

D-ENG Signal Quality Monitors

Introduction

The development of digital signal quality monitors for ENG has been a hotly debated topic since the first COFDM systems went on the air. News directors quickly learned about the digital “cliff”, and the arrival of this new knowledge was sometimes during a live broadcast. TV Engineers and news crews who had always relied on AGC as their golden yardstick soon discovered that their world had changed, and that a new way of monitoring must be found.

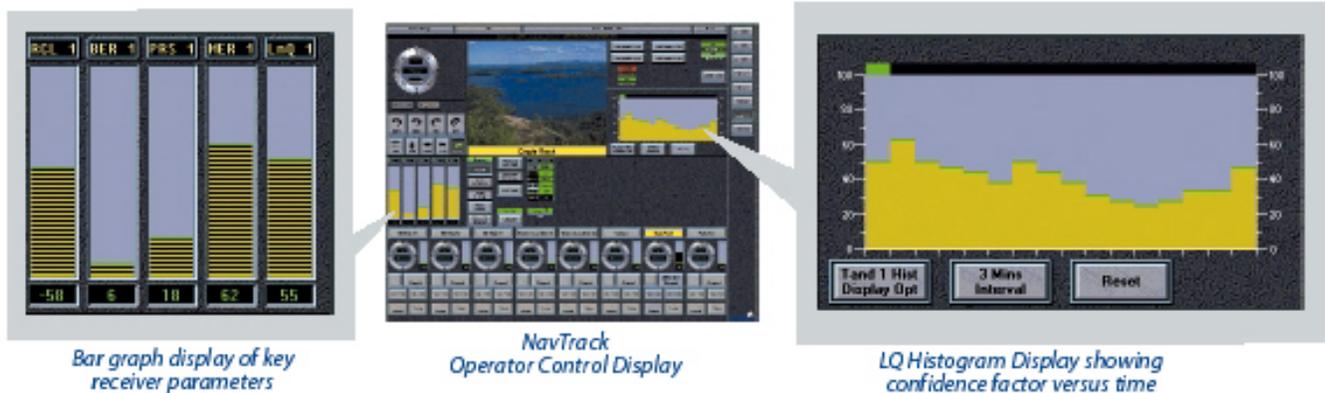
The Digital Link Quality Monitor

MRC introduced the nation’s first COFDM news gathering systems, and was first to recognize the issues associated with signal acquisition and the cliff effect. A new ENG confidence monitor was developed to analyze key receiver parameters, including pre and post Viterbi error correction, recovered signal to noise ratio, and received carrier level. Each parameter was given a weighting factor, and the sum of all weighted parameters was called digital Link Quality, or simply LQ.

The first LQ system displayed a confidence factor readout of 1 to 99 and provided better information than was previously available. However, the dynamic range was limited, and the signal processing delay made it difficult to find signal peaks when panning the antenna. It was also difficult to rapidly assess which direction the LQ was trending towards, the cliff or the overload point.

A New, More Effective Link Quality Monitor

The latest version of MRC LQ still displays all of the same parameters, except now it’s done in real time, while still providing a weighted LQ value. Also, a highly effective new tool has been added; a variable persistence histogram display that displays trends as they develop.



Typical LQ displays as seen on a Troll S750 antenna control system

The histogram display can be easily adjusted to suit an operators need to monitor varying conditions in the field, and still provide confidence level at a glance. For example; the histogram sampling time may be set for a one second refresh rate, giving a news director the ability to see rapidly changing trends on an ENG path just before, or during air time. The sampling time can also be lengthened, providing valuable insight into long-term trends for extended remotes. ,

The MRC Digital Link Quality monitor is also the fastest way to achieve accurate signal acquisition. The combination of received signal level and signal to noise ratio allow fine tuning to the most robust signal path, which may not always be the path with the strongest RF level, a phenomenon that did not exist in the “analog only” domain.



