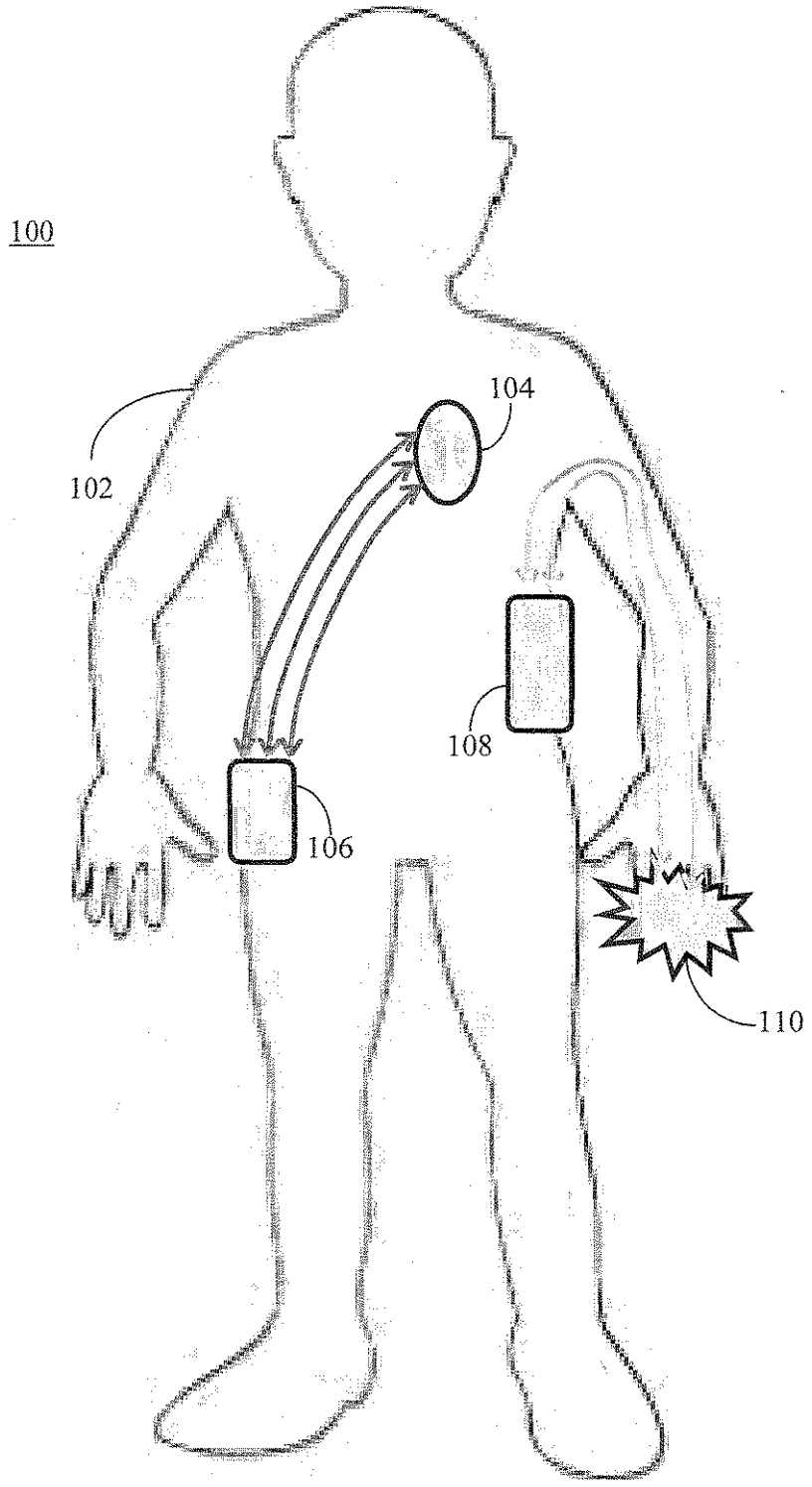


FIG. 1

200

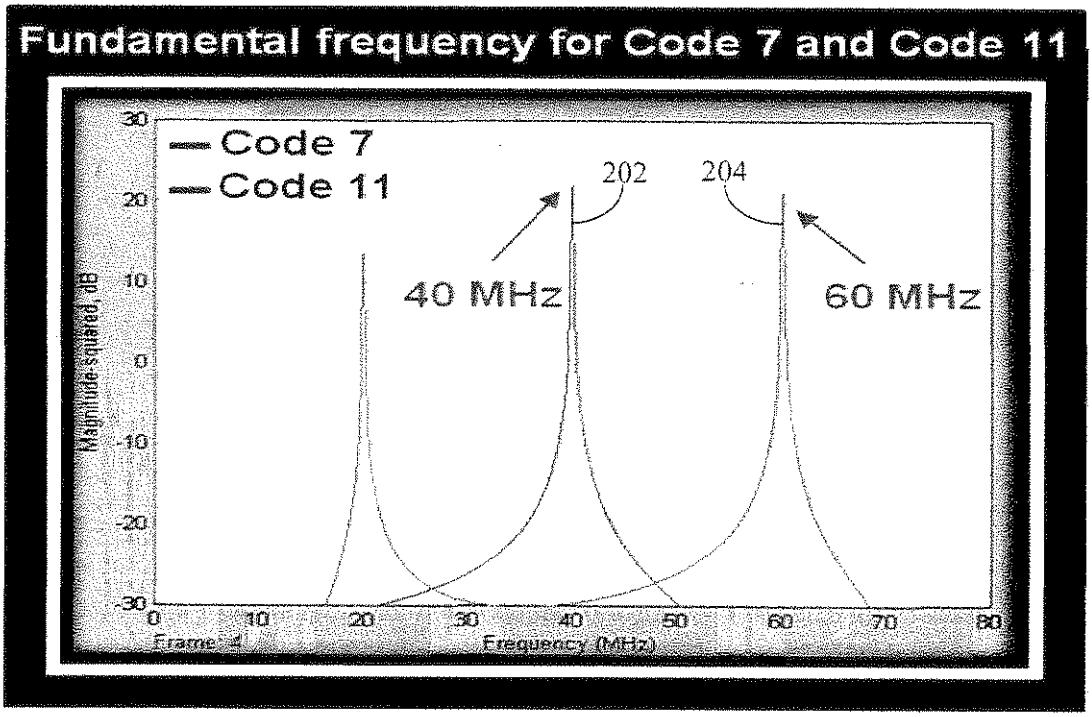


FIG. 2
PRIOR ART

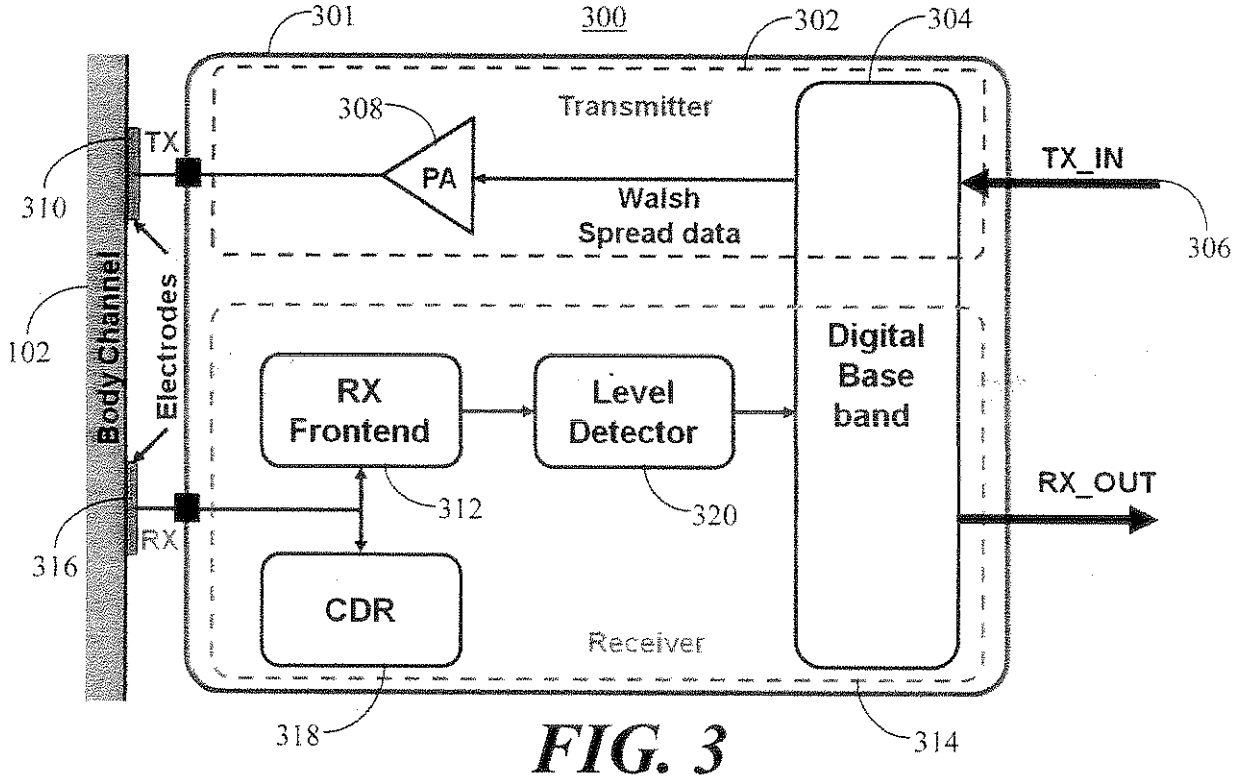
