CPC COOPERATIVE PATENT CLASSIFICATION

H03M CODING ; DECODING ; CODE CONVERSION IN GENERAL (using fluidic means F15C 4/00 ; optical analogue/digital converters G02F 7/00 ; coding, decoding or code conversion, specially adapted for particular applications, see the relevant subclasses, e.g. G01D , G01R , G06F , G06T , G09G , G10L , G11B , G11C , H04B , H04L , H04M , H04N ; ciphering or deciphering for cryptography or other purposes involving the need for secrecy G09C)

WARNING

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

H03M 7/32 covered by H03M 7/3004 , H03M 7/3048 H03M 7/34 covered by H03M 7/3004 , H03M 7/3051 H03M 7/36 covered by H03M 7/3004 , H03M 7/3044 H03M 7/38 covered by H03M 7/3004 , H03M 7/3046

Guidance heading:

H03M 1/00 Analogue/digital conversion ; Digital/analogue conversion (conversion of analogue values to or from differential modulation H03M 3/00)

H03M 1/001 . { Analogue/digital/analogue conversion }

H03M 1/002 . { with means for saving power }

H03M 1/004 . { Reconfigurable analogue/digital or digital/analogue converters (H03M 1/02 takes precedence) }

H03M 1/005 . . { among different converters types }

H03M 1/007 . . { among different resolutions }

H03M 1/008 . . { among different conversion characteristics, e.g. between mu-255 and a-laws }

H03M 1/02 . Reversible analogue/digital converters

H03M 1/04 . using stochastic techniques

H03M 1/06 . Continuously compensating for, or preventing, undesired influence of physical parameters (periodically, { e.g. by using stored correction values, } H03M 1/10)

H03M 1/0602 . . { of deviations from the desired transfer characteristic (H03M 1/0617 takes precedence) }

H03M 1/0604 . . . { at one point, i.e. by adjusting a single reference value, e.g. bias or gain error (gain setting for range control H03M 1/18) }

H03M 1/0607 . . . . { Offset or drift compensation (removal of offset already present on the analogue input signal H03M 1/1295) }

H03M 1/0609 . . . { at two points of the transfer characteristic, i.e. by adjusting two reference values, e.g. offset and gain error }

H03M 1/0612 . . . { over the full range of the converter, e.g. for correcting differential non-linearity }

H03M 1/0614 . . { of harmonic distortion (H03M 1/0617 takes precedence) }

H03M 1/0617 . . { characterised by the use of methods or means not specific to a particular type of detrimental influence }

H03M 1/0619 . . . { by dividing out the errors, i.e. using a ratiometric arrangement }

H03M 1/0621 . . . . { with auxiliary conversion of a value corresponding to the physical parameter(s) to be compensated for }

H03M 1/0624 . . . { by synchronisation }

H03M 1/0626 . . . { by filtering }

H03M 1/0629 . . . . { Anti-aliasing }

H03M 1/0631 . . . . { Smoothing }

H03M 1/0634 . . . { by averaging out the errors, e.g. using sliding scale }

H03M 1/0636 . . . . { in the amplitude domain }

H03M 1/0639 . . . . . { using dither (for increasing resolution H03M 1/20 D) }

H03M 1/0641 . . . . . { the dither being a random signal }

H03M 1/0643 . . . . { in the spatial domain }

H03M 1/0646 . . . . . { by analogue redistribution among corresponding nodes of adjacent cells, e.g. using an impedance network connected among all comparator outputs in a flash converter }

H03M 1/0648 . . . . . { by arranging the quantisation value generators in a non-sequential pattern layout, e.g. symmetrical }

H03M 1/0651 . . . . . { by selecting the quantisation value generators in a non-sequential order, e.g. symmetrical }

H03M 1/0653 . . . . . { the order being based on measuring the error }

H03M 1/0656 . . . . { in the time domain }

H03M 1/0658 . . . . . { by calculating a running average of a number of subsequent samples }

H03M 1/066 . . . . . { by continuously permuting the elements used, i.e. dynamic element matching }

H03M 1/0663 . . . . . { using clocked averaging }

H03M 1/0665 . . . . . { using data dependent selection of the elements, e.g. data weighted averaging }

H03M 1/0668 . . . . . { the selection being based on the output of noise shaping circuits for each element }

H03M 1/067 . . . . . { using different permutation circuits for different parts of the digital signal }

H03M 1/0673 . . . . . { using random selection of the elements (with data-controlled random generator 1/06M7T3D) }

H03M 1/0675 . . . { using redundancy }

H03M 1/0678 . . . . { using additional components or elements, e.g. dummy components }

H03M 1/068 . . . . . { the original and additional components or elements being complementary to each other, e.g. CMOS }

H03M 1/0682 . . . . . { using a differential network structure, i.e. symmetrical with respect to ground }

H03M 1/0685 . . . . . { using real and complementary patterns }

H03M 1/0687 . . . . { using fault-tolerant coding, e.g. parity check, error correcting codes (1/06M9R takes precedence) }

H03M 1/069 .... { by range overlap between successive stages or steps }
H03M 1/0692 ..... { using a diminished radix representation, e.g. radix 1.95 }
H03M 1/0695 ..... { using less than the maximum number of output states per stage, e.g. 1.5 bit per stage type }
H03M 1/0697 .... { in time, e.g. using additional comparison cycles }
H03M 1/08 .. of noise { (H03M 1/0617 takes precedence) }
H03M 1/0809 ... { of bubble errors, i.e. irregularities in thermometer codes }
H03M 1/0818 ... { of clock feed-through }
H03M 1/0827 ... { of electromagnetic or electrostatic field noise, e.g. by shielding, by optical isolation }
H03M 1/0836 ... { of phase error, e.g. jitter }
H03M 1/0845 ... { of power supply variations, e.g. ripple }
H03M 1/0854 ... { of quantisation noise }
H03M 1/0863 ... { of switching transients, e.g. glitches }
H03M 1/0872 .... { by disabling changes in the output during the transitions, e.g. by holding or latching }
H03M 1/0881 .... { by forcing a gradual change from one output level to the next, e.g. soft-start }
H03M 1/089 ... { of temperature variations }

H03M 1/10 . Calibration or testing
H03M 1/1004 .. { without interrupting normal operation, e.g. by providing an additional component for temporarily replacing components to be tested or calibrated (H03M 1/1009 , H03M 1/1071 take precedence) }
H03M 1/1009 .. { Calibration }
H03M 1/1014 ... { at one point of the transfer characteristic, i.e. by adjusting a single reference value, e.g. bias or gain error (gain setting for range control H03M 1/18) }
H03M 1/1019 .... { by storing a corrected or correction value in a digital look-up table }
H03M 1/1023 .... { Offset correction (H03M 1/1019 takes precedence; removal of offset already present on the analogue input signal H03M 1/1295) }
H03M 1/1028 ... { at two points of the transfer characteristic, i.e. by adjusting two reference values, e.g. offset and gain error (gain setting for range control H03M 1/18) }
H03M 1/1033 ... { over the full range of the converter, e.g. for correcting differential non-linearity }
H03M 1/1038 .... { by storing corrected or correction values in one or more digital look-up tables (H03M 1/1057 takes precedence) }
H03M 1/1042 ..... { the look-up table containing corrected values for replacing the original digital values (H03M 1/1052 takes precedence) }
H03M 1/1047 ..... { using an auxiliary digital/analogue converter for adding the correction values to the analogue signal (H03M 1/1052 takes precedence) }
H03M 1/1052 ..... { using two or more look-up tables each corresponding to a different type of error, e.g. for offset, gain error and non-linearity error respectively }
H03M 1/1057 .... { by trimming, i.e. by individually adjusting at least part of the quantisation value generators or stages to their nominal values }
H03M 1/1061 ..... { using digitally programmable trimming circuits }
H03M 1/1066 .. { Mechanical or optical alignment }
H03M 1/1071 .. { Measuring or testing }
H03M 1/1076 ... { Detection or location of converter hardware failure, e.g. power supply failure,

open or short circuit }

H03M 1/108 . . . { Converters having special provisions for facilitating access for testing purposes }

H03M 1/1085 . . . { using domain transforms, e.g. Fast Fourier Transform }

H03M 1/109 . . . { for dc performance, i.e. static testing (1/10T4 takes precedence) }

H03M 1/1095 . . . { for ac performance, i.e. dynamic testing (1/10T4 takes precedence) }

H03M 1/12 . Analogue/digital converters ({ H03M 1/001 to H03M 1/004 as well as } H03M 1/02 to H03M 1/10 take precedence)

H03M 1/1205 . . { Multiplexed conversion systems }

H03M 1/121 . . . { Interleaved, i.e. using multiple converters or converter parts for one channel }

H03M 1/1215 . . . . { using time-division multiplexing }

H03M 1/122 . . . { Shared, i.e. using a single converter for multiple channels }

H03M 1/1225 . . . . { using time-division multiplexing }

H03M 1/123 . . . { Simultaneous, i.e. using one converter per channel but with common control or reference circuits for multiple converters }

H03M 1/1235 . . { Non-linear conversion not otherwise provided for in subgroups of H03M 1/12 }

H03M 1/124 . . { Sampling or signal conditioning arrangements specially adapted for A/D converters (S/H circuits G11C 27/02 ; sample rate conversion H03H 17/0416 , H03H 17/0621) }

H03M 1/1245 . . . { Details of sampling arrangements or methods }

H03M 1/125 . . . . { Asynchronous operation }

H03M 1/1255 . . . . { Synchronisation of the sampling frequency or phase to the input frequency or phase }

H03M 1/126 . . . . { Multi-rate systems, i.e. adaptive to different fixed sampling rates }

H03M 1/1265 . . . . { Non-uniform sampling }

H03M 1/127 . . . . . { at intervals varying with the rate of change of the input signal }

H03M 1/1275 . . . . . { at extreme values only }

H03M 1/128 . . . . . { at random intervals, e.g. digital alias free signal processing [DASP }]

H03M 1/1285 . . . . { Synchronous circular sampling, i.e. using undersampling of periodic input signals }

H03M 1/129 . . . { Means for adapting the input signal to the range the converter can handle, e.g. limiting, pre-scaling (H03M 1/18 takes precedence) ; Out-of-range indication }

H03M 1/1295 . . . . { Clamping, i.e. adjusting the DC level of the input signal to a predetermined value }

H03M 1/14 . . Conversion in steps with each step involving the same or a different conversion means and delivering more than one bit

H03M 1/141 . . . { in which at least one step is of the folding type; Folding stages therefore }

H03M 1/142 . . . { the reference generators for the steps being arranged in a common two-dimensional array }

H03M 1/143 . . . { in pattern-reading type converters, e.g. having both absolute and incremental tracks on one disc or strip (H03M 1/16 takes precedence) }

H03M 1/144 . . . { the steps being performed sequentially in a single stage, i.e. recirculation type (H03M 1/141 , H03M 1/143 , H03M 1/16 take precedence) }

H03M 1/145 . . . { the steps being performed sequentially in series-connected stages (H03M 1/141 , H03M 1/143 , H03M 1/16 take precedence) }

H03M 1/146 . . . . { all stages being simultaneous converters }

H03M 1/147 . . . . . { at least two of which share a common reference generator }

H03M 1/148 . . . . . { the reference generator being arranged in a two-dimensional array }

H03M 1/16 . . . with scale factor modification, i.e. by changing the amplification between the steps { (H03M 1/141 takes precedence) }

H03M 1/161 . . . . { in pattern-reading type converters, e.g. with gearings }

H03M 1/162 . . . . { the steps being performed sequentially in a single stage, i.e. recirculation type (H03M 1/161 takes precedence) }

