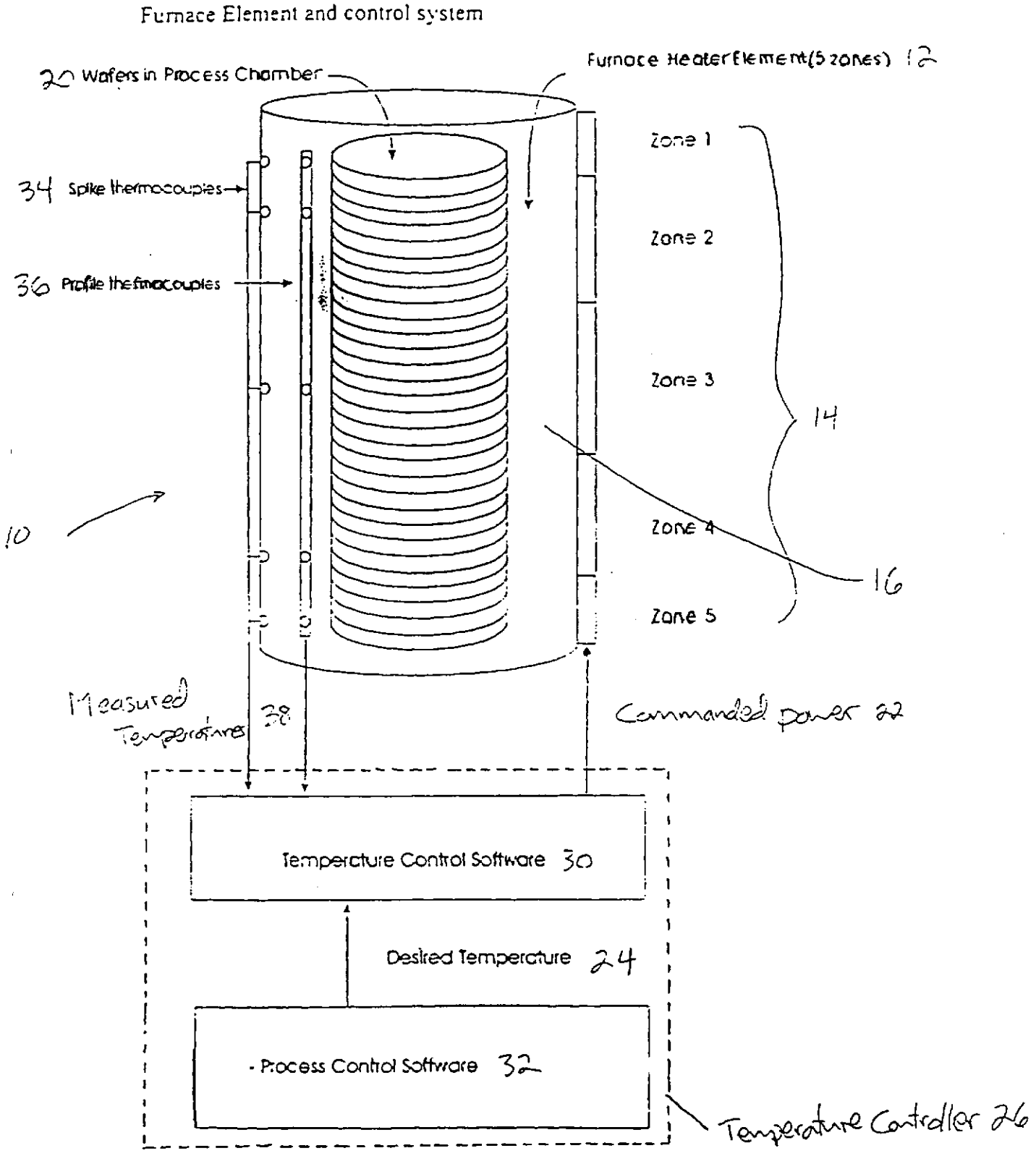

Furnace Element and control system
20 Wafers in Process Chamber
Furnace Heater Element (5 zones) 12
34 Spike thermocouples
36 Profile thermocouples
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
14
16
10
Measured Temperatures 38
Commanded power 22
Temperature Control Software 30
Desired Temperature 24
Process Control Software 32
Temperature Controller 26

