

The ADBL Spearhead has a proven record of performance covering twenty years as a leading high power, multi-channel FM CP panel antenna. Both screen and dipole assemblies are very heavy duty galvanized steel construction assuring long trouble free service under the toughest environmental conditions.

The Spearhead Panel with its massive crossed dipole radiating elements, was developed from the start with the demanding requirements of the high power multi-channel FM market clearly in mind. It is ideal for multi-channel operation over the complete FM band from 88 to 108 MHz. A system VSWR of 1.1:1 is achieved for each operating channel.

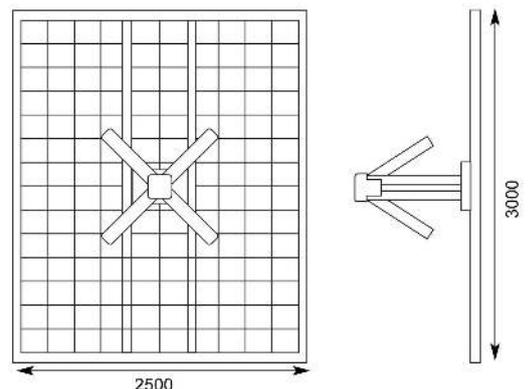
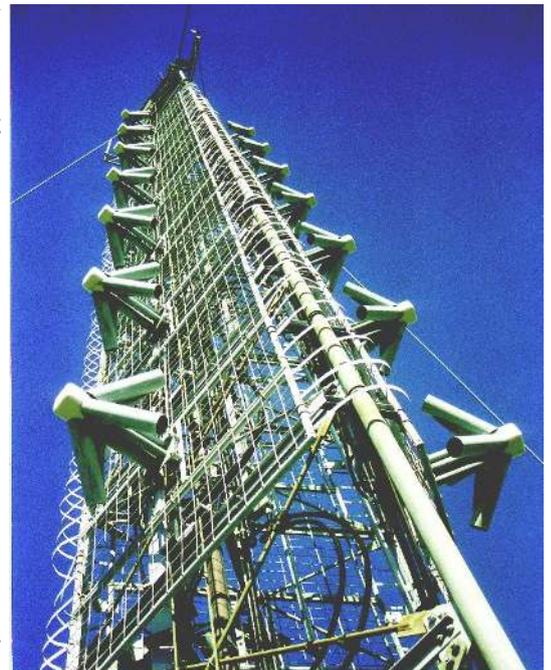
Designed to provide excellent omnidirectional radiation patterns using three panels per tier around triangular towers, the Spearhead panel has been developed with a 6dB beamwidth of 120deg. A combination of unequal power division and appropriate phasing between faces also provides the facility for a wide range of customised directional patterns. Single panel data is given in Fig.2.

A feature of Spearhead screen design is additional strength to allow tower crews to climb on them. Attention has still been paid to minimising the aerodynamic areas as far as is practicable, consistent with the panel dimensions, by the use of round cross section members for all parts of the galvanized screen and dipole assembly. Weather protection of the dipole feedpoints is provided by GRP covers so that no electrical de-icing of the elements is required. This greatly increases reliability while reducing operating costs. With fully pressurised feed systems and careful attention to dissimilar metal junctions, Spearhead arrays provide an integrated design with reliability second to none.

GENERAL ARRAY DATA

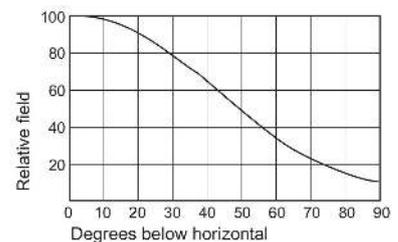
The weights and loading figures given on the following page are for symmetrical antennas with 3 panels per tier and do not include the support tower. Loadings are in accordance with UK Standard CP3 and North American Standard RS222F which are equivalent to one another. They will vary depending on the required power rating of the feed system and other factors. ADBL should always be consulted with reference to specific installations. The gain figure quoted is the mean value for omnidirectional arrays and is achieved in each plane of polarisation. Allowance has been made for typical distribution feeder losses and for null fill as indicated in the vertical plane radiation patterns depicted on the last page.