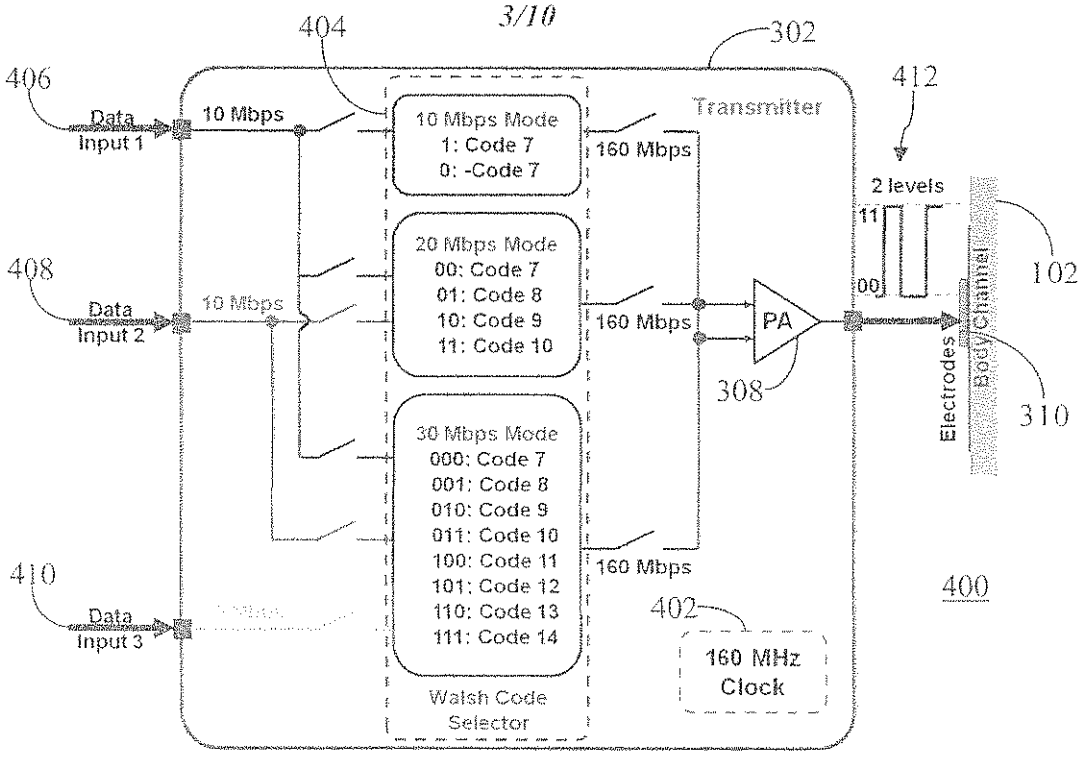


FIG. 3



Bits/Symbol	Max Data Rate (Mbps)	Number of Walsh Code Required
1	10	1
2	20	4
3	30	8

