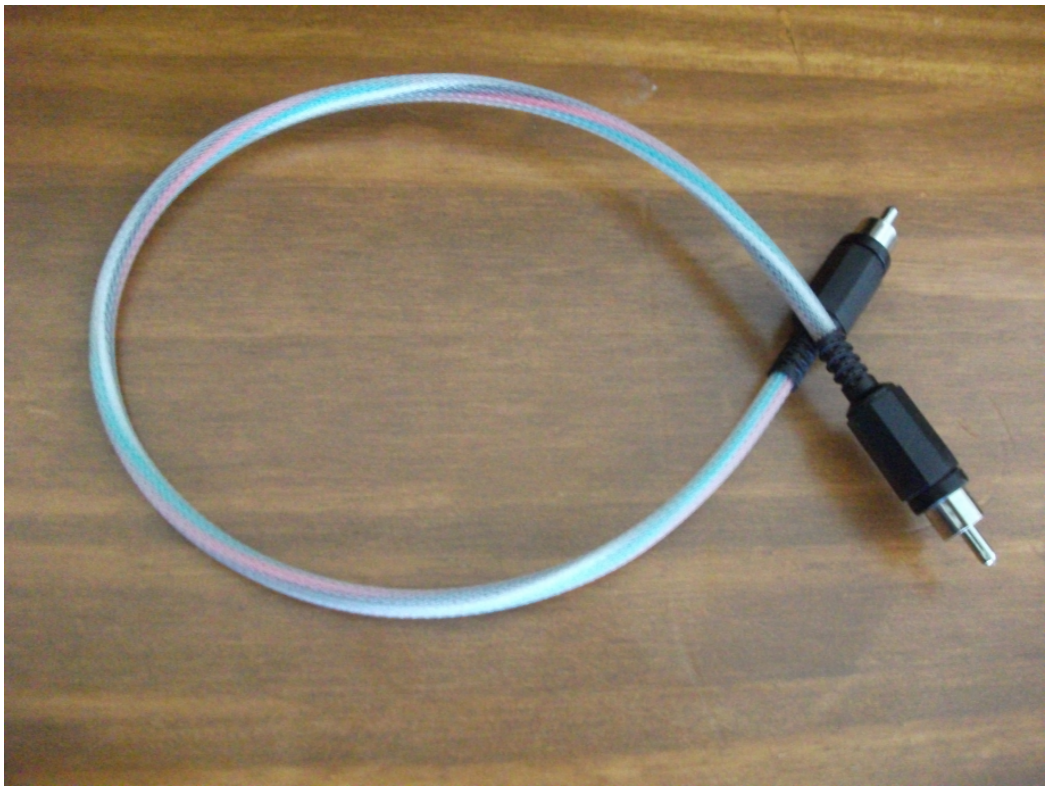
# Frya  2x2



RosVeta Frya 2x2 Cable, 4-wire configuration - 16 awg

-  -  -

The picture above is a **sample** of the Frya 2x2 interconnect design concept.

Interconnect cables are at the heart of many audio debates involving experts and the whole gamete of audio listeners. So to which cable or inter-connect 'sounds' the best is a costly, hot-debate.

It is costly to the audiophile who buys the '*new*' cables and ‘hot’ - topic for the reviewers who have to be careful not to offend the cable manufactures or sponsors.

Fortunately the audiophile can do many tests at home to test the various designs and styles of inter-connect. The audiophile can make and design his own cables and then test them out at home.

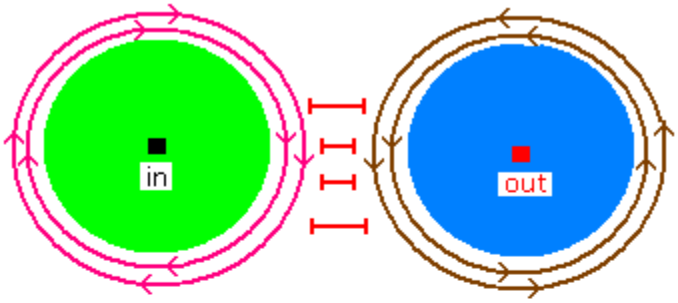
Cable testing will be more interesting and revealing when you replace your old - ‘crossover’- circuits with the BRIICe circuits, or any circuit that does not have a *'crossover*' characteristic.

- - -

The BRIICe Frya 2x2 is any twin wire cable placed together forming a four wire ‘square’ configuration.

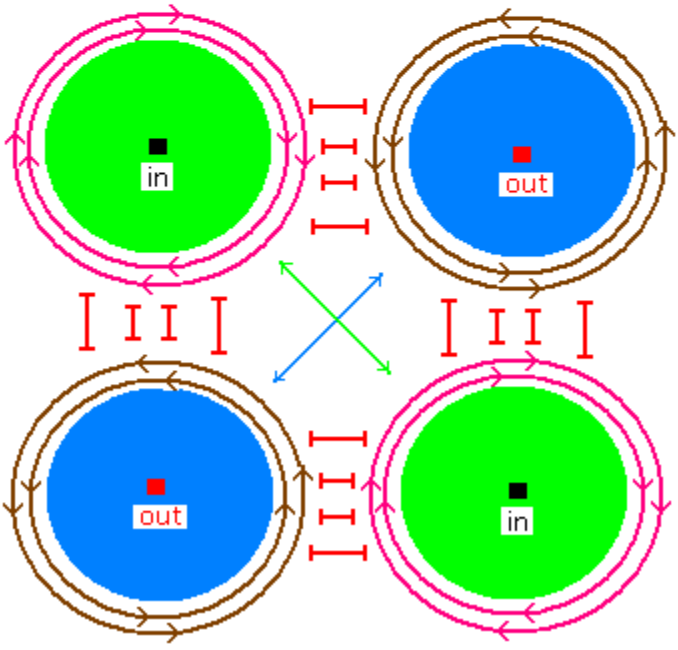
**Connect opposite corners together.**

Twin Lead

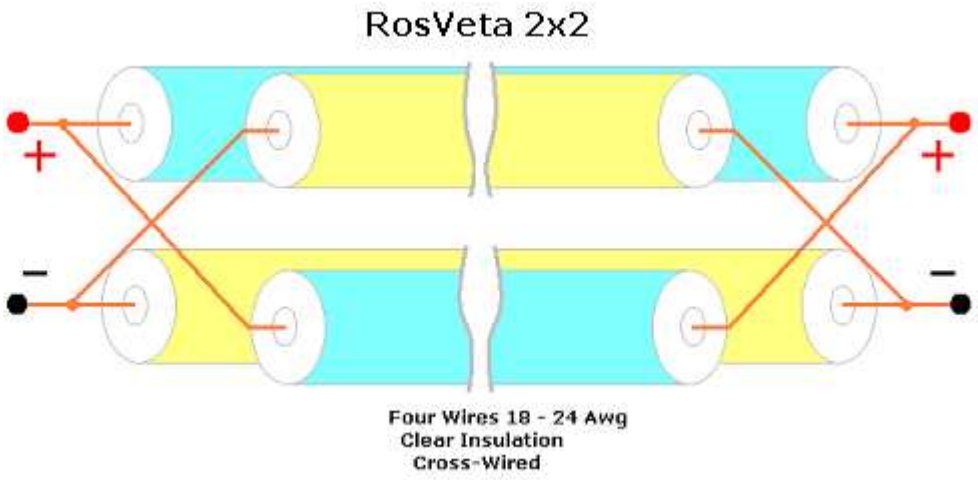



The Red-Bars represent the repulsion force between the individual wires.

RosVeta 2x2




The Green and Blue lines represent the weak attraction forces of the conductors carrying currents traveling in the same direction.




Use wires that are covered in a soft, clear-plastic insulation. Many colored wires use 'magnetic' materials for the pigmentation, which ‘distorts’ the wire’s magnetic fields.

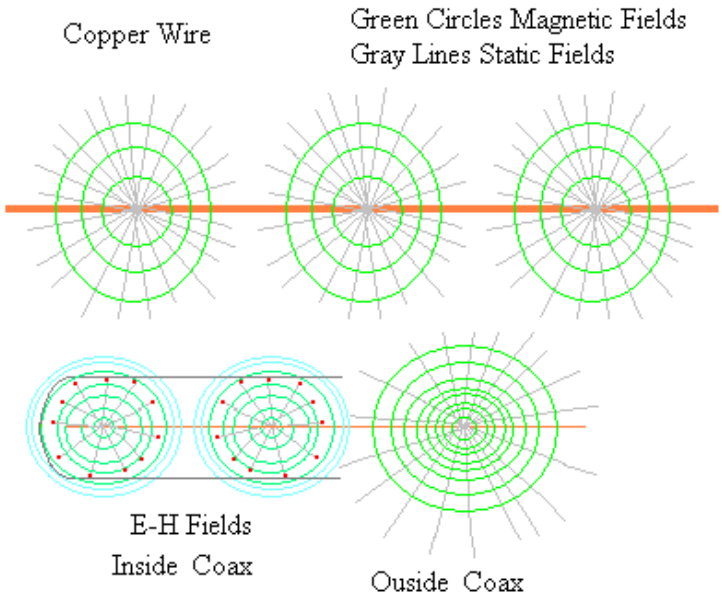
The color 'distortion' is 'measurable' using the F-M40 process,
that is: a clear cable compared to any colored cable.

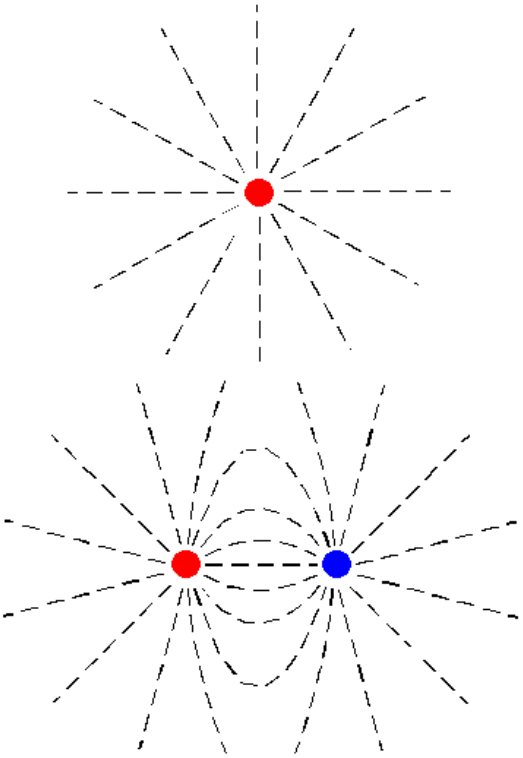
Now the next question is the color-distortion audible or of any concern. [?]

Also interesting is that insulations of higher dielectric constants help in 'sustaining' static fields of the propagating Audio-signal producing a better sound. These softer materials actually are a little 'slower' in velocity than the hard dielectrics - those having a lower dielectric constant.

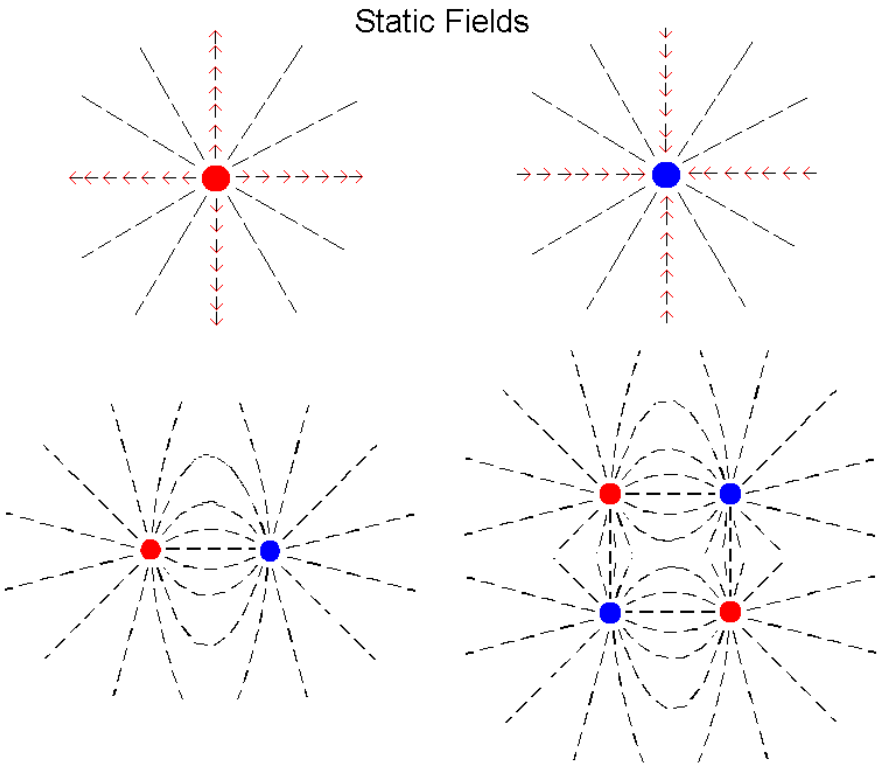
To test this idea of soft versus hard dielectrics try using wires covered with Teflon as an inter-connect and then compare them with wires covered with a material having a higher dielectric, like a clear, soft plastic cover.

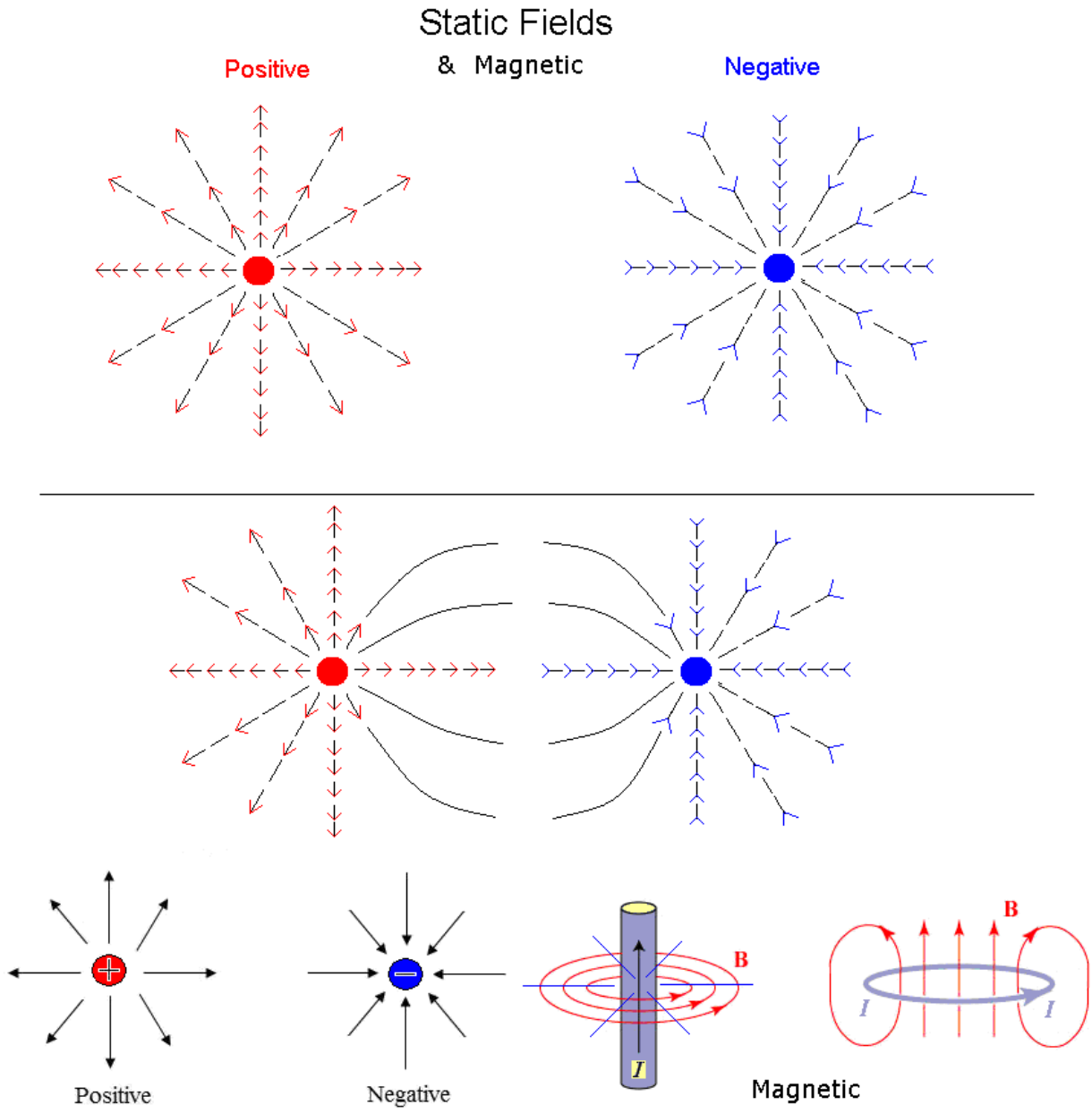
Make up a cable using coax vs. a 2x2 cable as suggested above and notice the great difference in what you hear, do not use coax for inter-connects!





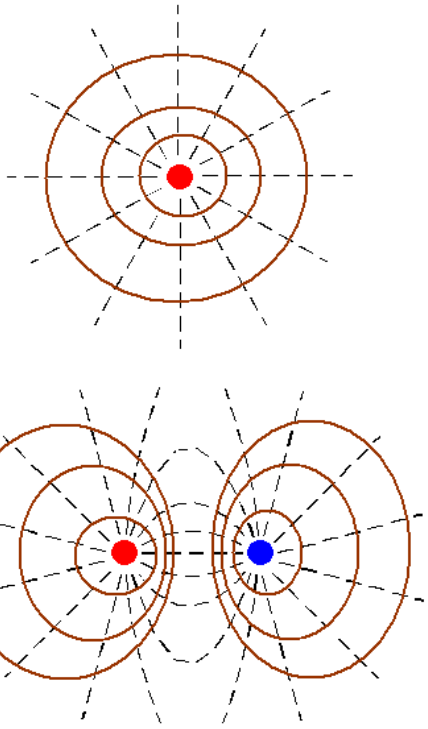
More diagrams of Static fields, twin lead configuration and then the 2x2 design.

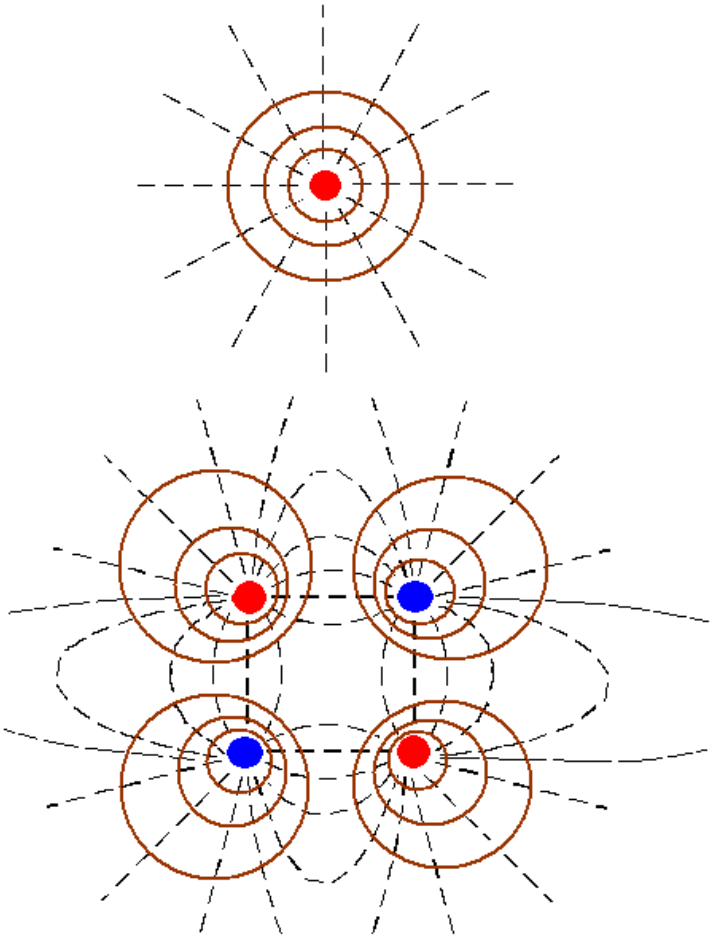





Add the magnetic property and then see a twin lead and then the 2x2 design.

The following diagrams demonstrate the self-shielding and the unique field-balancing of a 2x2 cable design.





This diagram show the Frya design. The magnetic fields opposing, the static fields attracting.

# Cables

## The Myopic 20-20 tests

The tremendous amount of testing [over the past 5 decades] of cables using the rudimentary testing of a cable's - Rdc, Inductance & Capacitance per foot and testing cables with the frequencies of 20 Hz to 20 kHz has revealed very little.
Many Audio-forums, like that of **Audioholics** and others, have done extensive testing on many inter-connects. [See their Website]

or:

Product Review - Audio Interconnect Cable Shootout - Part 1 - December 2000

Milan Cernohorsky - Editor, EUROPE

*(Cables evaluated by Jiri Michalek, Milan Cernohorsky,*

*Patrik Blaha, Petr Püschel, and Vladimir Rybar)*

Here is an earlier report on Speaker cables, to start with... [with permission]

A cable testing and comparison by Fred E. Davis
[J. Audio Eng. Soc., Vol. 39, No. 6, 1991 June] has shown that these measurements reveal again, that very little difference exists in cables when confined to the **basic** 20-20 tests.

| Cable | C - Farad | L - Henry | R - Ohms | Xc | XL | SWR | Zo | Fr |
|---|---|---|---|---|---|---|---|---|
| | Measured | Specs | | | | | | |
| Ribbon-064-flat | 2.35E-09 | 1.55E-07 | 0.00878 | 67,725 | 0.00097 | 6.16 | 8.12 | 8,339,120 |
| Litz | 3.45E-10 | 3.55E-07 | 0.00752 | 461,318 | 0.00223 | 1.56 | 32.08 | 14,381,239 |
| Weave-16-LPC | 2.05E-10 | 3.05E-07 | 0.00822 | 776,364 | 0.00192 | 1.30 | 38.57 | 20,127,654 |
| | | | | | | | | |
| Ribbon-036-flat | 1.05E-09 | 1.95E-07 | 0.02124 | 151,576 | 0.00123 | 3.67 | 13.63 | 11,122,645 |
| Weave-4-PR | 1.75E-10 | 2.85E-07 | 0.01605 | 909,455 | 0.00179 | 1.24 | 40.36 | 22,536,090 |
| Weave-8-LPC | 1.25E-10 | 5.15E-07 | 0.01515 | 1,273,237 | 0.00324 | 1.28 | 64.19 | 19,836,333 |
| | | | | | | | | |
| Vari-Layer-Eq-Speed | 4.85E-10 | 7.25E-07 | 0.01255 | 328,154 | 0.00456 | 1.29 | 38.66 | 8,487,507 |
| Levinson HF10C | 8.75E-11 | 1.13E-06 | 0.00376 | 1,818,909 | 0.00707 | 2.27 | 113.39 | 16,041,306 |
| Krell-Layer-s-Twist | 7.65E-11 | 1.40E-06 | 0.00585 | 2,080,452 | 0.00877 | 2.70 | 135.04 | 15,406,436 |
| | | | | | | | | |
| **Belden-ZIPcord** | 1.15E-10 | 1.15E-07 | 0.04185 | 1,383,953 | 0.00072 | 1.58 | 31.55 | 43,859,972 |
| **Belden-9718PVC** | 1.05E-10 | 7.95E-07 | 0.01063 | 1,515,758 | 0.00500 | 1.74 | 87.01 | 17,419,745 |
| **Auto Jumpers** | 9.15E-11 | 1.22E-06 | 0.00518 | 1,739,394 | 0.00767 | 2.31 | 115.47 | 15,063,627 |

This chart shows some of our calculated-electrical characteristics of various cables.

