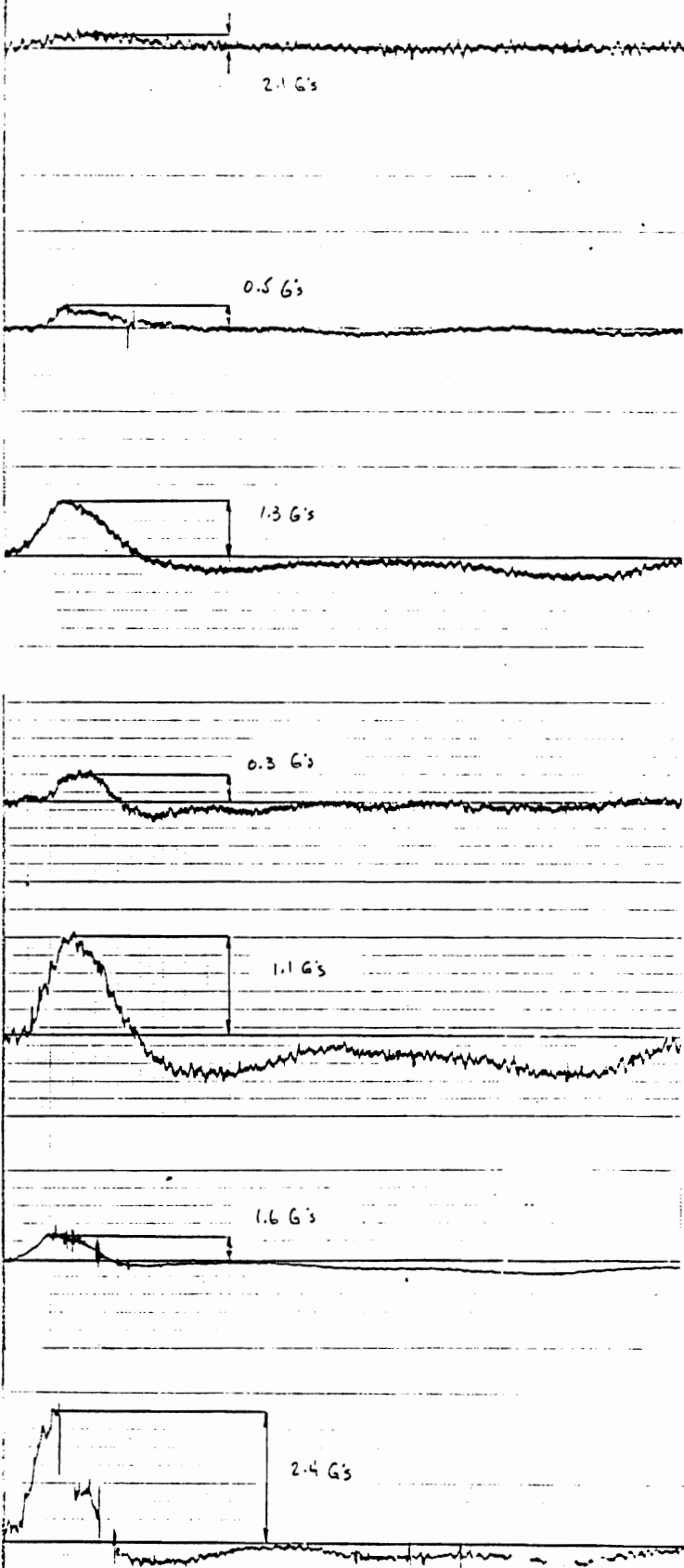
STERNUM UPPER  
ACCELEROMETER

1.6 G's

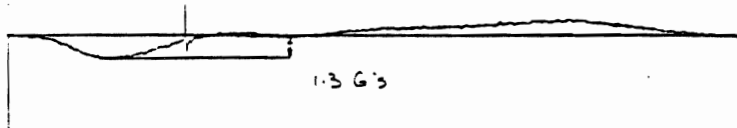
STERNUM LOWER  
ACCELEROMETER

2.4 G's

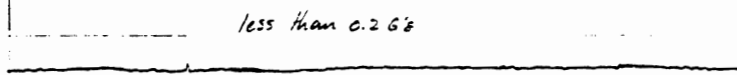
100 msec



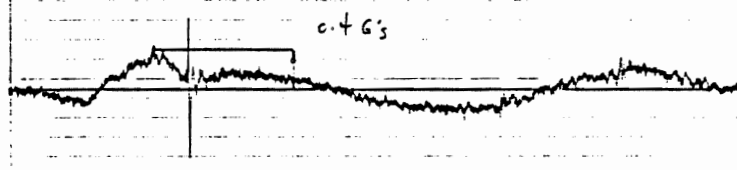
T<sub>1</sub> ACCELEROMETER  
(P-A)



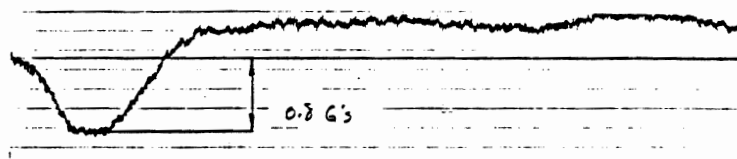
T<sub>1</sub> ACCELEROMETER  
(R-L)



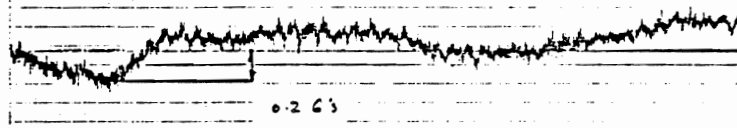
T<sub>1</sub> ACCELEROMETER  
(I-S)



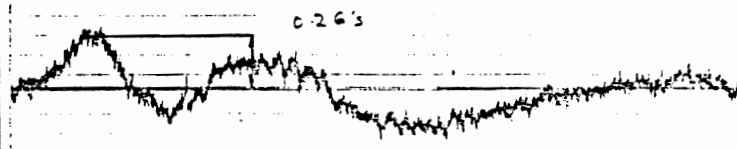
T<sub>12</sub> ACCELEROMETER  
(P-A)



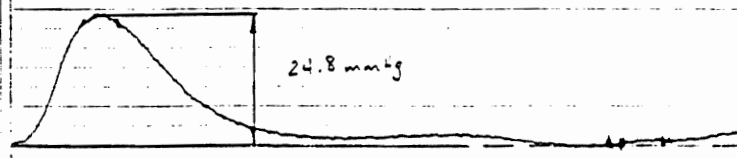
T<sub>12</sub> ACCELEROMETER  
(R-L)

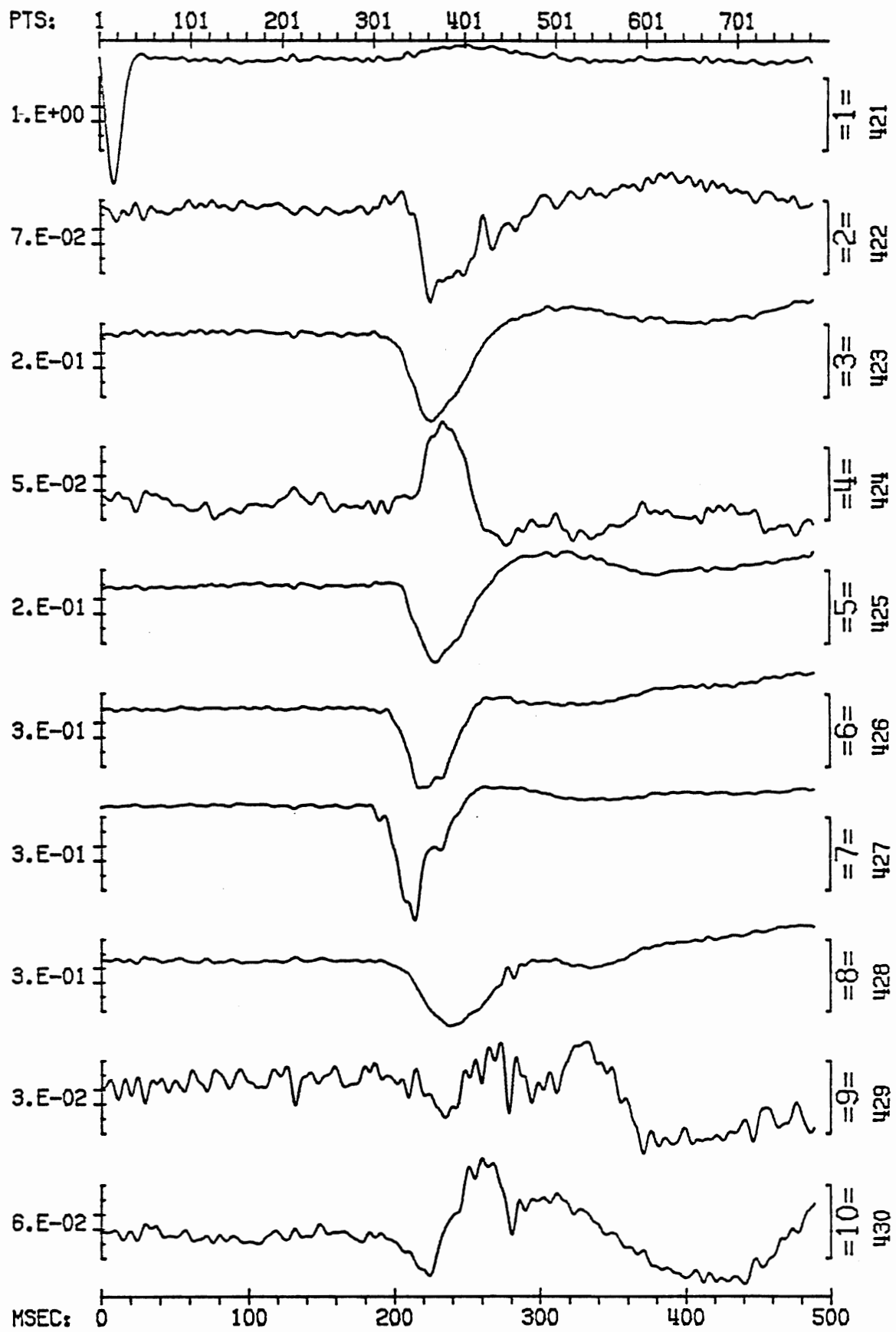


T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE





ID: 77T090-1:PT

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T090-1:PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3132 PTS/CH AT 6393.06 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
421	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	782	1598.27
422	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	782	1598.27
423	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.7	782	1598.27
424	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	782	1598.27
425	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	100.7	782	1598.27
426	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	782	1598.27
427	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.7	782	1598.27
428	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	100.7	782	1598.27
429	- 9:	T-1 R-L ACCELEROMETER	-3.90	G'S	4+1+ 3	100.7	782	1598.27
430	- 10:	T-1 I-S ACCELEROMETER	3.80	G'S	4+1+ 3	100.7	782	1598.27

11:

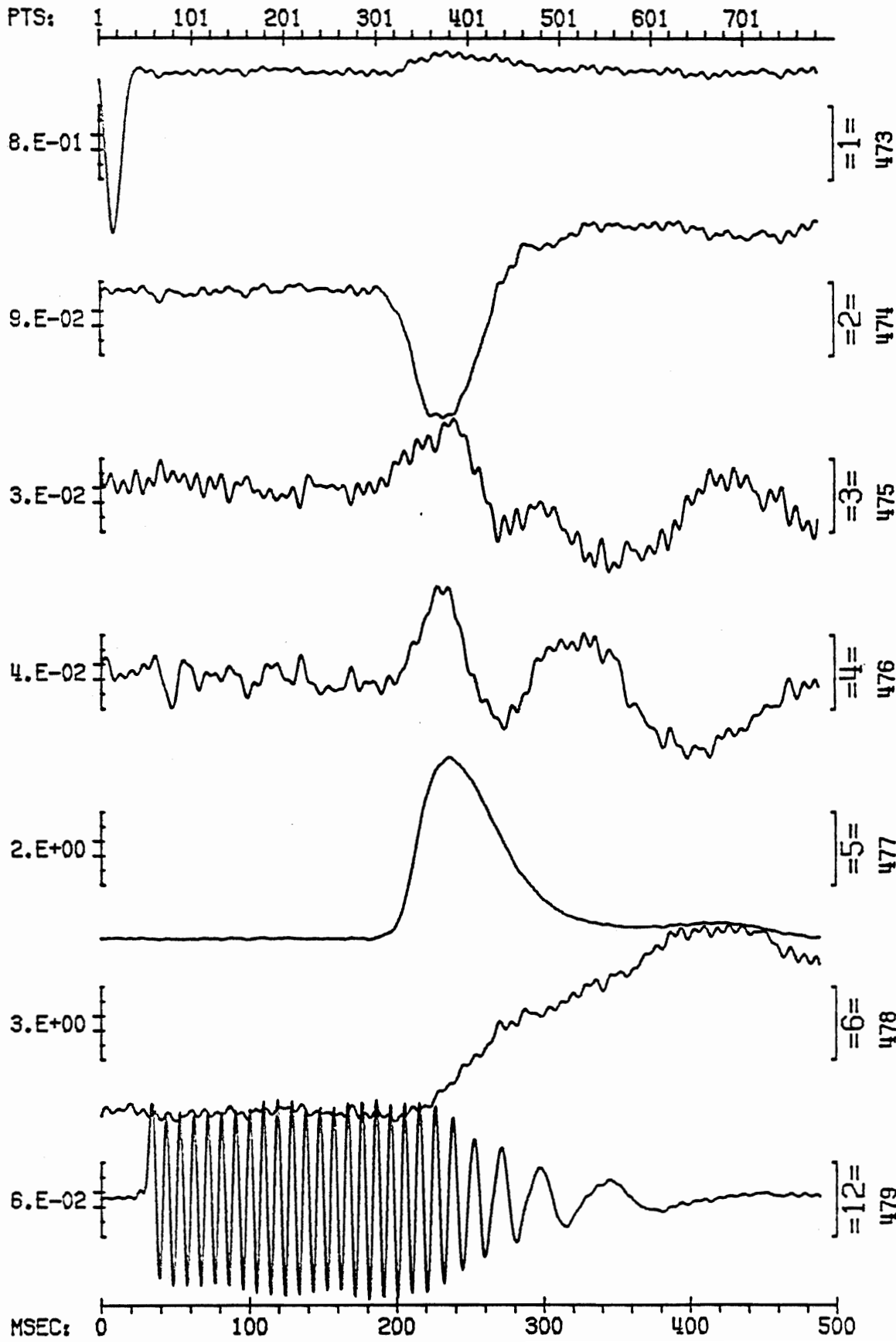
12:

13:

14:

----- FILTERED FILES: 421 - 430 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T090-1:PT -----





ID: 77T090-2:PT

TAPE: THORAX TESTS

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RUN ID: 77T090-2IPT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3132 PTS/CH AT 6395.34 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
473 - 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	782 0	1598.84
474 - 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	100.7	782 0	1598.84
475 - 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+ 3	100.7	782 0	1598.84
476 - 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+ 3	100.7	782 0	1598.84
477 - 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+ 3	100.7	782 0	1598.84
478 - 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+ 3	100.7	782 0	1598.84

7:  
8:  
9:  
10:  
11:  
12: PISTON VELOCITY  
13:  
14:

479 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 782 0 1598.84

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FILTERED FILES: 473 - 479 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T090-2IPT  
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TEST TTT-091

PISTON  
ACCELERATION

1.2 G's

LEFT UPPER RIB  
ACCELEROMETER

0.7 G's

LEFT LOWER RIB  
ACCELEROMETER

0.7 G's

RIGHT UPPER RIB  
ACCELEROMETER

1.1 G's

RIGHT LOWER RIB  
ACCELEROMETER

0.4 G's

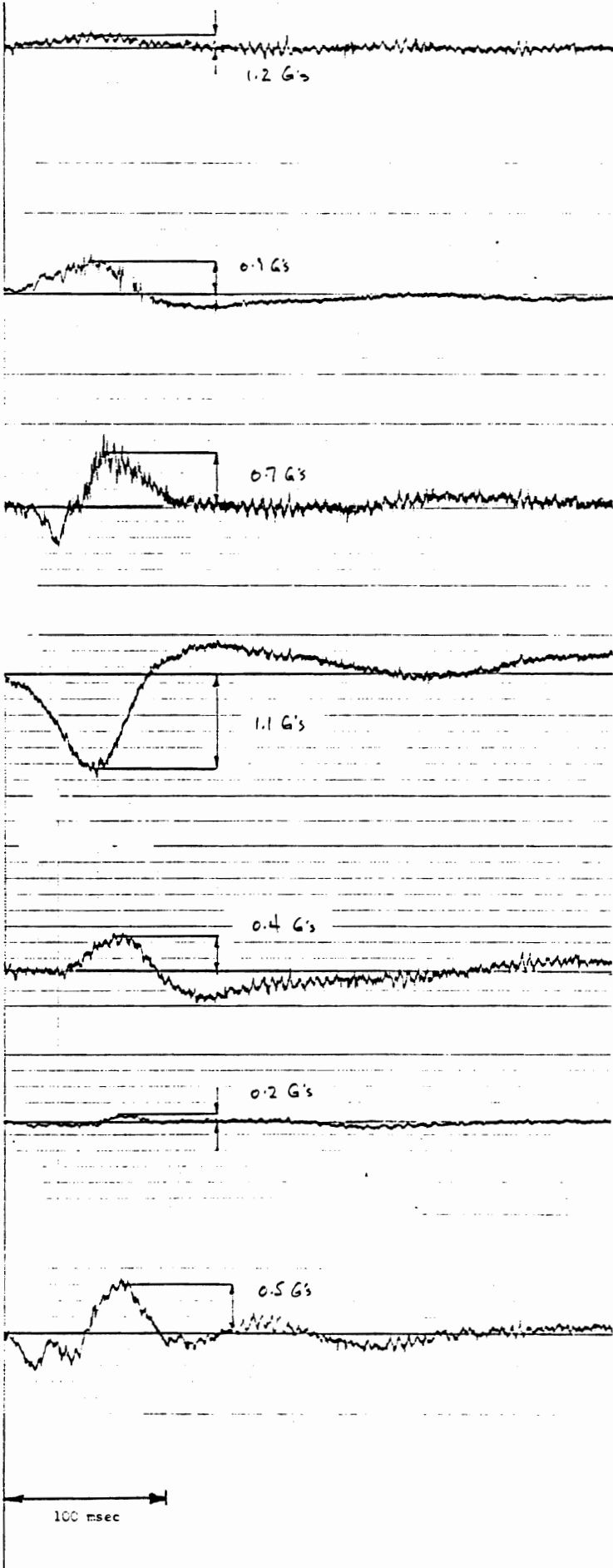
STERNUM UPPER  
ACCELEROMETER

0.2 G's

STERNUM LOWER  
ACCELEROMETER

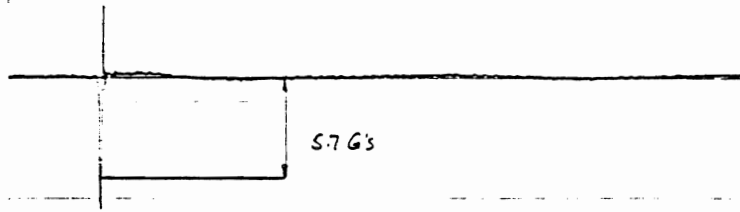
0.5 G's

100 msec

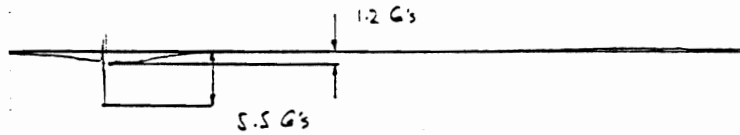


TEST WT-1

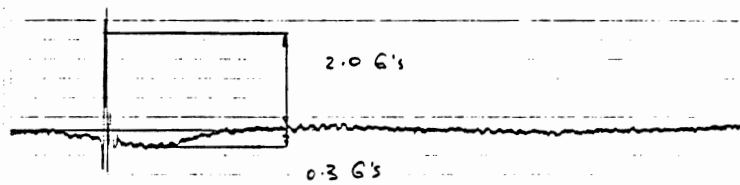
T<sub>1</sub> ACCELEROMETER  
(P-A)



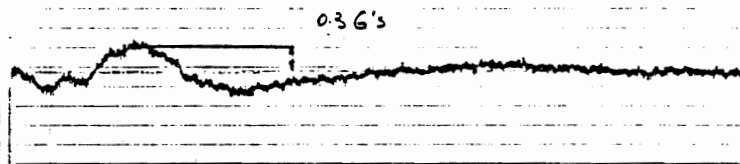
T<sub>1</sub> ACCELEROMETER  
(R-L)



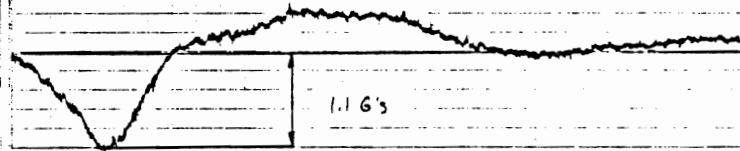
T<sub>1</sub> ACCELEROMETER  
(I-S)



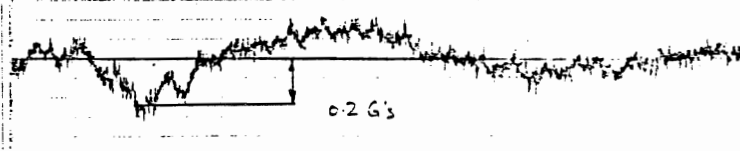
T<sub>12</sub> ACCELEROMETER  
(P-A)



