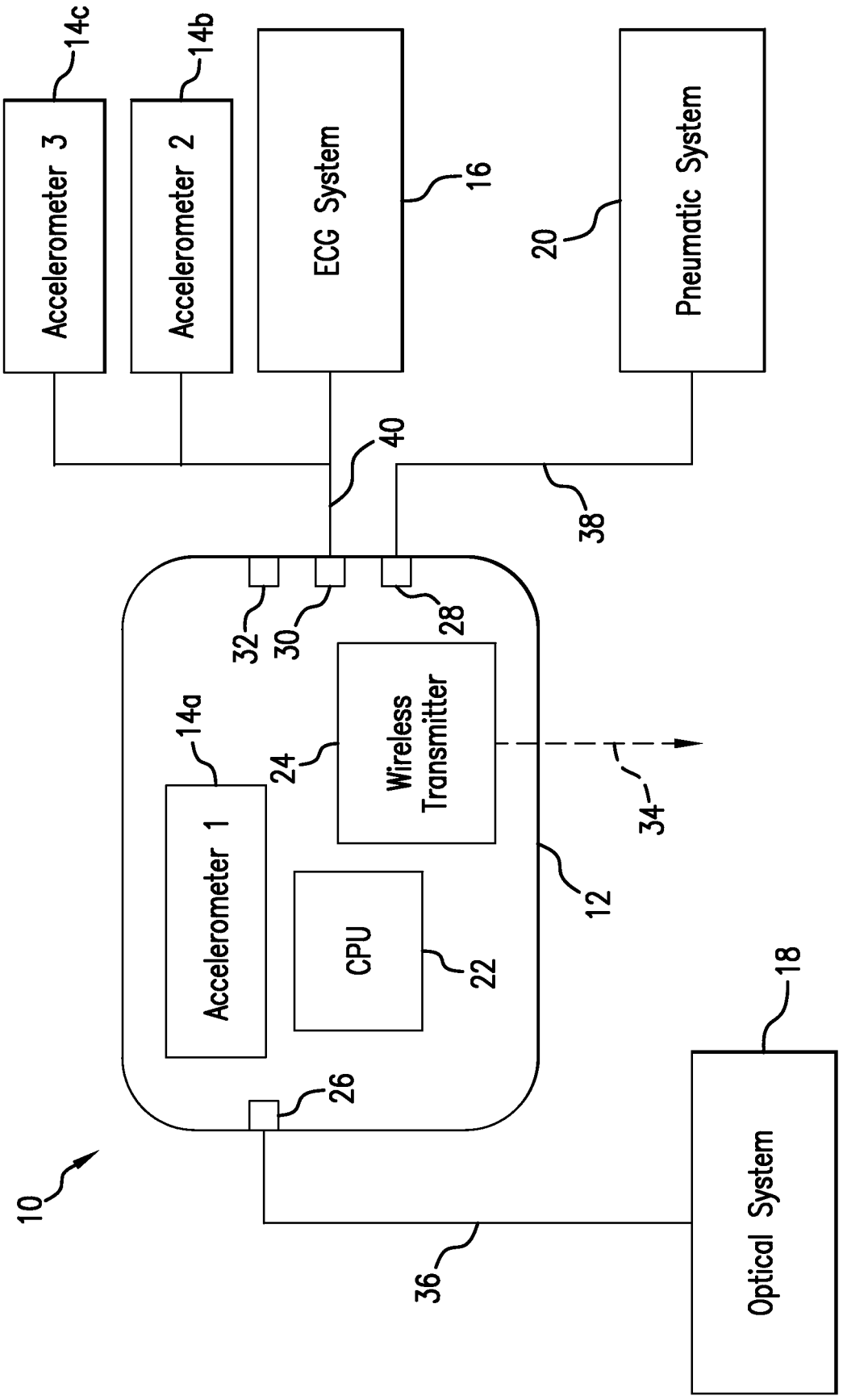

Accelerometer 3
14c
Accelerometer 2
14b
ECG System
16
Pneumatic System
20
40
38
32
30
28
Wireless Transmitter
24
14a
Accelerometer 1
CPU
22
34
12
18
Optical System
26
36
10