[Fred E. Davis : J. Audio Eng. Soc., Vol. 39, No. 6, 1991 June]

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More interesting 'calculated' electrical characteristics of various cables.

Q / Fr is the ratio of the amount of frequencies in respect to 'Q':
the ratio of AC impedance to DC resistance.
- Frequency merit for Q - [RosVeta Audio]

| Cable | Xc | XL | Zt | SWR-50 | Zo | Fr | Q | Q/Fr |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| Ribbon-064-flat | 67,725 | 0.00097 | 67,725 | 6.16 | 8.12 | 8,339,120 | 7,713,593 | 0.92 |
| Litz | 461,318 | 0.00223 | 461,318 | 1.56 | 32.08 | 14,381,239 | 61,345,425 | 4.27 |
| Weave-16-LPC | 776,364 | 0.00192 | 776,364 | 1.30 | 38.57 | 20,127,654 | 94,448,146 | 4.69 |
| | | | | | | | | |
| Ribbon-036-flat | 151,576 | 0.00123 | 151,576 | 3.67 | 13.63 | 11,122,645 | 7,136,336 | 0.64 |
| Weave-4-PR | 909,455 | 0.00179 | 909,455 | 1.24 | 40.36 | 22,536,090 | 56,663,844 | 2.51 |
| Weave-8-LPC | 1,273,237 | 0.00324 | 1,273,237 | 1.28 | 64.19 | 19,836,333 | 84,042,017 | 4.24 |
| | | | | | | | | |
| Vari-Layer-Eq-Speed | 328,154 | 0.00456 | 328,154 | 1.29 | 38.66 | 8,487,507 | 26,147,709 | 3.08 |
| Levinson HF10C | 1,818,909 | 0.00707 | 1,818,909 | 2.27 | 113.39 | 16,041,306 | 483,752,493 | 30.16 |
| Krell-Layer-s-Twist | 2,080,452 | 0.00877 | 2,080,452 | 2.70 | 135.04 | 15,406,436 | 355,632,803 | 23.08 |
| | | | | | | | | |
| **Belden-ZIPcord** | 1,383,953 | 0.00072 | 1,383,953 | 1.58 | 31.55 | 43,859,972 | 33,069,362 | 0.75 |
| **Belden-9718PVC** | 1,515,758 | 0.00500 | 1,515,758 | 1.74 | 87.01 | 17,419,745 | 142,659,559 | 8.19 |
| **Auto Jumpers** | 1,739,394 | 0.00767 | 1,739,394 | 2.31 | 115.47 | 15,063,627 | 335,790,388 | 22.29 |

Table 2 Calculations using cable data from: Fred E. Davis:
Effects of Cable, Loudspeaker, and Amplifier Interactions
J. Audio Eng. Soc., Vol. 39, No. 6, 1991 June]

Some comments on a few cables: [in our opinion: Dick Diamond]

Kimber-Weave-4-PR - Neutral fast and good imaging

Kimber-Weave-8-LPC - Neutral fast and good imaging, less 3D or less quiet.

Kimber-Weave-16-LPC - Similar to 8-LPC, but not as 3D sounding or as quiet.

Spectra-Ribbon-036-flat - Typical of ribbon wire: lean sounding - tipped up in response.

Spectra-Ribbon-064-flat - lean sounding - tipped up in response

Audio-Quest-Litz - Not as smooth or clear as Kimber.

Levinson HF10C - veiled sounding

Krell-Layer-S-Twist - veiled sounding

Belden-ZIP cord - a bit harsh and grainy (not smooth)

Auto Jumpers - Good Bass but very **rough** sounding

So by looking at the previous table above, Table 2:

If Q/Fr is less than 1 : the cable is lean - sharp High frequency response.

If Q/Fr is 2 - 5 : the cable is neutral, fast and good imaging.

If Q/Fr is 20 - 30 : the cable is veiled, harsh, grainy, and rough.

Some audio-enthusiasts have concluded it to be futile 'testing for audio differences' between the various and very expensive high-end cables.

| | Measured | Specifications | L/C Ratio | CLR | Reference ---- | Freq 1kHz | XL/XC | |
|---|---|---|---|---|---|---|---|---|
| NAME-TYPE | C - Farad | L - Henry | L/C Ratio | R - Ohms | X-C | X-L | Ratio | Z-totoal |
| Kimber-Weave-16-LPC:less<8TC | 2.05E-10 | 3.05E-07 | 1,488 | 0.00822 | 776,364 | 0.00192 | 405,120,791 | 776,364 |
| Kimber-Weave-4-PR: Best K-weave | 1.75E-10 | 2.85E-07 | 1,629 | 0.01605 | 909,455 | 0.00179 | 507,873,232 | 909,455 |
| Kimber-Weave-8-LPC: <3D,Quiet | 1.25E-10 | 5.15E-07 | 4,120 | 0.01515 | 1,273,237 | 0.00324 | 393,478,485 | 1,273,237 |
| FAST, IMAGE-OK,QUIET,NEUTRAL | | | | | | | | |
| **Minimum** | 1.25E-10 | 2.85E-07 | 1,488 | 0.00822 | 776,364 | 0.00179 | 393,478,485 | 776,364 |
| **Maximum** | 2.05E-10 | 5.10E-07 | 4,120 | 0.01605 | 1,273,237 | 0.00324 | 507,873,232 | 1,273,237 |

| | | | | Refernce Freq. --- 20 kHz | | XL/XC | | |
|---|---|---|---|---|---|---|---|---|
| | SWR-50 | Zo-Cable | Freq Resonanc | X-C 20 kHz | X-L 20 kHz | Ratio | Q | Q/Fr |
| Kimber-Weave-16-LPC:less<8TC | 1.30 | 38.57 | 20,127,654 | 38,818 | 0.0383 | 1,012,802 | 94,448,146 | 4.692 |
| Kimber-Weave-4-PR: Best K-weave | 1.24 | 40.36 | 22,536,090 | 45,473 | 0.0358 | 1,269,683 | 56,663,844 | 2.514 |
| Kimber-Weave-8-LPC: <3D,Quiet | 1.28 | 64.19 | 19,836,333 | 63,662 | 0.0647 | 983,696 | 84,042,017 | 4.237 |
| FAST, IMAGE-OK,QUIET,NEUTRAL | | | | | | | | |
| **Minimum** | 1.24 | 38.57 | 19,836,333 | 38,818 | 0.0358 | 983,696 | 56,663,844 | 2.514 |
| **Maximum** | 1.30 | 64.19 | 22,536,090 | 63,663 | 0.0647 | 1,269,683 | 94,448,146 | 4.692 |

| NAME-TYPE | C - Farad | L - Henry | L/C Ratio | R - Ohms | X-C | X-L | Ratio | Z-totoal |
|---|---|---|---|---|---|---|---|---|
| **Minimum** | 1.25E-10 | 2.85E-07 | 1,488 | 0.00822 | 776,364 | 0.00179 | 393,478,485 | 776,364 |
| **Maximum** | 2.05E-10 | 5.10E-07 | 4,120 | 0.01605 | 1,273,237 | 0.00324 | 507,873,232 | 1,273,237 |
| **Belden - ZIP Cord: HARSH-GRAINY** | 1.15E-10 | 1.15E-07 | 996 | 0.04185 | 1,383,953 | 0.00072 | 1,923,689,193 | 1,383,953 |
| **Belden-9718PVC** | 1.05E-10 | 7.95E-07 | 7,571 | 0.01063 | 1,515,758 | 0.00500 | 303,446,271 | 1,515,758 |
| | | | | | | | | |
| **Auto Jumpers: VERY ROUGH** | 9.15E-11 | 1.22E-06 | 13,333 | 0.00518 | 1,739,394 | 0.00767 | 226,911,918 | 1,739,394 |

| NAME-TYPE | SWR-50 | Zo-Cable | Freq Resonanc | X-C 20 kHz | X-L 20 kHz | Ratio | Q | Q/Fr |
|---|---|---|---|---|---|---|---|---|
| **Minimum** | 1.24 | 38.57 | 19,836,333 | 38,818 | 0.0358 | 983,696 | 56,663,844 | 2.514 |
| **Maximum** | 1.30 | 64.19 | 22,536,090 | 63,663 | 0.0647 | 1,269,683 | 94,448,146 | 4.692 |
| KK-Specs. & +/- 10% | | | | | | | | |
| **Belden - ZIP Cord: HARSH-GRAINY** | 1.58 | 31.55 | 43,859,972 | 69,198 | 0.014 | 4,809,223 | 33,069,362 | 0.754 |
| **Belden-9718PVC** | 1.74 | 87.01 | 17,419,745 | 75,788 | 0.100 | 758,616 | 142,659,559 | 8.190 |
| | | | | | | | | |
| **Auto Jumpers: VERY ROUGH** | 2.31 | 115.47 | 15,063,627 | 86,970 | 0.153 | 567,280 | 335,790,388 | 22.291 |

Yet there are many sonic differences in the various cables made by today's cable manufactures. Geometries, different materials, winding configurations, shielding schemes: etc., are used in the makeup of these exotic and expensive cables and inter-connects. The previous charts were used and expanded upon to provide the following graphs.

The L, C, R information was collected from many manufacture's web-sites. Calculations were from cable data from: Fred E. Davis:
Effects of Cable, Loudspeaker, and Amplifier Interactions
J. Audio Eng. Soc., Vol. 39, No. 6, 1991 June

Several cable manufactures would not send us cable specifications or do not publish even the simple L, C, R measurements.

# RF Calculations

The characteristic L-C-R and several 'RF' **calculations** were used to generate The following comparison charts.

Columns are:

1 C - Farad
2 L - Henry
3 L/C Ratio
4 R - Ohms
5 Xc
6 XL
7 XL/XC 1kHz Ratio
8 Z-Total [Xc, Xl, Rdc]
9 SWR-50 [Zo/ 50 Ohm Reference]
10 Zo-Cable [Zo of C and L]
11 Frequency Resonance [Fr] [of C & L]
12 Fr / L-C ratio @ Xc 20 kHz
13 Xc 20 kHz
14 Xl 20 kHz
15 Zt 20 kHz
16 XL/XC Ratio 20kHz
17 QZt / Rdc [Q = Zt / Rdc]
18 QZt / Zo [QZt = Zt / Zo (of cable)]
19 Q/Fr [QZt / Fr; resonant frequency of the cable]
20 Fr / Zo [Frequency Resonance / Zo]
21 Fr / Xc-1kHz [Frequency Resonance / Xc]
22 Qa 377 LC [Air Impedance ~377 * SQR (L*C)]
23 Z Wave 377 L/C [Air Impedance ~377 * SQR (L/C)]
24 Zo / Rdc (swr) [Zo / Rdc]
25 Q - Line [.085 * SQR Fr]

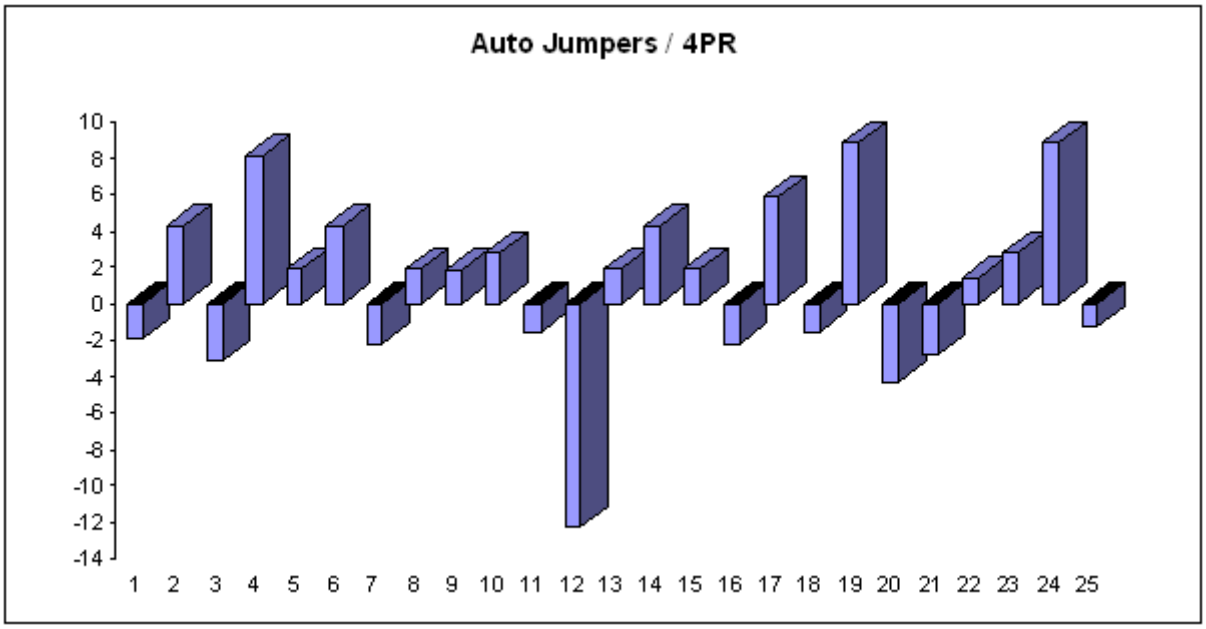
These ‘ratios’ are derivations of typical Radar-Microwave and RF calculations and esoteric in that no one uses these RF calculations for 'audio'. Our use is strictly for in house testing and for demonstrations.

We have all Tables and Charts included the Cable XL Charts folder] pdf file.

The ‘0’ reference is for comparison, showing the deviation from the average values of Kimber Keble’s woven-wires. These woven cables are geometrically consistent and exhibit constant characteristics and RF-calculated values.

## Esoteric Graphs

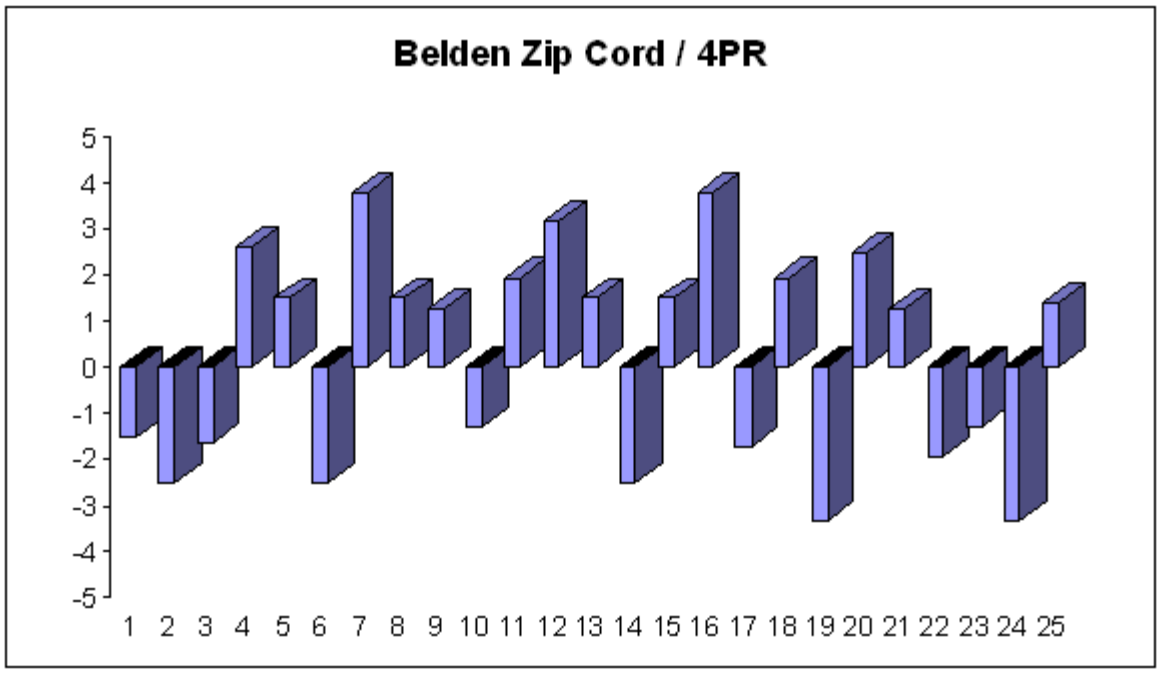
The first charted Cable group is Speaker Cables with 'odd-ball' cables that are frequently used to deride the **'Snake-oil'** cable manufactures. As it turns out, measuring any and all cables helped to establish what a good-cable might look like when using these odd Esoteric 'RF' ratio-graphs.

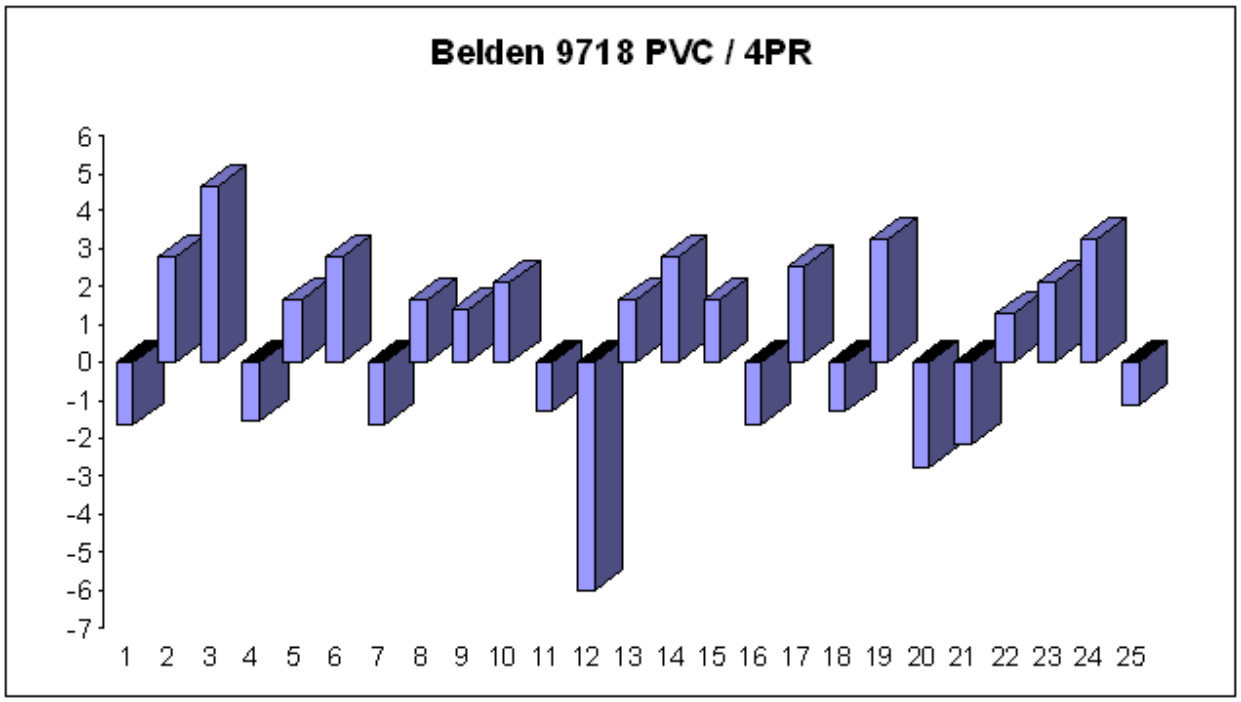



12 : Fr / L-C ratio X @ 20 kHz

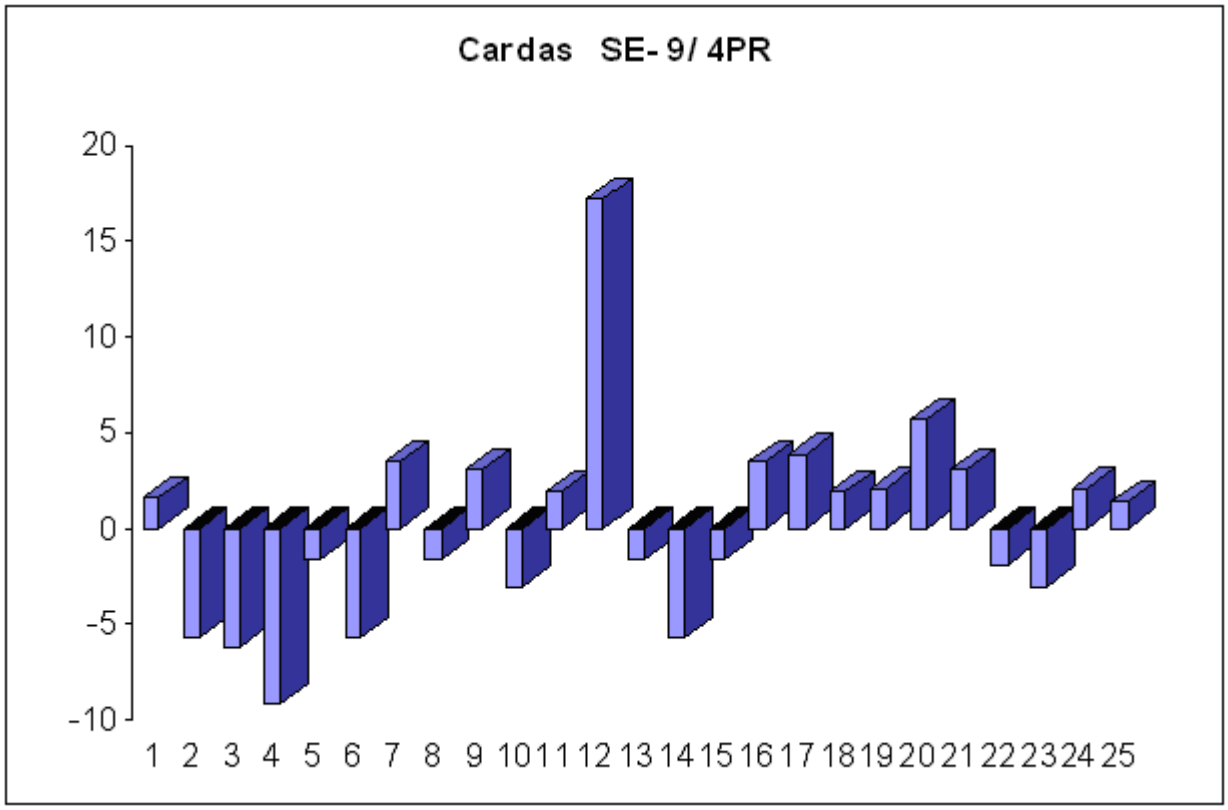
The positive Columns indicate a value that is more than the Kimber 4-PR weave cable. And the negative columns respectively indicate values that are less than Kimber 4-PR.

The Fr / L-C ratio : Xc @ 20kHz a ratio having a unit-less number of frequency divided by inductance minus capacitance; reactance.