The Spearhead panel allows antenna arrays to be designed and built for a wide variety of applications. The high power rating of the individual panel, coupled with ADBL's in-house design and manufacture of complete feed systems in all sizes and ratings from 7/8 to 9ins. IEC/EIA, means that there is virtually complete freedom in the array design. Spearhead arrays have been built with input power ratings exceeding 250kW. Local environmental conditions are always evaluated and transmission line components are selected to provide power and voltage safety factors appropriate to the transmitter power employed.



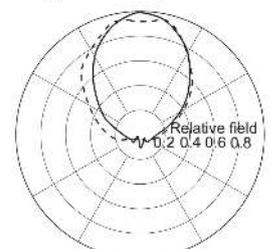
Note: In practice, to facilitate shipping and installation, the screening frame is built in two unequal parts.

Dimensions in mm



Horizontally polarised component —
Vertically polarised component - - - - -

Aerodynamic area	
Front	2.0m ²
Side	1.6m ²
Weight	140kg
Gain, each polarisation	3.7dB
Power rating	10kW
Input connectors (Two per panel)	7/8 IEC/EIA



Peak voltage ratings are especially important for multi-channel operations. Spearhead multi channel antennas are complemented by ADC transmitter combining units which are available in a number of configurations to serve different applications. In countries where circular polarisation is used for TV, Spearhead arrays have been provided for combined operation at FM and Band I (Mid-Band) TV frequencies.

The fact that Spearhead screens are continuous from tier to tier, coupled with the use of corner straps between adjacent panels within a tier, complete screening of the tower within the antenna aperture. This stabilises the array performance across a wide frequency range and makes it virtually independent of the individual tower geometry.

RADIATION PATTERNS

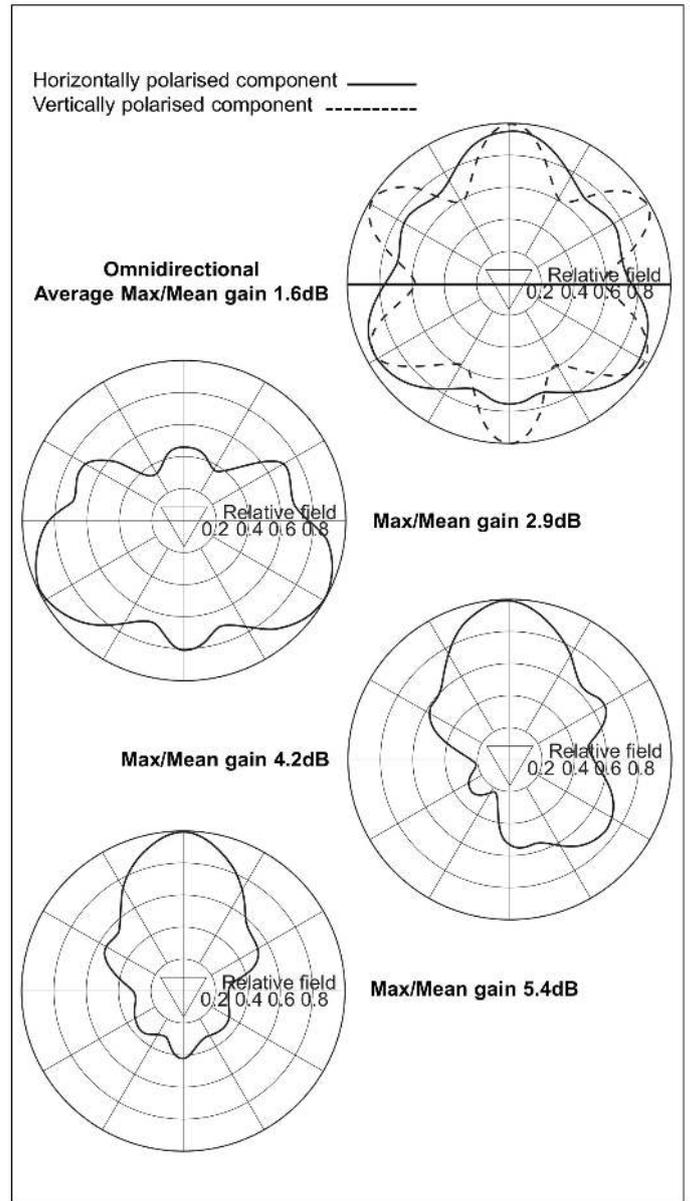
The picture to the right shows omnidirectional horizontal plane radiation patterns as well as examples of directional patterns that may be achieved. These patterns correspond to antennas built around 2.4m. triangular towers. The plots depicted on the following page gives typical vertical plane patterns for arrays of between two and twelve tiers. The values of beam tilt and null fill provided for any aperture may readily be tailored to suit individual station requirements.

