

1. Report No. UM-HSRI-77-39-3		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle  Whole Body Response Research Program Appendix B: Raw Data				5. Report Date April 25, 1978	
				6. Performing Organization Code	
7. Author(s) N.M. Alem, J.B. Benson, T.A. Tann				8. Performing Organization Report No. UM-HSRI-77-39-3	
9. Performing Organization Name and Address Highway Safety Research Institute The University of Michigan Huron Parkway and Baxter Road Ann Arbor, Michigan 48109				10. Work Unit No. (TRAI5) 320316	
				11. Contract or Grant No. 77-375-KB1	
12. Sponsoring Agency Name and Address General Motors Research Laboratories GM Tech Center 12 Mile and Mound Roads Warren, Michigan 48042				13. Type of Report and Period Covered Final 7-1-73 to 8-31-77	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract  The general objective of this program was to generate data on the kinematics and response of human surrogates in a realistic automobile impact environment. The program used a test configuration consisting of an idealized hard seat representation of a car seat with a three-point harness restraint system. Three different severity levels of crash test conditions were used. The human surrogates tested in this program were fifteen male cadavers, a Hybrid II (Part 572) Anthropomorphic Test Device and a Hybrid III ATD recently developed by GM. In addition, mathematical simulations of the response and kinematics of a 50th percentile male occupant were performed at the three levels of crash severity, using the MVMA Two-Dimensional Crash Victim Simulator. The data that has been produced by this program represents one of the most comprehensive and extensive documentations of whole-body response to date. The primary utility of the data is for comparing the similarities and differences in response and kinematics of the various types of human surrogates and in pointing out areas that need improvement in both anthropomorphic test devices and mathematical models.					
17. Key Words Whole-Body Kinematics; Cadaver Anthropometry; 3-D Motion; X-Ray Measurements; Head Injury Criterion; Digital Filtering & Processing.			18. Distribution Statement Unlimited		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 334	22. Price





## APPENDIX B: RAW DATA

### INTRODUCTION

This appendix is devoted to the presentation of the raw data generated during the last two years (1975, 1976) of the Whole Body Response Research Program. The raw data generated in the first two years of the Program was presented in the Second Year Final Report, no. UM-HSRI-76-3. In addition, some of the early data which was not reported before, is included in this appendix.

This appendix is organized in 11 data packages. Each of the first 9 packages is devoted to one cadaver (WBR-7 through WBR-15). The 10th package is devoted to Part 572 ATD test series and the last package contains previously unreported raw data, and is included here for the sake of completeness.

Each cadaver Raw Data Package is divided into two or more groups of data sheets: the first group pertains to the description of the cadaver and the instrumentation as well as the thorax autopsy, while the remaining group(s) pertain to each test conducted on that cadaver, each of which contains a detailed set-up diagram and photographs, the filtered signals and a graphcheck of the test.

In order to help understand the source and meaning of the raw data given in this appendix, the following is a description of the individual pages contained herein.

#### COVER PAGE

Each package begins with a cover page indicating the subject number and the run identifications of the test conducted. This cover page is also a "mini" Table of Contents for the package which follows.

For each cadaver, the following raw data is included:

#### ANTHROPOMETRY

Initially, there were 75 anthropometric measurements being taken on each cadaver, occupying 4 pages. Later, the number of measurements was reduced to 67, resulting in 3 pages of measurements.

## FRONTAL AND LATERAL X-RAYS

Once a cadaver is seated in the mock seat simulating the test position, two series of x-rays are taken to document the skeletal configuration. These x-rays overlap so that the whole body is covered. Therefore, the number of frontal x-rays varies from 4 to 8, and the lateral one from 4 to 6, depending on the coverage obtained for individual cadavers. To aid in overlapping, plexiglass rulers with lead pellets embedded at 1-inch intervals were laid alongside the body. Although accurate measurements are best obtained from anthropometric measurements, these x-rays provide useful information on the seating and skeletal geometry of the cadaver.

## HEAD X-RAYS AND ANALYSIS

The instrumented head was x-rayed twice to obtain stereometric measurements of anatomical landmarks and triaxial centers. The resulting measurements and transformation matrix are given in the x-ray analysis sheet.

## INSTRUMENTATION

Instrumentation sheets, one for the Honeywell 7600 and one for the CED tape recorders, are included. These are worksheets which indicate, by channel, the amplifiers and their gains, the transducers and their sensitivities, and other pertinent information necessary for complete documentation of the recorded analog signals.

## THORAX AUTOPSY

For each cadaver, a thorax autopsy sheet is included to indicate the rib fractures. This is not intended to be a complete autopsy report, but rather an indication of the effects of the shoulder harness on the thorax.

The next parts of each Raw Data Package contains data sheets for each test conducted on a given cadaver. Two tests were conducted on Cadaver WBR-7 and three on WBR-8. Thereafter, only one test was conducted per cadaver. Each test includes the following:

### SETUP DIAGRAM

This is a diagram of the test setup with descriptive instructions on the various critical positioning and targeting parameters. It includes the belt's initial lengths and femur targets spacing.

### BELTS/ANCHORS

This data sheets contains measurements of belt lengths and orientations, anchor locations and angles, belt slacks and pre-loads.

### SETUP PHOTOGRAPHS

These 3 photographs depict the cadaver seated in the final position, and are taken very shortly before the test is conducted from the subject's right side, front and left side.

### DIGITIZED SIGNALS

For each analog tape, a log of the signals which were digitized is included, and facing it, the digitized signals computer-plotted in a strip chart format. The calibration factor (units/volt) and the corner frequency of the digital filter used is also given for each channel. The computer plots include a scale factor (units per division) on the left-hand side, along with the channel number and the tape-file where the numerical values reside. The time scale is given on the left side (msec per division) as well as points (samples per division).

### GRAPHCHECK

A photographic copy of the graphcheck of each test terminates the raw data for that test.



WHOLE BODY RESPONSE

RAW DATA PACKAGE

SUBJECT: WBR-7

TEST: A-925

A-926

CONTENTS:

PAGE

Anthropometry	<u>7</u>
Frontal X-rays	<u>11</u>
Lateral X-rays	<u>17</u>
Head x-rays & Analysis	<u>21</u>
Instrumentation	<u>24</u>
Thorax Autopsy	<u>26</u>

	<u>For Each Test:</u>	<u>A-925</u>	<u>A-926</u>	<u>_____</u>
Setup Diagram		<u>27</u>	<u>37</u>	<u>_____</u>
Belts/anchors		<u>28</u>	<u>38</u>	<u>_____</u>
Setup photographs		<u>29</u>	<u>39</u>	<u>_____</u>
Digitized Signals (7600)		<u>32</u>	<u>42</u>	<u>_____</u>
Digitized Signals (CEC)		<u>34</u>	<u>44</u>	<u>_____</u>
Graphcheck		<u>36</u>	<u>46</u>	<u>_____</u>
<u>_____</u>		<u>_____</u>	<u>_____</u>	<u>_____</u>
<u>_____</u>		<u>_____</u>	<u>_____</u>	<u>_____</u>



WHOLE BODY RESPONSE: ANTHROPOMETRY

WBR # 7

CADAVER ID: 20281

DATE: September 26, 1975

ANTHROPOMETRIST: \_\_\_\_\_

Anthropometric Measurements: (All measurements except weight listed in cm)

(A = Anthropometer; Sp. C. = Spreading Calipers; Sl. C. = sliding calipers; T = Tapes)

1. Weight		<u>77.9 kg.</u>
2. Stature (A)		<u>178.5</u>
3. Trochanterion Hgt. (A)	Rt.	<u>78.6</u>
	Lt.	<u>79.6</u>
4. Anterior-Superior Iliac Spine Hgt. (A)	Rt.	<u>77.0</u>
	Lt.	<u>77.5</u>
5. Iliocristale Hgt. (A)	Rt.	<u>67.1</u>
	Lt.	<u>66.5</u>
6. Substernale Hgt. (A)		<u>55.6</u>
7. Axilla Hgt. (A)		<u>Rt: 37.8, Lt: 37.9</u>
8. Suprasternale Hgt. (A)		<u>31.6</u>
9. Hipple Hgt. (A)		<u>46.8</u>
10. Mastoid Hgt. (A)		<u>15.8</u>
11. Nuchale Hgt. (A)		<u>16.1</u>
12. Tragion Hgt. (A)	Rt.	<u>11.1</u>
	Lt.	<u>11.8</u>
13. Menton Hgt. (A)		<u>--</u>
14. Head Breadth (Sp. C.)		<u>16.0</u>
15. Head Length (Sp. C.)		<u>19.7</u>

Cad. I.D. 20281

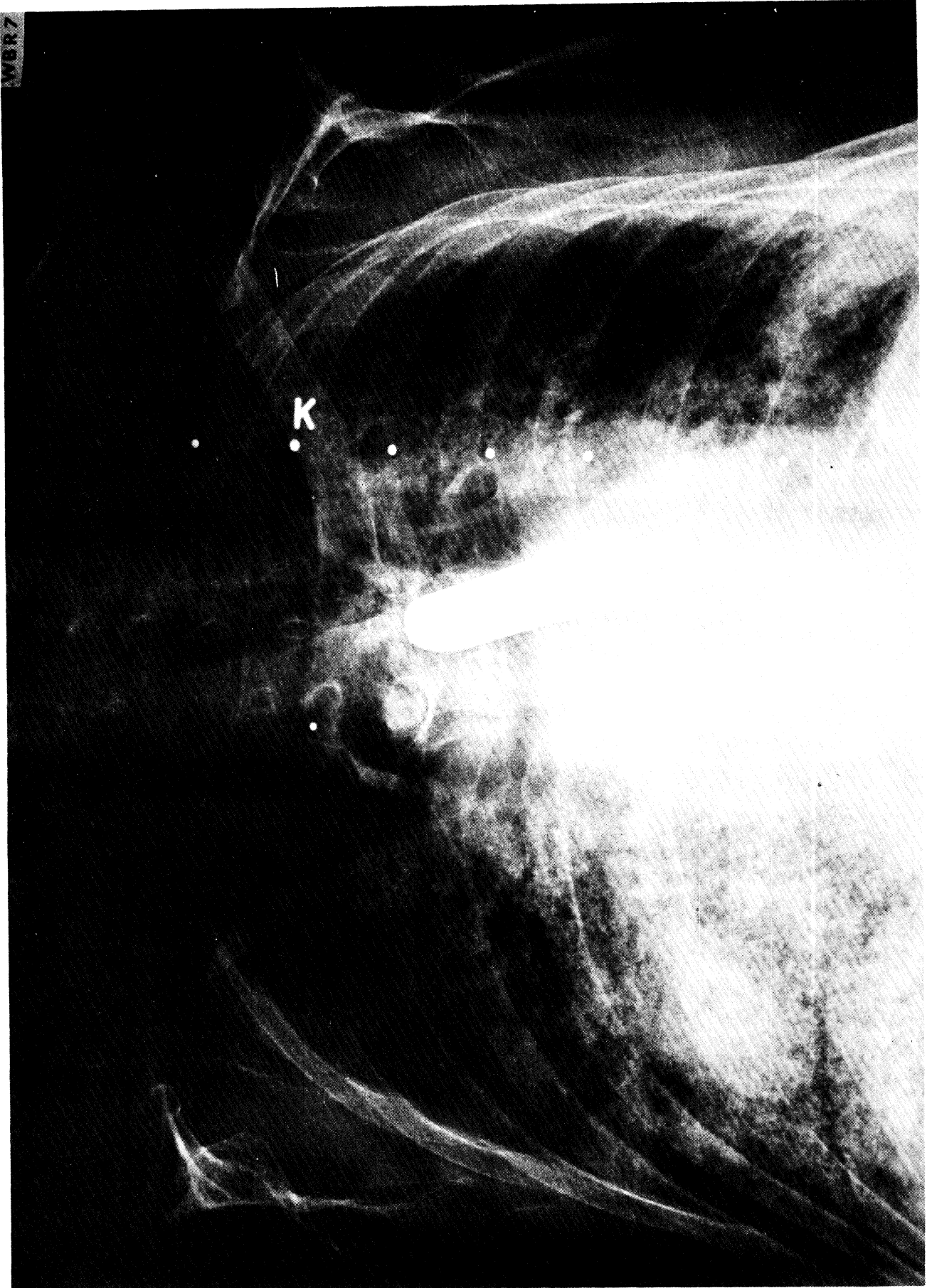
16. Bitragion Diameter (Sp. C.)	<u>15.9</u>
17. Bigonial Diameter (Sp. C.)	<u>11.3</u>
18. Menton Diagonal (Sp. C.)	<u>24.7</u>
19. Mastoid Diagonal (A)	<u>15.6</u>
20. Head Circumference (T)	<u>56.6</u>
21. Mid-Sagittal Arc Length (T)	<u>33.4</u>
22. Coronal Arc Length (T)	<u>33.5</u>
23. Mid-Neck Circumference (T)	<u>39.1</u>
24. Chest Circumference at Axilla (T)	<u>93.1</u>
25. Chest Circumference at Nipple (T)	<u>100.4</u>
26. Chest Circumference at Substernale (T)	<u>105.6</u>
27. Hip Circumference, Iliocristale (T)	<u>92.2</u>
28. Buttocks Circumference, Trochanterion (T)	<u>100.5</u>
29. Upper Arm Circumference, Axilla (T)	<u>32.5</u>
30. Upper Arm Circumference, Mid Biceps (T)	<u>30.3</u>
31. Upper Arm Circumference, Humeral Condyles (T)	<u>26.1</u>
32. Maximum Forearm Circumference (T)	<u>24.4</u>
33. Wrist Circumference (T)	<u>16.0</u>
34. Upper Thigh Circumference (T)	<u>51.9</u>
35. Mid-Thigh Circumference (T)	<u>46.4</u>
36. Lower Thigh Circumference (T)	<u>40.9</u>
37. Maximum Calf Circumference (T)	<u>34.1</u>
38. Ankle Circumference (T)	<u>20.8</u>



Cad. I.D. 20281

39. Biacromial Diameter (A)		<u>35.9</u>
40. Bideltoid Breadth (A)		<u>44.7</u>
41. Chest Breadth at Axilla (A)		<u>28.6</u>
42. Chest Breadth at Mid-Point between Supra- sternale and Substernale		<u>29.9</u>
43. Chest Breadth at Substernale (A)		<u>34.6</u>
44. Hip Breadth, Iliocristale (A)		<u>33.0</u>
45. Bispinous Diameter (A)		<u>23.6</u>
46. ASIS to Symphision Distance (A)	Rt.	<u>14.1</u>
	Lt.	<u>12.9</u>
47. Bitrochanteric Diameter (A)		<u>31.8</u>
48. Chest Depth at Suprasternale (A)		<u>18.5</u>
49. Chest Depth at Axilla (A)		<u>21.2</u>
50. Chest Depth at Nipple (A)		<u>25.6</u>
51. Chest Depth at Substernale (A)		<u>26.5</u>
52. Hip Depth, Iliocristale (A)		<u>20.0</u>
53. ASIS Depth (A)	Rt.	<u>20.0</u>
	Lt.	<u>18.9</u>
54. Buttocks Depth, Trochanterion (A)		<u>20.3</u>
55. Trochanterion	Rt.	<u>8.9</u>
	Lt.	<u>7.4</u>
56. Symphision (Hgt.)		<u>21.2</u>
57. Acromion-Radiale Length		<u>35.4</u>

58. Ball of Humerus - Radiale Length (A)	<u>32.0</u>
	27.2
59. Radiale-Stylian Length (A)	<u>29.5</u>
60. Olecranon-Stylian Length (A)	<u>46.2</u>
61. Femur Length (A)	<u>43.1</u>
62. Tibia Length (A)	<u>42.9</u>
63. Fibula Length (A)	<u>10.5</u>
64. Upper Arm Depth, Mid Biceps (S1.C.)	<u>7.7</u>
65. Humeral Biepicondylar Breadth (S1.C.)	<u>7.5</u>
66. Forearm Depth (S1.C.)	<u>3.9</u>
67. Wrist Depth (S1.C.)	<u>20.3</u>
68. Hand Length (S1.C.)	<u>8.4</u>
69. Hand Breadth (S1.C.)	<u>3.4</u>
70. Hand Depth (S1.C.)	<u>12.0</u>
71. Thigh Breadth, Mid-Thigh (S1.C.,)	<u>11.5</u>
72. Calf Depth (S1.C.)	<u>8.4</u>
73. Bimalleolus Breadth (S1. C.)	<u>26.5</u>
74. Foot Length (S1.C.)	<u>9.6</u>
75. Foot Breadth (S1.C.)	



WBR-7: FRONTAL X-RAY



WBR-7: FRONTAL X-RAY

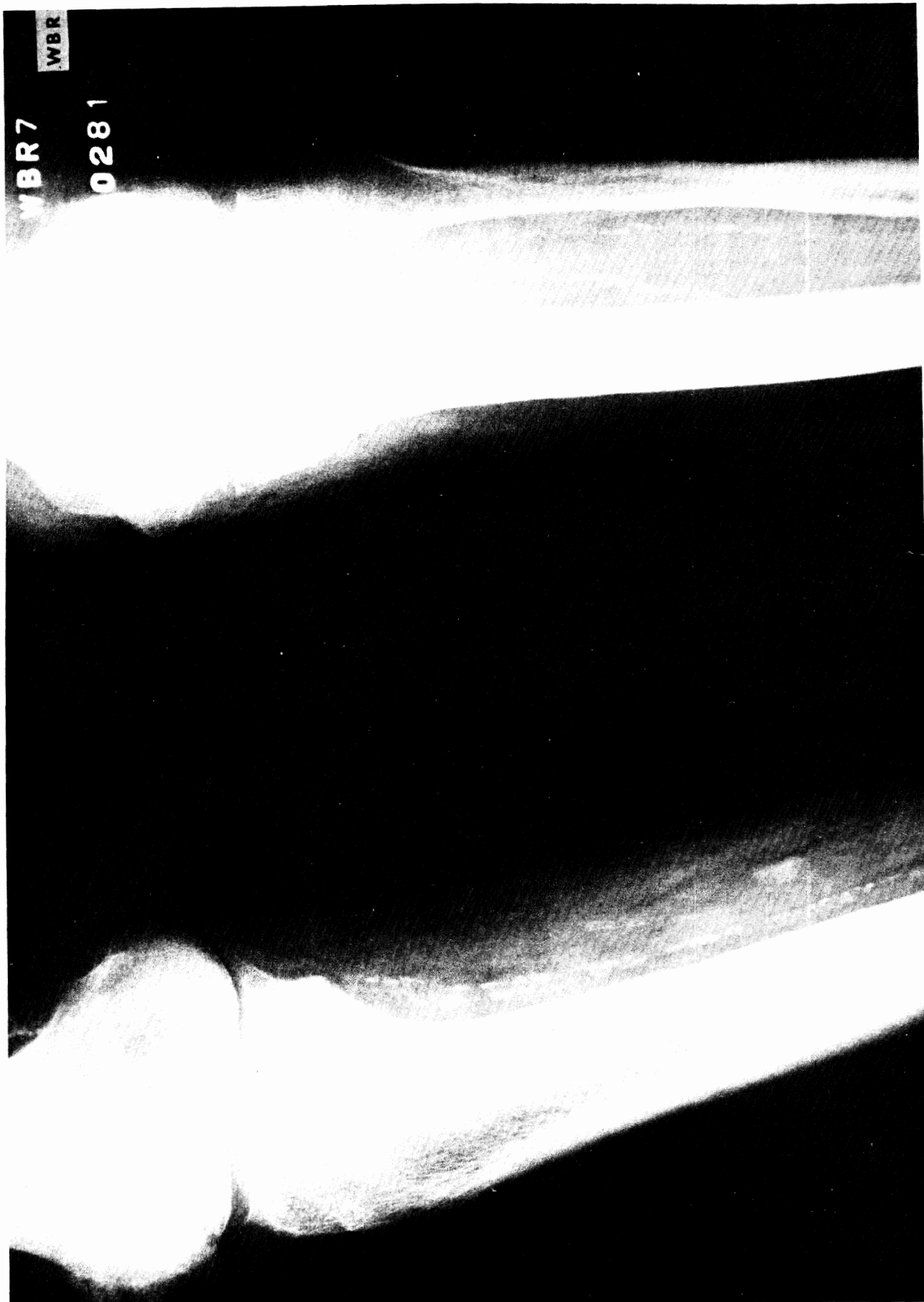


WBR-7: FRONTAL X-RAY



WBR-7: FRONTAL X-RAY

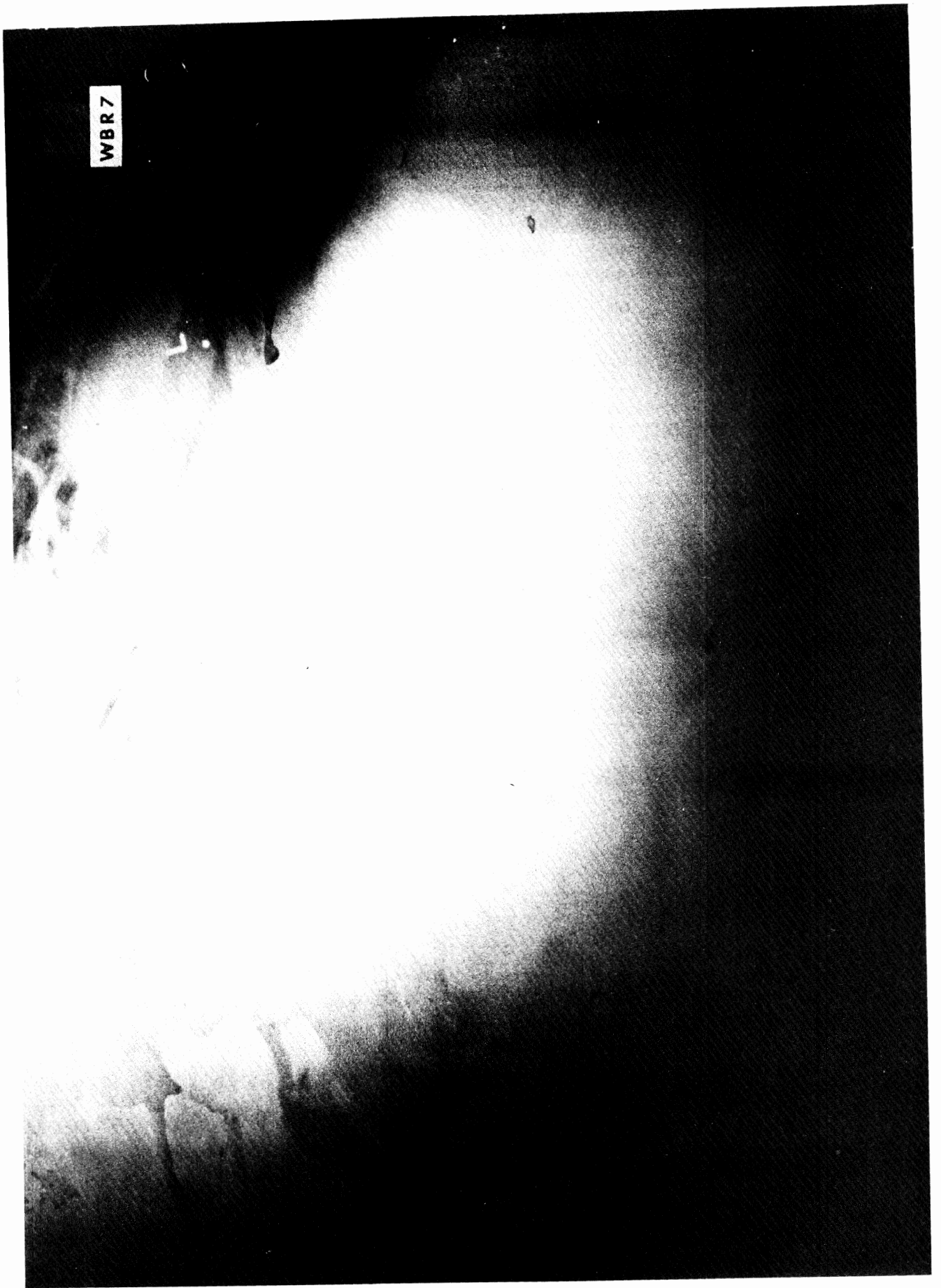




WBR-7: FRONTAL X-RAY







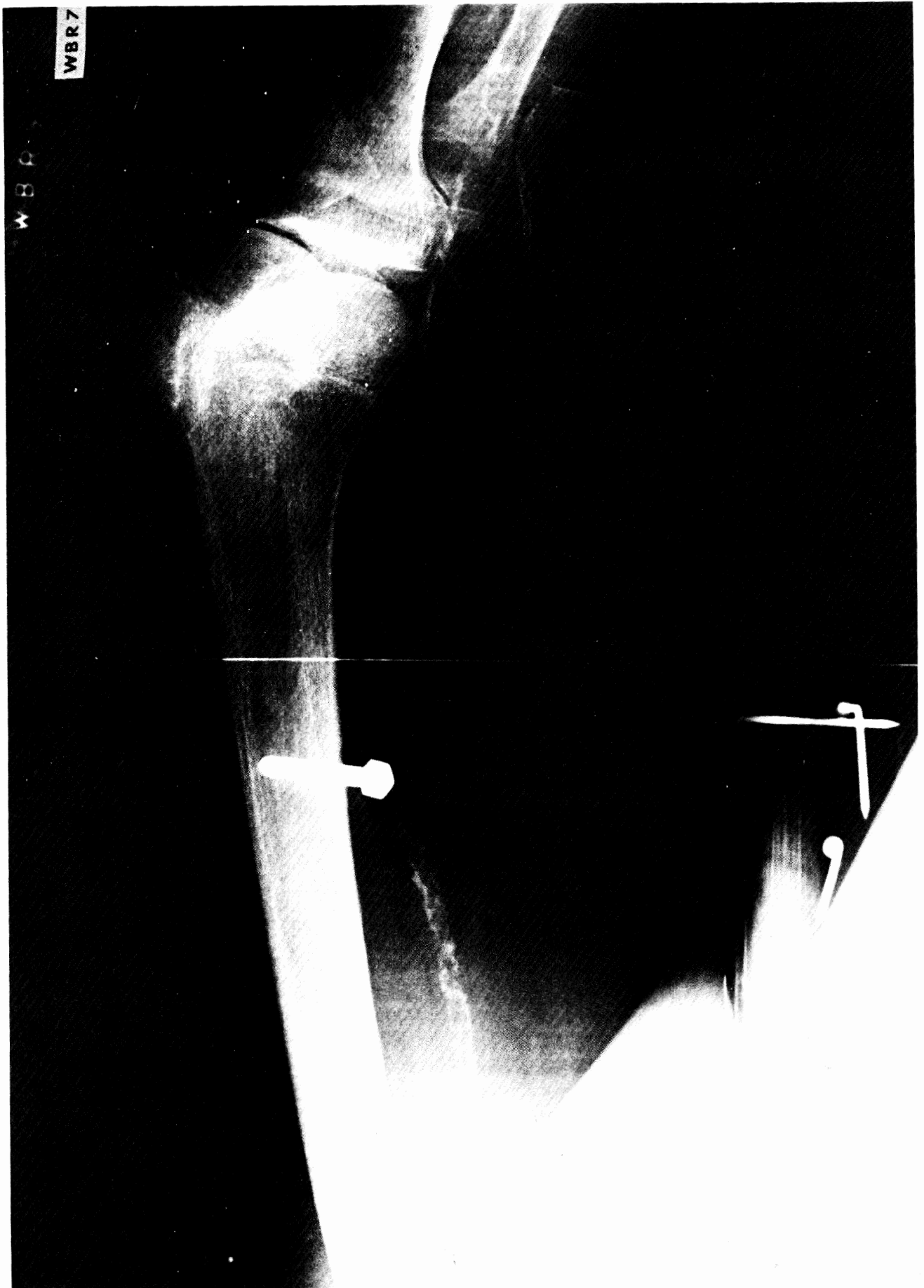
WBR 7

WBR-7: LATERAL X-RAY

WBR 7



WBR-7: LATERAL X-RAY



WBR-7: LATERAL X-RAY



WBR-7: LATERAL X-RAY

-----  
A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	4.730	-0.120	7.20	-0.800	-0.070	21.50
P2- L.EYE:	2.900	-0.540	4.20	2.500	-0.630	19.80
P3- R.EAR:	2.490	-0.440	11.20	-6.050	-0.530	19.00
P4- L.EAR:	-1.200	-1.730	6.00	1.100	-2.090	15.00
Q1- ACC. :	-5.000	0.870	10.70	-5.390	0.850	13.00
Q2- ACC. :	-1.800	3.220	4.50	2.810	4.100	15.50
Q3- ACC. :	0.870	5.750	9.20	-3.970	6.940	17.90
R1,R2,R3 :	5.340	4.340	3.340			

COORDINATES W.R.T. CAMERA			COORDINATES W.R.T. CAMERA				
	X	Y	Z		X	Y	Z
P1 :	3.989	-0.497	-0.072	Q1:	-3.946	-4.061	0.667
P2 :	2.581	1.620	-0.444	Q2:	-1.593	2.008	2.890
P3 :	1.946	-3.996	-0.347	Q3:	0.707	-2.690	4.687
P4 :	-1.034	0.795	-1.501	P :	-2.463	-1.626	5.137
C :	0.456	-1.601	-0.924	CP:	-2.918	-0.026	6.061

ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<I> :	0.80657	0.55906	0.19210	1.0000	-0.0000	-0.0000
<J> :	-0.53274	0.82788	-0.17254	-0.0000	0.9990	-0.0000
<K> :	-0.25554	0.03683	0.96573	-0.0000	-0.0000	0.9993

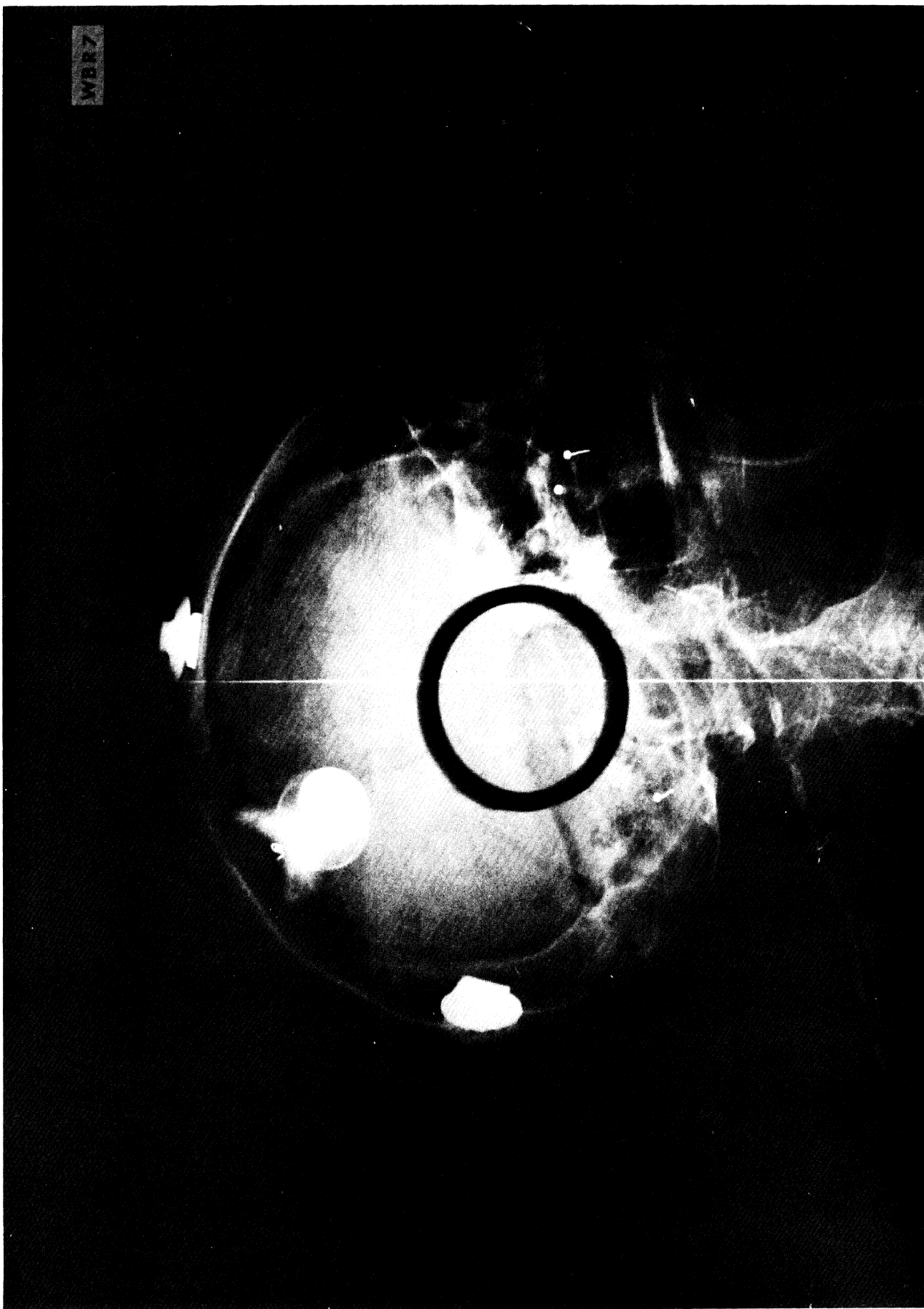
INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<E1>:	-0.27978	-0.45930	-0.84307	1.0000	-0.0043	-0.0056
<E2>:	0.19931	0.83361	-0.51514	-0.0043	1.0000	-0.0068
<E3>:	0.93958	-0.31527	-0.13340	-0.0056	-0.0068	1.0000

```

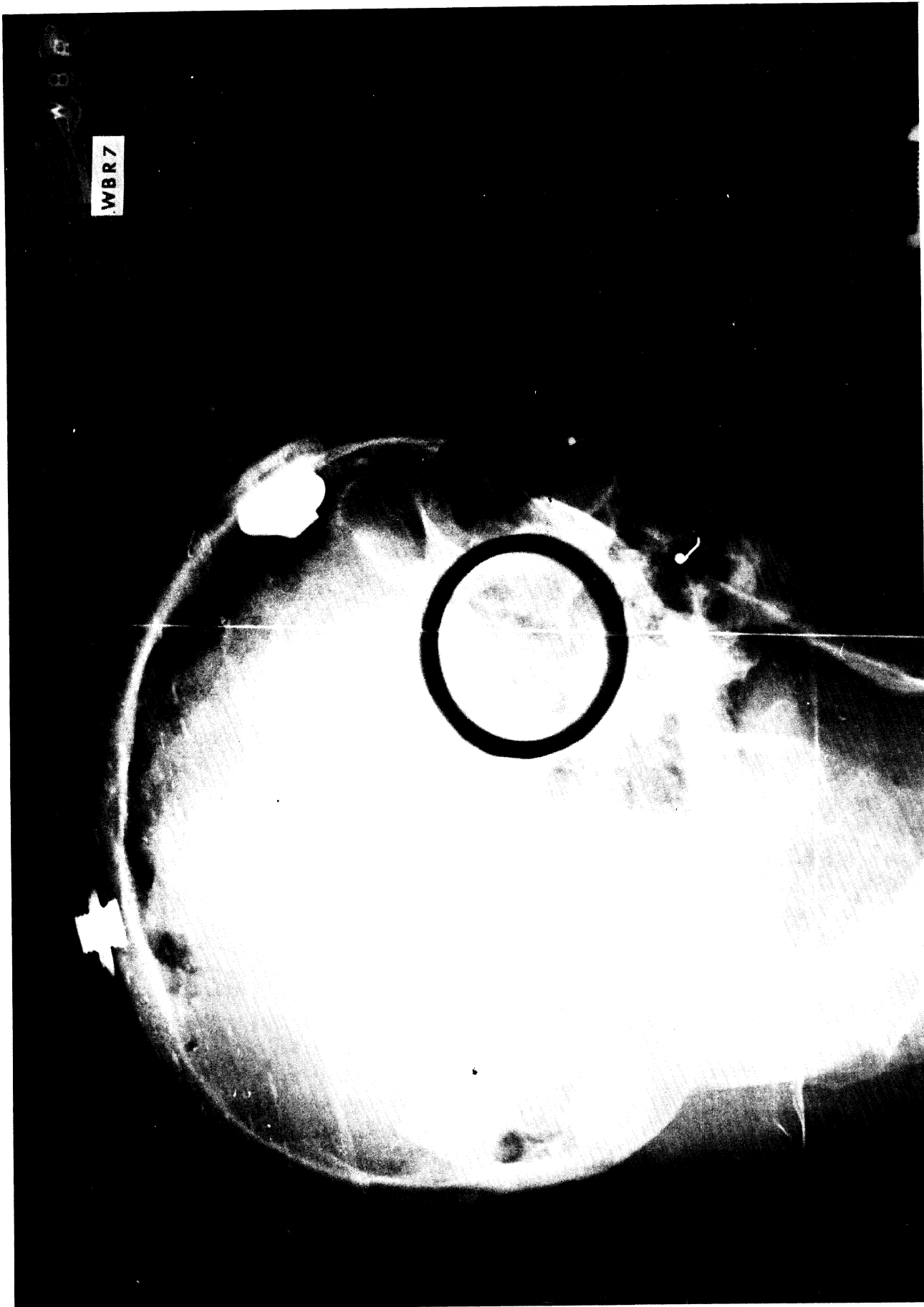
*****
*
* RUN ID:WBR-7          AUG 23, 1976
*
* PQ1= 5.340, PQ2= 4.340, PQ3= 3.340
* CPI= -1.204, CPJ= 0.488, CPK= 6.598
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*      <I>      <J>      <K>
*
* <E1>:  -0.64168  -0.08639  -0.76209
*
* <E2>:   0.52834   0.67048  -0.52087
*
* <E3>:   0.55596  -0.73688  -0.38460
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0040  0.0043  0.0047
* ORTHOGONALITY CHECK
*
* 1.0000  0.0000  -0.0000
*
* 0.0000  1.0000  -0.0000
*
* -0.0000 -0.0000  1.0000
*
*****

```

WBR-7



WBR-7: HEAD X-RAY (X-Z)



WBR-7: HEAD X-RAY (Y-Z)



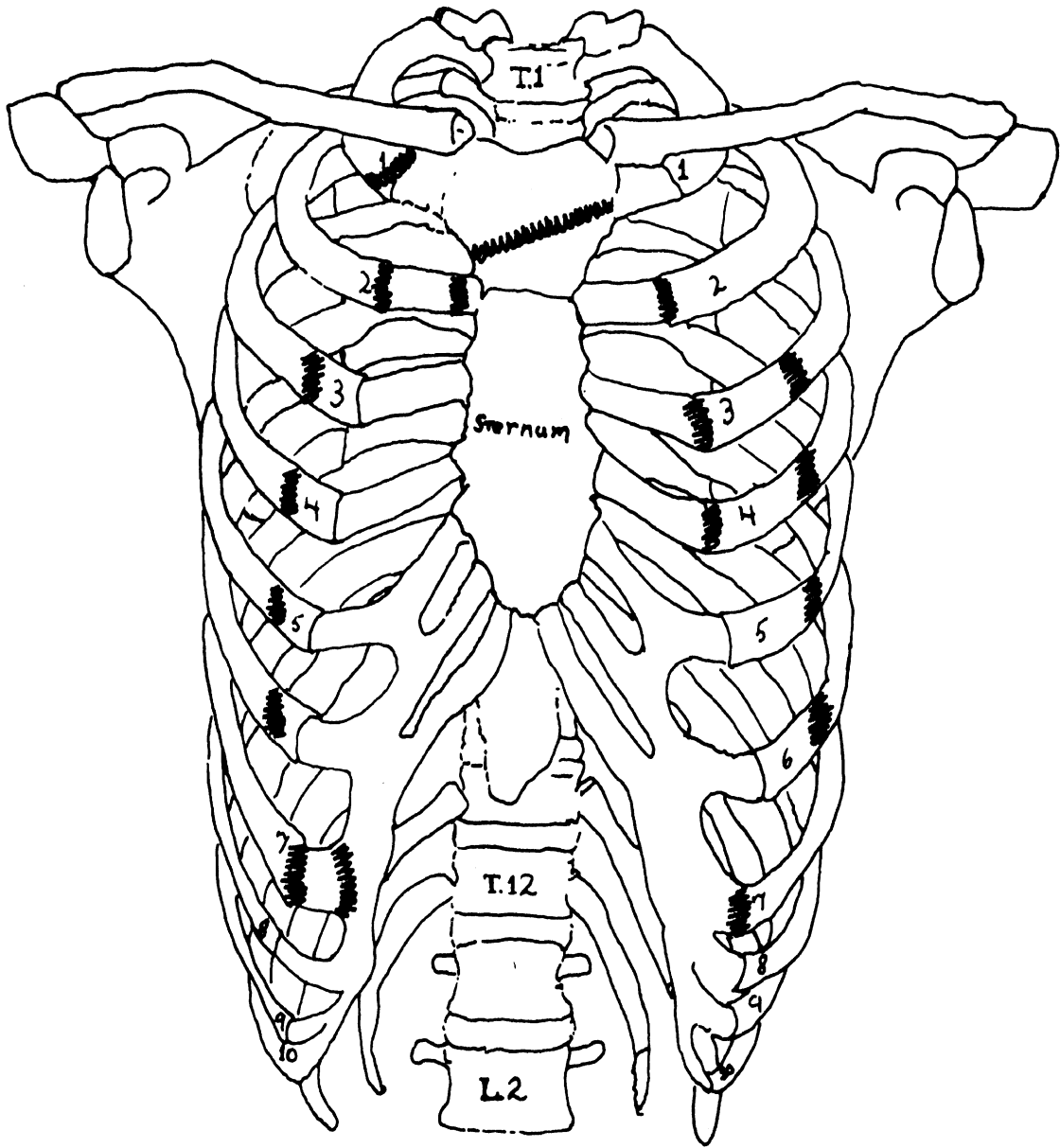
# INSTRUMENTATION DATA SHEET

TEST NO: A-925		DESCRIPTION WBR-7		Account No: 320316										
through: A-926		Whole Body Response Cadaver Test		DATE: 10-3-75										
SUBJECT: Cadaver		A-925: Low Severity Test		TAPE REEL # 138										
number: 20281		A-926: Low Severity Test		RECORDER: 7600										
FACILITY: Impact Sled				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT			CH #	
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt		units
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 / 2.2	1000	/		20.	G	1
2	Head Q <sub>1</sub> - A	H-5	100	1	10	Endevco	AB 59	1.15	100	56.4	-	49.0	G	2
3	Head Q <sub>1</sub> - B	H-6	100	2	10	"	AB 60	1.16	100	48.5	-	41.8	G	3
4	Head Q <sub>1</sub> - C	H-7	100	3	10	"	AB 79	1.14	100	52.5	-	46.1	G	4
5	Head Q <sub>2</sub> - C	H-8	100	4	10	"	AA 58	1.29	100	56.2	-	46.7	G	5
6	Head Q <sub>2</sub> - A	H-9	100	5	10	"	AB 87	1.18	100	46.0	-	39.0	G	6
7	Head Q <sub>2</sub> - B	H-10	100	6	10	"	AB 90	1.17	100	49.7	-	42.5	G	7
8	Head Q <sub>3</sub> - B	H-11	100	7	10	"	AC 14	1.15	100	51.6	-	44.9	G	8
9	Head Q <sub>3</sub> - C	H-12	100	8	10	"	AC 04	1.13	100	58.3	-	51.6	G	9
10	Head Q <sub>3</sub> - A	H-13	100	9	10	"	AC 06	1.17	100	58.1	-	49.7	G	10
11	Strobe									T <sub>0</sub>		1.	V	11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14



# INSTRUMENTATION DATA SHEET

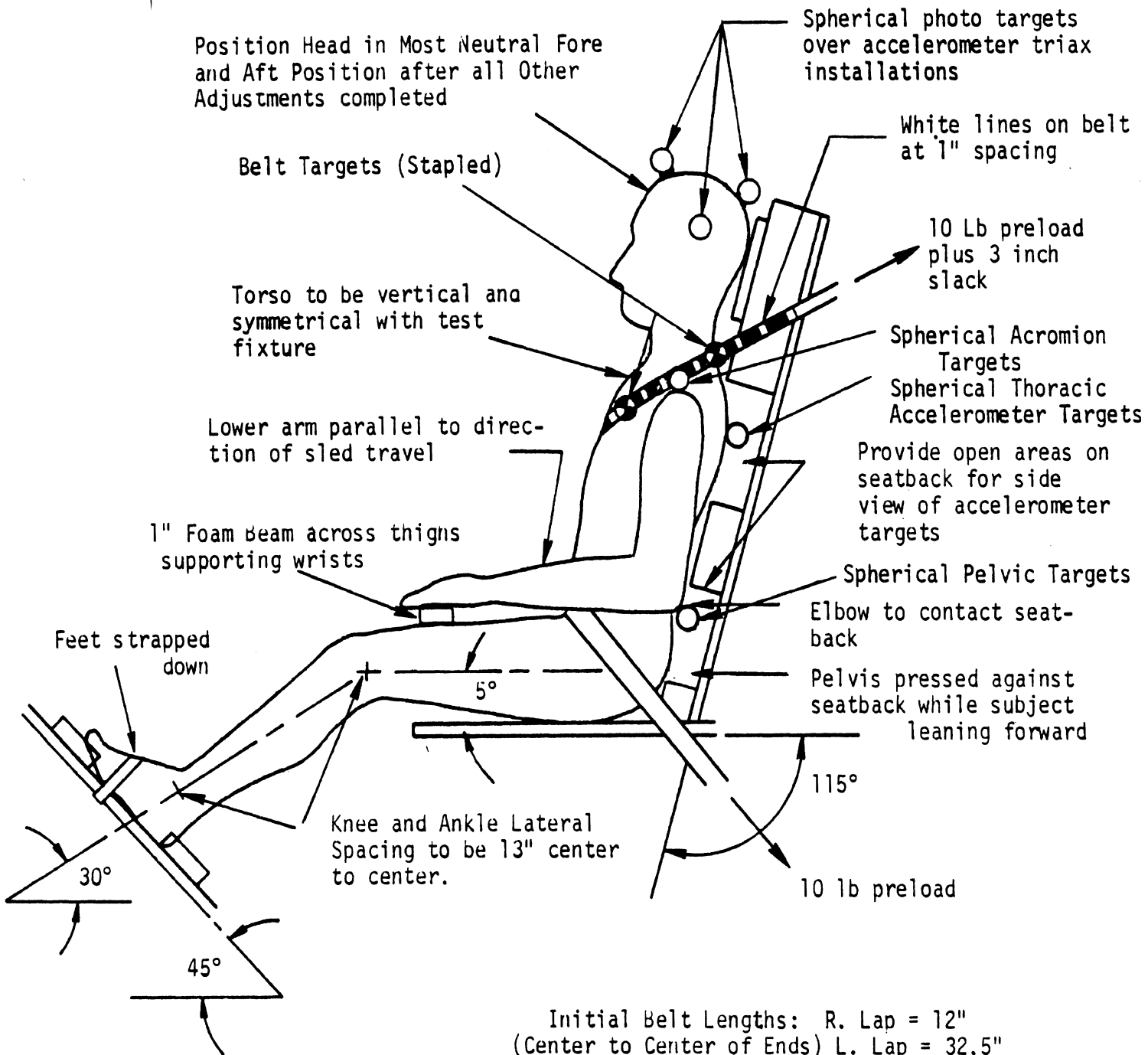
TEST NO: A-925		DESCRIPTION		Account No: 320316										
through: A-926		Whole Body Response Cadaver Test		DATE: 10-3-75	BY: J.B.									
SUBJECT: Cadaver		A-925: Low severity test		TAPE REEL # 139										
number: 20281		A-926: Low Severity Test		RECORDER: CEC										
FACILITY: Impact Sled				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT			CH #	
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt		units
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 2.2	1000		+	20.	G	1
2	Pelvis P-A	H-14	10	10	10	Endevco	2B 65	/	/	/	-	35.2	G	2
3	Pelvis I-S	H-15	100	23	10	"	AA 49	1.28	100	66.8 G	-	53.7	G	3
4	Thorax P-A	H-16	100	12	10	"	AA 81	/	100	/	+	39.8	G	4
5	Thorax I-S	H-17	100	13	10	"	AA 18	/	/	/	-	42.9	G	5
6														6
7	Rt. Lap	H-19	200	15	/	GSE	082	2.21	200	2209 #	+	1000.	#	7
8	Lt. Lap	H-20	200	16	/	"	083	2.24	200	2242 #	+	1000.	#	8
9	Up. Shldr.	CEC-1	VAR.	19	/	"	084	2.28	/	2277 #	+	1000.	#	9
10	Lo. Shldr.	CEC-2	VAR.	24	/	"	085	2.25	/	2245 #	+	1000.	#	10
11	Strobe	H-3	10							To		1.	V	11
12	Velocity	H-4	10	VEL.						12"/Pulse		1.	V	12
13	Dig. Gate									280 M.S.		1.	V	13
14	Time Base			TB						100 Hz		1.	V	14



**Bony Thoracic Cage,  
anterior aspect**

WBR 7 CADAVER 20281

# A-925



Position Head in Most Neutral Fore and Aft Position after all Other Adjustments completed

Spherical photo targets over accelerometer triax installations

Belt Targets (Stapled)

White lines on belt at 1" spacing

Torso to be vertical and symmetrical with test fixture

10 Lb preload plus 3 inch slack

Lower arm parallel to direction of sled travel

Spherical Acromion Targets  
Spherical Thoracic Accelerometer Targets

Provide open areas on seatback for side view of accelerometer targets

1" Foam beam across thighs supporting wrists

Spherical Pelvic Targets

Feet strapped down

Elbow to contact seatback

Pelvis pressed against seatback while subject leaning forward

30°

5°

115°

Knee and Ankle Lateral Spacing to be 13" center to center.

10 lb preload

45°

Initial Belt Lengths: R. Lap = 12"  
(Center to Center of Ends) L. Lap = 32.5"  
Shoulder = 42"

Femur Target Spacing:

Right Side = 6 11/16in.

Left Side = 6 13/16in.

Belt Sequence:  
(Out from Subject)

L. Lap, R. Lap, Shoulder

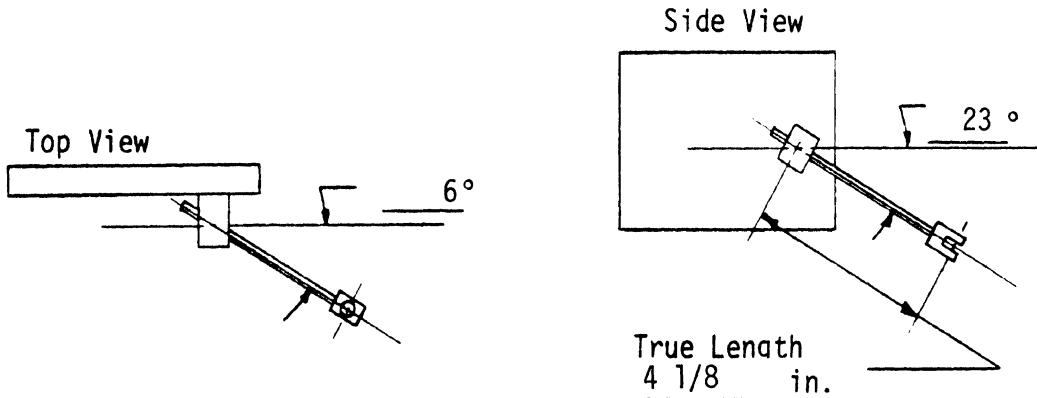
Belt End Orientation:  
(Ref. To Subject)

Away, Away, Toward

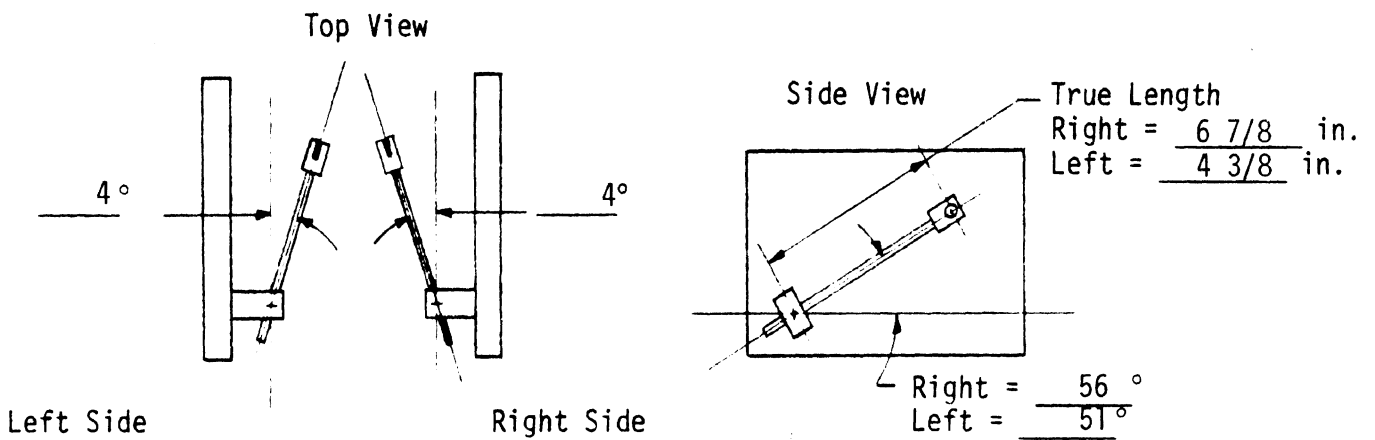
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



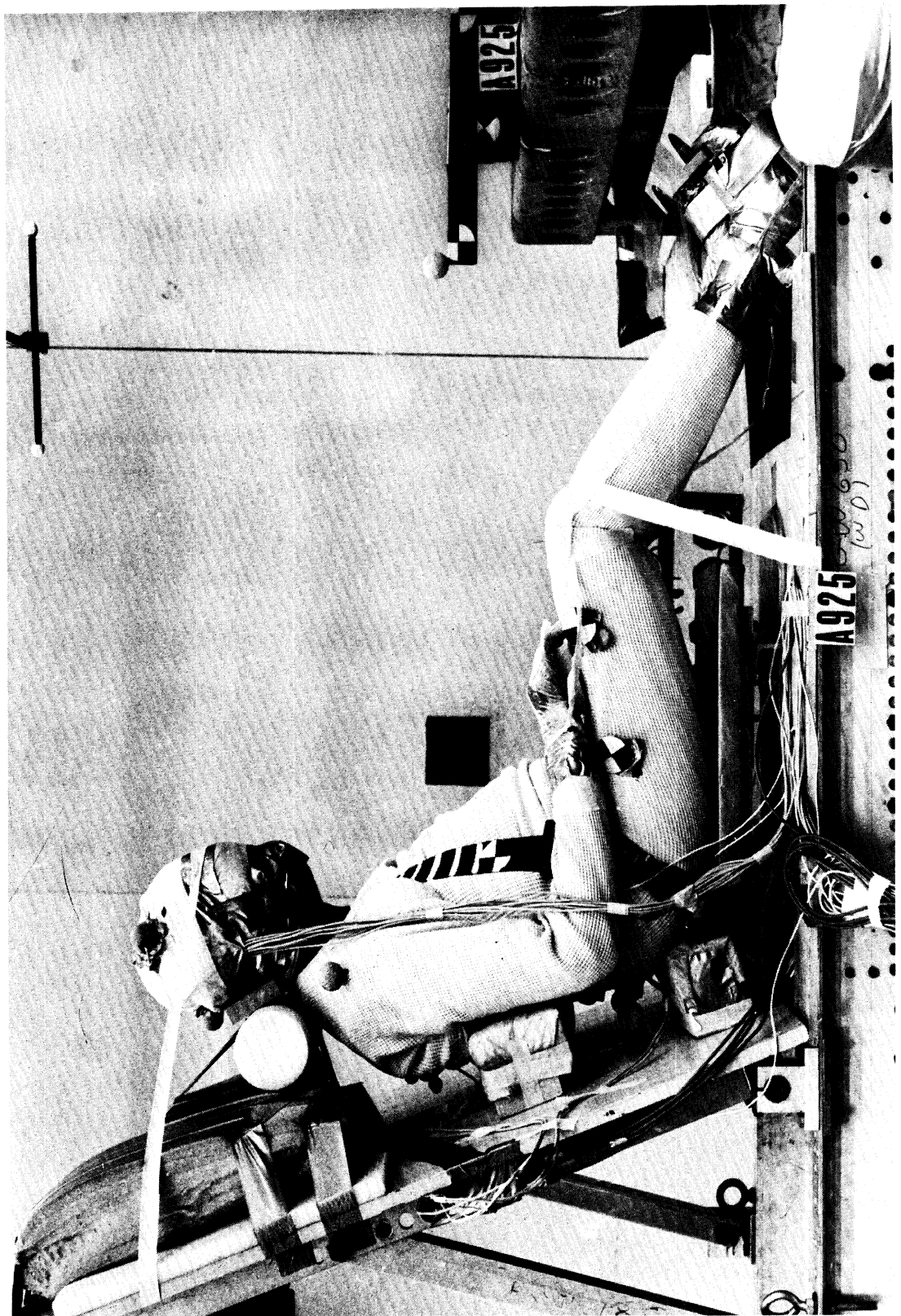
B. LAP BELT



Sketch indicates positive angle directions

BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	$12 \frac{1}{4}$	$12 \frac{3}{8}$	$\frac{1}{8}$	$11 \frac{5}{8}$
Lt. Lap	$32 \frac{1}{2}$	$32 \frac{5}{8}$	$\frac{1}{8}$	$31 \frac{3}{4}$
Shoulder	42	$42 \frac{1}{8}$	$\frac{1}{8}$	$40 \frac{1}{2}$

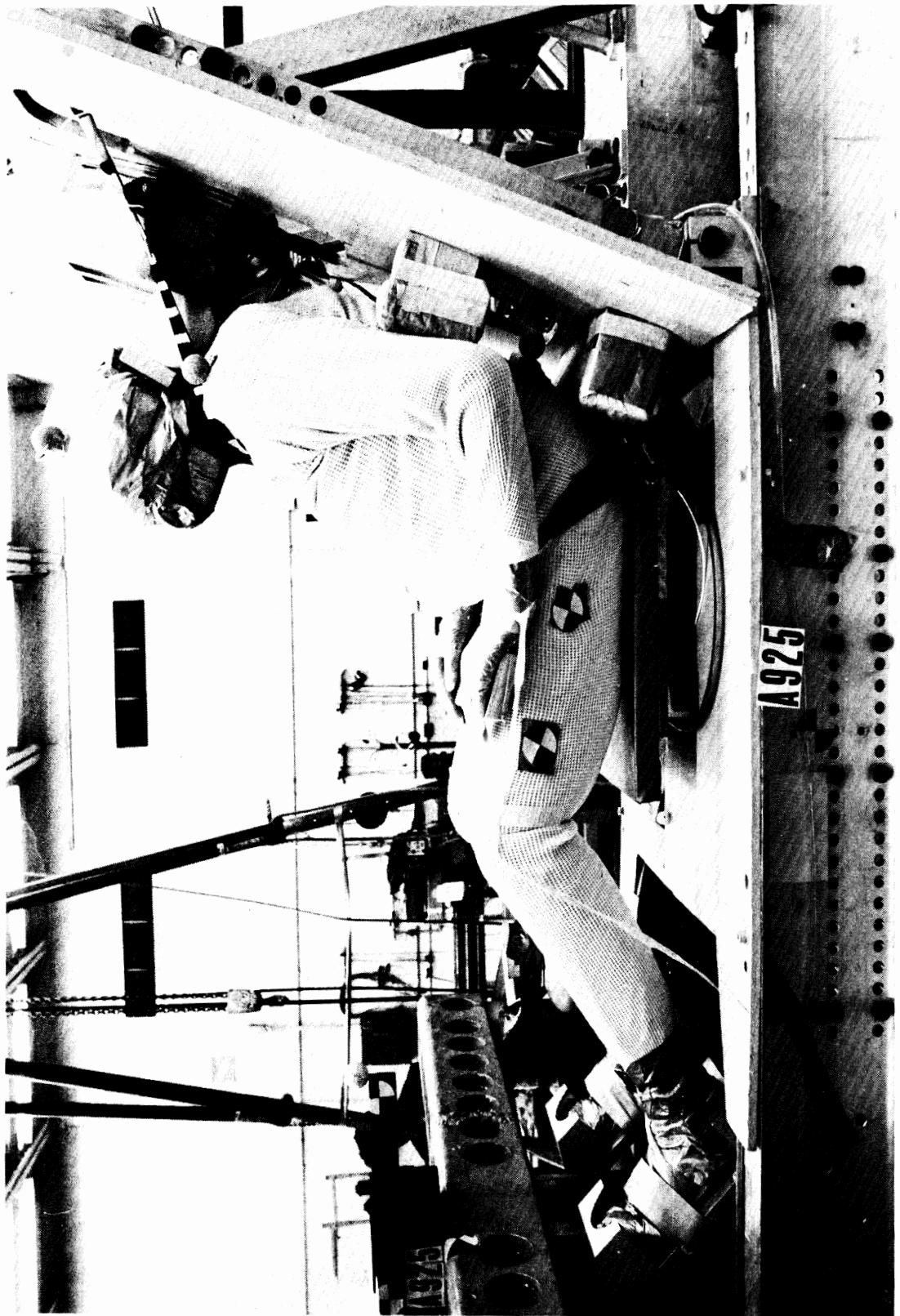


A-925: RIGHT SIDE VIEW



A-925: FRONT VIEW





A-925: LEFT SIDE VIEW

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-925-1: WBR-7

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 24-AUG-76

TEST SIGNALS: 2398 PTS/CH AT 6403.74 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
161	1: SLED DECELERATION	20.00	G'S	4+1+1	80.0	599	1600.93
162	2: AX1 HEAD A001 ACC	-49.00	G'S	4+1+18	570.5	599	1600.93
163	3: AY1 HEAD B001 ACC	-41.80	G'S	4+1+18	570.5	599	1600.93
164	4: AZ1 HEAD C001 ACC	-46.10	G'S	4+1+18	570.5	599	1600.93
165	5: AX2 HEAD C002 ACC	-43.60	G'S	4+1+18	570.5	599	1600.93
166	6: AY2 HEAD A002 ACC	-39.00	G'S	4+1+18	570.5	599	1600.93
167	7: AZ2 HEAD B002 ACC	-42.50	G'S	4+1+18	570.5	599	1600.93
168	8: AX3 HEAD B003 ACC	-44.20	G'S	4+1+18	570.5	599	1600.93
169	9: AY3 HEAD C003 ACC	-51.60	G'S	4+1+18	570.5	599	1600.93
170	10: AZ3 HEAD A003 ACC	-49.70	G'S	4+1+18	570.5	599	1600.93

111

121

131

141

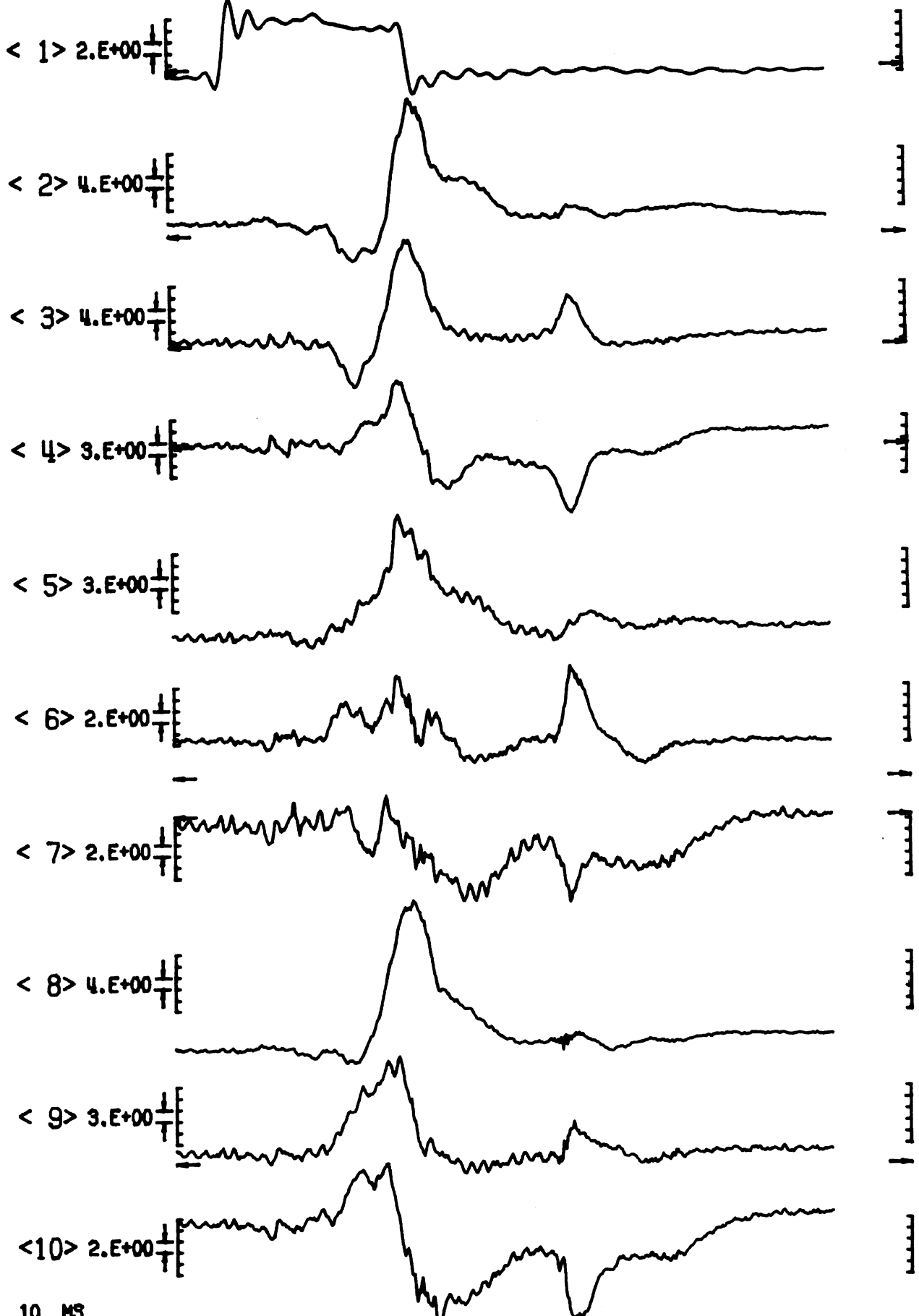
===== FILTERED FILES: 161 - 170 DIGITAL TAPE: GMR-CAD DATE: 03-SEP-76 RUN ID: A-925-1: WBR-7 =====



SEP 13, 1978 / 11:28:13

RUN ID: A-925-1: WBR-7

10 MS  
20 PTS



10 MS  
20 PTS

FILES:161-170, TAPE:GMR-CAD

589 PTS • 1800 HZ = 373.5 MS

=====

RUN ID: A-925-2; WBR-7

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 139(MSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 26-AUG-76

TEST SIGNALS: 2140 PTS/CH AT 6401.32 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE NO	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
171	11	SLED DECELERATION	20.00	G'S	4+1+1	80.0	535	1600.33
172	21	PELVIS BIAX P-A ACC	35.20	G'S	4+1+12	285.1	535	1600.33
173	31	PELVIS BIAX I-S ACC	52.20	G'S	4+1+12	285.1	535	1600.33
174	41	THORAX TRIAX P-A ACC	39.80	G'S	4+1+12	285.1	535	1600.33
175	51	THORAX TRIAX I-S ACC	42.90	G'S	4+1+12	285.1	535	1600.33
176	61	THORAX TRIAX R-L ACC	100.00	G'S	4+1+12	285.1	535	1600.33
177	71	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	535	1600.33
178	81	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	535	1600.33
179	91	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	535	1600.33
180	101	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	535	1600.33

111

121

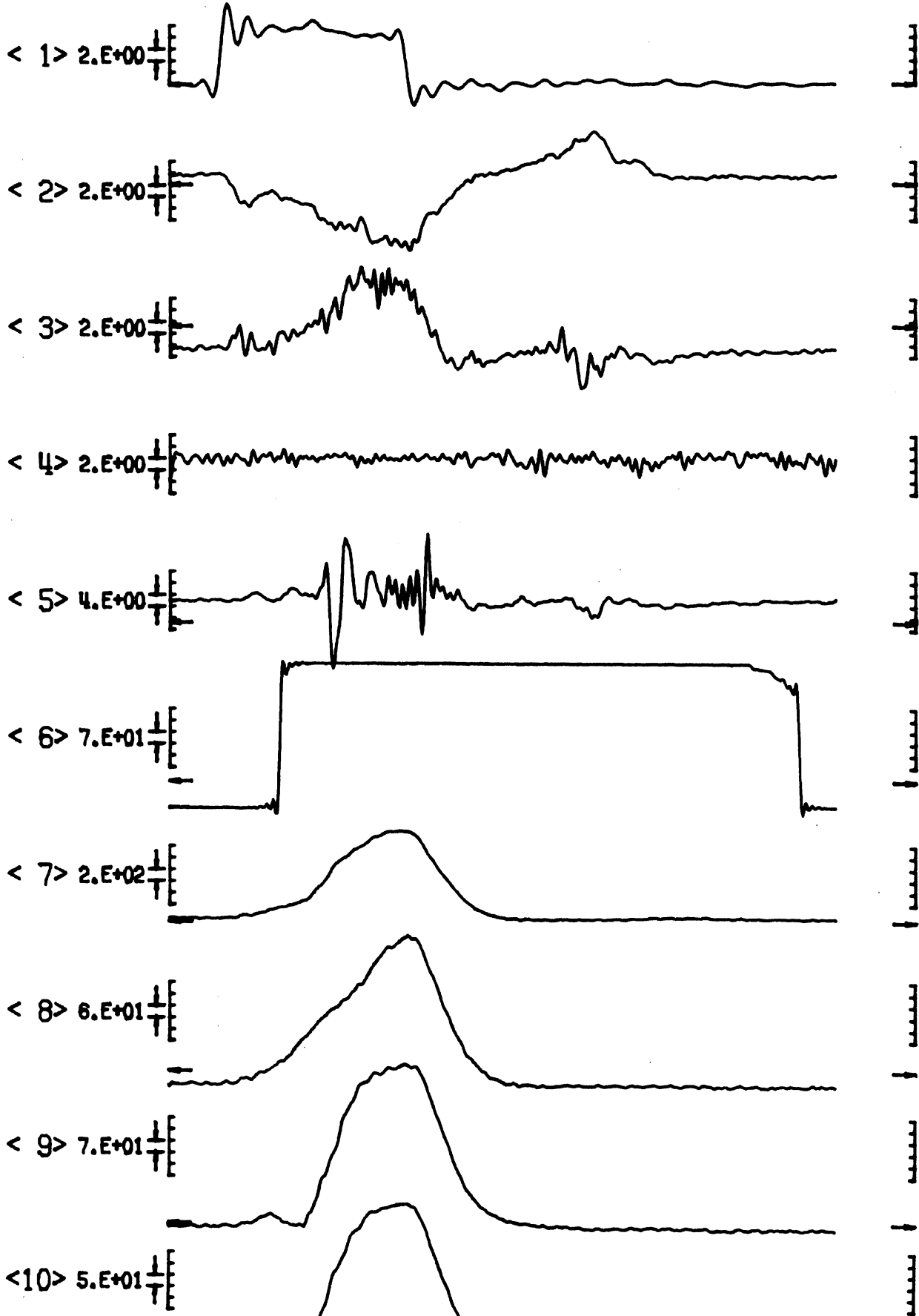
131

141

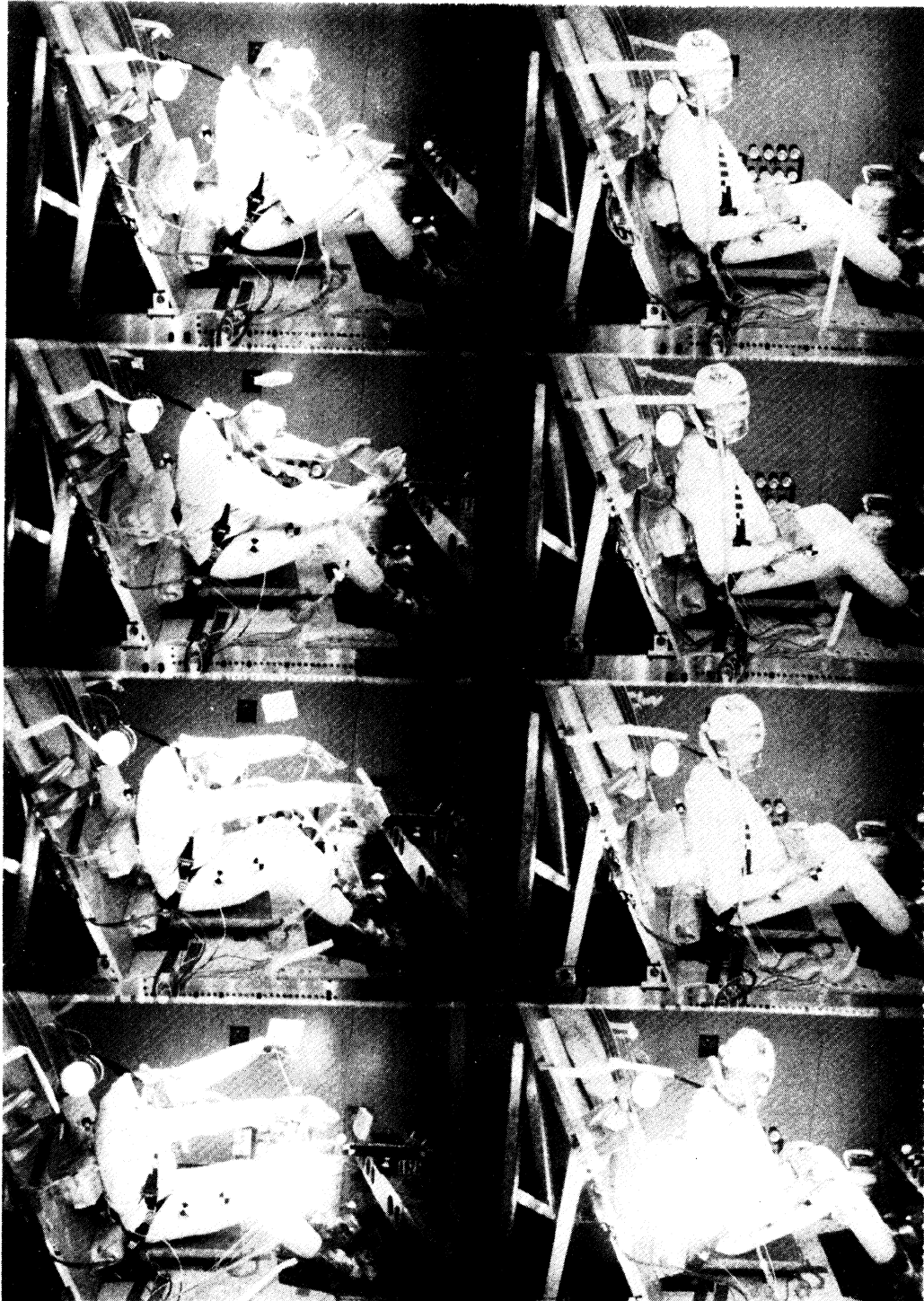
----- DIGITAL TAPE: GMR-CAD DATE: 03-SEP-76 RUN ID: A-925-2; WBR-7 -----

FILTERED FILES: 171 - 180

10 MS  
20 PTS



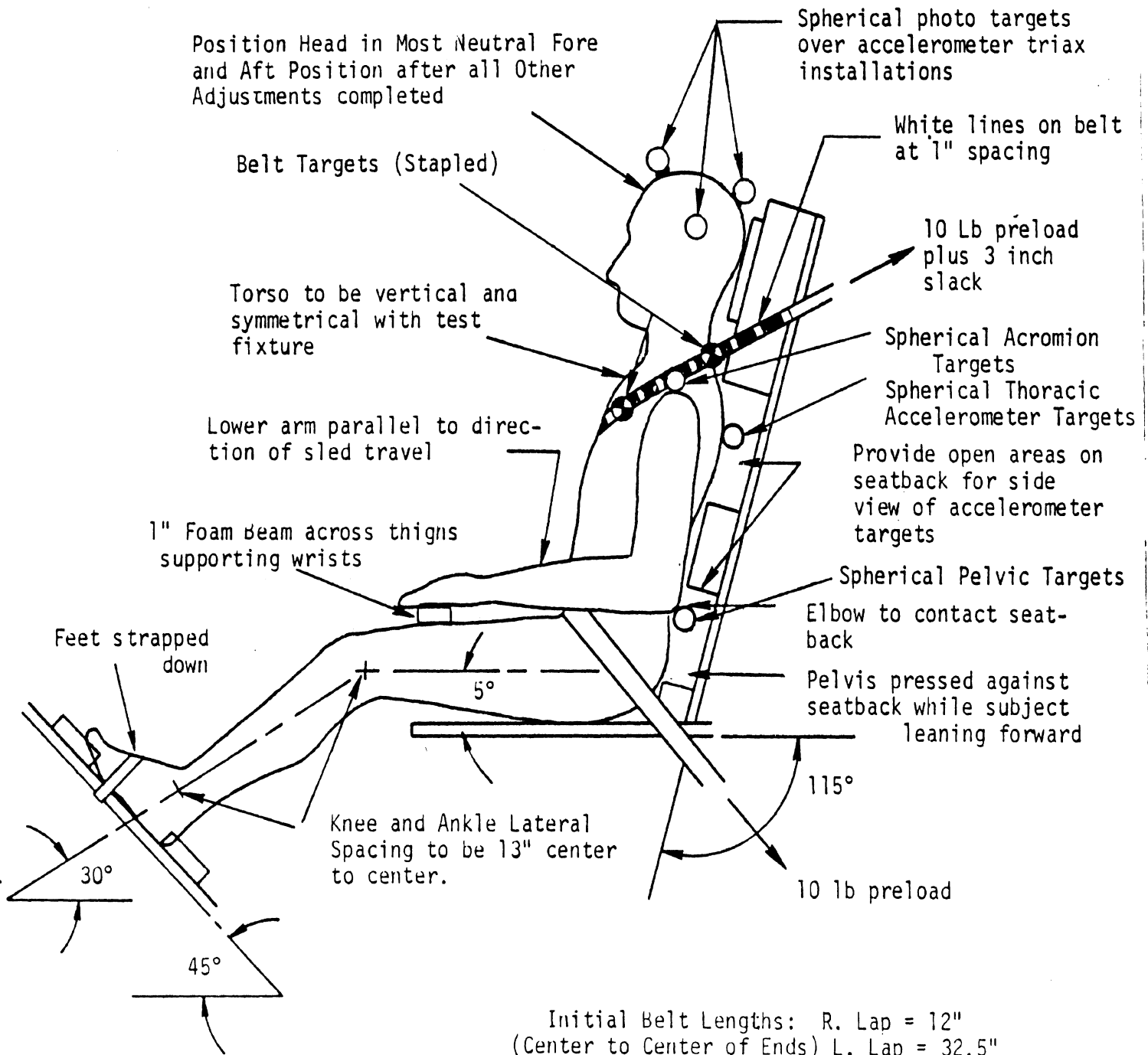
10 MS  
20 PTS



**A 925**

A-925: GRAPHCHECK SEQUENCE

# A-926



Position Head in Most Neutral Fore and Aft Position after all Other Adjustments completed

Spherical photo targets over accelerometer triax installations

Belt Targets (Stapled)

White lines on belt at 1" spacing

Torso to be vertical and symmetrical with test fixture

10 Lb preload plus 3 inch slack

Lower arm parallel to direction of sled travel

Spherical Acromion Targets  
Spherical Thoracic Accelerometer Targets

1" Foam beam across thighs supporting wrists

Provide open areas on seatback for side view of accelerometer targets

Feet strapped down

Spherical Pelvic Targets

Elbow to contact seatback

Pelvis pressed against seatback while subject leaning forward

Knee and Ankle Lateral Spacing to be 13" center to center.

115°

10 lb preload

30°

45°

Initial Belt Lengths: R. Lap = 12"  
(Center to Center of Ends) L. Lap = 32.5"  
Shoulder = 42"

Femur Target Spacing:

Right Side = 6 11/16in.

Left Side = 6 13/16in.

