UNIVERSITAT POLITÈCNICA DE CATALUNYA

ESCOLA TÈCNICA SUPERIOR D'ENGINYERS DE TELECOMUNICACIÓ

T E S I D O C T O R A L

" APORTACIÓN AL CONTROL DIGITAL ÓPTIMO DE SISTEMAS DE ENERGÍA ELÉCTRICA : APLICACIÓN A LA REGULACIÓN POTENCIA - FRECUENCIA ".

Autor: EDUARD BERTRAN ALBERTÍ

Director: JAUME HERRANZ LUIS

BARCELONA, SETEMBRE DE 1985

(2 toms)

APENDICE E :

Resultados de simulación anexos al Capítulo 5.

RESULTADOS DE SIMULACION.

Entrada: Perturbación de 0,01 p.u.MW en el Area 1.

Bloques listados:

20 : Generación del Area 1 (p.u.MW).

24 : Frecuencia del Area 1 (Hz).

27 : Intercambio de potencia del Area 1 al Area 2 (p.u.MW).

30 : Frecuencia del Area 2 (Hz).

38 : Generación del Area 2 (p.u.MW).

46 : Integral del ACE del Area 1, $\int ACE_1(t)\,dt$.

54 : Integral del ACE del Area 2, $\int ACE_2(t)\,dt$.

55 : Integral del error cuadrático de frecuencia del Area 1, $\int f_1^2(t)\,dt$.

56 : Integral del error cuadrático del intercambio de potencia $\int P_{12}^2(t)\,dt$.

S.1

```
    PROGRAMA DE CONTROL OPTIM/FILTRE DE KALMAN

    IDENTIFICACIO DEL PROBLEMA :

*********************************************
    T. DE MOSTR.
 .01500
    PRECISIO
 .05000
    ALFA:
0.00000

    LA MATRIU A

-4.8890E-01 -3.7700E-02  0.0000E 00 -3.7700E-02  0.0000E 00  0.0000E 00
 0.0000E 00
-2.6148E 00 -4.7420E-01  0.0000E 00 -2.0170E-01  0.0000E 00  0.0000E 00
 0.0000E 00
 3.0525E 00  7.5400E-02 -2.0746E 00  7.5400E-02  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  6.2500E 00 -9.3700E-02  0.0000E 00 -6.2500E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  9.2000E-02  0.0000E 00  1.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  1.5300E 00  0.0000E 00  0.0000E 00
-1.5300E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  6.2500E 00
-1.2343E 00

    LA MATRIU B

 3.7700E-02
 2.0170E-01
-7.5400E-02
 0.0000E 00
 0.0000E 00
 0.0000E 00
 0.0000E 00

    LA MATRIU C

 0.0000E 00  0.0000E 00  0.0000E 00  1.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00

    ********** OPCIO CONTROL **********


    LA MATRIU R

 1.0000E 00

    LA MATRIU Q

 5.0000E-01  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  5.0000E-01  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  5.0000E-01  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  1.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000F 00  5.0000E-01  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  5.0000E-01
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 5.0000E-01

    CONDICIONS INICIALS
```

Ejemplo de aplicación del programa de cálculo de la matriz de Riccati (matriz $\underset{\sim}{P}$).

S.2

```
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000F 00  0.0000E 00  0.0000E 00
 0.0000F 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000F 00
 0.0000E 00
 0.0000F 00  0.0000E 00  0.0000E 00  0.0000F 00  0.0000E 00  0.0000F 00
 0.0000E 00
 0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00  0.0000E 00
 0.0000F 00

##############################################
   **********

    SOLUCIO DE REGIM
    GUANYS

 3.7629E 00 -1.4429E-01  3.6269E-01  8.9876E-02  7.0658E-01  8.4836E-02
 2.5232E-02

     MATRIU P

 2.2644E 02 -1.3647E 01  2.6809E 01  8.0311E 00  4.2006E 01 -1.0452E 00
 2.0855E 00
-1.3647E 01  1.4085E 00 -1.1421E 00 -3.7926E-01 -2.2179E 00 -1.4758E-03
-1.2835E-02
 2.6809E 01 -1.1421E 00  5.5389E 00  1.8090E 00  5.6987E 00 -1.6516E 00
 6.7378E-01
 8.0311E 00 -3.7926E-01  1.8090E 00  1.0113E 00  1.9327E 00 -3.1949E-01
-4.6173E-02
 4.2006E 01 -2.2179E 00  5.6987E 00  1.9327E 00  1.1629E 01 -7.7491E-02
 8.1607E-02
-1.0452E 00 -1.4758E-03 -1.6516E 00 -3.1948E-01 -7.7480E-02  3.1025E 00
-3.4692E-01
 2.0855E 00 -1.2835E-02  6.7377E-01 -4.6175E-02  8.1599E-02 -3.4692E-01
 6.3205E-01
```

BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0120)

S1.1

TEMPS	SORTIDA24
.001	.0001
.750	-.0212
1.500	-.0322
2.250	-.0382
3.000	-.0396
3.750	-.0350
4.500	-.0298
5.250	-.0203
6.000	-.0133
6.750	-.0041
7.500	.0014
8.250	.0076
9.000	.0100
9.750	.0128
10.500	.0127
11.250	.0130
12.000	.0114
12.750	.0105
13.500	.0087
14.250	.0076
15.000	.0062
15.750	.0055
16.500	.0047
17.250	.0043
18.000	.0040
18.750	.0040
19.500	.0039
20.250	.0040
21.000	.0039
21.750	.0039
22.500	.0039
23.250	.0038
24.000	.0036
24.750	.0034
25.500	.0031
26.250	.0029
27.000	.0026
27.750	.0024
28.500	.0021
29.250	.0019
30.000	.0017
30.750	.0015
31.500	.0013
32.250	.0011
33.000	.0010
33.750	.0008
34.500	.0007
35.250	.0006
36.000	.0004
36.750	.0003
37.500	.0002
38.250	.0001
39.000	-.0001
39.750	-.0001
40.500	-.0002
41.250	-.0003
42.000	-.0004
42.750	-.0004
43.500	-.0005
44.250	-.0006
45.000	-.0006
45.750	-.0006
46.500	-.0007
47.250	-.0007
48.000	-.0007
48.750	-.0008
49.500	-.0008
50.250	-.0008
51.000	-.0008
51.750	-.0008
52.500	-.0008
53.250	-.0009
54.000	-.0009
54.750	-.0009
55.500	-.0009
56.250	-.0009
57.000	-.0009
57.750	-.0009
58.500	-.0008
59.250	-.0008
60.000	-.0008

Plot scale: -.0600 to .0120

S1:

Regulación PI convencional en las dos áreas.

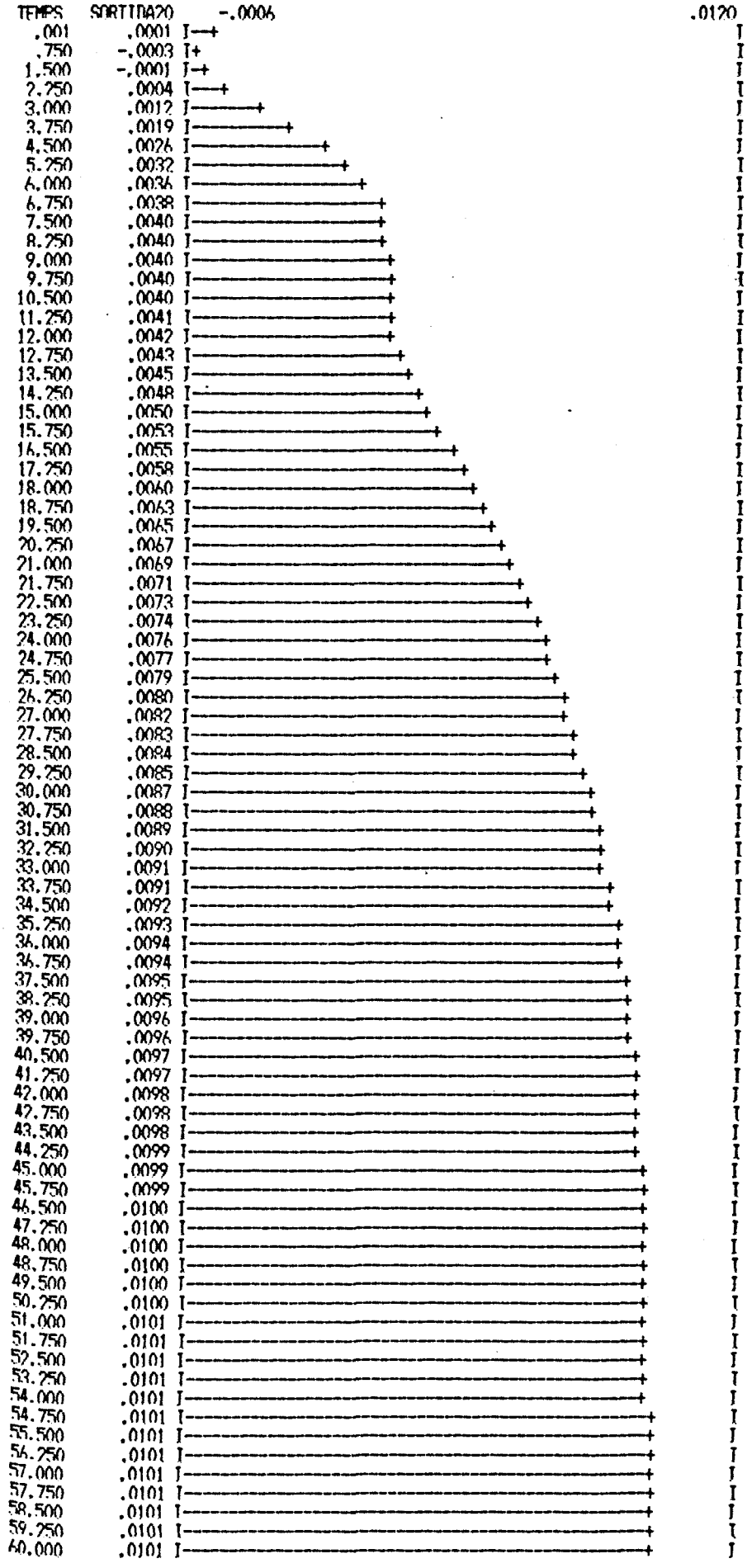
Ganancias de los reguladores:

Area 1 : $K_1 = 0,8$

Area 2 : $K_2 = 0,02$

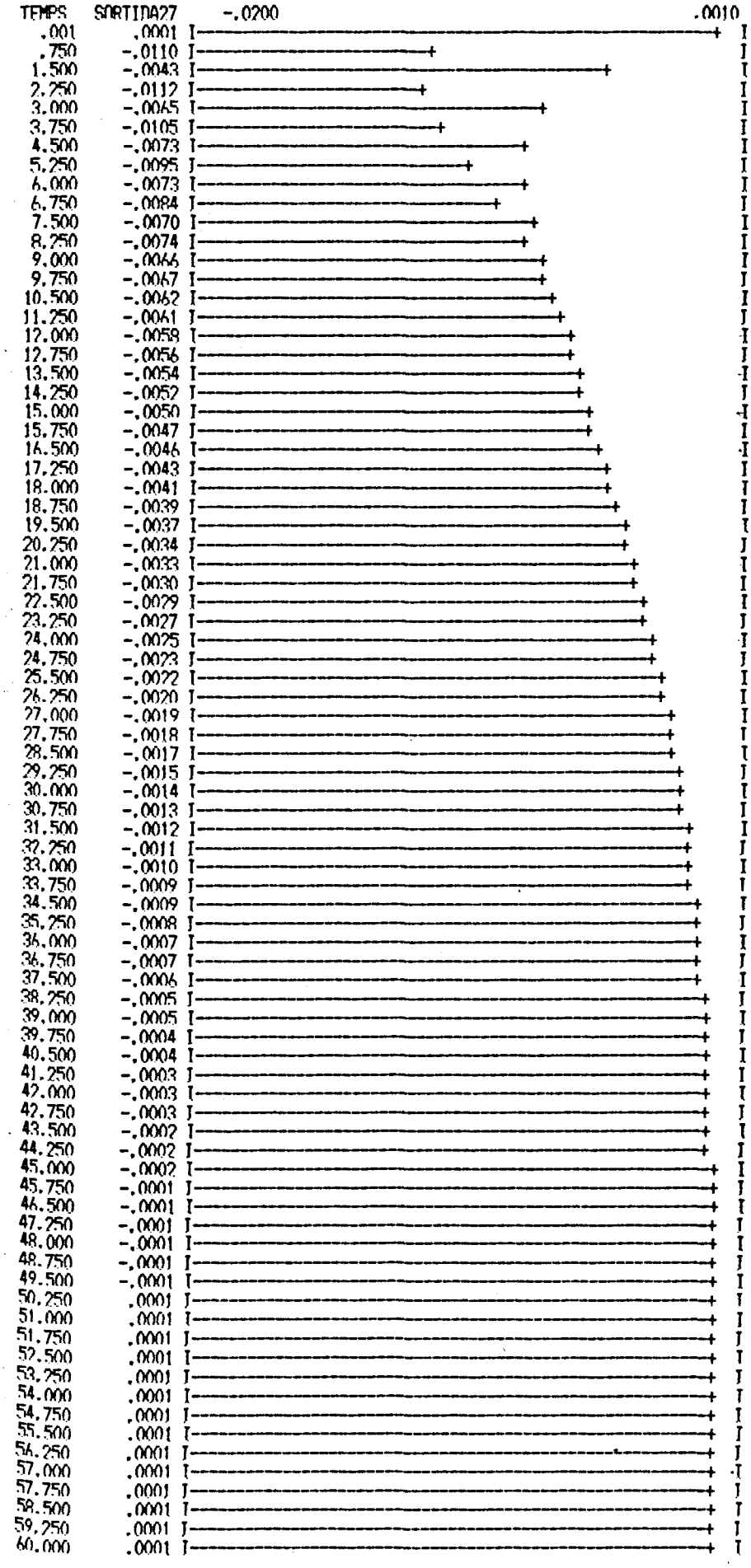
S1.2

BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)



S1.3

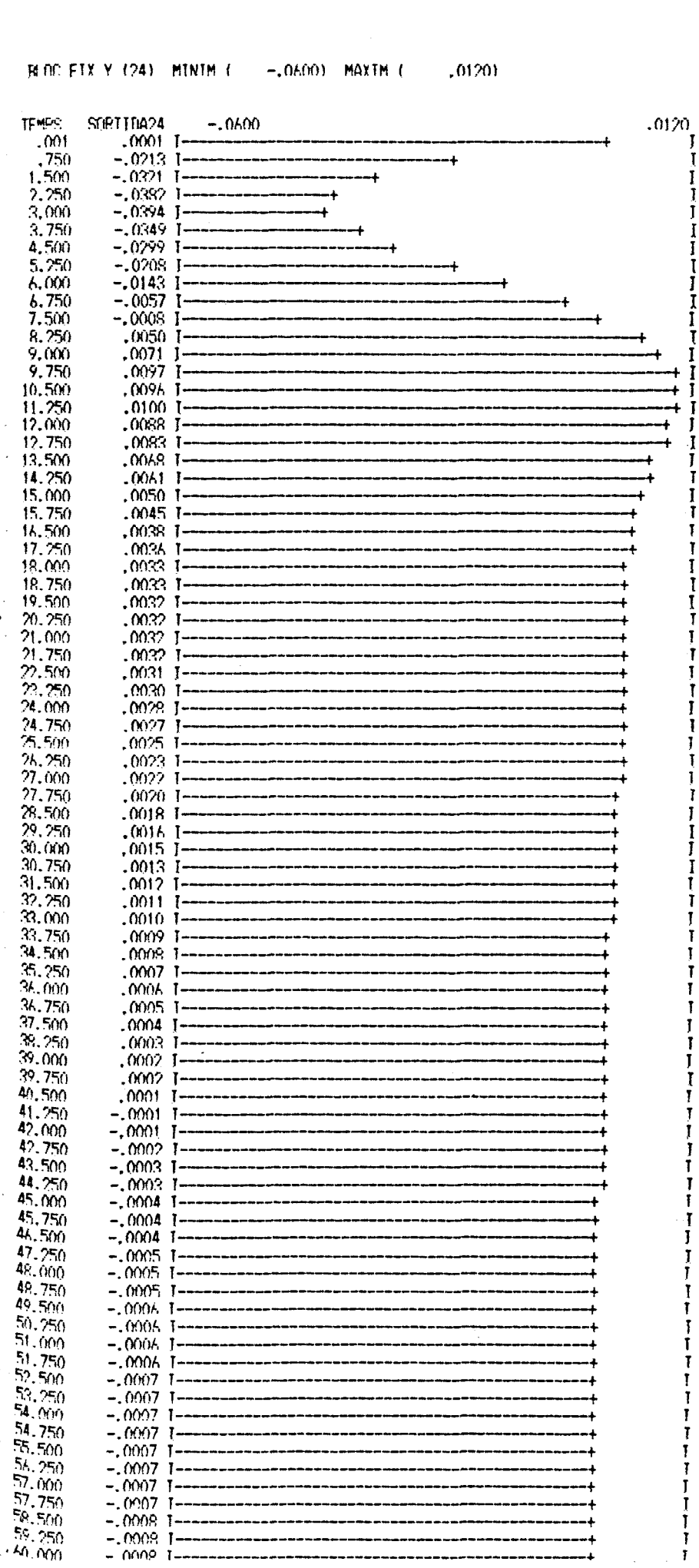
BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)



S1.4

TEMPS	SORTIDA46	SORTIDA41	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	.0131	.0014	.0002
4.00	-.0427	.0313	.0043	.0003
6.00	-.0633	.0477	.0054	.0005
8.00	-.0792	.0630	.0055	.0006
10.00	-.0909	.0766	.0057	.0007
12.00	-.1006	.0886	.0060	.0007
14.00	-.1099	.0996	.0062	.0008
16.00	-.1185	.1094	.0063	.0009
18.00	-.1264	.1181	.0064	.0009
20.00	-.1332	.1256	.0064	.0009
22.00	-.1388	.1320	.0064	.0009
24.00	-.1435	.1374	.0064	.0010
26.00	-.1474	.1419	.0065	.0010
28.00	-.1507	.1456	.0065	.0010
30.00	-.1534	.1487	.0065	.0010
32.00	-.1556	.1512	.0065	.0010
34.00	-.1574	.1531	.0065	.0010
36.00	-.1589	.1546	.0065	.0010
38.00	-.1600	.1558	.0065	.0010
40.00	-.1608	.1567	.0065	.0010
42.00	-.1615	.1573	.0065	.0010
44.00	-.1620	.1577	.0065	.0010
46.00	-.1623	.1579	.0065	.0010
48.00	-.1626	.1581	.0065	.0010
50.00	-.1627	.1581	.0065	.0010
52.00	-.1628	.1581	.0065	.0010
54.00	-.1629	.1582	.0065	.0010
56.00	-.1629	.1584	.0065	.0010
58.00	-.1628	.1586	.0065	.0010
60.00	-.1628	.1587	.0065	.0010
62.00	-.1628	.1589	.0065	.0010
64.00	-.1627	.1591	.0065	.0010
66.00	-.1626	.1593	.0065	.0010
68.00	-.1626	.1595	.0065	.0010
70.00	-.1625	.1597	.0065	.0010
72.00	-.1625	.1598	.0065	.0010
74.00	-.1624	.1600	.0065	.0010
76.00	-.1624	.1601	.0065	.0010
78.00	-.1623	.1602	.0065	.0010
80.00	-.1623	.1604	.0065	.0010
82.00	-.1622	.1605	.0065	.0010
84.00	-.1622	.1606	.0065	.0010
86.00	-.1622	.1606	.0065	.0010
88.00	-.1622	.1607	.0065	.0010
90.00	-.1622	.1608	.0065	.0010
92.00	-.1622	.1608	.0065	.0010
94.00	-.1621	.1609	.0065	.0010
96.00	-.1621	.1609	.0065	.0010
98.00	-.1621	.1610	.0065	.0010
100.00	-.1621	.1610	.0065	.0010
102.00	-.1621	.1610	.0065	.0010
104.00	-.1621	.1610	.0065	.0010
106.00	-.1621	.1611	.0065	.0010
108.00	-.1621	.1611	.0065	.0010
110.00	-.1621	.1611	.0065	.0010
112.00	-.1621	.1611	.0065	.0010
114.00	-.1621	.1611	.0065	.0010
116.00	-.1621	.1611	.0065	.0010
118.00	-.1621	.1611	.0065	.0010
120.00	-.1621	.1612	.0065	.0010
122.00	-.1621	.1612	.0065	.0010
124.00	-.1621	.1612	.0065	.0010
126.00	-.1621	.1612	.0065	.0010
128.00	-.1621	.1612	.0065	.0010
130.00	-.1621	.1612	.0065	.0010
132.00	-.1622	.1612	.0065	.0010
134.00	-.1622	.1612	.0065	.0010
136.00	-.1622	.1612	.0065	.0010
138.00	-.1622	.1612	.0065	.0010
140.00	-.1622	.1612	.0065	.0010
142.00	-.1622	.1612	.0065	.0010
144.00	-.1622	.1612	.0065	.0010
146.00	-.1622	.1612	.0065	.0010
148.00	-.1622	.1612	.0065	.0010
150.00	-.1622	.1612	.0065	.0010
152.00	-.1622	.1612	.0065	.0010
154.00	-.1622	.1612	.0065	.0010
156.00	-.1622	.1612	.0065	.0010
158.00	-.1622	.1612	.0065	.0010
160.00	-.1622	.1612	.0065	.0010

S2.1



TEMPS	SORTIDA24
.001	.0001
.750	-.0213
1.500	-.0321
2.250	-.0382
3.000	-.0394
3.750	-.0349
4.500	-.0299
5.250	-.0208
6.000	-.0143
6.750	-.0057
7.500	-.0008
8.250	.0050
9.000	.0071
9.750	.0097
10.500	.0096
11.250	.0100
12.000	.0088
12.750	.0083
13.500	.0068
14.250	.0061
15.000	.0050
15.750	.0045
16.500	.0038
17.250	.0036
18.000	.0033
18.750	.0033
19.500	.0032
20.250	.0032
21.000	.0032
21.750	.0032
22.500	.0031
23.250	.0030
24.000	.0028
24.750	.0027
25.500	.0025
26.250	.0023
27.000	.0022
27.750	.0020
28.500	.0018
29.250	.0016
30.000	.0015
30.750	.0013
31.500	.0012
32.250	.0011
33.000	.0010
33.750	.0009
34.500	.0008
35.250	.0007
36.000	.0006
36.750	.0005
37.500	.0004
38.250	.0003
39.000	.0002
39.750	.0002
40.500	.0001
41.250	-.0001
42.000	-.0001
42.750	-.0002
43.500	-.0003
44.250	-.0003
45.000	-.0004
45.750	-.0004
46.500	-.0004
47.250	-.0005
48.000	-.0005
48.750	-.0005
49.500	-.0006
50.250	-.0006
51.000	-.0006
51.750	-.0006
52.500	-.0007
53.250	-.0007
54.000	-.0007
54.750	-.0007
55.500	-.0007
56.250	-.0007
57.000	-.0007
57.750	-.0007
58.500	-.0008
59.250	-.0008
60.000	-.0008

S2.

RLO en Area 1

PI en Area 2

$\underset{\sim}{Q}$ = diag(0,5;0,5;0,5;0,5;0,5;0,5)

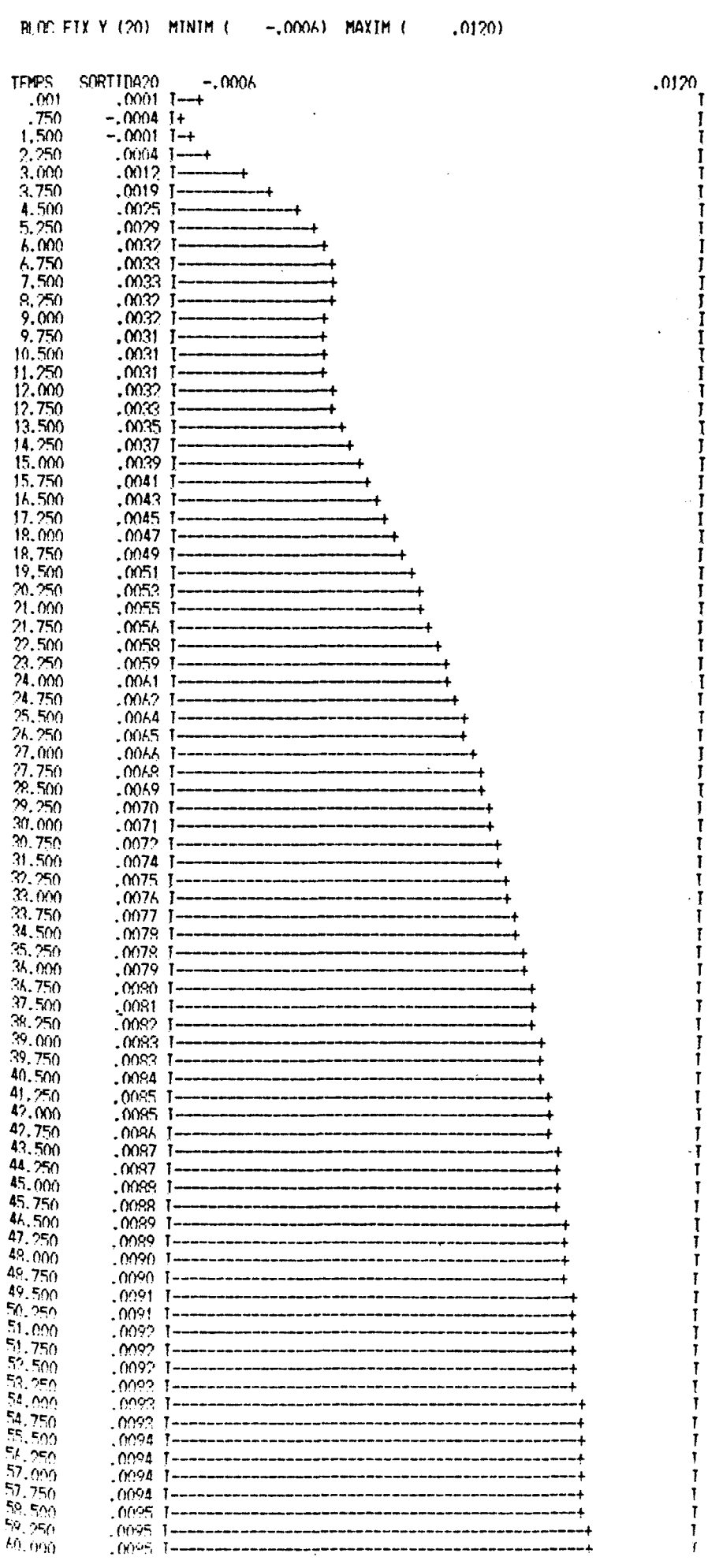
$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

Estructura de diseño convencional (desacoplo del modelo del Area por la línea de interconexión).

S2.2

BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)



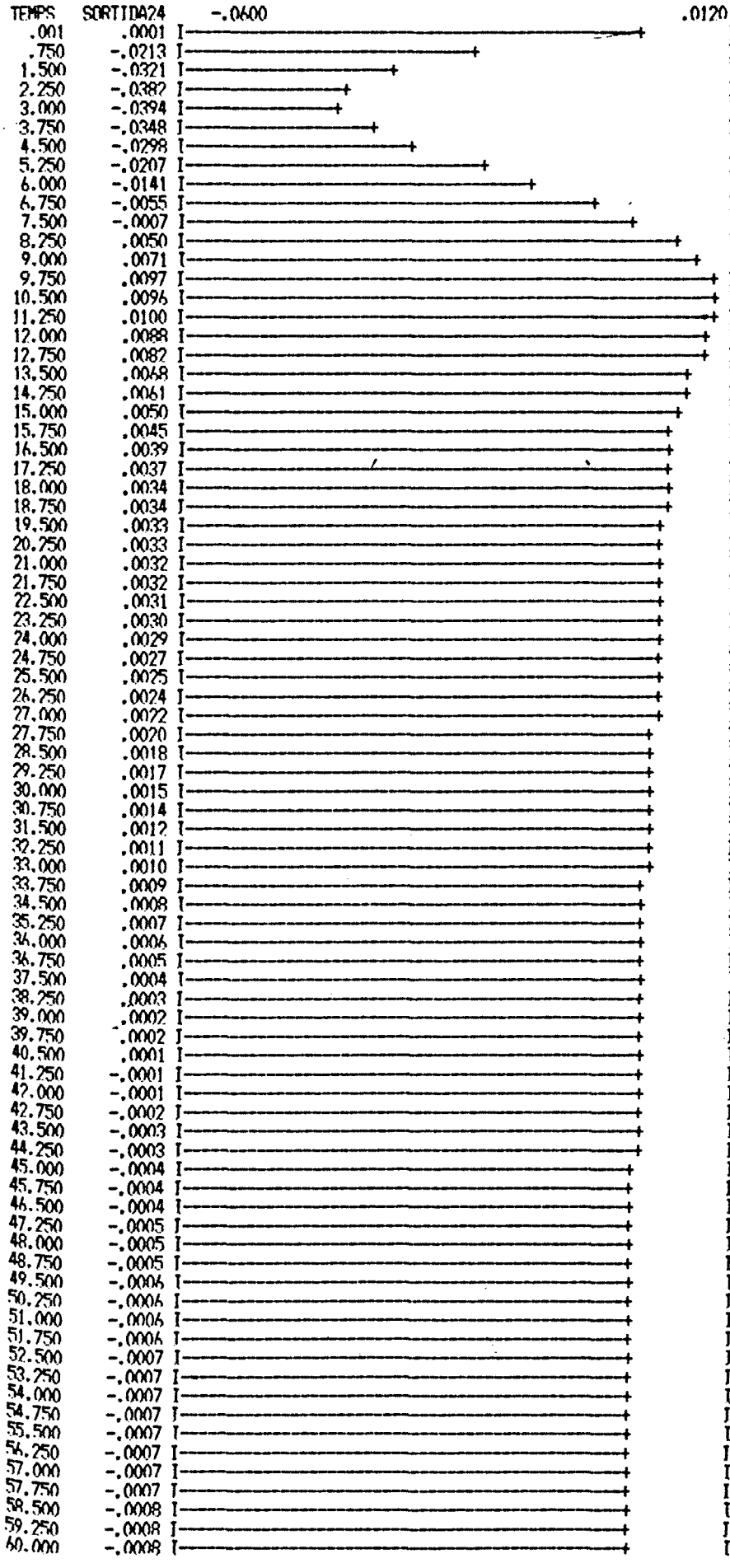
S2.3

```
BLOC FIX Y (27)  MINIM (    -.0200)  MAXIM (     .0010)

TEMPS   SORTIDA27     -.0200                                        .0010
  .001      .0001 I-------------------------------------------------+ I
  .750     -.0110 I--------------------+                             I
 1.500     -.0043 I-----------------------------------------+         I
 2.250     -.0112 I--------------------+                             I
 3.000     -.0065 I-------------------------------+                   I
 3.750     -.0105 I---------------------+                            I
 4.500     -.0074 I--------------------------------+                  I
 5.250     -.0096 I-----------------------+                           I
 6.000     -.0078 I--------------------------------+                  I
 6.750     -.0088 I-----------------------+                           I
 7.500     -.0075 I--------------------------------+                  I
 8.250     -.0081 I-------------------------------+                   I
 9.000     -.0073 I--------------------------------+                  I
 9.750     -.0075 I--------------------------------+                  I
10.500     -.0071 I---------------------------------+                 I
11.250     -.0071 I---------------------------------+                 I
12.000     -.0068 I----------------------------------+                I
12.750     -.0067 I----------------------------------+                I
13.500     -.0065 I-----------------------------------+               I
14.250     -.0063 I-----------------------------------+               I
15.000     -.0061 I-----------------------------------+               I
15.750     -.0059 I------------------------------------+              I
16.500     -.0058 I------------------------------------+              I
17.250     -.0056 I------------------------------------+              I
18.000     -.0054 I-------------------------------------+             I
18.750     -.0052 I-------------------------------------+             I
19.500     -.0050 I--------------------------------------+            I
20.250     -.0049 I--------------------------------------+            I
21.000     -.0047 I---------------------------------------+           I
21.750     -.0045 I---------------------------------------+           I
22.500     -.0044 I----------------------------------------+          I
23.250     -.0042 I----------------------------------------+          I
24.000     -.0040 I----------------------------------------+          I
24.750     -.0039 I-----------------------------------------+         I
25.500     -.0037 I-----------------------------------------+         I
26.250     -.0036 I------------------------------------------+        I
27.000     -.0035 I------------------------------------------+        I
27.750     -.0033 I-------------------------------------------+       I
28.500     -.0032 I-------------------------------------------+       I
29.250     -.0031 I-------------------------------------------+       I
30.000     -.0030 I--------------------------------------------+      I
30.750     -.0029 I--------------------------------------------+      I
31.500     -.0027 I--------------------------------------------+      I
32.250     -.0026 I---------------------------------------------+     I
33.000     -.0025 I---------------------------------------------+     I
33.750     -.0024 I---------------------------------------------+     I
34.500     -.0023 I---------------------------------------------+     I
35.250     -.0022 I----------------------------------------------+    I
36.000     -.0022 I----------------------------------------------+    I
36.750     -.0021 I----------------------------------------------+    I
37.500     -.0020 I----------------------------------------------+    I
38.250     -.0019 I-----------------------------------------------+   I
39.000     -.0018 I-----------------------------------------------+   I
39.750     -.0018 I-----------------------------------------------+   I
40.500     -.0017 I-----------------------------------------------+   I
41.250     -.001A I------------------------------------------------+  I
42.000     -.0015 I-------------------------------------------------+ I
42.750     -.0015 I-------------------------------------------------+ I
43.500     -.0014 I-------------------------------------------------+ I
44.250     -.0014 I-------------------------------------------------+ I
45.000     -.0013 I-------------------------------------------------+ I
45.750     -.0013 I-------------------------------------------------+ I
46.500     -.0012 I--------------------------------------------------+I
47.250     -.0012 I--------------------------------------------------+I
48.000     -.0011 I--------------------------------------------------+I
48.750     -.0011 I--------------------------------------------------+I
49.500     -.0010 I--------------------------------------------------+I
50.250     -.0010 I--------------------------------------------------+I
51.000     -.0009 I--------------------------------------------------+I
51.750     -.0009 I--------------------------------------------------+I
52.500     -.0009 I---------------------------------------------------+I
53.250     -.0008 I---------------------------------------------------+I
54.000     -.0008 I---------------------------------------------------+I
54.750     -.0008 I---------------------------------------------------+I
55.500     -.0007 I---------------------------------------------------+I
56.250     -.0007 I---------------------------------------------------+I
57.000     -.0007 I---------------------------------------------------+I
57.750     -.0004 I---------------------------------------------------+I
```

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)

S3.1



S3:

RLO en Area 1.

PI en Area 2.

$Q = \text{diag}(0,5;0,5;0,5;0,5;0,5;0,5;0,5;0,5)$

$R = I$

$\alpha_o = 0$

Inclusión de la carga externa en el diseño del RLO descentralizado del Area 1.

S3.2

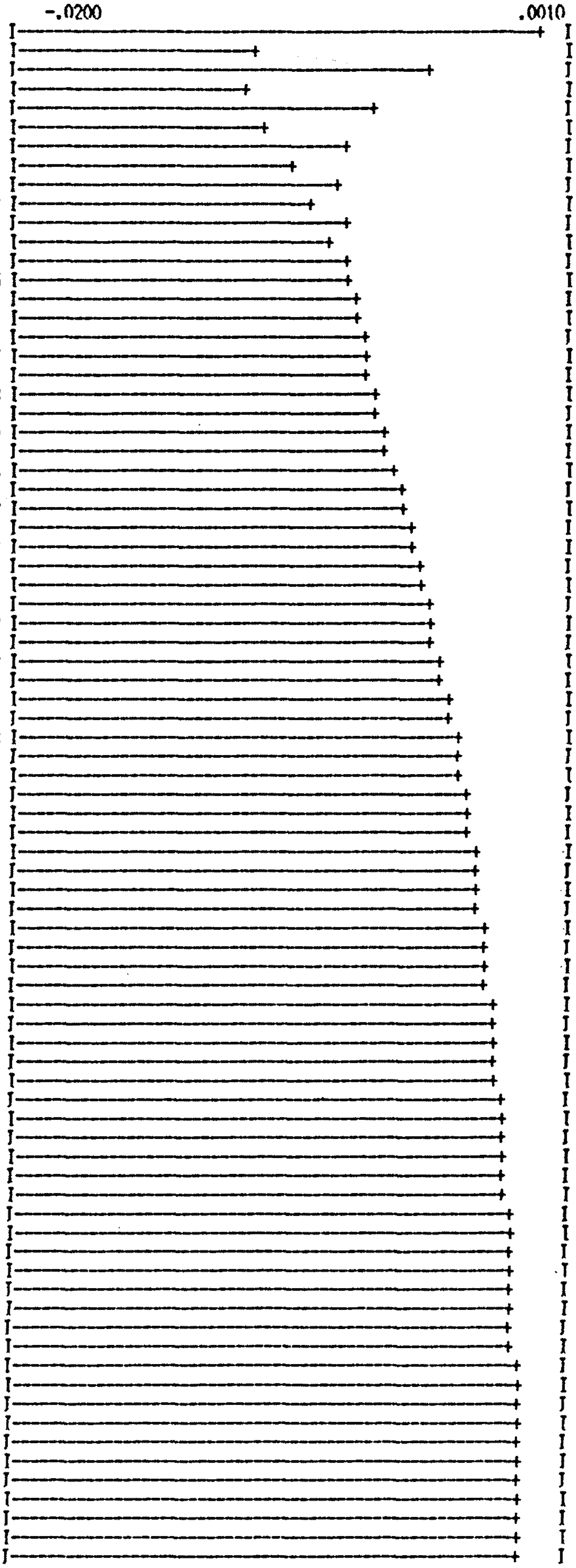
BLOC EIX Y (20) MINIM (-.0006) MAXIM (.0120)

TEMPS	SORTIDA20	-.0006	.0120
.001	.0001	I—+	I
.750	-.0004	I+	I
1.500	-.0001	I—+	I
2.250	.0004	I——+	I
3.000	.0012	I———+	I
3.750	.0019	I————+	I
4.500	.0025	I—————+	I
5.250	.0029	I——————+	I
6.000	.0032	I———————+	I
6.750	.0033	I———————+	I
7.500	.0033	I———————+	I
8.250	.0033	I———————+	I
9.000	.0032	I———————+	I
9.750	.0031	I——————+	I
10.500	.0031	I——————+	I
11.250	.0031	I——————+	I
12.000	.0032	I———————+	I
12.750	.0033	I———————+	I
13.500	.0035	I————————+	I
14.250	.0037	I—————————+	I
15.000	.0039	I——————————+	I
15.750	.0041	I———————————+	I
16.500	.0043	I————————————+	I
17.250	.0045	I—————————————+	I
18.000	.0047	I——————————————+	I
18.750	.0049	I———————————————+	I
19.500	.0051	I————————————————+	I
20.250	.0053	I—————————————————+	I
21.000	.0055	I—————————————————+	I
21.750	.0056	I——————————————————+	I
22.500	.0058	I———————————————————+	I
23.250	.0059	I————————————————————+	I
24.000	.0061	I————————————————————+	I
24.750	.0062	I—————————————————————+	I
25.500	.0064	I——————————————————————+	I
26.250	.0065	I——————————————————————+	I
27.000	.0066	I———————————————————————+	I
27.750	.0068	I————————————————————————+	I
28.500	.0069	I————————————————————————+	I
29.250	.0070	I—————————————————————————+	I
30.000	.0071	I—————————————————————————+	I
30.750	.0072	I——————————————————————————+	I
31.500	.0073	I——————————————————————————+	I
32.250	.0075	I———————————————————————————+	I
33.000	.0076	I———————————————————————————+	I
33.750	.0077	I————————————————————————————+	I
34.500	.0078	I————————————————————————————+	I
35.250	.0078	I—————————————————————————————+	I
36.000	.0079	I—————————————————————————————+	I
36.750	.0080	I——————————————————————————————+	I
37.500	.0081	I——————————————————————————————+	I
38.250	.0082	I——————————————————————————————+	I
39.000	.0083	I———————————————————————————————+	I
39.750	.0083	I———————————————————————————————+	I
40.500	.0084	I———————————————————————————————+	I
41.250	.0085	I————————————————————————————————+	I
42.000	.0085	I————————————————————————————————+	I
42.750	.0086	I————————————————————————————————+	I
43.500	.0087	I—————————————————————————————————+	I
44.250	.0087	I—————————————————————————————————+	I
45.000	.0088	I—————————————————————————————————+	I
45.750	.0088	I—————————————————————————————————+	I
46.500	.0089	I——————————————————————————————————+	I
47.250	.0089	I——————————————————————————————————+	I
48.000	.0090	I——————————————————————————————————+	I
48.750	.0090	I——————————————————————————————————+	I
49.500	.0091	I———————————————————————————————————+	I
50.250	.0091	I———————————————————————————————————+	I
51.000	.0092	I———————————————————————————————————+	I
51.750	.0092	I———————————————————————————————————+	I
52.500	.0092	I———————————————————————————————————+	I
53.250	.0093	I———————————————————————————————————+	I
54.000	.0093	I————————————————————————————————————+	I
54.750	.0093	I————————————————————————————————————+	I
55.500	.0094	I————————————————————————————————————+	I
56.250	.0094	I————————————————————————————————————+	I
57.000	.0094	I————————————————————————————————————+	I
57.750	.0094	I————————————————————————————————————+	I
58.500	.0095	I————————————————————————————————————+	I
59.250	.0095	I—————————————————————————————————————+	I
60.000	.0095	I—————————————————————————————————————+	I

BLOC EIX Y (27) MINIM (-.0200) MAXIM (.0010)

S3.3

TEMPS	SORTIDA27
.001	.0001
.750	-.0110
1.500	-.0043
2.250	-.0111
3.000	-.0065
3.750	-.0105
4.500	-.0073
5.250	-.0096
6.000	-.0076
6.750	-.0088
7.500	-.0075
8.250	-.0081
9.000	-.0073
9.750	-.0075
10.500	-.0071
11.250	-.0071
12.000	-.0068
12.750	-.0067
13.500	-.0065
14.250	-.0063
15.000	-.0062
15.750	-.0060
16.500	-.0058
17.250	-.0056
18.000	-.0054
18.750	-.0052
19.500	-.0051
20.250	-.0048
21.000	-.0047
21.750	-.0045
22.500	-.0044
23.250	-.0042
24.000	-.0040
24.750	-.0039
25.500	-.0038
26.250	-.0036
27.000	-.0035
27.750	-.0033
28.500	-.0032
29.250	-.0031
30.000	-.0030
30.750	-.0029
31.500	-.0027
32.250	-.0026
33.000	-.0025
33.750	-.0024
34.500	-.0023
35.250	-.0022
36.000	-.0021
36.750	-.0021
37.500	-.0020
38.250	-.0019
39.000	-.0018
39.750	-.0017
40.500	-.0017
41.250	-.0016
42.000	-.0015
42.750	-.0015
43.500	-.0014
44.250	-.0014
45.000	-.0013
45.750	-.0013
46.500	-.0012
47.250	-.0012
48.000	-.0011
48.750	-.0011
49.500	-.0010
50.250	-.0010
51.000	-.0009
51.750	-.0009
52.500	-.0009
53.250	-.0008
54.000	-.0008
54.750	-.0008
55.500	-.0007
56.250	-.0007
57.000	-.0007
57.750	-.0006
58.500	-.0006
59.250	-.0006
60.000	-.0006



S3.4

BLOC FIX Y (38) MINIM (-.0007) MAXIM (.0120)

TEMPS	SORTIDA38	-.0007	.0120
.001	.0001	I—+	I
.750	-.0003	I—+	I
1.500	-.0006	+	I
2.250	.0002	I—+	I
3.000	.0013	I———+	I
3.750	.0029	I————+	I
4.500	.0045	I——————+	I
5.250	.0060	I———————+	I
6.000	.0073	I————————+	I
6.750	.0083	I—————————+	I
7.500	.0090	I——————————+	I
8.250	.0094	I———————————+	I
9.000	.0095	I———————————+	I
9.750	.0094	I———————————+	I
10.500	.0091	I——————————+	I
11.250	.0088	I—————————+	I
12.000	.0084	I————————+	I
12.750	.0080	I————————+	I
13.500	.0076	I———————+	I
14.250	.0073	I————————+	I
15.000	.0070	I———————+	I
15.750	.0067	I——————+	I
16.500	.0064	I——————+	I
17.250	.0062	I——————+	I
18.000	.0060	I———————+	I
18.750	.0058	I———————+	I
19.500	.0056	I———————+	I
20.250	.0055	I———————+	I
21.000	.0053	I——————+	I
21.750	.0051	I——————+	I
22.500	.0049	I—————+	I
23.250	.0047	I—————+	I
24.000	.0045	I————+	I
24.750	.0044	I————+	I
25.500	.0042	I————+	I
26.250	.0040	I———+	I
27.000	.0038	I———+	I
27.750	.0037	I———+	I
28.500	.0035	I———+	I
29.250	.0034	I———+	I
30.000	.0032	I———+	I
30.750	.0031	I———+	I
31.500	.0029	I———+	I
32.250	.0028	I———+	I
33.000	.0027	I———+	I
33.750	.0026	I———+	I
34.500	.0024	I———+	I
35.250	.0023	I———+	I
36.000	.0022	I———+	I
36.750	.0021	I———+	I
37.500	.0020	I———+	I
38.250	.0019	I———+	I
39.000	.0018	I———+	I
39.750	.0017	I———+	I
40.500	.0017	I———+	I
41.250	.0016	I———+	I
42.000	.0015	I———+	I
42.750	.0014	I———+	I
43.500	.0014	I———+	I
44.250	.0013	I———+	I
45.000	.0012	I———+	I
45.750	.0012	I———+	I
46.500	.0011	I———+	I
47.250	.0011	I———+	I
48.000	.0010	I———+	I
48.750	.0009	I———+	I
49.500	.0009	I———+	I
50.250	.0009	I———+	I
51.000	.0008	I———+	I
51.750	.0008	I———+	I
52.500	.0007	I———+	I
53.250	.0007	I———+	I
54.000	.0007	I———+	I
54.750	.0006	I———+	I
55.500	.0006	I———+	I
56.250	.0006	I———+	I
57.000	.0005	I———+	I
57.750	.0005	I———+	I
58.500	.0005	I———+	I
59.250	.0004	I———+	I
60.000	.0004	I———+	I

S3.5

TEMPS	SORTIDA44	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0336	.0014	.0002
4.00	-.0426	-.0359	.0043	.0003
6.00	-.0635	-.0127	.0054	.0005
8.00	-.0805	.0030	.0055	.0006
10.00	-.0942	.0091	.0056	.0007
12.00	-.1064	.0091	.0058	.0008
14.00	-.1182	.0060	.0059	.0009
16.00	-.1294	.0041	.0060	.0010
18.00	-.1399	.0033	.0060	.0010
20.00	-.1496	.0031	.0060	.0011
22.00	-.1582	.0030	.0061	.0011
24.00	-.1661	.0027	.0061	.0012
26.00	-.1732	.0023	.0061	.0012
28.00	-.1796	.0018	.0061	.0012
30.00	-.1855	.0014	.0061	.0012
32.00	-.1908	.0010	.0061	.0012
34.00	-.1956	.0007	.0061	.0013
36.00	-.1999	.0005	.0061	.0013
38.00	-.2038	.0003	.0061	.0013
40.00	-.2073	.0001	.0061	.0013
42.00	-.2105	-.0002	.0061	.0013
44.00	-.2133	-.0003	.0061	.0013
46.00	-.2159	-.0005	.0061	.0013
48.00	-.2182	-.0005	.0061	.0013
50.00	-.2203	-.0006	.0061	.0013
52.00	-.2222	-.0007	.0061	.0013
54.00	-.2239	-.0007	.0061	.0013
56.00	-.2254	-.0008	.0061	.0013
58.00	-.2267	-.0008	.0061	.0013
60.00	-.2280	-.0008	.0061	.0013
62.00	-.2290	-.0008	.0061	.0013
64.00	-.2300	-.0008	.0061	.0013
66.00	-.2309	-.0008	.0061	.0013
68.00	-.2317	-.0008	.0061	.0013
70.00	-.2324	-.0007	.0061	.0013
72.00	-.2331	-.0007	.0061	.0013
74.00	-.2337	-.0007	.0061	.0013
76.00	-.2342	-.0007	.0061	.0013
78.00	-.2346	-.0007	.0061	.0013
80.00	-.2350	-.0006	.0061	.0013
82.00	-.2354	-.0006	.0061	.0013
84.00	-.2358	-.0006	.0061	.0013
86.00	-.2361	-.0005	.0061	.0013
88.00	-.2363	-.0005	.0061	.0013
90.00	-.2366	-.0005	.0061	.0013
92.00	-.2368	-.0005	.0061	.0013
94.00	-.2370	-.0004	.0061	.0013
96.00	-.2372	-.0004	.0061	.0013
98.00	-.2373	-.0004	.0061	.0013
100.00	-.2375	-.0004	.0061	.0013
102.00	-.2376	-.0004	.0061	.0013
104.00	-.2377	-.0003	.0061	.0013
106.00	-.2378	-.0003	.0061	.0013
108.00	-.2379	-.0003	.0061	.0013
110.00	-.2380	-.0003	.0061	.0013
112.00	-.2380	-.0003	.0061	.0013
114.00	-.2381	-.0003	.0061	.0013
116.00	-.2382	-.0002	.0061	.0013
118.00	-.2382	-.0002	.0061	.0013
120.00	-.2383	-.0002	.0061	.0013
122.00	-.2383	-.0002	.0061	.0013
124.00	-.2383	-.0002	.0061	.0013
126.00	-.2384	-.0002	.0061	.0013
128.00	-.2384	-.0002	.0061	.0013
130.00	-.2384	-.0002	.0061	.0013
132.00	-.2385	-.0002	.0061	.0013
134.00	-.2385	-.0002	.0061	.0013
136.00	-.2385	-.0001	.0061	.0013
138.00	-.2385	-.0001	.0061	.0013
140.00	-.2385	-.0001	.0061	.0013
142.00	-.2385	-.0001	.0061	.0013
144.00	-.2386	-.0001	.0061	.0013
146.00	-.2386	-.0001	.0061	.0013
148.00	-.2386	-.0001	.0061	.0013
150.00	-.2386	-.0001	.0061	.0013
152.00	-.2386	-.0001	.0061	.0013
154.00	-.2386	-.0001	.0061	.0013
156.00	-.2386	-.0001	.0061	.0013
158.00	-.2386	-.0001	.0061	.0013

S4.1

TEMPS	20	24	27	30
.00	.0001	.0001	.0001	.0001
.60	-.0004	-.0218	-.0098	-.0130
1.20	-.0002	-.0231	-.0064	-.0321
1.80	.0001	-.0397	-.0072	-.0305
2.40	.0006	-.0364	-.0104	-.0415
3.00	.0012	-.0394	-.0065	-.0376
3.60	.0017	-.0375	-.0105	-.0359
4.20	.0023	-.0300	-.0077	-.0335
4.80	.0027	-.0283	-.0087	-.0247
5.40	.0030	-.0189	-.0089	-.0221
6.00	.0032	-.0151	-.0074	-.0137
6.60	.0033	-.0090	-.0088	-.0094
7.20	.0033	-.0038	-.0072	-.0049
7.80	.0033	-.0014	-.0079	-.0002
8.40	.0033	.0029	-.0075	.0013
9.00	.0032	.0036	-.0070	.0044
9.60	.0032	.0052	-.0074	.0046
10.20	.0032	.0055	-.0067	.0053
10.80	.0033	.0051	-.0070	.0053
11.40	.0033	.0051	-.0066	.0044
12.00	.0034	.0040	-.0065	.0043
12.60	.0035	.0036	-.0065	.0031
13.20	.0037	.0027	-.0062	.0027
13.80	.0038	.0020	-.0063	.0020
14.40	.0040	.0017	-.0060	.0013
15.00	.0041	.0011	-.0059	.0011
15.60	.0043	.0010	-.0058	.0007
16.20	.0045	.0007	-.0055	.0007
16.80	.0047	.0007	-.0055	.0006
17.40	.0048	.0008	-.0053	.0006
18.00	.0050	.0008	-.0052	.0008
18.60	.0051	.0011	-.0050	.0008
19.20	.0053	.0011	-.0049	.0010
19.80	.0054	.0013	-.0048	.0011
20.40	.0055	.0014	-.0046	.0013
21.00	.0057	.0015	-.0045	.0014
21.60	.0058	.0016	-.0044	.0015
22.20	.0059	.0016	-.0042	.0015
22.80	.0060	.0017	-.0041	.0015
23.40	.0061	.0017	-.0040	.0015
24.00	.0062	.0016	-.0039	.0015
24.60	.0063	.0016	-.0038	.0015
25.20	.0064	.0016	-.0037	.0015
25.80	.0065	.0015	-.0036	.0014
26.40	.0066	.0015	-.0035	.0014
27.00	.0067	.0014	-.0034	.0013
27.60	.0068	.0014	-.0033	.0013
28.20	.0069	.0013	-.0032	.0012
28.80	.0070	.0013	-.0031	.0012
29.40	.0071	.0013	-.0030	.0012
30.00	.0072	.0012	-.0029	.0011
30.60	.0073	.0012	-.0028	.0011
31.20	.0074	.0012	-.0027	.0011
31.80	.0075	.0012	-.0027	.0011
32.40	.0075	.0011	-.0026	.0010
33.00	.0076	.0011	-.0025	.0010
33.60	.0077	.0011	-.0024	.0010
34.20	.0078	.0011	-.0024	.0010
34.80	.0078	.0010	-.0023	.0010
35.40	.0079	.0010	-.0022	.0009
36.00	.0080	.0010	-.0022	.0009
36.60	.0080	.0010	-.0021	.0009
37.20	.0081	.0009	-.0020	.0009
37.80	.0081	.0009	-.0020	.0009
38.40	.0082	.0009	-.0019	.0008
39.00	.0083	.0009	-.0019	.0008
39.60	.0083	.0008	-.0018	.0008
40.20	.0084	.0008	-.0017	.0008
40.80	.0084	.0008	-.0017	.0007
41.40	.0085	.0008	-.0016	.0007
42.00	.0085	.0008	-.0016	.0007
42.60	.0086	.0007	-.0015	.0007
43.20	.0086	.0007	-.0015	.0007
43.80	.0086	.0007	-.0015	.0006
44.40	.0087	.0007	-.0014	.0006
45.00	.0087	.0007	-.0014	.0006
45.60	.0088	.0006	-.0013	.0006
46.20	.0088	.0006	-.0013	.0006
46.80	.0089	.0006	-.0013	.0006
47.40	.0089	.0006	-.0012	.0006
48.00	.0089	.0006	-.0012	.0005

S4:

Igual que S3 cuando la generación
del Area 2 se limita a la primari

S4.2

48.00	.0089	.0006	-.0012	.0005
48.05	.0089	.0006	-.0012	.0005
48.60	.0090	.0006	-.0011	.0005
49.20	.0090	.0005	-.0011	.0005
49.80	.0090	.0005	-.0011	.0005
50.40	.0091	.0005	-.0010	.0005
51.00	.0091	.0005	-.0010	.0005
51.60	.0091	.0005	-.0010	.0005
52.20	.0091	.0005	-.0010	.0004
52.80	.0092	.0005	-.0009	.0004
53.40	.0092	.0004	-.0009	.0004
54.00	.0092	.0004	-.0009	.0004
54.60	.0093	.0004	-.0008	.0004
55.20	.0093	.0004	-.0008	.0004
55.80	.0093	.0004	-.0008	.0004
56.40	.0093	.0004	-.0008	.0004
57.00	.0093	.0004	-.0008	.0004
57.60	.0094	.0004	-.0007	.0003
58.20	.0094	.0004	-.0007	.0003
58.80	.0094	.0004	-.0007	.0003
59.40	.0094	.0003	-.0007	.0003
60.00	.0095	.0003	-.0007	.0003
60.60	.0095	.0003	-.0006	.0003
61.20	.0095	.0003	-.0006	.0003
61.80	.0095	.0003	-.0006	.0003
62.40	.0095	.0003	-.0006	.0003
63.00	.0095	.0003	-.0006	.0003
63.60	.0096	.0003	-.0005	.0003
64.20	.0096	.0003	-.0005	.0003
64.80	.0096	.0003	-.0005	.0003
65.40	.0096	.0003	-.0005	.0002
66.00	.0096	.0003	-.0005	.0002
66.60	.0096	.0003	-.0005	.0002
67.20	.0096	.0002	-.0005	.0002
67.80	.0097	.0002	-.0004	.0002
68.40	.0097	.0002	-.0004	.0002
69.00	.0097	.0002	-.0004	.0002
69.60	.0097	.0002	-.0004	.0002
70.20	.0097	.0002	-.0004	.0002
70.80	.0097	.0002	-.0004	.0002
71.40	.0097	.0002	-.0004	.0002
72.00	.0097	.0002	-.0004	.0002
72.60	.0097	.0002	-.0004	.0002
73.20	.0098	.0002	-.0004	.0002
73.80	.0098	.0002	-.0003	.0002
74.40	.0098	.0002	-.0003	.0002
75.00	.0098	.0002	-.0003	.0002
75.60	.0098	.0002	-.0003	.0002
76.20	.0098	.0002	-.0003	.0002
76.80	.0098	.0002	-.0003	.0002
77.40	.0098	.0002	-.0003	.0002
78.00	.0098	.0002	-.0003	.0002
78.60	.0098	.0002	-.0003	.0001
79.20	.0098	.0002	-.0003	.0001
79.80	.0098	.0002	-.0003	.0001
80.40	.0098	.0001	-.0003	.0001
81.00	.0099	.0001	-.0002	.0001
81.60	.0099	.0001	-.0002	.0001
82.20	.0099	.0001	-.0002	.0001
82.80	.0099	.0001	-.0002	.0001
83.40	.0099	.0001	-.0002	.0001
84.00	.0099	.0001	-.0002	.0001
84.60	.0099	.0001	-.0002	.0001
85.20	.0099	.0001	-.0002	.0001
85.80	.0099	.0001	-.0002	.0001
86.40	.0099	.0001	-.0002	.0001
87.00	.0099	.0001	-.0002	.0001
87.60	.0099	.0001	-.0002	.0001
88.20	.0099	.0001	-.0002	.0001
88.80	.0099	.0001	-.0002	.0001
89.40	.0099	.0001	-.0002	.0001
90.00	.0099	.0001	-.0002	.0001
90.60	.0099	.0001	-.0002	.0001
91.20	.0099	.0001	-.0002	.0001
91.80	.0099	.0001	-.0002	.0001
92.40	.0099	.0001	-.0002	.0001
93.00	.0099	.0001	-.0002	.0001
93.60	.0099	.0001	-.0002	.0001
94.20	.0100	.0001	-.0001	.0001
94.80	.0100	.0001	-.0001	.0001
95.40	.0100	.0001	-.0001	.0001
96.00	.0100	.0001	-.0001	.0001

```
59.250      .0094 I-----------------------------------------------+  I
60.000      .0095 I-----------------------------------------------+  I
```

