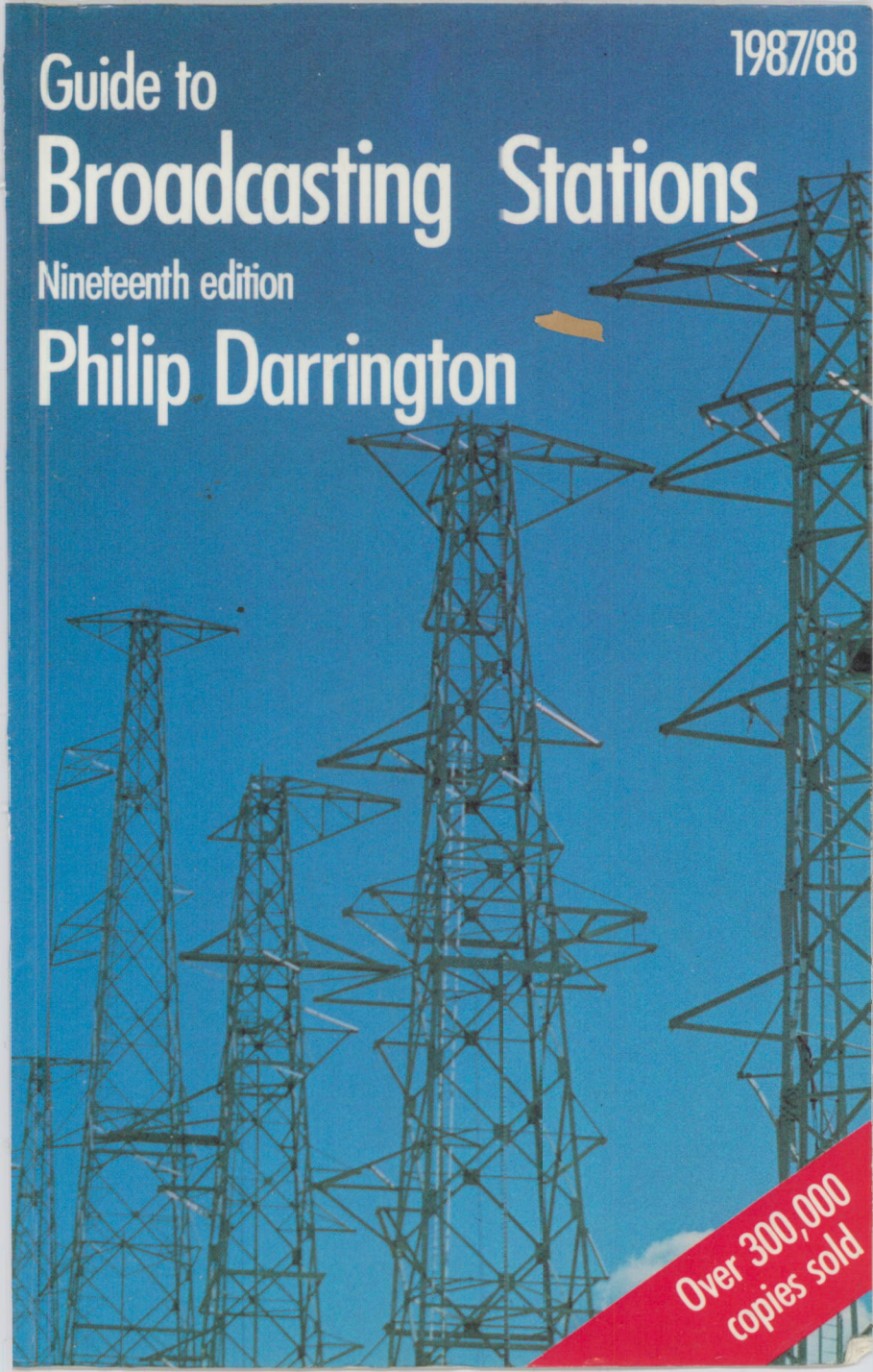
1987/88

Guide to Broadcasting Stations

Nineteenth edition

Philip Darrington



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Guide to Broadcasting Stations

Nineteenth Edition

Edited by
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1 Choosing a short wave receiver

Richard Lambley
Projects Editor, *Electronics & Wireless World*

Few people in Britain have any grasp of the enormous scale and scope of world broadcasting. In Western Europe, radio audiences are offered a wide variety of programmes from local and national services; and, for the most part, they enjoy reliable reception from nearby transmitters on VHF and medium or long waves. With such a choice of information and entertainment so easy to come by, there is little reason for the average listener to look further.

Certainly, some tune to offshore pop pirates or the evening transmissions of Radio Luxembourg's English service. But for the majority, foreign radio stations are unknown territory.

Yet international broadcasting is one of the world's big growth industries. In Europe it mostly passes us by because so few have access to a radio with adequate short wave coverage, or the inclination to explore it.

But in other parts of the world, broadcasting on the short waves is often the norm. In many emerging countries, television and FM radio are practicable only in the main cities – nationwide networks as we understand them would be too expensive. In the tropics, medium waves are unsuitable for radio because of static interference. And so, to cover the wide-open spaces, broadcasters are forced to resort to the short wave bands for their basic output.

From their audiences' point of view, a short wave service may be difficult to find and tune in; and as reception conditions vary it may fall short of total reliability. But listeners equipped to receive the national service on short wave can also pick and choose from the mass of foreign stations competing for attention.

Nearly every country of any size runs a short wave service; indeed, with many newly-emerging countries, the appearance of a pair of 250 kW HF transmitters carrying broadcasts for foreign consumption is often the first sign of their presence on the stage of world affairs.

Operating an external service is by far the cheapest way for a country to make its voice heard. Radio programmes cost little to make and disseminate; and, though it may surprise us, accustomed as we are to the domination of television, they can be highly influential.

Several of the world's principal broadcasters transmit many hundreds of hours of programmes per week and can be heard in scores of languages. Others may manage only a quarter of an hour a day, or even a week, in your language.

The staple of these services is almost always news, or rather that part of the news which the station wishes you to know about. For although much short wave broadcasting consists of harmless image-building by

the countries concerned (with varying degrees of subtlety), a great deal can be classed as crude political propaganda. Even so, it is not without interest.

Those with a taste for current affairs can follow events in the world's trouble-spots at first hand with the help of a short wave radio: in between trading insults, the radio stations involved often provide the first signs of newsworthy developments. A helpful pointer to stations in the news is given by the BBC's weekly *Six Continents* programme (Radio 3), a digest of world broadcasts as received by the BBC's own monitoring station at Caversham.

Fortunately for the British listener, English is the principal language of international radio. It is an irony that the radio audience in Britain has little knowledge of other countries' broadcasts. But as a result, few sets in British shops are equipped for any but the most casual listening on the short waves. If coverage is provided at all, it may extend no further than the 49-metre band. Where there is more, the bands are often cramped together on the dial so that tuning through them is impossibly fiddly.

If you have a low-cost set with maybe a few short wave bands on it, you will certainly pick up some interesting foreign stations under good reception conditions. But you should not expect to find many of the rarities listed in this book. For serious listening you need a set with good selectivity for separating out stations tightly packed together, and a tuning system which allows you to know with some degree of precision what frequency it is set to.

A reasonable choice of more advanced sets is available in specialist audio and electronics shops. The keen listener can pick from the multi-feature portable sets made for globe-trotting business people or the specialized general-coverage receivers sold by amateur radio dealers.

Of the sets listed in Table 3, all but one are imported: the exception is a low-frills, high-performance receiver newly launched for 1987 by a British company, Lowe Electronics, better known to radio amateurs as

Figure 1 Japan Radio Co.'s NRD-525 receiver covers 90 kHz–34 MHz in a single band. Optional plug-in converters extend its range into the VHF/UHF region

the UK agents for Trio (Kenwood) equipment. Other British sets do exist, bearing distinguished names such as Eddystone, Vigilant and Racal; but these are no-compromise instruments built to suit professional monitoring requirements and their prices might discourage all but the most dedicated amateur.

In the past decade, the more advanced short wave radios have altered almost out of recognition. Digital readouts, calculator-style keypads and often a mass of push-buttons are among the more obvious innovations, but there have been many more subtle developments inside. And so it is worth taking some time to examine some of the features you may come across on a modern set. You will not often find all these controls on every model; but fortunately, neither are you likely to want them all.

Tuning range

One of the first points you should check when considering a set is whether it covers the frequency bands you want. To an engineer the high frequency (or short wave) range includes all frequencies between 3 MHz and 30 MHz (100 m to 10 m). But numerous classes of radio user other than broadcasters have been shoe-horned into this range, including maritime radio operators, aircraft, diplomatic and military operators, news agencies and radio amateurs.

In theory, broadcasting is restricted by international treaty to the bands set out in Table 1; however, certain stations are to be found elsewhere. The BBC is an example: besides other frequencies, it uses 9.41, 12.095 and 15.07 MHz, which are close to but not inside the 31, 25 and 19 m bands. BBC programmes have been heard on those frequencies for decades and were there even before the regulations came into being.

To make room for the continuing expansion of international broadcasting, new bands marked in Table 1 by an asterisk were added in 1979 by a World Administrative Radio Conference organized by the International Telecommunications Union. In Britain, these bands have been occupied mostly by government stations and transmitters for public telecommunications, a service which is increasingly moving over to satellites for long-haul links. To give the remaining users time to move out, the intention was to bring the new bands into use later after further international discussion. But many stations have occupied the new frequencies already.

The same conference proposed additional allocations for the amateur service (Table 2).

Each short wave band has its own special propagation characteristics; for each one, there will be some time of the day, some season of the year, or some point in the sun's 11-year cycle at which it is the best band for the job of carrying programmes from transmitter to listener.

Take care not to confuse the bands listed in the tables with the tuning ranges selectable on your radio set. The two may correspond, but more likely they will not.

From the listener's point of view, some bands are more useful to have than others. Mainstream international broadcasting is to be found in the

Table 1 *High frequency broadcasting bands*

Metres	*MHz*	
120	2.3–2.495	Tropical band
90	3.2–3.4	Tropical band
75	3.95–4.0	
60	4.75–5.06	Tropical band
49	5.95–6.2	
41	7.1–7.3	
31	9.5–9.775	
	9.775–9.9	*
	11.65–11.7	*
25	11.7–11.975	
	11.975–12.05	*
22	13.6–13.8	*
19	15.1–15.45	
	15.45–15.6	*
	17.55–17.7	*
16	17.7–17.9	
13	21.45–21.75	
	21.750–21.850	*
11	25.670–26.1	

* Additional bands agreed in 1979

bands between 19 m and 49 m, and so you should ensure that your set covers these bands if nothing more. Radio propagation conditions on the highest frequencies, the 11 m and 13 m bands, are unfavourable except around the peak of the solar cycle; however, at such times they can give good daytime reception over very long distances. At the other

Table 2 *HF amateur bands in the UK. Most speech transmissions in these bands are in single-sideband mode*

MHz	*Metres*
80 m	3.5–3.8
40 m	7.0–7.1
*	10.1–10.15
20 m	14.0–14.35
*	18.068–18.168
15 m	21.0–21.45
*	24.89–24.99
10 m	28–29.7

* Additional bands agreed in 1979

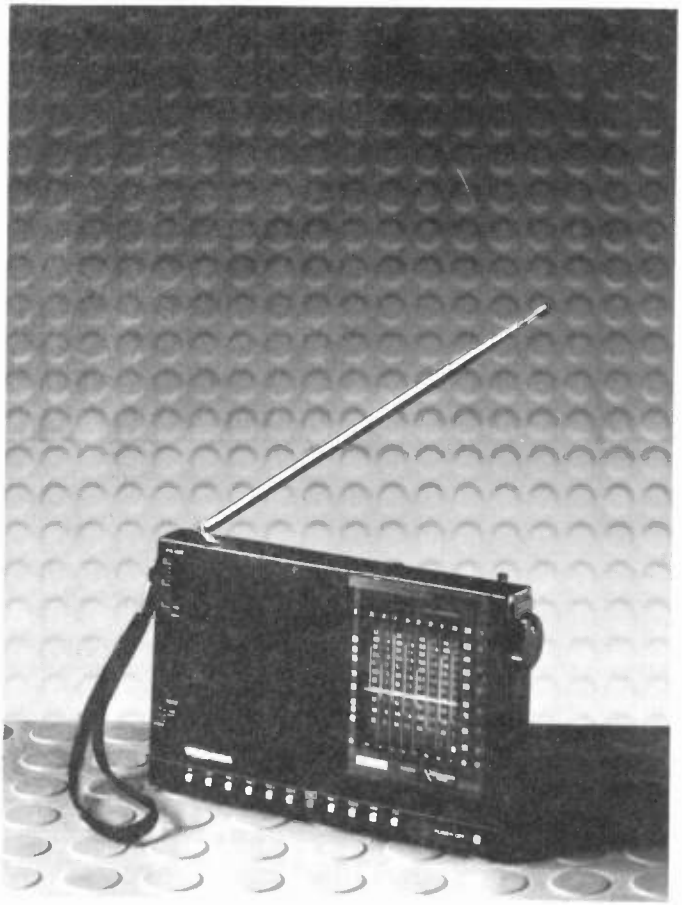

Figure 2 This compact portable from Toshiba tunes the broadcast bands in eleven non-contiguous ranges

end of the scale, the 75 m band is used by broadcasters less than it ought to be because many radios cannot receive it (a chicken-and-egg situation, some would say); and the tropical bands are not available to broadcasters in temperate zones such as Europe.

Many modern sets allow completely uninterrupted tuning of the high-frequency range; others handle it in sections, with a band selection switch for jumping from one to another. Still others may provide just the broadcast bands, with little or no coverage of the intervening ranges. Make sure that any set you are planning to buy covers out-of-band frequencies you may want to use (such as the BBC frequencies mentioned above) and, where appropriate, the extended WARC-79 bands.

Despite the 1979 additions, the future of short wave broadcasting still remains somewhat uncertain. Much depends on the outcome of a further WARC held in Geneva early in 1987. Preliminary indications are that if every country were to receive the allocations it wants, the present bands would be oversubscribed by about ten times. This unfortunately suggests that the future will bring overcrowding far worse than we know at present and that listeners will have to put up with severe interference. An increase in out-of-band broadcasting seems almost inevitable. And if more than a few countries decide to step out of line and ignore the rules, a breakdown of the present system of frequency planning could become a real possibility.

It is unrealistic to suppose that any further HF spectrum could now be turned over to broadcasting; but even if it could, the demand for frequencies would still be far too great to allow every transmitter a clear channel of its own.

Knob or buttons?

Although plenty of sets still retain the familiar dial-and-pointer tuning mechanism, developments in microelectronics have made the digital frequency synthesizer a practical possibility even in portable receivers. Such sets are easily recognizable by their calculator-style digital read-outs and push-button keypads for station selection.

You tune a synthesized set essentially by programming it with the frequency you want. The radio then locks on to that channel by reference to an accurate frequency source of its own, a quartz crystal oscillator inside.

Digital tuning is highly stable and repeatable; and although the principle of it may sound complicated, in practice it is ideal even for the inexperienced listener. Finding the station you want can be as easy as dialling a telephone number – provided you know the number to dial. There is no guesswork, no trial and error. And if reception is poor, you can search for an alternative frequency secure in the knowledge that you can get back to your starting point without difficulty.

In addition, push-button sets are especially convenient for the visually handicapped user. The Trio R-5000 and the Icom go still further in this direction and can be fitted with a voice synthesizer option which announces the frequencies as you tune them!

For technical reasons, a digital set tends to perform slightly less well than a comparable set fitted with mechanical tuning. But most users find the convenience far outweighs any such sacrifice.

Digital sets usually give a choice of tuning methods. Often there is a keypad for direct frequency selection: you press the buttons and there you are. Favourite stations can be stored in memory for later recall; and in some sets the memory can store other data associated with each channel, such as filter or detector settings.

One model by Sony has no less than thirty-two memory buttons – an array which may seem excessively large until you take into account how many times a broadcaster may need to switch frequency to get through the day in some parts of the world. In general, propagation conditions at night mean lower frequencies, while daylight demands higher ones. At dawn and dusk, conditions in the ionosphere change rapidly; and so

during breakfast time, always a peak listening period, the frequency for optimum reception may shift up through as many as six bands in only half an hour. The listener with all six programmed into his or her set can follow the ionosphere at the touch of a button.

Most synthesized receivers also offer scanning modes, which can save you the bother of re-keying a long number if you only want to adjust the tuning a little. Scanning enables you to roam up and down a band as though you were twiddling the tuning knob of a conventional set. Indeed, some models do actually have a tuning knob: this simulates electronically the action of a mechanical tuner, and for the user is far more pleasant than fumbling with a pair of 'up' and 'down' buttons. In fact, it can even be better than a real mechanical tuning knob: with cheap sets, backlash in the string and pulley system is liable to make the tuning drift off your chosen frequency as you let go of the knob.

In some models, scanning can be executed automatically. Several offer a choice of scanning modes, but usually they allow you at least to search a predefined band of frequencies for an occupied channel, or to flip through the stations you have programmed into the memories.

But automation can be developed further still. Automatic or remote-controlled operation is a common requirement in professional monitoring, where receivers are often grouped in a technical area and operated from a control position elsewhere. Today, remote-control facilities are becoming available also to the private user.

The Icom, JRC and Yaesu sets, and the Trio R-5000, may be linked if you wish to a personal computer, which then takes command of all major receiver functions. With a set-up like this, you could switch effortlessly from one station to another simply by picking them from a menu displayed on the computer screen. The computer would take care of all the adjustments and switch settings. Or you could automate your regular listening by storing station schedules on floppy disc and instructing the computer to retune at appropriate times. If you wanted to study ionospheric propagation, or the occupancy of particular bands, the system could scan those frequencies tirelessly for hours on end, and print its results in graphical form or as a listening log – just as professional HF scheduling engineers do.

Listeners familiar with the traditional tuning knob may be disconcerted to discover that with a synthesized set you cannot adjust the tuning smoothly and continuously. Always, the set jumps from one frequency to another in discrete steps defined by circuitry associated with the quartz crystal that governs it. To take an example from among the portable sets, the Sony ICF7600D tunes the long wave band in 3 kHz steps, medium wave in 9 kHz, short wave in 5 kHz and VHF/FM in 100 kHz. These steps have been chosen to suit the channel-spacings on each band, enabling the listener to hop adroitly from one station to another as the tuning is altered.

This is fine with sets intended primarily for broadcast listening. But in communications receivers designed for more demanding applications a smaller tuning interval is desirable; and on some it can be as little as 10 Hz, which for all practical purposes is no interval at all.

The main drawback of synthesized sets is a tendency to be overloaded by very strong signals. Weak signals are rarely a problem with

Figure 3 Vega's Selena B-215 gives extensive broadcast-band coverage at a very low price

short wave radio, since the limit to what you can receive is more often determined by interference than by the sensitivity of your set. Overloading by a strong signal will not physically damage your set (except maybe in extreme cases such as where lightning is involved); but it may cause the electronics to misbehave, producing effects such as stations appearing on the wrong frequency, stations mixed up together, and distorted sound. In particular, you may find difficulty in receiving a station when a stronger signal is on a frequency close by.

With low-cost portables you may find you can provoke the effects of overloading by connecting an external aerial (which otherwise would be a very desirable thing to have). If the designer expected you to rely wholly on the built-in telescopic aerial, he may not have spent his resources on making the receiver proof against high signal levels.

Susceptibility to overloading is not peculiar to synthesized sets; it is just that it is harder (and therefore more expensive) to build resistance to it into an electronically-tuned set than into an ordinary one. The more elaborate sets (of all kinds) usually have a switchable or variable attenuator (or RF gain control) to help you cope with such situations. Some have special circuitry to help minimize the problem.

One further difficulty with synthesizers is that the complexity of their electronics often results in heavy power consumption. Some such portables have a battery life no longer than nine or ten hours, but this may not discourage you if you intend to operate the set mostly on its mains unit.

Now that nickel-cadmium rechargeable cells are sold in most of the standard battery sizes, you may find them a money-saving alternative if you intend to use your set heavily. But bear in mind that these cells have

a slightly lower voltage than ordinary throwaway batteries, and that some radios (synthesized ones especially) may not work properly with a sub-standard power supply. Check the instructions to see whether there is a warning.

In the case of the bigger communications receivers, operation from a car battery is usually possible.

Largely for reasons connected with marketing strategy, digital tuning is still found only in the more expensive sets. Just as electronic calculators, watches and computers have fallen in price, so could electronically-tuned radio sets: a synthesizer on a chip could easily be made for less than the price of a good dial drive mechanism. Perhaps one day it will be. The wider availability of cheap digital sets could do much to encourage short-wave listening.

Note that not all sets with a digital display have synthesized tuning: in a few, the display simply monitors the setting of a mechanical tuner.

Modes

Numerous methods exist for impressing a sound signal on to radio waves, but in short-wave broadcasting amplitude modulation is used almost universally, just as it is in the long and medium wave bands. But some sets are equipped for other modes of transmission, of which the commonest is single sideband (SSB).

For an explanation of SSB signals you should consult a book on amateur radio; but to hear one, tune to the 7 MHz or 14 MHz amateur bands. An SSB speech signal heard on an AM receiver is often likened to the sound of Donald Duck; but with a suitable radio in experienced hands all becomes clear.

SSB is preferred by radio amateurs and professional operators for its higher efficiency as a communications medium. At one time it was even being canvassed as a solution to the chronic shortage of space in the broadcast bands. However, the relative complexity of SSB, and the huge number of ordinary AM sets now in the hands of listeners, have probably ruled out its adoption for the foreseeable future.

Some broadcasters have employed SSB on out-of-band frequencies to feed programmes to their overseas relay stations. These transmissions are not normally intended for the public; frequencies are rarely published and transmission schedules are liable to be changed without warning.

Both sidebands of the feeder transmitter may be used simultaneously to carry separate programmes, a practice known as independent sideband working (ISB). But with the advent of cheap satellite circuits which give more consistent sound quality, SSB feeders have become a less attractive option.

The SSB setting on your receiver can also be used for listening to morse-code signals; but for best results you need a set with special narrow filters which can discriminate sharply between the closely-spaced transmissions in the bands used for morse.

Certain sets have an advanced type of detector suitable for both AM and SSB. This circuit, which may be described in the brochure as a synchronous demodulator, gives noticeably lower distortion on AM reception. That alone might be enough to recommend it. But the

Figure 4 One of many features claimed for this Icom receiver is a virtually complete immunity to strong adjacent-channel signals. Operation can be controlled from the infra-red handset – or by a home computer

Stations in the short wave bands normally operate on frequencies which are multiples of 10 kHz (on medium and long waves in Europe a spacing synchronous demodulator if used properly can also help deal with background noise. By treating an AM transmission as a double SSB signal, it enables the user to choose which sideband to listen to. And often one sideband will be much less affected by interference or monkey-chatter than the other. If you listen to short wave broadcasts regularly for information and entertainment (rather than merely for logging them) you may well think this refinement worth paying for.

Professional-style communications receivers may also be fitted with a detector for narrow-band FM transmissions. These are similar to VHF/FM broadcasts in principle, but differ in detail. Citizen's band radio operators (the legal variety) use NBFM in Britain in their 27 MHz allocation and some radio amateurs have adopted it for local communications on 28–29.7 MHz. Otherwise the mode is not commonly used below 30 MHz; but a set with an NBFM detector can also be used for receiving radio-teleprinter transmissions, of which very many can be overheard as warbling sounds in the spaces between the HF broadcast bands.

These transmissions come from news agencies, weather bureaux, commercial operators and diplomatic sources. Many are encrypted to a greater or lesser degree, but if you can connect your set to a suitably-equipped home computer which can act as a receiving terminal, you may find a good deal of interest value in them. Note, however, that in Britain you are not normally permitted to monitor transmissions other than those from broadcasting stations, licensed amateurs and stations in the standard frequency and time service.

Selectivity

Stations in the short wave bands largely operate on frequencies which are multiples of 10 kHz (on medium and long waves in Europe a spacing

Figure 5 Behind the unassuming facade is Lowe's all-British HF-125, a high-performance synthesized set with microprocessor control. Coverage is 100 kHz to just short of 30 MHz; and among the features are 20 memories, four filter bandwidths and an exceptionally overload-resistant input stage. The keypad is optional; other extras are a matching stage for a whip antenna and a detector module giving narrow-band FM plus high-quality synchronous demodulation on AM

of 9 kHz has been introduced). Any AM station 10 kHz away from the wanted one will give rise to a 10 kHz whistle unless steps are taken to suppress it, and so manufacturers generally provide some audio filtering. Sometimes they add a speech/music switch, which, in the speech position removes the bass and emphasises, the mid-treble content to give extra punch for broadcasts such as news.

But most of a set's selectivity is achieved not in its audio department but in the intermediate frequency (IF) amplifier.

Good IF filtering is essential for controlling problems such as image interference. This phenomenon has nothing to do with television, but refers to phantom appearances of stations on parts of the radio dial where they do not belong. Such interference often arises when a strong signal meets a cheap radio set.

Virtually all modern radios are of the so-called supersonic heterodyne, or *superhet* type. In a superhet receiver, incoming signals, of whatever frequency, are mixed with a locally-generated signal from an oscillator controlled by the tuning knob and so transposed or converted to a third frequency. Further processing of the radio signal is all carried out at this fixed intermediate frequency, because it is much easier to design highly selective filters for a single frequency than to make adjustable ones.

The filters need to be quite complex in any case, and in more expensive models it is desirable to have the selectivity switchable to suit differing listening conditions.

Table 3 *Short wave receivers*

Maker	Model	Price £	Style	Dig. syn.	h.f. mem	Coverage VHF	L	M	75	49	41	31	25	22	19	16	13	11	s.s.b. /c.w.	nbfm	r.f. atten.	No. conv.	i.f. b/w	Comments
Grundig	Yacht Boy 215	57	P			▪	▪	▪		▪	▪	«»	▪		▪	«»	▪							Small; l.c.d. clock
	Satellit 400	180	P	▪	24	▪	▪	▪	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪			2		Time zone clock
	Satellit 650	400	T	▪	60	▪	▪	▪	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪			2	▪	Many features
Icom	IC-R71E	825	T	▪	32		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪	▪	4	▪	Multi-feature set
JRC	NRD525	1098	T	▪	200		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪	▪	2	▪	Multi-feature set
Lowe	HF-125	~350	T/P	▪	30		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	opt.	▪	2	▪	Opt. sync. a.m. det.
Panasonic	RF B20L		P			▪	▪	▪		▪	▪	▪	▪		▪	▪					▪	2		
	RF 1680L	50	P			▪	▪	▪		▪														
	RF B50L	100	P			▪	▪	▪		▪	▪	▪	¤		¤	¤	¤					2	▪	Compact
	RF 3100LBE		T	▪		▪	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪		▪	2	▪	
	RF B600LBE		T	▪	9	▪	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪		▪			Scan modes
Philips	D2999		T	▪	16	▪													▪			2		Many features
	D2935	170	P	▪	9	▪	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪				Compact, many features
	D1835		P			▪	▪	▪																Compact
PJE Mktg	Sniezka R206	32	M			▪	▪	▪		«»	«»	▪	▪	«»	«»	«»	▪							Low cost
	Spacelab 007	35	P			«»			«»	¤	«»	«»	«»											Air band etc.
	Lena 2	25	P			«»	▪	▪		«»	«»	«»												Made in Poland
	Julia	76	P			«»	▪	▪		▪	▪	▪	▪		¤	▪	▪							Made in Poland
Sony	ICF2001D	325	P	▪	32	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪		▪	2	▪	Synchronous detector
	ICF7600D	150	P	▪		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪			2		Very compact; clock
	ICF7600A	90	P			«»		▪		▪	▪	¤	¤		¤	¤	¤					2		Tuning indicator
	ICF4900	70	P			▪		▪	«»	«»		▪	▪		¤	▪	▪					2		Very small
Toshiba	RP-F11	80	P			▪	▪	▪		▪	«»	▪	▪	«»	▪	▪	▪							Compact; tuning ind.
Trio	R-2000	519	T	▪	10		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪	▪		▪	Many features
	R-5000		T	▪	100		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪	▪		▪	Noise blanker etc.
Vega	Selena 215	35	P			▪	▪	▪			▪	▪	«»		▪	▪								Tuning meter
	206	20	P				«»	▪	«»	«»	«»	«»	«»		¤	¤	¤							Very cheap
	242	25	P				«»	▪	«»	«»	«»	▪	¤		¤	«»	¤							Very cheap
Yaesu	FRG8800	540	T	▪	12		«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	«»	▪	▪	▪		▪	Computer control opt.

In the frequency coverage columns,
▪ denotes that coverage includes broadcast band extensions agreed at WARC-79;
¤ denotes that the set covers the extensions incompletely or not at all;
«» denotes coverage of the complete WARC-79 bands and more.

In the style column M indicates a mains-only set, T a table-top set (mains/battery) and P a portable.

For better performance, good-quality sets commonly convert at least twice, with IF amplifiers operating at different frequencies. When manufacturers have gone to the expense of dual conversion in a design aimed at a broad market, they can usually be relied upon to proclaim it in their literature. However, with top-of-the-range synthesized sets it is safe to assume dual conversion even where it is not mentioned.

Another feature desirable for listening under difficult conditions is a noise-blanker. This circuit suppresses abrupt bursts of energy, such as those caused by lightning, which might discomfort the listener. Less startling but more frustrating is repetitive noise, like the so-called Russian Woodpecker, an over-the-horizon short wave radar. Some sets – the Trio R-5000 is an example – have a blanker which can help suppress this too.

Sets available in the UK

Table 3 summarizes the vital statistics of most short wave receivers now available in Britain at prices below about £1000. A few other sets with some HF coverage are on the market, among them some radio-cassette recorders.

Such brief details cannot give more than a hint of the capabilities of the more expensive sets, or convey the many options that can be fitted to some of them. Among these are converters for other bands, especially for the VHF communications bands, teleprinter interfaces and additional filters. For more information you should ask for the manufacturer's literature.

Addresses

Grundig International Ltd
Mill Road
Rugby
Warwickshire CV21 1PR

Lowe Electronics Ltd
Chesterfield Road
Matlock
Derbyshire DE4 5LE
(Trio, JRC, Lowe)

Panasonic UK Ltd
300–318 Bath Road
Slough SL1 6JB

PJE Marketing Ltd
Sporhams Farm House
Sporhams Lane
Danbury
Chelmsford CM3 4AJ

Sony UK Ltd
South Street
Staines
Middlesex TW18 4PF

South Midlands Communications Ltd
School Close
Chandlers Ford Industrial Estate
Eastleigh
Southampton SO5 3BY
(Yaesu, JRC)

TOE (London) Ltd
Zenith House
The Hyde
Edgware Road
London NW9 6EE
(Vega)

Thanet Electronics Ltd
Sea Street
Herne Bay
Kent CT6 8LD
(Icom)

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2 A guide to listening

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Many people needlessly confine listening to radio to just a few programmes from the national, regional or local transmitters serving their own locality. Yet radio waves recognize no manmade frontiers; broadcasting is, or could be, an international medium, limited primarily by different languages. It is possible to receive and enjoy programmes from all parts of the globe. The expatriate can keep in touch with his homeland; the music lover can listen to the pick of the world's concerts; foreign languages can be mastered; nations can speak peace – or spread disenchantment – across frontiers. But there is also a fascination in exploring the radio waves and identifying far off stations that others might regard as virtually impossible to receive.

In the early days of broadcasting almost every listener was an enthusiast seeking receivers that would bring in many stations 'at full loudspeaker strength'. The stations were fewer, the bands less crowded, the special properties of HF (short-waves) still largely unknown. Those days are long gone but interest in DX – the reception of far-off stations – has remained.

One reason perhaps is that short waves still offer a challenge – despite high-power transmitters and overseas relay stations one can never be quite sure what the day will bring: conditions in the form of good or poor signals, vary from day to day, season to season, affected by the mysterious 11-year-or-so 'sunspot cycle'. To listen to desired stations on short waves is not just a matter of switching on the receiver. You need to know something about the propagation of radio waves; something about antennas (aerials); something about what makes some receivers good, some poor; something about the frequency bands used by broadcasting stations; and, of course, the frequencies actually used by the stations of interest.

Broadcasting frequencies

Broadcasting is only one of many services that use the radio (electromagnetic) spectrum. Other radio communication and radio and radar navigation services all require access to the limited usable radio spectrum.

All forms of electromagnetic radiation travel at the same speed which is very nearly 300,000,000 metres per second (roughly 186,000 miles per second). Hence the time for one complete cycle of energy to pass a given place determines the wavelength (λ) in the specific relationship.

$$300{,}000{,}000 = \text{frequency (Hz)} \times \text{wavelength (metres)}$$

or

$$300 = \text{frequency (MHz)} \times \text{wavelength (metres)}$$

Thus frequency (kHz) = 300,000/λ
frequency (MHz) = 300/λ
or wavelength (metres) = 300,000/f (kHz)

For historic reasons, it is still common practice in a few countries to refer to broadcasting stations in terms of wavelength but it is more convenient to use frequencies, kHz (1000 Hz), MHz (1,000,000 Hz or 1000 kHz) or even GHz (1000 MHz). Nevertheless it is still customary to refer to the long waves, the medium waves, short waves and to talk of the 19-metre band etc.

Radio waves at significantly different frequencies tend to behave differently and to be suitable for different forms of broadcasting. The detailed study of the ways in which radio waves are propagated is a complex branch of the science of radio physics. Unlike light rays (another form of electromagnetic radiation) radio signals at the frequencies used for sound broadcasting are not cut off sharply by hills or by the optical horizon. How far beyond the optical horizon that they travel is determined at medium and high frequencies by the presence or absence of ionized reflecting layers in the upper atmosphere (ionosphere). Very high frequencies are affected by atmospheric conditions existing within a few miles of the earth's surface (troposphere).

The main broadcasting bands are shown in Table 4.

Long waves (LF) are used for broadcasting only in Europe. High power transmissions have a consistent range of several hundred kilometres both day and night.

Medium waves (MF) are used for broadcasting (AM) in all parts of the world. In daylight, signals are reliably propagated by means of ground waves over distances of some tens of kilometres depending largely upon the power and size of the transmitting antenna. The sky waves are absorbed in the D-layer of the ionosphere (about 75–95 km above the earth's surface). At dusk, however, the ionization of the D-layer is much reduced, and medium-frequency signals pass through, but are reflected by the ionized E-layer about 110 km high. These reflected signals can be received up to many hundred or even a few thousand kilometres distant. However in those areas where both the ground and sky waves are received simultaneously, there can be severe fading.

Short waves (HF) are at frequencies between 3 to 30 MHz, including the broadcasting bands at roughly 3.9, 4.85, 6.1, 7.2, 9.65, 11.85, 15.3, 17.8, 21.6 and 25.85 MHz, the propagation is almost entirely by means of sky waves, the ground wave from even high power transmitters becoming rapidly attenuated. However the effect of the ionosphere becomes increasingly complex, and more liable to variations, as the frequency increases. For long periods of the night, few if any signals will be heard above 15 MHz. This will be particularly the case during sunspot minimum years; periods during which even in midday it will be rare to receive distant transmissions in the 26 MHz band.

HF transmissions below about 10 MHz may be reflected over medium distances from the E layer, but the main propagation mode depends on the F layer(s) between about 200 and 400 km above earth. In daylight there are usually two separate layers, the higher (F2) layer results in

Table 4 *Radio broadcasting frequency allocations*

Band	*Frequency*	*Wavelength (approx.)*	*Area and notes*
Long waveband	148.5–283.5 kHz	2020–1080 m	Region 1
Medium waveband	526.5–1606.5 kHz	570–187 m	Region 2 to extend up to 1705 kHz
120 m band	2300–2495 kHz	130–120 m	Tropical band
90 m band	3200–3400 kHz	93.7–88.2 m	Tropical band
75 m band	3950–4000 kHz	76–75 m	Regions 1 and 3 only
60 m band	4750–5060 kHz	63.2–59.3 m	Tropical band
49 m band	5950–6200 kHz	50.4–48.4 m	All regions
41 m band	7100–7300 kHz	42.3–41.1 m	Regions 1 and 3 only
31 m band	9500–9900 kHz	31.6–30.3 m	All regions
25 m band	11,650–12,050 kHz	25.8–25.9 m	All regions
22 m band	13,600–13,800 kHz	22.2–21.7 m	All regions
19 m band	15,100–15,600 kHz	19.9–19.2 m	All regions
16 m band	17,550–17,900 kHz	17.1–16.8 m	All regions
14 m band	21,450–21,850 kHz	14–13.7 m	All regions
11 m band	25,650–26,100 kHz	11.7–11.5 m	All regions
VHF/FM band	88–108 MHz	3.4–2.8 m	All regions

Notes: The frequencies listed above are those agreed under the 1982 Radio Regulations Table and include frequencies subject to delays in transfer from other radio services.

For historic reasons some broadcast services use frequencies just outside the limits shown. There are also some non-tropical areas operating broadcast transmitters in the tropical bands.

Region 1 comprises Europe, Africa, USSR and Turkey.
Region 2 comprises the Western Hemisphere: North and South America, Greenland and Pacific territories for which the FCC is the regulatory body.
Region 3 Oceania, Australasia and Asia, except some territories included in Regions 1 and 2.

signals being reflected over distances of around 2500 km in a single hop. The lower (F1) layer reflects daytime transmissions up to about 10 MHz at distances up to about 1500 km. Unfortunately sky wave transmissions tend to suffer considerable selective fading due to the interaction of signals reflected from different layers of the ionosphere, etc. and can result in severe distortion of an amplitude modulated transmission.

HF conditions

A listener soon learns that HF propagation is subject to many changing factors that influence the state of the ionospheric layers and dramatically vary their ability to reflect or alternatively to absorb (attenuate) the signals.

The state of the ionospheric routinely varies with the time of day, the seasonal changes in the pattern of night and day, and the position within the 11-year sunspot cycle. The sunspot cycle, moreover, is far from having a regular or predictable pattern and there is still no reliable way of predicting the start or finish of a cycle. Sunspot maxima occurred around 1947, 1958, 1969 and 1979 and sunspot minima around 1953, 1964, 1974 and 1986, but the sunspot count for the different

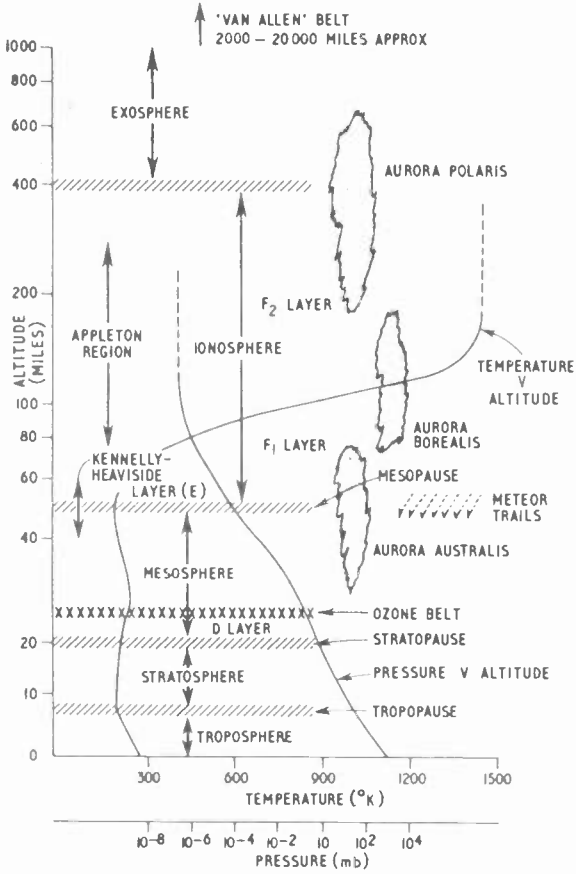


Figure 6 Earth's atmosphere and structure

maxima vary considerably and the duration of the minima also changes in each cycle.

During sunspot maxima the higher HF bands provide strong signals over longer periods of the day.

A rather different form of ionospheric disturbance – the fadeout or sudden ionospheric disturbance (SID) – is even more spectacular but seldom lasts very long, and only during daylight. In its most extreme form, relatively rare, it results in the virtual disappearance or greatly reduced strength of all sky wave signals over much of the HF spectrum, although some signals may continue to come through on the *higher* frequencies. It occurs quite suddenly but seldom lasts more than one or two hours.

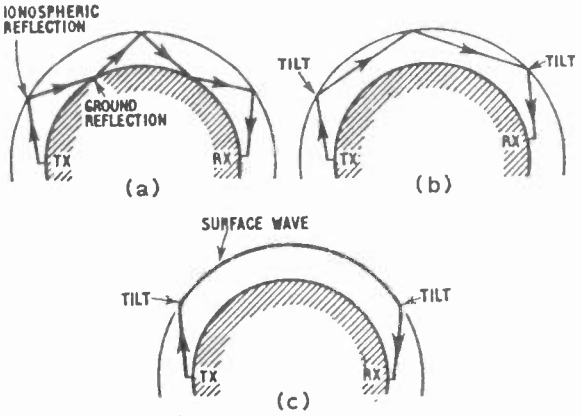


Figure 7 (a) Conventional 'HF' multihop path with two ground reflection points. (b) Chordal hop path sometimes with wave trapped between ionospheric layers. (c) Another possible form of chordal hop

During sunspot maxima the higher HF bands provide strong signals from distant stations over quite long periods of the day and frequencies up to 15 MHz may remain 'open' throughout the night. In general transmissions over an all-daylight path (i.e. north/south paths) are heard on higher frequencies more reliably than signals arriving on east/west paths. Optimum frequencies also depend on the latitude of the listener; the listener in or near the tropics will usually hear more stations on higher frequencies than a listener in, say, Scandinavia.

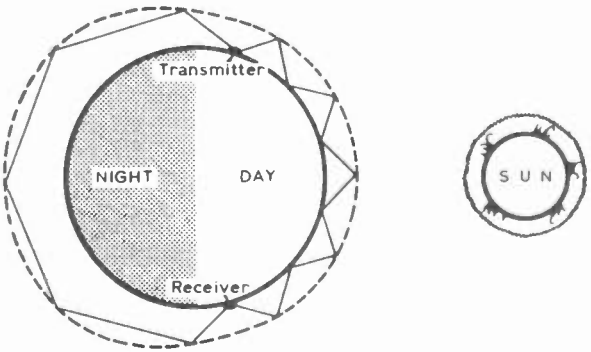


Figure 8 The change of effective height of the ionospheric reflecting layer around dusk and dawn produces the tilts that make possible chordal hop propagation for long-path transmissions, with low darkness attenuation and elimination of multiple ground-reflection losses that occur on the daylight short-path transmissions

The normal pattern of HF conditions can be upset by ionospheric storms that may last several days. During such storms signals deteriorate on the higher frequency bands but may continue to be reasonable on bands below about 8 MHz. The effects will be most noticeable at night.

HF signals reflected from the F2 layer can travel to distant parts of the globe by a series of hops each of about 4000 km (2500 miles), as they are reflected also from the surface of the earth. For many years it was assumed that, for example, signals reaching Australia or New Zealand

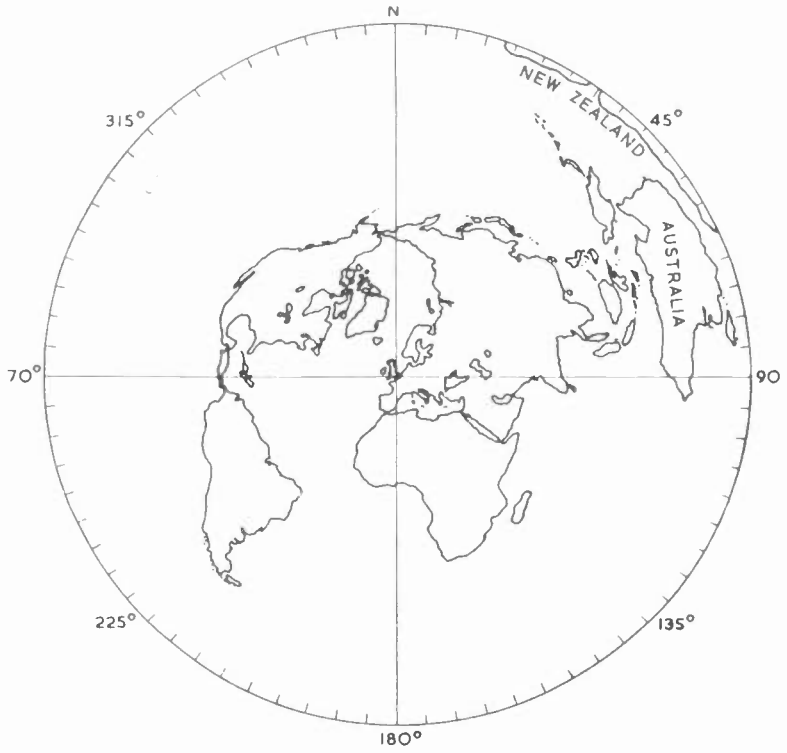


Figure 9 A great circle map, based on the UK. This is how the world appears to an amateur transmitter. Radio signals travel along great circle routes (which are the shortest routes on the globe and which on the map would be represented by straight lines radiating outwards from the centre). Such a map is essential when planning an antenna installation as it shows the directions along which signals will travel to particular countries. However, it should be noted that, in the mornings, signals to and from Australia, New Zealand and the Far East often travel the 'long way round' across South America. These directions will be exactly 180° more than those indicated on the map.

from Europe were propagated in this multi-hop form. However it is now appreciated that a better and more reliable form of long-distance propagation occurs over paths where dawn and dusk coincide when signals are propagated over very long-distances along darkness paths without intermediate ground reflection, a mode of propagation known as chordal hop arising from ionospheric tilts that occur during the dawn and dusk periods when the F1 and F2 layers combine or separate. This mode tends to result in the signals travelling over the long path from Europe to Australasia across South America rather than the shorter path across Asia.

It should be appreciated that radio signals normally travel along the great circle path which represents the shortest route that can be measured on a globe. This often implies a very different route direction than might be imagined from a conventional map, based for example on a map based on Mercator's projection. A great circle map applies only to a specific geographic region.

A map for UK listeners is shown in Figure 9 but to a listener in, say, India or Australia, the radio paths would look very different. A map is available from BBC External Services that enables a listener in any part of the world to estimate his radio bearing from London.

The great circle bearing becomes important where a listener decides to use a directional antenna to improve reception of a particular station. However apart from the ferrite-rod or frame antennas used on medium waves and on the low HF bands it must be appreciated that few simple or low-cost receiving antennas can be expected to show a marked directional gain. Although the half-wave dipole antenna is often regarded as broadly direction broadside to the element, this is true only of dipoles erected at least about a half-wave above ground and clear of local objects.

Interference

The very large number of broadcast transmissions in the medium and short wave bands, combined with the increasing use of extremely high power transmitters of 250, 500, 750 or even 1000 kilowatts output, has meant that interference limits rather than signal strength now defines the coverage area of many services. Since, on the medium wave band, interference levels rise substantially during the hours of darkness, the reliable coverage area at night of an MF transmitter may fall to about a quarter of its daytime area.

The spacing between MF channels is 9 kHz in Europe and 10 kHz in North America. Even with restricted audio frequencies, some radiation occurs in the adjacent channel and some degree of adjacent channel interference is inevitable at night, although either co-channel or adjacent-channel interference can often be reduced to acceptable levels by means of a directional frame or ferrite-rod antenna.

On HF the international channel spacing is only 5 kHz and adjacent-channel interference can be a serious problem.

A major problem is also the worldwide effects of deliberate interference, in the form of jamming transmissions stemming mainly from some Eastern European countries. Although intended to prevent listening in those countries to the external broadcasts directed at them,

the jamming affects listeners worldwide. At peak listening times, it has been estimated that as much as 60 to 70 per cent of available spectrum is being affected by the jamming signals.

For example, the Russians currently jam, in a highly sophisticated manner, the Russian-language programmes of the Voice of America, BBC, Deutsche Welle, Radio Free Europe, Radio Liberty, Radio Israel and Radio Peking. This is done from an elaborate and costly network of ground wave jammers in the main urban areas of more than 100,000 population and powerful sky wave jammers to blanket surburban and rural areas. This network can be rapidly switched on when objectionable programmes begin.

The jamming of transmissions has also resulted in the use of a large number of transmitters on different frequencies in attempts to circumvent the jammers. This results in greatly overcrowding the broadcast spectrum and, in turn, to the use of more jammers. See Chapter 5 for an anti-jamming short wave aerial design that was first published in *Electronics & Wireless World*.

Non-deliberate mutual interference between HF transmissions also arises from poor spectrum management and lack of experience in the control of transmitters in some countries. The HF spectrum is the least well regulated of any of the broadcasting allocations and it has proved extremely difficult to obtain the necessary degree of co-operation in international planning or in compliance with the Radio Regulations of the International Telecommunication Union.

Electrical interference

Electrical disturbances from nearby electrical apparatus are among the most frequent causes of unsatisfactory reception on long, medium and short wavebands. Any electrical apparatus which includes any mechanism which generates power, however minute, at radio frequencies will tend to radiate interference unless preventative measures have been or are taken. Interference most commonly arises from small sparks caused during switching, for example by the thermostats used in central heating systems, or in the small electric motors used in many domestic and industrial appliances. More recently the generation of high-speed pulses, for example in home computers, or within television receivers, has added to the levels of electrical interference in most urban areas. Although most countries have legislation which is intended to reduce the levels of electrical interference, but this is seldom sufficiently stringent to cover weak signal reception of distant stations. Electrical interference tends to be most troublesome on the lower frequencies, particularly those below about 700 kHz (long waves and low-frequency end of the medium waves).

Most forms of electrical interference are best suppressed or reduced by the fitting of appropriate filters at the source. However this is often outside the control of the listener.

Interference is often carried along the domestic house wiring and tends to be most severe within a few metres of the house wiring, structural steelwork, tubing, etc. A receiving antenna well clear of surrounding objects will greatly reduce the amount of electrical noise, particularly if the mains supply leads to the receiver are filtered.

Spurious signals

It has been emphasized in this chapter that broadcasting is only one of a number of services that use the HF radio spectrum. The non-broadcast transmissions are mostly of a nature that is not intelligible when heard on a normal broadcast receiver. They often sound like continuous buzzes, screeches, clicks, thumps or 'Donald Duck' speech being in fact signals generated by radio teleprinters and data transmissions with frequency or phase shift keying, morse, independent and single-sideband telephony.

These communications transmissions occupy the frequencies between the broadcasting bands and do not normally interfere directly with the reception of broadcasts. Unfortunately, most domestic and portable broadcast receivers and even many of the 'communication receivers' intended specifically for short wave reception tend to receive these transmissions as 'interference' on 'spurious' frequencies that may be within segments of the spectrum reserved for broadcasting. For example, most simple superhet receivers can receive a single transmission on two or more widely-spaced frequencies, even though the transmission is on only one frequency. The most common cause of such spurious or phantom signals is 'image-frequency' reception in which the spurious signal is spaced from the real signal by twice the intermediate-frequency of the receiver. In simple terms the degree of unwanted 'image' reception is determined by the intermediate frequency of a superhet receiver and the effectiveness of the selectivity provided before the mixer stage in which frequency conversion takes place. To provide complete rejection of all image response on HF or VHF is not easy, and is unlikely to be found except on relatively high-cost receivers designed specifically with this problem in mind.

