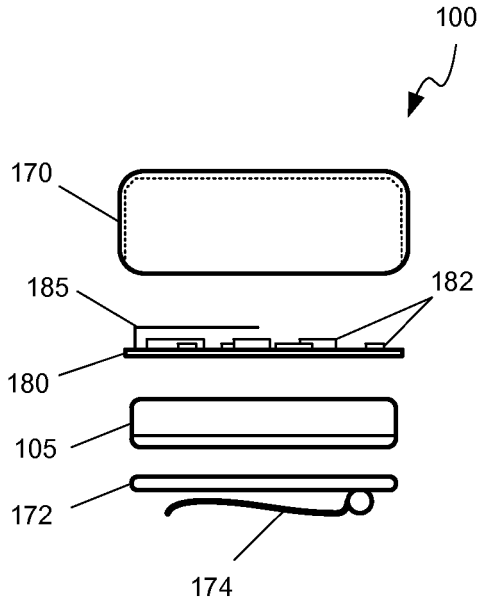

100
170
185
182
180
105
172
174

FIG. 1A

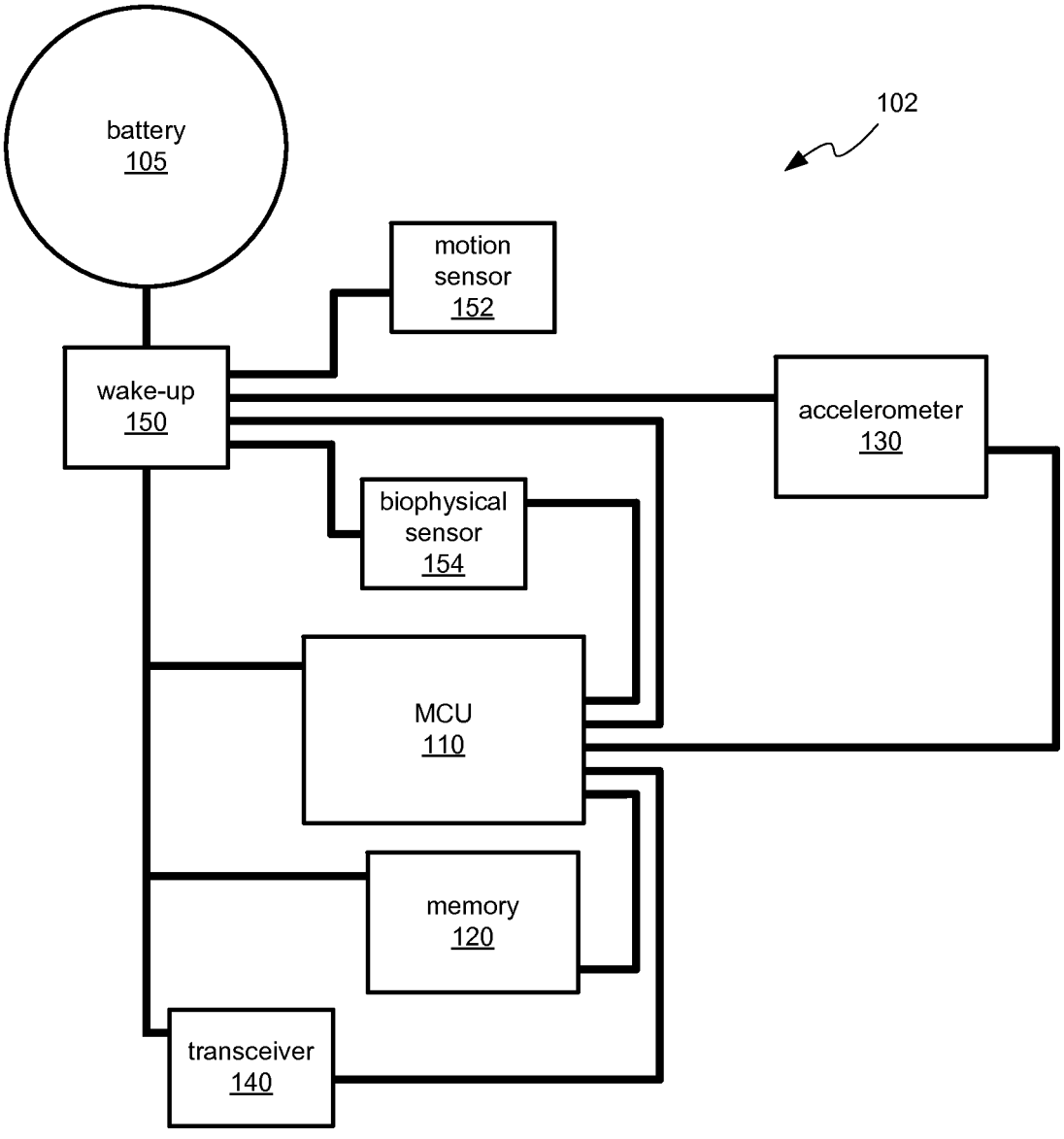

battery
105
102
motion
sensor
152
wake-up
150
accelerometer
130
biophysical
sensor
154
MCU
110
memory
120
transceiver
140

