Shortwave Radio Listening

What You Need To Get Started

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About this Guide

The purpose of this guide is to introduce you to the technical information necessary to operate your shortwave radio skillfully. Perhaps you already have a shortwave radio, or maybe you are thinking about getting one. This guide presents the practical information you need to join the millions of listeners around the world who enjoy the shortwave radio listening hobby. Welcome to the fascinating world of shortwave radio listening!

What is Shortwave Radio Listening?

Shortwave listening is an activity that anyone can participate in provided they have the right equipment (a shortwave radio) and some knowledge of *when* and *where* to listen (a program guide). Both shortwave *listening* and shortwave *listener* are commonly abbreviated, "SWL." The radio programs are heard on the air both day and night, but radio-wave propagation increases at night, which makes *long distance listening* (DX) more favorable during those hours. The term *shortwave* originally came from the fact that the radio frequencies were higher and had a *shorter wave length* than those being used on the standard AM broadcast band. This can be a bit confusing today because the standard FM broadcast band frequencies are higher than the international shortwave frequencies, which makes FM technically *shorter* than shortwave itself.

Before there was cable TV, and satellite links with hundreds of channels, cell phones, Internet, email, and the multitude of personal communication devices that we use today, people listened to shortwave radio to get their international programming from distant lands. Shortwave radio is still a viable medium today because it allows people to hear news, information, and music from around the globe – direct from the source, as it happens, and without a monthly subscription fee! Indeed, many people and cultures still rely on shortwave radio as a primary means of getting their daily updates and commentary.

Shortwave listening continues to be attractive because you can listen to the flavor and excitement of foreign broadcasts with only a modest outlay, and a nominal investment in time to understand some basic technical information. The only capital investment will be the radio itself, and perhaps a few publications containing international broadcast programming schedules (i.e. program guides).

What Do I Need to Get Started?

Shortwave Radio

First of all, you will need a shortwave radio, and fortunately, there is a wide range available to fit most budgets. Decent used shortwave radios can sometimes be found at garage sales, and flea markets for less than $50, and there are plenty of swap meets and vendors (both online, and traditional brick-and-mortar) who sell new, used, and reconditioned units. If you like older radios, (with vacuum tubes) then you can go back as far as the 1930s to find a suitable model. Generally speaking, the older the radio, the bigger and heavier it will be, and the more repairs and maintenance it will need. These sets are best left for the niche hobbyist, or serious collector.

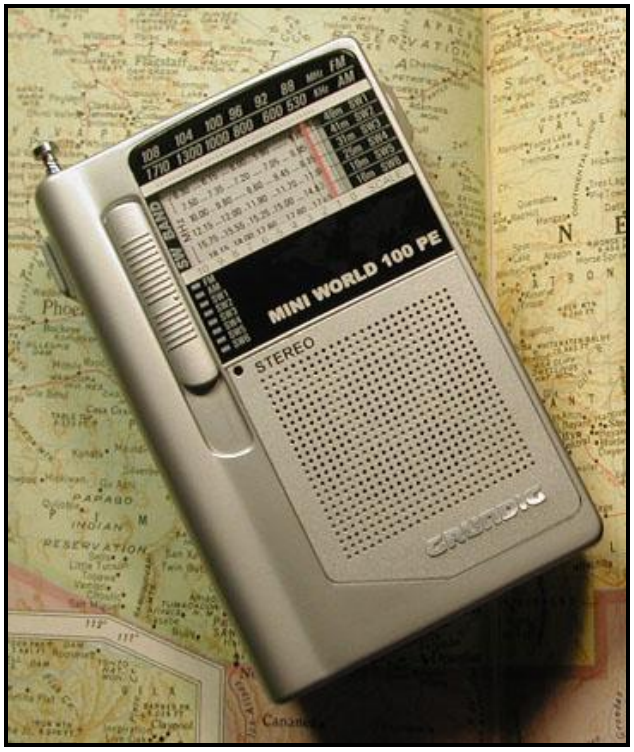

Figure 1. Grundig "Mini World 100 PE" ultra-portable multi-band shortwave radio (circa 2000)

Some modern (solid state) portable shortwave radios (Figure 1) can fit inside a shirt pocket and, when used with ear buds or headphones, have pretty decent audio, and favorable *selectivity* (ability to reject adjacent signals), and *sensitivity* (ability to receive weak signals). You will need to decide what best fits your lifestyle, budget, and listening habits. If you want to operate from a stationary position, then a larger, full featured tabletop model might be the best way to go. If you want to listen to your favorite international programs while travelling, a smaller portable model will probably meet your requirements better.