Similarly, many sets are affected by the presence of extremely strong broadcast or other signals even when these are on frequencies well away from a desired weak signal, due to what is termed the limit 'dynamic range' of most receivers. It is for this reason that the usual advice of always using the best possible outdoor antenna must be viewed with caution and why some receivers incorporate an 'attenuator' control or switch that can reduce the strength of the signals at the input to the receiver.

Fading and distortion

Broadcast transmissions on medium waves (MF) and short waves (HF) unless from local transmitting stations, may suffer severe distortion due to what is termed frequency selective fading. This is usually most pronounced on signals coming from stations hundreds rather than thousands of kilometres away. The prime cause is the arrival of signals that have travelled over more than one path (Figure 10). Such signals may alternatively increase or decrease the input to the receiver, and this can vary with the precise frequency. Long-distance (DX) HF signals, on the other hand, are normally much less severely distorted by fading, although in some conditions a very fast 'flutter' form of fading occurs.

Audio distortion owing to selective fading occurs also on medium waves (MF) and in this case one of the signals reaching the listener may be the ground wave signal. While the automatic gain circuits built into

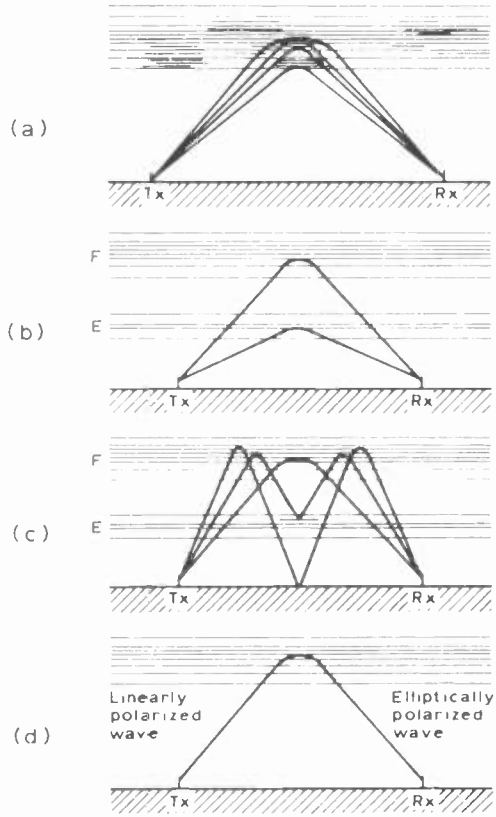


Figure 10 The modes of propagation that give rise to interference-type fading or fading due to polarization rotation. (a) Inhomogeneity of the reflecting layer providing multiple reflections of the same transmission. (b) Simultaneous arrival of signals reflected from the E and F layers. (c) Simultaneous arrival of signals propagated along different paths, including single and double hop with and without intermediate ground reflection points. (d) Polarization rotation during propagation that results in elliptical polarized wave

receivers can maintain the audio output from the receiver fairly constant there is little that the listener can do to reduce this form of distortion. The reason why frequency-selective fading can cause distortion is that the signal strength can vary across the 9 or 10 kHz channel and this can result in the carrier signal fading more than the sidebands carrying the information. To a receiver it then has the effect of gross overmodulation at the transmitter.

Selective fading is much less severe on single-sideband (SSB) transmissions with reduced or suppressed carrier. Tests have shown that it

would be possible to broadcast a compatible form of SSB that could be received satisfactorily on conventional receivers provided that these were accurately tuned. Normally, conventional receivers are incapable of receiving SSB that has a fully suppressed carrier. Although speech transmissions on SSB can be resolved with the aid of a beat frequency oscillator (BFO) as fitted to communications-type receivers, the satisfactory reception of music requires extreme accuracy of tuning and highly-stable receivers. The extent to which compatible single-sideband transmission will be introduced during the 1990s remains uncertain, although high-power transmitters suitable for this mode of transmission are being developed.

Home computers

A growing number of short wave enthusiasts, both listeners and transmitting amateurs, have found it possible to make effective use of home computers in pursuit of their hobby.

This can range from the use of the computer to store and retrieve useful data, building up a database gradually, to the use of special software programs, for example, to predict optimum frequencies for required stations at different times of the day or night, the various seasons and the position in the sunspot cycle. As a mathematical tool the computer can assist in the design of aerials, amplifiers, receivers etc. A computer can also be programmed to provide on request the great circle bearings, distances etc. of the principal stations. As a word processor it can be used to prepare reception reports. For those enthusiasts interested in such specialized communication modes as radio teleprinting (RTTY) or morse (CW), a computer can automatically display the incoming messages on a video screen (but remember that the deliberate interception of commercial and personal telegrams is forbidden in most countries, though this does not apply to amateur radio transmissions). Morse can thus be received without the months of practice normally required, although the human ear/brain remains superior on weak signals subject to interference.

While software programs are available for a multitude of applications, a few short wave broadcasters regularly transmit simple, non-copyright, programs that can be used in home computers – an idea pioneered by Radio Nederland. This station also publishes *InfoDutch* – a free, 22-page publication full of advice and information for those interested in using computers in pursuit of short wave radio. Copies of InfoDutch (3rd edition, July 1986) from Radio Nederland Wereldomroep, PO Box 222, 1200 JG Hilversum, The Netherlands. It includes names and addresses of firms that supply software programs for this aspect of short wave listening. Further details are given in Chapter 11.

Aerials and propagation

For medium and long wave reception most receivers have an internal ferrite-rod aerial, which enables them to receive the local stations and the stronger of the more distant stations. These aerials are directional and give very poor results when the rod points in the direction of the transmitter, so it is worthwhile checking whether the aerial is favourably orientated. Some portable receivers have a turntable built into the base

to enable them to be rotated conveniently, and larger receivers sometimes have a control which rotates the aerial within the case. In searching the wavebands, it is easily possible to miss signals from transmitters in line with the aerial, and it is a good plan, therefore, to repeat the search with the aerial at right angles to its former position. Ferrite-rod aerials are not used for short wave reception and these directional effects are not present.

Many receivers have aerial and earth sockets and it is possible to effect a great improvement in reception by using an external aerial. Suitable forms of aerial are discussed later. When an external aerial is used the effect on reception of rotating the ferrite rod is much less marked and may even be absent altogether.

Short wave receivers often have telescopic aerials which can be extended to a metre or so in length and can sometimes be tilted. These, too, can provide satisfactory reception of the stronger signals.

Improved reception is often possible using an aerial external to the receiver, supported, for example, on the wall of a room or in the roof-space. Results from indoor aerials are, however, often disappointing because the aerial is screened from the wanted signals by the walls and/or roof of the building and is near the electrical wiring and domestic electrical equipment. While it may be easy to suppress noise and interference from your own washing machine and light dimmer, it is less easy to suppress your neighbour's, which in flats and terraces may be even nearer than your own. Indoor aerials are thus liable to pick up a high level of electrical interference.

For best results an outdoor aerial is essential and, if electrical interference is a problem, the aerial should be located in an interference-free area and special precautions taken to ensure that the cable connecting the aerial to the receiver does not pick up interference from the electrical system of the house.

The active aerial is a very compact aerial, often comprising a relatively short rod accurately matched and coupled into a broad-band, low-noise amplifier of wide dynamic range. An aerial of this type can provide the receiver with signals of similar strength to a full-size aerial with virtually the same signal-to-noise ratio. However it is important to note that such aerials should preferably be mounted outdoors away from the electrical interference radiating from the electricity mains wiring.

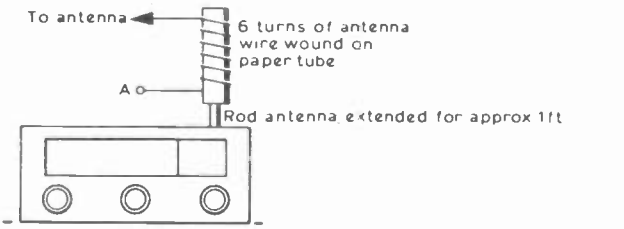


Figure 11 Using an external antenna when no socket is provided. Reception of frequencies above 15 MHz is usually enhanced by connecting point A to earth

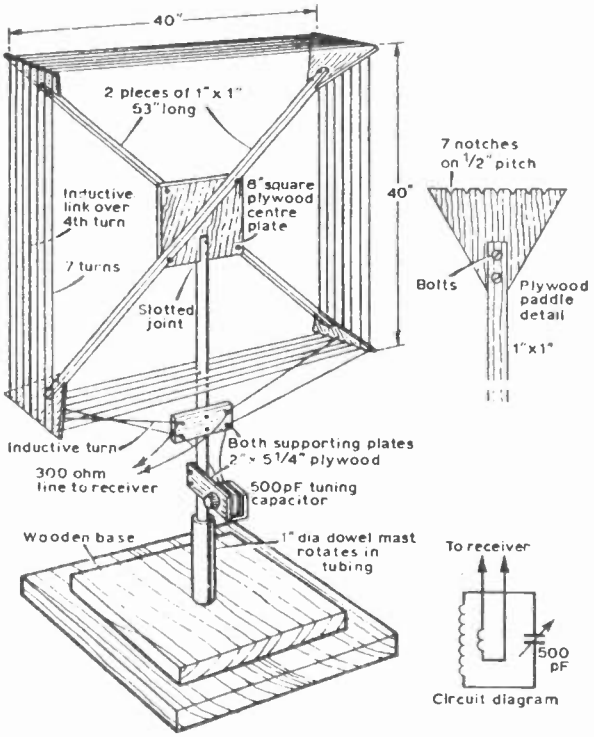


Figure 12 Constructional details of loop aerial for operation on medium waves and/or 1.8 MHz and capable of providing deep null on interfering signals

Only if you are fortunate enough to live in an interference-free area can you expect an indoor active aerial to equal the performance of an outdoor aerial.

For reception on medium waves and on short waves below about 4 MHz (above 75 metres) a home made frame aerial can provide an effective directional aerial. This form of aerial was the fore-runner to the widely-used ferrite-rod aerial and can be made more efficient than the short ferrite rods positioned close to other components. Both the large frame-aerial and the smaller ferrite rod aerial have the useful property of providing sharp nulls (very sharp in the case of the frame aerial) to reject unwanted signals coming from a different direction to the wanted signal. This form of aerial is also less susceptible to local electrical interference than other indoor aerials that are not in the form of a closed loop.

An inverted-L aerial, Figure 13(a), is quite suitable for long and medium wave reception. Results improve as the length of the horizontal section and the height above the ground are increased. The horizontal

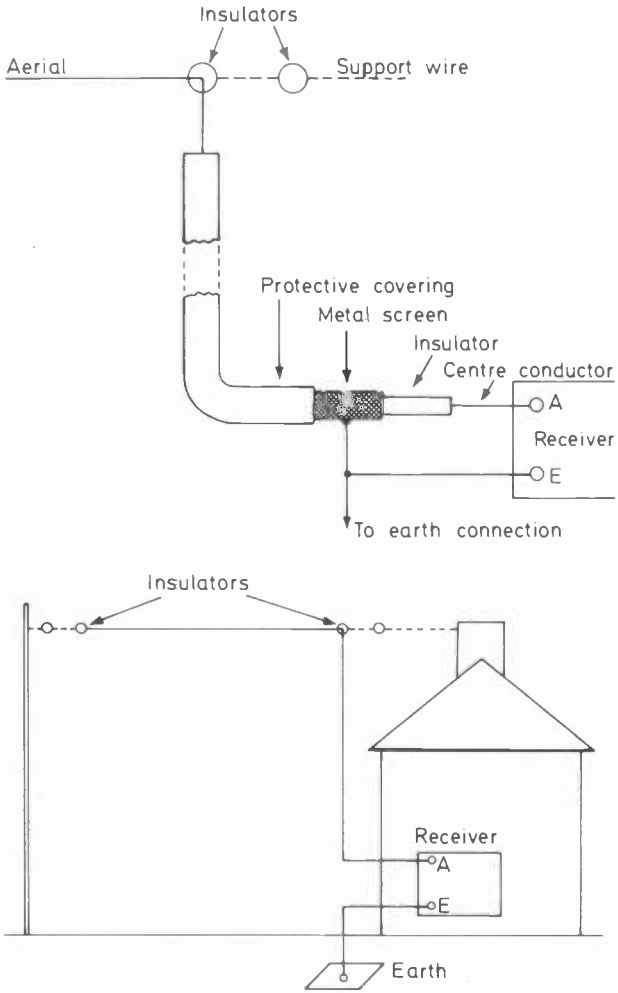


Figure 13 (a) Inverted L aerial. (b) Screened down-lead

section should be insulated from the supporting wires or ropes by several small porcelain insulators at each end. The downlead should be a continuous length of wire with the aerial and not joined separately because soldered and other kinds of joints are likely to deteriorate with weathering and eventually cause crackles and other effects in the receiver. The lead-in should be arranged to drop from the aerial well away from the building to avoid contact with gutters and to minimize

pick-up of noise from the domestic electrical supply. If a tree is used to support the far end of the aerial, allowance must be made for the movement of the tree under windy conditions. The terminating wire or rope should be passed over a pulley and terminated with a suitable weight. In this way the tension in the aerial wire can be maintained independent of movement of the tree.

Sometimes it is convenient to take the downlead from the centre point of the horizontal section. The resulting aerial is known as a T-aerial and its performance is very similar to that of the inverted L.

As a precaution against electrical interference the downlead can take the form of a coaxial cable, the inner conductor providing the connection to the receiver and the outer conductor being earthed as shown in Figure 13(b). By this means the downlead is screened so that only signals picked up by the horizontal wire are conveyed to the receiver.

Where there is sufficient space for an inverted L or T-aerial or where electrical interference is a serious problem, a vertical rod, say, 5 m long may be used. This should be mounted in an area where interference is a minimum (a chimney top is often a suitable place) and connected to the receiver by a screened lead as shown in FIgure 14. Aerial manufacturers market kits containing all the parts for such an installation including matching transformers for use at the aerial base and receiver input.

An inverted L, T-aerial or vertical rod aerial is suitable for short wave reception but where space permits there are more efficient types which

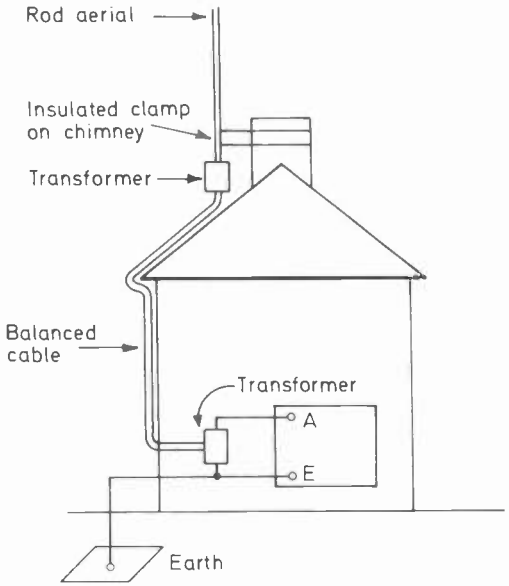


Figure 14 Vertical rod aerial

can be used: these are directional aerials which should therefore be positioned to favour the direction of the transmitters it is desired to receive.

One suitable aerial is the half-wave dipole illustrated in Figure 15. It consists of two horizontal arms connected to the receiver by a balanced feeder. The dipole should be mounted as high as possible but 10 m is probably the maximum height which is convenient for most domestic situations. The length of each of the two horizontal arms should be chosen to suit the wavelength of the signals it is desired to pick up and varies between 13 m for the 49-m band to 3 m for the 11-m band. The aerial has maximum response to signals travelling at right angles to its length and has minimum response to transmissions arriving in line with the aerial.

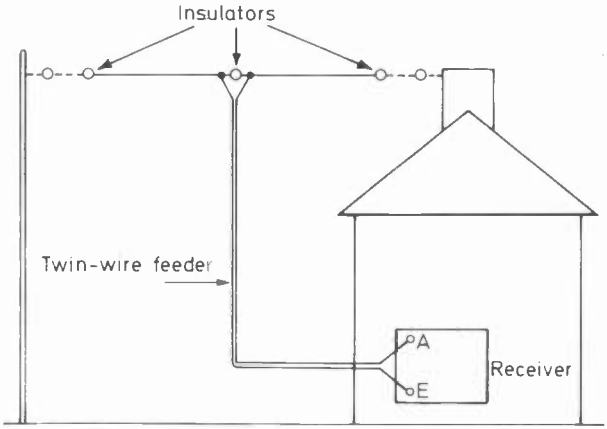


Figure 15 Simple dipole aerial

A disadvantage of the simple dipole is that it is less effective on wavebands other than those for which it has been designed. If, however, the two leads of the feeder are connected together and to the receiver aerial terminal, the earth terminal being connected to ground, the aerial then becomes a T type which can be used for long and medium wave reception as well as for short waves. A two-pole change-over switch can be used to convert the aerial from the dipole to the T form.

A better form of directional short wave aerial is the inverted V, Figure 16. This provides a greater signal to the receiver than the simple dipole and by using the dimensions shown it can be effective over all the short wave bands. It requires only a single support pole, one end of the aerial being earthed via a 400 ohm terminating resistor, the other being connected to the receiver input. This aerial has maximum sensitivity to signals travelling in the plane of the aerial as indicated in the diagram.

The Beverage aerial demands length but not height and consists of a length of wire supported by a series of short poles, say 2 or 3 m high and

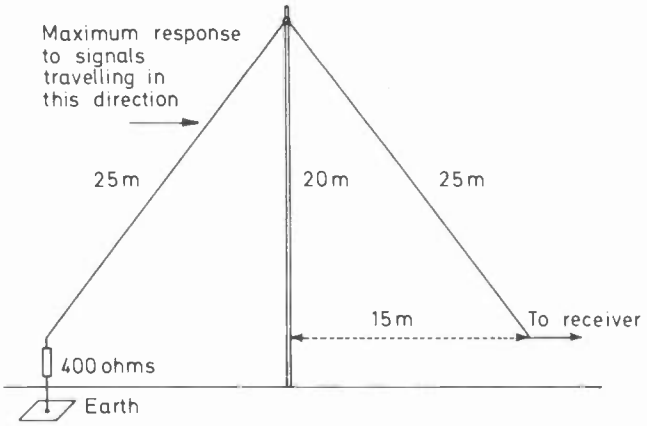


Figure 16 Inverted V aerial

spaced sufficiently close to prevent undue sag. Each should be surmounted with an insulator to which the wire is bound, not looped, the aerial being terminated at the far end by a 600 ohm resistor. Wire length is not critical but it should not be less than about 50 m and the lead-in should be direct to the receiver without significant deviation from the general line; if this can be achieved an RF transformer and coaxial line are not required to connect the aerial to the receiver. This aerial favours the reception of signals travelling in line with the aerial from the terminating resistor end, and is used professionally with wire lengths up to 1000 m.

When a receiver is supplied from a 3-pole main socket there is a natural temptation to use the earthed pole of the socket as an earth connection for the receiver. Such a connection is likely to be unsatisfactory because the physical connection of the main earth to ground is often at a considerable distance from the mains socket. Consequently the earth path may have appreciable resistance and can carry signals capable of causing interference to radio reception.

Where a receiver is provided with a signal earth terminal, local interference may be reduced by connecting the terminal by a short lead to a copper plate or earth rod buried in the ground. A similar connection is also required for inverted-V and some other aerials. A connection to a gas pipe is usually an unsatisfactory earth and may be extremely dangerous; most underground metal gas pipes are being replaced by plastic pipes. A connection to a metal water pipe is satisfactory only if the pipe is connected directly to an underground water main: in many modern housing estates the metal pipes within the house are connected to buried polythene pipes and do not provide a satisfactory earth connection.

Propagation of radio waves is a complex subject and in this brief chapter we can give only a general description of those aspects which may interest those whose hobby is listening to broadcasts generally and who may be sufficiently enthusiastic to extend their listening to more distant and difficult signals.

A knowledge of the basic facts will ensure that listening is carried out at the right time of day for a given frequency and will certainly provide more enjoyment by enabling the listener to anticipate good reception conditions and eliminate fruitless searching when propagation is poor. Awareness of the trends in propagation will leave the listener in no doubt as to causes of changes in reception and will enable selection of the most favourable periods for searching for the weaker and seldom-heard signal.

There are good reasons why a particular broadcast may within a short period improve to a degree when programme content can be appreciated or conversely may virtually disappear. It can also happen that strong signals from a given area may suddenly disappear within a minute or two, yet are received at their former strength thirty minutes or more later. Normal fading of signals may become more rapid, accompanied by a fall in strength and a corresponding increase in noise. These are some of the effects which the listener will observe and which, if carefully considered, will enable assessment of some of the changes in the ionosphere which affect reception conditions.

The basic facts governing short wave propagation can be summarized in the following way. Short wave radio communication is achieved by waves which strike the ionosphere (electrified layers in the earth's upper atmosphere) at an oblique angle and are reflected back to earth to cover the receiving area. The waves may be reflected again when they strike the earth and reach other receiving areas after successive bounces from the ionosphere. However in certain areas, for example in the area between the transmitter and the first earth-reflection point, the transmission may be very difficult to receive: this is a so-called skip zone.

For satisfactory short wave communication the frequency must be chosen with care. If it is too high, the waves penetrate the ionosphere and are lost in space: if it is too low the waves are attenuated by absorption in the lower regions of the ionosphere. Best results are achieved by using the highest frequency which does not penetrate the ionosphere and the value of this, the highest probable frequency (HPF), depends on the degree of ionization of the gases in the ionosphere. This in turn depends largely on the extent to which the ionosphere over the chosen path is illuminated by the sun. Thus the HPF varies with the time of day and with the time of year.

Any changes in the degree of ionization of the reflecting layer can affect long-distance reception and such changes can be produced by increased radiation from the sun, e.g. from blemishes on its surface such as sunspots and invisible areas called M regions. As seen from the earth, the sun takes 27 days to rotate on its axis and some effects on reception, particularly those due to long-lived M regions, tend to have a 27-day periodicity. Moreover the incidence of sunspots follows an 11-year cycle; this in turn causes an 11-year periodicity in short wave reception conditions.

At any particular time, a survey of all the broadcast bands will indicate that some are very active (many stations being receivable, possibly with a fair amount of interference), while other bands may appear to be practically devoid of signals, apart from weak scattered radiation from

stations some few hundred kilometres from the receiving site. These situations arise because transmissions are so arranged that programmes can be received at maximum signal strength in a desired area at local peak listening time. The choice is governed largely by HPF applicable to the required ionospheric path at that time, but the precise frequency may be somewhat lower to ensure that day-to-day variations in HPF do not seriously affect reception throughout the period of the programme or of the transmission schedule, which may be required to continue without alteration for a number of months. Two examples of prediction curves are given in Figure 17. The upper curve represents the HPF and, in general, frequencies above this value are heard infrequently. The lower curve indicates the frequency below which the signal-to-noise ratio of the received signal becomes unacceptable. If frequencies between these two boundary curves are used the transmitted wave normally propagates over the particular path and provides a service in the target zone. Frequencies which approach the HPF produce the stronger signal but their propagation is more likely to be affected by ionospheric disturbances. It is impossible to predict with accuracy the variations to which signals are likely to be subjected, although short term predictions based on daily observation of signals received can provide fair accuracy.

It is not good practice to make frequent changes of frequency in a broadcast schedule because the listener expects to find the programme at the same spot on the tuning scale. Thus to offset the variations of MUF and make best use of the transmission paths, two or more transmitters are used to radiate the same programmes on different frequencies. Thus a programme may be radiated simultaneously on, say, the 17, 15 and possibly the 11 MHz bands, so that when the HPF is high the 17 MHz signal is good and well supported by 15 MHz, whilst the low-frequency channel may suffer from some absorption. When the HPF is low, the 17 MHz signal is weak and a better service is obtained on 15 and 11 MHz.

Announcements made prior to close-down and radiated by all broadcasts in the same network mention the frequency of the broadcast band which is closing and that which is opening. For any target zone the peak listening time is evening and the schedules of transmissions to that area are arranged to provide programmes at that time. Frequency separation on the short wave bands is only 5 kHz and there may be difficulty in receiving a programme clear of interference.

The broadcast bands and their frequency limits are shown elsewhere in this book, and in general transmissions must, by international agreement, be confined to these bands. Other services are similarly restricted to certain frequencies. The highest allotted frequency used in short wave broadcasting is 26.100 MHz: thus when the HPF exceeds that figure, maximum use of propagation conditions cannot be obtained. However, most domestic receivers have an upper tuning limit as low as 21 or even 17 MHz.

Comparison of Figure 17(a) and (b) shows that under summer-time conditions the HPF curves flatten considerably, day-time frequencies being lower and night-time frequencies higher than in winter-time. In the summer more transmissions are crowded into fewer bands and interference problems increase.

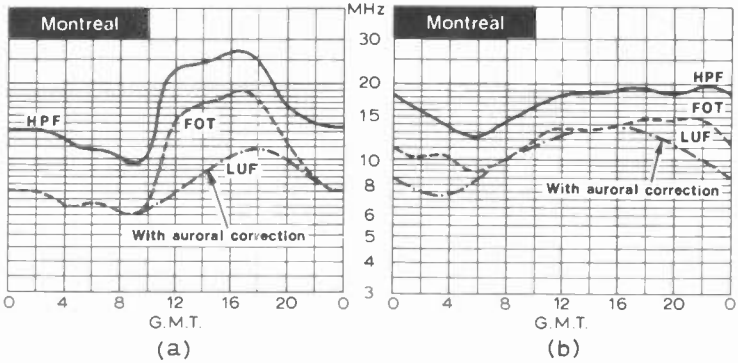


Figure 17 Examples of HF prediction curves for the UK-Montreal path for January (a) and July (b). The highest probable frequency (HPF) is the median usable frequency exceeded on 10% of the days. The LUF (lowest usable frequency) curves are for commercial telegraphy and assume the use of high-power transmitters and rhombic aerials. The path to Montreal passes through the Northern Auroral Zone and waves are subject to additional absorption: a correction is made for this in calculating the LUF. The term optimum traffic frequency (FOT) is self explanatory

At periods of minimum solar activity HPFs are generally lower throughout the year and the reduced spectrum available for broadcasting causes increased interference.

Sunspot maximum conditions occurred in 1979 and there was a gradual decrease in the HPFs until sunspot minimum conditions were reached in 1986, after which the HPFs will increase toward the next maximum.

The ionosphere is subject to disturbances which can affect radio reception. The disturbances are usually caused by sunspots and their effect is to make the reception of certain of the short wave broadcast bands difficult or even impossible. Thus, under certain conditions, signals in the high-frequency bands may be weak although the low-frequency bands are normal. Alternatively, the high-frequency bands may be normal and the low-frequency bands weak. Under more exceptional circumstances all the broadcast bands may be inaudible.

Thus, if short wave reception is found to be very poor, the most likely cause is a disturbance in the ionosphere and it is unlikely to last more than a few days. Most of the disturbances last only a few hours.

Signal identification

Tuning scales of receivers are often marked with a wealth of station names, but it does not follow that all these stations can be received, even with a good external aerial. Equally, it should not be assumed that stations, even if they can be received, will be picked up at precisely the point indicated by the name on the scale. The calibration of a receiver is not always exact, even when it is new, and it tends to drift as the receiver gets older. Calibration can be checked by tuning in certain stations

which maintain their allotted frequencies with great accuracy. Most transmitters have a reasonably good frequency stability but those on 200 kHz, 5, 10, 15 and 20 MHz are particularly accurate. For further details of standard frequencies and time codes see Chapter 11.

Signal identification involves a knowledge of broadcasting organizations and their programmes, transmission schedules and target areas, rather than merely a knowledge of transmitting stations. Interval signals, clock chimes, times of operation, types of programme and signal strength also aid identification.

The large number of languages used in short wave broadcasting would be beyond the ability of one person to learn, but consistent listening to broadcasts from known countries, many radiating similar versions of the current world news, gives good practice in recognizing languages. The sound pattern of an unrecognized language can be compared with other broadcasts of languages which appear similar, remembering that a dialect may be used. Knowledge of the normal occupants of a waveband in terms of broadcasters and their programme schedules is also useful in language recognition.

Interval signals, or particular tunes, are often used to preface the start of transmissions or programmes, typical examples being the use of Bow Bells, Greenwich Time Signal and Big Ben by the BBC, the Canadian National Anthem by Sackville. The Kremlin Bells by Moscow and the Kookaburra by Melbourne. Eastern European stations often use the first few bars of a well-known melody, which may have been written by an eminent composer.

If these signals can be recorded on tape, a library of interval signals can be built up. Each recording can be annotated with the details of reception, to increase its usefulness as a reference guide. See Chapter 11 for details of some commercially available tapes.

The make-up and timing of broadcasts can often prove useful in identification. If a continuous programme is well balanced between music, speech, drama and other items, it is probably intended for home consumption and the opening and closing times of the transmission will give some idea of the time of day in the country of origin. A programme consisting of short items, with a preponderance of speech, starting or finishing at odd times, is likely to be a service for listeners outside the country. Clock chimes may narrow the choice, by fixing the time zone, and they often precede an announcement or news bulletin. Don't forget that some countries have summer or daylight saving time. The relaying of programmes can produce difficulties; for instance, London's Big Ben is heard from stations all over the world. Nevertheless, continued listening may provide a clue, which can be a change of atmosphere at the conclusion of a relay, or an announcement that follows.

Most broadcasts begin with a period of tone for technical alignment purposes, followed by an interval signal and announcement, then possibly a time check, and finally the programme. The frequency of the line-up tone differs from one organization to another; thus the BBC uses 1 kHz, Federal Germany 900 Hz, and some authorities use 440 Hz.

The close-down of a transmission is also important, because of the probability of announcements, and perhaps a national anthem or clock chime.

The type of programme may yield evidence of the nationality of the broadcasting organization and of the intended zone of reception. Domestic services can generally be recognized by the parochial nature of the news, the coverage of world events being small. Programmes for a country's nationals abroad are often a blend of domestic and world news, with commentaries in the national language; a typical example is the BBC World Service. Frequent news bulletins, almost exclusively concerned with world events and given in many languages, strongly suggest a service intended for foreign listeners.

When a programme whose source is unknown is sufficiently intelligible to be followed to a limited extent and a guess made at the language, a search for the identical programme on different frequencies may help identification. A second receiver is useful for this, because it can be tuned to known stations operating services in the supposed language. If another transmission carrying the programme is found, it may be assumed that both originate from the same source, though not necessarily from co-sited transmitters. One transmission may be a relay, and if so the quality of the unknown transmission may not be as good as the known.

It may still be difficult to determine the location of the unknown station, though listening at times of programme change for local or regional announcements can help in reaching a conclusion. At such times there may be changes in fading characteristics and background noise, indicating the conclusion of a relay and suggesting that the signal has been affected twice by ionospheric conditions. A typical example of relays is provided by the BBC World Service broadcast from the UK and relayed by bases in the Middle East, Far East and South Atlantic; other examples are provided by Deutsche Welle in Germany and its relay base in Africa, by Paris and Brazzaville, and by the Voice of America at Greenville and its overseas stations at Tangier, Munich, Monrovia and elsewhere.

The stronger of two signals carrying the same programme may not necessarily be that of the nearer transmitter. The receiving location may be in the skip zone of this transmitter and thus obtains a weaker signal. A better signal may also be obtained from the more distant transmitters if this is beamed toward the receiver site.

Programmes which are broadcast simultaneously on a fair number of frequencies can be generally quickly identified as belonging to the same country or programme network. Even if foreign languages cause difficulty, the sound pattern of any language may indicate that the programme is originating from the same source irrespective of the number of transmitter outlets it may be heard on. With some experience, it becomes possible to identify language without understanding them; thus, if Cairo broadcasting in Arabic is positively identified, it is then feasible to recognize Arabic programmes in the external service of another country.

If a simultaneous broadcast cannot be found, but the programme pattern can be established, a search of programme schedules issued by the various countries may show details which conform closely to those of the unknown station.

A tape recorder is useful to aid identification, to give positive proof of reception, and to provide a tape library of announcements and call

signs, and the interval signals and jingles which characterize so many programmes and broadcast services. The tape machine should be close to the receiver and available for immediate use with its input connected to the receiver output, the mains supply switched on and a tape ready to record.

Any announcement heard which is not readily identifiable may be recorded and later played back repeatedly to help in identifying the language or recognizing some feature. Microphone facilities are useful to enable details of the time, date and approximate frequency or wavelength to be added to the recorded announcement. Such recordings could well form the beginning of an index of station announcements, which might later be arranged in country or geographical order to facilitate further research.

Tape recordings can be made of the signature tunes which most stations use either prior to their opening announcement or before particular programmes. Signature tunes are usually repeated for some minutes before the scheduled opening time, and as indicated previously, they may consist of a well-known melody characteristic of the country, of a few tones, or of bells or clock chimes. These tunes, when memorized, can provide an instant means of identification, but while some are distinctive, others are not, and a tape recording is often useful for comparison.

Reception reports

Reports on reception are always welcomed by broadcasting organizations, whether the listener is located in the target area or not. Such reports can provide useful information on transmissions, and help the broadcaster to assess the accuracy of the assessments on which his schedule was based and the effectiveness of the service. See Chapter 3.

3 Writing useful reception reports

Jonathan Marks
Radio Nederland Wereldomroep

Since the early days of international broadcasting on short wave, listeners have sent in reports on reception to radio stations. In the beginning, when many of the broadcasts were experimental, stations relied heavily on reports from listeners, whereas in the 1980s there is now a different technique required to make your reports useful to an international broadcaster. A survey by the European DX Council in 1983 asked a number of stations about their views on reception reports, and these results have been combined together with our own recommendations here at Radio Nederland Wereldomroep.

Note: The comments that follow apply *only* to reception reports sent to international broadcasters. If you wish to report to low power stations in Africa, Asia, or Latin America, you need to use a completely different approach, as described in the chapter on Latin American DXing.

Make your report stand out — not conform!

The reception report has been fairly standard over the years. So much so, that some DX clubs now offer printed forms for their members to use. These have both advantages and disadvantages. Some are even computer generated these days. Forms are certainly easier to check, as far as the QSL department is concerned, but it might not have the desired impact in other departments, such as programming. If you live in a country where companies send unsolicited printed matter to you through the mail, you'll be aware how impersonal this type of mail can be. The use of pre-printed forms really depends then on whom you wish to address your letter to.

A 'typical' reception report as received by many international short wave stations is shown at the end of this chapter. Note that some parts of the form have been labelled with numbers. These correspond to the numbers listed below.

General hints

1 *Name and address:* So obvious and yet it is amazing how many people forget to include it. In many cases your reception report may be processed by more than one department within the radio station (i.e. the engineering and programme departments), so we advise you to include your name and address on *each* sheet that you use. Either print your name and address in block capitals or type it. Many QSLs have failed to reach their destination because it was impossible to read the name and address of the sender. Signatures are often very difficult to decipher.

2 *The station address:* Always address your letter to the correct person. Avoid the use of titles like 'Director General', 'Head of Programmes', etc., if you want a QSL or wish to make programme suggestions. It is very unlikely that the station director or the general management will be the people responsible for answering the letters. If a particular programme presenter made a point on the air that you wish to take further, then send the letter to her or him by name, c/o English Section, Radio XYZ, etc. This will ensure that the right person opens the letter. Alternatively, writing to the programme by name: 'Media Network', English Section, Radio Nederland, PO Box 222, 1200 JG Hilversum, Holland', increases the chances that the producer of that programme will see that letter.

3 *Date:* It is best to write this out fully (i.e. 25 July 1985) since shorthand notation, such as 12.6.86, has different meanings depending on where you live. Naturally, it is usually obvious which meaning is implied, but writing the date out in full may ensure fewer mistakes.

4 *Time:* This should be stated in Co-ordinated Universal Time (or UTC), which is the standard used by the majority of international broadcasters. The term Greenwich Mean Time (GMT) is still being announced by a few stations, e.g. BBC London. But no conversion is necessary as both terms are interchangeable 0600 GMT = 0600 UTC.

If you are in doubt as to the time difference between your own local time and UTC, simply listen on the hour or half-hour to most international broadcasters (i.e. Radio Nederland, Radio Canada International, BBC, VOA) who will announce the time in UTC. Simply work out the hours difference between your time and UTC. Use this information to make a conversion table to keep by your radio for handy reference. Alternatively, set a clock by your receiver to work on UTC. Note that UTC is always the same, and is unaffected by local changes in summer or winter time. All stations use the 24 hour clock system, so avoid the use of a.m. and p.m. which can lead to confusion, e.g. 1830 = 6.30 p.m. A world time chart is printed on page 234.

5 *Frequency:* This describes the point on the dial that the signal came in, usually indicated in kilohertz (kHz). The frequency that you quote should be accurate to within 5 kHz if possible, i.e. saying 'I heard you on about 6 MHz' is not sufficient. If, however, your set cannot give accurate frequency readout from the short wave dial, say so in your report. The term kilocycles per second (kc/s) is an older expression, but means the same as kHz. If you know that a station is using more than one frequency at the time you're listening, check as many of these as possible, and note how well each of them is received. *A report on one single frequency on one day has little value these days*, though the station will probably still send you a QSL card. The experienced listener does one, or both, of the following:

(a) Notes the reception quality of a number of frequencies carrying the same programme over a period of three to six days.
(b) When a particular channel is blocked by interference, a check is made to see whether another frequency nearby is more suitable as an alternative (but see later notes).

6 *Metre band:* Not really necessary if you have noted the frequency correctly. If you only have 'metres' marked on your set, then quote this in your report, though few listeners quote them these days. If you need to convert metres to kilohertz, then use the following formula:

$$\frac{300{,}000}{\text{wavelength in metres}} = \text{frequency in kHz}$$

7 *Receiver:* This is a useful piece of information to the frequency department, so don't forget to include it in your report. If you are suffering bad reception, one of the first things that will be checked is the type of receiver that you're using. Remember too that the brand name and model number may not be known in the country where you send your report, so decide whether your receiver is a *domestic* type (i.e. has medium wave, or VHF/FM on it as well as short wave) or a *communications* type (i.e. made primarily for listening to short wave broadcasts between 3 and 30 MHz). If you can quote the description given in the manufacturer's brochure this is usually sufficient (e.g. 8-band SW superhet portable).

8 *Antenna:* Also a useful piece of information and frequently forgotten. Transistor portable radios usually perform adequately on a built-in antenna of the 'telescopic rod' variety. If you are using a piece of wire or a random length hung out of the window, the best description is a 'random longwire aerial'. Specially built antennas such as 'rhombics', 'inverted L' or 'dipole' should be mentioned by name if possible.

9 *Reporting code:* As soon as reception reports started flowing into radio stations, some kind of internationally recognized codes were introduced. These were needed not only to standardize report writing, but to be able to compare one report with another. The first, and most popular was the *SINPO* code, in which each letter stands for a specific item, and each is rated from 1 to 5. Full details are given below:

S – signal strength	I – interference	N – atmospheric noise	P – propagation, disturbance	O – overall merit
5 – excellent	5 – nil	5 – nil	5 – nil	5 – excellent
4 – good	4 – slight	4 – slight	4 – slight	4 – good
3 – fair	3 – moderate	3 – moderate	3 – moderate	3 – fair
2 – poor	2 – severe	2 – severe	2 – severe	2 – poor
1 – barely audible	1 – extremely strong	1 – extreme	1 – extreme	1 – unusable

While the above may look impressive and concise it will soon become evident that the SINPO code is very subjective. Somebody may rate a signal as 33232 while someone else might rate it as 44333. Likewise, although the original SINPO code did lay down technical specifications for each number (i.e. a number 3 in the P column meant a fixed number of fades per minute) these are hardly ever adhered to by reporters. Nor is it advisable to use the so called 'signal strength' meter to judge signal strength. No 'S' meter on a communications receiver under

£1000 in price is anything more than a tuning indicator. The 'S' meter reading is usually dependent on the setting of the RF gain control, so use your ears, not the needle, to judge signal strength. You may also find references to the SINFO code. In this case the 'F' stands for fading, instead of 'P' for propagation, but the two codes are essentially the same.

It is also clear that many listeners cannot distinguish between the 'I' which stands for man-made interference, the 'N' which stands for natural atmospheric noise, and the rating for 'P' is not often understood. There are some books and periodicals that maintain the SINPO code as being the only one for DX reporters. However, from a station's point of view we would suggest the following, simpler, code which is used by most professional monitoring stations around the world.

The SIO code

S – signal strength	I – interference (of any type)	O – overall merit
4 – good	4 – nil or very slight	4 – good
3 – fair	3 – moderate	3 – fair
2 – poor	2 – heavy	2 – unusable

You can see that the SIO code is based on the SINPO code, but in a simpler form. The two extremes (i.e. 5 and 1) are eliminated. Very few signals deserve a 55555 rating (except a local FM station), and 11111 is not much different from 22222 – both imply that reception quality is useless. The use of the SIO code, as opposed to the SINPO code, does *not* give the station the impression that you are an inferior reporter.

The backwards secret to the SIO code!

Most books that cover the subject of reception report writing have a very simple method of evaluating a signal. First, they say, judge the signal strength, then look at the level of interference. Finally, fill in the 'O' column by taking the average of the two numbers, and rounding down to the nearest whole number. So if the 'S' was 3, and the 'I' was 4, the 'C' rating would automatically be '3'. *This is very misleading!*

Instead, you should work backwards. First evaluate the overall rating of the signal. Is it 'listenable' or difficult to hear. Give it either 2, 3, or 4. Now examine the reasons for your 'O' rating. The signal may be weak (i.e. a 2), but if there is no interference on the signal, you simply have to turn up the volume control to enjoy the programme. Thus an SIO rating of 234 is *not impossible*.

Likewise a signal of 442 is possible. This might occur if the signal was strong, there was no interference, but the audio being broadcast was heavily distorted due to a fault in the transmitter. Listen around on the bands, and you will find a wide variation in the audio quality being broadcast. Being critical may alert a station to a problem. It is often very difficult to judge when measurements are made at the transmitter site.

If you give an '*Interference*' rating of either 2 or 3 in your report, then you should explain why (as our example does in the 'technical remarks'

column). If there is interference on the received signal, note the following details:

(a) Is the interference signal of the same frequency (so-called co-channel?) If it is, then as you move the tuning knob, both the signal you want, and the interfering signal will be tuned out. If, however, the interference gets stronger as you tune either up or down the band, the interference is probably coming from an adjacent frequency. It helps to indicate whether the interference is coming from a station on a higher or lower frequency than the one you are interested in. If you are listening on 11735 kHz and a station on 11730 is causing interference, the interference is from a station which is lower in frequency. If the interference station is a jamming signal (a buzzing sound designed to deliberately interfere with an international broadcaster) then this should be noted too.

(b) Local weather conditions *do not* generally affect short wave broadcasts, with the exception of local thunderstorms in your area. These may cause loud 'crashes' which spoil reception. If this affects your I (interference) rating, then note elsewhere that this was due to thunderstorms.

10 *Programme details:* This seems to be the most variable part of a reception report. Some people simply write 'Man spoke, woman spoke', or 'News, Newsline, Media Network' (you will find the latter details in our programme schedule) neither of which can tell the station that you have really heard the transmission. On the other hand, a verbatim script of the programme is also very undesirable. It won't be read all the way through, as secretarial staff don't usually have the time to read it. So why bother? The correct details should include the programme title, the name of the presenter (if given) and a few of the most important points raised. If the programme is musical, note the names of those performing. The reception report we have shown, has about the correct balance that most stations are looking for. Most stations need about 10 to 20 minutes of monitoring time for a verification.

11 *Programme comments:* Not the same thing as programme details. It is one thing to report what you hear in a programme, in the form of supplying programme details, but another to comment on what you heard. Although stations have set down guidelines in the past for sending in reception reports, this has rarely included advice on what to listen out for. To a certain extent this is probably the station's fault, rather than that of the listener. Suffice to say, stations are interested in your reaction to the programme. To assist you in filling the 'programme comments' sections of the report with feedback which will be of use to the station, and make your report stand out from the rest, we've listed a few questions that you might care to ask yourself while a programme is running.
Note: These are only intended to suggest points to look for. It is up to you to put the answers into a readable form. Simply writing down the answers is not sufficient, as stations won't know what the questions were!

(a) Did you tune in to the station expecting to hear a particular item or style of presentation? Did the station present the kind of information

you wanted or did it seem irrelevant? (Remember though, that some stations have different specialist programmes on different days of the week. Give the stations a fair hearing before complaining that they are ignoring a particular topic of interest.)

(b) Programmes consisting of short items of up to 4 minutes each can either be very interesting or extremely boring. If you tuned in to this style of programme (a magazine format) did the whole programme interest you or did you find only a small part was relevant? Did it sound too much like short unconnected stories connected by someone saying 'Now here's something from . . .' and then, 'That was . . .', or was there a theme to the whole programme?

(c) Did music fit into the programme being broadcast, and was it of the style you enjoy? Was reception reasonable over short wave radio, or were quiet passages lost in interference. (Remember that what the producer in the studio listens to on a hi-fi speaker, and what you hear at the other end of a SW radio, 1000s of kms away, may be two entirely different things.)

(d) Did you feel that the item being presented was complete, or that you were being told only one side of the argument? Did the item change your mind on a particular topic? If so, why? If you found an item hard to believe or confusing, mention this, as the producer is being paid to get a message across! The listener judges how successful this has been done.

(e) Was the item being presented too short or too long? Did the presenter sound interested in what he/she was reading (in some cases the presenter is the author of what he/she is reading). Was the speed of presentation too fast or too slow for easy short wave reception?

(f) Will you listen again? If so, what items interest you and what topics do you suggest the station should cover. If not, why not.

Summary

Stations receive anything up to 300 letters a day per language department. Some stations have the budget to reply personally to each one that comes in, others refer to letters on the air in programmes. If you follow the guidelines set out above there is greater chance that your report will generate more than a QSL card. But please consider the following points:

- Don't give praise where praise is not due. If you sat through 15 minutes of the most boring radio you ever listened to, don't say you found it interesting, educational and fascinating to try and get a QSL. You'll get a QSL card whether your reaction to the programme was positive or negative.
- Don't over-rate a signal rating in the SIO code. If the signal is 232 don't say it was 444 to try and get a QSL. Remember there will be other listeners writing in from your area and if the engineers note that most people report 232, your report of 444 will be thrown out as being unreliable. If you do the same twice to a station, the chances are that people will remember your name!
- Don't worry about your command of English if it is your second language. Some excellent comments are received at Radio Nederlands from listeners in Japan, West Germany, Finland, India and

- many other countries where English is not the mother tongue. Stations do understand what you are trying to say, even if the grammar is not perfect, providing they can read your writing.
- Don't forget a bit of diplomacy. If you feel strongly about a point, by all means say so. But don't resort to personal abuse or outright demands. A cool collected summary of why you feel something ought to be changed is a much better and effective approach. Letters which contain an alternative suggestion after criticising are always considered, those which simply criticise play far less of a role. Bear in mind too that humour and double meanings are very different from country to country. The secretary who reads your letter may or may not have the same command of English as you.
- Don't expect a station to change a frequency because you have provided them with information about a clear channel nearby. Few stations are able to hop about the band, and the use of one frequency for an hour or less is not common in international broadcasting. Stations often have to serve large target areas, and the problems of finding a clear channel are getting more difficult by the day. The low sunspot activity during the years 1985, 1986, 1987 and 1988 add to the problems. Assistance from listeners on a voluntary basis is always appreciated, though please remember that not all suggestions can be realized. It is rare that stations are able to offer payment for monitoring.
- Don't over-rate the value of a standard cassette taped reception report. Remember these recordings take much longer to process as somebody has to listen to them. They can be very misleading unless done on reasonable quality equipment. Some stations do like these reports (they are listed in the EDXC QSL Survey), though it is a *minority*. At Radio Nederland Wereldomroep we prefer written reports and cassette tapes are not generally returned.
- Don't forget to *ask* for a QSL card if you require one. Radio Nederland issues a new QSL card when stocks of the old one get low. There is a limit of one card per month per listener. Some stations have stopped sending out QSLs altogether, others do so only on request.
- Remember that reports on frequencies not intended for your target area are usually of marginal interest to the station, unless there is no service directed to your part of the world. Remember too that not all stations have a huge number of promotional items (such as pennants, books, diaries) to send out. Their primary function is to make programmes. 'I would appreciate a pennant, if you have one, please' will avoid embarrassment.

If you want details of the European DX Council QSL Survey, 2nd Edition, send one international reply coupon to European DX Council, PO Box 4, St Ives, Huntingdon, England PE17 4FE.

Sample reception report

From: ①

Richard Jones,
Box 234, Christchurch,
New Zealand

Date: 25th September 1986

To:

Media Network,
English Section,
Radio Nederland,
PO Box 222,
1200 JG Hilversum, Holland

Dear Sir,

I wish to report reception of your English language broadcasts directed to Australia and New Zealand over the past few days in the 31 and 49 metre bands.

Date	*Time UTC*	*Frequency kHz*	*S*	*I*	*Q*	*Technical remarks*
21 Sept.	0730	9630	4	3	3	Co-channel interference from an Arabic speaking station, believed to be Iraq.
21 Sept.	0733	9770	3	4	3	Weaker than 9630, but less interference.

Programme details: Welcome to REPORT programme. World news, covering items in West Beirut, Peace demonstrations in Paris. NEWSLINE programme covered relief aid to Ethiopia compiled by Tony Wilkinson, Central American political upheaval, and refugees in Cambodia.

22 Sept.	0754	9630	4	3	3	Co-channel interference from an Arabic speaking station, believed to be Iraq.
22 Sept.	0755	9770	4	4	4	Good signal today.
22 Sept.	1051	9650	4	2	2	Heavy jamming splash from 9655 was serious.
22 Sept.	1058	6020	2	2	2	Very weak signal, just detectable.

Programme details: Media Network, presented by Jonathan Marks. Looked at the Amsterdam Audio and Video Fair, with news of a new shortwave receiver. Media news with Victor Goonetilleke featured an item on a new relay station for Radio Japan.

Programme Comments: My main interest is in telecommunication, so I prefer items on satellite broadcasting and shortwave receiver reviews.

I don't feel your musical programmes come across very well under the present conditions. Perhaps a look at the current temperature in Hilversum, at the start of each transmission could be considered.

Receiver: Duo Museun FRG-2000. Communications type, PLL synthesised.

Antenna: 10 metre long wire out in the garden.

I hope you find my reception report to be of some use. If the details are correct, please verify with a QSL verification card. A sticker would also be appreciated, if these are available.

Yours sincerely,

RICHARD JONES.

4 Latin American DXing

Jonathan Marks
Radio Nederland Wereldomroep

The topic of listening to Latin America has probably occupied more space in short wave listening and DX bulletins over the years than any other topic. This chapter has been written from the broadcaster's viewpoint, based on conversations with managers of short wave stations in the region. It is primarily designed for short wave listeners who have gained some experience on the major international broadcasting bands (i.e. the 49 and 31 metre bands) and wish to look a little further.