FIG. 4A

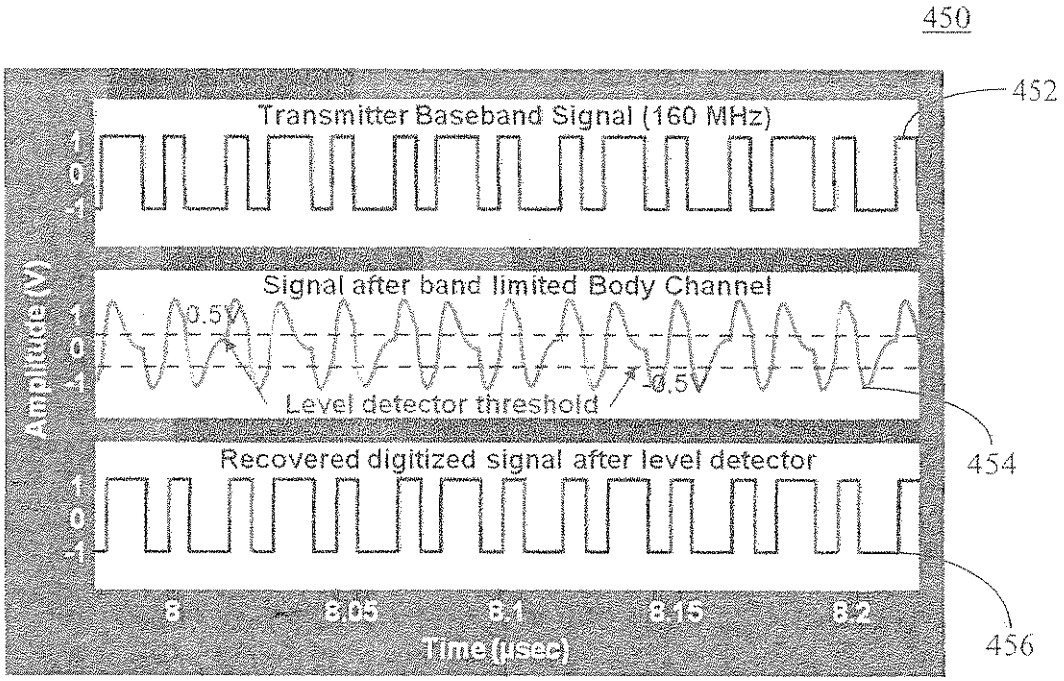


FIG. 4B

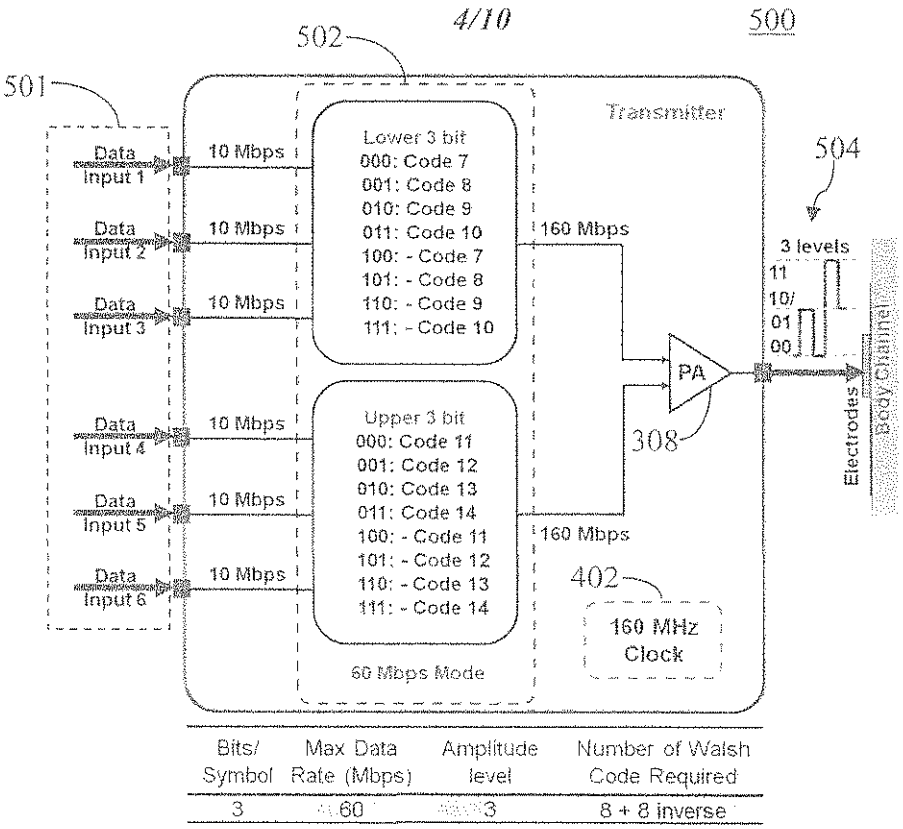

500
502
501
Transmitter
Data Input 1
Data Input 2
Data Input 3
Data Input 4
Data Input 5
Data Input 6
10 Mbps
Lower 3 bit
000: Code 7
001: Code 8
010: Code 9
011: Code 10
100: - Code 7
101: - Code 8
110: - Code 9
111: - Code 10
Upper 3 bit
000: Code 11
001: Code 12
010: Code 13
011: Code 14
100: - Code 11
101: - Code 12
110: - Code 13
111: - Code 14
60 Mbps Mode
160 Mbps
504
3 levels
11
10/
01
00
PA
308
Electrodes
Body Channel
402
160 MHz Clock
Bits/ Symbol
Max Data Rate (Mbps)
Amplitude level
Number of Walsh Code Required
3
60
3
8 + 8 inverse