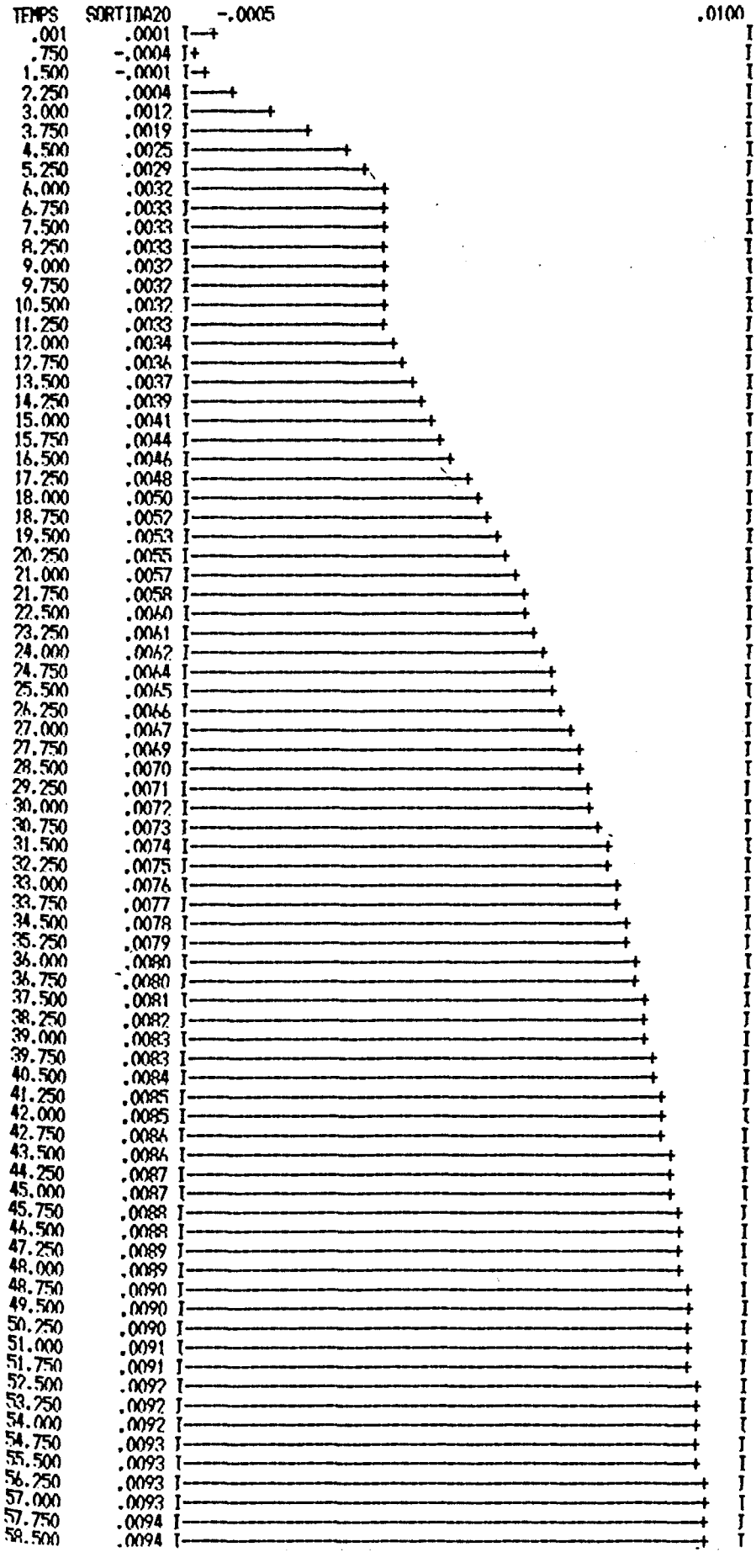
S4.3

```
BLOC FIX Y (24)  MINIM (    -.0420)  MAXIM (     .0060)

TEMPS   SORTIDA24     -.0420                                    .0060
  .001      .0001 I-----------------------------------------+       I
  .750     -.0213 I-------------------+                             I
 1.500     -.0321 I----------+                                      I
 2.250     -.0381 I-----+                                           I
 3.000     -.0394 I--+                                              I
 3.750     -.0348 I-------+                                         I
 4.500     -.0299 I----------+                                      I
 5.250     -.0211 I-------------------+                             I
 6.000     -.0151 I-----------------------+                         I
 6.750     -.0071 I---------------------------------+               I
 7.500     -.0029 I-------------------------------------+           I
 8.250      .0021 I-----------------------------------------+       I
 9.000      .0036 I------------------------------------------+      I
 9.750      .0056 I-------------------------------------------+     I
10.500      .0051 I-------------------------------------------+     I
11.250      .0053 I-------------------------------------------+     I
12.000      .0040 I------------------------------------------+      I
12.750      .0035 I------------------------------------------+      I
13.500      .0022 I-----------------------------------------+       I
14.250      .0018 I----------------------------------------+        I
15.000      .0011 I----------------------------------------+        I
15.750      .0009 I---------------------------------------+         I
16.500      .0007 I---------------------------------------+         I
17.250      .0008 I---------------------------------------+         I
18.000      .0008 I---------------------------------------+         I
18.750      .0011 I----------------------------------------+        I
19.500      .0012 I----------------------------------------+        I
20.250      .0014 I----------------------------------------+        I
21.000      .0015 I----------------------------------------+        I
21.750      .0016 I----------------------------------------+        I
22.500      .0017 I----------------------------------------+        I
23.250      .0017 I----------------------------------------+        I
24.000      .0016 I----------------------------------------+        I
24.750      .0016 I----------------------------------------+        I
25.500      .0015 I----------------------------------------+        I
26.250      .0015 I----------------------------------------+        I
27.000      .0014 I----------------------------------------+        I
27.750      .0014 I----------------------------------------+        I
28.500      .0013 I----------------------------------------+        I
29.250      .0013 I----------------------------------------+        I
30.000      .0012 I----------------------------------------+        I
30.750      .0012 I----------------------------------------+        I
31.500      .0012 I----------------------------------------+        I
32.250      .0011 I----------------------------------------+        I
33.000      .0011 I----------------------------------------+        I
33.750      .0011 I----------------------------------------+        I
34.500      .0010 I---------------------------------------+         I
35.250      .0010 I---------------------------------------+         I
36.000      .0010 I---------------------------------------+         I
36.750      .0010 I---------------------------------------+         I
37.500      .0009 I---------------------------------------+         I
38.250      .0009 I---------------------------------------+         I
39.000      .0009 I---------------------------------------+         I
39.750      .0008 I---------------------------------------+         I
40.500      .0008 I---------------------------------------+         I
41.250      .0008 I---------------------------------------+         I
42.000      .0008 I---------------------------------------+         I
42.750      .0007 I---------------------------------------+         I
43.500      .0007 I---------------------------------------+         I
44.250      .0007 I---------------------------------------+         I
45.000      .0007 I---------------------------------------+         I
45.750      .0006 I---------------------------------------+         I
46.500      .0006 I---------------------------------------+         I
47.250      .0006 I---------------------------------------+         I
48.000      .0006 I---------------------------------------+         I
48.750      .0006 I---------------------------------------+         I
49.500      .0005 I---------------------------------------+         I
50.250      .0005 I---------------------------------------+         I
51.000      .0005 I---------------------------------------+         I
51.750      .0005 I---------------------------------------+         I
52.500      .0005 I---------------------------------------+         I
53.250      .0005 I---------------------------------------+         I
54.000      .0004 I---------------------------------------+         I
54.750      .0004 I---------------------------------------+         I
55.500      .0004 I---------------------------------------+         I
56.250      .0004 I---------------------------------------+         I
57.000      .0004 I---------------------------------------+         I
57.750      .0004 I---------------------------------------+         I
58.500      .0004 I---------------------------------------+         I
```

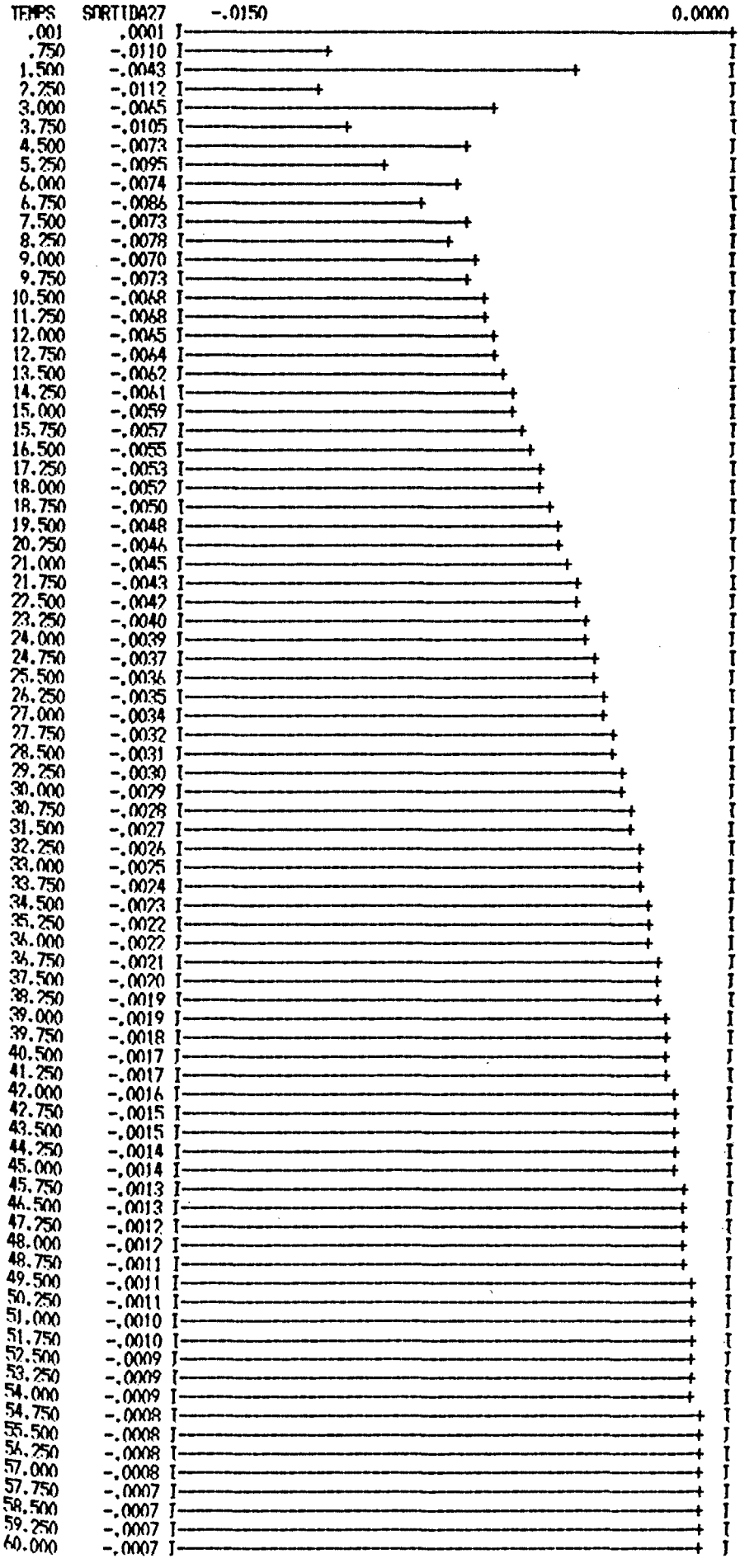
S4.4

BLOC EIX Y (20) MINIM (-.0005) MAXIM (.0100)



S4.5

BLOC EIX Y (27) MINIM (-.0150) MAXIM (0.0000)



```
59.250      .0003 I-----------------------------------------------+     .I
60.000      .0003 I-----------------------------------------------+     .I
```

BLOC FIX Y (30) MINIM (-.0420) MAXIM (.0060)

S4.6

```
TEMPS   SORTIDA30     -.0420                                    .0060
  .001      .0001 I-----------------------------------------------+     I
  .750     -.0200 I-------------------------+                           I
 1.500     -.0307 I-----------------+                                   I
 2.250     -.0391 I-+                                                  I
 3.000     -.0376 I--+                                                 I
 3.750     -.0366 I---+                                                I
 4.500     -.0282 I-----------------+                                   I
 5.250     -.0231 I-------------------------+                           I
 6.000     -.0137 I-----------------------------------+                 I
 6.750     -.0088 I-------------------------------------+               I
 7.500     -.0019 I---------------------------------------+             I
 8.250      .0008 I-----------------------------------------+           I
 9.000      .0044 I-------------------------------------------+         I
 9.750      .0046 I-------------------------------------------+         I
10.500      .0056 I--------------------------------------------+        I
11.250      .0045 I-------------------------------------------+         I
12.000      .0043 I-------------------------------------------+         I
12.750      .0029 I-----------------------------------------+           I
13.500      .0024 I----------------------------------------+            I
14.250      .0014 I---------------------------------------+             I
15.000      .0011 I---------------------------------------+             I
15.750      .0006 I----------------------------------------+            I
16.500      .0006 I----------------------------------------+            I
17.250      .0006 I----------------------------------------+            I
18.000      .0008 I----------------------------------------+            I
18.750      .0009 I----------------------------------------+            I
19.500      .0011 I---------------------------------------+             I
20.250      .0012 I---------------------------------------+             I
21.000      .0014 I---------------------------------------+             I
21.750      .0015 I---------------------------------------+             I
22.500      .0015 I---------------------------------------+             I
23.250      .0015 I---------------------------------------+             I
24.000      .0015 I---------------------------------------+             I
24.750      .0015 I---------------------------------------+             I
25.500      .0014 I---------------------------------------+             I
26.250      .0014 I---------------------------------------+             I
27.000      .0013 I---------------------------------------+             I
27.750      .0013 I---------------------------------------+             I
28.500      .0012 I---------------------------------------+             I
29.250      .0012 I---------------------------------------+             I
30.000      .0011 I---------------------------------------+             I
30.750      .0011 I---------------------------------------+             I
31.500      .0011 I---------------------------------------+             I
32.250      .0011 I---------------------------------------+             I
33.000      .0010 I----------------------------------------+            I
33.750      .0010 I----------------------------------------+            I
34.500      .0010 I----------------------------------------+            I
35.250      .0009 I----------------------------------------+            I
36.000      .0009 I----------------------------------------+            I
36.750      .0009 I----------------------------------------+            I
37.500      .0009 I----------------------------------------+            I
38.250      .0008 I----------------------------------------+            I
39.000      .0008 I----------------------------------------+            I
39.750      .0008 I----------------------------------------+            I
40.500      .0008 I----------------------------------------+            I
41.250      .0007 I----------------------------------------+            I
42.000      .0007 I----------------------------------------+            I
42.750      .0007 I----------------------------------------+            I
43.500      .0007 I----------------------------------------+            I
44.250      .0006 I----------------------------------------+            I
45.000      .0006 I----------------------------------------+            I
45.750      .0006 I----------------------------------------+            I
46.500      .0006 I----------------------------------------+            I
47.250      .0006 I----------------------------------------+            I
48.000      .0005 I----------------------------------------+            I
48.750      .0005 I----------------------------------------+            I
49.500      .0005 I----------------------------------------+            I
50.250      .0005 I----------------------------------------+            I
51.000      .0005 I----------------------------------------+            I
51.750      .0005 I----------------------------------------+            I
52.500      .0004 I----------------------------------------+            I
53.250      .0004 I----------------------------------------+            I
54.000      .0004 I----------------------------------------+            I
54.750      .0004 I----------------------------------------+            I
55.500      .0004 I----------------------------------------+            I
56.250      .0004 I----------------------------------------+            I
57.000      .0004 I----------------------------------------+            I
57.750      .0003 I----------------------------------------+            I
58.500      .0003 I----------------------------------------+            I
59.250      .0003 I----------------------------------------+            I
60.000      .0003 I----------------------------------------+            I
```

120.00	-.4526	-.2382	.0001	.0001

ΔCE1 ΔCE2.

S4.7

TEMPS	SORTIDA46	SORTIDA54	SORTIDA38	SORTIDA20
.00	.0001	.0001	.0001	.0001
1.50	-.0125	-.0473	-.0006	-.0001
3.00	-.0300	-.1371	.0013	.0012
4.50	-.0478	-.2256	.0043	.0025
6.00	-.0634	-.2769	.0069	.0032
7.50	-.0764	-.2884	.0082	.0033
9.00	-.0874	-.2738	.0084	.0032
10.50	-.0973	-.2490	.0079	.0032
12.00	-.1067	-.2252	.0072	.0034
13.50	-.1158	-.2066	.0065	.0037
15.00	-.1246	-.1932	.0060	.0041
16.50	-.1329	-.1827	.0056	.0046
18.00	-.1408	-.1730	.0053	.0050
19.50	-.1481	-.1631	.0051	.0053
21.00	-.1548	-.1527	.0048	.0057
22.50	-.1610	-.1421	.0045	.0060
24.00	-.1667	-.1318	.0042	.0062
25.50	-.1721	-.1221	.0039	.0065
27.00	-.1770	-.1130	.0036	.0067
28.50	-.1817	-.1047	.0033	.0070
30.00	-.1859	-.0970	.0031	.0072
31.50	-.1899	-.0897	.0029	.0074
33.00	-.1936	-.0830	.0027	.0076
34.50	-.1970	-.0767	.0025	.0078
36.00	-.2001	-.0708	.0023	.0080
37.50	-.2030	-.0653	.0022	.0081
39.00	-.2057	-.0602	.0020	.0083
40.50	-.2082	-.0555	.0019	.0084
42.00	-.2105	-.0511	.0017	.0085
43.50	-.2126	-.0470	.0016	.0086
45.00	-.2146	-.0432	.0015	.0087
46.50	-.2164	-.0397	.0014	.0088
48.00	-.2181	-.0365	.0013	.0089
49.50	-.2197	-.0335	.0012	.0090
51.00	-.2211	-.0307	.0011	.0091
52.50	-.2224	-.0281	.0010	.0092
54.00	-.2237	-.0258	.0009	.0092
55.50	-.2248	-.0236	.0009	.0093
57.00	-.2259	-.0215	.0008	.0093
58.50	-.2268	-.0196	.0008	.0094
60.00	-.2277	-.0179	.0007	.0095
61.50	-.2286	-.0163	.0007	.0095
63.00	-.2293	-.0148	.0006	.0095
64.50	-.2300	-.0134	.0006	.0096
66.00	-.2307	-.0122	.0005	.0096
67.50	-.2313	-.0110	.0005	.0096
69.00	-.2318	-.0099	.0005	.0097
70.50	-.2324	-.0089	.0004	.0097
72.00	-.2328	-.0080	.0004	.0097
73.50	-.2333	-.0071	.0004	.0098
75.00	-.2337	-.0063	.0003	.0098
76.50	-.2341	-.0056	.0003	.0098
78.00	-.2344	-.0049	.0003	.0098
79.50	-.2347	-.0043	.0003	.0098
81.00	-.2350	-.0037	.0003	.0099
82.50	-.2353	-.0032	.0002	.0099
84.00	-.2356	-.0027	.0002	.0099
85.50	-.2358	-.0022	.0002	.0099
87.00	-.2360	-.0018	.0002	.0099
88.50	-.2362	-.0014	.0002	.0099
90.00	-.2364	-.0010	.0002	.0099
91.50	-.2366	-.0007	.0002	.0099
93.00	-.2367	-.0004	.0002	.0099
94.50	-.2369	-.0001	.0002	.0100
96.00	-.2370	.0003	.0001	.0100
97.50	-.2371	.0005	.0001	.0100
99.00	-.2373	.0007	.0001	.0100
100.50	-.2374	.0009	.0001	.0100
102.00	-.2375	.0011	.0001	.0100
103.50	-.2375	.0013	.0001	.0100
105.00	-.2376	.0015	.0001	.0100
106.50	-.2377	.0016	.0001	.0100
108.00	-.2378	.0018	.0001	.0100
109.50	-.2378	.0019	.0001	.0100
111.00	-.2379	.0020	.0001	.0100
112.50	-.2380	.0021	.0001	.0100
114.00	-.2380	.0022	.0001	.0100
115.50	-.2381	.0023	.0001	.0100
117.00	-.2381	.0024	.0001	.0100
118.50	-.2381	.0025	.0001	.0100
120.00	-.2382	.0025	.0001	.0100

S5.1

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0178	-.0328	.0013	.0002
4.00	-.0416	-.0413	.0043	.0003
6.00	-.0616	-.0332	.0069	.0004
8.00	-.0788	-.0287	.0089	.0005
10.00	-.0933	-.0245	.0102	.0005
12.00	-.1057	-.0207	.0112	.0005
14.00	-.1164	-.0180	.0120	.0006
16.00	-.1256	-.0154	.0125	.0006
18.00	-.1335	-.0132	.0129	.0006
20.00	-.1403	-.0114	.0132	.0006
22.00	-.1461	-.0098	.0134	.0006
24.00	-.1511	-.0084	.0136	.0006
26.00	-.1553	-.0072	.0137	.0006
28.00	-.1590	-.0062	.0138	.0006
30.00	-.1622	-.0053	.0138	.0006
32.00	-.1649	-.0046	.0139	.0006
34.00	-.1672	-.0039	.0139	.0006
36.00	-.1692	-.0034	.0139	.0006
38.00	-.1709	-.0029	.0140	.0006
40.00	-.1723	-.0025	.0140	.0006
42.00	-.1736	-.0022	.0140	.0006
44.00	-.1747	-.0019	.0140	.0006
46.00	-.1756	-.0016	.0140	.0006
48.00	-.1764	-.0014	.0140	.0006
50.00	-.1771	-.0012	.0140	.0006
52.00	-.1776	-.0010	.0140	.0006
54.00	-.1781	-.0009	.0140	.0006
56.00	-.1786	-.0008	.0140	.0006
58.00	-.1789	-.0007	.0140	.0006
60.00	-.1792	-.0006	.0140	.0006
62.00	-.1795	-.0005	.0140	.0006
64.00	-.1797	-.0004	.0140	.0006
66.00	-.1799	-.0004	.0140	.0006
68.00	-.1801	-.0003	.0140	.0006
70.00	-.1803	-.0003	.0140	.0006
72.00	-.1804	-.0003	.0140	.0006
74.00	-.1805	-.0002	.0140	.0006
76.00	-.1806	-.0002	.0140	.0006
78.00	-.1807	-.0002	.0140	.0006
80.00	-.1807	-.0002	.0140	.0006
82.00	-.1808	-.0001	.0140	.0006
84.00	-.1808	-.0001	.0140	.0006
86.00	-.1809	-.0001	.0140	.0006
88.00	-.1809	-.0001	.0140	.0006
90.00	-.1810	-.0001	.0140	.0006
92.00	-.1810	-.0001	.0140	.0006
94.00	-.1810	-.0001	.0140	.0006
96.00	-.1810	-.0001	.0140	.0006
98.00	-.1810	-.0001	.0140	.0006
100.00	-.1811	-.0001	.0140	.0006
102.00	-.1811	-.0001	.0140	.0006
104.00	-.1811	-.0001	.0140	.0006
106.00	-.1811	-.0001	.0140	.0006
108.00	-.1811	-.0001	.0140	.0006
110.00	-.1811	-.0001	.0140	.0006
112.00	-.1811	-.0001	.0140	.0006
114.00	-.1811	-.0001	.0140	.0006
116.00	-.1811	-.0001	.0140	.0006
118.00	-.1811	-.0001	.0140	.0006
120.00	-.1811	-.0001	.0140	.0006
122.00	-.1811	-.0001	.0140	.0006
124.00	-.1811	-.0001	.0140	.0006
126.00	-.1811	-.0001	.0140	.0006
128.00	-.1811	-.0001	.0140	.0006
130.00	-.1811	-.0001	.0140	.0006
132.00	-.1811	-.0001	.0140	.0006
134.00	-.1811	-.0001	.0140	.0006
136.00	-.1811	-.0001	.0140	.0006
138.00	-.1811	-.0001	.0140	.0006
140.00	-.1811	-.0001	.0140	.0006
142.00	-.1811	-.0001	.0140	.0006
144.00	-.1811	-.0001	.0140	.0006
146.00	-.1811	-.0001	.0140	.0006
148.00	-.1811	-.0001	.0140	.0006
150.00	-.1811	-.0001	.0140	.0006
152.00	-.1811	-.0001	.0140	.0006
154.00	-.1811	-.0001	.0140	.0006
156.00	-.1811	-.0001	.0140	.0006
158.00	-.1811	-.0001	.0140	.0006
160.00	-.1811	-.0001	.0140	.0006

S5:

Igual que S3 cuando no se fuerza la generación del Area 2.

PLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)

S6.1

TEMPS	SORTIDA24 (-.0600 … .0120)
.001	.0001
.750	-.0213
1.500	-.0321
2.250	-.0382
3.000	-.0394
3.750	-.0348
4.500	-.0298
5.250	-.0207
6.000	-.0142
6.750	-.0056
7.500	-.0008
8.250	.0049
9.000	.0070
9.750	.0096
10.500	.0094
11.250	.0099
12.000	.0086
12.750	.0081
13.500	.0067
14.250	.0060
15.000	.0049
15.750	.0044
16.500	.0038
17.250	.0036
18.000	.0033
18.750	.0033
19.500	.0032
20.250	.0032
21.000	.0032
21.750	.0031
22.500	.0030
23.250	.0029
24.000	.0028
24.750	.0027
25.500	.0025
26.250	.0023
27.000	.0021
27.750	.0019
28.500	.0018
29.250	.0016
30.000	.0015
30.750	.0013
31.500	.0012
32.250	.0011
33.000	.0010
33.750	.0008
34.500	.0007
35.250	.0006
36.000	.0006
36.750	.0005
37.500	.0004
38.250	.0003
39.000	.0002
39.750	.0002
40.500	.0001
41.250	-.0001
42.000	-.0001
42.750	-.0002
43.500	-.0003
44.250	-.0003
45.000	-.0004
45.750	-.0004
46.500	-.0004
47.250	-.0005
48.000	-.0005
48.750	-.0005
49.500	-.0006
50.250	-.0006
51.000	-.0006
51.750	-.0006
52.500	-.0007
53.250	-.0007
54.000	-.0007
54.750	-.0007
55.500	-.0007
56.250	-.0007
57.000	-.0007
57.750	-.0007
58.500	-.0008
59.250	-.0008
60.000	-.0008

S6:

Sobrepenalización de las desviaciones de f_1.

$\tilde{Q} = \mathrm{diag}(0,5;0,5;0,5;1;0,5;0,5;0,5)$

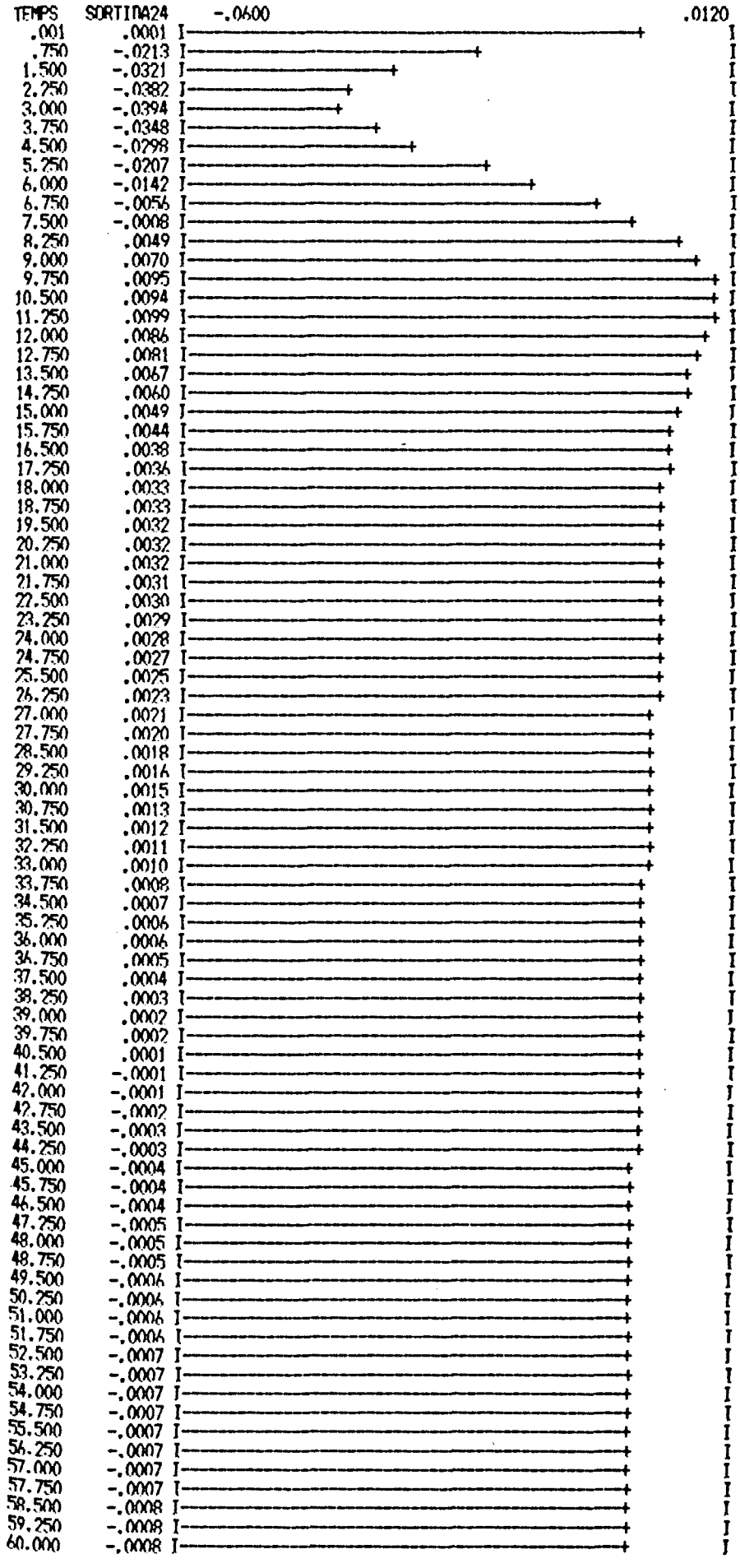
$\tilde{R} = \tilde{I}$

$\alpha_o = 0$

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0336	.0014	.0002
4.00	-.0426	-.0359	.0043	.0003
6.00	-.0635	-.0127	.0054	.0005
8.00	-.0805	.0029	.0055	.0006
10.00	-.0943	.0090	.0056	.0007
12.00	-.1065	.0090	.0058	.0008
14.00	-.1184	.0059	.0059	.0009
16.00	-.1297	.0040	.0060	.0010
18.00	-.1403	.0032	.0060	.0010
20.00	-.1500	.0030	.0060	.0011
22.00	-.1587	.0030	.0060	.0011
24.00	-.1667	.0027	.0061	.0012
26.00	-.1739	.0022	.0061	.0012
28.00	-.1804	.0018	.0061	.0012
30.00	-.1864	.0014	.0061	.0012
32.00	-.1918	.0010	.0061	.0013
34.00	-.1967	.0007	.0061	.0013
36.00	-.2012	.0005	.0061	.0013
38.00	-.2052	.0003	.0061	.0013
40.00	-.2088	.0001	.0061	.0013
42.00	-.2121	-.0002	.0061	.0013
44.00	-.2150	-.0003	.0061	.0013
46.00	-.2177	-.0005	.0061	.0013
48.00	-.2201	-.0005	.0061	.0013
50.00	-.2223	-.0006	.0061	.0013
52.00	-.2242	-.0007	.0061	.0013
54.00	-.2260	-.0007	.0061	.0013
56.00	-.2276	-.0008	.0061	.0013
58.00	-.2290	-.0008	.0061	.0013
60.00	-.2303	-.0008	.0061	.0013
62.00	-.2315	-.0008	.0061	.0013
64.00	-.2326	-.0008	.0061	.0013
66.00	-.2335	-.0008	.0061	.0013
68.00	-.2344	-.0008	.0061	.0013
70.00	-.2351	-.0007	.0061	.0013
72.00	-.2358	-.0007	.0061	.0013
74.00	-.2365	-.0007	.0061	.0013
76.00	-.2370	-.0007	.0061	.0013
78.00	-.2375	-.0007	.0061	.0013
80.00	-.2380	-.0006	.0061	.0013
82.00	-.2384	-.0006	.0061	.0013
84.00	-.2388	-.0006	.0061	.0013
86.00	-.2391	-.0006	.0061	.0013
88.00	-.2394	-.0005	.0061	.0013
90.00	-.2397	-.0005	.0061	.0013
92.00	-.2399	-.0005	.0061	.0013
94.00	-.2401	-.0005	.0061	.0013
96.00	-.2403	-.0004	.0061	.0013
98.00	-.2405	-.0004	.0061	.0013
100.00	-.2406	-.0004	.0061	.0013
102.00	-.2408	-.0004	.0061	.0013
104.00	-.2409	-.0004	.0061	.0013
106.00	-.2410	-.0003	.0061	.0013
108.00	-.2411	-.0003	.0061	.0013
110.00	-.2412	-.0003	.0061	.0013
112.00	-.2413	-.0003	.0061	.0013
114.00	-.2414	-.0003	.0061	.0013
116.00	-.2414	-.0003	.0061	.0013
118.00	-.2415	-.0002	.0061	.0013
120.00	-.2416	-.0002	.0061	.0013
122.00	-.2416	-.0002	.0061	.0013
124.00	-.2416	-.0002	.0061	.0013
126.00	-.2417	-.0002	.0061	.0013
128.00	-.2417	-.0002	.0061	.0013
130.00	-.2418	-.0002	.0061	.0013
132.00	-.2418	-.0002	.0061	.0013
134.00	-.2418	-.0002	.0061	.0013
136.00	-.2418	-.0002	.0061	.0013
138.00	-.2418	-.0001	.0061	.0013
140.00	-.2419	-.0001	.0061	.0013
142.00	-.2419	-.0001	.0061	.0013
144.00	-.2419	-.0001	.0061	.0013
146.00	-.2419	-.0001	.0061	.0013
148.00	-.2419	-.0001	.0061	.0013
150.00	-.2419	-.0001	.0061	.0013
152.00	-.2419	-.0001	.0061	.0013
154.00	-.2419	-.0001	.0061	.0013
156.00	-.2420	-.0001	.0061	.0013
158.00	-.2420	-.0001	.0061	.0013
160.00	-.2420	-.0001	.0061	.0013

S7.1

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)



S7:

Sobrepenalización de las desviaciones de f_2.

$\underset{\sim}{Q} = \text{diag}(0,5;0,5;0,5;0,5;0,5;0,5;1)$

$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

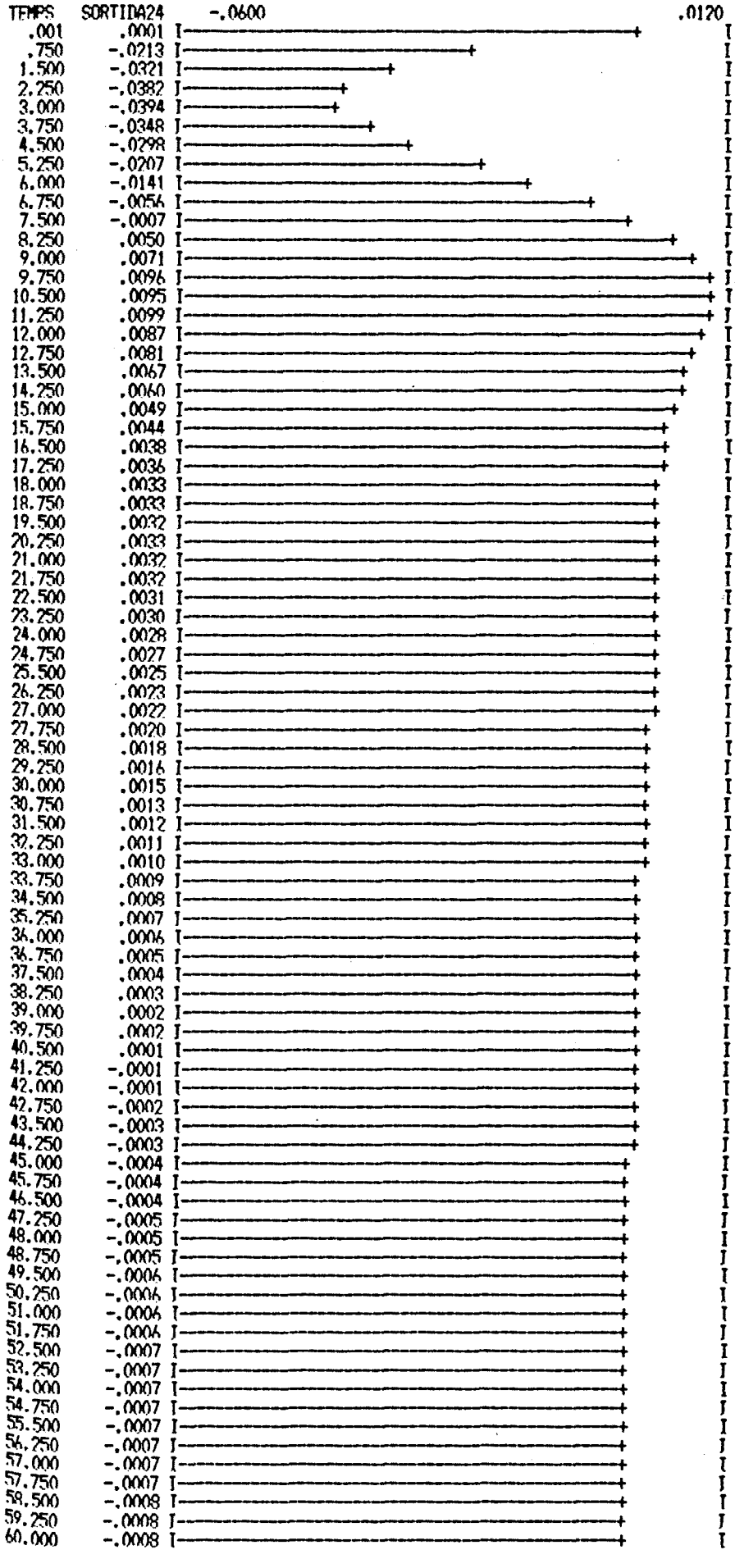
TEMPS SORTIDA46 SORTIDA30 SORTIDA55 SORTIDA56

S7.2

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0336	.0014	.0002
4.00	-.0426	-.0359	.0043	.0003
6.00	-.0635	-.0178	.0054	.0005
8.00	-.0805	.0029	.0055	.0006
10.00	-.0943	.0090	.0056	.0007
12.00	-.1046	.0090	.0058	.0008
14.00	-.1184	.0059	.0059	.0009
16.00	-.1298	.0040	.0060	.0010
18.00	-.1404	.0032	.0060	.0010
20.00	-.1501	.0030	.0060	.0011
22.00	-.1589	.0030	.0061	.0011
24.00	-.1668	.0027	.0061	.0012
26.00	-.1740	.0022	.0061	.0012
28.00	-.1806	.0018	.0061	.0012
30.00	-.1866	.0014	.0061	.0012
32.00	-.1920	.0010	.0061	.0013
34.00	-.1969	.0007	.0061	.0013
36.00	-.2013	.0005	.0061	.0013
38.00	-.2053	.0003	.0061	.0013
40.00	-.2090	.0001	.0061	.0013
42.00	-.2122	-.0002	.0061	.0013
44.00	-.2152	-.0003	.0061	.0013
46.00	-.2179	-.0005	.0061	.0013
48.00	-.2203	-.0005	.0061	.0013
50.00	-.2225	-.0006	.0061	.0013
52.00	-.2244	-.0007	.0061	.0013
54.00	-.2262	-.0007	.0061	.0013
56.00	-.2278	-.0008	.0061	.0013
58.00	-.2292	-.0008	.0061	.0013
60.00	-.2305	-.0008	.0061	.0013
62.00	-.2317	-.0008	.0061	.0013
64.00	-.2327	-.0008	.0061	.0013
66.00	-.2337	-.0008	.0061	.0013
68.00	-.2345	-.0008	.0061	.0013
70.00	-.2353	-.0007	.0061	.0013
72.00	-.2360	-.0007	.0061	.0013
74.00	-.2366	-.0007	.0061	.0013
76.00	-.2372	-.0007	.0061	.0013
78.00	-.2377	-.0007	.0061	.0013
80.00	-.2382	-.0006	.0061	.0013
82.00	-.2386	-.0006	.0061	.0013
84.00	-.2389	-.0006	.0061	.0013
86.00	-.2393	-.0006	.0061	.0013
88.00	-.2396	-.0005	.0061	.0013
90.00	-.2398	-.0005	.0061	.0013
92.00	-.2401	-.0005	.0061	.0013
94.00	-.2403	-.0005	.0061	.0013
96.00	-.2405	-.0004	.0061	.0013
98.00	-.2407	-.0004	.0061	.0013
100.00	-.2408	-.0004	.0061	.0013
102.00	-.2410	-.0004	.0061	.0013
104.00	-.2411	-.0004	.0061	.0013
106.00	-.2412	-.0003	.0061	.0013
108.00	-.2413	-.0003	.0061	.0013
110.00	-.2414	-.0003	.0061	.0013
112.00	-.2415	-.0003	.0061	.0013
114.00	-.2416	-.0003	.0061	.0013
116.00	-.2416	-.0003	.0061	.0013
118.00	-.2417	-.0002	.0061	.0013
120.00	-.2417	-.0002	.0061	.0013
122.00	-.2418	-.0002	.0061	.0013
124.00	-.2418	-.0002	.0061	.0013
126.00	-.2419	-.0002	.0061	.0013
128.00	-.2419	-.0002	.0061	.0013
130.00	-.2419	-.0002	.0061	.0013
132.00	-.2420	-.0002	.0061	.0013
134.00	-.2420	-.0002	.0061	.0013
136.00	-.2420	-.0002	.0061	.0013
138.00	-.2420	-.0001	.0061	.0013
140.00	-.2421	-.0001	.0061	.0013
142.00	-.2421	-.0001	.0061	.0013
144.00	-.2421	-.0001	.0061	.0013
146.00	-.2421	-.0001	.0061	.0013
148.00	-.2421	-.0001	.0061	.0013
150.00	-.2421	-.0001	.0061	.0013
152.00	-.2421	-.0001	.0061	.0013
154.00	-.2421	-.0001	.0061	.0013
156.00	-.2421	-.0001	.0061	.0013
158.00	-.2421	-.0001	.0061	.0013
160.00	-.2422	-.0001	.0061	.0013

S8.1

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)



S8:

Sobrepenalización del intercambio de potencia (P_{12}),

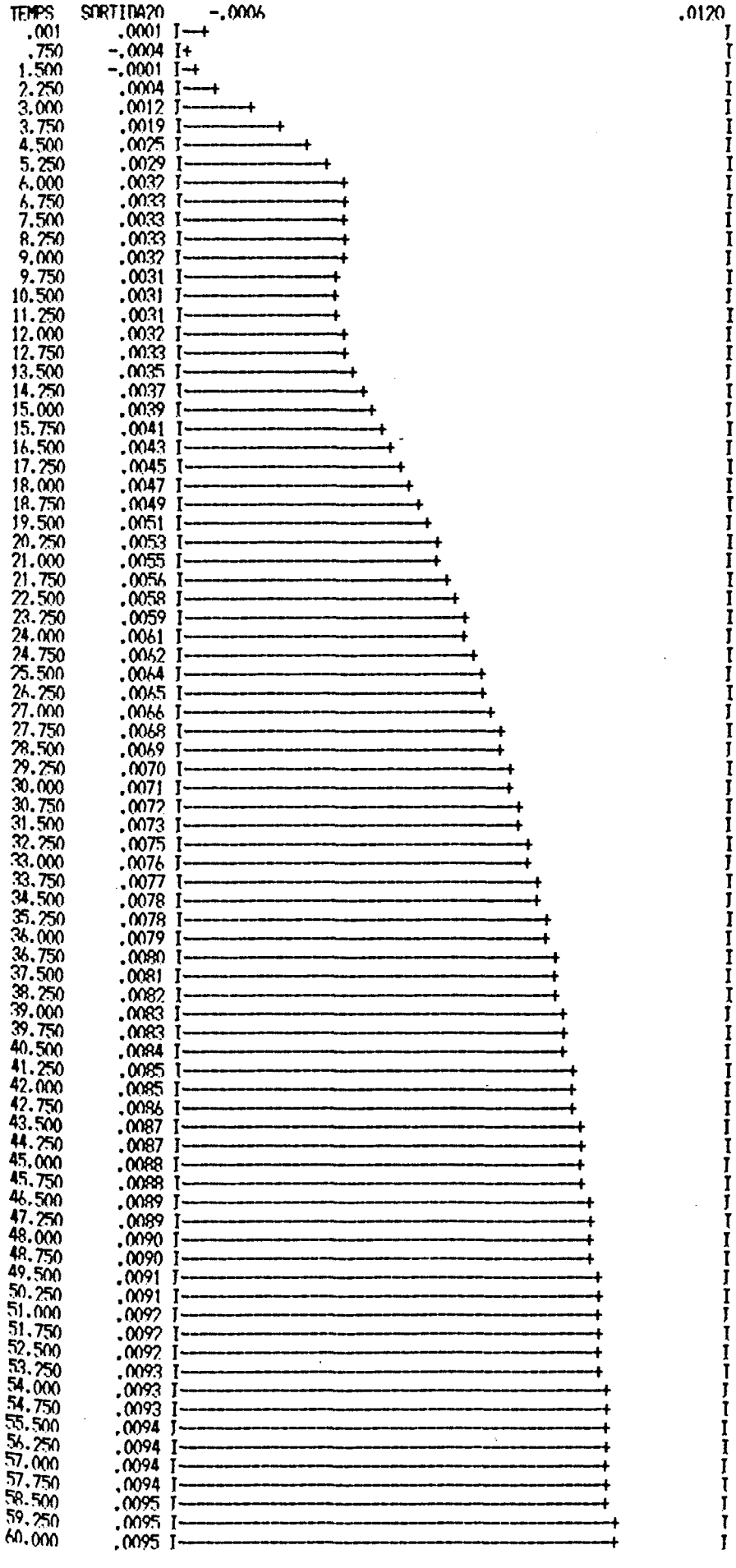
$Q = \text{diag}(0,5;0,5;0,5;0,5;0,5;1;0,5)$

$R = I$

$\alpha_o = 0$

S8.2

BLOC EIX Y (20) MINIM (-.0006) MAXIM (.0120)

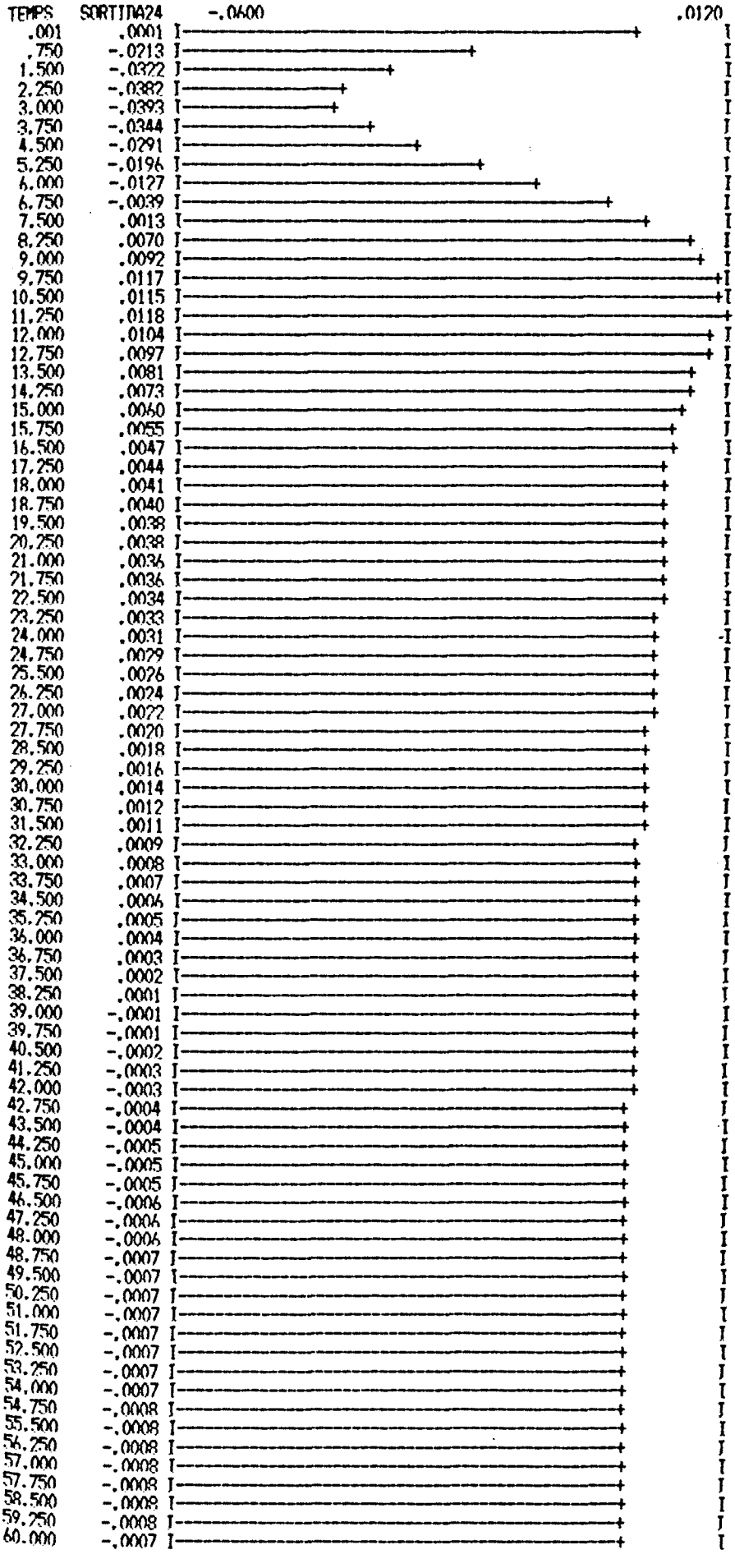


S8.3

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0336	.0014	.0002
4.00	-.0426	-.0359	.0043	.0003
6.00	-.0635	-.0177	.0054	.0005
8.00	-.0805	.0030	.0055	.0006
10.00	-.0942	.0091	.0056	.0007
12.00	-.1064	.0090	.0058	.0008
14.00	-.1182	.0059	.0059	.0009
16.00	-.1294	.0040	.0060	.0010
18.00	-.1399	.0033	.0060	.0010
20.00	-.1496	.0031	.0060	.0011
22.00	-.1582	.0030	.0061	.0011
24.00	-.1661	.0027	.0061	.0012
26.00	-.1732	.0023	.0061	.0012
28.00	-.1797	.0018	.0061	.0012
30.00	-.1855	.0014	.0061	.0012
32.00	-.1908	.0010	.0061	.0012
34.00	-.1956	.0007	.0061	.0013
36.00	-.1999	.0005	.0061	.0013
38.00	-.2038	.0003	.0061	.0013
40.00	-.2074	.0001	.0061	.0013
42.00	-.2105	-.0002	.0061	.0013
44.00	-.2134	-.0003	.0061	.0013
46.00	-.2160	-.0005	.0061	.0013
48.00	-.2183	-.0005	.0061	.0013
50.00	-.2204	-.0006	.0061	.0013
52.00	-.2222	-.0007	.0061	.0013
54.00	-.2239	-.0007	.0061	.0013
56.00	-.2254	-.0008	.0061	.0013
58.00	-.2268	-.0008	.0061	.0013
60.00	-.2280	-.0008	.0061	.0013
62.00	-.2291	-.0008	.0061	.0013
64.00	-.2301	-.0008	.0061	.0013
66.00	-.2310	-.0008	.0061	.0013
68.00	-.2318	-.0008	.0061	.0013
70.00	-.2325	-.0007	.0061	.0013
72.00	-.2332	-.0007	.0061	.0013
74.00	-.2338	-.0007	.0061	.0013
76.00	-.2343	-.0007	.0061	.0013
78.00	-.2347	-.0007	.0061	.0013
80.00	-.2352	-.0006	.0061	.0013

S9.1

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)



S9:

Sobrepenalización del ACE

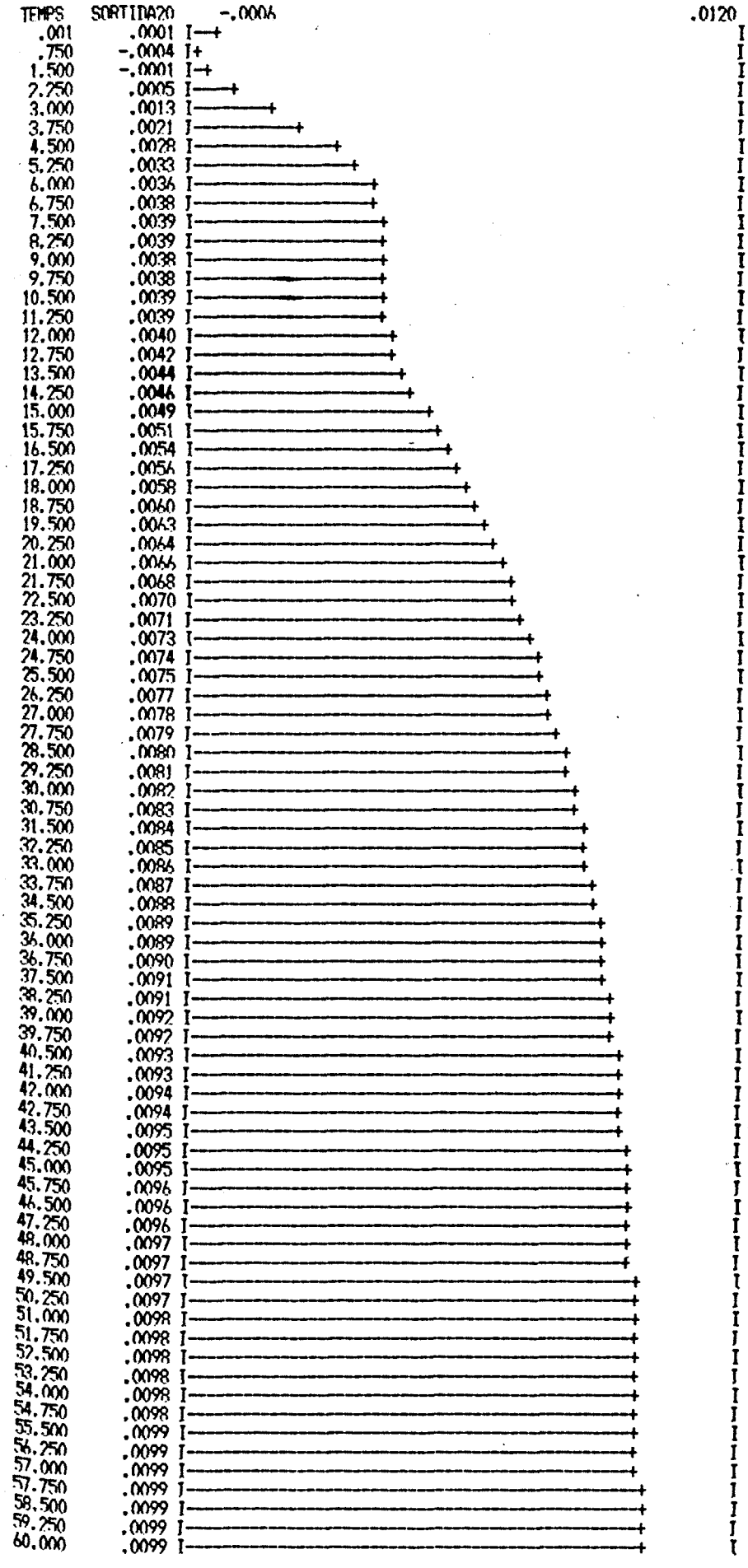
$\underset{\sim}{Q} = \text{diag}(0,5;0,5;0,5;0,5;1;0,5;0,5)$