Program Guide

You will increase the chances of hearing shortwave broadcasts with a program guide. The key is to get current program data. Broadcast schedules are constantly changing, so it makes sense to find the most recent program guide available. An annual publication such as the *World Radio and Television Handbook* (WRTH) is a useful reference, but a monthly publication like *Monitoring Times* magazine is updated more regularly, and will include the latest news about international broadcast stations.

Convert Your Local Time to Coordinated Universal Time (UTC)

Since shortwave broadcasts are heard worldwide, the stations list their program schedules according to a single worldwide standard known as Coordinated Universal Time (UTC). You need to convert your local time to UTC to find international shortwave radio programs at their designated times. Time zones around the world can be expressed as positive or negative offsets from UTC; UTC replaced Greenwich Mean Time (GMT) as the basis for the main reference time scale or civil time in various regions on January 1, 1972.

In the United States, Eastern Standard Time (EST) is five hours behind UTC (UTC-5). For example, if the UTC time is 10:00 p.m., the Eastern Standard Time would be 5:00 p.m. (UTC-5). To compensate for daylight-saving time (DST), subtract four hours from UTC, i.e. 10:00 p.m. UTC becomes 6:00 p.m. eastern DST. Also, all UTC time is listed according to a 24-hour clock (a.k.a. *military time*). In the previous example, 10:00 p.m. becomes 2200 hours, and 5:00 p.m. becomes 1700 hours (12:00 noon plus five hours = 1700). All international shortwave programs are listed this way. If a program is scheduled to begin at 2230 UTC, it means it will be on the air at 5:30 p.m. Eastern Standard Time, or 6:30 p.m. eastern DST. You must know how to convert your local time to UTC when listening to shortwave radio!

Where are the Shortwave Frequencies?

The shortwave radio frequencies are organized in bands just like the AM and FM radio bands but are located a little bit “above” the AM broadcast band and a little bit “below” the FM broadcast band (Table 1). The AM broadcast band begins at 530 kilohertz (kHz) and ends at 1710 kHz. *The shortwave meter bands begin at 2.3 Megahertz (MHz) and continue to 30 MHz (2300 kHz – 30000 kHz).* The FM broadcast band starts at 88 MHz and ends at 108 MHz.

Table 1

Location of AM/SW/FM Bands on the Radio Tuning Dial		
AM Broadcast Band	**International SW Bands**	**FM Broadcast Band**
530 kHz – 1710 kHz (0.53 MHz – 1.7 MHz)	2300 kHz – 30000 kHz (2.3 MHz – 30 MHz)	88000 kHz – 108000 kHz (88 MHz – 108 MHz)

The Shortwave Band Plan (2.3 MHz – 30 MHz)

Shortwave bands are located in the 2.3 MHz – 30 MHz (2300 kHz – 30000 kHz) range of the radio spectrum (Table 2). Not all frequencies in this range are used by international broadcasters. Most broadcasts are restricted to segments of this range called meter bands. Some meter bands are more widely used than others and some exhibit better conditions during the daytime while others are better at night. Here are the major bands used for shortwave broadcasts.

Table 2

Shortwave Listening Frequencies		
Meter Band	**Frequency (kHz)**	**Reception Times**
120	2300 – 2490	Infrequent reception
90	3200 – 3400	Winter nights
75	3900 – 4000	Winter nights
60	4750 – 5060	Tropical stations, winter nights
49	5950 – 6200	Best at night
40	7000 – 7100	Best at night
41	7100 – 7300	Best at night
31	9500 – 9900	Best at night, some day
25	11650 – 12050	Best at night, some day
22	13600 – 13800	Best day, some night
19	15100 – 15600	Best day, some night
Shortwave Listening Frequencies *(continued)*		
Meter Band	**Frequency (kHz)**	**Reception Times**
16	17550 – 17900	Best day, some night

13	21450 – 21850	Best at day
12	24890 – 24990	Best at day
11	25600 – 26100	Best at day
10	28000 – 29700	Best at day

Use the following formula to convert a radio frequency to its equivalent wave length (in meters): *Wave length (in meters) = 300 ÷ frequency (in MHz).* Example: The corresponding wave length of a radio signal at 7415 kHz would be 41 meters (divide 300 by 7.415 to get 40.45, and round up to 41). Technically, 7.415 MHz is just outside the official 41 meter band (7100 to 7600 kHz). Thus, it could be said the meter band designations shown in Table 2 are approximate, and not always exact.

