

# Release Notes

2/19/2018

## General Notes

### 16.1

- Now allow the '.v' after a signal name in a RUSE block. Thus 'A.sig.v' is the same as 'A.sig'.
- Updated wireman 553 window line to reflect KN5L measured data.
- SimSmith now writes '.ssx' files. These files may or may not be compatible with previous versions... it depends on the features used. Older, '.ss' files can still be read.
- Mouse Wheel Gain and direction... have been replaced with a new preference: "wheelGain p S h v R". Takes five values close to 1. The gains are for the 'p'arameters, the 'S'mith chart, 'h'orizontal, 'v'ertical, and 'R'use.
- Added "x /\_ y" operator (slash underscore). It rotates x by y degrees.
- RUSE: you can now zoom in and out in the schematic. The wheel is used (no arrow support).
- TEXT DIALOGS: the font size of an expression text dialog can be increased or decreased using the '+' and '-' buttons on the lower right hand side of the dialog near the 'commit' button.
- Circuit Elements: if you have a circuit element in the main menu that is taking room but you don't need to see, you can make it narrow using the 'left arrow to margin' button on the upper left hand side of the element. Once narrow, you can widen it by clicking on it.
- Transmission Line Database: added ability to add transmission lines to the database. File/preferences/tLineDB. Entries should be of the form:  
"description (display name)" 50 .82 66.01m .2888 2.125m  
added entries will not overwrite built in ones but they will be listed first. There is nothing magic about any of the words. Quotes are required. The file has to be read in each time you start SimSmith.
- Added 'Preferences' document to 'help' menu.
- Added ability to control color and stroke for Plot(), Smith(), RMS(), etc commands.
- Make 'signal name' optional in Plot(), Smith(), etc. commands. So 'Smith(L.Z);' is the same as "Smith('L.Z',L.Z);"

### 16.0

bug fixes from 15.1:

- Fixed bug where SimSmith crashed when preferences/pinSizeAndLocation was set to something other than 'useIncoming' and certain older files were loaded.
- Changed the formatting of numbers in reports to provide the number of digits specified by that parameter. The number of digits shown for a frequency specified by a load file may be problematic.
- Smith Chart: fixed bug where operating points were not displayed for plotted items on the Smith chart.
- RUSE: added the ability to delete line segments. While wiring, if you hit 'd', SimSmith will delete all line segments attached to the wiring sprite.
- RUSE: fixed bug with cut/paste of blocks 'stitching' back in incorrectly.
- RUSE: fixed bug where things could be placed 'off canvas' and then become abandoned.
- Fixed 'run away' "Extra Info". Now it is limited to 30 lines AND will only be computed when it is being displayed.
- Fixed bug when drag tuning a component with a parameter with a 'format'.

#### EMPHASIS:

- TRANSFORMERS: ideal transformers aren't as ideal as they used to be. Transformers with inductors with values > 1 may be problematic.
- In the past identifier 'I' was used to specify the 'incoming impedance' in the various blocks (RUSE,N,F,V). This variable has been replaced by 'Zin'.
- Identifiers can be used for only one purpose. Thus, "R0 R0 w1 w2;" is no longer allowed. To simplify the transition forward, in a RUSE block, any component where the location is the same as the value: the value is changed by adding an '\_' to the name. Any RUSE or N block parameter which consists of one of the letters R, L, C, or T followed by a string of digits will be converted to lower case. Any RUSE circuit element which has the same value as location will have the location converted to lower case. This feature can be disabled by preferences/xlateNAndRUSEParam.
- New RUSE elements will have default parameter names set to their location name followed by an '\_'.
- "I" cannot be used as a circuit element name.
- The parallel operator, that used to be '|' has been replaced with '|||'. The '|' operator is now 'bitwise or' to be consistent with C. I expect not many people used the parallel operator.
- The power operator '^' has been preserved but can also be invoked with "\*\*\*": a to the b power is a^b or a\*\*b. Bitwise exclusive or can be invoked with '^ ^'. For example, 1^2 is 3. I doubt anyone will use it, but there it is.
- Filter generation routines are presently under development and not available in version 16.0.

## additions:

- Plot and sweep expressions can now create main circuit element parameters.
- Added 'invZ' for plotting. This allows one to run the 'inverse' of the Circuit. This is essentially the same as reversing the circuit and negating all the values of the parameters. The most common use is probably "plot L.invZ;".
- This release is a rewrite all 'expression' parsing: literally a fork lift for everything F,N,RUSE,V,Plt,expr related. As a result, there will undoubtedly be incompatibilities and missing features, particularly semantic checking. This release is recommended for those requiring faster execution in circuits using expressions. It is expected this release will generate backward compatible .ss files for simple circuits. However, if you use any of the following features, chances are things won't be backward compatible.
- Numeric parameters can now hold complex values. The imaginary part may be ignored silently. The 'L' and isolation elements are special in that the equation for the impedance is  $R + jX$  even when R and X are complex. (G.Zo also pays attention for the imaginary part.)
- Parameter values are now maintained with full machine precision. This means that the number displayed IS NOT NECESSARILY the value being used for the computation. This is how spreadsheets work. THIS IS A MAJOR CHANGE FROM SIMSMITH IN THE PAST although it is doubtful it makes any difference to the typical user.
- The expression editing window is now different. Please watch the video called "Introduction to SimSmith 16" for more details. It is easy to use but there are some hidden useful tricks.
- Added a 'Daemon' block which can be placed anywhere in the circuit INCLUDING before the Load element. It operates essentially the same as the F block except it is more efficient. It cannot affect the impedance passing through the block. Use of this element will generate files incompatible with previous releases.
- Added the ability to 'reverse' the display of the circuit. This does NOT change the order of evaluation in any way; it is strictly a display choice. The 'view' menu can be used to choose between 'legacy order' and 'standard order'.
- This release is a major break in GUI philosophy. I have started to use the Java Swing window layout managers and so the new windows are not as refined as those of the past. (Well, the file chooser used Java window layout managers as well...) I figured my time was better spent on 'core strengths' which is certainly not GUI stuff...
- NOTE: the old SimSmith used '^' and '|' in ways inconsistent with most modern programming languages. The '^' (power) operator has been preserved and '\*\*' has been added as an equivalent. Future releases may remove the '^' so it should be converted to '\*\*' any time a file is touched. The '|' (parallel) has been replaced with '||'. The Java and C '^' (bitwise exclusive ok) can be invoked with '^ ^'. The reasoning: not many users of SimSmith will need bitwise exclusive or, but many already used power....
- Changed 'plot' selection menu to be two lines.

- Added 'plot selection' menu to RUSE block components... just right click on the component for a list of items easy to plot.
- Added the ability to do simple plots from Daemon blocks. See the end of the Presenter plotting discussion.
- Plot: horizontal and vertical lines and points are no longer supported. Additionally, many 'consistency' checks are not yet performed. For example, displaying totalPower on the Smith chart is nonsense but may not be checked.
- Plot: the syntax for overriding elements in colors has changed. Now uses the 'With' function: With(color,"alpha",0) will result in a color with alpha = 0.
- Plot: assignments in the Plot expression assignments are no longer 'temporary'. If you used this feature in the past, I apologize; it was just too difficult to carry forward.
- Plot: only one signal can be plotted with a single plot statement: "plot G.V,L.V;" is no longer legal.
- In the F block: specifying a capacitance could be done saying "C318p". Now, the syntax is C(318p). Likewise, L(), R(), and X().
- PLOT: note that the 'internals' of RUSE and N blocks are now named differently. Please see the Presenter documentation.

## 15.1

changes:

- Fixed bug with Markers on plotted items.
- Improved simulation speed of large RUSE and N blocks.

