MOUNTAIN
SPARK
GAPS

NPARC—The Radio Club for the Watchung Mountain Area

Website: http://www.nparc.org
Club Calls: N2XJ, W2FMI
Facebook: New Providence Amateur Radio Club ((NPARC)

VOLUME 53 NO. 9 September 2018

Regular Meetings

10/8 & 10/22
Monday 7:30
DeCorso Community Center

Upcoming Events

Holiday Luncheon
12/8 Chimney Rock

Kids Day
Tentative
1/7 DeCorso Center

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
2nd Monday of each month at the
NP Senior & Adult Center
15 East Forth Street
New Providence

Informal Meeting: 7:30—9:00 PM
4th Monday of each month
Same location
Everyone is Welcome
If a normal meeting night is a holiday,
we usually meet the following night.
Call one of the contacts below
or check the web site

Club Officers for 2018

President: W2PTP Paul Wolfmeyer
201-406-6914
Vice President:K2GLS Bob Willis
973-543-2454
Secretary: K2AL: Al Hanzl
908-872-5021
Treasurer: K2YG Dave Barr
908-277-4283
Activities: KA2MPG Brian Lynch
973-738-7322

On the Air Activities

Club Operating Frequency
145.750 MHz FM Simplex

Sunday Night Phone Net
Murray Hill Repeater (W2LI) at 9:00 PM
Transmit on 147.855 MHz
With PL tone of 141.3 Hz
Receive on 147.255 MHz
Net Control K2AL

Digital Net
First & Third Mondays 9 PM
28,084 — 28,086
Will be using PSK and RTTY
Net control K2YG

Club Internet Address

Website: http://www.nparc.org
Webmaster KC2WUF David Bean
Reflector: nparc@mailman.qth.net
Contact K2UI, Jim

MOUNTAIN SPARK GAPS

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WB2QOQ Rick Anderson
W2PTP Paul Wolfmeyer
K2UI Jim Stekas

Climatological Data for New Providence for July 2018

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 36 years.

TEMPERATURE -
Maximum temperature this July, 99 deg. F (July 2)
Last July(2017) maximum was 94 deg. F.
Average Maximum temperature this July, 87.5 deg. F
Minimum temperature this July, 59 deg. F (July 8)
Last July(2017) minimum was 57 deg. F.
Average Minimum temperature this July, 68.9 deg. F
Minimum diurnal temperature range, 9 deg. (82-73 deg.)7/23
Maximum diurnal temperature range, 28 deg. (87-59 deg.)7/8,(91-63)7/9

Average temperature this July, 78.2 deg. F
Average temperature last July, 75.3 deg. F

Maximum daily temperature of 90 degs. or higher - 11 days this July;
6 days last July.

PRECIPITATION -
Total precipitation this July - 6.48” rain
Total precipitation last July - 4.41” rain

Maximum one day precip. event this July -

July 24, 1.68” rain
Measurable rain fell on 11 days this July,
12 days last July.

YTD Precipitation - 31.67”

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Rick Anderson
8/17/18
243 Mountain Ave.
New Providence, NJ
(908)464-8912
rick243@comcast.net

Lat = 40 degrees, 41.7 minutes North
Long = 74 degrees, 23.4 minutes West
Elevation: 380 ft.
CoCoRaHS Network Station #NJ-UN-10

President's Column September 2018

Unavailable.

Fun With Coax

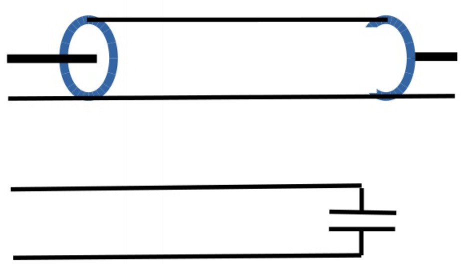
Jim Stekas - K2UI

Ask some typical hams to list the essential components of an amateur radio station and the list is sure to include an antenna, transceiver, key, microphone, SWR bridge, antenna tuner, computer, DVM, handbook, soldering iron, and on and on. I imagine very few would think to include coax on their list, but go into any station and remove the coax and that station would be off the air.