H03M 1/164 . . . . { the steps being performed sequentially in series-connected stages (H03M 1/161 takes precedence) }

H03M 1/165 . . . . . { in which two or more residues with respect to different reference levels in a stage are used as input signals for the next stage, i.e. multi-residue type }

H03M 1/167 . . . . . { all stages comprising simultaneous converters (H03M 1/165 takes precedence) }

H03M 1/168 . . . . . { and delivering the same number of bits }

H03M 1/18 . . Automatic control for modifying the range of signals the converter can handle, e.g. gain ranging

H03M 1/181 . . . { in feedback mode, i.e. by determining the range to be selected from one or more previous digital output values }

H03M 1/182 . . . . { the feedback signal controlling the reference levels of the analogue/digital converter }

H03M 1/183 . . . . { the feedback signal controlling the gain of an amplifier or attenuator preceding the analogue/digital converter }

H03M 1/185 . . . . . { the determination of the range being based on more than one digital output value, e.g. on a running average, a power estimation or the rate of change }

H03M 1/186 . . . { in feedforward mode, i.e. by determining the range to be selected directly from the input signal }

H03M 1/187 . . . . { using an auxiliary analogue/digital converter }

H03M 1/188 . . . { Multi-path, i.e. having a separate analogue/digital converter for each possible range }

H03M 1/20 . . Increasing resolution using an n bit system to obtain n + m bits

H03M 1/201 . . . { by dithering }

H03M 1/202 . . . { by interpolation }

H03M 1/203 . . . . { using an analogue interpolation circuit }

H03M 1/204 . . . . . { in which one or more virtual intermediate reference signals are generated between adjacent original reference signals, e.g. by connecting pre-amplifier outputs to multiple comparators }

H03M 1/205 . . . . . { using resistor strings for redistribution of the original reference signals or signals derived therefrom }

H03M 1/206 . . . . { using a logic interpolation circuit }

H03M 1/207 . . . . { using a digital interpolation circuit }

H03M 1/208 . . . { by prediction }

H03M 1/22 . . Pattern-reading type

H03M 1/24 . . . using relatively movable reader and disc or strip

H03M 1/245 . . . . { Constructional details of parts relevant to the encoding mechanism, e.g. pattern carriers, pattern sensors (for details of other parts, e.g. housings, casings or the like, see the relevant application subclasses of G01 , H01) }

H03M 1/26 . . . . with weighted coding, i.e. the weight given to a digit depends on the position of the digit within the block or code word, e.g. there is a given radix and the weights are powers of this radix

H03M 1/28 . . . . with non-weighted coding

H03M 1/282 . . . . . { of the pattern-shifting type, e.g. pseudo-random chain code }

H03M 1/285 . . . . . { of the unit Hamming distance type, e.g. Gray code }

H03M 1/287 . . . . . { using gradually changing slit width or pitch within one track; using plural tracks having slightly different pitches, e.g. of the Vernier or nonius type }

H03M 1/30 . . . . . incremental

H03M 1/301 . . . . . { Constructional details of parts relevant to the encoding mechanism, e.g. pattern carriers, pattern sensors (details of housings, casings or the like, see the relevant application subclasses of G01 , H01) }

H03M 1/303 . . . . . { Circuits or methods for processing the quadrature signals }

H03M 1/305 . . . . . { for detecting the direction of movement }

H03M 1/306 . . . . . { for waveshaping }

H03M 1/308 . . . . . { with additional pattern means for determining the absolute position, e.g. reference marks }

H03M 1/32 . . . using cathode-ray tubes { or analoguous two-dimensional deflection systems }

H03M 1/34 . . Analogue value compared with reference values (H03M 1/48 takes precedence)

H03M 1/345 . . . { for direct conversion to a residue number representation }

H03M 1/36 . . . simultaneously only, i.e. parallel type { (thermometer to binary encoders H03M 7/165) }

H03M 1/361 . . . . { having a separate comparator and reference value for each quantisation level, i.e. full flash converter type }

H03M 1/362 . . . . . { the reference values being generated by a resistive voltage divider }

H03M 1/363 . . . . . { the voltage divider taps being held in a floating state, e.g. by feeding the divider by current sources }

H03M 1/365 . . . . . { the voltage divider being a single resistor string }

H03M 1/366 . . . . . { using current mode circuits, i.e. circuits in which the information is represented by current values rather than by voltage values }

H03M 1/367 . . . . { Non-linear conversion }

H03M 1/368 . . . . { having a single comparator per bit, e.g. of the folding type }

H03M 1/38 . . . sequentially only, e.g. successive approximation type (converting more than one bit per step H03M 1/14)

H03M 1/40 . . . . recirculation type

H03M 1/403 . . . . . { using switched capacitors }

H03M 1/406 . . . . . { using current mode circuits, i.e. circuits in which the information is represented by current values rather than by voltage values }

H03M 1/42 . . . . Sequential comparisons in series-connected stages with no change in value of analogue signal

H03M 1/44 . . . . Sequential comparisons in series-connected stages with change in value of analogue signal

H03M 1/442 . . . . . { using switched capacitors }

H03M 1/445 . . . . . { the stages being of the folding type }

H03M 1/447 . . . . . { using current mode circuits, i.e. circuits in which the information is represented by current values rather than by voltage values }

H03M 1/46 . . . . with digital/analogue converter for supplying reference values to converter

H03M 1/462 . . . . . { Details of the control circuitry, e.g. of the successive approximation register }

H03M 1/464 . . . . . { Non-linear conversion }

H03M 1/466 . . . . . { using switched capacitors }

H03M 1/468 . . . . . { in which the input S/H circuit is merged with the feedback DAC array }

H03M 1/48 . . Servo-type converters

H03M 1/485 . . . { for position encoding, e.g. using resolvers or synchros }

H03M 1/50 . . with intermediate conversion to time interval (H03M 1/64 takes precedence, time-to-digital converters G04F 10/005)

H03M 1/502 . . . { using tapped delay lines }

H03M 1/504 . . . { using pulse width modulation }

H03M 1/506 . . . . { the pulse width modulator being of the charge-balancing type }

H03M 1/508 . . . . { the pulse width modulator being of the self-oscillating type }

H03M 1/52 . . . Input signal integrated with linear return to datum

H03M 1/54 . . . Input signal sampled and held with linear return to datum

H03M 1/56 . . . Input signal compared with linear ramp

H03M 1/58 . . . Non-linear conversion

H03M 1/60 . . with intermediate conversion to frequency of pulses

H03M 1/62 . . . Non-linear conversion

H03M 1/64 . . with intermediate conversion to phase of sinusoidal { or similar periodical } signals

H03M 1/645 . . . { for position encoding, e.g. using resolvers or synchros (H03M 1/485 takes precedence) }

H03M 1/66 . Digital/analogue converters ({ H03M 1/001 to H03M 1/004 as well as } H03M 1/02 to H03M 1/10 take precedence)

H03M 1/661 . . { Improving the reconstruction of the analogue output signal beyond the resolution of the digital input signal, e.g. by interpolation, by curve-fitting, by smoothing }

H03M 1/662 . . { Multiplexed conversion systems }

H03M 1/664 . . { Non-linear conversion not otherwise provided for in subgroups of H03M 1/66 }

H03M 1/665 . . { with intermediate conversion to phase of sinusoidal or similar periodical signals }

H03M 1/667 . . { Recirculation type }

H03M 1/668 . . { Servo-type converters }

H03M 1/68 . . with conversions of different sensitivity, i.e. one conversion relating to the more significant digital bits and another conversion to the less significant bits

H03M 1/682 . . . { both converters being of the unary decoded type }

H03M 1/685 . . . . { the quantisation value generators of both converters being arranged in a common two-dimensional array }

H03M 1/687 . . . { Segmented, i.e. the more significant bit converter being of the unary decoded type and the less significant bit converter being of the binary weighted type }

H03M 1/70 . . Automatic control for modifying converter range

H03M 1/72 . . Sequential conversion in series-connected stages (H03M 1/68 takes precedence)

H03M 1/74 . . Simultaneous conversion

H03M 1/742 . . . { using current sources as quantisation value generators }

H03M 1/745 . . . . { with weighted currents }

H03M 1/747 .... { with equal currents which are switched by unary decoded digital signals }
H03M 1/76 ... using switching tree
H03M 1/765 .... { using a single level of switches which are controlled by unary decoded digital signals }
H03M 1/78 ... using ladder network
H03M 1/785 .... { using resistors, i.e. R-2R ladders }
H03M 1/80 ... using weighted impedances (H03M 1/76 takes precedence)
H03M 1/802 .... { using capacitors, e.g. neuron-mos transistors, charge coupled devices }
H03M 1/804 ..... { with charge redistribution }
H03M 1/806 ..... { with equally weighted capacitors which are switched by unary decoded digital signals }
H03M 1/808 .... { using resistors }
H03M 1/82 .. with intermediate conversion to time interval
H03M 1/822 ... { using pulse width modulation }
H03M 1/825 .... { by comparing the input signal with a digital ramp signal }
H03M 1/827 .... { in which the total pulse width is distributed over multiple shorter pulse widths }
H03M 1/84 ... Non-linear conversion
H03M 1/86 .. with intermediate conversion to frequency of pulses
H03M 1/88 ... Non-linear conversion

H03M 3/00 Conversion of analogue values to or from differential modulation

H03M 3/02 . Delta modulation, i.e. one-bit differential modulation { (H03M 3/30 takes precedence) }
H03M 3/022 .. { with adaptable step size, i.e. adaptive delta modulation [ADM] }
H03M 3/024 ... { using syllabic companding, e.g. continuously variable slope delta modulation [CVSD] }

H03M 3/04 . Differential modulation with several bits, e.g. differential pulse code modulation [DPCM] { (H03M 3/30 takes precedence; voice coding G10L 19/00 ; image coding H04N 7/26) }
H03M 3/042 .. { with adaptable step size, e.g. adaptive differential pulse code modulation [ADPCM] }

H03M 3/30 . { Delta-sigma modulation }

NOTE

In this group branch, in the absence of an indication of the contrary, classification is made in the first appropriate place

H03M 3/32 .. { with special provisions or arrangements for power saving, e.g. by allowing a sleep mode, using lower supply voltage for downstream stages, using multiple clock domains, by selectively turning on stages when needed }
H03M 3/322 .. { Continuously compensating for, or preventing, undesired influence of physical parameters (periodically, e.g. by using stored correction values, H03M 3/378) }
H03M 3/324 ... { characterised by means or methods compensating or preventing more than

one type of error at a time, e.g. by synchronisation, using a ratiometric arrangement }

H03M 3/326 .... { by averaging out the errors }

H03M 3/328 ..... { using dither }

H03M 3/33 ..... { the dither being a random signal }

H03M 3/332 ..... { in particular a pseudo-random signal }

H03M 3/334 ..... { the dither being at least partially dependent on the input signal }

H03M 3/336 ..... { the dither being in the time domain }

H03M 3/338 ..... { by permutation in the time domain, e.g. dynamic element matching (in multiple bit sub-converters H03M 1/066) }

H03M 3/34 ..... { by chopping }

H03M 3/342 ..... { by double sampling, e.g. correlated double sampling }

H03M 3/344 .... { by filtering other than the noise-shaping inherent to delta-sigma modulators, e.g. anti-aliasing }

H03M 3/346 .... { by suppressing active signals at predetermined times, e.g. muting, using non-overlapping clock phases }

H03M 3/348 ..... { using return-to-zero signals }

H03M 3/35 .... { using redundancy }

H03M 3/352 ... { of deviations from the desired transfer characteristic }

H03M 3/354 .... { at one point, i.e. by adjusting a single reference value, e.g. bias or gain error (gain setting for range control H03M 3/478) }

