PROGRAMAS EN BASIC PARA EL PROYECTO DE AMPLIFICADORES DE BAJO RUIDO

J.A.BAVA J.A.SANZ R.M.FABRA

```
0 "V.E LNA.DISK 1   " TB 2A
4     "FORMAT LNA"         PRG
6     "LNA 1"              PRG
6     "LNA 2"              PRG
12    "LNA 3"              PRG
9     "LNA 4"              PRG
13    "LNA 5"              PRG
9     "LNA 6"              PRG
11    "LNA 7"              PRG
11    "LNA 8"              PRG
65    "SIMONS BASIC"       PRG
9     "LNA 10"             PRG
11    "LNA 11"             PRG
14    "LNA 9"              PRG
26    "LNA 12"             PRG
19    "HELP"               PRG
2     "TITULO"             PRG
437 BLOCKS FREE.

READY.
```

LNA 1

DETERMINA LOS VALORES DE LAS IMPEDANCIAS DE ENTRADA Y SALIDA NECESARIAS PARA ADAPTAR UN CUADRIPOLO TENIENDO COMO DATOS SUS PARAMETROS S. EL CUADRIPOLO ES CONSIDERADO UNILATERAL (S12=0) ;ESTO IMPLICA QUE LOS COEFICIENTES DE REFLEXION EN EL GENERADOR Y EN LA CARGA SON S11 Y S22 CONJUGADOS RESPECTIVAMENTE

LNA 2

CALCULA EL FACTOR DE ESTABILIDAD Y EL DETERMINANTE DE LA MATRIZ DE PARAMETROS S DE UN CUADRIPOLO, LO CUAL PERMITE DETERMINAR LA ESTABILIDAD CONDICIONAL O INCONDICIONAL DE DICHO CUADRIPOLO EN BASE A SUS PARAMETROS S

LNA 3

PERMITE CALCULAR DE UN CUADRIPOLO NO UNILATERAL Y EN BASE DE LOS PARAMETROS S, LOS VALORES DE LOS COEFICIENTES DE REFLEXION EN EL GENERADOR Y EN LA CARGA Y LAS IMPEDANCIAS DE ENTRADA Y SALIDA CORRESPONDIENTE PARA SU ADAPTACION. ESTE PROGRAMA PUEDE UTILIZARSE SOLAMENTE EN EL CASO DE ESTABILIDAD INCONDICIONAL

LNA 4

PERMITE CALCULAR LOS VALORES DEL RADIO Y CENTRO DE LOS CIRCULOS DE ESTABILIDAD DE GENERADOR Y CARGA, DE UN CUADRIPOLONO UNILATERAL, CONOCIENDO LOS PARAMETROS S. ESTOS CIRCULOS PUEDEN SER TRAZADOS EN LA CARTA DE SMITH Y PERMITEN DETERMINAR LAS ZONAS DE ESTABILIDAD E INESTABILIDAD

LNA 5

FIJADO EL COEFICIENT DE REFLEXION DE GENERADOR O CARGA DE UN CUADRIPOLO NO UNILATERAL Y CONOCIENDO LOS PARAMETROS S, ESTE PROGRAMA PERMITE CALCULAR EL COEFICIENTE DE REFLEXION DE CARGA O GENERADOR SEGUN LO FIJADO Y SUS IMPEDANCIAS DE ENTRADA Y SALIDA CORRESPONDIENTE PARA SU ADAPTACION

LNA 6

DETERMINA LOS RADIOS Y CENTROS DE CIRCULOS DE GANANCIA CTE. DE UN CUADRIPOLO NO UNILATERAL CONOCIENDO SUS PARAMETROS S. ESTO PERMITE TRAZAR SOBRE LA CARTA DE SMITH DICHOS CIRCULOS Y ELEGIR UN COEFICIENTE DE REFLEXION PARA UNA GANANCIA DESEADA

LNA 7

REALIZA UN CAMBIO DE PARAMETROS, TRANSFORMANDO PARAMETRO S EN PARAMETROS DE IMPEDANCIA

LNA 8

REALIZA UN CAMBIO DE PARAMETROS, TRANSFORMANDO PARAMETROS DE IMPEDANCIA EN PARAMETROS S

LNA 9

REALIZA UN CAMBIO DE PARAMETROS, TRANSFORMANDO PARAMETROS S EN PARAMETROS DE IMP EDANCIA, QUE INCLUYE LA SUMA DE UNA REACTANCIA CAPACITIVA O INDUCTIVA SEGUN SE E LIGA; ESTO PERMITE SUMAR DOS CUADRIPOLOS, UNO CARACTERIZADO POR SUS PARAMETROS S Y EL OTRO ES LA REACTANCIA ANTES MENCIONADA

LNA 10

DETERMINA LAS DIMENSIONES DE UNA LINEA DE MICROTIRA, TENIENDO COMO DATOS LAS CAR ACTERISTICAS DEL MATERIAL DE CIRCUITO IMPRESO Y LAS DE LA LINEA DE MICROTIRA DES ADA; ADEMAS CALCULA LA LONGITUD ELECTRICA DE LA LINEA DE MICROTIRA Y SU DISTANCI A A TIERRA PARA NO ALTERAR SUS CARACTERISTICAS

LNA 11

ESTE PROGRAMA PERMITE EN BASE A LA ECUACION DE NAGAHOCA CALCULAR EL NUMERO DE VU ELTAS DE UNA BOBINA O EL VALOR DE LA MISMA SEGUN SE DESEE

