

RESEARCH DEPARTMENT

**BAND III TRANSMITTING AERIAL FOR THE WINTER HILL
V.H.F. TELEVISION STATION**

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BAND III TRANSMITTING AERIAL FOR THE WINTER HILL V.H.F. TELEVISION STATION

INTRODUCTION

The Winter Hill relay station came into full service on the 25th March 1966. It provides a v.h.f. television service to western Lancashire and parts of Cheshire. Among the towns and cities included in the service area are Manchester, Liverpool, Blackpool, Preston, Bolton, Chester and Blackburn.

SUMMARY OF INSTALLATION

- Site: The site is approximately 8 km North-West of Bolton, grid reference SD660146, height 438 m a.m.s.l.
- Support Structure: The support structure, which is used for both BBC and ITA aerials, consists of a 309.4 m (1015 ft) stayed mast, with stays directed along bearings of 101° , 221° and 341° ETN. The mast has a 2.74 m (9 ft) diameter cylindrical cross-section up to the 198.1 m (650 ft) level. Between the 198.1 m (650 ft) and 259 m (850 ft) levels, the cross-section is triangular with a side dimension of 1.98 m (6 ft 6 in.). Above the 259 m (850 ft) level the cross-section is triangular with a side dimension of 1.3 m (4 ft 3 in.). The mast, between the 198.1 m (650 ft) and 259.1 m (850 ft) levels, is enclosed in a 3.66 m (12 ft) diameter glass fibre shield and between the 259.1 m (850 ft) and 305.4 m (1002 ft) levels in a 2.74 m (9 ft) diameter glass fibre shield.
- General Arrangement: See Fig. 1.
- Channel: Channel 12 with vertical polarization is used. The vision carrier is offset - 23.53125 kHz. The sound carrier is nominally offset - 40.3125 kHz and steered to within ± 300 Hz of the half line frequency of the ITA transmissions from Moel-y-Parc.
- Aerial: The aerial¹ consists of eight tiers of vertical 1λ dipoles formed by eight panel aerials, four panels being mounted off the mast face on bearing 281° ETN and four off the mast face on bearing 41° ETN.
- Each of the panel aerials (denoted type B) mounted off the mast face on bearing 41° ETN has two tiers spaced 1.52 m (5 ft) apart, each consisting of two vertical 1λ dipoles with a horizontal separation of 0.762 m (2 ft 6 in.) and spaced 0.38 m (1 ft 3 in.) from a 1.83 m (6 ft) by 3.05 m (10 ft) wire mesh screen. An additional screen, which extends 0.61 m (2 ft) from the main screening frame, is placed in the vertical plane between the dipoles. Details of these panels are shown in Fig. 2. The panel aerials (denoted type A) mounted off the mast face on bearing 281° ETN are similar to those described above, but in this case two screens are placed in the vertical plane between the dipoles. Details of these panels are shown in Fig. 3. A plan view of the mast and panel arrangement is shown in Fig. 4. The relative amplitudes and phases of the panel currents are shown in Fig. 5. The mean aerial height is 244.4 m (802 ft). There are independent main feeders to each half aerial.

Power:	A transmitter power of 8.5 kW is used.		
Templet and horizontal radiation pattern (h.r.p.):	See Fig. 6 and Note.		
Vertical radiation pattern (v.r.p.):	See Fig. 7.		
Gain:	Mean intrinsic gain		9.7 dB
	<u>Deduct:</u> loss due to distribution feeder, gapfilling and possible misalignment		<u>0.8 dB</u>
	Mean Net gain		8.9 dB
	<u>Deduct:</u> loss due to main feeder type F & G 3.1/8 in.	1.7 dB	
	Network loss	<u>1.0 dB</u>	<u>2.7 dB</u>
	Mean effective gain		<u>6.2 dB</u>
<u>Programme Source:</u>	Programme is provided by direct pick-up of the transmission from Holme Moss.		
<u>Note:</u>	The aerial design and installation was carried out by contractors.		

