

Les filtres électroniques n'ont plus aucun secret pour Jean-Luc GARNIER; la preuve...



FILTRES AMSTRAD

Mode d'emploi : Ce programme sur l'étude (avec schémas) des filtres passe-haut, passe-bas et passe-bande (structures Sallen-Key et Rauch), offre deux options principales : - Calcul des paramètres : calcul des caractéristiques d'un filtre en connaissant la valeur de ses composants.

- Calcul des composants : calcul des composants d'un filtre pour l'obtention de caractéristiques précises. Sélectionnez les diverses options à l'aide des touches directionnelles du curseur et validez par COPY. Toutes les explications nécessaires sont incluses.

```
10 REM *****
*****
*****
20 REM ***** FILTRES *****
*****
30 REM ***** écrit par r : JEAN-LUC GARNIER *****
*****
40 REM ***** copyright 1985 *****
*****
50 REM *****
*****
60 DIM total$(50),prec(50),r(12),rn(12),diffn(12),r12(12):ON BREAK GOSUB 5830
70 MODE 2:INK 0,0:INK 1,24:BORDER 0:PAPER 0:CLS:WINDOW #1,10,70,4,21:PAPER #1,1:CLS #1:PEN 1:PEN #1,0:80 MOVE 45,50:DRAW 45,365:DRAW 585,365:DRAW 585,50:DRAW 45,50:DRAW 585,365:MOVE 585,50:DRAW 45,365:90 qq=REMAIN(3):EVERY 150,3 GOSUB 5790
100 flageff=0:IF sautx=1 THEN GOTO 220
110 flageff=0:IF saut1x=1 THEN GOT 0 1450
TYPE
":LOCATE #1,15,5:PRINT #1,STRING$(14,"-"):LOCATE #1,20,8:PRINT #1,"- calcul des parametres":LOCATE #1,20,9:PRINT #1,"- calcul des composants"
130 yx=8:LOCATE #1,18,yx:flache=C HR$(246):PRINT #1,flache# 140 IF INKEY#="" THEN 140
150 IF INKEY(0)=0 THEN LOCATE #1,18,yx:PRINT #1,flache#yx:yx%yx%
160 IF INKEY(2)=0 THEN LOCATE #1,18,yx:PRINT #1,CHR$(32):yx%yx%+1:IF yx%>9 THEN yx%=9:LOCATE #1,18,yx%:PRINT #1,flache#yx%yx%
170 IF INKEY(9)=0 THEN gox=yx%-7:C ALL &BB03:ON gox GOTO 220,1450
180 GOTO 140
190 /
200 /-----CHOIX DE LA STRUCTURE
210 /
220 sautx=0:CLS #1:LOCATE #1,16,3:PRINT #1,"Structure 'Sallen et Key'":LOCATE #1,10,4:PRINT #1,"- passe-bas"
230 LOCATE #1,10,5:PRINT #1,"- passe-haut":LOCATE #1,10,6:PRINT #1,"- passe-bande"
240 LOCATE #1,16,8:PRINT #1,"Structure 'Rauch'":LOCATE #1,10,9:PRINT #1,"- passe-bas":LOCATE #1,10,10:PRINT #1,"- passe-haut"
250 LOCATE #1,10,11:PRINT #1,"- passe-bande":LOCATE #1,10,16:PRINT #1,"changement de type de calcul -"
260 yx=4:yx%yx%:LOCATE #1,8,yx:flache=CHR$(246):PRINT #1,flache# 270 IF INKEY#="" THEN 270
280 IF INKEY(79)=0 THEN 70
290 IF INKEY(0)=0 THEN LOCATE #1,8,yx:PRINT #1,CHR$(32):yx%yx%+1:IF yx%>9 THEN yx%=9 ELSE IF (yx%<9 AND yx%>6) THEN yx%=6
300 LOCATE #1,8,yx%:PRINT #1,flache#yx%yx%
310 IF INKEY(2)=0 THEN LOCATE #1,8,yx%:PRINT #1,CHR$(32):yx%yx%+1:IF yx%>11 THEN yx%=11 ELSE IF (yx%<9 AND yx%>6) THEN yx%=9
320 LOCATE #1,8,yx%:PRINT #1,flache#yx%yx%
330 IF (yx%>3 AND yx%>7) THEN gox=yx%-3 ELSE IF (yx%>8 AND yx%>12) THEN gox=yx%-5 ELSE gox=0
340 IF INKEY(9)=0 THEN CALL &BB03:ON gox GOTO 390,550,710,880,1070,1260
350 GOTO 270
360 /
370 /-----PASSE-BAS SALLEN ET KEY
380 /
390 CLS#1:GOSUB 3300:DRAW 30,0:di
```

```
r%0:GOSUB 3400:MOVER -45,6:TAG:PRINT"R1";:MOVER 29,-6:DRAW 30,0:dir%0:GOSUB 3400
400 MOVER -45,6:PRINT"R2";:MOVER 29,-6:DRAW 73,0:MOVER -60,0:DRAW 0,-80:dir%1:GOSUB 3450:MOVER -60,5:PRINT "C2";
410 MOVER 44,-5:DRAW 0,-116:DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT "///";:MOVER -100,210:DRAW 0,40:DRAW 90,0
420 dir%0:GOSUB 3450:MOVER 10,20:PRINT"C1";:TAGOFF:MOVER -26,-20:DRAW 200,0:DRAW 0,-72
430 a$="PASSE-BAS SALLEN ET KEY":GOSUB 3820
440 PRINT #1,CHR$(2):WINDOW SWAP 1,0:BORDER 9:GOSUB 5590
450 indice#="1":GOSUB 3500:r1=res:indice#="2":GOSUB 3500:r2=res:indice#="a":GOSUB 3500:ra=res:460 indice#="b":GOSUB 3500:rb=res:indice#="1":GOSUB 3620:c1=condo:indice#="2":GOSUB 3620:c2=condo:470 k=(rb/ra)+1:hdb=20*LOG10(k):f0=(1/SQR(r1*r2*c1*c2))/(2*PI):q=SQR(r1*r2*c1*c2)/(r1*c2)+(r2*c2*(1-k)*r2*c1)
480 CLS:ZONE 40:PRINT"gain nominal H0 :",USING"###.###";k:PRINT"gain en continu H dB :",USING"###.###";hdb;:PRINT" dB":freq#=" Hz"
490 IF f0>1000 THEN IF f0>1000000 THEN f0=f0/1000000:freq#=" MHz" ELSE f0=f0/1000:freq#=" kHz"
500 PRINT"frequence de coupure F0 :",USING"###.###";f0:PRINT freq#:PRINT"facteur de qualite Q :",USING"###.###";q:LOCATE 64,2:PRINT CHR$(24);" menu---> [TAB] ";CHR$(24)
510 IF INKEY(68)<>0 THEN 510 ELSE sautx=1:GOTO 70
520 /
530 /-----PASSE-HAUT SALLEN ET KEY
540 /
550 CLS#1:GOSUB 3300:DRAW 40,0:dir%0:GOSUB 3450:MOVER 10,20:TAG:PRINT"C1";:MOVER -26,-20:DRAW 70,0:dir%0:GOSUB 3450
560 MOVER 10,20:PRINT"C2";:MOVER -26,-20:DRAW 123,0:MOVER -70,0:DRAW 0,-90:dir%1:GOSUB 3400:MOVER -4,-10
570 PRINT"R";:MOVER -8,-18:PRINT"2";:MOVER -4,-34:DRAW 0,-54:DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT "///";:MOVER -110,210
580 DRAW 0,55:DRAW 120,0:dir%0:GOSUB 3400:MOVER -45,6:PRINT"R1";:TAGOFF:MOVER 29,-6:DRAW 140,0:DRAW 0,-88
590 a$="PASSE-HAUT SALLEN ET KEY":GOSUB 3820
600 PRINT #1,CHR$(2):WINDOW SWAP 1,0:BORDER 9:GOSUB 5590
610 indice#="1":GOSUB 3500:r1=res:indice#="2":GOSUB 3500:r2=res:indice#="a":GOSUB 3500:ra=res:620 indice#="b":GOSUB 3500:rb=res:indice#="1":GOSUB 3620:c1=condo:indice#="2":GOSUB 3620:c2=condo:630 k=(rb/ra)+1:hdb=20*LOG10(k):f0=1/(2*PI*SQR(r1*r2*c1*c2)):q=SQR(r1*r2*c1*c2)/(r1*c2)+(r2*c2*(1-k)*r2*c1)
640 CLS:ZONE 40:PRINT"gain nominal H0 :",USING"###.###";k:PRINT"gain en continu H dB :",USING"###.###";hdb;:PRINT" dB":freq#=" Hz"
650 IF f0>1000 THEN IF f0>1000000 THEN f0=f0/1000000:freq#=" MHz" ELSE f0=f0/1000:freq#=" kHz"
660 PRINT"frequence de coupure F0 :",USING"###.###";f0:PRINT freq#:PRINT"facteur de qualite Q :",USING"###.###";q:LOCATE 64,2:PRINT CHR$(24);" menu---> [TAB] ";CHR$(24)
670 IF INKEY(68)<>0 THEN 510 ELSE sautx=1:GOTO 70