## 15.0

changes:

- Added several rudimentary filter synthesis functions. Butterworth and Chebyshev filters can be any size; Bessel filters can be up to 10 elements. Filters can be low, high, band, or notch. See the 'primer' for details.
- Fixed bug in file chooser where warning dialogs came up on wrong screen.
- There is a bug when internally calculating the impedance of a filter; things seem to fall apart at about -80 to -100 dB. Things are fine with less aggressive attenuation values. See Primer for details. This is under investigation.
- **IMPORTANT:** the filter synthesis (well, filter calculator I suppose) is an evolving feature set in its most primitive beginnings. Ultimately, the goal will be to provide a more push button approach that will generate the circuit elements as well as perform the calculation. Since it is so primitive and since there are so many axes, there is tremendous opportunity for confusion. While it is believed the calculations are correct, matching the calculation to the correct circuit (a task assigned to the user at the moment) can be problematic.

- Updated the F block description to (hopefully) include all built in functions.
- The edit line can be fickle when there are errors therein. For example, if you are editing a value that has an error and you click away the edit line will be removed but the parameter field being edited will remain pink. There is no way to get the edit line to come back until the error condition has been removed.
- When a parameter fails verification (remains pink), a warning is now produced. This will help debug 'hidden parameter' freezes. (I hope). If you get a warning concerning a failed parameter verification and don't see how to resolve it, please send me a screen capture of the circuit and the warning.
- Added code to detect 'changing a parameter to the left'. You are not allowed to assign the value of a parameter of a block 'to the left' of where the assignment is being made. See the 'Presenter' documentation for details. Search for 'apology'.
- The 'WaveformOf', 'RMSOf', 'AngleOf', and 'PeakOf' functions have been removed. Please read the Presenter documentation for a more convenient methodology.
- Writing plot data: fixed bug when writing plot data when computed plot data was dots.
- Fixed bug in writing a file with an alternate extension. You couldn't, now you can.
- Added files/preferences/showSWRLines. If set to 'y', a horizontal, dotted line will be draw on the SWR chart for each value of SWR on the round chart. NOTE: the SWR values can be set only while viewing the Smith chart....
- The Scattering Parameter Square chart is now fairly well supported. See 'Presenter' for how to turn it on/off.
- Corrected computation of power with Harmonics. Use 'totalPower' for plotting power with harmonics.

## 14.16

changes:

- Added an 'edit line'. When you click on a parameter the 'view' line is replaced by a 'edit line'. You can edit either the parameter you clicked on OR click on the edit line and edit it. Determining when to 'unshow' the edit line is problematic and is being worked on.

## 14.15

changes:

- Fixed a few little annoyances.

## 14.14

## changes:

- Square Chart SWR axis. Added 'magnitude(Gamma)' option (like EZNEC's SWR chart). Click on SWR banner to flip back and forth.
- Added /\*---\*/ block comment support. Block comments may be nested. Note that the following usage allows you to comment/uncomment the block by changing just the first line. If the first line is "///\*" then the code is executed. If the first line is "/\*" then the code is not executed. No need to change the trailing "/\*\*/". (Learn something new every day!)

```
///*  
code  
/*/
```
- Expanded 'plot' menu of Square chart to allow it to cover the 'parameter report'. This helps make the plot selection menu a bit easier to read. Also reworked the formatting to make it a bit less variable.
- SWR BW report: changed the bandwidth report to display only 1 BW range on the chart reports. Now you must click within the SWR circle OR there must be only one span within the circle to get a report. The Bandwidth report now displays the start and end values (usually frequency). The units are not displayed so as to make room for larger numbers. Don't forget that hovering will show the text in the upper left hand corner of the screen.
- NOTE: the Bandwidth (and other Parameters) are reported ONLY when you click on a trace. The Bandwidth report is for the trace on which you clicked. Additionally, they are reported only when there is only one sweep parameter enabled.
- NOTE: the parameter (and Bandwidth) reports on the Smith and Square chart can become stale when changes are made to the design. To avoid confusion, these reports are now removed any time the design changes. This removal is hyper aggressive BUT, to be sure, click on the chart again.
- Fixed vertical axis banner to 'pad' as necessary to make the text more readable. This removes the need to pad the labels yourself in plot commands.
- Changed 'wave' plot to show two cycles of the primary rather than just 1. This puts '0' right in the middle of the screen.
- Added support for impedance files whose title line matches (case independent) "mhz\*db\*deg".

## 14.13

### changes:

- The 'simplified' transmission line model has been refined. Please see the 'primer', "Transmission Line Models" for more details.
- Fixed bug which occurred when tuning the '~deg' parameter. It is generally not a good idea to play directly with '~deg' because it can be updated by the transmission line model calculations (see above). None-the-less, it should be

possible to tune it with the arrows and wheels and an attempt has been made to make this work more smoothly.

- Reworked how startup works. Now, SimSmith should never write a file (except 'lastSimSmith...') without prompting. At startup, it first checks for '.SimSmithPreferences.ss' and reads it if it exists, then it reads 'lastSimSmithXX.ss' for any preferences, then any file specified by an argument. If the last fails, it will read 'lastSimSmithXX.ss' for an actual circuit.
- Added minimal 'bandwidth determination' support. When you click on a sweep, the 'parameters' piece of the report may contain something like "<num". This is the 'width' of the main sweep parameter which results in an SWR less than that specified on the Smith Chart. If you click on a trace where it is inside the circle it will give one result. If you click on the trace outside the circle it will give you all the results. It copes properly with multivalued SWR specifications. See 'Extra Information' in the Primer for more details.
- Fixed bug where something like "useZo\* $\sqrt{\text{watts}}$ " didn't work properly; it should now.
- Added 'maxv' to transmission line reports. Added 'maxv' as an element for plotting. Remember, all voltages are RMS.... Be cautious with this, it may prove untrustworthy. It may not work properly for negative length lines.
- Added "Extra Info" to 'view' menu. This block resides between the circuit element menu and the chart. It is sized to fit the area and responds to mouse hovers. See the primer for details.
- Fixed bug where writing plot results sometimes acted as though there was no data to write.
- REWORKED sweep range expressions. See 'Presenter' for details. This touched many places in the code, there may be lingering bugs there-in. This was largely preparation work for more advanced sweep expressions.
- Changed Square chart vertical axis to use 'autosized' fonts. This makes the characters bigger when possible AND enables the 'hover' feature of SimSmith which shows you the value of small text in the upper left hand corner of the screen.
- Replaced analog waveform subsystem. See 'Presenter' for details.
- Changed 'hover' to show beginning and end of large valued items.
- Changed SWR report to report partials (things which start and/or end within the SWR circle).
- Added 'left' and 'right' rotations for RUSE labels.
- Fixed bug with using locals (things starting with '\$') in RUSE and N blocks.
- Added check for references to 'self' computed built-ins like 'p' or 'V'.
- Fixed bug when specifying complex inductor or capacitor impedance with q equals 0.
- F block performance. F blocks used as controllers (those where the impedance is always returned as 'I') are about 4 times faster now.
- Now prune trailing zeros from parameters assigned by expressions (like F block and cloneLoad).
- Moved 'standards' and 'library' menus from the title bar to the 'file' menu.

- Put back 'a' and 'b' generator arguments which fixes bug in reading in old designs.
- PLEASE NOTE: markers do not yet work on waveforms.

Fixed bug where 'Vary' in the expression didn't like multi-letter element names.

## 14.12

changes:

- RUSE Block: Wiring within a group is now preserved when cutting and/or pasting.
- RUSE Block: you can now cut and paste between RUSE blocks in a single session. The RUSE clipboard is now shared among all blocks in a given session.
- V equations for ISOLATE and Generator block. The editing of the V equations for ISOLATE and Generator blocks has changed. Now, when you click on one of the generator options, SimSmith 'tries' to replace an existing generator with the new one. It may not succeed in all cases; that's simply too bloody hard. You have to hit 'done' when you are.
- ISOLATE V equation: if you click on 'cloneLoad', the 'cloneLoad' will be added to the equation. It may or may not add it correctly.

