

RESEARCH DEPARTMENT

**NEW BAND I TRANSMITTING AERIAL FOR THE
WENVOE TELEVISION STATION**

Technological Report No. E-114/11
(1965/31)

G.H. Millard, B.Sc., A.Inst.P.,
M.W. Greenway, M.Sc., Grad.I.E.E.,

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for Head of Research Department

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Page 1 - Substitute the following for the paragraph headed "Reserve Aerial":

"The reserve aerial, consisting of 1 tier of 6 dipoles at a mean height of 470 ft (143 m), is unchanged."

GHM/CHD
7.4.66.

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INTRODUCTION

A new Band I aerial has been built on the column of the existing mast at Wenvoe in order to permit the erection of a u.h.f. aerial on a top mast. The new aerial came into service on 8th December 1964.

SUMMARY OF INSTALLATION

- Site: The site is 5 miles (8 Km) west-south-west of Cardiff, grid reference ST/111742, height 422 ft (129 m) a.m.s.l.
- Support Structure: The support structure consists of a 715 ft (218 m) stayed mast. Up to a height of 610 ft (185 m) the mast is of triangular cross section with a side of 9 ft (2.75 m); above this height the cross-section is circular with a diameter of 6 ft 6 in (2 m). The mast is provided with three sets of stays, on bearings of 84°, 204° and 324° ETN.
- General Arrangement: See Fig. 1.
- Channel: Channel 5 with vertical polarization is used. Vision and sound carriers are not offset.
- Aerial: The aerial, which is shown in Fig. 2, comprises 2 tiers each of six dipoles fed with equal co-phased currents. The dipoles are spaced 0.25λ from the cylinder and the inter-tier spacing is 0.94λ . The mean height of the aerial is 703 ft $1\frac{1}{4}$ in (214 m), i.e. 34 ft $2\frac{3}{4}$ in (10.4 m) lower than the original aerial. The aerial is fed with a single feeder, Hackethal type HF $4\frac{1}{8}$ in (105 mm).
- Reserve Aerial: "The reserve aerial, consisting of 1 tier of 6 dipoles at a mean height of 470 ft (143 m), is unchanged."
- Power: A single transmitter run at 50 Kw is used. The reserve transmitter has a power of 5 Kw.

Templet and horizontal radiation pattern (h.r.p.):

Fig. 3 shows the templet and the h.r.p. of the original aerial. If no mast stays were present, the new aerial would be omnidirectional to within ± 0.2 dB (Fig. 4). The effect of the mast stays is to give the h.r.p. shown in Fig. 5 and results in too large a variation compared with the original aerial. Accordingly, additional scattering conductors were fitted mid-way between the mast stays; the resulting h.r.p., which is that adopted, is compared with the original h.r.p. and the templet in Fig. 6. (See Note).

Vertical radiation pattern (v.r.p.):

As the aerial comprises only two tiers, no gapfilling of the v.r.p. is required.

Gain:	Mean intrinsic gain	2.8 dB
	<u>Deduct:</u> loss in distribution feeders	<u>0.1 dB</u>
	Mean net gain	2.7 dB
	<u>Deduct:</u> loss in main feeder (type Hackethal HF $4\frac{1}{8}$)	0.6 dB
	network loss	<u>0.1 dB</u> 0.7 dB
	Mean effective gain	<u><u>2.0 dB</u></u>

Programme Link:

The programme is obtained by G.P.O. line.

Note:

The basic design of the aerial was based on measurements on a one-tenth scale model of the whole aerial complete with stays. It was originally proposed that the power of the transmitter should be increased by 1 dB in order to reduce the loss of field in certain directions compared with the old aerial. In the course of measurements comparing the performances of the old and new aeriels it was discovered that the locked-coil rope feeder supplying the old aerial had 0.9 dB more attenuation than had been supposed and the increase of transmitter power was not therefore implemented.

Acknowledgement:

The mechanical design, construction and setting to work of the aerial were carried out by Planning and Installation Department.

