CLASS 324, ELECTRICITY: MEASURING AND TESTING

SECTION I - CLASS DEFINITION

This is the residual home for all subject matter, not elsewhere classified, relating to the measuring, testing (or sensing) of electric properties, (e.g., determining ground resistivity, determining frequency of an alternating current, determining kilowatt hour demand), or the measuring, testing or sensing of nonelectric properties by electric means (e.g., determining moisture, a nonelectric property, by measuring conductance with a resistance bridge; determining speed, a nonelectric property by use of an electric tachometer).

(1) Note. Measuring and testing have been distinguished as being quantitative and qualitative, respectively, but in these definitions the terms are used synonymously.

(2) Note. This class was produced in 1953 by making official the unofficial digests which had been established by the Examiners of Class 175 (Division 48) during the period from about 1905 to 1952, and, in the case of subclasses 76+, by cursorily revising the unofficial digests which had been established by the Examiners of Classes 171 and 172 (Division 69) during the period from about 1902 to 1952. A caveat is given: While it is believed that the titles and definitions are reasonably correct, no assurance can be given that all of the patents, issued prior to the date of reclassification, are in the proper subclass, since only some of the individual patents were read during the reclassification project. Consequently, in making a thorough search in this class, it is advisable to investigate every subclass which may possibly be pertinent and not, in order to shorten the search, to rely upon the principle of superiority of subclass subject matter because of position in schedule, since the principle is applicable only in classes where each patent has been analyzed and placed in the schedule in accordance with that portion of the disclosed subject matter which is claimed.

(3) Note. Measuring and testing requires sensing and signaling or indicating to exhibit the result of the sensing. Sensing is synonymous with condition responsive. Sensing merely detects the presence and/or magnitude of the condition.

(4) Note. Since many other classes include condition responsive subclasses, often entitled automatically responsive or automatic, the search for sensing, in order to be complete, must extend to the class which relates to the environment in which the sensing occurs. Some of these classes are listed below under SEARCH CLASS.

(5) Note. Since Class 324 takes, under the class definition, only measuring and testing not elsewhere classified, the search, in order to be complete, must in appropriate instances extend to the other classes listed below under SEARCH CLASS.

(6) Note. The combination of the subject matter of this class (324) and an art environment is generally classified with the art environment where that environment is significant, either by virtue of a significant disclosed relationship or by virtue of a claimed relationship, as where a test is made of the condition of a portion of a telephone system without making said portion of the telephone system unavailable for use. Where the art environment is recited by name only the combination may be classified, in some instances, with the art environment, and in others, in this class (324). For a list of some of the other classes which contain pertinent subject matter, see the classes referred to under SEARCH CLASS.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Class 324, subclasses 870.01+ take telemetric-signaling means useful in transmitting a measured quantity, not limited to any particular measuring instrument provided for in other classes, while Class 324 takes such telemetric-signaling means in combination with a particular measuring means of the type provided for in Class 324.

LINE BETWEEN CLASS 340 AND CLASS 324

See Class 340, Communications: Electrical, appropriate subclasses, for subject matter sometimes similar to that in Class 324. Often, but not invariably, the line between these two classes is as follows: If the testing system is

permanently associated with the environment being tested, as in a machine monitoring device or in a burglar alarm, classification is in Class 340, while if it is temporarily associated, as in a portable test set, such as used by linemen, classification is in Class 324. Note particularly subclasses 870.01+ for telemetering and subclasses 500+ for signaling, automatically responsive to a condition.

LINE BETWEEN CLASS 429 AND CLASS 324

See Class 429, Chemistry: Electrical Current Producing Apparatus, Product and Process, subclasses 61+ for automatic battery control means combined with the battery, and subclasses 90+ for battery having measuring, testing, and indicating means. See Class 324, subclasses 20+ and Class 340, subclasses 636.1-636.21 for this subject matter.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

29, Metal Working, subclass 25.35 for the electrical measuring, testing or sensing of piezoelectric crystals combined with the manufacture thereof, and subclass 25.41 for the electrical measuring, testing or sensing of condensers combined with the manufacture thereof.

33, Geometrical Instruments, subclasses 125+, for the determination of distance, and subclasses 300+, for magnetic field direction sensing and indicating.

73, Measuring and Testing, appropriate subclasses for nonelectrical measuring and testing and for electrical measuring and testing of the following types: subclasses 26+ for gas analysis by electrical thermal determination,. subclass 75 for moisture determination by electrical thermal conductivity; subclass 760 for stress and strain gages, subclasses 104+ for surface and cutting edge determination by sliding pick-up, subclasses 116+ for motor and engine determinations (i.e., not merely ignition system). Subclass 304 for liquid level gages; immersible electrode type; subclasses 305+ for float type, subclass 755 for fluid pressure (e.g., Pirani type), subclasses 488+ for speed.

100, Presses, subclass 99 for presses having electrical measuring, testing or sensing means.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 47+ for methods of making or joining conductors of indefinite length.

178, Telegraphy, appropriate subclasses particularly subclass 69, for telegraphy combined with electrical measuring, testing or sensing.

181, Acoustics, subclasses 101+, for geophysical or subsurface exploration involving mechanically transmitting or receiving sound waves, subclasses 123+ for mechanical sound echo systems in general, and subclass 125 for mechanical sound location means.

204, Chemistry: Electrical and Wave Energy, subclass 400, for the analytical and testing apparatus related to the subject matter of that class, and subclass 242 for electrolytic cells, per se, (e.g., Beckmann cell).

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, appropriate subclasses for electrolysis utilized for electrochemistry and especially subclasses 775+ as the residual home for a process of electrolytic analysis or testing, per se.

209, Classifying, Separating, and Assorting Solids, for the subject matter of that class even if the basis of the separation is an electrical determination. Note subclasses 127.1+ for electrostatic separation and subclasses 212 and 213+ for magnetic separators, subclasses 511, 524+, 536, and 576 for photoelectric assorting.

250, Radiant Energy, subclasses 200+ for miscellaneous photoelectric cell circuits, subclass 250 for wave meters for measuring the wavelength or frequency of radio and microwaves, subclass 281 for methods and apparatus for ionic separation or analysis, subclasses 302+ for fluorescent and radioactive tracer methods, subclasses 336.1+ for the detection of invisible radiation or the examination of material by invisible radiation using radiant energy responsive electric signalling means, subclasses 428+ for fluent material containing, support or transfer means with or without an irradiating source or radiating fluent material, subclasses 453.11+ for supports for objects of irradiation, subclasses 458.1+ for luminophor irradiation, subclasses 472.1+ for nonelectric invisible radiation detectors, subclasses 493.1+ for radiant energy generation and sources, subclasses 505.1+ for radiation controlling means and subclasses 522.1+ for source supports.

273, Amusement Devices: Games, appropriate subclasses for games (e.g., pin-ball machines, target range) having electrical indicators.

307, Electrical Transmission or Interconnection Systems, subclass 111 for systems which are nonresponsive to frequency change and subclass 152 for systems which are responsive to rate of change.

313, Electric Lamp and Discharge Devices, subclass 10 for the subject matter of that class with integral temperature indicators.

314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses (note particularly subclass 9) for the subject matter of that class combined with measuring, testing or sensing.

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses (note particularly subclasses 129+) for the subject matter of that class combined with measuring, testing or sensing.

318, Electricity: Motive Power Systems, appropriate subclasses for automatically responsive motor systems and subclass 490 for motor systems having signals, meters, recorders or testing devices.

320, Electricity: Battery and Condenser Charging and Discharging, subclass 48 for battery charging and discharging systems having indicating, signaling and/or testing means.

322, Electricity: Single Generator Systems, subclasses 17+ for the subject matter of that class automatically responsive to a condition.

323, Electricity: Power Supply or Regulation Systems, subclasses 234 through 303 for the subject matter of that class automatically responsive to a condition.

329, Demodulators, for amplitude frequency, phase or pulse demodulators which may include an indicator.

330, Amplifiers, appropriate subclasses, for amplifiers, generally, which may be used in electrical measuring and testing circuits, particularly subclass 2 for amplifier condition testing or measuring. Where the amplifier is used merely as a part of an arrangement to measure or test a condition other than that of the amplifier, itself, classification is not in Class 330 but in the appropriate subclass of Class 324.

331, Oscillators, subclass 44 for oscillator systems provided with frequency calibrating or testing means, and subclass 64 for oscillator systems provided with indicator, signal or alarm.

332, Modulators, appropriate subclasses particularly subclasses 118 and 150 for the modulators having indicating, observing and/or signaling means.

333, Wave Transmission Lines and Networks, appropriate subclasses, particularly subclasses 2+, 14 and 17.1+ for the subject matter of that class automatically responsive to a condition.

336, Inductor Devices, subclasses 30+ for the subject matter of that class automatically responsive to a condition.

340, Communications: Electrical, appropriate subclasses, for subject matter sometimes similar to that in Class 324. (See Lines With Other Classes and Within This Class for a further discussion of the line).

343, Communications: Radio Wave Antennas, subclasses 5+ for reflected and/or otherwise returned radio wave energy wave measuring, testing and sensing systems, such as RADAR and ponder systems, and subclasses 350+ for direction finding radio systems.

346, Recorders, for recorders which record the operation of machines or workmen. Many of these recorders, especially in subclasses 33+ record the result of a measurement, test or sensing operation. Generally, but not invariably, a Class 324 disclosure, when combined with a recorder, is classified in Class 324.

348, Television, subclasses 180+ for monitoring, testing, or measuring television signals or apparatus.

356, Optics: Measuring and Testing, for measuring and testing light, materials and articles by means of visible light particularly subclasses 23+ for optical stroboscopes, subclasses 27+ for velocity or velocity and height measurements, subclasses 213+ for photometers, subclasses 237.1+ for apparatus for flaw detection subclasses 300+ for spectroscopic examination, subclasses 432+ for light transmission tests and subclasses 445+ for light reflection tests.

361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety systems responsive to an unsafe condition, such as circuit breaker systems, and subclasses 236+ for speed responsive electrical systems.

363, Electric Power Conversion Systems, subclasses 74, 164 and 165 for the subject matter of that class automatically responsive to a condition.

365, Static Information Storage and Retrieval, subclass 200 wherein a defective memory device is used to store information, subclass 201 for specifics of a memory device which is tested for defects or erroneous information.

368, Horology: Time Measuring Systems or Devices, subclasses 155+ for time measuring by clocks having electrical features.

374, Thermal Measuring and Testing, appropriate subclasses for a measurement or test of a thermal quantity, whether performed electrically or nonelectrically, except for a measurement or test involving a particle spin determination.

376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 245+ for processes or device for testing, measuring, etc., of a condition of a nuclear reactor during its operation.

378, X-Ray or Gamma Ray Systems or Devices, appropriate subclasses, particularly subclasses 44+, 51+ and 70+ for X-ray systems used in testing.

379, Telephonic Communications, appropriate subclasses, particularly subclasses 1.01 through 35, for telephony combined with electrical measuring, testing or sensing.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ and 105+ for apparatus for electrical measuring, testing, or sensing combined with significant chemical reaction or control.

429, Chemistry: Electrical Current Producing Apparatus, Product and Process, subclasses 61+ for automatic battery control means combined with the battery, and subclasses 90+ for battery having measuring, testing, and indicating means. (See Lines With Other Classes and Within This Class for further discussion of the line between Class 429 and Class 324.)

434, Education, and Demonstration appropriate subclasses, for electrical measuring, testing or sensing in combination with education.

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for processes of electrical measuring, testing, or sensing combined with significant chemical reaction or control.

439, Electrical Connectors, subclasses 488+ for a connector having indicating means or identifying means.

455, Telecommunications, appropriate subclasses for radio systems having electrical measuring testing or sensing means for indicating the operative condition of the radio system.

473, Games Using Tangible Projectile, and its incorporated class (273, Amusement Devices: Games), for a game device or apparatus (e.g., a pin-ball machine, target range, aerial projectile target device, bowling alley apparatus, golfing apparatus, simulated game apparatus, chance device, etc.) which may have an electrical indicator.

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c greater than 30 K) superconducting device, and particularly subclasses 160+ for measuring or testing system or device; and subclass 310 for a process of measuring or testing a superconductive property.

702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for data processing systems or calculating computers which are utilized for testing, measuring, or monitoring the operation of an external device or quantity where the external device or quantity must be only nominally claimed, particularly subclasses 6 through 13 for well-logging, subclasses 14-18 for seismology, subclasses 57-80 for electrical signal parameter measurement, subclasses 85-107 for calibration, subclasses 108-126 for a testing system, subclass 141 for acceleration, subclasses 142-149 for speed or velocity, subclasses 176-178 for time duration or rate, and subclasses 191-195 for noise reduction in measured signal processing.

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclass 4 for analog simulation of electrical device or system.

714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for error detection, correction, recovery or prevention in pulse code data or computers.

SUBCLASSES

66 This subclass is indented under the class definition. Subject matter for determining the location of a particular conductor or for identifying a particular conductor out of many.

(1) Note. This subclass includes, for example, the determination of a particular phase of polyphase conductors.

SEE OR SEARCH CLASS:

379, Telephonic Communications, subclasses 1.01 through 35, for testing devices used in telephony to identify or locate a particular line.

67 This subclass is indented under subclass 66. Subject matter for determining the location of a conductor at a point which is inaccessible.

(1) Note. The conductor, for example, may be located in a conduit inside a wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

326+, for similar subject matter utilized to determine the location of conductors which are buried in the earth.

71.1 DETERMINING NONELECTRIC PROPERTIES BY MEASURING ELECTRIC PROPERTIES:

This subclass is indented under the class definition. Subject matter for determining a nonelectric property by measuring an electric property.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61, for the determination of a nonelectric property by measuring capacity.

65, for the determination of a nonelectric property by measuring resistance.

