Testing Cable Loss with a Spectrum Analyzer

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Solution: A spectrum analyzer with a tracking generator can be a useful piece of test gear. This application note covers making a simple loss measurement on a coaxial cable with BNC connectors.

Required:

- Two N-type to BNC Adapters. Select adapters that convert N-type (in/out connectors on most spectrum analyzers) to the cable type you are testing. Also note that higher quality connectors (Silver plated, Beryllium Copper pins, etc..) equal better longevity and repeatability.

![Figure 1: N-type to BNC adapter](image)

- A short reference cable with terminations that match your adapters and cable-under-test.
– An adapter to go between the reference cable and the cable-under-test. This experiment will use a BNC “barrel connector”. Note that higher quality connectors (Silver plated, Berylium Copper pins, etc..) equal better longevity and repeatability.

![Figure 2: BNC barrel adapter](image1)

– Alternately, you can use two adapters a short cable as a reference assembly to normalize the display before making cable measurements. This removes the need to have the cable-to-cable adapter.

– Spectrum analyzer with Tracking Generator (TG)

**Steps:**

1) Turn on Spec An and attach adapters to the tracking generator (TG) output and RF Input.

2) Connect the reference cable to the TG out and RF In.

![Figure 3: Measuring reference cable](image2)
3) Adjust Span of scan for frequency range of interest.

4) Adjust TG output amplitude and spectrum analyzer display to view the entire trace.

5) Enable TG.

*Figure 4: Reference cable insertion loss before normalization.*
6) Normalize the reference insertion loss. This mathematically subtracts a reference signal (stored automatically) from the input signal.

- With the Rigol DSA815 Press TG > NORMALIZE > STOR REF and then Enable Normalize

![Figure 5: Reference cable insertion loss after normalization.](image)

7) Disconnect the reference cable from the RF input.

8) Place cable-to-cable adapter (BNC barrel or other) and connect to the cable to test.
9) Connect the cable-under-test to test to RF input and enable the TG.

*Figure 6: Cable-under-test connected.*

The screen displays the cable-under-test losses plus the error of the cable-to-cable adapter.

*Figure 7: Cable-under-test loss.*
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