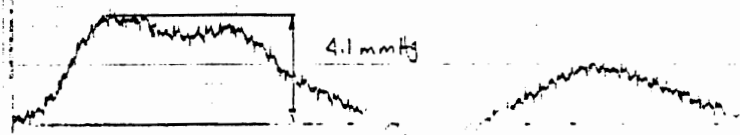
T<sub>12</sub> ACCELEROMETER  
(R-L)



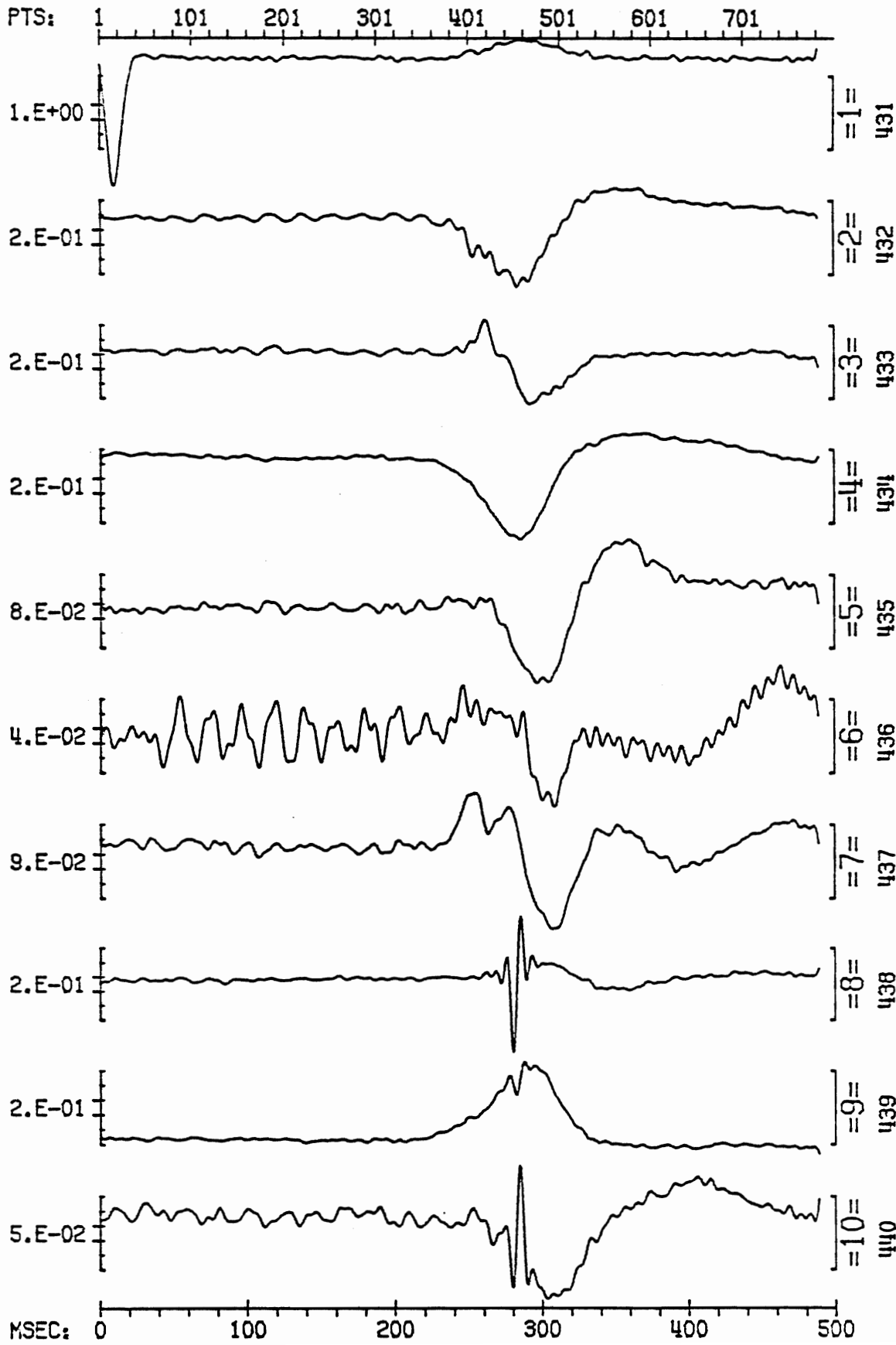
T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE



100 msec



ID: 77T091-1:PT

TAPE: THORAX TESTS

\*\*\*\*\*  
 RUN ID: 77T091-11PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

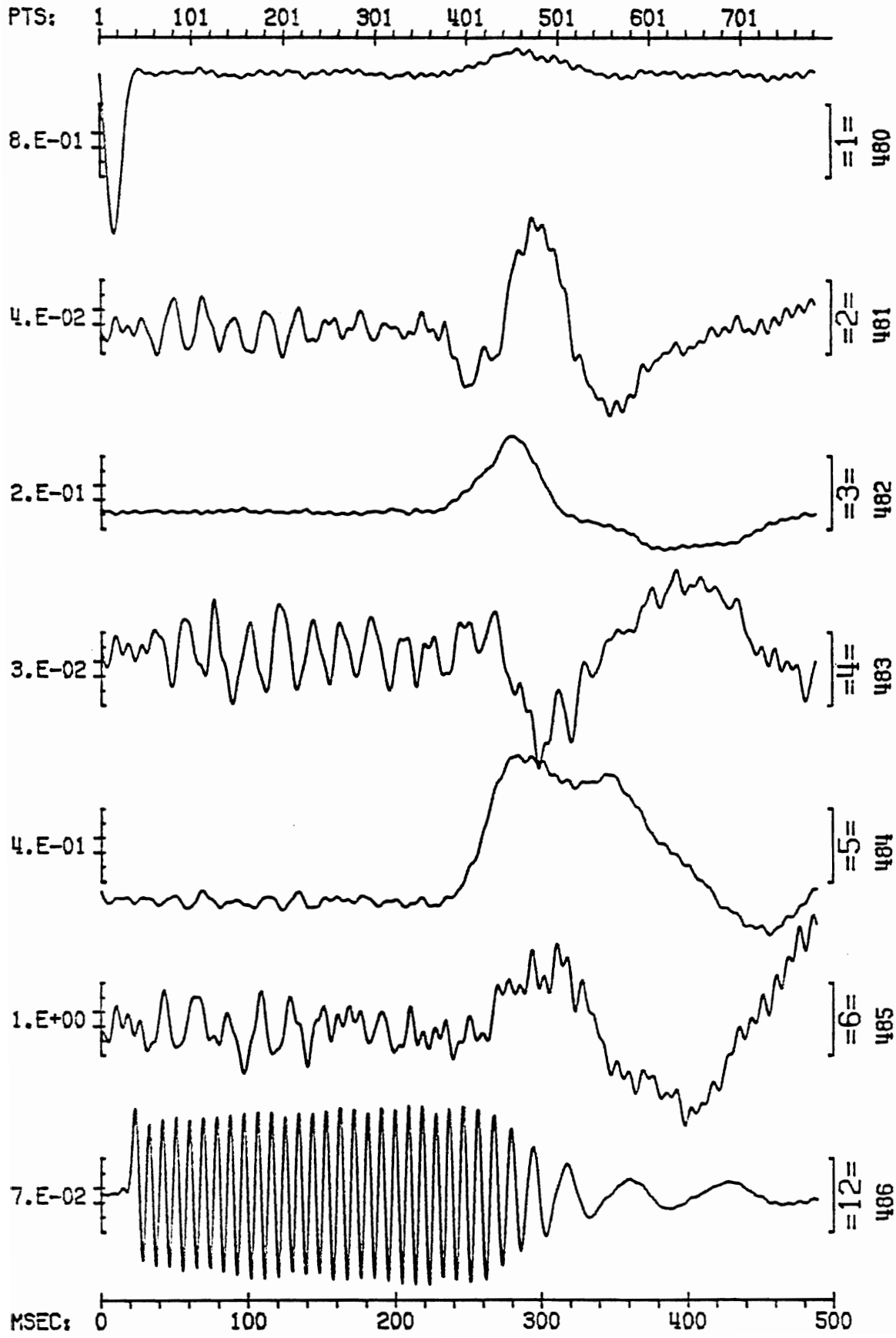
ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3131 PTS/CH AT 6395.26 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
431	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	100.7	782	1598.82
432	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	782	1598.82
433	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	100.7	782	1598.82
434	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.60	G'S	4+1+ 3	100.7	782	1598.82
435	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	100.7	782	1598.82
436	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	100.7	782	1598.82
437	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	100.7	782	1598.82
438	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	100.7	782	1598.82
439	- 9:	T-1 R-L ACCELEROMETER	-3.90	G'S	4+1+ 3	100.7	782	1598.82
440	- 10:	T-1 I-S ACCELEROMETER	3.60	G'S	4+1+ 3	100.7	782	1598.82

11:  
 12:  
 13:  
 14:

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 FILTERED FILES: 431 - 440 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T091-11PT



ID: 77T091-2:PT

TAPE: THORAX TESTS

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RUN ID: 77T091-21PT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 3130 PTS/CH AT 6396.73 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
480	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 100.7	782	0 1599.10
481	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+	3 100.7	782	0 1599.10
482	- 3:	T-12 R-L ACCELEROMETER	-4.30	G'S	4+1+	3 100.7	782	0 1599.10
483	- 4:	T-12 I-S ACCELEROMETER	3.50	G'S	4+1+	3 100.7	782	0 1599.10
484	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+	3 100.7	782	0 1599.10
485	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 100.7	782	0 1599.10

7:

8:

9:

10:

11:

486 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 100.7 782 0 1599.10

13:

14:

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FILTERED FILES: 480 - 486 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T091-21PT  
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TEST 57T-09L

LEFT UPPER RIB  
ACCELEROMETER

134.6 G's

LEFT LOWER RIB  
ACCELEROMETER

84.0 G's

RIGHT UPPER RIB  
ACCELEROMETER

87.6 G's

RIGHT LOWER RIB  
ACCELEROMETER

58.3 G's

STERNUM UPPER  
ACCELEROMETER

80.5 G's

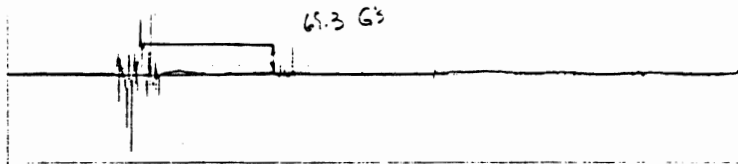
STERNUM LOWER  
ACCELEROMETER

226.6 G's

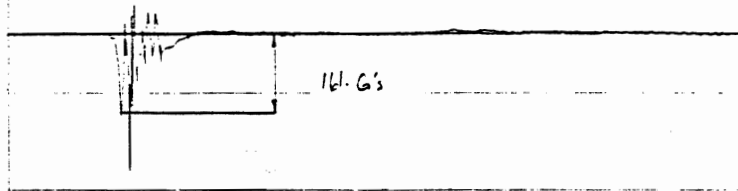
106.2 G's

100 msec

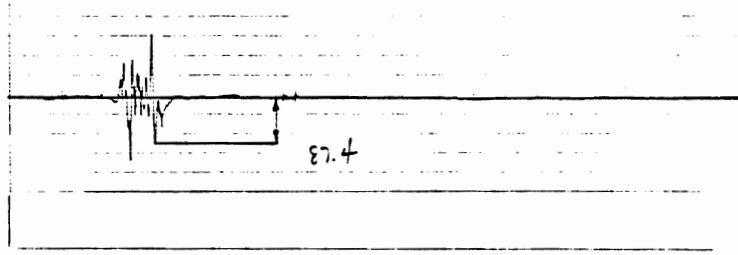
T<sub>1</sub> ACCELEROMETER  
(P-A)



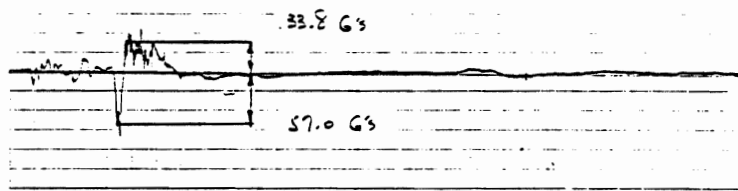
T<sub>1</sub> ACCELEROMETER  
(R-L)



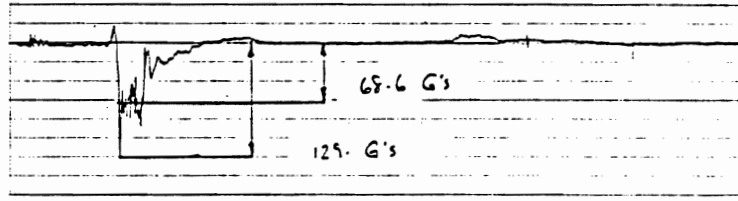
T<sub>1</sub> ACCELEROMETER  
(I-S)



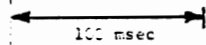
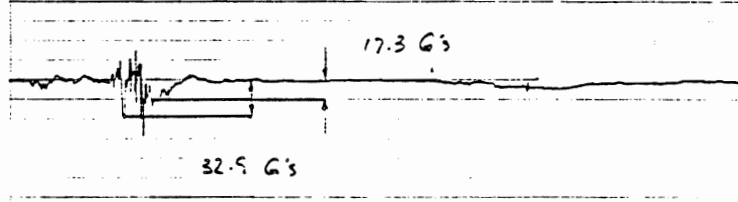
T<sub>12</sub> ACCELEROMETER  
(P-A)



T<sub>12</sub> ACCELEROMETER  
(R-L)

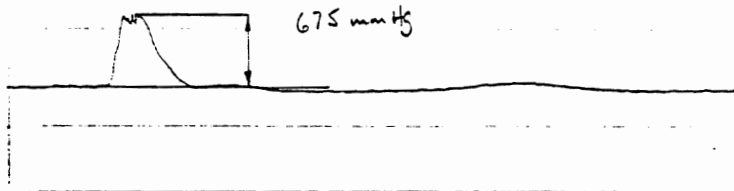


T<sub>12</sub> ACCELEROMETER  
(I-S)

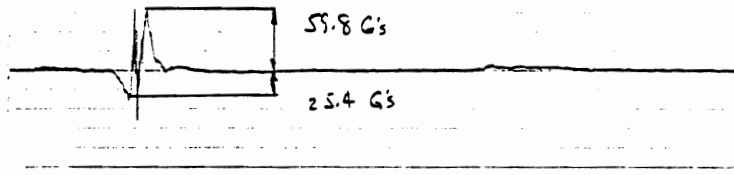


TEST 77T-09L

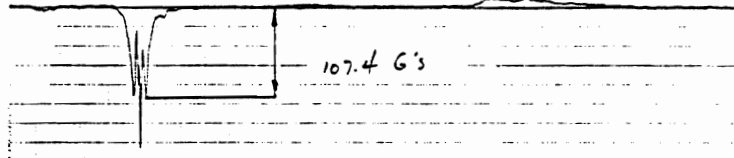
VASCULAR PRESSURE



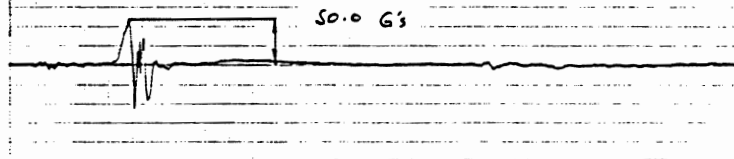
PELVIC P-A ACCELEROMETER



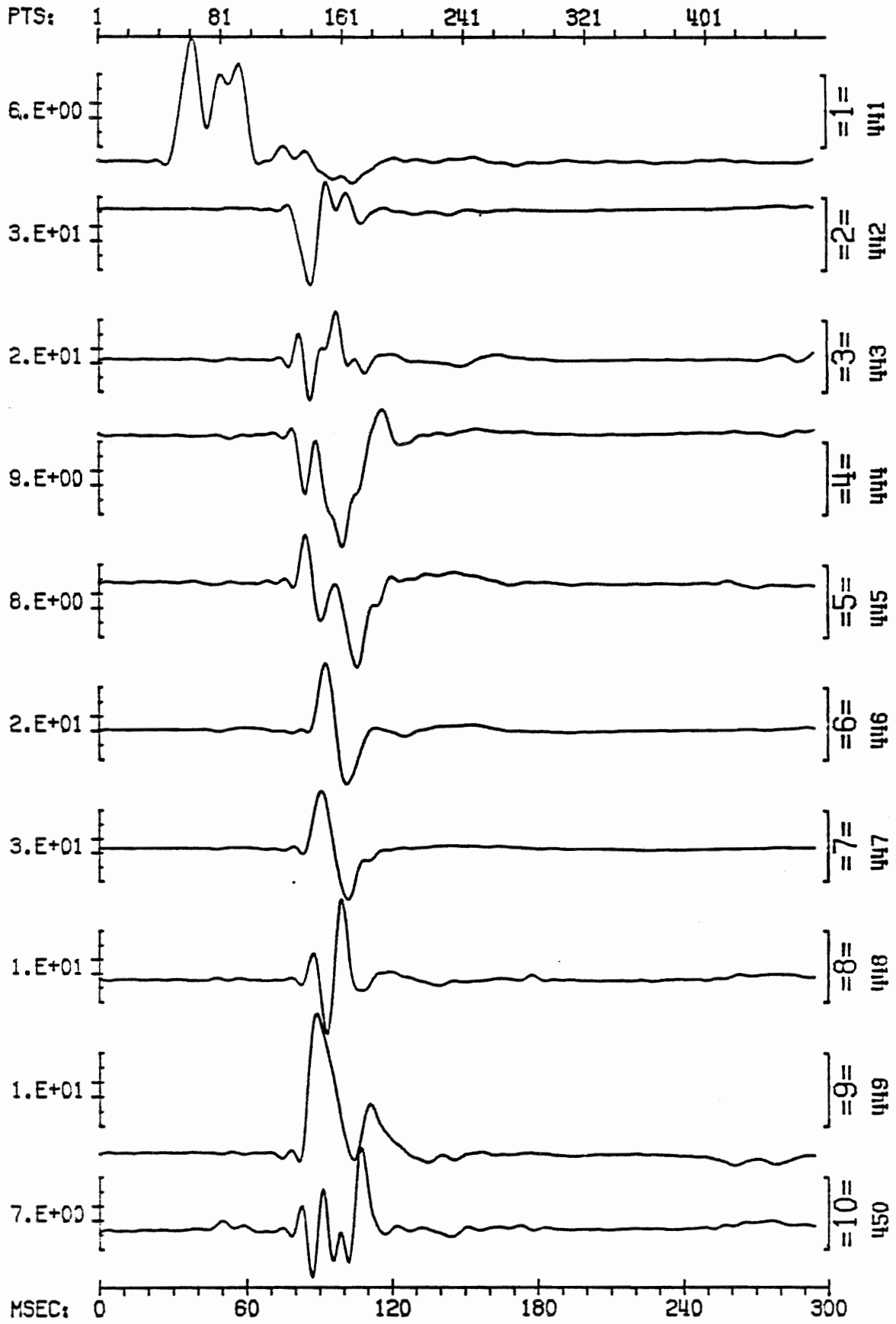
PELVIC I-S ACCELEROMETER



PELVIC R-L ACCELEROMETER



100 msec



ID: 77T092-1:55

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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RUN ID: 77T092-1188

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PROJECT: THOACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0452 DATE: 06-OCT-77

TEST SIGNALS: 1884 PTS/CH AT 6396.06 HZ. CAL SIGNALS: NOT DIGITIZED.