Figure 1

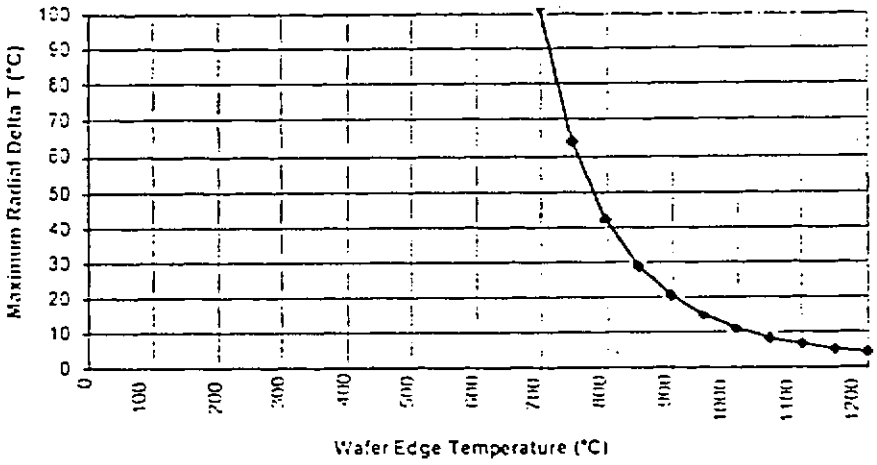

Maximum Radial Delta T (°C)
100
90
80
70
60
50
40
30
20
10
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
Wafer Edge Temperature (°C)