Though some texts lead the beginner SWL straight into the topic of listening to Latin America, the results can often be less than rewarding. In practice, most short wave listeners start their listening on the international SW broadcast bands and pick up stations such as Radio Canada International, Radio Australia, Radio Sweden International, Voice of America, British Broadcasting Corporation, and I hope, Radio Nederland Wereldomroep. All these, and many more, are *international* broadcasters. They make programmes in foreign languages other than their mother tongue, and the whole output is made with the *overseas* target area in mind. Most welcome reception reports, and many SWLs start to correspond with stations by first sending in a reception report. Over the years the emphasis on the reception report has changed (not necessarily diminished) and I have tried to define what many international broadcasters are looking for now in Chapter 3.

For the majority of short wave listeners, the international broadcasting stations are enough. But, if you have a little patience, and quite a lot of time, it is possible to find another category of stations on the bands, i.e. the SW *domestic* broadcaster.

Domestic broadcasters

Stations lying between the Tropic of Cancer and the Tropic of Capricorn are assigned three different 'tropical' short wave bands by the International Telecommunications Union (ITU) in Geneva. These are the 120 metre band which lies between 2300–2498 kHz, the 90 metre band between 3200–3400 kHz, and the 60 metre band 4750–5060 kHz (the frequency of 5000 kHz is not included since this is allocated to other users, including time signal stations). It is this latter frequency range that is probably the best to explore first for the newcomer.

Though there are some countries outside the tropics which use the tropical band of 60 metres (e.g. USSR) most of the signals you will hear are from tropical broadcasters using this frequency range for *domestic* broadcasting. This applies to stations in Latin America, though the reason for using the short wave seems to be changing now in many of these countries. Because thunderstorms are very frequent in the tropics,

medium wave reception can be very difficult when signal strength is low.

Many stations started broadcasting their programmes on the 60 metre band to reduce this problem (interference is usually less severe). A wider audience can be covered with the same transmitter. This reason now seems to be changing as more and more stations, particularly in the larger cities, use medium wave with stronger transmitters and even FM (VHF) in some areas. Shortwave outlets have, therefore, been discontinued by some major stations, or merely retained as an extra outlet.

For others, the main reason for keeping the outlet open is to keep in touch with listeners as they move further afield during parts of the year because of their work. In rural areas, especially mountainous regions, 60 metre band broadcasting has retained its importance.

Reception

To gain experience, tune this part of the dial as often as possible and also follow the loggings in most of the better DX clubs.

However, since other regions outside the tropics use this frequency range for *utility* broadcasting, a first impression may be misleading. Many beginners are disappointed to find the band full of morse and telex signals on a particular evening. However, checking the same frequency range 24 hours later may reveal a number of strong broadcasting signals from Latin America.

There is regular news on what has been heard from this region in our Thursday *Media Network* programme, on Radio Nederland.

Getting in touch

Many listeners make the fundamental mistake of confusing the stations they hear on the international bands and those in Latin America. The latter are *not* generally interested in receiving correspondence from abroad, and if they receive many dozens of requests for QSL cards, the reports are usually simply thrown away. The SINPO code means nothing to most Latin American broadcasters, nor are reports in any other language apart from the country's mother tongue of any value.

International Reply Coupons are available at larger post offices in many parts of the world. In theory, someone in another country can exchange it for postage stamps to the value of SEAMAIL postage. In practice, especially in South America, IRCs are often not recognized for what they are. In some parts they may be invalid altogether. These factors mean that there is not much point sending the same standard reception report form you might use for large international broadcasters to these 60 metre band stations. Instead, the approach should be in the form of a personal letter. Outright demands for a QSL card are seldom acknowledged and stations that receive many of these type of letters often stop QSLing altogether. Spanish reports can be used to the majority of stations, though Portuguese must be used to write to Brazilians. Simply asking for 'verificacao' (Portuguese) or 'verificacion' (Spanish) often brings a very vague reply which does not list the details contained in your report.

To help you, we have compiled a sample translation. This should *not* be regarded as the last word in Latin American reception report writing

because, obviously, if you speak either of the two languages you will be able to inject your own personality into the letter. However, for those who do not have sufficient command of the grammar, this letter is the next best thing. Each numbered sentence in the English text, corresponds with the same number in the Spanish and Portuguese text.

Dear Sir,

1 I am very interested in following events and the general way of life in Latin America.
2 You may know that radio and TV stations in this part of the world do not concentrate on news items from (Latin America or name of country) very often and only a limited range of records featuring folk music from your country can be obtained here.
3 For this reason, I listen to the tropical bands on my short wave receiver, to follow developments directly and to enjoy the unique style of music.
4 I was recently fortunate to tune in to Radio . . . and although I realize that your programmes are not intended for an international audience, I hope nevertheless that you may be interested in knowing that your programmes can be heard many thousands of kilometres away.
5 To give you an example I have made a note of the details of a recent broadcast.
6 On (date) at . . . (name of country, then local time) I tuned into a programme from Radio . . . broadcast on . . . kHz, in the 60/90/120 metre tropical SW band.
7 At . . . (time) you played a commercial for . . . .
8 I noticed a news broadcast at . . . .
9 You announced the name of the station at . . . with the following words '. . . .'
10 I recognized a piece of music with the title of . . . played at . . . .
11 Your station closed down with the national anthem at . . . .
12 Your station signed on at . . . local time.
13 There was a break in transmission between . . . and . . . .
14 The signal quality was very good/good/fair and I was able to enjoy what was said in the programme. I also found the music you played to be enjoyable.
15 The signal quality as received here in . . . was naturally rather weak, but nevertheless I was able to follow some of what you said.
16 There was slight/heavy interference from Radio Station . . . broadcasting from . . . on the frequency of . . . kHz.
17 My receiver is a . . . made in Japan/Germany/USA by the . . . company. It has a superhet design using . . . transistors.
18 The antenna is a (long wire) dipole/medium wave loop) and is . . . metres long, and . . . metres above the ground.
19 Because your signal varies in strength during different times of the year, it is not always good. I hope to find the time to listen again, mainly because you provide me with a unique source of music and information.

20 I should be very grateful if you could confirm in writing that I received Radio. . .judging from the details I have enclosed.
21 I would also appreciate a station pennant if you have one please, and more details about the programmes you broadcast.

I am enclosing a few mint stamps from your country which I hope will help towards your postage costs.

I am enclosing £. . .which I hope will help towards your postage costs.

22 I am also enclosing a few postcards/stamps from this part of the world which may be of interest, to give you an idea of the countryside around here. . . .
23 (Name of your town) lies about . . .km (north/south/east/west of (name of major city or capital).
24 Thank you for your help and I look forward to hearing from you soon.
25 Yours sincerely,

J.M.

Follow-up report

(a) Repeat sentences 1–4 then. . . .
(b) On the. . .(date of dispatch of reception report) I sent you details of how well you are received at this location. However, since it is now some while ago since I sent the report I presume my letter has been lost in the post. Therefore I enclose the details of reception on that day.
(c) Select further numbers as appropriate.

Thank you letter

Dear Sir,

Just a short note to say thank you for your letter (and pennant) which arrived safely a few days ago. I was delighted to receive confirmation of reception from your station and I hope that your signal will remain audible in this part of the world so I can follow events in your country.

Thanking you for your interest,

Best wishes,

Spanish translation

Estimados Señores:

1 Ante todo quisiera saludarles e indicarles que soy una persona muy interesada por todo lo referente a los acontecimientos y las costumbres de América Latina.
2 Como comprederán Ustedes, en esta parte del mundo las estaciones de radio y televisión no dedican tanta atención a las noticias sobre (Latin America or name of country) y además muy pocos discos de música folclórica de su país se pueden conseguir aquí.
3 Por ese motivo mediante mi receptor de onda corta escucho las

bandas tropicales para seguir el curso de los a contecimientos en directo y para divertirme con el estilo de música, que es único.

4 Recientemente tuve la suerte de sintonizar a la Radio . . . pero como me doy cuenta de que sus programas no están destinados a una audiencia internacional, espero que de todas formas Ustedos se interesen en saber que sus programas son escuchados a mucho kilómetros de distancia de su país.

5 Seguidamente les indico algunos detalles de la reciente transmisión escuchada.

6 El día . . . (date), a las . . . (local time) horas, sintonicé su programación de Radio . . . en los . . . kHz en los 60/90/120 metros de la banda tropical de la onda corta.

7 A las . . . (time) horas, Ustedes ofrecían un anuncio comercial para . . . .

8 Escuché un boletín de noticias a las . . . (time) horas.

9 Ustedes anunciaron el nombre de la emisora a las . . . (time) horas con las siguientes palabras '. . . . '

10 Recuerdo además un trozo de música titulada '. . . ', que se ofreció a las (time) horas.

11 Su emisora cerró con el himno nacional a las . . . (time).

12 Su emisora comenzó la emisión a las . . . (local time) hora local.

13 Noté una interrupción entre las . . . (time) hasta las . . . (time) horas.

14 La calidad de señal fue excelente/buena/regular. Estuve muy atento a su estupenda programación y también de la música tocada por Ustedes.

15 La calidad de señal recibida aquí en . . . fue naturalmente bastante débil, pero no obstante pude compreder algo de lo que Ustedes dijeron.

16 Había una interferencia suave/muy fuerte de la emisora Radio . . . , que transmitía desde las . . . horas en la frecuencia de los . . . kHz.

17 Mi receptor es de fabrición japonesa/alemana/estadounidense. Tiene un circuito de acuerdo con el 'principio superheterodino' y tiene . . . (nr.) transistores.

18 La antena es (long wire) un dipolo/una antena 'loop' de onda media y tiene una longitud de . . . metros y está a una altura de . . . metros.

19 Debido a que su señal varía de intesidad durante las diferentes estaciones del año, no siempre me es posible sintonizar sus programas. Sin embargo, cuando las condiciones sean propicias, espero tener tiempo para volverles a escuchar, ya que estoy interesado en las informaciones y en la música de su país, que dificilmente podemos encontrar aquí.

20 Les agradecería enormenente si Ustedes me constestaran en una carta en la cual se escribiera que yo he captado a Radio . . . por medio de los detalles que les he incluido.

21 También les quedariá muy agradecido me remitieran un banderin de la emisora o algún recuerdo y detalles sobre los programas que Ustedes transmiten.

Les incluyo una moneda/estampilla de su país para que les sirva de ayuda en el envío postal.

Les incluyo £ . . . que espero les ayude para los gastos de envio.

22 También les incluyo algunas postales/estampillas de esta parte del mundo, para darles una idea del lugar de donde les escribo.
23 (Name of your town)...está ubicada aproximadamente a unos...kilómetros al norte/sur/este/oeste de...(name of major city or capital).
24 Agradeciendoles de antemano su ayuda y esperando prontamente con gran interes su contestación.
25 Me despido muy atentamente,

Follow-up report

(a) Repeat sentences 1–4 then....
(b) El dia...(date) les envié a Ustedes detalles de cómo son escuchados sus programas en esta localidad. Ya ha pasado algún tiempo y aún no he recibido contestación alguna, por lo que imagino que la carta se habrá extraviado. Por eso les envío nuevamente los detalles de ese diá.
(c) Select further numbers as appropriate.

Thank you letter

Estimados Señores:

Por la presente me es muy grato saludarles y comunicarles que he recibido en buena forma hace unos dias su atenta carta (y el banderín) que tan gentilmente me remitieron. Estoy muy contento de recibir por su parte la confirmación de recepción de su emisora y espero que su señal continué siendo audible para así poder seguir los acontecimientos en su país.

Agradeciendoles nuevamente la atención dispensada, reciban los más cordiales saludos,

Muy atentamente,

Portuguese version

Prezados senhores:

1 Interesso-me bastante pelo que ocorre e pelos costumes e a vida em geral na America Latina.
2 Como os senhores podem compreender, as estações de rádio e televisão nesta parte do mundo não dedicam muita atenção às noticías da (Lat. America or name of country). Além disso são poucos os discos de música folclórica do seu páis que podemos obter aqui.
3 Porisso sintonizo as bandas tropicais no meu aparelho de ondas curtas para acompanhar diretamente a evolução dos acontecimentos e para ouvir um estilo de música que aprecio.
4 Recentemente tive a sorte de sintonizar a Rádio...e muito embora eu compreenda que os seus programas não são dirigidos a um público internacional, creio, no entanto, que os senhores certamente terão interesse em saber que as suas transmissões podem ser ouvidas a milhares de quilômetros de distancia.
5 Para lhes dar um exemplo, eu anotei os detalhes de uma transmissao recente.

6 No dia (date) às . . . (local time) (name of country or location) eu sintonizei um programa da Rádio . . . transmitido em . . . kHz, na faixa de 60/90/120 metros da banda tropical em Ondas Curtas.
7 Às . . . (time) os senhores rodaram um anuncio comercial para . . . .
8 Escutei um noticiáro às . . . .
9 O nome da estação foi anunciado às . . . (time) com as sequintes palavras '. . . .'
10 Reconheci um trecho de uma música com o titulo . . . tocada às . . . (time).
11 Sua transmissão foi encerrada com o hino nacional as . . . (time).
12 Sua estacão iniciou a transmissão às . . . (local time) hora local.
13 Houve uma interrupçao na transmissão entre . . . e . . . (time).
14 A qualidade do sinal era muito boa/boa/razoável e gostei da programação. Gostei também da música tocada, bastante agradável aliás.
15 A qualidade do sinal recebido aqui em . . . era naturalmente fraca, mesmo assim consequi acompanhar algo do programa.
16 Havia uma interferencia fraca/forte da Rádio . . . transmitindo de . . . na frequencia de . . . kHz.
17 Meu receptor é um . . . de fabricação japonesa/alemã/americana, marca . . . Possui um circuito de acordo com o 'principio heterodino' e tem . . . (number of transistors in your radio) de transistores.
18 A antena é uma (long wire) dipolo/antena 'loop' de onda media e tem . . . metros de extensão e uma altura de . . . metros.
19 Como o sinal da sua transmissão varia de intensidade durante diversos períodos do ano, nem sempre é possivel sintonizá-lo o que é uma pena, principalmente porque asua emissora oferece excelente música e boas informacoes.
20 Ficarei bastante grato se puderem confirmar por escrito que sintonizei a Radio . . . de acordo com os detalhes em anexo.
21 Gostaria de receber também uma flâmula, se houver, e mairoes detalhes sobre a sua programação.

Estou anexando alguns selos novos do seu país como contribuicao para as despesas postais.

Estou anexando $ para ajudar a cobrir as despesas com o porte.

22 Estou incluindo tambem alguns postais/selos desta parte do mundo que ponderão lhes interessar e para lhes dar uma ideia do panorama por aqui . . . .
23 (Name of your town) fica localizada a uns . . . kms ao norte/sul/leste/oeste de (name of major city or capital).
24 Anticipadamente grato pela sua ajuda e aguardo sua resposta para breve.
25 Antenciosamente,

Follow-up report

(a) Repeat sentences 1–4 then . . . .
(b) No dia . . . (date of dispatch of reception report) enviei-lhes os detalhes sobre a qualidade de recepção nesta parte do mundo. Como já

faz algum tempo e não obtive resposta, acredito que a minha carta deve ter-se extraviada. Por isso incluo os detalhes da recepção naquele dia.

(c) Select further numbers as appropriate.

Thank you letter

Prezados senhores:

Desejo agradecer a sua carta (e flâmula) que recebi ha alguns dias. Fiquei satisfeito ao receber a confirmação do meu relatorío da sua estação. Faco votos que o sinal da sua emissora continue audivel nesta parte do mundo para que eu possa continuar acompanhando os acontecimentos em seu pais.

Obrigado pelo seu interesse,

Atenciosamente.

Conclusions

A good Spanish–English and/or Portuguese–English dictionary is always an asset, but be careful about translating from English into either of those languages. The accents on top or below the letters are *important*. Don't forget them. Better to take an elementary course in the language if you are really interested in finding out more about the culture of Latin America.

5 An anti-jamming indoor loop aerial for short waves

S. Mukherjee and G. Wareham

Loop antennas are useful indoors, where they often provide rather more protection than a rod aerial against noise from electrical appliances, and can help reduce the effects of interference (deliberate or accidental). If an outdoor whip or long wire antenna cannot be used for short wave reception, it may be worth constructing a compact indoor loop. This chapter (first published in *Electronics & Wireless World*) describes how the aerial can be used with a communications receiver, or modified for use with a domestic receiver.

The loop antenna (Figure 18) has a main loop which is tuned to the band being received, and a small coupling loop which extracts the signal at a low-impedance level for connection to the receiver via coaxial cable. Both loops are screened against interference by making them from coaxial cable with a short gap in the outer conductor at the top of the loop. The screening (coax. outer) is earthed symmetrically at the bottom of each loop, using the outer of the downlead as an earth connection.

You can make a frame for the loop from wooden laths or bamboo poles using simple tools. Ideally, the frame should allow for easy rotation of the antenna (to maximize pickup and avoid unwanted nulls in the figure-eight shaped directional pattern). It should also be easy to move about to find the best spot in the room which, in general, is likely to be a short distance behind a window, but which varies from building to building.

Best results will be obtained using a well-screened communications receiver fitted with a low impedance (50–80 ohm) antenna socket: with poorly screened receivers, stray pick-up will bypass the loop and increase vulnerability to interference.

Tune the loop to a weak but steady transmission, using a large, insulated knob on the tuning capacitor to reduce hand effects (better with an insulated extension spindle as well). Mount the capacitor on a panel or platform of insulating material fixed near the top of the main loop.

In some receivers the antenna terminals sit at a d.c. potential above 'earth'; with these, insert blocking capacitors (say 10 nF) between antenna and receiver.

Table 5 gives dimensions for circular loops but square loops of equal area may also be used.

This design is not well suited to ordinary domestic receivers because their lack of screening allows signals to bypass the loop. The result is loss of directionality and, at the same time, trouble from local interference of the kind which a magnetic aerial rejects.

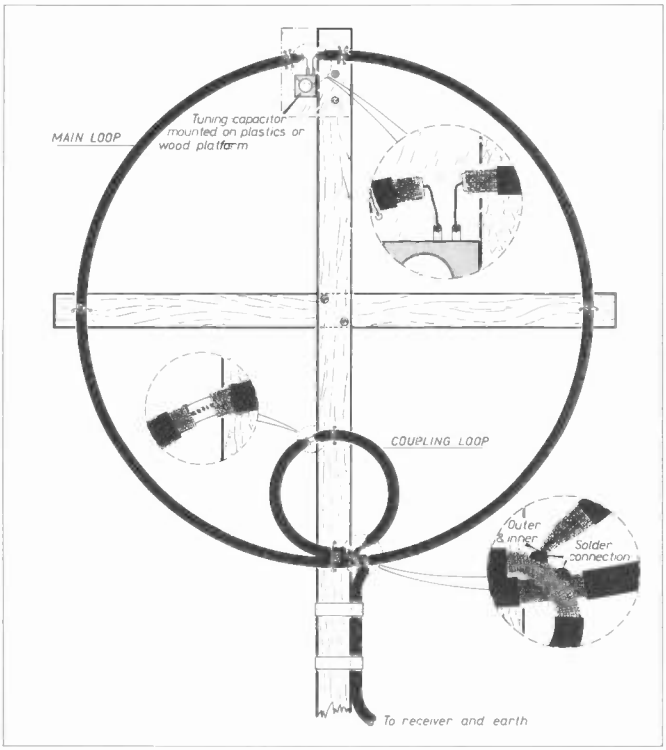


Figure 18 Construction of aerial

Some relatively simple changes can avoid these problems. The first requirement is to provide the receiver with some sort of screening enclosure to exclude direct pickup. A complete screening box is impracticable since it would prevent access to the controls. Experiment shows that an open-fronted box will work, provided that it is deep enough for the receiver to be pushed well inside.

Our tests indicate that a cardboard box covered with aluminium kitchen foil makes an adequate short wave screen. On long and medium waves the amount of screening provided by the thin foil is reduced, enabling the receiver's ferrite aerial to function on these bands.

Table 5

Diameter of main loop	700	440	350	mm
Diameter of coupler	140	105	80	mm
Tuning capacity maximum	500	200	100	pF
Tuning range	4–9	8–18	18–26	MHz

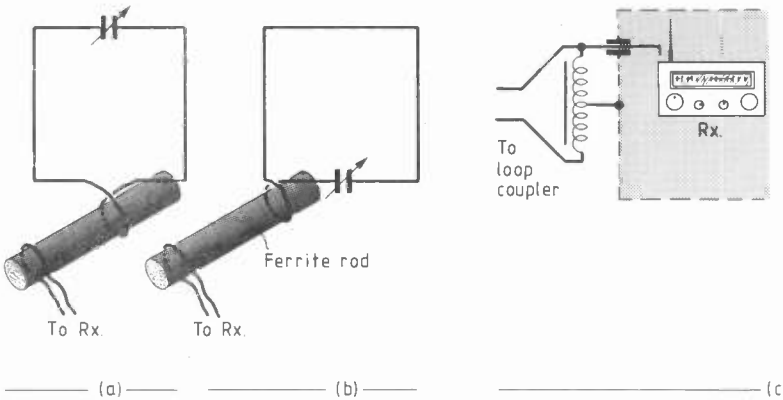
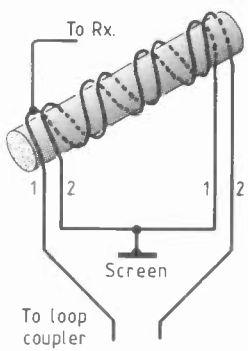


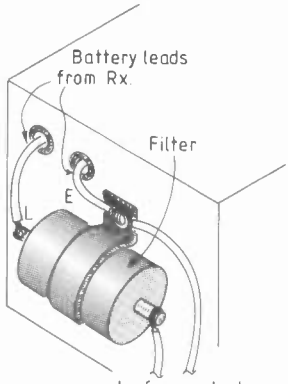
Figure 19 (a) The one or two-turn primary on ferrite rod; (b) the recommended capacitor position; (c) the balun to match aerial and downlead to receiver; (d) the method of avoiding signal injection from the power-supply lead

Having eliminated direct pickup of short wave signals, the next job is to deal with pickup by the downlead. This is done in two steps. First, an unscreened, unearthed loop is substituted for the original design. Any thick, insulated wire (such as mains flex) can be used for the loop, the signals being extracted via a transformer. The primary is formed by passing one or two turns of the loop conductor round a ferrite rod (Figure 19(a)). (An aerial rod from an old MW receiver is adequate.) Coupling to the unscreened twin downlead is effected by a secondary winding: two or three turns will generally be optimum, but the user can easily experiment with different numbers. For reasons explained below it is useful to make the secondary detachable.

Although considerations of symmetry suggest an arrangement like (Figure 19(a)) where the loop can float above earth in a balanced fashion, practical use is eased by putting the tuning capacitor at the bottom (Figure 19(b)) where it is easily reached. We have not noticed any impairment in performance from the assymmetry which results.

The aerial and downlead are balanced, but the receiver input circuit is not. A balun is needed, and this can take the form of a centre-tapped auto-transformer (Figure 19(c)), made with a bifilar winding of hookup wire on a magnetic core. Possible core materials are pieces of ferrite aerial rod, ferrite toroids, and tuning slugs of the through-hole type, which can be used as toroids. In general, the number of turns needed is 5–10, connected as shown. The balun is placed either just outside or just inside the screening box, with its centre tap connected to the foil by a short lead (fold its end into the foil or staple it to the foil). Coupling to the receiver is by wrapping a few turns of insulated wire round the end of the built-in telescopic aerial. We find that this is still the best method, even in a receiver which also has proper aerial and earth terminals. It is not





(d)

necessary to earth the screening box except when power supply considerations require it as explained later.

Check for downlead pickup by slipping the secondary coil off the transformer rod. Signals should vanish or at least become very noisy.

If a receiver is mains operated, the mains lead brings unwanted signals into the screening box. A power-supply filter is then required. One of the author's receivers is a battery-powered one which can be mains-driven via an external adapter (transformer-rectifier unit) which supplies the required low-voltage d.c. via a long lead. In this case, the appropriate side of the d.c. supply is connected to the screening foil and the 'live' side taken to the receiver via a three-terminal capacitor-type filter (Figure 19(d)). A lead from the earthy battery terminal of the receiver is connected to the foil to complete the circuit. A conventional pi-section LC filter can also be used: there were good results from a home-made filter where the series L was a TV frame coil on a ferrite ring core and the Cs were 100 nF polyester film capacitors. Whatever arrangement is used it is essential to keep the connections between capacitors and screening foil very short – a centimetre or less. If longer, their inductance impairs filtering. The case of this author's feed-through filter is the earth terminal and contact with the foil is made by bolting the filter unit to the screening box. The earth connections are made by trapping the bared ends of the earthy d.c. leads between filter and foil.

We have not so far attempted a filter for a receiver with a built-in mains power unit. A balanced filter would presumably be needed, with the earth line connected to the foil and to mains earth. Safety considerations suggest that the screening box should itself be enclosed in an insulating box to avoid contact with the foil.

If the receiver can be battery operated it is useful, when testing power-supply filters, to set up the receiver with the filter in situ but the mains power off. If the receiver is now battery operated it can be seen if signals are getting into the box via the filter.

When operating a well-screened receiver, bringing one's hand to the controls introduces stray signals. This can be an advantage since it allows the receiver to be pretuned to the required frequency before tuning in the loop.

6 Long and medium wave European stations in order of frequency

This list includes only those stations which are believed to be active on the frequencies indicated and which may be heard in Europe. Certain stations located outside the Continent of Europe are sometimes heard in Western Europe and these are included in this section, although they are situated outside the 'European Broadcasting Area'.

This area is bounded on the south by 30° north latitude, that is, by the territories bordering the Mediterranean Sea, excluding those parts of Arabia and Saudi Arabia within this area but including Iraq. On the west it encloses Iceland, Eire and the Azores, and on the east it is bounded by the meridian 40° east of Greenwich.

Stations are listed against the frequency on which they have been heard. Wavelength in metres is shown beside the frequency. The power is in kW.

Alternative station names or exact location of transmitters, where known, are shown after the usual station name. In appropriate cases station names have been given the anglicized spelling.

In certain instances, groups of low powered stations are indicated by a numeral following the name of the main station in the group.

Long wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
153	1921	Brasov	Romania	1200
		Donebach	West Germany	500/250
		Tromsoe	Norway	10
162	1850	Allouis (SF)	France	2000
		Tachkent	USSR	150
171	1754	Lvov	USSR	500
		Kaliningrad	USSR	1000
		Moscow	USSR	500
		Medi 1-Nador	Morocco	1200
180	1667	Oranienburg	East Germany	750
		Alma Ata	USSR	150
		Ankara	Turkey	1200
		Saarlouis	West Germany	2000
189	1587	Motala	Sweden	300
		Tbilisi	USSR	500
		Caltanissetta	Italy	10
200	1500	Droitwich (SF)	UK	400
(198 from		Burghead	UK	50
1.2.1988)		Westerglen	UK	50
		Warsaw	Poland	200
		Leningrad	USSR	150
		Moscow	USSR	100
		Etimesgut	Turkey	200
209	1435	Azilal	Morocco	800
		Reykjavik	Iceland	100
		Eidar	Iceland	20
		Kiev	USSR	500
218	1376	Monte Carlo	Monaco	1400
		Oslo	Norway	200
		Baku	USSR	500
227	1322	Warsaw	Poland	2000
236	1271	Junglinster	Luxembourg	2000
		Leningrad	USSR	1000
		Kichinev	USSR	1000
		Archangel	USSR	150

Long wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
245	1224	Kalundborg	Denmark	200
		Erzurum	Turkey	200
254	1181	Tipaza	Algeria	1500/750
		Lahti	Finland	200
		Erevan	USSR	150
263	1141	Moscow	USSR	2000
		Burg	East Germany	200
272	1103	Ceskoslovensko	Czechoslovakia	1500
281	1068	Sverdlovsk	USSR	500

Medium wave

531	565	Ain Beida	Algeria	600/300
		Jerusalem	Israel	200
		Leipzig	East Germany	100
		Greifswald	East Germany	5
		Beromünster	Switzerland	500
		Titovo Uzice	Yugoslavia	10
		Torshavn	Faroes	5
540	556	Wavre	Belgium	150/50
		Oulu	Finland	10
		Petrosani	Romania	15
		Solt	Hungary	2000
		Sidi Bennour	Morocco	600
549	546	Les Trembles	Algeria	600/300
		Bayreuth	West Germany	200
		Nordkirchen	West Germany	100
		Leningrad	USSR	100
		Kaliningrad	USSR	25
		Moscow	USSR	100
		Belikriz	Yugoslavia	20
558	538	Rutba	Iraq	300
		Abu Zaabal	Egypt	40
		Helsinki	Finland	—
		Faro	Portugal	10
		Guarda	Portugal	10
		Rostock	East Germany	20
		Neubrandenburg	East Germany	10
		Targu Jiu	Romania	200
		Monte Ceneri-C	Switzerland	300
567	529	Berlin	West Germany	100
		Tullamore	Eire	500
		Bologna	Italy	25

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
567	529	Caltanissetta	Italy	25
		Sassari	Italy	10
		Salento	Italy	6
		Aosta	Italy	2
		Valenca do Minho	Portugal	10
		Brasov	Romania	50
		Satu Mare	Romania	50
		Adra	Syria	300
		Volgograd	USSR	250
		Strumica	Yugoslavia	10
576	521	Bechar	Algeria	400/10
		Stuttgart	West Germany	300
		Vidin	Bulgaria	100
		Tel Aviv	Israel	200
		Braga	Portugal	10
		Schwerin	East Germany	250
		Riga	USSR	500
		Prijedor	Yugoslavia	2
585	513	Vienna	Austria	600/240
		Madrid	Spain	200
		Vitoria	Spain	2
		Paris	France	10
		Marseilles	France	4
		Dumfries	UK	2
		Gafsa	Tunisia	350
594	505	Frankfurt	West Germany	400
		Meissner	West Germany	200
		Pleven	Bulgaria	250
		Muge	Portugal	100
		Oujda	Morocco	100
603	498	Lyon	France	300
		Nicosia	Cyprus	20
		Nineva	Iraq	300
		Pico do Arieiro	Madeira	10
		Botosani	Romania	50
		Bucharest	Romania	30
		Turnu Severin	Romania	14
		Oradia	Romania	2
		Newcastle	UK	2
		East Kent	UK	0.5
		Sousse	Tunisia	10
612	490	Athlone	Eire	100
		Tullamore	Eire	100
		Sebaa Aioun	Morocco	300

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
612	490	Sarajevo	Yugoslavia	600
621	483	Wavre	Belgium	300
		Batra	Egypt	1000
		Tenerife	Canaries	100
630	476	Djedeida	Tunisia	600
		Dannenburg	West Germany	10
		Vigra	Norway	100
		Miranda Do Douro	Portugal	1
		Monte Morvelho	Portugal	50
		Chaves	Portugal	1
		Timisoara	Romania	400
		Redruth	UK	2
		Cukurova	Turkey	300
639	469	Zakaki (WS)	Cyprus	500
		Albacete	Spain	10
		La Coruna	Spain	100
		Almeria	Spain	20
		Bilbao	Spain	20
		Zaragoza	Spain	20
		Prague (Liblice)	Czechoslovakia	1500
648	463	WS	UK	500
		Tabruk	Libya	300
		Proghozhina	Albania	300
		Plovdiv	Bulgaria	30
		Simferoful	USSR	150
		Murska Sobata	Yugoslavia	10
		Lazarevac	Yugoslavia	0.1
656	457	Laayoune	Morocco	50
657	457	Neubrandenburg	East Germany	20
		Burg	East Germany	250
		Reichenbach	East Germany	5
		Naples	Italy	120
		Firenze	Italy	100
		Turin	Italy	50
		Bolzano	Italy	25
		Venice	Italy	20
		Madrid	Spain	20
		Murmansk	USSR	150
		Tchernovtsy	USSR	25
		Tel Aviv	Israel	200
		Wrexham	UK	2
		Bodmin	UK	0.5
666	450	Bodenseesender	West Germany	300/180
		Athens	Greece	15

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
666	450	Höfn	Iceland	5
		Lisbon	Portugal	135
		Vila Real	Portugal	10
		Braganza	Portugal	1
		Exeter	UK	0.5
		Fulford	UK	0.5
		Vilnius	USSR	500
		Sombor	Yugoslavia	10
		Tindouf	Algeria	0.5
		Damas-Sabboura	Syria	100
675	444	Marseilles	France	600
		Jerusalem	Israel	20
		Bodoe	Norway	10
		Benghazi	Libya	100
		Lopik	Holland	120
		Uzhgorod	USSR	50
		Volotchisk	USSR	50
		Bosilyegrad	USSR	10/5
684	439	Hof-Saale	West Germany	40
		Seville	Spain	250
		Burgos	Spain	10
		Belgrade	Yugoslavia	2000
693	433	Santa Barbara	Azores	10
		Ain-El-Hamam	Algeria	4
		Nicosia	Cyprus	20
		Barcelona	Spain	20
		Viseu	Portugal	10
		Berlin	East Germany	250
		Droitwich	UK	150
		Burghead	UK	50
		Bexhill	UK	1
		Brighton	UK	1
		Barrow	UK	1
		Enniskillen	UK	1
		Folkestone	UK	1
		Postwick	UK	10
		Redmoss	UK	1
		Stagshaw	UK	50
		Start Point	UK	50
		Basra	Iraq	1200
		Negotin	Yugoslavia	10/5
		Oufa	USSR	150
702	427	Aachen	West Germany	5/1
		Flensburg	West Germany	5/1
		Kleve	West Germany	3

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
702	427	Herford	West Germany	2
		Siegen	West Germany	2
		Banska-Bystrica	Czechoslovakia	400
		Presov	Czechoslovakia	400
		Tatry	Czechoslovakia	14
		Orava	Czechoslovakia	14
		Zilina	Czechoslovakia	14
		Rimavska Sobata	Czechoslovakia	14
		Monte Carlo	Monaco	300
		Sebaa-Aioun	Morocco	140
		Finnmark	Norway	20
		Kaliningrad	USSR	500
		El Kharga	Egypt	10
		Umraniye	Turkey	150
711	422	Heidelberg	West Germany	5
		Heilbronn	West Germany	5
		Ulm	West Germany	5
		Bopfingen	West Germany	0.2
		Wertheim	West Germany	0.2
		Abu Zabaal	Egypt	100
		Rennes	France	300
		Ghadames	Libya	50
		Jefren	Libya	50
		Sebha	Libya	50
		Tallinn	USSR	50
		Donetsk	USSR	150
		Kokhtla-Jarva	USSR	5
		Parnu	USSR	5
		Tartu	USSR	5
		Nis	Yugoslavia	20
		Sighet	Romania	30
		Jerusalem	Israel	—
720	417	Langenberg	West Germany	200
		Holzkirchen	West Germany RFE/RL	150
		WS	Cyprus	500
		Santa Cruz	Canaries	20
		Sfax	Tunisia	200
		Norte-Azurara	Portugal	100
		Mirandela	Portugal	10
		Castelo Branco	Portugal	1
		Faro	Portugal	10
		Predeal	Romania	14
		Borsa	Romania	1
		Isaccea	Romania	1
		Lisnagarvey	UK	10

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
720	417	London	UK	0.1
		Londonderry	UK	0.25
729	412	Puttbus	East Germany	5
		Athens	Greece	150
		Cork	Eire	10
		Oviedo	Spain	50
		Logrono	Spain	20
		Sadiyat	United Arab Emirates	700
		Malaga	Spain	20
738	407	In Amenas	Algeria	5
		Barcelona	Spain	250
		Tel Aviv	Israel	1200
		Poznan	Poland	300
		Tchelyabinsk	USSR	150
		Zagreb	Yugoslavia	25
		Krusevac	Yugoslavia	10
		Sibenik	Yugoslavia	2
747		Titovo	Yugoslavia	1
		Petrich	Bulgaria	500
		Cadiz	Spain	10
		Flevoland	Holland	400
		Sarakeb	Syria	100
		Bandar	Iran	800
756	397	Brunswick	West Germany	800/200
		Ravensburg	West Germany	100
		Delimara	Malta	20
		Lugoj	Romania	400
		Redruth	UK	2
		Carlisle	UK	1
		Shrewsbury	UK	1
		Hurriyah	Iraq	300
765	392	Ionnanina	Greece	10
		Sottens	Switzerland	500
		Medvejyagorsk	USSR	150
		Odessa	USSR	150
		Zadar	Yugoslavia	2
		Koprivnica	Yugoslavia	1
774	388	Langenfeld	Austria	0.05
		Sankt Gallenkirch	Austria	0.05
		Stolnik	Bulgaria	60
		Varna	Bulgaria	30
		Caceres	Spain	60
		Granada	Spain	4

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
774	388	Valencia	Spain	50
		Soria	Spain	10
		Orense	Spain	20
		San Sebastian	Spain	20
		Enniskillen	UK	1
		Cheltenham	UK	0.2
		Plymouth	UK	1
		Leeds	UK	0.5
		Littlebourne	UK	0.7
		Voronej	USSR	100
		Zagreb	Yugoslavia	20
		Abis	Egypt	500
783	383	Burg	East Germany	1000
		Miramar	Portugal	50
		Kazan	USSR	150
		Kiev	USSR	100
		Simferopol	USSR	50
		Ujgorod	USSR	50
		Djanet	Algeria	5
		Tartus	Syria	600
792	379	Seville	Spain	20
		Limoges	France	300
		Kavalla	Greece	500
		Sirte	Libya	20
		Prague	Czechoslovakia	30
		Bratislava	Czechoslovakia	6
		Astrakhan	USSR	50
		Arandjelovac	Yugoslavia	2
		Banovici	Yugoslavia	1
		Londonderry	UK	1
		Bedford	UK	0.2
		Capljina	Yugoslavia	1
801	375	Munich (Ismaning)	West Germany	450/420
		Nuremberg	West Germany	50
		Ajlun	Jordan	2000
		Amman	Jordan	200
		Barnstaple	UK	2
		Leningrad	USSR	1000/500
810	370	Berlin	West Germany	5
		Madrid	Spain	20
		Burghead	UK	100
		Westerglen	UK	100
		Redmoss	UK	5
		Dumfries	UK	2

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
810	370	Volgograd	USSR	150
		Vyru	USSR	5
		Skopje	Yugoslavia	1000
819	366	Sud Radio	Andorra	900
		Batra	Egypt	450
		Trieste	Italy	25
		Rabat	Morocco	25
		Warsaw	Poland	300
828	362	Sebha	Libya	300
		Oujda	Morocco	100
		Hanover	West Germany	100/5
		Freiburg	West Germany	40
		Shumen	Bulgaria	500
		Sofia	Bulgaria	60
		Barcelona	Spain	20
		Castelo Branco	Portugal	1
		Coimbra	Portugal	1
		Covilha	Portugal	1
		Guarda	Portugal	1
		Viseu	Portugal	1
		Bournemouth	UK	0.5
		Leeds	UK	0.2
		Luton	UK	0.2
		Sedgley	UK	0.2
		Deir El Zor	Syria	—
		Gorkii	USSR	100
		Vrbovec	Yugoslavia	1
837	358	Barossa	Azores	10
		Beni Abbes	Algeria	5
		Las Palmas	Canaries	10
		Nancy	France	200
		Barrow	UK	1
		Leicester	UK	0.7
		Kharkov	USSR	150
		Zagreb Gospic	Yugoslavia	10
		Zagreb Dubrovnik	Yugoslavia	2
846	355	Zefat	Israel	5
		Rome	Italy	540
		Ceske Budejovice	Czechoslovakia	30
		Ostrava	Czechoslovakia	30
		Moscow	USSR	60
		Elista	USSR	30
855	351	Berlin	West Germany	100

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
855	351	Bucharest	Romania	1500
		Murcia	Spain	125
		Santander	Spain	20
		Pontevedra	Spain	20
		Pamplona	Spain	10
		Ponferrada	Spain	10
		Huelva	Spain	5
		Preston	UK	1
		Postwick	UK	1
		Plymouth	UK	1
		Amman	Jordan	10
		Penza	USSR	30
864	347	Blagoevgrad	Bulgaria	30
		Paris	France	300
		Kelcyra	Albania	1
		Santah	Egypt	500
		Errachidia	Morocco	15
		Usti Nad Labem	Czechoslovakia	6/1
		Yerevan	USSR	150
		Zagreb	Yugoslavia	10
		Ivanic Grad	Yugoslavia	1
		Sokolac	Yugoslavia	1
873	344	Cairo (Abu Zaabal)	Egypt	50
		Ghardaia	Algeria	5
		Frankfurt	West Germany AFN	150
		Stara Zagora	Bulgaria	30
		Zaragoza	Spain	20
		Budapest	Hungary	20
		Pecs	Hungary	15
		Enniskillen	UK	1
		Kings Lynn	UK	0.25
		Damascus	Syria	10
		Leningrad	USSR	150
		Kaliningrad	USSR	100
882	340	Sabadell	Spain	2
		La Laguna	Canaries	20
		Bet Hillel	Israel	1
		Koenigswuster-hausen	East Germany	100
		Washford	UK	70
		Forden	UK	1
		Penmon	UK	10
		Tywyn	UK	5
		Titograd	Yugoslavia	100

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
882	340	Matruh	Egypt	10
891	337	Algiers	Algeria	600/300
		Hulsberg	Holland	10
		Antalya	Turkey	600
		Ujgorod	USSR	150
		Dniepropetrovsk	USSR	20
900	333	Guriat	Saudi Arabia	1000
		Milan	Italy	600
		Brno	Czechoslovakia	30
		Karlovy Vary	Czechoslovakia	30
		Iochkar-Ola	USSR	50
		Belgrade	Yugoslavia	2
909	330	Hurriyah	Iraq	300
		Giaghboub	Libya	20
		Kufra	Libya	10
		Angraheroismo	Azores	10
		Safi	Morocco	5
		Cluj	Romania	50
		Resita	Romania	15
		Moorside Edge	UK	150
		Brookmans Park	UK	140
		Clevedon	UK	50
		Westerglen	UK	50
		Lisnagarvey	UK	10
		Redruth	UK	2
		Exeter	UK	1
		Fareham	UK	1
		Fernbarrow	UK	1
		Londonderry	UK	1
		Whitehaven	UK	1
		Tamanrasset	Algeria	5
918	327	Paphos	Cyprus	2
		Cairo	Egypt	10
		Madrid	Spain	20
		Mezen	USSR	100
		Makhach Kala	USSR	50
		Liubliana	Yugoslavia	600/100
927	324	Wolvertem	Belgium	200
		Evora	Portugal	1
		Timimoun	Algeria	5
		Zakynthos	Greece	50
		Ismir	Turkey	200
936	321	Bremen	West Germany	100
		Bremerhaven	West Germany	5
		West Wiltshire	UK	0.2

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
936	321	Cairo	Egypt	20
		Trapani	Italy	5
		Gevgelija	Yugoslavia	10
		Djakovica	Yugoslavia	20
		Dorji Miholjac	Yugoslavia	0.05
		Ruma	Yugoslavia	1
		Lvov	USSR	500
		Agadir	Morocco	600
945	317	Pleven	Bulgaria	30
		Toulouse	France	300
		Larissa	Greece	5
		Miercurea Ciuc	Romania	14
		Rostov-Na-Donu	USSR	300
		Riga	USSR	50
		Sarajevo	Yugoslavia	300
		Kumanovo	Yugoslavia	2
		Backi Petrovac	Yugoslavia	0.1
		Smederevo	Yugoslavia	1
954	314	Madrid	Spain	20
		Iraklion	Greece	20
		Torbay	UK	0.4
		Hereford	UK	0.2
		Brno	Czechoslovakia	100
		Trabzon	Turkey	300
963	321	Korce	Albania	15
		Sofia	Bulgaria	150
		Turku	Finland	100
		Paris	France	8
		Tir Chonaill	Eire	10
		Lisbon	Portugal	1
		Djedeida	Tunisia	200
		Celje	Yugoslavia	2
		Radio Caroline	At sea	50
		Soba	Sudan	60
972	309	Puke	Albania	20
		Hamburg	West Germany	300
		Marrakesh	Morocco	1
		Nikolaev	USSR	500
981	306	Algiers	Algeria	600/300
		Baris	Egypt	5
		Assiut	Egypt	1
		Megara	Greece	200
		Trieste	Italy	10
		Ceske Budejovice	Czechoslovakia	7

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
981	306	Karlovy Vary	Czechoslovakia	7
		Ostrava	Czechoslovakia	1
		Bor	Yugoslavia	10
		Cacak	Yugoslavia	10
		Bjelovar	Yugoslavia	1
		Guarda	Portugal	1
990	303	Kukes	Albania	10
		Berlin	West Germany	300
		Hof	West Germany	40
		Idfu	Egypt	1
		Barcelona	Spain	10
		Bilbao	Spain	10
		Ceuta	Spain	0.5
		Doncaster	UK	0.3
		Exeter	UK	1
		Redmoss	UK	1
		Tywyn	UK	1
		Wolverhampton	UK	0.1
		Foca	Yugoslavia	1
		Pozarevac	Yugoslavia	1
		Zupanja	Yugoslavia	1
		Shiraz	Iran	400
999	300	Madrid	Spain	20
		Turin	Italy	50
		Rimini	Italy	6
		Vatican City	Vatican	2
		Delimara	Malta	20
		Addakhla	Morocco	10
		Hoyerswerda	East Germany	20
		Schwerin	East Germany	20
		Weimar	East Germany	20
		Fareham	UK	1
		Preston	UK	0.8
		Nottingham	UK	0.2
		Kichinev	USSR	500
1008	298	Beni Suef	Egypt	1
		Las Palmas	Canaries	10
		Kerkyra	Greece	50
		Flevoland	Holland	400
		Slonim	USSR	50
		Uchachi	USSR	50
		Aleksinac	Yugoslavia	400/120
		Belgrade	Yugoslavia	200/120
1017	245	Wolfsheim	West Germany	600
		Kardjali	Bulgaria	30

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1017	245	Venice	Italy	25
		Genoa	Italy	10
		Tangier	Morocco	1
		Nitra	Czechoslovakia	50
		Bratislava	Czechoslovakia	6
		Hradec Kralove	Czechoslovakia	6
		Rimavska Sobota	Czechoslovakia	6
		Kosice	Czechoslovakia	2
		Istanbul	Turkey	1200
1026	292	Hassi Messaoud	Algeria	5
		Linz Kronstorf	Austria	100
		Dornbirn Lauterach	Austria	50
		Scharnitz	Austria	0.05
		Alicante	Spain	3
		Gijon	Spain	2
		Vigo	Spain	3
		Reus	Spain	2
		Tel Aviv	Israel	50
		Rabat	Morocco	1
		Chesterton Fen	UK	0.5
		Belfast	UK	1
		Trinity	UK	1
		Brest	USSR	5
		Grodno	USSR	5
		Niandoma	USSR	5
		Pinsk	USSR	5
		Kragujevac	Yugoslavia	10
		Bar	Yugoslavia	5
		Skopje	Yugoslavia	2
		Nova Gradiska	Yugoslavia	1
1035	290	Milan	Italy	50
		Naples	Italy	25
		Venice	Italy	25
		Genoa	Italy	10
		Firenze	Italy	6
		Pescara	Italy	6
		Salento	Italy	6
		Caltanissetta	Italy	2
		Oristano	Italy	2
		Potenza	Italy	1
		Lisbon	Portugal	120
		Sheffield	UK	1
		Aberdeen	UK	0.5
		Ayr	UK	0.5

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1035	290	Chatham	UK	0.5
		Tallinn	USSR	500
		T. Mitrovica	Yugoslavia	5
1044	287	Dhekelia	Cyprus	1
		Thessaloniki	Greece	150
		Sebaa-Aioun	Morocco	300
		Dresden	East Germany	250
		Wachenbrunn	East Germany	250
		Tbilisi	USSR	100
		Podravska Slatina	Yugoslavia	1
		Temerin	Yugoslavia	0.1
1053	285	Tripoli	Libya	50
		Tangier	Morocco	600
		Iasi	Romania	1000
		Droitwich	UK	150
		Start Point	UK	100
		Stagshaw	UK	50
		Burghead	UK	20
		Postwick	UK	10
		Bexhill	UK	2
		Brighton	UK	2
		Barnstaple	UK	1
		Barrow	UK	*
		Dundee	UK	1
		Enniskillen	UK	*
		Folkestone	UK	1
		Hull	UK	*
		Londonderry	UK	1
1062	282	Kalundborg	Denmark	250
		Abu Zaabal	Egypt	50
		Gagliari	Italy	25
		Squinzano	Italy	25
		Catania	Italy	2
		Udine	Italy	2
		Verona	Italy	2
		Livorno	Italy	1
		Trento	Italy	1
		Azurara	Portugal	100
		Diyabakir	Turkey	300
		Saransk	USSR	150
		Zagreb	Yugoslavia	10
		Svetozarevo	Yugoslavia	5
1071	280	Lille	France	40
		Bastia	France	20

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1071	280	Brest	France	20
		Grenoble	France	20
		Montpellier	France	10
		Tartus	Syria	60
		Prague	Czechoslovakia	60
		Mnich Hradiste	Czechoslovakia	50
		Ceske Budejovice	Czechoslovakia	7
		Riga	USSR	60
		Kuldiga	USSR	50
		Valmiera	USSR	50
		Banja Luka	Yugoslavia	25
1080	278	El Minya	Egypt	10
		Luxor	Egypt	5
		Granada	Spain	5
		La Coruna	Spain	5
		Palma (Mallorca)	Spain	2
		Toledo	Spain	2
		Orestias	Greece	20
		Jerusalem	Israel	5
		Jalo	Libya	5
		Ajedabia	Libya	40
		Casablanca	Morocco	1
		Katowice	Poland	1500
1089	275	Durres	Albania	150
		Adrar	Algeria	5
		Akrotiri	Cyprus	10
		Brookmans Park	UK	150
		Markneukirchen	West Germany	1
		Moorside Edge	UK	150
		Washford	UK	50
		Westerglen	UK	50
		Lisnagarvey	UK	2
		Redmoss	UK	2
		Redruth	UK	2
		Fareham	UK	1
		Tywyn	UK	1
		Novi Sad	Yugoslavia	—
		Whitehaven	UK	1
		Krasnodar	USSR	300
1098	273	Quargla	Algeria	5
		Santa Cruz De Palma	Canaries	5
		Bologna	Italy	60
		Alma Ata	USSR	150

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1098	273	Vologda	USSR	5
		Bratislava	Czechoslovakia	400
1107	271	Munich	West Germany AFN	100
		Berlin	West Germany AFN	100
		Grafenwohr	West Germany AFN	10
		Kaiserslautern	West Germany AFN	10
		Nuremberg	West Germany AFN	10
		Batra	Egypt	600
		Rome	Italy	6
		Barcelona	Spain	10
		Caceres	Spain	5
		Turuel	Spain	5
		Vigo	Spain	5
		Murcia	Spain	2
		Palencia	Spain	2
		Ponferrada	Spain	2
		Santander	Spain	2
		Socuellamos	Spain	2
		Valladolid	Spain	2
		Inverness	UK	1
		Northampton	UK	0.5
		Wallasey	UK	0.5
		Kaunas	USSR	150
		Novi Sad	Yugoslavia	150
1116	269	Miskolc	Hungary	12
		Moson-magyarovar	Hungary	2
		Rutba	Iraq	300
		Bari	Italy	150
		Bologna	Italy	60
		Pisa	Italy	25
		Palermo	Italy	12.5
		Trieste	Italy	6
		Aosta	Italy	2
		Quarzazate	Morocco	15
		Tangier	Morocco	1
		Bloemendaal	Holland	0.05
		Derby	UK	0.5
		Kaliningrad	USSR	30
		Moscow	USSR	5
1125	267	El Beida	Libya	500
		La Louviere	Belgium	20
		Llandrindod Wells	UK	1
		Leningrad	USSR	150