FIG. 1B

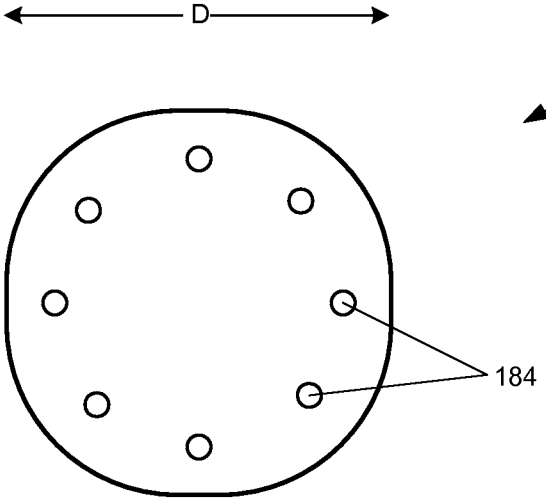


FIG. 1C

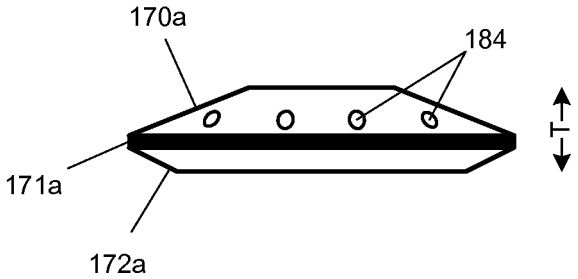


FIG. 1D

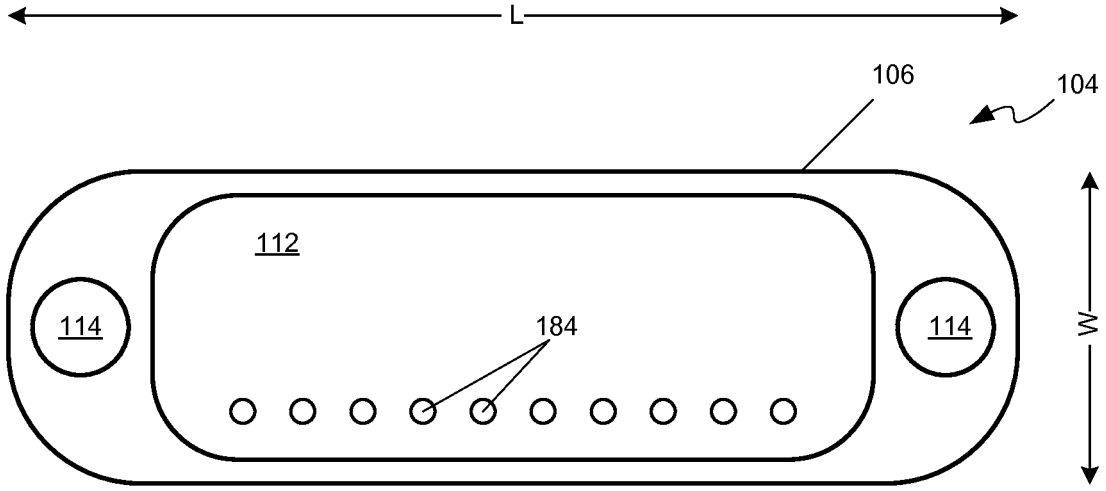


FIG. 1E

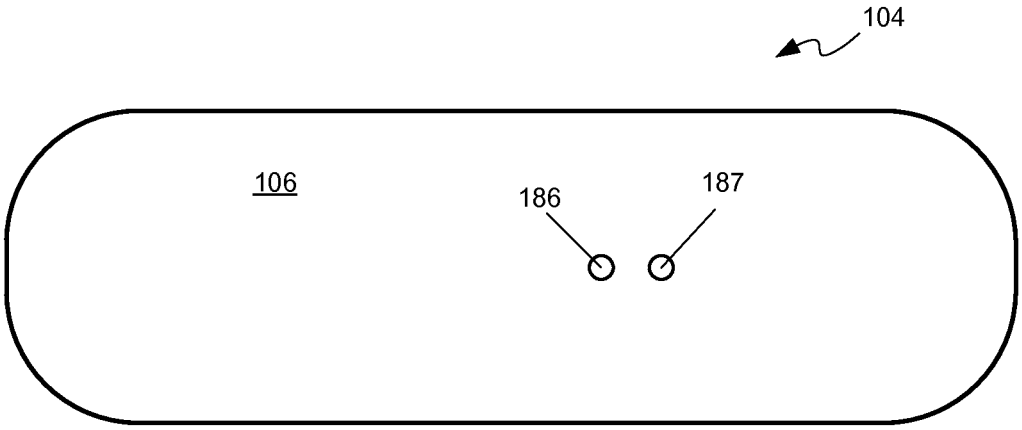

104
106
186
187

FIG. 1F

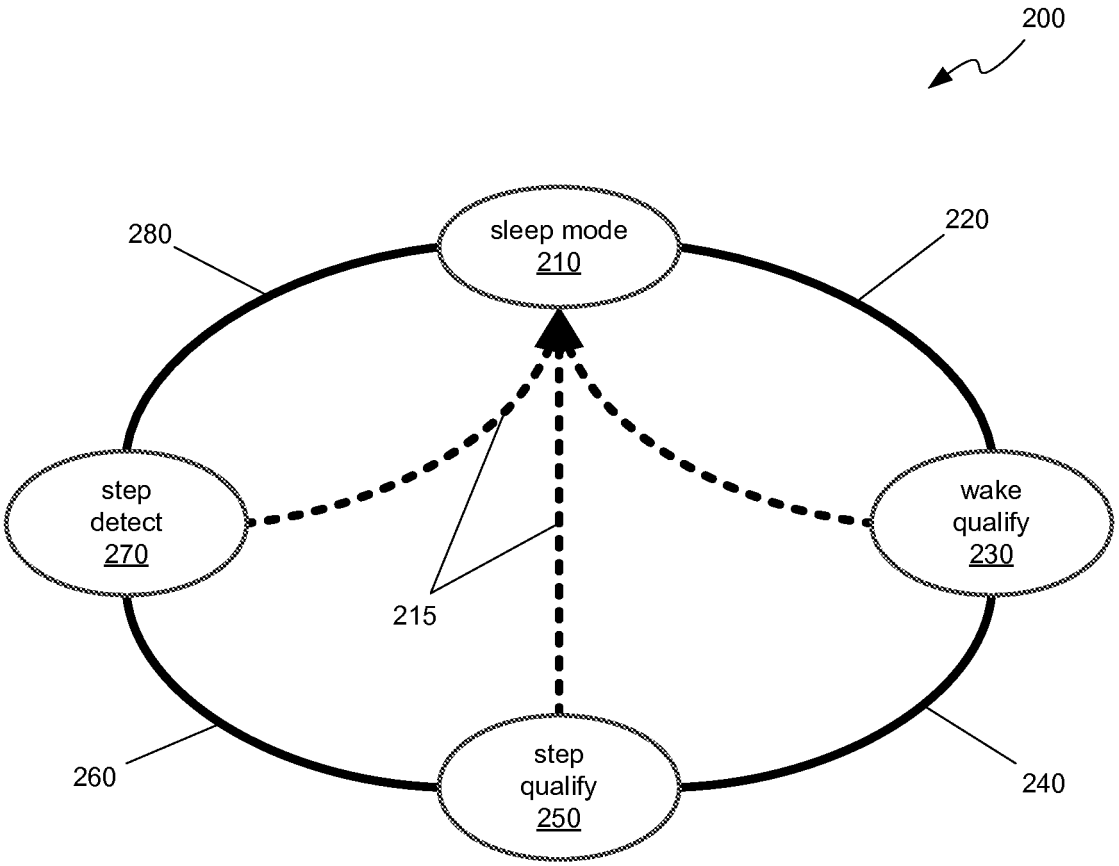

200
sleep mode
210
280
220
step
detect
270
wake
qualify
230
215
step
qualify
250
260
240

