Fig.1A.

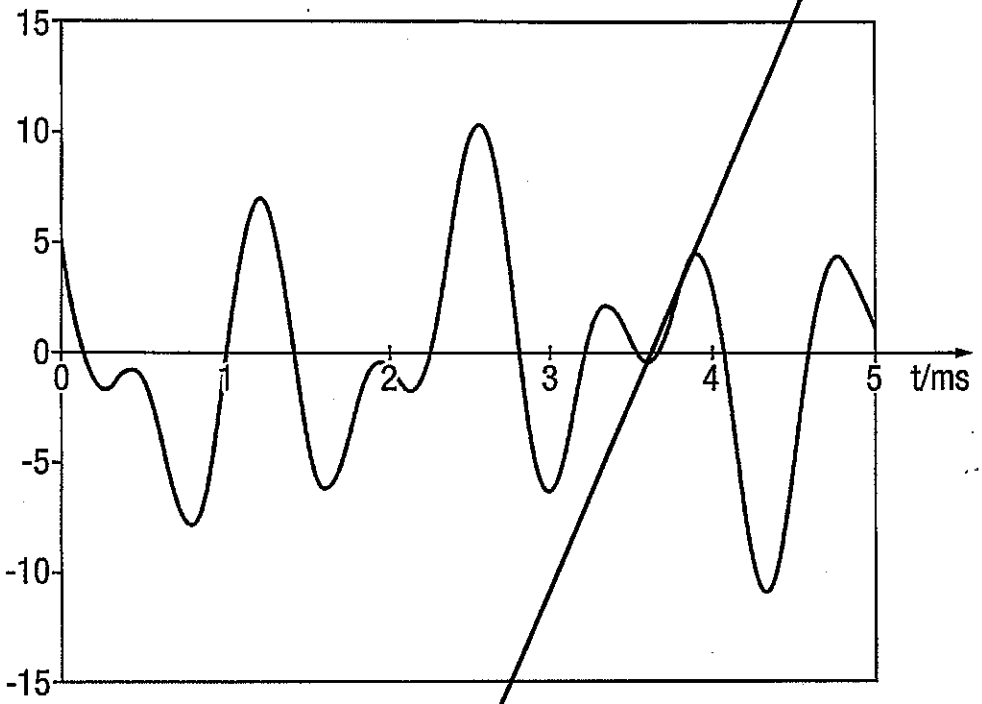


Fig.1B.

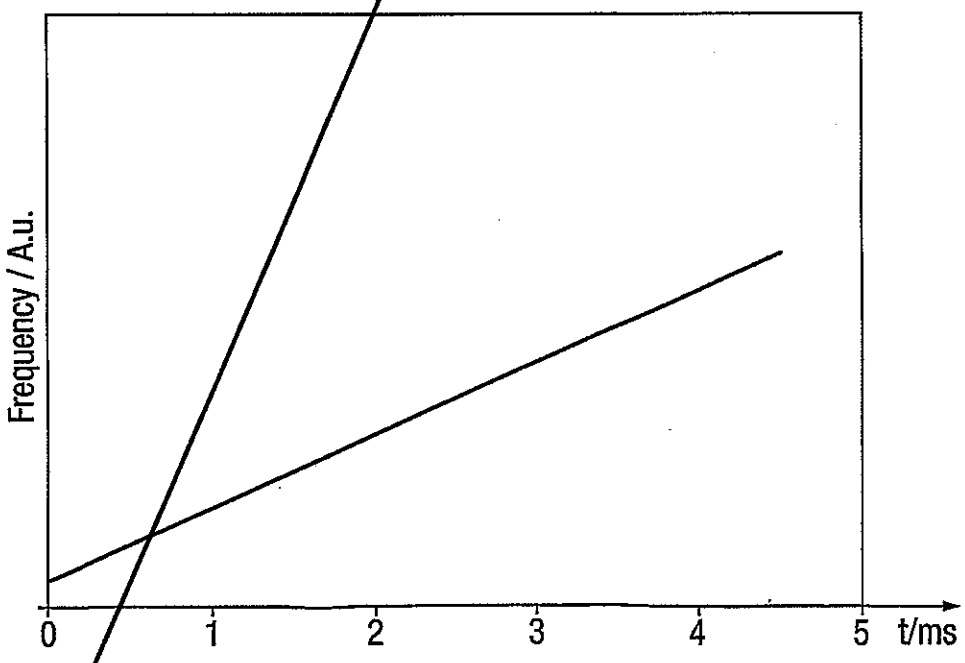


Fig.2A.

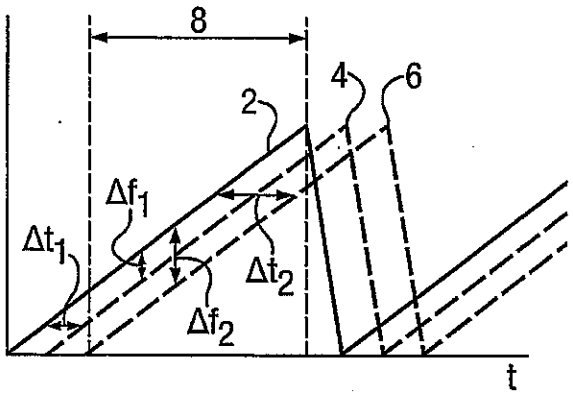


Fig.2B.

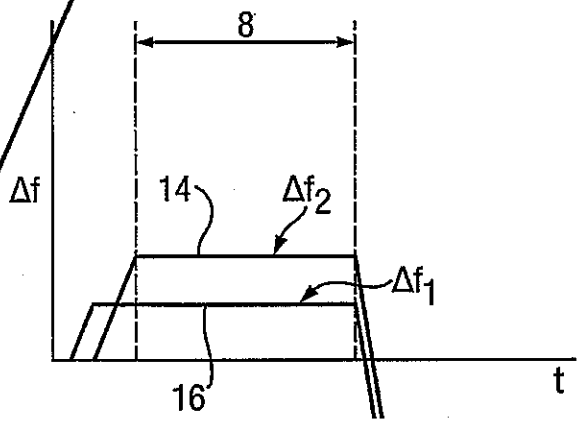


Fig.2C.

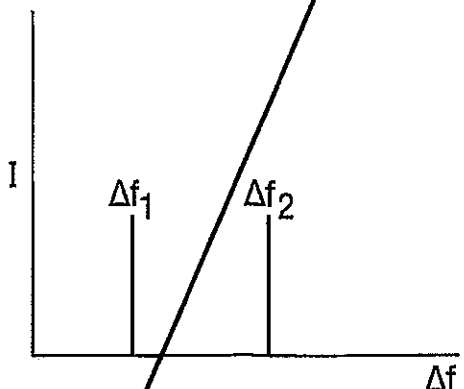


Fig.3A.

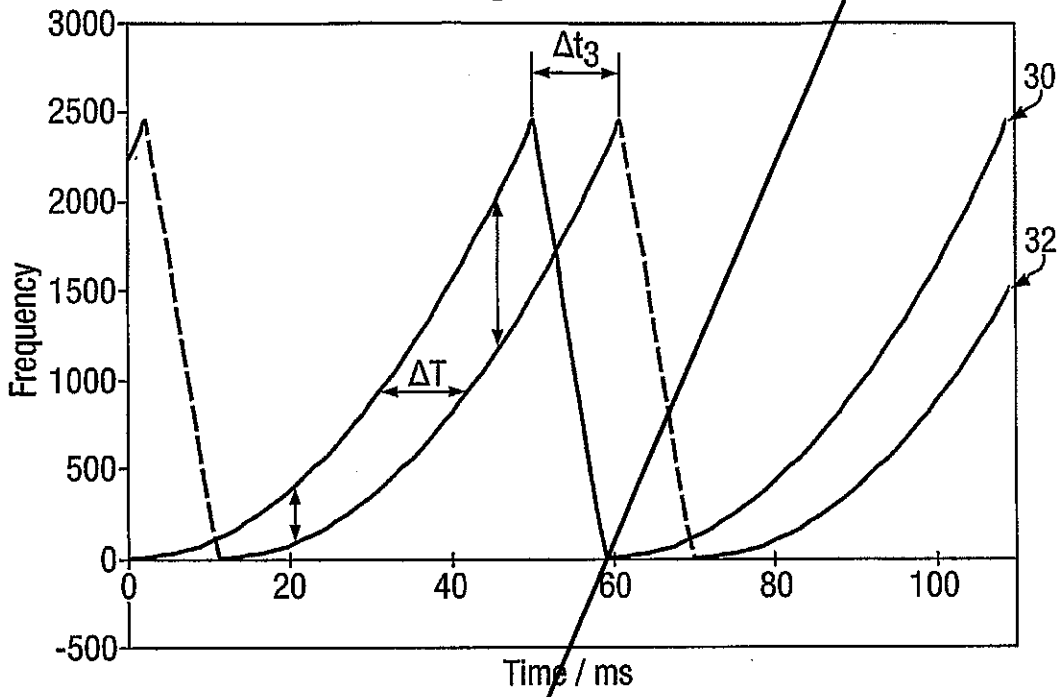

3000
2500
2000
1500
1000
500
0
-500
Frequency
0
20
40
60
80
100
Time / ms
Δt3
ΔT
30
32

Fig.3B.

