



## **RESEARCH DEPARTMENT**

**THE SERVICE AREAS OF THE LLANDDONA, LLANGOLLEN  
AND BLAEN-PLWYF V.H.F. SOUND TRANSMITTERS**

**Report No. K-147**

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**THE BRITISH BROADCASTING CORPORATION  
ENGINEERING DIVISION**

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## SUMMARY

The results of field strength surveys of the Llanddona, Llangollen and Blaen-plwyf v.h.f. sound transmitters are given. These transmitters, collectively, serve the more densely populated areas of North and West Wales but the mountainous nature of the country makes it inevitable that a few towns are beyond the service area of almost any transmitter.

## 1. INTRODUCTION

Wales is so mountainous that it is not possible to provide a sound service over the whole country without the uneconomic use of a large number of transmitters. The v.h.f. sound transmitters are, therefore, sited to give the best possible service to the more densely populated areas. Three transmitters are used to serve North and West Wales; two in the north, at Llanddona on Anglesey and at Cynr-y-Brain near Llangollen, and the other at Blaen-plwyf near Aberystwyth. These three transmitters cover most of the populated areas of North Wales and the Cardigan Bay area.

## 2. GENERAL

Details of the sites and the transmitter conditions are given in Table 1.

TABLE 1

Transmitter	Site Height A.M.S.L.		Aerial Height A.G.L.		Aerial	E.R.P. (kW)			Frequency (Mc/s)		
	ft	m	ft	m		Max.	Mean	Min.	Light	Third	Home
Llanddona	460	140	302	92	8-tier unipole-V	11.8	5.9	2.7	89.6	91.8	94.0
Llangollen	1825	556	170	52	4-tier Marconi quadrant	11	7.0	4.8	88.9	91.1	93.8
Blaen-plwyf	565	172	332	101	8 tiers each of 4 slots	-	55	-	88.7	90.9	93.1

The eight-tier slot aerial at Blaen-plwyf is omnidirectional but the eight-tier unipole-V at Llanddona and the four-tier Marconi quadrant at Llangollen have directional properties which have been used to the best advantage in relation to the centres of population in their service areas and sketches of their horizontal radiation patterns (h.r.p.s) are shown on the relevant contour maps. All field strengths quoted refer to a receiving aerial at 30 ft (9.1 m) above ground level.

### 3. RESULTS

The results of the surveys are presented in three contour maps (Figs. 1, 2 and 3). A composite map (Fig. 4) shows the overall coverage in North and West Wales. Details of the field strength in towns surveyed with a population of 1,000 or more are given in the Appendix.

#### 3.1. Llanddona

Fig. 1 shows that all of Anglesey receives a field strength greater than 1 mV/m, while the mainland service area is restricted to the coastal region owing to the mountainous terrain. Nevertheless, Llanddona gives a good service in the more densely populated regions of North Wales, from the Lleyrn Peninsula to Prestatyn. Examples of the median field strengths are Nevin 2.8 mV/m, Caernarvon 5.6 mV/m, Bethesda 2.1 mV/m, Bangor 14 mV/m, Llandudno 6.3 mV/m, Colwyn Bay 1.8 mV/m, Prestatyn 1.0 mV/m and Rhyl 0.56 mV/m. Rhyl is, however, better served by Llangollen. The only town on the coast which has a relatively poor service is Conway, where the median field strength is 0.33 mV/m and where 10% of the population receives less than 0.1 mV/m.

#### 3.2. Llangollen

The Llangollen v.h.f. sound transmitter serves the north-east corner of Wales (Fig. 2), including Wrexham and parts of Mid-Wales.

The service in north-east Wales is restricted, by the terrain, to the counties of Denbighshire and Flintshire. Only the extreme north-east corner of Merionethshire and a narrow strip of Montgomeryshire are within the service area. The principal towns served are Denbigh (5 mV/m), Wrexham (9.4 mV/m), Corwen (6.3 mV/m), Llangollen (7.1 mV/m), Rhyl (2.4 mV/m), Flint (1.3 mV/m) and Montgomery (6.3 mV/m). Prestatyn is better served by Llanddona.