71.2 Erosion:

This subclass is indented under subclass 71.1. Subject matter where the nonelectric property measured relates to the amount of material removed from an object.

71.3 Beam of atomic particles:

This subclass is indented under subclass 71.1. Subject matter where the property being measured is some characteristic of a beam of atomic particles.

71.4 Particle counting:

This subclass is indented under subclass 71.1. Subject matter where the measurement means includes means for counting particles.

(1) Note. For classification in this subclass there should be recited significant details in regard to handling or preparing the particles to be counted.

SEE OR SEARCH CLASS:

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclasses 10+ for particle counting, per se, and see also the search notes thereunder.

71.5 Semiconductors for nonelectrical property:

This subclass is indented under subclass 71.1. Subject matter including semiconductive means for sensing variations in the nonelectrical property being measured.

SEE OR SEARCH CLASS:

438, Semiconductor Device Manufacturing: Process, subclasses 17+ for methods of making semiconductor electrical devices combined with measurement of an electrical condition.

71.6 Superconductors:

This subclass is indented under subclass 71.1. Subject matter where the nonelectric properties being determined are those of superconductors.

72 This subclass is indented under the class definition. Subject matter for determining voltage, phase, current, power, frequency or a related quantity in a specific environment.

(1) Note. This subclass includes, for example, voltmeters, per se, in combination with a specific lightning rod.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76+, for a measurement of electricity, per se, when not related to a specific environment. Note particularly subclass 157 for the measurement of electricity combined with some other feature. See (3) Note to the definition of subclass 76 for a statement of the line between subclasses 72 and 76.

72.5 This subclass is indented under subclass 72. Subject matter having a voltage probe.

SEE OR SEARCH THIS CLASS, SUBCLASS:

119, for volt meters and ammeters having rectifiers in a probe.

149, for voltmeters and ammeters having a probe.

SEE OR SEARCH CLASS:

439, Electrical Connectors, appropriate subclasses for probe conductor structure, per se.

73.1 PLURAL, AUTOMATICALLY SEQUENTIAL TESTS:

This subclass is indented under the class definition. Subject matter for measuring or determining two or more electrical characteristics of an electrical circuit or circuit element, or for measuring or determining a single electrical characteristic of two or more electrical circuits or circuit elements, wherein the measurements or determinations are made one after another without human intervention.

(1) Note. This subclass is the residual locus of processes and apparatus which automatically perform sequential tests of the Class 324 type, none of which tests are provided for by subclasses preceding this one in the Class 324 schedule. Similar processes and apparatus in which one of the plural tests is provided for in a preceding subclass will be found in that subclass. For example, a patent claiming means for automatically testing a circuit for an "open circuit" caused by the failure of a circuit element, followed automatically by a test to determine the input/output characteristics of the circuit is classifiable as an "original" in subclasses 500+.

(2) Note. This subclass is the locus of processes and apparatus for performing, in automatic sequence, two or more Class 324 type tests which otherwise may be provided for in subclasses following this one in the Class 324 schedule. For example, a patent claiming a testing apparatus consisting of a combination of means to determine frequency, means to compare phase, and means to permit a human operator to switch from one means to another is classifiable as an "original" in subclasses 78+.

(3) Note. Subject matter for performing plural, Class 324 type tests simultaneously but not sequentially will be found in subclasses determined by the tests, per se.

(4) Note. Electrical characteristics measured by the subject matter of this subclass type include the response of a circuit or circuit element to a particular electrical input and includes such tests to determine the existence of miswired circuits. For similar subject matter used to detect the presence of short or open circuits caused by failures in circuit elements or their interconnections, see the reference below to subclasses 500+ in the search notes to other subclasses in this class.

(5) Note. The measurements of this subclass type may result in either quantitative or qualitative ("go-no-go") indications.

(6) Note. The automatic, sequential measurement of the analog responses of a circuit or circuit element to two different input levels is classifiable in this subclass. The response of a circuit or circuit element to a pattern of high and low digital input signals is classifiable in Class 371.

(7) Note. Testing means of this subclass type produce a distinct indication for each of the plural tests, Hence, testing means comprising plural transducers or detectors, each of outputs are combined to produce only on indication is not classifiable in this subclass unless the whole test is automatically repeated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

114, for plural tests employing plural meters, which tests are not automatically sequenced.

115+, for plural tests employing plural meter ranges, which tests are not automatically sequenced.

133, for plural go-no-go tests which are not automatically sequenced.

140, for testing means having plural inputs, which means does not include automatic sequencing.

459+, for measuring or testing electrical parameters of printed circuits with an ionizable gas.

500+, for plural tests explicitly for the purpose of detecting failures in circuits or circuit elements consisting of open or short circuits.

754+, for probes, per se, which might be suitable for use with subject matter of this subclass type.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, especially subclass 556, for diverse electrical test used to classify, separate or sort articles, and subclasses 571+ for sorting by sensing properties of articles by electrical testing means.

250, Radiant Energy, subclasses 306+ for plural sequential tests involving testing by charged particles, especially subclass 310 for automatic sequential tests of printed circuits using an electron probe, and subclasses 363+ for automatic sequential tests of electrical circuits and devices using radiant energy and invisible-to-visible light converters.

340, Communications: Electrical, subclass 653 for electrical alarms responsive to circuits for testing electrical circuits or components.

382, Image Analysis, appropriate subclasses for automatic, sequential tests of printed circuits using image comparison.

455, Telecommunications, subclasses 115.1 through 115.4 and subclasses 226.1-226.4 for the testing of radio transmitters and receivers, respectively, which may include automatic sequential tests.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 108+ for testing systems, particularly subclasses 117+ for testing of circuits, subclass 118 for testing multiple circuits, and subclass 121 for multiple test instruments.

714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for error detection, correction, recovery or prevention in pulse code data or computers.

74 This subclass is indented under the class definition. Subject matter for testing and calibrating electric meters.

SEE OR SEARCH THIS CLASS, SUBCLASS:

130, for electric meters, per se, having self-calibrating features.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 1.01+, for the proving or calibrating of mechanical instruments.

374, Thermal Measuring and Testing, subclasses 1+ for calibration or testing of a thermally responsive instrument.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 85+ for calibration or correction system, subclasses 108+ for testing systems.

75 This subclass is indented under subclass 74. Subject matter in which the testing or calibrating is done by stroboscopic means.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for flashing lamp systems.

356, Optics: Measuring and Testing, subclasses 23+ for optical stroboscopes.

76.11 MEASURING, TESTING, OR SENSING ELECTRICITY, PER SE:

This subclass is indented under the class definition. Subject matter relating to the measurement of electric voltages or currents, or combinations thereof, when said electric voltages and currents do not occur in a significantly recited external environment.

(1) Note. Measurement requires sensing and some indication of the result of the sensing. The indication can be quantitative, as in a calibrated voltmeter, or qualitative, as in an uncalibrated cathode-ray

oscilloscope or a "hot line" indicator. No distinction is made in these subclasses between testing and measuring.

(2) Note. The definition is not limited to subject matter which indicates the result of the measurement, but covers the sensing subcombination as well. Such subcombinations, when disclosed as having utility only in the measurement of this subclass, are generally classified here, but when disclosed to a specific art device, are classified in one of the classes referred to under the search notes.

(3) Note. The recited external environment is significant to the measurement when there is a disclosed significant relation or when the claims recite, by more than name only, more of the environment than is necessary for the performance of the measurement. When the external environment is not significant, for example, a meter which indicates the phase difference between A-C voltages in different circuits, will be classified in this class even though one of the inputs is recited as being from a generator and the other as being from a power system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72, for this subject matter in combination with a specific environment. See (3) Note above.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for nonelectrical measuring and testing and for electrical measuring and testing in combination with non-electrical measuring and testing. See the proceeding Class 324 definition notes for specific subclasses.

315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits of general application, including those for producing a visual grid on the face of the tube for calibration purposes.

340, Communications: Electrical, subclasses 870.01+ for telemetering systems for indicating at a remote point the value of a local condition. Class 324 provides for significant measuring, testing, or sensing of electricity, per se, and the indication of the result, whether by a telemetering system or otherwise.

356, Optics: Measuring and Testing, appropriate subclasses for measuring and testing light.

362, Illumination, subclass 23 for illuminated dial or scale, some of which can be used as voltage or current indicators.

370, Multiplex Communications, subclasses 241+ for testing (other than synchronization) of a multiplex communication element.

374, Thermal Measuring and Testing, appropriate subclasses for thermal measuring and testing.

375, Pulse or Digital Communications, subclasses 224+ for measuring and testing of pulse or digital communications device.

379, Telephonic Communications, subclasses 1.01 through 35 for diagnostic testing, malfunction indication, or electrical condition measurement of a telephonic communication device.

455, Telecommunications, subclasses 115.1 through 115.4 for measuring and testing of a transmitter and subclasses 226.1-226.4 for measuring and testing of a receiver in telecommunications.

714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for error detection, correction, recovery or prevention in pulse code data or computers.

76.12 Analysis of complex waves:

This subclass is indented under subclass 76.11. Subject matter whereby one or more components of a periodic wave made up of a combination of several frequencies or several sine waves superimposed on one another has components which are examined.

(1) Note. Such analysis as is found in this subclass is usually referred to as Fourier analysis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.39+, for the measurement of frequency of a cyclic current or voltage, per se.

76.77+, for the measurement of phase of cyclic voltage or current.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 861.06 for volume or rate of flow meters measuring transit time of a tracer or tag by correlator means.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 66+ for wave form analysis, particularly subclass 77 for Fourier analysis, subclass 112 for a testing system having sinusoidal signal stimulus, and subclasses 124+ for signal generation or waveform shaping.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, subclasses 205+ for determination of the component frequencies in a speech signal.

76.13 Amplitude distribution:

This subclass is indented under subclass 76.12. Subject matter comprising means to measure an extent of dispersion of magnitude variation in the component of the complex wave.

(1) Note. The amplitudes may be statistically analyzed.

76.14 Radiometer (e.g., microwave, etc.):

This subclass is indented under subclass 76.13. Subject matter having means that detect and measure radiant energy either at separate wave lengths or integrated over a broad wavelength band in the complex wave.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.56, for microwave frequency detection in digital output used in determining the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 250 for the measurement of radio or microwaves by an absorption wavemeter

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses for directive radio wave systems and devices used in communication.

76.15 With sampler:

This subclass is indented under subclass 76.13. Subject matter including a device whose output is a series of discrete values representative of the values of an input at a series of points in time.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.24, for sampling in a frequency spectrum analyzer.

76.38, for sampling, per se, in analysis of complex waves.

76.42, for sampling by frequency comparison in frequency of cyclic current or voltage.

76.58, for sampling in digital output by phase comparison.

76.16 With counter:

This subclass is indented under subclass 76.13. Subject matter including a device capable of changing stages in a specified sequence upon receiving appropriate signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.48, for counters in digital output by frequency comparison used to determine the frequency of cyclic current or voltage.

76.62, for counters in digital output by phase comparison used to determine the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 19 where pulses are counted in systems for determining the value of some parameters.

76.17 With integrator:

This subclass is indented under subclass 76.13. Subject matter whereby summing of a signal is derived.

SEE OR SEARCH CLASS:

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 336+ for miscellaneous integrating circuits.

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 823+ for analog integrators, per se.

76.18 With slope detector:

This subclass is indented under subclass 76.13. Subject matter comprising means to monitor the rise over the run in a wave.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.25, for slope detection in frequency spectrum analyzers.

SEE OR SEARCH CLASS:

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 14+ for miscellaneous slope detecting circuits and subclass 170 for slope control of a pulse waveform.

76.19 Frequency spectrum analyzer:

This subclass is indented under subclass 76.12. Subject matter including means that show an energy distribution as a function of frequency for a given signal.

SEE OR SEARCH CLASS:

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 76+ for frequency spectrum analysis.

76.21 By Fourier analysis:

This subclass is indented under subclass 76.19. Subject matter wherein the energy distribution is taken at discrete harmonic components, i.e., harmonics, of the given signal.

SEE OR SEARCH CLASS:

702, Data Processing: Measuring, Calibrating, or Testing, subclass 77 for Fourier analysis in a waveform measuring system.

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 823+ for analog integrators, per se.

76.22 Real-time spectrum analyzer:

This subclass is indented under subclass 76.19. Subject matter including a device which operates with sufficient speed that the energy distribution is determined within set timing limits.

76.23 With mixer:

This subclass is indented under subclass 76.19. Subject matter including a circuit that generates output frequencies equal to the sum or difference of two input frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.43, for plural mixers used in frequency comparison for the determination of cyclic current or voltage.

SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 313+ for mixers, per se.

76.24 With sampler:

This subclass is indented under subclass 76.19. Subject matter including a device whose output is a series of discrete values representative of the values of an input at a series of points in time.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.15, for sampling used in Amplitude distribution devices.

76.38, for sampling, per se, in analysis of complex waves.

76.42, for sampling by frequency comparison in determination of frequency of cyclic current or voltage.

76.58, for sampling in digital output by phase comparison in determination of frequency of cyclic current or voltage.

76.25 With slope detector:

This subclass is indented under subclass 76.19. Subject matter comprising means to monitor the rise over the run in a wave.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.18, for slope detection in amplitude distribution.

SEE OR SEARCH CLASS:

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 14+ for miscellaneous slope detecting circuits and subclass 170 for slope control of a pulse waveform.

76.26 Scanning-panoramic receiver:

This subclass is indented under subclass 76.19. Subject matter including a radio receiver that displays, on the screen of a cathode-ray tube, the presence and relative strength of all signals within a wide frequency range.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 364+ for cathode-ray tube deflections circuits.

455, Telecommunications, subclasses 145+ for panoramic display, per se.

76.27 With particular sweep circuit:

This subclass is indented under subclass 76.26. Subject matter including a specific circuit which produces at regular intervals, an approximately linear, circular, or other movement of a beam in a cathode-ray tube.

