

H03C

MODULATION (measuring, testing [G01R](#); masers, lasers [H01S](#); modulators specially adapted for use in the amplifiers [H03F 3/38](#); modulating pulses [H03K 7/00](#); so-called modulators capable only of a switching between predetermined states of amplitude, frequency or phase [H03K 17/00](#), [H04L](#); coding, decoding or code conversion, in general [H03M](#); synchronous modulators specially adapted for colour television [H04N 9/65](#))

Definition statement

This place covers:

- Modulation, keying, or interruption of sinusoidal oscillations or electromagnetic waves, the modulating signal having any desired waveform.
- Amplitude modulation
- Angle modulation
- Amplitude and angle modulation produced simultaneously or at will by the same modulating signal
- Modulating electromagnetic waves

In this subclass, modulation is a process of applying information onto a sinusoidal carrier.

Relationships with other classification places

Transference of modulation from one carrier to the other and frequency changing is classified in [H03D 7/00](#). Frequency changers used to convert from baseband may, where appropriate, additionally be classified in [H03C](#).

[H03C](#) is used to classify modulators essentially at circuit level, e.g. transistor level. Higher level aspects, e.g. transmitters or transmission systems, particularly where the modulator type is only a black box or of a standard configuration, are generally classified in [H04B](#), [H04L](#) or with the specific application.

References

Limiting references

This place does not cover:

Measuring, testing	G01R
Modulating light	G02F 1/00
Masers, lasers	H01S
Modulators specially adapted for use in dc amplifiers	H03F 3/38
Modulating non-sinusoidal oscillations	H03K , H04L
Modulating pulses	H03K 7/00
So-called modulators capable only of switching between predetermined states of amplitude, frequency or phase	H03K 17/00 , H04L
Coding, decoding or code conversion, in general	H03M
Transmission of data signals, monitoring and testing arrangements and suppression of noise and interference	H04B
AC transmission systems	H04L 27/00
Synchronous modulators specially adapted for colour television	H04N 9/65

Special rules of classification

- Circuits usable both as modulator and demodulator are classified in [H03C](#).
- Quite frequently, an exclusive group assignment of documents to amplitude modulation ([H03C 1/00](#)) or angle modulation ([H03C 3/00](#)) is not feasible (and/or not given within the document). In these cases, the best match with a subgroup definition in either or both groups is decisive.
- Cases concerning a type of modulation that effects neither amplitude nor angle modulation, e.g. waveform modulation, should be classified in [H03C 99/00](#).

H03C 1/00

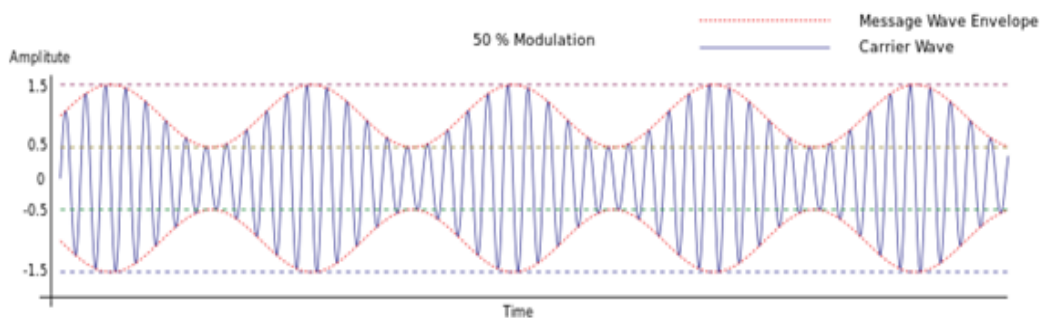
Amplitude modulation ([H03C 5/00](#), [H03C 7/00](#) take precedence)

Definition statement

This place covers:

Circuits and methods usable for modulation of a sinusoidal electromagnetic carrier wave whereby its amplitude is modified according to a modulating signal with frequency lower than that of the carrier. The modulating signal can be digital, resulting e.g. in Amplitude Shift Keying, or analog (see the example below).

Example:



Waveform of amplitude modulated carrier wave.

Relationships with other classification places

While modulators modulating the angle as well as the amplitude of a signal are classified in [H03C 5/00](#), aspects of the amplitude modulation may still be classified in [H03C 1/00](#).