$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

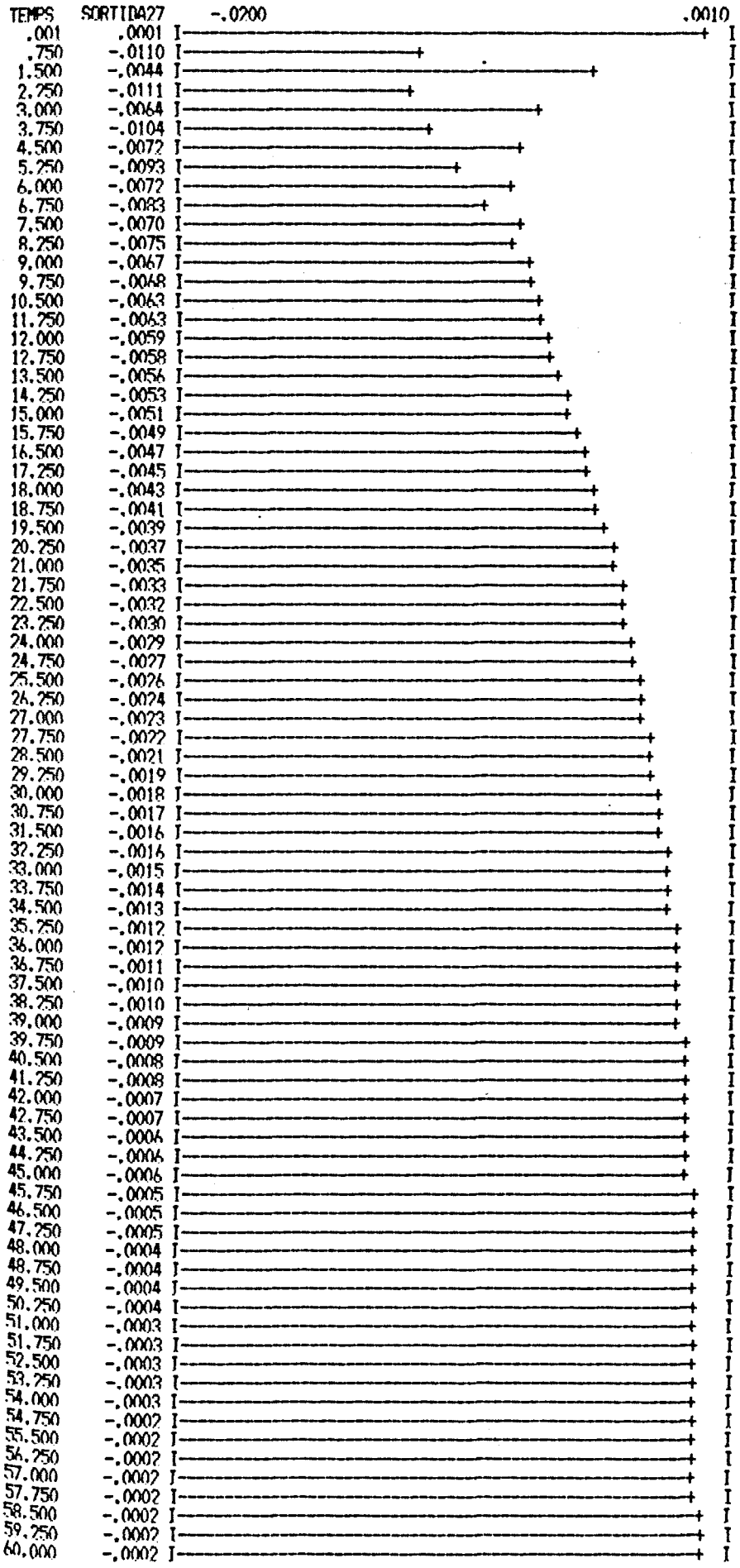
S9.2

BLOC ETX Y (20) MINIM (-.0006) MAXIM (.0120)



S9.3

BLOC EIX Y (27) MINIM (-.0200) MAXIM (.0010)



BLOC FIX V (38) MINIM (-.0007) MAXIM (.0100)

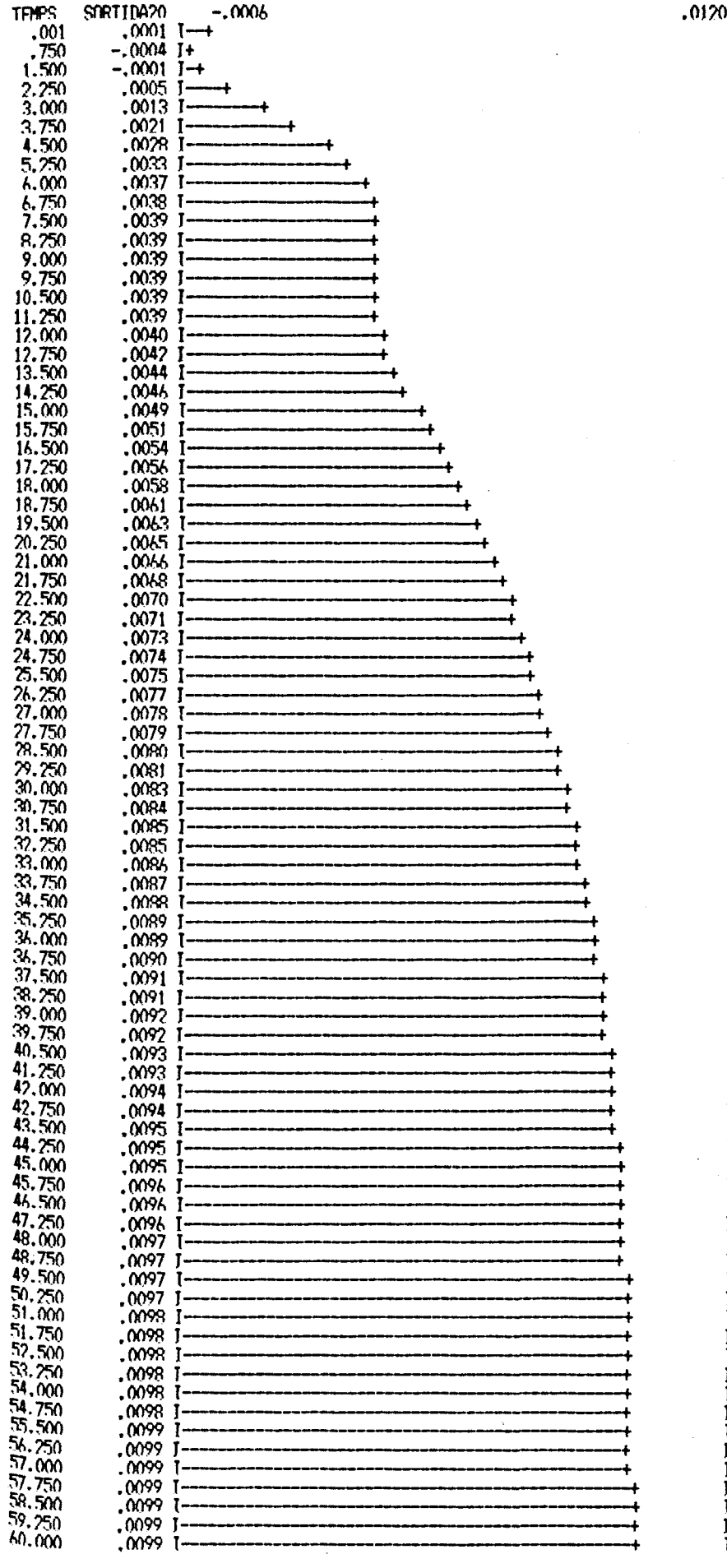
S9.4

TEMPS	SORTIDA38	-.0007	.0100
.001	.0001	I—+	I
.750	-.0003	I+	I
1.500	-.0006	+	I
2.250	.0002	I—+	I
3.000	.0013	I———+	I
3.750	.0029	I————+	I
4.500	.0045	I—————+	I
5.250	.0060	I——————+	I
6.000	.0073	I———————+	I
6.750	.0083	I————————+	I
7.500	.0089	I—————————+	I
8.250	.0092	I——————————+	I
9.000	.0093	I——————————+	I
9.750	.0091	I—————————+	I
10.500	.0087	I————————+	I
11.250	.0083	I————————+	I
12.000	.0078	I———————+	I
12.750	.0073	I———————+	I
13.500	.0069	I——————+	I
14.250	.0065	I—————+	I
15.000	.0061	I—————+	I
15.750	.0058	I————+	I
16.500	.0055	I————+	I
17.250	.0052	I————+	I
18.000	.0050	I———+	I
18.750	.0048	I———+	I
19.500	.0046	I———+	I
20.250	.0044	I———+	I
21.000	.0042	I———+	I
21.750	.0040	I———+	I
22.500	.0038	I———+	I
23.250	.0036	I———+	I
24.000	.0034	I———+	I
24.750	.0032	I———+	I
25.500	.0030	I———+	I
26.250	.0028	I———+	I
27.000	.0027	I———+	I
27.750	.0025	I———+	I
28.500	.0023	I———+	I
29.250	.0022	I———+	I
30.000	.0021	I———+	I
30.750	.0019	I———+	I
31.500	.0018	I———+	I
32.250	.0017	I———+	I
33.000	.0016	I———+	I
33.750	.0015	I———+	I
34.500	.0014	I———+	I
35.250	.0013	I———+	I
36.000	.0012	I———+	I
36.750	.0011	I———+	I
37.500	.0010	I———+	I
38.250	.0010	I———+	I
39.000	.0009	I———+	I
39.750	.0008	I———+	I
40.500	.0008	I———+	I
41.250	.0007	I———+	I
42.000	.0006	I———+	I
42.750	.0006	I———+	I
43.500	.0005	I———+	I
44.250	.0005	I———+	I
45.000	.0005	I———+	I
45.750	.0004	I———+	I
46.500	.0004	I———+	I
47.250	.0003	I———+	I
48.000	.0003	I———+	I
48.750	.0003	I———+	I
49.500	.0002	I———+	I
50.250	.0002	I———+	I
51.000	.0002	I———+	I
51.750	.0002	I———+	I
52.500	.0002	I———+	I
53.250	.0001	I———+	I
54.000	.0001	I———+	I
54.750	.0001	I———+	I
55.500	.0001	I———+	I
56.250	.0001	I———+	I
57.000	.0001	I———+	I
57.750	-.0001	I———+	I
58.500	-.0001	I———+	I
59.250	-.0001	I———+	I
60.000	-.0001	I———+	I

S9.5

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0176	-.0337	.0014	.0002
4.00	-.0425	-.0355	.0042	.0003
6.00	-.0627	-.0114	.0053	.0005
8.00	-.0785	.0049	.0054	.0006
10.00	-.0906	.0111	.0056	.0007
12.00	-.1008	.0107	.0058	.0007
14.00	-.1105	.0072	.0060	.0008
16.00	-.1196	.0050	.0061	.0009
18.00	-.1278	.0040	.0061	.0009
20.00	-.1350	.0036	.0062	.0009
22.00	-.1413	.0034	.0062	.0010
24.00	-.1467	.0029	.0062	.0010
26.00	-.1514	.0024	.0062	.0010
28.00	-.1555	.0018	.0062	.0010
30.00	-.1591	.0013	.0062	.0010
32.00	-.1622	.0009	.0062	.0010
34.00	-.1649	.0006	.0062	.0010
36.00	-.1672	.0003	.0062	.0010
38.00	-.1692	.0001	.0062	.0010
40.00	-.1710	-.0002	.0062	.0010
42.00	-.1724	-.0004	.0062	.0010
44.00	-.1737	-.0005	.0062	.0010
46.00	-.1748	-.0006	.0062	.0010
48.00	-.1758	-.0007	.0062	.0010
50.00	-.1766	-.0007	.0062	.0010
52.00	-.1773	-.0007	.0062	.0010
54.00	-.1778	-.0008	.0062	.0010
56.00	-.1783	-.0008	.0062	.0010
58.00	-.1788	-.0008	.0062	.0010
60.00	-.1791	-.0008	.0062	.0010
62.00	-.1795	-.0007	.0062	.0010
64.00	-.1797	-.0007	.0062	.0010
66.00	-.1800	-.0007	.0062	.0010
68.00	-.1801	-.0007	.0063	.0010
70.00	-.1803	-.0006	.0063	.0010
72.00	-.1804	-.0006	.0063	.0010
74.00	-.1806	-.0006	.0063	.0010
76.00	-.1807	-.0006	.0063	.0010
78.00	-.1807	-.0005	.0063	.0010
80.00	-.1808	-.0005	.0063	.0010
82.00	-.1809	-.0005	.0063	.0010
84.00	-.1809	-.0004	.0063	.0010
86.00	-.1810	-.0004	.0063	.0010
88.00	-.1810	-.0004	.0063	.0010
90.00	-.1810	-.0004	.0063	.0010
92.00	-.1811	-.0003	.0063	.0010
94.00	-.1811	-.0003	.0063	.0010
96.00	-.1811	-.0003	.0063	.0010
98.00	-.1811	-.0003	.0063	.0010
100.00	-.1811	-.0003	.0063	.0010
102.00	-.1811	-.0003	.0063	.0010
104.00	-.1811	-.0002	.0063	.0010
106.00	-.1811	-.0002	.0063	.0010
108.00	-.1811	-.0002	.0063	.0010
110.00	-.1811	-.0002	.0063	.0010
112.00	-.1811	-.0002	.0063	.0010
114.00	-.1812	-.0002	.0063	.0010
116.00	-.1812	-.0002	.0063	.0010
118.00	-.1812	-.0002	.0063	.0010
120.00	-.1812	-.0001	.0063	.0010
122.00	-.1812	-.0001	.0063	.0010
124.00	-.1812	-.0001	.0063	.0010
126.00	-.1812	-.0001	.0063	.0010
128.00	-.1812	-.0001	.0063	.0010
130.00	-.1812	-.0001	.0063	.0010
132.00	-.1812	-.0001	.0063	.0010
134.00	-.1812	-.0001	.0063	.0010
136.00	-.1812	-.0001	.0063	.0010
138.00	-.1812	-.0001	.0063	.0010
140.00	-.1812	-.0001	.0063	.0010
142.00	-.1812	-.0001	.0063	.0010
144.00	-.1812	-.0001	.0063	.0010
146.00	-.1812	-.0001	.0063	.0010
148.00	-.1812	-.0001	.0063	.0010
150.00	-.1812	-.0001	.0063	.0010
152.00	-.1812	-.0001	.0063	.0010
154.00	-.1812	-.0001	.0063	.0010
156.00	-.1812	-.0001	.0063	.0010
158.00	-.1812	-.0001	.0063	.0010
160.00	-.1812	-.0001	.0063	.0010

BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)



S10.1

S10:

Sobrepenalización del ACE y subpenalización de los esfuerzos del lazo de realimentación transitoria de las unidades generadoras.

$\underset{\sim}{Q} = \text{diag}(0,5;0,1;0,5;0,5;1;0,5;0,5)$

$\underset{\sim}{R} = \underset{\sim}{I}$

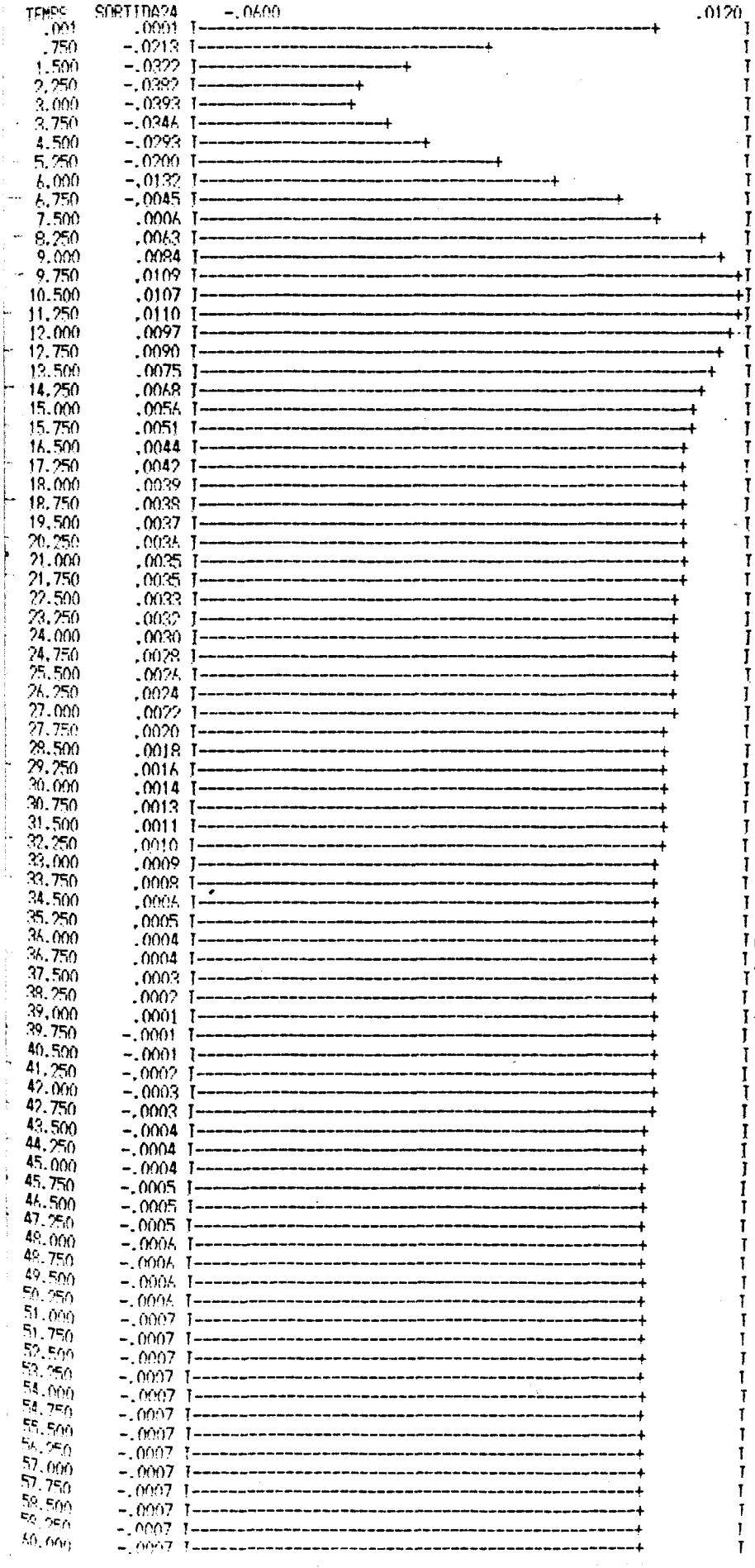
$\alpha_o = 0$

S10.2

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0176	-.0337	.0014	.0002
4.00	-.0424	-.0355	.0042	.0003
6.00	-.0627	-.0113	.0053	.0005
8.00	-.0784	.0050	.0054	.0006
10.00	-.0904	.0111	.0056	.0007
12.00	-.1006	.0106	.0058	.0007
14.00	-.1103	.0072	.0060	.0008
16.00	-.1194	.0049	.0061	.0009
18.00	-.1275	.0040	.0061	.0009
20.00	-.1347	.0036	.0061	.0009
22.00	-.1410	.0034	.0062	.0010
24.00	-.1464	.0029	.0062	.0010
26.00	-.1510	.0024	.0062	.0010
28.00	-.1551	.0018	.0062	.0010
30.00	-.1587	.0013	.0062	.0010
32.00	-.1618	.0009	.0062	.0010
34.00	-.1644	.0006	.0062	.0010
36.00	-.1668	.0003	.0062	.0010
38.00	-.1687	.0001	.0062	.0010
40.00	-.1705	-.0002	.0062	.0010
42.00	-.1719	-.0004	.0062	.0010
44.00	-.1732	-.0005	.0062	.0010
46.00	-.1743	-.0006	.0062	.0010
48.00	-.1752	-.0007	.0062	.0010
50.00	-.1760	-.0007	.0062	.0010
52.00	-.1767	-.0007	.0062	.0010
54.00	-.1773	-.0008	.0062	.0010
56.00	-.1778	-.0008	.0062	.0010
58.00	-.1782	-.0008	.0062	.0010
60.00	-.1786	-.0008	.0062	.0010
62.00	-.1789	-.0007	.0062	.0010
64.00	-.1791	-.0007	.0062	.0010
66.00	-.1794	-.0007	.0062	.0010
68.00	-.1796	-.0007	.0062	.0010
70.00	-.1797	-.0006	.0062	.0010
72.00	-.1799	-.0006	.0062	.0010
74.00	-.1800	-.0006	.0062	.0010
76.00	-.1801	-.0006	.0062	.0010
78.00	-.1801	-.0005	.0062	.0010
80.00	-.1802	-.0005	.0062	.0010
82.00	-.1803	-.0005	.0062	.0010
84.00	-.1803	-.0004	.0062	.0010
86.00	-.1804	-.0004	.0062	.0010
88.00	-.1804	-.0004	.0062	.0010
90.00	-.1804	-.0004	.0062	.0010
92.00	-.1805	-.0003	.0062	.0010
94.00	-.1805	-.0003	.0062	.0010
96.00	-.1805	-.0003	.0062	.0010
98.00	-.1805	-.0003	.0062	.0010
100.00	-.1805	-.0003	.0062	.0010
102.00	-.1805	-.0003	.0062	.0010
104.00	-.1805	-.0002	.0062	.0010
106.00	-.1805	-.0002	.0062	.0010
108.00	-.1805	-.0002	.0062	.0010
110.00	-.1806	-.0002	.0062	.0010
112.00	-.1806	-.0002	.0062	.0010
114.00	-.1806	-.0002	.0062	.0010
116.00	-.1806	-.0002	.0062	.0010
118.00	-.1806	-.0002	.0062	.0010
120.00	-.1806	-.0001	.0062	.0010
122.00	-.1806	-.0001	.0062	.0010
124.00	-.1806	-.0001	.0062	.0010
126.00	-.1806	-.0001	.0062	.0010
128.00	-.1806	-.0001	.0062	.0010
130.00	-.1806	-.0001	.0062	.0010
132.00	-.1806	-.0001	.0062	.0010
134.00	-.1806	-.0001	.0062	.0010
136.00	-.1806	-.0001	.0062	.0010
138.00	-.1806	-.0001	.0062	.0010
140.00	-.1806	-.0001	.0062	.0010
142.00	-.1806	-.0001	.0062	.0010
144.00	-.1806	-.0001	.0062	.0010
146.00	-.1806	-.0001	.0062	.0010
148.00	-.1806	-.0001	.0062	.0010
150.00	-.1806	-.0001	.0062	.0010
152.00	-.1806	-.0001	.0062	.0010
154.00	-.1806	-.0001	.0062	.0010
156.00	-.1806	-.0001	.0062	.0010
158.00	-.1806	-.0001	.0062	.0010
160.00	-.1806	-.0001	.0062	.0010

PLOT FIX Y (24) MINIM (-.0600) MAXIM (.0120)

S11.1



S11:

Igual que S10, pero penalizando aún menos la realimentación transitoria.

$\underset{\sim}{Q}$ = diag(0,5;0,02;0,5;0,5;1;0,5;0,5)

$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

S11.2

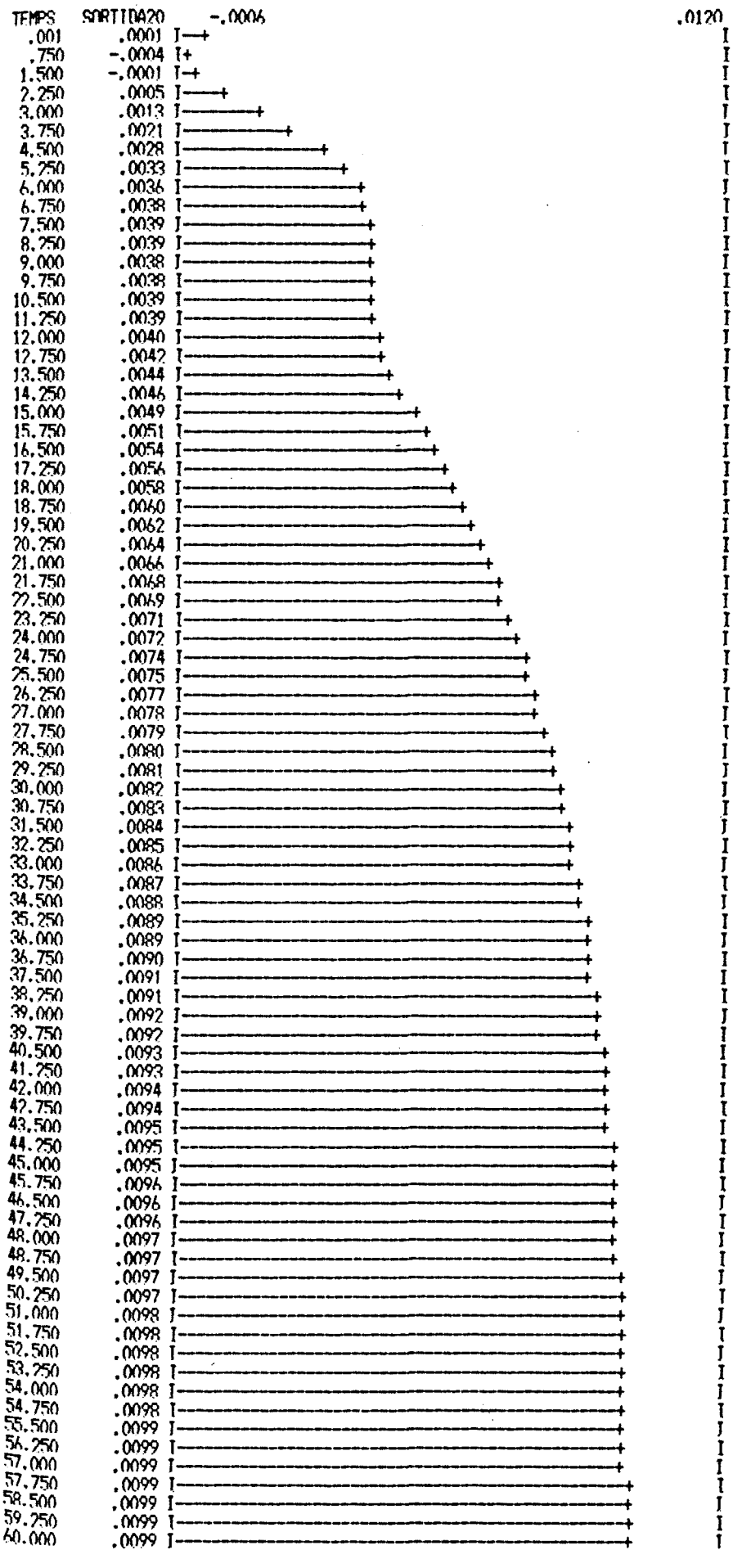
```
BLOC FIX Y (20)  MINIM (    -.0006)  MAXIM (     .0120)

TEMPS   SORTIDA20     -.0006                                    .0120
  .001      .0001 I--+                                           I
  .750     -.0004 I+                                             I

 2.250      .0004 I---+                                          I
 3.000      .0013 I--------+                                     I
 3.750      .0020 I----------+                                   I
 4.500      .0027 I------------+                                 I
 5.250      .0032 I--------------+                               I
 6.000      .0035 I---------------+                              I
 6.750      .0036 I----------------+                             I
 7.500      .0037 I----------------+                             I
 8.250      .0036 I----------------+                             I
 9.000      .0034 I---------------+                              I
 9.750      .0034 I---------------+                              I
10.500      .0034 I---------------+                              I
11.250      .0034 I---------------+                              I
12.000      .0037 I----------------+                             I
12.750      .0039 I-----------------+                            I
13.500      .0040 I-----------------+                            I
14.250      .0043 I------------------+                           I
15.000      .0045 I-------------------+                          I
15.750      .0047 I--------------------+                         I
16.500      .0050 I---------------------+                        I
17.250      .0052 I---------------------+                        I
18.000      .0054 I----------------------+                       I
18.750      .0056 I----------------------+                       I
19.500      .0058 I-----------------------+                      I
20.250      .0060 I------------------------+                     I
21.000      .0062 I------------------------+                     I
21.750      .0064 I-------------------------+                    I
22.500      .0065 I-------------------------+                    I
23.250      .0067 I--------------------------+                   I
24.000      .0068 I---------------------------+                  I
24.750      .0070 I---------------------------+                  I
25.500      .0071 I----------------------------+                 I
26.250      .0072 I----------------------------+                 I
27.000      .0074 I-----------------------------+                I
27.750      .0075 I-----------------------------+                I
28.500      .0076 I------------------------------+               I
29.250      .0077 I------------------------------+               I
30.000      .0078 I-------------------------------+              I
30.750      .0079 I-------------------------------+              I
31.500      .0080 I--------------------------------+             I
32.250      .0081 I--------------------------------+             I
33.000      .0082 I---------------------------------+            I
33.750      .0083 I---------------------------------+            I
34.500      .0084 I---------------------------------+            I
35.250      .0085 I----------------------------------+           I
36.000      .0086 I----------------------------------+           I
36.750      .0086 I----------------------------------+           I
37.500      .0087 I-----------------------------------+          I
38.250      .0088 I-----------------------------------+          I
39.000      .0088 I-----------------------------------+          I
39.750      .0089 I------------------------------------+         I
40.500      .0090 I------------------------------------+         I
41.250      .0090 I------------------------------------+         I
42.000      .0091 I-------------------------------------+        I
42.750      .0091 I-------------------------------------+        I
43.500      .0092 I-------------------------------------+        I
44.250      .0092 I-------------------------------------+        I
45.000      .0093 I--------------------------------------+       I
45.750      .0093 I--------------------------------------+       I
46.500      .0093 I--------------------------------------+       I
47.250      .0094 I--------------------------------------+       I
48.000      .0094 I--------------------------------------+       I
48.750      .0094 I--------------------------------------+       I
49.500      .0095 I--------------------------------------+       I
50.250      .0095 I---------------------------------------+      I
51.000      .0095 I---------------------------------------+      I
51.750      .0096 I---------------------------------------+      I
52.500      .0096 I---------------------------------------+      I
53.250      .0096 I---------------------------------------+      I
54.000      .0096 I---------------------------------------+      I
54.750      .0097 I---------------------------------------+      I
55.500      .0097 I---------------------------------------+      I
56.250      .0097 I----------------------------------------+     I
57.000      .0097 I----------------------------------------+     I
57.750      .0097 I----------------------------------------+     I
58.500      .0098 I----------------------------------------+     I
59.250      .0098 I----------------------------------------+     I
60.000      .0098 I----------------------------------------+     I
```

S12.1

BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)



S12:

Sobrepenalización del ACE y de la potencia generada en el Area (P_{G1}

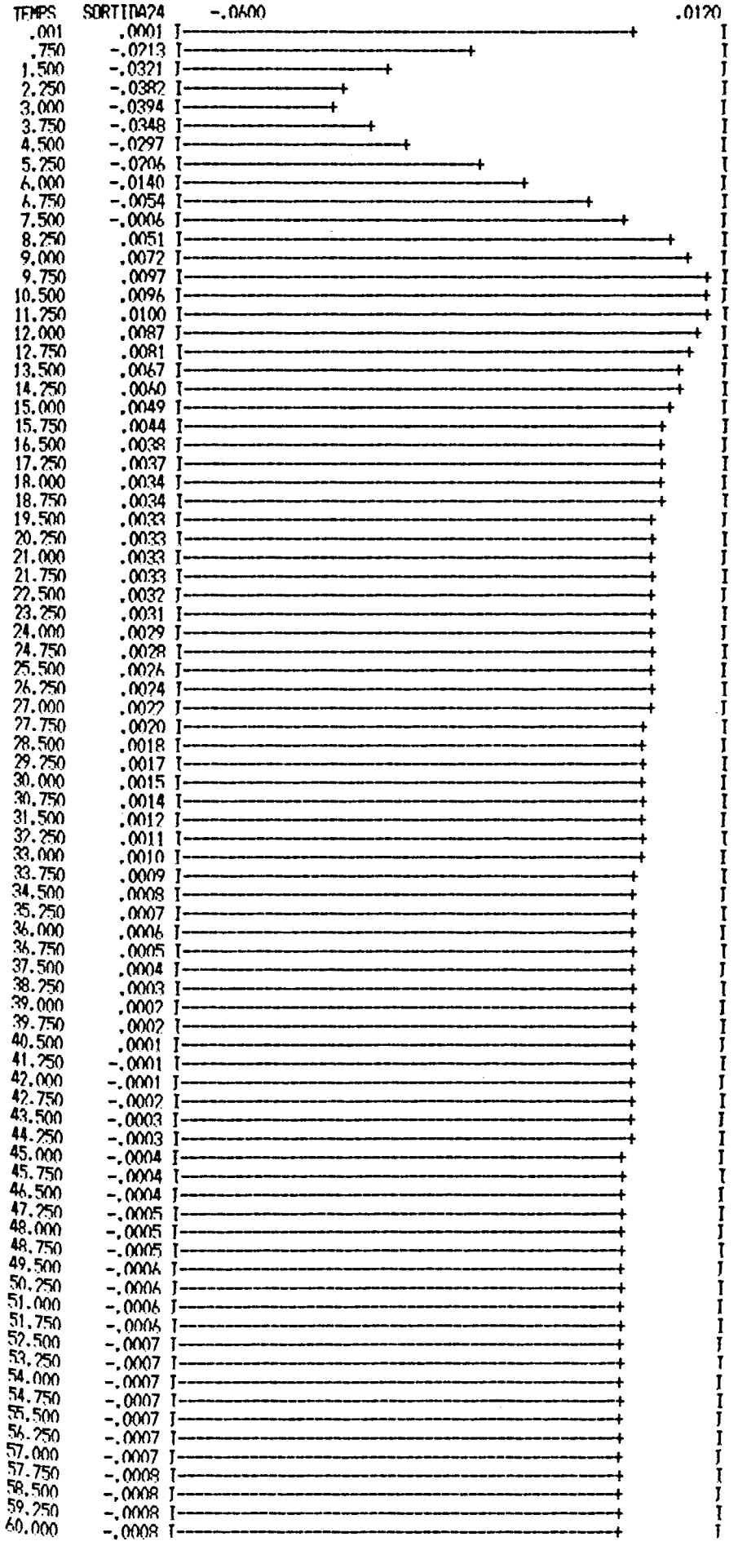
$\underset{\sim}{Q} = \text{diag}(0,5;0,5;1;0,5;1;0,5;0,5)$

$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

S13.1

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)



S13:

Sobrepenalización del ACE y del esfuerzo de control ($\underset{\sim}{R}$).

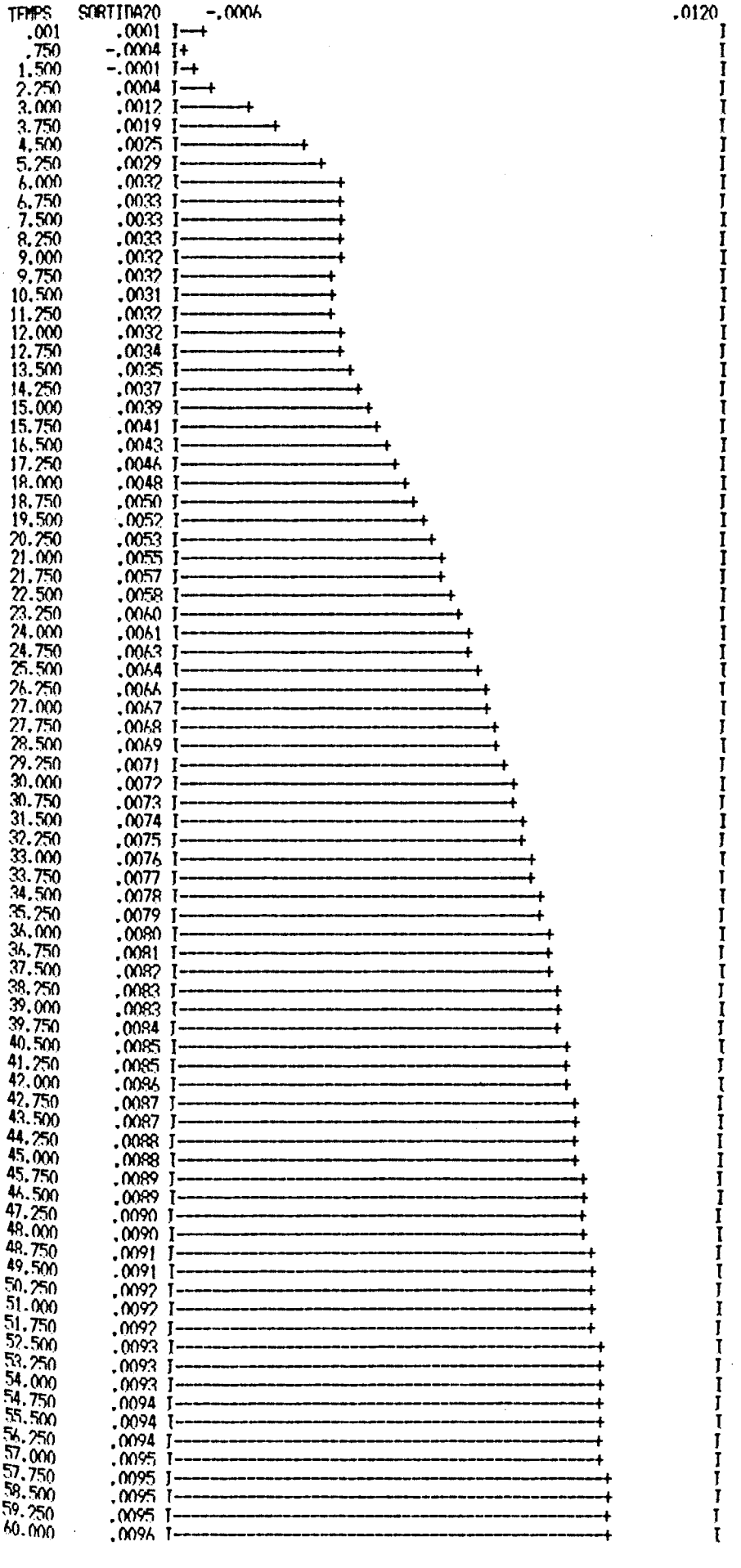
$\underset{\sim}{Q} = \text{diag}(0,5;0,5;0,5;0,5;1;0,5;0,5)$

$\underset{\sim}{R} = 2\underset{\sim}{I}$

$\alpha_0 = 0$

S13.2

BLOC EIX Y (20) MINIM (-.0006) MAXIM (.0120)

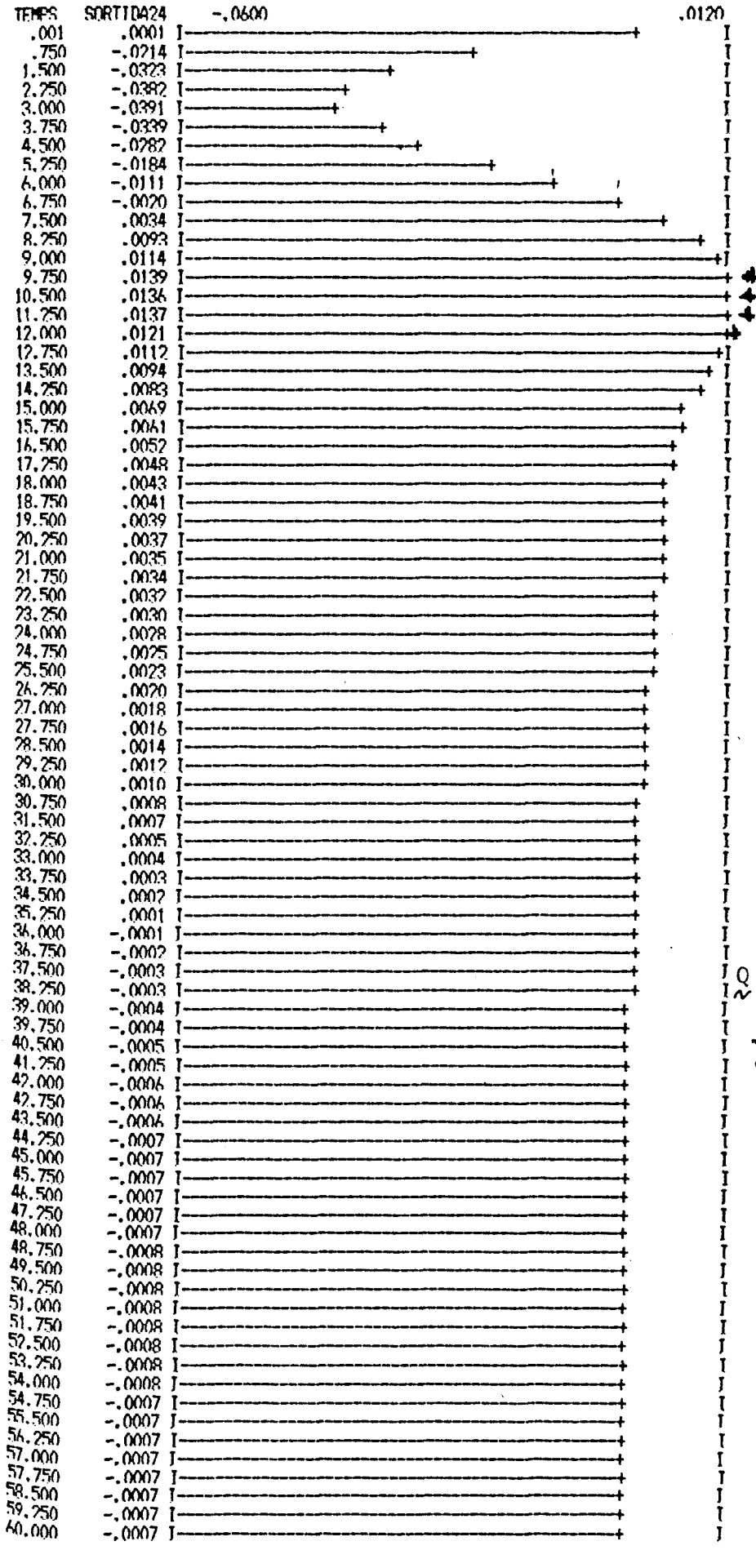


S13.3

TEMPS	SORTIDA44	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0336	.0014	.0002
4.00	-.0426	-.0359	.0043	.0003
6.00	-.0634	-.0126	.0054	.0005
8.00	-.0803	.0031	.0055	.0006
10.00	-.0940	.0092	.0056	.0007
12.00	-.1061	.0090	.0058	.0008
14.00	-.1178	.0059	.0059	.0009
16.00	-.1290	.0040	.0060	.0010
18.00	-.1394	.0033	.0060	.0010
20.00	-.1489	.0031	.0060	.0011
22.00	-.1575	.0031	.0061	.0011
24.00	-.1652	.0028	.0061	.0011
26.00	-.1722	.0023	.0061	.0012
28.00	-.1785	.0018	.0061	.0012
30.00	-.1842	.0014	.0061	.0012
32.00	-.1894	.0011	.0061	.0012
34.00	-.1940	.0008	.0061	.0012
36.00	-.1982	.0005	.0061	.0013
38.00	-.2019	.0003	.0061	.0013
40.00	-.2053	.0001	.0061	.0013
42.00	-.2083	-.0002	.0061	.0013
44.00	-.2111	-.0003	.0061	.0013
46.00	-.2135	-.0005	.0061	.0013
48.00	-.2157	-.0005	.0061	.0013
50.00	-.2177	-.0006	.0061	.0013
52.00	-.2194	-.0007	.0061	.0013
54.00	-.2210	-.0007	.0061	.0013
56.00	-.2224	-.0008	.0061	.0013
58.00	-.2237	-.0008	.0061	.0013
60.00	-.2248	-.0008	.0061	.0013
62.00	-.2258	-.0008	.0061	.0013
64.00	-.2267	-.0008	.0061	.0013
66.00	-.2275	-.0008	.0061	.0013
68.00	-.2283	-.0008	.0061	.0013
70.00	-.2289	-.0007	.0061	.0013
72.00	-.2295	-.0007	.0061	.0013
74.00	-.2300	-.0007	.0061	.0013
76.00	-.2305	-.0007	.0061	.0013
78.00	-.2309	-.0006	.0061	.0013
80.00	-.2313	-.0006	.0061	.0013
82.00	-.2316	-.0006	.0061	.0013
84.00	-.2319	-.0006	.0061	.0013
86.00	-.2322	-.0005	.0061	.0013
88.00	-.2324	-.0005	.0061	.0013
90.00	-.2326	-.0005	.0061	.0013
92.00	-.2328	-.0005	.0061	.0013
94.00	-.2330	-.0004	.0061	.0013
96.00	-.2331	-.0004	.0061	.0013
98.00	-.2333	-.0004	.0061	.0013
100.00	-.2334	-.0004	.0061	.0013
102.00	-.2335	-.0004	.0061	.0013
104.00	-.2336	-.0003	.0061	.0013
106.00	-.2337	-.0003	.0061	.0013
108.00	-.2338	-.0003	.0061	.0013
110.00	-.2338	-.0003	.0061	.0013
112.00	-.2339	-.0003	.0061	.0013
114.00	-.2340	-.0003	.0061	.0013
116.00	-.2340	-.0002	.0061	.0013
118.00	-.2341	-.0002	.0061	.0013
120.00	-.2341	-.0002	.0061	.0013
122.00	-.2341	-.0002	.0061	.0013
124.00	-.2342	-.0002	.0061	.0013
126.00	-.2342	-.0002	.0061	.0013
128.00	-.2342	-.0002	.0061	.0013
130.00	-.2342	-.0002	.0061	.0013
132.00	-.2343	-.0002	.0061	.0013
134.00	-.2343	-.0001	.0061	.0013
136.00	-.2343	-.0001	.0061	.0013
138.00	-.2343	-.0001	.0061	.0013
140.00	-.2343	-.0001	.0061	.0013
142.00	-.2343	-.0001	.0061	.0013
144.00	-.2343	-.0001	.0061	.0013
146.00	-.2343	-.0001	.0061	.0013
148.00	-.2344	-.0001	.0061	.0013
150.00	-.2344	-.0001	.0061	.0013
152.00	-.2344	-.0001	.0061	.0013
154.00	-.2344	-.0001	.0061	.0013
156.00	-.2344	-.0001	.0061	.0013
158.00	-.2344	-.0001	.0061	.0013
160.00	-.2344	-.0001	.0061	.0013

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)

S14.1



S14:

Sobrepenalización del ACE y aumento del esfuerzo de control (subpenalización de $\underset{\sim}{R}$).

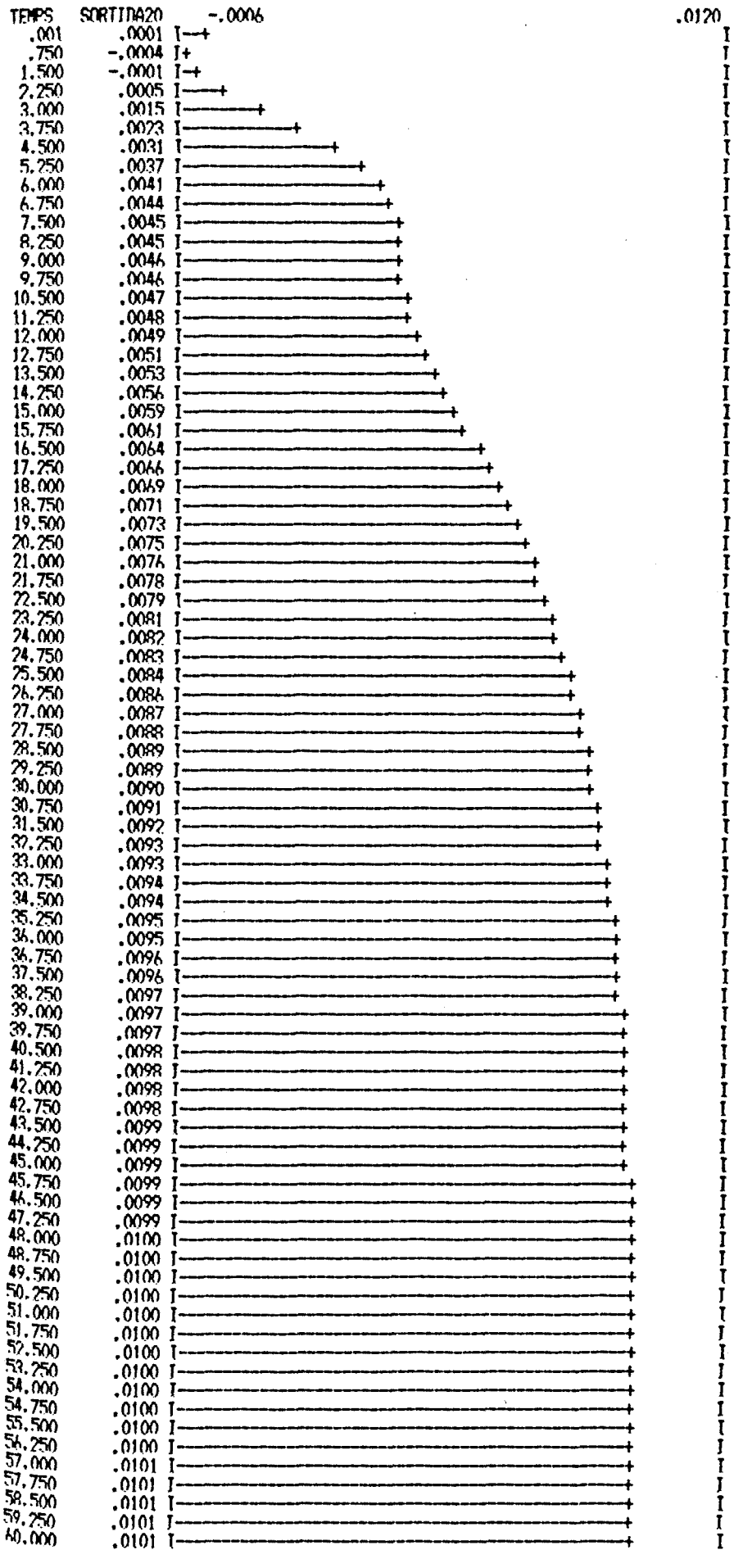
$\underset{\sim}{Q} = \text{diag}(0,5;0,5;0,5;0,5;1;0,5;0,5)$

$\underset{\sim}{R} = 0,5\ \underset{\sim}{I}$

$\alpha_o = 0$

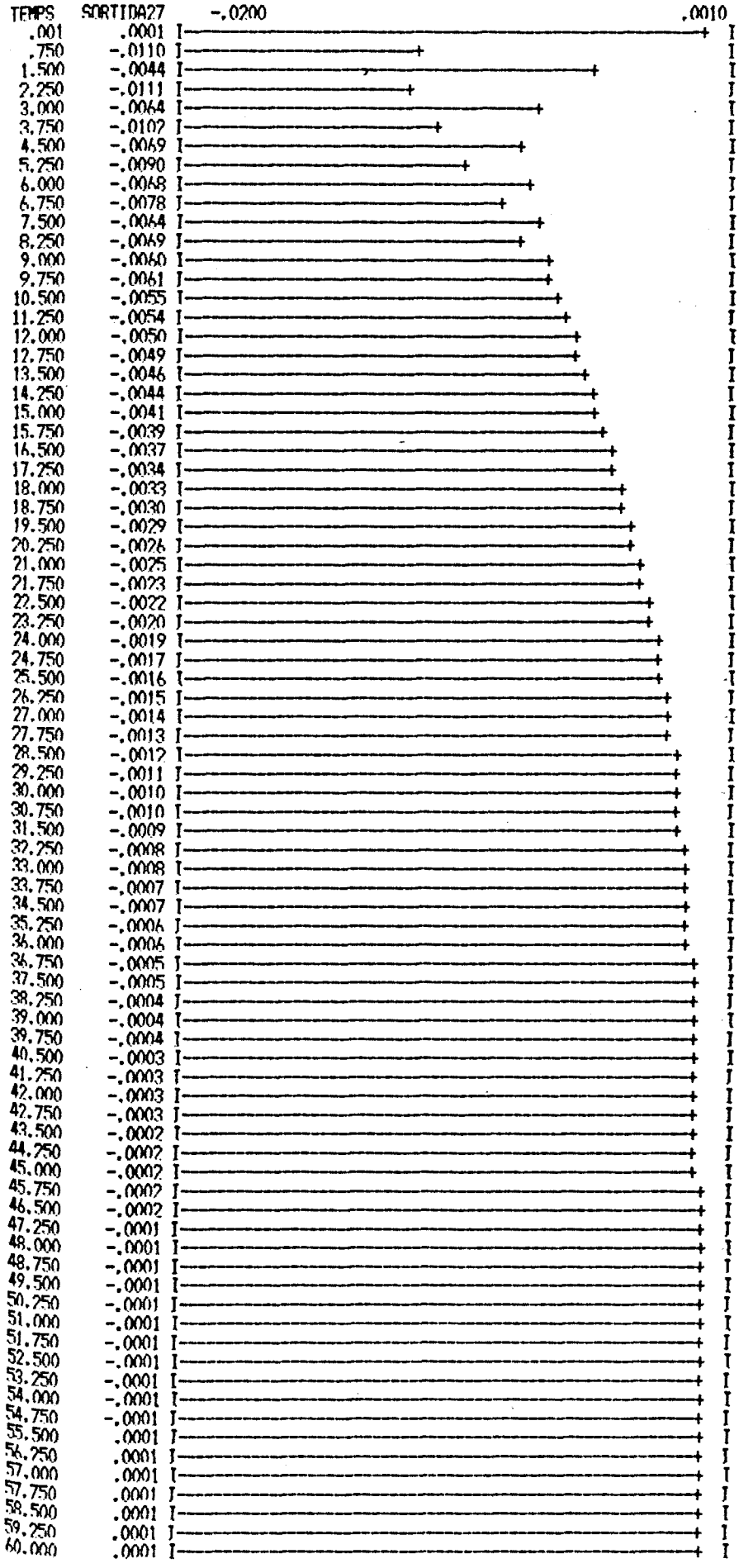
BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)

S14.2



S14.3

BLOC EIX Y (27) MINIM (-.0200) MAXIM (.0010)



S14.4

```
BLOC EIX Y (38)  MINIM (    -.0007)  MAXIM (     .0100)

TEMPS   SORTIDA38     -.0007                                        .0100
  .001      .0001 I--+                                                 I
  .750     -.0003 I-+                                                  I
 1.500     -.0006 +                                                    I
 2.250      .0002 I---+                                                I
 3.000      .0013 I-------+                                            I
 3.750      .0029 I-----------+                                        I
 4.500      .0045 I---------------+                                    I
 5.250      .0060 I-------------------+                                I
 6.000      .0073 I-----------------------+                            I
 6.750      .0082 I--------------------------+                         I
 7.500      .0088 I----------------------------+                       I
 8.250      .0090 I-----------------------------+                      I
 9.000      .0090 I-----------------------------+                      I
 9.750      .0087 I----------------------------+                       I
10.500      .0083 I---------------------------+                        I
11.250      .0078 I-------------------------+                          I
12.000      .0072 I-----------------------+                            I
12.750      .0066 I---------------------+                              I
13.500      .0061 I--------------------+                               I
14.250      .0056 I------------------+                                 I
15.000      .0052 I-----------------+                                  I
15.750      .0049 I----------------+                                   I
16.500      .0045 I---------------+                                    I
17.250      .0042 I--------------+                                     I
18.000      .0040 I-------------+                                      I
18.750      .0038 I-----------+                                        I
19.500      .0035 I----------+                                         I
20.250      .0033 I----------+                                         I
21.000      .0031 I---------+                                          I
21.750      .0029 I---------+                                          I
22.500      .0027 I--------+                                           I
23.250      .0025 I--------+                                           I
24.000      .0024 I-------+                                            I
24.750      .0022 I-------+                                            I
25.500      .0020 I------+                                             I
26.250      .0018 I------+                                             I
27.000      .0017 I-----+                                              I
27.750      .0015 I-----+                                              I
28.500      .0014 I-----+                                              I
29.250      .0013 I-----+                                              I
30.000      .0012 I----+                                               I
30.750      .0011 I----+                                               I
31.500      .0010 I----+                                               I
32.250      .0009 I---+                                                I
33.000      .0008 I---+                                                I
33.750      .0007 I---+                                                I
34.500      .0006 I---+                                                I
35.250      .0006 I---+                                                I
36.000      .0005 I--+                                                 I
36.750      .0005 I--+                                                 I
37.500      .0004 I--+                                                 I
38.250      .0004 I--+                                                 I
39.000      .0003 I--+                                                 I
39.750      .0003 I--+                                                 I
40.500      .0002 I--+                                                 I
41.250      .0002 I--+                                                 I
42.000      .0002 I--+                                                 I
42.750      .0001 I--+                                                 I
43.500      .0001 I--+                                                 I
44.250      .0001 I--+                                                 I
45.000      .0001 I--+                                                 I
45.750     -.0001 I--+                                                 I
46.500     -.0001 I--+                                                 I
47.250     -.0001 I--+                                                 I
48.000     -.0001 I--+                                                 I
48.750     -.0001 I--+                                                 I
49.500     -.0001 I--+                                                 I
50.250     -.0001 I--+                                                 I
51.000     -.0002 I--+                                                 I
51.750     -.0002 I--+                                                 I
52.500     -.0002 I--+                                                 I
53.250     -.0002 I--+                                                 I
54.000     -.0002 I--+                                                 I
54.750     -.0002 I--+                                                 I
55.500     -.0002 I--+                                                 I
56.250     -.0002 I--+                                                 I
57.000     -.0002 I--+                                                 I
57.750     -.0002 I--+                                                 I
58.500     -.0002 I--+                                                 I
59.250     -.0002 I--+                                                 I
60.000     -.0002 I--+                                                 I
```

S14.5

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0176	-.0338	.0014	.0002
4.00	-.0423	-.0349	.0042	.0003
6.00	-.0618	-.0098	.0052	.0004
8.00	-.0762	.0071	.0053	.0005
10.00	-.0865	.0132	.0055	.0006
12.00	-.0947	.0124	.0059	.0007
14.00	-.1022	.0084	.0061	.0007
16.00	-.1090	.0056	.0062	.0008
18.00	-.1151	.0042	.0063	.0008
20.00	-.1202	.0036	.0063	.0008
22.00	-.1244	.0032	.0063	.0008
24.00	-.1279	.0027	.0064	.0008
26.00	-.1308	.0020	.0064	.0008
28.00	-.1332	.0014	.0064	.0008
30.00	-.1352	.0009	.0064	.0008
32.00	-.1368	.0005	.0064	.0008
34.00	-.1382	.0002	.0064	.0008
36.00	-.1393	-.0001	.0064	.0008
38.00	-.1402	-.0003	.0064	.0008
40.00	-.1410	-.0005	.0064	.0008
42.00	-.1416	-.0006	.0064	.0008
44.00	-.1421	-.0007	.0064	.0008
46.00	-.1425	-.0007	.0064	.0008
48.00	-.1428	-.0008	.0064	.0008
50.00	-.1431	-.0008	.0064	.0008
52.00	-.1433	-.0008	.0064	.0008
54.00	-.1434	-.0008	.0064	.0008
56.00	-.1436	-.0007	.0064	.0008
58.00	-.1437	-.0007	.0064	.0008
60.00	-.1437	-.0007	.0064	.0008
62.00	-.1438	-.0007	.0064	.0008
64.00	-.1438	-.0006	.0064	.0008
66.00	-.1439	-.0006	.0064	.0008
68.00	-.1439	-.0006	.0064	.0008
70.00	-.1439	-.0005	.0064	.0008
72.00	-.1439	-.0005	.0064	.0008
74.00	-.1440	-.0005	.0064	.0008
76.00	-.1440	-.0004	.0064	.0008
78.00	-.1440	-.0004	.0064	.0008
80.00	-.1440	-.0004	.0064	.0008
82.00	-.1440	-.0004	.0064	.0008
84.00	-.1440	-.0003	.0064	.0008
86.00	-.1440	-.0003	.0064	.0008
88.00	-.1440	-.0003	.0064	.0008
90.00	-.1440	-.0003	.0064	.0008
92.00	-.1439	-.0003	.0064	.0008
94.00	-.1439	-.0002	.0064	.0008
96.00	-.1439	-.0002	.0064	.0008
98.00	-.1439	-.0002	.0064	.0008
100.00	-.1439	-.0002	.0064	.0008
102.00	-.1439	-.0002	.0064	.0008
104.00	-.1439	-.0002	.0064	.0008
106.00	-.1439	-.0002	.0064	.0008
108.00	-.1439	-.0002	.0064	.0008
110.00	-.1439	-.0001	.0064	.0008
112.00	-.1439	-.0001	.0064	.0008
114.00	-.1439	-.0001	.0064	.0008
116.00	-.1439	-.0001	.0064	.0008
118.00	-.1439	-.0001	.0064	.0008
120.00	-.1439	-.0001	.0064	.0008
122.00	-.1439	-.0001	.0064	.0008
124.00	-.1439	-.0001	.0064	.0008
126.00	-.1439	-.0001	.0064	.0008
128.00	-.1439	-.0001	.0064	.0008
130.00	-.1439	-.0001	.0064	.0008
132.00	-.1439	-.0001	.0064	.0008
134.00	-.1439	-.0001	.0064	.0008
136.00	-.1439	-.0001	.0064	.0008
138.00	-.1439	-.0001	.0064	.0008
140.00	-.1439	-.0001	.0064	.0008
142.00	-.1439	-.0001	.0064	.0008
144.00	-.1439	-.0001	.0064	.0008
146.00	-.1439	-.0001	.0064	.0008
148.00	-.1439	-.0001	.0064	.0008
150.00	-.1439	-.0001	.0064	.0008
152.00	-.1439	-.0001	.0064	.0008
154.00	-.1439	-.0001	.0064	.0008
156.00	-.1439	-.0001	.0064	.0008
158.00	-.1439	-.0001	.0064	.0008
160.00	-.1439	-.0001	.0064	.0008

S15.1

BLOC ETX Y (24) MINIM (-.0600) MAXIM (.0120)

TEMPS	SORTIDA24	-.0600	.0120
.001	.0001	I	I
.750	-.0213	I	I
1.500	-.0327	I	I
2.250	-.0382	I	I
3.000	-.0393	I	I
3.750	-.0344	I	I
4.500	-.0291	I	I
5.250	-.0197	I	I
6.000	-.0128	I	I
6.750	-.0040	I	I
7.500	.0012	I	I
8.250	.0069	I	I
9.000	.0091	I	I
9.750	.0116	I	I
10.500	.0114	I	I
11.250	.0117	I	I
12.000	.0104	I	I
12.750	.0097	I	I
13.500	.0081	I	I
14.250	.0072	I	I
15.000	.0060	I	I
15.750	.0054	I	I
16.500	.0047	I	I
17.250	.0044	I	I
18.000	.0040	I	I
18.750	.0039	I	I
19.500	.0038	I	I
20.250	.0037	I	I
21.000	.0036	I	I
21.750	.0035	I	I
22.500	.0034	I	I
23.250	.0032	I	I
24.000	.0030	I	I
24.750	.0028	I	I
25.500	.0026	I	I
26.250	.0024	I	I
27.000	.0022	I	I
27.750	.0019	I	I
28.500	.0017	I	I
29.250	.0016	I	I
30.000	.0014	I	I
30.750	.0012	I	I
31.500	.0011	I	I
32.250	.0009	I	I
33.000	.0008	I	I
33.750	.0007	I	I
34.500	.0006	I	I
35.250	.0005	I	I
36.000	.0004	I	I
36.750	.0003	I	I
37.500	.0002	I	I
38.250	.0001	I	I
39.000	-.0001	I	I
39.750	-.0001	I	I
40.500	-.0002	I	I
41.250	-.0003	I	I
42.000	-.0003	I	I
42.750	-.0004	I	I
43.500	-.0004	I	I
44.250	-.0005	I	I
45.000	-.0005	I	I
45.750	-.0005	I	I
46.500	-.0006	I	I
47.250	-.0006	I	I
48.000	-.0006	I	I
48.750	-.0006	I	I
49.500	-.0007	I	I
50.250	-.0007	I	I
51.000	-.0007	I	I
51.750	-.0007	I	I
52.500	-.0007	I	I
53.250	-.0007	I	I
54.000	-.0007	I	I
54.750	-.0007	I	I
55.500	-.0007	I	I
56.250	-.0008	I	I
57.000	-.0008	I	I
57.750	-.0008	I	I
58.500	-.0008	I	I
59.250	-.0007	I	I
60.000	-.0007	I	I

S15:

Distintas penalizaciones.

