DOWNLOAD PDF HISTORY OF AMPLITUDE MODULATION

Chapter 1 : Amplitude modulation - Wikipedia

A method to deal with this problem is to use a technique called Amplitude Modulation or AM. The technique imposes a second signal on the already existing carrier wave that transmits the information. The amplitude of the second signal varies (increases or decreases) correspondingly to the amplitude of the first wave.

Events Amplitude Modulation, AM Amplitude modulation, AM is being used less in its basic format, but it provides the basis of many other more advanced types of modulation for which its operation is key. Although one of the earliest used forms of modulation it is still used today, mainly for long, medium and short wave broadcasting and for some aeronautical point to point communications. Amplitude modulation history The first amplitude modulated signal was transmitted in by a Canadian engineer named Reginald Fessenden. He took a continuous spark transmission and placed a carbon microphone in the antenna lead. The sound waves impacting on the microphone varied its resistance and in turn this varied the intensity of the transmission. Although very crude, signals were audible over a distance of a few hundred metres, although there was a rasping sound caused by the spark. With the introduction of continuous sine wave signals, transmissions improved significantly, and AM soon became the standard for voice transmissions. Nowadays, amplitude modulation, AM is used for audio broadcasting on the long medium and short wave bands, and for two way radio communication at VHF for aircraft. However as there now are more efficient and convenient methods of modulating a signal, its use is declining, although it will still be very many years before it is no longer used. What is amplitude modulation? In order that a radio signal can carry audio or other information for broadcasting or for two way radio communication, it must be modulated or changed in some way. Although there are a number of ways in which a radio signal may be modulated, one of the easiest is to change its amplitude in line with variations of the sound. In this way the amplitude of the radio frequency signal varies in line with the instantaneous value of the intensity of the modulation. This means that the radio frequency signal has a representation of the sound wave superimposed in it. In view of the way the basic signal "carries" the sound or modulation, the radio frequency signal is often termed the "carrier". Amplitude Modulation, AM From the diagram, it can be seen that the envelope of the signal follows the contours of the modulating signal. Amplitude demodulation Amplitude modulation, AM, is one of the most straightforward ways of modulating a radio signal or carrier. It can be achieved in a number of ways, but the simplest uses a single diode rectifier circuit. Other methods of demodulating an AM signal use synchronous techniques and provide much lower levels of distortion and improved reception where selective fading is present. One of the main reasons for the popularity of amplitude modulation has been the simplicity of the demodulation. It enables costs to be kept low - a significant advantage in producing vast quantities of very low cost AM radios. Advantages of Amplitude Modulation, AM There are several advantages of amplitude modulation, and some of these reasons have meant that it is still in widespread use today: It is simple to implement it can be demodulated using a circuit consisting of very few components AM receivers are very cheap as no specialised components are needed. Disadvantages of amplitude modulation Amplitude modulation is a very basic form of modulation, and although its simplicity is one of its major advantages, other more sophisticated systems provide a number of advantages. Accordingly it is worth looking at some of the disadvantages of amplitude modulation. It is not efficient in terms of its power usage It is not efficient in terms of its use of bandwidth, requiring a bandwidth equal to twice that of the highest audio frequency It is prone to high levels of noise because most noise is amplitude based and obviously AM detectors are sensitive to it. Derivatives of Amplitude Modulation Although the use of amplitude modulation is decreasing, it nevertheless forms the basis of other forms of modulation that are still being widely used, or their use is increasing. Single sideband is widely used for HF communications. It is formed by taking a signal that has the carrier and one sideband removed. In this way it becomes far more efficient in terms of both spectrum and power. Quadrature amplitude modulation, QAM: Quadrature Amplitude Modulation is widely used for carrying many digital signals, everything from Wi-Fi to Mobile phone communications and very much more. Quadrature amplitude modulation, QAM AM overview AM has advantages of simplicity, but it is not the most efficient mode to use, both in terms of the amount of space or spectrum it takes up, and the way in which it uses the power that is transmitted. This is the reason why it is not widely used these days both for broadcasting and for two way radio communication. Even the long, medium and short wave broadcasts will ultimately change because of the fact that amplitude modulation, AM, is subject to much higher levels of noise than are other modes. For the moment, its simplicity, and its widespread usage, mean that it will be difficult to change quickly, and it will be in use for many years to come. Next page More Essential Radio Topics:

Chapter 2 : Amplitude Modulation AM | Index Depth | Electronics Notes

Amplitude modulation history The first amplitude modulated signal was transmitted in by a Canadian engineer named Reginald Fessenden. He took a continuous spark transmission and placed a carbon microphone in the antenna lead.