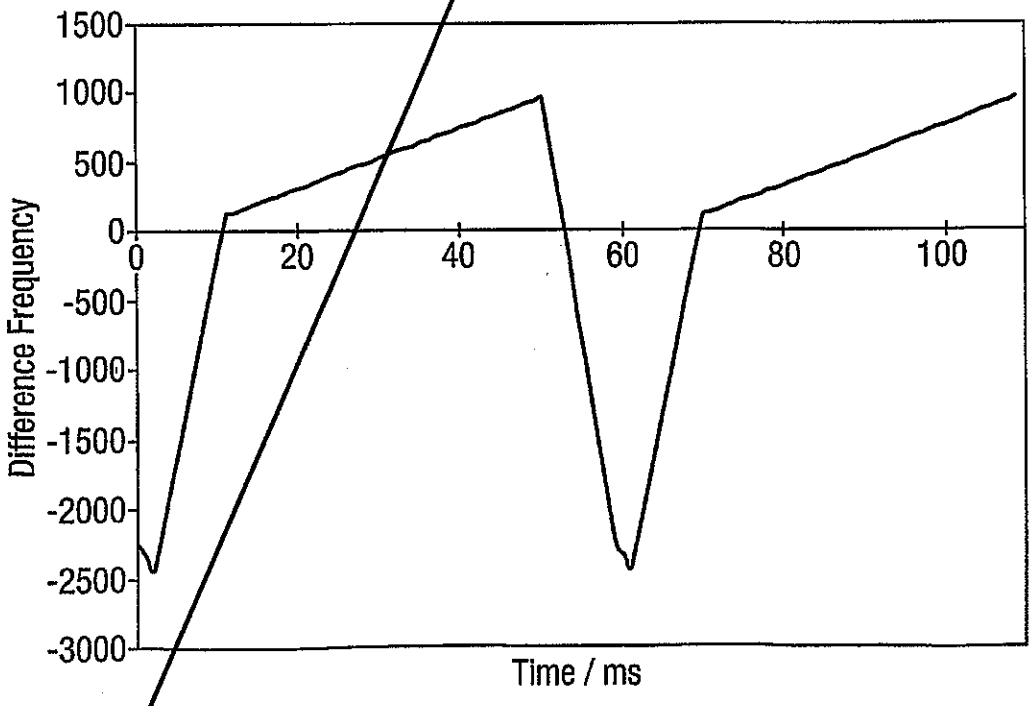

1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
Difference Frequency
0
20
40
60
80
100
Time / ms

Fig.4.

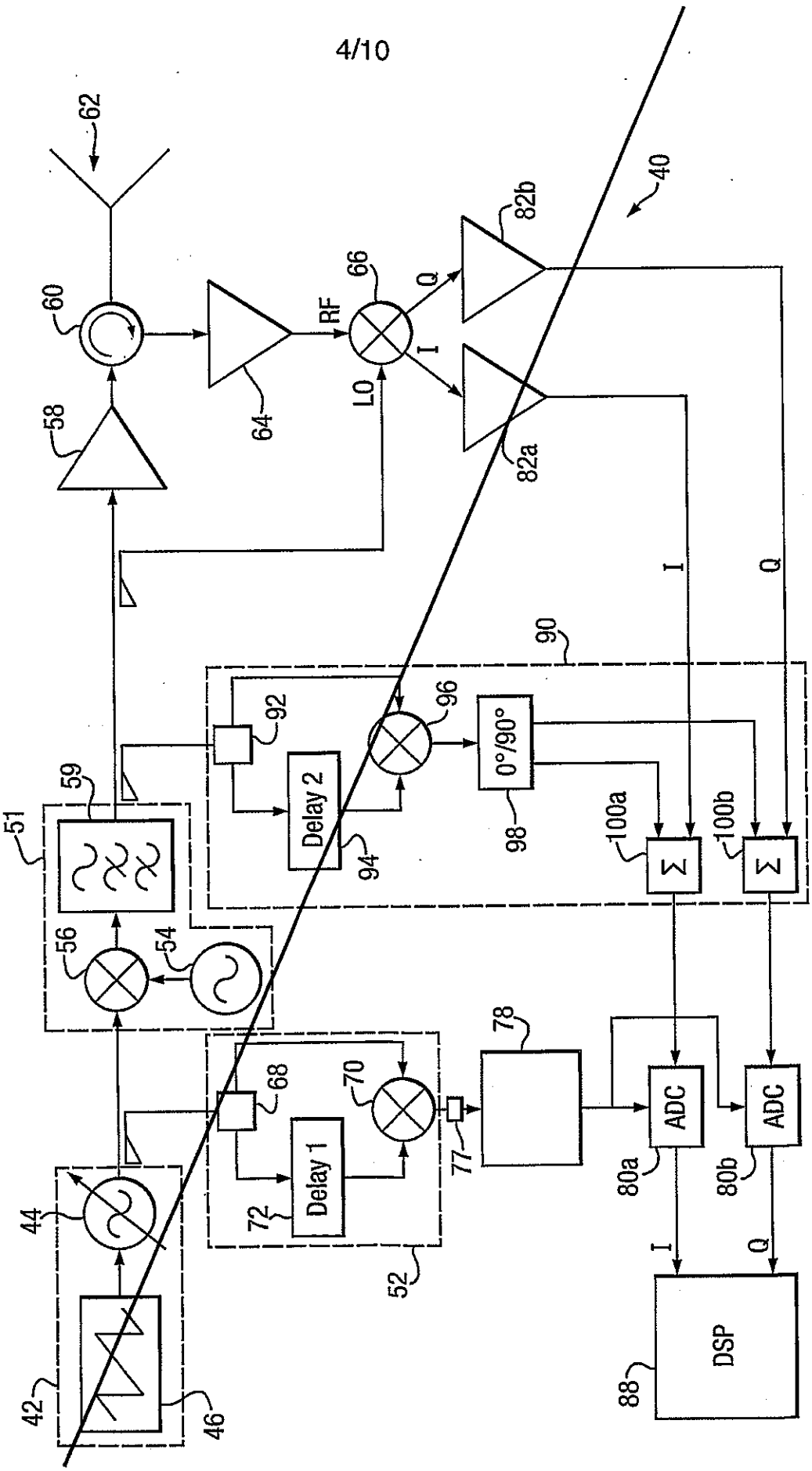

62
60
58
64
RF
66
LO
Q
I
82b
82a
40
I
Q
90
92
96
Delay 2
94
0°/90°
98
100a
100b
Σ
Σ
59
51
56
54
68
70
Delay 1
72
52
77
78
ADC
ADC
80a
80b
I
Q
DSP
88
44
42
46

Fig.5.

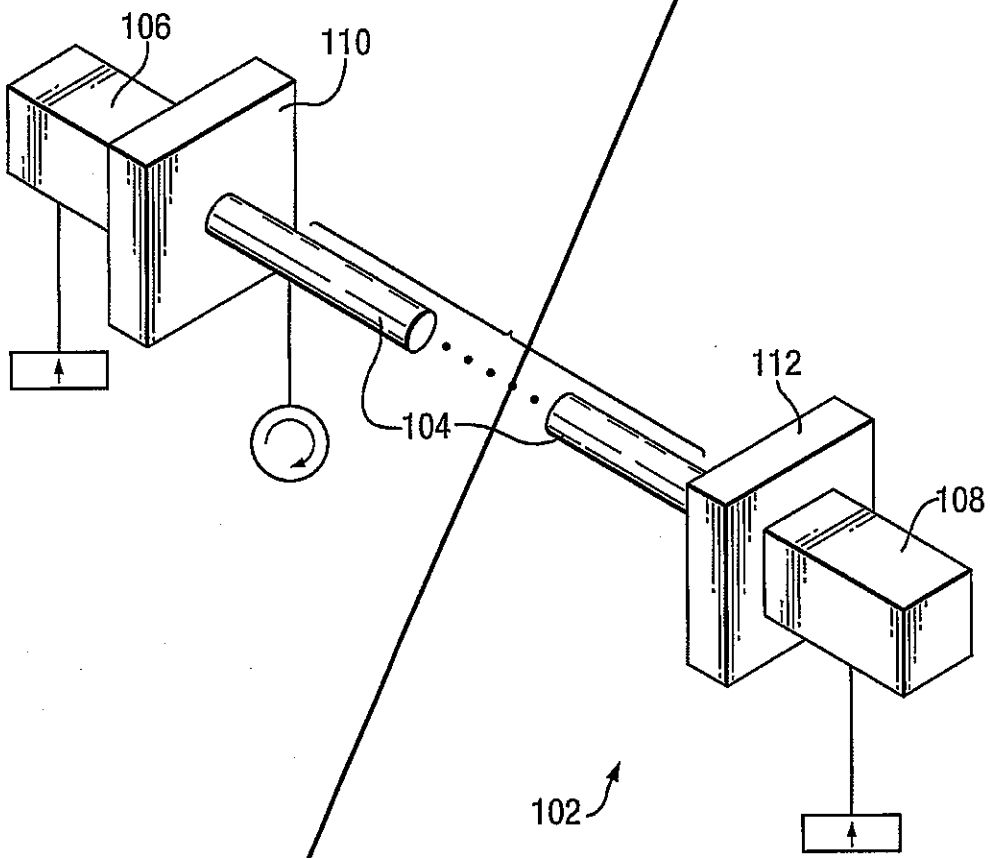


Fig.6A.