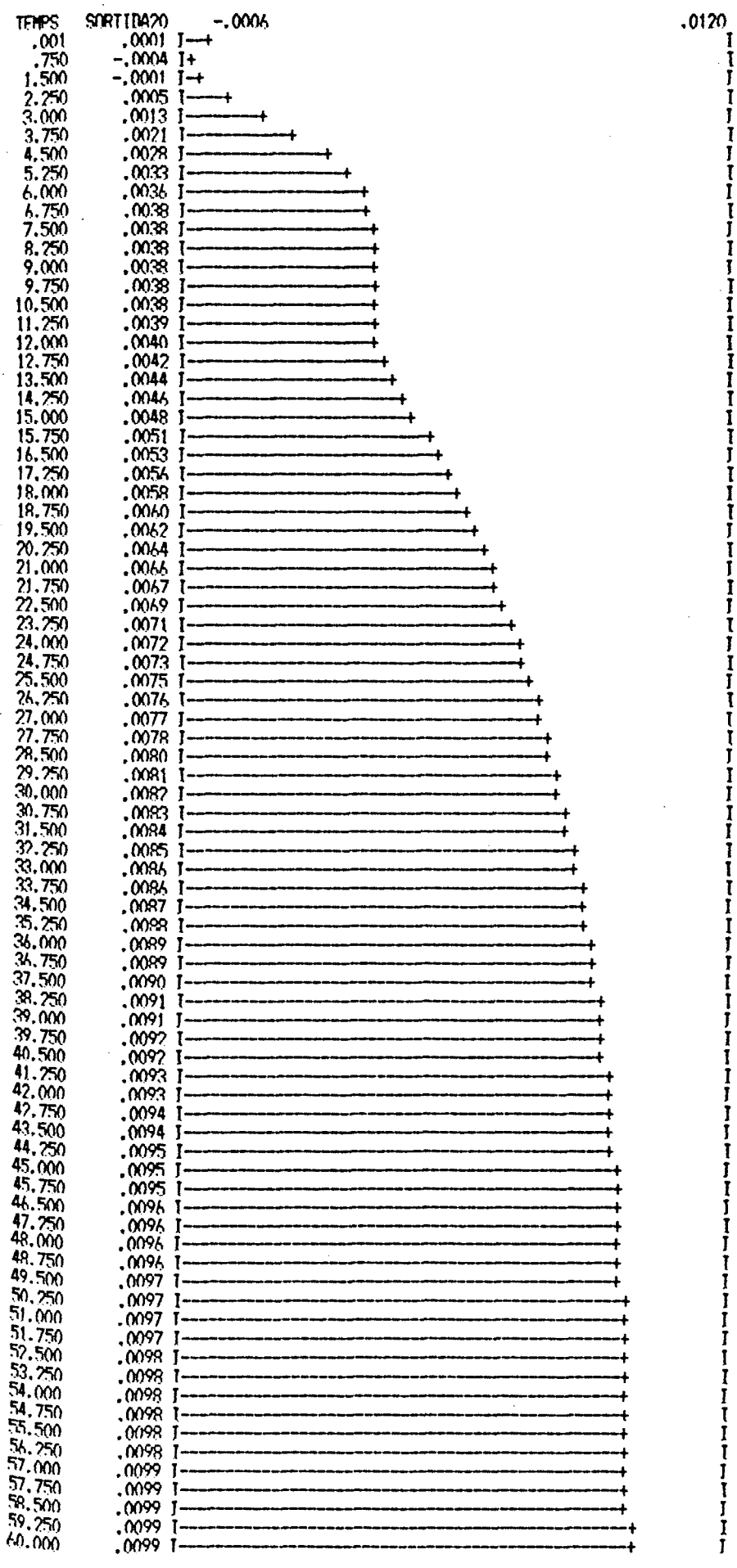
$\underset{\sim}{Q}$ = diag(0,2;0,5;0,2;0,8;1;0,9;0,8)

$\underset{\sim}{R} = \underset{\sim}{I}$

$\alpha_o = 0$

S15.2

BLOC FIX Y (20) MINIM (-.0006) MAXIM (.0120)



BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)

S15.3

TEMPS	SORTIA27	-.0200	.0010
.001	.0001	I	I
.750	-.0110	I	I
1.500	-.0044	I	I
2.250	-.0111	I	I
3.000	-.0064	I	I
3.750	-.0104	I	I
4.500	-.0072	I	I
5.250	-.0093	I	I
6.000	-.0072	I	I
6.750	-.0083	I	I
7.500	-.0070	I	I
8.250	-.0075	I	I
9.000	-.0067	I	I
9.750	-.0069	I	I
10.500	-.0063	I	I
11.250	-.0063	I	I
12.000	-.0060	I	I
12.750	-.0058	I	I
13.500	-.0056	I	I
14.250	-.0054	I	I
15.000	-.0052	I	I
15.750	-.0049	I	I
16.500	-.0048	I	I
17.250	-.0045	I	I
18.000	-.0043	I	I
18.750	-.0041	I	I
19.500	-.0039	I	I
20.250	-.0037	I	I
21.000	-.0036	I	I
21.750	-.0034	I	I
22.500	-.0032	I	I
23.250	-.0031	I	I
24.000	-.0029	I	I
24.750	-.0028	I	I
25.500	-.0026	I	I
26.250	-.0025	I	I
27.000	-.0024	I	I
27.750	-.0022	I	I
28.500	-.0021	I	I
29.250	-.0020	I	I
30.000	-.0019	I	I
30.750	-.0018	I	I
31.500	-.0017	I	I
32.250	-.0016	I	I
33.000	-.0015	I	I
33.750	-.0014	I	I
34.500	-.0014	I	I
35.250	-.0013	I	I
36.000	-.0012	I	I
36.750	-.0011	I	I
37.500	-.0011	I	I
38.250	-.0010	I	I
39.000	-.0010	I	I
39.750	-.0009	I	I
40.500	-.0009	I	I
41.250	-.0008	I	I
42.000	-.0008	I	I
42.750	-.0007	I	I
43.500	-.0007	I	I
44.250	-.0006	I	I
45.000	-.0006	I	I
45.750	-.0006	I	I
46.500	-.0005	I	I
47.250	-.0005	I	I
48.000	-.0005	I	I
48.750	-.0004	I	I
49.500	-.0004	I	I
50.250	-.0004	I	I
51.000	-.0004	I	I
51.750	-.0003	I	I
52.500	-.0003	I	I
53.250	-.0003	I	I
54.000	-.0003	I	I
54.750	-.0003	I	I
55.500	-.0003	I	I
56.250	-.0002	I	I
57.000	-.0002	I	I
57.750	-.0002	I	I
58.500	-.0002	I	I
59.250	-.0002	I	I
60.000	-.0002	I	I

S15.4

BLOC FIX Y (38) MINIM (-.0007) MAXIM (.0100)

TEMPS	SORTIDA38	-.0007	.0100
.001	.0001	I—+	I
.750	-.0003	I+	I
1.500	-.0006	+	I
2.250	.0002	I—+	I
3.000	.0013	I———+	I
3.750	.0029	I————————+	I
4.500	.0045	I——————————+	I
5.250	.0060	I————————————+	I
6.000	.0073	I——————————————+	I
6.750	.0083	I————————————————+	I
7.500	.0089	I——————————————————+	I
8.250	.0092	I———————————————————+	I
9.000	.0093	I———————————————————+	I
9.750	.0091	I——————————————————+	I
10.500	.0087	I————————————————+	I
11.250	.0083	I————————————————+	I
12.000	.0079	I———————————————+	I
12.750	.0074	I——————————————+	I
13.500	.0069	I————————————+	I
14.250	.0065	I———————————+	I
15.000	.0061	I——————————+	I
15.750	.0058	I————————+	I
16.500	.0055	I———————+	I
17.250	.0053	I———————+	I
18.000	.0050	I——————+	I
18.750	.0048	I——————+	I
19.500	.0046	I——————+	I
20.250	.0044	I——————+	I
21.000	.0042	I——————+	I
21.750	.0040	I——————+	I
22.500	.0038	I——————+	I
23.250	.0036	I——————+	I
24.000	.0034	I——————+	I
24.750	.0032	I——————+	I
25.500	.0031	I——————+	I
26.250	.0029	I——————+	I
27.000	.0027	I——————+	I
27.750	.0025	I——————+	I
28.500	.0024	I——————+	I
29.250	.0022	I——————+	I
30.000	.0021	I——————+	I
30.750	.0020	I——————+	I
31.500	.0019	I——————+	I
32.250	.0017	I——————+	I
33.000	.0016	I——————+	I
33.750	.0015	I——————+	I
34.500	.0014	I———————+	I
35.250	.0013	I———————+	I
36.000	.0012	I———————+	I
36.750	.0012	I———————+	I
37.500	.0011	I———————+	I
38.250	.0010	I———————+	I
39.000	.0009	I———————+	I
39.750	.0009	I———————+	I
40.500	.0008	I———————+	I
41.250	.0007	I———————+	I
42.000	.0007	I———————+	I
42.750	.0006	I———————+	I
43.500	.0006	I———————+	I
44.250	.0005	I———————+	I
45.000	.0005	I———————+	I
45.750	.0005	I———————+	I
46.500	.0004	I———————+	I
47.250	.0004	I———————+	I
48.000	.0003	I———————+	I
48.750	.0003	I———————+	I
49.500	.0003	I———————+	I
50.250	.0003	I———————+	I
51.000	.0002	I———————+	I
51.750	.0002	I———————+	I
52.500	.0002	I———————+	I
53.250	.0002	I———————+	I
54.000	.0001	I———————+	I
54.750	.0001	I———————+	I
55.500	.0001	I———————+	I
56.250	.0001	I———————+	I
57.000	.0001	I———————+	I
57.750	.0001	I———————+	I
58.500	.0001	I———————+	I
59.250	-.0001	I———————+	I
60.000	-.0001	I———————+	I

S15.5

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0176	-.0337	.0014	.0002
4.00	-.0424	-.0355	.0042	.0003
6.00	-.0627	-.0114	.0053	.0005
8.00	-.0786	.0048	.0054	.0006
10.00	-.0907	.0110	.0056	.0007
12.00	-.1011	.0104	.0058	.0007
14.00	-.1108	.0072	.0060	.0008
16.00	-.1199	.0049	.0061	.0009
18.00	-.1282	.0039	.0061	.0009
20.00	-.1355	.0035	.0061	.0009
22.00	-.1419	.0033	.0062	.0010
24.00	-.1475	.0029	.0062	.0010
26.00	-.1523	.0023	.0062	.0010
28.00	-.1565	.0018	.0062	.0010
30.00	-.1602	.0013	.0062	.0010
32.00	-.1634	.0009	.0062	.0010
34.00	-.1662	.0006	.0062	.0010
36.00	-.1687	.0003	.0062	.0010
38.00	-.1708	.0001	.0062	.0010
40.00	-.1726	-.0002	.0062	.0010
42.00	-.1742	-.0004	.0062	.0010
44.00	-.1756	-.0005	.0062	.0010
46.00	-.1767	-.0006	.0062	.0010
48.00	-.1777	-.0006	.0062	.0010
50.00	-.1786	-.0007	.0062	.0010
52.00	-.1794	-.0007	.0062	.0010
54.00	-.1800	-.0008	.0062	.0010
56.00	-.1806	-.0008	.0062	.0010
58.00	-.1811	-.0008	.0062	.0010
60.00	-.1815	-.0008	.0062	.0010
62.00	-.1818	-.0007	.0062	.0010
64.00	-.1821	-.0007	.0062	.0010
66.00	-.1824	-.0007	.0062	.0010
68.00	-.1826	-.0007	.0062	.0010
70.00	-.1828	-.0006	.0062	.0010
72.00	-.1830	-.0006	.0062	.0010
74.00	-.1831	-.0006	.0062	.0010
76.00	-.1832	-.0006	.0062	.0010
78.00	-.1833	-.0005	.0062	.0010
80.00	-.1834	-.0005	.0062	.0010
82.00	-.1835	-.0005	.0062	.0010
84.00	-.1835	-.0004	.0062	.0010
86.00	-.1836	-.0004	.0062	.0010
88.00	-.1836	-.0004	.0062	.0010
90.00	-.1837	-.0004	.0062	.0010
92.00	-.1837	-.0004	.0062	.0010
94.00	-.1837	-.0003	.0062	.0010
96.00	-.1837	-.0003	.0062	.0010
98.00	-.1838	-.0003	.0062	.0010
100.00	-.1838	-.0003	.0062	.0010
102.00	-.1838	-.0003	.0062	.0010
104.00	-.1838	-.0002	.0062	.0010
106.00	-.1838	-.0002	.0062	.0010
108.00	-.1838	-.0002	.0062	.0010
110.00	-.1838	-.0002	.0062	.0010
112.00	-.1838	-.0002	.0062	.0010
114.00	-.1838	-.0002	.0062	.0010
116.00	-.1838	-.0002	.0062	.0010
118.00	-.1838	-.0002	.0062	.0010
120.00	-.1838	-.0002	.0062	.0010
122.00	-.1838	-.0001	.0062	.0010
124.00	-.1838	-.0001	.0062	.0010
126.00	-.1838	-.0001	.0062	.0010
128.00	-.1838	-.0001	.0062	.0010
130.00	-.1838	-.0001	.0062	.0010
132.00	-.1838	-.0001	.0062	.0010
134.00	-.1838	-.0001	.0062	.0010
136.00	-.1838	-.0001	.0062	.0010
138.00	-.1838	-.0001	.0062	.0010
140.00	-.1838	-.0001	.0062	.0010
142.00	-.1838	-.0001	.0062	.0010
144.00	-.1838	-.0001	.0062	.0010
146.00	-.1838	-.0001	.0062	.0010
148.00	-.1838	-.0001	.0062	.0010
150.00	-.1838	-.0001	.0062	.0010
152.00	-.1838	-.0001	.0062	.0010
154.00	-.1838	-.0001	.0062	.0010
156.00	-.1838	-.0001	.0062	.0010
158.00	-.1838	-.0001	.0062	.0010
160.00	-.1838	-.0001	.0062	.0010

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0120)

S16.1

TEMPS	SORTIDA24	-.0600	.0120
.001	.0001	I———+	I
.750	-.0214	I——+	I
1.500	-.0323	I———+	I
2.250	-.0382	I———+	I
3.000	-.0391	I———+	I
3.750	-.0340	I———+	I
4.500	-.0282	I———+	I
5.250	-.0184	I———+	I
6.000	-.0111	I———+	I
6.750	-.0020	I———+	I
7.500	.0033	I———+	I
8.250	.0092	I———+	I
9.000	.0113	I———+	I
9.750	.0138	I———+	•
10.500	.0135	I———+	•
11.250	.0136	I———+	•
12.000	.0120	I———+	•
12.750	.0111	I———+	I
13.500	.0093	I———+	I
14.250	.0082	I———+	I
15.000	.0068	I———+	I
15.750	.0061	I———+	I
16.500	.0052	I———+	I
17.250	.0048	I———+	I
18.000	.0043	I———+	I
18.750	.0041	I———+	I
19.500	.0039	I———+	I
20.250	.0037	I———+	I
21.000	.0036	I———+	I
21.750	.0034	I———+	I
22.500	.0032	I———+	I
23.250	.0030	I———+	I
24.000	.0028	I———+	I
24.750	.0026	I———+	I
25.500	.0023	I———+	I
26.250	.0021	I———+	I
27.000	.0018	I———+	I
27.750	.0016	I———+	I
28.500	.0014	I———+	I
29.250	.0012	I———+	I
30.000	.0010	I———+	I
30.750	.0008	I———+	I
31.500	.0007	I———+	I
32.250	.0005	I———+	I
33.000	.0004	I———+	I
33.750	.0003	I———+	I
34.500	.0002	I———+	I
35.250	.0001	I———+	I
36.000	-.0001	I———+	I
36.750	-.0002	I———+	I
37.500	-.0002	I———+	I
38.250	-.0003	I———+	I
39.000	-.0004	I———+	I
39.750	-.0004	I———+	I
40.500	-.0005	I———+	I
41.250	-.0005	I———+	I
42.000	-.0006	I———+	I
42.750	-.0006	I———+	I
43.500	-.0006	I———+	I
44.250	-.0006	I———+	I
45.000	-.0007	I———+	I
45.750	-.0007	I———+	I
46.500	-.0007	I———+	I
47.250	-.0007	I———+	I
48.000	-.0007	I———+	I
48.750	-.0007	I———+	I
49.500	-.0007	I———+	I
50.250	-.0008	I———+	I
51.000	-.0008	I———+	I
51.750	-.0008	I———+	I
52.500	-.0008	I———+	I
53.250	-.0008	I———+	I
54.000	-.0007	I———+	I
54.750	-.0007	I———+	I
55.500	-.0007	I———+	I
56.250	-.0007	I———+	I
57.000	-.0007	I———+	I
57.750	-.0007	I———+	I
58.500	-.0007	I———+	I
59.750	-.0007	I———+	I
60.000	-.0007	I———+	I

S16:

Igual que S15, con:

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S16.2

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M OC FIX Y (20)  MINIM (    -.0006)  MAXIM (     .0120)

TEMPS   SORTIDA20     -.0006                                    .0120
  .001      .0001 I--+                                              I
  .750     -.0004 I+                                                I
 1.500     -.0001 I-+                                               I
 2.250      .0005 I---+                                             I
 3.000      .0015 I-------+                                         I
 3.750      .0023 I-----------+                                     I
 4.500      .0031 I-------------------+                             I
 5.250      .0037 I---------------------+                           I
 6.000      .0041 I-----------------------+                         I
 6.750      .0043 I-------------------------+                       I
 7.500      .0045 I--------------------------+                      I
 8.250      .0045 I--------------------------+                      I
 9.000      .0045 I--------------------------+                      I
 9.750      .0046 I--------------------------+                      I
10.500      .0046 I--------------------------+                      I
11.250      .0047 I---------------------------+                     I
12.000      .0049 I----------------------------+                    I
12.750      .0051 I-----------------------------+                   I
13.500      .0053 I------------------------------+                  I
14.250      .0055 I-------------------------------+                 I
15.000      .0058 I--------------------------------+                I
15.750      .0061 I---------------------------------+               I
16.500      .0063 I----------------------------------+              I
17.250      .0066 I-----------------------------------+             I
18.000      .0068 I------------------------------------+            I
18.750      .0070 I-------------------------------------+           I
19.500      .0072 I--------------------------------------+          I
20.250      .0074 I---------------------------------------+         I
21.000      .0076 I---------------------------------------+         I
21.750      .0077 I----------------------------------------+        I
22.500      .0079 I-----------------------------------------+       I
23.250      .0080 I------------------------------------------+      I
24.000      .0082 I------------------------------------------+      I
24.750      .0083 I-------------------------------------------+     I
25.500      .0084 I-------------------------------------------+     I
26.250      .0085 I--------------------------------------------+    I
27.000      .0086 I--------------------------------------------+    I
27.750      .0087 I---------------------------------------------+   I
28.500      .0088 I---------------------------------------------+   I
29.250      .0089 I----------------------------------------------+  I
30.000      .0090 I----------------------------------------------+  I
30.750      .0091 I-----------------------------------------------+ I
31.500      .0091 I-----------------------------------------------+ I
32.250      .0092 I-----------------------------------------------+ I
33.000      .0093 I------------------------------------------------+I
33.750      .0093 I------------------------------------------------+I
34.500      .0094 I------------------------------------------------+I
35.250      .0094 I------------------------------------------------+I
36.000      .0095 I-------------------------------------------------+I
36.750      .0095 I-------------------------------------------------+I
37.500      .0096 I-------------------------------------------------+I
38.250      .0096 I-------------------------------------------------+I
39.000      .0097 I-------------------------------------------------+I
39.750      .0097 I--------------------------------------------------+I
40.500      .0097 I--------------------------------------------------+I
41.250      .0098 I--------------------------------------------------+I
42.000      .0098 I--------------------------------------------------+I
42.750      .0098 I--------------------------------------------------+I
43.500      .0098 I--------------------------------------------------+I
44.250      .0099 I--------------------------------------------------+I
45.000      .0099 I--------------------------------------------------+I
45.750      .0099 I--------------------------------------------------+I
46.500      .0099 I---------------------------------------------------+I
47.250      .0099 I---------------------------------------------------+I
48.000      .0099 I---------------------------------------------------+I
48.750      .0100 I---------------------------------------------------+I
49.500      .0100 I---------------------------------------------------+I
50.250      .0100 I---------------------------------------------------+I
51.000      .0100 I---------------------------------------------------+I
51.750      .0100 I---------------------------------------------------+I
52.500      .0100 I---------------------------------------------------+I
53.250      .0100 I---------------------------------------------------+I
54.000      .0100 I---------------------------------------------------+I
54.750      .0100 I---------------------------------------------------+I
55.500      .0100 I---------------------------------------------------+I
56.250      .0100 I---------------------------------------------------+I
57.000      .0100 I---------------------------------------------------+I
57.750      .0100 I---------------------------------------------------+I
58.500      .0101 I---------------------------------------------------+I
59.250      .0101 I---------------------------------------------------+I
60.000      .0101 I---------------------------------------------------+I
```

BLOC EIX Y (27) MINIM (-.0200) MAXIM (.0010)

S16.3

TEMPS	SORTIDA27	-.0200	.0010
.001	.0001		
.750	-.0110		
1.500	-.0044		
2.250	-.0111		
3.000	-.0064		
3.750	-.0102		
4.500	-.0069		
5.250	-.0090		
6.000	-.0068		
6.750	-.0079		
7.500	-.0064		
8.250	-.0069		
9.000	-.0060		
9.750	-.0061		
10.500	-.0055		
11.250	-.0055		
12.000	-.0051		
12.750	-.0049		
13.500	-.0046		
14.250	-.0044		
15.000	-.0042		
15.750	-.0039		
16.500	-.0037		
17.250	-.0035		
18.000	-.0033		
18.750	-.0031		
19.500	-.0029		
20.250	-.0027		
21.000	-.0025		
21.750	-.0024		
22.500	-.0022		
23.250	-.0021		
24.000	-.0019		
24.750	-.0018		
25.500	-.0017		
26.250	-.0016		
27.000	-.0015		
27.750	-.0014		
28.500	-.0013		
29.250	-.0012		
30.000	-.0011		
30.750	-.0010		
31.500	-.0009		
32.250	-.0009		
33.000	-.0008		
33.750	-.0007		
34.500	-.0007		
35.250	-.0006		
36.000	-.0006		
36.750	-.0005		
37.500	-.0005		
38.250	-.0005		
39.000	-.0004		
39.750	-.0004		
40.500	-.0004		
41.250	-.0003		
42.000	-.0003		
42.750	-.0003		
43.500	-.0003		
44.250	-.0002		
45.000	-.0002		
45.750	-.0002		
46.500	-.0002		
47.250	-.0002		
48.000	-.0002		
48.750	-.0001		
49.500	-.0001		
50.250	-.0001		
51.000	-.0001		
51.750	-.0001		
52.500	-.0001		
53.250	-.0001		
54.000	-.0001		
54.750	-.0001		
55.500	-.0001		
56.250	-.0001		
57.000	.0001		
57.750	.0001		
58.500	.0001		
59.250	.0001		
60.000	.0001		

BLOC EIX Y (38) MINIM (-.0007) MAXIM (.0100)

S16.4

TEMPS	SORTIDA38	-.0007	.0100
.001	.0001	I—+	I
.750	-.0003	I+	I
1.500	-.0006	+	I
2.250	.0002	I—+	I
3.000	.0013	I———+	I
3.750	.0029	I————+	I
4.500	.0045	I——————+	I
5.250	.0060	I———————+	I
6.000	.0073	I————————+	I
6.750	.0082	I—————————+	I
7.500	.0088	I——————————+	I
8.250	.0090	I——————————+	I
9.000	.0090	I——————————+	I
9.750	.0087	I—————————+	I
10.500	.0083	I————————+	I
11.250	.0078	I———————+	I
12.000	.0072	I————————+	I
12.750	.0067	I———————+	I
13.500	.0062	I——————+	I
14.250	.0057	I—————+	I
15.000	.0053	I————+	I
15.750	.0049	I———————+	I
16.500	.0046	I——————+	I
17.250	.0043	I———————+	I
18.000	.0040	I———————+	I
18.750	.0038	I———————+	I
19.500	.0036	I———————+	I
20.250	.0034	I——————+	I
21.000	.0032	I——————+	I
21.750	.0030	I———————+	I
22.500	.0028	I———————+	I
23.250	.0026	I———————+	I
24.000	.0024	I———————+	I
24.750	.0022	I———————+	I
25.500	.0021	I———————+	I
26.250	.0019	I———————+	I
27.000	.0017	I———————+	I
27.750	.0016	I———————+	I
28.500	.0015	I———————+	I
29.250	.0013	I———————+	I
30.000	.0012	I———————+	I
30.750	.0011	I———————+	I
31.500	.0010	I———————+	I
32.250	.0009	I———————+	I
33.000	.0008	I———————+	I
33.750	.0008	I———————+	I
34.500	.0007	I———————+	I
35.250	.0006	I———————+	I
36.000	.0006	I———————+	I
36.750	.0005	I———————+	I
37.500	.0004	I———————+	I
38.250	.0004	I———————+	I
39.000	.0003	I———————+	I
39.750	.0003	I———————+	I
40.500	.0003	I———————+	I
41.250	.0002	I———————+	I
42.000	.0002	I———————+	I
42.750	.0002	I———————+	I
43.500	.0001	I———————+	I
44.250	.0001	I———————+	I
45.000	.0001	I———————+	I
45.750	.0001	I———————+	I
46.500	-.0001	I———————+	I
47.250	-.0001	I———————+	I
48.000	-.0001	I———————+	I
48.750	-.0001	I———————+	I
49.500	-.0001	I———————+	I
50.250	-.0001	I———————+	I
51.000	-.0001	I———————+	I
51.750	-.0001	I———————+	I
52.500	-.0002	I———————+	I
53.250	-.0002	I———————+	I
54.000	-.0002	I———————+	I
54.750	-.0002	I———————+	I
55.500	-.0002	I———————+	I
56.250	-.0002	I———————+	I
57.000	-.0002	I———————+	I
57.750	-.0002	I———————+	I
58.500	-.0002	I———————+	I
59.250	-.0002	I———————+	I
60.000	-.0002	I———————+	I

S16.5

TEMPS	SORTIDA46	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0176	-.0338	.0014	.0002
4.00	-.0423	-.0350	.0042	.0003
6.00	-.0618	-.0099	.0052	.0004
8.00	-.0762	.0070	.0053	.0005
10.00	-.0866	.0131	.0055	.0006
12.00	-.0949	.0123	.0059	.0007
14.00	-.1026	.0082	.0061	.0007
16.00	-.1095	.0055	.0062	.0008
18.00	-.1157	.0042	.0063	.0008
20.00	-.1209	.0036	.0063	.0008
22.00	-.1252	.0032	.0063	.0008
24.00	-.1288	.0027	.0063	.0008
26.00	-.1318	.0020	.0063	.0008
28.00	-.1343	.0014	.0064	.0008
30.00	-.1364	.0009	.0064	.0008
32.00	-.1381	.0005	.0064	.0008
34.00	-.1396	.0002	.0064	.0008
36.00	-.1408	-.0001	.0064	.0008
38.00	-.1418	-.0003	.0064	.0008
40.00	-.1426	-.0005	.0064	.0008
42.00	-.1432	-.0006	.0064	.0008
44.00	-.1438	-.0007	.0064	.0008
46.00	-.1442	-.0007	.0064	.0008
48.00	-.1446	-.0007	.0064	.0008
50.00	-.1449	-.0008	.0064	.0008
52.00	-.1451	-.0008	.0064	.0008
54.00	-.1453	-.0008	.0064	.0008
56.00	-.1455	-.0007	.0064	.0008
58.00	-.1456	-.0007	.0064	.0008
60.00	-.1457	-.0007	.0064	.0008
62.00	-.1458	-.0007	.0064	.0008
64.00	-.1458	-.0006	.0064	.0008
66.00	-.1459	-.0006	.0064	.0008
68.00	-.1459	-.0006	.0064	.0008
70.00	-.1459	-.0005	.0064	.0008
72.00	-.1460	-.0005	.0064	.0008
74.00	-.1460	-.0005	.0064	.0008
76.00	-.1460	-.0004	.0064	.0008
78.00	-.1460	-.0004	.0064	.0008
80.00	-.1460	-.0004	.0064	.0008
82.00	-.1460	-.0004	.0064	.0008
84.00	-.1460	-.0003	.0064	.0008
86.00	-.1460	-.0003	.0064	.0008
88.00	-.1460	-.0003	.0064	.0008
90.00	-.1460	-.0003	.0064	.0008
92.00	-.1460	-.0003	.0064	.0008
94.00	-.1460	-.0002	.0064	.0008
96.00	-.1460	-.0002	.0064	.0008
98.00	-.1460	-.0002	.0064	.0008
100.00	-.1460	-.0002	.0064	.0008
102.00	-.1460	-.0002	.0064	.0008
104.00	-.1460	-.0002	.0064	.0008
106.00	-.1460	-.0002	.0064	.0008
108.00	-.1460	-.0002	.0064	.0008
110.00	-.1460	-.0001	.0064	.0008
112.00	-.1460	-.0001	.0064	.0008
114.00	-.1460	-.0001	.0064	.0008
116.00	-.1460	-.0001	.0064	.0008
118.00	-.1460	-.0001	.0064	.0008
120.00	-.1460	-.0001	.0064	.0008
122.00	-.1460	-.0001	.0064	.0008
124.00	-.1460	-.0001	.0064	.0008
126.00	-.1460	-.0001	.0064	.0008
128.00	-.1460	-.0001	.0064	.0008
130.00	-.1459	-.0001	.0064	.0008
132.00	-.1459	-.0001	.0064	.0008
134.00	-.1459	-.0001	.0064	.0008
136.00	-.1459	-.0001	.0064	.0008
138.00	-.1459	-.0001	.0064	.0008
140.00	-.1459	-.0001	.0064	.0008
142.00	-.1459	-.0001	.0064	.0008
144.00	-.1459	-.0001	.0064	.0008
146.00	-.1459	-.0001	.0064	.0008
148.00	-.1459	-.0001	.0064	.0008
150.00	-.1459	-.0001	.0064	.0008
152.00	-.1459	-.0001	.0064	.0008
154.00	-.1459	-.0001	.0064	.0008
156.00	-.1459	-.0001	.0064	.0008
158.00	-.1459	-.0001	.0064	.0008
160.00	-.1459	-.0001	.0064	.0008

APENDICE F:

Programas desarrollados para el diseño del RLO discreto.

Los diferentes programas que se exponen en este Apéndice se han desarollado para obtener la ley de control óptima para el caso del RLO discreto, tando cuando la acción de control era simple y sin retardos como cuando había retardos o era múltiple. En concreto, los programas efectuan los siguientes cálculos:

Datos	Programa (s)	Resultados
$\underset{\sim}{A}$	TRAD	$\underset{\sim}{\Phi}(T)$
$\underset{\sim}{\Phi}(t)$	TRANS	$\underset{\sim}{\Phi}(T)$
$\underset{\sim}{\Phi}(t) + \underset{\sim}{B}$	FITA	$\underset{\sim}{\Theta}(T)$
$\underset{\sim}{\Phi}(T) + \underset{\sim}{\Theta}(T) + \underset{\sim}{Q} + \underset{\sim}{R}$	MATQ SIMP MATPES	$\hat{\underset{\sim}{Q}}(T)$, $\hat{\underset{\sim}{R}}(T)$, $\underset{\sim}{V}(T)$, $\underset{\sim}{M}_i(T)$
$\underset{\sim}{\Phi}(T) + \underset{\sim}{\Theta}(T) + \hat{\underset{\sim}{Q}}(T) + \hat{\underset{\sim}{R}}(T)$	RTRT RTR2	Solución de las ecuaciones de RIccati [62.16] y [62.18]
$\underset{\sim}{\Phi}(T) + \underset{\sim}{\Theta}(T) + \hat{\underset{\sim}{Q}}(T) + \hat{\underset{\sim}{R}}(T) + \underset{\sim}{M}_i(T) + \underset{\sim}{V}(T)$	MULTC MULTR	Solución de la ecuación de Riccati [63.28]

A diferencia del programa "BASMAT" de la ref. [126], usado para el cálculo de la ecuación de Riccati asociada al modelo contínuo del Capítulo 5, y que se había programado en Fortran, los programas de este Apéndice lo han sido en Basic, dado que el tiempo de cálculo del RLO discreto es, para una misma planta, sensiblemente menor que el del RLO continuo.

Puesto que los resultados de unos programas contituyen los datos de entrada de otros, lo ideal sería usar un único programa estructurado. Pero, dadas las limitaciones del TI990 sobre el que se han implementado (19 KB de memoria disponibles para el usuario), se ha recurrido a un programa independiente para cada cálculo, creándose unos ficheros para el intercambio de datos. En todo caso, su adaptación a un ordenador de mayor capacidad solo requerirá una sencilla depuración de las subrutinas de entrada y salida de datos.

TRAD : Calcula la matriz de planta discreta ($\underset{\sim}{\Phi}(T)$) a partir de la continua ($\underset{\sim}{A}$) mediante el desarrollo en serie de Taylor de $\underset{\sim}{\Phi}(T)$.

$$\underset{\sim}{\Phi}(T) = e^{\underset{\sim}{A}T} = \underset{\sim}{I} + \underset{\sim}{A}T + \frac{\underset{\sim}{A}^2T^2}{2!} + \frac{\underset{\sim}{A}^3T^3}{3!} + \ldots$$

Orden de la planta $\leqslant 7$.

Número de términos del desarrollo seleccionable.

TRANS : Efectua el mismo cálculo que "TRAD" a partir del desarrollo de Sylvester [120], para lo cual deben obtenerse con el programa "BASMAT" [126] los autovalores λ_i y las matrices $\underset{\sim}{F}_i$ de

$$\underset{\sim}{\Phi}(t) = \underset{\sim}{F}_1 e^{\lambda_1 t} + \underset{\sim}{F}_2 e^{\lambda_2 t} + \ldots + \underset{\sim}{F}_N e^{\lambda_N t},$$

encargándose el programa "TRANS" de particularizar para t = T. La precisión obtenida es la misma (hasta el 12º decimal) que en "TRAD" cuando en éste se seleccionan más de 5 términos del desarrollo.

FITA : Calcula (para $\underset{\sim}{B}$ = cte),

$$\underset{\sim}{\Theta}(T) = \int_0^T \underset{\sim}{\Phi}(\tau)\, \underset{\sim}{B}\, d\tau =$$

$$= \int_0^T (\underset{\sim}{F}_1 e^{\lambda_1 \tau} + \ldots + \underset{\sim}{F}_N e^{\lambda_N \tau})\, \underset{\sim}{B}\, d\tau.$$

debiéndose entrar la integral indefinida de la matriz de transición de estado $\underset{\sim}{\Phi}(t)$, obtenida con el programa "BASMAT".

MATQ
SIMP
MATPES

Calculan las matrices de ponderación de los criterios integrales adecuados al caso discreto a partir de las matrices $\underset{\sim}{Q}$ y $\underset{\sim}{R}$ del clásico criterio integral cuadrático continuo.

RTRT
RTR2

Resolución de la ecuación de Riccati para muestreo simple.

MULTC
MULTR

Resolución de la ecuación de Riccati para muestreo doble.

P.1

```
10 DIM R(7,7),Z(7,7),A(7,7),B(7,7),D(7,7),Y(7,7)
20 PRINT ERASE ALL
30 PRINT "ORDRE DE LA PLANTA"
40 INPUT H
50 PRINT ERASE ALL
60 PRINT "MATRIU A"
70 CALL MINT(A(,),H,H)
80 PRINT ERASE ALL
90 PRINT "T DE MOSTREIG"
100 INPUT T
110 PRINT "NOMBRE D'ITERACIONS"
120 INPUT N
130 K=0
140 CALL MIND(R(,),H)
150 CALL MIND(Z(,),H)
160 C=T/(K+1)
170 CALL MPRC(C,A(,),R(,),H,H)
180 CALL MPRD(R(,),R(,),D(,),H,H,H)
190 FOR II=1 TO H
200 FOR J=1 TO H
210 R(II,J)=D(II,J)
220 NEXT J::NEXT II
230 CALL MADD(R(,),"+",Z(,),Y(,),H,H)
240 FOR II=1 TO H
250 FOR J=1 TO H
260 Z(II,J)=Y(II,J)
270 NEXT J::NEXT II
275 PRINT ERASE ALL
280 CALL MOUT(Z(,),H,H)
290 K=K+1
300 PRINT K
310 IF K<N THEN GOTO 160
318 OPEN #8:"DSC2:TRA8"
320 CALL MOD(Z(,),H,H,8)
325 CLOSE #8
330 END
6130 SUB MOUT(X(,),F,C)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT AT (I+2,(J-1)*TA) USING A180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C)
6220 REM PRINT ERASE ALL
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT AT (I+2,(J-1)*TA):X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX

6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::N
```

$\underset{\sim}{A}(t)$

T

$\phi(T)$ ⟶

TRAD

$$\underset{\sim}{\Phi}(T) = e^{\underset{\sim}{A}T} =$$

$$= \underset{\sim}{I} + \underset{\sim}{A}T + \frac{\underset{\sim}{A}^2T^2}{2!} + \frac{\underset{\sim}{A}^3T^3}{3!} + \cdots$$

```
80 DIM A9(7,7),B9(7,7),C9(7,7),D9(7,7),E9(7,7),F9(7,7),G9(7,7)
81 DIM O9(7,7),P9(7,7),Q9(7,7),R9(7,7),S9(7,7),T9(7,7)
82 DIM V(7,7)
90 PRINT ERASE ALL
95 PP=0
97 TT=0
99 OPEN #1:"DISC2:MOD1"
100 OPEN #2:"DISC2:MOD2"
101 OPEN #3:"DISC2:MOD3"
102 OPEN #4:"DISC2:MOD4"
105 H9=(EXP(-5.7934E-01*TT))*COS(.43493*TT)
110 T9=(EXP(-5.7934E-01*TT))*SIN(.43493*TT)
115 J9=EXP(-2.0528E-01*TT)
120 K9=EXP(-2.3794*TT)
130 L9=(EXP(-3.1117E-01*TT))*COS(4.301*TT)
140 M9=(EXP(-3.1117E-01*TT))*SIN(4.301*TT)
150 PRINT "MAT 1"
160 CALL MINT(A9(,),7,7,1)
170 PRINT "MAT 2"
175 CALL MINT(B9(,),7,7,2)
180 PRINT "MAT 3"
185 CALL MINT(C9(,),7,7,3)
186 CLOSE #1
187 CLOSE #2
188 CLOSE #3
190 PRINT "MAT 4"
200 CALL MINT(D9(,),7,7,4)
202 CLOSE #4
210 PRINT "MAT 5"
212 OPEN #5:"DISC2:MOD5"
213 OPEN #6:"DISC2:MOD6"
214 OPEN #7:"DISC2:MOD7"
220 CALL MINT(E9(,),7,7,5)
230 PRINT "MAT 6"
240 CALL MINT(F9(,),7,7,6)
250 PRINT "MAT 7"
260 CALL MINT(G9(,),7,7,7)
266 CLOSE #5
267 CLOSE #6
268 CLOSE #7
280 CALL MPRD(J9,A9(,),D9(,),7,7)
290 CALL MPRD(H9,B9(,),P9(,),7,7)
300 CALL MPRD(T9,C9(,),Q9(,),7,7)
310 CALL MPRD(K9,D9(,),R9(,),7,7)
320 CALL MPRD(L9,E9(,),S9(,),7,7)
330 CALL MPRD(M9,F9(,),T9(,),7,7)
340 CALL MADD(D9(,),"+",P9(,),A9(,),7,7)
350 CALL MADD(Q9(,),"+",R9(,),B9(,),7,7)
360 CALL MADD(S9(,),"+",T9(,),C9(,),7,7)
370 CALL MADD(A9(,),"+",B9(,),D9(,),7,7)
380 CALL MADD(C9(,),"+",G9(,),S9(,),7,7)
381 CALL MADD(D9(,),"+",S9(,),F9(,),7,7)
382 IF PP=1 THEN GOTO 4387
383 FOR II=1 TO 7
384 FOR JJ=1 TO 7
```

F_1, F_2, F_3, F_4

105 – 140: COEFICIENTES λ_i (AUTOVALORES) (SALIDA DE "BASMAT")

ORDEN 7

Modificación del orden:

1/ 80 - 82: DIM ... (N,N).

2/ ADAPTAR 105-140 A LOS VALORES DE SALIDA DEL "BASMAT"

3/ ELIMINAR LA ENTRADA DE LOS $\underset{\sim}{F}_i$ SOBRANTES.

4/ ADECUAR LA DIMENSION DE LAS MATRICES RESULTADO

F_5, F_6, F_7

TRANS

$$\underset{\sim}{\Phi}(T) = e^{\underset{\sim}{A}T} =$$

$$= \underset{\sim}{F}_1 e^{\lambda_1 T} + \underset{\sim}{F}_2 e^{\lambda_2 T} + \dots F_N e^{\lambda_N T}$$

$$(N \leq 7)$$

```
385 V(II,.I)=F9(II,.J)
384 NEXT .I::NEXT II
388 PP=1
389 PRINT ERASE ALL
390 PRINT "T DE MOSTRETG"
391 INPUT TT
393 GOTO 99
4387 CALL MAND(F9(,),"-",V(,),F9(,),7,7)        (*)
4388 FOR II=1 TO 7
4390 F9(II,II)=F9(II,II)+1
4391 NEXT II
5389 OPEN #8:"DSC:TRB1"
5390 PRINT ERASE ALL
5391 CALL MOUT(F9(,),7,7,8)  ------>   Φ(T)
5392 CLOSE #8
5395 END
6130 SUB MOUT(X(,),F,C,LT)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR .J=1 TO C
6170 PRINT AT (I+2,(.J-1)*TA) USING 6175:X(I,.J)
6175 IMAGE ##.###^^^^
6180 PRINT #LT:X(I,.J)
6190 NEXT .J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C,LL)
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR .J=1 TO C
6260 INPUT #LL:X(I,.J)
6270 NEXT .J::NEXT I
6325 SUBEND
6430 SUB MAND(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR .J=1 TO C
6460 IF X$="+" THEN Z(I,.J)=X(I,.J)+Y(I,.J)
6470 IF X$="-" THEN Z(I,.J)=X(I,.J)-Y(I,.J)
6480 NEXT .J::NEXT I
6490 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR .J=1 TO C
6660 Z(I,.J)=A*X(I,.J)
6670 NEXT .J::NEXT I
6680 SUBEND
```

(*) : Si no hubiera errores de truncamiento y redondeo,

$$\underset{\sim}{V} = \underset{\sim}{\Phi}(0) = \underset{\sim}{I}.$$

Dado que, en realidad, $\underset{\sim}{V} \approx \underset{\sim}{I}$, por imprecisiones de "BASMAT", en 4387 y 4390 se compensan estos errores:

BASMAT $\longrightarrow$ $\underset{\sim}{F_1}, \underset{\sim}{F_2} \cdots \underset{\sim}{F_N}$

$$\underset{\sim}{V} = f_1(\underset{\sim}{F_1}, \underset{\sim}{F_2}, \ldots \underset{\sim}{F_N}) = \underset{\sim}{I} + \underset{\sim}{\varphi}$$

$$\underset{\sim}{\Phi_c}(T) = f_2(\underset{\sim}{F_1}, \underset{\sim}{F_2} \ldots \underset{\sim}{F_N}) = \underset{\sim}{\Phi}(T) + \varphi$$

$$\underset{\sim}{\Phi}(T) = \underset{\sim}{\Phi_c}(T) - \underset{\sim}{V} + \underset{\sim}{I}$$

```
1 REM ****A "620" ES POT CANVIAR EL FITXER DE SORTIDA DE DADES"
10 DIM A9(7,7),B9(7,7),C9(7,7),D9(7,7),E9(7,7),F9(7,7),G9(7,7)
11 DIM D9(7,7)
12 DIM H(7,7)
13 DIM S(7,7)
14 DIM P(7,7)
20 PRINT ERASE ALL
35 PP=0
40 PRINT "TEMPS DE MOSTREIG"
45 INPUT TT
50 OPEN #1:"DSC2:MOD1",INPUT
51 OPEN #2:"DSC2:MOD2"
52 OPEN #3:"DSC2:MOD3"
105 H9=EXP(-5.7934E-01*TT)*(-.57934*COS(.43693*TT)+.43693*SIN(.43693*TT))
106 H9=H9/((.57934^2)+(.43693^2))
110 I9=EXP(-5.7934E-01*TT)*(-.57934*SIN(.43693*TT)-.43693*COS(.43693*TT))
111 T9=I9/((.57934^2)+(.43693^2))
115 J9=EXP(-2.0528E-01*TT)/(-.20528)
120 K9=EXP(-2.3794*TT)/(-2.3794)
130 L9=EXP(-3.1117E-01*TT)*(-.31117*COS(4.301*TT)+4.301*SIN(4.301*TT))
131 O5=(.31117^2)+(4.301^2)
132 L9=L9/O5
140 M9=EXP(-3.1117E-01*TT)*(-.31117*SIN(4.301*TT)-4.301*COS(4.301*TT))
141 M9=M9/O5
150 PRINT "MAT 1"
160 CALL MINT(A9(,),7,7,1)
170 PRINT "MAT 2"
175 CALL MINT(B9(,),7,7,2)
180 PRINT "MAT 3"
185 CALL MINT(C9(,),7,7,3)
186 CLOSE #1
187 CLOSE #2
188 CLOSE #3
190 PRINT "MAT 4"
195 OPEN #4:"DSC2:MOD4"
200 CALL MINT(D9(,),7,7,4)
202 CLOSE #4
210 PRINT "MAT 5"
212 OPEN #5:"DSC2:MOD5"
213 OPEN #6:"DSC2:MOD6"
214 OPEN #7:"DSC2:MOD7"
220 CALL MINT(F9(,),7,7,5)
230 PRINT "MAT 6"
240 CALL MINT(F9(,),7,7,6)
250 PRINT "MAT 7"
260 CALL MINT(G9(,),7,7,7)
266 CLOSE #5
267 CLOSE #6
268 CLOSE #7
280 CALL MPRD(J9,A9(,),D9(,),7,7)
290 CALL MPRD(H9,B9(,),A9(,),7,7)
300 CALL MPRD(T9,C9(,),B9(,),7,7)
310 CALL MPRD(K9,D9(,),C9(,),7,7)
320 CALL MPRD(L9,E9(,),D9(,),7,7)
330 CALL MPRD(M9,E9(,),E9(,),7,7)
```

INTEGRAL DE LOS TERMINOS DE SALIDA DEL "BASHAT".

F1, F2, F3

F4

F5, F6, F7

Modificación del orden:

1/ 10-40: DIM....(N,N)

2/ 105-141: INTEGRAL DE LOS NUEVOS VALORES DE $e^{\lambda_i t}$ ("BASHAT")

3/ ELIMINAR LA ENTRADA DE LOS $\underset{\sim}{F_i}$ SOBRANTES.

4/ ADECUAR LA DIMENSION DE LAS MATRICES RESULTADO.

FITA

$$\underset{\sim}{\Theta}(T) = \int_0^T \underset{\sim}{\Phi}(t)\ \underset{\sim}{B}\ dt =$$

$$= \int_0^T \left(\underset{\sim}{F_1} e^{\lambda_1 t} + \underset{\sim}{F_2} e^{\lambda_2 t} + \dots + \underset{\sim}{F_N} e^{\lambda_N t}\right) \underset{\sim}{B}\ dt$$

```
331 CALL MPRD(TT,G9(,),F9(,),7,7)
340 CALL MADD(D9(,),"+",A9(,),P9(,),7,7)
350 CALL MADD(R9(,),"+",C9(,),A9(,),7,7)
360 CALL MADD(D9(,),"+",F9(,),R9(,),7,7)
370 CALL MADD(P9(,),"+",A9(,),C9(,),7,7)
380 CALL MADD(F9(,),"+",R9(,),G9(,),7,7)
381 CALL MADD(C9(,),"+",G9(,),D9(,),7,7)
382 IF PP=1 THEN GOTO 388
383 FOR I=1 TO 7
384 FOR J=1 TO 7
385 H(I,J)=D9(I,J)
386 NEXT J::NEXT I
387 GOTO 394
388 CALL MADD(H(,),"-",D9(,),B9(,),7,7)
394 GOTO 500
394 TT=0
397 PP=1
400 GOTO 50
500 PRINT ERASE ALL
505 TA=80
510 FOR I=1 TO 7
520 INPUT AT (I+2,0):S(I,1)
530 NEXT I
600 CALL MPRD(B9(,),S(,),A9(,),7,7,1)
620 OPEN #8:"DSC2:TRAS"
630 CALL MOUT(A9(,),7,1,8)
640 CLOSE #8
700 END
6130 SUB MOUT(X(,),F,C,LT)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT AT (I+2,(J-1)*TA) USING 6175:X(I,J)
6175 IMAGE ##.###^^^^
6180 PRINT #LT:X(I,J)
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C,LI)
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #LI:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
```

B

```
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*(INT(X(I,J)*100)/100)
6670 NEXT J::NEXT I
6680 SUBEND
```

P.7

```
10 DIM A(7,7),B(7,7),C(7,7),D(7,7),Q(7,7)
11 DIM E(7,7)
20 CALL MIND(Q(,),7)
30 Q(5,5)=1
40 CALL M7ER(A(,),7,7)
50 OPEN #1:"DSC:T1"
60 OPEN #2:"DSC:T2"
70 OPEN #3:"DSC:T3"
80 OPEN #4:"DSC:T4"
90 HH=1
100 CALL MINT(B(,),7,7,HH)
120 CALL MTRA(B(,),D(,),7,7)
130 CALL MPRD(Q(,),B(,),C(,),7,7,7)
140 CALL MPRD(D(,),C(,),B(,),7,7,7)
150 CALL MADD(A(,),"+",B(,),E(,),7,7)
160 FOR T=1 TO 7
165 FOR J=1 TO 7
170 A(T,J)=E(T,J)
180 NEXT J::NEXT T
188 HH=HH+1
195 IF HH=5 THEN GOTO 300
198 IF HH=9 THEN GOTO 500
200 GOTO 100
300 CLOSE #1
310 CLOSE #2
320 CLOSE #3
330 CLOSE #4
340 OPEN #5:"DSC:T5"
350 OPEN #6:"DSC:T6"
360 OPEN #7:"DSC:T7"
370 OPEN #8:"DSC:T8"
399 GOTO 100
500 CLOSE #5
510 CLOSE #6
520 CLOSE #7
530 CLOSE #8
600 OPEN #9:"DSC:TF"
610 CALL MOUT(E(,),7,7)
650 CLOSE #9
700 END
6130 SUB MOUT(X(,),F,C)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT #9:X(I,J)
6175 PRINT AT(I+1,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C,II)
6220 PRINT ERASE ALL
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #II:X(I,J)
```

DEFINICION DE $\underset{\sim}{Q}$

Ecuaciones 62.12 y 63.6
CASO $W(T)=\hat{Q}(T)$ $Ti=\Phi(1)$
CASO $W(T)=\hat{R}(T)$ $Ti=\Phi(1)\,\Theta(i)$
CASO $W(T)=V(T)$ $Ti=\Theta(i)$

$(T=8\ \text{seg})$ $\longrightarrow$ $E=T_1^T Q T_1 + T_2^T Q T_2 + \cdots + T_8^T Q T_8 = \hat{Q}(8)$

MATQ

INTEGRACION POR LA REGLA DE SIMPSON.

Calculo de las matrices de ponderación de [62.12] y de [63.6] a partir de la expresión general:

$$\underset{\sim}{W}(T)=\int_0^T [\underset{\sim}{\varphi}(t-\tau)\,\underset{\sim}{\gamma}(t-KT+\tau)\,\underset{\sim\sim}{Q}\,\underset{\sim\sim}{\beta}(t-KT+\tau)\,\underset{\sim}{\Omega}(t-\tau)]\,d\tau$$

```
6241 PRINT AT(I+1,(J-1)*TA) USING 6244:X(I,J)
6244 IMAGE ##.###^^^^
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6500 SUB MZER(X(,),F,C)
6510 FOR I=1 TO F
6520 FOR J=1 TO C
6530 X(I,J)=0.0
6540 NEXT J::NEXT I
6550 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
10 DIM A(7,1),B(7,7),C(7,7),D(7,7),Q(7,7)  | PARA ORDEN 7
11 DIM E(7,1),F(7,7)
20 CALL MTND(Q(,),7)  | DEFINICION DE Q.
30 Q(5,5)=1
40 CALL M7ER(A(,),7,1)
50 OPEN #1:"DSC:T1"
60 OPEN #2:"DSC:T2"
70 OPEN #3:"DSC:TU1"
80 OPEN #4:"DSC:TU2"
90 HH=1
95 MM=2
100 CALL MTNT(B(,),7,7,HH)
110 CALL MTNT(F(,),7,1,MM)
120 CALL MTRA(B(,),D(,),7,7)
130 CALL MPRD(Q(,),B(,),C(,),7,7,7)
140 CALL MPRD(D(,),C(,),B(,),7,7,7)
145 CALL MPRD(D(,),B(,),C(,),7,7,7)
148 CALL MPRD(C(,),F(,),B(,),7,7,1)
150 CALL MADD(A(,),"+",B(,),F(,),7,1)
160 FOR T=1 TO 7
170 A(T,1)=F(T,1)
180 NEXT T
188 HH=HH+1
190 MM=MM+1
191 PRINT HH,MM
195 IF HH=3 THEN GOTO 300
198 IF HH=7 THEN GOTO 500
200 GOTO 100
300 CLOSE #1
310 CLOSE #2
320 CLOSE #3
330 CLOSE #4
340 OPEN #5:"DSC:T3"
350 OPEN #6:"DSC:T4"
360 OPEN #7:"DSC:TU3"
370 OPEN #8:"DSC:TU4"
390 HH=5
393 MM=7
399 GOTO 100
500 CLOSE #5
510 CLOSE #6
520 CLOSE #7
530 CLOSE #8
600 OPEN #9:"DSC:TF"
610 CALL MPRT(E(,),7,1)
650 CLOSE #9
700 END
6130 SUB MPRT(X(,),F,C)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT #9:X(I,J)
6175 PRINT AT (I+1,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
```

$$Ti = \underset{\sim}{\varphi}(i)\ \underset{\sim}{\gamma}(i)$$

$$TUi = \underset{\sim}{\xi}(i)\ \underset{\sim}{\Omega}(i)$$

Modificaciones para integrar T seg:

1) $Ti = \varphi\left(\frac{T}{4}\right)\ \gamma\left(\frac{T}{4}\right)$

2) $TUi = \xi\left(\frac{T}{4}\right)\ \Omega\left(\frac{T}{4}\right)$

3) AÑADIR:

535: $E = E \cdot \frac{T}{4}$

(T = 4seg)

$$E = T_1^T Q\, TU_1 + T_2^T Q\, TU_2 + \ldots + T_4^T Q\, TU_4$$

SIMP

Ejemplo de adecuación de "MATQ" al cálculo de $\underset{\sim}{\hat{M}}_i(T)$ [ecuación [63.6] y [62.12]]

$$\underset{\sim}{W}(T) = \int_0^T \left[\underset{\sim}{\varphi}(t-\tau)\ \underset{\sim}{\gamma}(t-KT+\tau)\ \underset{\sim}{Q}\ \underset{\sim}{\xi}(t-KT+\tau)\ \underset{\sim}{\Omega}(t-\tau)\right] d\tau$$

```
6200 SUBEND
6210 SUB MINT(X(,),F,C,LL)
6220 PRINT ERASE ALL
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #LL:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6500 SUB MZER(X(,),F,C)
6510 FOR I=1 TO F
6520 FOR J=1 TO C
6530 X(I,J)=0.0
6540 NEXT J::NEXT I
6550 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
10 DIM Q(7,7),R(7,1),XT(1,7),A(7,7),ST(7,7),Y(7,7)
12 DIM QR(7,7),WR(7,1)
20 DIM C(7,7),D(7,1),W(7,7),F(7,7),NT(7,7)
30 DIM RQ(7,7),TW(7,1)
40 PRINT ERASE ALL
50 PRINT "ORDRE DEL SISTEMA"
60 INPUT Z
70 PRINT "MAT A"                    ↕ A(t)
80 CALL MINT(A(,),Z,Z)
90 PRINT ERASE ALL
100 PRINT "MAT B"                   ↕ B(t)
110 CALL MINT(B(,),Z,1)
115 PRINT ERASE ALL
130 PRINT "MAT Q"                   ↕ Q(t)
135 CALL MINT(Q(,),Z,Z)
140 PRINT ERASE ALL
145 PRINT "N. ITERACIONS"
150 INPUT N
170 PRINT "T="                      ↕ T
180 INPUT T
190 CALL MTRA(A(,),ST(,),Z,Z)
200 CALL MTRA(B(,),XT(,),Z,1)
210 CALL MPRC(T,Q(,),Y(,),Z,Z)
220 CALL MPRD(Q(,),B(,),C(,),Z,Z,1)
230 V=T*T/2
240 CALL MPRC(V,C(,),D(,),Z,1)
250 CALL MPRD(XT(,),C(,),W(,),1,Z,1)
260 RV=W(1,1)*T*T*T/3
270 FOR II=1 TO Z
280 FOR J=1 TO Z
290 RQ(II,J)=Y(II,J)
300 NEXT J
310 TW(II,1)=D(II,1)
320 NEXT II
330 K=0
340 M=T/(K+2)
350 CALL MPRC(M,ST(,),C(,),Z,Z)
360 CALL MPRC(M,A(,),Q(,),Z,Z)
370 CALL MPRD(C(,),Y(,),W(,),Z,Z,Z)
380 CALL MPRD(Y(,),Q(,),F(,),Z,Z,Z)
390 CALL MADD(W(,),"+",F(,),Y(,),Z,Z)
400 CALL MADD(RQ(,),"+",Y(,),QR(,),Z,Z)
402 FOR II=1 TO Z
404 FOR J=1 TO Z
406 RQ(II,J)=QR(II,J)
408 NEXT J::NEXT II
410 M=T/(K+3)
420 CALL MPRC(M,ST(,),C(,),Z,Z)
430 CALL MPRC(M,B(,),Q(,),Z,1)
440 CALL MPRD(C(,),D(,),W(,),Z,Z,1)
450 CALL MPRD(Y(,),Q(,),F(,),Z,Z,1)
460 CALL MADD(W(,),"+",F(,),D(,),Z,1)
470 CALL MADD(TW(,),"+",D(,),WR(,),Z,1)
472 FOR II=1 TO Z
474 TW(II,1)=WR(II,1)
```

MATPES

Cálculo de $\hat{Q}(T)$, $V(T)$ y $\hat{R}(T)$ de la ecuación [63.6] a partir del desarrollo de Taylor (hasta el 4º término) de $\Phi(T)$.

- Desarrollo de $\Phi(T)$ como en "TRAD"
- Integración por el método de Simpson.

