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Shortwave Antenna Technology

Leading the Industry
For the Best Signal-on-Air

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Shortwave Antennas Tailored to Meet Your Needs

Thomson goes Digital

As one of the most cost-effective, reliable technologies available today, shortwave broadcasting is the favored medium for reaching listeners beyond thousands of kilometers around the globe.

The introduction of the new digital AM technology, known under the brand name "DRM", has invested the AM bands with attractive new options. Depending on the choice of transmitter and antenna system, broadcasters can service listeners in crystal clear, near FM quality from an own home base and independent of satellite and cable networks.

Behind every great signal-on-air is a well-designed antenna. Thomson offers a variety of antennas to fit a wide range of customer needs.

Quadrant Antenna

Omni-directional transmitting antennas are most favored when it is required to provide same time coverage of areas surrounding the transmitter site which extend up to a radius of 1300 km, depending on the transmitter power.

If a single frequency operation is targeted to reach listeners day and night without re-tuning the receiver, a simple and therefore attractive design is the so-called quadrant antenna.

ITU Regulations apply a special alpha-numeric code to describe quadrant antennas. In its most general form the antenna is denoted by **HQ n/h**, whereby:

H horizontal polarisation of the antenna

Q quadrant type

n the number of dipoles stacked vertically in horizontal rows

h height of the lowest dipole above ground in wavelengths of the bottom row of diploes

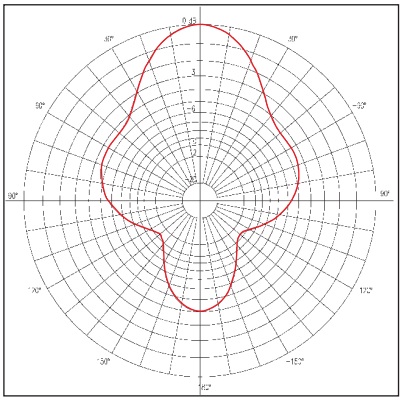
HQ antennas consist of horizontal bent dipoles, the bent angle of which may vary from 60° to 90°, depending on the required horizontal pattern characteristic (allowed deviation from perfect onmi-pattern).

It is obvious that simple dipoles cannot be operated over the entire shortwave broadcasting spectrum, although the "slenderness ratio", i.e. the ratio of dipole length to equivalent dipole diameter, is selected for best broadband characteristics and the dipole is executed as an open multi-wire cage.

State of the art design allows the operation of HQ antennas over the entire frequency range, covering two adjacent frequency bands out of the shortwave broadcasting spectrum, as defined by WARC allocations.

Technical Highlights

- Omni-directional coverage
- Simple antenna design
- Low lifetime costs



Typical radiation pattern [HQ 1/1/h]

Fixed Curtain Antenna

When sectional coverage is desired, directional antennas are the proper choice. Curtain antennas provide not only high antenna efficiency, but also highest tolerances when faced with unfavorable environmental conditions.

As per ITU Regulations, a special alphanumeric code is used to describe curtain antennas. In its most general form, the antenna is denoted by AHRS m/n/h, whereby:

A aperiodic

H horizontal polarisation of the antenna

R Existence of a reflector screen

S the possibility of beam slewing

m number of half-wave elements in a horizontal row [typical range 2,4 or 6]

n the number of dipoles stacked vertically in horizontal rows [typical range 2,4 or 6]

h height of the lowest dipole above ground in wavelengths of the bottom row of dipoles [typical range 0.25 - 1.0]

State of the art design allows curtains to be operated over the frequency range of one octave, covering up to six adjacent frequency bands out of the shortwave broadasting spectrum as defined by WARC.

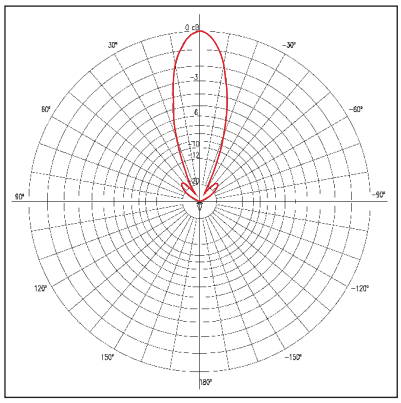
Classic Design

Fixed curtains consist of half-wave, folded, open and multiple wire cage dipoles. The dipole feeding system is based on broadband design, which means dipoles are switched in parallel to subgroups. These subgroups are switched in parallel to subsystems, until the common feed point (input of the slewing switch) is reached.

