

RESEARCH DEPARTMENT

U.H.F. TRANSMITTING AERIAL FOR THE LLANDDONA TELEVISION STATION

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for Head of Research Department

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U. H. F. TRANSMITTING AERIAL FOR THE LLANDDONA TELEVISION STATION**INTRODUCTION**

A u.h.f. transmitting aerial for the Anglesey and North Wales area has been built as a top-mast on the existing BBC mast at Llanddona. The station started trade tests on 20th May 1967 and full service on 3rd. June 1967.

SUMMARY OF INSTALLATION

- Site:** The site is 5 km (3 miles) north-north-west of Beaumaris, grid reference SH/583810, height 140 m (460 ft) a.o.d.
- Support Structure:** The aerial is supported by a 108.0 m (354 ft 6 in.) stayed mast of square cross-section with a side of 1.22 m (4 ft). The mast stays are on bearings of 15°, 105°, 195° and 285° ETN.
- General Arrangement:** See Fig. 1.
- Channels:** The aerial is designed to radiate on four channels simultaneously. BBC-2 will be radiated on Channel 63 and BBC-1 on Channel 57. The ITA channels are 53 and 60. All channels have positive offset.
- Aerial:** The aerial comprises six tiers each of three 2λ panels fed with nominally equal currents having relative phases of 0°, 60° and 120°. The total radiating length varies from 12.7λ at Channel 53 to 14.1λ at Channel 63. The arrangement of the panels is shown in elevation and plan in Figs. 2 and 3 respectively. Fig. 4 shows the construction of each panel.

The mean height of the aerial is 112.3 m (368 ft 6 in.).

<u>Gain:</u>	Channel	53	57	60	63
		dB	dB	dB	dB
	Mean intrinsic gain	11.8	12.0	12.2	12.3
<u>Deduct aerial losses:</u>					
	Null filling	0.5	0.6	0.6	0.8
	Distribution feeder	0.2	0.2	0.2	0.2
	Distribution transformers	0.1 0.8	0.1 0.9	0.1 0.9	0.1 1.1
	Mean net gain	11.0	11.1	11.3	11.2
<u>Deduct other losses:</u>					
	Main feeder 119 m (390 ft)	0.9	1.0	1.0	1.0
	Ground run 7.6 m (25 ft)	0.1	0.1	0.1	0.1
	Diplexer and splitter	0.1 1.1	0.1 1.2	0.1 1.2	0.1 1.2
	Mean effective gain	9.9	9.9	10.1	10.0
	HRP max./mean ratio	4.4	3.0	3.5	2.5
	Maximum effective gain	14.3	12.9	13.6	12.5

Feeders: The arrangement of the distribution feeders is shown schematically in Fig. 5. Each half of the aerial is connected to the transmitters by a main feeder type HF-4.1/8 - 50.

Power: Two 6.25 kW vision transmitters and two 1.25 kW sound transmitters will be provided for each channel; at present only those for Channel 63 (BBC-2) have been installed. The transmitters are run at the power required to give the maximum effective radiated power (e.r.p.) of 100 kW permitted under the Stockholm Agreement.

Each vision transmitter is combined with a sound transmitter and the combined outputs are paralleled by means of a diplexer. The output from the diplexer is equally divided to the two main feeders by a splitter transformer. This arrangement eliminates differences between the modulation characteristics of the vision transmitters. A four-channel combining unit will be added later, when required.

Templet and horizontal radiation pattern (h.r.p.): The h.r.p. was required to be directional with a maximum e.r.p. not exceeding 100 kW. The templet and the h.r.p.s at the vision carrier frequencies of the operating channels are shown in Figs. 6 - 9. These h.r.p.s are the mean of measurements on each half of the final full-scale aerial.

Vertical radiation pattern (v.r.p.): The v.r.p. was specified to be null-filled and the maximum of radiation to be tilted $0.6^\circ \pm 0.1^\circ$ below the horizontal. Null-filling is achieved by means of the following phase distribution of the feed currents over the length of the aerial:

Tier	1 (top)	2	3	4	5	6 (bottom)
Phase	-47°	0°	-19°	-25°	-44°	-77°

The v.r.p.s obtained for each face, shown in Figs. 10 - 12 were computed from measurements of the amplitudes and phases of the feeds to the aerial panels taken after erection.

Programme feed: Direct pick-up of Winter Hill at Great Ormes Head, then s.h.f. link.

ACKNOWLEDGEMENTS

The mechanical and electrical design, construction and setting to work of the aerial were carried out by Racal Communications Ltd. in association with Rohde & Schwarz, Munich. The contracting authority was the BBC Transmitter Planning and Installation Department.