## 14.11

changes:

- You can rename circuit elements: simply click on the name and edit away. The element name is preserved when put into a library or while cut/paste. Duplicates are renamed upon insertion.
- Elements are now named based on their type rather than as just letters.
- Replace 'cloneG' with 'cloneGen'.
- IN THE RUSE BLOCK... default instance names have been changed. Instance numbers now start at 1. Transmission lines now start with 'T', scattering parameter blocks start with 'S'. Default component values are now '-'. If the component value is '-' then the '-' is (internally) replaced with the instance name. Thus a transmission line 'Tdog' with value '-' will have the value set by the parameter 'Tdog'.

## 14.10

changes:

- Fixed bug with Isolation block causing crashes... I think.
- Changed '.ss' file format. See 'presenter' documentation under 'sharing'.
- In 'V' equations, allow 'useZo', 'fixedV', etc. to be anywhere in the expression. If any of the 6 predefined functions are used in a voltage expression, the resulting value is returned regardless of all else in the expression.

- Added extensions “.gamma” and “.swr” to transmission lines. Only available at ‘right’ or ‘at dot’.
- Added ‘vcvs’ to RUSE block.
- Added IndB() function:  $20 * \text{Log}_{10}(\text{Mag}(\text{val}))$

## 14.9

### changes:

- Worked some more on ‘hidden dialogs’ problem. Now it’s a bit more aggressive about make sure the user knows about active dialogs.
- Fixed bug with sweeping auto-LC parameters.
- Added ‘vccs’ to the RUSE block. This allows one to use a hybrid pi model for bipolar and mosfet ‘small signal’ models. Doesn’t yet support plotting of current through the vccs element.
- Added ‘defaultV’ to preferences so you can specify the default voltage equation for the G block.
- Fixed bug reporting 1 watt as ‘<-W = 0’.
- Added ‘isolateV’ to preferences. This mirrors ‘defaultV’ except it is used for the isolate block.

## 14.8

### changes:

- Fixed error messages with a sweep parameter to/from was zero.
- Fixed ‘Undo’ slider.
- Restricted SWR to values between (inclusive) 1 and 100.
- Changed Isolate block ‘V’ equation so that it is evaluated during the impedance computation phase (see Presenter for details of evaluation).
- Added ‘cloneG’ which will mimic the equation for G.V. These, in combination, allow the Isolate block to mimic both the Load and the Genrator:
  - ohm = L.ohms;
  - oohms = L.johms;
  - cloneG
- Removed arrow navigation in File Chooser.
- 

## 14.7

### changes:

- Changed ‘FileChooser’ to always appear on the same screen as the main window.
- Changed ‘pinSizeAndLocation’ somewhat. This parameter comes into play whenever a circuit file is loaded. Now, when a file is loaded, the three options are: ‘useIncoming’ size and location, ‘maintain’ the existing size and location, or ‘useBelow’ where the pinnedSize and pinnedLocation will be applied.

- Fixed 'miss-feature' where '.Z' and '.z' values were computed incorrectly. For the casual user; please access currents and voltages only in the plot expression.
- Fixed bug with negative frequencies in multi-resonant circuits. Be careful when using negative component values.
- Changed the evaluation algorithms affecting the access of 'internal' results such as .Z, .I, .V, .P, etc. Read the presenter document for details on accessing internal data.
- Changed default pull down for caps, inductors, transmission lines, etc to 1e15 instead of 1e20.
- Generalized 'plot point' to plot points on both Square and Smith chart. Note that the points are plotted on the Smith chart unless a 'sweep' is enabled.
- Added 'GetRedOf', 'GetGreenOf', 'GetBlueOf', and 'GetAlphaOf' so you can extract color elements from a color in plotting.
- Added 'WithRedOf', 'WithGreenOf', 'WithBlueOf', and 'WithAlphaOf' so you can set color pieces. Example: "WithAlphaOf(\$color,0);" to turn off the display. See presenter for details.
- Added 'Shade(startColor,endColor,lower,upper,value);" which will shade in what I hope is the obvious way :-)
- Fixed bug when dragging components to the FileChooser which has quotes in their names.
- Added code to pop up FileChooser when hovering a drag over the FileChooser icon.
- Improved integration with OS X and Linux (when using new installer).
- Disabled 'undo/redo' during dialogs with RUSE, etc.
- Made 'parameter format' dialogs mutually exclusive.
- Improved 'group selection' of RUSE blocks. Now, when you select a group the enclosing box is left on the screen. If you click on a side of the box you select the members of the box. This is useful if you find you can't select a component (for whatever reason). Simply use the group select and then click on an edge of the box.
- **FIXED MAJOR BUG WITH UNDO. I you use UNDO you absolutely should update...**

## 14.6

changes:

- Rewrote considerable pieces of the voltage-current reporting AND the '.v' and '.i' extensions for plotting. There may be bugs hidden therein. See next few bullets for details.
- Top level circuit elements now have 3 formats for voltage-current reports. If the element can be determined to be purely shunt then a report with an up/down arrow and a lower case 'v,i=' will be provided. The lower case indicates that the voltage an current are for the circuit element and should correspond to the '.v'

and 'i' of the plot command. If the element can be determined to be purely series then the report will consist of a left-right arrow followed by a 'v,i=' report; again with lower case and matching the 'v' and 'i' of the plot command.

Otherwise, the report will have NO arrow and be 'V,I=' (capitals) and be the port voltage and current as seen looking into the right side of the element.

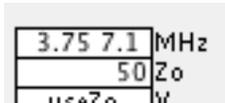
- Access to the N and RUSE block circuit elements (for the plot command specifically) have been reworked. There may be problems with properly reporting and trans and sprm blocks have ambiguous 'i', 'v', and 'z' values.
- Examine the voltage and current of a general purpose box (F,N,RUSE) and try to guess if it is a shunt or series (or combination) impedance. If clearly shunt or series provide a 'v,i' report. Otherwise provide a V,I report.
- Fix bug where file chooser banner would not be reset properly when pinned.
- Change 'previous startup may have failed' logic to be a bit less aggressive. See 'presenter' for details.
- Fixed bug where parameter format dialog box got lost and SimSmith effectively hung as a result.
- Fixed bug when displaying very small powers in dBW.
- Min and Max now take 1 or more args (not just 2).
- Plot now allows 'SWR' and 'PWR' in addition to 'Smith', 'y1', and 'y2'.
- F block 'L()' and 'C()' functions now take 1 to three arguments: e.g. L(H), L(H,Q), L(H,Q,MHz)...
- Capacitors and Inductors 'default' Q is now 1e6 (rather than 'infinite'). Specifying a Q of zero or not specifying a Q will result in an effective Q of 1e6.
- Added 'tie down' to each end of transmission lines, capacitors, and inductors in N and RUSE blocks. Helps avoid 'modified nodal analysis' warnings. The tiedown resistance is 1e20 ohms.
- Inductors now have a minimum inductance of 10 pH.
- Transmission line length in N and RUSE: if length is '0', substitute 1e-6.
- Improved 'drag tune' precision for components with large ranges.
- Fixed bug where Marker attached to a Path in the Smith Chart was display even when the 'path' was not.
- Changed when 'suggested range' is computed. When a parameter is added to the sweep menu, the 'suggested range' is computed based on the present value of the parameter.
- Replaced "file/preferences/defaultComponentVariation" with 'max/min value ratio'. Now, the default range values are from = nominal/sqrt(ratio) and from = nominal\*sqrt(ratio). The range is recomputed each time the parameter is added to the 'sweep parameter' menu. The value '1.2' acts very much like +- 10%.
- Undo/Redo: reworked this subsystem to make it a bit more reliable. Please let me know if you find a sequence which doesn't work.
- Added more 'plot' control including specifying color, dashes, and line width. See Presenter documentation for details.
- Fixed bug where suggested range was recalculation when sweep parameters were re-ordered.

