

DEVELOPMENT OF THE A.M. TRANSMITTER NETWORK

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Introduction

The British Broadcasting Company, under the chairmanship of Lord Gainford, was formed in October 1922 to set up a broadcasting system as outlined in a plan sanctioned by the Postmaster General in May 1922. This allowed for eight areas of Britain to have a local transmitter, of power 1.5 kW. From this original scheme, the BBC developed the network of high power stations that became so familiar.

1922 to 1929

Eight stations established, having an aerial power of about 1 kW, in main cities. Each city provided programmes from its own studio. Music quality land lines didn't exist at this time, but presumably speech programmes, such as news from London, could be conveyed on the trunk telephone circuits which came in from May 1923.

Main stations

Tues. November 14th 1922 : 2LO LONDON (Marconi House) on 369* metres.
Wed. November 15th 1922 : 5IT BIRMINGHAM on 420* metres.
Wed. November 15th 1922 : 2ZY MANCHESTER on 385* metres.
Sun. December 24th 1922 : 5NO NEWCASTLE-upon-TYNE
Tues. February 13th 1923 : 5WA CARDIFF
Tues. March 6th 1923 : 5SC GLASGOW
Wed. October 10th 1923 : 2BD ABERDEEN
Wed. October 17th 1923 : 6BM BOURNEMOUTH (originally to be Plymouth)

The Radio Times wasn't published until September 1923, so the wavelengths of the initial services aren't known. The wavelengths shown thus * are as given in Wireless World November 1972. (Broadcasting Jubilee article).

Several areas of large population were unable to receive a satisfactory signal on a crystal set, and additional stations were needed. However, it was considered uneconomic to also provide each with its own studio. Therefore eleven relay stations were constructed, receiving programmes from the main city studio via telephone circuits. The power of each station was restricted to 200 W (aerial power 120 W).

Relay Stations

Fri. November 16th 1923 : 6FL SHEFFIELD
Fri. March 28th 1924 : 5PY PLYMOUTH
Thur. May 1st 1924 : 2EH EDINBURGH
Wed. June 11th 1924: 6LV LIVERPOOL
Tues. July 8th 1924: 2LS LEEDS/
2LS BRADFORD
Fri. August 15th 1924 : 6KH HULL
Tues. September 16th 1924 : 5NG NOTTINGHAM
Sun. November 9th 1924 : 2DE DUNDEE
Fri. November 21st 1924 : 6ST STOKE-on-TRENT
Fri. December 12th 1924 : 5SX SWANSEA

Main Station

Sun. September 14th 1924 : 2BE BELFAST

The wavelengths of the stations were chosen to minimise mutual interference.

However, listeners complained and the wavelengths were changed from their initial values to improve the service. Listed below are the wavelengths given in the Radio Times at 1924 of the established stations, with the wavelengths of the relay stations, (and Belfast main), as they opened from November 1923.

<u>Station</u>	<u>May 1924</u>	<u>Aug 1924</u>	<u>Nov 1924</u>	<u>Dec 1924</u>
2LO London	365 m	365 m	365 m	365 m
5IT Birmingham	475 m	475 m	475 m	475 m
2ZY Manchester	375 m	375 m	375 m	375 m
5NO Newcastle	400 m	400 m	400 m	400 m
5WA Cardiff	351 m	351 m	351 m	351 m
5SC Glasgow	420 m	420 m	420 m	420 m
2BD Aberdeen	495 m	495 m	495 m	495 m
6BM Bournemouth	385 m	385 m	385 m	385 m
6FL Sheffield	303 m	301 m	301 m	301 m
5PY Plymouth	330 m	335 m		338 m
2EH Edinburgh	325 m		328 m	328 m
6LV Liverpool	318 m (June)	315 m	315 m	315 m
2LS Leeds	346 m (July)	346 m	346 m	346 m
2LS Bradford	310 m (July)	310 m	310 m	310 m
6KH Hull		320 m	335 m	335 m
2BE Belfast			435 m (Sept)	435 m
5NG Nottingham			340 m (Sept)	322 m
2DE Dundee			331 m	331 m
6ST Stoke			306 m	306 m
5SX Swansea			318 m (Dec)	485 m

Long Wave Station

With each medium wave BBC station on a separate frequency, it was obvious that with the multiplicity of transmitters in the rest of Europe, further expansion using low power stations would invite interference especially after dark. There was no overall European frequency plan at this time. The 300 m to 500 m band was used by many stations. As an experiment, the BBC decided to use a single high power transmitter in the long wave band. This would hopefully cover rural districts, not satisfactorily covered by the local stations of lower power. The Marconi company at Chelmsford established the first British station, 5XX with 15 kW aerial power.

Mon. July 21st 1924 : 5XX CHELMSFORD on 1600 m.

Initially the programming was experimental, but later became known as 5XX High Power programme.

Sun. December 28th 1924 : 5XX alternative programme offered.

With 5XX giving promising results, the BBC constructed its own long wave station at Daventry in Northamptonshire, but with an aerial power of 25kW. Opened in 1925.

Mon. July 27th 1925 : 5XX DAVENTRY on 1600 m (Chelmsford experimental closed)

Mon. April 6th 1925 : 2LO London Transmitter moved to Oxford Street (Selfridges) (Power 2 kW)

In March 1925, a preliminary conference in London, was held to consider the formation of an International Union, with the task, among other things, of regulating the frequencies used by each European country. A Technical Committee, under the Presidency of P.P. Eckersley (BBC Chief Engineer 1923-29), studied this matter.

The international meeting resulted in the first frequency plan for Europe. This was the Geneva Plan and accepted by most of Europe. Its success required each transmitter to have a carrier frequency held to close limits. This required the construction, calibration and distribution of many wavemeters to each country to ensure this. The implementation of the Plan was delayed by this, but it officially came into force in November 1926. The BBC got an allocation of 9 exclusive MF +1LF frequencies (inc. National Common Frequency 1040 kHz) and the use of International Common Frequencies 1010 kHz and 1020 kHz for low power use. The frequencies were multiples of 10 kHz. The NCF of 1040 kHz was used for most relay stations and required the use of high stability drive units.

The BBC foreign relay station, (set up in 1924 at Keston in Kent), was equipped to check frequencies of transmissions. Later this station was superseded by one at Tatsfield in Surrey around 1929.

Geneva Plan effective Sunday November 14th 1926.

	<u>Pre-Geneva</u>	<u>Post-Geneva</u>
2LO London	365 m	361.4 m 830 kHz
5IT Birmingham	479 m	491.8 m 610 kHz
2ZY Manchester	378 m	384.6 m 780 kHz
5NO Newcastle	404 m	312.5 m 960 kHz
5WA Cardiff	353 m	353 m 850 kHz
5SC Glasgow	422 m	405.4 m 740 kHz
2BD Aberdeen	495 m	491.8 m 610 kHz
6BM Bournemouth	386 m	306.1 m 980 kHz
2BE Belfast	439 m	326.1 m 920 kHz
6FL Sheffield	306 m	288.5 m 1040 kHz
5PY Plymouth	338 m	288.5 m 1040 kHz
2EH Edinburgh	328 m	288.5 m 1040 kHz
6LV Liverpool	331 m	288.5 m 1040 kHz
2LS Leeds	321 m	297 m 1010 kHz
2LS Bradford	310 m	294.1 m 1020 kHz
6KH Hull	440 m	288.5 m 1040 kHz
5NG Nottingham	326 m	288.5 m 1040 kHz
2DE Dundee	315 m	288.5 m 1040 kHz
6ST Stoke	301 m	288.5 m 1040 kHz
5SX Swansea	482 m	288.5 m 1040 kHz
5XX Daventry	1600 m	1600 m

After the Plan became operational, it was found that mutual interference required some amendments to the allocations, and the use of other International Common Frequencies (ICF), was found to improve reception. (Aberdeen and Birmingham shared 610 kHz). Contemporary literature refers to International Common Wavelengths (ICW) rather than Frequencies (ICF).

Dec 1926

2BD Aberdeen	500 m	600kHz (Int Com Wave ICW)
6BM Bournemouth	326.1 m	920 kHz (was Belfast)
2BE Belfast	306.1 m	980 kHz (was Bournemouth)
6FL Sheffield	272.7 m	1100 kHz (ICW)
5PY Plymouth	400 m	750 kHz (ICW)
6LV Liverpool	297 m	1010 kHz (ICW)
2LS Leeds	277.8 m	1080 kHz (ICW)
2LS Bradford	254.2 m	1180 kHz (ICW)
5NG Nottingham	275.2 m	1090 kHz (ICW)

Further changes in the next month.

Jan 1927

5IT Birmingham	326.1 m	920 kHz (was Bournemouth)
6BM Bournemouth	491.8 m	610 kHz (was Birmingham)
2LS Bradford	252.1 m	1190 kHz (ICW)
6KH Hull	294 m	1020 kHz (ICW)
6ST Stoke	294 m	1020 kHz (ICW)
5SX Swansea	294 m	1020 kHz (ICW)

The Radio Times up to now, had only listed station wavelengths, but from Sunday July 3rd 1927, the frequencies were shown. The 5XX Daventry station was now shown as a frequency of 187 kHz (1604.3 m), rather than the nominal wavelength of 1600 m. Some sources show 5XX on 187.5 kHz, that is 1600 m in wavelength.

It became clear to the British Broadcasting Company that with only 9 exclusive MF frequencies (and 1 long wave LF), it wouldn't be possible to construct more and more low power stations in order to serve the less populated areas of Britain and to provide an alternative programme. There were several schemes considered for going forward. One suggested using very few stations centrally placed, with hundreds of kilowatts of power each. This would have a very high field strength near to the transmitter, with possible wipe-out of other stations when unsophisticated receivers used. However, the use of one wavelength per programme meant that several alternative programmes could be possible. The so-called Regional Scheme finally adopted, was to have five regional stations of two wavelengths each, and power around 30 kW each. This uses the ten exclusive frequencies allocated to the United Kingdom. (Synchronised working of several stations on the same frequency, later however, meant that an alternative national programme didn't need to use all different frequencies). Valve receivers with more selectivity and sensitivity, would become popular, and so the shortcomings of crystal set reception wouldn't determine future operation.

On Saturday January 1st 1927, the British Broadcasting Corporation, under the chairmanship of the 6th Earl of Clarendon, replaced the Company.

In order to provide experience of high power medium wave coverage, the Post Office approved the erection of an high power station 5GB at Daventry, on a frequency of 610 kHz (ex 6BM Bournemouth) and aerial power of 30 kW. The programmes were known as Daventry Experimental. The 5IT Birmingham Station (Summer Lane) was closed down, and the 6BM Bournemouth Station took over its frequency of 920 kHz.

Sunday August 21st 1927. DAVENTRY EXPERIMENTAL - 5GB 610 kHz 30kW

Stations operating at this time are listed below.

	<u>Pre 5GB</u>	<u>Post 5GB</u>	
2LO London	830 kHz	830 kHz	3kW
5GB Daventry (Experimental)		610 kHz	30 kW
5IT Birmingham	920 kHz	closed	
2ZY Manchester	780 kHz	780 kHz	1.5 kW
5NO Newcastle	960 kHz	960 kHz	1.5 kW
5WA Cardiff	850 kHz	850 kHz	1.5 kW
5SC Glasgow	740 kHz	740 kHz	1.5 kW
2BD Aberdeen	600 kHz	600 kHz	1.5 kW
6BM Bournemouth	610 kHz	920 kHz	1.5 kW
2BE Belfast	980 kHz	980 kHz	1.5 kW
6FL Sheffield	1100 kHz	1100 kHz	0.2 kW
5PY Plymouth	750 kHz	750 kHz	0.2 kW
2EH Edinburgh	1040 kHz	1040 kHz	0.2 kW
6LV Liverpool	1010 kHz	1010 kHz	0.2 kW
2LS Leeds	1080 kHz	1080 kHz	0.2 kW
2LS Bradford	1190 kHz	1190 kHz	0.2 kW
6KH Hull	1020 kHz	1020 kHz	0.2 kW
5NG Nottingham	1090 kHz	1090 kHz	0.2 kW
2DE Dundee	1020 kHz	1020 kHz	0.2 kW
6ST Stoke	1020 kHz	1020 kHz	0.2 kW
5SX Swansea	1020 kHz	1020 kHz	0.2 kW
5XX Daventry	187 kHz	187 kHz	25 kW

Daventry 5GB radiated much material from the Birmingham studio, and some from London. It was designed to contrast the “High Power” programme (London) radiated from Daventry 5XX. Hence in this respect, Daventry became the forerunner of the “Twin-Transmitters”, radiating alternative programmes; although at the beginning 5GB was considered experimental.

