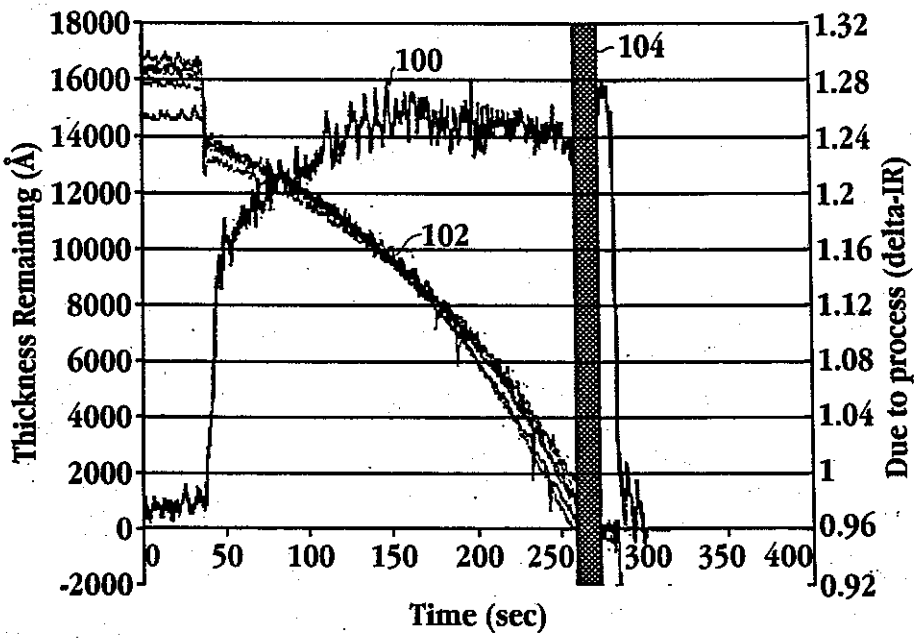

18000
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
Thickness Remaining (Å)
100
102
104
0
50
100
150
200
250
300
350
400
Time (sec)
1.32
1.28
1.24
1.2
1.16
1.12
1.08
1.04
1
0.96
0.92
Due to process (delta-IR)

Fig. 1

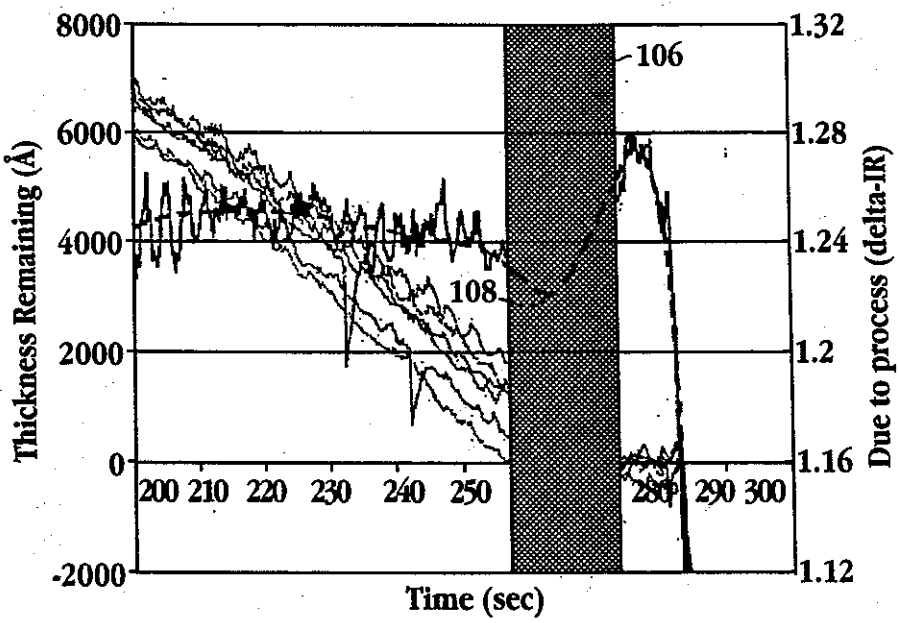

8000
6000
4000
2000
0
-2000
Thickness Remaining (Å)
106
108
200
210
220
230
240
250
280
290
300
Time (sec)
1.32
1.28
1.24
1.2
1.16
1.12
Due to process (delta-IR)

