CLASS 341,   CODED DATA GENERATION OR CONVERSION

SECTION I - CLASS DEFINITION

GENERAL STATEMENT OF THE CLASS SUBJECT MATTER

This is the generic class for (a) originating or emitting a coded set of discrete signals or (b) translating one code into another code wherein the information signal content remains the same but the formats may differ. For classification herein, at least one of the codes must be a set of pulses or digits and electrical in nature.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Excluded from this class is analog to analog conversion. See References to Other Classes, below, for examples of other classes containing this subject matter.

Included in this class (341) is subject matter relating to codes, per se, such as Morse codes, grey codes. Excluded from this class are coded records and coded record readers . See References to Other Classes, below,

Combinations of an optically encoded shaft wheel and a photocell absent any signal processing circuitry are classified elsewhere. See References to Other Classes, below.

Code converters which may be utilized in pulse or digital communication systems, Class 375, are classified in this class (341).

A. The combination of the subject matter of this class (341) and another art environment is generally classified with the art device where the environment is significant by virtue of the claimed relationship. For example:

Coding and decoding for cryptography

Coding and decoding for error detection or correction

Code transmitters specific to telemetry.

Data compression and expansion

Microwave devices.

Radiowave beacons.

Radar generation, conversion or systems

B. Pulse generation or conversion which is not unique to communications are classified in the appropriate classes. For example:

Pulse demodulation, per se.

Pulse generation.

Pulse modulation, per se

Pulse wave conversion systems; i.e., sine wave to pulse wave

See References to Other Classes, below, for appropriate class references.

This class is structured into 14 main divisions. See Subclass References to the Current Class, below.

SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+,	for Digital Pattern Reading Type Converters or generators: subclasses .
20+,	for Bodily Actuated Code Generator.
50+,	for Digital Code to Digital Code Converters.
108,	for Reversible Analog to Digital Converter
109,	for Stochastic Techniques.
110,	Analog to Digital Conversion Followed by Digital to Analog Conversion.
111+,	for Phase or Time of Phase Reversal
118+,	for Converter Compensation
120+,	Converter Calibration or Testing:
122+,	for Sample and Hold
126+,	for Analog to or From Digital Conversion
173+,	for Code Generator or Transmitter
200,	for Quantizers
899,	Miscellaneous

SECTION IV - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

178,	Telegraphy, subclass 2 for teles:graphic code changers, subclass 26.1 for telegraph printing page translators, and subclass 71 for code transformers in automatic telegraph repeaters.

234,   Selective Cutting (e.g., Punching), subclasses 69+ for a pattern controlled selective punching device embodying code conversion means.

235,   Registers, subclass 429 for electromechanical means to translate the code sensed from a coded record into a different code; subclasses 487+ for coded records and subclasses 435+ for coded record readers.

250,   Radiant Energy, subclass 231 for optical or photocell systems having a light valve which is actuated by a shaft encoder or angle indicator absent any signal processing circuitry, subclass 271 for invisible radiant energy coded record readers, subclasses 555+ for coded record controlled photocell circuits and subclasses 566+ for coded record reading optical or pre-photocell systems; appropriate subclasses for Microwave devices.

307,   Electrical Transmission or Interconnection Systems, for analog to analog conversion

327,   Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 50+ for signal discriminating or comparing by amplitude, subclasses 100+ for miscellaneous signal conversion or generation, i.e., sine wave to pulse wave, and subclasses 1+ for signal discriminating by various parameters; subclasses 291+ for Pulse generation.

329,   Demodulators, subclasses 104+ for pulse demodulators or detectors.

332,   Modulators, subclass 183 for modulation converters; subclasses 9+ for pulse modulation, per se.

340,   Communications: Electrical, subclasses 5.1 through 5.92 for intelligence comparison for controlling in a selective communication system, subclass 11.1 for selective systems with encoding of data, subclasses 870.01-870.44 for telemetering code transmitters, and subclass 870.21 for telemetry with analog to digital conversion.

342,   Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 185 for scan conversion in a radar system; subclasses 385+ for radiowave beacons.

345,   Computer Graphics Processing and Selective Visual Display Systems, subclasses 156+ for visual display systems with selective electrical control including specified input means and subclasses 418-475 for computer graphics processing.

348,   Television, subclasses 441 through 459 for television signal format conversion, subclasses 469-496 for television signal formatting, and subclasses 384.1-440.1 for analog television bandwidth compression or expansion.

358,   Facsimile and Static Presentation Processing, subclasses 426.01 through 426.16 for facsimile bandwidth compression or expansion.

360,   Dynamic Magnetic Information Storage or Retrieval, subclass 32 for analog to or from digital conversion combined with magnetic dynamic recording or reproduction, and subclasses 40+ for dynamic magnetic recording of digital signals in specified codes or formats.

361,   Electricity: Electrical Systems And Devices, subclasses 171+ for electrical relay systems of the code responsive type.

363,   Electric Power Conversion Systems, appropriate subclasses for electrical power conversion as opposed to data conversion.

367,   Communications, Electrical: Acoustic Wave Systems and Devices, subclass 66 for analog and digital compatible acoustic wave systems and subclass 74 for format conversion in an acoustic wave system.

370,   Multiplex Communications, subclasses 465+ for adaptive multiplex communications systems, and 477 for bandwidth compression or expansion.

375,   Pulse or Digital Communications, subclasses 240.01 through 240.29 for digital television bandwidth reduction systems and subclasses 242-254 for pulse code modulation of an input analog signal.

377,   Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 42 for analog to digital or digital to analog conversion of the input or output of such systems.

379,   Telephonic Communications, subclass 281 for conversion between dial pulse and tone signals in a telephone switching system, subclass 289 for a translator in a telephone switching system, subclass 339 for signal conversion in telephone repeaters and subclass 353 for conversion of signal form in telephony.

380,   Cryptography, appropriate subclasses for electrical cryptos:graphic devices, particularly encoding or decoding for cryptos:graphic purposes, which is excluded from this class (341).

381,   Electrical Audio Signal Processing Systems and Devices, subclasses 29 through 35 for time or bandwidth compression or expansion of an audio signal which may involve analog to or from digital conversion and subclasses 36 through 53 for speech analysis and/or synthesis

which may involve analog to or from digital conversion.

382,   Image Analysis, subclass 276 for image transformations and subclass 232 for data compression or image coding.

455,   Telecommunications, for analog to analog conversion.

463,   Amusement Devices: Games, subclasses 1+, particularly subclasses 36+, for a code generator or conversion device either combined with a game or particularly adapted to serve as an input device for an electronic game.

700,   Data Processing: Generic Control Systems or Specific Applications, subclasses 83 through 85 for input means for generic data processing control systems and subclasses 245-264 for robot control.

704,   Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 500+ for differential encoding of audio signals.

708,   Electrical Computers: Arithmetic Processing and Calculating, subclasses 1+ for hybrid computer systems having analog to digital or digital to analog conversion and subclasses 131+ for input means for digital data processors or computers.

709,   Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, appropriate subclasses for data transfer among a plurality of spatially distributed computers or digital data processing systems.

714,   Error Detection/Correction and Fault Detection/Recovery, subclasses 752 through 798 for conversion of digital data into error detecting or correcting codes, subclass 810 for error/fault detection techniques for a multilevel code and subclass 823 for error detection by transmission of data and its complement.

SUBCLASSES

1   DIGITAL PATTERN READING TYPE CONVERTER:
This subclass is indented under the class definition. Subject matter having a spatial variation of a parameter on an object to form a digital pattern carrier (e.g., movable code disk), and a pattern reading device providing a digital output.

(1)   Note. Data conversion combined with structural detail of another art device is classifiable with the art device.

(2)   Note. A record reader reads a selected one of plural recorded patterns, while a digital pattern reader can only read one pattern.

SEE OR SEARCH CLASS:
235,   Registers, subclasses 435 through 495 for coded records and readers.
250,   Radiant Energy, subclass 271 for invisible radiant energy coded record readers.
382,   Image Analysis, subclasses 181+ for alphanumeric character recognition.

2   Plural denominationally related carriers (e.g., coarse/fine geared discs):
This subclass is indented under subclass 1. Subject matter having a plurality of digital pattern carriers each producing an output signal portion representing a different integral power of the base or radix (denominational order) of the digital representation or an element of a combination code.