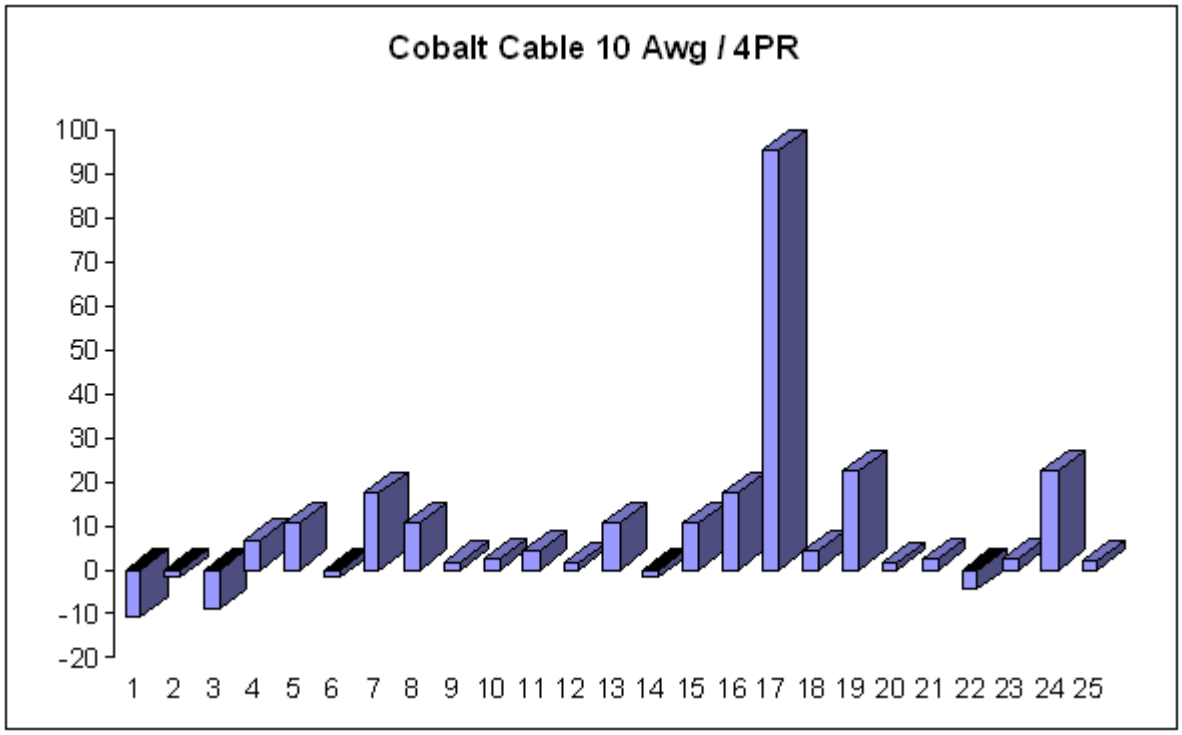


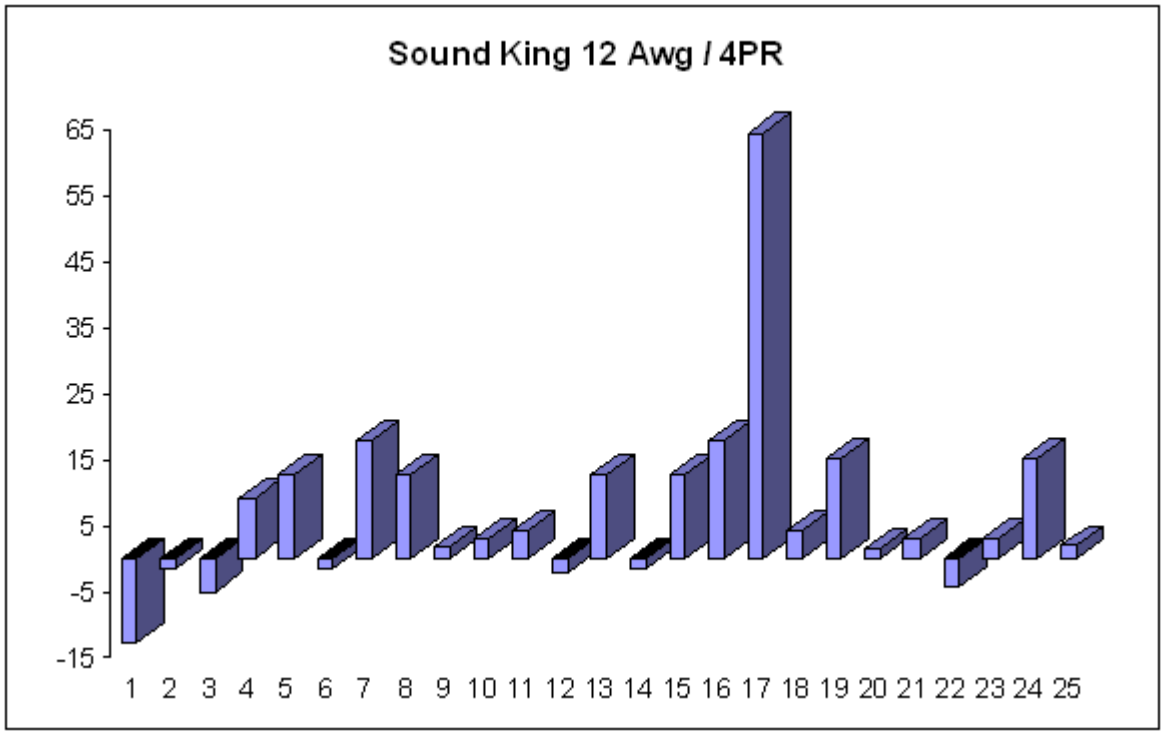

12 : Fr / L-C ratio X @ 20 kHz




12 : Fr / L-C ratio X @ 20 kHz

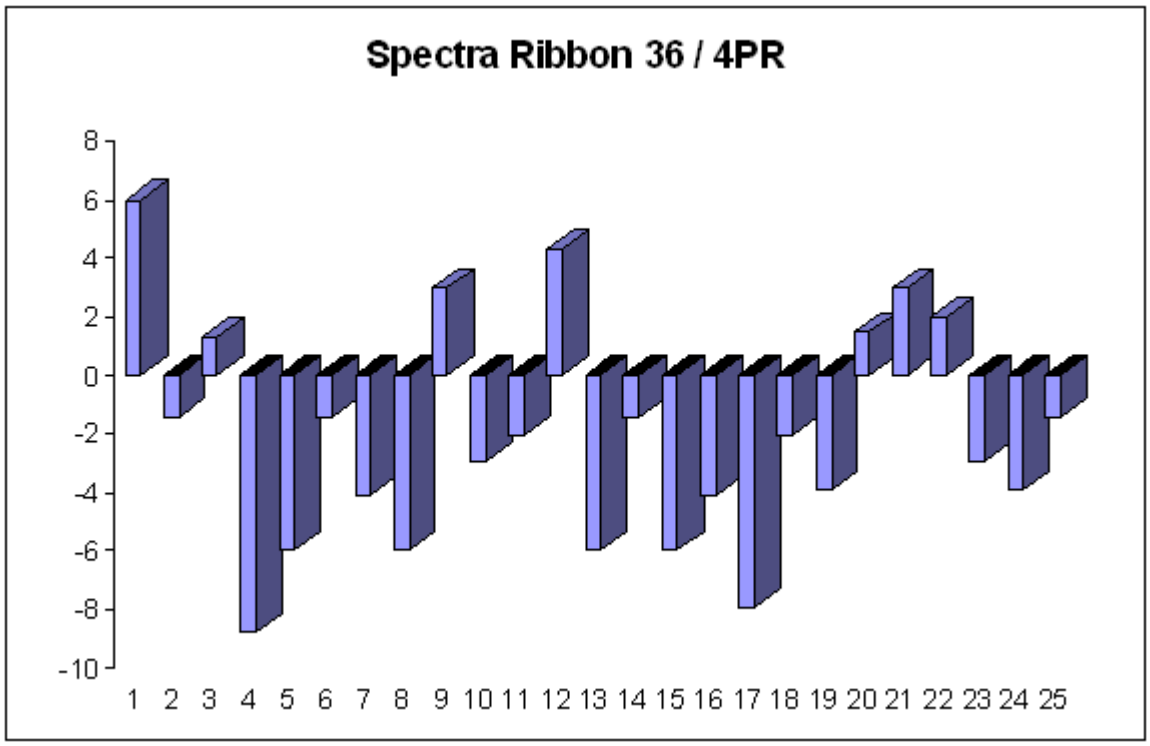


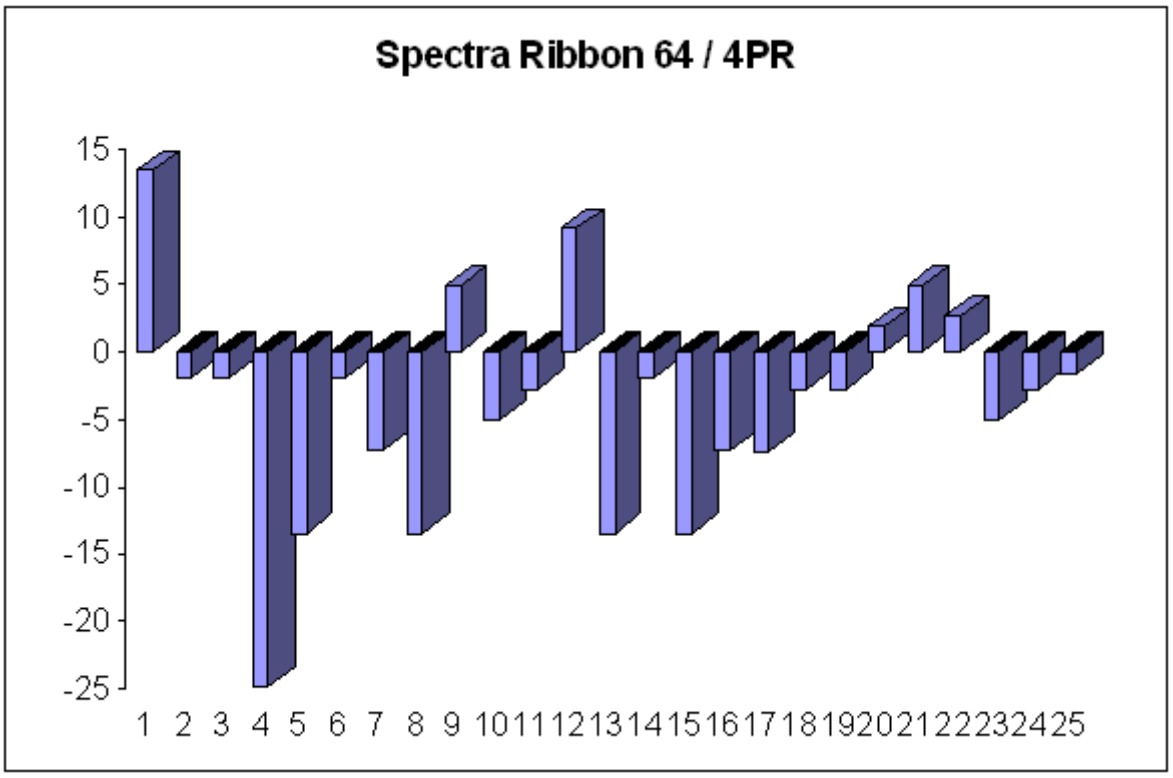

QZt / Rdc : [Q = Zt / Rdc] : 17



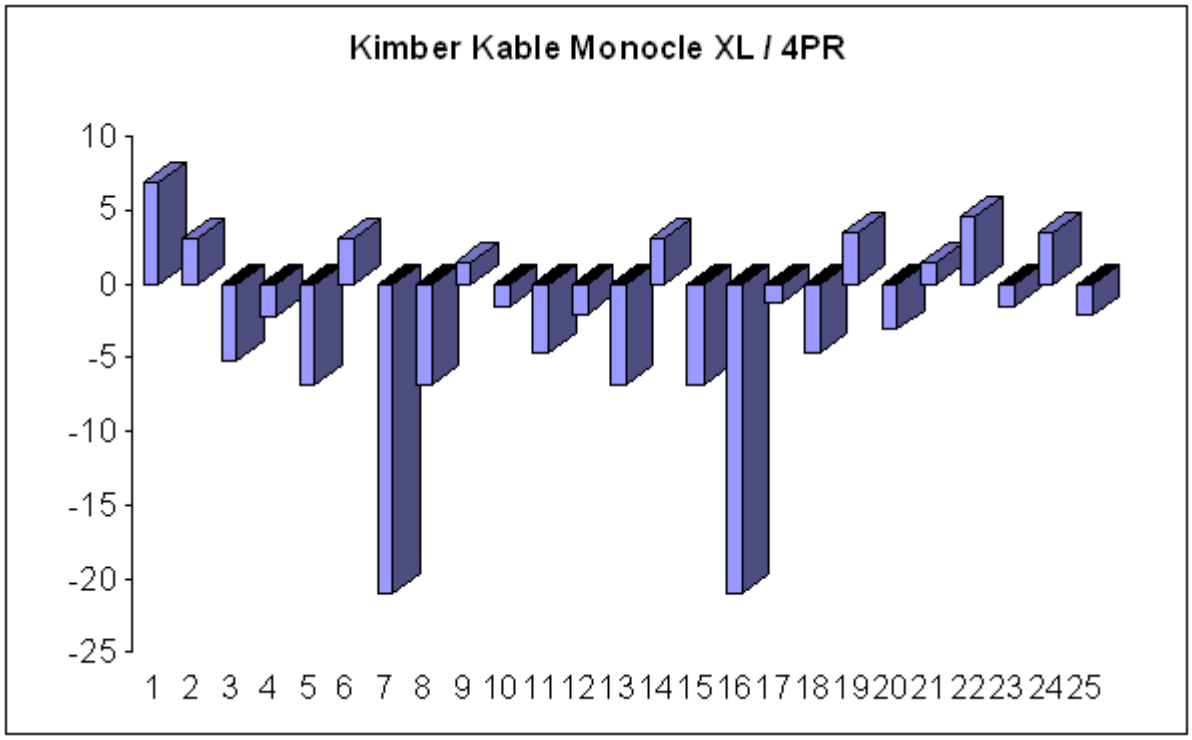

QZt / Rdc : [Q = Zt / Rdc] : 17

Flat Cables sounded lean…



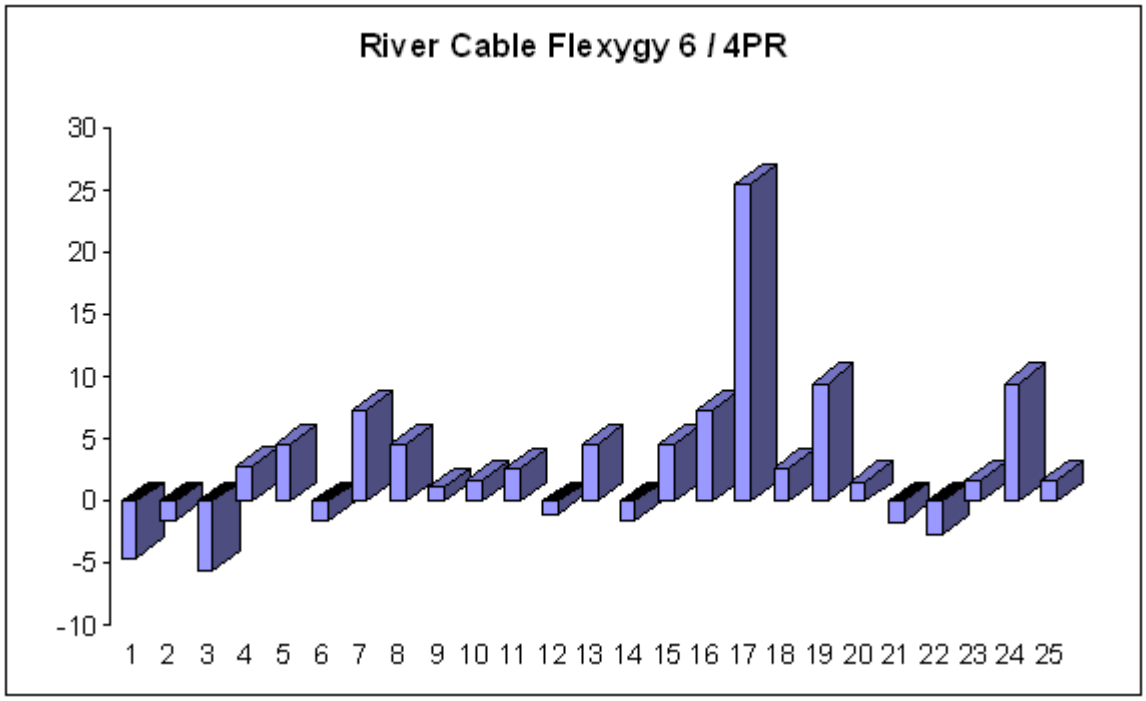



Now let us see how a large round woven cable responds…

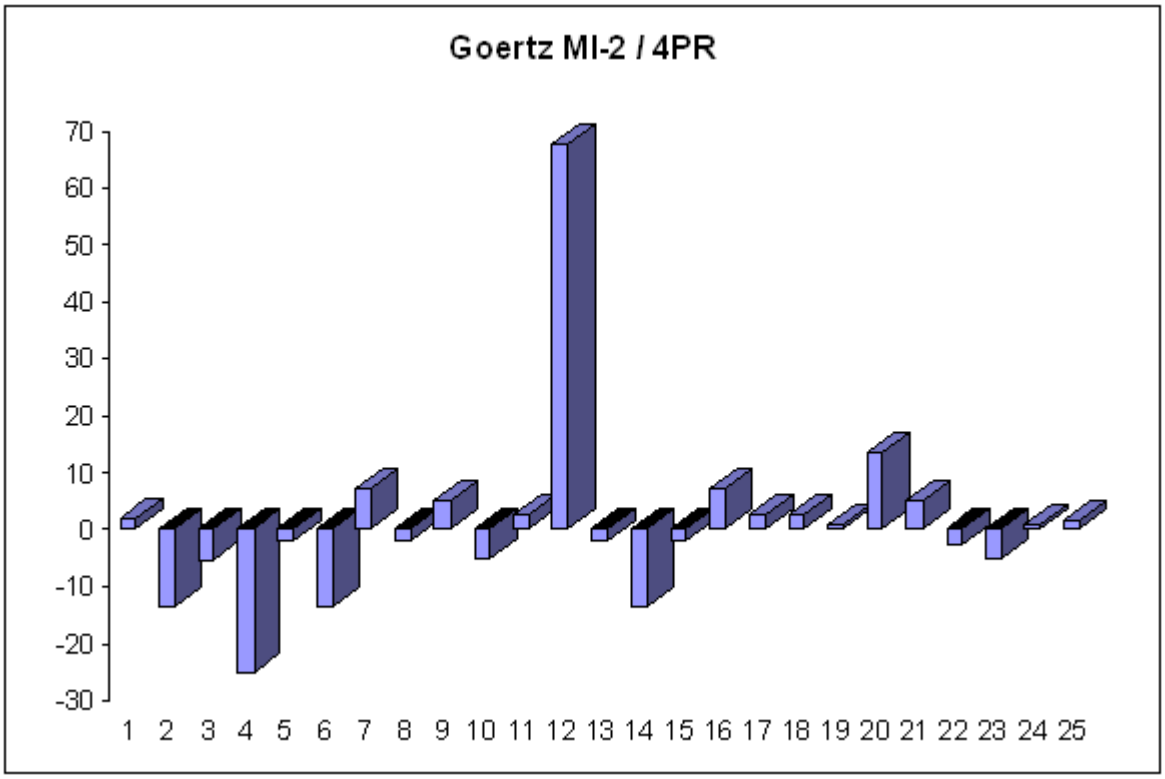



7 and 16 : Xl / Xc Ratios





Another style of cable design…




12 Fr / L-C ratio @ Xc 20 kHz

The previous graphs reveal several interesting insights into Cable design.

We noticed that:
The ratio of capacitance to inductance C-L,
or the Xl - Xc ratios [at 1 kHz and 20 kHz] and
the Frequency Resonance of the cable are important 'parameters'.

The Xl / Xc ratios demonstrate that a certain *pas de deux* or 'balance' of capacitance to inductance is essential in producing a 'good' cable.

To continue, let us now examine the myriad of various cable designs from the manufactures who published their cable specifications or those we were able

to calculate the basic L, C and R - from what limited information the manufactures provided. The following manufactures make-up our Test-Group of 'quality' cable designers.

The following graphs show the difference in the various cables as referenced to the values of a PBJ Cable [3-braid] from Kimber Kable.

**Notice that the Scales change from one cable to the next, this was done to fit the graph on a page due to the extremes of some cables.**

The charts show by numerical magnitude the difference between the various calculated test values. The positive and negative values indicate how much more or less the Test values of various cables in respect to Kimber's interconnects.

Ratio 7: Xl / Xc @ 1 kHz,
Ratio 16: Xl / Xc @ 20 kHz,
Ratio 12 is Fr / L-C ratio,
Ratio 17 QZt / Rdc,
Ratio 20 is Fr / Zo.

The Linear scaled Column-Charts display the Ratio-Deviation from the '0' 'reference-level' and so the shorter the columns [closer to 0] the better [?]

The Balance between Capacitance [1] and Inductance [2] of the 3-Braid is about 12,000 to 14,000 to 1; that is L over C.

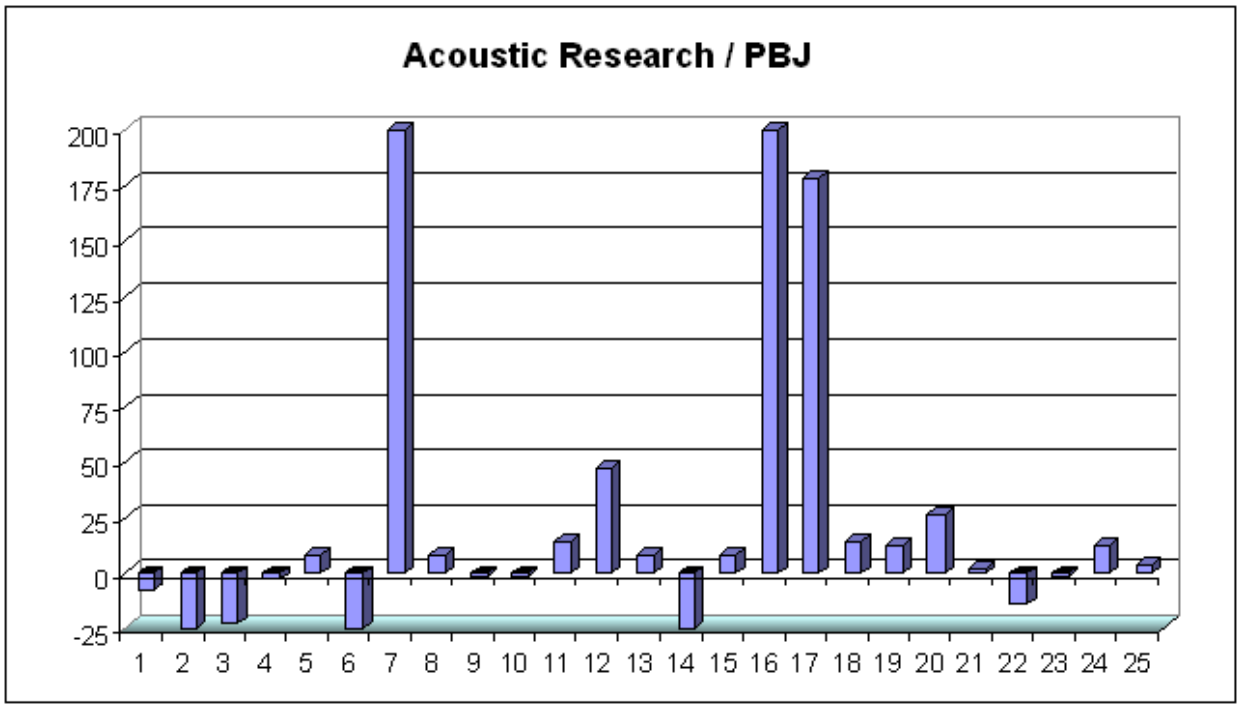
| | | | |
|---|---|---|---|
| Kimber 3-Braid PBJ * | 5.50E-11 | 7.70E-07 | 14,002 |
| **Acoustic-Research** | 7.10E-12 | 2.97E-08 | 4,183 |

This cable has extreme values of Capacitance and Inductance as per the PBJ Reference: having 8 times more Capacitance & 22 times more Inductance. [?]

