Broadcast Electronics

SAVE ENERGY

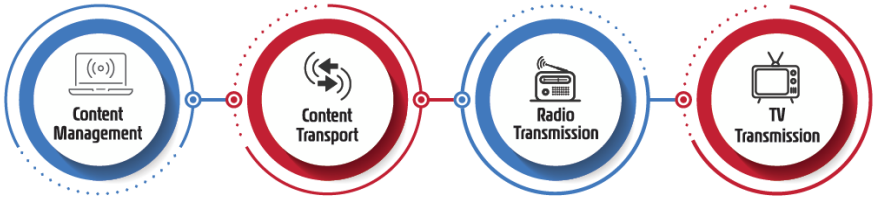
MDCL+: AM Radio

Modulation Dependent Carrier Level

Overview

Broadcast Electronics has an over 65-year legacy of providing innovative technology to enable radio and TV broadcasters to deliver compelling content to their audiences and create revenue-generating business opportunities. Supporting global innovation and next-generation content delivery, Broadcast Electronics embodies a customer-first approach to the market from the company's headquarters in Quincy, Illinois in the United States.

Customer-focused solutions from Broadcast Electronics are built on four technological areas:



AudioVault is BE's award-winning suite of Content Management software enabling live and automated program creation and playout, news solutions, and digital logging as well as data management.

The Marti range enables content Transportation, powering audio contribution and distribution for point-to-point (STL) wireless connectivity.

Radio Transmission is the heart of Broadcast Electronics with multiple product lines to support AM and FM transmission. The BE STX line of HD Radio® ready FM transmitters provides superior sonic quality and low operating cost. The BE ETX analog FM transmitters deliver compact, efficiency in a redundancy-equipped package. The BE AM line of transmitters provides rugged, reliable, energy-efficient peace of mind for your AM radio station.

Broadcast Electronics' complete line of **low and high-power TV transmitters** are designed around a software defined core exciter that can cover all the global analog and digital TV standards. With solutions covering UHF and VHF frequency bands and air-cooling configurations, BE can craft the right solution to meet your technical, budgetary, and operating requirements.

Broadcast Electronics

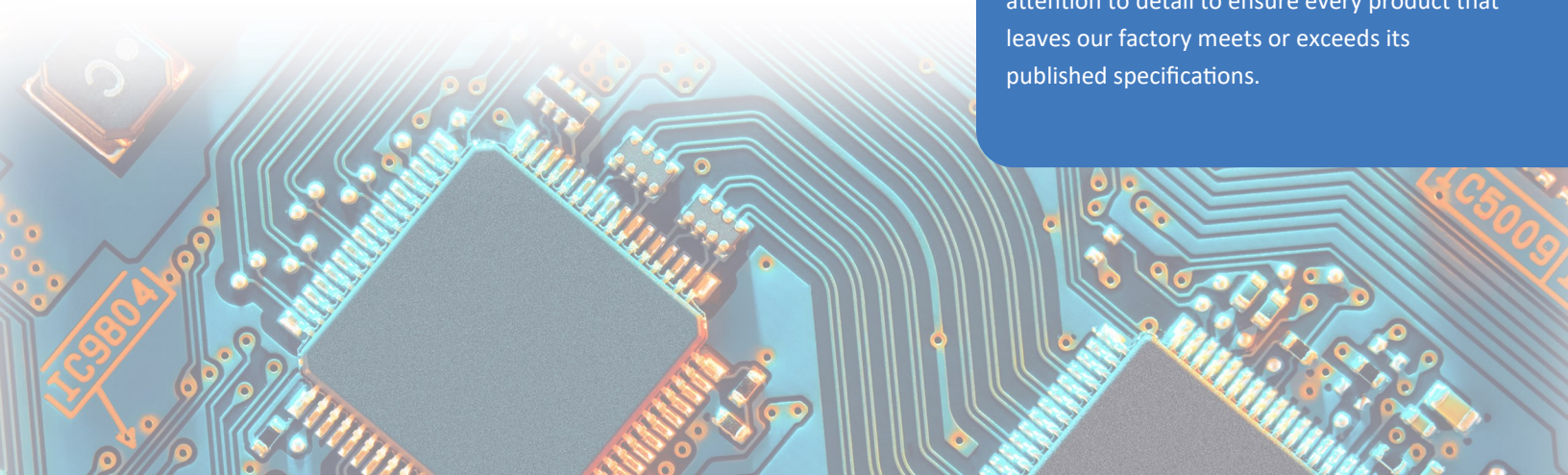
Broadcast Electronics is a global technology company dedicated to driving innovation in broadcast technology providing market leading solutions for software-based content management, Radio & Television transmission, and scientific applications of radio frequency devices.