ANTENNA TYPE NUMBER

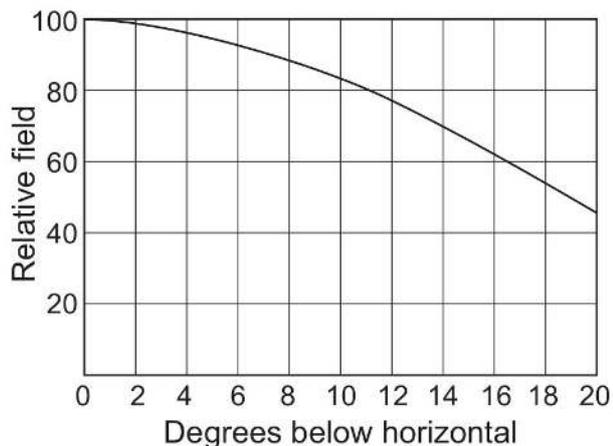
The antenna's type number provides a convenient reference to its main characteristics as illustrated below. For the Spearhead, six items are variable: the operating frequency (or frequency range), the number of tiers and the number of panels per tier, the total power rating, the HRP type and the number of inputs.

A six tier antenna with three panels in every tier, designed for multi-channel operation over the complete FM band, having a power rating of 150kW, an omnidirectional horizontal radiation pattern and being fed by two main transmission lines would thus be designated F88:108C6.3SH150ND2

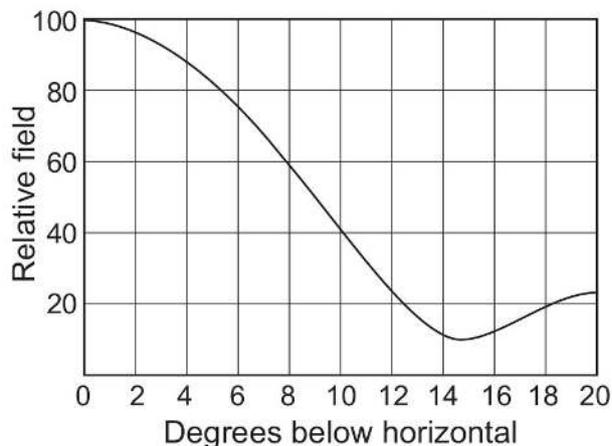
An antenna not having the same number of panels in every tier has the digit representing the number of panels per tier replaced by an 'S' Horizontal radiation pattern types are broadly designated: ND = Non Directional or Omni, C = Cardioid, P =Peanut, S =Special.