REFERENCE

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

Mast and Aerials, Outlines and Orientations	PID6047.2.149A4
Layout of Aerials and Feeders	EMI drawing No. 9A/D 88689
Schematic Diagram	EMI drawing No. 9A/C-C88689

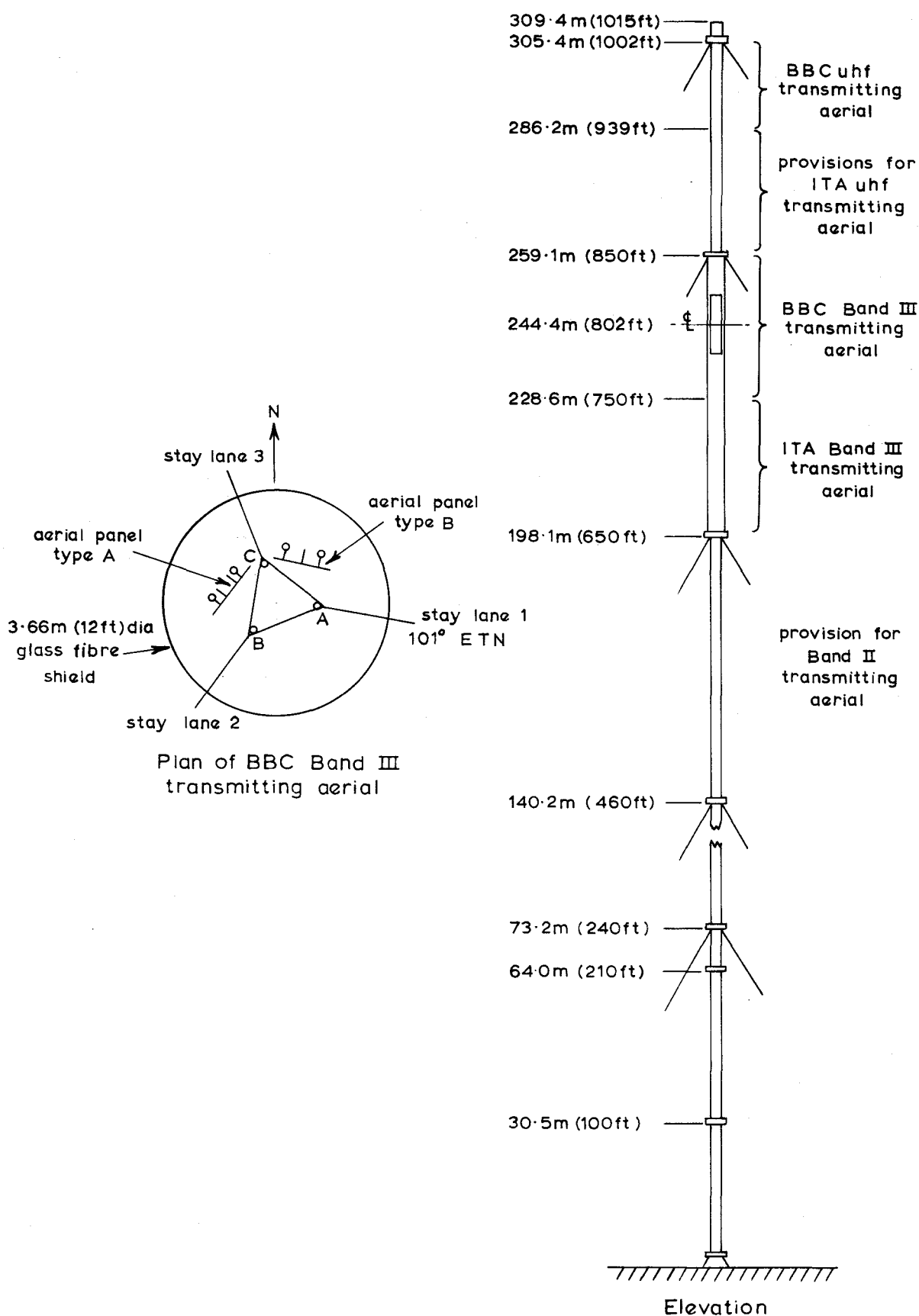