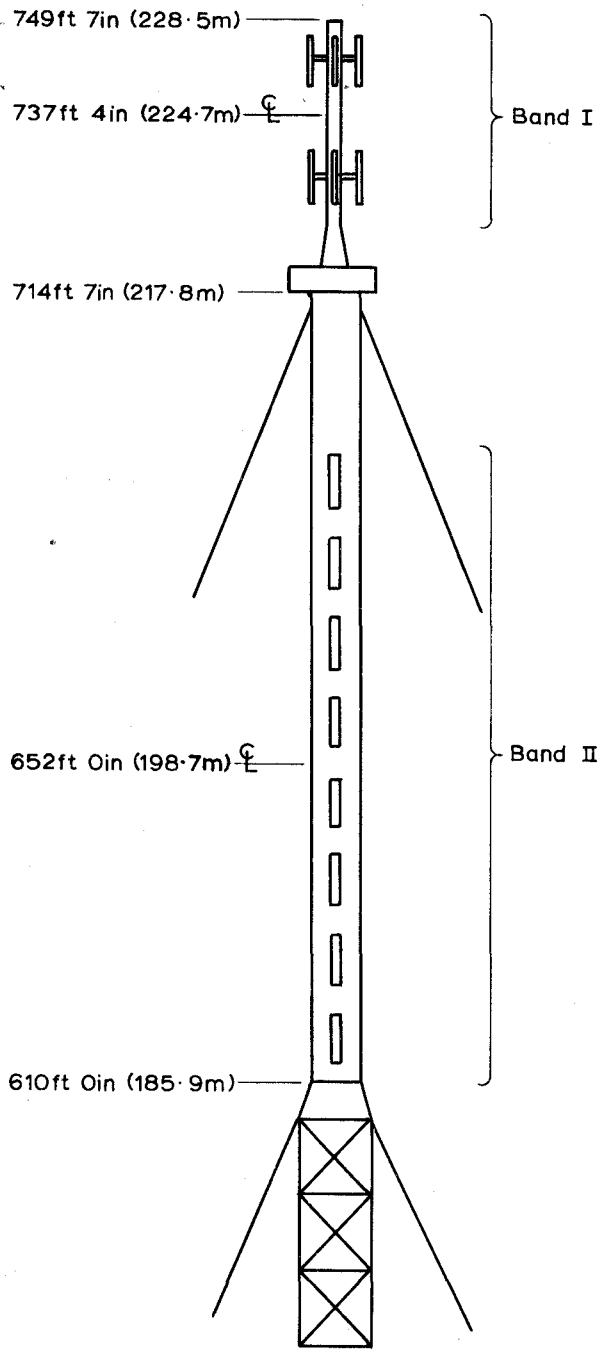
REFERENCE

1. Detailed information on the construction and dimensions of the aerial is given on the following drawings held by BBC Planning and Installation Department.