(1)   Note. Included herein are plural code disks with gearing to cause different motion from a common motive power source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9,   for a denominational pattern on a single pattern carrier.
113,   for coarse and fine conversions in a synchro or resolver to or from digital conversion.
145,   for coarse and fine conversions in a digital to analog conversion.
156,   for coarse and fine conversions in an analog to digital conversion.

3   Plural types of codes on single carrier:
This subclass is indented under subclass 1. Subject matter including a digital pattern carrier having two or more disparate code patterns thereon.

(1)   Note. Included herein are carriers with different codes on different surfaces.

4 **According to nonlinear function:**
This subclass is indented under subclass 1. Subject matter wherein the pattern is characterized by a mathematical function such that an encoded signal does not vary in direct proportion to the input being encoded.

SEE OR SEARCH THIS CLASS, SUBCLASS:
75,   for digital nonlinear code conversion.
138+, for nonlinear analog to or from digital conversion.

5 **For X or Y coordinate determination (e.g., stylus-pad):**
This subclass is indented under subclass 1. Subject matter having structure to produce a signal in accordance with the position of an object on a predetermined surface.

SEE OR SEARCH CLASS:
178,   Telegraphy, subclasses 18.01+   for position determination.
700,   Data Processing: Generic Control Systems or Specific Applications, subclass 85 for a positional input to a data processing control system.
708,   Electrical Computers: Arithmetic Processing and Calculating, subclasses 131 through 146   for a positional input to a digital calculating computer.

6 **With directional discrimination:**
This subclass is indented under subclass 1. Subject matter in which the digital pattern carrier and the pattern reading device have bidirectional motion therebetween, and includes circuitry or structure to distinguish the direction of such movement.

7 **Antiambiguity feature:**
This subclass is indented under subclass 1. Subject matter having structure or circuitry to positively ascertain which one of two adjacent pattern portions is being read when close to a boundary between two pattern portions.

8 **Real and complementary patterns:**
This subclass is indented under subclass 1. Subject matter where the digital pattern carrier has two patterns, one of which is the complement of the other.

9 **Having combined (e.g., denominational, combination code) coding pattern:**
This subclass is indented under subclass 1. Subject matter where the digital pattern has a plurality of separate tracks such that the digital output signal obtained is composed of several signal parts usually each representing a denominational order of the digital representation or an element of a combination code.

SEE OR SEARCH THIS CLASS, SUBCLASS:
2,   for digital pattern reading converters with plural denominationally related carriers.

10 **Constant distance code:**
This subclass is indented under subclass 9. Subject matter wherein successive portions of the digital pattern differ only in one bit or element.

(1)   Note.   Included herein are reflected binary codes and grey codes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
96+,   for digital constant distance code conversion.

11 **Incremental:**
This subclass is indented under subclass 1. Subject matter where the digital pattern is such that it produces a signal (pulse) on a single terminal for each predetermined incremental change of an input.

12 **Cathode ray:**
This subclass is indented under subclass 1. Subject matter where a beam of electrons is moved relative to a pattern in order to convert an analog signal to a digital signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
137,   where a cathode ray tube is used as a flying spot optical scanner or as an optical display in an analog to or from digital converter.

13   **Optical:**
This subclass is indented under subclass 1. Subject matter where the digital pattern carrier is read by an optical device.

(1)   Note. For optical shaft encoders in combination with a photocell absent any signal processing circuitry, search Class 250, subclass 231.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
137,   for analog to or from digital conversion using optical devices.

SEE OR SEARCH CLASS:
250,   Radiant Energy, subclass 231 for a photocell shaft encoder, subclass 271 for invisible radiant energy coded record readers, subclasses 555+ for coded record controlled photocell circuits and subclasses 566+ for coded record reading optical or prephotocell systems absent any signal processing circuitry.
346,   Recorders, subclass 225 and 246 through 264 for recording of a code disc by scanning of light.
369,   Dynamic Information Storage or Retrieval, subclasses 100+ for information retrieval from an optical information carrier.

14   **Having optical waveguide:**
This subclass is indented under subclass 13. Subject matter which includes an elongated optically transparent structure to carry light between the pattern carrier and a pattern reading device or light source.

SEE OR SEARCH CLASS:
385,   Optical Waveguides, appropriate subclasses for optical fibers or waveguides, per se.

15   **Magnetic, inductive or capacitive:**
This subclass is indented under subclass 1. Subject matter where the digital pattern on the carrier is a spatial variation of a magnetic, or electrostatic field, or permeability thereof to such a field, and the pattern reading device includes a device responsive to such a field.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
149,   for a digital to analog converter using magnetic components.
150,   for a digital to analog converter using capacitors.
171,   for an analog to digital converter using magnetic components.
172,   for an analog to digital converter using capacitors.

SEE OR SEARCH CLASS:
235,   Registers, subclasses 499+ for magnetic coded record sensors.
324,   Electricity: Measuring and Testing, subclasses 60+ for measurement of capacitance.
360,   Dynamic Magnetic Information Storage or Retrieval, subclasses 39+ for magnetic recording or reproduction of a digital signal.
361,   Electricity: Electrical Systems and Devices, subclasses 271+ for electrostatic capacitor structure.
369,   Dynamic Information Storage or Retrieval, subclasses 59.1 through 59.27 for capacitive recording or reproduction of a digital signal.

16   **Brush and contacts or conductive pattern:**
This subclass is indented under subclass 1. Subject matter where the indicia on a movable code member are formed by conductive elements.

SEE OR SEARCH CLASS:
200,   Electricity: Circuit Makers and Breakers, appropriate subclasses for switch structure.
235,   Registers, subclasses 444+, 452 and 453 for electromechanical, mechanical and pneumatic coded record sensors respectively.

17   **Actuated by physical projection:**
This subclass is indented under subclass 1. Subject matter having a code member with projections for actuating a force operated switch according to a code to be generated.

20   Bodily actuated code generator:
This subclass is indented under the class definition. Subject matter having a control element which an operator physically contacts to control the transmission or generation of a coded set of pulses.

SEE OR SEARCH CLASS:
178,   Telegraphy, subclasses 79+ for a telegraph transmitter; subclasses 101+ for a telegraph key.
200,   Electricity: Circuit Makers and Breakers, for a switch or switch actuator, absent circuitry.
250,   Radiant Energy, subclass 231 for an optical mouse.
338,   Electrical Resistors, appropriate subclasses for a variable resistance input controller.
340,   Communications: Electrical, subclass 11.1 for selective communications system having a multidigit encoder.
345,   Computer Graphics Processing and Selective Visual Display Systems, subclasses 156+ for input devices used in conjunction with a display device.
379,   Telephonic Communications, subclasses 353+, particularly subclasses 368 and 369 for a manually actuated telephone signalling device (e.g., keypad or dial).
380,   Cryptography, subclass 52 for a cryptos:graphic transmitter having specified keyboard structure.
463,   Amusement Devices: Games, subclasses 1+, particularly subclasses 36+, for a code generator or conversion device either combined with a game or particularly adapted to serve as an input device for an electronic game.
708,   Electrical Computers: Arithmetic Processing and Calculating, subclasses 142+ for a keyboard input for a digital calculator.

21   For handicapped user:
This subclass is indented under subclass 20. Subject matter particularly designed for use by a physically impaired individual.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, subclasses 4.1 through 4.4 for selective communications or remote control equipment for a handicapped user and subclass 407 for an electrical tactile signalling device.
379,   Telephonic Communications, subclass 52 for telephone equipment specifically designed for a handicapped user.

22   Including keyboard or keypad:
This subclass is indented under subclass 20. Subject matter including an array of manually actuated control elements, each of which is indicative of a code value (i.e., digits).

SEE OR SEARCH CLASS:
84,   Music, appropriate subclasses for a musical instrument having a keyboard.
200,   Electricity: Circuit Makers and Breakers, subclasses 1+ for a multiple circuit control arrangement, such as a keyboard, absent circuitry to generate or transmit a code.
235,   Registers, subclasses 7+ for a cash register having a keyboard; subclasses 54, 55 for a voting machine, having a keyboard; subclasses 59-61 for a mechanical register, having a keyboard; subclass 145 for a mechanical keyboard; subclasses 430+ for a record controlled device, having a keyboard.
340,   Communications: Electrical, subclass 11.1 for selective communications system having a multidigit encoder.
345,   Computer Graphics Processing and Selective Visual Display Systems, subclasses 168+ for a keyboard actuated display.
380,   Cryptography, subclass 52 for a cryptos:graphic transmitter having specified keyboard structure.
400,   Typewriting Machines, subclasses 472+ for typewriter keyboard structure.

