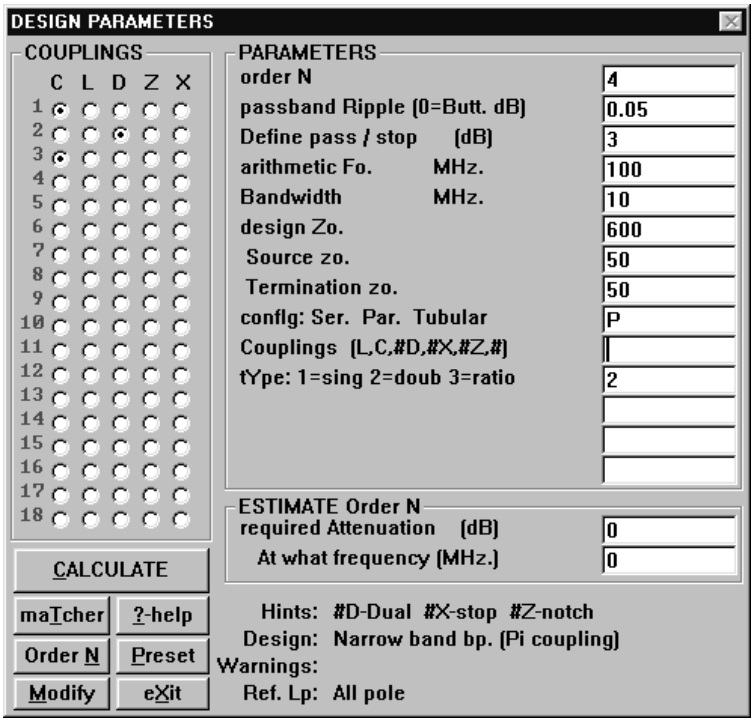
Parameters menu

The Parameters menu may be entered in several ways, but it will first appear automatically after a new design has been selected. It is used to set and modify the design parameters that are passed to the design equations in all of the design modules of the system. They are design values, not specifications. Such facts of life as bandwidth shrinkage due to losses and design approximations are up to you to compensate for. Each design parameter is displayed and recorded in such a manner as to allow any one to be changed easily without reentering all the others.

The parameters menu consists of several separate areas. The "PARAMETERS" themselves, the "COUPLING", “ESTIMATE” and the “Warning / hint” area. There is also a group of buttons to control operation.



Design parameters and Coupling menu

The design parameters appear according to the needs of the particular design that is selected and will appear in the order in which they are described below from top to bottom within the PARAMETERS area. The reference lowpass and design module selected will also be displayed in the warnings area.. Each of the parameters shown are recorded on disk in the file name shown on the main control menu and having the extension ".spk".

When starting a new design, the essential parameter setting my be initialized by pressing the [Preset] button for any design. This is only a starting point however.

Each parameter defined

Equal resonators (Yes or No)

Requests that an iteration be performed to make all internal resonators within a TEM microwave design be of equal diameter.

order N

Order of complexity of a filter design. Number of poles in an all-pole design.

passband Ripple (0=Butt. dB)

Selects passband ripple for Chebyshev and elliptic function designs or Butterworth if 0 dB ripple is requested.

Define pass / stop (dB)

Select the point that is to be considered the passband to stopband transition level (usually 3 dB or "last ripple").

required Attenuation (dB)

Specifies attenuation level (Amin) for elliptic function designs or attenuation for other designs such as resistor pads.

arithmetic Fo.

Center frequency of bandpass or notch filters (F1 + F2 / 2).

It is often easier to input the center frequency and bandwidth of wide bandwidth designs with reference to the corner frequencies (F1 and F2).

Simply enter the corner frequencies (F1, F2) into the arithmetic center frequency box. After F1 and F2 are entered, the correct Fo and Bw is calculated and displayed.

Enter F1 and F2 separated by commas:
arithmetic Fo. MHz. 100,140
Bandwidth MHz. 65 <--- Old data

Corrected Fo and Bandwidth is displayed:

arithmetic Fo. MHz. 120
Bandwidth MHz. 40

Bandwidth

Width of the band of frequencies of interest.

design Zo.

For all L-C designs, the impedance the filter is designed to work into or from. The Natural impedance of the design. This impedance will appear at one termination of the design or the other. For transmission line bandpass designs, this will be the impedance of the resonators.

Source zo.

Desired source end impedance for the matcher module.

Termination zo.

Desired termination end impedance for the matcher module.

Cutoff freq. fc.