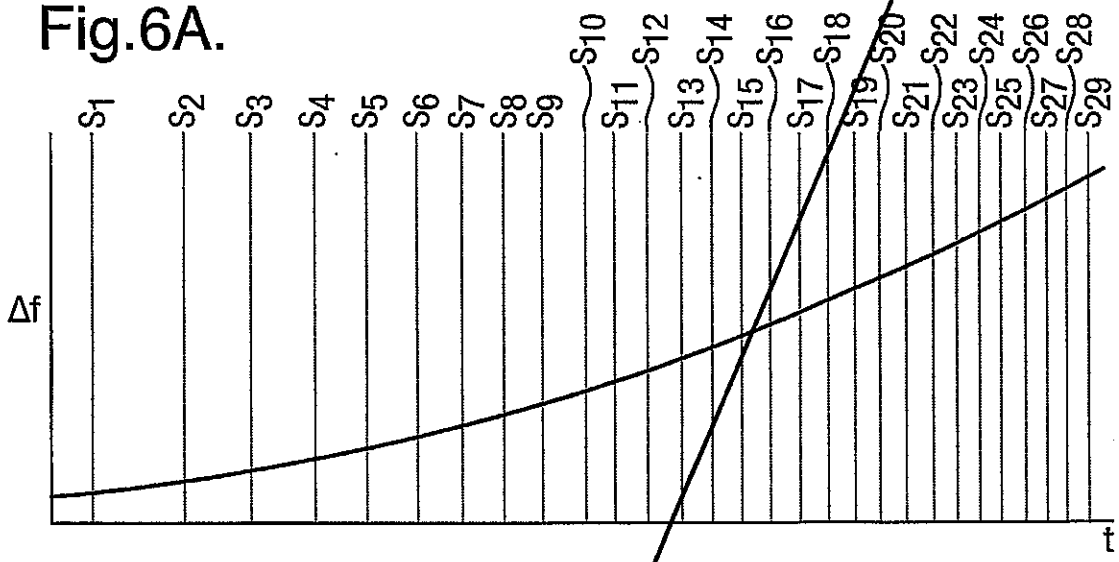


Fig.6B.

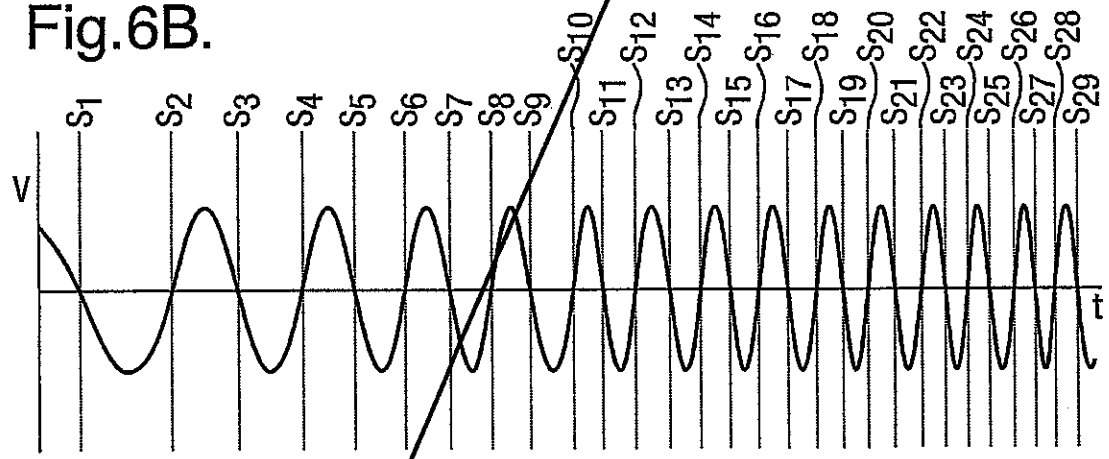


Fig.6C.

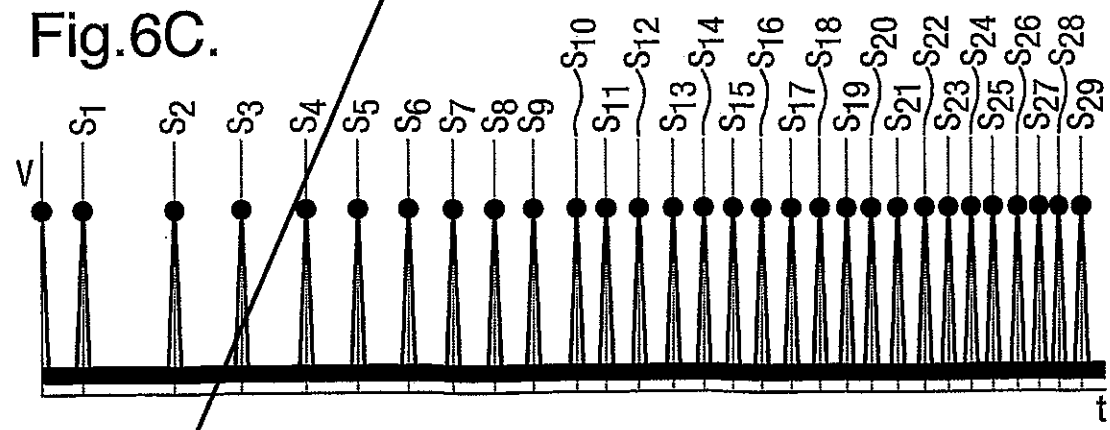


Fig.6D.

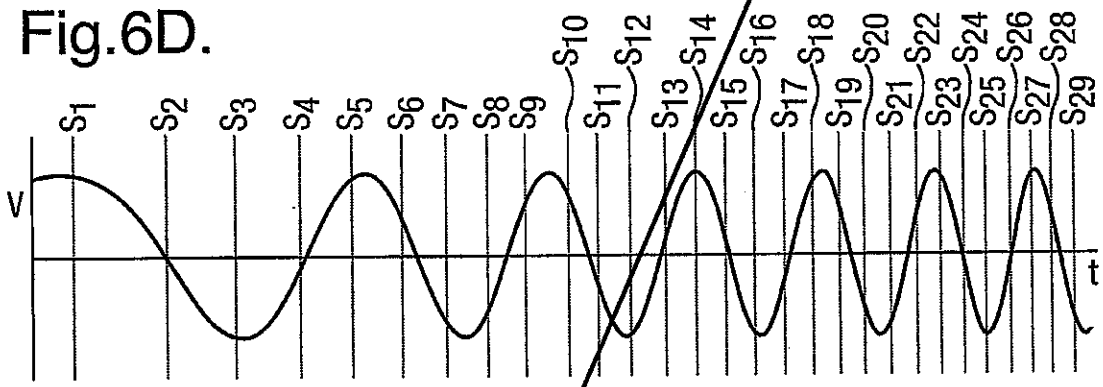

S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S22
S23
S24
S25
S26
S27
S28
S29
V
t

Fig.6E.

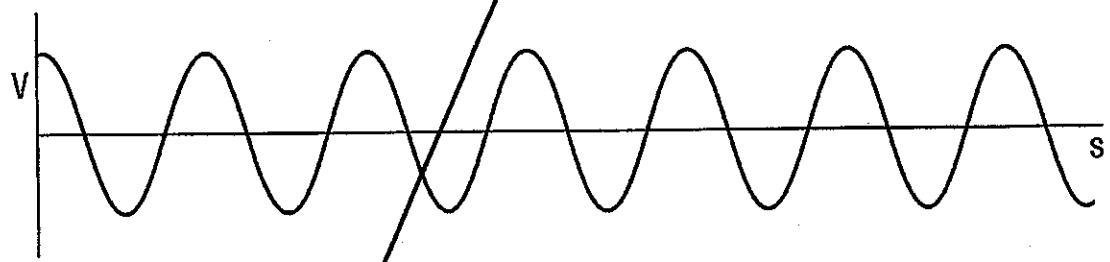

V
s

Fig.7.

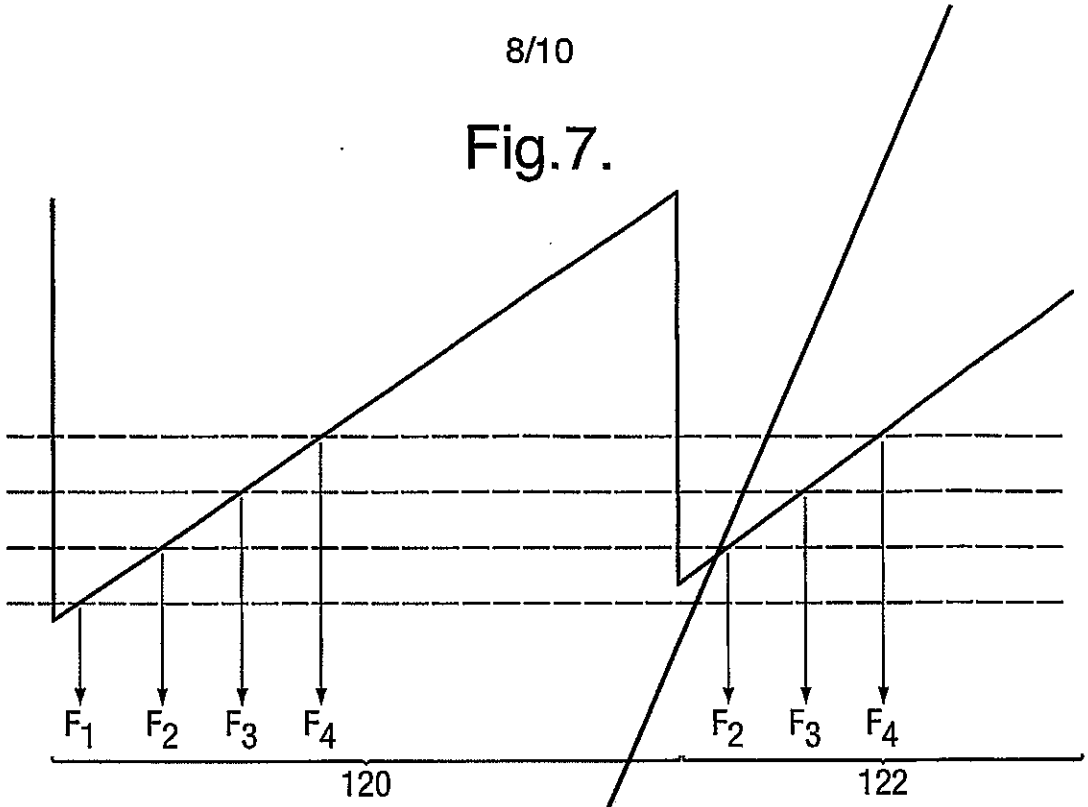


Fig.8A.