LNA 12

FIJADA UNA CARGA, QUE SE ENTRA COMO DATO, ESTE PROGRAMA PERMITE ADAPTARLA CON DI STINTOS ELEMENTOS (L,C,LINEAS Y TRAFOS) QUE SE PUEDEN IR ELIGIENDO SEGUN LA CONV ENIENCIA.ADEMAS PERMITE GRAFICAR LA CARTA DE SMITH Y VER EN QUE PUNTO UNO SE ENC UENTRA. ESTE PROGRAMA DEBE EJECUTARSE CON SIMONS BASIC

```
1 REM "LNA 1"
5 LET X=3
10 OPEN130,X
20 PRINT"^S":PRINT#130,SPC(8)"**************************"
25 PRINT#130,SPC(8)"*CALCULO DE IMPEDANCIAS *"
30 PRINT#130,SPC(8)"*   CON PARAMETROS S    *"
35 PRINT#130,SPC(8)"*PARA AMPL. UNILATERALES*"
40 PRINT#130,SPC(8)"**************************":PRINT#130
45 PRINT#130,SPC(16)"*DATOS*":PRINT#130
50 IF X=4 THEN 2035
55 PRINT "MODULO DE S11, M1=";
60 INPUT M1:PRINT
65 PRINT "ARGUMENTO DE S11, A1=";
70 INPUT B1:PRINT
75 PRINT "MODULO DE S22, M2=";
80 INPUT M2:PRINT
85 PRINT "ARGUMENTO DE S22, A2=";
90 INPUT B2:PRINT:PRINT
95 LET A1=B1/180:A2=B2/180:LET A1=-A1:LET A2=-A2
100 PRINT"^S"
105 LET R1=M1*(COS(A1))
110 LET X1=M1*(SIN(A1))
115 LET R2=M2*(COS(A2))
120 LET X2=M2*(SIN(A2))
125 LET R3=(((1+R1)*(1-R1))-(X1^2))/(((1-R1)^2)+(X1^2))
130 LET X3=(((1+R1)*X1)+((1-R1)*X1))/(((1-R1)^2)+(X1^2))
135 LET R4=(((1+R2)*(1-R2))-(X2^2))/(((1-R2)^2)+(X2^2))
140 LET X4=(((1+R2)*X2)+((1-R2)*X2))/(((1-R2)^2)+(X2^2))
145 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN EL GENERADOR*":PRINT#130
150 PRINT#130,SPC(8)"COEF. GEN.="M1;"/"B1*(-1):PRINT#130
155 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN LA CARGA*":PRINT#130
160 PRINT#130,SPC(8)"COEF. CARGA="M2;"/"B2*(-1):PRINT#130
165 PRINT#130,SPC(8)"*IMPEDANCIA DE GENERADOR*":PRINT#130
170 PRINT#130,"RG/ZO="R3,:PRINT#130,"XG/ZO="X3:PRINT#130
175 PRINT#130,SPC(8)"*IMPEDANCIA DE CARGA*":PRINT#130
180 PRINT#130,"RC/ZO="R4,:PRINT#130,"XC/ZO="X4
185 IF X=4 THEN 195
190 GOSUB 2000
195 CLOSE 130
200 STOP
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 IF A$="SI" THEN 145
2050 RETURN

READY.

READY.
```

```
1 REM "LNA 2"
5 LET X=3
10 OPEN130,X
15 PRINT"^S":PRINT#130,SPC(8)"**************************"
20 PRINT#130,SPC(8)"*   CALCULO DEL FACTOR   *"
25 PRINT#130,SPC(8)"*   DE ESTABILIDAD K     *"
30 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
35 PRINT#130,SPC(8)"**************************":PRINT#130
40 PRINT#130,SPC(16)"*DATOS*":PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M1:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B1:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M2:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B2:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M3:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
110 INPUT B3:PRINT
115 PRINT "MODULO DE S21, M21=";
120 INPUT M4:PRINT
125 PRINT"ARGUMENTO DE S21, A21=";
130 INPUT B4:PRINT:PRINT
135 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
140 PRINT"^S"
145 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
150 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
155 LET M=SQR((R^2)+(I^2))
160 LET A=ATN(I/R)
161 GOSUB 400
165 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
170 PRINT#130,SPC(8)"^rFACTOR DE ESTABILIDAD^R" : PRINT#130
175 PRINT#130,SPC(8)"K="K:PRINT#130
180 PRINT#130,SPC(8)"^rDETERMINANTE DE LA MATRIZ S ^R":PRINT#130
185 PRINT#130,SPC(8)"DELTA="M;"/"A
190 IF X=4 THEN 200
195 GOSUB 2000
200 CLOSE 130
205 STOP
400 REM "SUB. CORRECCION DE ANGULO"
405 LET A=A*180
410 IF R>0 THEN 420
415 A=A+180
420 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
2045 IF A$="SI" THEN 170
2050 RETURN

READY.
```

```
1 REM "LNA 3"
5 LET X=3
10 OPEN130,X
15 PRINT"^S":PRINT#130,SPC(8)"*************************"
20 PRINT#130,SPC(8)"* CALCULO DE IMPEDANCIAS *"
25 PRINT#130,SPC(8)"*    CON PARAMETROS S    *"
30 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
35 PRINT#130,SPC(8)"*************************":PRINT#130
40 PRINT#130,SPC(16)"*DATOS*":PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M1:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B1:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M2:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B2:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M3:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
110 INPUT B3:PRINT
115 PRINT "MODULO DE S21, M21=";
120 INPUT M4:PRINT
125 PRINT"ARGUMENTO DE S21, A21=";
130 INPUT B4:PRINT:PRINT
135 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
140 PRINT"^S"
145 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
150 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
155 LET M=SQR((R^2)+(I^2))
160 LET A=ATN(I/R)
161 GOSUB 600
165 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
170 PRINT#130,SPC(8)"^rFACTOR DE ESTABILIDAD^R" : PRINT#130
175 PRINT#130,SPC(8)"K="K:PRINT#130
180 LET X1=M1*(COS(A1))-M*M2*(COS(A-A2))
185 LET Y1=M1*(SIN(A1))-M*M2*(SIN(A-A2))
190 LET C1=SQR((X1^2)+(Y1^2))
195 LET F1=ATN(Y1/X1)
200 LET X2=M2*(COS(A2))-M*M1*(COS(A-A1))
205 LET Y2=M2*(SIN(A2))-M*M1*(SIN(A-A1))
210 LET C2=SQR((X2^2)+(Y2^2))
215 LET F2=ATN(Y2/X2)
220 LET B5=1+(M1^2)-(M2^2)-(M^2)
225 LET B6=1+(M2^2)-(M1^2)-(M^2)
230 LET U1=B5/(2*(C1^2))
235 LET I1=((B5^2)-(4*(C1^2)))/((2*(C1^2))^2)
240 LET U2=B6/(2*(C2^2))
245 LET I2=((B6^2)-(4*(C2^2)))/((2*(C2^2))^2)
250 GOSUB 400
255 LET R1=S1*(COS(N1)):LET X1=S1*(SIN(N1))
260 LET R2=S2*(COS(N2)):LET X2=S2*(SIN(N2))
261 GOSUB 500
262 LET R1=S1*(COS(N1/180)):LET X1=S1*(SIN(N1/180))
263 LET R2=S2*(COS(N2/180)):LET X2=S2*(SIN(N2/180))
265 LET R3=(((1+R1)*(1-R1))-(X1^2))/(((1-R1)^2)+(X1^2))
270 LET X3=(((1+R1)*X1)+((1-R1)*X1))/(((1-R1)^2)+(X1^2))
275 LET R4=(((1+R2)*(1-R2))-(X2^2))/(((1-R2)^2)+(X2^2))
280 LET X4=(((1+R2)*X2)+((1-R2)*X2))/(((1-R2)^2)+(X2^2))
300 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN EL GENERADOR*":PRINT#130

READY.
```

```
305 PRINT#130,SPC(5)"COEF. GEN.="S1;"/"N1:PRINT#130
310 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN LA CARGA*":PRINT#130
315 PRINT#130,SPC(5)"COEF. CARGA="S2;"/"N2:PRINT#130
320 PRINT#130,SPC(8)"*IMPEDANCIA DE GENERADOR*":PRINT#130
325 PRINT#130,"RG/ZO="R3,:PRINT#130,"XG/ZO="X3:PRINT#130
330 PRINT#130,SPC(8)"*IMPEDANCIA DE CARGA*":PRINT#130
335 PRINT#130,"RC/ZO="R4,:PRINT#130,"XC/ZO="X4:PRINT#130
345 IF X=4 THEN 355
350 GOSUB 2000
355 CLOSE 130
360 STOP
400 REM "SUB. SIGNO DE B"
405 IF I1>0 THEN 415
410 LET I1=-I1
415 IF B5>0 THEN 430
420 LET S1=(C1*(U1+(SQR(I1)))):LET N1=-F1
425 GO TO 435
430 LET S1=(C1*(U1-(SQR(I1)))):LET N1=-F1
435 IF I2>0 THEN 445
440 LET I2=-I2
445 IF B6>0 THEN 460
450 LET S2=(C2*(U2+(SQR(I2)))):LET N2=-F2
455 GO TO 465
460 LET S2=(C2*(U2-(SQR(I2)))):LET N2=-F2
465 RETURN
500 REM "SUB. CORRECCION DE ANGULOS"
505 LET N1=N1*180:LET N2=N2*180
510 IF X1>0 THEN 520
515 LET N1=180+N1
520 IF X2>0 THEN 530
525 LET N2=180+N2
530 RETURN
600 REM "SUB. CORRECCION DE ANGULO"
605 IF R>0 THEN 615
610 LET A=A
615 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
2045 IF A$="SI" THEN 300
2050 RETURN

READY.
```

```
1 REM "LNA 4"
5 LET X=3
10 OPEN130,X
15 PRINT"^S":PRINT#130,SPC(8)"**************************"
20 PRINT#130,SPC(8)"*   CALCULO DE CIRCULOS  *"
25 PRINT#130,SPC(8)"*    DE ESTABILIDAD S    *"
30 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
35 PRINT#130,SPC(8)"**************************":PRINT#130
40 PRINT#130,SPC(16)"*DATOS*":PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M1:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B1:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M2:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B2:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M3:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
110 INPUT B3:PRINT
115 PRINT "MODULO DE S21, M21=";
120 INPUT M4:PRINT
125 PRINT"ARGUMENTO DE S21, A21=";
130 INPUT B4:PRINT:PRINT
135 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
140 PRINT"^S"
145 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
150 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
155 LET M=SQR((R^2)+(I^2))
160 LET A=ATN(I/R)
161 GOSUB 500
165 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
170 PRINT#130,SPC(8)"^rFACTOR DE ESTABILIDAD^R" : PRINT#130
175 PRINT#130,SPC(8)"K="K:PRINT#130
180 LET X1=M1*(COS(A1))-M*M2*(COS(A-A2))
185 LET Y1=M1*(SIN(A1))-M*M2*(SIN(A-A2))
190 LET C1=SQR((X1^2)+(Y1^2))
195 LET F1=ATN(Y1/X1)
200 LET X2=M2*(COS(A2))-M*M1*(COS(A-A1))
205 LET Y2=M2*(SIN(A2))-M*M1*(SIN(A-A1))
210 LET C2=SQR((X2^2)+(Y2^2))
215 LET F2=ATN(Y2/X2)
220 LET T1=C1/((M1^2)-(M^2))
225 LET L1=-F1
230 LET E1=(M3*M4)/((M1^2)-(M^2))
235 LET T2=C2/((M2^2)-(M^2))
240 LET L2=-F2
245 LET E2=(M3*M4)/((M2^2)-(M^2))
250 GOSUB 400
255 PRINT#130,SPC(3)"*CIRCULO DE ESTABILIDAD DE GENERADOR*":PRINT#130
260 PRINT#130,"RADIO="E1:PRINT#130:PRINT#130,"CENTRO="T1;"/"L1:PRINT#130
265 PRINT#130,SPC(3)"*CIRCULO DE ESTABILIDAD DE CARGA*":PRINT#130
270 PRINT#130,"RADIO="E2:PRINT#130:PRINT#130,"CENTRO="T2;"/"L2:PRINT#130
275 IF X=4 THEN 285
280 GOSUB 2000

READY.
```

```
285 CLOSE 130
290 STOP
345 IF X=4 THEN 355
350 GOSUB 2000
355 CLOSE 130
360 STOP
400 REM "SUB. CORRECCION DE ANGULOS"
405 LET L1=L1*180:LET L2=L2*180