FIG. 5A

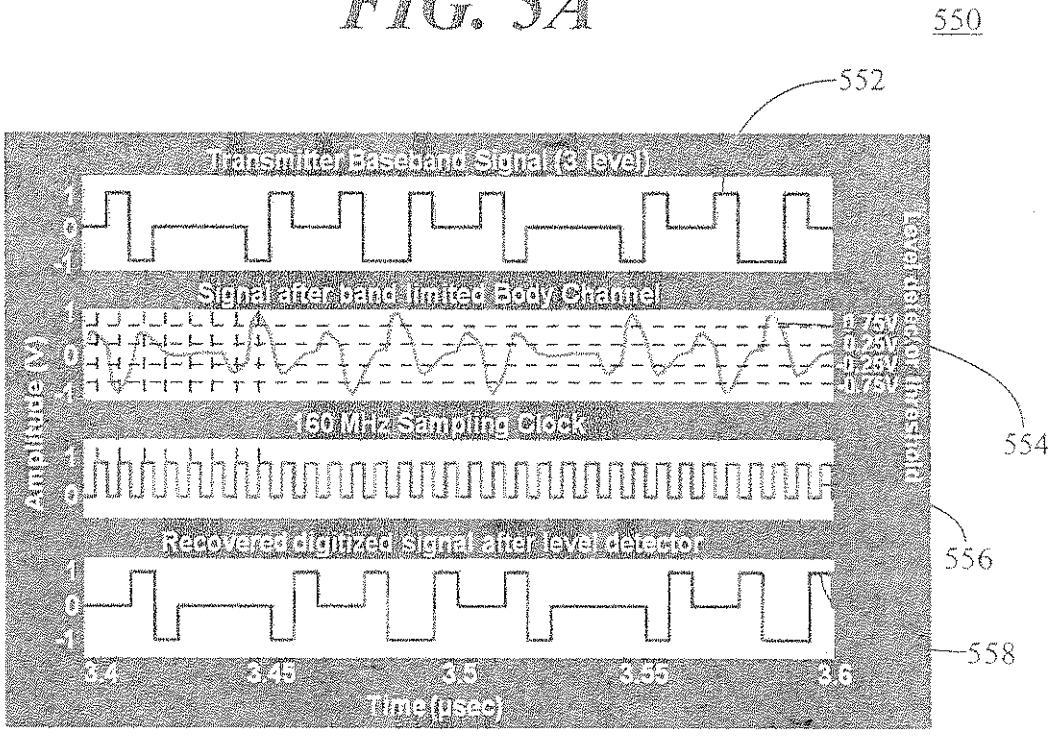

550
552
Transmitter Baseband Signal (3 level)
Signal after band limited Body Channel
160 MHz Sampling Clock
Recovered digitized signal after level detector
Amplitude (V)
Level detector threshold
0.75V
0.25V
-0.25V
-0.75V
554
556
558
3.4
3.45
3.5
3.55
3.6
Time (μsec)