FIG. 2A

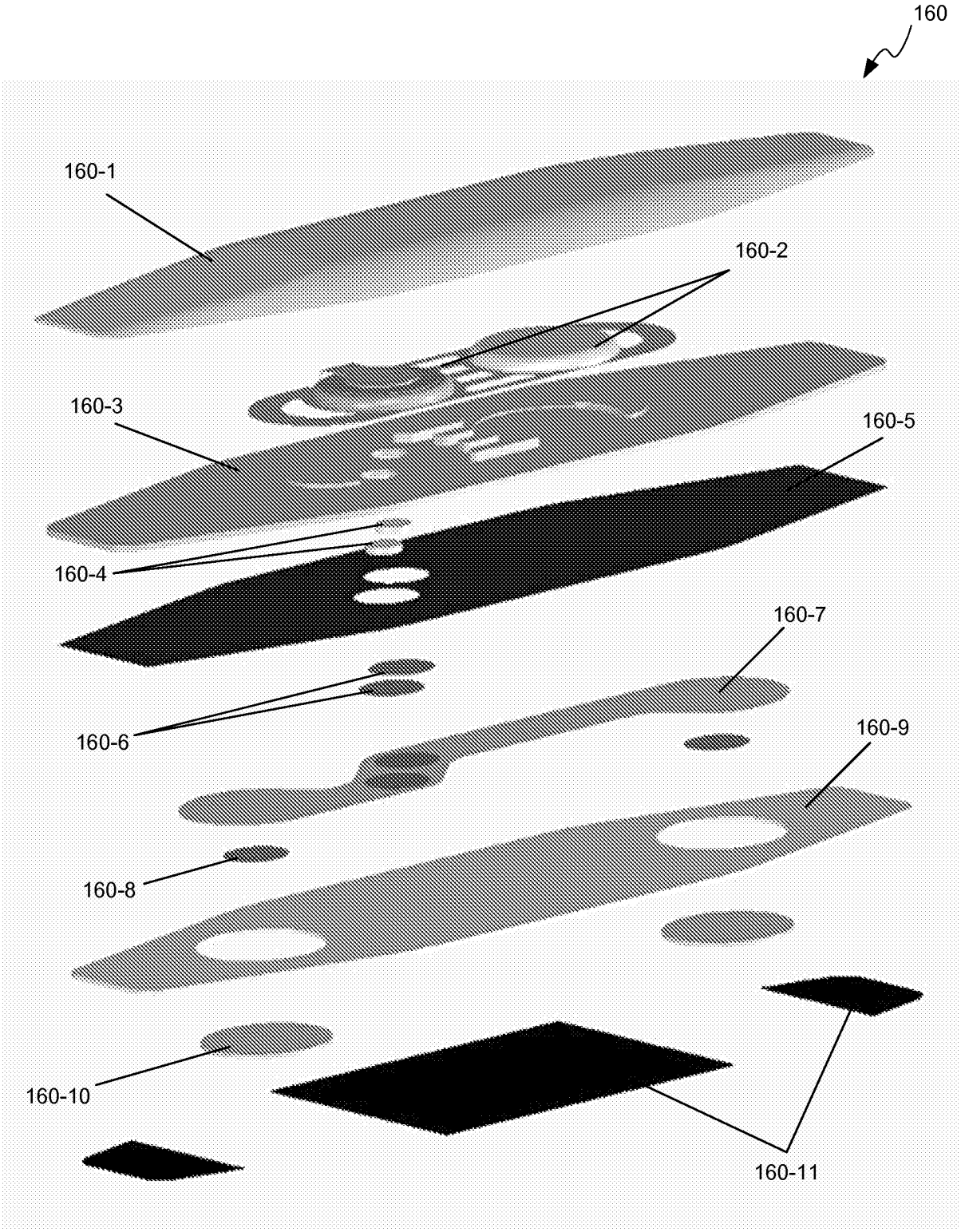


FIG. 1G

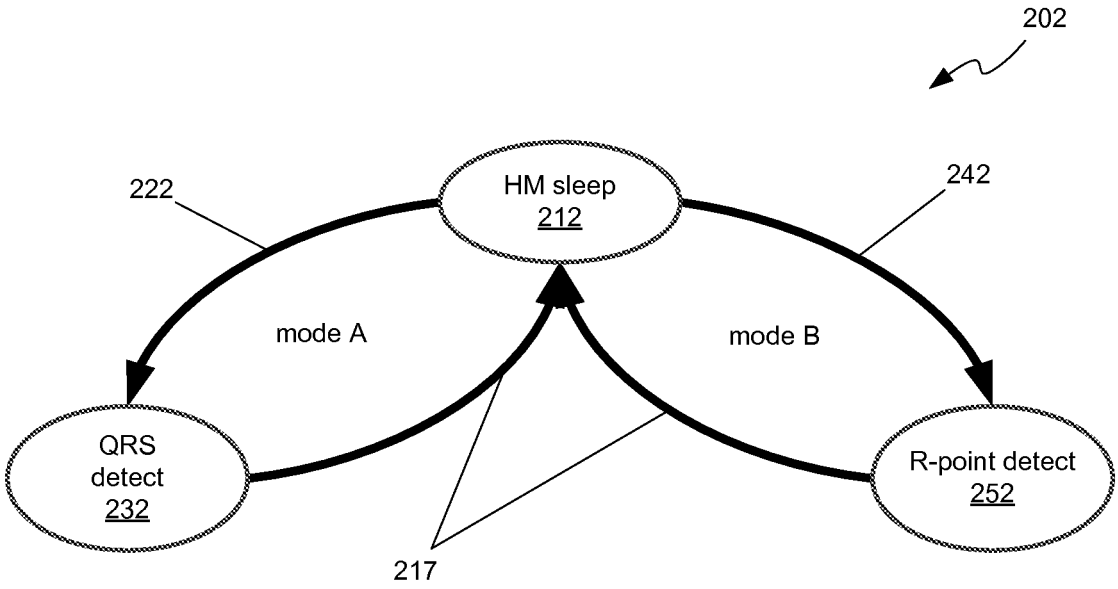

202
222
HM sleep
212
242
mode A
mode B
QRS
detect
232
R-point detect
252
217

FIG. 2B

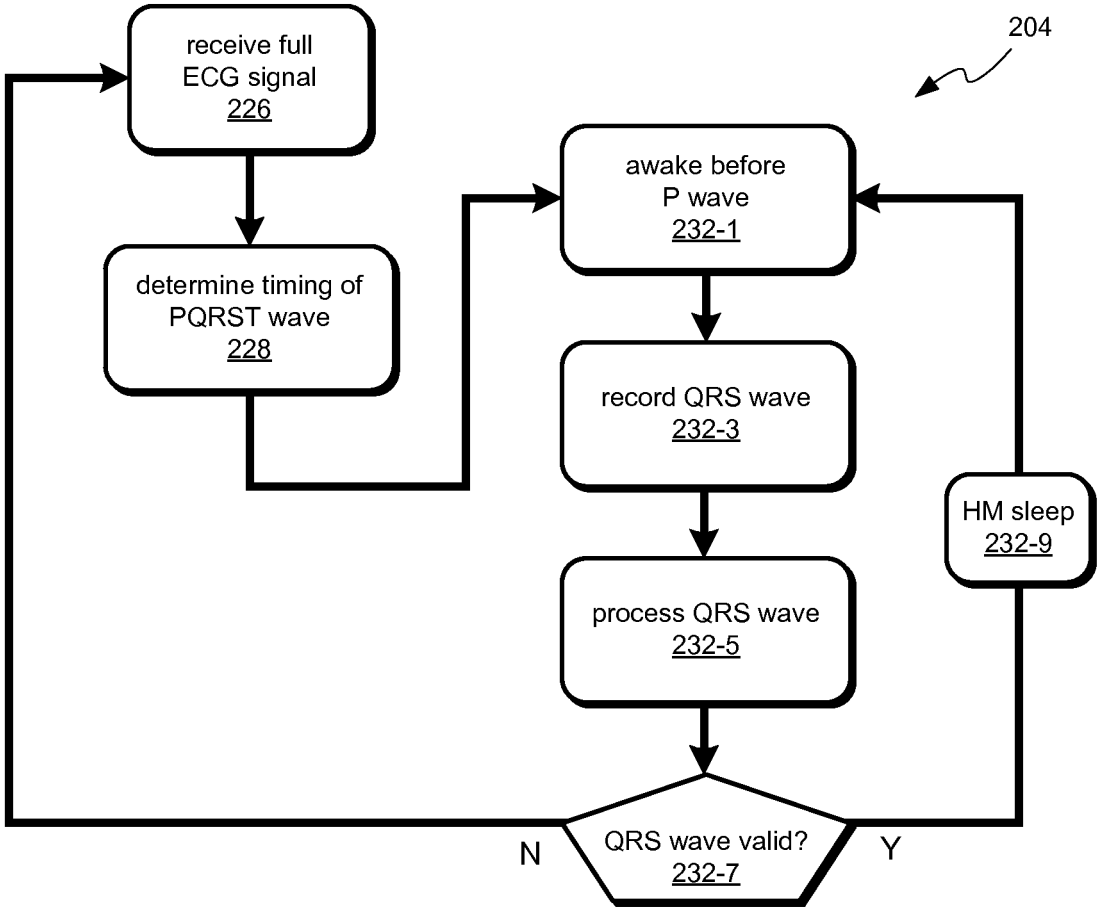

204
receive full
ECG signal
226
determine timing of
PQRST wave
228
awake before
P wave
232-1
record QRS wave
232-3
process QRS wave
232-5
QRS wave valid?
232-7
N
Y
HM sleep
232-9

FIG. 2C

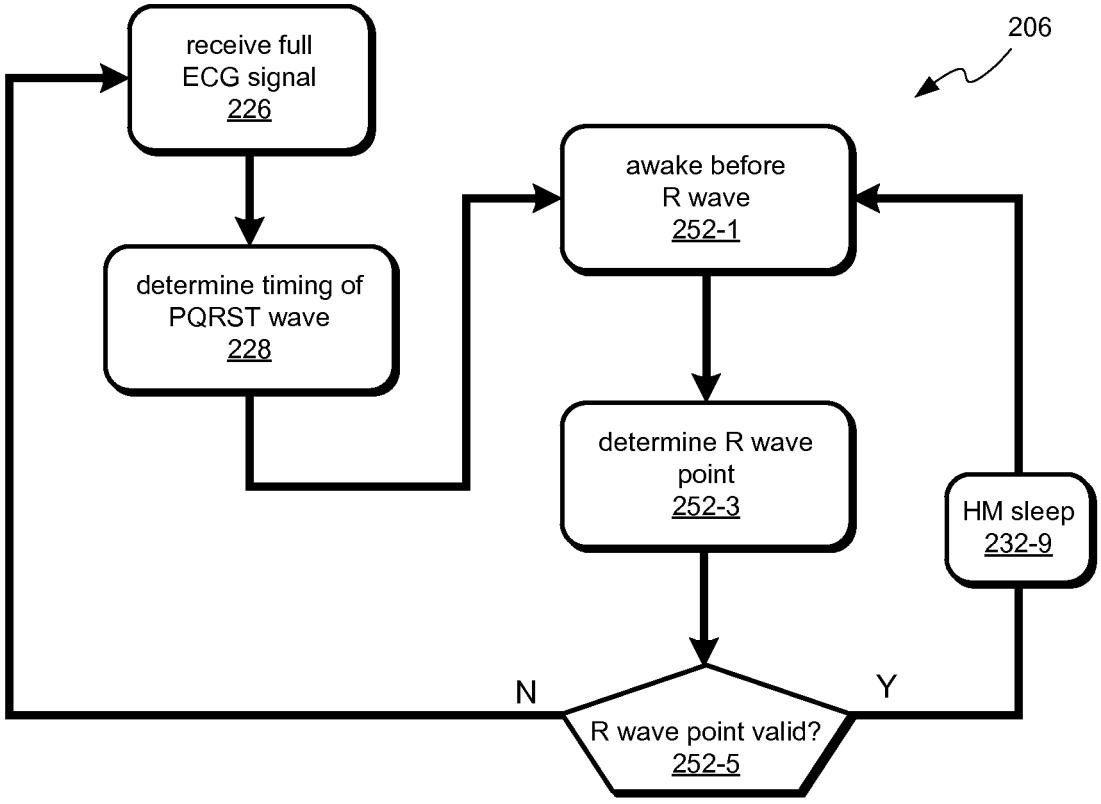

206
receive full ECG signal 226
determine timing of PQRST wave 228
awake before R wave 252-1
determine R wave point 252-3
R wave point valid? 252-5
HM sleep 232-9
N
Y

