Application Note

08/27/2007

Noise Scan Testing

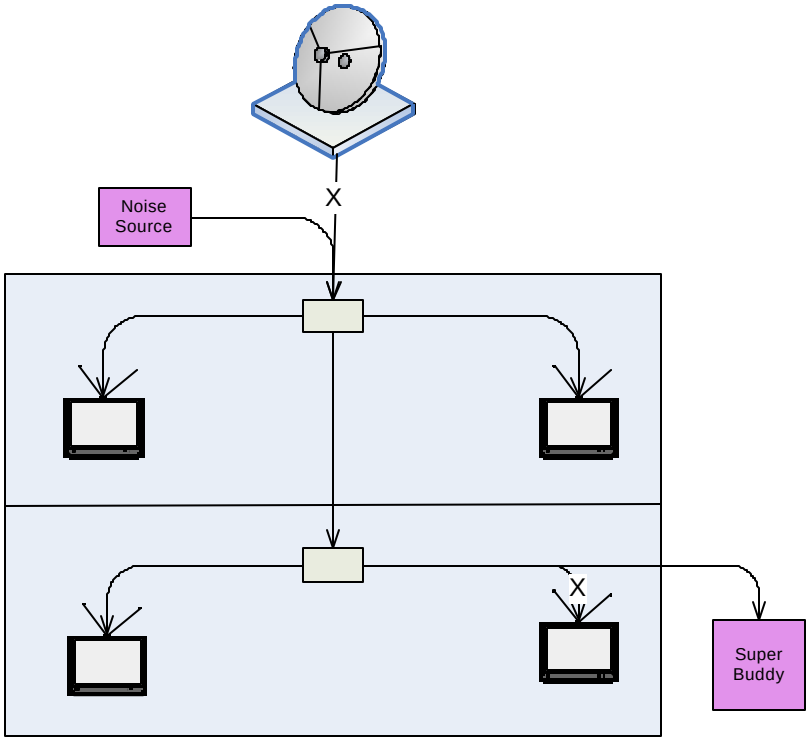
The Super Buddy™ Signal Level Meter includes a Noise Scan feature that simulates a sweep test for testing cable wiring within a building. This function tests the frequency response of the cable system to determine if it is suitable for L-band distribution.

Theory of Operation

This function uses a noise source such as the Applied Instrument's model NS-1 to inject RF power across the entire L-band spectrum into the cable network. The noise source is connected where the satellite signal would normally enter the building.

The Super Buddy is then connected at the drop points within the building and a measurement scan is performed. The scan compares the present readings with a previously stored reference reading to determine the effect of the cable system on the RF signal. The data is displayed graphically along with summary readings.

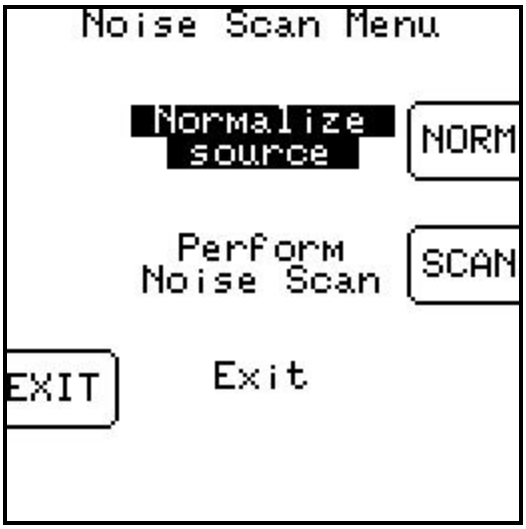
When given the expected RF level entering the network, the Super Buddy uses the measured losses to calculate the expected min/max levels at the receiver. These are compared to limits and a Pass/Fail indication is given.



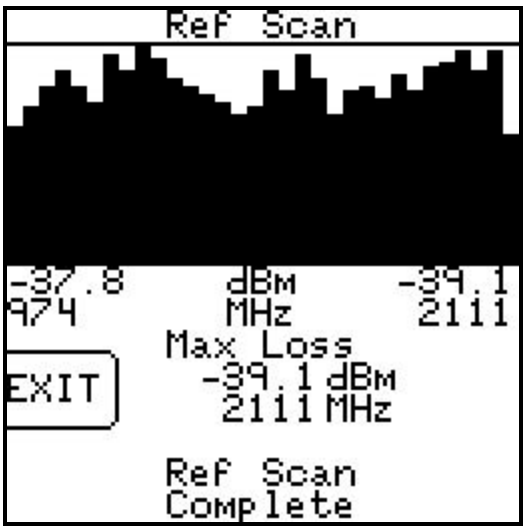
Normalization Scan

This step is required before scanning a system to normalize the readings to the noise source.

1) Connect the noise source (NS-1) directly to the Super Buddy using a short jumper cable.
2) Turn the noise source on.
3) On the Super Buddy, select:
   a) MENU
   b) Noise Scan
   c) Normalize Source



The Super Buddy will then scan through a standard set of 32 frequencies and store the signal level at each frequency. This reference scan is stored in the Super Buddy and used in subsequent Noise Scans.