FIG.1

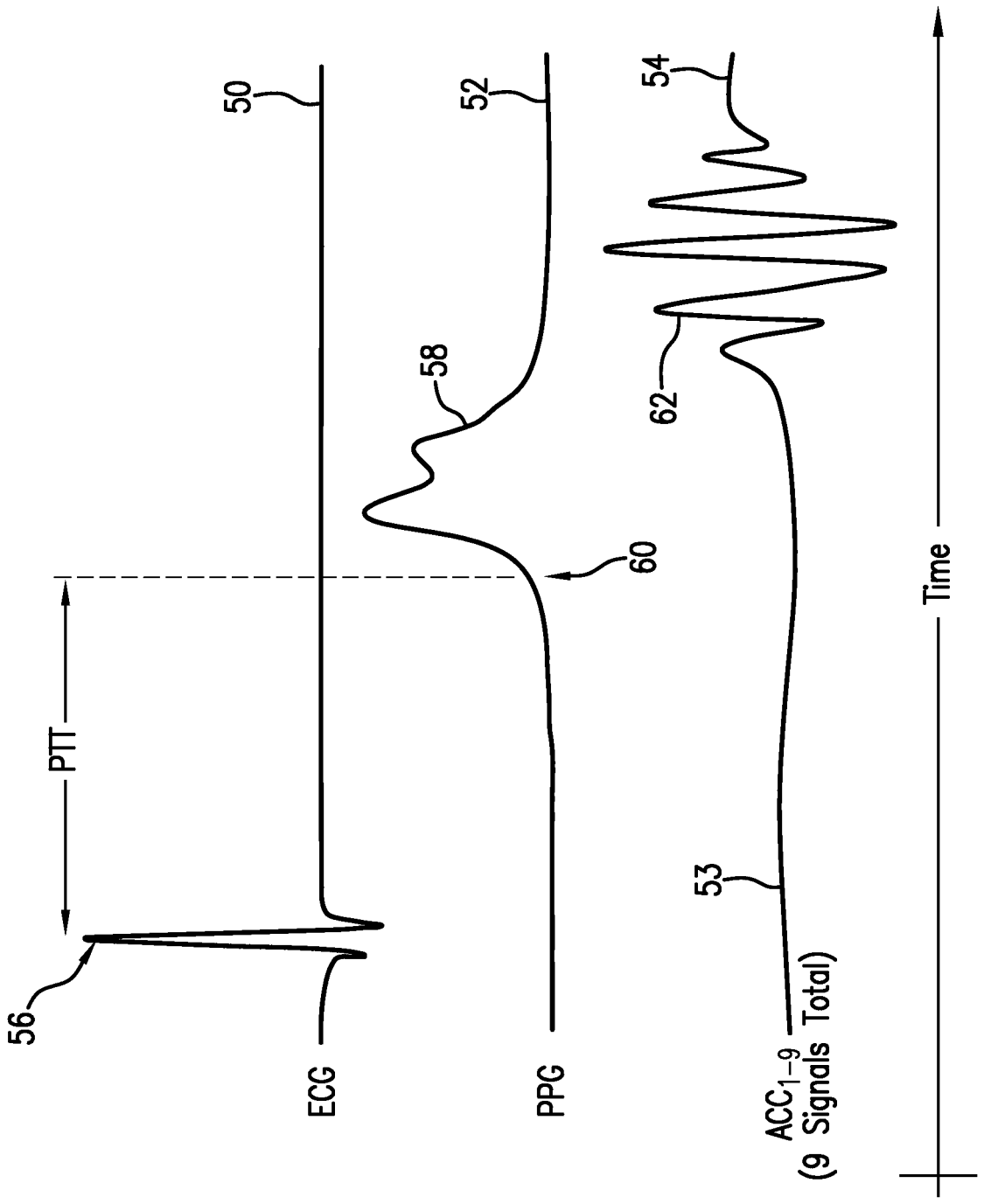


FIG.2

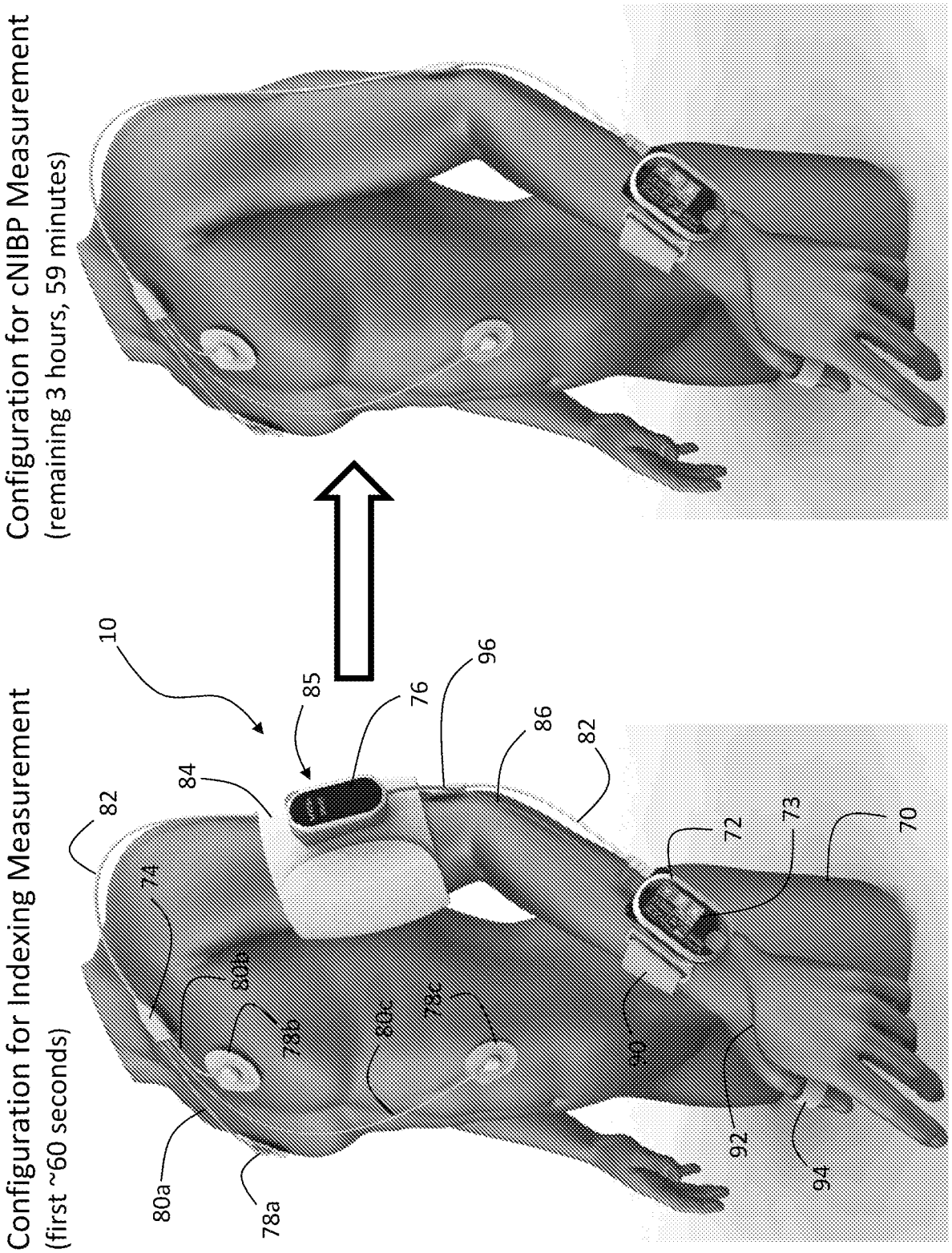

Configuration for Indexing Measurement
(first ~60 seconds)
Configuration for cNIBP Measurement
(remaining 3 hours, 59 minutes)
10
82
84
85
76
96
86
82
74
80b
78b
80c
78c
80a
78a
72
73
70
90
92
94