In amplitude modulation AM , auditory or visual information is impressed on a carrier wave by varying the amplitude of the carrier to match the fluctuations in the audio or video signal being transmitted. AM is the oldest method of broadcasting radio programs. Commercial AM stations operate at frequencies spaced 10 kHz apart between and 1, kHz. In addition to its use in commercial radiobroadcasting, AM is employed in long-distance shortwave radio broadcasts and in transmitting the video portion of television programs. In frequency modulation FM , unlike AM, the amplitude of the carrier is kept constant, but its frequency is altered in accordance with variations in the audio signal being sent. This form of modulation was developed by the American electrical engineer Edwin H. Armstrong during the early s in an effort to overcome interference and noise that affect AM radio reception. FM is less susceptible than is AM to certain kinds of interference, such as that caused by thunderstorms as well as random electrical currents from machinery and other related sources. These noise-producing signals affect the amplitude of a radio wave but not its frequency, and so an FM signal remains virtually unchanged. FM is better adapted than is AM to the transmission of stereophonic sound, audio signals for television programs, and long-distance telephone calls by microwave radio relay. Commercial FM broadcasting stations are assigned higher frequencies than are AM stations. The assigned frequencies, spaced kHz apart, range from 88 to MHz. The phase of a carrier wave is varied in response to the vibrations of the sound source in phase modulation PM. This form of modulation is often considered a variation of FM. The two processes are closely related because phase cannot be changed without also varying frequency, and vice versa. Also, the rate at which the phase of a carrier changes is directly proportional to the frequency of the audio signal. The two techniques are commonly used together. FM cannot be applied during the amplification of a sound signal in broadcasting, and so PM is used instead. PM is also utilized in some microwave radio relays and in certain kinds of telegraphic and data-processing systems. Other important applications of PM include communications between mobile radio units employed by the police and military. In pulse-coded modulation PCM , the intelligence signal converts the carrier into a series of constant-amplitude pulses spaced in such a manner that the desired intelligence is contained in coded form. PCM minimizes transmission losses and eliminates noise and interference problems because the receiving unit need only detect and identify simple pulse patterns. Moreover, the pulses, unlike continuous signals, can be regenerated electronically by repeater stations along the transmission route with virtually no distortion. PCM, invented by H. Reeves of the United States in , is employed by many communications companies and organizations, including Comsat and Intelsat, for telegraph , telephone, and television transmission. The technique has proved especially useful for the exchange of digital information between computer terminals. Another kind of pulse modulation is pulse-duration modulation PDM , in which intelligence is represented by the length and order of regularly recurring pulses. A familiar example of PDM is the International Morse Code , used in ship-to-shore communications, amateur radio , and certain other forms of radiotelegraphy. Besides its use in telegraphic communications by means of microwave radio relay systems, its chief application is telemetering. Learn More in these related Britannica articles:

Chapter 3 : The History of Amplitude Modulation

Amplitude modulation (AM) is a modulation technique used in electronic communication, most commonly for transmitting information via a radio carrier calendrierdelascience.com amplitude modulation, the amplitude (signal strength) of the carrier wave is varied in proportion to that of the message signal being transmitted.

