DOWNLOAD PDF ON THE THEORY OF MODULATION.

Chapter 1 : Learn About Modulation | Deciphering Music calendrierdelascience.com

Amplitude Modulation is the changing the amplitude of the carrier signal with respect to the instantaneous change in message signal. The amplitude modulated wave form, its envelope and its frequency spectrum and bandwidth.

Hybrid Pedagogy Publishing Modulation Tonicization occurs when a chord or short succession of chords are borrowed from another key in order to emphasizeâ€”or tonicizeâ€”a chord in the home key. See analyzing applied chords. Modulation occurs when a longer succession of chords emphasizes a new tonic, leading to the perception of a new key. The principal difference between tonicization and modulation is the presence or absence of a cadence: There are several ways in which a composer can effect a modulation. The most common are described below. In other words, there is no smooth transition or overlap between keys, just a direct movement from one key to the next. This often happens at phrase boundaries, with the old-key tonic ending one phrase and the new-key tonic beginning the next. When a direct modulation happens across a phrase boundary, it is also called a phrase modulation. Examples of phrase modulations abound at the point between the end of the exposition in a minuet or a sonata and the beginning of the repeat of the exposition if an exposition repeat is present. A direct modulation is noted in a harmonic analysis by following the last chord in the old key with the new key, followed by a colon, and then the first chord in the new key. T1 S4 D5 T1 Am: A step-up modulation is notated like a direct modulation. Truck-driver modulation A truck-driver modulation is a direct modulation that moves from the old key usually the tonic chord to the dominant chord of the new key to prepare that tonic arrival, again common in pop music. A truck-driver modulation is notated like a direct modulation. Pivot-chord modulation A pivot-chord modulation makes use of at least one chord that is native to both the old key and the new key. It is the most common type of modulation in common-practice tonal music. The smoothest type of pivot-chord modulation uses a pivot-chord that expresses the same function in both keys â€" commonly subdominant function, but other functional arrangements are possible and commonly used. When a chord expresses dominant function in the new key and is an applied chord in the old key, it is not a pivot chord. Instead, that chord is effecting a direct or truck-driver modulation. A pivot-chord modulation is notated in a special way. The pivot chord receives its analytical symbol for the old key, as usual. Below that symbol is the new key, colon, and the analytical symbol for the pivot chord in the new key. When using notation software, a two-layered analysis is fine: When analyzing by hand, use a bracket like the one shown in the following example.

Chapter 2 : Modulation â€“ Open Music Theory

Pivot-chord modulation. A pivot-chord modulation makes use of at least one chord that is native to both the old key and the new key. It is the most common type of modulation in common-practice tonal music.

Modulation When a piece of music moves from one key to another the process is called modulation. There are, however, modulations which last only briefly, where the new key may only be suggested, and those modulations where a new key is established for longer periods, usually by a cadence in the new key. Several techniques are commonly used by composers to effect both types of modulation. The first is through the use of a Pivot chord, or Pivot chords, which are chords common to both keys: If we look at the harmonised keys of C major and G major we see that there are four chords which are common to both: C major, E minor, G major and A minor. Because these two keys are closely related, G is the dominant of C, they have more chords in common than two unrelated keys other chords can also become available through the use of mixture. By using a pivot chord, or chords, we may play a pivot chord in one key and continue our progression in a new key. In the following example the C major chord is heard as the tonic in C major through a I â€" V â€" I progression in that key. The C major chord is then left as chord IV in G major where it progresses towards a perfect cadence ii â€" V â€" I suggesting G as the new key centre. This is because the first three chords in the key of G major also belong to C major: C major, G major and A minor; the use of the C to G progression, which has just been played in the key of C, also means the move to G is not fully felt. Even with a perfect cadence a new key may not become fully established until further activity confirms this key. Consider the following In this example the ii â€" V â€" I cadential progression from above is treated as a secondary ii â€" V progression which embellishes chord V in C major. The secondary nature of the progression can be confirmed by the immediate reintroduction of the F natural and a perfect cadence in C major. In the following example G major has been further established by the melodic line and another cadential progression in G. However, because of the many common chords in this progression, further G major activity is probably needed to fully establish the new key centre. As you can see and hear in these examples, the move to a new key may not be felt even after a cadence in the new key has been played. Often a change of key may only be suggested by a temporary introduction of an accidental, such as the F sharp in the above examples, or, the composer may simply be using secondary chords for added colour. Another common means of effecting modulation is through the use of a common note, or notes. In the following example the note C is found in both the C major chord and the A flat major chord. Whereas in the following example the held E whole note effects the modulation between C major and C sharp minor; the semitone relationship between the two tonic chords of these keys means the modulation is a little more abrupt. Sometimes two common notes are used to effect a modulation Here the notes A and C are held from chord ii in G major to become part of chord V of B flat major. Using fifth relations between chords, based on the circle of fifths, is another common means of modulating. In the following example the cycle of fifths begins in the key of E minor, starting with the subdominant seventh chord. As the cycle continues, chord VI in E minor is chromatically inflected becoming a C sharp dominant seventh chord, instead of the expected submediant chord in E minor C major ; this inflected dominant moves the music into the key of F sharp minor. This technique can also be used with other chords from the cycle of fifths: In the following example the G mediant seventh chord in E minor is changed to a G dominant seventh chord which moves the music into the key of C major.