In early 1925, the wavelengths of the continental stations varied greatly and very long waves were in use. e.g. Koenigwusterhausen (Germany) was on 4000 m; Eiffel Tower (France) was on 2600 m. In 1927, the International Radio Telegraphic Convention held in Washington, allotted the band 200-545 metres and 1340-1875 metres for broadcasting use. The Prague Plan (1929) did, however, conditionally permit stations in the range 545 metres to 1340 metres, provided no interference was caused.

With the reduction in wavelengths available to broadcasters after the Washington Convention in 1927, the Geneva Plan, based on transmissions in 1925, had to be updated to cope with less available wavelengths and yet fit in more countries wanting to broadcast in Europe. To get agreement, established broadcasters had to give up some wavelengths and accept others.

The Brussels Plan was the result and took effect in January 1929.

The separation between MF stations is now a multiples of 9 kHz up to 1000 kHz (300 metres), and 10 kHz separation above, rather than a uniform 10 kHz as in the Geneva Plan. This 9 kHz multiple spacing remains today. (USA and Canada use 10 kHz multiples). Interestingly, the Radio Times article (Vol. 21 No.274 Dec 28, 1928) uses the term “kilohertz”, whereas the programme pages gives the station frequencies in kc.

The 5XX Long Wave transmitter changed its frequency on Armistice Day 1928 whilst the BBC medium wave stations changed in January 1929.

Sun. November 11th 1928 : 5XX Daventry from 187 kHz to 192 kHz (1562.5 m)

Brussels Plan effective Sunday January 13th 1929

	<u>Pre-Brussels</u>	<u>Post-Brussels</u>
2LO London	830 kHz	838 kHz
5GB Daventry Exp	610 kHz	622 kHz
2ZY Manchester	780 kHz	793 kHz
5NO Newcastle	960 kHz	1230 kHz
5WA Cardiff	850 kHz	928 kHz
5SC Glasgow	740 kHz	748 kHz
2BD Aberdeen	600 kHz	964 kHz
6BM Bournemouth	920 kHz	1040 kHz (Nat Common Freq)
2BE Belfast	980 kHz	991 kHz
6FL Sheffield (R)		1040 kHz*
5PY Plymouth (R)	750 kHz	757 kHz (1040 kHz June 2 1929)
2EH Edinburgh (R)	1040 kHz	1040 kHz
6LV Liverpool (R)		1040 kHz*
2LS Leeds (R)		1160 kHz
2LS Bradford (R)		1020 kHz
6KH Hull (R)		1040 kHz*
5NG Nottingham (R)		
2DE Dundee (R)		1040 kHz*
6ST Stoke (R)		1040 kHz*
5SX Swansea (R)	1020 kHz	1020 kHz (1040 kHz May 19 1929)
5XX Daventry	192 kHz	192 kHz

Relay stations (R) with frequencies shown as 1040 kHz* didn't transfer immediately to the new National Common Frequency of 1040 kHz, until single working frequency equipment had been installed. This enabled the carrier frequency of each relay to be kept very close to each other to reduce the effects of the interference at the extremes of the service area.. The relays may also have had to transmit the same programme when interference was possible.

The Radio Times Southern Edition no longer listed some Northern Relay Stations from Saturday June 16th 1928; their day to day frequencies then unavailable to me. The Nottingham Relay is not mentioned after 1928, so it may have closed due to the high power Daventry 5GB station providing adequate service in this area.

The Bournemouth 6BM Station now used the National Common Wave, as per Relay Stations.

The Prague Plan

The Geneva and Brussels Plans, were a result of the Technical Committee of the Union Internationale de Radiodiffusion. The Union represented about 80% of European stations when the 1926 Geneva Plan was agreed to, and the Brussels Plan of 1928 evolved from this to admit more countries and stations.

However, there was no legal obligation on the part of governments to adhere to the plans as the Union was only formed by broadcasters interested in mutual cooperation.

The Czecho-Slovakian Government suggested a conference to remedy this. The Prague Conference opened in April 4th 1929 with a meeting of all interested governments who sent their delegations of P.T.T. or Post Office officials. On April 13th 1929, representatives of twenty seven European administrations signed the Protocol, (eight abstained), to agree to the partition of wavelengths as established. Thus the plan included most European broadcasting authorities and was required to be binding on the part of each station. The Plan became effective June 30th 1929. As in the Brussels Plan, there is 9 kHz separation on M.F. but now extended up to 1400 kHz with 10 kHz separation above this. Some U.S.S.R. stations were offset by 4.5 kHz. The BBC was again allocated 9 exclusive MW frequencies and 1 LW frequency.

Prague Plan effective Sunday June 30th 1929

	<u>Pre Prague</u>	<u>Post Prague</u>
2LO London	838 kHz	842 kHz (356.3 m)
5GB Daventry Exp	622 kHz	626 kHz (479.2 m)*
2ZY Manchester	793 kHz	797 kHz (376.4 m)*
5NO Newcastle	1230 kHz	1148 kHz (261.3 m)
5WA Cardiff	928 kHz	968 kHz (309.9 m)
5SC Glasgow	748 kHz	752 kHz (398.9 m)*
2BD Aberdeen	964 kHz	995 kHz (301.5 m)
6BM Bournemouth	1040 kHz	1040 kHz (288.5 m) (Nat Com Freq)
2BE Belfast	991 kHz	1238 kHz (242.3 m)
6FL Sheffield (R)	1040 kHz	1040 kHz (288.5 m)
5PY Plymouth (R)	1040 kHz	1040 kHz (288.5 m)
2EH Edinburgh (R)	1040 kHz	1040 kHz (288.5 m)
6LV Liverpool (R)	1040 kHz	1040 kHz (288.5 m)
2LS Leeds (R)	1160 kHz	1500 kHz (200 m) (Not exclusive)
2LS Bradford (R)	1020 kHz	1040 kHz (288.5 m)
6KH Hull (R)	1040 kHz	1040 kHz (288.5 m)
2DE Dundee (R)	1040 kHz	1040 kHz (288.5 m)
6ST Stoke (R)	1040 kHz	1040 kHz (288.5 m)
5SX Swansea (R)	1040 kHz	1040 kHz (288.5 m)
5XX Daventry	192 kHz	193 kHz (1554.4 m)

*The **exclusive** frequencies in the plan are not necessarily required to be used by the allocated transmitter, as by definition, it doesn't interfere directly with another country. The frequencies allocated to Daventry 5GB, Manchester and Glasgow were originally intended by the BBC to be 752 kHz, 626 kHz and 797 kHz respectively.

However, the BBC didn't make the change until April 12th 1931, and the actual frequencies used after June 30th for these stations, are close to their former Pre-Prague values as shown above. The Leeds frequency of 1500 kHz is a free one and not used by others. The shorter wavelength is suited to a local low power service. International Common Waves are shared among countries for low power stations.

London Regional Station - Brookmans Park

This was the first twin-wave station housed in one building.

The Brookmans Park estate in Hertfordshire, comprised a flat stretch of land beside the Great North Road, near to a high quality P.O. music circuit. It had to be close enough to central London, (where the Oxford Street transmitter was situated), so that insensitive receivers were still satisfactory. The aerials for the two programme services were each supported on a pair of 200 foot self-supporting lattice towers. Air Ministry regulations didn't permit higher towers. (In 1946 a mast radiator on 877 kHz was added). The longer wavelength service to be radiated with a power of 30 kW.

Mon. October 21st 1929 : 2LO - BROOKMANS PARK 842 kHz 30 kW
(Oxford Street Selfridges station closed)

After a few months of single programme working, with time for some readjustment to unselective receivers, the BBC introduced the alternative programme on the second transmitter working on 1148 kHz, (used by Newcastle in the Prague Plan). Simple crystal sets near to the transmitter, probably had difficulty separating the two stations easily. Just before the Oxford Street transmitter closed, the Baird 30 line television system was radiated from here, and continued to do so after, from Brookmans Park.

1930 to 1939

NATIONAL PROGRAMME introduced

Sun. March 9th 1930 :National Prog. - BROOKMANS PARK 1148 kHz 45 kW
National Prog. - Daventry Long Wave 193 kHz

Newcastle frequency change from 1148 kHz to 1040 kHz (National Common Wave)

Station call signs dropped from Radio Times.

London Regional Brookmans Park 842 kHz (formerly 2LO)
Midland Regional Daventry 626 kHz (formerly 5GB).

Until other regions had their own alternative transmitter, for the National Programme, "National" items would also be broadcast on their local programme. Bournemouth was advertised as carrying the National programme at times, from March 31st 1930. The programmes for Cardiff were advertised as Cardiff Western Region, in the Radio Times from July 18th 1930.

Baird Television System

As mentioned above, the 30 line experimental system in vision only, was inaugurated on Sept 30th 1929 from 2LO (Selfridges) on 842 kHz. After Brookmans Park opened with the second transmitter, Vision was radiated on 1148 kHz and Sound on 842 kHz from March 31st 1930. Later the Midland Regional sometimes transmitted the Sound.

Sun. April 12th 1931 : Midland Regional (Daventry) freq. from 626 kHz to 752 kHz
Manchester frequency from 797 kHz to 626 kHz
Glasgow frequency from 752 kHz to 797 kHz

North Regional Station - Moorside Edge

Sited five miles west of Huddersfield, and near to Slaithwaite at a height of 1100 feet above sea level, the North Regional Transmitting Station opened with the North Regional Programme in May 1931. Its design is similar to Brookmans Park, but having no Air Ministry restrictions, the aerials are supported on three 500 foot stayed masts, instead of towers. The second transmitter on 995 kHz (ex Aberdeen) opened July 1931, with the National Programme.

Sun. May 17th 1931 : North Regional - MOORSIDE EDGE 626 kHz 30 kW

Sun. May 17th 1931 : Closure of Manchester (Main), and Sheffield,
Liverpool, Leeds, Bradford, Hull and Stoke Relays.

Sun. July 12th 1931 : National Prog. - MOORSIDE EDGE 995 kHz

Sun. July 12th 1931 : Aberdeen frequency change from 995 kHz to
National Common Wave 1040 kHz

Scottish Regional Station - Westerglen

This is sited at Westerglen, south of Falkirk alongside the B803 road to Slamannan.

Opened with the Scottish Regional Programme in June 1932, and the National Programme in September 1932.

Sun. June 12th 1932 : Scottish Regional - WESTERGLLEN 797 kHz

Sun. June 12th 1932 : Closure of Glasgow (Main), and Edinburgh and Dundee Relays.

Sun. September 25th 1932 : National Prog. - WESTERGLLEN 1040 kHz

The National Programme from Westerglen, was transmitted on a frequency of 1040 kHz, which had been used as a British Common Wavelength for most of the Relay stations and some of these had now closed; but Swansea and Plymouth, with Bournemouth, still used this value. Main stations Aberdeen and Newcastle were also on 1040 kHz at this time. Westerglen National required more changes.

Sun. September 25th 1932 : Aberdeen frequency change : 1040 kHz to 1400 kHz

Newcastle frequency change : 1040 kHz to 1420 kHz

The Prague Plan had allocated 1400 kHz & 1420 kHz to Poland and Roumania respectively. Plymouth and Swansea followed as shown below.