References

Limiting references

This place does not cover:

Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal	H03C 5/00
Modulating electromagnetic waves	H03C 7/00
Mixers per se	H03D 7/00
Pulse amplitude modulation	H03K 7/02

Informative references

Attention is drawn to the following places, which may be of interest for search:

Balanced modulators/mixers	H03D 7/1425 , H03D 7/1441 , H03D 7/14
Amplifiers	H03F
Summing of phase-modulated signals	H03F 1/0294
Automatic control of gain	H03G
Transmitters and details of transmission	H04B 1/00
AC transmission systems including amplitude modulation circuits	H04L 27/02 , H04L 27/04

Special rules of classification

Documents should in general be classified in all subgroups which apply, e.g. a single sideband modulator may, in addition to [H03C 1/60](#), be classified in [H03C 1/36](#), if it is a transistor type.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

by means of	The actual amplitude modulation is performed by these "means". It does not mean that such "means" are merely present in the circuit but fulfilling another purpose.
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Synonyms and Keywords

In patent documents, the following abbreviations are often used:

AM	Amplitude Modulation
SSB	single side band

H03C 1/08

by means of variable impedance element ([H03C 1/28](#) - [H03C 1/34](#),
[H03C 1/46](#) - [H03C 1/52](#), [H03C 1/62](#) take precedence)

References

Limiting references

This place does not cover:

Amplitude Modulation by means of transit-time tube	H03C 1/28
Amplitude Modulation by means of a magnetron	H03C 1/30
Amplitude Modulation by deflection of electron beam in discharge tube	H03C 1/32
Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulators with mechanically or acoustically driven parts	H03C 1/46
Amplitude Modulation by means of Hall-effect devices	H03C 1/48
Amplitude Modulation by converting angle modulation to amplitude modulation	H03C 1/50

Amplitude Modulators in which carrier or one side-band are wholly or partially suppressed	H03C 1/52
Amplitude Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present	H03C 1/62

H03C 1/16

by means of discharge device having at least three electrodes
([H03C 1/28](#) - [H03C 1/34](#), [H03C 1/50](#), [H03C 1/52](#), [H03C 1/62](#) take precedence)

References

Limiting references

This place does not cover:

Amplitude Modulation by means of transit-time tube	H03C 1/28
Amplitude Modulation by means of a magnetron	H03C 1/30
Amplitude Modulation by deflection of electron beam in discharge tube	H03C 1/32
Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulation by converting angle modulation to amplitude modulation	H03C 1/50
Amplitude Modulators in which carrier or one side-band are wholly or partially suppressed	H03C 1/52
Amplitude Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present	H03C 1/62

H03C 1/36

by means of semiconductor device having at least three electrodes ([H03C 1/34](#), [H03C 1/50](#), [H03C 1/52](#), [H03C 1/62](#) take precedence)

References

Limiting references

This place does not cover:

Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulation by converting angle modulation to amplitude modulation	H03C 1/50
Amplitude Modulators in which carrier or one side-band are wholly or partially suppressed	H03C 1/52
Amplitude Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present	H03C 1/62

H03C 1/50

by converting angle modulation to amplitude modulation
 (H03C 1/28 - H03C 1/34, H03C 1/46, H03C 1/48 take precedence)

Definition statement

This place covers:

Example:

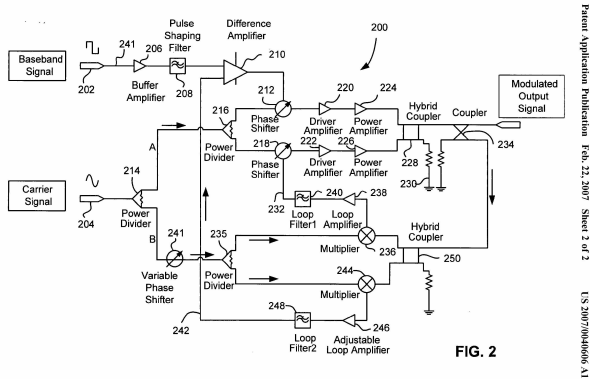


FIG. 2

Patent Application Publication Feb. 22, 2007 Sheet 2 of 2 US 2007/0040606 A1

US2007040606

Conversion of angle modulation (212) in amplitude modulation (228).