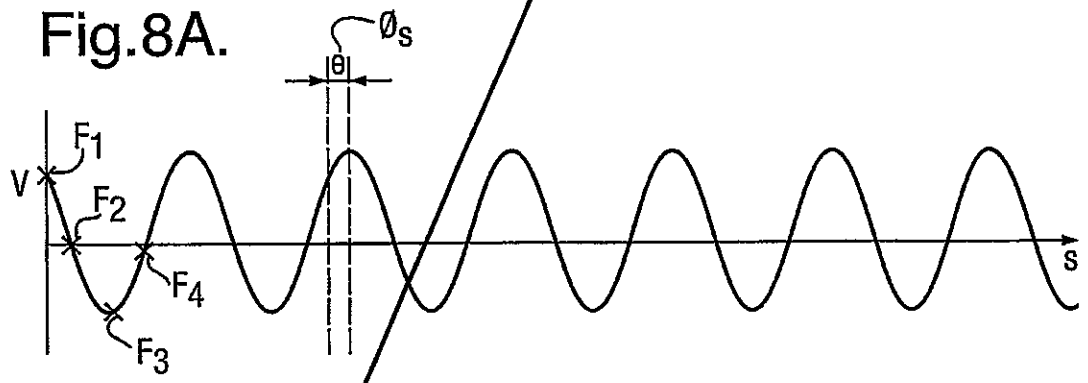


Fig.8B.

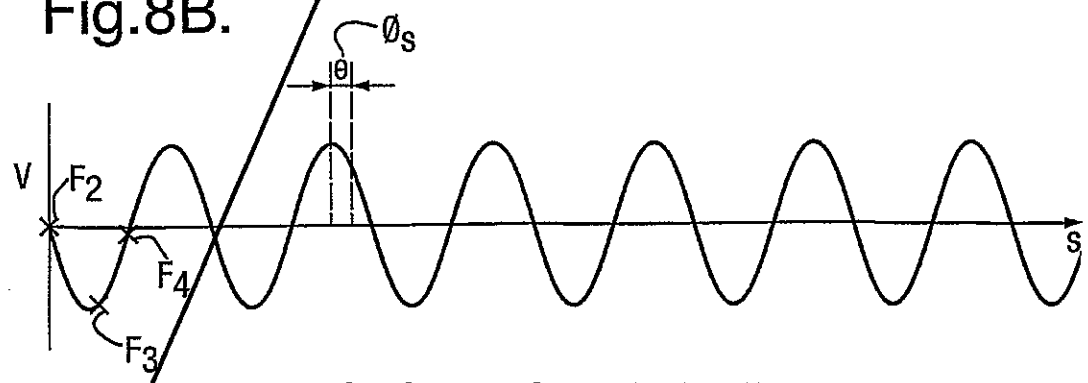


Fig.9.

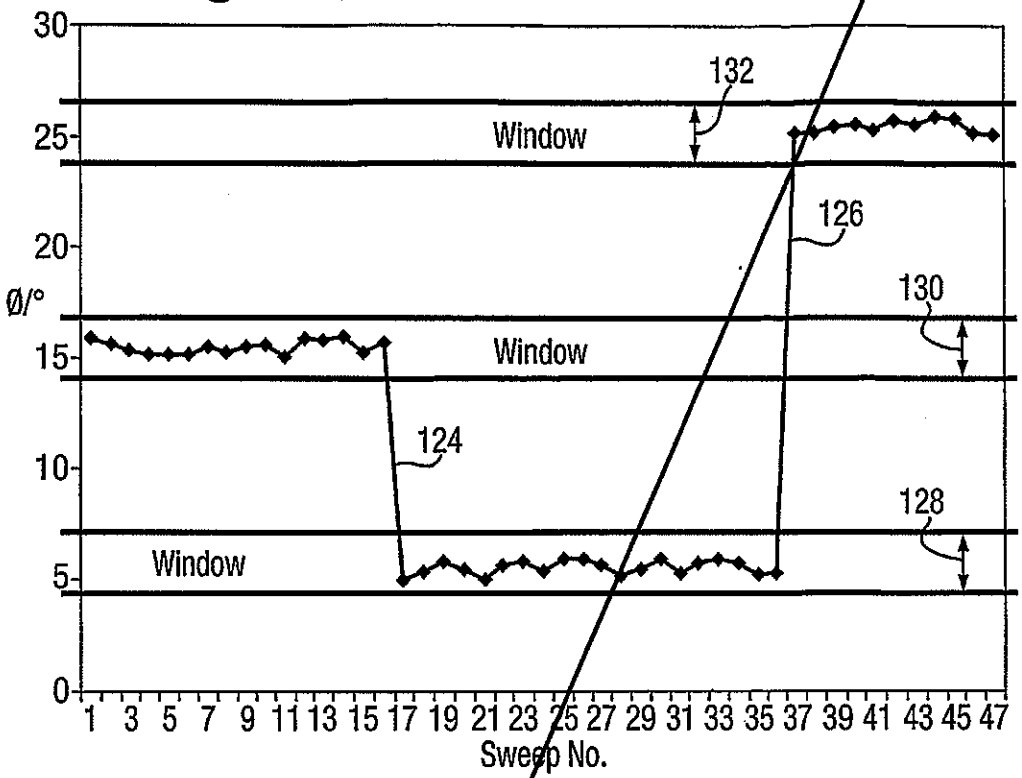

30
25
20
15
10
5
0
Ø/°
132
Window
126
130
Window
124
128
Window
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sweep No.

Fig.10.

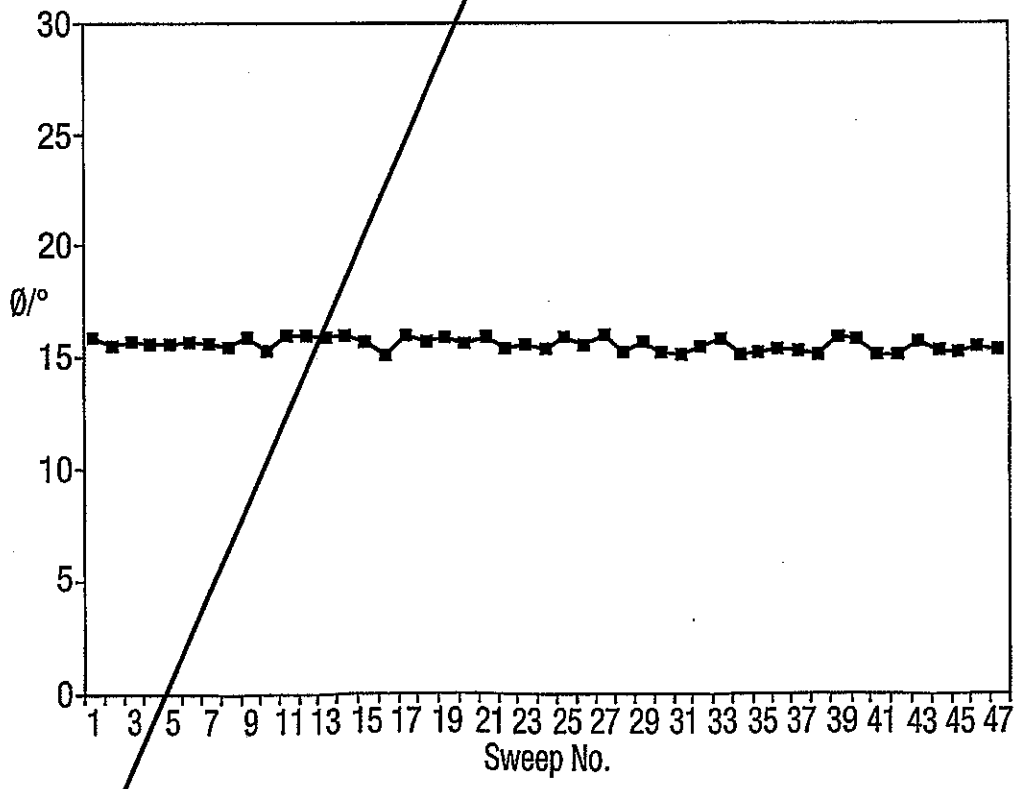

30
25
20
15
10
5
0
Ø/°
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sweep No.

Fig.11.

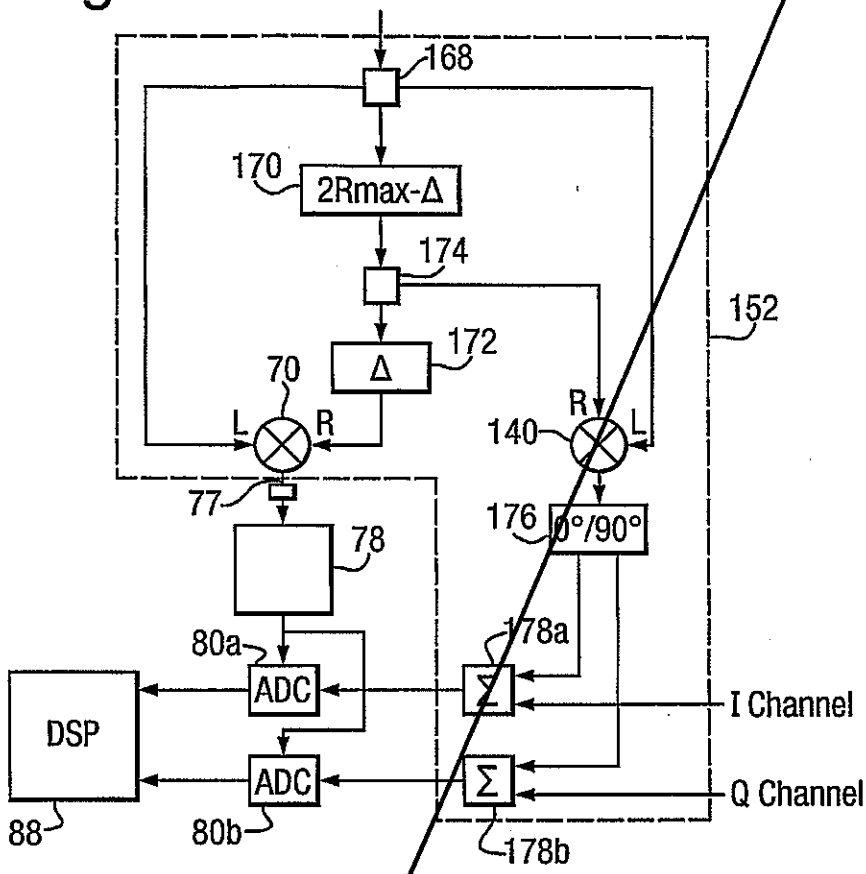

168
170
2Rmax-Δ
174
152
172
Δ
70
L
R
R
140
L
77
176
0°/90°
78
80a
178a
ADC
DSP
I Channel
ADC
Q Channel
88
80b
178b

Fig.12.

