

RESEARCH DEPARTMENT

NEW BAND I TRANSMITTING AERIAL FOR THE DIVIS TELEVISION STATION

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for Head of Research Department

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NEW BAND I TRANSMITTING AERIAL FOR THE DIVIS TELEVISION STATION

INTRODUCTION

A new Band I aerial has been built on the column of the existing mast at Divis in order to permit the erection of a u.h.f. aerial on a top mast. The new aerial came into service on 17th December 1965.

SUMMARY OF INSTALLATION

- Site: The site is Divis Hill, 4 miles (6.4 km) west of Belfast, grid reference NW/413307, height 1206 ft (368 m) a.m.s.l.
- Support Structure: The support structure consists of a 439 ft (134 m) stayed mast with a cantilever extension to 455 ft (139 m). The mast is of square cross-section with a side of 4 ft (1.22 m). Stays are fitted on bearings of 26°, 116°, 206° and 296° ETN.
- General Arrangement: See Fig. 1.
- Channel: Channel 1 is used with horizontal polarization. The vision carrier frequency is offset by -6.75 kc/s and the sound carrier frequency by -20 kc/s.
- Aerial: The aerial, which is shown in Fig. 2, comprises eight tiers each of two quarter-wavelength unipoles fed with equal currents in antiphase. The unipoles are mounted in the centres of adjacent mast faces. The inter-tier spacing is slightly non-uniform, being 0.5λ between the unipoles fed as a pair, and 0.96λ between adjacent pairs. The mean height of the aerial is 415 ft 6 in. (127 m) a.g.l., i.e. 59 ft 6 in (18.1 m) lower than the original aerial.
- Each half of the aerial is fed with a separate main feeder type HM7 (75 ohms).
- Reserve Aerial: Since the halves of the new aerial are fed separately, no reserve is required. The original reserve aerial has been dismantled.
- Power: A single 5 kW transmitter is used. The reserve transmitter has a power of 0.5 kW.
- Templet and horizontal radiation pattern (h.r.p.): Fig. 3 shows the h.r.p. of the original aerial together with field-strength measurements* showing the changes of radiated field required to offset the reduction of mean aerial height. These measurements were made by comparing at representative locations the field strengths obtained from the original main and reserve aerials (corrected for equal effective radiated powers) and show the shadowing to the north-west caused by Divis Hill when the lower aerial is used. The h.r.p. of the new aerial was therefore required to increase the field to the north-west while maintaining it in other directions; Fig. 4 shows the h.r.p. achieved.

* Carried out by D.W. Taplin.

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

As the aerial has a radiating length of only four wavelengths, no gap-filling of the v.r.p. is required.

Gain:	Mean intrinsic gain	6.5 dB
	Mean net gain	6.2 dB
	<u>Deduct:</u> loss in main feeder (435 ft, 132 m, of HM7)	0.7 dB
	network loss	<u>0.1 dB</u>
	Mean effective gain	<u>5.4 dB</u>

Programme Link:

The programme is received by u.h.f. link from Snaefell.

Note:

The aerial is a standard type for which the h.r.p. has been determined precisely from measurements on small-scale models.