FIG. 2D

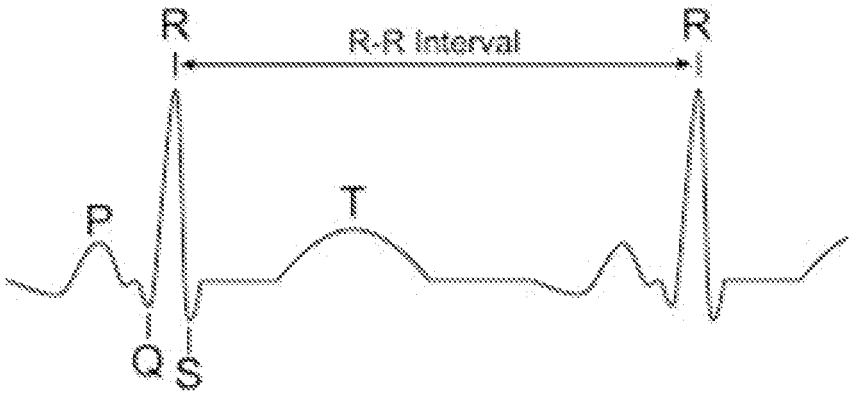

R
R-R Interval
R
P
T
Q
S

FIG. 2E

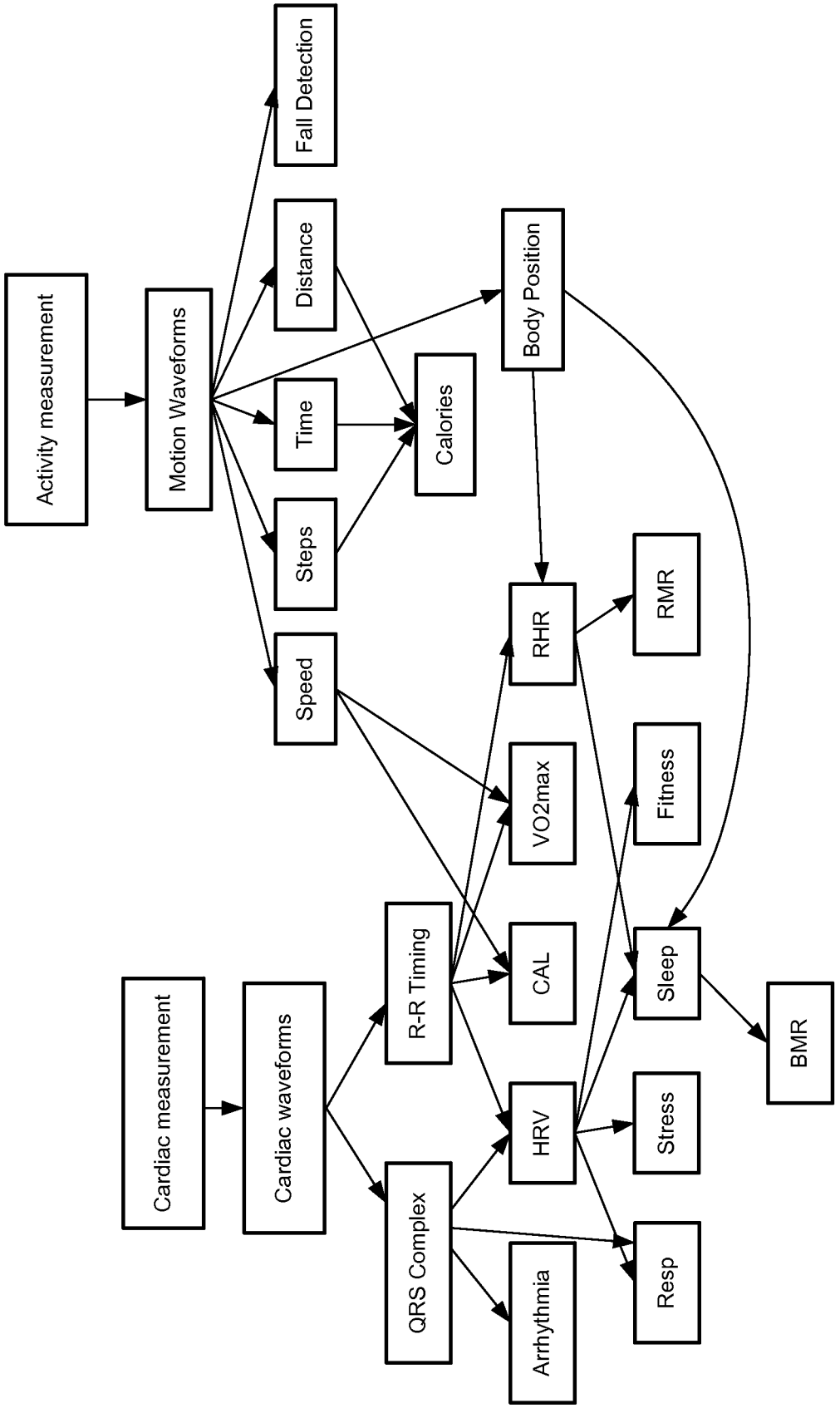

Activity measurement
Motion Waveforms
Fall Detection
Distance
Time
Steps
Speed
Calories
Body Position
RHR
RMR
VO2max
Fitness
Cardiac measurement
Cardiac waveforms
R-R Timing
QRS Complex
CAL
HRV
Sleep
Stress
Resp
Arrhythmia
BMR

FIG. 2F

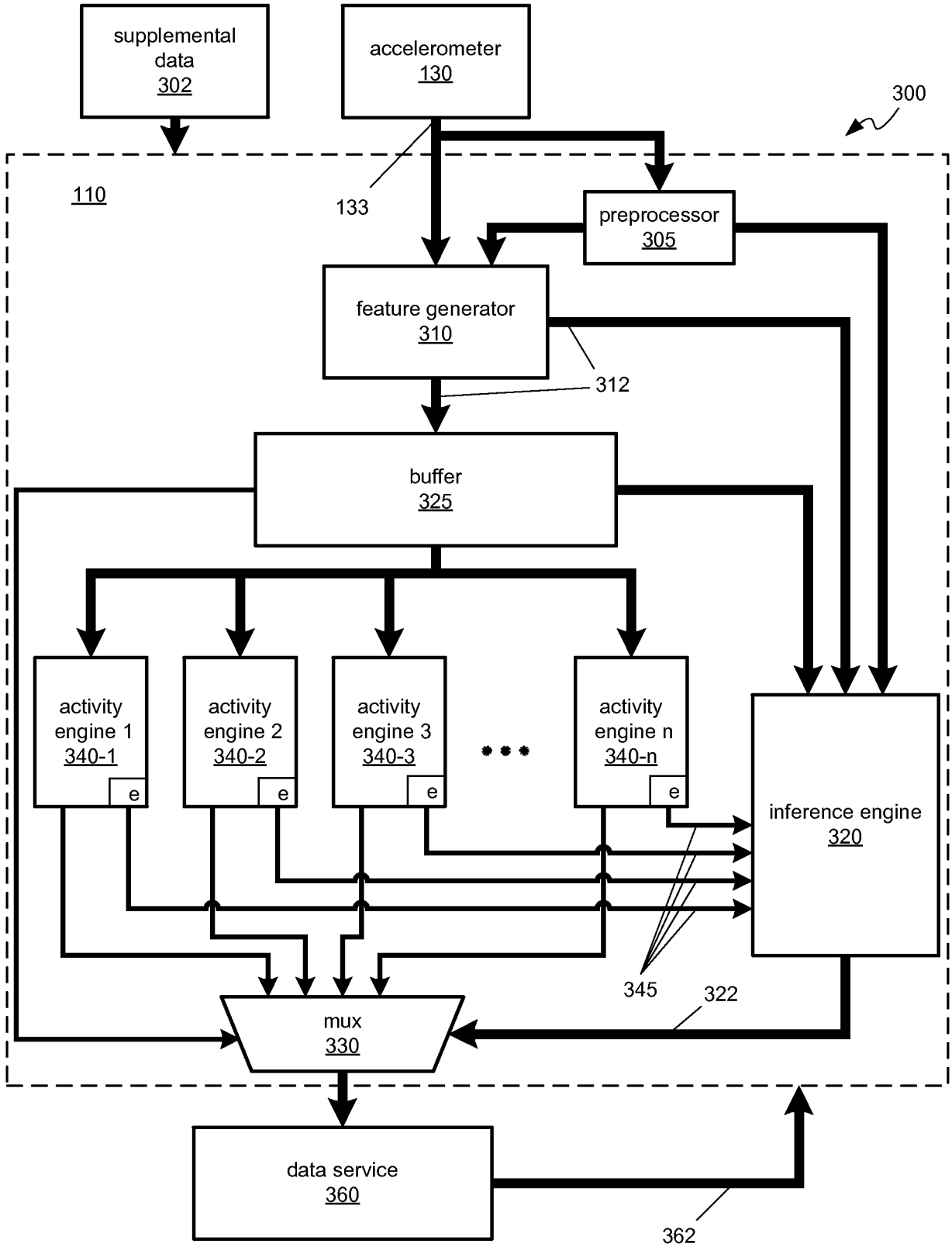

supplemental data 302
accelerometer 130
300
110
133
preprocessor 305
feature generator 310
312
buffer 325
activity engine 1 340-1
activity engine 2 340-2
activity engine 3 340-3
activity engine n 340-n
e
inference engine 320
345
322
mux 330
data service 360
362