76.28 Digital filter:

This subclass is indented under subclass 77.11. Subject matter wherein an input signal is operated on by means of digital circuitry to alter the frequency spectrum of the input signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.29, for filtering in frequency spectrum analyzers.

76.31, for parallel filters in frequency spectrum analysis.

76.44, for filtering in frequency comparison used to determine the frequency of cyclic current or voltage.

76.68, for filtering in phase comparison used to determine the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, appropriate subclasses for filters and filtering in wave transmission lines and networks.

702, Data Processing: Measuring, Calibrating, or Testing, subclass 17 for filtering or noise removal in a seismic prospecting system, subclasses 190+ for measured signal extraction or separation (e.g., filtering).

76.29 With filtering:

This subclass is indented under subclass 77.11. Subject matter including a network of resistors, inductors, or capacitors which offers comparatively little opposition to certain frequencies, while blocking or attenuating other frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.44+, for filtering in frequency comparison for determination of the frequency of cyclic current or voltage.

76.68, for filtering in phase comparison for the determination of the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, appropriate subclasses for filters and filtering in wave transmission lines and networks.

702, Data Processing: Measuring, Calibrating, or Testing, subclass 17 for filtering or noise removal in a seismic prospecting system, subclasses 190+ for measured signal extraction or separation (e.g., filtering).

76.31 Parallel filters:

This subclass is indented under subclass 76.29. Subject matter including parallel connected network of resistors, inductors, or capacitors which offers comparatively little opposition to certain frequencies, while blocking or attenuating other frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.28, for digital filters in frequency spectrum analysis.

76.44, for filtering in frequency comparison used to determine the frequency of cyclic current or voltage.

76.68, for filtering in phase comparison used to determine the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, appropriate subclasses for filters and filtering in wave transmission lines and networks.

702, Data Processing: Measuring, Calibrating, or Testing, subclass 17 for filtering or noise removal in a seismic prospecting system, subclasses 190+ for measured signal extraction or separation (e.g., filtering).

76.32 With space discharge device:

This subclass is indented under subclass 76.31. Subject matter comprising any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.76, for space discharge device in frequency of cyclic current or voltage devices.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, for space discharge devices, per se.

76.33 Correlation:

This subclass is indented under subclass 77.11. Subject matter including means to measure the similarity of two or more signals.

SEE OR SEARCH CLASS:

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 422+ for correlation in electric digital calculating computers.

76.34 With space discharge device:

This subclass is indented under subclass 76.33. Subject matter comprising any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.76, for space discharge device in frequency of cyclic current or voltage devices.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, for space.

76.35 With delay line:

This subclass is indented under subclass 77.11. Subject matter comprising a real or artificial transmission line or equivalent component that slows a signal for a predetermined length of time.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.54, for delay line in phase comparison in frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, appropriate subclasses for delay lines in wave transmission lines and networks.

76.36 With optics:

This subclass is indented under subclass 77.11. Subject matter comprising lenses, prisms, or mirrors to be used in the frequency spectrum analyzer.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, for optics measuring and testing, per se.

359, Optics: Systems (Including Communication) and Elements, appropriate subclasses for optical systems and devices that may be used in measuring and testing.

76.37 Bragg cell:

This subclass is indented under subclass 76.36. Subject matter comprising acousto-optic means to redirect light by the method of Bragg diffraction.

76.38 With sampler:

This subclass is indented under subclass 76.12. Subject matter including a device whose output is a series of discrete values representative of the values of an input at a series of points in time.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.15, for sampling in amplitude distribution devices.

76.24, for sampling in a frequency spectrum analyzer.

76.42, for sampling by frequency comparison in frequency of cyclic current or voltage.

76.58, for sampling in digital output by phase comparison.

76.39 Frequency of cyclic current or voltage (e.g., cyclic counting etc.):

This subclass is indented under subclass 76.11. Subject matter relating to the measuring of the frequency of an electric voltage or current which fluctuates in a periodic manner.

(1) Note. Generally, when an intangible electric voltage measurement occurs in a significant environment (for example, when the measurement is of the synchronizing frequency in a communication system) the class which provides for the environment also provides for the frequency measurement in that environment. The search should therefore, in appropriate instances, extend to other classes. An environment recited by name only is not considered to be significant.

(2) Note. The frequency measurement may be indicated in various manners, as in terms of frequency error, deviation, or average frequency over a period of time. The measurement and indication may be either qualitative or quantitative.

(3) Note. It is impossible to vary the frequency of a periodically varying voltage without concomitantantly varying its phase. Consequently, when the frequency changes slowly, it may be possible to indicate frequency by measuring phase angle. In those instances the search should extend to subclasses 76.77+, especially subclass 91, since synchronization is usually concerned with obtaining a zero phase angle rather than with obtaining a mere equality of frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

160+, for electrical measuring of speed, for example, the speed of rotating shafts or bullets, and for measuring the average frequency of random events, such as the occurrence of random electrical impulses and for timing means utilized to electrically determine the time interval between points spaced in time, when said points are not determined by the fluctuations of a periodically varying voltage, as when the points are determined, for example, by a randomly varying voltage or by the events at a race track.

76.12+, for complex wave analysis, per se.

SEE OR SEARCH CLASS:

84, Music, subclasses 454+ for tuning devices utilized in the tuning of musical instruments, some of which will measure the frequency of an unknown sound.

250, Radiant Energy, subclass 250 for the measurement of radio or microwaves by an absorption wavemeter.

329, Demodulators, subclasses 311+ for pulse demodulators or detectors; subclasses 315+ for frequency demodulators; and subclasses 345+ for phase demodulators.

331, Oscillators, subclass 44 for oscillators provided with means or the method for calibrating the oscillator with respect to its generated frequency and subclass 64 for oscillators.

332, Modulators, subclass 118 for frequency modulators having frequency measuring means and for the frequency meters, per se, when limited to use with modulation.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses for radar systems. Note particularly subclasses 104+ for such systems (for example, by measuring the frequency shift due to the doppler effect) and subclasses 128+ for such systems which utilize frequency modulated waves.

361, Electricity: Electrical Systems and Devices, subclasses 236+ for speed sensing and speed controlled systems, such as synchronizing systems.

368, Horology: Time Measuring Systems or Devices, subclasses 15+ and 155+ for clocks which serve as standards in frequency measurements.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, appropriate subclasses for frequency of cyclic current or voltage in cycle counters or cycle counting.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 75+ for frequency analysis, subclass 106 for signal frequency or phase correction.

76.41 Frequency comparison (e. g., heterodyne, etc.):

This subclass is indented under subclass 76.39. Subject matter having means to compare two frequencies with each other.

(1) Note. The two frequencies are usually, but not necessarily, sinusoidal.

(2) Note. One frequency, for example, may serve as a time base for an oscilloscope upon which the other frequency is displayed, or the two frequencies may be heterodyned to make a beat which has a mathematically determinable frequency with respect to the two frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.77+, especially subclass 91, for this subject matter when the frequency comparison is for synchronizing purposes. See also (3) Note to subclass 76.39.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits that can be used in frequency comparison (e.g., oscilloscopes, etc.).

331, Oscillators, for oscillators whose generated frequency can be varied or which can serve as frequency standards. By way of example, subclasses 37+ of Class 331 provides for beat frequency oscillator systems, and subclass 44 provides for oscillators with frequency calibration of oscillator.

334, Tuners, appropriate subclasses for tuned networks for use in wave energy apparatus and comprising inductance and capacitance elements in circuit arrangement to form a resonant circuit and in which structure is provided for adjusting one or both of these elements for changing the mean resonant frequency of the circuit. Note especially subclasses 30+ for tuners combined with resonant indicators.

455, Telecommunications, for this subject matter in combination with a radio receiving system, particularly subclasses 145+ for panoramic receivers.

76.42 With sampler:

This subclass is indented under subclass 76.41. Subject matter including a device whose output is a series of discrete values representative of the values of an input at a series of points in time.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.15, for sampling in amplitude distribution devices.

76.24, for sampling in a frequency spectrum analyzer.

76.38, for sampling, per se, in analysis of complex waves current, or voltage.

76.58, for sampling in digital output by phase comparison.

76.43 With plural mixers:
This subclass is indented under subclass 76.41. Subject matter including more than one circuit that generates output frequencies equal to the sum and the difference of two input frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.23, for mixers in frequency spectrum analyzers

SEE OR SEARCH CLASS:
455, Telecommunications, subclasses 313+ for mixers, per se.

76.44 With filtering:
This subclass is indented under subclass 76.41. Subject matter including a selective network of resistors, inductors, or capacitors which offers comparatively little opposition to certain frequencies,while blocking or attenuating other frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.28, for digital filters in frequency spectrum analysis.
76.29+, for filtering in frequency spectrum analyzer.
76.31, for parallel filters in frequency spectrum analysis.
76.68, for filtering in phase comparison used to determine the frequency of cyclic current or voltage.

76.45 Bandpass:
This subclass is indented under subclass 76.44. Subject matter that limits the range of frequencies that will be passed through a device.

76.46 Plural:
This subclass is indented under subclass 76.44. Subject matter including more than one filter.

76.47 Digital output:
This subclass is indented under subclass 76.41. Subject matter comprising an output signal which represents the size of a stimulus or input signal in the form of a series of discrete quantities which are coded to represent digits in a system of numerical notation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.55+, for digital output by phase comparison in frequency of cyclic current or voltage.
76.82+, for digital output in phase comparison, per se.

76.48 With counter:
This subclass is indented under subclass 76.47. Subject matter including a device capable of changing stages in a specified sequence upon receiving appropriate signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.16, for counters in amplitude distribution devices.
76.62, for plural counters in digital output by phase comparison.

SEE OR SEARCH CLASS:
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 19 where pulses are counted in systems for determining the value of some parameters.

76.49 Tuned mechanical resonator (e.g., reed, piezocrystal, etc.):
This subclass is indented under subclass 76.39. Subject matter having a mechanical resonating system and an electromechanical transducer to drive the mechanical resonating system in accordance with the electric voltage or current.

(1) Note. The mechanical resonator is usually a reed and its vibration can be visually observed, but it may be a quartz crystal whose motion is not visible or some other resonator.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclasses 141+ and 186+ for electromechanical filters utilizing mechanical resonating systems.

76.51 By tuning (e.g., to resonance, etc.):
This subclass is indented under subclass 76.39. Subject matter having circuit which may be adjusted for resonance at a particular frequency or other predetermined condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.41+, for this subject matter in combination with heterodyning means.
76.49+, for this subject matter where the tuned current has a tuned mechanically resonant element.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclass 250 for this subject matter in combination with a radio or carrier wave communication frequency
334, Tuners, appropriate subclasses for tuned networks for use in wave energy apparatus and comprising inductance and capacitance elements in circuit arrangement to form a resonant circuit and in which structure is provided for adjusting one or both of these elements for changing the mean resonant frequency of the circuit.
455, Telecommunications, subclasses 154.1+ for indicator means combined with frequency selection means in a radio receiver.

76.52 By phase comparison:
This subclass is indented under subclass 76.39. Subject matter having angle relationship means as a part thereof, in order to perform the frequency measurement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.77+, for the phase comparison means, per se.

76.53 With phase lock:
This subclass is indented under subclass 76.52. Subject matter comprising means of making the phase of an oscillator signal follow exactly the phase of a reference signal.

76.54 With delay line:
This subclass is indented under subclass 76.52. Subject matter comprising a real or artificial transmission line or equivalent component that slows a signal for a predetermined length of time.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.35, for delay line in frequency spectrum analyzer.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, appropriate subclasses for delay lines in wave transmission lines and networks.

76.55 Digital output:
This subclass is indented under subclass 76.52. Subject matter comprising an output signal which represents the size of a stimulus or input signal in the form of a series of discrete quantities which are coded to represent digits in a system of numerical notation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.47+, for digital output in frequency comparison.
76.82, for digital output in phase comparison, per se.

76.56 With microwave frequency detection:
This subclass is indented under subclass 76.55. Subject matter comprising means to detect frequencies of 1000mhz plus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.14, for radiometers in amplitude distribution used in analysis of complex waves.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclass 250 for the measurement of radio or microwaves by an absorption wavemeter.
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses for directive radio wave

systems and devices used in communication.

76.57 With tone detection:
This subclass is indented under subclass 76.55. Subject matter comprising means to detect a sound sensation having pitch.

76.58 With sampler:
This subclass is indented under subclass 76.55. Subject matter including a device whose output is a series of discrete values representative of the values of an input at a series of points in time.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.15, for sampling in amplitude distribution devices.
76.24, for sampling in a frequency spectrum analyzer.
76.38, for sampling used in analysis of complex waves.
76.42, for sampling in frequency comparison used in determination of frequency of cyclic current or voltage.

76.59 With multiplexing:
This subclass is indented under subclass 76.55. Subject matter including a device for simultaneous transmission of two or more signals in either or both directions over the same transmission path.

SEE OR SEARCH CLASS:
370, Multiplex Communications, for multiplex communications, per se.

76.61 With memory:
This subclass is indented under subclass 76.55. Subject matter comprising means to collect and hold information until it is needed.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, for memories, per se.

76.62 With counter:
This subclass is indented under subclass 76.55. Subject matter including devices capable of changing stages in a specified sequence upon receiving appropriate signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.16, for counters in amplitude distribution devices.
76.48, for counters in digital output by frequency comparison used in determining the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 19 where pulses are counted in systems for determining the value of some parameters.

76.63 Using register:
This subclass is indented under subclass 76.62. Subject matter including a device in which information is stored in and serially transferred through a storage medium.

SEE OR SEARCH CLASS:
235, Registers, for mechanical registers, per se.
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, for electrical registers, per se.