References

Limiting references

This place does not cover:

Amplitude Modulation by means of transit-time tube	H03C 1/28
Amplitude Modulation by means of a magnetron	H03C 1/30
Amplitude Modulation by deflection of electron beam in discharge tube	H03C 1/32
Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulators with mechanically or acoustically driven parts	H03C 1/46
Amplitude Modulation by means of Hall-effect devices	H03C 1/48

H03C 1/52

Modulators in which carrier or one side-band are wholly or partially suppressed
 (H03C 1/28 - H03C 1/34, H03C 1/46, H03C 1/48 take precedence)

References

Limiting references

This place does not cover:

Amplitude Modulation by means of transit-time tube	H03C 1/28
Amplitude Modulation by means of a magnetron	H03C 1/30
Amplitude Modulation by deflection of electron beam in discharge tube	H03C 1/32

Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulators with mechanically or acoustically driven parts	H03C 1/46
Amplitude Modulation by means of Hall-effect devices	H03C 1/48

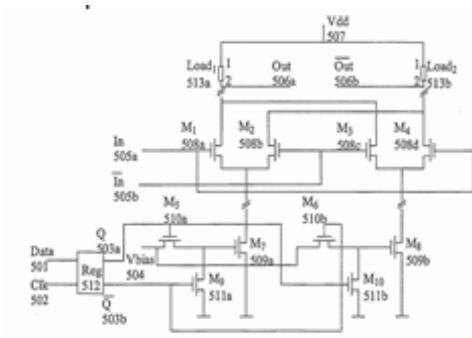
H03C 1/547

{using field-effect transistors}

Definition statement

This place covers:

Example:



EP1338085

Carrier suppression in a double balanced modulator using field effect transistors.

H03C 1/62

Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present ([H03C 1/28](#) - [H03C 1/34](#), [H03C 1/46](#), [H03C 1/48](#) take precedence)

References

Limiting references

This place does not cover:

Amplitude Modulation by means of transit-time tube	H03C 1/28
Amplitude Modulation by means of a magnetron	H03C 1/30
Amplitude Modulation by deflection of electron beam in discharge tube	H03C 1/32
Amplitude Modulation by means of light-sensitive element	H03C 1/34
Amplitude Modulators with mechanically or acoustically driven parts	H03C 1/46
Amplitude Modulation by means of Hall-effect devices	H03C 1/48

H03C 3/00

Angle modulation ([H03C 5/00](#), [H03C 7/00](#) take precedence)

Definition statement

This place covers:

- Circuits and methods usable for angle, i.e. frequency and/or phase modulation.

Relationships with other classification places

While modulators modulating the angle as well as the amplitude of a signal are classified in [H03C 5/00](#), aspects of the angle modulation may still be classified in [H03C 3/00](#).

References

Limiting references

This place does not cover:

Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal	H03C 5/00
Modulating electromagnetic waves	H03C 7/00
Frequency tuning of oscillators	H03B
Tuning of resonant circuits	H03J
Pulse/frequency modulators	H03K 7/04 , H03K 7/06

Informative references

Attention is drawn to the following places, which may be of interest for search:

Oscillators, VCO	H03B
Mixers per se	H03D 7/00
Reduction of nonlinear distortion in amplifiers (particularly regarding H03C 3/406 and H03C 5/00)	H03F 1/32
PLLs and other frequency regulation arrangements in general	H03L 7/00
PLL with fractional dividers	H03L 7/1974
Transmitters and details of transmission	H04B 1/00
AC transmission systems including phase or frequency modulation circuits	H04L 27/10 , H04L 27/12 , H04L 27/18 , H04L 27/20

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

FM	Frequency Modulation
PLL	Phase Locked Loop
VCO	Voltage Controlled Oscillator
"by means of" in the subgroup definition	see explanation in H03C 1/00

H03C 3/06

Means for changing frequency deviation {(for demodulation [H03D 3/003](#), [H03D 3/242](#))}

Definition statement

This place covers:

Means for modifying the frequency modulation characteristics, e.g. the frequency range or bandwidth or the sensitivity of frequency deviation with respect to the modulating signal.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reducing frequency deviation for demodulation	H03D 3/003 , H03D 3/242
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H03C 3/09