With four Regional high power stations now in use the frequencies became:

	<u>Sept 25th 1932</u>
London Regional	Brookmans Park 842 kHz 50 kW (843 kHz from Jan 8th 1933)
Midland Regional	Daventry 752 kHz 25 kW
North Regional	Moorside Edge 626 kHz 50 kW (625 kHz from Nov 27th 1932)
Scottish Regional	Westerglen 797 kHz 50 kW
Cardiff	Cardiff 968 kHz 1 kW
Newcastle	Newcastle 1420 kHz 1 kW
Aberdeen	Aberdeen 1400 kHz 1 kW
Belfast	Belfast 1238 kHz 1 kW
Bournemouth	Bournemouth 1040 kHz 1 kW
Plymouth	Plymouth 1040 kHz 1 kW (1373 kHz* from Jan 1933)
Swansea	Swansea 1040 kHz 1 kW (1220 kHz* from Nov 13th 1932)
London National	Brookmans Park 1148 kHz 50 kW (1147 kHz -Nov 27th 1932)
North National	Moorside Edge 995 kHz 50 kW
Scottish National	Westerglen 1040 kHz 50 kW
Daventry National	Daventry Long Wave 193 kHz 30 kW

* Frequencies 1220 kHz and 1373 kHz are International Common Frequencies.

The BBC exclusive frequencies are: 626kHz, 752 kHz, 797 kHz, 842 kHz, 968 kHz, 995 kHz, 1040 kHz, 1148 kHz, and 1238 kHz for MW; and 193 kHz for LW.

The power of transmitters was internationally agreed to be given by the Copenhagen rating, which is the power supplied to the aerial in carrier wave condition.

Later, 1 kHz adjustments were later made to the London National and Regional and North Regional frequencies to reduce the effects of foreign interference. London Regional, London National and North Regional on 843 kHz, 1147 kHz and 625 kHz respectively, now had 10 kHz separation from the German stations at Mühlacker, Stuttgart on 833 kHz, Leipzig on 1157 kHz, and Langenberg on 635 kHz.

West Regional Station - Washford

This is situated at Washford Cross on the A39 road, near to the Somerset coast. It covers the West of England, and also South Wales over the Bristol Channel. It opened in May 1933 on 968 kHz (the frequency used by Cardiff), and then in July 1933, it radiated the National Programme on the second transmitter.

Sun. May 28th 1933 : West Regional - WASHFORD 968 kHz 50 kW
Sun. May 28th 1933 : Cardiff (Main)and Swansea Relay stations closed.

Mon. July 17th 1933 :National Prog. - WASHFORD 1147 kHz

The London National and West National were both on 1147 kHz, and so synchronised working (< 0.2 c/s) was necessary to prevent mush in the overlap areas; they carry the same programme content however. The power of these synchronised National transmitters, was also reduced if necessary, to improve reception at the edge of the wanted service area, by ensuring the wanted signal was at least three times larger than the unwanted one.

Lucerne Plan

A conference was held in Madrid in September 1932, to reconsider the allocation of wavelengths among Aeronautical, Maritime, Telegraph & Telephone and Broadcast users. The detailed allocation for European broadcasters was later worked out at Lucerne in May/June 1933. Here thirty-five European countries sent representatives to allocate the 200 to 2000 metre band available to broadcasters. Unfortunately, with more stations catered for, sharing of wavelengths had to occur. There were some non-signatories however, as in the Prague Plan.

The BBC only got four exclusive frequencies allocated, viz. 200 kHz, 767 kHz, 877 kHz (all for high power use) and 1474 kHz (British Common Wave limited to 5 kW). Non-exclusive frequencies were in theory, shared with established stations or ones to come into service or on International Common Frequencies with several low power stations. The BBC got an allocation of 10 MF and 1 LF apart from International Common Frequencies.

The Lucerne Plan became effective January 15th 1934. (The Long Wave allocation of 200 kHz (Daventry) remained at this value for 54 years, until Droitwich changed to 198 kHz at the end of broadcasting on Sunday January 31st 1988).

Generally, the medium waveband frequencies were separated by 9 kHz, but there was minor exceptions to reduce interference, e.g. Langenberg on 658 kHz and North Regional on 668 kHz; and Milan on 814 kHz with Scottish Regional on 804 kHz. For exclusive wavelengths, the carrier frequency had to be within ± 50 Hz; and ± 10 Hz for shared frequencies.

For a complete listing of the Plan see the Appendix.

Lucerne Plan effective Monday January 15th 1934.

	<u>Pre-Lucerne</u>	<u>Post-Lucerne</u>
London Regional-Brookmans Park	843 kHz	877 kHz 50 kW
Midland Regional-Daventry	752 kHz	767 kHz 25 kW
West Regional-Washford	968 kHz	977 kHz 50 kW
North Regional-Moorside Edge	625 kHz	668 kHz 50 kW
Scottish Regional-Westerglen	797 kHz	804 Khz 50 kW
Newcastle	1420 kHz	1429 kHz (ICW1) 1 kW
Aberdeen	1400 kHz	1285 kHz* 1 kW
Belfast	1238 kHz	1122 kHz 1 kW
Bournemouth	1040 kHz	1474 kHz* (BCW) 1 kW
Plymouth	1373 kHz	1474 kHz (BCW) 0.3kW
London National-Brookmans Park	1147 kHz	1149 kHz 50 kW
West National-Washford	1147 kHz	1149 kHz 50 kW
North National-Moorside Edge	995 kHz	1013 kHz 50 kW
Scottish National-Westerglen	1040 kHz	1050 kHz 50 kW
LW National-Daventry	193 kHz	200 kHz 30 kW

* Aberdeen was allocated the International Common Frequency 1348 kHz, but the BBC was allowed temporary use of 1285 kHz, allocated to Belgium and Greece.

Bournemouth was allocated 1050 kHz, but used the British Common Wave of 1474 kHz. London National and West National were probably adjusted in power to reduce any mutual interference as before. Newcastle used the International Common Wave 1.

Midland Regional Station - Droitwich

This was a replacement for both Daventry transmitters, known earlier as 5XX and 5GB. The Droitwich site is at Wychbold on the A38 road. It is closer to Birmingham than the Daventry site. The Long Wave service commenced in October 1934, taking the 200 kHz frequency from Daventry. The aerial power was 150 kW, and was designed to have a wider bandwidth than 5XX, giving higher audio quality.

The Medium Wave service, on 1013 kHz (ex North National Frequency), commenced in February 1935 with an aerial power of 50 kW. The Daventry station then ceased normal domestic transmissions until the Third programme in March 1950.

Sun. October 7th 1934 : LW National Prog - DROITWICH 200 kHz 150 kW
Sun. October 7th 1934 : Closure of Daventry LW (5XX) on 200 kHz.
Sun. February 17th 1935 : Midland Regional - DROITWICH 1013 kHz 50 kW
Sun. February 17th 1935 : Closure of Daventry MW (5GB) on 767 kHz
Sun. February 17th 1935 :
North National frequency change : 1013 kHz to 1149 kHz
Scottish Regional frequency change : 804 kHz to 767 kHz
West Regional frequency change : 977 kHz to 804 kHz
Belfast N. Ireland frequency change : 1122 kHz to 977 kHz
Newcastle frequency change : 1429 kHz to 1122 kHz.

After this swapping, Newcastle was now on the higher power frequency of 1122 kHz, instead of an International Common one; North National now shared 1149 kHz with Washford and Brookmans Park, so synchronous working used with power adjustment.

From January 4th 1935, Radio Times billed the London Regional programme as Regional. From January 6th, the Belfast programme was known as Northern Ireland.

N. Ireland Regional Station - Lisnagarvey

The site would ideally be at the geographical centre of the region, but unfortunately would be too far from Belfast and Londonderry for a good service. A site near Lisburn was eventually chosen to cover Belfast and other towns, but Londonderry couldn't be well covered. The station opened in March 1936, with single service on 977 kHz. The power, advertised in 1937, was 100 kW. The aerial was a mast radiator with novel features, such as a "capacity hat" with inductance, and sliding topmast. The vertical polar radiation, could be modified to give low angle radiation, and thus extending the non-fading service area.

Fri. March 20th 1936 :N. Ireland Regional - LISNAGARVEY 977 kHz 100 kW

Fri. March 20th 1936 : Closure of Belfast station (2BE).

Scottish Regional Station - Burghead

This station, situated at Burghead near Elgin, improved the Scottish Regional coverage for populated areas in the North of Scotland. It opened in October 1936, on the same frequency as Westerglen, 767 kHz with 60 kW. The two stations were locked by sending a submultiple of the Westerglen carrier frequency as a tone on a telephone link, and then using it to control the Burghead carrier.

Mon. October 12th 1936 : Scottish Regional - BURGHEAD 767 kHz 60 kW

The stations from October 12th 1936 now had frequencies:

Regional-Brookmans Park	877 kHz
Midland Regional-Droitwich	1013 kHz
West Regional-Washford	804 kHz
North Regional-Moorside Edge	668 kHz
Scottish Regional-Westerglen	767 kHz
Scottish Regional-Burghead	767 kHz
Newcastle	1122 kHz
Aberdeen	1285 kHz
N. Ireland-Lisnagarvey	977 kHz
Bournemouth	1474 kHz
Plymouth	1474 kHz
London National-Brookmans Park	1149 kHz
West National-Washford	1149 kHz
North National-Moorside Edge	1149 kHz
Scottish National-Westerglen	1050 kHz
LW National-Droitwich	200 kHz

Up to now the West Regional Transmitter had to serve both West of England and Wales. The West Region headquarters were in Cardiff and it was decided to have a separate programme for Wales. A new transmitter in North Wales was built at Penmon in Anglesey. This operated on 804 kHz in synchronism with Washford.

When this opened in February 1937, the programme in this region became known as West and Wales, instead of West Regional.

Mon. February 1st 1937 : West and Wales - PENMON 804 kHz 5 kW

Feb 1st 1937

London-Brookmans Park	877 kHz 70 kW
Midland-Droitwich	1013 kHz 70 kW
West and Wales-Washford	804 kHz 70 kW
West and Wales-Penmon	804 kHz 5 kW
North-Moorside Edge	668 kHz 70 kW
Scottish-Westerglen	767 kHz 70 kW
Scottish-Burghead	767 kHz 60 kW
Newcastle	1122 kHz 1 kW
Aberdeen	1285 kHz 1 kW (temp use of 1285 kHz)
N. Ireland-Lisnagarvey	977 kHz 100 kW
Bournemouth (Regional)	1474 kHz 1 kW
Plymouth (Regional)	1474 kHz 0.3 kW

National-Brookmans Park	1149 kHz 20 kW
National-Washford	1149 kHz 20 kW
National-Moorside Edge	1149 kHz 20 kW
National-Westerglen	1050 kHz 50 kW
National-Droitwich	200 kHz 150 kW

In July 1937 it was decided to have a separate Welsh programme to be radiated by the Washford and Penmon transmitters. The Washford National transmitter was altered to radiate the West Regional programme on 1050 kHz, then used by Westerglen National. Westerglen National was now radiated with the other “Nationals” on 1149 kHz. The West Regional was now on a less preferable shorter wavelength.

Frequencies from Sunday July 4th 1937.

London-Brookmans Park	877 kHz 70 kW
Midland-Droitwich	1013 kHz 70 kW
West-Washford	1050 kHz 50 kW
Wales-Washford	804 kHz 70 kW
Wales-Penmon	804 kHz 5 kW
North-Moorside Edge	668 kHz 70 kW
Scottish-Westerglen	767 kHz 70 kW
Scottish-Burghead	767 kHz 60 kW
Newcastle	1122 kHz 1 kW
Aberdeen	1285 kHz 1 kW (temp use of 1285 kHz)
N. Ireland-Lisnagarvey	977 kHz 100 kW
Bournemouth (Regional)	1474 kHz 1 kW
Plymouth (Regional)	1474 kHz 0.3 kW
National-Brookmans Park	1149 kHz 20 kW
National-Moorside Edge	1149 kHz 20 kW
National-Westerglen	1149 kHz 50 kW
National-Droitwich	200 kHz 150 kW

Although the West Region had lost its medium wave National programme on 1149 kHz, the West programme from Washford carried items of National programme up to 5 p.m. to 6 p.m. The Droitwich long wave National now had to be used as the main transmission.