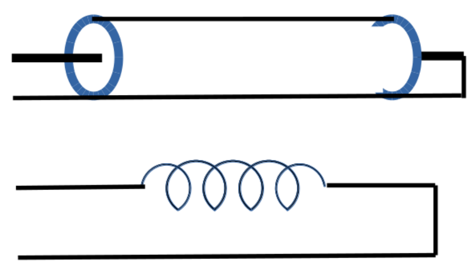
The great thing about coax is that it carries RF from point A to B with negligible leakage and interference. The outer shield keeps RF energy inside the cable from leaking out, and RF energy outside the cable from getting in. We can run coax through walls, around corners, up towers, next to power lines[1], and what goes in one end comes out the other – pretty much.

For the coax to do its job we must terminate it with the proper impedance, usually 50 Ohms. What does this mean? How does the coax "know" what it's connected to?

To answer this imagine a 100 ft. length of RG8 coax. Assuming it is terminated with a 50 Ohm load (e.g. antenna) the power source (transmitter) will "see" 50 Ohms at the other end. Add an additional inch of coax and we still see 50 Ohms at the source, which is a bit weird because a small piece of coax acts like a little capacitor (below left). But if we short one side the little capacitor now looks like a little inductor (below right).

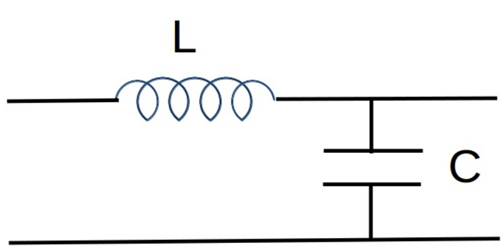


Open Piece of Coax



Shorted Piece of Coax

Both of the above models of a short piece of coax can be combined into a single model (below) which behaves like a capacitor when open and an inductor when shorted.



Short Coax Circuit Model

1 Cable providers like Comcast run their coax on the same poles that are used for AC power. Sensible hams keep feeders and antennas well clean of power lines.

If we connect a resistor, R, to the end of a short piece of coax the circuit model allows us to calculate the impedance, Z, at the other end.

$$Z = jX_L + \frac{jX_C \cdot R}{R + jX_C} \quad \text{or} \quad (Z - jX_L)(R + jX_C) = jX_C \cdot R$$

But if the coax is to work, the short piece must be “transparent” and look like R on the input side, so we must have $Z = R$. Setting $Z = R$ and doing a little algebra ...

$$(R - jX_L)(R + jX_C) = jX_C \cdot R$$

$$R^2 + X_L X_C = jX_L \cdot R$$

As the coax gets very short, $X_C \rightarrow -\infty$ and $X_L \rightarrow 0$ but their product remains finite and we have:

$$R^2 = |X_L| \cdot |X_C| = \omega L \left(\frac{1}{\omega C} \right) \quad \text{or} \quad R = \sqrt{\frac{L}{C}}\ .$$

This is the formula for the characteristic impedance of a coaxial cable where L and C are usually given per unit length. Doubling the length of our short piece of coax will double L and double C and their ratio is independent of length.