410 IF X1>0 THEN 420
415 LET L1=180+L1
420 IF X2>0 THEN 430
425 LET L2=180+L2
430 RETURN
500 REM "SUB. CORRECCION DE ANGULO"
505 IF R>0 THEN 515
510 LET A=A
515 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
2045 IF A$="SI" THEN 255
2050 RETURN

READY.
```

```
1 REM "LNA 5"
5 LET X=3
10 OPEN130,X
15 PRINT"^S":PRINT#130,SPC(8)"*************************"
20 PRINT#130,SPC(8)"* CALCULO DE IMPEDANCIAS *"
25 PRINT#130,SPC(8)"*     CON PARAMETROS S    *"
30 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
35 PRINT#130,SPC(8)"*************************":PRINT#130
40 PRINT#130,SPC(16)"*DATOS*":PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M1:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B1:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M2:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B2:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M3:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
110 INPUT B3:PRINT
115 PRINT "MODULO DE S21, M21=";
120 INPUT M4:PRINT
125 PRINT"ARGUMENTO DE S21, A21=";
130 INPUT B4:PRINT:PRINT
135 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
140 PRINT"^S"
145 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
150 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
155 LET M=SQR((R^2)+(I^2))
160 LET A=ATN(I/R)
161 GOSUB 700
165 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
170 PRINT#130,SPC(8)"^rFACTOR DE ESTABILIDAD^R" : PRINT#130
175 PRINT#130,SPC(8)"K="K:PRINT#130
180 PRINT#130,"CALCULA COEF. DE REFLEXION DEL GENERADOR (G) O DE LA CARGA (C)"
185 PRINT#130:INPUTB$:PRINT#130
190 IF B$="C" THEN 220
195 PRINT#130,"ENTRE COEF. DE REFLEXION EN LA CARGA":PRINT#130
200 PRINT#130,"MODULO=";:INPUT H2:PRINT#130
205 PRINT#130,"ARGUMENTO=";:INPUT J:LET J2=J/180:PRINT"^S"
210 GOSUB 400
215 GO TO 240
220 PRINT#130,"ENTRE COEF. DE REFLEXION EN EL GENERADOR":PRINT#130
225 PRINT#130,"MODULO=";:INPUT H1:PRINT#130
230 PRINT#130,"ARGUMENTO=";:INPUT J:LET J1=J/180:PRINT"^S"
235 GOSUB 500
240 LET R1=H1*(COS(J1)):LET X1=H1*(SIN(J1))
245 LET R2=H2*(COS(J2)):LET X2=H2*(SIN(J2))
250 LET R3=(((1+R1)*(1-R1))-(X1^2))/(((1-R1)^2)+(X1^2))
255 LET X3=(((1+R1)*X1)+((1-R1)*X1))/(((1-R1)^2)+(X1^2))
260 LET R4=(((1+R2)*(1-R2))-(X2^2))/(((1-R2)^2)+(X2^2))
265 LET X4=(((1+R2)*X2)+((1-R2)*X2))/(((1-R2)^2)+(X2^2))
270 GOSUB 600
275 IF B$="C" THEN 290
280 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN EL GENERADOR*":PRINT#130
285 PRINT#130,SPC(3)"COEF. GEN.="H1;"/"J1:PRINT#130
290 IF B$="G" THEN 305

READY.
```

```
295 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN LA CARGA*":PRINT#130
300 PRINT#130,SPC(3)"COEF. CARGA="H2;"/"J2:PRINT#130
305 PRINT#130,SPC(8)"*IMPEDANCIA DE GENERADOR*":PRINT#130
310 PRINT#130,"RG/ZO="R3,:PRINT#130,"XG/ZO="X3:PRINT#130
320 PRINT#130,SPC(8)"*IMPEDANCIA DE CARGA*":PRINT#130
325 PRINT#130,"RC/ZO="R4,:PRINT#130,"XC/ZO="X4:PRINT#130
345 IF X=4 THEN 355
350 GOSUB 2000
355 CLOSE 130
360 STOP
400 REM "SUB. CALCULO COEF. DE REFLEXION DE GENERADOR"
405 LET P=(M1*COS(A1)-H2*M*COS(J2+A)):LET DR=(1-H2*M2*COS(J2+A2))
410 LET O=(M1*SIN(A1)-H2*M*SIN(J2+A)):LET DI=((-1)*H2*M2*SIN(J2+A2))
415 LET D=(DR^2)+(DI^2):LET P1=(P*DR+O*DI)/D:LET O1=(O*DR-P*DI)/D
420 LET H1=SQR((P1^2)+(O1^2)):LET J1=-(ATN(O1/P1))
425 RETURN
500 REM "SUB. CALCULO COEF. DE REFLEXION DE CARGA"
505 LET P=(M2*COS(A2)-H1*M*COS(J1+A)):LET DR=(1-H1*M1*COS(J1+A1))
510 LET O=(M2*SIN(A2)-H1*M*SIN(J1+A)):LET DI=((-1)*H1*M1*SIN(J1+A1))
515 LET D=(DR^2)+(DI^2):LET P2=(P*DR+O*DI)/D:LET O2=(O*DR-P*DI)/D
520 LET H2=SQR((P2^2)+(O2^2)):LET J2=-(ATN(O2/P2))
600 REM "SUB. CORRECCION DE ANGULOS"
605 IF B$="C" THEN 625
610 LET J1=J1*180
615 IF P1>0 THEN 625
620 LET J1=180+J1
625 IF B$="G" THEN 645
630 LET J2=J2*180
635 IF P2>0 THEN 645
640 LET J2=180+J2
645 RETURN
700 REM "SUB. CORRECCION DE ANGULOS"
705 IF R>0 THEN 715
710 LET A=A
715 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2070
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
2045 IF B$="C" THEN 2055
2050 PRINT#130,"COEF. CARGA="H2;"/"J:PRINT#130
2055 IF B$="G" THEN 2065
2060 PRINT#130,"COEF. GEN.="H1;"/"J:PRINT#130
2065 IF A$="SI" THEN 275
2070 RETURN

READY.
```

```
1 REM "LNA 6"
2 DIM G(30),K(30),T(30),Z(30)
5 LET X=3
10 OPEN130,X
15 PRINT"^S":PRINT#130,SPC(8)"**************************"
20 PRINT#130,SPC(8)"*   CALCULO DE CIRCULOS  *"
25 PRINT#130,SPC(8)"*    DE GANANCIA CTE.    *"
30 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
35 PRINT#130,SPC(8)"**************************":PRINT#130
40 PRINT#130,SPC(16)"*DATOS*":PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M1:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B1:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M2:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B2:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M3:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
110 INPUT B3:PRINT
115 PRINT "MODULO DE S21, M21=";
120 INPUT M4:PRINT
125 PRINT"ARGUMENTO DE S21, A21=";
130 INPUT B4:PRINT:PRINT
135 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
140 PRINT"^S"
145 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
150 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
155 LET M=SQR((R^2)+(I^2))
160 LET A=ATN(I/R)
161 GOSUB 500
165 LET X2=M2*(COS(A2))-M*M1*(COS(A-A1))
170 LET Y2=M2*(SIN(A2))-M*M1*(SIN(A-A1))
175 LET C2=SQR((X2^2)+(Y2^2))
180 LET F2=ATN(Y2/X2)
185 LET D2=(M2^2)-(M^2)
186 GOSUB400
190 PRINT#130,"GANANCIA MINIMA EN DB";:INPUT A :PRINT#130
195 PRINT#130,"GANANCIA MAXIMA EN DB";:INPUT B :PRINT#130
197 N=(1+(M^2)-(M1^2)-(M2^2))/(2*M4*M3)
200 PRINT#130,"SEPARACION ENTRE CIRCULOS EN DB";:INPUT C :PRINT#130
210 FOR I=A TO B STEP C
215 LET G(I)=(10^(I/10))/(M4^2)
220 LET K(I)=(G(I)/(1+D2*G(I)))*C2
225 LET T(I)=-F2
230 LET Z(I)=(SQR(1-2*N*(M3*M4)*G(I)+((M3*M4)^2)*(G(I)^2)))/(1+(D2*G(I)))
240 NEXT I
250 FOR I=A TO B STEP C
251 IF I>A THEN 265
255 PRINT#130,SPC(3)"*CIRCULOS DE GANANCIA CONSTANTES*":PRINT#130
260 PRINT#130,TAB(0);"GAN.";TAB(6);"RADIO";TAB(17);"CENTRO":PRINT#130
265 PRINT#130,I;TAB(4);Z(I);TAB(9);K(I);"/"T(I):PRINT#130
270 NEXT I
345 IF X=4 THEN 355
350 GOSUB 2000

READY.
```

```
355 CLOSE 130
360 STOP
400 REM"SUB. CORRECCION DE ANGULOS"
405 LET F2=F2*180
410 IF X2>0 THEN 420
415 LET F2=180+F2
420 RETURN
500 REM "SUB. CORRECCION DE ANGULOS"
505 IF R>0 THEN 515
510 LET A=A
515 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2065
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
2045 PRINT#130,"GANANCIA MINIMA="A;"DB":PRINT#130
2050 PRINT#130,"GANANCIA MAXIMA="B;"DB":PRINT#130
2055 PRINT#130,"SEPARACION ENTRE CIRCULOS EN DB="C:PRINT#130
2060 IF A$="SI" THEN 250
2065 RETURN

READY.
```

```
1 REM "LNA 7"
5 LET X=3
10 OPEN130,X
20 PRINT"^S":PRINT#130,SPC(8)"****************************"
30 PRINT#130,SPC(8)"*  PASAJE DE PARAMETROS  *"
40 PRINT#130,SPC(8)"*      S A PARAMETROS     *"
50 PRINT#130,SPC(8)"*      DE IMPEDANCIA      *"
60 PRINT#130,SPC(8)"****************************": PRINT#130
70 PRINT#130,SPC(16)"*DATOS*": PRINT#130
80 IF X=4 THEN 2035
90 PRINT "MODULO DE S11, M11=";
100 INPUT M1: PRINT
110 PRINT "ARGUMENTO DE S11, A11=";
120 INPUT B1: PRINT
130 PRINT "MODULO DE S22, M22=";
140 INPUT M2: PRINT
150 PRINT "ARGUMENTO DE S22, A22=";
160 INPUT B2: PRINT
170 PRINT "MODULO DE S12, M12=";
180 INPUT M3: PRINT
190 PRINT "ARGUMENTO DE S12, A12=";
200 INPUT B3: PRINT
210 PRINT "MODULO DE S21, M21=";
220 INPUT M41: PRINT
230 PRINT "ARGUMENTO DE S21, A21=";
240 INPUT B4: PRINT
250 LET A1=B1/180: A2=B2/180: A3=B3/180: A4=B4/180
260 PRINT"^S"
315 AR=1+M1*COS(A1)
320 AI=M1 * SIN(A1)
325 BR=1-M1 * COS(A1)
330 BI=(-1) * M1 * SIN(A1)
335 CR=1 + M2 * COS(A2)
340 CI=M2 * SIN(A2)
345 DR=1 - M2 * COS(A2)
350 DI=(-1) * M2 * SIN(A2)
355 P1=M3 * M4  * COS(A3)* COS(A4)
360 P2=M3 * M4 * SIN(A3)* SIN(A4)
365 PR = P1 - P2
370 PI = M3 * M4 * COS(A3)* SIN(A4)
375 P2 = M3 * M4 * SIN(A3)* COS(A4)
380 PI = P1 + P2
385 XR = AR * CR - AI * CI
390 XI = AR * CI + CR * A1
395 YR = AR * DR - AI * DI
400 YI = AR * DI + AI * DR
405 ZR = BR * CR - BI * CI
410 ZI = BR * CI + BI * CR
415 WR = BR * DR - BI * DI
420 WI = BR * DI + BI * DR
425 O = (WR-PR)^2 + (WI-PI)^2
430 R(1)= ((YR+PR) * (WR-PR) + (YI+PI) * (WI-PI)) / O
440 I(1)=((WR-PR) * (YI+PI) - (YR+PR) * (WI-PI)) / O
450 R(2)= ((ZR+PR) * (WR-PR) + (ZI+PI) * (WI-PI)) / O
460 I(2)= ((WR-PR) * (ZI+PI) - (ZR+PR) * (WI-PI)) / O
470 AX = M3 * COS(A3)
475 BX = M3 * SIN(A3)
480 AY = M4 * COS(A4)

READY.
```

```
485 BY = M4 * SIN(A4)
490 R(3) = (2*AX*(WR-PR)+2*BX*(WI-PI))/D
500 I(3)= (2*AX*(WI-PI)*(-1)+2*BX*(WR-PR))/D
510 R(4)=(2*AY*(WR-PR)+2*BY*(WI-PI))/D
520 I(4)=(2*AY*(WI-PI)*(-1)+2*BY*(WR-PR))/D
525 Z1M = SQR((R(1)^2) + (I(1)^2)):Z2A=(ATN(I(1)/R(1)))*180
530 Z3M = SQR((R(2)^2)+(I(2)^2)):Z4A=(ATN(I(2)/R(2)))*180
535 Z5M = SQR((R(3)^2) + (I(3)^2)):Z6A=(ATN(I(3)/R(3)))*180
540 Z7M = SQR((R(4)^2) + (I(4)^2)):Z8A=(ATN(I(4)/R(4)))*180
545 GOSUB 640
570 PRINT#130,SPC(8)"***************"
575 PRINT#130,SPC(8)"* PARAMETRO Z *"
577 PRINT#130,SPC(8)"*   --------   *"
580 PRINT#130,SPC(8)"* RESULTANTES *"