680 /
690 /-----PASSE-BANDE SALLEN ET KEY
700 /
710 CLS#1:GOSUB 3300:DRAW 30,0:dir%0:GOSUB 3400:MOVER -35,6:TAG:PR
```

```
INT"R";:MOVER 27,-6:DRAW 50,0:dir%0:GOSUB 3450
720 MOVER 10,30:PRINT"C";:MOVER -18,-30:DRAW 83,0:MOVER -70,0:DRAW 0,-90:dir%1:GOSUB 3400:MOVER -4,-18
730 PRINT"R";:MOVER -4,-43:DRAW 0,-54:DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT"///";:MOVER -13,125:DRAW -60,0:DRAW 0,-40:dir%1:GOSUB 3450:MOVER -40,18:PRINT"C";:MOVER 32,-18:DRAW 0,-72
740 DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT"///";:MOVER 0,210:DRAW 0,50:DRAW 120,0:dir%0:GOSUB 3400:MOVER -35,6:PRINT"R";:TAGOFF
750 MOVER 27,-6:DRAW 111,0:DRAW 0,-84
760 a$="PASSE-BANDE SALLEN ET KEY":GOSUB 3820
770 PRINT #1,CHR$(2):WINDOW SWAP 1,0:BORDER 9:GOSUB 5590
780 PRINT "attention!Ce type de filtre est realise avec UNE valeur de C et UNE valeur de R":FOR i=1 TO 2000:NEXT
790 CLS:indice#=" ":GOSUB 3500:r=res:indice#="a":GOSUB 3500:ra=res:indice#="b":GOSUB 3500:rb=res:indice#="1":GOSUB 3620:c1=condo:indice#="2":GOSUB 3620:c2=condo:800 k=rb/ra+1:hdb=20*LOG10(k/(5-k)):f0=SQR(2)/(r*c2*PI):q=SQR(2)/(5-k)
810 CLS:ZONE 40:PRINT"gain nominal H0 :",USING"###.###";k:PRINT"gain en continu H dB :",USING"###.###";hdb;:PRINT" dB":freq#=" Hz"
820 IF f0>1000 THEN IF f0>1000000 THEN f0=f0/1000000:freq#=" MHz" ELSE f0=f0/1000:freq#=" kHz"
830 PRINT"frequence de coupure F0 :",USING"###.###";f0:PRINT freq#:PRINT"facteur de qualite Q :",USING"###.###";q:LOCATE 64,2:PRINT CHR$(24);" menu---> [TAB] ";CHR$(24)
840 IF INKEY(68)<>0 THEN 840 ELSE sautx=1:GOTO 70
850 /
860 /-----PASSE-BAS RAUCH
870 /
880 CLS#1:GOSUB 3740:DRAW 30,0:dir%0:GOSUB 3400:MOVER -45,6:TAG:PRINT"R1";:MOVER 29,-6:DRAW 50,0:dir%0:GOSUB 3400
890 MOVER -45,6:PRINT"R3";:MOVER 29,-6:DRAW 53,0:MOVER -138,0:DRAW 0,10:MOVER 0,60:dir%1:GOSUB 3400
900 MOVER -4,-10:PRINT"R";:MOVER -8,-18:PRINT"2";:MOVER -4,28:DRAW 0,10:DRAW 275,0:DRAW 0,-115:MOVE R -170,37:DRAW 0,25
910 MOVER 0,10:dir%1:GOSUB 3450:MOVER 20,10:PRINT"C1";:MOVER -36,0:DRAW 0,45
920 MOVER -105,-82:DRAW 0,-70:dir%1:GOSUB 3450:MOVER 20,0:PRINT"C2";:MOVER -36,0:DRAW 0,-135:DRAW 12,0:DRAW -24,0
930 MOVER 0,-4:PRINT "///";:TAGOFF:MOVER -12,4
940 a$="PASSE-BAS RAUCH":GOSUB 3820
950 BORDER 9:GOSUB 5590:PRINT #1,CHR$(2):WINDOW SWAP 1,0
960 indice#="1":GOSUB 3500:r1=res:indice#="2":GOSUB 3500:r2=res:indice#="3":GOSUB 3500:r3=res:970 indice#="1":GOSUB 3620:c1=condo:indice#="2":GOSUB 3620:c2=condo:980 k=-((r2/r1)+hdb)-20*LOG10(ABS(k)):f0=1/(2*PI*SQR(r1*r3*c1*c2)):q=SQR(r2*r3*c1*c2)/(r2*r3*((1/r1)+(1/r2)+(1/r3))*c1)
990 CLS:ZONE 40:PRINT"gain nominal H0 :",USING"###.###";k:PRINT"gain en continu H dB :",USING"###.###";hdb;:PRINT" dB":freq#=" Hz"
1000 IF f0>1000 THEN IF f0>1000000 THEN f0=f0/1000000:freq#=" MHz" ELSE f0=f0/1000:freq#=" kHz"
1010 PRINT"frequence de coupure F0 :",USING"###.###";f0:PRINT freq#:PRINT"facteur de qualite Q :",USING"###.###";q:r=(r1*r2)/(r1+r2)+r3:PRINT"l'entree + est reliee a l
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a masse par R = R3+(R1/R2) = ";r:1020 LOCATE 64,2:PRINT CHR$(24);" menu---> [TAB] ";CHR$(24)
1030 IF INKEY(68)<>0 THEN 1030 ELSE sautx=1:GOTO 70
1040 /
1050 /-----PASSE-HAUT RAUCH
1060 /
1070 CLS #1:GOSUB 3740:DRAW 55,0:dir%0:GOSUB 3450:MOVER 20,20:TAG:PRINT"C1";:MOVER -36,-20:DRAW 100,0:dir%0:GOSUB 3450
1080 MOVER 10,20:PRINT"C3";:MOVER -26,-20:DRAW 78,0:MOVER -138,0:DRAW 0,35:MOVER 0,10:dir%1:GOSUB 3450
1090 MOVER 20,10:PRINT "C2";:MOVER -36,0:DRAW 0,35:DRAW 275,0:DRAW R 0,-115:MOVER -170,37:DRAW 0,10:1100 MOVER 0,60:dir%1:GOSUB 3400:MOVER -4,-10:PRINT "R";:MOVER -8,-18:PRINT "1";:MOVER -4,28:DRAW 0,10
1110 MOVER -105,-82:DRAW 0,-45:dir%1:GOSUB 3400:MOVER -4,-10:PRINT "R";:MOVER -8,-18:PRINT "2";:MOVE R -4,-32
1120 DRAW 0,-110:DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT"///";:TAGOFF:MOVER -12,4
1130 a$="PASSE-HAUT RAUCH":GOSUB 3820
1140 PRINT #1,CHR$(2):WINDOW SWAP 1,0:BORDER 9:GOSUB 5590
1150 indice#="1":GOSUB 3500:r1=res:indice#="2":GOSUB 3500:r2=res:1160 indice#="1":GOSUB 3620:c1=condo:indice#="2":GOSUB 3620:c2=condo:1170 k=-((c1/c2)+hdb)-20*LOG10(ABS(k)):f0=1/((SQR(r1*r2*c1*c2))*2*PI):q=SQR(r1*r2*c1*c2)/(r2*(c1+c2+c3))
1180 CLS:ZONE 40:PRINT"gain nominal H0 :",USING"###.###";k:PRINT"gain en continu H dB :",USING"###.###";hdb;:PRINT" dB":freq#=" Hz"
1190 IF f0>1000 THEN IF f0>1000000 THEN f0=f0/1000000:freq#=" MHz" ELSE f0=f0/1000:freq#=" kHz"
1200 PRINT"frequence de coupure F0 :",USING"###.###";f0:PRINT freq#:PRINT"facteur de qualite Q :",USING"###.###";q:PRINT"l'entree + est reliee a la masse par R = R1 = ";r1:CHR$(191)
1210 LOCATE 64,2:PRINT CHR$(24);" menu---> [TAB] ";CHR$(24)
1220 IF INKEY(68)<>0 THEN 1220 ELSE sautx=1:GOTO 70
1230 /
1240 /-----PASSE-BANDE RAUCH
1250 /
1260 CLS #1:GOSUB 3740:DRAW 30,0:dir%0:GOSUB 3400:MOVER -45,6:TAG:PRINT "R1";:MOVER 29,-6:DRAW 75,0:dir%0:GOSUB 3450
1270 MOVER 10,20:PRINT "C2";:MOVER -26,-20:DRAW 78,0:MOVER -138,0:DRAW 0,35:MOVER 0,10:dir%1:GOSUB 3450
1280 MOVER 20,10:PRINT "C1";:MOVER -36,0:DRAW 0,35:DRAW 275,0:DRAW R 0,-115:MOVER -170,37:DRAW 0,10:MOVER 0,60
1290 dir%1:GOSUB 3400:MOVER -4,-10:PRINT "R";:MOVER -8,-18:PRINT "3";:MOVER -4,28:DRAW 0,10
1300 MOVER -105,-82:DRAW 0,-45:dir%1:GOSUB 3400:MOVER -4,-10:PRINT "R";:MOVER -8,-18:PRINT "2";:MOVE R -4,-32
1310 DRAW 0,-110:DRAW 12,0:DRAW -24,0:MOVER 0,-4:PRINT"///";:TAGOFF:MOVER -12,4
1320 a$="PASSE-BANDE RAUCH":GOSUB 3820
1330 PRINT #1,CHR$(2):WINDOW SWAP 1,0:BORDER 9:GOSUB 5590
1340 indice#="1":GOSUB 3500:r1=res:indice#="2":GOSUB 3500:r2=res:indice#="3":GOSUB 3500:r3=res
```

A SUIVRE...