Engineers and news directors both agree that reliable signal quality monitoring is an absolute necessity for ENG. Industry supported field-testing of the two most prominent monitoring methods, MRC Link Quality and RF spectrum analysis, has proven conclusively that MRC's latest Link Quality implementation is the one approach that provides the highest value to the ENG operator with an uncomplicated, but highly effective display.

Spectrum Viewer

Some customers have asked for the capability of adding a 2 GHz spectrum display to enable visual observation of their own ENG signal, as well as any in band interference. While the new MRC LQ histogram display provides a high degree of accuracy in monitoring real time trends, we understand that some engineers are more comfortable with a view of the RF spectrum. Although it does require a well trained eye, the spectrum analyzer display can be a valuable aid to seeing trends develop, and to understanding the nature of interference. There are several ways to accomplish this:

Monitoring the entire spectrum directly at 2 GHz

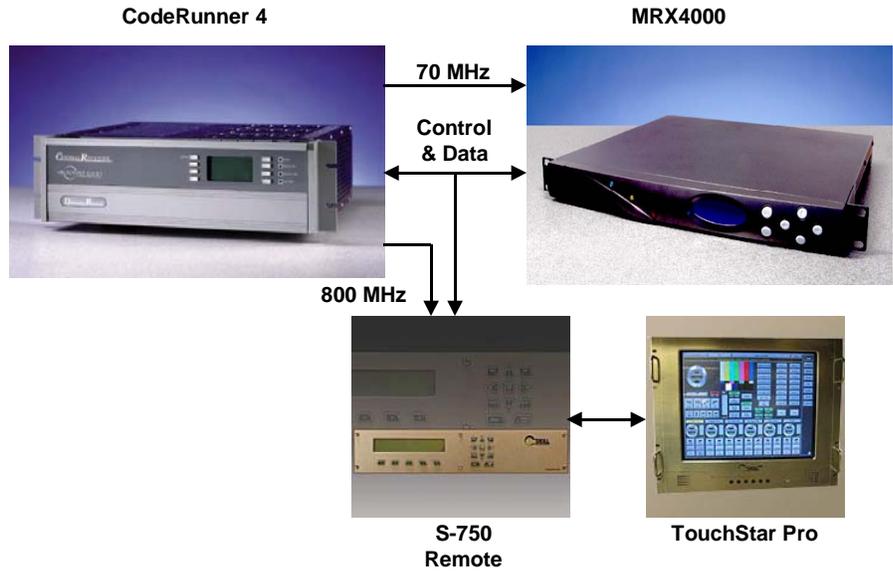
This requires an RF coupler inserted in the transmission line before the ENG Central receiver input. To avoid excess loss to the Central Receiver, a 10 to 1 power split is typically used, with the 10 dB side towards the analyzer input. This method does provide a direct view of the 2 GHz band after the channel filter and LNA, but the dynamic range of analyzer may not match that of the ENG Central Receiver for overload and/or sensitivity

Monitoring the 70 MHz IF

A view of the IF output will clearly show COFDM and analog signals in the passband of the receiver, and can be a valuable aid in aligning the antenna. It will show co-channel interference, but not adjacent channel interference. In the case of a 70 MHz monitor, or a 2 GHz monitor located at a remote site, the display graphics may cause a processing delay to be incurred by limited downlink speed to the studio, which can preclude real time results.

Monitoring the 800 MHz first IF

This is the choice made by MRC and Troll for the spectrum viewer option offered with an MRC - Troll combined system. The MRC first IF is at 800 MHz, and allows a view of the wanted signal, plus one full channel on either side. The greatest percentage of interference is either co-channel or adjacent channel, making this solution ideal for virtually all applications. In addition, the display graphics are generated at the studio, and only low speed data is transferred from the remote site, assuring real time performance.



MRC – Troll Spectrum Monitor

In Summary

The second generation MRC Link Quality monitor now provides real time signal metrics and a variable persistence histogram. This easy to use LQ display will provide all of the key microwave link information needed by ENG operators and news directors, at a glance. For those who prefer a spectrum viewer, MRC and Troll have teamed up to provide the most useful product available for that purpose. For further information, contact your local MRC sales office.