What Can I Hear on Shortwave?

Radio waves know no boundaries and in many parts of the world, shortwave radio is still the primary means of hearing (and disseminating) news, music, political information, and religious viewpoints. It is a reliable means of getting a message heard by a large number of people. Some of the most popular shortwave news broadcasts (in English) include the British Broadcasting Corporation (BBC), Voice of America (VOA), Deutsche Welle (Germany), China Radio International (CRI), Radio Habana (Cuba), Radio Sweden, and Radio Nederland Worldwide (RNW). Many of these stations also include abundant music and multi-cultural programming for the avid SWL to enjoy.

It should be noted that, in recent years, the number of traditional shortwave broadcasters has declined somewhat. For instance, the BBC no longer targets North America, but it can still be heard with a sensitive radio and a good antenna. New stations have begun to populate the tuning dial while others have ceased broadcasting altogether. China Radio International (CRI) now has the all the presence, flavor, and style as any shortwave broadcast station in recent memory.

What are the Best Times to Listen?

Perhaps this is a good place to clear up some misconceptions about what shortwave receivers are capable of doing. Receiving shortwave signals is not as easy and simple as receiving local broadcast stations, where you simply turn the dial to the indicated spot and hear clear words and music booming regardless of the frequency, time of day, or the season of the year. With shortwave, you don't pick up a signal directly from the station a few miles away. What you hear has made several bounces off the ionosphere, which is continuously changing. A station heard at 7:30 p.m. local time might fluctuate from one minute to the next or may not be heard at all a few

minutes later. The challenge of hearing these distant stations is what keeps many SWL interested in the hobby for many years.

Daytime and Nighttime Listening

Radio signals grow at night due to being reflected off the F layer of the ionosphere (Figure 2). The phenomenon is known as skywave propagation. At night, the lower layer of the ionosphere (the D layer) dissolves and merges with the higher E and F layers thus creating a reflection path that allows radio waves to travel greater distances around the globe.

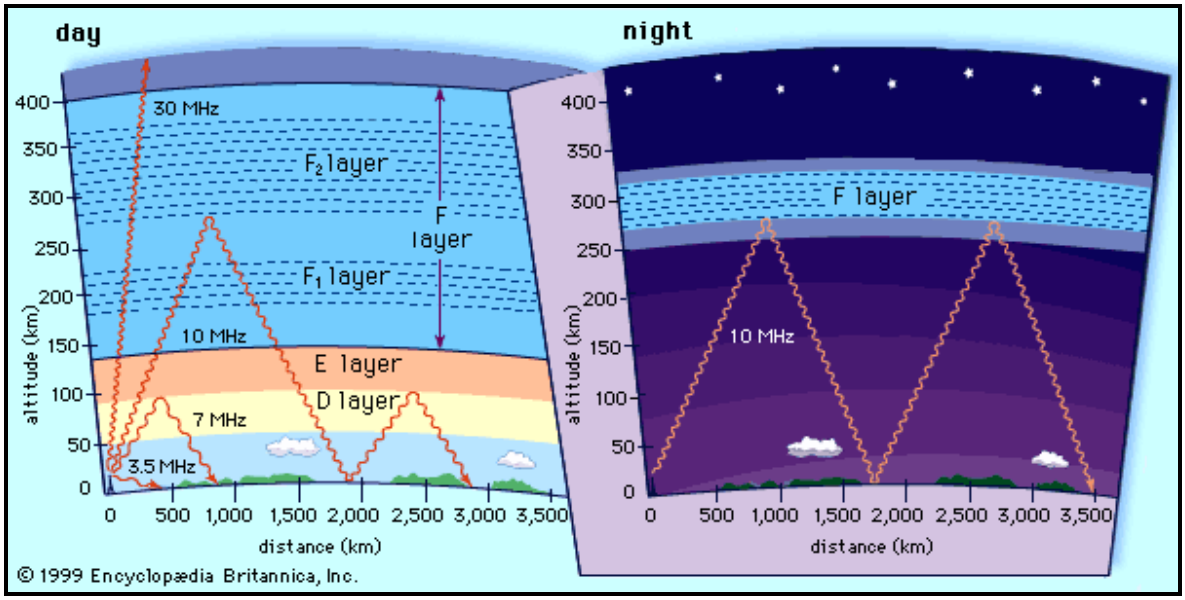

Figure 2. Daytime and Nighttime Propagation

Increased solar activity (sun spots) also enhances radio propagation. The quality of the reception is based on the path the electromagnetically charged waves travel from the transmitter to the receiver.