FIG. 3

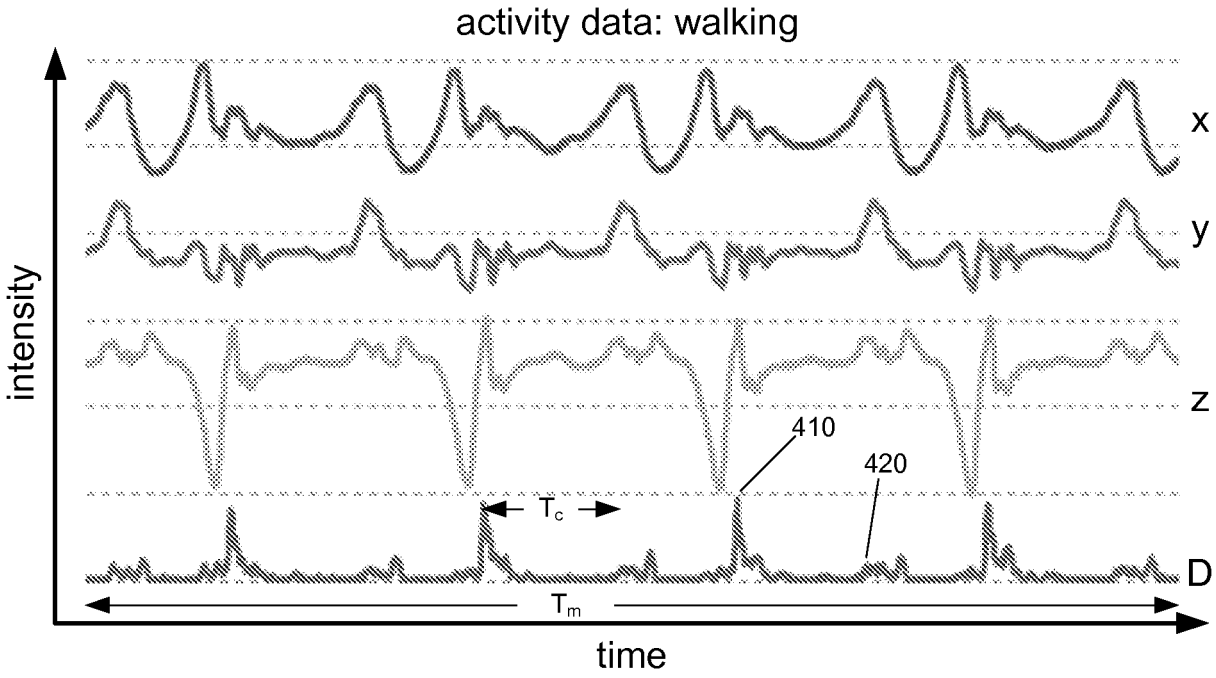

activity data: walking
x
y
z
D
intensity
410
420
T_c
T_m
time

FIG. 4A

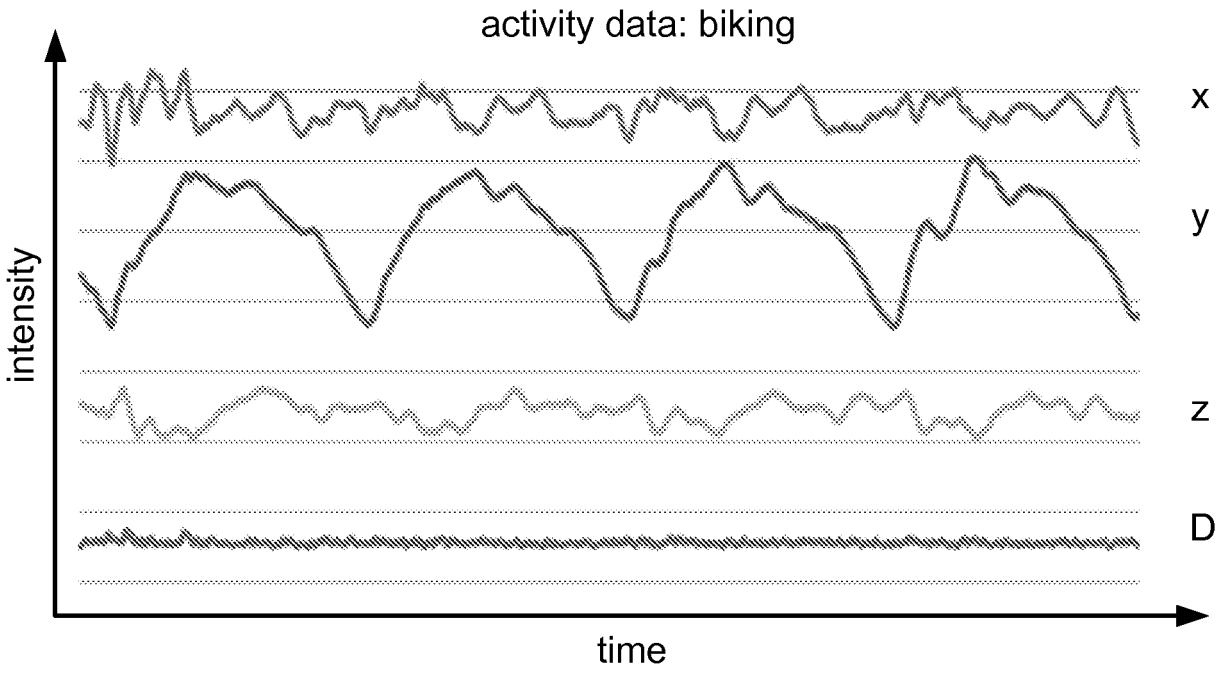

activity data: biking
x
y
z
D
intensity
time

FIG. 4B

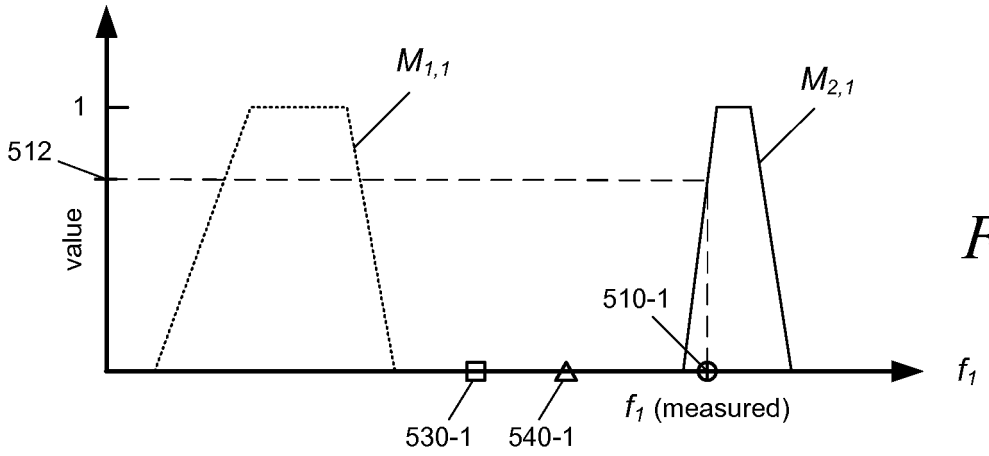


FIG. 5A

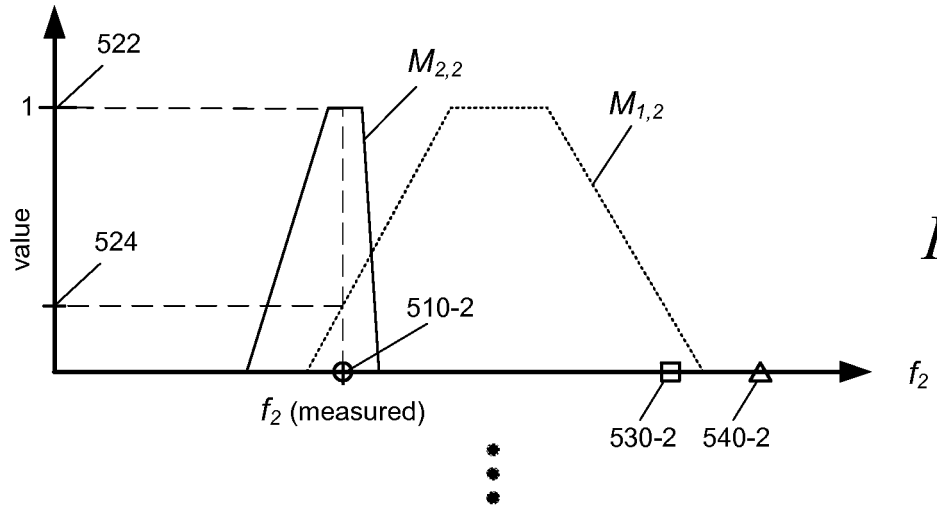


FIG. 5B

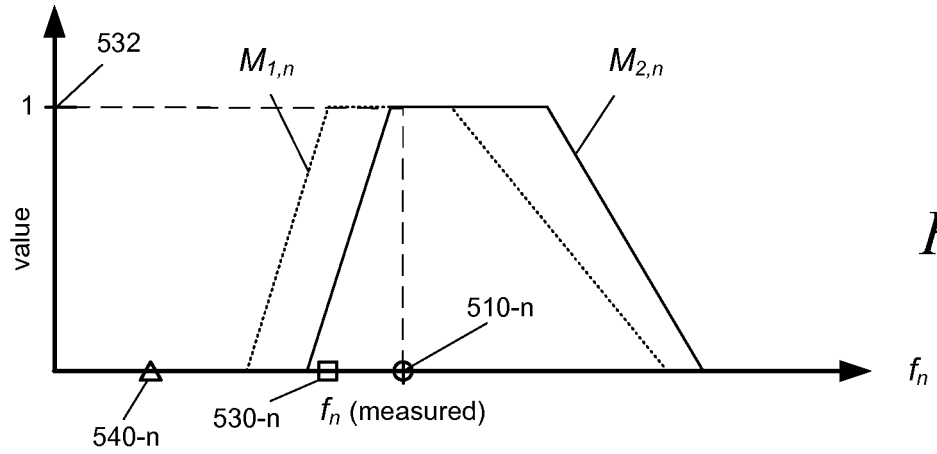


FIG. 5C

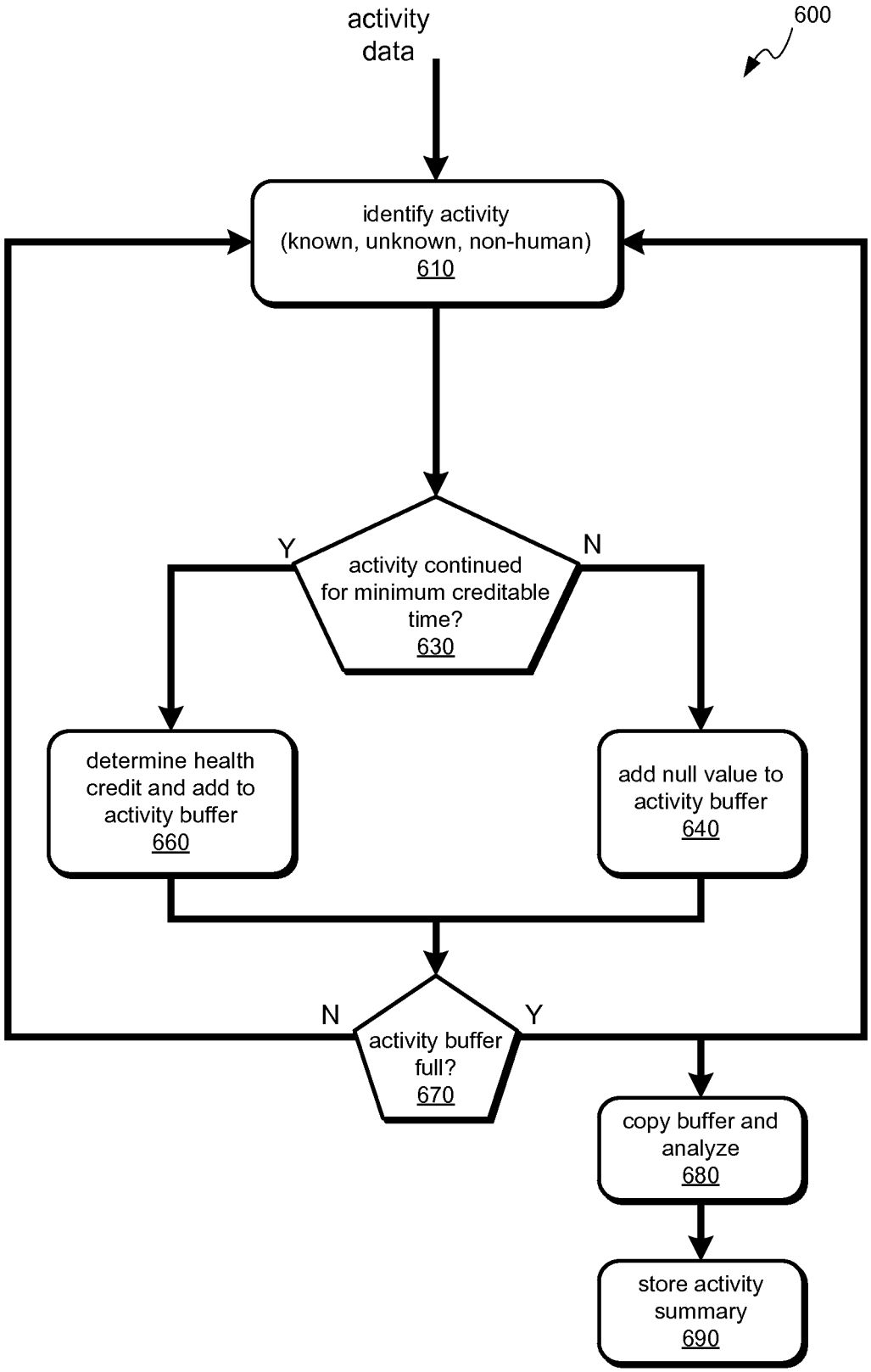

activity data
600
identify activity (known, unknown, non-human) 610
activity continued for minimum creditable time? 630
Y
N
determine health credit and add to activity buffer 660
add null value to activity buffer 640
activity buffer full? 670
N
Y