76.64 Plural:
This subclass is indented under subclass 76.62. Subject matter comprising more than one counter.

76.65 With space discharge device:
This subclass is indented under subclass 76.55. Subject matter comprising any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.76, for space discharge device in frequency of cyclic current or voltage devices.

SEE OR SEARCH CLASS:
313, Electric Lamp and Discharge Devices, for space discharge devices, per se.

76.66 With capacitive energy storage:
This subclass is indented under subclass 76.52. Subject matter comprising conductors and dielectrics that store electrical energy.

76.67 With space discharge device:
This subclass is indented under subclass 76.66. Subject matter comprising any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.76, for space discharge device in frequency of cyclic current or voltage devices.

SEE OR SEARCH CLASS:
313, Electric Lamp and Discharge Devices, for space discharge devices, per se.

76.68 With filtering:
This subclass is indented under subclass 76.52. Subject matter including a network of resistors, inductors, or capacitors which offers comparatively little opposition to certain frequencies, while blocking or attenuating other frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.28, for digital filters in frequency spectrum analysis.
76.29+, for filtering in frequency spectrum analyzer.
76.31, for parallel filters in frequency spectrum analysis.
76.44, for filtering in frequency comparison used to determine the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, appropriate subclasses for filters and filtering in wave transmission lines and networks.
702, Data Processing: Measuring, Calibrating, or Testing, subclass 17 for filtering or noise removal in a seismic prospecting system, subclasses 190+ for measured signal extraction or separation (e.g., filtering).

76.69 Current output proportional to frequency:
This subclass is indented under subclass 76.52. Subject matter whereby the current is related to the frequency by a constant.

76.71 Nulling circuit:
This subclass is indented under subclass 76.52. Subject matter comprising a circuit that indicates when current, voltage, or power is zero.

76.72 Qualitative output:
This subclass is indented under subclass 76.52. Subject matter whereby an output indicates conformance to specifications of a device.

(1) Note. This is usually a go or no situation.

76.73 With saturable device:
This subclass is indented under subclass 76.52. Subject matter comprising a magnetic-core reactor, the reactance of which is controlled by changing the saturation of the core by varying a superimposed unidirectional flux.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76.75, for inductive sensing used in determining the frequency of cyclic current or voltage.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclasses 401+ for Nonlinear Reactors Systems (e.g., Saturable), per se.

76.74 Deviation measurement:
This subclass is indented under subclass 76.52. Subject matter comprising a device that measures the difference between the actual and specified values of a quantity.

76.75 Having inductive sensing:
This subclass is indented under subclass 76.39. Subject matter comprising detecting means which senses an inductance or detects the inducing of a voltage through mutual or electrostatic induction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.73, for a saturable device in by phase comparison used in determining the frequency of cyclic current or voltage.

200+, for devices and methods to sense and indicate the sensing of a magnetic field, per se.

76.76 With space discharge device:

This subclass is indented under subclass 76.39. Subject matter comprising any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.65, for space discharge device in digital output by phase comparison.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, for space discharge devices, per se.

76.77 Phase comparison (e.g., between cyclic pulse voltage and sinusoidal current, etc.):

This subclass is indented under subclass 76.11. Subject matter relating to the measuring of a phase relationship between an electric voltage or current which fluctuates in a periodic manner and another electric voltage or current which fluctuates in the same manner.

(1) Note. Generally, when the measurement of an intangible phase relationship occurs in a significant environment (for example, when the measurement is of the phase difference between voltages produced by two generators in an electric generating system) the search is in this class which provides for the phase measurement in that environment. The search should therefore, in appropriate instances, extend to other classes. An environment recited by name only is not considered to be significant.

(2) Note. The voltage or current usually fluctuates in a sinusoidal manner, but may fluctuate in any other periodic manner.

(3) Note. The phase measurement may be indicated in various manners, as in terms of phase angle, power factor, time lag or advance, or otherwise. The measurement and indication may be either quantitative or qualitative (as, for example, “lead” and “lag”).

(4) Note. The two periodic voltages or currents need not be supplied to the system as inputs. For example, one of these periodic voltages may be supplied to the system as the unknown input while the other can be derived from the unknown input by an averaging process or can be supplied by a stable oscillator which is part of the system, or it can be supplied by a mechanically moving standard.

(5) Note. It is impossible to vary the phase of a periodically fluctuating voltage or current without concomitantly varying its frequency. Consequently, especially when phase angles vary rapidly, it may be possible to indicate phase angle by measuring frequency. In those instances the search should extend to subclasses 76.39+ of this class.

(6) Note. One of the voltages or currents may be of a different type than the other voltage or current; for example, one may be a sinusoidal voltage while the other may be a pulse current, or one of the voltages may be a harmonic of the other voltage and the measurement may be of the phase relationship between harmonics of the same frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.52, for phase comparison in frequency of cyclic current or voltage devices.

141, and 142, for watt meters and voltmeters which do not indicate phase angle but respond to it.

160+, for the measurement of phase angle between an electrical voltage or current and the angular position of a rotating machine which generates or is supplied by said voltage or current.

SEE OR SEARCH CLASS:

329, Demodulators, subclasses 311+ for pulse demodulators using locally generated oscillations, subclasses 336+ for frequency demodulator employing phase shift, and subclass 346 for using locally generated oscillations.

76.78 Quadrature sensing:

This subclass is indented under subclass 76.77. Subject matter comprising means to detect the state or condition of two related periodic functions or two related points separated by a quarter of a cycle, or 90 electrical degrees.

76.79 Feedback control, electrical:

This subclass is indented under subclass 76.77. Subject matter having electrical means to control a return path from an output terminal to an input terminal of at least one functional circuit device or circuit.

SEE OR SEARCH CLASS:

330, Amplifiers, appropriate subclasses for feedback, per se.

76.81 Feedback control, mechanical:

This subclass is indented under subclass 76.77. Subject matter having mechanical means to control a return path from an output terminal to an input terminal of at least one functional circuit device or circuit.

SEE OR SEARCH CLASS:

330, Amplifiers, appropriate subclasses for feedback, per se.

76.82 Digital output:

This subclass is indented under subclass 76.77. Subject matter comprising an output signal which represents the size of a stimulus or input signal in the form of a series of discrete quantities which are coded to represent digits in a system of numerical notation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76.47, for digital output in frequency comparison in frequency of cyclic current or voltage.

76.55, for digital output in by phase comparison in frequency of cyclic current or voltage.

76.83 Analog output:

This subclass is indented under subclass 76.77. Subject matter having an output quantity which varies smoothly over a continuous range of values rather than in discrete steps.

77.11 Nonscanning:

This subclass is indented under subclass 76.19. Subject matter wherein the frequency components of the spectrum are acquired simultaneously.

84 This subclass is indented under subclass 83. Subject matter having a wave guide.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 239+, for wave guides, per se. Also consult the search notes to that subclass for the other classes which make provision for wave guides.

85 This subclass is indented under subclass 83. Subject matter having means to change the frequency of a voltage or current into another frequency which varies in correspondence therewith.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79, for frequency measuring using zero or countable beat heterodyne.

82, for the subject matter of this subclass (85) used to measure frequency.

86 This subclass is indented under subclass 83. Subject matter in which one of the electric voltages or currents is obtained from a polyphase source.

(1) Note. In order that a disclosure be classified in this subclass, the polyphase source must be significantly related to the phase measurement. For example, the average phase angle of three phases of a three phase circuit may be compared with the phase of a single phase circuit. A polyphase source which supplies only a single phase voltage or current to the measuring equipment, without more, is not significantly related to the phase measurement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

108, for the measurement of positive, negative and zero sequence components of a three phase system.

87 This subclass is indented under subclass 83. Subject matter having a lamp or space discharge device or nonlinear device.

(1) Note. The lamp and space discharge device of this subclass are of the type which are classified elsewhere (see the Search Notes below) The nonlinear device is one whose voltage-current relationship is significantly nonlinear, as, for example, a thermistor, contact rectifier, thyrite resistor, transistor, saturable reactor or nonlinear condenser.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, see the Class Definition of Class 313 for lamp and space discharge device of this subclass (324/87). See (1) Note above.

88 This subclass is indented under subclass 87. Subject matter having a cathode ray tube.

(1) Note. The cathode-ray tube usually serves as an indicator, but not necessarily so.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 364+, for cathode-ray tubes, per se.

315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits of general application.

89 This subclass is indented under subclass 87. Subject matter having a space discharge device of the discharge control type.

(1) Note. The discharge may be controlled, for example, by means of a grid or by means of a magnetic field. The space discharge device may be of either the vacuum, gas or vapor type.

90 This subclass is indented under subclass 83. Subject matter having an indicating instrument of the type which has a stator element which produces a magnetic field by means of a supplied current.

(1) Note. The electrodynamometer instruments usually do not have a permanent magnetic field, but not necessarily so. They are, for example, of the ratio-meter type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

144, for the electrodynamometer instrument, per se.

91 This subclass is indented under subclass 83. Subject matter for indicating if two voltages or currents are in phase.

(1) Note. The indication may be quantitative or qualitative, as, for example, “lead” and “lag”. The measurement must be of a phase angle and not of some unrelated quantity. Thus, for example, a mere voltmeter, even though designated a “synchroscope”, is not classified here but is classified with the appropriate art.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84, through 90, for this subject matter where the synchroscope is of the type set forth in subclasses 84 through 90.

92 This subclass is indented under subclass 76. Subject matter having fluid means as a part thereof.

(1) Note. The fluid means must be significant to the electrical measurement or to the apparatus used in the measurement, and may be used, for example, as an expansible means in a thermal meter, as a lubricant, or as a cooling means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

155, for meter pivots and bearings.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 861+ for fluid rate of flow or volume meters, 290+ for fluid depth gages, and 700+ for fluid pressure gages.

137, Fluid Handling, appropriate subclasses, for the subject matter of that class. Note subclasses 123+ for syphons, and subclasses 334+ for fluid handling with heating.

93 This subclass is indented under subclass 92. Subject matter in which the fluid is electrically conductive and having means to cause electricity to flow through the fluid.

(1) Note. The fluid is usually mercury, but may be any other conductive fluid, such as a molten alloy. Herein are found, inter alia, mercury type ampere hour meters.

94 This subclass is indented under subclass 93. Subject matter in which the fluid is electrolytic and having means to cause an electrolytic action to take place.

SEE OR SEARCH CLASS:

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, appropriate subclasses for electrolysis utilized for electrochemistry and especially subclasses 775+ as the residual home for a process of electrolytic analysis or testing, per se.

252, Compositions, subclass 62.2 for electrolytes utilized in electrical devices, such as electrolytic condensers and rectifiers.

95 This subclass is indented under subclass 76. Subject matter having a wave guide or electrically long line.

(1) Note. A cavity resonator is a special case of a wave guide.

SEE OR SEARCH THIS CLASS, SUBCLASS:

94+, for similar subject matter utilized in electrical testing other than the measuring of electricity, per se.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 236+, for long lines and wave guides, per se, and consult the class notes of Class 333 and the subclass definition notes for a definition of these terms.

96 This subclass is indented under subclass 76. Subject matter utilizing radiant energy means as a part thereof.

(1) Note. A voltage being measured may, for example, be applied to an electric light and the luminuous flux produced by the light may be taken as a measure of the voltage being measured.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for the detections of nuclear or invisible radiant energy particularly subclasses 336.1+ for invisible radiant energy responsive electric signalling devices.

343, Communications: Radio Wave Antennas, subclass 703 for antenna combined with structure which tells the magnitude of the signal energy flowing in, to or from the antenna, a significant relationship existing between the antenna and the measuring structure.

356, Optics: Measuring and Testing, subclass 46 for incandescent standards, and subclasses 213+ for photometers.

97 This subclass is indented under subclass 96. Subject matter having means to direct the radiant energy in beams.

(1) Note. This subclass includes, for example, reflection galvanometers of the mirror type and pointer instruments having optical means to project an enlarged image of the pointer onto a scale.

SEE OR SEARCH THIS CLASS, SUBCLASS:

154, for rotors that are mounted on filar suspensions.

98 This subclass is indented under subclass 76. Subject matter having means for actively bringing a state of balance between mechanical or electrical forces into existence.

(1) Note. This subclass includes, for example, potentiometers in which the potential of an unknown voltage is balanced against the potential of a standard cell.

(2) Note. The mere passive balancing that occurs in an instrument such as the D'Arsonval meter, where the spring restoring torque equals the rotor torque, is not the type of balancing which is the subject matter of this subclass. But balancing without deflection, for example, is found here.

99 This subclass is indented under subclass 98. Subject matter having automatic means for bringing about the state of balance.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 560+, and the classes referred to in the search notes to these subclasses for follow-up electric motor systems, also known as rebalancing and servo motor systems.
330, Amplifiers, subclasses 144+ for amplifier systems including automatically variable impedance in the signal path.

100 This subclass is indented under subclass 99. Subject matter in which the result of the balancing operation is recorded.

SEE OR SEARCH THIS CLASS, SUBCLASS:
113, for similar subject matter not having automatic balancing means.

SEE OR SEARCH CLASS:
346, Recorders, subclass 31 and 32 for this subject matter.

101 This subclass is indented under subclass 76. Subject matter having a Wheatstone bridge and having means to indicate the current which results because of the unbalance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57+, for Wheatstone bridges used to measure impedance.
98+, for this subject matter having a Wheatstone bridge which is balanced.

SEE OR SEARCH CLASS:
323, Electricity: Power Supply or Regulation Systems, subclass 365, for miscellaneous Wheatsone bridge circuits and consult the search notes to that subclass for a list of the other classes which have provision for Wheatstone bridges.
330, Amplifiers, subclasses 72, 146 and 175, for amplifier systems wherein series arranged vacuum tubes are in the arms of a bridge, wherein at least one arm of a Wheatstone bridge, and wherein there is a Wheatstone bridge in the signal coupling circuit, respectively.