#### 3.3. Blaen-plwyf

The service area (limit 0.25 mV/m) of the Blaen-Plwyf v.h.f. sound transmitter is shown in Fig. 3. Most towns on the coast of Cardigan Bay get an excellent service but the relatively large towns, Dolgelley, Ffestiniog, Llandyssul and Machynlleth, only a few miles inland, get too low a field strength for a satisfactory service, the median values being 0.06 mV/m, 0.18 mV/m, 0.19 mV/m and 0.1 mV/m, respectively.

Note:  
The contours represent field strength in mV/m at 30ft(9.1m) above ground as cited at 50% of receiving sites in a given locality. The value exceeded at 90% of receiving sites may be as much as 10 dB below the value indicated by the contours particularly in hilly and built-up areas.

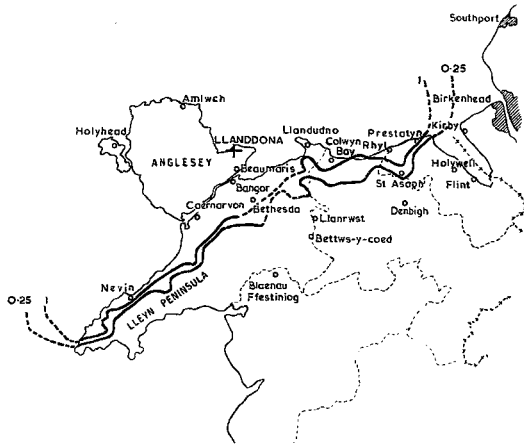


Fig. 1

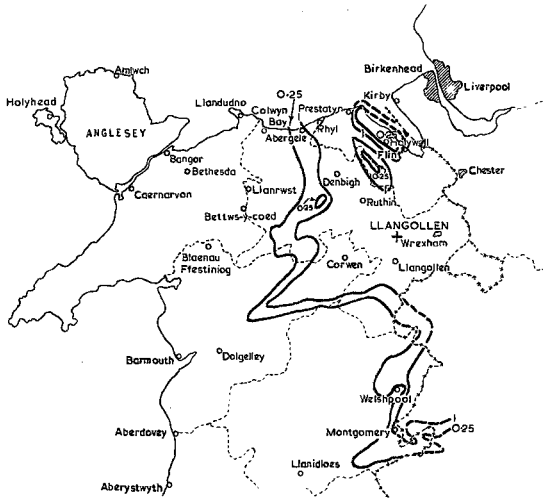
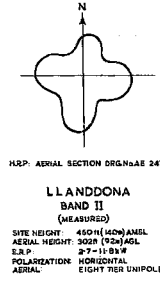


Fig. 2

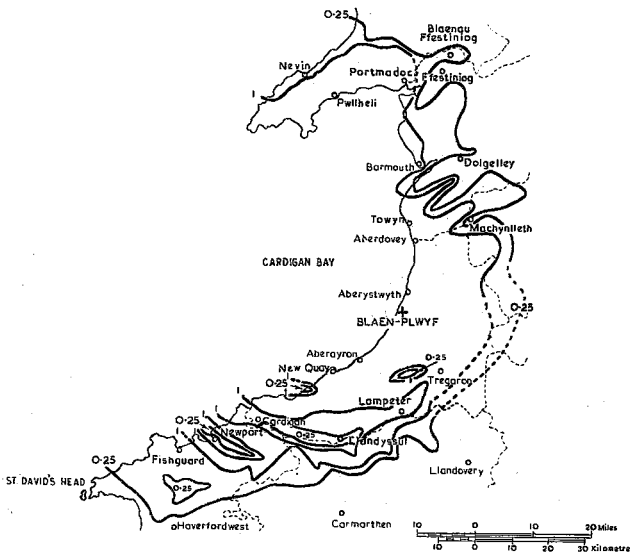
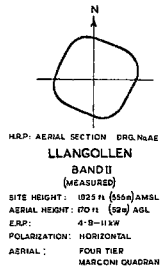
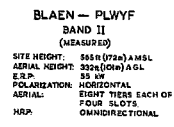


Fig. 3



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#### 4. CONCLUSIONS

Fig. 4 shows the existing v.h.f. service in West and North Wales. Provision has been made for a v.h.f. sound transmitter to serve the Llandrindod Wells area and, when this transmitter comes into service, the v.h.f. distribution plan for North, West and Central Wales will be complete.