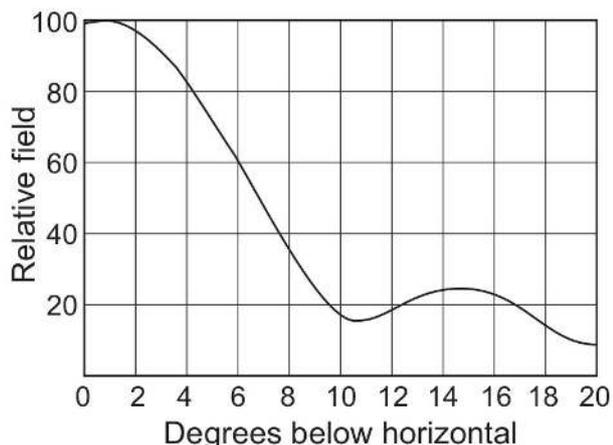
No. of tiers	Aperture m	Aerodynamic area m ² CP3 (RS222D)	Weight kg	Mean Gain dB
2	6	9.8	915	0.4
4	12	19.5	1830	3.4
6	18	29.3	2750	5.0
8	24	39.0	3660	6.1
10	30	49.2	4580	7.1
12	36	59.5	5500	7.9



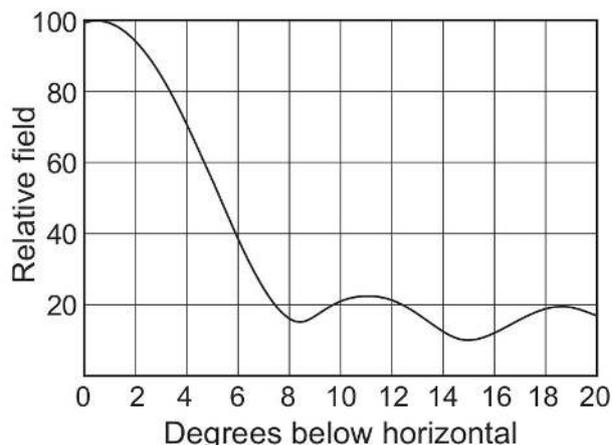
2 Tiers Beam tilt 0deg. Null fill loss 0dB



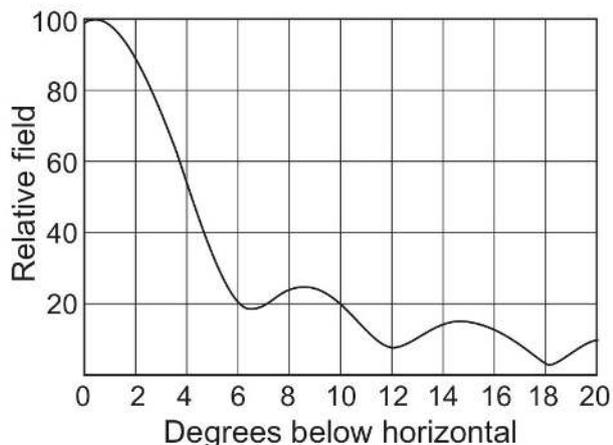
4 Tiers Beam tilt 0deg. Null fill loss 0.1dB



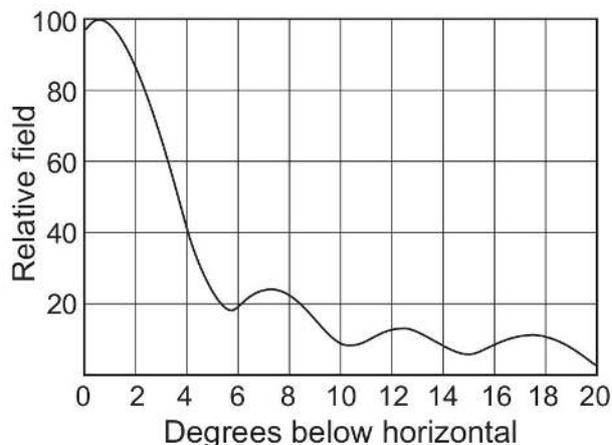
6 Tiers Beam tilt 1deg. Null fill loss 0.3dB



8 Tiers Beam tilt 0.5deg. Null fill loss 0.4dB



10 Tiers Beam tilt 0.5deg. Null fill loss 0.4dB



12 Tiers Beam tilt 0.5deg. Null fill loss 0.4dB