```
474 NEXT II
480 CALL MTRA(D(,),NT(,),Z,1)
490 M=T/(K+4)
500 CALL MPRD(M,XT(,),C(,),1,7)
510 CALL MPRD(M,R(,),Q(,),Z,1)
520 CALL MPRD(C(,),D(,),W(,),1,7,1)
530 CALL MPRD(NT(,),Q(,),F(,),1,Z,1)
540 G=W(1,1)+F(1,1)
550 RV=RV+G
560 PRINT RV,D ----------> V(T)/T
570 OPEN #1:"DISC2:PESQ"
580 OPEN #2:"DISC2:PESW"
590 CALL MOUT(TW(,),7,1,2) ----------> R̂(T)/T
610 PRINT ERASE ALL
615 CALL MOUT(RQ(,),7,Z,1) ----------> Q̂(T)/T
620 CLOSE #1
630 CLOSE #2
640 D=D-1
650 K=K+1
660 IF D=0 THEN GOTO 680
670 GOTO 340
680 BRK
690 GOTO 130
6130 SUB MOUT(X(,),F,C,LL)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT AT (I+2,(J-1)*TA) USING 6180:X(I,J)
6175 PRINT #LL USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C)
6220 REM PRINT ERASE ALL
6230 TA=INT(80/C)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT AT (I+2,(J-1)*TA):X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
```

```
6440 FOR I=1 TO E
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6500 SUB MZER(X(,),E,C)
6510 FOR I=1 TO E
6520 FOR J=1 TO C
6530 X(I,J)=0.0
6540 NEXT J::NEXT I
6550 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=1.0
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRD(A,X(,),Z(,),E,C)
6640 FOR I=1 TO E
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
10 DIM A(7,7),B(7,7),C(7,7),Q(7,7),I(7,7),P(7,7),W(7,7),Z(7,7)
11 DIM ZT(7,7),WT(7,7),F(7,7)
12 PRINT ERASE ALL
13 DIM D(7,7)
15 Y=7 ————————→ ORDEN DEL SISTEMA
20 PRINT "N ITERACIONS"
30 INPUT H
31 PRINT ERASE ALL
33 PRINT "COND. INICIALS"
34 TA=INT(80/Y)
35 FOR U=1 TO Y
40 FOR J=1 TO Y
45 INPUT AT (U+2,(J-1)*TA):P(U,J) ——→ Valores iniciales de la matriz de Riccati P(KT)
50 NEXT J::NEXT U
60 OPEN #1:"DSC2:TRA8"
70 OPEN #2:"DSC2:TRA5"
80 CALL MINT(W(,),Y,Y,1) ——→ Φ(T)
90 CALL MINT(Z(,),Y,1,2) ——→ Θ(T)
100 CLOSE #1
105 CLOSE #2
110 CALL MPRD(P(,),Z(,),A(,),Y,Y,1)
120 CALL MPRD(P(,),W(,),B(,),Y,Y,Y)
130 CALL MTRA(Z(,),ZT(,),Y,1)
140 CALL MTRA(W(,),WT(,),Y,Y)
150 CALL MPRD(ZT(,),A(,),C(,),1,Y,1)
155 CALL MZER(D(,),Y,Y)
160 CALL MPRD(WT(,),A(,),D(,),Y,Y,1)
170 CALL MTRA(D(,),ZT(,),Y,1)
180 CALL MPRD(WT(,),B(,),F(,),Y,Y,Y)
190 D=C(1,1)+1        |——————→ Definición de R
200 M=1/D
205 CALL MZER(R(,),Y,Y)
210 CALL MPRC(M,ZT(,),R(,),1,Y)
215 CALL MZER(A(,),Y,Y)
220 CALL MPRD(D(,),R(,),A(,),Y,1,Y)
230 CALL MADD(F(,),"-",A(,),Q(,),Y,Y)
240 CALL MIND(I(,),Y) |——————→ Definición de Q
245 I(5,5)=1
250 CALL MADD(I(,),"+",Q(,),P(,),Y,Y)
255 FOR U=1 TO Y       ↑ Compensación de los defectos de simetría de
256 FOR J=U TO Y       |
257 P(U,J)=(P(U,J)+P(J,U))/2  ↓ P(KT) por truncamientos y redondeos.
258 NEXT J::NEXT U
260 FOR U=1 TO Y
261 FOR J=U TO Y
262 P(J,U)=P(U,J)
263 NEXT J::NEXT U
269 IF H=0 THEN GOTO 500
270 H=H-1
280 PRINT ERASE ALL
290 PRINT H
291 TA=INT(80/Y)
292 FOR U=1 TO Y
293 FOR J=1 TO Y
294 PRINT AT(U+2,(J-1)*TA) USING 295:P(U,J) ——→ P(KT)
```

RTRT

Resolución de la ecuación de Riccati [62.18].

```
295 IMAGE ##.###^^^^
296 NEXT J::NEXT U
300 CALL MZER(D(,),Y,Y)
302 CALL MZER(A(,),Y,Y)
303 CALL MZER(B(,),Y,Y)
304 CALL MZER(ZT(,),Y,Y)
305 CALL MZER(WT(,),Y,Y)
306 CALL MZER(C(,),Y,Y)
307 CALL MZER(F(,),Y,Y)
308 CALL MZER(I(,),Y,Y)
499 GOTO 110
500 OPEN #4:"DSC2:TRA11"
501 CALL MOUT(B(,),1,Y,4)
505 CLOSE #4
541 END
6130 SUB MOUT(X(,),F,C,LT)
6140 TA=INT(80/C)
6145 PRINT ERASE ALL
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6170 PRINT AT (I+2,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6187 PRINT #LT:X(I,J)
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C,LT)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #LT:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6500 SUB MZER(X(,),F,C)
6510 FOR I=1 TO F
6520 FOR J=1 TO C
```

```
6530 X(I,J)=0
6540 NEXT J::NEXT I
6550 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
1 REM *** A 60 I 70 HI HA ELS FITXERS D'ENTRADA, A 500 EL DE SORTIDA ***
10 DIM A(7,7),B(7,7),C(7,7),Q(7,7),T(7,7),P(7,7),W(7,7),Z(7,7)
11 DIM ZT(7,7),WT(7,7),F(7,7),NT(1,7),M(1,7)
12 PRINT ERASE ALL
13 DIM D(7,7)
15 Y=7
20 PRINT "N ITERACIONS"
30 INPUT H
31 PRINT ERASE ALL
33 PRINT "COND. INICIALS"
34 TA=INT(80/Y)
35 FOR U=1 TO Y
40 FOR J=1 TO Y
45 INPUT AT (U+2,(J-1)*TA):P(U,J)
50 NEXT J::NEXT U
51 PRINT ERASE ALL "MAT Q"
53 FOR U=1 TO Y
54 FOR J=1 TO Y
55 INPUT AT (U+2,(J-1)*TA):T(U,J)
56 NEXT J::NEXT U
57 PRINT ERASE ALL "MAT M"
59 FOR U=1 TO Y
60 INPUT AT (U+2,0):M(1,U)
61 NEXT U
65 OPEN #1:"DSC:TR"
70 OPEN #2:"DSC:TU4"
80 CALL MINT(W(,),Y,Y,1)
90 CALL MINT(Z(,),Y,1,2)
100 CLOSE #1
105 CLOSE #2
110 CALL MPRD(P(,),Z(,),A(,),Y,Y,1)
120 CALL MPRD(P(,),W(,),B(,),Y,Y,Y)
130 CALL MTRA(Z(,),ZT(,),Y,1)
140 CALL MTRA(W(,),WT(,),Y,Y)
150 CALL MPRD(ZT(,),A(,),C(,),1,Y,1)
155 CALL MZER(D(,),Y,Y)
160 CALL MPRD(WT(,),A(,),D(,),Y,Y,1)
170 CALL MTRA(D(,),NT(,),Y,1)
175 CALL MADD(NT(,),"+",M(,),ZT(,),1,Y)
180 CALL MPRD(WT(,),B(,),F(,),Y,Y,Y)
190 D=C(1,1)+1.4673
200 VV=1/D
205 CALL MZER(B(,),Y,Y)
210 CALL MPRC(VV,ZT(,),B(,),1,Y)
215 CALL MZER(A(,),Y,Y)
220 CALL MPRD(D(,),B(,),A(,),Y,1,Y)
230 CALL MADD(F(,),"-",A(,),Q(,),Y,Y)
250 CALL MADD(T(,),"+",Q(,),P(,),Y,Y)
255 FOR U=1 TO Y
256 FOR J=U TO Y
257 P(U,J)=(P(U,J)+P(J,U))/2
258 NEXT J::NEXT U
260 FOR U=1 TO Y
261 FOR J=U TO Y
262 P(J,U)=P(U,J)
```

- Line 15 → orden del sistema
- Lines 33–50 → P(O)
- Lines 51–56 → Q
- Lines 57–61 → Entrada de la matriz $\underset{\sim}{M}(T)$.
- Line 80 — $\Phi(T)$
- Line 90 — $\Theta(T)$
- Line 190 → Definición de R

RTR2

Ampliación de "RTRT" para que también soporte la resolución de la ecuación de Riccati [62.16].

```
268 NEXT J::NEXT II
269 IF H=0 THEN GOTO 500
270 H=H-1
280 PRINT ERASE ALL
290 PRINT H
291 TA=INT(80/Y)
292 FOR II=1 TO Y
293 FOR J=1 TO Y
294 PRINT AT(II+2,(J-1)*TA) USING 295:P(II,J)
295 IMAGE ##.###^^^^
296 NEXT J::NEXT II
300 CALL MZER(D(,),Y,Y)
302 CALL MZER(A(,),Y,Y)
303 CALL MZER(B(,),Y,Y)
304 CALL MZER(ZT(,),Y,Y)
305 CALL MZER(WT(,),Y,Y)
306 CALL MZER(C(,),Y,Y)
307 CALL MZER(E(,),Y,Y)
499 GOTO 110
500 OPEN #4:"DSC:TE"
501 CALL MOUT(B(,),1,Y,4)
505 CLOSE #4
541 END
6130 SUB MOUT(X(,),E,C,LT)
6140 TA=INT(80/C)
6145 PRINT ERASE ALL
6150 FOR I=1 TO E
6160 FOR J=1 TO C
6170 PRINT AT (I+2,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6187 PRINT #LT:X(I,J)
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),E,C,LT)
6240 FOR I=1 TO E
6250 FOR J=1 TO C
6260 INPUT #LT:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),EX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO EX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),E,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO E
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),E,C)
6440 FOR I=1 TO E
```

```
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6500 SUB MZER(X(,),F,C)
6510 FOR I=1 TO F
6520 FOR J=1 TO C
6530 X(I,J)=0
6540 NEXT J::NEXT I
6550 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
10 DIM T1(7,7),T2(7,1),F(7,7),FT(7,7),TT(1,7),TR(1,7)
11 DIM TP(1,7),KU(7,1),OM(7,1)
12 DIM P(7,7),W(7,1),Z(7,7),C(7,7)
14 DIM M(1,1),S(7,1),A(7,1),E(7,1),D(1,1)
15 Y=7                    → orden del sistema
16 M3=.000489             → M3(T)
17 PRINT ERASE ALL
18 R=1.088                → R(T)
19 V=.4473                → V(T)
20 PRINT "N D'ITERAC."
22 INPUT H
24 PRINT "COND. INIC."
26 TA=INT(80/Y)
28 FOR I=1 TO Y
30 FOR J=1 TO Y
32 INPUT AT (I+2,(J-1)*TA):P(I,J)   → P(0)
34 NEXT J::NEXT I
35 FOR I=1 TO Y
36 READ KU(I,1)
37 NEXT I
38 DATA 2.164,-.1069,.236,.07336,.428,-.007295,.003036   → M1(T)
40 FOR I=1 TO Y
41 READ OM(I,1)
42 NEXT I
43 DATA -.2114,.04375,-.01793,-.00605,.0339,.0167,-.0034   → M2(T)
50 OPEN #1:"DSC:T8"
55 OPEN #2:"DSC:P1"
60 OPEN #3:"DSC:TU4"
70 CALL MINT(F(,),Y,Y,1)    → Φ1
75 CALL MINT(T1(,),Y,1,2)   → Θ1
80 CALL MINT(T2(,),Y,1,3)   → Θ2
85 CLOSE #1
86 CLOSE #2
87 CLOSE #3
90 CALL MTRA(F(,),FT(,),Y,Y)
95 CALL MTRA(T1(,),TT(,),Y,1)
100 CALL MTRA(T2(,),TR(,),Y,1)
105 CALL MPRD(P(,),T2(,),W(,),Y,Y,1)
110 CALL MPRD(TR(,),W(,),M(,),1,Y,1)
115 G=M(1,1)+V
120 B=1/G
125 CALL MPRD(P(,),F(,),Z(,),Y,Y,Y)
130 CALL MPRD(P(,),T1(,),S(,),Y,Y,1)
135 CALL MPRD(FT(,),W(,),A(,),Y,Y,1)
140 CALL MPRD(FT(,),Z(,),C(,),Y,Y,Y)
145 CALL MPRD(FT(,),S(,),E(,),Y,Y,1)
150 CALL MPRD(TR(,),S(,),D(,),1,Y,1)
152 D(1,1)=D(1,1)+M3
155 CALL MPRD(TT(,),S(,),F(,),1,Y,1)
160 RT=R+F(1,1)-D(1,1)*B*D(1,1)
165 RT=1/RT
170 MI=B*D(1,1)
173 CALL MADD(A(,),"+",OM(,),Z(,),Y,1)
174 CALL MADD(E(,),"+",KU(,),A(,),Y,1)
175 CALL MPRC(MI,Z(,),W(,),Y,1)
```

MULTC

Resolución de la nueva ecuación de Riccati [63.28].
(para sistemas con una entrada de control).
y de las leyes de control [63.26] y [63.27].

P.21

```
180 CALL MATM(W(,),"-",A(,),S(,),Y,1)
185 CALL MTRA(S(,),TT(,),Y,1)
190 CALL MPRD(RT,TT(,),TR(,),1,Y)
200 CALL MPRD(S(,),TR(,),E(,),Y,1,Y)
205 CALL MTRA(Z(,),TT(,),Y,1)
210 CALL MPRD(R,TT(,),TP(,),1,Y)
220 CALL MPRD(Z(,),TP(,),T1(,),Y,1,Y)
230 CALL MATM(E(,),"+",T1(,),Z(,),Y,Y)
240 FOR I=1 TO Y
241 FOR J=1 TO Y
242 READ E(I,J)
243 NEXT J::NEXT I
244 DATA 110,-5.72,15.24,4.51,21,-1.01,1.4,-5.72,.6647,-.375,-.12,-.61
245 DATA .0005,-.018,15.24,-.375,3.7462,1.168,4.079,-1,.373,4.51,-.12
246 DATA 1.168,.529,1.44,-.054,-.046,21,-.61,4.079,1.44,8,-.046,.088
247 DATA -1.01,.0005,-1,-.054,-.046,1.8452,-.245,1.4,-.018,.373,-.046
248 DATA .088,-.245,.2481
249 RESTORE 244
250 CALL MATM(E(,),"+",C(,),ET(,),Y,Y)
260 CALL MATM(ET(,),"-",Z(,),P(,),Y,Y)
270 FOR I=1 TO Y
280 FOR J=I TO Y
290 P(I,J)=(P(I,J)+P(J,I))/2
295 P(J,I)=P(I,J)
300 NEXT J::NEXT I
310 IF H=0 THEN GOTO 1000
320 H=H-1
330 PRINT ERASE ALL
340 PRINT H
350 FOR I=1 TO Y
360 FOR J=1 TO Y
370 PRINT AT (I+2,(J-1)*TA) USING 380:P(I,J)
380 IMAGE ##.###^^^^
400 NEXT J::NEXT I
500 GOTO 50
1000 OPEN #9:"DSC:ETN"
1001 PRINT ERASE ALL
1010 CALL MOUT(TR(,),1,Y,9)
1020 CLOSE #9
1050 BRK
1060 CALL MPRD(D(,),TR(,),T1(,),1,1,Y)
1070 CALL MATM(T1(,),"+",TT(,),TR(,),1,Y)
1080 CALL MPRD(R,TR(,),T1(,),1,Y)
1090 OPEN #8:"DSC:ETAU"
1100 CALL MOUT(T1(,),1,Y,8)
1200 CLOSE #8
1300 END
6130 SUB MOUT(X(,),F,C,U)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6165 PRINT #U:X(I,J)
6170 PRINT AT (I+2,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
```

$\hat{Q}(T)$

$P(KT)$

$\mu(KT)$

$\mu(KT+\tau)$

```
6200 SUBEND
6210 SUB MINT(X(,),F,C,LI)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #LI:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

```
10 DIM T1(7,7),T2(7,1),F(7,7),FT(7,7),TT(1,7),TR(1,7)
11 DIM TP(1,7)
12 DIM P(7,7),W(7,1),Z(7,7),C(7,7)
14 DIM M(1,1),S(7,1),A(7,1),E(7,1),D(1,1)
15 Y=7                          ---> Orden del sistema
17 PRINT ERASE ALL
18 R=1        |---> Fijación de R y V.
19 V=1
20 PRINT "N D'ITERAC."
22 INPUT H
24 PRINT "COND. INIC."                P(O)
26 TA=INT(80/Y)
28 FOR I=1 TO Y
30 FOR J=1 TO Y
32 INPUT AT (I+2,(J-1)*TA):P(I,J)
34 NEXT J::NEXT I
50 OPEN #1:"DSC:TRB1" --- Φ1
55 OPEN #2:"DSC:TRC1" --- Θ1
60 OPEN #3:"DSC2:TRA2" --- Θ2
70 CALL MINT(F(,),Y,Y,1)
75 CALL MINT(T1(,),Y,1,2)
80 CALL MINT(T2(,),Y,1,3)
85 CLOSE #1
86 CLOSE #2
87 CLOSE #3
90 CALL MTRA(F(,),FT(,),Y,Y)
95 CALL MTRA(T1(,),TT(,),Y,1)
100 CALL MTRA(T2(,),TR(,),Y,1)
105 CALL MPRD(P(,),T2(,),W(,),Y,Y,1)
110 CALL MPRD(TR(,),W(,),M(,),1,Y,1)
115 G=M(1,1)+V
120 B=1/G
125 CALL MPRD(P(,),F(,),Z(,),Y,Y,Y)
130 CALL MPRD(P(,),T1(,),S(,),Y,Y,1)
135 CALL MPRD(FT(,),W(,),A(,),Y,Y,1)
140 CALL MPRD(FT(,),Z(,),C(,),Y,Y,Y)
145 CALL MPRD(FT(,),S(,),E(,),Y,Y,1)
150 CALL MPRD(TR(,),S(,),D(,),1,Y,1)
155 CALL MPRD(TT(,),S(,),E(,),1,Y,1)
160 RI=R+E(1,1)-D(1,1)*B*D(1,1)
165 RI=1/RI
170 ML=B*D(1,1)
175 CALL MPRC(ML,A(,),W(,),Y,1)
180 CALL MADD(W(,),"-",E(,),S(,),Y,1)
185 CALL MTRA(S(,),TT(,),Y,1)
190 CALL MPRC(RI,TT(,),TR(,),1,Y)
200 CALL MPRD(S(,),TR(,),F(,),Y,1,Y)
205 CALL MTRA(A(,),TT(,),Y,1)
210 CALL MPRC(B,TT(,),TP(,),1,Y)
220 CALL MPRD(A(,),TP(,),T1(,),Y,1,Y)
230 CALL MADD(F(,),"+",T1(,),Z(,),Y,Y)
240 CALL MIND(F(,),Y)
245 F(5,5)=1       |---> Definición de Q̂(T)
250 CALL MADD(F(,),"+",C(,),FT(,),Y,Y)
260 CALL MADD(FT(,),"-",Z(,),P(,),Y,Y)
```

MULTR

Particularización de "MULTC" al criterio integral [63.10]

(Penalización de las desviaciones sólo en los instantes de muestreo).

```
270 FOR I=1 TO Y
280 FOR J=I TO Y
290 P(I,J)=(P(I,J)+P(J,I))/2
295 P(J,I)=P(I,J)
300 NEXT J::NEXT I
310 IF H=0 THEN GOTO 1000
320 H=H-1
330 PRINT ERASE ALL
340 PRINT H
350 FOR I=1 TO Y
360 FOR J=1 TO Y
370 PRINT AT (I+2,(J-1)*TA) USING 380:P(I,J) ----------> P(KT)
380 IMAGE ##.###^^^^
400 NEXT J::NEXT I
500 GOTO 50
1000 OPEN #9:"DSC:FIN"
1001 PRINT ERASE ALL
1010 CALL MOUT(TR(,),1,Y,9) ----------> μ(KT)
1020 CLOSE #9
1050 BRK
1060 CALL MPRD(D(,),TR(,),T1(,),1,1,Y)
1070 CALL MADD(T1(,),"+",TT(,),TR(,),1,Y)
1080 CALL MPRD(B,TR(,),T1(,),1,Y)
1090 OPEN #8:"DSC:FTAU"
1100 CALL MOUT(T1(,),1,Y,8) ----------> μ(KT+τ)
1200 CLOSE #8
1300 END
6130 SUB MOUT(X(,),F,C,LL)
6140 TA=INT(80/C)
6150 FOR I=1 TO F
6160 FOR J=1 TO C
6165 PRINT #LL:X(I,J)
6170 PRINT AT (I+2,(J-1)*TA) USING 6180:X(I,J)
6180 IMAGE ##.###^^^^
6190 NEXT J::NEXT I
6200 SUBEND
6210 SUB MINT(X(,),F,C,LL)
6240 FOR I=1 TO F
6250 FOR J=1 TO C
6260 INPUT #LL:X(I,J)
6270 NEXT J::NEXT I
6280 SUBEND
6290 SUB MPRD(X(,),Y(,),Z(,),FX,XY,CY)
6300 FOR J=1 TO CY
6310 FOR I=1 TO FX
6320 Z(I,J)=0
6330 FOR K=1 TO XY
6340 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)
6350 NEXT K::NEXT I::NEXT J
6360 SUBEND
6370 SUB MTRA(X(,),XT(,),F,C)
6380 FOR I=1 TO C
6390 FOR J=1 TO F
6400 XT(I,J)=X(J,I)
6410 NEXT J::NEXT I
```

```
6420 SUBEND
6430 SUB MADD(X(,),X$,Y(,),Z(,),F,C)
6440 FOR I=1 TO F
6450 FOR J=1 TO C
6460 IF X$="+" THEN Z(I,J)=X(I,J)+Y(I,J)
6470 IF X$="-" THEN Z(I,J)=X(I,J)-Y(I,J)
6480 NEXT J::NEXT I
6490 SUBEND
6560 SUB MIND(X(,),N)
6570 FOR I=1 TO N
6580 FOR J=1 TO N
6590 X(I,J)=0.0
6600 IF I=J THEN X(I,J)=0.5
6610 NEXT J::NEXT I
6620 SUBEND
6630 SUB MPRC(A,X(,),Z(,),F,C)
6640 FOR I=1 TO F
6650 FOR J=1 TO C
6660 Z(I,J)=A*X(I,J)
6670 NEXT J::NEXT I
6680 SUBEND
```

APENDICE G :

Resultados de simulación anexos al Capítulo 6.

RESULTADOS DE SIMULACION.

Entrada: Perturbación indicial de 0,01 p.u.MW en el Area 1.

Bloques listados:

20 : Generación del Area 1 (p.u.MW).

24 : Desviaciones frecuencia del Area 1 (Hz).

27 : Intercambio de potencia del Area 1 al Area 2 (p.u.MW).

38 : Generación del Area 2 (p.u.MW).

46 : Integral del ACE del Area 1, $\int ACE_1 \, dt$.

55 : Integral del error cuadrático de frecuencia del Area 1,

$$\int f_1^2 \, dt.$$

56 : Integral del error cuadrático del intercambio de potencia

$$\int P_{12}^2 \, dt.$$

30 : Desviaciones de frecuencia del Area 2 (Hz).

SD1

RLO discreto de acción simple (sin retardo) ajustado con los valores obtenidos en el diseño sobre el modelo continuo (caso Ⓘ del Capítulo 5).

T = 8 segundos.

(simulación sin retardo de cálculo).

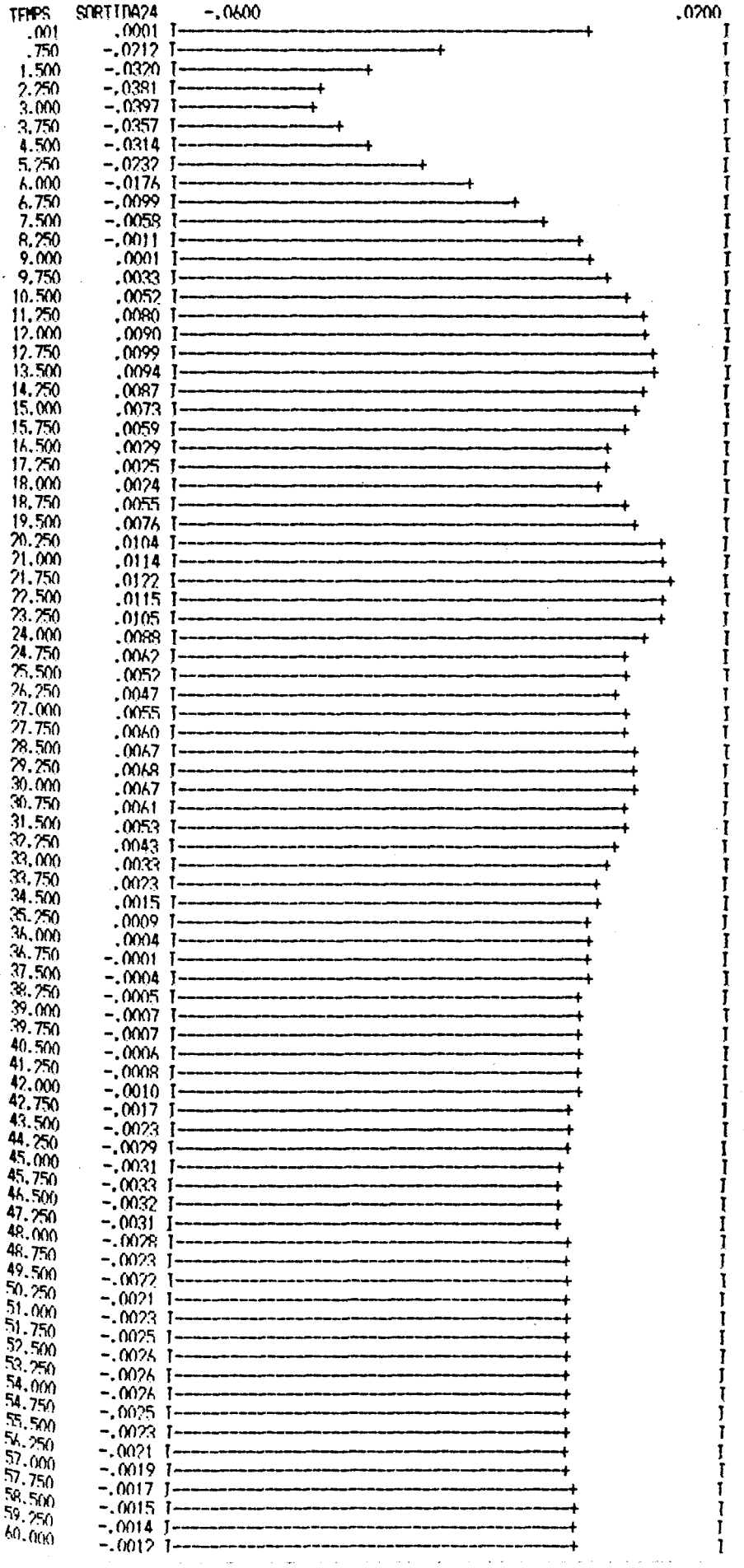
BLOC FIX Y (24) MINIM (-.1000) MAXIM (.1000)

SD1.1

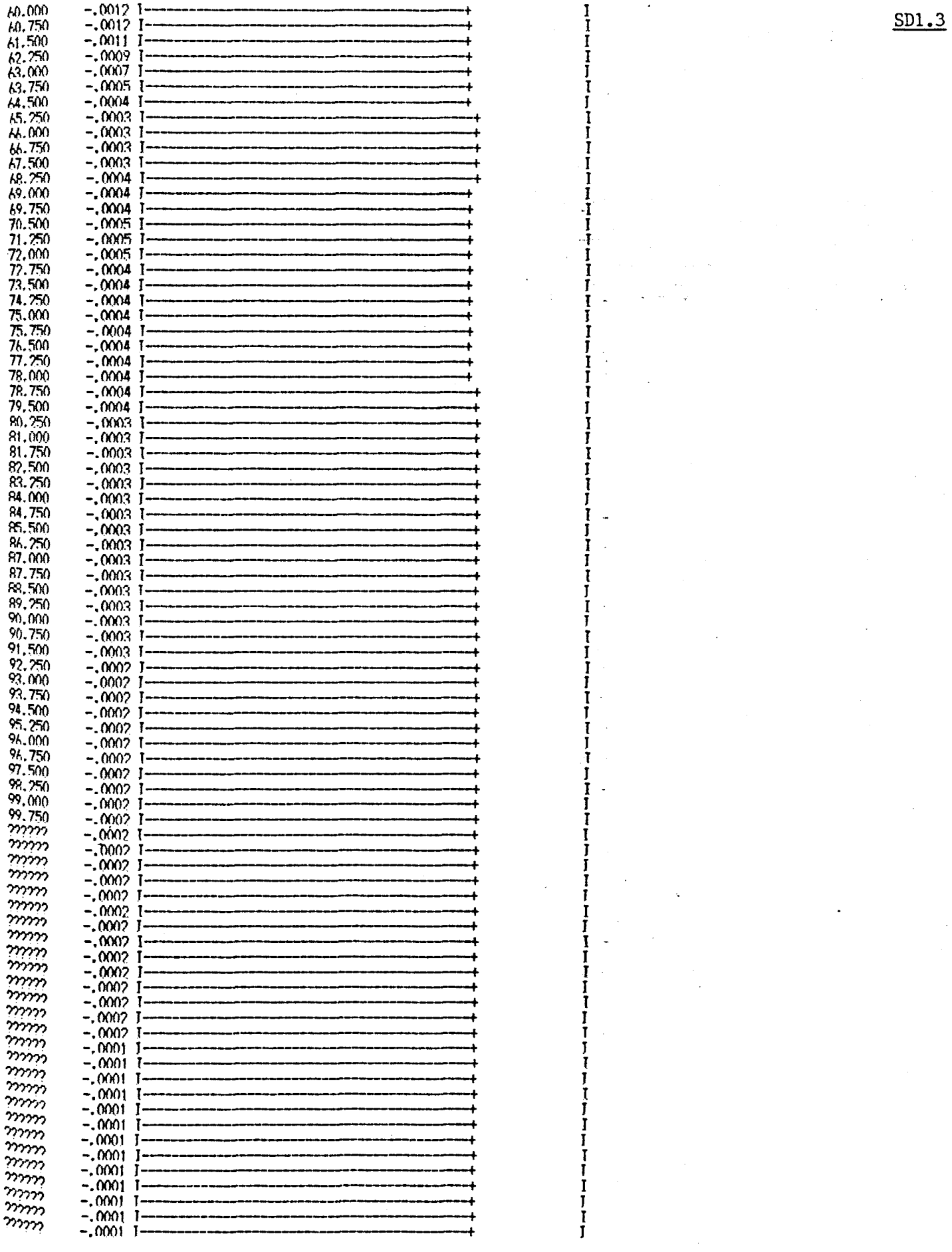
TEMPS	SORTIDA24	-.1000	.1000
.001	.0001	I——————————+	I
.750	-.0212	I————————+	I
1.500	-.0320	I———————+	I
2.250	-.0381	I——————+	I
3.000	-.0397	I——————+	I
3.750	-.0357	I———————+	I
4.500	-.0314	I———————+	I
5.250	-.0232	I————————+	I
6.000	-.0176	I————————+	I
6.750	-.0099	I—————————+	I
7.500	-.0058	I——————————+	I
8.250	-.0011	I———————————+	I
9.000	.0001	I———————————+	I
9.750	.0033	I————————————+	I
10.500	.0052	I————————————+	I
11.250	.0080	I————————————+	I
12.000	.0090	I————————————+	I
12.750	.0099	I————————————+	I
13.500	.0094	I————————————+	I
14.250	.0087	I————————————+	I
15.000	.0073	I————————————+	I
15.750	.0059	I————————————+	I
16.500	.0029	I————————————+	I
17.250	.0025	I———————————+	I
18.000	.0024	I———————————+	I
18.750	.0055	I————————————+	I
19.500	.0076	I————————————+	I
20.250	.0104	I————————————+	I
21.000	.0114	I————————————+	I
21.750	.0122	I————————————+	I
22.500	.0115	I————————————+	I
23.250	.0105	I————————————+	I
24.000	.0088	I————————————+	I
24.750	.0062	I————————————+	I
25.500	.0052	I————————————+	I
26.250	.0047	I————————————+	I
27.000	.0055	I————————————+	I
27.750	.0060	I————————————+	I
28.500	.0067	I————————————+	I
29.250	.0068	I————————————+	I
30.000	.0067	I————————————+	I
30.750	.0061	I————————————+	I
31.500	.0053	I————————————+	I
32.250	.0043	I————————————+	I
33.000	.0033	I————————————+	I
33.750	.0023	I———————————+	I
34.500	.0015	I———————————+	I
35.250	.0009	I———————————+	I
36.000	.0004	I———————————+	I
36.750	-.0001	I———————————+	I
37.500	-.0004	I———————————+	I
38.250	-.0005	I———————————+	I
39.000	-.0007	I———————————+	I
39.750	-.0007	I———————————+	I
40.500	-.0006	I———————————+	I
41.250	-.0008	I———————————+	I
42.000	-.0010	I————————————+	I
42.750	-.0017	I————————————+	I
43.500	-.0023	I————————————+	I
44.250	-.0029	I————————————+	I
45.000	-.0031	I————————————+	I
45.750	-.0033	I————————————+	I
46.500	-.0032	I————————————+	I
47.250	-.0031	I————————————+	I
48.000	-.0028	I————————————+	I
48.750	-.0023	I————————————+	I
49.500	-.0022	I————————————+	I
50.250	-.0021	I————————————+	I
51.000	-.0023	I————————————+	I
51.750	-.0025	I————————————+	I
52.500	-.0026	I————————————+	I
53.250	-.0026	I————————————+	I
54.000	-.0026	I————————————+	I
54.750	-.0025	I————————————+	I
55.500	-.0023	I————————————+	I
56.250	-.0021	I————————————+	I
57.000	-.0019	I————————————+	I
57.750	-.0017	I————————————+	I
58.500	-.0015	I————————————+	I
59.250	-.0014	I————————————+	I
60.000	-.0012	I————————————+	I

BLOC FTX V (24) MINIM (-.0600) MAXIM (.0200)

SD1.2



SD1.3


60.000 -.0012
60.750 -.0012
61.500 -.0011
62.250 -.0009
63.000 -.0007
63.750 -.0005
64.500 -.0004
65.250 -.0003
66.000 -.0003
66.750 -.0003
67.500 -.0003
68.250 -.0004
69.000 -.0004
69.750 -.0004
70.500 -.0005
71.250 -.0005
72.000 -.0005
72.750 -.0004
73.500 -.0004
74.250 -.0004
75.000 -.0004
75.750 -.0004
76.500 -.0004
77.250 -.0004
78.000 -.0004
78.750 -.0004
79.500 -.0004
80.250 -.0003
81.000 -.0003
81.750 -.0003
82.500 -.0003
83.250 -.0003
84.000 -.0003
84.750 -.0003
85.500 -.0003
86.250 -.0003
87.000 -.0003
87.750 -.0003
88.500 -.0003
89.250 -.0003
90.000 -.0003
90.750 -.0003
91.500 -.0003
92.250 -.0002
93.000 -.0002
93.750 -.0002
94.500 -.0002
95.250 -.0002
96.000 -.0002
96.750 -.0002
97.500 -.0002
98.250 -.0002
99.000 -.0002
99.750 -.0002
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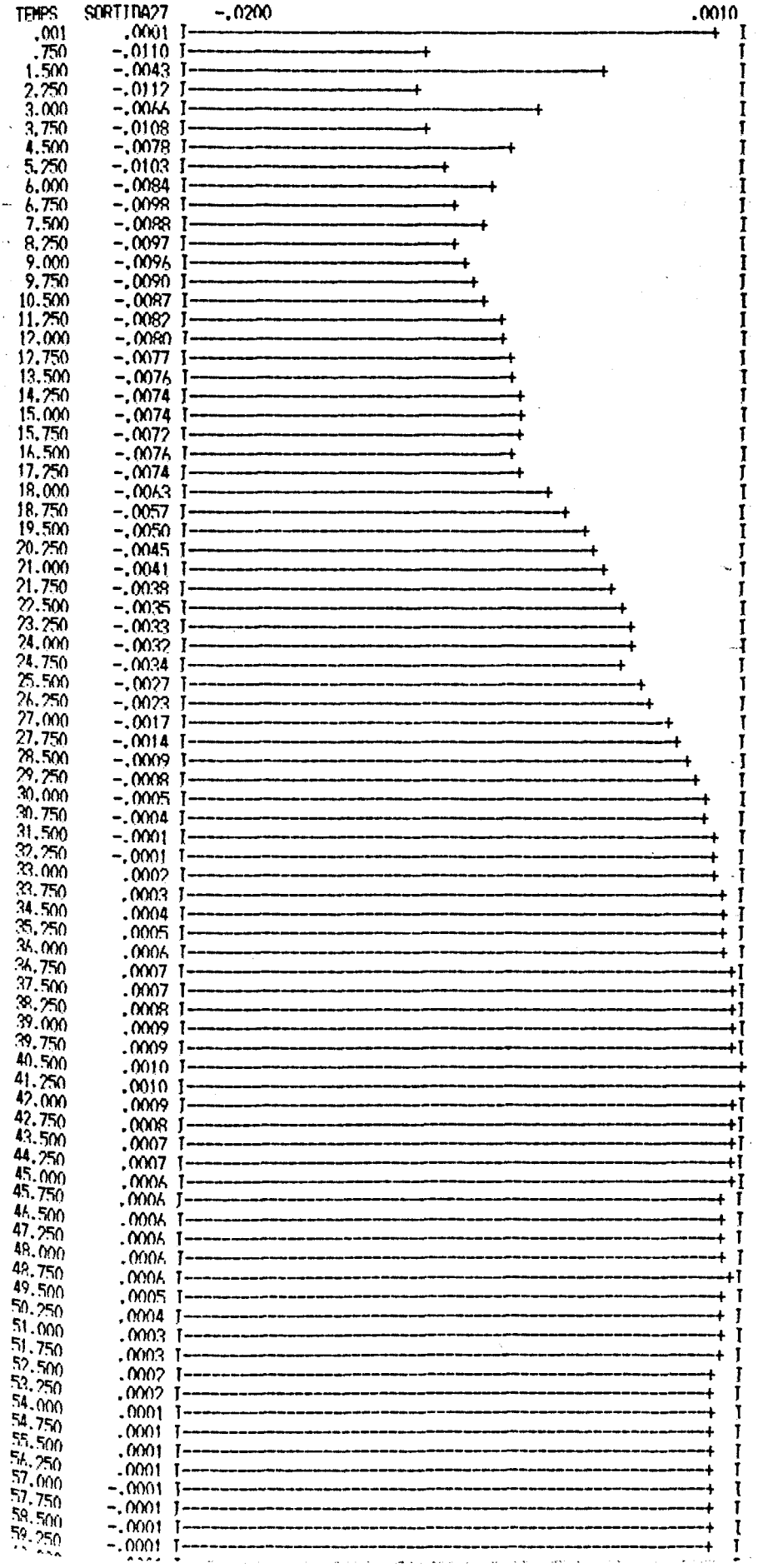
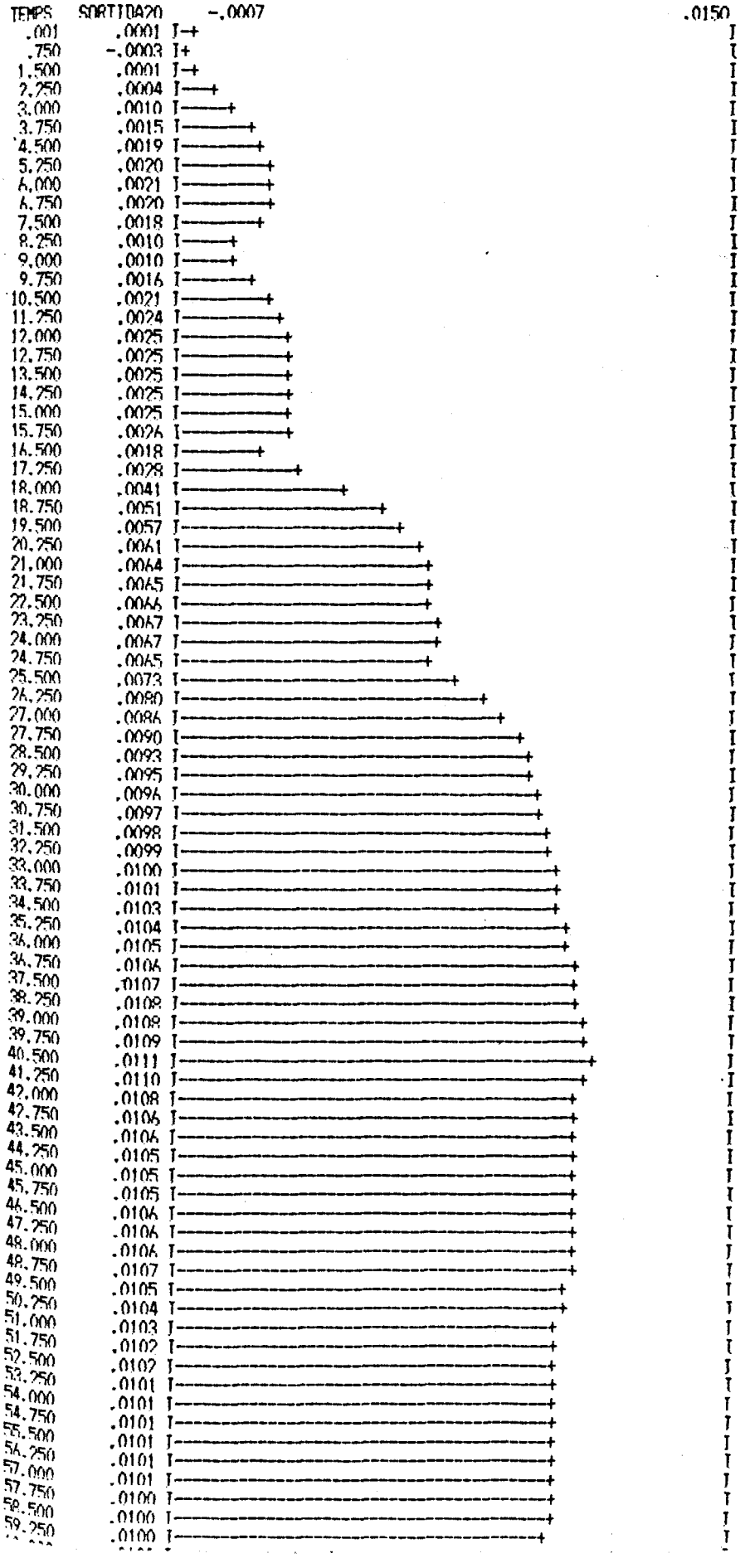
SD1.4

BLOC EIX Y (27) MINIM (-.0200) MAXIM (.0010)



SD1.5

BLOC FIX Y (20) MINIM (-.0007) MAXIM (.0150)



BLOC FIX Y (38) MINIM (-.0007) MAXIM (.0150)

Scale: -.0007 to .0150

TEMPS	SORTIDA38
.001	.0001
.750	-.0003
1.500	-.0006
2.250	.0002
3.000	.0013
3.750	.0029
4.500	.0044
5.250	.0060
6.000	.0073
6.750	.0084
7.500	.0092
8.250	.0097
9.000	.0100
9.750	.0101
10.500	.0102
11.250	.0101
12.000	.0100
12.750	.0097
13.500	.0093
14.250	.0089
15.000	.0085
15.750	.0081
16.500	.0077
17.250	.0074
18.000	.0072
18.750	.0071
19.500	.0071
20.250	.0068
21.000	.0065
21.750	.0061
22.500	.0056
23.250	.0050
24.000	.0045
24.750	.0040
25.500	.0035
26.250	.0032
27.000	.0029
27.750	.0026
28.500	.0023
29.250	.0020
30.000	.0017
30.750	.0013
31.500	.0010
32.250	.0006
33.000	.0003
33.750	.0001
34.500	-.0003
35.250	-.0005
36.000	-.0006
36.750	-.0007
37.500	-.0008
38.250	-.0009
39.000	-.0010
39.750	-.0011
40.500	-.0011
41.250	-.0012
42.000	-.0012
42.750	-.001[illegible]
43.500	-.001[illegible]
44.250	-.001[illegible]
45.000	-.001[illegible]
45.750	-.0013
46.500	-.0012
47.250	-.0011
48.000	-.0010
48.750	-.0010
49.500	-.0009
50.250	-.0009
51.000	-.0008
51.750	-.0008
52.500	-.0007
53.250	-.0007
54.000	-.0006
54.750	-.0006
55.500	-.0005
56.250	-.0004
57.000	-.0004
57.750	-.0003
58.500	-.0003
59.250	-.0002
60.000	-.0002

SD1.7

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0653	-.0159	.0057	.0005
8.00	-.0854	-.0024	.0059	.0007
10.00	-.1041	.0034	.0059	.0008
12.00	-.1195	.0091	.0060	.0010
14.00	-.1331	.0088	.0062	.0011
16.00	-.1463	.0053	.0063	.0012
18.00	-.1602	.0025	.0063	.0013
20.00	-.1701	.0089	.0064	.0014
22.00	-.1761	.0117	.0066	.0014
24.00	-.1808	.0088	.0069	.0014
26.00	-.1856	.0045	.0069	.0014
28.00	-.1881	.0060	.0070	.0014
30.00	-.1884	.0064	.0071	.0014
32.00	-.1878	.0045	.0072	.0014
34.00	-.1869	.0019	.0072	.0014
36.00	-.1859	.0003	.0072	.0014
38.00	-.1847	-.0005	.0072	.0014
40.00	-.1832	-.0008	.0072	.0014
42.00	-.1814	-.0011	.0072	.0014
44.00	-.1803	-.0026	.0072	.0014
46.00	-.1796	-.0033	.0072	.0014
48.00	-.1792	-.0028	.0072	.0014
50.00	-.1786	-.0021	.0072	.0014
52.00	-.1784	-.0025	.0073	.0014
54.00	-.1786	-.0026	.0073	.0014
56.00	-.1789	-.0022	.0073	.0014
58.00	-.1793	-.0016	.0073	.0014
60.00	-.1796	-.0012	.0073	.0014
62.00	-.1800	-.0010	.0073	.0014
64.00	-.1805	-.0009	.0073	.0014
66.00	-.1809	-.0008	.0073	.0014
68.00	-.1813	-.0004	.0073	.0014
70.00	-.1814	-.0002	.0073	.0014
72.00	-.1816	-.0002	.0073	.0014
74.00	-.1818	-.0003	.0073	.0014
76.00	-.1819	-.0002	.0073	.0014
78.00	-.1818	-.0001	.0073	.0014
80.00	-.1818	-.0001	.0073	.0014
82.00	-.1817	-.0002	.0073	.0014
84.00	-.1816	-.0003	.0073	.0014
86.00	-.1815	-.0003	.0073	.0014
88.00	-.1815	-.0003	.0073	.0014
90.00	-.1813	-.0003	.0073	.0014
92.00	-.1813	-.0003	.0073	.0014
94.00	-.1812	-.0003	.0073	.0014
96.00	-.1812	-.0003	.0073	.0014
98.00	-.1811	-.0003	.0073	.0014
100.00	-.1811	-.0003	.0073	.0014
102.00	-.1811	-.0003	.0073	.0014
104.00	-.1811	-.0002	.0073	.0014
106.00	-.1811	-.0002	.0073	.0014
108.00	-.1811	-.0002	.0073	.0014
110.00	-.1811	-.0002	.0073	.0014
112.00	-.1811	-.0002	.0073	.0014
114.00	-.1812	-.0001	.0073	.0014
116.00	-.1812	-.0001	.0073	.0014
118.00	-.1812	-.0001	.0073	.0014
120.00	-.1812	-.0001	.0073	.0014
122.00	-.1812	-.0001	.0073	.0014
124.00	-.1812	-.0001	.0073	.0014
126.00	-.1812	-.0001	.0073	.0014
128.00	-.1812	-.0001	.0073	.0014
130.00	-.1812	-.0001	.0073	.0014
132.00	-.1812	-.0001	.0073	.0014
134.00	-.1812	-.0001	.0073	.0014
136.00	-.1812	-.0001	.0073	.0014
138.00	-.1812	-.0001	.0073	.0014
140.00	-.1812	-.0001	.0073	.0014
142.00	-.1812	-.0001	.0073	.0014
144.00	-.1812	-.0001	.0073	.0014
146.00	-.1812	-.0001	.0073	.0014
148.00	-.1811	-.0001	.0073	.0014
150.00	-.1811	-.0001	.0073	.0014
152.00	-.1811	-.0001	.0073	.0014
154.00	-.1811	-.0001	.0073	.0014
156.00	-.1811	-.0001	.0073	.0014
158.00	-.1811	-.0001	.0073	.0014
160.00	-.1811	-.0001	.0073	.0014

SD2

RLO discreto de acción simple (sin retardo) diseñado según [62.13] (penalización en kT) y modelo de simulación.

