Top 40 radio charts

Lifewire uses cookies to give you a great user experience. By using Lifewire you agree to the use of our cookies. Have you ever wanted you to run your own radio station? You can run three different types of or radio stations: low power (for-profit organizations), full power (commercial radio stations) or webcast (live webcast). Here's how to run a non-internet radio station. Apply for frequency. It may take a long time for you to be assigned a frequency [source FCC]. Apply for a license. It is illegal to operate unlicensed radio stations, even with very low power [source: FCC]. Determine the source of funding. Remember that you need to pay for studio space and power, among other things. When you take care of these things, you'll be ready to continue. Decide whether you want to start a low-power or full-power radio station. Apply for a broadcasting station building permit from the Federal Communications Commission (FCC). This includes payment of the application fee. [source: FCC] Decide how much energy you need, depending on how much you want your station to broadcast. A full power plant will require tens of thousands of watts, and a low-power power plant can only need a thousand watts. Buy the necessary equipment, including transmitter actuator and antenna. You may have to rent space on the tower for your antenna. Create your own studio. You'll need audio checking, headphones, speakers, microphones, and more[source: Community-Media]. Recruit broadcasters. Make sure you have enough people to fill all the slots. Do your broadcasters practice doing shows for a few weeks before going on air. They will need to work comfortably with the microphone and improve their technical skills. Work with all relatives from your program schedule. Make sure everything goes smoothly until your first broadcast [source: Community-Media]. Be responsible and use etiquette in the air. You never know who can listen. Radio waves transmit music, conversations, photos and data imperceptibly through the air, often within millions of miles - this happens every day in thousands of different ways! Although radio waves are invisible and completely undetectable to humans, they have completely changed society. Whether we're talking about a cell phone, baby monitor, wireless phone or any of the thousands of other wireless technologies, they all communicate on the airwaves. Here are just some of the everyday technologies that depend on the radio waves: The list goes on and on... Even things like radar and microwaves depend on radio waves. Things like communications and navigation satellites would be impossible without radio waves, like modern aviation - the plane depends on a dozen different radio systems. The current trend toward wireless Internet access uses radio as well, which means much more convenience in the future! The funny thing is that basically radio is simple technology. With the a couple of electronic components that cost no more than a dollar or two, you can create simple radio transmitters and receivers. The story of how something so simple has become the foundation technology of the modern world is fascinating! In this article, we will explore radio technology so that you can fully understand how invisible radio waves do so many things! Content Radio can be incredibly simple, and around a century turn this simplicity made early experimentation possible for almost everyone. How easy can it get? Here's an example: Take a fresh 9-volt battery and coin. Find the AM radio and set it to the dialing area where you hear the static. Now hold the battery next to the antenna and quickly tap the two battery terminals with the coin (to connect them instantly). On the radio you will hear a slot caused by the connection and disconnection of the coin. Your battery/coin combination is a radio transmitter! It doesn't pass anything useful (just static), and it won't pass very far (only a few inches because it's not optimized for distance). But if you use a static tap morse code, you can actually communicate within a few inches with this green device! Advertising If you want to get a little more elaborate, use a metal file and two pieces of wire. Connect the file knob to one 9-volt battery terminal. Connect another piece of wire to the next terminal and release the free end of the cord up and down. If you do this in the dark, you will be able to see a very small 9 volt spark along the file when the end of the wire connects and disconnects from the file ridges. Hold the file next to the AM radio and you will hear a lot of static. In the early days of radio, transmitters were called spark rolls, and they created a constant stream of sparks at a much higher voltage (e.g. 20,000 volts). High voltage has created large fat sparks, as you can see in the spark plug, and they can pass further. Today, a transmitter like that is illegal because it spams the entire radio spectrum, but in the early days it worked well and was very common because there were not many people using radio waves. Advertising As seen in the previous section, it is incredibly easy to pass static. However, all radio receivers use continuous sine waves to transmit information (sound, image, data). The reason we use constant sine waves today is that there are so many different people and devices who want to use radio waves at the same time. If you had some way to see them, you could find that there are literally thousands of different radio waves (in the form of sine waves) around you now – TV broadcasts, AM and FM radio broadcasts, police and fire radio, satellite TV broadcasts, cell phone chats, GPS signals, and so on. It's amazing how many uses there are radio waves today (see how radio spectrum is idea). Each different radio signal uses a different frequency of sine waves, and how they are all separated. But the radio setup has two parts: The Advertising Transmitter Receiver Transmitter takes a certain message (it can be someone's voice sound, TV photos, radio modem data or whatever), encodes it on a sinus wave and transmits it by radio waves. The receiver receives radio waves and decrypts the message from the incoming sine wave. Both the transmitter and the receiver use antennas to radiate and capture the radio signal. The baby monitor is about as simple as radio technology gets. The baby's room sits with a transmitter and receiver, which the parents use to listen to the baby. Here are some important features