In North and West Wales the principal towns beyond the service area of any transmitter are Llanrwst, Ffestiniog, Dolgellay, Machynlleth and Welshpool.

Details of the population within the 1.0 mV/m and 0.25 mV/m contours of the Llanddona, Llangollen and Blaen-plwyf transmitters have been estimated by Engineering Information Department and are given in Table 2.

TABLE 2

Transmitter	Population within	
	1.0 mV/m	0.25 mV/m
Llanddona	177,500	198,400
Llangollen	244,600	277,700
Blaen-plwyf	79,200	134,600

The population coverage (limit 0.25 mV/m) of the three Welsh v.h.f. sound transmitters in the counties comprising West and North Wales is given in Table 3.

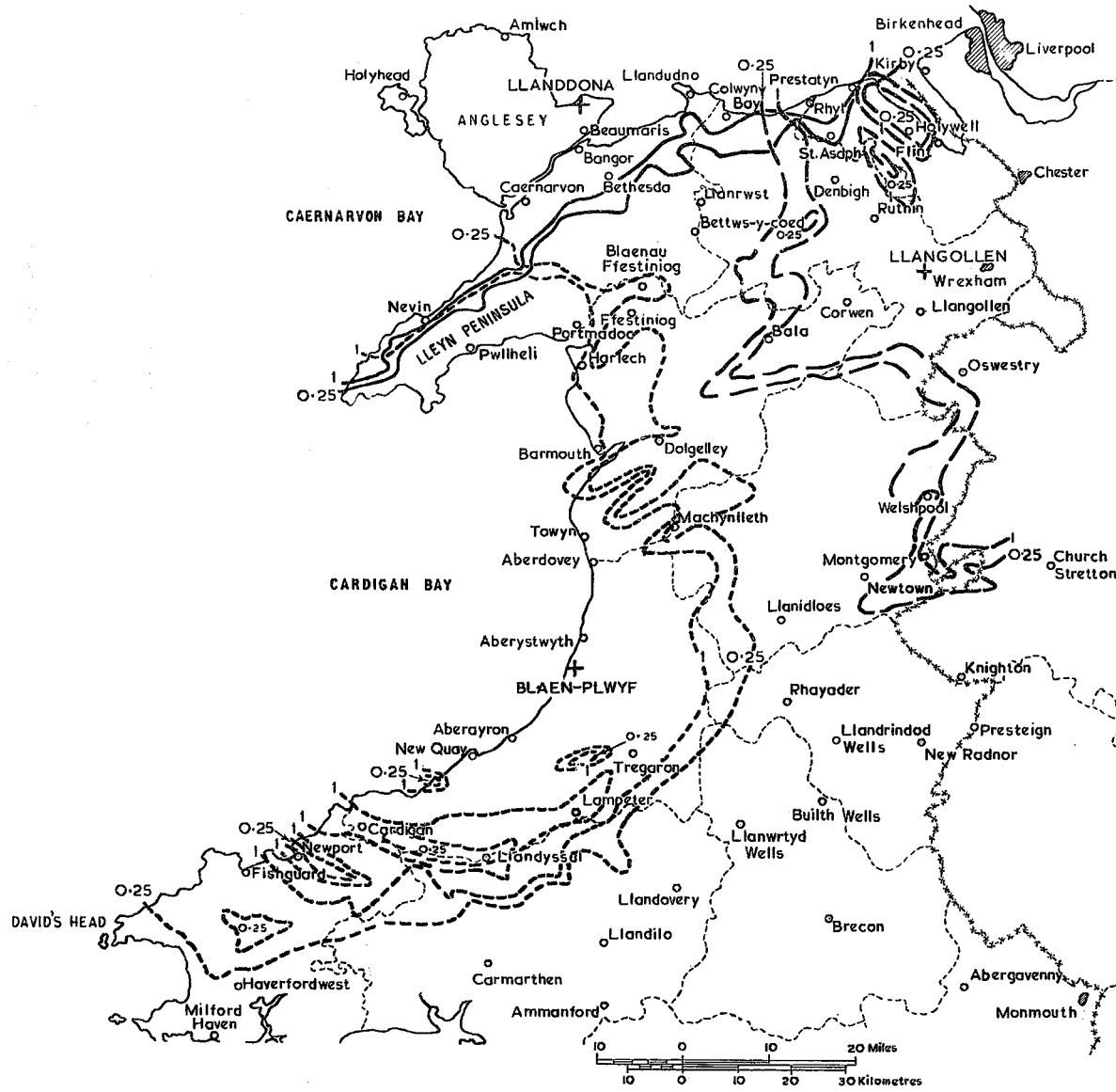
TABLE 3

County	Population in thousands		
	Total	Field strength	
		>0.25 mV/m	<0.25 mV/m
Denbighshire	170.7	158.9	11.8
Caernarvonshire	124.1	102.9	21.2
Flintshire	145.1	134.2	10.9
Montgomeryshire	46.0	15.2	30.8
Merionethshire	41.5	26.7	14.8
Cardiganshire	53.3	49.7	3.6

Only 33% of the population of Montgomeryshire is served and there will be very little, if any, improvement in the coverage of this county when the proposed Llandrindod Wells v.h.f. sound transmitter comes into service. In Merionethshire 64% of the population is served. With the exception of Caernarvonshire, where 83% of the population is within the 0.25 mV/m contour, the coverage in the other counties is 93%, a very high percentage in such mountainous terrain.

No multipath observations have been made on any of the transmissions surveyed. It will be realised, however, that the mountainous terrain in Wales makes this phenomenon inevitable, since so many of the receiver sites are screened from the direct transmission and are exposed to a reflected signal from a distant source. In such conditions the use of a good quality receiver and a well sited directional receiving aerial is the only remedy.





Note:  
 The contours represent field strength in mV/m at 30ft (9.1m) above ground exceeded at 50% of receiving sites in a given locality. The value exceeded at 90% of receiving sites may be as much as 10dB below the value indicated by the contours particularly in hilly and built-up areas

**V.H.F. SOUND DISTRIBUTION IN NORTH AND WEST WALES**

Limits of the three adjacent service areas represented in each case by the 0.25 mV/m and 1 mV/m contours are shown as follows:

- LLANDDONA: 2.7 kW - 11.8 kW
- LLANGOLLEN: 4.8 kW - 11 kW
- ..... BLAEN-PLWYF: 55 kW

**Fig. 4**

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## APPENDIX

Field strength in mV/m at 30 ft (9.1 m) a.g.l.