708,   Electrical Computers: Arithmetic Processing and Calculating, subclasses 142+ for a keyboard input for a digital calculator.

23   **Variable key legends:**
This subclass is indented under subclass 22. Subject matter wherein each control element may represent a plurality of code values and includes structure to provide an indication of the code value of each element.

(1)   Note. Included herein are overlays and movable legend exhibitors, and electrical legend indicators.

(2)   Note. A plural legend which is always on a key such as a shifted character indication which legend does not change is not in this subclass.

SEE OR SEARCH CLASS:
345,   Computer Graphics Processing and Selective Visual Display Systems, subclasses 173+ for selective displays with overlying touch panels wherein the selective display may define a keyboard.

24   **With error prevention means (e.g., debounce, antichatter):**
This subclass is indented under subclass 22. Subject matter including compensation for improper system operation or operator actuation.

SEE OR SEARCH CLASS:
327,   Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 385+ for the elimination of contact bounce noise signals, per se.
714,   Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for error detection or correction in an electrical device of general utility.

25   **With rollover feature (i.e., antidouble strike):**
This subclass is indented under subclass 24. Subject matter which compensates for simultaneous actuation of plural control elements.

26   **With particular key scanning feature:**
This subclass is indented under subclass 22. Subject matter having a detail of a device which sequentially senses the state of the plural control elements.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, subclasses 1.1 through 16.1 for a selective scanning device.

27   **With audible or tactile indicator:**
This subclass is indented under subclass 22. Subject matter which gives an indication of key operation which may be heard or felt by the operator.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, subclasses 815+ for a visual indicator; subclasses 384.1+ for an audible signal; subclasses 407.1+ for an electrical tactile indicator.

28   **For pictorial or ideos:graphic characters (e.g., design, chinese or japanese characters):**
This subclass is indented under subclass 22. Subject matter wherein the keys are specifically adapted for generating a code corresponding to a design or a pictorial language symbol representative of an idea or object rather than a word or sound.

(1)   Note. Such a symbol code is often produced by operation of a key combination rather than single key.

SEE OR SEARCH CLASS:
400,   Typewriting Machines, subclass 110 for an oriental language typewriter.

29   **With variable pulse spacing or grouping:**
This subclass is indented under subclass 22. Subject matter in which the duration of or between pulses, or the order of diverse types of pulses, is varied.

(1)   Note. This subclass includes pulse permutation devices.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
178, for this subject matter not controlled by a keyboard or keypad.

30 For numerical pulse type transmission:
This subclass is indented under subclass 22. Subject matter in which the meaning of the pulse code is determined solely by the number of pulses transmitted.

(1) Note. The type of code found in this subclass is known in the art as the numerical pulse type.

(2) Note. The pulses may, but need not, be identical.

31 Photoelectric actuation:
This subclass is indented under subclass 22. Subject matter in which the operation of a control element is sensed by an electrical light sensor.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for a photoelectric switch.

32 Magnetic or inductive actuation:
This subclass is indented under subclass 22. Subject matter in which the operation of a control element is sensed by a magnetic field responsive sensor.

SEE OR SEARCH CLASS:
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 205+ for a magnetically operated switch, per se.

33 Capacitive actuation:
This subclass is indented under subclass 22. Subject matter in which the operation of a control element is sensed by a capacitive sensor.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclass 600 for a capacitive switch, absent circuitry.
307, Electrical Transmission or Interconnection Systems, subclasses 112+ for a capacitive device controlled switching circuit.

361, Electricity: Electrical Systems and Devices, subclasses 287+ for a mechanically variable capacitor.

34 Pressure sensitive actuation:
This subclass is indented under subclass 22. Subject matter in which the operation of a control element is sensed by a sensor responsive to an applied mechanical force.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, appropriate subclasses for a force or pressure actuated switch, per se.

35 With rotary dial:
This subclass is indented under subclass 20. Subject matter including a control element adapted for rotational motion.

SEE OR SEARCH CLASS:
379, Telephonic Communications, subclasses 353+, particularly subclasses 362-368 for a telephone dial, or a dial mounting on a telephone set.

50 DIGITAL CODE TO DIGITAL CODE CONVERTERS:
This subclass is indented under the class definition. Subject matter comprising means whereby a system of digital signals representing information is changed to a different system of digital signals representing the same information.

51 Adaptive coding:
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals wherein the coding is automatically modified during the coding process.

SEE OR SEARCH CLASS:
358, Facsimile and Static Presentation Processing, subclasses 426.02 through 426.11 for transmission of facsimile data combined with adaptive or predictive encoding.
370, Multiplex Communications, subclasses 465+ for adaptive multiplex communications systems.

700,   Data Processing: Generic Control Systems or Specific Applications, subclasses 28 through 55 for adaptive control systems.

52   **To or from particular bit symbol:**
This subclass is indented under subclass 50. Subject matter for converting digital signals, where certain types of wave forms are used to represent zeros and ones, to other digital signals where different wave forms are used to represent zeros and ones.

53   **Bit represented by pulse width:**
This subclass is indented under subclass 52. Subject matter where specific pulse widths are used to represent the signal states of the digital signals.

54   **Bit represented by discrete frequency:**
This subclass is indented under subclass 52. Subject matter where different specific frequencies are used to represent the signal states of the digital signals.

55   **Substituting specified bit combinations for other prescribed bit combinations:**
This subclass is indented under subclass 50. Subject matter for converting digitally encoded signals to other digitally encoded signals by substituting one combination of bits for another combination of bits.

56   **To or from multilevel codes:**
This subclass is indented under subclass 50. Subject matter for converting to or from digital signals in which each bit of one of the digital signals can be one of three or more signal states.

(1)   Note. This subclass is not intended to include subject matter where one of the states of the digital signals is used only for framing or synchronizing purposes.

57   **Binary to or from ternary:**
This subclass is indented under subclass 56. Subject matter for converting digital signals where each bit may have one of two stable states to or from digital signals where each bit may have one of three stable states.

(1)   Note. This subclass is not intended to include subject matter where the third state of the digital signals is used only for framing or synchronizing purposes.

58   **To or from minimum D.C. level codes:**
This subclass is indented under subclass 50. for converting digital signals to or from other digital signals wherein the coding is arranged to minimize the direct current component present in the converted signal.

59   **To or from run length limited codes:**
This subclass is indented under subclass 50. Subject matter for converting to or from codes where the number of successive ones or zeros occurring in the code is constrained not to exceed a predetermined limit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
63,   for conversion to or from bit count codes.

60   **To or from packed format:**
This subclass is indented under subclass 50. Subject matter for converting to or from codes comprising more than one shorter data words so that they can be handled by a machine component designed for longer data words.

SEE OR SEARCH THIS CLASS, SUBCLASS:
95,   for digital code converters where the byte length is changed.

61   **Data rate conversion:**
This subclass is indented under subclass 50. Subject matter for changing the number of bits per unit of time during which the bits comprising a digital signal are presented.

62   **BCD (binary-coded-decimal) to or from decimal:**
This subclass is indented under subclass 50. Subject matter for converting between digital signals where each digit of a number expressed in a system having a base of ten is individually coded as a number having a base of two, and digital signals where each digit of a decimal number is represented by a "one" in an appropriate one of ten bit positions.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
84,   and 85, for binary coded decimal con-
        version to or from binary.

63   To or from bit count codes:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to
or from other digital signals by counting the
number of zeros and or ones in the signal and
substituting a digital indication of that count in
place of the actual bits (e.g., run length codes).

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
59,   for converting to or from run length
        limited codes.

SEE OR SEARCH CLASS:
358,   Facsimile and Static Presentation Pro-
        cessing, subclass 426.13   for   run
        length encoding in a facsimile system.

64   To or from number of pulses:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to
or from other digital signals wherein the num-
ber of discrete pulses is representative of the
coded information.

65   To or from huffman codes:
This subclass is indented under subclass 64.
Subject matter for converting coded digital sig-
nals to or from other coded digital signals rep-
resenting the same information, where the
various code words are generated based on the
probability of character or symbol occurrence.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
107,   for conversion to or from codes based
        on probability in general.

66   To or from Morse code:
This subclass is indented under subclass 64.
Subject matter where each character is repre-
sented by one or more bits which may have
two different lengths, the particular code
assigned to each character being in accordance
with the coding system known as Morse code.