585 PRINT#130,SPC(8)"***************"
590 PRINT#130,"Z11="Z1M ; "/"Z2A :PRINT#130,"Z22="Z3M ; "/"Z4A
595 PRINT#130,"Z12="Z5M ; "/"Z6A :PRINT#130,"Z21="Z7M ; "/"Z8A
600 IF X=4 THEN 620
610 GOSUB 2000
620 CLOSE 130
630 STOP
640 REM "SUB. CORRECCION DE ANGULOS"
645 IF R(1)>0 THEN 655
650 Z2A=Z2A+180
655 IF R(2)>0 THEN 665
660 Z4A=Z4A+180
665 IF R(3)>0 THEN 675
670 Z6A=Z6A+180
675 IF R(4)>0 THEN 685
680 Z8A=Z8A+180
685 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2070
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2 :PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4 :PRINT#130
2045 IF A$="SI" THEN 570
2050 RETURN
2070 STOP

READY.
```

```
1 REM "LNA 8"
2 DIM R(4),I(4),B(4),M(4)
5 LET X=3
10 OPEN130,X
11 PRINT"^S"
20 PRINT#130,SPC(8)"****************************"
30 PRINT#130,SPC(8)"*  PASAJE DE PARAMETROS  *"
40 PRINT#130,SPC(8)"*     Z A PARAMETROS     *"
50 PRINT#130,SPC(8)"*           S            *"
60 PRINT#130,SPC(8)"****************************": PRINT#130
70 PRINT#130,SPC(16)"*DATOS*": PRINT#130
80 IF X=4 THEN 2035
90 PRINT "MODULO DE Z11, M11=";
100 INPUT M1: PRINT
110 PRINT "ARGUMENTO DE Z11, A11=";
120 INPUT B1: PRINT
130 PRINT "MODULO DE Z22, M22=";
140 INPUT M2: PRINT
150 PRINT "ARGUMENTO DE Z22, A22=";
160 INPUT B2: PRINT
170 PRINT "MODULO DE Z12, M12=";
180 INPUT M3: PRINT
190 PRINT "ARGUMENTO DE Z12, A12=";
200 INPUT B3: PRINT
210 PRINT "MODULO DE Z21, M21=";
220 INPUT M4: PRINT
230 PRINT "ARGUMENTO DE Z21, A21=";
240 INPUT B4: PRINT
250 LET A1=B1/180: A2=B2/180: A3=B3/180: A4=B4/180
260 PRINT"^S"
315 AR=1+M1*COS(A1)
320 AI=M1 * SIN(A1)
325 BR=(1-M1 * COS(A1))*(-1)
330 BI= M1 * SIN(A1)
335 CR=1 + M2 * COS(A2)
340 CI=M2 * SIN(A2)
345 DR=(1 - M2 * COS(A2))*(-1)
350 DI= M2 * SIN(A2)
355 P1=M3 * M4  * COS(A3)* COS(A4)
360 P2=M3 * M4 * SIN(A3)* SIN(A4)
365 PR = P1 - P2
370 P1 = M3 * M4 * COS(A3)* SIN(A4)
375 P2 = M3 * M4 * SIN(A3)* COS(A4)
380 PI = P1 + P2
385 XR = AR * CR - AI * CI
390 XI = AR * CI + CR * AI
395 YR = AR * DR - AI * DI
400 YI = AR * DI + AI * DR
405 ZR = BR * CR - BI * CI
410 ZI = BR * CI + BI * CR
415 WR = BR * DR - BI * DI
420 WI = BR * DI + BI * DR
425 D = (XR-PR)^2 + (XI-PI)^2
430 R(1)= ((ZR-PR) * (XR-PR) + (ZI-PI) * (XI-PI)) / D
440 I(1)= ((XR-PR) * (ZI-PI) - (ZR-PR) * (XI-PI)) / D
450 R(2)= ((YR-PR) * (XR-PR) + (YI-PI) * (XI-PI)) / D
460 I(2)= ((XR-PR) * (YI-PI) - (YR-PR) * (XI-PI)) / D
470 R(3) = (2*M3*COS(A3)*(XR-PR)+2*M3*SIN(A3)*(XI-PI))/ D

READY.
```

```
475 I(3)=((-1)*2*M3*COS(A3)*(XI-PI)+2*M3*SIN(A3)*(XR-PR))/D
480 R(4) =(2*M4*COS(A4)*(XR-PR)+2*M4*SIN(A4)*(XI-PI))/D
485 I(4)=((-1)*2*M4*SIN(A4)*(XR-PR)+2*M4*COS(A4)*(XI-PI))/D
490 S1M=SQR((R(1)^2)+(I(1)^2)):S2A=(ATN(I(1)/R(1)))*180
495 S3M=SQR((R(2)^2)+(I(2)^2)):S4A=(ATN(I(2)/R(2)))*180
500 S5M=SQR((R(3)^2)+(I(3)^2)):S6A=(ATN(I(3)/R(3)))*180
505 S7M=SQR((R(4)^2)+(I(4)^2)):S8A=(ATN(I(4)/R(4)))*180
510 GOSUB 640
570 PRINT#130,SPC(8)"***************"
575 PRINT#130,SPC(8)"* PARAMETRO S *"
577 PRINT#130,SPC(8)"*    -------    *"
580 PRINT#130,SPC(8)"* RESULTANTES *"
585 PRINT#130,SPC(8)"***************":PRINT#130
590 PRINT#130,"S11="S1M;"/"S2A,:PRINT#130,"S22="S3M;"/"S4A:PRINT#130
592 PRINT#130,"S12="S5M;"/"S6A,:PRINT#130,"S21="S7M;"/"S8A:PRINT#130
600 IF X=4 THEN 620
610 GOSUB 2000
620 CLOSE 130
630 STOP
640 REM "SUB. CORRECCION DE ANGULOS"
645 IF R(1)>0 THEN 655
650 S1A=S1A+180
655 IF R(2)>0 THEN 665
660 S4A=S4A+180
665 IF R(3)>0 THEN 675
670 S6A=S6A+180
675 IF R(4)>0 THEN 685
680 S8A=360-(S8A+180)
685 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130,"Z11="M1;"/"B1,:PRINT#130,"Z22="M2;"/"B2:PRINT#130
2040 PRINT#130,"Z12="M3;"/"B3,:PRINT#130,"Z21="M4;"/"B4:PRINT#130
2045 IF A$="SI" THEN 570
2050 RETURN

READY.
```

```
1 REM "LNA 9"
5 LET X=3
10 OPEN130,X
20 PRINT"^S":PRINT#130,SPC(8)"*****************************"
30 PRINT#130,SPC(8)"*  PASAJE DE PARAMETROS  *"
40 PRINT#130,SPC(8)"*     S A PARAMETROS     *"
50 PRINT#130,SPC(8)"*     DE IMPEDANCIA      *"
51 PRINT#130,SPC(8)"*     CON SUMA DE        *"
52 PRINT#130,SPC(8)"*      REACTANCIA        *"
60 PRINT#130,SPC(8)"*****************************": PRINT#130
70 PRINT#130,SPC(16)"*DATOS*": PRINT#130
80 IF X=4 THEN 2035
90 PRINT "MODULO DE S11, M11=";
100 INPUT M1: PRINT
110 PRINT "ARGUMENTO DE S11, A11=";
120 INPUT B1: PRINT
130 PRINT "MODULO DE S22, M22=";
140 INPUT M2: PRINT
150 PRINT "ARGUMENTO DE S22, A22=";
160 INPUT B2: PRINT
170 PRINT "MODULO DE S12, M12=";
180 INPUT M3: PRINT
190 PRINT "ARGUMENTO DE S12, A12=";
200 INPUT B3: PRINT
210 PRINT "MODULO DE S21, M21=";
220 INPUT M41: PRINT
230 PRINT "ARGUMENTO DE S21, A21=";
240 INPUT B4: PRINT
250 LET A1=B1/180: A2=B2/180: A3=B3/180: A4=B4/180
260 PRINT"^S"
261 GOSUB 700
315 AR=1+M1*COS(A1)
320 AI=M1 * SIN(A1)
325 BR=1-M1 * COS(A1)
330 BI=(-1) * M1 * SIN(A1)
335 CR=1 + M2 * COS(A2)
340 CI=M2 * SIN(A2)
345 DR=1 - M2 * COS(A2)
350 DI=(-1) * M2 * SIN(A2)
355 P1=M3 * M4  * COS(A3)* COS(A4)
360 P2=M3 * M4 * SIN(A3)* SIN(A4)
365 PR = P1 - P2
370 P1 = M3 * M4 * COS(A3)* SIN(A4)
375 P2 = M3 * M4 * SIN(A3)* COS(A4)
380 PI = P1 + P2
385 XR = AR * CR - AI * CI
390 XI = AR * CI + CR * A1
395 YR = AR * DR - AI * DI
400 YI = AR * DI + AI * DR
405 ZR = BR * CR - BI * CI
410 ZI = BR * CI + BI * CR
415 WR = BR * DR - BI * DI
420 WI = BR * DI + BI * DR
425 O = (WR-PR)^2 + (WI-PI)^2
430 R(1)= ((YR+PR) * (WR-PR) + (YI+PI) * (WI-PI)) / O
440 I(1)=(((WR-PR) * (YI+PI) - (YR+PR) * (WI-PI)) / O)+R
450 R(2)= ((ZR+PR) * (WR-PR) + (ZI+PI) * (WI-PI)) / O
460 I(2)= (((WR-PR) * (ZI+PI) - (ZR+PR) * (WI-PI)) / O)+R
470 AX = M3 * COS(A3)

READY.
```

```
475 BX = M3 * SIN(A3)
480 AY = M4 * COS(A4)
485 BY = M4 * SIN(A4)
490 R(3) = (2*AX*(WR-PR)+2*BX*(WI-PI))/D
500 I(3)=((2*AX*(WI-PI)*(-1)+2*BX*(WR-PR))/D)+R
510 R(4)=(2*AY*(WR-PR)+2*BY*(WI-PI))/D
520 I(4)=((2*AY*(WI-PI)*(-1)+2*BY*(WR-PR))/D)+R
525 Z1M = SQR((R(1)^2) + (I(1)^2)):Z2A=(ATN(I(1)/R(1)))*180
530 Z3M = SQR((R(2)^2)+(I(2)^2)):Z4A=(ATN(I(2)/R(2)))*180
535 Z5M = SQR((R(3)^2) + (I(3)^2)):Z6A=(ATN(I(3)/R(3)))*180
540 Z7M = SQR((R(4)^2) + (I(4)^2)):Z8A=(ATN(I(4)/R(4)))*180
545 GOSUB 640
570 PRINT#130,SPC(8)"****************"
575 PRINT#130,SPC(8)"* PARAMETRO Z *"
577 PRINT#130,SPC(8)"*    --------    *"
580 PRINT#130,SPC(8)"* RESULTANTES *"
585 PRINT#130,SPC(8)"****************":PRINT#130
590 PRINT#130,"Z11="Z1M ; "/"Z2A :PRINT#130,"Z22="Z3M ; "/"Z4A
595 PRINT#130,"Z12="Z5M ; "/"Z6A :PRINT#130,"Z21="Z7M ; "/"Z8A
600 IF X=4 THEN 620
610 GOSUB 2000
620 CLOSE 130
630 STOP
640 REM "SUB. CORRECCION DE ANGULOS"
645 IF R(1)>0 THEN 655
650 Z2A=Z2A+180
655 IF R(2)>0 THEN 665
660 Z4A=Z4A+180
665 IF R(3)>0 THEN 675
670 Z6A=Z6A+180
675 IF R(4)>0 THEN 685
680 Z8A=Z8A+180
685 RETURN
700 PRINT"^S"
701 REM "SUB. SUMA DE REACTANCIA"
710 PRINT#130:PRINT#130,"*VALOR DE LA REACTANCIA A SUMAR*":PRINT#130
720 PRINT#130,"SUMA CAPCIDAD O INDUCTANCIA (L O C)";
730 INPUT B$:PRINT#130
740 PRINT#130,"FRECUENCIA DE TRABAJO EN MHZ=";:INPUT F:PRINT#130
750 IF B$="L" THEN 775
760 PRINT#130,"VALOR DE CAPAC. EN NANO FARADAY=";:INPUT C
765 R=((1/(2*F*C*10E-3))*(-1))/50
766 IF B$="C" THEN 780
775 PRINT#130,"VALOR DE LA INDUC. EN NANO HENRY=";:INPUT L
777 R=(2*F*L*1E-3)/50
778 PRINT"^S"
780 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130 :PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2070
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 10
2035 PRINT#130:PRINT#130,SPC(14)"F="F;"MHZ":PRINT#130
2036 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2 :PRINT#130
2040 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4 :PRINT#130
2041 PRINT#130:PRINT#130,SPC(3)"VALOR DE LA REACTANCIA SUMADA="R;"OMHS"
2042 PRINT#130
2045 IF A$="SI" THEN 570
2050 RETURN
2070 STOP

READY.
```

```
1 PRINT"^S"
2 REM "LNA 10"
3 LET S=3
4 OPEN130,S
5 PRINT#130,SPC(9);"**********************"
10 PRINT#130,SPC(9);"*      CALCULO DE      *"
15 PRINT#130,SPC(9);"*LINEAS DE MICROTIRAS*"
20 PRINT#130,SPC(9);"**********************":PRINT#130
25 PRINT#130,SPC(16);"*DATOS*":PRINT#130
26 IF S=4 THEN 2035
30 PRINT#130,"ESPESOR DEL DIELECTRICO EN MM H=";
35 INPUT H:PRINT
40 PRINT#130,"CTE. DIELECTRICA RELATIVA E=";
45 INPUT E:PRINT
50 PRINT#130,"ESPESOR DEL COBRE EN MM T=";
55 INPUT T:PRINT
60 PRINT#130,"IMPEDANCIA DE LINEA EN OHMS ZO=";
65 INPUT ZO:PRINT
70 PRINT#130,"FRECUENCIA DE TRABAJO EN MHZ FO=";
75 INPUT FO:PRINT#130
80 PRINT"^S"
85 LET A=ZO/60*SQR((E+1)/2)+((E-1)/(E+1))*(.23+(.11/E))
90 LET B=(377)/(2*ZO*E^.5)
95 LET W1=((2*H))*((B-1-(LOG(2*B-1)))+(E-1)/(2*E)*((LOG(B-1))+.39-(.16/E)))
100 LET W2=H*((8*EXP(A))/(EXP(2*A)-2))
105 GOSUB 225
110 GOSUB 240
115 LET X=T/H
120 IF X<5.00000E-03 THEN 125
125 LET Y=W/H
130 GOSUB 285
135 GOSUB 305
140 LET L=29980/FO
145 LET E1=1+(E-1)*(.5*(1+(1/(SQR(1+((10*H)/W))))))
150 LET LO=L/(SQR(E1))
155 GOSUB 315
160 GOSUB 330
165 LET A=11*H
170 PRINT#130,SPC(8);"^r*LINEA DE MICROTIRA*^R":PRINT#130
175 PRINT#130,SPC(6);"ANCHO DE LA MICROTIRA EN MM ":PRINT#130
180 PRINT#130,SPC(13);"W=";W:PRINT#130
185 PRINT#130,"LONGITUD ELECTRICA DE LA MICROTIRA EN CM":PRINT#130