Dipoles and their feeding system as well as the reflector screen are suspended to towers or masts in such a way that they can be lowered separately for maintenance.

A counterweight system is fixed directly to ground at one end, and at the other end, fixed to ground by a follow-up mechanism. This counterweight system makes sure that strong winds cannot damage the dipoles, the feeding system or the reflector screen.

Broadcasters Choice: Fixed or Rotatable



Typical radiation pattern [AHR(S) 4/4h]

Curtains may be arranged back-to-back or side-by-side and may be suspended individually or collectively between suitably dimensioned guyed or self-supported towers.

In case a large range of azimuth needs to be covered with radio signals, the curtains may be installed in either a star or a polygon shape.

Technical Highlights

- High tech performance
- Highest tolerance on worst environmental conditions
- Shortest lead time to start-off coverage
- Design, operational and technical advantages

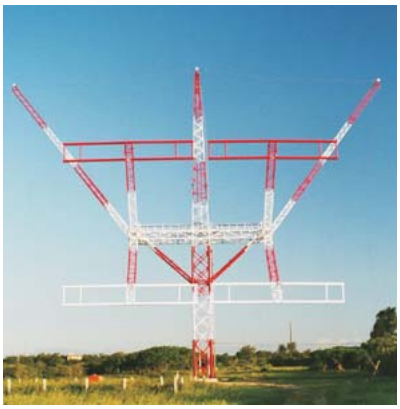
New Developments

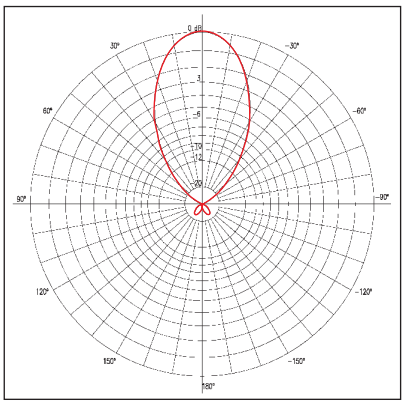
The Rigid Dipole Technology combines design principles as implemented in rotatable shortwave antennas with the advantages of curtain antennas. The resulting integrated system consists of rigid dipoles and a self-supporting structure with central shaft.

The components of the rigid "curtain" antenna are easily accessible. The system maintainability is greatly simplified due to the fact that there are no moving parts like halyards, steel ropes, counterweights etc.

Technical Highlights

- Back-to-back arrangement of a low band and a high band curtain antenna, each with its own reflector screen
- High antenna gain from 18 dBi up to 24 dBi
- Perfect DC grounding; minimized number of insulators (spacer, hanger, supports)
- Lowest possible life cycle cost, optimized maintainability
- DRM compatibility





Typical radiation pattern [AHR(S) 2/2h]

Rotatable Curtain Antenna (TCA)

The rotatable curtain antenna system is the most flexible solution available today. Covering a 360° angle at the touch of a button, the TCA offers best investment efficiency.

The folded half-wave and rigid (steel) dipoles are an integral part of the steel construction. Tubular shafts are used as base sections and

house all equipment needed to operate the antenna, such as drive system, feeding system including coaxial rotary joint, matching unit, broadband balun and antenna selector switch.

Thus all parts that are susceptible to climatic and/or environmental exposures, including the exposure to electromagnetic fields, are well protected.

Lattice shaft sections are used on top of the tubular sections, for the cross arms, supports of dipoles and reflector screens. All steel parts are of highest quality design to ensure an optimal weight of the overall system.

Accessibility is key to the design of the Thomson rotatable curtain antennas, making inspection and maintenance work quick and easy.