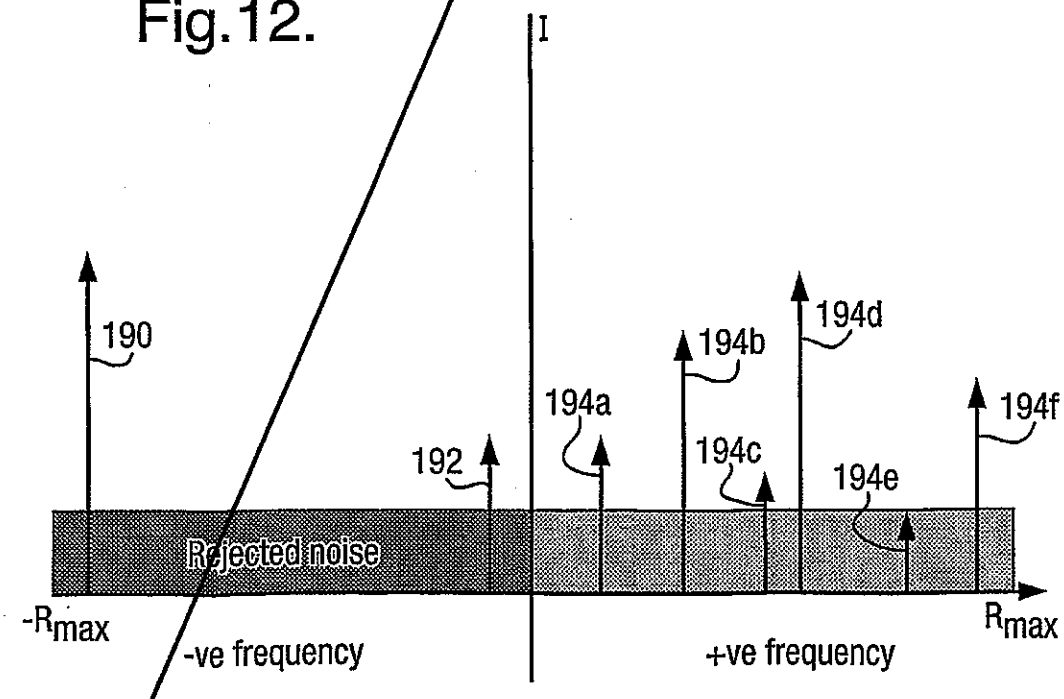

I
190
194d
194b
194a
194f
192
194c
194e
Rejected noise
-Rmax
Rmax
-ve frequency
+ve frequency

Fig.1A.

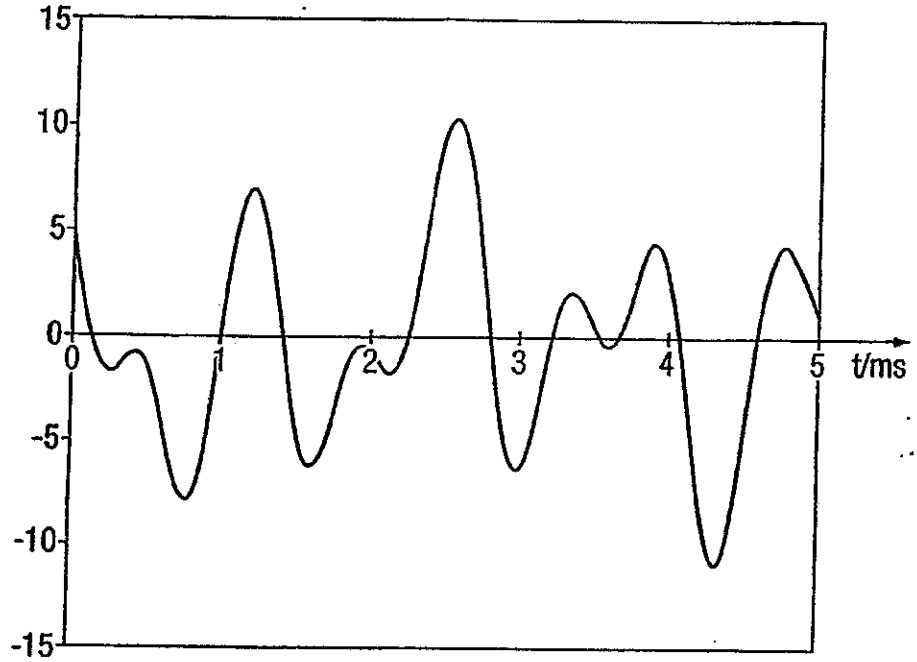


Fig.1B.

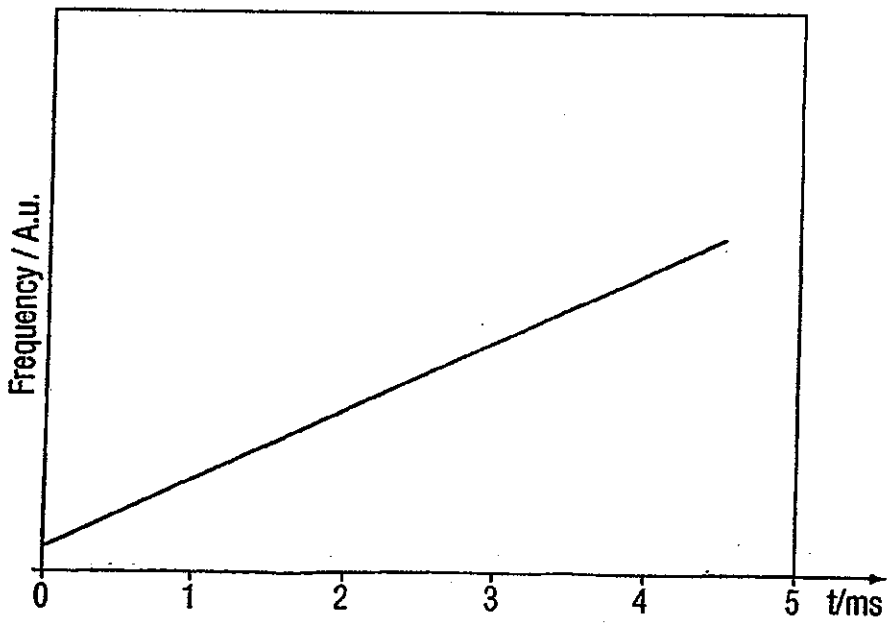


Fig.2A.

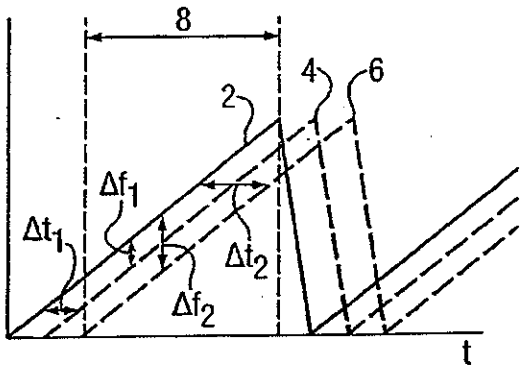


Fig.2B.

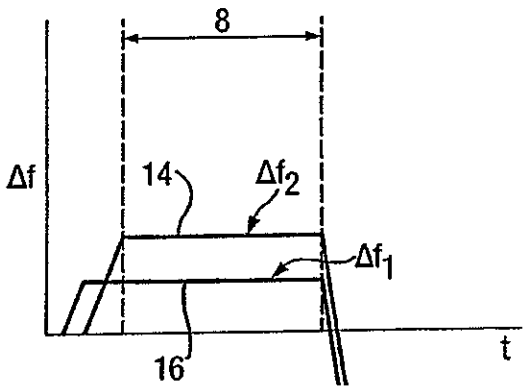


Fig.2C.

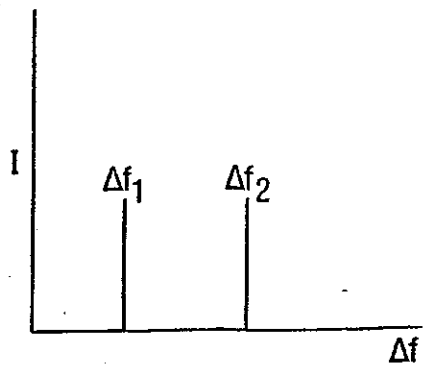


Fig.3A.