Fig.1. General arrangement of airtials on mast

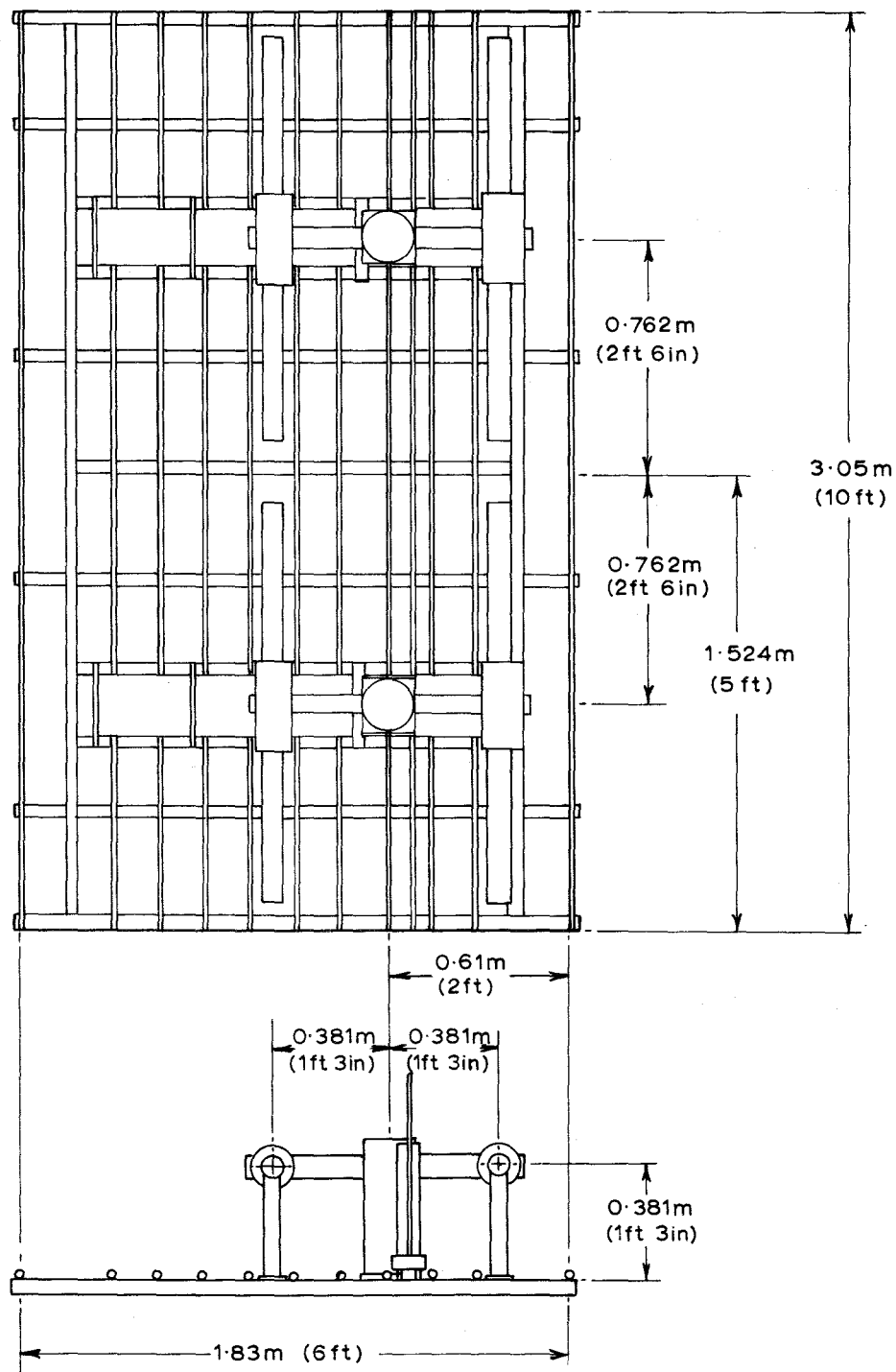


Fig. 2. Aerial panel type B

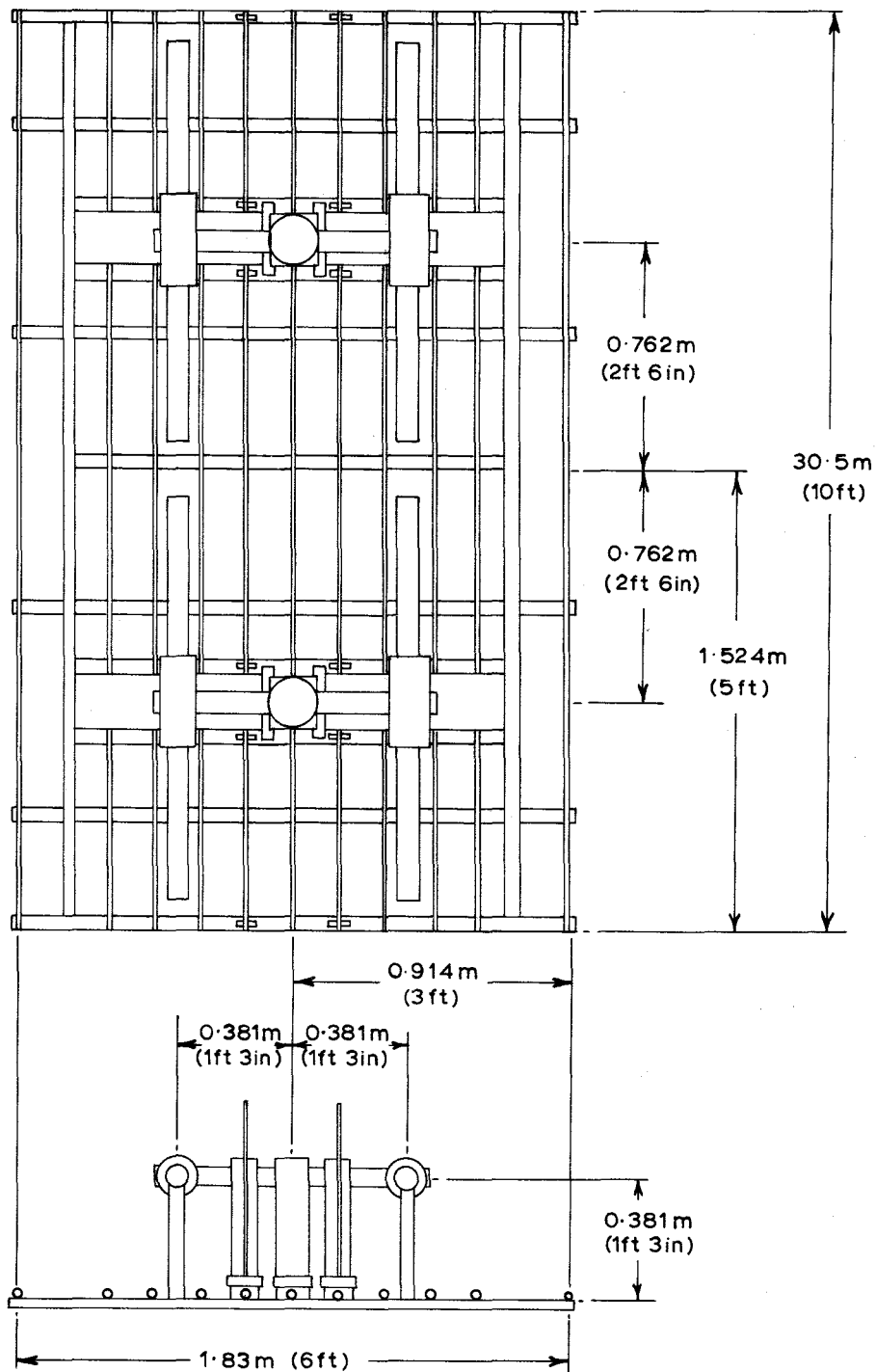