Technical Highlights

The TCA has all the highlights of the rigid dipole antenna and in addition offers the following benefits for highest flexibility:

- Access to all specified frequency bands of the allocated shortwave broadcasting range (Standard Design, without tropical bands)
- Electric control logic to operate the entire network and to assure that the antenna is tuned in the direction of the respective coverage area over the shortest possible path
- Smooth, joltless starting and breaking to a standstill
- High rotation speed of 1 degree per second
- High positioning accuracy of < 1 degree
- Monitoring and remote control of all operational functions

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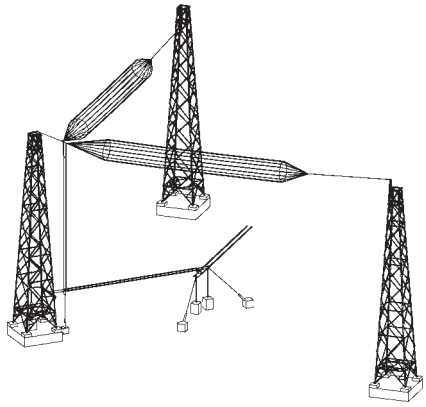
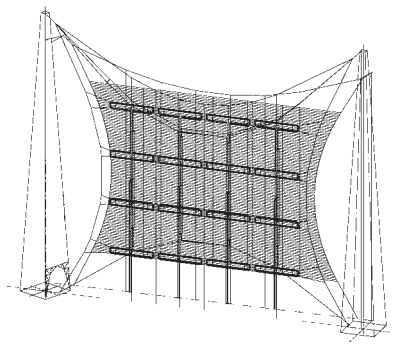
Overview of Shortwave Antenna Solutions

Antenna Type	Range [in km]				Frequency Range	Radiation Pattern	Typical Gain [dBi]
	Up to 1300	1000 to 4000	2000 to 6000	3000 to 8000			
HQ 1/1/h [Quadrant]	X				max. 2 adjacent bands in the SW range	omni-directional	8 - 10
AHR 1/1/h [Rigid Dipole Curtain]	X				single specified frequency	directional	12 - 13
AHR(S) 2/2/h [Fixed Curtain]		X			up to six adjacent frequency bands	directional	14 - 16
AHR(S) 4/2/h [Fixed Curtain]			X		up to six adjacent frequency bands	directional	15 - 21
AHR(S) 4/4/h [Fixed Curtain]				X	up to six adjacent frequency bands	directional	18 - 24

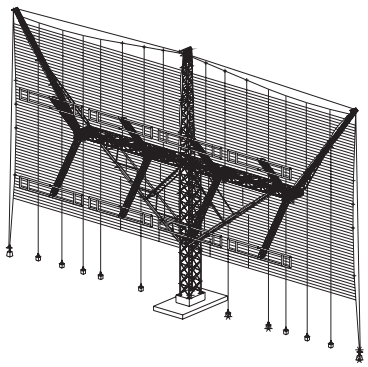
The height [h] is according specific performance requirements.
The stated range is assuming single-hop transmission and can be seen as a rough guideline for design purposes. In any case the range is dependent on specific ionospheric propagation conditions.



Typical Design of Quadrant Antenna



Typical Design of Fixed Curtain Antenna



Typical Design of Rigid Dipole Antenna

Typical Dimensions

Type:	HQ 1/0.35
Frequency Range:	5 - 6 MHz
Footprint:	42x42x42 [BxTxH]
Weight:	12 tons

Type:	AHR 4/4/0.5
Frequency Range:	6 - 11 MHz
Footprint:	100x12x110 [BxTxH]
Weight:	300 tons

Type:	AHR 4/2/0.5
Frequency Range:	6 - 11 MHz
Footprint:	83x12x47 [BxTxH]
Weight:	54 tons

Thomson Broadcast & Multimedia AG
Spinnereistrasse 5
CH-5300 Turgi - Switzerland
Tel : +41 (0)56 299 22 10
Fax : +41 (0)56 288 11 25
sales@thomson-bm.ch

Thomson Broadcast & Multimedia SA
1, rue de l'Hautil
F-78702 Conflans Ste. Honorine - France
Tel : +33 (0)1 34 90 31 00
Fax : +33 (0)1 34 90 30 00
info@thomson-bm.com

Thomson Broadcast & Multimedia GmbH
Carl-Benz-Strasse 6-8
D-67105 Schifferstadt - Germany
Tel : +49 (0)6235 92 50 300
Fax : +49 (0)6235 92 50 330
info@thomson-bm.de