In October 1937, the Newcastle transmitter of 1 kW was replaced by a higher power station, sited north of Hexham, a few miles to the west of Newcastle-upon-Tyne. This transmitter at Beukley was called Stagshaw, after a local area, and radiated the “Stagshaw” programme on 1122 kHz (the Newcastle frequency).

Tues. October 19th 1937 : Stagshaw - STAGSHAW 1122 kHz 60 kW
Tues. October 19th 1937 : Closure of Newcastle (5NO)

In September 1938 Aberdeen was replaced by Redmoss on the same frequency.

In June 1939, the West Region saw the opening of two new transmitters. A high power 100 kW station was opened at Start Point on the Devon coast, south of Dartmouth. This took the West-Washford frequency of 1050 kHz, but Washford National on 1149 kHz was never restored. The second transmitter to open was at Clevedon, west of Bristol, and radiated the West programme on 1474 kHz at 20 kW.

This frequency (originally the British Common Wave) was used by Bournemouth and Plymouth stations. These stations then closed. In the Lucerne Plan 1474 kHz had a power limit of 5 kW, but now used for one higher power station.

Wed. June 14th 1939 : West - START POINT 1050 kHz 100 kW
Wed. June 14th 1939 : Closure of West - Washford on 1050 kHz
Wed. June 14th 1939 : West - CLEVEDON 1474 kHz 20 kW
Wed. June 14th 1939 : Closure of Bournemouth (6BM) on 1474 kHz
Closure of Plymouth (5PY) on 1474 kHz

June 14th 1939

London-Brookmans Park	877 kHz (342.1 m) 70 kW
Midland-Droitwich	1013 kHz (296.1 m) 70 kW
West-Start Point	1050 kHz (285.7 m) 100 kW
West-Clevedon	1474 kHz (203.5 m) 20 kW
Wales-Washford	804 kHz (373.1 m) 70 kW
Wales-Penmon	804 kHz (373.1 m) 5 kW
North-Moorside Edge	668 kHz (449.1 m) 70 kW
Scottish-Westerglen	767 kHz (391.1 m) 70 kW
Scottish-Burghead	767 kHz (391.1 m) 60 kW
Stagshaw-Stagshaw	1122 kHz (267.3 m) 60 kW
Redmoss-Aberdeen	1285 kHz (233.5 m) 5 kW (temp use)
N. Ireland-Lisnagarvey	977 kHz (307.1 m) 100 kW
National-Brookmans Park	1149 kHz (261.1 m) 40 kW
National-Moorside Edge	1149 kHz (261.1 m) 40 kW
National-Westerglen	1149 kHz (261.1 m) 50 kW
National-Droitwich	200 kHz (1500 m) 150 kW

The BBC had high power stations on all its ten MW allocations given under the Lucerne Plan. Redmoss (Aberdeen) still used a temporary non-allocated frequency.

1939 to 1945

On Friday September 1st 1939, Great Britain mobilised its armed forces for possible war with Germany. The Alexandra Palace VHF transmitter was closed down.

In the early evening, transmitting stations opened sealed orders which gave them instructions for retuning each transmitter and aerial system, to operate on one of two wavelengths. These instructions had been carefully prepared over several months.

The wavelengths used were the two longest medium wavelengths allocated to the BBC, viz : 449.1 metres or 668 kHz (ex North Regional), and 391.1 metres or 767 kHz (ex Scottish regional).

The Regional and National programmes, were combined into one national programme which was called the HOME SERVICE. By 8.15 p.m. the Home service was broadcast on the two wavelengths. If the BBC had maintained its operation as before, there would have been nine separate frequencies used for the regional programmes, which could have enabled enemy aircraft to use them as a navigational aid. By using a

synchronised group of several stations on one or other frequency, then it was difficult to separate out a single station for navigation until the aircraft were close to it. Before this position was reached, the station was closed down. Hence it was necessary to have only one programme transmitted. The Long Wave National transmitter at Droitwich was also closed. Later in the evening, the 1149 kHz frequency was used to radiate a European Service; (this Service on 1149 kHz continued to July 28th 1945).

On Sunday September 3rd, the general public heard the Prime Minister's broadcast that war now existed between Britain and Germany as from 11 a.m. The Home Service was radiated on 668 kHz and 767 kHz up to July 28th 1945, with additional programmes and frequencies as below. In December 1939 the 877 kHz frequency was used for experimental programmes for the armed forces in the B.E.F.

- Late 1939: Droitwich radiating European Service on 1149 kHz using modified long wave transmitter.
- January 7th 1940 : New programme "For The Forces" radiated on 877 kHz from 6 p.m. to 12.15 a.m. (Home Service up to 6 p.m.)
- February 18th 1940 : "For The Forces" also carried on 804 kHz from 11 a.m. to 7 p.m. Outside these hours, 804 kHz used to give additional transmission of the European Service. (877 kHz then used from 6 p.m. to 11 p.m. to carry Forces programme).
- February 25th 1940 : "For The Forces" 11 a.m. to 8 p.m. on 804 kHz, then 8 p.m. to 11 p.m. on 877 kHz. Home Service on 877 kHz 11 p.m. to 12.15 a.m.
- March 17th 1940 : "For The Forces" 11 a.m. to 10 p.m. on 804 kHz, then 10 p.m. to 11 p.m. on 877 kHz. The Home Service on 877 kHz 11 p.m. to 12.15 a.m. This arrangement until September 15th 1940; then Forces programme on 804 kHz only 6.15 a.m. to 11 p.m. until March 2nd 1941.
- June 9th 1940 : Home Service additionally radiated on 1013 kHz, up to January 26th 1941.
- October 1940 : European Service additionally radiated on 1050 kHz (Start Point).
- November 1st 1940 : Introduction in phases, of low power, local stations in major towns, all on 1474 kHz (ex Clevedon frequency) Known as Group H stations, they provided continuity of service, when a high power station was closed during air raids. Radiated the Home Service. To be used by local authorities in event of a German military invasion.
- March 2nd 1941 : "For The Forces" programme back on 877 kHz only 6.30 a.m. to 11 p.m. with synchronised group of transmitters.
- June 1941 : New 400 kW Droitwich transmitter on 1149 kHz for European Service.
- Autumn 1941 : European Service additionally transmitted on 200 kHz using Droitwich Long Wave and, two other synchronised LW transmitters at Daventry (old 5XX), and a new one at Brookmans Park.

March 8th 1942 : “For the Forces” additionally radiated on 1013 kHz, 6.30 a.m. to 11 p.m.

February 1943 : New station at Ottringham, near Hull, opened with capacity of four 200 kW transmitters, operating on medium and long wave. Potential to radiate one programme on 800 kW, or more programmes each of less power.

February 27th 1944 : “For The Forces” programme on 877 kHz and 1013 kHz, renamed as “General Forces Programme”.

It should be mentioned that as well as the existing Short Wave station at Daventry, additional permanent sites were built at Rampisham, Skelton and Woofferton. These radiated the Overseas and European Services on short wave, but the Home Service was also broadcast on the short wave band at times. Start Point, Clevedon and Lisnagarvey also had shortwave facilities installed to give diversity.

When American armed forces came to Europe, the BBC loaned two of its allocated wavelengths, 307 metres or 977 kHz (ex Lisnagarvey) and 267 metres or 1122 kHz (ex Stagshaw), to be used for broadcasting U.S. programmes from BBC sites. This project was known as American Broadcasting Station in Europe (or ABSIE). These stations came on air in about May/June 1944. From June 6th (D-Day) the AEF programme for the Allied Expeditionary Force started. Transmissions used 583 kHz (514.6 metres) and possibly 1050 kHz at times. The AEF programme closed on July 28th 1945.

ABSIE came to an end at the beginning of July 1945, but the two BBC high power frequencies 977 kHz and 1122 kHz were now used for the BBC European Services.

The high power East coast station at Ottringham carried the European Service from July 6th 1945 using 977 kHz. The other frequency of 1122 kHz also carried the European Service using the Diplomatic Wireless Station at Crowborough (Aspidistra) which the BBC had used in the war.

The General Forces Programme carried on after the end of the war, up until December 31st 1946. On January 1st 1947, the General Overseas Service began.

1945 to 1967

On July 29th 1945, the BBC returned to peacetime operation by restoring regional programmes in the form of six regional HOME SERVICES, and introducing another national service, the LIGHT PROGRAMME, borrowing from the “FORCES” format. Unfortunately 977 kHz and 1122 kHz were not for domestic use, and the Lucerne Plan non-allocated frequency of 1285 kHz, (used up to 1939 for Aberdeen), was also unavailable, and meant that there was only eight of the pre-war medium wavelengths to use, plus the long wave allocation of 1500 metres or 200 kHz. However, the BBC continued to use 514.6 metres or 583 kHz, which had been allocated to Madona in Latvia in the Lucerne Plan, but used by the AEF in the UK after D-Day.

The use by Ottringham of 200 kHz now ceased as Droitwich required this frequency for the new Light programme. The European Service wanted to continue in the long wave band from Ottringham and initially a frequency of 250 kHz was used, but trouble with harmonics changed this to 271 kHz. This frequency was in use by other stations such as Leningrad (USSR) and another long wavelength was preferable.

The Prague Plan of 1929 had allocated 167 kHz to the high power station at Lahti in Finland, with Radio Paris (France) on 174 kHz. At the Lucerne Conference, Radio Paris was allocated 167 kHz with Lahti on 262 kHz. In the event however, after 1934, Radio Paris continued on its current frequency of 182 kHz and Lahti used 166 kHz.

At the war's end Lahti was required to share 160 kHz with Brasov in Romania, and the BBC was then given the 167 kHz (1796 m.) frequency for the Ottringham Long Wave transmitter.

Sun. July 29th 1945: LIGHT PROGRAMME introduced

	<u>June 14th 1939</u>	<u>July 29th 1945</u>
583 kHz	Latvia (Madona) 1934	West Home Service-Start Point
668 kHz	North-Moorside Edge	North Home Service-Moorside Edge
767 kHz	Scottish-Westerglen	Scottish Home Service-Westerglen
767 kHz	Scottish-Burghead	Scottish Home Service-Burghead
767 kHz		Scottish Home Service-Redmoss
804 kHz	Wales-Washford	Welsh Home Service-Washford
804 kHz	Wales-Penmon	Welsh Home Service-Penmon
877 kHz	London-Brookmans Park	London Home Service-Brookmans Park
977 kHz	N. Ireland-Lisnagarvey	European Service-Ottringham
1013 kHz	Midland-Droitwich	Midland Home Service-Droitwich
1050 kHz	West-Start Point	North Home Service-Stagshaw
1050 kHz		N. Ireland Home Service-Lisnagarvey
1122 kHz	Stagshaw-Stagshaw	European Service-Crowborough
1285 kHz	Aberdeen-Redmoss	
1474 kHz	West-Clevedon	West Home Service-Clevedon
1149 kHz	National-Brookmans Park	Light Programme-Brookmans Park
1149 kHz	National-Moorside Edge	Light Programme-Moorside Edge
1149 kHz	National-Westerglen	Light Programme-Westerglen
1149 kHz		Light Programme-Burghead
1149 kHz		Light Programme-Lisnagarvey
200 kHz	National-Droitwich	Light Programme-Droitwich

Thus there are nine of the pre-war frequencies used (including 200 kHz), plus the one of 583 kHz. Unfortunately, Stagshaw (Newcastle area) and Lisnagarvey both shared 1050 kHz, and therefore generally carried the same programme. It was likely that during the day, local area news was possibly transmitted separately. Low power transmitters on 1149 kHz (261.1 m) gave improved Light Programme service to Redruth, Redmoss, Newcastle and Londonderry. New higher power transmitters on 1149 kHz at Burghead and Lisnagarvey gave an alternative Light Programme signal to the north of Scotland and Northern Ireland, where the long wave coverage could be unsatisfactory.