Figure 2

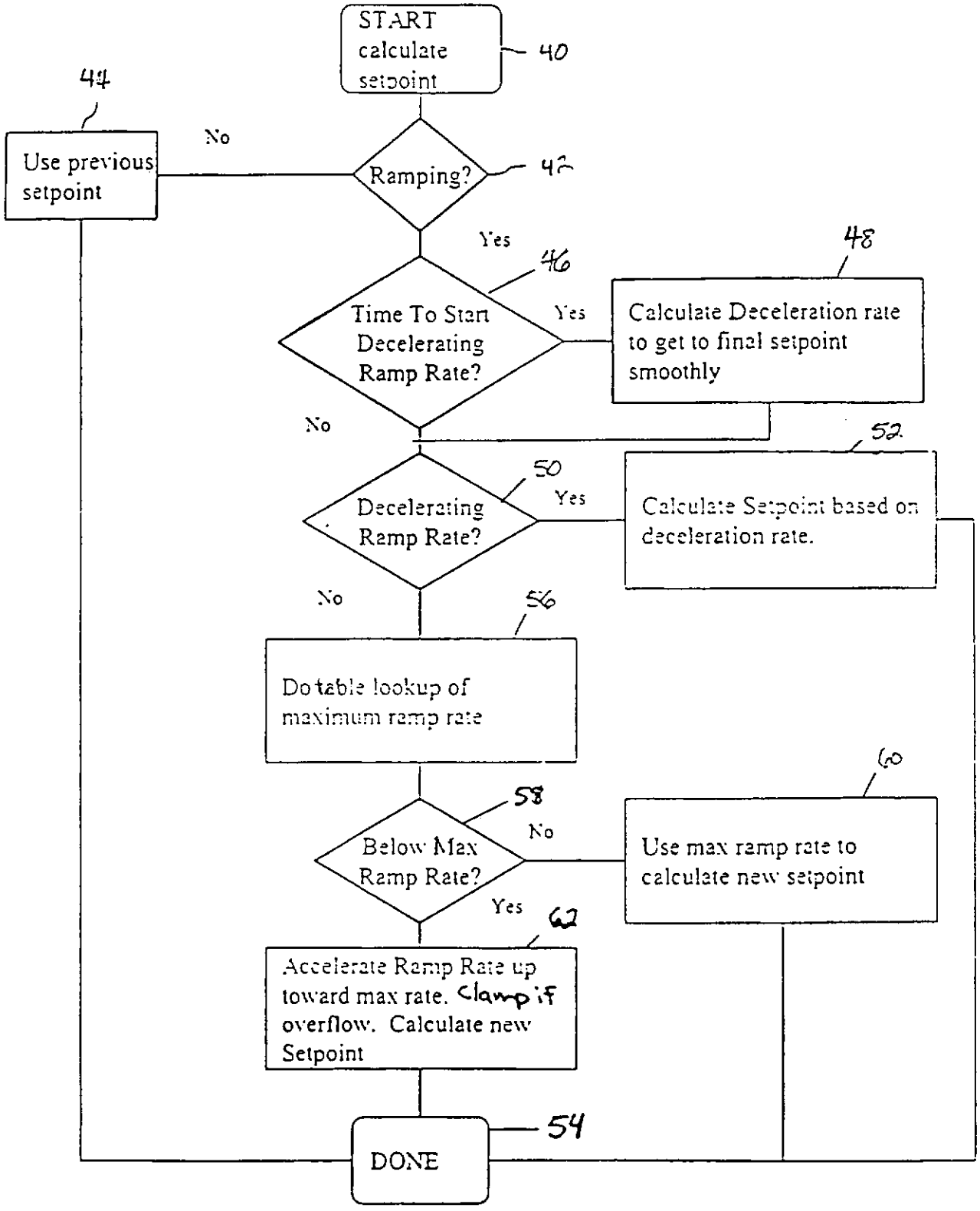

START calculate setpoint
40
Ramping?
42
No
Use previous setpoint
44
Yes
Time To Start Decelerating Ramp Rate?
46
Yes
Calculate Deceleration rate to get to final setpoint smoothly
48
No
Decelerating Ramp Rate?
50
Yes
Calculate Setpoint based on deceleration rate.
52
No
Do table lookup of maximum ramp rate
56
Below Max Ramp Rate?
58
No
Use max ramp rate to calculate new setpoint
60
Yes
Accelerate Ramp Rate up toward max rate. Clamp if overflow. Calculate new Setpoint
62
DONE
54