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1134	265	Bilbao	Spain	10
		Zaragoza	Spain	10
		Almeria	Spain	2
		Aviles	Spain	2
		Caceres	Spain	2
		Ciudad Real	Spain	2
		Ciudadela	Spain	2
		Ferrol	Spain	2
		Figueras	Spain	2
		Jaen	Spain	2
		Orense	Spain	2
		Pamplona	Spain	2
		Salamanca	Spain	2
		Astorga	Spain	2
		Lorca	Spain	2
		Zadar	Yugoslavia	1200
1143	262	Les Trembles	Algeria	40/20
		Stuttgart	West Germany AFN	10
		Bremerhaven	West Germany AFN	5
		Heidelberg	West Germany AFN	1
		Hof	West Germany AFN	1
		Karlsruhe	West Germany AFN	1
		11 low power	West Germany AFN	0.3
		Sohag	Egypt	5
		Messina	Italy	6
		Kuibyshev	USSR	100
		Zagreb	Yugoslavia	85
1152	260	Marrakesh	Morocco	1
		Cluj	Romania	950
		London	UK	5.5
		Glasgow	UK	2
		Norwich	UK	1
		Tyne and Wear	UK	1
		Birmingham	UK	0.8
		Plymouth	UK	0.5
		Manchester	UK	0.35
1161	258	In Salah	Algeria	5
		Stara Zagora	Bulgaria	500
		Sofia	Bulgaria	60
		Tanta	Egypt	60
		Strasbourg	France	200
		Toulouse	France	50
		Ajaccio	France	20
		Bedford	UK	0.08
		Bexhill	UK	1

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1161	258	Dundee	UK	0.5
		Hull	UK	0.5
		Swindon	UK	0.4
		Zenica	Yugoslavia	2
1170	256	Vila Real	Portugal	10
		Keula	East Germany	5
		Swansea	UK	0.5
		Stockton-on-Tees	UK	0.5
		Ipswich	UK	0.3
		Stoke-on-Trent	UK	0.25
		Portsmouth	UK	0.2
		Moghilev	USSR	1000
		Maikop	USSR	500
		Beli Kriz	Yugoslavia	300/100
		Vrnjacka Banja	Yugoslavia	1
		Backa Topola	Yugoslavia	1
1179	254	Qena	Egypt	10
		Murcia	Spain	5
		Barcelona	Spain	10
		Thessaloniki	Greece	50
		Bacau	Romania	200
		Vascau	Romania	5
		Solvesborg	Sweden	600
		Van Iskelesi	Turkey	2
		Samobor	Yugoslavia	1
		Smederevska Palanka	Yugoslavia	1
1188	253	Kuurne	Belgium	5
		Ras Gharib	Egypt	10
		Szolnok	Hungary	135
		Szombathely	Hungary	25
		Dublin	Eire	—
		Casablanca	Morocco	1
		San Remo	Italy	6
1197	251	Portalegre	Portugal	1
		Munich	West Germany	300
		Alexandria	Egypt	10
		Nineva	Iraq	300
		Agadir	Morocco	20
		Enniskillen	UK	1
		Bournemouth	UK	1
		Torquay	UK	0.5
		Cambridge	UK	0.2
		Minsk	USSR	50
		Bjeljina	Yugoslavia	2

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1197	251	Bosanski Novi	Yugoslavia	1
		Kriva Palanka	Yugoslavia	1
		Visoko	Yugoslavia	1
1206	249	Korce	Albania	10
		Bordeaux	France	100
		Haifa	Israel	50
		Wroclaw	Poland	200
		Lublin	Poland	60
		Koszalin	Poland	10
		Olsztyn	Poland	2
		Bosanski Brod Majdanpek	Yugoslavia	1
1215	247	Lushnje	Albania	500
		Las Palmas	Canaries	20
		Washford	UK	60
		Brookmans Park	UK	50
		Moorside Edge	UK	50
		Westerglen	UK	40
		Droitwich	UK	30
		Burghead	UK	20
		Lisnagarvey	UK	10
		Hull	UK	0.3
		Tyne and Wear	UK	2
		Londonderry	UK	1
		Redmoss	UK	2
		Redruth	UK	2
		Brighton	UK	1
		Fareham	UK	1
		Plymouth	UK	1
		Postwick	UK	1
		Tywyn	UK	1
		Tartu	USSR	50
		Orrisare	USSR	30
		Kursk	USSR	20
		Djurdjevac	Yugoslavia	1
		Mladenovac	Yugoslavia	1
1224	245	Vidin	Bulgaria	500
		Granada	Spain	5
		Albacete	Spain	2
		Cordoba	Spain	2
		Avelva	Spain	2
		Jerez	Spain	2
		Lerida	Spain	2
		Lugo	Spain	2
		Palma Mallorca	Spain	2

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1224	245	San Sebastian	Spain	2
		Santander	Spain	2
		Zamora	Spain	2
		Puertolland	Spain	2
		Beer Sheva	Israel	20
		Bijelina	Yugoslavia	2
		Krapina	Yugoslavia	1
1233	243	Liege	Belgium	5
		Cape Greco	Cyprus	600
		Tangier	Morocco	200
		Prague	Czechoslovakia	400
		Ceske Budejovice	Czechoslovakia	60
		Karlovy Vary	Czechoslovakia	50
		Pilsen	Czechoslovakia	7
		Hradec Kralove	Czechoslovakia	6
		Strakonice	Czechoslovakia	7
		Ilijas	Yugoslavia	1
1242	242	Vaasa	Finland	25
		Marseille	France	150
		Maidstone	UK	Low
		Kiev	USSR	150
		Simferopol	USSR	50
		Volotchisk	USSR	50
		Donetsk	USSR	30
		Odessa	USSR	30
		Modrica	Yugoslavia	0.1
		Ohrid	Yugoslavia	5
		Liubliana-Student	Yugoslavia	Low
1251	240	Siofok	Hungary	135
		Nyiregyhasa	Hungary	25
		Hulsberg	Holland	—
		Porto	Portugal	10
		Chaves	Portugal	1
		Viseu	Portugal	10
		Castelo Brancu	Portugal	1
		Bury St Edmunds	UK	0.5
		Gorazde	Yugoslavia	1
		Tripoli	Libya	500
1260	238	Fier	Albania	1
		Valencia	Spain	10
		San Sebastian	Spain	10
		Algeciras	Spain	5

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1260	238	Badajoz	Spain	5
		Rhodes	Greece	500
		Szczecin	Poland	160
		Bristol	UK	0.8
		Leicester	UK	0.2
		Wrexham	UK	0.6
		Scarborough	UK	0.1
		Vatican City	Vatican	5
1269	236	Neumunster	West Germany	600
		La Orotava	Canaries	—
		Las Palmas	Canaries	20
		Novi Sad	Yugoslavia	600
1278	235	Assiut	Egypt	10
		Aswan	Egypt	10
		Turku	Finland	4
		Strasbourg	France	300
		Florina	Greece	20
		Cork	Eire	10
		Dublin	Eire	10
		Bradford	UK	0.3
		Odessa	USSR	150
1287	233	El Golea	Algeria	5
		Tel Aviv	Israel	100
		Ceskoslovensto	Czechoslovakia	300
		Bratislava	Czechoslovakia	30
		Liblice	Czechoslovakia	200
		Presov	Czechoslovakia	30
		Kocani	Yugoslavia	1
		Petrinja	Yugoslavia	1
1296	231	Kardjali	Bulgaria	150
		Rabat	Morocco	1
		Orfordness WS	UK	500
		Baku	USSR	150
		Loznica	Yugoslavia	10
		Vranje	Yugoslavia	10
1305	230	Ciirokaster	Albania	15
		Constantine	Algeria	20
		Marche	Belgium	10
		Assiut	Egypt	1
		Haifa	Israel	20
		Eilat	Israel	5
		Rzeszow	Poland	100
		Bialystok	Poland	60
		Gdansk	Poland	60
		Lodz	Poland	60

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1305	230	Barnsley	UK	0.3
		Newport	UK	0.23
		Bosanska Krupa	Yugoslavia	1
		Cakovec	Yugoslavia	1
		Herceg Novi	Yugoslavia	1
		Vinkovci	Yugoslavia	1
1314	228	Hurghada	Egypt	10
		Valencia	Spain	20
		San Sebastian	Spain	10
		Cadiz	Spain	2
		Sama Langreo	Spain	2
		Soria	Spain	2
		Tarrega	Spain	2
		Tripolis	Greece	10
		Ancona	Italy	6
		Campobasso	Italy	1
		Catanzaro	Italy	1
		Matera	Italy	1
		Kvitsoy	Norway	1200
		Timisoara	Romania	30
		Constantza	Romania	14
		Craiova	Romania	7
		Aleppo	Syria	10
		Skopje	Yugoslavia	100
		Ohrid	Yugoslavia	10
1323	227	Shkoder	Albania	10
		Limassol (World Service)	Cyprus	200
		Leipzig	East Germany	150
		Targu Mures	Romania	10
		Taunton	UK	1
		Bitola	Yugoslavia	10
		Gostivar	Yugoslavia	2
		Sid	Yugoslavia	1
		Safi	Morocco	5
1332	225	Rome	Italy	300
		Bari	Italy	50
		Pescara	Italy	25
		Palermo	Italy	12.5
		Elvas	Portugal	1
		Galatzi	Romania	15
		Peterborough	UK	0.5
		Jihlava	Czechoslovakia	14
		Vyru	USSR	30
		Parnu	USSR	20

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1332	225	Khokhtla	USSR	15
		Gnjilane	Yugoslavia	2
1341	224	Cairo	Egypt	100
		Budapest	Hungary	150
		Lisnagarvey	UK	100
		Zajelar	Yugoslavia	10
		Santa Cruz (Tenerife)	Canaries	20
1350	222	Quseir	Egypt	2
		Nancy	France	100
		Nice	France	100
		Purgos	Greece	4
		Gyor	Hungary	5
		Szolnok	Hungary	5
		Erevan	USSR	150
		Madona	USSR	50
		Kuldiga	USSR	20
		Zabok	Yugoslavia	1
1359	221	Tirana	Albania	50
		Berlin	East Germany	250/100
		Chelmsford	UK	0.3
		Cardiff	UK	0.25
		Bournemouth	UK	0.25
		Coventry	UK	0.1
		Moscow	USSR	150
		Vrbas-Kula	Yugoslavia	2
		Kirkuk	Iraq	120
1368	219	Venice	Italy	20
		Naples	Italy	12.5
		Milan	Italy	12
		Genoa	Italy	10
		Turin	Italy	6
		Messina	Italy	5
		Catania	Italy	2
		Firenze	Italy	2
		Palermo	Italy	2
		Pisa	Italy	2
		Sassari	Italy	2
		Bari	Italy	1
		Trento	Italy	0.1
		Cracow	Poland	60
		Zielona Gora	Poland	30
		Foxdale	UK	2
		Lincoln	UK	2
		Valjevo	Yugoslavia	10

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1368	219	Sanski Most	Yugoslavia	1
1377	218	Shumen	Bulgaria	30
		Lille	France	300
		Canidelo	Portugal	10
		Lutsk	USSR	50
		Tcherovtsy	USSR	50
		Vinnitsa	USSR	30
		Prizren	Yugoslavia	10/2
		Zagreb	Yugoslavia	4
1386	216	Athens	Greece	50
		Kaunas	USSR	500
		Kratovo	Yugoslavia	1
1395	215	Angra Heroismo	Azores	1
		Lushnje	Albania	1000
		Granada	Spain	5
		La Coruna	Spain	5
		Alicante	Spain	2
		Ciudad Real	Spain	2
		Huelva	Spain	2
		Leon	Spain	2
		Tortosa	Spain	2
		Bugojno	Yugoslavia	1
		Doboj	Yugoslavia	1
1404	214	Tripoli	Libya	20
		Helsinki	Finland	2
		Ajaccio	France	20
		Brest	France	20
		Pau	France	20
		Dijon	France	1
		Grenoble	France	1
		Baia Mare	Romania	15
		Dniepropetrovsk	USSR	30
		Lvov	USSR	30
		Izmail	USSR	25
1413	212	Bad Mergentheim	West Germany	3
		Heidenheim	West Germany	0.2
		Zaragoza	Spain	20
		Seville	Spain	10
		Oviedo	Spain	5
		Vitoria	Spain	2
		Pristina	Yugoslavia	1000
1422	211	Algiers	Algeria	50
		Saarbrucken	West Germany	1200/600
		Ras Ghareb	Egypt	10

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1422	211	7 low power stations	Romania	15
		Valmiera	USSR	50
		Liepaia	USSR	5
		Rezekne	USSR	5
1431	210	Foggia	Italy	2
		Pesaro	Italy	2
		Taranto	Italy	1
		Caramulo	Portugal	10
		Dresden	East Germany	20
		Bernburg	East Germany	20
		Wachenbrunn	East Germany	20
		Seelow	East Germany	5
		Weida	East Germany	5
		Southend	UK	0.4
		Reading	UK	0.2
		Krivoi Rog	USSR	500
		Probistip	Yugoslavia	1
		Krizevci	Yugoslavia	0.05
1440	208	Marnach	Luxembourg	1200
		Svetozarevo	Yugoslavia	10
		Mizurata	Libya	20
1449	207	Berlin	West Germany	5
		Squinzano (plus 24 low power stations)	Italy	50
		Redmoss	UK	2
		Peterborough	UK	0.1
		Kalinin	USSR	30
		Karlovac	Yugoslavia	2
1458	206	Lushnje	Albania	500
		Eilat	Israel	1
		Constantza	Romania	50
		Brookmans Park	UK	50
		Birmingham	UK	7
		Manchester	UK	5
		Newcastle	UK	2
		Torquay	UK	1
		Whitehaven	UK	0.5
		Gibraltar	Gibraltar	2
		Kudymkar	USSR	50
		Kraljevo	Yugoslavia	10
		Valpovo	Yugoslavia	1
1467	204	Monte Carlo	Monaco	1000/400
		Kiev	USSR	300

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1467	204	Frunze	USSR	30
		Yalta	USSR	30
		Zrenjanin	Yugoslavia	2
		Zvornik	Yugoslavia	1
1476	203	Vienna	Austria	600
		Bilbao	Spain	10
		Cordoba	Spain	5
		Albacete	Spain	2
		Almeria	Spain	2
		Orense	Spain	2
		Palma Mallorca	Spain	2
		Guildford	UK	0.5
		Lvov	USSR	120
1485	202	Baden-Baden (plus 7 low power stations)	West Germany	1
		Antequerra (plus 10 low power stations)	Spain	2
		Tours	France	0.05
		Orestias	Greece	1
		Volos	Greece	1
		12 low power stations	Italy	—
		Bugibba	Malta	1
		Casablanca	Morocco	1
		10 low power stations	East Germany	1
		Wallasey	UK	2
		Hull	UK	1.5
		Brighton	UK	1
		Carlisle	UK	1
		Bournemouth	UK	1
		Oxford	UK	0.5
		Saviese	Switzerland	1
		Pilsen	Czechoslovakia	1
		25 low power stations	Yugoslavia	1
1494	201	Prenjas	Albania	1
		Bastia	France	20
		Clermont Ferrand	France	20
		Bayonne	France	4
		Besancon	France	1
		Rhodos	Greece	5

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1494	201	Leningrad	USSR	1000
		Edintsy	USSR	25
1503	200	Nicosia	Cyprus	1
		El Arish	Egypt	1
		Avila	Spain	5
		Badajoz	Spain	5
		Tarragon	Spain	5
		Burgos	Spain	2
		Jaen	Spain	2
		Marbella	Spain	2
		Pamplona	Spain	2
		Stargard	Poland	300
		Stoke-on-Trent	UK	1
		Belgrade	Yugoslavia	10
		Ulcinj	Yugoslavia	5
		Kutina	Yugoslavia	1
		Zavidovici	Yugoslavia	1
1512	198	Wolvertem	Belgium	100
		Chania	Greece	5
		Sotchi	USSR	30
		Tallinn	USSR	30
		Pristina	Yugoslavia	10
1521	197	Quseir	Egypt	10
		Oviedo	Spain	5
		Pontevedra	Spain	3
		Manresa	Spain	1
		Nottingham	UK	0.5
		Reigate	UK	0.7
		Kosice	Czechoslovakia	600
		Ostrava	Czechoslovakia	60
		Nitra	Czechoslovakia	40
		Banska Bystrica	Czechoslovakia	14
		Bratislava	Czechoslovakia	6
		Monastir	Tunisia	10
		Dura	Saudi Arabia	2000
1530	196	Mahmudia	Romania	15
		Mihaeleni	Romania	15
		Worcester	UK	0.5
		Jitomir	USSR	5
		Vatican City	Vatican	450
		Donja Vakuf	Yugoslavia	1
1539	195	Mut	Egypt	1
		Vallodolid	Spain	5
		Castellon	Spain	2
		Yalta	USSR	25

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1539	195	Pec	Yugoslavia	2
		Sisak	Yugoslavia	1
		Mainflingen	West Germany	700
1548	194	London	UK	27
		Bristol	UK	8
		Edinburgh	UK	2
		Liverpool	UK	1
		Stockton	UK	1
		Sheffield	UK	0.3
1557	193	Nice	France	300
		Cyclops (DW)	Malta	75
		Rad. Med.	Malta	600
		Kaunas	USSR	75
		Vechintos	USSR	50
		Klaipeda	USSR	5
		Osijek	Yugoslavia	20
1566	192	Covilha	Portugal	1
		Sarnen	Switzerland	300
		Sfax	Tunisia	1200
		Leningrad	USSR	60
		Odessa	USSR	5
		Smarje	Yugoslavia	2
		Vrgin Most	Yugoslavia	1
		Vila Do Porto	Azores	1
1575	190	Cordoba	Spain	5
		Genoa	Italy	50
		17 low power stations	Italy	2–0.1
		Canidelo	Portugal	10
		Burg	East Germany	250
1584	189	Jerez	Spain	1
		Orense	Spain	1
		Pamplona	Spain	1
		Toulon	France	1
		Amalias	Greece	1
		Ostroda	Poland	1
		11 low power stations	East Germany	1
		18 low power stations	Yugoslavia	2–0.005
1593	188	Langenberg	West Germany	600/400
		El Minya	Egypt	10
		Marrakesh	Morocco	1
		Miercurea Cruc	Romania	14
		Aibiu	Romania	7.5

Medium wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
1593	188	Oradea	Romania	7
		Liberec	Czechoslovakia	6
		Dniepropetrovsk	USSR	5
		Kichinev	USSR	5
		Lisbon	Portugal	10
1602	187	2 low power stations	Austria	0.05
		Lugo	Spain	2
		Onteniente	Spain	2
		Segovia	Spain	2
		Linares	Spain	—
		Vitoria	Spain	1
		Mesolongion	Greece	1
		9 low power stations	Italy	1–0.1
		4 low power stations	Poland	1
		13 low power stations	East Germany	1
		Rusthall	UK	0.25
		9 low power stations	Yugoslavia	2–0.1
1611	186	Vatican City	Vatican	5

7 Long and medium wave European stations – geographically

Long and medium wave stations

	kHz
Albania	
Rroghozina	648
Kelcyra	864
Korce	963
	1206
Puke	972
Kukes	990
Durres	1089
Lushnje	1215
	1395
	1458
Fier	1260
Gjirokaster	1305
Shkoder	1323
Tirana	1359
Prenjas	1494
Algeria	
Tipaza	254
Les Trembles	549
	1143
Bechar	576
Tinsouf	666
Ain-El-Hamam	693
In Amenas	738
Djanet	783
Beni Abbes	837
Ghardaia	873
Algiers	891
	981
	1422
Tamanrasset	909
Timimoun	927
Hassi Messaoud	1026
Adrar	1089
Quargla	1098
In Salah	1161
El Golea	1287
Constantine	1305
Andorra	
Sud Radio	819
Austria	
Vienna	585
	1476
Langenfeld	774
Sankt Gallenkirch	774
	1602
Linz-Kronstorf	1026
Dorbirn-Lauterach	1026
Scharnitz	1026
Pfunds	1602
Azores	
Santa Barbara	693
Barossa	837
Angra Heroismo	1395
Vila Do Porto	1566
Belgium	
Wavre-Overijse	540
	621
La Louviere	1125
Kuurne	1188
Liege	1233
Marche	1305
Wolvertem	1512
Bulgaria	
Vidin	576
	1224
Pleven	594
	945
Plovdiv	648

Bulgaria—*contd*	*kHz*
Petrich	747
Stolnik	774
Varna	774
Shumen	828
	1377
Sofia	828
	963
	1161
Blagoevgrad	864
Stara Zagora	873
	1161
Kardjali	1017
	1296
Canary Islands	
Santa Cruz de Tenerife	621
	1341
Santa Cruz de Palma	720
	1098
Las Palmas	837
	1008
	1215
	1269
La Laguna	882
La Orotava	1269
Cyprus	
Nicosia	603
	693
	1503
Zakaki	639
	720
Paphos	918
Dhekelia	1044
Akrotiri	1089
Cape Greco	1233
Zyyi	1323
Czechoslovakia	
Ceskoslovensko	272
Prague (Liblice)	639
Banska-Bystrica	702
Prague	792
	1233
Ceske Budejovice	846
	981
	1071
	1233
Ostrava	846
Usti Nad Labem	864
Brno	900
	954
Karlovy Vary	900
	091
	1233
Nitra	1017
Prague	1071
Mnich Hradiste	1071
Bratislava	1098
	1287
Pilsen	1233
Hradel Kralove	1233
Strakonice	1233
Ceskoslovensko	1287
Jihlava	1287
Pilsen	1485
Kosice	1521
Liberec	1593
Denmark	
Kalundborg	245
	1062
Egypt	
Abu Zaabal	558
	711
	873
	1062
Batra	621
	1107
El Kharga	702
Assiut	981
	1278
Abis	774
Santah	864
Matruh	882
Cairo	918
	936
	1341
Baris	981
Idfu	990
El Minya	1080
	1593
Luxor	1080
	1305
Sohag	1143
Tanta	1161
Qena	1179
Ras Gharib	1188
	1422

Egypt—*contd*	*kHz*
Alexandria	1197
Aswan	1278
Quseir	1350
El Arish	1503
Mut	1539
Eire	
Tullamore	567
	612
Athlone	612
Cork	729
	1278
Tir Chonaill	963
Dublin	1188
	1278
Finland	
Lahti	254
Oulu	540
Helsinki	558
	1404
Turku	963
	1278
Vaasa	1233
France	
Allouia	164
Paris	585
	864
	963
Marseille	585
	675
	1242
Lyon	594
Rennes	711
Limoges	792
Nancy	837
	1350
Toulouse	945
	1161
Strasbourg	1161
	1278
Ajaccio	1161
	1404
Bordeaux	1206
Nice	1350
	1557
Lille	1377
Brest	1404
Pau	1404
Dijon	1404
Grenoble	1404
Tours	1485
Bastia	1494
Clermont Ferrand	1494
Bayonne	1494
Besancon	1494
Toulon	1584
Germany (East)	
Oranienburg	182
Burg	263
	783
	1575
Leipzig	531
	1323
Greifswald	531
Rostock	558
Schwerin	576
	999
Neubrandenburg	657
Hof-Saale	684
Berlin	693
	1359
Puttbus	729
Konigwusterhausen	882
Hoyerswerda	999
Weimar	999
Dresden	1044
	1431
Keula	1170
Bernburg	1431
Wachenbrunn	1431
Seelow	1431
Weida	1431
Germany (West)	
Donebach	155
Saarlouis	180
Munich	801
	1107
	1197
Bayreuth-Thurnau	549
Nordkirchen	549
Berlin	567
	855
	990
	1167
Stuttgart	576
	1143

Germany (West)—*contd*	*kHz*
Frankfurt	594
	873
Meissner	594
Dannenburg	630
Bodensee	666
Aachen	702
Flensrurg	702
Kleve	702
Herford	702
Siegen	702
Heidelberg	711
	1143
Heilbronn	711
Ulm	711
Bopfingen	711
Wertheim	711
Langenberg	720
Holzkirchen	720
Brunswick	756
Ravensburg	756
Nuremberg	801
	1107
Hanover	828
Freiburg	828
Bremen	936
Bremerhaven	936
	1143
Hamburg	972
Hof	990
	1143
Wolfsheim	1017
Markneukirchen	1089
Grafenwohr	1107
Kaiserslautern	1107
Karlsruhe	1143
Neumunster	1269
Bad Mergentheim	1413
Heidenheim	1413
Saarbrucken	1422
Baden-Baden	1485
Mainflingen	1539
Greece	
Athens	666
	729
	1386
Ionnanina	765
Kavalla	792
Zakynthos	927
Larissa	945
	kHz
Megara	981
Kerkyra	1008
Thessaloniki	1044
	1179
Orestias	1080
	1485
Rhodes	1260
	1494
Florina	1278
Tripolis	1314
Purgos	1350
Volos	1485
Chania	1512
Amalia	1584
Mesolongion	1602
Holland	
Lopik	675
Flevoland	747
	1008
Hulsberg	891
	1251
Bloemendaal	1116
Hungary	
Solt	540
Miskolc	1116
Mosonmagyarovar	1116
Szolnok	1188
	1350
Szombathely	1188
Siofok	1251
Nyieresyhasa	1251
Budapest	1341
Syor	1350
Iceland	
Reykjavik	209
Eidar	209
Höfn	666
Iran	
Bandar	747
Teheran	765
Shiraz	990
Tabriz	1152
Iraq	
Rutba	558
Nineva	603
	1359

Iraq—*contd*	*kHz*
Basra	693
Hurriyah	756
	909
Rutba	1116
Israel	
Jerusalem	531
	675
	738
	1080
Tel Aviv	576
	657
	1062
	1287
Zefat	846
Bet Hillel	882
Haifa	1206
	1305
Beer Sheva	1224
Eilat	1305
	1458
Italy	
Caltanissetta	191
	567
	1035
Bologna	567
	1098
	1116
Salento	567
	1035
Sassari	567
Aosta	567
	1116
Naples	657
	1035
	1368
Firenze	657
	1035
	1368
Turin	657
	999
	1368
Bolzano	657
Venice	657
	1017
	1035
	1368
Trieste	819
Trieste—*contd*	981
	1116
Rome	846
	1107
	1332
	1368
Milan	900
	1035
	1368
Trapani	936
Rimini	999
Genoa	1017
	1035
	1368
	1575
Pescara	1035
	1332
Oristano	1035
Potenza	1035
Cagliari	1062
Squinzano	1062
	1449
Catania	1062
	1368
Udine	1062
Verona	1062
Livorno	1062
Trento	1062
	1368
Bari	1116
	1332
	1368
Pisa	1116
	1368
Palermo	1116
	1332
	1368
Cracow	1368
Zielona Gora	1368
Stargard	1503
Ostroda	1584
Messina	1368
Ancona	1314
Campobasso	1314
Catanzaro	1314
Matero	1314
Sassari	1368
Foggia	1431
Pesaro	1431
Taranto	1431

Libya	*kHz*
Tobruk	648
Benghazi	675
Ghadames	711
Jefren	711
Sebha	711
	828
Sirte	783
Giaghboub	909
Kufra	909
Tripoli	1053
	1251
	1404
Jalo	1080
Ajedabia	1080
El Beida	1125
Mizurata	1440

Luxembourg	
Junglinster	236
Marnach	1440

Malta	
Delimara	756
	999
Bugibba	1485
Cyclops	1557

Monaco	
Monte Carlo	281
	702
	1467

Morocco	
Medi I-Nador	173
Azilal	209
Sidi Bennour	540
Sebaa-Aioun	612
	702
	1044
Laayoune	657
Rabat	819
	1026
Safi	909
	1323
Agadir	936
	1197
Marrakesh	972
	1152
	1593

	kHz
Adakhla	999
Tangier	1017
	1053
	1116
	1233
Casablanca	1080
	1188
	1485
Quarzazate	1116

Norway	
Tromsoe	155
Oslo	218
Vigra	630
Bodoe	675
Finnmark	702
Kuitsoy	1311

Poland	
Warsaw	200
	819
Konstantinow	227
Poznan	738
Katowice	1080
Szczecin	1260
Rzeszow	1305
Bialystok	1305
Gdansk	1305
Lodz	1305
Modrica	1242
Liubliana-Student	1242
Gorazde	1251
Petrinja	1287
Kocani	1287
Loznica	1286
Vranje	1286
Bozanska Krupa	1305
Cakovec	1305
Herceg Novi	1305
Vincovci	1305
Nitola	1323
Gostivar	1323
Sid	1323
Gnjilane	1332
Zajecar	1341
Zabok	1350
Vrbas-Kula	1359
Valjevo	1368
Sanski Most	1368
Prizren	1377

Poland—*contd*	*kHz*
Kratovo	1377
Bugojno	1395
Doboj	1395
Pristina	1413
Probistip	1431
Krizevci	1431
Karlovac	1449
Kraljevo	1458
Valpovo	1458
Zrenjanin	1467
Zvornik	1467
Ulcinj	1503
Kutina	1503
Zavidovici	1503
Donja Vakuf	1530
Sisak	1539
Osijek	1557
Smarje	1566
Vrgin Most	1566
Portugal	
Faro	558
	720
Guarda	558
	828
Valenca Do Minho	567
Braga	576
Mirando Do Douro	630
Monte Marvelho	630
Chaves	630
	1260
Lisbon	666
	1035
	1593
Vila Real	666
	1170
Braganza	666
Viseu	693
	828
	1251
Norte-Azurara	720
	1062
Mirandela	720
Castelo Branco	720
	828
	1251
Miramar	783
Coimbra	828
Covilha	828
	1566
Evora	927
Portalegre	1197
Porto	1251
Elvas	1332
Canidelo	1377
	1575
Caramulo	1431
Romania	
Brasov	155
	567
Petrosani	540
Targu Jiv	558
Satu Mare	567
Botosani	603
Bucharest	603
	855
Turnu Severin	603
Oradia	603
	1593
Timasoara	630
	1314
Sighet	711
Predeal	720
Isaccea	720
Borsa	720
Lugoj	756
Cluj	909
	1152
Rwaira	909
Miercurea Ciuc	945
	1593
Iasi	1053
Bacau	1179
Vascau	1179
Constantza	1314
	1458
Craiova	1314
Targu Mures	1323
Galatzi	1332
Baia Mare	1404
Mahmudia	1530
Mihaeleni	1530
Sibiu	1593
Spain	
Madrid	585
	657
	810
	918

Spain—*contd*	*kHz*
Madrid	954
	999
Vitoria	585
	1413
	1602
Albacete	639
Barcelona	693
	738
	828
	1107
	1174
Seville	684
	792
	1413
Burgos	684
	1503
Oviedo	729
	1413
	1521
Logrono	729
Malaga	729
Cadiz	747
Cacares	774
	1107
	1134
Valencia	774
	1260
	1314
Granada	774
	1080
	1395
Soria	774
	1314
Orense	774
	1134
	1476
	1584
Murcia	855
	1107
	1179
Santander	855
	1107
Pontevedra	855
	1521
Pamplona	855
	1134
	1503
	1584
Ponferrada	855
	1107

	kHz
Zaraçoza	873
	1134
	1413
Sabadell	822
Bilbao	990
	1134
	1476
Ceuta	990
Alicante	1026
	1395
Gijon	1026
Vigo	1026
	1107
La Coruna	1080
	1395
Huesca	1080
Palma (Mallorca)	1080
	1476
Toledo	1080
Tervel	1107
Palencia	1107
Socuellamos	1107
Valladolid	1107
	1539
Reus	1125
Almeria	1134
	1476
Aviles	1134
Ciudad Real	1134
	1395
Ciudadela	1134
Ferrol	1134
Figueras	1134
Jaen	1134
	1503
Salamanca	1134
Astorga	1134
Lorca	1134
San Sebastian	1260
	1314
Algeciras	1260
Badajoz	1260
	1503
Cadiz	1314
Sama Langreo	1314
Tarrega	1314
Huelva	1395
Leon	1395
Tortosa	1395
Cordoba	1476

Spain—*contd*	*kHz*
Cordoba	1575
Albacete	1476
Antequerra	1485
Avila	1503
Tarragon	1503
Marbella	1503
Manresa	1521
Castellon	1539
Jerez	1584
Lugo	1602
Onteniente	1602
Segovia	1602
Linares	1602
Sweden	
Motala	191
Solvesborg	1179
Switzerland	
Beromunster	531
Monte Ceneri	558
Sottens	765
Saviese	1485
Sarnen	1566
Syria	
Adra	567
Damas-Sabboura	666
Sarakeb	747
Tartus	783
	1071
Deir-El-Zor	828
Damascus	873
Aleppo	1314
Tunisia	
Gafsa	585
Djedeida	630
	963
Sfax	720
Monastir	1521
Turkey	
Ankara	182
Etimesgut	200
Erzurum	245
Cukuroca	630
Umraniye	702
Antalya	891
Izmir	927

Turkey—*contd*	*kHz*
Trabzon	954
Istanbul	1017
Diyabakir	1062
Van Iskelesi	1179
USSR	
Lvov	173
	1404
	1476
Kaliningrad	173
	549
	702
	873
	1116
Moscow	173
	263
	549
	846
	1116
	1359
Alma Ata	182
	1092
Tbilisi	191
	1044
Kiev	209
	783
	1242
	1467
Baku	218
	1296
Leningrad	236
	549
	801
	873
	1125
	1494
	1566
Kichinev	236
	999
	1593
Archangel	236
Yerevan	254
	864
	1350
Sverdlovsk	281
	1197
Riga	576
	945
	1071

USSR—*contd*	*kHz*
Simferopol	648
	783
	1242
Murmansk	657
Tcherovtsy	657
	1377
Vilnius	666
Uzgorod	675
	783
	891
Volotchisk	675
	1242
Bosilyegrad	675
Oufa	693
Donetsk	711
	1242
Kokhtla-Jarve	711
	1332
Parnu	711
	1332
Tartu	711
	1215
Tchelyabinsk	738
Medbejyagorsk	765
Odessa	765
	1242
	1278
	1566
Voronezh	774
Kazan	783
Astrakhan	792
Volgograd	810
Vyru	810
	1332
Gorki	828
	1278
Karkov	837
Elista	846
Penza	855
Yochkar-Ola	900
Mezen	918
Makhach Kala	918
Rostov-na-Danu	945
Nikolayev	972
Slonim	1008
Uchachi	1008
Brest	1026
Grodno	1026
Niandoma	1026
Pinsk	1026
Kuldiga	1071
	1350
Valmiera	1071
	1422
Krasnodar	1089
Vologda	1098
Kaunas	1107
	1386
	1557
Kuibyshev	1143
Moghilev	1170
Maikop	1170
Kursk	1215
Orrisare	1215
Madona	1350
Lutsk	1377
Vinnitsa	1377
Dniepropetrovsk	1404
	1593
Izmail	1404
Liepaia	1422
Rezekne	1422
Krivoi Rog	1431
Kalinin	1449
Kudymkar	1458
Frunze	1467
Yalta	1467
	1530
Edintsy	1494
Sochi	1512
Jitomir	1530
Bechintos	1557
Klaipeda	1557
United Arab Emirates	
Sadiya	657
	729
	1539
United Kingdom	
Droitwich	200
	693
	1053
	1215
Burghead	200
	693
	810
	1053
	1215

United Kingdom—*contd*	*kHz*
Westerglen	200
	810
	909
	1089
	1215
Dumfries	585
	810
Newcastle	603
	1152
	1215
	1458
East Kent	612
Redruth	630
	756
	909
	1089
	1215
Orfordness	648
Exeter	666
	909
	990
Wrexham	657
Bodmin	657
Fulford	666
Bexhill	693
	1053
	1161
Brighton	693
	1053
	1215
	1485
Barrow	693
	837
	1053
Folkestone	693
	1053
Postwick	693
	846
	1053
	1215
Redmoss	693
	810
	1089
	1215
	1449
Stagshaw	693
	1053
Lisnagarvey	720
	909
	1089
Lisnagarvey—*contd*	1215
	1341
London	720
	1152
	1548
Londonderry	720
	792
	909
	1053
	1215
Carlisle	756
	1485
Shrewsbury	756
Cheltenham	774
Enniskillen	774
	873
	1053
	1197
Plymouth	774
	855
	1152
	1215
Leeds	774
	828
Littlebourne	774
Bedford	792
	1161
	1305
Barnstaple	801
	1053
Bournemouth	828
	1197
	1359
	1485
Luton	828
Sedgley	828
Wolverhampton	828
Leicester	837
	1260
Preston	846
	999
Norwich	855
	1152
Blackburn	855
Kings Lynn	873
Forden	882
Washford	882
	1089
	1215
Penmon	882

United Kingdom—*contd*	*kHz*
Tywyn	882
	990
	1089
	1215
Fernbarrow	909
Moorside Edge	909
	1089
	1215
Brookmans Park	909
	1089
	1215
	1458
Clevedon	909
Fareham	909
	999
	1089
	1215
Whitehaven	909
	1089
	1458
West Wiltshire	936
Torbay	954
Hereford	954
Doncaster	990
Wolverhampton	990
Nottingham	999
	1521
Belfast	1026
Chesterton Fen	1026
Trinity	1026
Sheffield	1035
	1548
Aberdeen	1035
Ayr	1035
Chatham	1035
Startpoint	1053
Dundee	1053
	1161
Hull	1053
	1161
	1215
	1485
Inverness	1107
Northampton	1107
Wallasey	1107
	1485
Start Point	693
Enniskillen	693
Derby	1116
Llandrindod Wells	1125
Glasgow	1152
Birmingham	1152
	1458
Manchester	1152
	1458
Swindon	1161
Swansea	1170
Stockton-on-Tees	1170
	1548
Ipswich	1170
Stoke-on-Trent	1170
	1503
Portsmouth	1170
Torquay	1197
	1458
Cambridge	1197
Maidstone	1242
Bury St Edmunds	1251
Bristol	1260
	1548
Wrexham	1260
Scarborough	1260
Bradford	1278
Barnsley	1305
Newport	1305
Taunton	1323
Chelmsford	1359
Cardiff	1359
Coventry	1359
Foxdale	1368
Lincoln	1368
Southend	1431
Reading	1431
Peterborough	1449
Guildford	1476
Oxford	1485
Reigate	1521
Worcester	1530
Edinburgh	1548
Liverpool	1548
Rusthall	1602
Vatican	
Vatican City	999
	1260
	1530
	1611
Yugoslavia	
Titovo Uzice	531
Beli Kriz	549

Yugoslavia—*contd*	*kHz*
Beli Kritz	1539
Strumica	567
Prijedor	576
Sarajevo	612
	945
Murska Sobota	648
Lazarevac	648
Sombor	666
Belgrade	684
	900
	1008
	1503
Negotin	693
Nis	711
Zagreb	738
	774
	864
	1062
	1143
	1377
Koprivnica	765
Zadar	765
	1134
Arandjelovac	792
Banovici	792
Capljina	792
Skopje	810
	1026
	1314
Vrbovec	828
Zagreb-Gospic	837
Ucka	864
Ivanic Grad	864
Sokolac	864
Titograd	882
Liubliana	918
Donji Miholjac	936
Djacovica	936
Ruma	936
Backi Petrovac	945
Kumanov	945
Smederevo	945
Celje	963
Bor	981
Cacak	981
Bjelovar	981
Foca	990
Pozarevac	990
Zupanja	990
Aleksinac	1008
Kragujevac	1026
Bar	1026
Nova Gradiska	1026
T Mitrovica	1035
Temerin	1044
Podravska Slatina	1044
Svetozarevo	1062
Banja Luka	1071
Novi Sad	1089
	1107
	1269
Zenica	1161
Beli Kriz	1170
Vrnjacka Banja	1170
Backa Topola	1170
Samobor	1179
Smederevska Palanka	1179
Bjeljina	1197
	1224
Bozanski Novi	1197
Covasna	1197
Visoko	1197
Kriva Palanka	1197
Bozanski Brod	1206
Majdanpek	1206
Djurdjevac	1215
Mladenovac	1215
Krapina	1224
Ilijas	1233
Ohrid	1242
	1314

8 Short wave stations of the world in order of frequency

Station names and services

Station names are those of the nearest large town or city to the transmitter, or the capital of the country when there are multiple locations transmitting on the same frequency. In the case of the UK, 'BBC' is used.

Services are often abbreviated, as in DW, WS, RFE/RL, etc. The main ones are listed below.

DW – Deutsche Welle, from West Germany, transmitted from stations in West Germany (Julich, Wertachtal); in Portugal (Sines); in Malta (Cyclops); in Antigua; in Montserrat; in Sri Lanka (Trincomalee).

Frequencies

1557	6100	7150	9585	9765	11905	15350
3995	6120	7155	9600	9700	11910	15355
5960	6130	7175	9605	11705	11945	15410
5990	6135	7200	9610	11720	11965	17715
5995	6140	7225	9615	11730	15105	17765
6000	6145	7235	9625	11750	15120	17780
6010	6155	7265	9640	11765	15135	17800
6020	6160	7270	9650	11785	15185	17810
6025	6170	7275	9670	11795	15205	17825
6035	6185	7285	9680	11805	15210	17845
6040	6190	7290	9690	11810	15245	17875
6045	7105	9505	9700	11820	15275	21500
6065	7130	9545	9715	11850	15320	21560
6075	7145	9565	9735	11855	15330	21590
6085		9570	9750	11865		21650
						21680

RFE/RL – Radio Free Europe/Radio Liberty, broadcasting to the Eastern bloc from West Germany (Biblis Holzkirchen, Lampertheim); Spain (Playa de Pals); Portugal (Lisbon).

Frequencies

3960	6170	7255	9695	11895	15290	17770
3970	7115	7295	9705	11935	15340	17805
3985	7145	9505	9725	11955	15355	17835
3990	7155	9520	9750	11970	15370	17865
5955	7165	9555	11725	15115	15380	17895
5970	7180	9565	11770	15130	15445	21455
5985	7190	9595	11815	15145	17725	21665
6050	7200	9625	11825	15170	17735	21720
6105	7220	9660	11855	15215	17750	21735
6115	7245	9680	11875	15255	17760	21745

WS – World Service, put out by the BBC from the UK (Daventry, Rampisham, Skelton,Crowborough); Ascension Island; Oman (Masirah Island); Singapore (Kranji); Canada (Sackville); Antigua; Cyprus (Limassol)

Frequencies from the UK

3955	7120	9640	11955	21470
3970	7150	9750	12095	21550
5975	7185	9760	15070	21710
6010	7325	9915	17705	
6050	9410		17790	

Frequencies from Cyprus

3990	9590
6050	9660
6105	11760
6180	11775
7135	15420
7160	17885
9580	21660

Frequencies from Masirah Island

5965
7125
7160
11955
15310
21550

Frequencies from Ascension Island

6005	15105
6020	15260
7105	15390
11750	15400
11820	17880
11860	17885
	21660

Frequencies from Singapore

3915	11750
6195	11955
7120	15280
9570	15380
9740	15435
	17880

Frequencies from Antigua

6175
6195
9150
11775

Frequencies from Canada

5965
6120
9510
9515
9590
15260

RCI – Radio Canada International, transmitted from Canada (Sackville); UK (Daventry); Portugal (Sines).

Frequencies from Sackville

5960	9755	11925	15260
6065	9760	11940	15325
6140	11710	11945	15440
6195	11720	11955	17820
9535	11775	11960	17875
9625	11825	15150	21695
9650	11845	15190	

Frequencies from Daventry

5965	7285
5995	9590
7155	11775
7230	11840
7235	11935
7260	15235

Frequencies from Sines

9285
9615
11915
15315

VOA – Voice of America. US Information Agency Broadcasting Service. Transmitted from Greenville, Delana, Dixon and Bethany in the US and from stations in West Germany (Munich); the UK (Woofferton); Greece (Kavalla and Rhodes); Liberia (Monrovia); Morocco (Tangier); Philippines (Poro and Tinang) and Sri Lanka (Colombo).

Frequencies from the USA

5995	9530	11730	15195	15580
6020	9540	11740	15205	17640
6030	9550	11790	15245	17740
6040	9565	11805	15265	17765
6080	9575	11830	15315	17775
6125	9590	11890	15330	17785
6130	9640	11895	15345	17800
6140	9650	11915	15355	17830
6155	9670	11930	15390	17865
6190	9690	11950	15400	21560
9455	9700	15135	15410	21580
9505	9840	15160	15415	21590
9525	11715	15185	15430	21610

Frequencies from West Germany

3980	6095	7245	11960
6060	6150	7270	15265
6090	7105	9735	15330

Frequencies from the UK

5965	6150	7180	9735	15225
6040	6160	7200	11710	15235
6060	6180	7210	11775	15270
6080	7120	7220	11835	15280
6125	7125	7235	11865	17855
6130	7130	9580	11875	21500
6140	7170	9585	15205	21520

Frequencies from Greece (Kavalla)

5955	7105	7265	11705	11915
5985	7125	7270	11740	11925
6015	7130	7280	11760	11945
6060	7135	9530	11780	15205
6140	7145	9585	11805	15435
6150	7170	9615	11835	17865
6160	7210	9635	11845	

Frequencies from Greece (Rhodes)

5965	6080	6105	7205	9715

Frequencies from Liberia

3990	7175	9550	11715	11915	17705
6035	7195	9605	11760	15315	17740
6045	7265	9620	11835	15320	17780
6180	7280	9750	11840	15445	18870
7135	9540	11710	11850	15600	21485
					21500

Frequencies from Morocco

6090	6180	9615	9770	15235	
6095	7190	9650	11710	15245	
6130	9530	9715	11760	17855	
6150	9605	9760	15195		

Frequencies from the Philippines

6015	7225	9620	11760	11965	15290	17740
6030	7230	9660	11775	15150	15325	17785
6065	7260	9725	11805	15155	15330	17810
6100	7275	9730	11840	15160	15395	17865
6110	7285	9760	11920	15185	15410	21670
6130	9545	9770	11925	15210	15425	
6185	9555	11715	11930	15215	15430	
7120	9575	11740	11945	15250	17735	

Frequencies from Sri Lanka

7105	7115	7125	9645	11710	15250	15395

TWR – Trans World Radio, an international religious organisation, broadcasting from stations in Monte Carlo, Netherlands and Antilles, Swaziland, Cyprus, Sri Lanka, Guam and Uruguay.

FEBA – Far East Broadcasting Association.

FEBC – Far East Broadcasting Company.

SF after a station indicates that it radiates a standard frequency.