On September 29th 1946, the BBC introduced the THIRD PROGRAMME to complete its pattern for post war broadcasting. There was one main transmission on the longest medium wavelength the BBC used, that is 514.6 metres, a frequency of 583 kHz, from Droitwich. Unfortunately this frequency had been allocated to Latvia in 1933 and the power of Droitwich had now to respect the Latvian station now on this frequency. Low power filler stations were required to radiate the Third Programme in certain areas. The old Group H stations on a frequency of 1474 kHz were used, but two extra wavelengths were now required to keep the *status quo* for the rest of the network.

The European Service surrendered 977 kHz in September 1946 for use by Start Point, and Clevedon was given 1384 kHz, which had been allocated to Albania and Poland in the Lucerne Plan.

Sun. September 29th 1946 : THIRD PROG.- DROITWICH 583 kHz ~50 kW
also low power stations on 1474 kHz.

Sun. September 29th 1946 : West Home Service - Start Point 977 kHz
West Home Service - Clevedon 1384 kHz

At sometime, the medium wave transmitter at Ottringham also gave routine relief for the Crowborough 1122 kHz transmissions.

For completeness, the BBC made use of continental stations for its European Service on medium wave after losing 977 kHz. These were Norden (Germany) on 658 kHz and later Graz-Dobl (Austria) on 886 kHz, both frequencies allocated to these countries in pre-war days.

On the domestic front, East Anglia had the benefit of a station near Norwich, at Postwick, on a frequency of 1013 kHz (Midland Home Service); and south Hampshire enjoyed the West Home Service from Bartley (near Southampton) on 1384 kHz.

Copenhagen Plan

In 1938 a conference in Cairo slightly increased the number of medium waves available for broadcasters, and this was followed by a European Broadcasting Conference at Montreux in 1939. A revision of the Lucerne Plan was agreed and due to become effective as the Montreux Plan in 1940. The war prevented this adoption.

The war also stopped the next planned International Telecommunications Conference, (after Cairo in 1938), planned for Rome in 1942 and it didn't take place until 1947 in Atlantic City. The broadcasters share of the wavelengths changed again and thus a revision of the Lucerne Plan was agreed for European broadcasters at a conference held in Copenhagen in 1948. This plan became effective March 15th 1950. The BBC allocation was 11 MF + 1 LF and use of 2 International Common Waves 1484 kHz (202 m.), and 1594 kHz (188 m.) for domestic use; and 2 MF allocations of 1295 kHz (232 m.) and 1340 kHz (224 m.) for European broadcasts. The powerful French station at Allouis now had 164 kHz and the BBC lost the use of 167 kHz for its European Service. The 658 kHz service from Norden also ceased.

Copenhagen Plan effective Wednesday March 15th 1950.

	<u>Pre Copenhagen</u>	<u>Post Copenhagen</u>
London Home Service-Brookmans Park	877 kHz	908 kHz 150 kW
Midlands Home Service-Droitwich	1013 kHz	1088 kHz
Midlands Home Service-Postwick	1013 kHz	1088 kHz
North Home Service-Moorside Edge	668 kHz	692 kHz 150 kW
North/N. Ireland Home Service-Stagshaw	1050 kHz	1151 kHz
Welsh Home Service-Washford	804 kHz	881 kHz
Welsh Home Service-Penmon	804 kHz	881 kHz
Welsh Home Service-Wrexham	804 kHz	881 kHz
West Home Service-Start Point	977 kHz	1052 kHz 150 kW
West Home Service-Clevedon & Bartley	1384 kHz	1457 kHz
Scottish Home Service-Westerglen	767 kHz	809 kHz
Scottish Home Service-Burghead & Redmoss	767 kHz	809 kHz
N. Ireland/North Home Service-Lisnagarvey	1050 kHz	1151 kHz
N. Ireland/North Home Service-Londonderry	1050 kHz	1151 kHz
Light Programme-Droitwich	200 kHz	200 kHz 400 kW
Light Programme-Brookmans Park	1149 kHz	1214 kHz
Light Programme-Moorside Edge	1149 kHz	1214 kHz
Light Programme-Westerglen	1149 kHz	1214 kHz
Light Programme-Burghead	1149 kHz	1214 kHz
Light Programme-Lisnagarvey	1149 kHz	1214 kHz
Light Programme-low power stations	1149 kHz	1214 kHz
Third Programme-Droitwich	583 kHz	
Third Programme-Daventry		647 kHz
Third Programme-low power stations	1474 kHz	1546 kHz & 647 kHz
European Service-Ottringham	167 kHz	1295 kHz
European Service-Crowborough (Ottringham)	1122 kHz	1340 kHz

The luxury of exclusive frequencies was a rarity now; in a 1954 European listing only 908 kHz, 1295 kHz and 1546 kHz are shown as exclusive to BBC services.

The Third Programme on 647 kHz now came from a temporary medium power transmitter (60 kW Marconi Ampliphase) at Daventry until April 8th 1951, when a new high power station with a mast radiator (at Dodford) took over.

The Stagshaw and Lisnagarvey transmitters still shared the same frequency of 1151 kHz, which meant a common programme content if interference occurred.

The Ottringham station closed in February 1953 and the BBC European Service was continued on 1295 kHz from the German station at Norden. The Graz-Dobl station continued under the Plan with a new frequency of 1025 kHz, ending transmission of the BBC programmes in 1955.

Sun. April 8th 1951 : Third Programme - DAVENTRY 647 kHz 150 kW

June 1st 1951 : Postmaster-General announced plans for 12 low power stations, to improve Home Service coverage. Projected as :

- Barnstaple 1052 kHz West Home Service
- Scarborough 1151 kHz North/N. Ireland Home Service
- Bexhill 1457 kHz West Home Service
- Folkestone 1457 kHz West Home Service
- Brighton 1457 kHz West Home Service
- Whitehaven 692 kHz North Home Service
- Barrow 1484 kHz (ICW) North Home Service
- Ramsgate 1484 kHz (ICW) London Home Service
- Pwllheli 881 kHz Welsh Home Service
- Cromer 908 kHz London Home Service
- Montrose 1484 kHz (ICW) Scottish Home Service
- Dumfries 809 kHz Scottish Home Service

Later references show that Pwllheli station isn't listed, it appears to have been replaced by one at Towyn (Tywyn), which can reach Pwllheli across Cardigan Bay.

The Montrose station isn't listed later, so may have been covered by Redmoss.

The Cromer station is listed later as having the frequency 692 kHz, rather than 908 kHz, and carrying the North Home Service.

Home Service Medium and High Power Stations at 1955

London-Brookmans Park	908 kHz (330.4 m) 140 kW
Midlands-Droitwich	1088 kHz (275.7 m) 150 kW
Midlands-Postwick	1088 kHz (275.7 m) 7.5 kW
North-Moorside Edge	692 kHz (433.5 m) 150 kW
North/N. Ireland-Stagshaw	1151 kHz (260.6 m) 100 kW
Welsh-Washford	881 kHz (340.5 m) 100 kW
Welsh-Penmon	881 kHz (340.5 m) 8 kW
Welsh-Towyn (Tywyn)	881 kHz (340.5 m) 5kW
West-Start Point	1052 kHz (285.2 m) 120 kW
West-Clevedon	1457 kHz (205.9 m) 20 kW
West-Bartley	1457 kHz (205.9 m) 10 kW
Scottish-Westerglen	809 kHz (370.8 m) 100 kW
Scottish-Burghead	809 kHz (370.8 m) 100 kW
Scottish-Redmoss	809 kHz (370.8 m) 5 kW
N. Ireland/North-Lisnagarvey	1151 kHz (260.6 m) 100 kW

Additional low power stations used the above frequencies and also the International Common Frequency of 1484 kHz.

Light Programme Medium and High Power Stations at 1955

Droitwich	200 kHz (1500 m) 400 kW
Brookmans Park	1214 kHz (247.1 m) 60 kW
Moorside Edge	1214 kHz (247.1 m) 58 kW
Westerglen	1214 kHz (247.1 m) 50 kW
Burghead	1214 kHz (247.1 m) 20 kW
Lisnagarvey	1214 kHz (247.1 m) 10 kW

Additional low power stations all on 1214 kHz.

Third Programme High Power Station 1955

Daventry	647 kHz (463.7 m) 150 kW
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Additional low power stations all on 647 kHz (463.7 m), and 1546 kHz (194 m).

In 1948, the BBC carried out field trials at frequencies around 90 MHz, to assess the merits of VHF transmission using A.M. and F.M. as a future system of higher quality broadcasting. An F.M. system required more expensive receivers but was found superior in performance. This was adopted and the first VHF FM station opened at Wrotham on Monday May 2nd 1955. Other stations followed covering the U.K.

Since July 1945, the Northern Ireland station at Lisnagarvey had been sharing its wavelength with the Stagshaw station near Newcastle. When interference was possible, the same programme had generally to be radiated in each area, although short news programmes may have been separate in content.

In late 1962, BBC use of the Norden station on 1295 kHz (231.7 m) ceased, and the Crowborough station continued the BBC European Service on this frequency and surrendered its own 1340 kHz to the domestic service, which was then used by Lisnagarvey and Londonderry from January 1963, with Stagshaw on 1151 kHz.

Mon. January 7th 1963 :N.Ireland Home Service - Lisnagarvey 1340 kHz (223.9 m)
(Stagshaw then radiated North Home Service only)

The BBC were now using 12 MF+1 LF+1MF (ICW), and the use of another 1 MF (ICW) for domestic purposes, and 1 MF for the European Service.

1967 to 1978

In the 1960's, pirate radio stations began to operate with mainly a fare of "pop" music, devoting more time to this type of music than the BBC could as part of its Light Programme schedule. The government brought in legislation to outlaw pirate stations within its jurisdiction, but allowed the BBC to start another radio network to accommodate a new younger audience. To transmit this new programme, the Light Programme was now radiated only on long wave and VHF FM, and its medium wave stations carried the new network known as RADIO 1. However additional high power medium wave stations were now opened at Washford and Droitwich with reduction in power at Brookmans Park, Moorside Edge and Westerglen. More low power also stations built. The last time Washford carried two domestic programmes in peace time, was June 13th 1939.

The Light, Third and Home Service, were renamed RADIO 2, 3 and 4 respectively.

Sat. September 30th 1967 : Introduction of RADIO 1 on 1214 kHz (247 m)

Sat. September 30th 1967 : Light Programme renamed RADIO 2
(Long Wave only, but has FM coverage)

Sat. September 30th 1967 : Third Programme renamed RADIO 3

Sat. September 30th 1967 : Home Service renamed RADIO 4

Medium and High Power Stations after September 30th 1967

	<u>Radio 1</u>	<u>Radio 4</u>
Brookmans Park	1214 kHz 247 m 35 kW	908 kHz 330m 140 kW London
Droitwich	1214 kHz 247 m 30 kW	1088 kHz 276 m 150kW Midland
Postwick		1088 kHz 276 m 7.5 kW Midland
Moorside Edge	1214 kHz 247 m 35 kW	692 kHz 434 m 150 kW North
Stagshaw		1151 kHz 261 m 100 kW North
Washford	1214 kHz 247 m 60 kW	881 kHz 341 m 100 kW Welsh
Penmon		881 kHz 341 m 10 kW Welsh
Tywyn		881 kHz 341 m 5 kW Welsh
Start Point		1052 kHz 285 m 100 kW West
Clevedon		1457 kHz 206 m 20 kW West
Bartley		1457 kHz 206 m 10 kW West
Westerglen	1214 kHz 247 m 25 kW	809 kHz 371 m 100 kW Scottish
Burghead	1214 kHz 247 m 20 kW	809 kHz 371 m 100 kW Scottish
Redmoss		809 kHz 371 m 5 kW Scottish
Lisnagarvey	1214 kHz 247 m 10 kW	1340 kHz 224 m 100kW N.Ireln
Low Power	1214 kHz 247 m	Used above frequencies and also on 1484 kHz 202 m (ICW)
	<u>Radio 2</u>	<u>Radio 3</u>
Droitwich	200 kHz 1500 m 400 kW	
Daventry		647 kHz 464 m 150 kW
Low Power		647 kHz 464 m/1546 kHz 194 m

In November 1967, BBC started local radio with Radio Leicester.