Figure 3

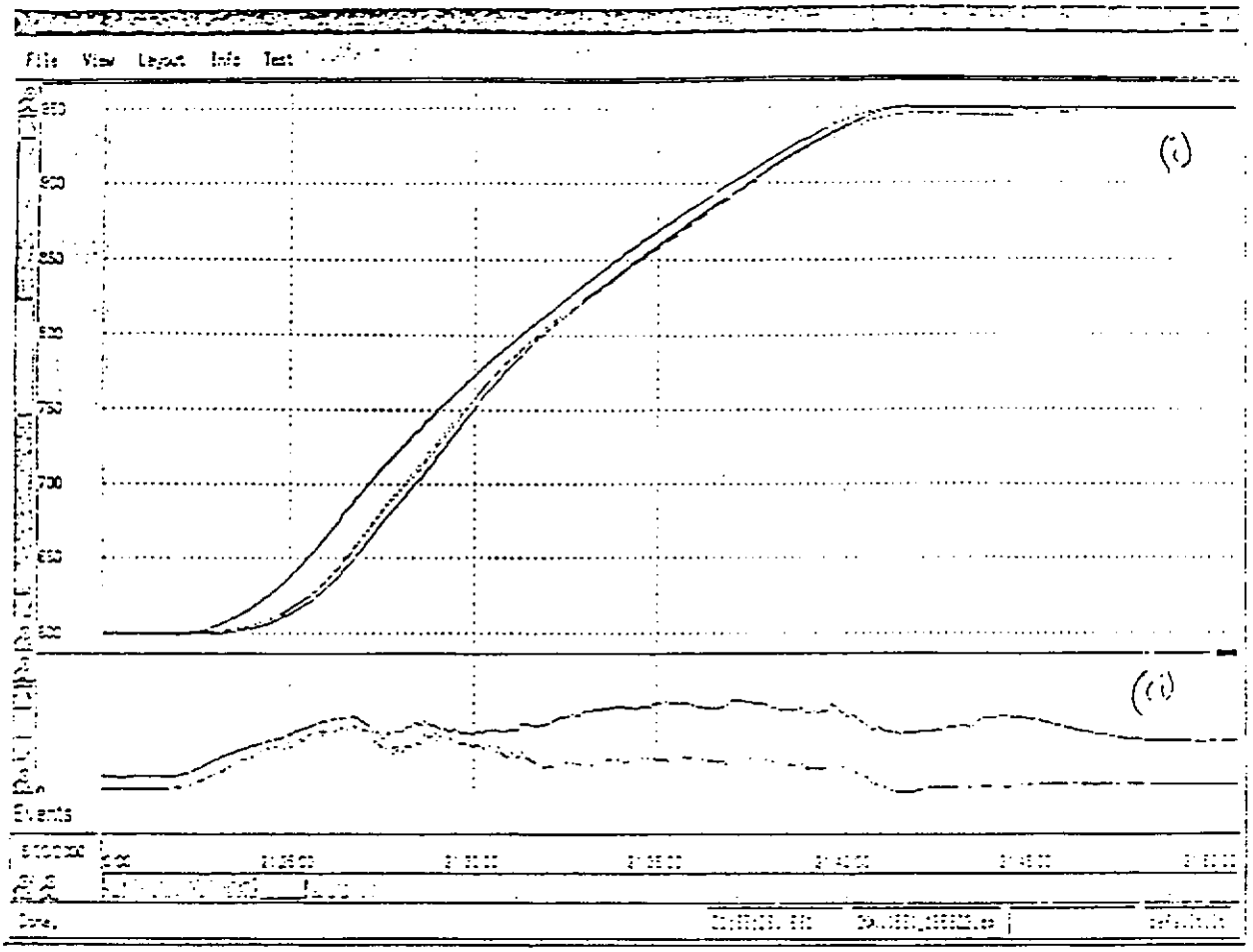


Figure 4

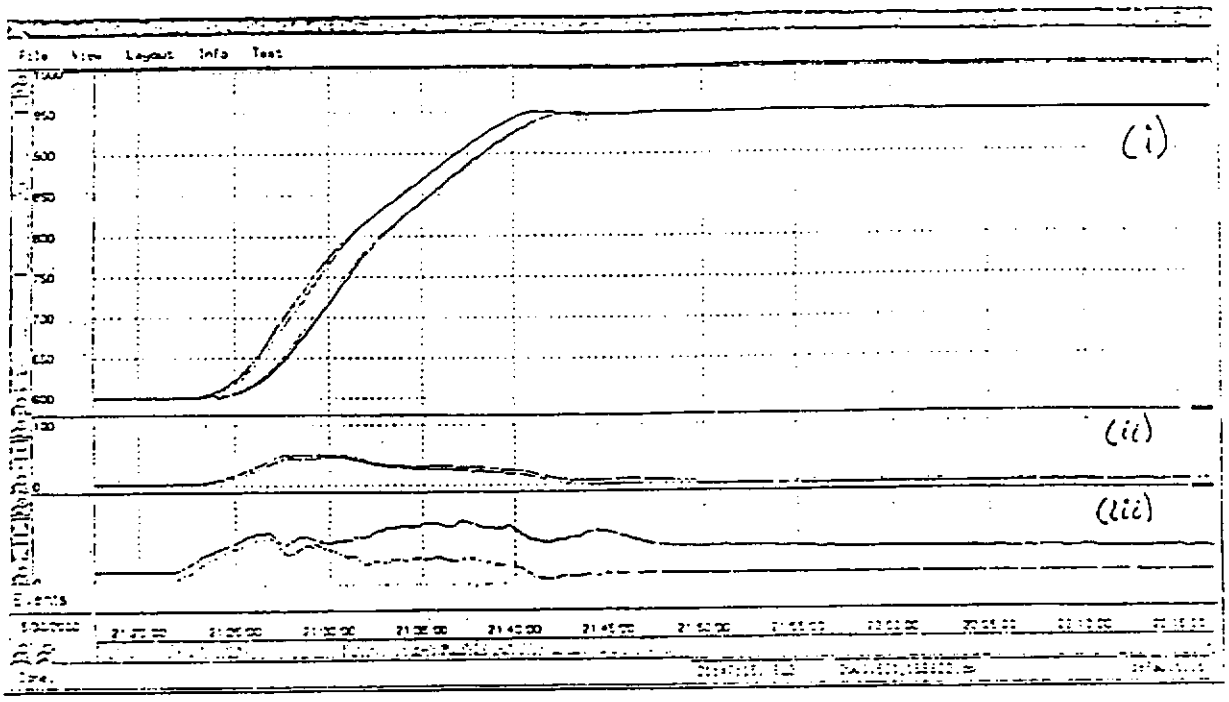