H03M 3/356 ..... { Offset or drift compensation (removal of offset already present on the analogue input signal H03M 3/494) }

H03M 3/358 ... { of non-linear distortion, e.g. instability (avoiding instability by structural design H03M 3/44) }

H03M 3/36 .... { by temporarily adapting the operation upon detection of instability conditions }

H03M 3/362 ..... { in feedback mode, e.g. by reducing the order of the modulator }

H03M 3/364 ..... { by resetting one or more loop filter stages }

H03M 3/366 ..... { in feed-forward mode, e.g. using look-ahead circuits }

H03M 3/368 ... { of noise other than the quantisation noise already being shaped inherently by delta-sigma modulators }

H03M 3/37 .... { Compensation or reduction of delay or phase error }

H03M 3/372 ..... { Jitter reduction }

H03M 3/374 ..... { Relaxation of settling time constraints, e.g. slew rate enhancement }

H03M 3/376 .... { Prevention or reduction of switching transients, e.g. glitches }

H03M 3/378 .. { Calibration or testing }

H03M 3/38 ... { Calibration }

H03M 3/382 .... { at one point of the transfer characteristic, i.e. by adjusting a single reference value, e.g. bias or gain error (gain setting for range control H03M 3/478) }

H03M 3/384 ..... { Offset correction (removal of offset already present on the analogue input signal H03M 3/494) }

H03M 3/386 .... { over the full range of the converter, e.g. for correcting differential non-linearity }

H03M 3/388 ..... { by storing corrected or correction values in one or more digital look-up

tables }

H03M 3/39 .. { Structural details of delta-sigma modulators, e.g. incremental delta-sigma modulators (of digital delta-sigma modulators H03M 7/3004) }

H03M 3/392 ... { Arrangements for selecting among plural operation modes, e.g. for multi-standard operation }

H03M 3/394 .... { among different orders of the loop filter }

H03M 3/396 .... { among different frequency bands }

H03M 3/398 .... { among different converter types }

H03M 3/40 ... { Arrangements for handling quadrature signals, e.g. complex modulators }

H03M 3/402 ... { Arrangements specific to bandpass modulators }

H03M 3/404 .... { characterised by the type of bandpass filters used }

H03M 3/406 ..... { by the use of a pair of integrators forming a closed loop }

H03M 3/408 ..... { by the use of an LC circuit }

H03M 3/41 .... { combined with modulation to or demodulation from the carrier }

H03M 3/412 ... { characterised by the number of quantisers and their type and resolution }

H03M 3/414 .... { having multiple quantisers arranged in cascaded loops, each of the second and further loops processing the quantisation error of the loop preceding it, i.e. multiple stage noise shaping [MASH] type }

H03M 3/416 ..... { all these quantisers being multiple bit quantisers }

H03M 3/418 ..... { all these quantisers being single bit quantisers }

H03M 3/42 .... { having multiple quantisers arranged in parallel loops }

H03M 3/422 .... { having one quantiser only }

H03M 3/424 ..... { the quantiser being a multiple bit one }

H03M 3/426 ..... { the quantiser being a successive approximation type analogue/digital converter }

H03M 3/428 ..... { with lower resolution, e.g. single bit, feedback }

H03M 3/43 ..... { the quantiser being a single bit one }

H03M 3/432 ..... { the quantiser being a pulse width modulation type analogue/digital converter, i.e. differential pulse width modulation }

H03M 3/434 ..... { with multi-level feedback }

H03M 3/436 ... { characterised by the order of the loop filter, e.g. error feedback type }

NOTE

In this group branch the order of the loop filters is considered to be the number of integrators for a baseband modulator and the number of resonators for a bandpass modulator respectively

H03M 3/438 .... { the modulator having a higher order loop filter in the feedforward path }

H03M 3/44 ..... { with provisions for rendering the modulator inherently stable }

H03M 3/442 ..... { by restricting the swing within the loop, e.g. gain scaling }

H03M 3/444 ..... { using non-linear elements, e.g. limiters }

H03M 3/446 ..... { by a particular choice of poles or zeroes in the z-plane, e.g. by positioning zeroes outside the unit circle, i.e. causing the modulator to operate in a chaotic regime }

H03M 3/448 ..... { by removing part of the zeroes, e.g. using local feedback loops }

H03M 3/45 ..... { with distributed feedforward inputs, i.e. with forward paths from the

modulator input to more than one filter stage }

H03M 3/452 . . . . . { with weighted feedforward summation, i.e. with feedforward paths from more than one filter stage to the quantiser input }

H03M 3/454 . . . . . { with distributed feedback, i.e. with feedback paths from the quantiser output to more than one filter stage }

H03M 3/456 . . . . { the modulator having a first order loop filter in the feedforward path }

H03M 3/458 . . { Analogue/digital converters using delta-sigma modulation as an intermediate step }

H03M 3/46 . . . { using a combination of at least one delta-sigma modulator in series with at least one analogue/digital converter of a different type }

H03M 3/462 . . . { Details relating to the decimation process (decimation filters in general H03H 17/0416 , H03H 17/0621) }

H03M 3/464 . . . { Details of the digital/analogue conversion in the feedback path }

H03M 3/466 . . . { Multiplexed conversion systems }

H03M 3/468 . . . . { Interleaved, i.e. using multiple converters or converter parts for one channel, e.g. using Hadamard codes, pi-delta-sigma converters }

H03M 3/47 . . . . . { using time-division multiplexing }

H03M 3/472 . . . . { Shared, i.e. using a single converter for multiple channels }

H03M 3/474 . . . . . { using time-division multiplexing }

H03M 3/476 . . . { Non-linear conversion systems }

H03M 3/478 . . . { Means for controlling the correspondence between the range of the input signal and the range of signals the converter can handle; Means for out-of-range indication }

NOTE

In this group branch, classification is made both in group branch H03M 3/44 and in group branch H03M 3/448 if both of these sets of groups are relevant

H03M 3/48 . . . . { characterised by the type of range control, e.g. limiting }

H03M 3/482 . . . . . { by adapting the quantisation step size }

H03M 3/484 . . . . . { by adapting the gain of the feedback signal, e.g. by adapting the reference values of the digital/analogue converter in the feedback path }

H03M 3/486 . . . . . { by adapting the input gain }

H03M 3/488 . . . . { using automatic control }

H03M 3/49 . . . . . { in feedback mode, i.e. by determining the range to be selected from one or more previous digital output values }

H03M 3/492 . . . . . { in feed forward mode, i.e. by determining the range to be selected directly from the input signal }

H03M 3/494 . . . { Sampling or signal conditioning arrangements specially adapted for delta-sigma type analogue/digital conversion systems (sample/hold circuits G11C 27/02 ; sample rate conversion H03H 17/0416 , H03H 17/0621) }

H03M 3/496 . . . . { Details of sampling arrangements or methods }

H03M 3/498 . . . . . { Variable sample rate }

H03M 3/50 . . { Digital/analogue converters using delta-sigma modulation as an intermediate step (digital delta-sigma modulators per se H03M 7/3004) }

H03M 3/502 . . . { Details of the final digital/analogue conversion following the digital delta-sigma

modulation }

H03M 3/504 . . . . { the final digital/analogue converter being constituted by a finite impulse response [FIR] filter, i.e. FIRDAC }

H03M 3/506 . . . . { the final digital/analogue converter being constituted by a pulse width modulator }

H03M 3/508 . . . { Details relating to the interpolation process (interpolation filters in general H03H 17/0416 , H03H 17/0621) }

H03M 3/51 . . . { Automatic control for modifying converter range }

H03M 5/00 **Conversion of the form of the representation of individual digits**

NOTE

In groups H03M 5/02 to H03M 5/22 , in the absence of an indication to the contrary, an invention is classified in the last appropriate place.

H03M 5/02 . Conversion to or from representation by pulses

H03M 5/04 . . the pulses having two levels

H03M 5/06 . . . Code representation, e.g. transition, for a given bit cell depending only on the information in that bit cell

H03M 5/08 . . . . Code representation by pulse width

H03M 5/10 . . . . Code representation by pulse frequency

H03M 5/12 . . . . Biphase level code, e.g. split phase code, Manchester code ; Biphase space or mark code, e.g. double frequency code

H03M 5/14 . . . Code representation, e.g. transition, for a given bit cell depending on the information in one or more adjacent bit cells, e.g. delay modulation code, double density code

H03M 5/145 . . . . { Conversion to or from block codes or representations thereof }

H03M 5/16 . . the pulses having three levels

H03M 5/18 . . . two levels being symmetrical with respect to the third level, i.e. balanced bipolar ternary code

H03M 5/20 . . the pulses having more than three levels

H03M 5/22 . Conversion to or from representation by sinusoidal signals

H03M 7/00 **Conversion of a code where information is represented by a given sequence or number of digits to a code where the same information** { or similar information or a subset of information } **is represented by a different sequence or number of digits**

H03M 7/001 . { characterised by the elements used }

H03M 7/002 . . { using thin film devices }

H03M 7/003 . . { using superconductive devices }

H03M 7/004 . . { using magnetic elements, e.g. transfluxors }

H03M 7/005 . . { using semiconductor devices (H03M 7/006 takes precedence) }

H03M 7/006 . . { using diodes }

H03M 7/007 . . { using resistive or capacitive elements }

H03M 7/008 . . { using opto-electronic devices }

NOTE

In groups H03M 7/02 to H03M 7/50 , in the absence of an indication to the contrary, an invention is classified in the last appropriate place.

H03M 7/02 . Conversion to or from weighted codes, i.e. the weight given to a digit depending on the position of the digit within the block or code word { (Booth encoders G06F 7/52C2D1 , G06F 7/52C2D2A) }

H03M 7/04 . . the radix thereof being two

H03M 7/06 . . the radix thereof being a positive integer different from two

H03M 7/08 . . . the radix being ten, i.e. pure decimal code

H03M 7/10 . . the radix thereof being negative

H03M 7/12 . . having two radices, e.g. binary-coded-decimal code

H03M 7/14 . Conversion to or from non-weighted codes

H03M 7/16 . . Conversion to or from unit-distance codes, e.g. Gray code, reflected binary code

H03M 7/165 . . . { Conversion to or from thermometric code }

H03M 7/18 . . Conversion to or from residue codes

H03M 7/20 . . Conversion to or from n-out-of-m codes { (number-of-one counters G06F 7/607) }

H03M 7/22 . . . to or from one-out-of-m codes

H03M 7/24 . . Conversion to or from floating-point codes

H03M 7/26 . Conversion to or from stochastic codes

H03M 7/28 . Programmable structures, i.e. where the code converter contains apparatus which is operator-changeable to modify the conversion process

H03M 7/30 . Compression (speech analysis-synthesis for redundancy reduction G10L 19/00 ; for image communication H04N) ; Expansion ; Suppression of unnecessary data, e.g. redundancy reduction { (for data acquisition G06F 17/40 ; for image data processing G06T 9/00 ; redundancy reduction in data recording G11B 20/14 ; for transmission H04B 1/66) }

H03M 7/3002 . . { Conversion to or from differential modulation }

H03M 7/3004 . . . { Digital delta-sigma modulation }

H03M 7/3006 . . . . { Compensating for, or preventing of, undesired influence of physical parameters }

H03M 7/3008 . . . . . { by averaging out the errors, e.g. using dither }

H03M 7/3011 . . . . . { of non-linear distortion, e.g. by temporarily adapting the operation upon detection of instability conditions (avoiding instability by structural design H03M 7/3035) }