FIG.3A

FIG.3B

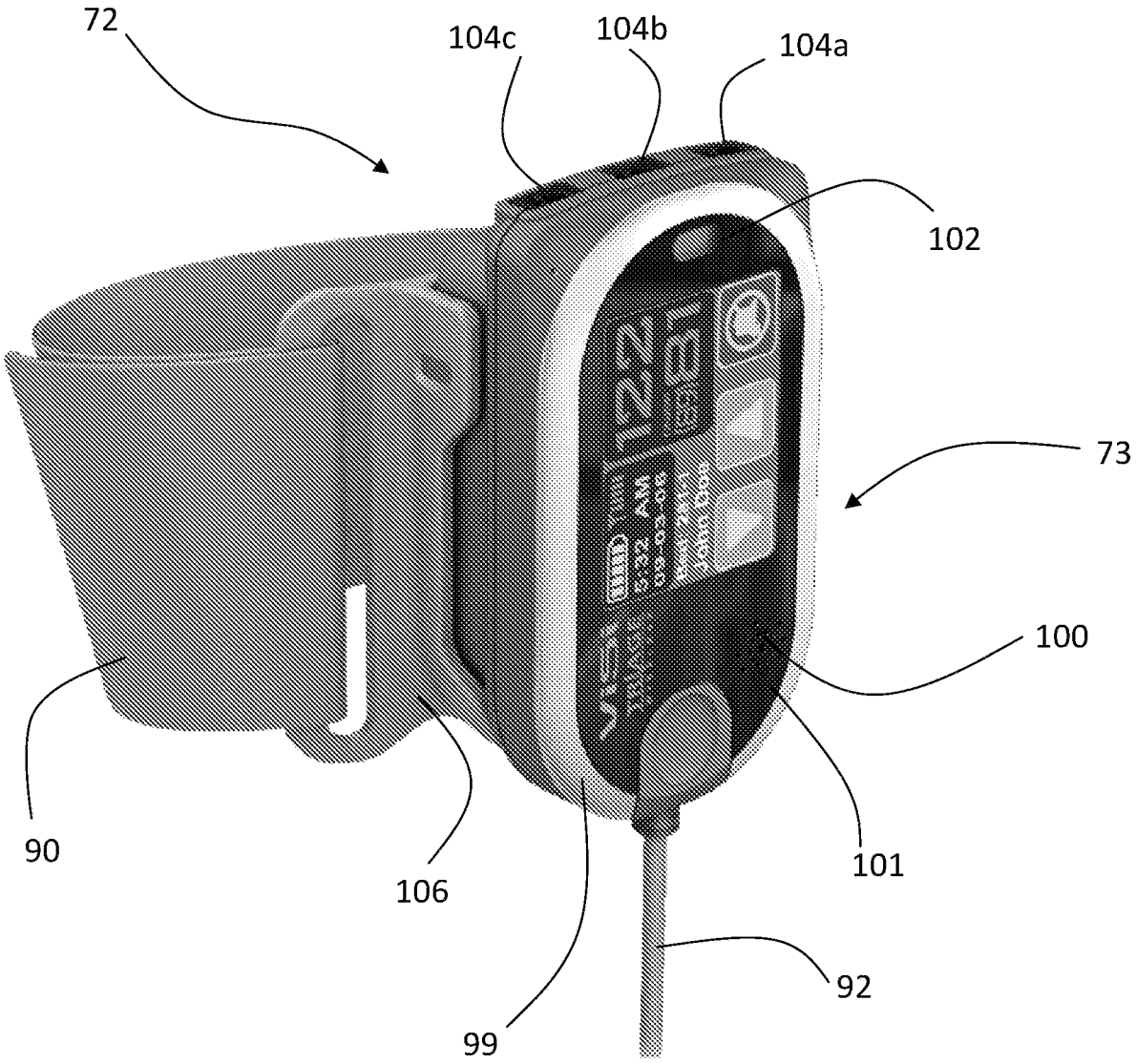


FIG.4

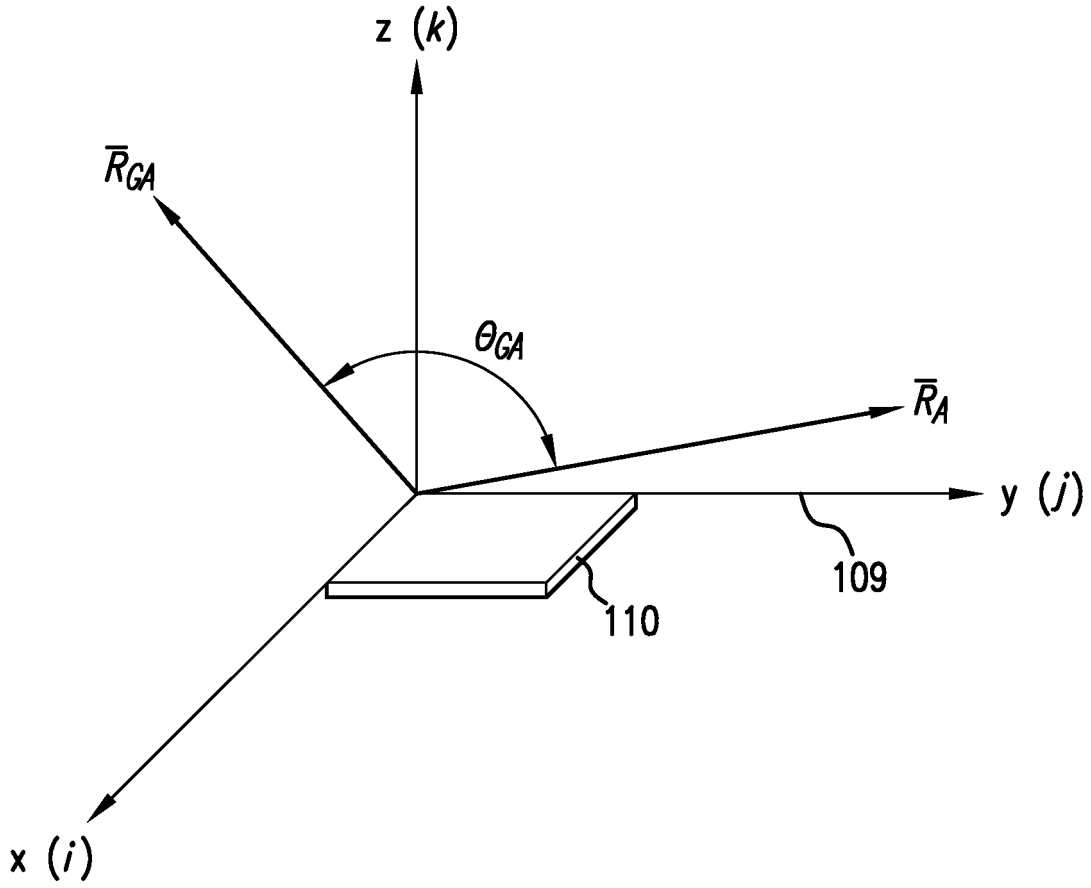


FIG.5