T = 8 segundos.

(simulación sin retardo de cálculo).

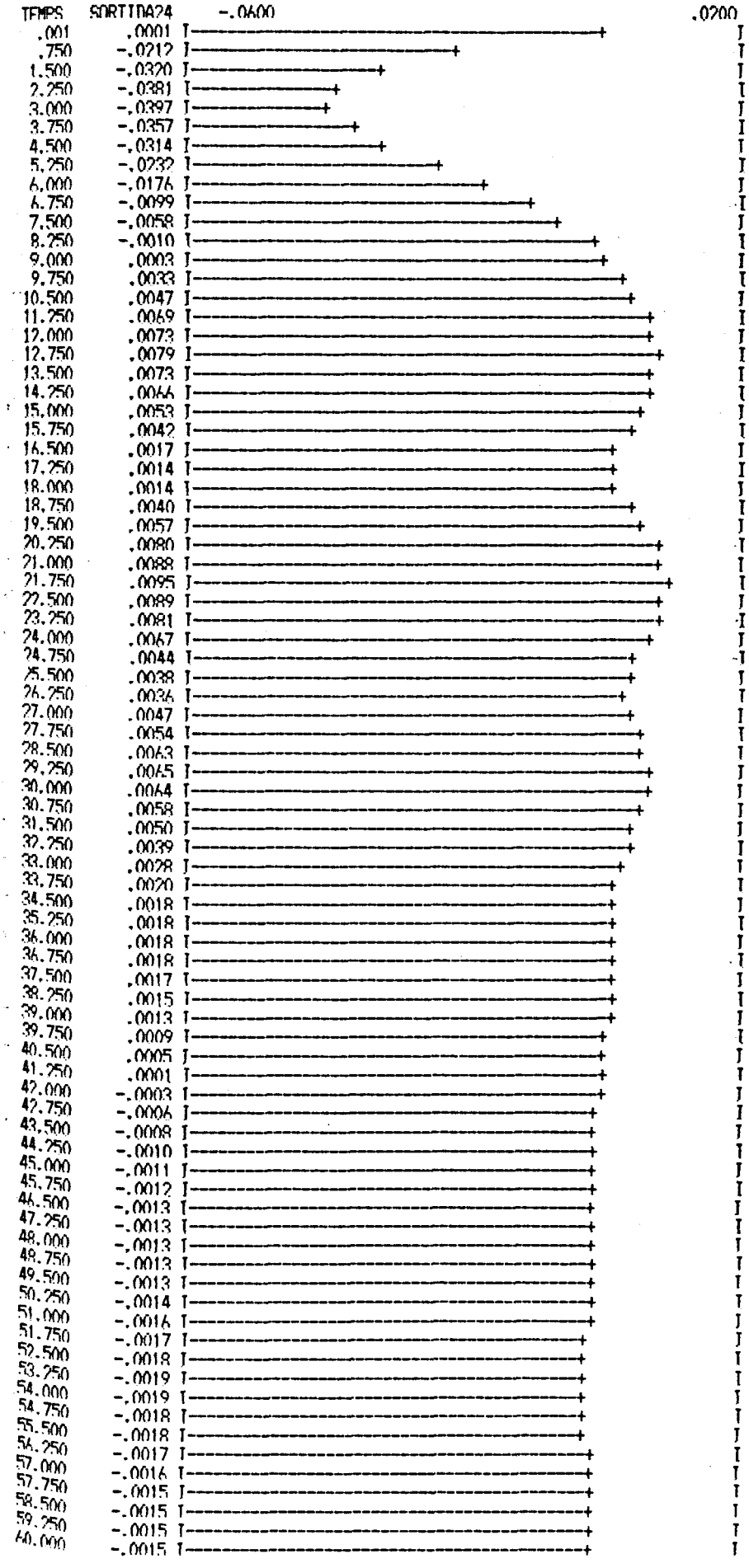
BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)

SD2.1

TEMPS	SORTIDA24	-.0600	.0200
.001	.0001	I——————————+	I
2.000	-.0406	I———+	I
4.000	-.0323	I————+	I
6.000	-.0176	I——————+	I
8.000	-.0027	I———————+	I
10.000	.0038	I————————+	I
12.000	.0073	I—————————+	I
14.000	.0069	I—————————+	I
16.000	.0037	I————————+	I
18.000	.0014	I————————+	I
20.000	.0073	I—————————+	I
22.000	.0093	I——————————+	I
24.000	.0067	I—————————+	I
26.000	.0034	I————————+	I
28.000	.0058	I————————+	I
30.000	.0064	I—————————+	I
32.000	.0043	I————————+	I
34.000	.0019	I———————+	I
36.000	.0018	I———————+	I
38.000	.0016	I———————+	I
40.000	.0008	I———————+	I
42.000	-.0003	I———————+	I
44.000	-.0009	I——————+	I
46.000	-.0012	I——————+	I
48.000	-.0013	I——————+	I
50.000	-.0014	I——————+	I
52.000	-.0018	I———————+	I
54.000	-.0019	I———————+	I
56.000	-.0017	I———————+	I
58.000	-.0015	I——————+	I
60.000	-.0015	I——————+	I
62.000	-.0015	I——————+	I
64.000	-.0014	I——————+	I
66.000	-.0012	I——————+	I
68.000	-.0010	I——————+	I
70.000	-.0009	I——————+	I
72.000	-.0008	I——————+	I
74.000	-.0007	I——————+	I
76.000	-.0006	I——————+	I
78.000	-.0006	I——————+	I
80.000	-.0006	I——————+	I
82.000	-.0005	I——————+	I
84.000	-.0005	I——————+	I
86.000	-.0004	I——————+	I
88.000	-.0004	I——————+	I
90.000	-.0004	I———————+	I
92.000	-.0003	I———————+	I
94.000	-.0003	I———————+	I
96.000	-.0003	I———————+	I
98.000	-.0003	I———————+	I
??????	-.0003	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0002	I———————+	I
??????	-.0001	I———————+	I
??????	-.0001	I———————+	I

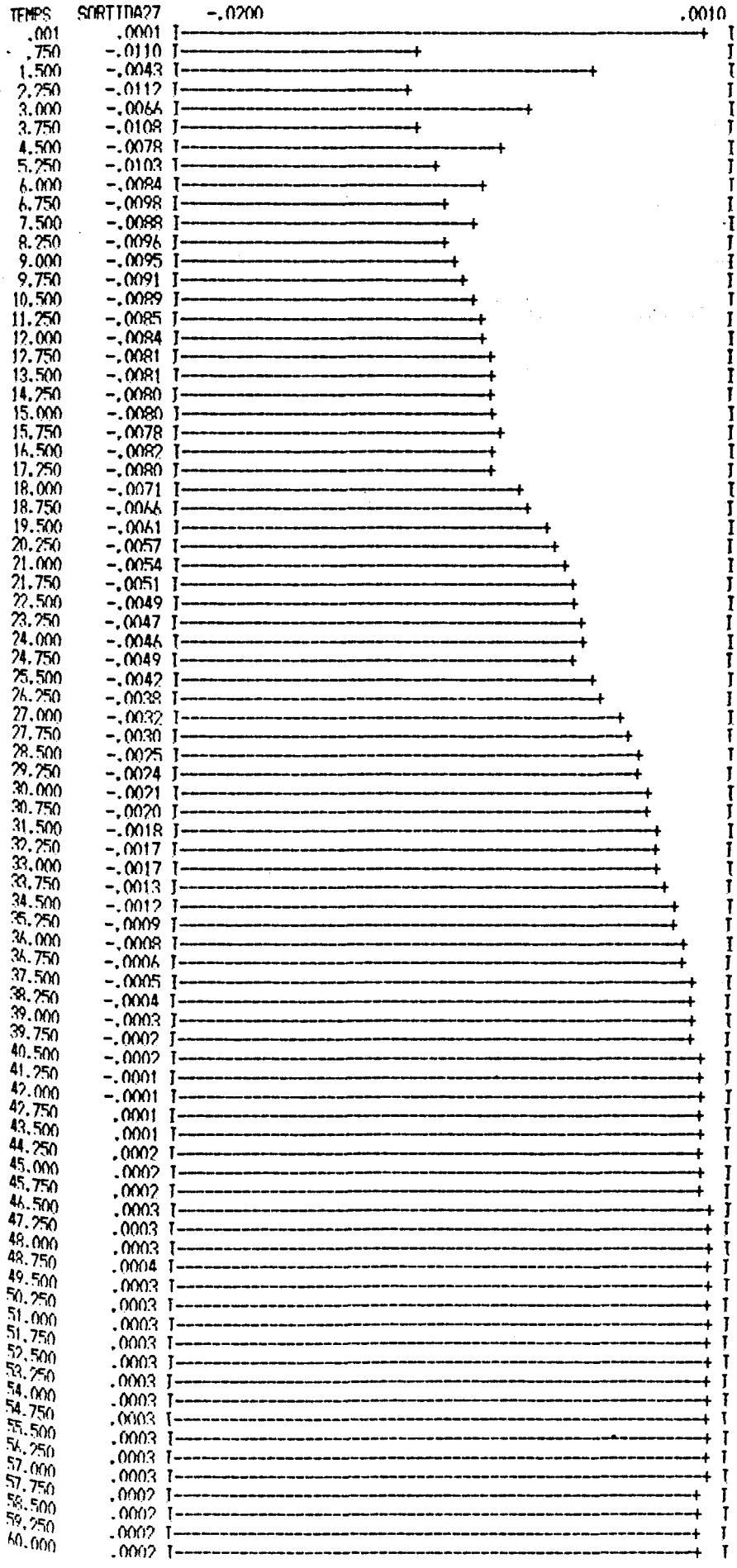
SD2.2

BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)



BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)

SD2.3



BLOC FIX Y (20) MINIM (-.0007) MAXIM (.0150)

SD2.4

TEMPS	SORTIDA20
.001	.0001
.750	-.0003
1.500	.0001
2.250	.0004
3.000	.0010
3.750	.0015
4.500	.0019
5.250	.0020
6.000	.0021
6.750	.0020
7.500	.0018
8.250	.0012
9.000	.0010
9.750	.0015
10.500	.0018
11.250	.0019
12.000	.0020
12.750	.0020
13.500	.0020
14.250	.0020
15.000	.0020
15.750	.0020
16.500	.0014
17.250	.0022
18.000	.0032
18.750	.0040
19.500	.0046
20.250	.0049
21.000	.0050
21.750	.0051
22.500	.0052
23.250	.0053
24.000	.0053
24.750	.0050
25.500	.0058
26.250	.0065
27.000	.0071
27.750	.0075
28.500	.0077
29.250	.0079
30.000	.0080
30.750	.0081
31.500	.0082
32.250	.0081
33.000	.0083
33.750	.0087
34.500	.0090
35.250	.0092
36.000	.0094
36.750	.0095
37.500	.0096
38.250	.0097
39.000	.0097
39.750	.0098
40.500	.0099
41.250	.0099
42.000	.0100
42.750	.0100
43.500	.0101
44.250	.0101
45.000	.0102
45.750	.0102
46.500	.0102
47.250	.0103
48.000	.0103
48.750	.0103
49.500	.0103
50.250	.0103
51.000	.0103
51.750	.0102
52.500	.0102
53.250	.0102
54.000	.0103
54.750	.0103
55.500	.0103
56.250	.0103
57.000	.0103
57.750	.0102
58.500	.0102
59.250	.0102
60.000	.0102

BLOC FIX Y (38) MINIM (-.0014) MAXIM (.0150)

TEMPS	SORTIDA38
.001	.0001
.750	-.0003
1.500	-.0006
2.250	.0002
3.000	.0013
3.750	.0029
4.500	.0044
5.250	.0060
6.000	.0073
6.750	.0084
7.500	.0092
8.250	.0097
9.000	.0100
9.750	.0101
10.500	.0102
11.250	.0101
12.000	.0099
12.750	.0097
13.500	.0094
14.250	.0090
15.000	.0087
15.750	.0084
16.500	.0081
17.250	.0079
18.000	.0078
18.750	.0077
19.500	.0076
20.250	.0075
21.000	.0072
21.750	.0069
22.500	.0065
23.250	.0060
24.000	.0056
24.750	.0052
25.500	.0048
26.250	.0045
27.000	.0043
27.750	.0041
28.500	.0039
29.250	.0036
30.000	.0032
30.750	.0029
31.500	.0025
32.250	.0022
33.000	.0019
33.750	.0016
34.500	.0014
35.250	.0013
36.000	.0011
36.750	.0009
37.500	.0008
38.250	.0006
39.000	.0005
39.750	.0003
40.500	.0002
41.250	-.0001
42.000	-.0002
42.750	-.0003
43.500	-.0003
44.250	-.0004
45.000	-.0005
45.750	-.0005
46.500	-.0005
47.250	-.0006
48.000	-.0006
48.750	-.0006
49.500	-.0006
50.250	-.0006
51.000	-.0006
51.750	-.0007
52.500	-.0007
53.250	-.0006
54.000	-.0006
54.750	-.0006
55.500	-.0006
56.250	-.0006
57.000	-.0006
57.750	-.0005
58.500	-.0005
59.250	-.0005
60.000	-.0005

Scale: -.0014 to .0150

SD2.6

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0653	-.0159	.0057	.0005
8.00	-.0854	-.0024	.0059	.0007
10.00	-.1040	.0032	.0059	.0008
12.00	-.1201	.0076	.0060	.0010
14.00	-.1350	.0067	.0061	.0011
16.00	-.1498	.0037	.0061	.0012
18.00	-.1651	.0015	.0061	.0014
20.00	-.1772	.0068	.0062	.0014
22.00	-.1862	.0091	.0063	.0015
24.00	-.1942	.0067	.0065	.0015
26.00	-.2022	.0033	.0065	.0016
28.00	-.2079	.0054	.0066	.0016
30.00	-.2115	.0062	.0066	.0016
32.00	-.2141	.0043	.0067	.0016
34.00	-.2167	.0018	.0067	.0016
36.00	-.2183	.0016	.0067	.0016
38.00	-.2190	.0015	.0067	.0016
40.00	-.2193	.0007	.0067	.0016
42.00	-.2195	-.0003	.0067	.0016
44.00	-.2194	-.0010	.0067	.0016
46.00	-.2193	-.0013	.0067	.0016
48.00	-.2191	-.0014	.0067	.0016
50.00	-.2187	-.0014	.0067	.0016
52.00	-.2185	-.0018	.0067	.0016
54.00	-.2183	-.0019	.0068	.0016
56.00	-.2182	-.0017	.0068	.0016
58.00	-.2181	-.0015	.0068	.0016
60.00	-.2180	-.0015	.0068	.0016
62.00	-.2180	-.0015	.0068	.0016
64.00	-.2180	-.0013	.0068	.0016
66.00	-.2181	-.0011	.0068	.0016
68.00	-.2181	-.0010	.0068	.0016
70.00	-.2182	-.0009	.0068	.0016
72.00	-.2183	-.0009	.0068	.0016
74.00	-.2184	-.0008	.0068	.0016
76.00	-.2184	-.0006	.0068	.0016
78.00	-.2185	-.0006	.0068	.0016
80.00	-.2185	-.0005	.0068	.0016
82.00	-.2186	-.0005	.0068	.0016
84.00	-.2186	-.0004	.0068	.0016
86.00	-.2186	-.0004	.0068	.0016
88.00	-.2187	-.0004	.0068	.0016
90.00	-.2187	-.0004	.0068	.0016
92.00	-.2187	-.0003	.0068	.0016
94.00	-.2187	-.0003	.0068	.0016
96.00	-.2187	-.0003	.0068	.0016
98.00	-.2187	-.0003	.0068	.0016
100.00	-.2187	-.0003	.0068	.0016
102.00	-.2186	-.0002	.0068	.0016
104.00	-.2186	-.0002	.0068	.0016
106.00	-.2186	-.0002	.0068	.0016
108.00	-.2186	-.0002	.0068	.0016
110.00	-.2186	-.0002	.0068	.0016
112.00	-.2186	-.0002	.0068	.0016
114.00	-.2186	-.0002	.0068	.0016
116.00	-.2186	-.0002	.0068	.0016
118.00	-.2186	-.0002	.0068	.0016
120.00	-.2186	-.0001	.0068	.0016
122.00	-.2186	-.0001	.0068	.0016
124.00	-.2186	-.0001	.0068	.0016
126.00	-.2186	-.0001	.0068	.0016
128.00	-.2186	-.0001	.0068	.0016
130.00	-.2186	-.0001	.0068	.0016
132.00	-.2186	-.0001	.0068	.0016
134.00	-.2186	-.0001	.0068	.0016
136.00	-.2186	-.0001	.0068	.0016
138.00	-.2186	-.0001	.0068	.0016
140.00	-.2186	-.0001	.0068	.0016
142.00	-.2186	-.0001	.0068	.0016
144.00	-.2186	-.0001	.0068	.0016
146.00	-.2186	-.0001	.0068	.0016
148.00	-.2186	-.0001	.0068	.0016
150.00	-.2186	-.0001	.0068	.0016
152.00	-.2186	-.0001	.0068	.0016
154.00	-.2186	-.0001	.0068	.0016
156.00	-.2186	-.0001	.0068	.0016
158.00	-.2186	-.0001	.0068	.0016
160.00	-.2186	-.0001	.0068	.0016

SD2.7

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##########################################################################
##########################################################################
###################          PROGRAMA DE SIMULACIO          ##############
###################    DE SISTEMES CONTINUS I DISCRETS      ##############
##########################################################################
##########################################################################
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CONFIGURACIO

BLOC	TIPUS	ENT.1	ENT.2	ENT.3
1	K	0	0	0
2	+	-49	-24	0
3	+	2	-8	0
4	G	3	0	0
5	I	4	0	0
6	L	5	0	0
7	G	5	0	0
8	+	7	9	0
9	G	12	0	0
10	G	9	0	0
11	I	10	0	0
12	+	5	-11	0
13	Z	41	58	0
14	Z	57	62	0
15	K	0	0	0
16	G	6	0	0
17	+	16	-21	0
18	G	17	0	0
19	I	17	0	0
20	+	19	-18	0
21	G	19	0	0
22	M	15	20	27
23	G	22	0	0
24	I	23	24	0
25	+	24	-30	0
26	G	25	0	0
27	I	26	0	0
28	M	27	38	39
29	G	28	0	0
30	I	29	30	0
31	G	40	0	0
32	I	31	32	0
33	G	66	0	0
34	+	33	-37	0
35	G	34	0	0
36	I	34	0	0
37	G	36	0	0
38	+	36	-35	0
39	K	0	0	0
40	+	-50	-30	0
41	M	5	9	20
42	M	24	46	27
43	+	13	14	0
44	G	24	0	0
45	+	44	27	0
46	I	45	0	0
47	X	24	24	0
48	X	27	27	0
49	Z	43	67	0
50	G	54	0	0
51	G	30	0	0
52	G	30	0	0
53	+	52	-27	0
54	I	53	0	0
55	I	47	0	0
56	I	48	0	0
57	+	42	51	0
58	+	59	-74	0
59	T	60	0	0
60	+	73	-61	0
61	K	0	0	0
62	+	63	-74	0
63	T	65	0	0
64	K	0	0	0
65	+	73	-64	0
66	L	32	0	0
67	+	68	-74	0
68	T	70	0	0
69	K	0	0	0
70	+	73	-69	0
73	I	1	0	0
74	K	0	0	0

SD2.8

CONDITIONS INITIALES ET PARAMETRES

BLOC	CI/PAR 1	PAR 2	PAR 3
1	1.0000	0.0000	0.0000
4	.0377	0.0000	0.0000
6	.0247	-.0738	0.0000
7	12.9700	0.0000	0.0000
9	5.3518	0.0000	0.0000
10	.0509	0.0000	0.0000
13	0.0000	.0380	0.0000
14	0.0000	-.1677	0.0000
15	.0100	0.0000	0.0000
16	2.0746	0.0000	0.0000
18	.9640	0.0000	0.0000
21	2.0746	0.0000	0.0000
22	-1.0000	1.0000	-1.0000
23	6.2500	0.0000	0.0000
24	0.0000	-.0937	0.0000
26	1.5300	0.0000	0.0000
28	1.0000	1.0000	-1.0000
29	6.2490	0.0000	0.0000
30	0.0000	-1.2343	0.0000
31	.0525	0.0000	0.0000
32	0.0000	-.0295	0.0000
33	2.0000	0.0000	0.0000
35	1.0000	0.0000	0.0000
37	2.0000	0.0000	0.0000
41	3.3470	-.2022	.3716
42	.1238	.7647	-.0034
44	.0920	0.0000	0.0000
49	0.0000	-.1292	0.0000
50	.0200	0.0000	0.0000
51	-.0001	0.0000	0.0000
52	1.9475	0.0000	0.0000
59	8.0000	-5.9750	0.0000
61	2.0000	0.0000	0.0000
63	8.0000	.0250	0.0000
64	4.0000	0.0000	0.0000
66	1.7770	-2.6666	0.0000
68	8.0000	-3.9750	0.0000
69	8.0000	0.0000	0.0000
71	20000.0000	0.0000	0.0000
74	.0100	0.0000	0.0000
75	60.0000	0.0000	0.0000

SD3

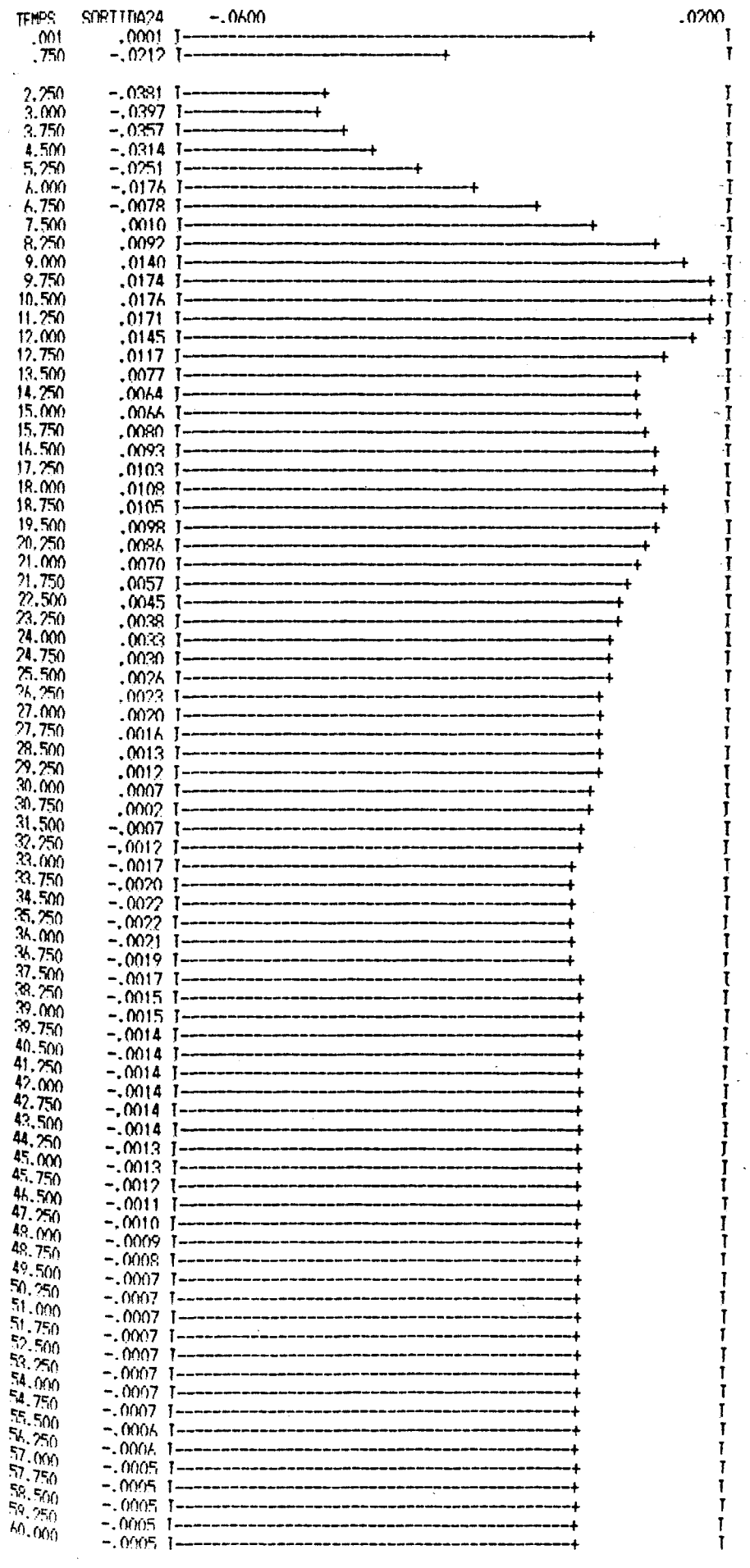
RLO discreto de acción simple (sin retardo) diseñado según [62.11] (penalización continua).

T = 8 segundos.

(simulación sin retardo de cálculo).

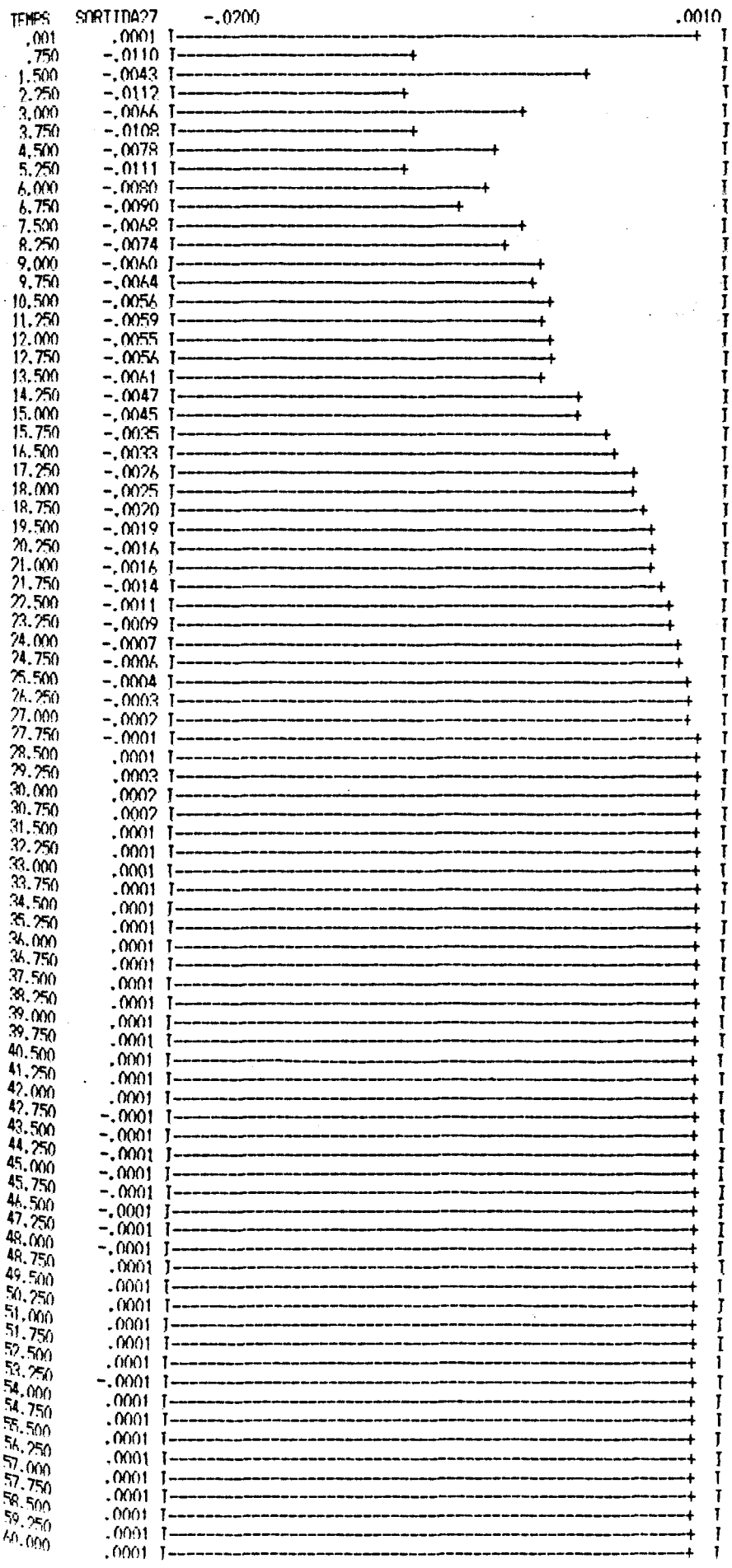
SD3.1

RIDE ETX Y (24) MINIM (-.0600) MAXIM (.0200)



SD3.2

BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)



BLOC FTX Y (20) MINTM (-.0007) MAXTM (.0150)

SD3.3

TEMPS	SORTIA20	-.0007	.0150
.001	.0001	I-+	I
.750	-.0003	I+	I
1.500	.0001	I-+	I
2.250	.0004	I--+	I
3.000	.0010	I----+	I
3.750	.0015	I------+	I
4.500	.0019	I--------+	I
5.250	.0013	I------+	I
6.000	.0027	I----------+	I
6.750	.0039	I------------+	I
7.500	.0045	I--------------+	I
8.250	.0048	I---------------+	I
9.000	.0048	I---------------+	I
9.750	.0046	I--------------+	I
10.500	.0045	I-------------+	I
11.250	.0043	I-------------+	I
12.000	.0042	I-------------+	I
12.750	.0036	I-----------+	I
13.500	.0039	I------------+	I
14.250	.0051	I----------------+	I
15.000	.0061	I-------------------+	I
15.750	.0069	I---------------------+	I
16.500	.0074	I----------------------+	I
17.250	.0077	I-----------------------+	I
18.000	.0079	I-----------------------+	I
18.750	.0081	I------------------------+	I
19.500	.0082	I------------------------+	I
20.250	.0083	I-------------------------+	I
21.000	.0083	I-------------------------+	I
21.750	.0085	I--------------------------+	I
22.500	.0088	I----------------------------+	I
23.250	.0091	I-----------------------------+	I
24.000	.0093	I------------------------------+	I
24.750	.0095	I-------------------------------+	I
25.500	.0096	I-------------------------------+	I
26.250	.0098	I--------------------------------+	I
27.000	.0099	I--------------------------------+	I
27.750	.0100	I--------------------------------+	I
28.500	.0100	I---------------------------------+	I
29.250	.0102	I---------------------------------+	I
30.000	.0101	I---------------------------------+	I
30.750	.0100	I---------------------------------+	I
31.500	.0100	I--------------------------------+	I
32.250	.0100	I--------------------------------+	I
33.000	.0100	I--------------------------------+	I
33.750	.0100	I---------------------------------+	I
34.500	.0101	I---------------------------------+	I
35.250	.0101	I---------------------------------+	I
36.000	.0101	I---------------------------------+	I
36.750	.0102	I---------------------------------+	I
37.500	.0102	I---------------------------------+	I
38.250	.0101	I---------------------------------+	I
39.000	.0101	I---------------------------------+	I
39.750	.0101	I---------------------------------+	I
40.500	.0100	I---------------------------------+	I
41.250	.0100	I---------------------------------+	I
42.000	.0100	I---------------------------------+	I
42.750	.0100	I---------------------------------+	I
43.500	.0100	I---------------------------------+	I
44.250	.0100	I---------------------------------+	I
45.000	.0100	I--------------------------------+	I
45.750	.0100	I---------------------------------+	I
46.500	.0100	I---------------------------------+	I
47.250	.0101	I---------------------------------+	I
48.000	.0101	I---------------------------------+	I
48.750	.0101	I---------------------------------+	I
49.500	.0101	I---------------------------------+	I
50.250	.0101	I---------------------------------+	I
51.000	.0101	I---------------------------------+	I
51.750	.0101	I---------------------------------+	I
52.500	.0100	I---------------------------------+	I
53.250	.0100	I---------------------------------+	I
54.000	.0101	I---------------------------------+	I
54.750	.0101	I---------------------------------+	I
55.500	.0101	I---------------------------------+	I
56.250	.0101	I---------------------------------+	I
57.000	.0101	I---------------------------------+	I
57.750	.0101	I---------------------------------+	I
58.500	.0101	I---------------------------------+	I
59.250	.0101	I---------------------------------+	I
60.000	.0101	I---------------------------------+	I

<u>SD3.4</u>

BLOC FIX Y (38) MINIM (-.0014) MAXIM (.0150)

TEMPS	SORTIDA38	-.0014 ... .0150
.001	.0001	I---+ I
.750	-.0003	I---+ I
1.500	-.0006	I--+ I
2.250	.0002	I----+ I
3.000	.0013	I--------+ I
3.750	.0029	I-----------------+ I
4.500	.0044	I-------------------------+ I
5.250	.0060	I---------------------------------+ I
6.000	.0073	I---------------------------------------+ I
6.750	.0085	I---+ I
7.500	.0094	I---+ I
8.250	.0099	I---+ I
9.000	.0100	I---+ I
9.750	.0098	I---+ I
10.500	.0093	I---+ I
11.250	.0086	I---+ I
12.000	.0079	I--+ I
12.750	.0072	I---------------------------------------+ I
13.500	.0065	I------------------------------------+ I
14.250	.0060	I---------------------------------+ I
15.000	.0057	I--------------------------------+ I
15.750	.0054	I--------------------------------+ I
16.500	.0052	I-------------------------------+ I
17.250	.0048	I-----------------------------+ I
18.000	.0045	I---------------------------+ I
18.750	.0040	I-------------------------+ I
19.500	.0035	I-----------------------+ I
20.250	.0031	I---------------------+ I
21.000	.0026	I------------------+ I
21.750	.0022	I-----------------+ I
22.500	.0018	I--------------+ I
23.250	.0015	I-------------+ I
24.000	.0013	I-----------+ I
24.750	.0010	I----------+ I
25.500	.0008	I----------+ I
26.250	.0007	I---------+ I
27.000	.0005	I-------+ I
27.750	.0003	I-------+ I
28.500	.0002	I-----+ I
29.250	-.0001	I-----+ I
30.000	-.0002	I----+ I
30.750	-.0003	I----+ I
31.500	-.0004	I----+ I
32.250	-.0005	I---+ I
33.000	-.0005	I---+ I
33.750	-.0005	I---+ I
34.500	-.0005	I---+ I
35.250	-.0005	I---+ I
36.000	-.0005	I---+ I
36.750	-.0004	I---+ I
37.500	-.0004	I----+ I
38.250	-.0004	I----+ I
39.000	-.0004	I----+ I
39.750	-.0004	I----+ I
40.500	-.0003	I----+ I
41.250	-.0003	I----+ I
42.000	-.0003	I----+ I
42.750	-.0003	I----+ I
43.500	-.0003	I----+ I
44.250	-.0003	I----+ I
45.000	-.0003	I----+ I
45.750	-.0002	I----+ I
46.500	-.0002	I----+ I
47.250	-.0002	I----+ I
48.000	-.0002	I----+ I
48.750	-.0002	I----+ I
49.500	-.0002	I----+ I
50.250	-.0002	I----+ I
51.000	-.0002	I----+ I
51.750	-.0002	I----+ I
52.500	-.0002	I----+ I
53.250	-.0002	I----+ I
54.000	-.0002	I----+ I
54.750	-.0002	I----+ I
55.500	-.0002	I----+ I
56.250	-.0002	I----+ I
57.000	-.0002	I----+ I
57.750	-.0002	I----+ I
58.500	-.0002	I----+ I
59.250	-.0002	I----+ I
60.000	-.0002	I----+ I

SD3.5

TEMPS	SORTTDA4A	SORTTDA30	SORTTDA55	SORTTDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0660	-.0177	.0058	.0005
8.00	-.0827	.0065	.0059	.0006
10.00	-.0932	.0170	.0063	.0007
12.00	-.1014	.0148	.0069	.0008
14.00	-.1109	.0055	.0071	.0008
16.00	-.1180	.0082	.0072	.0009
18.00	-.1219	.0104	.0074	.0009
20.00	-.1239	.0088	.0076	.0009
22.00	-.1256	.0050	.0077	.0009
24.00	-.1267	.0032	.0077	.0009
26.00	-.1272	.0023	.0078	.0009
28.00	-.1271	.0015	.0078	.0009
30.00	-.1267	.0008	.0078	.0009
32.00	-.1265	-.0011	.0078	.0009
34.00	-.1267	-.0021	.0078	.0009
36.00	-.1270	-.0021	.0078	.0009
38.00	-.1271	-.0015	.0078	.0009
40.00	-.1273	-.0014	.0078	.0009
42.00	-.1275	-.0014	.0078	.0009
44.00	-.1278	-.0013	.0078	.0009
46.00	-.1281	-.0012	.0078	.0009
48.00	-.1283	-.0009	.0078	.0009
50.00	-.1284	-.0007	.0078	.0009
52.00	-.1285	-.0007	.0078	.0009
54.00	-.1286	-.0007	.0078	.0009
56.00	-.1287	-.0006	.0078	.0009
58.00	-.1287	-.0005	.0078	.0009
60.00	-.1287	-.0005	.0078	.0009
62.00	-.1287	-.0005	.0078	.0009
64.00	-.1287	-.0005	.0078	.0009
66.00	-.1286	-.0005	.0078	.0009
68.00	-.1286	-.0005	.0078	.0009
70.00	-.1286	-.0004	.0078	.0009
72.00	-.1286	-.0004	.0078	.0009
74.00	-.1286	-.0004	.0078	.0009
76.00	-.1286	-.0004	.0078	.0009
78.00	-.1286	-.0003	.0078	.0009
80.00	-.1286	-.0003	.0078	.0009
82.00	-.1286	-.0003	.0078	.0009
84.00	-.1286	-.0003	.0078	.0009
86.00	-.1286	-.0002	.0078	.0009
88.00	-.1286	-.0002	.0078	.0009
90.00	-.1286	-.0002	.0078	.0009
92.00	-.1286	-.0002	.0078	.0009
94.00	-.1286	-.0002	.0078	.0009
96.00	-.1285	-.0002	.0078	.0009
98.00	-.1285	-.0002	.0078	.0009
100.00	-.1285	-.0002	.0078	.0009
102.00	-.1285	-.0001	.0078	.0009
104.00	-.1285	-.0001	.0078	.0009
106.00	-.1285	-.0001	.0078	.0009
108.00	-.1285	-.0001	.0078	.0009
110.00	-.1285	-.0001	.0078	.0009
112.00	-.1285	-.0001	.0078	.0009
114.00	-.1285	-.0001	.0078	.0009
116.00	-.1285	-.0001	.0078	.0009
118.00	-.1285	-.0001	.0078	.0009
120.00	-.1285	-.0001	.0078	.0009
122.00	-.1285	-.0001	.0078	.0009
124.00	-.1285	-.0001	.0078	.0009
126.00	-.1285	-.0001	.0078	.0009
128.00	-.1285	-.0001	.0078	.0009
130.00	-.1285	-.0001	.0078	.0009
132.00	-.1285	-.0001	.0078	.0009
134.00	-.1285	-.0001	.0078	.0009
136.00	-.1285	-.0001	.0078	.0009
138.00	-.1285	-.0001	.0078	.0009
140.00	-.1285	-.0001	.0078	.0009
142.00	-.1285	-.0001	.0078	.0009
144.00	-.1285	-.0001	.0078	.0009
146.00	-.1285	-.0001	.0078	.0009
148.00	-.1285	-.0001	.0078	.0009
150.00	-.1285	-.0001	.0078	.0009
152.00	-.1285	-.0001	.0078	.0009
154.00	-.1285	-.0001	.0078	.0009
156.00	-.1285	-.0001	.0078	.0009
158.00	-.1285	-.0001	.0078	.0009
160.00	-.1285	-.0001	.0078	.0009

SD4

RLO discreto de acción simple con un retardo de 4 segundos en el cálculo de la acción de control (T = 8 segundos).

Diseño según [62.13] (penalización en kT) y sin considerar el retardo.

(simulación con el retardo de cálculo).

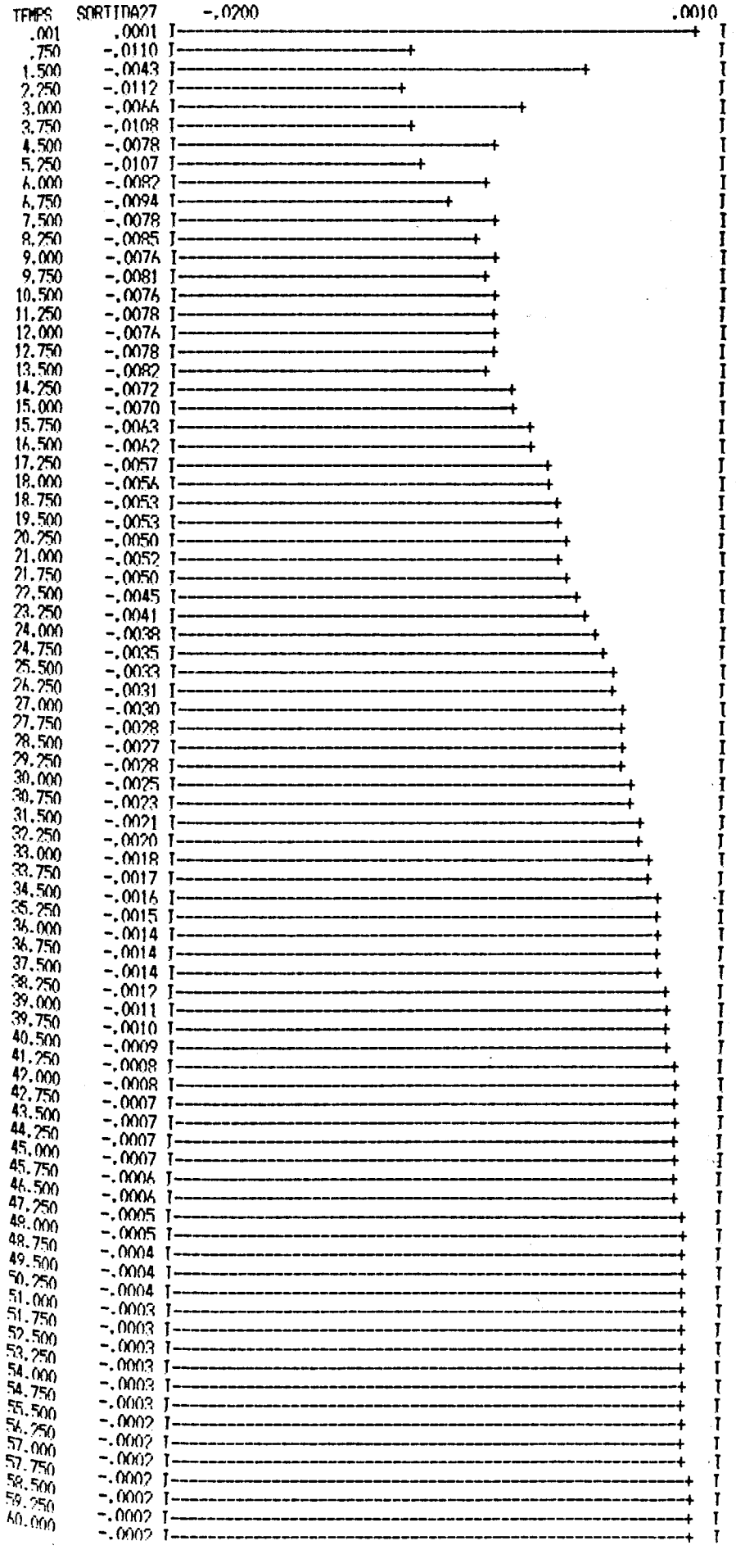
BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)

SD4.1

TEMPS	SORTIDA24	-.0600	.0200
.001	.0001	I——————————+	I
.750	-.0212	I————————+	I
1.500	-.0320	I———————+	I
2.250	-.0381	I——————+	I
3.000	-.0397	I——————+	I
3.750	-.0357	I———————+	I
4.500	-.0314	I———————+	I
5.250	-.0241	I————————+	I
6.000	-.0176	I—————————+	I
6.750	-.0089	I——————————+	I
7.500	-.0026	I———————————+	I
8.250	.0040	I————————————+	I
9.000	.0071	I————————————+	I
9.750	.0100	I————————————+	I
10.500	.0099	I————————————+	I
11.250	.0098	I————————————+	I
12.000	.0079	I————————————+	I
12.750	.0063	I————————————+	I
13.500	.0035	I———————————+	I
14.250	.0030	I———————————+	I
15.000	.0034	I———————————+	I
15.750	.0047	I————————————+	I
16.500	.0059	I————————————+	I
17.250	.0069	I————————————+	I
18.000	.0073	I————————————+	I
18.750	.0072	I————————————+	I
19.500	.0067	I————————————+	I
20.250	.0058	I————————————+	I
21.000	.0041	I————————————+	I
21.750	.0034	I———————————+	I
22.500	.0029	I———————————+	I
23.250	.0037	I———————————+	I
24.000	.0042	I————————————+	I
24.750	.0050	I————————————+	I
25.500	.0051	I————————————+	I
26.250	.0052	I————————————+	I
27.000	.0047	I————————————+	I
27.750	.0042	I————————————+	I
28.500	.0034	I———————————+	I
29.250	.0022	I——————————+	I
30.000	.0017	I——————————+	I
30.750	.0014	I——————————+	I
31.500	.0015	I——————————+	I
32.250	.0016	I——————————+	I
33.000	.0018	I——————————+	I
33.750	.0017	I——————————+	I
34.500	.0016	I——————————+	I
35.250	.0014	I——————————+	I
36.000	.0011	I——————————+	I
36.750	.0006	I———————————+	I
37.500	.0002	I———————————+	I
38.250	-.0002	I———————————+	I
39.000	-.0002	I———————————+	I
39.750	-.0002	I———————————+	I
40.500	-.0001	I———————————+	I
41.250	-.0001	I———————————+	I
42.000	-.0001	I———————————+	I
42.750	-.0002	I———————————+	I
43.500	-.0003	I———————————+	I
44.250	-.0005	I————————————+	I
45.000	-.0007	I————————————+	I
45.750	-.0008	I————————————+	I
46.500	-.0009	I————————————+	I
47.250	-.0009	I————————————+	I
48.000	-.0008	I————————————+	I
48.750	-.0008	I————————————+	I
49.500	-.0008	I————————————+	I
50.250	-.0008	I————————————+	I
51.000	-.0008	I————————————+	I
51.750	-.0009	I————————————+	I
52.500	-.0009	I————————————+	I
53.250	-.0010	I————————————+	I
54.000	-.0011	I————————————+	I
54.750	-.0011	I————————————+	I
55.500	-.0010	I————————————+	I
56.250	-.0010	I————————————+	I
57.000	-.0009	I————————————+	I
57.750	-.0009	I————————————+	I
58.500	-.0009	I————————————+	I
59.250	-.0009	I————————————+	I
60.000	-.0009	I————————————+	I

SD4.2

BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)



SD4.3

```
BLOC FIX Y (20)  MINIM (    -.0007)  MAXIM (     .0150)

TEMPS   SORTIDA20     -.0007                                    .0150
  .001      .0001 I-+                                            I
  .750     -.0003 I+                                             I
 1.500      .0001 I-+                                            I
 2.250      .0004 I--+                                           I
 3.000      .0010 I---+                                          I
 3.750      .0015 I-----+                                        I
 4.500      .0019 I------+                                       I
 5.250      .0017 I------+                                       I
 6.000      .0024 I-------+                                      I
 6.750      .0029 I--------+                                     I
 7.500      .0031 I---------+                                    I
 8.250      .0031 I---------+                                    I
 9.000      .0029 I--------+                                     I
 9.750      .0027 I--------+                                     I
10.500      .0025 I-------+                                      I
11.250      .0023 I-------+                                      I
12.000      .0022 I-------+                                      I
12.750      .0017 I------+                                       I
13.500      .0019 I------+                                       I
14.250      .0028 I--------+                                     I
15.000      .0035 I----------+                                   I
15.750      .0040 I-----------+                                  I
16.500      .0044 I------------+                                 I
17.250      .0046 I-------------+                                I
18.000      .0047 I-------------+                                I
18.750      .0048 I-------------+                                I
19.500      .0048 I-------------+                                I
20.250      .0049 I-------------+                                I
21.000      .0046 I-------------+                                I
21.750      .0051 I--------------+                               I
22.500      .0057 I---------------+                              I
23.250      .0062 I----------------+                             I
24.000      .0065 I----------------+                             I
24.750      .0068 I-----------------+                            I
25.500      .0069 I-----------------+                            I
26.250      .0070 I-----------------+                            I
27.000      .0071 I-----------------+                            I
27.750      .0072 I------------------+                           I
28.500      .0072 I------------------+                           I
29.250      .0072 I------------------+                           I
30.000      .0075 I-------------------+                          I
30.750      .0078 I--------------------+                         I
31.500      .0080 I---------------------+                        I
32.250      .0082 I----------------------+                       I
33.000      .0083 I----------------------+                       I
33.750      .0084 I----------------------+                       I
34.500      .0085 I-----------------------+                      I
35.250      .0086 I-----------------------+                      I
36.000      .0086 I-----------------------+                      I
36.750      .0086 I-----------------------+                      I
37.500      .0087 I-----------------------+                      I
38.250      .0089 I------------------------+                     I
39.000      .0090 I-------------------------+                    I
39.750      .0091 I-------------------------+                    I
40.500      .0092 I-------------------------+                    I
41.250      .0092 I--------------------------+                   I
42.000      .0093 I--------------------------+                   I
42.750      .0093 I--------------------------+                   I
43.500      .0094 I--------------------------+                   I
44.250      .0094 I--------------------------+                   I
45.000      .0094 I--------------------------+                   I
45.750      .0094 I--------------------------+                   I
46.500      .0095 I---------------------------+                  I
47.250      .0096 I---------------------------+                  I
48.000      .0096 I---------------------------+                  I
48.750      .0097 I---------------------------+                  I
49.500      .0097 I---------------------------+                  I
50.250      .0097 I---------------------------+                  I
51.000      .0097 I---------------------------+                  I
51.750      .0097 I---------------------------+                  I
52.500      .0098 I----------------------------+                 I
53.250      .0098 I----------------------------+                 I
54.000      .0098 I----------------------------+                 I
54.750      .0098 I----------------------------+                 I
55.500      .0099 I----------------------------+                 I
56.250      .0099 I----------------------------+                 I
57.000      .0099 I----------------------------+                 I
57.750      .0099 I----------------------------+                 I
58.500      .0099 I----------------------------+                 I
59.250      .0099 I----------------------------+                 I
60.000      .0099 I----------------------------+                 I
```

SD4.4

BLOC FTX V (38) MINIM (-.0014) MAXIM (.0150)

TEMPS	SORTIDA38	-.0014	.0150
.001	.0001	I——+	I
.750	-.0003	I——+	I
1.500	-.0006	I—+	I
2.250	.0002	I——+	I
3.000	.0013	I————+	I
3.750	.0029	I——————+	I
4.500	.0044	I————————+	I
5.250	.0060	I——————————+	I
6.000	.0073	I————————————+	I
6.750	.0085	I——————————————+	I
7.500	.0093	I———————————————+	I
8.250	.0098	I————————————————+	I
9.000	.0100	I————————————————+	I
9.750	.0100	I————————————————+	I
10.500	.0097	I———————————————+	I
11.250	.0094	I———————————————+	I
12.000	.0089	I——————————————+	I
12.750	.0085	I——————————————+	I
13.500	.0081	I————————————+	I
14.250	.0078	I———————————+	I
15.000	.0077	I———————————+	I
15.750	.0076	I——————————+	I
16.500	.0074	I——————————+	I
17.250	.0072	I—————————+	I
18.000	.0070	I————————+	I
18.750	.0067	I————————+	I
19.500	.0063	I———————+	I
20.250	.0060	I———————+	I
21.000	.0056	I——————+	I
21.750	.0053	I——————+	I
22.500	.0051	I—————+	I
23.250	.0049	I—————+	I
24.000	.0047	I————+	I
24.750	.0045	I————+	I
25.500	.0043	I———+	I
26.250	.0041	I———+	I
27.000	.0038	I———+	I
27.750	.0035	I———+	I
28.500	.0032	I———+	I
29.250	.0029	I———+	I
30.000	.0027	I———+	I
30.750	.0025	I———+	I
31.500	.0024	I———+	I
32.250	.0023	I———+	I
33.000	.0021	I———+	I
33.750	.0020	I———+	I
34.500	.0018	I———+	I
35.250	.0017	I———+	I
36.000	.0015	I———+	I
36.750	.0014	I———+	I
37.500	.0013	I———+	I
38.250	.0011	I———+	I
39.000	.0011	I———+	I
39.750	.0010	I———+	I
40.500	.0009	I———+	I
41.250	.0008	I———+	I
42.000	.0008	I———+	I
42.750	.0007	I———+	I
43.500	.0006	I———+	I
44.250	.0006	I———+	I
45.000	.0005	I———+	I
45.750	.0004	I———+	I
46.500	.0004	I———+	I
47.250	.0003	I———+	I
48.000	.0003	I———+	I
48.750	.0003	I———+	I
49.500	.0003	I———+	I
50.250	.0002	I———+	I
51.000	.0002	I———+	I
51.750	.0002	I———+	I
52.500	.0001	I———+	I
53.250	.0001	I———+	I
54.000	.0001	I———+	I
54.750	.0001	I———+	I
55.500	-.0001	I———+	I
56.250	-.0001	I———+	I
57.000	-.0001	I———+	I
57.750	-.0001	I———+	I
58.500	-.0001	I———+	I
59.250	-.0001	I———+	I
60.000	-.0001	I———+	I

SD4.5

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0657	-.0168	.0057	.0005
8.00	-.0842	.0019	.0059	.0006
10.00	-.0988	.0095	.0060	.0008
12.00	-.1123	.0084	.0062	.0009
14.00	-.1270	.0022	.0062	.0010
16.00	-.1399	.0050	.0063	.0011
18.00	-.1505	.0071	.0064	.0012
20.00	-.1597	.0060	.0065	.0012
22.00	-.1690	.0025	.0065	.0013
24.00	-.1767	.0042	.0065	.0013
26.00	-.1827	.0050	.0066	.0013
28.00	-.1876	.0038	.0066	.0013
30.00	-.1925	.0014	.0066	.0014
32.00	-.1966	.0015	.0066	.0014
34.00	-.1998	.0016	.0066	.0014
36.00	-.2025	.0010	.0066	.0014
38.00	-.2050	-.0002	.0066	.0014
40.00	-.2072	-.0002	.0066	.0014
42.00	-.2088	-.0001	.0066	.0014
44.00	-.2102	-.0004	.0066	.0014
46.00	-.2115	-.0009	.0066	.0014
48.00	-.2126	-.0009	.0066	.0014
50.00	-.2135	-.0008	.0066	.0014
52.00	-.2143	-.0009	.0066	.0014
54.00	-.2149	-.0011	.0066	.0014
56.00	-.2155	-.0010	.0066	.0014
58.00	-.2160	-.0009	.0066	.0014
60.00	-.2164	-.0009	.0066	.0014
62.00	-.2167	-.0010	.0066	.0014
64.00	-.2170	-.0009	.0066	.0014
66.00	-.2173	-.0008	.0067	.0014
68.00	-.2175	-.0008	.0067	.0014
70.00	-.2177	-.0008	.0067	.0014
72.00	-.2178	-.0008	.0067	.0014
74.00	-.2179	-.0007	.0067	.0014
76.00	-.2180	-.0007	.0067	.0014
78.00	-.2181	-.0007	.0067	.0014
80.00	-.2182	-.0006	.0067	.0014
82.00	-.2183	-.0006	.0067	.0014
84.00	-.2183	-.0005	.0067	.0014
86.00	-.2184	-.0005	.0067	.0014
88.00	-.2184	-.0005	.0067	.0014
90.00	-.2184	-.0004	.0067	.0014
92.00	-.2185	-.0004	.0067	.0014
94.00	-.2185	-.0004	.0067	.0014
96.00	-.2185	-.0004	.0067	.0014
98.00	-.2185	-.0003	.0067	.0014
100.00	-.2185	-.0003	.0067	.0014
102.00	-.2185	-.0003	.0067	.0014
104.00	-.2185	-.0003	.0067	.0014
106.00	-.2185	-.0003	.0067	.0014
108.00	-.2186	-.0002	.0067	.0014
110.00	-.2186	-.0002	.0067	.0014
112.00	-.2186	-.0002	.0067	.0014
114.00	-.2186	-.0002	.0067	.0014
116.00	-.2186	-.0002	.0067	.0014
118.00	-.2186	-.0002	.0067	.0014
120.00	-.2186	-.0002	.0067	.0014
122.00	-.2186	-.0002	.0067	.0014
124.00	-.2186	-.0001	.0067	.0014
126.00	-.2186	-.0001	.0067	.0014
128.00	-.2186	-.0001	.0067	.0014
130.00	-.2186	-.0001	.0067	.0014
132.00	-.2186	-.0001	.0067	.0014
134.00	-.2186	-.0001	.0067	.0014
136.00	-.2186	-.0001	.0067	.0014
138.00	-.2186	-.0001	.0067	.0014
140.00	-.2186	-.0001	.0067	.0014
142.00	-.2186	-.0001	.0067	.0014
144.00	-.2186	-.0001	.0067	.0014
146.00	-.2186	-.0001	.0067	.0014
148.00	-.2186	-.0001	.0067	.0014
150.00	-.2186	-.0001	.0067	.0014
152.00	-.2185	-.0001	.0067	.0014
154.00	-.2185	-.0001	.0067	.0014
156.00	-.2185	-.0001	.0067	.0014
158.00	-.2185	-.0001	.0067	.0014
160.00	-.2185	-.0001	.0067	.0014

SD5

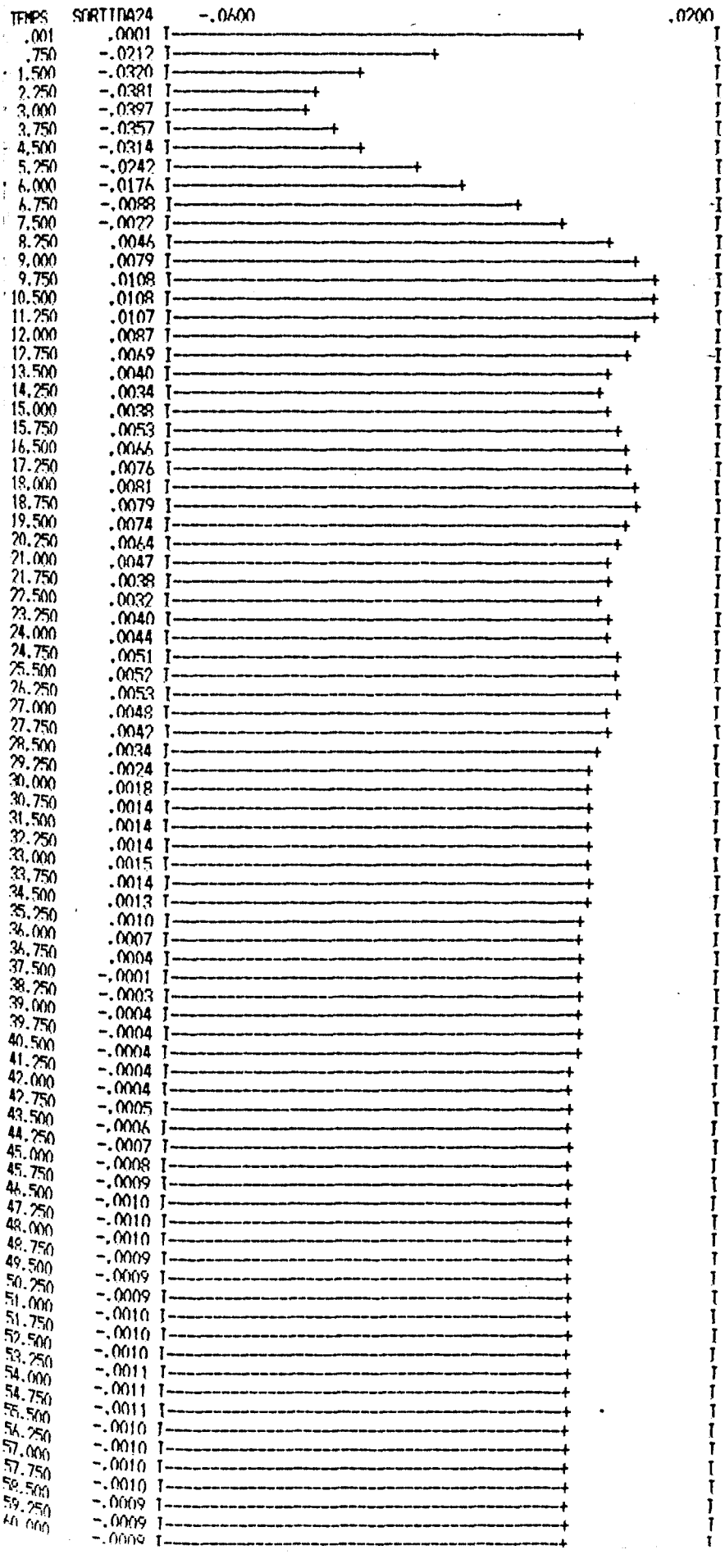
RLO discreto de acción simple con un retardo de 4 segundos en el cálculo de la acción de control (T = 8 segundos).