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FILTRES

SUITE DU N°139

```
1350 indice$="1":GOSUB 3620:c1=con
do:indice$="2":GOSUB 3620:c2=condo
1360 k=- (r3/r1)/(c2/(c1+c2)):hdb=2
0*LOG10(ABS(k)):req=r1*r2/(r1+r2):
f0=1/((SQR(c1*c2*r3*req))*2*PI):q=
1/(c1*c2*SQR(req/(r3*c1*c2)))
1370 CLS:ZONE 40:PRINT"gain nomina
l H0 :","USING"###.###";k:PRINT"gai
n en continu H dB :","USING"###.###
";hdb:PRINT" dB":freq$=" Hz"
1380 IF f0>1000 THEN IF f0/1000000
THEN f0=f0/1000000:freq$=" MHz" E
LSE f0=f0/1000:freq$=" kHz"
1390 PRINT"frequence de coupure FO
:","USING"###.###";f0:PRINT freq$
:PRINT"facteur de qualite Q :","USI
NG"###.###";qr:r3:PRINT"l'entree
+ est reliee a la masse par R = R3
=";r:CHR$(191)
1400 LOCATE 64,2:PRINT CHR$(24);"
menu---> [TAB]";CHR$(24)
1410 IF INKEY(68)<>0 THEN 1410 ELS
E sautX=1:GOTO 70
1420 /
1430 /-----CHOIX DU FILTRE A CALCU
LER
1440 /
1450 CLS #1:saut1X=0:LOCATE #1,20,
4:PRINT #1,"ORDRE DU FILTRE ":LOCA
TE #1,20,5:PRINT #1,STRING$(15,"-
"):LOCATE #1,20,7
1460 PRINT #1,"-second ordre":LOCA
TE #1,20,8:PRINT #1,"-troisieme or
dre":LOCATE #1,20,9:PRINT #1,"-qua
trieme ordre":LOCATE #1,10,16
1470 PRINT #1,"changement de type
"
1480 yX=7:yyX=yX:LOCATE #1,18,yX:f
leche$=CHR$(246):PRINT #1,fleche$
1490 IF INKEY$="" THEN 1490
1500 IF INKEY(79)=0 THEN 70
1510 IF INKEY(0)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX-1:I
F yyX<=7 THEN yyX=7
1520 IF INKEY(2)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX+1:I
F yyX>=9 THEN yyX=9
1530 LOCATE #1,18,yyX:PRINT #1,fle
che$:yX=yyX
1540 IF INKEY (9)=0 THEN ordreX=yX
-6:GOTO 1560
1550 GOTO 1490
1560 CALL &BB03:CLS #1:LOCATE #1,2
0,4:PRINT #1,"FONCTION DE TRANSFER
T":LOCATE #1,20,5:PRINT #1,STRING$
(21,"-"):LOCATE #1,20,8
1570 PRINT #1,"-passe-bas":LOCATE
#1,20,9:PRINT #1,"-passe-haut":LOC
ATE #1,10,16:PRINT #1,"changement
"
1580 yX=8:yyX=yX:LOCATE #1,18,yX:f
leche$=CHR$(246):PRINT #1,fleche$
1590 IF INKEY$="" THEN 1590
1600 IF INKEY(79)=0 THEN 70
1610 IF INKEY(0)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX-1:I
F yyX<=8 THEN yyX=8
1620 IF INKEY(2)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX+1:I
F yyX>=9 THEN yyX=9
1630 LOCATE #1,18,yyX:PRINT #1,fle
che$:yX=yyX
1640 IF INKEY (9)=0 THEN typeX=yX-
7:GOTO 1660
1650 GOTO 1590
1660 CALL &BB03:CLS #1:LOCATE #1,2
0,4:PRINT #1,"TYPE DE REPONSE":LOC
ATE #1,20,5:PRINT #1,STRING$(15,"-
"):LOCATE #1,20,8:PRINT #1,"- repo
nse de Bessel":LOCATE #1,20,9:PRIN
T #1,"- reponse de Butterworth":LO
CATE #1,10,16
1670 PRINT #1,"changement de type
"
1680 yX=8:yyX=yX:LOCATE #1,18,yX:f
leche$=CHR$(246):PRINT #1,fleche$
1690 IF INKEY$="" THEN 1690
1700 IF INKEY(79)=0 THEN 70
1710 IF INKEY(0)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX-1:I
F yyX<=8 THEN yyX=8
1720 IF INKEY(2)=0 THEN LOCATE #1,
18,yX:PRINT #1,CHR$(32):yyX=yX+1:I
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F yyX>=9 THEN yyX=9
1730 LOCATE #1,18,yyX:PRINT #1,fle
che$:yX=yyX
1740 IF INKEY (9)=0 THEN reponseX=
yX-7:CALL &BB03:GOTO 1770
1750 GOTO 1690
1760 /-----aiguillage vers les sou
s routines
1770 ON ordreX GOTO 1780,1810,1840
1780 ON typeX GOTO 1790,1800
1790 GOTO 1900
1800 GOTO 2120
1810 ON typeX GOTO 1820,1830
1820 GOTO 2330
1830 GOTO 2580
1840 ON typeX GOTO 1850,1860
1850 GOTO 2810
1860 GOTO 3050
1870 /
1880 /-----PASSE-BAS 2eme ORDRE
1890 /
1900 GOSUB 3860:DRAW 0,-45:dirX=1
:GOSUB 3450:MOVER 20,0:TAG:PRINT"C
b";:MOVER -36,0:DRAW 0,-45:DRAW 12,0
1910 DRAW -24,0:MOVER 0,-5:PRINT"
///";:MOVER -12,105:DRAW -10,0:MO
VER -60,0:dirX=0:GOSUB 3400:MOVER
-53,6:PRINT"R";
1920 MOVER -15,-6:DRAW -20,0:MOVE
R -60,0:GOSUB 3400:MOVER -53,6:PRI
NT "R";:MOVER -15,-6:DRAW -20,0:M
OVER -10,6
1930 PRINT CHR$(246);:MOVER 92,-6:
DRAW 0,45:MOVER 0,10:dirX=1:GOSUB
3450:MOVER 20,10:PRINT "Ca";:TAGO
FF:MOVER -36,0
1940 DRAW 0,60:BORDER 9:GOSUB 559
0:ON reponseX GOTO 1950,2010
1950 a$="PASSE-BAS 2eme ORDRE BESS
EL":GOSUB 4100:WINDOW SWAP 1,0:CLS
:CALL &BB03:LOCATE 1,3:PRINT "La r
esistance R doit avoir une valeur
comprise entre 4,7 et 10 k";:PRINT
CHR$(191)
1960 FOR iX=1 TO 2500:NEXT:GOSUB 4
250:r=res:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
1980 rep$=UPPER$(INKEY$):IF rep$="
" THEN 1980 ELSE IF rep$="0" THEN
jumpX=2:GOTO 1990 ELSE jumpX=1:GOT
O 2000
1990 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 1990
2000 ca=0.9076/(2*PI*f0*r):cb=0.68
09/(2*PI*f0*r):cap=ca:GOSUB 5710:c
a$=condo$:cap=cb:GOSUB 5710:cb$=co
ndo$:GOTO 2060
2010 a$="PASSE-BAS 2eme ORDRE BUTT
ERWORTH":GOSUB 4100:WINDOW SWAP 1,
0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"La resistance R doit avoir une va
leur comprise entre 4,7 et 10 k";:
PRINT CHR$(191):FOR iX=1 TO 2500:N
EXT:GOSUB 4250:r=res:GOSUB 4140:CL
S
ajustement
<O>ui ou <N>on"
2030 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2030 ELSE IF rep$="0" THEN
jumpX=2:GOTO 2040 ELSE jumpX=1:GOT
O 2050
2040 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 2040
2050 ca=SQR(2)/(2*PI*f0*r):cb=1/(S
QR(2)*2*PI*f0*r):cap=ca:GOSUB 5710
:ca$=condo$:cap=cb:GOSUB 5710:cb$=
condo$
2060 CLS:PRINT:PRINT " pour R = ";
r/1000;"k";CHR$(191);SPACE$(10);"C
a=";ca$;SPACE$(10);"Cb=";cb$
2070 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB]";CHR$(24)
2080 IF INKEY(68)<>0 THEN 2080 ELS
E saut1X=1:GOTO 70
2090 /
2100 /-----PASSE-HAUT 2eme ORDRE
2110 /
2120 GOSUB 3860:DRAW 0,-20:dirX=1
:GOSUB 3400:MOVER -4,-10:TAG:PRINT