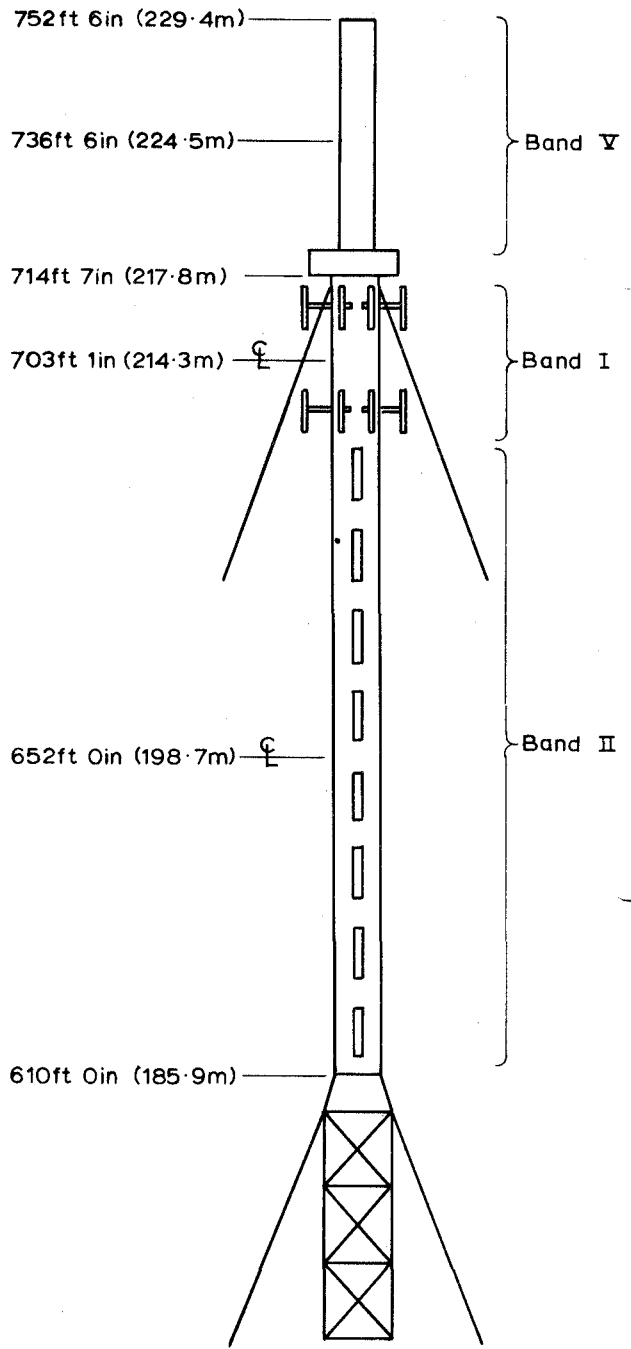
P.I.D. SK 15907 H Transmitting dipoles

P.I.D. SK 15922 G Scattering elements

P.I.D. 9103.9.1 J Distribution feeders

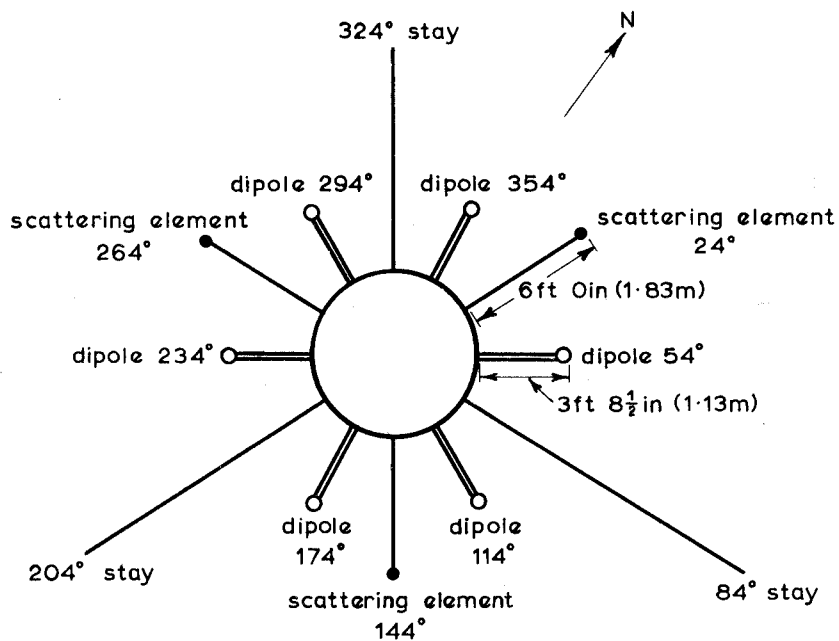