Belt Sequence:  
(Out from Subject)

L. Lap, R. Lap, Shoulder

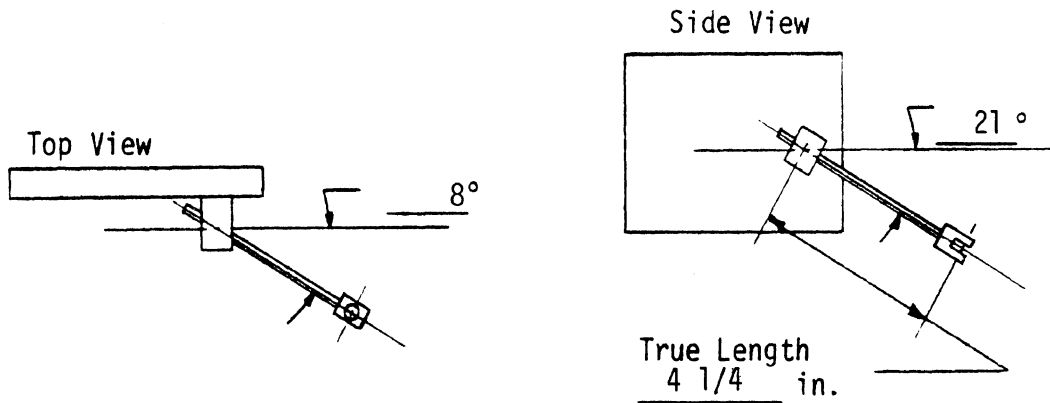
Belt End Orientation:  
(Ref. To Subject)

Away, Away, Toward

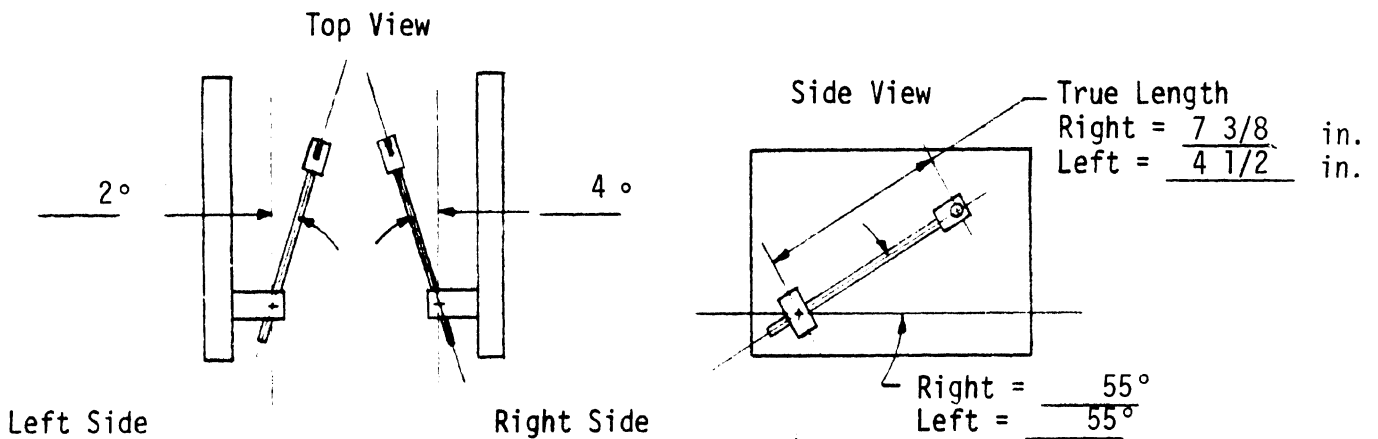
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



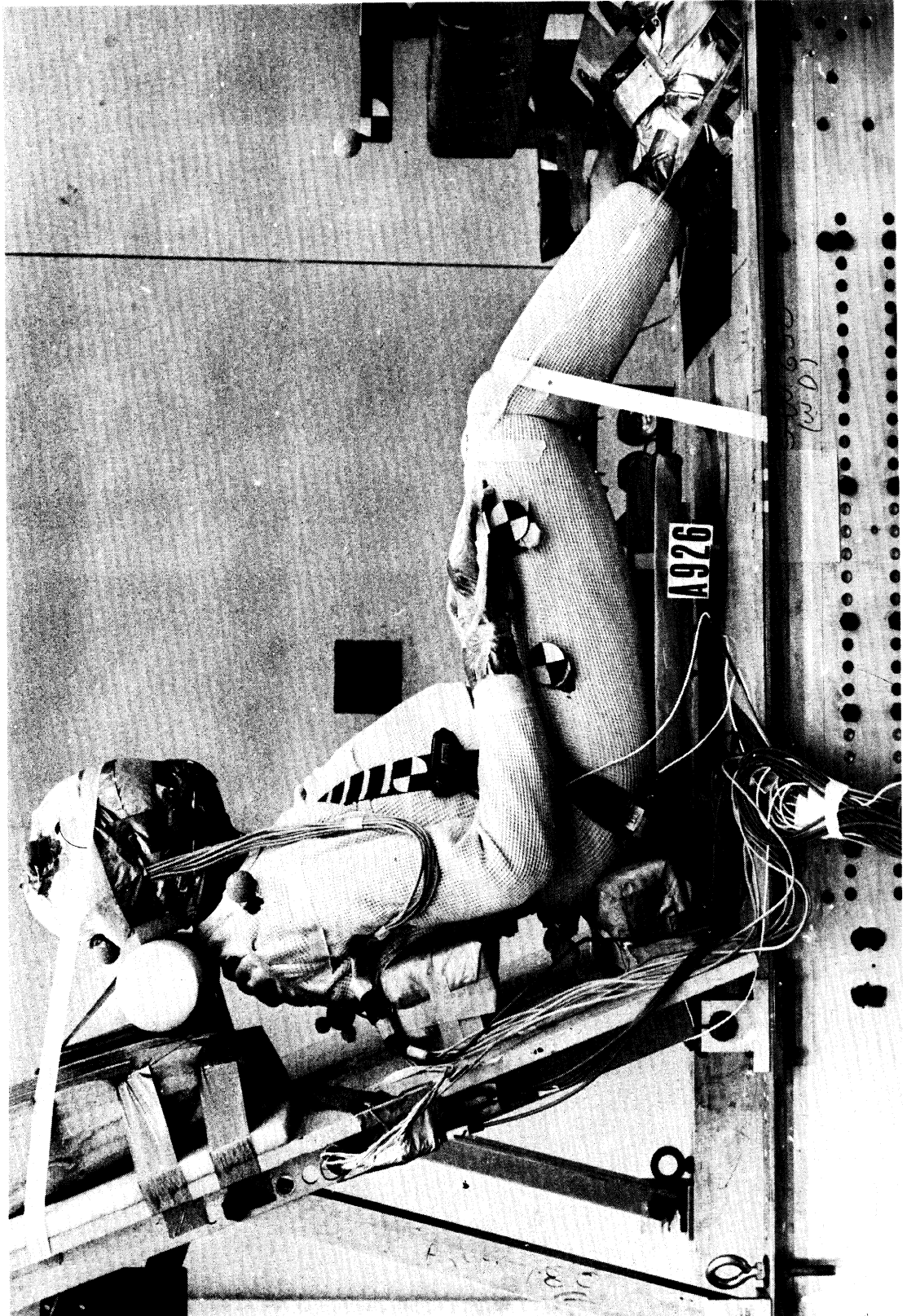
B. LAP BELT



Sketch indicates positive angle directions

BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in.)	BELT STRETCH (in.)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	12 1/8	12 1/4	1/8	11 1/2
Lt. Lap	32 1/2	32 5/8	1/8	31 7/8
Shoulder	42	42 5/8	0	40 3/8



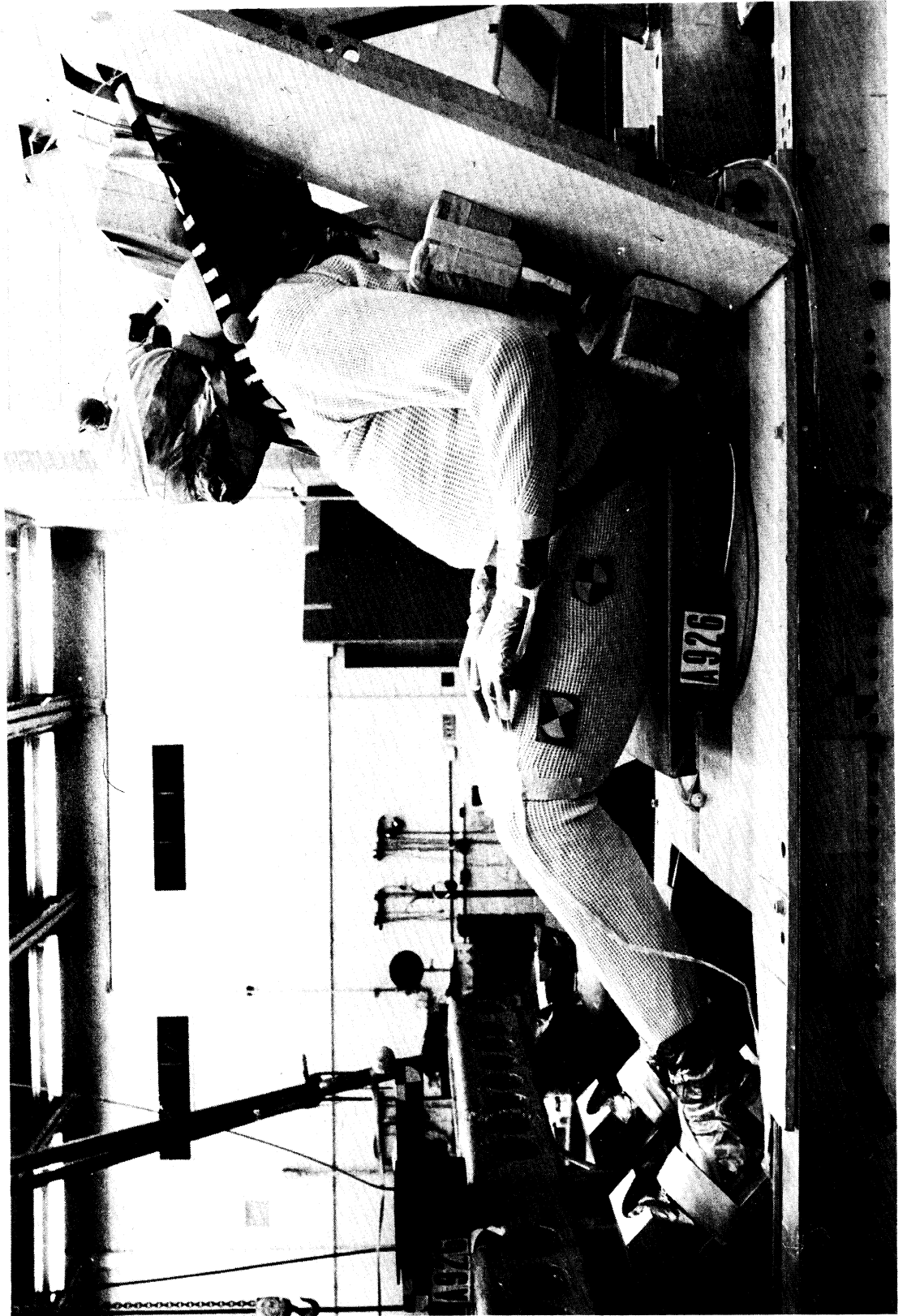
A-926: RIGHT SIDE VIEW





A-926: FRONT VIEW





A-926: LEFT SIDE VIEW

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-926-11 HMR-7

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16BIT, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 24-AUG-76

TEST SIGNALS: 1619 PTS/CH AT 6398.42 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
181	11 SLED DECELERATION	20.00	G'S	4+1+1	80.0	403	1599.60
182	21 AX1 HEAD A001 ACC	-49.00	G'S	4+1+10	570.0	403	1599.60
183	31 AY1 HEAD B001 ACC	-41.80	G'S	4+1+10	570.0	403	1599.60
184	41 AZ1 HEAD C001 ACC	-46.10	G'S	4+1+10	570.0	403	1599.60
185	51 AX2 HEAD C002 ACC	-43.60	G'S	4+1+10	570.0	403	1599.60
186	61 AY2 HEAD A002 ACC	-39.80	G'S	4+1+10	570.0	403	1599.60
187	71 AZ2 HEAD B002 ACC	-42.50	G'S	4+1+10	570.0	403	1599.60
188	81 AX3 HEAD B003 ACC	-44.90	G'S	4+1+10	570.0	403	1599.60
189	91 AY3 HEAD C003 ACC	-51.60	G'S	4+1+10	570.0	403	1599.60
190	101 AZ3 HEAD A003 ACC	-49.70	G'S	4+1+10	570.0	403	1599.60

111

121

131

141

=====

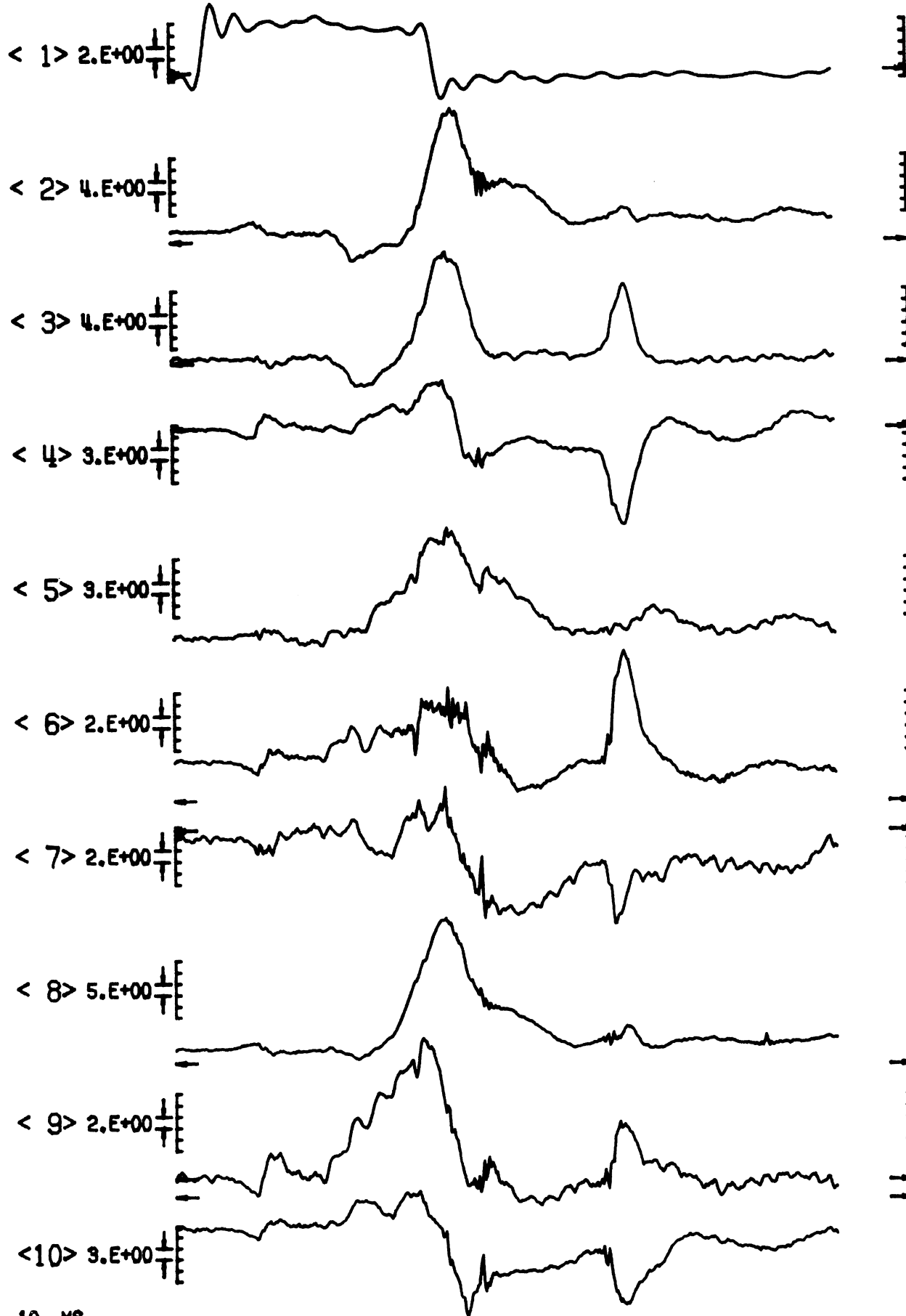
FILTERED FILES: 181 - 190

DIGITAL TAPE: GMR-CAD

DATE: 03-SEP-76

RUN ID: A-926-11 HMR-7

10 MS  
20 PTS



10 MS  
20 PTS

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-926-2: WBR-7

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 139(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1618 PTS/CH AT 6398.26 HZ. CAL SIGNALS: NOT DIGITIZED,

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
191	1	SLED DECELERATION	20.00	G'S	4+1+ 1	80.0	403	1599.56
192	2	PELVIS BIAX P-A ACC	-35.20	G'S	4+1+12	285.0	403	1599.56
193	3	PELVIS BIAX I-S ACC	-52.20	G'S	4+1+12	285.0	403	1599.56
194	4	THORAX TRIAX P-A ACC	39.80	G'S	4+1+12	285.0	403	1599.56
195	5	THORAX TRIAX I-S ACC	-42.90	G'S	4+1+12	285.0	403	1599.56
196	6	THORAX TRIAX R-L ACC	100.00	G'S	4+1+12	285.0	403	1599.56
197	7	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.0	403	1599.56
198	8	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.0	403	1599.56
199	9	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.0	403	1599.56
200	10	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.0	403	1599.56

111

121

131

141

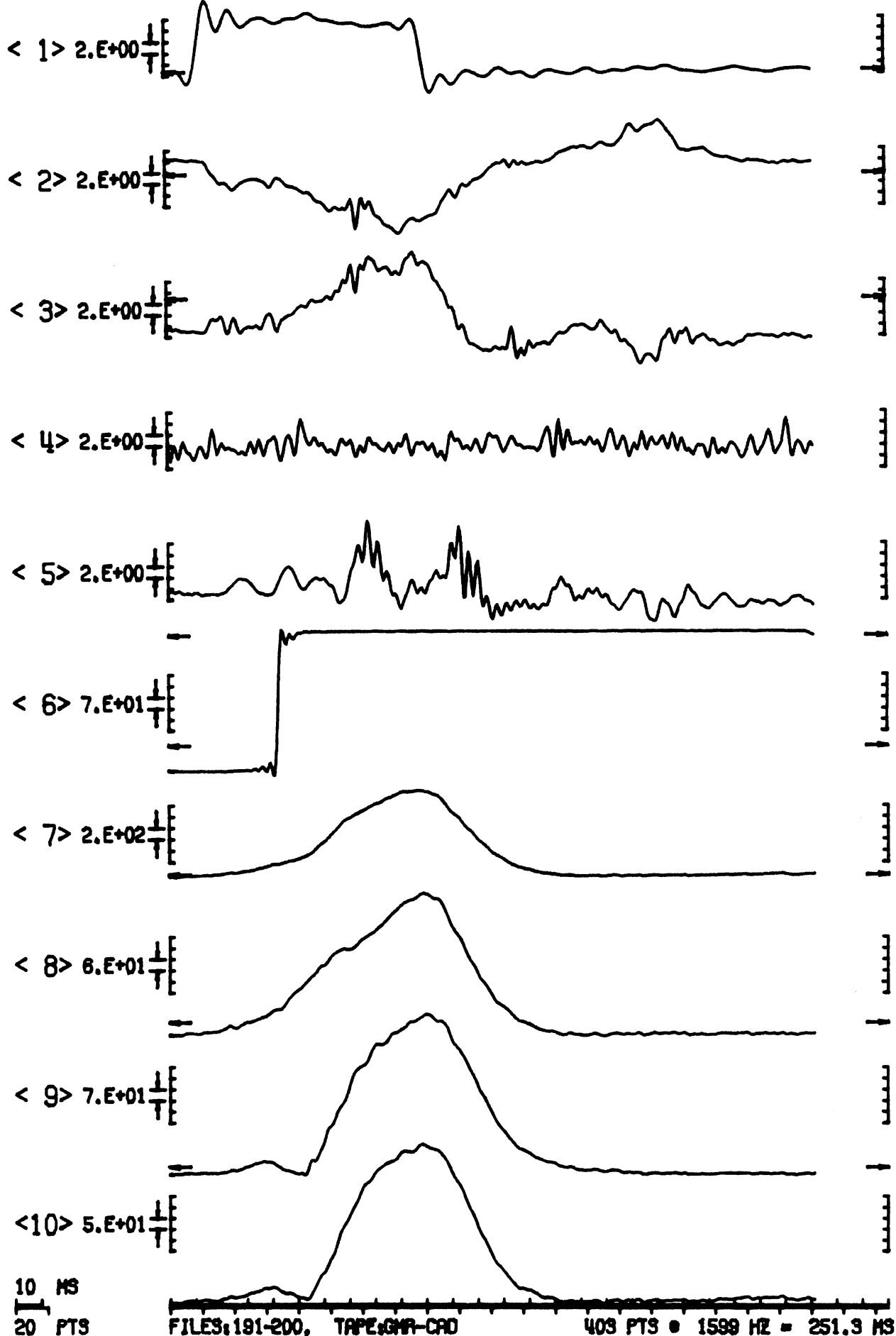
FILTERED FILES: 191 - 200

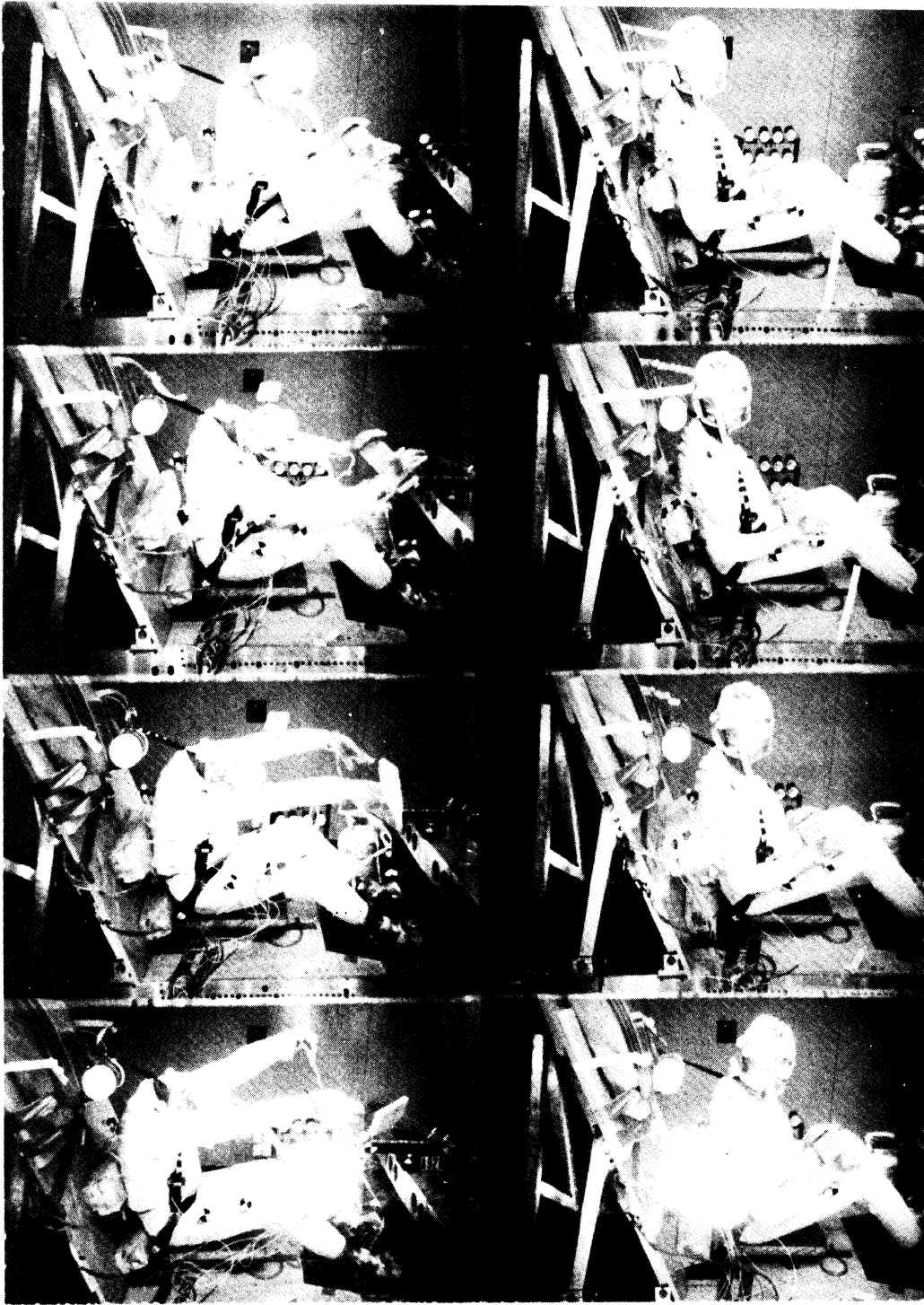
DIGITAL TAPE: GMR-CAD

DATE: 03-SEP-76

RUN ID: A-926-2: WBR-7

10 MS  
20 PTS





8

**A 926**

A-926: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-8  
 TEST: A-934  
       A-935  
       A-936

CONTENTS:

	<u>PAGE</u>				
Anthropometry	<u>49</u>				
Frontal X-rays	<u>53</u>				
Lateral X-rays	<u>57</u>				
Head x-rays & Analysis	<u>63</u>				
Instrumentation	<u>66</u>				
Thorax Autopsy	<u>68</u>				
		For Each Test:	<u>A-934</u>	<u>A-935</u>	<u>A-936</u>
Setup Diagram	<u>69</u>		<u>69</u>	<u>79</u>	<u>89</u>
Belts/anchors	<u>70</u>		<u>70</u>	<u>80</u>	<u>90</u>
Setup photographs	<u>71</u>		<u>71</u>	<u>81</u>	<u>91</u>
Digitized Signals (7600)	<u>74</u>		<u>74</u>	<u>84</u>	<u>94</u>
Digitized Signals (CEC)	<u>76</u>		<u>76</u>	<u>86</u>	<u>96</u>
Graphcheck	<u>78</u>		<u>78</u>	<u>88</u>	<u>98</u>
_____			_____	_____	_____
_____			_____	_____	_____





WHOLE BODY RESPONSE: ANTHROPOMETRY

WBR: 8  
 CADAVER ID: 20287

DATE: November 14, 1975

ANTHROPOMETRIST: \_\_\_\_\_

Anthropometric Measurements: (All Measurements except weight in cm)

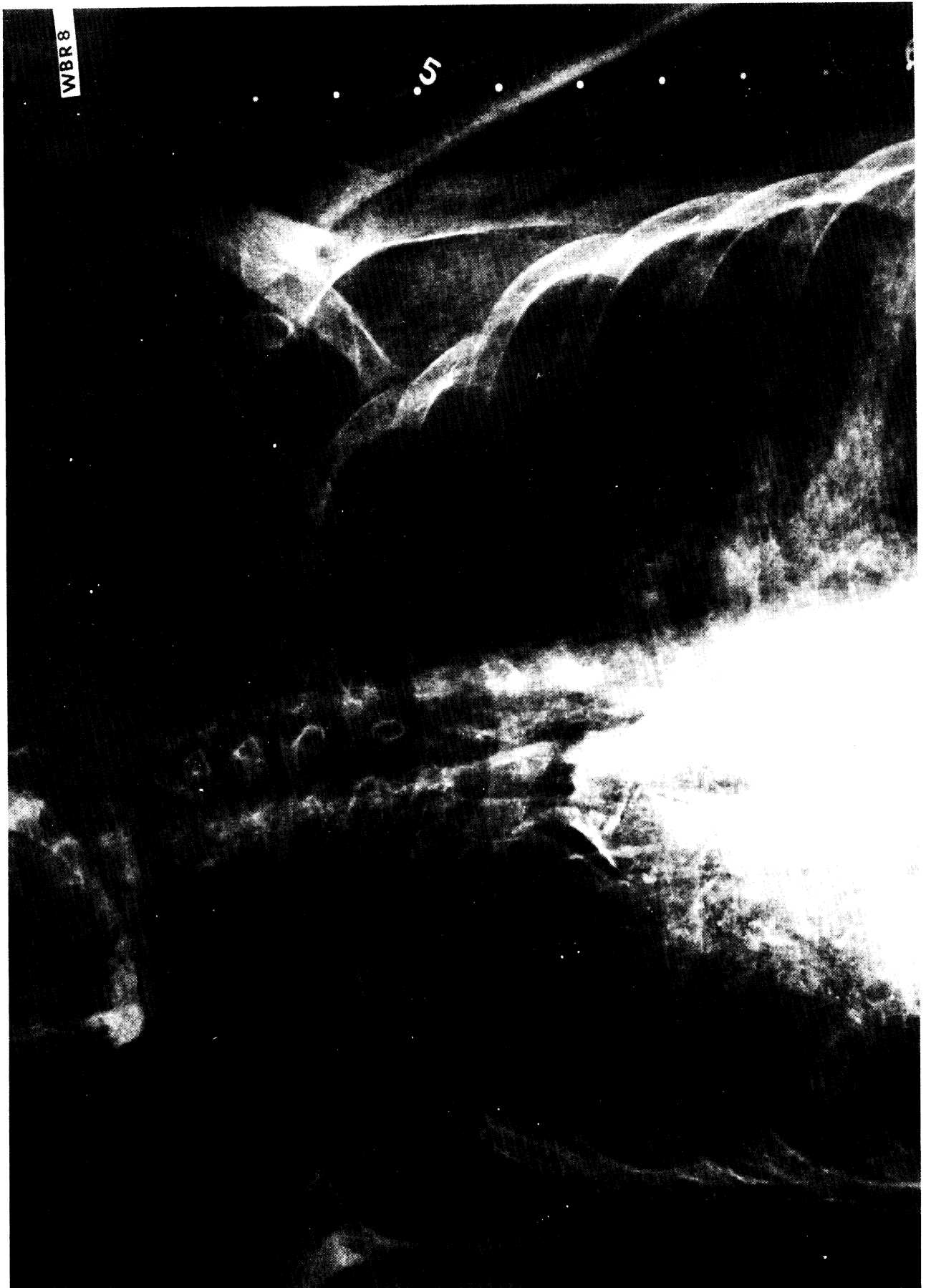
(A = Anthropometer; Sp. C. = Spreading Calipers; Sl. C. = sliding calipers; T = Tapes)

1. Weight		<u>60.1 kg</u>
2. Stature (A)		<u>172.6</u>
3. Trochanterion Hgt. (A)	Rt.	<u>82.5</u>
	Lt.	<u>83.0</u>
4. Anterior-Superior Iliac Spine Hgt. (A)	Rt.	<u>75.1</u>
	Lt.	<u>74.8</u>
5. Iliocristale Hgt. (A)	Rt.	<u>69.5</u>
	Lt.	<u>68.5</u>
6. Substernale Hgt. (A)		<u>53.0</u>
7. Axilla Hgt. (A)		<u>--</u>
8. Suprasternale Hgt. (A)		<u>31.4</u>
9. Nipple Hgt. (A)		<u>45.1</u>
10. Mastoid Hgt. (A)	Rt: 16.4	Lt: 16.6
11. Nuchale Hgt. (A)		<u>--</u>
12. Tragion Hgt. (A)	Rt.	<u>11.6</u>
	Lt.	<u>11.9</u>
13. Menton Hgt. (A)		<u>21.8</u>
14. Head Breadth (Sp. C.)		<u>--</u>
15. Head Length (Sp. C.)		<u>--</u>

16. Bitragion Diameter (Sp. C.)	15.2
17. Bigonial Diameter (Sp. C.)	11.1
18. Menton Diagonal (Sp. C.)	--
19. Mastoid Diagonal (A)	16.1
20. Head Circumference (T)	--
21. Mid-Sagittal Arc Length (T)	--
22. Coronal Arc Length (T)	--
23. Mid-Neck Circumference (T)	39.2
24. Chest Circumference at Axilla (T)	99.3
25. Chest Circumference at Nipple (T)	98.7
26. Chest Circumference at Substernale (T)	95.6
27. Hip Circumference, Iliocristale (T)	88.3
28. Buttocks Circumference, Trochanterion (T)	97.4
29. Upper Arm Circumference, Axilla (T)	29.9
30. Upper Arm Circumference, Mid Biceps (T)	27.2
31. Upper Arm Circumference, Humeral Condyles (T)	27.4
32. Maximum Forearm Circumference (T)	26.4
33. Wrist Circumference (T)	17.1
34. Upper Thigh Circumference (T)	50.0
35. Mid-Thigh Circumference (T)	44.4
36. Lower Thigh Circumference (T)	37.9
37. Maximum Calf Circumference (T)	31.1
38. Ankle Circumference (T)	20.4

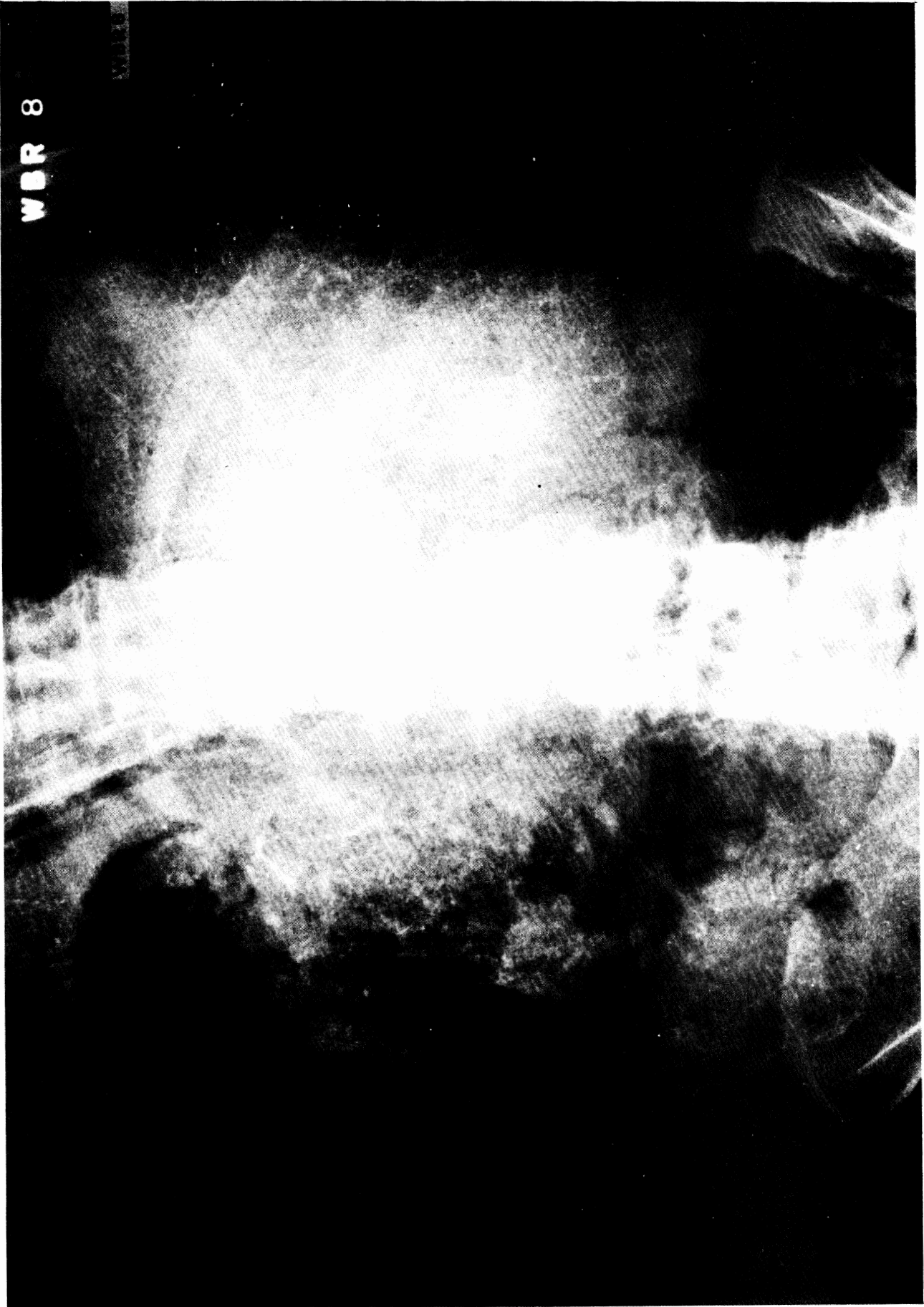
39. Biacromial Diameter (A)		35.8
40. Bideltoid Breadth (A)		49.9
41. Chest Breadth at Axilla (A)		--
42. Chest Breadth at Mid-Point between Supra- sternale and Substernale		31.8
43. Chest Breadth at Substernale (A)		32.7
44. Hip Breadth, Iliocristale (A)		29.0
45. Bispinous Diameter (A)		23.0
46. ASIS to Symphision Distance (A)	Rt.	14.4
	Lt.	14.8
47. Bitrochanteric Diameter (A)		32.5
48. Chest Depth at Suprasternale (A)		18.4
49. Chest Depth at Axilla (A)		--
50. Chest Depth at Nipple (A)		22.5
51. Chest Depth at Substernale (A)		22.6
52. Hip Depth, Iliocristale (A)		21.5
53. ASIS Depth (A)	Rt.	17.0
	Lt.	16.6
54. Buttocks Depth, Trochanterion (A)		19.1
55. Trochanterion	Rt.	--
	Lt.	--
56. Symphision (Hgt.)		--
57. Acromion-Radiale Length		34.1

58. Ball of Humerus - Radiale Length (A)	<u>31.5</u>
59. Radiale-Stylian Length (A)	<u>24.8</u>
60. Olecranon-Stylian Length (A)	<u>26.8</u>
61. Femur Length (A)	<u>40.0</u>
62. Tibia Length (A)	<u>37.4</u>
63. Fibula Length (A)	<u>40.4</u>
64. Upper Arm Depth, Mid Biceps (S1.C.)	<u>8.4</u>
65. Humeral Biepicondylar Breadth (S1.C.)	<u>6.3</u>
66. Forearm Depth (S1.C.)	<u>7.0</u>
67. Wrist Depth (S1.C.)	<u>4.7</u>
68. Hand Length (S1.C.)	<u>18.7</u>
69. Hand Breadth (S1.C.)	<u>9.0</u>
70. Hand Depth (S1.C.)	<u>4.0</u>
71. Thigh Breadth, Mid-Thigh (S1.C.)	<u>13.4</u>
72. Calf Depth (S1.C.)	<u>9.1</u>
73. Bimalleolus Breadth (S1. C.)	<u>6.3</u>
74. Foot Length (S1.C.)	<u>25.1</u>
75. Foot Breadth (S1.C.)	<u>9.5</u>



WBR-8: FRONTAL X-RAY

WBR 8



WBR-8: FRONTAL X-RAY

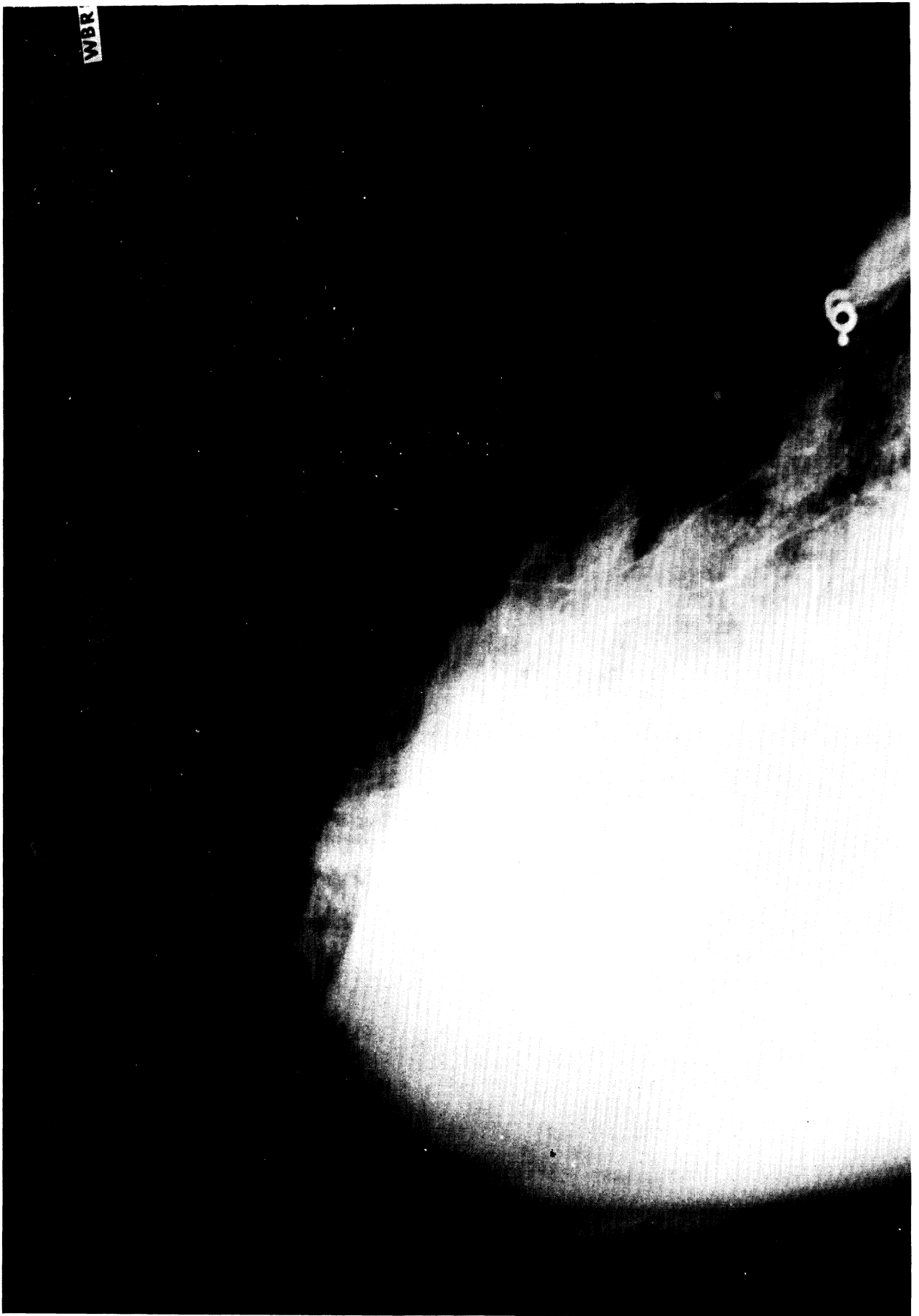


WBR-8: FRONTAL X-RAY



WBR-8: FRONTAL X-RAY





WBR-8: LATERAL X-RAY

WBR 8



WBR-8: LATERAL X-RAY



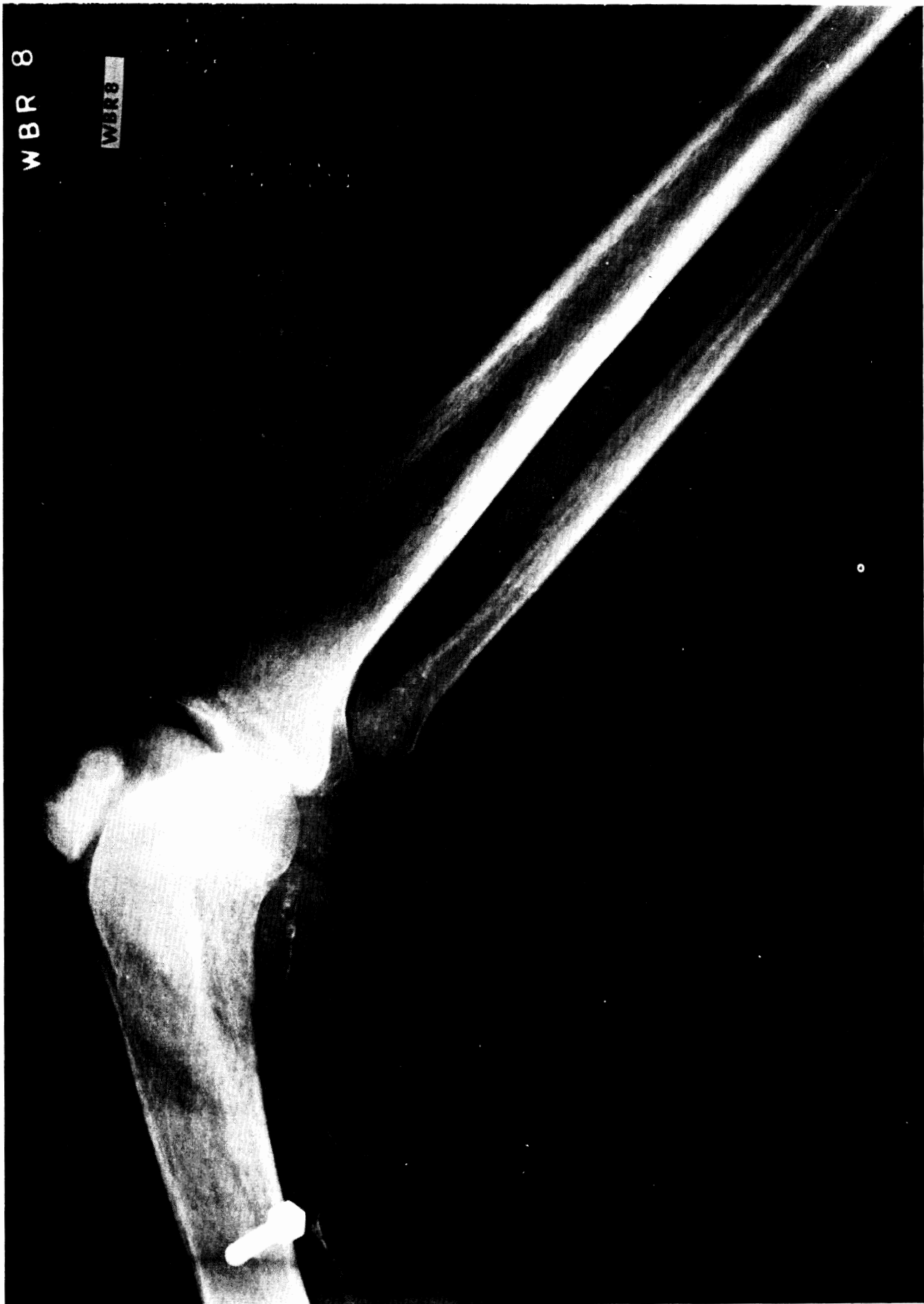
WBR-8: LATERAL X-RAY



WBR-8: LATERAL X-RAY



WBR-8: LATERAL X-RAY



WBR-8: LATERAL X-RAY

A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	2.840	1.930	13.25	-2.480	2.350	21.25
P2- L.EYE:	2.220	1.090	10.50	1.950	1.550	20.75
P3- R.EAR:	-0.780	-0.700	15.75	-5.390	-0.780	18.00
P4- L.EAR:	-1.870	-1.410	9.25	2.490	-1.480	16.75
Q1- ACC. :	-7.570	4.030	12.25	-1.500	3.900	11.50
Q2- ACC. :	-2.510	4.650	9.25	2.760	5.410	15.75
Q3- ACC. :	-1.670	6.300	14.25	-4.060	6.580	17.00
R1,R2,R3 :	3.630	3.420	3.730			

	COORDINATES W.R.T. CAMERA				COORDINATES W.R.T. CAMERA		
	X	Y	Z		X	Y	Z
P1 :	2.129	-1.552	1.458	Q1:	-5.792	-1.165	3.056
P2 :	1.759	1.235	0.923	Q2:	-2.037	1.962	3.810
P3 :	-0.554	-3.644	-0.512	Q3:	-1.226	-2.807	4.588
P4 :	-1.518	1.731	-1.087	P:	-3.553	-0.324	5.879
C :	-1.036	-0.956	-0.800	CP:	-2.517	0.632	-6.679

ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<I> :	0.81327	0.20815	0.54339	1.0000	0.0000	0.0
<J> :	-0.15238	0.97634	-0.14592	0.0000	0.9978	-0.0000
<K> :	-0.56109	0.03588	0.82602	0.0	-0.0000	0.9984

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<E1>:	-0.60507	-0.22731	-0.76304	1.0000	0.0413	0.0390
<E2>:	0.44125	0.66530	-0.60223	0.0413	1.0000	0.0420
<E3>:	0.63933	-0.68215	-0.35486	0.0390	0.0420	1.0000

```

*****
*
* RUN ID:WBR-8          AUG 26, 1976
*
* PQ1= 3.630, PQ2= 3.420, PQ3= 3.730
* CPI= 1.714, CPJ= 0.026, CPK= 6.952
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*   <I>   <J>   <K>
*
* <E1>:  -0.96206  -0.01845  -0.27221
*
* <E2>:   0.18568   0.68674  -0.70279
*
* <E3>:   0.19990  -0.72667  -0.65726
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0280  0.0301  0.0293
*
* ORTHOGONALITY CHECK
*
* 1.0000  0.0000  0.0000
*
* 0.0000  1.0000 -0.0000
*
* 0.0000 -0.0000  1.0000
*
*****

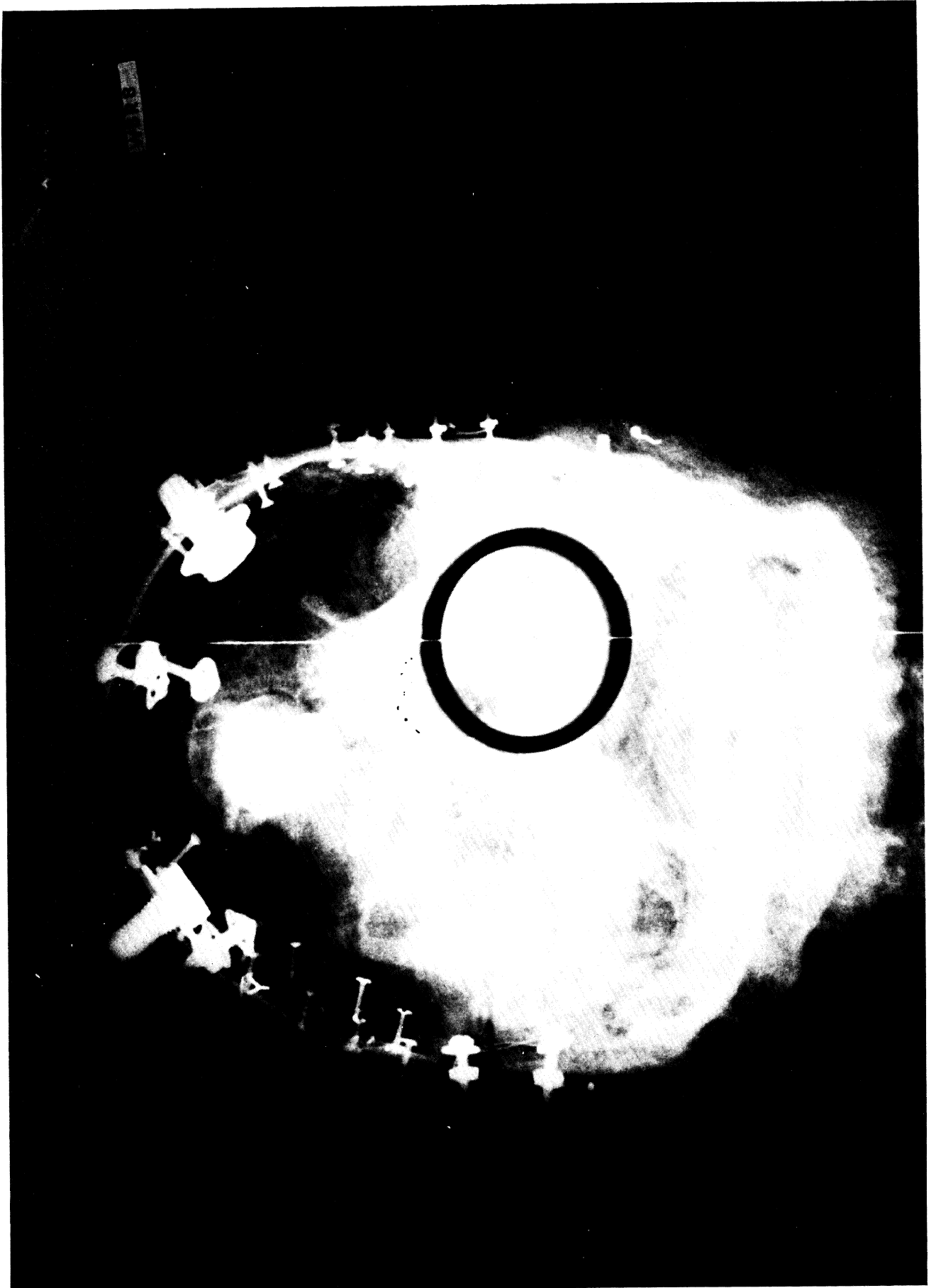
```

WBR 8



WBR-8: HEAD X-RAY (X-Z)





WBR-8: HEAD X-RAY (Y-Z)

# INSTRUMENTATION DATA SHEET

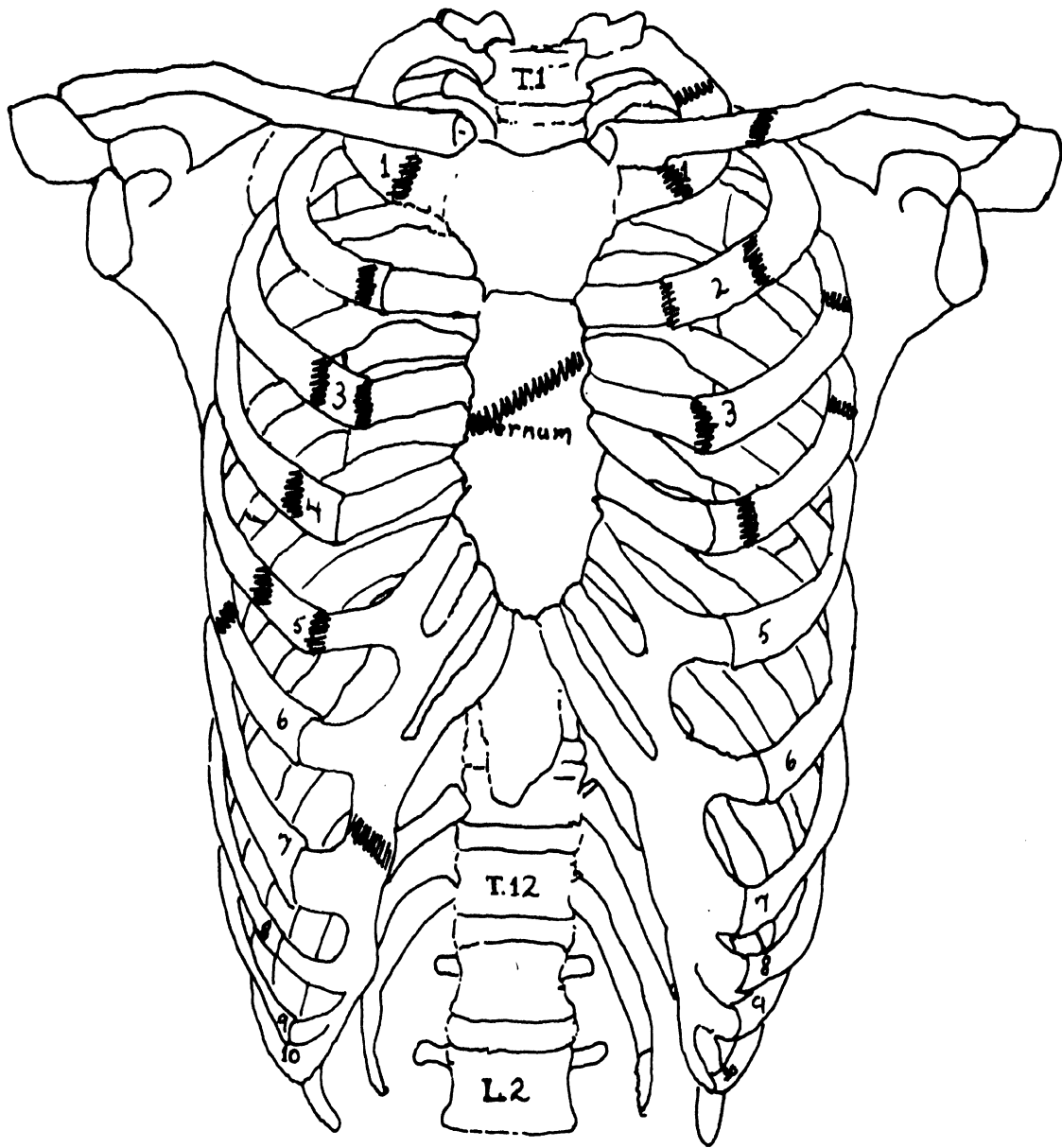
TEST NO: A-934	<u>DESCRIPTION</u>	WBR-8	Account No: 320316
through: A-936	Whole Body Response Cadaver Test		DATE: 11-20-75 BY: J.B.
SUBJECT: Cadaver	A-934: Mid-Severity Test		TAPE REEL # 138
number: 20287	A-935: Mid-Severity Test		RECORDER: 7600
FACILITY: Impact Sled	A-936: High Severity Test		REC. SPEED: 30 I.P.S.

CH #	SET UP DATA				TRANSDUCER		CALIBRATION			OUTPUT			CH #	
	input	ampl. #	gain	umbil.#	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt		units
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Head Q <sub>1</sub> - A	H-5	100	1	10	Endevco	AB 59	1.16	100	56.4 G	-	48.6	G	2
3	Head Q <sub>1</sub> - B	H-6	100	2	10	"	AB 60	1.17	100	48.5 G	-	41.5	G	3
4	Head Q <sub>1</sub> - C	H-7	100	3	10	"	AB 79	1.15	100	52.5 G	-	45.7	G	4
5	Head Q <sub>2</sub> - C	H-8	100	4	10	"	AB 87	1.16	100	46.0 G	-	39.7	G	5
6	Head Q <sub>2</sub> - A	H-9	100	5	10	"	AB 90	1.16	100	49.7 G	-	42.8	G	6
7	Head Q <sub>2</sub> - B	H-10	100	6	10	"	AC 04	1.16	100	58.3 G	-	50.3	G	7
8	Head Q <sub>3</sub> - B	H-11	100	7	10	"	AC 06	1.17	100	58.1 G	-	49.7	G	8
9	Head Q <sub>3</sub> - C	H-12	100	8	10	"	AC 14	1.16	100	51.6 G	-	44.5	G	9
10	Head Q <sub>3</sub> - A	H-13	100	9	10	"	AB 57	1.16	100	39.5 G	-	34.1	G	10
11	Strobe	H-3	10							T <sub>0</sub>		1.	V	11
12	Velocity	H-4	10	VEL						12"/Pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base			TB						100 Hz.		1.	V	14

B-66

# INSTRUMENTATION DATA SHEET

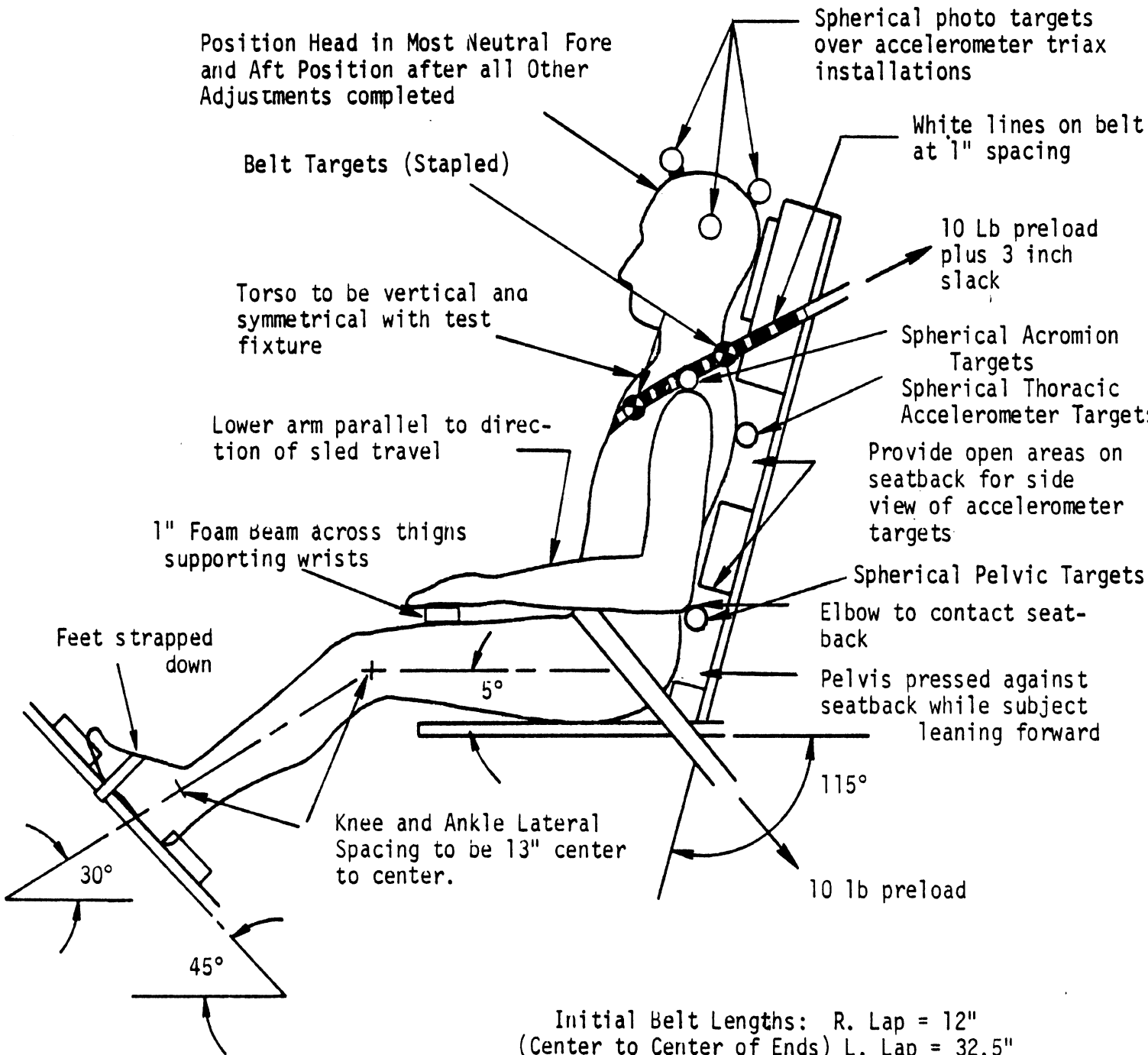
TEST NO: A-934		DESCRIPTION		Account No: 320316										
through: A-936		Whole Body Response Cadaver Test		DATE: 11-20-75	BY: J.B.									
SUBJECT: Cadaver		A-934: Mid Severity Test		TAPE REEL # 139										
number: 20287		A-935: Mid Severity Test		RECORDER: CEC										
FACILITY: Impact Sled		A-936: High Severity Test		REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA				TRANSDUCER			CALIBRATION			OUTPUT		CH #	
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt		units
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Pelvis P-A	H-14	100	10	10	Endevco	AA 49	1.26	100	66.8	-	53.7	G	2
3	Pelvis I-S	H-15	100	24	10	"	AA 58	1.26	100	56.2	+	46.7	G	3
4	Thorax P-A	H-16	100	12	10	"	AB 76	1.16	100	43.5	+	37.5	G	4
5	Thorax I-S	H-17	100	13	10	"	AC 02	1.15	100	42.6	-	37.0	G	5
6	Thorax R-L	H-18	100	14	10	"	AC 16	1.14	100	42.8	+	37.5	G	6
7	Rt. Lap	H-19	200	15	/	GSE	082	2.20	200	2209 #	+	1000.	#	7
8	Lt. Lap	H-20	200	16	/	"	083	2.24	200	2242 #	+	1000.	#	8
9	Up. Shldr.	CEC-1	VAR.	19	/	"	084	2.27	/	2277 #	+	1000.	#	9
10	Lo. Shldr.	CEC-2	VAR.	23	/	"	085	2.25	/	2245 #	+	1000.	#	10
11	Strobe									T <sub>0</sub>		1.	V	11
12	Velocity			VEL.						12" Pulse		1.	V	12
13	Dig. Gate									280 M.S.		1.	V	13
14	Time Base			TB						100 Hz		1.	V	14



**Bony Thoracic Cage,  
anterior aspect**

WBR 8 CADAVER 20287

# A-934



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

**Femur Target Spacing:**

Right Side = 5 1/4 in.  
 Left Side = 5 1/8 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

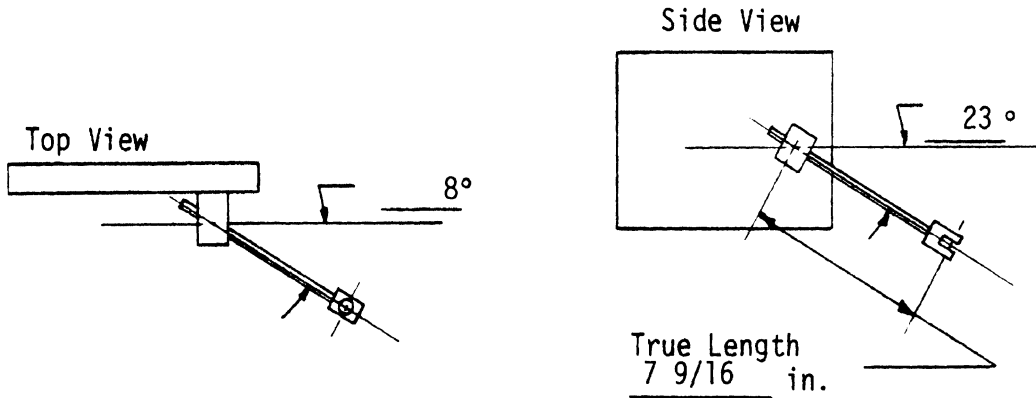
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

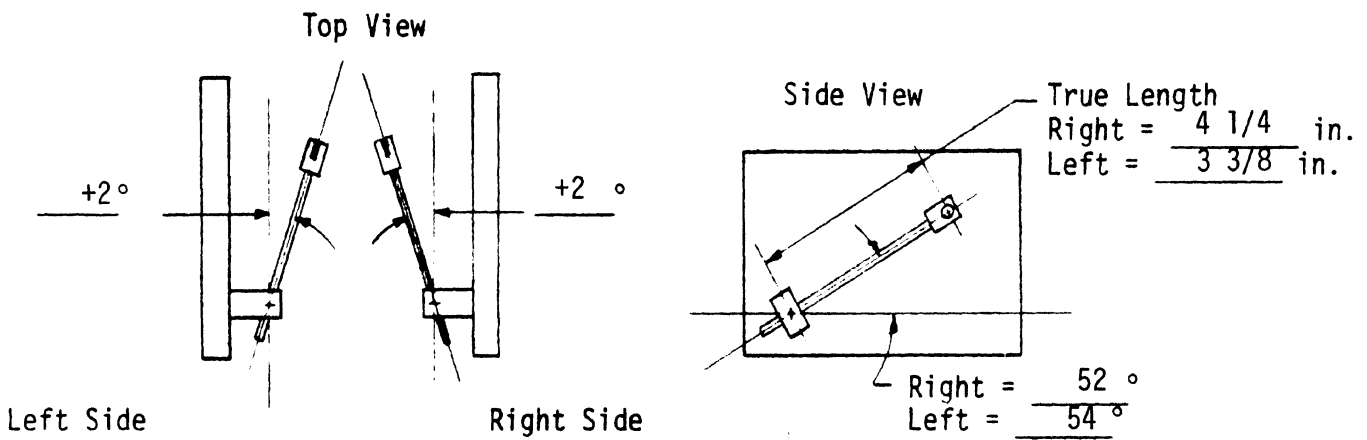
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



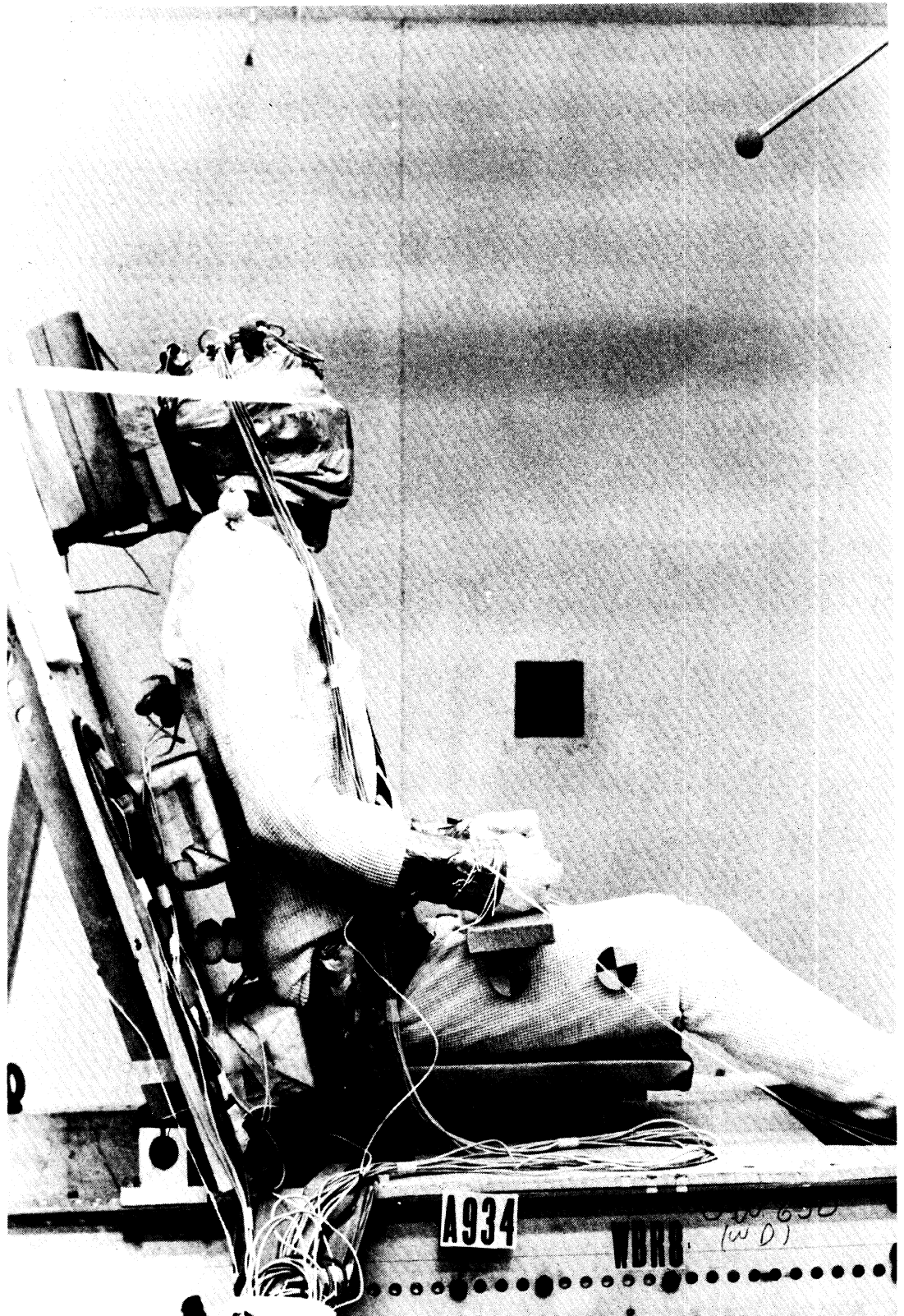
B. LAP BELT



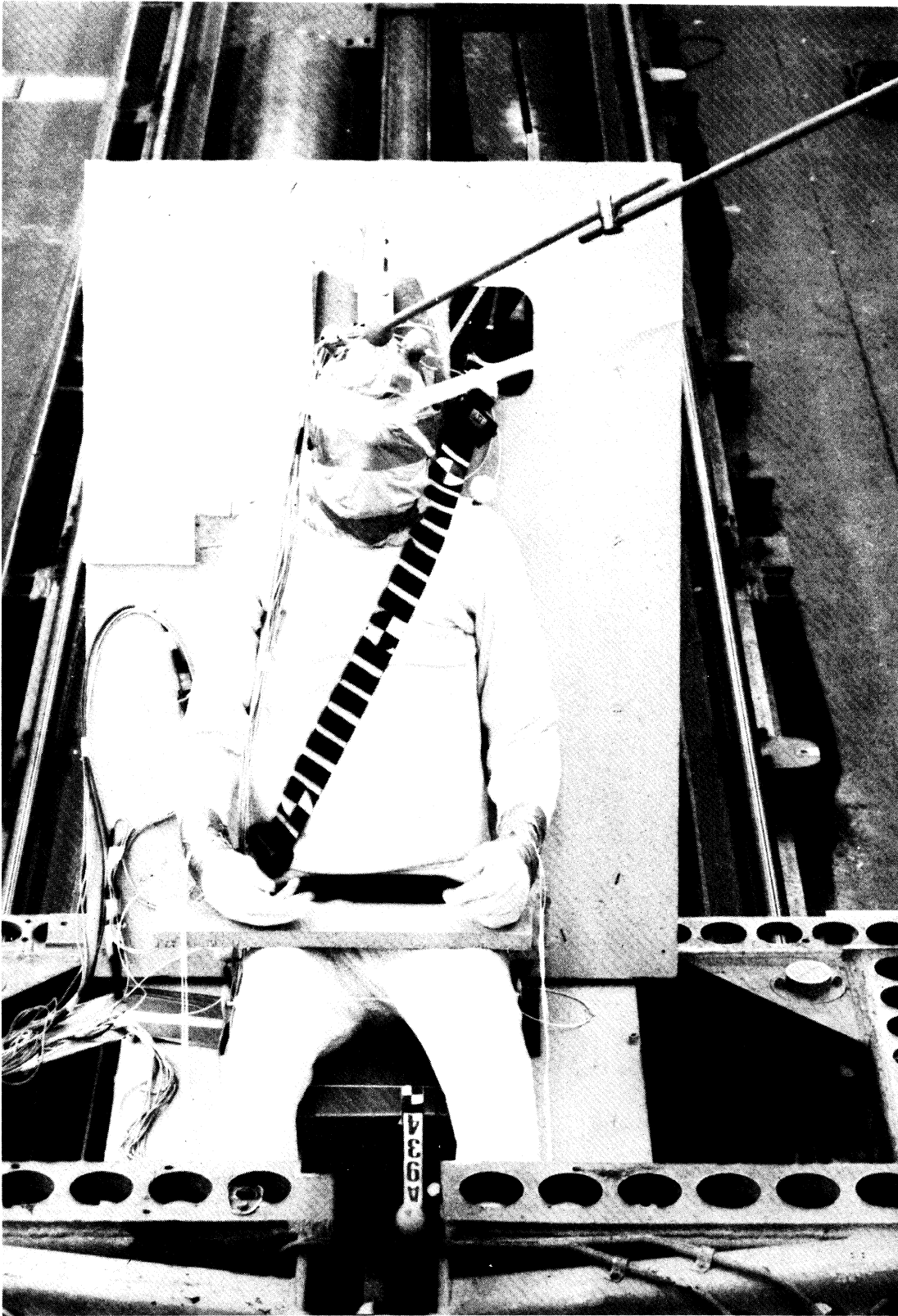
Sketch indicates positive angle directions

BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	<u>12</u>	<u>12</u>	<u>0</u>	<u>11 1/8</u>
Lt. Lap	<u>32 1/2</u>	<u>32 1/2</u>	<u>0</u>	<u>31 3/4</u>
Shoulder	<u>42</u>	<u>42</u>	<u>0</u>	<u>40 1/2</u>

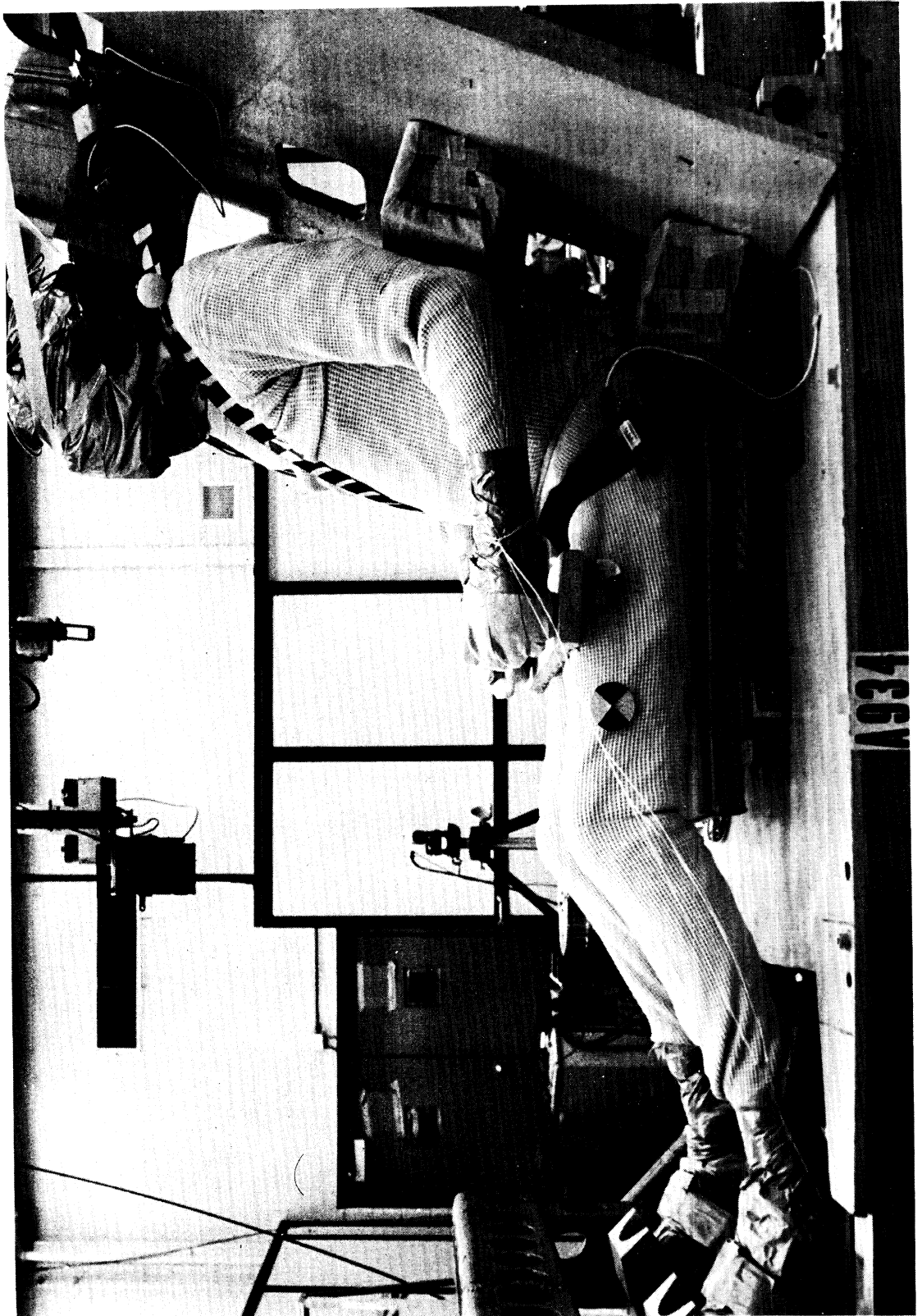


A-934: RIGHT SIDE VIEW



A-934: FRONT VIEW





A-934: LEFT SIDE VIEW

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-934-18 WBR-8

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1611; WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 24-AUG-76

TEST SIGNALS: 1663 PTS/CH AT 6399.85 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
201	- 1:	SLED DECELERATION	20.00	G'S	4+1+ 1	80.0	412	1599.96
202	- 2:	AX1 HEAD A001 ACC	-48.60	G'S	4+1+10	570.2	412	1599.96
203	- 3:	AY1 HEAD B001 ACC	-41.50	G'S	4+1+10	570.2	412	1599.96
204	- 4:	AZ1 HEAD C001 ACC	-45.70	G'S	4+1+10	570.2	412	1599.96
205	- 5:	AX2 HEAD C002 ACC	-39.70	G'S	4+1+10	570.2	412	1599.96
206	- 6:	AY2 HEAD A002 ACC	-42.80	G'S	4+1+10	570.2	412	1599.96
207	- 7:	AZ2 HEAD B002 ACC	-50.30	G'S	4+1+10	570.2	412	1599.96
208	- 8:	AX3 HEAD B003 ACC	-49.70	G'S	4+1+10	570.2	412	1599.96
209	- 9:	AY3 HEAD C003 ACC	-44.50	G'S	4+1+10	570.2	412	1599.96
210	- 10:	AZ3 HEAD A003 ACC	-34.10	G'S	4+1+10	570.2	412	1599.96

11:

12:

13:

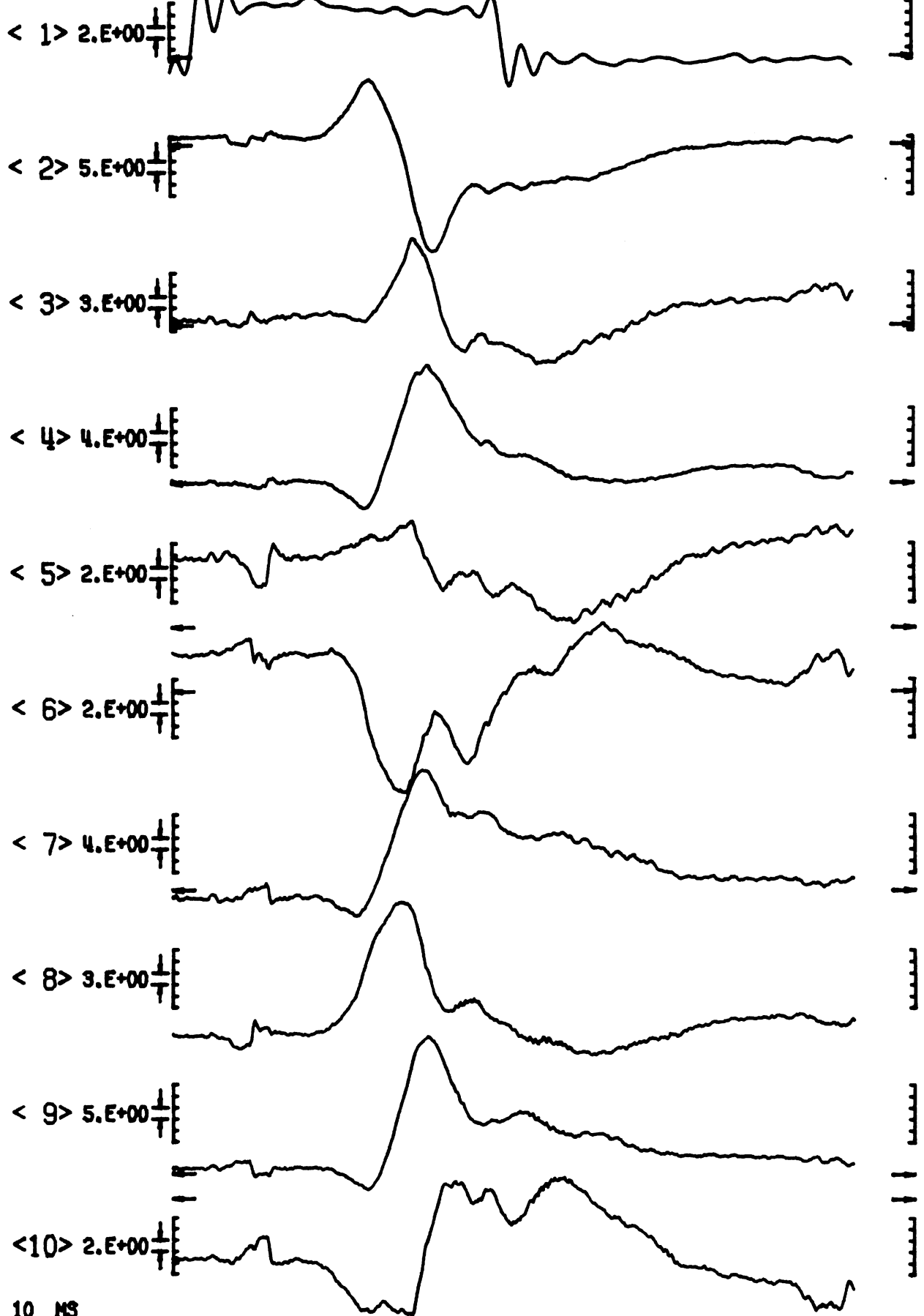
14:

===== FILTERED FILES: 201 - 210 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-934-18 WBR-8 =====

SEP 13, 1976 / 11:31:18

RUN ID: A-934-1: WBR-8

10 MS  
20 PTS



10 MS  
20 PTS

FILES:201-210, TAPE:GMR-CRD

412 PTS • 1599 HZ = 256.9 MS

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-934-2: WBR-8

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1681, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1662 PTS/CH AT 6399.85 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANFL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
211	- 1:	SLED DECELERATION	20.00	G'S	4+1+1	80.0	412	1599.96
212	- 2:	PELVIS BIAX P-A ACC	-53.00	G'S	4+1+12	285.1	412	1599.96
213	- 3:	PELVIS BIAX I-S ACC	44.60	G'S	4+1+12	285.1	412	1599.96
214	- 4:	THORAX TRIAX P-A ACC	37.50	G'S	4+1+12	285.1	412	1599.96
215	- 5:	THORAX TRIAX I-S ACC	-37.00	G'S	4+1+12	285.1	412	1599.96
216	- 6:	THORAX TRIAX R-L ACC	37.50	G'S	4+1+12	285.1	412	1599.96
217	- 7:	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	412	1599.96
218	- 8:	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	412	1599.96
219	- 9:	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	412	1599.96
220	- 10:	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	412	1599.96

111

121

131

141

===== FILTERED FILES: 211 - 220 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-934-2: WBR-8 =====

SEP 13, 1976 / 11:32:05

RUN ID: A-934-2: WBR-8

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 2.E+00

< 3 > 2.E+00

< 4 > 2.E+00

< 5 > 2.E+00

< 6 > 2.E+00

< 7 > 1.E+02

< 8 > 5.E+01

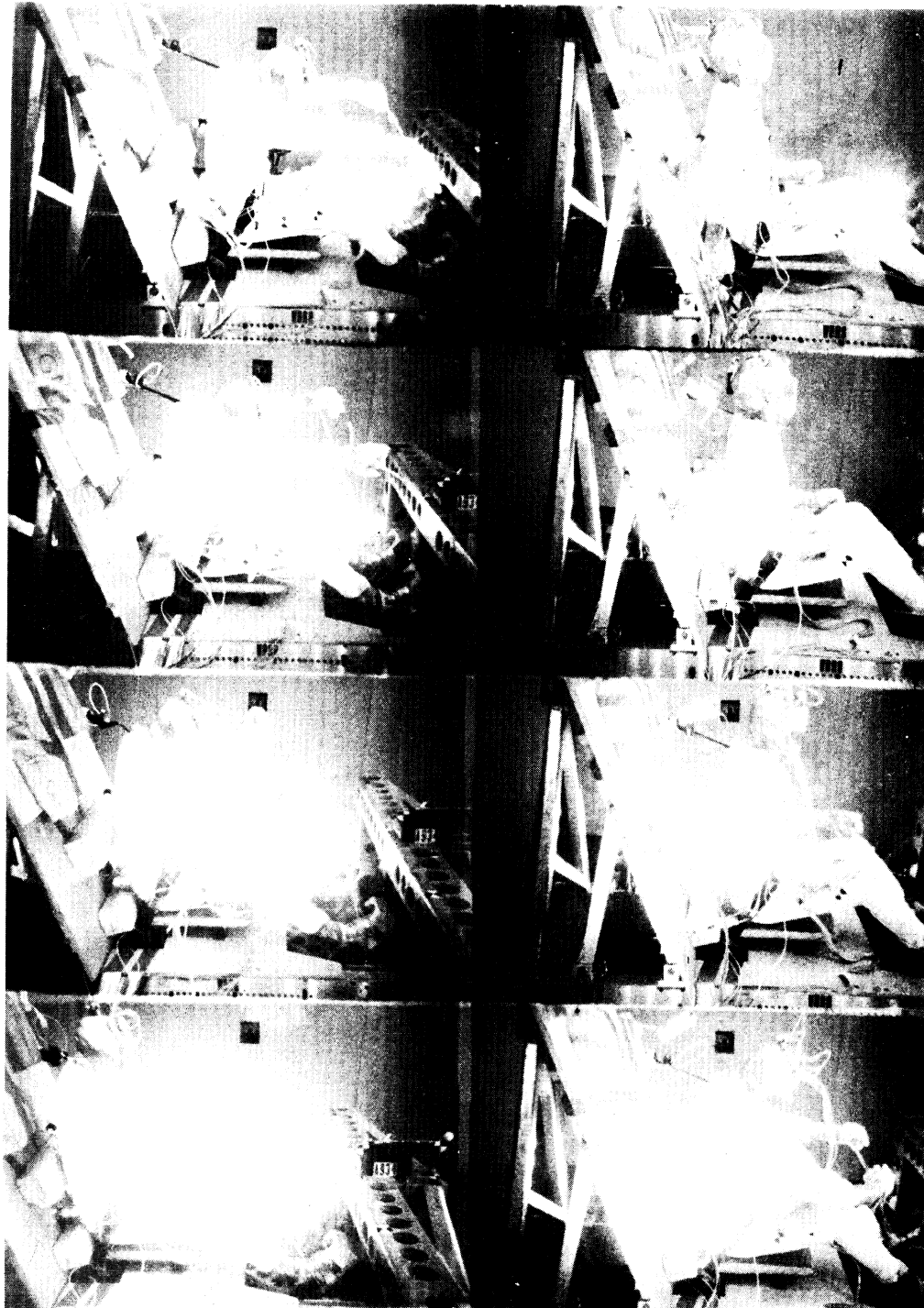
< 9 > 7.E+01

< 10 > 5.E+01

10 MS  
20 PTS

FILE9:211-220, TAPE:GWA-CAD

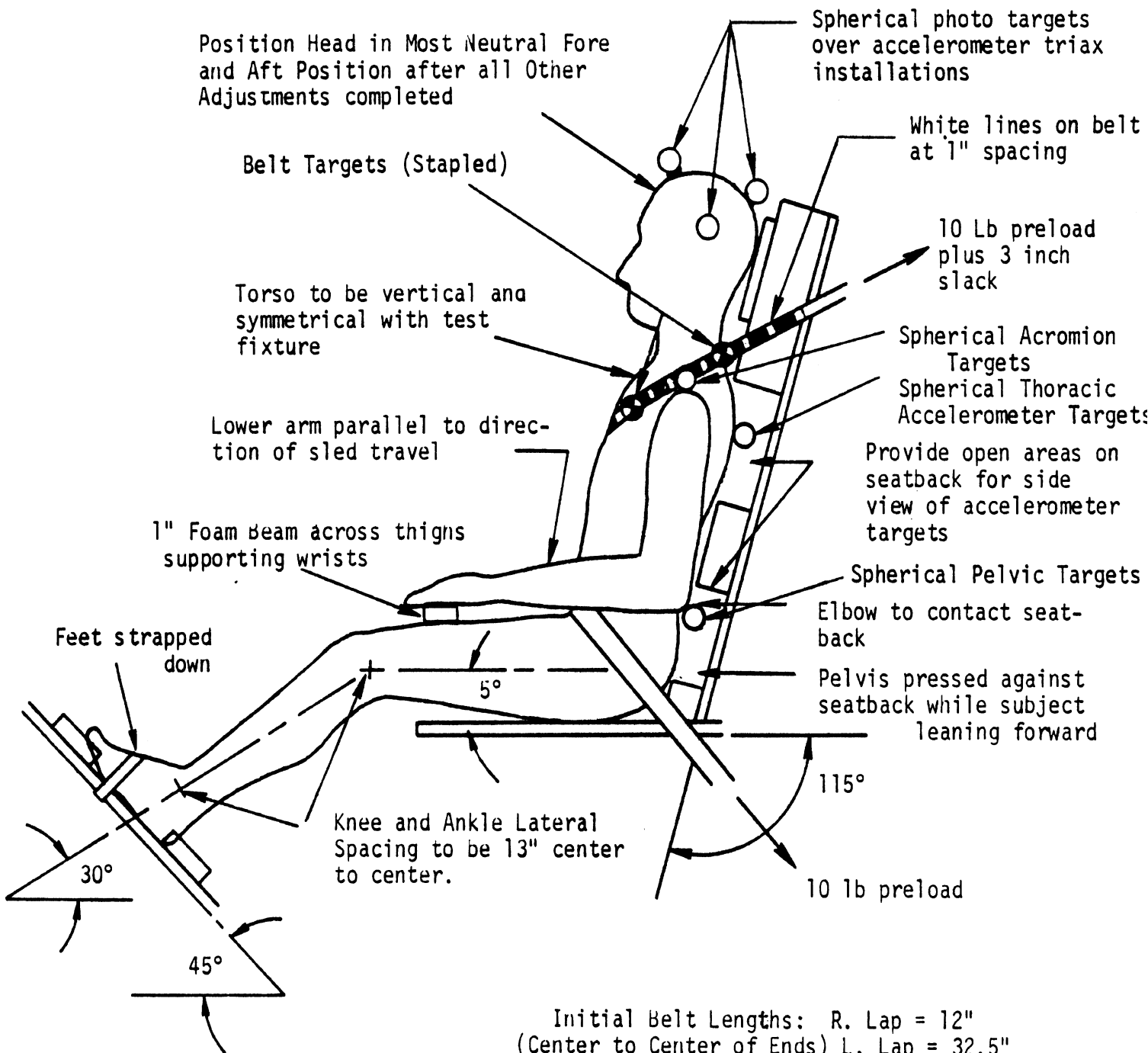
412 PTS • 1500 HZ = 258.9 MS



**A 934**

A-934: GRAPHCHECK SEQUENCE

# A-935



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

## Femur Target Spacing:

Right Side = 5 1/4 in.  
 Left Side = 5 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