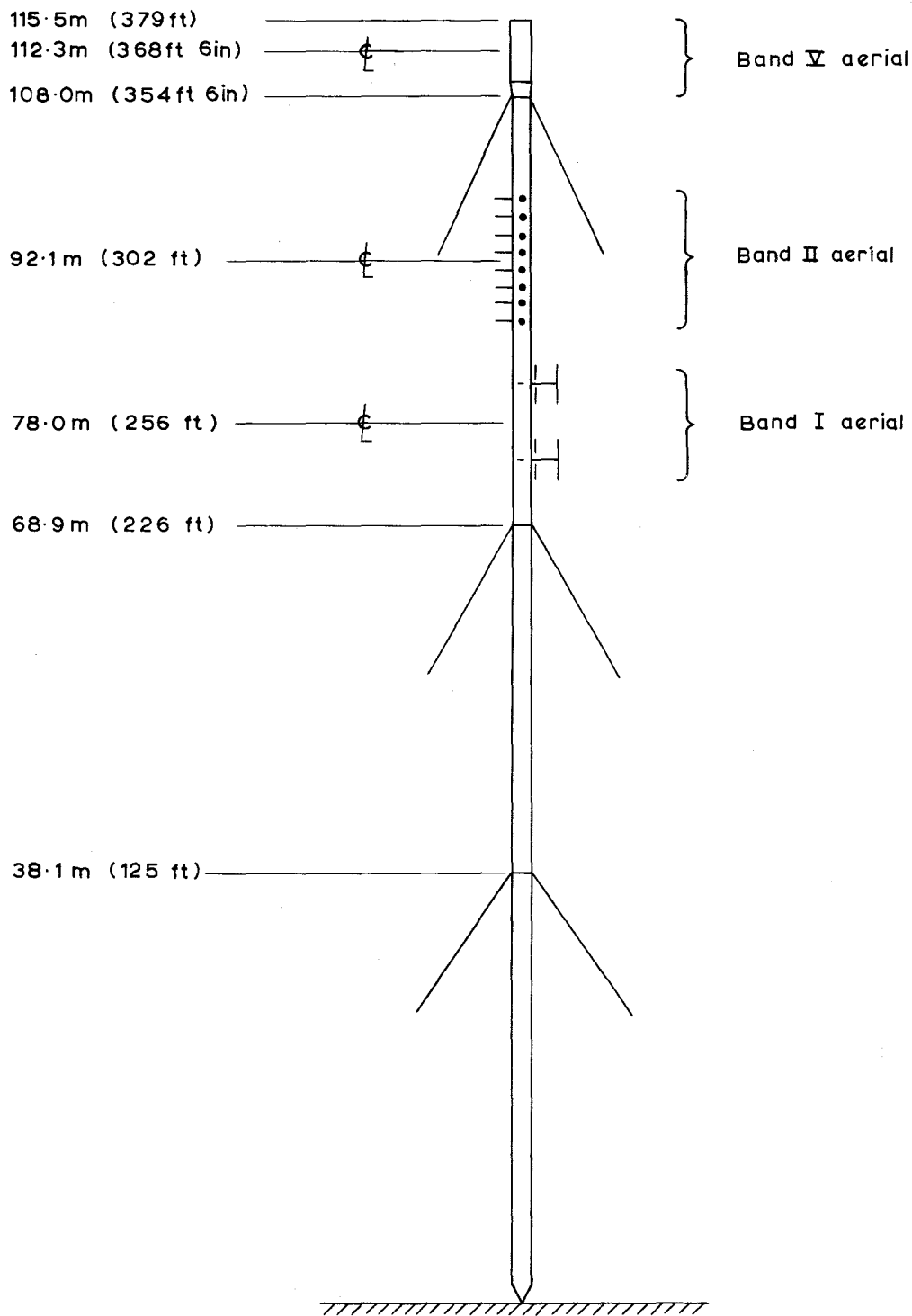


Fig. 1. General arrangement of aerials on mast.

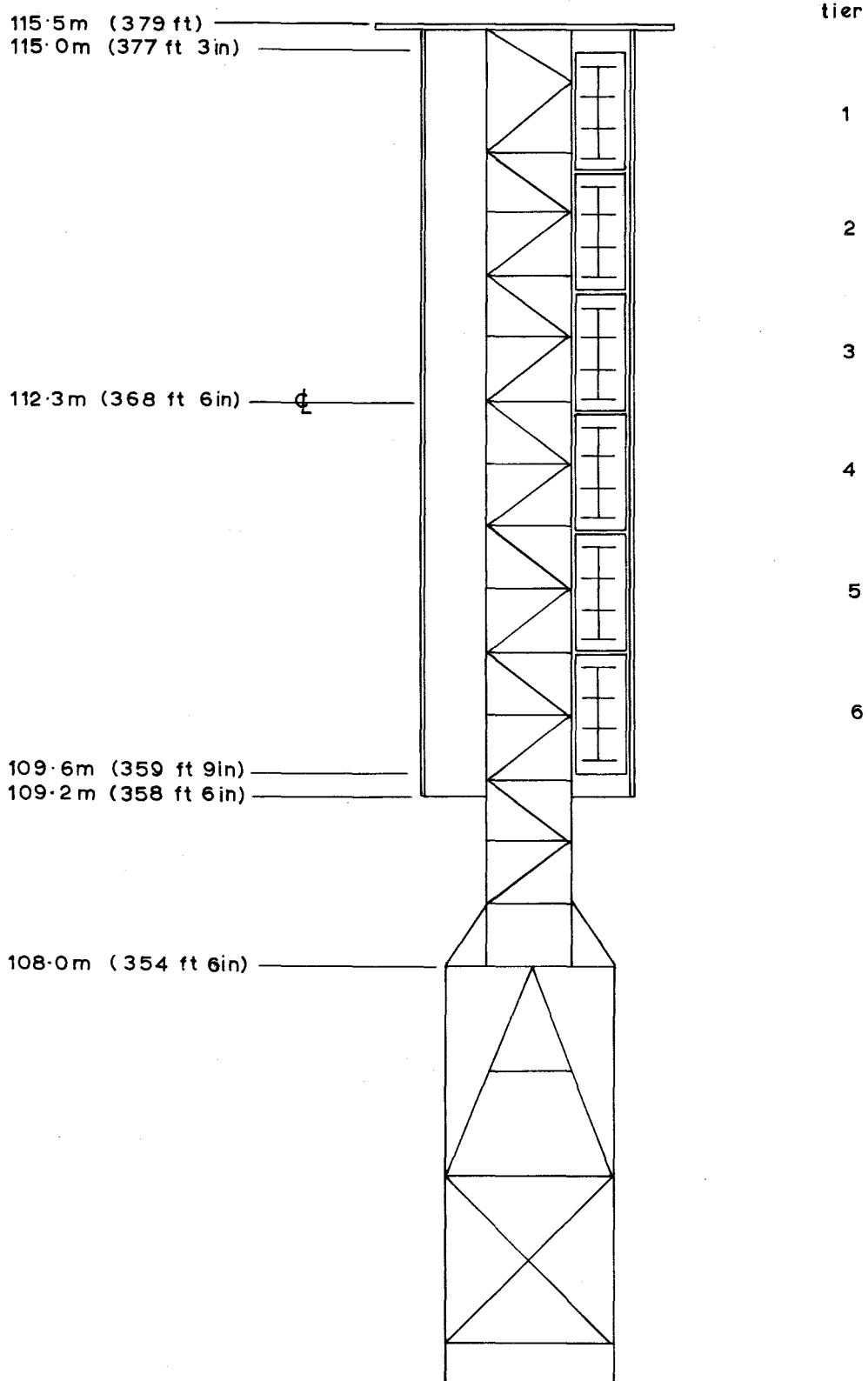


Fig. 2. Elevation of aerial.