This extremely small amount of capacitance may hinder the magnetic fields of the audio signal as per the ***pas de deux*** relationship, because the static fields are electrically and mutually supportive of the magnetic fields in the propagation of the Audio signal.

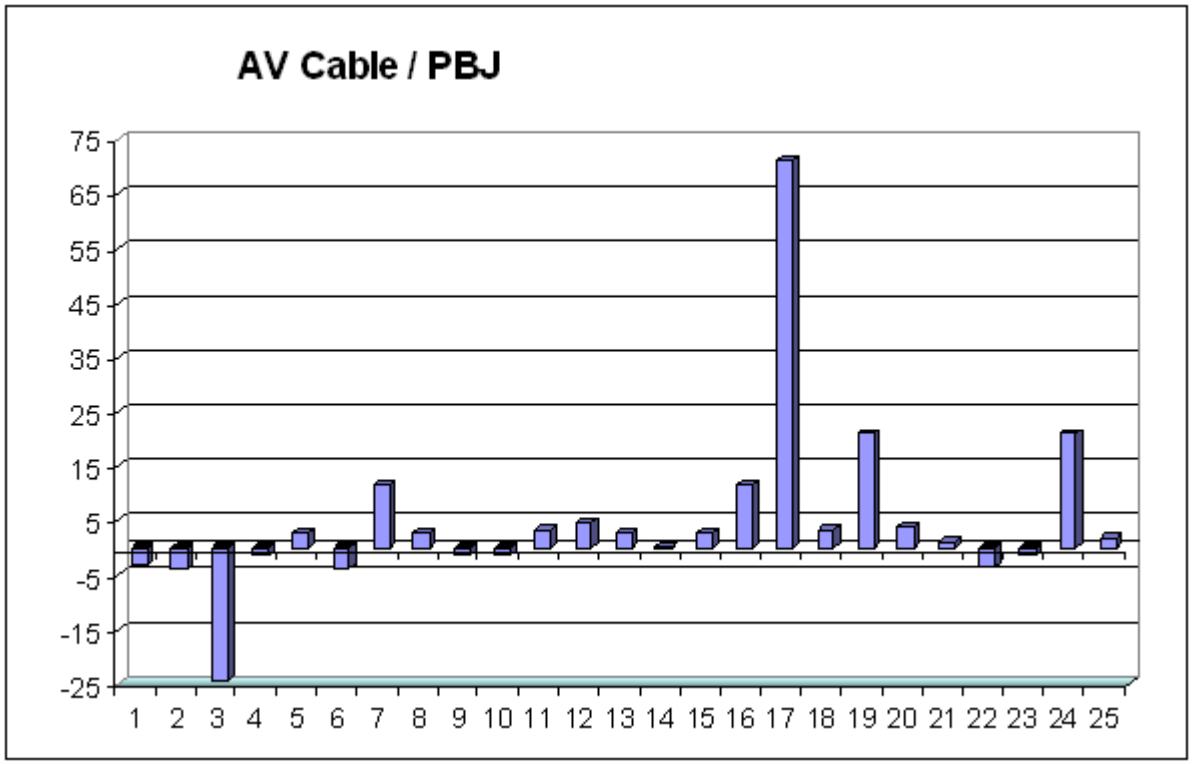
Point 17 is Q Zt / Rdc; very large Xc lends to a very large Zt being divided by small Rdc [d.c. resistance]. Q then is very large in value being 180 times more than the 3-Braid 'reference'.

QZt / Rdc
51,686,980
9,703,955,303
187.74

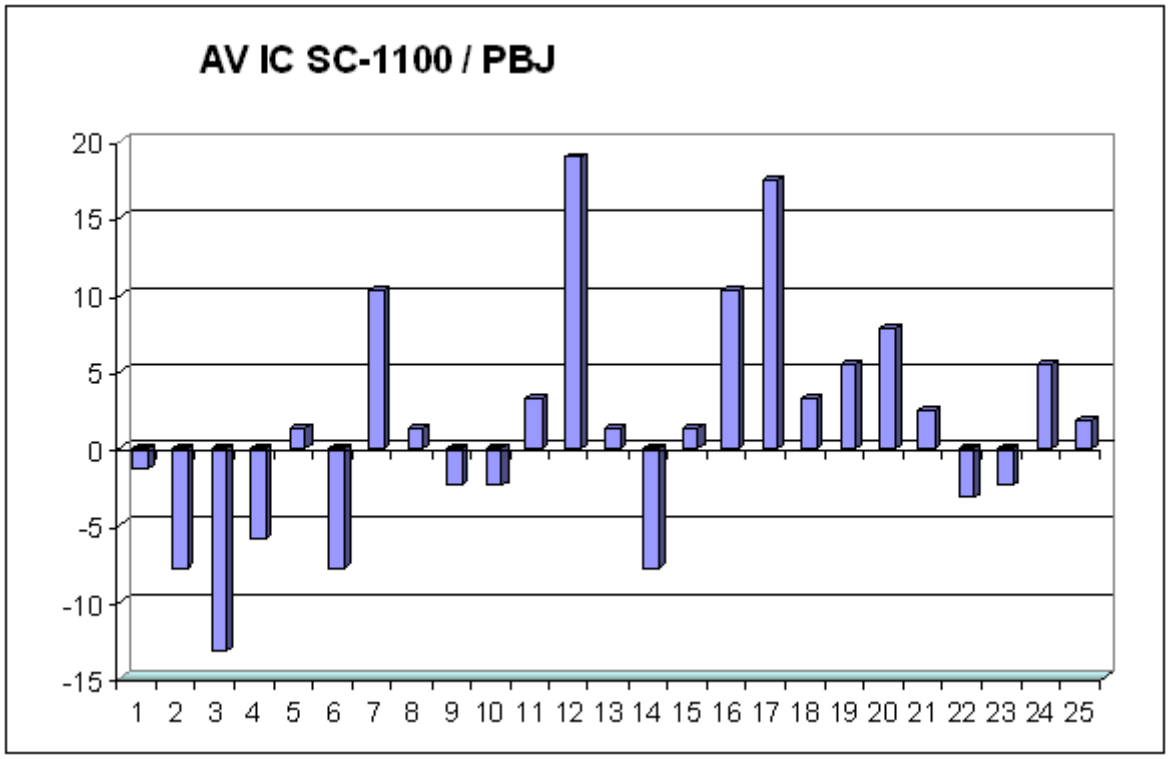


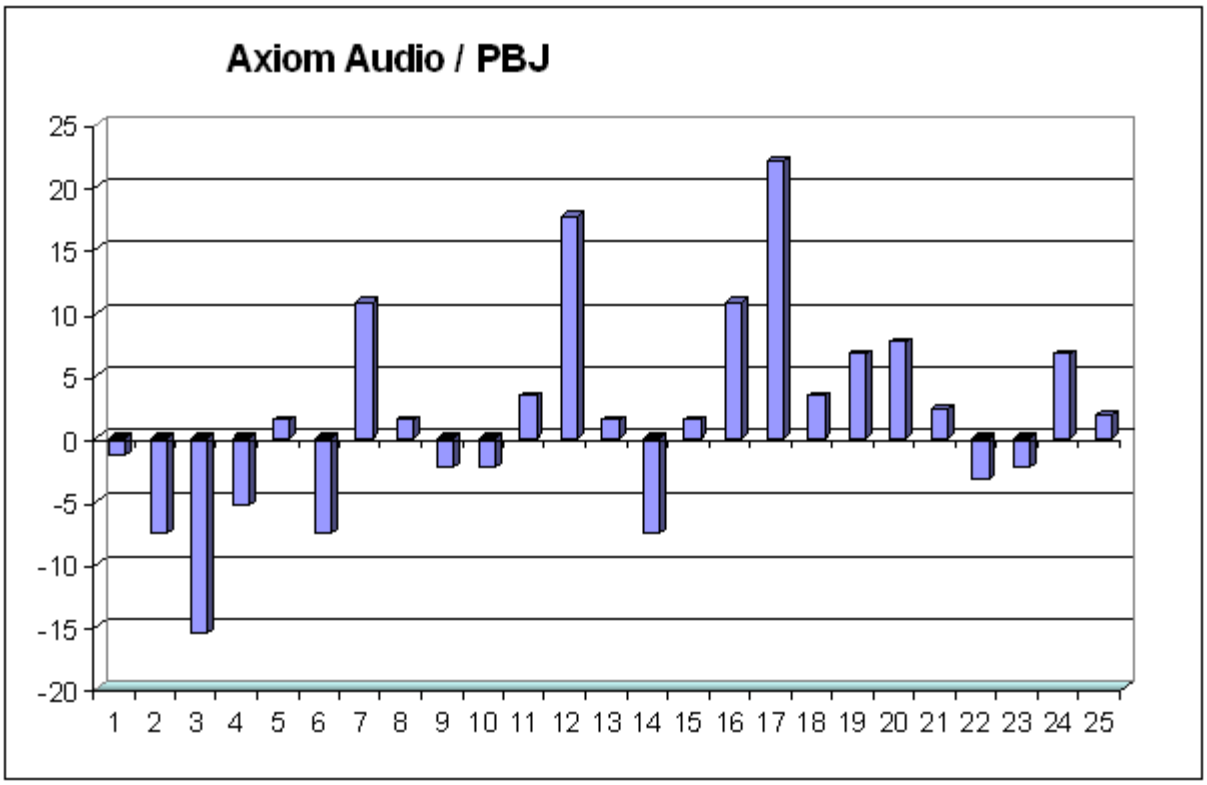

7 XL/XC 1kHz Ratio
12 Fr / L-C ratio @ Xc 20 kHz
16 XL/XC Ratio 20kHz
17 QZt / Rdc [Q = Zt / Rdc]

Notice scale has been enlarged to accommodate the differences.

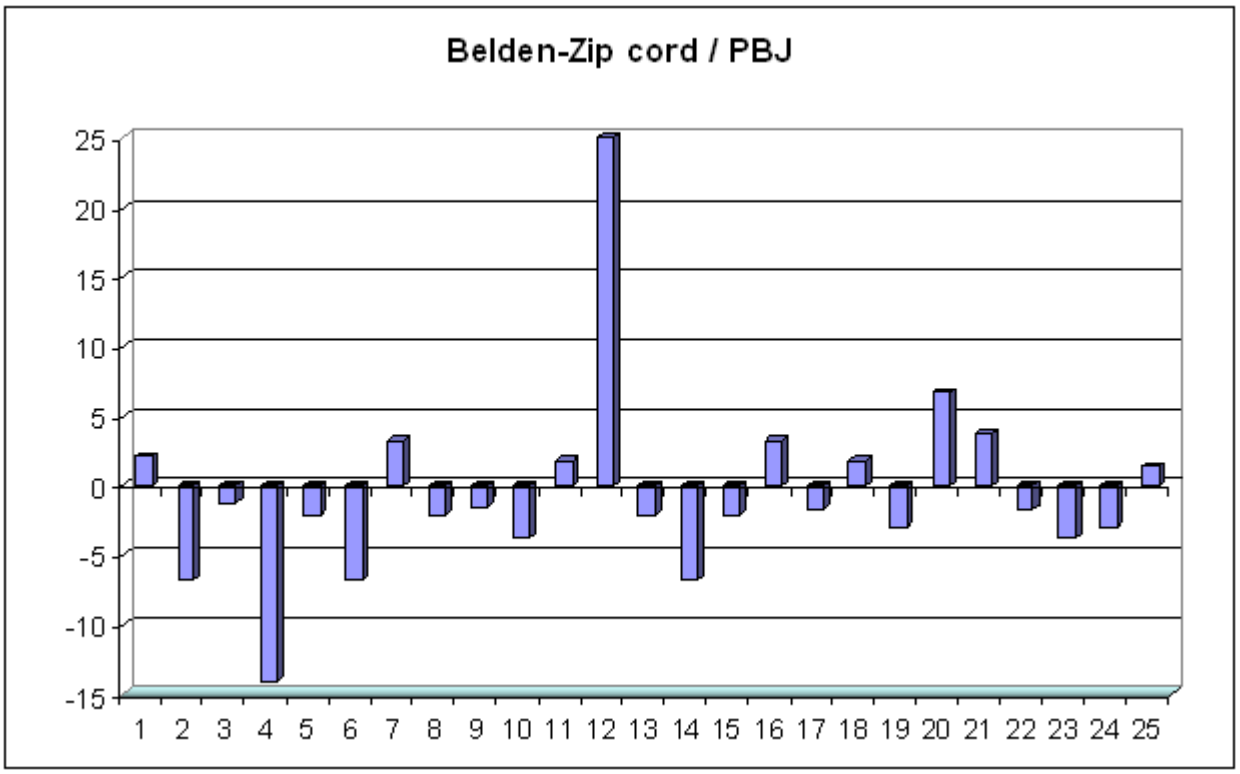



Notice scale has been enlarged to accommodate the differences.





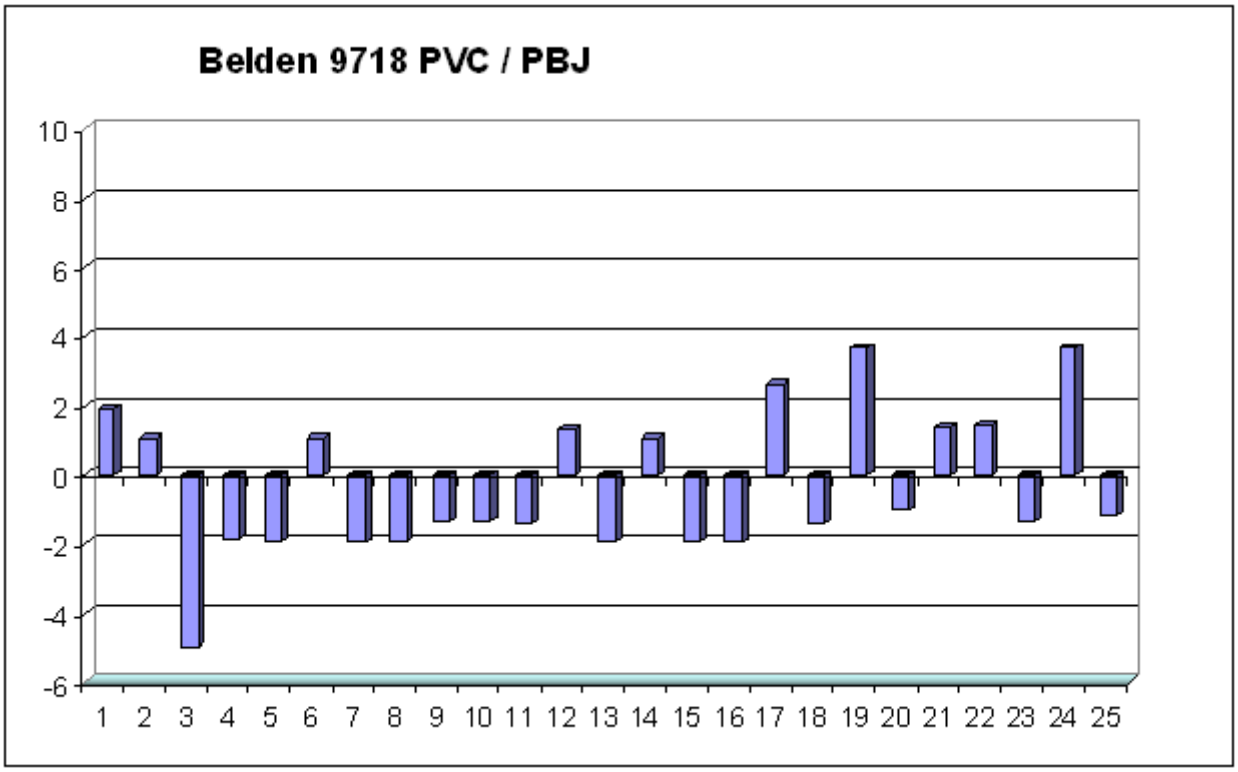

Notice scale has been enlarged to accommodate the differences.




Notice scale has been enlarged to accommodate the differences.

4: R - Ohms

12: Fr / L-C ratio X @ 20 kHz




| Column | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Name Brand** | **C - Farad** | **L - Henry** | **R - Ohms** | **L/C Ratio** | **Xc** | **Xl** |
| Cardas : 300B MicroTwin | 1.41E-10 | 1.27E-07 | 0.005 | 901 | 1,128,756 | 0.00080 |
| Kimber Braid : PBJ IC | 5.50E-11 | 7.70E-07 | 0.0530 | 14,002 | 2,898,719 | 0.00484 |
| Ratio | 2.56 | -6.06 | -10.60 | -15.55 | 2.57 | -6.07 |

| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|
| **Xl/Xc-Ratio** | **Z-Total 1 kHz** | **SWR-50** | **Zo-Cable** | **Freq Resonance** | **Fr / L-C** | **Xc 20 kHz** | **Xl 20 kHz** |
| 1,414,540,540 | 1,128,756 | 1.67 | 30.01 | 37,610,456 | 41,756 | 56,438 | 0.0160 |
| 598,037,503 | 2,893,719 | 2.37 | 118.33 | 24,454,856 | 1,747 | 144,686 | 0.0968 |
| 2.37 | -2.56 | 1.42 | -3.94 | 1.54 | 23.90 | 2.56 | 6.07 |

| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|
| **Z-Total 20 kHz** | **Xl/Xc-Ratio** | **Q (Zt / Rdc)** | **Q (Zt / Zo)** | **Q/Fr** | **Fr / Zo** | **Fr / Xc-1kHz** | **Qa 377 LC** |
| 56,438 | 3,536,351 | 225,751,164 | 37,610 | 6.002 | 1,253,188 | 33.32 | 1.60E-06 |
| 144,686 | 1,495,094 | 54,598,480 | 24,455 | 2.233 | 206,668 | 8.45 | 2.45E-06 |
| 2.56 | 2.37 | 4.13 | 1.54 | 2.69 | 6.06 | 3.94 | -1.54 |

| 23 | 24 | 25 |
|---|---|---|
| **Z Wave 377 L/C** | **Zo / Rdc (SWR)** | **Q - Line** |
| 11,314 | 6,002 | 521 |
| 44,610 | 2,233 | 420 |
| -3.94 | 2.69 | 1.24 |

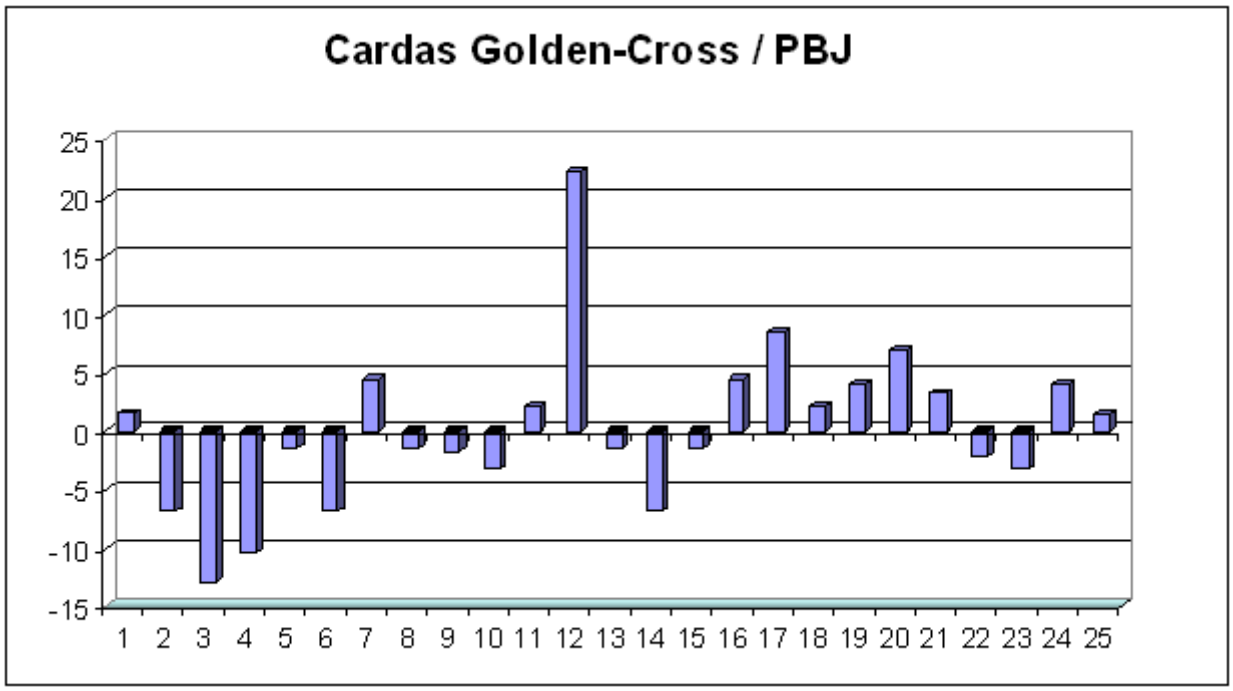
These 25 columns of ratios, as shown above of the Cardas 300B Micro Twin and the Kimber Kable PBJ, numerically shows the differences in these two styles of cables.