Fig.3. Aerial panel type A

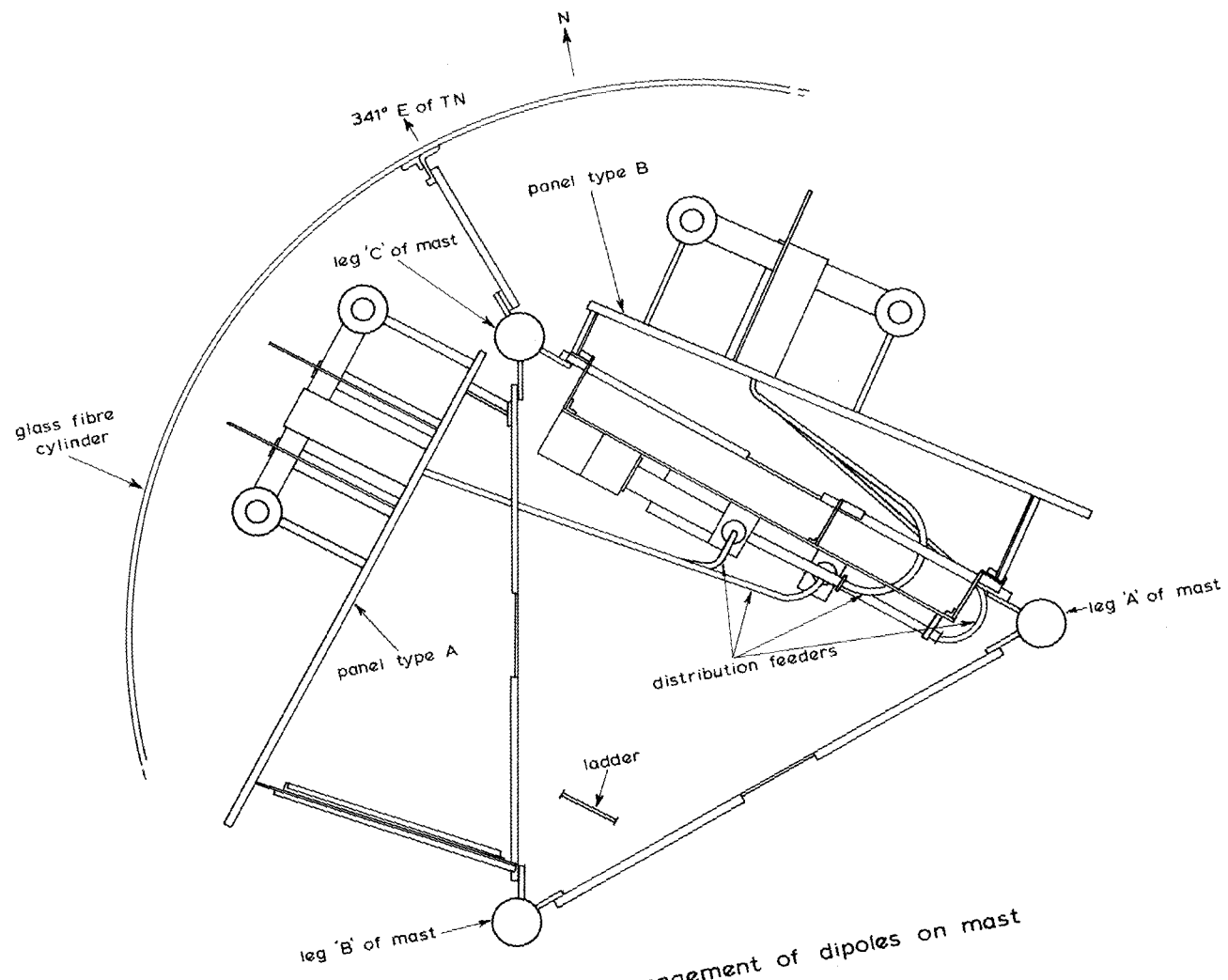


Fig. 4. Plan of arrangement of dipoles on mast

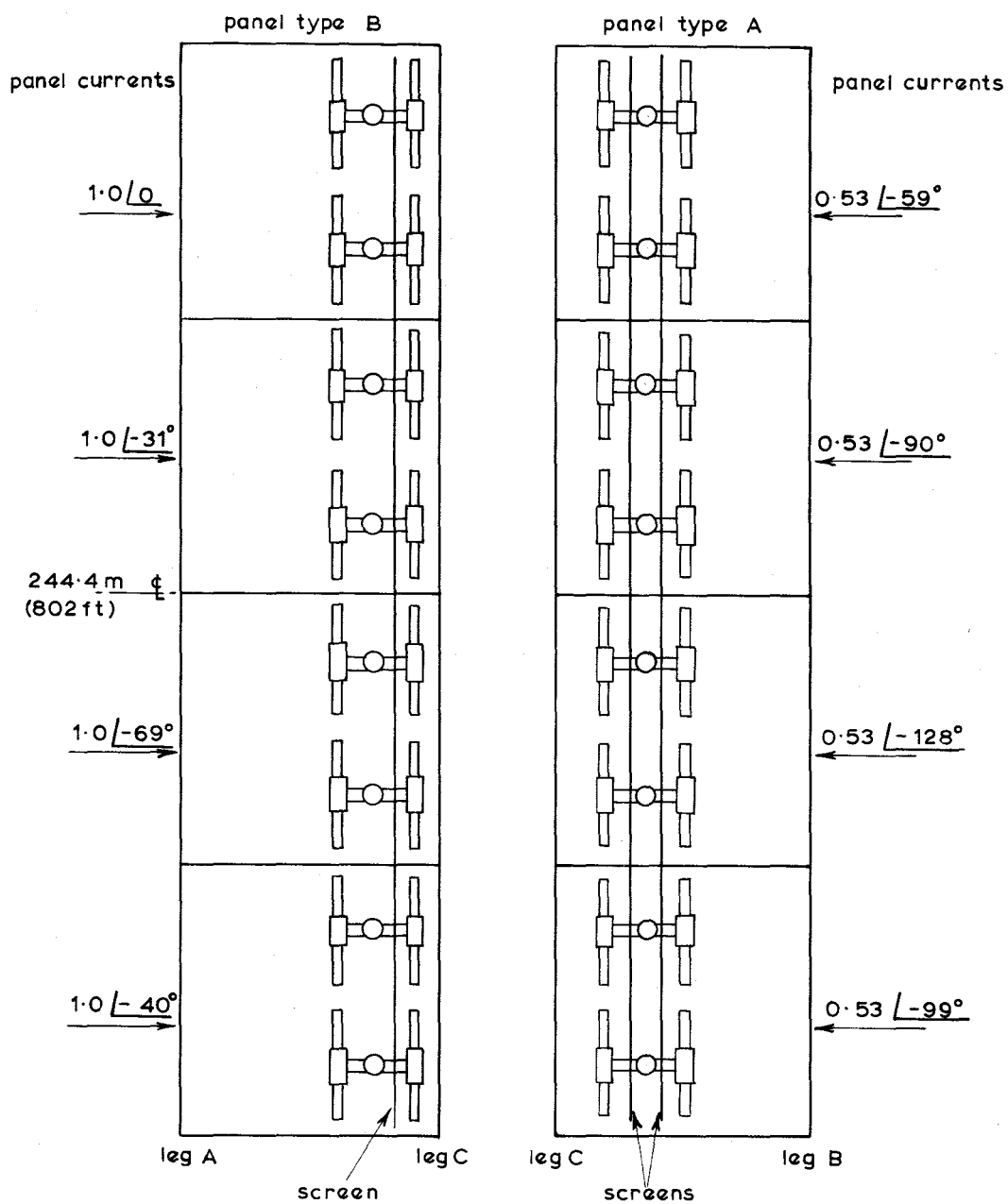