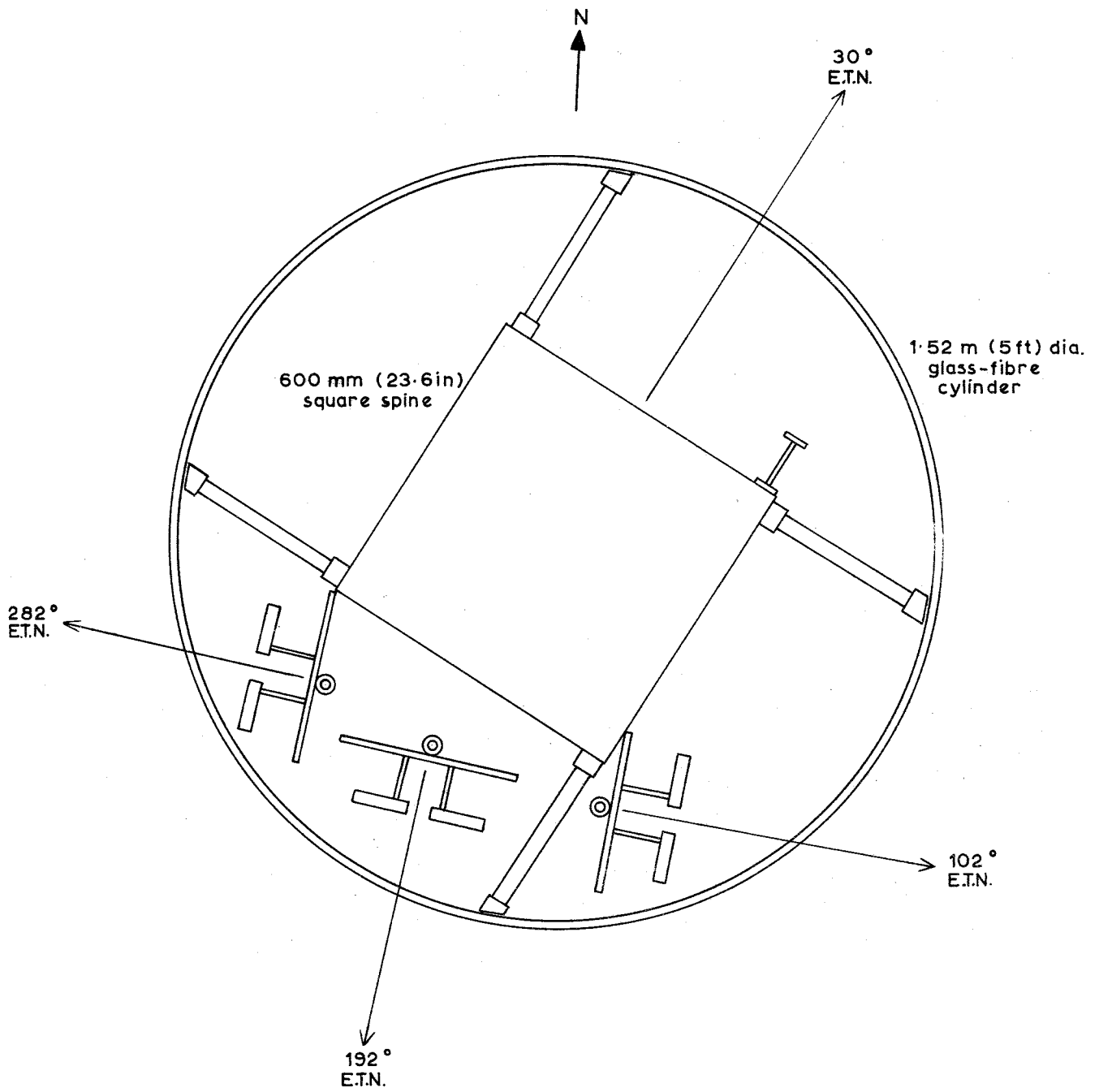


Fig. 3. Plan of aerial.