Diseño según [62.13] (penalización en kT) y considerando el retardo.

(simulación con el retardo de cálculo).

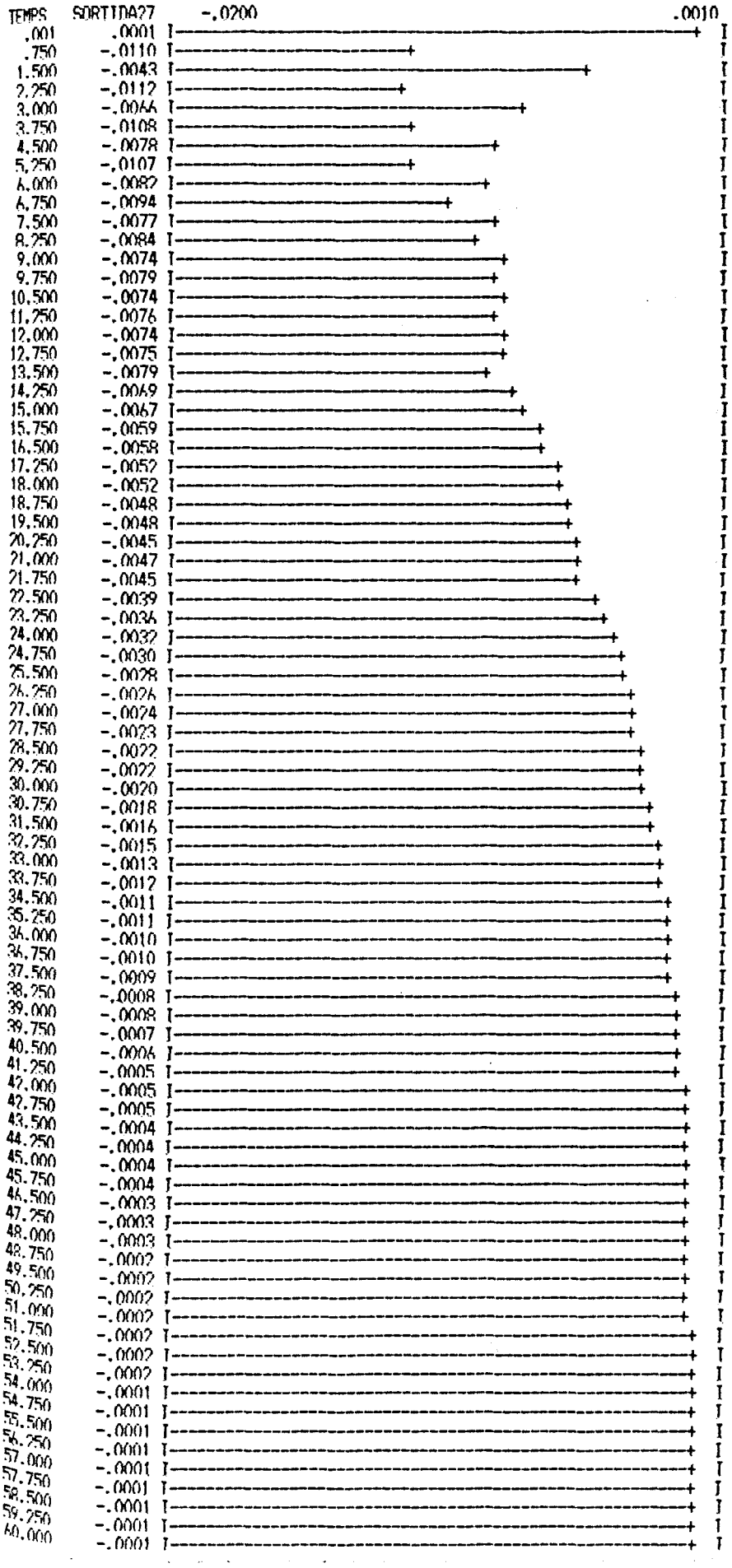
SD5.1

BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)



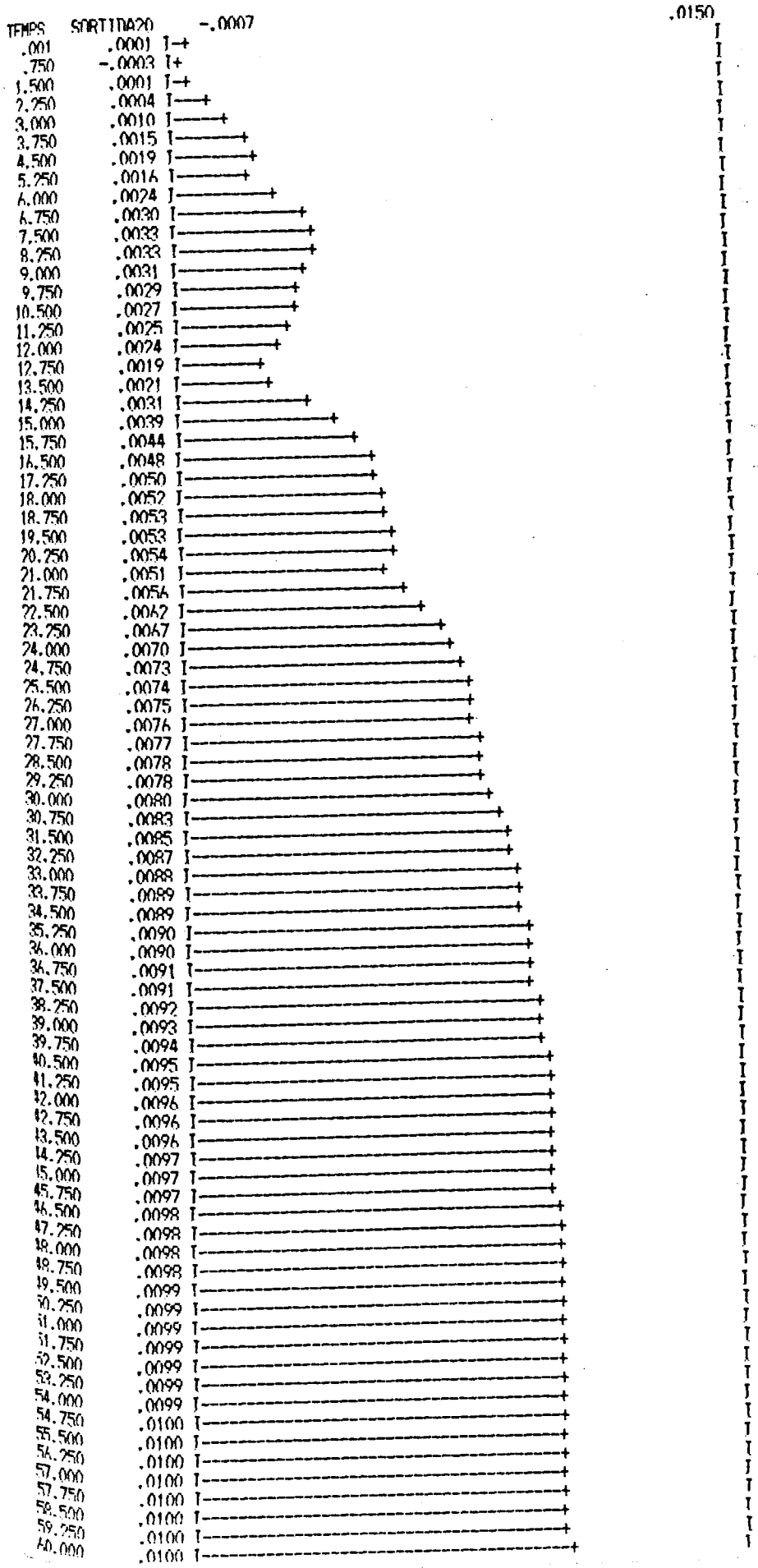
SD5.2

BLOC ETX Y (27) MINIM (-.0200) MAXIM (.0010)



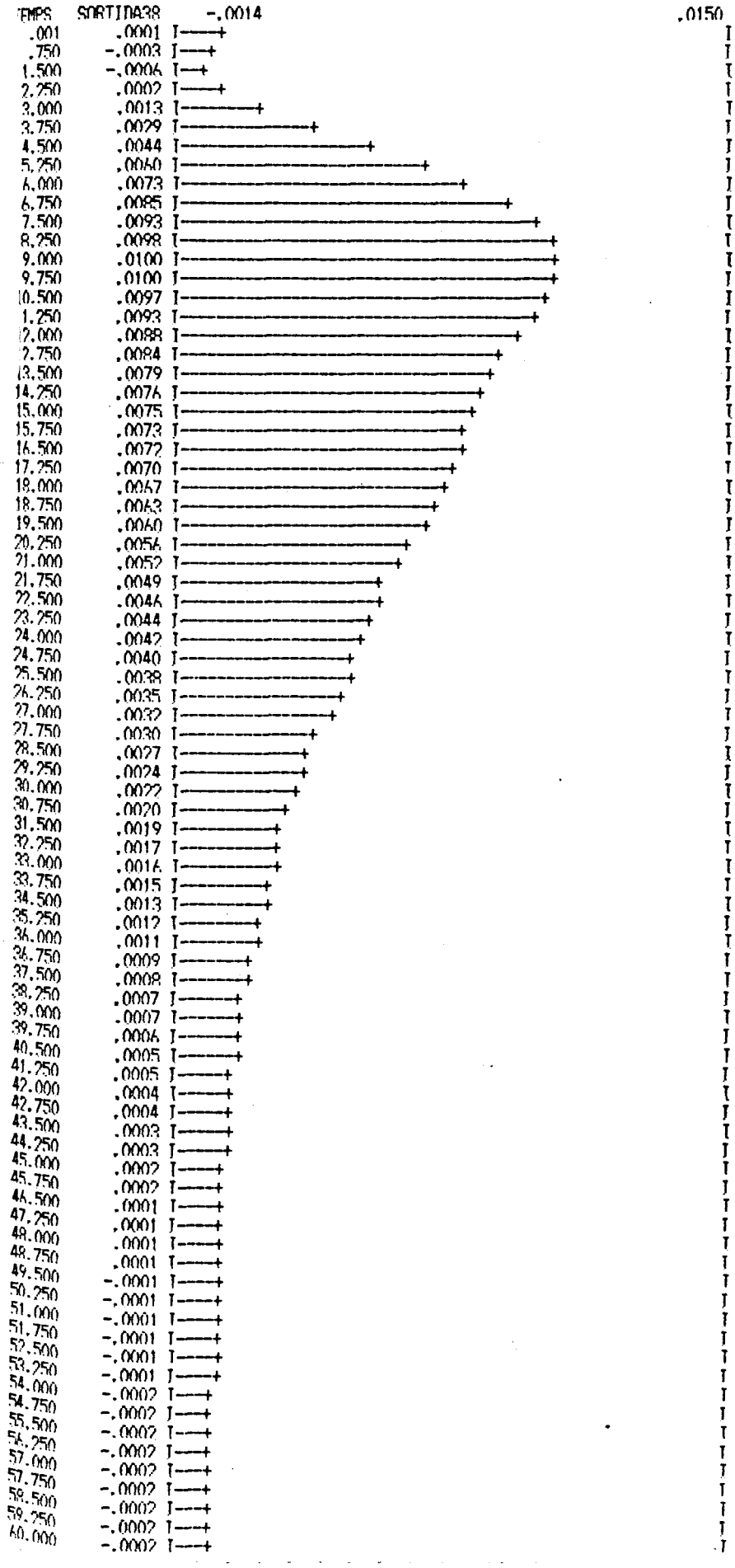
SD5.3

PLOT FIX Y (20) MINIM (-.0007) MAXIM (.0150)



SD5.4

BLOC FIX V (38) MINIM (-.0014) MAXIM (.0150)



SD5.5

TEMPS	SORTIDA44	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0657	-.0169	.0057	.0005
8.00	-.0840	.0024	.0059	.0006
10.00	-.0982	.0104	.0060	.0008
12.00	-.1110	.0092	.0062	.0009
14.00	-.1251	.0025	.0063	.0010
16.00	-.1373	.0055	.0064	.0011
18.00	-.1468	.0078	.0065	.0011
20.00	-.1550	.0066	.0066	.0012
22.00	-.1632	.0029	.0066	.0012
24.00	-.1698	.0043	.0067	.0012
26.00	-.1746	.0051	.0067	.0013
28.00	-.1785	.0039	.0067	.0013
30.00	-.1823	.0015	.0068	.0013
32.00	-.1854	.0013	.0068	.0013
34.00	-.1877	.0013	.0068	.0013
36.00	-.1896	.0007	.0068	.0013
38.00	-.1913	-.0003	.0068	.0013
40.00	-.1928	-.0004	.0068	.0013
42.00	-.1939	-.0005	.0068	.0013
44.00	-.1948	-.0007	.0068	.0013
46.00	-.1956	-.0010	.0068	.0013
48.00	-.1963	-.0010	.0068	.0013
50.00	-.1968	-.0010	.0068	.0013
52.00	-.1973	-.0010	.0068	.0013
54.00	-.1977	-.0011	.0068	.0013
56.00	-.1980	-.0010	.0068	.0013
58.00	-.1983	-.0010	.0068	.0013
60.00	-.1985	-.0009	.0068	.0013
62.00	-.1987	-.0010	.0068	.0013
64.00	-.1988	-.0009	.0068	.0013
66.00	-.1990	-.0008	.0068	.0013
68.00	-.1991	-.0008	.0068	.0013
70.00	-.1992	-.0008	.0068	.0013
72.00	-.1993	-.0007	.0068	.0013
74.00	-.1993	-.0006	.0068	.0013
76.00	-.1994	-.0006	.0068	.0013
78.00	-.1994	-.0006	.0068	.0013
80.00	-.1994	-.0005	.0068	.0013
82.00	-.1995	-.0005	.0068	.0013
84.00	-.1995	-.0005	.0068	.0013
86.00	-.1995	-.0004	.0068	.0013
88.00	-.1995	-.0004	.0068	.0013
90.00	-.1995	-.0004	.0068	.0013
92.00	-.1995	-.0004	.0068	.0013
94.00	-.1995	-.0003	.0068	.0013
96.00	-.1995	-.0003	.0068	.0013
98.00	-.1995	-.0003	.0068	.0013
100.00	-.1995	-.0003	.0068	.0013
102.00	-.1995	-.0003	.0068	.0013
104.00	-.1995	-.0002	.0068	.0013
106.00	-.1995	-.0002	.0068	.0013
108.00	-.1995	-.0002	.0068	.0013
110.00	-.1995	-.0002	.0068	.0013
112.00	-.1995	-.0002	.0068	.0013
114.00	-.1995	-.0002	.0068	.0013
116.00	-.1995	-.0002	.0068	.0013
118.00	-.1995	-.0002	.0068	.0013
120.00	-.1995	-.0001	.0068	.0013
122.00	-.1995	-.0001	.0068	.0013
124.00	-.1995	-.0001	.0068	.0013
126.00	-.1995	-.0001	.0068	.0013
128.00	-.1995	-.0001	.0068	.0013
130.00	-.1995	-.0001	.0068	.0013
132.00	-.1995	-.0001	.0068	.0013
134.00	-.1995	-.0001	.0068	.0013
136.00	-.1995	-.0001	.0068	.0013
138.00	-.1995	-.0001	.0068	.0013
140.00	-.1995	-.0001	.0068	.0013
142.00	-.1995	-.0001	.0068	.0013
144.00	-.1995	-.0001	.0068	.0013
146.00	-.1995	-.0001	.0068	.0013
148.00	-.1995	-.0001	.0068	.0013
150.00	-.1995	-.0001	.0068	.0013
152.00	-.1995	-.0001	.0068	.0013
154.00	-.1995	-.0001	.0068	.0013
156.00	-.1995	-.0001	.0068	.0013
158.00	-.1995	-.0001	.0068	.0013
160.00	-.1995	-.0001	.0068	.0013

SD6

RLO discreto de acción simple con un retaro de 4 segundos en el cálculo de la acción de control (T = 8 segundos).

Diseñado según [62.11] (penalización continua) y considerando el retardo.

(simulación con el retardo de cálculo).

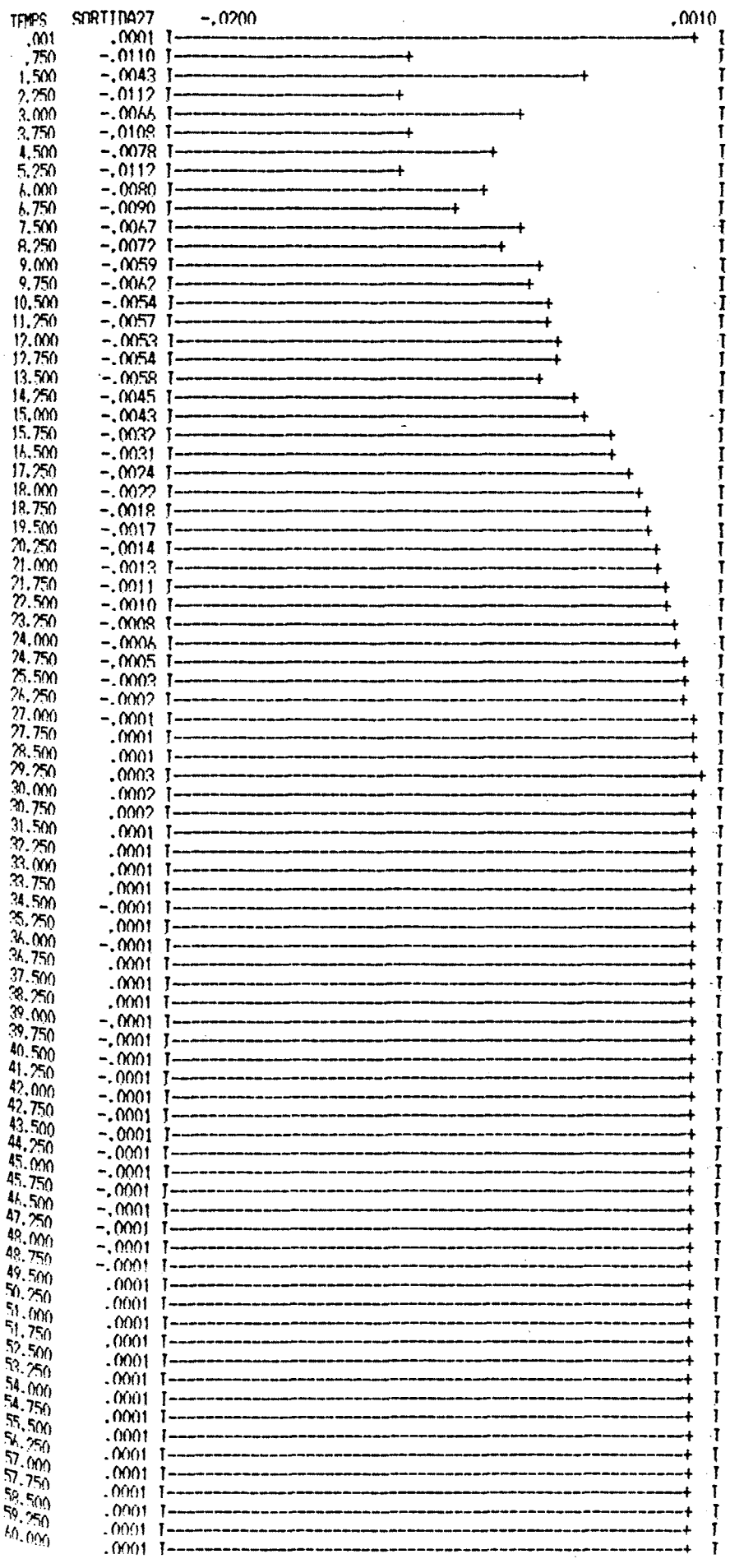
SD6.1

PLOT FIX Y (24) MINIM (-.0600) MAXIM (.0200)

TEMPS	SORTIA24	-.0600	.0200
.001	.0001	I——————————+	I
.750	-.0212	I————————+	I
1.500	-.0320	I——————+	I
2.250	-.0381	I————————+	I
3.000	-.0397	I————————+	I
3.750	-.0357	I————————+	I
4.500	-.0314	I——————+	I
5.250	-.0252	I————————+	I
6.000	-.0176	I————————+	I
6.750	-.0077	I——————————+	I
7.500	.0013	I——————————+	I
8.250	.0097	I——————————+	I
9.000	.0146	I——————————+	I
9.750	.0182	I——————————+	I
10.500	.0184	I——————————+	I
11.250	.0178	I——————————+	I
12.000	.0151	I——————————+	I
12.750	.0122	I——————————+	I
13.500	.0082	I——————————+	I
14.250	.0068	I——————————+	I
15.000	.0068	I——————————+	I
15.750	.0081	I——————————+	I
16.500	.0094	I——————————+	I
17.250	.0103	I——————————+	I
18.000	.0107	I——————————+	I
18.750	.0104	I——————————+	I
19.500	.0097	I——————————+	I
20.250	.0085	I——————————+	I
21.000	.0071	I——————————+	I
21.750	.0057	I——————————+	I
22.500	.0045	I——————————+	I
23.250	.0036	I——————————+	I
24.000	.0029	I——————————+	I
24.750	.0024	I——————————+	I
25.500	.0020	I——————————+	I
26.250	.0017	I——————————+	I
27.000	.0014	I——————————+	I
27.750	.0011	I——————————+	I
28.500	.0008	I——————————+	I
29.250	.0009	I——————————+	I
30.000	.0004	I——————————+	I
30.750	-.0001	I——————————+	I
31.500	-.0009	I——————————+	I
32.250	-.0014	I——————————+	I
33.000	-.0020	I——————————+	I
33.750	-.0022	I——————————+	I
34.500	-.0024	I——————————+	I
35.250	-.0024	I——————————+	I
36.000	-.0022	I——————————+	I
36.750	-.0020	I——————————+	I
37.500	-.0018	I——————————+	I
38.250	-.0016	I——————————+	I
39.000	-.0015	I——————————+	I
39.750	-.0014	I——————————+	I
40.500	-.0013	I——————————+	I
41.250	-.0013	I——————————+	I
42.000	-.0012	I——————————+	I
42.750	-.0012	I——————————+	I
43.500	-.0012	I——————————+	I
44.250	-.0012	I——————————+	I
45.000	-.0012	I——————————+	I
45.750	-.0011	I——————————+	I
46.500	-.0010	I——————————+	I
47.250	-.0009	I——————————+	I
48.000	-.0008	I——————————+	I
48.750	-.0007	I——————————+	I
49.500	-.0006	I——————————+	I
50.250	-.0005	I——————————+	I
51.000	-.0005	I——————————+	I
51.750	-.0005	I——————————+	I
52.500	-.0006	I——————————+	I
53.250	-.0006	I——————————+	I
54.000	-.0006	I——————————+	I
54.750	-.0006	I——————————+	I
55.500	-.0006	I——————————+	I
56.250	-.0006	I——————————+	I
57.000	-.0005	I——————————+	I
57.750	-.0005	I——————————+	I
58.500	-.0005	I——————————+	I
59.250	-.0005	I——————————+	I
60.000	-.0005	I——————————+	I

SD6.2

BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)



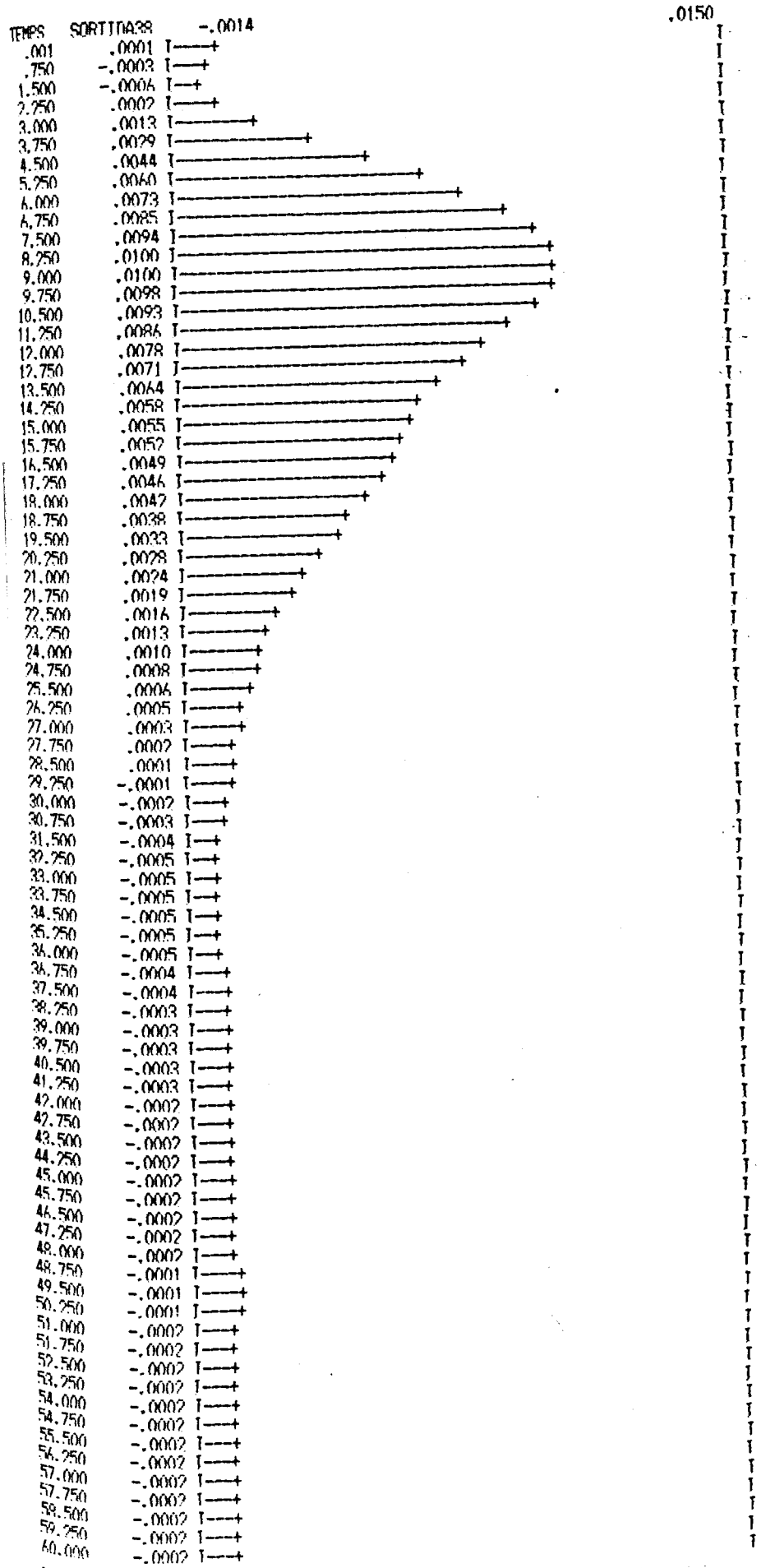
BLOC FIX Y (20) MINIM (-.0007) MAXIM (.0150)

SD6.3

```
TEMPS   SORTIDA20     -.0007                                        .0150
  .001      .0001 I-+                                                   I
  .750     -.0003 I+                                                    I
 1.500      .0001 I-+                                                   I
 2.250      .0004 I--+                                                  I
 3.000      .0010 I----+                                                I
 3.750      .0015 I-------+                                             I
 4.500      .0019 I-------+                                             I
 5.250      .0012 I-----+                                               I
 6.000      .0027 I----------+                                          I
 6.750      .0039 I-------------+                                       I
 7.500      .0047 I---------------+                                     I
 8.250      .0050 I----------------+                                    I
 9.000      .0050 I----------------+                                    I
 9.750      .0048 I----------------+                                    I
10.500      .0046 I---------------+                                     I
11.250      .0045 I---------------+                                     I
12.000      .0044 I---------------+                                     I
12.750      .0038 I-------------+                                       I
13.500      .0041 I-------------+                                       I
14.250      .0053 I-----------------+                                   I
15.000      .0063 I-------------------+                                 I
15.750      .0071 I---------------------+                               I
16.500      .0076 I----------------------+                              I
17.250      .0079 I-----------------------+                             I
18.000      .0081 I-----------------------+                             I
18.750      .0083 I------------------------+                            I
19.500      .0084 I------------------------+                            I
20.250      .0085 I-------------------------+                           I
21.000      .0085 I-------------------------+                           I
21.750      .0088 I--------------------------+                          I
22.500      .0090 I---------------------------+                         I
23.250      .0092 I----------------------------+                        I
24.000      .0094 I----------------------------+                        I
24.750      .0096 I-----------------------------+                       I
25.500      .0097 I-----------------------------+                       I
26.250      .0098 I------------------------------+                      I
27.000      .0099 I------------------------------+                      I
27.750      .0100 I-------------------------------+                     I
28.500      .0101 I-------------------------------+                     I
29.250      .0103 I-------------------------------+                     I
30.000      .0101 I-------------------------------+                     I
30.750      .0100 I-------------------------------+                     I
31.500      .0100 I------------------------------+                      I
32.250      .0100 I------------------------------+                      I
33.000      .0100 I------------------------------+                      I
33.750      .0100 I------------------------------+                      I
34.500      .0100 I------------------------------+                      I
35.250      .0100 I-------------------------------+                     I
36.000      .0101 I-------------------------------+                     I
36.750      .0101 I-------------------------------+                     I
37.500      .0101 I-------------------------------+                     I
38.250      .0101 I-------------------------------+                     I
39.000      .0101 I-------------------------------+                     I
39.750      .0100 I-------------------------------+                     I
40.500      .0100 I-------------------------------+                     I
41.250      .0100 I------------------------------+                      I
42.000      .0100 I------------------------------+                      I
42.750      .0100 I------------------------------+                      I
43.500      .0100 I------------------------------+                      I
44.250      .0100 I------------------------------+                      I
45.000      .0100 I------------------------------+                      I
45.750      .0100 I------------------------------+                      I
46.500      .0100 I-------------------------------+                     I
47.250      .0100 I-------------------------------+                     I
48.000      .0100 I-------------------------------+                     I
48.750      .0101 I-------------------------------+                     I
49.500      .0101 I-------------------------------+                     I
50.250      .0101 I-------------------------------+                     I
51.000      .0101 I-------------------------------+                     I
51.750      .0101 I-------------------------------+                     I
52.500      .0100 I-------------------------------+                     I
53.250      .0100 I-------------------------------+                     I
54.000      .0101 I-------------------------------+                     I
54.750      .0101 I-------------------------------+                     I
55.500      .0101 I-------------------------------+                     I
56.250      .0101 I-------------------------------+                     I
57.000      .0101 I-------------------------------+                     I
57.750      .0101 I-------------------------------+                     I
58.500      .0101 I-------------------------------+                     I
59.250      .0101 I-------------------------------+                     I
60.000      .0101 I-------------------------------+                     I
```

SD6.4

BLOC ETX Y (38) MINIM (-.0014) MAXIM (.0150)



SD6.5

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0478	-.0349	.0043	.0003
6.00	-.0661	-.0178	.0058	.0005
8.00	-.0826	.0069	.0059	.0006
10.00	-.0927	.0177	.0063	.0007
12.00	-.1003	.0155	.0070	.0008
14.00	-.1093	.0059	.0072	.0008
16.00	-.1159	.0083	.0073	.0009
18.00	-.1193	.0104	.0075	.0009
20.00	-.1210	.0088	.0077	.0009
22.00	-.1222	.0051	.0078	.0009
24.00	-.1230	.0028	.0079	.0009
26.00	-.1233	.0017	.0079	.0009
28.00	-.1233	.0009	.0079	.0009
30.00	-.1228	.0006	.0079	.0009
32.00	-.1224	-.0013	.0079	.0009
34.00	-.1229	-.0023	.0079	.0009
36.00	-.1233	-.0022	.0079	.0009
38.00	-.1237	-.0017	.0079	.0009
40.00	-.1239	-.0013	.0079	.0009
42.00	-.1242	-.0012	.0079	.0009
44.00	-.1245	-.0012	.0079	.0009
46.00	-.1248	-.0011	.0079	.0009
48.00	-.1251	-.0008	.0079	.0009
50.00	-.1252	-.0006	.0079	.0009
52.00	-.1252	-.0005	.0079	.0009
54.00	-.1253	-.0006	.0079	.0009
56.00	-.1254	-.0006	.0079	.0009
58.00	-.1254	-.0005	.0079	.0009
60.00	-.1254	-.0005	.0079	.0009
62.00	-.1253	-.0005	.0079	.0009
64.00	-.1253	-.0005	.0079	.0009
66.00	-.1253	-.0005	.0079	.0009
68.00	-.1253	-.0005	.0079	.0009
70.00	-.1253	-.0004	.0079	.0009
72.00	-.1253	-.0004	.0079	.0009
74.00	-.1253	-.0004	.0079	.0009
76.00	-.1253	-.0004	.0079	.0009
78.00	-.1253	-.0003	.0079	.0009
80.00	-.1253	-.0003	.0079	.0009
82.00	-.1253	-.0003	.0079	.0009
84.00	-.1253	-.0003	.0079	.0009
86.00	-.1253	-.0002	.0079	.0009
88.00	-.1253	-.0002	.0079	.0009
90.00	-.1253	-.0002	.0079	.0009
92.00	-.1253	-.0002	.0079	.0009
94.00	-.1252	-.0002	.0079	.0009
96.00	-.1252	-.0002	.0079	.0009
98.00	-.1252	-.0002	.0079	.0009
100.00	-.1252	-.0002	.0079	.0009
102.00	-.1252	-.0001	.0079	.0009
104.00	-.1252	-.0001	.0079	.0009
106.00	-.1252	-.0001	.0079	.0009
108.00	-.1252	-.0001	.0079	.0009
110.00	-.1252	-.0001	.0079	.0009
112.00	-.1252	-.0001	.0079	.0009
114.00	-.1252	-.0001	.0079	.0009
116.00	-.1252	-.0001	.0079	.0009
118.00	-.1252	-.0001	.0079	.0009
120.00	-.1252	-.0001	.0079	.0009
122.00	-.1252	-.0001	.0079	.0009
124.00	-.1252	-.0001	.0079	.0009
126.00	-.1252	-.0001	.0079	.0009
128.00	-.1252	-.0001	.0079	.0009
130.00	-.1252	-.0001	.0079	.0009
132.00	-.1252	-.0001	.0079	.0009
134.00	-.1252	-.0001	.0079	.0009
136.00	-.1252	-.0001	.0079	.0009
138.00	-.1252	-.0001	.0079	.0009
140.00	-.1252	-.0001	.0079	.0009
142.00	-.1252	-.0001	.0079	.0009
144.00	-.1252	-.0001	.0079	.0009
146.00	-.1252	-.0001	.0079	.0009
148.00	-.1252	-.0001	.0079	.0009
150.00	-.1252	-.0001	.0079	.0009
152.00	-.1252	-.0001	.0079	.0009
154.00	-.1252	-.0001	.0079	.0009
156.00	-.1252	-.0001	.0079	.0009
158.00	-.1252	-.0001	.0079	.0009
160.00	-.1252	-.0001	.0079	.0009

SD7

RLO discreto de acción simple con un retardo de 4 segundos en el cálculo de la acción de control (T = 8 segundos).

Ajustado con los valores obtenidos con el modelo continuo (caso (I) del Capítulo 5).

(simulación con el retardo de cálculo).

BLOC EIX Y (24) MINIM (-.0600) MAXIM (.0200)

-.0600 .0200

TEMPS	SORTIDA24
.001	.0001
.750	-.0212
1.500	-.0320
2.250	-.0381
3.000	-.0397
3.750	-.0357
4.500	-.0314
5.250	-.0244
6.000	-.0176
6.750	-.0086
7.500	-.0017
8.250	.0055
9.000	.0090
9.750	.0121
10.500	.0121
11.250	.0119
12.000	.0098
12.750	.0078
13.500	.0047
14.250	.0040
15.000	.0044
15.750	.0059
16.500	.0073
17.250	.0083
18.000	.0088
18.750	.0086
19.500	.0080
20.250	.0070
21.000	.0053
21.750	.0043
22.500	.0036
23.250	.0041
24.000	.0043
24.750	.0049
25.500	.0049
26.250	.0049
27.000	.0044
27.750	.0039
28.500	.0032
29.250	.0023
30.000	.0017
30.750	.0013
31.500	.0011
32.250	.0010
33.000	.0009
33.750	.0008
34.500	.0007
35.250	.0005
36.000	.0003
36.750	.0001
37.500	-.0003
38.250	-.0005
39.000	-.0006
39.750	-.0006
40.500	-.0007
41.250	-.0007
42.000	-.0007
42.750	-.0008
43.500	-.0008
44.250	-.0009
45.000	-.0010
45.750	-.0010
46.500	-.0011
47.250	-.0011
48.000	-.0011
48.750	-.0010
49.500	-.0010
50.250	-.0010
51.000	-.0010
51.750	-.0010
52.500	-.0010
53.250	-.0011
54.000	-.0010
54.750	-.0010
55.500	-.0010
56.250	-.0010
57.000	-.0009
57.750	-.0009
58.500	-.0009
59.250	-.0009
60.000	-.0009

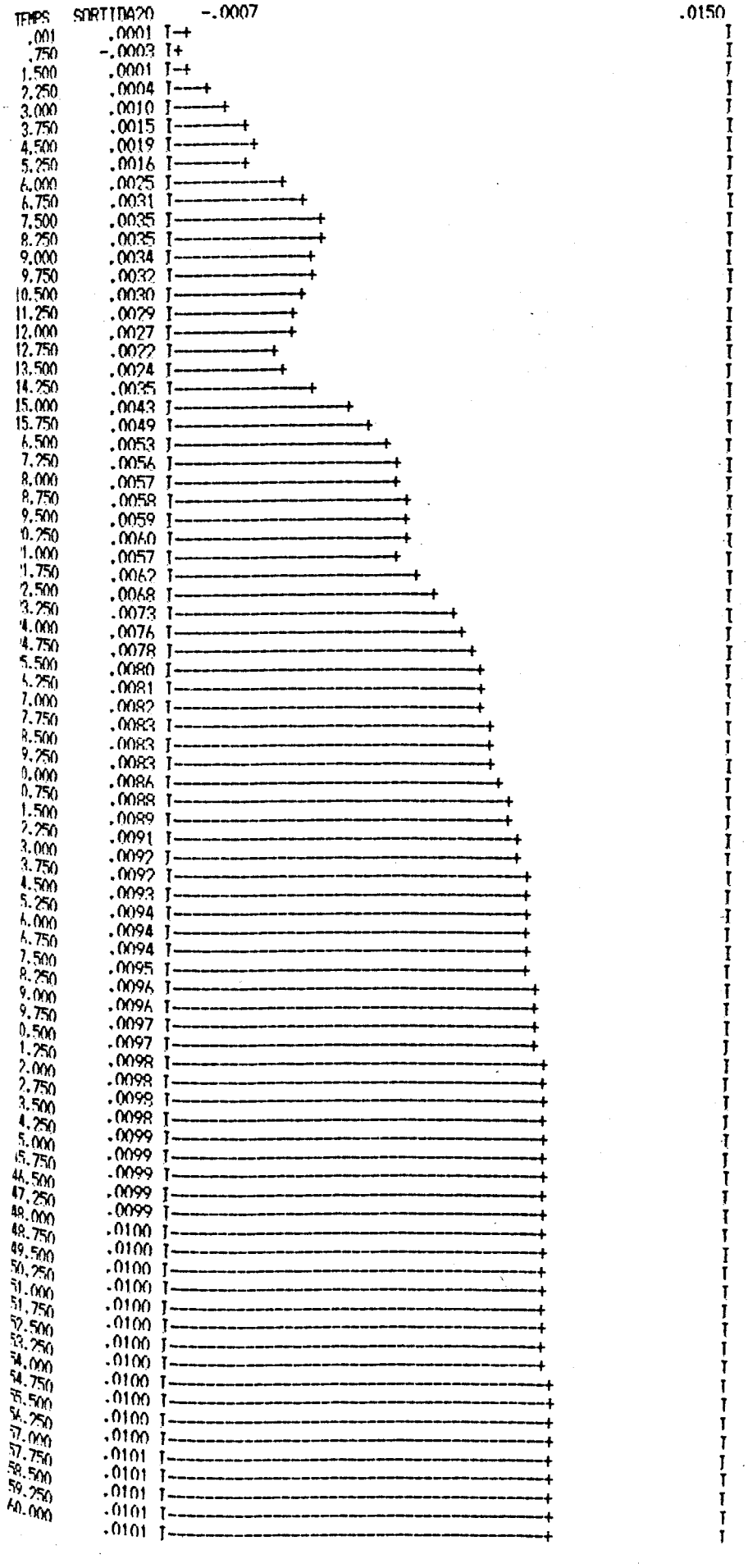
SD7.2

BLOC ETX Y (27) MINIM (-.0200) MAXIM (.0010)

TEMPS	SORTIDA27	-.0200	.0010
.001	.0001	I	I
.750	-.0110	I	I
1.500	-.0043	I	I
2.250	-.0112	I	I
3.000	-.0066	I	I
3.750	-.0108	I	I
4.500	-.0078	I	I
5.250	-.0108	I	I
6.000	-.0081	I	I
6.750	-.0093	I	I
7.500	-.0075	I	I
8.250	-.0082	I	I
9.000	-.0072	I	I
9.750	-.0076	I	I
10.500	-.0070	I	I
11.250	-.0073	I	I
12.000	-.0070	I	I
12.750	-.0072	I	I
13.500	-.0076	I	I
14.250	-.0064	I	I
15.000	-.0063	I	I
15.750	-.0054	I	I
16.500	-.0053	I	I
17.250	-.0047	I	I
18.000	-.0046	I	I
18.750	-.0042	I	I
19.500	-.0042	I	I
20.250	-.0039	I	I
21.000	-.0040	I	I
21.750	-.0038	I	I
22.500	-.0033	I	I
23.250	-.0030	I	I
24.000	-.0027	I	I
24.750	-.0024	I	I
25.500	-.0022	I	I
26.250	-.0020	I	I
27.000	-.0019	I	I
27.750	-.0017	I	I
28.500	-.0017	I	I
29.250	-.0016	I	I
30.000	-.0014	I	I
30.750	-.0013	I	I
31.500	-.0011	I	I
32.250	-.0011	I	I
33.000	-.0009	I	I
33.750	-.0009	I	I
34.500	-.0008	I	I
35.250	-.0007	I	I
36.000	-.0006	I	I
36.750	-.0006	I	I
37.500	-.0006	I	I
38.250	-.0005	I	I
39.000	-.0005	I	I
39.750	-.0004	I	I
40.500	-.0004	I	I
41.250	-.0003	I	I
42.000	-.0003	I	I
42.750	-.0003	I	I
43.500	-.0002	I	I
44.250	-.0002	I	I
45.000	-.0002	I	I
45.750	-.0002	I	I
46.500	-.0002	I	I
47.250	-.0002	I	I
48.000	-.0001	I	I
48.750	-.0001	I	I
49.500	-.0001	I	I
50.250	-.0001	I	I
51.000	-.0001	I	I
51.750	-.0001	I	I
52.500	-.0001	I	I
53.250	-.0001	I	I
54.000	-.0001	I	I
54.750	-.0001	I	I
55.500	.0001	I	I
56.250	.0001	I	I
57.000	.0001	I	I
57.750	.0001	I	I
58.500	.0001	I	I
59.250	.0001	I	I
60.000	.0001	I	I

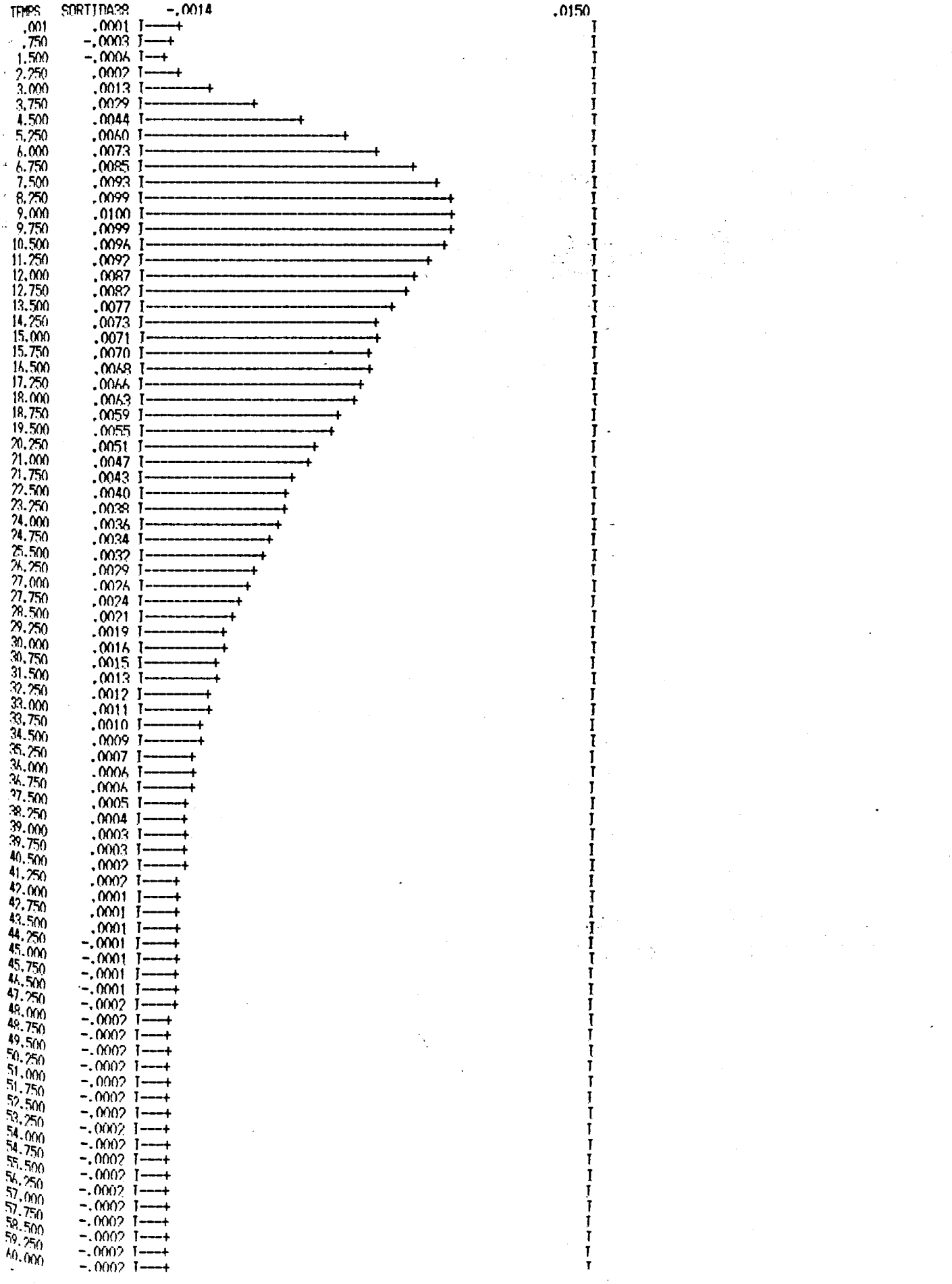
SD7.3

BLOC FIX Y (20) MINIM (-.0007) MAXIM (.0150)



BLOC FTX V (38) MINIM (-.0014) MAXIM (.0150)

SD7.4



SD7.5

TEMPS	SORTIDA4A	SORTIDA30	SORTIDA55	SORTIDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0658	-.0170	.0057	.0005
8.00	-.0838	.0032	.0059	.0006
10.00	-.0972	.0116	.0061	.0007
12.00	-.1092	.0102	.0063	.0008
14.00	-.1225	.0031	.0064	.0010
16.00	-.1336	.0062	.0065	.0010
18.00	-.1420	.0085	.0066	.0011
20.00	-.1489	.0072	.0067	.0011
22.00	-.1556	.0034	.0068	.0011
24.00	-.1610	.0043	.0068	.0012
26.00	-.1648	.0047	.0069	.0012
28.00	-.1677	.0036	.0069	.0012
30.00	-.1703	.0015	.0069	.0012
32.00	-.1725	.0010	.0069	.0012
34.00	-.1741	.0007	.0069	.0012
36.00	-.1754	.0003	.0069	.0012
38.00	-.1765	-.0005	.0069	.0012
40.00	-.1774	-.0007	.0069	.0012
42.00	-.1781	-.0008	.0069	.0012
44.00	-.1787	-.0009	.0069	.0012
46.00	-.1791	-.0011	.0069	.0012
48.00	-.1795	-.0011	.0069	.0012
50.00	-.1799	-.0010	.0069	.0012
52.00	-.1801	-.0010	.0069	.0012
54.00	-.1803	-.0011	.0069	.0012
56.00	-.1805	-.0010	.0070	.0012
58.00	-.1807	-.0009	.0070	.0012
60.00	-.1808	-.0009	.0070	.0012
62.00	-.1809	-.0009	.0070	.0012
64.00	-.1810	-.0008	.0070	.0012
66.00	-.1810	-.0007	.0070	.0012
68.00	-.1811	-.0007	.0070	.0012
70.00	-.1811	-.0007	.0070	.0012
72.00	-.1812	-.0006	.0070	.0012
74.00	-.1812	-.0006	.0070	.0012
76.00	-.1812	-.0005	.0070	.0012
78.00	-.1812	-.0005	.0070	.0012
80.00	-.1812	-.0005	.0070	.0012
82.00	-.1812	-.0004	.0070	.0012
84.00	-.1812	-.0004	.0070	.0012
86.00	-.1812	-.0004	.0070	.0012
88.00	-.1812	-.0004	.0070	.0012
90.00	-.1812	-.0003	.0070	.0012
92.00	-.1812	-.0003	.0070	.0012
94.00	-.1812	-.0003	.0070	.0012
96.00	-.1812	-.0003	.0070	.0012
98.00	-.1812	-.0003	.0070	.0012
100.00	-.1812	-.0002	.0070	.0012
102.00	-.1812	-.0002	.0070	.0012
104.00	-.1812	-.0002	.0070	.0012
106.00	-.1812	-.0002	.0070	.0012
108.00	-.1812	-.0002	.0070	.0012
110.00	-.1812	-.0002	.0070	.0012
112.00	-.1812	-.0002	.0070	.0012
114.00	-.1812	-.0002	.0070	.0012
116.00	-.1812	-.0001	.0070	.0012
118.00	-.1812	-.0001	.0070	.0012
120.00	-.1812	-.0001	.0070	.0012
122.00	-.1812	-.0001	.0070	.0012
124.00	-.1812	-.0001	.0070	.0012
126.00	-.1812	-.0001	.0070	.0012
128.00	-.1812	-.0001	.0070	.0012
130.00	-.1812	-.0001	.0070	.0012
132.00	-.1812	-.0001	.0070	.0012
134.00	-.1812	-.0001	.0070	.0012
136.00	-.1812	-.0001	.0070	.0012
138.00	-.1812	-.0001	.0070	.0012
140.00	-.1812	-.0001	.0070	.0012
142.00	-.1812	-.0001	.0070	.0012
144.00	-.1812	-.0001	.0070	.0012
146.00	-.1812	-.0001	.0070	.0012
148.00	-.1812	-.0001	.0070	.0012
150.00	-.1812	-.0001	.0070	.0012
152.00	-.1812	-.0001	.0070	.0012
154.00	-.1812	-.0001	.0070	.0012
156.00	-.1812	-.0001	.0070	.0012
158.00	-.1812	-.0001	.0070	.0012
160.00	-.1812	-.0001	.0070	.0012

SDD1

RLO de doble acción ($\tau = 4$, T = 8), u(kT) = u(kT + τ) = valores obtenidos con el modelo continuo (caso (I) del Capítulo 5).

(simulación con un retardo de cálculo de 1 segundo).