The Micro-Twin has:

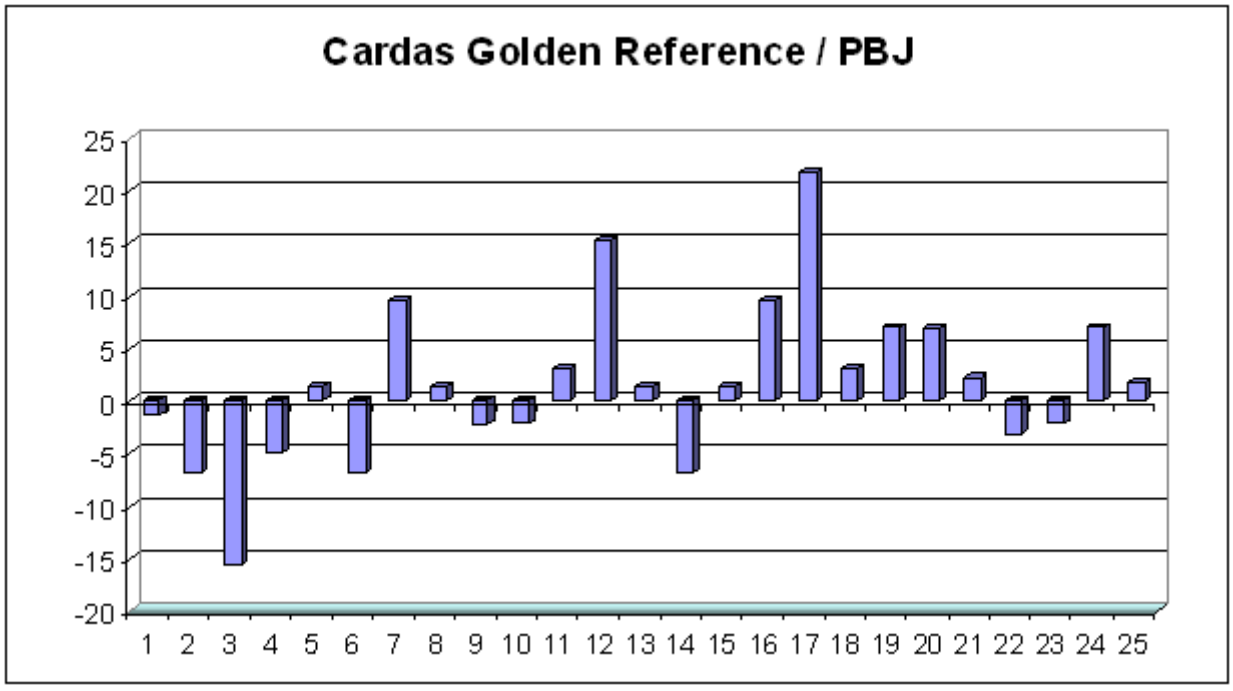
1.) 2.56 more Capacitance
2.) ~1/6 the Inductance,
3.) ~1/10 the DC resistance,
4.) L/C ratio is ~1/15,
5.) less Xc: 1/2.57
6.) less Xl: 1/6,
7.) a greater Xl/Xc ratio by 2.37 times,
8.) less Total Impedance Z: 1/2.56,
9.) SWR is less by 1/4.2,
10.) Cable Zo is 1/4,
11.) Calculated Frequency Resonance is 1.54 times higher,
12.) L/C ratio compared to the Resonant Frequency is 24 times greater.

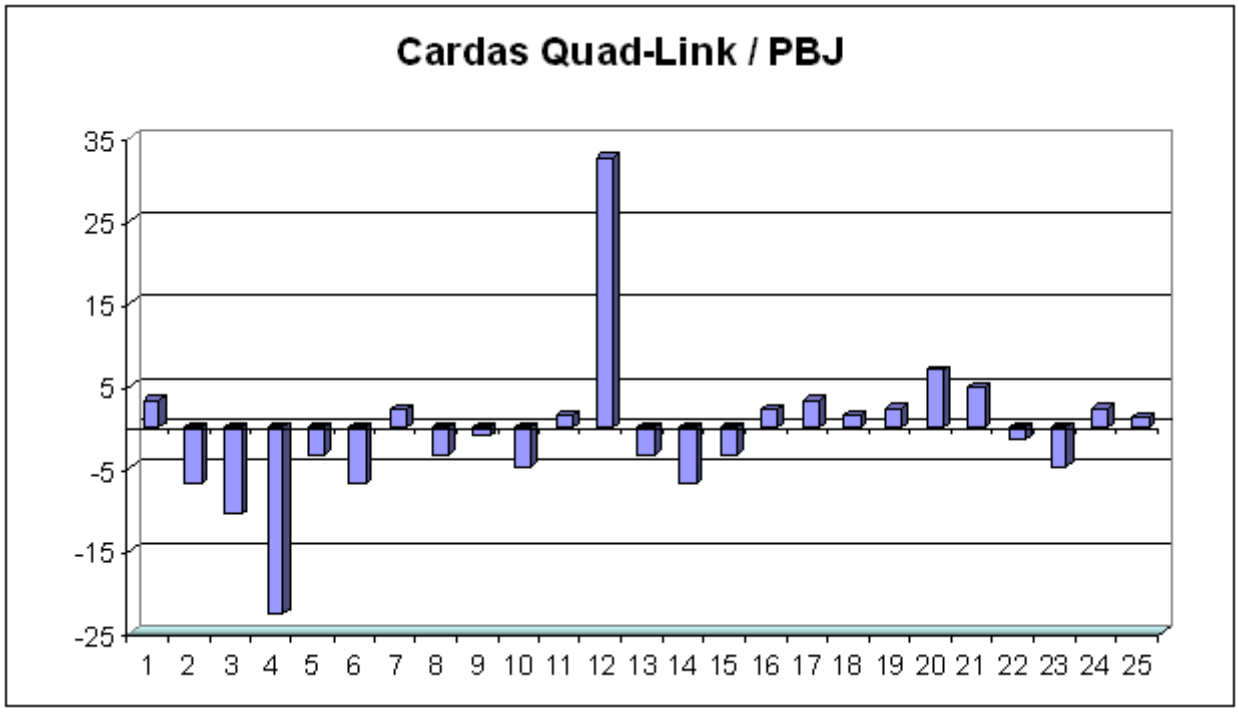
13, 14, 15 and 16 same as the 1 kHz ratios.

17.) Cable Q is 4 times greater
18.) Q of Total impedance and Cables Zo is 1.54 greater
19.) Q and ratio of Resonant Frequency is 2.23 greater
20.) Resonant Frequency and Cable Zo is 6 times more
21.) Resonant Frequency and Xc is 4 times more
22.) Qa 377 / [L/C] is less: 1/1.54
23.) Z Wave 377 L/C is less by 1/4
24.) Zo/rdc (SWR) is 2.69 times more
25.) Q-line is 1.24 more.

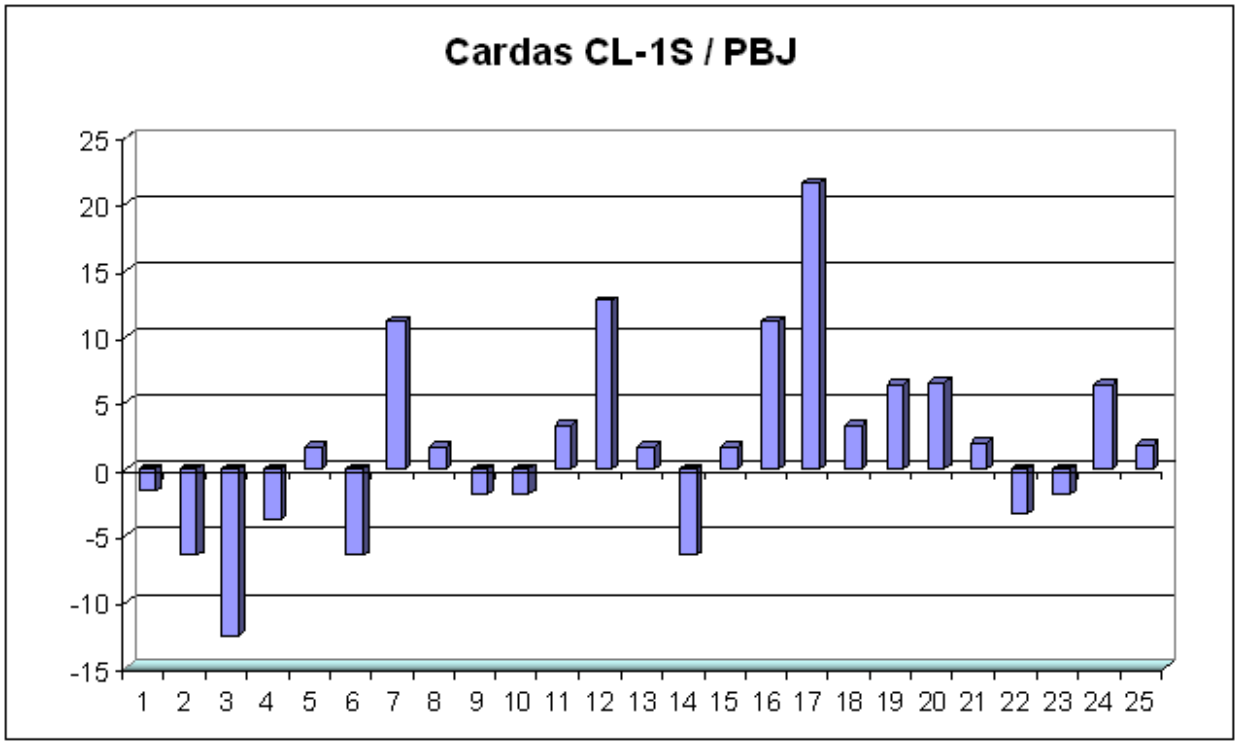


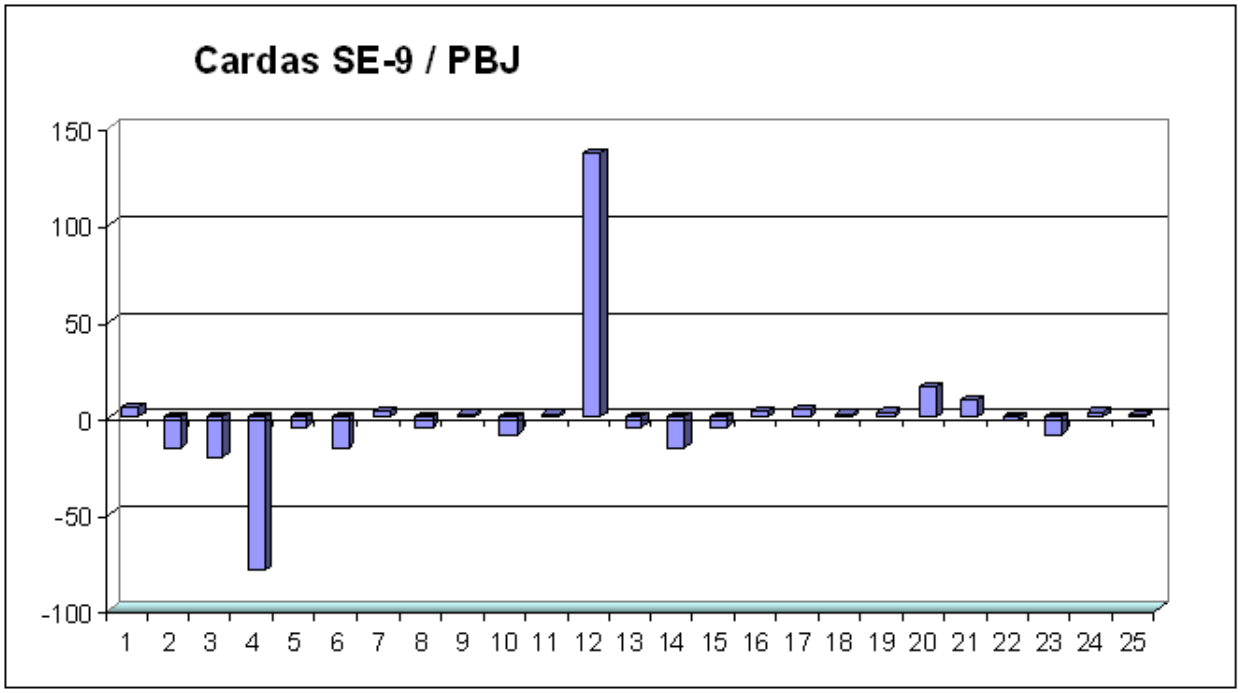

PBJ haw no shield…





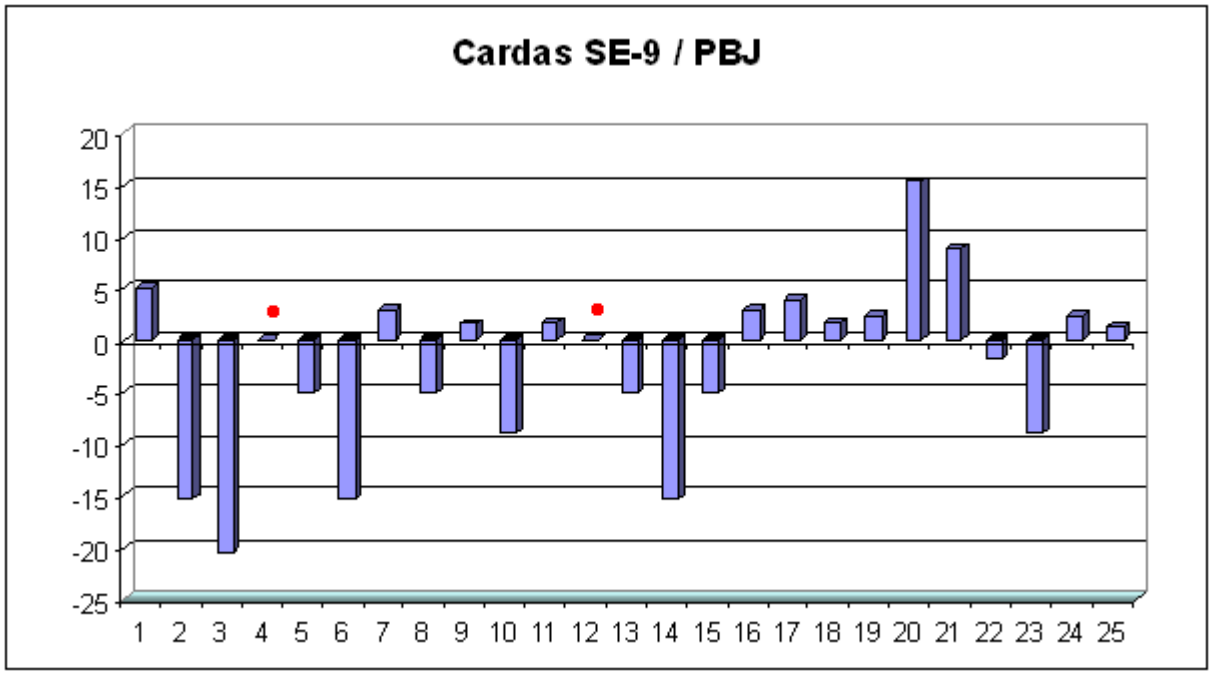

PBJ has no shield…






The SE-9 cable has two values that are extreme:

1. Ratio 4: L/C is 177 to 1,which is 79 times smaller than the PBJ value of 14,002 to 1.
2. Ratio 12: Fr/L-C is 238,757 to 1, which is 136 times larger than the PBJ value of 1,747.

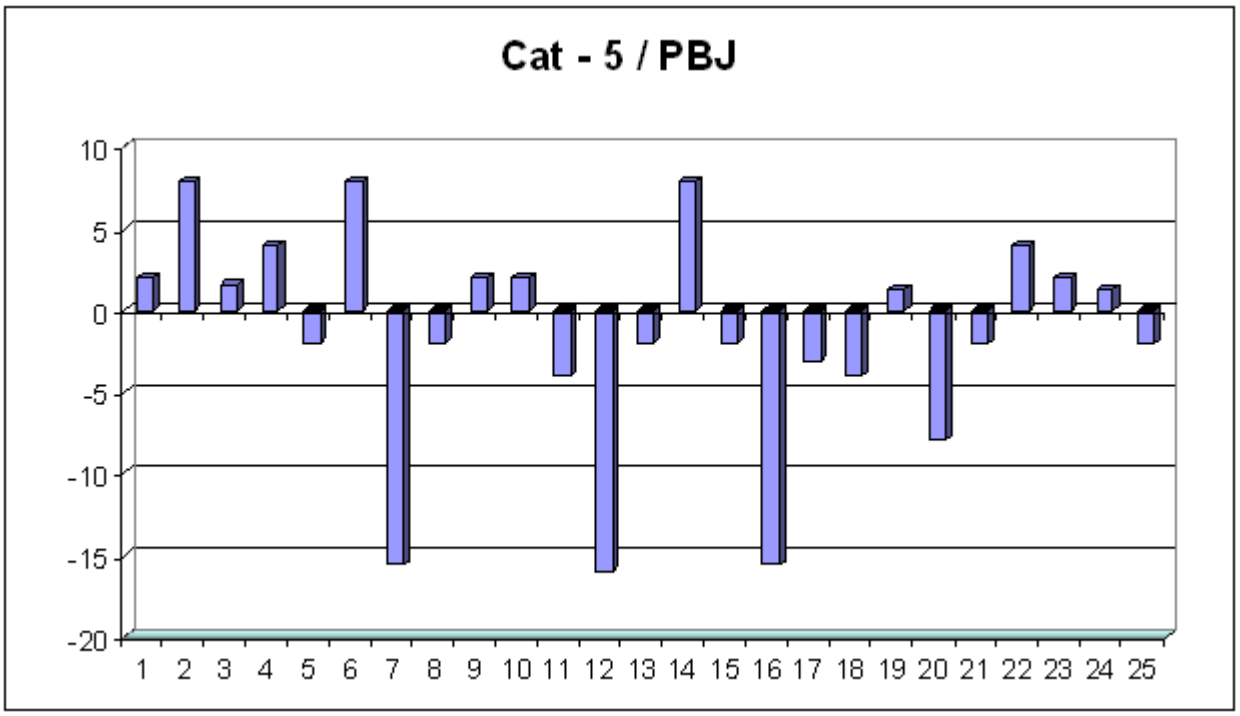


Cardas SE-9 with: Ratio 4 L/C Ratio & Ratio 12 Fr/L-C: changed to ‘0’.

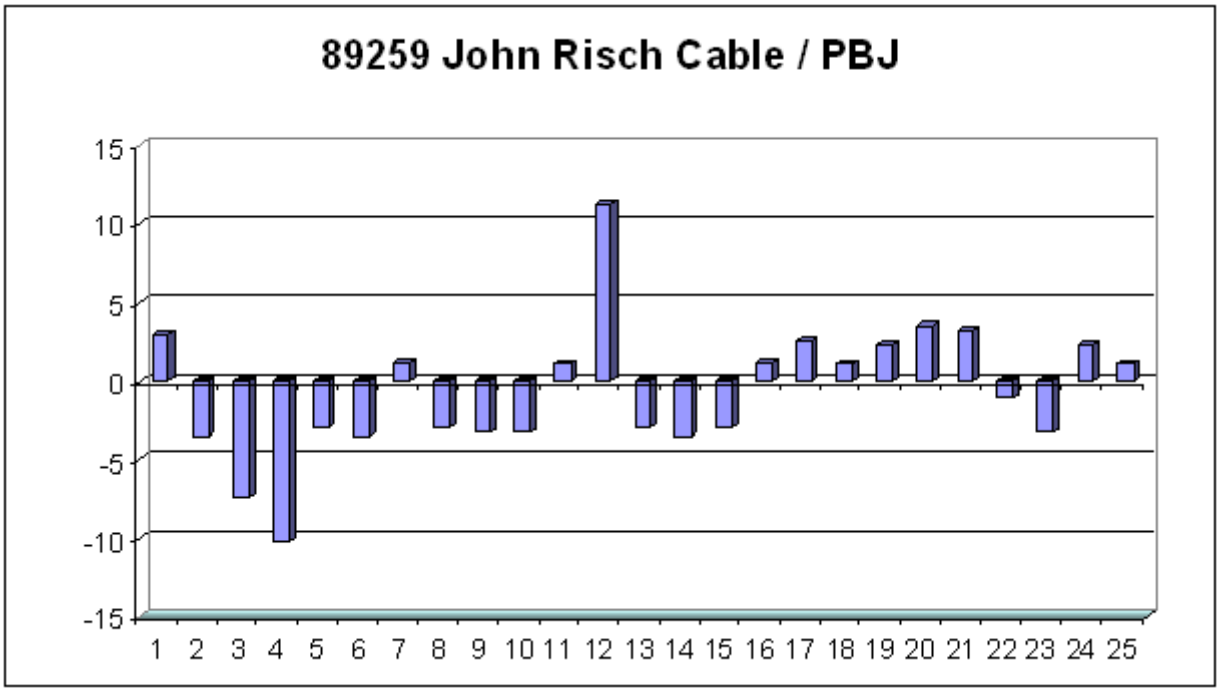
The SE-9 cable’s L/C of 177 is very low indicating that the Magnetic-Fields and Static-Fields are more proportionally ‘equivalent’.

The PBJ L/C ratio is greater, having a larger proportion of inductance than capacitance. Comparatively, PBJ cable has more Inductance and less capacitance.

| | F | L | ratio |
|---|---|---|---|
| PBJ | 5.50E-11 | 7.70E-07 | 14,002 |
| SE-9 | 2.83E-10 | 5.01E-08 | 177 |

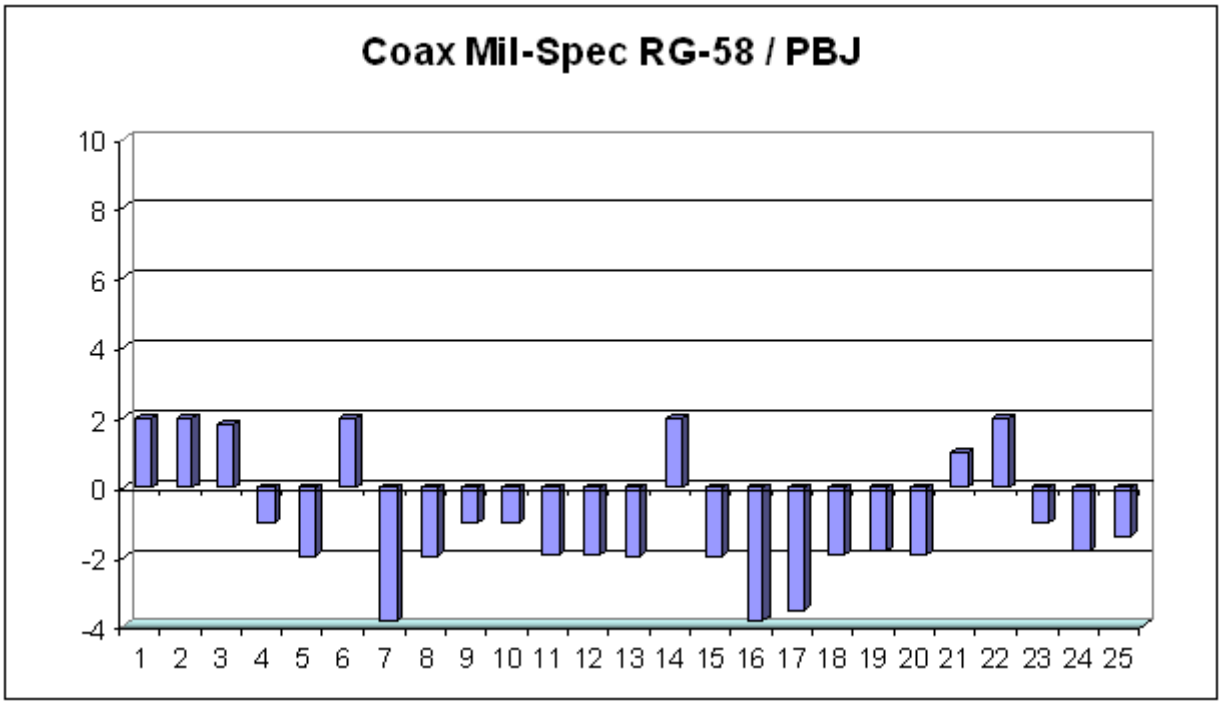


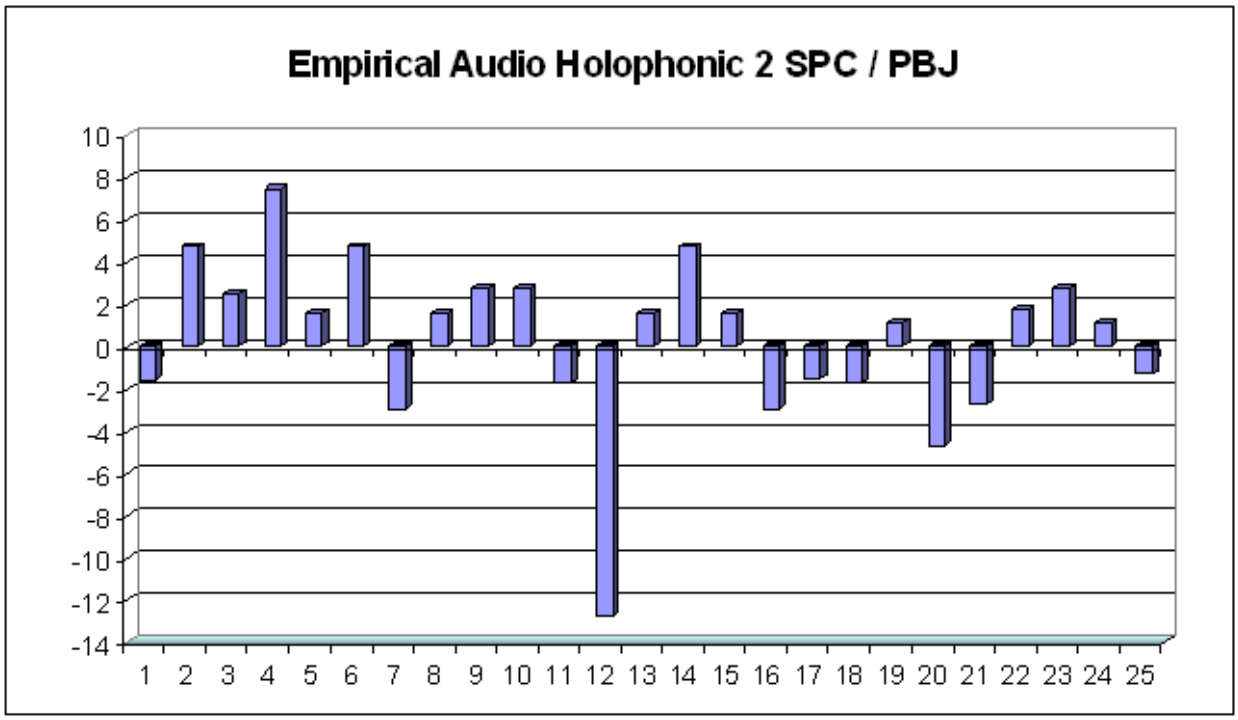

We made our Cat-5 the best we knew how… PBJ has low L, C and R.
Cat 5 by geometric design has more L due to the many twisting paths, many parallel lines – more capacitance.