How Can I Get the Most Enjoyment out of SWL?

Operating your Shortwave Radio

Operating a shortwave radio is very much like operating any other radio except there are extra band switches and usually a longer telescopic antenna. Older radios typically have a slide-rule tuning scale where the entire spectrum is visible at once. The slide-rule tuning scale is logically arranged and grouped according to the frequency ranges (bands). A legend is printed on the tuning dial to indicate the frequencies in kHz or MHz. Some shortwave listeners prefer these older, traditional style tuning dials (Figure 3) over the more recent radios (with LCD read-out and frequency push-buttons) because it gives them a more visceral sense of where they are in the spectrum.

Figure 3. Realistic "Globester 4" multi-band portable radio (circa 1976)

Not all shortwave radios include the entire (2300 kHz – 30000 kHz) SWL spectrum. The radio shown in Figure 3 has the standard FM and AM bands as well as the Marine Band (1600 kHz - 4500 kHz) and shortwave (SW) coverage from 4500 kHz – 12000 kHz. This range of shortwave frequencies would be sufficient for nighttime listening on the 60 – 25 meter bands.

Many radios produced since the mid-1980s include an LCD tuning display and push-buttons to enter the frequency (Figure 4). For example if you want to listen to a program on 7.415 MHz (WBCQ), you simply enter 7.415 with the keypad to select the frequency. This feature takes some of the guesswork out of operating a shortwave radio and increases the accuracy and precision with which you can locate your favorite programs.

Figure 4. Grundig "Satellit International 400" portable multi-band shortwave radio (circa 1989)

Logging what you Hear

Another popular aspect of the SWL hobby is keeping organized records of what you hear. You may wish to document and save the stations you hear in a logbook – or even make audio recordings for future listening and archival purposes. SWL logbooks are readily available from commercial vendors, or you can easily make your own with pencil and paper, or with a word processing program. An SWL logbook need only include the following information: date, time (UTC), frequency, station, signal strength, and an area for comments.

Station's Acknowledgement of your Reception Report (QSL)

Related to logging, another tradition of the SWL hobby is sending reception and signal reports to the stations you hear. In return, many stations will send a confirmation of your report. These confirmations are known as a QSL (Morse code for "acknowledgement"). The basic information to include with your report is (a) your name, (b) your address, (c) the frequency, (d) the time you heard the station (UTC), (e) some of the content heard, including the name of the program, and, the announcer's name, if possible. You may also want to include some information about the radio and antenna you were using at the time of your report.

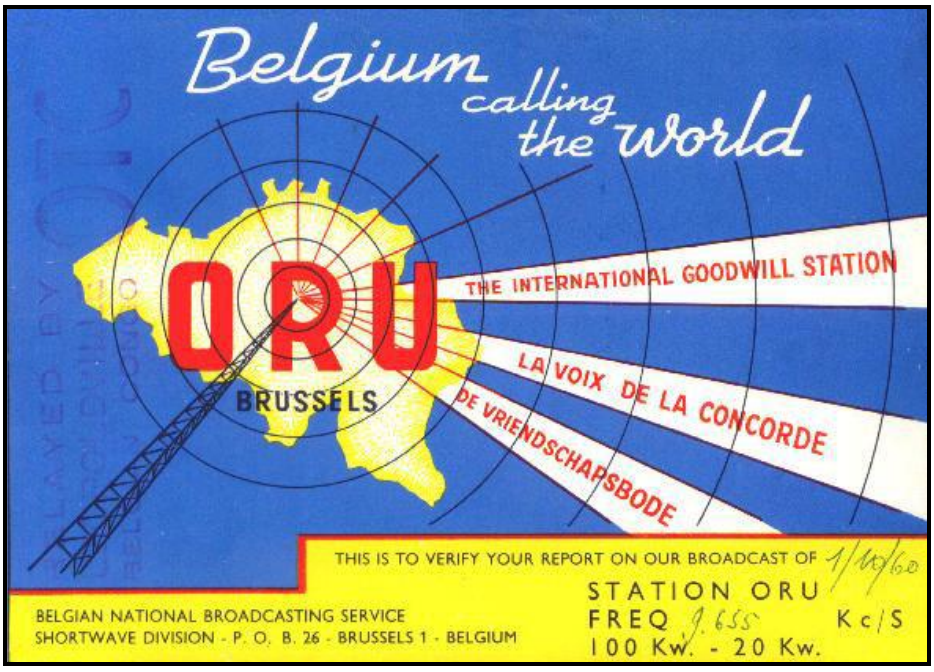

Figure 5. Traditional QSL card from Radio Belgium (circa 1960)

Some stations are better known for sending QSL packages that include programming schedules, bookmarks, pins, QSL cards (Figure 5) and pennants. The References section of this guide includes publications that list the stations most likely to QSL. The World Radio and Television Handbook (WRTH) is one of the best guides for this information because it includes the station's mailing address. Today, most shortwave broadcast stations also have an online presence, and include an email address as a way to stay in close contact with their valued listeners.

