CHECK OUT OUR WEBSITE SOME TIME FOR PLENTY OF ARTICES ABOUT SELF DEFENSE, SURVIVAL, FIREARMS AND MILITARY MANUALS.

http://www.survivalebooks.com/

Thank you for purchasing our ebook package.

PART 1 – Choosing A Shortwave Radio

There are many different makes and models of shortwave radios, and they vary greatly in cost, features, size, complexity, and other factors. There is no one "right" shortwave radio for everyone. **The best shortwave radio for you depends primarily on your listening interests.** However, there are some features and specifications you should look for in any shortwave radio you consider. They are:

• **Frequency coverage.** Shortwave frequencies are usually considered those from the upper end of the AM broadcasting band, 1700 kHz, up to 30 MHz. The minimum frequency coverage you should look for is 540 kHz to 30 MHz. Most shortwave radios sold today also tune down to 150 kHz, covering the longwave band.

• **Frequency readout.** Most shortwave radios sold today have a digital display showing the frequency the radio is tuned to. A few radios, usually less expensive models, have an analog "slide rule" frequency readout that does not indicate the precise frequency the radio is receiving. It can be very difficult and frustrating to find a station on a specific frequency without a digital display, so a **digital frequency display should be a "must"** for any shortwave radio you're considering. However, an analog readout shortwave radio can make a good, inexpensive "spare" radio for traveling, etc.

• **Modes.** Some shortwave radios tune only AM mode stations, and these can be satisfactory for listening to most shortwave broadcasting stations. However, SSB is used by a few broadcasting stations in addition to ham, aeronautical, military, and maritime communications. A shortwave radio that can receive **SSB in addition to AM will greatly expand your listening options** on shortwave.

• **Selectivity Options.** Selectivity is discussed in more detail below, but you need to consider how many selectivity bandwidths you can select. Some portable receivers allow you to choose between "wide" and "narrow" selectivity bandwidths, while some desktop shortwave radios have as many as five selectivity bandwidths. **Narrow selectivity bandwidths let you reduce interference** from stations on adjacent frequencies, although the audio quality of the desired station will be reduced as the selectivity is narrowed.

• **Antenna Connections.** Some portable radios come with a built-in telescoping antenna but have no provision for an external antenna. Other portable shortwave radios have a jack that let you connect an external antenna. Most tabletop shortwave radios have connectors for external antennas. These usually include connectors for antennas using 50-ohm coaxial cables and others for antennas using ordinary insulated "hook-up" wire. **External antennas normally give better reception than built-in antennas**, although built-in antennas are usually satisfactory for listening to major international broadcasting stations. However, built-in antennas give poor results inside buildings with steel frames, like a high-rise condominium or apartment buildings. In such cases, the ability to connect an external antenna (even it is only a few feet of wire outside a window) can make a significant improvement in reception.

Here are some of the terms you need to understand when buying a shortwave radio. These terms are used to describe the features and controls found on shortwave radios:

Audio filter. This circuit rejects certain audio frequencies in the audio output of a receiver. A *bandpass* filter will pass a certain band of audio frequencies but reject others. A *low pass* filter will reject all audio frequencies above a certain frequency. A *high pass* filter rejects all audio frequencies below a certain frequency.

Automatic gain control (AGC). This circuit adjusts the gain of the receiver to maintain a relatively constant level of audio output from the receiver regardless of changes in the strength of the received signal. Some AGC circuits let you select how fast it reacts to a change in signal strength, such as a "slow" or "fast" AVC. This circuit is sometimes called an *automatic volume control* (AVC).

Beat frequency oscillator (BFO). A circuit that produces an internally-generated carrier to allow reception of SSB, CW, and FSK signals.

Crystal lattice filter. This device improves selectivity by increasing rejection of signals on adjacent frequencies.

Digital signal processing (DSP). Circuitry in which analog signals, such as audio or radio signals, are converted into digital form, manipulated and processed while in digital form, and then converted back to analog form.

Dynamic range. A measure of the strongest received signal that a receiver can handle with overloading or distortion. It is measured in decibels. A minimum satisfactory measurement is 70 dB; over 100 dB is preferred.

Memories. These allow storing of frequencies of favorite stations. Some receivers allow storing of mode, receiver bandwidth, etc., in addition to frequency.