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
2260	132.74	Purwokerto	Indonesia	1
2300	130.43	Hyesan	Korea	—
2310	129.87	Sousa	Brazil	0.25
		Kunming	People's Republic of China	15
2332	128.64	Jakarta	Indonesia	5
2340	128.21	Itacoatiara	Brazil	1
		Fuzhou	People's Republic of China	10
2350	127.66	Jogjakarta	Indonesia	1
2376	126.26	Kundiawa	Papua New Guinea	2
2380	126.05	Limeira	Brazil	0.25
		Stanley	Falklands	3
2390	125.52	Tenango	Guatemala	—
		Cirebon	Indonesia	1
		Huayacocotla	Mexico	0.5
2410	124.48	—	Brazil	1
		—	Papua New Guinea	2
2420	123.97	Sao Carlos	Brazil	0.5
2430	123.46	Fuzhou	People's Republic of China	10
2433	123.3	Banda Aceh	Indonesia	50
2445	122.7	Nanchang	People's Republic of China	10
2460	121.95	Kunming	People's Republic of China	10
2464	121.75	Purwokerto	Indonesia	0.25
2467	121.61	Blitar	Indonesia	0.5
2470	121.46	—	Brazil	1

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
2474	121.26	Purwokerto	Indonesia	1
2475	121.21	Hangzhou	People's Republic of China	10
		Jakarta	Indonesia	0.5
2490	120.48	Fuzhou	People's Republic of China	10
		Semarang	Indonesia	1
		Ujung Pandang	Indonesia	0.5
2500	120	MSF Rugby (SF)	UK	0.5
		WWV (SF) Fort Collins	USA	2.5
		WWVH (SF) Kekaha	Hawaii	5
		ZLF (SF) Wellington	New Zealand	—
		RCH (SF) Tashkent	USSR	1
2600	115.38	Fuzhou	People's Republic of China	50
2670	112.36	Sariwon	Korea	—
2624	114.33	Blora	Indonesia	0.5
2694	111.36	Ende	Indonesia	0.5
2696	111.28	Ch'Ongjin	Korea	—
2746	109.24	Sinuiju	Korea	—
2765	108.5	Pyongyang	Korea	—
2776	108.07	Hamhung	Korea	—
2850	105.26	Pyongyang	Korea	—
3000	100	Surabaya	Indonesia	1
3015	99.5	Pyongyang	Korea	120
3018	99.4	Yungay	Peru	—
3200	93.75	Tripoli	Libya	100
			Swaziland	25
		Fuzhou	People's Republic of China	10
3204	93.63	Bandung	Indonesia	10
3205	93.6	Lucknow	India	10
		Ribeirao Preto	Brazil	1
		West Sepik	Papua New Guinea	10
3212	93.4	Maputo	Mozambique	100
3215	93.31	Hsinchu	Taiwan	10
		Manado	Indonesia	10
3220	93.17	Peking	People's Republic of China	—
		Quito	Ecuador	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
3220	93.17	Morobe	Papua New Guinea	2
3222	93.11	Kara	Togo	10
3223	93.08	Simla	India	2.5
		Mataram	Indonesia	5
3225	93.02	Lins	Brazil	1
		Tanjung Pinang	Indonesia	10
		Tovar	Venezuela	1
3230	92.88	Monrovia	Liberia	10
		Meyerton	South Africa	250
3232	92.82	Bukittinggi	Indonesia	10
3235	92.74	Marilia	Brazil	0.5
			Papua New Guinea	2
		Gauhati	India	10
3240	92.59		Swaziland	25
3241	92.56	Ambon	Indonesia	1
		Sibolgo	Indonesia	5
3245	92.45	Varginha	Brazil	1
			Papua New Guinea	2
3255	92.17	Monrovia	Liberia	50
			Brazil	1
3260	92.02	Guiyang	People's Republic of China	10
		Niamey	Niger	4
		Madang	Papua New Guinea	2
		Oxapampa	Peru	5
3265	91.88	Bengkulu	Indonesia	10
3268	91.80	Kohima	India	2
3270	91.74	Windhoek	South Africa	100
		Beijing	People's Republic of China	50
3275	91.60	Caceres	Brazil	1
		South Highlands	Papua New Guinea	2
		TWR	Swaziland	25
3277	91.55	Jakarta	Indonesia	1
		Srinagar	India	7.5
3280	91.46		Ecuador	2.5
		Beira	Mozambique	100
3285	91.32	Belize	Belize	1
		Bandeirantes	Brazil	2.5
3286	91.30	Madiun	Indonesia	1

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
3286	91.30	Rio Tarqui	Ecuador	0.5
		Antananarivo	Madagascar	100
3290	91.19	Beijing	People's Republic of China	—
		Tayabamba	Peru	1
3295	91.05	Windhoek	South Africa	100
		Delhi	India	10
		Tapuyo	Brazil	1
3300	90.91	Bujumbara	Burundi	25
		Fuzhou	People's Republic of China	10
			Guatemala	10
		Lampung	Indonesia	0.3
3305	90.77	Ranchi	India	2
			Papua New Guinea	10
		Gueru	Zimbabwe	10/100
3310	90.63	Changchun	People's Republic of China	10
		Bagua	Peru	—
		San Miguel	Bolivia	0.5
3315	90.5	Bhopal	India	10
		Manus	Papua New Guinea	2
		Pastaza	Ecuador	2.5
		Simalunga	Papua New Guinea	1
3320	90.36	Pyongyang	Korea	—
			South Africa	100
3325	90.23	Palangkaraya	Indonesia	10
		Barillas	Guatemala	1
			Brazil	5
		Quevedo	Ecuador	1.5
3326	90.2	Lagos	Nigeria	10
3330	90.09	Kigali	Rwanda	5
		CHU (SF) Ottawa	Canada	3
		Huallaga	Peru	0.5
3331	90.06	Moroni	Comoros	4
		Sukabumi	Indonesia	—
3335	89.96	Taipei	Taiwan	10
		Alvorada	Brazil	5
		Sepik	Papua New Guinea	10
3338	89.9	Maputo	Mozambique	10
		Zanzibar	Tanzania	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
3340	89.82	Viloco	Bolivia	1
3345	89.69	Ternate	Indonesia	10
		Jammu	India	2
		Pontianak	Indonesia	5
3346	89.66	Lusaka	Zambia	120
3349	89.58		Bolivia	1
3355	89.42	Kuseong	India	10
		Jambi	Indonesia	10
		Noumea	New Caledonia	20
3356	89.39	Gaborone	Botswana	10
3360	89.29	Beijing	People's Republic of China	—
		Milne Bay	Papua New Guinea	10
		Nahuala	Guatemala	1
3365	89.15	Radio Cultura	Brazil	1
		Delhi	India	10
3366	89.13	Accra	Ghana	10
3368	89.07	Salman Pak	Iraq	50
3370	89.02	Beira	Mozambique	10
		Tezulutlan	Guatemala	1
		Florida	Bolivia	1
3375	88.89	Gauhati	India	10
		Medan	Indonesia	7.5
		West Highlands	Papua New Guinea	2
		Radio Equatorial	Brazil	5
		Guajara	Brazil	5
3380	88.76	Jocotan	Guatemala	1
			Malawi	100
		Cumbre	Bolivia	1
3381	88.73	Radio Iris	Ecuador	5
3385	88.63	Kupang	Indonesia	10
		Sarawak	Malaysia	10
		Rabaul	Papua New Guinea	10
		Congonas	Brazil	1
		Cayenne	French Guiana	4
3390	88.5	Bunia	Zaire	10
		Camargo	Bolivia	1
3395	88.37	Radio Nyab	Bhutan	1
		Tanjungkarang	Indonesia	10
		R East Highlands	Papua New Guinea	10
		Zaracay	Ecuador	5

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
3396	88.34	Gweru	Zimbabwe	20/100
3398	88.29	Sigaraja	Indonesia	1
3400	88.24	Fuzhou	People's Republic of China	10
3458	86.76	Lebak	Indonesia	0.5
3478	86.26	Ketapang	Indonesia	0.5
3535	84.87	Fuzhou	People's Republic of China	10
3550	84.51	Convencion	Peru	1
3607	86.17	Hiroshima	Japan	1
3640	86.42	Fuzhou	People's Republic of China	10
3660	81.97	Beijing	People's Republic of China	—
3705	80.98	'Lux'	Colombia	—
3775	74.97		Iran	50
		Sumbawa	Indonesia	0.25
3799	78.97	Gorontalo	Indonesia	10
3815	78.64	Beijing	People's Republic of China	—
3855	77.82		Indonesia	—
3885	77.22	Radio Libertad	Bolivia	0.1
3900	76.92	Fuzhou	People's Republic of China	10
		Hailar	People's Republic of China	—
3905	76.82	Delhi	India	10
		Merauke	Indonesia	1
			Papua New Guinea	3
3910	76.73	Tokyo	Japan	10
3915	76.63	WS	Singapore	100
3916	76.61	Ternate	Indonesia	10
3925	76.43	Delhi	India	10
		Tokyo	Japan	50
		Sapporo	Japan	50/10
		Port Moresby	Papua New Guinea	10
3930	76.34	Suwon	Korea	5
3931	76.32	Mindelo	Cape Verde	10
3935	76.24	Semarang	Indonesia	10
3940	76.14		People's Republic of China	—
3945	76.05	Denpasar	Indonesia	10
		Tokyo	Japan	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
3945	76.05	Vanuatu	Vanuatu	10
3946	76.03		Indonesia	10
3950	75.95	Xining	People's Republic of China	10
3955	75.85	WS	UK	100
3958	75.8	Stanley	Falklands	5
3960	75.76	Urumqi	People's Republic of China	50
		RFE/RL	West Germany	100
		Palu	Indonesia	10
		Dalandzagad	Mongolia	12
3965	75.66	Allouis	France	4
		Kabul	Afghanistan	—
3970	75.57	RFE/RL	West Germany	100
		Buea	Cameroon	8
		Hohhot	People's Republic of China	—
		Sapporo	Japan	1
		Nagoya	Japan	1
3976	75.45	Surabaya	Indonesia	10
3980	75.38	VOA	West Germany	8
3985	75.28	Beijing	People's Republic of China	—
		RFE/RL	West Germany	100
		Beromunster	Switzerland	250
3986	75.26	Manokwari	Indonesia	1
3990	75.38	RFE/RL	West Germany	100
		Urumqi	People's Republic of China	50
		WS	Cyprus	10
		VOA	Liberia	50
			Angola	—
3995	75.09	DW	West Germany	100
		Pontaniak	Indonesia	10
		Rome	Italy	50
		Yuzhno	USSR	50
		Kyzyl	USSR	20
3999	75.02	Nuuk	Greenland	1
4000	75	Bafoussam	Cameroon	20
		Kendari	Indonesia	5
4003	74.94	Padang	Indonesia	10
4005	74.91		Peru	—
4010	74.81	Khirgiz	USSR	25
4025	74.53	Rioja	Peru	—
4030	74.44	Anadyr	USSR	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4035	74.35	Lhasa	Tibet	50
4040	74.26	Yerevan	USSR	15
		Vladivostok	USSR	50
4045	74.12	Fuzhou	People's Republic of China	10
4050	74.07	Khirgiz	USSR	50
4055	73.98	Kalinin	USSR	50
4060	73.89	Kharkov	USSR	100
4080	73.53	Ulan Bator	Mongolia	50
4130	72.64	Beijing	People's Republic of China	50
4200	71.43	Beijing	People's Republic of China	50
4230	70.92	Urumqi	People's Republic of China	—
4250	70.59	Beijing	People's Republic of China	50
4254	70.52	Santa Cruz	Peru	—
		Radio Gonzanama	Ecuador	—
4273	70.21	Kanggye	Korea	—
4300	69.77	Radio Moderna	Peru	0.25
		Radio Urkupina	Bolivia	1
4330	69.28	Fuzhou	People's Republic of China	10
4340	69.12	Kutai	Indonesia	—
4380	68.49	Fuzhou	People's Republic of China	10
4395	68.26	Yakutsk	USSR	100
4420	67.87	Reyes	Bolivia	0.5
4440	65.57	Santa Rosa	Bolivia	—
4450	67.42	Kabul	Afghanistan	15
4458	67.29		Bolivia	—
4460	67.26	Beijing	People's Republic of China	10
		Norandina	Peru	—
4465	67.19	Odom Xai	Laos	1
4472	67.08	Movima	Bolivia	1
4485	66.89	Ufa	USSR	50
		Petropavlovsk	USSR	50
4500	66.67	Urumqi	People's Republic of China	50
		VNG (SF) Lyndhurst	Australia	10
		Radio Galaxia	Bolivia	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4510	66.52	Fergana	USSR	10
4520	66.37	Khanty Mansiysk	USSR	50
4545	66.00	Alma Ata	USSR	50
4585	65.43	Cochabamba	Brazil	—
4607	65.12	Serui	Indonesia	0.25
4610	65.08	Khabharovsk	USSR	50
4620	64.94	Beijing	People's Republic of China	10
4635	64.72	Dushanbe	USSR	50
4638	64.68	Marzo	Bolivia	—
4682	64.08	Paititi	Bolivia	1
4697	63.87	Riberalta	Bolivia	5
4699	63.84	Surabaya	Indonesia	2
4701	63.82		Vietnam	—
4723	63.52	Rangoon	Burma	50
4732	63.40	Caraz	Peru	—
4735	63.36	Maputo	Mozambique	25
		Urumqi	People's Republic of China	50
4740	63.29	Mamore	Bolivia	1
			Afghanistan	50
4750	63.16	Bertoua	Cameroon	20
		Ulgai	People's Republic of China	15
		Lhasa	Tibet	50
4751	63.14	Lubumbashi	Zaire	10
4753	63.12	Ujung Padang	Indonesia	20
4755	63.09	R Educacoa Rural	Brazil	10
		E So Maranhao	Brazil	2
		Huanta	Peru	1
4760	63.03		People's Republic of China	50
		Monrovia	Liberia	10
		Trans-World Radio	Swaziland	25
4762	63.00	R Inca	Peru	2
4764	62.97	Medan	Indonesia	50
4765	62.96	Huanay	Bolivia	1
		Cruzeiro Do Sul	Brazil	10
		Havana (R Moscow)	Cuba	10
4766	62.95	Guayaquil	Ecuador	5
4770	62.89	Lunda Norte	Angola	1
		Beijing	People's Republic of China	15

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4770	62.89	Kaduna	Nigeria	50
		R Mundial	Venezuela	1
4775	62.83	A Voz Do Oeste	Brazil	1
		Gauhati	India	10
		Tarma	Peru	1
		R Los Andes	Bolivia	5
		Jakarta	Indonesia	50
		Islamabad	Pakistan	100
4777	62.80	Libreville	Gabon	100
4780	62.76	Cuando Cubango	Angola	5
		Petrozauodsk	USSR	50
		Carabobu	Venezuela	1
		Djibouti	Djibouti	20
4785	62.70	R Ballivian	Bolivia	1
		Campinas	Brazil	1
		R Caiari	Brazil	1
			People's Republic of China	10
		Dar Es Salaam	Tanzania	50
		Baku	USSR	50
		R Cooperativo	Peru	1
4790	62.63	Fak Fak	Indonesia	1
		Islamabad	Pakistan	100
4792	62.60	Atalaya	Ecuador	5
4795	62.57	Aquidauana	Brazil	2
		Douala	Cameroon	100
		Los Caras	Ecuador	5
		Ulan Ude	USSR	50
4797	62.54	R Nueva America	Bolivia	10
4800	62.50	Hyderabad	India	10
		Maseru	Lesotho	100
		Yakutsk	USSR	—
		R Lara	Venezuela	10
		E Popular	Ecuador	3
4804	62.45	Nairobi	Kenya	5
		Santa Ana	Bolivia	0.25
		Lam Dong	Vietnam	—
4805	62.44	Difusora Amazonas	Brazil	5
		Kupang	Indonesia	0.5
4807	62.41	Soa Tome	Soa Tome	10
		Africa 1	Gabon	250
		R San Martin	Peru	3
		Yerevan	USSR	50
		Galapagos	Ecuador	5

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4815	62.31	Tabatinga	Brazil	10
		Londrina	Brazil	0.5
		Beijing	People's Republic of China	10
		Karachi	Pakistan	10
4820	62.24	R Paz y Bien	Ecuador	2
		Gaborone	Botswana	50
		Evangelica	Honduras	5
		Calcutta	India	10
		Khanty Mansiysk	USSR	50
		Huila	Angola	25
4822	62.21	Ha Tuyen	Vietnam	—
4825	62.18	Braganca	Brazil	5
		R Mam	Guatemala	1
		La Selva	Peru	10
		Vladwostok	USSR	100
		Ashkhabad	USSR	50
		Moquegua	Peru	—
4826	62.16	Sicuani	Peru	0.5
4827	62.15	R Grigota	Bolivia	1
4830	62.11	Bangkok	Thailand	10
		Tachira	Venezuela	10
		Shenyang	People's Republic of China	10
4832	62.09	R Reloj	Costa Rica	3
4835	62.05	R Atalaia	Brazil	5
		Teresina	Brazil	0.5
		R Tezulutlan	Guatemala	3
		Kuching	Malaysia	10
		SA Broadcasting Corporation	South Africa	100
4840	61.98	Harbin	People's Republic of China	50
		Fuzhou	People's Republic of China	10
		Bombay	India	10
		Valera	Venezuela	1
4845	61.92	R Fides	Bolivia	10
		Manaus	Brazil	250
		Kajang	Malaysia	50
		Nouakchott	Mauretania	100
		Bucaramanga	Colombia	1
		Ambon	Indonesia	1
4848	61.88	Uige	Angola	5
4850	61.86	Yaounde	Cameroon	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4850	61.86	Kohima	India	2
		Tashkent	USSR	50
		R Capital	Venezuela	1
4851	61.85	R Luz Y Vida	Ecuador	5
4853	61.82	Sana'a	Yemen	100
4854	61.80	Pampas	Peru	1
4855	61.79	Radio por Mundo Melhor	Brazil	1
		Radio Aruana	Brazil	1
			Mauritius	10
		Palembang	Indonesia	10
4860	61.73	Delhi	India	10
		Chita	USSR	15
		Kalinin	USSR	50
		Maracaibo	Venezuela	1
4865	61.66	Santana	Brazil	1
		Lanzhou	People's Republic of China	50
		La Voz del Cinaruco	Colombia	1
4867	61.64	Wamena	Indonesia	—
4870	61.60	Cotonou	Benin	30
		Radio Rio Amazonas	Ecuador	5
			Sri Lanka	10
4872	61.58	Sorong	Indonesia	10
4875	61.54	Radio Jornal do Brasil	Brazil	10
		Boa Vista	Brazil	10
		Uralsk	USSR	15
4876	61.53	La Cruz del Sur	Bolivia	10
		Radio Super	Colombia	2
		Radio Central	Peru	—
4879	61.49	Quetta	Pakistan	10
		Dacca	Bangladesh	10
4880	61.48	South African BC	South Africa	100
4883	61.44	Beijing	People's Republic of China	50
4885	61.41	Er do Zaire	Angola	5
		Radio Clube do Para	Brazil	5
		Radio Difusora Acreana		
		Nairobi	Kenya	250
		Ondas del Meta	Colombia	5

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4885	61.41	Huancavelica	Peru	1
		Radio Sararenda	Bolivia	1
4890	61.35	Centinela del Sur	Ecuador	2
		Port Moresby	Papua New Guinea	10
		Dakar	Senegal	100
4895	61.29	Bie	Angola	1
		Radio Bare	Brazil	1
		Kurseong	India	20
		Ashkhabad	USSR	50
		Tyumen	USSR	15
		Radio Chanchamayo	Peru	1
4900	61.22	Surakarta	Indonesia	—
		Radio Juventud	Venezuela	10
		Radio Libertador	Ecuador	1
4902	61.20		Sri Lanka	10
4904	61.17	N'Djamena	Chad	100
4905	61.16	Radio Relogio Federal	Brazil	5
		Beijing	People's Republic of China	10
4910	61.10	Lusaka	Zambia	50
		Conakry	Guinea	20
		Bukittinggi	Indonesia	1
4911	61.09	Gran Colombia	Ecuador	10
4915	61.04	Radio Anhanguera	Brazil	10
		Radio Nacional	Brazil	10
		Nanning	People's Republic of China	10
		Accra	Ghana	10
		Armonias Caqueta	Colombia	3
		Nairobi	Kenya	100
4920	61.00	Brisbane	Australia	10
		Madras	India	10
		Yakutsk	USSR	50
		Tangjungpinang	Indonesia	10
		Quito	Ecuador	5
4921	60.96	Ondas del Titicaca	Peru	1
4924	60.93	Maputo	Mozambique	—
4925	60.91	Taubatu	Brazil	1

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4925	60.91	Harbin	People's Republic of China	50
4926		Bate	Guinea	100
4927	60.89	Jambi	Indonesia	10
4930	60.85	Tbilisi	USSR	50
		Ashkhabad	USSR	50
4932	60.83	Surakarta	Indonesia	10
4935	60.79	Radio Tropical	Peru	1
		Radio Jornal a Critica	Brazil	5
		Radio Difusora	Brazil	2.5
		Radio Capixaba	Brazil	1
4939	60.74	Montera	Bolivia	1.5
4940	60.73	Xining	People's Republic of China	10
			Sri Lanka	10
		Kiev	USSR	50
4945	60.67	Radio Illimani	Bolivia	10
		Pocos de Caldas	Brazil	1
		Porto Velho	Brazil	50
		Voz Sao Francisco	Brazil	2
		Neiva	Colombia	2
4946	60.66	Bandung	Indonesia	2
4950	60.61	Nairobi	Kenya	5
		Kuching	Malaysia	10
		Peshawar	Pakistan	10
		Radio Madre de Dios	Peru	5
4955	60.54	Rondonopolis	Brazil	2.5
		Radio Cultural Amauta	Peru	1
		Campos	Brazil	2.5
		Banda Aceh	Indonesia	—
4957	60.52	Baku	USSR	50
4960	60.48	Beijing	People's Republic of China	50
		Radio Federacion	Ecuador	5
		Ranchi	India	10
		La Merceo	Peru	1
4965	60.42	Radio Juan XXIII	Bolivia	3
		Radio Poti	Brazil	1
4968	60.39	Cutervo	Peru	1
			Sri Lanka	10
4970	60.36	Cabinda	Angola	1

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
4970	60.36	Urumqi	People's Republic of China	50
		Kota Kinbalu	Malaysia	10
		Radio Rumbos	Venezuela	10
4971	60.35	Yaounde	Cameroon	30
4975	60.30	Fuzhou	People's Republic of China	10
		Radio del Pacifico	Peru	4
		Dushanbe	USSR	50
		Ondas Orteguaza	Colombia	1
4976	60.29	Radio Iguatemi	Brazil	1
4977	60.28	Radio Tarqui	Ecuador	3
4980	60.24	Radio Batallon Topater	Bolivia	5
		Swazi Commercial	Swaziland	100
		Elos del Torbes	Venezuela	10
		Radio Azad Kashmir	Pakistan	10
		Ondas Azuayas	Ecuador	10
4985	60.18	Radio Brazil Central	Brazil	10
4990	60.12	Radio Beni	Bolivia	1
		Changsha	People's Republic of China	10
		Radio Baha	Ecuador	5
		Lagos	Nigeria	20
		Radio South Africa	South Africa	250
		Yerevan	USSR	50
		Radio Barquisimeto	Venezuela	15
			Iran	100
		Radio Ancash	Peru	10
4991	60.11	Radio Animas	Bolivia	1
4995	60.06	Choibalsan	Mongolia	10
4996	60.04	RWM (SF) Moscow	USSR	5
5000	60.00	WWV (SF) Fort Collins	USA	10
		WWVH (SF) Kekaha	Hawaii	10
		LOL (SF) Buenos Aires	Argentina	2

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5000	60.00	MSF (SF) Rugby	UK	0.5
		IBF (SF) Turin	Italy	5
		RCH (SF) Tashkent	USSR	1
5004	59.95	RID (SF) Irkutsk	USSR	1
5005	59.94	Radio Cristal	Bolivia	1
5010	59.88	Rawalpindi	Pakistan	10
		Radio Elo	Peru	1
		Garoua	Cameroon	100
		Nanning	People's Republic of China	10
		Surcolombiana	Colombia	2.5
		Antananarivo	Madagascar	100
5015	59.82	Radio Copacabana	Brazil	1
		Cuiaba	Brazil	5
		Radio Pioneira	Brazil	1
		Arkhangelsk	USSR	50
			Ecuador	10
5020	59.76	Cuarto Centenario	Bolivia	1
		Nanchang	People's Republic of China	10
		Honiara	Solomon Islands	10
			Sri Lanka	10
		Radio Nacional	Venezuela	1
		Gjirokaster	Albania	15
		Niamey	Nigeria	20
5025	59.70	Radio Trans-amazonica	Brazil	5
		Radio Borborema	Brazil	1
		Radio Rebelde	Cuba	10
		Radio Splendit	Ecuador	3
5027	59.68	Kampala	Uganda	20
5030	59.64	Kuching	Malaysia	10
		Radio Continente	Venezuela	15
		Radio Los Andes	Peru	1
5035	59.58	Schulungssender	Austria	10
		Radio Educacao Rural	Brazil	—
		Radio Aparecida	Brazil	3
		Alma Ata	USSR	50
		Radio Centrafricaine	Central African Republic	100
5039	59.94	Radio Omdurman	Sudan	20

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5040	59.52	Fuzhou	People's Republic of China	10
		Tbilisi	USSR	50
		Maturin	Venezuela	10
5045	59.46	Radio Cultura do Para	Brazil	10
		Rioja	Peru	1
5046	59.45	Jogjakarta	Indonesia	20
5047	59.44	Togblekope	Togo	100
5050	59.41	Aizawal	India	10
		Dar es Salaam	Tanzania	10
		Cangallo	Peru	1
5052	59.38	Seletar	Singapore	50
5055	59.35	Radio Maua	Brazil	5
		Faro del Caribe	Costa Rica	5
		TWR	Swaziland	25
		Radio Catolica	Ecuador	10
5057	59.32	Gjirokaster	Albania	15
5060	59.29	Taung-Gyi	Burma	0.1
		Radio Amazonas	Peru	1
		Huambo	Angola	1
5065	59.23	Petrozavodsk	USSR	50
		Nacional Progreso	Ecuador	5
		Bunia	Zaire	1
5075	59.11	Radio Sutatenza	Colombia	25
5090	58.94		People's Republic of China	50
5095	58.88	Radio Sutatenza	Colombia	25
5096	58.87	Islamabad	Pakistan	100
5016	58.87	Islamabad	Pakistan	100
5120	58.59	Radio Mundo	Peru	1
		Nghia Binh	Vietnam	—
5125	58.54	Beijing	People's Republic of China	10
5145	58.31	Beijing	People's Republic of China	120
5170	58.03	Fuzhou	People's Republic of China	10
5191	57.79	Radio Nuevo Continente	Peru	3
5198	57.71	Radio Origenes	Peru	—
5220	57.47	Beijing	People's Republic of China	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5240	57.25	Fuzhou	People's Republic of China	10
5250	57.14	Beijing	People's Republic of China	50
5257	57.07	Sibolga	Indonesia	1
5260	57.03	Alma Ata	USSR	50
5265	56.98	Fuzhou	People's Republic of China	10
5274	56.88	Radio Moderna	Peru	—
		Chota	Peru	1
5290	56.71	Krasnoyarsk	USSR	100
5295	56.66	Beijing	People's Republic of China	15
5320	56.39	Beijing	People's Republic of China	15
5325	56.34	Acobamba	Peru	1
5360	55.97	Radio Vision	Peru	—
5405	55.50	ER do Namibe	Angola	5
5420	55.35	Beijing	People's Republic of China	10
5450	55.05	Radio Machupo	Bolivia	—
		Biak	Indonesia	1
5660	53.00	Xieng Khouang	Laos	1
5740	52.26	San Jose	Peru	—
5770	51.99	Fuzhou	People's Republic of China	10
5800	51.72	Urumqi	People's Republic of China	50
5850	51.28	Beijing	People's Republic of China	100
5860	51.19		People's Republic of China	50
5870	51.11	Riyadh	Saudi Arabia	50
5880	51.02	Beijing	People's Republic of China	10
5881	51.01	Pekanbaru	Indonesia	5
5885	50.98	Tel Aviv	Israel	—
5886	50.97	Pekanbaru	Indonesia	1
5895	50.89	Wavre	Belgium	100/250
5900	50.85	Fuzhou	People's Republic of China	50
		Chengdu	People's Republic of China	15
		Radio Moscow	USSR	100
5905	50.80	Islamabad	Pakistan	10
5910	50.76	Wavre	Belgium	100/250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5910	50.76	Radio Moscow	USSR	100
			Bolivia	—
5915	50.72	Alma Ata	USSR	100
		Beijing	People's Republic of China	50
		Tel Aviv	Israel	20
5920	50.68	Radio Moscow	USSR	100
		Hanoi	Vietnam	5
5925	50.63	Tashkent	USSR	50
		Tallinn	USSR	50
5930	50.59	Prague	Czechoslovakia	120
		Murmansk	USSR	50
		Tbilisi	USSR	50
5935	50.55	Riga	USSR	50
		Lhasa	Tibet	50
5940	50.51	Magadan	USSR	50
		Caracol	Colombia	10
5945	50.46	Vienna	Austria	100
		Radio Moscow	USSR	100
5950	50.42	Arequipa	Peru	1
		Harbin	People's Republic of China	50
		Allouis	France	100
		Georgetown	Guyana	10
		Leningrad	USSR	100
5954	50.39	Radio Pio Doce	Bolivia	1
5955	50.38	Radio Gazeta	Brazil	10
		RFE/RL	West Germany	250
		VOA	Greece	250
		Guatemala City	Guatemala	10
		Flevoland	Holland	500
		Huancayo	Peru	1
		TWR	Swaziland	250
5960	50.34	RCI	Canada	250
		Kunming	People's Republic of China	50
		DW	West Germany	500
		Jammu	India	1
		Ulan Bator	Mongolia	50
		Ankara	Turkey	250/500
		Alma Ata	USSR	50/100
5965	50.29	Wavre	Belgium	100
		Huanuni	Bolivia	2.5
		Radio Guaiba	Brazil	2.5
		WS	Canada	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5965	50.29	BBC	Cyprus	250
		WS	UK	250
		RCI	UK	100
		VOA	UK	250
		VOA	Greece	50
			Japan	100
		Kajang	Malaysia	100
		Jos	Nigeria	10
5970	50.25	RFE/RL	West Germany	100
		Gauhati	India	10
		NHK	Japan	100
		Lima	Peru 2	—
		Gauhati	India	10
		Alma Ata	USSR	100
			Yemen	100
		Banjarmasin	Indonesia	1
5975	50.21	WS	UK	100/250
		Beijing	People's Republic of China	120
		Radio Garuja	Brazil	10
		Suwon	Korea	10
		Gweu	Zimbabwe	100
		Cochabamba	Bolivia	1
		Radio Macarena	Colombia	5
5980	50.17	Kota Kinabalu	Malaysia	10
			Sierra Leone	250
		Quetta	Pakistan	10
		Radio RSA	South Africa	500
5985	50.13	Rangoon	Burma	50
		RFE/RL	West Germany	100
		Rabaul	Papua New Guinea	10
		VOA	Greece	250
		V of Free China	USA	100
		Mexico City	Mexico	10
5990	50.08	Allouis	France	500
		Rome	Italy	100
		Bucharest	Romania	250
		WS	UK	500
			Ethiopia	100
		Bhopal	India	10
		Rio	Brazil	7.5
		DW	West Germany	100/500
		FEBC	Philippines	50
5995	50.04	DW	West Germany	100/500

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
5995	50.04	Lyndhurst	Australia	10
		Allouis	France	100
		Radio Loyola	Bolivia	1
		Warsaw	Poland	8
		Lhasa	Tibet	50
		RCI	UK	100
			Malawi	20/50
		Bamako	Mali	50
		VOA	USA	250
		Arequipa	Peru	1
6000	50.00	Vienna	Austria	10/500
		DW	West Germany	100/500
		DW	Malta	250
		Fuzhou	People's Republic of China	50
			Singapore	50
6005	49.96	WS	Ascension Island	125/250
		La Paz	Bolivia	10
		Zanzibar	Tanzania	10
			Yemen	100
		Lanzhou	People's Republic of China	10
			Sri Lanka	20
		Montreal	Canada	1
		V of Hope	USA	250
		San Jose	Costa Rica	3
6010	49.92	Radio Berlin	East Germany	50/100
		Aparecida	Brazil	10
		WS	UK	100/250
		Radio RSA	South Africa	250
		Calcutta	India	10
		WS	Singapore	100
		Lima	Peru	2.5
		Radio los Andes	Venezuela	1
		DW	West Germany	100/500
6012	49.90	McMurdo Base	Antarctica	1
6015	49.88	VOA	Greece	250
		Suwon	Korea	250
		RCI	Portugal	250
		WS	UK	500
		VOA	Philippines	250
		Vatican City	Vatican	100
		Beijing	People's Republic of China	50
6020	49.83	DW	West Germany	100/500

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6020	49.83	Flevoland	Holland	500
		Moscow	USSR	100
		WS	Ascension Island	250
		Gweru	Zimbabwe	100
		Simla	India	2.5
		Radio North Solomons	Papua New Guinea	10
		VOA	USA	250
		Kiev	USSR	50
		Bonaire	Antilles	300
		Lima	Peru	5
6025	49.79	DW	West Germany	100/500
		La Paz	Bolivia	10
		Radio Educadora	Brazil	10
			Malaysia	100
		Budapest	Hungary	250
		DW	Malta	250
		Enugu	Nigeria	10
6030	49.75	Muhlacker	West Germany	20
		Calgary	Canada	0.1
		US Military	USA	50/200
		Radio Santa Maria	Chile	1
		Limassol	Cyprus	250
		BBC	UK	250
		NHK	Japan	150
		Deiedrikstad	Norway	500
		Masirahi Island	Oman	100
		FEBC	Philippines	200
		FEBA	Seychelles	50
		VOA	Philippines	250
6035	49.71	Carnavon	Australia	100/300
		R Globo	Brazil	10
		Sofia	Bulgaria	100
		DW	West Germany	100/500
		Vladivostok	USSR	100
		Delhi	India	100
		VOA	Liberia	250
		Guaviare	Colombia	5
6040	49.67	Allouis	France	100
		DW	West Germany	100/500
		Berlin	East Germany	500
		VOA	UK	250
		Milne Bay	Papua New Guinea	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6040	49.67	VOA	USA	250
		FEBC	Philippines	50
6045	49.63	Allouis	France	100/500
		DW	West Germany	200/500
		WS	UK	100
		Delhi	India	100
		VOA	Liberia	250
		Tambacounda	Senegal	4
		R Sport	Uruguay	1
		Gweru	Zimbabwe	100
		Jakarta	Indonesia	100
		Moscow	USSR	240
		Unn de San Luis Potosi	Mexico	0.5
6050	49.59	RTB Francais	Belgium	100
		Quito	Ecuador	100
		WS	Cyprus	100/250
		RFE/RL	West Germany	100
		Rome	Italy	100
		Delhi	India	50
		Sibu	Malaysia	10
		Ibadan	Nigeria	50
		Irkutsk	USSR	100
		WS	UK	100/250
6055	49.55	Prague	Czechoslovakia	120
		Allouis	France	500
		Kigali	Rwanda	50
			Kuwait	250
		Tokyo	Japan	50
		BBC Delano	USA	250
		SAO Paolo	Brazil	7.5
6060	49.50	VOA	UK	250
		Buenos Aires	Argentina	50
		Caltanisetta	Italy	50
		Havana	Cuba	100
		Lusaka	Zambia	10
		VOA	Greece	250
		Miri	Malaysia	10
		VOA	West Germany	100
		Shepparton	Australia	100
6065	49.46	Kranji (BBC)	Singapore	250
		Brasilia	Brazil	250
		Hörby	Sweden	350
		Karlsborg	Sweden	350
		Armavir	USSR	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6065	49.46	Kohima	India	2
		Bogotá	Colombia	5
		DW	West Germany	100/500
		RCI	Canada	100
		D Welle Trincomalee	Sri Lanka	250
		VOA	Philippines	250
6070	49.42	Limassol	Cyprus	100
		Bangkok	Thailand	10
		Sofia	Bulgaria	150
		Jaya Pura	Indonesia	20
		Toronto	Canada	1
		Oruro	Bolivia	2
		Kmarkhov	USSR	100
		Leipzig	East Germany	100
		Navan	East Germany	500
		Manzini	Swaziland	100
		Quito	Ecuador	100
6075	49.38	Ekala	Sri Lanka	10
		DW	West Germany	100/500
		Tashkent	USSR	100
		S Barbara	Honduras	2
6080	49.34	VOA	UK	250
		Kranji (BBC)	Singapore	250
		Nauen	East Germany	50
		Moscow	USSR	50
		Vancouver	Canada	0.1
		Daru	Papua New Guinea	10
		VOA	USA	500
		Hailar	Mongolia	—
		VOA	Greece	50
		Catavi	Bolivia	1
		Shepparton	Australia	100
6085	49.30	DW	Antigua	250
		DW	West Germany	100/500
		Munich	West Germany	100
		Sofia	Bulgaria	100
		Kabul	Afghanistan	50
		Allouis	France	500
		DW	Malta	250
		BBC	UK	100
		Radio Oman	Oman	100
		Ondas Del Darien	Colombia	1
6090	49.26	Havana	Cuba	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6090	49.26	Simferopol	USSR	240
		Orenburg	USSR	100
		Irkutsk	USSR	50
		Junglinster	Luxembourg	500
		Beira	Mozambique	10
		Phnom-Penh	Kampuchea	50
		VOA	West Germany	100
		FEBC	Philippines	50
		Monrovia	Liberia	50
		VOA	Morocco	100
6095	49.22	VOA	West Germany	100
		Warsaw	Poland	100
		Mogadiscio	Somalia	50
		Espinal	Colombia	5
		Dixon	USA	100
		Quito	Ecuador	100
		VOA	Morocco	100
		Serpukhov	USSR	100
6100	49.18	Belgrade	Yugoslavia	100
		DW	West Germany	100/500
		Kajang	Malaysia	500
		Kaunas	USSR	50
		Irkutsk	USSR	500
		Caracas	Venezuela	1
		BBC	UK	250
		VOA	Philippines	500
6105	49.14	RFE/RL	West Germany	250
		WS	Cyprus	—
		Merida	Mexico	1
		Kalinin	USSR	120
		Delhi	India	100
		VOA	Greece	50
		Ankara	Turkey	250
		WYFR Florida	USA	100
		Radio Universdad	Costa Rica	2
		La Paz	Bolivia	10
6110	49.10	BBC	UK	50
		Baku	USSR	50
		Budapest	Hungary	100
		Srinigar	India	7.5
		VOA	Philippines	250
		Ismaning	West Germany	100
		Beijing	People's Republic of China	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6110	49.10	Flevoland	Holland	500
		Rad. Med.	Malta	250
6115	49.06	Radio Berlin	East Germany	50
		Hermosillo	Mexico	1
		Khabarovsk	USSR	50
		Maputo	Mozambique	100
		RFE/RL	West Germany	100
		FEBC	Philippines	50
		Brazzaville	Congo	50
		Rio de Janeiro	Brazil	5
		Tokyo Nagara	Japan	10
		Havana (Radio Moscow)	Cuba	100
		Lima	Peru	10
6120	49.02	BBC	UK	250
		Limassol (BBC)	Cyprus	100
		Hyderabad	India	10
		Delhi	India	100
		Buenos Aires	Argentina	10
		DW	West Germany	100/500
		Bocave	Philippines	50
		Pori	Finland	15/250
		Armavir	USSR	240
		Bluefields	Nicaragua	2
		Surabaya	Indonesia	10
		Sackville (US)	Canada	50/250
		Bata	Guinea	50
		DW	Antigua	250
		Urumqui	People's Republic of China	50
6125	48.98	Sao Paulo	Brazil	10
		Beijing	China	50
		VOA	UK	300
		BBC	UK	250/500
		Limassol	Cyprus	250
		Greenville	USA	500
		Cincinnati	USA	250
		Ashkhabad	USSR	100
		Naven	East Germany	500
		Radio Exterior Espana	Spain	350
6130	48.94	DW	West Germany	500/100
		VOA	UK	250
		Limassol (BBC)	Cyprus	250
		Ekala	Sri Lanka	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6130	48.94	Halifax	Canada	0.5
		Moscow	USSR	240
		Novosibirsk	USSR	100
		VOA	USA	500
		Kumamoto	Japan	1
		Vientiane	Laos	10
		Quito	Ecuador	100
		Islamabad	Pakistan	250
		Lisbon	Portugal	100
		VOA	Morocco	100
		Radio Valles Del Tuy	Venezuela	1
		VOA	Philippines	250
		Feba	Seychelles	100
6135	48.90	DW	West Germany	100/500
		Baku	USSR	100
		Warsaw	USSR	100
		Papeete	Tahiti	4/20
		Porto Alegre	Brazil	7.5
		Suwon	Korea	10
		Samarinda	Indonesia	1
		Antananarivo	Madagascar	100
		Schwarzenburg	Switzerland	150
		Concepcion	Chile	10
6140	48.86	Santa Cruz	Bolivia	1
		DW	West Germany	100/500
		Perth	Australia	2
		Bujumbura	Burundi	25
		BCC	UK	500
		VOA	UK	250
		Limassol	Cyprus	200
		Voronezh	USSR	100
		Arganda	Spain	100
		Wewak	Papua New Guinea	10
		VOA	Greece	250
		Ranchi	India	2
		RCI	Canada	100/250
		VOA	USA	500
		Huayllay	Peru	1
		Copenhagen	Denmark	50
		Havana	Cuba	50
		Beijing	People's Republic of China	50
6145	48.82	Delhi	India	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6145	48.82	DW	West Germany	100/500
		Moscow	USSR	100
		Khabharovsk	USSR	100
		Allouis	France	100
		Calabar	Nigeria	10
		Algiers	Algeria	50
		FEBC	Philippines	50
		Tarija	Bolivia	1
		Bonaire	Neth. Antilles	50
6150	48.78	BBC	UK	250/500
		VOA	UK	300
			Yugoslavia	500
		VOA	West Germany	100
		Lyndhurst	Australia	10
		San Jose	Costa Rica	20
		VOA	Greece	250
		Neiva	Colombia	1
		VOA	Morocco	100
		Harbin	People's Republic of China	50
		Benguela	Angola	1
6155	48.74	La Paz	Bolivia	1
		Nikolayevsk Amur	USSR	50
		Seletar	Singapore	50
		Tokyo	Japan	10
		Vienna	Austria	100/500
		Bucharest	Romania	120/250
		Conakry	Guinea	18/120
		Tripoli	Libya	500
		Comm. Radio	Swaziland	10
		Kara	Togo	10
		Lanzhou	People's Republic of China	10
		Delhi	India	100
		St Joan's (BBC)	Antigua	100
		Pucalipa	Peru	1
		DW	West Germany	100/500
6160	48.70	VOA	UK	250
		Delhi	India	100
		Sofia	Bulgaria	150
		St John's	Canada	0.3
		Vancouver	Canada	0.5
		Moscow	USSR	100
		Algiers	Algeria	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6160	48.70	DW	West Germany	100/500
		VOA	Greece	250
		Radio RSA	South Africa	250
		Bogotá	Colombia	10
		Malargue	Argentina	3
6165	48.66	Lenk	Switzerland	250
		Vladivostok	USSR	100
		Kiev	USSR	100
		Havana	Cuba	—
		Lusaka	Zambia	20
		Mexico City	Mexico	10
		Sao Paulo	Brazil	7.5
		Bonaire	Neth. Antilles	300
		Berlin	East Germany	100
		Rome	Italy	100
		Beijing	People's Republic of China	50
		Pyongyang	Korea	100
6170	48.62	Daventry	UK	100
		RFE/RL	West Germany	100
		DW	West Germany	100/500
		Lucknow	India	10
		Marulas	Philippines	10
		Armavir	USSR	100
		Florencia	Colombia	2.5
		Tirana	Albania	2.5
		Cayenne	French Guiana	4
6175	48.58	WS	Antigua	250
		Belo Horizonte	Brazil	10
		Kajang	Malaysia	100
		Allouis	France	100
		Hiroshima	Japan	1
		Yian	People's Republic of China	—
		Kaduna	Nigeria	10
		Luanda	Angola	100
		Faro del Caribe	Costa Rica	2.5
		Gimje	North Korea	100
6180	48.54	Mendoza	Argentina	10
		WS	Cyprus	100
		VOA	UK	250
		Alma Ata	USSR	100
		Tula	USSR	100
		VOA	Liberia	250
		Ziguinchor	Senegal	4

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6180	48.54	Guatemala City	Guatemala	1
		Tirana	Albania	—
		VOA	Morocco	50
		Radio Turismo	Venezuela	1
6185	48.50	Tirana	Albania	—
		BBC	UK	500
		Ekala	Sri Lanka	10
		DW	Sri Lanka	300
		Tripoli	Libya	100
		Mexico City	Mexico	1
		Sao Paulo	Brazil	10
		Riazan	USSR	240
		VOA	Philippines	250
		DW	West Germany	100/500
		Radio Vatican	Vatican	—
6190	48.47	Santa Maria Galeria	Vatican	100
		Bremen	West Germany	10
		Bucharest	Romania	250
		VOA	USA	500
		Delhi	India	10
		Omsk	USSR	100
		Nikolayeusk Amur	USSR	50
		Osaka	Japan	0.5
		Padang	Indonesia	10
		Manokwari	Indonesia	1
		Swiss Radio International	Switzerland	500
		Maseru (BBC)	Lesotho	100
		Baghdad	Iraq	500
		DW	West Germany	100/500
		Beijing	People's Republic of China	50
6195	48.43	WS	UK	250/500
		WS	Antigua	250
		Limassol (BBC)	Cyprus	250
		Baku	USSR	50
		Rio de Janeiro	Brazil	7.8
		La Paz	Bolivia	10
		Sokoto	Nigeria	10
		RCI	Canada	100
		WS	Singapore	50
6200	48.39	Tirana	Albania	100
		Leningrad	USSR	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6200	48.39	Beijing	People's Republic of China	—
		Radio Sandino	Nicaragua	1
6205	48.35	Forli	Italy	10
		Quito	Ecuador	500
6220	48.23	Monte Carlo	Monaco	100/500
6225	48.19	Beijing	People's Republic of China	—
6243	48.05	Calca	Peru	—
6252	47.98	Vatican City	Vatican	80
		Pyongyang	Korea	50/100
6250	48	Malabo	Equatorial Guinea	10
6260	47.92	Xininh	People's Republic of China	10
6324	47.44	Estacion City	Peru	—
6332	47.34	Son La	Vietnam	—
6340	47.32	Turkish Police	Turkey	1
6383	47.00	Ulan Bator	Mongolia	50
6400	46.88	Fuzhou	People's Republic of China	10
		Pyongyang	Korea	50
6428	46.67	Radio Espinar	Peru	—
6430	46.66	Beijing	People's Republic of China	—
6480	46.30	Gimje	North Korea	250
6493	46.20	Beijing	People's Republic of China	—
6500	46.15	Xining	People's Republic of China	10
6510	46.08	Cao Bang	Vietnam	—
6525	45.98	Pakse	Laos	—
6540	45.87	Pyongyang	Korea	100
6550	45.80	Beijing	People's Republic of China	—
		Voice of Lebanon	Lebanon	10
6560	45.73	Beijing	People's Republic of China	—
6576	45.62	Pyongyang	Korea	100
6580	45.59	Radio La Cumbre	Peru	—
6590	45.52	Beijing	People's Republic of China	—
6600	45.45	Pyongyang	Korea	—
6665	45.01	Beijing	People's Republic of China	—
6675	44.94	Radio Pedro Domingo	Bolivia	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
6710	44.71	Hoang Lien Son	Vietnam	—
6725	44.61	Radio Satellite	Peru	—
6750	44.44	Beijing	People's Republic of China	—
6765	44.35	Fuzhou	People's Republic of China	—
6790	44.18	Beijing	People's Republic of China	—
		Radio Selecta	Peru	—
6810	44.05	Beijing	People's Republic of China	—
6814	44.03	Radio Nuevo Eden	Peru	—
6815	44.02	Radio Universo	Peru	—
6825	43.96	Beijing	People's Republic of China	—
6840	43.86	Daventry	UK	30
		Darwin	Australia	—
6860	43.73	Beijing	People's Republic of China	—
6890	43.54	Beijing	People's Republic of China	—
6900	43.48	Meteorology	Turkey	2.5
6910	43.42	Dublin	Eire	1
6933	43.27	Beijing	People's Republic of China	100
6937	43.25	Kunming	People's Republic of China	50
6955	43.13	Beijing	People's Republic of China	—
6960	43.10	Radio Nueva Cajamarca	Peru	—
6965	43.07	Luang Prabang	Laos	1
6974	43.02	Hohhot	People's Republic of China	25
6995	42.89	Beijing	People's Republic of China	—
7010	42.80	Beijing	People's Republic of China	—
		Radio Frequencia	Peru	0.05
7025	42.70	Fuzhou	People's Republic of China	—
7035	52.64	Tirana	Albania	100
		Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7050	42.55	Urumqi	People's Republic of China	50
7053	42.54	Radio Celedin	Peru	—
7055	42.52	Beijing	People's Republic of China	100
7065	42.46	Beijing	People's Republic of China	100
		Tirana	Albania	50
7075	42.40	Tirana	Albania	50/100
7080	42.37	Tirana	Albania	100
		Beijing	People's Republic of China	—
7090	42.31	Tirana	Albania	100
		Islamabad	Pakistan	10
7095	42.28	Beijing	People's Republic of China	—
7098	42.27	Yokjakarta	Indonesia	10
7100	42.25	Radio Moscow	USSR	50/500
7105	42.22	WS	Ascension Island	250
		BBC	UK	100/250
		Arganda	Spain	350
		VOA	Sri Lanka	35
		Radio Nepal	Nepal	100
		VOA	West Germany	100/500
		VOA	Greece	250
		Radio Time-IBC	Italy	1
		DW	Malta	250
		Bucharest	Romania	250
		Limassol (BBC)	Cyprus	250
		Dacca	Bangladesh	100
7110	42.19	Omsk	USSR	100
		Bamako	Mali	50
		DW	Sri Lanka	250
		Maputo	Mozambique	10
		Gedja	Ethiopia	100
		Delhi	India	100
		DW	West Germany	100/500
		Lhasa	Tibet	50
7115	42.16	Bangkok	Thailand	10
		Bandundu	Zaire	10
		RFE/RL	West Germany	10
		RFE/RL	Portugal	200
		Radio Moscow	Bulgaria	500
		Gedja	Ethiopia	100
		VOA	Sri Lanka	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7120	42.13	BBC	UK	250/500
		VOA	UK	300
		N'Djamena	Chad	100
		Tirana	Albania	100
		Hargeisa	Somalia	10
		Novosibirsk	USSR	100
		Tula	USSR	50
		Kuwait	Kuwait	250
		Delhi	India	100
		Allouis	France	500
		Salah el Dein	Iraq	500
		Hohhot	People's Republic of China	50
		VOA	Philippines	250
		WS	Singapore	100
7125	42.11	Conakry	Guinea	100
		Ranchi	India	10
		Nairobi	Kenya	5
		Warsaw	Poland	100
		VOA	Greece	250
		VOA	UK	300
		Vatican Radio	Vatican	100
		Radio Cairo	Egypt	100
		Vientiane	Laos	25
		VOA	Sri Lanka	25
7130	42.08	BBC	UK	100/250
		VOA	UK	300
		RCI	UK	100/300
		Kuchin	Malaysia	10
		DW	West Germany	100/500
		Minsk	USSR	100
		Yerevan	USSR	100
		Limbe	Malawi	100
		Taipei	Taiwan	50
		VOA	Greece	250
		FEBA	Seychelles	100
7135	42.05	VOA	Liberia	50/250
		Moscow	USSR	100
		Radio Havana	USSR	100
		Allouis	France	100/500
		VOA	Greece	250
		Sofia	Bulgaria	500
		Bucharest	Romania	250
		WS	Oman	100
		WS	Cyprus	450

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7135	42.05	Darwin: Carnarvon	Australia	250
7140	42.02	BBC	UK	100/500
		BBC	Oman	100
		Limassol	Cyprus	20/250
		Hyderabad	India	10
		Nairobi	Kenya	100
		Kazan	USSR	100
		Alma Ata	USSR	100
		Tokyo-Yamata	Japan	50/100
		Spoleto	Italy	0.5
7145	41.99	Kuching	Malaysia	10
		Warsaw	Poland	100
		Tashkent	USSR	100
		Tula	USSR	100
		Quelimane	Mozambique	0.25
		Algiers	Algeria	100
		VOA	Greece	250
		RFE/RL	Portugal	250
		DW	West Germany	100/500
		Tirana	Albania	50
		Allouis	France	500
		Bucharest	Romania	250
		Ilorin	Nigeria	10
		Riyadh	Saudi Arabia	350
7150	41.96	WS	UK	250/500
		Krasnoyarsk	USSR	100
		Serpukhov	USSR	100
		Nairobi	Kenya	5
		DW	West Germany	100/500
		Douala	Cameroon	100
		Abu Zaabal	Egypt	100
		Bunia	Zaire	5
		WS	Oman	100
		Taipei	Taiwan	100
		Gauhati	India	10
		Delhi	India	50
7155	41.93	DW	West Germany	100/500
		RFE/RL	West Germany	250
		BCC	UK	250
		RCI	UK	250
		Amman	Jordan	100
		Budapest	Hungary	100
		RFE/RL	Spain	250
		Niamey	Niger	20

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7155	41.93	Jeddah	Saudi Arabia	350
7160	41.90	Kuchin	Malaysia	10
		Madras	India	10
		Kazan	USSR	240
		Omsk	USSR	100
		Petropavlovsk	USSR	100
		Allouis	France	100/500
		DW	West Germany	500
		Monte Carlo	Monaco	100
		BBC	Ascension Island	250
		WS	Cyprus	250
		WS	Oman	100
		Aligarth	India	250
7165	41.87	RFE/RL	West Germany	100
		RFE/RL	Portugal	250
		Serpukhov	USSR	15
		Lvov	USSR	500
		Gedja	Ethiopia	100
		Katmandu	Nepal	100
		BBC	UK	250
		Vienna	Austria	100
		Rertoua	Cameroon	20
		Beijing	People's Republic of China	100
7170	41.84	BBC	UK	250/500
		VOA	UK	300
		VOA	Greece	250
		Dakar	Senegal	100
		Radio Moscow	USSR	100/250
		SABC	South Africa	100
		Vienna	Austria	100
		Kohima	India	2
		Ankara	Turkey	250
		Lhasa	Tibet	—
		Seletar	Singapore	10
		Loboto	Angola	1
7175	41.81	DW	West Germany	100/500
		Caltanisetta	Italy	50
		Kiev	USSR	240
		Radio Moscow	USSR	100
		VOA	Liberia	250
		Bucharest	Romania	250
7180	41.78	VOA	UK	500
		BBC	Singapore	250
		VOA	Greece	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7180	41.78	RFE/RL	Portugal	250
		Bhopal	India	10
7185	41.75	Dubai	United Arab Emirates	300
		WS	UK	100/250
		RCI	UK	100
		Radio Berlin International	East Germany	100
		Radio Moscow	USSR	250/500
		Rangoon	Burma	50
7190	41.72	Colombo	Sri Lanka	10
		Jayapura	Indonesia	10
		VOA	Morocco	100
		RFE/RL	Portugal	250
		RFE/RL	West Germany	100
		Parakou	Benin	20
		Beijing	People's Republic of China	50
7195	41.70	Bucharest	Romania	100/250
		VOA	Liberia	50
		Tula	USSR	100
		Simferopol	USSR	500
		Rawalpindi	Pakistan	10
		Kampala	Uganda	20
		Dubai	United Arab Emirates	300
7200	41.67	VOA	UK	300
		Penang	Malaysia	10
		Irkutsk	USSR	50
		Vladivostok	USSR	50
		Zhigulevsk	USSR	100
		Belgrade	Yugoslavia	100
		Mogadishu	Somalia	50
		Kabul	Afghanistan	50
		DW	West Germany	100/500
		RFE/RL	Portugal	250
		Afrique No. 1	Gabon	250
		DW	Sri Lanka	250
7205	41.64	Armavir	USSR	100
		Moscow	USSR	500
		VOA	Greece	250
		VOA	Greece	50
		Yaounde	Cameroon	30
		Lubumbashi	Zaire	10
		Tokyo Yamata	Japan	20