H03M 7/3013 . . . . { Non-linear modulators }

H03M 7/3015 . . . . { Structural details of digital delta-sigma modulators (H03M 7/3006 , H03M 7/3013 take precedence) }

H03M 7/3017 . . . . . { Arrangements specific to bandpass modulators }

H03M 7/302 . . . . . { characterised by the number of quantisers and their type and resolution }

H03M 7/3022 . . . . . { having multiple quantisers arranged in cascaded loops, each of the

second and further loops processing the quantisation error of the loop preceding it, i.e. multiple stage noise shaping [MASH] type }

H03M 7/3024 . . . . . { having one quantiser only }

H03M 7/3026 . . . . . { the quantiser being a multiple bit one }

H03M 7/3028 . . . . . { the quantiser being a single bit one }

H03M 7/3031 . . . . . { characterised by the order of the loop filter, e.g. having a first order loop filter in the feedforward path }

NOTE

In this group the order of the loop filters is considered to be the number of integrators for a baseband modulator and the number of resonators for a bandpass modulator respectively

H03M 7/3033 . . . . . { the modulator having a higher order loop filter in the feedforward path, e.g. with distributed feedforward inputs }

H03M 7/3035 . . . . . { with provisions for rendering the modulator inherently stable, e.g. by restricting the swing within the loop, by removing part of the zeroes using local feedback loops, by positioning zeroes outside the unit circle causing the modulator to operate in a chaotic regime }

H03M 7/3037 . . . . . { with weighted feedforward summation, i.e. with feedforward paths from more than one filter stage to the quantiser input }

H03M 7/304 . . . . . { with distributed feedback, i.e. with feedback paths from the quantiser output to more than one filter stage }

H03M 7/3042 . . . . . { the modulator being of the error feedback type, i.e. having loop filter stages in the feedback path only }

H03M 7/3044 . . . { Conversion to or from differential modulation with several bits only, i.e. the difference between successive samples being coded by more than one bit, e.g. differential pulse code modulation [DPCM] (H03M 7/3004 takes precedence; voice coding G10L 19/00 ; image coding H04N 7/26) }

H03M 7/3046 . . . . { adaptive, e.g. adaptive differential pulse code modulation [ADPCM] }

H03M 7/3048 . . . { Conversion to or from one-bit differential modulation only, e.g. delta modulation [DM] (H03M 7/3004 takes precedence) }

H03M 7/3051 . . . . { adaptive, e.g. adaptive delta modulation [ADM] }

H03M 7/3053 . . { Block-compounding PCM systems }

H03M 7/3055 . . { Conversion to or from Modulo-PCM }

H03M 7/3057 . . { Distributed Source coding, e.g. Wyner-Ziv, Slepian Wolf }

H03M 7/3059 . . { Digital compression and data reduction techniques where the original information is represented by a subset or similar information, e.g. lossy compression }

H03M 7/3062 . . . { Compressive sampling or sensing }

H03M 7/3064 . . . { Segmenting }

H03M 7/3066 . . { by means of a mask or a bit-map }

H03M 7/3068 . . { Precoding preceding compression, e.g. Burrows-Wheeler transformation }

H03M 7/3071 . . . { Prediction }

H03M 7/3073 . . . . { Time }

H03M 7/3075 . . . . { Space }

H03M 7/3077 . . . { Sorting }

H03M 7/3079 . . . { Context modeling }

H03M 7/3082 .. { Vector coding (for television signals, see H04N 7/28) }
H03M 7/3084 .. { using adaptive string matching, e.g. the Lempel-Ziv method }
H03M 7/3086 ... { employing a sliding window, e.g. LZ77 }
H03M 7/3088 ... { employing the use of a dictionary, e.g. LZ78 }
H03M 7/3091 ... { Data deduplication }
H03M 7/3093 .... { using fixed length segments }
H03M 7/3095 .... { using variable length segments }
H03M 7/3097 ... { Grammar codes }
H03M 7/40 .. Conversion to or from variable length codes, e.g. Shannon-Fano code, Huffman code, Morse code
H03M 7/4006 ... { Conversion to or from arithmetic code }
H03M 7/4012 .... { Binary arithmetic codes }
H03M 7/4018 ..... { Context adapative binary arithmetic codes [CABAC }]
H03M 7/4025 ... { constant length to or from Morse code conversion }
H03M 7/4031 ... { Fixed length to variable length coding }
H03M 7/4037 .... { Prefix coding }
H03M 7/4043 ..... { Adaptive prefix coding }
H03M 7/405 ..... { Tree adaptation }
H03M 7/4056 ..... { Coding table selection }
H03M 7/4062 ..... { Coding table adaptation }
H03M 7/4068 ..... { Parameterized codes }
H03M 7/4075 ..... { Golomb codes }
H03M 7/4081 ..... { Static prefix coding }
H03M 7/4087 ..... { Encoding of a tuple of symbols }
H03M 7/4093 ... { Variable length to variable length coding }
H03M 7/42 ... using table look-up for the coding or decoding process, e.g. using read-only memory { (H03M 7/4006 takes precedence) }
H03M 7/425 .... { for the decoding process only }
H03M 7/46 .. Conversion to or from run-length codes, i.e. by representing the number of consecutive digits, or groups of digits, of the same kind by a code word and a digit indicative of that kind
H03M 7/48 ... alternating with other codes during the code conversion process, e.g. run-length coding being performed only as long as sufficientlylong runs of digits of the same kind are present
H03M 7/50 .. Conversion to or from non-linear codes, e.g. companding
H03M 7/55 .. { Compression Theory, e.g. compression of random number, repeated compression }
H03M 7/60 .. { General implementation details not specific to a particular type of compression }
H03M 7/6005 ... { Decoder aspects }
H03M 7/6011 ... { Encoder aspects }
H03M 7/6017 ... { Methods or arrangements to increase the throughput }
H03M 7/6023 .... { Parallelization }
H03M 7/6029 .... { Pipelining }
H03M 7/6035 ... { Handling of unkown probabilities }

H03M 7/6041 . . . { Compression optimized for errors }
H03M 7/6047 . . . { Power optimization with respect to the encoder, decoder, storage or transmission }
H03M 7/6052 . . . { Synchronisation of encoder and decoder }
H03M 7/6058 . . . { Saving memory space in the encoder or decoder }
H03M 7/6064 . . . { Selection of Compressor }
H03M 7/607 . . . . { Selection between different types of compressors }
H03M 7/6076 . . . . { Selection between compressors of the same type }
H03M 7/6082 . . . . { Selection strategies }
H03M 7/6088 . . . . . { according to the data type }
H03M 7/6094 . . . . . { according to reasons other than compression rate and data type }
H03M 7/70 . . { Type of the data to be coded, other than image and sound }
H03M 7/702 . . . { Software }
H03M 7/705 . . . { Unicode }
H03M 7/707 . . . { Structured documents, XML }

H03M 9/00 **Parallel/series conversion or vice versa** (digital stores in which the information is moved stepwise per se G11C 19/00)

H03M 11/00 **Coding in connection with keyboards or like devices, i.e. coding of the position of operated keys** (keyboard switch arrangements, structural association of coders and keyboards H01H 13/70 , H03K 17/94)

H03M 11/003 . { Phantom keys detection and prevention }

H03M 11/006 . { Measures for preventing unauthorised decoding of keyboards }

H03M 11/02 . Details
H03M 11/04 . . Coding of multifunction keys
H03M 11/06 . . . by operating the multifunction key itself in different ways
H03M 11/08 . . . . by operating selected combinations of multifunction keys
H03M 11/10 . . . . by methods based on duration or pressure detection of keystrokes
H03M 11/12 . . . . by operating a key a selected number of consecutive times whereafter a separate enter key is used which marks the end of the series
H03M 11/14 . . . by using additional keys, e.g. shift keys, which determine the function performed by the multifunction key
H03M 11/16 . . . . wherein the shift keys are operated after the operation of the multifunction keys
H03M 11/18 . . . . wherein the shift keys are operated before the operation of the multifunction keys

H03M 11/20 . Dynamic coding, i.e. by key scanning (H03M 11/26 takes precedence)

H03M 11/22 . Static coding (H03M 11/26 takes precedence)
H03M 11/24 . . using analogue means

H03M 11/26 . using opto-electronic means

H03M 13/00 **Coding, decoding or code conversion, for error detection or error correction ; Coding theory basic assumptions ; Coding bounds ; Error probability evaluation methods ; Channel models ; Simulation or testing of codes** (error detection or error correction for analogue/digital, digital/analogue or code conversion H03M 1/00 to H03M 11/00 ; specially adapted for digital computers G06F 11/08 , for information storage based on relative movement between record carrier and transducer G11B , e.g. G11B 20/18 , for static stores G11C ; { use of error detection or error correction in transmission systems H04L 1/004 , in television systems H04N 7/0357 })

H03M 13/005 . { using punctured codes }

H03M 13/01 . Coding theory basic assumptions ; Coding bounds ; Error probability evaluation methods ; Channel models ; Simulation or testing of codes

H03M 13/015 . . { Simulation or testing of codes, e.g. bit error rate [BER } measurements]

WARNING

H03M 13/015 and H03M 13/036 are not complete, see provisionally also H03M 13/01

H03M 13/03 . Error detection or forward error correction by redundancy in data representation, i.e. code words containing more digits than the source words

H03M 13/033 . . { Theoretical methods to calculate these checking codes }

H03M 13/036 . . . { Heuristic code construction methods, i.e. code construction or code search based on using trial-and-error }

H03M 13/05 . . using block codes, i.e. a predetermined number of check bits joined to a predetermined number of information bits { (H03M 13/2906 takes precedence) }

H03M 13/07 . . . Arithmetic codes

WARNING

Not complete, see also G06F 11/10C

H03M 13/09 . . . Error detection only, e.g. using cyclic redundancy check [CRC] codes or single parity bit { (error detection or correction by redundancy in data representation G06F 11/08) }

WARNING

Not complete, see also G06F 11/10 B

H03M 13/091 . . . . { Parallel or block-wise CRC computation }

H03M 13/093 . . . . { CRC update after modification of the information word }

H03M 13/095 . . . . { Error detection codes other than CRC and single parity bit codes }

H03M 13/096 . . . . . { Checksums }

H03M 13/098 . . . . { using single parity bit }

H03M 13/11 . . . using multiple parity bits

H03M 13/1102 . . . . { Codes on graphs and decoding on graphs, e.g. low-density parity check [LDPC } codes]

H03M 13/1105 . . . . . { Decoding }

H03M 13/1108 . . . . . { Hard decision decoding, e.g. bit flipping, modified or weighted bit flipping }

H03M 13/1111 . . . . . { Soft-decision decoding, e.g. by means of message passing or belief propagation algorithms }

H03M 13/1114 . . . . . { Merged schedule message passing algorithm with storage of sums of check-to-bit node messages or sums of bit-to-check node messages, e.g. in order to increase the memory efficiency }

H03M 13/1117 . . . . . { using approximations for check node processing, e.g. an outgoing message is depending on the signs and the minimum over the magnitudes of all incoming messages according to the min-sum rule }

H03M 13/112 . . . . . { with correction functions for the min-sum rule, e.g. using an offset or a scaling factor }

H03M 13/1122 . . . . . { storing only the first and second minimum values per check node }

H03M 13/1125 . . . . . { using different domains for check node and bit node processing, wherein the different domains include probabilities, likelihood ratios, likelihood differences, log-likelihood ratios or log-likelihood difference pairs }

H03M 13/1128 . . . . . { Judging correct decoding and iterative stopping criteria other than syndrome check and upper limit for decoding iterations }