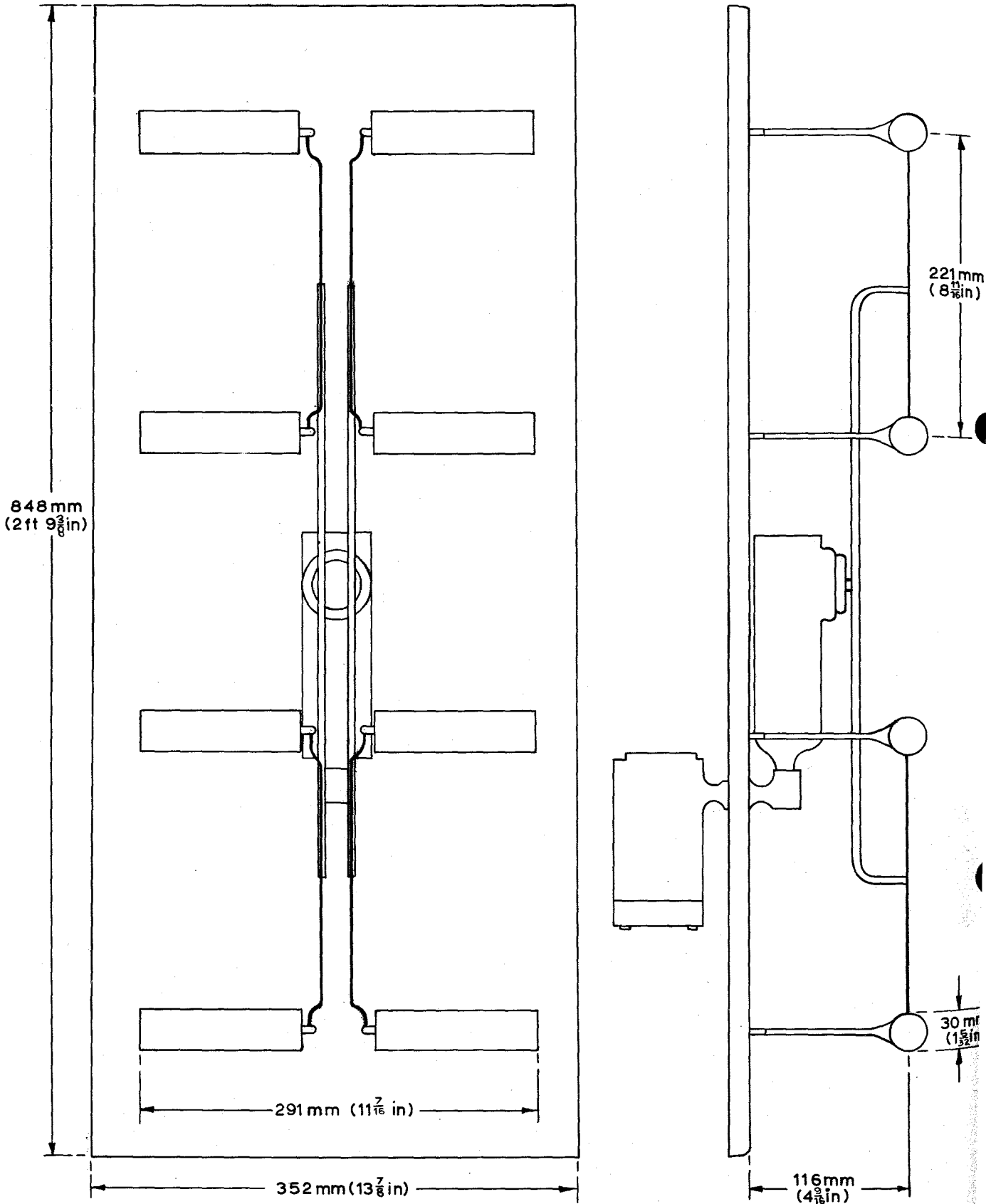


Fig. 4. Construction of aerial panel

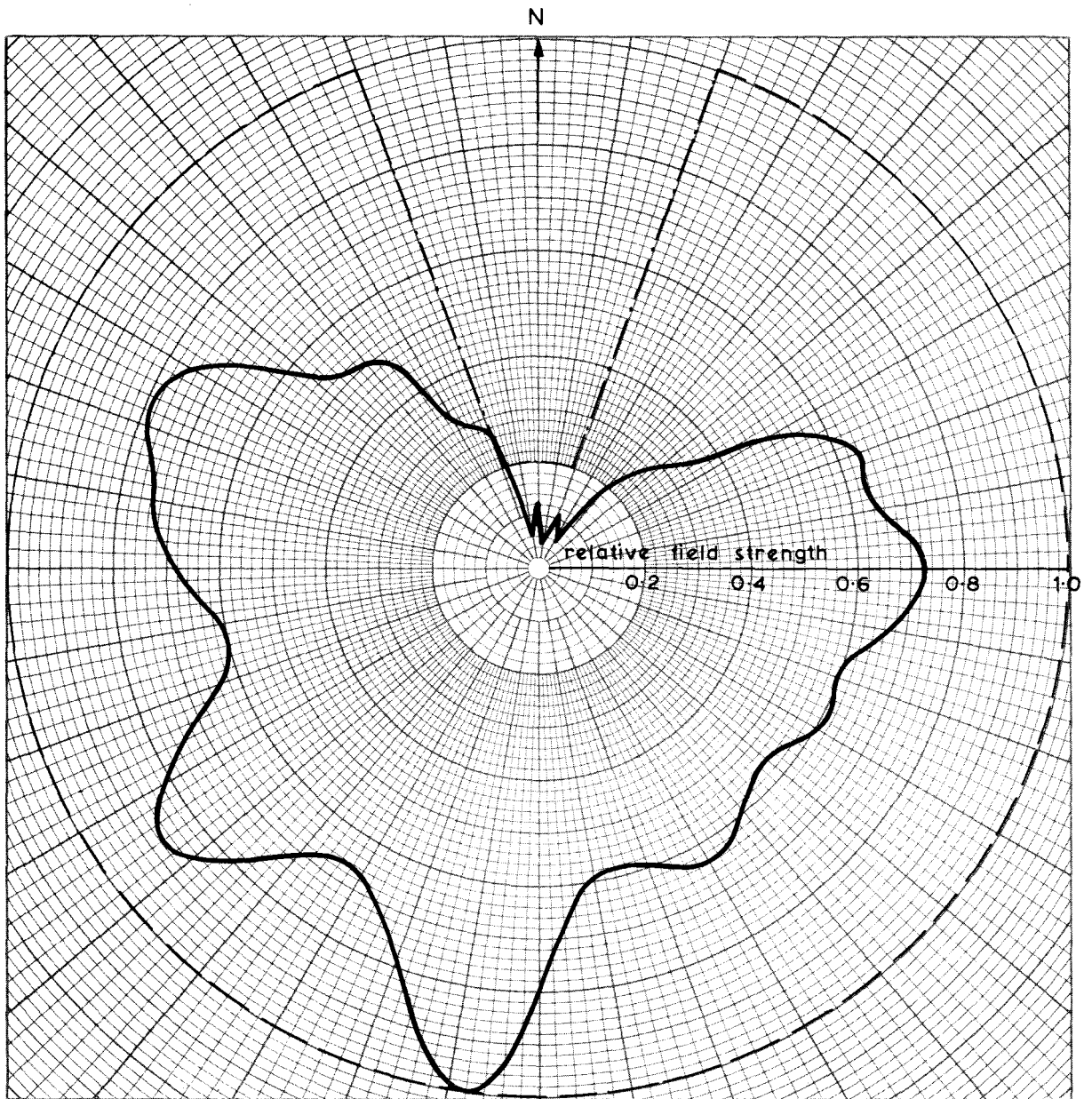


Fig. 6. Horizontal radiation pattern: Channel 53

HORIZONTAL POLARIZATION

Vision carrier 727.25 MHz, Sound carrier 733.25 MHz.

Mean effective gain: 9.9 dB

Peak vision transmitter power: 2 x 1.8 kW

Mean E.R.P.: 36 kW

— — — Stockholm E.R.P. limit.

— · — · — Additional internal E.R.P. limit.