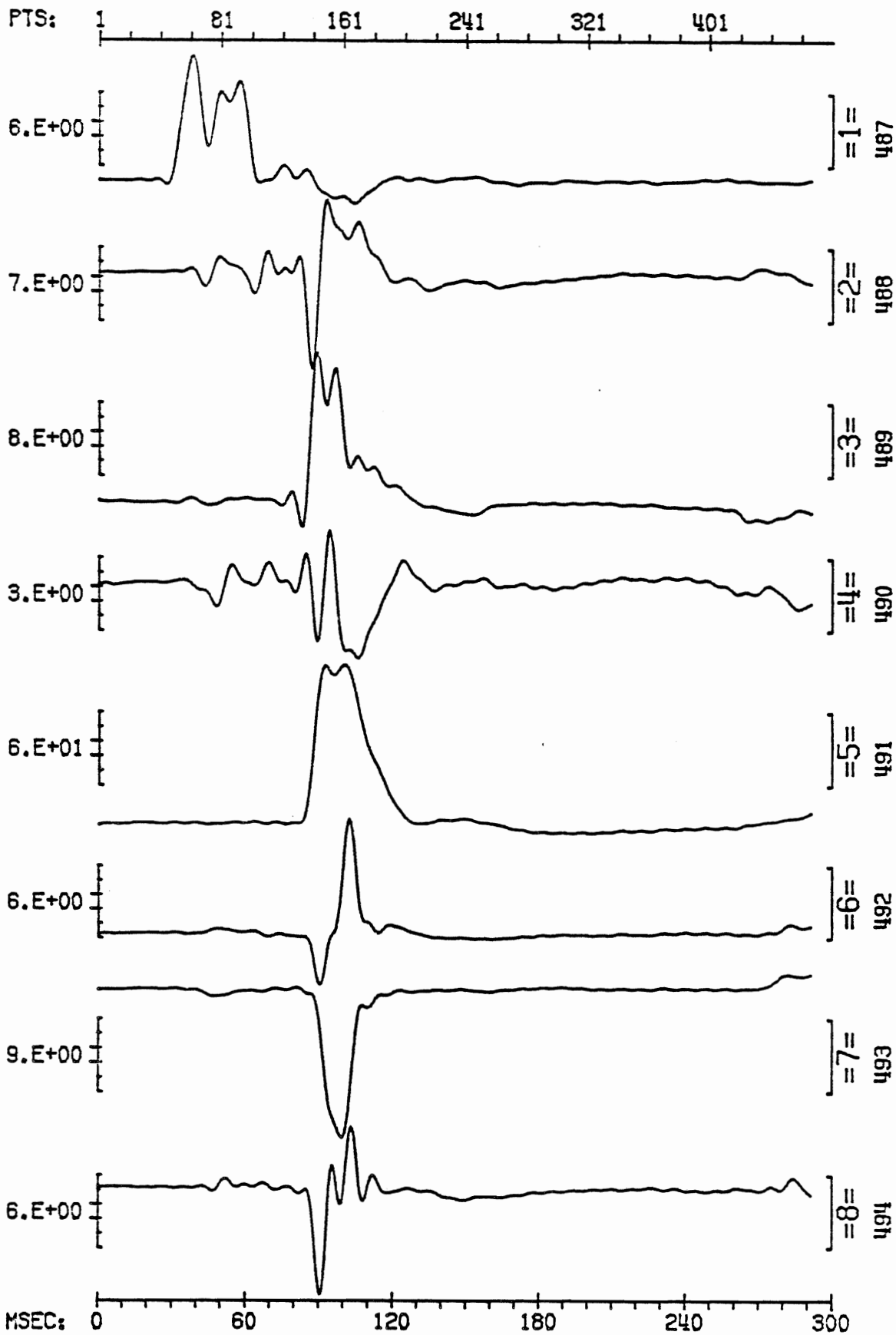
FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
441	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	100.7	471	1599.02
442	- 2:	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+ 3	100.7	471	1599.02
443	- 3:	LEFT LOWER RIB ACCELEROMETER	-84.00	G'S	4+1+ 3	100.7	471	1599.02
444	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	100.7	471	1599.02
445	- 5:	RIGHT LOWER RIB ACCELEROMETER	-80.40	G'S	4+1+ 3	100.7	471	1599.02
446	- 6:	UPPER STERNAL ACCELEROMETER	-89.40	G'S	4+1+ 3	100.7	471	1599.02
447	- 7:	LOWER STERNAL ACCELEROMETER	-66.40	G'S	4+1+ 3	100.7	471	1599.02
448	- 8:	T-1 P-A ACCELEROMETER	88.00	G'S	4+1+ 3	100.7	471	1599.02
449	- 9:	T-1 R-L ACCELEROMETER	-78.60	G'S	4+1+ 3	100.7	471	1599.02
450	- 10:	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+ 3	100.7	471	1599.02

11:  
12:  
13:  
14:

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FILTERED FILES: 441 - 450 DIGITAL TAPE: JEFLEH DATE: 06-OCT-77 RUN ID: 77T092-1188

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ID: 77T092-2:55

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T092-2189

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE SLED TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE; HS0452 DATE: 06-OCT-77

TEST SIGNALS: 1883 PTS/CH AT 6390.37 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
487	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	100.0	467	1599.59
488	- 2:	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+ 3	100.0	467	1599.59
489	- 3:	T-12 R-L ACCELEROMETER	-85.80	G'S	4+1+ 3	100.0	467	1599.59
490	- 4:	T-12 I-S ACCELEROMETER	69.20	G'S	4+1+ 3	100.0	467	1599.59
491	- 5:	VASCULAR PRESSURE	730.00	MM-HG	4+1+ 3	100.0	467	1599.59
492	- 6:	PELVIS P-A ACCELEROMETER	74.80	G'S	4+1+ 3	100.0	467	1599.59
493	- 7:	PELVIS R-L ACCELEROMETER	91.40	G'S	4+1+ 3	100.0	467	1599.59
494	- 8:	PELVIS I-S ACCELEROMETER	-83.40	G'S	4+1+ 3	100.0	467	1599.59

9:

10:

11:

12:

13:

14:

----- DIGITAL TAPE: JEFLEH

FILE: 487 - 494

DATE: 06-OCT-77

RUN ID: 77T092-2189

## SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

### TEST NUMBERS

77T093 - Low Energy Front Pendulum Impact  
77T094 - Low Energy Side Pendulum Impact  
77T095 - Padded Wall Side Impact - 20 mph.

### TEST DATE

October 11, 1977

### TEST SUBJECT

Age - 77  
Sex - Male  
Weight - 92.8 kg  
Stature - 183.2 cm

### RESTRAINT SYSTEM

None - Side Impact with Padded Flat Surface  
In Test No. 77T095, 4 inches of Ethafoam 220 closed cell polyethylene foam ( $\sim 2.2 \text{ lb/ft}^3$ ) were backed up with 2 inches of Scott Impact II open cell foam ( $\sim 3.3 \text{ lb/ft}^3$ ).

### VELOCITY

In Test No. 77T095, closing velocity was about 20 mph.

### INJURIES

Left rib fractures (2-9), right rib fractures (1, 2, 4).  
Very small superficial interior aortic hemorrhage.  
Long tear and hemorrhage between left lobes.  
Hemorrhages at rib fractures and on diaphragm.

### AIS NUMBER ESTIMATE



TEST # 77T095

TEST DATE 10.11.79

TEST DESCRIPTION SLAB RAM PADDED SIDE SLEED IMPACT VELOCITY 29.3 ft/s

SUBJECT:

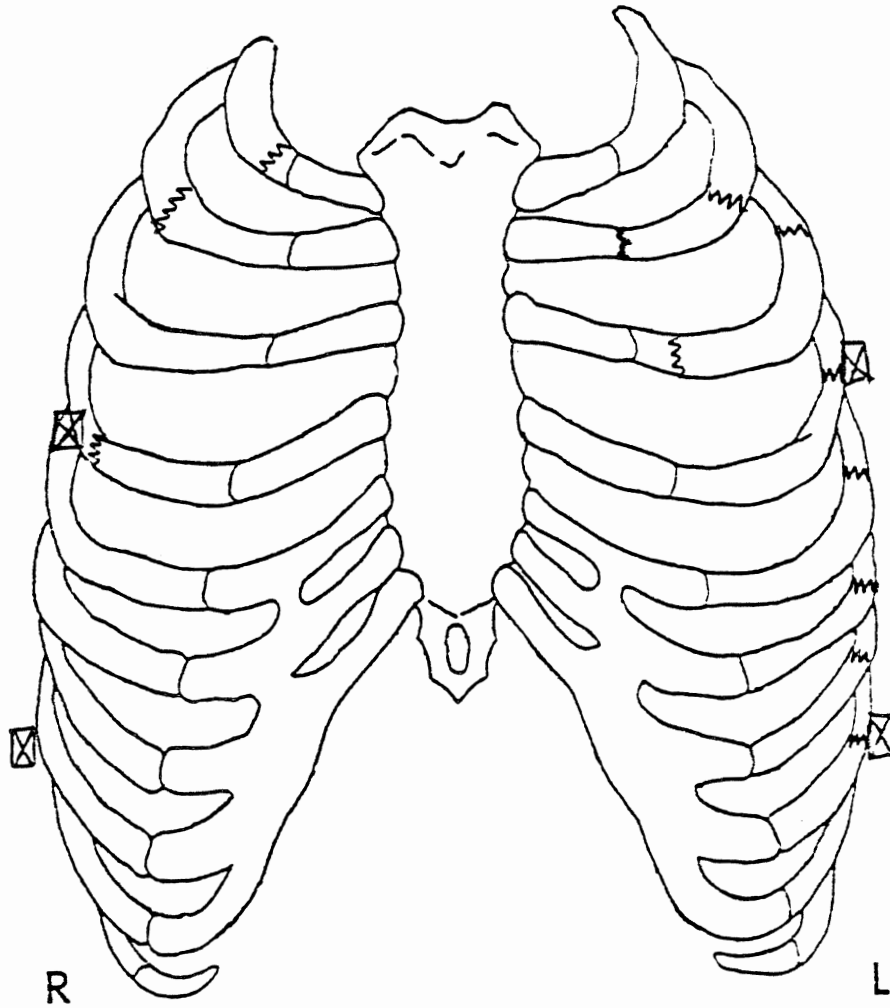
AGE 77 SEX M CAUSE OF DEATH cerebral hemorrhage

INJURY INFORMATION:

OVERALL THORACIC AIS 4

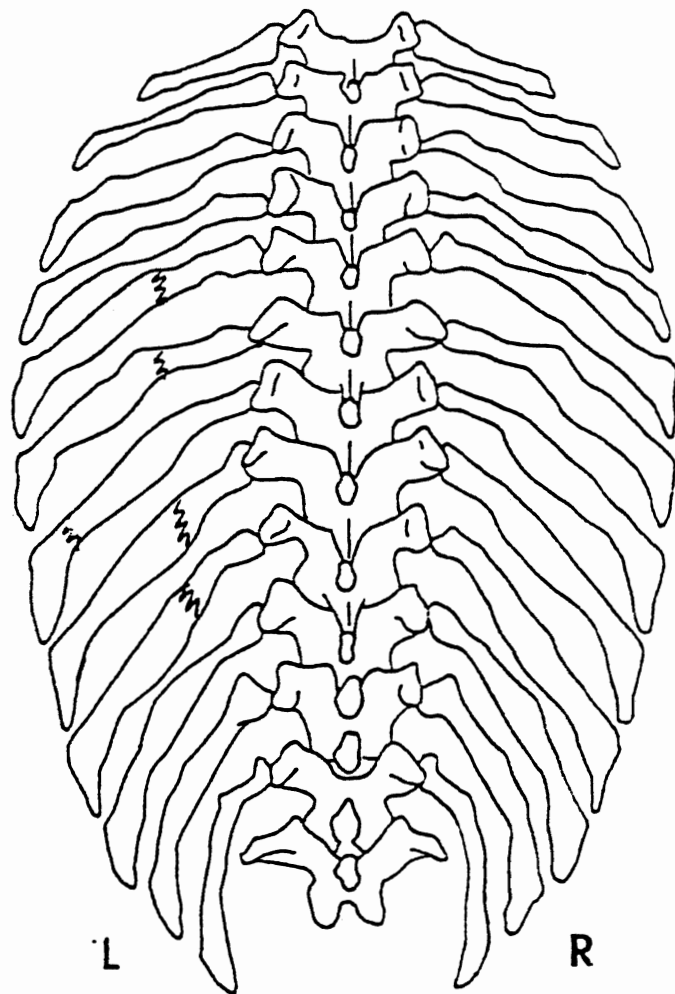
		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>L</u>	<u>L</u>	<u>P</u>	<u>4</u>
	2	<u>C</u>	<u>B</u>	<u>H</u>	<u>P</u>	<u>4</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>4</u>
	4	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	5	—	—	—	—	—
	6	—	—	—	—	—
	7	—	—	—	—	—
	8	—	—	—	—	—
MAJOR NON-THORACIC INJURIES NOTED	1	<u>M</u>	<u>S</u>	<u>C</u>	<u>R</u>	<u>2</u>
	2	<u>S</u>	<u>L</u>	<u>F</u>	<u>S</u>	<u>2</u>
	3	—	—	—	—	—
	4	—	—	—	—	—
	5	—	—	—	—	—

TEST # 77T095



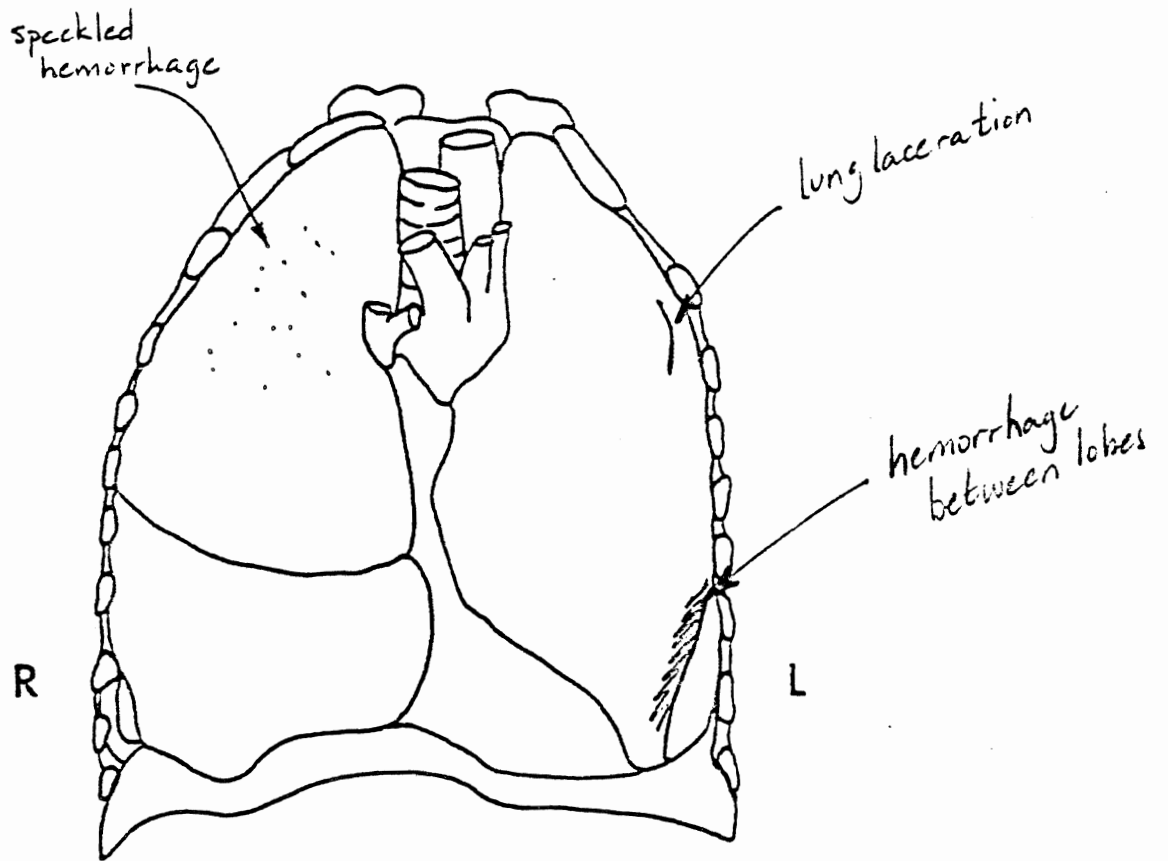
ANTERIOR VIEW RIB CAGE

TEST # 777095



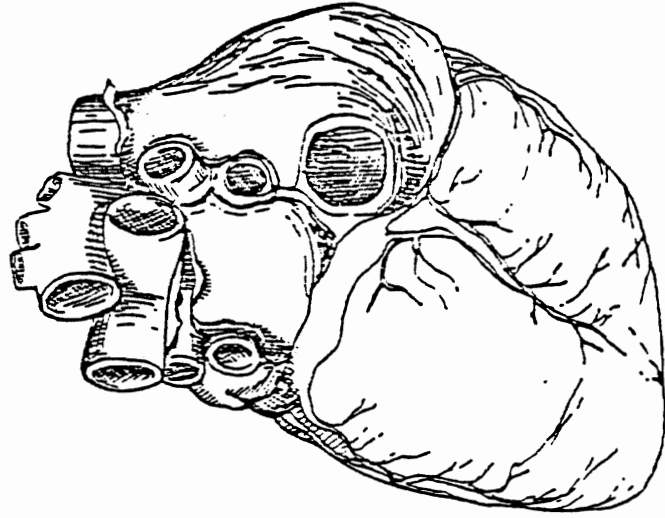
POSTERIOR VIEW RIB CAGE

TEST # 77095

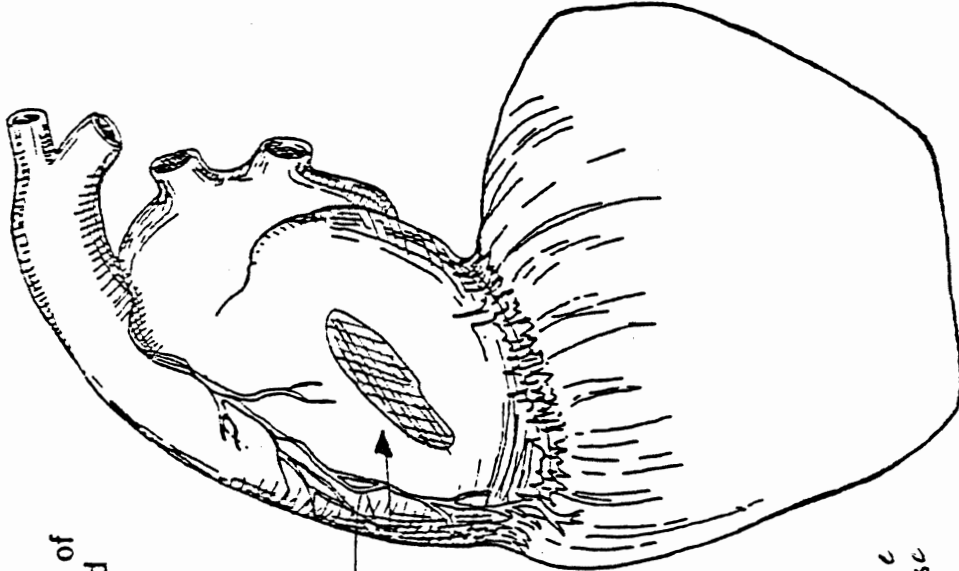


ANTERIOR VIEW THORACIC CAVITY

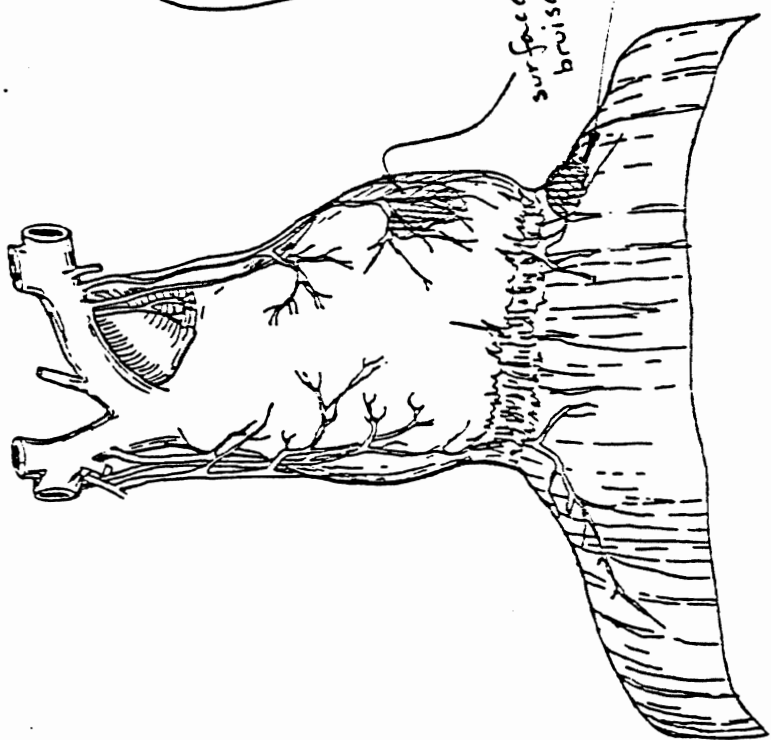
Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm



bruise

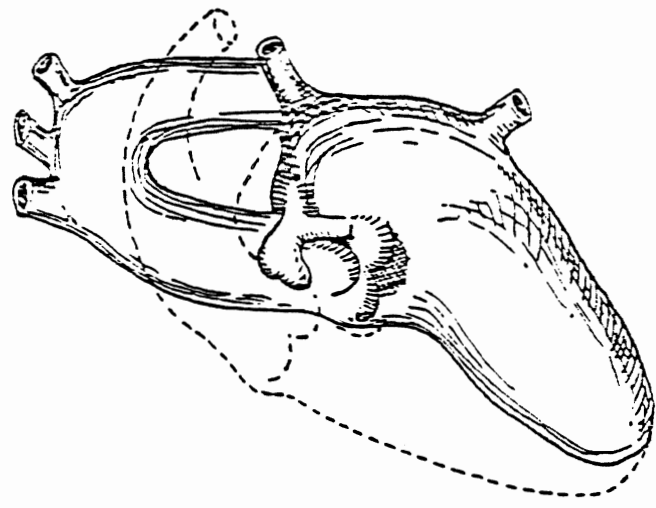


surface bruise

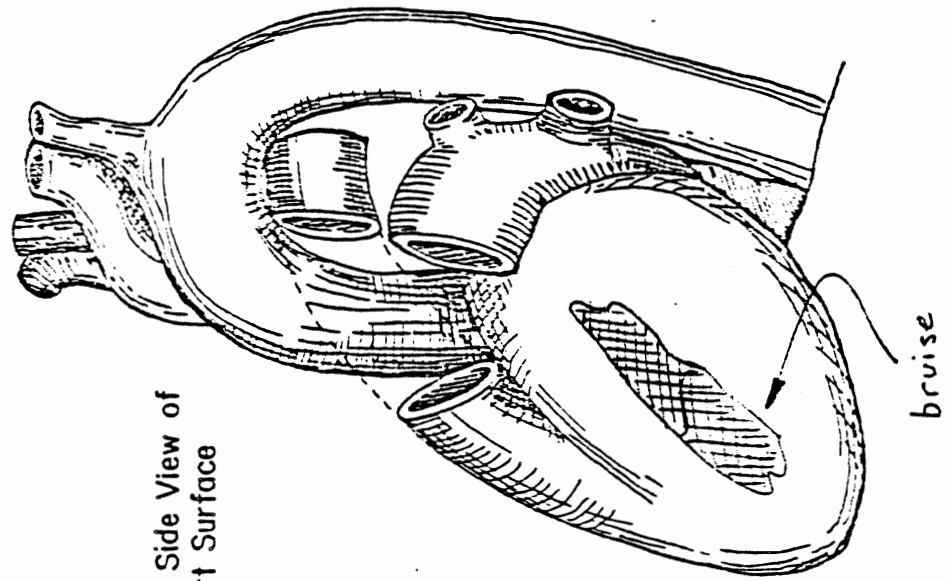
dia. bruise  
diaphragm

Anterior View of Pericardium and Diaphragm

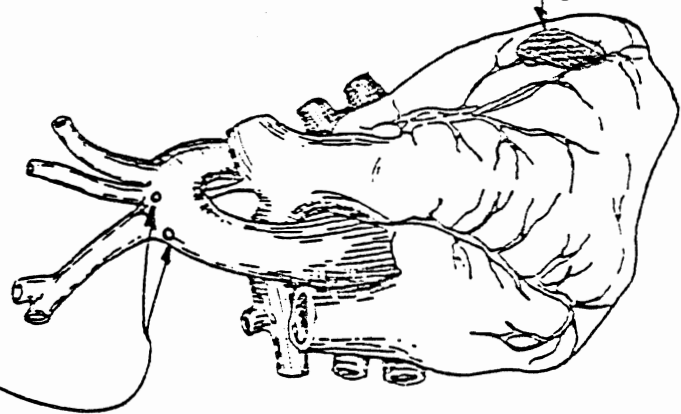
Left View of Left Side of Heart



Left Side View of Heart Surface



*very superficial  
internal  
hemorrhage*



Anterior View of Heart

TABLE 1. Deflection Data - Test No. 77T095 (inches)