(a) Original arrangement

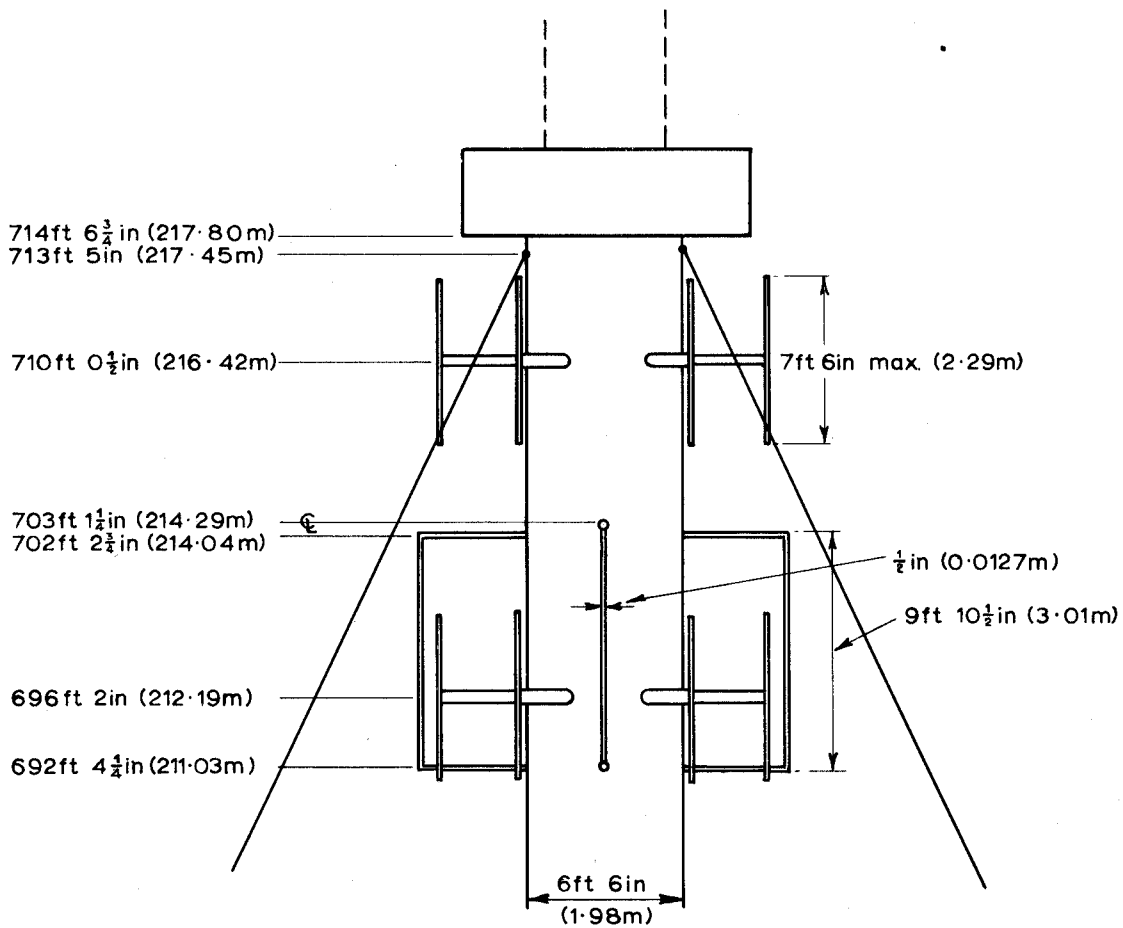


(b) New arrangement

Fig.1. General arrangement of aerals on mast



(a) Plan



(b) Elevation

Fig. 2. Arrangement of new Band I aerial