Conclusion

Having read this guide to its conclusion, you now have enough information about SWL to begin your own personal exploration into this intriguing hobby. In addition to the things you now know, the Web links provided will assist you in discovering an abundance of published material and a wealth of online references that will aid in your SWL endeavors. For a modest investment, and with a solid understanding of the basic technical principles related to skilled shortwave listening, you have the ingredients for an entertaining life-long hobby that you can practice anywhere.

Where can I find References?

Internet References

Use the Internet to search for more information if the links have changed.

- http://en.wikipedia.org/wiki/Shortwave
- http://mt-shortwave.blogspot.com
- http://ac6v.com/swl.htm
- http://en.wikipedia.org/wiki/Coordinated_Universal_Time
- http://www.odxa.on.ca

Publications

In some cases these printed references also have an online presence.

- Your Radio Owner's Manual *(valuable, yet often overlooked)*
- The Spectrum Monitor (www.thespectrummonitor.com)
- World Radio And Television Handbook (WRTH) (www.wrth.com)
- Popular Communications (www.popular-communications.com)
- Grundig Shortwave Listening Guide
- The Complete Shortwave Listener's Handbook (fourth or fifth edition)

Clubs and Associations

These resources may be useful for general reference and further investigation.

- List of DX clubs (www.dxing.com/clublink.htm)
- North American Shortwave Association (NASWA) (www.naswa.net)
  NASWA hosts an Annual SWL Fest in Kulpsville, Pennsylvania
- Ontario DX Association (ODXA) (www.odxa.on.ca)

Research Methods

The following two methods of research were used in the creation of this guide.

- The author's personal knowledge and experiences provided the impetus for creating the guide. He is a long-time SWL, and has a modest reference library dedicated to radio history, electronics, and radio repair. He is an Extra Class amateur radio operator (call sign N2AWA) and restores vintage vacuum tube radios, and volunteers as a docent at the Antique Wireless Association (AWA) Museum in Bloomfield, NY. He served on the Rochester Amateur Radio Association (RARA) board of directors for two years (May 2008 – May 2010).
- Multiple Internet, and printed resources were used in the creation of this guide, which are included in the *Internet References*, and *Publications* sections. Unfortunately, Internet links go stale after time, so search the web, or try the root of the URLs provided.

Glossary

- Antenna: Converts electromagnetic radiation into electrical current, or vice versa
- Band: Range of frequencies grouped together on the face of the radio tuning dial
- Broadcast: Organized radio program transmitted to a wide range of listeners
- Coordinated Universal Time (UTC): Time standard based on International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation
- Kilohertz (kHz): One thousand cycles per second (frequency)
- DX: Long distance (Morse code)
- International Shortwave Bands: The band of frequencies between 2300 kHz and 30000 kHz
- Internet: Global system of interconnected computer networks
- Log: Organized record of stations heard; including date, time (UTC), frequency, station, signal strength, and comments
- LCD: Liquid crystal display; used as tuning dial on many contemporary radios
- Megahertz (MHz): One Million cycles per second (frequency)
- Program Guide: Publication that lists current broadcast schedules
- QSL: Acknowledgement of signal report (Morse code)
- Solid State: Radio circuit based on transistor and semiconductor technology
- Sensitivity: Radio’s ability to receive weak signals
- Selectivity: Radio’s ability to null, or reject adjacent signals
- Station: Facility with radio transmitter for broadcasting regularly scheduled programs
- Shortwave Radio: Radio capable of receiving some or all of the international shortwave bands
- Spectrum: Entire range of radio frequencies available for shortwave broadcast
- SW: Shortwave
- SWL: Shortwave listener, or shortwave listening
- URL: Uniform Resource Locator (web address)
- Vacuum Tube: Electronic device used in early radio design capable of oscillation, amplification, and switching electrical signals by controlling electrons in a low pressure space
- Web: World Wide Web (WWW); system of interlinked hypertext documents found on the Internet