67   To or from variable length codes:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to
or from other digital signals wherein the words
are not all of the same bit length.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
59,   for converting to or from run length
        limited codes.

68   To or from nrz (nonreturn-to-zero) codes:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to
or from a digital signal waveform wherein the
signal levels do not return to zero between suc-
cessive bit periods.

SEE OR SEARCH CLASS:
360,   Dynamic Magnetic Information Stor-
        age or Retrieval, subclass 41 for pro-
        cessing of a NRZ signal in a dynamic
        magnetic recording or retrieval sys-
        tem.

**69   Return-to-zero to or from nrz (nonreturn-
to-zero) codes:**
This subclass is indented under subclass 68.
Subject matter for converting digital signals
encoded so that the signal returns to zero
between successive bits to digital signals
wherein the signal does not return to zero
between successive bits or vice versa.

**70   To or from bi-phase level code (e.g., split
phase code, manchester code):**
This subclass is indented under subclass 68.
Subject matter for converting digital signals to
or from other digital signals wherein a one is
encoded as a transition from a high to a low
level during the middle of a bit cell and a zero
is encoded as a transition from a low to a high
level during the middle of a bit cell or where a
zero is encoded as a transition from a high to a
low level during the middle of a bit cell and a
one is encoded as a transition from a low to a
high level during the middle of a bit cell.

**71   To or from bi-phase space or mark codes
(e.g., double frequency code, fm code):**
This subclass is indented under subclass 68.
Subject matter for converting digital signals to
or from other digital signals wherein there is a

transition at the beginning of every bit cell and (a) a one is no second transition and a zero is a second transition half a bit period later, or (b) a one is a second transition half a bit period later and a zero is no second transition.

72　　To or from delay modulation code (e.g., miller code, three frequency code, mfm code):
This subclass is indented under subclass 68. Subject matter for converting digital signals to or from other digital signals wherein a one is encoded as a transition in the middle of a bit cell and a zero is encoded as a transition at the start of the bit cell except there is no transition after a one.

73　　To or from coded mark inversion:
This subclass is indented under subclass 68. Subject matter where data is represented by a code where zeros are represented by a 01 during each bit cell and ones are represented by 11 or 00 alternately during each bit cell, Also called binary coded alternate mark inversion.

(1)　Note. See U.S. Patent No. 4,325,053 for an example.

74　　To or from double density code:
This subclass is indented under subclass 68. Subject matter for converting digital signals to or from other digital signals where a one is a transition at the end of a bit period and a zero is a transition at the center of a bit period, except when a zero follows a one, in which case there is no transition in the bit period.

75　　To or from nonlinear codes:
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals such that the information represented by the latter digital signals are a nonlinear function of the information represented by the former digital signals.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
4,　　　for nonlinear pattern reading conversion.
108,　　for nonlinear reversible analog to digital conversion.
138+,　for nonlinear analog to or from digital conversion.

76　　To or from differential codes:
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals wherein each signal is determined as the result of a difference or comparison between the current value of the signal and prior values of the signal.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
143,　　for analog to or from digital differential encoding.

SEE OR SEARCH CLASS:
375,　　Pulse or Digital Communications, subclasses 244+ for communication systems using differential codes.
704,　　Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 500+ for differential encoding of audio signals.

77　　To or from delta modulation codes:
This subclass is indented under subclass 76. Subject matter where the output signal is a series of one bit words representing the difference between the current input signal and the integral value of all prior input signals.
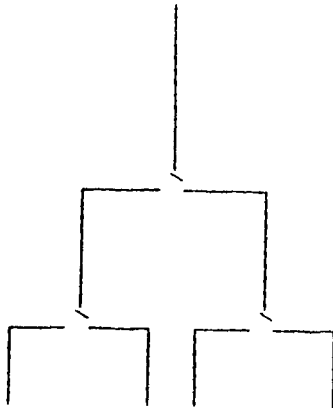
SEE OR SEARCH CLASS:
375,　　Pulse or Digital Communications, subclasses 247+ for communication systems using delta modulation codes.

78　　Programmable structure:
This subclass is indented under subclass 50. Subject matter where the code converter contains apparatus which is operator changeable to modify the conversion process.

79　　Tree structure:
This subclass is indented under subclass 50. Subject matter where interconnections of switches have a divergent branching arrangement with each preceding switch output connected to a plurality of succeeding switches or vice versa. For example:

(1) Note. The switches may comprise any type of switch which is suitable for switching electric current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
148, for a digital to analog converter with a switching tree.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, subclass 68 for tree structure in a static storage and retrieval system.

80 To or from fibonacci codes:
This subclass is indented under subclass 50. Subject matter for converting to or from codes wherein the relative weighing assigned to each bit of the code word is equal to the sum of the weights of the adjacent two bits of lesser significance.

81 To or from interleaved format:
This subclass is indented under subclass 50. Subject matter for converting to or from a data format wherein each data word as presented contains bits from more than one code word.

82 To or from mixed code formats:
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals wherein single words are encoded using two or more different codes.

83 To or from mixed base codes:
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals where the coding involves two or more different bases.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
62, for binary coded decimal to or from decimal conversion.

84 Binary to bcd (binary-coded-decimal):
This subclass is indented under subclass 83. Subject matter for converting from digital signals representing numbers coded in a system having a base of two to digital signals where each digit of these numbers is individually coded in a system having a base of two.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
62, for binary coded decimal to or from decimal conversion.
104, for binary to decimal conversion.

85 BCD (binary coded decimal) to binary:
This subclass is indented under subclass 83. Subject matter for converting from digital signals where each digit of a number having a base of ten is encoded using a base of two to digital signals where the number as a whole is coded in a system having a base of two.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
62, for binary coded decimal to or from decimal conversion.
105, for decimal to binary conversion.

86 Generator runs until new code is generated:
This subclass is indented under subclass 50. Subject matter where the conversion is accomplished by a code generator which is allowed to operate until it generates the new code equivalent of the old code word sought to be converted.

87 Unnecessary data suppression:
This subclass is indented under subclass 50. Subject matter for converting digital signals to a form wherein signals representing data which are not essential to the desired information are eliminated.

SEE OR SEARCH CLASS:
714,   Error Detection/Correction and Fault
        Detection/Recovery, subclasses 752
        through 798   for redundant error
        detecting or correcting encoding or
        decoding.

88   Multiple conversions using same converter:
This subclass is indented under subclass 50.
Subject matter where, in the same code converter, more than one code conversion takes place.

89   Reversible converters:
This subclass is indented under subclass 50.
Subject matter comprising converters which convert digital signals in one code to digital signals in another code and also convert the latter digital signals back to the first digital signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108,   for reversible analog to digital converters.

90   To or from alphanumeric code formats:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to or from other digital signals which are encoded so that numerals as well as letters of the alphabet and special symbols may be represented.

91   To or from baudot code:
This subclass is indented under subclass 90.
Subject matter for converting digital signals to or from other digital signals which are coded in Baudot code.

(1)   Note. Baudot code is a code having five bit positions. Two of the thirty-two possible codes are reserved for a "LETTERS" and "FIGURES" shift command. If the "LETTERS" shift command is actuated the remaining thirty codes are used to indicate letters and machine commands. If the "FIGURES" shift command is actuated the same thirty codes are used to indicate numbers, punctuation marks and machine commands.

92   To or from hollerith code:
This subclass is indented under subclass 90.
Subject matter for converting digital signals to or from other digital signals which are coded in Hollerith code.

(1)   Note. Hollerith code is used on IBM punched cards where each character on the card is represented by holes in a vertical column. There are eighty vertical columns each having twelve possible hole positions. In accordance with the Hollerith code characters are represented one, two, or three holes in particular positions in the vertical columns.

93   Complementers:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to or from other digital signals which are derivable from a specified number by subtracting it from a second specified number.

94   With error detection or correction:
This subclass is indented under subclass 50.
Subject matter with means inherent in the converter for sensing when the converter is producing an incorrect result and/or correcting the result.

SEE OR SEARCH CLASS:
714,   Error Detection/Correction and Fault
        Detection/Recovery, appropriate subclasses for error detection and correction in general.

95   Byte length changed:
This subclass is indented under subclass 50.
Subject matter for converting digital signals of one set word length to signals of another set word length.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60,   for conversion to or from a pack format.

96   To or from constant distance codes:
This subclass is indented under subclass 50.
Subject matter for converting digital signals to or from other digital signals encoded in a format so that in going from any particular numerical value to an immediately adjacent

numerical value a constant number of bit positions change state.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
10,   for digital pattern reading type converters for constant distance codes.