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7205	41.64	Shepparton/ Carnarvon	Australia	100/250
		FEBC	Philippines	500
		Monte Carlo	Monaco	500
7210	41.61	BBC	UK	500/250
		VOA	UK	300
		BBC	Cyprus	100
		Schwarzenburg (Red Cross)	Switzerland	150
		Calcutta	India	10
		Moscow	USSR	100
		Khabarovsk	USSR	50
		Minsk	USSR	15
		Nairobi	Kenya	10
		Biak	Indonesia	1
		VOA	Greece	250
		Fredrikstad	Norway	500
		Kunming	People's Republic of China	—
7215	41.58	Abidjan	Ivory Coast	10
		Delhi	India	100
		Kalamabad	Iran	100
		Sofia	Bulgaria	500
		Luanda	Angola	10
		Ankara	Turkey	250
		Abu Dhabi	United Arab Emirates	500
		Carnarvon *et al.*	Australia	250
7220	41.55	VOA	UK	300
		Lusaka	Zambia	50
		Diriyya	Saudi Arabia	50
		Tchita	USSR	500
		RFE/RL	West Germany	50/250
		RFE/RL	Portugal	250
		Budapest	Hungary	50/250
		Bangui	Central African Republic	100
7225	41.52	Bucharest	Romania	250
		Delhi	India	100
		Aligarh	India	250
		VOA	Philippines	250
		VOA	Rwanda	250
		Sfax	Tunisia	100
		Chengdu	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7225	41.52	DW	West Germany	100/500
		Budapest	Hungary	100
7230	41.49	BBC	UK	250/500
		CBC	UK	100
		RCI	UK	100
		Limassol (BBC)	Cyprus	250
		Kazan	USSR	100
		Nikolayevsk Amur	USSR	100
		Kiev	USSR	100
		VOA	Philippines	250
		Kurseong	India	10
		Ouagadougou	Burkina Faso	4
		Pyongyang	Korea	—
7235	41.47	BBC	UK	—
		RCI	UK	300
		DW	West Germany	100/500
		Madras	India	100
		Rome	Italy	100
		Lusaka	Zambia	50
		Tirana	Albania	50
		Monte Carlo	Monaco	100
		Limassol (BBC)	Cyprus	250
		Masirah (BBC)	Oman	100
7240	41.44	Garoua	Cameroon	100
		Maputo	Mozambique	100
		Belgrade	Yugoslavia	10
		Bombay	India	10
		Delhi	India	50
		Tula	USSR	240
		Nairobi	Kenya	10
		Beijing	People's Republic of China	—
		Allouis	France	500
7245	41.41	RFE/RL	West Germany	100/250
		VOA	West Germany	100
		Nouakchott	Mauretania	100
		Luanda	Angola	100
		Khabmarousk	USSR	240
		Algiers	Algeria	50
			Libya	500
7250	41.38	Seletar	Singapore	50
		Radio Moscow	USSR	100
		Sta Maria Galeria	Vatican	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7250	41.38	Lucknow	India	10
		Taipei	Taiwan	10
7255	41.35	BBC	UK	250
		Ikorodu	Nigeria	50
		Sofia	Bulgaria	150
		RFE/RL	West Germany	100
		Radio Moscow	USSR	100
			Botswana	50
		Delhi	India	100
7260	41.32	BBC	UK	250/500
		RCI	UK	100
		Limassol (BBC)	Cyprus	250
		Vila	Vanuatu	2.5
		Bombay	India	100
		Novosibirsk	USSR	100
		Petropavlovsk	USSR	100
		Naven	East Germany	500
		Moroni	Comoro	4
		Ulan Bator	Mongolia	25
		VOA	Philippines	250
7265	41.29	Togblekope	Togo	100
		Riazan	USSR	240
		Yakutsk	USSR	100
		Komsomolsk Amur	USSR	100
		Rohrdorf	West Germany	20
		DW	Malta	250
		VOA	Greece	250
		VOA	Liberia	250
		Ankara	Turkey	250
		Delhi	India	100
		DW	Sri Lanka	250
7270	41.27	Kuchin	Malaysia	10
		Meyerton	South Africa	250
		Jakarta	Indonesia	50/100
		VOA	Greece	250
		Warsaw	Poland	100
		France Ville	Gabon	100
		VOA	West Germany	100
		DW	Portugal	250
7275	41.24	VOA	Philippines	50
		Rome	Italy	100
		Duchanbe	USSR	50
		DW	West Germany	100
		Monte Carlo	Monaco	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7275	41.24	Suwon	Korea	50
		Feba	Seychelles	25/100
		Tirana	Albania	—
		DW	Malta	250
		Guiyang	People's Republic of China	10
7280	41.21	Moscow	USSR	240
		Allouis	France	100
		VOA	Greece	250
		VOA	Liberia	50
		Fuzhou	People's Republic of China	15
		Gauhati	India	10
		Delhi	India	50
7285	41.18	Warsaw	Poland	100
		Radio Moscow	USSR	500
		Lagos	Nigeria	50
		DW	West Germany	100/500
		DW, RCI	Portugal	250
		Antananarivo (Radio Nederland)	Malagasy	300
		Bamako	Mali	18
		VOA	Philippines	100
		Meyerton	South Africa	100
		Limassol (BBC)	Cyprus	100
		Taipei	Taiwan	10
7240	41.15	Radio Moscow	USSR	240
		Rome	Italy	100
		DW	West Germany	500
		Islamabad	Pakistan	100
7295	41.12	BBC	UK	100/250
		Accra	Ghana	10
		Berlin	East Germany	100
		DW	West Germany	500
		RFE/RL	West Germany	100
		Kajang	Malaysia	100
		Moscow	USSR	240/500
		Manado	Indonesia	1
		Mbuji Mayi	Zaire	10
		Milan	Italy	5
		Manzini	Swaziland	25
		Aizawal	India	10
7300	41.10	Tirana	Albania	100
		Moscow	USSR	250

Short wave

Frequency (kHz)	*Wavelength (m)*	*Station*	*Country*	*Power (kW)*
7305	41.07	Radio Moscow	USSR	100
7310	41.04	Radio Moscow	USSR	100
		Tirana	Albania	50
7315	41.01	Beijing	People's Republic of China	100
		Taipei	Taiwan	—
		Radio Moscow	USSR	—
7320	40.98	BBC	UK	100/500
		Radio Magadan	USSR	—
		Radio Kiev	USSR	—
		Radio Moscow	USSR	—
7325	40.96	WS	UK	100/500
		VOA	UK	300
		Radio Moscow	USSR	50/500
7330	40.93	Radio Moscow	USSR	250/500
		Beijing	People's Republic of China	—
7335	—	CHU (SF) Ottawa	Canada	10
7340	40.87	Radio Moscow	USSR	100
7345	40.84	Prague	Czechoslovakia	100
		Radio Moscow	USSR	100
7350	40.82	Beijing	People's Republic of China	—
		Radio Moscow	USSR	—
7355	40.79	Radio Moscow	USSR	100
		Wyfr-Family Radio	USA	100
7360	40.76	Beijing	People's Republic of China	120
		Radio Moscow	USSR	500
7365	40.73	WYFR	USA	100
		KGEI	USA	250
7370	40.71	Radio Moscow	USSR	250
		Beijing	People's Republic of China	120
		Islamabad	Pakistan	100
7380	40.65	Radio Moscow	USSR	240
7385	40.62	Beijing	People's Republic of China	120
		Urumqi	People's Republic of China	50
7390	40.60	Radio Moscow	USSR	100
7395	40.57	Athens	Greece	100
		Tel Aviv	Israel	—
7400	40.54	Radio Moscow	USSR	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7405	40.51	Beijing	People's Republic of China	100
7410	40.49	Tel Aviv	Israel	300
		Radio Moscow	USSR	10
7412	40.47	Delhi	India	50
		Tel Aviv	Israel	300
7420	40.43	Radio Moscow	USSR	100
7430	40.38	Athens	Greece	—
7440	40.32	Beijing	People's Republic of China	—
		Radio Moscow	USSR	240
7450	40.27	R Exterior Espana	Spain	100/350
7455	40.24	Adhra	Syria	500
7460	40.21	Tel Aviv	Israel	300
7465	40.19	Tel Aviv	Israel	50
7470	40.16	Beijing	People's Republic of China	500
7480	40.11	Beijing	People's Republic of China	100
7500	40	VNG (SF) Lyndhurst	Australia	10
7504	39.98	Beijing	People's Republic of China	100
7516	39.91	Beijing	People's Republic of China	50
7525	39.87	Beijing	People's Republic of China	—
7550	39.74	Gimje	Korea	100
7590	39.53	Beijing	People's Republic of China	120
7620	39.37	Beijing	People's Republic of China	50
7651	39.21	VOA	USA	50
7660	39.16	Beijing	People's Republic of China	—
7670	39.11	Stolnik	Bulgaria	15
7700	38.96	Beijing	People's Republic of China	—
7770	38.61	Beijing	People's Republic of China	—
7775	38.59	Beijing	People's Republic of China	—
7800	38.46	Beijing	People's Republic of China	—
7820	38.36	Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
7850	38.22	Fuzhou	People's Republic of China	—
7925	37.85	Radio Moscow	USSR	15
7935	37.81	Beijing	People's Republic of China	—
8007	37.47	Beijing	People's Republic of China	—
8110	36.99	Delano	USA	100
8167.5	36.73	LQB9 (SF) Buenos Aires	Argentina	5
8260	36.32	Beijing	People's Republic of China	—
8300	36.14	Beijing	People's Republic of China	—
8345	35.95	Beijing	People's Republic of China	—
8425	35.61	Beijing	People's Republic of China	—
8450	35.50	Beijing	People's Republic of China	—
8490	35.34	Beijing	People's Republic of China	—
8566	35.02	Beijing	People's Republic of China	—
8660	34.64	Beijing	People's Republic of China	—
8925	33.61	R Continente	Peru	—
9009	33.30	Tel Aviv	Israel	100/300
9020	3326	Beijing	People's Republic of China	—
9030	33.22	Beijing	People's Republic of China	—
9064	33.10	Beijing	People's Republic of China	—
9080	33.04	Beijing	People's Republic of China	—
9090	33.00	RFE	West Germany	10
9170	32.72	Beijing	People's Republic of China	—
		RFE/RL	West Germany	10
9200	32.61	Radio Moscow	USSR	15
9210	32.57	Radio Moscow	USSR	—
9250	32.43	RFE/RL	West Germany	10
9290	32.29	Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9335	32.14	Beijing	People's Republic of China	—
9340	32.12	Beijing	People's Republic of China	—
9350	32.09	VOA	Korea	—
9360	32.05	REE	Spain	350
9365	32.03	Beijing	People's Republic of China	—
9375	32.00	Tirana	Albania	50
9380	31.98	Beijing	People's Republic of China	—
9385	31.97	Tel Aviv	Israel	50
9390	31.95	Tel Aviv	Israel	50
		Beijing	People's Republic of China	—
9395	31.93	Athens	Greece	—
9410	31.88	WS	UK	100
9420	31.85	Athens	Greece	100
9430	31.81	Tirana	Albania	50
9435	31.80	Tel Aviv	Israel	300
9440	31.78	Beijing	People's Republic of China	—
9450	31.75	Radio Moscow	USSR	240
9455	31.73	Cairo	Egypt	250
		Beijing	People's Republic of China	—
		VOA	USA	250
9457	31.72	Beijing	People's Republic of China	—
9460	31.71	Thessaloniki	Greece	35
9465	31.70	Islamabad	Pakistan	250
9470	31.68	Radio Moscow	USSR	100
9475	31.66	Cairo	Egypt	250
		TW Radio	Monaco	100
9480	31.65	Beijing	People's Republic of China	—
		Radio Moscow	USSR	250
		Tirana	Albania	100
9485	31.63	Tacna	Peru	0.5
9490	31.61	Beijing	People's Republic of China	100
		Radio Moscow	USSR	240
9495	31.60	Cairo	Egypt	100
		TW Radio	Monaco	100/500
9500	31.58	Tirana	Albania	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9500	31.58	Berlin	East Germany	100
		Magadan	USSR	50
		Caracas	Venezuela	50
9505	31.56	Prague	Czechoslovakia	120
		RFE/RL	West Germany	100
		Alma Ata	USSR	50
		Belgrade	Yugoslavia	10
		Fuzhou	People's Republic of China	—
		Shepparton	Australia	100
		VOA	USA	250
		Radio Record	Brazil	7.5
		DW	West Germany	100/500
9510	31.55	WS	Antigua	250
		WS	Canada	250
		Bucharest	Romania	250
		FEBA	Seychelles	100
		Santiago	Chile	10
		Taipei	Taiwan	100
		TW Radio	Guam	100
		FEBA	Mariana Islands	100
9515	31.53	BBC	Antigua	250
		Caltanisetta	Italy	50
		WS	Canada	250
		Maseru (BBC)	Lesotho	100
		Limassol (BBC)	Cyprus	250
		Delhi	India	100
		Radio Nederland	Madagascar	300
		Radio Malaysia	Malaysia	100
		Mexico City	Mexico	20
		Ankara	Turkey	250
		Radio Moscow	USSR	250
		FEBC	Philippines	50
		Greenville (BBC)	USA	250
9520	31.51	Radio Pampa	Brazil	10
		RFE/RL	West Germany	50/250
		Radio Nederland	Madagascar	300
		Port Moresby	Papua New Guinea	10
		FEBA	Mariana Islands	100
9525	31.50	Warsaw	Poland	100
		Havana	Cuba	—
		Madras	India	100
		Tokyo	Japan	200
		Voice of Hope	USA	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9525	31.50	VOA	USA	250/500
9530	31.48	BBC	UK	250
		VOA	Greece	50/250
		Bucharest	Romania	120
		REE	Spain	350
		Amman	Jordan	100
		VOA	USA	800
		VOA	Morocco	35/100
9535	31.46	Allouis	France	100
		Swiss BC Co.	Switzerland	250
		Luanda	Angola	100
		RCI	Canada	250
		WYFR Family Radio	USA	100
		Bonaire	Neth. Antilles	50
		Nagoya	Japan	0.6
9540	31.45	Prague	Czechoslovakia	120
		FEBA	Seychelles	100
		DW	West Germany	100/500
		Warsaw	Poland	100
		VOA	Liberia	250
		Radio Nederland	Madagascar	300
		VOA	USA	500
		Radio Nacional	Venezuela	50
9545	31.43	DW	West Germany	100/500
		DW	Malta	250
		Radio Universo	Brazil	7.5
		VOA	Philippines	250
		Honiara	Solomon Islands	10
		DW	Montserrat	50
		Radio Moscow	USSR	50/100
		Islamabad	Pakistan	10/100
9550	31.41	VOA	Liberia	50
		Reijing	People's Republic of China	—
		VOA	USA	250
		WYFR Family Radio	USA	100
		Havana	Cuba	50
		Radio Nacional	Chile	10
9555	31.40	RFE/RL	West Germany	100/250
		RFE/RL	Portugal	100/250
		VOA	Philippines	250
		La Hora Exacta	Mexico	0.5

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9560	31.38	Beijing	People's Republic of China	100
		Radio Berlin (Naven)	East Germany	500
		Amman	Jordan	100
		Swiss Radio International	Switzerland	100
		Ankara	Turkey	500
		Sofia	Bulgaria	500
9565	31.36	RFE/RL	West Germany	100
		DW	West Germany	100/500
		DW	Malta	250
		Lisbon	Portugal	50
		BBC	UK	500
		DW	Rwanda	250
		Delhi	India	50
		VOA UN	USA	250
		Radio Universo	Brazil	15
9570	31.35	Moyabe (NHK)	Gabon	500
		DW	West Germany	500
		Gimje	Korea	100
		Bucharest	Romania	250
		WS	Singapore	250
		REE	Spain	350
9575	31.33	Allouis	France	100
		Rome	Italy	100
		Radio Renascenza	Portugal	100
		BBC	UK	250
		Delhi	India	100
		VOA	Philippines	250
		Port Moresby	Papua New Guinea	—
		VOA	USA	250
		Taipei	Taiwan	50
		Radio Moscow	USSR	50
9580	31.32	Vienna	Austria	100
		REE	Spain	100
		VOA	UK	250
		WS	Ascension Island	250
		RSA	South Africa	250
		WS	Cyprus	100/250
		Beijing	People's Republic of China	100
			Philippines	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9580	31.32	WS	Singapore	250
		Shepparton	Australia	100
		VOA	Brazil	250
9585	31.30	DW	West Germany	100/500
		Radio Excelsior	Brazil	10
		VOA	UK	250
		Rome	Italy	100
		Meyerton	South Africa	500
		VOA	Greece	250
		Budapest	Hungary	250
9590	31.28	TW Radio	Monaco	100
		Fredrikstad	Norway	500
		Bucharest	Romania	250
		RCI	UK	250
		WS	Cyprus	100
		WS	Canada	250
		VOA	USA	100
		Radio Nederland	Neth. Antilles	300
9595	31.27	RFE/RL	West Germany	100
		Tokyo	Japan	50
		RFE/RL	Portugal	100
		Abu Dhabi	United Arab Emirates	250
		Montevideo	Uruguay	10
9600	31.25	WS	Ascension Island	250
		BBC	UK	500
		FEBA	Seychelles	25/100
		Prague	Czechoslovakia	120
		DW	West Germany	100/500
		WS	Cyprus	100
		Taipei	Taiwan	—
		Havana (Radio Moscow	Cuba	100
		University Radio	Mexico	1
9605	31.23	Prague	Czechoslovakia	120
		Allouis	France	100/500
		DW	West Germany	100/500
		Fredrikstad	Norway	500
		Sines	Portugal	250
		Karlsborg	Sweden	350
			Vatican	500
		VOA	Liberia	250
		VOA/UN	Morocco	100
		Masirah (BBC)	Oman	100
		Tokyo	Japan	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9605	31.23	Radio Veritas	Philippines	100
		DW	Canada	250
		WYFR Family Radio	USA	100
9610	31.22	DW	West Germany	500
		Cyclops	Malta	250
		TW Radio	Monaco	100
		Flevoland	Holland	500
		WS	Ascension Island	250
		Nouakchott	Mauretania	230
		Limassol (BBC)	Cyprus	100
		Abu Ghraib	Iraq	250
		FEBA	Seychelles	25/100
		Delhi	India	50
		Perth	Australia	10/50
		Jayapura	Indonesia	7.5
9615	31.20	DW	West Germany	100/500
		Limassol (BBC)	Cyprus	250
		Delhi/Bombay (All India Radio)	India	100
		DW, RCI	Portugal	250
		KGEI VO Friendship (CA)	USA	50
		Vatican Radio	Vatican	500
		VOA	Greece	250
		VOA	Morocco	50
			Angola	—
9618	31.19	Maputo	Mozambique	120
9620	31.19	Cairo	Egypt	100
		Naven	East Germany	500
		VOA	Liberia	—
		VOA	Philippines	250
		REE	Spain	350
		Sodre	Uruguay	2
		United Nations	USA	50
		Radio Moscow	USSR	240
		Belgrade	Yugoslavia	100
9625	31.17	RCI	Canada	100
		VOA	West Germany	100
		DW	Malta	250
		Limassol (BBC)	Cyprus	250
		RFE/RL	Spain	250
		Bucharest	Romania	120

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9625	31.17	Swiss Radio	Switzerland	100
		Vatican Radio	Vatican	100
9630	31.15	Prague	Czechoslovakia	250
		Rome	Italy	50/100
		REE	Spain	350
		Radio Sweden International	Sweden	350
		Adventist World Radio	Gabon	250
		Taipei	Taiwan	—
		Radio Nederland	Neth. Antilles	300
9635	31.14	Aparecida	Brazil	10
		VOA	Greece	250
		VOA	UK	250
		Bamako	Mali	18
		Limassol (BBC)	Cyprus	250
		Baghdad	Iraq	500
		Singapore BC	Singapore	50
		Radio Nacional	Colombia	25
		FEBC	Philippines	100
		Beira	Mozambique	100
9640	31.12	Carnarvon	Australia	100
		Dacca	Bangladesh	100
		Beijing	People's Republic of China	—
		Havana	Cuba	—
		DW	West Germany	100/500
		DW	Ruanda	250
		TW Radio	Swaziland	100
		Gimje	Korea	100
		Bucharest	Romania	250
		VOA	USA	250
		BBC	UK	100
		Radio Moscow	USSR	—
9645	31.10	Vatican Radio	Vatican	100
		Radio Bandeirantes	Brazil	7.5
		San Jose	Costa Rica	1
		Tokyo	Japan	100
		VOA, DW	Sri Lanka	35/250
		FEBC	Philippines	50
9650	31.09	DW	West Germany	100/500
		REE	Spain	350
		RCI	Canada	250
		Radio Nederland	Neth. Antilles	300

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9650	31.09	Vatican Radio	Vatican	500
		Conakry	Guinea	100
		VOA	Morocco	100
		VOA	USA	500
9655	31.07	Pori	Finland	250
		Havana	Cuba	50
		Riyadh	Saudi Arabia	350
		Bangkok	Thailand	100
		Radio Nor Peruana	Peru	1
		TW Radio	Monaco	100
		Radio Moscow	USSR	100
9660	31.06	Luanda	Angola	100
		Brisbane	Australia	10
		WS	Cyprus	100
		RFE/RL	West Germany	100/250
		VOA	Philippines	100
		Ankara	Turkey	250
		Greenville	USA	100
		Radio Rumbos	Venezuela	10
9665	31.04	Pyongyang	Korea	50
		Radio Berlin International	East Germany	500
		Radio Marumbe	Brazil	10
		Delhi	India	100
			Malaysia	100
		Saipan	Northern Mariana Islands	100
		FEBC	Philippines	50
9670	31.02	DW	West Germany	100/500
		Sines	Portugal	250
		Beijing	People's Republic of China	—
		FEBC	Philippines	50
		FEBA	Seychelles	100
		Saipan	Northern Mariana Islands	100
		VOA	USA	250
		Radio Moscow	USSR	100
9675	31.01	Warsaw	Poland	100
		REE	Spain	100
		Cairo	Egypt	100
		Delhi	India	100
		Tokyo	Japan	200
		Radio Del Pacifico	Peru	5

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9680	30.99	DW	West Germany	500
		RFE/RL	West Germany	100
		Lyndhurst	Australia	10
		VOA	Greece	250
		Lisbon	Portugal	100
		Jakarta	Indonesia	50
		WYFR Family Radio	USA	100
		RFE/RL	Spain	250
		Mexico City	Mexico	0.5
9685	30.98	Bucharest	Romania	120
		Kampala	Uganda	250
		Taipei	Taiwan	—
		Saipan	Northern Mariana Islands	100
		Sao Paulo (Radio Gazeta)	Brazil	7.5
9690	30.96	Abu Ghraib	Iraq	250
		DW	West Germany	100/500
		VOA	Greece	250
		Bucharest	Romania	250
		Antananarivo	Madagascar	10
		Taipei	Taiwan	10
		Buenos Aires	Argentina	100
9695	30.94	RFE/RL	Portugal	250
		Hörby	Sweden	350
		Abu Dhabi	United Arab Emirates	200
		Havana	Cuba	—
		Phnom Penh	Kampuchea	—
		Manaos	Brazil	7.5
9700	30.93	Sofia	Bulgaria	100
		DW	West Germany	500
		VOA	Greece	250
		Beijing	People's Republic of China	—
		FEBC	Philippines	50
		VOA	USA	250
9705	30.91	Radio Nacional	Brazil	7.5
		RFE/RL	West Germany	100
		WYFR Family Radio	USA	50
		Radio Mexico International	Mexico	10
		RFE/RL	Portugal	100
9710	30.90		Mauritius	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9710	30.90	Rome	Italy	100
		RSI	Sweden	500
		Kaunas	USSR	50
		TW Radio	Swaziland	25
		Carnarvon	Australia	100
		Radio Nacional	Argentina	6
9715	30.88	Allouis	France	100/500
		DW	West Germany	100
		VOA	Greece	50
		Flevoland	Holland	500
		BBC	Ascension Island	250
		Monrovia	Liberia	50
		Radio Nederland	Madagascar	300
		VOA	Morocco	50
		FEBC	Philippines	50
		WYFR Family Radio	USA	50
		Radio Nederland	Neth. Antilles	300
		Quito	Ecuador	100
9720	30.86	Radio La Plata	Bolivia	2
		Colombo	Sri Lanka	100
		Darwin	Australia	250
		Quito	Ecuador	100
9725	30.85	Vienna	Austria	100
		RFE/RL	Portugal	250
		RFE/RL	West Germany	100
		Swiss Radio International Red Cross	Switzerland	500
		TW Radio	Swaziland	25
		Beijing	People's Republic of China	100
		VOA	Philippines	50
		BBC	Singapore	100
9730	30.83		Denmark	50
		Radio Berlin International	East Germany	50/100
		Kampala	Uganda	250
		Riyadh	Saudi Arabia	350
		Ankara	Turkey	500
		Rangoon	Burma	50
		Delhi	India	100
		VOA	Philippines	250
		Havana	Cuba	100
		Radio Moscow	USSR	350

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9735	30.82	Radio Nacional	Paraguay	100
		DW	West Germany	100/500
		VOA	West Germany	100
		VOA	UK	250
		DW	Rwanda	250
		Radio Oman	Oman	100
		DW	Antigua	250
			Brazil	7.5
		Radio Moscow	USSR	100/500
9740	30.80	Sofia	Bulgaria	100
		Prague	Czechoslovakia	120/200
		VOA	Greece	250
		Lisbon	Portugal	100
		Cairo	Egypt	240
		Limassol	Cyprus	250
		Malalos (Radio Veritas)	Philippines	100
		WS	Singapore	250
		Radio Moscow	USSR	120/240
9745	30.79	Allouis	France	100
		Lisbon	Portugal	100
		Yaounde	Cameroon	—
		Abu Ghraib	Iraq	250
		Saipan	Northern Mariana Islands	100
		Sao Paulo	Brazil	7.5
		Quito	Ecuador	100
		Hörby	Sweden	350
		Moscow	USSR	240
		Sofia	Bulgaria	500
9750	30.77	Dar Es Salaam	Tanzania	50
		Papeete	Tahiti	4
		Tirana	Albania	—
		DW	West Germany	500
		RFE/RL	West Germany	100
		WS	UK	100
		VOA	Liberia	50
		WS	Cyprus	20/100
		Hohhot	People's Republic of China	—
			Kuwait	—
		Madras	India	100
		Gimje	South Korea	250
		Pyongyang	North Korea	—
		Kajang	Malaysia	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9750	30.77	Santiago	Chile	10
		Bucharest	Romania	120
		Tashkent	USSR	240
9755	30.75	Sofia	Bulgaria	250
		Sta Maria Galeria	Vatican	100
		Cairo	Egypt	100
		Delhi	India	100
		RCI	Canada	250
9670	30.74	RCI	Canada	250
		Vienna	Austria	100
		VOA	Greece	250
		BBC	UK	100/250
		VOA	UK	250
		VOA	Morocco	25/100
		Limassol	Cyprus	250
		Tokyo	Japan	10
		VOA	Philippines	250
		Shepparton	Australia	100
		Ivanofrankousk	USSR	240
		Tirana	Albania	—
9765	30.72	DW	West Germany	100/500
		BBC	Ascension Island	250
		Beijing	People's Republic of China	—
		Taipei	Taiwan	—
		Quito	Ecuador	100
9770	30.71	DW	West Germany	100/500
		Königswuster-hausen	East Germany	100
		VOA	Greece	250
		Abis	Egypt	100
		VOA	Morocco	100
		Kalamabad	Iran	100
		Masirah (BBC)	Oman	100
		VOA	Philippines	100
		Kranji (BBC)	Singapore	250
		Shepparton	Australia	50/100
		Havana	Cuba	10
		Bonaire (Radio Nederland)	Neth. Antilles	300
		Rio de Janeiro	Brazil	7.5
		Limassol (BBC)	Cyprus	100
		Jakarta	Indonesia	20
9775	30.70	Dacca	Bangladesh	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9775	30.70	Beijing	People's Republic of China	—
		Moscow	USSR	200
9780	30.67	Moscow	USSR	100
9785	30.66	Vinnitsa	USSR	100
		Beijing	People's Republic of China	—
9790	30.64	Moscow	USSR	—
		Allouis	France	500
9795	90.63	Minsk	USSR	50
9800	30.61	Allouis	France	500
		Moscow	USSR	100
9805	30.60	Cairo	Egypt	250
9810	30.58	Moscow	USSR	100
9815	30.57	Jerusalem	Israel	300
9820	30.55	Beijing	People's Republic of China	—
		Moscow	USSR	—
9825	30.53	BBC	UK	100/250
		Moscow	USSR	250
9830	30.52	Moscow	USSR	—
9835	30.50	Budapest	Hungary	100
9840	30.44	Hanoi	Vietnam	100
			Kuwait	—
		VOA	USA	500
9845	30.47	Taipei	Taiwan	—
9850	30.46	Abis	Egypt	100
		Moscow	USSR	—
9855	3044	Athens	Greece	100
9860	30.43	Wavre	Belgium	100
		Quito	Ecuador	—
		Beijing	People's Republic of China	—
9865	30.41	Moscow	USSR	—
9870	30.40	Gimje	Korea (S)	—
		Riyadh	Saudi Arabia	350
9880	30.36	Wavre	Belgium	—
		Beijing	People's Republic of China	120
		Kiev	USSR	—
		Kuwait	Kuwait	—
9885	30.35	Islamabad	Pakistan	100
		Riyadh	Saudi Arabia	350
		Swiss Radio Int.	Switzerland	500
9840	30.33	Sabrata	Libya	500

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
9840	30.33	Moscow	USSR	—
9895	30.32	Flevoland	Holland	500
		Moscow	USSR	100
9900	30.30	Wavre	Belgium	250
		Beijing	People's Republic of China	—
9905	30.24	Wavre	Belgium	250
		Athens/Kavalla	Greece	100/250
		Doha	Quatar	250
9910	30.27	Delhi	India	250
9915	30.26	BBC	UK	500
9920	30.24	Beijing	People's Republic of China	—
		Tel Aviv	Israel	20
9925	30.23	Wavre	Belgium	250
9945	30.17	Dacca	Bangladesh	250
		Beijing	People's Republic of China	—
9950	30.15	Delhi	India	20
9965	30.11	Beijing	People's Republic of China	—
9977	30.07	Pyongyang	Korea	—
9988	30.04	Rioja	Peru	—
9996	30.01	RWM (SF) Moscow	USSR	5
10000	30	WWV (SF) Fort Collins	USA	10
		WWVH (S) Kekaha	Hawaii	10
		LOL (SF) Buenos Aires	Argentina	2
		MSF (SF) Rugby	UK	0.5
		RTA (SF) Novosibirsk	USSR	5
		RCH (SF) Tashkent	USSR	1
10004	29.99	RID (SF) Irkutsk	USSR	1
10010	29.97	Ho Chi Minh C	Vietnam	—
10040	29.88	Ho Chi Minh C	Vietnam	—
10060	29.82	Ho Chi Minh C	Vietnam	—
10235	29.31	VOA	USA	—
10245	29.28	Beijing	People's Republic of China	—
10260	29.24	Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
10335	29.03	Delhi	India	50
10380	28.90	VOA	USA	—
10420	28.79	RFE/RL	West Germany	—
10454	28.71	VOA	USA	—
10510	28.54	Tirana	Albania	100
10690	28.06	Moscow	USSR	—
10855	27.64	Moscow	USSR	—
10869	27.60	VOA	USA	50
10922	27.47	DW	West Germany	—
11000	27.27	Beijing	People's Republic of China	—
11040	27.17	Beijing	People's Republic of China	—
11100	27.03	Beijing	People's Republic of China	—
11290	26.57	Beijing	People's Republic of China	—
11330	26.48	Beijing	People's Republic of China	—
11375	26.37	Beijing	People's Republic of China	—
11445	26.21	Beijing	People's Republic of China	—
11455	26.19	Beijing	People's Republic of China	—
11490	26.11	Beijing	People's Republic of China	—
11500	26.09	Beijing	People's Republic of China	—
11505	26.08	Beijing	People's Republic of China	—
11515	26.05	Beijing	People's Republic of China	—
11555	25.96	Dacca	Bangladesh	250
11575	25.92	Beijing	People's Republic of China	—
11585	25.90	Tel Aviv	Israel	300
11590	25.88	Fuzhou	People's Republic of China	—
11600	25.86	Beijing	People's Republic of China	—
11605	25.85	Tel Aviv	Israel	300
11610	25.84	Beijing	People's Republic of China	—
11620	25.82	Delhi/Aligarh	India	50/250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11625	25.81	Adhra	Syria	500
11630	25.80	Beijing	People's Republic of China	—
		Moscow	USSR	240
11640	25.77	Adhra	Syria	500
11645	25.76	Hargeisa	Somalia	5
		Athens/Kavalla	Greece	100
11650	25.75	Beijing	People's Republic of China	—
		Moscow	USSR	—
11655	25.74	Tel Aviv	Israel	300
		Pyongyang	Korea	—
11660	25.73	Vienna	Austria	100
		Moscow	USSR	—
		Beijing	People's Republic of China	—
11665	25.72	Abu Zaabal	Egypt	100
11670	25.71	Moscow	USSR	—
		Vienna	Austria	100
		Allouis	France	500
11675	25.70	Moscow	USSR	—
		Beijing	People's Republic of China	240
		Kuwait	Kuwait	250
		Islamabad	Pakistan	250
11680	25.68	BBC	UK	—
		Pyongyang	Korea	100
		Moscow	USSR	—
11685	25.67	Riyadh	Saudi Arabia	350
		Beijing	People's Republic of China	—
11690	25.66	Moscow	USSR	—
		Arganda	Spain	100
11695	25.65	Wavre	Belgium	250
		Monte Carlo (TWR)	Monaco	500
		Beijing	People's Republic of China	—
11700	25.64	Santa Domingo	Dominican Republic	50
		Allouis	France	500
		Sala-El-Deen	Iraq	500
		Berlin	East Germany	250
		Tel Aviv	Israel	—
		Moscow	USSR	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11700	25.64	Sta Maria Galeria	Vatican	—
11705	25.63	Allouis	France	100
		DW	West Germany	100/500
		Berlin	East Germany	100
		VOA	Greece	250
		Carnarvon	Australia	100
		Limassol (BBC)	Cyprus	100
		DW	British West Indies	50
		Moscow	USSR	240
		Karlsborg/Hörby	Sweden	350
11710	25.62	VOA	UK	250
		VOA	Liberia	250
		VOA	Morocco	100
		Beijing	People's Republic of China	50
		VOA	Sri Lanka	35
		Noumea	New Caledonia	4
		RCI	Canada	250
		Havana	Cuba	—
		Buenos Aires	Argentina	100
		Moscow	USSR	100/240
11715	25.61	Monte Carlo (TWR)	Monaco	100
		Abis	Egypt	250
		VOA	Liberia	250
		Algiers	Algeria	50
		Delhi	India	100
		VOA	Philippines	250
		TWR	Guam	250
		VOA	USA	500
		Orcha	USSR	240
		Komsomolsamur	USSR	100
		Sta Maria Galeria	Vatican	100
		Beijing	People's Republic of China	—
11720	25.60	Sofia	Bulgaria	250
		DW	West Germany	100/500
		Flevoland	Holland	500
		BBC	UK	100
		BBC	Cyprus	20
		Shepparton	Australia	100
		RCI	Canada	250
		FEBA	Seychelles	25/100
		Lvov	USSR	240

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11720	25.60	Yerevan	USSR	100
		Tula	USSR	240
11725	25.59	Sta Maria Galeria	Vatican	100
		RFE/RL	West Germany	100
		RFE/RL	Portugal	250
		Havana	Cuba	10
		Malolos	Philippines	100
		Beijing	People's Republic of China	—
		Gimje	Korea	250
11730	25.58	Flevoland	Holland	500
		DW	Rwanda	500
		DW	West Germany	100/500
		Noblejas	Spain	350
		Sfax	Tunisia	100
		Riyadh	Saudi Arabia	350
		Dubai	United Arab Emirates	300
		Delhi	India	100
11735	25.56	Belgrade	Yugoslavia	100
		Antananarivo	Madagascar	300
		Agana	Guam	100
		Montevideo	Uruguay	1.5
		Vinnitsa	USSR	240
		Goiana	Brazil	7.5
		Tehran	Iran	100
		Sofia	Bulgaria	100
11740	25.55	BBC	Cyprus	250
		BBC	Oman	100
		Novosibirsk	USSR	50
		Sta Maria Galeria	Vatican	100
		VOA	USA	250
		VOA	Greece	250
		Bucharest	Romania	250
		Flevoland	Holland	500
		Lisbon	Portugal	100
		VOA	Philippines	250
11745	25.54	Minsk	USSR	240
		Armavir	USSR	500
		Kalamabad	Iran	100
		Taipei	Taiwan	—
		Dacca	Bangladesh	—
		Brasilia	Brazil	—
11750	25.53	WS	Ascension Island	250
		WS	UK	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11750	25.53	WS	Cyprus	100
		WS	Singapore	125
		Tokyo	Japan	10
		Kazan	USSR	100
		Sofia	Bulgaria	500
		Leipzig	East Germany	100
		DW	West Germany	100/500
11755	25.52	Buenos Aires	Argentina	7
		Tbilisi	USSR	240
		Leningrad	USSR	240
		Vladivostok	USSR	100
		FEBA	Seychelles	100
		Pori	Finland	15/20
11760	25.51	VOA	UK	300
		WS	Cyprus	100
		VOA	Philippines	250
		Kharkov	USSR	100
		VOA	Morocco	35/100
		Havana	Cuba	100
		Manzini	Swaziland	25
		VOA	Greece	250
		Carnarvon	Australia	300
		Rarotonga	Cook Islands	0.5
		VOA	Liberia	250
		FEBA	Seychelles	25
		Sta Maria Galeria	Vatican	100
11765	25.50	Irkutsk	USSR	100
		Leningrad	USSR	500
		Delhi	India	100
		DW	West Germany	100/500
		Sofia	Bulgaria	100
		Beijing	People's Republic of China	—
11770	25.49	RFE/RL	West Germany	100
		Ikorodu	Nigeria	100
		Jakarta	Indonesia	100
		RFE/RL	Spain	250
		Mexico City	Mexico	10
		Malolos	Philippines	100
11775	25.48	Bucharest	Romania	250
		VOA	UK	300
		RCI	UK	100
		WS	Antigua	250
		Armavir	USSR	240
		WS	Canada	50/250

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11775	25.48	Taipei	Taiwan	—
		VOA	Philippines	250
11780	25.47	BBC	UK	100
		Buenos Aires	Argentina	7.5
		Tokyo	Japan	100
		Lvov	USSR	100
		Brasilia	Brazil	250
		Pyongyang	Korea	100
		VOA	Greece	250
11785	25.46	DW	Antigua	250
		Omsk	USSR	100
		Tashkent	USSR	100
		DW	Rwanda	250
		Berlin	East Germany	100/500
		DW	West Germany	100/500
		Porto Alegre	Brazil	7.5
		DW	Malta	250
		Abis	Egypt	250
		Hörby	Sweden	250
11790	25.45	Allouis	France	500
		FEBA	Seychelles	25/100
		Cincinnatti	USA	175
		Riazan	USSR	240/500
		SABC	South Africa	100
		Bucharest	Romania	250
		Jakarta	Indonesia	100
		Havana	Cuba	—
		Arganda	Spain	100
		Salah el Deen	Iraq	500
		Islamabad	Pakistan	500
11795	25.43	DW	West Germany	100/500
		Berlin	East Germany	100
		Delhi	India	100
		Tbilisi	USSR	50
		DW	Malta	250
		Schwarzenburg	Switzerland	100
11800	25.42	Ekala	Sri Lanka	100
		Rome	Italy	100
		Kiev	USSR	100
		Lisbon	Portugal	100
		Shepparton	Australia	250
		Riyadh	Saudi Arabia	350
11805	25.41	VOA	UK	300
		Kazan	USSR	50
		Tbilisi	USSR	500
		VOA	Philippines	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11805	25.41	VOA	Greece	250
		Rio de Janeiro	Brazil	10
		Tangier	Morocco	10
		Allouis	France	100/500
		Kabul	Afghanistan	—
		DW	West Germany	100/500
11810	25.40	DW	West Indies	125/250
		Algiers	Algeria	100
		FEBA	Seychelles	25/100
		Delhi	India	100
		Simferopol	USSR	240
		DW	West Germany	100/500
		Rome	Italy	100
		Bucharest	Romania	120
		Athens	Greece	250
		Sta Maria Galeria	Vatican	100
		Berlin	East Germany	100
		Hörby	Sweden	250
11815	25.39	Warsaw	Poland	100
		Goiana	Brazil	7.5
		RFE/RL	West Germany	100
		RFE/RL	Portugal	50
		Tokyo	Japan	100
		Okeechobee	USA	100
		Aligarh	India	250
		Khabarovsk	USSR	100
11820	25.38	WS	Ascension Island	125/500
		Voronezh	USSR	100
		Frunze	USSR	500
		BBC Delano	USA	250
		DW	West Germany	100/500
		Ankara	Turkey	250
		Gimje	Korea	100
11825	25.37	Papeete	Tahiti	20
		RFE/RL	West Germany	10
		Berlin	East Germany	50
		RFE/RL	Portugal	250
		RFE/RL	Spain	250
		Taipei	Taiwan	25
		RCI	Canada	250
11830	25.36	Okeechobee	USA	500
		Bombay	India	100
		Delhi	India	100
		Moscow	USSR	240
		Malolos	Philippines	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11830	25.36	Bucharest	Romania	250
		Sta Maria Galeria	Vatican	100
		Quito	Ecuador	100
		Monrovia	Liberia	50
		Pyongyang	Korea	50
11835	25.35	VOA	UK	250
		Ekala	Sri Lanka	35/100
		Tashkent	USSR	—
		Montevideo	Uruguay	5
		Quito	Ecuador	100
		VOA	Liberia	50
		Carnarvon	Australia	250
		VOA	Greece	250
		Saipan	Mariana Islands	100
		BBC	Oman	100
11840	25.34	Lisbon	Portugal	100
		Warsaw	Poland	100
		VOA	Greece	250
		Tokyo	Japan	50/100
		Poro	Philippines	35
		Bucharest	Romania	250
		VOA	Liberia	50/250
			Guam	100
		FEBC	Philippines	50
		Sofia	Bulgaria	250
		Havana (Radio Moscow)	Cuba	—
		RCI	UK	100/250
11845	25.33	VOA	UK	500
		Kazan	USSR	100
		Allouis	France	100/500
		Sta Maria Galeria	Vatican	100
		Tirana	Albania	500
		Sackville	Canada	250
		Hörby	Sweden	350
		Delhi	India	100
		VOA	Philippines	250
		VOA	Greece	250
		Limassol (BBC)	Cyprus	20/250
11850	25.32	BBC	Singapore	250
		Delhi	India	100
		Fredrikstad	Norway	100/250
		Konevo	USSR	240
		DW	West Germany	100/500
		Wavre	Belgium	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11850	25.32	Wellington	New Zealand	7.5
		Agana	Guam	100
		Sofia	Bulgaria	500
		Havana	Cuba	—
		VOA	Liberia	250
		FEBC	Philippines	50
11855	25.31	VOA	UK	300
		Okeechobee	USA	50/100
		Jeddah	Saudi Arabia	100
		Ulan Bator	Mongolia	50
		Sackville	Canada	250
		Prague	Czechoslovakia	120
		RFE/RL	West Germany	100
		DW	West Germany	500
		RFE/RL	Portugal	100
		Carnarvon	Australia	100
		FEBA	Seychelles	100
		Aparecida	Brazil	—
11860	25.30	WS	Ascension Island	125/250
		Gorki	USSR	100
		Krasnoyarsk	USSR	100
		Taipei	Taiwan	50
		Fredrikstad	Norway	500
		Sofia	Bulgaria	500
		FEBC	Philippines	100
		Beijing	People's Republic of China	500
11865	25.28	VOA	UK	280
		Limassol (BBC)	Cyprus	100
		BBC	Singapore	250
		Jayapura	Indonesia	25
		DW	West Germany	100/500
		Sines	Portugal	250
		FEBC	Philippines	50
		FEBA	Seychelles	25/100
		DW	Malta	250
		Novosibirsk	USSR	100
		Delhi	India	100
		Vatican Radio	Vatican	100
11870	25.27	Knabarousk	USSR	240
		Serpukhov	USSR	240
		Aligarh	India	250
		Sofia	Bulgaria	50/500
		Fredrikstad	Norway	250
11875	25.26	Bonaire	Neth. Antilles	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11875	25.26	RFE/RL	West Germany	100
		VOA	UK	250
		VOA	Greece	250
		Tokyo	Japan	100
11880	25.25	Lyndhurst	Australia	10
		Lusaka	Zambia	50
		Moscow	USSR	240
		Noblejas	Spain	350
		Allouis	France	100
		Pyongyang	Korea	—
		Meyerton	South Africa	250
11885	25.24	RFE/RL	West Germany	100/250
		RFE/RL	West Germany	100
		Meyerton	South Africa	100
		RFE/RL	Spain	250
11890	25.23	Konigswuster-hausen	East Germany	100
		FEBC	Philippines	50
		VOA	USA	500
		Kenga	USSR	100
		Ryazan	USSR	240
		Noblejas	Spain	350
		Seeb	Oman	50
11895	25.22	Delhi	India	100
		RFE/RL	Portugal	250
		VOA	USA	250
		Port Alegre	Brazil	1
		Bonaire	Neth. Antilles	50
		Feba	Seychelles	100
11900	25.21	Duchanbe	USSR	240
		Komsomolskamur	USSR	100
		Luov	USSR	240
		Meyerton	South Africa	500
		Kajang	Malaysia	100
		Quito	Ecuador	100
		Riyadh	Saudi Arabia	350
		Sofia	Bulgaria	350
		Saipan	Northern Mariana Islands	100
11905	25.20	Taipei	Taiwan	50
		DW	West Germany	100/500
		Rome	Italy	50/100
		Frunze	USSR	100
		Sines	Portugal	250
		Pathumthani	Thailand	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11905	25.20	Tirana	Albania	100
			Brazil	7.5
		Beijing	People's Republic of China	150
		Radio Cairo	Egypt	100/250
11910	25.19	BBC	Singapore	100
		Jaszbereny	Hungary	250
		Diosd	Hungary	100
		Moscow	USSR	240
		Komsomolskamur	USSR	100
		Quito	Ecuador	100
		Riydah	Saudi Arabia	350
		DW	West Germany	100/500
		Shepparton	Australia	100
11915	25.18	Abu Zaabal	Egypt	100
		Concepcion	Paraguay	100
		Petropavlovsk Kam	USSR	100
		Porto Alegre	Brazil	7.5
		VOA	USA	250
		VOA	Liberia	250
		RCI	Portugal	250
		Taipei	Taiwan	—
		Riyadh	Saudi Arabia	350
		Tirana	Albania	—
		VOA	Greece	250
11920	25.17	VOA	USA	250
		UN	USA	250
		VOA	Philippines	250
		Arganda	Spain	100
		Novosibirsk	USSR	100
		Abijan	Ivory Coast	100
		Feba	Seychelles	25/100
		Amman	Jordan	100
		Tangier	Morocco	50
11925	25.16	BBC	UK	250
		Krashoyarsk	USSR	240
		VOA	Greece	250
		VOS	Philippines	250
		RCI	Canada	250
		Sao Paulo	Brazil	10
		Quito	Ecuador	100
11930	25.15	Allouis	France	100/500
		Ashkhabad	USSR	240/500
		FEBC	Philippines	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11930	25.15	VOA	Philippines	250
		Poro	Philippines	50
		Flevoland	Holland	500
		VOA	USA	50
11935	25.14	RCI	UK	100
		RFE/RL	West Germany	250
		RFE/RL	Spain	250
		Meyerton	South Africa	100
		Delhi	India	20
		Curitiba	Brazil	7.5
		Tirana	Albania	100
		Fredrikstad	Norway	100/250
		Flevoland	Holland	500
		Tokyo	Japan	100
		Vienna	Austria	100
11940	25.13	Bucharest	Romania	250
		RCI	Canada	250
		Monrovia	Liberia	50
		Aligarh	India	250
		Seletar	Singapore	50
		Hörby	Sweden	350
11945	25.12	BBC	UK	250
		DW	West Germany	100/500
		Beijing	People's Republic of China	—
		Monrovia	Liberia	50
		Delhi	India	100
		RCI	Canada	250
		Noblejas	Spain	350
		DW	Malta	100
		VOA	Greece	250
		VOA	Philippines	250
11950	25.10	Diriyah	Saudi Arabia	50
		Alma Ata	USSR	100
		Kharkov	USSR	240
		Rio de Janeiro	Brazil	7.5
		Tokyo	Japan	200
		Havana	Cuba	100
11955	25.09	WS	UK	250
		WS	Singapore	250
		WS	Oman	100
		Ivanofraneovsk	USSR	240
		Hörby	Sweden	350
		Allouis	France	500
		Luanda	Angola	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
11955	25.09	Tokyo	Japan	100
		Ankara	Turkey	250
		RCI	Canada	250
		Dubai	United Arab Emirates	300
		Sta Maria Galeria	Vatican	100
11960	25.08	BBC	UK	100
		VOA	West Germany	100
		Serpukhov	USSR	100
		Kiev	USSR	500
		Tel Aviv	Israel	50
		Quito	Ecuador	100
		RCI	Canada	250
11965	25.07	Kigali	Rwanda	250
		Allouis	France	100
		VOA	Philippines	250
		Sao Paulo	Brazil	7.5
		DW	West Germany	100/500
		Tirana	Albania	—
11970	25.06	RFE/RL	Portugal	100
		RFE/RL	Spain	250
		Havana	Cuba	50
		RFE/RL	West Germany	100/250
		Naven	East Germany	50
		Frunze	USSR	500
		Kharkov	USSR	240
		Bucharest	Romania	120/250
		Beijing	People's Republic of China	—
11975	25.05	Naven	East Germany	—
		Kharkov	USSR	240
		Abu Zaabar	Egypt	100
11980	25.04	Wavre	Belgium	250
		Beijing	People's Republic of China	—
		Tbilisi	USSR	—
11985	25.03	Tirana	Albania	240
		Orcha	USSR	50
11990	25.02	Prague	Czechoslovakia	100
			USSR	—
			Kuwait	—
11995	25.01	Allouis	France	100/500
			USSR	—
12000	25	VNG(SF) Lyndhurst	Australia	10
12005	24.99	Islamabad	Pakistan	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
12005	24.99		USSR	—
12010	24.98		USSR	—
12015	24.97	Vienna	Austria	700
			USSR	—
		Beijing	People's Republic of China	—
		Ulan Bator	Mongolia	250
12020	24.96		USSR	—
		Hanoi	Vietnam	—
12025	24.95	Tel Aviv	Israel	300
		Saipan	N. Mariana Islands	100
12030	24.94		USSR	—
		Swiss Radio	Switzerland	—
12035	24.93	Swiss Radio	Switzerland	—
		Hanoi	Vietnam	—
12040	24.92	BBC	UK	—
			USSR	—
12045	24.91		USSR	—
12050	24.90	Abu Zaabal	Egypt	100
			USSR	—
12055	24.89		USSR	—
12060	24.88		USSR	—
12065	24.87		USSR	—
12070	24.86		USSR	—
12075	24.84		USSR	—
12080	24.83	Tel Aviv	Israel	50
12085	24.82	Adhra	Syria	500
12095	24.80	WS	UK	—
12200	24.59	Beijing	People's Republic of China	—
12450	24.10	Beijing	People's Republic of China	—
13605	22.05		USSR	—
13625	22.02		USSR	—
13670	21.95	Dacca	Bangladesh	250
13725	21.85	Tel Aviv	Israel	20
14320	20.95	Tirana	Albania	—
14500	20.69	UN	Switzerland	—
14670	20.45	CHU(SF) Ottawa	Canada	3
14996	20.01	RWM(SF) Moscow	USSR	8
15000	20	WWV(SF) Fort Collins	USA	10
		WWVH(SF) Kekaha	Hawaii	10
15000	20	LOL(SF) B. Aires	Argentina	2