"R";:MOVER -8,-18:PRINT"b";:MOVER
-4,-34
```

```
2130 DRAW 0,-20:DRAW 12,0:DRAW 12,0:
DRAW -24,0:MOVER 0,-5:PRINT"///";:MOVER
-12,107:DRAW -35,0:MOVER -10,0:di
rX=0:GOSUB 3450
2140 MOVER -28,15:PRINT"C";:MOVER
10,-15:DRAW -70,0:MOVER -10,0:dir
X=0:GOSUB 3450:MOVER -28,15:PRINT"
C";
2150 MOVER 10,-15:DRAW -45,0:MOVE
R -10,6:PRINT CHR$(246);:MOVER 92,
-6:DRAW 0,20:MOVER 0,60:dirX=1:GO
SUB 3400
2160 MOVER -4,-8:PRINT"R";:MOVER -
8,-18:PRINT"a";:TAGOFF:MOVER -4,26
:DRAW 0,35:BORDER 9:GOSUB 5590:ON
reponseX GOTO 2170,2220
2170 a$="PASSE-HAUT 2eme ORDRE BESS
EL":GOSUB 4100:WINDOW SWAP 1,0:CL
S:CALL &BB03:LOCATE 1,3:PRINT "Le
condensateur C doit avoir une vale
ur comprise entre 4,7 et 10 nF";:F
OR iX=1 TO 2500:NEXT:GOSUB 4290:c=
condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2190 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2190 ELSE IF rep$="0" THEN
jumpX=2:GOTO 2200 ELSE jumpX=1:GOT
O 2210
2200 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 2200
2210 ra=1.1017/(2*PI*f0*c):rb=1.46
88/(2*PI*f0*c):res=ra:GOSUB 5750:r
a$=res$:res=rb:GOSUB 5750:rb$=res$
:GOTO 2270
2220 a$="PASSE-HAUT 2eme ORDRE BUT
TERWORTH":GOSUB 4100:WINDOW SWAP 1
,0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"Le condensateur doit avoir une v
aleur comprise entre 4,7 et 10 nF"
";:FOR iX=1 TO 2500:NEXT:GOSUB 4290
:c=condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2240 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2240 ELSE IF rep$="0" THEN
jumpX=2:GOTO 2250 ELSE jumpX=1:GOT
O 2260
2250 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 2250
2260 ra=1/(SQR(2)*2*PI*f0*c):rb=SQ
R(2)/(2*PI*f0*c):res=ra:GOSUB 5750
:ra$=res$:res=rb:GOSUB 5750:rb$=re
s$
2270 CLS:PRINT:PRINT " pour C = "
;c*1E+09;"nF";SPACE$(10);"Ra=";ra
$;SPACE$(10);"Rb=";rb$
2280 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB]";CHR$(24)
2290 IF INKEY(68)<>0 THEN 2290 ELS
E saut1X=1:GOTO 70
2300 /
2310 /-----PASSE-BAS DU 3eme ORDRE
2320 /
2330 GOSUB 3930:DRAW 0,-32:dirX=1
:GOSUB 4050:MOVER 20,0:TAG:PRINT"C
b";:MOVER -36,0:DRAW 0,-32:DRAW 12,0:
DRAW -24,0
2340 MOVER 0,-5:PRINT"///";:MOVER
-12,74:DRAW -10,0:MOVER -30,0:dir
X=0:GOSUB 4000:MOVER -27,25:PRINT"
R";
2350 MOVER -11,-25:DRAW -30,0:MOV
ER -30,0:GOSUB 4000:MOVER -27,25:P
RINT"R";:MOVER -11,-25:DRAW -15,0
:MOVER -15,6
2360 PRINT CHR$(246);:MOVER 64,-6:
DRAW 0,23:MOVER 0,5:dirX=1:GOSUB
4050:MOVER -20,20:PRINT"Ca";:MOVER
4,-15
2370 DRAW 0,28:MOVER 164,-38:dirX
=0:GOSUB 4000:MOVER -27,25:PRINT"R
";:MOVER 19,-25:DRAW 15,0:DRAW 0
,-42:dirX=1
2380 GOSUB 4050:MOVER 20,0:PRINT"C
d";:MOVER -36,0:DRAW 0,-42:DRAW 12,0:
DRAW -24,0:MOVER 0,-5:PRINT"
///";
2390 MOVER -12,94:DRAW 20,0:DRAW 0,
-15:DRAW 0,60:DRAW 60,-30:DRA
WR -60,-30:MOVER 0,15:MOVER 5,5:PR
INT "t";
```

```
2400 MOVER -8,29:PRINT "-";:MOVER
-13,0:DRAW -20,0:DRAW 0,20:DRAW 90,0:
DRAW 0,-38:DRAW -10,0:DRAW
R 25,0
2410 MOVER 15,6:PRINT CHR$(246);:T
AGOFF:BORDER 9:GOSUB 5590:ON repon
seX GOTO 2420,2470
2420 a$="PASSE-BAS 3eme ORDRE BESS
EL":GOSUB 4100:WINDOW SWAP 1,0:CLS
:CALL &BB03:LOCATE 1,3:PRINT "La r
esistance R doit avoir une valeur
comprise entre 4,7 et 10 k";:PRINT
CHR$(191):FOR iX=1 TO 2500:NEXT:G
OSUB 4250:r=res:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2440 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2440 ELSE IF rep$="0" THEN
jumpX=2:GOTO 2450 ELSE jumpX=1:GOT
O 2460
2450 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 2450
2460 denom=2*PI*f0*r:ca=0.9548/den
om:cb=0.4998/denom:cd=0.756/denom:
cap=ca:GOSUB 5710:ca$=condo$:cap=c
b:GOSUB 5710:cb$=condo$:cap=cd:GOS
UB 5710:cd$=condo$:GOTO 2520
2470 a$="PASSE-BAS 3eme ORDRE BUTT
ERWORTH":GOSUB 4100:WINDOW SWAP 1,
0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"La resistance R doit avoir une va
leur comprise entre 4,7 et 10 k";:
PRINT CHR$(191):FOR iX=1 TO 2500:N
EXT:GOSUB 4250:r=res:GOSUB 4140:CL
S
ajustement
<O>ui ou <N>on"
2490 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2490 ELSE IF rep$="0" THEN
jumpX=2:GOTO 2500 ELSE jumpX=1:GOT
O 2510
2500 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1X ou 5X):"
;tolX:IF tolX<>1 AND tolX<>5 THEN
CLS:GOTO 2500
2510 denom=2*PI*f0*r:ca=2/denom:cb
=0.5/denom:cd=1/denom:cap=ca:GOSUB
5710:ca$=condo$:cap=cb:GOSUB 5710
:cb$=condo$:cap=cd:GOSUB 5710:cd$=
condo$
2520 CLS:PRINT:PRINT SPACE$(15);"p
our R = ";r/1000;"k";CHR$(191):PRIN
T:PRINT SPACE$(10);"Ca=";ca$;SPAC
E$(15);"Cb=";cb$;SPACE$(15);"Cd="
";cd$
2530 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB]";CHR$(24)
2540 IF INKEY(68)<>0 THEN 2540 ELS
E saut1X=1:GOTO 70
2550 /
2560 /-----PASSE-HAUT DU 3eme ORDR
E
2570 /
2580 GOSUB 3930:DRAW 0,-29:dirX=1
:GOSUB 4000:MOVER 20,0:TAG:PRINT"R
b";:MOVER -36,-30:DRAW 0,-30:DRAW
R 12,0:DRAW -24,0
2590 MOVER 0,-5:PRINT"///";:MOVER
-12,94:DRAW -30,0:MOVER -5,0:dirX
=0:GOSUB 4050:MOVER -5,25:PRINT"C"
";
2600 MOVER -8,-25:DRAW -55,0:MOVE
R -5,0:GOSUB 4050:MOVER -5,25:PRIN
T"C";:MOVER -8,-25:DRAW -50,0:MOV
ER -15,6
2610 PRINT CHR$(246);:MOVER 93,-6:
DRAW 0,12:MOVER 0,30:dirX=1:GOSUB
4000:MOVER -20,20:PRINT"Ra";:MOVE
R 4,-20
2620 DRAW 0,14:MOVER 164,-38:DRA
WR 10,0:dirX=0:GOSUB 4050:MOVER -5,
25:PRINT"C";:MOVER -3,-25:DRAW 25
,0:DRAW 0,-39:dirX=1:GOSUB 4000:M
OVER 20,0:PRINT"Rd";:MOVER -36,-30
:DRAW 0,-40
2630 DRAW 12,0:DRAW -24,0:MOVER
0,-5:PRINT"///";:MOVER -12,114:DRA
WR 20,0:DRAW 0,-15:DRAW 0,60:DRA
WR 60,-30:DRAW -60,-30:MOVER 0,15
```