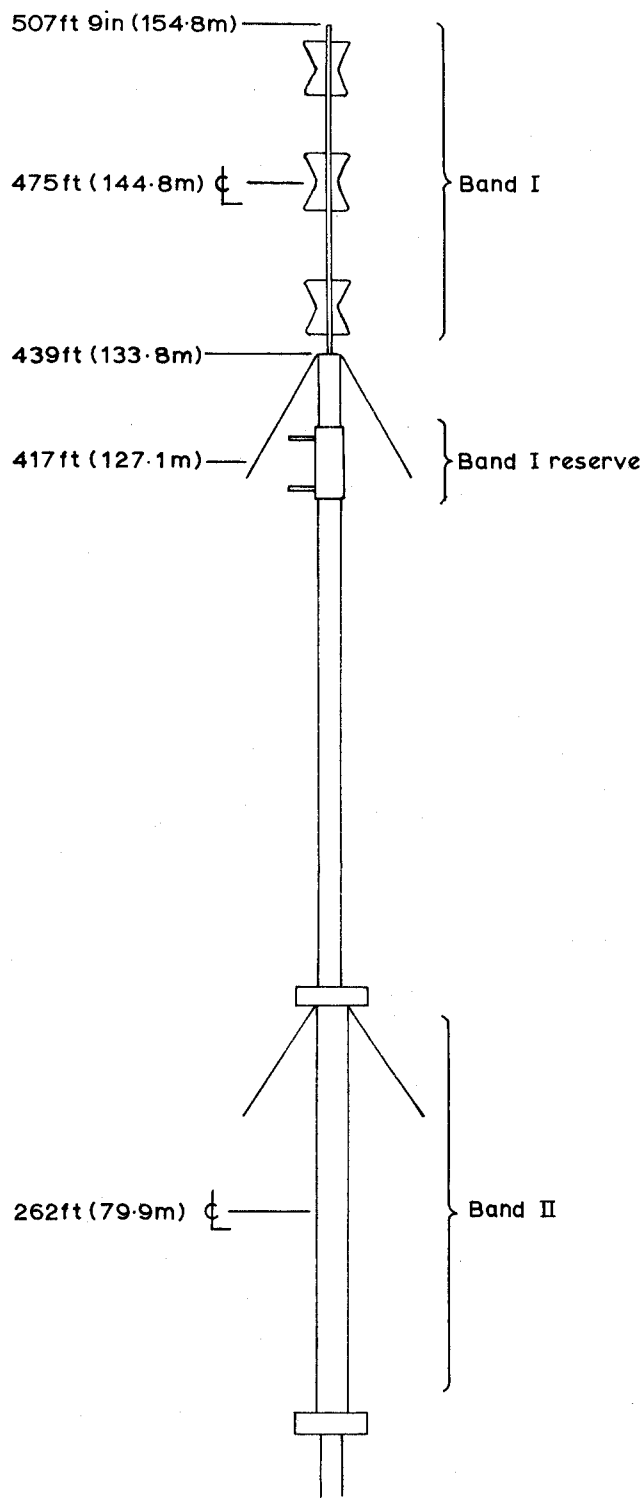
ACKNOWLEDGMENTS

The aerial was manufactured and set to work by E.M.I. Electronics Ltd. and the contracting authority was the BBC Transmitter Planning and Installation Department.

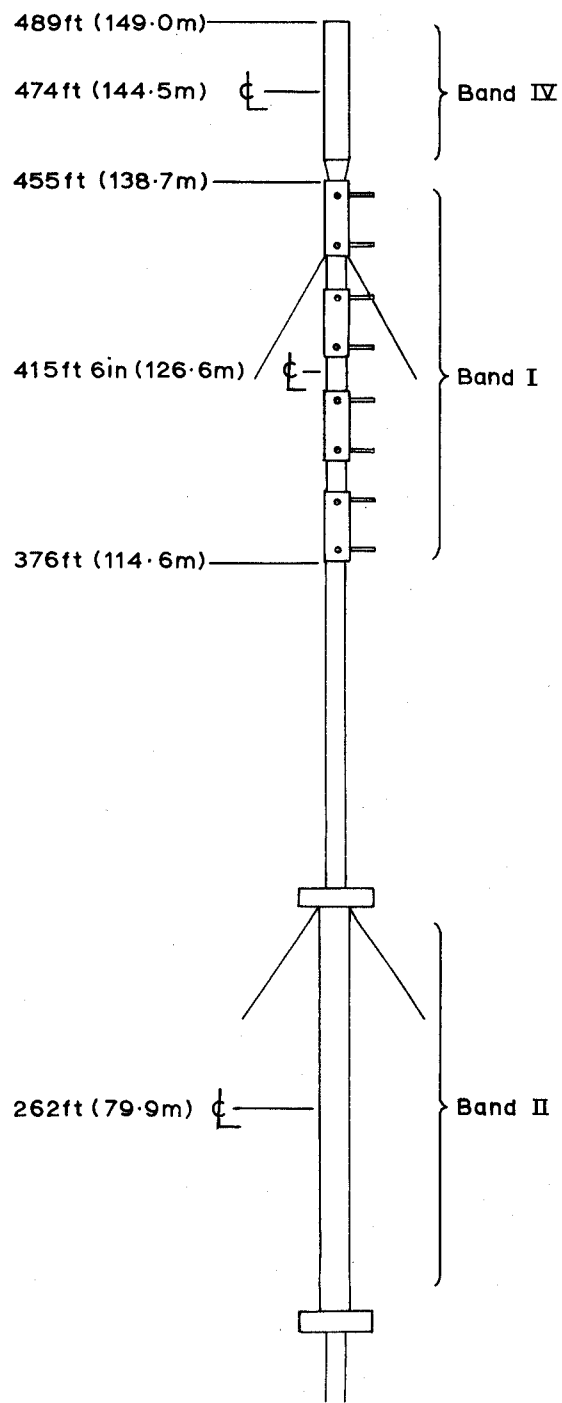
REFERENCE

The general arrangement of the aerial and feeders is shown on the following drawing held by Transmitter Planning and Installation Department:

P.I.D. 9612.2.1 AO



(a) Original arrangement



(b) New arrangement

Fig.1. General arrangement of aerials on mast.