Town	Field strength exceeded at stated percentage locations			Town	Field strength exceeded at stated percentage locations		
	10%	50%	90%		10%	50%	90%
LLANDDONA				Towyn	2.0	1.4	0.94
Abergele	1.1	0.6	0.22	Tudweiloig	3.2	0.94	0.47
Amlwch	4.0	1.8	1.0	Waenfawr	4.0	1.7	0.71
Bangor	56	14	5.0	LLANGOLLEEN			
Beaumaris	22	10	5.0	Abergele	2.2	0.56	0.21
Benllech	224	89	40	Bala	0.9	0.6	0.32
Bethesda	4.2	2.1	0.6	Brymbo	32	13	2.2
Caernarvon	15	5.6	2.0	Buckley	47	25	13
Colwyn Bay	7.5	1.8	0.75	Chirk	11	8.9	3.8
Conway	0.71	0.33	0.1	Colwyn Bay	0.16	0.1	0.05
Criccieth	0.16	0.05	0.03	Connah's Quay	4.2	2.0	1.0
Dyserth	18	4.7	0.79	Corwen	17	6.3	2.8
Harlech	0.71	0.25	0.03	Denbigh	13	5.0	1.4
Holyhead	4.5	2.0	0.56	Dyserth	0.17	0.1	0.05
Llanaelhaiarn	0.79	0.3	0.16	Flint	2.1	1.3	0.7
Llanbedrog	0.6	0.32	0.09	Greenfield	0.24	0.16	0.09
Llanberis	0.4	0.22	0.13	Gresford	11	7.5	4.0
Llandudno	15	6.3	1.8	Hawarden	2.5	1.1	0.63
Llanfairfechan	150	71	32	Holywell	0.5	0.17	0.07
Llanfair P.G.	15	11	5.6	Hope	8.9	3.8	2.5
Llangefni	11	3.2	1.2	Llandudno	0.22	0.11	0.07
Llanrug	24	14	8.4	Llangollen	14	7.1	3.2
Llantsantffraid Glan Conway	3.3	1.2	0.42	Mold	11	5.0	3.2
Meliden	3.0	1.3	0.6	Montgomery	11	6.3	3.5
Menai Bridge	13	4.7	2.2	Overton-on-Dee	50	27	16
Nevin	4.0	2.8	1.0	Prestatyn	0.22	0.1	0.05
Penmaen-Mawr	200	100	38	Rhosllanerchrugog	11	4.0	1.5
Prestatyn	1.7	1.0	0.53	Rhuddlan	4.2	2.7	1.5
Rhuddlan	2.1	1.1	0.56	Rhyl	4.0	2.4	1.3
Rhyl	1.1	0.56	0.22				
St. Asaph	0.9	0.25	0.12				

Town	Field strength exceeded at stated percentage locations			Town	Field strength exceeded at stated percentage locations		
	10%	50%	90%		10%	50%	90%
Ruabon	13	7.9	3.6	Harlech	0.47	0.28	0.13
Ruthin	12	4.5	1.9	Haverfordwest	0.79	0.18	0.1
St. Asaph	4.7	2.2	0.75	Lampeter	0.89	0.42	0.2
Towyn	2.2	1.8	1.1	Llanaelhaiarn	7.8	4.7	3.2
Welshpool	0.22	0.1	0.06	Llanarth	34	18	2.5
Wrexham	15	9.4	5.0	Llanbadarn-Fawr	270	180	94
BLAEN--PLWYF				Llandilo	0.11	0.06	0.05
Aberayron	71	24	14	Llandoverly	0.08	0.06	0.04
Aberdaron	15	5.6	1.7	Llandyssul	0.5	0.19	0.08
Aberdovey	80	40	22	Llangadock	0.18	0.09	0.06
Aberporth	28	14	7.9	Llanllyfni	0.8	0.2	0.11
Aberystwyth	180	56	18	Llanybyther	2.2	1.3	0.53
Barmouth	2.7	1.4	0.56	Machynlleth	0.3	0.1	0.06
Blaenau Ffestiniog	1.3	0.28	0.08	Morfa Nefyn	0.94	0.6	0.38
Borth	11	5.6	2.0	Narberth	0.34	0.17	0.04
Cardigan	1.1	0.4	0.16	Newport	1.0	0.53	0.32
Criccieth	14	7.9	2.0	New Quay	630	250	67
Dolgelley	0.14	0.06	0.04	Penrhyndeudraeth	3.0	0.75	0.4
Ffestiniog	0.6	0.18	0.1	Portmadoc	2.8	1.0	0.38
Fishguard	1.3	0.53	0.24	Pwllheli	6.0	2.2	0.8
Goodwick	5.3	2.5	1.1	St. Davids	0.17	0.08	0.06
				Towyn	71	36	13
				Trawsfynydd	0.75	0.45	0.2
				Tregaron	5.0	2.0	1.1
				Tudweiloig	2.0	1.3	0.6