Measurement Station	1	2	3	4	5	6	7
A		2.288		2.682		2.274	
B	1.656	2.203	2.527	2.657	2.528	2.224	1.695
C		2.179		2.625		2.146	
D		3.046					
E	2.356	2.867	3.121				
F		2.535					
G	2.055	2.277	2.435				
H		2.127					
I	1.996	2.228	2.309				
J		2.240					

TEST 771.9

PISTON  
ACCELERATION

2.3G

LEFT UPPER RIB  
ACCELEROMETER

1.0G

LEFT LOWER RIB  
ACCELEROMETER

1.7G

RIGHT UPPER RIB  
ACCELEROMETER

1.1G

RIGHT LOWER RIB  
ACCELEROMETER

1.3G

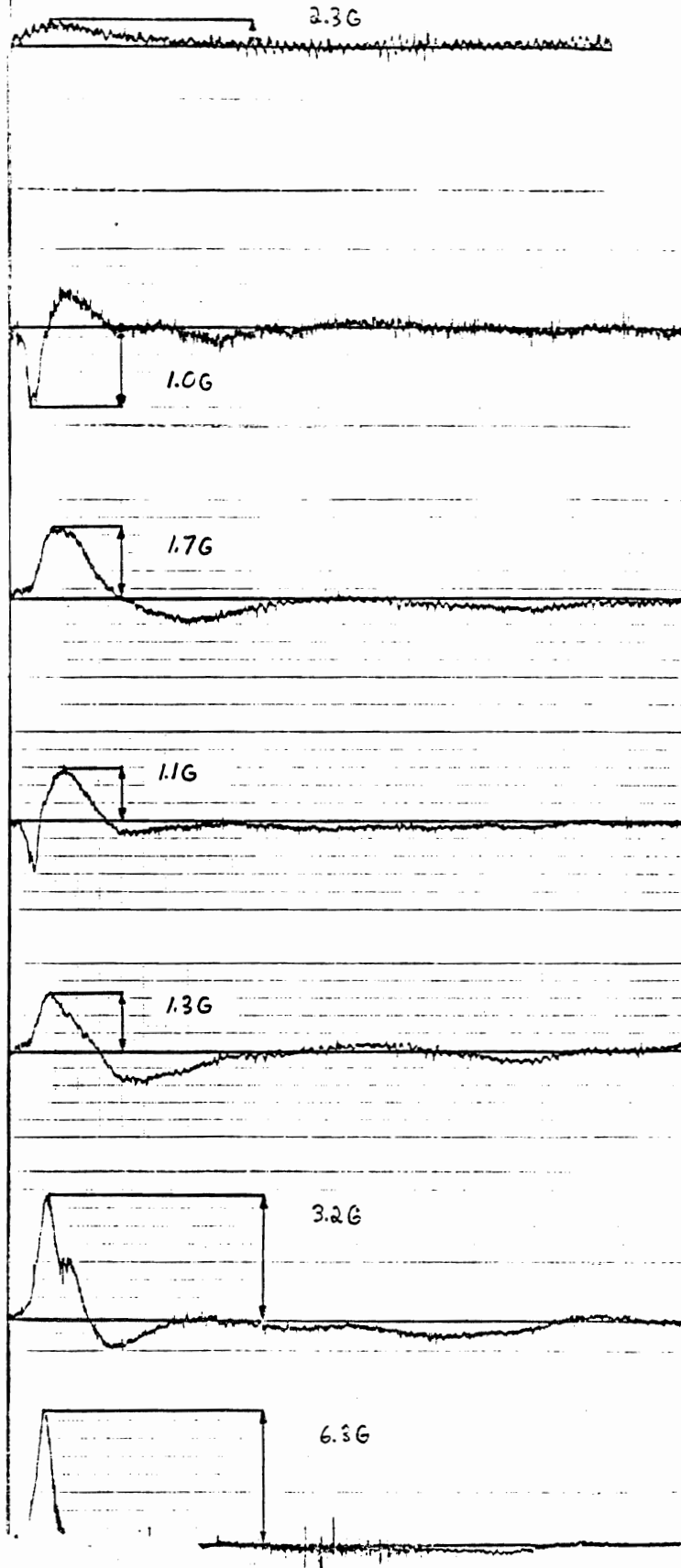
STERNUM UPPER  
ACCELEROMETER

3.2G

STERNUM LOWER  
ACCELEROMETER

6.3G

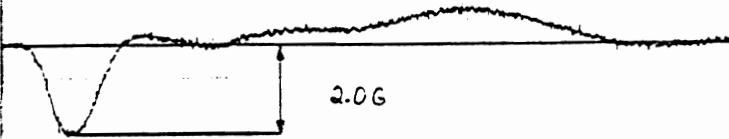
100 msec



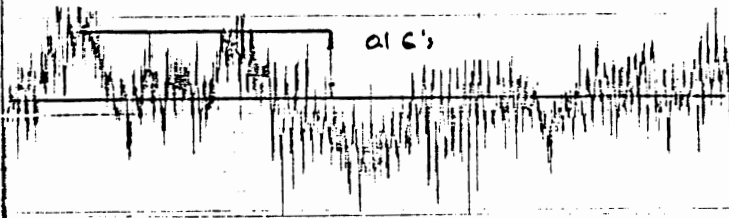


TEST 111096

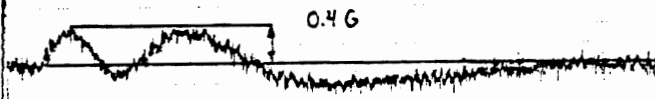
T<sub>1</sub> ACCELEROMETER  
(P-A)



T<sub>1</sub> ACCELEROMETER  
(R-L)



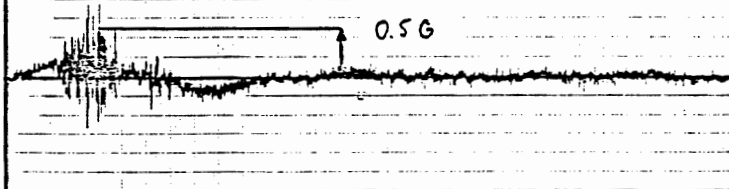
T<sub>1</sub> ACCELEROMETER  
(I-S)



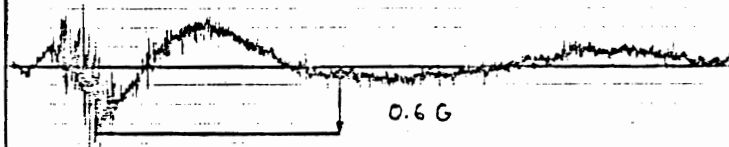
T<sub>12</sub> ACCELEROMETER  
(P-A)



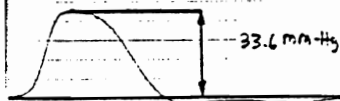
T<sub>12</sub> ACCELEROMETER  
(R-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)

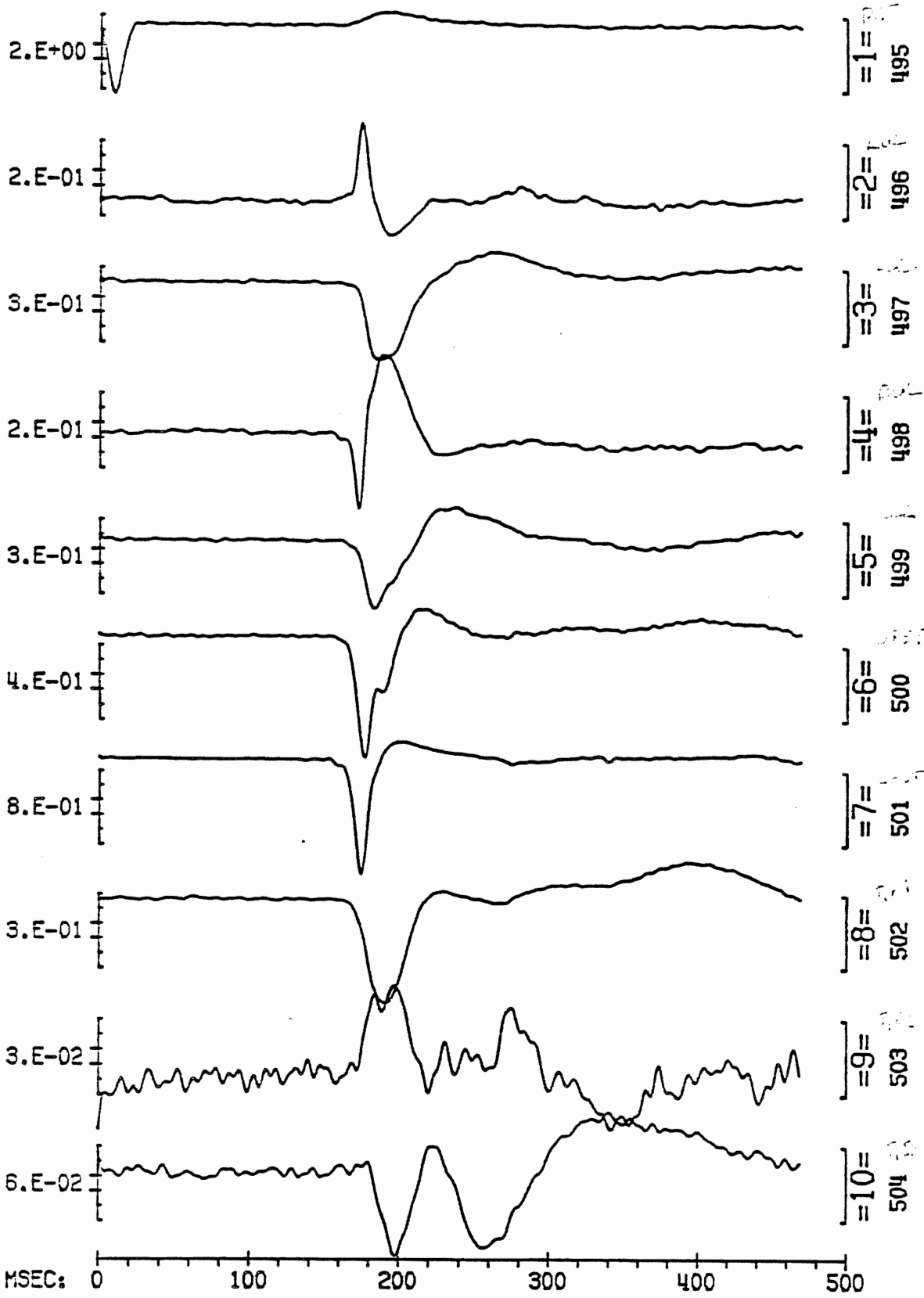


VASCULAR  
PRESSURE



100 msec

PIS: 1 161 321 481 641 801



77T093-1:PT

ID:

TAPE: THORAX. TESTS

=====

RUN ID: 77T093-11PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

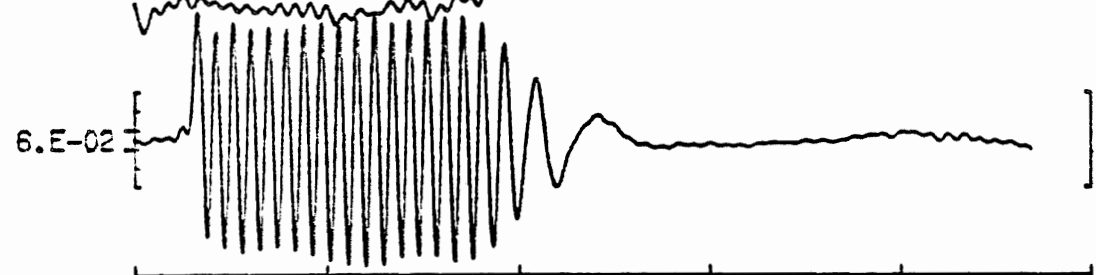
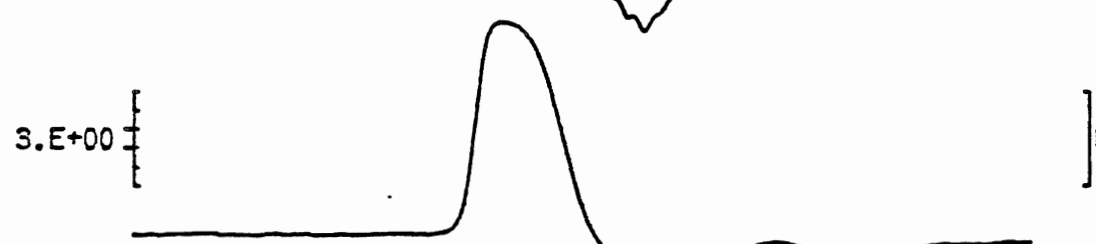
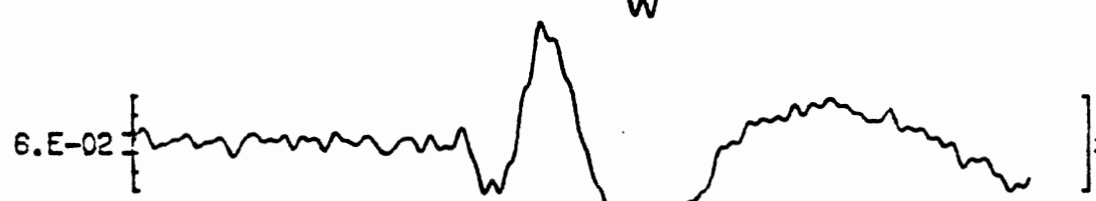
TEST SIGNALS: 3048 PTS/CH AT 6470.31 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
495	- 1:	PISTON DECELERATION	30.00	G'S	4+1+	3 101.9	759	1617.50
496	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+	3 101.9	759	1617.50
497	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+	3 101.9	759	1617.50
498	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+	3 101.9	759	1617.50
499	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+	3 101.9	759	1617.50
500	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+	3 101.9	759	1617.50
501	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+	3 101.9	759	1617.50
502	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+	3 101.9	759	1617.50
503	- 9:	T-1 R-L ACCELEROMETER	3.90	G'S	4+1+	3 101.9	759	1617.50
504	- 10:	T-1 I-S ACCELEROMETER	-3.80	G'S	4+1+	3 101.9	759	1617.50

11:  
12:  
13:  
14:

-----  
 FILTERED FILES: 495 - 504 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T093-11PT  
 -----

PTS: 1 161 321 481 641 801



MSEC: 0 100 200 300 400 500

ID: 77T093-2:PT

TAPE: THORAX. TESTS

\*\*\*\*\*  
RUN ID: 77T093-21PT  
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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 3048 PTS/CH AT 6472.54 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
555	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	101.9	759	1618.14
556	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+ 3	101.9	759	1618.14
557	- 3:	T-12 R-L ACCELEROMETER	4.30	G'S	4+1+ 3	101.9	759	1618.14
558	- 4:	T-12 I-S ACCELEROMETER	-3.50	G'S	4+1+ 3	101.9	759	1618.14
559	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+ 3	101.9	759	1618.14
560	- 6:	VERTICAL SUPPORT FORCE	200.00	LB9.	4+1+ 3	101.9	759	1618.14

7:  
8:  
9:  
10:  
11:

561	- 12:	PISTON VELOCITY	1.00	VOLTS	4+1+ 3	101.9	759	1618.14
13:								
14:								

-----  
FILTERED FILES: 555 - 561 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T093-21PT  
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TEST 1119-

PISTON  
ACCELERATION

2.7G

LEFT UPPER RIB  
ACCELEROMETER

1.2G

LEFT LOWER RIB  
ACCELEROMETER

0.9G

RIGHT UPPER RIB  
ACCELEROMETER

1.2G

RIGHT LOWER RIB  
ACCELEROMETER

0.7G

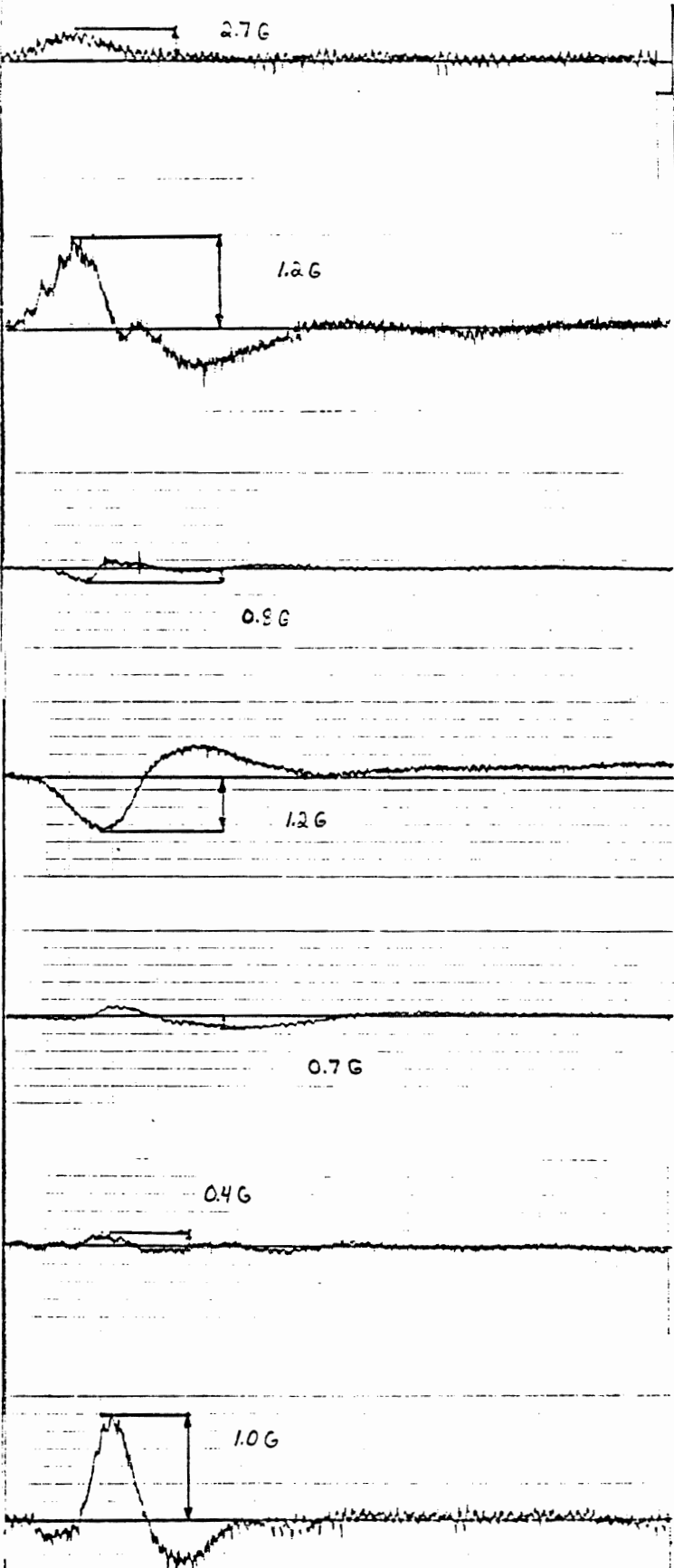
STERNUM UPPER  
ACCELEROMETER

0.4G

STERNUM LOWER  
ACCELEROMETER

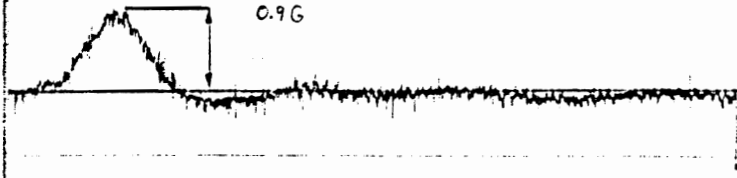
1.0G

100 msec

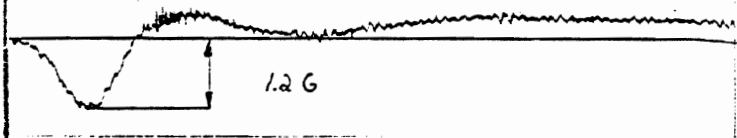


TEST 0700--

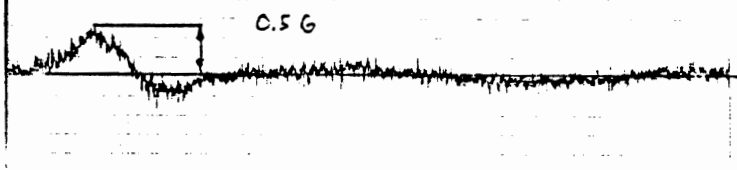
T<sub>1</sub> ACCELEROMETER  
(P-A)