102 This subclass is indented under subclass 76. Subject matter which is responsive to a transient or which is used to determine some characteristic of a transient or some characteristic of a portion of a wave form of a cyclic wave.

(1) Note. This subclass includes, for example, the determination of the complete wave form of a transient, such as results when a short circuit occurs on a transmission line.

SEE OR SEARCH THIS CLASS, SUBCLASS:
100, and 113, for recorders which are equally responsive to transients and steady state voltages.
103+, for peak voltmeters or maximum current ammeters.
121, for cathode ray oscilloscopes which are equally responsive to steady state and transient voltages.

103 This subclass is indented under subclass 76. Subject matter having means for indicating the demand for electricity, averaged over a set period of time, or having means for indicating the consumption of electricity exceeding a set

minimum or having means for indicating the maximum or minimum value of the electricity.

(1) Note. The demand may be indicated in various manners, as by average demand over a period of time larger than the set period of time, maximum demand, integrated demand, or otherwise, and may be expressed in terms of watts, voltamperes or otherwise. The excess consumption may likewise be expressed in various manners, such as integrated excess or excess demand.

SEE OR SEARCH THIS CLASS, SUBCLASS:

102, for the measurement of some characteristic of a transient, other than mere maximum or minimum.

116, for multi-rate registering meters which register at different rates depending upon demand.

139, for time controlled meters which do not measure demand.

104 This subclass is indented under subclass 103. Subject matter having means whose temperature is varied in accordance with the electricity being measured and having means, responsive to said temperature variation for indicating the demand, excess consumption, maximum, or minimum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

92, for this subject matter having fluid means, such as thermal expansion meters.

105 This subclass is indented under subclass 76. Subject matter having means which are significant because of some thermal relationship.

(1) Note. This subclass includes, for example, cooling features and means for compensating an instrument for changes in the ambient temperature. Thermally actuated meters are in indented subclass 106.

106 This subclass is indented under subclass 105. Subject matter having means whose temperature is varied in accordance with the electricity being measured and having means, responsive to said temperature variation, for indicating the result of the measurement.

(1) Note. This subclass includes, for example, hot wire ammeters of both the expansion or bimetallic type and the thermocouple type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

92, for this subject matter having fluid means, such as thermal fluid expansion meters.

104, for this subject matter for indicating demand, excess, maximum or minimum.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclasses 100+, for thermometers, per se.

107 This subclass is indented under subclass 76. Subject matter responsive to the voltages or currents in a polyphase system.

(1) Note. A polyphase system is a group of alternating current circuits, usually interconnected, which enter or leave a region at more than two points of entry or exit, and which are so energized that in the steady state the alternating currents through the point of entry or exit and the alternating potential differences between them all have substantially equal periods, but have differences in phase and may have differences in wave form.

SEE OR SEARCH THIS CLASS, SUBCLASS:

140+, for single phase systems of the three wire type, having means to measure the energy in such systems. Note that some of such metering systems are inherently capable of also measuring polyphase energy. Also consult the search notes to subclass 140.

108 This subclass is indented under subclass 107. Subject matter for measuring the positive, negative or zero sequence of current of voltage in the polyphase system or responsive to one of these factors.

109 This subclass is indented under subclass 76. Subject matter having means for utilizing electrostatic attraction or repulsion or piezo-electric action in order to respond to the electricity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78+, and 83+, for this subject matter when utilized to measure frequency or compare phase as, for example, in synchroscopes.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 309 for electrostatic motors and subclasses 311+ for piezo-electric devices and systems, per se.

361, Electricity: Electrical Systems and Devices, subclasses 271+ for electrostatic condensers, per se.

110 This subclass is indented under subclass 76. Subject matter for protecting the electric measuring apparatus or for combating attempts to cause the meter to read inaccurately.

(1) Note. This subclass includes, for example, meters combined with fuses to protect the meter against accidental overloads and meters that are provided with special circuit means to cause the meter to continue to register if the potential coil is disconnected by a customer of a utility company who is attempting to defraud the company.

SEE OR SEARCH THIS CLASS, SUBCLASS:

156, for meters having casings which serve to protect the meter mechanically.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 659+ for meters having casings and similar structures to protect the meters mechanically.

111 This subclass is indented under subclass 76. Subject matter having means to store the electricity which is being measured.

(1) Note. This subclass relates to storage means, such as condenser banks, which store the electricity in such a manner that the original wave form can be recovered, and also relates to condensers which are used to integrate the electricity.

SEE OR SEARCH CLASS:

178, Telegraphy, subclass 17.5, for telegraph systems having storage means for temporarily holding signals.

315, Electric Lamp and Discharge Devices: Systems, subclasses 8.51+ for cathode ray tube systems for accumulating or storing electrical pulse energy for later retrieval, and subclasses 84.51+ for similar electrical pulse storage systems utilizing electric space discharge devices of the gaseous type.

365, Static Information Storage and Retrieval, appropriate subclass for the storage and retrieval of information. This class excludes the mere storage of control signals.

112 This subclass is indented under subclass 111. Subject matter in which the electricity is stored in an extended tape or wire or in a sheet medium.

(1) Note. This subclass relates to, for example, the storage of the electricity in a disk, similar to a phonograph record, and to the storage of the electricity in magnetic wire or tape.

SEE OR SEARCH CLASS:

360, Dynamic Magnetic Information Storage or Retrieval, for magnetic recording or reproducing.

365, Static Information Storage and Retrieval, appropriate subclass for the storage and retrieval of information. This class excludes the mere storage of control signals.

369, Dynamic Information Storage or Retrieval, for dynamic storage of information signals.

113 This subclass is indented under subclass 76. Subject matter for recording the result of the measurement of the electricity.

(1) Note. Many of the Classes have provision for their own recording systems,

consequently, in appropriate instances, the search for a recorder should extend to the class relating to the environment in which the recorder might be found.

SEE OR SEARCH CLASS:

346, Recorders, appropriate subclasses, for this same subject matter. In Class 346 there is no subclass which relates specifically to the recording of electricity, per se, but the recorders are classified on the basis of the manner in which the record is made. Note subclass 150.2 in which an electric spark is utilized to mark a phenomenal record.

347, Incremental Printing of Symbolic Information, subclasses 111+ for electric recorders comprising means for applying electricity to a medium for recording an image.

114 This subclass is indented under subclass 76. Subject matter having plural meters.

(1) Note. The meters may be of the same or of different kinds and may be separated or may be combined to one case.

SEE OR SEARCH THIS CLASS, SUBCLASS:

115, for single meters which have plural ranges or plural scales.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 870.41 and 870.15 for telemetering systems having plural receivers or meters.

361, Electricity: Electrical Systems and Devices, subclass 660 for switchboards having plural meters.

115 This subclass is indented under subclass 76. Subject matter having plural ranges, plural scales, or plural registration rates.

SEE OR SEARCH THIS CLASS, SUBCLASS:

114, for meters having plural scales or plural ranges where both scales or both ranges are simultaneously usable, (i.e., where there are plural meters).

116 This subclass is indented under subclass 115. Subject matter having a register.

(1) Note. This subclass includes, for example, watt hour meters which register at one rate for an initial period and then register at a different rate for other periods.

SEE OR SEARCH THIS CLASS, SUBCLASS:

103, for demand meters, per se, i.e., meters that indicate purely demand and not some quantity of which demand is but a factor.

139, for time controlled meters of the registering type which do not register at plural rates.

117 This subclass is indented under subclass 76. Subject matter having magnetic means in which a significant amount of saturation occurs during the operation thereof.

(1) Note. This subclass relates, for example, to metering systems having magnetic amplifiers and to meters having saturated pole tips.

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, subclasses 249, 302, 310, and 329, for magnetic amplifiers of the nonlinear type.

330, Amplifiers, subclass 10 for amplifier systems wherein the active element is a saturable core reactor.

118 This subclass is indented under subclass 76. Subject matter having means to modulate the voltage or current being measured onto a carrier wave and having further means to demodulate the resulting modulating carrier wave into a replica of the original voltage or current.

(1) Note. This subclass relates, for example, to direct current voltmeters which measure a very small direct current voltage which small voltage is amplified in the modulator-demodulator apparatus so that it is large enough to actuate a conventional meter.

SEE OR SEARCH CLASS:
329, Demodulators, appropriate subclasses for demodulators, per se.
330, Amplifiers, subclass 10 for modulator-demodulator amplifiers, per se.
332, Modulators, appropriate subclasses, for modulators.

119 This subclass is indented under subclass 76. Subject matter having a rectifier.

(1) Note. The rectifier may be used, for example, to change an alternating current input into a direct current output, or the rectifier may be used merely as a nonlinear element.

SEE OR SEARCH CLASS:
363, Electric Power Conversion Systems, appropriate subclasses for miscellaneous rectifying systems.

120 This subclass is indented under subclass 76. Subject matter having means to transform the voltage or current to be measured into a different current or voltage and having means to measure said different voltage or current.

(1) Note. This subclass contains, for example, systems where a DC voltage is changed into an AC voltage which is measured as an AC voltage, systems wherein the input voltage is converted into a pulse voltage and systems wherein the input voltage is converted from one frequency into another frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118, for this subject matter wherein the input voltage or current is first modulated and then demodulated.
119, for this subject matter having a rectifier.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 870.01+ for telemetering systems having no significant measuring, testing or sensing of the condition to be telemetered. Some telemetering systems utilize current conversion means. Note indented subclasses 870.19+ for telemetering systems in which the value of the condition is represented by a pulse code.

121 This subclass is indented under subclass 76. Subject matter having a cathode-ray tube.

(1) Note. The cathode-ray tube may be an indicator as, for example, a cathode ray oscilloscope or a “magic eye” tube, or the cathode-ray tube may be a control tube of some type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
88, for this subject matter utilized to measure phase displacement between two voltages.

SEE OR SEARCH CLASS:
313, Electric Lamp and Discharge Devices, subclasses 364+, for cathode-ray tubes, per se.
315, Electric Lamp and Discharge Devices: Systems, subclasses 1+, for cathode- ray tubes circuits of general application. Note that Class 315 includes, among its cathode-ray tube systems, those systems in which an unknown voltage is applied to the deflecting means of the cathode-ray tube so that the unknown voltage may be observed. The system is not excluded from Class 315 unless some means is claimed to enable the desired information to be derived other than merely observing the trace of the ray on an unchartered luminous screen.

122 This subclass is indented under subclass 76. Subject matter having a gaseous discharge device.

(1) Note. A gaseous discharge device is defined as being a device having two spaced electrodes between which electricity flows and having either gas or vapor in the space between the electrodes.

(2) Note. This subclass includes, for example, spark gap volt meters and metering systems using a gaseous discharge device as a nonlinear impedance.

SEE OR SEARCH CLASS:
313, Electric Lamp and Discharge Devices, subclasses 567+ for gaseous discharge devices, per se.
315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses for miscellaneous gas discharge device systems.

123 This subclass is indented under subclass 76. Subject matter having an amplifier or having a space discharge device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, for this subject matter utilizing magnetic saturation type amplifiers.
121, for this subject matter when the space discharge device is a cathode-ray tube.
122, for this subject matter when the space discharge device is a gaseous discharge device.

SEE OR SEARCH CLASS:
330, Amplifiers, for amplifiers, per se.

124 This subclass is indented under subclass 123. Subject matter having an inverted amplifier.

(1) Note. An inverted amplifier is defined as one having an amplification factor which is less than unity. Usually this is achieved by connecting the input circuit to the plate of a vacuum tube and taking the output from the grid of a vacuum tube. The inverted amplifier acts as an attenuating circuit to couple the meter to the source of voltage or current being measured.

SEE OR SEARCH CLASS:
330, Amplifiers, subclass 250 for inverted transistor amplifiers, and subclasses 160+ and 162+ for inverted amplifiers of the vacuum tube type.

125 This subclass is indented under subclass 76. Subject matter having means to control the mechanical vibrations which result because of inertia, elasticity, and damping or having means to control vibrations which arise outside or inside the measuring means.

(1) Note. This subclass includes, for example, instruments having “dead beat” characteristics.

SEE OR SEARCH THIS CLASS, SUBCLASS:
123, for this subject matter having amplifier means with negative feed back control, for the purpose of controlling the inertia effects.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 430 for instrument mechanism dampening, per se, subclasses 514.12+ for fluid or fluent material dampening of an inertial member in an acceleration measuring apparatus, and subclass 514.14 for vibration dampening in an inertial-type acceleration measuring apparatus.
248, Supports, subclasses 560+ for resilient supports.

126 This subclass is indented under subclass 76. Subject matter having means for coupling the measuring device to the source of current or voltage being measured.

(1) Note. Such means, for example, may be an attenuator or an instrument shunt.

SEE OR SEARCH THIS CLASS, SUBCLASS:
115, for this subject matter in instruments having plural ranges.
149, for measuring instruments having mere prods, probes or other terminal structure without circuit elements other than conductors.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclasses 24+ for coupling networks, per se.
338, Electrical Resistors, subclass 49 for electrical resistors of the shunt type.

127 This subclass is indented under subclass 126. Subject matter in which the coupling means is a transformer.

(1) Note. The transformer, for example, may be of the type having a core which can be opened to admit a current carrying conductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

129, for instruments having pole pieces which will admit a nonunitary input conductor without disconnecting or cutting said implement conductor.

SEE OR SEARCH CLASS:

336, Inductor Devices, appropriate subclasses for the structure of transformers, per se. Of special interest are subclass 172, for "Fractional turn" type inductive devices (including transformers), and subclasses 173+ and 175+ which include current transformers.

128 This subclass is indented under subclass 126. Subject matter in which the coupling means is a selective filter.

(1) Note. The filter may be a high pass, low pass or band pass filter.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 167+, for wave filters, per se.

129 This subclass is indented under subclass 76. Subject matter having pole piece means so constructed that they will admit an input conductor without cutting or disconnecting said conductor.