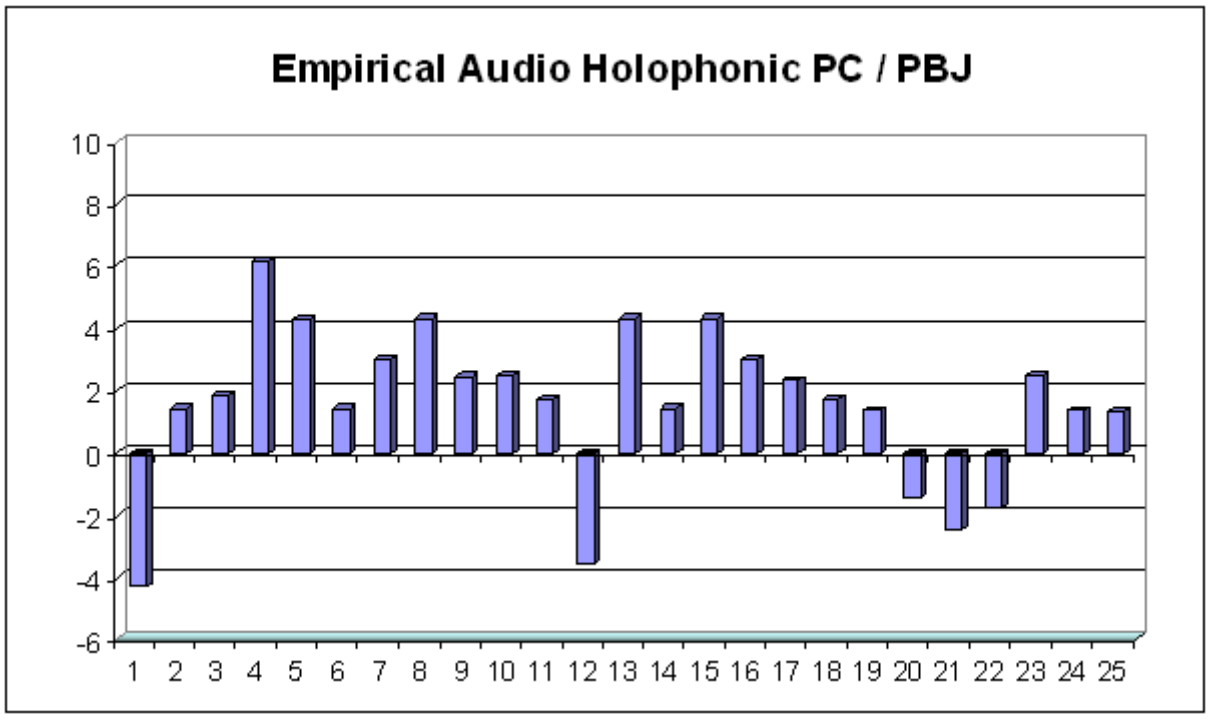


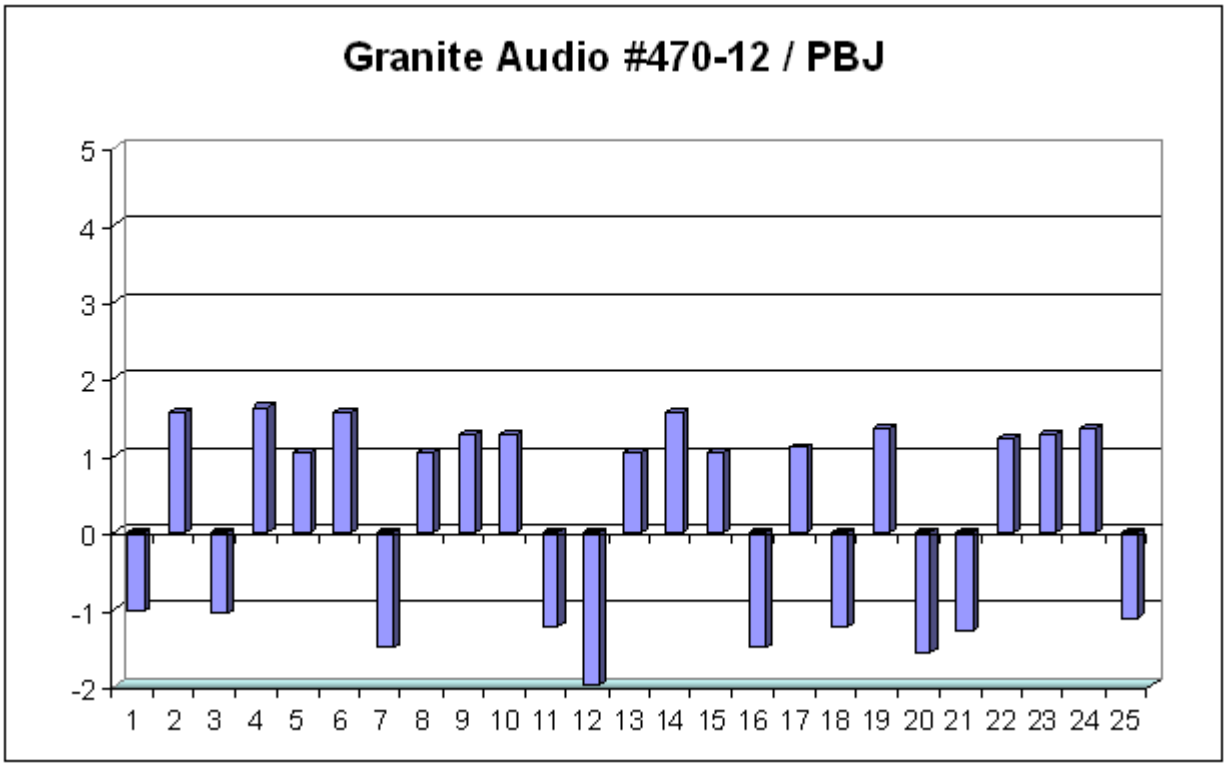

CAT-5 as per the published specifications… this cable is a good competitor as compared to the previous high-end cables.

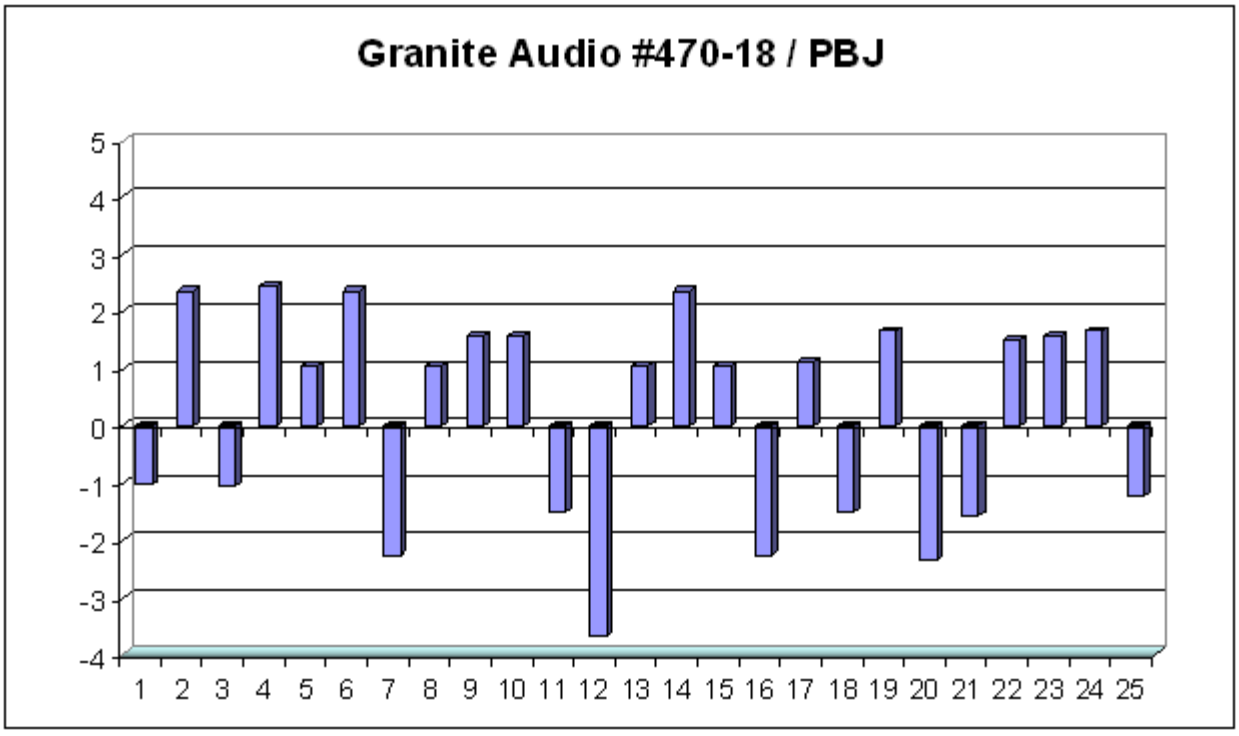
Round-Shielded Cable - Coax

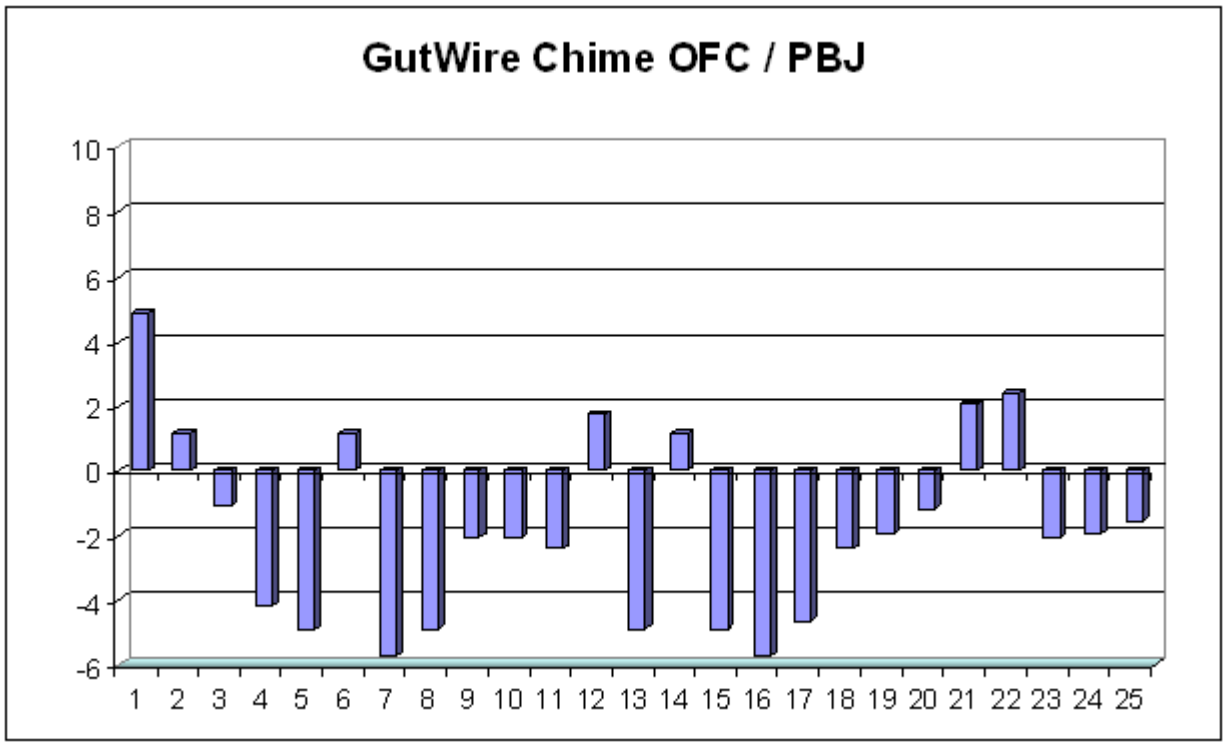


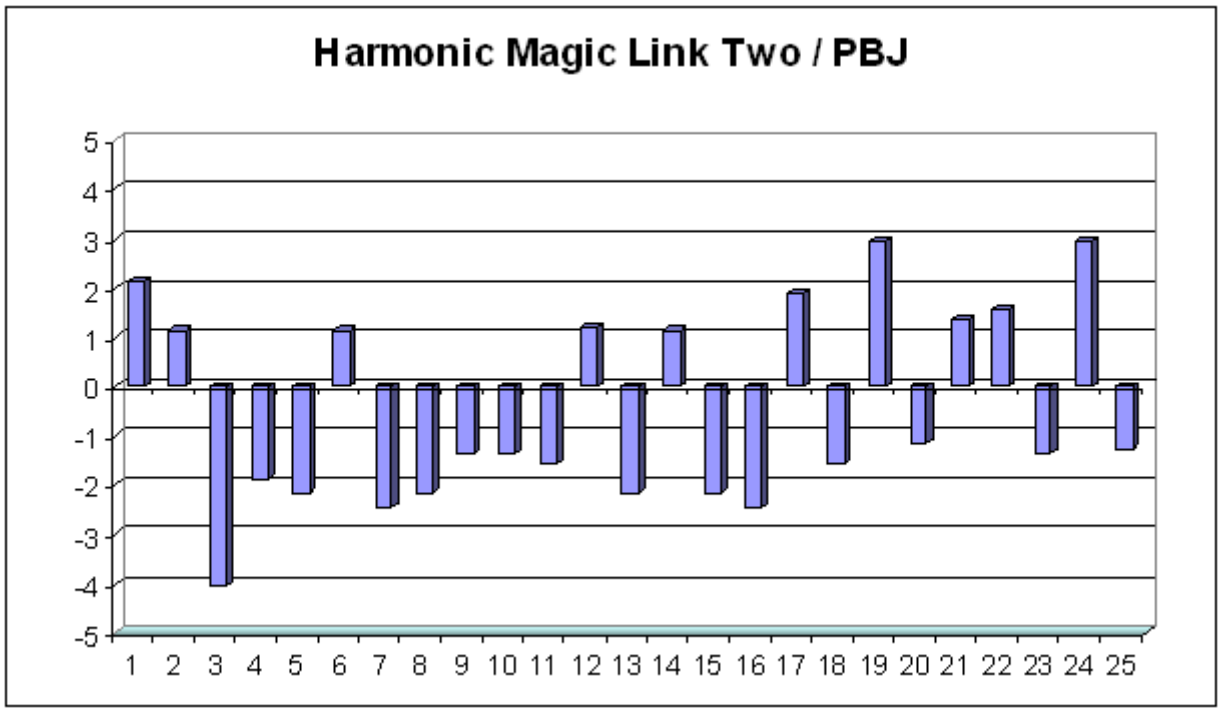

Empirical Audio Holophonic 2 SPC / PBJ
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

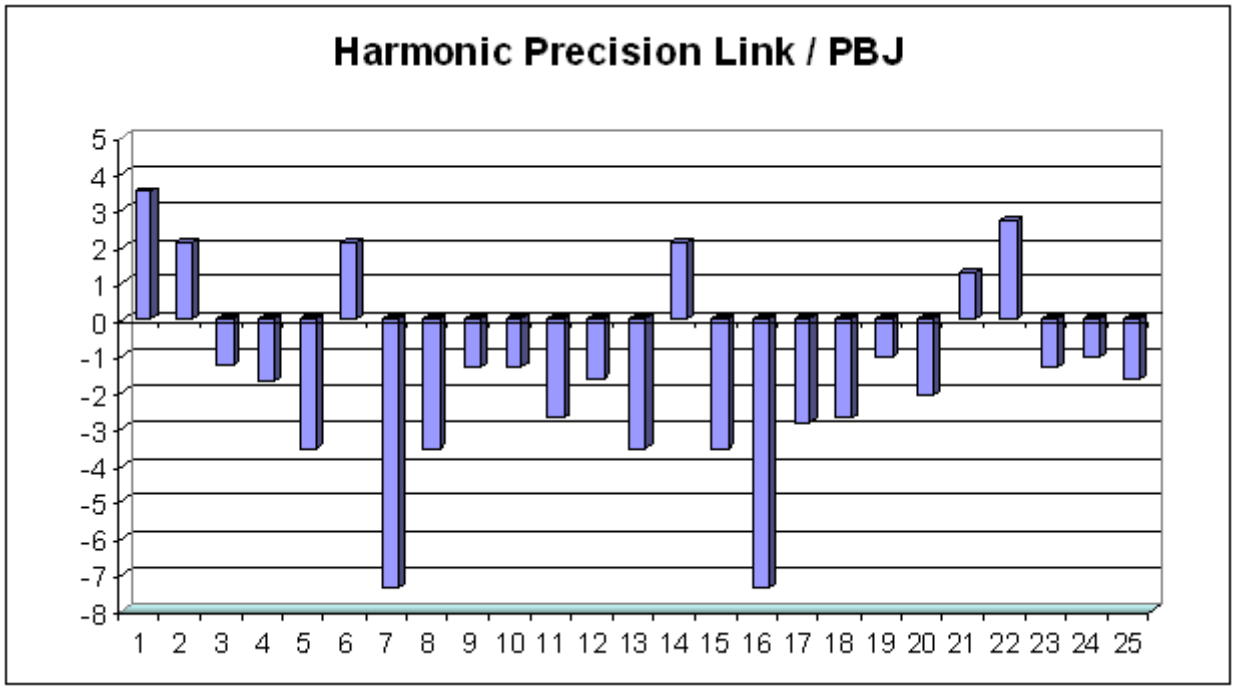

Empirical Audio Holophonic PC / PBJ
10
8
6
4
2
0
-2
-4
-6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

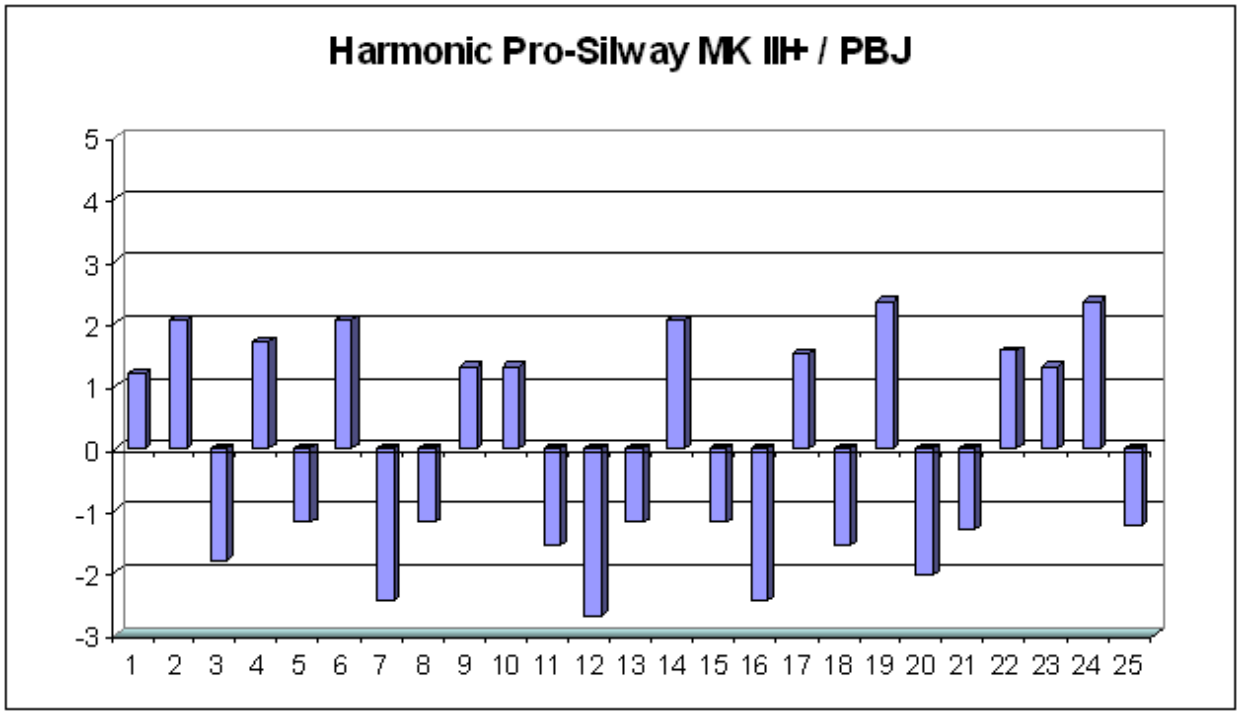

Granite Audio #470-12 / PBJ
5
4
3
2
1
0
-1
-2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