AMSTRAD

A SUIVRE...



Les filtres électroniques n'ont plus aucun secret pour Jean-Luc GARNIER; la preuve...



FILTRES

SUITE DUN 139

```
:MOVER 5,5:PRINT "+";:MOVER -8,29:
PRINT "-";
2640 MOVER -13,0:DRAWR -20,0:DRAWR
0,20:DRAWR 30,0:DRAWR 0,-38:DRAWR
-10,0:DRAWR 25,0:MOVER 15,6:PRINT
CHR$(246);:TAGOFF:BORDER 9:GOSUB
5590:ON reponse% GOTO 2650,2700
2650 a$="PASSE-HAUT 3eme ORDRE BES
SEL":GOSUB 4100:WINDOW SWAP 1,0:CL
S:CALL &BB03:LOCATE 1,3:PRINT "Le
condensateur C doit avoir une vale
ur comprise entre 4,7 et 10 nF";:F
OR ix=1 TO 2500:NEXT:GOSUB 4290:c=
condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2670 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2670 ELSE IF rep$="0" THEN
jump%=2:GOTO 2680 ELSE jump%=1:GOT
O 2690
2680 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 2680
2690 denom=2*PI*f0*c:ra=1.047/deno
m:rb=2.008/denom:rd=1.3228/denom:
res$=ra:GOSUB 5750:ra$=res$:res$=rb:G
OSUB 5750:rb$=res$:res$=rd:GOSUB 57
50:rd$=res$:GOTO 2750
2700 a$="PASSE-HAUT 3eme ORDRE BUT
TERWORTH":GOSUB 4100:WINDOW SWAP 1
,0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"Le condensateur doit avoir une v
aleur comprise entre 4,7 et 10 nF"
;:FOR ix=1 TO 2500:NEXT:GOSUB 4290
:c=condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2720 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2720 ELSE IF rep$="0" THEN
jump%=2:GOTO 2730 ELSE jump%=1:GOT
O 2740
2730 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 2730
2740 denom=2*PI*f0*c:ra=0.5/denom:
rb=2/denom:rd=1/denom:res$=ra:GOSUB
5750:ra$=res$:res$=rb:GOSUB 5750:r
b$=res$:res$=rd:GOSUB 5750:rd$=res$
2750 CLS:PRINT:PRINT SPACE$(15);"p
our C = ";c*1E+09;"nF":PRINT:PRINT
SPACE$(10);"Ra = ";ra$;SPACE$(10);"
Rb = ";rb$;SPACE$(10);"Rd = ";rd$
2760 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB] ";CHR$(24)
2770 IF INKEY(68)<>0 THEN 2770 ELS
E saut1%=1:GOTO 70
2780 /
2790 /-----PASSE-BAS 4eme ORDRE
2800 /
2810 GOSUB 3930:DRAWR 0,-32:dir%=1
:GOSUB 4050:MOVER 20,0:TAG:PRINT"C
b";:MOVER -36,0:DRAWR 0,-32:DRAWR
12,0:DRAWR -24,0
2820 MOVER 0,-5:PRINT"///";:MOVER
-12,74:DRAWR -10,0:MOVER -30,0:dir
%=0:GOSUB 4000:MOVER -27,25:PRINT"
R";
2830 MOVER -11,-25:DRAWR -30,0:MOV
ER -30,0:GOSUB 4000:MOVER -27,25:P
RINT"R";:MOVER -11,-25:DRAWR -15,0
:MOVER -15,6
2840 PRINT CHR$(246);:MOVER 64,-6:
DRAWR 0,23:MOVER 0,5:dir%=1:GOSUB
4050:MOVER -20,20:PRINT"Ca";:MOVER
4,-15
2850 DRAWR 0,28:MOVER 294,-21:GOSU
B 5650:TAG:DRAWR 0,-42:dir%=1:GOSU
B 4050:MOVER 20,0:PRINT"Cd";:MOVER
-36,0:DRAWR 0,-42:DRAWR 12,0:DR
AWR -24,0
2860 MOVER 0,-5:PRINT"///";:MOVER
-12,94:DRAWR -10,0:MOVER -30,0:dir
%=0:GOSUB 4000:MOVER -27,25:PRINT"
R";
2870 MOVER -11,-25:DRAWR -40,0:MOV
ER -30,0:GOSUB 4000:MOVER -27,25:P
RINT"R";:MOVER 40,-25:DRAWR 0,23:M
OVER 0,5:dir%=1:GOSUB 4050:MOVER -
20,20:PRINT"Ce";:MOVER 4,-15:DRAWR
0,28
2880 MOVER 179,-32:PRINT CHR$(246)
```

```
;:TAGOFF:BORDER 9:GOSUB 5590:ON re
ponse% GOTO 2890,2940
2890 a$="PASSE-BAS 4eme ORDRE BESS
EL":GOSUB 4100:WINDOW SWAP 1,0:CL
S:CALL &BB03:LOCATE 1,3:PRINT "La r
esistance R doit avoir une valeur
comprise entre 4,7 et 10 k";:PRINT
CHR$(191):FOR ix=1 TO 2500:NEXT:G
OSUB 4250:r=res:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
2910 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2910 ELSE IF rep$="0" THEN
jump%=2:GOTO 2920 ELSE jump%=1:GOT
O 2930
2920 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 2920
2930 denom=2*PI*f0*c:ra=0.7298/deno
m:cb=0.6639/denom:cc=1.0046/denom
:cd=0.3872/denom:cap=c:GOSUB 5710
:ca$=condo$;:cap=c:GOSUB 5710:cb$=
condo$;:cap=c:GOSUB 5710:cc$=condo
$:cap=c:GOSUB 5710:cd$=condo$:GOT
O 2990
2940 a$="PASSE-BAS 3eme ORDRE BUT
TERWORTH":GOSUB 4100:WINDOW SWAP 1
,0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"La resistance R doit avoir une va
leur comprise entre 4,7 et 10 k";:
PRINT CHR$(191):FOR ix=1 TO 2500:CL
EXT:GOSUB 4250:r=res:GOSUB 4140:CL
S
ajustement
<O>ui ou <N>on"
2960 rep$=UPPER$(INKEY$):IF rep$="
" THEN 2960 ELSE IF rep$="0" THEN
jump%=2:GOTO 2970 ELSE jump%=1:GOT
O 2980
2970 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 2970
2980 denom=2*PI*f0*c:ra=1.0824/den
om:cb=0.9239/denom:cc=2.613/denom:
cd=0.3827/denom:cap=c:GOSUB 5710:
ca$=condo$;:cap=c:GOSUB 5710:cb$=c
ondo$;:cap=c:GOSUB 5710:cc$=condo$
:cap=c:GOSUB 5710:cd$=condo$
2990 CLS:PRINT:PRINT SPACE$(15);"p
our R = ";r/1000;"k";CHR$(191):PRIN
T:PRINT SPACE$(8);"Ca = ";ca$;SPACE
$(8);"Cb = ";cb$;SPACE$(8);"Cc = ";c
c$;SPACE$(8);"Cd = ";cd$
3000 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB] ";CHR$(24)
3010 IF INKEY(68)<>0 THEN 3010 ELS
E saut1%=1:GOTO 70
3020 /
3030 /-----PASSE-HAUT DU 4eme ORDR
E
3040 /
3050 GOSUB 3930:DRAWR 0,-29:dir%=1
:GOSUB 4000:MOVER 20,0:TAG:PRINT"R
b";:MOVER -36,-30:DRAWR 0,-30:DR
AWR 12,0:DRAWR -24,0
3060 MOVER 0,-5:PRINT"///";:MOVER
-12,94:DRAWR -30,0:MOVER -5,0:dir%
=0:GOSUB 4050:MOVER -5,25:PRINT"C"
;
3070 MOVER -8,-25:DRAWR -55,0:MOVE
R -5,0:GOSUB 4050:MOVER -5,25:PRIN
T"C";:MOVER -8,-25:DRAWR -50,0:MOV
ER -15,6
3080 PRINT CHR$(246);:MOVER 93,-6:
DRAWR 0,12:MOVER 0,30:dir%=1:GOSUB
4000:MOVER -20,20:PRINT"Ra";:MOVE
R 4,-20
3090 DRAWR 0,14:MOVER 280,-21:GOSU
B 5650:TAG:DRAWR 0,-39:dir%=1:GOSU
B 4000:MOVER 20,0:PRINT"Rd";:MOVER
-36,-30:DRAWR 0,-40:DRAWR 12,0:DR
AWR -24,0
3100 MOVER 0,-5:PRINT"///";:MOVER
-12,114:DRAWR -30,0:MOVER -5,0:dir
%=0:GOSUB 4050:MOVER -5,25:PRINT"C
";
3110 MOVER -8,-25:DRAWR -55,0:MOVE
R -5,0:GOSUB 4050:MOVER -5,25:PRIN
T"C";:MOVER 28,-25:DRAWR 0,12:MOVE
R 0,30:dir%=1:GOSUB 4000:MOVER -20
,20:PRINT"Rc";:MOVER 4,-20
3120 DRAWR 0,14:MOVER 164,-38:MOVE
R 15,6:PRINT CHR$(246);:TAGOFF:BO
RDER 9:GOSUB 5590:ON reponse% GOTO
3130,3180
```