(Note: the data shown above is NOT representative of a real scan.)

You should run a new normalization scan whenever you use a different noise source or suspect the noise source has changed output level.

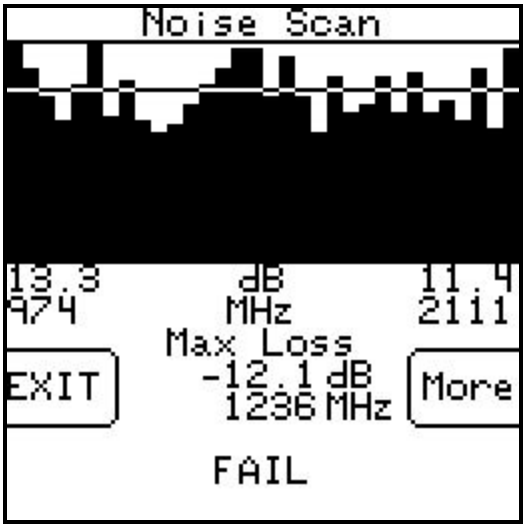
You can check your normalization scan by performing a regular noise scan while the noise source is connected with the same short jumper. The readings in this case should only differ from the reference normalization scan by a few tenths of a dB.

System Scan

Now connect the noise source to the cable system in place of the dish antenna. Turn the noise source on and leave it there while performing system scans in other parts of the building.

1) Connect the Super Buddy to a service drop in place of the receiver.
2) Select:
   a) Menu
   b) Noise Scan
   c) Perform Noise Scan

The Super Buddy will scan through the same 32 frequencies and compare the reading to the stored normalization reference. The difference is the signal drop caused by the cable network at each frequency. This drop is displayed graphically as the data is collected.



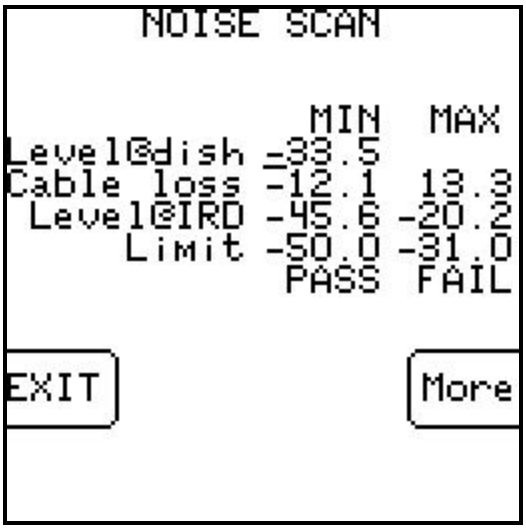
(Note: the data shown above is NOT representative of a real scan.)

The results screen shows the signal loss at the low and high frequencies and the maximum loss found. The pass/fail result is displayed at the bottom.

The graph is usually scaled so that 0 dB loss is at the top of screen. The measured loss is plotted across frequency and the area below the measured data line is shaded.

If a gain is measured, a zero line is drawn across the screen, in inverse color where it crosses the shaded portions. The graph above shows positive gain and hence the horizontal line. This is not the usual situation but may occur if amplifiers are used in the cable network.

Press the MORE key to display the limit screen:



This screen lets you enter the expected level at the dish. It displays the min and max measured cable loss and calculates the min and max level that would result at the IRD. These levels are then compared to min and max level limits, which may be changed, and individual PASS/FAIL indications are shown.

You may press the MORE key to return to the results summary screen or the EXIT key to return the Noise Scan Menu screen.

Analysis

The test shows several items which are important in determining the health of a cable system.

First, the RF level that will reach each receiver is critical. Most receivers require an input level of around –50 to –31 dBm. If you know what level you can expect from the intended dish, this test will estimate the levels that will reach the receivers.

Check the specifications for the receivers that you expect to be used and make sure these limits are appropriate. The limits will be stored and do not need to be reentered each time.

If the estimated levels are too low, you may need to add an amplifier. You can check the effect of adding amplifiers by increasing the expected level at the dish by the gain of the amp. The screen will recalculate the level at the IRD and check the new values against the limits.

Second, a faulty cable network may show abnormally large losses at certain frequencies. This will show up as a large dip in the graph at a certain frequency. This should always be considered a problem even if it passes the limit check since the fault may worsen and lead to a system failure. Faults of this kind may be caused by bad connectors, broken or damaged cable or water in the line.

Higher frequencies are attenuated more than lower frequencies as they travel through a cable. Therefore you should expect a slight left to right downward tilt in the displayed graph. RG-6 will have better performance than RG-59 cable. The longer the cable the more loss, so RG-6 cable may work where RG-59 cable won't. This test will indicate if the existing cable, whatever kind it is, is good enough for distances it actually covers.