97   **Gray to binary:**
This subclass is indented under subclass 96. Subject matter for converting from a unit distance code as shown in the chart below to a code where numbers are expressed in a system having a base of two.

Binary = 0000;   Gray code = 0000
Binary = 0001;   Gray code = 0001
Binary = 0010;   Gray code = 0011
Binary = 0011;   Gray code = 0010
Binary = 0100;   Gray code = 0110
Binary = 0101;   Gray code = 0111
Binary = 0110;   Gray code = 0101
Binary = 0111;   Gray code = 0100
Binary = 1000;   Gray code = 1100
Binary = 1001;   Gray code = 1101
Binary = 1010;   Gray code = 1111
Binary = 1011;   Gray code = 1110
Binary = 1100;   Gray code = 1010
Binary = 1101;   Gray code = 1011
Binary = 1110;   Gray code = 1001
Binary = 1111;   Gray code = 1000

SEE OR SEARCH THIS CLASS, SUB-CLASS:
98,   for binary to Gray code conversion.

98   **Binary to gray:**
This subclass is indented under subclass 96. Subject matter for converting from a code where numbers are expressed in a system having a base of two to a unit distance code where decimal values are assigned as shown in the chart below for the first 15 words.

Binary = 0000;   Gray code = 0000
Binary = 0001;   Gray code = 0001
Binary = 0010;   Gray code = 0011
Binary = 0011;   Gray code = 0010
Binary = 0100;   Gray code = 0110
Binary = 0101;   Gray code = 0111
Binary = 0110;   Gray code = 0101
Binary = 0111;   Gray code = 0100
Binary = 1000;   Gray code = 1100
Binary = 1001;   Gray code = 1101
Binary = 1010;   Gray code = 1111
Binary = 1011;   Gray code = 1110
Binary = 1100;   Gray code = 1010
Binary = 1101;   Gray code = 1011
Binary = 1110;   Gray code = 1001
Binary = 1111;   Gray code = 1000

SEE OR SEARCH THIS CLASS, SUB-CLASS:
97,   for Gray to binary code conversion.

99   **To or from display device codes:**
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals which are arranged in codes designed to activate particular devices for displaying the value of the coded signal.

100   **Serial to parallel:**
This subclass is indented under subclass 50. Subject matter for converting digital signals wherein the bits of each word are presented one bit at a time in sequence to digital signals where all bits of a word are presented simultaneously.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
101,   for parallel to serial conversion.

101   **Parallel to serial:**
This subclass is indented under subclass 50. Subject matter for converting digital signals where all bits of a word are presented simultaneously to digital signals wherein the bits of each word are presented one bit at a time in sequence.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
100,   for serial to parallel conversion.

102   **To or from "N" out of "M" codes:**
This subclass is indented under subclass 50. Subject matter for converting digital signals to or from other digital signals which have a given number of bit positions (M) and where, in each of the code words, the same number of bit positions (N) contain a one.

103   **"N" out of "M" to "X" out of "Y":**
This subclass is indented under subclass 102. Subject matter for converting digital signals from one "N" out of "M" code to another "N" out of "M" code where the values of N and/or M are different.

104   **Binary to decimal:**
This subclass is indented under subclass 50. Subject matter for converting digital signals which represent a number in a system having a base of two to signals where each digit of a number expressed in a system having a base ten is represented by a "one" in an appropriate one of the ten bit positions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
57,   for binary to or from ternary conversion.
62,   for decimal to or from binary coded decimal conversion.
84,   and 85, for binary to or from binary coded decimal conversion.
105,   for decimal to binary conversion.

105   **Decimal to binary:**
This subclass is indented under subclass 50. Subject matter for converting digital signals, where each digit of a number expressed in a system having a base of ten is represented by a "one" in an appropriate one of the ten bit positions, to digital signals which represent the number in a system having a base two.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
57,   for binary to or from ternary conversion.
62,   for decimal to or from binary coded decimal conversion.
84,   and 85, for binary to or from binary coded decimal coded decimal conversion.
104,   for binary to decimal conversion.

106   **Coding by table look-up techniques:**
This subclass is indented under subclass 50. Subject matter for converting words coded according to a first system to words coded according to a second system by selecting from storage the word in the second system corresponding to the word in the first system.

107   **To or from code based on probability:**
This subclass is indented under subclass 50. Subject matter for converting coded digital signals representing letters to or from other coded digital signals representing the same letters where, the various code words are generated based on the statistical likelihood of character or symbol occurrence.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
109,   for conversions based on stochastic techniques.

SEE OR SEARCH CLASS:
702,   Data Processing: Measuring, Calibrating, or Testing, subclass 126   for converting an input signal, subclasses 179+ for statistical measurements, and subclass 198 for converting measurement value from one measuring unit to another measuring unit.

108   **REVERSIBLE ANALOG TO DIGITAL CONVERTERS:**
This subclass is indented under the class definition. Subject matter where the converter is capable of operating either as an analog to digital converter or as a digital to analog converter.

(1)   Note. The analog to digital and digital to analog conversions can occur sequentially or simultaneously.

(2)   Note. Reversible converters are typically nonlinear.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
89,   for reversible digital code converters.

109 STOCHASTIC TECHNIQUES:
This subclass is indented under the class definition. Subject matter where the code conversion is based on random generation of signals or codes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107, for digital conversion to or from a code based on probability.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclass 126 for converting an input signal, subclasses 179+ for statistical measurements, and subclass 198 for converting measurement value from one measuring unit to another measuring unit.

110 ANALOG TO DIGITAL CONVERSION FOLLOWED BY DIGITAL TO ANALOG CONVERSION:
This subclass is indented under the class definition. Subject matter where an analog to digital conversion is followed by a digital to analog conversion.

(1) Note. There usually is a signal processing such that the output analog signal differs from the input signal in some parameter (e.g., delay, bandwidth).

SEE OR SEARCH THIS CLASS, SUBCLASS:
88, for multiple digital code conversions using the same converter.
89, for reversible digital code converters.
108, for reversible analog to digital converters.

111 PHASE OR TIME OF PHASE CHANGE:
This subclass is indented under the class definition. Subject matter wherein the analog quantity converted is the phase or the time of phase change of a signal.

112 Synchro or resolver signal:
This subclass is indented under subclass 111. Subject matter including a motorlike device having a stator and a rotor which transforms an angular-position input into variable phase output or vice versa, or a simulation thereof.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 10+ for dynamoelectric motors or generators.
318, Electricity: Motive Power Systems, appropriate subclasses for synchro or resolver systems.

113 Coarse and fine:
This subclass is indented under subclass 112. Subject matter comprising two or more distinct and related conversions one of which has an output comprising the more significant bits of the digital signal and the other of which has an output comprising the less significant bits of the digital signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
2, for coarse and fine conversion in a pattern reading type converter.
145, for coarse and fine conversions in a digital to analog conversion.
156, for coarse and fine conversions in an analog to digital conversion.

114 Control system:
This subclass is indented under subclass 112. Subject matter where there is a comparison between the desired position of an object and its actual position as measured and there is a control means which responds to the difference in these positions and attempts to minimize this difference.

SEE OR SEARCH THIS CLASS, SUBCLASS:
142, for an analog to or from digital converter as part of a control system.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 518+ for miscellaneous control systems.
340, Communications: Electrical, subclasses 1.1 through 16.1 for selective control systems.
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 2 for counters used in control systems.

700,   Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic control systems using computers.

115   Converter compensation:
This subclass is indented under subclass 112. Subject matter comprising means, inherent in the converter, for automatically correcting for undesired changes in the parameters controlling converter operation and means for determining or manually correcting or setting the operating conditions of the converter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
94,   for digital code conversion with error detection or correction.
118,   for converter compensation in general.
120,   for conversion with calibration or testing.

116   Analog resolver or synchro signal to digital signal:
This subclass is indented under subclass 112. Subject matter for converting from an angular position of a resolver or synchro rotor relative to a reference position to a digital signal.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
117,   for a digital to synchro signal converter.

117   Digital signal to analog resolver or synchro signal:
This subclass is indented under subclass 112. Subject matter for converting from a digital input to analog values which represent the angular position of a resolver or synchro rotor relative to a reference position.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
116,   for a resolver or synchro to digital converter.