By 1969, Radio 2 had acquired low power stations on 1484 kHz 202 m (ICW), sharing this with Radio 4 (Barrow & Ramsgate). Radio 3 low power stations also used the other International Common Frequency of 1594 kHz 188 m. in addition to 647 kHz & 1546 kHz. The Bournemouth Radio 3 on 1546 kHz changed to 1594 kHz, and Bournemouth now also transmitted Radio 1 on 1484 kHz.

In the 1970's, the radio networks were re-organized and Local Radio then carried the local news for English regions. The Home Service English regional services were replaced by an England National service and so the high power stations could use the same frequency if synchronised, so releasing other frequencies. The Droitwich frequency 1088 kHz was given to the External Service, and 1457 kHz was used for Radio London, Radio Birmingham and Radio Manchester. Stagshaw's 1151 kHz was allocated to Independent Local Radio in 1973, with BBC & ILR sharing of 1546 kHz.

Sat. September 2nd 1972 :

Droitwich frequency change : 1088 kHz to 1052 kHz
Postwick frequency change : 1088 kHz to 1052 kHz
Clevedon frequency change : 1457 kHz to 908 kHz
Bartley frequency change : 1457 kHz to 692 kHz
Crowborough (Ext Service) : 1088 kHz

Low power R4 stations on 1457 kHz i.e. Brighton, Folkestone, Bexhill and Redruth may have changed at this date as well. They are listed later as being on 692 kHz, 1052 kHz, 1052 kHz and 908 kHz respectively. Low power R3 stations on 1546 kHz were discontinued; some stations disappeared and others converted to 647 kHz.

It was found later that reception in Swindon of R4 England National was poorer after the changes as the Droitwich and Start Point transmissions, now both on 1052 kHz, resulted in Swindon being a mush area.

This was overcome by installing a low power 0.5 kW transmitter on 1340 kHz. Although this was already used by the high power Lisnagarvey station for R4 Northern Ireland, interference should have been small.

In 1973 the BBC had to surrender the high power frequency allocation of 1151 kHz to enable Independent Local Radio (ILR) to develop a separate network of stations. Thus Stagshaw and Scarborough (low power) had to change frequency.

Sat. September 29th 1973 :

Stagshaw frequency change : 1151 kHz to 908 kHz
(Scarborough low power TX same change)

Medium and High Power Stations at 1975

	<u>Radio 1</u>	<u>Radio 4</u>
Brookmans Park	1214 kHz 247 m 50 kW	908 kHz 330 m 140 kW England
Droitwich	1214 kHz 247 m 30 kW	1052 kHz 285 m 150 kW Engl'nd
Postwick		1052 kHz 285 m 7.5 kW England
Moorside Edge	1214 kHz 247 m 50 kW	692 kHz 434 m 300 kW England
Stagshaw		908 kHz 330 m 100 kW England
Washford	1214 kHz 247 m 60 kW	881 kHz 341 m 100 kW Wales
Penmon		881 kHz 341 m 10 kW Wales
Tywyn		881 kHz 341 m 5 kW Wales
Start Point		1052 kHz 285 m 100kW England
Clevedon		908 kHz 330 m 20 kW England
Bartley		692 kHz 434 m 10 kW England
Westerglen	1214 kHz 247 m 40 kW	809 kHz 371 m 100 kW Scotland
Burghead	1214 kHz 247 m 20 kW	809 kHz 371 m 100 kW Scotland
Redmoss		809 kHz 371 m 5 kW Scotland
Lisnagarvey	1214 kHz 247 m 10 kW	1340 kHz 224 m 100kW N.Ireland
Low Power	1214 kHz 247 m &	Above frequencies and also
Low Power	1484 kHz 202 m (ICW)	1457 kHz 206 m South-West
Low Power		683 kHz 439 m * South-West
Low Power		854 kHz 351 m * South-West

	<u>Radio 2</u>	<u>Radio 3</u>
Droitwich	200 kHz 1500 m 400 kW	
Low Power	1484 kHz 202 m (ICW)	
Daventry		647 kHz 464 m 150 kW
Low Power		647 kHz 464 m &
		1594 kHz 188 m (ICW)

*Radio 4 additionally used 683 kHz and 854 kHz, on low power. 1546 kHz now used in BBC Local Radio and ILR. Later, Radio 4 in Wales, Scotland and Northern Ireland became known as Radio Wales, Radio Scotland and Radio Ulster.

Main Local Radio stations : Radio London-Brookmans Park 1457 kHz 206 m 50kW
Radio Birmingham 1457 kHz 206 m 10 kW
Radio Manchester 1457 kHz 206 m 5 kW
Radio Bristol 1546 kHz 194 m 5 kW

By 1977 low power local and Radio 4 stations also used more new frequencies not originally allocated, viz. 854 kHz, 719 kHz, 755 kHz, 1115 kHz, 1106 kHz, 1034kHz, 1520 kHz, 998 kHz and 1502 kHz.

In the Copenhagen Plan 1948, the BBC were allocated 11 MF + 1 LF+2MF (ICW) for domestic use and 2 MF for External Services. By 1978, there were 10 MF frequencies being used domestically for 5 kW and above.

Geneva Plan

Since the last European frequency conference held in Copenhagen in 1948, the number of transmitters had more than doubled and the power more than quadrupled. With interference now worse, especially at night, a new plan was needed. The International Telecommunications Union held two sessions, and the second session in Geneva in 1975, prepared the frequency assignment plan. The delegates to the conference were formally from each country's governments (as per Prague Plan etc). The plan was to cover if possible, foreseen requirements for the period 1978 to 1989.

The channel spacings for Europe were kept at 9 kHz (which dates back to the Brussels Plan, effective January 1929), but additionally, the MW carrier frequency values were now made to be integral multiples of 9 kHz. The Geneva Plan became effective November 23rd 1978. LW carrier frequencies didn't change until later (WARC 1979).

The UK retained its present 13 MF +1LF for high power use, as per 1948 (including External Service use) and the right to another long wave or low frequency on 227 kHz at medium power. The changes to the MW carrier frequencies were only required to be 1 or 2 kHz. Additional frequencies for low power expansion of the local radio network were also obtained. These high power allocations now had to be shared with Independent Local Radio, and not for sole BBC use as in the 1948 Plan.

Instead of the BBC using the (slightly changed) frequencies as before, it reappraised the frequencies used by each network. Radio 4 in Wales, Scotland and Northern Ireland was carried nationally as Radio Wales, Radio Scotland and Radio Ulster with one frequency for each; although Belfast and Londonderry also had local stations on a separate frequency. The English regionals had been replaced by an England National with regional programmes carried by the English local radio.

If Radio 4 now became UK national, then Wales, Scotland and Northern Ireland could carry more local programmes on Radio Wales, Radio Scotland and Radio Ulster, and these nations would still have access to a national Radio 4 for mainstream news and information. It was decided therefore to put Radio 4 national service onto the long waveband. This would release the 3 high power medium frequencies used in England. The 647 kHz frequency used up to now for the high power Radio 3 transmission, was estimated to suffer from considerable night time interference. This frequency, now 648 kHz, was suitable for directional European broadcasts. The External Service swapped 1089 kHz for 648 kHz and kept 1296 kHz (Copenhagen 1295 kHz).

Radio 3 then used the 1215 (1214) kHz network of Radio 1. Radio 3 was well covered by FM anyway. The 1089 kHz together with the 3 frequencies vacated by the English Radio 4, gave the BBC 4 high power frequencies for Radio 1 and Radio 2; each network using a pair of frequencies to cover the UK. It was originally intended to improve long wave coverage in Scotland by using Burghead on 200 kHz with Droitwich; and Westerglen on the new 227 kHz. However, 227 kHz was also used by a powerful Polish station and interference was found to be excessive at darkness. In the event, Westerglen was also used on 200 kHz, with all three L.F. stations locked.

The coverage of the UK with several transmitters on one frequency, leads to the overlap areas having phasing problems. The use of two frequencies, as per Radio 1 and Radio 2, to cover the country makes it possible to arrange overlaps where the carriers can be different frequencies and hence phasing not relevant. Thus Radio 1 used a distribution of 1053 kHz and 1089 kHz. Radio 2 used a distribution of 693 kHz and 909 kHz.

The Belfast low power station on 719 kHz was superseded by a 10 kW station at Lisnagarvey on 720 kHz to give Radio 4 coverage to Northern Ireland; Lisnagarvey also carrying Radio Ulster on 1341 kHz at 100 kW.

Geneva Plan effective Thursday November 23rd 1978.

<u>Stations 5kW and above</u>		<u>Pre-Geneva</u>		<u>Post-Geneva</u>
Brookmans Park	908 kHz	140 kW R4	909 kHz	140 kW R2
Brookmans Park	1214 kHz	50 kW R1	1215 kHz	50 kW R3
Brookmans Park			1089 kHz	150 kW R1
Droitwich	1052 kHz	150 kW R4	1053 kHz	150 kW R1
Droitwich	1214 kHz	30 kW R1	1215 kHz	30 kW R3
Droitwich			693 kHz	150 kW R2
Droitwich	200 kHz	400 kW R2	200 kHz	400 kW R4 UK
Moorside Edge	692 kHz	300 kW R4	909 kHz	100 kW R2
Moorside Edge	1214 kHz	50 kW R1	1215 kHz	50 kW R3
Moorside Edge			1089 kHz	150 kW R1
Stagshaw	908 kHz	100 kW R4	693 kHz	50 kW R2
Stagshaw			1053 kHz	50 kW R1
Start Point	1052 kHz	100 kW R4	1053 kHz	100 kW R1
Clevedon	908 kHz	20 kW R4	909 kHz	20 kW R2
Bartley	692 kHz	10 kW R4		
Postwick	1052 kHz	7.5 kW R4	1053 kHz	10 kW R1
Postwick			693 kHz	10 kW R2
Washford	881 kHz	70 kW R. Wales	882 kHz	70 kW R. Wales
Washford	1214 kHz	60 kW R1	1215 kHz	60 kW R3
Washford			1089 kHz	50 kW R1
Penmon	881 kHz	10 kW R. Wales	882 kHz	10 kW R. Wales
Tywyn	881 kHz	5 kW R. Wales	882 kHz	5 kW R. Wales
Westerglen	809 kHz	100 kW R.Scot'd	810 kHz	100 kW R.Scot'd
Westerglen	1214 kHz	40 kW R1	1215 kHz	40 kW R3
Westerglen			909 kHz	50 kW R2
Westerglen			1089 kHz	50 kW R1
Westerglen			200 kHz	50 kW R4 UK
Burghead	809 kHz	100 kW R.Scot'd	810 kHz	100 kW R.Scot'd
Burghead	1214 kHz	20 kW R1	1215 kHz	20 kW R3
Burghead			693 kHz	50 kW R2
Burghead			1053 kHz	20 kW R1
Burghead			200 kHz	50 kW R4 UK
Redmoss	809 kHz	5 kW R.Scot'd	810 kHz	5 kW R.Scot'd
Lisnagarvey	1340 kHz	100 kW R.Ulster	1341 kHz	100 kW R.Ulster
Lisnagarvey	1214 kHz	10 kW R1	1215 kHz	10 kW R3
Lisnagarvey			909 kHz	10 kW R2
Lisnagarvey			1089 kHz	10 kW R1
Lisnagarvey			720 kHz	10 kW R4 UK
Daventry	647 kHz	150 kW R3		
Crowborough			648 kHz	500 kW WS
Crowborough	1295 kHz	500 kW WS	1296 kHz	500 kW WS
Crowborough	1088 kHz	500 kW WS		

Bartley and Daventry were casualties of this new plan.