(1) Note. This subclass includes, for example, "hook on" ammeters of the type not equipped with an integral transformer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

127, for similar subject matter utilizing a transformer of the split core type.

130 This subclass is indented under subclass 76. Subject matter having means for self-calibrating the instrument.

SEE OR SEARCH THIS CLASS, SUBCLASS:

74+, for calibrating means for electric instruments, per se.

131 This subclass is indented under subclass 76. Subject matter in which the measuring instrument indications are of the suppressed zero type.

(1) Note. Suppressed zero refers to that condition of instrument in which the scale reading does not extend from zero to an upper value but rather from an intermediate value to an upper value.

132 This subclass is indented under subclass 76. Subject matter in which the measuring instrument indications are of the nonlinear type.

(1) Note. The instrument deflection, for example, may be related to the input current or voltage in a logarithmic manner.

133 This subclass is indented under subclass 76. Subject matter for giving a nonquantitative indication.

(1) Note. This subclass includes, for example, polarity testers and "hot-line" indicators.

(2) Note. A quantitative instrument may be modified into a nonquantitative instrument by merely omitting the scale. Consequently, in appropriate instances, the search should extend to the pertinent quantitative type subclass.

SEE OR SEARCH CLASS:

340, Communications: Electrical, appropriate subclasses for similar subject matter. Also see the search note to Class 340 in the class definition of this class (324).

362, Illumination, appropriate subclasses, for electric lamp luminaries, many of which could be used as nonquantitative indicators.

134 This subclass is indented under subclass 76. Subject matter having a commutator or having a reversing switch or having a pulsating switch.

(1) Note. This subclass includes, for example, DC watt hour meters.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, appropriate subclasses for the structure of switches, per se.
310, Electric Generator or Motor Structure, appropriate subclasses, for motors having commutators.
361, Electricity: Electrical Systems and Devices, subclasses 139+ for relay systems, per se.

135 This subclass is indented under subclass 134. Subject matter having a rotor which oscillates between two positions.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 430 for instrument mechanism dampening, per se, subclasses 514.12+ for fluid or fluent material dampening of an inertial member in an acceleration measuring apparatus, and subclass 514.14 for vibration dampening in an inertial-type acceleration measuring apparatus.
310, Electrical Generator or Motor Structure, subclasses 36+ for oscillating motors, per se.

136 This subclass is indented under subclass 76. Subject matter having a rolling ball or a rolling wheel.

(1) Note. The ball or wheel are usually part of an integrating mechanism, but may be part of a speed transmission.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclass 121 for area integrators, per se.
235, Registers, appropriate subclasses, particularly subclasses 65, 66 and 68, for calculating devices and machines having integrating features.

137 This subclass is indented under subclass 76. Subject matter having a rotor upon which torque is exerted by means of an electo-magnetic field which produces eddy current in the rotor.

(1) Note. This subclass includes, for example, the familiar AC integrating watt hour meter. The rotor is often known as a Ferraris disk.

(2) Note. The rotor in this subclass may rotate continuously or may rotate through only a certain angle as determined by the stiffness of a spring which restrains further rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152, for this subject matter where the eddy current rotor is merely a drag disk.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 166+ for eddy current motors of general application.
318, Electricity: Motive Power Systems, subclasses 727+ for eddy current motor systems of general application. Note particularly indented subclasses 781+, for eddy current motors which operate from a single phase source.

138 This subclass is indented under subclass 137. Subject matter having means to vary the time-phase relationship between two alternating magnetic fields.

(1) Note. The time-phase relationship, for example, may be adjusted so as to bring the alternating magnetic fields into time quadrature, or it may be adjusted so that they are slightly out of quadrature.

SEE OR SEARCH THIS CLASS, SUBCLASS:
148, for other measuring means having phase shift means.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclass 729 for power-factor control of induction motor systems including eddy current motor systems.
323, Electricity: Power Supply or Regulation Systems, subclasses 212 through 219 for phase shifting means, per se.

139 This subclass is indented under subclass 76. Subject matter having rotary motor driving means which rotate constantly, independently of the electricity being measured, or having time control means or having means which oscillate.

(1) Note. Time control means may be, for example, a clock which rotates at a constant speed or an electric synchronous motor which rotates at a constant speed. Oscillating means may be means such as an anchor escapement or a stepping ratchet.

(2) Note. This subclass relates, for example, to integrating meters wherein an element periodically oscillates at an amplitude which is determined by the quantity to be integrated (variable stroke) or at a radius which is determined by that quantity (variable radius).

SEE OR SEARCH THIS CLASS, SUBCLASS:

103+, for demand, excess, maximum or minimum meters which provide a final indication of which time is but a factor.

116, for multi-rate registering meters which register at different rates in accordance with a function of time.

135, for oscillating measuring means in which a pulsating or reversing switch is associated with the oscillating means.

136, for variable radius type meters which utilize a rolling ball or wheel.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, appropriate subclasses, for ratchet mechanisms.

368, Horology: Time Measuring Systems or Devices, for clocks and watches. Note subclasses 155+, for those having electrical features.

140 This subclass is indented under subclass 76. Subject matter having plural inputs to the measuring means.

(1) Note. A single circuit can furnish plural inputs to the measuring means, since a single circuit can carry a voltage and a current independently of each other. Thus, the indented subclasses contain watt meters and volt-ampere meters of the type which are not found in subclasses above.

(2) Note. This subclass includes, for example, ratio meters and summation meters.

SEE OR SEARCH THIS CLASS, SUBCLASS:

62+, for complete resistance measuring systems including, as a part thereof, ratio meters.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 870.01+ for telemetering systems for indicating at a remote point the value of a local condition. Note subclasses 870.11+ where the condition at plural localities is sensed. Note subclasses 870.19+ where the value of the condition is coded into a pulse type code.

141 This subclass is indented under subclass 140. Subject matter for measuring volt amperes.

(1) Note. The volt amperes may be either real or reactive. Reactive volt amperes are often referred to as volt vars,

SEE OR SEARCH THIS CLASS, SUBCLASS:

137+, for this subject matter having an eddy current rotor.

142 This subclass is indented under subclass 140. Subject matter for measuring watts.

(1) Note. This subclass contains, for example, watt meters of the dynamometer type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

134, for this subject matter having a commutator or a reversing or pulsating switch.

137+, for this subject matter having an eddy current rotor.

143 This subclass is indented under subclass 76. Subject matter having plural active motor elements.

(1) Note. The plural active motor element may be mounted on a single shaft to operate a single indicator, or they may be mounted on two shafts to operate two rotary arms whose variable point of intersection determines the final indication.

SEE OR SEARCH THIS CLASS, SUBCLASS:
114, for plural meters.
115, for a single meter having plural ranges or scales.

144 This subclass is indented under subclass 76. Subject matter having a stationary means to produce a magnetic field by the flow of electricity through a winding.

(1) Note. This subclass includes, for example, electrodynamometer type instruments having only a single input.

SEE OR SEARCH THIS CLASS, SUBCLASS:
134+, for this subject matter having a rotor with a commutator or reversing or pulsating switch.
137+, for this subject matter having an eddy current rotor.
140+, for this subject matter having plural inputs.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 10+, for dynamo electric structure of general application.

145 This subclass is indented under subclass 144. Subject matter having a core armature which is attracted by the magnetic field and which moves, under said attraction, along its own axis.

SEE OR SEARCH CLASS:
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 255+ for plunger type solenoids, per se.

146 This subclass is indented under subclass 144. Subject matter having a permanent magnet.

(1) Note. The permanent magnet may supplement the magnetic field produced by the electromagnet or it may be acted upon by the electromagnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:
147, for similar subject matter having soft instead of hard iron.

SEE OR SEARCH CLASS:
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 299+ for similar subject matter, not restricted to the measurement of electricity.

147 This subclass is indented under subclass 144. Subject matter having an iron rotor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
146, for this subject matter where the iron rotor is or becomes a permanent magnet under any conditions of operation.

149 This subclass is indented under subclass 76. Subject matter having a probe, a prod or a specific terminal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
72.5, for similar subject matter in combination with a high frequency testing device.
119, for this subject matter having a rectifier in the probe.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclass 668 for meter terminal or connector arrangements.

439, Electrical Connectors, appropriate subclasses for an electrical terminal, per se.

150 This subclass is indented under subclass 76. Subject matter having a rotor which has a coil which is eccentrically mounted with respect to the axis of the rotor.

(1) Note. The coil, for example, may be of rectangular shape and the axis of the rotor may correspond with one of the sides of the rectangle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
140, for this subject matter having plural inputs, as in ratio-meters.

151 This subclass is indented under subclass 76. Subject matter having a permanent magnet.

(1) Note. This subclass relates, for example, to D'Arsonval type instruments and to magnetic suspensions for instrument rotors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
146, for this subject matter also having a magnetic field produced by an electromagnet.
171+, for similar subject matter not restricted to the measurement of electricity.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 90.5 for a bearing having a magnetic suspension.
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 302+ for permanent magnets, per se.

152 This subclass is indented under subclass 151. Subject matter in which the permanent magnet is associated with an eddy current means and the permanent magnet acts as a drag for the eddy current means.

(1) Note. The eddy current means usually is a disk rotor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103, for excess type meters which utilize a hysteresis type brake (which has a constant counter-torque at all speeds) having a permanent magnet and for meters in which the torque on the drag magnet actuates an indicator by movement of the drag magnet.
137+, for similar subject matter where an eddy current disk acts both as a motive element and a drag element.
139, for meters having a rotor which is driven by a constant torque device and having a brake whose drag is determined by the electricity to be measured.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 103+, for magnetic field type torque transmitting brakes and clutches.

153 This subclass is indented under subclass 76. Subject matter having a register.

(1) Note. A registering means is herein defined as being a device which converts a linear or rotational movement into a number which corresponds to the movement and is a measure thereof. Generally the register is provided with means for separately indicating the value of the several digits which go to make up the number that is a measure of the indication.

154 This subclass is indented under subclass 76. Subject matter having a rotor.

(1) Note. This subclass includes, for example, rotors provided with filar suspensions, rotors having means for setting them to zero, and rotors having means to balance them.

155 This subclass is indented under subclass 154. Subject matter having significant bearing or pivot structure.

(1) Note. A bearing or pivot is significant when it is claimed by more than name

only or when it is disclosed as being significant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

151, for magnetic suspensions which decrease friction by decreasing bearing load.

403+, for meters with fluid means, such as lubricating means.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 90.5 for a bearing having a magnetic suspension.

156 This subclass is indented under subclass 76. Subject matter having a casing for the instrument.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 431, for this subject matter.

312, Supports: Cabinet Structure, for miscellaneous casings.

361, Electricity: Electrical Systems and Devices, subclasses 659+ for special meter casings, and subclasses 664+ for meter mounting arrangements.

157 This subclass is indented under subclass 76. Subject matter combined with some other type of subject matter.

(1) Note. The meter, for example, may be combined with a specific type of distribution system.

(2) Note. A meter in a specific environment, generally, but not invariably, is classified with the specific environment. Consequently, in appropriate instances, the search should extend to the class which relates to the environment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72, for the measurement of electricity in a specific environment.

116, for multi-rate registering meters which may, for example, be combined with two load circuits having loads of different tariff rates.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, appropriate subclasses for systems for distributing electricity.

158.1 MISCELLANEOUS

This subclass is indented under the class definition. Subject matter not provided for in any preceding subclass.

160 This subclass is indented under the class definition. Subject matter wherein are provided processes or means to produce an electrical signal representative of the time rate of change of position (speed) of a physical element and to indicate, in response to said signal, said time rate.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 178+, for navigational speed measuring devices such as ship's logs, leeway incidence or rate of climb; subclasses 861+, for volume or rate of flow meters; subclasses 488+, for mechanical speed measuring devices and indented subclasses 519.01+, for permanent magnet type speedometers.

340, Communications: Electrical, subclasses 441 and 446, for vehicle speed actuated signals and subclasses 670+, for speed actuated signals and alarms in general.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 104+ for radar type systems which determine the velocity of an object.

346, Recorders, subclass 18, for recorders combined with a speed indicator or alarm.

356, Optics: Measuring and Testing, subclasses 27+, for velocity or velocity/height measuring systems including optical sighting systems.

361, Electricity: Electrical Systems and Devices, subclass 51 and subclasses 236+ for control systems responsive to speed.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 304 for speed control.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 141 and 142+ for acceleration and speed measuring systems, respectively.

161 This subclass is indented under subclass 160. Subject matter in which means are provided for comparing one speed signal with another speed signal or a reference signal.

(1) Note. The comparison means is not necessarily electrical.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79, for comparison of the frequencies of two electrical signals.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 123, for switching systems responsive to the differential speed between two bodies.

361, Electricity: Electrical Systems and Devices, subclasses 243+ for the synchronization of rotating shafts which requires a comparison of the speeds of the shafts. Also consult the search notes to that subclass for a compilation of other pertinent classes.

162 This subclass is indented under subclass 160. Subject matter including means producing an electrical signal representative of the time rate of change of speed or a physical object.

(1) Note. This subclass relates to electrical accelerometers other than, for example, those which sense acceleration by means of an inertial element.

(2) Note. The means of this subclass may include means responsive to acceleration, per se, or means responsive to a speed signal to derive the acceleration.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 514.01+, for means indicating acceleration including an inertial element. See (1) Note above.

307, Electrical Transmission or Interconnection Systems, subclass 121, for switching systems responsive to acceleration.

340, Communications: Electrical, subclass 669, for acceleration or deceleration responsive signals or alarms.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 304 for speed control.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 141 and 142+ for acceleration and speed measuring system, respectively.

163 This subclass is indented under subclass 160. Subject matter in which means for producing a signal representative of speed includes means to convert mechanical motion into an electrical signal whose output amplitude is a function of the speed being measured, and in which the indicating means measures said amplitude.