Noise blanker/limiter. This circuit reduces noise due to electrical equipment, lightning, neon lights, etc. Noise limiters are simpler circuits that limit the maximum strength of noise pulses, while more complex noise blankers actually silence the receiver during noise pulses. While this circuits can help reduce noise, they cannot eliminate noise and often introduce some audio distortion.

Notch filter. A notch filter removes a very narrow slice from a received signal, either from the radio frequency itself ("RF notch") or from the audio output ("audio notch") of the receiver.

Passband tuning. A circuit that allows you to move the selectivity bandwidth above or below the frequency to which the radio is tuned. This is often helpful in reducing interference.

Product detector. This is a beat frequency oscillator with enhancements for improved SSB and CW reception.

RF attenuator. This circuit reduces the sensitivity of the receiver in discrete steps, such as 10 or 20 decibels.

RF gain. A control that permits the sensitivity of a receiver to be continuously varied.

Scanning. This feature lets the receiver automatically tune through a desired frequency range, stopping on all frequencies where a signal is present. This feature is sometimes not too useful on shortwave, since atmospheric noise can also can mimic a radio signal.

Selectivity. The ability of a shortwave radio to reject signals on frequencies adjacent to the desired station. It is usually expressed as a bandwidth measured at 6 dB rejection points ("6 dB down" or "-6 dB"). For example, a selectivity specification of "6 kHz at -6 dB" means any signal outside the 6 kHz bandwidth will be reduced in strength by at least 6 dB (in other words, the interfering signal is only one-fourth as strong as it would be otherwise). Typical good selectivity measurements at 6 dB points are 6 kHz for AM, 2.5 kHz for SSB, and 0.5 kHz for CW.

Sensitivity. The ability of a shortwave radio to respond to weak signals. It is measured in microvolts (μV). The lower the measurement in microvolts, the fainter the signal the radio can receive.

Squelch. This quiets the receiver audio until the strength of a received signal exceeds a desired level.

Synchronous detection. A circuit that replaces the carrier in a received AM signal with an internally generated replacement to reduce the effects of fading.

Variable bandwidth tuning. This circuit allows the selectivity of a receiver to be continuously varied.

PART 2 – Choosing A Shortwave Radio

The Basics

1. WHAT IS SHORTWAVE RADIO?

Shortwave Radio is a means of radio broadcast, similar to that of medium wave, but which travels more reliably for longer distances. It is therefore used as a means of international broadcasting for a number of purposes. International Broadcasting, as the name implies is transmitting across borders, although the term usually refers to speech based 'broadcasters.

2. CAN I RECEIVE SHORTWAVE ON A STANDARD RADIO?

Probably not, although this depends on where you live. Most radios sold in the Western World now receive just domestic FM, Medium wave and perhaps Longwave (only FM / AM bands in the Americas.) Shortwave radio is for a more specialized market, and thus requires a more specialized radio. In some parts of the world where domestic media is not so saturated with stations, shortwave can often be found on radios sold.

3. ARE SHORTWAVE RADIOS EXPENSIVE THEN?

Not necessarily. Shortwave radios can be picked up cheaply - under £20 / $30 from your average high street electrical stores. However, you get what you pay for. If you wish to hear just powerful shortwave stations from your own continent and a little beyond, a cheap, analogue tuned radio can be sufficient. However, such radios are imprecise in their tuning, and if you are searching for more distant and weak stations, you will find your efforts frustrated and often unsuccessful.

If you want to make the best of the hobby from the outset, but don't yet know whether you are willing to seriously commit yourself to the shortwave listening, try out a decent portable. The following radios are often recommended: Sony ICF-SW7600GR, Grundig Yacht Boy 400, Sangean ATS 909 / Roberts R-861. These can be picked up for between £100 - £200. It's less than the price of a TV or video, and has the potential to be far more rewarding. Even if you decide not to stick with Shortwave listening much, you'll have a great radio for hearing domestic stations further away and with a stronger signal.

4. WHERE CAN I OBTAIN THESE RADIOS?

Your average high street electrical stores may well have some, but not usually the better portables listed above, and if they do they're usually considerably more expensive than you can obtain the radios for from mail order companies. Sony Centers, or similar retailers of Grundig or Roberts etc. will often stock more advanced radios, but again these are well above mail order price. Look for a magazine called 'Popular Communications'. Another good source is Ebay.com. Be sure you get a retail price from a dealer before bidding on Ebay.