Fig. 2

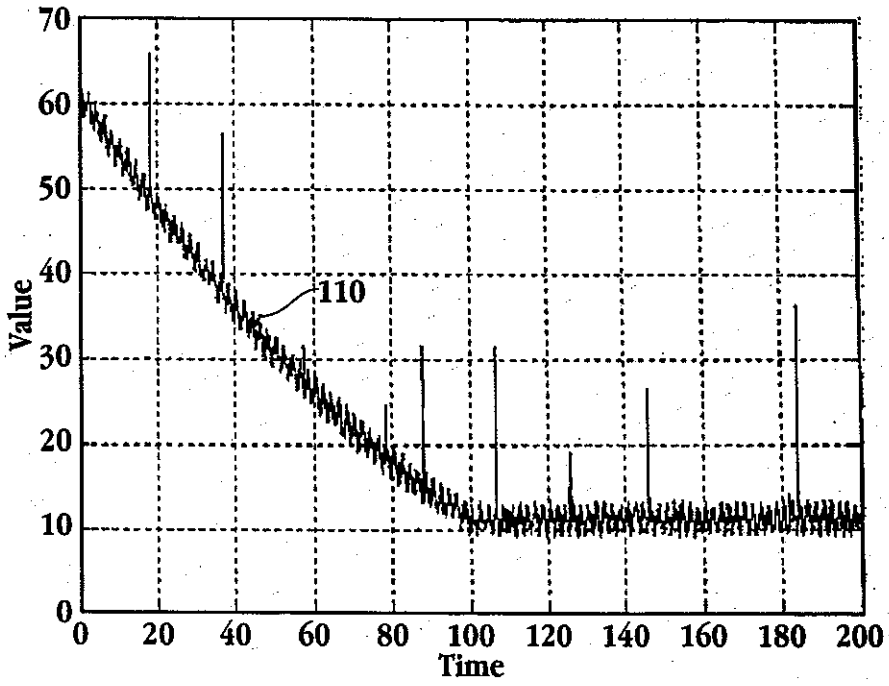

70
60
50
40
30
20
10
0
Value
110
0
20
40
60
80
100
120
140
160
180
200
Time

Fig. 3

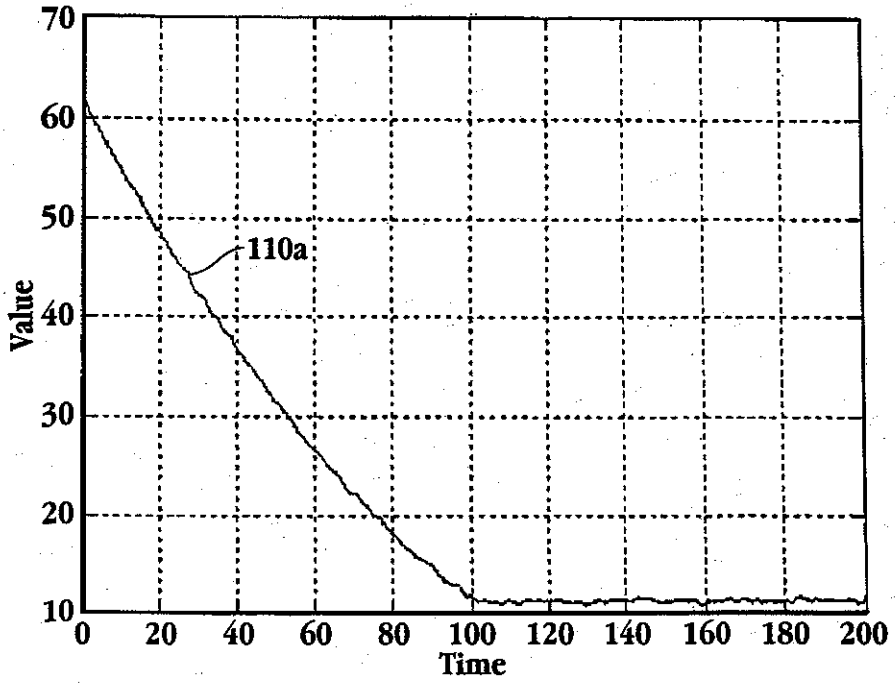

70
60
50
40
30
20
10
Value
110a
0
20
40
60
80
100
120
140
160
180
200
Time

Fig. 4

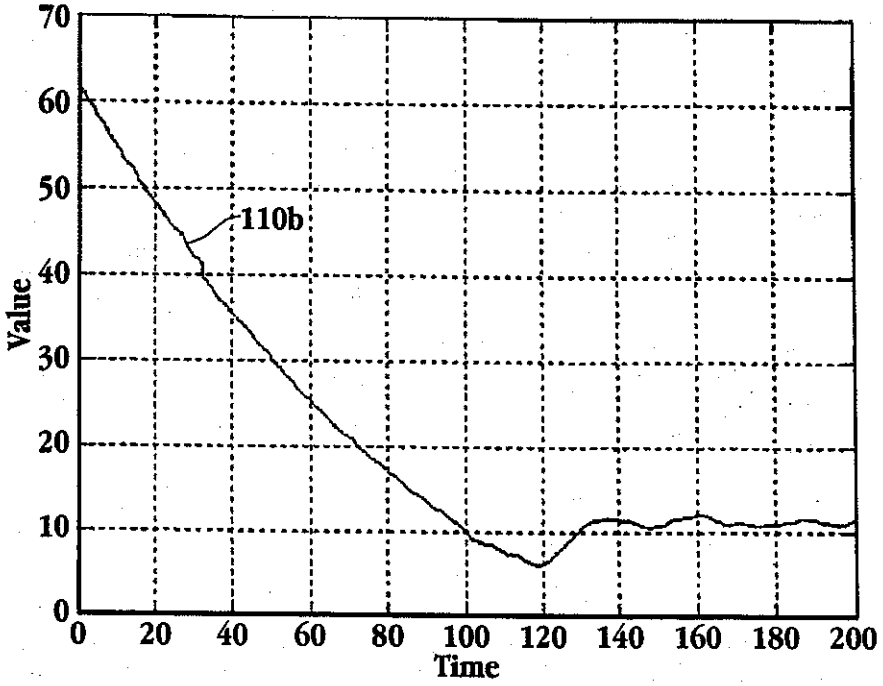

