Technical Solution for Transmitter Maintenance and Testing in the Era of CDR/FM Digital-Analog Simulcast

Doewe Technologies Application Notes-019-V1.0

http://www.doewe.com

Introduction

1. Introduction to CDR Technology

2. Current Status of CDR Technology in China

3. Testing CDR/FM Broadcast Signals

4. Doewe Solution

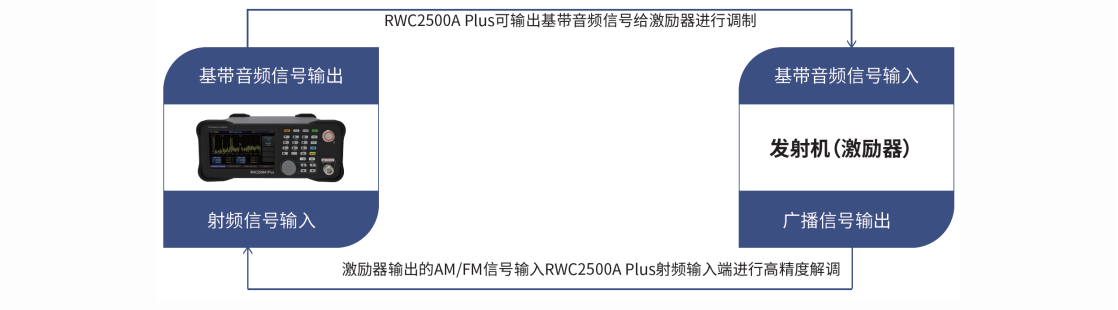
For the CDR/FM digital-analog simulcast era, Beijing Doewe Technologies Co., Ltd. provides a series of broadcast signal testing solutions. Whether for transmitter performance, signal reception quality, or signal coverage effectiveness, these solutions enable comprehensive testing of various broadcast signal indicators, thereby optimizing the listener's experience.

1、Broadcast Modulation Analyzer RWC2500A Plus

The RWC2500A Plus is a professional broadcast modulation analyzer primarily used for AM/FM transmitter testing. As a single unit, it can comprehensively test RF parameters, modulation performance, and audio layer metrics.

The device can demodulate AM/FM (mono and stereo) with high precision in real-time. It can test carrier power, frequency deviation, AM modulation depth, FM frequency deviation, and pilot signal-related parameters. The device supports real-time output of the demodulated audio signal. It can be configured for audio generation,

outputting baseband audio signals, and supports independent level and frequency settings for left and right channels. It features both digital (balanced) and analog (balanced and unbalanced) audio output interfaces. The device has audio analysis capabilities, analyzing the demodulated baseband audio signal, supporting frequency domain and time domain analysis, and displaying audio spectrum and waveform. Based on its multifunctional combination, the RWC2500A Plus can directly analyze key transmitter indicators, such as carrier parameters, audio distortion, audio signal-to-noise ratio (SNR), audio frequency response, and stereo audio separation. A single instrument meets the complete testing requirements for broadcast transmitters in the broadcasting industry.

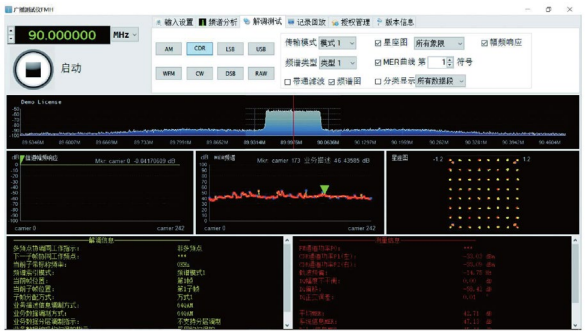


2、Broadcast Tester FMH

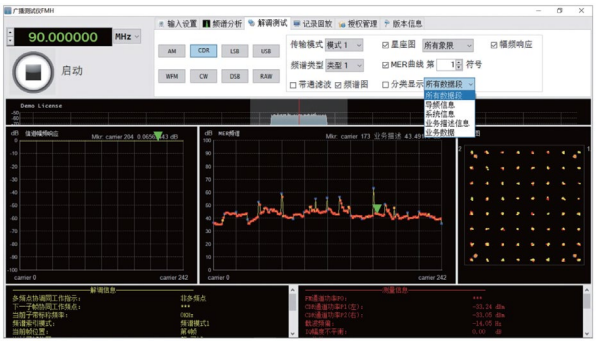
The portable Broadcast Tester FMH is specifically designed for broadcast signal testing. Its test architecture, based on globally standard RF hardware fundamentals, ensures its professionalism. The FMH supports not only traditional AM and FM testing and monitoring but also detailed testing of China's Digital Audio Broadcast (CDR) signals.