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

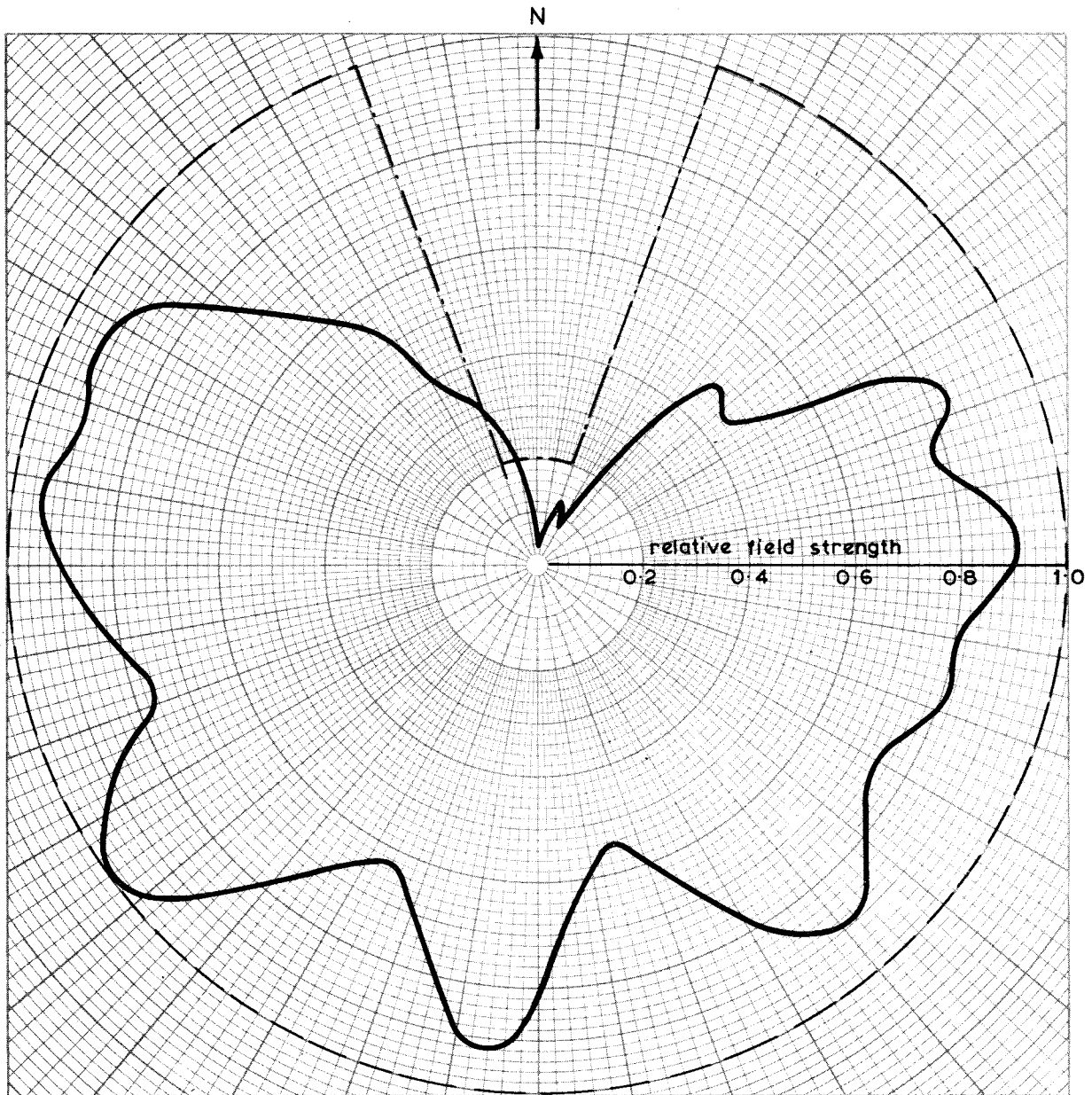


Fig. 7. Horizontal radiation pattern: Channel 57 (BBC 1)

HORIZONTAL POLARIZATION

Vision carrier 759.25 MHz, Sound carrier 765.25 MHz

Mean effective gain: 9.9 dB

Peak vision transmitter power: 2 x 2.5 kW

Mean E.R.P.: 50 kW

— — — — — Stockholm E.R.P. limit

- - - - - Additional Internal E.R.P. limit.