70
60
50
40
30
20
10
0
Value
110b
0
20
40
60
80
100
120
140
160
180
200
Time

Fig. 5

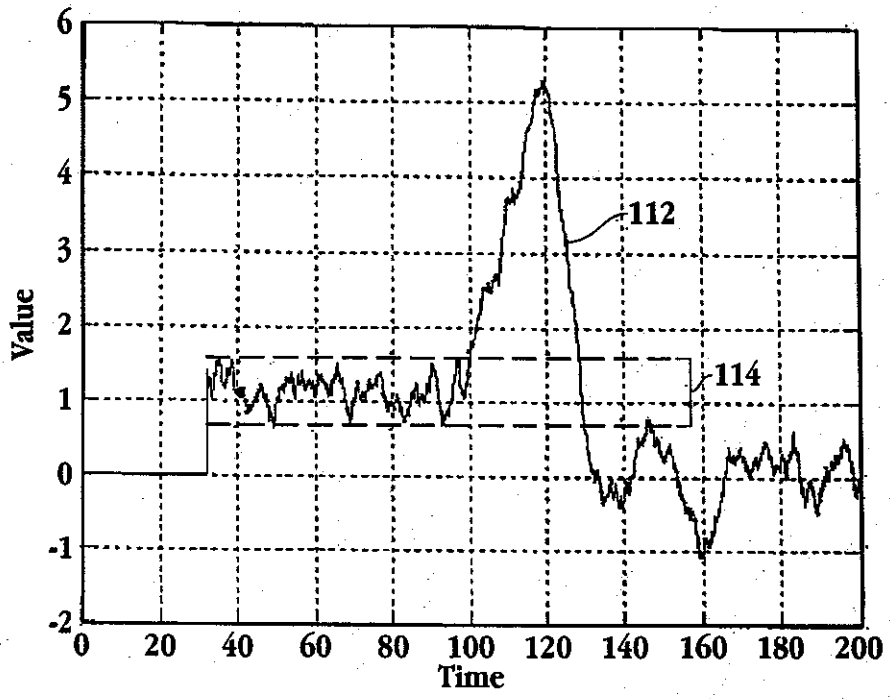

Value
Time
112
114
6
5
4
3
2
1
0
-1
-2
0
20
40
60
80
100
120
140
160
180
200

Fig. 6

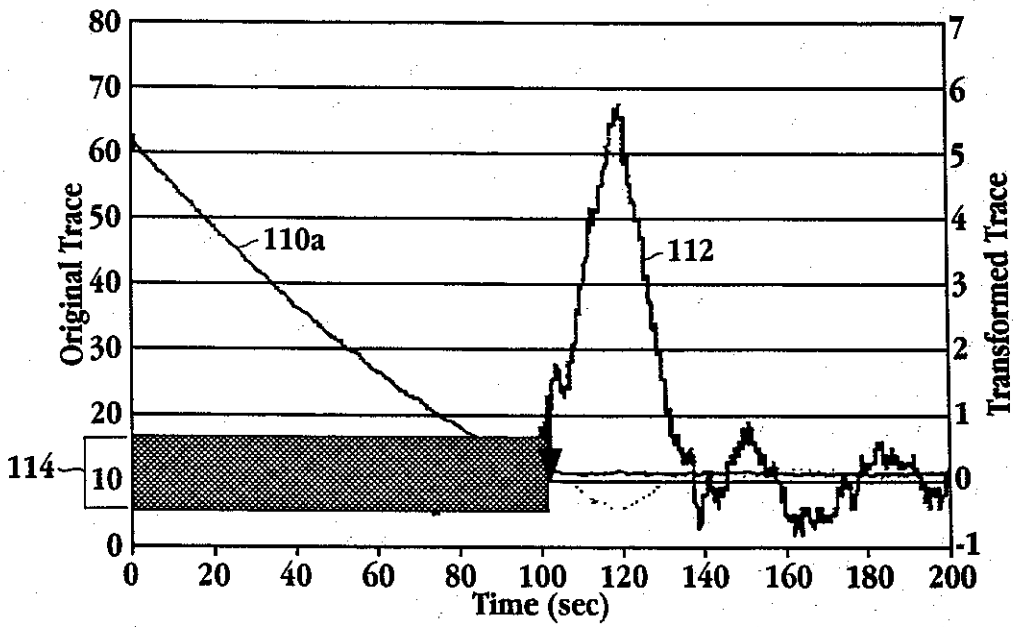

Original Trace