5. SURELY TO HEAR FAR AWAY STATIONS I NEED A HUGE AERIAL?

Happily you can receive many stations on the same telescopic whip, which you use for FM. In Europe this will pull more or less all-European stations of size, and stations further away too, depending on your radio. On a £17 SW radio I got from Dixons (British High street Electrical retailer), I regularly heard KOL Israel and US Commercial stations, for example. On my quality Sony & Grundig portables I can hear far more. In addition attaching a wire antenna will improve antenna markedly for more distant and weak signals, and is often thought essential for those living in weak signal areas such as Western North America or Australia. These areas simply are long distances from transmitter sites. Such a wire aerial need not be high tech and fancy - the 'reel' antenna which accompanies many portable SW radios will improve things, although a 'long wire' antenna outdoors will do so to an even greater extent.

6. OK, I'VE GOT A RADIO AND AN AERIAL. WHAT NOW?

You can start tuning away! However there are lots of frequencies and broadcasts out there. Initially it can be quite rewarding and fun to scan through the frequencies and see what you come across. However you will eventually want to listen regularly to favorite stations and in a language you can understand.

The two most 'directories' of sorts for the shortwave bands are 'Passport to World Band Radio' and 'World Radio Television Handbook'. Theses are published annually, updating the numerous changes in frequencies and sometimes stations, which occurs each year. These are both great for getting to grips with what is available, although Passport features more on programming, WRTH concentrating more on the actual tuning in of stations

Further resources are available on the internet, although radios don't often like all the radio frequency noise PCs churn out. Visiting a station's website is the best way for finding current schedules for individual broadcasters.

7. MOST STATIONS AREN'T IN ENGLISH

Shortwave radio is used by most countries of the world to broadcast to throughout the world. Dozens of languages are spoken, and similarly, dozens of languages are broadcast, just one of these being English. That said, English-speaking countries are certainly not the only states to broadcast in the English language. Most broadcasters of any size do have an English language service. In addition, broadcasters, dependant on the mandate of the station, also broadcast other widely spoken European based languages and some broadcasters in many dozens of regional languages. Each station broadcasts a different selection of languages based upon the station's role, location and size.

8. I KEEP SEEING AND HEARING 'UTC' EVERYWHERE. WHAT DOES IT MEAN?

Remember that different countries are in different time zones? When trains first appeared there was a need for a standardization of time between the cities the trains ran to. Similarly, when shortwave is broadcast and received in so many different counties, a time standardization is called for. This it UTC or UT, meaning Coordinated Universal Time, or just Universal Time. UT is essentially the same as Greenwich Mean Time, as set in London. From knowing UT you can work out your local time in relation to it. UT never changes, so in summer and winter it always remains the same, although your local time may change in relation to it.

So for example: the East Coast of North America operates on 'Eastern Time' in the winter. This is UTC -5. That is, Eastern time is 5 time zones, and therefore 5 hours behind Universal Time. In summer the clocks go forward in many countries, and therefore in the Americas move one hour nearer the standard Universal Time. Then Eastern Daylight Time becomes only UT -4. During summer *some* shortwave station change their broadcast hours relative to UT so that their broadcast appears to be at the same local time, despite your clocks having moved forward. As you can see, this International Time is a tricky business - but with practice you'll get used to it.

9. THE SIGNAL ISN'T VERY CLEAR. WHY?

There are a number of reasons why signals are not crystal clear on shortwave. Firstly, don't expect FM quality signals. FM is a steady medium, which uses large bandwidths to achieve the high quality audio. Bandwidth is restricted in Shortwave. It's better to compare Shortwave broadcasts to Medium wave or AM broadcasts. At night you can often hear far away stations on Medium wave. Shortwave uses more or less the same principles, but shortwave signals travel further throughout the whole day. When you listen to those far away medium wave signals, you hear that the signal often fades in an out, and often stations can be on top of each other. Shortwave is more stable at broadcasting over long distances, but suffers from some of the same problems. For shortwave to travel long distances, it has to bounce off a layer of the atmosphere called the ionosphere. This reflects the signal back to Earth, but it isn't a perfect mirror. It is affected by the sun and sometimes reflects better than other times.
You will normally find that signals from countries nearer to you are strongest and clearest. This is because they have had to bounce off the ionosphere the least number of times to get to you - perhaps only once. Signals from further away bounce more and are thus subject to more imperfections from the mirror of the ionosphere.
Imperfections usually are found as fading in the signal. That is, the signal fades in strength.