For example, with an alphabet consisting of 16 alternative symbols, each symbol represents 4 bits. Thus, the data rate is four times the baud rate. In the case of PSK, ASK or QAM, where the carrier frequency of the modulated signal is constant, the modulation alphabet is often conveniently represented on a constellation diagram , showing the amplitude of the I signal at the x-axis, and the amplitude of the Q signal at the y-axis, for each symbol. The resulting so called equivalent lowpass signal or equivalent baseband signal is a complex-valued representation of the real-valued modulated physical signal the so-called passband signal or RF signal. These are the general steps used by the modulator to transmit data: Group the incoming data bits into codewords, one for each symbol that will be transmitted. Map the codewords to attributes, for example, amplitudes of the I and Q signals the equivalent low pass signal , or frequency or phase values. Adapt pulse shaping or some other filtering to limit the bandwidth and form the spectrum of the equivalent low pass signal, typically using digital signal processing. Perform digital to analog conversion DAC of the I and Q signals since today all of the above is normally achieved using digital signal processing , DSP. Generate a high-frequency sine carrier waveform, and perhaps also a cosine quadrature component. Carry out the modulation, for example by multiplying the sine and cosine waveform with the I and Q signals, resulting in the equivalent low pass signal being frequency shifted to the modulated passband signal or RF signal. Sometimes this is achieved using DSP technology, for example direct digital synthesis using a waveform table , instead of analog signal processing. In that case, the above DAC step should be done after this step. Amplification and analog bandpass filtering to avoid harmonic distortion and periodic spectrum. At the receiver side, the demodulator typically performs: Automatic gain control , AGC to compensate for attenuation , for example fading. Frequency shifting of the RF signal to the equivalent baseband I and Q signals, or to an intermediate frequency IF signal, by multiplying the RF signal with a local oscillator sine wave and cosine wave frequency see the superheterodyne receiver principle. Sampling and analog-to-digital conversion ADC sometimes before or instead of the above point, for example by means of undersampling. Equalization filtering, for example, a matched filter , compensation for multipath propagation, time spreading, phase distortion and frequency selective fading, to avoid intersymbol interference and symbol distortion. Detection of the amplitudes of the I and Q signals, or the frequency or phase of the IF signal. Quantization of the amplitudes, frequencies or phases to the nearest allowed symbol values. Mapping of the quantized amplitudes, frequencies or phases to codewords bit groups. Parallel-to-serial conversion of the codewords into a bit stream. Pass the resultant bit stream on for further processing such as removal of any error-correcting codes. As is common to all digital communication systems, the design of both the modulator and demodulator must be done simultaneously. Digital modulation schemes are possible because the transmitter-receiver pair has prior knowledge of how data is encoded and represented in the communications system. In all digital communication systems, both the modulator at the transmitter and the demodulator at the receiver are structured so that they perform inverse operations. Non-coherent modulation methods do not require a receiver reference clock signal that is phase synchronized with the sender carrier signal. In this case, modulation symbols rather than bits, characters, or data packets are asynchronously transferred. The opposite is coherent modulation. List of common digital modulation techniques[edit] The most common digital modulation techniques are:

Chapter 4 : Modulation - Wikipedia

In amplitude modulation (AM), auditory or visual information is impressed on a carrier wave by varying the amplitude of the carrier to match the fluctuations in the audio or video signal being transmitted.