- Plotting on the Smith chart: you used to need to say “plot Gamma(G.Z) Smith”. Now you just say “plot G.Z Smith;” Note that this may break earlier designs which used ‘Gamma’. Sorry.
- Added a ‘macro’ capability to the expression parser. See the Presenter documentation for details.
- Enhanced ‘RGBA’ to allow for values from 0 to 255. If a color component value is  $\leq 1$  then it is taken to have a range from 0 to 1 inclusive. If the component is larger than 1 then the range is taken to be 0 to 255. Thus, you can now say: RGBA(200,150,255,255); This allows the use of most of the RGB ‘colorpickers’ on the web.
- Added ‘plot point’, ‘plot verticalLine’, and ‘plot horizontalLine’. See presenter for details. These ‘unforgiving’ so be careful.

## 14.4

changes:

- Changed ‘G.MHz’ to be a multi value parameter. Now you can show the ‘path’ on the Smith chart for multiple frequencies. Values separated by spaces just as with SWR and Q circles:



- Made the GAM file reader a bit more tolerant.
- REMOVED ‘z’ built-in from expressions. Use ‘G.Zo’ instead.
- Added “.z” extension to information available about L,R, & C in RUSE and N blocks. ‘.v’ ‘.i’ ‘.z’ ‘.val’ ‘.p’ are available in RUSE and N blocks.
- Added ‘.p’ for S and transmission lines in RUSE and N blocks.
- Changed power calculation in N and RUSE blocks to be “Mag(?.?.i)^2\*Real(?.?.z)”.
- Added ‘.i’, ‘.v’, ‘.z’, and ‘.p’ to the main circuit components. Thus, to find the current through element ‘A’ you can say ‘A.i’. **WARNING: these names may conflict with previously used parameter names. The parameter names will need to be changed. Designs which used these parameters ‘globally’ will need to be reworked. Designs which used ‘z’ as a shorthand for “G.Zo” will be broken in undetectable ways.** Notice that ‘.val’ is not supported. Sorry for the red. Components with ambiguous currents and voltages will cause an error. “.p” is always available.
- Note that the N (and RUSE) blocks run somewhat slower than before.
- Fixed bug with hang while plotting 2 dimensional square charts.
- Changed drag tuning back to original algorithm. It doesn’t do large steps well so you have to coax it along...
- Fixed bug where “0^2” was not equal to 0.
- Removed restriction on using ‘I’ in the N block.
- Reworked internal computation engine to ease restrictions on F and N block expressions. Particularly, change the F block conversion to ABCD parameters.

Please ensure the final expression is 'linear'. See the last section in 'presenter' for more details if you see unexpected behavior.

- Fixed bug with expression block parameters starting with 'j'.
- In Harmonic evaluation, the 'WaveformOf()' construct is now optional. You can just say 'plot foo;' where 'foo' was set inside the Harmonics statement.
- Fixed 'copy' in RUSE so that it copies the rotation and value properties.
- Added colors to plot pallet
- Fixed bug in impedance file classification
- Fixed L.v being classified ambiguous
- Removed superfluous marker warning for plot expressions.
- Added markers to 'paths' on the Smith chart. The marker will snap to the end of the path. These markers still need some beautification but they at least work.
- Added 'color' to the Circuit Element menu. Right click on the circuit element and select the color. This color overrides the auto-color routines. Autocolor does NOT take the fixed colors into account.
- Reworked modified nodal analysis (note to author: 'to simplify instrumentation').
- Fixed bug in 'plot' were it seemingly computed the wrong values for  $?p$ ,  $?i$  ...
- Changed default RUSE component orientation (to make adding a RUSE element have the same 'direction' as adding a main circuit element).
- Reading in a file did not precisely restore a transmission line instance... fixed it.
- Changing a transmission line model changed the length of the line... fixed that.
- Added the ability to set the color of any drawn item by right clicking on a 'plot selection button'.
- Fixed bug with coupling inductors with non-ideal inductors.
- Now limit coupled device to inductors.

## 14.3

changes:

- Reduced title bar font size.
- Disabled arrow tuning and zooming while editing Notes and Text block.
- Permanently enabled 'captures' menu item.
  - Change drag tune to take 'parameter format' into account. Now, if the parameter is a 'linear' parameter the drag tune range will be -10k to 10k..
  - Added optional second argument to "SWR" and "Gamma" built-in functions. This allows you to do things like "plot SWR(A.Z,55-j10);" or ("plot Gamma(A.Z,55-j10) Smith;". Utility of this function is left as an exercise for the reader :-)
  - Added "Select" function to expression parser. See 'F block syntax' for more details.
  - In transmission lines: the computation of  $Z_o$  given  $Z_{nom}$  and loss has been updated. The old algorithm had problems at low frequencies. The new algorithm produces slightly different results but is usable at much lower frequencies.

- In transmission lines: while a complex  $Z_0$  was allowed in F and N blocks, the losses were not properly computed. As a result, a line with a complex impedance of, say "50-5j" would appear to have power gain under certain conditions. The losses should now be properly computed. See the 'primer' for more details.
- Fixed bug in N block which causes problems with numbers starting with a '.'.
- Enhanced 'coupled inductors' to allow for a complete coupling constant matrix. See the N block syntax document for more details.
- Added support for SARK impedance analyzer.
- Changed the RUSE autowirer away from put Rats Nets. It now does something closer to 'wire to closest point'. Wiring two points on the same component is dealt with in a special way to improve viewability.
- AutoTransformer. Fixed bug when computing equivalent inductance when coupling coefficient was not close to 1.

## 14.2

changes:

- Fix autotransformer bug

## 14.1

changes:

- Ensure readable font in root menu.
- Monitor memory usage and warn when getting too large.  
Fixed crash when typing '\' in the filter field of File Chooser.

## 14.0

changes:

- Added 'Dot(a,b)' function to compute dot product of two complex args.
- Added '.p' to access the power in an N block element. Thus, for R0 you might want 'R0.v' for voltage, 'R0.i' for current, 'R0.val' for the value and 'R0.p' for the power.
- Fixed bug in reporting '.val' of capacitors and inductors.
  - Added 'group' to the RUSE editor. Primitive but useful. Group and cut, paste, move, or delete the highlighted items.
  - Fixed problem with N block variables names starting with 'c' or 'v'.
  - Added 'view' pane immediately above the circuit menu. If you hover over a parameter the text of that parameter will appear above the circuit menu.
  - Introduced a new 'File Chooser'. The old java based choosers have been removed. This chooser is very simple minded and lacks many features which would reasonably be expected (such as group operations and cut/paste). The major advantage of this browser is that it has a 'favorites' (recently accessed) pane and a previewer for SimSmith Circuit Element (.ssce) files. Note that when

dragging a component from the SS File Chooser back to the circuit a small delay from 'click/drag' to the component appearing is seen. Please move slowly in this operation... I'm working on it. A video on the File Chooser is coming.

- Refined drag/drop target. If you drag an impedance file to a 'file' parameter, you now need to drop it directly on the file parameter rather than simply on the component. This is to allow for components that have multiple files.
- You can now drag components from the circuit (or library) to the native file system (or desktop). Simply click on the circuit component and drag it to the destination. A file with extension '.ssce' will be created. The name of the file is not special but the extension is. As expected, you can drag a component from the native file system to the circuit. Note that when you drag an element out of the SS window the SS File Chooser will pop up. You can drag an item into the file chooser directly by dragging the item into the 'file chooser' icon next to the trash bin.
- Added 'rotate' for main circuit elements. Typing ^r while pointing to a circuit element will rotate that component. Not all components can be rotated, even some which one might reasonably expect.
- You can drag an 'impedance' file to the circuit (as opposed to a circuit element). When you do that, a 'Z' block is inserted with the dragged file as the 'file' parameter. You can type ^r to rotate it in place if you like.
- You can 'export' a circuit which is essentially as 'SAVE' EXCEPT: no preferences or File Chooser information will be embedded. Any 'impedance' information will be embedded and any file references will be 'unlinked'. This is the recommended way to 'share' a design with someone else.
- Added 'arrow' navigation in the file chooser. Up/down/left/right should move you around the file hierarchy.
- Added 'pinned' radio button to the File Chooser. The radio button to the left of the 'path' (to the left of 'ROOT') controls the persistence of the File Chooser dialog. When selected, the File Chooser will remain after a drag and drop. Otherwise, after a drop, the File Chooser will vanish.
- Added 'right click' to circuit elements. You can right click on a circuit element to see options.
- Fixed bugs in markers. Not sure how there came to be so many :-)
- Fixed bugs in zooming and panning in the square chart, again not sure how there came to be so many.
- Increased scrolling speed for File Chooser which and scroll buttons.
- WARNING: For things like copy, paste, delete, cut, rotate: I changed how the circuit element is selected. If there is a floating item (an item is being dragged) then that item is highlighted. Otherwise, if the mouse is pointing to a circuit element that can be removed (not L or G) then that item is highlighted. The action is always performed on the highlighted (if any) item.
- Added 'label' field to markers so you can know what it points to (sorry for the grammar).
- Added ability to add unattached marker to Smith chart.
- Right clicking on a main circuit circuit element will pop up a menu of choices of actions which can be performed on that element.