FIG. 5B

600

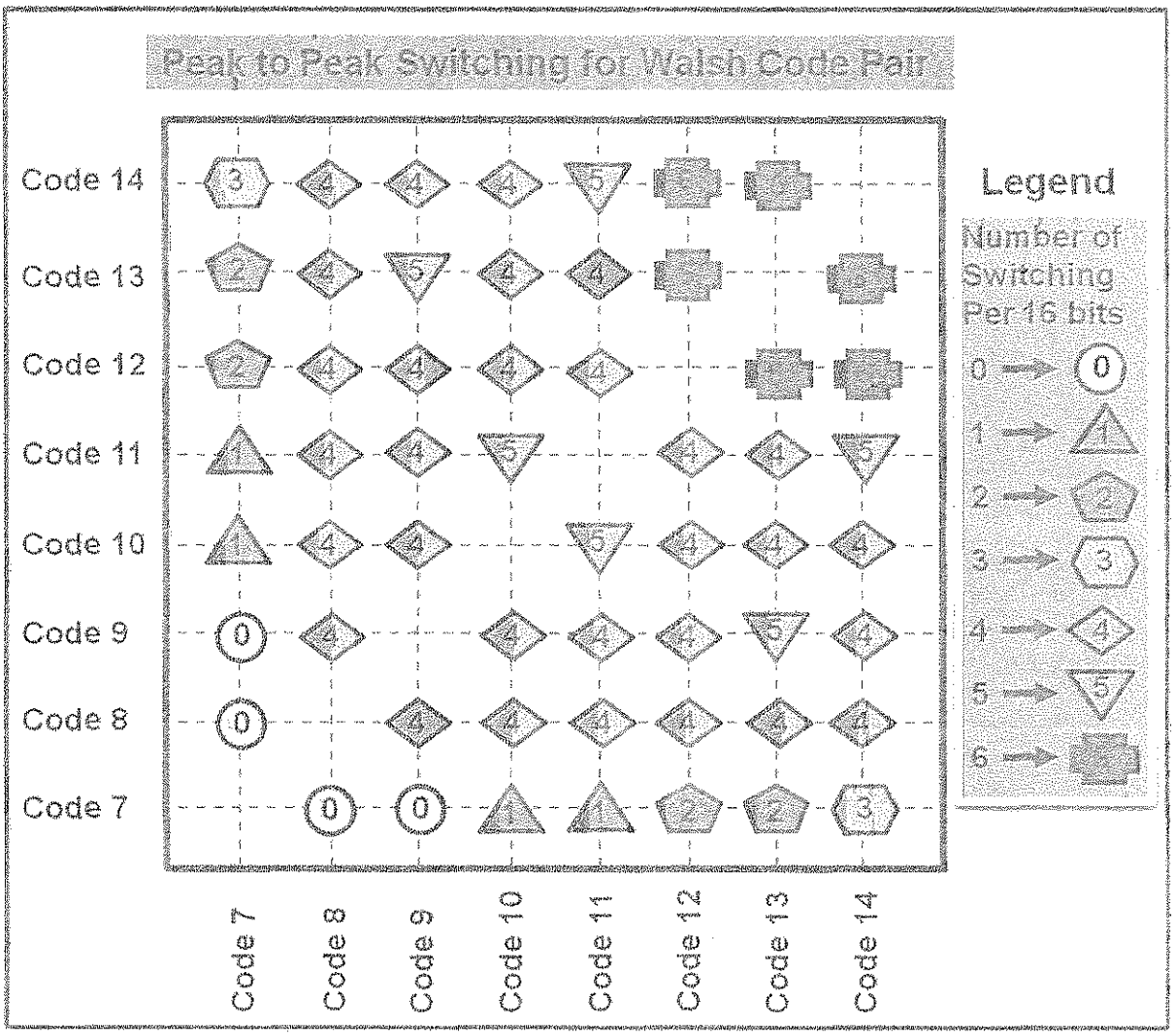


FIG. 6

PRIOR ART

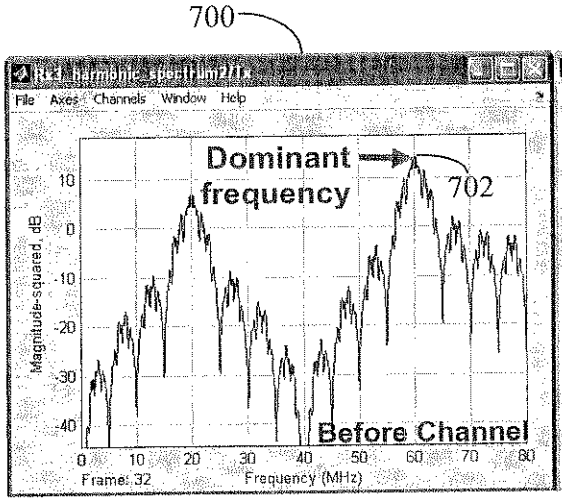


FIG. 7A

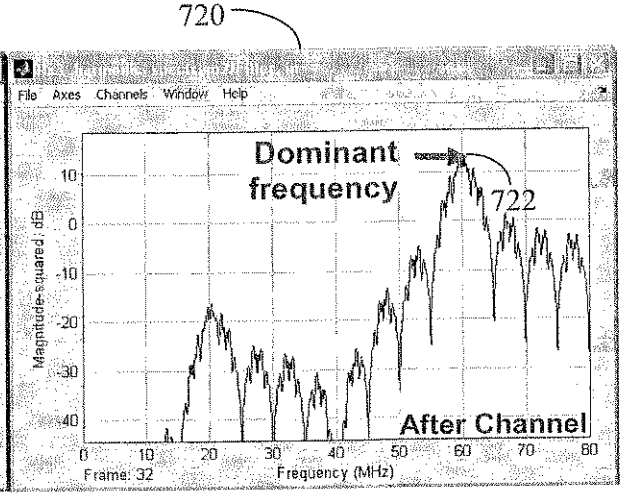


FIG. 7B

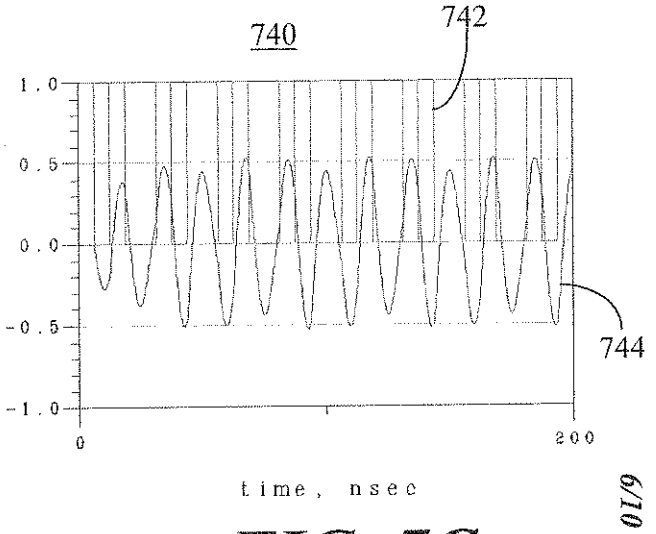


FIG. 7C

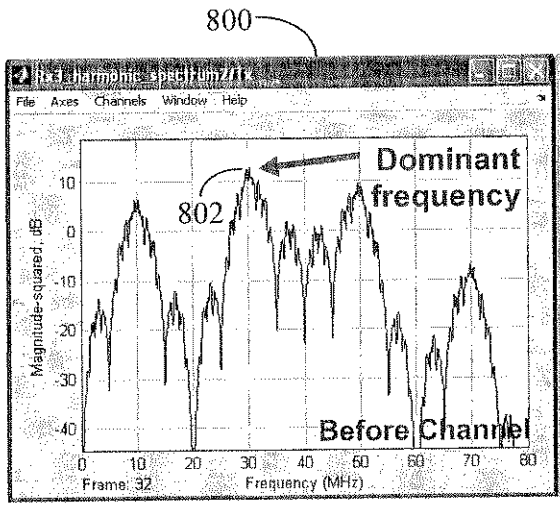


FIG. 8A

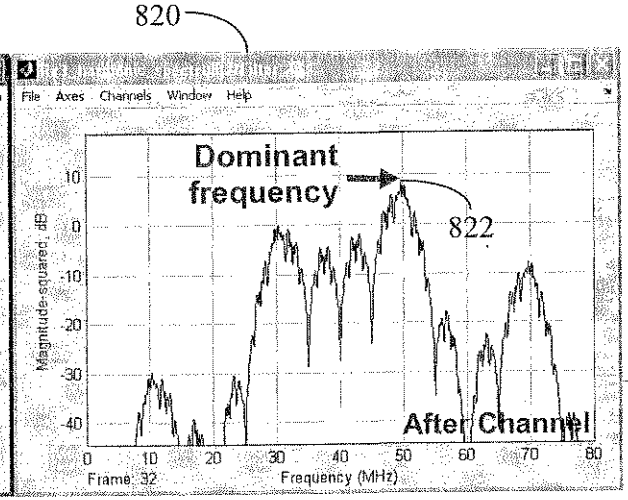


FIG. 8B