118   CONVERTER COMPENSATION:
This subclass is indented under the class definition. Subject matter comprising means, inherent in a converter, for automatically correcting for undesired changes in the parameters controlling converter operation or means for deter-

mining and manually correcting or setting the operating conditions of the converter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
94,   for digital code conversion with error detection or correction.
115,   for compensation in a synchro/resolver to or from digital converter.
120,   for conversion with calibration or testing.

119   Temperature compensation:
This subclass is indented under subclass 118. Subject matter comprising means for compensating for drift due to the effects of heat.

120   CONVERTER CALIBRATION OR TEST-ING:
This subclass is indented under the class definition. Subject matter comprising means for evaluation of a converter"s output for known input values, followed by adjustments for obtaining a desired input-output relation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
94,   for digital code conversion with error detection or correction.
115,   for converter compensation in a synchro or resolver converter.
118,   for data conversion with compensation.

SEE OR SEARCH CLASS:
324,   Electricity: Measuring and Testing, appropriate subclasses for electrical testing in general.
714,   Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for diagnostic testing in general.

121   Trimming control circuits:
This subclass is indented under subclass 120. Subject matter wherein auxiliary circuits are provided by means of which the converter is altered to be within specifications.

122   SAMPLE AND HOLD:
This subclass is indented under the class definition. Subject matter where the value of the input to the converter is determined only at dis-

crete time intervals and the value so determined is kept constant during the conversion.

(1) Note. The sample and hold operation is often intermediate to a conversion to a time interval.

123 Having variable sampling rate:
This subclass is indented under subclass 122. Subject matter where the time intervals between the determinations of the value of the input to the converter are not constant.

124 Sampled and held input signal with linear return to datum:
This subclass is indented under subclass 122. Subject matter where the sampled and held signal is returned linearly to a reference level.

125 Sampled and held input signal with nonlinear return to datum:
This subclass is indented under subclass 122. Subject matter where the sampled and held signal is returned nonlinearly to a reference level.

126 ANALOG TO OR FROM DIGITAL CONVERSION:
This subclass is indented under the class definition. Subject matter wherein analog information represented by the amplitude of an electrical signal, which signal can have an infinite number of values within a given range is converted to or from a coded digital signal representing the same information.

127 Bipolar:
This subclass is indented under subclass 126. Subject matter where the analog signal has appreciable amplitude in both directions from a reference level.

128 Dual slope analog to digital converter:
This subclass is indented under subclass 127. Subject matter where the input analog signal is integrated for a fixed time interval following which there is a linear return of the integrated signal to a reference level by means of an applied signal; the order of application of the two signals may be reversed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167, for a nonbipolar dual slope analog to digital converter.

129 Plural slope analog to digital converter:
This subclass is indented under subclass 127. Subject matter where the input analog signal is integrated for a fixed time interval following which there is a nonlinear return of the integrated signal to a reference level by means of applied plural signals or by changing the frequency of a clock signal which is being counted.

SEE OR SEARCH THIS CLASS, SUBCLASS:
168, for a nonbipolar plural slope analog to digital converter.

130 Difunction code as output:
This subclass is indented under subclass 126. Subject matter where each of two signal levels is assigned a specific numerical value and any analog value between these two levels is represented by the relative number of occurrences of pulses at each of the two levels.

131 Increasing converter resolution (e.g., dithering):
This subclass is indented under subclass 126. Subject matter where, from a system having a quantizing interval corresponding to a nominally n-bit system, one obtains a system having an n+1 or greater bit system due to the application of an oscillating or periodic signal to the input signal.

132 Detecting analog signal peak:
This subclass is indented under subclass 126. Subject matter including means whereby the maximum or minimum point of the analog signal waveform is detected.

133 With particular solid state devices (e.g., gunn effect device, josephson device, drift transistor, using solid state active devices as impedances):
This subclass is indented under subclass 126. Subject matter wherein there are used special transistors other than ordinary transistors or wherein solid state devices are used to perform special functions they do not commonly perform.

SEE OR SEARCH CLASS:
257,   Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses for active solid-state devices, per se.
327,   Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous solid-state device circuits and systems.

134   Integrated injection logic:
This subclass is indented under subclass 133. Subject matter having a complementary transistor pair merged on the same substrate as an integrated circuit device, incorporating a vertical, inverse mode NPN (PNP) transistor, which can have isolated multicollector regions, and a PNP (NPN) lateral transistor, which serves as a current injector to inject charge current directly into the NPN (PNP) transistor base.

SEE OR SEARCH CLASS:
257,   Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclass 555, 556, and 574-576 for integrated injection logic devices.
326,   Electronic Digital Logic Circuitry, subclass 70 and 100 for IIL digital logic circuits.

135   Current mirror:
This subclass is indented under subclass 133. Subject matter having a circuit with parallel elements wherein the current flowing through one element exactly reflects that flowing in the other element.

SEE OR SEARCH CLASS:
330,   Amplifiers, subclass 257 and 288 for current mirror amplifiers.

136   Field effect transistor:
This subclass is indented under subclass 133. Subject matter using a semiconductor device in which the resistance between two terminals, the source and the drain, is switched by a voltage applied to the third terminal, the gate, and the said resistance is determined by device geometry.

SEE OR SEARCH CLASS:
257,   Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclasses 213 through 413 for field effect devices.
326,   Electronic Digital Logic Circuitry, appropriate subclasses for FET logic circuits.
327,   Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous FET circuits.

137   Using optical device, (e.g., fiber optics, cathode ray tubes):
This subclass is indented under subclass 126. Subject matter wherein the analog to or from digital conversion is achieved using devices which generate, detect or transmit light (e.g., photoelectric cells, photomultipliers, Kerr cells, light relays, electroluminescent devices, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
13+,   for a digital pattern reading type converter using optical devices.

SEE OR SEARCH CLASS:
250,   Radiant Energy, subclasses 555+ for coded record controlled photocell circuits and subclasses 566+ for coded record reading optical or prephotocell systems absent any signal processing circuitry.

138   Nonlinear:
This subclass is indented under subclass 126. Subject matter where the output does not vary in direct proportion to the input.

SEE OR SEARCH THIS CLASS, SUBCLASS:
4,   for a nonlinear digital pattern reading type converter.
75,   for a digital to digital code converter for converting to or from nonlinear codes.
108,   for a nonlinear reversible analog to digital converter.

139 Automatic control for increasing converter range (e.g., gain ranging, automatic gain control):
This subclass is indented under subclass 138. Subject matter comprising automatic means particularly adapted for increasing the range of signal amplitudes which can be handled by the converter.

140 Linearization (e.g., nonlinear transfer characteristic compensates for nonlinear transducer):
This subclass is indented under subclass 138. Subject matter wherein nonlinear code conversion is used to provide an output which varies in direct proportion to the input.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 171 for linearization in temperature measuring.

141 Multiplex:
This subclass is indented under subclass 126. Subject matter where a single converter is used to convert signals received on different inputs representing distinct data in time division multiplex or where a converter produces a plurality of different distinct simultaneous outputs representing differing independent data.

SEE OR SEARCH CLASS:
370, Multiplex Communications, appropriate subclasses for multiplex communications in general.

142 Converter is part of control loop:
This subclass is indented under subclass 126. Subject matter where there is a comparison between the desired position of an object and its actual position and there is a control means which responds to the difference in these positions and attempts to minimize this difference.

SEE OR SEARCH THIS CLASS, SUBCLASS:
114, for synchro or resolver signal coersion to or from digital signal in control systems.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 518+ for miscellaneous control systems.
340, Communications: Electrical, subclasses 1.1 through 16.1 for selective control systems.
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 2 for counters used in control systems.
700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic control systems using computers.

143 Differential encoder and/or decoder (e.g., delta modulation, differential pulse code modulation):
This subclass is indented under subclass 126. Subject matter wherein the analog signal which is to be encoded or decoded depends on the difference between a given analog signal and the analog signal previously encoded or decoded.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76, for digital to digital code converters where one of the codes is a differential code.

SEE OR SEARCH CLASS:
375, Pulse or Digital Communications, subclasses 244+ for communication systems using differential codes.
704, 704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 500+ for differential encoding of audio signals.

144 Digital to analog conversion:
This subclass is indented under subclass 126. Subject matter wherein information represented by a coded digital signal is converted to a form wherein the information is contained in the amplitude of an electrical signal.