H03M 13/1131 . . . . . { Scheduling of bit node or check node processing }

H03M 13/1134 . . . . . { Full parallel processing, i.e. all bit nodes or check nodes are processed in parallel }

H03M 13/1137 . . . . . { Partly parallel processing, i.e. sub-blocks or sub-groups of nodes being processed in parallel }

H03M 13/114 . . . . . { Shuffled, staggered, layered or turbo decoding schedules }

H03M 13/1142 . . . . . { using trapping sets }

H03M 13/1145 . . . . . { Pipelined decoding at code word level, e.g. multiple code words being decoded simultaneously }

H03M 13/1148 . . . . . { Structural properties of the code parity-check or generator matrix }

H03M 13/1151 . . . . . { Algebraically constructed LDPC codes, e.g. LDPC codes derived from Euclidean geometries [EG-LDPC codes } (H03M 13/116 , H03M 13/1174 take precedence)]

H03M 13/1154 . . . . . { Low-density parity-check convolutional codes [LDPC-CC }]

H03M 13/1157 . . . . . { Low-density generator matrices [LDGM }]

H03M 13/116 . . . . . { Quasi-cyclic LDPC [QC-LDPC } codes, i.e. the parity-check matrix being composed of permutation or circulant sub-matrices]

H03M 13/1162 . . . . . { Array based LDPC codes, e.g. array codes }

H03M 13/1165 . . . . . { QC-LDPC codes as defined for the digital video broadcasting [DVB } specifications, e.g. DVB-Satellite [DVB-S2]]

H03M 13/1168 . . . . . { wherein the sub-matrices have column and row weights greater than one, e.g. multi-diagonal sub-matrices }

H03M 13/1171 . . . . . { Parity-check or generator matrices with non-binary elements, e.g. for non-binary LDPC codes }

H03M 13/1174 . . . . . { Parity-check or generator matrices built from sub-matrices representing known block codes such as e.g. Hamming codes, e.g. generalized LDPC codes }

H03M 13/1177 . . . . . { Regular LDPC codes with parity-check matrices wherein all rows and columns have the same row weight and column weight, respectively }

H03M 13/118 ..... { Parity check matrix structured for simplifying encoding , e.g. by having a triangular or an approximate triangular structure (H03M 13/1165 takes precedence) }

H03M 13/1182 ..... { wherein the structure of the parity-check matrix is obtained by reordering of a random parity-check matrix }

H03M 13/1185 ..... { wherein the parity-check matrix comprises a part with a double-diagonal }

H03M 13/1188 ..... { wherein in the part with the double-diagonal at least one column has an odd column weight equal or greater than three }

H03M 13/1191 ..... { Codes on graphs other than LDPC codes }

H03M 13/1194 ..... { Repeat-accumulate [RA } codes]

H03M 13/1197 ..... { Irregular repeat-accumulate [IRA } codes]

H03M 13/13 ... Linear codes

H03M 13/132 .... { Algebraic geometric codes, e.g. Goppa codes }

WARNING

H03M 13/13 A- H03M 13/138 are not complete, see provisionally also H03M 13/13

H03M 13/134 .... { Non-binary linear block codes not provided for otherwise }

H03M 13/136 .... { Reed-Muller [RM } codes]

H03M 13/138 .... { Codes linear in a ring, e.g. Z4-linear codes or Nordstrom-Robinson codes }

H03M 13/15 .... Cyclic codes, i.e. cyclic shifts of codewords produce other codewords, e.g. codes defined by a generator polynomial, Bose-Chaudhuri-Hocquenghem (BCH) codes (H03M 13/17 takes precedence)

H03M 13/1505 ..... { Golay Codes }

WARNING

H03M 13/1505 is not complete, see provisionally also H03M 13/15]

H03M 13/151 ..... { using error location or error correction polynomials }

H03M 13/1515 ..... { Reed-Solomon codes }

WARNING

H03M 13/1515 - H03M 13/1585 are not complete, see provisionally also H03M 13/15

H03M 13/152 ..... { Bose-Chaudhuri-Hocquenghem [BCH } codes]

H03M 13/1525 ..... { Determination and particular use of error location polynomials }

H03M 13/153 ..... { using the Berlekamp-Massey algorithm }

H03M 13/1535 ..... { using the Euclid algorithm }

H03M 13/154 ..... { Error and erasure correction, e.g. by using the error and erasure locator or Forney polynomial }

H03M 13/1545 ..... { Determination of error locations, e.g. Chien search or other methods or arrangements for the determination of the roots of the error locator polynomial }

H03M 13/155 ..... { Shortening or extension of codes }

H03M 13/1555 . . . . . { Pipelined decoder implementations }

H03M 13/156 . . . . . { Encoding or decoding using time-frequency transformations, e.g. fast Fourier transformation }

H03M 13/1565 . . . . . { Decoding beyond the bounded minimum distance [BMD }]

H03M 13/157 . . . . . { Polynomial evaluation, i.e. determination of a polynomial sum at a given value }

H03M 13/1575 . . . . . { Direct decoding, e.g. by a direct determination of the error locator polynomial from syndromes and subsequent analysis or by matrix operations involving syndromes, e.g. for codes with a small minimum Hamming distance }

H03M 13/158 . . . . . { Finite field arithmetic processing (methods or arrangements for finite field arithmetic G06F 7/72) }

H03M 13/1585 . . . . . { Determination of error values }

H03M 13/159 . . . . . { Remainder calculation, e.g. for encoding and syndrome calculation }

WARNING

H03M 13/159 and H03M 13/1595 are not complete, see provisionally also H03M 13/15

H03M 13/1595 . . . . . { Parallel or block-wise remainder calculation }

H03M 13/17 . . . . Burst error correction, e.g. error trapping, Fire codes

H03M 13/175 . . . . . { Error trapping or Fire codes }

WARNING

H03M 13/175 is not complete, see provisionally also H03M 13/17

H03M 13/19 . . . . Single error correction without using particular properties of the cyclic codes, e.g. Hamming codes, extended or generalised Hamming codes

WARNING

Not complete, see also G06F 11/1008

H03M 13/21 . . . Non-linear codes, e.g. m-bit data word to n-bit code word (mBnB) conversion with error detection or error correction

H03M 13/23 . . using convolutional codes, e.g. unit memory codes

H03M 13/235 . . . { Encoding of convolutional codes, e.g. methods or arrangements for parallel or block-wise encoding }

WARNING

H03M 13/235 is not complete, see provisionally also H03M 13/23

H03M 13/25 . Error detection or forward error correction by signal space coding, i.e. adding redundancy in the signal constellation, e.g. Trellis Coded Modulation [TCM] { (modulation codes H03M 13/31) }

H03M 13/251 . . { with block coding }

H03M 13/253 . . { with concatenated codes }

H03M 13/255 . . { with Low Density Parity Check (LDPC) codes }

H03M 13/256 . . { with trellis coding, e.g. with convolutional codes and TCM }

H03M 13/258 . . { with turbo codes, e.g. Turbo Trellis Coded Modulation (TTCM) }

H03M 13/27 . using interleaving techniques

H03M 13/2703 . . { the interleaver involving at least two directions }

H03M 13/2707 . . . { Simple row-column interleaver, i.e. pure block interleaving }

H03M 13/271 . . . { Row-column interleaver with permutations, e.g. block interleaving with inter-row, inter-column, intra-row or intra-column permutations }

H03M 13/2714 . . . . { Turbo interleaver for 3rd generation partnership project [3GPP } universal mobile telecommunications systems [UMTS], e.g. as defined in technical specification TS 25.212]

H03M 13/2717 . . . { the interleaver involves 3 or more directions }

H03M 13/2721 . . . { the interleaver involves a diagonal direction, e.g. by using an interleaving matrix with read-out in a diagonal direction }

H03M 13/2725 . . . { Turbo interleaver for 3rd generation partnership project 2 [3GPP2 } mobile telecommunication systems, e.g. as defined in the 3GPP2 technical specifications C.S0002]

H03M 13/2728 . . . { Helical type interleaver }

H03M 13/2732 . . { Convolutional interleaver; Interleavers using shift-registers or delay lines like e.g. Ramsey type interleaver }

H03M 13/2735 . . { Interleaver using powers of a primitive element, e.g. Galois field [GF } interleaver]

H03M 13/2739 . . { Permutation polynomial interleaver, e.g. quadratic permutation polynomial [QPP } interleaver and quadratic congruence interleaver]

H03M 13/2742 . . { Irregular interleaver wherein the permutation pattern is not obtained by a computation rule, e.g. interleaver based on random generators }

H03M 13/2746 . . . { S-random interleaver }

H03M 13/275 . . { Interleaver wherein the permutation pattern is obtained using a congruential operation of the type y=ax+b modulo c }

H03M 13/2753 . . . { Almost regular permutation [ARP } interleaver]

H03M 13/2757 . . { Interleaver with an interleaving rule not provided for in the subgroups H03M 13/2703 - H03M 13/2753 }

H03M 13/276 . . { Interleaving address generation }

H03M 13/2764 . . . { Circuits therefore }

H03M 13/2767 . . { Interleaver wherein the permutation pattern or a portion thereof is stored }

H03M 13/2771 . . { Internal interleaver for turbo codes (H03M 13/2714 and H03M 13/2725 take precedence) }

H03M 13/2775 . . . { Contention or collision free turbo code internal interleaver }

H03M 13/2778 . . { Interleaver using block-wise interleaving, e.g. the interleaving matrix is sub-divided into sub-matrices and the permutation is performed in blocks of sub-matrices }

H03M 13/2782 . . { Interleaver implementations, which reduce the amount of required interleaving memory }

H03M 13/2785 . . . { Interleaver using in-place interleaving, i.e. writing to and reading from the memory is performed at the same memory location }

H03M 13/2789 . . { Interleaver providing variable interleaving, e.g. variable block sizes }

H03M 13/2792 . . { Interleaver wherein interleaving is performed jointly with another technique such as puncturing, multiplexing or routing }

H03M 13/2796 . . . { Two or more interleaving operations are performed jointly, e.g. the first and

second interleaving operations defined for 3GPP UMTS are performed jointly in a single interleaving operation }

H03M 13/29 . combining two or more codes or code structures, e.g. product codes, generalised product codes, concatenated codes, inner and outer codes

H03M 13/2903 . . { Methods and arrangements specifically for encoding, e.g. parallel encoding of a plurality of constituent codes }

WARNING

H03M 13/2903 is not complete, see provisionally also H03M 13/29

H03M 13/2906 . . { using block codes (H03M 13/2957 takes precedence) }

H03M 13/2909 . . . { Product codes }

WARNING

H03M 13/2909 - H03M 13/293 are not complete, see provisionally also H03M 13/29

H03M 13/2912 . . . . { omitting parity on parity }

H03M 13/2915 . . . . { with an error detection code in one dimension }

H03M 13/2918 . . . { with error correction codes in three or more dimensions, e.g. 3-dimensional product code where the bits are arranged in a cube }

H03M 13/2921 . . . { wherein error correction coding involves a diagonal direction }

H03M 13/2924 . . . . { Cross interleaved Reed-Solomon codes [CIRC }]

H03M 13/2927 . . . { Decoding strategies }

H03M 13/293 . . . . { with erasure setting }

H03M 13/2933 . . { using a block and a convolutional code (H03M 13/2957 takes precedence) }

WARNING

H03M 13/29 C- H03M 13/2954 are not complete, see provisionally also H03M 13/29

H03M 13/2936 . . . { comprising an outer Reed-Solomon code and an inner convolutional code }