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15000	20	RTA(SF) Novosibirsk	USSR	5
15004	19.99	RID(SF) Irkutsk	USSR	1
15030	19.96	Beijing	People's Republic of China	—
15040	19.95	Beijing	People's Republic of China	—
15055	19.93	Taipei	Taiwan	—
15060	19.92	Riyadh	Saudi Arabia	—
15070	19.91	WS	UK	100/300
15084	19.89	Tehran	Iran	—
15095	18.87	Beijing	People's Republic of China	—
15100	19.87	Tel Aviv	Israel	—
			USSR	—
		Konigswuster-hausen	East Germany	50/100
		Beijing	People's Republic of China	—
15105	19.86	BBC	UK	100
		WS	Ascension Island	250
		Konigswuster-hausen	East Germany	50/100
		DW	West Germany	100/500
		Beijing	People's Republic of China	—
		Malolos	Philippines	50
15110	19.85	Moscow	USSR	500
		Prague	Czechoslovakia	120
		Bata	Guinea	50
		Delhi	India	250
15115	19.85	Quito	Ecuador	50/100
		RFE/RL	Portugal	100
		Islamabad	Pakistan	100/250
		Agana	Guam	100
		UN	USA	100
		Beijing	People's Republic of China	—
		Limassol (BBC)	Cyprus	250
		BBC	UK	100
		Hörby	Sweden	350
		Sta Maria Galeria	Vatican	500
15120	19.84	Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15120	19.84	DW	West Germany	100/500
		VOA	Greece	250
		Warsaw	Poland	100
		Feba	Seychelles	100
		Ekala	Sri Lanka	35/100
		Hörby	Sweden	350
		UN	USA	250
		Sta Maria Galeria	Vatican	100
		Ikorodu	Nigeria	100
15125	19.83	Taipei	Taiwan	—
		Saipan	N. Mariana Islands	100
		UN	USA	50/500
		Moscow	USSR	250
15130	19.83	RFE/RL	West Germany	50
		VOA	Greece	250
		Delhi	India	100
		RFE/RL	Spain	100/350
		Okeechobee	USA	100
15135	19.82	DW	West Germany	100/500
		Sao Paulo	Brazil	7.5
		Sofia	Bulgaria	500
		Beijing	People's Republic of China	—
		Allouis	France	100/500
		Malolos	Philippines	50
15140	19.82	Riazan	USSR	240
		RCI	Canada	250
		Riga	USSR	100
		Santiago	Chile	100
		Carnarvon	Australia	250
		Bombay	India	100
15145	19.81	Naven	East Germany	100
		RFE/RL	Portugal	250
		Red Lion	USA	50
15150	19.80	Julich	West Germany	100
		Jakarta	Indonesia	100
		Wellington	New Zealand	7.5
		Bocaue	Philippines	50
		Minsk	USSR	240/500
		Santiago	Chile	100
15155	19.80	Brasilia	Brazil	250
		Quito	Ecuador	100
		Abis	Egypt	250
		Allouis	France	100/500
		VOA	Philippines	50/250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15155	19.80	Duchanbe	USSR	500
15160	19.79	Algiers	Algeria	100
		Lyndhurst	Australia	10
		Quito	Ecuador	100
		VOA	Greece	250
		Szekesfehervar	Hungary	20
		Delhi	India	100
		VOA	Philippines	250
		DW	Portugal	250
15160	19.79	Cincinatti	USA	250
		VOA	USA	50/100
		Budapest	Hungary	20
		Mexico City	Mexico	10
15165	19.78	Beijing	People's Republic of China	—
		Copenhagen	Denmark	50
		Bombay	India	100
		Juitsoy	Norway	500
15170	19.78	Papeete	Tahiti	20
		RFE/RL	Portugal	100/250
		Greenville	USA	250
15175	19.77	Abu Zaabal	Egypt	100
		Aligarh	India	250
		Delhi	India	100
		Fredrikstad	Norway	100
		Moscow	USSR	500
15180	19.76	Beijing	People's Republic of China	—
			France	100/500
		BBC	UK	100/500
		Fredrikstad	Norway	500
		Multiple	USSR	100
		Shepparton	Australia	100
15185	19.76	DW	West Germany	100/500
		Ikorodu	Nigeria	100
		VOA	Philippines	50
		Meyerton	South Africa	250
		Red Lion	USA	50
		VOA	USA	250
		Zhigulevsk	USSR	240
15190	19.75	Khabarovsk	USSR	100
		Sta Maria Galeria	Vatican	500
		Belo Horizonte	Brazil	25
		RCI	Canada	50/250
		Brazzaville	Congo	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15190	19.75	Allouis	France	100/500
		Saipan	Northern Mariana Islands	100
15195	19.74	Beijing	People's Republic of China	—
		Salah-el-Deen	Iraq	500
		Tokyo	Japan	100
		VOA	Morocco	100
		Mamolos	Philippines	100
		VOA	USA	500
15200	19.74	Beijing	People's Republic of China	—
		Allouis	France	100/500
		Moyabe	Gabon	250
		Kalatch	USSR	240
		VOA	UK	250
15205	19.73	BBC	UK	250/500
		DW	Antigua	250
		Prague	Czechoslovakia	250
		DW	West Germany	100/500
		VOA	Greece	250
		Tangier	Morocco	35/100
		VOA	USA	250/500
15210	19.72	Waure	Belgium	100
		Abis	Egypt	100/250
		DW	West Germany	100/500
		Armavir	USSR	500
		Moscow	USSR	240
		VOA	Philippines	250
15215	19.72	BBC	UK	100
		RFE/RL	Portugal	100/250
		Okeechobee	USA	100
		Sao Luis	Brazil	2.5
		Malalos	Philippines	50
		VOA	Philippines	250
		Noblejas	Spain	350
		Algiers	Algeria	100
15220	19.71	Abis	Egypt	250
		Jaszbereny	Hungary	250
		Meyerton	South Africa	250
		Ankara	Turkey	500
		Duchanbe	USSR	500
15225	19.70	Taipei	Taiwan	—
		VOA	UK	250
		Sfax	Tunisia	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15225	19.70	Beijing	People's Republic of China	—
15230	19.70	Lyndhurst	Australia	10
		Reijing	People's Republic of China	—
		Havana	Cuba	100
		Delhi	India	100
		Tokyo	Japan	100
		Fredrikstad	Norway	500
		Alma Ata	USSR	50
		Moscow	USSR	100
15235	19.69	BBC, RCI, VOA	UK	250/500
		Monrovia	Liberia	250
		Tripoli	Libya	500
		VOA	Morocco	50
		BBC	Oman	500
15240	19.69	Multiple	Australia	10/50
		Naven	East Germany	500
			Guam	100
		Delhi	India	100
		VOA	USA	500
		Belgrade	Yugoslavia	100
15245	19.68	BBC	UK	500
		VOA	USA	500
		Rome	Italy	100
		Pyongyang	Korea	—
		VOA	Morocco	35
		DW	Portugal	250
		Moscow	USSR	120
		Kinshasa	Zaire	100
		DW	West Germany	100/500
15250	19.67	Bucharest	Romania	250
		UN/VOA	Philippines	250
		Delhi	India	100
		Kampala	Uganda	250
		VOA	Sri Lanka	35
15255	19.67	Naven	East Germany	500
		RFE/RL	Portugal	250
		RFE/RL	West Germany	50
		Kabul (Radio Moscow)	Afghanistan	—
		Abu Zaabal	Egypt	100
15260	19.66	WS	Ascension Island	250
		Baku	USSR	240/500
		Tokyo	Japan	10

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15260	19.66	VOA	Greece	250
		Kalamabad	Iran	350
		WS/RCI	Canada	100/250
15265	19.65		Qatar	250
		VOA	USA	500
		Kenga	USSR	500
		Pori	Finland	100
		VOA	West Germany	100
15270	19.65	BBC/VOA	UK	250
		Limassol (BBC)	Cyprus	100
		Taipei	Taiwan	—
		Tangier	Morocco	100
		Vienna	Austria	500
		Quito	Ecuador	100
15275	19.64	DW	West Germany	100/500
		Montevideo	Uruguay	10
		Malolos	Philippines	50
		DW	Antigua	250
15280	19.63	VOA	UK	250
		WS	Singapore	100
		Redwood City	USA	50
		Khabarousk	USSR	240
		Bombay	India	100
		Malolos	Philippines	100
		Flevoland	Holland	500
		Beijing	People's Republic of China	—
15285	19.63	Lisbon	Portugal	100
		Irkutsk	USSR	240
15290	19.62	Buenos Aires	Argentina	10
		VOA	Philippines	250
		RFE/RL	Spain	250
		RFE/RL	Portugal	100/250
15295	19.61	Kajang	Malaysia	100
		Voronezh	USSR	240
		Maputo	Mozambique	100
		Quito	Ecuador	100
15300	19.61	Havana	Cuba	—
		Allouis	France	500
		Tokyo	Japan	100
		Dubai	United Arab Emirates	300
		Novosibirsk	USSR	100
15305	19.60	VOA	Greece	250
		Delhi	India	50

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15305	19.60	Pyongyang	Korea	—
		Ulan Bator	Mongolia	250
		Fredrikstad	Norway	500
		Schwarzenberg	Switzerland	150/500
		Voronezh	USSR	100
15310	19.60	Sofia	Bulgaria	250
		Fredrikstad	Norway	500
		WS	Oman	100
		WS	Singapore	100
		Malolos	Philippines	100
		Conakry	Guinea	100
15315	19.59	Allouis	France	100/500
		Kalamabad	Iran	100
		VOA	Liberia	250
		Bonaire	Neth. Antilles	300
		RCI	Portugal	250
		Greenville	USA	250
15320	19.58	Shepparton	Australia	100
		Vienna	Austria	100
		DW	West Germany	100/500
		Aligarh	India	250
		Delhi	India	100
15320	19.58	VOA	Liberia	250
		Dubai	United Arab Emirates	300
15325	19.58	RCI	Canada	250
		VOA	Philippines	250
		Feba	Seychelles	50
		Dubai	United Arab Emirates	300
		Kampala	Uganda	250
		Sao Paulo	Brazil	1
15330	19.57	Beijing	People's Republic of China	—
		DW	West Germany	100/500
		VOA	West Germany	100
		Rome	Italy	100
		Tangier	Morocco	50
		UN/VOA	Philippines	250
		Cincinatti	USA	175
		Kursk	USSR	240
15335	19.56	Abis	Egypt	250
		Aligarh	India	250
		Madras	India	100
		Tangier	Morocco	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15335	19.56	Bucharest	Romania	250
15340	19.56	Havana	Cuba	50
		RFE/RL	West Germany	100
		Pyongyang	Korea	—
15345	19.55	Buenos Aires	Argentina	50
		Sulaibiyah	Kuwait	250
		Taipei	Taiwan	50
		VOA	USA	250
		Riyadh	Saudi Arabia	350
		Hörby	Sweden	350
15350	19.54	DW	West Germany	100/500
		Tokyo	Japan	100
		FEBC	Philippines	50
		Junglinster	Luxembourg	6
		Komsomol-skamur	USSR	240
15355	19.54	DW	West Germany	100/500
		Bonaire	Neth. Antilles	80/250
		RFE/RL	Portugal	100/250
		RFE/RL	Spain	100
		Redwood	USA	250
15360	19.53	Allouis	France	100
		Tangier	Morocco	50
		BBC	Singapore	250
		Moscow	USSR	240
		Tinang	Philippines	50/250
15365	19.52		Australia	250
		Tenerife	Canary Islands	50
		Allouis	France	500
		Aligarh	India	250
		Bucharest	Romania	250
		Delano	USA	240
15370	19.52	RFE/RL	West Germany	100
		RFE/RL	Portugal	100
		RFE/RL	Spain	250
		Tula	USSR	100
		Riyadh	Saudi Arabia	350
15375	19.51	Abu Zaabal	Egypt	100
		Kimje	Korea	100
		Kenga	USSR	100
15380	19.51	WS	Singapore	100
		Bucharest	Romania	250
		RFE/RL	Spain	250/500
		Darwin	Australia	250
15385	19.50	Sofia	Bulgaria	150/500

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15385	19.50	Beijing	People's Republic of China	—
		Rome	Italy	100
		FEBC	Philippines	50
15390	19.49	Naven	East Germany	100
		Hörby	Sweden	350
		BBC	UK	500
		WS	Ascension Island	250
		Limassol (BBC)	Cyprus	250
		VOA	USA	250
15395	19.49	Carnarvon	Australia	500
		Noblejas	Spain	300
		VOA	Philippines	250
		VOA	Sri Lanka	35
		Tashkent	USSR	240
15400	19.48	WS	Ascension Island	125/250
		Pori	Finland	100
		VOA	West Germany	100
		VOA	USA	250/500
15405	19.47	Armavir	USSR	100
		Tirana	Albania	—
		Sta Maria Galeria	Vatican	100
		DW	West Germany	500
		DW	Malta	250
		Saipan	Northern Mariana Islands	100
		Feba	Seychelles	100
15410	19.47	Vienna	Austria	100
		FEBC	Philippines	50
		VOA	Philippines	250
		DW	West Germany	100/500
		DW	Rwanda	250
		VOA	USA	250
		Moscow	USSR	50
15415	19.46	VOA	USA	500
		Ribeirao Preto	Brazil	1/7.5
		Moscow	USSR	100
		Tripoli	Libya	500
		Pyongyang	Korea	100
15420	19.46	Abu Zaabal	Egypt	100
		WS	Cyprus	250
		Tokyo	Japan	20/100
		Islamabad	Pakistan	100/250
		TWR	Guam	100
		Serpukhov	USSR	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15425	19.45	Perth	Australia	10/50
		Allouis	France	100/500
		DW	West Germany	500
		Jerusalem	Israel	50
		Petropavlovsk Kam	USSR	100
		Kenga	USSR	240
		Ekala	Sri Lanka	100
		VOA	Philippines	250
15430	19.44	Pori	Finland	100
		Schwarzenburg	Switzerland	250
		VOA	USA	50/250
		Mexico City	Mexico	50
		VOA	Philippines	250
		Feba	Seychelles	100
15435	19.44	Pori	Finland	100
		Schwarzenburg	Switzerland	250
		VOA	USA	50/250
		Mexico City	Mexico	50
		VOA	Philippines	250
		Feba	Seychelles	100
15435	19.44	WS	Singapore	100
		VOA	Greece	250
		Frunze	USSR	500
		Allouis	France	500
		Varberg	Sweden	100
		Tirana	Albania	50
		Beijing	People's Republic of China	—
15440	19.43	RCI	Canada	250
		Okeechobee	USA	100
		Riazan	USSR	120
15445	19.42	Naven	East Germany	500
		RFE/RL	West Germany	100
		VOA	Liberia	250
		RFE/RL	Portugal	—
		RFE/RL	Spain	250
		FEBC	Philippines	50
15450	19.42	Serpukhov	USSR	100
		Karachi	Pakistan	—
			Libya	—
15455	19.41	Simferopol	USSR	240
15460	19.40		USSR	—
15465	19.40		USSR	—
15470	19.34		USSR	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15475	19.39	Abu Zaabal	Egypt	50
		Moyabe	Gabon	250
			USSR	—
15480	19.38		USSR	—
15485	19.37	Tel Aviv	Israel	300
			USSR	—
15490	19.37		USSR	—
15495	19.36		Kuwait	500
			USSR	—
15500	19.35	Beijing	People's Republic of China	—
			USSR	—
15505	19.35		USSR	—
			Kuwait	250
15510	19.34	Beijing	People's Republic of China	—
			USSR	—
15515	19.34	Wavre	Belgium	250
			USSR	—
15520	19.33	Beijing	People's Republic of China	—
			USSR	—
15525	19.32	Dacca	Bangladesh	100
			USSR	—
15530	19.32		USSR	—
15535	19.31		USSR	—
15540	19.31		USSR	—
15545	19.30		USSR	—
15550	19.29		USSR	—
		Beijing	People's Republic of China	—
15560	19.28	Flevoland	Holland	500
		Tel Aviv	Israel	300
		Bonaire	Neth. Antilles	300
15565	19.27	Islamabad	Pakistan	100
15570	19.27	Sottens (Red Cross/BRI)	Switzerland	500
		Antananarivo	Madagascar	300
			USSR	—
15575	19.26	Gimje	Korea	—
15580	19.26	Islamabad	Pakistan	250
15585	19.25	Tel Aviv	Israel	300
			USSR	—
15590	19.24	Beijing	People's Republic of China	—

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
15595	19.24	Islamabad	Pakistan	250
			USSR	—
15600	19.23	Beijing	People's Republic of China	—
		VOA	Liberia	250
			USSR	—
15605	19.22	Islamabad	Pakistan	250
15615	19.21	Tel Aviv	Israel	300
15630	19.19	Athens	Greece	100
15670	19.14	Beijing	People's Republic of China	—
15710	19.10	Beijing	People's Republic of China	—
15880	18.84	Beijing	People's Republic of China	—
16230	18.38	Tirana	Albania	50
16384	18.31	Allouis	France	2000
17387	17.25	Delhi	India	100
17533	17.11	Beijing	People's Republic of China	—
17550	17.09	LQC20 (SF) Buenos Aires	Argentina	5
17555	17.09	Tel Aviv	Israel	300
17565	17.08	Athens	Greece	100
17575	17.07	Antananarivo	Madagascar	300
17595	17.05	Wavre	Belgium	250
		Tangier	Morocco	50
17605	17.05	Beijing	People's Republic of China	—
		Flevoland	Holland	500
		Bonaire	Neth. Antilles	300
17620	17.03	Allouis	France	100/500
17630	17.02	Tel Aviv	Israel	300
17635	17.01	Beijing	People's Republic of China	—
17640	17.01	Islamabad	Pakistan	250
		VOA	USA	500
17645	17.00	Dacca	Bangladesh	—
17650	17.00	Beijing	People's Republic of China	—
17655	16.99	Moscow	USSR	—
17660	16.99	Islamabad	Pakistan	250
		Karachi	Pakistan	50
17670	16.98	Abu Zaabal	Egypt	100
		Dacca	Bangladesh	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
17675	16.97	Wavre	Belgium	100
		Abis	Egypt	250
		Moscow	USSR	—
17680	16.97	Beijing	People's Republic of China	240
		Wavre	Belgium	100
			USSR	—
17685	16.96	Tel Aviv	Israel	20
17690	16.96	Abis	Egypt	250
17695	16.95	BBC	UK	100/500
17700	16.95	Konigswuster-hausen	East Germany	100
17705	16.94	Prague	Czechoslovakia	120
		WS	UK	250
		VOA	Liberia	250
		Delhi	India	50/100
		Havana	Cuba	50
17710	16.94	Budapest	Hungary	20/250
		Tel Aviv	Israel	100/300
		Beijing	People's Republic of China	50
		BBC	Singapore	100
		Wellington	New Zealand	7.5
		VOA	Brazil	250
17710	16.94	Moscow	USSR	240
17715	16.93	BBC (Mult. Station)	UK	100/25
		DW	Antigua	250
		Mult. Station	Australia	300
		DW	West Germany	100/500
		Rome	Italy	100
		Fredrikstad	Norway	100
17720	16.93	Allouis	France	500
		Bucharest	Romania	120/250
		Khabharovsk	USSR	100
		Abis	Egypt	250
17725	16.93	Shepparton	Australia	100
		RFE/RL	Portugal	100/250
		Beijing	People's Republic of China	—
17730	16.92	Bucharest	Romania	120
		Sta Maria Galeria	Vatican	100
		UN	USA	250
		Irkutsk	USSR	240
17735	16.92	RFE/RL	Portugal	100

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
17735	16.92	VOA	Philippines	250
			USSR	—
17740	16.91	Limassol (BBC)	Cyprus	250
		VOA	Liberia	250
		Fredrikstad	Norway	250
		VOA	Philippines	250
		Riyadh	Saudi Arabia	50
		VOA	USA	500
		Atchkhabad	USSR	100
		Sta Maria Galeria	Vatican	100
17745	16.91	Abis	Egypt	250
		Quito	Ecuador	100
		Kursk	USSR	240
17750	16.90	RFE/RL	West Germany	250
		Havana	Cuba	50
		Moyabe	Gabon	500
		Karachi	Pakistan	50
		Okeechobee	USA	100
		Darwin	Australia	250
17755	16.90	Brasilia	Brazil	250
		Königswuster-hausen	East Germany	100
		Tokyo	Japan	100
17760	16.89	RFE/RL	West Germany	100
		Riyadh	Saudi Arabia	350
17765	16.89	DW	West Germany	100/500
		Delano	USA	250
		VOA	USA	250
		Tula	USSR	100
		Mexico City	Mexico	10
17770	16.88	RFE/RE	Portugal	100
		Noblejas	Spain	350
		RFE/RL	West Germany	50
		Varberg	Sweden	100
17775	16.88	Dubai	United Arab Emirates	300
		Beijing	People's Republic of China	—
		VOA	USA	250
		Khabharousk	USSR	240
		Frunze	USSR	240/500
		Riazan	USSR	240
17780	16.87	BBC	UK	250
		VOA	UK	250
		Aligarh	India	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
17780	16.87	Meyerton	South Africa	500
		DW	West Germany	100/500
		VOA	Liberia	250
17780	16.87	VOA	Philippines	50
		VOA	Philippines	250
		Rome	Italy	100
		DW	Malta	250
		Feba	Seychelles	25/100
		Limassol (BBC)	Cyprus	—
17785	16.87	Pori	Finland	250
		Abis	Egypt	250
		Aligarh	India	250
		VOA	Philippines	250
		Ivanofrankovsk	USSR	240
		Allouis	France	500
17790	16.86	Quito	Ecuador	500
		BBC (Mult. Station)	UK	100/250
		Bucharest	Romania	250
17795	16.86	Allouis	France	100/500
		Serpukhov	USSR	100
		Rome	Italy	100
		Shepparton	Australia	100
17800	16.85	BBC	UK	100
		VOA	USA	250
		DW	West Germany	100/500
		Allouis	France	100
		DW	Rwanda	250
		Abis	Egypt	250
17805	16.85	Tbilisi	USSR	100/500
		Aligarh	India	250
		RFE/RL	Portugal	250
		Bucharest	Romania	250
		Okeechobee	USA	100
17810	16.84	DW	West Germany	100/500
		DW	Antigua	250
		BBC	UK	250
		Tokyo	Japan	—
		VOA	Philippines	50
17815	16.84	Sao Paulo	Brazil	10
		Frunze	USSR	50
		Tel Aviv	Israel	250
		Tangier	Morocco	50
17820	16.84	Kiev	USSR	240
		RCI	Canada	50/250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
17820	16.84	Islamabad	Pakistan	100/250
		Tinang	Philippines	250
		Moyabe	Gabon	250
17825	16.83	Tokyo	Japan	200
		DW	West Germany	100/500
		DW	Malta	250
17830	16.83	BBC	Ascension Island	250
		Schwarzenburg	Switzerland	150/250
		VOA	Greece	100
		Delhi	India	100
			Qatar	250
		Dubai	United Arab Emirates	500
		VOA	USA	50
17835	16.82	RFE/RL	Portugal	100/250
		Vinnitsa	USSR	240
17840	16.82	Velkekostolany	Czechoslovakia	120
		Fredrikstad	Norway	120
		Sta Maria Galeria	Vatican	100
17845	16.81	Allouis	France	500
		Okeechobee	USA	100
		DW	West Germany	100/500
		Noblejas	Spain	250
17845	16.81	Sta Maria Galeria	Vatican	100
		VOA	Greece	250
17850	16.81	Allouis	France	500
			USSR	—
			Kuwait	—
		Ekala	Sri Lanka	35
17855	16.80	BBC (Mult. Station)	UK	250
		VOA	UK	500
		Delhi	India	250
		VOA	Morocco	—
17860	16.80		Brazil	250
		VOA	Liberia	250
		Bonaire	Neth. Antilles	300
17865	16.79	VOA	Greece	250
		VOA	Philippines	100
		Warsaw	Poland	100
		RFE/RL	Spain	250
		VOA	USA	500
		Sta Maria Galeria	Vatican	500
17870	16.79		Kuwait	—
		VOA	Liberia	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
17870	16.79	Tchita	USSR	100
17875	16.78	RCI	Canada	250
		DW	West Germany	100/500
		Rio de Janeiro	Brazil	7.5
		Tashkent	USSR	500
		Allouis	France	500
		Aligarh	India	250
		Feba	Seychelles	100
17880	16.78	WS	Ascension Island	125
		WS	Singapore	100
		Lisbon	Portugal	100
		Tula	USSR	100
		Naven	East Germany	500
17885	16.77	WS	Ascension Island	125/250
		Brasilia	Brazil	250
		Havana	Cuba	100
		Tbilisi	USSR	100
		WS	Cyprus	20/100
		RFE/RL	Spain	250
		Ankara	Turkey	250/500
17890	16.77	Quito	Ecuador	100
		Noblejas	Spain	250
		Islamabad	Pakistan	250
17895	16.76	RFE/RL	Spain	250/500
		Tripoli	Libya	500
		RFE/RL	Portugal	100
		Lusaka	Zambia	50
18080	16.59	BBC (Mult. Station)	UK	—
18195	16.49		USSR	—
20000	15	WWV (SF) Fort Collins	USA	2.5
21455	13.98	RFE/RL	West Germany	100
21460	13.98	Wavre	Belgium	250
		Abis	Egypt	250
		Naven	East Germany	100
		Leipzig	East Germany	100
21470	13.97	BBC	UK	250
21480	13.97	Antananarivo	Madagascar	300
21485	13.96	Sta Maria Galeria	Vatican	100
		VOA	Liberia	250
21490	13.96	BCC	Ascension Island	250
		VOA	Ascension Island	250
21495	13.96	Riyadh	Saudi Arabia	350
21500	13.95	VOA	UK	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
21500	13.95	DW	West Germany	100/500
		DW	Rwanda	250
		VOA	Liberia	250
21505	13.95	Prague	Czechoslovakia	250
		Yerevan	USSR	240/500
21510	13.95	RFE/RL	West Germany	100/250
21515	13.94	Frunze	USSR	50
21520	13.94	VOA	UK	250
		VOA	Greece	250
21525	13.94	Budapest	Hungary	20/250
		Okeechobee	USA	250
21530	13.93	RFE/RL	Portugal	250
21535	13.93	Meyerton	South Africa	250
21540	13.93	Naven	East Germany	500
		Flevoland	Holland	100
		Bonaire	Neth. Antilles	300
21550	13.92	WS	UK	250
21555	13.92	Varberg	Sweden	100
21560	13.91	DW	West Germany	100/500
21570	13.91	VOA	Greece	250
21580	13.90	Allouis	France	500
		VOA	USA	500
21585	13.90	Duchanbe	USSR	100
21590	13.90	VOA	USA	250
		DW	Malta	250
		DW	West Germany	100/500
21595	13.89	Noblejas	Spain	350
21605	13.89	Dubai	United Arab Emirates	300
21610	13.88	Rome	Italy	100
		Tokyo	Japan	100
		VOA	USA	250
21615	13.88	Rome	Italy	100
		Okeechobee	USA	100
21620	13.88	Allouis	France	100
21625	13.87	Tel Aviv	Israel	300
		Frunze	USSR	100
21630	13.87	BBC	UK	250
		VOA	Philippines	250
21640	13.86	Flevoland	Holland	100
		Limassol (BBC)	Cyprus	250
		BBC	UK	250
		Tokyo	Japan	100
21650	13.86	DW	West Germany	100/500
		DW	Malta	250

Short wave

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
21650	13.86	VOA	Morocco	35
21660	13.85	WS	Ascension Island	250
		WS	Cyprus	50/100
21665	13.85	RFE/RL	Portugal	50
		Bucharest	Romania	250
21670	13.84	VOA	Philippines	35
21680	13.84	DW	West Germany	100/500
		Baku	USSR	100
21685	13.83	Bonaire	Neth. Antilles	300
21690	13.83	Rome	Italy	100
		Hörby	Sweden	350
21695	13.83	RCI	Canada	250
21700	13.82	Lisbon	Portugal	100
		Dubai	United Arab Emirates	300
21705	13.82	Prague	Czechoslovakia	100
21710	13.82	WS	UK	100/250
		UN	USA	50
21720	13.81	RFE/RL	Portugal	100
21725	13.81	Sta Maria Galeria	Vatican	100
21735	13.80	RFE/RL	Portugal	250
21745	13.80	RFE/RL	Portugal	50
21810	13.76	Wavre	Belgium	250

9 Short wave stations of the world – geographically

Short wave stations

Afghanistan

3965	6085	15255
4450	7200	
4740	11805	

Albania

5020	7035	7145	9430	11845	14320
5057	7065	7235	9480	11905	15405
6170	7075	7275	9500	11915	15435
6180	7080	7300	9750	11935	26320
6185	7090	7310	9760	11965	
6200	7120	9375	10510	11985	

Algeria

6145	11715
6160	11810
7145	15160
7245	15215

Angola

3990	4895	7170	11955
4770	4970	7215	
4780	5060	7245	
4820	5405	9535	
4848	6150	9615	
4885	6175	9660	

Antarctica

6012

Antigua

6085	9510	15205
6120	9515	15275
6155	9735	17715
6175	11775	17810
6195	11785	

Antilles

6020	9650	15353
6145	9715	15560
6165	9770	17605
9535	11875	17860
9590	11895	21540
9630	15315	21685

Argentina

5000	8167	11780
6060	9690	15000
6120	9710	15290
6160	11710	15345
6180	11755	17550

Ascension Island

6005	9715	15390
6020	9765	15400
7105	11750	17830
7160	11820	17880
9580	11860	17885
9600	15105	21490
9610	15260	21660

Australia

4500	6840	9640	11720	15140	15395
4920	7135	9660	11760	15160	15425
5995	7205	9680	11800	15180	17715
6035	7215	9750	11835	15230	17725
6060	7500	9720	11855	15240	17750
6080	9505	9760	11880	15320	17795
6140	9580	9770	11910	15345	
6150	9610	11705	12000	15380	

Austria

5035	7170	11670	15410
5945	9580	11935	
6000	9725	12015	
6155	9760	15270	
7165	11660	15320	

Bangladesh

4879	9945	15525
7105	11555	17645
9640	11745	17670
9775	13670	

Belgium

5895	9880	11850	17675
5910	9900	11980	17680
5965	9905	15210	21460
6050	9925	15515	21810
9860	11695	17595	

Belize

3285

Benin

4870
7190

Bhutan

3395

Bolivia

3310	4458	4797	4990	6025
3340	4472	4804	4991	6070
3349	4500	4827	5005	6080
3370	4638	4845	5020	6105
3380	4682	4876	5910	6140
3390	4697	4885	5954	6145
3885	4740	4939	5965	6155
4300	4765	4945	5975	6195
4420	4775	4965	5995	6675
4440	4785	4980	6005	9720

Botswana

3356
4820
7255

Brazil

2310	3285	4795	4915	5055	6135	9645	11805	15190
2340	3295	4805	4925	5955	6165	9665	11815	15215
2380	3325	4815	4935	5965	6175	9685	11855	15325
2410	3335	4825	4945	5975	6185	9695	11895	15415
2420	3365	4835	4955	5990	6195	9705	11905	17710
2470	3375	4845	4965	6005	9505	9735	11915	17755
3205	3385	4855	4976	6020	9520	9745	11925	17815
3225	4585	4865	4985	6025	9545	9770	11935	17860
3235	4755	4875	5015	6035	9565	11735	11950	17875
3245	4765	4885	5025	6055	9580	11745	11965	17885
3255	4775	4895	5035	6115	9585	11780	15135	
3275	4785	4905	5045	6125	9635	11785	15155	

British West Indies
9545
11705
11810

Bulgaria

6035	7135	9700	11735	11860	15385
6070	7215	9740	11750	11870	
6085	7255	9745	11765	11900	
6160	7670	9755	11840	15135	
7115	9560	11720	11850	15310	

Burundi
3300
6140

Burkina Faso
7230

Burma

4723	7185	
5060	9730	
5985		

Cameroon

3970	4850	7165
4000	4971	7205
4750	5010	7240
4795	7150	9745

Canada

3330	6080	9510	9755	11855	15190
5960	6120	9515	9760	11925	15260
5965	6130	9535	11710	11940	15325
6005	6140	9590	11720	11945	15440
6030	6160	9605	11775	11955	17820
6065	6195	9625	11825	11960	17875
6070	7335	9650	11845	15150	21695

Canary Islands
15365

Cape Verde
3931

Central African Republic
5035
7220

Chad
4904
7120

Chile
6030 9550 15150
6135 9750
9510 15140

Colombia
3705 4915 5095 6065 6170
4845 4945 5450 6085 9635
4865 4975 5940 6095
4876 5010 5975 6150
4885 5075 6035 6160

Comoros
3331
7260

Congo
6115
15190

Cook Islands
11760

Cuba
4765 6140 9655 11760 15230 17885
5025 9525 9730 11840 15300
6060 9550 9770 11850 15340
6090 9600 11710 11950 17705
6115 9640 11725 11970 17750

Cyprus
3990 6180 7285 9740 11865
5965 6195 9515 9750 15115
6030 7105 9580 9760 15270
6050 7135 9590 9770 15390
6070 7140 9600 11705 15420
6105 7160 9610 11720 17740
6120 7210 9615 11740 17780
6125 7230 9625 11750 17885
6130 7235 9635 11760 21640
6140 7260 9660 11845 21660

Czechoslovakia

5930	9600	11990	21505
6055	9605	15110	21705
7345	9630	15205	
9505	9740	17705	
9540	11855	17840	

Denmark

6140	15165
9730	

Djibouti

4780

Dominican Republic

11700

France

3965	7145	11700	15180	17785
5950	7160	11705	15190	17795
5990	7240	11790	15200	17800
5995	7280	11805	15300	17845
6040	9535	11845	15315	17850
6045	9575	11880	15360	17875
6055	9605	11930	15365	21580
6085	9715	11955	15425	21620
6145	9745	11965	15435	
6175	9790	11995	16384	
7120	9800	15135	17620	
7135	11670	15155	17720	

French Guiana

3385
6170

Gabon

4777	9630
4807	15200
7200	15475
7270	17750
9570	17820

Germany (East)

6010	7185	9730	11810	15145	17880
6040	7260	9770	11825	15240	21460
6070	7295	11700	11890	15255	21540
6080	9500	11705	11970	15390	
6115	9560	11750	11975	15445	
6125	9620	11785	15100	17700	
6165	9665	11795	15105	17755	

Germany (West)

3960	6100	7225	9650	11825	15350
3970	6105	7235	9660	11850	15355
3980	6110	7245	9670	11855	15370
3985	6115	7255	9680	11865	15400
3990	6120	7265	9690	11875	15405
3995	6130	7270	9700	11885	15410
5955	6135	7275	9795	11905	15425
5960	6140	7285	9715	11910	15445
5970	6145	7290	9725	11935	17715
5985	7150	7295	9735	11945	17750
5990	6155	9090	9750	11960	17760
5995	6160	9170	9765	11965	17765
6000	6170	9250	9770	11970	17770
6010	6185	9505	10420	15105	17780
6015	6190	9520	10922	15120	17800
6020	7105	9540	11705	15130	17810
6025	7110	9545	11720	15135	17825
6030	7115	9555	11725	15150	17845
6035	7130	9565	11730	15185	17875
6040	7145	9570	11750	15205	21455
6045	7150	9585	11765	15210	21500
6050	7155	9595	11770	15245	21510
6060	7160	9600	11785	15255	21560
6065	7165	9605	11795	15265	21590
6075	7175	9610	11805	15275	21650
6085	7190	9615	11810	15320	21680
6090	7200	9625	11815	15330	
6095	7220	9640	11820	15340	

Ghana

3366					
4915					
7295					

Ecuador

3220	4795	4960	6095	11925
3280	4800	4977	6130	11960
3286	4807	4980	9715	15115

Ecuador – *contd*

3315	4820	4990	9720	15155	
3325	4851	5015	9745	15160	
3381	4870	5025	9765	15270	
3395	4890	5055	11810	15295	
4254	4900	5065	11835	17745	
4766	4911	6050	11900	17790	
4792	4920	6070	11910	17890	

Egypt

7125	9675	11665	12050	15335	17690
7150	9740	11715	15155	15375	17720
9455	9755	11785	15175	15420	17745
9475	9770	11905	15210	15475	17785
9495	9805	11915	15220	17670	17800
9620	9850	11975	15255	17675	21460

Ethiopia

5990
7110
7115
7165

Falkland Islands

2380
3958

Finland

6120	15400
9655	15430
11755	17785
15265	

Greece

5955	7125	7395	9740	11810	15205
5965	7130	9420	9760	11835	15260
5985	7135	9460	9770	11840	15305
6015	7145	9530	9855	11845	15435
6060	7170	9585	9905	11875	15630
6080	7180	9615	11645	11915	17565
6105	7205	9635	11705	11925	17830
6140	7210	9680	11740	11945	17845
6150	7265	9690	11760	15120	17865
6160	7270	9700	11780	15130	21520
7105	7280	9715	11805	15160	21570

Greenland

3999

Guam
9510 11850
11715 15115
11735 15240
11840 15420

Guatemala
2390 3380
3300 4825
3325 4835
3360 5955
3370 6180

Guinea
4910 6250
4926 7125
5004 9650
6120 15110
6155 15310

Guyana
5950

Haiti
4930

Hawaii
2500
5000
15000

Holland
5955 9715 11740 15560
6020 9895 11930 17605
6110 11720 11935 21540
9610 11730 15280 21640

Honduras
4820
6075

Hungary
6025 7225 12000 21525
6110 9585 15160
7155 9835 15220
7220 11910 17710

India

3205	4800	6045	7140	7280	9950	11935	15320
3223	4820	6050	7150	7295	10335	11940	15355
3235	4840	6065	7160	7412	11620	11945	15365
3268	4850	6105	7170	9515	11715	15000	17387
3277	4860	6110	7180	9525	11730	15110	17705
3295	4895	6120	7210	9565	11765	15130	17780
3305	4920	6140	7215	9575	11795	15140	17785
3315	4960	6145	7225	9610	11810	15160	17805
3345	5050	6155	7230	9615	11815	15165	17830
3355	5960	6160	7235	9665	11830	15175	17855
3365	5970	6170	7240	9675	11845	15230	17875
3375	5990	6190	7250	9730	11850	15240	
3905	6010	7110	7255	9750	11865	15250	
3925	6020	7120	7260	9755	11870	15280	
4775	6035	7125	7265	9910	11895	15305	

Indonesia

2260	3204	3355	3945	4775	4955	7190
2320	3215	3375	3946	4790	5046	7210
2350	3223	3385	3960	4805	5257	7270
2390	3225	3395	3976	4845	5450	7295
2433	3232	3398	3986	4855	5881	9610
2464	3241	3458	3995	4867	5886	9680
2467	3265	3478	4000	4872	5970	9770
2474	3277	3775	4003	4900	6045	11770
2475	3286	3799	4340	4910	6070	11790
2490	3300	3855	4607	4920	6120	11865
2670	3325	3905	4699	4927	6135	15150
2694	3331	3916	4753	4932	6190	
3000	3345	3935	4764	4946	7098	

Iran

3775	9770	15004
4990	11735	15260
7215	11745	15315

Iraq

3368	9690
6190	9745
7120	11700
9610	11790
9635	15195

Israel

5915	9385	11585	12080	15615	21625
7395	9390	11605	15100	17555	
7410	9425	11655	15425	17630	

Israel—*contd*

7412	9435	11700	15485	17685
7465	9815	11960	15560	17710
9009	9920	12025	15585	17815

Italy

3995	7105	9515	15245	21615
5000	7140	9575	15330	21690
5990	7175	9585	15385	
6050	7235	9630	17715	
6060	7275	9710	17780	
6165	7290	11800	17795	
6205	7295	11810	21610	
		11905		

Ivory Coast

7215
11920

Japan

3607	6030	7140	9675	11935	15350
3910	6055	7205	9760	11950	15420
3925	6115	9525	11750	15000	17755
3945	6130	9535	11780	15195	17810
3970	6155	9595	11815	15235	17825
5965	6175	9605	11840	15260	21610
5970	6190	9645	11875	15300	21640

Jordan

7155
9530
9560
11920

Kampuchea

6090
9695

Kenya

4804	7140
4885	7150
4915	7210
4950	7240
7125	

Korea

2300	3320	6252	7550	11655	15245
2624	3930	6400	9350	11680	15305
2696	4273	6480	9570	11725	15340
2746	5975	6540	9640	11780	15375
2765	6015	6576	9665	11820	15415
2776	6135	6600	9750	11850	15575
2850	6165	7230	9870	11880	
3015	6175	7275	9977	12000	

Kuwait

6055	9840	11990	15505
7120	9880	15345	17850
9750	11675	15495	17870

Laos

4465	6525
5660	6965
6130	7125

Lebanon

6550

Lesotho

4800
6190
9515

Liberia

3230	6180	9550	11760	11945	17740
3255	7135	9605	11830	15235	17780
3990	7175	9620	11835	15315	17860
4760	7195	9715	11840	15320	17870
6035	7265	9750	11850	15445	21485
6045	7280	11710	11915	15600	21500
6090	9540	11715	11940	17705	

Libya

3200	7245	15415
6155	9890	15450
6185	15235	17895

Luxembourg

6090
15350

Madagascar

3286	9520	11735
5010	9540	15570
6135	9690	17575
9515	9715	21480

Malagasy

7285

Malawi

3380
5995
7130

Malaysia

3385	5965	6175	7295
4835	5980	7130	9515
4845	6025	7145	9665
4950	6050	7160	9750
4970	6060	7200	11900
5030	6100	7270	15295

Mali

5995
7110
7285
9635

Malta

6000	7265	9625	15405
6025	7275	11785	17780
6085	9545	11795	17825
6110	9565	11865	21590
7105	9610	11945	21650

Mariana Islands

9510	9685	12025
9520	9745	15125
9665	11835	15190
9670	11900	15405

Mauretania

4845
7245
9610

Mauritius

4855
9710

Mexico

2390	6115	9555	11770
5985	6165	9600	15160
6045	6185	9680	15430
6105	9515	9705	17765

Monaco

6220	7275	9610
7160	9475	9655
7205	9495	11695
7235	9590	11715

Mongolia

3960	6383
4080	7260
4995	11855
5960	12015
6080	15305

Morocco

6090	7190	9715	11805	15245	17595
6095	9530	9760	11920	15270	17815
6130	9605	9770	15915	15330	17855
6150	9615	11710	15205	15335	21650
6180	9650	11760	15235	15360	

Mozambique

3212	4735	7110	9635
3280	4924	7145	15295
3338	6090	7240	
3370	6115	9618	

Nepal

7105
7165

New Caledonia

3355
11710

New Zealand

2500
11850
15150
17710

Nicaragua

6120
6200

Niger
3260
5020
7155

Nigeria

3326	6050	7255
4770	6145	7285
4990	6175	11770
5965	6195	15120
6025	7145	15185

Norway

6030	11850	15165	15305	17840
7210	11860	15175	15310	
9590	11870	15180	17715	
9605	11935	15230	17740	

Oman

6030	7150	9735	11890
6085	7160	9770	11955
7135	7325	11740	15235
7140	9605	11835	15310

Pakistan

4775	5096	7370	15115	17640
4790	5905	9465	15420	17660
4815	5980	9545	15450	17750
4879	6130	9885	15565	17820
4950	7090	11675	15580	17890
4980	7195	11790	15595	
5010	7290	12005	15605	

Papua New Guinea

2376	3275	3385	6040
2410	3290	3395	6080
3205	3305	3905	6140
3220	3315	3925	9520
3235	3335	4890	9575
3245	3360	5985	
3260	3375	6020	

Paraguay
9375
11915

People's Republic of China

2310	4770	5770	6500	7210	8345	9700	11610	15165
2340	4785	5800	6550	7225	8425	9725	11630	15180
2430	4815	5850	6560	7240	8450	9750	11650	15195
2445	4830	5860	6590	7275	8490	9765	11660	15200
2460	4840	5880	6665	7280	8566	9775	11675	15225
2475	4865	5900	6750	7315	8660	9785	11685	15230
2440	4883	5915	6765	7335	9020	9820	11695	15280
2600	4905	5950	6790	7350	9030	9860	11710	15330
3200	4915	5960	6810	7360	9064	9880	11715	15385
3220	4925	5975	6825	7370	9080	9900	11725	15435
3260	4940	6000	6860	7385	9170	9920	11765	15500
3270	4960	6010	6890	7405	9290	9945	11860	15510
3290	4970	6015	6933	7440	9335	9965	11905	15520
3300	4975	6110	6937	7470	9340	11000	11945	15550
3310	4990	6120	6955	7480	9365	11040	11970	15590
3360	5010	6125	6974	7590	9380	11100	11980	15600
3400	5020	6140	6995	7620	9390	11290	12015	15670
3535	5040	6150	7010	7660	9440	11330	12200	15710
3640	5090	6155	7025	7700	9455	11375	12450	15880
3815	5125	6165	7035	7770	9457	11450	15000	17533
3900	5145	6175	7050	7775	9480	11455	15030	17605
3940	5170	6190	7055	7800	9490	11490	15040	17635
4460	5220	6200	7065	7820	9505	11500	15095	17650
4500	5250	6225	7080	7850	9550	11505	15100	17680
4620	5265	6260	7095	7953	9560	11515	15105	17710
4735	5295	6400	7120	8007	9580	11575	15115	17725
4750	5320	6430	7165	8260	9640	11590	15120	17775
4760	5420	6493	7190	8300	9670	11600	15135	

Peru

3018	4460	4876	4975	5198	6020	6814
3260	4732	4885	4990	5274	6115	6815
3290	4755	4895	4996	5325	6140	6960
3310	4762	4921	5010	5360	6115	7010
3330	4775	4927	5030	5740	6243	7053
3550	4785	4935	5045	5950	6324	8925
4005	4807	4950	5050	5955	6428	9485
4025	4825	4955	5060	5970	6580	9655
4254	4826	4960	5120	5995	6725	9675
4300	4854	4968	5191	6010	6790	9988

Philippines

5990	7120	9635	11740	11920	15250	15445
6015	7205	9645	11760	11925	15275	17735
6030	7225	9660	11770	11930	15280	17740
6040	7230	9665	11775	11945	15290	17780
6065	7260	9670	11805	11965	15310	17785

Philippines—*contd*

6090	7275	9700	11830	15105	15325	17810
6100	7285	9715	11840	15135	15330	17820
6110	9515	9725	11845	15150	15350	17865
6115	9545	9730	11850	15155	15360	21630
6120	9555	9740	11860	15160	15385	21670
6130	9575	9760	11865	15185	15395	
6145	9580	9770	11890	15195	15410	
6170	9605	11715	—	15210	15425	
6185	9620	11725	—	15215	15430	

Poland

5995	7270	11815
6095	7285	11840
6135	9525	15120
7125	9540	17865
7145	9675	

Portugal

6015	7270	9680	11815	15115	15315	17880
6130	7285	9695	11825	15145	15355	17895
7115	9555	9705	11840	15160	15370	21530
7145	9565	9725	11855	15170	15495	21665
7165	9575	9740	11865	15215	17725	21700
7180	9595	9745	11895	15245	17735	21720
7190	9605	11725	11905	15255	17770	21735
7200	9615	11740	11915	15285	17805	21745
7220	9670	11800	11970	15290	17835	

Qatar

9905
15265
17830

Romania

5990	7145	9530	9685	11790	11970	17720
6155	7175	9570	9690	11810	15250	17730
6190	7195	9590	9750	11830	15335	17790
7105	7225	9625	11740	11840	15365	17805
7135	9510	9640	11775	11940	15380	21665

Rwanda

3330	9640	11965
6055	9735	15410
7225	11730	17800
9565	11785	21500

Sao Tome
4807

Saudi Arabia

5870	9870	11900	15370
7145	9885	11910	17740
7155	11685	11915	17760
7220	11730	11950	21495
9655	11800	15060	
9730	11855	15345	

Senegal
4890
6045
6180
7170

Seychelles

6030	9600	11790	15120
6130	9610	11810	15325
7130	9670	11855	15405
7275	11720	11865	15430
9510	11755	11895	17780
9540	11760	11920	17875

Sierra Leone
590

Singapore

3915	7120	9740	15280
5052	7170	9770	15310
6000	7180	11750	15360
6010	7250	11850	15380
6065	9570	11865	15435
6080	9580	11910	17710
6155	9635	11940	17880
6195	9725	11955	

Solomon Islands
5020
9545

Somalia
6095
7120
7200
11645

South Africa

3230	4990	7285	11900		
3270	5980	9550	11935		
3295	6010	9585	15185		
3320	6160	11790	15220		
4835	7170	11880	17780		
4880	7270	11885	21535		

Spain

6125	9570	9680	11885	15215	17770
6140	9580	11690	11890	15290	17845
7105	9620	11730	11920	15355	17865
7155	9625	11770	11935	15370	17885
7450	9630	11790	11945	15380	17890
9360	9650	11825	11970	15395	17895
9530	9675	11880	15130	15445	21595