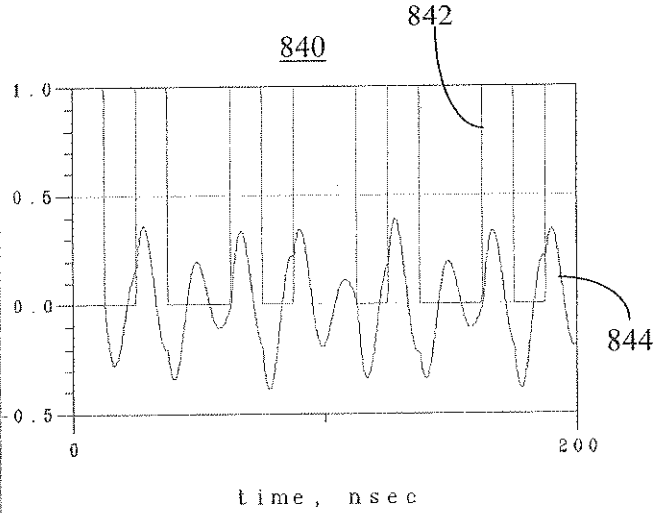


FIG. 8C

900

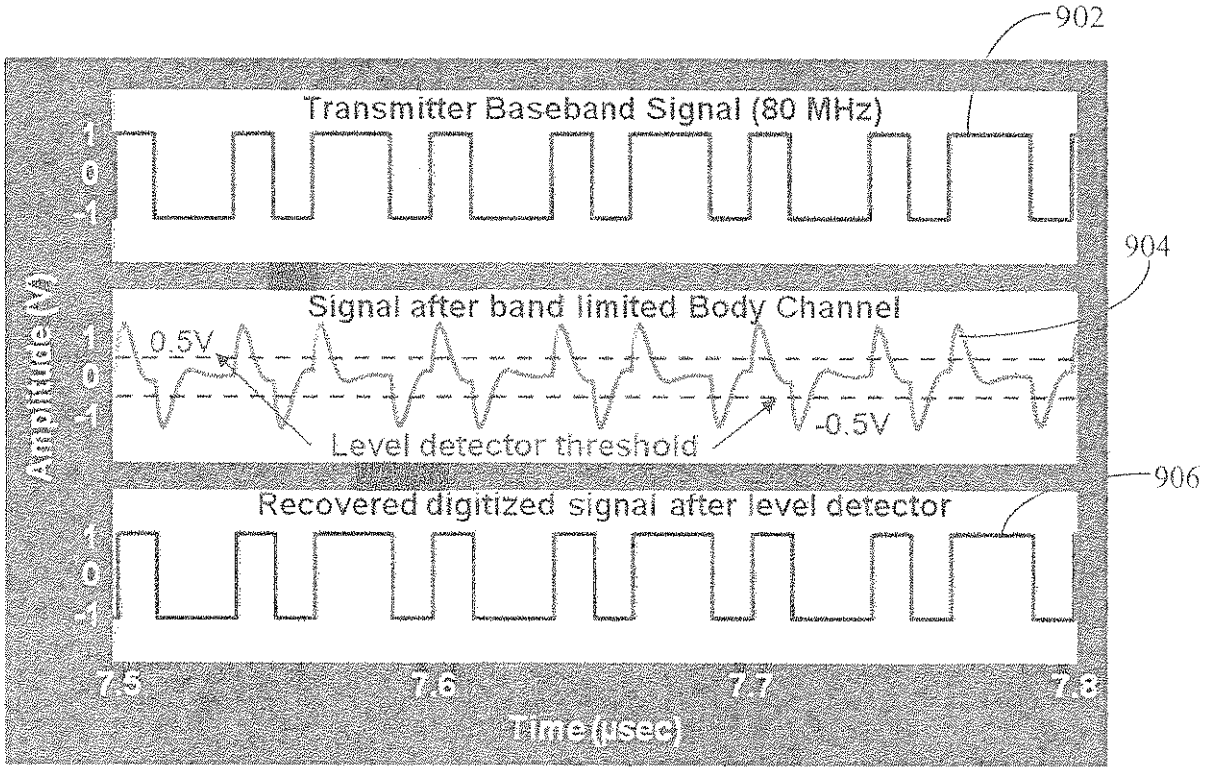

902
Transmitter Baseband Signal (80 MHz)
904
Signal after band limited Body Channel
0.5V
-0.5V
Level detector threshold
906
Recovered digitized signal after level detector
Amplitude (V)
1.0
0.5
0.0
-0.5
-1.0
7.5
7.6
7.7
7.8
Time (usec)