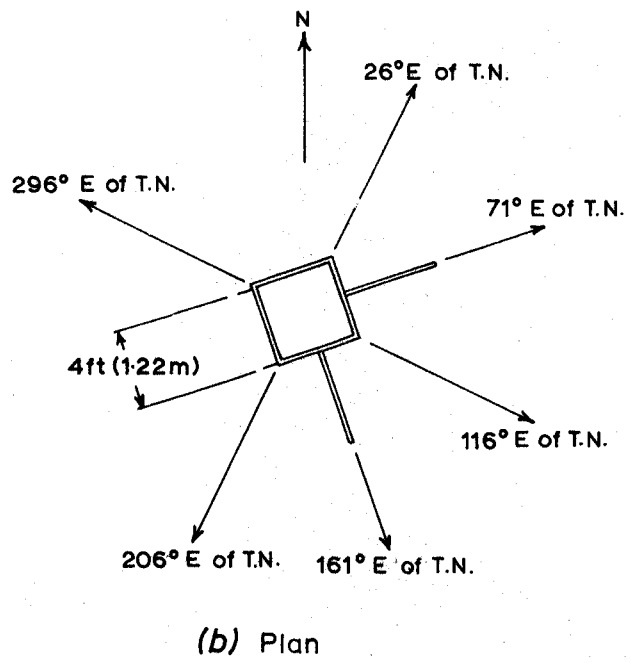
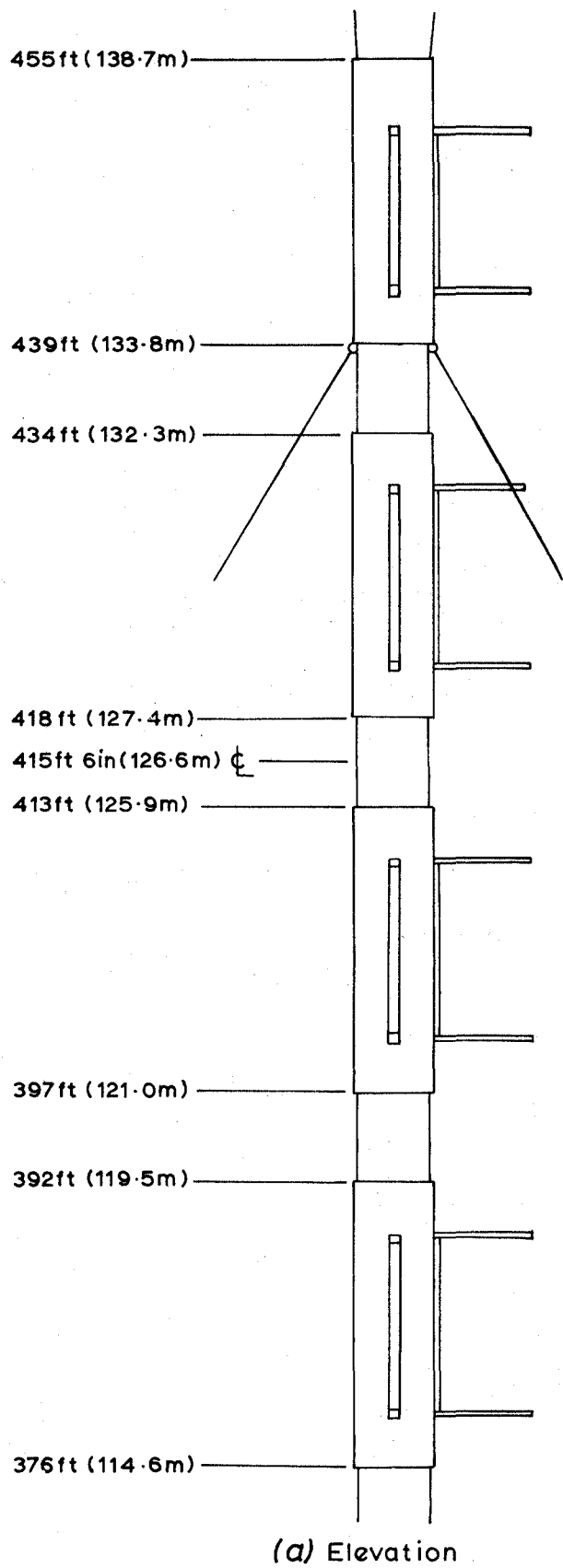


Fig.2. Arrangement of new aerial.