190 PRINT#130,SPC(13);"LM=";LO:PRINT#130
195 PRINT#130,"DISTANCIA DE LA MICROTIRA A TIERRA EN MM":PRINT#130
200 PRINT#130,SPC(13);"D=";D:PRINT#130
205 PRINT#130,SPC(8);"ALTURA DE LA CAJA EN MM":PRINT#130
210 PRINT#130,SPC(13);"AL=";A:PRINT#130
211 IF S=4 THEN 213
212 GOSUB 2000
213 CLOSE 130
214 STOP
220 REM "SUB. ELECCION DEL W"
225 IF W1<2 THEN 235
230 LET W=W1
235 RETURN
240 IF W2>2 THEN 250
245 LET W=W2
250 RETURN

READY.
```

```
255 REM "SUB. EFECTOS DEL ESPESOR T"
260 IF Y<.16 THEN 285
275 LET W3=W+(T)*(1+(LOG(2*H/T)))
280 LET W=W3*1
285 RETURN
290 IF Y>.16 THEN 305
295 LET W3=W+(T)*(1+(LOG(4*W/T)))
300 W=W3*1
305 RETURN
310 REM "SUB. DIMENSION DE LA CAJA"
315 IF ZO<=50 THEN 325
320 D=9*W/2
325 RETURN
330 IF ZO>50 THEN 340
335 LET D=W
340 RETURN
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130:PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 2050
2020 CLOSE130
2025 LET S=4
2030 IF A$="SI" THEN 4
2035 PRINT#130,"ESPESOR DEL DIELCTRICO EN MM H=";H:PRINT#130
2036 PRINT#130,"ESPESOR DEL COBRE EN MM T=";T:PRINT#130
2037 PRINT#130,"IMPEDANCIA DE LINEA EN OHMS ZO=";ZO:PRINT#130
2040 PRINT#130,"FRECUENCIA DE TRABAJO EN MHZ FO=";FO:PRINT#130
2045 IF A$="SI" THEN 170
2050 RETURN

READY.
```

```
 1 PRINT"^S"
 2 REM "LNA 11"
 3 LET X=3
 4 OPEN130,X
 5 PRINT#130,SPC(6);"*****************************"
 6 PRINT#130,SPC(6);"* CALCULO DE INDUCTANCIAS *"
 7 PRINT#130,SPC(6);"*  EN BASE A LA ECUACION  *"
 8 PRINT#130,SPC(6);"*        DE NAGAHOKA        *"
 9 PRINT#130,SPC(6);"*****************************":PRINT#130
 10 IF X=4 THEN 2035
 14 PRINT#130,SPC(10);"QUE DESEA CALCULAR?":PRINT#130
 15 PRINT#130,"EL VALOR DE INDUCTANCIAS EN MHY?(SI,NO)";I$
 20 INPUT I$ :PRINT#130
 25 IF I$="SI" THEN 120
 30 PRINT#130,"CALCULA EL NUMERO DE VUELTAS?(SI,NO)";N$
 32 INPUT N$
 35 IF N$="NO" THEN 10
 40 PRINT"^S"
 41 PRINT#130,SPC(6);"*********************************"
 42 PRINT#130,SPC(6);"*CALCULO DEL NUMERO DE VUELTAS*"
 43 PRINT#130,SPC(6);"*  EN BASE A LA INDUCTANCIA    *"
 44 PRINT#130,SPC(6);"*********************************":PRINT#130
 45 PRINT#130,SPC(16);"*DATOS*":PRINT#130
 46 IF X=4 THEN 2500
 47 PRINT#130,SPC(4);"*VALOR DE LA INDUCTANCIA EN MHY*":PRINT#130
 50 PRINTSPC(16);"L=";
 55 INPUT L :PRINT#130
 60 PRINT#130,SPC(9);"*DIAMETRO EN PULGADA*":PRINT#130
 65 PRINT#130,SPC(16);"D=";
 70 INPUT D:PRINT#130
 75 PRINT#130,SPC(9);"*LONGITUD EN PULGADA*":PRINT#130
 80 PRINT#130,SPC(16);"LO=";
 85 INPUT LO:PRINT#130
 90 LET N=SQR(((L*10^3)*(9*D/2+10*LO))/((D/2)^2))
 100 PRINT"^S"
 105 PRINT#130,SPC(6)"^rNUMEROS DE VUELTAS^R":PRINT
 110 PRINT#130,SPC(13);"N=";N
 111 IF X=4 THEN 113
 112 GOSUB 2000
 113 CLOSE130
 115 STOP
 120 PRINT"^S":PRINT#130
 121 PRINT#130,SPC(6);"*****************************"
 122 PRINT#130,SPC(6);"* CALCULO DE INDUCTANCIAS *"
 123 PRINT#130,SPC(6);"*EN BASE A LAS DIMENCIONES*"
 124 PRINT#130,SPC(6);"*****************************":PRINT#130
 125 PRINT#130,SPC(16);"*DATOS*":PRINT#130
 126 IF X=4 THEN 2040
 128 PRINTSPC(9);"*NUMERO DE VUELTAS*":PRINT
 130 PRINTSPC(16);"N=";
 135 INPUT N:PRINT#130
 140 PRINT#130,SPC(9)"*DIAMETRO EN PULGADAS*":PRINT#130
 145 PRINT#130,SPC(16);"D=";
 150 INPUT D:PRINT#130
 155 PRINT#130,SPC(9);"*LONGITUD EN PULGADAS*":PRINT#130
 160 PRINT#130,SPC(14);"LONG.=";
 165 INPUT LO
 170 LET L=(((N^2)*((D/2)^2))/(9*D/2+10*LO)/(10^3))

READY.
```

```
175 PRINT"^S"
180 PRINT#130,SPC(3);"^rVALOR DE LA INDUCTANCIA EN MHY ":PRINT#130
185 PRINT#130,SPC(13);"L=";L
190 IFX=4 THEN 200
195 GOSUB 2000
200 CLOSE130
210 STOP
2000 REM "SUB. IMPRESION CON EPSON"
2005 PRINT#130:PRINT#130,"IMPRIME (SI O NO)",
2010 INPUT A$
2015 IF A$="NO" THEN 3000
2020 CLOSE 130
2025 LET X=4
2030 IF A$="SI" THEN 4
2035 IF I$="SI" THEN 120
2040 IF N$="SI" THEN 40
2045 PRINT#130,"NUMERO DE VUELTAS N=";N:PRINT#130
2050 PRINT#130,"DIAMETRO EN PULGADAS D=";D:PRINT#130
2055 PRINT#130,"LONGITUD EN PULGADAS LO=";LO:PRINT#130
2060 PRINT#130,SPC(8)"*VALOR DE LA INDUCTANCIA EN MHY*":PRINT#130
2065 PRINT#130,SPC(13)"L=";L
2070 RETURN
2500 PRINT#130,"VALOR DE LA INDUCTANCIA EN MHY L=";L:PRINT#130
2505 PRINT#130,"DIAMETRO EN PULGADAS D=";D:PRINT#130
2510 PRINT#130,"LONGITUD EN PULGADAS LO=";LO:PRINT#130
2515 PRINT#130,SPC(10)"*NUMERO DE VUELTAS*":PRINT#130
2520 PRINT#130,SPC(13)"N=";N
3000 RETURN

READY.
```

```
0 REM "LNA 12"
1 SP$="           ":FORJ=1TO23:CL$=CL$+SP$:NEXT
2 PRINT"^S^q^q":d#"PROGRAMA PARA ADAPTAR IMPEDANCIA":PRINT"^ö^q^q"
4 d#"USANDO":PRINT
6 PRINT "^q^q^ö":d#"CARTA DE SMITH"
8 df 4
10 PRINT"^SGRAFICA FRECUENCIAS DISCRETAS (D) O ":INPUT"CONTINUAS (S)";D$:PRINT
11 IF D$<>"D"AND D$<>"S"THEN10
12 INPUT"^qQUE VALOR DE VSWR GRAFICA";VS:IF VS<1 THEN 12:VR=100*(VS-1)/(VS+1)
13 VR=100*(VS-1)/(VS+1):PRINT
14 INPUT"QUE IMPEDANCIA CARACTERISTICA";ZO:PRINT
15 INPUT"^qCUANTAS FRECUENCIAS (1-10)";N:PRINT
16 FOR J=1 TON
17 A$=""
18 PRINT"^qFRECUENCIA"J;:INPUT"IN MHZ";F(J):PRINT
20 PRINT"INPUT RS, XS OF LOAD AT "F(J)"MHZ":INPUT R(J),I(J)
22 X(J)=R(J):Y(J)=I(J):NEXT:GO TO 24
24 PRINT"^SESTOS SON SUS VALORES DE IMPEDANCIA DE CARGA^q"
26 PRINT"^q       FO           RS          XS":PRINT
27 FOR J=1 TO N: F$=STR$(F(J))
28 RS$=STR$(R(J)):XS$=STR$(I(J))
29 d,"    ######.###",F$:d,"    ######.##",RS$:d,"    ######.##",XS$:PRINT:NEXT
30 PRINT d(0,18) " "
31 PRINT
32 INPUT"ESTA UD SATISFECHO (S=SI)";A$:PRINT
34 IF A$<>"S" THEN GO TO 14
38 INPUT"IMPRIME ESTOS VALORES (S=SI)";A$:PRINT
40 IF A$="S" THEN PRINT d(0,18)CL$:ds
43 INPUT"GRAFICA LOS VALORES DE CARGA (S=SI)";P$
44 XM=1.4
45 IF P$="S"THENGOSUB 8000
50 PRINT"^S    ELIGA EL TIPO DE ADAPTACION    ^q"
52 PRINT" 1 C SERIE
54 PRINT" 2 L SERIE
56 PRINT" 3 SINTONIZADO SERIE (SERIE L-C)
58 PRINT" 4 SINTONIZADO SERIE (PARALELO L-C)
60 PRINT" 5 LINEA DE TRANSMISION SERIE
62 PRINT" 6 C PARALELO
64 PRINT" 7 L PARALELO
66 PRINT" 8 SINTONIZADO PARALELO (SERIE L-C)
68 PRINT" 9 SINTONIZADO PARALELO (PARALELO L-C)
70 PRINT"10 LINEA DE TRANSMISION PARALELO
72 PRINT"11 TRANSFORMADOR
74 PRINT"12 R SERIE
76 PRINT"13 R PARALELO^q
78 PRINT"14 STOP SUMA DE SECCIONES
80 INPUT"^ö^q^q^q^qELIJA  (1-14)";M:PRINT"^W"
81 IF M<1 OR M>14 THEN 80
82 d% 500*(M+1)
1000 PRINT CHR$(147)"SUMA CAPACITOR EN SERIE
1002 INPUT"WHAT IS VALUE (IN PF)";C
1010 FOR J=1TO N
1015 X(J)=R(J)
1020 Y(J)=I(J)-1/(2*F(J)*C*1E-06)
1025 NEXT J:GOTO 9000
1500 PRINT CHR$(147)"SUMA INDUCTOR EN SERIE
1502 INPUT"WHAT IS VALUE (IN UH)";L
1510 FOR J=1 TO N:X(J)=R(J)
1520 Y(J)=I(J)+2*F(J)*L:NEXT:GOTO 9000

READY.
```

```
1520 Y(J)=I(J)+2*F(J)*L:NEXT:GOTO 9000
2000 PRINT CHR$(147)"SUMA SINTONIZADO SERIE (SERIE L-C)
2002 INPUT"WHAT IS VALUE OF C (IN PF)";C
2004 INPUT"WHAT IS VALUE OF L (IN UH)";L
2010 FOR J=1 TO N:X(J)=R(J)
2020 Y(J)=I(J)+2*F(J)*L-1/(2*F(J)*C*1E-06):NEXT:GOTO 9000
2500 PRINT CHR$(147)"SUMA SINTONIZADO SERIE (PARALELO L-C)
2502 INPUT"WHAT IS VALUE OF C (IN PF)";C
2504 INPUT"WHAT IS VALUE OF L (IN UH)";L
2510 FORJ=1 TO N: X(J)=R(J)
2520 Y(J)=I(J)+(2*F(J)*L)/(1-((2*F(J))^2)*L*C*1E-06):NEXT:GOTO 9000
3000 PRINT CHR$(147)"SUMA LINEA DE TRANSMISION SERIE
3002 INPUT"QUE IMPEDANCIA (OHMS)";Z1
3004 INPUT"QUE VELOCIDAD DE PROPAG.";V
3006 INPUT"QUE LONGITUD (EN PULG.)";LL
3010 FOR J=1 TO N
3015 T=1.2*LL*F(J)/39.37/V
3020 D=(R(J)+Z1)^2+I(J)^2
3025 R=(R(J)^2-Z1^2+I(J)^2)/D
3030 I=2*Z1*I(J)/D
3035 Z=SQR(R*R+I*I)
3040 T=180*ATN(I/(R+1E-30))-2*T+180*(R<0)
3045 R=Z*COS(T/180)
3050 I=Z*SIN(T/180)
3055 D=(1-R)^2+I^2
3060 X(J)=Z1*(1-R^2-I^2)/D
3065 Y(J)=2*Z1*I/D
3070 NEXT:GOTO 9000
3500 PRINT CHR$(147)"SUMA CAPACITOR PARALELO
3502 INPUT"QUE VALOR DE C (EN PF)";C
3506 FOR J=1 TO N: W=2*C*1E-06
3508 D=(1-W*F(J)*I(J))^2+(R(J)*W*F(J))^2
3510 X(J)=R(J)/D
3512 Y(J)=(I(J)*(1-W*F(J)*I(J))-R(J)^2*W*F(J))/D:NEXT:GOTO 9000
4000 PRINT CHR$(147)"SUMA INDUCTOR PARALELO
4002 INPUT"QUE VALOR DE L (EN UH)";L
4015 FOR J=1 TO N: W=2*F(J)*L
4025 D=R(J)^2+(I(J)+W)^2
4030 X(J)=R(J)*W^2/D
4035 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
4040 NEXT:GOTO 9000
4500 PRINT CHR$(147)"SUMA SINTONIZADO PARALELO (SERIE L-C)
4502 INPUT"QUE VALOR DE C (EN PF)";C
4504 INPUT"QUE VALOR DE L (EN UH)";L
4510 FOR J=1 TO N
4515 W=2*F(J)*L-(1E+06)/(2*F(J)*C)
4517 D=R(J)^2+(I(J)+W)^2
4520 X(J)=R(J)*W^2/D
4525 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
4530 NEXT J:GO TO 9000
5000 PRINT CHR$(147)"SUMA SINTONIZADO PARALELO (PARALELO L-C)
5002 INPUT"QUE VALOR DE C (EN PF)";C
5004 INPUT"QUE VALOR DE L (EN UH)";L
5010 FOR J=1 TO N
5015 W=(2*F(J)*L)/(1-((2*F(J))^2)*L*C*1E-06)
5020 D=R(J)^2+(I(J)+W)^2
5025 X(J)=R(J)*W^2/D
5030 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
5035 NEXT: GO TO 9000
5500 PRINT CHR$(147)"SUMA LINEA DE TRANSMISION EN PARALELO
5502 INPUT"QUE IMPEDANCIA DE LINEA (OHMS)";Z1
5504 INPUT"QUE VELOCIDAD DE PROPAGACION ";V
5506 INPUT"QUE LONGITUD (EN PULG.)";LL
5508 PRINT"LINEA ABIERTA (O) O CERRADA (S) ":
```

```
5510 INPUT S$
5512 IF S$<>"O" AND S$<>"S" THEN 5510
5520 FOR J=1 TO N
5525 T=LL*F(J)*1.2/39.37/V
5530 IF S$="S" THEN W=Z1*TAN(T/180)
5535 IF S$="O" THEN W=Z1*TAN((T+90)/180)
5540 D=R(J)^2+(I(J)+W)^2
5545 X(J)=R(J)*W^2/D
5550 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