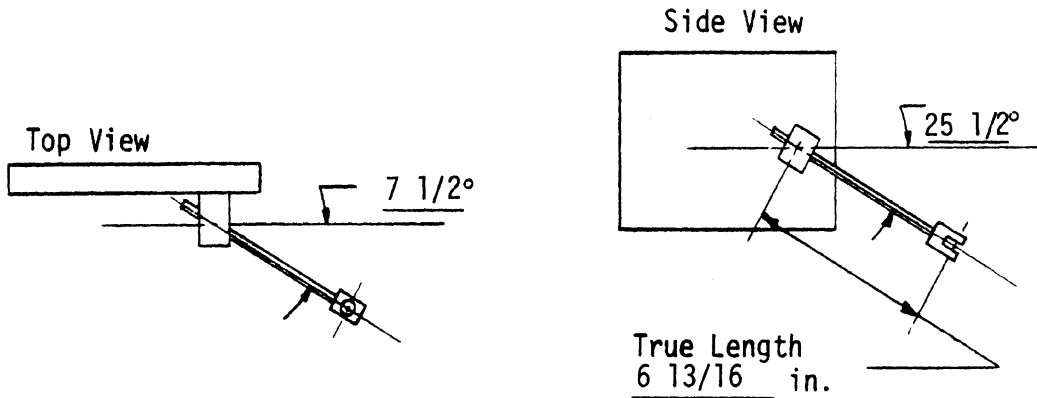
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

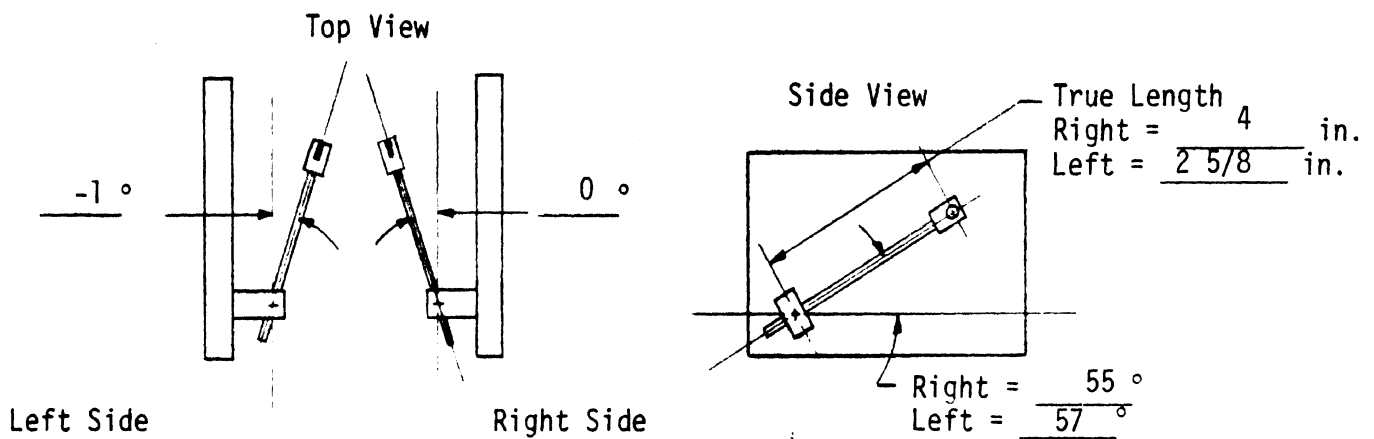
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



B. LAP BELT

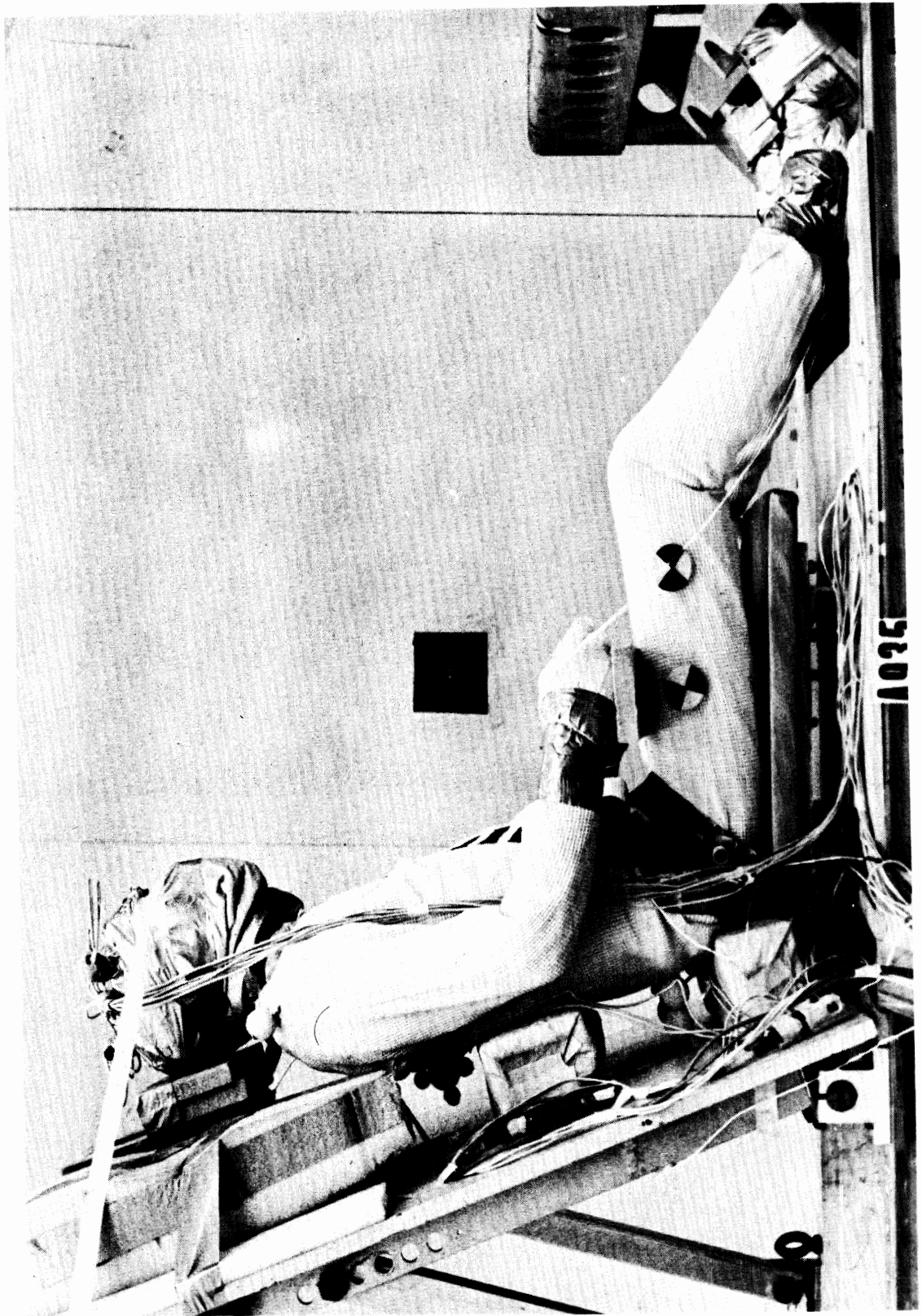


Sketch indicates positive angle directions

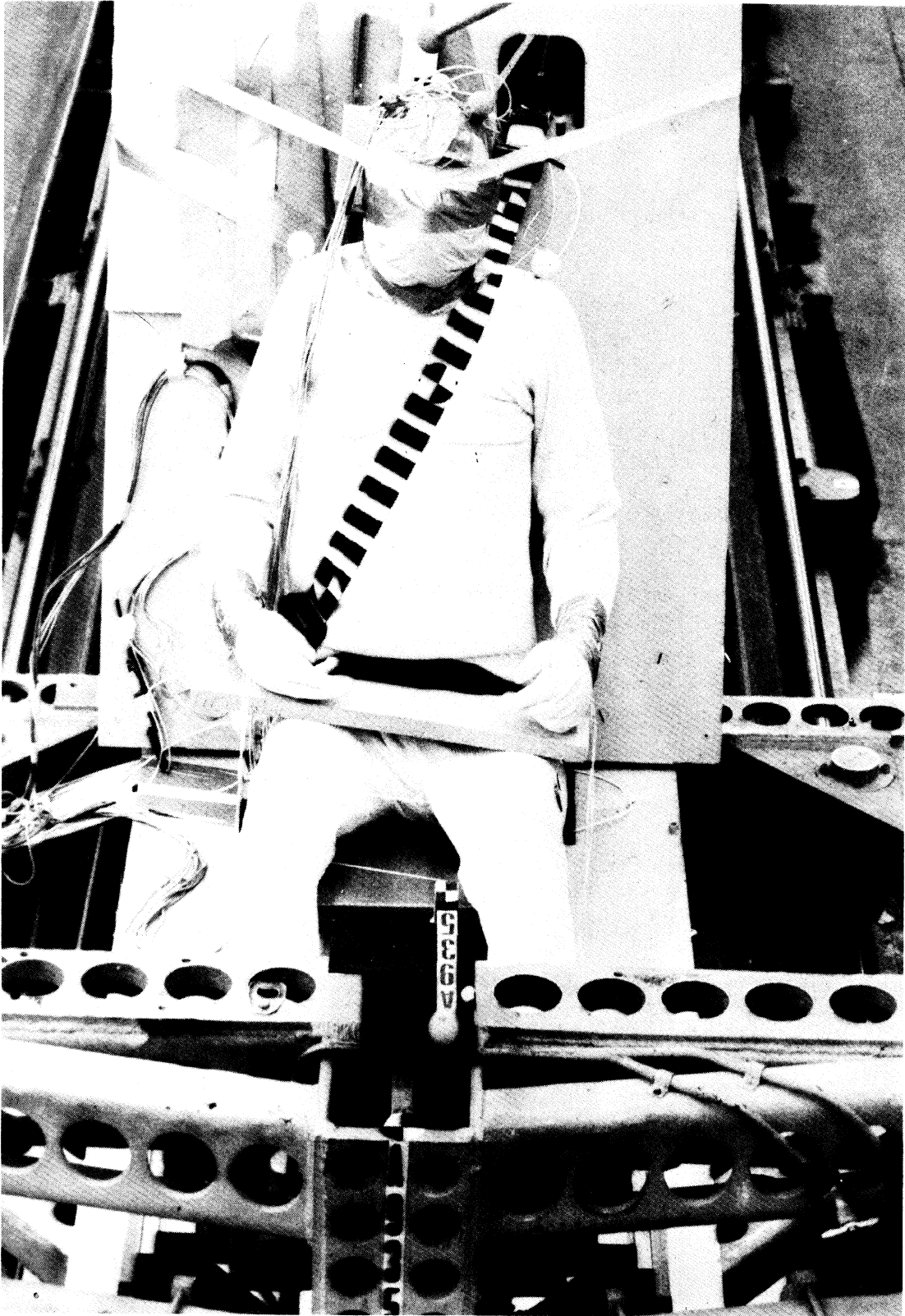
BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	<u>12</u>	<u>12</u>	<u>0</u>	<u>11 1/4</u>
Lt. Lap	<u>32 1/2</u>	<u>32 1/2</u>	<u>0</u>	<u>31 3/4</u>
Shoulder	<u>42</u>	<u>42</u>	<u>0</u>	<u>40 3/8</u>

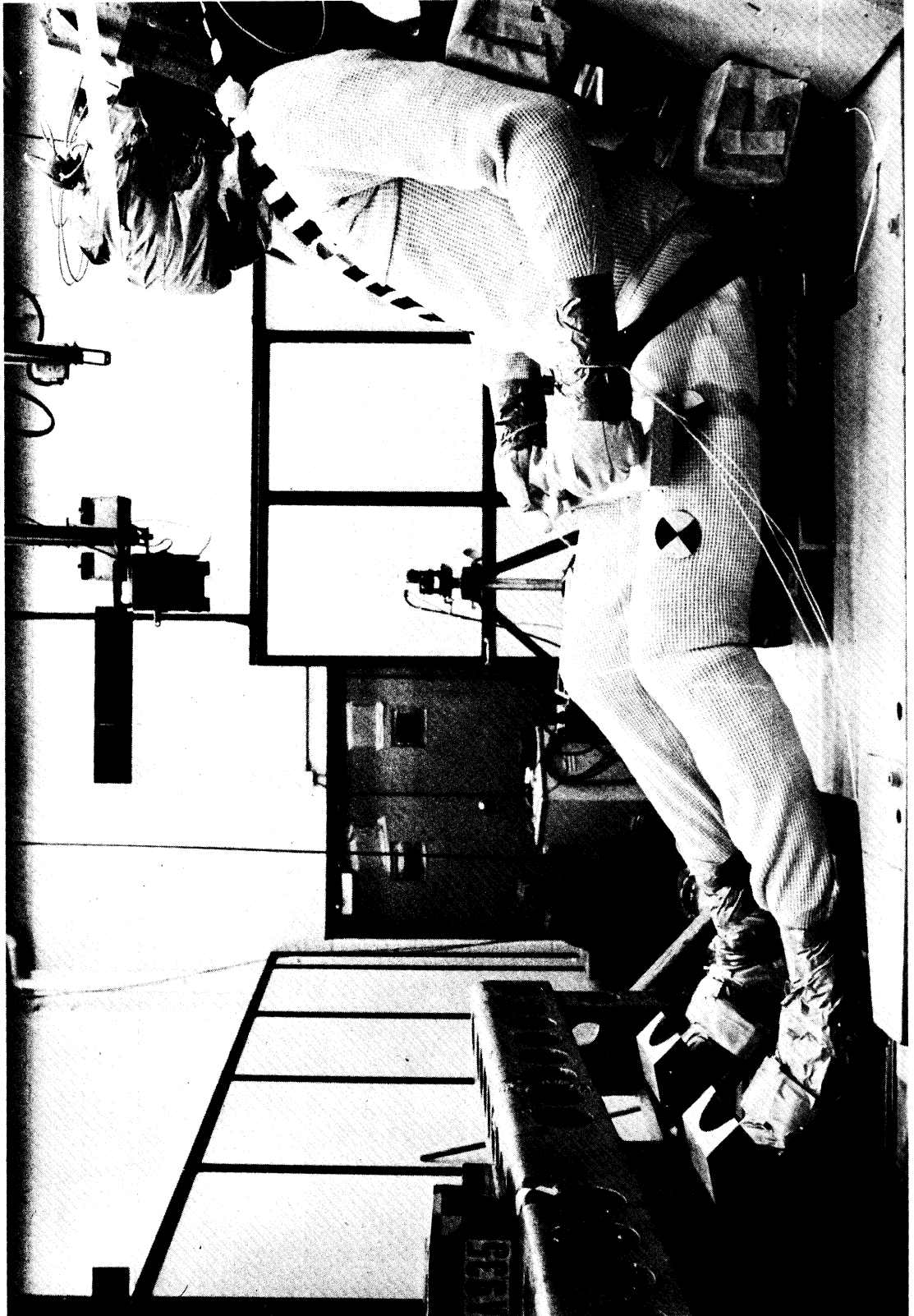




A-935: RIGHT SIDE VIEW



A-935: FRONT VIEW



A-935: LEFT SIDE VIEW

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-935-11 MBR-8

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSKI) EXPANDED 1601, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 24-AUG-76

TEST SIGNALS: 1587 PTS/CH AT 6399.35 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
221	11	SLED DECELERATION	20.00	G'S	4+1+1	80.0	394	1599.84
222	21	AX1 HEAD A001 ACC	40.60	G'S	4+1+18	570.1	394	1599.84
223	31	AY1 HEAD B001 ACC	41.50	G'S	4+1+18	570.1	394	1599.84
224	41	AZ1 HEAD C001 ACC	45.70	G'S	4+1+18	570.1	394	1599.84
225	51	AX2 HEAD C002 ACC	39.70	G'S	4+1+18	570.1	394	1599.84
226	61	AY2 HEAD A002 ACC	42.80	G'S	4+1+18	570.1	394	1599.84
227	71	AZ2 HEAD B002 ACC	50.30	G'S	4+1+18	570.1	394	1599.84
228	81	AX3 HEAD B003 ACC	49.70	G'S	4+1+18	570.1	394	1599.84
229	91	AY3 HEAD C003 ACC	44.50	G'S	4+1+18	570.1	393	1599.84
230	101	AZ3 HEAD A003 ACC	34.10	G'S	4+1+18	570.1	393	1599.84

111

121

131

141

----- FILTERED FILES: 221 - 230 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-935-11 MBR-8 -----

SEP 13, 1978 / 11:32:54

RUN ID: A-935-1: WBR-8

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 5.E+00

< 3 > 3.E+00

< 4 > 4.E+00

< 5 > 2.E+00

< 6 > 3.E+00

< 7 > 4.E+00

< 8 > 3.E+00

< 9 > 5.E+00

< 10 > 3.E+00

10 MS  
20 PTS

FILES: 221-230, TAPE: GNR-CAD

394 PTS • 1589 HZ = 245.6 MS

=====

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

RUN ID: A-935-2: WBR-R

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1601, WAS A/D CONVERTED TO DIGITAL TAPE; GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1586 PTS/CH AT 6397.42 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING RATE
----	---	-----	-----	-----	-----	-----	---	-----
231	1	SLED DECELERATION	20.00	G'S	4+1+1	80.0	394	1599.35
232	2	PELVIS BIAX P-A ACC	-53.00	G'S	4+1+12	285.0	394	1599.35
233	3	PELVIS BIAX I-S ACC	44.60	G'S	4+1+12	285.0	394	1599.35
234	4	THORAX TRIAX P-A ACC	37.50	G'S	4+1+12	285.0	394	1599.35
235	5	THORAX TRIAX I-S ACC	-37.00	G'S	4+1+12	285.0	394	1599.35
236	6	THORAX TRIAX R-L ACC	37.50	G'S	4+1+12	285.0	394	1599.35
237	7	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.0	394	1599.35
238	8	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.0	394	1599.35
239	9	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.0	393	1599.35
240	10	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.0	393	1599.35

111  
121  
131  
141

-----  
FILTERED FILES: 231 - 240 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-935-2: WBR-R

SEP 13, 1976 / 11:33:26

RUN ID: A-935-2; WBR-8

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 2.E+00

< 3 > 2.E+00

< 4 > 3.E+00

< 5 > 2.E+00

< 6 > 3.E+00

< 7 > 1.E+02

< 8 > 6.E+01

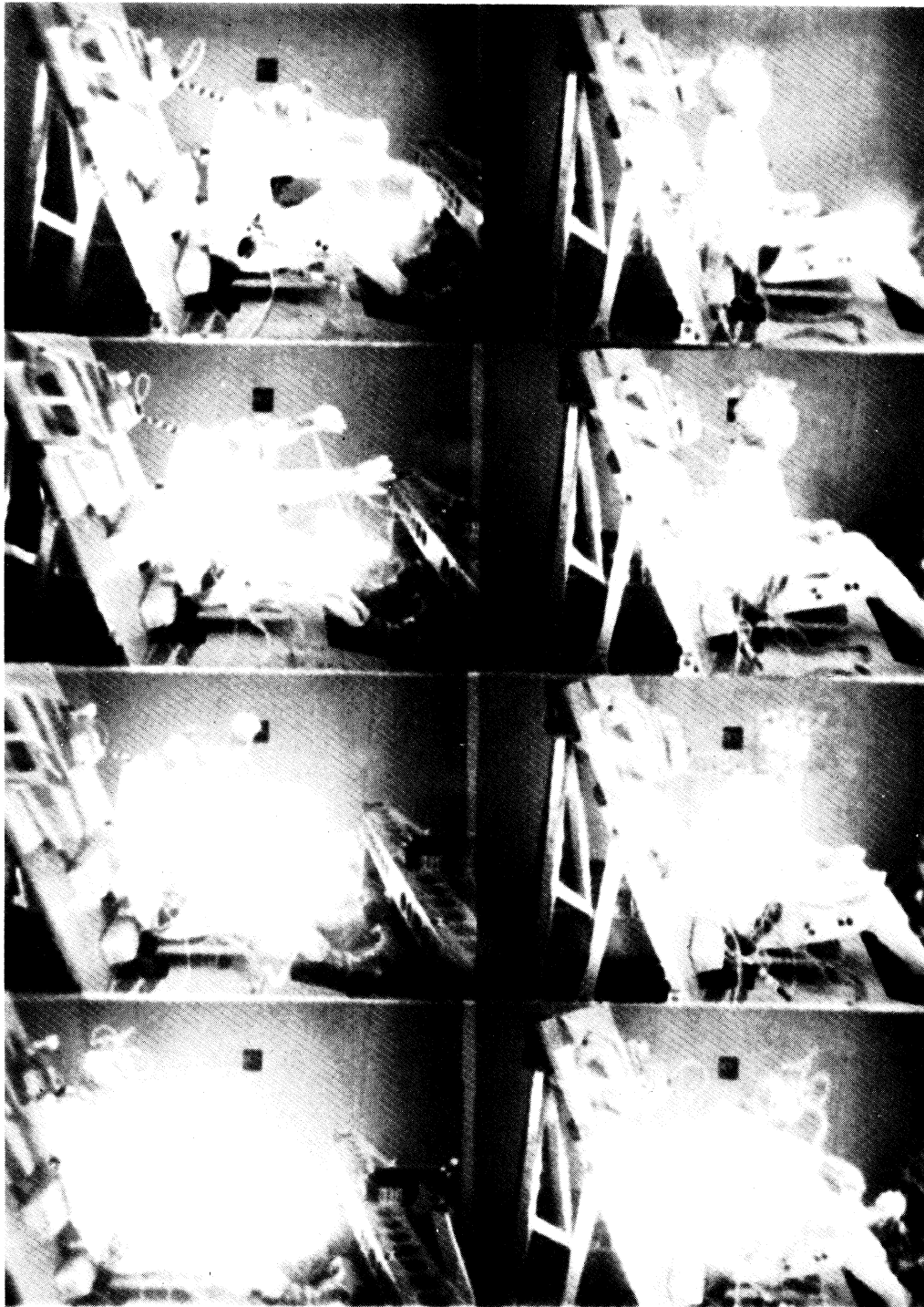
< 9 > 7.E+01

< 10 > 8.E+01

10 MS  
20 PTS

FILES: 231-240, TAPE: GNR-CRD

394 PTS • 1599 HZ = 245.7 MS

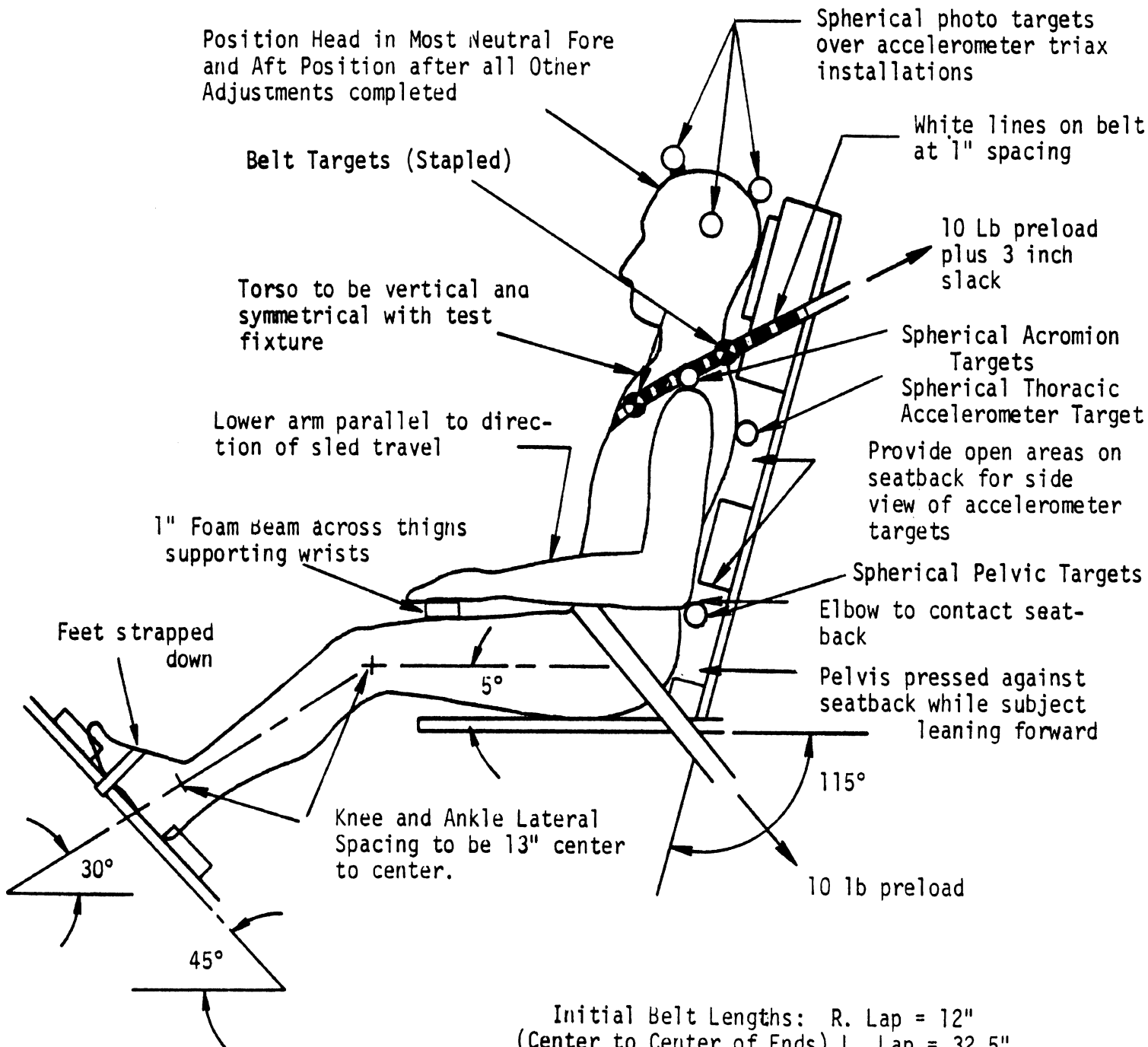


# A 935

A-935: GRAPHCHECK SEQUENCE



# A-936



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

**Femur Target Spacing:**

Right Side = 5 1/4 in.  
 Left Side = 5 1/2 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

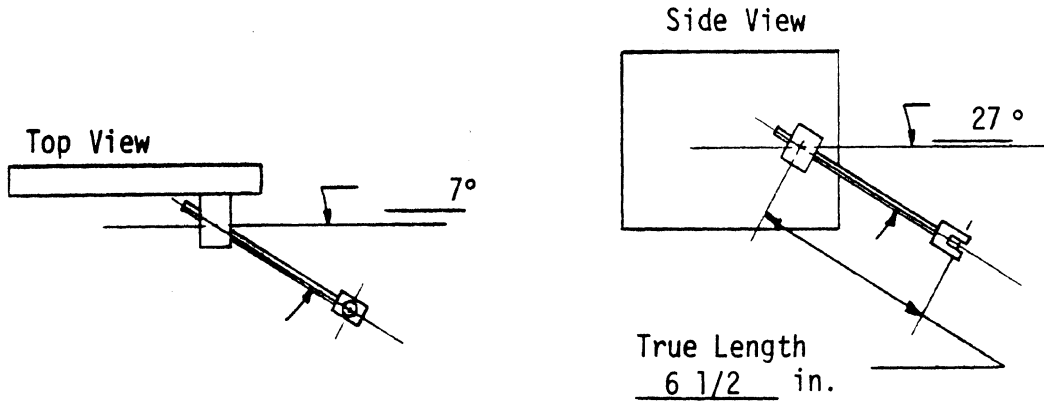
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

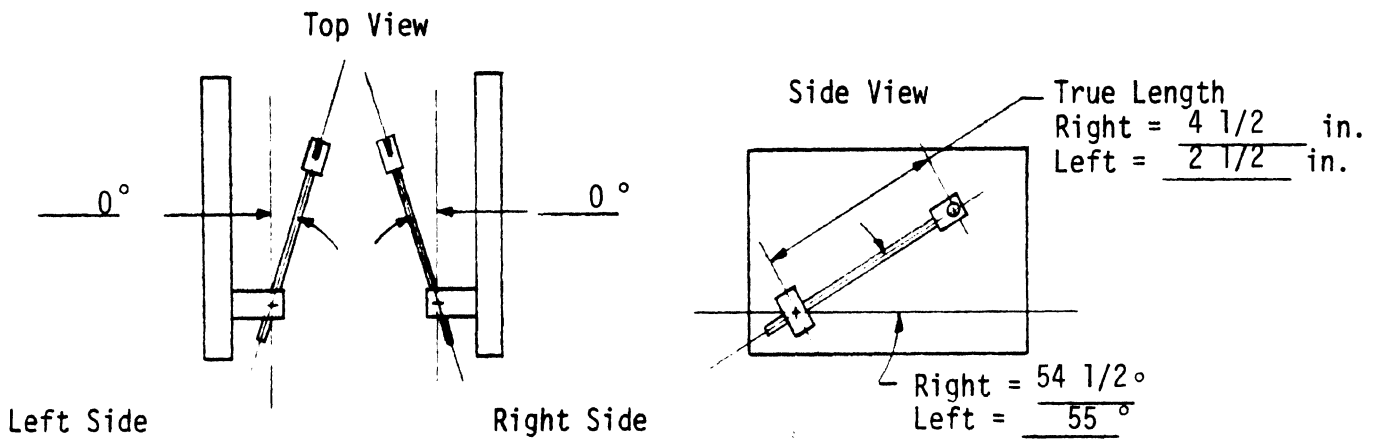
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



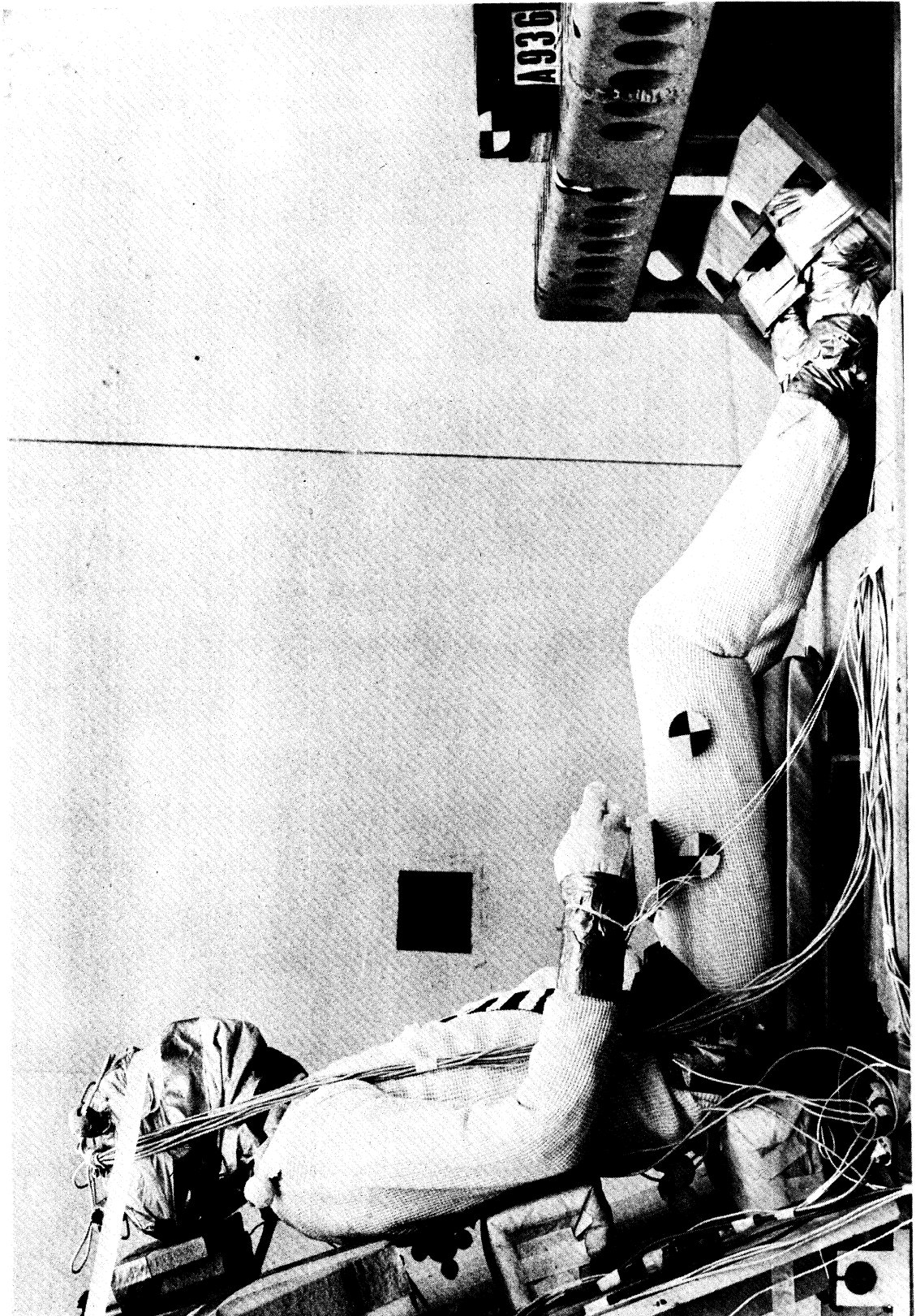
B. LAP BELT



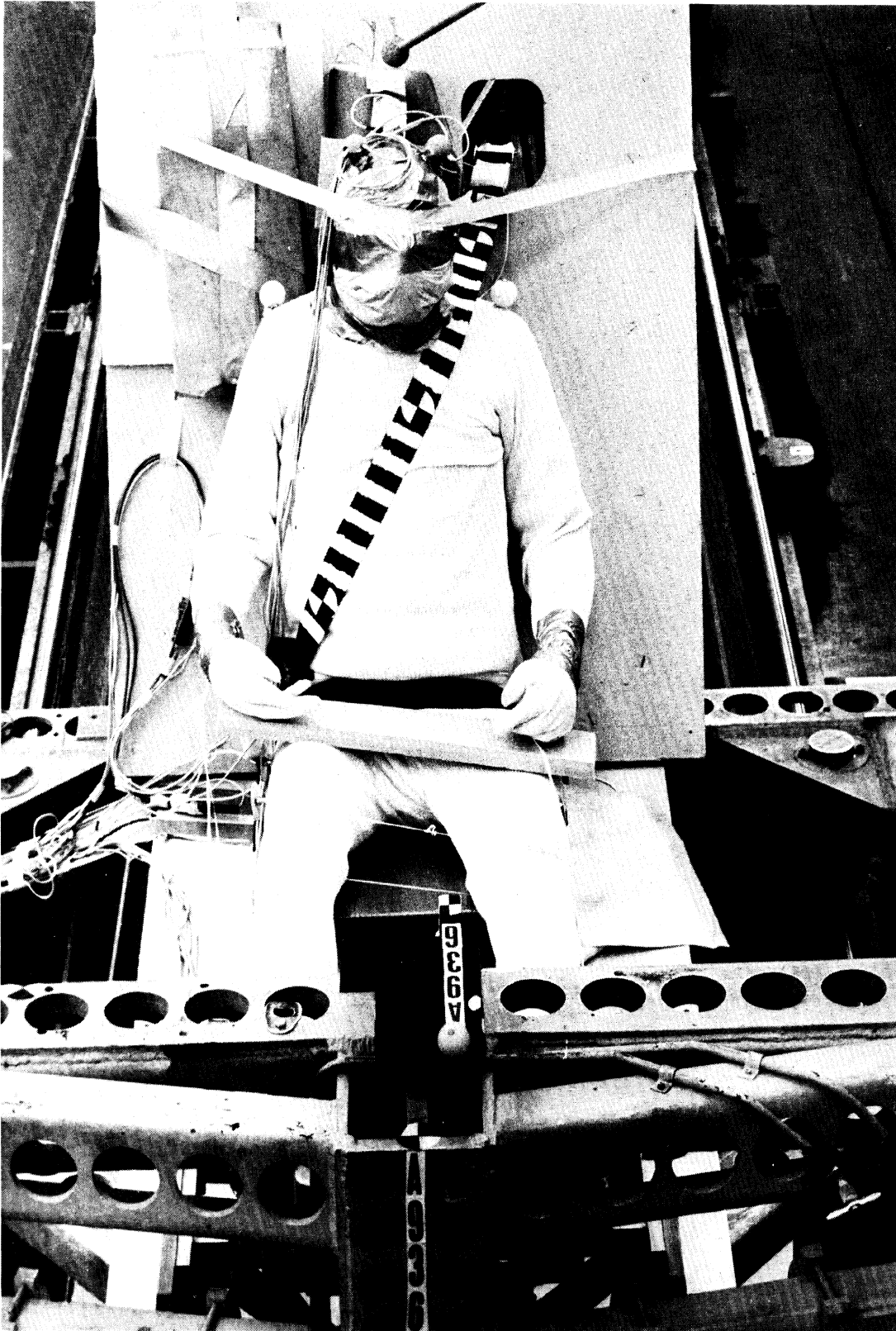
Sketch indicates positive angle directions

BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	<u>12</u>	<u>12</u>	<u>0</u>	<u>11 1/4</u>
Lt. Lap	<u>32 1/2</u>	<u>32 1/4</u>	<u>- 1/4</u>	<u>31 3/8</u>
Shoulder	<u>42</u>	<u>42</u>	<u>1/4</u>	<u>41 3/4</u>



A-936: RIGHT SIDE VIEW



A-936: FRONT VIEW



A-936: LEFT SIDE VIEW

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-936-1: WBR-R

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 24-AUG-76

TEST SIGNALS: 1663 PTS/CH AT 6400.46 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
241	1	SLED DECELERATION	20.00	G'S	4+1+1	80.0	412	1600.12
242	2	AX1 HEAD A0Q1 ACC	-48.60	G'S	4+1+18	570.2	412	1600.12
243	3	AY1 HEAD B0Q1 ACC	-41.50	G'S	4+1+18	570.2	412	1600.12
244	4	AZ1 HEAD C0Q1 ACC	-45.70	G'S	4+1+18	570.2	412	1600.12
245	5	AX2 HEAD C0Q2 ACC	-39.70	G'S	4+1+18	570.2	412	1600.12
246	6	AY2 HEAD A0Q2 ACC	-42.80	G'S	4+1+18	570.2	412	1600.12
247	7	AZ2 HEAD B0Q2 ACC	-50.30	G'S	4+1+18	570.2	412	1600.12
248	8	AX3 HEAD B0Q3 ACC	-49.70	G'S	4+1+18	570.2	412	1600.12
249	9	AY3 HEAD C0Q3 ACC	-44.50	G'S	4+1+18	570.2	412	1600.12
250	10	AZ3 HEAD A0Q3 ACC	-34.10	G'S	4+1+18	570.2	412	1600.12

11:

12:

13:

14:

-----  
 FILTERED FILES: 241 - 250 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-936-1: WBR-R

SEP 13, 1978 / 11:34:24

RUN ID: A-936-1: WBR-8

10 MS

20 PTS

< 1 > 3.E+00

< 2 > 8.E+00

< 3 > 4.E+00

< 4 > 5.E+00

< 5 > 5.E+00

< 6 > 6.E+00

< 7 > 8.E+00

< 8 > 5.E+00

< 9 > 7.E+00

< 10 > 5.E+00

10 MS

20 PTS

FILES: 241-250, TAPE: GNR-CAD

412 PTS • 1600 HZ = 256.9 MS

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-936-2: WBP-R

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1611; WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 25-AUG-76

TEST SIGNALS: 1662 PTS/CH AT 6401.85 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
251	- 1:	SLED DECELERATION	20.00	G'S	4+1+1	80.0	412	1600.46
252	- 2:	PELVIS 6IAX P-A ACC	-53.00	G'S	4+1+12	285.2	412	1600.46
253	- 3:	PELVIS 6IAX I-S ACC	44.60	G'S	4+1+12	285.2	412	1600.46
254	- 4:	THORAX TRIAX P-A ACC	37.50	G'S	4+1+12	285.2	412	1600.46
255	- 5:	THORAX TRIAX I-S ACC	-37.00	G'S	4+1+12	285.2	412	1600.46
256	- 6:	THORAX TRIAX R-L ACC	37.50	G'S	4+1+12	285.2	412	1600.46
257	- 7:	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.2	412	1600.46
258	- 8:	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.2	412	1600.46
259	- 9:	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.2	412	1600.46
260	- 10:	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.2	412	1600.46

11:

12:

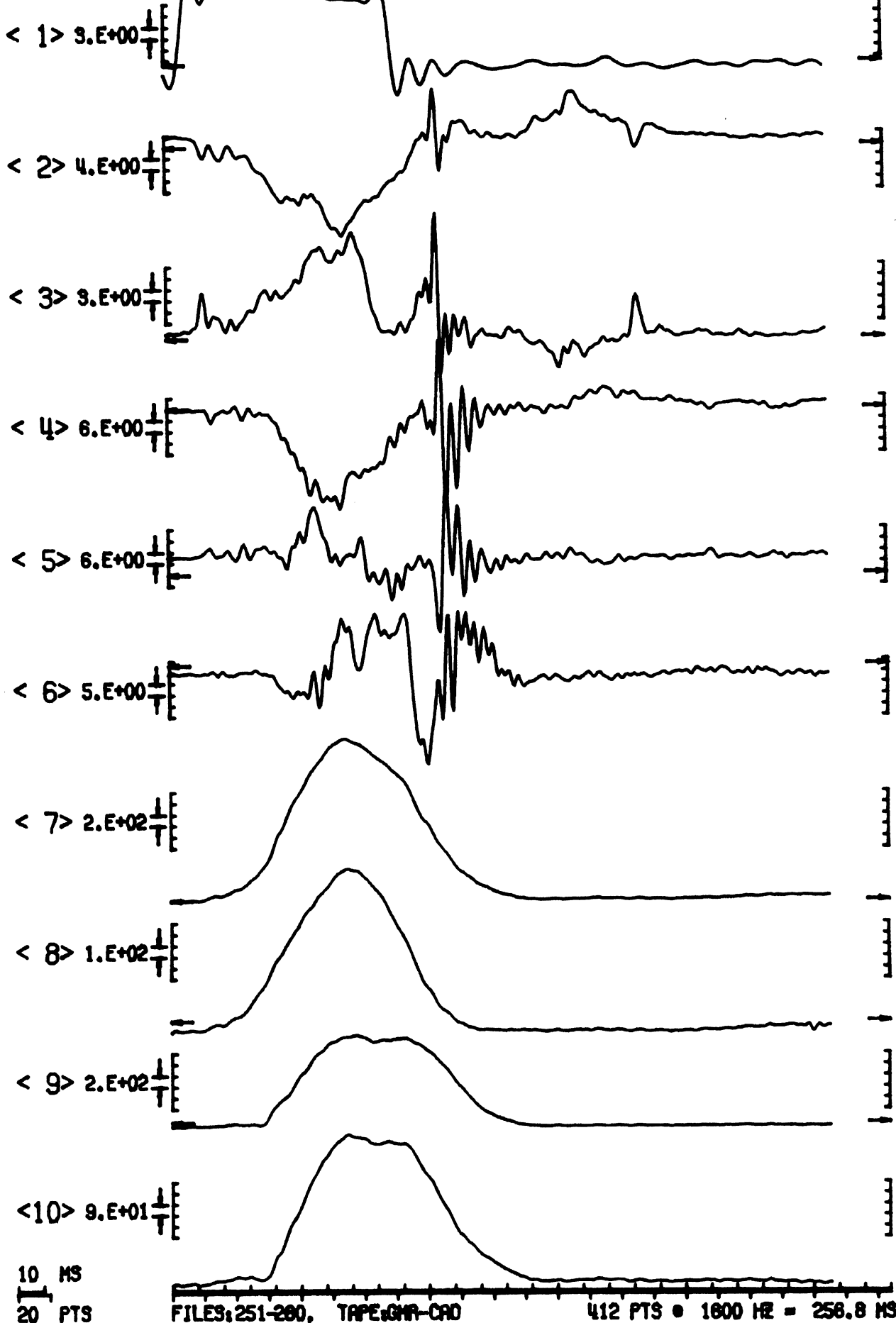
13:

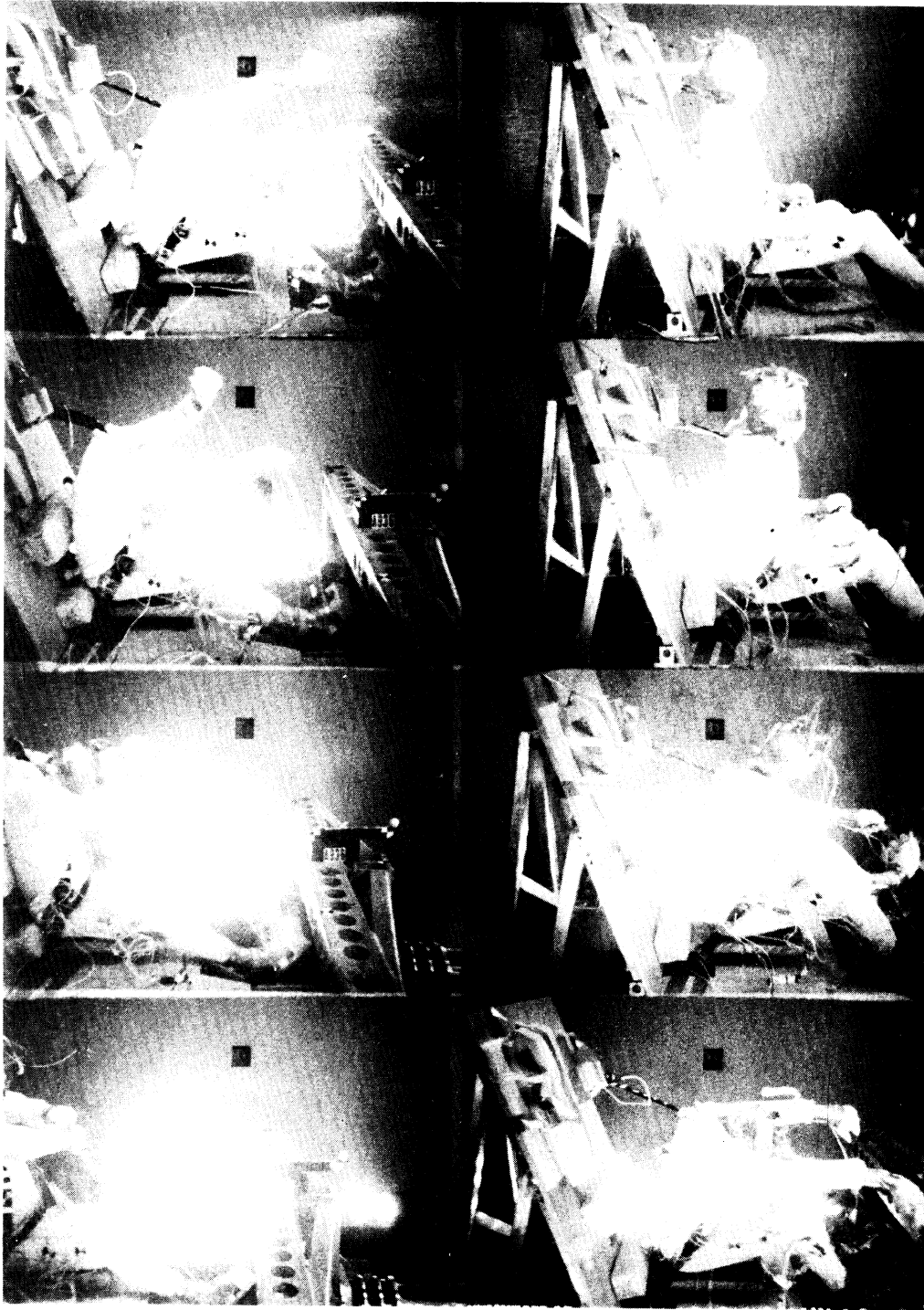
14:

===== FILTERED FILES: 251 - 260 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-936-2: WBP-R =====



10 MS  
20 PTS





# A936

A-936: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-9

TEST: A-938

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>101</u>
Frontal X-rays	<u>105</u>
Lateral X-rays	<u>111</u>
Head x-rays & Analysis	<u>117</u>
Instrumentation	<u>120</u>
Thorax Autopsy	<u>122</u>

For Each Test: A-938

\_\_\_\_\_

Setup Diagram	<u>123</u>
Belts/anchors	<u>124</u>
Setup photographs	<u>125</u>
Digitized Signals (7600)	<u>128</u>
Digitized Signals (CEC)	<u>130</u>
Graphcheck	<u>132</u>

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



WHOLE BODY RESPONSE: ANTHROPOMETRY

WBR #: 9  
 CADAVER ID: 20336

DATE: December 15, 1975

ANTHROPOMETRIST: \_\_\_\_\_

Anthropometric Measurements: (All measurements except weight listed in cm)

(A = Anthropometer; Sp. C. = Spreading Calipers; Sl. C. = sliding calipers; T = Tapes)

1. Weight		<u>62.3 kg.</u>
2. Stature (A)		<u>172.7</u>
3. Trochanterion Hgt. (A)	Rt.	<u>85.0</u>
	Lt.	<u>84.5</u>
4. Anterior-Superior Iliac Spine Hgt. (A)	Rt.	<u>78.2</u>
	Lt.	<u>78.4</u>
5. Iliocristale Hgt. (A)	Rt.	<u>71.1</u>
	Lt.	<u>70.9</u>
6. Substernale Hgt. (A)		<u>30.8</u>
7. Axilla Hgt. (A)		<u>40.9</u>
8. Suprasternale Hgt. (A)		<u>50.9</u>
9. Hipple Hgt. (A)		<u>--</u>
10. Mastoid Hgt. (A)		<u>14.8</u>
11. Nuchale Hgt. (A)		<u>12.9</u>
12. Tragion Hgt. (A)	Rt.	<u>11.8</u>
	Lt.	<u>12.3</u>
13. Menton Hgt. (A)		<u>--</u>
14. Head Breadth (Sp. C.)		<u>14.5</u>
15. Head Length (Sp. C.)		<u>18.6</u>

Cad. I.D. 20336

16. Bitragion Diameter (Sp. C.)	<u>14.6</u>
17. Bigonial Diameter (Sp. C.)	<u>10.7</u>
18. Menton Diagonal (Sp. C.)	<u>--</u>
19. Mastoid Diagonal (A)	<u>16.5</u>
20. Head Circumference (T)	<u>56.4</u>
21. Mid-Sagittal Arc Length (T)	<u>31.7</u>
22. Coronal Arc Length (T)	<u>33.6</u>
23. Mid-Neck Circumference (T)	<u>34.8</u>
24. Chest Circumference at Axilla (T)	<u>--</u>
25. Chest Circumference at Nipple (T)	<u>87.4</u>
26. Chest Circumference at Substernale (T)	<u>--</u>
27. Hip Circumference, Iliocristale (T)	<u>82.8</u>
28. Buttocks Circumference, Trochanterion (T)	<u>83.9</u>
29. Upper Arm Circumference, Axilla (T)	<u>24.8</u>
30. Upper Arm Circumference, Mid Biceps (T)	<u>21.9</u>
31. Upper Arm Circumference, Humeral Condyles (T)	<u>21.8</u>
32. Maximum Forearm Circumference (T)	<u>21.5</u>
33. Wrist Circumference (T)	<u>15.4</u>
34. Upper Thigh Circumference (T)	<u>44.0</u>
35. Mid-Thigh Circumference (T)	<u>38.5</u>
36. Lower Thigh Circumference (T)	<u>32.2</u>
37. Maximum Calf Circumference (T)	<u>27.9</u>
38. Ankle Circumference (T)	<u>18.4</u>

WBR: 9

Page 4

Cad. I.D. 20336

58. Ball of Humerus - Radiale Length (A)	<u>31.5</u>
59. Radiale-Stylion Length (A)	<u>25.0</u>
60. Olecronan-Stylion Length (A)	<u>26.1</u>
61. Femur Length (A)	<u>42.1</u>
62. Tibia Length (A)	<u>36.4</u>
63. Fibula Length (A)	<u>37.7</u>
64. Upper Arm Depth, Mid Biceps (S1.C.)	<u>7.9</u>
65. Humeral Biépicondylar Breadth (S1.C.)	<u>6.5</u>
66. Forearm Depth (S1.C.)	<u>6.7</u>
67. Wrist Depth (S1.C.)	<u>3.7</u>
68. Hand Length (S1.C.)	<u>18.3</u>
69. Hand Breadth (S1.C.)	<u>8.2</u>
70. Hand Depth (S1.C.)	<u>2.2</u>
71. Thigh Breadth, Mid-Thigh (S1.C.)	<u>10.7</u>
72. Calf Depth (S1.C.)	<u>9.6</u>
73. Bimalleolus Breadth (S1. C.)	<u>6.5</u>
74. Foot Length (S1.C.)	<u>21.8</u>
75. Foot Breadth (S1.C.)	<u>9.0</u>

Cad. I.D. 20336

39. Biacromial Diameter (A)		<u>34.2</u>
40. Bideltoid Breadth (A)		<u>42.3</u>
41. Chest Breadth at Axilla (A)		<u>--</u>
42. Chest Breadth at Mid-Point between Supra- sternale and Substernale		<u>29.3</u>
43. Chest Breadth at Substernale (A)		<u>--</u>
44. Hip Breadth, Iliocristale (A)		<u>29.1</u>
45. Bispinous Diameter (A)		<u>25.0</u>
46. ASIS to Symphision Distance (A)	Rt.	<u>15.8</u>
	Lt.	<u>16.2</u>
47. Bitrochanteric Diameter (A)		<u>29.3</u>
48. Chest Depth at Suprasternale (A)		<u>16.2</u>
49. Chest Depth at Axilla (A)		<u>          </u>
50. Chest Depth at Nipple (A)		<u>20.2</u>
51. Chest Depth at Substernale (A)		<u>22.5</u>
52. Hip Depth, Iliocristale (A)		<u>23.0</u>
53. ASIS Depth (A)	Rt.	<u>16.6</u>
	Lt.	<u>15.9</u>
54. Buttocks Depth, Trochanterion (A)		<u>19.5</u>
55. Trochanterion	Rt.	<u>--</u>
	Lt.	<u>--</u>
56. Symphision (Hgt.)		<u>--</u>
57. Acromion-Radiale Length		<u>33.8</u>



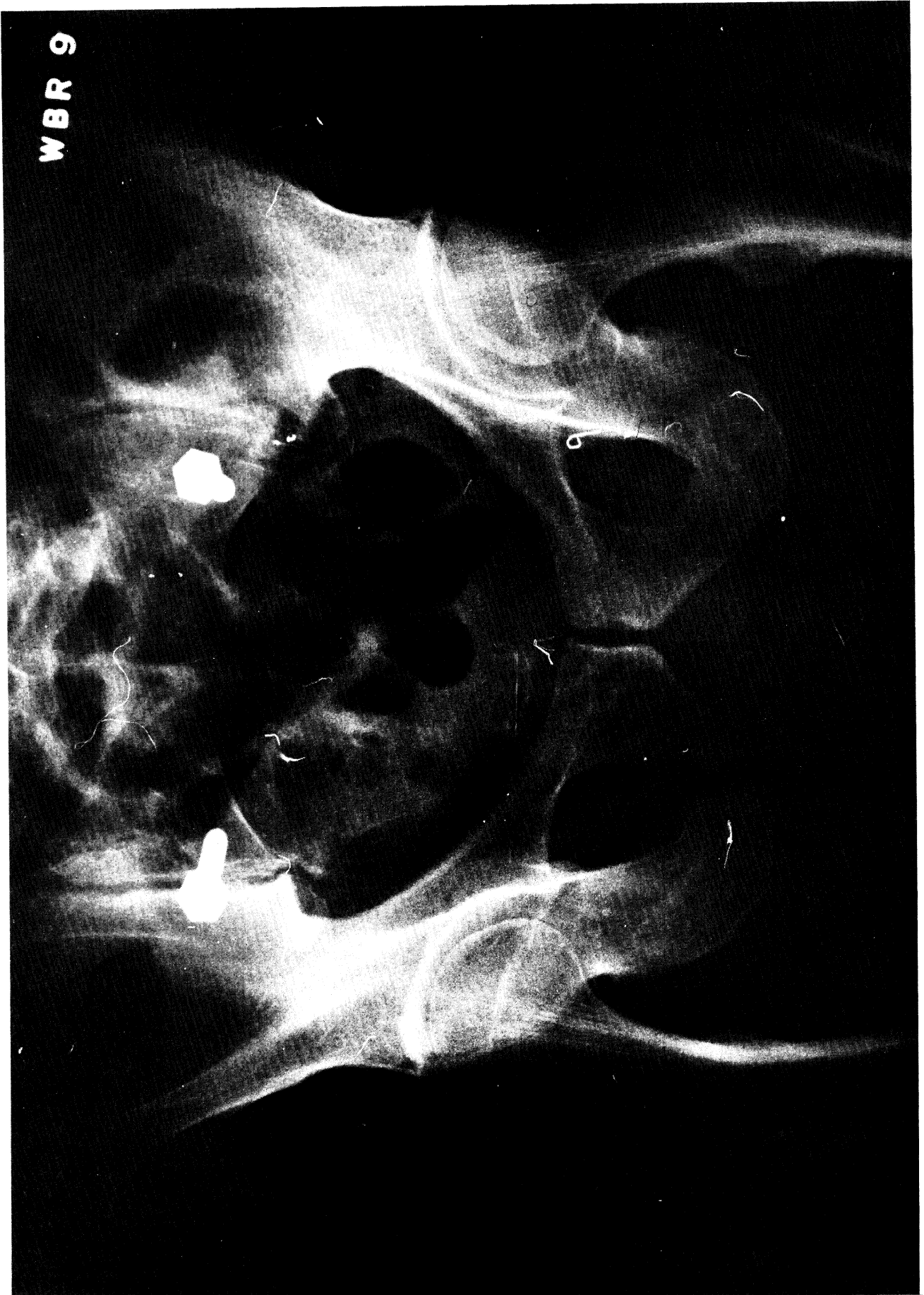


WBR-9: FRONTAL X-RAY



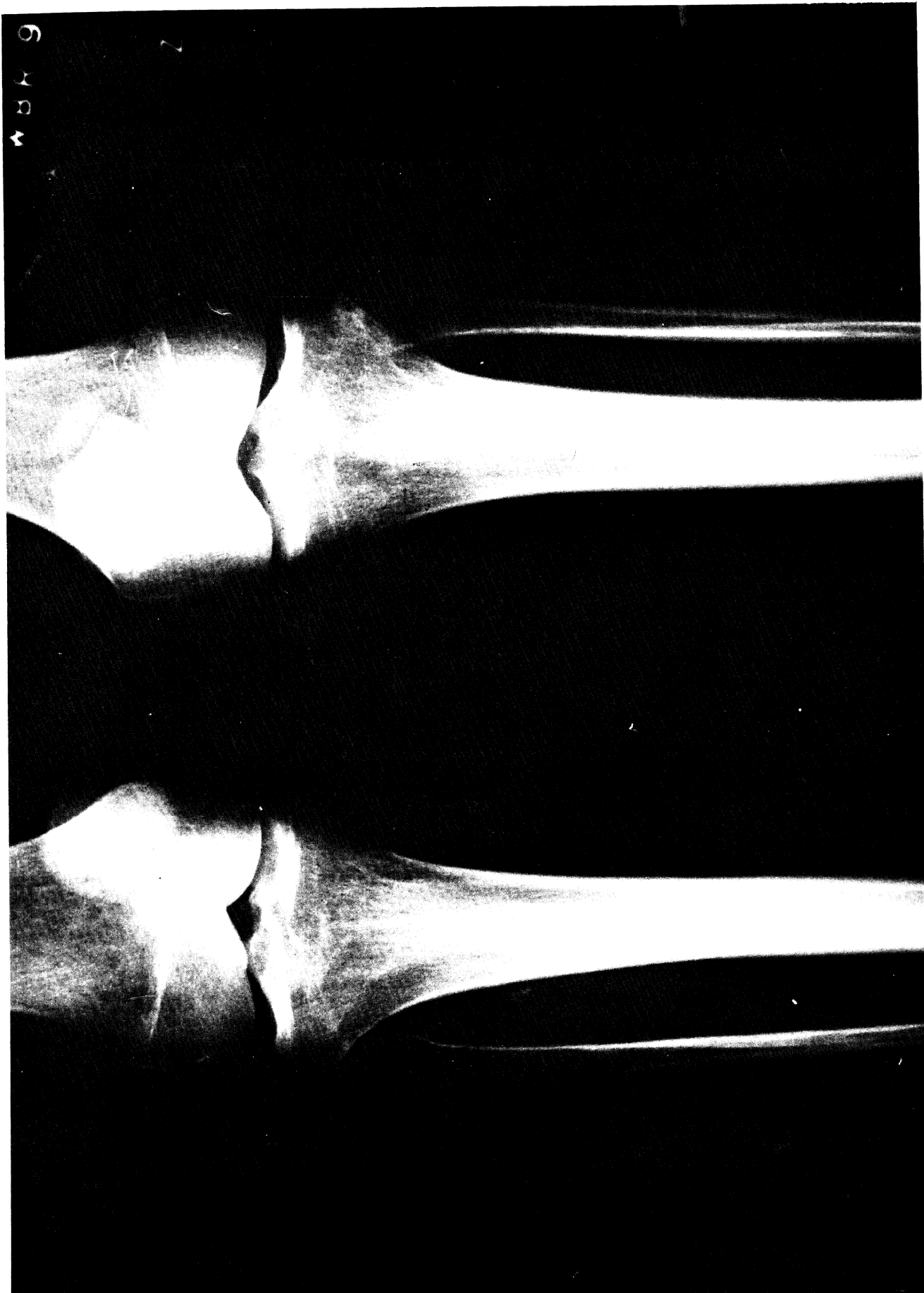
WBR-9: FRONTAL X-RAY

WBR 9



WBR-9: FRONTAL X-RAY





WBR-9: FRONTAL X-RAY





WBR-9: LATERAL X-RAY





WBR-9: LATERAL X-RAY

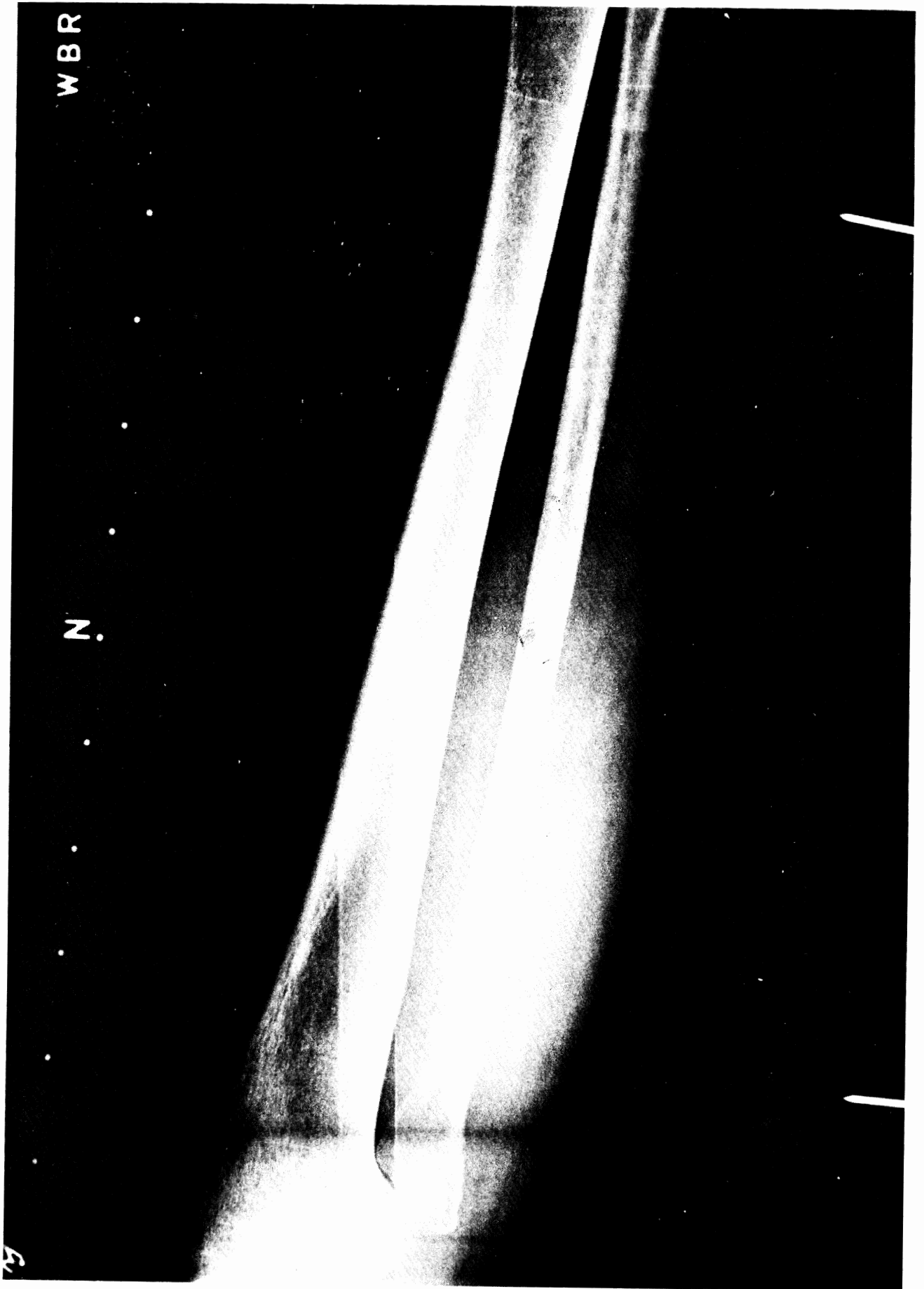




WBR-9: LATERAL X-RAY



WBR-9: LATERAL X-RAY



WBR-9: LATERAL X-RAY



A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	0.680	3.840	13.50	0.710	3.870	16.25
P2- L.EYE:	-0.470	2.100	11.25	3.720	2.090	14.75
P3- R.EAR:	1.630	0.660	16.00	-2.420	0.510	17.00
P4- L.EAR:	-0.900	-2.400	11.50	2.960	-2.750	14.50
Q1- ACC. :	-3.730	-5.390	17.00	-3.750	-5.290	13.00
Q2- ACC. :	-6.210	1.170	12.50	1.380	0.750	9.50
Q3- ACC. :	-2.330	3.990	17.50	-4.640	3.410	14.00
R1,R2,R3 :	5.138	4.229	4.301			

COORDINATES W.R.T. CAMERA			COORDINATES W.R.T. CAMERA				
X	Y	Z	X	Y	Z		
P1 :	0.507	0.499	2.792	Q1:	-2.579	-2.826	-3.857
P2 :	-0.367	2.702	1.579	Q2:	-4.727	1.115	0.748
P3 :	1.152	-1.673	0.410	Q3:	-1.593	-3.424	2.622
P4 :	-0.699	2.162	-1.936	P:	-5.369	-2.966	0.469
C :	0.227	0.244	-0.763	CP:	-5.595	-3.210	1.232

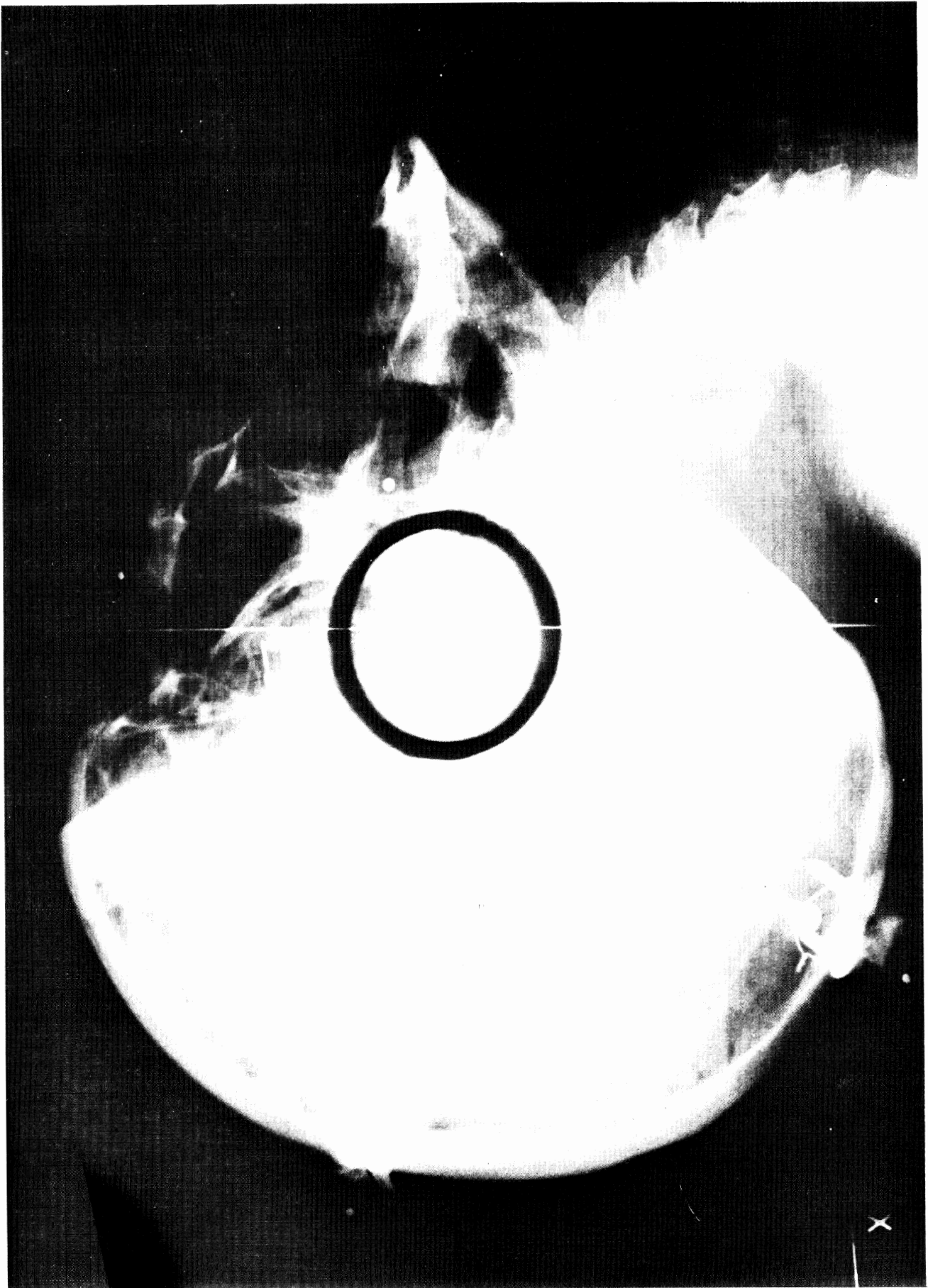
ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<I> :	-0.07406	0.47622	0.87620	1.0000	-0.0000	0.0
<J> :	-0.35453	0.80806	-0.46915	-0.0000	0.9988	0.0000
<K> :	-0.93172	-0.34549	0.10902	0.0	0.0000	0.9994

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<E1>:	0.54176	0.02722	-0.84009	1.0000	0.0540	0.0512
<E2>:	0.15490	0.98562	0.06750	0.0540	1.0000	0.0637
<E3>:	0.86383	-0.10492	0.49274	0.0512	0.0637	1.0000

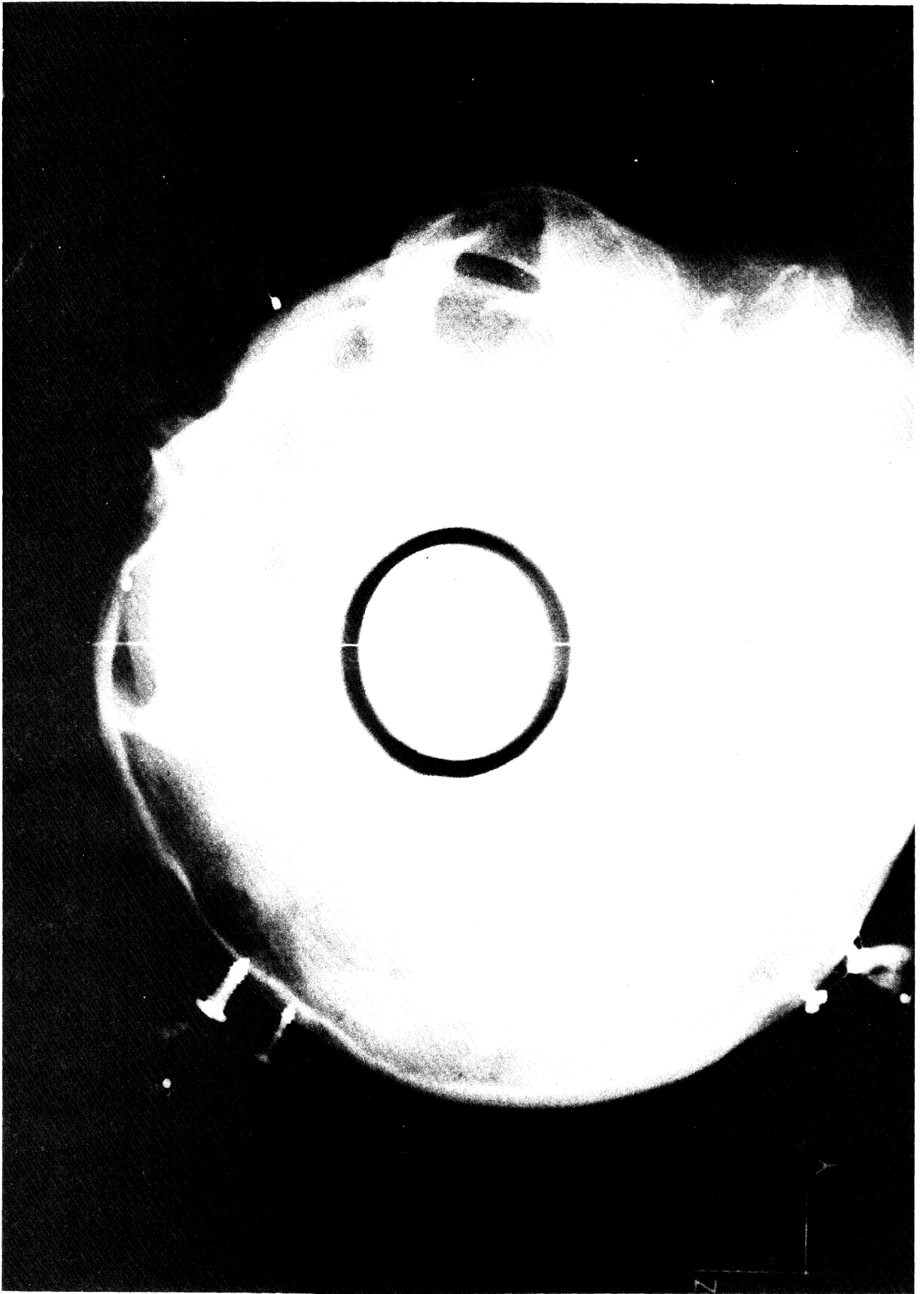
```

*****
*
* RUN ID:WBR-9          AUG 23, 1976
*
* PQ1= 5.138, PQ2= 4.229, PQ3= 4.301
* CPI= -0.035, CPJ= -1.188, CPK= 6.457
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*   <I>      <J>      <K>
*
* <E1>:  -0.78595  0.22143  -0.57728
*
* <E2>:   0.52831  0.72555  -0.44098
*
* <E3>:   0.32120 -0.65157  -0.68723
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0367  0.0417  0.0409
*
* ORTHOGONALITY CHECK
*
* 1.0000  0.0000 -0.0000
*
* 0.0000  1.0000  0.0000
*
* -0.0000  0.0000  1.0000
*
*****

```



WBR-9: HEAD X-RAY (X-Z)



WBR-9: HEAD X-RAY (Y-Z)

# INSTRUMENTATION DATA SHEET

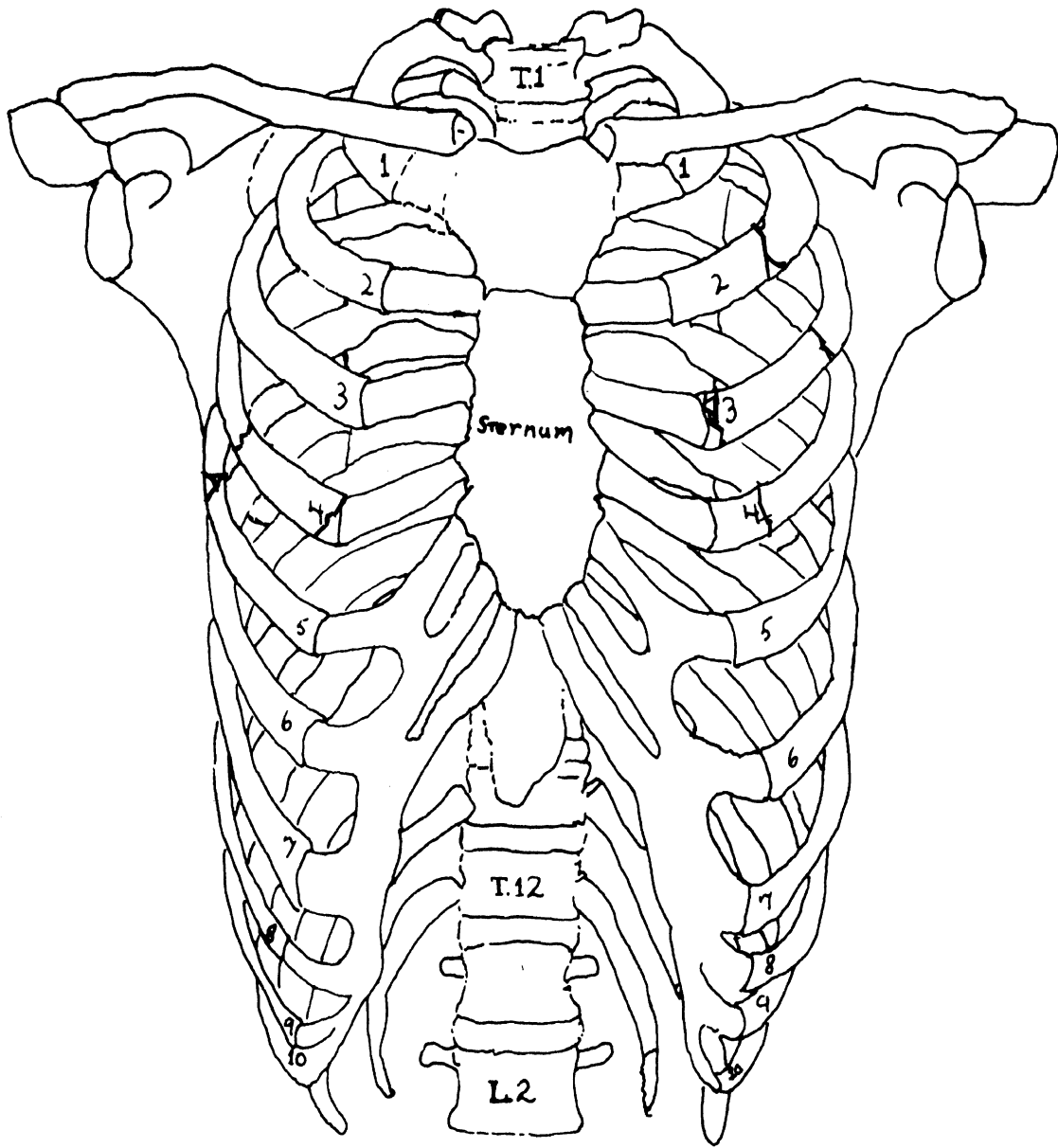
TEST NO: A-938	DESCRIPTION	Account No: 320316	
through:	Whole Body Response Cadaver Test	DATE: 12-16-75	BY: J.B.
SUBJECT: Cadaver	A-938: Mid-Severity Test	TAPE REEL # 138	
number: 20336		RECORDER: 7600	
FACILITY: Impact Sled		REC. SPEED: 30 I.P.S.	