H03M 13/2939 . . { using convolutional codes (H03M 13/2957 takes precedence) }

H03M 13/2942 . . { wherein a block of parity bits is computed only from combined information bits or only from parity bits, e.g. a second block of parity bits is computed from a first block of parity bits obtained by systematic encoding of a block of information bits, or a block of parity bits is obtained by an XOR combination of sub-blocks of information bits }

H03M 13/2945 . . { using at least three error correction codes (H03M 13/2957 takes precedence) }

H03M 13/2948 . . { Iterative decoding (H03M 13/2957 takes precedence) }

H03M 13/2951 . . . { using iteration stopping criteria }

H03M 13/2954 . . { using Picket codes or other codes providing error burst detection capabilities, e.g. burst indicator codes and long distance codes [LDC }]

H03M 13/2957 . . { Turbo codes and decoding }

NOTE

This group covers also aspects when a component code is replaced by a non-coded constraint, e.g. like in joint turbo decoding and detection

H03M 13/296 . . . { Particular turbo code structure }

NOTE

this group covers hybrid parallel and serial concatenated turbo code structures and other unusual code structures that do not fit into H03M 13/2963 - H03M 13/2972

H03M 13/2963 . . . . { Turbo-block codes, i.e. turbo codes based on block codes, e.g. turbo decoding of product codes }

H03M 13/2966 . . . . { Turbo codes concatenated with another code, e.g. an outer block code }

H03M 13/2969 . . . . { Non-binary turbo codes }

H03M 13/2972 . . . . { Serial concatenation using convolutional component codes }

H03M 13/2975 . . . { Judging correct decoding, e.g. iteration stopping criteria (stopping criteria for iterative decoding, see also H04L 1/00B5T1) }

H03M 13/2978 . . . { Particular arrangement of the component decoders }

H03M 13/2981 . . . . { using as many component decoders as component codes }

H03M 13/2984 . . . . { using less component decoders than component codes, e.g. multiplexed decoders and scheduling thereof }

H03M 13/2987 . . . . { using more component decoders than component codes, e.g. pipelined turbo iterations }

H03M 13/299 . . . { Turbo codes with short blocks }

H03M 13/2993 . . . { Implementing the return to a predetermined state, i.e. trellis termination }

H03M 13/2996 . . . { Tail biting }

H03M 13/31 . combining coding for error detection or correction and efficient use of the spectrum (without error detection or correction H03M 5/14 , { H03M 5/145 })

H03M 13/33 . Synchronisation based on error coding or decoding { (for transmission H04L 7/048) }

WARNING

Groups H03M 13/33 F- H03M 13/336 are not complete pending reclassification; see also this group

H03M 13/333 . . { Synchronisation on a multi-bit block basis, e.g. frame synchronisation }

WARNING

H03M 13/33 F- H03M 13/336 are not complete, see provisionally also H03M 13/33

H03M 13/336 . . { Phase recovery }

H03M 13/35 . Unequal or adaptive error protection, e.g. by providing a different level of protection according to significance of source information or by adapting the coding according to the change of transmission channel characteristics

H03M 13/353 . . { Adaptation to the channel }

WARNING

H03M 13/353 and H03M 13/356 are not complete, see provisionally also H03M 13/35

H03M 13/356 . . { Unequal error protection [UEP }]

H03M 13/37 . Decoding methods or techniques, not specific to the particular type of coding provided for in groups H03M 13/03 to H03M 13/35

H03M 13/3707 . . { Adaptive decoding and hybrid decoding, e.g. decoding methods or techniques providing more than one decoding algorithm for one code }

WARNING

H03M 13/37 A- H03M 13/3792 are not complete, see provisionally also H03M 13/37

H03M 13/3715 . . . { Adaptation to the number of estimated errors or to the channel state }

H03M 13/3723 . . { using means or methods for the initialisation of the decoder }

H03M 13/373 . . { with erasure correction and erasure determination, e.g. for packet loss recovery or setting of erasures for the decoding of Reed-Solomon codes }

H03M 13/3738 . . { with judging correct decoding }

H03M 13/3746 . . { with iterative decoding }

H03M 13/3753 . . . { using iteration stopping criteria }

H03M 13/3761 . . { using code combining, i.e. using combining of codeword portions which may have been transmitted separately, e.g. Digital Fountain codes, Raptor codes or Luby Transform [LT } codes]

H03M 13/3769 . . { using symbol combining, e.g. Chase combining of symbols received twice or more }

H03M 13/3776 . . { using a re-encoding step during the decoding process }

H03M 13/3784 . . { for soft-output decoding of block codes }

H03M 13/3792 . . { for decoding of real number codes }

H03M 13/39 . . Sequence estimation, i.e. using statistical methods for the reconstruction of the original codes

H03M 13/3905 . . . { Maximum a posteriori probability (MAP) decoding and approximations thereof based on trellis or lattice decoding, e.g. forward-backward algorithm, log-MAP decoding, max-log-MAP decoding; MAP decoding also to be found in H04L 1/0055 }

H03M 13/3911 . . . . { Correction factor, e.g. approximations of the exp(1+x) function }

H03M 13/3916 . . . . { for block codes using a trellis or lattice }

H03M 13/3922 . . . . { Add-Compare-Select (ACS) operation in forward or backward recursions }

H03M 13/3927 . . . . { Log-Likelihood Ratio (LLR) computation by combination of forward and backward metrics into LLRs }

H03M 13/3933 . . . . { Decoding in probability domain }

H03M 13/3938 . . . . { Tail-biting (H03M 13/2996 takes precedence) }

H03M 13/3944 . . . { for block codes, especially trellis or lattice decoding thereof }

WARNING

H03M 13/39 B- H03M 13/3994 are not complete, see provisionally also H03M 13/39

H03M 13/395	. . .	{ using a collapsed trellis, e.g. M-step algorithm, radix-n architectures with n>2 }
H03M 13/3955	. . .	{ using a trellis with a reduced state space complexity, e.g. M-algorithm or T-algorithm }
H03M 13/3961	. . .	{ Arrangements of methods for branch or transition metric calculation }
H03M 13/3966	. . .	{ based on architectures providing a highly parallelized implementation, e.g. based on systolic arrays }
H03M 13/3972	. . .	{ using sliding window techniques or parallel windows }
H03M 13/3977	. . .	{ using sequential decoding, e.g. the Fano or stack algorithms }
H03M 13/3983	. . .	{ for non-binary convolutional codes }
H03M 13/3988	. . .	{ for rate k/n convolutional codes, with k>1, obtained by convolutional encoders with k inputs and n outputs }
H03M 13/3994	. . .	{ using state pinning or decision forcing, i.e. the decoded sequence is forced through a particular trellis state or a particular set of trellis states or a particular decoded symbol }
H03M 13/41	. . .	using the Viterbi algorithm or Viterbi processors
H03M 13/4107	. . . .	{ implementing add, compare, select (ACS) operations }
H03M 13/4115	. . . .	{ list output Viterbi decoding }
H03M 13/4123	. . . .	{ implementing the return to a predetermined state }
H03M 13/413	. . . .	{ tail biting Viterbi decoding }
H03M 13/4138	. . . .	{ soft-output Viterbi algorithm based decoding, i.e. Viterbi decoding with weighted decisions }
H03M 13/4146	. . . . .	{ soft-output Viterbi decoding according to Battail and Hagenauer in which the soft-output is determined using path metric differences along the maximum-likelihood path, i.e. "SOVA" decoding }
H03M 13/4153	. . . . .	{ two-step SOVA decoding, i.e. the soft-output is determined by a second traceback operation after the determination of the hard decision like in the Berrou decoder }
H03M 13/4161	. . . .	{ implementing path management }
H03M 13/4169	. . . . .	{ using traceback (H03M 13/4192 takes precedence) }
H03M 13/4176	. . . . .	{ using a plurality of RAMs, e.g. for carrying out a plurality of traceback implementations simultaneously }
H03M 13/4184	. . . . .	{ using register-exchange (H03M 13/4192 takes precedence) }
H03M 13/4192	. . . . .	{ using combined traceback and register-exchange }
H03M 13/42	. . .	{ MAP decoding or approximations thereof based on trellis or lattice decoding, e.g. forward-backward algorithm, log-MAP decoding, max-log-MAP decoding (see also H04L 1/0055) }
H03M 13/43	. .	Majority logic or threshold decoding
H03M 13/45	. .	Soft decoding, i.e. using symbol reliability information (H03M 13/41 takes precedence)
H03M 13/451	. . .	{ using a set of candidate code words, e.g. ordered statistics decoding [OSD }]

WARNING

H03M 13/45 C- H03M 13/458 are not complete, see provisionally also

H03M 13/45

H03M 13/453 .... { wherein the candidate code words are obtained by an algebraic decoder, e.g. Chase decoding }

H03M 13/455 ..... { using a set of erasure patterns or successive erasure decoding, e.g. generalized minimum distance [GMD } decoding]

H03M 13/456 .... { wherein all the code words of the code or its dual code are tested, e.g. brute force decoding }

H03M 13/458 ... { by updating bit probabilities or hard decisions in an iterative fashion for convergence to a final decoding result }

H03M 13/47 . Error detection, forward error correction or error protection, not provided for in groups H03M 13/01 to H03M 13/37

H03M 13/49 .. Unidirectional error detection or correction

H03M 13/51 .. Constant weight codes ; n-out-of-m codes ; Berger codes

H03M 13/53 .. Codes using Fibonacci numbers series

H03M 13/61 . { Aspects and characteristics of methods and arrangements for error correction or error detection, not provided for otherwise }

WARNING

H03M 13/61 - H03M 13/6597 are not complete, see provisionally also H03M 13/61 , H03M 13/63 and H03M 13/65

H03M 13/611 .. { Specific encoding aspects, e.g. encoding by means of decoding }

H03M 13/612 .. { Aspects specific to channel or signal-to-noise ratio estimation (H03M 13/63 takes precedence) }

H03M 13/613 .. { Use of the dual code }

H03M 13/615 .. { Use of computational or mathematical techniques }

H03M 13/616 ... { Matrix operations, especially for generator matrices or check matrices, e.g. column or row permutations }

H03M 13/617 ... { Polynomial operations, e.g. operations related to generator polynomials or parity-check polynomials }

H03M 13/618 .. { Shortening and extension of codes }

H03M 13/63 . { Joint error correction and other techniques (H03M 13/31 and H03M 13/33 take precedence) }

H03M 13/6306 .. { Error control coding in combination with Automatic Repeat reQuest [ARQ } and diversity transmission, e.g. coding schemes for the multiple transmission of the same information or the transmission of incremental redundancy (H03M 13/3761 , H03M 13/3769 and H03M 13/635 take precedence; ARQ schemes in general H04L 1/18)]

H03M 13/6312 .. { Error control coding in combination with data compression }

H03M 13/6318 ... { using variable length codes }

H03M 13/6325 .. { Error control coding in combination with demodulation }

H03M 13/6331 .. { Error control coding in combination with equalisation }

H03M 13/6337 .. { Error control coding in combination with channel estimation }

H03M 13/6343 .. { Error control coding in combination with techniques for partial response channels,

e.g. recording }

H03M 13/635 .. { Error control coding in combination with rate matching }
H03M 13/6356 ... { by repetition or insertion of dummy data, i.e. rate reduction }
H03M 13/6362 ... { by puncturing }
H03M 13/6368 .... { using rate compatible puncturing or complementary puncturing }
H03M 13/6375 ..... { Rate compatible punctured convolutional [RCPC } codes]
H03M 13/6381 ..... { Rate compatible punctured turbo [RCPT } codes]
H03M 13/6387 ..... { Complementary punctured convolutional [CPC } codes]
H03M 13/6393 ..... { Rate compatible low-density parity check [LDPC } codes]