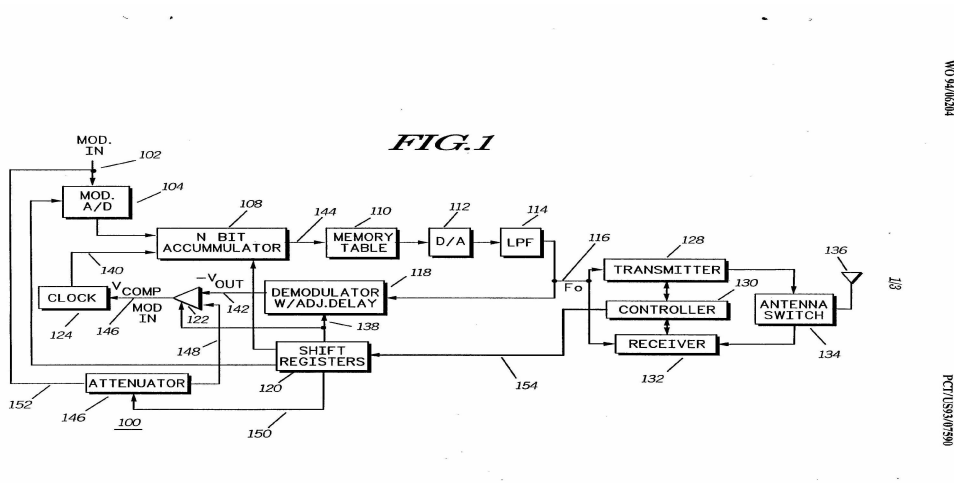
Modifications of modulator for regulating the mean frequency

Definition statement

This place covers:

Modifications of angle modulators for regulating the mean frequency of the carrier wave

Example:



US5331293

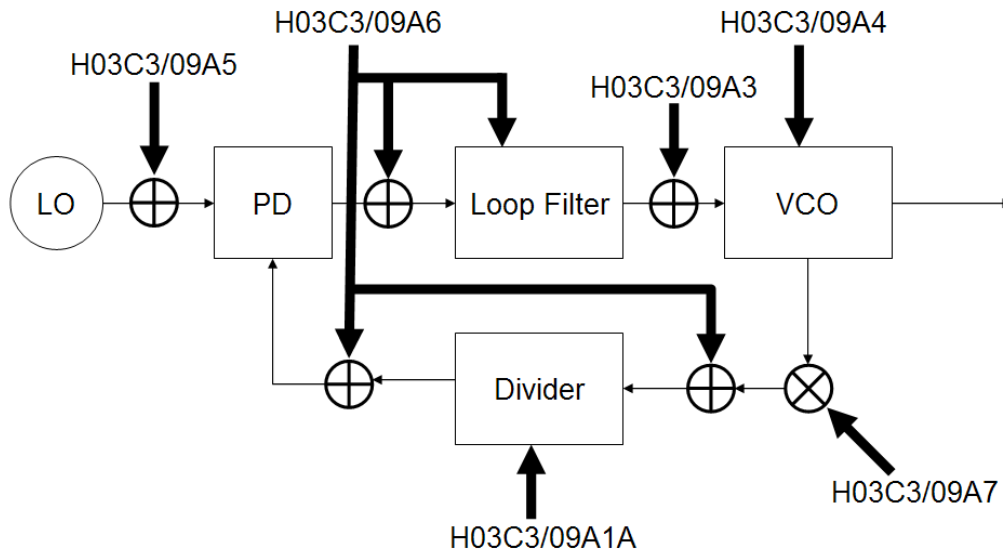
Regulation of mean frequency in a modulator without PLL, using a demodulator in the feedback path

H03C 3/0908

{using a phase locked loop}

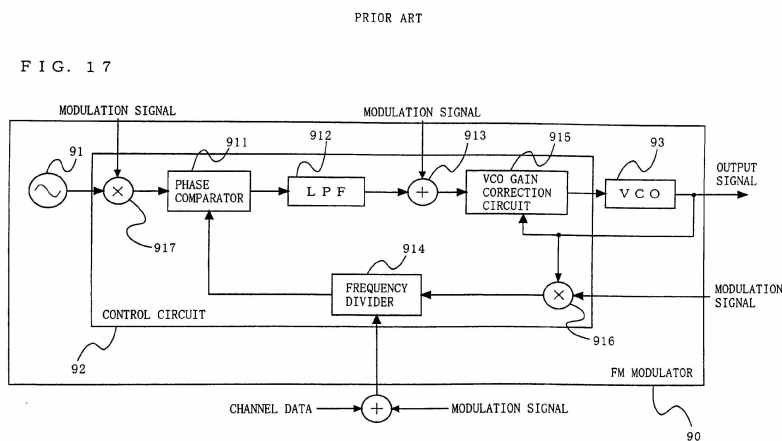
Definition statement

This place covers:



Schematic view of a PLL including a reference clock (LO), a phase detector, a loop filter, a voltage controlled oscillator (VCO) and a divider. The arrows point to subgroups assigned to manners of modulation.

Example:



Patent Application Publication Apr. 26, 2007 Sheet 17 of 20 US 2007/093217 A1

US2007093217

Regulation of mean frequency in a modulator with PLL, using three point modulation ([H03C 3/0941](#)) in divider ([H03C 3/0925](#)), reference clock ([H03C 3/0966](#)) and in front of the VCO ([H03C 3/095](#)) and at a mixer ([H03C 3/0983](#)).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

PLL with frequency divider/counter in general	H03L 7/18
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H03C 3/0933

{using fractional frequency division in the feedback loop of the phase locked loop}

References

Limiting references

This place does not cover:

PLL synthesisers with fractional dividers	H03L 7/1974
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H03C 3/10

by means of variable impedance ([H03C 3/30](#) - [H03C 3/38](#) take precedence)

Definition statement

This place covers:

Circuits or methods using an element with variable impedance for angle modulation.

References

Limiting references

This place does not cover:

Angle modulation by means of transit-time tube	H03C 3/30
Angle modulation the tube being a magnetron	H03C 3/32
Angle modulation by deflection of electron beam in discharge tube	H03C 3/34
Angle modulation by means of light-sensitive element	H03C 3/36
Conversion of amplitude to angle modulation	H03C 3/38

H03C 3/222

{using bipolar transistors ([H03C 3/227](#) takes precedence)}

References

Limiting references

This place does not cover:

Using a combination of bipolar transistors and field effect transistors	H03C 3/227
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H03C 3/225

{using field effect transistors ([H03C 3/227](#) takes precedence)}

References

Limiting references

This place does not cover:

Using a combination of bipolar transistors and field effect transistors	H03C 3/227
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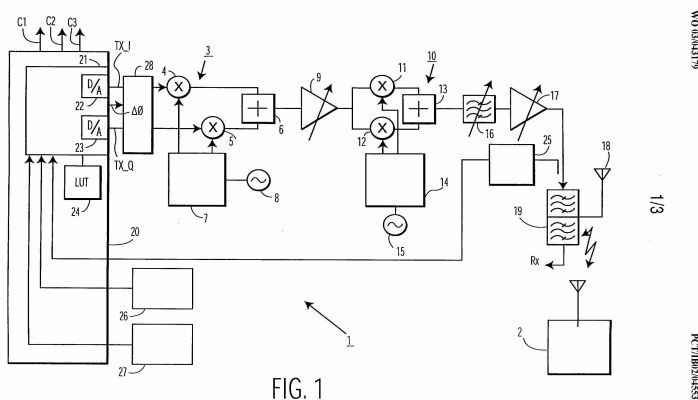
H03C 3/403

{using two quadrature frequency conversion stages in cascade}

Definition statement

This place covers:

Example:



US2003095608

Conversion of amplitude to angle modulation by using two quadrature frequency conversion stages in cascade (4, 5 and 11, 12)

H03C 3/42

by means of electromechanical devices ([H03C 3/28](#) takes precedence)

References

Limiting references

This place does not cover:

Angle modulation using variable impedance driven mechanically or acoustically	H03C 3/28
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H03C 5/00