CH #	SET UP DATA				TRANSDUCER				CALIBRATION				OUTPUT		CH #
	input	ampl. #	gain	umbil.#	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units		
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 / 2.2	1000	/			20.	G	1
2	Head Q <sub>1</sub> - A	H-5	100	1	10	Endevco	AB 59	1.16	100	56.4	G	-	48.6	G	2
3	Head Q <sub>1</sub> - B	H-6	100	2	10	"	AB 60	1.16	100	48.5	G	-	41.8	G	3
4	Head Q <sub>1</sub> - C	H-7	100	3	10	"	AA 81	1.27	100	/		-	39.8	G	4
5	Head Q <sub>2</sub> - C	H-8	100	4	10	"	AB 87	1.15	100	46.0	G	-	40.0	G	5
6	Head Q <sub>2</sub> - A	H-9	100	5	10	"	AB 90	1.17	100	49.7	G	-	42.5	G	6
7	Head Q <sub>2</sub> - B	H-10	100	6	10	"	AC 04	1.15	100	58.3	G	-	50.7	G	7
8	Head Q <sub>3</sub> - B	H-11	100	7	10	"	AC 06	1.14	100	58.1	G	-	51.0	G	8
9	Head Q <sub>3</sub> - C	H-12	100	8	10	"	AC 14	1.16	100	51.6	G	-	44.5	G	9
10	Head Q <sub>3</sub> - A	H-13	100	9	10	"	AB 57	1.16	100	39.5	G	-	34.1	G	10
11	Strobe	H-3	10	-						To			1.	V	11
12	Velocity	H-4	10	VEL						12"/pulse			1.	V	12
13	Dig. Gate									28 ms.			1.	V	13
14	Time Base									100 Hz.			1.	V	14



# INSTRUMENTATION DATA SHEET

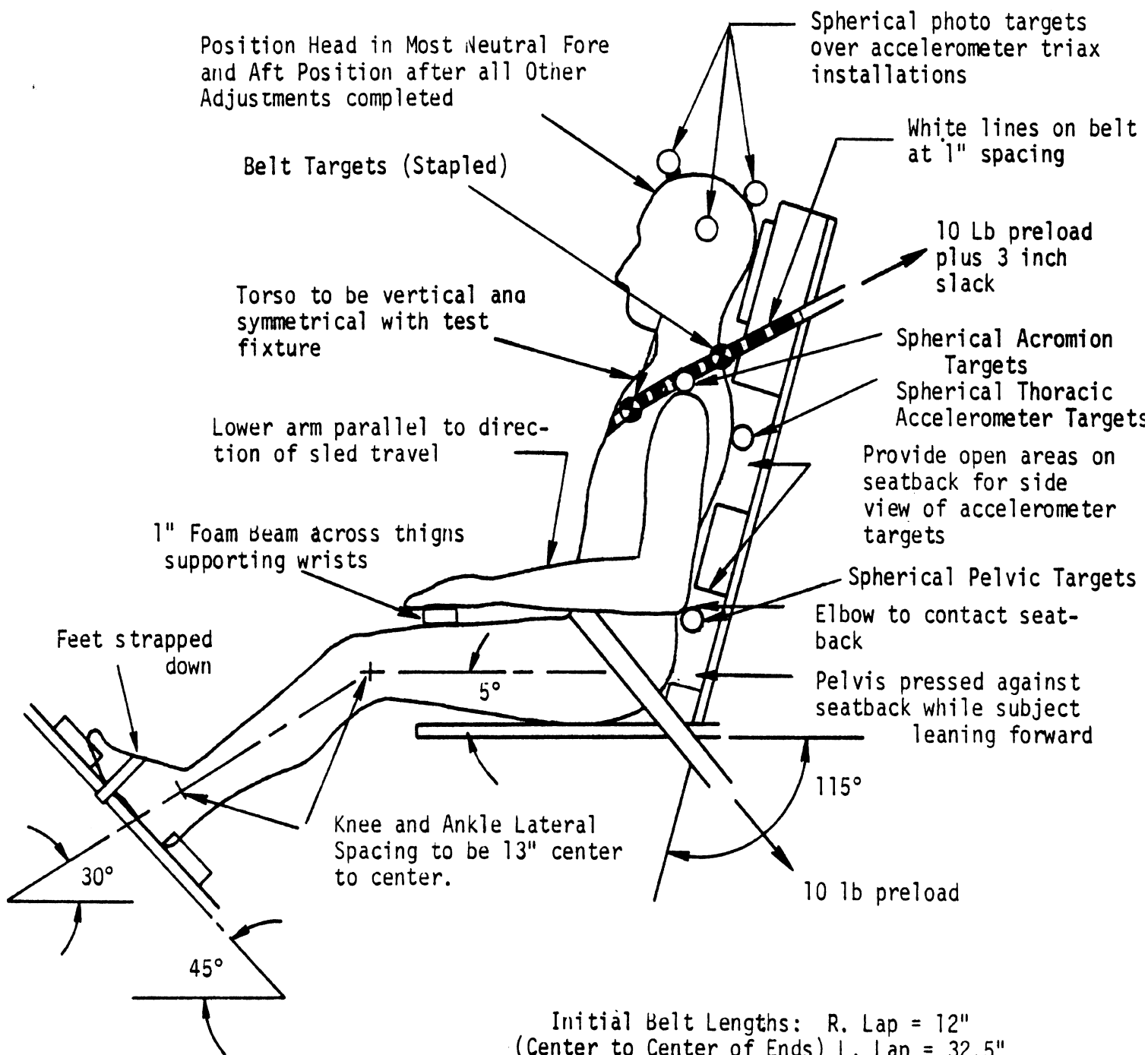
TEST NO: A-938		DESCRIPTION WBR-9		Account No: 320316		DATE: 12-16-75		BY: J.B.						
through:		Whole Body Response Cadaver Test												
SUBJECT: Cadaver		A-938: Mid Severity Test												
number: 20336		RECORDER: CEC												
FACILITY: Impact Sled		REC. SPEED: 30 I.P.S.												
CH #	SET UP DATA				TRANSDUCER				CALIBRATION			OUTPUT		CH #
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	
1	Sled Decel.	H-1	200	26	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Pelvis P-A	H-14	100	10	10	Endevco	AA 41	1.27	100	/	-	42.2	G	2
3	Pelvis I-S	H-15	100	23	10	"	AC 22	1.26	100	/	+	33.4	G	3
4	Thorax P-A	H-16	100	12	10	"	AB 76	1.16	100	43.6 G	+	37.6	G	4
5	Thorax I-S	H-17	100	13	10	"	AC 02	1.14	100	42.6 G	-	37.4	G	5
6	Thorax R-L	H-18	100	14	10	"	AC 16	1.15	100	42.8 G	+	37.2	G	6
7	Rt. Lap	H-19	200	24	/	GSE	082	2.21	200	2209 #	+	1000	#	7
8	Lt. Lap	H-20	200	16	/	"	083	2.24	200	2242 #	+	1000	#	8
9	Up. Shldr.	CEC-1	VAR	19	/	"	084	2.27	VAR	2277 #	+	1000	#	9
10	Lo. Shldr.	CEC-2	VAR	25	/	"	085	2.25	VAR	2245 #	+	1000	#	10
11	Strobe	H-3	10							T <sub>0</sub>		1.	V	11
12	Velocity	H-4	10	VEL						12"/Pulse		1.	V	12
13	Dig. Gate									280 M.S.		1.	V	13
14	Time Base			TB						100 Hz.		1.	V	14



**Bony Thoracic Cage,  
anterior aspect**

WBR-9    CADAVER 20336

# A-938



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

## Femur Target Spacing:

Right Side = 5 1/8 in.  
 Left Side = 5 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

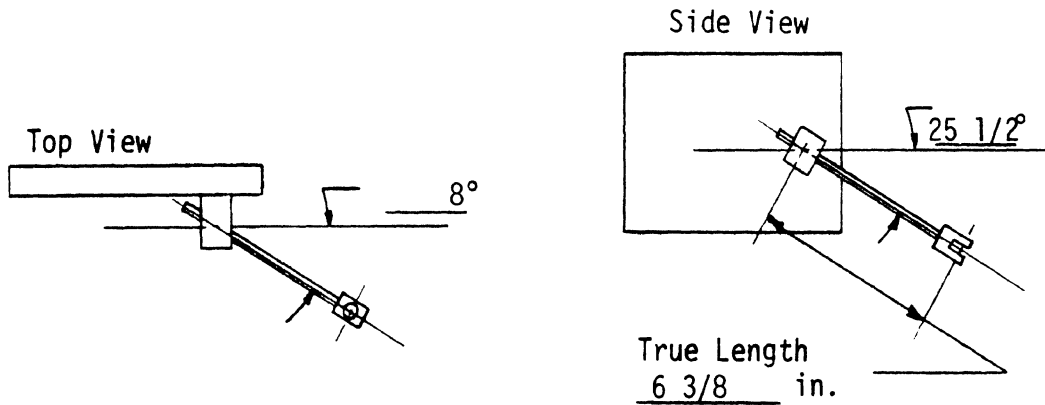
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

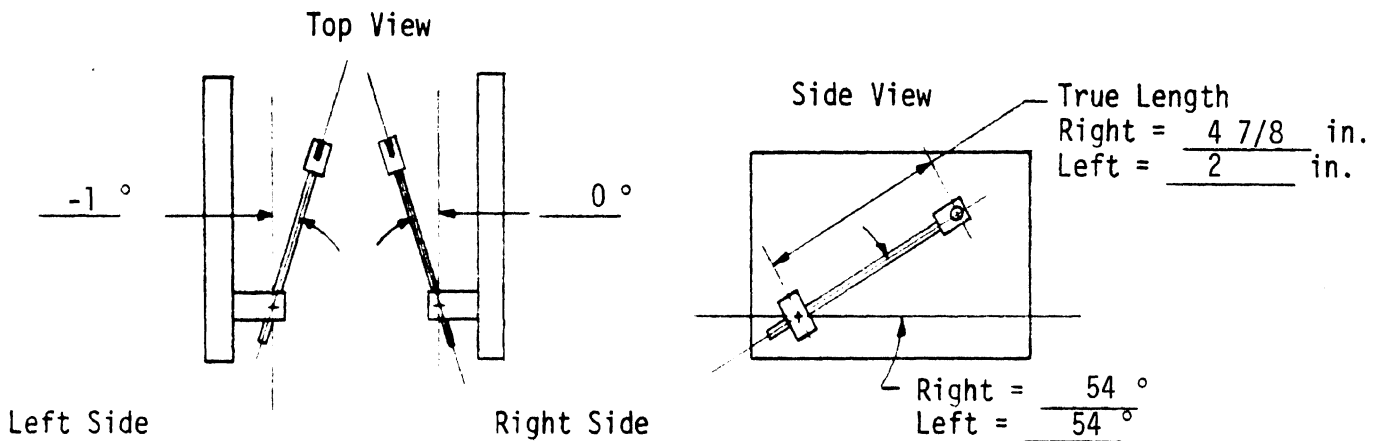
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



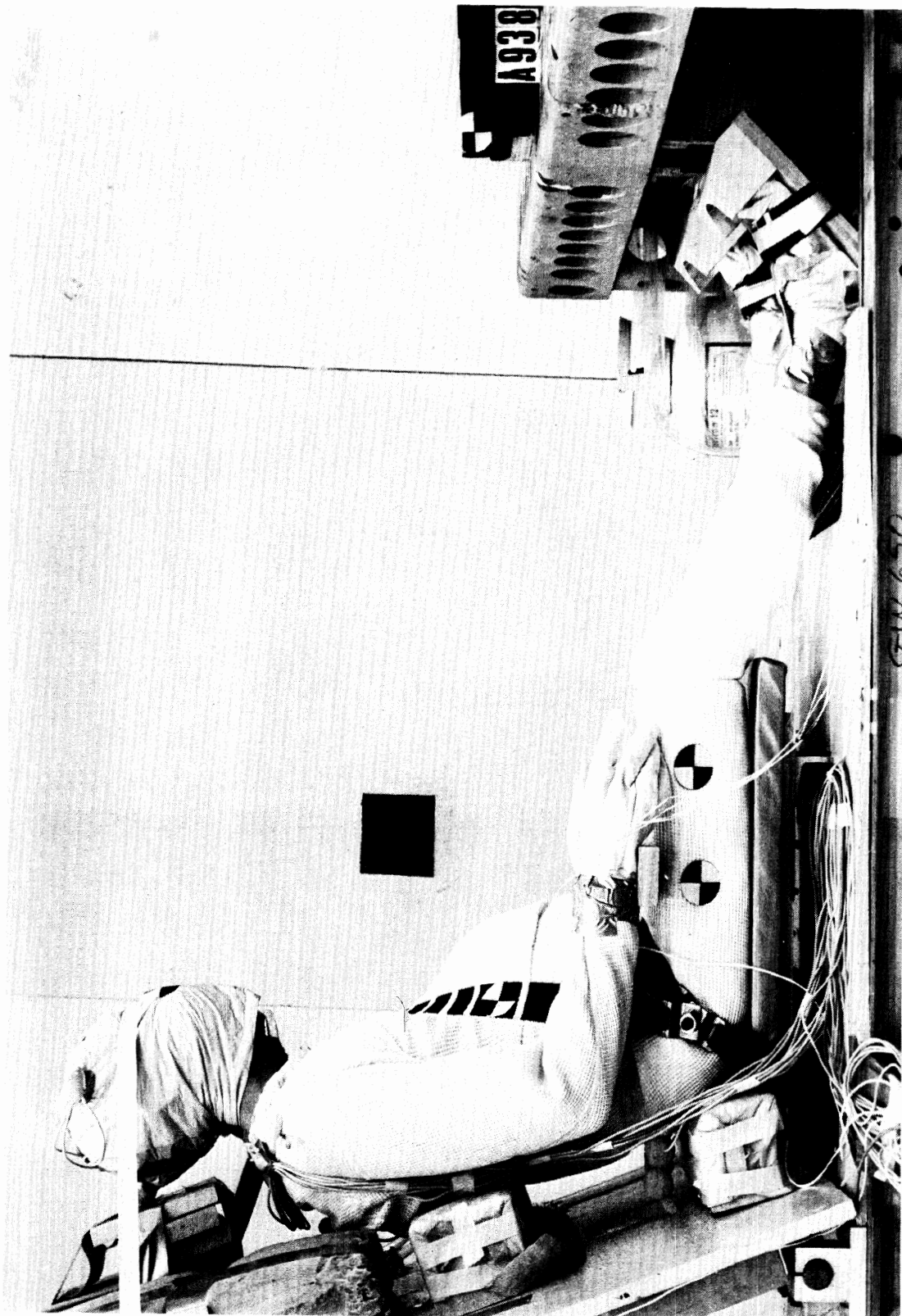
B. LAP BELT



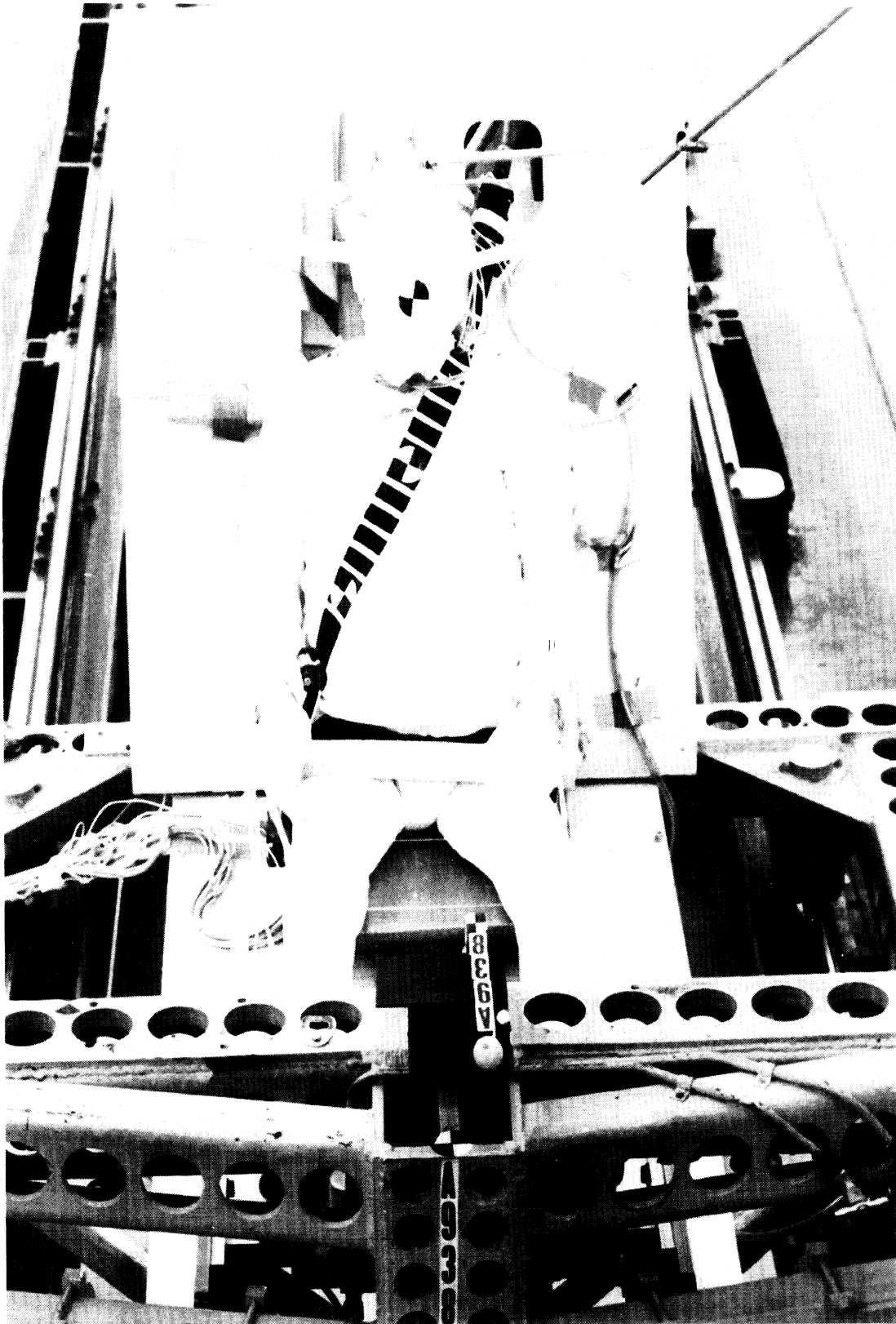
Sketch indicates positive angle directions

BELT LENGTH DATA

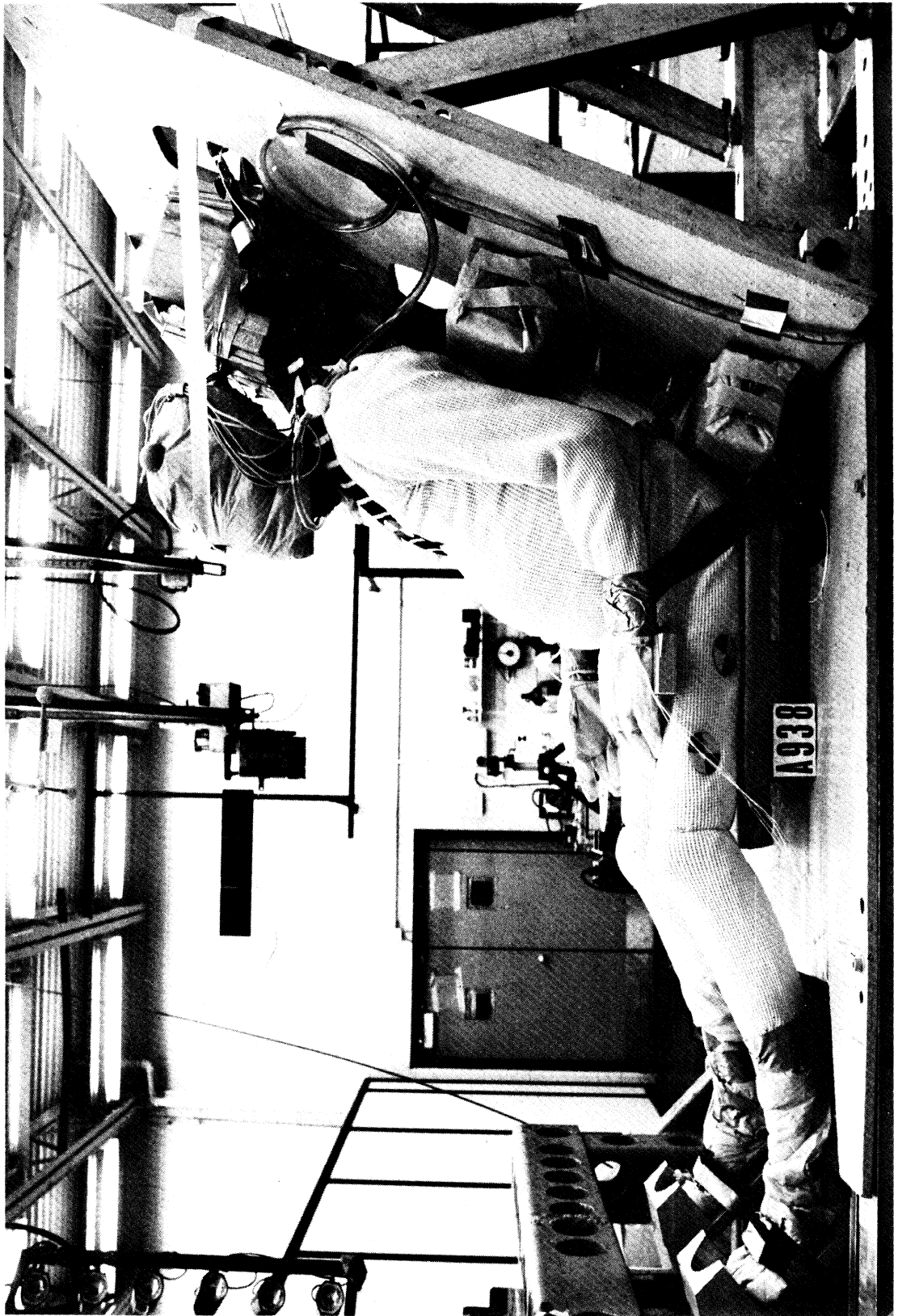
BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	12	12 1/4	1/4	11 3/8
Lt. Lap	32 1/2	32 1/2	0	31 7/8
Shoulder	42	42 1/4	1/4	40 5/8



A-938: RIGHT SIDE VIEW



A-938: FRONT VIEW



A-938: LEFT SIDE VIEW

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-938-1: WBR-9

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 24-AUG-76

TEST SIGNALS: 1609 PTS/CH AT 6399.68 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
261	11	SLED DECELERATION	20.00	G'S	4+1+ 1	80.0	398	1599.92
262	21	AX1 HEAD A0Q1 ACC	-48.60	G'S	4+1+18	570.1	398	1599.92
263	31	AY1 HEAD B0Q1 ACC	-41.80	G'S	4+1+18	570.1	398	1599.92
264	41	AZ1 HEAD C0Q1 ACC	-39.80	G'S	4+1+18	570.1	398	1599.92
265	51	AX2 HEAD C0Q2 ACC	-40.00	G'S	4+1+18	570.1	398	1599.92
266	61	AY2 HEAD A0Q2 ACC	-42.50	G'S	4+1+18	570.1	398	1599.92
267	71	AZ2 HEAD B0Q2 ACC	-50.70	G'S	4+1+18	570.1	398	1599.92
268	81	AX3 HEAD B0Q3 ACC	-51.00	G'S	4+1+18	570.1	398	1599.92
269	91	AY3 HEAD C0Q3 ACC	-44.50	G'S	4+1+18	570.1	398	1599.92
270	101	AZ3 HEAD A0Q3 ACC	-34.10	G'S	4+1+18	570.1	398	1599.92
		111						
		121						
		131						
		141						

FILTERED FILES: 261 - 270 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: A-938-1: WBR-9



SEP 13, 1976 / 11:37:22

RUN ID: A-938-1: WBR-9

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 7.E+00

< 3 > 6.E+00

< 4 > 5.E+00

< 5 > 5.E+00

< 6 > 3.E+00

< 7 > 3.E+00

< 8 > 6.E+00

< 9 > 3.E+00

< 10 > 3.E+00

10 MS  
20 PTS

FILES: 261-270, TAPE: GNR-CAD

398 PTS @ 1598 HZ = 248.1 MS

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: A-938-21 WRR-9

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1608 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
271	- 11	SLED DECELERATION	20.00	G'S	4+1+1	80.0	398	1600.04
272	- 21	PELVIS BIAX P-A ACC	-32.50	G'S	4+1+12	285.1	398	1600.04
273	- 31	PELVIS BIAX I-S ACC	33.40	G'S	4+1+12	285.1	398	1600.04
274	- 41	THORAX TRIAX P-A ACC	37.60	G'S	4+1+12	285.1	398	1600.04
275	- 51	THORAX TRIAX I-S ACC	-37.40	G'S	4+1+12	285.1	398	1600.04
276	- 61	THORAX TRIAX R-L ACC	37.20	G'S	4+1+12	285.1	398	1600.04
277	- 71	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	398	1600.04
278	- 81	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	398	1600.04
279	- 91	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	398	1600.04
280	- 101	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	398	1600.04

111  
121  
131  
141

=====

FILTERED FILES: 271 - 280 DIGITAL TAPE: GMR-CAD

RUN ID: A-938-21 WRR-9

DATE: 07-SEP-76

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 3.E+00

< 3 > 2.E+00

< 4 > 3.E+00

< 5 > 2.E+00

< 6 > 3.E+00

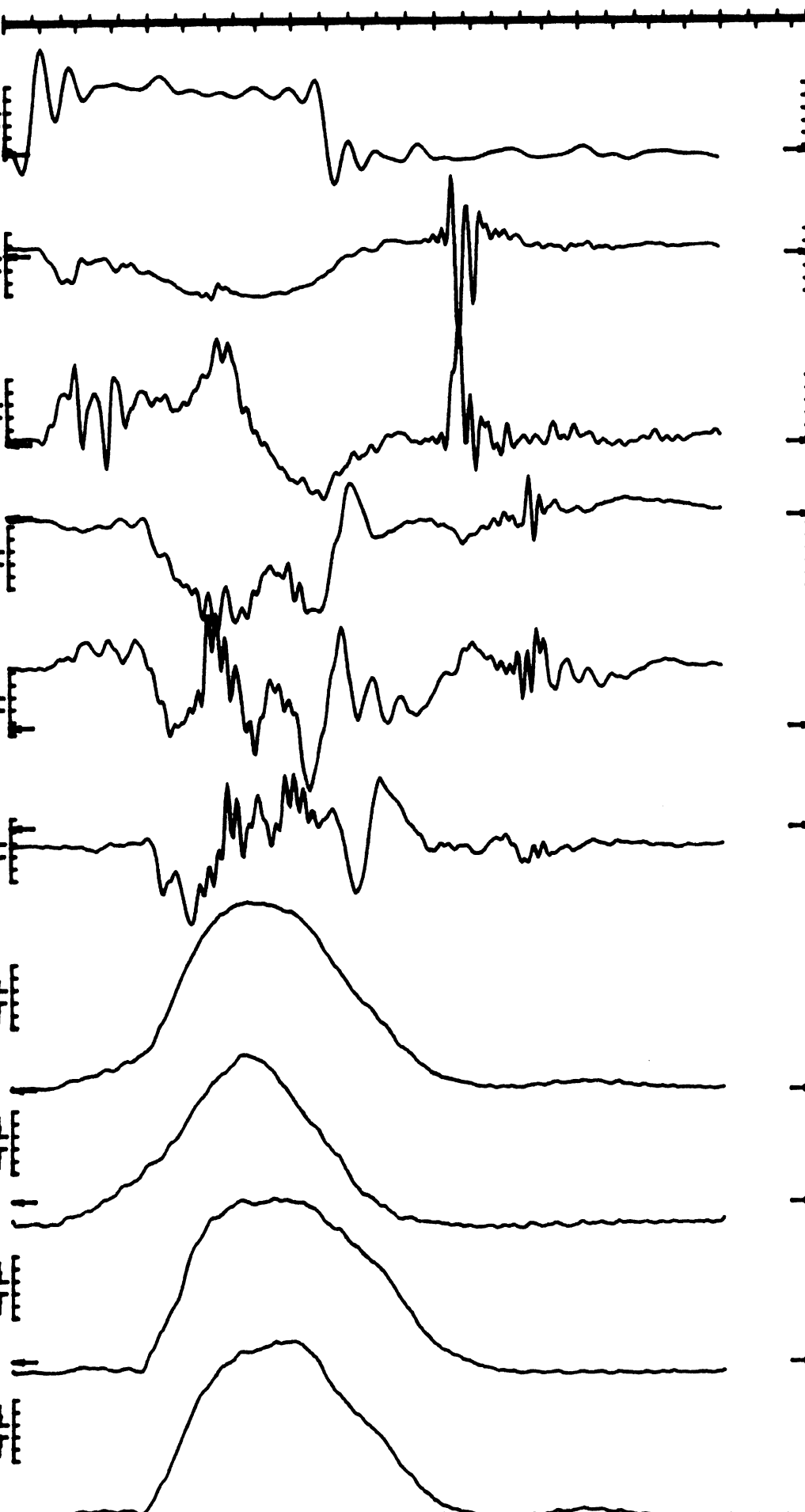
< 7 > 1.E+02

< 8 > 5.E+01

< 9 > 7.E+01

< 10 > 6.E+01

10 MS  
20 PTS





A 938

A-938: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE  
RAW DATA PACKAGE

SUBJECT: WBR-10

TEST: 76B001

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>135</u>
Frontal X-rays	<u>139</u>
Lateral X-rays	<u>147</u>
Head x-rays & Analysis	<u>149</u>
Instrumentation	<u>152</u>
Thorax Autopsy	<u>154</u>

For Each Test: 76B001

Setup Diagram	<u>155</u>	_____	_____
Belts/anchors	<u>156</u>	_____	_____
Setup photographs	<u>157</u>	_____	_____
Digitized Signals (7600)	<u>160</u>	_____	_____
Digitized Signals (CEC)	<u>162</u>	_____	_____
Graphcheck	<u>164</u>	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20372                      WBR 10

List of Measurements (All measurements except weight listed in cm)

1. Weight		62.8 kg
2. Stature		174.4
3. Trochanterion Hgt.	Rt.	86.9
	Lt.	87.1
4. Symphysis Hgt.		86.7
5. Anterior Superior Iliac Spine Hgt.	Rt.	78.1
	Lt.	78.1
6. Iliocristale Hgt.	Rt.	71.6
	Lt.	70.3
7. Substernale Hgt.		47.6
8. Mid-Chest Hgt.		39.4
9. Suprasternale Hgt.		31.1
10. Acromion Hgt.	Rt.	25.2
	Lt.	22.5
11. Menton Hgt.		20.0
12. Mastoid Hgt.	Rt.	--
	Lt.	--
13. Tragion Hgt.	Rt.	--
	Lt.	--
14. Tragion Depth	Rt.	--
	Lt.	--
15. Suprasternale Depth		19.3
16. Mid-Chest Depth		20.7
17. Substernale Depth		21.2
18. Anterior Superior Iliac Spine Depth	Rt.	15.8
	Lt.	17.6

19. Symphision Depth		18.0
20. Trochanterion Depth	Rt.	6.9
	Lt.	8.0
21. Suprasternale-Acromion Distance	Rt.	27.7
	Lt.	21.8
22. Biacromial Breadth		36.6
23. Bideltoid Breadth		48.9
24. Mid-Chest Breadth		31.0
25. Chest Breadth at Substernale		30.6
26. Hip Breadth at Iliocristale		28.7
27. Bispinous Diameter		20.3
28. ASIS to Symphision Distance	Rt.	14.7
	Lt.	13.9
29. Bitrochanteric Breadth		33.4
30. Acromion-Radiale Length		32.1
31. Ball of Humerus-Radiale Length		30.8
32. Radiale-Stylian Length		27.4
33. Hand Length		18.4
34. Hand Breadth		8.9
35. Hand Depth		4.0
36. Wrist Breadth		5.6
37. Forearm Depth		7.5
38. Upper Arm Depth		8.9
39. Trochanterion-Fibulare Length		41.4
40. Fibulare-Lateral Malleolus Length		39.5
41. Tibiale-Sphyrion Length		36.7
42. Tibiale-Heel of Foot Length		44.8



43. Foot Length	25.1
44. Foot Breadth	9.0
45. Minimum Ankle Breadth	5.4
46. Calf Depth	9.8
47. Upper Thigh Breadth	16.1
48. Head Breadth	--
49. Head Length	--
50. Bitragion Breadth	14.8
51. Bigonial Breadth	12.1
52. Menton Diagonal Length	--
53. Mastoid-Crinion Length	--
54. Head Circumference	--
55. Mid-Sagittal Arc Length	--
56. Bitragion-Coronal Arc Length	--
57. Mid-Neck Circumference	39.0
58. Chest Circumference at Mid-Chest	97.1
59. Chest Circumference at Substernale	91.8
60. Hip Circumference at Iliocristale	81.5
61. Buttocks Circumference at Trochanterion	97.2
62. Upper Arm Circumference (Mid-Biceps)	28.8
63. Maximum Forearm Circumference	27.1
64. Minimum Wrist Circumference	17.6
65. Upper Thigh Circumference	49.1
66. Maximum Calf Circumference	30.9
67. Minimum Ankle Circumference	19.8

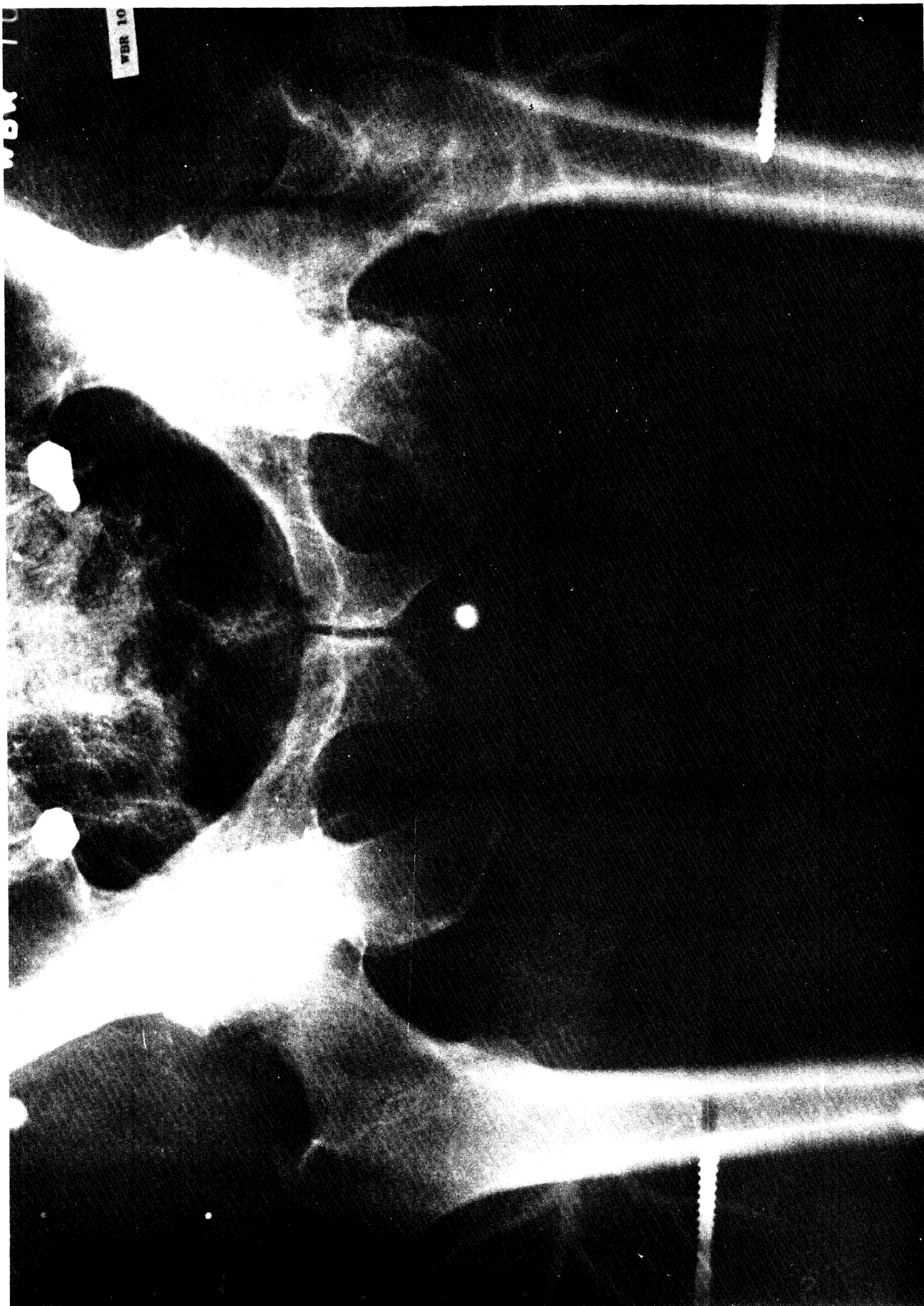




WBR-10: FRONTAL X-RAY

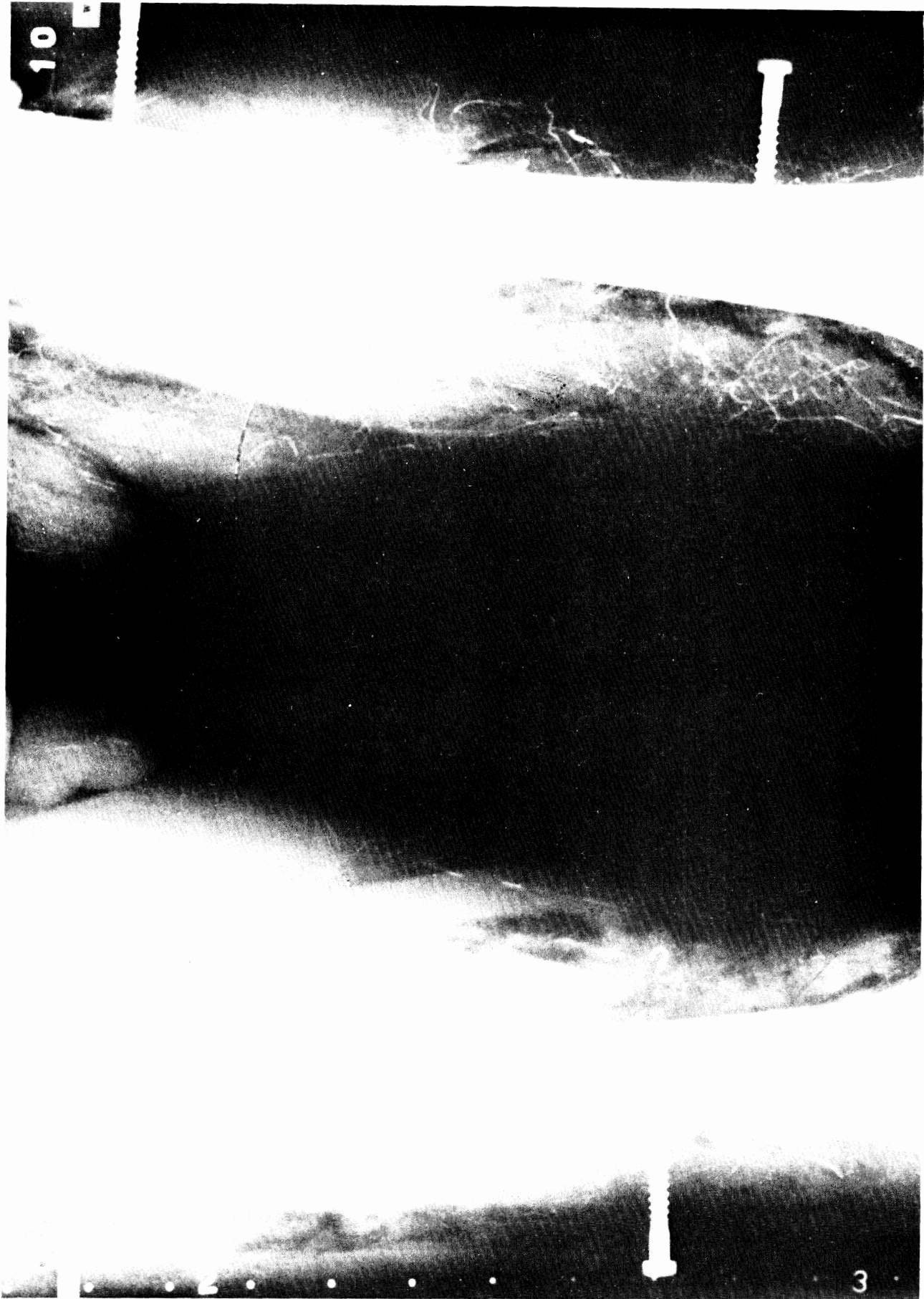


WBR-10: FRONTAL X-RAY



WBR-10: FRONTAL X-RAY

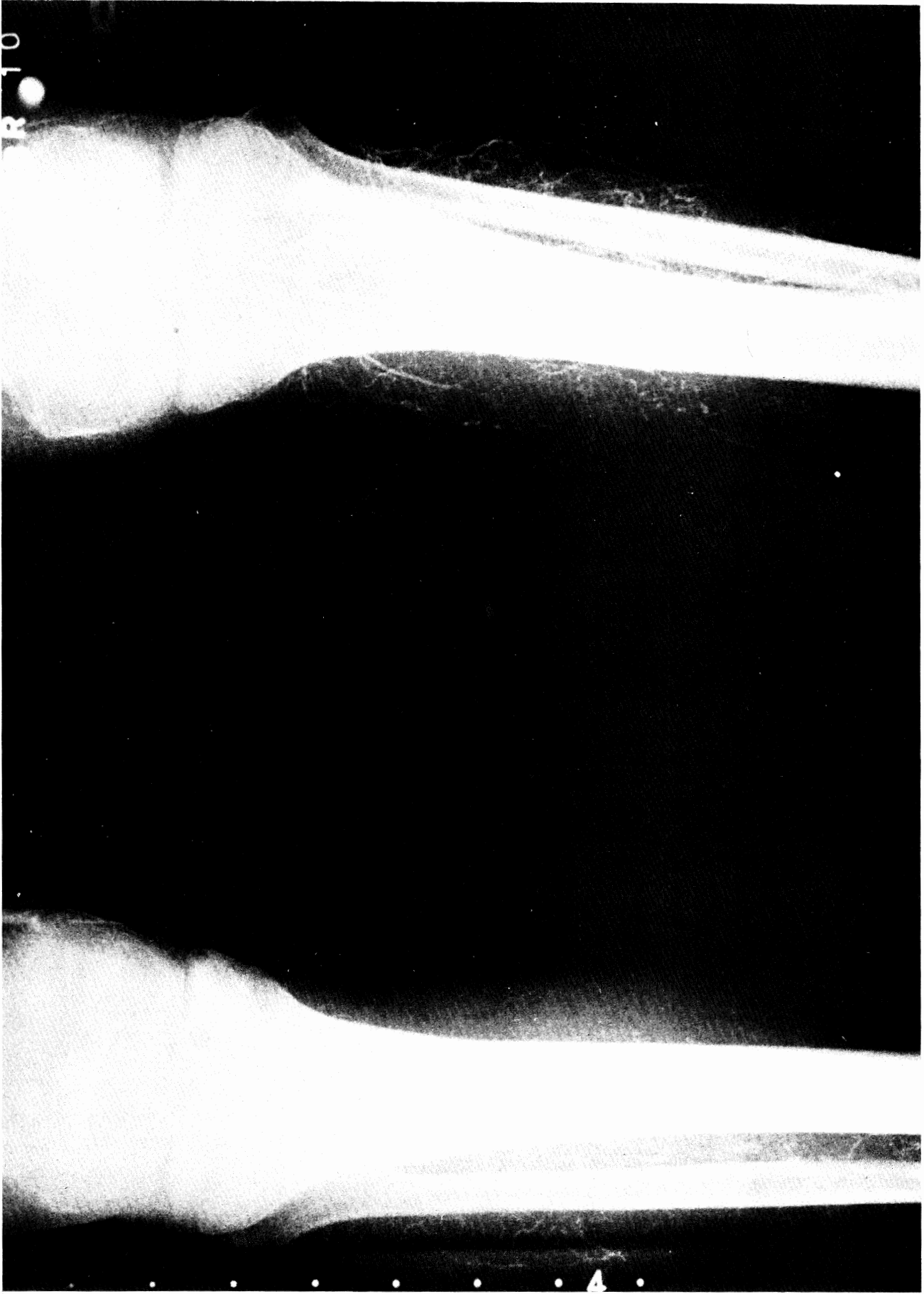




WBR-10: FRONTAL X-RAY

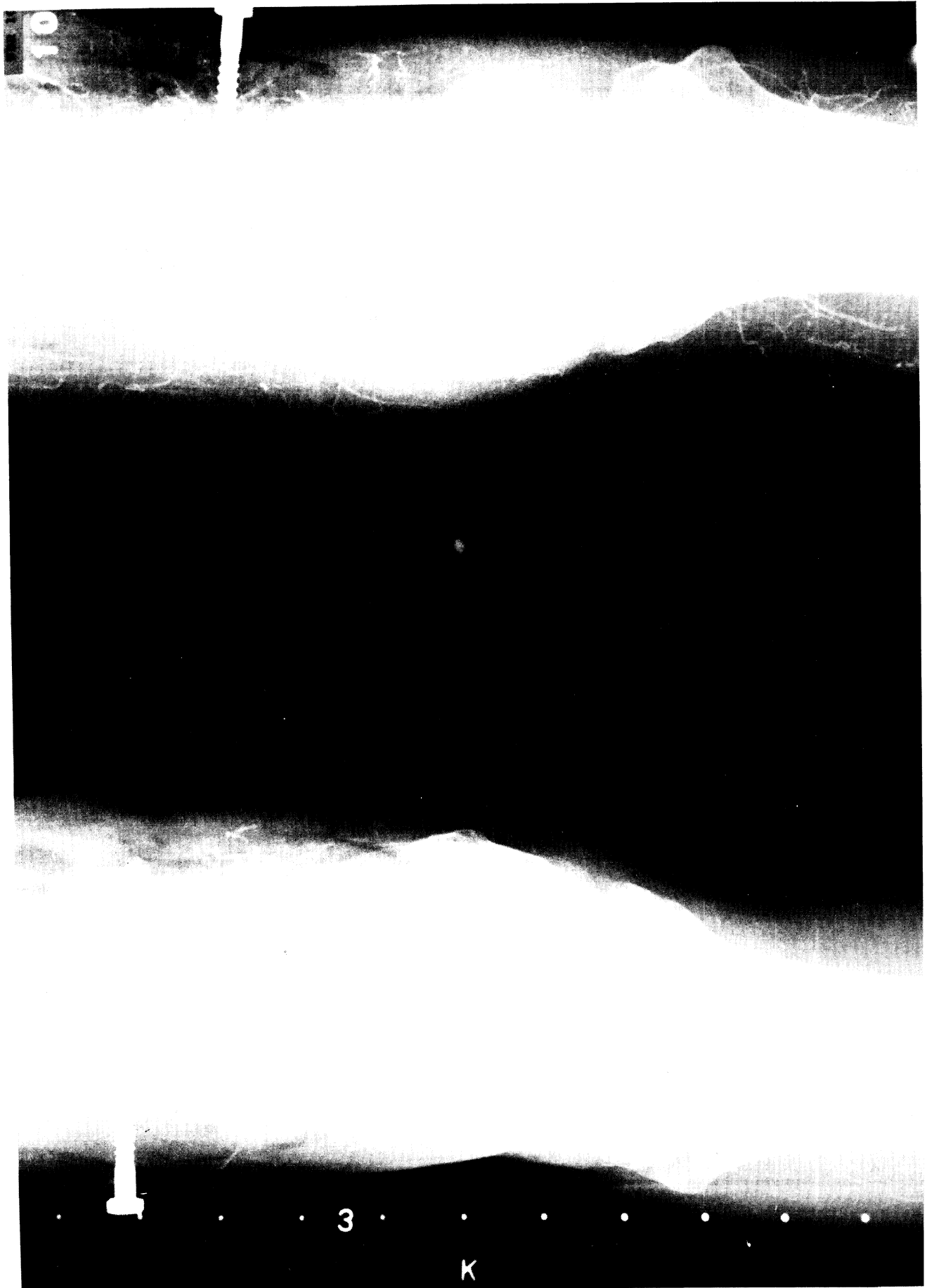


WBR-10: FRONTAL X-RAY



WBR-10: FRONTAL X-RAY

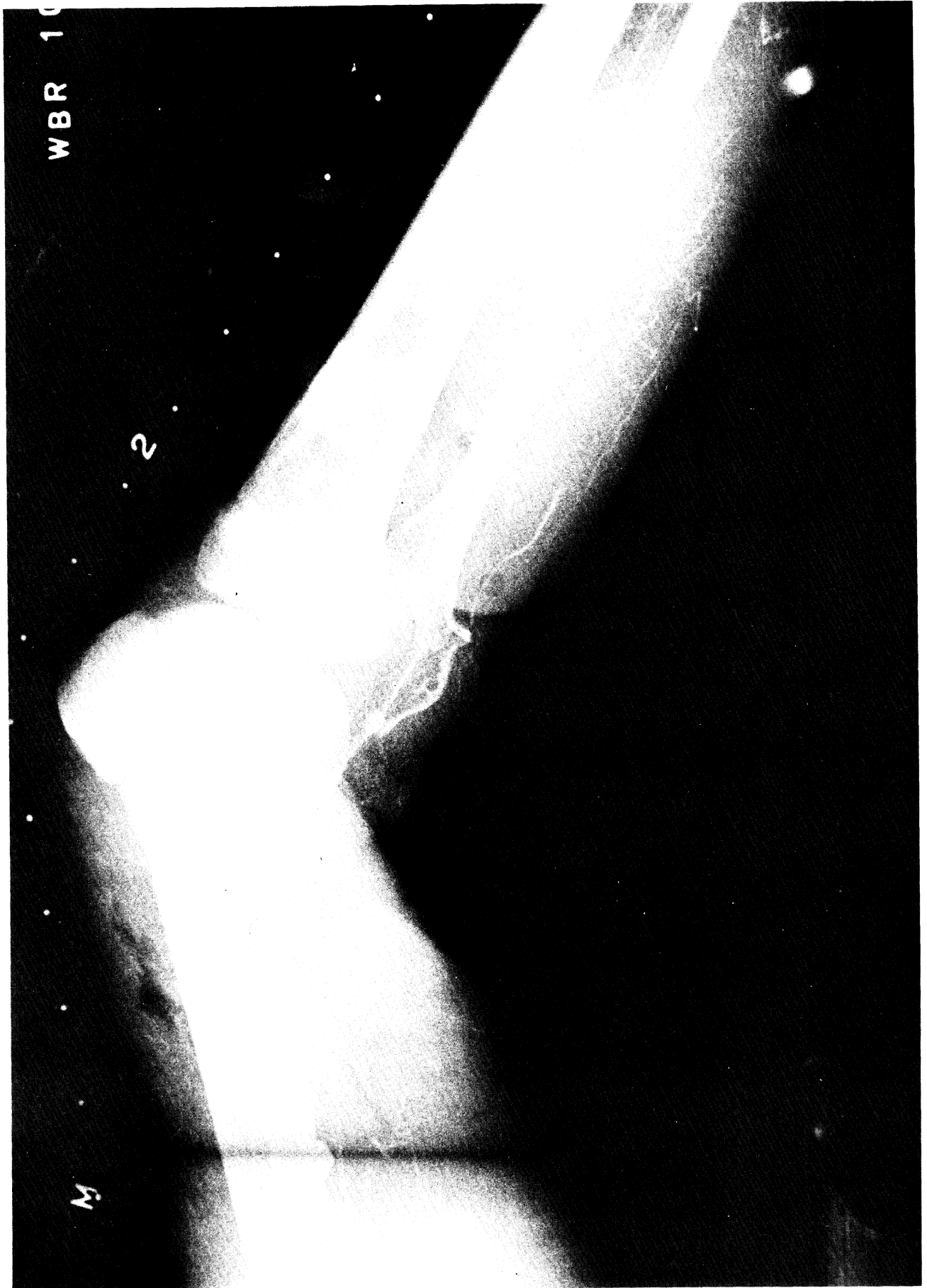




WBR-10: FRONTAL X-RAY

B-145





WBR-10: LATERAL X-RAY

WBR 10



WBR-10: LATERAL X-RAY

-----  
A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	1.450	-0.130	12.25	-3.110	-0.130	16.00
P2- L.EYE:	2.910	0.200	9.25	0.640	0.360	17.50
P3- R.EAR:	-1.850	-3.710	11.75	-2.460	-3.870	12.00
P4- L.EAR:	1.420	-2.900	6.50	4.150	-3.350	17.00
Q1- ACC. :	-5.630	-3.040	6.00	4.660	-3.210	10.00
Q2- ACC. :	-0.530	1.810	6.25	4.510	2.270	15.50
Q3- ACC. :	-4.400	1.290	11.25	-1.830	1.240	10.50
R1,R2,R3 :	4.897	3.839	4.320			

	COORDINATES W.R.T. CAMERA				COORDINATES W.R.T. CAMERA		
	X	Y	Z		X	Y	Z
P1 :	1.109	-2.199	-0.096	Q1:	-4.853	3.728	-2.594
P2 :	2.362	0.438	0.204	Q2:	-0.455	3.224	1.588
P3 :	-1.430	-1.892	-2.922	Q3:	-3.435	-1.450	0.995
P4 :	1.213	2.870	-2.397	P:	-4.106	2.644	2.194
C :	-0.108	0.489	-2.659	CP:	-3.997	2.155	4.854

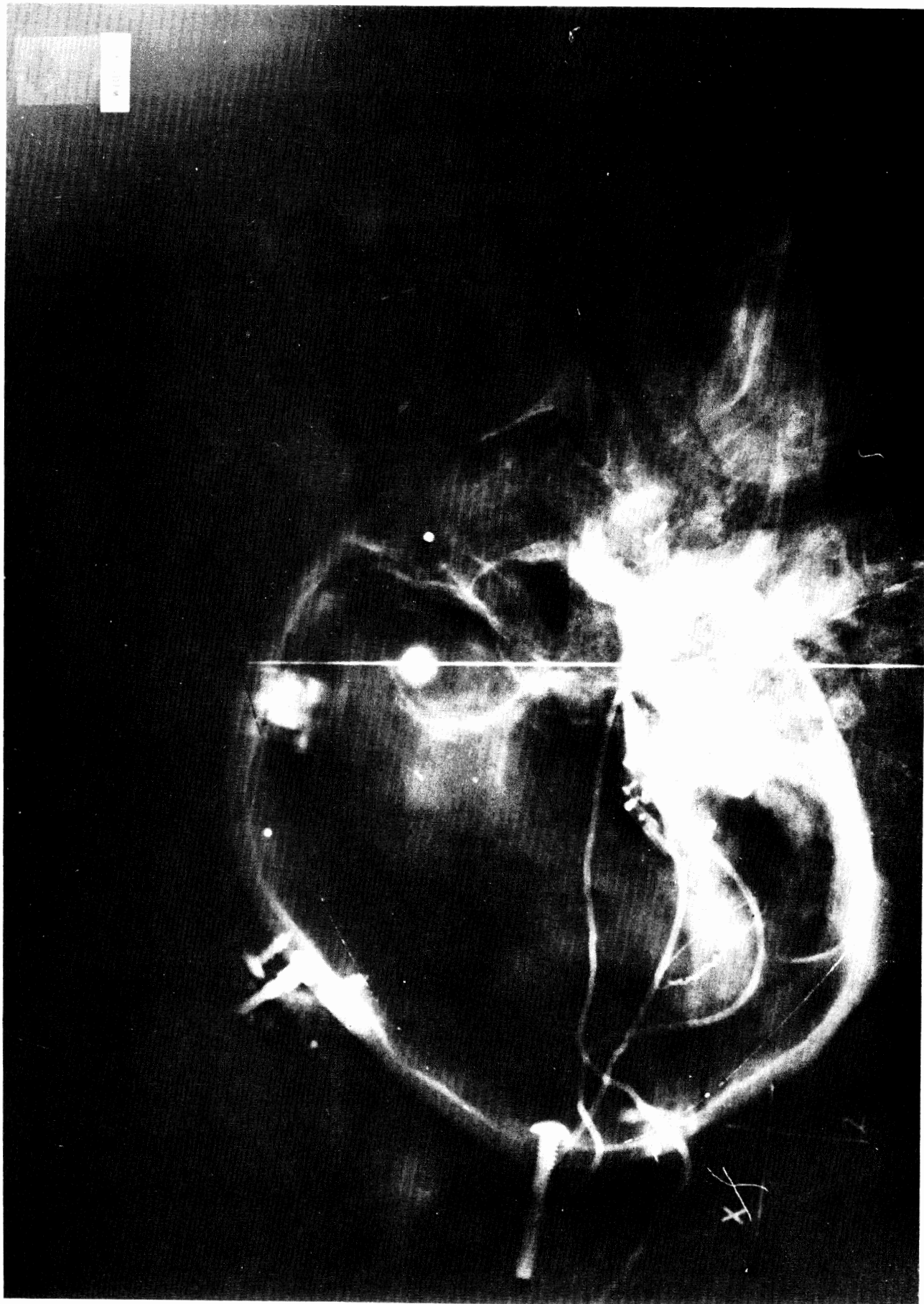
ANATOMICAL FRAME (WRT CAMERA)				ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>				
<I> :	0.53191	-0.35950	0.76670	1.0000	0.0	0.0000	
<J> :	0.45496	0.88442	0.09907	0.0	0.9990	-0.0000	
<K> :	-0.71387	0.29619	0.63414	0.0000	-0.0000	0.9995	

INSTRUMENT FRAME (WRT CAMERA)				ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>				
<E1>:	-0.15046	0.21832	-0.96421	1.0000	0.0432	0.0375	
<E2>:	0.97460	0.15476	-0.16188	0.0432	1.0000	0.0497	
<E3>:	0.15541	-0.94799	-0.27779	0.0375	0.0497	1.0000	

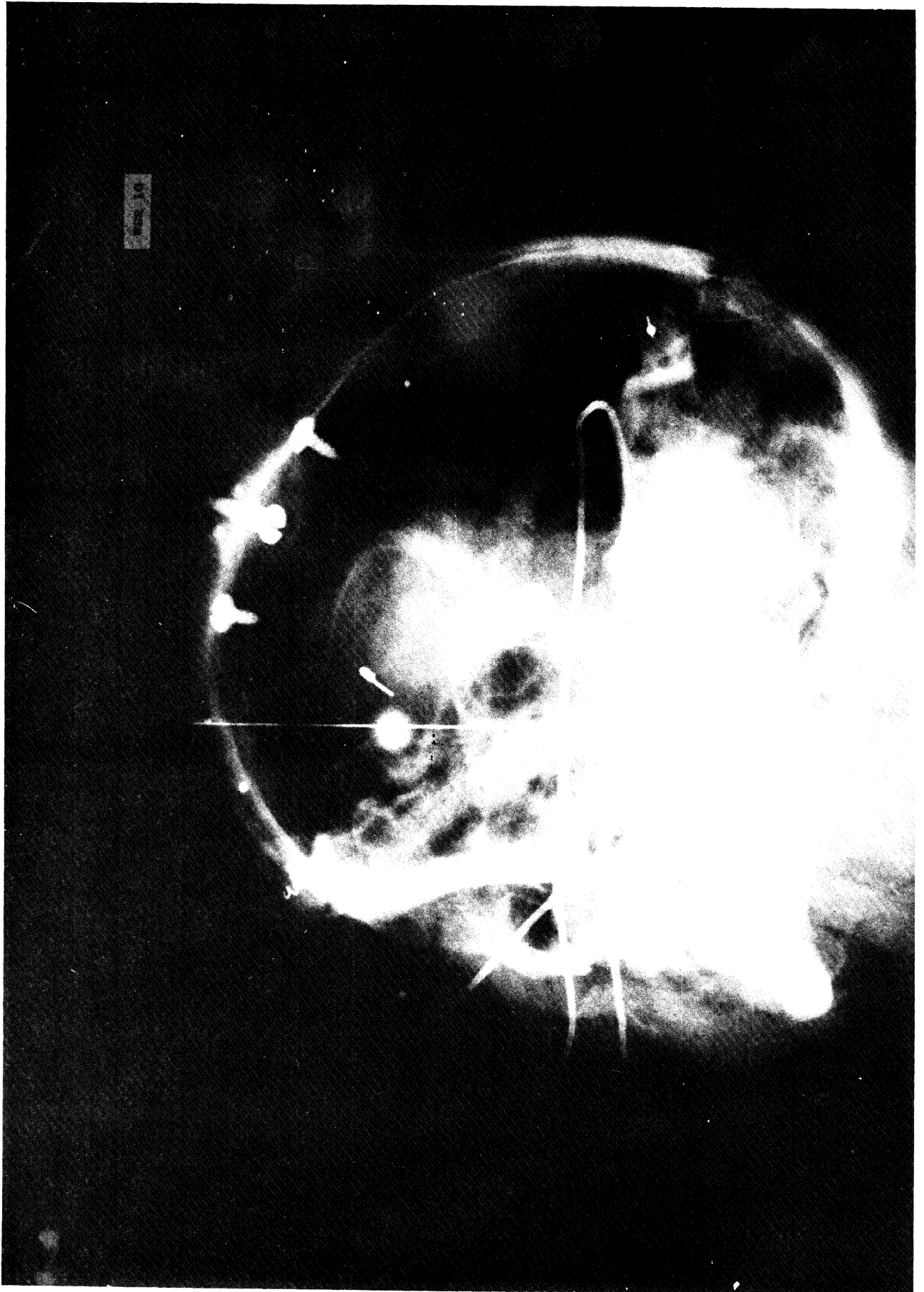
```

*****
*
* RUN ID:WBR-10          AUG 23, 1976
*
* PQ1= 4.897, PQ2= 3.839, PQ3= 4.320
* CPI= 0.820, CPJ= 0.568, CPK= 6.570
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*      <I>      <J>      <K>
*
* <E1>:  -0.90974  0.03164  -0.41397
*
* <E2>:   0.35290  0.58416  -0.73090
*
* <E3>:   0.21870  -0.81102  -0.54260
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0282  0.0330  0.0313
* ORTHOGONALITY CHECK
*
* 1.0000  0.0      0.0000
*
* 0.0      1.0000  0.0
*
* 0.0000  0.0      1.0000
*
*****

```



WBR-10: HEAD X-RAY (X-Z)



WBR-10: HEAD X-RAY (Y-Z)



# INSTRUMENTATION DATA SHEET

TEST NO: 76B001	<u>DESCRIPTION</u> WBR-10	Account No: 320316
through:	Whole Body Response Cadaver Test	DATE: 2-13-76 BY: J.B.
SUBJECT: Cadaver	76B001: High Severity Test	TAPE REEL # 138
number: 20372		RECORDER: 7600
FACILITY: Impact Sled		REC. SPEED: 30 I.P.S.

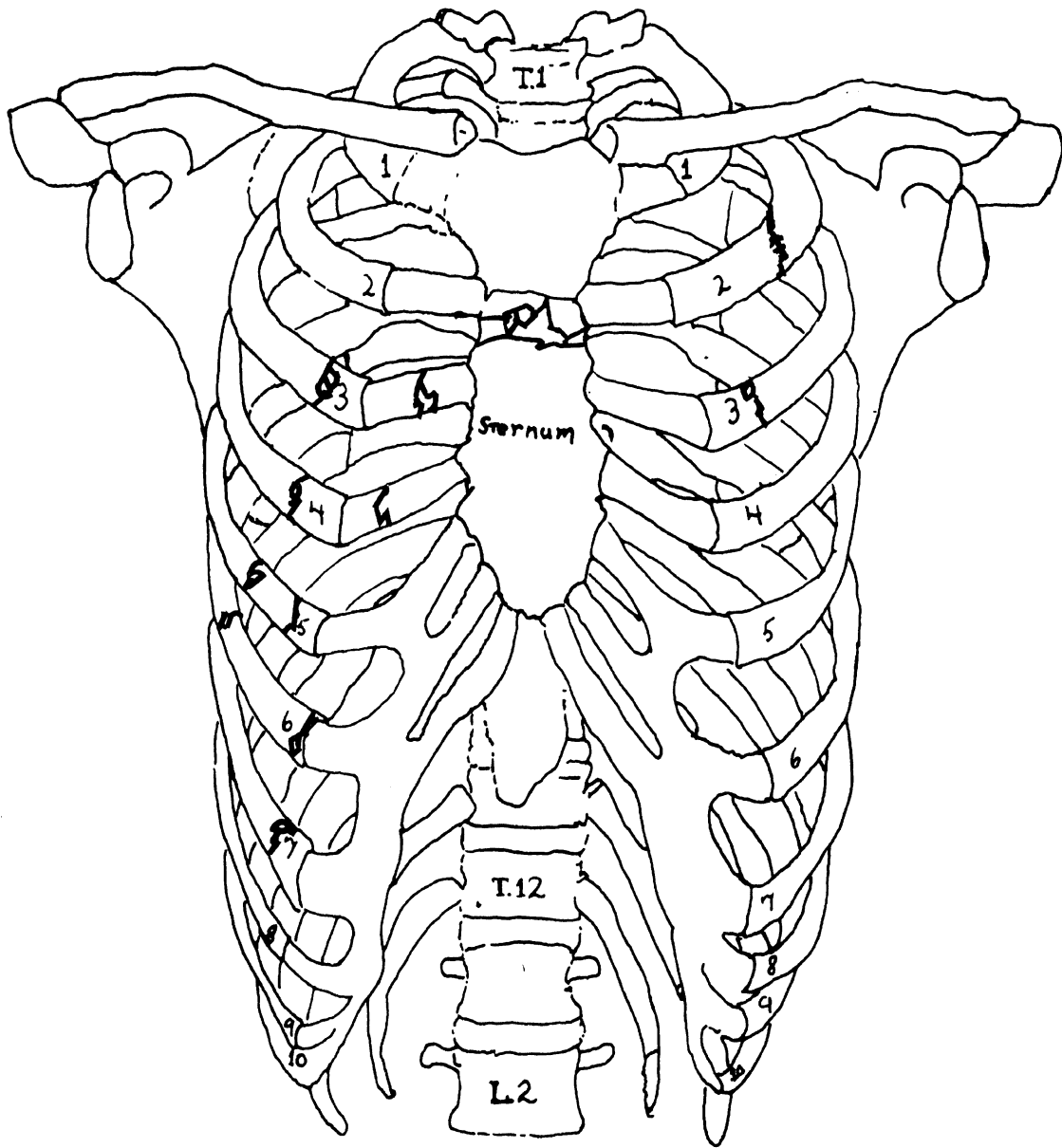
CH #	SET UP DATA				TRANSDUCER			CALIBRATION			OUTPUT			CH #
	input	ampl. #	gain	umbil.#	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	
1	Sled Decel.	H-1	200	26	/	Statham	13587	<del>1.1</del> 2.2	1000	/		20.	G	1
2	Head Q <sub>1</sub> - A	H-5	100	5	10	Endevco	AB 59	1.17	100	56.4 G	-	48.2	G	2
3	Head Q <sub>1</sub> - B	H-6	100	6	10	"	AB 60	1.17	100	48.5 G	-	41.5	G	3
4	Head Q <sub>1</sub> - C	H-7	100	7	10	"	AB 87	1.15	100	46.0 G	-	40.0	G	4
5	Head Q <sub>2</sub> - C	H-8	100	8	10	"	AB 90	1.15	100	49.7 G	-	43.2	G	5
6	Head Q <sub>2</sub> - A	H-9	100	9	10	"	AC 04	1.17	100	58.3 G	-	49.8	G	6
7	Head Q <sub>2</sub> - B	H-10	100	10	10	"	AC 06	1.15	100	58.1 G	-	50.5	G	7
8	Head Q <sub>3</sub> - C	H-11	100	1	10	"	AC 14	1.18	100	51.6 G	-	43.7	G	8
9	Head Q <sub>3</sub> - B	H-12	100	12	10	"	AB 57	1.16	100	39.5 G	-	34.1	G	9
10	Head Q <sub>3</sub> - A	H-13	100	13	10	"	AB 76	1.17	100	43.6 G	-	37.3	G	10
11														11
12	Velocity									12"/pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

B-152



# INSTRUMENTATION DATA SHEET

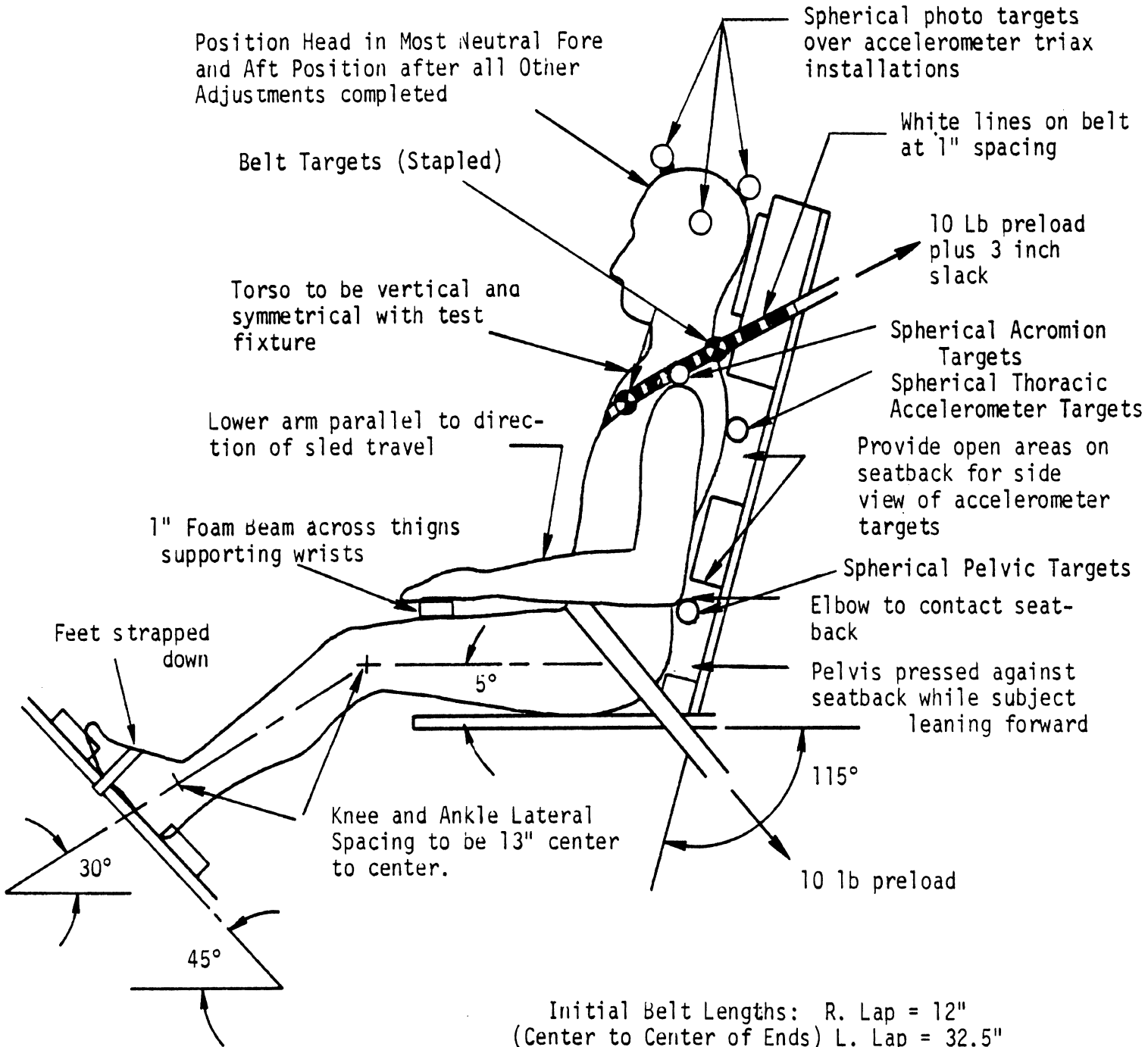
TEST NO: 76B001		DESCRIPTION		Account No: 320316										
through:		WBR-10		DATE: 2-13-76										
BY:		Whole Body Response Cadaver Test		TAPE REEL # 139										
SUBJECT: Cadaver		76B001: High Severity Test		RECORDER: CEC										
number: 20372		FACILITY: Impact Sled		REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT				
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	CH #
1	Head P-A	H-14	100	14	10	Endevco	AA 41	1.20	100	42.6 G	+	42.2	G	1
2	Pelvis P-A	H-15	100	2	10	"	AC 02	1.15	100	42.6 G	-	37.0	G	2
3	Pelvis I-S	H-16	100	16	10	"	AC 16	0.92	100	42.8 G	+	46.5	G	3
4	Thorax P-A	H-17	100	3	10	"	AA 49	1.26	100	66.8 G	+	53.7	G	4
5	Thorax I-S	H-18	100	18	10	"	AA 58	1.25	100	56.2 G	-	46.2	G	5
6	Thorax R-L	H-19	100	19	10	"	AA 81	1.12	100	/	+	39.8	G	6
7	Rt. Lap	H-21	200	27	/	GSE	082	2.21	200	2209 #	+	1000	#	7
8	Lt. Lap	H-22	200	23	/	"	083	2.24	200	2242 #	+	1000	#	8
9	Up. Shldr.	H-23	200	24	/	"	084	2.28	200	2277 #	+	1000	#	9
10	Lo. Shldr.	CEC-1	-	25	/	"	085	2.25	200	2245 #	+	1000	#	10
11	Head I-S	H-20	100	4	10	Endevco	AC 22	1.25	100	/	+	33.4	G	11
12	Head R-L	CEC-2	-	20/28	10	"	AD 44	1.63	100	- G	-	36.7	G	12
13	Dig. Gate									280 M.S.		1.	V	13
14	Time Base			TB						100 Hz.		1.	V	14



**Bony Thoracic Cage,  
anterior aspect**

WBR-10 CADAVER 20372

# 76B001



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

## Femur Target Spacing:

Right Side = 7 1/2 in.

Left Side = 6 3/4 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

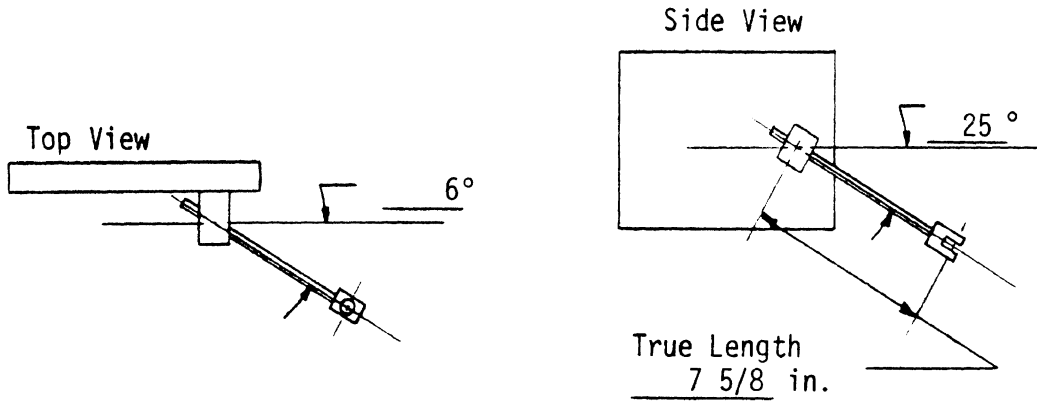
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

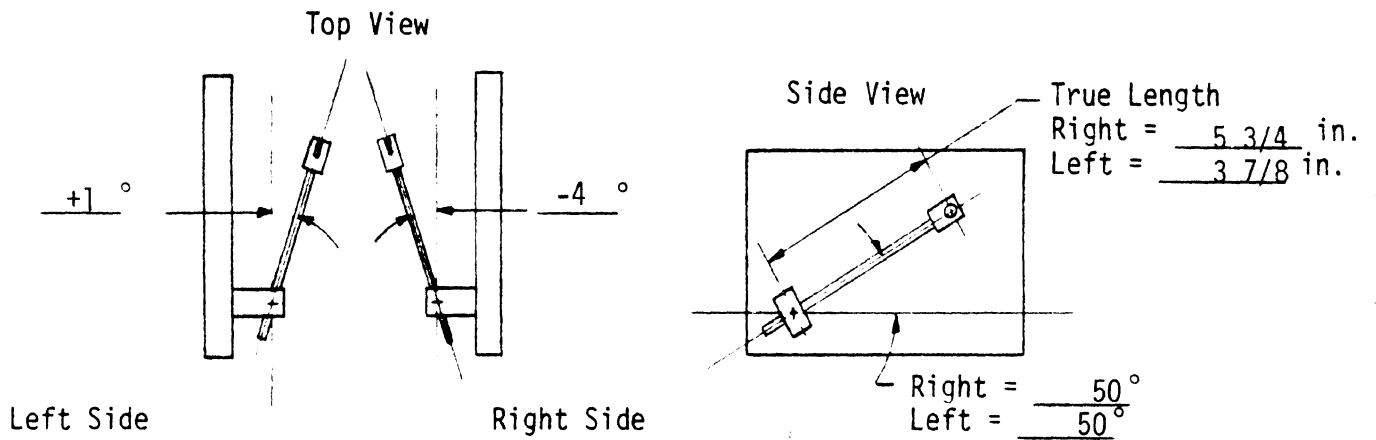
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



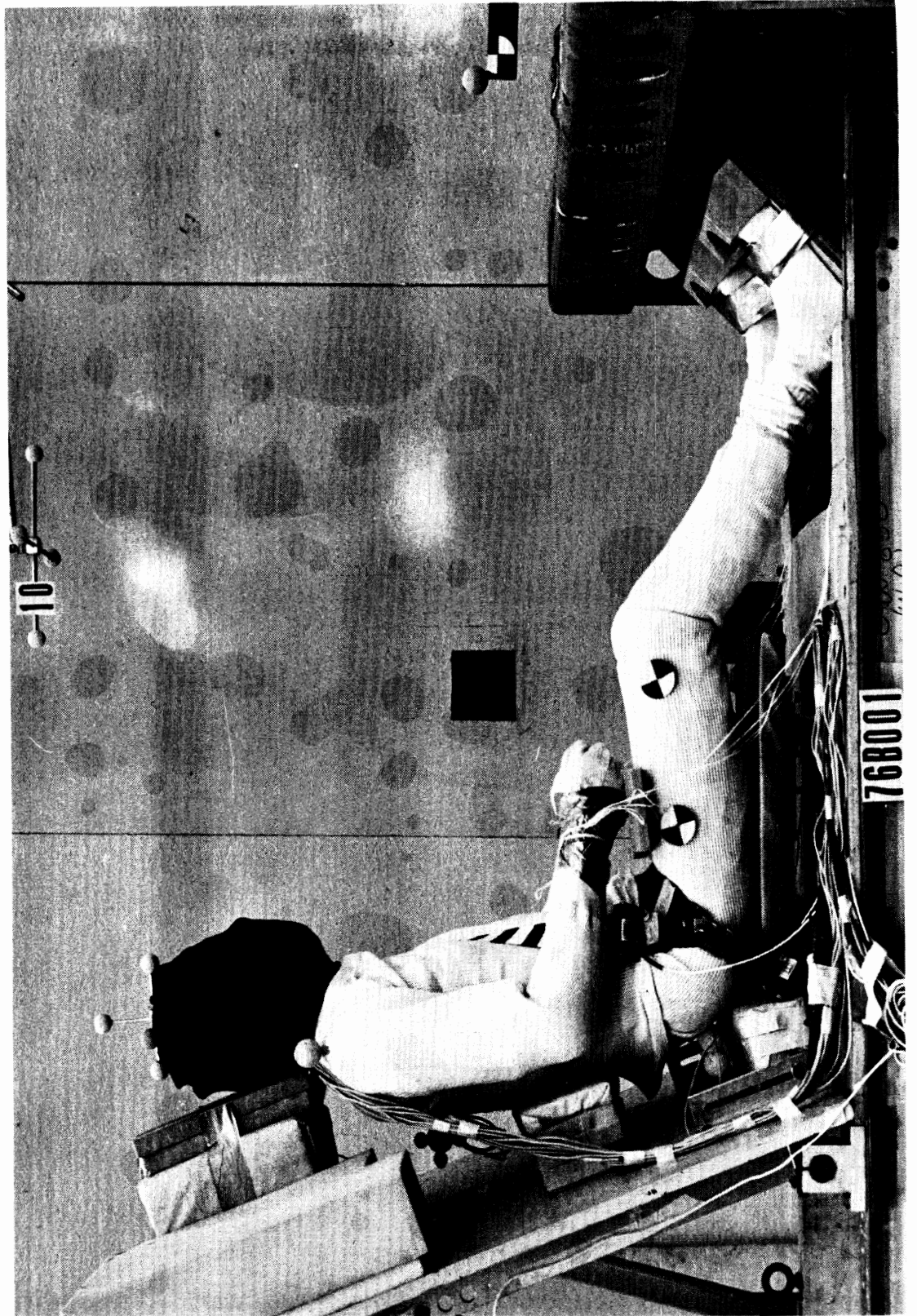
B. LAP BELT



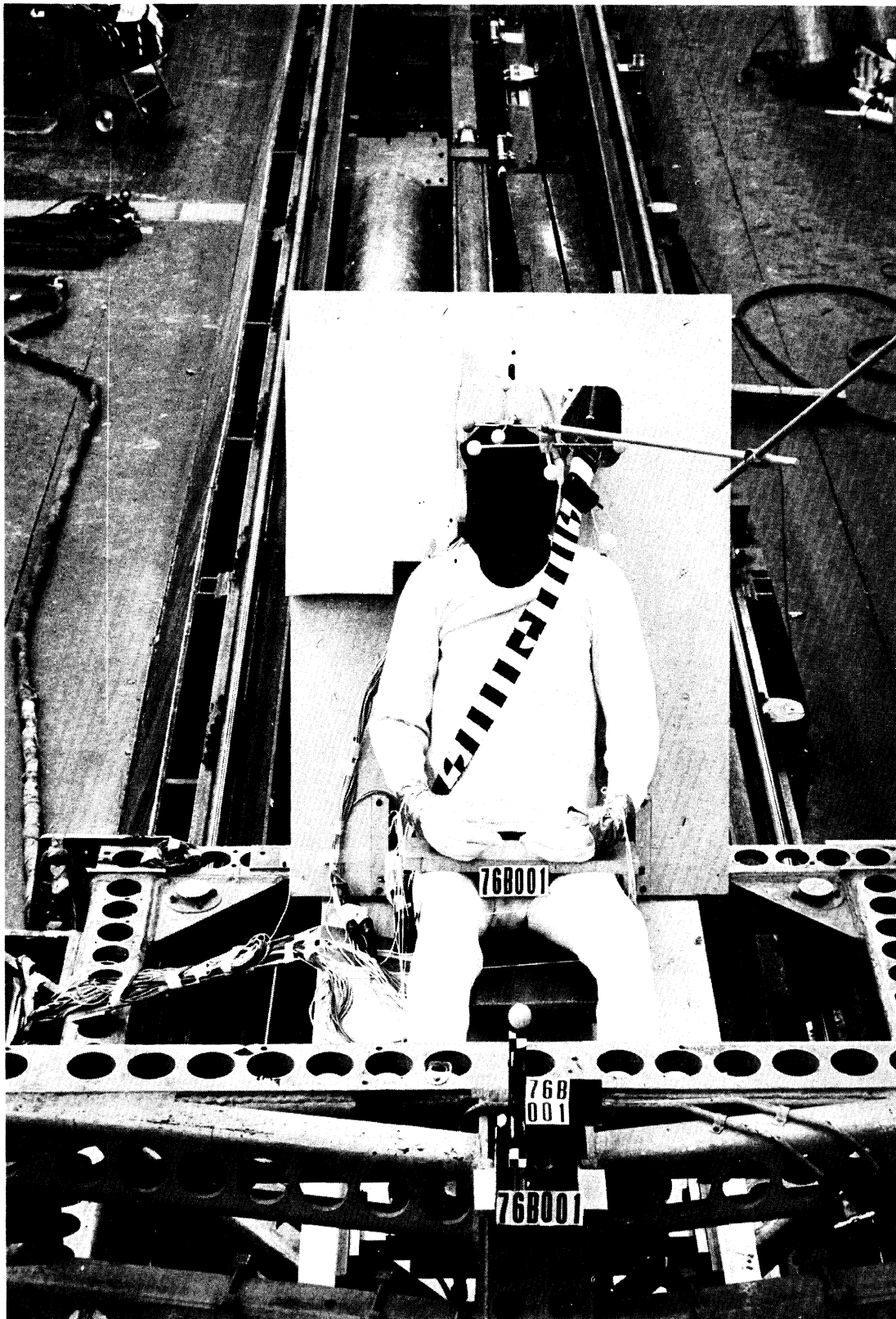
Sketch indicates positive angle directions

BELT LENGTH DATA

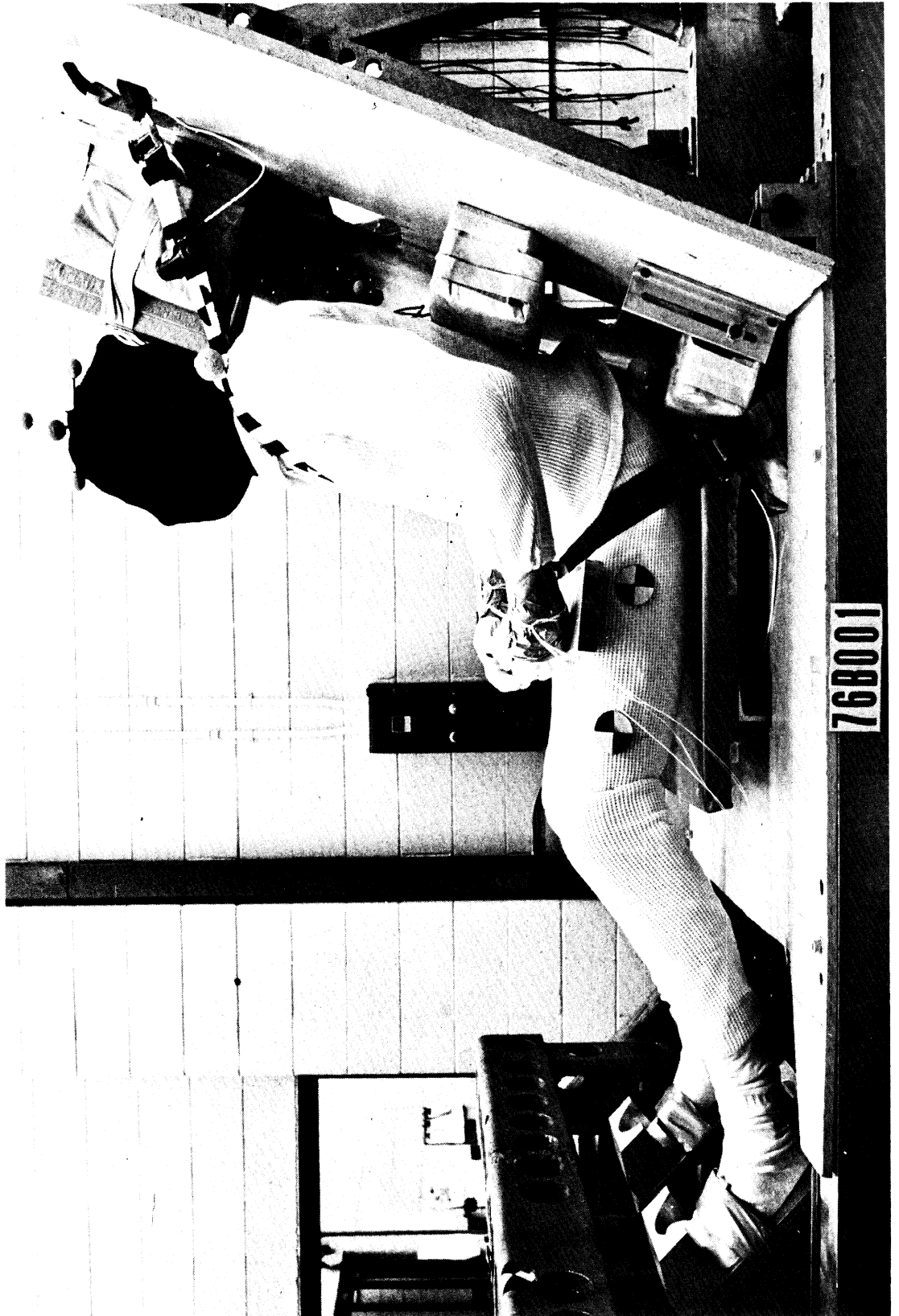
BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	12	12 1/4	1/4	11 1/2
Lt. Lap	32 1/2	32 3/4	1/4	32
Shoulder	42	42 3/16	3/16	40 7/16



76B001: RIGHT SIDE VIEW



76B001-FRONT VIEW



76B001: LEFT SIDE VIEW

=====  
 RUN ID: 768001-11 WRR-10  
 =====

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

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16BIT, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 24-AUG-76

TEST SIGNALS: 1646 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
281	11	SLED DECELERATION	20.00	G'S	4+1+1	80.0	412	1600.31
282	21	AX1 HEAD A001 ACC	-48.20	G'S	4+1+18	570.3	412	1600.31
283	31	AY1 HEAD B001 ACC	-41.50	G'S	4+1+18	570.3	412	1600.31
284	41	AZ1 HEAD C001 ACC	-40.00	G'S	4+1+18	570.3	412	1600.31
285	51	AX2 HEAD C002 ACC	-43.20	G'S	4+1+18	570.3	412	1600.31
286	61	AY2 HEAD A002 ACC	-49.80	G'S	4+1+18	570.3	412	1600.31
287	71	AZ2 HEAD B002 ACC	-50.50	G'S	4+1+18	570.3	412	1600.31
288	81	AX3 HEAD B003 ACC	-43.70	G'S	4+1+18	570.3	412	1600.31
289	91	AY3 HEAD C003 ACC	-34.10	G'S	4+1+18	570.3	412	1600.31
290	101	AZ3 HEAD A003 ACC	-37.30	G'S	4+1+18	570.3	412	1600.31

11:  
 12:  
 13:  
 14:

-----  
 FILTERED FILES: 281 - 290 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768001-11 WRR-10  
 -----



SEP 13, 1976 / 11:38:58

RUN ID: 76B001-1: WBR-10

10 MS

20 PTS

< 1 > 9.E+00

< 2 > 9.E+00

< 3 > 2.E+01

< 4 > 2.E+01

< 5 > 7.E+00

< 6 > 2.E+01

< 7 > 9.E+00

< 8 > 7.E+00

< 9 > 6.E+00

< 10 > 2.E+01

10 MS

20 PTS

FILES: 281-290, TAPE: GNR-CAD

412 PTS @ 1600 HZ = 256.8 MS

=====

RUN ID: 76001-2; MRK-10

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 130(HSRI) EXPANDED 16:11, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1644 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 PERI
---	--	-----	-----	-----	-----	-----	---	-----
291	- 1:	A-P ACC AT BASE OF SKULL	-35.50	G'S	4+1+18	570.1	407	1599.88
292	- 2:	PELVIS BIAX P-A ACC	-37.00	G'S	4+1+12	285.1	407	1599.88
293	- 3:	PELVIS BIAX I-S ACC	46.50	G'S	4+1+12	285.1	407	1599.88
294	- 4:	THORAX TRIAX P-A ACC	53.00	G'S	4+1+12	285.1	407	1599.88
295	- 5:	THORAX TRIAX I-S ACC	-50.20	G'S	4+1+12	285.1	407	1599.88
296	- 6:	THORAX TRIAX R-L ACC	39.80	G'S	4+1+12	285.1	407	1599.88
297	- 7:	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	407	1599.88
298	- 8:	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	407	1599.88
299	- 9:	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	407	1599.88
300	- 10:	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	407	1599.88
301	- 11:	S-I ACC AT BASE OF SKULL	-33.40	G'S	4+1+18	570.1	407	1599.88
302	- 12:	L-R ACC AT BASE OF SKULL	51.60	G'S	4+1+18	570.1	407	1599.88

13:

14:

----- FILTERED FILES: 291 - 302 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 76001-2; MRK-10 -----

SEP 13, 1976 / 11:41:34

RUN ID: 76B001-2: WBR-10

10 MS

20 PTS

< 1 > 8.E+00

< 2 > 7.E+00

< 3 > 9.E+00

< 4 > 6.E+00

< 5 > 4.E+00

< 6 > 7.E+00

< 7 > 3.E+02

< 8 > 7.E+02

< 9 > 2.E+02

< 10 > 4.E+02

< 11 > 5.E+00

< 12 > 2.E+01

10 MS

20 PTS

FILES: 291-302, TAPE: GM-CAD

407 PTS • 1599 HZ = 253.8 MS



TEST # 76B001

76B001: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-11

TEST: 76B002

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>167</u>
Frontal X-rays	<u>171</u>
Lateral X-rays	<u>179</u>
Head x-rays & Analysis	<u>185</u>
Instrumentation	<u>188</u>
Thorax Autopsy	<u>190</u>

For Each Test: 76B002

Setup Diagram	<u>191</u>	_____	_____
Belts/anchors	<u>192</u>	_____	_____
Setup photographs	<u>196</u>	_____	_____
Digitized Signals (7600)	<u>198</u>	_____	_____
Digitized Signals (CEC)	<u>200</u>	_____	_____
Graphcheck	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20418 WBR 11

List of Measurements (All measurements except weight listed in cm)