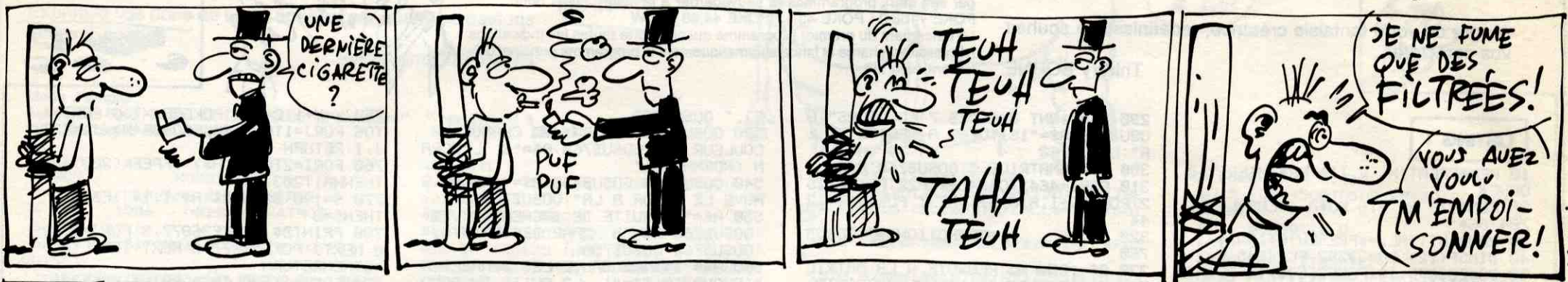
```
3130 a$="PASSE-HAUT 4eme ORDRE BES
SEL":GOSUB 4100:WINDOW SWAP 1,0:CL
S:CALL &BB03:LOCATE 1,3:PRINT "Le
condensateur C doit avoir une vale
ur comprise entre 4,7 et 10 nF";:F
OR ix=1 TO 2500:NEXT:GOSUB 4290:c=
condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
3150 rep$=UPPER$(INKEY$):IF rep$="
" THEN 3150 ELSE IF rep$="0" THEN
jump%=2:GOTO 3160 ELSE jump%=1:GOT
O 3170
3160 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 3160
3170 denom=2*PI*f0*c:ra=1.3701/den
om:rb=1.4929/denom:rc=0.9952/denom
:rd=2.583/denom:res$=ra:GOSUB 5750:
ra$=res$:res$=rb:GOSUB 5750:rb$=res
$:res$=rc:GOSUB 5750:rc$=res$:res$=r
d:GOSUB 5750:rd$=res$:GOTO 3230
3180 a$="PASSE-HAUT 4eme ORDRE BUT
TERWORTH":GOSUB 4100:WINDOW SWAP 1
,0:CLS:CALL &BB03:LOCATE 1,3:PRINT
"Le condensateur doit avoir une v
aleur comprise entre 4,7 et 10 nF"
;:FOR ix=1 TO 2500:NEXT:GOSUB 4290
:c=condo:GOSUB 4140:CLS
ajustement
<O>ui ou <N>on"
3200 rep$=UPPER$(INKEY$):IF rep$="
" THEN 3200 ELSE IF rep$="0" THEN
jump%=2:GOTO 3210 ELSE jump%=1:GOT
O 3220
3210 LOCATE 1,4:INPUT "tolerance d
es composants desiree (1% ou 5%):"
;tol%:IF tol%<>1 AND tol%<>5 THEN
CLS:GOTO 3210
3220 denom=2*PI*f0*c:ra=0.9239/den
om:rb=1.0824/denom:rc=0.3827/denom
:rd=2.613/denom:res$=ra:GOSUB 5750:
ra$=res$:res$=rb:GOSUB 5750:rb$=res
$:res$=rc:GOSUB 5750:rc$=res$:res$=r
d:GOSUB 5750:rd$=res$
3230 CLS:PRINT:PRINT SPACE$(15);"p
our C = ";c*1E+09;"nF":PRINT:PRINT
SPACE$(8);"Ra = ";ra$;SPACE$(8);"Rb
= ";rb$;SPACE$(8);"Rc = ";rc$;SPACE
$(8);"Rd = ";rd$
3240 LOCATE 64,3:PRINT CHR$(24);"
menu---> [TAB] ";CHR$(24)
3250 IF INKEY(68)<>0 THEN 3250 ELS
E saut1%=1:GOTO 70
3260 END
3270 /
3280 /-----STRUCTURE SALLEN ET KEY
3290 /
3300 CLS:BORDER 0:GOSUB 5590:WINDO
W #1,1,80,21,25:PEN #1,0:PAPER #1,
1:CLS #1:ORIGIN 0,80,0,639,399,80
3310 MOVE 370,200:DRAWR 0,-60:DR
AWR 0,120:DRAWR 120,-60:DRAWR -120,-
60:MOVER 0,25:MOVER 10,0:TAG:PRINT
"-";:MOVER -18,0:DRAWR -40,0:DR
AWR 0,-40
3320 DRAWR 80,0:MOVER 5,5:PRINT "R
b=n.Ra";:MOVER -6,1-5:DRAWR 0,10:D
RAWR 60,0:DRAWR 0,-20:DRAWR -60,0:
DRAWR 0,10
3330 MOVER 60,0:DRAWR 50,0:DRAWR 0
,75:DRAWR -35,0:DRAWR 65,0:MOVER 4
,6:PRINT CHR$(246);:MOVER -12,-6
3340 MOVER -220,-75:DRAWR 0,-20:MO
VER -4,-10:PRINT "R";:MOVER -8,-18
:PRINT "a";:MOVER -4,26:DRAWR 10,0
3350 DRAWR 0,-60:DRAWR -20,0:DRAWR
0,60:DRAWR 10,0:MOVER 0,-60:DRAWR
0,-15:DRAWR 12,0:DRAWR -24,0:MOVE
R 0,-4
3360 PRINT "///";:MOVER -12,210:DR
AWR 40,0:MOVER 10,0:PRINT "+";:MOV
ER -285,6:PRINT CHR$(246);:TAGOFF:
MOVER 4,-6:RETURN
3370 /
3380 /-----DESSIN D'UNE RESISTANCE
3390 /
3400 IF dir%=0 THEN x1%=0:y1%=10:x
2%=60:y2%=0:x3%=0:y3%=-20:x4%=-60:
y4%=0:x5%=0:y5%=10 ELSE IF dir%=1
THEN x1%=10:y1%=0:x2%=0:y2%=-60:x3
%=-20:y3%=0:x4%=0:y4%=60:x5%=10:y5
%=0
3410 DRAWR x1%,y1%:DRAWR x2%,y2%:D
RAWR x3%,y3%:DRAWR x4%,y4%:DRAWR x
5%,y5%:IF dir%=0 THEN MOVER 60,0:R
```

```
ETURN ELSE RETURN
3420 /
3430 /-----DESSIN D'UN CONDENSATEU
R
3440 /
3450 IF dir%=0 THEN x1%=0:y1%=15:x
2%=0:y2%=-30:x3%=10:y3%=0:x4%=0:y4
%=30:x5%=0:y5%=-15 ELSE IF dir%=1
THEN x1%=15:y1%=0:x2%=-30:y2%=0:x3
%=0:y3%=-10:x4%=30:y4%=0:x5%=-15:y
5%=0
3460 DRAWR x1%,y1%:DRAWR x2%,y2%:M
OVER x3%,y3%:DRAWR x4%,y4%:DRAWR x
5%,y5%:RETURN
3470 /
3480 /-----ENTREE D'UNE R
3490 /
3500 CLS:PRINT:CALL &BB03:PRINT "E
ntrez la valeur de R";:PRINT indic
e$;r$="R";indice$:LOCATE 5,3:PRINT
r$+"=";
3510 INPUT "",r:LOCATE 50,3:PRINT
CHR$(191):LOCATE 55,3:PRINT "k"+CH
R$(191):LOCATE 60,3
3520 PRINT "M"+CHR$(191):fleche$=C
HR$(244):LOCATE 50,4:x%=50:y%=4:xx
%=x%:PRINT fleche$
3530 IF INKEY$="" THEN 3530
3540 IF INKEY(8)=0 THEN xx%=x%-5:I
F x%=50 THEN xx%=x%
3550 IF INKEY(1)=0 THEN xx%=x%+5:I
F x%=60 THEN xx%=x%
3560 CALL &BD19:LOCATE xx%,y%:PRIN
T " ";CALL &BD19:LOCATE xx%,y%:PRIN
T fleche$:xx%=xx%
3570 IF INKEY(9)=0 THEN mult%=(xx
%-50)/5)*3:res$=r*(10^mult%):flagn
o=1:GOSUB 5310:flagnor=0:RETURN
3580 CALL &BB03:GOTO 3530
3590 /
3600 /-----ENTREE D'UN C
3610 /
3620 CLS:PRINT:CALL &BB03:PRINT "E
ntrez la valeur de C";:PRINT indic
e$:c$="C";indice$:LOCATE 5,3:PRINT
c$+"=";
3630 INPUT "",c:LOCATE 50,3:PRINT
CHR$(183);"F":LOCATE 55,3:PRINT "n
F":LOCATE 60,3:PRINT "pF"
3640 fleche$=CHR$(244):LOCATE 50,4
:xx%=50:y%=4:xx%=x%:PRINT fleche$
3650 IF INKEY$="" THEN 3650
3660 IF INKEY(8)=0 THEN xx%=x%-5:I
F x%=50 THEN xx%=x%
3670 IF INKEY(1)=0 THEN xx%=x%+5:I
F x%=60 THEN xx%=x%
3680 CALL &BD19:LOCATE xx%,y%:PRIN
T " ";CALL &BD19:LOCATE xx%,y%:PRIN
T fleche$:xx%=xx%
3690 IF INKEY(9)=0 THEN mult%=(xx
%-50)/5)+2)*(-3):cap=c*(10^mult%)
:flagnor=1:GOSUB 5450:flagnor=0:RE
TURN
3700 CALL &BB03:GOTO 3650
3710 /
3720 /-----STRUCTURE RAUCH
3730 /
3740 CLS:BORDER 0:GOSUB 5590:WINDO
W #1,1,80,21,25:PEN #1,0:PAPER #1,
1:CLS #1:ORIGIN 0,80,0,639,399,80
3750 MOVE 370,200:DRAWR 0,-60:DR
AWR 0,120:DRAWR 120,-60:DRAWR -120,-
60:MOVER 0,25:MOVER 10,0:TAG:PRINT
"-";:MOVER -18,0:DRAWR -40,0:DR
AWR 0,-40
3760 MOVER 160,75:DRAWR 65,0:MOVER
4,6:PRINT CHR$(246);:MOVER -12,-6
:MOVER -225,-38:DRAWR 0,-40:MOVER
-4,-10
3770 PRINT "R";:MOVER -4,10:DRAWR
10,0:DRAWR 0,-60:DRAWR -20,0:DRAWR
0,60:DRAWR 10,0:MOVER 0,-60:DRAWR
0,-40:DRAWR 12,0
3780 DRAWR -24,0:MOVER 0,-4:PRINT
"///";:MOVER -12,220:DRAWR 40,0:M
OVER 10,0:PRINT "+";:MOVER -285,6:
PRINT CHR$(246);:TAGOFF:MOVER 4,-6
:RETURN
3790 /
3800 /-----AFFICHAGE TITRE
3810 /
3820 MOVE 30,30:PRINT CHR$(24):MOV
E 30,30:TAG:PRINT a$;:TAGOFF:RETUR
N
```

A SUIVRE...