Passband cutoff frequency for a highpass or lowpass filter.

confIg: _____

Selects circuit configuration, usually Series or Parallel input. The options displayed vary with the design chosen.

Couplings (L,C,#D,#X,#Z,#)

Controls the coupling types used in a narrow band design. The selections are displayed in the "COUPLINGS" area. You will probably want to change these with you mouse, directly in the COUPLINGS area, but they can also be set from the couplings edit box using the keyboard.

C - Sets all couplings to capacitors.
L - Sets all couplings to inductors.
D - converts the filter to the dual from this section to termination.
X - Stops the inverter process and continues with Norton transformed direct scaled processing from this section to the termination.
Z - Sets a stopband zero (notch).
(a coupling number) A coupling number alone switches a C coupling to an L or any other (X,L or D) to a C coupling. The number can be followed by the coupling type you want, like this:

4D sets coupling 4 to begin a dual.
3X stops inversion process at coupling 3.
6L sets coupling 6 to be an inductor.

tYpe: 1=sing 2=doub 3=ratio

Selects terminations:

1 = Singly terminated (for multiplexers).
2 = Doubly terminated.
3 = Arbitrarily specified unequal terminations.
Note: When doing elliptic function designs, the prompt will change to:
tYpe: 1=sing 2=doub 3="C"
In this case, a "tYpe 3" specifies a type "C" filter (N=even order, equal terminations).

EXternal reference filename.

Selects the filename of a normalized reference lowpass filter on disk. The file name can include full path and name (.DZN extension is assumed).

type 3: impedance ratio (>1)

Sets impedance ratio of source to termination of "termination type 3". all-pole designs. Ratio must be > 1 or an error is generated.

stOpband zero freq.

Sets the frequency of the stopband notch associated with the notch inverter or "Z coupling".

electrical Length (Deg.)

Set length of TEM design resonators in degrees.

Passband type (L-Lp H-Hp)

Used to select the overall passband shape of a narrow band notch.

Passband Cp tune-up (Y or N)

This appears only for Comb or Interdigital filters. It lets you decide if you want to optimize the section tuning capacitors on each resonator for best return loss (VSWR). This affects the return loss ONLY and is most useful on wide bandwidth filters. It has NO effect on spacings (mechaNical dimensions).

You can abort the iteration at any time by pressing the <~> [Back] key

adMittance scaler (about .5)

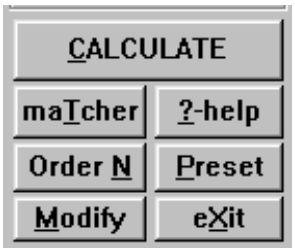
Used by the interdigital bandpass designs to compensate for the approximate nature of the design equations involved.

Wire inductance

Unwanted inductance of connecting wire.

Control buttons

The command buttons control the operation of the parameters menu. The options are:



CALCULATE

This option performs the calculations for the design. Use it after all of the parameters are set. This is identical to the calculate option on the main control menu.

maTcher

Resets or disables the impedance matcher module. The matcher status is displayed on the main control window. For more information see chapter 9.

Modify

Allows 1 parameter to be changed repeatedly. This is the default selection when entering the parameters menu. Press it and the “input focus” will jump to the parameter you last modified.

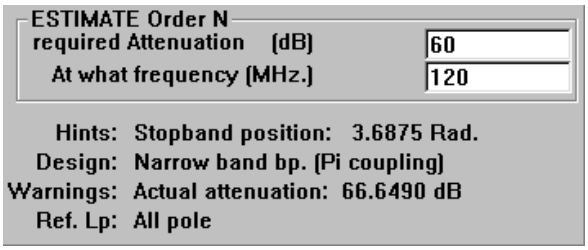
Preset

This will set up all of the important parameter to starting values. These are a starting point only and will certainly need to be changed to optimize the design..

eXit

Returns the program to the main control menu.

Order N



Use this to determine the order of complexity of a new design from stopband specifications assuming infinite component Q.

To determine the required order needed for each stopband frequency simply enter the frequency and required attenuation at that frequency into the two boxes and press the [order N] button. The actual theoretical attenuation at that point will be displayed. The required order N will be set directly into the order N parameter.

The results displayed are correct for a lossless network of the type selected. In the narrow band case, all factors are taken into account including coupling types (L,C,X or D) which will skew skirt shape. Elliptic function filters may also be estimated using this feature.

When using an external reference lowpass where the attenuation can't be calculated directly, this feature may still be used to determine the radian frequency so that the attenuation can be read from an appropriate curve.

?-Help

The help screens explain each parameter.