Other noises in signals are created elsewhere. Let's briefly look at these:
As shortwave signals are quite squeezed for space, they will often inhabit adjacent frequencies, which may cause interference with each other. On occasion, signals may co-habit the same frequency. This happens because the signals may be broadcasting to different parts of the Earth. But because shortwave often travels further than intended, you may receive both signals, both using the same frequency. Interference from stations can vary quite considerably. It may just be voices from the next frequency overlapping on the signal you're listening to. At other times, the interference may consist of many strange noises. Such noises come from utility stations - who transmit for purposes and using means other than voice. Be it Morse code or computer data, if the broadcast you're listening to is on the edge of a shortwave broadcast band, it might receive interference from these utility stations. We'll be looking at Utility stations more later.
Finally there is other noise. Cracks of static for example. These are caused by lightening and are most prevalent during your hemisphere's summer, when most thunderstorms occur. However, if you're listening to a station during their summer, even though you are in winter the static crashes may be present, as they are being picked up in the station's own region.

10. YOU MENTION SHORTWAVE BROADCAST BANDS. WHAT ARE THESE?

Shortwave isn't solely used for voice based international broadcasting. Utility stations have already been mentioned. Shortwave is also used by Aircraft, Maritime vessels, the Military, even the secret service and a whole host of information services. To have a voice based international broadcasters interfering with crucial air traffic, for example, would not do, so bands are set up in the shortwave spectrum to keep different broadcasts apart. Just like Medium wave broadcasts between about 550 and 1600khz, the same is true of shortwave, only shortwave has several of these bands.

The broadcast bands look more or less like this:

2300 - 2495 120 Meters (Tropical Band)
3200 - 3400 90 Meters (Tropical Band)
3900 - 4000 75 Meters (Tropical Band)
4750 - 5060 60 Meters (Tropical Band)
5900 - 6200 49 Meters (International Band)
7100 - 7350 41 Meters (International Band)
9400 - 9900 31 Meters (International Band)
11600 - 12100 25 Meters (International Band)
13570 - 13870 22 Meters (International Band)
15100 - 15800 19 Meters (International Band)
17480 - 17900 16 Meters (International Band)
18900 - 19020 15 Meters (not yet widely used)
21450 - 21850 13 Meters (International Band)
25600 - 26100 11 Meters (International Band)

There is a reason why so many bands are required. Different bands propagate, that is bounce of the ionosphere more effectively at different times of the day. This is due to sunlight (or the lack thereof) affecting the ionosphere differently. As a rule, lower frequencies propagate best during darkness, higher frequencies during daylight, and around 9 - 13 Mhz during half-light and perhaps also daylight and after dark.

One cannot simply come up with easy to follow rules for this. The location of the transmitting station and the receiver (i.e. you, the listener) affect the usability of different frequency bands at different times. However, use the low - night, high - day rule as a basis to start from. Experience will teach you what is best heard when.
Now you will notice that the table is divided into 1. The range of frequencies, 2. The corresponding Band name and 3. The type of band,
The use of 'metreband' or 'meters' is more or less obsolete for measuring frequencies, but is still used for Band names. Personally, I prefer using megahertz rather than meters, e.g. 'the 5Mhz band' as a band name, but that's down to preference.

As to the two types of bands, tropical bands on the whole, although not exclusively are used by stations in tropical regions of the Earth for more local or regionalized transmissions. These can make for both interesting and challenging listening, but for now you'll want to focus on the International Bands. These are used by broadcasters to mostly broadcast throughout the world, and it is here you will find international broadcasting programs directed towards your region.

11. WHAT SORT OF PROGRAMMING WILL I FIND ON SHORTWAVE?

This can vary quite considerably, but most stations can be categorized in one way or another. Firstly and perhaps fore mostly are the stations, primarily backed by their respective country's government, which promote and broadcast news and features about their own country. The majority of countries have such a station, although the size of such stations and the extent to which they broadcast do vary considerably. Such broadcasters, as mentioned, will give news from their country, and broadcast features about the culture, history, music or other aspects of their country and people. If you're interested in a particular country, or wish to hear news from different worldly perspectives, such stations are an excellent way to pursue your interests.