Chapter 3 : Modulation - Wikipedia

*On the Theory of Modulation [Seamus Riley] on calendrierdelascience.com *FREE* shipping on qualifying offers. This Supplement to the Theory of Modulation is intended both for the professional musician (for those learning harmony.*

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 : On the Theory of Modulation: Book

Pulse amplitude modulation is the basic form of pulse modulation. In this modulation, the signal is sampled at regular intervals and each sample is made proportional to the amplitude of the modulating signal.

Compared with an optimum AM scheme, FM typically has poorer SNR below a certain signal level called the noise threshold, but above a higher level â€" the full improvement or full quieting threshold â€" the SNR is much improved over AM. The improvement depends on modulation level and deviation. FM broadcasting using wider deviation can achieve even greater improvements. Additional techniques, such as pre-emphasis of higher audio frequencies with corresponding de-emphasis in the receiver, are generally used to improve overall SNR in FM circuits. Direct FM modulation can be achieved by directly feeding the message into the input of a voltage-controlled oscillator. For indirect FM modulation, the message signal is integrated to generate a phase-modulated signal. This is used to modulate a crystal-controlled oscillator , and the result is passed through a frequency multiplier to produce an FM signal. In this modulation, narrowband FM is generated leading to wideband FM later and hence the modulation is known as indirect FM modulation. Detectors Many FM detector circuits exist. A common method for recovering the information signal is through a Foster-Seeley discriminator or ratio detector. A phase-locked loop can be used as an FM demodulator. Slope detection demodulates an FM signal by using a tuned circuit which has its resonant frequency slightly offset from the carrier. As the frequency rises and falls the tuned circuit provides a changing amplitude of response, converting FM to AM. AM receivers may detect some FM transmissions by this means, although it does not provide an efficient means of detection for FM broadcasts. Applications[edit] Magnetic tape storage[edit] FM is also used at intermediate frequencies by analog VCR systems including VHS to record the luminance black and white portions of the video signal. Commonly, the chrominance component is recorded as a conventional AM signal, using the higher-frequency FM signal as bias. FM also keeps the tape at saturation level, acting as a form of noise reduction ; a limiter can mask variations in playback output, and the FM capture effect removes print-through and pre-echo. A continuous pilot-tone, if added to the signal â€" as was done on V and many Hi-band formats â€" can keep mechanical jitter under control and assist timebase correction. These FM systems are unusual, in that they have a ratio of carrier to maximum modulation frequency of less than two; contrast this with FM audio broadcasting, where the ratio is around 10, Consider, for example, a 6-MHz carrier modulated at a 3. The system must be designed so that this unwanted output is reduced to an acceptable level. This technique, known as FM synthesis , was popularized by early digital synthesizers and became a standard feature in several generations of personal computer sound cards.

Chapter 5 : Theory - Modulation

Notes on the Theory of Modulation Abstract: The transmission system of "frequency modulation" (transmission by variation of the frequency of the radiated wave) is mathematically analyzed, and the width of the band of frequencies occupied by this method of transmission at a given speed is compared with the width of the corresponding band for.

Chapter 6 : What is Modulation | Simplifying Theory

Theory Of FM Modulation written by: nostolgia â€¢ edited by: KennethSleight â€¢ updated: 8/30/ The article help you to understand the basic theory of modulation and FM calendrierdelascience.com help to understand how the FM radio stations transmit the voice signals.

Chapter 7 : FM concepts explained - What is frequency modulation?

NOTES ON THE THEORYOF MODULATION JOHN R. CARSON (DEPARTMENT OF DEVELOPMENT*

DOWNLOAD PDF ON THE THEORY OF MODULATION.

ANDRESEARCH, AMERICANTELEPHONE AND TELEGRAPH COMPANY, NEWYORK) It is a well-known fact that in carrier wave' transmission.

Chapter 8 : theory - How many types of modulation are there? - Music: Practice & Theory Stack Exchange

The basic theory and equations behind amplitude modulation are relatively straightforward and can be handled using straightforward geometric calculations and manipulation. Essentially an amplitude modulated wave consists of a radio frequency carrier - a sine wave at one frequency, typically in the.

Chapter 9 : Amplitude Modulation AM | Theory & Equations - calendrierdelascience.com

In telecommunications and signal processing, frequency modulation (FM) is the encoding of information in a carrier wave by varying the instantaneous frequency of the wave.. In analog frequency modulation, such as FM radio broadcasting of an audio signal representing voice or music, the instantaneous frequency deviation, the difference between the frequency of the carrier and its center.