SEE OR SEARCH THIS CLASS, SUBCLASS:

166+, for electrical generators of speed signals whose frequency is a function of the speed being measured.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 10+, for dynamoelectric generator structure.

322, Electricity: Single Generator Systems, appropriate subclasses, for single dynamoelectric generator systems.

164 This subclass is indented under subclass 163. Subject matter in which the electrical generator includes a conductive, nonferromagnetic armature whose movement is representative of the speed being measured, means to induce an electric current in said armature and means responsive to the current to indicate the speed of the armature.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 171, for induction generator structure.

322, Electricity: Single Generator Systems, subclass 47, for induction generator systems.

165 This subclass is indented under subclass 163. Subject matter combined with means to indicate the sense of motion (e.g., forward or backward, clockwise or counter clockwise) within a given path, of the object whose speed is being measured.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 204, for direction indicators in general which are responsive to some force.

116, Signals and Indicators, subclasses 200+, for mechanically actuated shaft rotation indicators.

307, Electrical Transmission or Interconnection Systems, subclass 122, for switching systems responsive to direction of rotation.

340, Communications: Electrical, subclass 465, for signal means for automatically indicating the direction of movement of a vehicle, and subclasses 671+, for signal means for indicating machine shaft rotation or direction.

166 This subclass is indented under subclass 160. Subject matter in which the signal producing means produces a periodic electrical signal whose frequency is a function of the speed being measured.

(1) Note. This subclass includes, for example, apparatus in which an electrical pulse is produced each time the moving object traverses a fixed increment of distance. The movement thus sensed may be either linear or angular (e.g., rotary).

SEE OR SEARCH THIS CLASS, SUBCLASS:

78+, for the measurement of the frequency of cyclic electric currents of voltages.

167 This subclass is indented under subclass 166. Subject matter including electro-magnetic, indicator driving means energized by the speed signal to produce a rotating magnetic field whose rotation is synchronized with the frequency of the speed signal.

(1) Note. The rotating magnetic field may drive freely rotating armature or a restrained armature either of which is, in turn, connected to some means to indicate the speed of the rotating field and, thus, the object whose speed is being measured.

168 This subclass is indented under subclass 166. Subject matter in which the means for producing a signal includes an electrical circuit breaker actuated at a frequency representative of the speed being measured.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 19.01+, for periodically actuated switches.

169 This subclass is indented under subclass 168. Subject matter in which the switch is also a component of an internal combustion engine ignition system.

170 This subclass is indented under subclass 169. Subject matter wherein the speed measuring means is connected to the secondary circuit of the ignition system; the voltage fluctuations of the secondary circuit thereby producing the speed signal.

171 This subclass is indented under subclass 168. Subject matter combined with means to indicate the distance the object whose speed is being measured has traveled during the speed measuring interval.

(1) Note. This subclass includes revolution counters as well as odometers.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 490, for mechanical speed and distance measuring systems.

172 This subclass is indented under subclass 166. Subject matter in which means for producing a speed signal includes a recording medium and means to move it at a speed proportional to speed being measured.

173 This subclass is indented under subclass 166. Subject matter in which the means for producing a speed signal included means producing a magnetic field and further means sensitive to

changes in the field to produce an electrical signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200, for magnetic detectors and systems therefor.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 519.01 for a speed measuring device using a magnetic drag cup.

310, Electrical Generator or Motor Structure, subclasses 40+, for rotary dynamoelectric generator structure.

322, Electricity: Single Generator Systems, appropriate subclasses for single dynamoelectric generator systems.

174 This subclass is indented under subclass 173. Subject matter in which the means for producing a magnetic field includes a permanent magnet.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 152+ for rotary, dynamoelectric generator structure including permanent magnets.

322, Electricity: Single Generator Systems, subclass 46, for single dynamoelectric permanent-magnet generator systems.

175 This subclass is indented under subclass 166. Subject matter in which means for producing a speed signal includes means responsive to radiant energy (i.e., electromagnetic or atomic radiation) to produce or alter an electric current.

176 This subclass is indented under subclass 160. Subject matter in which the means for producing the electric speed signal includes a variable circuit element whose impedance varies as a function of the position of the object in the path along which its speed is being measured.

(1) Note. The impedance of the circuit element of this subclass being a function of displacement, the current through the element may, for example, be differentiated with respect to time to produce the speed signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

178, and the subclasses indented thereunder for systems including an element whose electrical characteristics change in response to the passage of an object.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 514.39+, for apparatus including a mechanical speed indicating device with electrical means for sensing its indication, for example, a flyball governor with electrical means for sensing the radial displacement of the flyball.

177 This subclass is indented under subclass 160. Subject matter in which the means producing an electric speed signal is responsive to the supply voltage or current of an electric motor.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, and subclass 490, for electric motors with signals, meters, recorders or testing devices.

388, Electricity: Motor Control Systems, appropriate subclasses, together with art collection 928.1, for running-speed and acceleration control systems for responsive to terminal electromotive force.

178 This subclass is indented under subclass 160. Subject matter wherein the means for producing a speed signal includes means responsive to the passage (event) of an object past a plurality spaced locations.

(1) Note. This subclass includes, for example, systems for measuring the time taken by an object such as projectile or vehicle to move through a measured distance. The “event” being the passage of the object past the ends of the measured distance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

181+, for systems for measuring the duration of time intervals.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 167, for apparatus for testing ordinance and projectiles.

346, Recorders, subclass 38, for recorders actuated responsive to ordinance.

179 This subclass is indented under subclass 178. Subject matter in which the means responsive to the passage of an object is sensitive to magnetic field variations caused by passage of the object through magnetic field.

180 This subclass is indented under subclass 178. Subject matter in which the means responsive to the passage of an object includes an electrical switch actuated directly by the object.

(1) Note. The switch of this subclass may be frangible.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, appropriate subclasses for switches or particular structure or type, particularly subclass 47, for limit switches adapted to be actuated by the motion of a machine part, and subclass 61.41, for stationary switch structure having an actuator responsive to the passage of a transient object

200 MAGNETIC:

This subclass is indented under the class definition. Subject matter which includes apparatus to sense and indicate the sensing of a magnetic field and elements or subcombinations of apparatus to sense and indicate the sensing of the magnetic field where not elsewhere provided.

(1) Note. Method claims pertaining to the subject matter of this group of subclasses will be placed with the corresponding apparatus subclasses.

(2) Note. The term “elements” includes magnetic sensors, per se, and energized sensors not provided for in another class.

(3) Note. The apparatus to indicate includes a visible or latent recording of the result of a magnetic field sensing.

(4) Note. The magnetic field sensed may be a portion of a magnetic field or a portion of a magnetic field in a material.

(5) Note. Included in this group of subclasses are: the measuring or testing of magnetic fields, the measuring, testing, or sensing of material of metal or nonmetal by means of magnetic fields for electrical, magnetic, and other properties of the material, subcombinations of the apparatus to measure or test magnetic fields or materials by magnetic fields not provided for elsewhere, magnetic field sensors not classified elsewhere, supports for material tested by magnetic fields, and supports for magnetic field sensing devices.

(6) Note. This is the generic subclass for the location, identification, or testing of (1) metal ores, (2) unwanted metals, or (3) the presence of metal in a nonmetal environment. In these cases the metal is located, identified, or tested by its interaction with a magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

51, for short or open coil tests, the number of coil turns tests, and coil polarity tests.

55, for transformer properties testing. 300+, for nuclear or electronic testing. 323+, for geophysical subsurface and surface testing. 376+, for core sample magnetic orientation testing.

SEE OR SEARCH CLASS:

164, Metal Founding, subclass 450.5 for a metal casting apparatus including control means influenced by a magnetic sensor.

209, Classifying, Separating, and Assorting Solids, subclass 8 for magnetizing or demagnetizing precedent to a separation, subclasses 38+ for the combination of a magnetic separation with another physical separation of a solid from a solid, subclasses 72+ for the magnetic testing and separation of objects from other objects, and sub-

classes 212+ for the separation of material by magnetic separation.

250, Radiant Energy, subclasses 250+ for the detection of invisible electromagnetic energy and the testing of material by invisible electromagnetic radiation, subclasses 493.1+ for radiant energy generation and sources, and subclasses 505.1+ for radiation controlling means.

331, Oscillators, subclass 44 for oscillators with frequency calibration or testing.

343, Communications: Radio Wave Antenna, subclass 17.7 for radar systems with testing or calibrating, and subclass 703 for antennas with means to measure radiated antenna signal energy.

356, Optics: Measuring and Testing, subclasses 33+ for the measurement of distance by light, subclasses 300+ for the examination of visible light by spectros copy, subclasses 138+ for angle or axial alignment testing, subclass 625 for menstruation or conation comparison, subclasses 401+ for color tests, and subclasses 213+ for the examination of visible light generally.

360, Dynamic Magnetic Information Storage or Retrieval, subclass 31 for monitoring or testing the progress of recording.

455, Telecommunications, subclasses 67.11 through 67.7 , 115.1-115.4, and subclasses 226.1-226.4 for measuring and testing of communication equipment.

201 Susceptibility:

This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field is responsive to a magnetic field modified by material which has magnetic properties, the indication of the sensing being directly or indirectly representative of the ease with which the material can be magnetized.

(1) Note. The ratio of the intensity of magnetization of the material to the magnetic intensity of the field causing the magnetization of the material is known as susceptibility.

SEE OR SEARCH THIS CLASS, SUBCLASS:

204, for apparatus to test gas, liquids, and fluent particles entrained in a fluid.

228, for apparatus to test materials which require a magnetic test field including torque magnetometers.

202 Calibration:

This subclass is indented under subclass 200. Subject matter which includes means to present a known magnetic field to the apparatus to sense and indicate the sensing of the magnetic field so that the sensing and indication can be noted to see if the apparatus to sense and indicate gives the correct response to the sensed known magnetic field.

(1) Note. The known magnetic field may be a magnetic field of known magnetic intensity and type of wave, or the field can be a known magnetic field which is modified by a member whose effect on the field is known.

SEE OR SEARCH THIS CLASS, SUBCLASS:

74, for testing and calibrating electric meters.

130, for self-calibrating instruments which measure voltage or current.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 1.01+ for proving or calibrating test instruments.

250, Radiant Energy, subclass 252.1 for methods of calibration or standardization of radiant energy test devices.

356, Optics: Measuring and Testing, subclass 46 for electrical lamp circuits forming light standards, and subclasses 421+ for color charts.

374, Thermal Measuring and Testing, subclasses 1+ for calibration or testing of a thermally responsive instrument.

203 Curie point determination:

This subclass is indented under subclass 200. Subject matter which includes means to create a magnetic field in which is placed a heated ferromagnetic material, the apparatus to sense and indicate being responsive to the magnetic

field modified by the heated material to determine whether the heated material is at least at or below the critical temperature at which the heated material loses its ferromagnetism.

(1) Note. The apparatus to sense and indicate the magnetic field may be a magnet which functions to pass its magnetic flux through the material to induce magnetism in the material if its temperature is below the Curie point of the material to attract the material to the magnet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

224, for the temperature control of the test material or an element of the test circuit.

228, for permanent magnets which locate ferromagnetic material by inducing magnetism in the material and noting the relative movement of the permanent magnet to material to be located.

SEE OR SEARCH CLASS:

148, Metal Treatment, particularly subclasses 195+ for flame cutting or burning combined with sensing, subclasses 215+ for processes of carburizing or nitriding of metal combined with sensing or testing, subclass 240 for testing combined with reactive coating of metal, or subclasses 508+ for processes of measuring, testing, or sensing combined with treatment of solid or semi-solid metal to modify or maintain the internal physical structure (i.e., microstructure) or chemical property of metal. If casting, fusion bonding, machining, or working is combined with the treatment of solid or semi-solid metal to modify or maintain the internal physical structure (i.e., microstructure), there is a requirement that there be significant heat treatment as defined in section III, A, of the Class 148 definition.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 209+ for magnets and electromagnets.

340, Communications: Electrical, subclass 597 for a ferromagnetic temperature sensor in a signalling system; and subclasses 577 and 600 for ferromagnetic flame and radiation sensors, respectively, in a signalling system.

356, Optics: Measuring and Testing, subclasses 43+ for optical pyrometers.

361, Electricity: Electrical Systems and Devices, subclass 158 for temperature indicating instruments with systems for magnetizing, demagnetizing, or controlling a magnetic field.

374, Thermal Measuring and Testing, subclass 176 for a thermometer having a ferromagnetic sensor.

204 Fluid material examination:

This subclass is indented under subclass 200. Subject matter which includes a magnetic field in which a gas or liquid material is placed for examination by the magnetic field, the apparatus to sense and indicate being responsive to the field modified by the gas or liquid material to give an indication of some property of the material examined.

(1) Note. Particles may be entrained in the gas or liquid examined magnetically in this subclass.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 232+ for gas analysis processes.

73, Measuring and Testing, subclasses 23+ for gas analysis, particularly subclass 27 for paramagnetic gas analysis by magnetic and thermal means, and subclass 194 for magnetic induction type flow meters.

95, Gas Separation: Processes, subclasses 27 and 28 for processes of gas separation using magnetism.

96, Gas Separation: Apparatus, subclasses 1+ for magnetic separation means for gas separation.

209, Classifying, Separating, and Assorting Solids, subclasses 38 through 40 for the magnetic separation of a solid from a solid, liquid, or a gas combined with another type of separation, and subclass 232 for the separation of a solid from a solid or liquid magnetically when in a fluid suspension.

210, Liquid Purification or Separation, subclass 695 for processes of precipitation of a solid from a liquid by magnetic means, and subclasses 222+ for apparatus to magnetically treat material under the class definition.