Transformed Trace
Time (sec)
110a
112
114
80
70
60
50
40
30
20
10
0
7
6
5
4
3
2
1
0
-1
0
20
40
60
80
100
120
140
160
180
200

Fig. 7

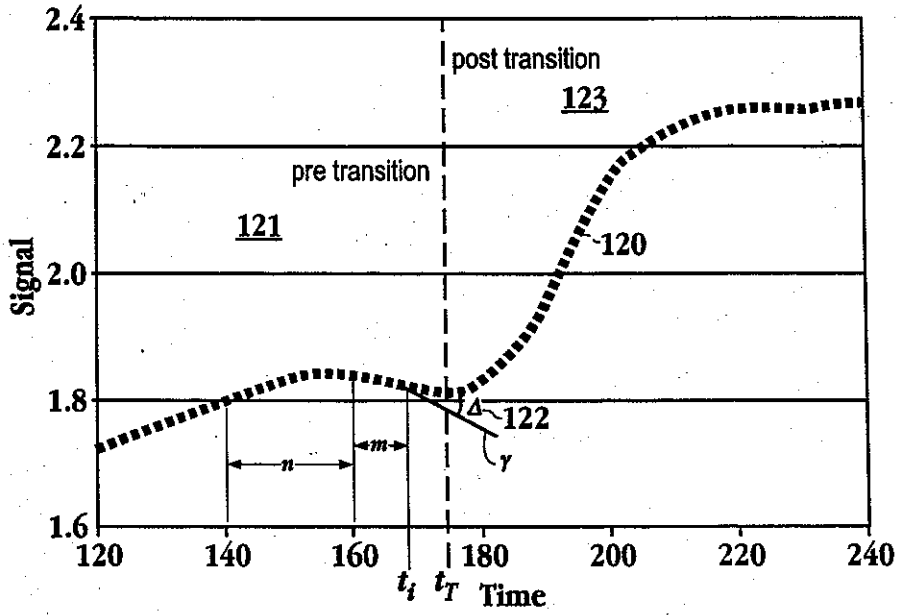

2.4
2.2
2.0
1.8
1.6
Signal
post transition
123
pre transition
121
120
122
Δ
γ
n
m
120
140
160
180
200
220
240
t_i
t_T
Time