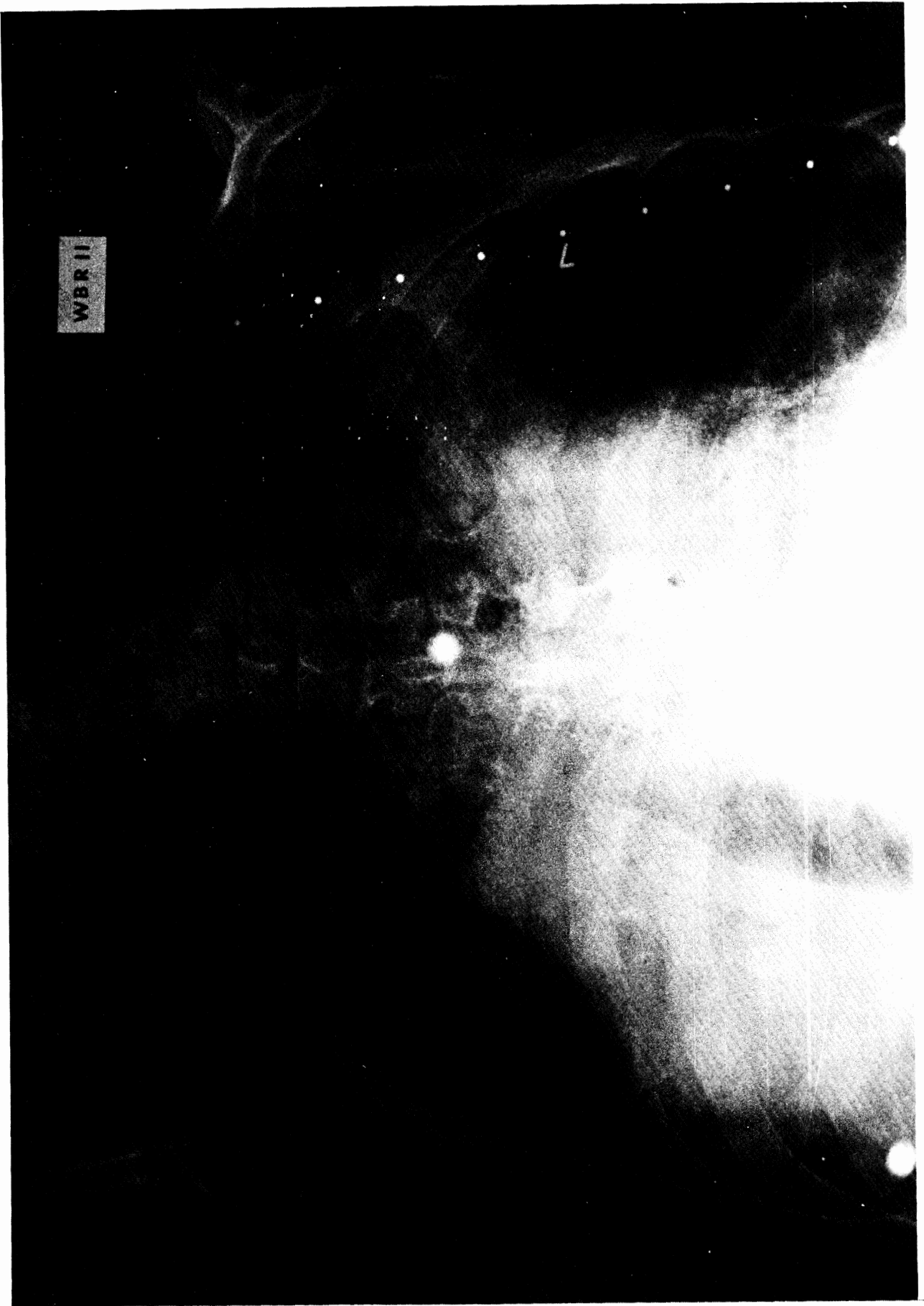
1. Weight		<u>73.9 kg</u>
2. Stature		<u>170.6</u>
3. Trochanterion Hgt.		<u>80.1</u>
4. Symphysis Hgt.		<u>80.4</u>
5. Anterior Superior Iliac Spine Hgt.	Rt.	<u>72.7</u>
	Lt.	<u>--</u>
6. Iliocristale Hgt.	Rt.	<u>65.6</u>
	Lt.	<u>--</u>
7. Substernale Hgt.		<u>51.4</u>
8. Mid-Chest Hgt.		<u>40.9</u>
9. Suprasternale Hgt.		<u>30.7</u>
10. Acromion Hgt.	Rt.	<u>22.7</u>
	Lt.	<u>--</u>
11. Menton Hgt.		<u>20.6</u>
12. Mastoid Hgt.	Rt.	<u>15.4</u>
	Lt.	<u>--</u>
13. Tragion Hgt.	Rt.	<u>11.3</u>
	Lt.	<u>--</u>
14. Tragion Depth	Rt.	<u>9.9</u>
	Lt.	<u>--</u>
15. Suprasternale Depth		<u>19.1</u>
16. Mid-Chest Depth		<u>21.8</u>
17. Substernale Depth		<u>22.3</u>
18. Anterior Superior Iliac Spine Depth	Rt.	<u>16.2</u>
	Lt.	<u>--</u>

19. Symphision Depth		17.8
20. Trochanterion Depth	Rt.	6.1
	Lt.	--
21. Suprasternale-Acromion Distance	Rt.	19.9
	Lt.	--
22. Biacromial Breadth		34.5
23. Bideltoid Breadth		43.9
24. Mid-Chest Breadth		32.6
25. Chest Breadth at Substernale		33.6
26. Hip Breadth at Iliocristale		31.8
27. Bispinous Diameter		24.9
28. ASIS to Symphision Distance	Rt.	14.7
	Lt.	15.7
29. Bitrochanteric Breadth		34.6
30. Acromion-Radiale Length		33.7
31. Ball of Humerus-Radiale Length		32.5
32. Radiale-Stylian Length		27.2
33. Hand Length		19.9
34. Hand Breadth		8.9
35. Hand Depth		3.2
36. Wrist Breadth		6.3
37. Forearm Depth		8.8
38. Upper Arm Depth		9.3
39. Trochanterion-Fibulare Length		45.9
40. Fibulare-Lateral Malleolus Length		40.9
41. Tibiale-Sphyrion Length		39.7
42. Tibiale-Heel of Foot Length		46.9



43. Foot Length	24.6
44. Foot Breadth	9.6
45. Minimum Ankle Breadth	5.8
46. Calf Depth	9.3
47. Upper Thigh Breadth	14.2
48. Head Breadth	15.2
49. Head Length	20.8
50. Bitragion Breadth	15.4
51. Bigonial Breadth	11.3
52. Menton Diagonal Length	25.3
53. Mastoid-Crinion Length	16.3
54. Head Circumference	57.8
55. Mid-Sagittal Arc Length	34.1
56. Bitragion-Coronal Arc Length	33.5
57. Mid-Neck Circumference	40.2
58. Chest Circumference at Mid-Chest	98.2
59. Chest Circumference at Substernale	94.7
60. Hip Circumference at Iliocristale	90.6
61. Buttocks Circumference at Trochanterion	96.5
62. Upper Arm Circumference (Mid-Biceps)	27.6
63. Maximum Forearm Circumference	23.2
64. Minimum Wrist Circumference	17.9
65. Upper Thigh Circumference	50.9
66. Maximum Calf Circumference	35.9
67. Minimum Ankle Circumference	21.7



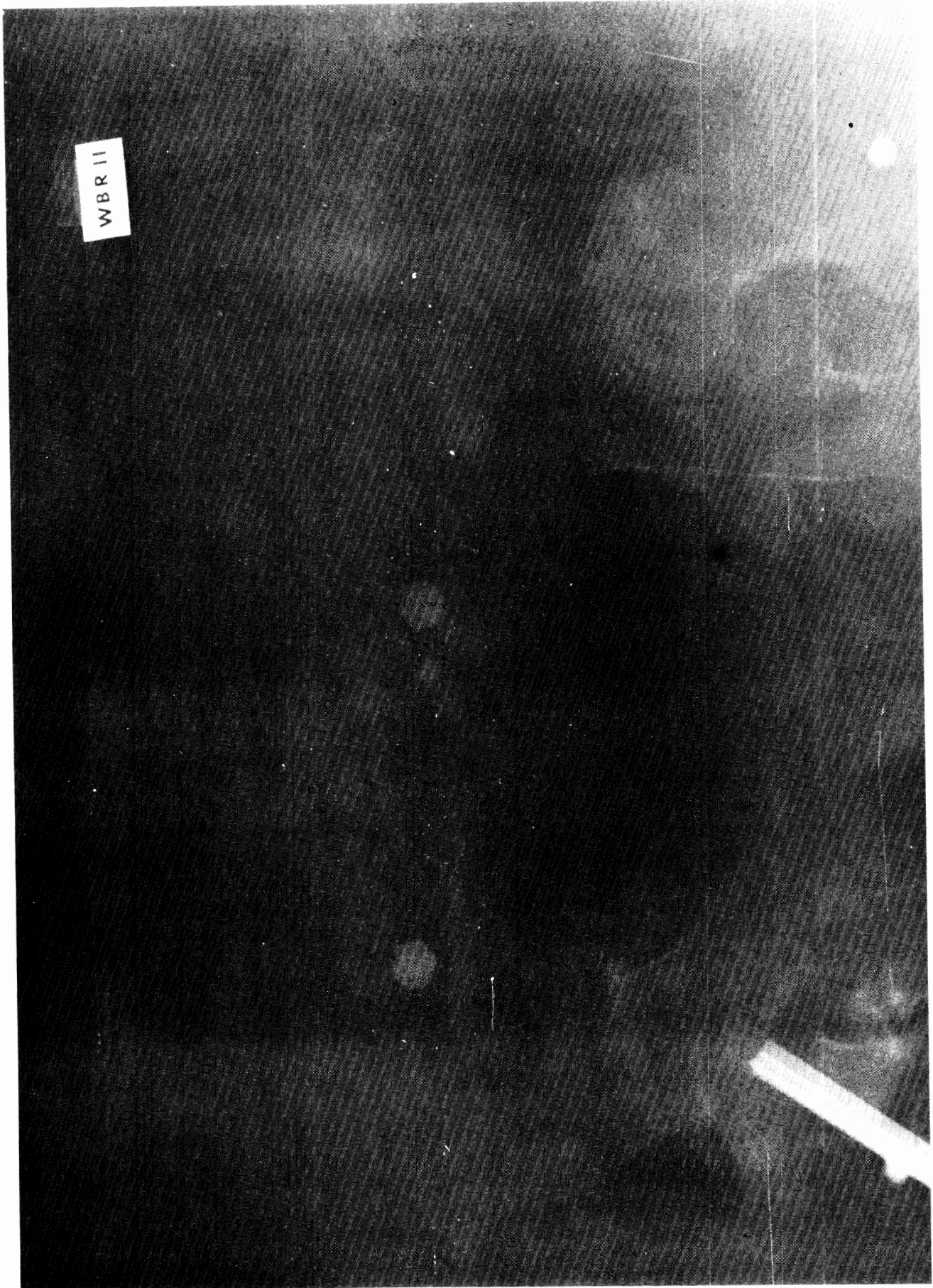


WBR-11: FRONTAL X-RAY

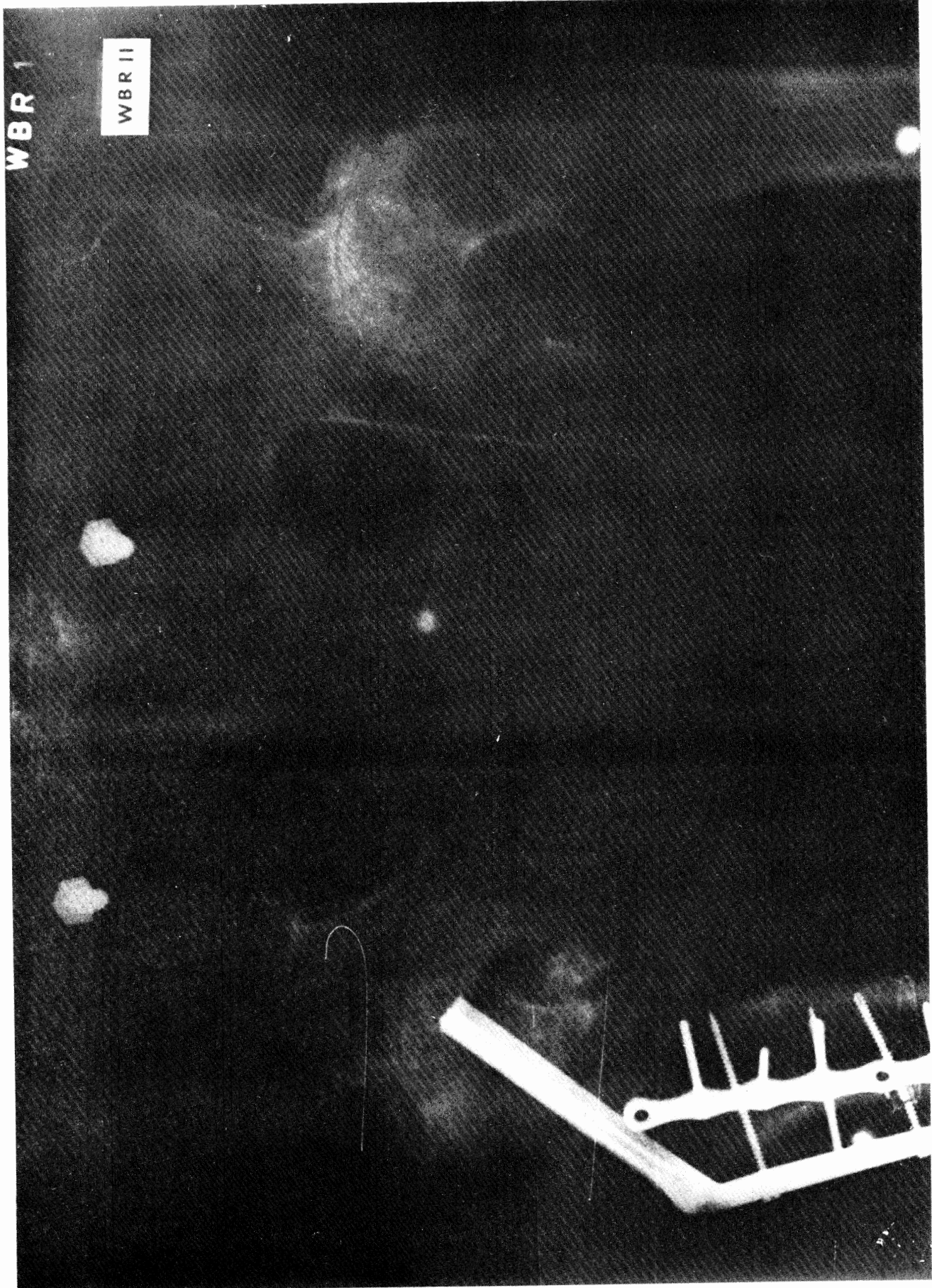


WBR-11: FRONTAL X-RAY





WBR-11: FRONTAL X-RAY



WBR-11: FRONTAL X-RAY



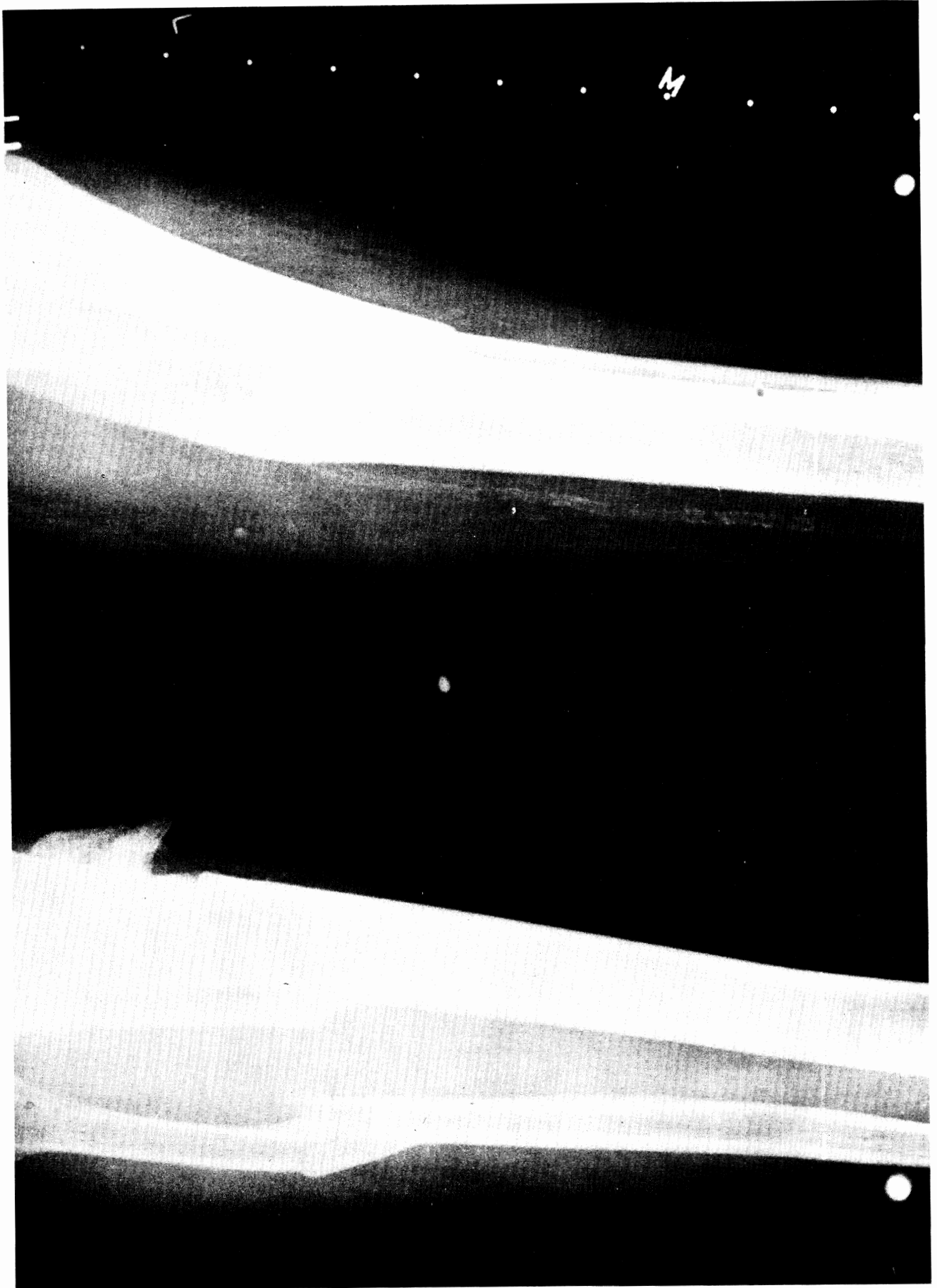


WBR-11: FRONTAL X-RAY



WBR-11: FRONTAL X-RAY

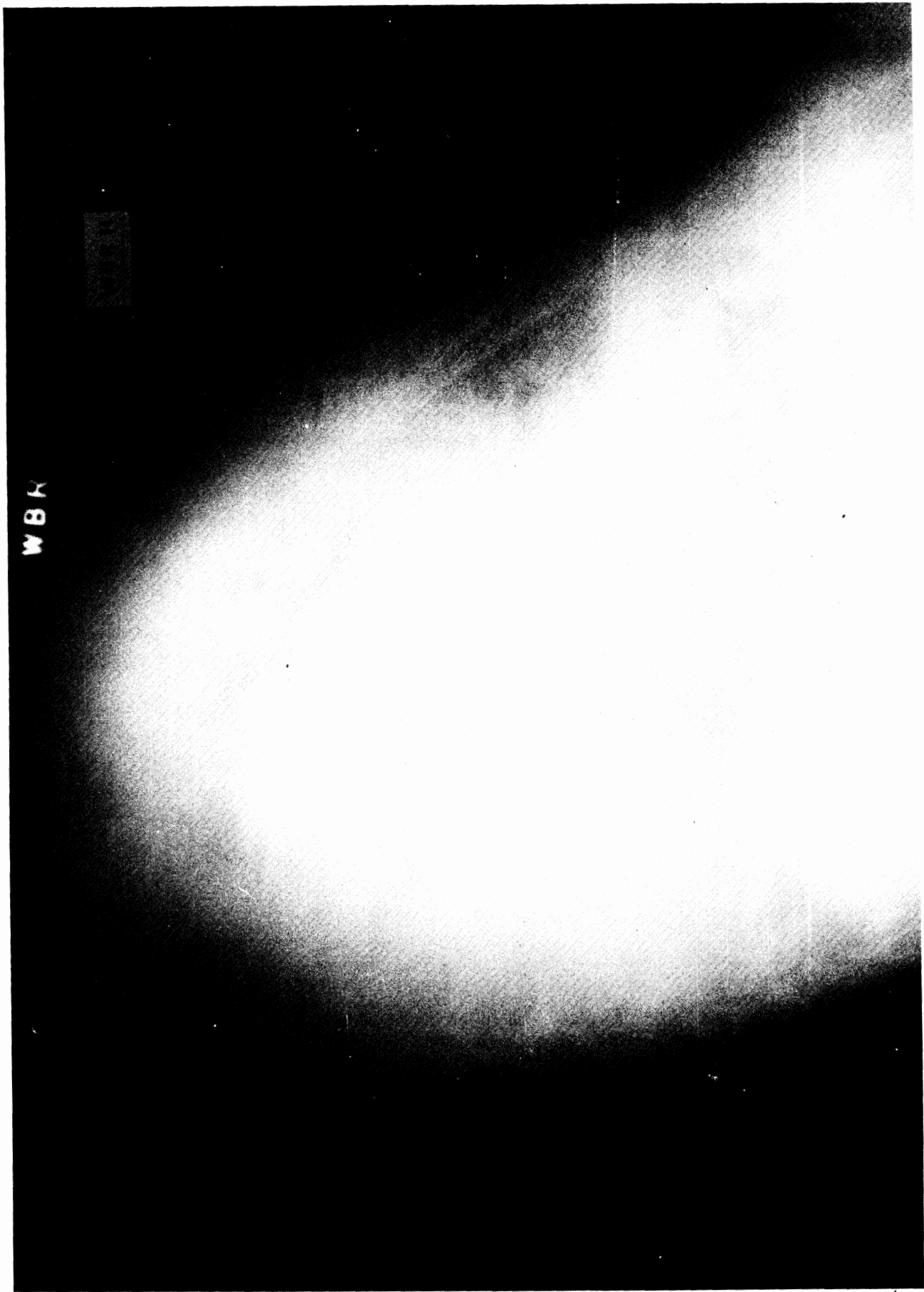




WBR-11: FRONTAL X-RAY

B-177

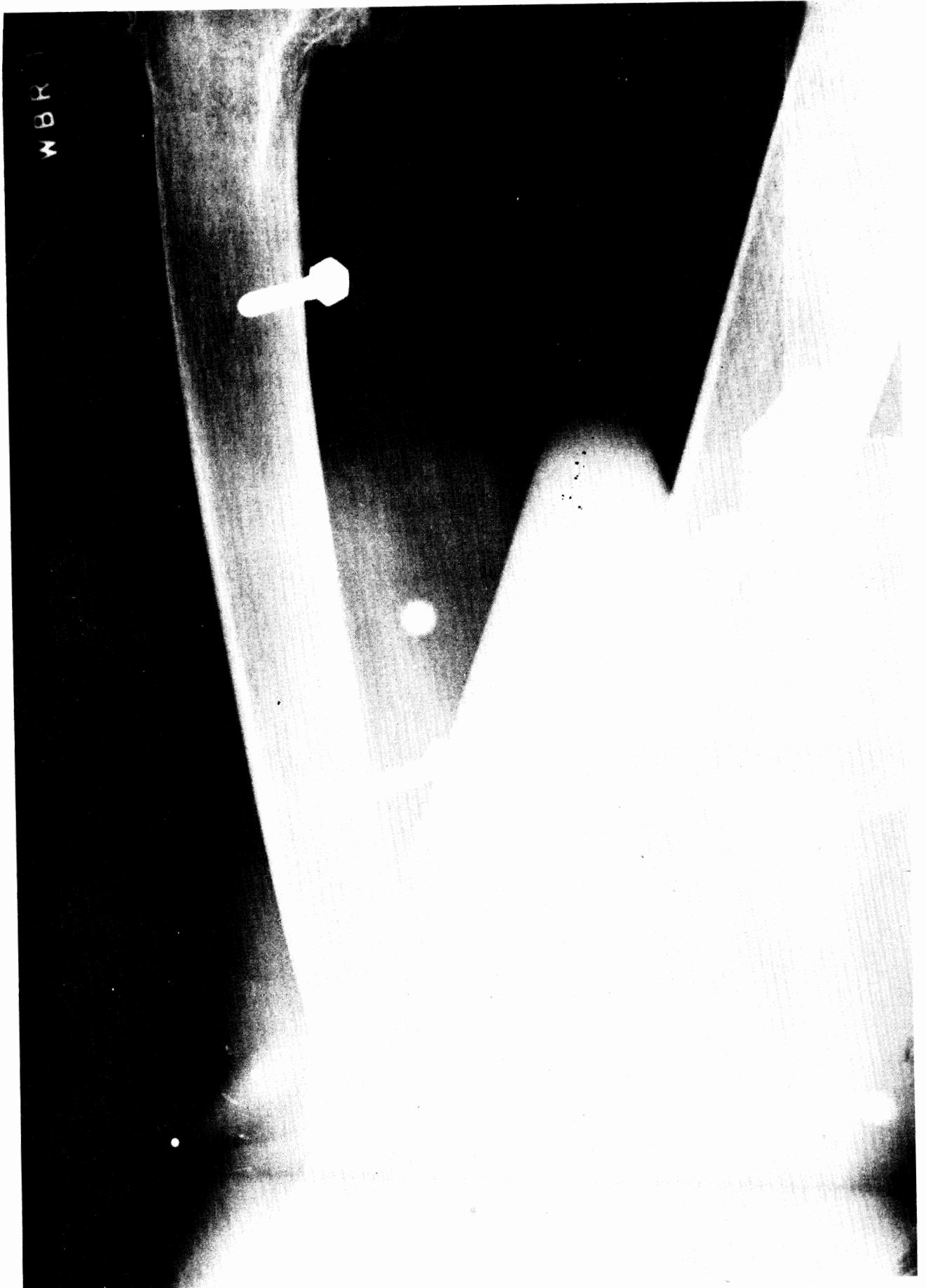




WBR-11: LATERAL X-RAY

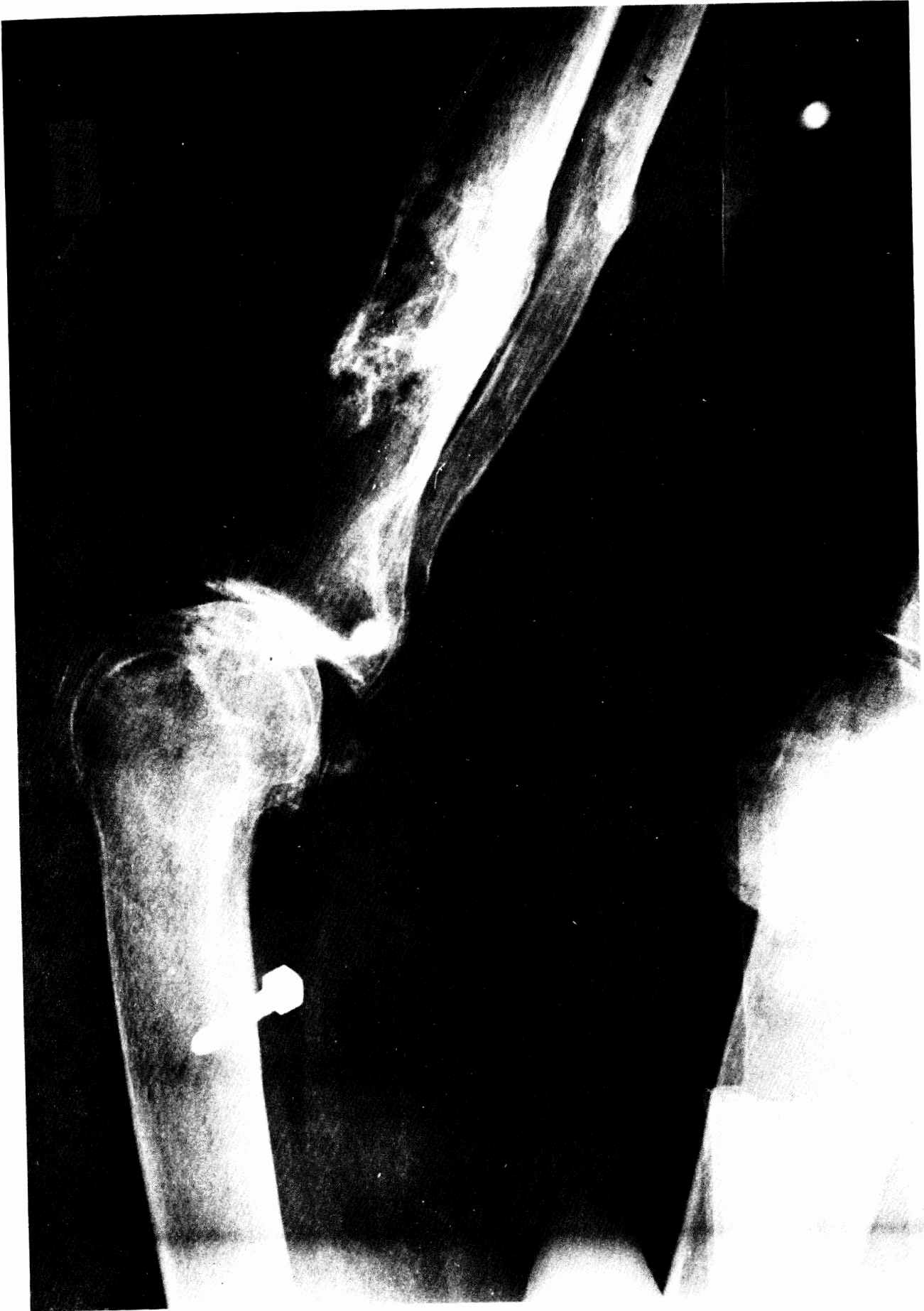


WBR-11: LATERAL X-RAY



WBR

WBR-11: LATERAL X-RAY



WBR-11: LATERAL X-RAY



WBR-11: LATERAL X-RAY





A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	4.610	2.830	10.63	-1.060	3.740	20.25
P2- L.EYE:	4.290	2.300	8.13	2.210	3.270	20.50
P3- R.EAR:	1.430	0.460	13.75	-3.190	0.650	18.25
P4- L.EAR:	1.110	-0.400	6.75	3.260	-0.170	17.00
Q1- ACC. :	-4.970	-1.030	9.50	-0.140	-0.990	11.75
Q2- ACC. :	-2.200	3.290	6.25	4.250	4.050	12.75
Q3- ACC. :	-2.170	4.690	13.38	-4.640	4.830	14.00
R1,R2,R3 :	3.270	4.449	5.058			

	COORDINATES W.R.T. CAMERA				COORDINATES W.R.T. CAMERA		
	X	Y	Z		X	Y	Z
P1 :	3.643	-0.680	2.317	Q1:	-4.015	-0.108	-0.799
P2 :	3.556	1.408	1.995	Q2:	-1.888	3.219	2.945
P3 :	1.061	-2.144	0.389	Q3:	-1.622	-3.424	3.535
P4 :	0.944	2.254	-0.229	P:	-5.015	0.128	2.306
C :	1.002	0.055	0.080	CP:	-6.017	0.072	2.226

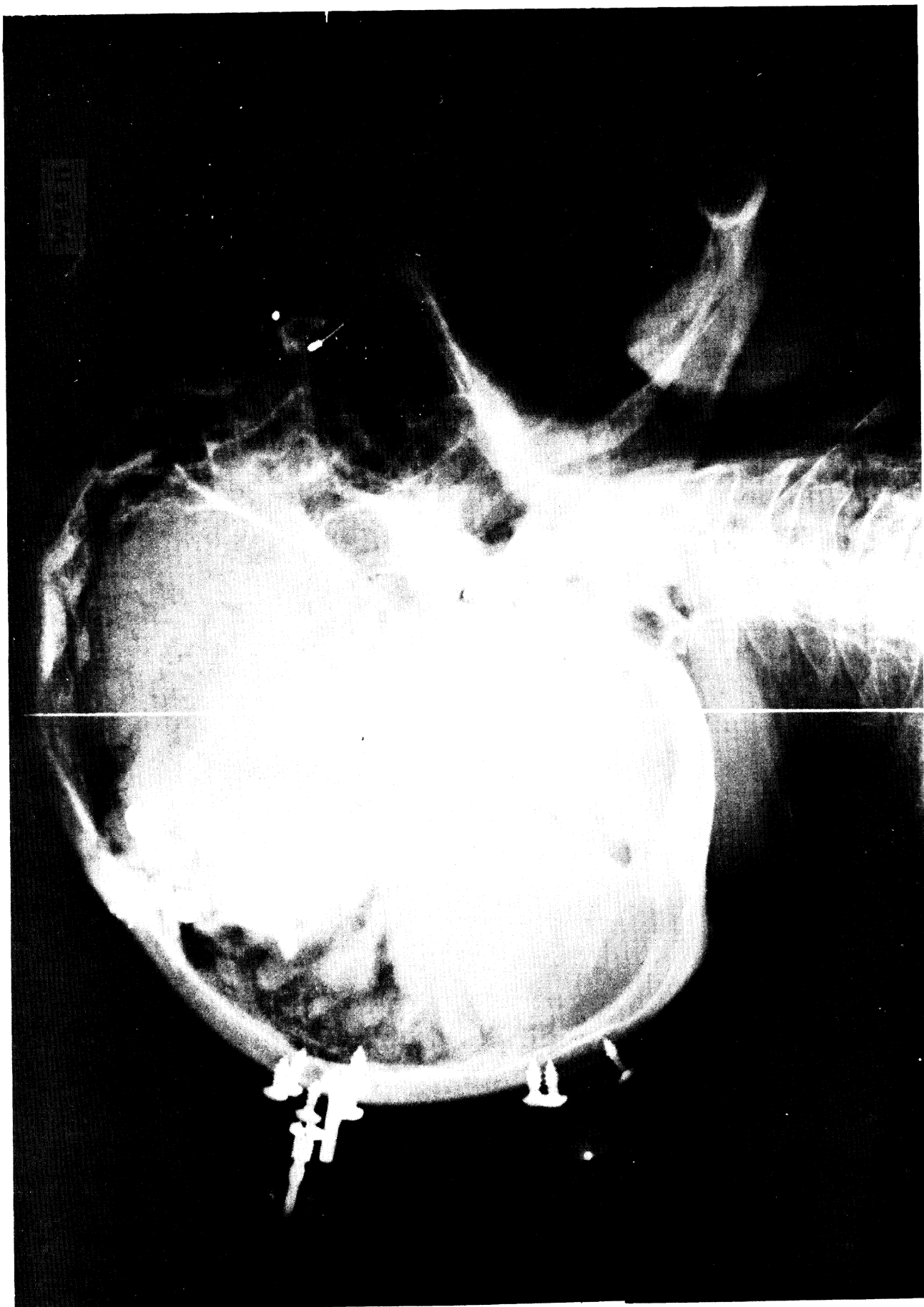
ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<I> :	0.77717	0.11752	0.61822	1.0000	-0.0000	0.0
<J> :	-0.03365	0.98871	-0.14565	-0.0000	0.9999	-0.0000
<K> :	-0.62839	0.09239	0.77239	0.0	-0.0000	1.0000

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
<X>	<Y>	<Z>				
<E1>:	0.30582	-0.07211	-0.94935	1.0000	0.0284	0.0249
<E2>:	0.70372	0.69575	0.14391	0.0284	1.0000	0.0184
<E3>:	0.66999	-0.70152	0.24284	0.0249	0.0184	1.0000

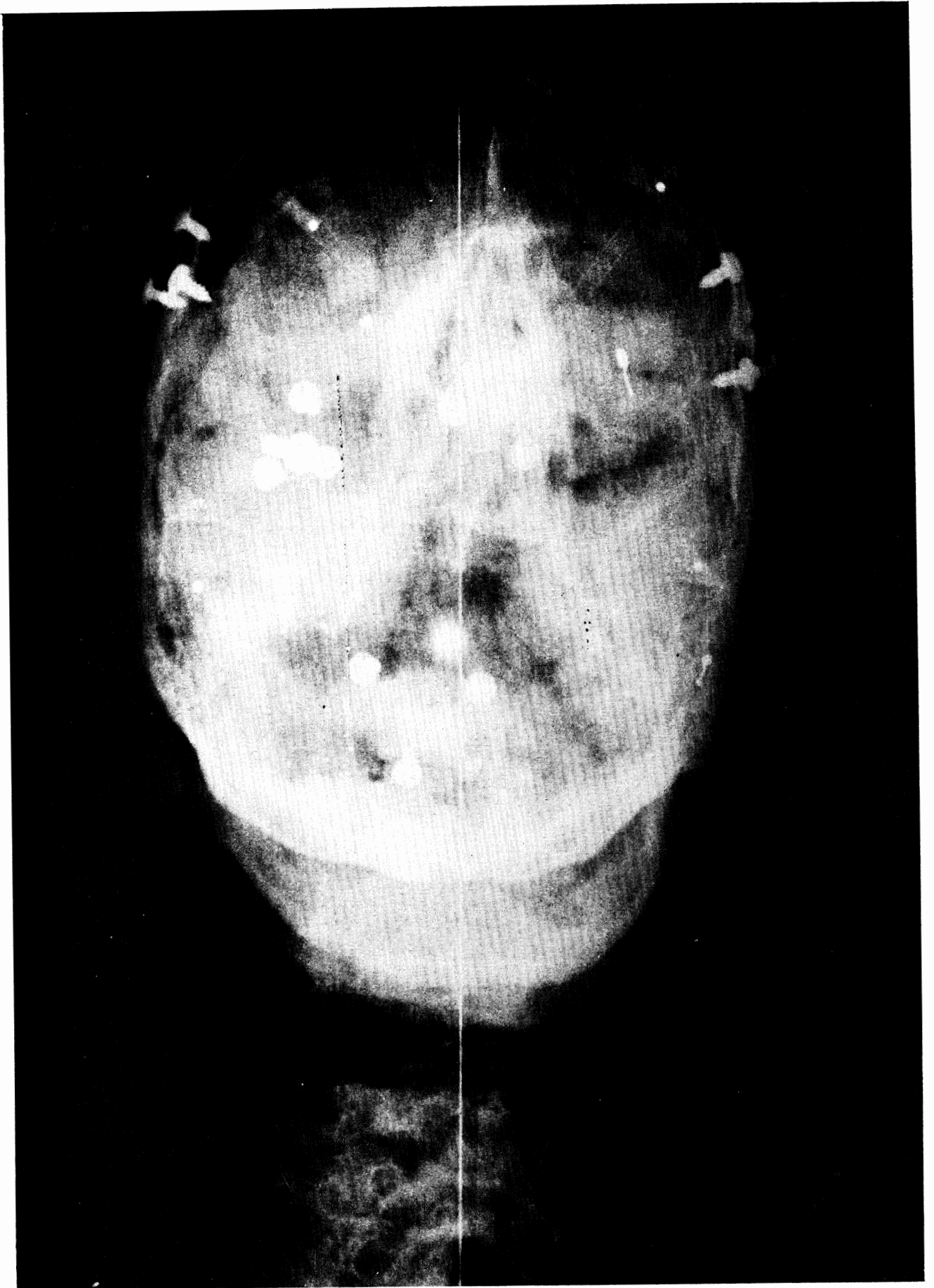
```

*****
*
* RUN ID:WBR-11           MAY 27, 1976
*
* PQ1= 3.270, PQ2= 4.449, PQ3= 5.058
* CPI= -3.292, CPJ= -0.050, CPK= 5.507
*
* PERTURBATIONS: E1,E2,E3
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*   <I>      <J>      <K>
*
* <E1>:  -0.37521  0.05692  -0.92519
*
* <E2>:   0.71773  0.64946  -0.25112
*
* <E3>:   0.58658 -0.75826  -0.28453
*
*****

```



WBR-11: HEAD X-RAY (X-Z)



WBR-11: HEAD X-RAY (Y-Z)

# INSTRUMENTATION DATA SHEET

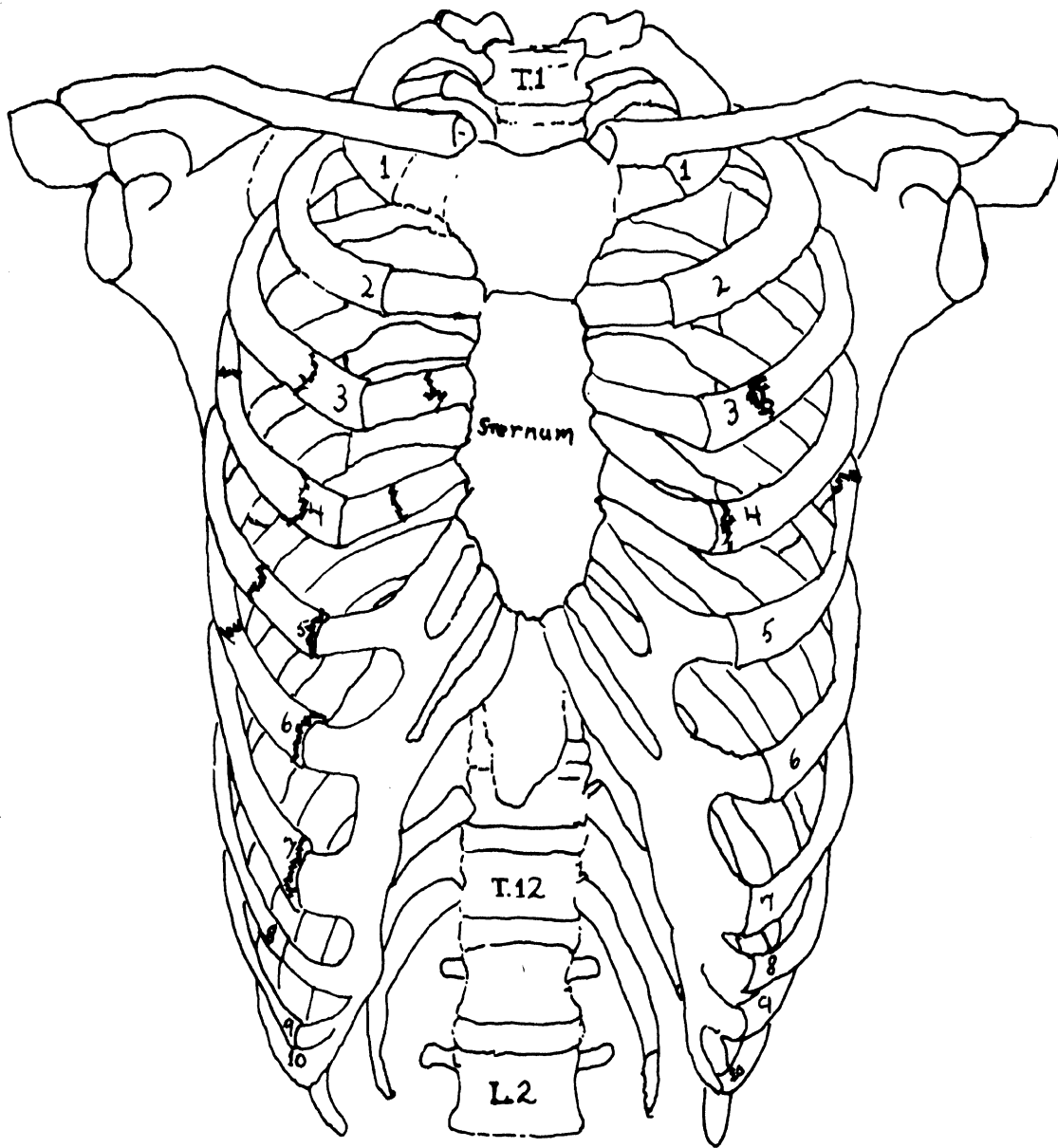
TEST NO: 76B002		DESCRIPTION		Account No: 320316										
through:		Whole Body Response Cadaver Test		DATE: 3-31-76										
SUBJECT: Cadaver		76B002: Mid-Severity Test		BY: J.B.										
number: 20418		FACILITY: Impact Sled		TAPE REEL # 138										
				RECORDER: 7600										
				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT		CH #		
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±		units/volt	units
1	Sled Decel.	H-1	200	1	-	Statham	13587	1.1	1000	/		20.	G	1
2	Head Q <sub>1</sub> - A	H-5	100	5	10	Endevco	AB 59	1.16	100	56.4 G	-	48.6	G	2
3	Head Q <sub>1</sub> - B	H-6	100	6	10	"	AB 60	1.16	100	48.5 G	-	41.8	G	3
4	Head Q <sub>1</sub> - C	H-7	100	7	10	"	AB 87	1.16	100	46.0 G	-	39.7	G	4
5	Head Q <sub>2</sub> - C	H-8	100	8	10	"	AB 90	1.16	100	49.7 G	-	42.8	G	5
6	Head Q <sub>2</sub> - A	H-9	100	9	10	"	AC 04	1.16	100	58.3 G	-	50.3	G	6
7	Head Q <sub>2</sub> - B	H-10	100	10	10	"	AC 06	1.14	100	58.1 G	-	51.0	G	7
8	Head Q <sub>3</sub> - B	H-11	100	11	10	"	AB 57	1.16	100	39.5 G	-	34.1	G	8
9	Head Q <sub>3</sub> - C	H-12	100	12	10	"	AB 76	1.15	100	43.6 G	-	37.9	G	9
10	Head Q <sub>3</sub> - A	H-13	100	13	10	"	AA 41	1.26	100	- G	-	42.2	G	10
11														11
12	Velocity									12"/pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

# INSTRUMENTATION DATA SHEET

<b>TEST NO:</b> 76B002	<b>DESCRIPTION</b> WBR-11	Account No: 320316
through:	Whole Body Response Cadaver Test	<b>DATE:</b> 3-31-76 <b>BY:</b> J.B.
<b>SUBJECT:</b> Cadaver	76B002: Mid-Severity Test	<b>TAPE REEL #</b> 139
number: 20418		<b>RECORDER:</b> CEC
<b>FACILITY:</b> Impact Sled		<b>REC. SPEED:</b> 30 I.P.S.

CH #	SET UP DATA				TRANSDUCER			CALIBRATION			OUTPUT			CH #
	input	ampl. #	gain	umbil.#	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	
1	Sled Decel.	H-1	200	1	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Pelvis P-A	H-14	100	14	10	Endevco	AC 02	1.15	100	42.6 G	-	37.0	G	2
3	Pelvis I-S	H-15	100	15	10	"	AC 16	1.16	100	42.8 G	+	36.9	G	3
4	Thorax P-A	H-16	100	16	10	"	AC 22	1.16	100	/	+	33.4	G	4
5	Thorax I-S	H-17	100	17	10	"	AA 58	1.24	100	56.2 G	-	46.7	G	5
6	Thorax R-L	H-18	100	18	10	"	AA 81	1.26	100	/	+	39.8	G	6
7	Rt. Lap	H-19	200	19	/	GSE	082	2.21	200	2209 #	+	1000	#	7
8	Lt. Lap	H-20	200	20	/	"	083	2.24	200	2242 #	+	1000	#	8
9	Up. Shoulder	H-21	200	21	/	"	084	2.28	200	2277 #	+	1000	#	9
10	Lo. Shoulder	CEC	/	22	/	"	085	2.25	/	2245 #	+	1000		10
11														11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

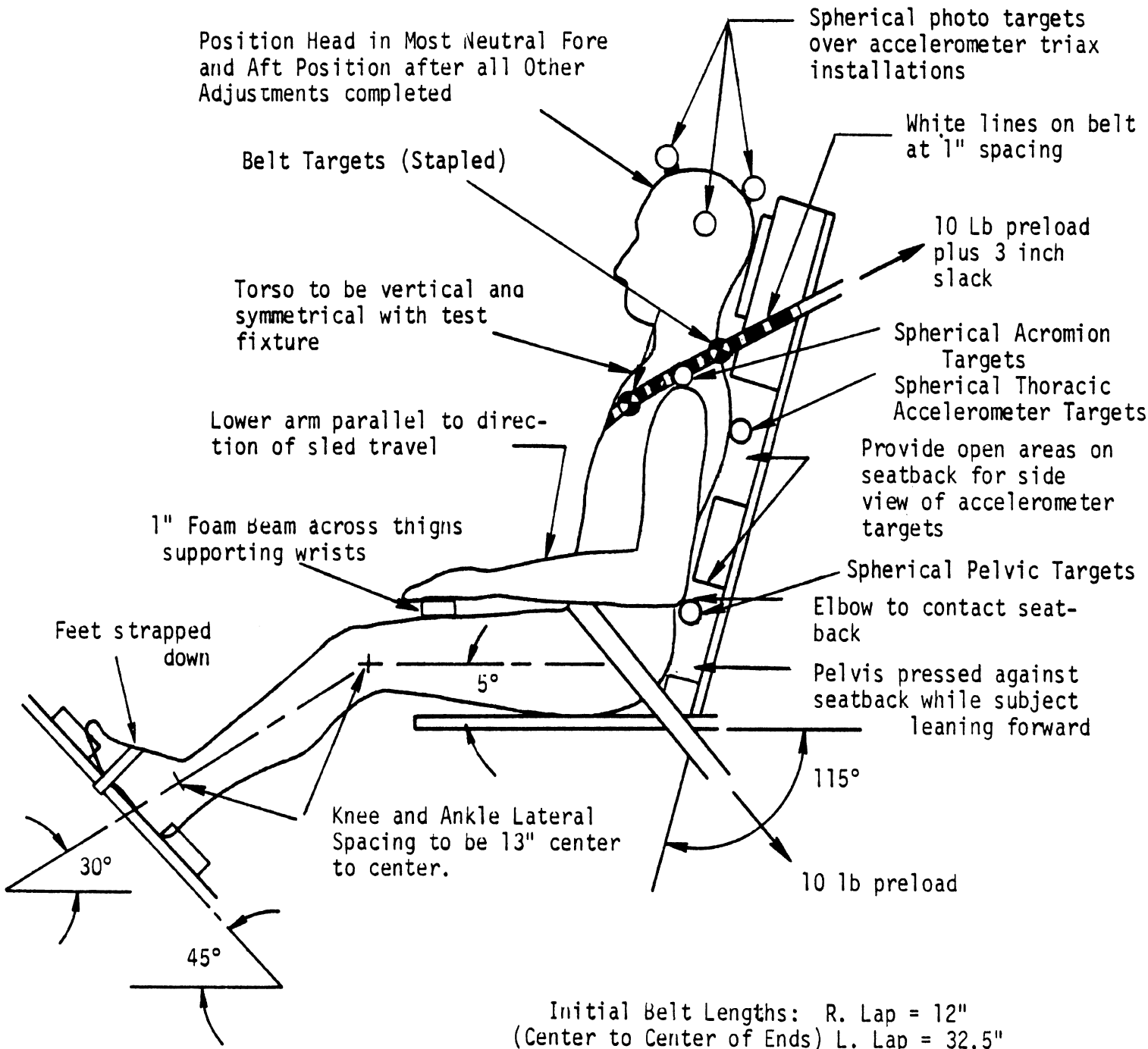
B-189



**Bony Thoracic Cage,  
anterior aspect**

WBR-11 CADAVER 20418

# 76B002



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

**Femur Target Spacing:**

Right Side = 4 3/4 in.  
 Left Side = 5 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

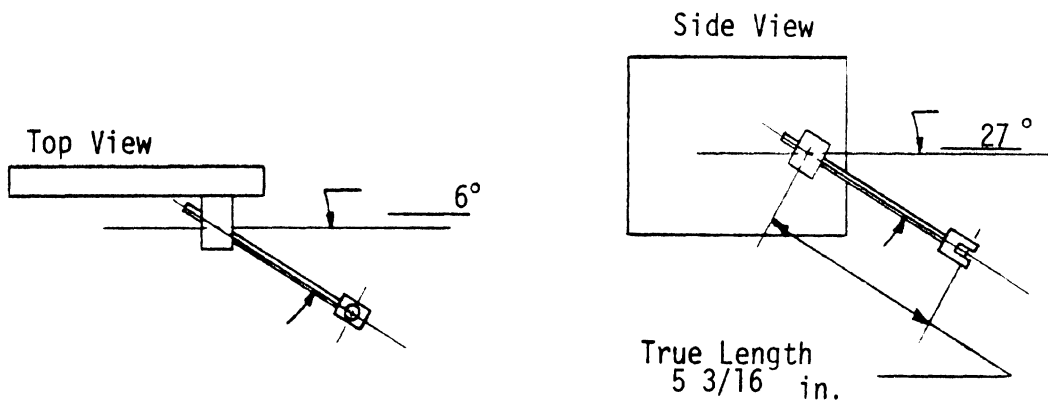
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

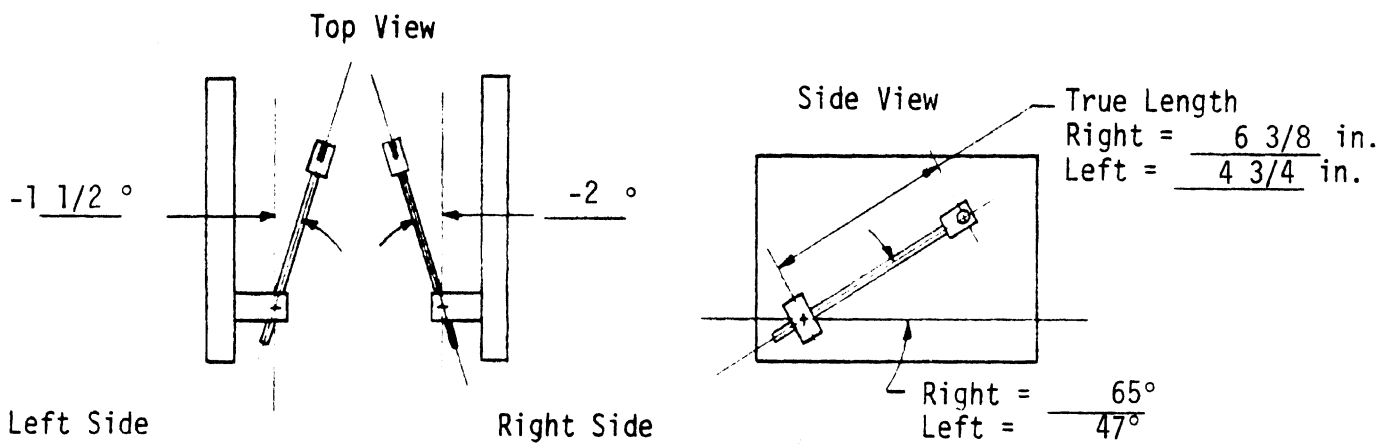
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



B. LAP BELT

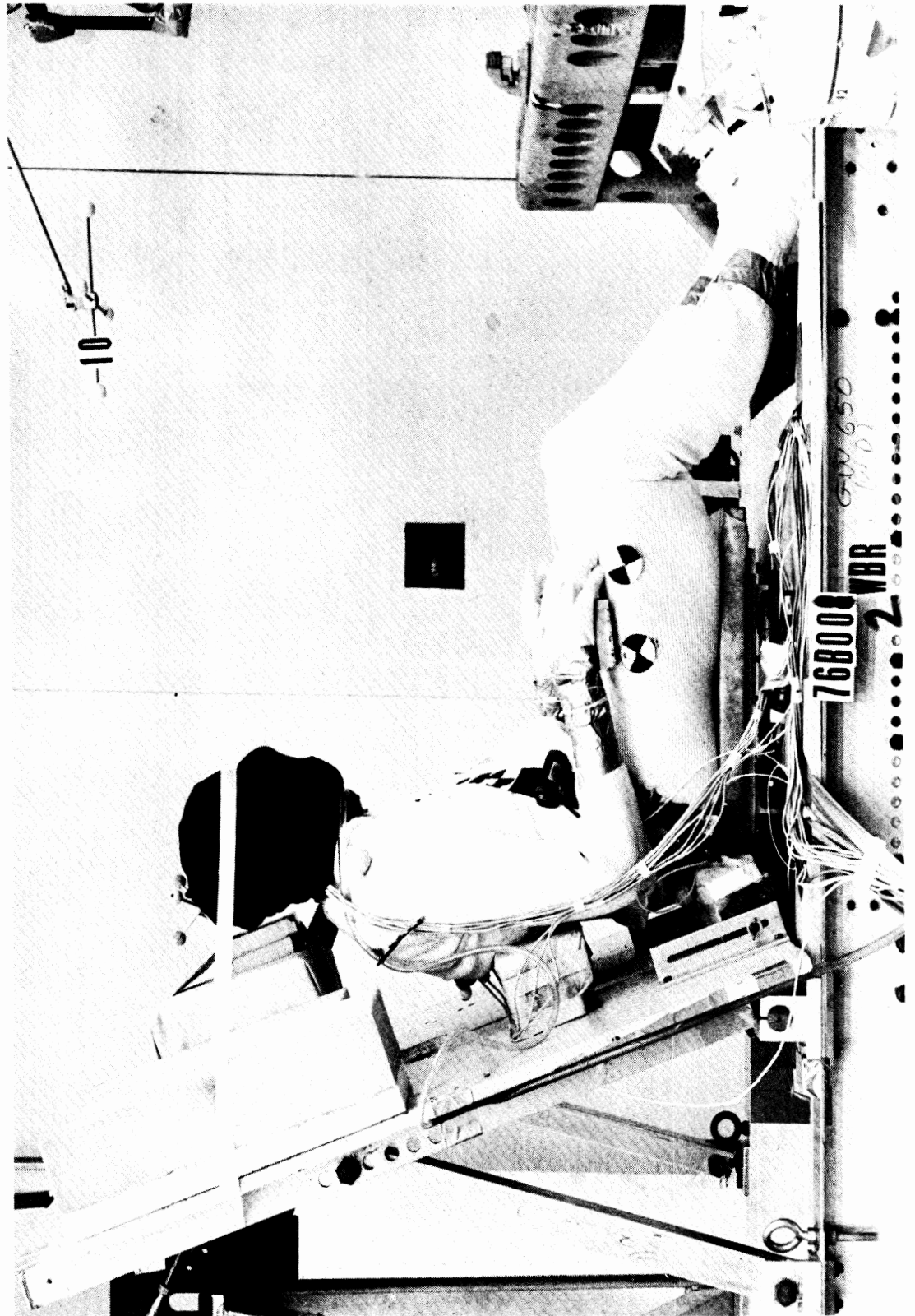


Sketch indicates positive angle directions

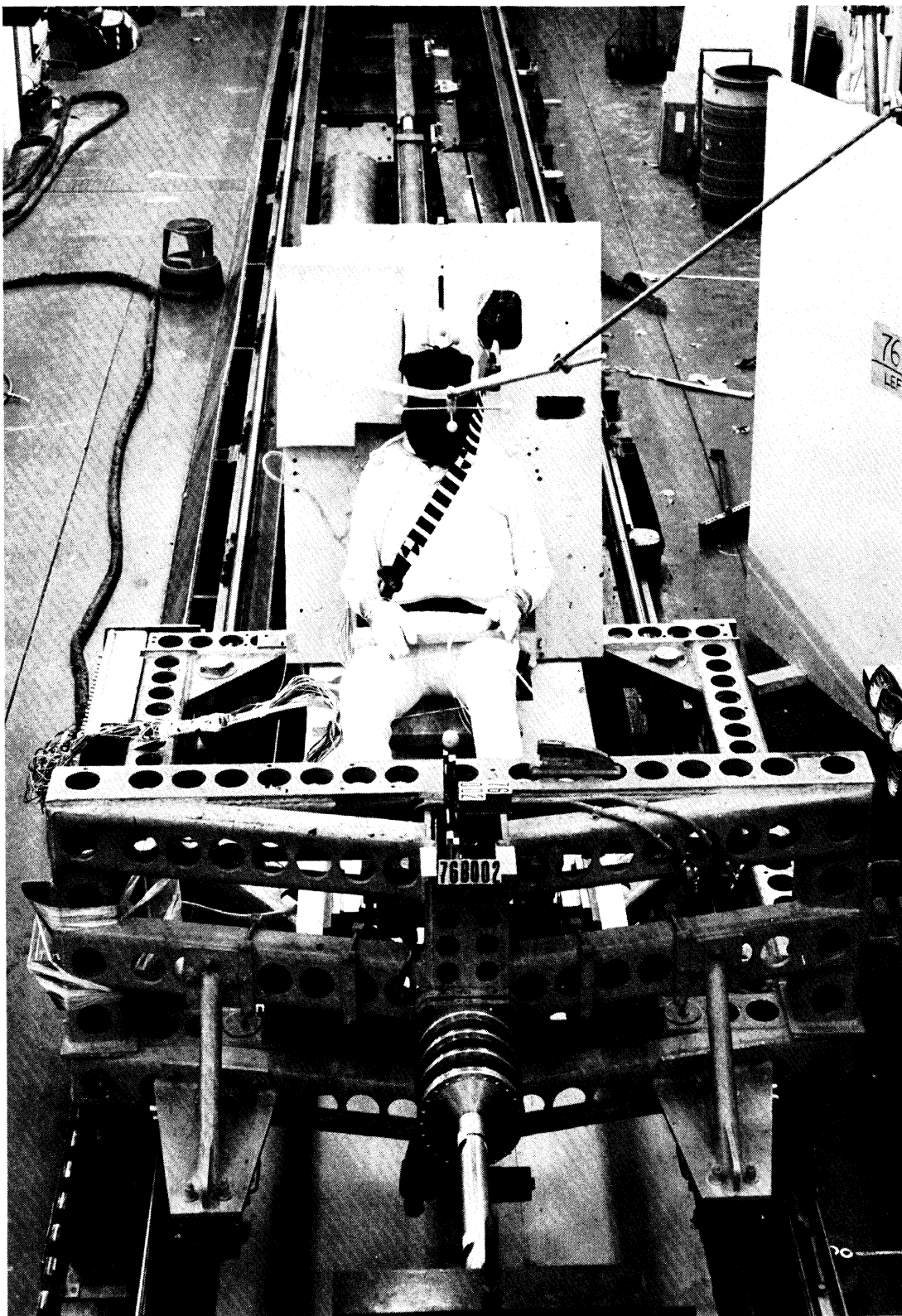
BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	12	12 1/4	1/4	11 1/2
Lt. Lap	32 1/2	32 13/16	5/16	32
Shoulder	42	42 1/16	1/16	40 5/16

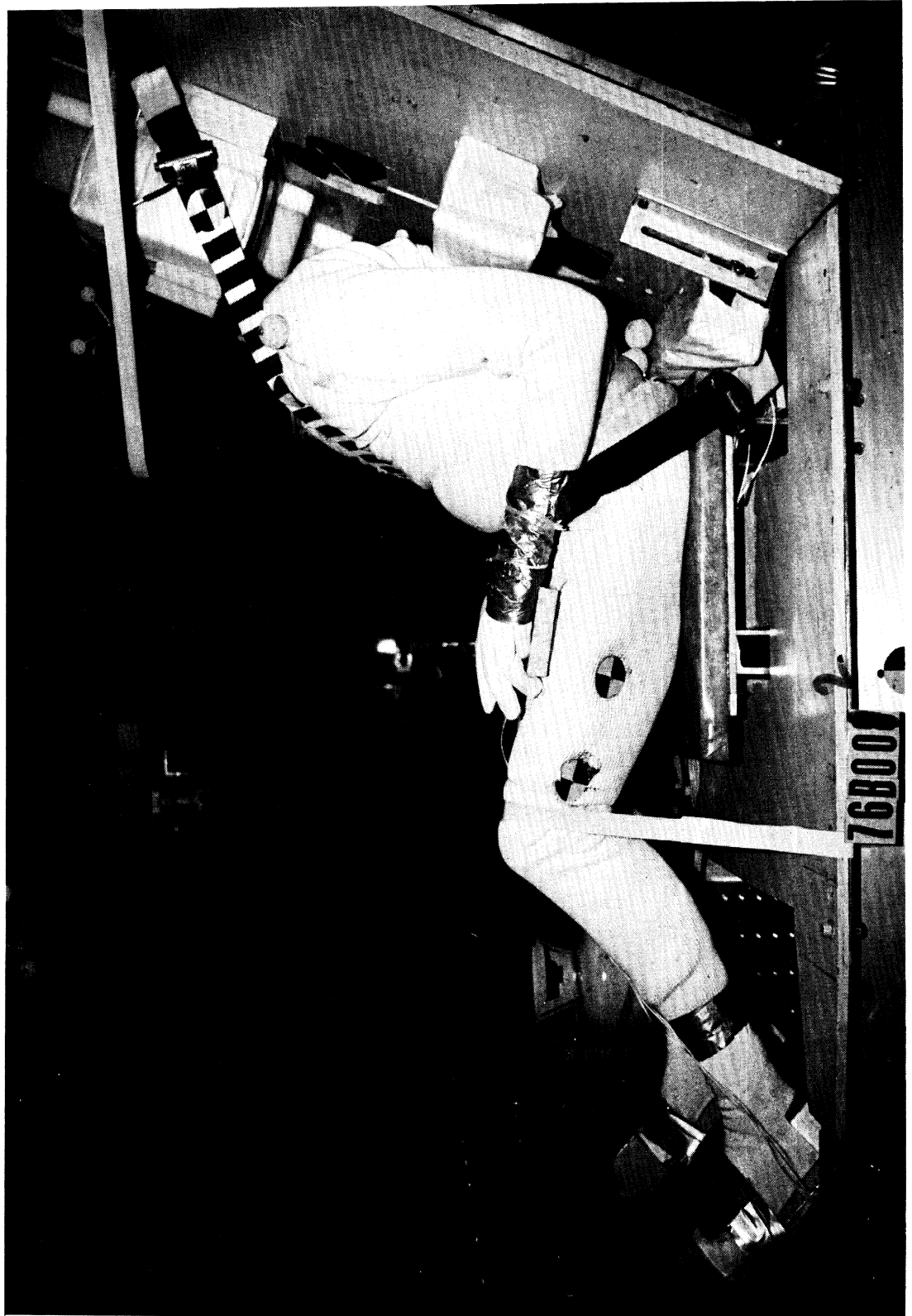




76B002: RIGHT SIDE VIEW



76B002: FRONT VIEW



76B002: LEFT SIDE VIEW

=====  
 RUN ID: 768002-1: WRR-11  
 =====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 136(HSKI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 24-AUG-76

TEST SIGNALS: 1589 PTS/CH AT 6398.71 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
303 -	1: SLFD DECELERATION	20.00	G'S	4+1+1	80.0	394	1599.68
304 -	2: AX1 HEAD A001 ACC	-48.60	G'S	4+1+10	570.1	394	1599.68
305 -	3: AY1 HEAD B001 ACC	-41.80	G'S	4+1+10	570.1	394	1599.68
306 -	4: AZ1 HEAD C001 ACC	-39.70	G'S	4+1+10	570.1	394	1599.68
307 -	5: AX2 HEAD C002 ACC	-42.80	G'S	4+1+10	570.1	394	1599.68
308 -	6: AY2 HEAD A002 ACC	-50.30	G'S	4+1+10	570.1	394	1599.68
309 -	7: AZ2 HEAD B002 ACC	-51.00	G'S	4+1+10	570.1	394	1599.68
310 -	8: AX3 HEAD B003 ACC	-34.10	G'S	4+1+10	570.1	394	1599.68
311 -	9: AY3 HEAD C003 ACC	-37.90	G'S	4+1+10	570.1	393	1599.68
312 -	10: AZ3 HEAD A003 ACC	-32.50	G'S	4+1+10	570.1	393	1599.68

11:  
 12:  
 13:  
 14:

-----  
 FILTERED FILES: 303 - 312 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768002-1: WRR-11  
 -----

SEP 13, 1976 / 11:43:18

RUN ID: 76B002-1: WBR-11

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 8.E+00

< 3 > 3.E+00

< 4 > 3.E+00

< 5 > 4.E+00

< 6 > 2.E+00

< 7 > 2.E+00

< 8 > 5.E+00

< 9 > 3.E+00

< 10 > 3.E+00

10 MS  
20 PTS

FILES: 909-912, TAPE: GNR-CAD

394 PTS • 1500 KHZ = 245.7 MS

B-198

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 768002-2: MRK-11

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1588 PTS/CH AT 6400.48 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
313	1	SLED DECELERATION	20.00	G'S	4+1+ 1	80.0	394	1600.12
314	2	PELVIS BIAX P-A ACC	37.00	G'S	4+1+12	285.1	394	1600.12
315	3	PELVIS BIAX I-S ACC	36.90	G'S	4+1+12	285.1	394	1600.12
316	4	THORAX TRIAX P-A ACC	33.40	G'S	4+1+12	285.1	394	1600.12
317	5	THORAX TRIAX I-S ACC	45.30	G'S	4+1+12	285.1	394	1600.12
318	6	THORAX TRIAX R-L ACC	39.80	G'S	4+1+12	285.1	394	1600.12
319	7	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	394	1600.12
320	8	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	394	1600.12
321	9	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	393	1600.12
322	10	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	393	1600.12
		11						
		12						
		13						
		14						

FILTERED FILES: 313 - 322 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768002-2: MRK-11

SEP 13, 1976 / 11:44:25

RUN ID: 76B002-2: WBR-11

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 2.E+00

< 3 > 2.E+00

< 4 > 2.E+00

< 5 > 2.E+00

< 6 > 2.E+00

< 7 > 1.E+02

< 8 > 5.E+01

< 9 > 7.E+01

< 10 > 8.E+01

10 MS  
20 PTS

FILES:313-322, TAPE:GMR-CAD

394 PTS @ 1600 HZ = 245.6 MS



76B002

76B002: GRAPHCHECK SEQUENCE



WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-12

TEST: 76B003

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>203</u>
Frontal X-rays	<u>207</u>
Lateral X-rays	<u>213</u>
Head x-rays & Analysis	<u>219</u>
Instrumentation	<u>222</u>
Thorax Autopsy	<u>224</u>

For Each Test: 76B003

Setup Diagram	<u>225</u>	_____	_____
Belts/anchors	<u>226</u>	_____	_____
Setup photographs	<u>227</u>	_____	_____
Digitized Signals (7600)	<u>230</u>	_____	_____
Digitized Signals (CEC)	<u>232</u>	_____	_____
Graphcheck	<u>234</u>	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20447 WBR 12

List of Measurements (All measurements except weight listed in cm)

1. Weight		<u>61.9 kg</u>
2. Stature		<u>168.3</u>
3. Trochanterion Hgt.		<u>--</u>
4. Symphision Hgt.		<u>83.6</u>
5. Anterior Superior Iliac Spine Hgt.	Rt.	<u>--</u>
	Lt.	<u>--</u>
6. Iliocristale Hgt.	Rt.	<u>--</u>
	Lt.	<u>--</u>
7. Substernale Hgt.		<u>49.4</u>
8. Mid-Chest Hgt.		<u>39.2</u>
9. Suprasternale Hgt.		<u>31.3</u>
10. Acromion Hgt.	Rt.	<u>24.8</u>
	Lt.	<u>--</u>
11. Menton Hgt.		<u>22.6</u>
12. Mastoid Hgt.	Rt.	<u>--</u>
	Lt.	<u>--</u>
13. Tragion Hgt.	Rt.	<u>--</u>
	Lt.	<u>--</u>
14. Tragion Depth	Rt.	<u>--</u>
	Lt.	<u>--</u>
15. Suprasternale Depth		<u>16.3</u>
16. Mid-Chest Depth		<u>19.4</u>
17. Substernale Depth		<u>21.0</u>
18. Anterior Superior Iliac Spine Depth	Rt.	<u>--</u>
	Lt.	<u>--</u>

WBR: 12

19. Symphysis Depth		16.8
20. Trochanterion Depth	Rt.	7.7
	Lt.	--
21. Suprasternale-Acromion Distance	Rt.	16.6
	Lt.	--
22. Biacromial Breadth		29.0
23. Bideltoid Breadth		--
24. Mid-Chest Breadth		28.1
25. Chest Breadth at Substernale		29.1
26. Hip Breadth at Iliocristale		--
27. Bispinous Diameter		--
28. ASIS to Symphysis Distance	Rt.	--
	Lt.	--
29. Bitrochanteric Breadth		--
30. Acromion-Radiale Length		--
31. Ball of Humerus-Radiale Length		--
32. Radiale-Stylion Length		--
33. Hand Length		18.3
34. Hand Breadth		--
35. Hand Depth		--
36. Wrist Breadth		5.0
37. Forearm Depth		--
38. Upper Arm Depth		6.2
39. Trochanterion-Fibulare Length		--
40. Fibulare-Lateral Malleolus Length		--
41. Tibiale-Sphyrion Length		--
42. Tibiale-Heel of Foot Length		--

43. Foot Length	23.0
44. Foot Breadth	--
45. Minimum Ankle Breadth	--
46. Calf Depth	7.2
47. Upper Thigh Breadth	--
48. Head Breadth	15.2
49. Head Length	19.6
50. Bitragion Breadth	--
51. Bigonial Breadth	--
52. Menton Diagonal Length	--
53. Mastoid-Crinion Length	--
54. Head Circumference	56.3
55. Mid-Sagittal Arc Length	--
56. Bitragion-Coronal Arc Length	--
57. Mid-Neck Circumference	32.3
58. Chest Circumference at Mid-Chest	88.8
59. Chest Circumference at Substernale	94.0
60. Hip Circumference at Iliocristale	--
61. Buttocks Circumference at Trochanterion	87.5
62. Upper Arm Circumference (Mid-Biceps)	24.1
63. Maximum Forearm Circumference	20.7
64. Minimum Wrist Circumference	15.0
65. Upper Thigh Circumference	--
66. Maximum Calf Circumference	29.8
67. Minimum Ankle Circumference	23.4





WBR-12: FRONTAL X-RAY

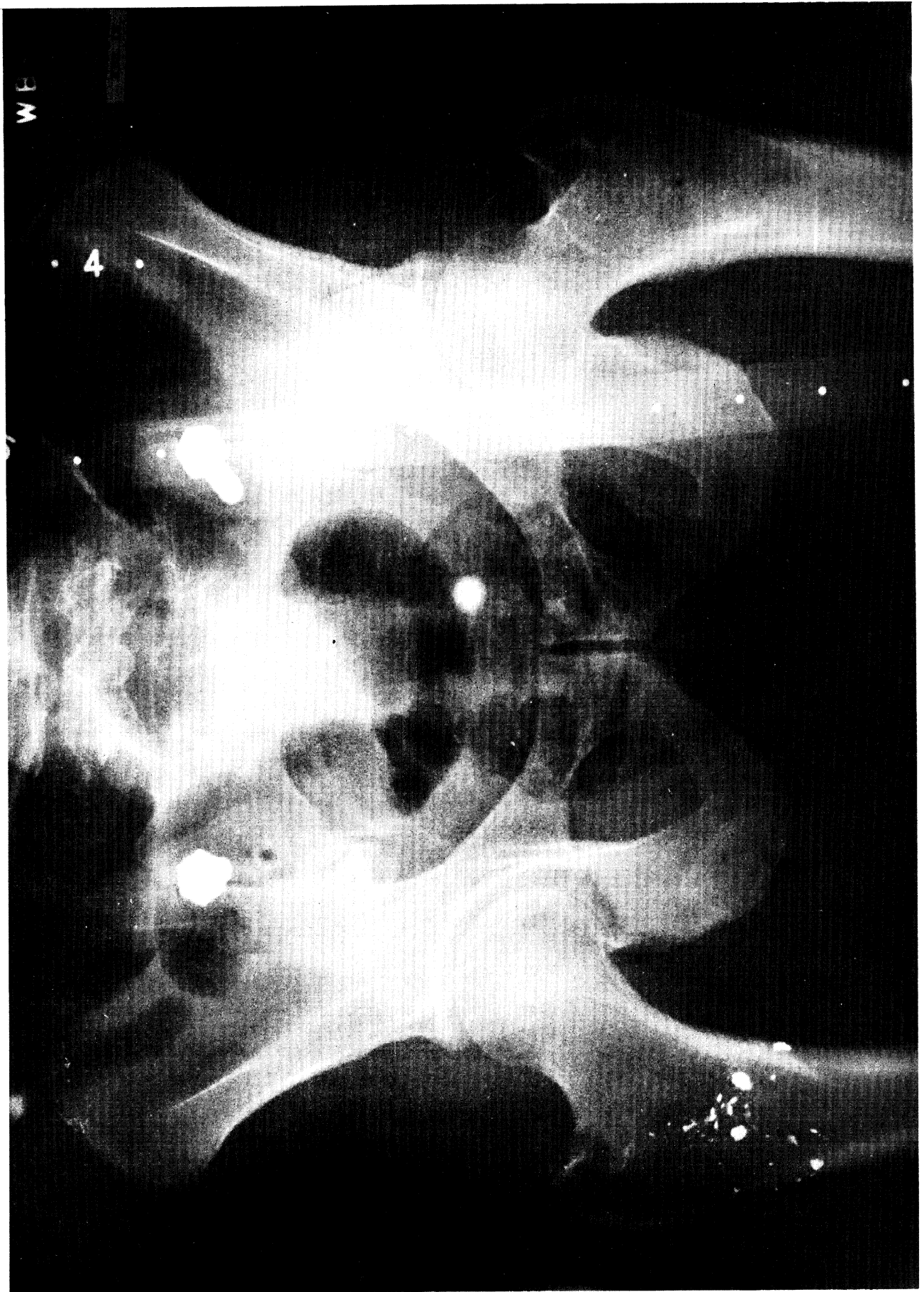


S.