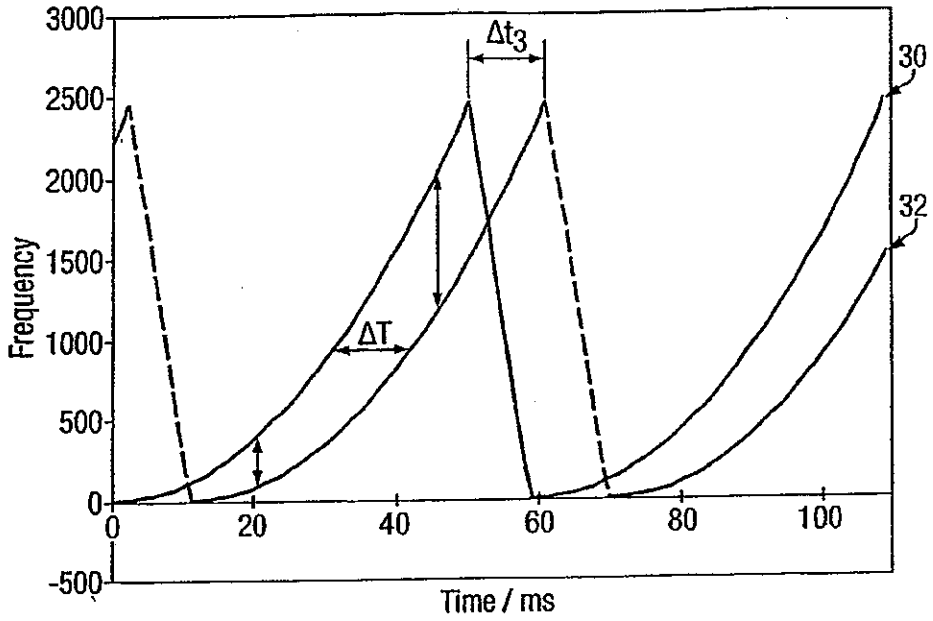

3000
2500
2000
1500
1000
500
0
-500
Frequency
0
20
40
60
80
100
Time / ms
Δt3
ΔT
30
32

Fig.3B.

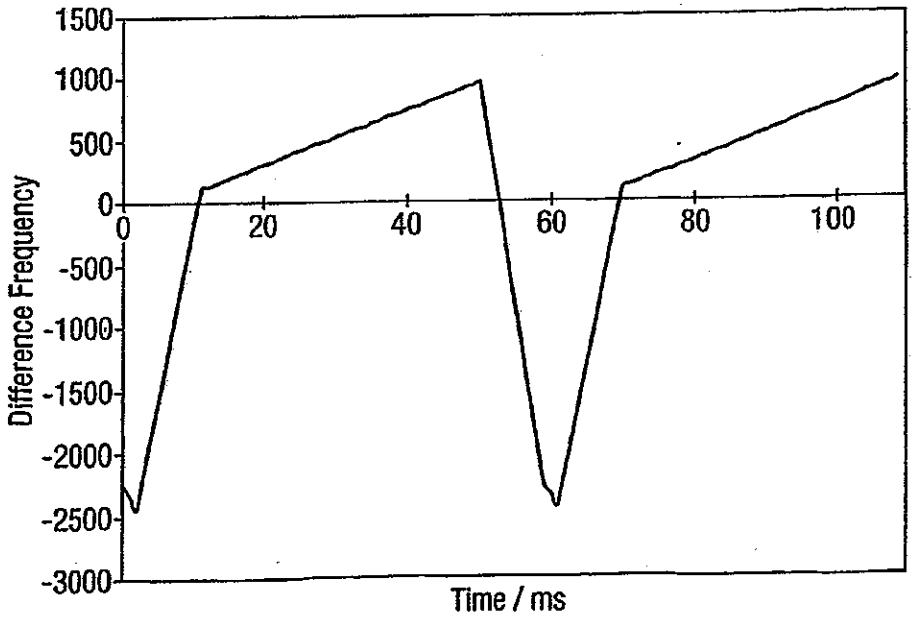

1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
Difference Frequency
0
20
40
60
80
100
Time / ms

Fig.4.

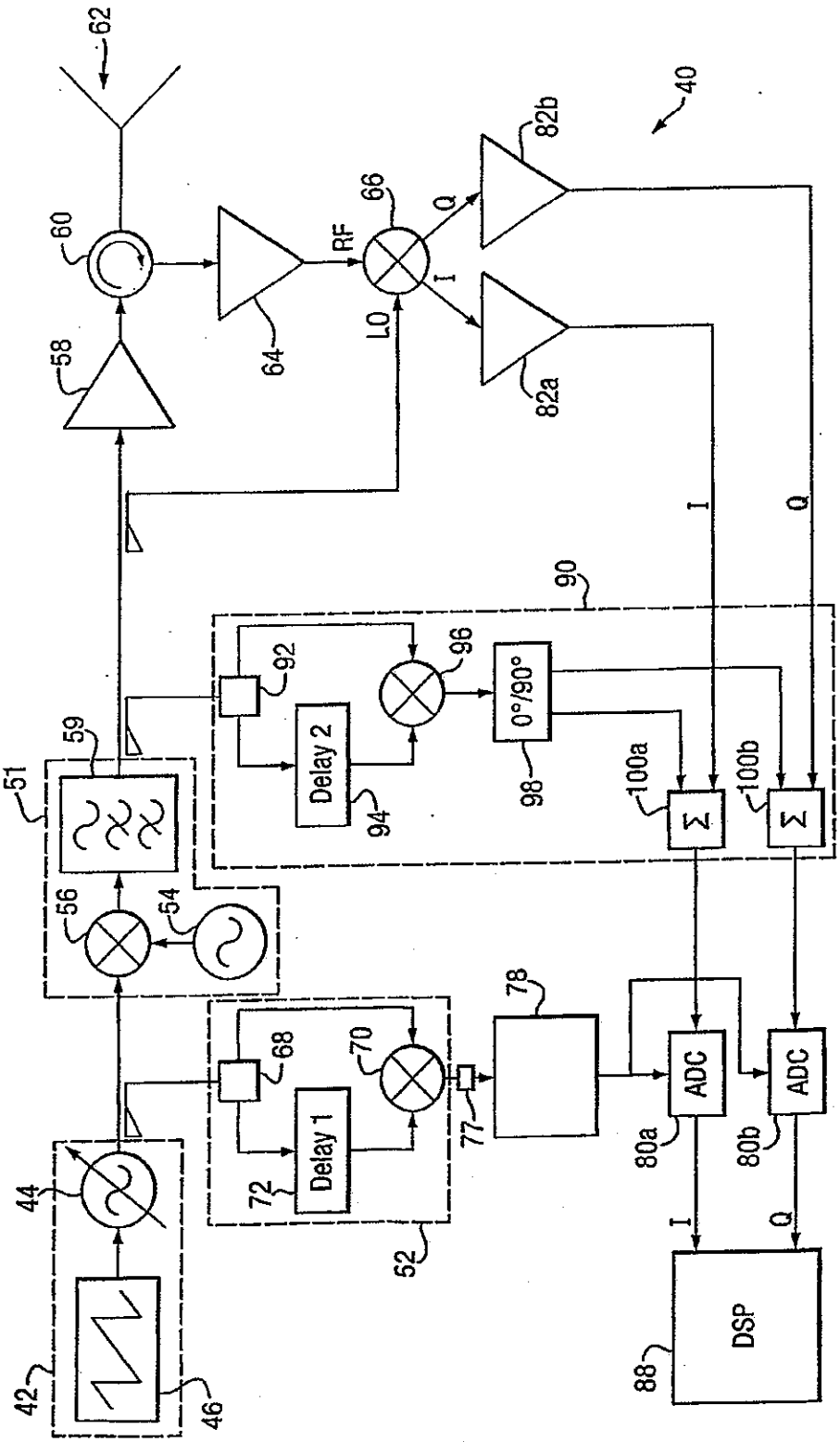

62
60
58
64
RF
66
LO
Q
I
82b
82a
40
90
92
96
0°/90°
Delay 2
94
98
100a
100b
Σ
Σ
59
51
56
54
68
70
Delay 1
72
52
78
77
ADC
ADC
80a
80b
I
Q
DSP
88
44
42
46

Fig.5.

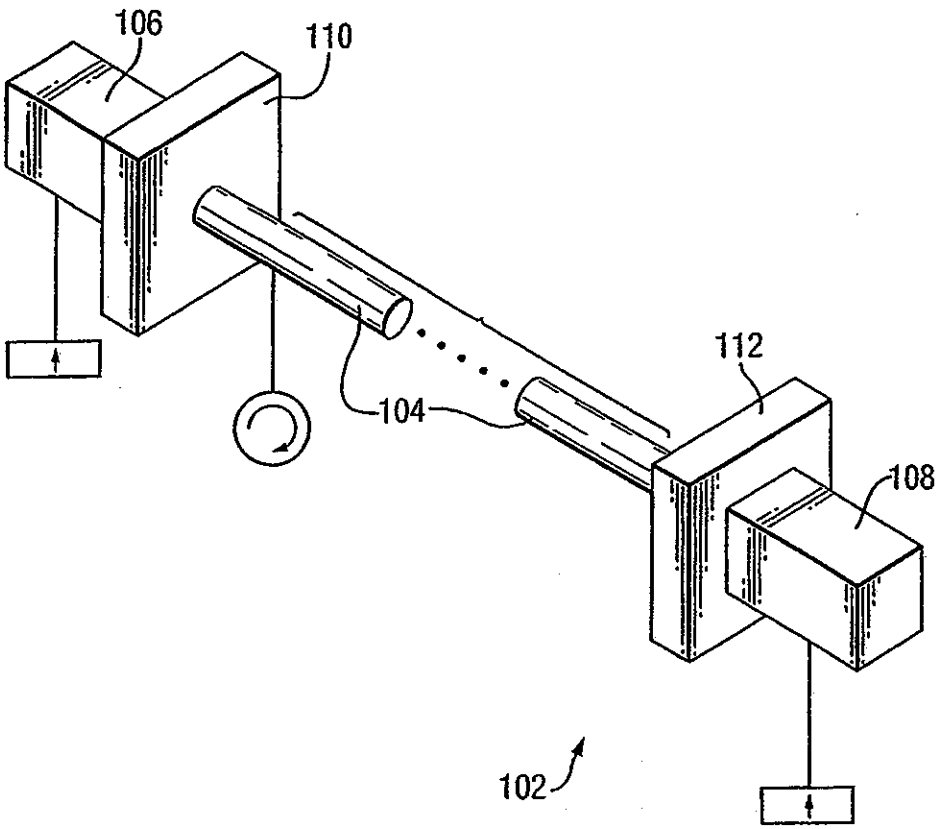


Fig.6A.