T<sub>1</sub> ACCELEROMETER  
(R-L)



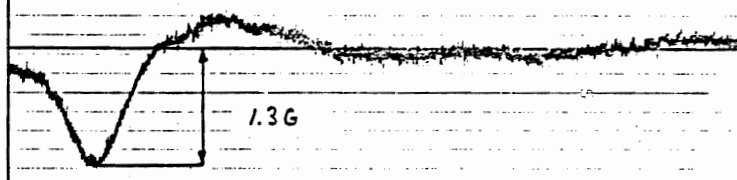
T<sub>1</sub> ACCELEROMETER  
(I-S)



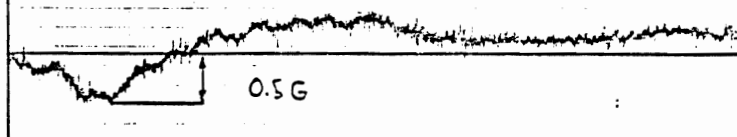
T<sub>12</sub> ACCELEROMETER  
(P-A)



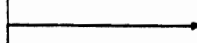
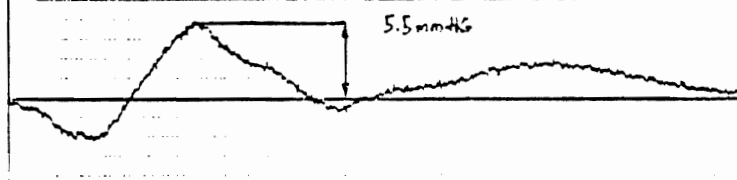
T<sub>12</sub> ACCELEROMETER  
(R-L)



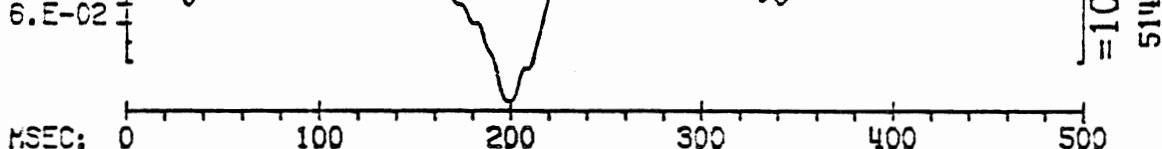
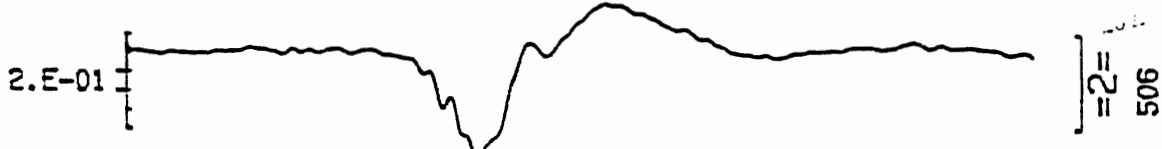
T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE



PTS: 1 161 321 481 641 801



MSEC: 0 100 200 300 400 500

77T0911-1:PT

ID:

TAPE: THORAX. TESTS



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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T094-1:PT

=====

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 3084 PTS/CH AT 6468.38 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
505	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	101.9	768	1617.09
506	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	768	1617.09
507	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	101.9	768	1617.09
508	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	101.9	768	1617.09
509	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	101.9	768	1617.09
510	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	768	1617.09
511	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	101.9	768	1617.09
512	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	101.9	768	1617.09
513	- 9:	T-1 R-L ACCELEROMETER	3.90	G'S	4+1+ 3	101.9	768	1617.09
514	- 10:	T-1 I-S ACCELEROMETER	-3.80	G'S	4+1+ 3	101.9	768	1617.09

- 11:
- 12:
- 13:
- 14:

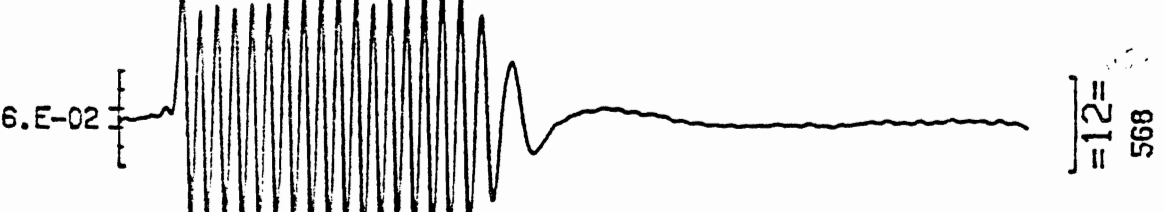
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FILTERED FILES: 505 - 514 DIGITAL TAPE: JEFLEH

DATE: 03-NOV-77

RUN ID: 77T094-1:PT

PTS: 1 161 321 481 641 801



MSEC: 0 100 200 300 400 500

ID: 77T094-2:PT

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T094-21PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 3083 PTS/CH AT 6468.31 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
562	- 1	PISTON DECELERATION	30.00	G'S	4+1+	3 101.9	768	1617.00
563	- 2	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+	3 101.9	768	1617.00
564	- 3	T-12 R-L ACCELEROMETER	4.30	G'S	4+1+	3 101.9	768	1617.00
565	- 4	T-12 I-S ACCELEROMETER	-3.50	G'S	4+1+	3 101.9	768	1617.00
566	- 5	VASCULAR PRESSURE	14.60	MM-HG	4+1+	3 101.9	768	1617.00
567	- 6	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+	3 101.9	768	1617.00

71

81

91

101

111

568 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+ 3 101.9 768 1617.00

131

141

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TEST 071095

SLED DECELERATION PULSE

47.0G

LEFT UPPER RIB  
ACCELEROMETER

80.3G

LEFT LOWER RIB  
ACCELEROMETER

79.8

RIGHT UPPER RIB  
ACCELEROMETER

152.4G

RIGHT LOWER RIB  
ACCELEROMETER

40.2G

STERNUM UPPER  
ACCELEROMETER

89.4G

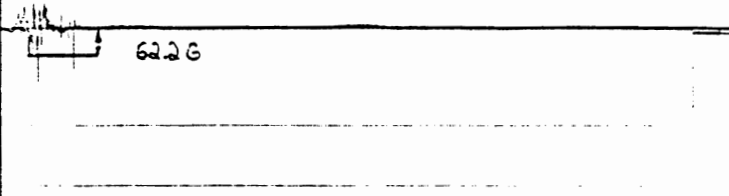
STERNUM LOWER  
ACCELEROMETER

79.7G

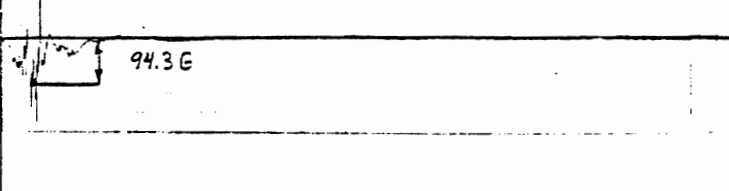
100 msec

TEST RESULTS

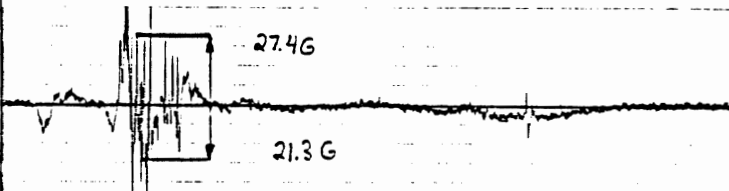
T<sub>1</sub> ACCELEROMETER  
(P-A)



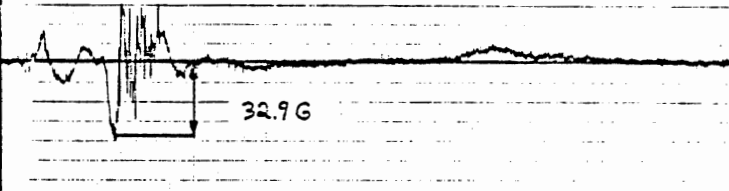
T<sub>1</sub> ACCELEROMETER  
(R-L)



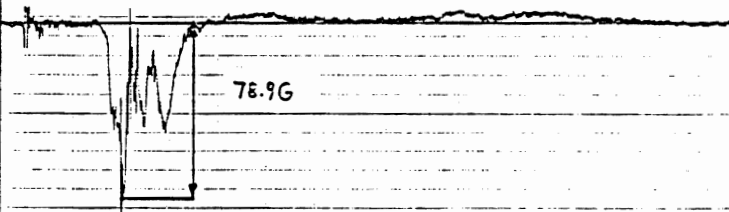
T<sub>1</sub> ACCELEROMETER  
(I-S)



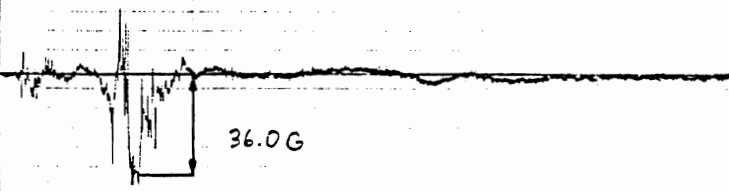
T<sub>12</sub> ACCELEROMETER  
(P-A)



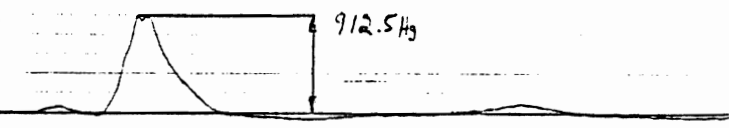
T<sub>12</sub> ACCELEROMETER  
(R-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)



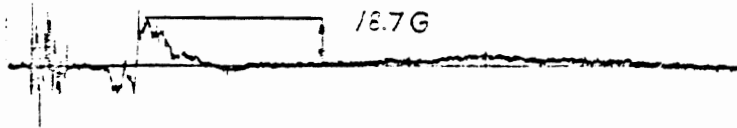
VASCULAR  
PRESSURE



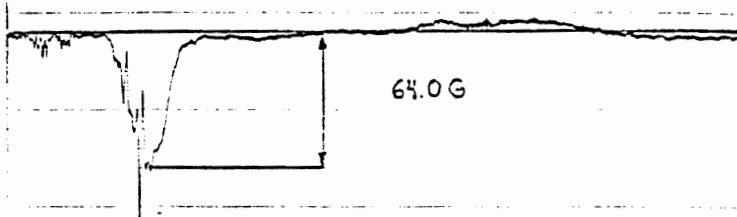
100 msec

TEST WTC09

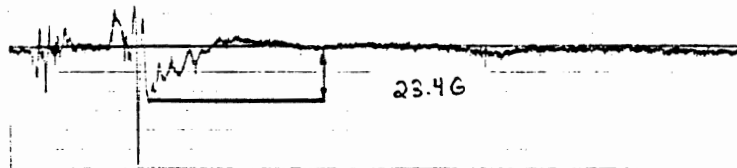
PELVIC F-A ACCELEROMETER



PELVIC R-L ACCELEROMETER

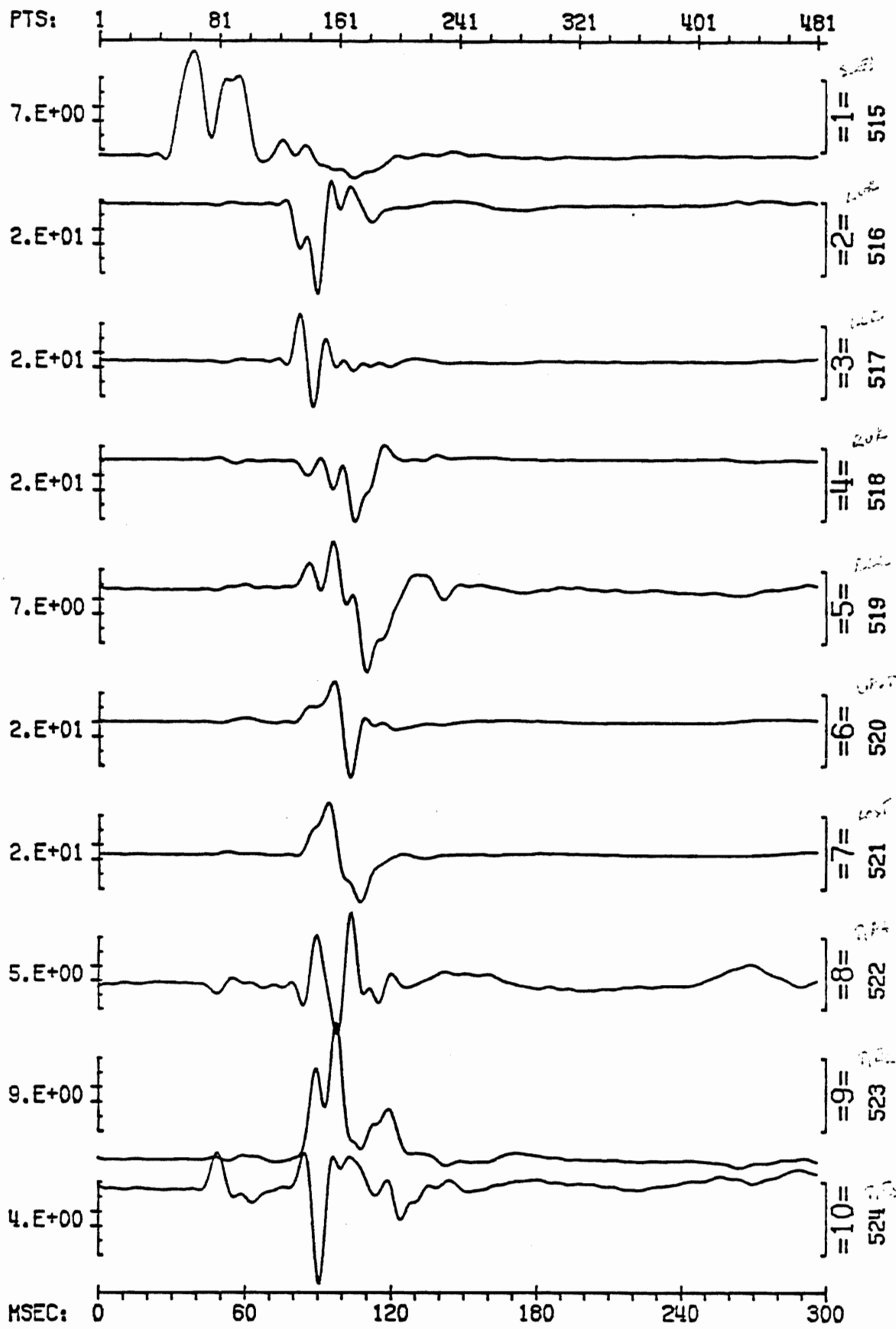


PELVIC I-S ACCELEROMETER



100 msec





ID: 77T095-1:SS

TAPE: THORAX. TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T095-1159

=====

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 1927 PTS/CH AT 6469.43 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
515	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	101.9	480	1617.36
516	- 2:	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+ 3	101.9	480	1617.36
517	- 3:	LEFT LOWER RIB ACCELEROMETER	-84.00	G'S	4+1+ 3	101.9	480	1617.36
518	- 4:	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+ 3	101.9	480	1617.36
519	- 5:	RIGHT LOWER RIB ACCELEROMETER	-80.40	G'S	4+1+ 3	101.9	480	1617.36
520	- 6:	UPPER STERNAL ACCELEROMETER	-89.40	G'S	4+1+ 3	101.9	480	1617.36
521	- 7:	LOWER STERNAL ACCELEROMETER	-66.40	G'S	4+1+ 3	101.9	480	1617.36
522	- 8:	T-1 P-A ACCELEROMETER	88.00	G'S	4+1+ 3	101.9	480	1617.36
523	- 9:	T-1 R-L ACCELEROMETER	-78.60	G'S	4+1+ 3	101.9	480	1617.36
524	- 10:	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+ 3	101.9	480	1617.36

- 11:
- 12:
- 13:
- 14:

=====

FILTERED FILES: 515 - 524 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T095-1159



PTS: 1 81 161 241 321 401 481



MSEC: 0 60 120 180 240 300

IO: 77T095-2:55

TAPE: THORAX. TESTS

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RUN ID: 77T095-2:9S

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 1926 PTS/CH AT 6470.14 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
569	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 3	101.9	480	1617.54
570	- 2:	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+ 3	101.9	480	1617.54
571	- 3:	T-12 R-L ACCELEROMETER	-85.80	G'S	4+1+ 3	101.9	480	1617.54
572	- 4:	T-12 I-S ACCELEROMETER	69.20	G'S	4+1+ 3	101.9	480	1617.54
573	- 5:	VASCULAR PRESSURE	730.00	MM-HG	4+1+ 3	101.9	480	1617.54
574	- 6:	PELVIS P-A ACCELEROMETER	74.80	G'S	4+1+ 3	101.9	480	1617.54
575	- 7:	PELVIS R-L ACCELEROMETER	91.40	G'S	4+1+ 3	101.9	480	1617.54
576	- 8:	PELVIS I-S ACCELEROMETER	-83.40	G'S	4+1+ 3	101.9	480	1617.54

- 91
- 101
- 111
- 121
- 131
- 141

=====

FILTERED FILES: 569 - 576 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T095-2:8S

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## SUMMARY TEST REPORT

THORACIC INJURY PROJECT (Contract DOT-HS-4-00921) Highway Safety Research  
Institute - The University of Michigan

### TEST NUMBERS

77T096 - Low Energy Front Pendulum Impact

77T097 - Low Energy Side Pendulum Impact

77T098 - Padded Wall Side Impact - 20 mph

### TEST DATE

October 27, 1977

### TEST SUBJECT

Age - 71

Sex - Male

Weight - 59 kg

Stature - 168.2 cm

### RESTRAINT SYSTEM

None - Side Impact with Padded Flat Surface

In Test No. 77T098, 6 inches of Scott Impact II open cell foam  
( $\sim 3.3 \text{ lb/ft}^3$ ) covered the rigid wall.

### VELOCITY

In Test No. 77T098, closing velocity was about 20 mph.

### INJURIES

Left rib fractures (2-5), right rib fractures (2-10).

Hemorrhage of fatty area on pericardium near aorta.

Pneumothorax and slight tear in lung.

Fracture at C5 at disc.

### AIS NUMBER ESTIMATE

TEST # 77T098

TEST DATE 10.27.77

TEST DESCRIPTION SLAB FOAM PADDED SIDE SLED IMPACT VELOCITY 29.3 ft/s

SUBJECT:

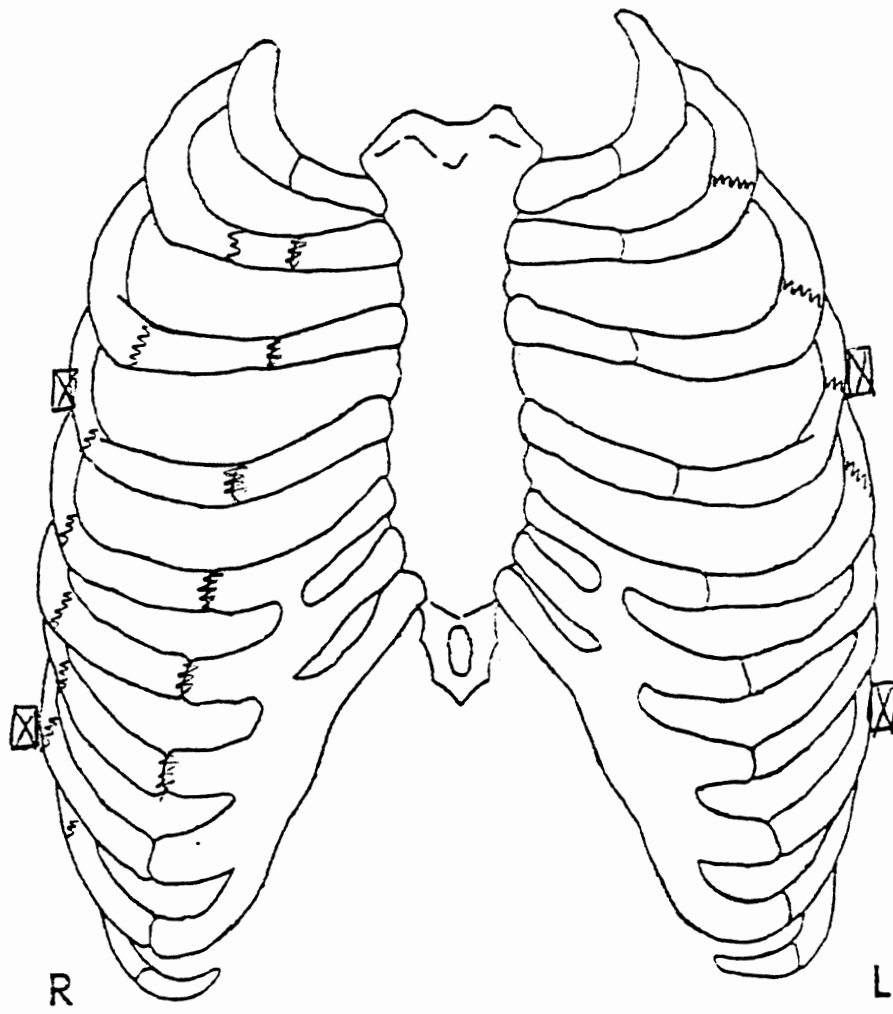
AGE 71 SEX M CAUSE OF DEATH Asphyxiation

INJURY INFORMATION:

OVERALL THORACIC AIS 4

		R E G I O N	A S P E C T	L E S I O N	S Y S T E M	A I S
THORACIC INJURIES	1	<u>C</u>	<u>B</u>	<u>F</u>	<u>S</u>	<u>4</u>
	2	<u>C</u>	<u>R</u>	<u>Ø</u>	<u>P</u>	<u>3</u>
	3	<u>C</u>	<u>C</u>	<u>C</u>	<u>H</u>	<u>3</u>
	4	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	5	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	6	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	7	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	8	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
MAJOR NON-THORACIC INJURIES NOTED	1	<u>N</u>	<u>P</u>	<u>F</u>	<u>V</u>	<u>3</u>
	2	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	3	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	4	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
	5	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>

TEST # 7709X

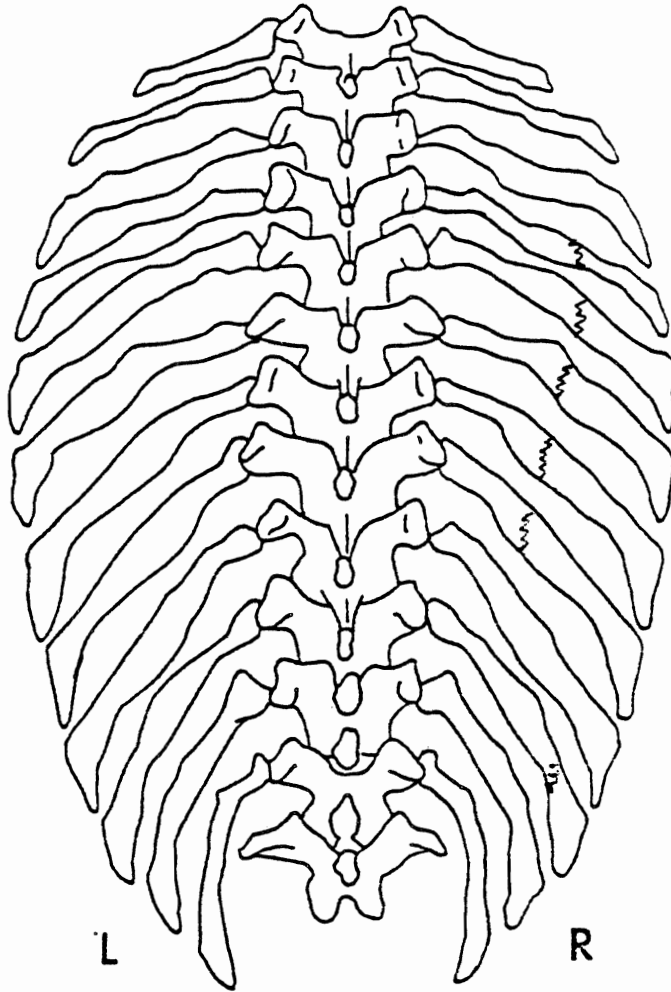


hemorrhage above breasts  
⊗ lateral ribs, and R<sub>2,3,4</sub>  
chondrocostal.