Sri Lanka

4870	6075	7190	11835
4902	6130	7200	15120
4940	6185	7265	15250
4968	7105	9645	15395
5020	7110	9720	15425
6005	7115	11710	17850
6065	7125	11800	

Sudan

5039

Swaziland

3200	5055	9640
3240	5955	9710
3275	6070	9725
4760	6155	11760
4980	7295	

Sweden

6065	9745	11940	15390
9605	11705	11955	15435
9630	11785	15115	17770
9695	11810	15120	21555
9710	11845	15345	21690

Switzerland

3985	7210	9725	12035	15570
6135	9535	9885	14500	17830
6165	9560	11795	15305	
6190	9625	12030	15430	

Syria
7455
11625
11640
12085

Tahiti
6135
9750
11825
15170

Taiwan

3215	9510	9845	15000
3335	9575	11745	15055
7130	9600	11775	15125
7150	9630	11825	15225
7250	9685	11860	15270
7285	9690	11905	15345
7315	9765	11915	

Tanzania
3338
4785
5050
6005
9750

Thailand
4830
6070
7115
9655
11905

Tibet
4035
4750
5935
5995
7110
7170

Togo
3222
5047
6155
7265

Tunisia

7225
11730
15225

Turkey

5960	7215	9730
6105	7265	11820
6340	9515	11955
6900	9560	15220
7170	9660	17885

Uganda

5027
7195
9685
9730
15250
15325

United Arab Emirates

7185	15300
7195	15320
7215	15325
9595	17775
9695	17830
11730	21605
11955	21700

United Kingdom

2500	6110	7150	9530	11720	12095	17780
3945	6120	7155	9565	11750	15070	17790
5000	6125	7165	9575	11760	15105	17800
5965	6130	7170	9580	11775	15115	17810
5975	6140	7180	9585	11780	15180	17855
5990	6150	7185	9590	11805	15200	18080
5995	6160	7200	9600	11835	15205	21470
6010	6170	7210	9635	11840	15215	21500
6015	6180	7220	9640	11845	15225	21520
6030	6185	7230	9735	11855	15235	21550
6040	6195	7235	9750	11865	15245	21630
6045	6840	7255	9760	11875	15270	21640
6050	7105	7260	9825	11925	15280	21710
6060	7120	7295	9915	11935	15390	
6080	7125	7320	10000	11945	17695	
6085	7130	7325	11680	11955	17705	
6100	7140	9410	11710	11960	17715	

Uruguay

6045	11735
9595	11835
9620	15275

USA

2500	6190	9590	10454	15004	15315	17765
5000	7355	9605	10869	15115	15330	17775
5985	7365	9615	11715	15120	15345	17800
5995	7651	9620	11740	15130	15355	17805
6005	8110	9640	11790	15145	15365	17830
6020	9455	9650	11815	15160	15390	17845
6030	9505	9660	11820	15170	15400	17865
6040	9515	9670	11830	15185	15410	20000
6055	9525	9680	11855	15195	15415	21525
6080	9530	9700	11890	15205	15430	21580
6095	9535	9705	11895	15215	15440	21590
6105	9540	9715	11915	15240	17640	21610
6125	9550	9840	11920	15245	17730	21615
6130	9565	10235	11930	15265	17740	21710
6140	9575	10380	15000	15280	17750	

USSR

2500	5290	6195	7340	9785	11785	12045
3995	5900	6200	7345	9790	11790	12050
4010	5910	7100	7350	9795	11795	12055
4030	5915	7110	7355	9800	11800	12060
4040	5920	7120	7360	9810	11805	12065
4050	5925	7130	7370	9820	11810	12070
4055	5930	7135	7380	9825	11815	12075
4060	5935	7140	7390	9830	11820	13605
4395	5940	7145	7400	9850	11830	13625
4485	5945	7150	7410	9865	11835	15000
4510	5950	7160	7420	9880	11845	15100
4520	5960	7165	7440	9890	11850	15110
4545	5970	7170	7504	9895	11860	15125
4610	6020	7175	7516	9996	11865	15140
4635	6035	7185	7525	10004	11870	15150
4780	6045	7195	7925	10245	11880	15155
4785	6050	7200	9200	10260	11890	15175
4795	6065	7205	9210	10690	11900	15180
4800	6070	7210	9450	10853	11905	15185
4807	6075	7220	9470	11630	11910	15190
4820	6080	7230	9480	11650	11915	15200
4825	6090	7240	9490	11660	11920	15210
4850	6095	7245	9500	11670	11925	15220
4860	6100	7250	9505	11675	11930	15230
4875	6105	7255	9515	11680	11950	15245

USSR—*contd*

4895	6110	7260	9545	11690	11955	15260
4920	6115	7265	9575	11700	11960	15265
4930	6120	7275	9620	11705	11970	15280
4940	6125	7280	9640	11710	11975	15285
4957	6130	7285	9655	11715	11980	15295
4975	6135	7290	9670	11720	11985	15300
4990	6140	7295	9710	11735	11990	15305
4996	6145	7300	9730	11740	11995	15330
5000	6155	7305	9735	11745	12000	13350
5004	6160	7310	9740	11750	12005	15360
5015	6165	7315	9745	11755	12010	15370
5035	6170	7320	9750	11760	12015	15375
5040	6180	7325	9760	11765	12020	15395
5065	6185	7330	9775	11775	12030	15405
5260	6190	7335	9780	11780	12040	15410
15415	15470	15515	15585	17735	17820	21515
15420	15475	15520	15595	17740	17835	21585
15425	15480	15525	15600	17745	17850	21625
15435	15485	15530	17655	17765	17870	21680
15440	15490	15535	17675	17775	17875	
15450	15495	15540	17680	17785	17880	
15455	15500	15545	17710	17795	17885	
15460	15505	15550	17720	17805	18195	
15465	15510	15570	17730	17815	21505	

Vanuatu

3945	
7260	

Vatican

6015	9615	11725	11955	17840
6185	9625	11740	15115	17845
6190	9645	11760	15120	17865
6252	9650	11810	15190	21485
7125	9755	11830	15405	21725
7250	11700	11845	17730	
9605	11715	11865	17740	

Venezuela

3225	4850	5020	6180
4770	4860	5030	9500
4780	4900	5040	9540
4800	4970	6010	9660
4830	4980	6100	
4840	4990	6130	

Vietnam
4701 6710
4804 9840
4822 10010
5120 10040
5920 10060
6332 12020
6510 12035

Yemen
4853
5970
6005
11770

Yugoslavia
6100 9505
6150 9620
7210 11735
7240 15240

Zaire
3390 7150
4751 7205
5065 7295
7115 15245

Zambia
3346 7220
4910 7235
6060 11880
6165 17895

Zimbabwe
3305
3396
5975
6020
6045

10 Standard frequency transmissions

Frequency (kHz)	*Wave-length (m)*	*Station*	*Country*	*Power (kW)*
2500	120	MSF Rugby (SF)	UK	0.5
		WWV (SF) Fort Collins	USA	2.5
		WWVH (SF) Kekaha	Hawaii	5
		ZLF (SF) Wellington	New Zealand	—
		RCH (SF) Tashkent	USSR	1
3330	90.09	CHU (SF) Ottawa	Canada	3
4996	60.05	RWM (SF) Moscow	USSR	5
5000	60	WWV (SF) Fort Collins	USA	10
		WWVH (SF) Kekaha	Hawaii	10
		LOL (SF) Buenos Aires	Argentina	2
		MSF (SF) Rugby	UK	0.5
		IBF (SF) Turin	Italy	5
		RCH (SF) Tashkent	USSR	1
5004	59.95	RID (SF) Irkutsk	USSR	1
7335	4090	CHU (SF) Ottawa	Canada	10
7500	40	VNG (SF) Lyndhurst	Australia	10
8167.5	36.73	LQB9 (SF) Buenos Aires	Argentina	5
9996	30.01	RWM (SF) Moscow	USSR	5
10000	30	WWV (SF) Fort Collins	USA	10
		WWVH (S) Kekaha	Hawaii	10
		LOL (SF) Buenos Aires	Argentina	2
		MSF (SF) Rugby	UK	0.5
		RTA (SF) Novosibirsk	USSR	5
		RCH (SF) Tashkent	USSR	1
1004	29.99	RID (SF) Irkutsk	USSR	1
12000	25	VNG (SF) Lyndhurst	Australia	10
14670	20.45	CHU (SF) Ottawa	Canada	3
14996	20.01	RWM (SF) Moscow	USSR	8
15000	20	WWV (SF) Fort Collins	USA	10
		WWVH (SF) Kekaha	Hawaii	10
		LOL (SF) Buenos Aires	Argentina	2
		RTA (SF) Novosibirsk	USSR	5
15004	19.99	RID (SF) Irkutsk	USSR	1
16384	18.31	Allouis	France	2000
17550	17.09	LQC20 (SF) Buenos Aires	Argentina	5
20000	15	WWV (SF) Fort Collins	USA	2.5

11 Useful information for DXers

Clubs (in the UK)

International Listeners' Association
1 Jersey Street, Hafod
Swansea SA1 2HF

The Association was formed in 1985 'to encourage the free exchange of information, ideas and techniques between short wave listeners regardless of their affiliations'. Membership is free, but send four stamps (not envelopes) to cover the cost of sending out the quarterly newsletter. This is published in March, June, September and December, and contains items of general interest to listeners to broadcast and amateur bands, often provided by members. The 'Broadcast Listeners' Award' is presented for logging over 100 standard broadcast stations worldwide.

European DX Council (EDXC)
PO Box 4
St Ives
Huntingdon
Cambridgeshire PE17 4FE

EDXC is the umbrella association of short wave listeners and DXers in Europe with more than thirty member and observer clubs from all over the world. It produces a newsletter and other interesting publications, for example a *QSL* reporting guide in English, French, German etc., a club list with membership and publication details, and a QSL survey. The newsletter, *Euro DX*, is published ten times a year.

For further information send a SAE (UK), 2 IRCs (Europe), 3 IRCs (the rest of the world).

Note: An IRC is an International Reply Coupon. These can be exchanged for stamps abroad, and you can buy them from larger Post Offices in this country. Many advertisers or stations will expect you to send some if you want a reply. One is usually enough for a seamail reply, two or three for airmail. Check when buying them if they are valid in the country you are writing to.

Handicapped Aid Programme (HAP-UK)
c/o EDXC, PO Box 4
St Ives, Huntingdon
Cambridgeshire PE17 4FE

HAP is a voluntary organization which introduces DXing to handicapped people, and helps those already involved in the hobby. It

produces many of the tapes mentioned elsewhere. Note that the address is the same as for the EDXC, but please keep correspondence and orders separate as they are different organizations.

British DX Club (BDXC-UK)
54 Birkhall Road
Catford
London SE6 1TE

The club was founded in 1974 as the Twickenham DX club, but expanded rapidly and became the British DX Club in 1979. It covers most aspects of DXing, except ham radio, citizens band and utility reception. The monthly publication *Communication* is sent to all members, is about twenty pages long, and contains regular features by experienced DXers. The club also publishes an annual guide to *Radio Stations in the UK*, and a *QSL Survey* every two years, and operates a *Tape Circle*. Send return postage with any enquiries.

Medium Wave Circle
69 Alderley Way
Cramlington
Northumberland NE23 9UQ

The prime activity of the club (founded in 1955) is the publication of its newsletter, *Medium Wave News* (MWN), which currently appears eight times per year – monthly during the winter DX season. MWN normally consists of eight or ten A4 pages of information, news and comment, including a number of regular columns as well as feature articles. These include DX news (latest station information), DX log (what members have recently heard) and the QSL corner (details of members' activities in this sphere). A feature entitled Member-to-member also appears, allowing members to advertise items, request help or ideas and so on. The MWC also organizes a *DX Alarm*, which is an early warning scheme designed to keep members informed of good DX conditions, and operates a *Bulletin Exchange Scheme* with radio clubs worldwide. Additional direct sources of information include the BBC, the IBA and EBU. Further details are available from the Secretary, Edward Baker.

World DX Club
17 Motspur Drive
Northampton NN2 6LY

World DX Club was founded in 1968, and the membership is spread throughout the English-speaking world.

The club's monthly bulletin *Contact* is stencil duplicated to keep costs low and to provide a very quick turn-round of news and fresh information.

Interest is within the broadcast band side of the hobby and the bulletin provides space for a DX news column, QSL report, QSL ladder, and a fun listing of QSL's received totals – nothing serious! Short wave logbook, medium wave logbook, TV/FM section, members' correspondence column, and original articles are also included.

The World DX Club is a full member of the European DX Council (EDXC) and an associate member of the Association of North American Radio Clubs (ANARC), the respective umbrella organizations for DX clubs on those continents. Enquiries should be sent to Arthur Ward at the address above.

Radio Society of Great Britain (RSGB)
Lambda House
Cranbourne Road
Potters Bar
Hertfordshire EN6 3JE

For those listeners who want to become talkers, i.e. two-way amateur radio enthusiasts. The Society publishes many of its own books and runs a comprehensive publications service through its monthly magazine *Radio Communication*.

Note that a worldwide list of clubs is published in the *World Radio TV Handbook*, distributed in the UK by Pitman.

Magazines
Several of these magazines have readers' book services so you can keep up to date with the latest publications. The best magazines will keep you up-to-date with frequency changes.

Practical Wireless
Enefco House
The Quay
Poole
Dorset BH15 1PP

Regular features on VHF, MW, and SW DXing. Monthly.

Radio and Electronics World
Sovereign House
Brentwood
Essex CM14 4SE

Regular features include Medium wave DXing and Short wave news. Monthly.

Ham Radio Today
1 Golden Square
London W1R 3AB

Mostly about amateur radio. Monthly.

Amateur Radio
Sovereign House
Brentwood
Essex CM14 4SE

Construction projects for SWLs occasionally, but mostly for two-way radio enthusiasts. Monthly.

The Shortwave Magazine
34 High Street
Welwyn
Herts. AL6 9EQ

Includes a clubs' roundup. Runs a mail order books department with a counter service in Welwyn. Monthly.

Electronics and Wireless World
Quadrant House
The Quadrant
Sutton
Surrey SM2 5AS

The editor and projects editor have been heavily involved in producing this nineteenth edition and the magazine has been connected with the book for forty years. The magazine, however, is now aimed very much at professionals. Monthly.

Radio Communication
The Radio Society of Great Britain
Lambda House
Cranbourne Road
Potters Bar
Herts EN6 3JE

The official RSGB publication for members. Mainly to do with two-way amateur radio. Monthly.

In addition to these, various electronics magazines have occasional articles and projects for SWLs. Look out for: *Electronics (The Maplin Magazine); Practical Electronics; Everyday Electronics; Elektor Electronics;* and *Electronics Today International*.

Cassettes
Interesting and useful tape cassettes are available from two UK sources: The Handicapped Aid Programme, PO Box 4, St Ives, Huntingdon, Cambridgeshire PE17 4FE and HS Publications, 7 Epping Close, Derby DE3 4HR. Write to them for details of prices and availability but include stamps or IRCs if you want to be sure of a reply. Some of the more interesting tapes are described below, and are marked as available from HAP or HS.

Identification Signals Tape (HAP)
This recording contains the interval signals and identifications of the majority of the world's international broadcasters. The tape lists the signals in sound order: in other words, all the bell-type signals are grouped together in one section, the bird-like signals are in another section and so on. It includes a large number of Soviet regional stations, many of which can easily baffle the beginner. The tape is always kept fully up-to-date, so as any changes occur in the broadcast scene, you are kept fully aware of current interval signals. A comprehensive guide is included with the tape detailing all the signals on the recording.

Foreign Language Recognition Course (HAP)
This tape consists of spoken examples of fifty-five different languages which can be heard on the short wave bands. Along with these language examples are comments by language expert, author and DXer Dr Richard E. Wood, who gives many helpful guides to pronunciation and recognition of the various language families and also gives many key-words to help in the identification of different languages.

The course, which lasts about eighty minutes, is designed to give the serious SWL and DXer the basic means of recognizing and sorting out the jumble of different languages that can be heard on short wave. Once the language is known, it is that much easier to determine the country.

Unofficial Radio Series (HAP)
Six tapes are included in this series. *Secret local radio* examines the clandestine radio scene around the world over the past decade, with the background to these stations and extracts from some of their broadcasts. In a two-part documentary running some two hours, *The London underground* explores the alternative broadcasting media in the British capital. In *Famous radio hoaxes* there are transmitter hijacks, with actual studio recordings and extracts from programmes: such items as London Mono Radio's interview with Dr David Strange of Radio Strange. A second two-part documentary, *SW pirates* examines the SW hobby pirate scene in Europe. It includes European Music Radio, Radio Utopia, Empire Radio and others, with interviews and programme extracts which explain just why they're on the air.

Long Live Short wave! (HAP)
This is dedicated to the short wave stations of the world and to the men and women working behind the scenes. It is an introduction to short wave: frequencies; propagation; the radio spectrum; identifications of facsimile telegraphy; RTTY; slow scan television; WWHV and much more. There is a talk by Henry Hatch whose experience dates back over fifty years; his career began at the BBC's monitoring receiving station and later he was promoted to become a senior engineer responsible to the Chief Engineer of External Services. Henry's voice is well-known from the days of the BBC World Service 'World Radio Club'. Also available as an LP record.

World on the Air (HS)
This cassette tape includes the following stations: Finnish Broadcasting Corporation; WAPA; Radio Tabajara; Voice of America; Radio Cordac; American Forces Radio; Radio Clarin; Far East Broadcasting Co.; KGEI; La Voz Evangelica; Radio Hong Kong; Family Radio; Capital Radio; Radio Tonga; Radio Los Andes; Radio Botswana; Radio New Zealand; Radio Canada; Deutsche Welle; Radio Prague; HCJB; TWR; Radio Nederland; BBC and many more (total of ninety stations). The tape lasts about sixty-five minutes, and was produced in Finland a few years ago, so you will need a good radio and a time warp to hear some of them today. Good fun, nevertheless.

USA on the Air (HS)
Also from Finland. Programme excerpts from forty-three US and Canadian stations plus some catchy commercials. This cassette also features a word-by-word text booklet, so it is possible to practice writing reception reports. After playing the tape, the listener is able to make a trial report, and check it with the cassette's 100 per cent report.

Latin America on the Air (HS)
This Finnish cassette tape is for all radio DXers interested in Latin American stations. The tape includes excerpts from fifty stations and covers twenty-three Latin American and Caribbean countries. It is supplied with a 24-page guide book with useful information on Latin American DXing. The guide also includes a transcription of everything on the tape so that it will be easier for the enthusiast to follow the Spanish language programme excerpts. The guide book is available only with the cassette tape.

Other tapes
HS also distribute four West German tapes giving examples of stations in Argentina, Uruguay, USA and the UK (local FM).

Two sources of tapes from abroad may be useful, if you can speak German. The ADXB in Vienna has probably the world's largest collection of interval signal tapes, announced in German. A DX language and Morse course is also available. Send three IRCs (international reply coupons) for full details to Orbit Postfach 29, Vienna A-1111 Austria.

A tape of modulation types is available from Joerg Klingenfuss, Hagenloher Strasse 14, Hagelloch, Tuebingen D-7000, West Germany. It gives examples of various types of emission, for identification and checking purposes: speech, Morse, teletype, facsimile, etc.

Computers
According to the EDXC Computer Survey (conducted in the winter of 1985–86), few home computers are being used to their full potential in connection with short wave radio – most are employed simply for the keeping of listening logs and for use as word processors when writing to clubs and stations. Only a very small proportion of microcomputers are presently being used in conjunction with receivers for computerized control and memory functions. However, a new computer system has been developed in The Netherlands for short wave radio listeners. Known as INFODUTCH (**INFO**rmation of Direct **U**se **T**o **C**omputer **H**obbyists) it provides a service to listeners having a home computer and a telephone line with modem to access the Radio Netherlands computer and obtain information including a regularly updated *Propagation Report*, tests on receivers and other DX-related news.

If you have a computer and a suitable modem connected to the telephone, you can now call up any of their data sheets, frequency schedules, or even advanced programme news on the screen. By dialling 31, the country code for Holland, and then 3545395 you can reach the NOS Radio – Radio Nederland on-line computer. Your modem needs to be capable of decoding CCITT tones (standard in Europe) and their

computer will automatically switch to either 300/300, 1200/1200 or 1200/75 baud.

This computer is also part of the FIDO net, rapidly expanding in Europe and North America. The computer is in Net 500, and it is node number 202. In this way you can ask for Radio Nederland data via your local FIDO node. The new database operates 24 hours a day, and you can choose from either Dutch or English instructions. The password for beginners on the system is BASICODE, and users should fill in their first name as 'NOS' and last name 'HOBBYSCOPE'.

Regular reading of the recommended magazines will keep you up-to-date with other available computer software and services.

Radio Nederland's *Infodutch bulletin* contains up-to-date information on available software, hardware and bulletin boards, etc. Write for a copy to:

Media Network
English Section
Radio Nederland Wereldomroep
PO Box 222
1200 JG Hilversum
The Netherlands

QSL addresses

This selected list was kindly provided by Trevor Morgan, GW4OXB, of the International Listeners' Association. 'QSL' is one of the Q-code abbreviations in Morse, meaning 'Can you acknowledge receipt?' or 'I will acknowledge receipt'. Broadcasting stations use QSL cards for verification.

Albania	Rue Ismail Quemal, Tirana
Algeria	21 Boulevard des Martyrs, Algiers
Antarctica	AFAN McMurdo, US Naval Support Force, Antarctica, Fleet PO, San Francisco, California 96601, USA
Argentina	PO Box 555, Buenos Aires 1000
Australia	PO Box 428G, GPO Melbourne 3001
Austria	PO Box 200, A-1043, Vienna
Bangladesh	20 Green Road, Dacca 5
Belgium	PO Box 26, 1000 Brussels
Brazil	PO Box 1620, Brasilia
Bulgaria	4BB Dragan Tsankov, Sofia
Canada	PO Box 6000, Montreal, H3C 3A8
Chile	PO Box 244V, Santiago
China	Fu Hsin Men, Beijing
Colombia	Via del Aeropuerto, El Dorado, Bogota (Radio Nacional)
Colombia	Aereo 7170, Bogota (Radio Sutatenza)
Cuba	Apatardo 7062, La Havana
Czechoslovakia	12099 Vinohradska, Praha 2

Denmark	Radio House, Rosenorns Alle 22, 1999 Copenhagen
Ecuador	Casilla 691, Quito (Radio HCJB)
Egypt	PO Box 1186, Cairo
Finland	Kesakatu 2, 00260 Helsinki 26
France	BP 9516, 75762 Paris, Cedex 16
Germany (East)	Nalepastrasse 18–50, Berlin 116 (Radio Berlin International)
Germany (West)	PO Box 100444, D-5000 Koln 1 (Radio Deutsche Welle)
Greece	PO Box 19, Aghia Paraskevi, Athens
Holland	PO Box 222, 1200JG, Hilversum (Radio Nederland)
Hungary	Brody Sandor 5–7, H-1800 Budapest
India	Post Box 500, New Delhi, 110001
Indonesia	PO Box 157, Jakarta
Iran	PO Box 41–3456 Tehran
Iraq	Salihiya Baghdad
Israel	PO Box 7139, Jerusalem
Italy	Casella Postale 320, Roma
Japan	NHK Center, 2–2–1 Jinnan, Shibuya-ku, Tokyo
Korea	Korean Central Broadcasting Committee, Pyongyang
Korea	1–51 Yeoido-Dong, Yeongdeunngpo-Gu, Seoul
Kuwait	PO Box 397, Kuwait
Lebanon	Radio Lebanon, Beirut
Libya	PO Box 3731, Tripoli
Luxembourg	Villa Louvigny, Luxembourg
Malaysia	PO Box 1074, Kuala Lumpur
Malta	PO Box 2, Valetta, Malta
Morocco	1 Rue El Brihi, Rabat
New Zealand	PO Box 2092, Wellington
Nigeria	Voice of Nigeria, Lagos
Norway	Bj. Bjornsons Plass 1, Oslo 3
Pakistan	PO Box 443, Karachi
Papua	Box 1359, Boroko
Philippines	Box 2041, Manila (FEBC)
Philippines	PO Box 939, Manila (Radio Veritas)
Poland	Al Niepodleglosci 75/77, Warsaw
Portugal	Rua do Quelhas 21, Lisboa 2

Romania	PO Box 111, Bucharest
Saudi Arabia	PO Box 570, Riyadh
Seychelles	Box 234 Mahe
Singapore	PO Box 1902, Singapore
South Africa	PO Box 4559, Johannesburg
Spain	Apatardo 150039, Madrid 24
Sri Lanka	PO Box 574, Torrington Square, Columbo 7
Sweden	S-10510, Stokholm
Switzerland	Giacomettistrasse 1, CH-3000, Berne 15
Taiwan	53 Jen Ai Road, Section 3, Taipei City 106
Turkey	PO Box 333, Ankara
Trans World Radio	PO Box 98, Chatham, New Jersey 07928, USA
UAE	PO Box 1695, Dubai, United Arab Emirates
UK	Bush House, Strand, London WC2B 4PH
UN	United Nations Radio, New York, NY 10017
USA	Voice of America, Washington DC 20547
USA	AFRTS, 1016 North McCaddem Place, Los Angeles, CA 90038
USA	WYFR, 290 Hegenberger Road, Oakland, California 94621
USSR	Piatnitskaya ulitza 25, Moscow
Vatican	Vatican City, Italy
Vietnam	58 Quan Su Street, Hanoi
Yugoslavia	2 Hilendarska, Geograd

Listeners' services

Radio Nederland has sent out free pamphlets of interest to SWLs for over twenty-five years. Write to the English Section for a catalogue of what's currently available. The address is given in the Computers section. Two of the chapters in this book were adapted from their pamphlets. Perhaps the most useful is the 32-page 'booklist' which is updated regularly and includes a selection of recommended books, magazines, tapes and addresses.

The BBC External Services give away a variety of technical information sheets, mainly aimed at overseas listeners to the BBC World Service, with details of languages (they broadcast in thirty-six), programmes, and frequency schedules. Other leaflets include regular reviews of receivers, transcribed from their 'Waveguide' programme. *London Calling* is the programme journal of the BBC World Service (English Language), and is available in all parts of the world. For a free copy and a subscription form write to London Calling, PO Box 76, Bush House, Strand, London WC2B 4PH. Other enquiries should go to the Engineering Department or the Publicity Department at the same address. If you live in London drop into the BBC World Information Centre and Shop at Bush House in the Strand. The Independent Broadcasting Authority has an Engineering Information Service at Crawley

Court, Winchester, Hants SO21 2QA, where there's a library, and 70 Brompton Road, London SW3 1EY.

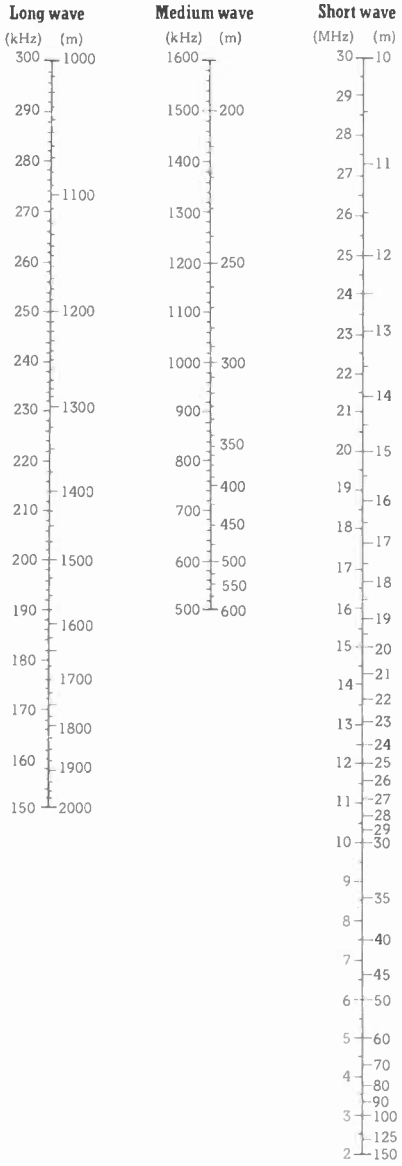
You will soon get to know which other stations run helpful services by listening to them, particularly to their programmes for DXers (listed elsewhere in this book).

The BBC Monitoring Service publishes every day from Monday to Saturday the *Summary of World Broadcasts* (SWB) covering foreign broadcast (and printed) sources. This is issued in four parts: 1 The USSR; 2 Eastern Europe; 3 The Far East (including the Sub-Continent and South-East Asia); 4 The Middle East, Africa and Latin America.

Some items, such as major government or party statements, communiqués, press or radio commentaries, etc., may be given word for word; others are published in part, or summarized, or reported briefly. Each part has an introduction which highlights main points, and these introductions are combined in a separate publication called the *Monitoring Report*. Each of the four parts publishes a *Weekly Economic Report* containing economic, technical and scientific information. A section on Space Research, compiled largely from Soviet broadcasts, is also published as and when material becomes available.

Note that these summaries are fairly expensive, so it's probably best to find a library that takes them, if you are interested. Further details are available from the Subscriptions Office, News and Publications, BBC Monitoring Service, Caversham Park, Reading RG4 8TZ, England. You could just listen to *Six Continents*, the Radio 3 programme, for the most interesting parts of the week's broadcasts.

Wavelength/frequency conversion charts



World time chart

Difference between local time and Greenwich mean time
The differences marked + indicate the number of hours ahead of GMT. Differences marked – indicate the number of hours behind GMT. Note that GMT, UTC (co-ordinated Universal Time), and Z (Zulu) are in effect the same. UTC is probably the one most commonly used outside the UK.

	Normal time	*Summer time*
Afars and Issas	+3	+3
Afghanistan	+4½	+4½
Alaska		
Juneau	–8	–8
General	–10	–10
Nome and Aleutians	–11	–11
Albania	+1	+1
Algeria	GMT	GMT
Andorra	+1	+1
Angola	+1	+1
Argentina	–4	–3
Ascension Islands	GMT	GMT
Australia		
Victoria		
New South Wales		
Queensland	+10	+10
Tasmania	+10	+11
North Territory		
South Australia	+9½	+9½
West Australia	+8	+8
Austria	+1	+1
Azores	–1	–1
Bahamas	–5	–5
Bahrain	+4	+4
Bangladesh	+6	+6
Barbados	–4	–4
Belgium	+1	+1
Bermuda	–4	–4
Bolivia	–4	–4
Botswana	+2	+2
Brazil		
Eastern and Coastal	–3	–2
Manaos	–4	–3
Acre	–5	–4
Brunei	+8	+8
Bulgaria	+2	+2
Burma	+6½	+6½
Burundi	+2	+2

	Normal time	*Summer time*
Cambodia	+7	+7
Cameroon	+1	+1
Canada		
Newfoundland	−3½	−2½
Atlantic	−4	−3
Eastern	−5	−4
Central	−6	−5
(Alberta)	−7	−6
Pacific	−8	−7
Yukon	−9	−8
Canary Islands	GMT	GMT
Cape Verde Islands	−2	−2
Central African Republic	+1	+1
Chad	+1	+1
Chile	−4	−4
China		
General	+8	+8
Tibet and Urumchi	+6	+6
Colombia	−5	−5
Comoro Islands	+3	+3
Congo (Brazzaville)	+1	+1
Costa Rica	−6	−6
Cuba	−5	−5
Cyprus	+2	+2
Czechoslovakia	+1	+1
Dahomey	+1	+1
Denmark	+1	+1
Dominican Republic	−5	−4
Ecuador	−5	−5
Egypt	+2	+3
El Salvador	−6	−6
Ethiopia	+3	+3
Falkland Islands	−4	−3
Faeroe Islands	GMT	GMT
Fiji Islands	+12	+12
Finland	+2	+2
France	+1	+1
Gabon	+1	+1
Gambia	GMT	GMT
Germany	+1	+1
Ghana	GMT	GMT
Gibraltar	+1	+1
Gilbert Islands	+12	+12
Great Britain	GMT	+1

	Normal time	*Summer time*
Greece	+2	+2
Greenland	−3	−3
Guadeloupe	−4	−4
Guam	+10	+10
Guatemala	−6	−6
Guiana	−3¾	−3¾
Guiana (French)	−3	−3
Guinea	GMT	GMT
Guinea Equatorial	+1	+1
Guinea Bissau	−1	−1
Haiti	−5	−5
Hawaii	−10	−10
Holland	+1	+1
Honduras	−5	−6
Honduras (Belize)	−6	−5½
Hong Kong	+8	+9
Hungary	+1	+1
Iceland	−1	GMT
India	+5½	+5½
Indonesia		
Java, Sumatra	+7	+7
Borneo, Celebes, Bali	+8	+8
Moluccas, West Irian	+9	+9
Iran	+3½	+3½
Iraq	+3	+3
Ireland	GMT	+1
Israel	+2	+2
Italy	+1	+2
Ivory Coast	GMT	GMT
Jamaica	−5	−5
Japan	+9	+9
Jordan	+2	+2
Kenya	+3	+3
Korea	+9	+9
Kuwait	+3	+3
Laos	+7	+7
Lebanon	+2	+2
Leeward Islands	−4	−4
Lesotho	+2	+2
Liberia	−¾	−¾
Luxembourg	+1	+1
Libya	+2	+2

	Normal time	*Summer time*
Macao	+8	+8
Madagascar	+3	+3
Madeira	GMT	GMT
Malawi	+2	+2
Malaysia	+7½	+7½
Maldive Island	+5½	+5½
Mali	GMT	GMT
Mauritania	GMT	GMT
Malta	+1	+1
Marshall Islands	+12	+12
Martinique	−4	−4
Mauritius	+4	+4
Mexico		
Generally	−6	−6
Mongolia	+8	+8
Morocco	GMT	GMT
Mozambique	+2	+2
Nauru	+11½	+11½
Nepal	+5.40	+5.40
Neth. Antilles	−4	−4
New Caledonia	+11	+11
New Guinea	+10	+10
New Hebrides	+11	+11
New Zealand	+12	+12
Nicaragua	−6	−6
Niger	+1	+1
Nigeria	+1	+1
Norway	+1	+1
Oman	+4	+4
Pakistan	+5	+5
Panama	−5	−5
Papua	+10	+10
Paraguay	−4	−4
Peru	−5	−5
Phillipines	+8	+8
Poland	+1	+1
Portugal	+1	+1
Qatar	+4	+4
Reunion	+4	+4
Rhodesia	+2	+2
Rumania	+2	+2
Rwanda	+2	+2

	Normal time	*Summer time*
Sabah	+8	+8
Samoa Islands	−11	−11
St Pierro	−3	−3
S Tomé	GMT	GMT
Sarawak	+8	+8
Saudi Arabia	+3	+3
Senegal	GMT	GMT
Seychelles	+4	+4
Sierra Leone	GMT	GMT
Singapore	+8	+8
Solomon Islands	+11	+11
Somalia	+3	+3
South Africa	+2	+2
South Yemen	+3	+3
Spain	+1	+1
Sri Lanka	+5½	+5½
Sudan	+2	+2
Surinam	−3½	−3½
Swaziland	+2	+2
Sweden	+1	+1
Switzerland	+1	+1
Syria	+2	+3
Tahiti	−10	−10
Taiwan	+8	+9
Tanzania	+3	+3
Tasmania	+10	+11
Thailand	+7	+7
Timor	+8	+8
Togo	GMT	GMT
Tonga Islands	+13	+13
Trinidad	−4	−4
Trucial States	+4	+4
Tunisia	+1	+1
Turkey	+2	+2
Uganda	+3	+3
Upper Volta	GMT	GMT
Uruguay	−3	−3
USA		
Eastern Zone	−5	−4
Central Zone	−6	−5
Mountain Zone	−7	−6
Pacific Zone	−8	−7
USSR		
Moscow		
Leningrad	+3	+3

	Normal time	*Summer time*
USSR—*contd*		
Baku	+4	+4
Sverdlosk	+5	+5
Tashkent	+6	+6
Novosibirsk	+7	+7
Irkutsk	+8	+8
Yakutsk	+9	+9
Khabarovsk	+10	+10
Magadan	+11	+11
Petropavlovsk	+12	+12
Anadyr	+13	+13
Venezuela	−4	−4
Vietnam	+7	+7
Virgin Islands	−4	−4
Windward Islands	−4	−4
Yemen	+3	+3
Yugoslavia	+1	+1
Zaire		
Kinshasa	+1	+1
Lumumbashi	+2	+2
Zambia	+2	+2

12 Programmes in English and programmes for DXers

Richard Lambley
Projects Editor, *Electronics & Wireless World*

Transmissions listed below should normally be receivable at good strength in the UK and North-West Europe on one or more of the frequencies given. However, many stations broadcast programmes in English to other target areas at other times and it often happens that these transmissions can be picked up reliably too.

Note that many stations adjust their frequency schedules several times a year to match the propagation conditions they expect. Forthcoming changes are normally announced on the air and published in advance in the station's schedule leaflet or magazine. This list is compiled from schedules current at the end of 1986 and the beginning of 1987.

Times are expressed in Greenwich Mean Time (GMT) except where indicated. Central European Time (CET) is GMT + 1 in winter, GMT + 2 in summer. Universal Co-ordinated Time (UTC) is equivalent to GMT. Frequencies are given in kilohertz: 1000 kHz equals 1 MHz.

Austria
Radio Austria International (Radio Österreich International), A-1136 Wien.
0430–0500: 6155
0630–0700: 6000, 6155
0830–0900: 6000, 6155, 7210
1230–1300: 6000, 6155
1530–1600: 6000, 6155
1830–1900: 6000
2130–2200: 5945, 6000

Belgium
BRT International Service, Postbus 26, B-1000 Brussel.
1830–1855: 1512, 5910, 9905
2200–2225: 1512, 5910

Canada
Radio Canada International, PO Box 6000, Montreal, Quebec HC3 3A8.
2000–2030 (Mon.–Fri.): 5995, 7235, 11945, 15140, 15325
2100–2130 (–2200 Sat./Sun.): 5995, 7185, 11960, 15325

China, People's Republic of
Radio Beijing, Beijing.
1900–2000: 9860, 11500
2100–2200: 9860, 11500

Cuba
Radio Habana, Aptdo. de Correos 70–26, La Habana.
1700–1800: 9695
1830–2000: 11795
2200–2300: 6165

Czechoslovakia
Radio Prague, Vinohradská 12, Praha 2.
0530–0545: 1287, 6055, 9505, 11990
1630–1657: 5930, 7345
1900–1927: 5930, 7345
2000–2027: 5930, 7345
2130–2200: 1287, 6055

Ecuador
HCJB, Casilla 691, Quito.
0650–0900: 6205, 9860
1900–2000: 15270, 17790
2130: 15270, 17790

Finland
Radio Finland, Box 10, 00241 Helsinki.
0530–0555: 6120, 11755
0730–0755: 254, 558, 963, 6120, 11755
0830–0930 (Sat.): 254, 558, 963, 6120, 9655, 11755, 11935
0930–0955: 6120, 9655, 11755, 11935
1930–1955 (not Sat.): 254, 558, 963, 6120, 9530, 11755
1955–2000: 254, 558, 963, 6120, 9530, 11755
2030–2055: 254, 558, 963, 6120
2200–2225: 254, 558, 963, 6120 (–2300 Sat.)

France
Radio France Internationale, BP 95, 16 Paris.
0315–0330: 738
0415–0430: 738
1600–1654: 738, 6195

German Democratic Republic
Radio Berlin International, 1160 Berlin, GDR.
0445: 5965
0700: 5965
0815 (Sat., Sun.): 6040, 7185, 9730
1615–1700: 6115, 7295, 9730
1745–1830: 6115, 7260, 9730
1915–2000: 1359, 6080, 6115
2145: 5965
2300: 1359, 5965, 7295

Germany, Federal Republic
Deutschlandfunk-DLF, Raderberggürtel 40, D-5000 Köln 51.
1915–2000: 1269

Greece
Elliniki Radiophonia Tileorasi, PO Box 19, Aghia Paraskevi, Attikis, Athens.
The Voice of Greece.
1920–1930: 9395, 7430, 9425

Hungary
Radio Budapest, Bródy Sándor u. 5–7, Budapest 1800.
1150–1220 (Mon.–Fri.): 6025, 9835, 11910, 15160, 17710
1515–1530 (Tue.–Fri.): 6110, 9585, 9835, 11910, 15160
1700–1730: 6110, 7225, 9585, 9835, 11910
2100–2130: 6110, 7225, 9585, 9835, 11910

India
All-India Radio, External Services Division, PO Box 500, New Delhi.
General Overseas Service.
1845–2230: 7412, 11620
2000–2230: 9910

Israel
Kol Israel, External Services, PO Box 1082, 91010 Jerusalem.
0500–0515: 7410, 7460, 9012, 9435
1100–1130: 11585, 12080, 13725, 15640
1800–1815: 9385, 9930, 11655
2000–2030: 5885, 7410, 7465, 9435
2200–2230: 5885, 7410, 7465, 9435

Japan
Radio Japan, Tokyo 150.
0700–0800: 11955, 15230
0900–1000: 11955
1500–1600: 17785
2300–2400: 9645

Jordan
Radio Jordan, PO Box 909, Amman.
1500–1730: 9560

Kuwait
Radio Kuwait, PO Box 397, 13004 Safat, Kuwait.
1800–2100: 11675

Luxembourg
Radio-Télé Luxembourg: Radio Luxembourg (London) Ltd, 38 Hertford Street, London W1Y 8BA.
0000–0300: 1440, 6090
1845–2400: 1440 (Suns. 1815–; Wed.–Fri. 1900–)

Malta
Radio Mediterranean, PO Box 2, Valletta.
2230–2330: 1557, 6100

Monaco
TransWorld Radio, Box 349, MC98007, Monte Carlo.
0725–0935 (–1010, Mon.; –1025, Sat.; –1100, Sun.): 7105

Netherlands
Radio Nederland Wereldomroep, Postbus 222, 1200JG, Hilversum.
Radio Netherlands.
1130–1225: 5955, 9715, 17605
1430–1525: 5955
1830–1925: 6020

Pakistan
Pakistan Broadcasting Corporation, Broadcasting House, Islamabad.
Radio Pakistan.
1100–1115: 15605, 17660
1645–1745: 6230, 9455

Poland
Radio Polonia, Al. Niepodległości 77/85, 00–950 Warszawa.
0630–0700: 6135, 7270, 9675
1200–1225: 6095, 7285
1400–1430: 6095, 7285
1600–1630: 6135, 9540
1730–1800: 6135, 9540
1830–1855: 1503, 5995, 6135, 7285
2030–2055: 6095, 7285
2230–2300: 1503, 5995, 6135, 7125, 7270

Portugal
Radiodifusão Portuguesa, Rua do Quelhas 21, 1200 Lisboa.
RDP International Service.
2030–2100 (Mon.–Fri. only): 6100, 9740

Romania
Radioteleviziunea Română, Str. Nuferilor Nr 62, Bucureşti.
Radio Bucharest.
1045–1100: 9690, 11940, 15250
1300–1330: 9690, 11940, 15250
1930–2030: 5990, 6055, 7145, 7195
2100–2130: 5990, 6055, 7145, 7195

South Africa
Radio RSA, PO Box 4559, Johannesburg 2000, Republic of South Africa.
0630–0730: 5980, 9585, 11900, 15270
1100–1156: 15220, 21590
1300–1556: 7270, 15220, 21590
2100–2156: 5980, 7270, 9685

Spain
Radio Exterior de España, Apartado 156.202, 28080 Madrid.
1830–1930: 7275, 9765, 11715
2300–2400: 6020, 7105, 9620

Sweden
Radio Sweden International, S-105 10 Stockholm.
1100: 6065 (not Sat.), 9630
1600: 1179, 6065
1830: 6065
2100: 1179, 6065
2300: 1179

Switzerland
Swiss Radio International, CH-3000 Bern 15.
Times are CET.
0830–0900: 3985, 6165, 9535
1400–1430: 6165, 9535, 12030
1900–1930: 3985, 6165

Taiwan (Republic of China)
Broadcasting Corporation of China, PO Box 24–38, Taipei.
Voice of Free China.
2200–2300: 9455, 9955, 15370

United Arab Emirates
UAE Radio and Television, PO Box 1695, Dubai.
1030: 11730, 17775, 17865, 21605
1330: 11940, 17775, 17865, 21605
1600: 9640, 11955, 15320, 15435

United Kingdom
BBC World Service, Bush House, Strand, London WC2B 4PH.
648 kHz medium wave and many short wave frequencies, including 5975, 6180 and 9750. Daily programme lists for this 24-hour service are carried in many British newspapers.

United States of America
Voice of America, Washington, DC 20547.
0300–0400: 6040
0400–0430: 792, 5995, 6040
0430–0500: 1197, 3980, 5995, 6040, 7170, 7200
0500–0600: 792, 5995, 6040, 6060, 7170, 7200
0600–0630: 792, 5995, 6040, 6060, 7170, 7200, 7325
0630–0700: 792, 3980, 5995, 6040, 6060, 7170, 7200, 7325
0700–0800: 792, 3980, 5995, 6040, 6060, 7170, 7200, 7325, 9635
1700–1730: 792, 1197, 3980, 6040, 9760, 11760
1730–1800: 792, 6040, 9760, 11760
1800–1830: 792, 6040, 9760, 11760
1830–2100: 6040, 9760, 11760
2100–2200: 6040, 9760

VOA-Europe (times are CET):
0100–0300: 1197
0800–1200: 1197
1400–1800: 1197

At the time of compiling this list, the VOA-Europe service was due to close at the end of 1986: however, it appeared that a reprieve might still be possible.

WINB, Box 88, Red Lion, PA17356.
1602–1800: 15295
1802–2000: 15400
2003–2245: 15185
2247–2345: 15145

WRNO Worldwide, PO Box 100, New Orleans, Louisiana 70181
24-hour broadcasts: frequencies include
6185, 7355, 9650, 9715, 11705, 11965, 15420

Union of Soviet Socialist Republics
Radio Moscow, Moscow.
2000–2059:
(winter 1986–87) 5900, 5980, 6030, 6170, 7110, 7150, 7190
(March 1987) 5980, 6030, 7190, 7260, 7330, 9730, 9760

Radio Kiev, Kiev Ukrainian SSR.
1900–1930: 6010, 6090, 6165, 7195

Lithuania.
Lietuvos Radijas, 232674 Lietuvos TSR, Vilnius.
Radio Vilnius
2230: 666, 6100
2300: 6035, 7165, 11790, 13645, 15180

Vatican City
Radio Vaticana, 00120 Città del Vaticano.
0600–0620: 1530, 6185, 9645
1445–1500: 1530, 7250, 9645, 11740
2050–2110: 1530, 6190, 7250, 9645

Special programmes for radio enthusiasts
Many stations broadcast programmes of special interest to short wave hobbyists, or DXers as they are often called. These may include such material as technical advice, receiver reviews, ionospheric forecasts and news of the international broadcasting scene.

Programmes listed below are in English and, apart from the exception noted, are intended for listeners in Europe. Further transmissions may be available for listeners elsewhere. In many cases, these programmes follow a regular news bulletin or current affairs programme and so may begin somewhat later than the times given.

Times are for the winter schedule, except where noted: some European stations alter their transmission times for summer.

Sunday
0630 DX Corner (Radio RSA)
0750 Waveguide (BBC World Service)
0800 World of Radio (WRNO Worldwide)

0900 Austrian Shortwave Panorama
0915 DX Corner (Radio Japan)
1030 Mailbag (RTV Dubai, UAE)
1115 DX Corner (Radio Japan)
1230 Austrian Shortwave Panorama
1330 Mailbag (RTV Dubai, UAE)
1430 Austrian Shortwave Panorama
1600 Mailbag (RTV Dubai, UAE)
1805 Austrian Shortwave Panorama
1830 Radio World (BRT, Brussels)
1900 Radio Kiev DX-Club
1915 DX Programme: Radio España Exterior
2200 Radio World (BRT, Brussels)
2315 DX Corner (Radio Japan)
2345 DX Programme: Radio España Exterior

Monday
0430 Austrian Shortwave Panorama
0450 Waveguide (BBC World Service)
1615 RBI DX Club (fortnightly)
1745 RBI DX Club (fortnightly)
1802 Bits and Bytes (Radio Kuwait)
1915 RBI DX Club (fortnightly)
1930 Programme for radio amateurs (Radio Bucharest)
2130 RBI DX Club (fortnightly)
2215 RBI DX Club (fortnightly)

Tuesday
1115 Waveguide (BBC World Service)
1515 Calling DXers and Radio Amateurs (Radio Budapest)
1700 Sweden Calling DXers
1730 VOA's Worldwide Shortwave Spectrum (in the Magazine Show)
1830 Sweden Calling DXers
2100 Sweden Calling DXers
2300 Sweden Calling DXers

Wednesday
1130 Sweden Calling DXers
1400 DX-Club (Radio Polonia)
1730 DX-Club (Radio Polonia)
1900 DX-Chat (Radio Prague)
1930 DX Mailbag (Radio Bucharest)
2130 DX-Chat (Radio Prague)

Thursday
0130 Waveguide (BBC World Service)
0630 DX-Club (Radio Polonia)
1150 Media Network (Radio Netherlands)
1300 DX Corner (Radio RSA)
1450 Media Network (Radio Netherlands)
1850 Media Network (Radio Netherlands)

Friday
1515 Calling DXers and Radio Amateurs (Radio Budapest)

Saturday
0300 World of Radio (WRNO Worldwide)
0730 Swiss Shortwave Merry-Go-Round
0900 Deutsche Welle DXer's Desk (3rd Sat.; for Asia, Australasia)
1030 Mailbag (RTV Dubai, UAE)
1200 DX-Club (Radio Polonia)
1300 Swiss Shortwave Merry-Go-Round
1330 Mailbag (RTV Dubai, UAE)
1600 Mailbag (RTV Dubai, UAE)
1610 Deutsche Welle DXer's Desk (3rd Sat.; for Asia, Australasia)
1800 Swiss Shortwave Merry-Go-Round
2030 DX-Club (Radio Polonia)
2030 DX (RDP International Service, Portugal)
2100 SWL Digest (Radio Canada International)
2130 DX Party Line (HCJB, Ecuador)
2330 World of Radio (WRNO Worldwide)

Information from Radio Netherlands' Media Network programme, including an introduction to DXing, news about radio, propagation forecasts and receiver reviews, is available to computer enthusiasts from a dial-up computer bulletin board on Hilversum 45395 (FidoNet), 300 baud or 1200/75. There is no charge to callers, other than for the telephone connection.

Around the world some thousands of radio stations are sending signals. If you're receiving, this standard guide will tell you who's where. It lists stations broadcasting in the long, medium, and short wave bands, dealing with them by frequency, geographical location and alphabetical order.

Contents include ■ Choosing a short wave receiver ■ A guide to listening ■ Writing useful reception reports ■ Latin American DXing ■ Clubs ■ Magazines ■ Computers in radio ■ Tape cassettes ■ Aerials ■ Broadcasts in English ■ And much more

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The front cover shows Radio Nederland's new Flevoland transmitter (Radio Nederland Wereldomroep)