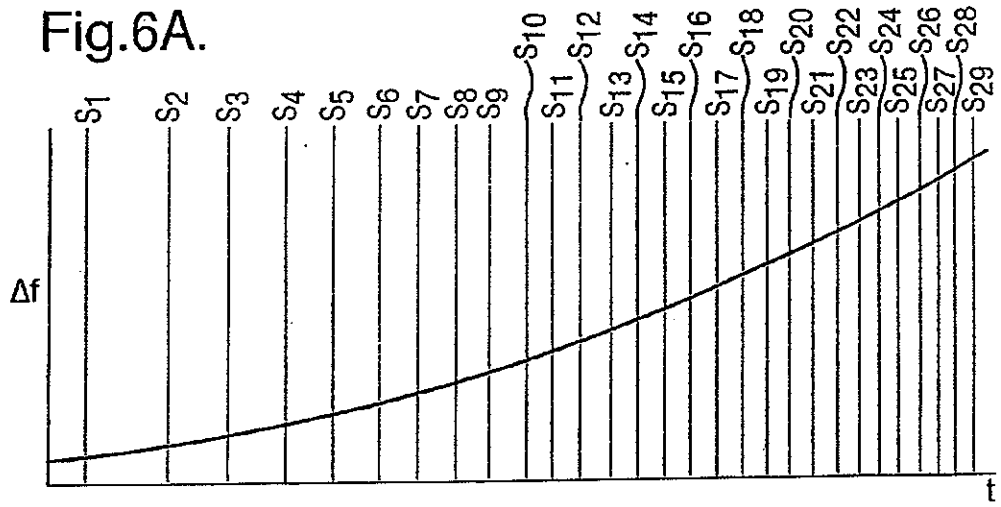


Fig.6B.

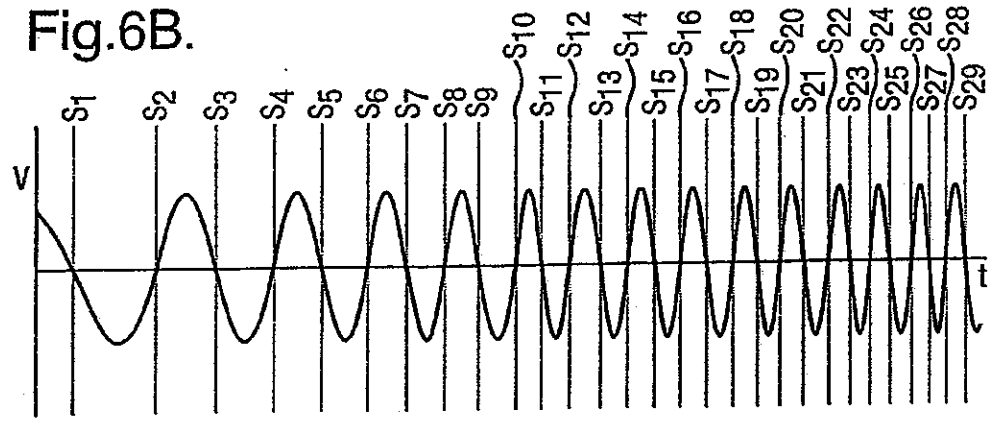


Fig.6C.

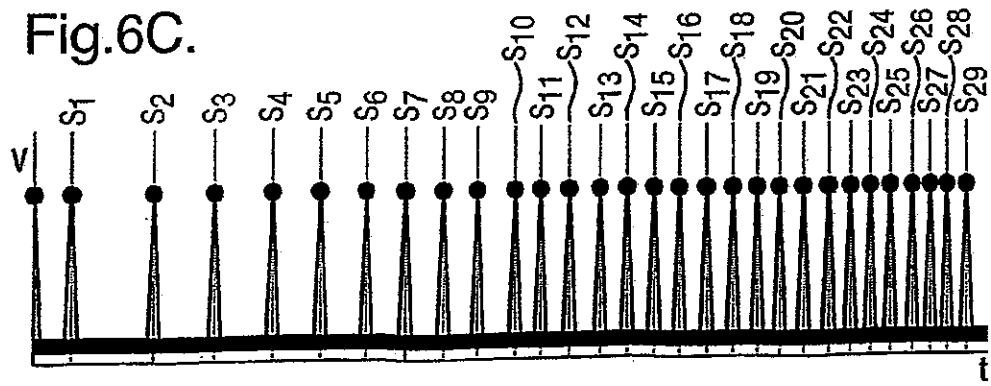


Fig.6D.

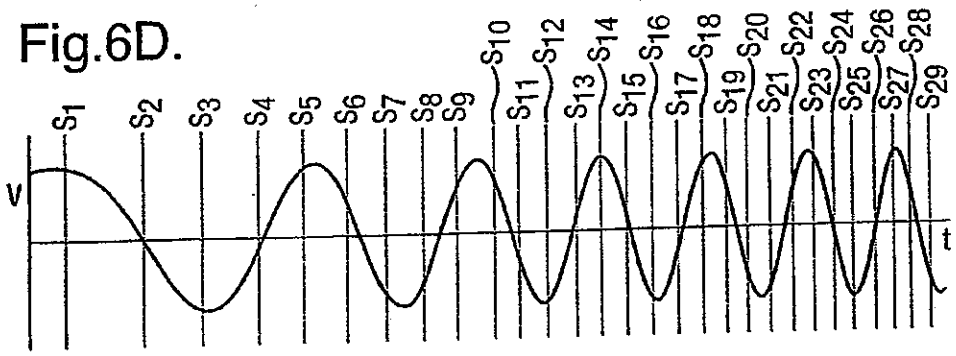

S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S22
S23
S24
S25
S26
S27
S28
S29
V
t

Fig.6E.

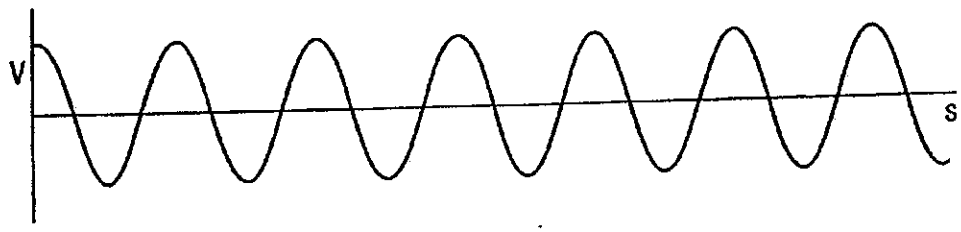

V
s

Fig.7.

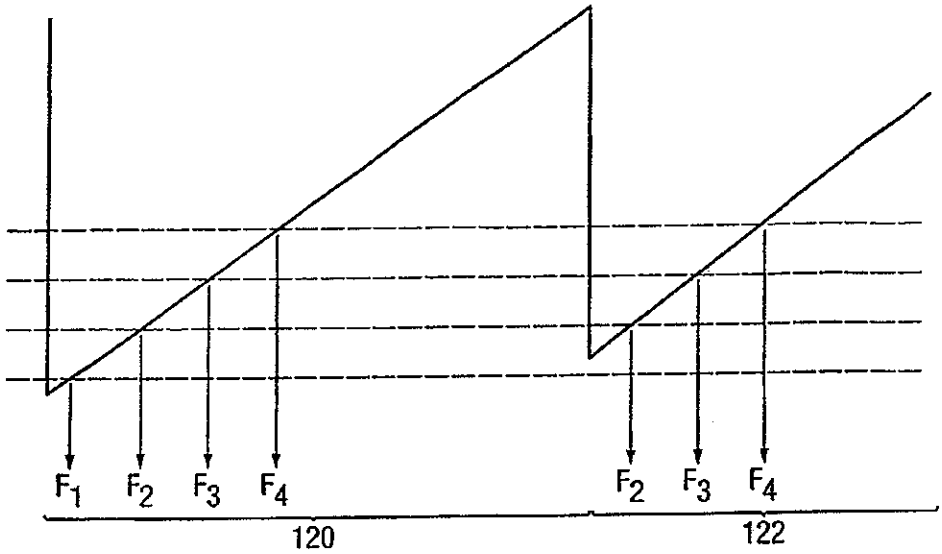


Fig.8A.

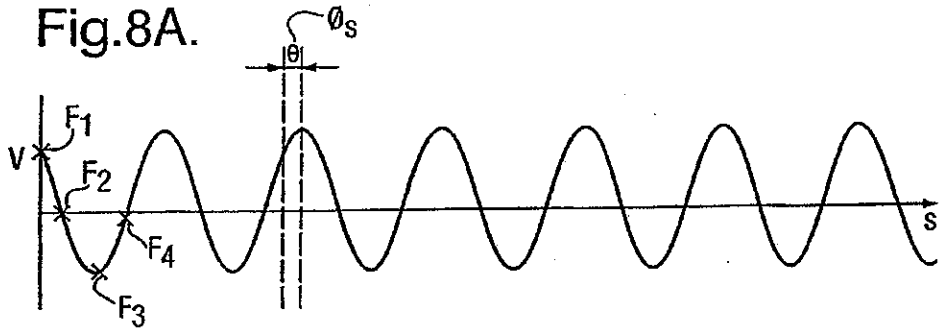


Fig.8B.