5555 NEXT: GO TO 9000
6000 PRINT CHR$(147)"SUMA TRANSFORMADOR
6002 INPUT"TRAFO ELEVADOR (U) O REDUCTOR (D)";T$
6004 IF T$<>"U" AND T$<>"D" THEN 6000
6006 INPUT"QUE RELACION DE TRANSFORMACION ";W
6010 IF T$="D" THEN W=1/W
6020 FOR J=1 TO N:X(J)=W*R(J)
6025 Y(J)=W*I(J):NEXT:GO TO 9000
6500 PRINT CHR$(147)"SUMA RESISTOR SERIE
6502 INPUT"QUE VALOR DE R";RS
6506 FOR J=1 TO N: X(J)=R(J)+RS
6508 Y(J)=I(J):NEXT:GO TO 9000
7000 PRINT CHR$(147)"SUMA RESISTOR PARALELO
7002 INPUT"QUE VALOR DE R";RS
7004 FOR J=1 TO N
7006 D=(R(J)+RS)^2+I(J)^2
7008 X(J)=RS*(R(J)^2+RS*R(J)+I(J)^2)/D
7010 Y(J)=I(J)*RS^2/D:NEXT: GO TO 9000
7500 PRINT CHR$(147);
7501 INPUT"DESEA EJECUTAR EL PROGRAMA NUEVAMENTE";A$
7502 IF LEFT$(A$,1)="S" THEN 10
7504 PRINT d(14,10)"GOOD-BY^W":END
8000 d 0,3:XR=100*XM
8002 dB 160,100,XR,100,1
8004 d 160-XR,100,160+XR,100,1
8008 dk 160+XR,0,180,270,10,XR,100,1
8010 dk 160+XR,200,270,360,10,XR,100,1
8012 dB 160+XR/2,100,XR/2,50,1
8014 dB 160,100,VR*XM,VR,1
8016 d
 158-.67*XR,97,43,1,1
8017 do 153-.67*XR,104,".2",1,1,8
8018 d
 158-.33*XR,97,43,1,1
8019 do 153-.33*XR,104,".5",1,1,8
8020 d
 156+.33*XR,97,43,1,1
8021 do 156+.33*XR,104,"2",1,1,8
8022 d
 156+.67*XR,97,43,1,1
8023 do 156+.67*XR,104,"5",1,1,8
8100 dp 2
8105 do 10,190,"F7=RETURN",1,1,8
8110 do 246,190,"F8=PRINT",1,1,8
8115 FOR J=1 TO N
8120 D=(X(J)+Z0)^2+Y(J)^2
8125 PX(J)=((X(J)-Z0)*(X(J)+Z0)+Y(J)^2)/D*100*XM
8130 PY(J)=-2*Y(J)*Z0/D*100
8140 d
 157+PX(J),97+PY(J),43,1,1
8150 IF D$="S" AND J>1 THEN d 160+PX(J-1),100+PY(J-1),160+PX(J),100+PY(J),1
8160 NEXT
8170 GET A$:IF A$=" " THEN 8170
8175 IF A$=CHR$(136) THEN dg :RETURN
```

```
8180 IF A$<>CHR$(140) THEN 8170
8185 TEXT 10,190,"F7=RETURN",0,1,8
8190 TEXT 246,190,"F8=PRINT",0,1,8
8195 COPY :NRM :RETURN
9000 PRINT"^q      FREQ          RS          XS":PRINT
9005 FOR J=1 TO N
9010 RS$=STR$(X(J))
9015 XS$=STR$(Y(J))
9020 F$=STR$(F(J))
9025 USE "    #####.###",F$:USE "    #####.##",RS$:USE "    #####.##",XS$:PRINT
9030 NEXT
9031 IF A$<>CHR$(138) THEN 9050
9050 PRINT AT(0,18)"F1=GRAFICA SOBRE PANTALLA
9055 PRINT"F2=GRAFICA SOBRE PANTALLA PARA IMPRIMIR
9056 PRINT"F3=GRAFICA LO ULTIMO DE PANTALLA
9060 PRINT"F4=IMPRIME LO DE PANTALLA
9070 PRINT"F5=MAL VALOR: DESCARGA ESTE INTENTO
9075 PRINT"F7=BUEN VALOR: TOMA Y PROCEDE
9100 GET A$:IF A$=" " THEN 9100
9110 IF A$=CHR$(133) THEN XM=1.4:GOSUB 8000:GO TO 9050
9120 IF A$=CHR$(137) THEN XM=.833:GOSUB 8000:GO TO 9050
9130 IFA$=CHR$(134) THEN GOSUB 8100: GO TO 9050
9140 IF A$=CHR$(138) THEN GOSUB 9307:GO TO 9050
9150 IF A$=CHR$(135) THEN 50
9160 IF A$=CHR$(136) THEN 9200
9170 GO TO 9100
9200 FOR J=1 TO N:R(J)=X(J)
9210 I(J)=Y(J):NEXT
9215 PRINT AT(0,18)CL$;
9220 PRINT AT(0,18)"UD DEBE AHORA ADAPTAR LAS IMPEDANCIAS LISTADAS ARRIBA.^W"
9230 PAUSE 4:GO TO 50
9307 OPEN130,4:CMD130
9308 CGOTO 9305+(M*5)
9310 PRINT"SUMA CAPACITOR EN SERIE":PRINT
9311 PRINT"VALOR DE C (EN PF)=";C:PRINT:GO TO 9391
9315 PRINT"SUMA DE INDUCTOR EN SERIE":PRINT
9316 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 9391
9320 PRINT"SUMA SINTONIZADO SERIE (SERIE L-C)":PRINT
9321 PRINT"VALOR DE C (EN PF)=";C:PRINT
9322 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 9391
9325 PRINT"SUMA SINTONIZADO SERIE (PARALELO L-C)":PRINT
9326 PRINT"VALOR DE C (EN PF)=";C:PRINT
9327 PRINT"VALOR DE L (EN UH)=";LL:PRINT:GO TO 9391
9330 PRINT"SUMA LINEA DE TRASMISION SERIE":PRINT
9331 PRINT"VELOCIDAD DE PROPAG.=";V:PRINT
9332 PRINT"LONGITUD (EN PULG.)=";L:PRINT
9333 PRINT"IMPEDANCIA DE LINEA (OHMS)=";Z1:PRINT:GO TO 9391
9335 PRINT"SUMA CAPACITOR EN PARALELO":PRINT
9336 PRINT"VALOR DE C (EN PF)=";C:PRINT:GO TO 9391
9340 PRINT"SUMA INDUCTOR EN PARALELO":PRINT
9341 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 9391
9345 PRINT"SUMA SINTONIZADO PARALELO (SERIE L-C)":PRINT
9346 PRINT"VALOR DE C (EN PF)=";C:PRINT
9347 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 9391
9350 PRINT"SUMA SINTONIZADO PARALELO (PARALELO L-C)":PRINT
9351 PRINT"VALOR DE C (EN PF)=";C:PRINT
9352 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 9391
9355 PRINT"SUMA LINEA DE TRASMISION PARALELO":PRINT
9356 PRINT"IMPEDANCIA DE LINEA (OHMS)=";Z1:PRINT

READY.
```

```
9357 PRINT"VELOCIDAD DE PROPAG.=";V:PRINT
9358 PRINT"LONGITUD (EN PULG.)=";LL:PRINT
9359 PRINT"LINEA ABIERTA (O) O CERRADA (S)";S$:PRINT:GO TO9391
9360 PRINT"TRANSFORMADOR":PRINT
9361 PRINT"TRAFO ELEVADOR (U) O REDUCTOR (D)";T$:PRINT
9362 PRINT"RELACION DE TRANSFORMACION=";W:PRINT:GO TO9391
9365 PRINT"SUMA RESISTOR SERIE":PRINT
9366 PRINT"VALOR DE R=";RS:PRINT:GO TO9391
9370 PRINT"SUMA RESISTOR PARALELO":PRINT
9371 PRINT"VALOR DE R=";RS:PRINT:GO TO9391
9391 PRINT"^q      FREQ          RS          XS":PRINT
9392 FOR J=1 TO N
9393 RS$=STR$(X(J))
9394 XS$=STR$(Y(J))
9395 F$=STR$(F(J))
9396 USE "    #####.###",F$:USE "    #####.##",RS$:USE "    #####.##",XS$:PRINT
9397 NEXT
9398 IF A$<>CHR$(138) THEN 9050
9399 PRINT#130:CLOSE130:PRINT"^S":GO TO 9000
9400 STOP

READY.
```

```
1 REM"LNA 13"
5 DATA 32,16,32,18,32,15,32,25,32,5,32,3,32,20,32,15,32
6 X=32
7 WIDTH80,1
8 FOR I=1010 26
9 CHAR1*8,54,X,1,4
10 READ X
11 NEXT:X=32
12 DATA 32,1,32,13,32,16,32,12,32,9,32,6,32,9,32,3,32,1,32,4,32,15,32,18,32,5
13 DATA32,19,32:FOR I=7 TO 35
14 READ X
15 CHAR1*8,83,X,1,4
16 NEXT
17 DATA 32,4,32,5,32,32,2,32,1,32,10,32,15,32,32,18,32,21,32,9,32,4,32,15,32
18 FOR I=8 TO 31
19 READ X
20 CHAR1*8,134,X,1,4
21 NEXT
22 PAUSE15
23 NRM
24 OPEN130,3
25 PRINT"^S"
26 PRINT#130,SPC(16)"*DATOS*":PRINT#130
27 PRINT#130,"NOMBRE=";:INPUTX$
28 PRINT#130:PRINT#130,"POLARIZACION:","V(VOLTS)=";:INPUTV
29 PRINT#130,SPC(20)"I(MA)=";:INPUTI
30 PRINT#130:PRINT#130,"FRECUENCIA EN MHZ=";:INPUTFX:PRINT#130
45 IF X=4 THEN 2035
50 PRINT "MODULO DE S11, M11=";
55 INPUT M5:PRINT
60 PRINT "ARGUMENTO DE S11, A11=";
65 INPUT B5:PRINT
70 PRINT "MODULO DE S22, M22=";
75 INPUT M6:PRINT
80 PRINT "ARGUMENTO DE S22, A22=";
85 INPUT B6:PRINT
90 PRINT "MODULO DE S12, M12=";
95 INPUT M7:PRINT
100 PRINT "ARGUMENTO DE S12, A12=";
105 INPUT B7:PRINT
110 PRINT "MODULO DE S21, M21=";
115 INPUT M8:PRINT
120 PRINT"ARGUMENTO DE S21, A21=";
125 INPUT B8:PRINT:PRINT
126 LET M1=M5:M2=M6:M3=M7:M4=M8:B1=B5:B2=B6:B3=B7:B4=B8
130 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180:TX=0
131 PRINT"^S":PRINT"IMPRIME (SI O NO) ) ";:INPUT T$
132 CLOSE130:IF T$="NO" THEN 165
135 PRINT"^S"
160 CLOSE130
162 GOSUB3100
163 CLOSE130
165 GOSUB 300
166 CLOSE130:IF TX=0 THEN 172
167 PRINT"ESTA UD SATISFECHO (SI O NO)";:INPUT Y$
168 IF Y$="NO" THEN 126
172 CLOSE 130:PRINT"^S":TX=TX+1:IF Y$="SI" THEN 195
173 PRINT"DESEA USAR REALIMENTACION (SI O NO) ";:INPUT W$
174 IF W$="NO" THEN 195

READY.
```

```
175 GOSUB 700
180 CLOSE130
185 GOSUB1105
190 CLOSE 130
191 IF W$="SI"THEN 165
195 GOSUB 1505
200 CLOSE130
205 J=1:F(J)=FX
206 R(J)=R3*50:I(J)=X3*(-50)
207 V=1
210 GOSUB2000
215 PRINT"^S"
217 PRINT"NUEVOS DATOS (SI O NO) ";:INPUTQ$:PRINT
218 IF Q$="SI" THEN 24
299 STOP
300 REM "LNA 2-LNA4"
305 LET X=3
310 OPEN130,X
315 PRINT"^S":PRINT#130,SPC(8)"**************************"
320 PRINT#130,SPC(8)"*  CALCULO DEL FACTOR Y *"
325 PRINT#130,SPC(8)"*        CIRCULOS       *"
330 PRINT#130,SPC(8)"*    DE ESTABILIDAD S   *"
335 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
340 PRINT#130,SPC(8)"**************************":PRINT#130
350 IF X=4 THEN 645
355 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
360 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
365 LET M=SQR((R^2)+(I^2))
370 LET A=ATN(I/R)
375 GOSUB 590
380 LET F=A*180
385 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
400 LET X1=M1*(COS(A1))-M*M2*(COS(A-A2))
405 LET Y1=M1*(SIN(A1))-M*M2*(SIN(A-A2))
410 LET C1=SQR((X1^2)+(Y1^2))
415 LET F1=ATN(Y1/X1)
420 LET X2=M2*(COS(A2))-M*M1*(COS(A-A1))
425 LET Y2=M2*(SIN(A2))-M*M1*(SIN(A-A1))
430 LET C2=SQR((X2^2)+(Y2^2))
435 LET F2=ATN(Y2/X2)
440 LET T1=C1/((M1^2)-(M^2))
445 LET L1=-F1
450 LET E1=(M3*M4)/((M1^2)-(M^2))
455 LET T2=C2/((M2^2)-(M^2))
460 LET L2=-F2
465 LET E2=(M3*M4)/((M2^2)-(M^2))
470 GOSUB 555
475 PRINT#130,SPC(8)"^rFACTOR DE ESTABILIDAD^R":PRINT#130
480 PRINT#130,SPC(8)"K="K:PRINT#130
485 PRINT#130,SPC(8)"^rDETERMINANTE DE LA MATRIZ S^R":PRINT#130
490 PRINT#130,SPC(8)"DELTA="M;"/"F:PRINT#130
495 PRINT#130,SPC(3)"*CIRCULO DE ESTABILIDAD DE GENERADOR*":PRINT#130
500 PRINT#130,"RADIO="E1:PRINT#130:PRINT#130,"CENTRO="T1;"/"L1:PRINT#130
505 PRINT#130,SPC(3)"*CIRCULO DE ESTABILIDAD DE CARGA*":PRINT#130
510 PRINT#130,"RADIO="E2:PRINT#130:PRINT#130,"CENTRO="T2;"/"L2:PRINT#130
515 IF X=4 THEN 525
520 GOSUB 610
525 CLOSE 130
530 RETURN

READY.
```

```
555 REM "SUB. CORRECCION DE ANGULOS"
560 LET L1=L1*180:LET L2=L2*180
565 IF X1>0 THEN 575
570 LET L1=180+L1
575 IF X2>0 THEN 585
580 LET L2=180+L2
585 RETURN
590 REM "SUB. CORRECCION DE ANGULO"
595 IF R>0 THEN 605
600 LET A=A
605 RETURN
610 REM "SUB. IMPRESION CON EPSON"
615 PRINT#130 :PRINT#130,"IMPRIME (SI O NO) ";
620 INPUT A$
625 IF A$="NO" THEN 650
630 CLOSE 130
635 LET X=4
640 IF A$="SI" THEN 310
645 IF A$="SI" THEN 475
650 RETURN
700 REM "AB9"
705 LET X=3