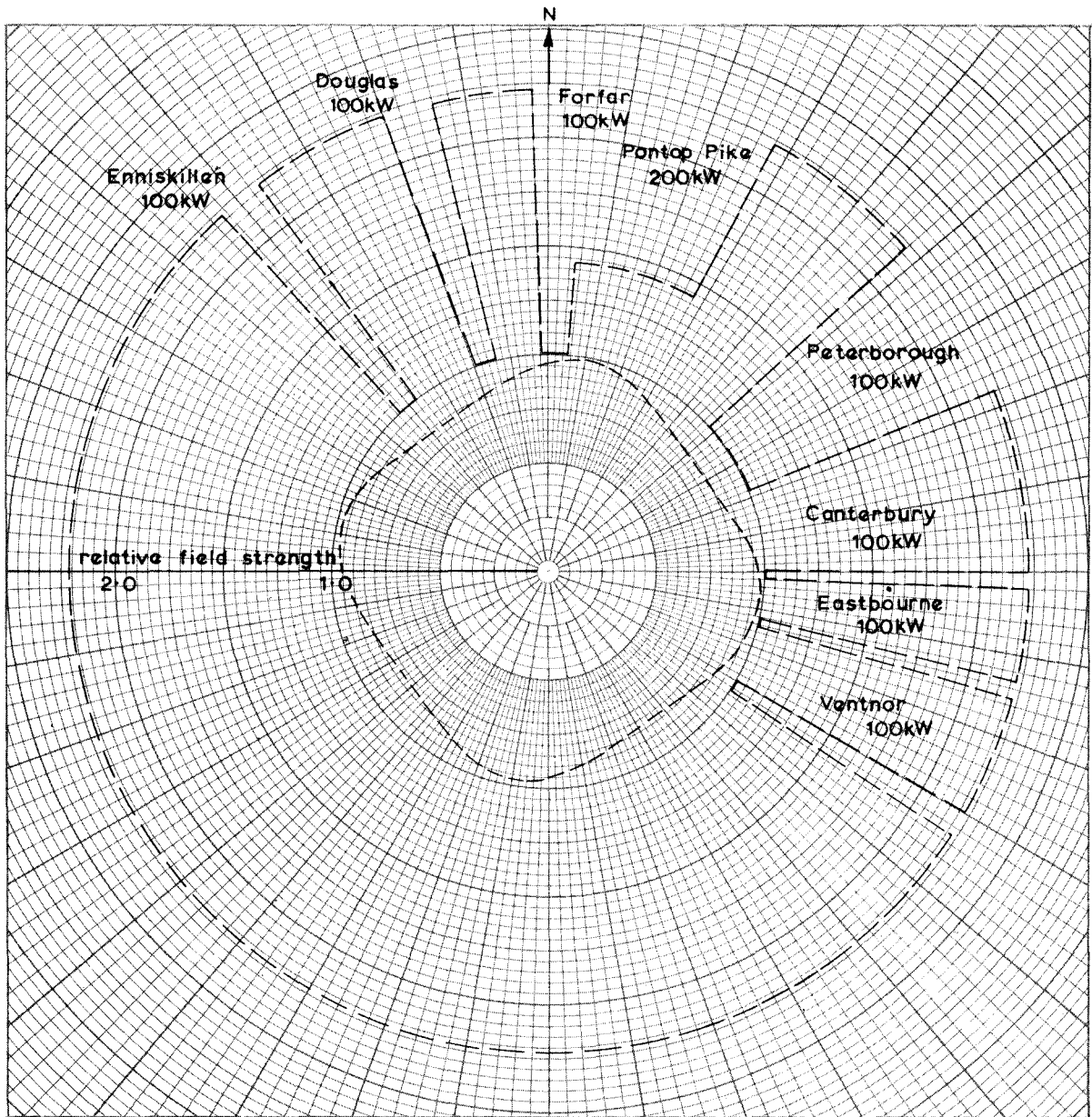


Fig 3. Templet for new aerial

VERTICAL POLARIZATION

Channel 5 (Vision carrier 63.25Mc/s, Sound carrier 66.75 Mc/s)

——— Maximum permissible E.R.P.

- - - - - Minimum desirable E.R.P.