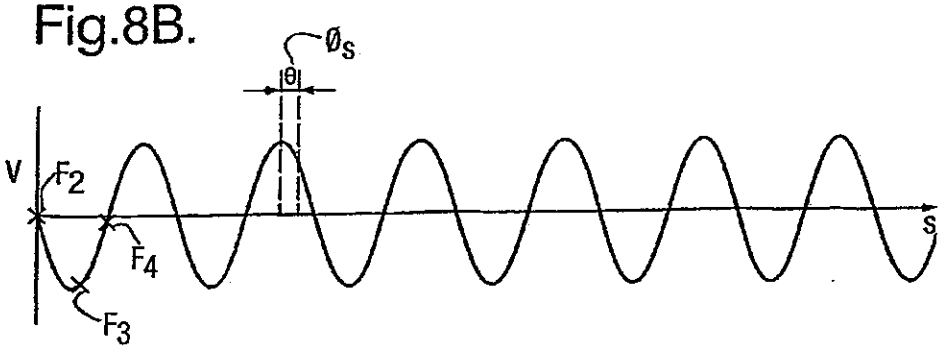


Fig.9.

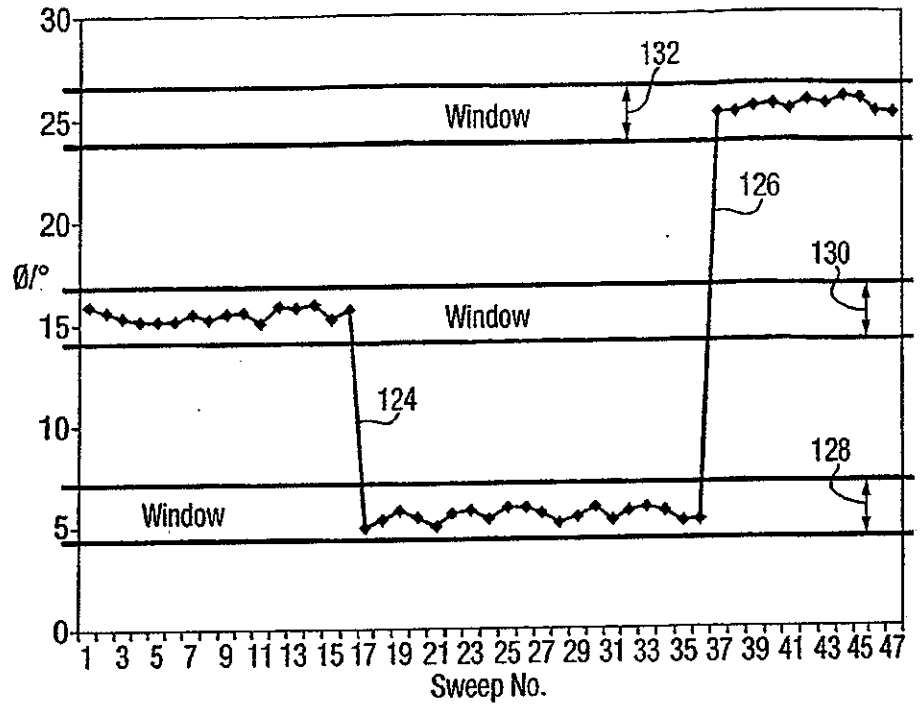

30
25
20
Ø/°
15
10
5
0
132
Window
126
130
Window
124
128
Window
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sweep No.

Fig.10.

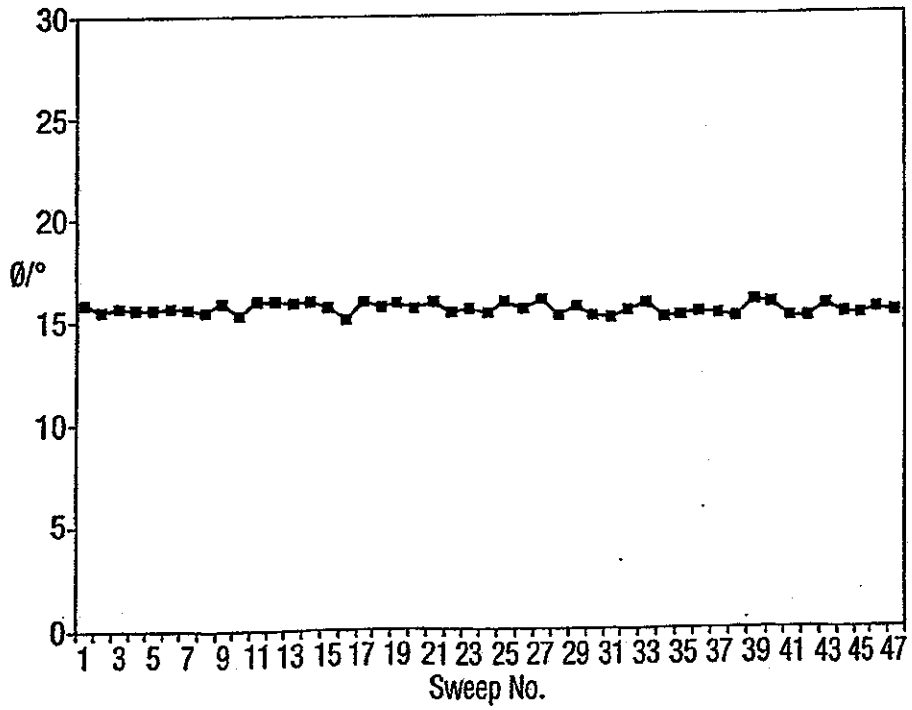

30
25
20
Ø/°
15
10
5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sweep No.

Fig.11.

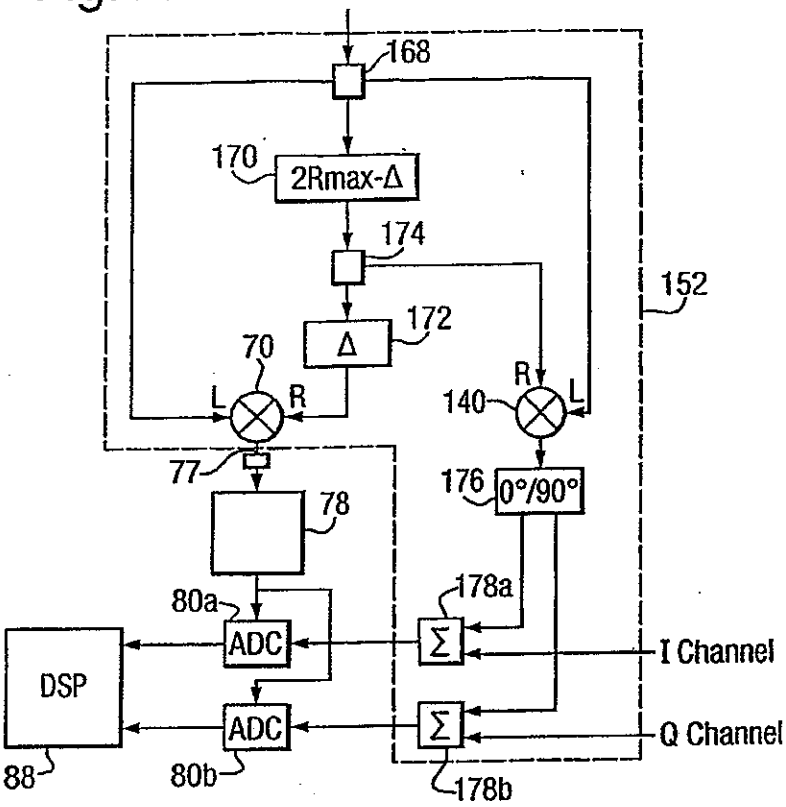
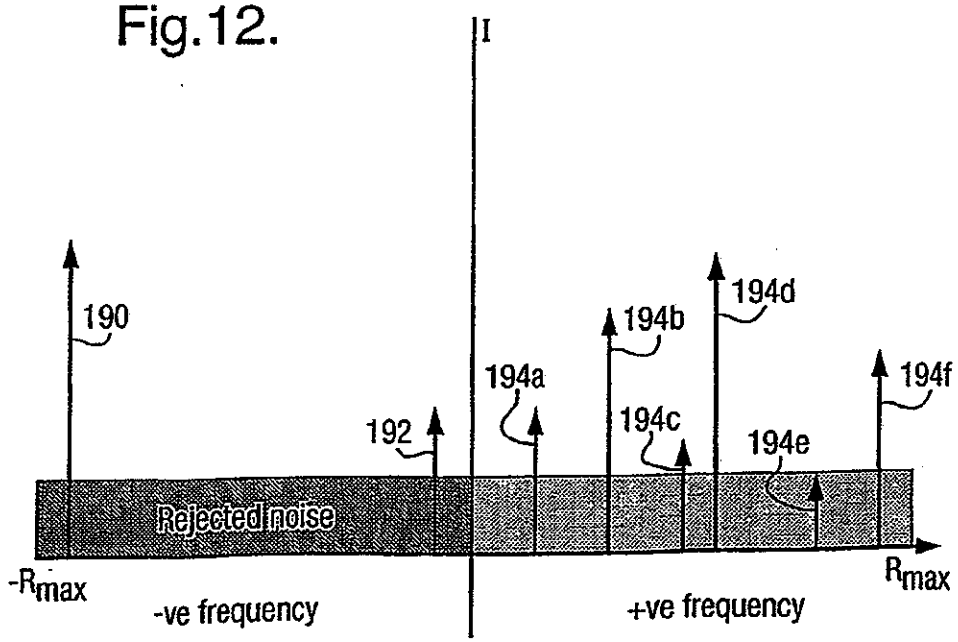

168
170
2Rmax-Δ
174
152
172
Δ
70
L
R
R
140
L
77
176
0°/90°
78
80a
178a
ADC
Σ
I Channel
DSP
ADC
Σ
Q Channel
88
80b
178b

Fig.12.


I
190
194d
194b
194a
194f
192
194c
194e
Rejected noise
-Rmax
Rmax
-ve frequency
+ve frequency