For CDR testing, the FMH can test level/constellation diagram/MER (Modulation Error Ratio), and IQ characteristics. Its high MER testing capability places it directly in the forefront of instruments for transmitter testing, with a comprehensive real-time

MER testing capability reaching 45 dB (for pure digital CDR). It can subdivide and test MER parameters at all levels involved in the standard, display MER curves for individual subcarriers, and test IQ distortion and amplitude-frequency response. For field testing, the FMH boasts industry-leading receiver sensitivity, ensuring capture and analysis of low-level signals. Simultaneously, the FMH features a spectrum waterfall display and spectrum monitoring functions and can record IQ data for later playback and testing. These functional characteristics undoubtedly make the FMH a multi-featured instrument, bringing significant additional value to transmitter station engineers.

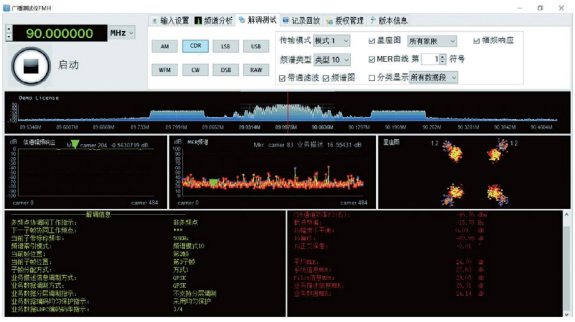


For pure CDR digital signals, the FMH possesses real-time MER testing capability with high MER measurement parameters, fully satisfying transmitter performance testing. Particularly importantly, the FMH can simultaneously test the power of the CDR upper and lower sidebands in real-time.



For scenarios where CDR and FM signals are simulcast, general analyzers can only perform spectrum analysis. The FMH features a dedicated filter module, allowing it to continue demodulating the CDR signal and observing channel parameters while performing spectrum analysis. It can also test MER. Despite the strong interference from the FM signal, the FMH can still maximize the demodulation of the constellation

diagram and provide an MER value for comparative testing.



3、Field Strength Coverage Test System BroadCMS Plus

The Field Strength Coverage Test System BroadCMS comprehensively supports AM, FM, and CDR signal integrated field strength coverage drive testing. The system is configured with drive test platform software, a GPS reception system, and a map solution, enabling the drawing of point and line trajectories and performing 2D map coverage effect evaluation.

BroadCMS can be combined with the Broadcast Modulation Analyzer RWC2500A Plus or the Broadcast Tester FMH, used alongside professional receiving antennas and precision transmission cables. It supports secondary integration with industry-leading broadcast and television test instruments.

The main functions of the field strength coverage test system are as follows:

• The coverage test software can display signal level parameters and perform strength statistics. It can automatically calculate the field strength value in dBμV/m based on user-input antenna factors and cable losses.;

• The coverage test software automatically saves test information, including signal strength, longitude, and latitude;

• The coverage test software features GPS positioning and real-time communication with the test host, providing system status during mobile testing;

• The coverage test software supports both online and offline map working modes, features map caching, and supports maps such as Google and Bing;

• It can display the current test position and related test data in real-time on the map window;

• Test data can be exported as Google Earth files;

• The test process can be replayed based on the test path and data;

• It features coverage analysis capabilities, enabling the generation of areal coverage analysis maps based on test data;

• It can automatically generate test reports in WORD format;

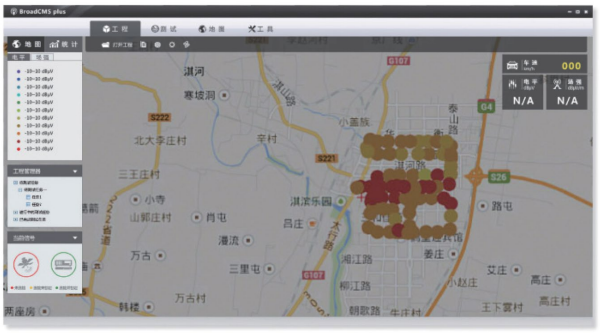
• Threshold settings can be customized;

• It has statistical functions to view the data distribution of current or completed tests;

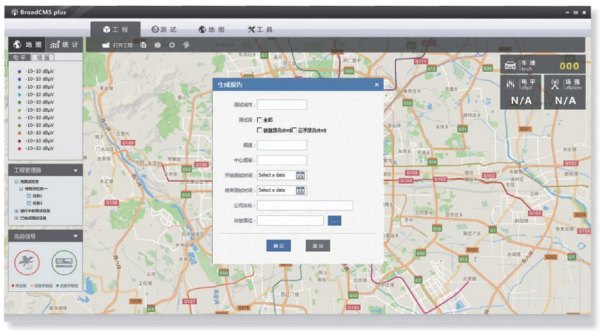
• It can export data to Excel.

For marking transmitter tower information:

Select the "Mark Transmitter Tower" tool in the navigation bar. Left-click the mouse on the map at the location where a transmitter tower needs to be marked. A transmitter tower information dialog box will pop up.



BroadCMS supports automatic report generation



Supports coverage diagram function to illustrate signal coverage quality