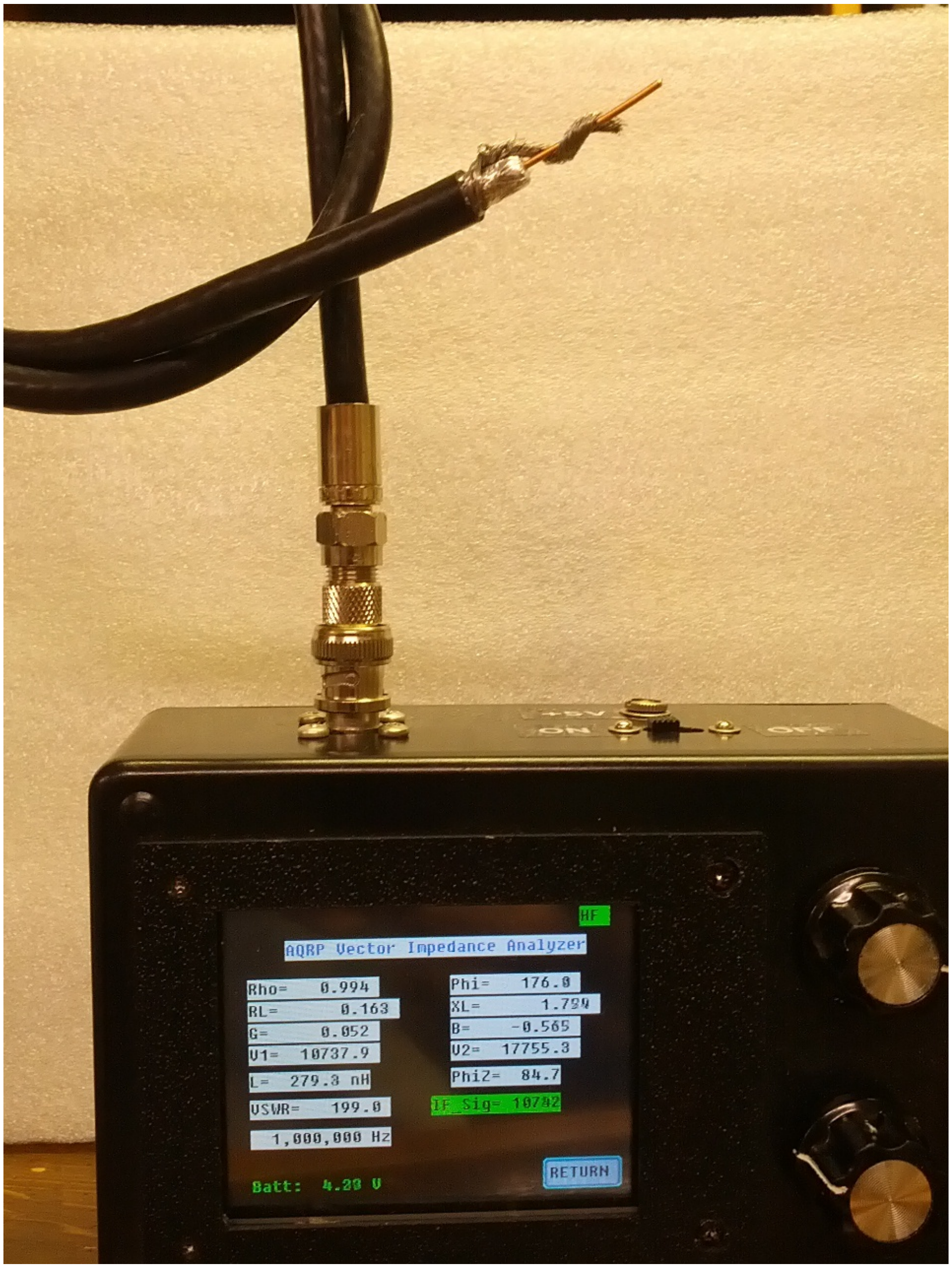
Note that jX_L is the shorted impedance of the piece of coax, and jX_C is the open impedance. So we could also express R as $R = \sqrt{|Z_{short} Z_{open}|}$ in this case. Curiously it turns out that this formula works not only for short pieces of coax, but for any length that isn't an exact multiple of $\lambda/4$.

If you have a network analyzer to measure impedance you can use the open/short technique to determine the impedance of an unknown piece of coax. Although it's easier to read the coax product info off the outer insulator and look up the specs, but let's try it the hard way and see how it works ….

A scrap piece of RG-6 about 18 in. long was used to test the open/short technique of determining characteristic impedance. RG-6 is a low loss cable used by CATV providers and as a characteristic impedance of 75 Ohms.

Below is the measurement of the open condition. My network analyzer gave a reading of C = 41.5 pF at a test frequency of 1 MHz. Given that the wavelength of 1 MHz is 300 meters the coax can be considered “short”.

The shorted measurement (below) gave a value of L = 279 nH.



Applying the formula:

$$R = \sqrt{\frac{L}{C}} = \sqrt{\frac{279 \cdot 10^{-9}}{41.5 \cdot 10^{-12}}} \approx 82\, Ohms$$

This is about 10% higher than the RG-6 spec of 75 Ohms. Not too bad.