Broadcast Electronics, has been providing high-tech solutions for broadcasters for more than 65 years in over 170 countries. All of our products and services come from a heritage of creativity and innovation unmatched in the industry, focused on developing innovative solutions for customers problems.

Every major innovation that shaped modern radio originated in Quincy, and it is here that BE products are designed, supported, and manufactured today.

Our facility in Quincy employs the latest instruments for research, new product design, prototype fabrication and testing.

We take advantage of the best practices of automated production, adding human attention to detail to ensure every product that leaves our factory meets or exceeds its published specifications.



MDCL+: Lower Energy Costs for AM Radio

Broadcast Electronics know that every broadcaster needs to carefully manage costs, and energy consumption is a big topic on everyone's mind. MDCL, or Modulation-Dependent Carrier Level, is a technology that allows AM radio stations to reduce their electricity consumption by dynamically adjusting the stations carrier power based on the audio content, saving energy without significantly impacting audio quality.

Simple Upgrade for New & Existing Transmitters

MDCL+ employs Modulation Dependent Carrier Level algorithms and **can save most AM radio stations 50% or more of their electricity costs.** A typical 10kW AM station operating 24 hours a day with an average electricity cost of 20 cents per Kilowatt/hour, the savings can be more than $12,000 every year. Some locations (including Alaska and Hawaii) will have considerably higher power rates resulting in up to four times greater energy and cost savings.

How does it work? MDCL+ works by reducing transmitter power during periods when the program is louder and quickly recovers power during quiet periods. Any increase in received noise is masked by the louder program content. Audio processing is easily adjustable to ensure the best power savings are obtained without affecting received audio quality.

Is it easy to install? Yes, It would take less than 60 minutes to install on most BE transmitters, and a little more on most modern (> year 2000) brands.

Are there any compromises? With contemporary audio processing, there is no reduction in coverage, and an unnoticeable difference in audio noise.

BE understand all broadcasters are looking to make the most out of their investment in infrastructure and minimize operating costs, without having to replace their transmitter to take advantage of new energy saving technology.

MDCL+ was designed to allow AM broadcasters to cost effectively and simply upgrade existing equipment without a major overhaul of their transmitter site. Transmitters are major purchases with long operating lifecycle, and Broadcast Electronics is pleased to be able to help operators extend their investment and reduce costs simultaneously .

Put these powerful capabilities to work for you

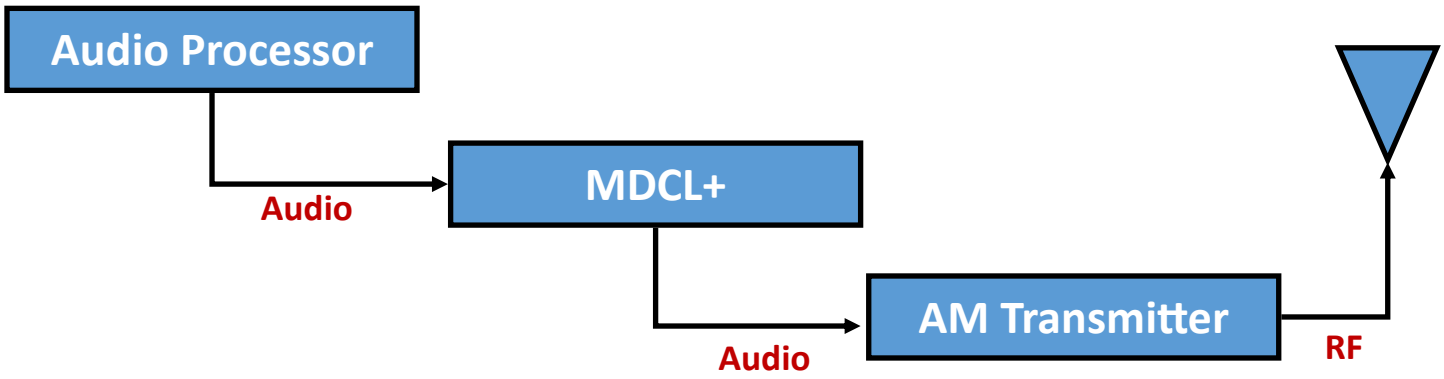
- Saves up to 50% on Power Bills
- No noticeable effect on audio performance
- No effect on coverage
- Simple to install
- Small size – 19” half rack 1 RU
- Fits any brand of modern era (> year 2001)
- Compatible with older transmitters (small modification maybe needed)
- Works with all existing and new AM audio processors
- User selectable energy reduction modes—dial in the amount that best matches your needs.
- Cost effective solutions makes for fast ROI

The AM carrier uses 66% of the transmitter power yet delivers no useful information!

