



### Performance Data

Frequency Range:

- Customized operating frequency in the range between 150 kHz and 1600 kHz
- Bandwidth 9 kHz (standard) up to 20 kHz (DRM), extended bandwidth on request

Operating Power:

- Up to 2 MW
- With AM modulation of 100% (standard) or customized (e.g. 125%)

Radiation Characteristic:

- horizontal omnidirectional or customized directional pattern
- standard vertical (for antenna heights  $\leq 0.5 \lambda$ ) or customized (anti fading) vertical pattern

Antenna Input Impedance:

- 50  $\Omega$  or 120  $\Omega$ , other input impedances on request
- $VSWR_{max} \leq 1.2$  for  $\pm 4.5$  kHz (typical) or  $VSWR_{max} \leq 1.1$  for  $\pm 10$  kHz (DRM specification)

### Revitalizing AM Technology

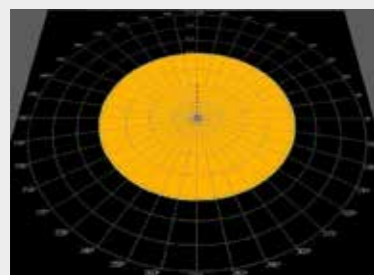
The revolutionary DRM standard opens the door to a bright future for the classical AM technology, whose merits have been field proven throughout the last hundred years. The innovative DRM technology's benefits are:

- FM like audio quality even under difficult reception conditions
- Introduction of additional services by providing up to 4 different channels on the same frequency
- Considerable reduction of power needed to service a given coverage area

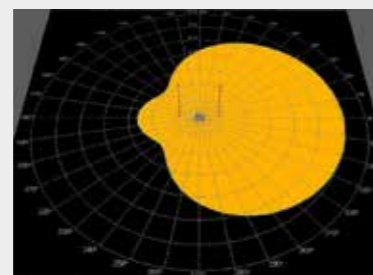
DRM also practically eliminates the classical unwanted side effects of AM broadcasting such as negative effects due to quality variations coming from fading, multi-path reception and atmospheric noise.

At the heart of DRM technology is a digital signal, whereby the optimized propagation of this signal is dependent on the quality, compatibility and optimization of the overall broadcasting chain. This fascinating technology provides broadcasters with the tools. Perfect implementation, however, depends on solid engineering experience and know-how. To know more about all the advantages provided by DRM, refer to the DRM website [www.drm.org](http://www.drm.org).

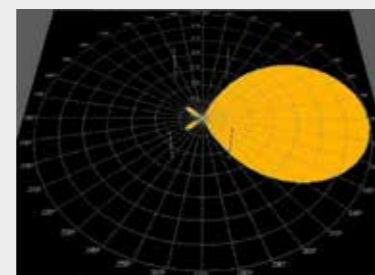
### Horizontal Radiation Patterns



Omnidirectional

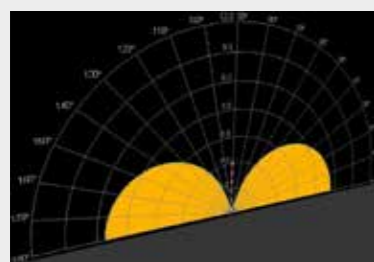


2-Mast with Passive Reflector

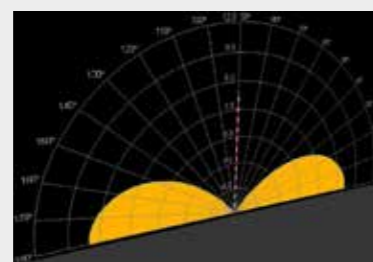


4-Mast all Active

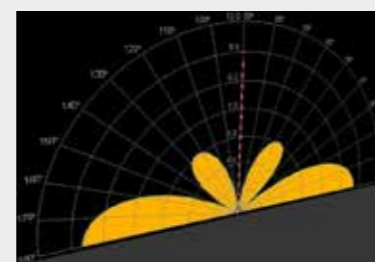
### Vertical Radiation Patterns



$\lambda/4$  Structure



$\lambda/2$  Structure



$5/8 \lambda$  Structure

## Contact

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Science



MedTech



Industry



Broadcast



## Long- and Mediumwave (LW & MW) Broadcast Antennas



# Long- and Mediumwave (LW & MW) Broadcast Antennas

Long- and mediumwave broadcasting is a highly cost-efficient way of making either local service with transmitting powers of several kilowatts, or large area domestic respectively even international service with transmitting powers of up to 2 megawatts. As the range of coverage of such a system can reach several hundreds of kilometres, a very moderate number of transmitting sites has to be deployed for large scale broadcasting. Unlike satellite broadcasting, mobile reception is easily possible. Receivers are widely spread in all regions of the world and a large number of listeners are therefore independent from satellite and internet.