ANTERIOR VIEW RIB CAGE

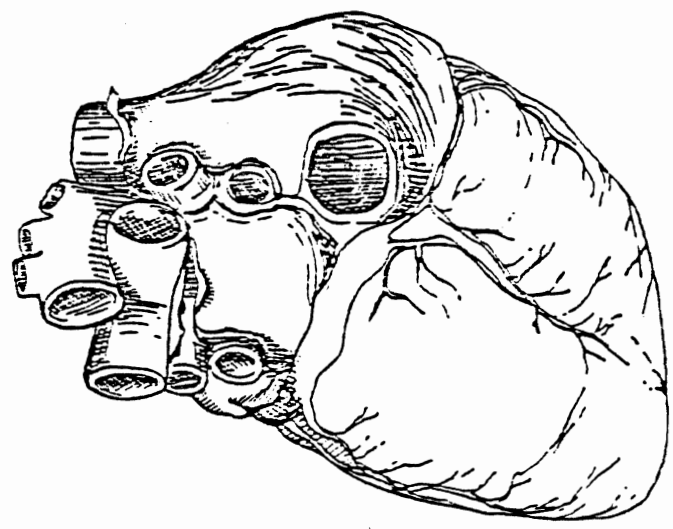
(In addition,  
• fracture, with possible  
dislocation, C5, at disc)

TEST = 77T098

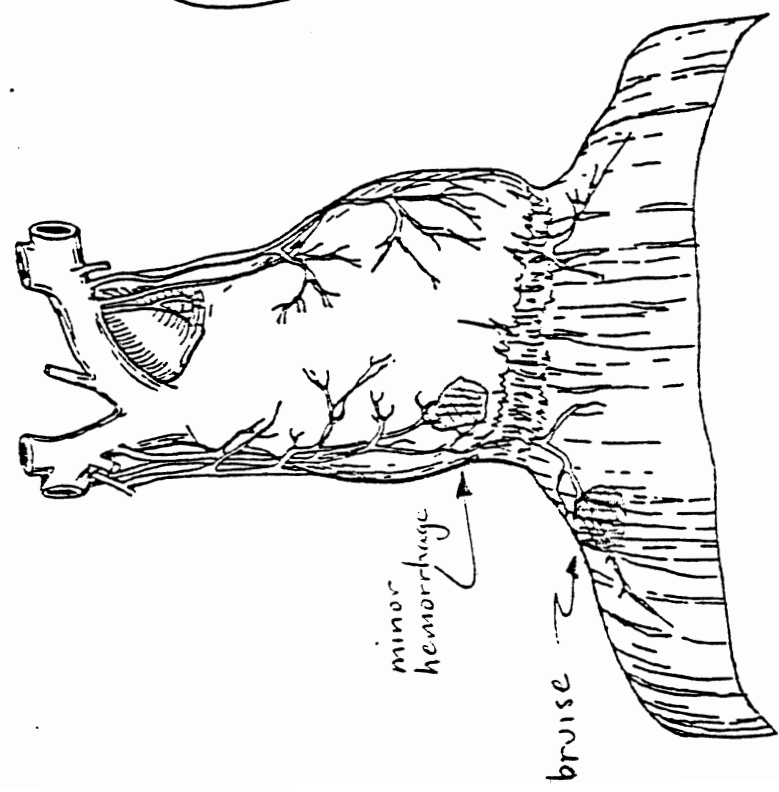
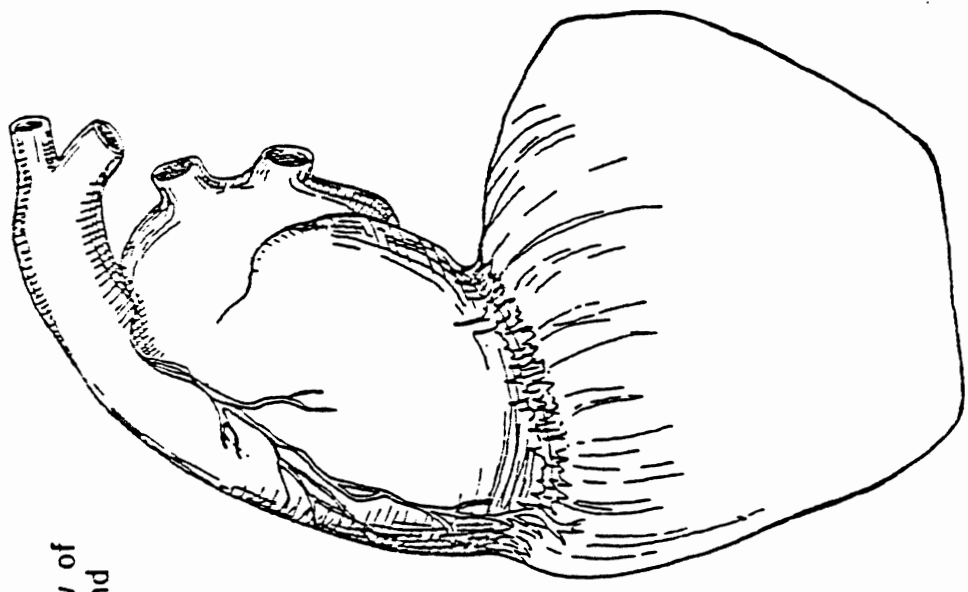


POSTERIOR VIEW RIB CAGE

Diaphragmatic View of Heart



Left Side View of Pericardium and Diaphragm

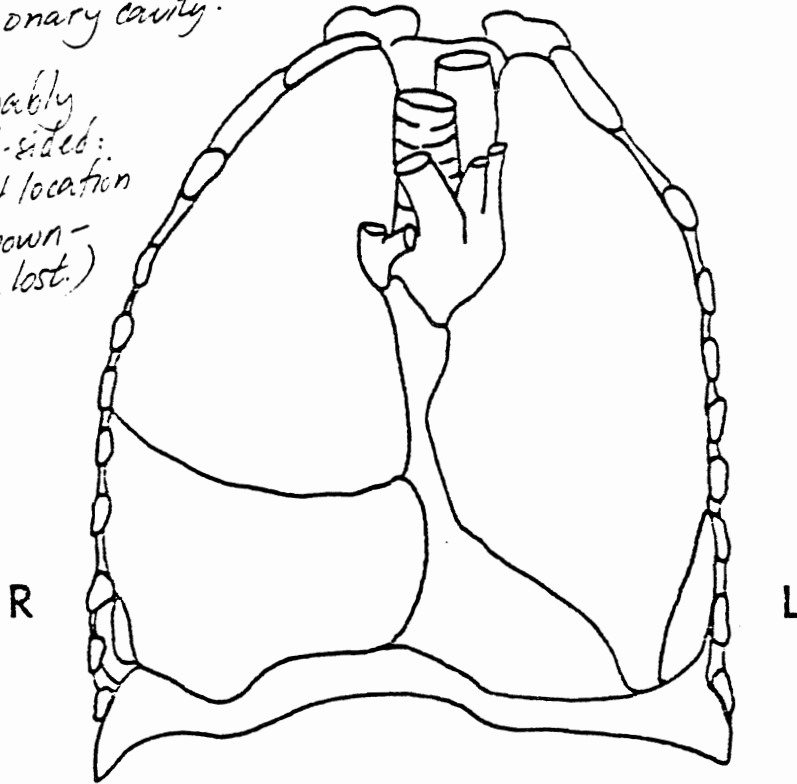


Anterior View of Pericardium and Diaphragm

traumatic pneumothorax  
as a consequence of rib  
fracture fragment piercing  
pulmonary cavity.

TEST # 77098

(Probably  
right-sided;  
exact location  
unknown -  
data lost.)



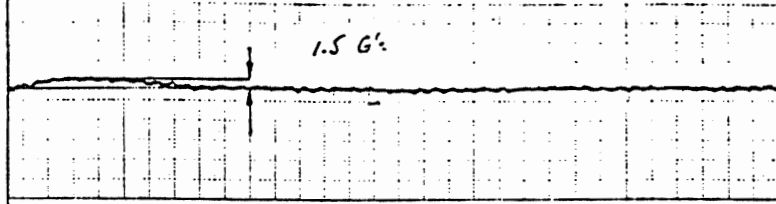
ANTERIOR VIEW THORACIC CAVITY



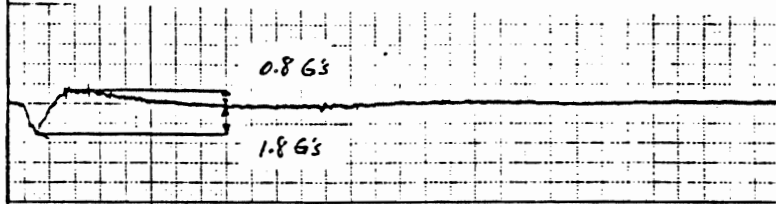
TABLE 2. Deflection Data - Test No. 77T098 (inches)

Measurement Station	1	2	3	4	5	6	7
A		.881		1.29		.753	
B	.09	.705	-	1.324	1.707	.138	.558
C		1.135		.145		1.513	
D		.081					
E	.203	.134	.065				
F		.408					
G	.391	2.167	.394				
H		.076					
I	.734	.289	.185				
J		1.901					

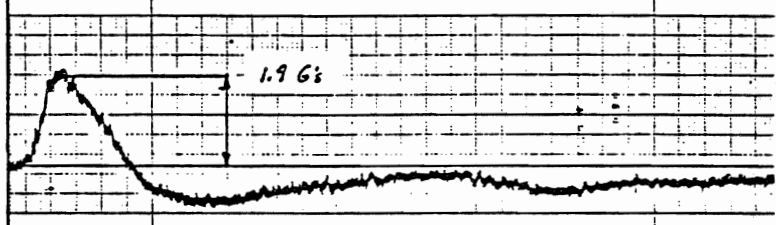
PISTON  
ACCELERATION



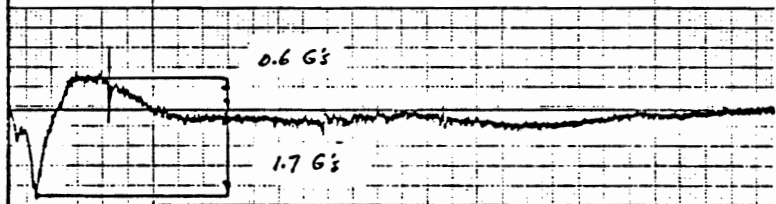
LEFT UPPER RIB  
ACCELEROMETER



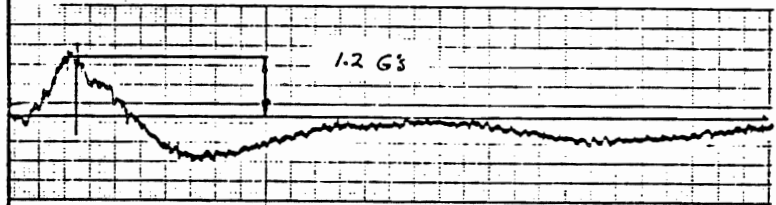
LEFT LOWER RIB  
ACCELEROMETER



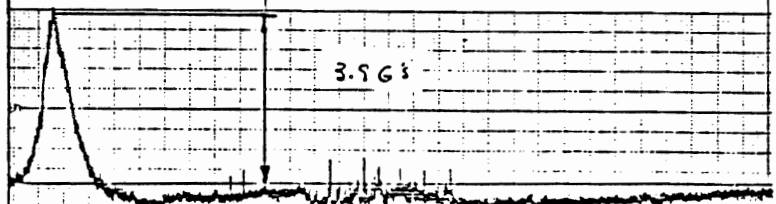
RIGHT UPPER RIB  
ACCELEROMETER



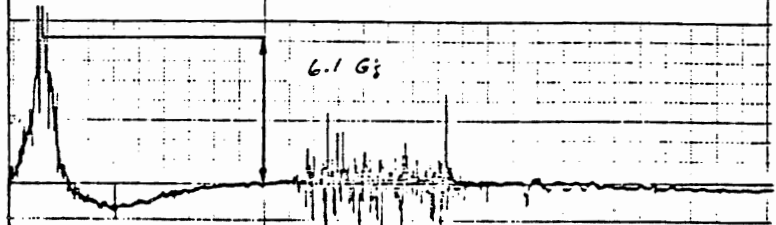
RIGHT LOWER RIB  
ACCELEROMETER



STERNUM UPPER  
ACCELEROMETER

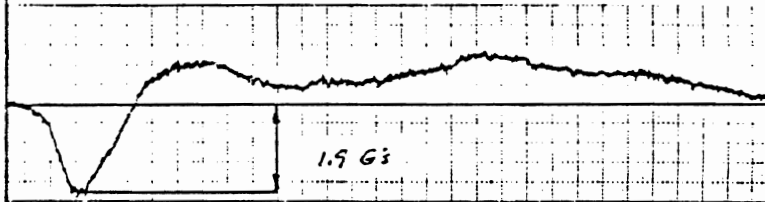


STERNUM LOWER  
ACCELEROMETER

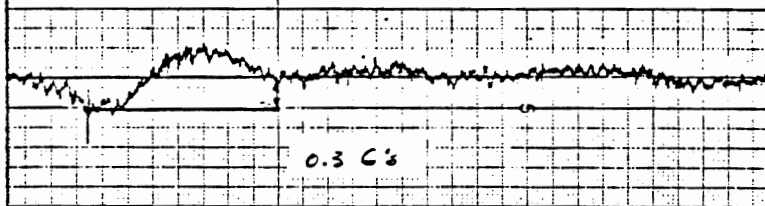


100 msec

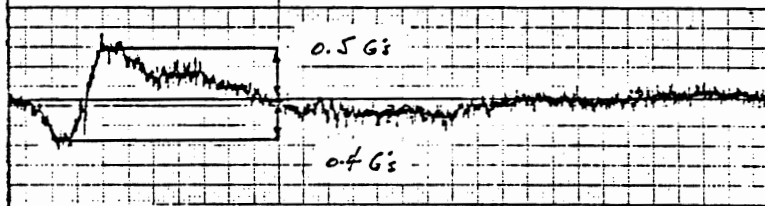
T<sub>1</sub> ACCELEROMETER  
(P-A)



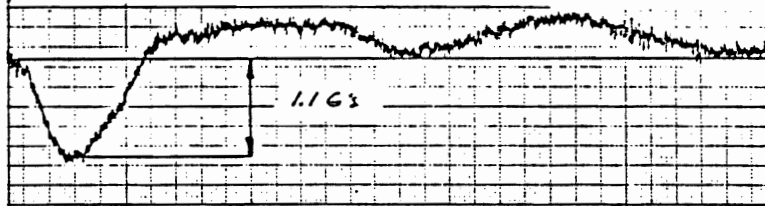
T<sub>1</sub> ACCELEROMETER  
(R-L)



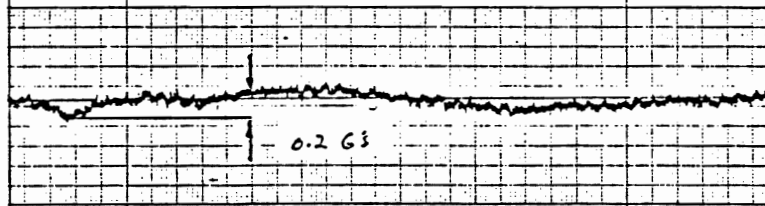
T<sub>1</sub> ACCELEROMETER  
(I-S)



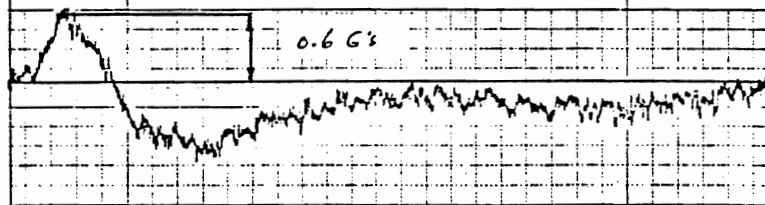
T<sub>12</sub> ACCELEROMETER  
(P-A)



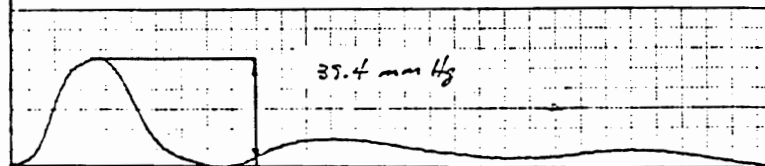
T<sub>12</sub> ACCELEROMETER  
(R-L)



T<sub>12</sub> ACCELEROMETER  
(I-S)

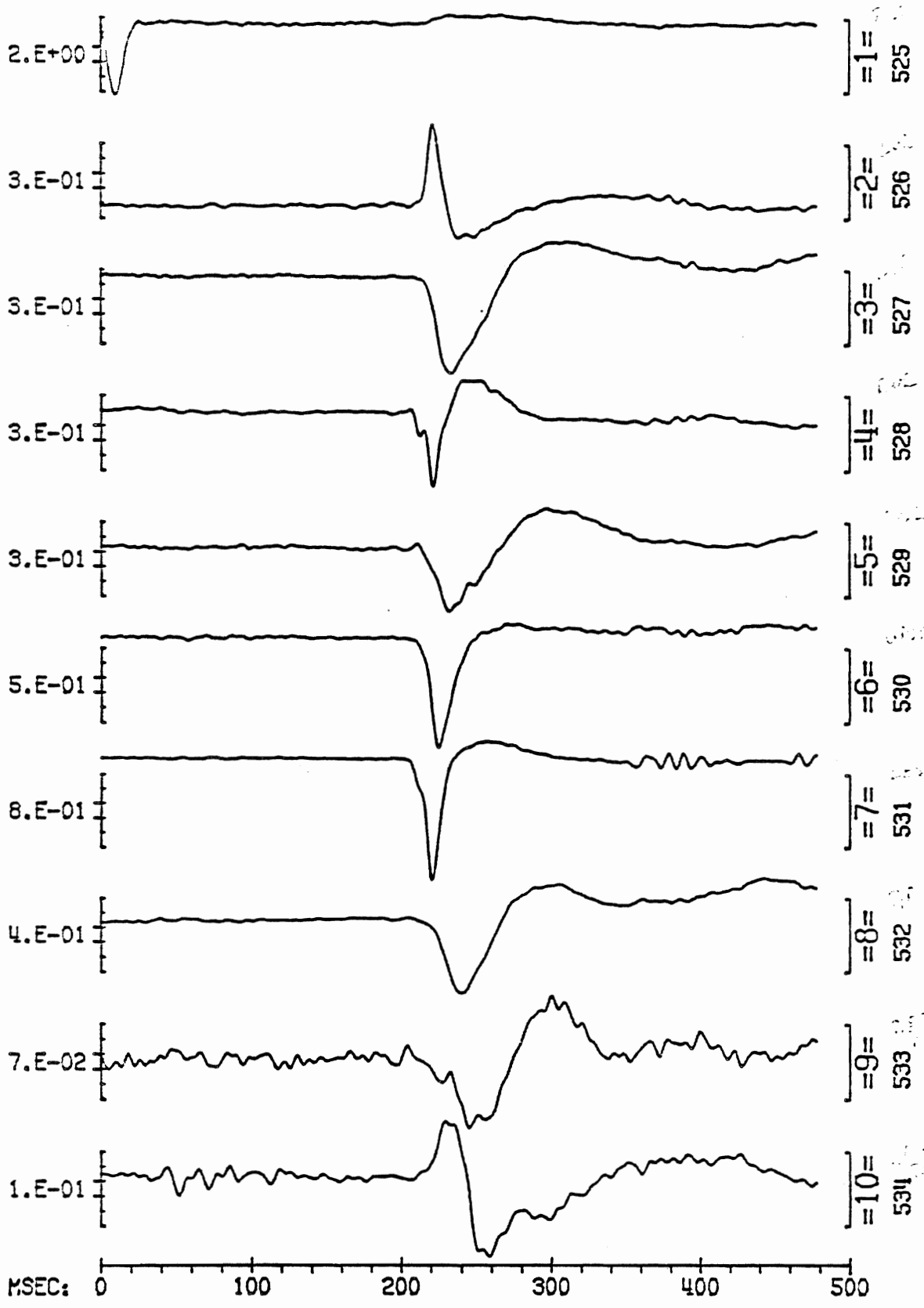


VASCULAR  
PRESSURE



100 msec

PTS: 1 161 321 481 641 801



ID: 77T096-1:PT

TAPE: THORAX. TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 77T096-1:PT

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 3099 PTS/CH AT 6468.21 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
525	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	101.9	773	1617.05
526	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	773	1617.05
527	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	101.9	773	1617.05
528	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	101.9	773	1617.05
529	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	101.9	773	1617.05
530	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	773	1617.05
531	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	101.9	773	1617.05
532	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	101.9	773	1617.05
533	- 9:	T-1 R-L ACCELEROMETER	3.90	G'S	4+1+ 3	101.9	773	1617.05
534	- 10:	T-1 I-S ACCELEROMETER	-3.80	G'S	4+1+ 3	101.9	773	1617.05