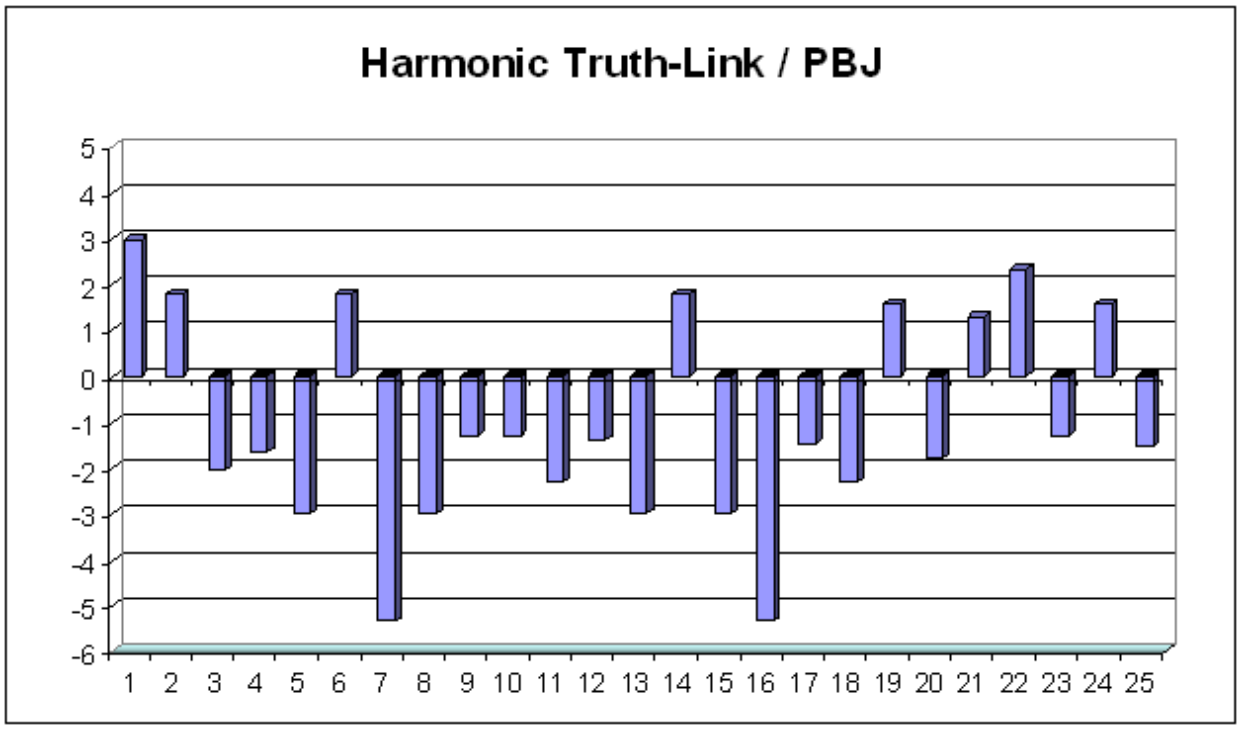

Granite Audio #470-18 / PBJ
5
4
3
2
1
0
-1
-2
-3
-4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

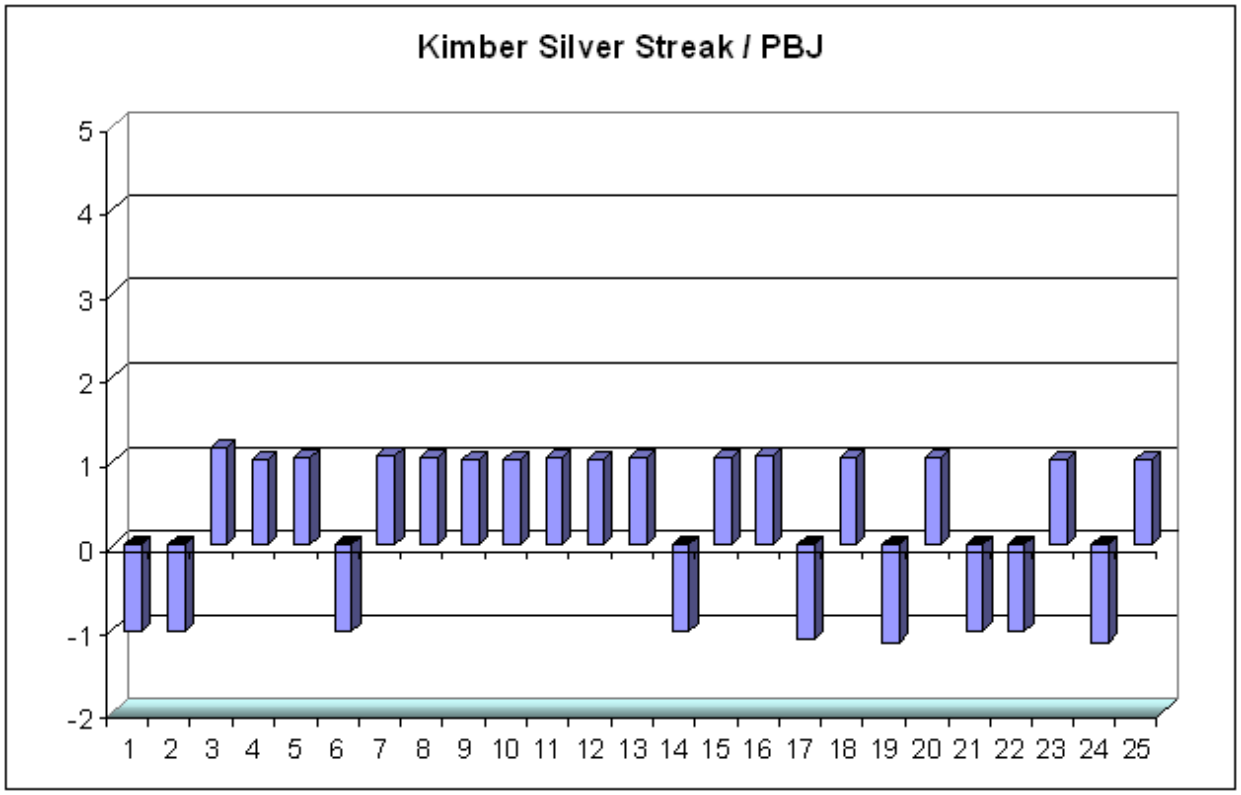

GutWire Chime OFC / PBJ
10
8
6
4
2
0
-2
-4
-6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

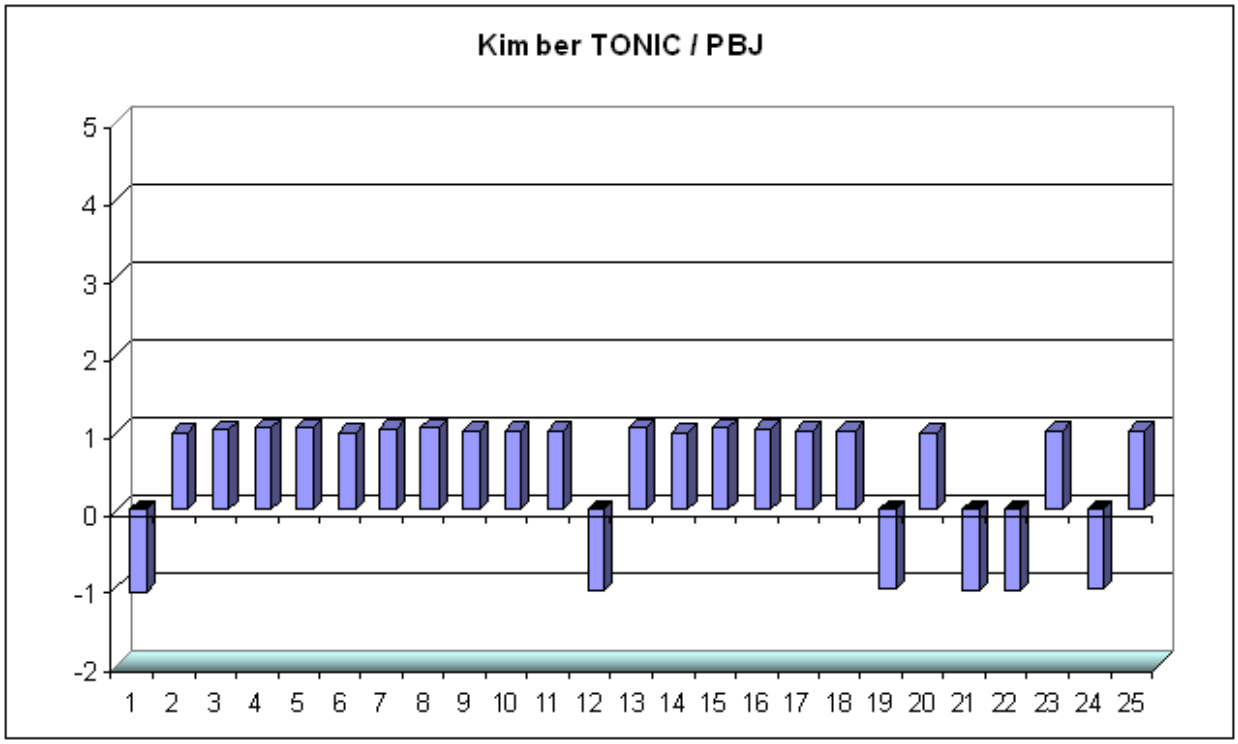

Harmonic Magic Link Two / PBJ
5
4
3
2
1
0
-1
-2
-3
-4
-5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

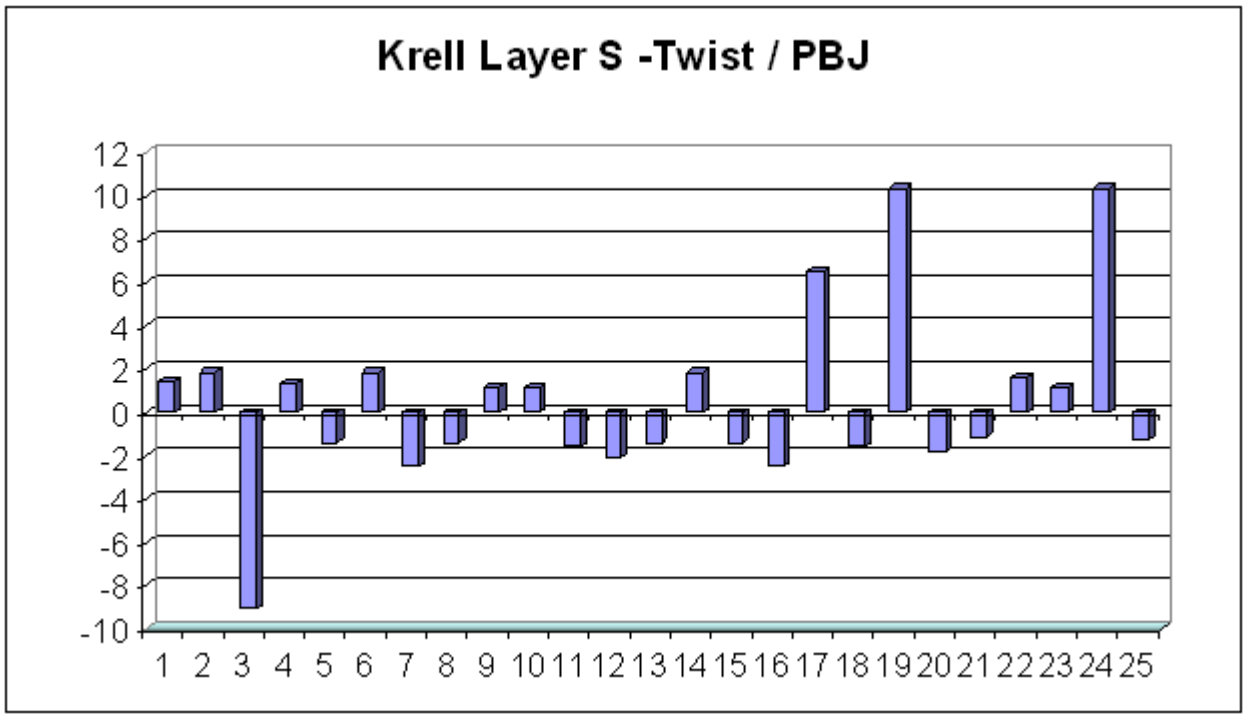

Harmonic Precision Link / PBJ
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


Harmonic Pro-Silway MK IIH+ / PBJ
5
4
3
2
1
0
-1
-2
-3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

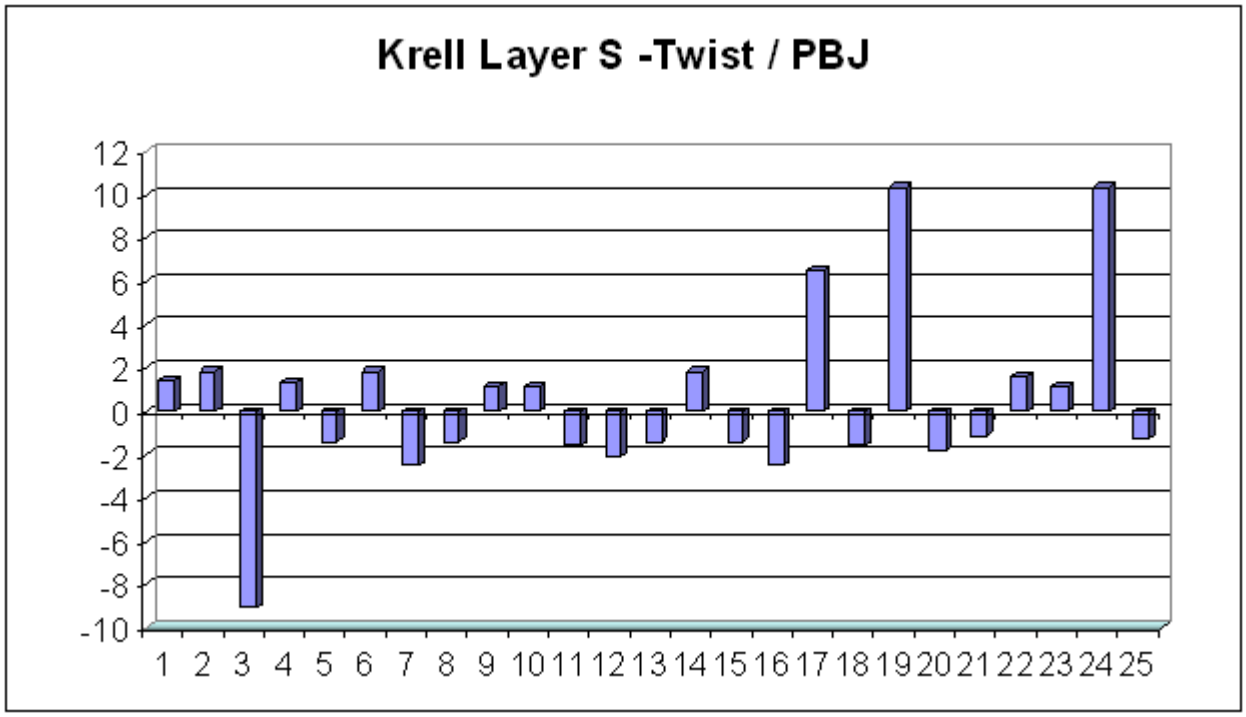

Harmonic Truth-Link / PBJ
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

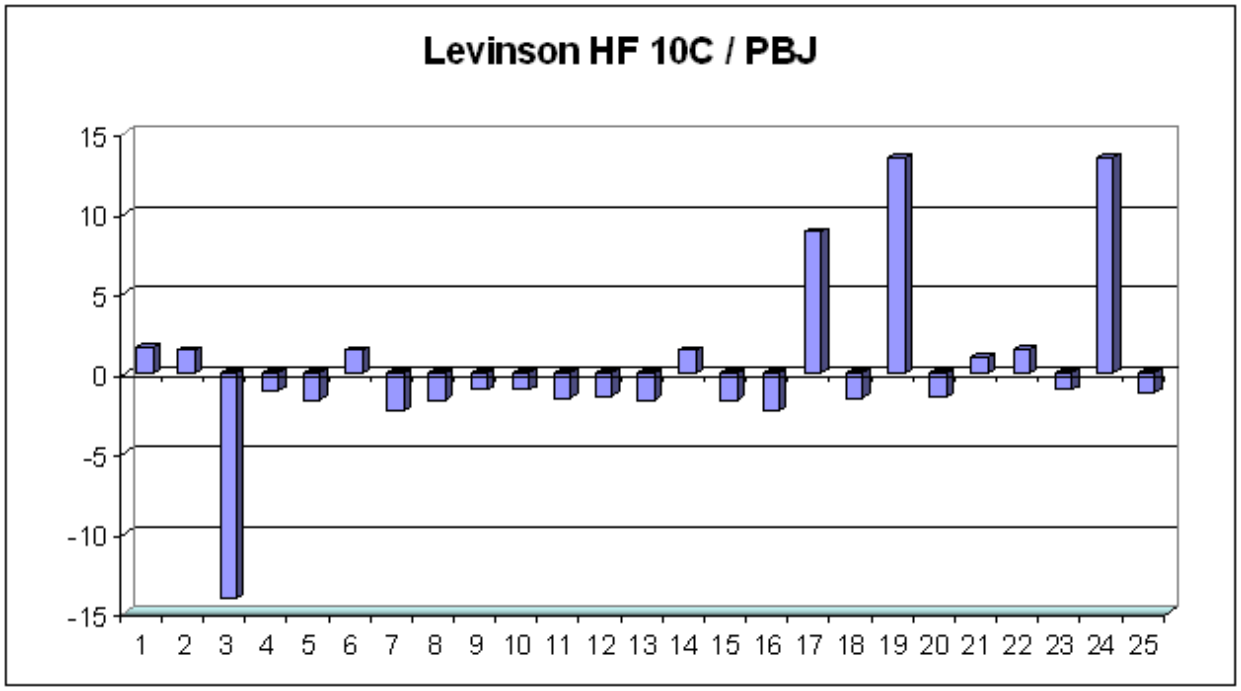

Kimber Silver Streak / PBJ
5
4
3
2
1
0
-1
-2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

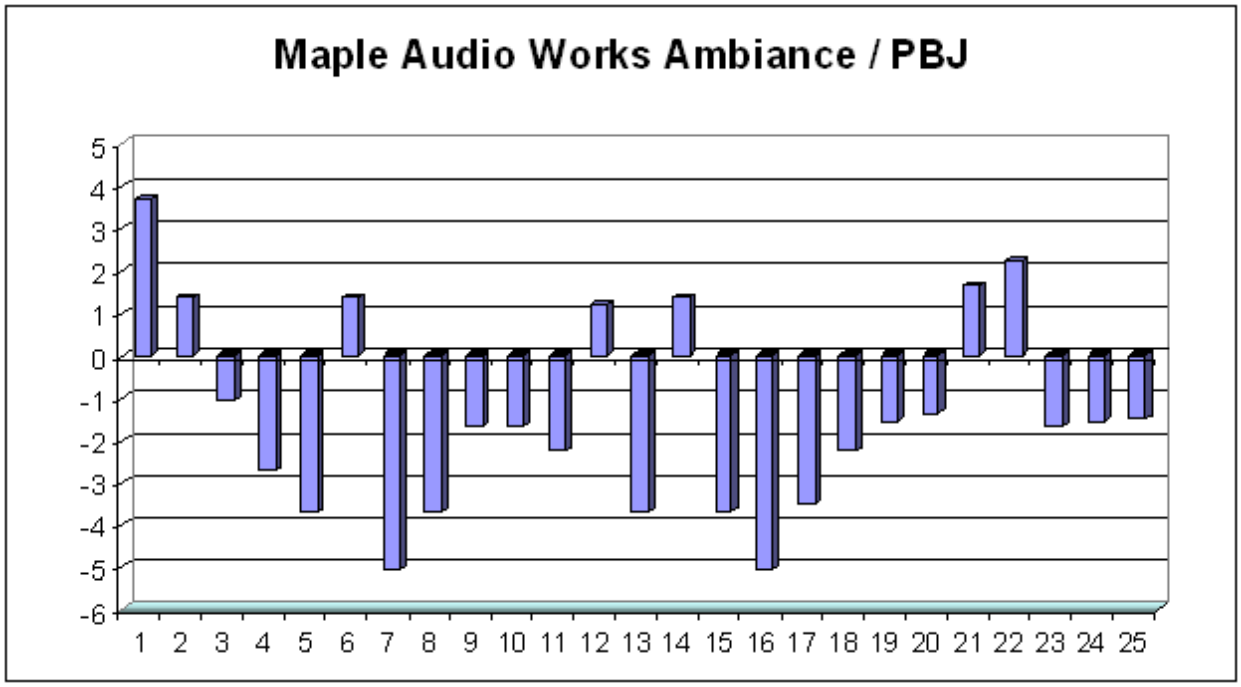


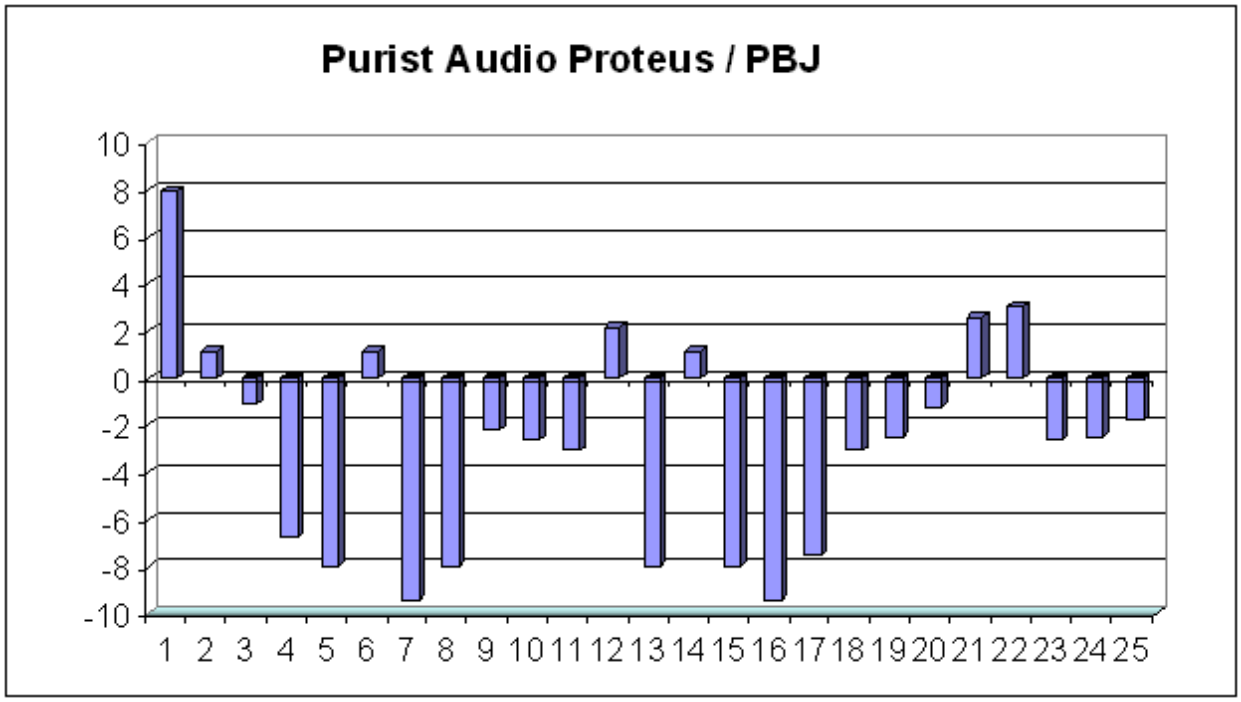



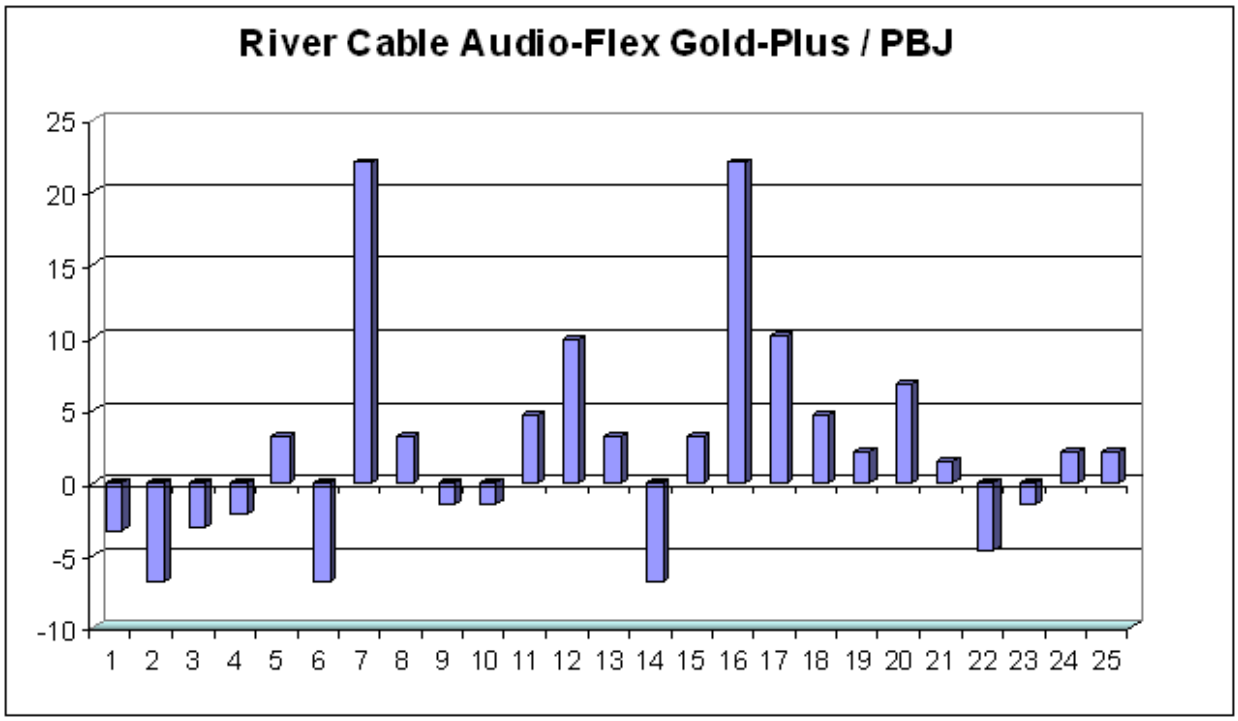

3: L/C Ratio 17 QZt / Rdc [Q = Zt / Rdc]
19 Q/Fr [QZt / Fr; resonant frequency of the cable]
24 Zo / Rdc (swr) [Zo / Rdc]