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

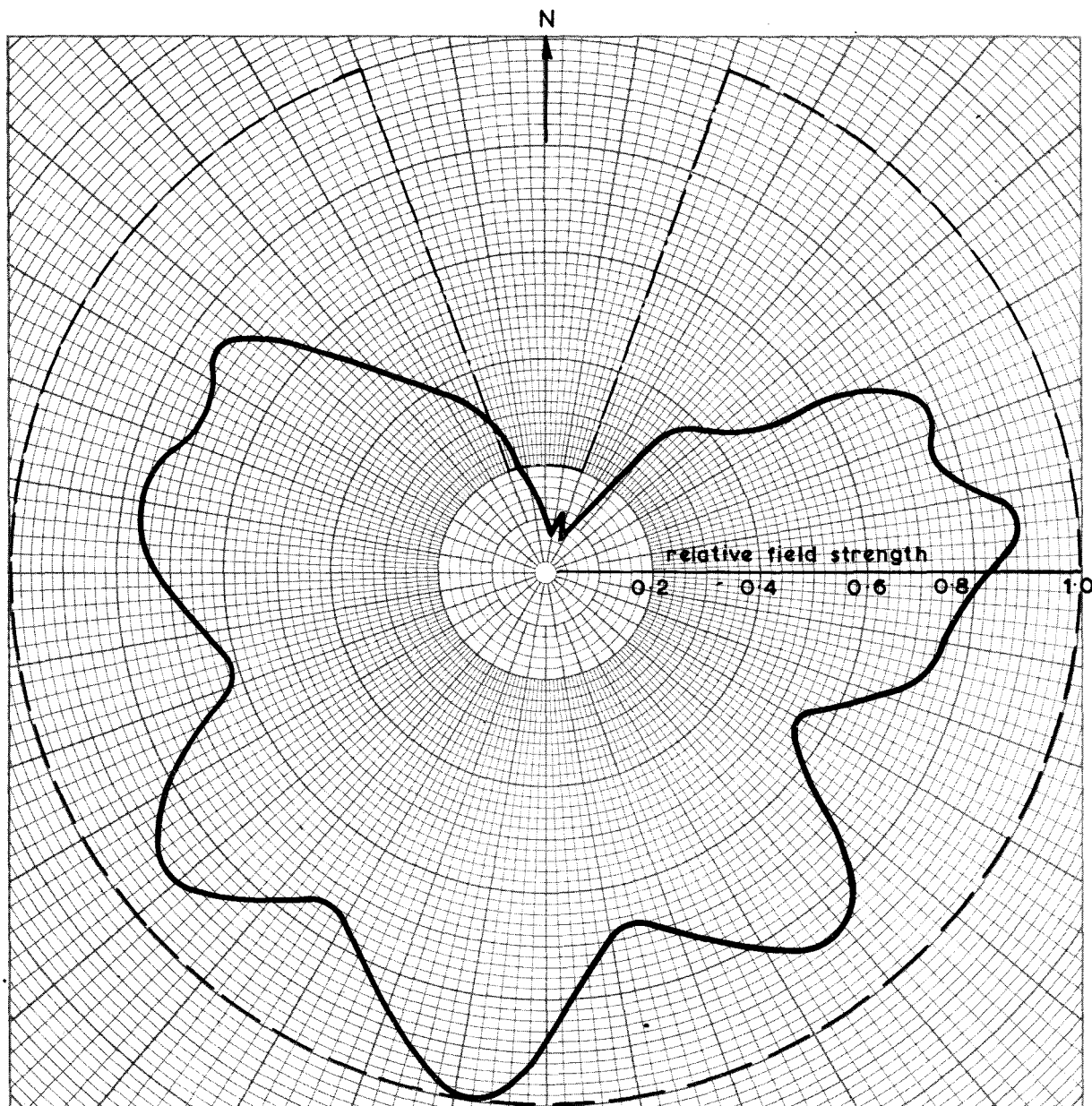


Fig. 8. Horizontal radiation pattern: Channel 60

HORIZONTAL POLARIZATION

Vision carrier 783.25 MHz, Sound carrier 789.25 MHz

Mean effective gain: 10.1 dB

Peak vision transmitter power: 2 x 2.2 kW

Mean E.R.P.: 44 kW

— — — Stockholm E.R.P. limit.

- . - . - Additional internal E.R.P. limit.

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

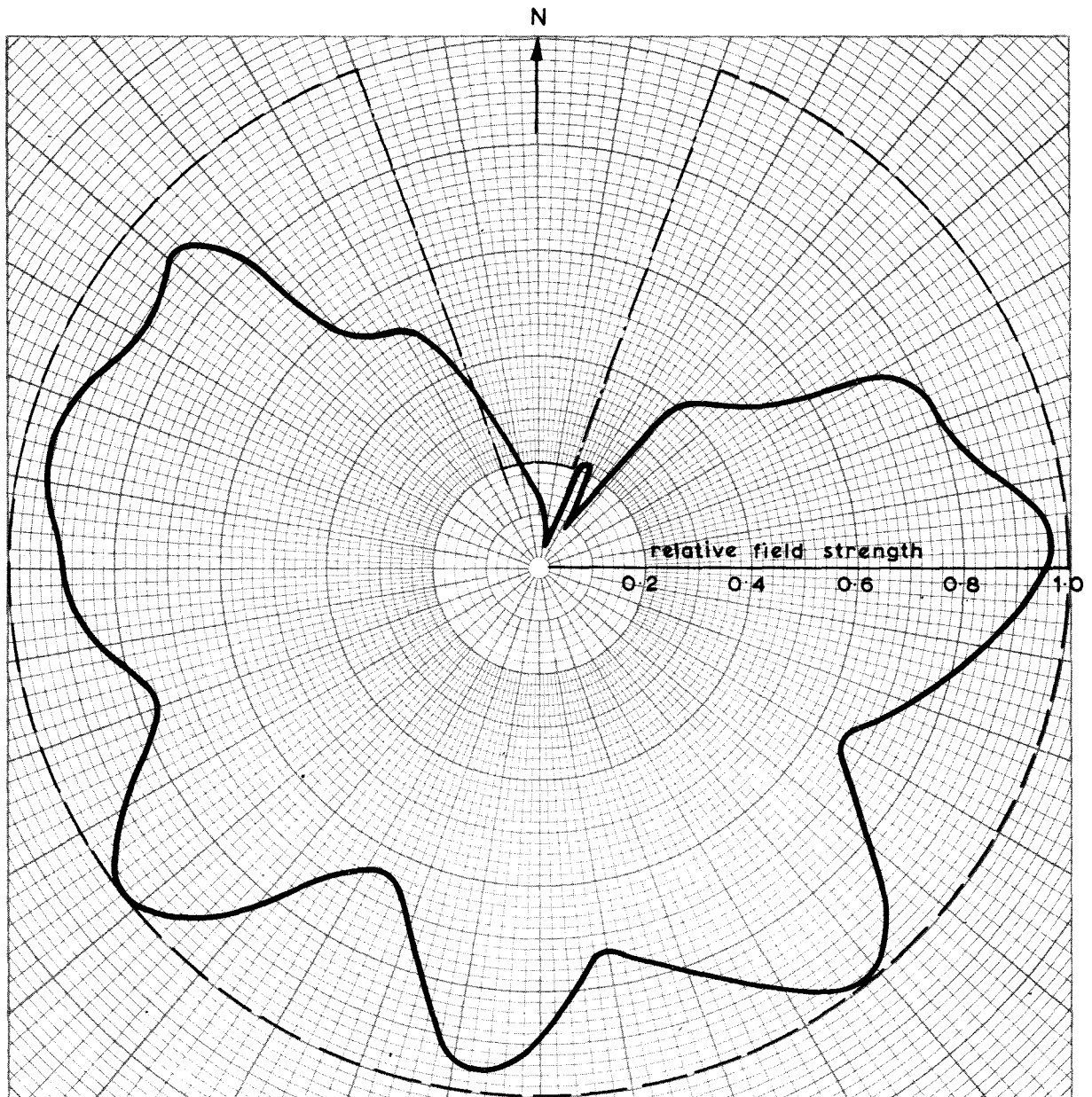


Fig. 9. Horizontal radiation pattern : Channel 63 (BBC 2)

HORIZONTAL POLARIZATION

Vision carrier 807.25 MHz, Sound carrier 813.25 MHz..