of a typical baby monitor: Modulation: Amplitude Modulation (AM)Frequency range: 49 MHzDiber frequencies: 1 or 2Transmiters power: 0.25 watts (Don't worry if terms such as modulation and frequency don't make sense now – we'll get them in a moment.) Advertising Cell phone is also a radio and is a much more complex device (see how cell phones work in details). The cell phone is both a transmitter and a receiver, can use them both at the same time, can understand hundreds of different frequencies, and can automatically switch frequencies. Here are some important characteristics of a typical analog mobile phone: Modulation: Frequency Modulation (FM)Frequency range: 800 MHzDiber frequencies: 1,664 (832 per provider, two providers in one area)Transmitter power: 3 watts You can get an idea of how the radio transmitter works starting with a battery and a piece of wire. Under How electromagnets work, you see that the battery sends electricity (electron stream) through the cable if you connect the cable between the two battery-crushers. Moving electrons create a magnetic field surrounding the wire, and that field is strong enough to affect the compass. Let's say you take another wire and put it parallel to the battery wire, but a few inches (5 cm) from it. If you connect a very sensitive voltmeter to the cord, it will occur: Every time you connect or disconnect the first cord from the battery, you will feel a very low voltage and current in the second wire; any changing magnetic field can cause an electric field in the conductor - this is the basic principle of any power generator. So: Advertising Battery creates electron flow on the first release. Moving electrons create a magnetic field around the wire. The magnetic field extends to the second wire. Electrons begin to flow on the second wire when the magnetic field of the first wire changes. One important thing to note is that the electrons flow in the second wire only when you connect or disconnect the battery. The magnetic field does not cause electrons to flow by wire unless the magnetic field changes. and when the battery is disconnected, the magnetic field changes (when the battery is connected to the cord creates a magnetic field and the field is drawn when disconnected), the electrons flow through the second wire at those two moments. To create a simple radio transmitter, what you want to do is create a fast-changing electric current on the wire. You can do this by quickly connecting and disconnecting the battery, for example: A better way is to create an ever-changing electric current in the wire. The simplest (and smoothest) form of ever-changing wave is the sine wave, as shown below: Advertising By creating a sine wave and running it through the wire, you create a simple radio transmitter. It is very easy to create a sine wave with only a few electronic components - a capacitor and inductor can create a sine wave, and a couple of transistors can amplify the wave to a powerful signal (see Annex II). By sending this signal antenna, you can transmit a sine wave into space. If you have a sine wave and transmitter that transmits a sine wave into space with an antenna, you have a radio station. The only problem is that the sine wave is not any information. You need to modulate the wave in some way to encode information about it. There are three common ways to modulate sine wave: Pulse modulation - PM, you just turn on and off the sine wave. This is an easy way to send morse code. The PM is not that common, but one good example is the radio system that sends signals to radio-controlled watches in the United States. One PM transmitter can cover the whole of the United States! Advertising Amplitude Modulation – Both AM radio stations and video part tv signal use amplitude modulation to encode information. In amplitude modulation, the amplitude of the sine wave changes (its maximum voltage). So, for example, the sine wave produced by the human voice is covered with a sine wave on the transmitter to change its amplitude. Frequency modulation - FM radio stations and hundreds of other wireless technologies (including the tv signal audio part, wireless phones, mobile phones, etc.) use frequency modulation. The advantage of FM is that it is mainly protected from static. The sine wave frequency of the FM transmitter changes very slightly based on the information signal. When you modulate the sine wave with information, you can pass on the information! Here's an example of the real world. When you adjust your car's AM radio to the station , such as a 680 AM wheel, the transmitter's sine wave transmits 680,000 hertz (the sine wave repeats 680,000 times per second). Dj's voice is modulated on that carrier wave, changing the amplitude of the transmitter's sine wave. The amplifier amplifies the signal to something like 50,000 watts for a large AM station. Then the antenna sends radio waves into space. Thus, as a your car's AM radio - receiver - get a 680,000-hertz signal that the transmitter sent and extracted information (DJ voice) from it? Here are the steps: Advertising Unless you're sitting right next to the transmitter, your radio needs an antenna to help him pick the transmitter's radio from the air. The AM antenna is simply a wire or metal stick that increases the amount of metal with which transmitter waves can interact. The radio requires a receiver. The antenna will receive thousands of sine waves. The receiver's job is to separate one sine wave from the thousands of radio signals received by the antenna. In this case, the receiver is adjusted to receive a 680,000 coat signal. Receivers operate using a principle called resonance. This means that the receivers resonate and amplify one specific frequency and ignore all other frequencies in the air. It is easy to create a resonator with a condenser and inductee (check how the oscillators work to see how inducers and capacitors work together to create a receiver). The receiver causes the radio to get only one sine wave frequency (in this case, 680,000 hertz). Now radio has to extract the DJ's voice from that sine wave. This is done with a radio part called a detector or demodulator. In the case of AM radio, the detector is made of an electronic component called a diode. The diode allows the current to flow in one direction, but not to the other, so it is cut off from one side of the wave like this: The next radio amplifies the clipped signal and sends it to the