Some of these stations also take on a dual role, most notably the larger stations such as the British BBC World Service, the United States' Voice of America and Holland's Radio Netherlands to name but three. Such stations also take on the role as informants. Many countries of the world have limited or restricted news services for whatever reasons, and these countries' people may not be aware of regional or even national news and issues which affect them. Shortwave, which only requires a cheap radio is therefore available to the information underfed, and is thus a prime medium to be used to inform such people. Shortwave traverses national boundaries, and therefore cannot easily be stopped by any particular country. The above stations then intend to inform the world with international, regional and national news. As a result of this targeting of audience, such broadcasters tend to aim their broadcasters first and fore mostly at the developing world.

Other sorts of information and entertainment stations are present. Some stations transmit more specific information services, such as a station in Russia, which broadcasts to Russian fishermen at sea, or tropical stations (that is, stations in the tropics) broadcasting rather more domestically targeted programming.

Other stations transmit information with purposes other than those broadly established above, and are predominantly concerned with Politics and Religion. Both topics have given rise to broadcasters with a whole host of mandates, from the overthrow of governments to spreading salvation among the world's people.

Shortwave as both a cross-border and an international medium result in such a whole host of possibilities for broadcasts.

12. WHOSE PROGRAMMES ARE BEST?

That's for you to decided upon, based on your own interests. Of the roles of stations described above, which most appeals to you? Knowledge on world events, learning about a specific country, spreading Catholicism or becoming a Russian fisherman in the Pacific Ocean? The choice is yours! Some stations on the Shortwave bands are regarded as producing the best programming in the world, others dubbed with being the worst. The choice can be fantastically varied, certainly more so then on your domestic radio bands.

13. EXPLAINING SOME TEMINOLOGY….

Okay, here's a run down of some more frequently used shortwave related terms:

DX: The hobby of listening for far away and weak signals, as opposed to normal programmed listening.
SWL: Abbreviation for Short Wave Listen -er/ing
BCB: Abbreviation for Broad-Cast-Band - the areas of the radio spectrum used by voice broadcasters for general reception.
CW: This means Continuous Wave, which otherwise means Morse Code. This is decreasing in use.
ID: Identification; a station may give its identification e.g. "This is the BBC World Service."
IS: Interval Signal; Shortwave stations tend to play a tune, often short and repeated, to signify their station. As SW stations don't broadcast continuously on a frequency, but rather for briefer periods, playing an interval signal allows listeners to lock on to the signal (especially if using a more primitive analogue tuned radio, with a dial rather than a digital readout, which is imprecise in locating frequencies.) Both IDs and ISs are worth mentioning in reception reports when giving programming information.
Q Signs: In addition to QSL, you may hear QRM for referring to interference, QRN for referring to Noise and QTH for location. These are used more prevalently by radio amateurs then by shortwave broadcasters or listeners, but you may hear them used on a mailbag show.

14. I CAN'T HEAR THE STATION ON THE LISTED FREQUENCY, OR RECEPTION IS POOR.

Due to there being no certainty of hearing a station well on any given frequency, due to whatever reason, almost all but the smallest Shortwave stations use more than one frequency. Why? So the chances are at least one frequency will be in the clear in the intended target area. Normally the larger stations, with the largest number of available transmitters use the most frequencies. Ironically, it is not necessarily these station, which are best heard. Smaller stations using just a couple of frequencies can be heard clearer through more flexible choice of frequencies. To an extent it is chance as to how clear a frequency is at a given time, but a station carefully selecting frequencies can reap the rewards of well-heard broadcasts.

Selecting frequencies is not a hit and miss affair, however. The International Telecommunication Union (ITU) is the organization, which oversees the frequency allocations by each country. However, as established above, the nature of shortwave means that shortwave broadcasts don't always just cover their target broadcast area and don't just cover the one allocated frequency.
Reception reports, as explained above, can be most useful for shortwave stations in selecting frequencies which are 'in the clear'; that is, clear of interference and also providing a good signal to your target area. If you can, monitor the frequency band for clear frequencies and suggest frequencies to stations which you recommend them using.