709 REM "LNA 9-LNA8"
710 OPEN130,X
715 PRINT"^S";PRINT#130,SPC(8)"****************************"
720 PRINT#130,SPC(8)"*  PASAJE DE PARAMETROS  *"
725 PRINT#130,SPC(8)"*      S A PARAMETROS    *"
730 PRINT#130,SPC(8)"*      DE IMPEDANCIA     *"
735 PRINT#130,SPC(8)"*      CON SUMA DE       *"
740 PRINT#130,SPC(8)"*       REACTANCIA       *"
745 PRINT#130,SPC(8)"****************************": PRINT#130
760 GOSUB 1025
765 AR=1+M1*COS(A1)
770 AI=M1 * SIN(A1)
775 BR=1-M1 * COS(A1)
780 BI=(-1) * M1 * SIN(A1)
785 CR=1 + M2 * COS(A2)
790 CI=M2 * SIN(A2)
795 DR=1 - M2 * COS(A2)
800 DI=(-1) * M2 * SIN(A2)
805 P1=M3 * M4  * COS(A3)* COS(A4)
810 P2=M3 * M4 * SIN(A3)* SIN(A4)
815 PR = P1 - P2
820 P1 = M3 * M4 * COS(A3)* SIN(A4)
825 P2 = M3 * M4 * SIN(A3)* COS(A4)
830 PI = P1 + P2
835 XR = AR * CR - AI * CI
840 XI = AR * CI + CR * A1
845 YR = AR * DR - AI * DI
850 YI = AR * DI + AI * DR
855 ZR = BR * CR - BI * CI
860 ZI = BR * CI + BI * CR
865 WR = BR * DR - BI * DI
870 WI = BR * DI + BI * DR
875 O = (WR-PR)^2 + (WI-PI)^2
880 R(1)= ((YR+PR) * (WR-PR) + (YI+PI) * (WI-PI)) / O
885 I(1)=(((WR-PR) * (YI+PI) - (YR+PR) * (WI-PI)) / O)+R
890 R(2)= ((ZR+PR) * (WR-PR) + (ZI+PI) * (WI-PI)) / O
895 I(2)= (((WR-PR) * (ZI+PI) - (ZR+PR) * (WI-PI)) / O)+R

READY.
```

```
895 I(2)= (((WR-PR) * (ZI+PI) - (ZR+PR) * (WI-PI)) / D)+R
900 AX = M3 * COS(A3)
905 BX = M3 * SIN(A3)
910 AY = M4 * COS(A4)
915 BY = M4 * SIN(A4)
920 R(3) = (2*AX*(WR-PR)+2*BX*(WI-PI))/D
925 I(3)=((2*AX*(WI-PI)*(-1)+2*BX*(WR-PR))/D)+R
930 R(4)=(2*AY*(WR-PR)+2*BY*(WI-PI))/D
935 I(4)=((2*AY*(WI-PI)*(-1)+2*BY*(WR-PR))/D)+R
940 Z1M = SQR((R(1)^2) + (I(1)^2)):Z2A=(ATN(I(1)/R(1)))*180
945 Z3M = SQR((R(2)^2)+(I(2)^2)):Z4A=(ATN(I(2)/R(2)))*180
950 Z5M = SQR((R(3)^2) + (I(3)^2)):Z6A=(ATN(I(3)/R(3)))*180
955 Z7M = SQR((R(4)^2) + (I(4)^2)):Z8A=(ATN(I(4)/R(4)))*180
960 GOSUB 970
965 RETURN
970 REM "SUB. CORRECCION DE ANGULOS"
975 IF R(1)>0 THEN 985
980 Z2A=Z2A+180
985 IF R(2)>0 THEN 995
990 Z4A=Z4A+180
995 IF R(3)>0 THEN 1005
1000 Z6A=Z6A+180
1005 IF R(4)>0 THEN 1015
1010 Z8A=Z8A+180
1015 RETURN
1020 PRINT"^S"
1025 REM "SUB. SUMA DE REACTANCIA"
1030 PRINT#130:PRINT#130,"*VALOR DE LA REACTANCIA A SUMAR*":PRINT#130
1035 PRINT#130,"SUMA CAPCIDAD O INDUCTANCIA (L O C)";
1040 INPUT B$:PRINT#130
1050 IF B$="L" THEN 1070
1055 PRINT#130,"VALOR DE CAPAC. EN NANO FARADAY=";:INPUT C
1060 R=((1/(2*PX*C*10E-3))*(-1))/50
1065 IF B$="C" THEN 1085
1070 PRINT#130,"VALOR DE LA INDUC. EN NANO HENRY=";:INPUT L
1075 R=(2*PX*L*1E-3)/50
1080 PRINT"^S"
1085 RETURN
1105 REM "AB82
1110 LET X=3
1115 OPEN130,X
1120 PRINT"^S"
1125 LET A1=Z2A/180: A2=Z4A/180: A3=Z6A/180: A4=Z8A/180
1130 LET M1=Z1M: M2=Z3M: M3=Z5M: M4=Z7M
1135 PRINT"^S"
1140 AR=1+M1*COS(A1)
1145 AI=M1 * SIN(A1)
1150 BR=(1-M1 * COS(A1))*(-1)
1155 BI= M1 * SIN(A1)
1160 CR=1 + M2 * COS(A2)
1165 CI=M2 * SIN(A2)
1170 DR=(1 - M2 * COS(A2))*(-1)
1175 DI= M2 * SIN(A2)
1180 P1=M3 * M4  * COS(A3)* COS(A4)
1185 P2=M3 * M4 * SIN(A3)* SIN(A4)
1190 PR = P1 - P2
1195 P1 = M3 * M4 * COS(A3)* SIN(A4)
1200 P2 = M3 * M4 * SIN(A3)* COS(A4)
1205 PI = P1 + P2

READY.
```

```
1210 XR = AR * CR - AI * CI
1215 XI = AR * CI + CR * AI
1220 YR = AR * DR - AI * DI
1225 YI = AR * DI + AI * DR
1230 ZR = BR * CR - BI * CI
1235 ZI = BR * CI + BI * CR
1240 WR = BR * DR - BI * DI
1245 WI = BR * DI + BI * DR
1250 D = (XR-PR)^2 + (XI-PI)^2
1255 R(1)= ((ZR-PR) * (XR-PR) + (ZI-PI) * (XI-PI)) / D
1260 I(1)= ((XR-PR) * (ZI-PI) - (ZR-PR) * (XI-PI)) / D
1265 R(2)= ((YR-PR) * (XR-PR) + (YI-PI) * (XI-PI)) / D
1270 I(2)= ((XR-PR) * (YI-PI) - (YR-PR) * (XI-PI)) / D
1275 R(3) = (2*M3*COS(A3)*(XR-PR)+2*M3*SIN(A3)*(XI-PI))/ D
1280 I(3)=((-1)*2*M3*COS(A3)*(XI-PI)+2*M3*SIN(A3)*(XR-PR))/D
1285 R(4) =(2*M4*COS(A4)*(XR-PR)+2*M4*SIN(A4)*(XI-PI))/D
1290 I(4)=((-1)*2*M4*SIN(A4)*(XR-PR)+2*M4*COS(A4)*(XI-PI))/D
1295 M1=SQR((R(1)^2)+(I(1)^2)):B1=(ATN(I(1)/R(1)))*180
1300 M2=SQR((R(2)^2)+(I(2)^2)):B2=(ATN(I(2)/R(2)))*180
1305 M3=SQR((R(3)^2)+(I(3)^2)):B3=(ATN(I(3)/R(3)))*180
1310 M4=SQR((R(4)^2)+(I(4)^2)):B4=(ATN(I(4)/R(4)))*180
1315 GOSUB 1375
1320 PRINT#130,SPC(8)"***************************"
1325 PRINT#130,SPC(8)"* PARAMETROS S CORREGIDOS*"
1330 PRINT#130,SPC(8)"* POR SUMA DE REACTANCIA *"
1335 PRINT#130,SPC(8)"***************************":PRINT#130
1336 IF B$="L" THEN 1338
1337 PRINT#130,"VALOR DE C (EN NF)=";C:PRINT#130:GO TO 1345
1338 PRINT#130,"VALOR DE L (EN NHY)=";L:PRINT#130
1345 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
1350 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
1355 IF X=4 THEN 1365
1360 GOSUB 1425
1365 CLOSE 130
1370 RETURN
1375 REM "SUB. CORRECCION DE ANGULOS"
1380 IF R(1)>0 THEN 1390
1385 B1=B1+180
1390 IF R(2)>0 THEN 1400
1395 B2=B2+180
1400 IF R(3)>0 THEN 1410
1405 B3=B3+180
1410 IF R(4)>0 THEN 1420
1415 B4=360-(B4+180)
1420 RETURN
1425 REM "SUB. IMPRESION CON EPSON"
1430 PRINT#130 :PRINT#130,"IMPRIME (SI O NO) ";
1435 INPUT A$
1440 IF A$="NO" THEN 1485
1445 CLOSE 130
1450 LET X=4
1455 OPEN130,X
1480 IF A$="SI" THEN 1320
1485 RETURN
1505 LET X=3
1509 REM "LNA3"
1510 OPEN130,X
1515 PRINT"^S":PRINT#130,SPC(8)"*************************"
1520 PRINT#130,SPC(8)"* CALCULO DE IMPEDANCIAS*"

READY.
```

```
1525 PRINT#130,SPC(8)"*     CON PARAMETROS S    *"
1530 PRINT#130,SPC(8)"* PARA AMPL. NO UNILAT. *"
1535 PRINT#130,SPC(8)"**************************":PRINT#130
1540 IF X=4 THEN 1925
1545 LET A1=B1/180:A2=B2/180:A3=B3/180:A4=B4/180
1555 LET R=M1*M2*(COS(A1+A2))-M3*M4*(COS(A3+A4))
1560 LET I=M1*M2*(SIN(A1+A2))-M3*M4*(SIN(A3+A4))
1565 LET M=SQR((R^2)+(I^2))
1570 LET A=ATN(I/R)
1575 GOSUB 1870
1580 LET K=(1+(M^2)-(M1^2)-(M2^2))/(2*M3*M4)
1585 LET X1=M1*(COS(A1))-M*M2*(COS(A-A2))
1590 LET Y1=M1*(SIN(A1))-M*M2*(SIN(A-A2))
1595 LET C1=SQR((X1^2)+(Y1^2))
1600 LET F1=ATN(Y1/X1)
1605 LET X2=M2*(COS(A2))-M*M1*(COS(A-A1))
1610 LET Y2=M2*(SIN(A2))-M*M1*(SIN(A-A1))
1615 LET C2=SQR((X2^2)+(Y2^2))
1620 LET F2=ATN(Y2/X2)
1625 LET B5=1+(M1^2)-(M2^2)-(M^2)
1630 LET B6=1+(M2^2)-(M1^2)-(M^2)
1635 LET U1=B5/(2*(C1^2))
1640 LET I1=((B5^2)-(4*(C1^2)))/((2*(C1^2))^2)
1645 LET U2=B6/(2*(C2^2))
1650 LET I2=((B6^2)-(4*(C2^2)))/((2*(C2^2))^2)
1655 GOSUB 1765
1660 LET R1=S1*(COS(N1)):LET X1=S1*(SIN(N1))
1665 LET R2=S2*(COS(N2)):LET X2=S2*(SIN(N2))
1670 GOSUB 1835
1675 LET R1=S1*(COS(N1/180)):LET X1=S1*(SIN(N1/180))
1680 LET R2=S2*(COS(N2/180)):LET X2=S2*(SIN(N2/180))
1685 LET R3=(((1+R1)*(1-R1))-(X1^2))/(((1-R1)^2)+(X1^2))
1690 LET X3=(((1+R1)*X1)+((1-R1)*X1))/(((1-R1)^2)+(X1^2))
1695 LET R4=(((1+R2)*(1-R2))-(X2^2))/(((1-R2)^2)+(X2^2))
1700 LET X4=(((1+R2)*X2)+((1-R2)*X2))/(((1-R2)^2)+(X2^2))
1705 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN EL GENERADOR*":PRINT#130
1710 PRINT#130,SPC(5)"COEF. GEN.="S1;"/"N1:PRINT#130
1715 PRINT#130,SPC(3)"*COEF. DE REFLEXION EN LA CARGA*":PRINT#130
1720 PRINT#130,SPC(5)"COEF. CARGA="S2;"/"N2:PRINT#130
1725 PRINT#130,SPC(8)"*IMPEDANCIA DE GENERADOR*":PRINT#130
1730 PRINT#130,"RG/ZO="R3,:PRINT#130,"XG/ZO="X3:PRINT#130
1735 PRINT#130,SPC(8)"*IMPEDANCIA DE CARGA*":PRINT#130
1740 PRINT#130,"RC/ZO="R4,:PRINT#130,"XC/ZO="X4:PRINT#130
1745 IF X=4 THEN 1755
1750 GOSUB 1890
1755 CLOSE 130
1760 RETURN
1765 REM "SUB. SIGNO DE B"
1770 IF I1>0 THEN 1780
1775 LET I1=-I1
1780 IF B5>0 THEN 1795
1785 LET S1=(C1*(U1+(SQR(I1)))):LET N1=-F1
1790 GO TO 1800
1795 LET S1=(C1*(U1-(SQR(I1)))):LET N1=-F1
1800 IF I2>0 THEN 1810
1805 LET I2=-I2
1810 IF B6>0 THEN 1825
1815 LET S2=(C2*(U2+(SQR(I2)))):LET N2=-F2
1820 GO TO 1830
1825 LET S2=(C2*(U2-(SQR(I2)))):LET N2=-F2

READY.
```

```
1830 RETURN
1835 REM "SUB. CORRECCION DE ANGULOS"
1840 LET N1=N1*180:LET N2=N2*180
1845 IF X1>0 THEN 1855
1850 LET N1=180+N1
1855 IF X2>0 THEN 1865
1860 LET N2=180+N2
1865 RETURN
1870 REM "SUB. CORRECCION DE ANGULO"
1875 IF R>0 THEN 1885
1880 LET A=A
1885 RETURN
1890 REM "SUB. IMPRESION CON EPSON"
1895 PRINT#130 :PRINT#130,"IMPRIME (SI O NO) ";
1900 INPUT A$
1905 IF A$="NO" THEN 1930
1910 CLOSE 130
1915 LET X=4
1920 IF A$="SI" THEN 1510
1925 IF A$="SI" THEN 1705
1930 RETURN
2000 SP$="            ":FOR X=1TO23:CL$=CL$+SP$:NEXT
2005 LET D$="D"
2010 PRINT"^S"
2011 V=V+1
2015 INPUT"^qQUE VALOR DE VSWR GRAFICA";VS:IF VS<1 THEN 12:VR=100*(VS-1)/(VS+1)
2020 VR=100*(VS-1)/(VS+1):PRINT
2025 INPUT"QUE IMPEDANCIA CARACTERISTICA";ZO:PRINT
2030 A$=""
2035 X(J)=R(J):Y(J)=I(J):GO TO 2037
2036 OPEN130,4:CMD130
2037 IF V=3 THEN 2039
2038 PRINT"*ADAPTACION DE ENTRADA*":PRINT:GO TO 2040
2039 PRINT"*ADAPTACION DE SALIDA*":PRINT
2040 PRINT"ESTOS SON SUS VALORES DE IMPEDANCIA ":PRINT
2045 PRINT"        FO          R           X ":PRINT
2050 F$=STR$(F(J))
2055 RS$=STR$(R(J)):XS$=STR$(I(J))
2060 USE"    #####.###",F$:USE"    #####.##",RS$:USE"    #####.##",XS$:PRINT
2061 IF A$="SI"THEN 2092
2065 PRINT AT(0,18) " "
2070 PRINT
2085 INPUT"IMPRIME ESTOS VALORES (SI O NO) ";A$:PRINT
2090 IF A$="NO" THEN 2095
2091 IF A$="SI" THEN 2036
2092 PRINT#130:CLOSE130
2095 INPUT"GRAFICA LOS VALORES DE CARGA(SI O NO)";P$
2100 XM=1.4
2105 IF P$="SI"THENGOSUB 2720
2110 PRINT"^S    ELIGA EL TIPO DE ADAPTACION    ^q"
2115 PRINT" 1 C SERIE