FIG. 9

1000

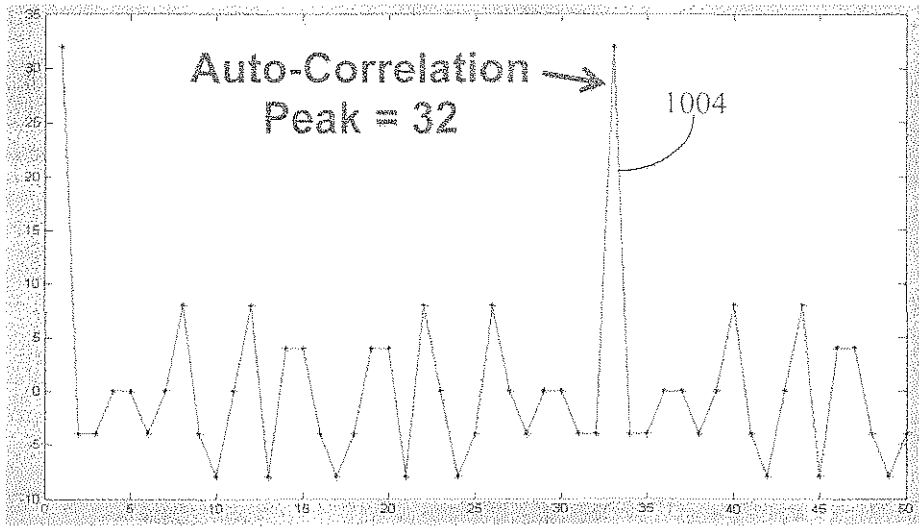


FIG. 10A
PRIOR ART

1020

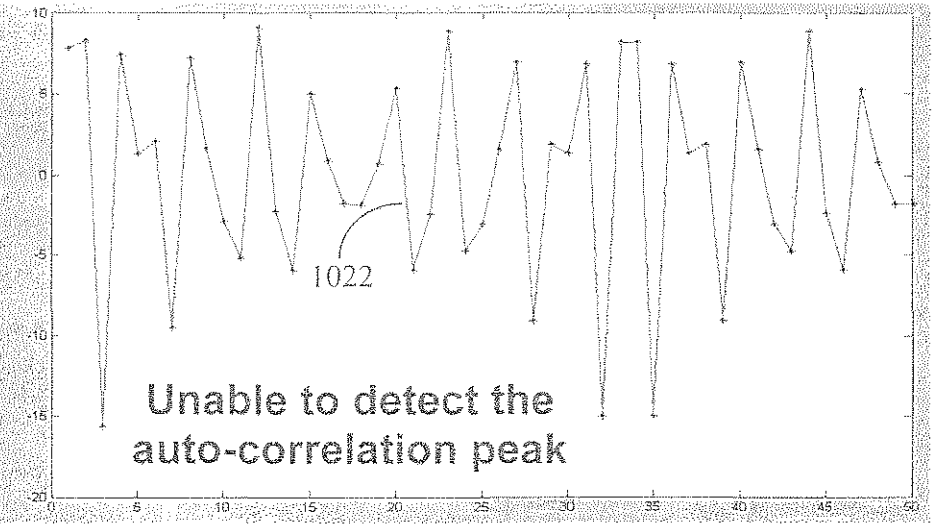


FIG. 10B
PRIOR ART

1100

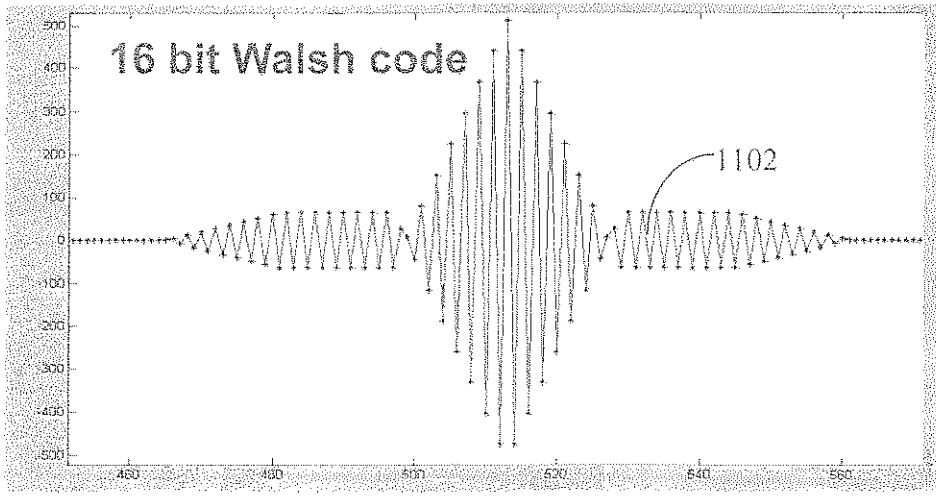


FIG. 11A

1120

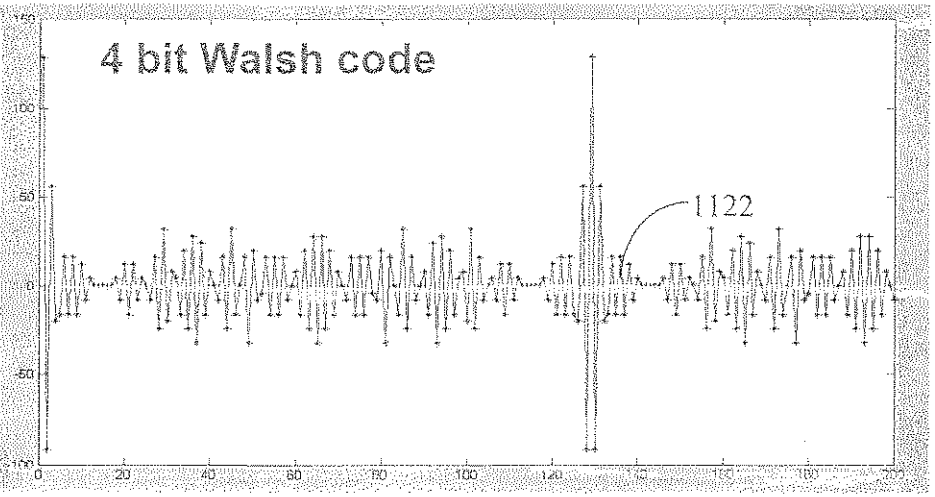


FIG. 11B

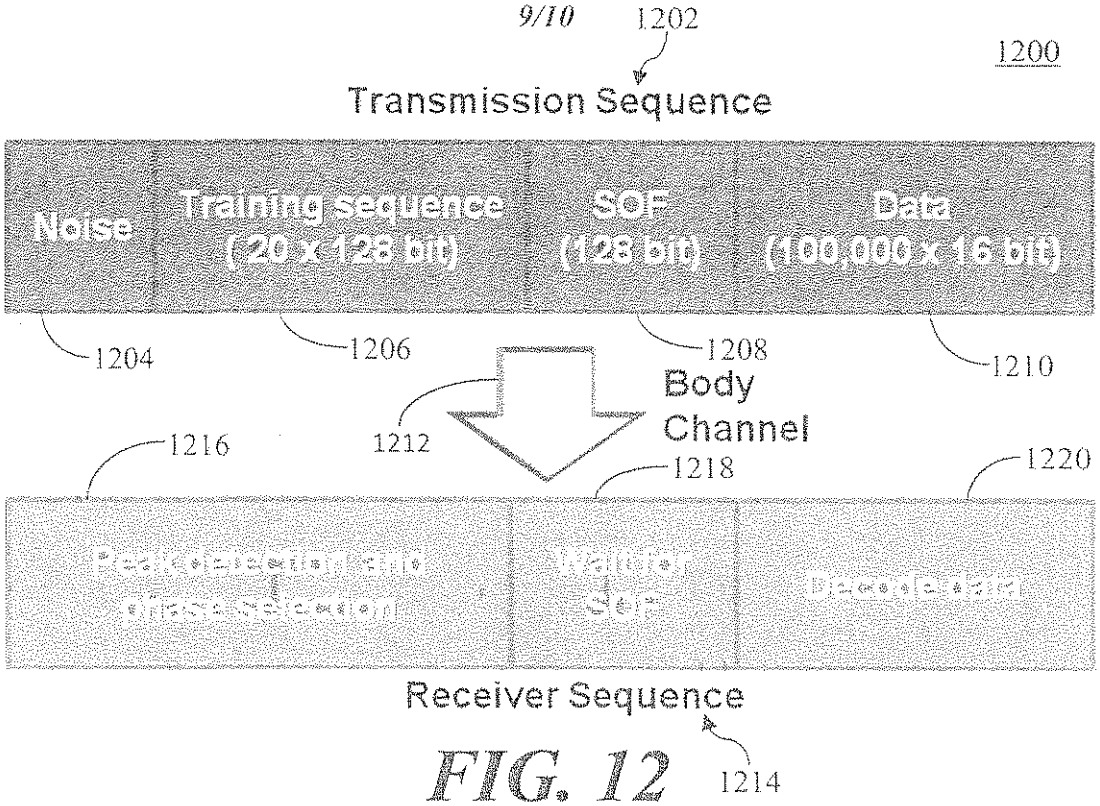

1202
1200
Transmission Sequence
Noise
Training sequence
(20 x 128 bit)
SOF
(128 bit)
Data
(100,000 x 16 bit)
1204
1206
1208
1210
Body
Channel
1212
1216
1218
1220
Receiver Sequence
1214