PROGRAMA DE SIMULACIO
DE SISTEMES CONTINUS I DISCRETS

SDD1.1

CONFIGURACIO

BLOC	TIPUS	ENT.1	ENT.2	ENT.3
1	K	0	0	0
2	W	3	24	8
3	R	66	35	49
4	G	2	0	0
5	I	4	0	0
7	G	5	0	0
8	G	7	9	0
9	G	12	0	0
10	G	9	0	0
11	I	10	0	0
12	+	5	-11	0
13	Z	41	58	0
14	Z	57	62	0
15	K	0	0	0
16	G	5	0	0
17	+	16	-21	0
18	G	17	0	0
19	I	17	0	0
20	+	19	-18	0
21	G	19	0	0
22	W	15	20	27
23	G	22	0	0
24	I	23	24	0
25	+	24	-30	0
26	G	25	0	0
27	I	26	0	0
28	+	27	38	0
29	G	28	0	0
30	G	29	30	0
31	G	40	0	0
32	I	31	32	0
33	G	32	0	0
34	+	33	-37	0
35	G	49	0	0
36	G	34	0	0
37	G	36	0	0
38	+	34	-34	0
39	X	27	27	0
40	+	-50	-30	0
41	W	5	9	20
42	W	24	46	27
43	+	13	14	0
44	G	24	0	0
45	+	44	27	0
46	I	45	0	0
47	I	66	0	0
48	X	24	24	0
49	Z	43	47	0
50	G	54	0	0
51	G	30	0	0
52	G	30	0	0
53	+	52	-27	0
54	I	53	0	0
55	I	48	0	0
56	I	39	0	0
57	+	42	51	0
58	+	59	-74	0
59	T	60	0	0
60	+	73	61	0
61	K	0	0	0
62	+	63	-74	0
63	T	65	0	0
64	K	0	0	0
65	+	73	-64	0
66	R	75	61	1
67	+	68	-74	0
68	T	70	0	0
69	K	0	0	0
70	+	73	-69	0
73	I	1	0	0
74	K	0	0	0
75	X	47	47	0

(Modelo de simulación)

CONDITIONS INITIALS I PARAMETRES SDD1.2

BLOC	CI/PAR 1	PAR 2	PAR 3
1	1.0000	0.0000	0.0000
2	-1.0000	-1.0000	-1.0000
4	.0377	0.0000	0.0000
7	12.9700	0.0000	0.0000
9	5.3518	0.0000	0.0000
10	.0509	0.0000	0.0000
13	0.0000	.0325	0.0000
14	0.0000	-.1422	0.0000
15	.0100	0.0000	0.0000
16	2.0744	0.0000	0.0000
18	.9640	0.0000	0.0000
21	2.0746	0.0000	0.0000
22	-1.0000	1.0000	-1.0000
23	6.2500	0.0000	0.0000
24	0.0000	-.0937	0.0000
26	1.5300	0.0000	0.0000
29	6.2490	0.0000	0.0000
30	0.0000	-1.2343	0.0000
31	.0525	0.0000	0.0000
32	0.0000	-.0295	0.0000
33	2.0000	0.0000	0.0000
35	.7600	0.0000	0.0000
37	2.0000	0.0000	0.0000
39	12.0000	-2.9750	0.0000
41	2.9250	-.1756	.3229
42	.1081	.6629	-.0015
44	.0920	0.0000	0.0000
47	0.0000	-2.0000	1.0000
49	0.0000	-.1297	0.0000
50	.0200	0.0000	0.0000
51	-.0005	0.0000	0.0000
52	1.9475	0.0000	0.0000
55	0.0000	-.0100	-.0100
59	8.0000	-1.9750	0.0000
61	-2.0000	0.0000	0.0000
63	8.0000	-3.9750	0.0000
64	4.0000	0.0000	0.0000
66	1.7770	-2.6666	0.0000
68	4.0000	-.9750	0.0000
69	5.0000	0.0000	0.0000
72	13.0000	0.0000	0.0000
74	.0100	0.0000	0.0000
75	40.0000	0.0000	0.0000

SDD1.3

TEMPS	SORTIDA44	SORTIDA30	SORTIDA55	SORTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0657	-.0172	.0057	.0005
8.00	-.0847	.0011	.0059	.0006
10.00	-.0987	.0114	.0061	.0008
12.00	-.1108	.0108	.0063	.0009
14.00	-.1239	.0036	.0065	.0010
16.00	-.1362	.0046	.0065	.0011
18.00	-.1449	.0087	.0066	.0011
20.00	-.1518	.0082	.0068	.0011
22.00	-.1583	.0044	.0068	.0012
24.00	-.1640	.0038	.0069	.0012
26.00	-.1678	.0050	.0069	.0012
28.00	-.1704	.0042	.0070	.0012
30.00	-.1727	.0021	.0070	.0012
32.00	-.1747	.0009	.0070	.0012
34.00	-.1761	.0006	.0070	.0012
36.00	-.1771	.0004	.0070	.0012
38.00	-.1779	-.0003	.0070	.0012
40.00	-.1786	-.0008	.0070	.0012
42.00	-.1792	-.0010	.0070	.0012
44.00	-.1795	-.0010	.0070	.0012
46.00	-.1798	-.0011	.0070	.0012
48.00	-.1801	-.0013	.0070	.0012
50.00	-.1804	-.0013	.0070	.0012
52.00	-.1805	-.0011	.0070	.0012
54.00	-.1807	-.0011	.0070	.0012
56.00	-.1808	-.0011	.0070	.0012
58.00	-.1810	-.0011	.0070	.0012
60.00	-.1810	-.0009	.0070	.0012
62.00	-.1811	-.0009	.0070	.0012
64.00	-.1812	-.0008	.0070	.0012
66.00	-.1812	-.0007	.0070	.0012
68.00	-.1812	-.0007	.0070	.0012
70.00	-.1812	-.0007	.0070	.0012
72.00	-.1813	-.0007	.0070	.0012
74.00	-.1813	-.0005	.0070	.0012
76.00	-.1813	-.0005	.0070	.0012
78.00	-.1812	-.0005	.0070	.0012
80.00	-.1813	-.0005	.0070	.0012
82.00	-.1813	-.0004	.0070	.0012
84.00	-.1813	-.0004	.0070	.0012
86.00	-.1812	-.0004	.0070	.0012
88.00	-.1813	-.0004	.0070	.0012
90.00	-.1813	-.0003	.0070	.0012
92.00	-.1812	-.0003	.0070	.0012
94.00	-.1812	-.0003	.0070	.0012
96.00	-.1813	-.0003	.0070	.0012
98.00	-.1813	-.0002	.0070	.0012
100.00	-.1812	-.0002	.0070	.0012

SDD2

RLO de doble acción (τ = 4, T = 8).

Penalización continua, sin importar el esfuerzo de control en kT + τ

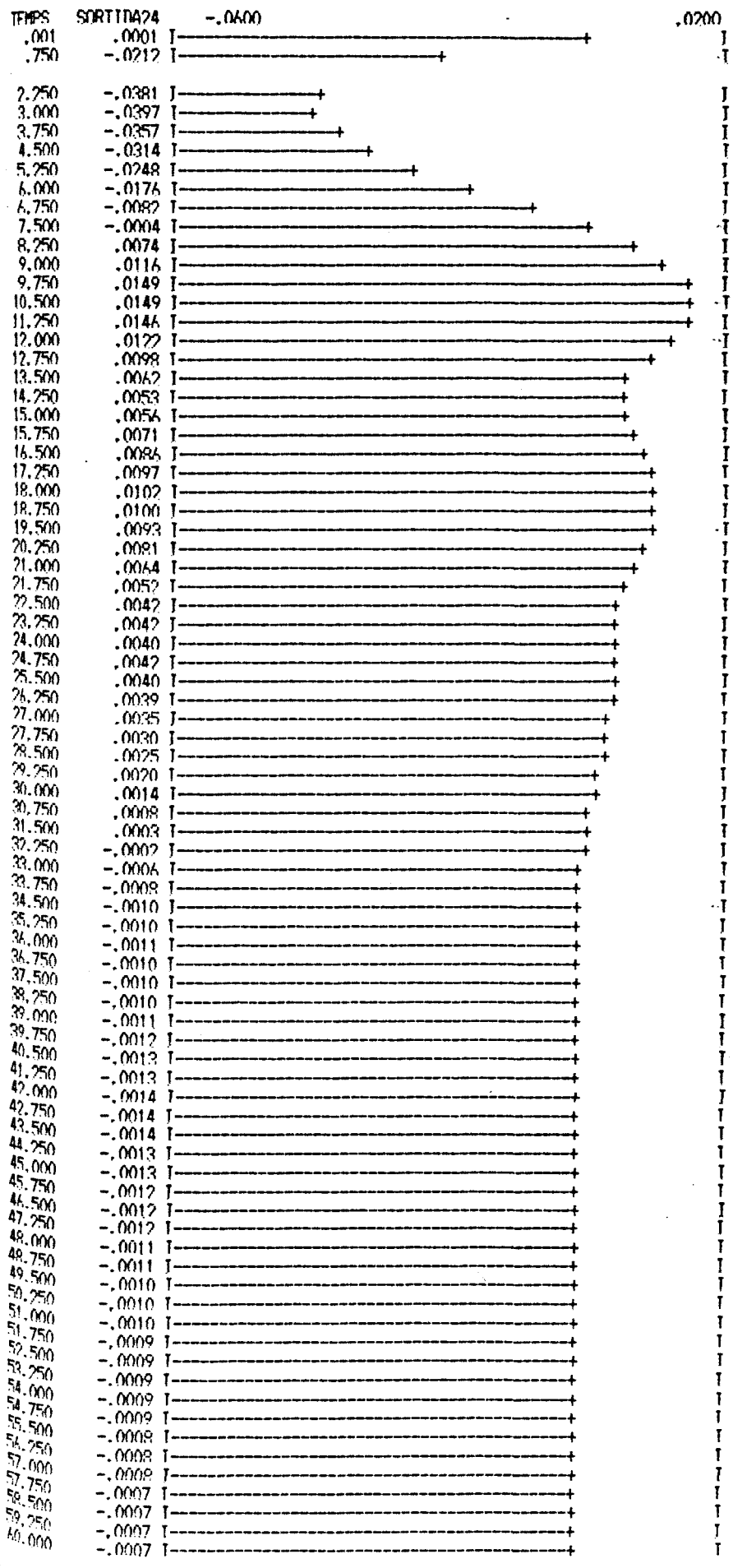
(simulación con un retardo de cálculo de 1 segundo).

SDD2.1

EMPS	SQRTIDA46	SQRTIDA30	SQRTIDA55	SQRTIDA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0349	.0043	.0003
6.00	-.0659	-.0174	.0057	.0005
8.00	-.0832	.0049	.0059	.0006
10.00	-.0951	.0144	.0062	.0007
12.00	-.1052	.0126	.0066	.0008
14.00	-.1165	.0043	.0067	.0009
16.00	-.1255	.0074	.0068	.0009
18.00	-.1313	.0099	.0070	.0010
20.00	-.1354	.0084	.0072	.0010
22.00	-.1394	.0044	.0073	.0010
24.00	-.1422	.0039	.0073	.0010
26.00	-.1439	.0038	.0073	.0010
28.00	-.1448	.0028	.0074	.0010
30.00	-.1454	.0013	.0074	.0010
32.00	-.1459	-.0002	.0074	.0010
34.00	-.1464	-.0009	.0074	.0010
36.00	-.1468	-.0011	.0074	.0010
38.00	-.1471	-.0010	.0074	.0010
40.00	-.1473	-.0012	.0074	.0010
42.00	-.1476	-.0014	.0074	.0010
44.00	-.1478	-.0013	.0074	.0010
46.00	-.1480	-.0012	.0074	.0010
48.00	-.1482	-.0011	.0074	.0010
50.00	-.1484	-.0010	.0074	.0010
52.00	-.1485	-.0009	.0074	.0010
54.00	-.1486	-.0009	.0074	.0010
56.00	-.1488	-.0008	.0074	.0010
58.00	-.1488	-.0007	.0074	.0010
60.00	-.1489	-.0007	.0074	.0010
62.00	-.1489	-.0007	.0074	.0010
64.00	-.1489	-.0006	.0074	.0010
66.00	-.1490	-.0006	.0074	.0010
68.00	-.1490	-.0005	.0074	.0010
70.00	-.1490	-.0005	.0074	.0010
72.00	-.1490	-.0005	.0074	.0010
74.00	-.1490	-.0004	.0074	.0010
76.00	-.1490	-.0004	.0074	.0010
78.00	-.1490	-.0004	.0074	.0010
80.00	-.1490	-.0004	.0074	.0010
82.00	-.1489	-.0003	.0074	.0010
84.00	-.1489	-.0003	.0074	.0010
86.00	-.1489	-.0003	.0074	.0010
88.00	-.1489	-.0003	.0074	.0010
90.00	-.1489	-.0003	.0074	.0010
92.00	-.1489	-.0002	.0074	.0010
94.00	-.1489	-.0002	.0074	.0010
96.00	-.1489	-.0002	.0074	.0010
98.00	-.1489	-.0002	.0074	.0010
100.00	-.1489	-.0002	.0074	.0010
102.00	-.1489	-.0002	.0074	.0010
104.00	-.1489	-.0002	.0074	.0010
106.00	-.1489	-.0001	.0074	.0010
108.00	-.1489	-.0001	.0074	.0010
110.00	-.1489	-.0001	.0074	.0010
112.00	-.1489	-.0001	.0074	.0010
114.00	-.1489	-.0001	.0074	.0010
116.00	-.1489	-.0001	.0074	.0010
118.00	-.1489	-.0001	.0074	.0010
120.00	-.1489	-.0001	.0074	.0010
122.00	-.1489	-.0001	.0074	.0010
124.00	-.1489	-.0001	.0074	.0010
126.00	-.1489	-.0001	.0074	.0010
128.00	-.1489	-.0001	.0074	.0010
130.00	-.1489	-.0001	.0074	.0010
132.00	-.1489	-.0001	.0074	.0010
134.00	-.1489	-.0001	.0074	.0010
136.00	-.1489	-.0001	.0074	.0010
138.00	-.1489	-.0001	.0074	.0010
140.00	-.1489	-.0001	.0074	.0010
142.00	-.1489	-.0001	.0074	.0010
144.00	-.1489	-.0001	.0074	.0010
146.00	-.1489	-.0001	.0074	.0010
148.00	-.1489	-.0001	.0074	.0010
150.00	-.1489	-.0001	.0074	.0010
152.00	-.1489	-.0001	.0074	.0010
154.00	-.1489	-.0001	.0074	.0010
156.00	-.1489	-.0001	.0074	.0010
158.00	-.1489	-.0001	.0074	.0010
160.00	-.1489	-.0001	.0074	.0010

SDD2.2

BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)



SDD2.3

BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)

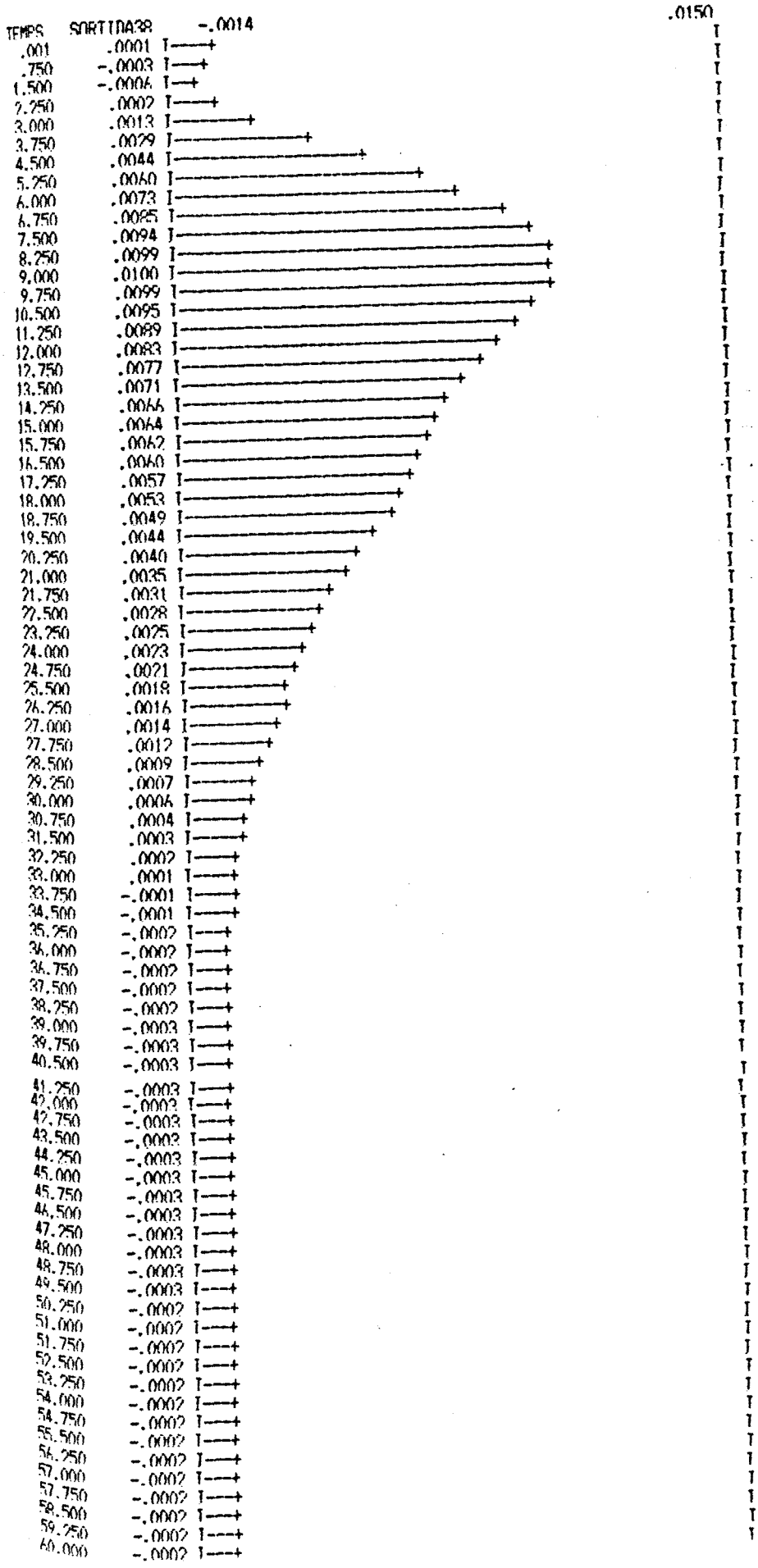
TEMPS	SORTIDA27	-.0200	.0010
.001	.0001	I----------+	I
.750	-.0110	I----------+	I
1.500	-.0043	I----------+	I
2.250	-.0112	I----------+	I
3.000	-.0066	I----------+	I
3.750	-.0108	I----------+	I
4.500	-.0078	I----------+	I
5.250	-.0110	I----------+	I
6.000	-.0081	I----------+	I
6.750	-.0092	I----------+	I
7.500	-.0071	I----------+	I
8.250	-.0078	I----------+	I
9.000	-.0066	I----------+	I
9.750	-.0070	I----------+	I
10.500	-.0063	I----------+	I
11.250	-.0065	I----------+	I
12.000	-.0062	I----------+	I
12.750	-.0064	I----------+	I
13.500	-.0068	I----------+	I
14.250	-.0055	I----------+	I
15.000	-.0053	I----------+	I
15.750	-.0043	I----------+	I
16.500	-.0042	I----------+	I
17.250	-.0035	I----------+	I
18.000	-.0034	I----------+	I
18.750	-.0030	I----------+	I
19.500	-.0029	I----------+	I
20.250	-.0026	I----------+	I
21.000	-.0027	I----------+	I
21.750	-.0025	I----------+	I
22.500	-.0021	I----------+	I
23.250	-.0018	I----------+	I
24.000	-.0015	I----------+	I
24.750	-.0013	I----------+	I
25.500	-.0011	I----------+	I
26.250	-.0009	I----------+	I
27.000	-.0008	I----------+	I
27.750	-.0007	I----------+	I
28.500	-.0006	I----------+	I
29.250	-.0005	I----------+	I
30.000	-.0005	I----------+	I
30.750	-.0004	I----------+	I
31.500	-.0004	I----------+	I
32.250	-.0003	I----------+	I
33.000	-.0003	I----------+	I
33.750	-.0002	I----------+	I
34.500	-.0002	I----------+	I
35.250	-.0001	I----------+	I
36.000	-.0001	I----------+	I
36.750	-.0001	I----------+	I
37.500	-.0001	I----------+	I
38.250	-.0001	I----------+	I
39.000	-.0001	I----------+	I
39.750	-.0001	I----------+	I
40.500	-.0001	I----------+	I
41.250	-.0001	I----------+	I
42.000	-.0001	I----------+	I
42.750	-.0001	I----------+	I
43.500	-.0001	I----------+	I
44.250	-.0001	I----------+	I
45.000	.0001	I----------+	I
45.750	-.0001	I----------+	I
46.500	.0001	I----------+	I
47.250	.0001	I----------+	I
48.000	.0001	I----------+	I
48.750	.0001	I----------+	I
49.500	.0001	I----------+	I
50.250	.0001	I----------+	I
51.000	.0001	I----------+	I
51.750	.0001	I----------+	I
52.500	.0001	I----------+	I
53.250	.0001	I----------+	I
54.000	.0001	I----------+	I
54.750	.0001	I----------+	I
55.500	.0001	I----------+	I
56.250	.0001	I----------+	I
57.000	.0001	I----------+	I
57.750	.0001	I----------+	I
58.500	.0001	I----------+	I
59.250	.0001	I----------+	I
60.000	.0001	I----------+	I

SDD2.4

```
BLOC FIX Y (20)  MINIM (    -.0007)  MAXIM (     .0150)

TEMPS   SORTIDA20     -.0007                                        .0150
  .001      .0001 I-+                                                  I
  .750     -.0003 I+                                                   I
 1.500      .0001 I-+                                                  I
 2.250      .0004 I--+                                                 I
 3.000      .0010 I----+                                               I
 3.750      .0015 I------+                                             I
 4.500      .0019 I------+                                             I
 5.250      .0014 I------+                                             I
 6.000      .0024 I---------+                                          I
 6.750      .0035 I-----------+                                        I
 7.500      .0040 I------------+                                       I
 8.250      .0042 I------------+                                       I
 9.000      .0041 I------------+                                       I
 9.750      .0040 I------------+                                       I
10.500      .0038 I------------+                                       I
11.250      .0036 I-----------+                                        I
12.000      .0035 I-----------+                                        I
12.750      .0029 I----------+                                         I
13.500      .0032 I----------+                                         I
14.250      .0043 I-------------+                                      I
15.000      .0053 I---------------+                                    I
15.750      .0060 I-----------------+                                  I
16.500      .0065 I------------------+                                 I
17.250      .0068 I------------------+                                 I
18.000      .0070 I-------------------+                                I
18.750      .0071 I-------------------+                                I
19.500      .0072 I--------------------+                               I
20.250      .0073 I--------------------+                               I
21.000      .0071 I-------------------+                                I
21.750      .0075 I---------------------+                              I
22.500      .0080 I-----------------------+                            I
23.250      .0084 I-------------------------+                          I
24.000      .0086 I--------------------------+                         I
24.750      .0089 I---------------------------+                        I
25.500      .0090 I----------------------------+                       I
26.250      .0092 I----------------------------+                       I
27.000      .0093 I-----------------------------+                      I
27.750      .0093 I-----------------------------+                      I
28.500      .0094 I-----------------------------+                      I
29.250      .0095 I------------------------------+                     I
30.000      .0095 I------------------------------+                     I
30.750      .0096 I------------------------------+                     I
31.500      .0096 I------------------------------+                     I
32.250      .0097 I------------------------------+                     I
33.000      .0098 I-------------------------------+                    I
33.750      .0098 I-------------------------------+                    I
34.500      .0099 I-------------------------------+                    I
35.250      .0099 I-------------------------------+                    I
36.000      .0100 I-------------------------------+                    I
36.750      .0100 I-------------------------------+                    I
37.500      .0100 I-------------------------------+                    I
38.250      .0100 I-------------------------------+                    I
39.000      .0100 I-------------------------------+                    I
39.750      .0100 I-------------------------------+                    I
40.500      .0100 I-------------------------------+                    I
41.250      .0100 I-------------------------------+                    I
42.000      .0100 I--------------------------------+                   I
42.750      .0100 I--------------------------------+                   I
43.500      .0100 I--------------------------------+                   I
44.250      .0100 I--------------------------------+                   I
45.000      .0100 I--------------------------------+                   I
45.750      .0100 I--------------------------------+                   I
46.500      .0100 I--------------------------------+                   I
47.250      .0100 I--------------------------------+                   I
48.000      .0100 I--------------------------------+                   I
48.750      .0101 I--------------------------------+                   I
49.500      .0101 I--------------------------------+                   I
50.250      .0101 I--------------------------------+                   I
51.000      .0101 I--------------------------------+                   I
51.750      .0101 I--------------------------------+                   I
52.500      .0101 I--------------------------------+                   I
53.250      .0100 I--------------------------------+                   I
54.000      .0100 I--------------------------------+                   I
54.750      .0101 I--------------------------------+                   I
55.500      .0101 I--------------------------------+                   I
56.250      .0101 I--------------------------------+                   I
57.000      .0101 I--------------------------------+                   I
57.750      .0101 I--------------------------------+                   I
58.500      .0101 I--------------------------------+                   I
59.250      .0101 I--------------------------------+                   I
60.000      .0101 I--------------------------------+                   I
```

BLOC FTX Y (38) MINIM (-.0014) MAXIM (.0150)



SDD3

RLO de doble acción (τ = 4, T = 8).

Penalización continua, importando tanto el esfuerzo en kT como en kT + τ.

(simulación con un retardo de cálculo de 1 segundo).

SDD3.[1]

BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)

TEMPS	SORTIDA24
.001	.0001
.750	-.0212
1.500	-.0320
2.250	-.0381
3.000	-.0397
3.750	-.0357
4.500	-.0314
5.250	-.0241
6.000	-.0176
6.750	-.0089
7.500	-.0028
8.250	.0037
9.000	.0067
9.750	.0094
10.500	.0093
11.250	.0092
12.000	.0074
12.750	.0057
13.500	.0033
14.250	.0027
15.000	.0032
15.750	.0044
16.500	.0056
17.250	.0064
18.000	.0068
18.750	.0064
19.500	.0060
20.250	.0051
21.000	.0034
21.750	.0030
22.500	.0027
23.250	.0037
24.000	.0042
24.750	.0052
25.500	.0050
26.250	.0051
27.000	.0043
27.750	.0039
28.500	.0030
29.250	.0019
30.000	.0015
30.750	.0015
31.500	.0017
32.250	.0020
33.000	.0023
33.750	.0019
34.500	.0017
35.250	.0013
36.000	.0009
36.750	.0002
37.500	.0001
38.250	-.0002
39.000	.0002
39.750	.0002
40.500	.0005
41.250	.0004
42.000	.0003
42.750	-.0003
43.500	-.0003
44.250	-.0007
45.000	-.0010
45.750	-.0009
46.500	-.0008
47.250	-.0006
48.000	-.0005
48.750	-.0002
49.500	-.0006
50.250	-.0006
51.000	-.0010
51.750	-.0010
52.500	-.0012
53.250	-.0012
54.000	-.0012
54.750	-.0008
55.500	-.0008
56.250	-.0006
57.000	-.0005
57.750	-.0008
58.500	-.0010
59.250	-.0012
60.000	-.0012

Plot axis: -.0600 to .0200

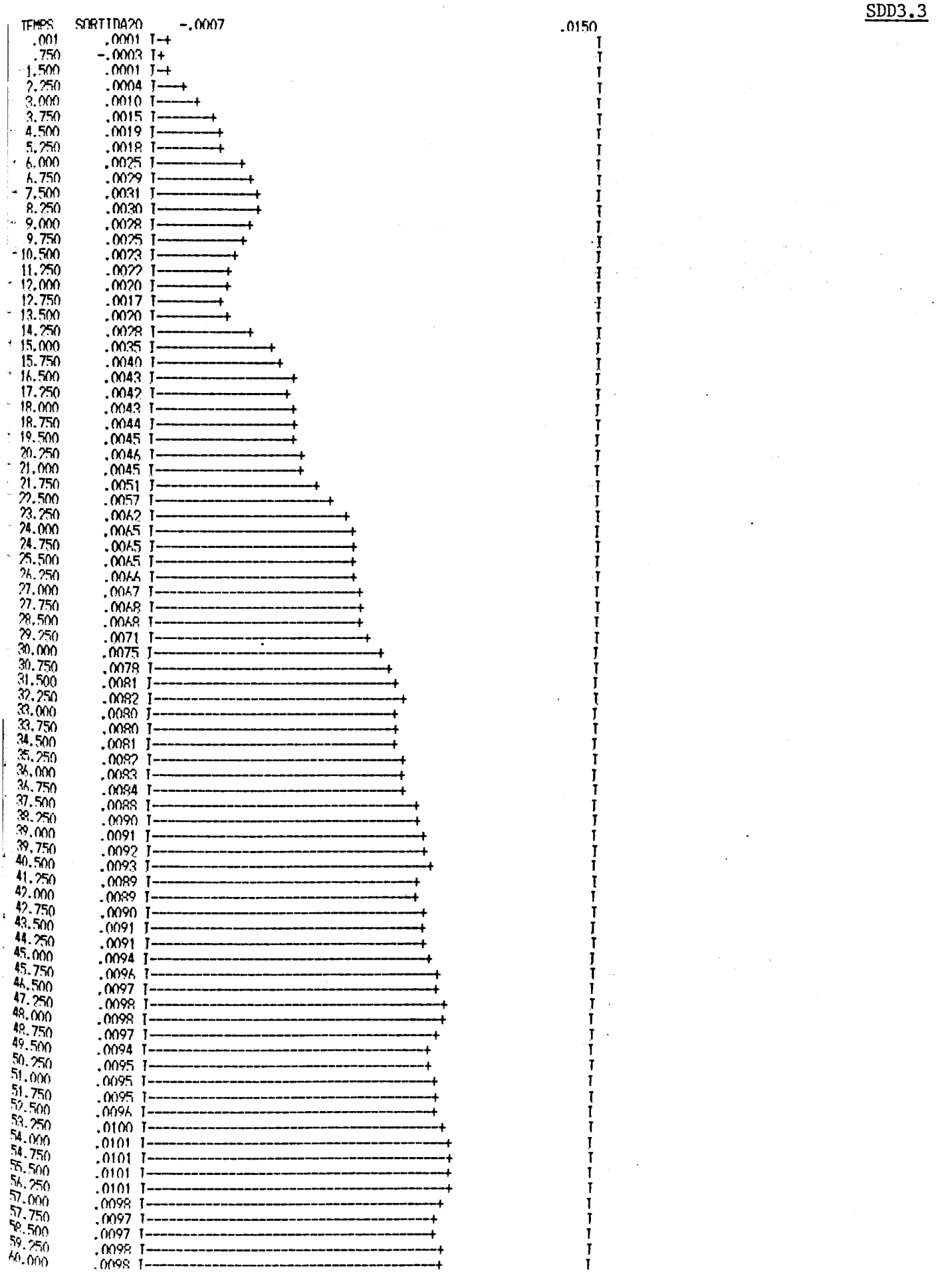
SDD3.2

BLOC FIX Y (27) MINIM (-.0200) MAXIM (.0010)

TEMPS	SORTIDA27	-.0200	.0010
.001	.0001	I----------+	I
.750	-.0110	I----------+	I
1.500	-.0043	I----------+	I
2.250	-.0112	I----------+	I
3.000	-.0066	I----------+	I
3.750	-.0108	I----------+	I
4.500	-.0078	I----------+	I
5.250	-.0107	I----------+	I
6.000	-.0082	I----------+	I
6.750	-.0095	I----------+	I
7.500	-.0079	I----------+	I
8.250	-.0086	I----------+	I
9.000	-.0077	I----------+	I
9.750	-.0082	I----------+	I
10.500	-.0077	I----------+	I
11.250	-.0080	I----------+	I
12.000	-.0077	I----------+	I
12.750	-.0079	I----------+	I
13.500	-.0083	I----------+	I
14.250	-.0073	I----------+	I
15.000	-.0072	I----------+	I
15.750	-.0065	I----------+	I
16.500	-.0064	I----------+	I
17.250	-.0059	I----------+	I
18.000	-.0060	I----------+	I
18.750	-.0056	I----------+	I
19.500	-.0056	I----------+	I
20.250	-.0054	I----------+	I
21.000	-.0056	I----------+	I
21.750	-.0052	I----------+	I
22.500	-.0048	I----------+	I
23.250	-.0044	I----------+	I
24.000	-.0041	I----------+	I
24.750	-.0038	I----------+	I
25.500	-.0037	I----------+	I
26.250	-.0035	I----------+	I
27.000	-.0034	I----------+	I
27.750	-.0032	I----------+	I
28.500	-.0032	I----------+	I
29.250	-.0032	I----------+	I
30.000	-.0028	I----------+	I
30.750	-.0027	I----------+	I
31.500	-.0024	I----------+	I
32.250	-.0023	I----------+	I
33.000	-.0020	I----------+	I
33.750	-.0022	I----------+	I
34.500	-.0018	I----------+	I
35.250	-.0019	I----------+	I
36.000	-.0017	I----------+	I
36.750	-.0018	I----------+	I
37.500	-.0016	I----------+	I
38.250	-.0015	I----------+	I
39.000	-.0013	I----------+	I
39.750	-.0013	I----------+	I
40.500	-.0011	I----------+	I
41.250	-.0010	I----------+	I
42.000	-.0012	I----------+	I
42.750	-.0010	I----------+	I
43.500	-.0010	I----------+	I
44.250	-.0009	I----------+	I
45.000	-.0010	I----------+	I
45.750	-.0007	I----------+	I
46.500	-.0008	I----------+	I
47.250	-.0006	I----------+	I
48.000	-.0007	I----------+	I
48.750	-.0005	I----------+	I
49.500	-.0006	I----------+	I
50.250	-.0006	I----------+	I
51.000	-.0006	I----------+	I
51.750	-.0005	I----------+	I
52.500	-.0005	I----------+	I
53.250	-.0005	I----------+	I
54.000	-.0003	I----------+	I
54.750	-.0004	I----------+	I
55.500	-.0003	I----------+	I
56.250	-.0003	I----------+	I
57.000	-.0002	I----------+	I
57.750	-.0004	I----------+	I
58.500	-.0002	I----------+	I
59.250	-.0004	I----------+	I
60.000	-.0002	I----------+	I

SDD3.3

BLOC ETX Y (20) MINIM (-.0007) MAXIM (.0150)



BLOC FIX Y (38) MINIM (-.0014) MAXIM (.0150)

TEMPS	SORTIDA38 (-.0014 … .0150)
.001	.0001
.750	-.0003
1.500	-.0006
2.250	.0002
3.000	.0013
3.750	.0029
4.500	.0044
5.250	.0060
6.000	.0073
6.750	.0085
7.500	.0093
8.250	.0098
9.000	.0100
9.750	.0100
10.500	.0097
11.250	.0094
12.000	.0090
12.750	.0086
13.500	.0082
14.250	.0080
15.000	.0078
15.750	.0077
16.500	.0076
17.250	.0074
18.000	.0071
18.750	.0068
19.500	.0065
20.250	.0062
21.000	.0059
21.750	.0056
22.500	.0054
23.250	.0052
24.000	.0051
24.750	.0049
25.500	.0047
26.250	.0044
27.000	.0041
27.750	.0038
28.500	.0035
29.250	.0033
30.000	.0031
30.750	.0029
31.500	.0028
32.250	.0026
33.000	.0025
33.750	.0023
34.500	.0022
35.250	.0020
36.000	.0018
36.750	.0017
37.500	.0016
38.250	.0015
39.000	.0014
39.750	.0013
40.500	.0012
41.250	.0012
42.000	.0010
42.750	.0009
43.500	.0009
44.250	.0008
45.000	.0007
45.750	.0007
46.500	.0006
47.250	.0006
48.000	.0006
48.750	.0005
49.500	.0005
50.250	.0004
51.000	.0003
51.750	.0003
52.500	.0003
53.250	.0002
54.000	.0002
54.750	.0002
55.500	.0002
56.250	.0002
57.000	.0002
57.750	.0001
58.500	.0001
59.250	.0001
60.000	-.0001

SDD3.5

TEMPS	SORTIA44	SORTIA30	SORTIA55	SORTIA56
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0656	-.0167	.0057	.0005
8.00	-.0842	.0016	.0059	.0006
10.00	-.0991	.0089	.0060	.0008
12.00	-.1130	.0079	.0062	.0009
14.00	-.1281	.0021	.0062	.0010
16.00	-.1414	.0047	.0062	.0011
18.00	-.1525	.0064	.0063	.0012
20.00	-.1625	.0053	.0064	.0013
22.00	-.1726	.0023	.0064	.0013
24.00	-.1809	.0042	.0064	.0014
26.00	-.1875	.0048	.0065	.0014
28.00	-.1933	.0035	.0065	.0014
30.00	-.1990	.0013	.0065	.0014
32.00	-.2038	.0018	.0065	.0014
34.00	-.2076	.0017	.0065	.0014
36.00	-.2109	.0008	.0065	.0014
38.00	-.2142	-.0001	.0065	.0015
40.00	-.2168	.0003	.0065	.0015
42.00	-.2189	.0001	.0065	.0015
44.00	-.2208	-.0006	.0065	.0015
46.00	-.2227	-.0008	.0065	.0015
48.00	-.2241	-.0005	.0065	.0015
50.00	-.2252	-.0008	.0065	.0015
52.00	-.2263	-.0011	.0066	.0015
54.00	-.2274	-.0010	.0066	.0015
56.00	-.2281	-.0007	.0066	.0015
58.00	-.2287	-.0010	.0066	.0015
60.00	-.2294	-.0012	.0066	.0015
62.00	-.2301	-.0009	.0066	.0015
64.00	-.2304	-.0006	.0066	.0015
66.00	-.2307	-.0009	.0066	.0015
68.00	-.2312	-.0011	.0066	.0015
70.00	-.2315	-.0008	.0066	.0015
72.00	-.2317	-.0005	.0066	.0015
74.00	-.2318	-.0008	.0066	.0015
76.00	-.2321	-.0010	.0066	.0015
78.00	-.2324	-.0006	.0066	.0015
80.00	-.2324	-.0003	.0066	.0015
82.00	-.2324	-.0007	.0066	.0015
84.00	-.2326	-.0009	.0066	.0015
86.00	-.2328	-.0005	.0066	.0015
88.00	-.2328	-.0002	.0066	.0015
90.00	-.2327	-.0006	.0066	.0015
92.00	-.2329	-.0008	.0066	.0015
94.00	-.2330	-.0003	.0066	.0015
96.00	-.2330	-.0001	.0066	.0015
98.00	-.2329	-.0005	.0066	.0015
100.00	-.2331	-.0007	.0066	.0015
102.00	-.2331	-.0002	.0066	.0015
104.00	-.2331	-.0001	.0066	.0015
106.00	-.2330	-.0004	.0066	.0015
108.00	-.2332	-.0005	.0066	.0015
110.00	-.2333	-.0001	.0066	.0015
112.00	-.2332	.0001	.0066	.0015
114.00	-.2331	-.0003	.0066	.0015
116.00	-.2333	-.0005	.0066	.0015
118.00	-.2333	-.0001	.0066	.0015
120.00	-.2332	.0002	.0066	.0015
122.00	-.2332	-.0003	.0066	.0015
124.00	-.2333	-.0004	.0066	.0015
126.00	-.2334	.0001	.0066	.0015
128.00	-.2333	.0002	.0066	.0015
130.00	-.2332	-.0003	.0066	.0015
132.00	-.2334	-.0004	.0066	.0015
134.00	-.2334	.0001	.0066	.0015
136.00	-.2333	.0003	.0066	.0015
138.00	-.2333	-.0002	.0066	.0015
140.00	-.2334	-.0004	.0066	.0015
142.00	-.2334	.0001	.0066	.0015
144.00	-.2333	.0003	.0066	.0015
146.00	-.2333	-.0002	.0066	.0015
148.00	-.2334	-.0004	.0066	.0015
150.00	-.2334	.0001	.0066	.0015
152.00	-.2333	.0003	.0066	.0015
154.00	-.2333	-.0002	.0066	.0015
156.00	-.2334	-.0004	.0066	.0015
158.00	-.2334	.0002	.0066	.0015
160.00	-.2333	.0003	.0066	.0015

SDD4

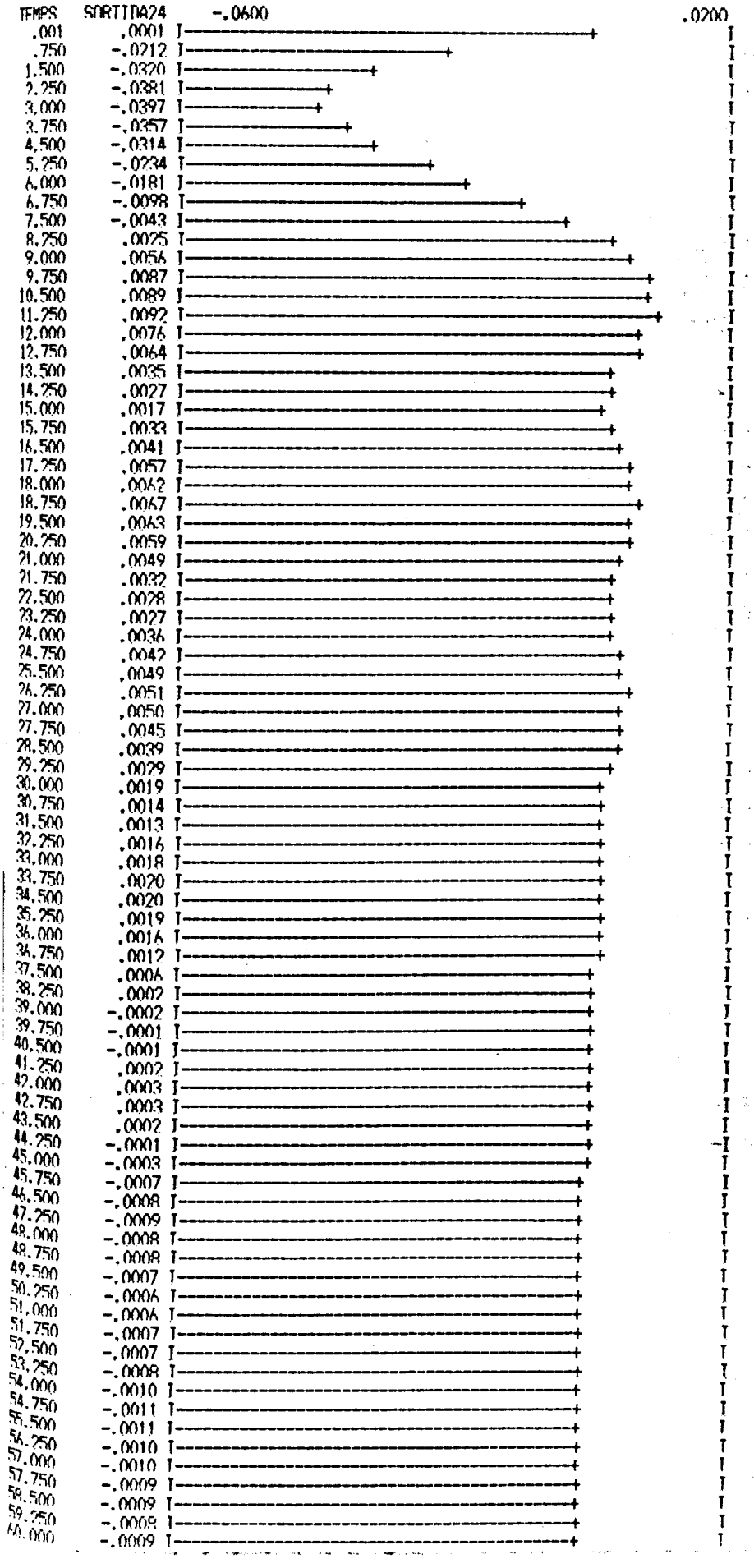
RLO de doble acción ($\tau = 4$, $T = 8$).

Penalización de las desviaciones y del esfuerzo de control solamente en kT (penalización discreta).

(simulación con un retardo de cálculo de 1 segundo).

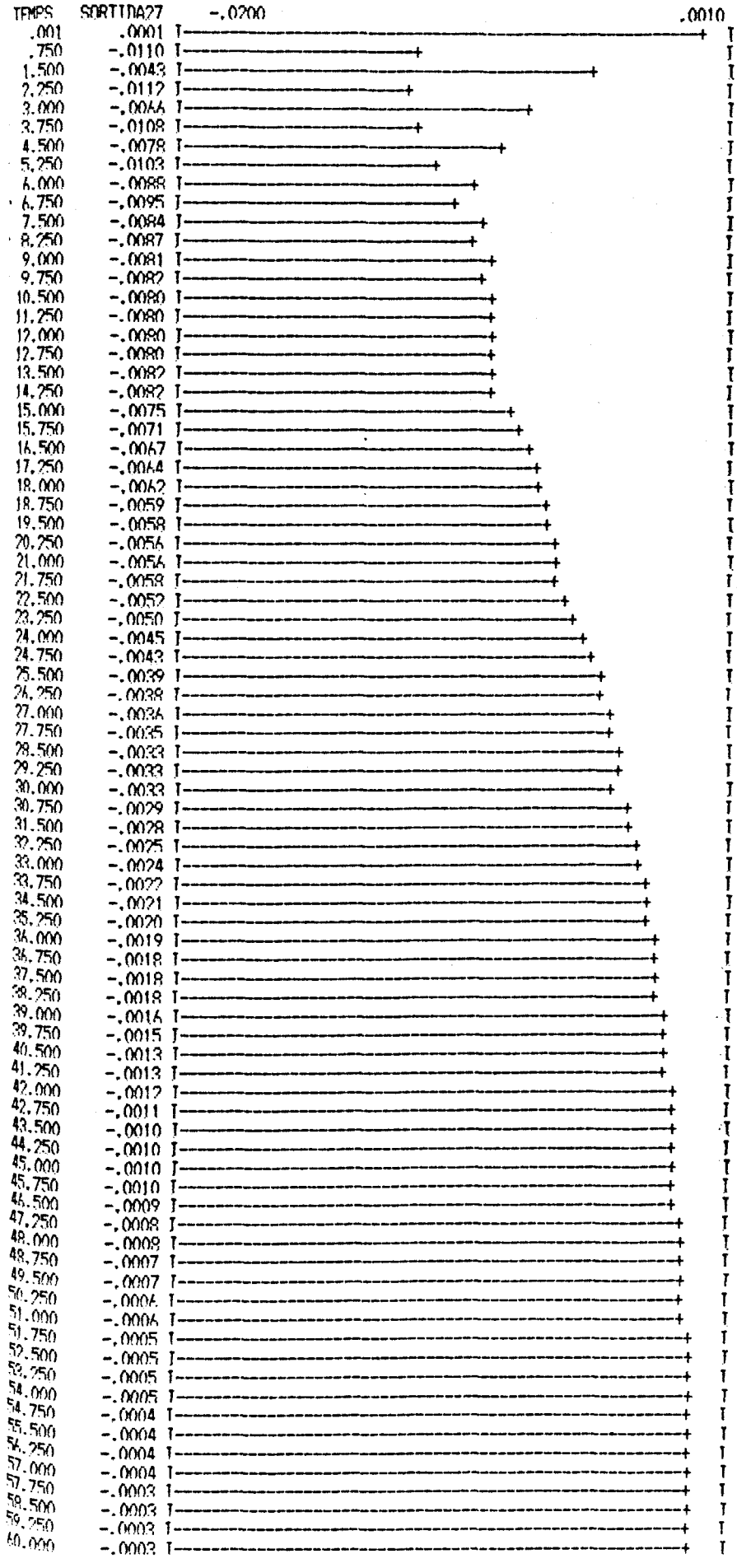
BLOC FIX Y (24) MINIM (-.0600) MAXIM (.0200)

SDD4.1



SDD4.2

BLOC FTX V (27) MINIM (-.0200) MAXIM (.0010)



SDD4.3

```
BLOC FIX Y (20)  MINIM (    -.0007)  MAXIM (     .0150)

TEMPS   SORTIDA20     -.0007                                    .0150
  .001      .0001 I-+                                            I
  .750     -.0003 I+                                             I
 1.500      .0001 I-+                                            I
 2.250      .0004 I--+                                           I
 3.000      .0010 I---+                                          I
 3.750      .0015 I----+                                         I
 4.500      .0019 I-----+                                        I
 5.250      .0017 I-----+                                        I
 6.000      .0019 I-----+                                        I
 6.750      .0024 I------+                                       I
 7.500      .0027 I------+                                       I
 8.250      .0027 I-------+                                      I
 9.000      .0026 I------+                                       I
 9.750      .0024 I------+                                       I
10.500      .0022 I-----+                                        I
11.250      .0021 I-----+                                        I
12.000      .0019 I-----+                                        I
12.750      .0019 I-----+                                        I
13.500      .0013 I----+                                         I
14.250      .0019 I-----+                                        I
15.000      .0027 I------+                                       I
15.750      .0033 I--------+                                     I
16.500      .0037 I---------+                                    I
17.250      .0040 I---------+                                    I
18.000      .0042 I---------+                                    I
18.750      .0043 I----------+                                   I
19.500      .0043 I----------+                                   I
20.250      .0044 I----------+                                   I
21.000      .0044 I----------+                                   I
21.750      .0041 I---------+                                    I
22.500      .0047 I----------+                                   I
23.250      .0053 I-----------+                                  I
24.000      .0057 I-----------+                                  I
24.750      .0060 I-----------+                                  I
25.500      .0063 I-----------+                                  I
26.250      .0064 I-----------+                                  I
27.000      .0065 I-----------+                                  I
27.750      .0066 I-----------+                                  I
28.500      .0067 I-----------+                                  I
29.250      .0065 I-----------+                                  I
30.000      .0066 I-----------+                                  I
30.750      .0070 I-----------+                                  I
31.500      .0073 I-----------+                                  I
32.250      .0076 I-----------+                                  I
33.000      .0078 I-----------+                                  I
33.750      .0079 I-----------+                                  I
34.500      .0080 I-----------+                                  I
35.250      .0081 I-----------+                                  I
36.000      .0081 I-----------+                                  I
36.750      .0082 I-----------+                                  I
37.500      .0081 I-----------+                                  I
38.250      .0082 I-----------+                                  I
39.000      .0084 I-----------+                                  I
39.750      .0084 I-----------+                                  I
40.500      .0087 I-----------+                                  I
41.250      .0088 I-----------+                                  I
42.000      .0090 I-----------+                                  I
42.750      .0090 I-----------+                                  I
43.500      .0090 I-----------+                                  I
44.250      .0091 I-----------+                                  I
45.000      .0091 I-----------+                                  I
45.750      .0090 I-----------+                                  I
46.500      .0091 I-----------+                                  I
47.250      .0092 I-----------+                                  I
48.000      .0093 I-----------+                                  I
48.750      .0093 I-----------+                                  I
49.500      .0095 I-----------+                                  I
50.250      .0095 I-----------+                                  I
51.000      .0095 I-----------+                                  I
51.750      .0095 I-----------+                                  I
52.500      .0096 I-----------+                                  I
53.250      .0095 I-----------+                                  I
54.000      .0095 I-----------+                                  I
54.750      .0095 I-----------+                                  I
55.500      .0096 I-----------+                                  I
56.250      .0096 I-----------+                                  I
57.000      .0097 I-----------+                                  I
57.750      .0098 I-----------+                                  I
58.500      .0098 I-----------+                                  I
59.250      .0098 I-----------+                                  I
60.000      .0098 I-----------+                                  I
```

BLOC FIX Y (38) MINIM (-.0014) MAXIM (.0150)

SDD4.4

TEMPS	SORTIDA38	-.0014 … .0150
.001	.0001	I---+
.750	-.0003	I--+
1.500	-.0006	I-+
2.250	.0002	I---+
3.000	.0013	I--------+
3.750	.0029	I---------------+
4.500	.0044	I----------------------+
5.250	.0060	I------------------------------+
6.000	.0073	I------------------------------------+
6.750	.0084	I---+
7.500	.0093	I---+
8.250	.0098	I---+
9.000	.0101	I---+
9.750	.0101	I---+
10.500	.0099	I--+
11.250	.0096	I--+
12.000	.0092	I--+
12.750	.0088	I---+
13.500	.0085	I---+
14.250	.0082	I--+
15.000	.0080	I---------------------------------------+
15.750	.0079	I--------------------------------------+
16.500	.0078	I--------------------------------------+
17.250	.0077	I--------------------------------------+
18.000	.0075	I-------------------------------------+
18.750	.0072	I------------------------------------+
19.500	.0069	I----------------------------------+
20.250	.0066	I---------------------------------+
21.000	.0063	I--------------------------------+
21.750	.0060	I------------------------------+
22.500	.0057	I-----------------------------+
23.250	.0055	I-----------------------------+
24.000	.0053	I----------------------------+
24.750	.0052	I----------------------------+
25.500	.0050	I---------------------------+
26.250	.0047	I-------------------------+
27.000	.0045	I------------------------+
27.750	.0042	I-----------------------+
28.500	.0039	I----------------------+
29.250	.0036	I---------------------+
30.000	.0034	I--------------------+
30.750	.0032	I------------------+
31.500	.0030	I------------------+
32.250	.0029	I-----------------+
33.000	.0027	I-----------------+
33.750	.0026	I----------------+
34.500	.0024	I----------------+
35.250	.0023	I---------------+
36.000	.0021	I--------------+
36.750	.0019	I--------------+
37.500	.0018	I-------------+
38.250	.0016	I-------------+
39.000	.0015	I------------+
39.750	.0014	I------------+
40.500	.0014	I------------+
41.250	.0013	I-----------+
42.000	.0012	I-----------+
42.750	.0011	I-----------+
43.500	.0010	I----------+
44.250	.0009	I----------+
45.000	.0009	I----------+
45.750	.0008	I----------+
46.500	.0007	I---------+
47.250	.0006	I---------+
48.000	.0006	I---------+
48.750	.0006	I---------+
49.500	.0005	I---------+
50.250	.0005	I--------+
51.000	.0004	I--------+
51.750	.0004	I--------+
52.500	.0004	I--------+
53.250	.0003	I--------+
54.000	.0003	I--------+
54.750	.0002	I--------+
55.500	.0002	I-------+
56.250	.0002	I-------+
57.000	.0002	I-------+
57.750	.0002	I-------+
58.500	.0001	I-------+
59.250	.0001	I-------+
60.000	.0001	I-------+

SDD4.5

TEMPS	SORTTDA4A	SORTTDA30	SORTTDA55	SORTTDA5A
.00	.0001	.0001	.0001	.0001
2.00	-.0175	-.0334	.0014	.0002
4.00	-.0428	-.0369	.0043	.0003
6.00	-.0655	-.0168	.0057	.0005
8.00	-.0849	-.0001	.0059	.0006
10.00	-.1004	.0085	.0060	.0008
12.00	-.1147	.0080	.0061	.0009
14.00	-.1299	.0022	.0062	.0010
16.00	-.1444	.0029	.0062	.0012
18.00	-.1564	.0062	.0063	.0012
20.00	-.1670	.0059	.0063	.0013
22.00	-.1773	.0027	.0064	.0014
24.00	-.1867	.0031	.0064	.0014
26.00	-.1941	.0049	.0064	.0015
28.00	-.2003	.0042	.0065	.0015
30.00	-.2063	.0017	.0065	.0015
32.00	-.2118	.0012	.0065	.0015
34.00	-.2161	.0019	.0065	.0015
36.00	-.2197	.0015	.0065	.0015
38.00	-.2231	.0002	.0065	.0015
40.00	-.2262	-.0003	.0065	.0015
42.00	-.2287	.0002	.0065	.0015
44.00	-.2307	-.0001	.0065	.0016
46.00	-.2326	-.0007	.0065	.0016
48.00	-.2344	-.0009	.0065	.0016
50.00	-.2358	-.0007	.0065	.0016
52.00	-.2369	-.0007	.0065	.0016
54.00	-.2380	-.0010	.0065	.0016
56.00	-.2390	-.0011	.0065	.0016
58.00	-.2398	-.0010	.0065	.0016
60.00	-.2404	-.0008	.0065	.0016
62.00	-.2410	-.0010	.0065	.0016
64.00	-.2416	-.0011	.0065	.0016
66.00	-.2420	-.0010	.0065	.0016
68.00	-.2424	-.0008	.0065	.0016
70.00	-.2427	-.0008	.0065	.0016
72.00	-.2430	-.0009	.0065	.0016
74.00	-.2433	-.0008	.0065	.0016
76.00	-.2435	-.0007	.0065	.0016
78.00	-.2436	-.0007	.0065	.0016
80.00	-.2438	-.0008	.0065	.0016
82.00	-.2440	-.0007	.0065	.0016
84.00	-.2441	-.0005	.0065	.0016
86.00	-.2441	-.0005	.0065	.0016
88.00	-.2443	-.0006	.0065	.0016
90.00	-.2444	-.0006	.0065	.0016
92.00	-.2444	-.0004	.0065	.0016
94.00	-.2444	-.0004	.0065	.0016
96.00	-.2445	-.0005	.0065	.0016
98.00	-.2446	-.0005	.0065	.0016
100.00	-.2446	-.0003	.0065	.0016
102.00	-.2446	-.0003	.0065	.0016
104.00	-.2446	-.0004	.0065	.0016
106.00	-.2447	-.0004	.0065	.0016
108.00	-.2447	-.0002	.0065	.0016
110.00	-.2447	-.0002	.0065	.0016
112.00	-.2447	-.0003	.0065	.0016
114.00	-.2447	-.0003	.0065	.0016
116.00	-.2447	-.0001	.0065	.0016
118.00	-.2447	-.0001	.0065	.0016
120.00	-.2447	-.0003	.0065	.0016
122.00	-.2448	-.0003	.0065	.0016
124.00	-.2448	-.0001	.0065	.0016
126.00	-.2447	-.0001	.0065	.0016
128.00	-.2448	-.0002	.0065	.0016
130.00	-.2448	-.0002	.0065	.0016
132.00	-.2448	-.0001	.0065	.0016
134.00	-.2447	-.0001	.0065	.0016
136.00	-.2448	-.0002	.0065	.0016
138.00	-.2448	-.0002	.0065	.0016
140.00	-.2448	.0001	.0065	.0016
142.00	-.2447	.0001	.0065	.0016
144.00	-.2448	-.0002	.0065	.0016
146.00	-.2448	-.0002	.0065	.0016
148.00	-.2448	.0001	.0065	.0016
150.00	-.2447	.0001	.0065	.0016
152.00	-.2448	-.0002	.0065	.0016
154.00	-.2448	-.0002	.0065	.0016
156.00	-.2448	.0001	.0065	.0016
158.00	-.2447	.0001	.0065	.0016
160.00	-.2448	-.0002	.0065	.0016