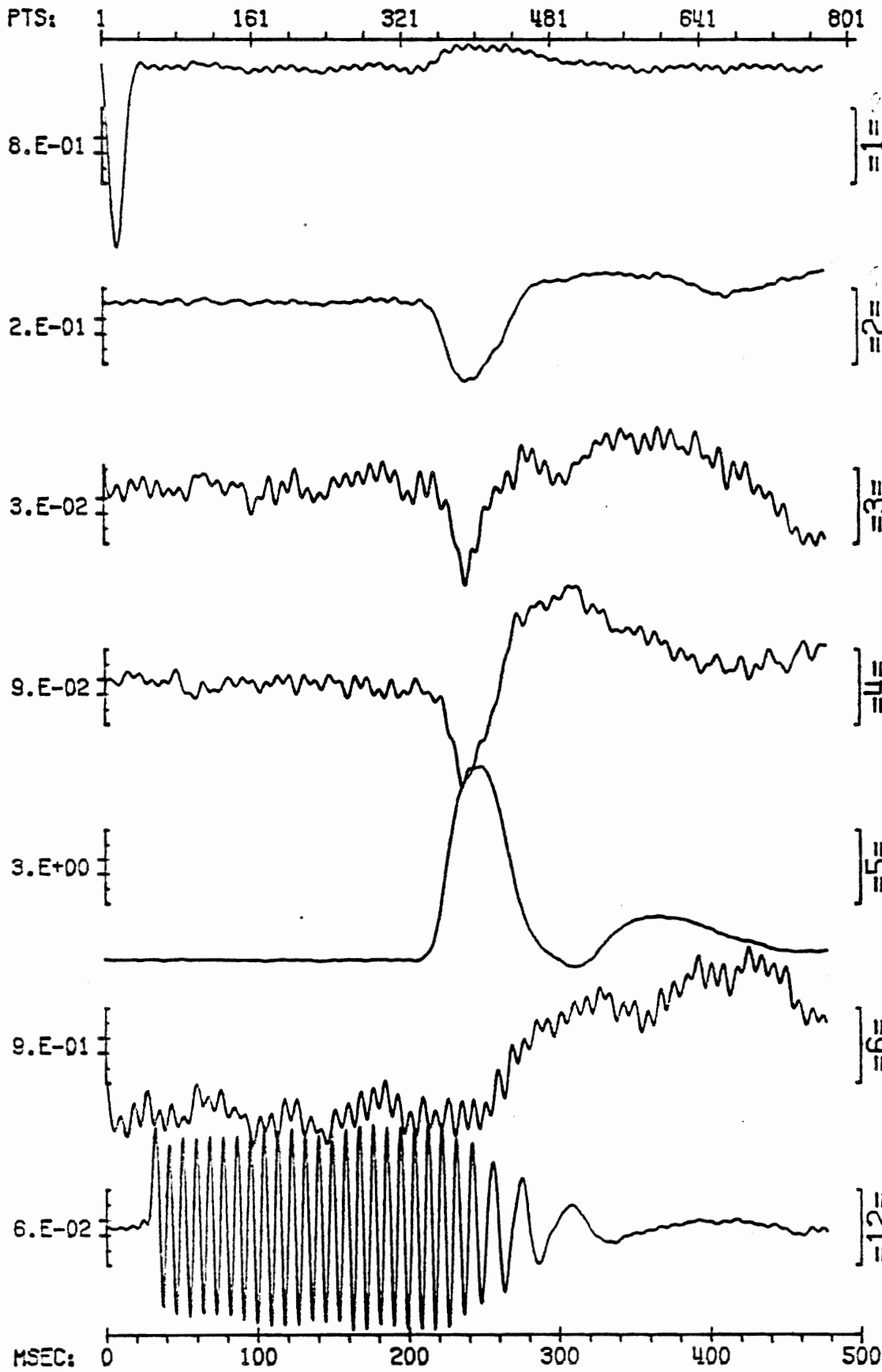
- 11:
- 12:
- 13:
- 14:

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FILTERED FILES: 525 - 534 DIGITAL TAPE: JEFLEH

RUN ID: 77T096-1:PT

DATE: 03-NOV-77



ID: 77T096-2:PT

TAPE: THORAX TESTS

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ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING
RUN ID: 77T096-21PT

PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0010 DATE: 03-NOV-77

TEST SIGNALS: 3096 PTS/CH AT 6467.26 HZ. CAL SIGNALS: NOT DIGITIZED.

Table with columns: FILE CH, CONTENT OF CHANNEL, UNITS/VOLT, UNITS, FILTER STAGES, FILTER CUTOFF, NO. PTS, SAMPLING HERTZ. Rows include PISTON DECELERATION, T-12 P-A ACCELEROMETER, T-12 R-L ACCELEROMETER, T-12 I-8 ACCELEROMETER, VASCULAR PRESSURE, VERTICAL SUPPORT FORCE.

7:
8:
9:
10:
11:
503 - 12: PISTON VELOCITY
13:
14:

=====
FILTERED FILES: 577 - 583 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T096-21PT
=====

TEST 771051

PISTON  
ACCELERATION

2.1 G's

LEFT UPPER RIB  
ACCELEROMETER

1.5 G's

LEFT LOWER RIB  
ACCELEROMETER

1.6 G's

RIGHT UPPER RIB  
ACCELEROMETER

1.5 G's

RIGHT LOWER RIB  
ACCELEROMETER

0.8 G's

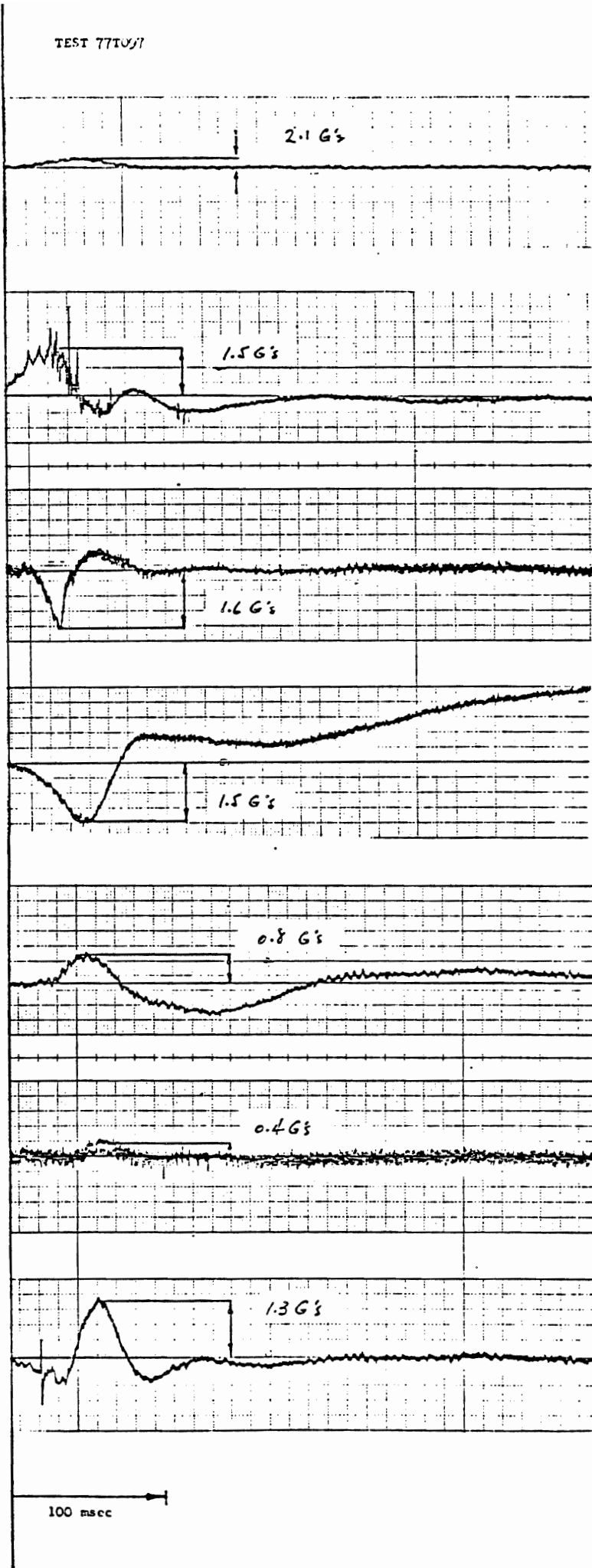
STERNUM UPPER  
ACCELEROMETER

0.4 G's

STERNUM LOWER  
ACCELEROMETER

1.3 G's

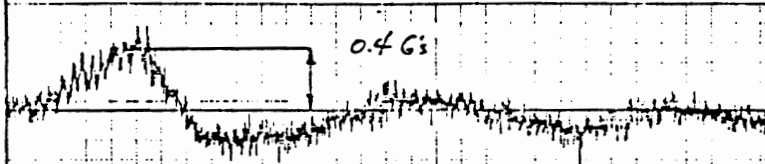
100 msec



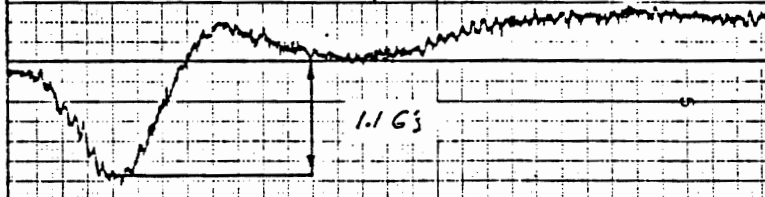


TEST 77T097

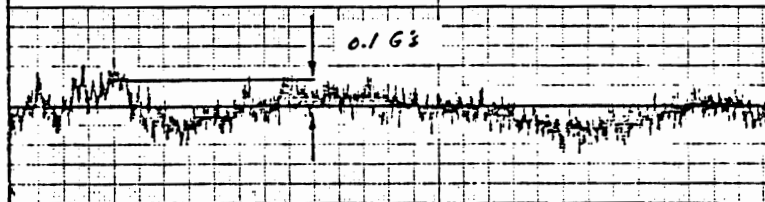
T<sub>1</sub> ACCELEROMETER  
(P-A)



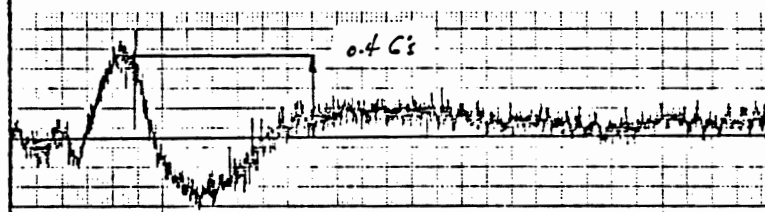
T<sub>1</sub> ACCELEROMETER  
(R-L)



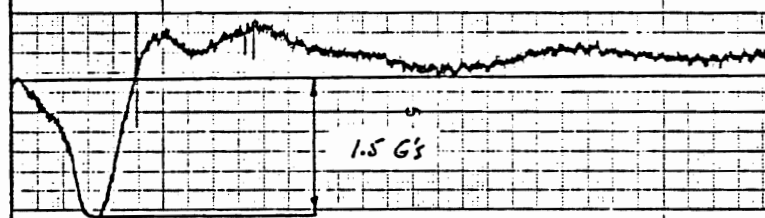
T<sub>1</sub> ACCELEROMETER  
(I-S)



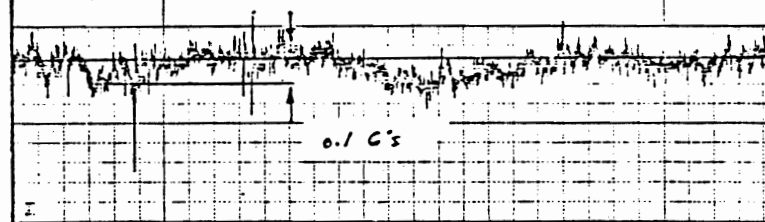
T<sub>12</sub> ACCELEROMETER  
(P-A)



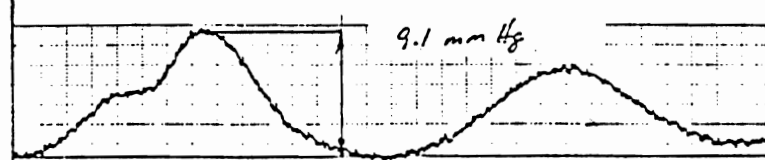
T<sub>12</sub> ACCELEROMETER  
(R-L)



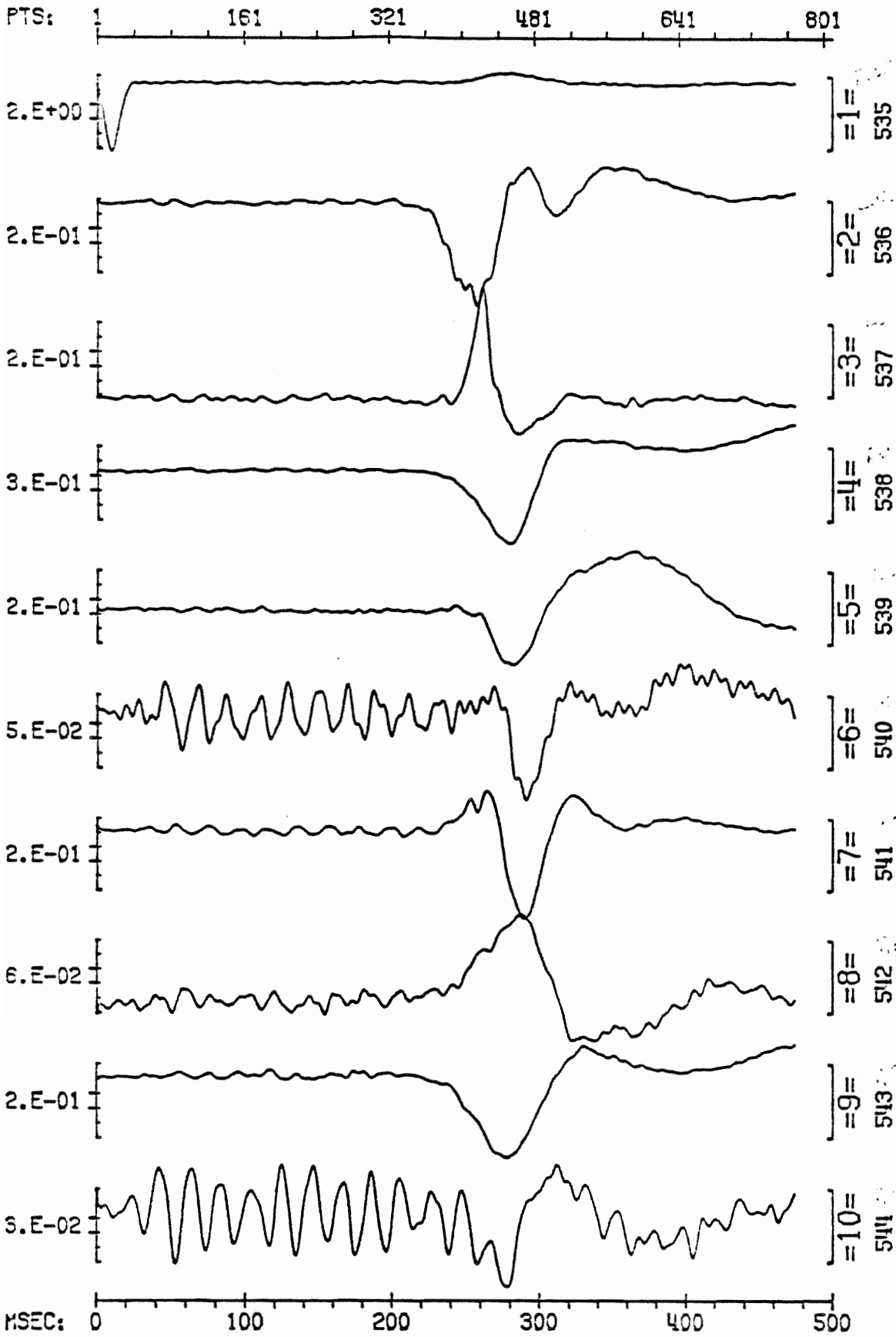
T<sub>12</sub> ACCELEROMETER  
(I-S)



VASCULAR  
PRESSURE



100 nsec



ID: 77T097-1:PT

TAPE: THOROX TESTS

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RUN ID: 77T097-1:PT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

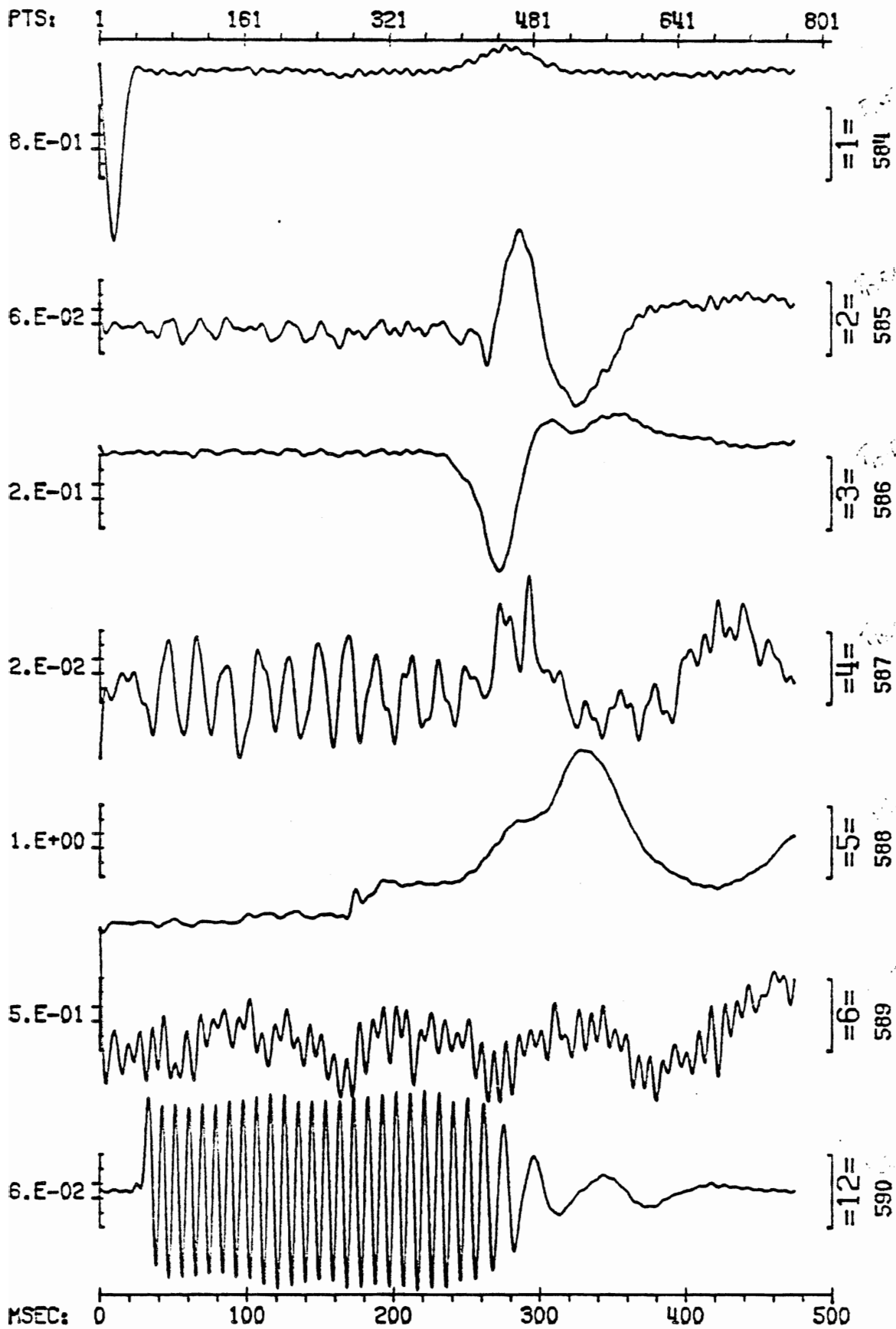
TEST SIGNALS: 3085 PTS/CH AT 6470.47 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
535	- 1:	PISTON DECELERATION	30.00	G'S	4+1+ 3	101.9	768	1617.62
536	- 2:	LEFT UPPER RIB ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	768	1617.62
537	- 3:	LEFT LOWER RIB ACCELEROMETER	-4.20	G'S	4+1+ 3	101.9	768	1617.62
538	- 4:	RIGHT UPPER RIB ACCELEROMETER	3.80	G'S	4+1+ 3	101.9	768	1617.62
539	- 5:	RIGHT LOWER RIB ACCELEROMETER	-4.00	G'S	4+1+ 3	101.9	768	1617.62
540	- 6:	UPPER STERNAL ACCELEROMETER	-4.50	G'S	4+1+ 3	101.9	768	1617.62
541	- 7:	LOWER STERNAL ACCELEROMETER	-3.30	G'S	4+1+ 3	101.9	768	1617.62
542	- 8:	T-1 P-A ACCELEROMETER	4.40	G'S	4+1+ 3	101.9	768	1617.62
543	- 9:	T-1 R-L ACCELEROMETER	3.90	G'S	4+1+ 3	101.9	768	1617.62
544	- 10:	T-1 I-S ACCELEROMETER	-3.60	G'S	4+1+ 3	101.9	768	1617.62