H03M 13/65 . { Purpose and implementation aspects }
H03M 13/6502 .. { Reduction of hardware complexity or efficient processing }
H03M 13/6505 ... { Memory efficient implementations }
H03M 13/6508 .. { Flexibility, adaptability, parametrability and configurability of the implementation }
H03M 13/6511 ... { Support of multiple decoding rules, e.g. combined MAP and Viterbi decoding }
H03M 13/6513 ... { Support of multiple code types, e.g. unified decoder for LDPC and turbo codes }
H03M 13/6516 ... { Support of multiple code parameters, e.g. generalized Reed-Solomon decoder for a variety of generator polynomials or Galois fields }
H03M 13/6519 ... { Support of multiple transmission or communication standards }
H03M 13/6522 .. { Intended application, e.g. transmission or communication standard }
H03M 13/6525 ... { 3GPP LTE including E-UTRA }
H03M 13/6527 ... { IEEE 802.11 (WLAN) }
H03M 13/653 ... { 3GPP HSDPA, e.g. HS-SCCH or DS-DSCH related }
H03M 13/6533 ... { ITU 992.X (ADSL) }
H03M 13/6536 ... { GSM GPRS }
H03M 13/6538 ... { ATSC VBS systems }
H03M 13/6541 ... { DVB-H and DVB-M }
H03M 13/6544 ... { IEEE 802.16 (WIMAX and broadband wireless access) }
H03M 13/6547 ... { TCP, UDP, IP and associated protocols, e.g. RTP }
H03M 13/655 ... { UWB OFDM }
H03M 13/6552 ... { DVB-T2 }
H03M 13/6555 ... { DVB-C2 }
H03M 13/6558 ... { 3GPP2 }
H03M 13/6561 .. { Parallelized implementations }
H03M 13/6563 .. { Implementations using multi-port memories }
H03M 13/6566 .. { Implementations concerning memory access contentions }
H03M 13/6569 .. { Implementation on processors, e.g. DSPs, or software implementations }
H03M 13/6572 .. { Implementations using a tree structure, e.g. implementations in which the complexity is reduced by a tree structure from O(n) to O (log(n)) }
H03M 13/6575 .. { Implementations based on combinatorial logic, e.g. boolean circuits }
H03M 13/6577 .. { Representation or format of variables, register sizes or word-lengths and quantization }
H03M 13/658 ... { Scaling by multiplication or division }

H03M 13/6583 . . . { Normalization other than scaling, e.g. by subtraction }

H03M 13/6586 . . . . { Modulo/modular normalization, e.g. 2's complement modulo implementations }

H03M 13/6588 . . . { Compression or short representation of variables }

H03M 13/6591 . . . { Truncation, saturation and clamping }

H03M 13/6594 . . . { Non-linear quantization }

H03M 13/6597 . . { Implementations using analogue techniques for coding or decoding, e.g. analogue Viterbi decoder }

H03M 99/00 **Subject matter not provided for in other groups of this subclass**

Guidance heading:

H03M 2201/00 **Indexing scheme relating to A/D or D/A conversion**

NOTE

As this scheme is obtained by conversion from the former deep indexing system RM03 it reflects the several editions of that system in the following way:

- code symbols added at subsequent editions are indicated by numbers [2] or [3] in square brackets, the code symbols present from the first edition on having no indication;
- headers which did not have a code symbol in the RM03 system and thus could not be assigned to documents, but which need a code symbol in the ICO system for the purpose of a correct hierarchical order, are indicated by the symbol [H];
- the edition according to which a document has been indexed is indicated by the assignment of one of code symbols H03M 2201/01 through H03M 2201/03 to that document. In principle, therefore, a search should include a separate combination of appropriate code symbols for each edition, each combination including one of codes H03M 2201/01 through H03M 2201/03 .
On an incidental base, however, code symbols from later editions have been assigned to documents indexed according to an earlier edition.

WARNING

The use of this indexing scheme has been discontinued for all documents published later than 1989.

H03M 2201/01 . First edition

H03M 2201/02 . Second edition

H03M 2201/03 . Third edition

H03M 2201/10 . Conversion systems

H03M 2201/11 . . A/D conversion systems

H03M 2201/1109 . . . Servo-systems for A/D conversion
H03M 2201/1118 . . . . without D/A converter in feedback [3]
H03M 2201/1127 . . . . in which the digital generator is adjusted in a predetermined direction regardless of the sign of the error
H03M 2201/1136 . . . . with auxiliary A/D conversion of the error signal
H03M 2201/1145 . . . . with intermediate conversion of the error to frequency [2]
H03M 2201/1154 . . . . using a counter as digital generator
H03M 2201/1163 . . . . . the counter being a reversible one
H03M 2201/1172 . . . Subranging, i.e. conversion in steps each delivering plural digits of the output signal [2]
H03M 2201/1181 . . . . with scaling between the steps [2]
H03M 2201/119 . . . . using an auxiliary D/A converter [2]
H03M 2201/12 . . D/A conversion systems
H03M 2201/122 . . . Servo-systems for D/A conversion
H03M 2201/124 . . . . in which the analogue generator is adjusted in a predetermined direction regardless of the sign of the error
H03M 2201/126 . . . . with auxiliary D/A conversion of the error signal
H03M 2201/128 . . . . using a servomotor as analogue generator
H03M 2201/13 . . A/D convertible into D/A
H03M 2201/14 . . Scale factor modification
H03M 2201/145 . . . using an auxiliary D/A or A/D converter [2]
H03M 2201/16 . . Coarse and fine conversions
H03M 2201/162 . . . by interpolation other than subranging [2]
H03M 2201/165 . . . . Vernier or Nonius type interpolation [3]
H03M 2201/167 . . . with overlapping ranges
H03M 2201/17 . . Multiplexing
H03M 2201/173 . . . Timesharing, i.e. using a single converter or part for multiple channels [3]
H03M 2201/176 . . . Interleaving, i.e. using multiple converters or parts for one channel [3]
H03M 2201/19 . . Applications [H]
H03M 2201/192 . . . Measuring systems
H03M 2201/194 . . . Control systems
H03M 2201/196 . . . Communications systems
H03M 2201/198 . . . Computing systems

H03M 2201/20 . A/D converters
H03M 2201/21 . . Digital pattern reading type
H03M 2201/2103 . . . Characteristics of the coding [H]
H03M 2201/2107 . . . . Providing an absolute position [3]
H03M 2201/2111 . . . . . using a pure representation
H03M 2201/2114 . . . . . with denominational arrangement
H03M 2201/2118 . . . . . on one track [3]
H03M 2201/2122 . . . . . with plural readers per track [2]
H03M 2201/2125 . . . . Providing an incremental position

H03M 2201/2129 ..... with additional synchronisation marks
H03M 2201/2133 ..... with directional discrimination
H03M 2201/2137 .... Providing real and complementary signals
H03M 2201/214 .... Anti-ambiguity arrangements
H03M 2201/2144 ..... V-arrangement of readers [2]
H03M 2201/2148 ... Characteristics of the pattern carriers of readers [H]
H03M 2201/2151 .... Type of pattern carrier or reader means
H03M 2201/2155 ..... Mechanical
H03M 2201/2159 ..... Switches ; commutators
H03M 2201/2162 ..... formed by a printed circuit pattern
H03M 2201/2166 ..... Cathodes ray tubes
H03M 2201/217 ..... Capacitive
H03M 2201/2174 ..... Magnetic
H03M 2201/2177 ..... using a recorded pattern
H03M 2201/2181 ..... using variable reluctance
H03M 2201/2185 ..... Photoelectric
H03M 2201/2188 ..... by generating an interference pattern [2]
H03M 2201/2192 ..... Radiation other than visible light
H03M 2201/2196 .... Constructional details
H03M 2201/22 .. Analogue comparing type
H03M 2201/2208 ... with separate comparision for each quantization level
H03M 2201/2216 .... with parallel operation, i.e. flash type [2]
H03M 2201/2225 ... with separate comparison for each denomination [3]
H03M 2201/2233 .... with serial operation, i.e. successive approximation type
H03M 2201/2241 ..... using a single stage
H03M 2201/225 ..... using plural stages
H03M 2201/2258 ..... with free-running operation [2]
H03M 2201/2266 ..... in which the reference is modified at each step or stage
H03M 2201/2275 ..... in which the input is modified at each step or stage
H03M 2201/2283 ..... with scaling between the steps or stages
H03M 2201/2291 ..... with auxiliary D/A converter
H03M 2201/23 .. Intermediate conversion to time interval type
H03M 2201/2305 ... in which a reference signal sweeps through the range of possible values
H03M 2201/2311 .... using a continuously varying analogue reference signal, e.g. a sawtooth signal
H03M 2201/2316 ..... in which the digital signal is produced from the reference signal by an auxiliary A/D converter
H03M 2201/2322 .... using a stepwise varying analogue reference signal, e.g. a staircase signal
H03M 2201/2327 ..... in which the reference signal is produced by stepwise charging or discharging a capacitor
H03M 2201/2333 ..... in which the reference signal is produced from the digital generator using an auxiliary D/A converter
H03M 2201/2338 ... in which the input signal or a signal derived therefrom is reduced or increased until a predetermined reference value is reached

H03M 2201/2344 .... the input signal or its derivative varying continuously
H03M 2201/235 ..... Single slope type [3]
H03M 2201/2355 ..... Dual slope type, i.e. charge balancing type [3]
H03M 2201/2361 .... the input signal or its derivative varying stepwise
H03M 2201/2366 ... with intermediate conversion to pulse width [3]
H03M 2201/2372 ... with intermediate conversion to phase or time of phase reversal
H03M 2201/2377 ... Input sampling without holding [3]
H03M 2201/2383 ... Input sampling combined with integration [2]
H03M 2201/2388 ... the time interval consisting of multiple subintervals [2]
H03M 2201/2394 ... Interval or phase digitising without counting [2]
H03M 2201/24 .. Intermediate conversion to pulse frequency type
H03M 2201/241 ... using a free running oscillator [2]
H03M 2201/243 ... using a reset integrator [2]
H03M 2201/245 ... using a unit discharge integrator, i.e. charge balancing type [2]
H03M 2201/246 ... using a clock operated generator [2]
H03M 2201/248 ... using a reversible counter [2]

H03M 2201/30 . D/A converters
H03M 2201/31 .. Selection, addition or subtraction of quantisation values
H03M 2201/3105 ... Successive addition or subtraction of selected values
H03M 2201/311 .... with plural stages
H03M 2201/3115 ... Simultaneous addition or subtraction of selected values
H03M 2201/3121 .... the values having different weights [3]
H03M 2201/3126 .... the values having equal weights [3]
H03M 2201/3131 ... Direct selection from all possible values
H03M 2201/3136 ... Specific network arrangement
H03M 2201/3142 .... Series network
H03M 2201/3147 .... Parallel network [3]
H03M 2201/3152 .... Comb network, e.g. R-2R ladder [3]
H03M 2201/3157 ... Specific kinds of quantisation values
H03M 2201/3163 .... Impedances [H]
H03M 2201/3168 ..... Resistors
H03M 2201/3173 ..... Inductors
H03M 2201/3178 ..... Capacitors
H03M 2201/3184 ..... Phase shifters
H03M 2201/3189 .... Voltage sources [3]
H03M 2201/3194 .... Current sources [3]
H03M 2201/32 .. Intermediate conversion to time interval type
H03M 2201/322 ... characterised by the way in which the time interval is generated [H]
H03M 2201/324 .... using a digital comparator for generating the time interval [2]
H03M 2201/326 .... Time interval generation without counting [2]
H03M 2201/328 .... the time interval consisting of multiple subintervals [2]