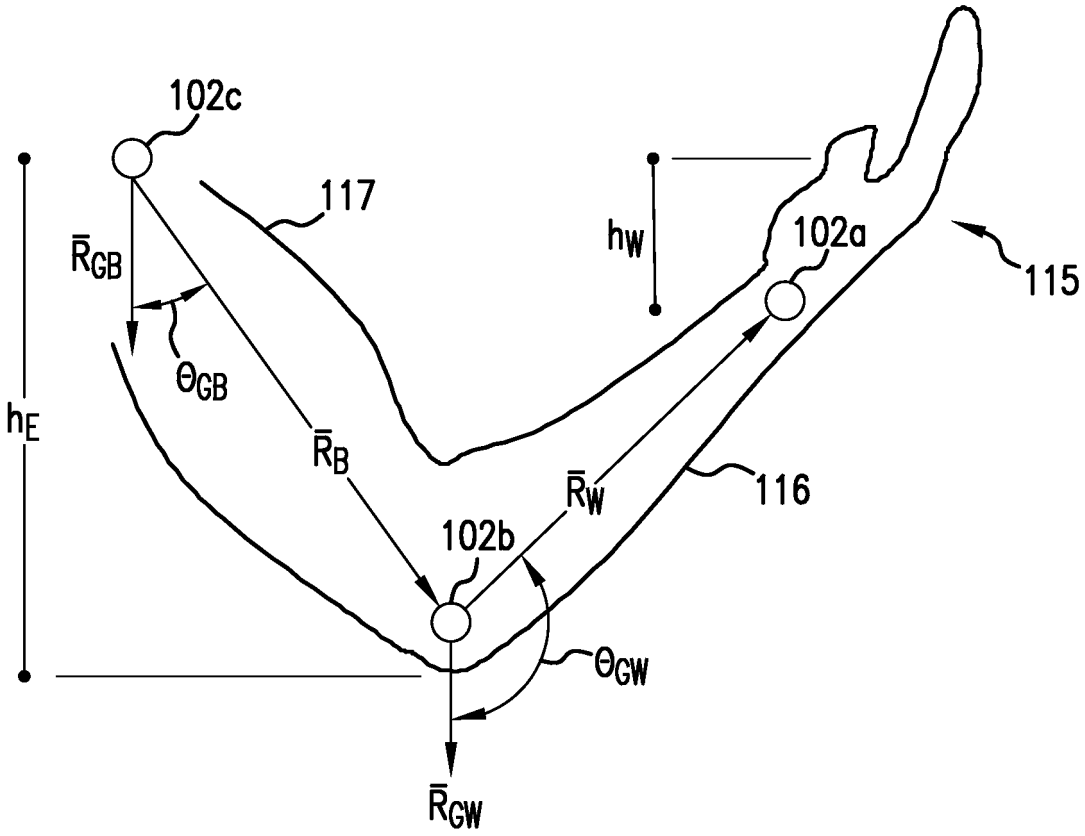

102c
117
$\bar{R}_{GB}$
h_W
102a
115
θ_{GB}
h_E
$\bar{R}_B$
$\bar{R}_W$
116
102b
θ_{GW}
$\bar{R}_{GW}$