Figure 5

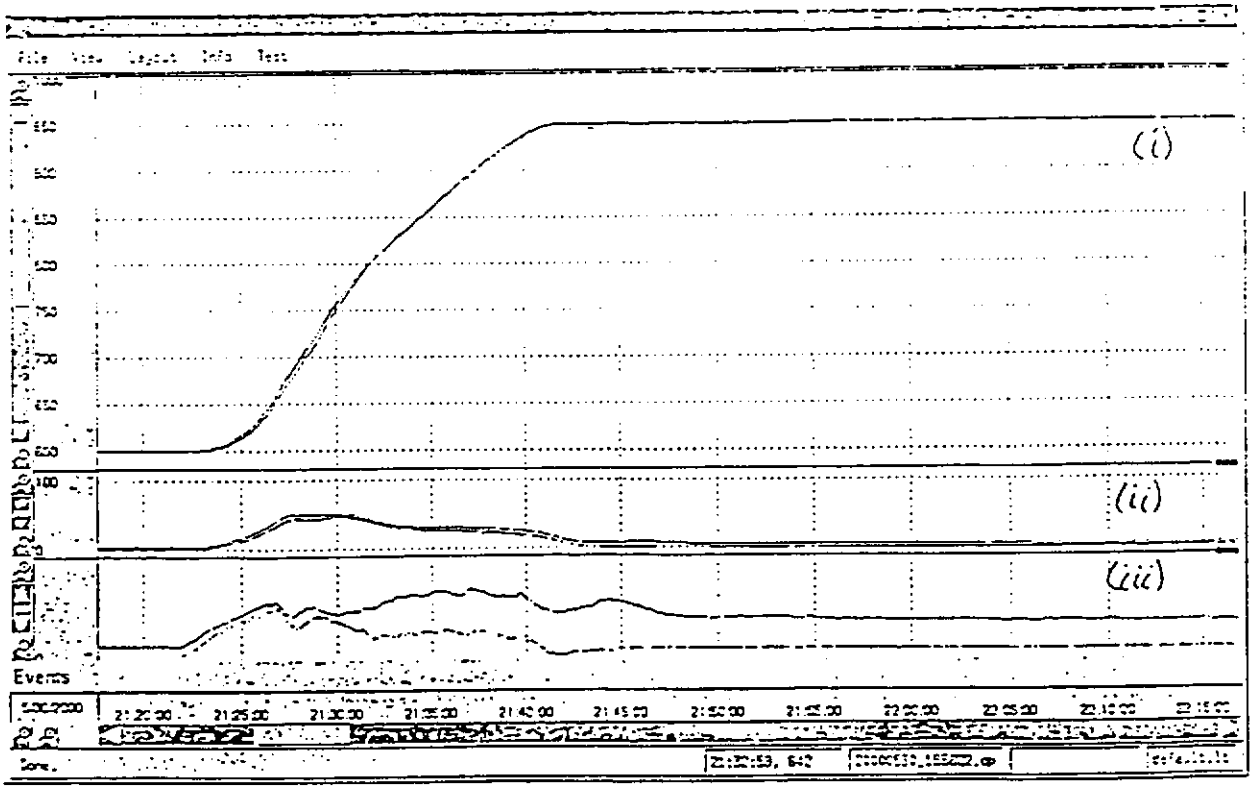


Figure 6