- Added {vf zo k0 k1 k2} construct to transmission lines in N block.
- Added ability to use AC6LA database in N block. See N block syntax description for details.
- In File Chooser, added 'sort by time' and 'show all' buttons.
- In the N block: added small conductances between P1 and P2 so as to avoid floating voltages and isolated ports. (Somewhat esoteric issue but helps avoid unexpected MNA failures.)

## 12.3

changes:

- Added zooming and panning to the Square Chart. Use the wheel to zoom around the cursor location. Click&drag well away from a trace to pan. Works only horizontally.

The resistive circuit elements have been deprecated. The Z block is used instead. If the Z block has no reactance it is drawn as a resistor. Old designs which use the R block can still use it but you can't (easily) add new R blocks.

- Fixed bug with 'X' type object in Netlist blocks.
- Fell into the pit and wrote a 'Really Ugly Schematic Editor' for N block users. I means REALLY ugly. Its only good for small circuits and generates truly ugly schematics BUT... it is graphical. There's a video on my web site for 'RUSE'.
- Further modified the general purpose Expression parser (N,F,G and Plt blocks). It now automatically generates parameters for variables it cannot otherwise resolve. Please see the F block description for more details.
- 'Monitors' have been added to the N block elements for R,L, and C components. Now you can access their currents, voltages, and values. See the N block documentation for more details.
- Fixed (well, perhaps 'hacked') SPRM support in N and RUSE blocks do be more tolerant of 'unity' values of S parameters.

## 12.1

changes:

- Added 'time domain' functions. See 'Presenter' for details.
- Extended 'local variables' to be more than 1 letter in length. Now, any number of letters, digits, '\$' or '\_' may follow the '\$'. This extension was made to encourage the use of more informative variable names. It is possible that this extension will break previously working designs. I apologize if this happens to you.
- Added 'FileLookup' to general expression syntax. This allows you to use an impedance file as a general purpose lookup. See 'Presenter' for details.
- Fixed but in writing touchstone2 files with Zo other than 50...
- Added ability to read and write Y parameters and Z parameters to s2p files. Yes, 's2p' is probably wrong. The format is specified in preferences "TS2 Format".
- May have mucked up other things associated with Z files and touchstone 2 files, please be forewarned AND let me know of any problems.

- Added a 'report screen'. Click on 'notes/show Report Screen' for parameter reports.
- Fixed bug in processing s1p files in 'Z' format.
- Fixed bug in 'cleanup' after having written touchstone files.
- Added a 'Generic' CSV file format for load files. See 'primer' for details.
- Reworked the 'impedance load file' parser. It is possible I broke it. Please take a moment to verify your load files are working properly.
- Fixed bug when load was purely reactive.
- Added 'save Circuit with Preferences'. Now. Under normal conditions a circuit will be saved without preferences. Clicking on 'save Circuit With Preferences' will do exactly that. If you load a circuit (using file/load circuit) which has the preferences included you are given the option to ignore those preferences if you like.
- **ATTENTION: the general purpose expression parser described at length in the document "F block syntax" has been extensively updated and made much more 'strict' in its parsing. It is known to break certain older designs using the F block that use short form of function calls such as 'Ra' or 'Ca' or 'jwa'. In general, every function is now... a function for the form 'name()'. It affects the F, N, G and 'Plt' formats. Nearly every document has been affected. The most significant change is that variables are now of arbitrary length AND you can name your own parameters to these blocks. See the primer for specifics.**
- When you save a circuit file now, the impedance data you use is saved. If the file is not available when you reload the design the 'old' data is used.
- When an Impedance file disappears, SimSmith will continue to use the old data.
- Using files in N blocks is completely reworked including those used for the SPRM document.

## 11.11

changes:

- Added ability to edit library elements and have the library file updated. This allows you to edit the 'name' field of an N or F block for documentation purposes.
- Monitor library file for changes and re-read on change. Allows you to share a library file between instances.
- Added 'paste' to library window.
- Added 'control d' to delete in library window. Delete the item over which the cursor is floating by typing control d. Essentially the same as 'control click' in the library.
- Added automatic removal of redundant library elements. Adding the same element twice will warn you and NOT add the element. Redundant elements are remove upon read of older library file.
- Modified plot expression semantics; please read the 'presenter' documentation on plotting for details. This allows you to modify circuit parameters within the plot expression without affecting parameter values outside the plot expression.

## 11.10

changes:

- Coax element put onto the clipboard or into the library reverted to a bastardized 'simplified' model. Now, hopefully, they don't.
- Reworked the sweep menu a bit. Now you can have NO sweep ranges specified. (i.e. G.MHz is no longer automatically enabled)
- Added an 'auto' transformer model. Click on the transformer 'mdl' to get the form of transformer you want. Note that autotransformers with voltage gains very close to 1 can be problematic.

## 11.9

Added features

- Replaced 'enableWheelTune' with 'wheelTuneDirection' so you can control what happens with each wheel click.
- Added parameter format control. For most numeric parameters, right click on the parameter to get a dialog box. The dialog will let you set precision and update mode. Setting number of digits to 'system' means 'use file/parameters/numParamDigits'. The 'linear' mode allows you to specify the increment for an arrow or wheel click. Linear mode is a convenient way to have a parameter swing positive and negative. The 'geometric' mode is the legacy mode and the default.
- Added 'write plot data' capability. Using statements in the plot expression, you can write files with selected data. See 'Presenter' documentation for details.
- If you try to use too small an increment a warning box pops up. This can become annoying. You can suppress this warning in 'file/preferences/warnParamDigits'.
- Replaced "MaxSweepPoints" with two parameters: NormalSweepSize and ExtendedSweepSize. For most sweeps, the maximum number of points which will be plotted is controlled by 'NormalSweepPoints'. A sweep of size "ExtendedSweepSize" can be invoked by clicking on the 'sweep' button of the sweep control menu just to the right of the 'name' button. The extended size sweep will take place. See 'primer' for (not many) more details.
- Reworked window placement. Should act the same as before but please let me know of any problems.
- Changed wheel and arrow gain factors. They now default to: shift = 10%, control=.1%, shift+control=.01%, no modifiers, 1%. These can be changed in "file/preferences/s n c s&c" which is a multivalued parameter. The format should be obvious. Remember that spaces (not commas) separate multivalued parameter values.
- Added an 'Abort' key. When you do an extended sweep an 'abort' button will pop up along with a progress bar. Clicking on the abort button will stop the sweep. NOTE: if you make the extendedSweepSize unreasonably long, even the abort button won't work. The size where the abort key stops working is system

dependent. Use large sweeps cautiously until you find your system's limit on circuit size and sweep size. Clicking the sweep button when it is green will turn it back to gray and will run a 'normalSweepSize' sweep.

- Moved 'notes box' support around a bit. Now there is a top level menu item for the notes box. The first line of text in a note box will be duplicated to the right of the 'notes' menu item.
- Made the sweep control menu 'sweep' button turn pink when a sweep is taking place.
- Hidden feature: clicking on a circuit element power report string is exactly the same as clicking on the preferences menu 'powerUnits' button.
- When using the ISOLATE block (a generator and a load in a single unit) and displaying 'path', a menu is provided to allow you to choose which of the paths to see.