FIG.6

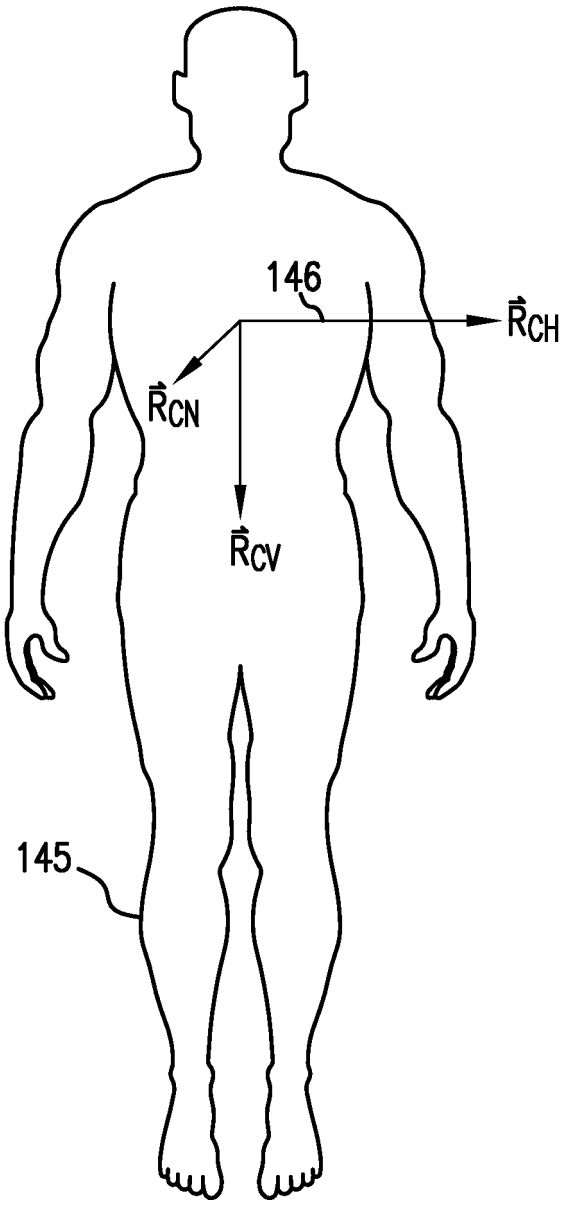


FIG.7

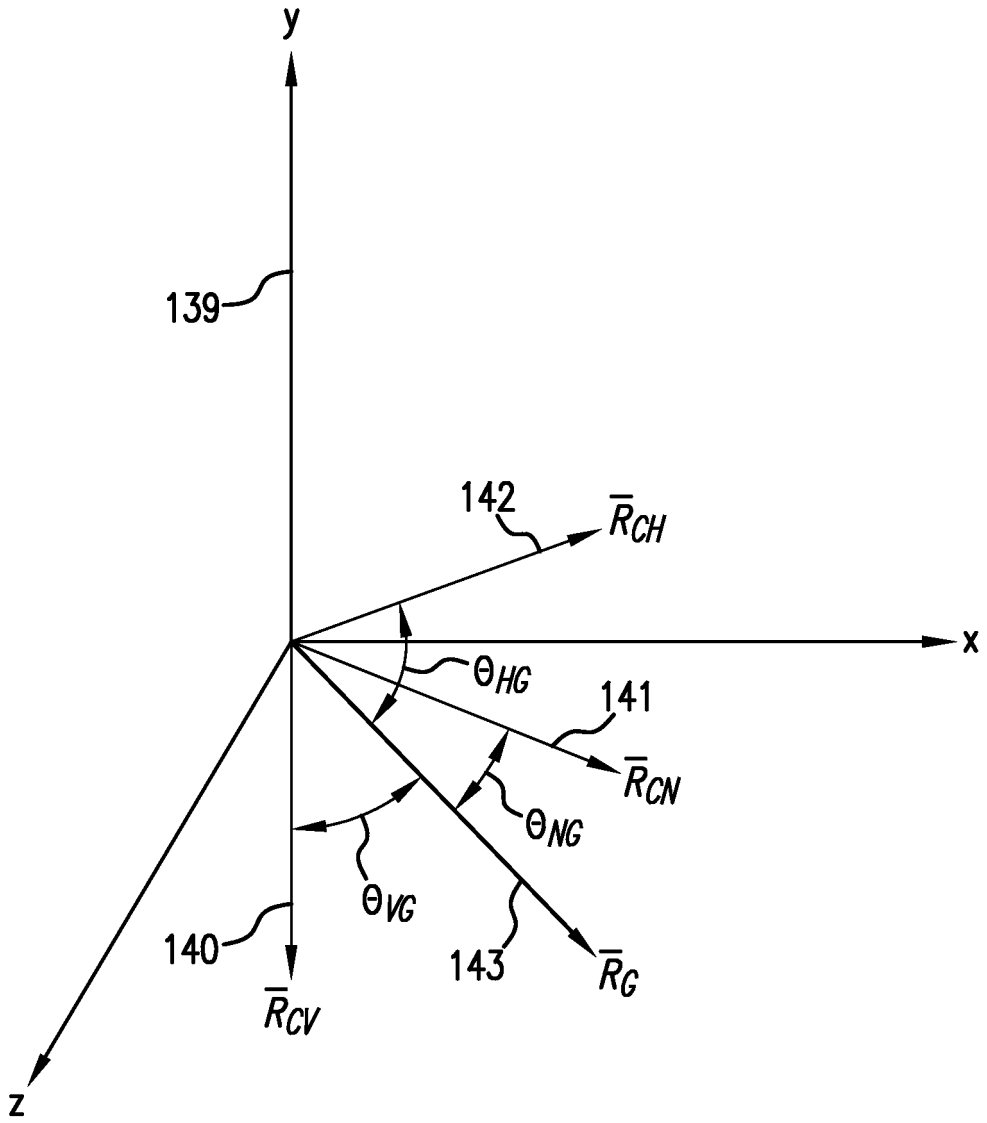

y
139
142
$\bar{R}_{CH}$
x
Θ_{HG}
141
$\bar{R}_{CN}$
Θ_{NG}
Θ_{VG}
140
143
$\bar{R}_{G}$
$\bar{R}_{CV}$
z

FIG.8

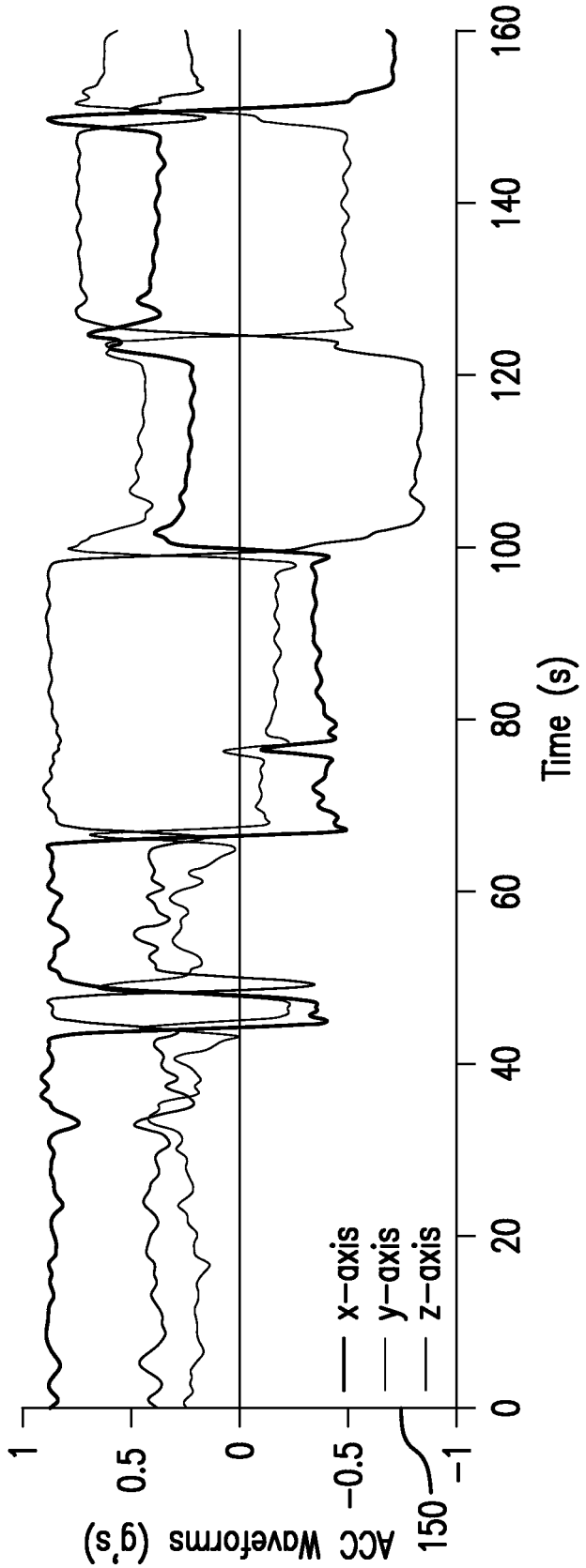

ACC Waveforms (g's)
1
0.5
0
−0.5
−1
150
x−axis
y−axis
z−axis
0
20
40
60
80
100
120
140
160
Time (s)