H03M 2201/33 .. Intermediate conversion to pulse frequency type [2]

H03M 2201/40 . Information representation [H]
H03M 2201/41 .. Analogue signals
H03M 2201/4105 ... Positive/negative indication
H03M 2201/411 ... Ensemble of signals belonging together [3]
H03M 2201/4115 ... Position signals
H03M 2201/412 .... representing linear position
H03M 2201/4125 .... representing angular position
H03M 2201/413 ... Electrical signals
H03M 2201/4135 .... Momentary value
H03M 2201/414 ..... Random pulses [2]
H03M 2201/4145 .... Modulated carrier [H]
H03M 2201/415 ..... Amplitude modulated carrier
H03M 2201/4155 ..... Phase modulated carrier
H03M 2201/416 ..... Frequency modulated carrier
H03M 2201/4165 .... Modulated pulses [H]
H03M 2201/417 ..... Amplitude modulated pulses
H03M 2201/4175 ..... Time modulated pulses
H03M 2201/418 ..... Width modulated pulses
H03M 2201/4185 ..... Frequency modulated pulses
H03M 2201/419 ... Light signals [2]
H03M 2201/4195 ... Temperature signals [2]
H03M 2201/42 .. Digital signals [H]
H03M 2201/4204 ... positive/negative indication
H03M 2201/4208 ... Temporal or spatial distribution [H]
H03M 2201/4212 .... Serial
H03M 2201/4216 .... Serial-parallel
H03M 2201/422 .... Parallel-serial
H03M 2201/4225 .... Parallel
H03M 2201/4229 ... Elementary signals [H]
H03M 2201/4233 .... Bivalued
H03M 2201/4237 .... Multivalued
H03M 2201/4241 .... other than amplitude, e.g. frequency, phase [2]
H03M 2201/4245 ... Denominational arrangements [H]
H03M 2201/425 .... Non-denominational
H03M 2201/4254 ..... One-bit information [2]
H03M 2201/4258 .... Denominational
H03M 2201/4262 ..... Binary radix
H03M 2201/4266 ..... Decimal radix
H03M 2201/427 ..... Floating-point representation [2]
H03M 2201/4275 ... Coding [H]

H03M 2201/4279 .... Pure
H03M 2201/4283 ..... x-out-of-n code, i.e. value x,x=0,...,n, is represented by x bits being ONE within a total of n bits [2]
H03M 2201/4287 .... Combination code other than those forming a straight power series
H03M 2201/4291 ..... Unit distance code
H03M 2201/4295 ..... Pattern shifting code

H03M 2201/50 . Additional conversions [H]
H03M 2201/51 .. Analogue conversions
H03M 2201/512 ... Mechanical/electrical
H03M 2201/514 ... Electrical/other electrical
H03M 2201/516 .... Impedance/voltage or current [2]
H03M 2201/518 ... with analogue feedback
H03M 2201/52 .. Digital conversions
H03M 2201/521 ... Bivalued/multivalued
H03M 2201/522 ... Non-denominational/denominational ; Pure/combination code
H03M 2201/523 ... between different combination codes ; between different radices
H03M 2201/524 .... Binary/decimal
H03M 2201/525 .... Normal/reflected
H03M 2201/526 ... Parallel/serial
H03M 2201/527 ... Rounding
H03M 2201/528 ... Complementing or inverting [3]
H03M 2201/53 .. Non-linear conversions
H03M 2201/531 ... outside the actual A/D or D/A [2]
H03M 2201/532 ... Specific type of non-linearity
H03M 2201/533 .... Goniometric
H03M 2201/534 .... Logarithmic, exponential
H03M 2201/535 .... Maximum, minimum
H03M 2201/536 .... Average
H03M 2201/537 .... Integration
H03M 2201/538 .... Differentiation
H03M 2201/539 .... Hyperbolic

H03M 2201/60 . Fidelity improvement
H03M 2201/61 .. Adjustment or control means [H]
H03M 2201/6107 ... Operation method [H]
H03M 2201/6114 .... Manual
H03M 2201/6121 .... Automatic
H03M 2201/6128 .... in feedforward mode [3]
H03M 2201/6135 .... in feedback mode [3]
H03M 2201/6142 ... Means used [H]
H03M 2201/615 .... Compensation [3]
H03M 2201/6157 ..... with auxiliary D/A or A/D conversion [2]

H03M 2201/6164 . . . . . using stored correction values (for previous editions, see provisionally H03M 2201/72) [3]
H03M 2201/6171 . . . . . using a computer for more than just storing (for previous editions, see provisionally H03M 2201/72) [3]
H03M 2201/6178 . . . . Dither [3]
H03M 2201/6185 . . . . Interpolation (for fine conversions H03M 2201/1172 , T03M 201/12B , H03M 2201/162) [3]
H03M 2201/6192 . . . . Redundancy [3]
H03M 2201/62 . . Precision improvement ; Layout optimisation [2]
H03M 2201/622 . . . Accuracy improvement [3]
H03M 2201/625 . . . Resolution enhancement [3]
H03M 2201/627 . . . . using an n-bit converter for obtaining a resolution of more than n bits [3]
H03M 2201/63 . . Calibration ; Deviation correction [2]
H03M 2201/6309 . . . Timing [H]
H03M 2201/6318 . . . . in-between normal conversions [3]
H03M 2201/6327 . . . . during normal conversions [3]
H03M 2201/6336 . . . . . periodically [3]
H03M 2201/6345 . . . Type of correction [H]
H03M 2201/6354 . . . . Component mismatch correction [3]
H03M 2201/6363 . . . . Mechanical alignment [3]
H03M 2201/6372 . . . . Linearisation of non-linear characteristic [3]
H03M 2201/6381 . . . . Gain, i.e. slope deviation correction [3]
H03M 2201/639 . . . . Offset or drift correction (for the second edition, see provisionally H03M 2201/64) [3]
H03M 2201/64 . . Noise reduction [2]
H03M 2201/641 . . . Type of noise [H]
H03M 2201/642 . . . . Quantisation noise [3]
H03M 2201/643 . . . . Power supply variations, e.g. ripple [3]
H03M 2201/644 . . . . Switching transients, e.g. glitches [3]
H03M 2201/645 . . . Method [3]
H03M 2201/646 . . . . Filtering [H]
H03M 2201/647 . . . . . on input [3]
H03M 2201/648 . . . . . Output smoothing
H03M 2201/65 . . Error detection or correction [2]
H03M 2201/652 . . . out-of-range indication [3]
H03M 2201/655 . . . Power failure [3]
H03M 2201/657 . . . Testing [3]

H03M 2201/70 . Additional functions
H03M 2201/71 . . Sampling ; Holding [3]
H03M 2201/711 . . . Place [H]
H03M 2201/712 . . . . at input
H03M 2201/713 . . . . at output [2]
H03M 2201/714 . . . Means [H]

H03M 2201/715 . . . . Electrical
H03M 2201/716 . . . . Mechanical
H03M 2201/717 . . . . Optical [3]
H03M 2201/718 . . . . Digital latching, e.g. of bits applied to a D/A converter [3]
H03M 2201/72 . . Computing
H03M 2201/721 . . . Multiplying, e.g. MDAC [3]
H03M 2201/722 . . . Dividing, e.g. ratiometric [3]
H03M 2201/723 . . . Pre- or post-treatment [3]
H03M 2201/725 . . . . Numerical [3]
H03M 2201/726 . . . . Analogue [3]
H03M 2201/727 . . . Computer as part of converter [3]
H03M 2201/728 . . . . Conversion partially by software [3]
H03M 2201/73 . . Accelerated conversion [2]
H03M 2201/75 . . Synchronisation [3]
H03M 2201/76 . . Pipelining [3]
H03M 2201/77 . . Feedback means not provided for elsewhere [3]
H03M 2201/78 . . Prediction [3]
H03M 2201/79 . . Time recording

H03M 2201/80 . Components, circuits or devices used with or within A/D or D/A converters but not disclosed in detail and not provided for elsewhere [H]

NOTE

The codes of this subgroup should be assigned only insofar as the component, circuit or device concerned is not usual for the type of converter concerned, e.g. an intermediate time interval type A/D converter usually has a counter which therefore need not be indexed in this subgroup.

H03M 2201/81 . . Electrical components
H03M 2201/8104 . . . Discharge tubes
H03M 2201/8108 . . . . Vacuum tubes
H03M 2201/8112 . . . . Gaseous tubes
H03M 2201/8116 . . . . Counting tubes ; Beam switching tubes
H03M 2201/812 . . . . Cathode ray tubes
H03M 2201/8124 . . . Semiconductor devices
H03M 2201/8128 . . . . Diodes
H03M 2201/8132 . . . . Transistors
H03M 2201/8136 . . . . . bipolar [3]
H03M 2201/814 . . . . . FET (varistors H03M 2201/8156) [2]
H03M 2201/8144 . . . . Zener diodes
H03M 2201/8148 . . . . Tunnel diodes
H03M 2201/8152 . . . Capacitive devices [H]
H03M 2201/8156 . . . . Varistors
H03M 2201/816 . . . . Ferro-electric capacitors

H03M 2201/8164 .... Switched capacitors [3]
H03M 2201/8168 .... Charge-coupled devices [3]
H03M 2201/8172 ... Magnetic devices [H]
H03M 2201/8176 .... Magnetic cores
H03M 2201/818 .... Magnetic film devices [2]
H03M 2201/8184 .... Hall effect devices
H03M 2201/8188 .... Parametrons
H03M 2201/8192 ... Photoelectric devices
H03M 2201/8196 ... Superconductive devices
H03M 2201/82 .. Basic electrical circuits [H]
H03M 2201/822 ... Bridge circuits [3]
H03M 2201/825 ... Delay lines [2]
H03M 2201/827 .... Travelling-wave guides [3]
H03M 2201/83 .. Basic logic components [H]
H03M 2201/831 ... Counters [2]
H03M 2201/832 .... bidirectional [2]
H03M 2201/834 ... Look-up tables, e.g. ROM [2]
H03M 2201/835 ... (Pseudo-)random generators [2]
H03M 2201/837 ... Shift registers [2]
H03M 2201/838 ... Microprocessors (as an application system H03M 2201/198 , for fidelity improvement H03M 2201/6171 , for computing as part of the conversion process H03M 2201/72 , for testing H03M 2201/657 [3])
H03M 2201/84 .. Electro-mechanical components [H]
H03M 2201/841 ... Dynamo-electric machines
H03M 2201/842 .... Synchro
H03M 2201/843 .... Resolvers
H03M 2201/844 .... Servomotors
H03M 2201/845 .... Stepping motors [3]
H03M 2201/846 ... Switching circuits [H]
H03M 2201/847 .... Switches
H03M 2201/848 .... Relays
H03M 2201/849 .... Choppers
H03M 2201/85 .. Mechanical components [H]
H03M 2201/853 ... Reduction gearings
H03M 2201/856 ... Shaft couplings

H03M 2201/90 . Miscellaneous [H]
H03M 2201/91 .. Theory
H03M 2201/915 ... Code theory
H03M 2201/93 .. Constructional details
H03M 2201/931 ... Symmetrical configuration [2]
H03M 2201/932 ... of electrical parts or components [3]
H03M 2201/933 .... Processing circuitry [3]

H03M 2201/934 . . . . . on one chip, e.g. A/D and muP [3]
H03M 2201/935 . . . . Battery powered [3]
H03M 2201/936 . . . of mechanical parts or components [3]
H03M 2201/937 . . . . Housing [3]
H03M 2201/938 . . . of optical parts or components [3]