Mean effective gain: 10.0 dB

Peak vision transmitter power: 2 x 2.8 kW

Mean E.R.P.: 56 kW

— — — — — Stockholm E.R.P. limit.

— . — . — . — . — Additional internal E.R.P. limit

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

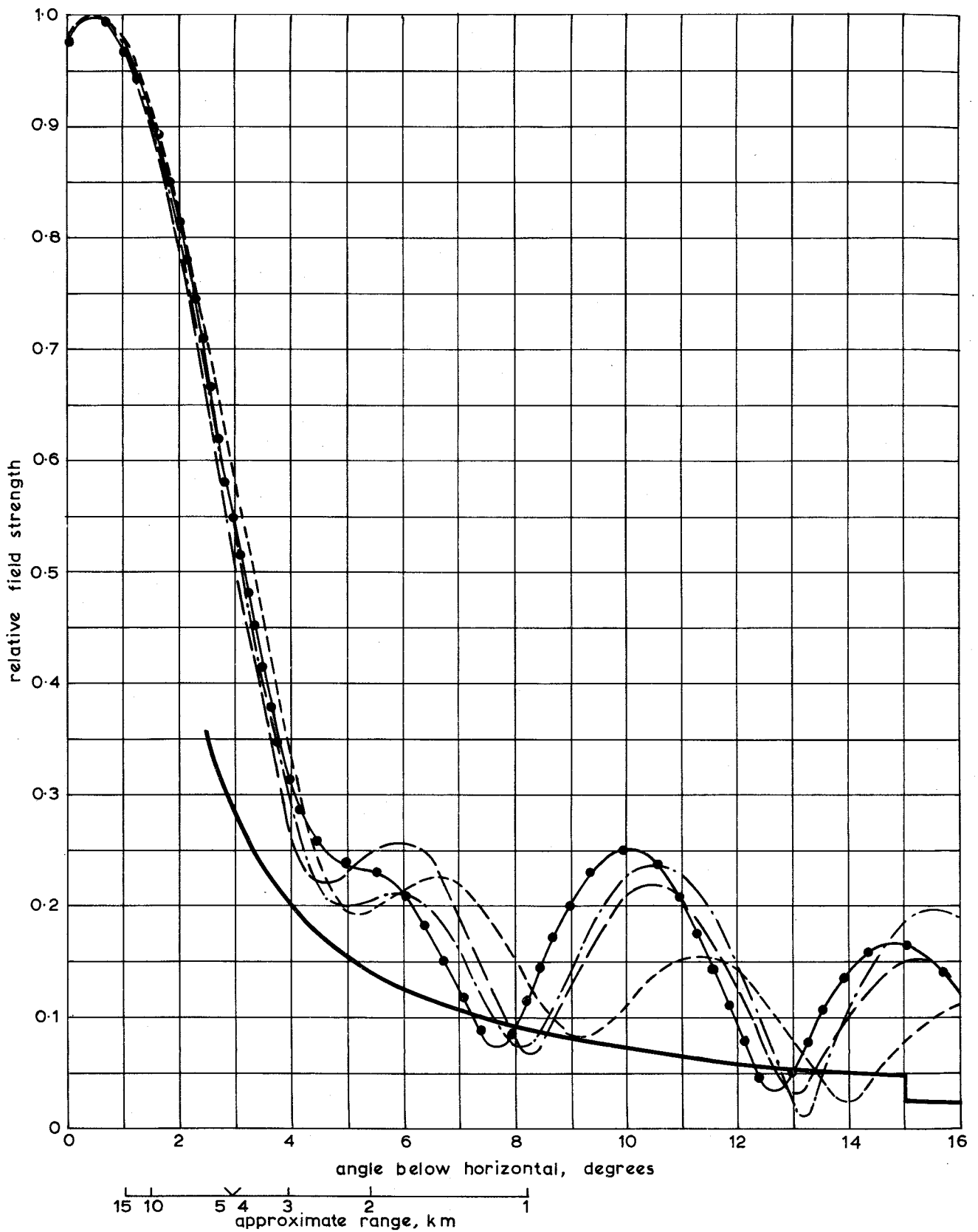


Fig. 10. Vertical radiation pattern on bearing 102° E.T.N.

- Channel 53 - - - - - Channel 57 (BBC 1)
- . - . - Channel 60 ● - ● - Channel 63 (BBC 2)
- Specified minimum field