Les filtres électroniques n'ont plus aucun secret pour Jean-Luc GARNIER; la preuve...



# FILTRES

## SUITE DU N° 141

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3830 /
3840 /-----STRUCTURE FILTRES ACTIF
S
3850 /
3860 CLS:BORDER 0:GOSUB 5590:WINDO
W #1,1,80,21,25:PEN #1,0:PAPER #1,
1:CLS #1:ORIGIN 0,80,0,639,399,80
3870 MOVE 370,150:DRAW 0,-60:DRAW
R 0,120:DRAW 120,-60:DRAW -120,-
60:MOVER 10,30:TAG:PRINT "+";:MOVE
R -8,70
3880 PRINT "-";:MOVER -18,0:DRAW
-40,0:DRAW 0,40:DRAW -80,0:DRAW
260,0:DRAW 0,-80
3890 DRAW -20,0:DRAW 50,0:MOVER
4,6:PRINT CHR$(246);:TAGOFF:MOVER
-182,-41:DRAW -40,0:RETURN
3900 /
3910 /-----STRUCTURE MINIATURE
3920 /
3930 CLS:BORDER 0:GOSUB 5590:WINDO
W #1,1,80,21,25:PEN #1,0:PAPER #1,
1:CLS #1:ORIGIN 0,80,0,639,399,80
3940 MOVE 220,150:DRAW 0,-30:DRAW
R 0,60:DRAW 60,-30:DRAW -60,-30:
MOVER 5,20:TAG:PRINT "+";:MOVER -8
,29
3950 PRINT "-";:TAGOFF:MOVER -13,0
:DRAW -20,0:DRAW 0,20:DRAW -58,
0:DRAW 148,0:DRAW 0,-38
3960 DRAW -10,0:DRAW 25,0:MOVER
-85,-18:DRAW -20,0:RETURN
3970 /
3980 /-----R. MINIATURES
3990 /
4000 IF dirX=0 THEN x1X=0:y1X=5:x2
X=30:y2X=0:x3X=0:y3X=-10:x4X=-30:y
4X=0:x5X=0:y5X=5 ELSE IF dirX=1 TH
EN x1X=5:y1X=0:x2X=0:y2X=-30:x3X=-
10:y3X=0:x4X=0:y4X=30:x5X=5:y5X=0
4010 DRAW x1X,y1X:DRAW x2X,y2X:D
RAW x3X,y3X:DRAW x4X,y4X:DRAW x
5X,y5X:IF dirX=0 THEN MOVER 30,0:R
ETURN ELSE RETURN
4020 /
4030 /-----C. MINIATURES
4040 /
4050 IF dirX=0 THEN x1X=0:y1X=8:x2
X=0:y2X=-15:x3X=5:y3X=0:x4X=0:y4X=
15:x5X=0:y5X=-8 ELSE IF dirX=1 THE
N x1X=8:y1X=0:x2X=-15:y2X=0:x3X=0:
y3X=-5:x4X=15:y4X=0:x5X=-8:y5X=0
4060 DRAW x1X,y1X:DRAW x2X,y2X:M
OVER x3X,y3X:DRAW x4X,y4X:DRAW x
5X,y5X:RETURN
4070 /
4080 /-----TITRE SUP.
4090 /
4100 MOVE 200,300:TAG:PRINT a$;:TA
GOFF:RETURN
4110 /
4120 /-----ENTREE DE FO
4130 /
4140 CLS:PRINT CHR$(2):CALL &BB03:
LOCATE 1,3:PRINT "Entrez la valeur
de la frequence";:INPUT "FO=";fo
:LOCATE 55,3:PRINT "Hz"
4150 LOCATE 60,3:PRINT "kHz":LOCAT
E 65,3:PRINT "MHz":fleche$=CHR$(24
4):LOCATE 55,4:xX=55:yX=4:xxX=xX:P
RINT fleche$
4160 IF INKEY$="" THEN 4160
4170 IF INKEY(9)=0 THEN xxX=xX-5:I
F xxX=55 THEN xxX=xX
4180 IF INKEY(1)=0 THEN xxX=xX+5:I
F xxX=65 THEN xxX=xX
4190 CALL &BD19:LOCATE xX,yX:PRINT
":CALL &BD19:LOCATE xxX,yX:PRIN
T fleche$:xxX=xxX
4200 IF INKEY(9)=0 THEN multX=((xx
X-55)/5)*3:f0=f0*(10^multX):RETURN
4210 CALL &BB03:GOTO 4160
4220 /
4230 /-----ENTREE D'UNE R. UNIQUE
4240 /
4250 CLS:PRINT CHR$(2):CALL &BB03:
LOCATE 1,3:PRINT "Entrez la valeur