	<u>Pre-Geneva</u>	<u>Post-Geneva</u>
Low Power :	Above frequencies and: 683 kHz, 989 kHz R4 SW 1457 kHz, 755 kHz R4 SW 854 kHz R4 SW 719 kHz R4 NI 1484 kHz (ICW) R1 & R2 1594 kHz (ICW) R3	Above frequencies and: 1485 kHz R1 & R4 UK 603 kHz, 720 kHz R4 UK 1449 kHz R4 UK 756 kHz, 855 kHz R4 S'West 801 kHz, 990 kHz R4 S'West 1458 kHz R4 S'West 1197 kHz R3

Main Local Radio stations : Radio London-Brookmans Park 1458 kHz 206 m 50kW
Radio Birmingham 1458 kHz 206 m 10 kW
Radio Manchester 1458 kHz 206 m 5 kW
Radio Bristol 1548 kHz 194 m 5 kW

The BBC are now using 13 frequencies in the medium waveband for powers of 5 kW and above, including local radio and Europe. The 1151 kHz frequency was revised to 1152 kHz for high power use for Independent Local Radio with sharing of 1548 kHz.

1978 to ?

When the IBA commenced Independent Local Radio in London in October 1973, the medium wave transmitter for Capital Radio and LBC on 1546 kHz and 1151 kHz, was intended to be from a high power station northwest of London. The site at Saffron Green (north of Barnet), was delayed and so a temporary site in central London was used at Lots Road Chelsea. This was at the London Transport power station. This temporary station on 0.5 kW, radiated Capital Radio on 557 kHz and LBC on 719 kHz until the permanent station opened.

After 1978 when Radio 4 UK's non-VHF coverage in England was mainly on long wave, the aerials at Droitwich were damaged in a storm and the programme was temporarily unavailable. Television sound was used at times to carry the programme to listeners not having VHF FM receivers or a local MW station, during this period.

The BBC decided later to provide a low power local station in central London to carry the long wave programme in the medium waveband. The Lots Road station was now used again, to radiate Radio 4 UK (long wave service) on 720 kHz (416.6 m) 0.5 kW for the London area; a useful alternative if the long wave signal suffered electrical interference.

When 648 kHz was transferred to the BBC External Service, Daventry ceased to transmit domestic programmes and the medium wave station was dismantled. The station continued to radiate the External Service on the short waveband; but this came to an end on Sunday March 29th 1992.

By 1981/2 the 648 kHz and 1296 kHz frequencies used by the External Services from the Foreign and Commonwealth Office station near Crowborough, had been transferred to a new station on the coast at Orfordness in Suffolk with 500 kW transmitters. The Crowborough station was no longer used.

From Monday February 1st 1988, the long waveband carrier frequency of 200 kHz was changed to 198 kHz (a multiple of 9 kHz), as required by agreement at the World Administrative Radio Conference (WARC) held in 1979.

The 200 kHz allocation had been used by the BBC since Monday January 15th 1934.

(The 227 kHz frequency allocation now changed to 225 kHz)

Appendix

LUCERNE CONVENTION EUROPEAN WAVELENGTH PLAN

A. GENERAL PROVISIONS

1. The figure giving the actual power indicates, for each station, the power at the date of signature of the present Convention.
2. The stations using an identical frequency are indicated in the alphabetical order of their official names.
3. In the case where the maximum power is not indicated in the Plan, the non-modulated power measured in the aerial must not exceed the following values :-

(a) For frequencies below 300 kc/s (waves above 1,000m.)	150 kW ¹
(b) For frequencies between 550 and 1,100 kc/s (waves between 545 and 272.7 m.)	100 kW ²
(c) For frequencies between 1,100 and 1,250 kc/s (waves between 272.7 and 240 m.)	60 kW
(d) For frequencies between 1,250 and 1,500 kc/s (waves between 240 and 200 m.)	30 kW

¹ For the station Moscow I, the maximum power admitted is 500 kW.

² For the following stations : Budapest, Leipzig, Paris PTT, Prague I, Rennes PTT, Toulouse PTT, Vienna, the maximum power admitted is 120 kW.

However, the power of stations mentioned in the Plan must not exceed the value which is necessary to ensure economically an efficient national service of good quality within the limits of the country in question.

4. On the other hand, the power of stations using common waves is limited as follows :-

(a) For National Common Waves	5 kW
(b) For International Common Waves Type 1	2 kW
(c) For International Common Waves Type 2	0.2 kW

5. In the case where the maximum power is indicated in the list of stations on the Plan, this power will be modified after agreement of the interested Administrations, if experience, supported by measurements, shows that this modification is useful or necessary. The modifications must be limited to the value which will allow the avoidance of interferences if it is a case of diminution of power, or to the value shown in section 3 if it is a case of an increase of power.

6. The admissible tolerances for the frequency of stations are fixed as follows :-

(a) Stations using an exclusive frequency	± 50 cycles/sec.
(b) Stations using a shared frequency	± 10 cycles/sec.
(c) Stations using a national common frequency	± 50 cycles/sec.
(d) Stations using an international common frequency Type 1	±10 cycles/sec.
(e) Stations using an international common frequency Type 2	± 50 cycles/sec.

However, a tolerance of ± 10 cycles/sec. is recommended for the frequency of stations mentioned under (a) and (c).

7. (a) A “shared wave” is a wave used by two or more stations specially named in the Plan.
 (b) A “National Common Wave” is an exclusive or shared wave attributed to a country which that country may use for an unlimited number of synchronised stations.
 (c) An “International Common Wave”, Type 1, and an “International Common Wave”, Type 2, are waves used by stations belonging to different countries and fulfilling the conditions laid down in Sections 4 and 6.
8. Frequencies mentioned in the Plan must only be used for a telephonic broadcasting service. A visual broadcasting service may be admitted on a frequency allotted to a station when this service does not cause any interference to the working of neighbouring stations.
9. In addition to the frequencies provided for stations of the contracting countries, the Plan also provides attributions of frequencies for stations of countries which are not signatories of the Lucerne Convention.
10. In conformity with the dispositions of Article 1, sec. 2, of the European Broadcasting Convention, modifications can be made to the Plan only under the conditions fixed in Article 5 of this Convention.
11. The final Protocol of the European Radio-electric Conference of Prague (1929) ceases to have effect on the date of the entry into force of the present Plan.

B. LIST OF STATIONS

Band No. 1: 150 to 300 kc/s (2,000 to 1,000m.).

<u>Frequency</u> <u>kc/s</u>	<u>Wavelength</u> <u>metres</u>	<u>Station</u>	<u>Aerial Power kW</u>		
			<u>Present</u>	<u>Maximum</u> <u>by dayby night¹</u>	
160	1875	Brasov (Romania)	1		
167	1796	Radio-Paris (France)	75		
		Syria (Syria)	0	20	20
175	1714	Moscow I (U.S.S.R.)	500		
183	1639	Ankara (Turkey)	7		
		Kaunas (Lithuania)	7	7	7
		Madrid I (Spain)	0		
		Reykjavik (Iceland)	16	30	30
191	1571	Königs Wusterhausen (Germany)	60		
200	1500	Daventry (Droitwich) (Gt. Britain)	30		
208	1442	Minsk (U.S.S.R.)	100		
216	1389	Motala (Sweden)	30		
223	1345	Huizen (Holland)	7		
		Kharkov (U.S.S.R.)	20		
230	1304	Warsaw (Poland)	120		
238	1261	Kalundborg (Denmark)	75	60	60
		Portugal (North) ² (Portugal)	0	20	20
245	1224	Leningrad (U.S.S.R.)	100	100	100
253	1186	Oslo ³ (Norway)	60	60	60
262	1145	Lahti ⁴ (Finland)	40	150	60
271	1107	Moscow II (U.S.S.R.)	100	100	100

Notes :

¹ Applicable one hour after sunset at the transmitter.

² Must use a directional aerial towards the south and reduce the power during the night in case of interference with services not open to public correspondence of Spain and of France.

³ Norway will do all that she can to reduce the field towards the south-east without diminishing the national service of Oslo.

⁴ May use a power at night up to 150 kW if an aerial directed towards the north is installed.

Band No. 2: 300 to 500 kc/s (1,000 to 600m.).

<u>Frequency</u> <u>kc/s</u>	<u>Wavelength</u> <u>metres</u>	<u>Station</u>	<u>Aerial Power kW</u>		
			<u>Present</u>	<u>Maximum</u> <u>by dayby night¹</u>	
355	845	Finmark (Norway)	1	10	5
		Rostov-on Don (U.S.S.R.)	20	20	20
364	824	Smolensk (U.S.S.R.)	10	10	10
392	765	Ostersund (Sweden)	0.6	10	5
		Slovakia ² Czechoslovakia)	0	30	15
401	748	Geneva ³ (Switzerland)	1.3	1.3	0.5
		Moscow III (U.S.S.R.)	100	100	50
413.5	726	Boden (Sweden)	0.6	10	5
		Voroneje (U.S.S.R.)	10	10	10
431	696	Oulu ⁴ (Finland)	2	5	1.5

Notes :

¹Applicable one hour after sunset at the transmitter.

²Must use a directional aerial towards the east.

³Under the condition not to interfere with the services not open to public correspondence.

⁴Must use a directional aerial towards the north. The power may be increased if experience shows that trouble does not result to the maritime service.

Band No. 3: 500 to 1,500 kc/s (600 to 200m.).

<u>Frequency</u> <u>kc/s</u>	<u>Wavelength</u> <u>metres</u>	<u>Station</u>	<u>Aerial Power kW</u>		
			<u>Present</u>	<u>Maximum</u> <u>by dayby night¹</u>	
519	578.0	Hamar (Norway)	0.7	2	0.5
		Innsbruck ^{4or5} (Austria)	0	2	1
527	569.3	Ljubljana ¹¹ (Yugoslavia)	5	5	5
		Tampere ² (Finland)	1.2	1	1
		Finnish Common Wave (Finland)	0.5	1	1
536	559.7	Bolzano ³ (Italy)	1	1	1
		Wilno ² (Poland)	16	16	8
546	549.5	Budapest (Hungary)	18.5	120	120
556	539.6	Beromünster (Switzerland)	60		
565	531.0	Athlone (Irish Free State)	60		
		Palermo ⁹ (Italy)	3	3	3
		Italian Common Wave (Sicily) ⁹ (Italy)	0	3	3
574	522.6	Mühlacker (Germany)	60		
583	514.6	Madona (Latvia)	15		
		Tunis (Tunisia)	0		
592	506.8	Vienna (Austria)	120		
601	499.2	Athens (Greece)	0		
		Radio-Maroc (Morocco)	6.5		
		Sundsvall (Sweden)	10		
610	491.8	Florence (Italy)	20		
		Murmansk (U.S.S.R.)	10		
620	483.9	Brussels I (Belgium)	15		
		Cairo (Egypt)	0	20	20
629	476.9	Lisbon (Portugal)	0		
		Skoplje (Yugoslavia)	0		
		Trondheim (Norway)	1.2		
638	470.2	Prague I (Czechoslovakia)	120		
648	463.0	Lyons P.T.T. (France)	15		
		Petrozavodsk (U.S.S.R.)	10		
658	455.9	Langenberg (Germany)	60		
668	449.1	Jerusalem (Palestine)	0	20	20
		North Regional (Gt. Britain)	50		
677	443.1	Sottens (Switzerland)	25		