copy buffer and analyze 680
store activity summary 690

FIG. 6

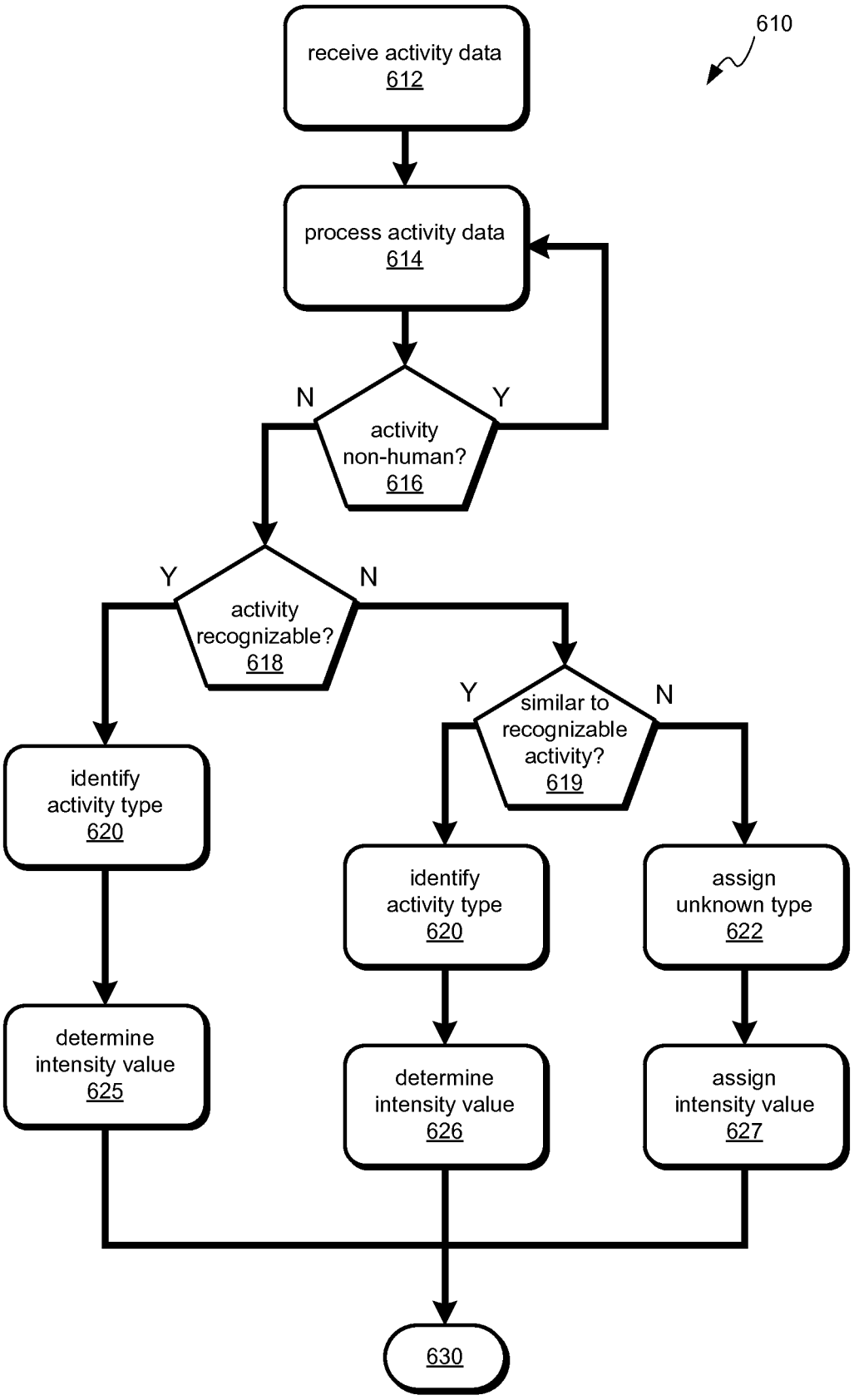

610
receive activity data
612
process activity data
614
activity
non-human?
616
N
Y
activity
recognizable?
618
Y
N
similar to
recognizable
activity?
619
Y
N
identify
activity type
620
identify
activity type
620
assign
unknown type
622
determine
intensity value
625
determine
intensity value
626
assign
intensity value
627
630

FIG. 7A

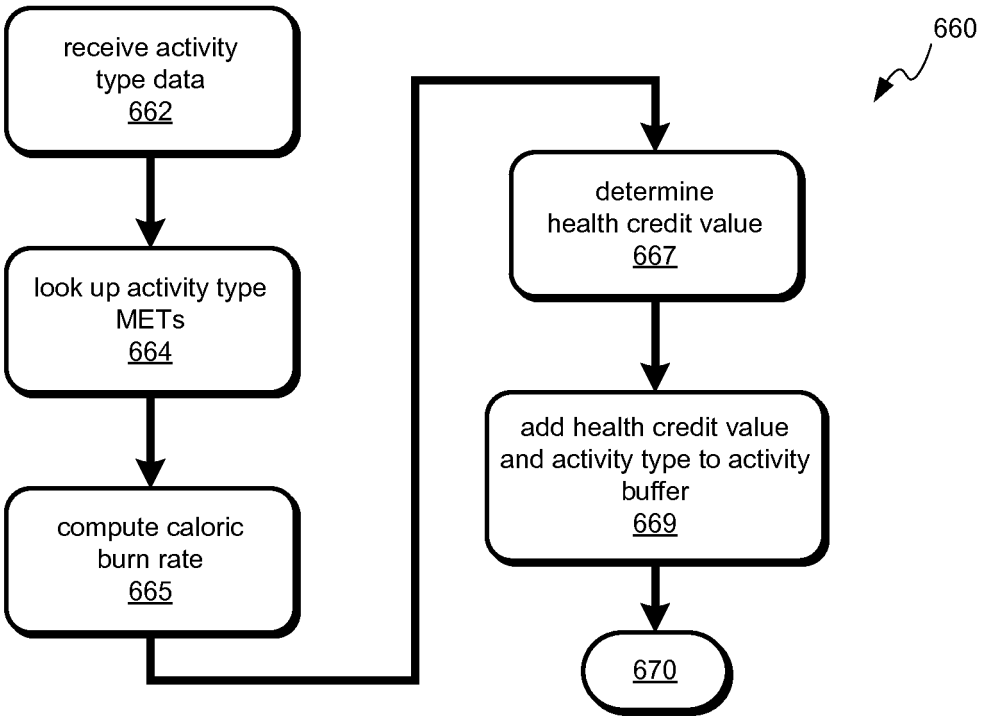

receive activity type data 662
look up activity type METs 664
compute caloric burn rate 665
determine health credit value 667
add health credit value and activity type to activity buffer 669
670
660