11:  
12:  
13:  
14:

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FILTERED FILES: 535 - 544 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T097-1:PT



ID: 77T097-2:PT

TAPE: THORAX. TESTS

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RUN ID: 77T097-2IPT

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 3084 PTS/CH AT 6469.99 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
584	- 1:	PISTON DECELERATION	30.00	G'S	4+1+3	101.9	768	1617.50
585	- 2:	T-12 P-A ACCELEROMETER	4.20	G'S	4+1+3	101.9	768	1617.50
586	- 3:	T-12 R-L ACCELEROMETER	4.30	G'S	4+1+3	101.9	768	1617.50
587	- 4:	T-12 I-S ACCELEROMETER	-3.50	G'S	4+1+3	101.9	768	1617.50
588	- 5:	VASCULAR PRESSURE	14.60	MM-HG	4+1+3	101.9	768	1617.50
589	- 6:	VERTICAL SUPPORT FORCE	200.00	LBS.	4+1+3	101.9	768	1617.50

7:  
8:  
9:  
10:  
11:

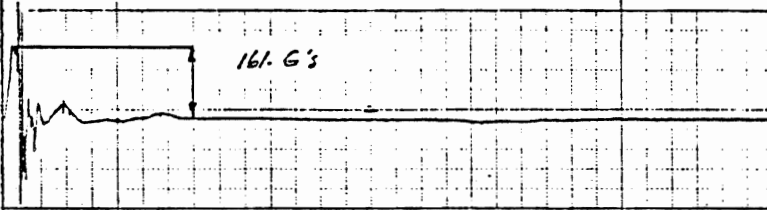
590 - 12: PISTON VELOCITY 1.00 VOLTS 4+1+3 101.9 768 1617.50

13:  
14:

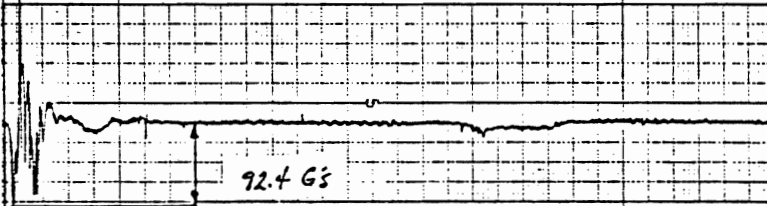
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FILTERED FILES: 584 - 590 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T097-2IPT

TEST 77T098

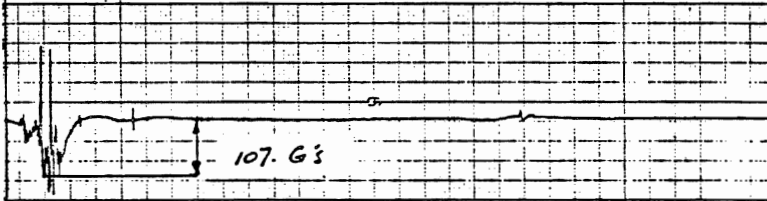
LEFT UPPER RIB  
ACCELEROMETER



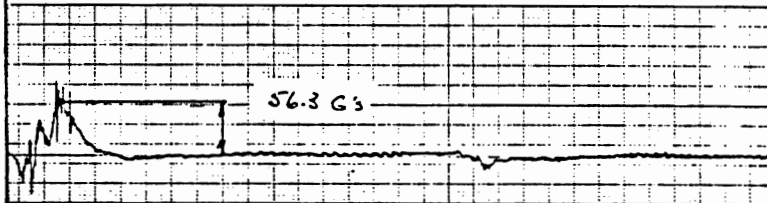
LEFT LOWER RIB  
ACCELEROMETER



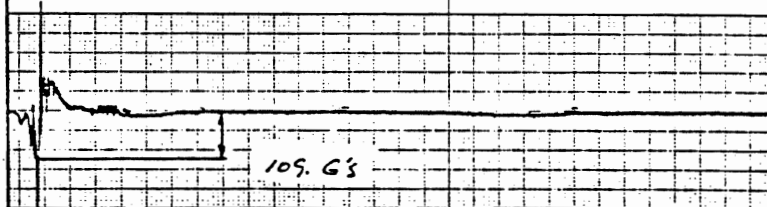
RIGHT UPPER RIB  
ACCELEROMETER



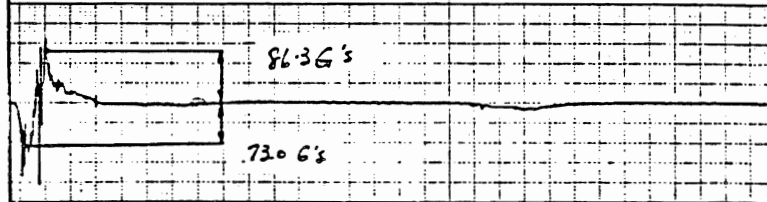
RIGHT LOWER RIB  
ACCELEROMETER



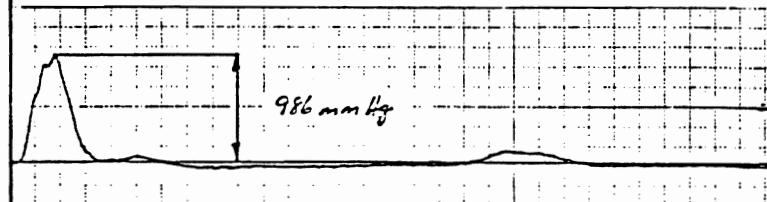
STERNUM UPPER  
ACCELEROMETER



STERNUM LOWER  
ACCELEROMETER

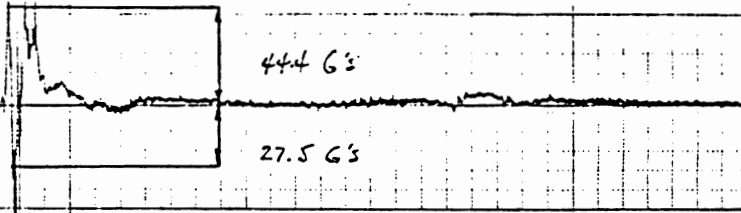


VASCULAR  
PRESSURE

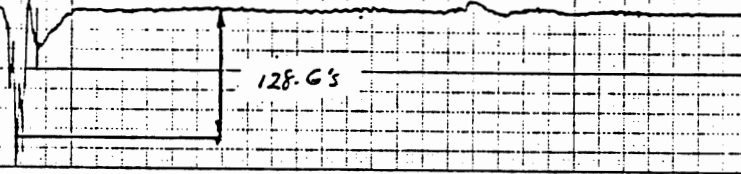


100 msec

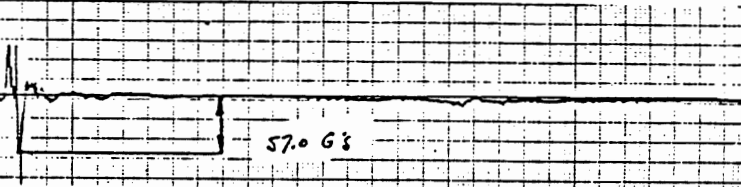
T<sub>1</sub> ACCELEROMETER  
(P-A)



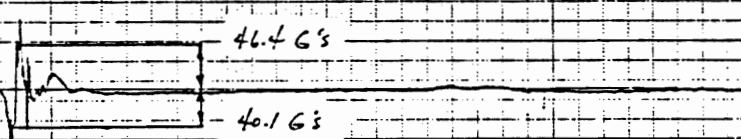
T<sub>1</sub> ACCELEROMETER  
(R-L)



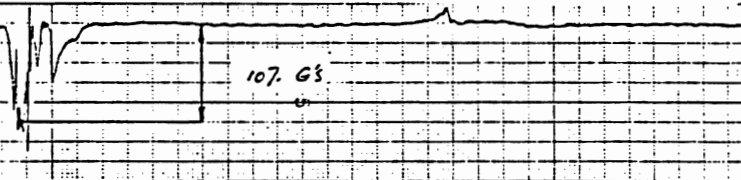
T<sub>1</sub> ACCELEROMETER  
(I-S)



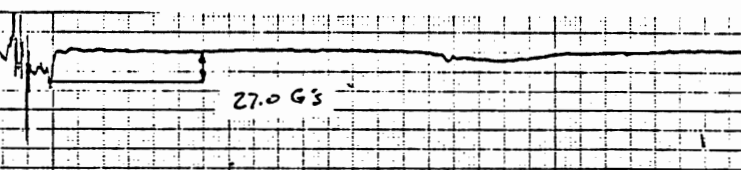
T<sub>12</sub> ACCELEROMETER  
(P-A)



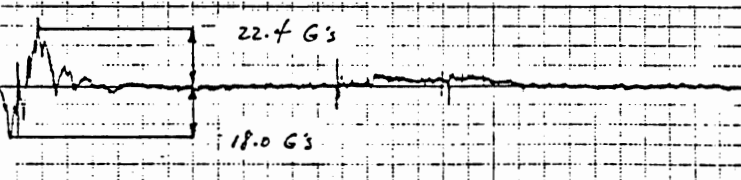
T<sub>12</sub> ACCELEROMETER  
(R-L)



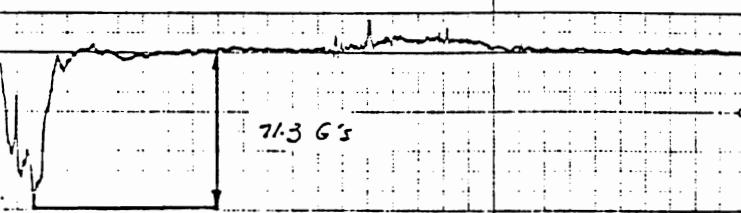
T<sub>12</sub> ACCELEROMETER  
(I-S)



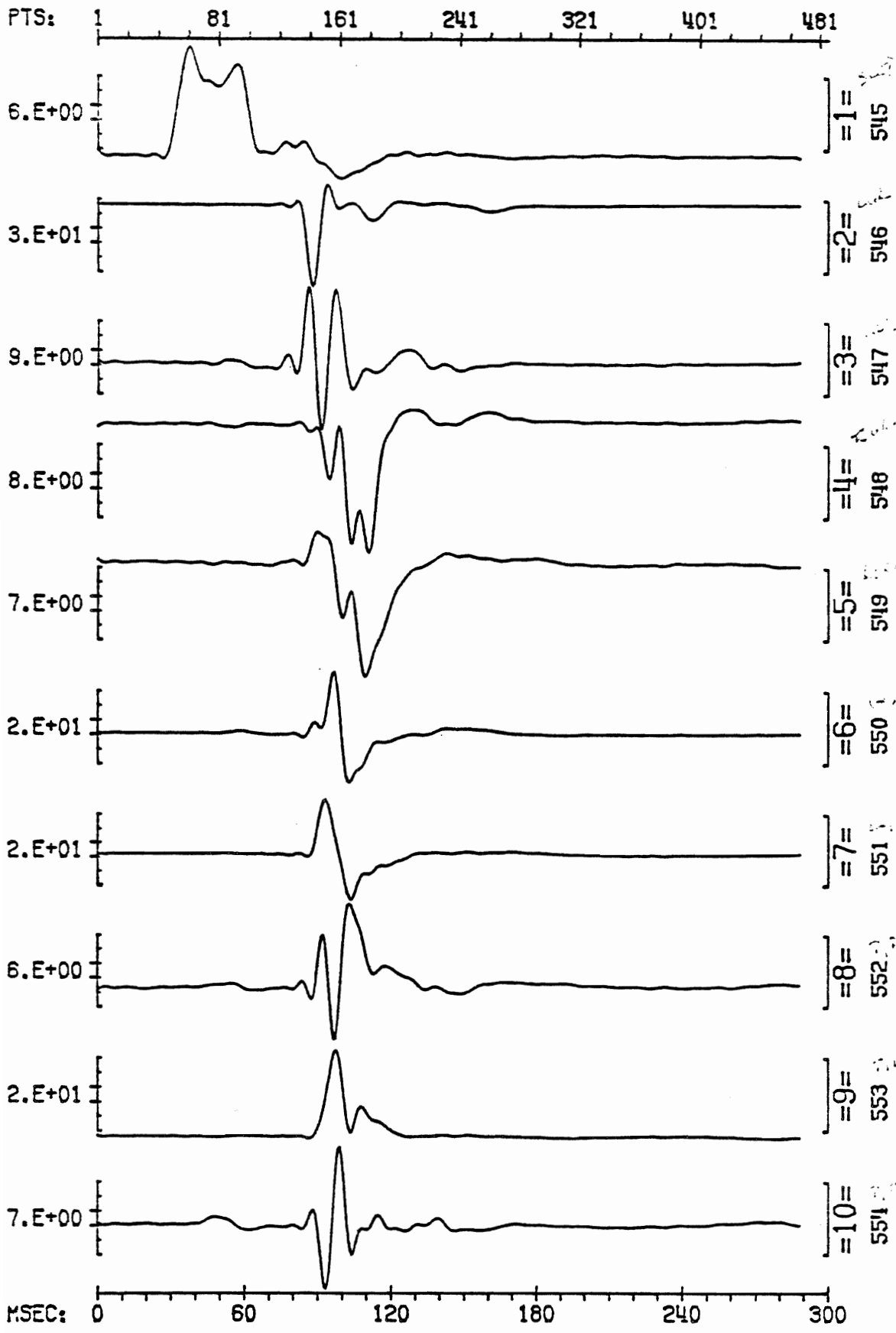
PELVIS P-A ACCELEROMETER



PELVIS R-L ACCELEROMETER



100 msec



ID: 77T098-1:55

TAPE: THORAX TESTS



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RUN ID: 77T098-1188

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#149 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 1883 PTS/CH AT 6471.76 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
545	1	SLED DECELERATION	20.00	G'S	4+1+3	101.9	467	1617.94
546	2	LEFT UPPER RIB ACCELEROMETER	-89.20	G'S	4+1+3	101.9	467	1617.94
547	3	LEFT LOWER RIB ACCELEROMETER	-84.00	G'S	4+1+3	101.9	467	1617.94
548	4	RIGHT UPPER RIB ACCELEROMETER	76.20	G'S	4+1+3	101.9	467	1617.94
549	5	RIGHT LOWER RIB ACCELEROMETER	-80.40	G'S	4+1+3	101.9	467	1617.94
550	6	UPPER STERNAL ACCELEROMETER	-89.40	G'S	4+1+3	101.9	467	1617.94
551	7	LOWER STERNAL ACCELEROMETER	-66.40	G'S	4+1+3	101.9	467	1617.94
552	8	T-1 P-A ACCELEROMETER	88.00	G'S	4+1+3	101.9	467	1617.94
553	9	T-1 R-L ACCELEROMETER	-78.60	G'S	4+1+3	101.9	467	1617.94
554	10	T-1 I-S ACCELEROMETER	-76.00	G'S	4+1+3	101.9	467	1617.94

11

12

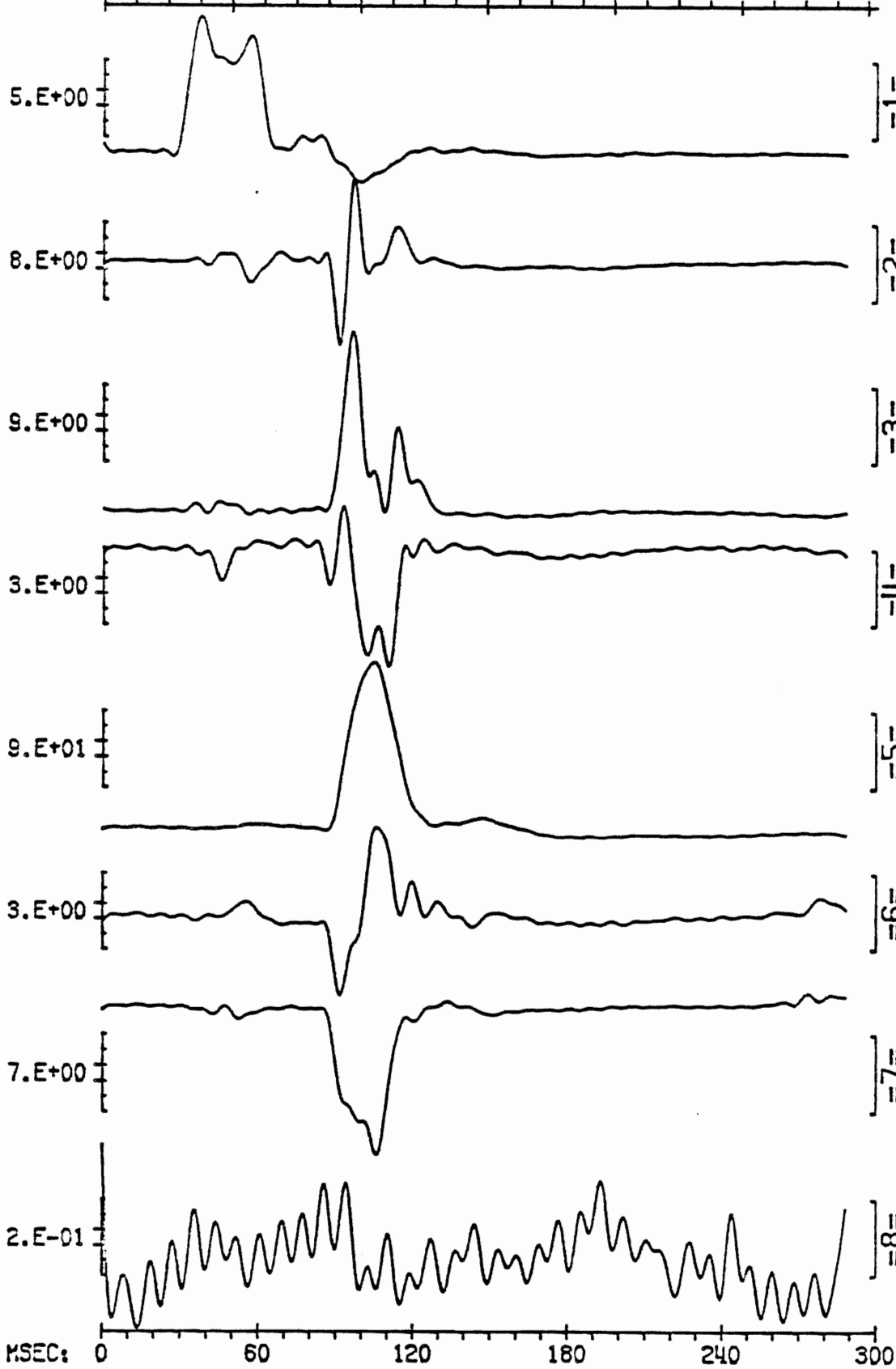
13

14

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FILTERED FILES: 545 - 554 ' DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T098-1188

PTS: 1 81 161 241 321 401 481



=1= 591

=2= 592

=3= 593

=4= 594

=5= 595

=6= 596

=7= 597

=8= 598

ID: 77T098-2:55

TAPE: THORAX TESTS

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RUN ID: 77T098-2188

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
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PROJECT: THORACIC IMPACT PROJECT -- PENDULUM TAPS AND SIDE IMPACT TESTS

ANALOG TAPE: HSRI#148 EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: HS0018 DATE: 03-NOV-77

TEST SIGNALS: 1881 PTS/CH AT 6468.92 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
591	- 11	SLED DECELERATION	20.00	G'S	4+1+ 3	101.9	467	1617.23
592	- 21	T-12 P-A ACCELEROMETER	84.40	G'S	4+1+ 3	101.9	467	1617.23
593	- 31	T-12 R-L ACCELEROMETER	-85.80	G'S	4+1+ 3	101.9	467	1617.23
594	- 41	T-12 I-S ACCELEROMETER	69.20	G'S	4+1+ 3	101.9	467	1617.23
595	- 51	VASCULAR PRESSURE	730.00	MM-HG	4+1+ 3	101.9	467	1617.23
596	- 61	PELVIS P-A ACCELEROMETER	74.80	G'S	4+1+ 3	101.9	467	1617.23
597	- 71	PELVIS R-L ACCELEROMETER	91.40	G'S	4+1+ 3	101.9	467	1617.23
598	- 81	PELVIS I-S ACCELEROMETER	-83.40	G'S	4+1+ 3	101.9	467	1617.23

- 91
- 101
- 111
- 121
- 131
- 141

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FILTERED FILES: 591 - 598 DIGITAL TAPE: JEFLEH DATE: 03-NOV-77 RUN ID: 77T098-2188