686	437.3	Belgrade (Yugoslavia)	2.5		
695	431.7	Paris P.T.T. (France)	7		
704	426.1	Stockholm (Sweden)	55		
713	420.8	Rome (Italy)	50		
722	415.5	Kiev (U.S.S.R.)	100		
731	410.4	Seville (Spain)	3		
		Tallinn (Estonia)	20		
740	405.4	Munich (Germany)	60		
749	400.5	Marseilles P.T.T. (France)	5		
		Viipuri (Finland)	13		
758	395.8	Katowice (Poland)	12		
767	391.1	Midland Regional	25		
		(Gt. Britain)			
776	386.6	Stalino (U.S.S.R.)	10		
		Toulouse P.T.T. (France)	2		
785	382.2	Leipzig (Germany)	120		
795	377.4	Coruña (Santiago) (Spain)	0.5		
		Lwów (Poland)	16		
804	373.1	Salonica (Greece)	0	20	20
		Scottish Regional	50		
		(Gt. Britain)			
814	368.6	Milan (Italy)	50		
823	364.5	Romania (Romania)	0		
832	360.6	Moscow IV (U.S.S.R.)	100		
841	356.7	Berlin (Germany)	1.5		
850	352.9	Bergen (Norway)	1		
		Norwegian Common Wave	0.7		
		(Norway)			
		Sofia ⁶ (Bulgaria)	0		
		Valencia (Spain)	1.5	20	20
859	349.2	Simferopol (U.S.S.R.)	10		
		Strasbourg (France)	12		
868	345.6	Marrakesh (Morocco)	0	20	20
		Poznan (Poland)	1.7		
877	342.1	London Regional	50		
		(Gt. Britain)			
886	338.6	Graz (Austria)	7		
895	335.2	France (Sth. Pyrenees)	-	10	10
		(France)			
		Helsinki (Finland)	10		
904	331.9	Hamburg (Germany)	1.5		
		Spanish Morocco ²	0		
		(Spanish Morocco)			
913	328.6	Limoges P.T.T. (France)	0.5		
		Dniepropetrovsk (U.S.S.R.)	10		
922	325.4	Brno (Czechoslovakia)	32		
932	321.9	Brussels II (Belgium)	15		
941	318.8	Algiers (Algeria)	12		
		Göteborg (Sweden)	10		
950	315.8	Breslau (Germany)	60		
959	312.8	France (Paris Region)	-		
		(France)			
		Gomel (U.S.S.R.)	1.2		
968	309.9	Grenoble (France)	20	20	20
		Odessa (U.S.S.R.)	10		
		Oukhta (or Tiraspol)	2		
		(U.S.S.R.)			
977	307.1	Haifa (Palestine)	0	5	5
		West Regional	50		
		(Gt. Britain)			
986	304.3	Genoa (Italy)	10		
		Torun or Cracow	2 or 1.7		
		(Poland)			
995	301.5	Hilversum (Holland)	20		
1004	298.8	Bratislava (Czechoslovakia)	13.5		
1013	296.2	North National	50		
		(Gt. Britain)			

		Tchernigov (U.S.S.R.)	10		
1022	293.5	Madrid II (Spain)	3		
1031	291.0	Heilsberg (Germany)	60		
		Portugal (South) (Portugal)	0		
1040	288.5	Leningrad II (U.S.S.R.)	10		
		Rennes P.T.T. (France)	2.5		
		Syria (Syria)	0	20	20
1050	285.7	Bournemouth (Gt. Britain)	1		
		Krasnodar (U.S.S.R.)	10		
		Scottish National (Gt. Britain)	50		
1059	283.3	Bari (Italy)	20		
1068	280.9	Tiraspol (or Odessa) (U.S.S.R.)	10		
1077	278.6	Bordeaux P.T.T. (France)	12		
1086	276.2	Falun (Sweden)	2		
		Zagreb (Yugoslavia)	0.7		
1095	274.0	Barcelona (Spain)	7		
		Vinnitsa (U.S.S.R.)	10		
1104	271.7	Naples (Italy)	1.5		
		Kuldiga (Latvia)	0		
1113	269.5	Kosice (Uszhorod) (Czechoslovakia)	2.6		
		Oran ¹⁰ (Algeria)	0		
1122	267.4	Belfast (Gt. Britain)	1		
		Alexandria (Egypt)	0	5	5
1131	265.3	Hörby ⁷ (Sweden)	10		
1140	263.2	Turin (Italy)	7		
1149	261.1	London National (Gt. Britain)	50		
		Turkey (Turkey)	5	10	10
		West National (Gt. Britain)	50		
1158	259.1	Moravská Ostrava (Czechoslovakia)	11.2		
1167	257.1	Monte Ceneri (Switzerland)	15		
1176	255.1	Copenhagen (Denmark)	0.8		
		Malta (Malta)	0	5	5
1185	253.2	Kharkov II (U.S.S.R.)	10		
		Nice-Corsica P.T.T. (France)	0		
1195	251.0	Frankfurt (Germany)	17		
		German Common Wave (Germany)	2		
1204	249.2	Prague II (Czechoslovakia)	5		
		Czechoslovak Common Wave (Czechoslovakia)	0		
1213	247.3	Lille P.T.T. (France)	5		
1222	245.5	Trieste (Italy)	10		
1231	243.7	Gleiwitz (Germany)	5		
		German Common Wave (Germany)	0.25		
1240	241.9	Yugoslavia (Yugoslavia)	0		
1249	240.2	Luxembourg (Luxembourg)	150		
1258	238.5	Riga (Latvia)	15	10	10
		Rome II ⁸ (Italy)	0.5	1	1
		San Sebastian (Spain)	3		
1267	236.8	German Common Wave (Germany)	2		
1276	235.1	Norwegian Common Wave (Norway)	0.7		
		Varna (Bulgaria)	0		
1285	233.5	Belgium (Belgium)	0		
		Southern Greece (Greece)	0		
1294	231.8	Linz (Austria)	0.5		
		Salzburg (Austria)	0.5		

1303	230.2	Danzig (Danzig Free City)	0.5	10	10
		Sombor (Yugoslavia)	0	10	10
1312	228.7	Swedish Common Wave (Sweden)	1.25		
1321	227.1	Budapest II (Hungary)	0.8		
1330	225.6	North German Common Wave (Germany)	0.5		
1339	224.0	Montpellier P.T.T. (France)	5	5	5
		Pinsk (Poland)	0	5	5
		East Polish Common Wave (Poland)	0		
1348	222.6	International Common Wave			
		Aberdeen (Gt. Britain)	1		
		Benghazi (Cyrenaica)	0		
		Cairo II (Egypt)	0		
		Dublin (Irish Free State)	1		
		Estonia (Estonia)	0		
		France (South-East) (France)	0		
		Königsberg (Germany)	0.5		
		Lithuania (Lithuania)	0		
		Lodz (Poland)	1.7		
		Milan II (Italy)	4		
		Monaco	0		
		(Principality of Monaco)			
		Norway (Norway)	0		
		Vorarlberg (Austria)	0		
		Yugoslavia (Yugoslavia)	0		
1357	221.1	Italian Common Wave (Italy)	0		
		Norwegian Common Wave (Norway)	0.5		
1366	219.6	Cracow or Torun (Poland)	1.7 or 2		
1375	218.2	Swiss Common Wave (Switzerland)	0.5		
1384	216.8	Albania (Albania)	0		
		Warsaw II (Poland)	2		
1393	215.4	France (Central) (France)	0		
		French Common Wave (France)	0		
1402	214.0	Bulgaria (Bulgaria)	0	5	5
		Swedish Common Wave (Sweden)	0.4		
1411	212.6	Bucharest (Romania)	12	12	12
		Portuguese Common Wave (Portugal)	2		
		Romanian Common Wave (Romania)	0		
1420	211.3	Finland Common Wave (Finland)	1.5		
		Yugoslav Common Wave (Yugoslavia)	0		
1429	209.9	International Common Wave (Type 1)			
		Alexandria II (Egypt)	0		
		Cork (Irish Free State)	1		
		France (Ile de France) (France)	0		
		Klagenfurt (Austria)	0.5		
		Newcastle (Gt. Britain)	1		
		Norway (Norway)	0		
		Holland (Holland)	0		
		Tripoli (Tripolitania)	0		
		Yugoslavia (Yugoslavia)	0		
1438	208.6	Hungarian Common Wave (Hungary)	0		
		Magyarovar (Hungary)	1.25		

		Miskolc (Hungary)	1.25		
		Nyiregyhaza (Hungary)	6.25	6.2	6.2
		Pecs (Hungary)	1.25		
1447	207.3	Spanish Common Wave (Spain)	1		
		Lithuania (Lithuania)	0		
1456	206.0	French Common Wave (France)	0		
1465	204.8	German Common Wave (Germany)	0		
1474	203.5	British Common Wave (Gt. Britain)	0		
		Plymouth (Gt. Britain)	0.3	5	5
1483	202.3	Soviet Common Wave (U.S.S.R.)	0		
1492	201.1	International Common Wave (Type 2)			
1500	200	International Common Wave (Type 2)			

Notes :

¹ Applicable one hour after sunset at the transmitter.

² Must use an aerial directed towards the interior of the country.

³ In case of interference to mobile services must use an aerial directed away from the sea.

⁴ Must use an aerial directed towards the interior of the country and limit the radiation towards the sea to a value which is not likely to interfere with maritimetraffic.

⁵ To be synchronised with Luy and Salzburg on 1,294 kc/s (231.8 m.) if this station compromises the maritime service.

⁶ Must use an aerial directed towards the east.

⁷ Must use an aerial directed towards the north if the power exceeds 60 kW, the maximum authorised being up to 100 kW.

⁸ In case of interference must use an aerial directed towards the east.

⁹ The power of Palermo and that of the stations of the Italian common wave (Sicily) may be increased to 5 kW if the power of Athlone is increased to 100 kW. In this case the Italian stations will use directional aerials, limiting the radiation towards Ireland in order to avoid interference with the service of the Athlone station.

¹⁰ In case of interference with the service of Naples must use an aerial directed towards the interior of the country.

¹¹ In case of interference with the mobile services or with the services not open to public correspondence, must use a directional aerial and reduce its power during the night.

The above information of the Lucerne Plan is reproduced from the Appendix of the BBC Year-Book 1934.

Later footnote

Although the separation is largely 9 kc/s between frequency allocations there are exceptions. For the British stations we note:-

Band 1 (150 to 300 kc/s.). Some stations have only 7 or 8 kc/s separation in some instances. Daventry is only 8 kc/s from Minsk, the high powered Soviet station. The long wave station has less strength in its reflected sky wave than from a comparable powered medium wave station. Hence sky wave interference is less of a problem from distant stations than for the medium waves. Provided the geographic separation of the stations is large and the direct wave interference is small, then 7 or 8 kc/s. separation can be tolerated in this band.

Band 3 (500 to 1,500 kc/s.). The BBC have benefited from 10 kc/s. separation in two instances to reduce foreign interference. i) North Regional on 668 kc/s. and Langenberg (Germany) on 658 kc/s. and ii) Scottish Regional on 804 kc/s. and Milan (Italy) on 814 kc/s.

Two other points of interest:-

i) The two British stations Aberdeen and Bournemouth, each took up a different allocation to that noted in the Plan in 1933. Aberdeen was allowed use of 1285 kc/s. and Bournemouth took the British Common Wave 1474 kc/s, as used by Plymouth. At this time the power limit was 5 kW per station on this national common wave.

However in 1939, the BBC replaced both Bournemouth and Plymouth stations and Clevedon took the 1474 kc/s. frequency but was allowed 20 kW as a single station.

During the coming War, this frequency was used for the emergency low power Group H stations.

ii) 1149 kc/s. was originally shown allocated to both the London National and West National stations, with a presumed maximum power allowed of 60 kW each in this part of the band. Later the BBC used up to three Nationals synchronised on this frequency with a possible combined power of over 120 kW between them.

Two foreign stations might briefly be mentioned:-

i) Before the Lucerne Conference was convened in the summer of 1933, Luxembourg had ambitions to broadcast in the long waveband. They were dismayed to find the Conference had only permitted them a medium wave frequency of 1249 kc/s. They didn't accept this and established a powerful long wave transmitter on an unauthorised wavelength in Band 1. The programmes were commercial and were received in Britain; attracting opprobrium from the authorities and the BBC.

ii) Radio Normandie was a private non-P.T.T. French station and was disappointingly given the use of 1500 kc/s. the International Common Wave Type 2 having a power limit of only 0.2 kW. However representations secured a better allocation to the French Common Wave of 1456 kc/s.(206.0 m.) having the higher power limit of 5kW.

After 1933 some countries used allocations different to those noted in the Plan's List of Stations at the time of the Conference. Working experience of the Plan may have shown some levels of interference to be intolerable; elsewhere some allocations may have been little used by some countries and allowed to be used by others.