Single sideband suppressed carrier In order that a steady radio signal or "radio carrier" can carry information it must be changed or modulated in one way so that the information can be conveyed from one place to another. There are a number of ways in which a carrier can be modulated to carry a signal - often an audio signal and the most obvious way is to vary its amplitude. Amplitude Modulation has been in use since the very earliest days of radio technology. The first recorded instance of its use was in when a signal was transmitted by a Canadian engineer named Reginald Fessenden. To achieve this, he used a continuous spark transmission and placed a carbon microphone in the antenna lead. The sound waves impacting on the microphone varied its resistance and in turn this varied the intensity of the transmission. Although very crude, signals were audible over a distance of a few hundred metres. The quality of the audio was not good particularly as a result of the continuous rasping sound caused by the spark used for the transmission. Later, continuous sine wave signals could be generated and the audio quality was greatly improved. As a result, amplitude modulation, AM became the standard for voice transmissions. Amplitude modulation applications Amplitude modulation is used in a variety of applications. Even though it is not as widely used as it was in previous years in its basic format it can nevertheless still be found. AM is still widely used for broadcasting on the long, medium and short wave bands. It is simple to demodulate and this means that radio receivers capable of demodulating amplitude modulation are cheap and simple to manufacture. Nevertheless many people are moving to high quality forms of transmission like frequency modulation, FM or digital transmissions. VHF transmissions for many airborne applications still use AM. It is used for ground to air radio communications as well as two way radio links for ground staff as well. Amplitude modulation in the form of single sideband is still used for HF radio links. Using a lower bandwidth and providing more effective use of the transmitted power this form of modulation is still used for many point to point HF links. AM is widely used for the transmission of data in everything from short range wireless links such as Wi-Fi to cellular telecommunications and much more. These form some of the main uses of amplitude modulation. However in its basic form, this form of modulation is being sued less as a result of its inefficient use of both spectrum and power. Amplitude modulation basics When an amplitude modulated signal is created, the amplitude of the signal is varied in line with the variations in intensity of the sound wave. In this way the overall amplitude or envelope of the carrier is modulated to carry the audio signal. Here the envelope of the carrier can be seen to change in line with the modulating signal. Amplitude Modulation Amplitude modulation, AM is the most straightforward way of modulating a signal. Demodulation, or the process where the radio frequency signal is converted into an audio frequency signal is also very simple. An amplitude modulation signal only requires a simple diode detector circuit. The circuit that is commonly used has a diode that rectifies the signal, only allowing the one half of the alternating radio frequency waveform through. A capacitor is used to remove the radio frequency parts of the signal, leaving the audio waveform. This can be fed into an amplifier after which it can be used to drive a loudspeaker. As the circuit used for demodulating AM is very cheap, it enables the cost of radio receivers for AM to be kept low. These mean that it is used in particular circumstances where its advantages can be used to good effect.. Advantages It is simple to implement It can be demodulated using a circuit consisting of very few components AM receivers are very cheap as no specialised components are needed. An amplitude modulation signal is not efficient in terms of its power usage It is not efficient in terms of its use of bandwidth, requiring a bandwidth equal to twice that of the highest audio frequency An amplitude modulation signal is prone to high levels of noise because most noise is amplitude based and obviously AM detectors are sensitive to it. In view of its characteristics advantages and disadvantages, amplitude modulation is being used less frequently. However it is still in widespread use for broadcasting on the long, medium and short wave bands as well as for a number of mobile or portable communications systems including some aircraft communications. Modulating and demodulating AM signals Two key elements of any AM system are the circuits where the signal is modulated and demodulated. Modulating an AM signal can be achieved in a number of ways. Essentially the simplest is to pass the RF carrier and the modulating signal into a mixer. The resulting output will be the required amplitude modulated signal. Demodulation of AM can similarly be undertaken in a number of ways. The simplest is the simple diode detector. Note on AM Demodulation: In order to be able to extract any information being carried by an AM signal, it is necessary to pass it through a demodulator. The output from this stage provides the information that was carried by the AM signal. There are many methods of achieving this, using circuits that employ a variety of different techniques. Read more about AM demodulation Amplitude modulation related signals Amplitude modulation forms the basis of a number of forms of signal apart from the basic mode. These signal formats are typically generated by removing or suppressing the carrier, and then utilising the sidebands. These formats are defined in greater detail in further pages of this tutorial.

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Chapter 5 : Amplitude Modulation by Marchael Heramis on Prezi

Amplitude Modulation (AM) and Frequency Modulation (FM) Remember that the amplitude of a wave is its displacement from the normal, and frequency is how often the wave occurs. See properties of waves.