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de R";:INPUT "",r:LOCATE 28,3:I
F r<4.7 OR r>10 THEN 4250 ELSE PRI
NT "k"+CHR$(191):res=r*10^3:flagno
r=1:GOSUB 5310:flagnor=0:FOR i=1 T
O 1000:NEXT:RETURN
4260 /
4270 /-----ENTREE D'UN C. UNIQUE
4280 /
4290 CLS:PRINT CHR$(2):CALL &BB03:
LOCATE 1,3:PRINT "Entrez la valeur
de C";:INPUT "",c:LOCATE 28,3:I
F c<4.7 OR c>10 THEN 4290 ELSE PRI
NT "nF":cap=c*10^-9:flagnor=1:GOSU
B 5450:flagnor=0:FOR i=1 TO 1000:N
EXT:RETURN
4300 /
4310 /-----AJUSTEMENT D
'UNE R
4320 /
4330 DATA 1,1.2,1.5,1.8,2.2,2.7,3.
3,3.9,4.7,5.6,6.8,8.2
4340 RESTORE 4330:FOR aX=1 TO 12:R
EAD r(aX):NEXT aX:x=1:y=1
4350 IF (res<0.5) OR (res>16400000
) THEN PRINT "PATIENTEZ S.V.P ..."
4360 tourX=1:l=res-(tolX/100)*res:
u=res+(tolX/100)*res:br=0:a$=""
4370 FOR zX=1 TO 7
4380 FOR mX=1 TO 12:IF r(mX)*x>2*u
OR r(mX)*x<res THEN 4530
4390 FOR wX=1 TO 7
4400 FOR nX=1 TO 12:IF r(nX)*y<res
THEN 4520
4410 p=r(mX)*x+r(nX)*y/((r(mX)*x)+
(r(nX)*y))
4420 IF p<1 OR p>u THEN 4520
4430 t1=((100*p/res)-100)*1000:t1
=INT(t1)/1000
4440 r1=r(mX)*x:k$="":k1$=""
4450 IF x>100 THEN r1=r1/1000:k$="
k"+CHR$(191)
4460 IF x>100000 THEN r1=r1/1000:k
$="M"+CHR$(191)+CHR$(32)
4470 r2=r(nX)*y:IF y>100 THEN r2=r
2/1000:k1$="k"+CHR$(191)
4480 IF y>100000 THEN r2=r2/1000:k
1$="M"+CHR$(191)+CHR$(32)
4490 total$(tourX)=STR$(r1)+k$+CHR
$(32)+a$+STR$(r2)+k1$:prec(tourX)=
t1
4500 tourX=tourX+1
4510 IF tourX=26 THEN nX=12:wX=7:m
X=12:zX=7:GOTO 4550
4520 NEXT nX:y=y*10:NEXT wX:y=1
4530 NEXT mX:x=x*10
4540 NEXT zX
4550 tourX=tourX-1
4560 x=1:y=1:a$=""
4570 FOR zX=7 TO 1 STEP -1
4580 FOR mX=12 TO 1 STEP -1:IF r(m
X)*x<1/2 OR r(mX)*x>res THEN 4730
4590 FOR wX=7 TO 1 STEP -1
4600 FOR nX=12 TO 1 STEP -1:IF r(n
X)*y>res THEN 4720
4610 p=r(mX)*x+r(nX)*y
4620 IF p<1 OR p>u THEN 4720
4630 t1=((100*p/res)-100)*1000:t1=
INT(t1)/1000
4640 r1=r(mX)*x:k$="":k1$=""
4650 IF x>100 THEN r1=r1/1000:k$="
k"+CHR$(191)
4660 IF x>100000 THEN r1=r1/1000:k
$="M"+CHR$(191)+CHR$(32)
4670 r2=r(nX)*y:IF y>100 THEN r2=r
2/1000:k1$="k"+CHR$(191)
4680 IF y>100000 THEN r2=r2/1000:k
1$="M"+CHR$(191)+CHR$(32)
4690 total$(tourX)=STR$(r1)+k$+CHR
$(32)+a$+STR$(r2)+k1$:prec(tourX)=
t1
4700 tourX=tourX+1
4710 IF tourX=51 THEN nX=1:wX=1:mX
=1:zX=1:GOTO 4750
4720 NEXT nX:y=y*10:NEXT wX:y=1
4730 NEXT mX:x=x*10
4740 NEXT zX
4750 tourX=tourX-1
4760 FOR iX=1 TO tourX:prec(iX)=AB
S(prec(iX)):NEXT:top=tolX:FOR iX=1
TO tourX:top=MIN(top,prec(iX)):NE

```

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XT
4770 tourX=1:WHILE prec(tourX)<>to
p:tourX=tourX+1:WEND
4780 IF tourX=51 OR tourX<0 THEN
PRINT "error":RETURN ELSE res$=tot
al$(tourX):RETURN
4790 /
4800 /-----AJUSTEMENT D'UN C
4810 /
4820 DATA 1e-12,1.5e-12,2.2e-12,3.
3e-12,4.7e-12,6.8e-12
4830 RESTORE 4820:FOR aX=1 TO 6:RE
AD c(aX):NEXT aX:x=1:y=1
4840 IF (cap<5E-13) OR (cap>0.0000
136) THEN PRINT "out of range":FOR
iX=1 TO 3000:NEXT:RETURN ELSE LOC
ATE 55,5:PRINT "PATIENTEZ S.V.P ..
"
4850 tourX=1:l=cap-(tolX/100)*cap:
u=cap+(tolX/100)*cap:br=0:a$=""
4860 FOR zX=1 TO 7
4870 FOR mX=1 TO 6:IF c(mX)*x>2*u
OR c(mX)*x<cap THEN 5020
4880 FOR wX=1 TO 7
4890 FOR nX=1 TO 6:IF c(nX)*y<cap
THEN 5010
4900 p=c(mX)*x+c(nX)*y/((c(mX)*x)+
(c(nX)*y))
4910 IF p<1 OR p>u THEN 5010
4920 t1=((100*p/cap)-100)*1000:t1=
INT(t1)/1000
4930 c1=c(mX)*x:k$="pF":k1$="pF"
4940 IF x>100 THEN c1=c1/1000:k$="
nF"
4950 IF x>100000 THEN c1=c1/1000:k
$=CHR$(183)+"F"+CHR$(32)
4960 c2=c(nX)*y:IF y>100 THEN c2=c
2/1000:k1$="nF"
4970 IF y>100000 THEN c2=c2/1000:k
1$=CHR$(183)+"F"+CHR$(32)
4980 total$(tourX)=STR$(c1*1E+12)+
k$+CHR$(32)+a$+STR$(c2*1E+12)+k1$:
prec(tourX)=t1
4990 tourX=tourX+1
5000 IF tourX=26 THEN nX=6:wX=7:mX
=6:zX=7:GOTO 5040
5010 NEXT nX:y=y*10:NEXT wX:y=1
5020 NEXT mX:x=x*10
5030 NEXT zX
5040 tourX=tourX-1
5050 x=1:y=1:a$=""
5060 FOR zX=7 TO 1 STEP -1
5070 FOR mX=6 TO 1 STEP -1:IF c(mX
)*x<1/2 OR c(mX)*x>cap THEN 5220
5080 FOR wX=7 TO 1 STEP -1
5090 FOR nX=6 TO 1 STEP -1:IF c(nX
)*y>cap THEN 5210
5100 p=c(mX)*x+c(nX)*y
5110 IF p<1 OR p>u THEN 5210
5120 t1=((100*p/cap)-100)*1000:t1=
INT(t1)/1000
5130 c1=c(mX)*x:k$="pF":k1$="pF"
5140 IF x>100 THEN c1=c1/1000:k$="
nF"
5150 IF x>100000 THEN c1=c1/1000:k
$=CHR$(183)+"F"+CHR$(32)
5160 c2=c(nX)*y:IF y>100 THEN c2=c
2/1000:k1$="nF"
5170 IF y>100000 THEN c2=c2/1000:k
1$=CHR$(183)+"F"+CHR$(32)
5180 total$(tourX)=STR$(c1*1E+12)+
k$+CHR$(32)+a$+STR$(c2*1E+12)+k1$:
prec(tourX)=t1
5190 tourX=tourX+1
5200 IF tourX=51 THEN nX=1:wX=1:mX
=1:zX=1:GOTO 5240
5210 NEXT nX:y=y*10:NEXT wX:y=1
5220 NEXT mX:x=x*10
5230 NEXT zX
5240 tourX=tourX-1
5250 FOR iX=1 TO tourX:prec(iX)=AB
S(prec(iX)):NEXT:top=tolX:FOR iX=1
TO tourX:top=MIN(top,prec(iX)):NE
XT
5260 FOR iX=1 TO tourX:IF prec(iX)
=top THEN 5270 ELSE NEXT iX
5270 IF tourX=51 OR tourX<0 THEN
PRINT "error":RETURN ELSE condo$=t
otal$(tourX):RETURN
5280 /
5290 /-----NORMALISATION D'UNE R
5300 /

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```

5310 DATA 1.2,1.5,1.8,2.2,2.7,3.3,
3.9,4.7,5.6,6.8,8.2,10
5320 x=1:RESTORE 5310:FOR iX=1 TO
12:READ rn(iX):NEXT:LOCATE 55,5:PR
INT "PATIENTEZ S.V.P ..."
5330 r1=res/x:IF r1>1 THEN x=x*1
0:GOTO 5330 ELSE GOTO 5340
5340 r1=r1*10:raj=ROUND(r1,1):x
=x/10
5350 raj=raj*x
5360 FOR iX=1 TO 12:r12(iX)=rn(iX)
*x:diffn(iX)=ABS(raj-r12(iX)):NEXT
5370 top=raj:FOR iX=1 TO 12:petit=
MIN(top,diffn(iX)):top=petit:NEXT
5380 FOR iX=1 TO 12:IF diffn(iX)<>
petit THEN NEXT iX ELSE aX=iX:GOTO
5390
5390 r13=r12(aX):IF flagnor=1 THEN
res=r13:RETURN
5400 k$=CHR$(191):IF r13>1000 THEN
IF r13>1000000 THEN r13=r13/10000
00:k$="M"+CHR$(191) ELSE r13=r13/1
000:k$="k"+CHR$(191)
5410 res$=STR$(r13)+k$:RETURN
5420 /
5430 /-----NORMALISATION D'UN C
5440 /
5450 DATA 1.5,2.2,3.3,4.7,6.8,10
5460 x=1:RESTORE 5450:FOR iX=1 TO
6:READ cn(iX):NEXT:LOCATE 55,5:PRI
NT "PATIENTEZ S.V.P ..."
5470 cp1=cap*x:IF cp1<1 THEN x=x*1
0:GOTO 5470 ELSE GOTO 5480
5480 caj=ROUND(cp1,1):x=1/x
5490 caj=caj*x
5500 FOR iX=1 TO 6:cp2(iX)=cn(iX)*
x:diffn(iX)=ABS(caj-cp2(iX)):NEXT
5510 top=caj:FOR iX=1 TO 6:petit=M
IN(top,diffn(iX)):top=petit:NEXT
5520 FOR iX=1 TO 6:IF diffn(iX)<>
petit THEN NEXT iX ELSE aX=iX:GOTO
5530
5530 cp3=cp2(aX):IF flagnor=1 THEN
condo=cp3:RETURN
5540 k$=CHR$(183)+"F":IF cp3<0.000
001 THEN IF cp3<0.000000001 THEN k
$="pF":cp3=cp3*(10^12) ELSE k$="nF
":cp3=cp3*(10^9) ELSE cp3=cp3*1000
000
5550 condo$=STR$(cp3)+k$:RETURN
5560 /
5570 /-----EFFACEMENT ECRAN
5580 /
5590 IF flageff=0 THEN OUT &BC00,6
:OUT &BD00,0:INK 1,0
5600 IF flageff=1 THEN OUT &BC00,6
:OUT &BD00,25:INK 1,24
5610 flageff=flageff XOR &X1:RETUR
N
5620 /
5630 /-----STRUCTURE MINI RELATIVE
5640 /
5650 DRAW 0,-30:DRAW 0,60:DRAW
60,-30:DRAW -60,-30:MOVER 5,20:TA
G:PRINT "+";:MOVER -8,29:PRINT "-"
;:TAGOFF
5660 MOVER -13,0:DRAW -20,0:DRAW
0,20:DRAW -58,0:DRAW 148,0:DRAW
R 0,-38
5670 DRAW -10,0:DRAW 25,0:MOVER
-85,-18:DRAW -20,0:RETURN
5680 /
5690 /-----AJUST. DU NORM. D'UN C
5700 /
5710 ON jumpX GOSUB 5450,4820:RETU
RN
5720 /
5730 /-----AJUST. DU NORM. D'UNE R
5740 /
5750 ON jumpX GOSUB 5310,4330:RETU
RN
5760 /
5770 /-----DETECTION 'BREAK'
5780 /
5790 IF INKEY(66)=0 THEN GOTO 5830
ELSE RETURN
5800 /
5810 /-----FIN
5820 /
5830 INK 0,0:INK 1,26:BORDER 0:PAP
ER 0:PEN 1:MODE 2:END

```