(H.R.P. of original aerial)

Unit field corresponds to an E.R.P. of 100kW

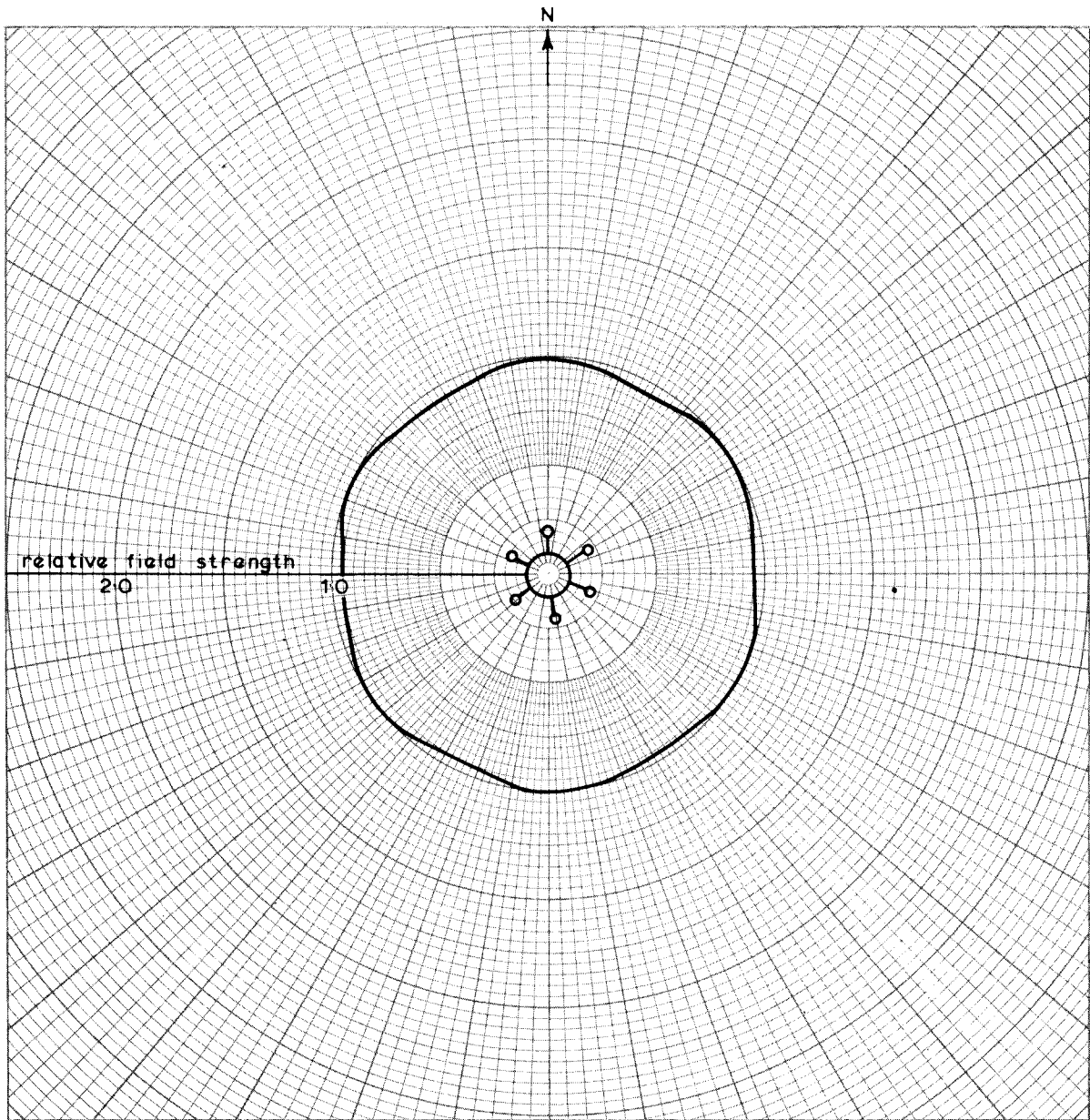


Fig. 4. Theoretical horizontal radiation pattern of aerial without stays or scattering elements