Fig. 8A

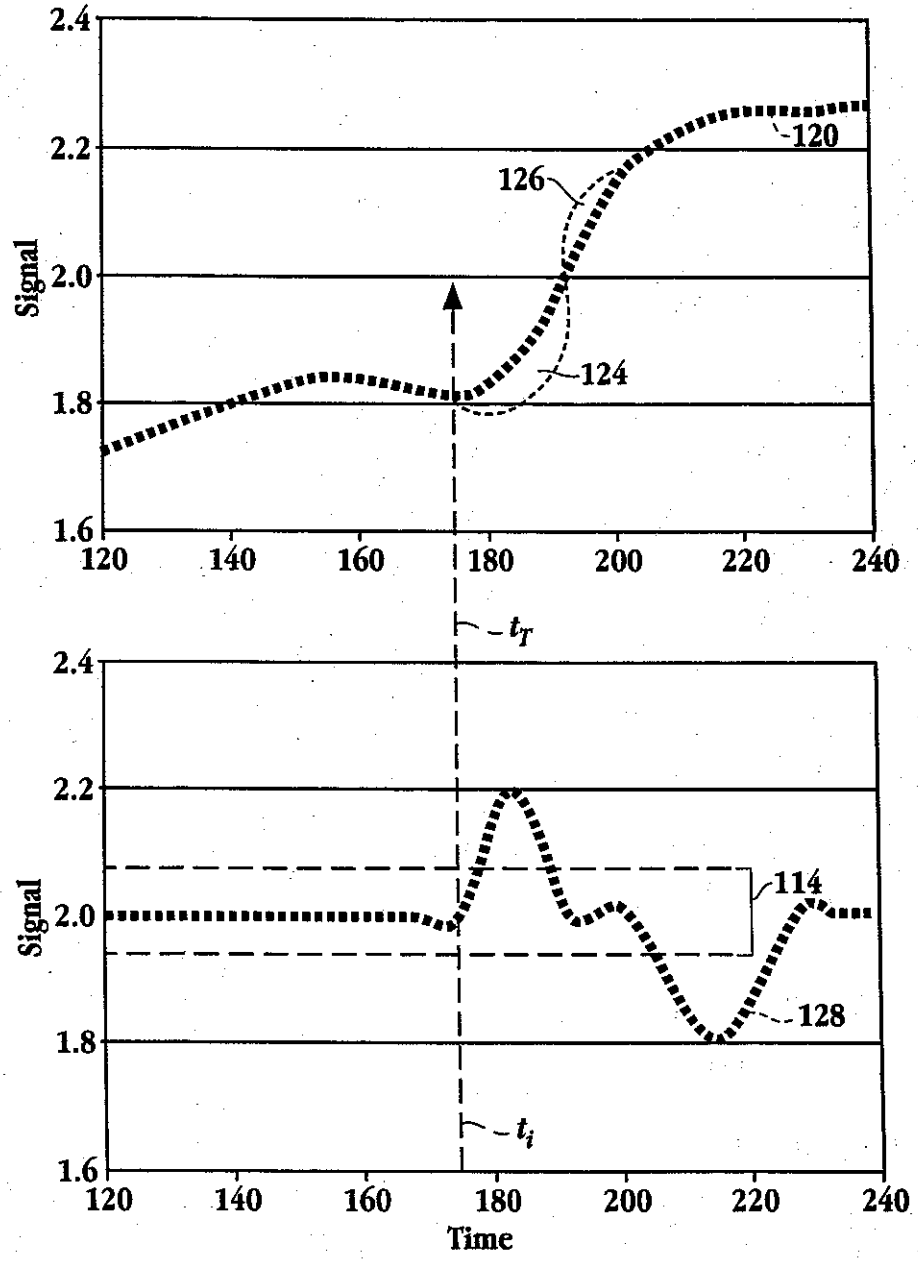

2.4
2.2
2.0
1.8
1.6
Signal
120
126
124
120
140
160
180
200
220
240
t_T
2.4
2.2
2.0
1.8
1.6
Signal
114
128
t_i
120
140
160
180
200
220
240
Time