FIG.9A

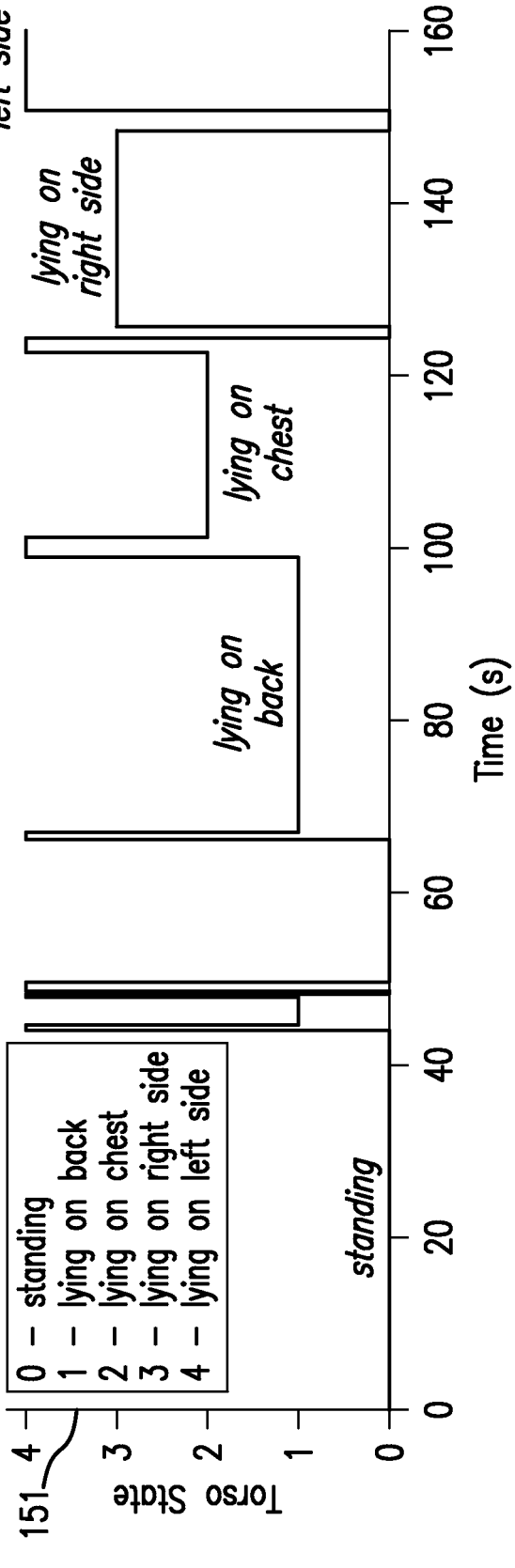

Torso State
4
3
2
1
0
151
0 – standing
1 – lying on back
2 – lying on chest
3 – lying on right side
4 – lying on left side
standing
lying on back
lying on chest
lying on right side
lying on left side
0
20
40
60
80
100
120
140
160
Time (s)

FIG.9B

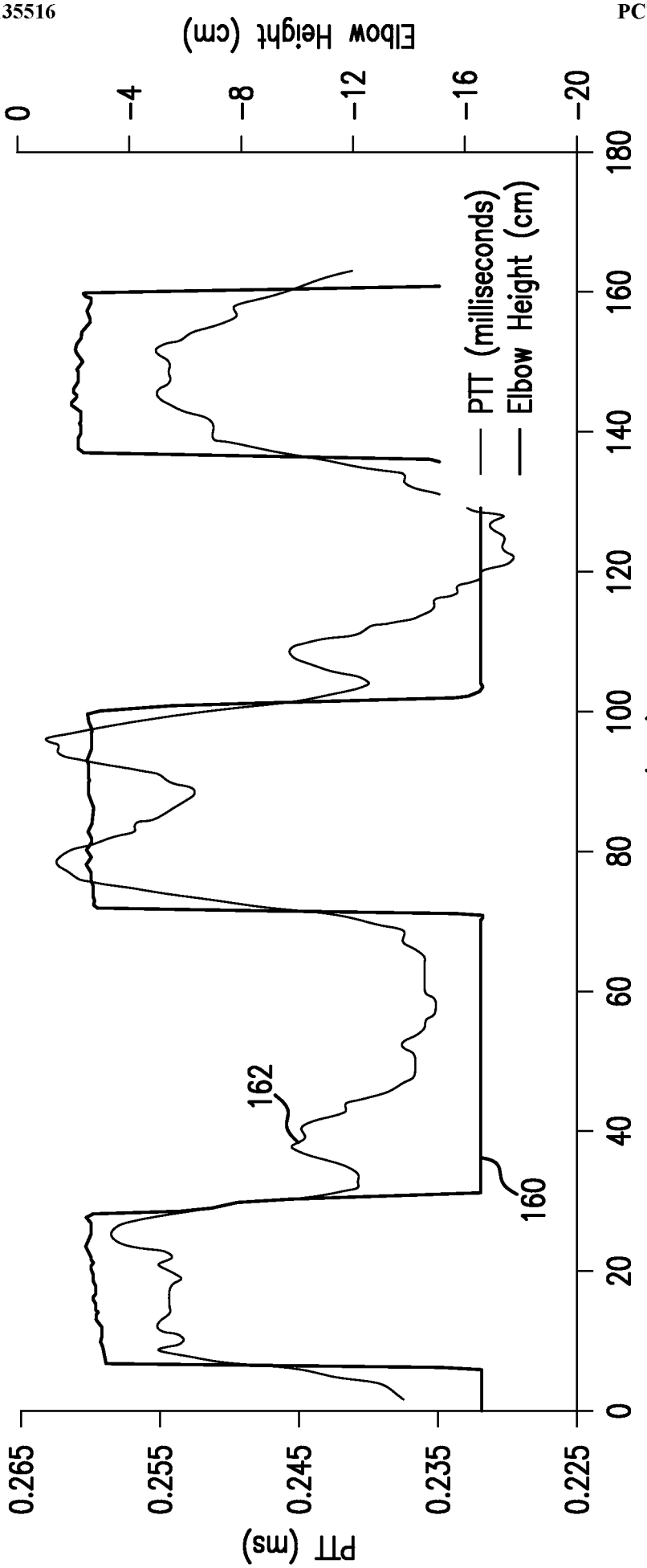

PTT (ms)
0.265
0.255
0.245
0.235
0.225
Elbow Height (cm)
0
-4
-8
-12
-16
-20
0
20
40
60
80
100
120
140
160
180
Time (arb.)
PTT (milliseconds)
Elbow Height (cm)
162
160