Ampegon offers a full range of LW & MW equipment up to 2 megawatts:

- Antenna masts and towers
- Directional and omni-directional systems
- RF matching-, filtering-, phasing- and power distribution units
- Multiplexing devices
- RF-feed-lines
- Accessories like RF-switches, high performance insulators, control systems, air obstruction lights, safety devices etc.

For the best results it is mandatory to match the longwave & mediumwave transmitting system exactly to the broadcasters needs. Our engineers are considering all the factors which are affecting the performance of the system, its interaction with other systems and with the environment and last but not least the economic situation. The antenna system is the key component in this optimization process.

Consequently the Ampegon antenna engineers are focusing on the following key aspects in the design of the antenna system:

- Maximum performance
- Highest efficiency
- Best reliability
- Flexibility
- System optimization
- Customizing

## Maximum Performance

Performance criteria for Ampegon antenna systems are for instance antenna gain and bandwidth on the electrical side or maximum stresses through high wind speeds on the mechanical side. Our state of the art antennas are developed in a holistic approach, hand in hand by our in house RF engineers and our in house structural engineers. As a result, the broadcaster gets a maximum performing antenna system, where the antenna technology and the structural part merge into a single physical entity.

## Highest Efficiency

Highly efficient antenna systems are transforming the biggest part of the power coming from the transmitter into radiated signal and only very few percentages will be lost on the ground and on antenna components. Thus the high efficiency assures that the broadcasters longwave or mediumwave program will arrive at the radio listener with the lowest possible energy consumption at the broadcasting site. The designs of the radiating structure, ground screen and tuning network with its components are decisive to achieve the antenna's best overall efficiency.

## Best Reliability

Rugged design, proper material and easy maintainability are the keys to best reliability. Taking an example from the high end of mediumwave antenna technology, the vertical dipole antenna, the Ampegon philosophy of maximum reliability becomes apparent.

First of all special attention is given to the layout of electrical insulation, whereby the insulation of structural parts is reduced to a minimum. If possible, mast or tower base insulation is avoided by choosing the antenna concept accordingly.

The insulator material is another main issue. Materials, defying even worst environmental conditions on long term, have to be ultimate strong under highest mechanical and electrical stress. The antenna tuning networks are designed with sufficient safety margin. Even under operation with highest TX power and highest modulation the voltage and current stress on the components is far inside the limits.

As a result of these design criteria, the broadcasters benefits are reliable operation, less need of spare parts as well as fast and easy maintenance.

## Flexibility

Far sighted engineering allows taking tomorrow's requirements into consideration today. On demand Ampegon can provide antenna systems, where the operating frequency or the radiation characteristic can be changed by a simple turn of a switch or with very slight antenna tuning network modifications.

Another very interesting possibility is a design, which takes the multiple-shift usage of a LW / MW antenna structure for FM, TV, radio relay and mobile phone services into consideration.

## System Optimization

System optimization is a wide field and includes for instance the optimization of stations with several transmitting systems and frequencies, where



multiplexing and specific filtering is an important issue. It also includes radiation hazard considerations, when integrating an antenna system into a particular environment. Ampegon engineers are experienced system integrators, well known around the globe for advanced turnkey implementations, and have the expertise and the tools to analyse the wide variety of requirements and provide the broadcaster with profound solutions.

## Customizing

LW & MW antennas are highly individual, sophisticated devices. No other component in the transmitting system offers as many options in terms of performance and cost as the antenna. Besides obvious parameters like operating frequency, transmitting power and specified coverage resp. radiation pattern there are additional factors like environmental and social-political conditions and constraints, climate, maintenance requirements as well as the site specific situation which have to be taken into consideration for a well-designed antenna system. Therefore an antenna

system is unique not only due to frequency and to power, a lot more customizing may be required. Individual demands of the broadcaster and the situation at the available site avoid unwanted interactions with other installations or with the environment.

## Key Features

- Optimized gain in accordance with specific broadcaster needs
- Highest radiated energy to target area for best antenna efficiency
- Maximum performance
- Highest efficiency
- Best reliability and maintainability
- Optimized insulation layouts and designs
- Fully customized systems
- Full DRM compatibility as option