It turned out to be a classic case of amplitude modulation. As shown in Figure 1 the original data looks a fairly standard run up time series. Figure 2 shows an associated tachometer signal and Figure 3 shows the speed curve calculated from the tachometer signal. Original time history Figure 2: Tachometer signal Figure 3: Speed v time curve Waterfall analysis of the data, as shown in Figure 4, shows a number of interesting frequency components. Speed v frequency waterfall This shows a sharp central frequency with wider outer peaks. Part 1 Figure 5 focuses on one particular frequency component in detail. The central, resonant frequency can be seen, with the side bands, and their harmonics, moving away from the central frequency on both the left and right-hand sides of the spectrum. Zoomed section of speed v frequency waterfall Sidebands are usually caused by amplitude modulation of a central carrier frequency. In this case it is important to note that the carrier frequency is fixed whilst the sideband locations are changing with speed. If we examine the frequency difference between the fixed frequency and the sidebands then we find that the difference is always a factor of eight of the rotational speed. For example, at RPM Secondary sidebands are also visible at 16x rotational speed. At rpm Figure 7: At rpm The observations show that a number of fixed frequency components are present in the vibration. These could well be due to resonances within the pump body or housing. The variable frequency components are no doubt caused by modulation which affects the signal on a cyclic basis. We know that the particular pump under test has 8 impeller blades, which matches the modulation frequency of 8 times the rotational speed. As the impeller rotates around at speed, it can decelerate and then accelerates slightly around the revolution causing the modulation. The root cause may well be a blade fault on the impeller. The modulation can be shown more clearly by band pass filtering the original pump vibration data. The result is a modulated sine wave. Section of original time history Figure 8 shows a section of the original time signal. Section of original time history after filtering In Figure 9 it is hard to make any clear deductions, indeed there appears to be general a noise issue, however once band pass filtered, as shown in Figure 8, the amplitude modulation effect can clearly be seen. This wave shape shows that the initial assumptions were indeed proven correct. The presence of side bands around a central frequency is a well known phenomena and is discussed further in the following articles, written by Don Davies ,.

Chapter 6 : What is Amplitude Modulation | AM Tutorial | calendrierdelascience.com

Amplitude Modulation. In Amplitude Modulation or AM, the carrier signal has its amplitude. modulated in proportion to the message bearing (lower frequency) signal. to give The magnitude of.

History[edit] One of the crude pre-vacuum tube AM transmitters, a Telefunken arc transmitter from The carrier wave is generated by 6 electric arcs in the vertical tubes, connected to a tuned circuit. Modulation is done by the large carbon microphone cone shape in the antenna lead. One of the first vacuum tube AM radio transmitters, built by Meissner in with an early triode tube by Robert von Lieben. He used it in a historic 36 km 24 mi voice transmission from Berlin to Nauen, Germany. Compare its small size with above transmitter. Although AM was used in a few crude experiments in multiplex telegraph and telephone transmission in the late s, [2] the practical development of amplitude modulation is synonymous with the development between and of " radiotelephone " transmission, that is, the effort to send sound audio by radio waves. The first radio transmitters, called spark gap transmitters , transmitted information by wireless telegraphy , using different length pulses of carrier wave to spell out text messages in Morse code. In effect they were already amplitude modulated. His first transmitted words were, "Hello. One, two, three, four. Is it snowing where you are, Mr. The words were barely intelligible above the background buzz of the spark. Fessenden was a significant figure in the development of AM radio. He was one of the first researchers to realize, from experiments like the above, that the existing technology for producing radio waves, the spark transmitter, was not usable for amplitude modulation, and that a new kind of transmitter, one that produced sinusoidal continuous waves , was needed. This was a radical idea at the time, because experts believed the impulsive spark was necessary to produce radio frequency waves, and Fessenden was ridiculed. He invented and helped develop one of the first continuous wave transmitters - the Alexanderson alternator , with which he made what is considered the first AM public entertainment broadcast on Christmas Eve, He also discovered the principle on which AM is based, heterodyning , and invented one of the first detectors able to rectify and receive AM, the electrolytic detector or "liquid baretter", in Other radio detectors invented for wireless telegraphy, such as the Fleming valve and the crystal detector also proved able to rectify AM signals, so the technological hurdle was generating AM waves; receiving them was not a problem. The first practical continuous wave AM transmitters were based on either the huge, expensive Alexanderson alternator , developed , or versions of the Poulsen arc transmitter arc converter , invented in The modifications necessary to transmit AM were clumsy and resulted in very low quality audio. Modulation was usually accomplished by a carbon microphone inserted directly in the antenna or ground wire; its varying resistance varied the current to the antenna. The limited power handling ability of the microphone severely limited the power of the first radiotelephones; many of the microphones were water-cooled. Vacuum tubes[edit] The discovery in of the amplifying ability of the Audion vacuum tube , invented in by Lee De Forest , solved these problems. The vacuum tube feedback oscillator , invented in by Edwin Armstrong and Alexander Meissner , was a cheap source of continuous waves and could be easily modulated to make an AM transmitter. Wartime research greatly advanced the art of AM modulation, and after the war the availability of cheap tubes sparked a great increase in the number of radio stations experimenting with AM transmission of news or music. The vacuum tube was responsible for the rise of AM radio broadcasting around , the first electronic mass entertainment medium. Amplitude modulation was virtually the only type used for radio broadcasting until FM broadcasting began after World War 2. After WW2 it was developed by the military for aircraft communication. Simplified analysis of standard AM[edit] Illustration of amplitude modulation Consider a carrier wave sine wave of frequency fc and amplitude A given by:

Chapter 7 : Amplitude Modulation - National Instruments

Amplitude modulation, AM is the most straightforward way of modulating a signal. Demodulation, or the process where the radio frequency signal is converted into an audio frequency signal is also very simple.

These inventions used wires to transmit noise from sender to receivers. The telegraph and telephone use vast networks of wires to send information. Yes No I need help Towards the end of the 19th century, much research was being done on the sending and receiving of signals without wires. The inventor of the radio is rooted in historical debate. Nikola Tesla unveiled the first wireless radio in , however, credit for the invention is generally given to Guglielmo Marconi who obtained the patent in Prior to WWI, these early radios were used nautically on ships and vessels for communication. The introduction of radio stations commercialized the radio and it soon became a fixture in most homes. Radio and the technologies it relies on was further developed so that information such as sound radio and pictures television could be broadcast and received. They are sent from transmitters and can travel in one of 3 ways, depending on their wavelength. A barrier in the transmission of radio waves is diffraction. This is the apparent bending of waves around obstacles. This diffraction is influenced by the wavelength of the radio waves. A radio wave with a large wavelength is able to diffract around obstacles, whereas the smaller wavelengths will not. Look at the example below of the houses in the hills. It is not able to receive short wavelength broadcasts, but can pick up the long ones. Amplitude Modulation AM and Frequency Modulation FM Remember that the amplitude of a wave is its displacement from the normal, and frequency is how often the wave occurs. See properties of waves. AM and FM are two ways that signals are represented in radio waves and you will recognize these terms being used if you listen to the radio. Here is a quick comparison of the two: AM FM Noise affects the amplitude of a wave more readily so the signal can be of lower quality. Have a longer distance range. Has a shorter range. Referencing this Article If you need to reference this article in your work, you can copy-paste the following depending on your required format: If you have problems with any of the steps in this article, please ask a question for more help, or post in the comments section below.

Chapter 8 : Amplitude Modulation

In electronics and telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal that typically contains information to be transmitted.

Amplitude Modulation Modulation is the process of varying a higher frequency carrier wave to transmit information. Though it is theoretically possible to transmit baseband signals or information without modulating it, it is far more efficient to send data by modulating it onto a higher frequency "carrier wave. If we were to transmit audio signals directly we would need an antenna that is around 10, km! Modulation techniques can be broadly divided into analog modulation and digital modulation. Amplitude modulation AM is one form of analog modulation. Mathematical Background The carrier signal is generally a high-frequency sine wave. There are three parameters of a sine wave that can be varied: Any of these can be modulated, or varied, to transmit information. Carrier Wave The carrier signal is modulated by varying its amplitude in proportion to the message, or baseband, signal. The modulated signal can be represented by multiplying the carrier signal and the summation of 1 and the message signal, as shown below. With some basic trigonometric manipulation, the above waveform can be written as Back to Top 3. Types of AM Modulation As described in the previous section, the modulated signal has waves at three frequencies: Transmitting at all three frequencies wastes power and bandwidth. To avoid that problem use a filter to remove one of the sidebands usually the lower sideband, fc â€” fb. Use a highpass filter to remove the lower sideband signal; this process is single sideband SSB modulation. However, by removing one of the sidebands we lose some of the original power of the modulated signal. To maximize the power transmitted, transmit both the lower and the upper sideband. This process is double sideband DSB modulation. The following figure illustrates DSB. Because the carrier wave does not have any information, we can remove the carrier wave component from the signal before we transmit it. However, we need the carrier when demodulating the signal. We can also use amplitude modulation to send digital data. Quadrature amplitude modulation QAM uses four predetermined amplitude levels to determine digital bits. Back to Top 4. Reality Check Although understanding AM is helpful to understand modulation, it is not the most efficient or useful way to modulate a signal. Simple AM is slow and requires too much power. Because most communication today is digital, far more complex methods are used. Generally, phase shift keying PSK â€”a type of phase modulationâ€”is used to transmit digital data.