Fig. 8B

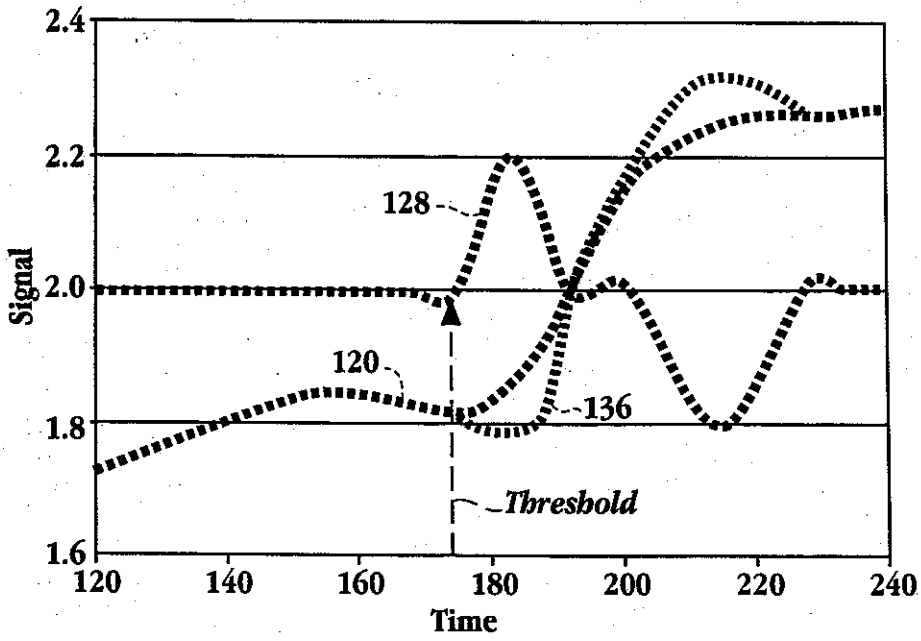

2.4
2.2
2.0
1.8
1.6
Signal
128
120
136
Threshold
120
140
160
180
200
220
240
Time