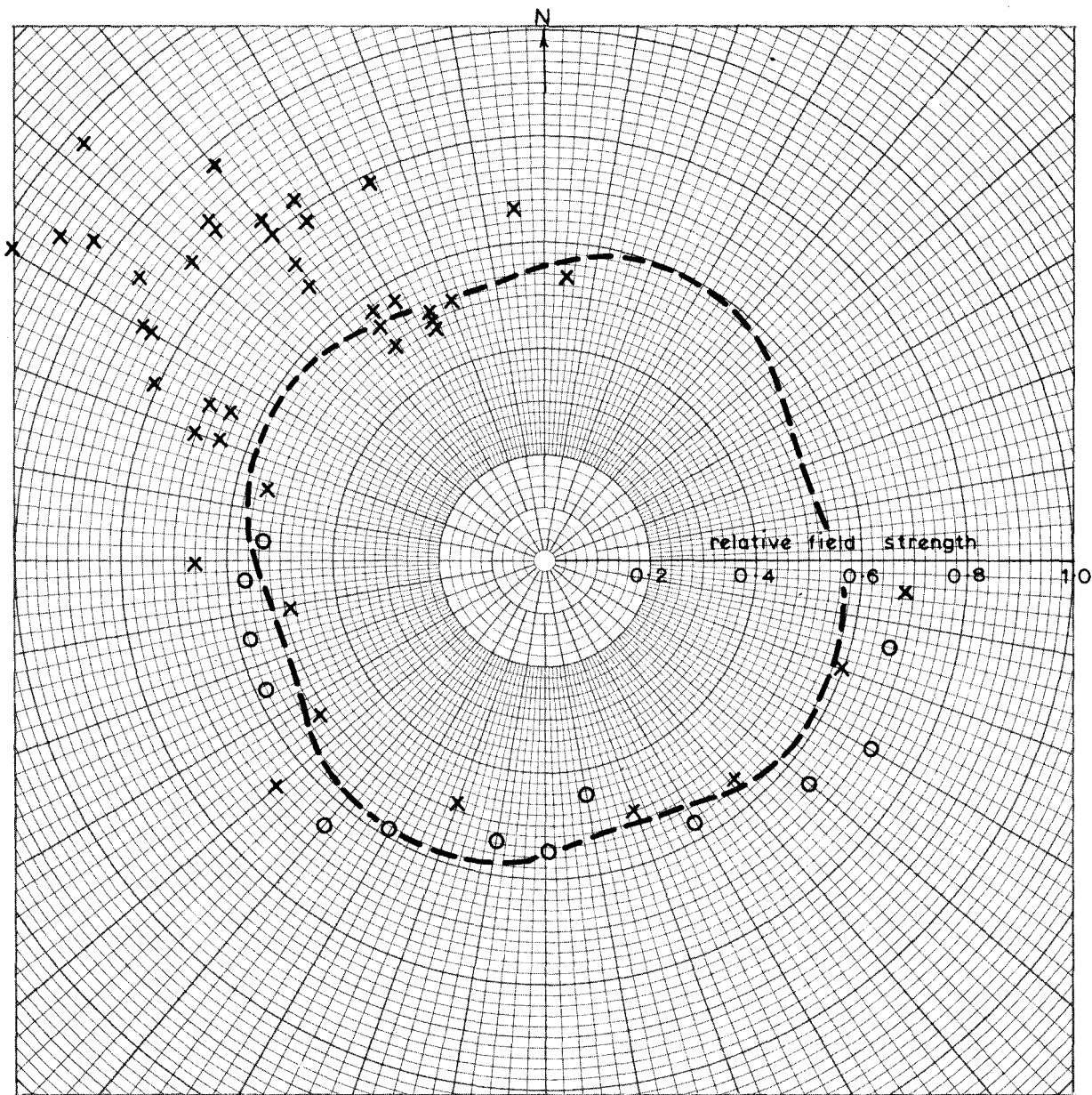


Fig. 3. Horizontal radiation pattern requirements.

— — Original H.R.P.