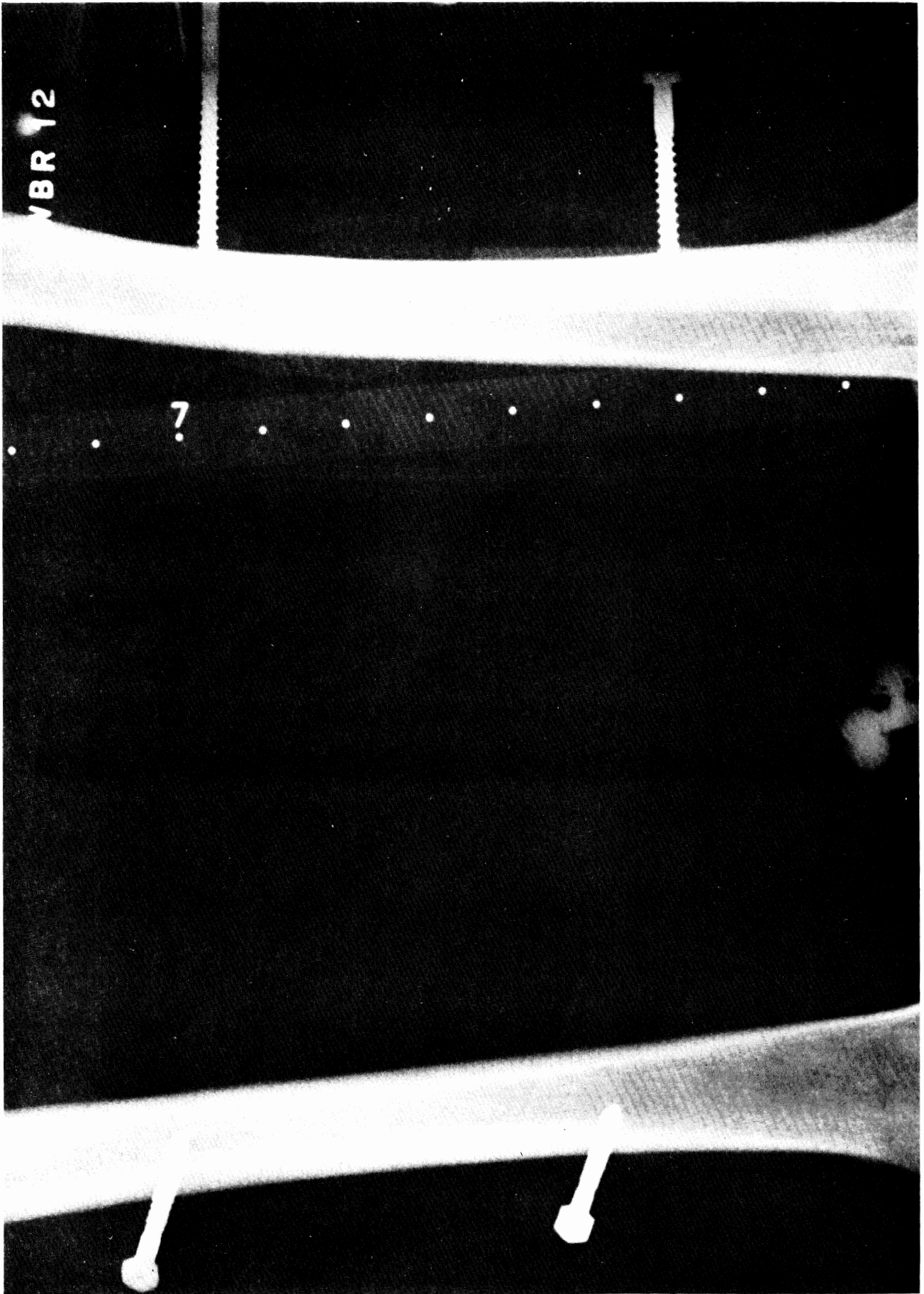
WBR

WBR-12: FRONTAL X-RAY





WBR-12: FRONTAL X-RAY



WBR-12: FRONTAL X-RAY



WBR-12: FRONTAL X-RAY





WBR-12: LATERAL X-RAY



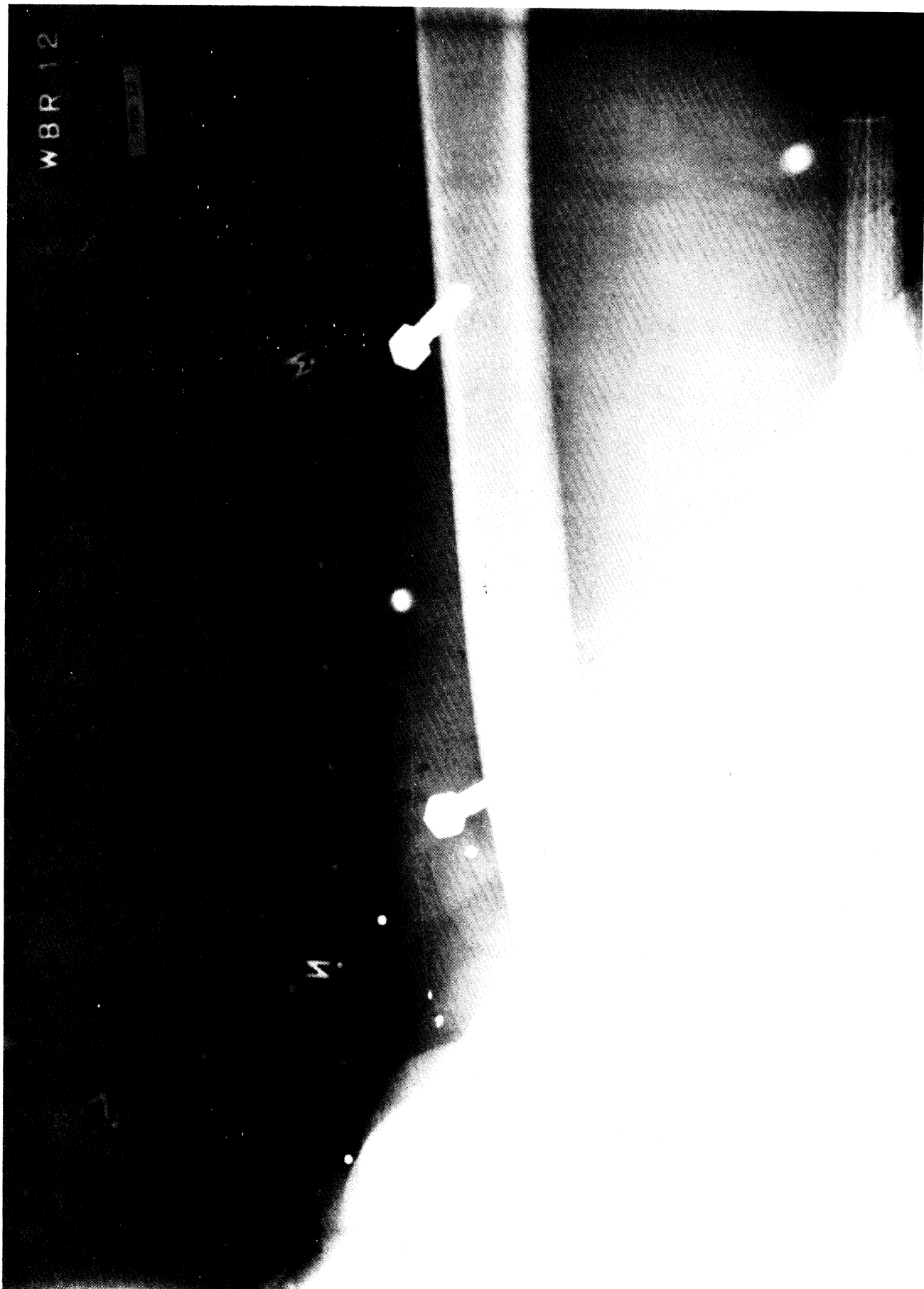
WBR-12: LATERAL X-RAY





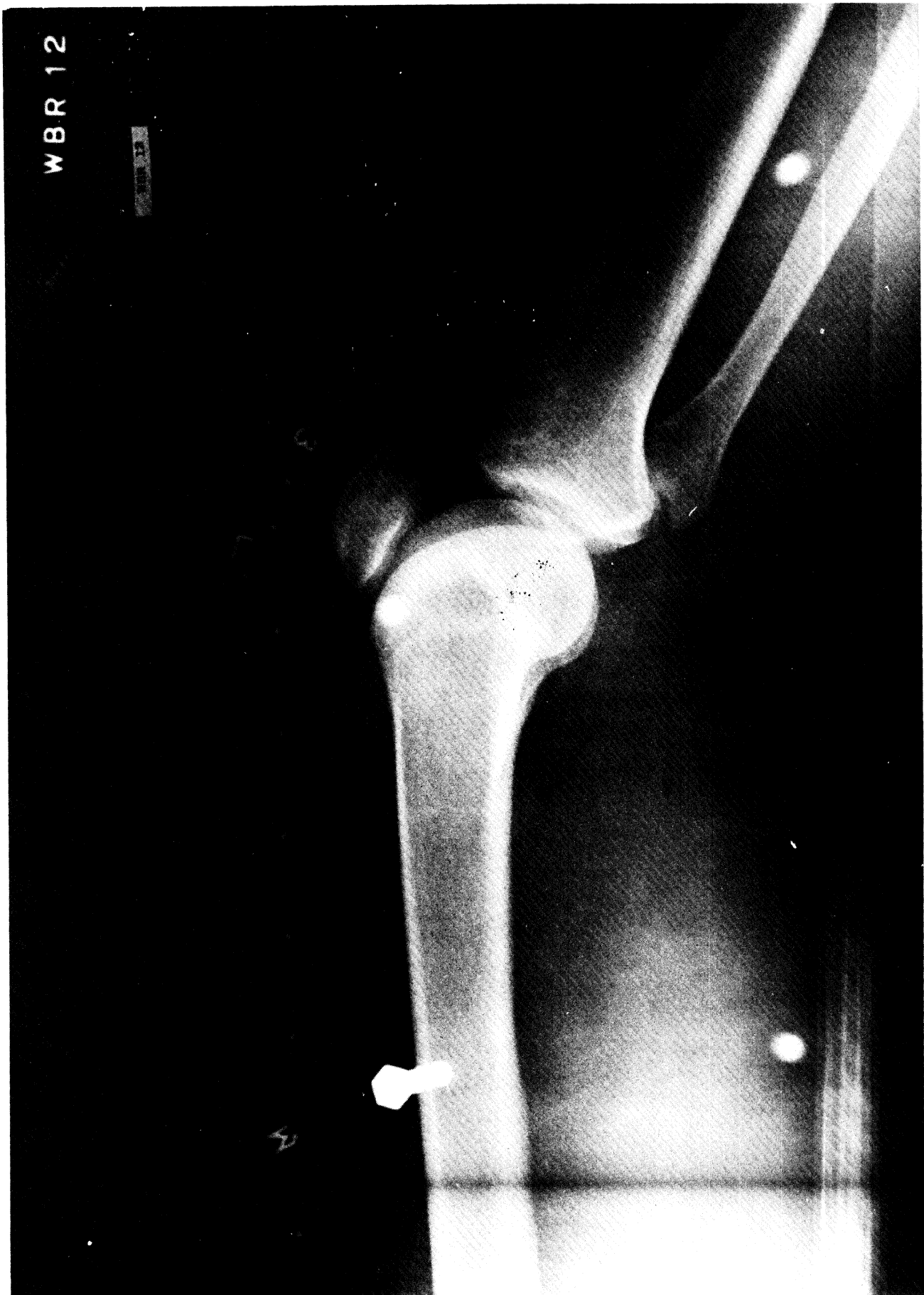
WBR 12

WBR-12: LATERAL X-RAY



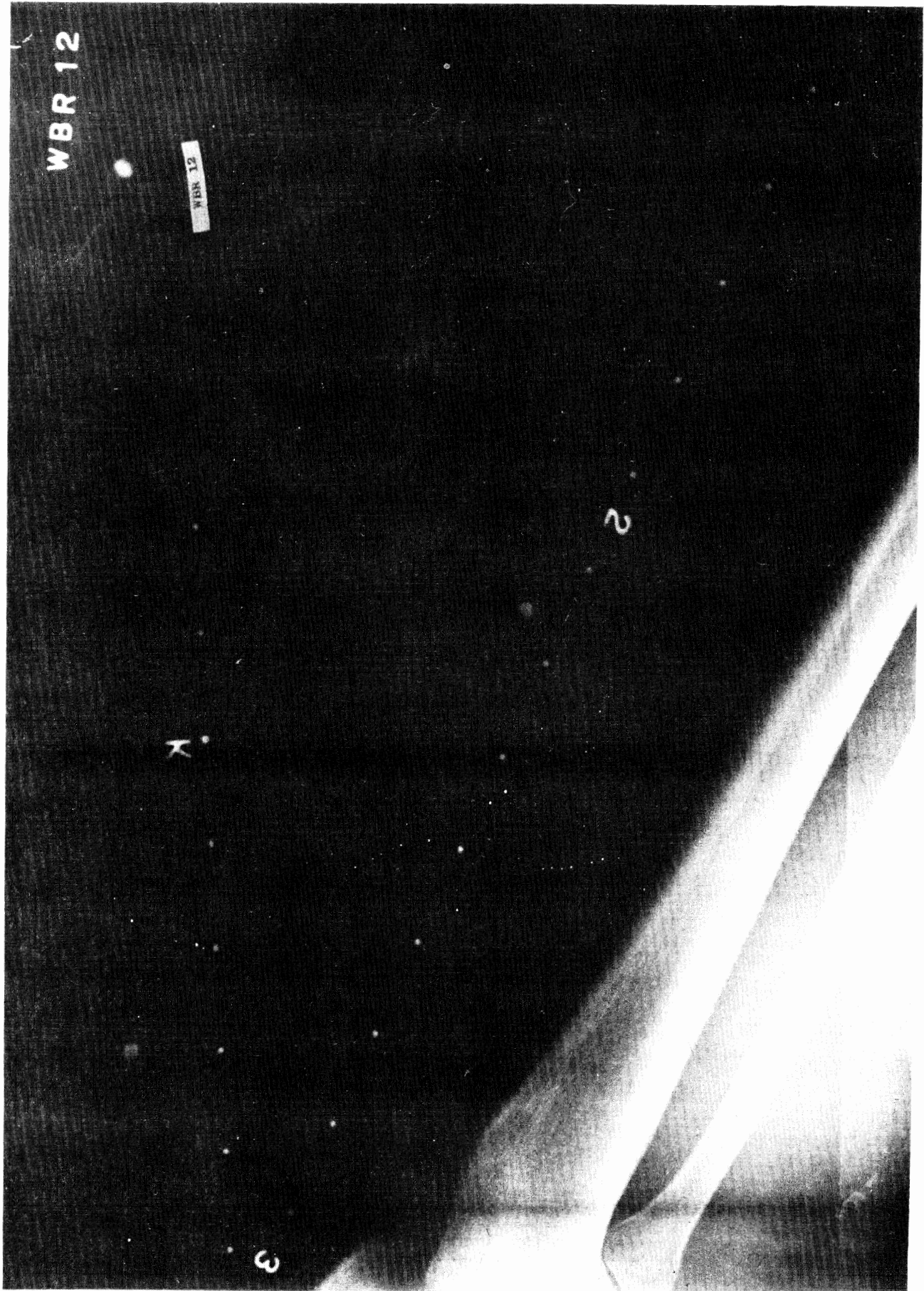
WBR-12: LATERAL X-RAY





WBR 12

WBR-12: LATERAL X-RAY



WBR-12: LATERAL X-RAY

A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	3.950	-4.950	10.50	-2.490	-5.990	22.50
P2- L.EYE:	4.110	-5.220	7.50	0.930	-6.600	22.50
P3- R.EAR:	0.060	-3.770	11.00	-3.180	-4.190	18.00
P4- L.EAR:	0.630	-4.720	4.50	3.260	-5.740	18.50
Q1- ACC. :	-3.450	0.230	6.75	1.850	0.510	13.50
Q2- ACC. :	3.580	-0.500	5.00	4.640	-0.220	21.25
Q3- ACC. :	3.170	0.530	10.75	-4.000	0.970	20.75
R1,R2,R3 :	5.285	3.704	4.311			

COORDINATES W.R.T. CAMERA			COORDINATES W.R.T. CAMERA				
	X	Y	Z		X	Y	Z
P1 :	3.129	-1.510	-3.777	Q1:	-2.934	1.380	0.288
P2 :	3.447	0.564	-4.190	Q2:	3.141	2.903	-0.288
P3 :	0.047	-2.150	-2.895	Q3:	2.499	-2.533	0.516
P4 :	0.558	2.178	-4.007	P:	1.773	1.174	2.659
C :	0.302	0.014	-3.451	CP:	1.470	1.160	6.110

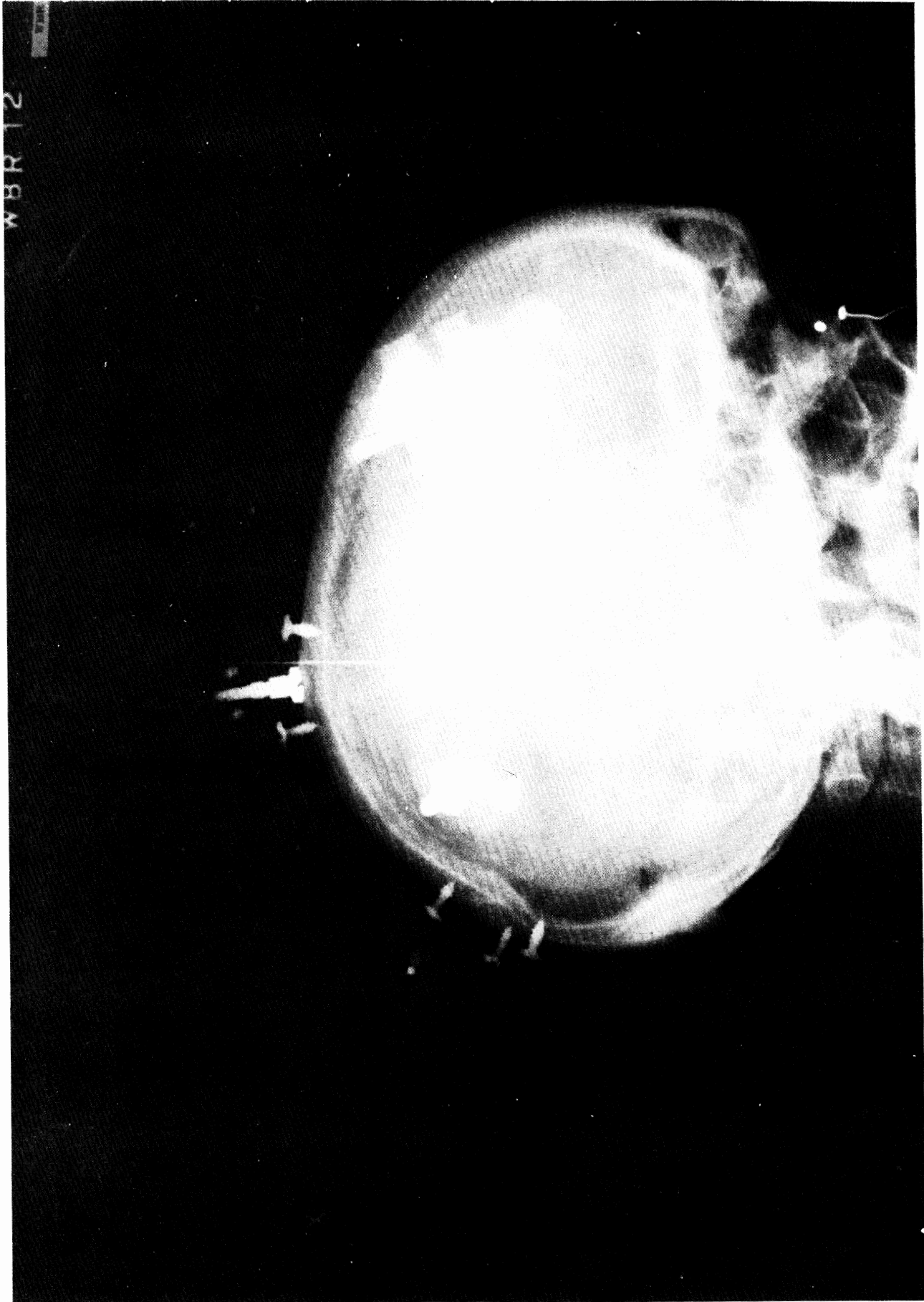
ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<I> :	0.97043	-0.17063	-0.17074	1.0000	0.0000	-0.0000
<J> :	0.13111	0.96605	-0.22026	0.0000	0.9989	-0.0000
<K> :	0.20257	0.19141	0.96007	-0.0000	-0.0000	0.9994

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<E1>:	-0.89239	0.03892	-0.44958	1.0000	0.0464	0.0393
<E2>:	0.37187	0.46962	-0.80073	0.0464	1.0000	0.0563
<E3>:	0.16724	-0.85361	-0.49334	0.0393	0.0563	1.0000

```

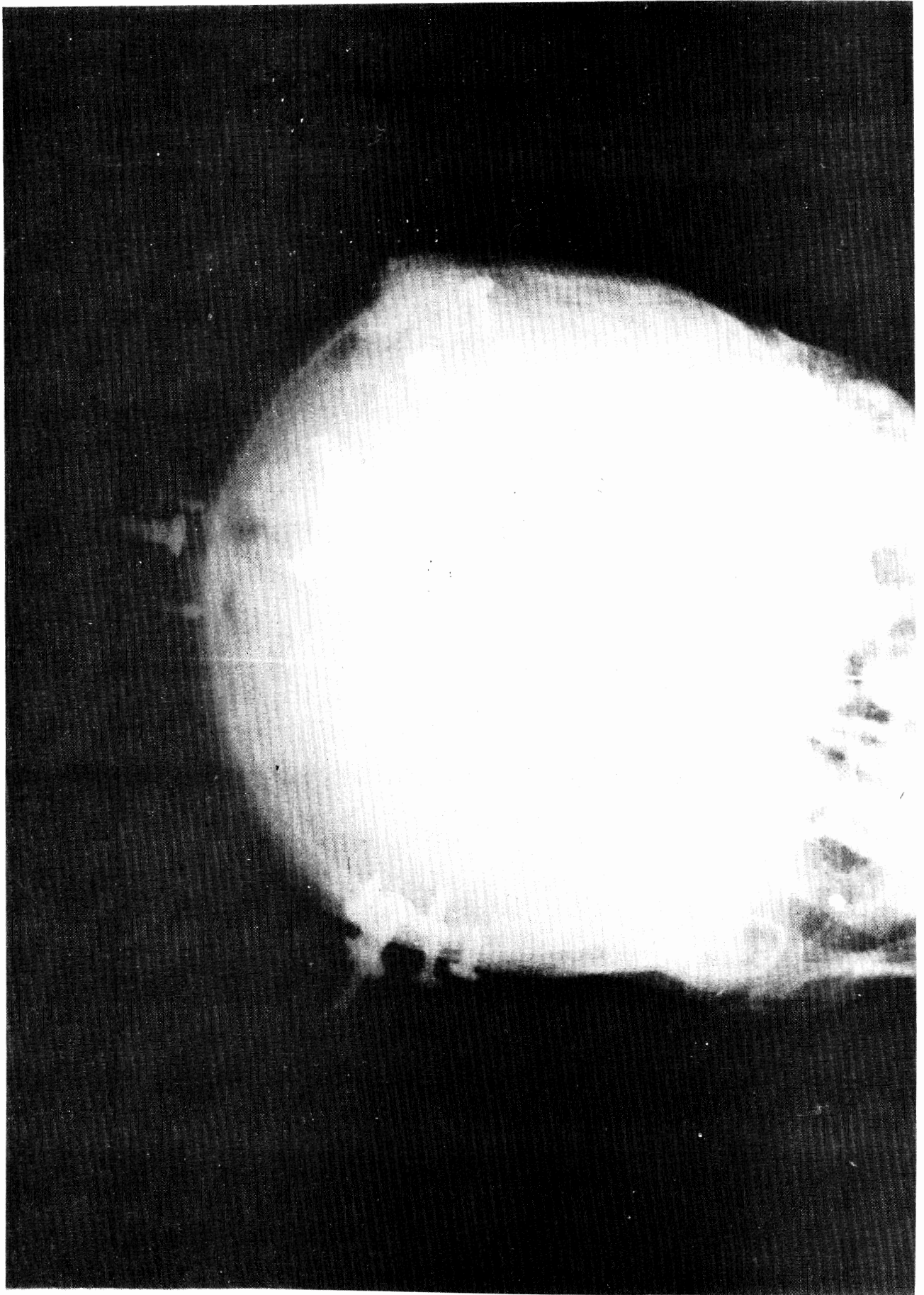
*****
*
* RUN ID:WBR-12           MAY 27, 1976
*
* PQ1= 5.285, PQ2= 3.704, PQ3= 4.311
* CPI= 0.186, CPJ= -0.032, CPK= 6.386
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*           <I>           <J>           <K>
*
* <E1>:   -0.81369   0.01743  -0.58104
*
* <E2>:    0.42532   0.69921  -0.57464
*
* <E3>:    0.39625  -0.71471  -0.57635
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0300  0.0366  0.0345
*
* ORTHOGONALITY CHECK
*
* 1.0000 -0.0000 -0.0000
*
* -0.0000  1.0000 -0.0000
*
* -0.0000 -0.0000  1.0000
*
*****

```



WBR-12: HEAD X-RAY (X-Z)





WBR-12: HEAD X-RAY (Y-Z)

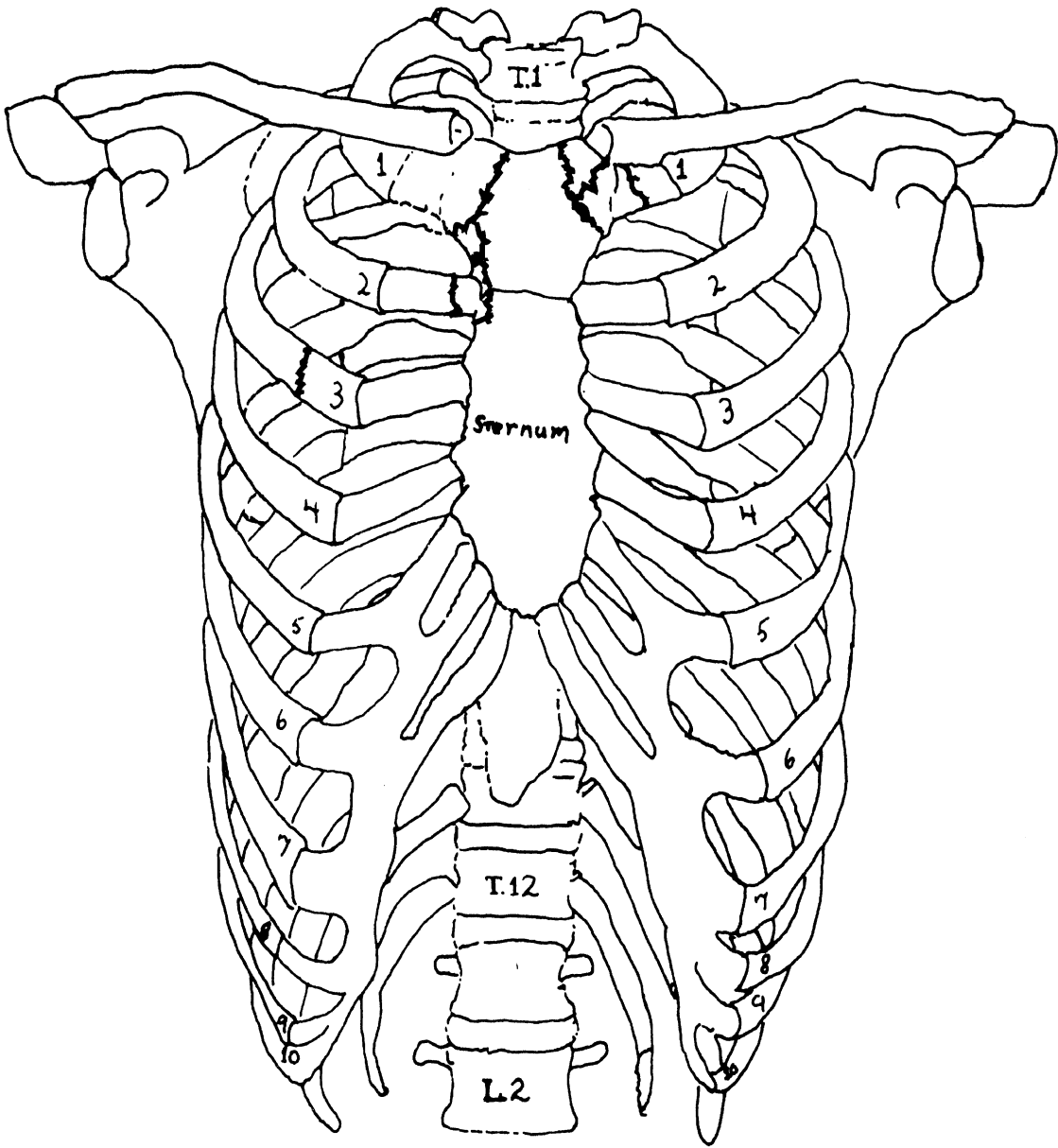
# INSTRUMENTATION DATA SHEET

TEST NO: 76B003		DESCRIPTION WBR-12		Account No: 320316										
through:		Whole Body Response Cadaver Test		DATE: 4-28-76										
SUBJECT: Cadaver		76B003: Mid Severity Test		TAPE REEL # 138										
number: 20447				RECORDER: 7600										
FACILITY: Impact Sled				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT				
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	CH #
1	Sled Decel.	1	200	1	/	Statham	13587	1.1	1000	/	+	20.	G	1
2	Head Q <sub>1</sub> - A	5	100	5	10	Endevco	AD 44	2.2	100	/	-	36.7	G	2
3	Head Q <sub>1</sub> - B	6	100	6	10	"	AC 22	1.26	100	/	-	33.4	G	3
4	Head Q <sub>1</sub> - C	7	100	7	10	"	AA 41	1.26	100	/	-	42.2	G	4
5	Head Q <sub>2</sub> - C	8	100	8	10	"	AC 02	1.16	100	42.6 G	-	36.7	G	5
6	Head Q <sub>2</sub> - A	9	100	9	10	"	AC 16	1.15	100	42.8 G	-	37.2	G	6
7	Head Q <sub>2</sub> - B	10	100	10	10	"	AC 38	1.16	100	/	-	42.5	G	7
8	Head Q <sub>3</sub> - B	11	100	11	10	"	AC 04	1.16	100	58.3 G	-	50.3	G	8
9	Head Q <sub>3</sub> - C	12	100	12	10	"	AC 14	1.15	100	51.6 G	-	44.9	G	9
10	Head Q <sub>3</sub> - A	13	100	13	10	"	AB 57	1.16	100	39.5 G	-	34.1	G	10
11														11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

## INSTRUMENTATION DATA SHEET

TEST NO: 76B003		<u>DESCRIPTION</u> WBR-12								Account No: 320316				
through:		Whole Body Response Cadaver Test 76B003: Mid Severity Test								DATE: 4-28-76		BY: J.B.		
SUBJECT: Cadaver										TAPE REEL # 139				
number: 20447										RECORDER: C.E.C.				
FACILITY: Impact Sled										REC. SPEED: 30 I.P.S.				
CH #	SET UP DATA				TRANSDUCER			CALIBRATION			OUTPUT			CH #
	input	ampl. #	gain	umbil.#	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	
1	Sled Decel.	1	200	1	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Pelvis P-A	14	100	14	10	Endevco	AA 58	1.25	100	52.6 G	-	46.7	G	2
3	Pelvis I-S	15	100	15	10	"	AA 81	1.27	100	/	+	39.8	G	3
4	Thorax P-A	16	100	16	10	"	AB 60	1.17	100	48.5 G	+	41.5	G	4
5	Thorax I-S	17	100	17	10	"	AB 87	1.14	100	46.0 G	-	40.4	G	5
6	Thorax R-L	18	100	18	10	"	AB 90	1.14	100	49.7 G	+	43.6	G	6
7	Rt. Lap	19	200	19	/	GSE	082	2.21	200	2209 #	+	1000	#	7
8	Lt. Lap	20	200	20	/	"	083	2.24	200	2242 #	+	1000	#	8
9	Up. Shldr.	21	200	21	/	"	084	2.28	200	2277 #	+	1000	#	9
10	Lo. Shldr.	22	200	22	/	"	085	2.25	200	2245 #	+	1000	#	10
11														11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 M.S.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

B-223



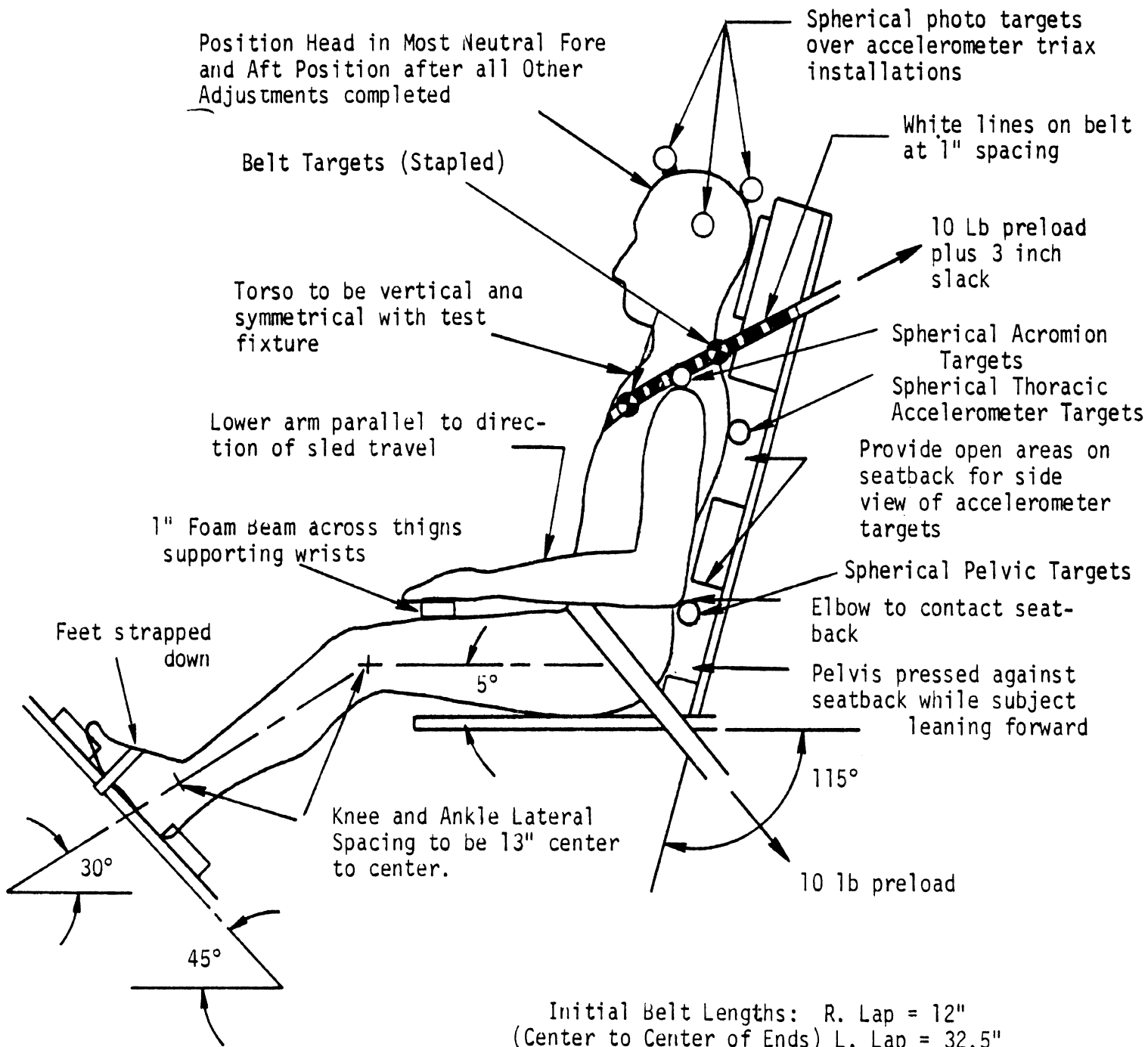
**Bony Thoracic Cage,  
anterior aspect**

WBR-12 CADAVER 20447

NOTE: Right lung extensively abscessed. Left lung partially abscessed.



# 76B003



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

**Femur Target Spacing:**

Right Side = - in.  
 Left Side = - in.

**Belt Sequence:**  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

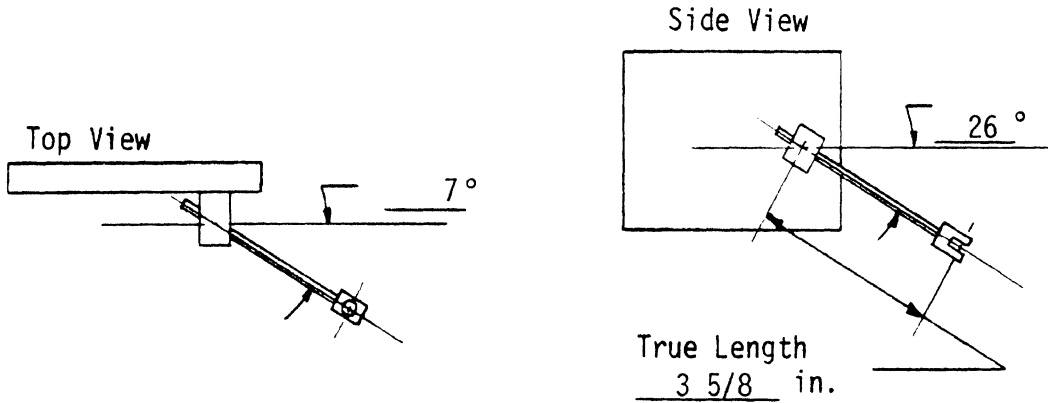
**Belt End Orientation:**  
 (Ref. To Subject)

Away, Away, Toward

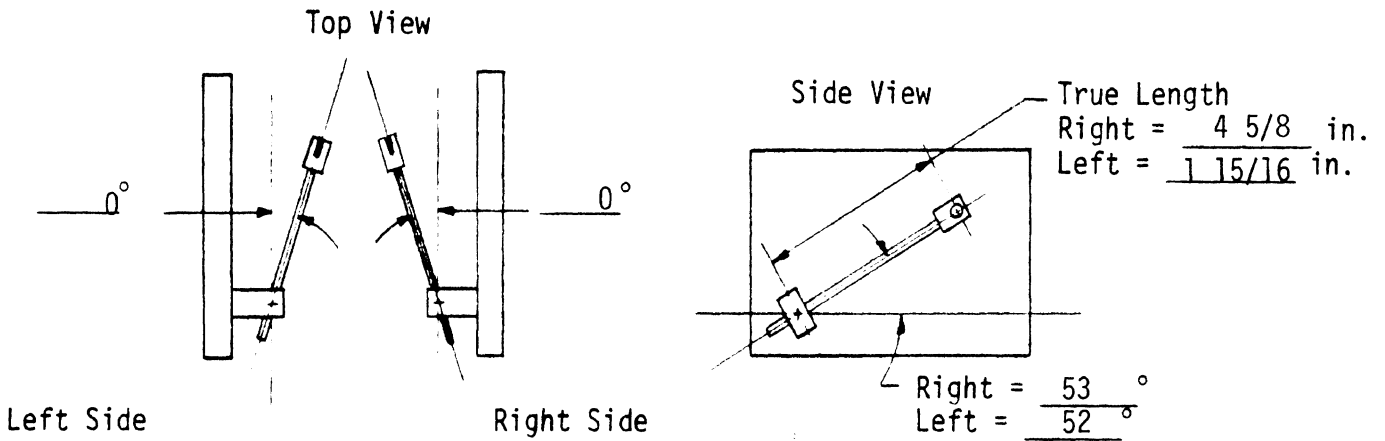
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



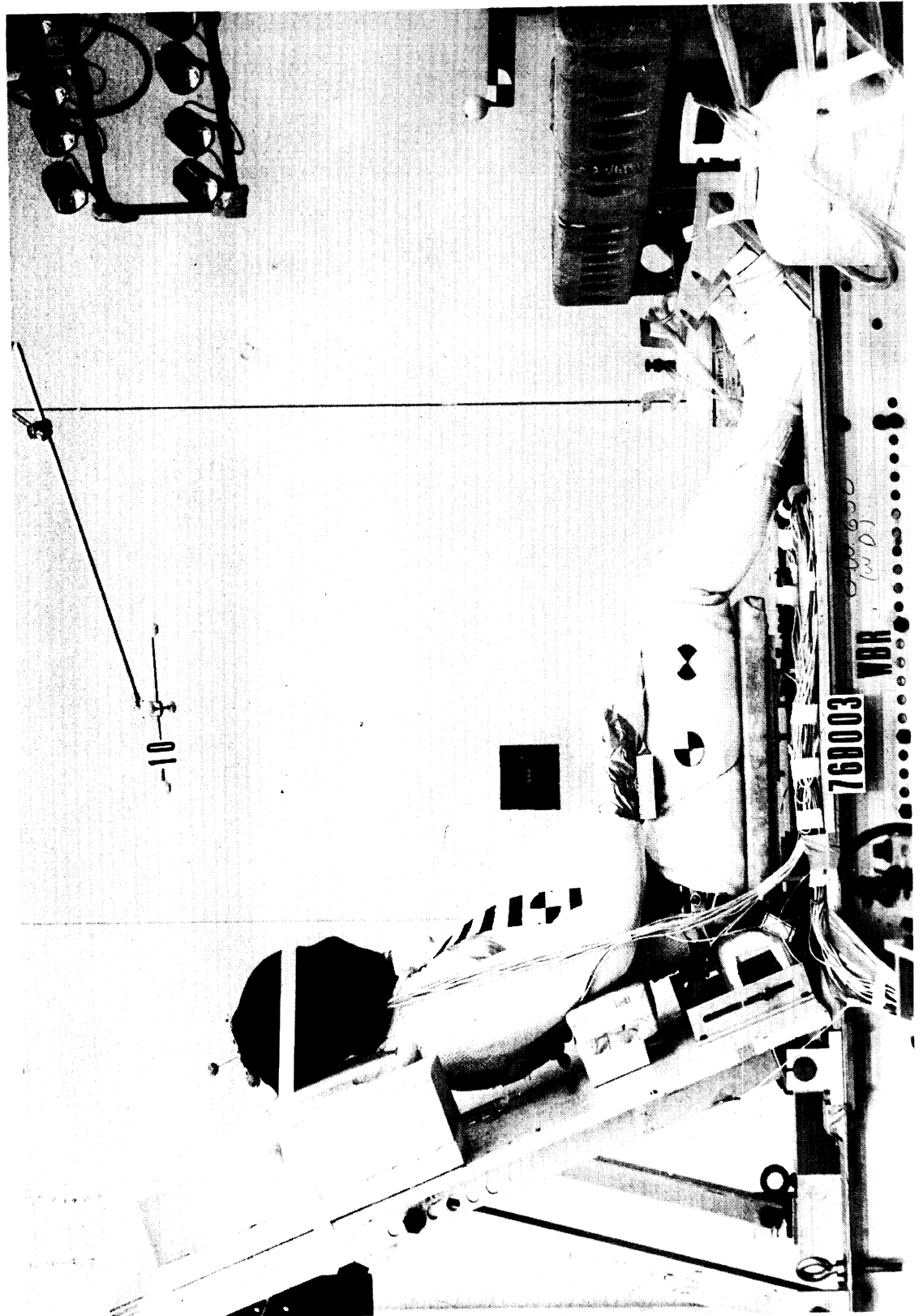
B. LAP BELT



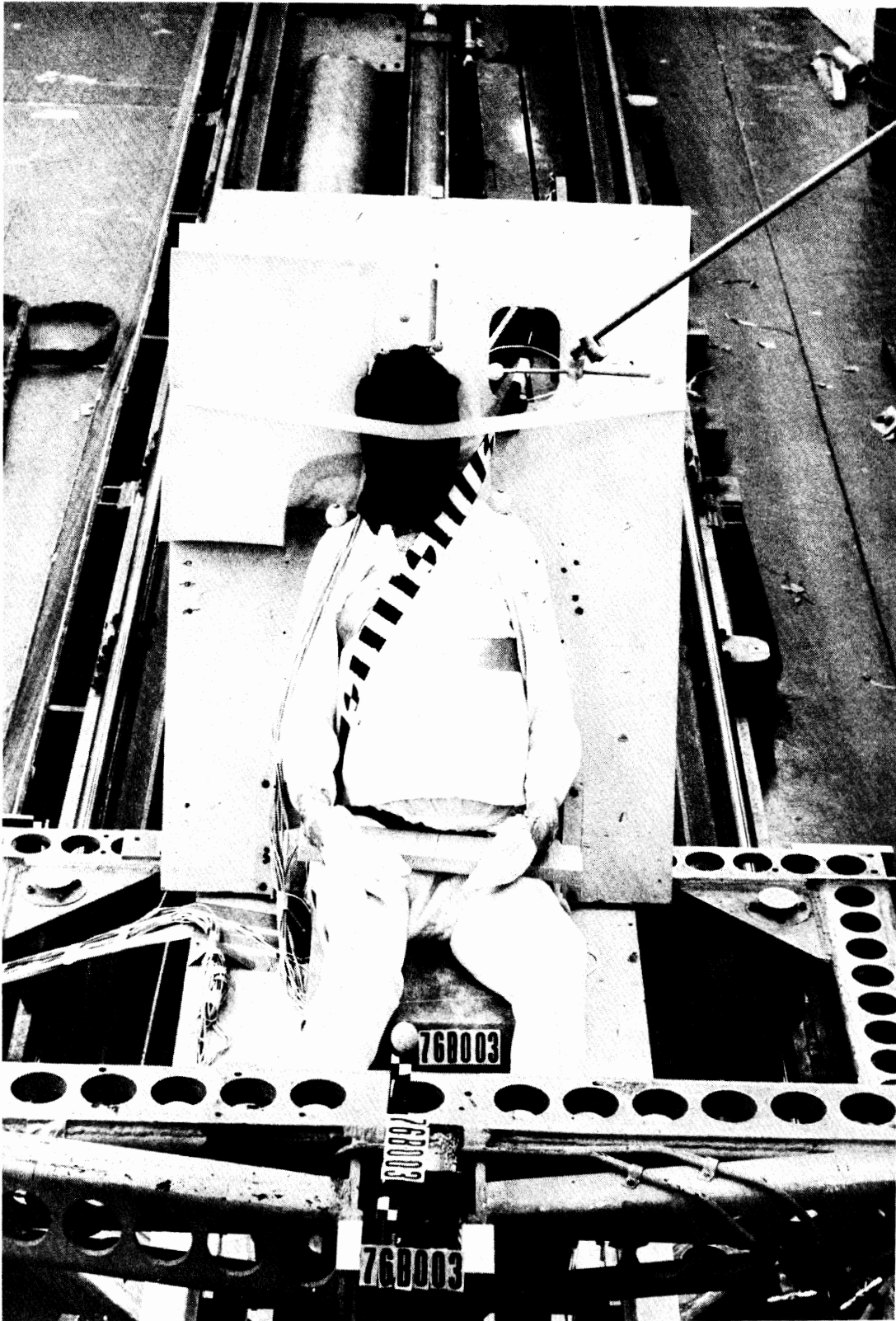
Sketch indicates positive angle directions

BELT LENGTH DATA

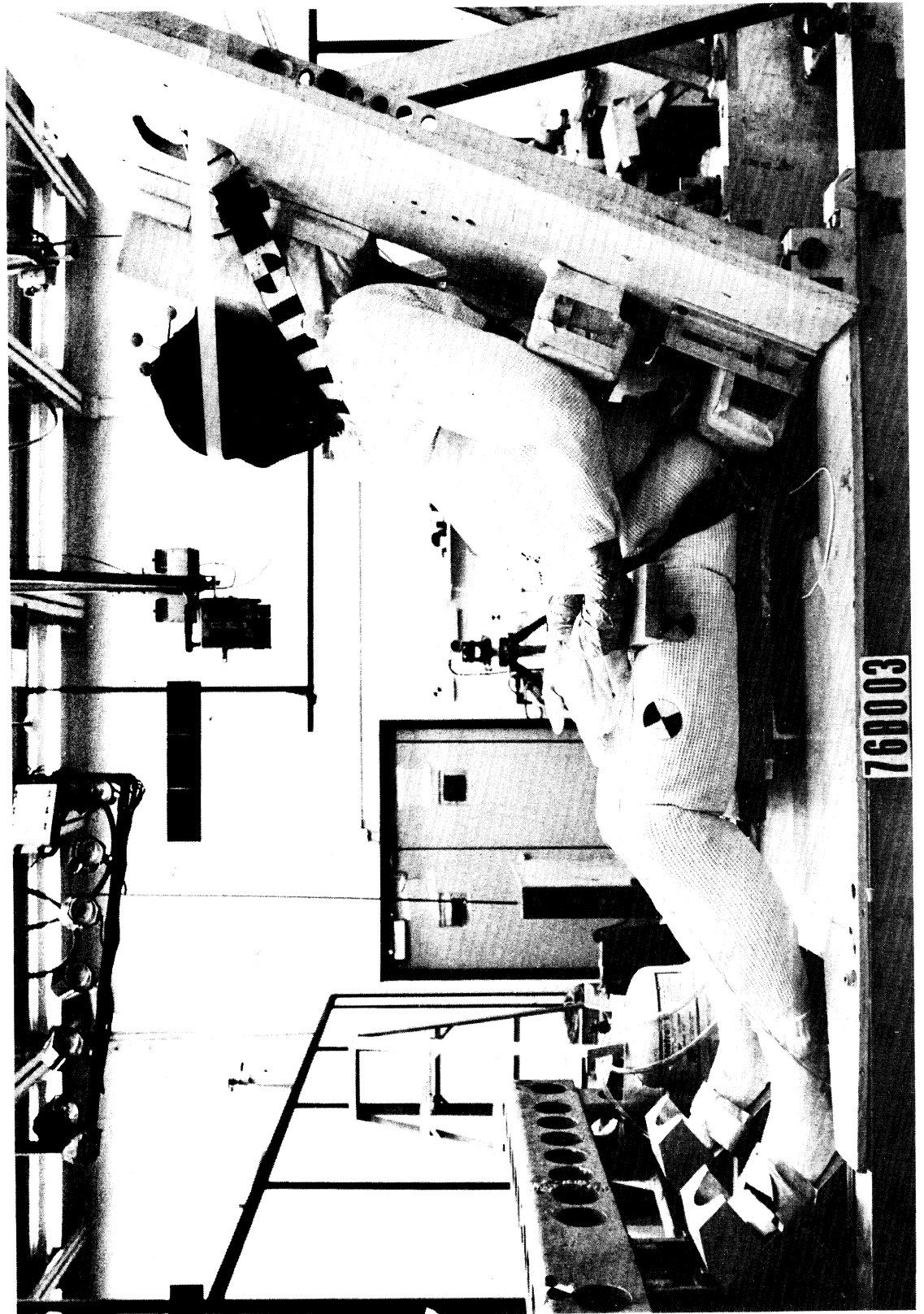
BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	<u>12</u>	<u>12 1/8</u>	<u>1/8</u>	<u>11 3/8</u>
Lt. Lap	<u>32 1/2</u>	<u>32 9/16</u>	<u>1/16</u>	<u>31 13/16</u>
Shoulder	<u>42</u>	<u>42 1/8</u>	<u>1/8</u>	<u>40 9/16</u>



76B003: RIGHT SIDE VIEW



76003: FRONT VIEW



76B003: LEFT SIDE VIEW

=====  
 RUN ID: 76B0U3-1: MHR-12  
 =====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING  
 -----  
 PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(MSRI) EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 24-AUG-76  
 TEST SIGNALS: 2624 PTS/CH AT 6401.56 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING FREQ
323 -	1: SLED DECELERATION	20.00	G'S	4+1+1	80.0	654	1600.39
324 -	2: AX1 HEAD A001 ACC	-36.70	G'S	4+1+10	570.3	654	1600.39
325 -	3: AY1 HEAD B001 ACC	-33.40	G'S	4+1+10	570.3	654	1600.39
326 -	4: AZ1 HEAD C001 ACC	-32.50	G'S	4+1+10	570.3	654	1600.39
327 -	5: AX2 HEAD C002 ACC	-36.70	G'S	4+1+10	570.3	654	1600.39
328 -	6: AY2 HEAD A002 ACC	-37.20	G'S	4+1+10	570.3	654	1600.39
329 -	7: AZ2 HEAD B002 ACC	-42.50	G'S	4+1+10	570.3	654	1600.39
330 -	8: AX3 HEAD B003 ACC	-50.30	G'S	4+1+10	570.3	654	1600.39
331 -	9: AY3 HEAD C003 ACC	-44.90	G'S	4+1+10	570.3	654	1600.39
332 -	10: AZ3 HEAD A003 ACC	-34.10	G'S	4+1+10	570.3	654	1600.39

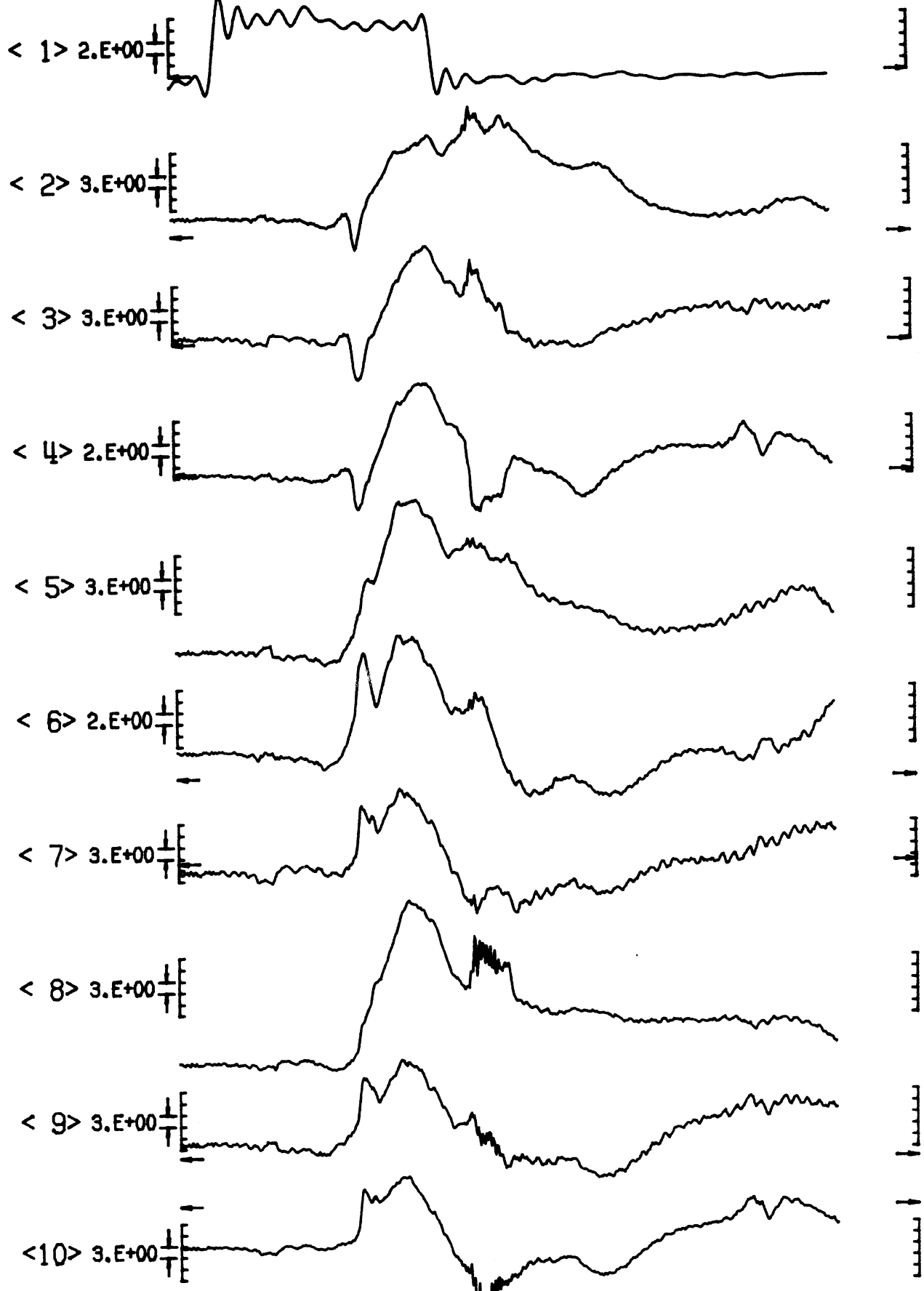
111  
 121  
 131  
 141

-----  
 FILTERED FILE# 323 - 332 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 76B0U3-1: MHR-12  
 -----

SEP 13, 1978 / 11:45:45

RUN ID: 76B003-1: WBR-12

10 MS  
20 PTS



10 MS  
20 PTS

FILES: 323-332, TAPE: GMR-CAD 654 PTS • 1600 HZ = 408.0 MS

=====  
 RUN ID: 768003-2: WBR-12  
 =====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UJA DATE: 25-AUG-76

TEST SIGNALS: 2191 PTS/CH AT 6404.33 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
333	- 1	SLED DECELERATION	20.00	G'S	4+1+1	285.3	544	1601.08
334	- 2	PELVIS BIAX P-A ACC	-45.00	G'S	4+1+12	285.3	544	1601.08
335	- 3	PELVIS BIAX I-S ACC	39.80	G'S	4+1+12	285.3	544	1601.08
336	- 4	THRAX TRIAX P-A ACC	41.50	G'S	4+1+12	285.3	544	1601.08
337	- 5	THRAX TRIAX I-S ACC	-40.40	G'S	4+1+12	285.3	544	1601.08
338	- 6	THRAX TRIAX R-L ACC	43.60	G'S	4+1+12	285.3	544	1601.08
339	- 7	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.3	544	1601.08
340	- 8	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.3	544	1601.08
341	- 9	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.3	544	1601.08
342	- 10	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.3	544	1601.08

111  
 121  
 131  
 141

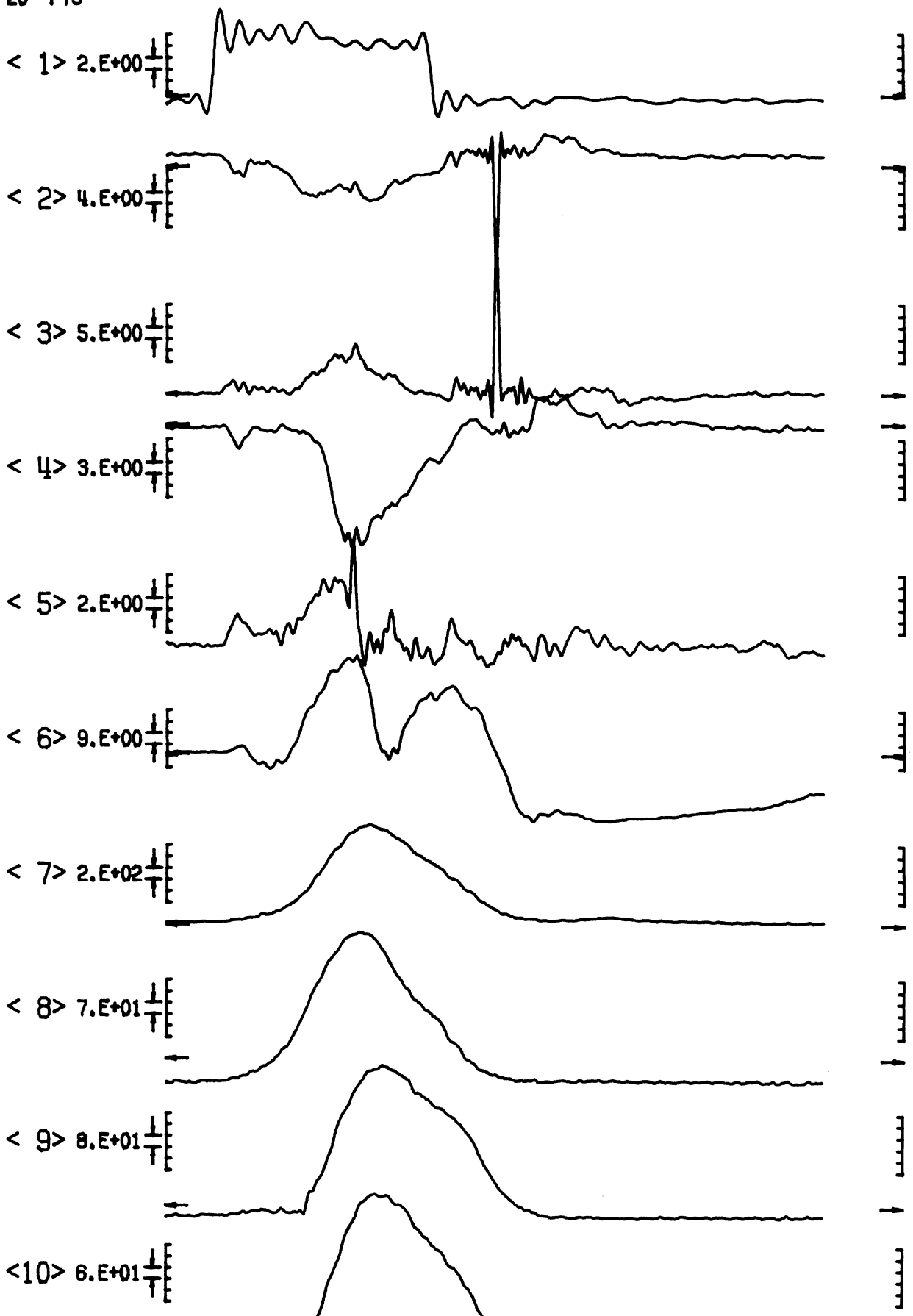
=====  
 FILTERED FILE: 333 - 342 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768003-2: WBR-12  
 =====



SEP 13, 1976 / 11:46:39

RUN ID: 76B003-2: WBR-12

10 MS  
20 PTS



10 MS  
20 PTS

FILES:333-842, TAPE:GMR-CAD

544 PTS @ 1601 HZ = 339.1 MS



76B003

76B003: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-13

TEST: 76B004

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>237</u>
Frontal X-rays	<u>241</u>
Lateral X-rays	<u>247</u>
Head x-rays & Analysis	<u>253</u>
Instrumentation	<u>256</u>
Thorax Autopsy	<u>258</u>

For Each Test: 76B004

Setup Diagram	<u>259</u>	_____	_____
Belts/anchors	<u>260</u>	_____	_____
Setup photographs	<u>261</u>	_____	_____
Digitized Signals (7600)	<u>264</u>	_____	_____
Digitized Signals (CEC)	<u>266</u>	_____	_____
Graphcheck	<u>268</u>	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20483                      WBR 13

List of Measurements (All measurements except weight listed in cm)

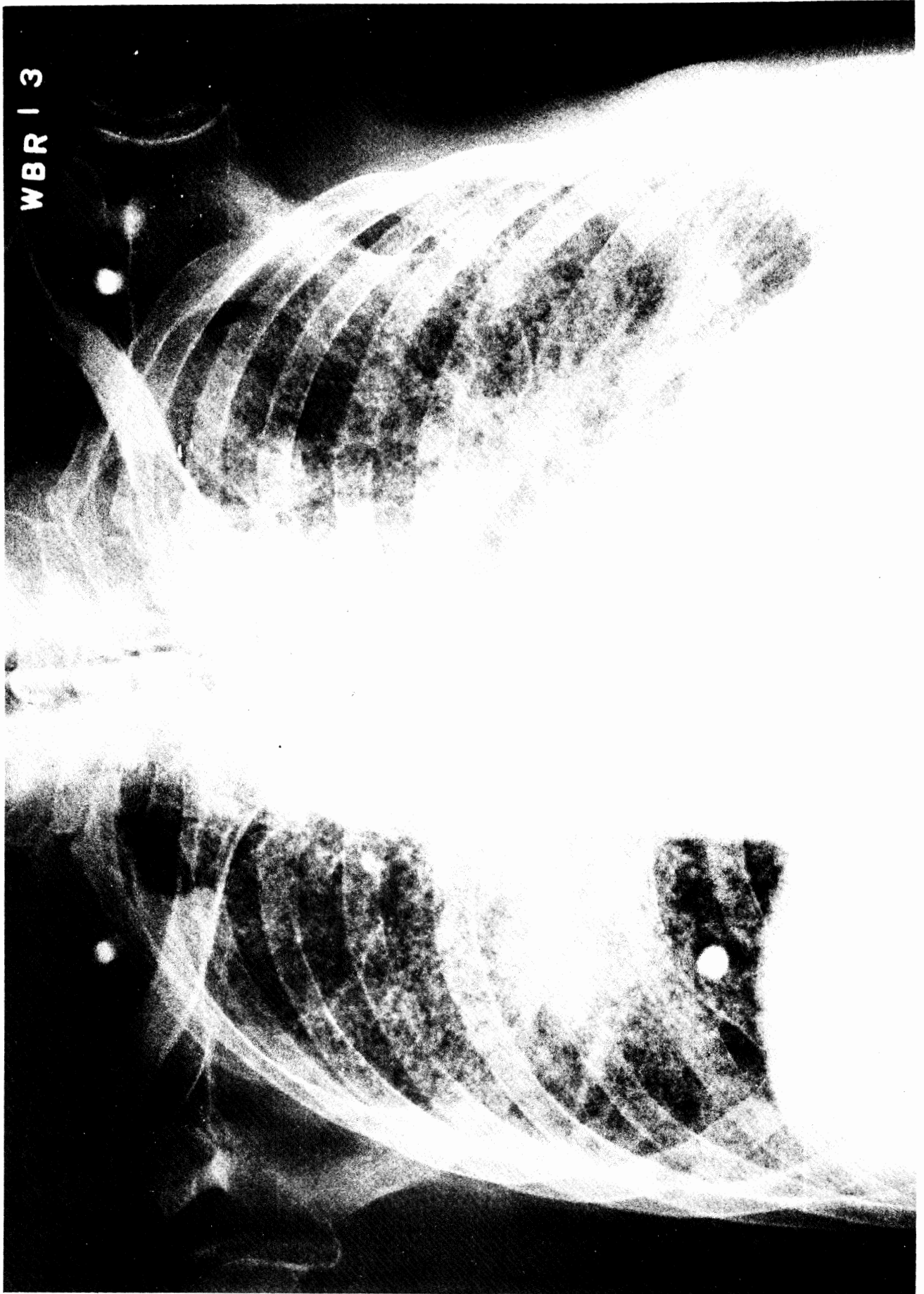
1. Weight		75.3 kg.
2. Stature		175.5
3. Trochanterion Hgt.		80.0
4. Symphysis Hgt.		85.3
5. Anterior Superior Iliac Spine Hgt.	Rt.	77.3
	Lt.	--
6. Iliocristale Hgt.	Rt.	67.8
	Lt.	--
7. Substernale Hgt.		52.8
8. Mid-Chest Hgt.		41.9
9. Suprasternale Hgt.		31.1
10. Acromion Hgt.	Rt.	24.9
	Lt.	--
11. Menton Hgt.		20.8
12. Mastoid Hgt.	Rt.	18.7
	Lt.	--
13. Tragion Hgt.	Rt.	12.1
	Lt.	--
14. Tragion Depth	Rt.	32.1
	Lt.	--
15. Suprasternale Depth		22.5
16. Mid-Chest Depth		22.5
17. Substernale Depth		18.9
18. Anterior Superior Iliac Spine Depth	Rt.	15.9
	Lt.	--

19. Symphision Depth		15.9
20. Trochanterion Depth	Rt.	5.9
	Lt.	--
21. Suprasternale-Acromion Distance	Rt.	18.5
	Lt.	--
22. Biacromial Breadth		34.7
23. Bideltoid Breadth		42.7
24. Mid-Chest Breadth		33.6
25. Chest Breadth at Substernale		34.2
26. Hip Breadth at Iliocristale		29.7
27. Bispinous Diameter		25.0
28. ASIS to Symphision Distance	Rt.	13.9
	Lt.	--
29. Bitrochanteric Breadth		39.6
30. Acromion-Radiale Length		36.0
31. Ball of Humerus-Radiale Length		32.0
32. Radiale-Stylion Length		27.1
33. Hand Length		19.7
34. Hand Breadth		9.1
35. Hand Depth		2.9
36. Wrist Breadth		6.1
37. Forearm Depth		6.1
38. Upper Arm Depth		8.7
39. Trochanterion-Fibulare Length		46.8
40. Fibulare-Lateral Malleolus Length		43.2
41. Tibiale-Sphyrion Length		36.7
42. Tibiale-Heel of Foot Length		44.5

43. Foot Length	25.9
44. Foot Breadth	10.2
45. Minimum Ankle Breadth	7.3
46. Calf Depth	10.4
47. Upper Thigh Breadth	20.0
48. Head Breadth	15.4
49. Head Length	18.9
50. Bitragion Breadth	14.3
51. Bigonial Breadth	11.5
52. Menton Diagonal Length	23.3
53. Mastoid-Crinion Length	16.2
54. Head Circumference	56.0
55. Mid-Sagittal Arc Length	29.0
56. Bitragion-Coronal Arc Length	29.5
57. Mid-Neck Circumference	35.6
58. Chest Circumference at Mid-Chest	95.5
59. Chest Circumference at Substernale	97.6
60. Hip Circumference at Iliocristale	89.4
61. Buttocks Circumference at Trochanterion	103.9
62. Upper Arm Circumference (Mid-Biceps)	23.6
63. Maximum Forearm Circumference	20.9
64. Minimum Wrist Circumference	18.8
65. Upper Thigh Circumference	54.8
66. Maximum Calf Circumference	34.7
67. Minimum Ankle Circumference	31.0







WBR-13: FRONTAL X-RAY

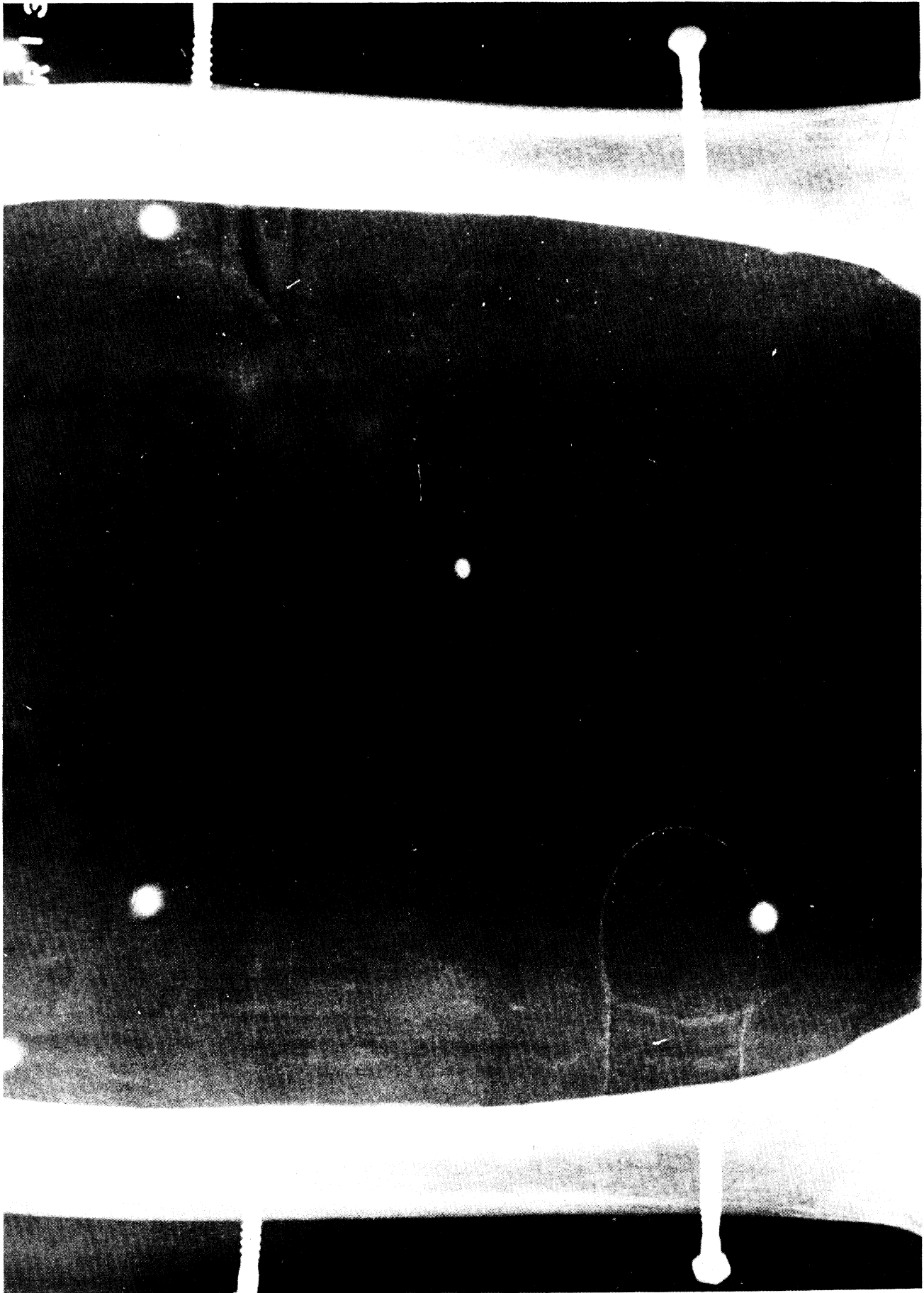


WBR-13: FRONTAL X-RAY

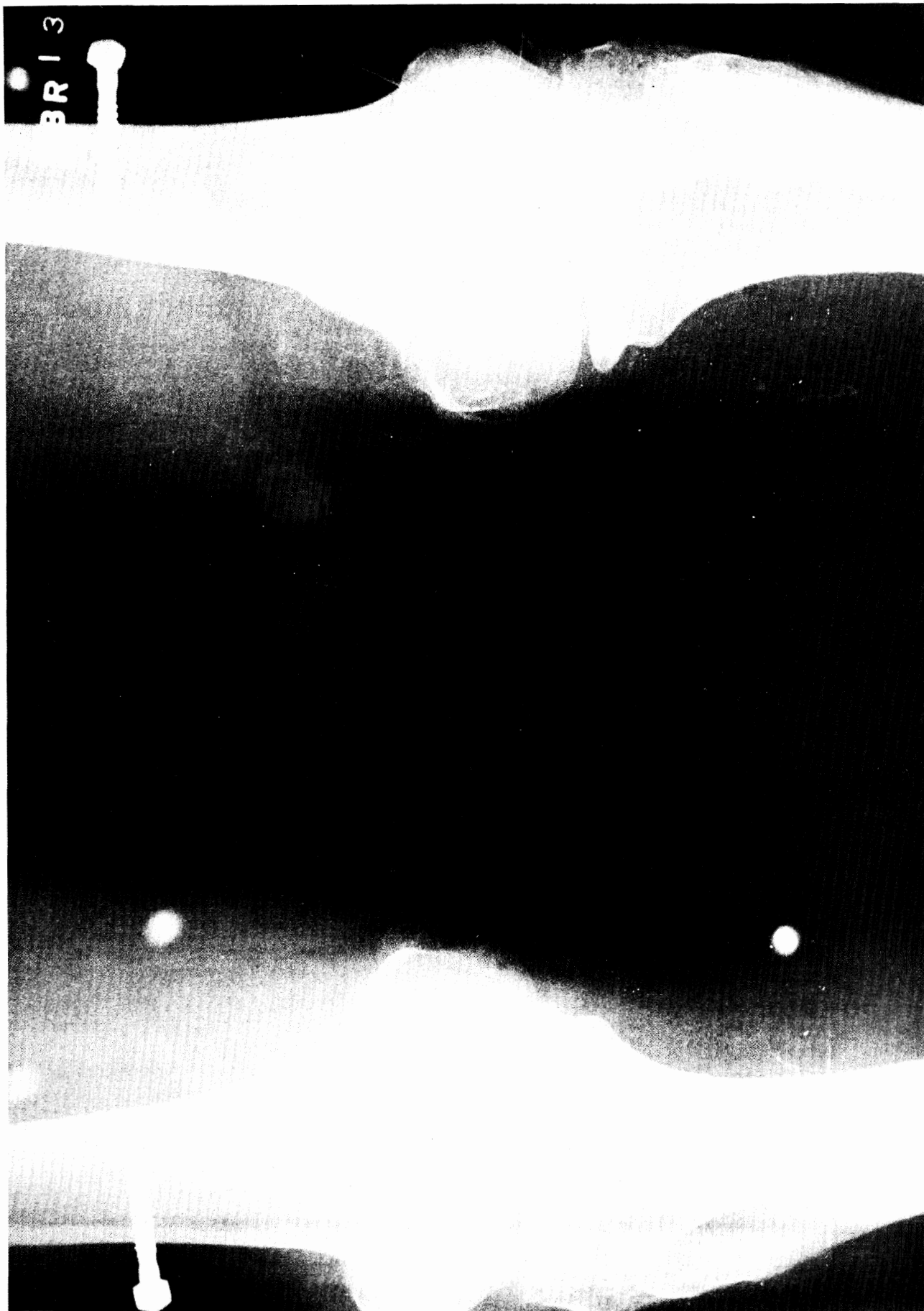


WBR-13: FRONTAL X-RAY



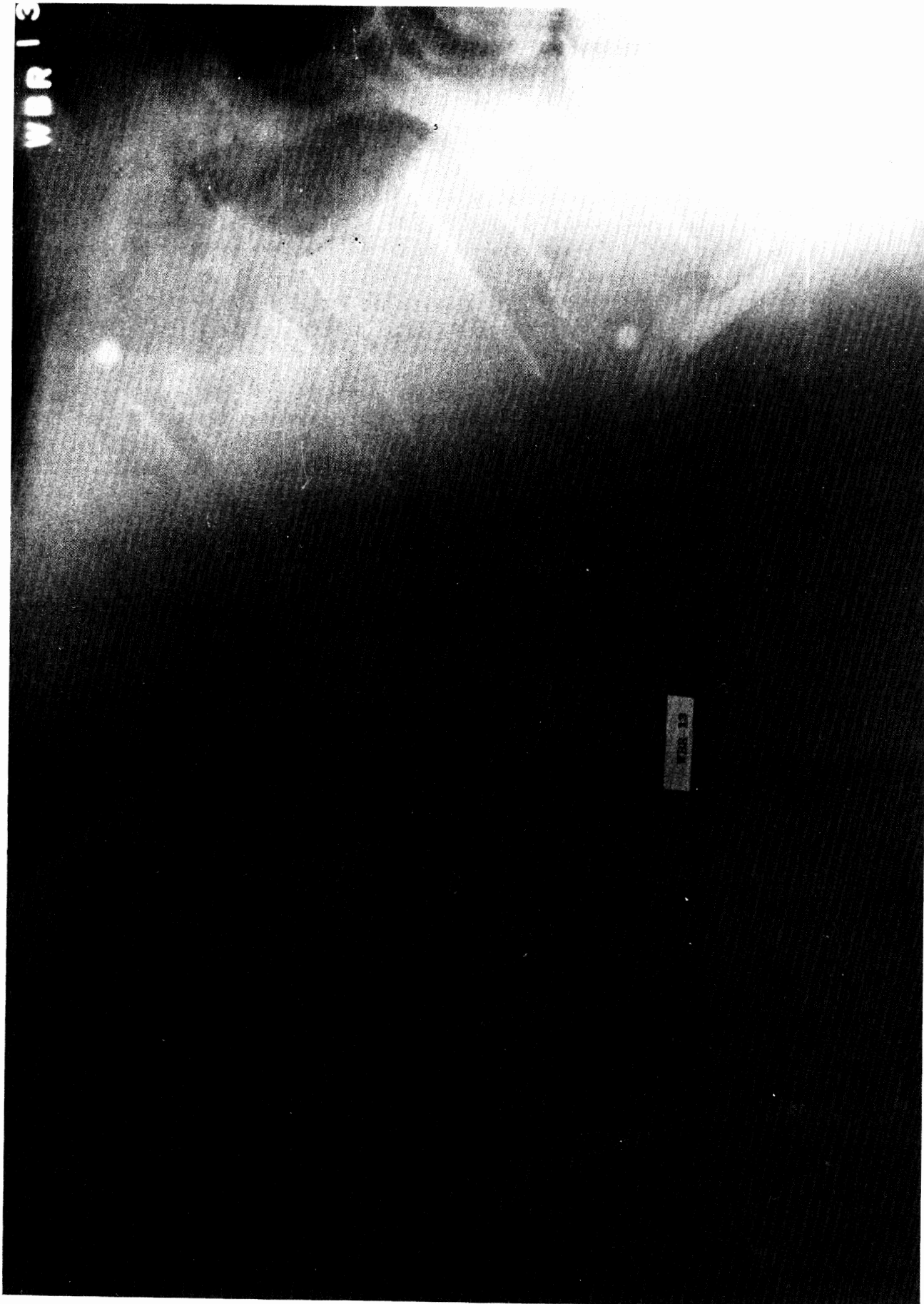


WBR-13: FRONTAL X-RAY



WBR-13: FRONTAL X-RAY





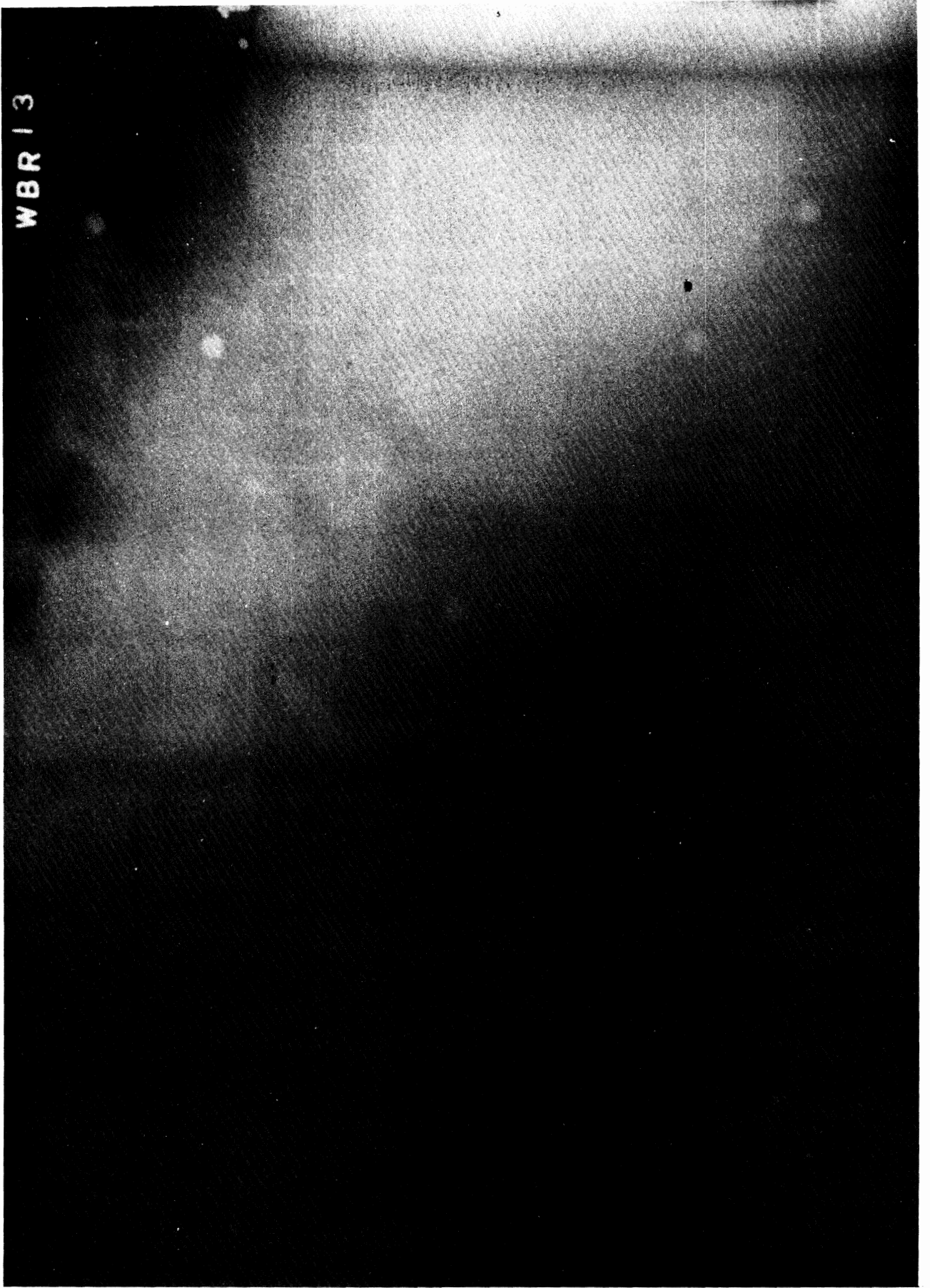
WBR-13: LATERAL X-RAY



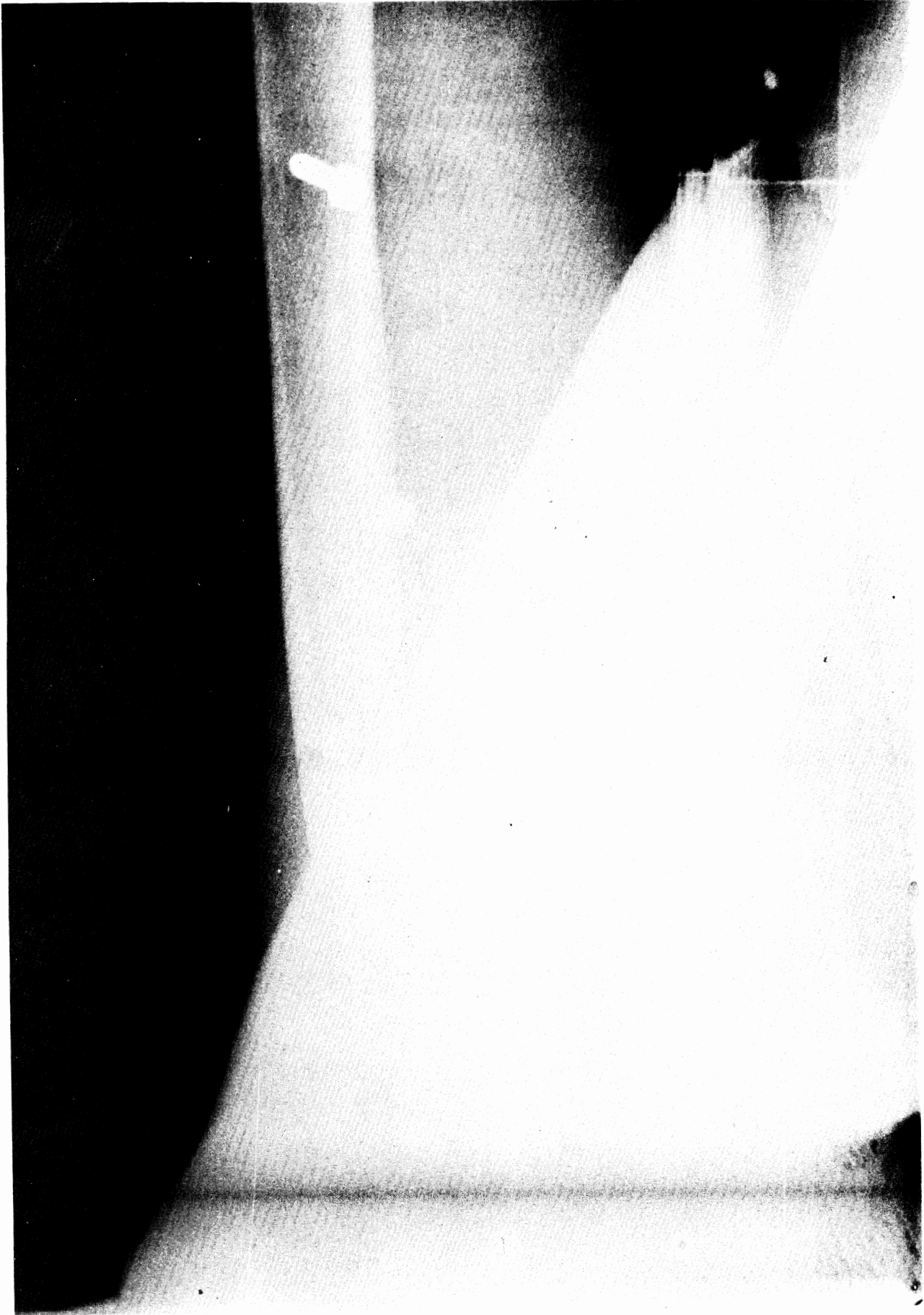
WBR-13: LATERAL X-RAY



WBR 13



WBR-13: LATERAL X-RAY

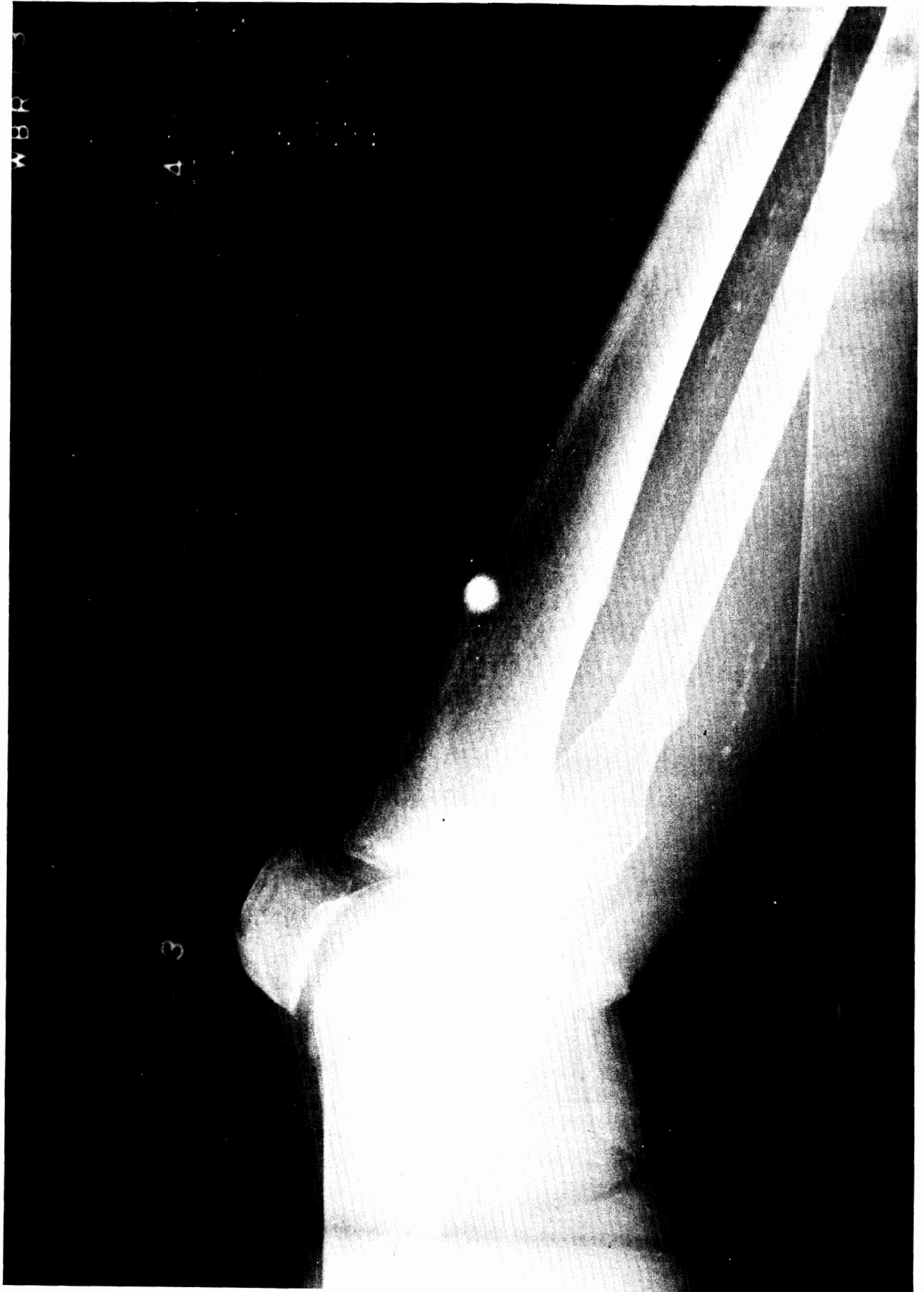


WBR-13: LATERAL X-RAY

WBR-13

4

3



WBR-13: LATERAL X-RAY



A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	5.220	-0.920	12.00	-1.540	-0.360	17.50
P2- L.EYE:	5.050	-0.920	9.50	1.870	-0.320	17.25
P3- R.EAR:	1.440	-1.950	13.75	-3.180	-1.430	13.50
P4- L.EAR:	1.230	-2.100	8.25	3.440	-1.630	13.50
Q1- ACC. :	-4.590	-1.590	10.25	0.780	-1.020	8.75
Q2- ACC. :	-0.630	3.080	7.75	3.970	4.050	12.00
Q3- ACC. :	0.830	3.110	14.00	-4.020	3.580	13.25
R1,R2,R3 :	4.365	3.670	5.129			

COORDINATES W.R.T. CAMERA			COORDINATES W.R.T. CAMERA				
	X	Y	Z		X	Y	Z
P1 :	4.014	-1.053	-0.477	Q1:	-3.654	0.639	-1.051
P2 :	4.079	1.286	-0.482	Q2:	-0.526	3.053	2.843
P3 :	1.068	-2.371	-1.257	Q3:	0.613	-3.013	2.489
P4 :	1.017	2.565	-1.476	P:	-3.074	0.496	3.276
C :	1.043	0.097	-1.366	CP:	-4.117	0.399	4.642

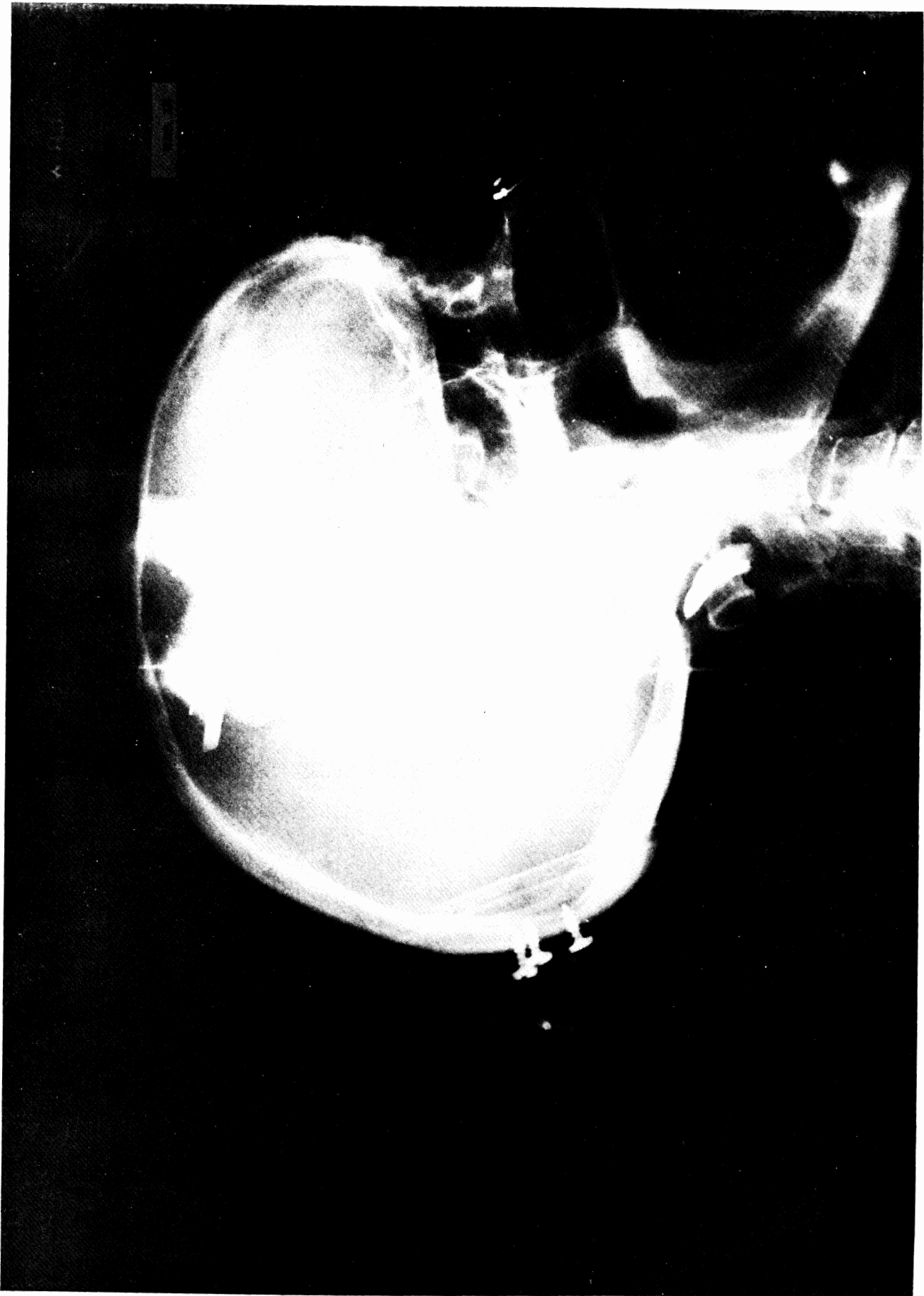
ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<I> :	0.95906	-0.00179	0.28318	1.0000	0.0000	-0.0000
<J> :	0.00873	0.99929	-0.02325	0.0000	0.9992	-0.0000
<K> :	-0.28303	0.02478	0.95870	-0.0000	-0.0000	0.9998

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<E1>:	-0.13277	0.03281	-0.99060	1.0000	0.0480	0.0339
<E2>:	0.70087	0.70328	-0.11909	0.0480	1.0000	0.0407
<E3>:	0.71584	-0.68137	-0.15271	0.0339	0.0407	1.0000