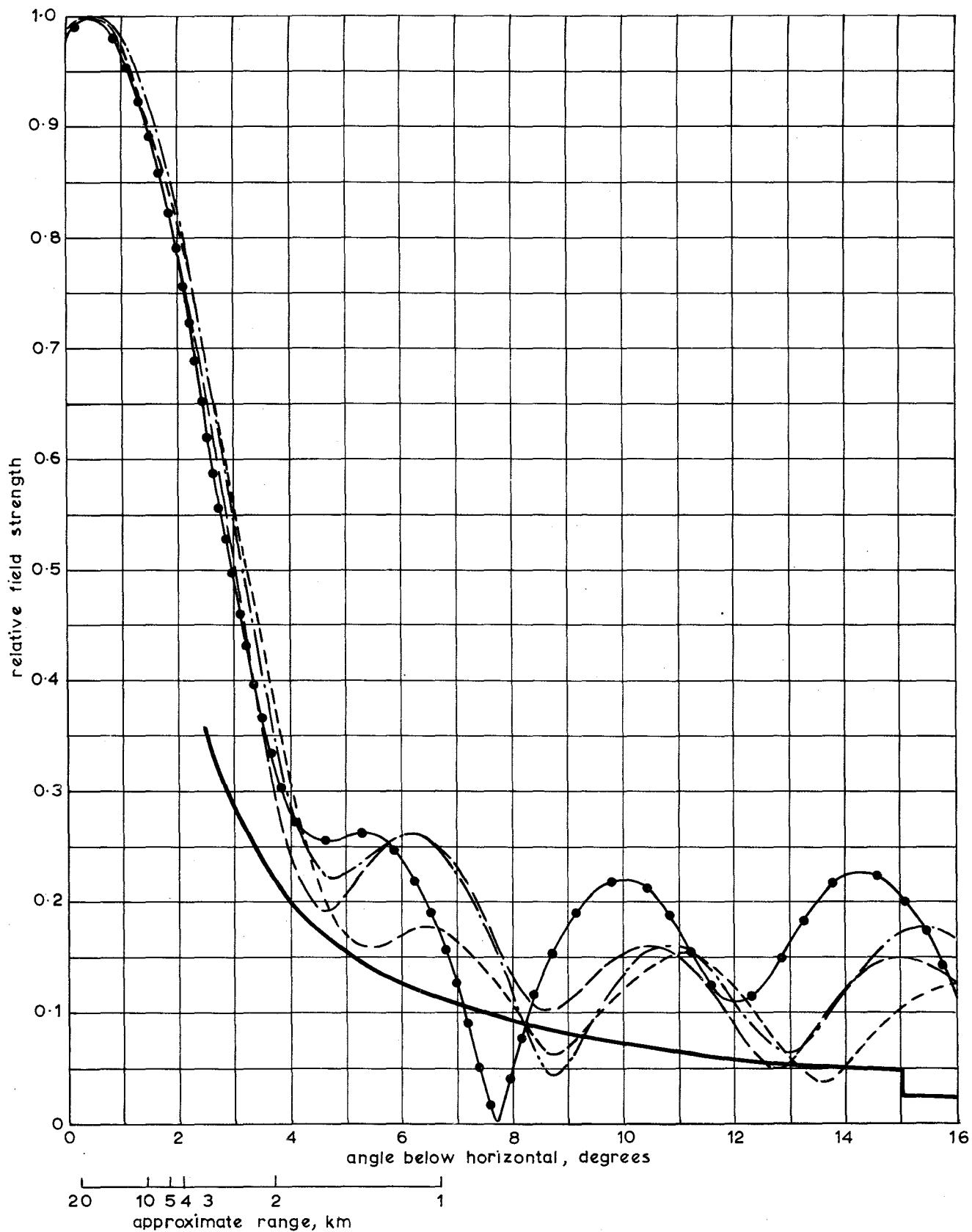


Fig. 11. Vertical radiation pattern on bearing 192° E.T.N.

- - - - - Channel 53 - · - · - Channel 57 (BBC1)
 - - - - - Channel 60 · · - - - Channel 63 (BBC2)
 ———— Specified minimum field

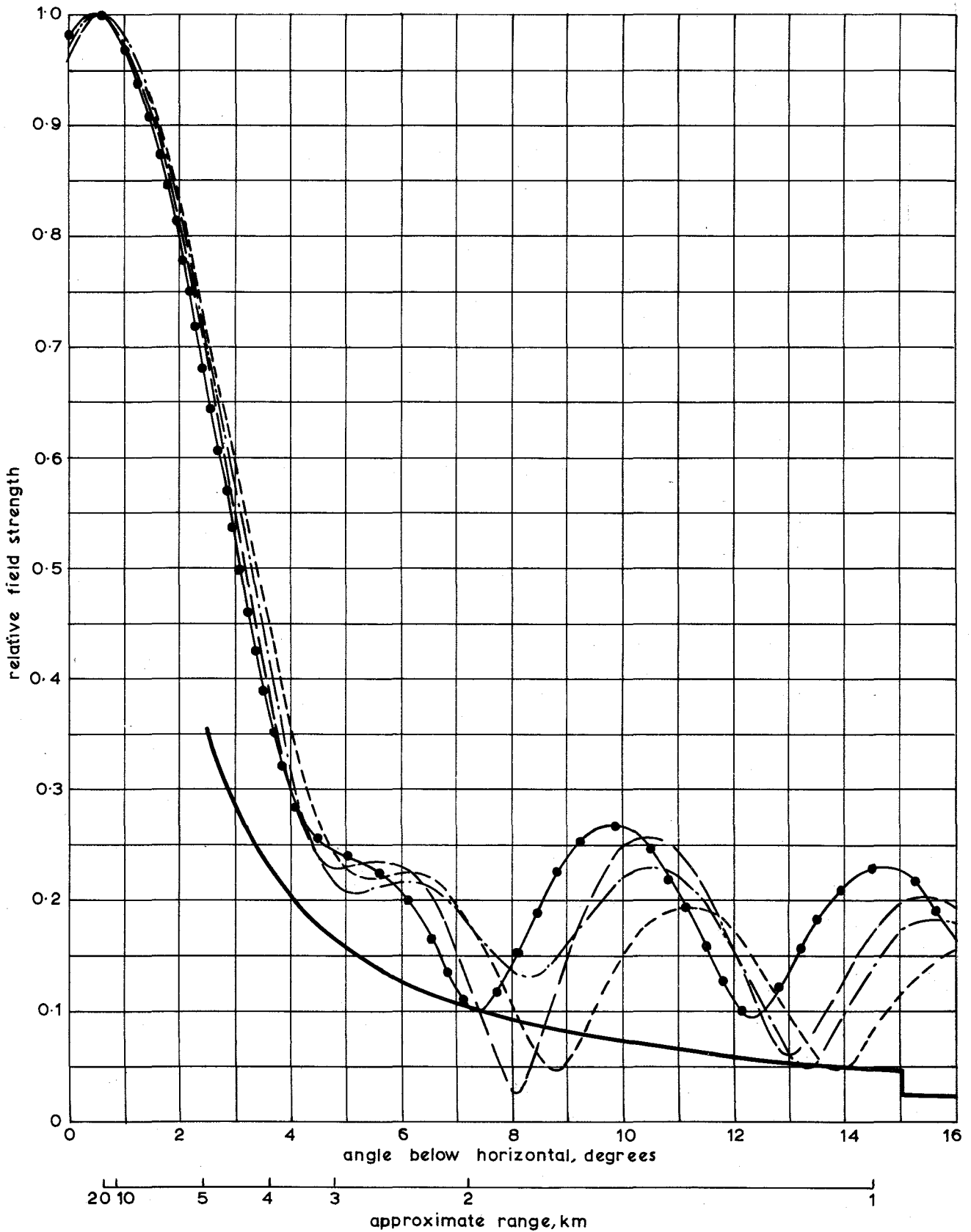


Fig. 12. Vertical radiation pattern on bearing 282° E.T.N.

- - - - - Channel 53 - · - - - Channel 57 (BBC 1)
 ——— Channel 60 ● ——— Channel 63 (BBC 2)
 ——— Specified minimum field