145 Coarse and fine conversions:
This subclass is indented under subclass 144. Subject matter comprising two or more distinct but related conversions one of which responds

to the more significant bits of the digital signal
and the other of which responds to the less sig-
nificant bits of the digital signal.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
2,   for coarse and fine conversion in a
         pattern reading type converter.
113,   for coarse and fine conversions in a
         synchro or resolver to or from digital
         converter.
156,   for analog to digital coarse and fine
         conversion.

146   Serial conversion:
This subclass is indented under subclass 144.
Subject matter where the conversion occurs as
a series of sequential conversions made in seri-
ally connected stages the output of a given
stage being dependent on the results of the pre-
ceding stage.

147   Function generator:
This subclass is indented under subclass 144.
Subject matter wherein a series of digital sig-
nals is converted to a series of discrete analog
values, these values being a particular mathe-
matical function of the input digital signals.

SEE OR SEARCH CLASS:
708,   Electrical Computers: Arithmetic Pro-
         cessing and Calculating, subclasses
         8+, 270+, and 845+ for function gen-
         erators in computing.

148   Tree structure:
This subclass is indented under subclass 144.
Subject matter where interconnections of
switches have a divergent branching arrange-
ment with each preceding switch output con-
nected to a plurality of succeeding switches or
vice versa. For example:
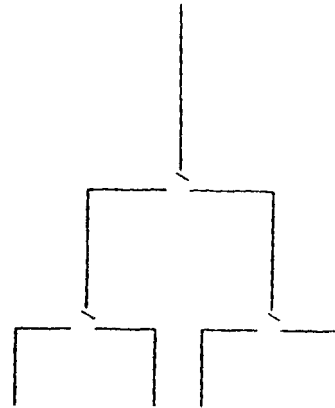
(1)   Note. The switches may comprise any
         type of switch which is suitable for
         switching electric current.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
79,   for a digital to digital code converter
         having a switching tree.

SEE OR SEARCH CLASS:
365,   Static Information Storage and
         Retrieval, subclass 68 for tree struc-
         ture in a static storage and retrieval
         system.

149   Using magnetic or cryogenic components:
This subclass is indented under subclass 144.
Subject matter wherein particular magnetic
components or components used at very low
temperatures near absolute zero form an essen-
tial part of a digital to analog conversion.

(1)   Note. Excluded from this subclass are
         ordinary transformers used in power
         supplies or for signal coupling or induc-
         tances use for filtering or decoupling.

SEE OR SEARCH THIS CLASS, SUB-
CLASS:
15,   for a digital pattern reading type con-
         verter having a magnetically read pat-
         tern.
171,   for an analog to digital or analog to
         digital combined with a digital to ana-

log converter having magnetic or cryogenic components.

SEE OR SEARCH CLASS:
235,   Registers, subclasses 499+ for magnetic coded record sensors.
307,   Electrical Transmission or Interconnection Systems, subclasses 401+ for nonlinear saturable reactor systems.
360,   Dynamic Magnetic Information Storage or Retrieval, subclasses 39+ for magnetic recording or reproduction of a digital signal.

150   Using charge coupled devices or switched capacitances:
This subclass is indented under subclass 144. Subject matter where there is a digital to analog converter using devices or circuits through which there is a sequential transfer of electric charges.

SEE OR SEARCH THIS CLASS, SUBCLASS:
15,   for a digital pattern reading converter having a capacitive pattern.
172,   for an analog to digital converter using charged coupled devices or switched capacitances.

151   Analog output represents a displacement or force:
This subclass is indented under subclass 144. Subject matter where the analog output of the converter represents a change in position of an object or a force applied to an object.

152   With intermediate conversion of digital value to time interval:
This subclass is indented under subclass 144. Subject matter wherein the input digital signal is converted to intermediate signals which are a measure of a time interval or a series of intervals representative of the input digital signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
166,   for analog to digital converters with intermediate conversion of an input analog signal to a time interval.

153   Using weighted impedances:
This subclass is indented under subclass 144. Subject matter where the conversion utilizes a network comprising a series of impedances each of which has a value such that the current through it is representative of the value of a particular bit position of the digital input signal and a summing circuit for adding the currents flowing through the impedances to develop a signal representative of the digital input signal.

154   Using ladder network:
This subclass is indented under subclass 144. Subject matter where the conversion utilizes an impedance network (typically an R\2R ladder network) having a number of nodes equal to the number of bits in the digital signal, each node being selectively fed with equal currents in response to the digital signals and thereby outputting an electrical signal representative of the digital input signal.

155   Analog to digital conversion:
This subclass is indented under subclass 126. Subject matter wherein analog information represented by a parameter of an electrical signal, which signal can have an infinite number of values within a given range, is converted to a coded digital signal representing the same information.

(1)   Note. Examples of a parameter of a signal are amplitude or frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1+,   for pattern reading type analog to digital conversion.
111+, for conversion of the phase or time of phase change of a signal to a coded digital signal.
118+, for compensation of an analog to digital converter.
120+, for testing or calibrating an analog to digital converter.
122+, for analog to digital converters where an input analog signal is sampled and held.
143,   for analog to or from differential code conversion.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, sub-class 870.21 for analog to digital function conversion in telemetry.
375,   Pulse or Digital Communications, subclasses 242+ for pulse code modulation communication systems.
704,   Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 200+, 500+, and 503+ for audio and speech-to-digital conversion.

156   **Coarse and fine conversions:**
This subclass is indented under subclass 155. Subject matter comprising two or more distinct but related conversions one of which produces the more significant bits of the digital signal and the other of which produces the less significant bits of the digital signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
2,   for coarse and fine conversion in a pattern reading type converter.
113,   for coarse and fine conversions in a synchro or resolver to or from digital converter.
145,   for coarse and fine conversions in a digital to analog converter.

157   **Intermediate conversion to frequency or number of pulses:**
This subclass is indented under subclass 155. Subject matter wherein the input analog signal is converted to a signal the frequency of which is proportional to the value of the input signal or is converted to a pulse signal the number of pulses of which is proportional to the value of the input signal.

158   **Analog input compared with static reference:**
This subclass is indented under subclass 155. Subject matter in which the analog input signal is compared with one or more nonvarying analog reference values.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, subclass 146.2 for digital comparitors in general.

159   **Parallel type:**
This subclass is indented under subclass 158. Subject matter where an analog value is simultaneously compared with a number of different reference values.

160   **Including priority encoder:**
This subclass is indented under subclass 159. Subject matter where an encoder, in which an input analog signal is compared with a plurality of reference values, has an output which depends on the largest reference value which the input signal is greater than.

161   **Acting sequentially:**
This subclass is indented under subclass 158. Subject matter where the conversion occurs as a result of sequential comparisons made in serially connected stages and during which the particular analog value being converted is not changed.

162   **Serial conversions with change in signal:**
This subclass is indented under subclass 158. Subject matter where the conversion occurs as a result of sequential comparisons made in serially connected stages and during which the particular analog value being converted is changed.

163   **Recirculating:**
This subclass is indented under subclass 158. Subject matter wherein the analog signal is compared with a fixed reference signal and, depending on their relative magnitudes, either the analog signal itself or the difference between the analog signal and the reference signal is amplified and fed back for comparison with the same reference value.

SEE OR SEARCH CLASS:
377,   Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, appropriate subclasses for recirculating registers.

164   **Single comparator and counter:**
This subclass is indented under subclass 158. Subject matter having one comparator and a counter.

(1)   Note. This subclass will include many successive approximation types of ana-

log to digital converters as well as tracking types of analog to digital converters employing reversible counters.

SEE OR SEARCH CLASS:
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, appropriate subclasses for electrical counters.

165 Single comparator and digital storage:
This subclass is indented under subclass 158. Subject matter having one comparator and means for storing a digital signal.

(1) Note. This subclass will include many successive approximation types of analog to digital converters.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, appropriate subclasses for digital signal storage.

166 Intermediate conversion to time interval:
This subclass is indented under subclass 155. Subject matter where the analog input signal is converted to a signal where the analog value is represented by some time interval and the latter signal is digitized or coded by counting during said interval.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152, for a digital to analog converter with an intermediate conversion of the digital signal to a time interval.

167 Dual slope:
This subclass is indented under subclass 166. Subject matter wherein the input analog signal is integrated for a fixed time interval following which there is a linear return of the integrated signal to the datum level by means of an applied reference signal; the order of application of the two signals may be reversed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
128, for bipolar dual slope conversion.