FIG.10

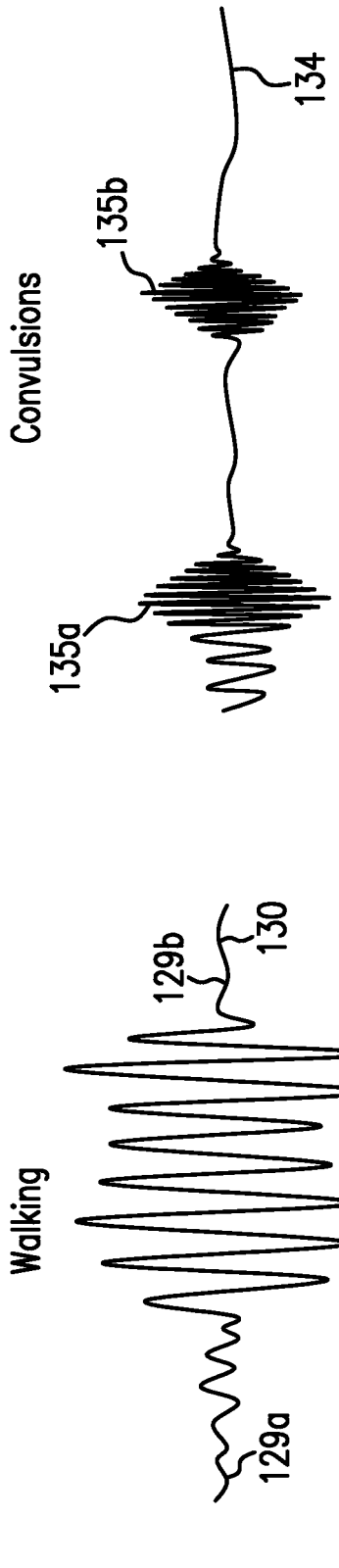


FIG.11A

FIG.11C

FIG.11B

FIG.11D

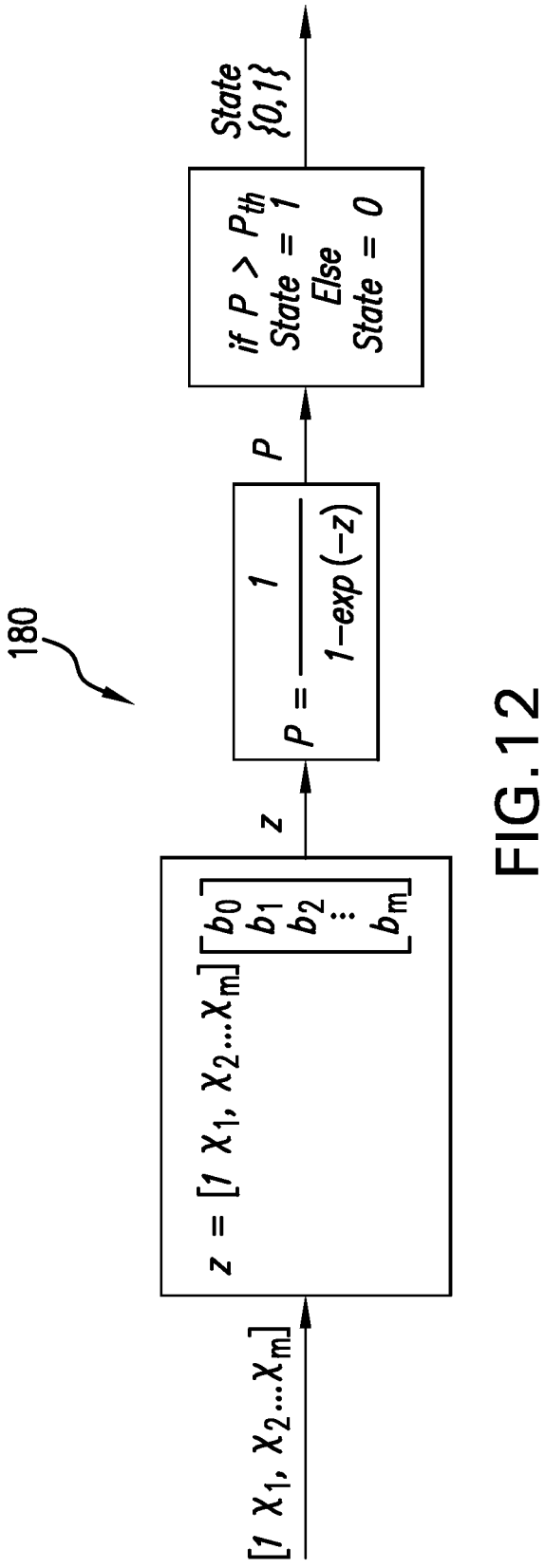

180
[1 x_1, x_2...x_m]
$z = [1\ x_1, x_2 \ldots x_m] \begin{bmatrix} b_0 \\ b_1 \\ b_2 \\ \vdots \\ b_m \end{bmatrix}$
z
$P = \frac{1}{1-exp(-z)}$
P
if $P > P_{th}$
State = 1
Else
State = 0
State {0,1}