Fig.5. Arrangement of dipoles on panels

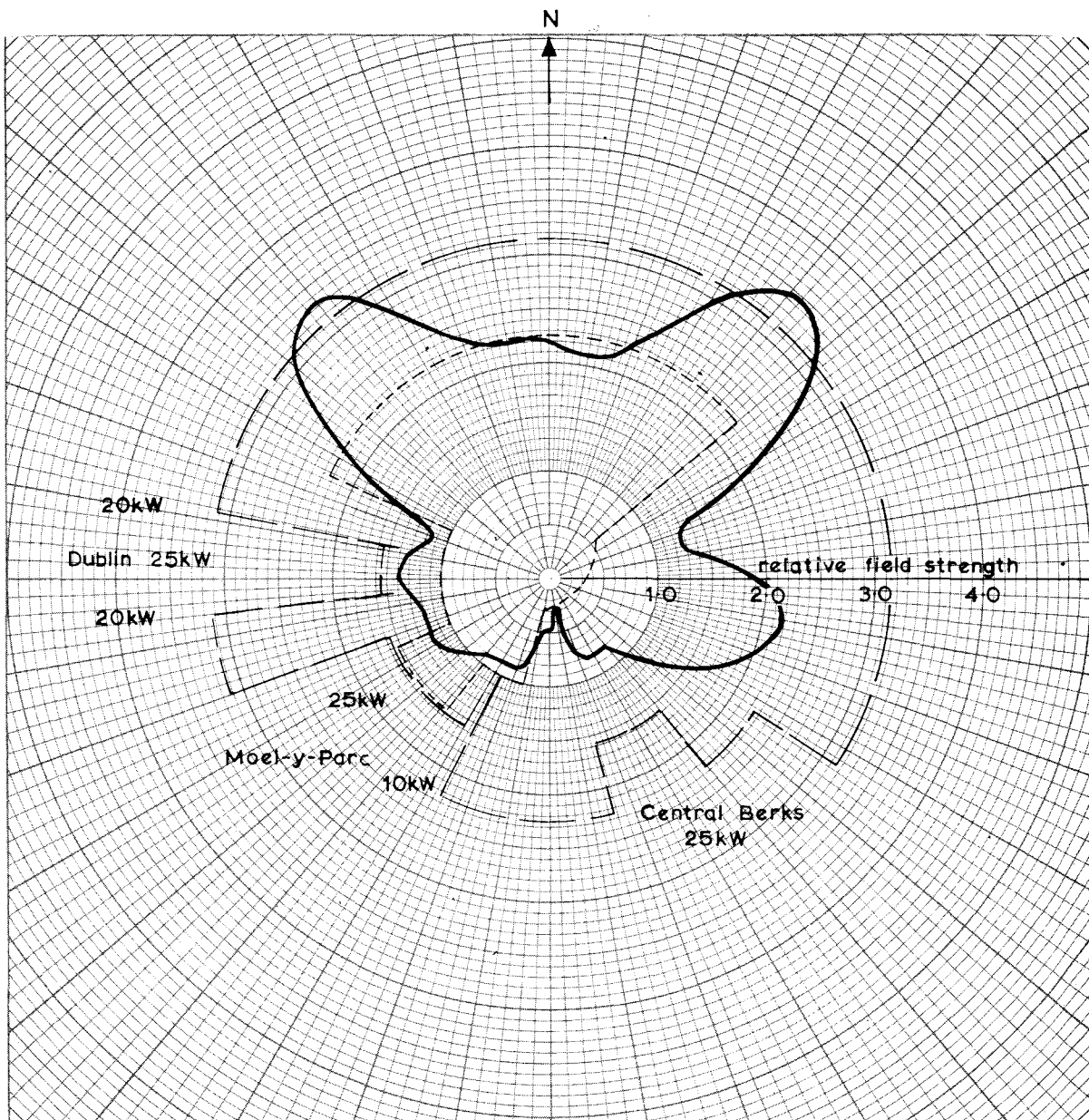


Fig.6. Templet and horizontal radiation pattern

VERTICAL POLARIZATION

Channel 12 (Vision carrier 209.75MHz, Sound carrier 206.25MHz)

Mean effective gain: 6.2dB ——— Maximum permissible E.R.P.