FIG. 7B

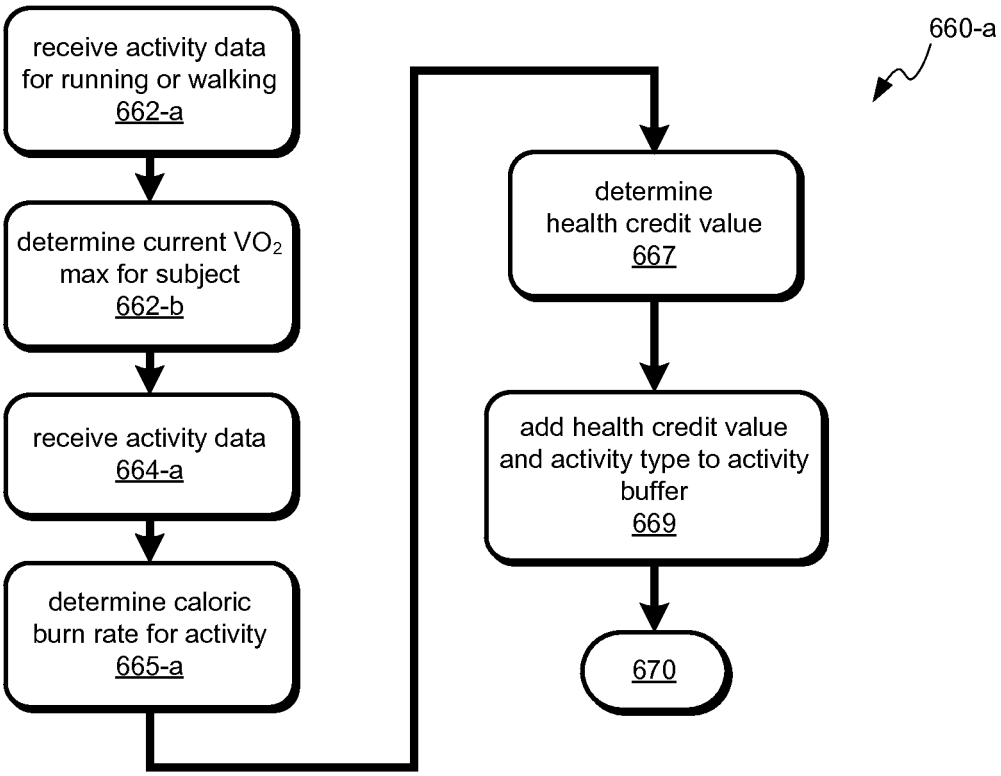

receive activity data for running or walking 662-a
determine current VO_2 max for subject 662-b
receive activity data 664-a
determine caloric burn rate for activity 665-a
determine health credit value 667
add health credit value and activity type to activity buffer 669
670
660-a

FIG. 7C

802

activity type 810	intensity 812	METs 814	
0110	00110	01000	running, 4-6 mph
0110	01000	01011	running, 6-8 mph
0110	01010	01101	running, 8-10 mph
0110	01100	10000	running, 10-12 mph
0110	01110	10101	running, 12-14 mph
⋮			
1011	00000	00101	aerobics, low impact
1011	00001	00111	aerobics, high impact
⋮			
0001	00000	00001	resting
⋮			