FIG. 12

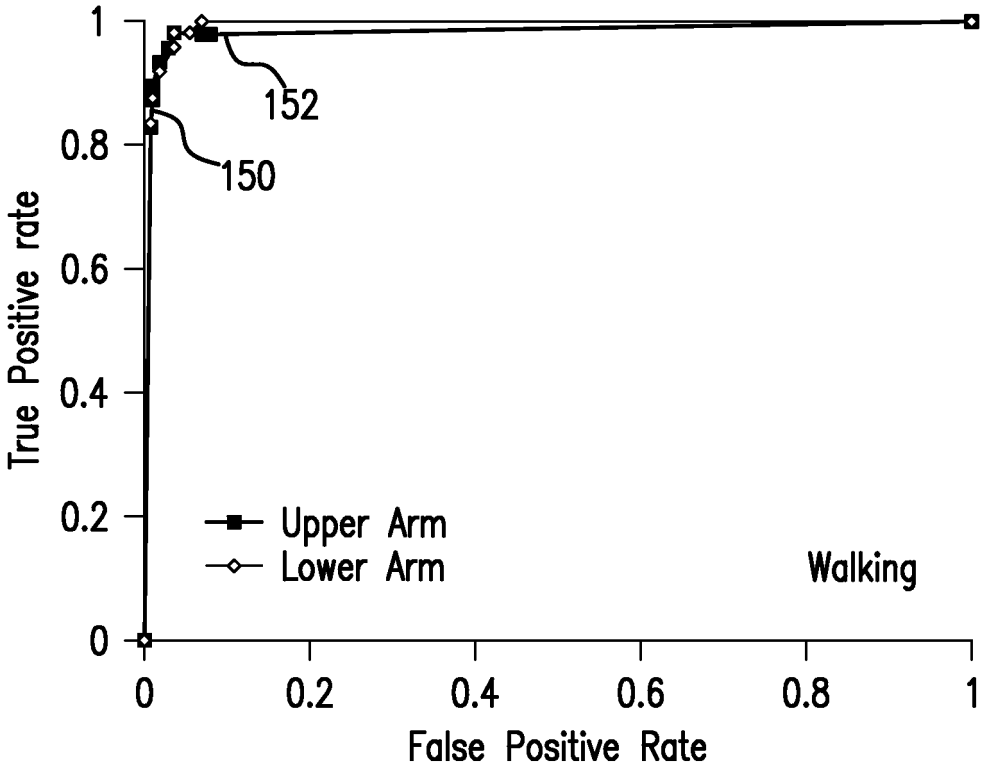


FIG.13A

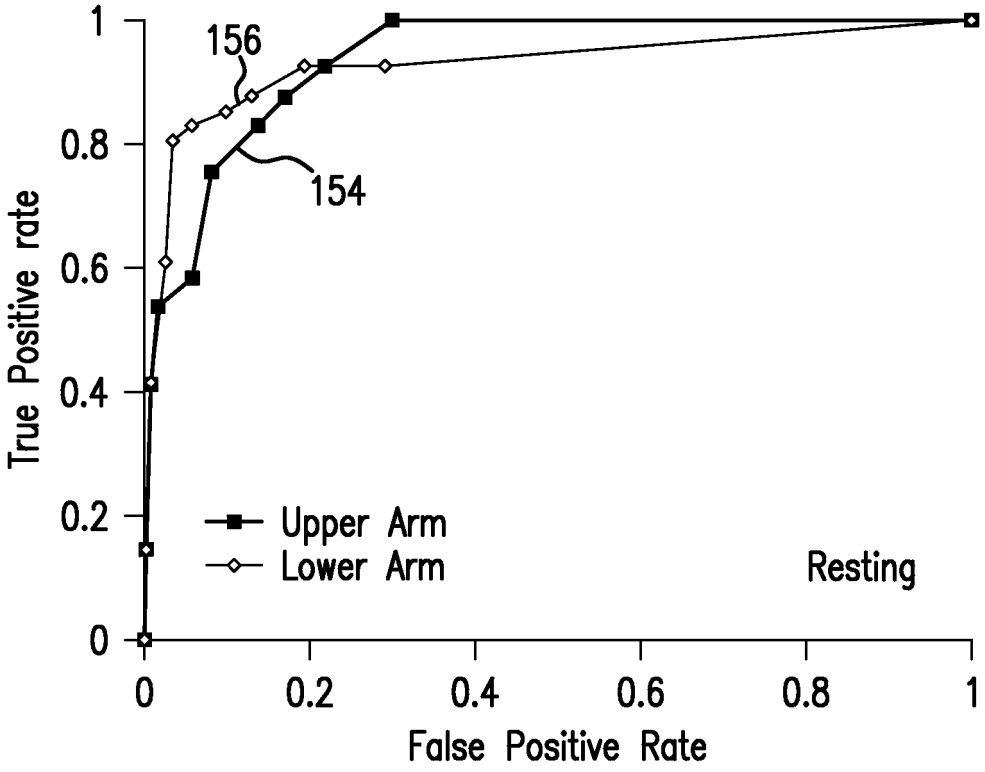


FIG.13B

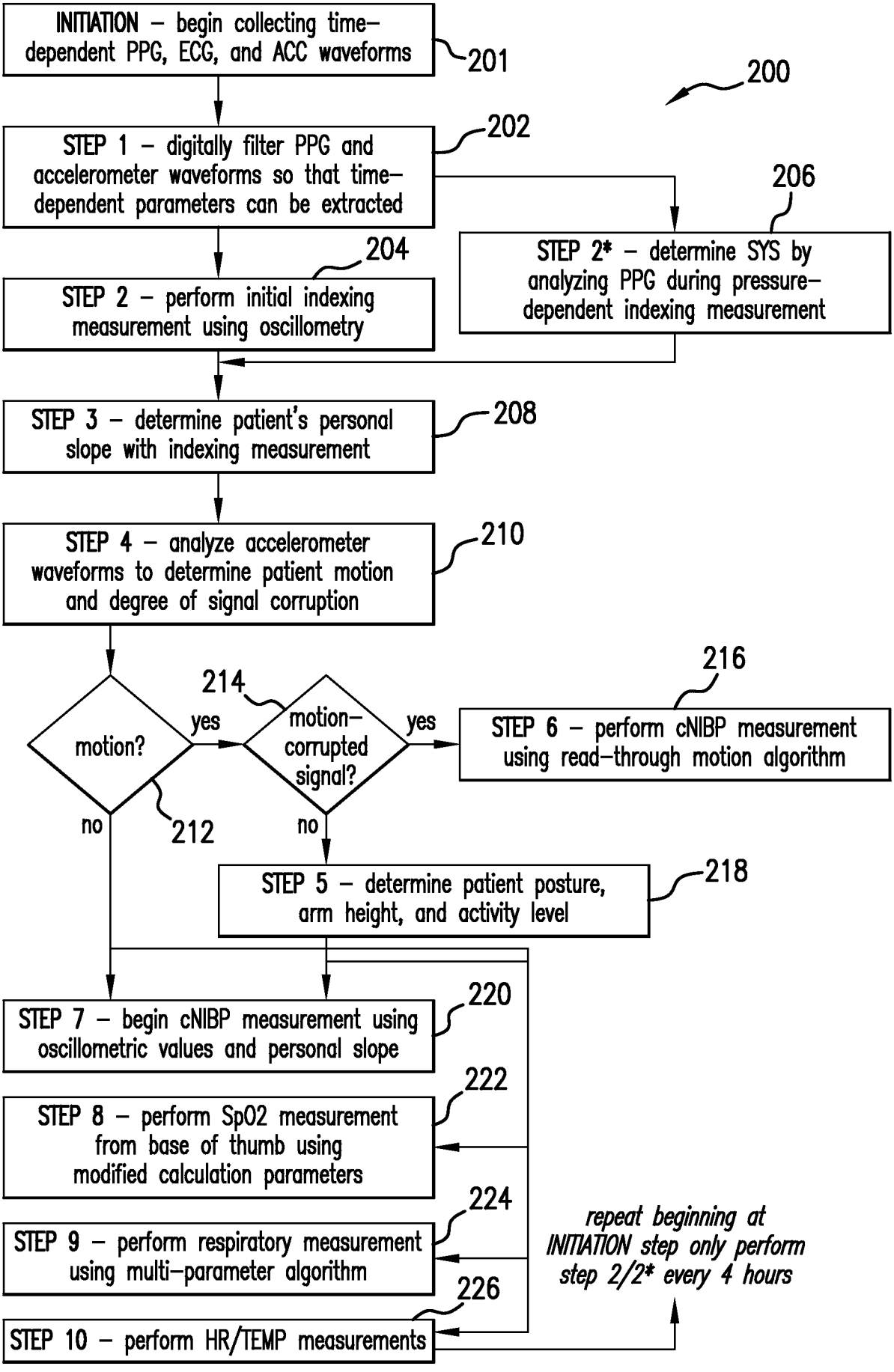

INITIATION – begin collecting time-dependent PPG, ECG, and ACC waveforms
201
200
STEP 1 – digitally filter PPG and accelerometer waveforms so that time-dependent parameters can be extracted
202
206
STEP 2* – determine SYS by analyzing PPG during pressure-dependent indexing measurement
204
STEP 2 – perform initial indexing measurement using oscillometry
STEP 3 – determine patient's personal slope with indexing measurement
208
STEP 4 – analyze accelerometer waveforms to determine patient motion and degree of signal corruption
210
motion?
yes
214
motion-corrupted signal?
yes
216
STEP 6 – perform cNIBP measurement using read-through motion algorithm
no
212
no
STEP 5 – determine patient posture, arm height, and activity level
218
STEP 7 – begin cNIBP measurement using oscillometric values and personal slope
220
STEP 8 – perform SpO2 measurement from base of thumb using modified calculation parameters
222
STEP 9 – perform respiratory measurement using multi-parameter algorithm
224
STEP 10 – perform HR/TEMP measurements
226
repeat beginning at INITIATION step only perform step 2/2* every 4 hours

FIG.14