Chapter 9 : Amplitude modulation - Simple English Wikipedia, the free encyclopedia

Amplitude modulation implies the modulation of a coherent carrier wave by mixing it in a nonlinear device with the modulating signal to produce discrete upper and lower sidebands, which are the sum and difference frequencies of the carrier and signal Amplitude modulation is achieved by a circuit in the transmitter that varies the power supply.

But what about AM or amplitude modulation radio? What do we mean by the term and what is the history of amplitude modulation as a broadcasting technique? A method to deal with this problem is to use a technique called Amplitude Modulation or AM. The technique imposes a second signal on the already existing carrier wave that transmits the information. The amplitude of the second signal varies increases or decreases correspondingly to the amplitude of the first wave. These variations in amplitude or strength are used by the receiver in order to reproduce audio and visual information different sounds and images. The range of frequencies available for AM transmission is from to kilohertz. There is also the Frequency Modulation or FM technique, in which the frequency - and not the amplitude - of the second signal is regulated according to the carrier wave. For a better understanding check the comparison image. The technology was based on the already existing inventions of the telegraph and the telephone. According to some researchers, the amplitude modulation technique originated from the experimental and theoretical work of Leblanc, back in , Mayer and Rayleigh For example, the first successful attempt to transmit audio signals over telephone lines took place in the mids and this has been acknowledged as one of the first transmissions taking place with the help of some form of amplitude modulation. The inventors and engineers of the early 20th century were not aware of this work. They rediscovered the same principles and developed them into new and innovative devices. A number of inventions are attributed to Lee de Forest, including the triode amplifier, the space telegraphy and the Audion, another type of vacuum tube. The use of the term "radio" is also attributed to him. His work had to do with the amplification of very weak signals that needed to be picked up by the antenna before application to the receiver detector. This work is thought to have significantly contributed to the development of the amplitude modulation technique. The first transmission however, took place in from a garage in Brant Rock, Massachusetts. His message was heard by radio-equipped ships within a range of several hundred miles away from the transmission point The use of AM broadcasting became more extensive in the years before World War I. After World War I, the number of radio experimentalists increased dramatically and so did the use of AM radio. The station is now called CINW. Correspondingly, the first commercial broadcasting in the US took place in Pennsylvania by Frank Conrad, who was also responsible for the founding of the first licensed broadcast station in the world, KDKA. The well-known frequency-modulated or FM radio managed to dominate the world of music and public broadcasting, especially during the late s. The reason was that the new improved signal was less susceptible to noise, static, and electrical or atmospheric interference. For example, electrical motors, domestic appliances, light bulbs, lightning, and even tall buildings and metal structures could easily disrupt an AM signal, whereas an FM signal would stay intact. Despite this fact, AM remains widely used even in the 21st century, especially in areas where FM frequencies are in short supply or in thinly populated or mountainous areas where the coverage is too poor. In the late s, radio stations such as the WABC transmitted rock and roll music on this band with huge success. Although it is not very popular for music broadcasting nowadays, it is a good option for talk radio, news, sports, etc. Still you can find certain music such as country and ethnic music transmitted on the AM band.