FIG. 12

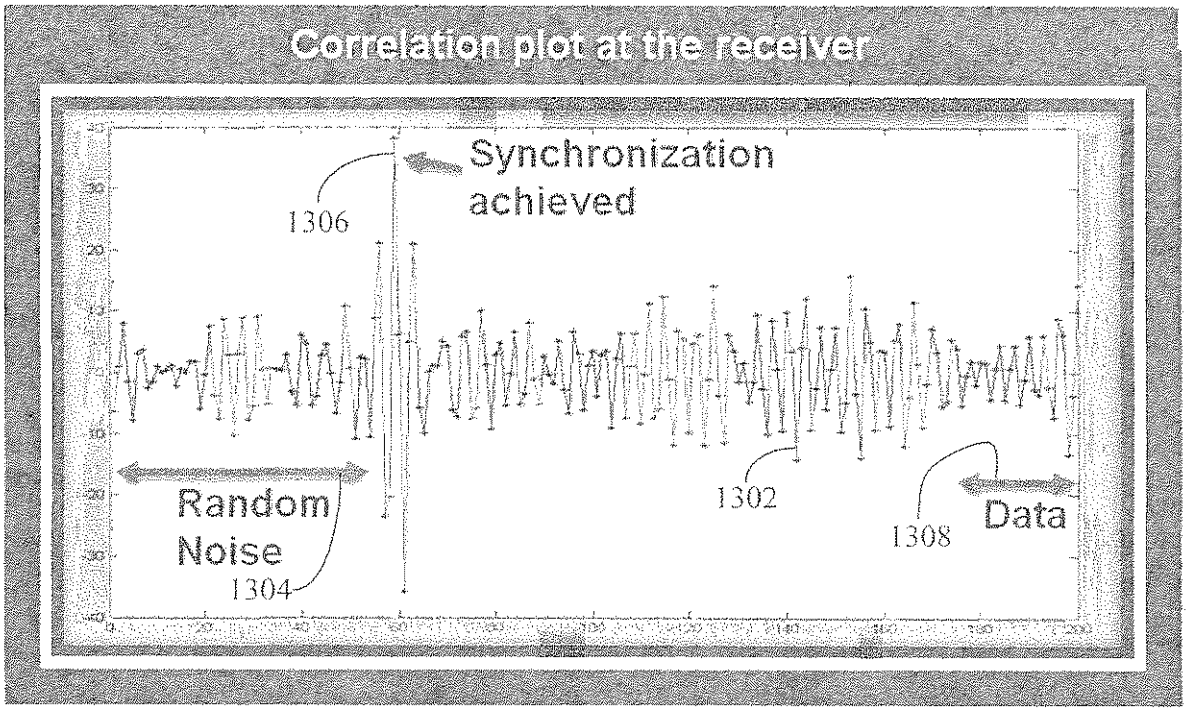

1300
Correlation plot at the receiver
Synchronization
achieved
1306
Random
Noise
1304
1302
1308
Data

FIG. 13

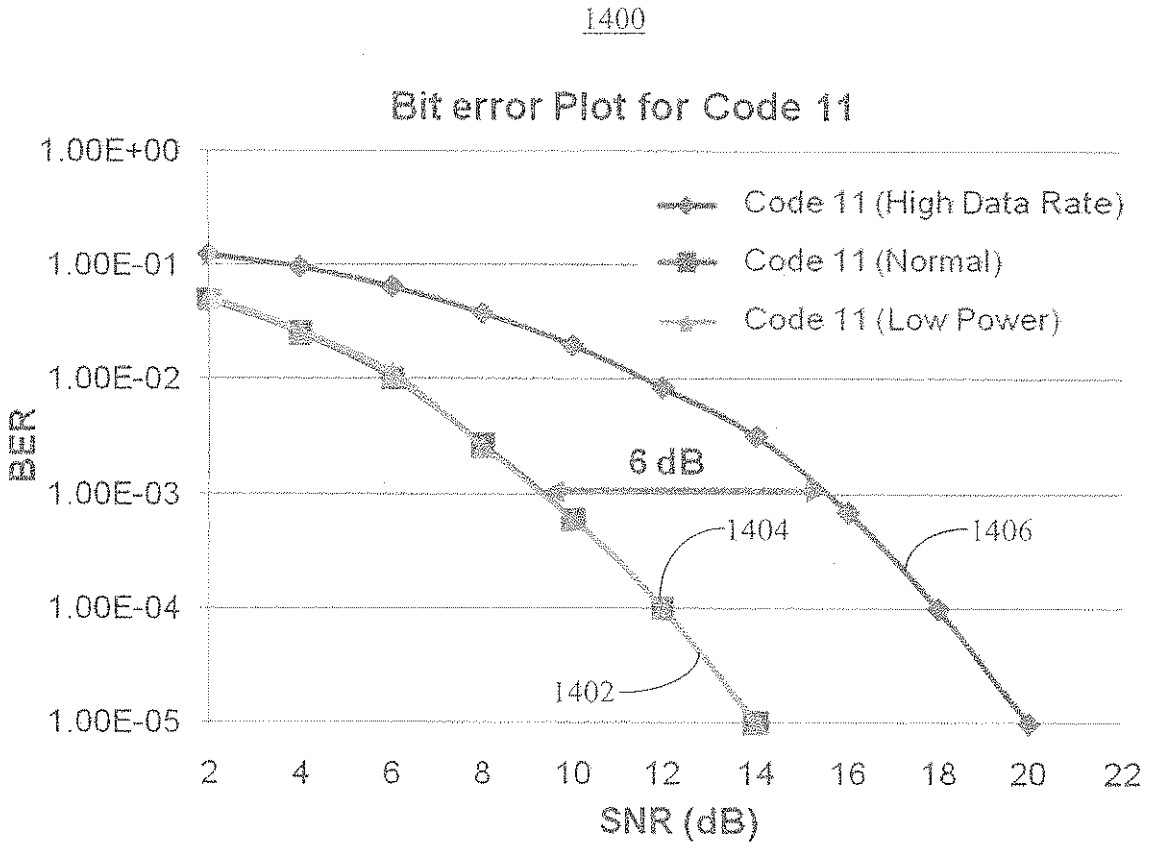

1400
Bit error Plot for Code 11
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
BER
Code 11 (High Data Rate)
Code 11 (Normal)
Code 11 (Low Power)
6 dB
1404
1406
1402
2
4
6
8
10
12
14
16
18
20
22
SNR (dB)

FIG. 14