Fig. 8C

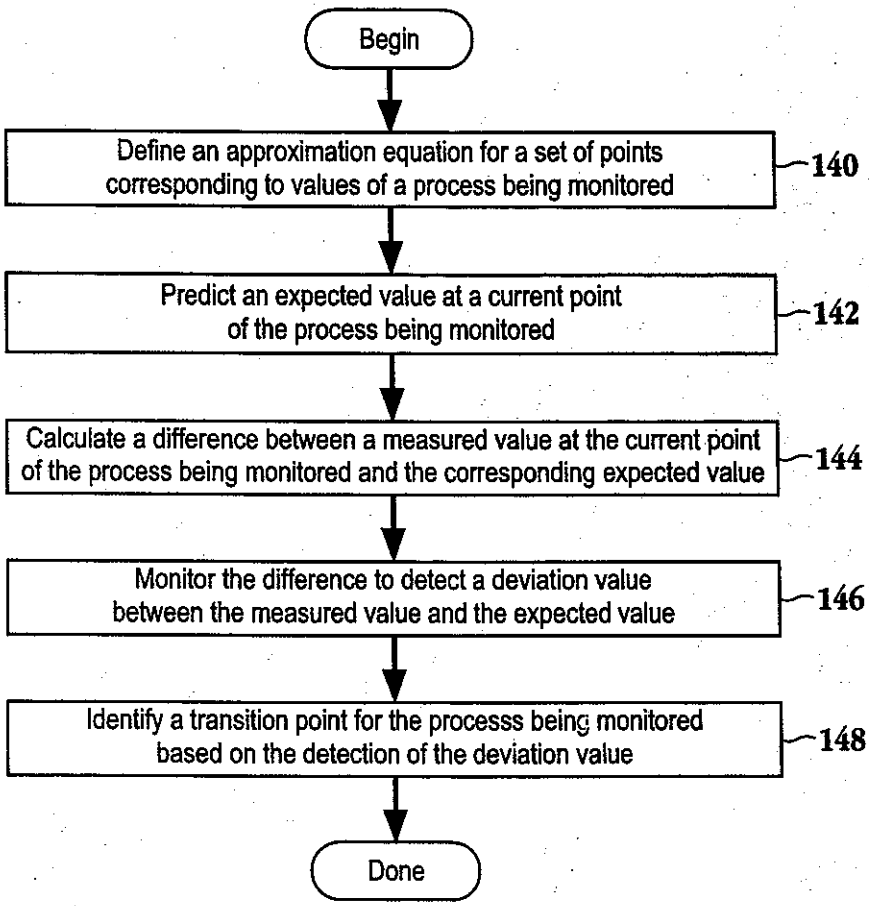

Begin
Define an approximation equation for a set of points corresponding to values of a process being monitored
140
Predict an expected value at a current point of the process being monitored
142
Calculate a difference between a measured value at the current point of the process being monitored and the corresponding expected value
144
Monitor the difference to detect a deviation value between the measured value and the expected value
146
Identify a transition point for the processs being monitored based on the detection of the deviation value
148
Done

Fig. 9

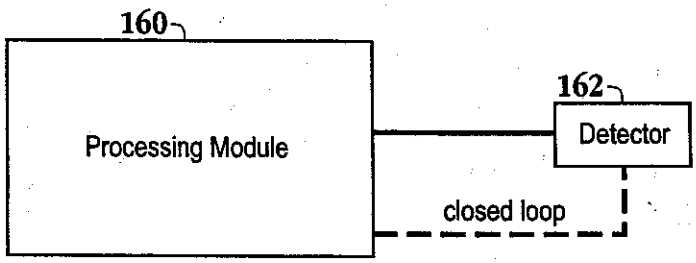


Fig. 10

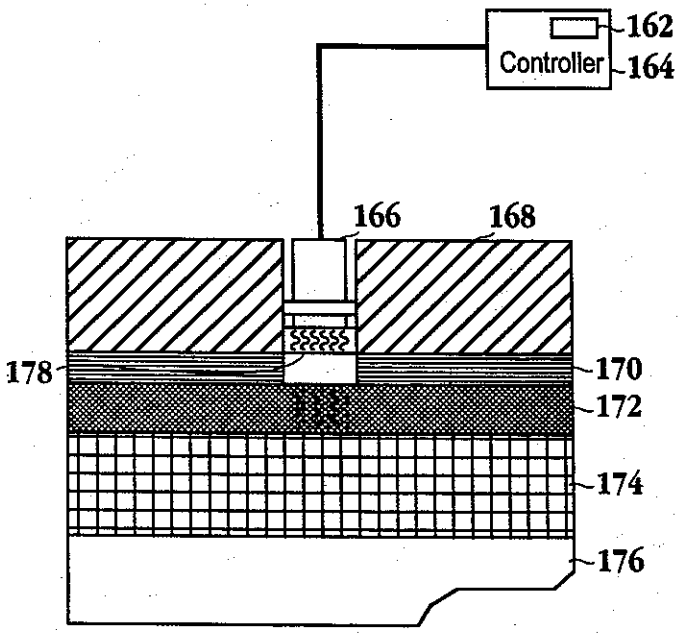


Fig. 11

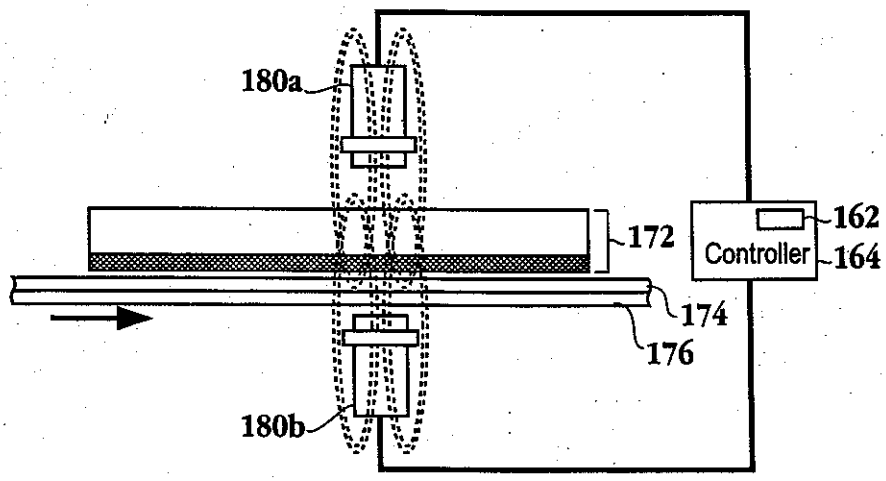


Fig. 12