15. WHAT ELSE CAN BE HEARD ON SHORTWAVE? UTILITY STATIONS…

Utility stations don't 'broadcast' as International Broadcasters do. Rather than having a wide audience targeted, utility stations often have a specific target or targets for their transmission. Lets look at some of these stations now. Utility stations can range widely in terms of the bodies transmitting and also the means being used to transmit. Many modes of transmission are some form of data transmission. Without

special equipment these cannot be deciphered, so we'll concentrate on voice utility broadcasters only. The main users are Amateur Radio (or HAM) operators, the Military - primarily Air Force, civil aviation, maritime - such as ship to shore transmissions, and other special broadcasters.

Amateur Radio operators, in case you don't know, are people who follow the hobby of contacting others by the means of radio broadcasting. They don't exclusively use Shortwave, but Shortwave is used for long-range communications. Amateur Radio operators normally have to take a course followed by an examination and are then assigned a license to broadcast on specific bands and using a certain transmitting power limit. Taking more advanced exams allow operators to use more bands and more power. On the Amateur Radio band you can often hear a number of active conversations taking place. However, Amateur and other utility voice broadcasters don't use the same voice transmission mode as the International Broadcasters.

Instead they use what is called Single Side Band or SSB. An AM signal, which you hear, such as from a typical International Broadcaster, is made of a carrier - that's in essence the signal strength, and on both sides of this is the modulation, or speech which you here. Single Side Band on the other hand only uses modulation on one side of the carrier, hence the name. If the upper side is used, it's called Upper Side Band, with the lower it's Lower Side Band. This results in a more efficient transmission which is generally less prone to fading. As a result this is favored by those who are sending important messages, such as the military or civil users mentioned and also the Radio Amateurs who require readable signals over long distances. However, listening to a SSB broadcast does require very precise tuning. Your radio may, or may not have a SSB capability. Listening to SSB transmissions on normal AM mode makes the audio sound distorted and unreadable. If you own one of the radios recommended at the beginning of this FAQ, costing at least 100 pounds sterling, then it most likely has SSB capability. In which case you can enjoy the whole offshoot of shortwave listening which is utility station listening.

Utility stations are found between the Broadcast bands listed in the table earlier. Not all areas of the utility bands are used for voice transmissions - different areas are allocated to different transmission means and users. To give you a list of all the users and allocated bands would be far too lengthy. Instead, I'd recommend you contact your local shortwave outlet for a frequency listing publication of Utility stations. Such publications include: Ferrell's Confidential Frequency list, presently in its 11th edition. Such publications simply list all utility frequencies in order and show who broadcasts on them.

Listening to Utility transmissions, once you have the frequency is not like tuning into an international broadcaster, it should be noted. Whereas international broadcasters use a specific frequency at a specific time, utility stations only broadcast when they need to. These broadcasts may be very short and you most likely will not understand what is being referred to. However, you may here some transmissions, which are of interest: in-flight communications with Air Force One, transmissions related to a Space Shuttle launch or a boat in distress. More likely you will hear routine communications, but depending on your own interests, these can make for a fascinating listen.

Even the seemingly incomprehensible stations have a certain interest attached to their transmissions. Not least of these are 'numbers stations.' Numbers stations, it is believed, are used by secret services to contact their operatives 'in the field' as it

were, overseas. The transmissions are usually made of five numbers, repeated a couple of times. No one in the general Shortwave listening circles quite knows what these transmissions mean. They have never been deciphered to deliver a meaning to us. It is thought that the codes used to decode the numbers alter regularly, although those who analyze the transmissions of numbers stations have found certain patterns. What to listen for? A computerized voice usually repeating sets of five numbers. Numbers stations are usually found in SSB and can occur not too far outside broadcast bands. For example, in Europe a numbers station thought to be of the British Secret Service, entitled the 'Lincolnshire Poacher' due to the tune it plays between sets on numbers, is often found interfering with US Station WWCR on 15685. The Lincolnshire Poacher itself broadcasts on 15683 Upper Side Band and can often be found being jammed, presumably by Iraq or another Middle Eastern state, which doesn't appreciate such broadcasts being transmitted.

Finally on the topic of utility stations, I'll give you a few handy frequencies to get started with. If you're interested in Military Air Traffic, the primary frequencies of the United States Air Force, heard worldwide are: 8992, 11175, 15016 all Upper Side Band.