2120 PRINT" 2 L SERIE
2125 PRINT" 3 SINTONIZADO SERIE (SERIE L-C)
2130 PRINT" 4 SINTONIZADO SERIE (PARALELO L-C)
2135 PRINT" 5 LINEA DE TRANSMISION SERIE
2140 PRINT" 6 C PARALELO
2145 PRINT" 7 L PARALELO
2150 PRINT" 8 SINTONIZADO PARALELO (SERIE L-C)
2155 PRINT" 9 SINTONIZADO PARALELO (PARALELO L-C)

READY.
```

```
2160 PRINT"10 LINEA DE TRANSMISION PARALELO
2165 PRINT"11 TRANSFORMADOR
2170 PRINT"12 R SERIE
2175 PRINT"13 R PARALELO^q
2180 PRINT"14 STOP SUMA DE SECCIONES
2185 INPUT"^ö^q^q^q^qELIJA  (1-14)";M:PRINT"^W"
2190 IF M<1 OR M>14 THEN 2185
2195 CGOTO 2180+(M*20)
2200 PRINT CHR$(147)"SUMA CAPACITOR EN SERIE
2205 INPUT"WHAT IS VALUE (IN PF)";C
2206 FOR J=1TO N
2207 X(J)=R(J)
2208 Y(J)=I(J)-1/(2*F(J)*C*1E-06)
2209 NEXT J:GOTO 2875
2220 PRINT CHR$(147)"SUMA INDUCTOR EN SERIE
2221 INPUT"WHAT IS VALUE (IN UH)";L
2222 FOR J=1 TO N:X(J)=R(J)
2223 Y(J)=I(J)+2*F(J)*L:NEXT:GOTO 2875
2240 PRINT CHR$(147)"SUMA SINTONIZADO SERIE (SERIE L-C)
2241 INPUT"QUE VALOR DE C (EN PF)";C
2242 INPUT"QUE VALOR DE L (EN UH)";L
2243 FOR J=1 TO N:X(J)=R(J)
2244 Y(J)=I(J)+2*F(J)*L-1/(2*F(J)*C*1E-06):NEXT:GOTO 2875
2260 PRINT CHR$(147)"SUMA SINTONIZADO SERIE (PARALELO L-C)
2261 INPUT"QUE VALOR DE C (EN PF)";C
2262 INPUT"QUE VALOR DE L (EN UH)";L
2263 FORJ=1 TO N:  X(J)=R(J)
2264 Y(J)=I(J)+(2*F(J)*L)/(1-((2*F(J))^2)*L*C*1E-06):NEXT:GOTO 2875
2280 PRINT CHR$(147)"SUMA LINEA DE TRANSMISION SERIE
2281 INPUT"QUE VELOCIDAD DE PROPAG.";V
2283 INPUT"QUE LONGITUD (EN PULG.)";LL
2284 INPUT"QUE IMPEDANCIA DE LINEA (OHMS)";Z1
2285 FOR J=1 TO N
2286 T=1.2*LL*F(J)/39.37/V
2287 D=(R(J)+Z1)^2+I(J)^2
2288 R=(R(J)^2-Z1^2+I(J)^2)/D
2289 I=2*Z1*I(J)/D
2290 Z=SQR(R*R+I*I)
2291 T=180*ATN(I/(R+1E-30))-2*T+180*(R<0)
2292 R=Z*COS(T/180)
2293 I=Z*SIN(T/180)
2294 D=(1-R)^2+I^2
2295 X(J)=Z1*(1-R^2-I^2)/D
2296 Y(J)=2*Z1*I/D
2297 NEXT:GOTO 2875
2300 PRINT CHR$(147)"SUMA CAPACITOR PARALELO
2301 INPUT"QUE VALOR DE C (EN PF)";C
2302 FOR J=1 TO N:  W=2*C*1E-06
2303 D=(1-W*F(J)*I(J))^2+(R(J)*W*F(J))^2
2304 X(J)=R(J)/D
2305 Y(J)=(I(J)*(1-W*F(J)*I(J))-R(J)^2*W*F(J))/D:NEXT:GOTO 2875
2320 PRINT CHR$(147)"SUMA INDUCTOR PARALELO
2321 INPUT"QUE VALOR DE L (EN UH)";L
2322 FOR J=1 TO N:  W=2*F(J)*L
2323 D=R(J)^2+(I(J)+W)^2
2324 X(J)=R(J)*W^2/D
2325 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
2326 NEXT:GOTO 2875
2340 PRINT CHR$(147)"SUMA SINTONIZADO PARALELO (SERIE L-C)

READY.
```

```
2341 INPUT"QUE VALOR DE C (EN PF)";C
2342 INPUT"QUE VALOR DE L (EN UH)";L
2343 FOR J=1 TO N
2344 W=2*F(J)*L-(1E+06)/(2*F(J)*C)
2345 D=R(J)^2+(I(J)+W)^2
2346 X(J)=R(J)*W^2/D
2347 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
2348 NEXT J:GO TO 2875
2360 PRINT CHR$(147)"SUMA SINTONIZADO PARALELO (PARALELO L-C)
2361 INPUT"QUE VALOR DE C (EN PF)";C
2362 INPUT"QUE VALOR DE L (EN UH)";L
2363 FOR J=1 TO N
2364 W=(2*F(J)*L)/(1-((2*F(J))^2)*L*C*1E-06)
2365 D=R(J)^2+(I(J)+W)^2
2366 X(J)=R(J)*W^2/D
2367 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
2368 NEXT: GO TO 2875
2380 PRINT CHR$(147)"SUMA LINEA DE TRANSMISION EN PARALELO
2381 INPUT"QUE IMPEDANCIA DE LINEA (OHMS)";Z1
2382 INPUT"QUE VELOCIDAD DE PROPAGACION ";V
2383 INPUT"QUE LONGITUD (EN PULG.)";LL
2384 PRINT"LINEA ABIERTA (O) O CERRADA (S) ";
2385 INPUT S$
2386 IF S$<>"O" AND S$<>"S" THEN 2565
2387 FOR J=1 TO N
2388 T=LL*F(J)*1.2/39.37/V
2389 IF S$="S" THEN W=Z1*TAN(T/180)
2390 IF S$="O" THEN W=Z1*TAN((T+90)/180)
2391 D=R(J)^2+(I(J)+W)^2
2392 X(J)=R(J)*W^2/D
2393 Y(J)=W*(R(J)^2+I(J)^2+W*I(J))/D
2394 NEXT: GO TO 2875
2400 PRINT CHR$(147)"SUMA TRANSFORMADOR
2401 INPUT"TRAFO ELEVADOR (U) O REDUCTOR (D)";T$
2402 IF T$<>"U" AND T$<>"D" THEN 2615
2403 INPUT"QUE RELACION DE TRANSFORMACION ";W
2404 IF T$="D" THEN W=1/W
2405 FOR J=1 TO N:X(J)=W*R(J)
2406 Y(J)=W*I(J):NEXT:GO TO 2875
2420 PRINT CHR$(147)"SUMA RESISTOR SERIE
2421 INPUT"QUE VALOR DE R";RS
2422 FOR J=1 TO N: X(J)=R(J)+RS
2423 Y(J)=I(J):NEXT:GO TO 2875
2440 PRINT CHR$(147)"SUMA RESISTOR PARALELO
2441 INPUT"QUE VALOR DE R";RS
2442 FOR J=1 TO N
2443 D=(R(J)+RS)^2+I(J)^2
2444 X(J)=RS*(R(J)^2+RS*R(J)+I(J)^2)/D
2445 Y(J)=I(J)*RS^2/D:NEXT: GO TO 2875
2460 PRINT CHR$(147);
2705 J=1:F(J)=FX:R(J)=R4*50:I(J)=X4*(-50)
2706 IF V=2 THEN 2005:GO TO215
2709 GO TO215
2710 STOP
2720 HIRES 0,3:XR=100*XM
2725 CIRCLE 160,100,XR,100,1
2730 LINE 160-XR,100,160+XR,100,1
2735 ARC 160+XR,0,180,270,10,XR,100,1
2740 ARC 160+XR,200,270,360,10,XR,100,1

READY.
```

```
2745 CIRCLE 160+XR/2,100,XR/2,50,1
2750 CIRCLE 160,100,VR*XM,VR,1
2755 CHAR 158-.67*XR,97,43,1,1
2760 TEXT 153-.67*XR,104,".2",1,1,8
2765 CHAR 158-.33*XR,97,43,1,1
2770 TEXT 153-.33*XR,104,".5",1,1,8
2775 CHAR 156+.33*XR,97,43,1,1
2780 TEXT 156+.33*XR,104,"2",1,1,8
2785 CHAR 156+.67*XR,97,43,1,1
2790 TEXT 156+.67*XR,104,"5",1,1,8
2795 CSET 2
2800 TEXT 10,190,"F7=RETURN",1,1,8
2810 FOR J=1 TO N
2815 D=(X(J)+ZO)^2+Y(J)^2
2820 PX(J)=((X(J)-ZO)*(X(J)+ZO)+Y(J)^2)/D*100*XM
2825 PY(J)= 2*Y(J)*ZO/D*100
2830 CHAR 157+PX(J),97+PY(J),43,1,1
2835 IF D$="S" AND J>1 THEN LINE 160+PX(J-1),100+PY(J-1),160+PX(J),100+PY(J),1
2840 NEXT
2845 GET A$:IF A$=" " THEN 2845
2850 IF A$=CHR$(136) THEN NRM :RETURN
2855 IF A$<>CHR$(140) THEN 2845
2860 TEXT 10,190,"F7=RETURN",0,1,8
2870 COPY :NRM :RETURN
2875 PRINT"       FREQ          R            X ":PRINT
2880 FOR J=1 TO N
2885 RS$=STR$(X(J))
2890 XS$=STR$(Y(J))
2895 F$=STR$(F(J))
2900 USE "    ######.###",F$:USE "    ######.##",RS$:USE "    ######.##",XS$:PRINT
2905 NEXT
2910 IF A$<>CHR$(138) THEN 2915
2915 PRINT:PRINT:PRINT:PRINT"F1=GRAFICA SOBRE PANTALLA
2925 PRINT"F3=GRAFICA LO ULTIMO DE PANTALLA
2930 PRINT"F4=IMPRIME LO DE PANTALLA
2935 PRINT"F5=MAL VALOR: DESCARGA ESTE INTENTO
2940 PRINT"F7=BUEN VALOR: TOMA Y PROCEDE
2945 GET A$:IF A$=" " THEN 2945
2950 IF A$=CHR$(133) THEN XM=1.4:GOSUB 2720:PRINT"^S":GO TO 2875
2960 IFA$=CHR$(134) THEN GOSUB 2795:PRINT"^S":GO TO 2875
2965 IF A$=CHR$(138) THEN GOSUB 3007:PRINT"^S":GOTO 2875
2970 IF A$=CHR$(135) THEN 2110
2975 IF A$=CHR$(136) THEN 2985
2980 GO TO 2945
2985 FORJ=1 TON:R(J)=X(J)
2990 I(J)=Y(J):NEXT
3000 PRINT:PRINT:PRINT"UD DEBE AHORA ADAPTAR LAS IMPEDANCIAS LISTADAS ARRIBA"
3005 PAUSE 4:GO TO 2110
3007 OPEN130,4:CMD130
3008 CGOTO 3005+(M*5)
3010 PRINT"SUMA CAPACITOR EN SERIE":PRINT
3011 PRINT"VALOR DE C (EN PF)=";C:PRINT:GO TO3091
3015 PRINT"SUMA DE INDUCTOR EN SERIE":PRINT
3016 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO3091
3020 PRINT"SUMA SINTONIZADO SERIE (SERIE L-C)":PRINT
3021 PRINT"VALOR DE C (EN PF)=";C:PRINT
3022 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO3091
3025 PRINT"SUMA SINTONIZADO SERIE (PARALELO L-C)":PRINT
3026 PRINT"VALOR DE C (EN PF)=";C:PRINT

READY.
```

```
3027 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO3091
3030 PRINT"SUMA LINEA DE TRASMISION SERIE":PRINT
3031 PRINT"VELOCIDAD DE PROPAG.=";V:PRINT
3032 PRINT"LONGITUD (EN PULG.)=";L:PRINT
3033 PRINT"IMPEDANCIA DE LINEA (OHMS)=";Z1:PRINT:GO TO 3091
3035 PRINT"SUMA CAPACITOR EN PARALELO":PRINT
3036 PRINT"VALOR DE C (EN PF)=";C:PRINT
3037 GO TO 3091
3040 PRINT"SUMA INDUCTOR EN PARALELO":PRINT
3041 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 3091
3045 PRINT"SUMA SINTONIZADO PARALELO (SERIE L-C)":PRINT
3046 PRINT"VALOR DE C (EN PF)=";C:PRINT
3047 PRINT"VALOR DE L (EN UH)=";L:PRINT:GO TO 3091
3050 PRINT"SUMA SINTONIZADO PARALELO (PARALELO L-C)":PRINT
3051 PRINT"VALOR DE C (EN PF)=";C:PRINT
3052 PRINT"VALOR DE L (EN UH)=";L:PRINT
3053 GO TO 3091
3055 PRINT"SUMA LINEA DE TRASMISION PARALELO":PRINT
3056 PRINT"IMPEDANCIA DE LINEA (OHMS)=";Z1:PRINT
3057 PRINT"VELOCIDAD DE PROPAG.=";V:PRINT
3058 PRINT"LONGITUD (EN PULG.)=";LL:PRINT
3059 PRINT"LINEA ABIERTA (O) O CERRADA (S)    ";S$:PRINT:GO TO 3091
3060 PRINT"TRANSFORMADOR":PRINT
3061 PRINT"TRAFO ELEVADOR (U) O REDUCTOR (D)    ";T$:PRINT
3062 PRINT"RELACION DE TRANSFORMACION=";W:PRINT:GO TO 3091
3065 PRINT"SUMA RESISTOR SERIE":PRINT
3066 PRINT"VALOR DE R=";RS:PRINT:GO TO 3091
3070 PRINT"SUMA RESISTOR PARALELO":PRINT
3071 PRINT"VALOR DE R=";RS:PRINT:GO TO 3091
3091 PRINT"       FREQ          R           X ":PRINT
3092 FOR J=1 TO N
3093 RS$=STR$(X(J))
3094 XS$=STR$(Y(J))
3095 F$=STR$(F(J))
3096 USE "    #####.###",F$:USE "    #####.##",RS$:USE "    #####.##",XS$:PRINT
3097 NEXT
3098 IF A$<>CHR$(138) THEN 2915
3099 PRINT#130:CLOSE130:PRINT"^S":GO TO2875
3100 OPEN 130,4
3105 P=96
3110 PRINT#130,CHR$(27);"!";CHR$(P);
3115 PRINT#130,SPC(11)" PROYECTO DE"
3120 PRINT#130:PRINT#130
3125 PRINT#130,SPC(5)"AMPLIFICADORES DE BAJO RUIDO"
3130 P=26
3135 PRINT#130,CHR$(27);"!";CHR$(P);
3140 PRINT#130:PRINT#130:PRINT#130
3145 PRINT#130,SPC(28)"*DATOS*"
3150 PRINT#130,"NOMBRE",:PRINT#130,SPC(40)X$
3155 PRINT#130:PRINT#130,"POLARIZACION",SPC(34)"V(VOLTS)=";:PRINT#130,V
3160 PRINT#130,SPC(56)"I(MA)=";:PRINT#130,I
3165 PRINT#130:PRINT#130,"FRECUENCIA EN MHZ";:PRINT#130,SPC(38)FX:PRINT#130
3170 PRINT#130,"PARAMETROS  S  ",:PRINT#130:PRINT#130
3175 PRINT#130,"S11="M1;"/"B1,:PRINT#130,"S22="M2;"/"B2:PRINT#130
3180 PRINT#130,"S12="M3;"/"B3,:PRINT#130,"S21="M4;"/"B4:PRINT#130
3185 RETURN
10000 OPEN130,4:CMD130:LIST3027-:CLOSE130:STOP
READY.
```