FIG. 8A

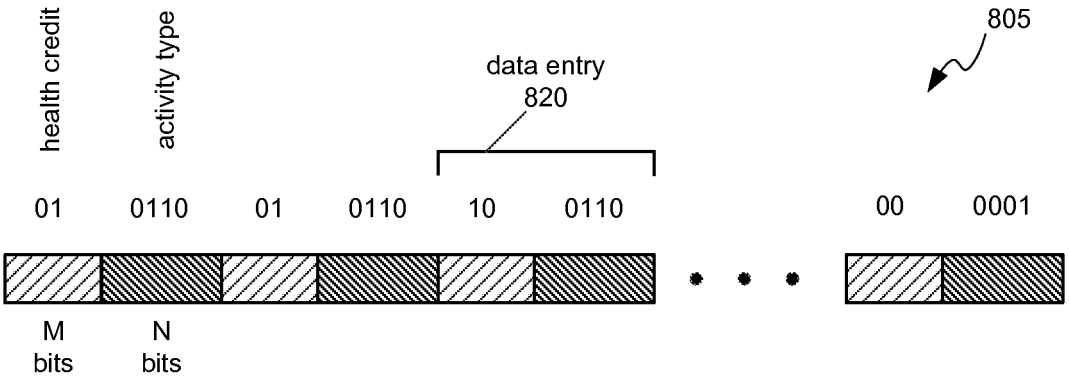


FIG. 8B

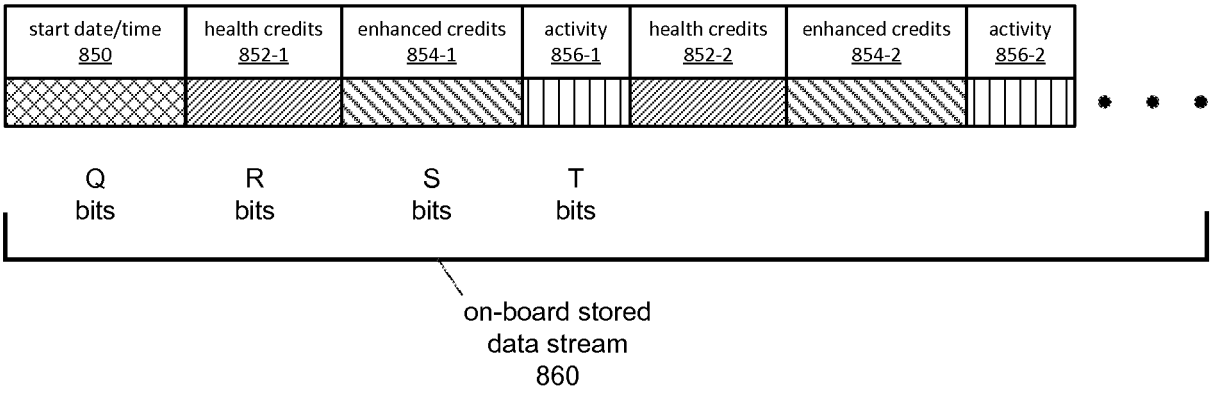


FIG. 8C

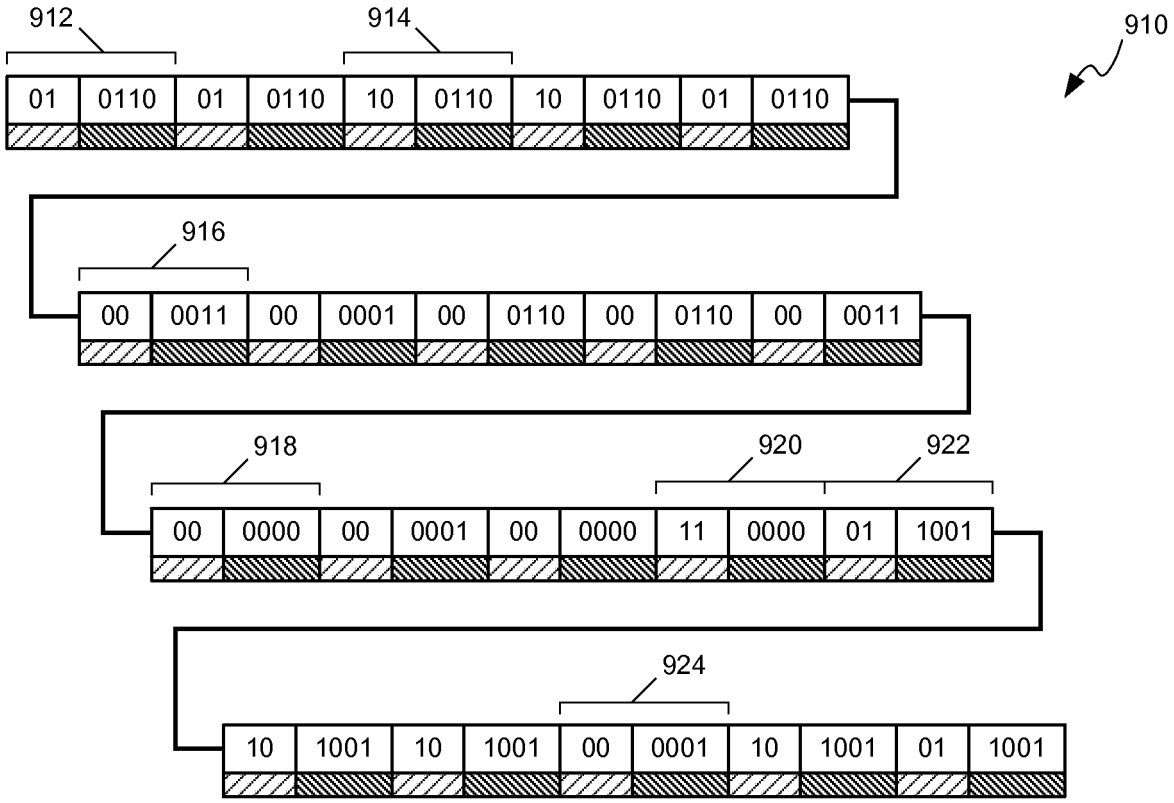


FIG. 9A

930

health credits 852-n	enhanced credits 854-n	activity 856-n
001111	0000	1001

950

carry time 952	carry credits 954
00101	01000

FIG. 9B

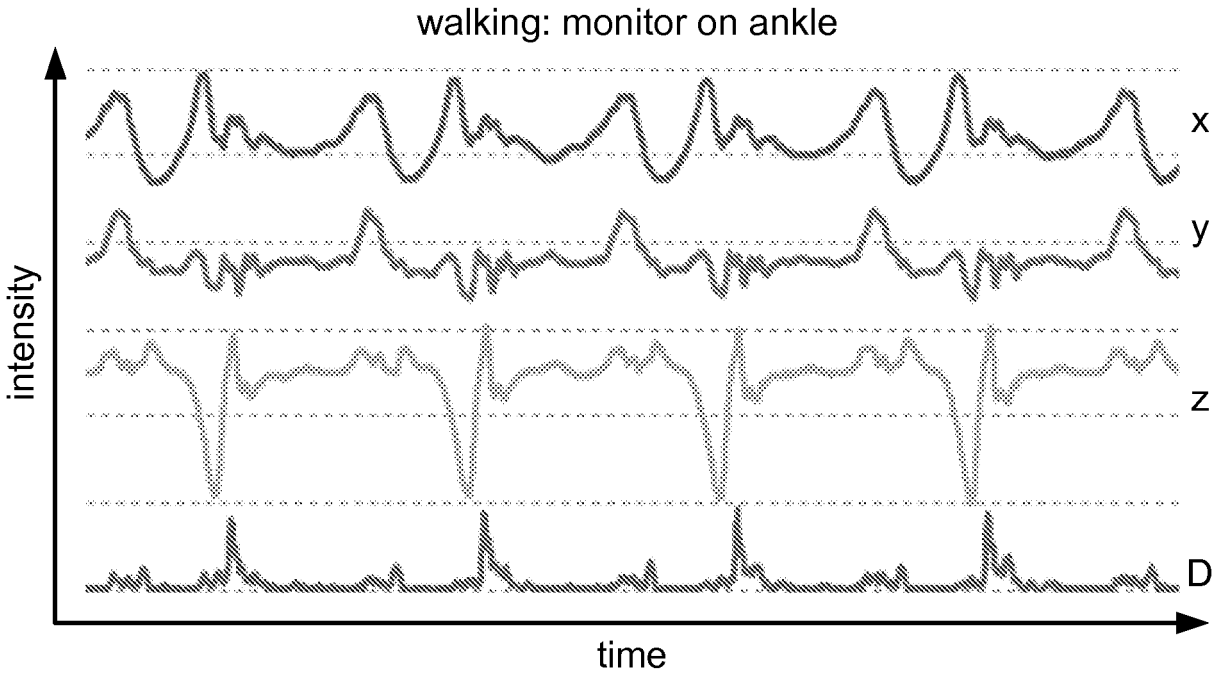


FIG. 10A

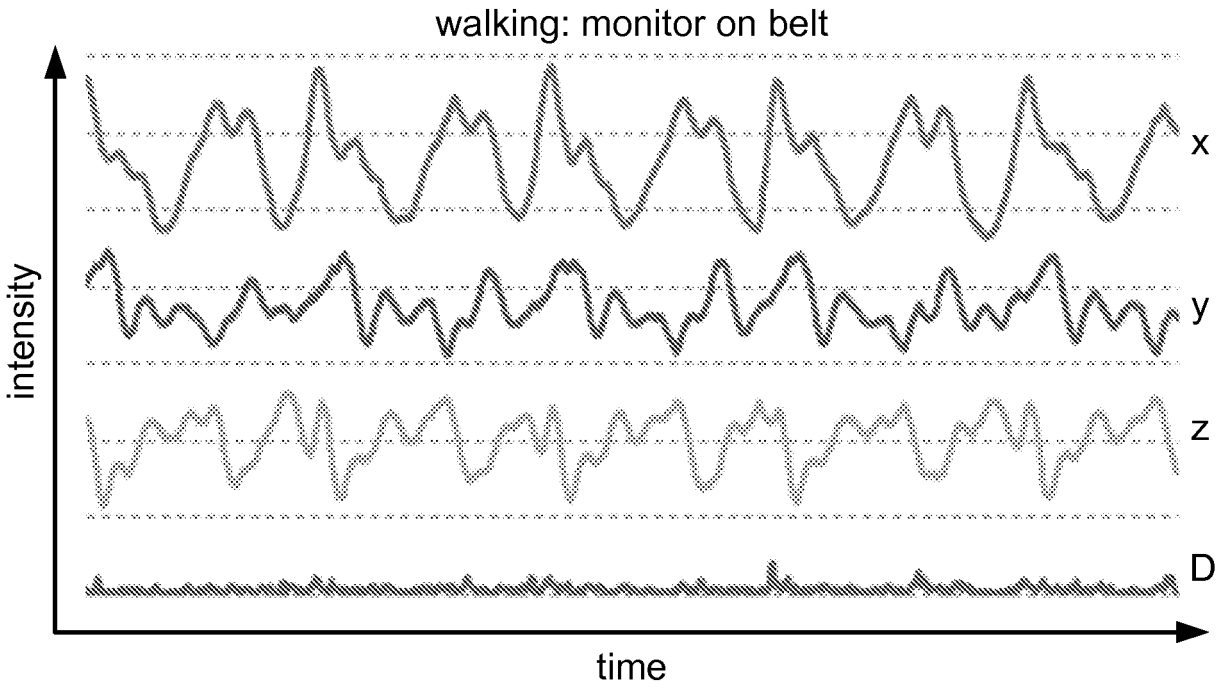


FIG. 10B

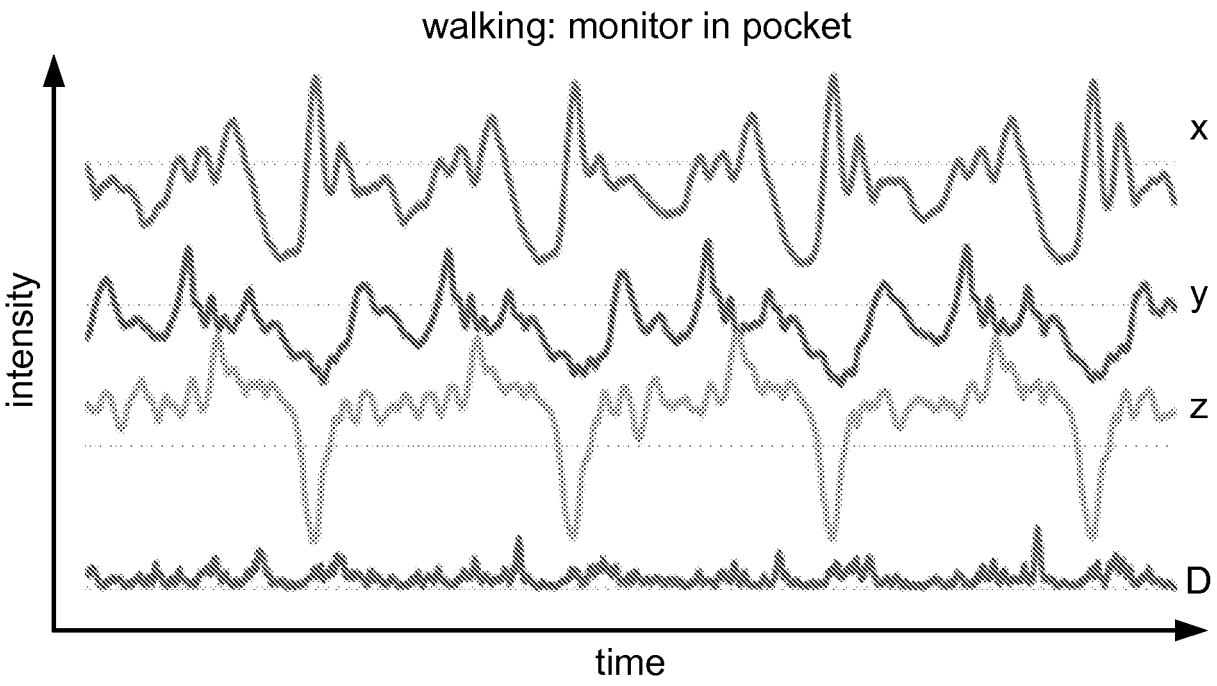


FIG. 10C