## 11.8

### Added features

- Added arrow support for tuning parameters. Up and Right arrows increase, down and left arrows decrease. Holding the control key reduces the increment by a factor of ten, shift increases it by a factor of ten. Useful when fine-tuning parameters. Small increments don't always work because there aren't enough digits of precision.

Added arrow support for zooming the Smith chart. Up and right mean zoom out, down and left mean zoom in. Control key does nothing. Essentially, arrows work exactly the same as 1 click of the mouse wheel.

- Added arrow support for the Square chart axes. Up and Right mean increase scale, down and left mean decrease scale. Holding the control key makes the scale control 'continuous'. Essentially, arrows work exactly like 1 click of the mouse wheel. Shift does nothing.
- Wheel tuning of parameter values. Select a parameter and leave the mouse inside the parameter. You can tune the parameter with the wheel. 1 click of the wheel is the same as the smallest tune button step. Holding the control key reduces the increment by a factor of ten, the shift key increases it by a factor of ten. Use the wheel to get close and the arrows or tune buttons to get closer. Closest, as always, is to type it directly. This feature must be enabled: "file/preferences/enableMouseTune".
- Fixed the bug where the default 'warnings window' was off screen in Windows. Window management is now a little more aggressive. There is a preference called 'windowReveal'. When set to 'all', the sub-windows (text windows and warning window) will always be on the same screen as the main window. When set to 'partial', at least a part of the text and warnings windows will be visible. When set to 'none', no effort is made to manage windows independently of the host system. Note: dragging things around with open sub windows can be problematic as is not recommended... you won't like the results.

- Added new little icons on the Generator and Isolate\_Z blocks. SimSmith tries to determine the type of generator equation you are using and adjust the serial impedance box. It tries to: set it to a boxed-M when a transmatch is being used, set it to a line if a voltage source is being used, set it to a resistor when there is an internal impedance which is purely real, and set it to a boxed-Z when there is a complex internal impedance. Since you can do pretty much anything with the equation, SimSmith makes the determination by running a test, not by examining the equation. It can get it wrong. Let me know if you find a case.
- SimSmith now restarts at the old screen location rather than on the main screen.
- Added ability to specify the number of digits SimSmith displays (and uses). See 'file/preferences/numParamDigits'.

## 11.7

Added features, fixed bugs...

- Fixed bug where 'click' wouldn't select an import on the square chart.
- Added default 'transmission model' to the preferences menu. Now you can choose something other than 'simplified' for your default transmission line.
- Forced 'reasonable' limits on preferences/minimumChartScale'. Force Smith chart to always be at least partially visible.
  - 'Zooming all the way out' on the Smith chart sets it to minimum size and centers it (as before) and moves the mouse to the center of the chart (new).
  - Moved default error window to lower right of screen. The command 'help/Recover warning window' will move it to the upper left hand corner to make sure its visible.
  - Added two colors to the color map.

## 11.6

Added features, fixed bugs...

- Fixed bug where transformer has power gain...
- Fixed bug I introduced reading touchstone files. Grrrrr.
- For SWR mode: set 'reverse power' coming out of the load to be '1 watt into the matching impedance' rather than '1 volt into 50 ohms'.

## 11.5

Added features, fixed bugs...

- Added a new circuit element called 'XMatch'. In the 'manual' mode it provide an LC or CL network with independent L and C. Not really anything new. In the 'auto' mode, it automatically adjusts the L and C to deliver a target Z at a specified frequency.

- Added new generator builtin called “outputZ(val)”. outputZ(val) will act as a Thevenin equivalent impedance will be val. The Thevenin internal voltage is set such that 1 watt will be delivered to a load of Zo. (An optional second arg will scale the power; outputZ(a+jb,c) will deliver c watts to a load of Zo.)
- Restored the ‘click on element to select primary parameter’ feature. Now, ‘delete’ (or ‘backspace’) will have the correct effect on a parameter BUT cut/copy/paste/undo/redo will affect the selected or floating item, not the parameter value.
- Fixed bug when using ‘←dbW’ with circuit elements with power gain.
- Fixed bug when changing units of swept variables.
- Fixed but when displaying very short, negative length transmission lines.

## 11.4

### Added features, fixed bugs...

- Disabled ‘autofocus’ when adding or clicking on components in the circuit. Not many folks used it, sorry if you’re one of the few...  
Fixed bug with ‘powerUnits’ on Windows machines.
- Fixed bug in displaying dB power on square chart.
- Cleaned up keyboard commands for undo (control or command Z), redo (control or command y). They seem to work more reliably now.
- Added ‘persistent’ select: when you click on a circuit element or a reference the ‘clicked-on’ item stays highlighted. If you click on a trace, the circuit element involved is highlighted.
- Added ‘delete’ (or backspace or control d or command d) which will delete the highlighted item.
- Added a SimSmith internal ‘clipboard’ that should NOT be confused with the system clipboard. The clipboard is a stack that can be up to 10 items deep.
- Added ‘cut’ (control x or command x). This will cut out the highlighted item and push it on the SimSmith clipboard stack.
- Added ‘copy’ (control c or command c). This will place a copy of the highlighted item on the SimSmith clipboard stack.
- Added ‘paste’ (control v or command v) which will copy an item off the SimSmith clipboard and ready it for insertion. Repeated ‘pastes’ without actually placing the item will walk down the stack. So, for example, say you ‘cut’ a capacitor and then ‘cut’ an inductor. Typing ^v will give you the ‘inductor’ for placement. If you don’t place it and again type ^v you will get the capacitor for placement. The stack order is not modified when using this feature: the ‘inductor’ remains at the top of the stack.
- NOTE: NONE OF THESE COMMANDS WORK IF you are editing a parameter value since these commands may affect the parameter value itself.
- Added option for choosing ‘panButton’ and ‘actionButton’. The panButton, which is used to move the Smith chart around, defaults to ‘left’. You can now set it to ‘right’ or ‘middle’ or ‘doubleLeft’. The actionButton is what’s used to do

drag tuning (and click tuning). It defaults to 'right'. You can set it to 'doubleLeft' or 'middle'. No check is made to make sure they aren't the same.....

- Added 'inches' and 'cm' to length options for length units. These are specified in the preferences menu.
- Added more report formats. Now have "original", "Admittance", "Impedance", and "coordinate". Give them a try.
- Many of the Preference 'Default' parameters have been renamed. Old values are discarded. The names were changed because they were in fact NOT the default values but really only the 'Initial' value. For example, the 'Default TLine Zo' was not the default value used by the NBlock 'trans' or the F block 'T()' statements.
- Fixed bug when reading it a circuit 'saved in meters' and read back in when preferences requested 'feet'.
- Fixed 'gaps in Smith Chart Sweep curves' bug.

## 11.3 the 'Presenter' Release

Added features, fixed bugs...

- Turned on plotting, markers, and sweep expressions for normal distribution.
- **POWER USERS!** Previous versions of SimSmith often recomputed the scan data unnecessarily. This resulted in slow responses during editing, resizing, or plot selections. This version of SimSmith can eliminate these redundant computations by putting the string 'Lazy' in 'file/preferences/featuresKey'. Unfortunately, with this flag enabled, there may be a time when SimSmith SHOULD recompute the scan data and it doesn't. If you find such a case, please let me know. (If you use this feature, please let me know. If it seems solid over time, I'll turn it on by default in later releases. You can send me mail with "help/send ae6ty mail".)
- Fixed bug where markers were not shown when they should have been.
- Added 'markerSizeFactor' to preferences. This increases the size of markers on the square and round chart. '1' means normal size, '1.5' means half again as large, etc.
- Marker size is no longer changes during zoom on the Smith chart.
- Substantially improved (I hope) marker placement. Markers now no longer overlap each other nor obscure the targets of the arrows. Arrows now go from the center of the labels to the point of interest. Markers pointing to targets slightly out of view are displayed. NOTE: if you are using the tune buttons to move markers you may find them 'flipping around' at will. This is because markers are automatically placed and optimized; no manual placement is supported.
- Added 'forXfer' generator option to all modes.
- Power reporting has now been expanded to four options:
  - Power entering from the right in watts (shown as " $\leftarrow W$ ")
  - Power entering from the right in dBW (shown as " $\leftarrow \text{dBW}$ ")
  - Power lost in the device in watts (shown as " $\uparrow W$ ")
  - Power lost in the device in dBW (shown as " $\uparrow \text{dBW}$ ")

- Clicking on the banner of the Power axis will advance the display option just as though you had set it in the preferences menu.
- Delayed the appearance of the error window's appearance. Remember, it can be relocated so it doesn't pop up over your text windows. Once relocated, it stays there.
- Remember that text windows can be resized and relocated on a per instance basis.

## 11.2 the 'Presenter' Release

Added features, fixed bugs...

- Added access to reverse direction. This allows you to plot the voltages, currents, impedances, and powers of elements when running 'backwards'. See 'Presenter' documentation for examples.
- Added the ability to use s2p files in the N block. See the 'NBlockDescription' documentation in 'help'.
- Square chart: only the vertical axes created by the plot expression have a logarithmic option. (Removed this option from all other vertical axes.)
- Removed N block caching.

## 11.1 the 'Presenter' Release

Added a bunch of new features, some of which must be 'enabled'.

- On the square chart: added 'log' scales to the vertical axes. Click on the name of the axis (at the top) to toggle between 'linear' and 'logarithmic' scales.
- Added the ability to access some of the electrical nodes within the N block. In essence, you can now see the voltages on wires and the currents through voltage sources
- Added 'markers'. This is an enabled feature.
- Added 'disjoint' scans. This is an enabled feature. With it you can scan multiple disjoint ranges. For example, you can scan 7 to 7.4 MHz and 14 to 14.4 MHz. This is supported using the new sweep parameter type 'expr'.
- Restored a weak but usable 'Scattering Parameter' feature which was previously removed. It is now an 'enabled' feature: "Sp".
- Added a general purpose 'Plot' function. I started out using gnuplot as a model but found it unworkable. Hopefully, you'll find what I provided easy enough to master. Again, an enabled feature.
- Added 'report alternatives' on the charts. If a line in the report (generally found on the lower right hand side of the chart) is white then there is an alternative report available. Click on the white area to toggle between reports.
- If you attempt to plot a large number of points (greater than that specified by the 'maxSweepPoints'), SimSmith will discard sweep points to reduce the total number. The total number may remain somewhat larger than the 'maxSweepPoints' for various reasons. This discard now applies to load file points as well.

- Fixed bug in 'incrementFileName' used when saving images to files.
- **ERROR REPORTS: are now more verbose and provided in a popup frame you can resize and move around. Some error messages will persist until you close the window, particularly ones involved with references to N nodes and the like. If you close the error window and it pops back up, it means you didn't fix the problem.**

## • 10.3

Changed a few things, Highlights:

- Added generator equations to the Z isolation block so it can be independent.
- Added decision construct (a?b:c) to F, N, and G blocks. This allows things like "\$a = (b < c) ? d : e;" which is to say, "if b < c then a = d else a = e".
- Added 'parameter assignment' capability. You can now assign parameter values inside the F, N and G blocks. For example, "@a=b+c;" will assign the local parameter a to the value of b+c. (Only the 'real' part is assigned). This is helpful when you're trying to figure out intermediate computation values. Global assignments are also possible ("@G.a = \$L.ohms;") for example. SimSmith is not well behaved in some situations where global assignments are being performed... be careful. In the case of '@', capitalization is important.
- Expanded the transmission line in the F block. You can now (optionally) specify velocity fact, lossPer, and lossFreq just as with the N block. Syntax is simply:  

$$T(Zload,Length,Zo [VF [lossPer [lossFreq]]])$$
- Reduced startup time for large numbers of plot points.
- Added new functions to F,N,G blocks: Sinh,Cosh,Tanh,Abs,Gamma, & SWR among others. See 'F block syntax' for a (hopefully) complete list.
- Added 'alternate displays' for the reports on the Smith and Square charts. In addition to basic Z and Y reports, you can now get 'capacitance/inductance' reports. To change the report, just click on the report.

## 10.2

Changed a few things, Highlights:

- Fixed bug when reading certain nec2c output files where the translator changed the output file format.
- Suppress 'syntax error' warnings of F and N blocks in the library. WARNING: putting Z blocks with load files in the library and then deleting the load file can cause an unexpected warning.
- Fixed bug in N block with when K=1. If K=1 I change it to K=.999999999. This is related to having the ports 'short circuited' which is a no-no at the present.
- Added optional arguments to 'useZo', 'xMtch', and 'fixedV'. The argument is the amount of power desired. For example, 'xMtch(100)' delivers 100 watts to the circuit.
- Fixed bug in Square chart when displaying the 'Operating Point' on curves.
- Added 'Log10(a)' function.

- In F and N blocks, SimSmith can draw a line from start to finish OR, it can draw a simple curve. If you give the directive “TraceAs Series;” then the curve will be drawn as though an impedance was introduced ‘in series’. “TraceAs Shunt;” is also supported. Many times this improves visual understanding...

## 10.1

### Changed a few things, Highlights:

- Added MMANA frequency/impedance file output support.
- Removed S parameters from square chart... lack of interest.
- Added ‘Conj(x)’ (conjugate) to the N, F and G equations.
- Now report Gamma > 1 points on Smith chart.
- Fixed bug in N, F and G equations when using ‘w’ (omega).
- Fixed hang when working with large negative Gammas.
- Added ‘powerUnits’ to preferences. You can now display power in dBW or in Watts.
- Fixed ‘out of memory’ bug when sweeping larger numbers of parameters.
- Each time SimSmith starts up, it tries to determine if it closed down smoothly last time. If it decides it didn’t, it will give you three options: ‘continue’ will simply try to continue startup, ‘abort’ will abort startup, and ‘clear:’ will clear out the ‘lastSimSmithCircuit’ file. (NOTE: SimSmith can get confused if you start it and close it without doing anything in between.) Anytime you think there’s a bug, please send me the ‘.SimSmithLogFile’ and ‘lastSimSmithCircuit???.ss’.
- You can now drag a ‘reference’ from the Smith (or square) chart to a component to specify its load. Not done often but often enough I got annoyed.
- When adjusting the vertical position of an axis on the square chart, SimSmith will snap align the labels to the grid when you release the mouse. If you hold down the control key when you start the move, SimSmith will NOT do this alignment. This allows you to place a trace at a specific place on the chart independent of the grid. (May have been added to 9.10, I don’t remember.)
- Now: ‘captures’ function available by default. This now works in java1.7.0\_67 on osx. I changed the preference name to force everyone to default to ‘enabled’.
- Generalized the display of ‘operating point’ on the Square chart(s). It is now shown on all traces (was shown on just “swr” when plotting frequency). (Little circles on traces at operating point.)
- Fixed problem with mouse wheel gain.
- Now: When displaying ‘Both’ in the Smith chart, only those ‘Path’ elements leading to a displayed ‘sweep’ are shown. (Used to show all ‘path’s and it was confusing...
- Added a ‘Voltage Current and Power’ section to the primer.
- Fixed bug in transmission line AC6LA selection menu.

## 9.10

Fixed little things along the way., Highlights:

- Changed 'click/drag' positioning of Square chart axis. Simply click and drag in the axis area to change the vertical position. When adjusting the scale (mouse wheel), the scale is expanded around the last selected label. The last selected label is marked with a '>' or '<'. The marker is visible only when the mouse is in the axis area.
- Zooming all the way out on the Square chart (and then some) will reset the chart to its defaults.
- Optimized the Square chart line drawing algorithm somewhat.
- Square chart: fine gain axis placement and zooming can be done by holding down the ctrl key. It won't snap to align and it won't quantize zoom. Even finer granularity can be achieved by changing the file/preferences/wheelGain setting.
- On the Smith chart, the mouse will snap to 'the closest computation point on the closest line' to where the mouse is. This simplifies line selection at high zooms where the computation points can be far apart.
- Fixed a couple minor annoyances in F, N, and G equations.
- SimSmith no longer creates a temp file in your home directory when reading documentation.