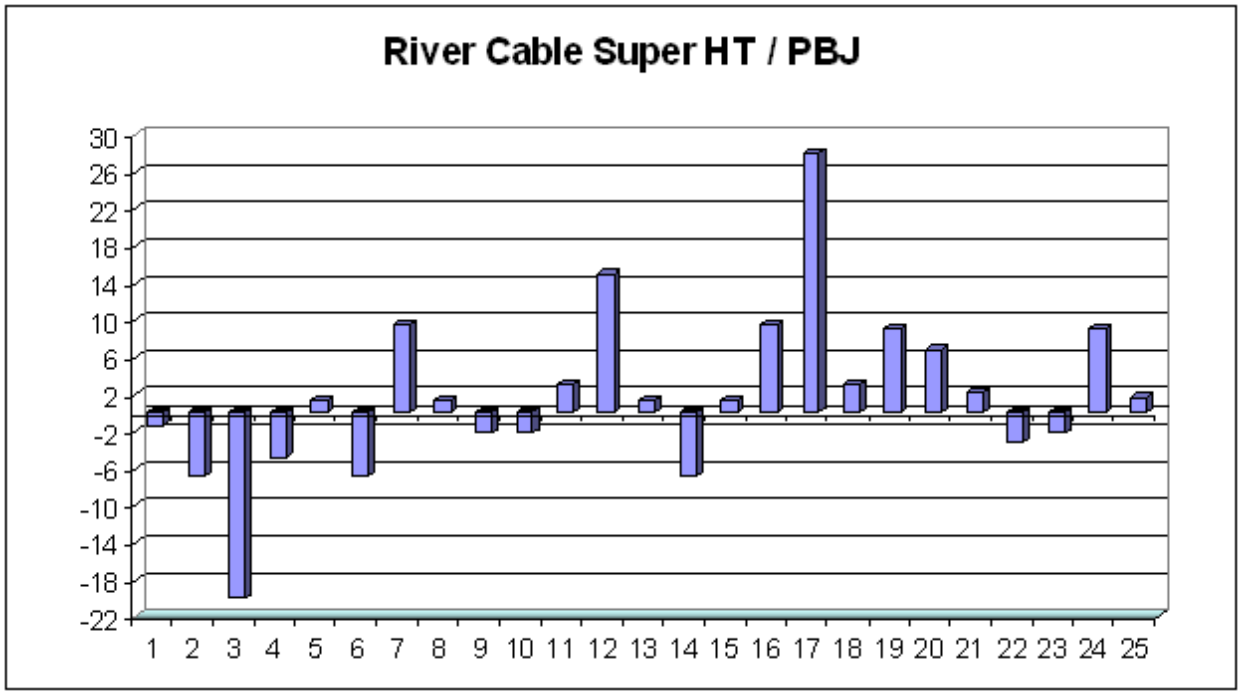

Krell Layer S -Twist / PBJ
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


Levinson HF 10C / PBJ
15
10
5
0
-5
-10
-15
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


Maple Audio Works Ambiance / PBJ
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


Purist Audio Proteus / PBJ
10
8
6
4
2
0
-2
-4
-6
-8
-10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25



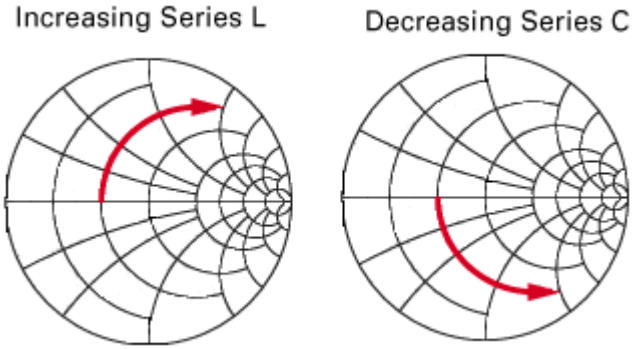



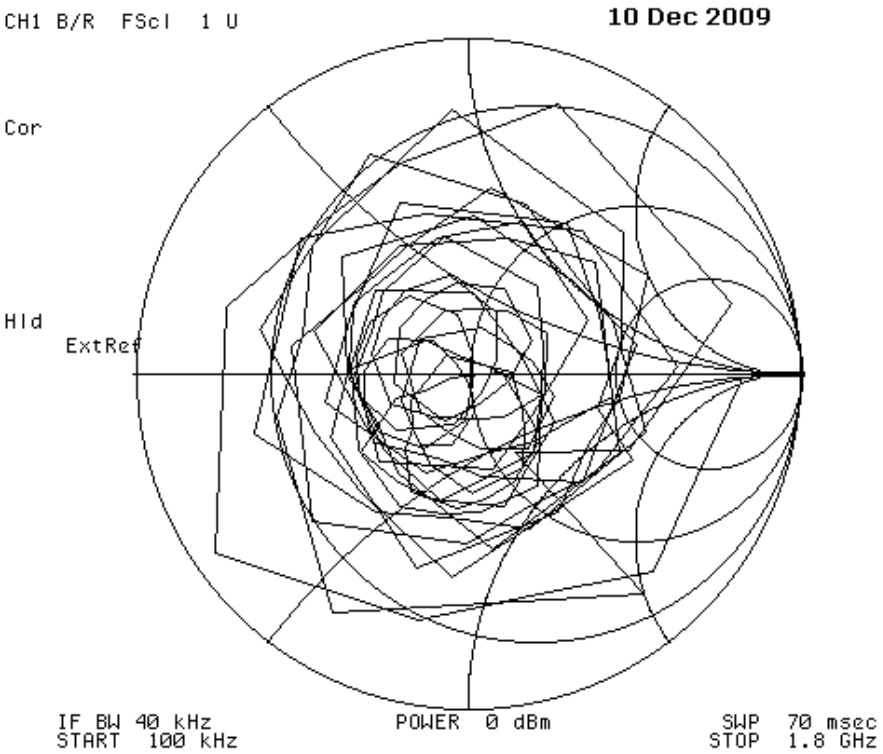

The previous graphs offer a simple process to compare cables using the published LCR specifications. To test your cables by using our RF Charting spread sheet program, just enter the L, C and R values into line **164** of the Spread Sheet called: **Cable-Tests-RF-Ratios.xls in the - CABLE CHARTS folder**. The **graph** below the 163, 164, 165 lines will automatically change as you type in the new manufactures L C R values.

# Smith Charts

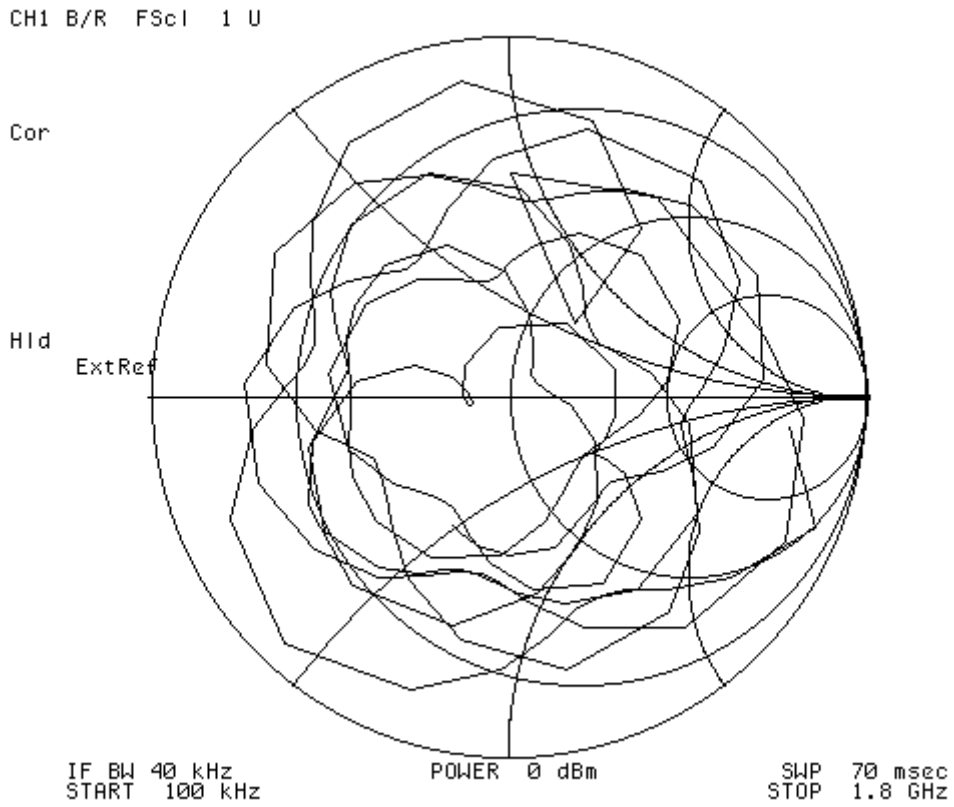
To conclude our cable test we will now show a few RF Smith Charts. Our RosVeta Fyra, a 2x2 cable, a manufactured ‘interconnect’ cable and a dual twisted-pair cable will be displayed. We did request a sample cable from several manufactures but they declined, which is ok we needed to finish this book.

The following charts indicate the RF characteristics of circuits as the frequency is changed from a low frequency to a pre-selected upper frequency. The circular chart is separated into three sections: top half Inductive and the lower half Capacitive and the horizontal-middle line represent the DC resistance value.




Zip-cord [6 Ft.]
This common Black Zip cord has many RF point of discontinuity. [corners]




**Twisted Pair**

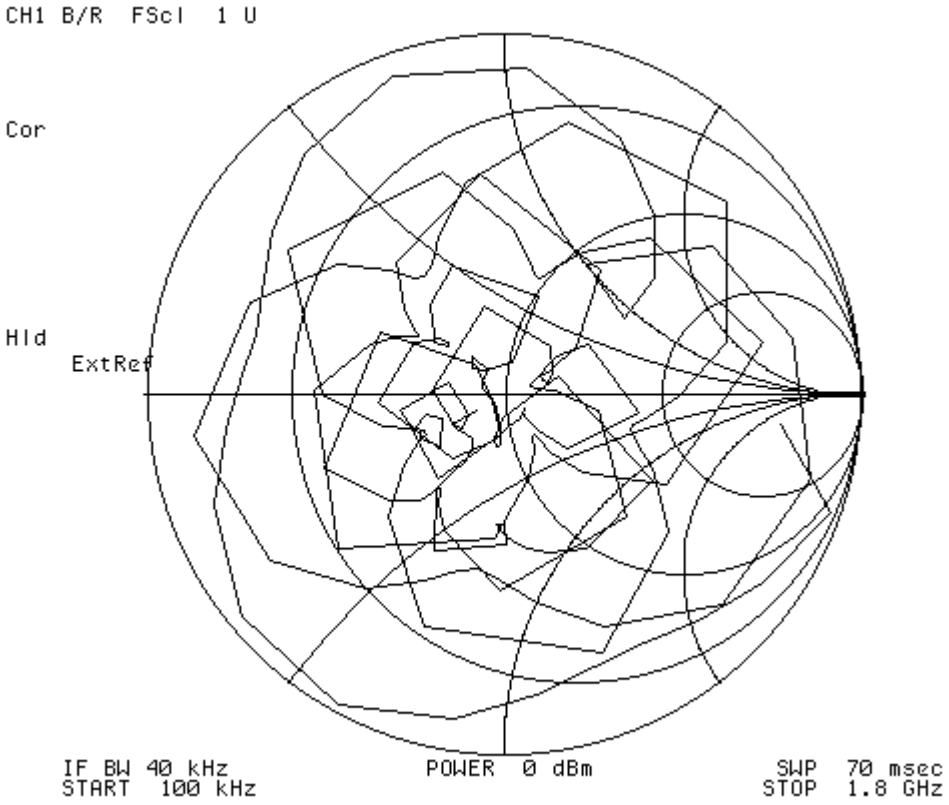
As stated before, Zip cords and 'twisted-pairs' are always used for derision to say these styles work as well as 'snake-oil-cables'.

Here we present a scientific measurement of a few cables as compared to these Standard' cords - cables.

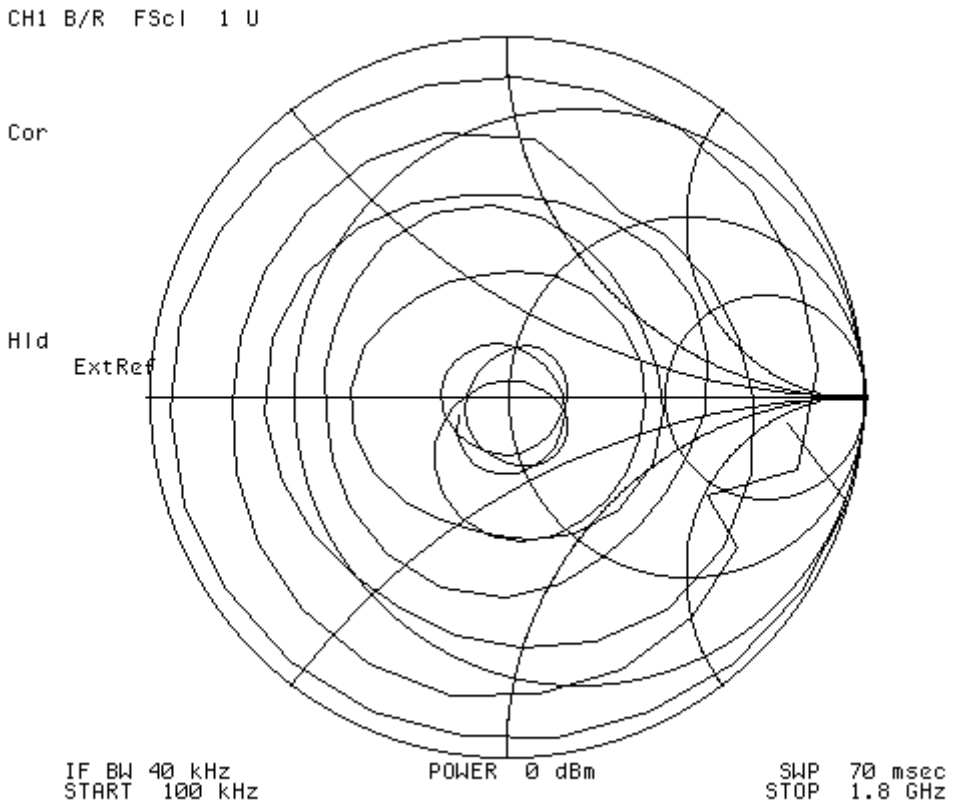
One simple interpretation of the previous charts is that the more the trace has quick-sharp changes the less uniform the RF characteristics are of a cable. Another point: notice how many times the trace makes 'circles', less the circles the better.

As you can see both of these standard cables have many sharp-edged changes, and many 'circles' as the frequency is swept through these *common* cables.

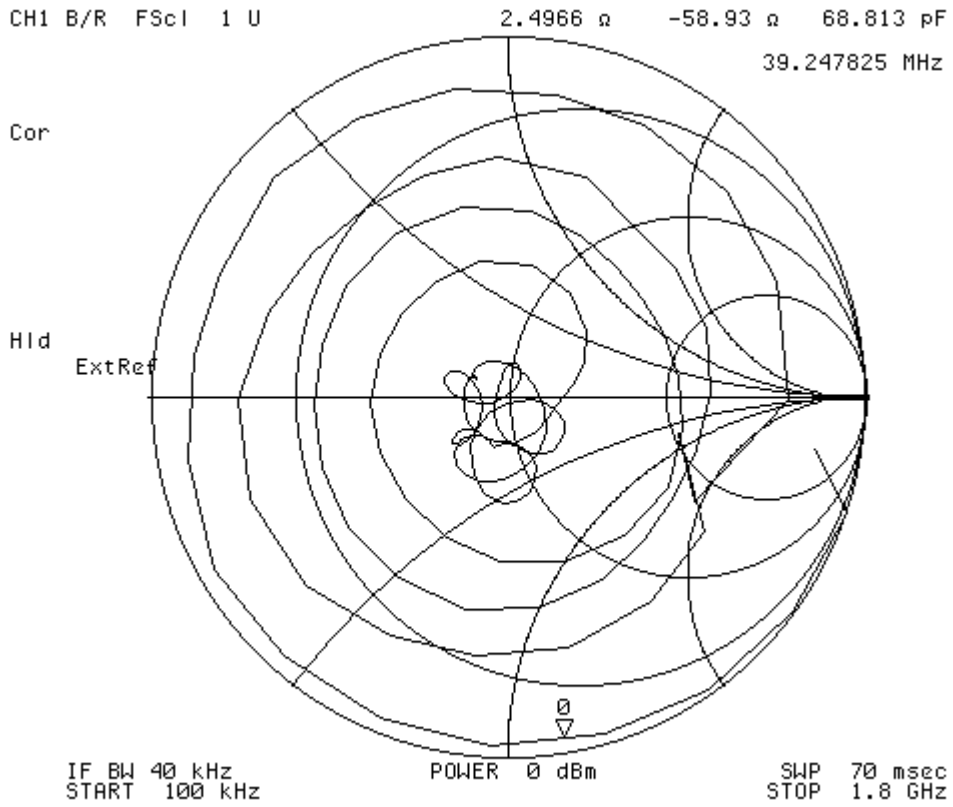
ALSO, notice that the **geometry** of the cables play a significant part in a cables RF response !



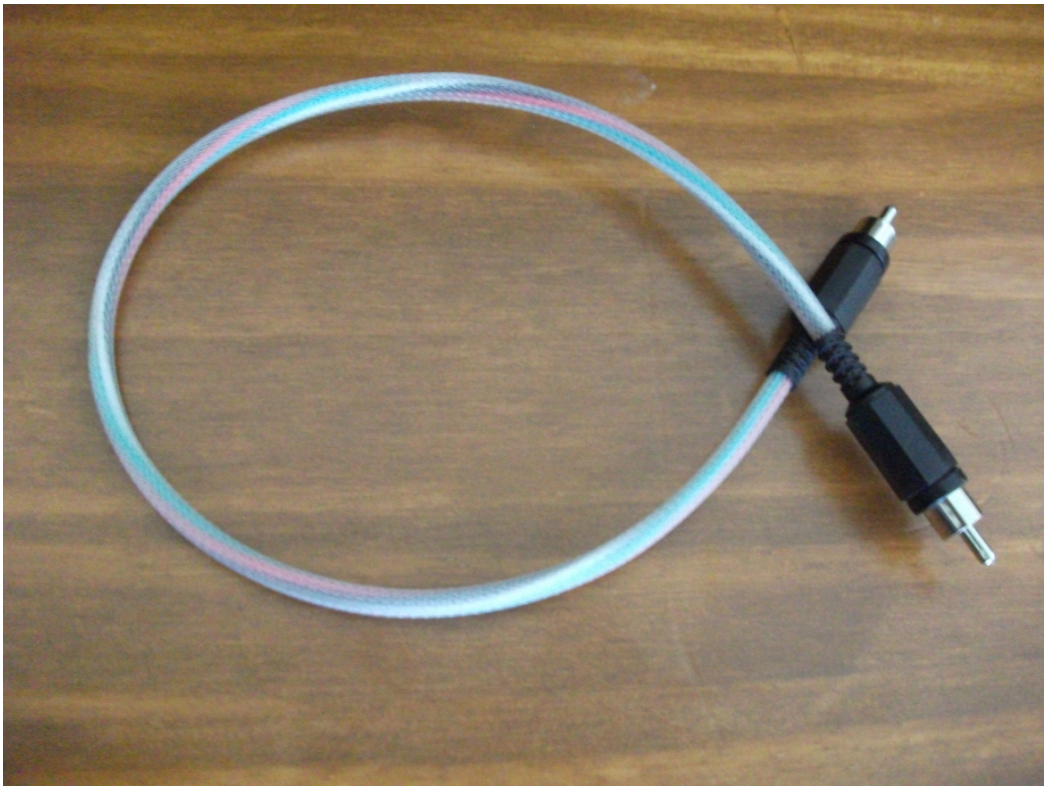

a home made three braid [1+red, 2- white]




Pc Audio Electronics HIGH Resolution Signal Cable: [nice trace]




RosVeta Frya 2x2 Cable, 4-wire configuration - 16 awg



Our RosVeta Frya 2x2 Cable, 4-wire configuration - 16 awg as shown above is made from a common four wire cable, like:

Parts Express - JSC 16 Awg 4-C, part number 100-756.

Take off the jacket…

Connect Black - Red and then connect the Green - White .
Add RCA connectors, cover with flexible covering.
Your cost will be ~ 75 cents foot plus the RCA connectors.

Enjoy…

Curtis Larson

RosVeta Audio