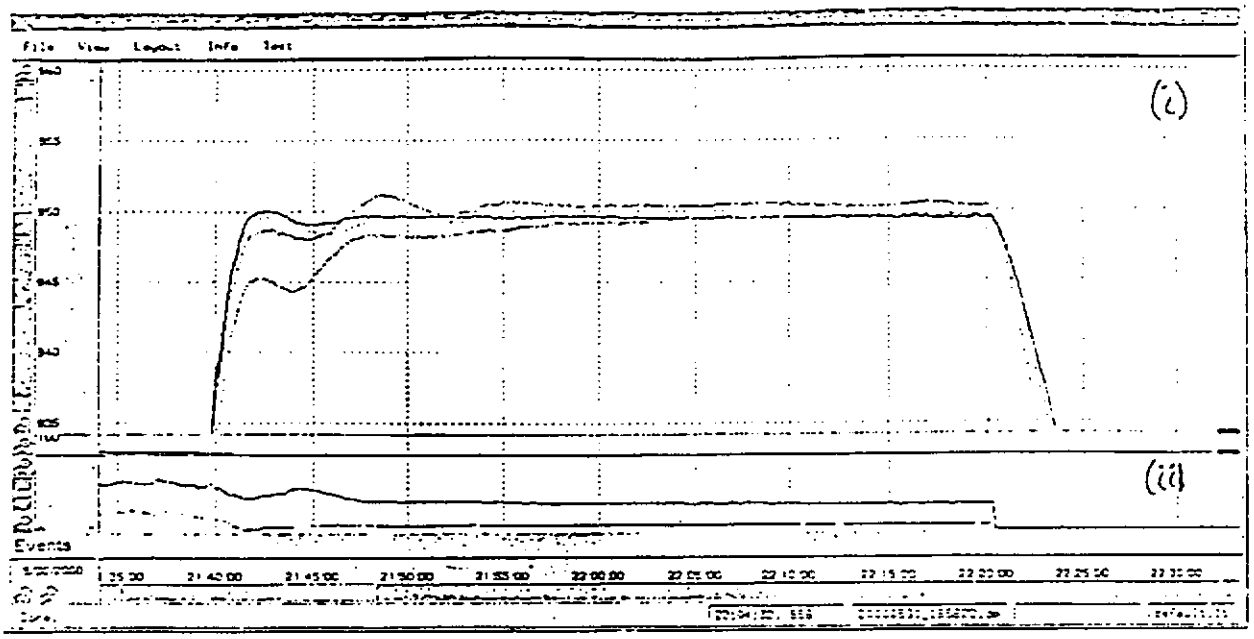


Figure 7

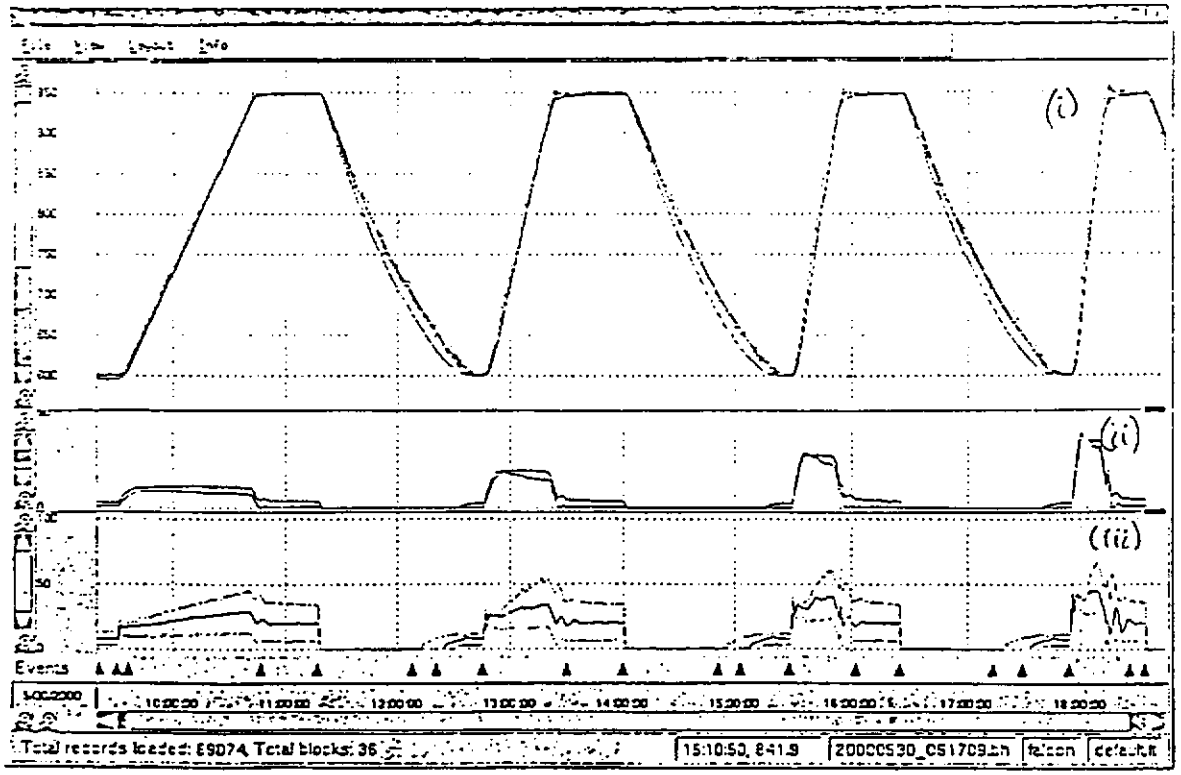


Figure 8