250, Radiant Energy, subclass 306 for the inspection of liquids by electrically charged particles, subclasses 343+ for the infrared examination of contained fluent material, subclass 356.1 for flow metering by radiant energy apparatus, subclass 357.1 for fluent material level examination by radiant energy, subclasses 373+ for the ultraviolet examination of contained fluent material, subclasses 383+ for the examination of emissive fluent type or radiation transmissive fluent material by ionized gas-type detector, subclasses 428+ for fluent material containment, support, or transfer means combined with radiant energy treatment, subclasses 564+ for photocell sensing of fluent material, and subclasses 573+ for optical or prephotocell systems to sense fluent material by photoelectric means.

356, Optics: Measuring and Testing, subclass 70 for oil testing by visible light; subclass 398 for the inspection of container content by light; subclasses 409+ for color transmission testing of fluids; and subclasses 441+ for the examination of liquid particle suspensions by visible light.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 83+ for analysis of apparatus involving a chemical reaction.

205 Permanent magnet testing:

This subclass is indented under subclass 200. Subject matter which involves the testing of permanent magnets which have their own static magnetic field, the apparatus to sense and indicate the sensing of the field including a field sensing member placed in the field and an indicator responsive to the member.

(1) Note. The sensing member may be a fixed or movable permanent magnet, a member that can be temporarily magnetized by the field of the tested magnet, an electrically conductive member that causes eddy currents in response to the field, or a sensing coil that is fixed or movable.

SEE OR SEARCH THIS CLASS, SUBCLASS:

228, for the testing of material by a magnetic field and the sensing of the material modified field by a nonelectrically energized field sensor.

256, for the sensing of a magnetic field by a movable energized sensing coil magnetometer.

259, for a magnet or magnet member sensor type magnetometer.

SEE OR SEARCH CLASS:

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 302+ for permanent magnets.

206 Movable random length material measurement:

This subclass is indented under subclass 200. Subject matter which includes a movable magnetizable member and a magnetic marking means to form magnetic field marks on the member in the direction of its movement, and wherein the apparatus to sense and indicate the sensing of the magnetic field is responsive to the marks and indicates the sum of the marks as an indication of its length or compares the sensed marks to indicate a deviation of its length between markings.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 732+ for feeding a fabric or cord through a fabric or cord distance measuring device in contact with the fabric or cord.

226, Advancing Material of Indeterminate Length, subclasses 10+ for control means actuated in response to marks on advancing material.

242, Winding, Tensioning, or Guiding, subclass 431 for a winding machine under the control of an electrical property of an article being wound, and subclasses 334.3, 334.4, 485.5, 487.5, 534+, and 563+ for a detector or stop

which may measure length of an elongated material being wound or unwound.

333, Wave Transmission Lines and Networks, subclasses 141+ for electromechanical transducer-type time delays.

360, Dynamic Magnetic Information Storage or Retrieval, subclasses 1+ for recording or reproducing from an element of diverse utility, and subclass 6 for recording or playback apparatus combined with metering or sensing.

207.11 Displacement:

This subclass is indented under subclass 200. Subject matter which includes a device to note the change in position of one member with respect to another member, the device having means to create a magnetic field and having either (1) the means supported by one of the members, or (2) the members included in a magnetic circuit in the magnetic field, the apparatus to sense and indicate the sensing of the magnetic field being responsive to the change in the magnetic field to note the movement of one of the members with respect to the other member.

SEE OR SEARCH CLASS:

178, Telegraphy, subclasses 18.01+ for position determining or writing (e.g., hand writing analysis).

341, Coded Data Generation or Conversion, subclass 15 for a displacement responsive magnetic pattern element with a digital code signal generating circuit.

207.12 Compensation for measurement:

This subclass is indented under subclass 207.11. Subject matter which includes a device, circuit or circuit component that corrects an undesirable condition which affects the displacement measurement.

207.13 Having particular sensor means:

This subclass is indented under subclass 207.11. Subject matter which includes a device having a specific function or structure that detects the presence of, or a change in the level of a magnetic field.

207.14 Diverse sensors:

This subclass is indented under subclass 207.13. Subject matter in which two or more different types of sensors are used simultaneously or alternatively.

(1) Note. Plural measurements involve two or more different types of measurements such as linear and rotary, whereas diverse measurement includes two or more sensors for one or more measurements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207.23, for plural measurements.

207.15 Inductive:

This subclass is indented under subclass 207.13. Subject matter wherein sensing device is an inductor.

SEE OR SEARCH CLASS:

336, Inductor Devices, appropriate subclasses for inductors not specifically used in testing.

207.16 Electrically energized:

This subclass is indented under subclass 207.15. Subject matter containing one or more sources of electrical energy for energizing sensor means to produce a magnetic field.

207.17 Separate pick-up:

This subclass is indented under subclass 207.16. Subject matter in which a magnetic sensor is a receiver means that generates a signal in response to an electrically energized transmitter.

207.18 Differential type (e.g., LVDT):

This subclass is indented under subclass 207.16. Subject matter wherein (1) a sensor measures two separate stimuli and provides an output proportionate to the difference between them or (2) a transformer uses two or more primary sensor signals, or (3) a transformer uses two or more secondary sensor signals to provide a differential output.

(1) Note. LVDT is an abbreviation meaning linear variable differential transformer.

207.19 Differential bridge circuit:
This subclass is indented under subclass 207.16. Subject matter wherein an imbalance in a bridge circuit is based upon the difference between at least two inductive sensors forming at least two legs of the bridge circuit.

207.2 Hall effect:
This subclass is indented under subclass 207.13. Subject matter wherein the sensor uses the Hall effect to give an output voltage proportional to magnetic field strength.

(1) Note. Hall effect is the description given to the following phenomena: when a conductor, through which a current is flowing, is placed in a magnetic field, a potential difference is generated between the two opposed edges of the conductor in the direction mutually perpendicular to both the field and the conductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
251, for hall plate magnetometers.

SEE OR SEARCH CLASS:
330, Amplifiers, subclass 6 for hall effect amplifiers.
338, Electrical Resistors, subclass 32 for resistance value responsive to a condition wherein magnetic field or compass utilizes Hall effect.

207.21 Magnetoresistive:
This subclass is indented under subclass 207.13. Subject matter wherein a sensor is a semiconductor material in which the electrical resistance is a function of the applied magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:
252, for Hall plate magnetoresistive magnetometer.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 32 for a magnetic field or compass with resistance value responsive to a condition.

207.22 Having particular sensed object:
This subclass is indented under subclass 207.11. Subject matter in which a specific configuration or structure of an object is such that its motion may be detected by measuring a change of a magnetic property associated with the object.

(1) Note. This subclass includes sensor attachments that move with the device under test.

207.23 Plural measurements (e.g., linear and rotary):
This subclass is indented under subclass 207.11. Subject matter wherein there are two or more different types of position measurement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
207.14, for measurements using two or more sensors.

207.24 Linear:
This subclass is indented under subclass 207.11. Subject matter in which motion in a straight line is determined.

207.25 Rotary:
This subclass is indented under subclass 207.11. Subject matter in which (1) angular displacement is determined or (2) deviation from an angular path is measured.

207.26 Approach or retreat:
This subclass is indented under subclass 207.11. Subject matter in which the (1) the sensing device gives an indication when approaching or being approached by a magnetic field, or (2) the sensing device gives an indication when retreating or being retreated by a magnetic field, or (3) an object approaches or retreats from the sensor's magnetic field.

209 Stress in material measurement:
This subclass is indented under subclass 200. Subject matter which includes apparatus to note the strain within material having means to form a magnetic field in which the material is placed, or means to form a magnetic field in the material, the apparatus to sense a magnetic field and indicate the sensing of the magnetic

field senses the magnetic field modified by the material or the field produced in the material and indicates the result of the test, the indication being a measure of the strain in the material as a result of some type of force imparted to or within the material.

(1) Note. The means to impart the force to the material may or may not be claimed.

(2) Note. Compressional, tensional, shear, or torsional physical force is used to impart strain to the material.

(3) Note. The material tested can be examined for residual strain after the applied force is removed from the material, or the material can be examined for strain resulting from the applied force.

(4) Note. Excluded are claims to sense the internal strain of a magnetic sensor which is an indication of the force applied to the sensor and torque or torsion sensing devices relying on magnetic characteristics.

(5) Note. Claims testing the magnetostrictive effect of material are classifiable here.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 136+ and 141+ for sensing the internal strain of a magnetic sensor which is an indication of the force applied to the sensor and torque or torsion sensing devices relying on magnetic characteristics; subclass 779 for stress or strain measuring system having an inductive or magnetic sensor mechanically coupled to the specimen and subclasses 862+ for dynamometers including subclasses 862.381+ for the measurement of force by magnetic load cells.

356, Optics: Measuring and Testing, subclasses 32+ for material strain analysis of material by visible light.

210 Magnetic information storage element testing:

This subclass is indented under subclass 200. Subject matter which includes a magnetic recorder element to be tested magnetically, means to create a magnetic test signal to be either sensed by the tested element or recorded on the tested element, the said apparatus to sense the magnetic field either (1) being or including the tested element itself, or (2) sensing the recorded test signal on the tested element, the said apparatus to indicate the sensing of the test magnetic signal being responsive to the apparatus to sense the signal or to the recorder element tested.

(1) Note. The testing device is not integral with the information device tested.

(2) Note. A prerecorded test signal on a magnetic storage element tested may take the place of the means to create a test signal.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 603 for processes of making magnetic recording reproducing transducers.

346, Recorders, subclass 33 for a magnetic recorder with an external operating means, and subclass 74.2 for magnetic pictorial or graphic recorders.

365, Static Information Storage and Retrieval, subclass 201 for specifics of a memory which are tested for defects or erroneous information.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 108+ for testing system, particularly subclasses 117+ for testing of circuit.

714, Error Detection/Correction and Fault Detection/Recovery, subclasses 718+ for diagnostic testing of memory systems.

211 Memory core storage element testing:

This subclass is indented under subclass 210. Subject matter wherein the element tested is a nonmoving toroid magnetic memory element.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclass 81 for the automatic magnetic testing and sorting of static cores.

365, Static Information Storage and Retrieval, subclasses 129+ for toroid magnetic elements in a memory system.

212 Dynamic information element testing:

This subclass is indented under subclass 210. Subject matter wherein the element tested is a movable magnetic storage element.

(1) Note. Here are magnetic tape, drum, disc, and wire storage elements.

SEE OR SEARCH CLASS:

360, Dynamic Magnetic Information Storage or Retrieval, subclass 31 for testing the progress of recording.

213 Magnetic recording medium on magnetized object records object field:

This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field includes a magnetic recording medium applied to magnetized material so that any stray or leakage field from the magnetized material induces a magnetic field in the recording medium which is indicative of flaws in the material tested.

(1) Note. The magnetic field of the recording medium is latent and requires, for example, magnetic particles to form a visible image of the induced field on the recording medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

210+, for the testing of magnetic information storage elements.

214+, for testing of magnetic fields or magnetized materials by magnetic particles.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclass 215 and other related subclasses for separation of flawed articles from good magnetized articles based upon the change in the magnetic field of magnetized article due to flaws in the article.

252, Compositions, subclass 62.52 for flaw detections compositions.

346, Recorders, subclass 33 for the recording of flaws in response to an external flaw detection device.

214 By paramagnetic particles:

This subclass is indented under subclass 200. Subject matter which includes a magnetic field detector composed of particles including ferromagnetic material which, when placed in the magnetic field, align themselves in the direction of the tested magnetic field to form a visual representation of the tested magnetic field.

(1) Note. The particles may be of iron, nickel, or cobalt material.

(2) Note. The particles when in the magnetic field act as both a magnetic field detector and a visual indicator of the pattern of the tested field at the location of the field between the magnetic poles or at the location of the field discontinuities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200, for the sensing and plotting of magnetic fields.

SEE OR SEARCH CLASS:

252, Compositions, subclass 62.51 for magnetic compositions useful for magnetic purposes.

215 With pattern enhancing additive:

This subclass is indented under subclass 214. Subject matter wherein some chemical, composition, material, or mixture of materials is added to the paramagnetic particles to enhance the viewing of the particles with respect to the object tested after the particles are magnetized and attracted to the magnetized object tested.

(1) Note. The chemical, composition, material, or mixture may be directly placed on or diffused some way into the magnetic particles, or may form a dry mix-

ture with the particles or a liquid vehicle for the magnetic particles.

(2) Note. Coatings, dyes, and liquid and solid mixtures of material with the particles are in this subclass.

(3) Note. Fluorescent and phosphorescent material which require radiation on these materials to emit light are here as well as materials which have optical properties to permit the particles to be more easily distinguished from the object and the surroundings of the test.

216 Flaw testing:

This subclass is indented under subclass 214. Subject matter wherein the paramagnetic particles are used to test an object made of magnetic material and which includes means to magnetize the object to be tested to cause the parmagnetic particles, when upon the magnetized object, to become magnetized and adhere to the magnetized object or at a location where a discontinuity occurs when present in the object, the adhering magnetized particles arranging themselves in the pattern of the flux exiting from the object or in the pattern of a discontinuity when present in the object.

(1) Note. The magnetization may be caused by direct electrical current, by alternating current, by alternating and direct current, or by a permanent magnet.

(2) Note. A discontinuity is a flaw which includes a crack, fault, or other defect that is present in a tested object that is capable of changing the magnetization pattern known to be formed from a perfect object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

213, for the detection of flaws by magnetizing a material with a magnetic recording medium thereon to record the field of the magnetized material.

215, for particles with additives to enhance the viewing of magnetized particles.

217+, for flaw detection of railroad rails.

452+, for the use of particles to test flaws by electrostatic forces.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 632+ for flaw detection by means of compressional waves.

250, Radiant Energy, subclass 358.1 for pipe inspection by invisible radiant energy, and for tire inspection by invisible radiation, subclasses 559.45+ for the photoelectric sensing of web, strand, or sheet material for defects by visible light.

356, