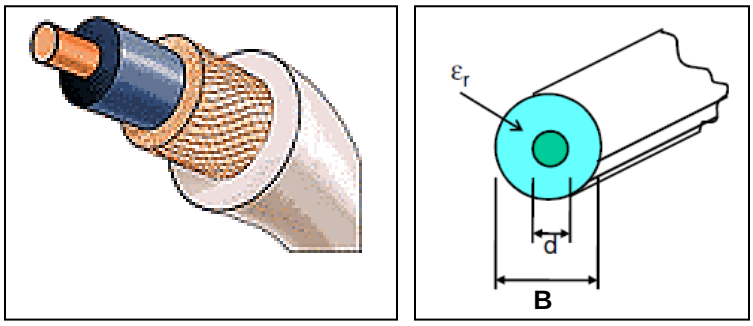
Quick Start User Manual: Coax



Typical Cross-Section of Coax

1.0 Getting Ready:

The software product you purchased is located inside a ZIP file that you can open, by following these steps:

1. Double-click on the ZIP file you purchased. This action starts the ZIP Wizard application, which contains the software product.
2. The ZIP Wizard automatically opens the software product you purchased and stores it inside your computer.
3. Once the software product is unzipped, right-click on the application's *filename* and single-click: "Extract". This action will extract all files located inside the software product and store them inside your computer:
    a. *Coax.exe*: The executable software product.
    b. *Coax.DEF*: Default Data File read by *Coax.exe*
    c. *Quick Start User Manual*: This User Manual.
    d. *License*: License Agreement for the software product.
4. NOTE: All files unzipped inside your computer must be located in the same file folder, since several Data Files are read by the executable software product.
5. Open the License Agreement so you know the terms & conditions for using the software product. Return the software product for a full refund if you do not agree with those terms & conditions, as stated in the License Agreement.
6. Open the Default Data File: *Coax.DEF* using Notepad and read the description contained inside.

Once the above software files are extracted and stored inside your computer, just double-click on the executable file to start using the product.

2.0 How I Works:

Software product: *Coax.exe* performs Electrical Synthesis, Dimensional Synthesis and Frequency Analysis of any balanced Coaxial Transmission Line.

The executable file: *Coax.exe* reads the Default Data File: *Coax.DEF* each time you start the program. As such, you can change Data Entries inside *Coax.DEF* to suite your most common Coaxial Transmission Line designs, using the guidelines written in *Coax.DEF*.

When you start using the software product, you are asked to enter key design parameters for your Coaxial Transmission Line. If you press <ENTER> on your computer's keyboard, the

software product uses the Data Entry from your Default Data File: *Coax.DEF* for that design parameter. As such, you can change any/all Data Entries in *Coax.DEF* suite your most common Coaxial designs, without having to enter those values when asked by the executable file: *Coax.exe*. Just press <ENTER> on your computer's keyboard and your Default Data values are used for that Data entry by the software product.

Figure 2-1 shows the baseline data entries for Default Data file: Coax.DEF.

Certain design parameters have a "default answer", shown as an asterisk (*), which enables you to press <ENTER> on your keyboard, if that "default answer" (= *) is your selection.

Lastly, all Data entries (including Default Data entries) are included in the Output Data format so you know the basis for your Synthesis and for your Analysis of Coaxial Transmission Lines.

Most data entries are straight-forward and easy to understand for those skill-at-the-art of RF/microwave design…….and those not-so-skilled. So, let us know where improvements are needed as you operate the software product.

3.0 Screen Shots: Input Data

Screen-shots for User Input Data entry are shown in Figures 3-1 and Figure 3- 2 for Dimensional Synthesis and for Frequency Analysis of your Coaxial Transmission Lines, respectively.

4.0 Screen Shots: Output Data

Screen-shots of Output Data calculated by the software product are shown in Figures 4-1 and Figure 4-2 for Dimensional Synthesis and for Frequency Analysis of your Coaxial Transmission Lines, respectively.

The Output Data from the software product can be stored in a User-defined filename:

A. Enter a *filename*.**xls** for storage in a spreadsheet.
B. Enter *filename*.**doc** for Output Data storage in a word processor.
C. Enter *filename*.**txt** for Output Data storage as a text file.

The Output Data files can be used for presentations to your Customers, e-mails to your colleagues, and for graphical plots of your Output Data.

5.0 User Data Files:

For the Analysis Option, the software product reads a User's Input Data filename to analyze the Frequency response of physical dimensions planned for manufacture of your Coaxial Transmission Line.

You can create any number of User Input Data files, each of which defines the actual physical dimensions of your Coaxial Transmission Lines. Once created, you can enter that Input Data filename when asked by the software product, for Frequency Analysis and for comparison with actual measured swept-frequency data for that design.

6.0 Software Bugs

Every effort has been applied to minimize "software bugs" inside the software product. Yet, we invite all Users to notify us if you find one. Many thanks!

Inside the software product, you will find "User-friendly Error Traps", which identify errors in your Data Entry. The software product notifies you when an error is detected and asks for a different Data Entry, so the software product performs within the proper technical bounds for the technology.

7.0 Customer Satisfaction:

Many thanks for purchasing our RF/microwave CAE software product. We hope you find the product useful in your high frequency designs, both in Synthesis of your designs and in Analysis of your designs. Please let us know where our software product can be improved, and what your needs are for another software product you could use. . . . .. perhaps we can develop that software product for you.

Our best regards. . . . . .

AtlantaRF

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Coax.DEF contains all Default Data values read by Program: Coax.exe
 10.0              :F       = Analysis Frequency……...GHz
 18.5              :Fmax    = Maximum Frequency for Analysis..GHz
  0.5              :Fmin    = Minimum Frequency for Analysis...GHz
  0.5              :Fstep   = Step Frequency for Analysis……...GHz
  4.0              :RESB  = Resistivity of  Outer Conductor……..Micro-Ohm-cm
  2.828            :RESD  = Resistivity of Center Conductor……Micro-Ohm-cm
125.0              :SRB     = Surface Roughness of  Outer  Conductor, Micro-Inches
125.0              :SRD     = Surface Roughness of Center Conductor, Micro-Inches
  2.02             :ER      = Relative Dielectric Constant of insulator
  0.209            :B       = Outer Conductor Diameter.....Inches
  0.2              :Bmin    = Minimum Outer Conductor Diameter……Inches
  0.218            :Bmax    = Maximum Outer Conductor Diameter…..Inches
  0.001            :Bstep   = Step size in Outer Conductor.....Inches
  0.064            :D       = Inner Conductor Diameter.....Inches
  0.06             :Dmin    = Minimum Inner Conductor Diameter.....Inches
  0.068            :Dmax    = Maximum Inner Conductor Diameter.....Inches
  0.0005           :Dstep   = Step size in Inner Conductor Diameter…Inches
  0.0002           :DLTAN = Dielectric Loss Tangent of insulator
200.0              :Zmax    = Maximum Impedance for Synthesis.....Ohms
 10.0              :Zmin    = Minimum Impedance for Synthesis.....Ohms
 10.0               :Zstep   = Synthesis Impedance Step Size.....Ohms
 Coax.DAT          :FN      = Default filename for your Output Data Storage
                   |
                   |____ The first 20 characters are read by Coax.exe

Default Data File: Coax.DEF is read by RF/microwave software product:
Coax.exe when you start the program. As such, the executable file (Coax.exe)
and this Default Data File (Coax.DEF) must be located in the same Folder or
Subfolder in your computer.

The executable program (Coax.exe) reads the first 20 characters in each line
from Coax.DEF, so keep those first 20 characters for data, and do not shorten
any line in this Default Data File: Coax.DEF.

The User is invited to change any/all data values in Coax.DEF to data values
you commonly use for your RF/microwave designs of Coaxial Transmission Lines,
so you do not have to enter data values when prompted by Coax.exe (just press
ENTER on your computer's keyboard and your Default Data values will be assigned
to that data entry).

Thank you for choosing Atlanta RF for your RF/microwave CAE software products.
```

Figure 2-1: Baseline data entries (and Instructions) in **Default Data file**: Coax.DEF

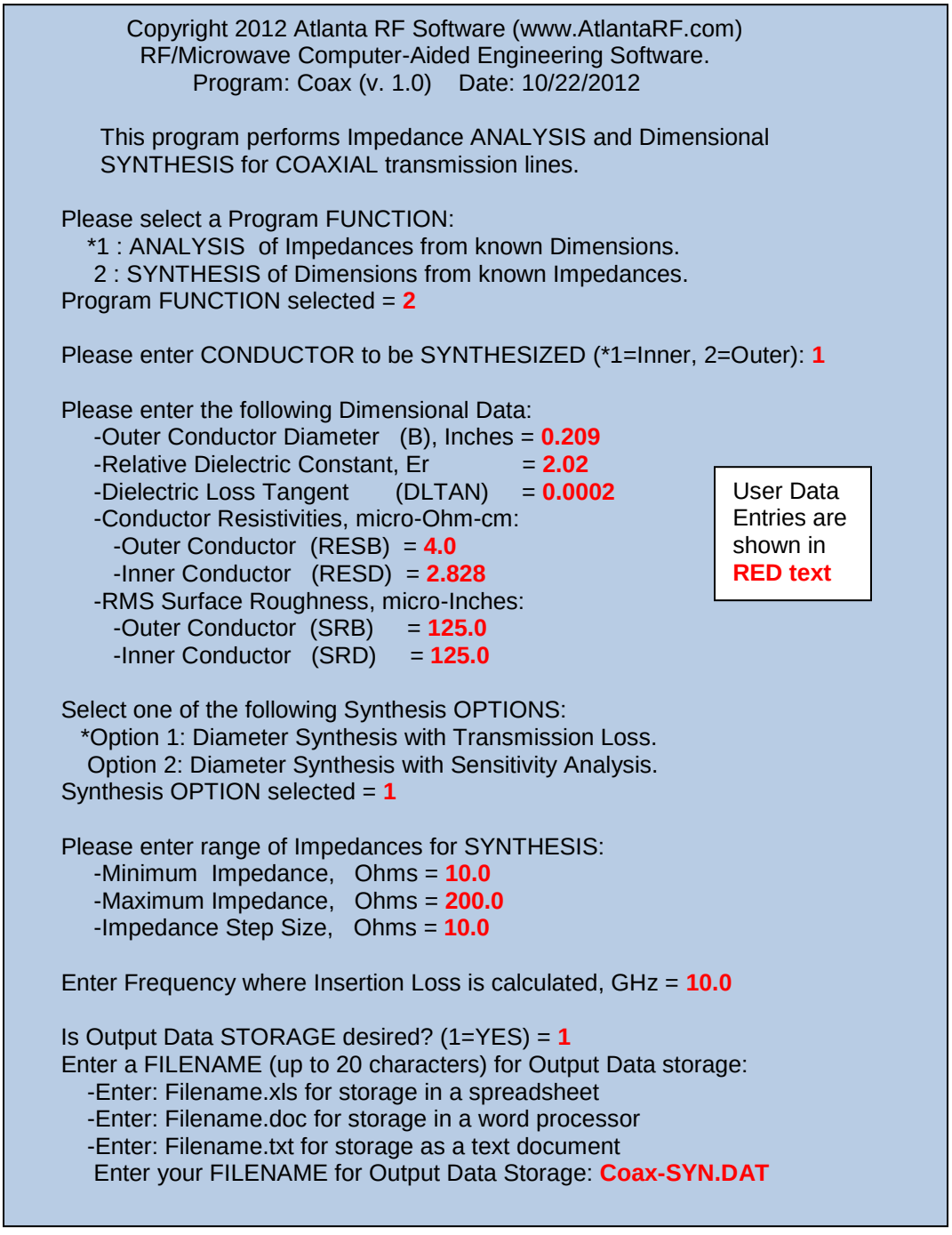

Figure 3-1: Typical Input Data entry for **Dimensional Synthesis** in Coax.exe

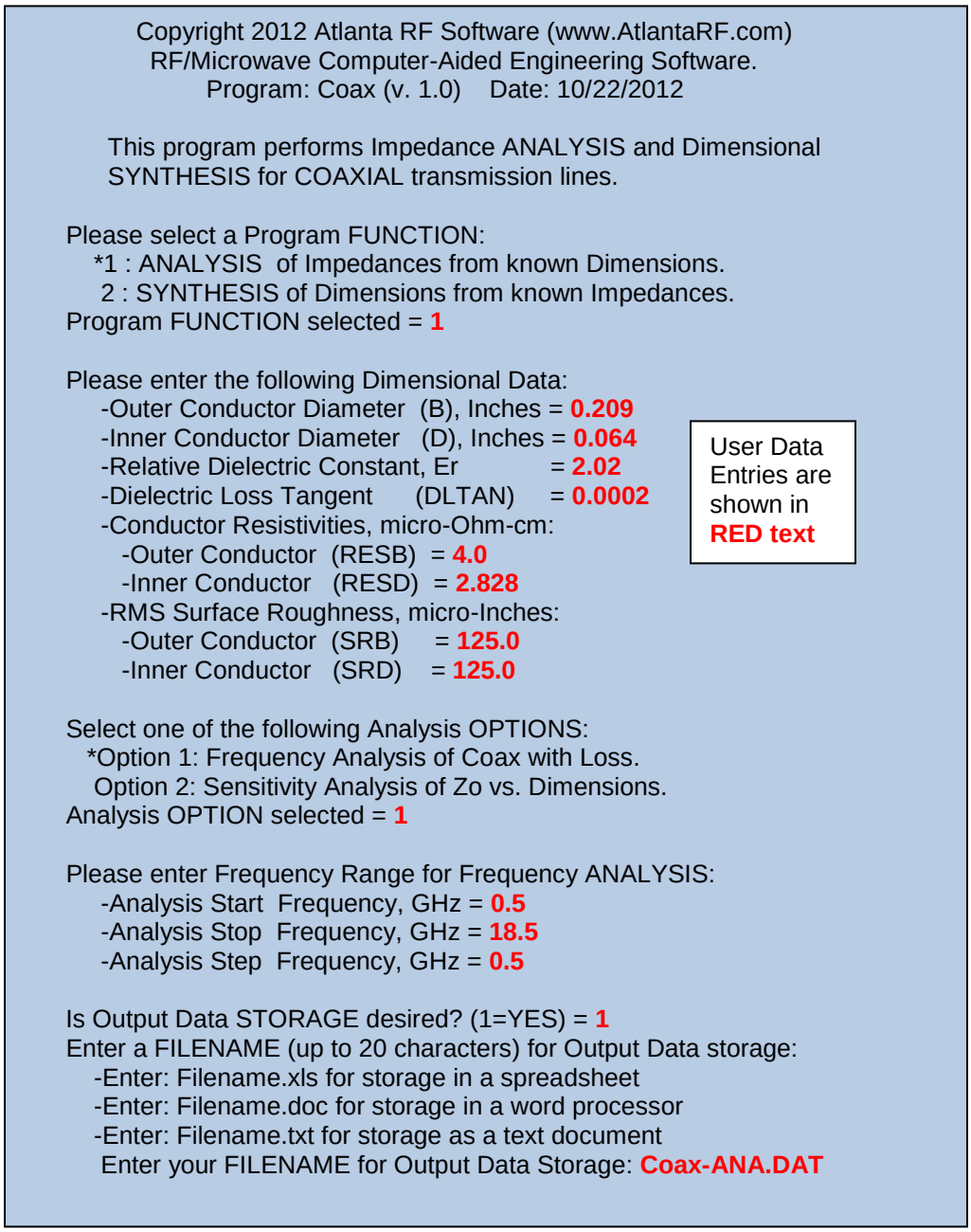

Figure 3-2: Typical Input Data entry for **Frequency Analysis** in Coax.exe

```
-----------------------------------------------------------------------------------------
 Coax (v. 1.0)                          Date:10/22/2012 at 23:59:21Hours
        Copyright 2012 Atlanta RF software (www.AtlantaRF.com)
         RF/Microwave Computer-Aided Engineering Design Data
                    For Coaxial Transmission Lines.

 SRB     = 125.000u"        Dimensional Synthesis            B = 0.2090"
 SRD     = 125.000u"    ======================          Er =  2.020
 DLTAN =  0.0002                 (OPTION 1)
 RESB   =   4.000
 RESD   =   2.828
                                          Transmission Loss at
                                          10.000 GHz (dB/Foot)
 Inner              TE11    Peak  ---------------------------------------------
 Cond.(D)   Zo     Cutoff   Power  Conductor Losses   Dielec.   Total
 (Inches)  (Ohms)  (GHz)    (kW)    Inner     Outer     Loss      Loss
-----------------------------------------------------------------------------------------
 0.1649    10.00   14.14    2.61   0.6615    0.6165    0.0789    1.3568
 0.1301    20.00   15.59    3.25   0.4192    0.3082    0.0789    0.8063
 0.1026    30.00   16.96    3.04   0.3542    0.2055    0.0789    0.6386
 0.0810    40.00   18.23    2.52   0.3367    0.1541    0.0789    0.5697
 0.0639    50.00   19.37    1.96   0.3414    0.1233    0.0789    0.5436
 0.0504    60.00   20.38    1.46   0.3607    0.1027    0.0789    0.5423
 0.0398    70.00   21.25    1.06   0.3918    0.0881    0.0789    0.5588
 0.0314    80.00   21.99    0.76   0.4346    0.0771    0.0789    0.5905
 0.0248    90.00   22.62    0.53   0.4896    0.0685    0.0789    0.6370
 0.0195   100.00   23.13    0.37   0.5585    0.0616    0.0789    0.6990
 0.0154   110.00   23.56    0.25   0.6435    0.0560    0.0789    0.7784
 0.0122   120.00   23.91    0.17   0.7477    0.0514    0.0789    0.8779
 0.0096   130.00   24.19    0.11   0.8748    0.0474    0.0789    1.0011
 0.0076   140.00   24.41    0.08   1.0296    0.0440    0.0789    1.1525
 0.0060   150.00   24.59    0.05   1.2180    0.0411    0.0789    1.3380
 0.0047   160.00   24.74    0.03   1.4474    0.0385    0.0789    1.5648
 0.0037   170.00   24.85    0.02   1.7266    0.0363    0.0789    1.8418
 0.0029   180.00   24.95    0.01   2.0669    0.0342    0.0789    2.1800
 0.0023   190.00   25.02    0.01   2.4819    0.0324    0.0789    2.5932
 0.0018   200.00   25.08    0.01   2.9885    0.0308    0.0789    3.0982
-----------------------------------------------------------------------------------------
Synthesis   Data stored in User filename: Coax-SYN.DAT

Coaxial Transmission Line calculations completed.
Select next OPERATION:
        1. Select new OPTION.
        2. RECYCLE and CONTINUE.
       *3. EXIT to operating system.
OPERATION selected =
```

Figure 4-1: Typical Output Data for **Dimensional Synthesis** from Coax.exe

Coax (v. 1.0) Date:10/22/2012 at 23:58:28Hours
Copyright 2012 Atlanta RF software (www.AtlantaRF.com)
RF/Microwave Computer-Aided Engineering Design Data
For Coaxial Transmission Lines.

B = 0.2090" Frequency Analysis SRB = 125.000u"
D = 0.0640" ========== SRD = 125.000u"
Er = 2.020 (OPTION 1) DLTAN = 0.00020
Zo = 49.93 Ohms RESB = 4.000
CAP = 2.41 pF/Inch RESD = 2.828
IND = 6.01 nH/Inch

Freq. (GHz)	Wavelength,Inches Free-Space	"Guide"	Transmission Losses (dB/Foot) Conductor Losses Inner	Outer	Dielec. Loss	Total Loss
0.500	23.606	16.609	0.0580	0.0196	0.0039	0.0815
1.000	11.803	8.304	0.0933	0.0320	0.0079	0.1332
1.500	7.869	5.536	0.1204	0.0420	0.0118	0.1742
2.000	5.901	4.152	0.1429	0.0503	0.0158	0.2090
2.500	4.721	3.322	0.1624	0.0576	0.0197	0.2397
3.000	3.934	2.768	0.1799	0.0640	0.0237	0.2676
3.500	3.372	2.373	0.1959	0.0699	0.0276	0.2934
4.000	2.951	2.076	0.2106	0.0754	0.0315	0.3176
4.500	2.623	1.845	0.2244	0.0805	0.0355	0.3404
5.000	2.361	1.661	0.2374	0.0853	0.0394	0.3622
5.500	2.146	1.510	0.2498	0.0898	0.0434	0.3830
6.000	1.967	1.384	0.2615	0.0942	0.0473	0.4030
6.500	1.816	1.278	0.2728	0.0983	0.0513	0.4224
7.000	1.686	1.186	0.2836	0.1023	0.0552	0.4411
7.500	1.574	1.107	0.2940	0.1061	0.0591	0.4593
8.000	1.475	1.038	0.3041	0.1098	0.0631	0.4770
8.500	1.389	0.977	0.3138	0.1134	0.0670	0.4942
9.000	1.311	0.923	0.3232	0.1168	0.0710	0.5111
9.500	1.242	0.874	0.3324	0.1202	0.0749	0.5275
10.000	1.180	0.830	0.3414	0.1235	0.0789	0.5437
10.500	1.124	0.791	0.3501	0.1267	0.0828	0.5595
11.000	1.073	0.755	0.3586	0.1298	0.0867	0.5751
11.500	1.026	0.722	0.3668	0.1328	0.0907	0.5904
12.000	0.984	0.692	0.3750	0.1358	0.0946	0.6054
12.500	0.944	0.664	0.3829	0.1387	0.0986	0.6202
13.000	0.908	0.639	0.3907	0.1415	0.1025	0.6347
13.500	0.874	0.615	0.3983	0.1443	0.1065	0.6491
14.000	0.843	0.593	0.4058	0.1471	0.1104	0.6633
14.500	0.814	0.573	0.4131	0.1498	0.1144	0.6772
15.000	0.787	0.554	0.4204	0.1524	0.1183	0.6911
15.500	0.761	0.536	0.4275	0.1550	0.1222	0.7047
16.000	0.738	0.519	0.4344	0.1575	0.1262	0.7182
16.500	0.715	0.503	0.4413	0.1601	0.1301	0.7315
17.000	0.694	0.488	0.4481	0.1625	0.1341	0.7447
17.500	0.674	0.475	0.4547	0.1650	0.1380	0.7577
18.000	0.656	0.461	0.4613	0.1674	0.1420	0.7706
18.500	0.638	0.449	0.4678	0.1697	0.1459	0.7834

TE11 Mode Cutoff = 19.366 GHz; Peak Power (In Air) = 1.96 kW

Frequency Data stored in User filename: Coax-ANA.DAT

Figure 4-2: Typical Output Data for **Frequency Analysis** from Coax.exe