Typical MDCL+ Installation

MDCL+ is a half rack width 1RU unit that installs in the audio path between your final AM audio processor and the audio input to the AM transmitter. MDCL+ analyzes the audio and creates a DC coupled control voltage that will dynamically adjust the transmitters carrier level corresponding to the audio levels and your customizable setting to ensure maximum energy efficiency. MDCL+ will work with any AM audio processor, but the most energy savings is achieved with the more powerful modern AM processors such as the Orban XPN-AM.

- The only connections are AC power, input audio, output audio
- Only simple hand tools required for installation
- Transmitter exciter is configured using jumpers settings
- A quick calibration process is required
- Ideally transmitter connected to dummy load
- An audio processor is required which can source a 100% audio tone for calibration
- A method to measure carrier power (RF Current Meter or Modulation Monitor)
- A method to measure modulation depth (Modulation Monitor or Oscilloscope)



How Does MDCL+ reduce energy consumption?

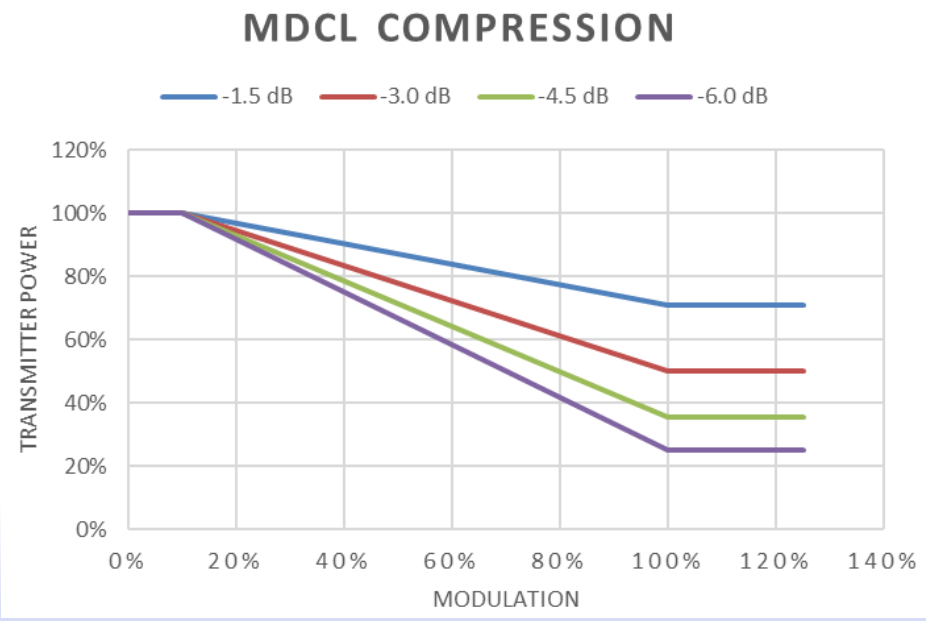
The downside to AM is that it is very inefficient to transmit. The AM carrier uses 66% of the transmitter power yet it delivers no useful information! Even with modern PWM AM transmitters the power consumption for a 5 kW AM station is substantial , so how do we make AM more efficient? The solution is to modulate the carrier based upon the audio input to suppress the carrier and reduce its power consumption. Much research was done by the BBC in the past, and implemented it using analog control which was widely deployed by global AM and Shortwave broadcasters but never really caught on in North America.

Modulation Dependent Carrier Level (MDCL) is achieved using an algorithm called Amplitude Modulation Companding (AMC), which maintains the carrier at maximum when no audio is present and reduces the carrier and the modulation together by up to 6 dB when modulation is at a maximum.

Carrier levels are decreased with increasing audio modulation.

The carrier is increased to full power during quiet periods when noise is most easily perceived.

As modulation density has substantially increased with modern audio processing AMC can generate greater efficiency than other methods.