168 Plural slope:
This subclass is indented under subclass 166. Subject matter wherein the input analog signal is integrated for a fixed time interval following which there is a nonlinear return to the datum level by means of applied plural reference signals or by changing the frequency of a clock signal which is being counted.

SEE OR SEARCH THIS CLASS, SUBCLASS:
129, for bipolar plural slope conversion.

169 Input signal compared with linear ramp:
This subclass is indented under subclass 166. Subject matter where the input analog signal is compared with a linearly increasing signal.

(1) Note. The latter includes a stepped waveform produced by a digital to analog converter responsive to a counter driven to produce sawtooth or triangular waveforms.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170, for conversion with an input signal compared with a nonlinear ramp.

170 Input signal compared with nonlinear ramp:
This subclass is indented under subclass 166. Subject matter where the input analog signal is compared with a signal increasing in a nonlinear manner.

SEE OR SEARCH THIS CLASS, SUBCLASS:
169, for conversion where an input signal is compared with a linear ramp.

171 Using magnetic or cryogenic components:
This subclass is indented under subclass 155. Subject matter wherein particular magnetic components or components used at very low temperatures near absolute zero form an essential part of an analog to digital conversion.

(1) Note. Excluded from this subclass are ordinary transformers used in power supplies or for signal coupling or inductances used for filtering or decoupling.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

15,   for a digital pattern reading type converter having a magnetically read pattern.

149,   for a digital to analog or an analog to digital combined with a digital to analog converter having magnetic or cryogenic components.

SEE OR SEARCH CLASS:

235,   Registers, subclasses 499+ for magnetic coded record sensors.

307,   Electrical Transmission or Interconnection Systems, subclasses 401+ for nonlinear saturable reactor systems.

360,   Dynamic Magnetic Information Storage or Retrieval, subclasses 39+ for magnetic recording or reproduction of a digital signal.

172   Using charge transfer devices (e.g., charge coupled devices, charge transfer by switched capacitances):

This subclass is indented under subclass 155. Subject matter where there is an analog to digital converter using devices or circuits through which there is a sequential transfer of electric charges.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

15,   for a digital pattern reading converter having a capacitive pattern.

150,   for digital to analog converters using charge transfer devices.

173   Code generator or transmitter:

This subclass is indented under the class definition. Subject matter for originating or emitting a coded set of pulses.

(1)   Note. Included in this and indented subclasses are wireless transmitters.

SEE OR SEARCH CLASS:

178,   Telegraphy, subclasses 79+ for a telegraph transmitter; subclasses 101+ for a telegraph key.

200,   Electricity: Circuit Makers and Breakers, for a switch or switch actuator, absent circuitry.

340,   Communications: Electrical, subclasses 1.1 through 16.1 for a selective code transmitter and receiver combined, or a selective code receiver.

375,   Pulse or Digital Communications, subclasses 295+ for transmission of a digital signal having arbitrary message content.

379,   Telephonic Communications, subclasses 353+, particularly subclasses 368 and 369 for a manually actuated telephone signalling device (e.g., keypad or dial).

380,   Cryptography, appropriate subclasses for a cryptographic code transmitter, and subclasses 278 through 285 for distribution of a cryptographic key.

174   Plural transmitters:

This subclass is indented under subclass 173. Subject matter including multiple pulse transmitters for sending output along a common channel.

SEE OR SEARCH CLASS:

370,   Multiplex Communications, appropriate subclasses for plural transmitters with outputs multiplexed along a common channel.

175   With code display at transmitter:

This subclass is indented under subclass 173. Subject matter including a visual indication of the contents of the pulse code at the point of code origination.

176   Transmitter for remote control signal:

This subclass is indented under subclass 173. Subject matter in which the transmitter produces a signal specifically described for control of a remotely located device.

(1)   Note. Some remote control aspect of the transmitter must be mentioned.

(2)   Note. A remote control transmitter specific to a particular art device is classified with the art device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
20+,   for a remote control transmitter including a body contact actuating element.

SEE OR SEARCH CLASS:
340,   Communications: Electrical, sub-classes 5.61 through 5.63 and 5.64 for a wireless transceiver and a wireless transmitter in a coded record authorization control .
348,   Television, subclasses 731+ and 734 for remote control transmitter for a television receiver.
446,   Amusement Devices: Toys, subclass 454 for remote control of a wheeled toy.
455,   Telecommunications, subclasses 151.1+ and 352+ for a remote control transmitter for a radio receiver.

177   Producing different pulse frequencies:
This subclass is indented under subclass 173. Subject matter which generates coded pulses of different frequencies and in which the code is represented by the pulse frequency.

178   With variable pulse spacing and grouping:
This subclass is indented under subclass 173. Subject matter in which the duration of or between pulses, or the order of diverse types of pulses, is varied.

(1)   Note. Pulse permutation devices are classified in this and indented sub-classes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
29,   for this subject matter controlled by a keyboard or keypad.

SEE OR SEARCH CLASS:
375,   Pulse or Digital Communications, subclasses 237+ for a pulse code modulating message transmitter.

179   Plural pulse shapes:
This subclass is indented under subclass 178. Subject matter in which pulses of different shapes are utilized.

180   Plural channels:
This subclass is indented under subclass 178. Subject matter having more than one channel leading away from the transmitter.

(1)   Note. For example, there may be an individual channel, for each individual pulse of the code.

181   Carrier frequency variation:
This subclass is indented under subclass 178. Subject matter in which the frequency of the carrier upon which the pulses are modulated is varied.

SEE OR SEARCH CLASS:
375,   Pulse or Digital Communications, subclasses 303+ for transmission of a digital signal having arbitrary message content by frequency shift keying.

182   With variable pulse length:
This subclass is indented under subclass 178. Subject matter in which the duration of the pulses is varied.

183   Pulse presence or absence in equal length code:
This subclass is indented under subclass 178. Subject matter in which the code consists of a set of a fixed number of pulses and in which the meaning of the pulse code is determined by the presence or absence of a pulse.

(1)   Note. The well-known Baudot code is an example of the codes in this subclass.

SEE OR SEARCH CLASS:
714,   Error Detection/Correction and Fault Detection/Recovery, appropriate sub-classes for error detection or correction in an electrical device of general utility.

184   Numerical pulse type:
This subclass is indented under subclass 173. Subject matter in which the meaning of the pulse code is determined solely by the number of pulses transmitted.

SEE OR SEARCH CLASS:
714,   Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for a parity bit generator.

185   **Multistage:**
This subclass is indented under subclass 184. Subject matter having plural pulse code generating stages cooperating to produce components of a pulse code output.

(1)   Note. Such devices often include a pulse generating source for each component of a combined or denominational code output.

186   **With gaseous or space discharge device:**
This subclass is indented under subclass 184. Subject matter wherein a portion of a signal current conducting path includes an ion or electron beam path through a gas, vapor or vacuum.

SEE OR SEARCH CLASS:
315,   Electric Lamp and Discharge Devices: Systems, appropriate subclasses for a discharge device circuit with plural load circuits.

187   **Having counter or register:**
This subclass is indented under subclass 184. Subject matter including a device to store or accumulate pulses.

SEE OR SEARCH CLASS:
377,   Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclasses 82+ for an electromechanical register, per se.

188   **Serial pulse number actuation:**
This subclass is indented under subclass 184. Subject matter wherein different pulse codes are actuated by serially connected code generators in which an actuated code generator further actuates successively connected generators for a composite output.

189   **Pulse gating:**
This subclass is indented under subclass 184. Subject matter in which a pulse code controlling device permits passage of pulses from a pulse source to generate a pulse code output.

190   **Mechanical switch feature:**
This subclass is indented under subclass 184. Subject matter including a structural detail of a circuit path modifying device.

191   **With gaseous or space discharge device feature:**
This subclass is indented under subclass 173. Subject matter including a detail of a signal current conducting device having a current conducting path which includes an electron or ion path through a gas, vapor or vacuum.

192   **With rotary distributor:**
This subclass is indented under subclass 173. Subject matter including a multiposition switch with a rotary wiper arm.

SEE OR SEARCH CLASS:
379,   Telephonic Communications, subclasses 353+, particularly subclasses 362-368 for a telephone dial, or a dial mounting on a telephone set.

200   **QUANTIZER:**
This subclass is indented under the class definition. Subject matter for converting the instantaneous amplitude of an input signal to the nearest of a fixed number of discreet amplitude levels.

899   **MISCELLANEOUS:**
This subclass is indented under the class definition. Subject matter which does not meet the definition of, any other subclass in this class.

END