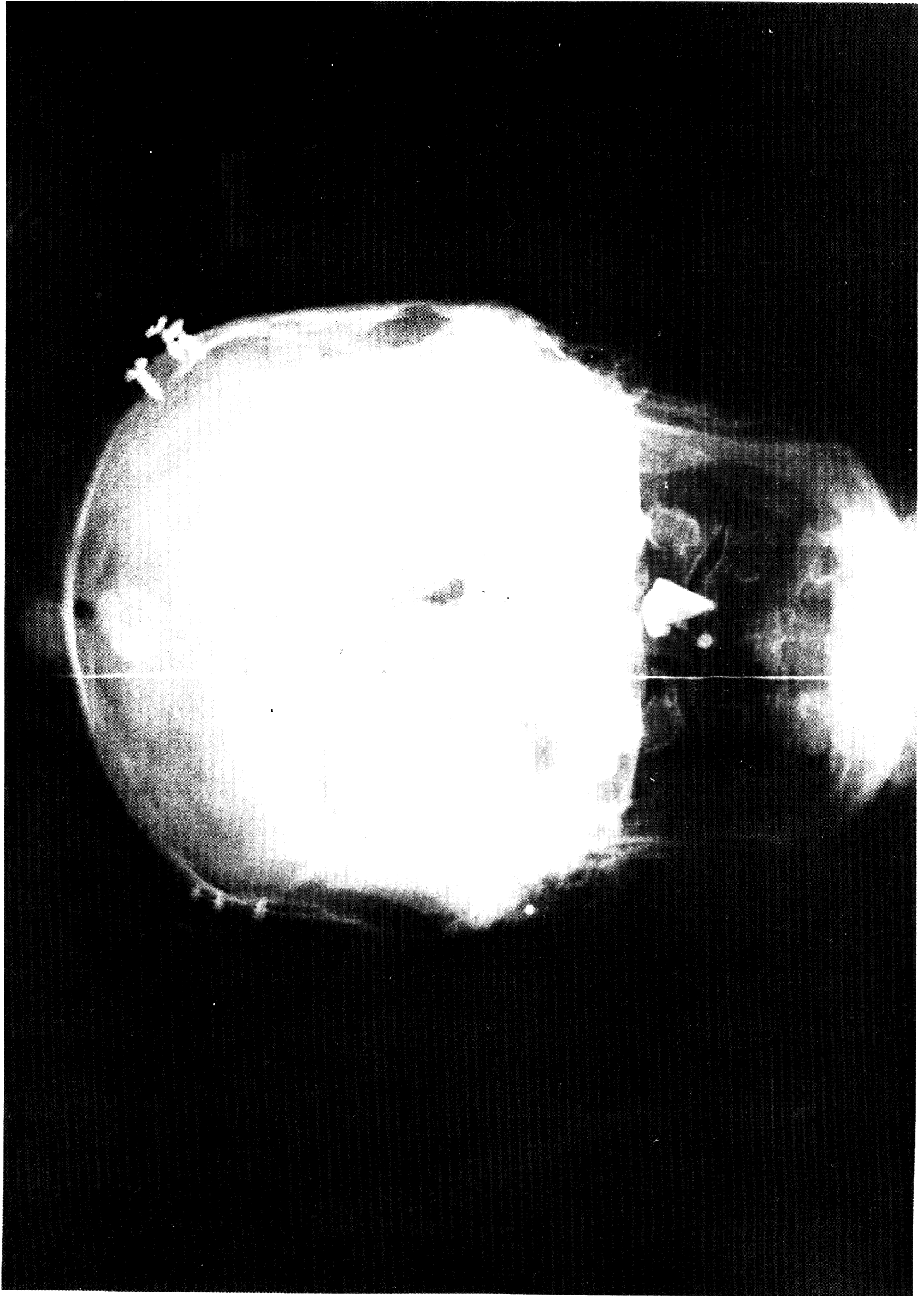
```

*****
*
* RUN ID:WBR-13          AUG 23, 1976
*
* PQ1= 4.365, PQ2= 3.670, PQ3= 5.129
* CPI= -2.635, CPJ= 0.255, CPK= 5.626
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL
*      <I>      <J>      <K>
*
* <E1>:  -0.43392  0.04889  -0.89962
*
* <E2>:   0.63496  0.72499  -0.26686
*
* <E3>:   0.63917  -0.68702  -0.34563
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0292  0.0315  0.0265
* ORTHOGONALITY CHECK
* 1.0000 -0.0000  0.0
* -0.0000  1.0000  0.0000
* 0.0      0.0000  1.0000
*
*****

```



WBR-13: HEAD X-RAY (X-Y)



WBR-13: HEAD X-RAY (Y-Z)

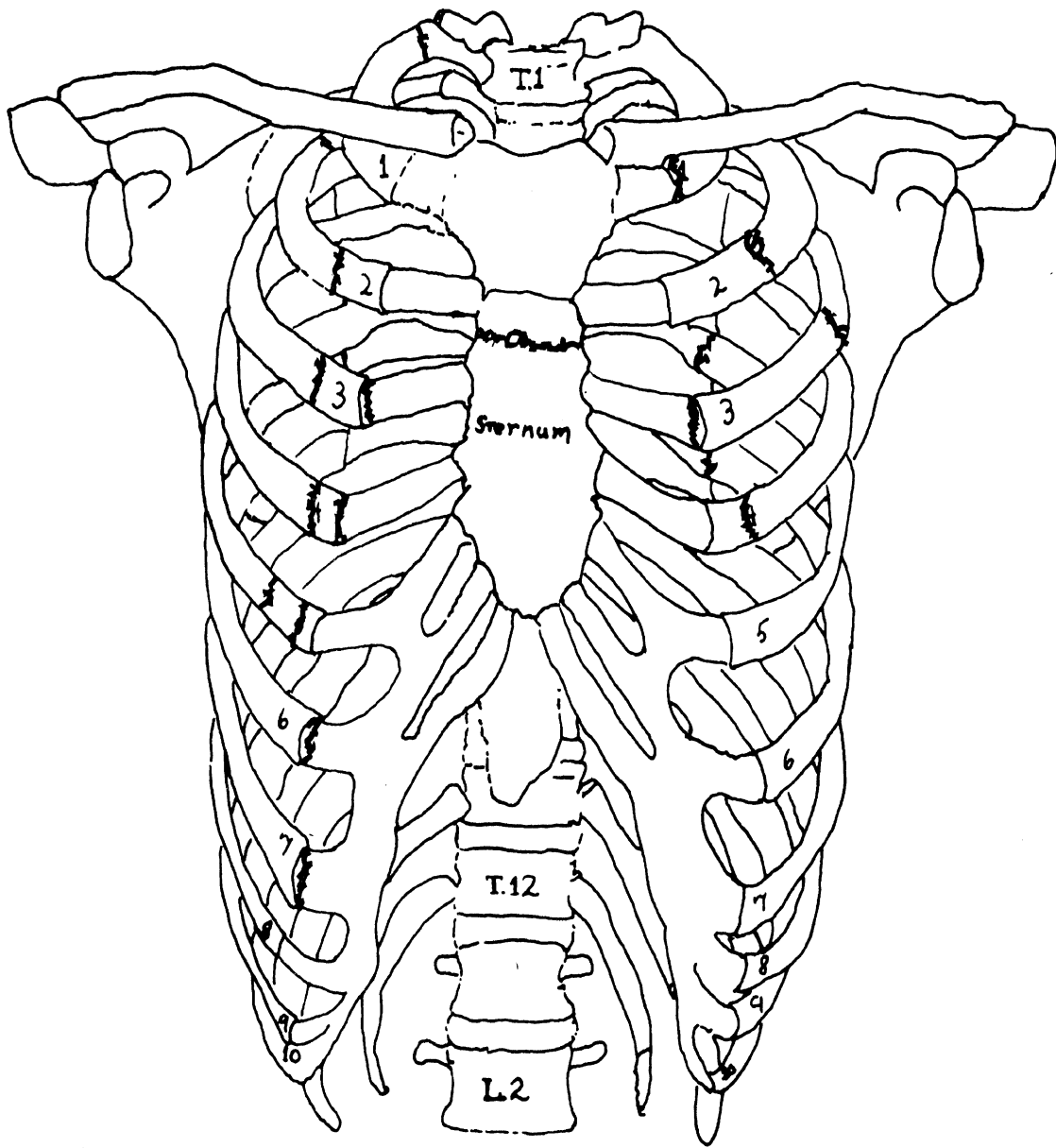
# INSTRUMENTATION DATA SHEET

<b>TEST NO:</b> 76B004		<b>DESCRIPTION</b> WBR-13		Account No: 320316										
through:		Whole Body Response Cadaver Test		<b>DATE:</b> 6-9-76										
<b>SUBJECT:</b> Cadaver		76B004: High Severity Test		<b>TAPE REEL #</b> 138										
number: 20483				<b>RECORDER:</b> 7600										
<b>FACILITY:</b> Impact Sled				<b>REC. SPEED:</b> 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT		CH #		
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±		units/volt	units
1	Sled Decel.	H-1	200	1	/	Statham	13587	1.1 / 2.2	1000	/			G	1
2	Head Q <sub>1</sub> - A	H-4	100	4	10	Endevco	AB 87	1.15	100	46.0 G	-		G	2
3	Head Q <sub>1</sub> - B	H-5	100	5	10	"	AA 41	1.25	100	/	-		G	3
4	Head Q <sub>1</sub> - C	H-6	100	6	10	"	AC 04	1.16	100	58.3 G	-		G	4
5	Head Q <sub>2</sub> - C	H-7	100	7	10	"	AC 14	1.17	100	51.6 G	-		G	5
6	Head Q <sub>2</sub> - A	H-8	100	8	10	"	AB 57	1.16	100	39.5 G	-		G	6
7	Head Q <sub>2</sub> - B	H-9	100	9	10	"	AC 02	1.15	100	42.6 G	-		G	7
8	Head Q <sub>3</sub> - B	H-10	100	10	10	"	AC 16	1.15	100	42.8 G	-		G	8
9	Head Q <sub>3</sub> - C	H-11	100	11	10	"	AC 22	1.25	100	/	-		G	9
10	Head Q <sub>3</sub> - A	H-12	100	12	10	"	AC 38	1.14	100	/	-		G	10
11														11
12	Velocity									12"/pulse			V	12
13	Dig. Gate									280 ms.			V	13
14	Time Base									100 Hz.			V	14



# INSTRUMENTATION DATA SHEET

TEST NO: 76B004		DESCRIPTION WBR-13		Account No: 320316										
through:		Whole Body Response Cadaver Test		DATE: 6-9-76										
BY: J.B.		76B004: High Severity Test		TAPE REEL # 139										
number: 20483		FACILITY: Impact Sled		RECORDER: CEC										
FACILITY: Impact Sled		REC. SPEED: 30 I.P.S.												
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT		CH #		
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±		units/volt	units
1	Sled Decel.	H-1	200	1	/	Statham	13587	1.1	1000	/	+	20.	G	1
2	Pelvis P-A	H-13	100	13	10	Endevco	AC 41	2.2	100	/	-	38.3	G	2
3	Pelvis I-S	H-14	100	14	10	"	AD 07	1.17	100	/	+	37.1	G	3
4	Thorax P-A	H-15	100	15	10	"	AD 27	1.16	100	/	+	38.7	G	4
5	Thorax I-S	H-16	100	16	10	"	AD 44	1.15	100	/	-	36.7	G	5
6	Thorax R-L	H-17	100	17	10	"	AD 46	1.16	100	/	+	42.5	G	6
7	Rt. Lap	H-18	200	18	10	GSE	082	2.21	200	2209 #	+	1000	#	7
8	Lt. Lap	H-19	200	19	10	"	083	2.24	200	2242 #	+	1000	#	8
9	Up. Shldr.	H-20	200	20	10	"	084	2.28	200	2277 #	+	1000	#	9
10	Lo. Shldr.	H-21	200	21	10	"	085	2.25	200	2245 #	+	1000	#	10
11														11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 m.s.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

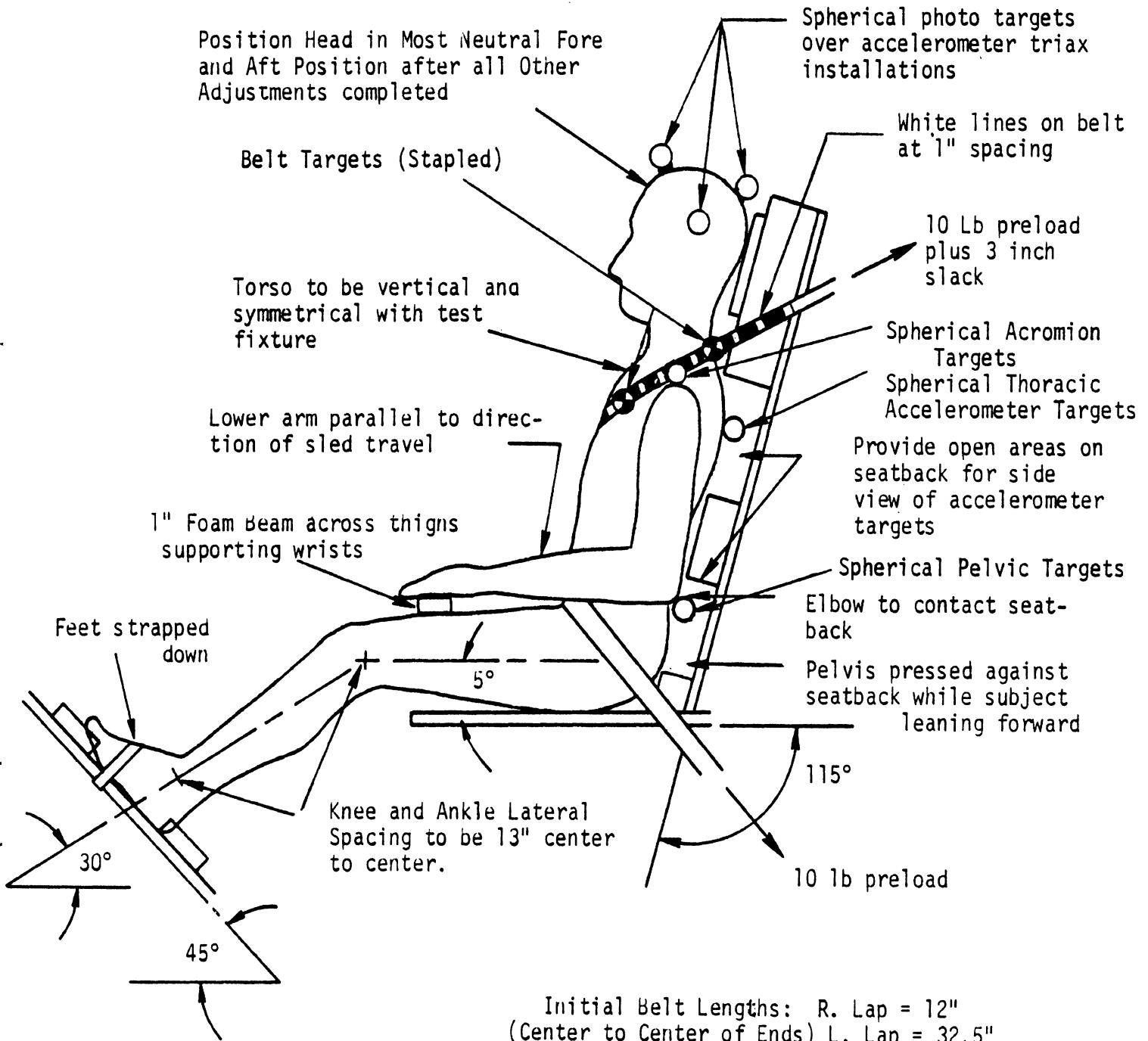


**Bony Thoracic Cage,  
anterior aspect**

WBR-13 CADAVER 20483

NOTE: Left clavicle was dislocated.

# 76B004



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

## Femur Target Spacing:

Right Side = 5 1/2 in.  
 Left Side = 5 5/8 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

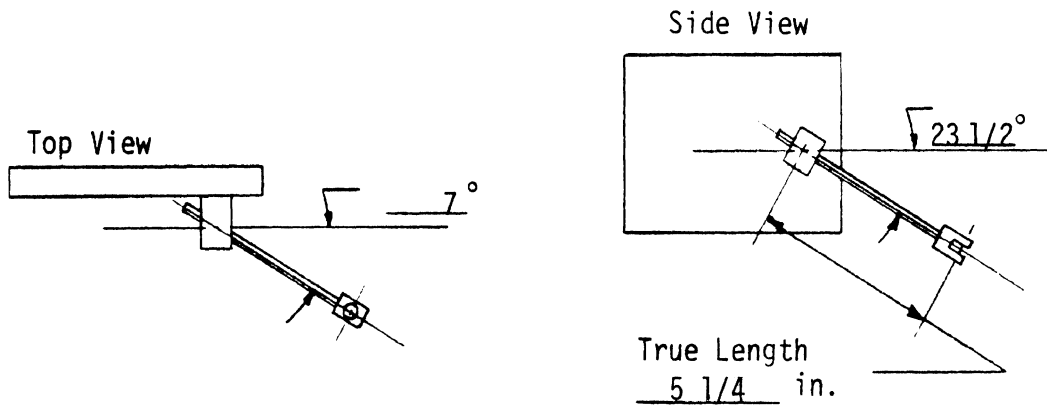
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

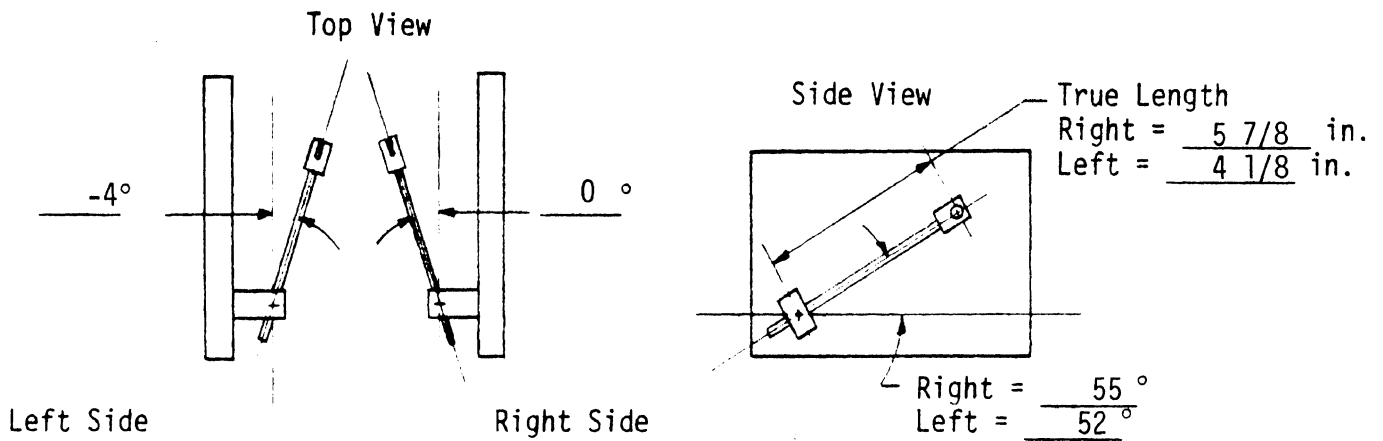
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



B. LAP BELT



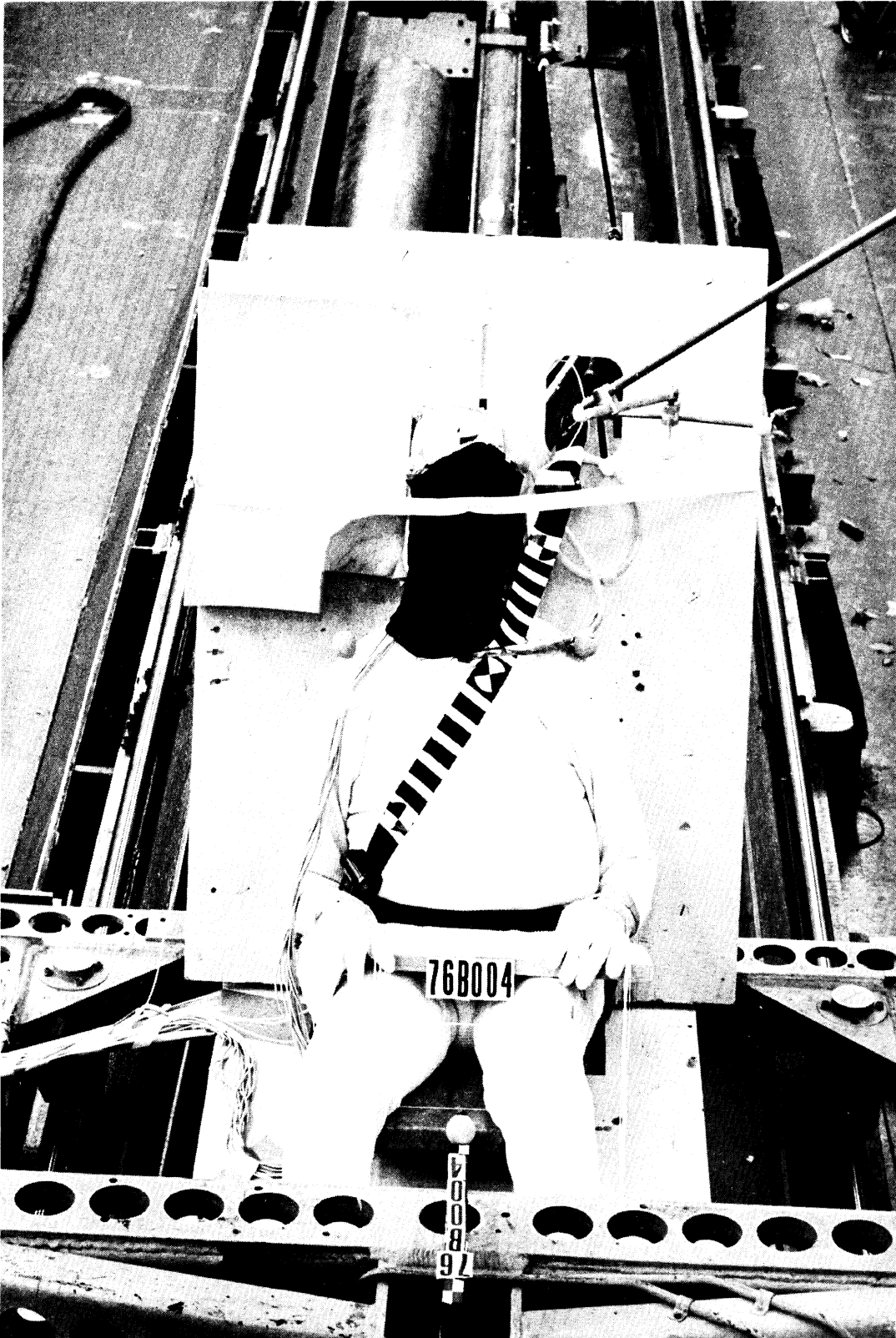
Sketch indicates positive angle directions

BELT LENGTH DATA

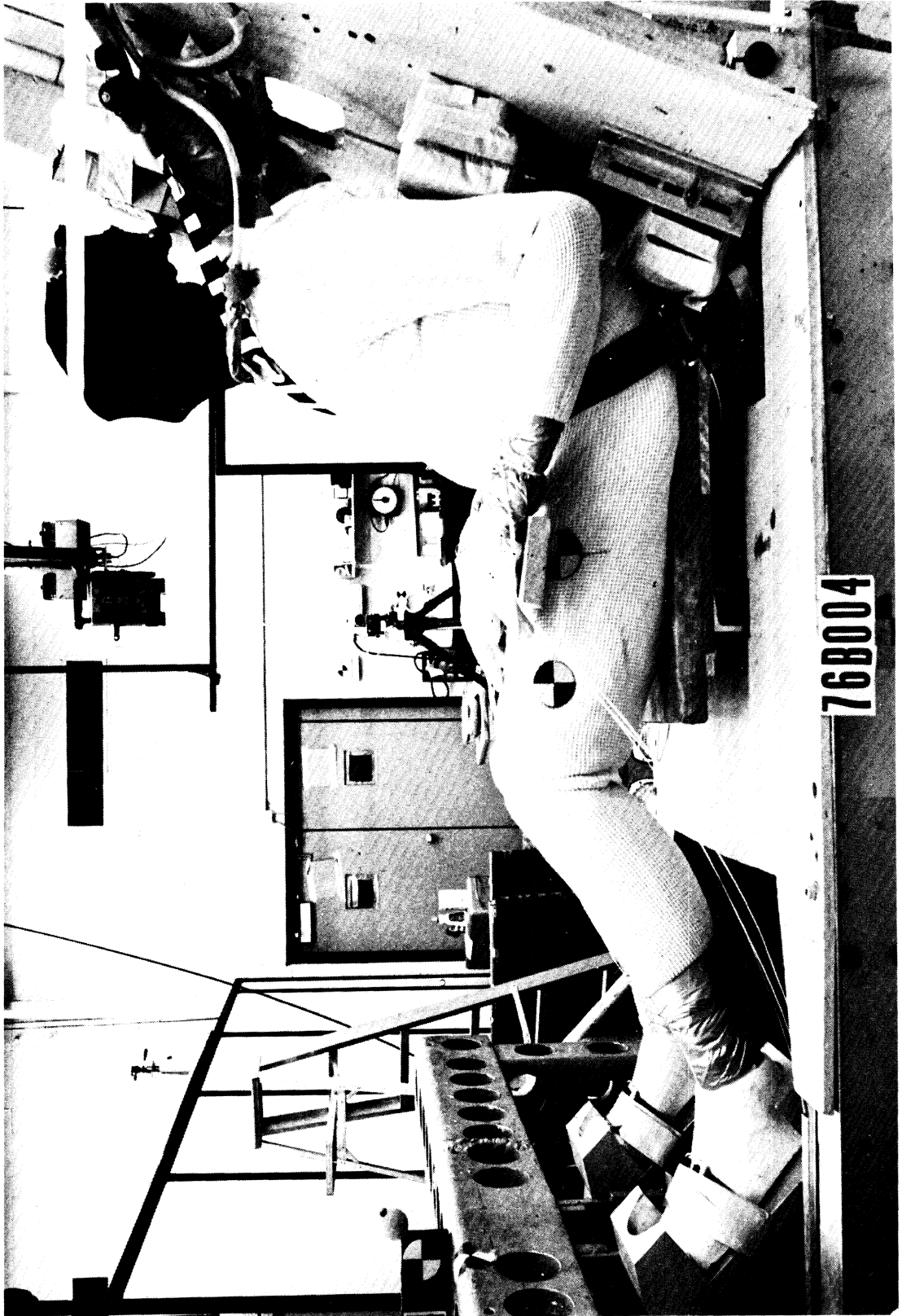
BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	12	12 1/4	1/4	11 1/2
Lt. Lap	32 1/2	32 1/2	0	31 3/4
Shoulder	42	42 1/16	1/16	40 7/16



768004: RIGHT SIDE VIEW



76B004: FRONT VIEW



76B004: LEFT SIDE VIEW

=====  
 RUN ID: 768004-1: WRK-13  
 =====

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

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES  
 ANALOG TAPE: 138(HSRI) EXPANDED 16BIT, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 24-AUG-76  
 TEST SIGNALS: 1523 PTS/CH AT 6400.34 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING RATE
---	--	-----	-----	-----	-----	-----	---	-----
343	- 11	SLIP DECELERATION	20.00	G'S	4+1+1	80.0	380	1600.00
344	- 21	AX1 HEAD A001 ACC	-40.00	G'S	4+1+18	570.2	380	1600.00
345	- 31	AY1 HEAD B001 ACC	-32.50	G'S	4+1+18	570.2	380	1600.00
346	- 41	AZ1 HEAD C001 ACC	-50.30	G'S	4+1+18	570.2	380	1600.00
347	- 51	AX2 HEAD C002 ACC	-40.10	G'S	4+1+18	570.2	380	1600.00
348	- 61	AY2 HEAD A002 ACC	-34.10	G'S	4+1+18	570.2	380	1600.00
349	- 71	AZ2 HEAD B002 ACC	-37.00	G'S	4+1+18	570.2	380	1600.00
350	- 81	AX3 HEAD B003 ACC	-37.20	G'S	4+1+18	570.2	380	1600.00
351	- 91	AY3 HEAD C003 ACC	-33.40	G'S	4+1+18	570.2	380	1600.00
352	- 101	AZ3 HEAD A003 ACC	-42.50	G'S	4+1+18	570.2	380	1600.00

111  
 121  
 131  
 141

-----  
 FILTERED FILES: 343 - 352 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768004-11 WRK-13  
 -----



SEP 13, 1978 / 11:47:46

RUN ID: 76B004-1: WBR-13

10 MS

20 PTS

< 1 > 3.E+00

< 2 > 2.E+01

< 3 > 5.E+00

< 4 > 5.E+00

< 5 > 9.E+00

< 6 > 4.E+00

< 7 > 5.E+00

< 8 > 4.E+00

< 9 > 1.E+01

< 10 > 8.E+00

10 MS

20 PTS

FILES: 343-352, TAPE: GMR-CAD

380 PTS @ 1600 HZ = 236.9 MS

=====  
 RUN ID: 768004-2: WRK-13  
 =====

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

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 118(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-11A DATE: 25-AUG-76  
 TEST SIGNALS: 1521 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
353 - 1:	SLFD DECELERATION	20.00	G'S	4+1+1	80.0	380	1599.03
354 - 2:	PELVIS BIAX P-A ACC	-38.30	G'S	4+1+12	284.9	380	1599.03
355 - 3:	PELVIS BIAX I-S ACC	37.10	G'S	4+1+12	284.9	380	1599.03
356 - 4:	THORAX TRIAX P-A ACC	38.70	G'S	4+1+12	284.9	380	1599.03
357 - 5:	THORAX TRIAX I-S ACC	-36.70	G'S	4+1+12	284.9	380	1599.03
358 - 6:	THORAX TRIAX R-L ACC	42.50	G'S	4+1+12	284.9	380	1599.03
359 - 7:	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	284.9	380	1599.03
360 - 8:	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	284.9	380	1599.03
361 - 9:	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	284.9	380	1599.03
362 - 10:	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	284.9	380	1599.03

11:  
 12:  
 13:  
 14:

-----  
 FILTERED FILMS: 353 - 362 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768004-2: WRK-13  
 -----

SEP 13, 1976 / 11:48:28

RUN ID: 76B004-2: WBR-13

10 MS  
20 PTS

< 1 > 9.E+00

< 2 > 5.E+00

< 3 > 4.E+00

< 4 > 1.E+01

< 5 > 4.E+00

< 6 > 4.E+00

< 7 > 2.E+02

< 8 > 1.E+02

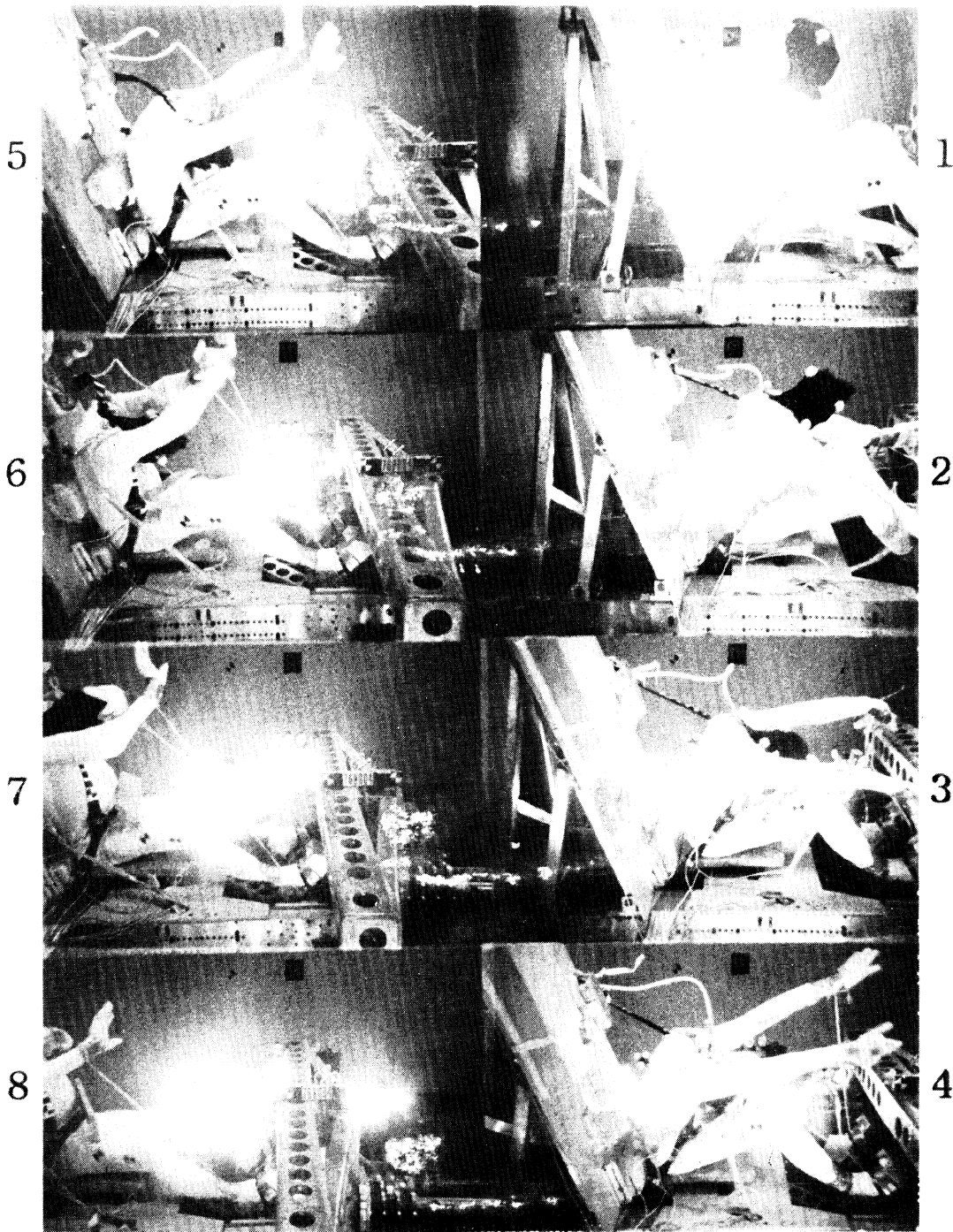
< 9 > 2.E+02

< 10 > 9.E+01

10 MS  
20 PTS

FILES: 353-382, TAPE: GMR-CAD

380 PTS • 1599 HZ = 297.0 MS



76B004

76B004: GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-14

TEST: 76B005

\_\_\_\_\_  
 \_\_\_\_\_

<u>CONTENTS:</u>	<u>PAGE</u>
Anthropometry	<u>271</u>
Frontal X-rays	<u>275</u>
Lateral X-rays	<u>281</u>
Head x-rays & Analysis	<u>285</u>
Instrumentation	<u>288</u>
Thorax Autopsy	<u>290</u>

For Each Test: 76B005

Setup Diagram	<u>291</u>	_____	_____
Belts/anchors	<u>292</u>	_____	_____
Setup photographs	<u>293</u>	_____	_____
Digitized Signals (7600)	<u>296</u>	_____	_____
Digitized Signals (CEC)	<u>298</u>	_____	_____
Graphcheck	<u>300</u>	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20500 WBR 14

List of Measurements (All measurements except weight listed in cm)

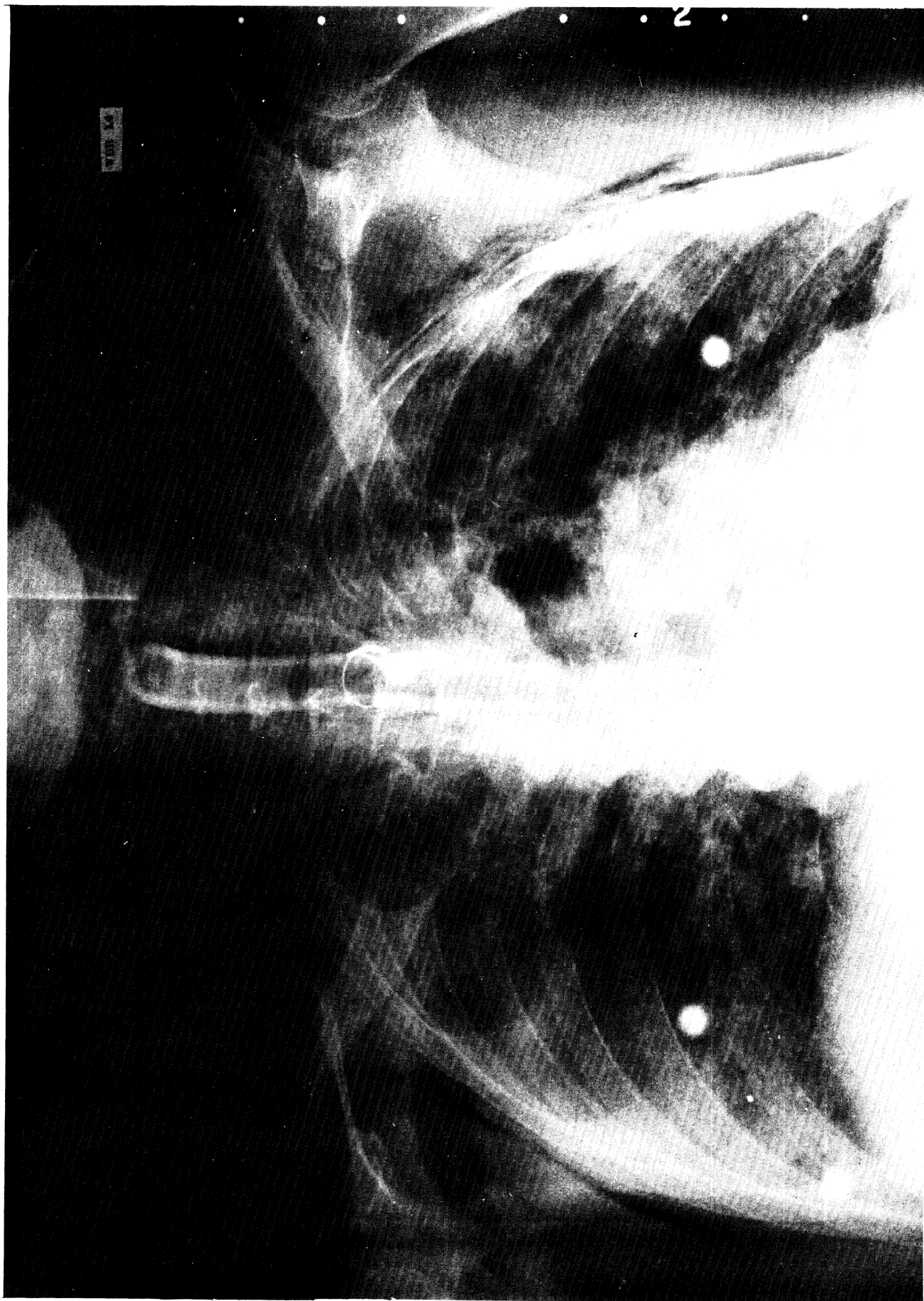
1. Weight		75.9 kg
2. Stature		168.3
3. Trochanterion Hgt.	Rt.	73.9
	Lt.	73.4
4. Symphision Hgt.		81.9
5. Anterior Superior Iliac Spine Hgt.	Rt.	75.1
	Lt.	74.5
6. Iliocristale Hgt.	Rt.	67.1
	Lt.	66.0
7. Substernale Hgt.		50.8
8. Mid-Chest Hgt.		40.0
9. Suprasternale Hgt.		30.6
10. Acromion Hgt.	Rt.	23.9
	Lt.	22.7
11. Menton Hgt.		21.4
12. Mastoid Hgt.	Rt.	17.2
	Lt.	16.9
13. Tragion Hgt.	Rt.	12.5
	Lt.	12.4
14. Tragion Depth	Rt.	9.8
	Lt.	8.5
15. Suprasternale Depth		19.4
16. Mid-Chest Depth		22.6
17. Substernale Depth		24.9
18. Anterior Superior Iliac Spine Depth	Rt.	17.2
	Lt.	16.5

19. Symphision Depth		18.6
20. Trochanterion Depth	Rt.	8.0
	Lt.	7.8
21. Suprasternale-Acromion Distance	Rt.	19.0
	Lt.	18.6
22. Biacromial Breadth		32.3
23. Bideltoid Breadth		46.3
24. Mid-Chest Breadth		32.8
25. Chest Breadth at Substernale		33.0
26. Hip Breadth at Iliocristale		30.1
27. Bispinous Diameter		25.5
28. ASIS to Symphision Distance	Rt.	14.2
	Lt.	14.7
29. Bitrochanteric Breadth		29.6
30. Acromion-Radiale Length		34.7
31. Ball of Humerus-Radiale Length		31.4
32. Radiale-Styilion Length		24.5
33. Hand Length		18.4
34. Hand Breadth		8.1
35. Hand Depth		2.9
36. Wrist Breadth		5.7
37. Forearm Depth		8.6
38. Upper Arm Depth		9.2
39. Trochanterion-Fibulare Length		48.5
40. Fibulare-Lateral Malleolus Length		37.3
41. Tibiale-Sphyrion Length		39.3
42. Tibiale-Heel of Foot Length		43.8



43. Foot Length	25.2
44. Foot Breadth	9.2
45. Minimum Ankle Breadth	6.5
46. Calf Depth	9.9
47. Upper Thigh Breadth	18.4
48. Head Breadth	15.8
49. Head Length	19.4
50. Bitragion Breadth	15.6
51. Bigonial Breadth	11.0
52. Menton Diagonal Length	25.0
53. Mastoid-Crinion Length	17.7
54. Head Circumference	57.0
55. Mid-Sagittal Arc Length	31.5
56. Bitragion-Coronal Arc Length	34.8
57. Mid-Neck Circumference	43.5
58. Chest Circumference at Mid-Chest	100.2
59. Chest Circumference at Substernale	98.7
60. Hip Circumference at Iliocristale	91.7
61. Buttocks Circumference at Trochanterion	91.0
62. Upper Arm Circumference (Mid-Biceps)	37.5
63. Maximum Forearm Circumference	36.1
64. Minimum Wrist Circumference	6.2
65. Upper Thigh Circumference	50.7
66. Maximum Calf Circumference	38.5
67. Minimum Ankle Circumference	14.8



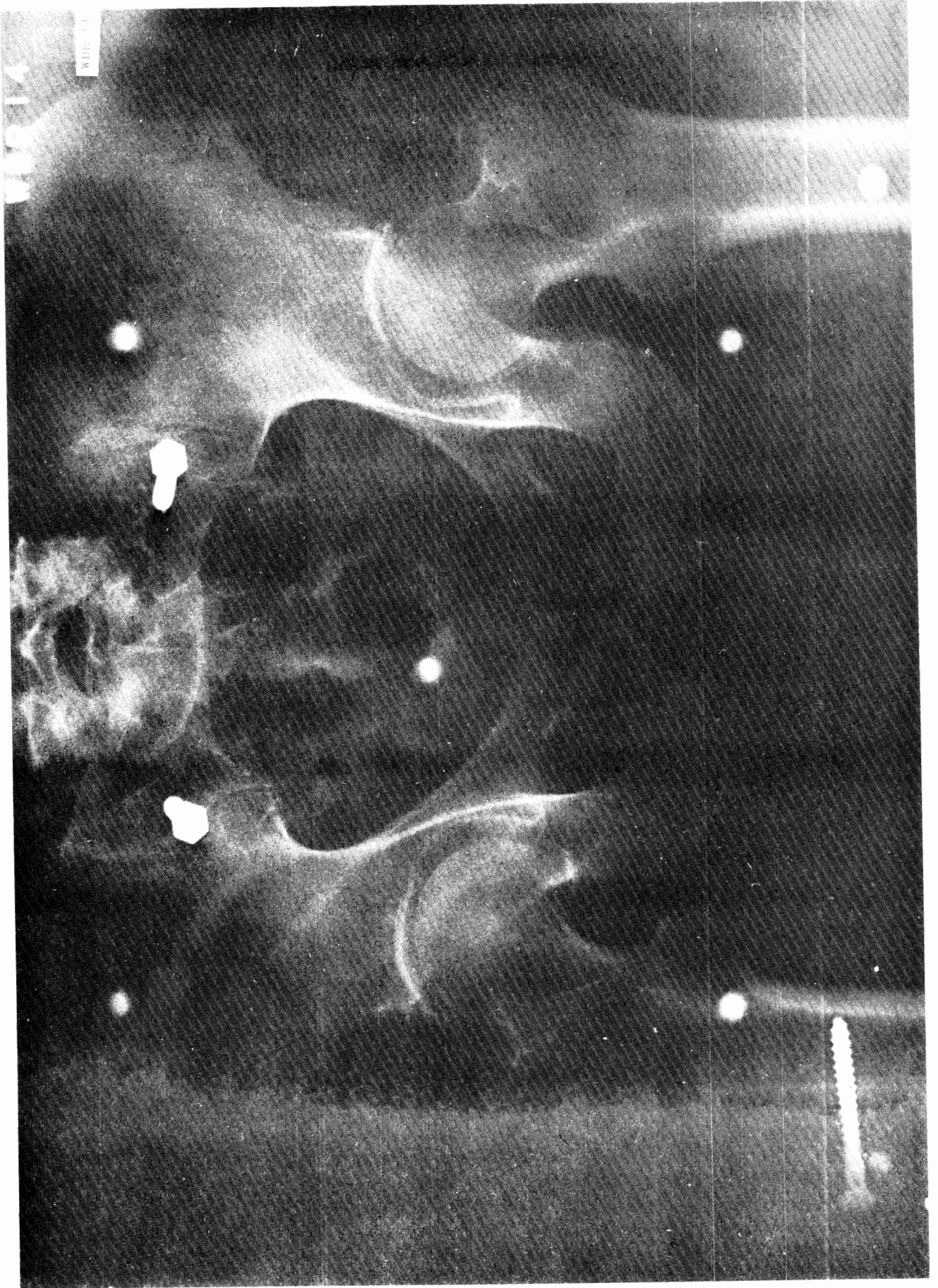


WBR-14: FRONTAL X-RAY

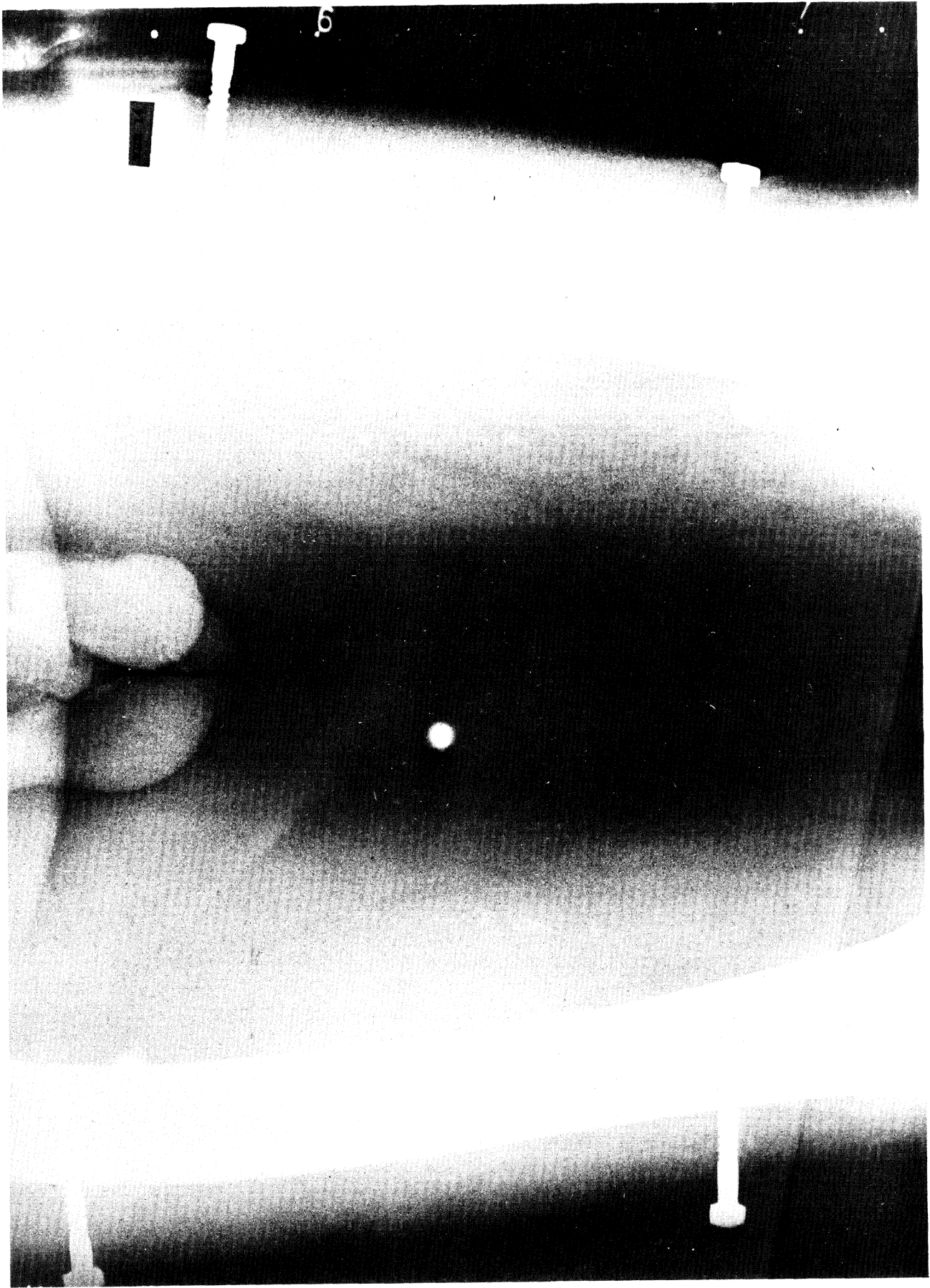


WBR-14: FRONTAL X-RAY

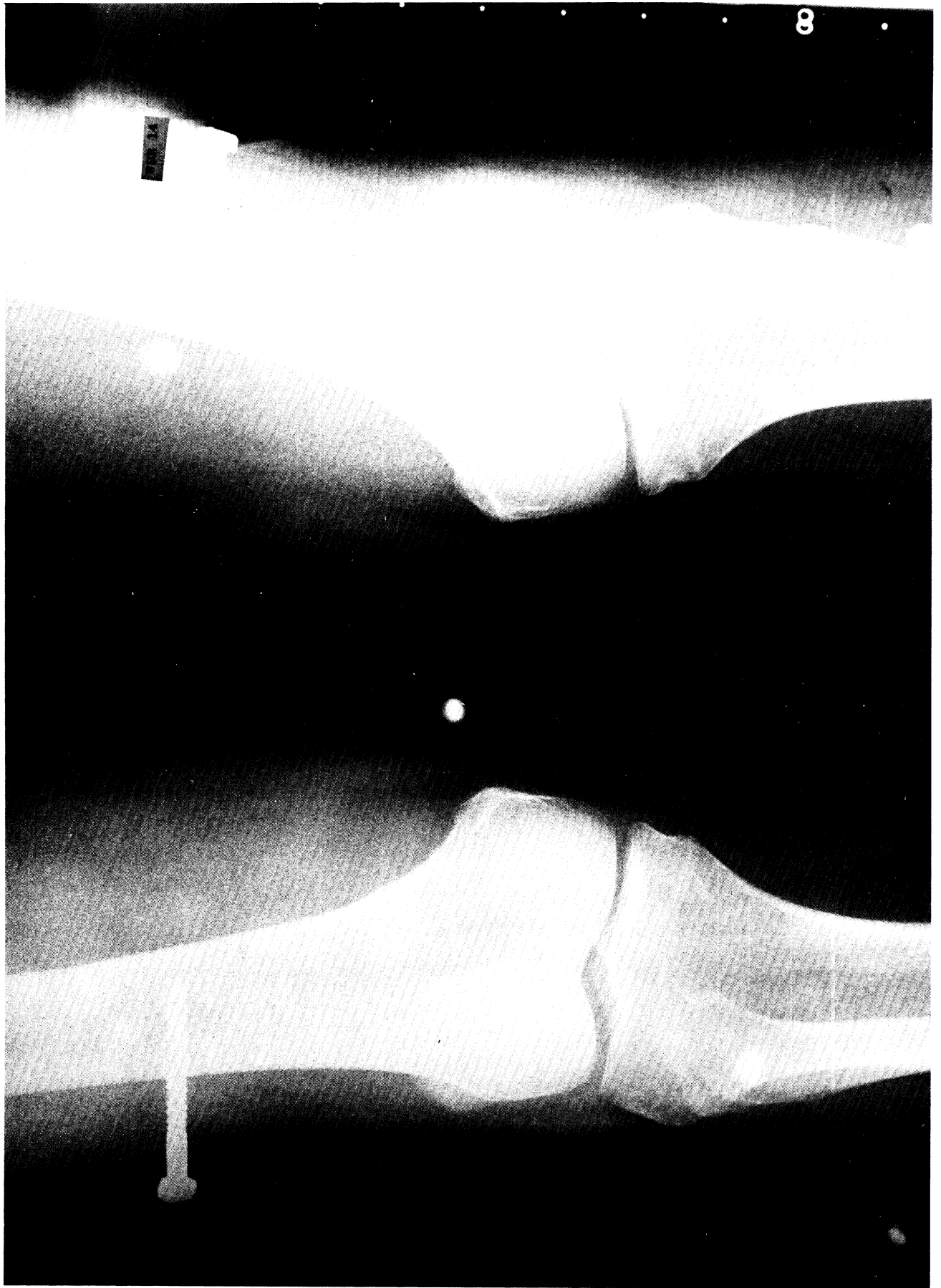




WBR-14: FRONTAL X-RAY



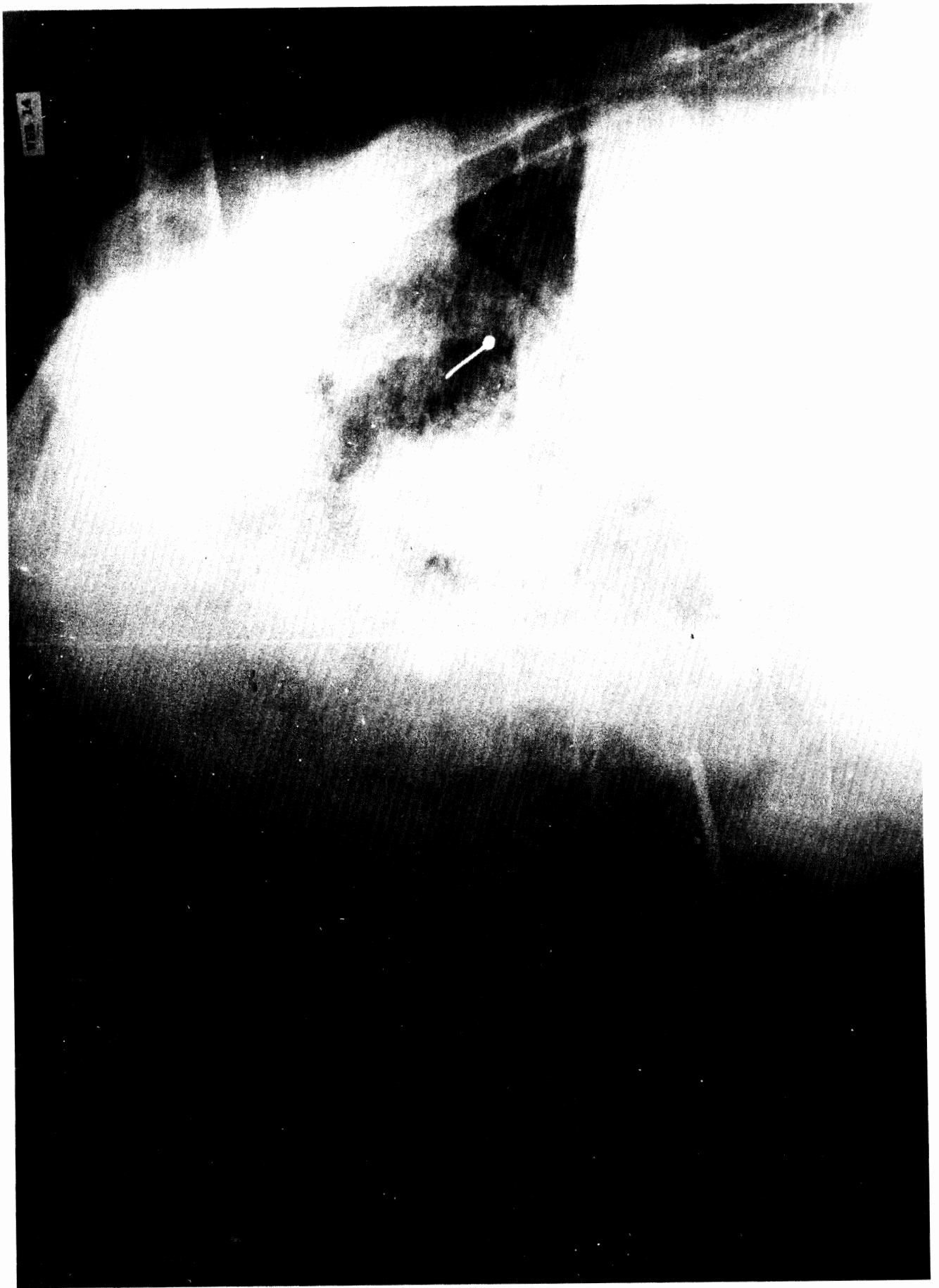
WBR-14: FRONTAL X-RAY



B-279







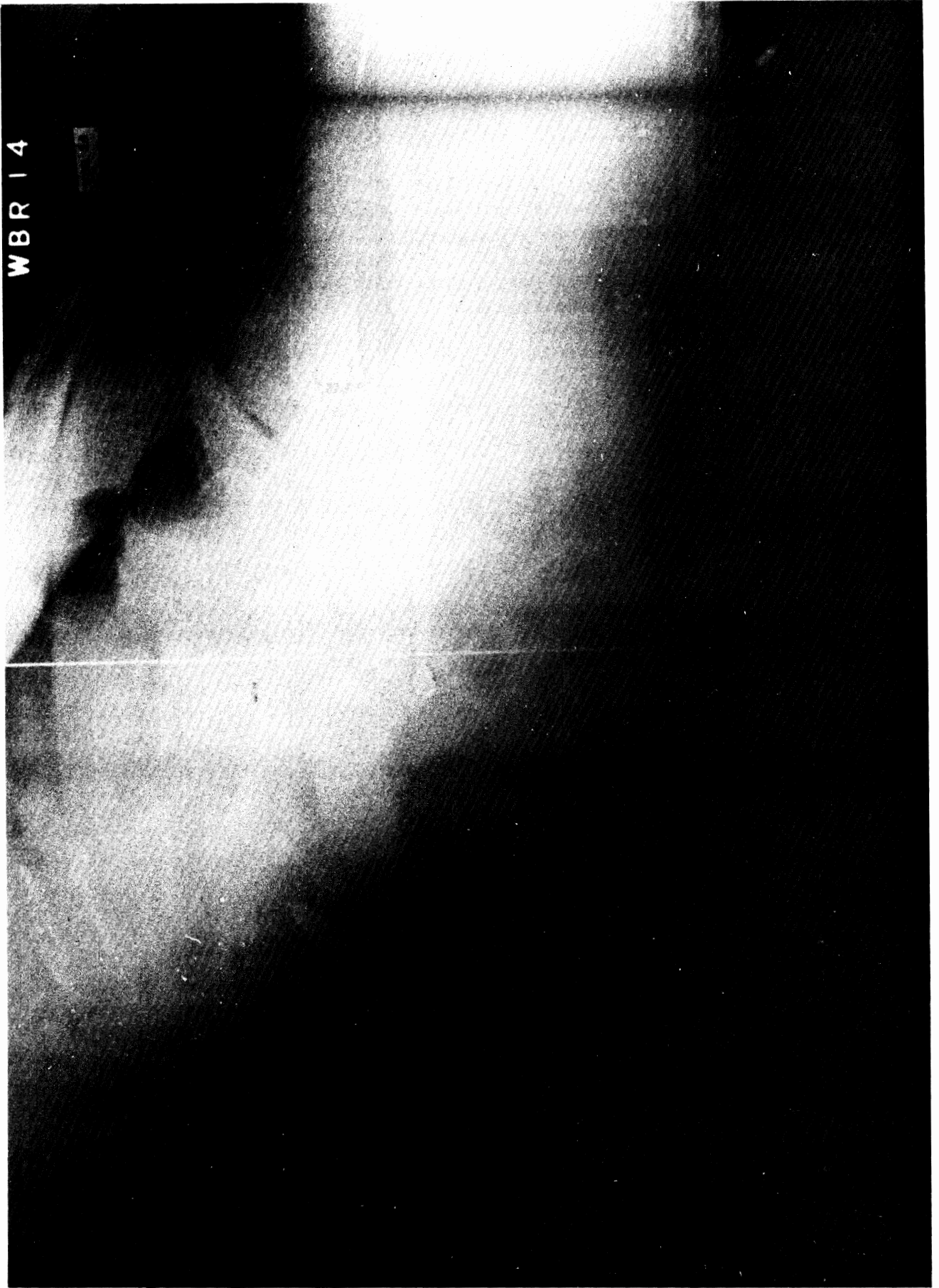
WBR-14: LATERAL X-RAY

B-281

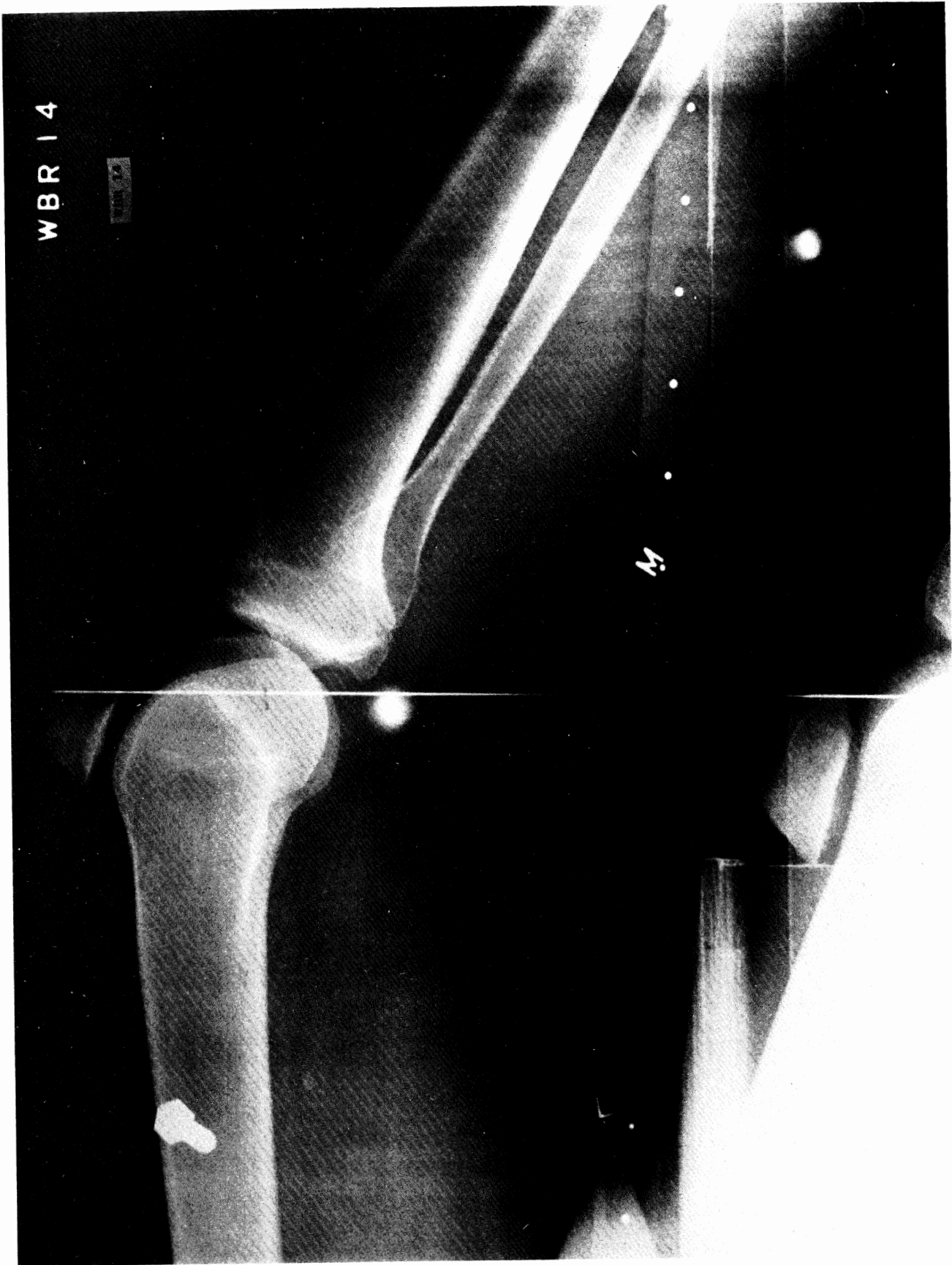


WBR-14: LATERAL X-RAY

WBR 14



WBR-14: LATERAL X-RAY



WBR-14: LATERAL X-RAY

A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	3.340	-4.110	12.00	-1.780	-4.740	22.75
P2- L.EYE:	3.090	-3.790	8.50	2.630	-4.490	22.50
P3- R.EAR:	-1.150	-4.640	14.50	-3.690	-4.970	18.50
P4- L.EAR:	-0.980	-3.980	8.00	4.120	-4.540	19.00
Q1- ACC. :	-6.550	-3.040	10.50	1.100	-3.120	13.00
Q2- ACC. :	-0.550	1.450	8.50	4.190	2.220	19.25
Q3- ACC. :	-0.830	1.630	14.50	-4.220	1.950	18.25
R1,R2,R3 :	5.347	3.635	4.435			

COORDINATES W.R.T. CAMERA			COORDINATES W.R.T. CAMERA				
	X	Y	Z		X	Y	Z
P1 :	2.568	-1.072	-3.008	Q1:	-5.189	0.829	-2.380
P2 :	2.544	1.594	-2.921	Q2:	-0.453	2.751	1.326
P3 :	-0.840	-2.466	-3.355	Q3:	-0.606	-2.836	1.250
P4 :	-0.814	2.721	-3.153	P:	-3.054	0.704	2.543
C :	-0.827	0.128	-3.254	CP:	-2.227	0.576	5.797

ANATOMICAL FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<I> :	0.99648	-0.00083	0.08378	1.0000	-0.0000	-0.0000
<J> :	-0.00217	0.99933	0.03571	-0.0000	0.9999	0.0000
<K> :	-0.08376	-0.03576	0.99584	-0.0000	0.0000	1.0000

INSTRUMENT FRAME (WRT CAMERA)			ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>			
<E1>:	-0.39786	0.02327	-0.91715	1.0000	0.0365	0.0287
<E2>:	0.73754	0.58049	-0.34506	0.0365	1.0000	0.0436
<E3>:	0.54469	-0.78780	-0.28754	0.0287	0.0436	1.0000

```

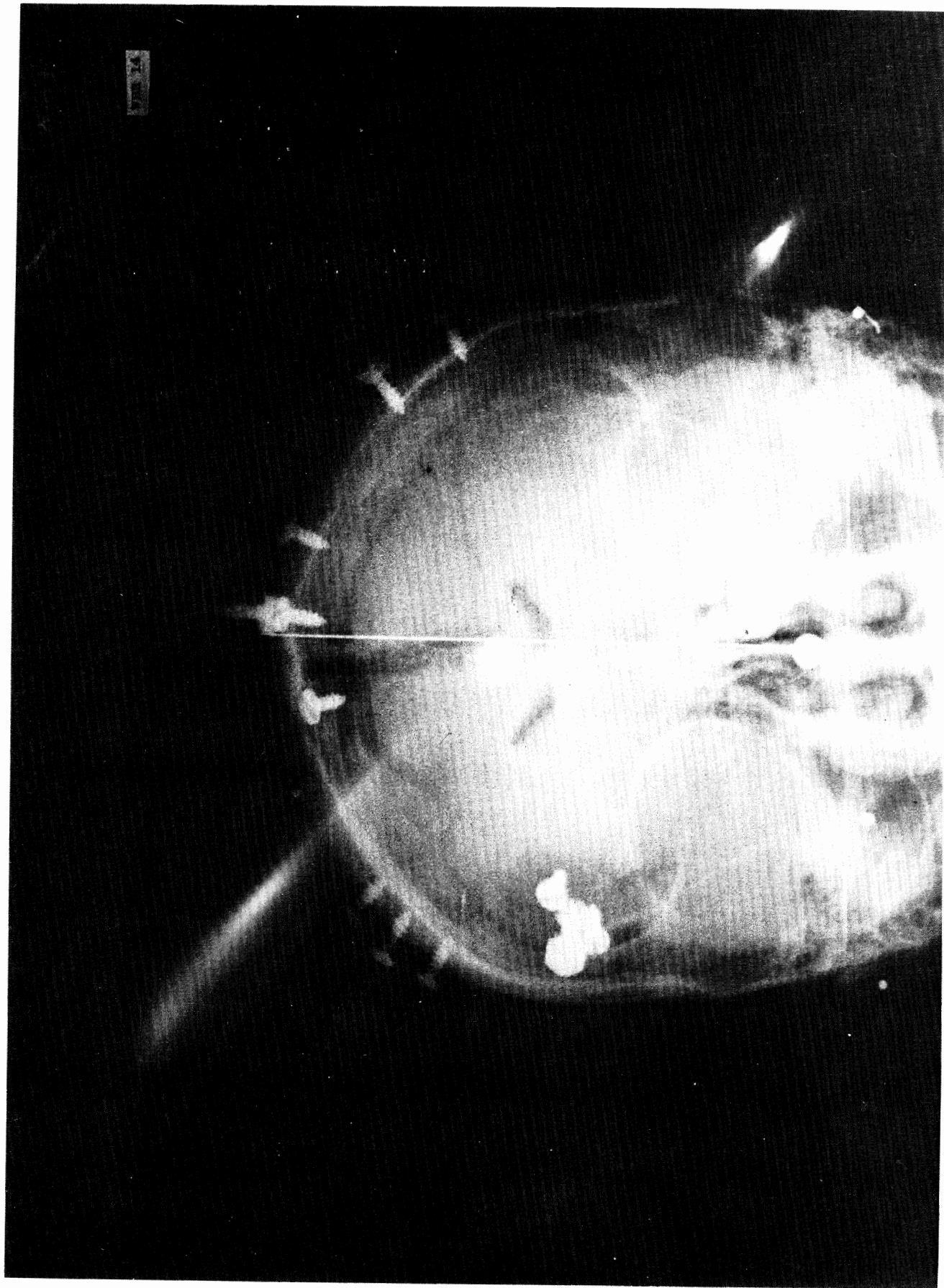
*****
*
* RUN ID:WBR-14          AUG 23, 1976  *
*
* PQ1= 5.347, PQ2= 3.635, PQ3= 4.435 *
* CPI= -1.734, CPJ= 0.788, CPK= 5.938 *
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL *
*           <I>           <J>           <K> *
*
* <E1>:  -0.49344  -0.00774  -0.86975 *
*
* <E2>:   0.70368   0.58419  -0.40442 *
*
* <E3>:   0.51122  -0.81158  -0.28281 *
*
*****

```





WBR-14: HEAD X-RAY (X-Z)



WBR-14: HEAD X-RAY (Y-Z)

# INSTRUMENTATION DATA SHEET

TEST NO: 76B005	DESCRIPTION	WBR-14	Account No: 320316	
through:	Whole Body Response Cadaver Test		DATE: 7-6-76	BY: F.C.
SUBJECT: Cadaver	76B005: Mid Severity Test		TAPE REEL # 138	
number: 20500			RECORDER: 7600	
FACILITY: Impact Sled			REC. SPEED: 30 I.P.S.	

CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT		CH #		
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±		units/volt	units
1	Sled Decel.	H-1	200	1	/	Statham	13587	1.1	1000	/	+	20.	G	1
2	Head Q <sub>1</sub> - A	H-4	100	4	10	Endevco	AD 27	1.15	100	/	-	38.7	G	2
3	Head Q <sub>1</sub> - B	H-5	100	5	10	"	AD 07	1.15	100	/	-	37.1	G	3
4	Head Q <sub>1</sub> - C	H-6	100	6	10	"	AB 87	1.15	100	46.0 G	-	40.0	G	4
5	Head Q <sub>2</sub> - C	H-7	100	7	10	"	AD 46	1.16	100	/	-	42.5	G	5
6	Head Q <sub>2</sub> - A	H-8	100	8	10	"	AD 44	1.16	100	/	-	36.7	G	6
7	Head Q <sub>2</sub> - B	H-9	100	9	10	"	AC 41	1.16	100	/	-	38.3	G	7
8	Head Q <sub>3</sub> - B	H-10	100	10	10	"	AD 47	1.17	100	/	-	40.9	G	8
9	Head Q <sub>3</sub> - C	H-11	100	11	10	"	AC 22	1.25	100	/	-	33.4	G	9
10	Head Q <sub>3</sub> - A	H-12	100	12	10	"	AC 38	1.14	100	/	-	42.5	G	10
11														11
12	Velocity									12"/Pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

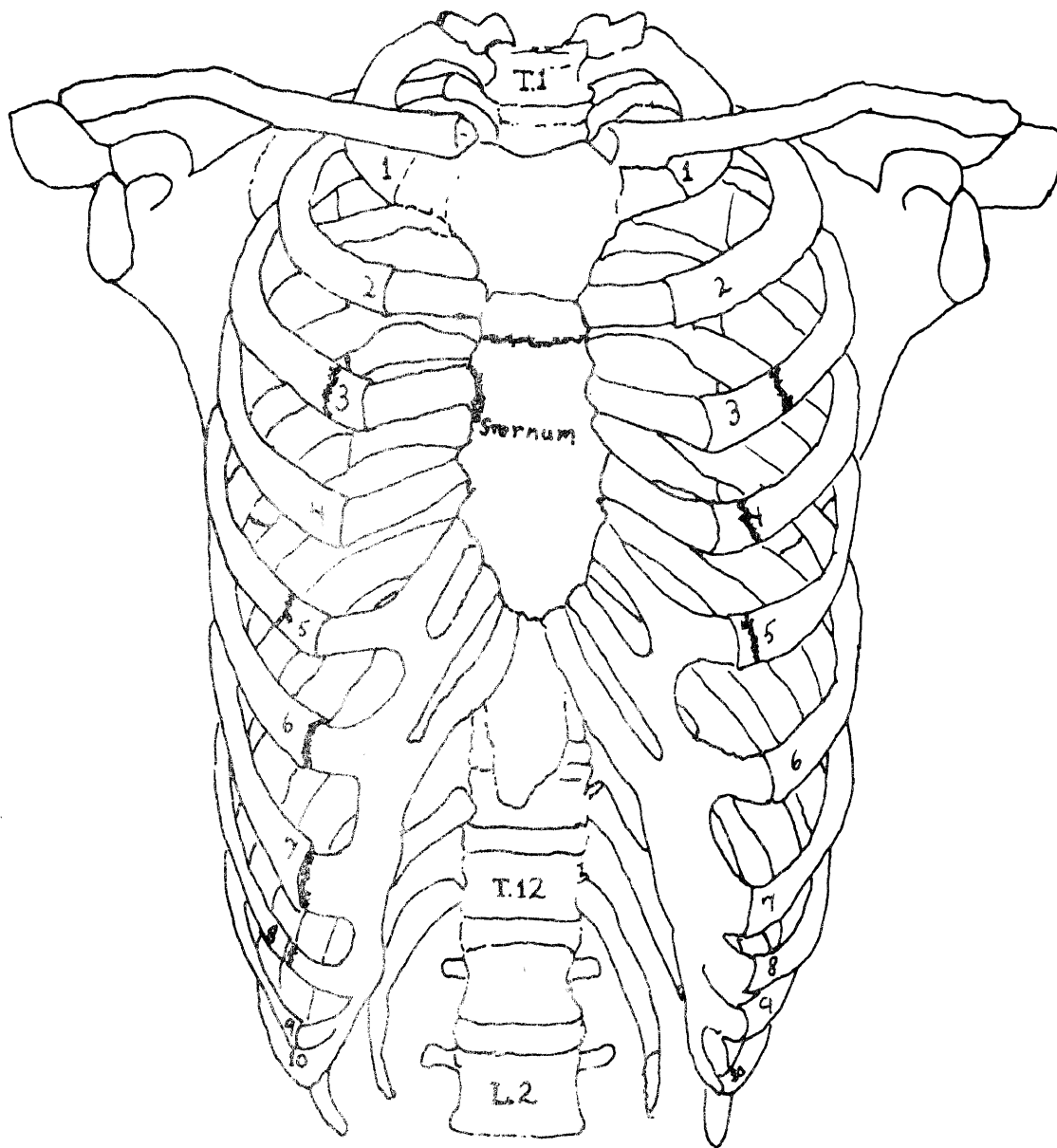


# INSTRUMENTATION DATA SHEET

<b>TEST NO:</b> 76B005	<b>DESCRIPTION</b> WBR-14	<b>Account No:</b> 320316	<b>BY:</b> F.C.
through:	Whole Body Response Cadaver Test	<b>DATE:</b> 7-6-76	
<b>SUBJECT:</b> Cadaver	76B005: Mid-Severity Test	<b>TAPE REEL #</b> 139	
number: 20500		<b>RECORDER:</b> C.E.C.	
<b>FACILITY:</b> Impact Sled		<b>REC. SPEED:</b> 30 I.P.S.	

CH	SET UP DATA		TRANSDUCER	CALIBRATION		OUTPUT		CH
	Input	Output		Scale	Factor	Units	Units	
1	Sled Decel.	200	100	1.17	100	+	30	G
2	Pelvis P-A	100	10	1.15	100	-	50.7	G
3	Pelvis I-S	100	14	1.17	100	+	44.1	G
4	Thorax P-A	100	15	1.27	100	+	42.2	G
5	Thorax I-S	100	16	1.16	100	-	34.1	G
6	Thorax R-L	100	17	1.16	100	+	36.7	G
7	Rt. Lap	200	18	2.21	200	+	1000	#
8	Lt. Lap	200	19	2.24	200	+	1000	#
9	Up. Shldr.	200	20	2.28	200	+	1000	#
10	Lo. Shldr.	200	21	2.25	200	+	1000	#
11	Strobe						1.	V
12	Velocity						1.	V
13	Dig. Gate						1.	V
14	Time Base						1.	V

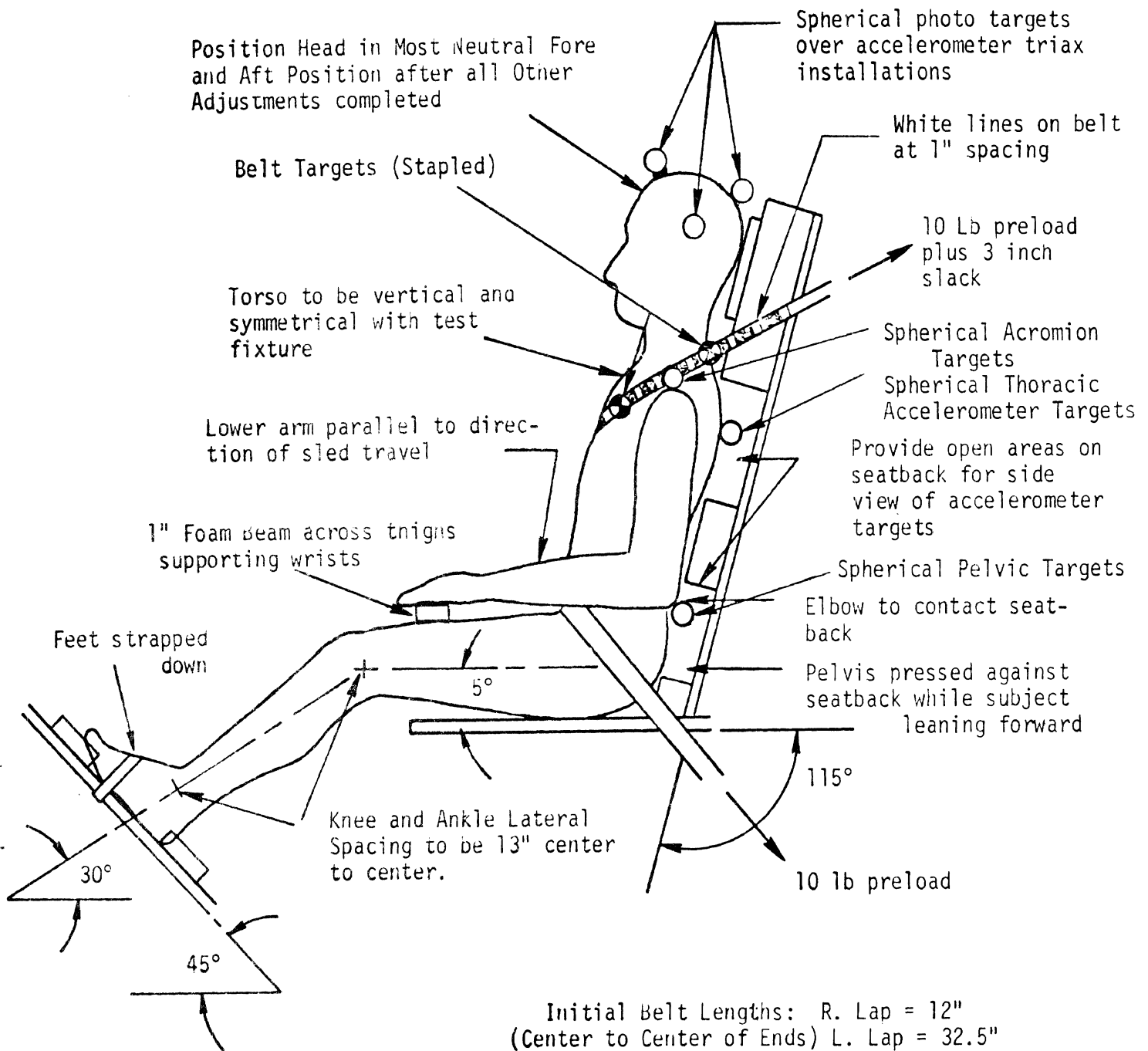


**Bony Thoracic Cage,  
anterior aspect**

WBR-14 CADAVER 20500

NOTE: Massive hemorrhaging occurred on left side in vicinity of rib 3 and rib 4.

# 76B005



Position Head in Most Neutral Fore and Aft Position after all Other Adjustments completed

Spherical photo targets over accelerometer triax installations

Belt Targets (Stapled)

White lines on belt at 1" spacing

Torso to be vertical and symmetrical with test fixture

10 Lb preload plus 3 inch slack

Lower arm parallel to direction of sled travel

Spherical Acromion Targets  
Spherical Thoracic Accelerometer Targets

Provide open areas on seatback for side view of accelerometer targets

1" Foam beam across thighs supporting wrists

Spherical Pelvic Targets

Feet strapped down

Elbow to contact seatback

Pelvis pressed against seatback while subject leaning forward

Knee and Ankle Lateral Spacing to be 13" center to center.

115°

10 lb preload

30°

45°

Initial Belt Lengths: R. Lap = 12"  
(Center to Center of Ends) L. Lap = 32.5"  
Shoulder = 42"

Femur Target Spacing:

Right Side = 8 in.  
Left Side = 6 in.