RF Specifications	
Range (Frequency)	Compatible with any AM frequency
RF Harmoniec Suppression	Depending on the transmitter type – MDCL+ does not affect harmonic Suppression
Modulation Capabilities	Depending on the transmitter type – MDCL+ does not affect modulation capabilities
Carrier Shift	Depending on the transmitter type – MDCL+ does not affect Carrier Shift
Regulatory	Meets or exceeds FCC and DOC technical requirements, meets ENG0215 safety requirements
Audio Specifications	
Modes	Mono L+R, Mono L, Mono R
Input Level	0-10 dBm, +/- dB, L+R (or mono) to produce 100% L+R envelope modulation, other input levels accommodated by menu setting
Impedance	600 Ohm; inputs are balanced, transformerless, and resistive with passive RFI filtering; other impedances can be accommodated
Squarewave Overshoot	1% or less at 400 Hz, 50% single channel modulation with high-frequency boost disabled
Squarewave Tilt	1% or less at 40 Hz, 1.5% or less at 20 Hz, measured with 90% negative modulation
Connector Type	3-position terminal block
Squarewave Overshoot	0.1% or less at 400 Hz, 90% modulation (linear phase mode)
Intermod Dist	1.2% or less 1:1 ratio, 1.7% or less 4:1 ratio. 60/7000 hz SMPTE standards with 85% modulation
S/N Radio	>65 dB below a reference level equivalent to 100% negative modulation in a 22 Hz to 30 kHz bandwidth, unweighted
Temperature	0° to 50° C up to 95% humitity (non-condensing)
Altitude	10,000 ft (3,048 M) at 60 Hz; 7,500 ft (2,286 M) at 50 Hz
AC Input Voltage/frequency	90V to 252V / 50 or 60 Hz
Dimensions	½ Rack Unit wide (9 1/4 “) x 1.75” height x 6” deep (210 mm x 32 mm x 196 mm
Weight	Less than 2.2 LBS (1.0 kg)

Service and Support

We know that having the right support behind a product is every bit as important as the features and capabilities it delivers. At Broadcast Electronics we are committed to provide you with not only great products and software, but a dedicated team of service experts to help you keep your station running smoothly for years to come.

Training

Broadcast Electronics has long provided training programs for our products to educate and prepare users to operate and maintain them in the most effective possible manner. Training is offered for all styles of transmitters and Audio Vault systems, featuring a mix of instruction with hands-on operation and troubleshooting. Training programs can be crafted to meet your local needs, offered in our facility, at your location, or online. Many of our programs can provide SBE ongoing educational credits.

Warranty

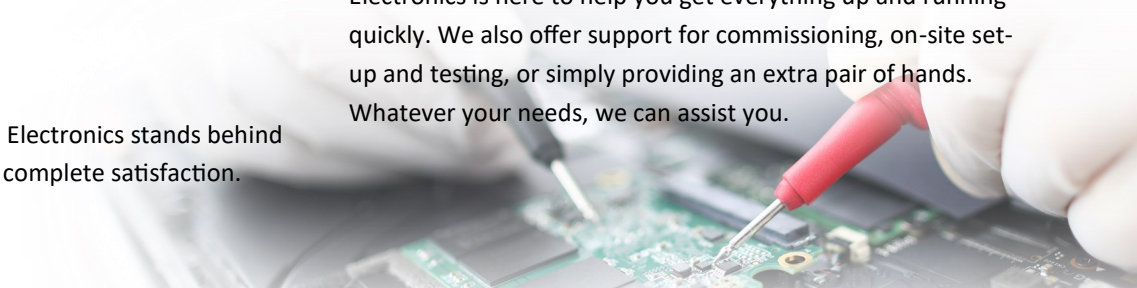
You can rest assured that Broadcast Electronics stands behind its products and services to provide complete satisfaction. Our products offer a standard set of warranty services that exceed others in the industry.

Repair Service

As a leader in providing innovative products and solutions to broadcasters around the globe, Broadcast Electronics understands the need for long life and years of trouble-free service. You can feel secure that if disaster strikes and your products need service, we offer complete repair and refurbishment service to get you back on the air delivering your high-quality programming quickly.

On-Site Service and Installation

Whether you need assistance troubleshooting an existing transmitter or Audio Vault system or require a complete installation of a new one, the global service team at Broadcast Electronics is here to help you get everything up and running quickly. We also offer support for commissioning, on-site set-up and testing, or simply providing an extra pair of hands. Whatever your needs, we can assist you.



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