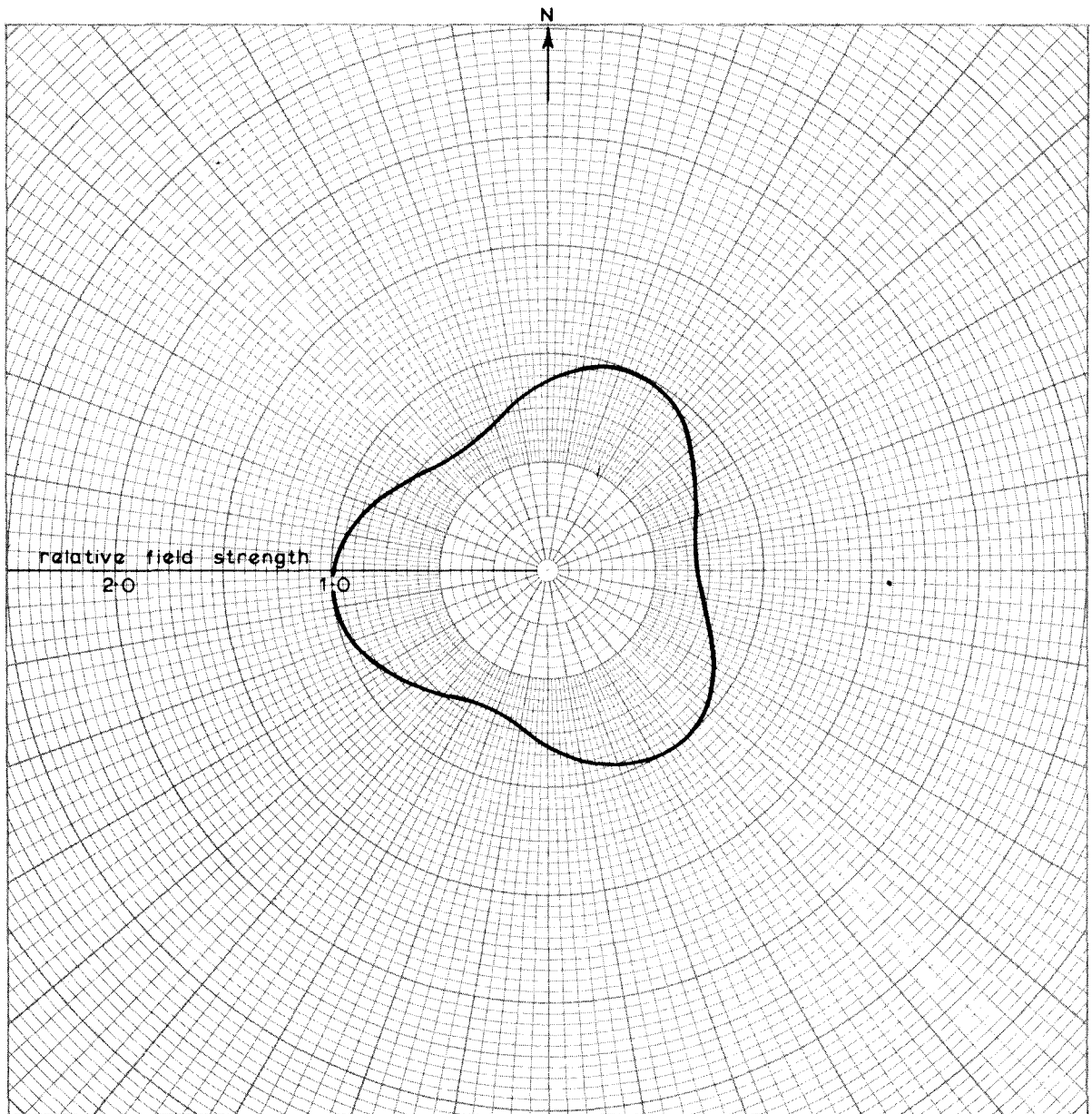


Fig.5. Measured horizontal radiation pattern of aerial with stays but without scattering elements