## 9.9

Fixed lots of stuff and added some trivial features.

- Fixed problem with Square Chart axes when 'capturing' or 'saving an image'.
- N block evaluations can be cached to improve sweeping performance. Set file/preferences/enableNBlockCache.
- Fixed 'file gets updated' when double clicked (on windows).
- Fixed infinite loop when trying to write file that is 'read only'.
- Fixed problem while drawing the path of very short transmission lines.
- Fixed mouse wheel direction to be same as everyone (EVERYONE!) else... if you changed your mouse wheel settings, you'll have to do so again.
- I now 'self sign' for Windows/Linux/Java. You can add my certification to your trusted certificates and eliminate future warnings. Or not, up to you!
- Updated 'standards file' to allow "//" based comments and multiple values per line. This lets you have lines like

```
// here is just a comment line.  
1 2 3 4 5 // first five
```
- Select parameters can have multiple values at once. At present, only the SWR and Q parameters on the Smith chart are supported. Multiple values are separated by whitespace. Thus, and SWR value of "2 3" will have two SWR circles while "2 2.5 3" will have three circles.
- S2P files can be used as load impedance files. See the Primer for more details.
- SimSmith now creates ".SimSmithTemp.pdf" in your home directory. It should be put somewhere else but I got lazy.

- SimSmith now creates “.SimSmithLogFile” in your home directory. If you have a problem, please send me your “lastSimSmith???.ss” file, any load files you are using, and the “.SimSmithLogFile” (notice the leading period in the file name.) It may be empty but its good to know that.
- Added ‘click/drag’ of Smith chart to reposition the chart. Simply click/hold on the chart away from any trace and drag the chart to a new position. Quick movements may cause erratic behavior.

## 9.8

- Fixed power loss reporting in Square chart. It was off by a factor of 2.
- Fixed N block evaluation problem... again.

## 9.7

- Fixed problem with N block.

## 9.6 & 9.5

- Added Smith Chart ‘grid’ brightness control
- Added ‘chartMinimumScale’; when zooming out, the chart will not be allowed to become smaller than the chartMinimumScale. 1 is the maximum minimum scale.
- Set default ‘suppressCaptureMenu’ based on OS and Java version.
- Fixed scaling problem with lettering on the Smith chart.
- Fixed transparency issue with square chart axes on capture and images.

## 9.4 and before

- Introduced the N block. See ‘help/N block syntax’ for details.
- Trap tuning. Now, changing L or C changes only the frequency. Changing the frequency changes L and C more or less in proportion.
- The mouse wheel ‘speed’ can be adjusted using “file/preferences/wheelGain”. This is the multiplier used to adjust zoom each time the mouse wheel advances. Setting it larger, say 1.05 or even 1.10 will make the zoom ‘faster’ but also increase granularity.

- Reference file names show only the file name, not the entire path to the file.
- PREFERENCES: the preferences behavior has been changed. The preferences are now read in only at the beginning of the session. This makes the preferences more of a 'user' concept. As a result, importing a design from another user doesn't change your "preferences".
- Max Plot Points: the maximum plot points specified in the file/preferences menu is now quietly enforced. This may change again....
- Coupling Coefficient: the Transformer 'k' parameter and the N block coupling coefficient ('k') are no longer restricted.
- Transformer: the ever painful transformer code has been rewritten again, sigh. It should now operate 'in reverse' by negating the L and C values (but not the 'k' as of my last debug: 12-23-13). Keep an eye out if you are using transformers, especially if you are trying to use in 'in reverse'.
- Sweeping: the 'steps' parameter has been replaced by the 'numPnts' parameter. Previously, to get 1 MHz samples from 1 to 20 you requested 19 'steps', now you request 20 points.
- Drag and Drop. If you drag and drop a file onto one of the circuit elements, SimSmith will look at the extension. If the extension is ".ss" it will load in the file as a new circuit description. If it isn't ".ss" and the circuit element will take a file to describe impedances, SimSmith will try to load the file as the impedance description.
- Help/reset screen size: now endeavors to fit the screen onto the physical screen even if you set the file/preferences/reset screen width or file/preferences/reset screen height big. This simplifies importing of designs as well.
- Drag and Drop. If you drag and drop a file onto the Smith or Square charts, SimSmith will try to load that file as a reference. You can drag/drop multiple files into the charts. (But not the circuit area... one file at a time there please).
- Delete Items: you can delete an item directly by selecting with the left mouse button while holding the 'control' key.
- Drag Tuning: the limits on a single click/drag are set based on value. When you start the drag, a parameter's limits are set to the value/10 and value\*10. Sometimes it is necessary to do a drag to get 'close', stop, and then 'drag' again. DRAG TUNING MAY NE BE AS RESPONSIVE AS THE PAST, PATIENCE!

- N and F blocks: the first parameter is now a button. The label of the button is the first line of the equation or netlist. Click on the button to edit the equation/netlist.
- N and F blocks: you can access other component parameters in your equation by using the \$ construct. For example, "\$A.ohms" references the 'ohms' parameter of the A circuit component.
- N and F blocks: you can enable drag tuning of an N or F block parameter by including a directive. For example, "DragTune a,c;" will enable drag tuning of the a and c parameters but no others.
- DRAG TUNING algorithm has changed. It should deal with large changes more readily than before.
- LINE OPTOMIZATION: the line drawing algorithms have changed to be a little smarter in deleting small line segments. Things should appear smoother now.
- One Click Delete. Holding down the 'control' key while clicking on an object will automatically drag it to the garage can.
- Undo does not work for libraries. Sorry.
- References: can be added and deleted using drag/drop. References can no longer be listed but not drawn.
- Smith chart zooming. The 'magnification button' of the Smith chart has been removed. You can now zoom into and out of the Smith chart using the mouse wheel. The zoom happens around where the mouse is pointing.
- SWR and Qeye parameters have moved from the Generator to the Smith chart itself. They are now down by the small Square chart.
- N block Current Controlled Sources: these are now like Spice, the third argument is the identifier of the component through which the current is being sensed. Unlike spice, the sensed component need not be a voltage source.
- Scattering Parameter displays: These are no long logarithmic. The reflection coefficient is plotted from 0 to 1. The transfer parameter is not really a transfer parameter, it is the voltage delivered to that component; this is why the axis is labeled 'V' rather than 'T'. Setting the generator voltage to 1 makes the 'V' the same as 'T'. Displaying the angle of these parameters can be enabled in the file/preferences menu.

- Square Chart Scale: the square chart scales can be changed using the mouse wheel. Place the mouse pointer in the axis area and the wheel will increase or decrease the scale.

## Release Notes for version 8

- The power computed in each component is now the power dissipated by that component. In the Square chart, the power, again is the power lost in the component.
- The voltage and current reported in the circuit element reflect the current through the part and the voltage across the part. This can be confusing for N and F blocks... be warned!
- The 'lastSimSmithSession.ss' file name: the file name now reflects the version of SimSmith being used. The banner at the top of the session shows the file name.
- Square Chart: can now be either 'swr/powerLost' or 'reflection/transmission'. The button down by the plot menus indicates which is being shown. Clicking on the button changes the mode.
- UNDO. SimSmith now has an undo command. Just below the tuning buttons you'll find an 'undo' and a 'redo' button. The slider in between is a timeline; clicking on it will move to that point in time. History is 50 changes deep. Usually, but not always, 'control z' or 'command z' will undo the latest change. Control y or command y 'redoes' the command.
- Printing has been replaced by 'image save' and 'image capture' capabilities. Image save works on all system, image capture to clipboard works on some systems. The 'file/preferences/includeCaptureMenu' turns on the main menu. Image save file names can be auto-incremented if they are of the form "name#.png". The '#' field is incremented.