speakers (or headphones). The amplifier is made of one or more transistors (more transistors means more amplification and therefore more power for speakers). What you hear coming out of the speakers is the DJ's voice! On FM radio, the detector is different, but everything else is the same. The FM detector converts frequency changes into sound, but the antenna, receiver and amplifier are essentially the same. In the case of a strong AM signal, it turns out that you can create a simple radio receiver with only two parts and some wires! The process is very simple – here's what you need: a diode – You can get a diode for about $1 radio shack. Part number 276-1123 will do. Two pieces of wire - you will need about 20-30 feet (15 to 20 meters) of wire. Radio Shack part number 278-1224 is great, but any wire will do. A small metal tussle that you can drive to the ground (or if the transmitter has a safety railing or a metal fence, you can use it)crystal headphones - Unfortunately, Radio Shack does not sell it. However, Radio Shack doesn't sell the Crystal Radio Kit (part number 28-178), which has headphones, diode, wire and receiver (meaning you don't have to stand next to the transmitter for it to work), all for $10. Now you need to find and be near the AM radio station transmission tower (per mile / 1.6 km or so) to make it work. Here's what you do: Advertising stake to the ground or find a comfortable metal fence post. Strip insulation from the end of a 10-foot (3 meter) piece of wire and wrap it around the stakes/five or 10 times to get a good strong connection. It's ground wire. Attach the diode to the other end of the ground wire. Take another piece of wire with a thickness of 10 to 20 feet (from 3 to 6 meters), and connect one end of it to the other end of the diode. This cable is your antenna. Place it on the ground or hang it in a tree, but make sure that the bald end does not touch the ground. Connect two wires from the earpick to any end of the diode, for example: Now, if you put the ear plug in your ear, you will hear the radio station - this is the simplest possible radio receiver! This ultra-simple project won't work if you're very far from the station, but it shows how easy a radio can be. That's how it works. Your wire antenna receives all kinds of radio signals, but since you're so close to a particular transmitter, it really doesn't matter. The nearby signal is overwhelmed by everything else in the millions. Because you are so close to the transmitter, the antenna also gets a lot of energy - enough to drive headphones! Therefore, you do not need a receiver, batteries or anything else. The diode acts as an AM signal detector as described in the previous section. So you can hear the station, despite the lack of receiver and amplifier! The Crystal Radio Kit that Radio Shack sells (28-178) has two additional parts: inductor and capacitor. These two parts create a receiver that gives the radio an additional range. For more information, see How oscillators work. You've probably noticed that almost every radio you see (like your cell phone, your car radio, etc.) has an antenna. Antennas come in different shapes and sizes depending on how often the antenna tries to get. The antenna can be anything from a long, rigid wire (like am/fm radio antennas in many cars) to something strange like a satellite antenna. Radio transmitters also use very high antenna towers to transmit their signals. The idea of a radio transmitter antenna is to launch radio waves into space. The idea of the receiver is to pick up as much transmitter power as possible and supply it to the receiver. Nasa uses huge antennae of vessels up to 200 feet (60 meters) in diameter for satellites a million miles away! The size of the optimal radio antenna is related to the frequency of the signal that the antenna is trying to transmit or receive. The reason for this ratio is that there is a speed of light, so the distance electrons can travel. The speed of light is 186,000 miles per second (300,000 kilometers per second). On the next page we will use this number to calculate the size of a real-life antenna. Let's say you're trying to build a radio tower for a radio station at 680 AM. It transmits a sine wave with a frequency of 680 000 In one sine wave cycle, the transmitter intends to move the electron antenna in one direction, toggle and pull them back, toggle and push them and switch and move them back. In other words, electrons will change direction four times in one sine wave cycle. If the transmitter operates at 680,000, this means that each cycle is completed (1/680,000) by 0.0000147 seconds. A quarter of that is 0.000003675 seconds. At the speed of light, electrons can travel 0.0684 miles (0.11 km) in 0.000003675 seconds. This means that the optimal antenna size transmitter of 680,000 hertz is about 361 feet (110 meters). So AM radio stations need very tall towers. For mobile phone work 900,000,000 (900 MHz), on the other hand, the optimal antenna size is about 8.3 cm or 3 inches. That's why cell phones can have such short antennae. You may have noticed that the AM radio antenna in your car is not 300 feet long - it's only a couple of feet long. If you made the antenna longer it would get better, but AM stations are so strong in cities that it doesn't really matter if your antenna is the optimal length. You may wonder why, when a radio transmitter transmits something, radio waves want to spread through space at the speed of the antenna light. Why can radio waves go millions of miles? Why does the antenna simply not have a magnetic field around it, close to the antenna, as you can see with the wire, attach to the battery? One simple way to think about it is this: When the current enters the antenna, it creates a magnetic field around the antenna. We have also seen that the magnetic field will create an electric field (voltage and current) in another wire, which is close to the transmitter. It turns out that the magnetic field created by the antenna in space causes an electric field in space. This electric field in turn induces another magnetic field in space, which causes another electric field, which causes another magnetic field, and so on. These electrical and magnetic fields (electromagnetic fields) will induce each other in space at the speed of light, traveling outwards from the antenna. For more information about radio and related topics, see the links on the next page. Page.