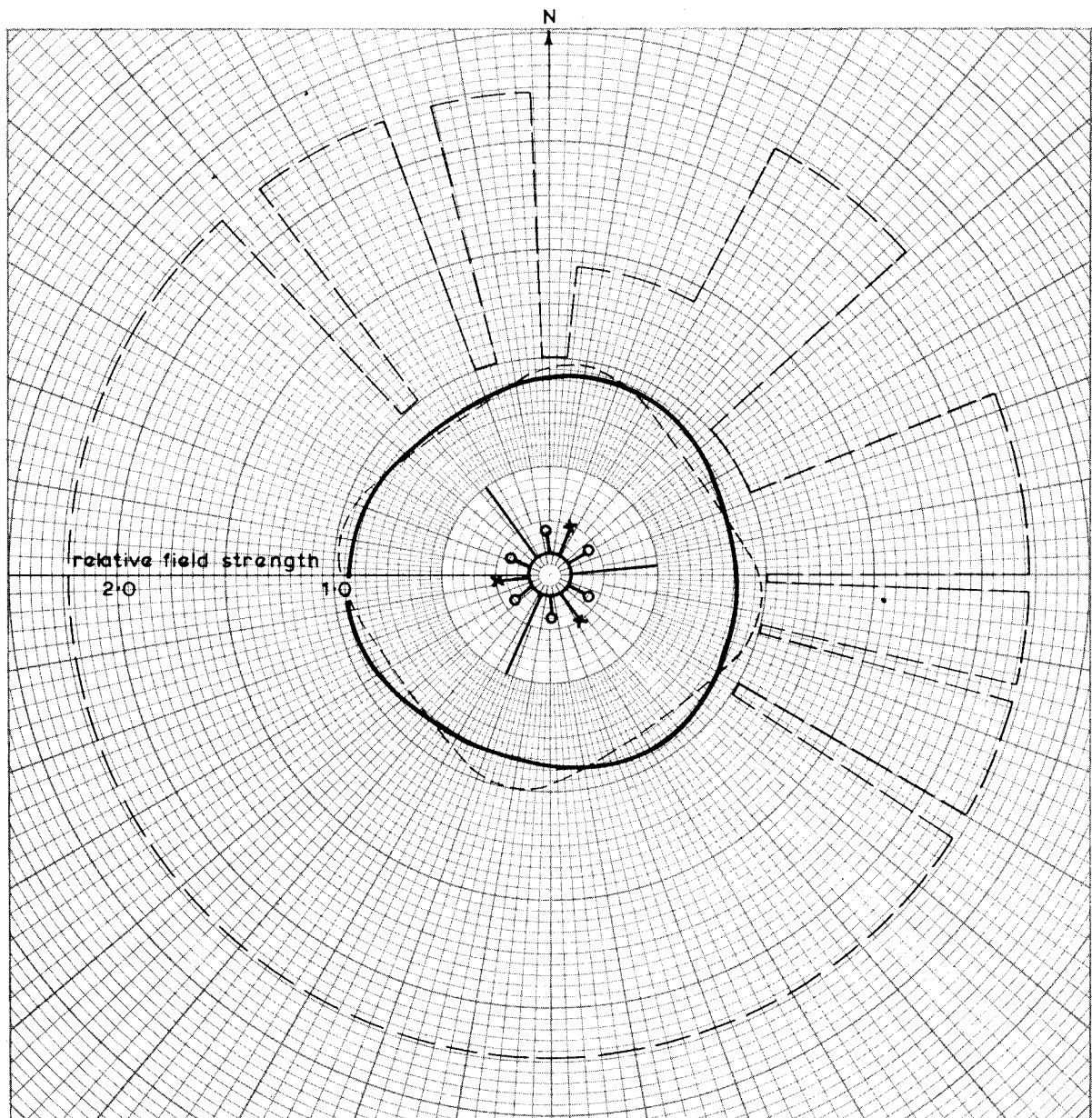


Fig. 6 Measured horizontal radiation pattern of aerial with stays and scattering elements

VERTICAL POLARIZATION

Channel 5 (Vision carrier 63.25Mc/s, Sound carrier 66.75Mc/s)

Mean effective gain 2.0dB

Transmitter power 50kW

Mean E.R.P. 79kW

————— Maximum permissible E.R.P.

----- Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 100kW.