Measured ratio by which H.R.P. should be changed to offset reduction of aerial height:-

x Town median values

o Country median values

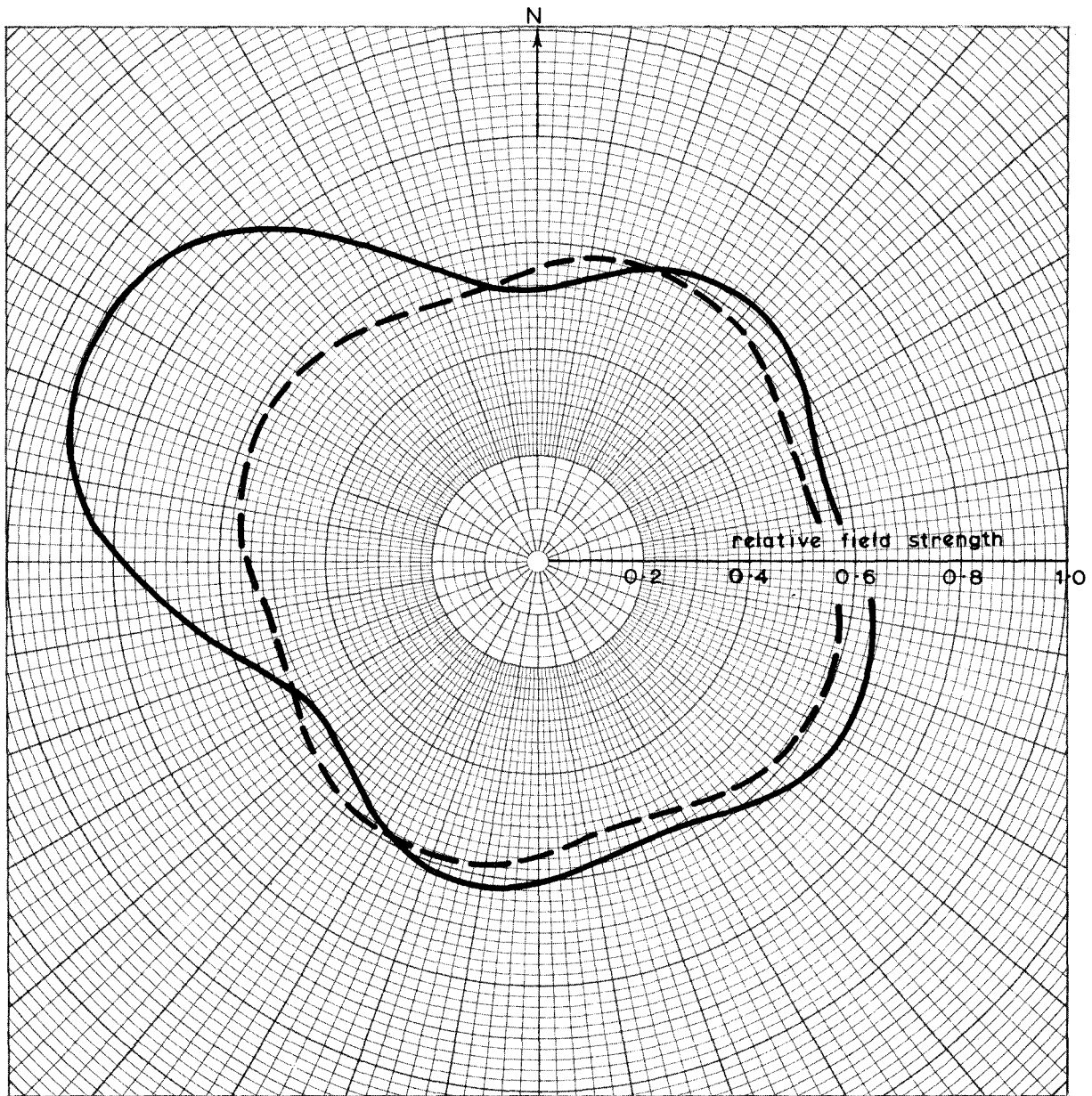


Fig.4. Horizontal radiation pattern of new aerial.

HORIZONTAL POLARIZATION

Channel 1 (Vision carrier 45.0Mc/s, Sound carrier 41.5 Mc/s)

Mean effective gain : 5.4dB

— — — — — Original H.R.P.

Transmitter power: 5kW

Mean E.R.P. : 17kW

Unit field corresponds to an E.R.P. of 40kW.