Belt Sequence:  
(Out from Subject)

L. Lap, R. Lap, Shoulder

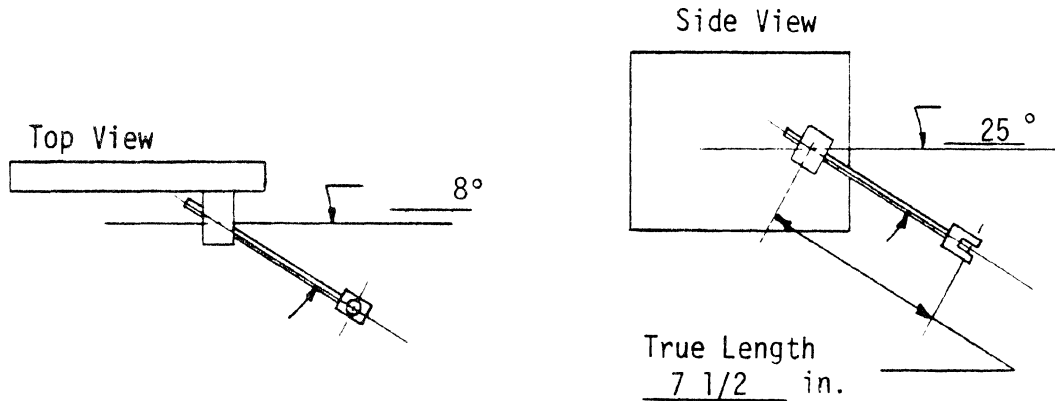
Belt End Orientation:  
(Ref. To Subject)

Away, Away, Toward

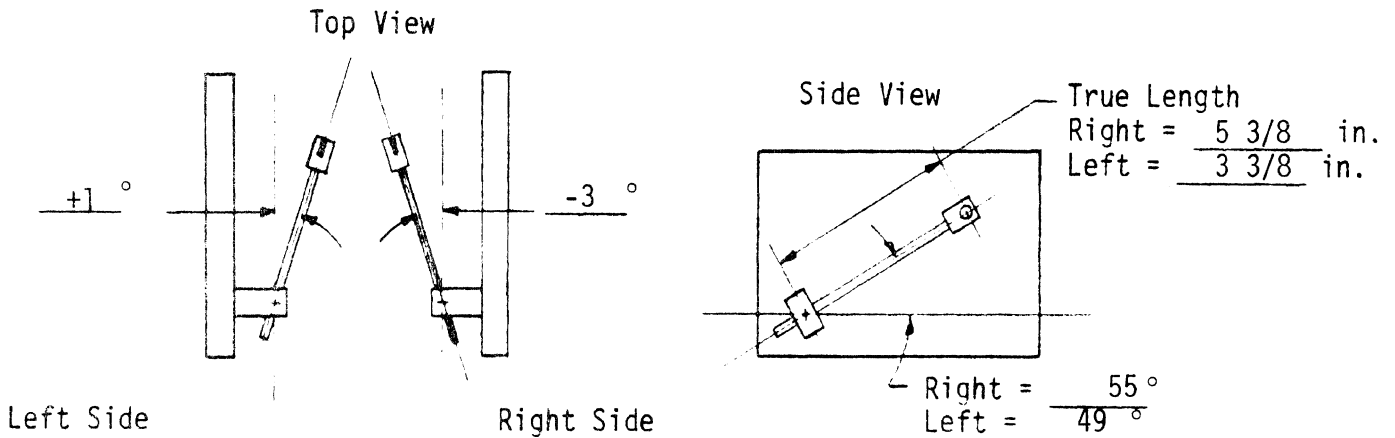
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



B. LAP BELT



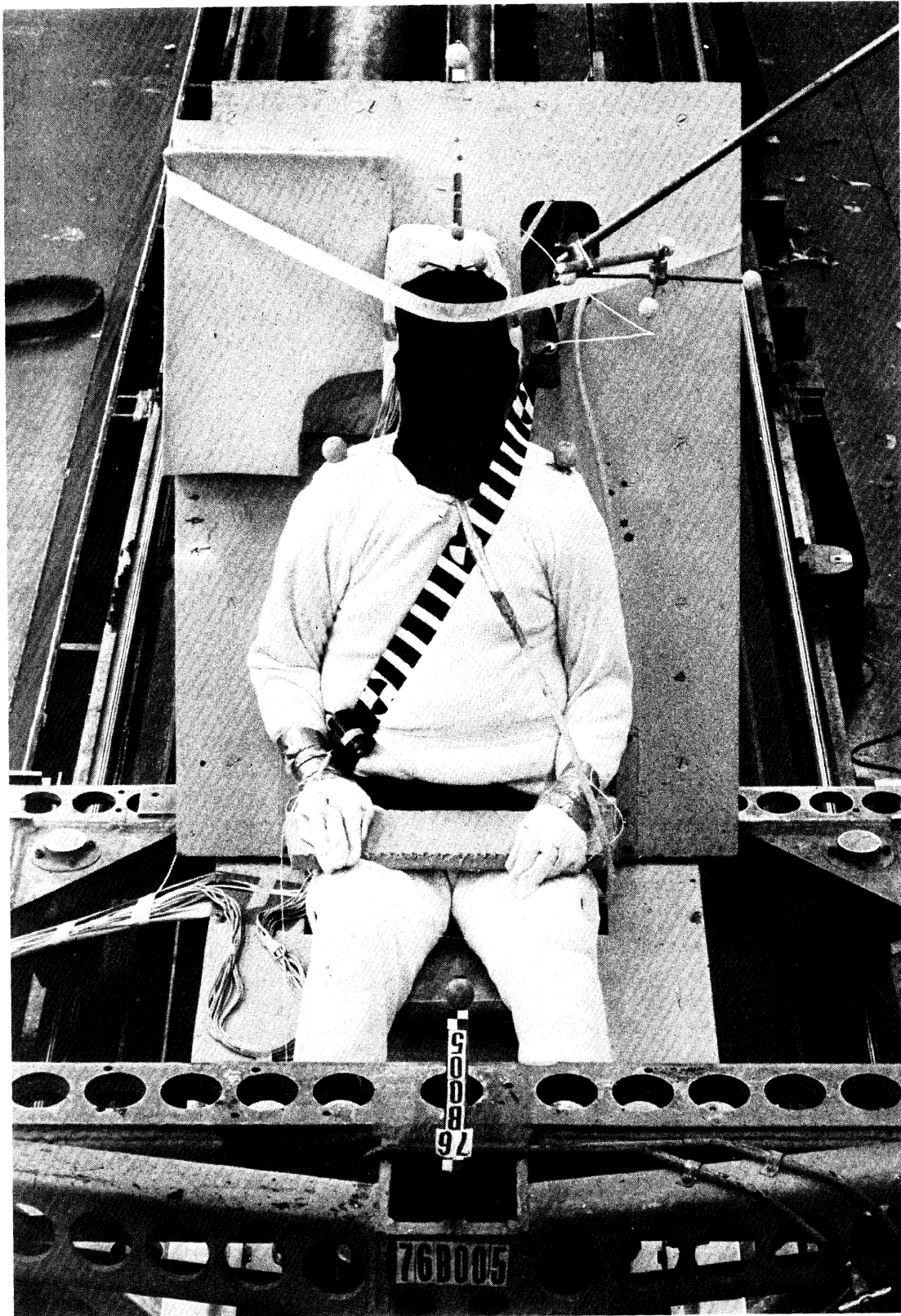
Sketch indicates positive angle directions

BELT LENGTH DATA

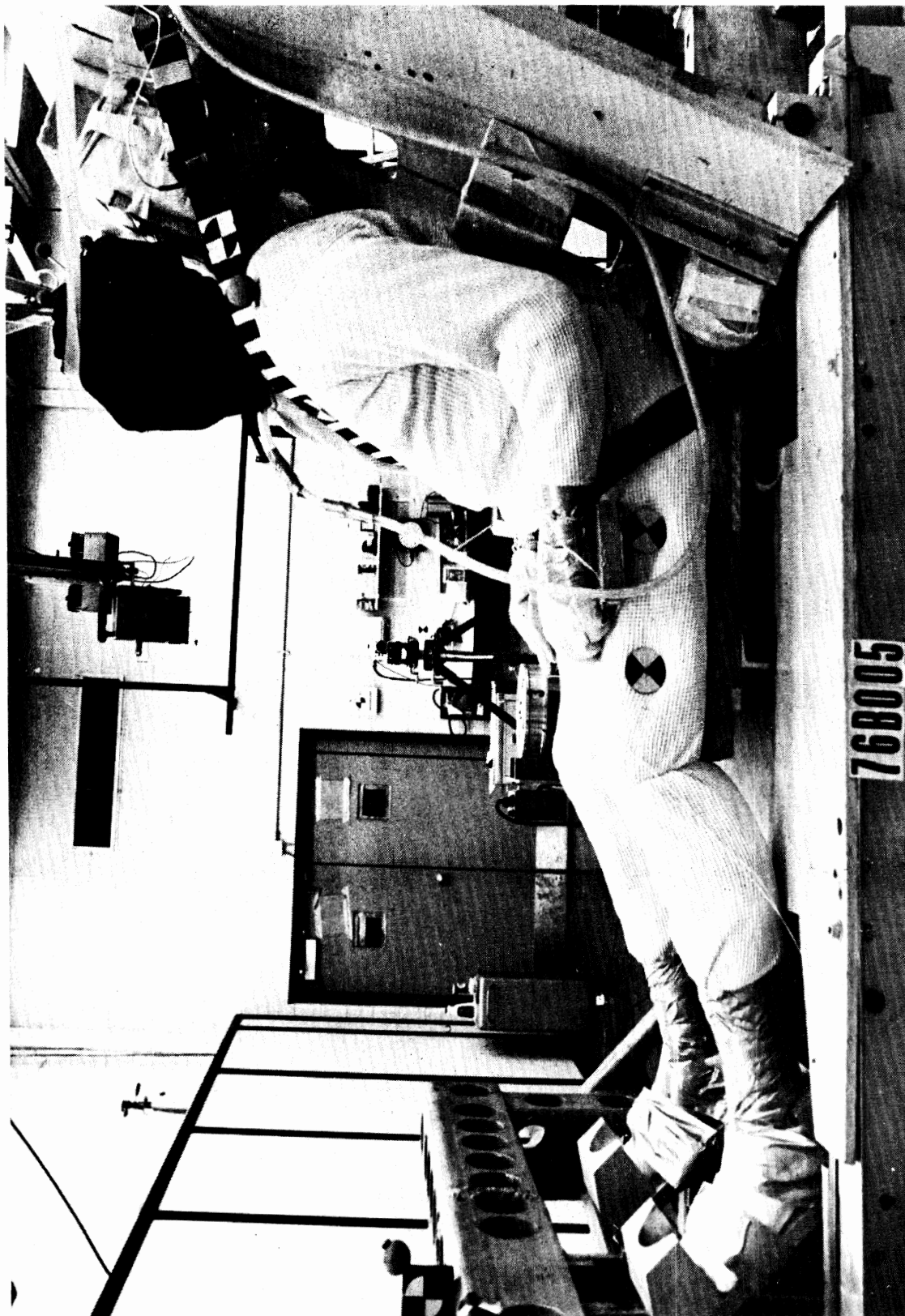
BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	$12$	$12 \frac{5}{16}$	$\frac{5}{16}$	$11 \frac{1}{2}$
Lt. Lap	$32 \frac{1}{2}$	$32 \frac{3}{4}$	$\frac{1}{4}$	$32$
Shoulder	$42$	$42 \frac{3}{16}$	$\frac{3}{16}$	$40 \frac{5}{8}$



76B005: RIGHT SIDE VIEW



76B005: FRONT VIEW



76B005: LEFT SIDE VIEW

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 760005-1: GHR-14

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GHR-01A DATE: 25-AUG-76

TEST SIGNALS: 1676 PTS/CH AT 6398.32 HZ. CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
363	1	SLED DECELERATION	20.00	G'S	4+1+1	80.0	416	1599.58
364	2	AX1 HEAD A0Q1 ACC	-38.70	G'S	4+1+18	570.0	416	1599.58
365	3	AY1 HEAD B0Q1 ACC	-37.10	G'S	4+1+18	570.0	416	1599.58
366	4	AZ1 HEAD C0Q1 ACC	-40.00	G'S	4+1+18	570.0	416	1599.58
367	5	AX2 HEAD C0Q2 ACC	-42.50	G'S	4+1+18	570.0	416	1599.58
368	6	AY2 HEAD A0Q2 ACC	-36.70	G'S	4+1+18	570.0	416	1599.58
369	7	AZ2 HEAD B0Q2 ACC	-38.30	G'S	4+1+18	570.0	416	1599.58
370	8	AX3 HEAD B0Q3 ACC	-40.90	G'S	4+1+18	570.0	416	1599.58
371	9	AY3 HEAD C0Q3 ACC	-33.40	G'S	4+1+18	570.0	416	1599.58
372	10	AZ3 HEAD A0Q3 ACC	-42.50	G'S	4+1+18	570.0	416	1599.58

11:

12:

13:

14:

FILTERED FILES: 363 - 372 DIGITAL TAPE: GHR-CAD DATE: 07-SEP-76 RUN ID: 760005-1: GHR-14



SEP 13, 1976 / 11:49:45

RUN ID: 76B005-1: WBR-14

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 4.E+00

< 3 > 5.E+00

< 4 > 2.E+00

< 5 > 3.E+00

< 6 > 2.E+00

< 7 > 2.E+00

< 8 > 6.E+00

< 9 > 3.E+00

< 10 > 2.E+00

10 MS  
20 PTS

FILES: 363-872, TAPE: GMR-CAD

416 PTS • 1500 HZ = 259.4 MS

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76B005-2; BRK-14

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 138(HSRI) EXPANDED 16:11, HAS A/D CONVERTED TO DIGITAL TAPE: GMR-U1A DATE: 25-AUG-76

TEST SIGNALS: 1677 PTS/CH AT 6401.99 HZ, CAL SIGNALS: NOT DIGITIZED.

FILE	CH	CONTENT OF CHANNEL	UNITS/VOLT	UNITS	FILTER STAGES	FILTER CUTOFF	NO. PTS	SAMPLING HERTZ
373	1	SLED DECELERATION	20.00	G'S	4+1+1	80.0	416	1600.50
374	2	PELVIS BIAX P-A ACC	-50.70	G'S	4+1+12	285.2	416	1600.50
375	3	PELVIS BIAX I-S ACC	44.10	G'S	4+1+12	285.2	416	1600.50
376	4	THORAX TRIAX P-A ACC	32.50	G'S	4+1+12	285.2	416	1600.50
377	5	THORAX TRIAX I-S ACC	-34.10	G'S	4+1+12	285.2	416	1600.50
378	6	THORAX TRIAX R-L ACC	36.70	G'S	4+1+12	285.2	416	1600.50
379	7	LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.2	416	1600.50
380	8	LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.2	416	1600.50
381	9	SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.2	416	1600.50
382	10	SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.2	416	1600.50
		11						
		12						
		13						
		14						

FILTERED FILES: 373 - 382

DIGITAL TAPE: GMR-CAD

DATE: 07-SEP-76

RUN ID: 76B005-2; BRK-14

SEP 13, 1976 / 12:17:51

RUN ID: 76B005-2: WBR-14

10 MS  
20 PTS

< 1 > 2.E+00

< 2 > 2.E+00

< 3 > 2.E+00

< 4 > 2.E+00

< 5 > 2.E+00

< 6 > 2.E+00

< 7 > 2.E+02

< 8 > 8.E+01

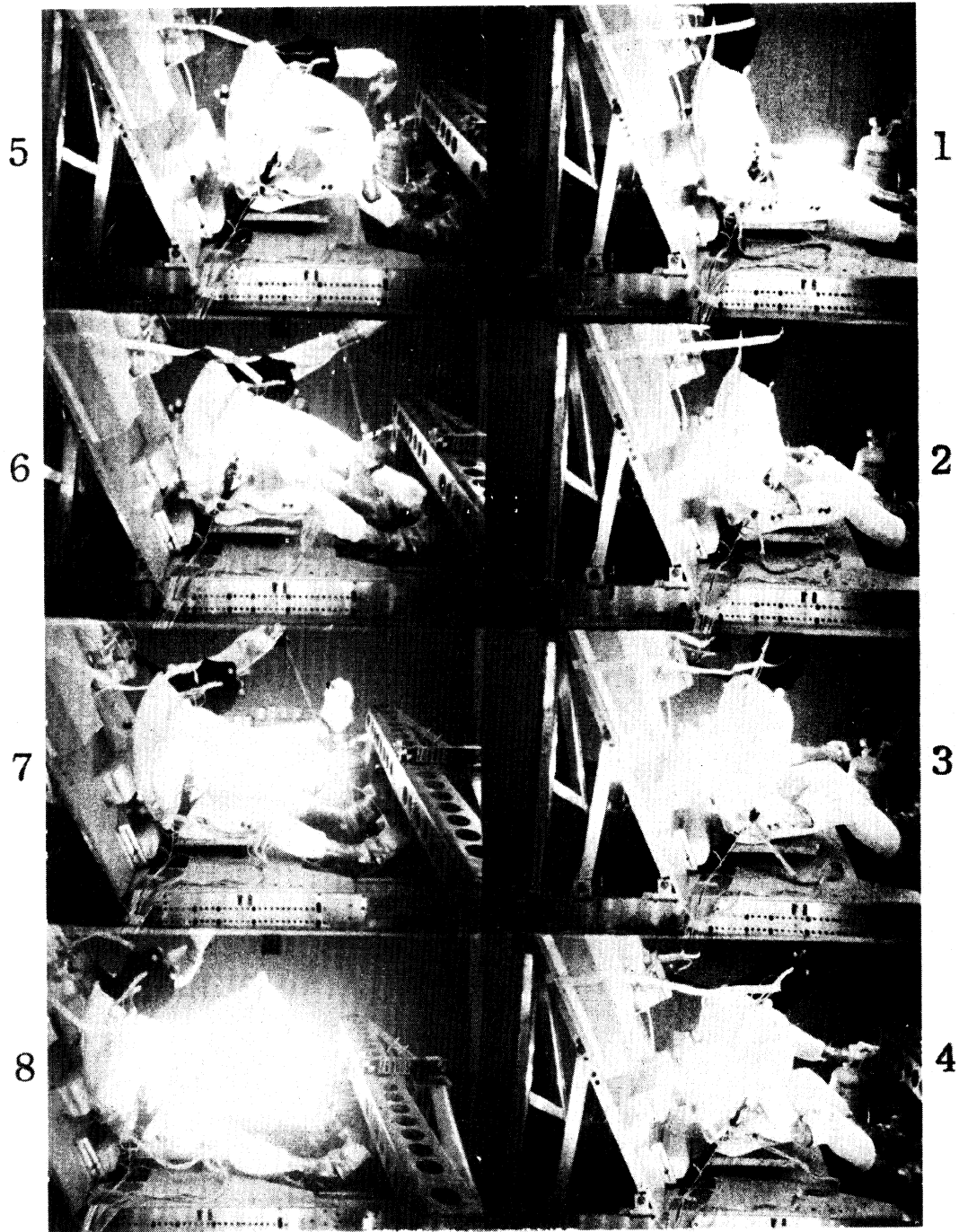
< 9 > 5.E+01

< 10 > 6.E+01

10 MS  
20 PTS

FILES: 373-882, TAPE: GNR-CRD

416 PTS • 1600 HZ = 259.3 MS



76B005

GRAPHCHECK SEQUENCE

WHOLE BODY RESPONSE <u>RAW DATA PACKAGE</u>
--

SUBJECT: WBR-15

TEST: 76B006

\_\_\_\_\_  
 \_\_\_\_\_

CONTENTS:

PAGE

Anthropometry	<u>303</u>
Frontal X-rays	<u>307</u>
Lateral X-rays	<u>313</u>
Head x-rays & Analysis	<u>319</u>
Instrumentation	<u>322</u>
Thorax Autopsy	<u>324</u>

For Each Test: 76B006

Setup Diagram	<u>325</u>	_____	_____
Belts/anchors	<u>326</u>	_____	_____
Setup photographs	<u>327</u>	_____	_____
Digitized Signals (7600)	<u>330</u>	_____	_____
Digitized Signals (CEC)	<u>332</u>	_____	_____
Graphcheck	<u>334</u>	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



ANTHROPOMETRIC MEASUREMENTS

Cadaver No. 20508                      WBR 15

List of Measurements (All measurements except weight listed in cm)

1. Weight		84.1 kg
2. Stature		175.3
3. Trochanterion Hgt.		Lt. 82.3      Rt. 82.3
4. Symphysis Hgt.		85.2
5. Anterior Superior Iliac Spine Hgt.	Rt.	77.0
	Lt.	77.0
6. Iliocristale Hgt.	Rt.	71.4
	Lt.	71.1
7. Substernale Hgt.		52.3
8. Mid-Chest Hgt.		40.6
9. Suprasternale Hgt.		29.7
10. Acromion Hgt.	Rt.	24.2
	Lt.	23.3
11. Menton Hgt.		20.9
12. Mastoid Hgt.	Rt.	14.4
	Lt.	14.3
13. Tragion Hgt.	Rt.	12.5
	Lt.	12.5
14. Tragion Depth	Rt.	9.2
	Lt.	8.7
15. Suprasternale Depth		18.9
16. Mid-Chest Depth		24.0
17. Substernale Depth		25.4
18. Anterior Superior Iliac Spine Depth	Rt.	17.8
	Lt.	17.7

19. Symphision Depth		20.4
20. Trochanterion Depth	Rt.	8.2
	Lt.	7.8
21. Suprasternale-Acromion Distance	Rt.	20.2
	Lt.	19.9
22. Biacromial Breadth		36.7
23. Bideltoid Breadth		46.8
24. Mid-Chest Breadth		30.7
25. Chest Breadth at Substernale		32.8
26. Hip Breadth at Iliocristale		30.8
27. Bispinous Diameter		23.5
28. ASIS to Symphision Distance	Rt.	14.4
	Lt.	14.2
29. Bitrochanteric Breadth		35.4
30. Acromion-Radiale Length		34.2
31. Ball of Humerus-Radiale Length		29.5
32. Radiale-Stylion Length		27.8
33. Hand Length		18.4
34. Hand Breadth		8.5
35. Hand Depth		2.7
36. Wrist Breadth		5.8
37. Forearm Depth		10.8
38. Upper Arm Depth		11.2
39. Trochanterion-Fibulare Length	Rt.	46.2
40. Fibulare-Lateral Malleolus Length		39.0
41. Tibiale-Sphyrion Length		37.7
42. Tibiale-Heel of Foot Length		6.9



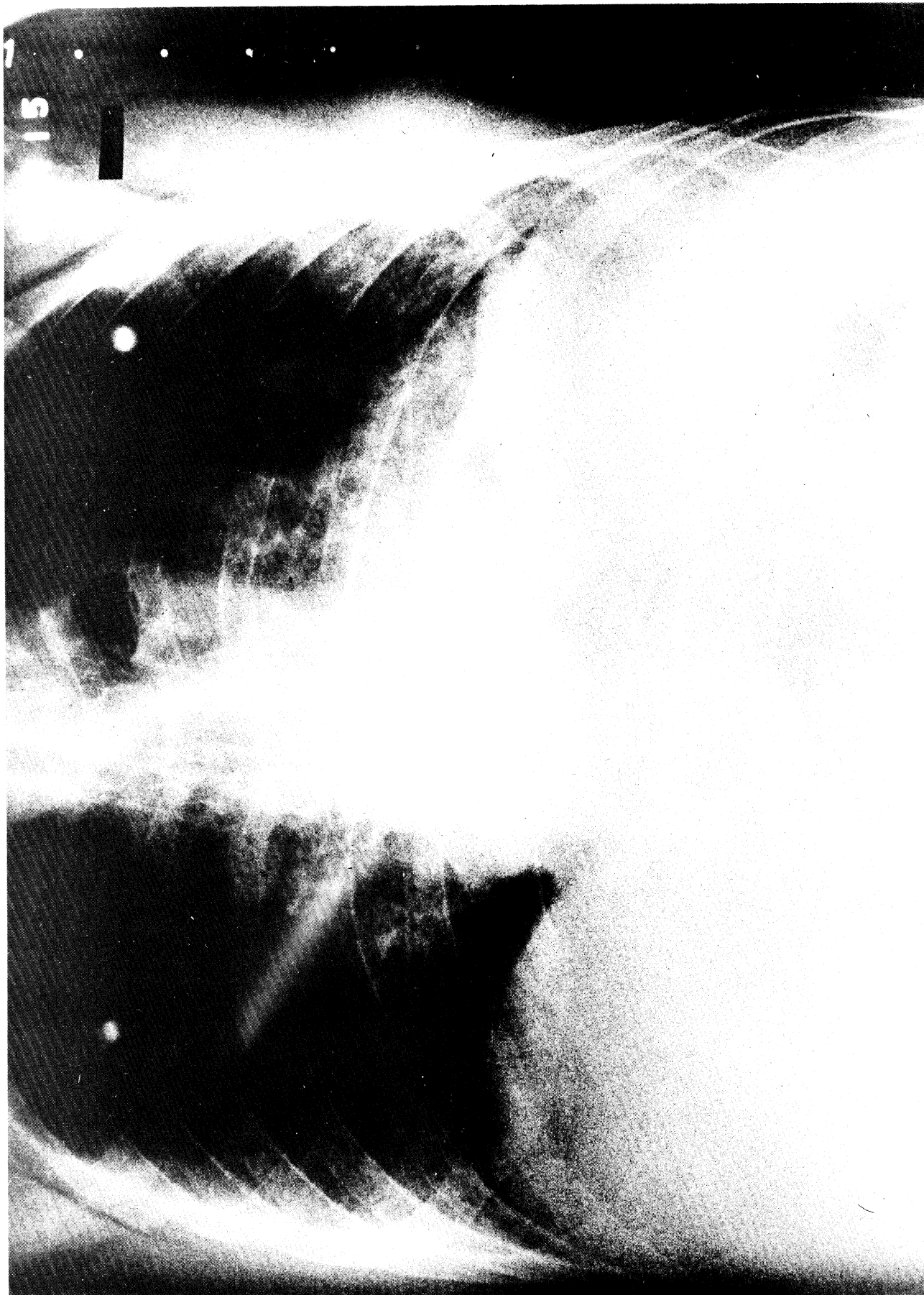
43. Foot Length	23.4
44. Foot Breadth	3.7
45. Minimum Ankle Breadth	5.0
46. Calf Depth	11.3
47. Upper Thigh Breadth	21.1
48. Head Breadth	15.5
49. Head Length	19.5
50. Bitragion Breadth	15.2
51. Bigonial Breadth	10.0
52. Menton Diagonal Length	24.7
53. Mastoid-Crinion Length	17.7
54. Head Circumference	57.6
55. Mid-Sagittal Arc Length	30.5
56. Bitragion-Coronal Arc Length	34.6
57. Mid-Neck Circumference	40.2
58. Chest Circumference at Mid-Chest	101.2
59. Chest Circumference at Substernale	102.6
60. Hip Circumference at Iliocristale	96.2
61. Buttocks Circumference at Trochanterion	104.9
62. Upper Arm Circumference (Mid-Biceps)	31.8
63. Maximum Forearm Circumference	29.1
64. Minimum Wrist Circumference	18.2
65. Upper Thigh Circumference	57.5
66. Maximum Calf Circumference	32.7
67. Minimum Ankle Circumference	20.5





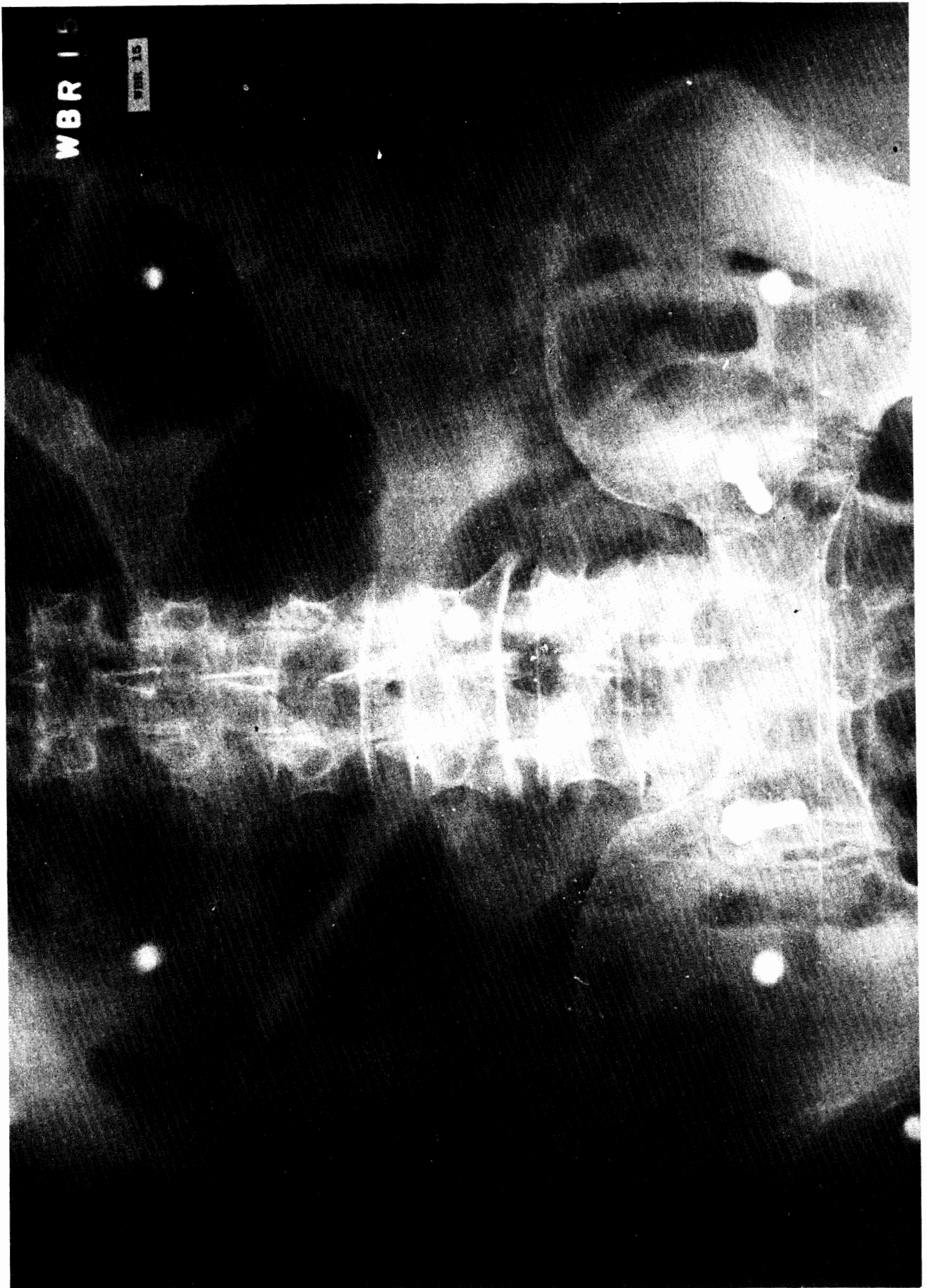
WBR-15: FRONTAL X-RAY

B-307



WBR-15: FRONTAL X-RAY

B-308

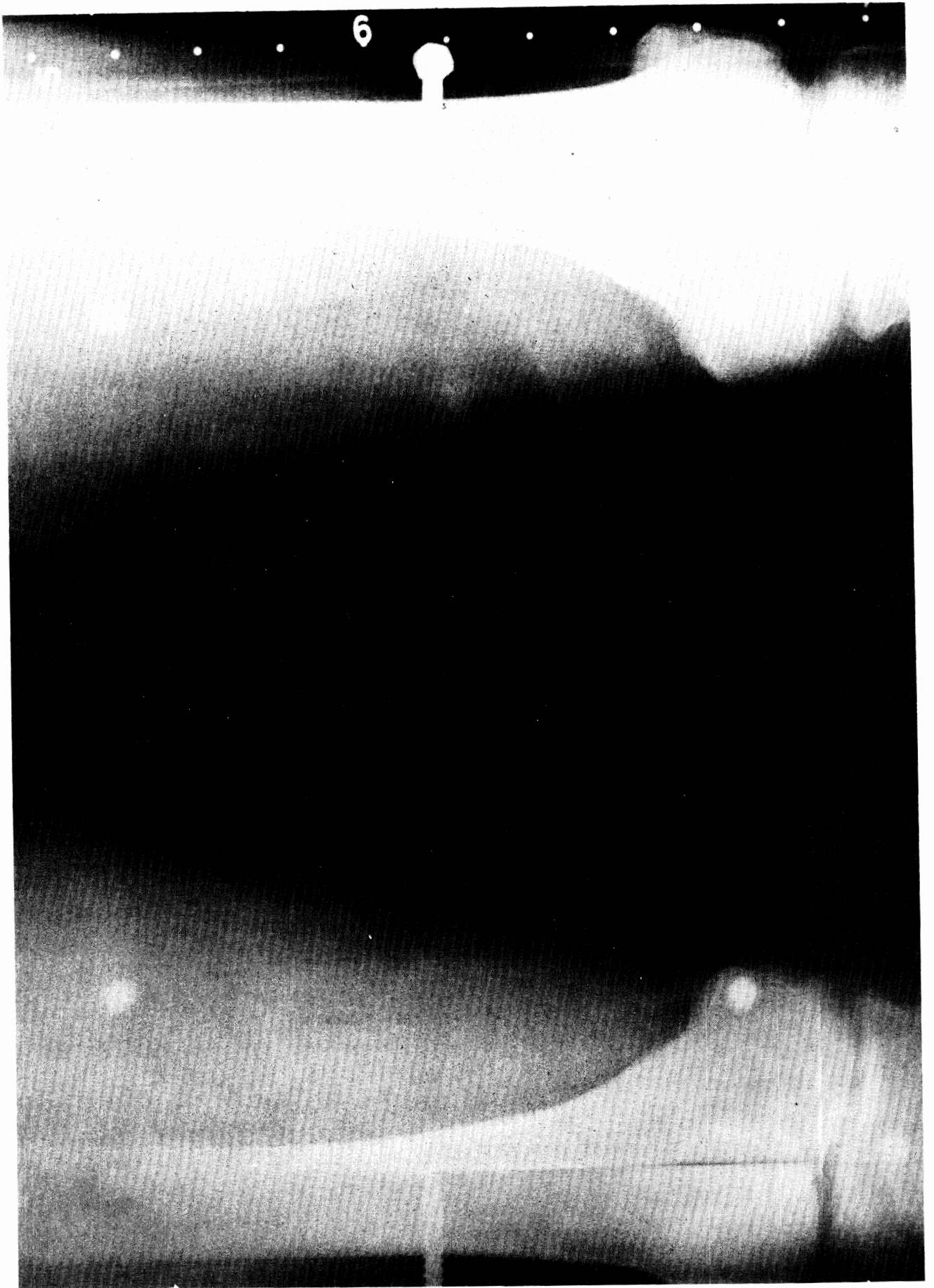


WBR-15: FRONTAL X-RAY



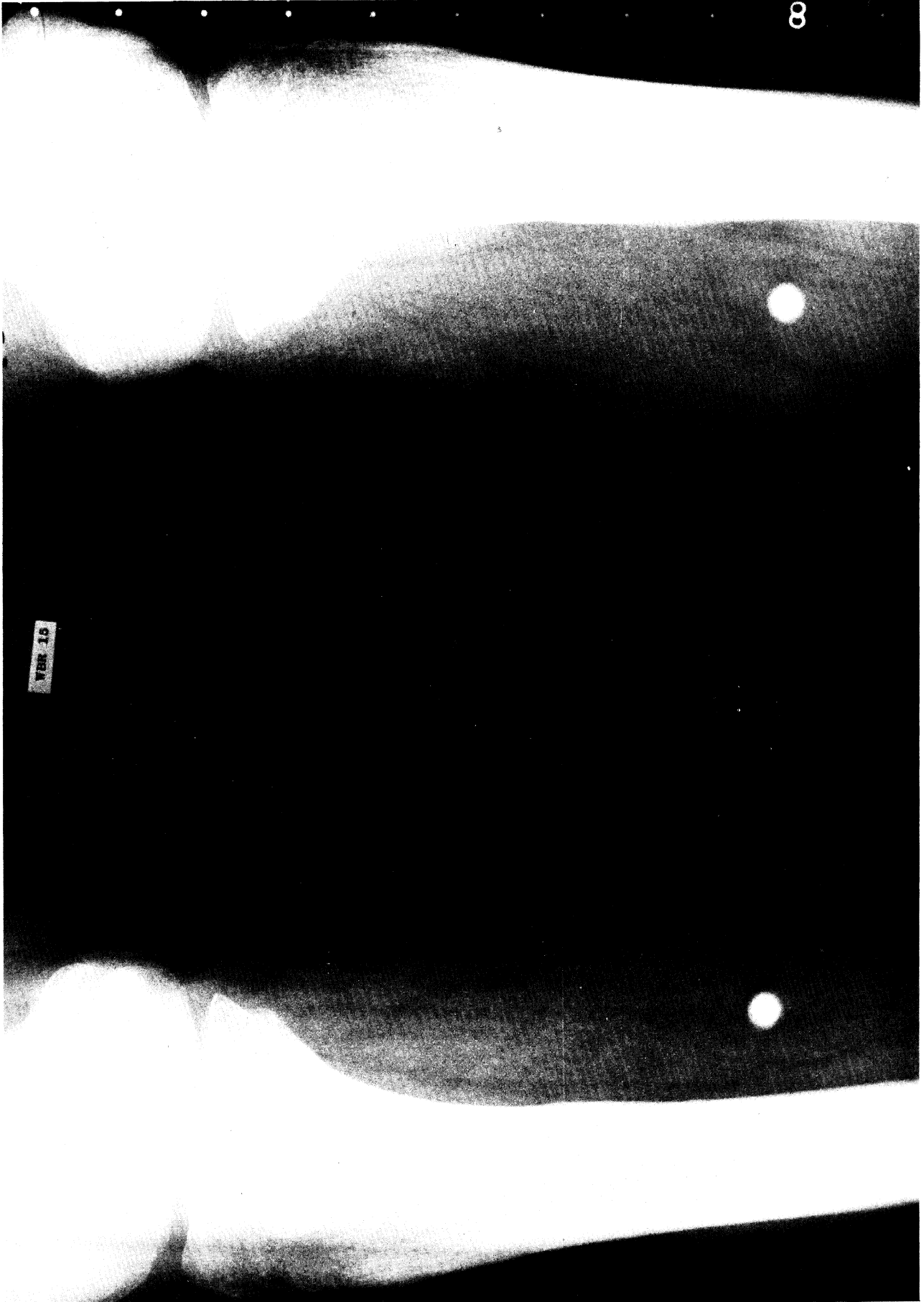
WBR-15: FRONTAL X-RAY





WBR-15: FRONTAL X-RAY

8



WBR-15: FRONTAL X-RAY



WBR 15



WBR-15: LATERAL X-RAY

WBR-15



WBR-15: LATERAL X-RAY

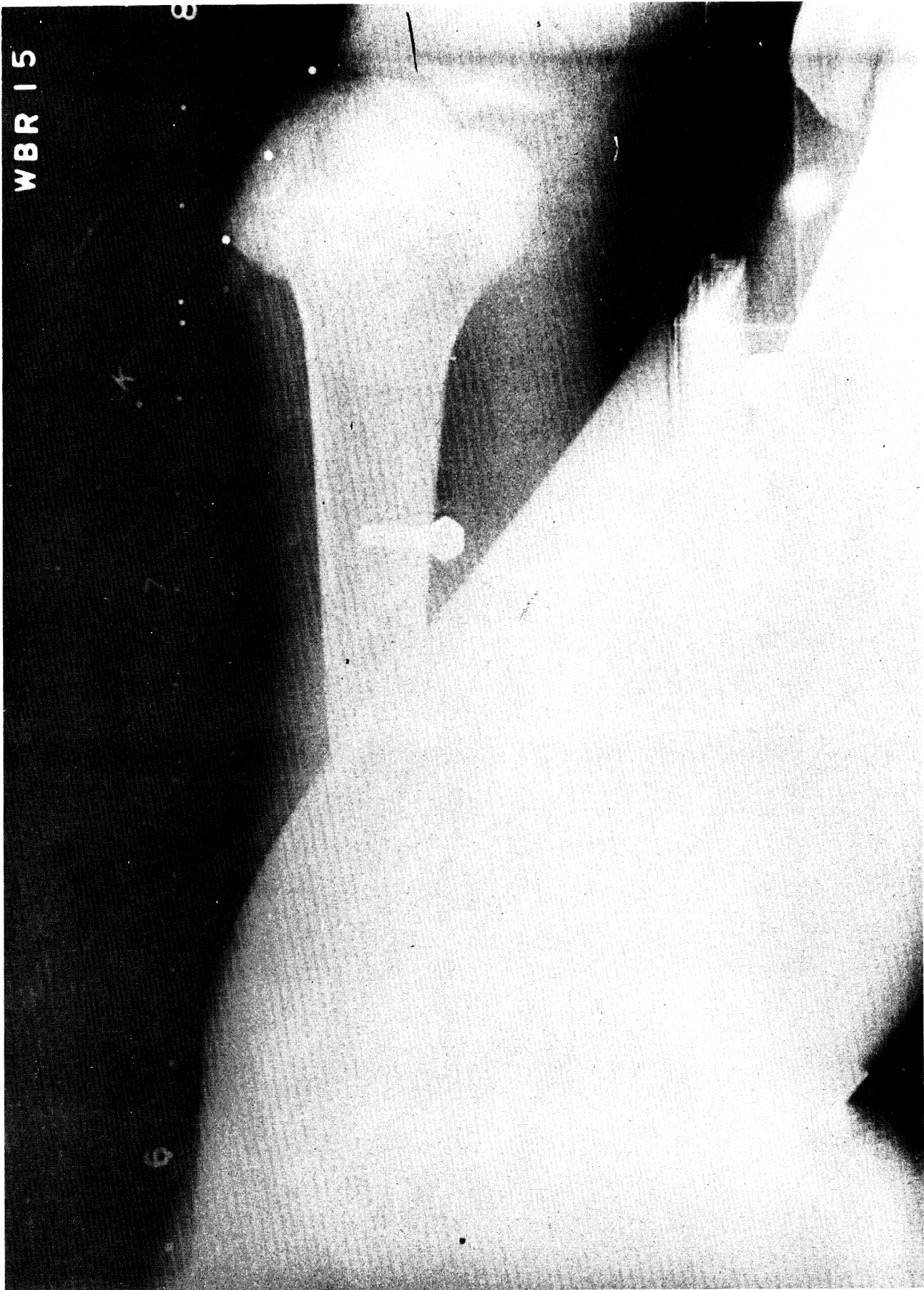


WBR-15: LATERAL X-RAY

B-315

WBR 15

8



WBR-15: LATERAL X-RAY



WBR-15: LATERAL X-RAY



X-RAY FILM ANALYSIS

AUG 23, 1976

RUN ID: WBR-15

A=0.9550, B=0.0155

	READINGS OF X-Z PLANE			READINGS OF Y-Z PLANE		
	X	Z	D	Y	Z	D
P1- R.EYE:	4.250	-1.060	11.00	-2.620	-1.460	21.50
P2- L.EYE:	4.040	-1.160	7.50	1.820	-1.560	22.00
P3- R.EAR:	0.220	-2.790	12.50	-4.000	-3.360	18.25
P4- L.EAR:	0.110	-2.970	5.25	2.950	-3.720	18.00
Q1- ACC. :	-5.380	-3.070	9.50	-0.230	-3.420	12.50
Q2- ACC. :	-1.690	1.880	6.25	3.520	2.500	16.50
Q3- ACC. :	-1.090	2.370	12.50	-4.260	2.550	17.00
R1,R2,R3 :	4.750	3.603	4.190			

	COORDINATES W.R.T. CAMERA				COORDINATES W.R.T. CAMERA		
	X	Y	Z		X	Y	Z
P1 :	3.334	-1.629	-0.870	Q1:	-4.346	-0.175	-2.542
P2 :	3.389	1.117	-0.965	Q2:	-1.450	2.461	1.681
P3 :	0.167	-2.688	-2.191	Q3:	-0.830	-2.946	1.784
P4 :	0.096	1.994	-2.555	P:	-3.965	-0.042	2.121
C :	0.132	-0.347	-2.373	CP:	-4.096	0.305	4.493

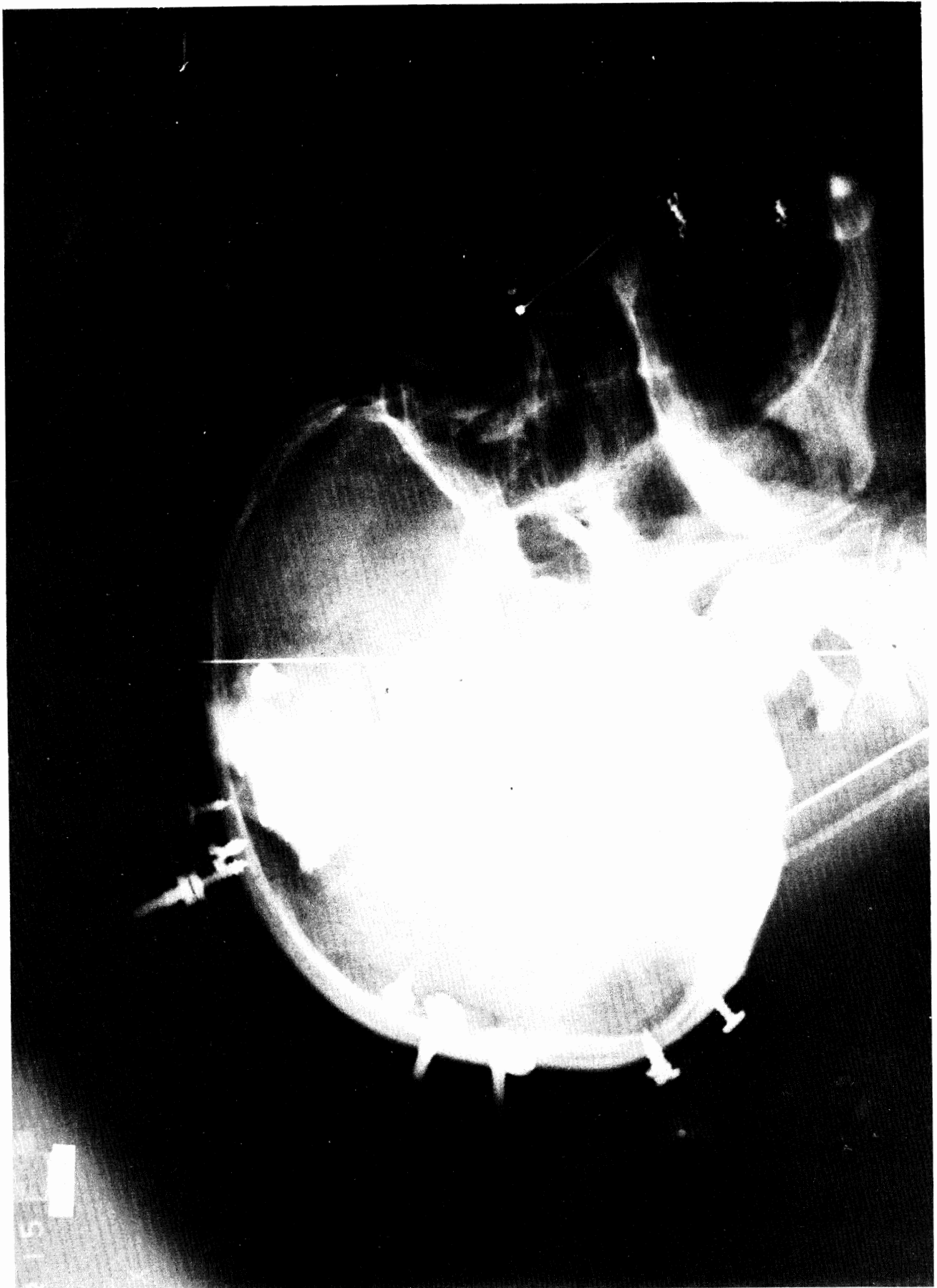
ANATOMICAL FRAME (WRT CAMERA)				ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>				
<I> :	0.91147	0.02100	0.41083	1.0000	0.0	0.0	
<J> :	0.00230	0.99804	-0.05611	0.0	0.9992	-0.0000	
<K> :	-0.41134	0.05211	0.90994	0.0	-0.0000	0.9999	

INSTRUMENT FRAME (WRT CAMERA)				ORTHOGONALITY CHECK			
	<X>	<Y>	<Z>				
<E1>:	-0.08146	-0.02833	-0.99627	1.0000	0.0454	0.0379	
<E2>:	0.70319	0.70028	-0.12302	0.0454	1.0000	0.0496	
<E3>:	0.73140	-0.67740	-0.07859	0.0379	0.0496	1.0000	

```

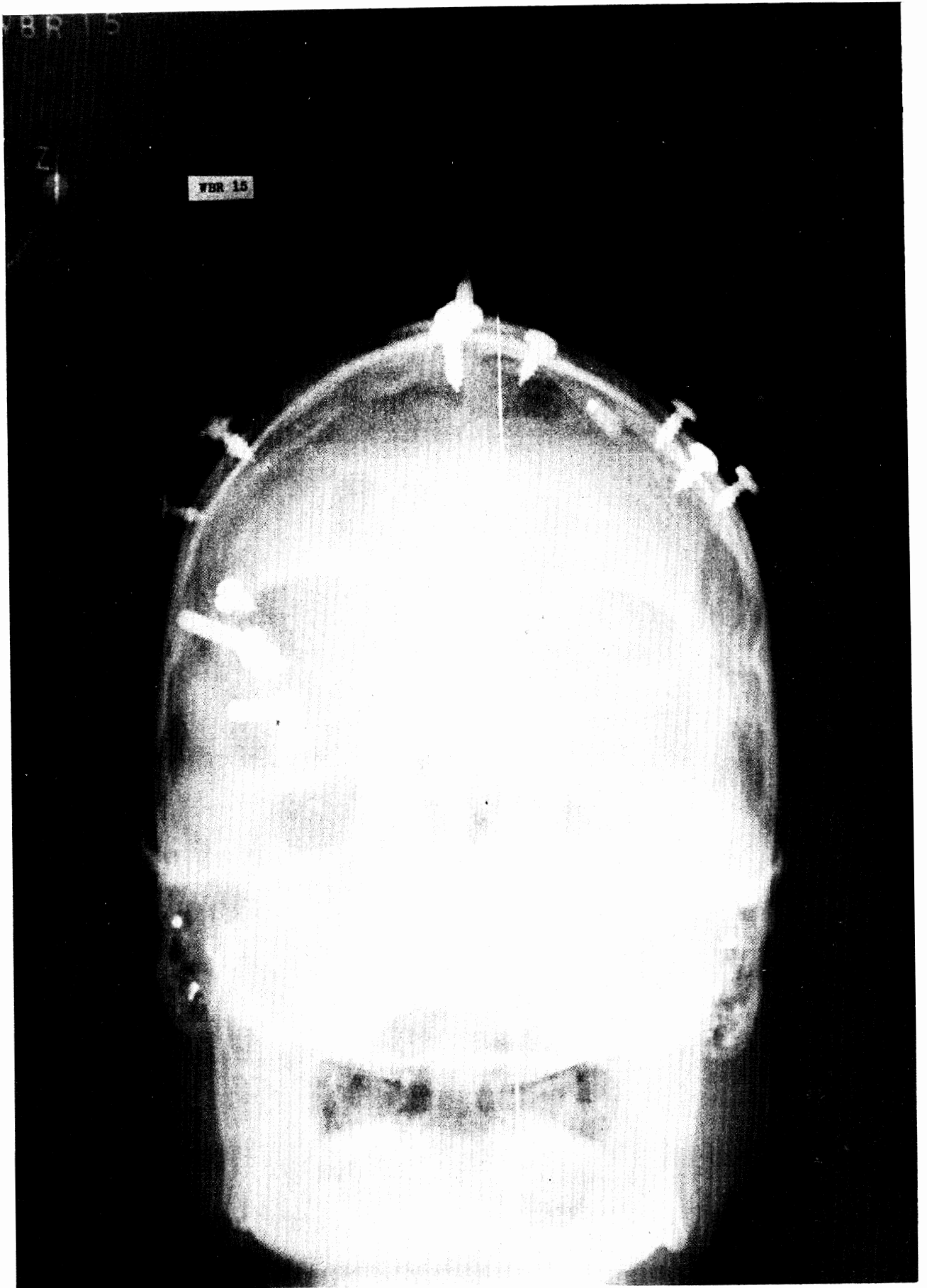
*****
*
* RUN ID:WBR-15          AUG 23, 1976  *
*
* PQ1=  4.750, PQ2=  3.603, PQ3=  4.190 *
* CPI= -1.881, CPJ=  0.042, CPK=  5.790 *
*
* INSTRUMENTATION MATRIX WRT ANATOMICAL *
*           <I>           <J>           <K>           *
*
* <E1>:   -0.50939   0.02402  -0.86020 *
*
* <E2>:    0.60176   0.72451  -0.33611 *
*
* <E3>:    0.61515  -0.68884  -0.38352 *
*
*****
* PERTURBATIONS: E1,E2,E3
* 0.0293  0.0337  0.0312
* ORTHOGONALITY CHECK
* 1.0000  0.0      0.0000
* 0.0      1.0000  0.0
* 0.0000  0.0      1.0000
*
*****

```



WBR-15: HEAD X-RAY (X-Z)





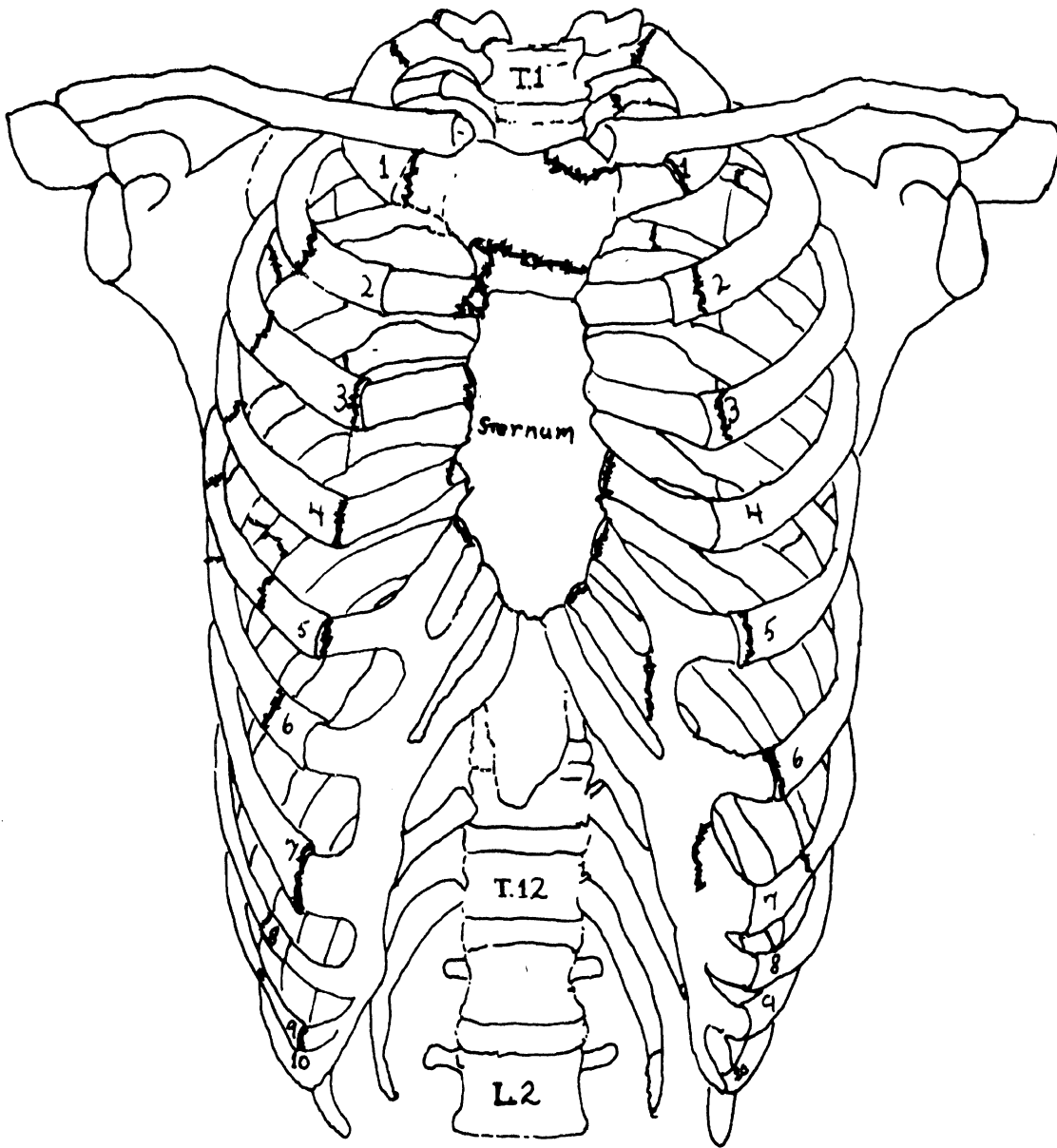
WBR-15: HEAD X-RAY (Y-Z)

# INSTRUMENTATION DATA SHEET

TEST NO: 76B006		DESCRIPTION WBR-15		Account No: 320316										
through:		Whole Body Response Cadaver Test		DATE: 7-13-76	BY: F.C.									
SUBJECT: Cadaver		76B006: High Severity Test		TAPE REEL# 138										
number: 20508				RECORDER: 7600										
FACILITY: Impact Sled				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT				
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	CH #
1	Sled Decel.	H-1	200	1	/	Statham	13587	1.1 2.2	1000	/	+	20.	G	1
2	Head Q <sub>1</sub> - A	H-4	100	4	10	Endevco	AD 27	1.15	100	/	-	38.7	G	2
3	Head Q <sub>1</sub> - B	H-5	100	5	10	"	AD 07	1.17	100	/	-	37.1	G	3
4	Head Q <sub>1</sub> - C	H-6	100	6	10	"	AB 87	1.15	100	46.0 G	-	40.0	G	4
5	Head Q <sub>2</sub> - C	H-7	100	7	10	"	AD 46	1.15	100	/	-	42.5	G	5
6	Head Q <sub>2</sub> - A	H-8	100	8	10	"	AD 44	1.16	100	/	-	36.7	G	6
7	Head Q <sub>2</sub> - B	H-9	100	9	10	"	AC 41	1.16	100	/	-	38.3	G	7
8	Head Q <sub>3</sub> - B	H-10	100	10	10	"	AD 47	1.16	100	/	-	40.9	G	8
9	Head Q <sub>3</sub> - C	H-11	100	11	10	"	AC 22	1.25	100	/	-	33.4	G	9
10	Head Q <sub>3</sub> - A	H-12	100	12	10	"	AC 38	1.14	100	/	-	42.5	G	10
11	Strobe									To		1.	V	11
12	Velocity	H-3								12"/pulse		1.	V	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

# INSTRUMENTATION DATA SHEET

TEST NO: 76B006		DESCRIPTION		Account No: 320316										
through:		WBR-15		DATE: 7-13-76										
SUBJECT: Cadaver		Whole Body Response Cadaver Test		BY: F.C.										
number: 20508		76B006: High Severity Test		TAPE REEL # 139										
FACILITY: Impact Sled				RECORDER: CEC										
				REC. SPEED: 30 I.P.S.										
CH #	SET UP DATA			TRANSDUCER			CALIBRATION			OUTPUT				
	input	ampl. #	gain	umbil. #	excit. volts	MFR.	S/N	voltage	gain	value	±	units/volt	units	CH #
1	Airway Pressure	H-19	100	23	7	KuLite	11001	/	/	/	+	/	/	1
2	Pelvis P-A	H-13	100	13	10	Endevco	AC 04	1.15	100	58.3 G	-	50.7	G	2
3	Pelvis I-S	H-14	100	14	10	"	AC 14	1.16	100	51.6 G	+	44.5	G	3
4	Thorax P-A	H-15	100	15	10	"	AA 41	1.26	100	/	+	42.2	G	4
5	Thorax I-S	H-16	100	16	10	"	AC 16	1.15	100	42.8 G	-	37.2	G	5
6	Thorax R-L	H-17	100	17	10	"	AC 02	1.15	100	42.6 G	+	37.0	G	6
7	Rt. Lap	H-22	/	18	5	GSE	082	2.21	/	2209 #	+	1000	#	7
8	Lt. Lap	H-23	/	19	5	"	083	2.24	/	2242 #	+	1000	#	8
9	Up. Shldr.	H-20	200	20	-	"	084	2.28	200	2277 #	+	1000	#	9
10	Lo. Shldr.	H-21	200	21	-	"	085	2.25	200	2245 #	+	1000	#	10
11	Strobe									T <sub>0</sub>		1.	V	11
12	Vasc. Pressure	H-18	20	22	7	KuLite	100	/	/	/		/	/	12
13	Dig. Gate									280 ms.		1.	V	13
14	Time Base									100 Hz.		1.	V	14

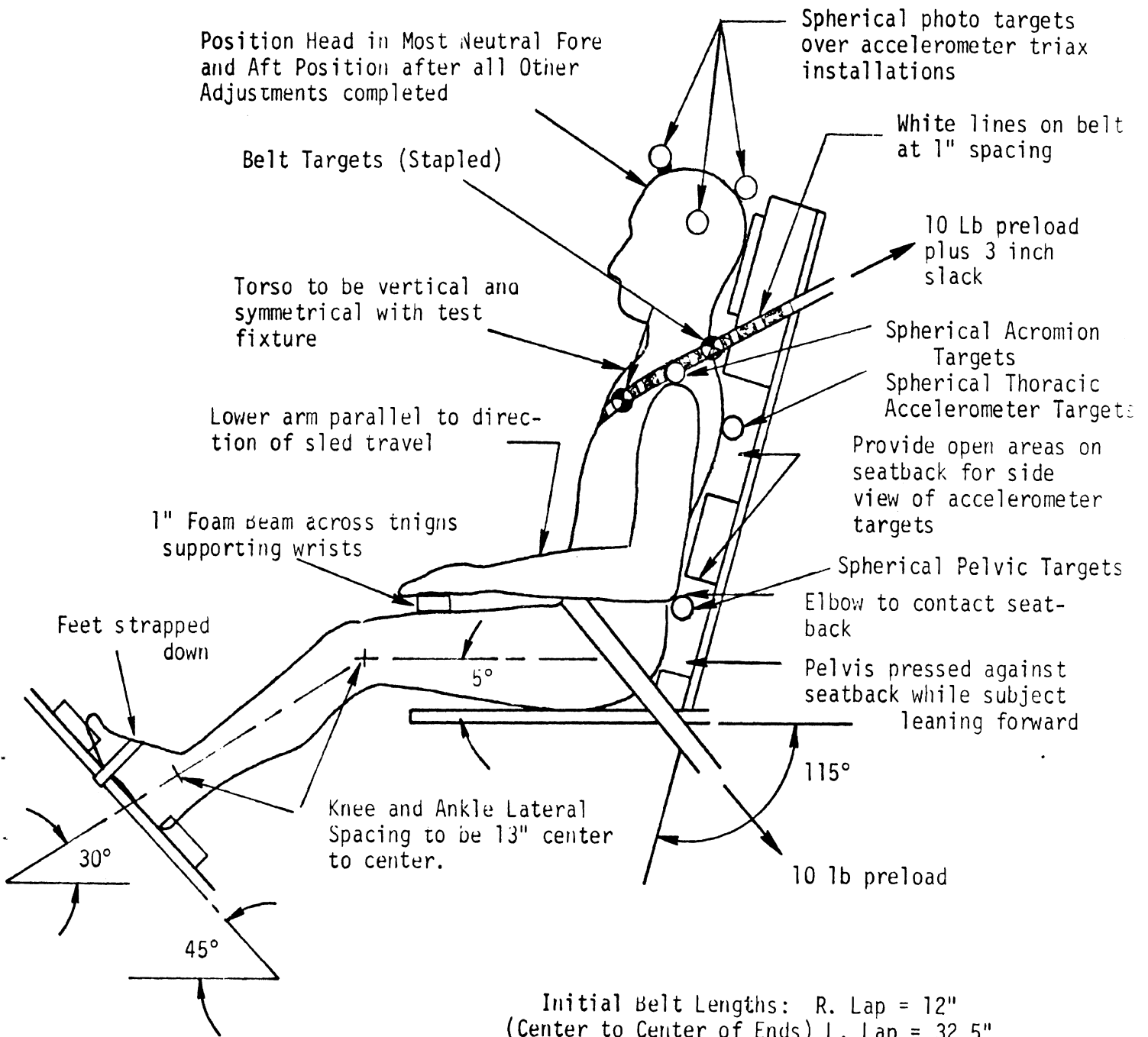


**Bony Thoracic Cage,  
anterior aspect**

WBR-15    CADAVER 20508

NOTE: Massive breaks, complete separation of ribs at fractures, extensive pericardium hemorrhage.

# 76B006



Initial Belt Lengths: R. Lap = 12"  
 (Center to Center of Ends) L. Lap = 32.5"  
 Shoulder = 42"

**Femur Target Spacing:**

Right Side = 6 3/8 in.  
 Left Side = 5 7/8 in.

Belt Sequence:  
 (Out from Subject)

L. Lap, R. Lap, Shoulder

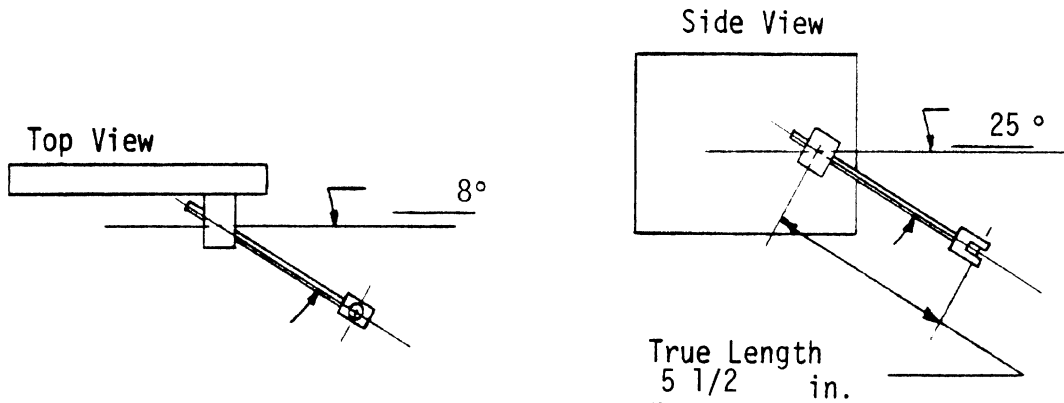
Belt End Orientation:  
 (Ref. To Subject)

Away, Away, Toward

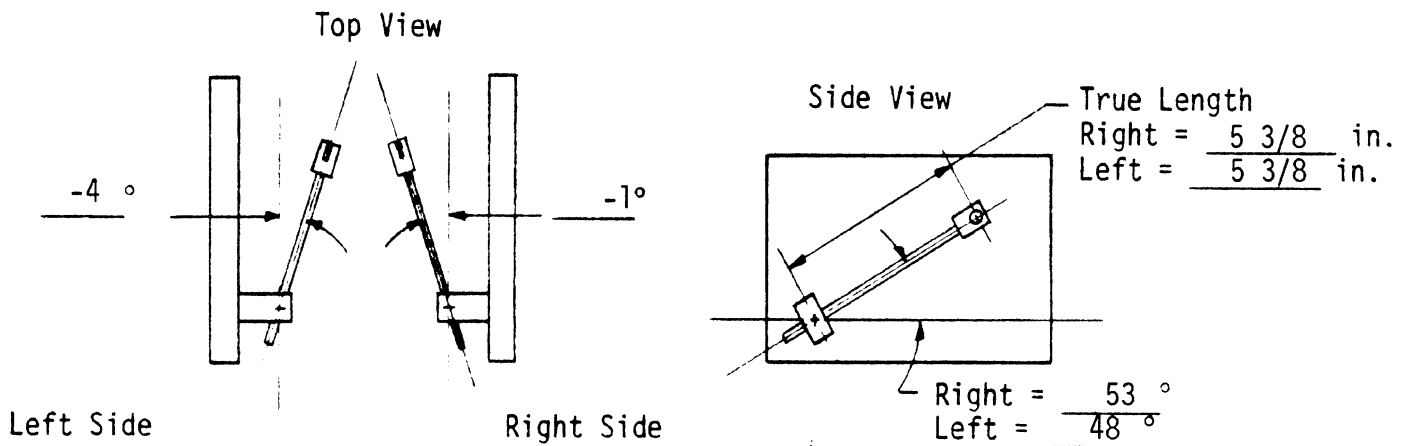
POSITIONING AND TARGETING DIAGRAM

BELT ANCHOR ORIENTATIONS

A. SHOULDER BELT



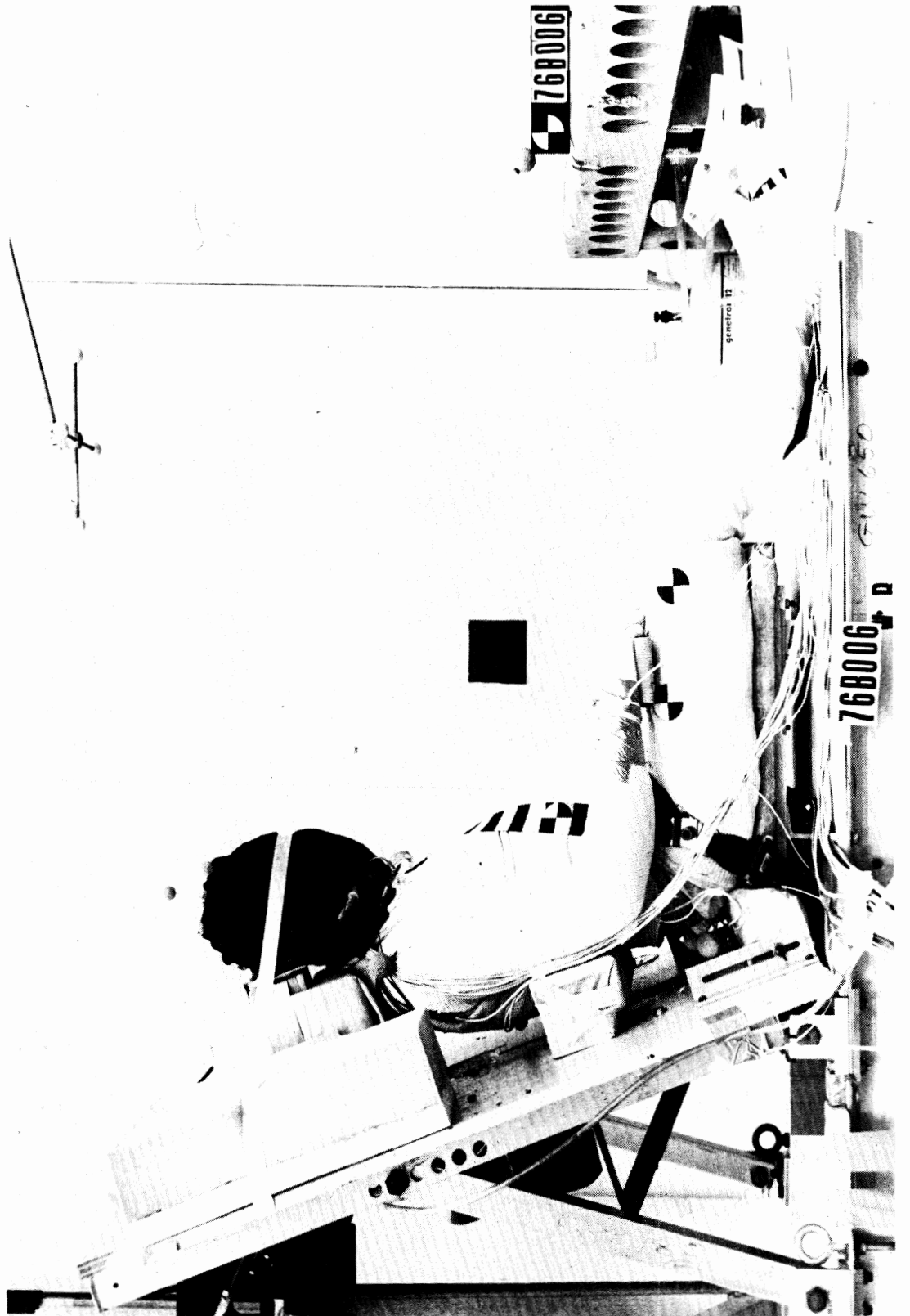
B. LAP BELT



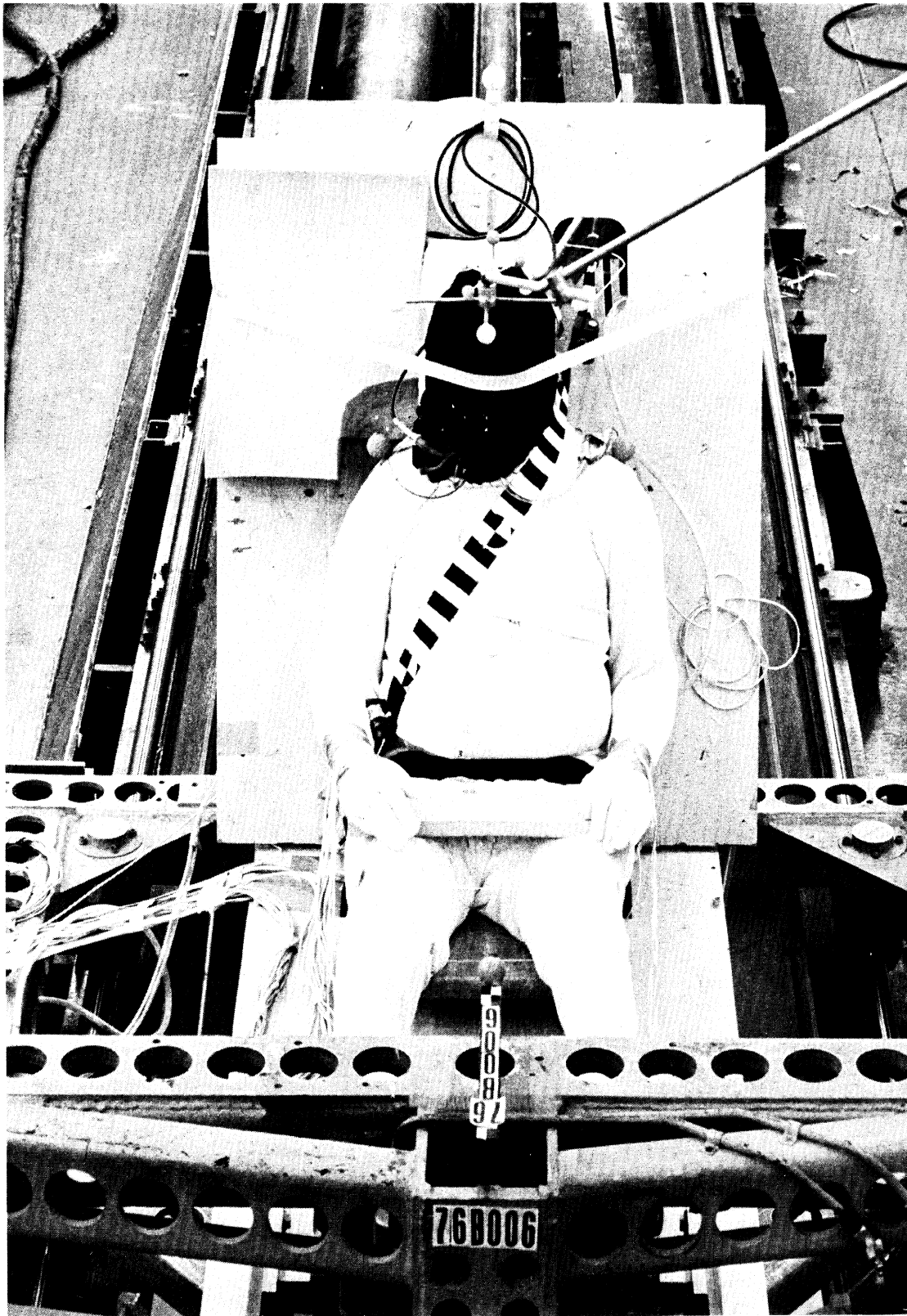
Sketch indicates positive angle directions

BELT LENGTH DATA

BELT POSITION	PRE-IMPACT LENGTH (in.)	POST-IMPACT LENGTH (in)	BELT STRETCH (in)	POST IMPACT LENGTH w/ LOAD CELLS (in.)
Rt. Lap	$12 \frac{1}{4}$	$12 \frac{1}{2}$	$\frac{1}{4}$	$11 \frac{3}{4}$
Lt. Lap	$32 \frac{1}{2}$	$32 \frac{7}{8}$	$\frac{3}{8}$	$32 \frac{1}{16}$
Shoulder	42	$42 \frac{1}{2}$	$\frac{1}{2}$	41

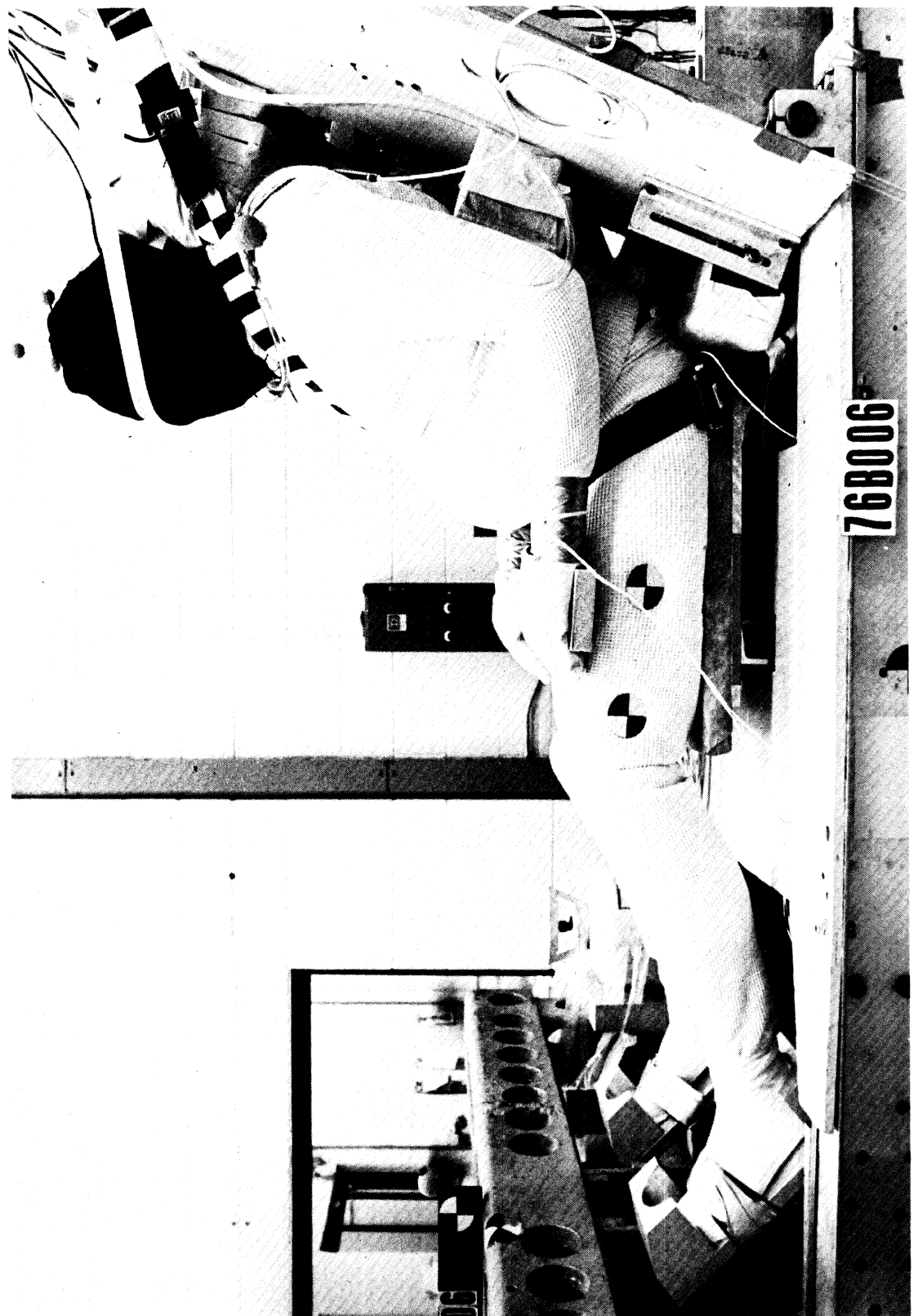


76B006: RIGHT SIDE VIEW



76B006: FRONT VIEW





76B006: LEFT SIDE VIEW

=====

ANALOG-TO-DIGITAL CONVERSION & DIGITAL FILTERING

RUN ID: 76HR06-1: MRR-15

=====

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 13(CHSRI) EXPANDED 16:1, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-UIA DATE: 25-AUG-76  
TEST SIGNALS: 1668 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
383	- 1:	SLED DECELERATION	20.00	G'S	4+1+1	80.0	416	1599.01
384	- 2:	AX1 HEAD A001 ACC	-36.70	G'S	4+1+10	570.1	416	1599.01
385	- 3:	AY1 HEAD R001 ACC	-37.10	G'S	4+1+10	570.1	416	1599.01
386	- 4:	AZ1 HEAD C001 ACC	-40.00	G'S	4+1+10	570.1	416	1599.01
387	- 5:	AX2 HEAD C002 ACC	-42.50	G'S	4+1+10	570.1	416	1599.01
388	- 6:	AY2 HEAD A002 ACC	-36.70	G'S	4+1+10	570.1	416	1599.01
389	- 7:	AZ2 HEAD R002 ACC	-38.30	G'S	4+1+10	570.1	416	1599.01
390	- 8:	AX3 HEAD R003 ACC	-40.90	G'S	4+1+10	570.1	416	1599.01
391	- 9:	AY3 HEAD C003 ACC	-33.40	G'S	4+1+10	570.1	416	1599.01
392	- 10:	AZ3 HEAD A003 ACC	-42.50	G'S	4+1+10	570.1	416	1599.01

11:  
12:  
13:  
14:

----- FILTERED FILES: 383 - 392 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 76HR06-1: MRR-15 -----

SEP 13, 1976 / 12:18:30

RUN ID: 76B006-1: WBR-15

10 MS  
20 PTS

< 1 > 3.E+00

< 2 > 4.E+00

< 3 > 3.E+00

< 4 > 3.E+00

< 5 > 4.E+00

< 6 > 3.E+00

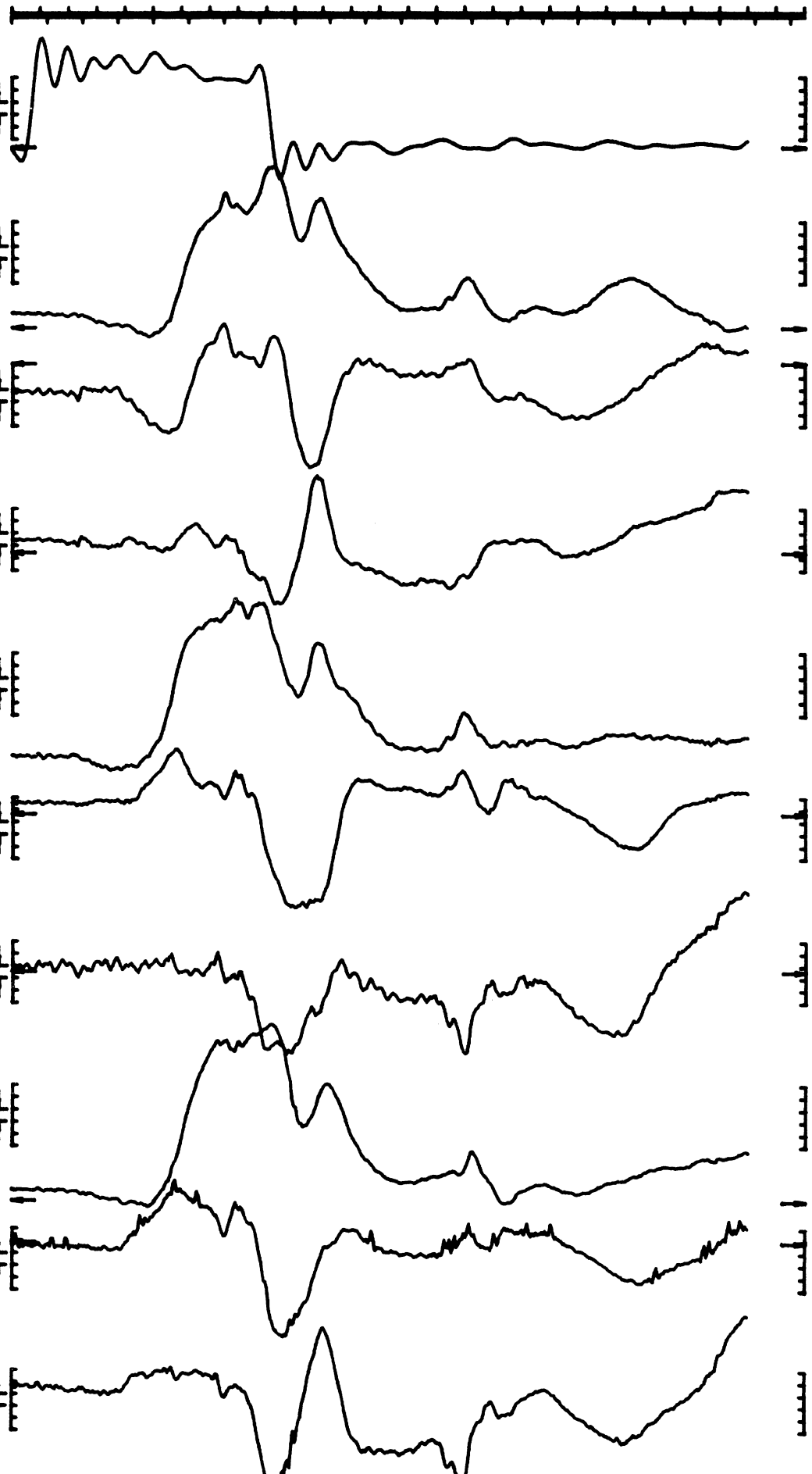
< 7 > 2.E+00

< 8 > 4.E+00

< 9 > 3.E+00

< 10 > 2.E+00

10 MS  
20 PTS



FILES: 383-892, TAPE: GNR-CAD

416 PTS • 1599 HZ = 259.4 MS

=====  
 RUN ID: 768006-2: MBR-15  
 =====

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

PROJECT: WHOLE BODY RESPONSE -- HUMAN CADAVER SERIES

ANALOG TAPE: 139(MSRI) EXPANDED 1611, WAS A/D CONVERTED TO DIGITAL TAPE: GMR-11A DATE: 25-AUG-76

TEST SIGNALS: 1667 PTS/CH AT 6401.38 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	20.00	G'S	4+1+1	80.0	416	1600.35
394	2: PELVIS BIAX P-A ACC	44.50	G'S	4+1+12	285.1	416	1600.35
395	3: PELVIS BIAX I-S ACC	44.10	G'S	4+1+12	285.1	416	1600.35
396	4: THORAX TRIAX P-A ACC	37.20	G'S	4+1+12	285.1	416	1600.35
397	5: THORAX TRIAX I-S ACC	37.00	G'S	4+1+12	285.1	416	1600.35
398	6: THORAX TRIAX R-L ACC	1000.00	G'S	4+1+12	285.1	416	1600.35
399	7: LAP BELT RIGHT LOAD	1000.00	LBS	4+1+12	285.1	416	1600.35
400	8: LAP BELT LEFT LOAD	1000.00	LBS	4+1+12	285.1	416	1600.35
401	9: SHOULDER BELT UPPER LOAD	1000.00	LBS	4+1+12	285.1	416	1600.35
402	10: SHOULDER BELT LOWER LOAD	1000.00	LBS	4+1+12	285.1	416	1600.35

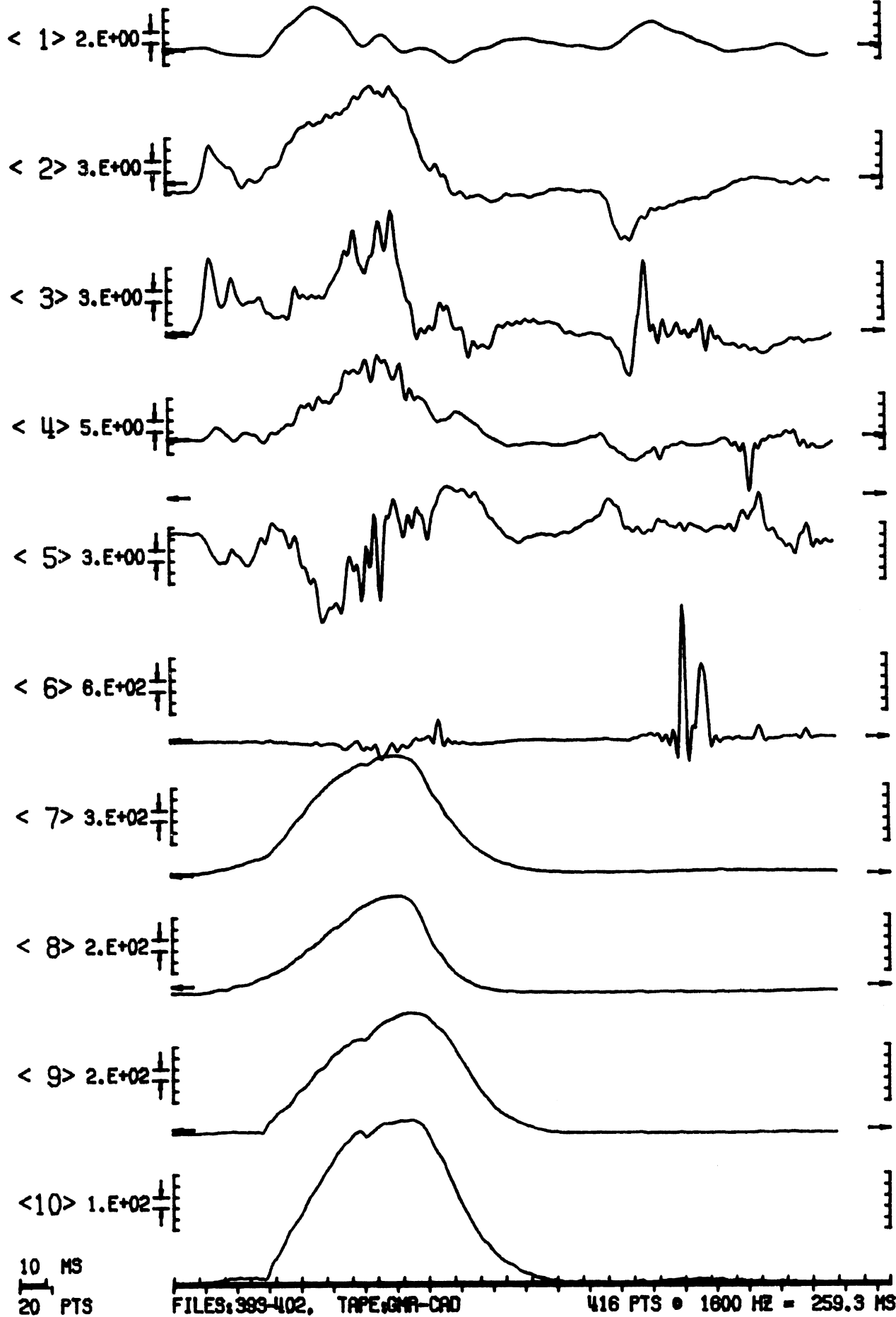
11:  
 12:  
 13:  
 14:

-----  
 FILTERED FILES: 393 - 402 DIGITAL TAPE: GMR-CAD DATE: 07-SEP-76 RUN ID: 768006-2: MBR-15  
 -----

SEP 13, 1976 / 12:32:55

RUN ID: 76B006-2: WBR-15

10 MS  
20 PTS





76B006

76B006: GRAPHCHECK SEQUENCE