Transmitter power: 8.5kW ----- Minimum desirable E.R.P.

Mean E.R.P. : 35kW

Unit field strength corresponds to an E.R.P. of 10kW

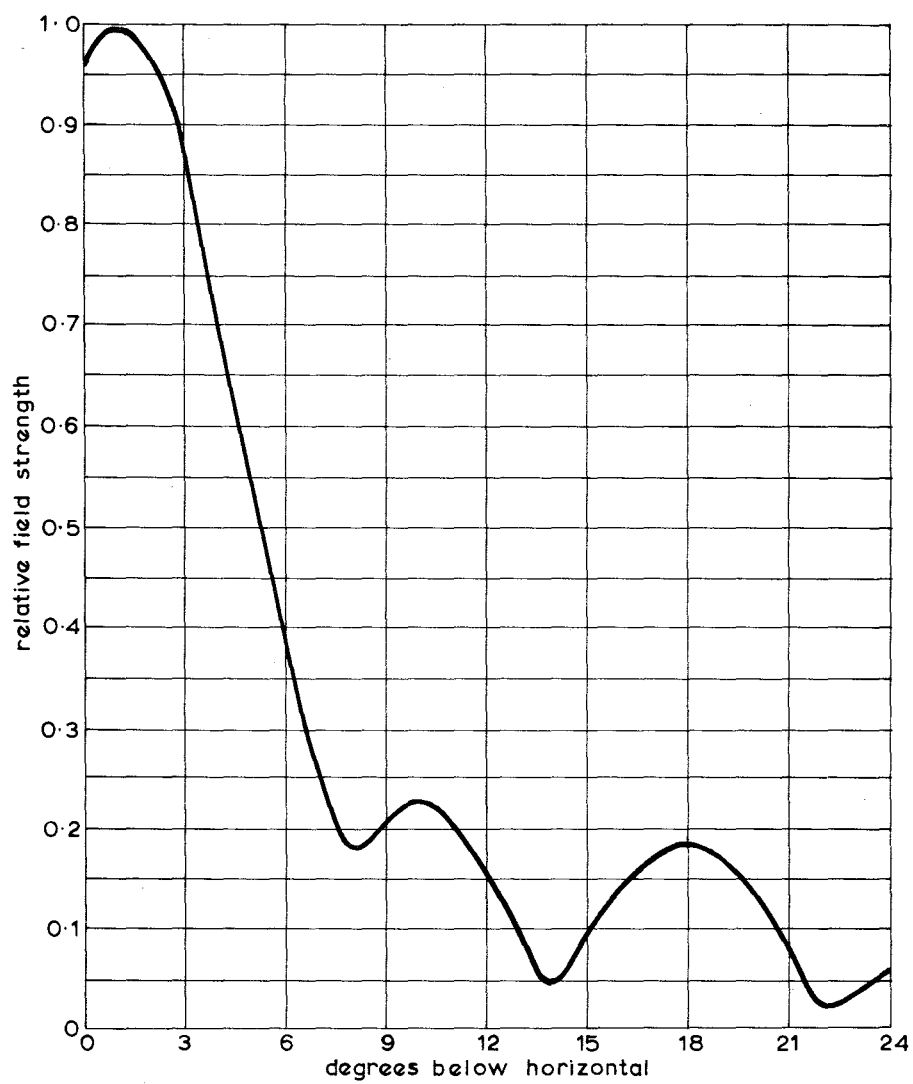


Fig.7 Vertical radiation pattern