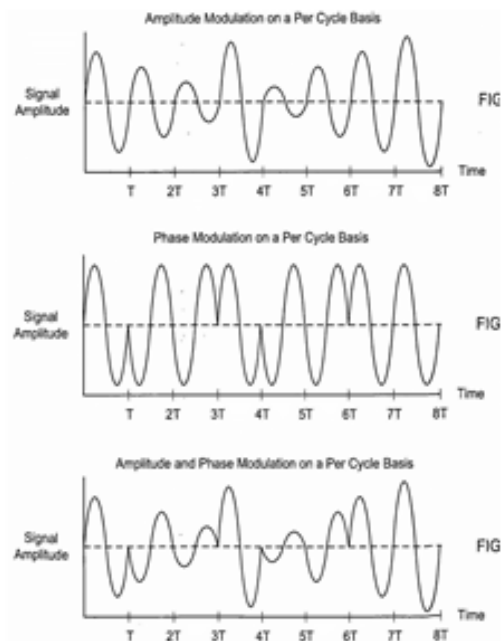
Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal ([H03C 7/00](#) takes precedence)

Definition statement

This place covers:

- Circuits selectable between FM and AM modulation
- Polar or phase-amplitude modulation by means of transistor circuits
- Polar or phase-amplitude modulation by means of transit time tubes

Example:



EP2034686

Polar modulation resulting in simultaneous amplitude and phase modulation.

References

Limiting references

This place does not cover:

Conversion of angle to amplitude modulation	H03C 1/50
Conversion of amplitude to angle modulation	H03C 3/38
Modulating electromagnetic waves	H03C 7/00

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

"by the same modulating signal"	also includes the common case where the modulation signal is split into two components
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H03C 7/00

Modulating electromagnetic waves (modulating light [G02F 1/00](#); for generating oscillations [H03B](#), [H03K](#))

Definition statement

This place covers:

Modulation of electromagnetic waves, e.g. microwaves

- in transmission line, waveguide, cavity resonator or radiation field of aerial [H03C 7/02](#)

References

Limiting references

This place does not cover:

Modulating light	G02F 1/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

For generating oscillations H03B	H03B ; H03K
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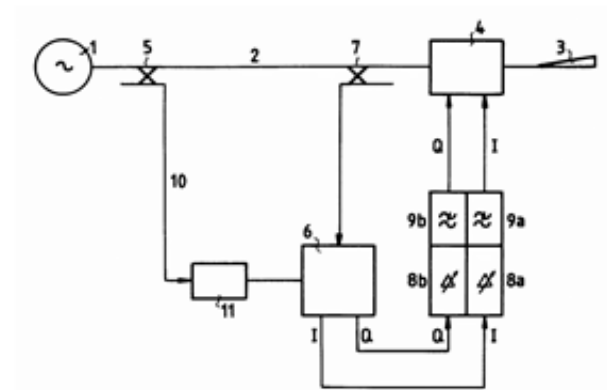
H03C 7/025

{using semiconductor devices}

Definition statement

This place covers:

Example:



EP0463665

Microwave modulator using transmission line (2), vector modulator (4) and quadrature detector (6).

H03C 7/04

Polarisation of transmitted wave being modulated {([H03C 7/022](#) takes precedence)}

References

Limiting references

This place does not cover:

Using ferromagnetic devices, e.g. ferrites	H03C 7/022
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H03C 99/00

Subject matter not provided for in other groups of this subclass

Definition statement

This place covers:

Modulation, keying, or interruption of sinusoidal oscillations or electromagnetic waves that does not comply with other groups of this subclass.

References

Limiting references

This place does not cover:

Amplitude modulation	H03C 1/00
Angle modulation	H03C 3/00
Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal	H03C 5/00
Modulating electromagnetic waves	H03C 7/00

H03C 2200/00

Indexing scheme relating to details of modulators or modulation methods covered by [H03C](#)

Definition statement

This place covers:

Particular circuit elements of modulators **H03C200/01**

Functional aspects of modulators **H03C200/02**

H03C 2200/002**Filters with particular characteristics****References****Limiting references***This place does not cover:*

Filtering of the input modulating signal for obtaining a constant sensitivity of frequency modulation	H03C 2200/0054
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H03C 2200/0025**Gilbert multipliers****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Balanced arrangements for transference of modulation from one carrier to another	H03D 7/14
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H03C 2200/007**with one sideband wholly or partially suppressed****References****Limiting references***This place does not cover:*

Amplitude modulators in which one side-band is wholly or partially suppressed	H03C 1/60
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H03C 2200/0079**Measures to linearise modulation or reduce distortion of modulation characteristics****References****Limiting references***This place does not cover:*

Modification of amplitude modulators to reduce distortion	H03C 1/06
Modification of angle modulators to linearise modulation	H03C 3/08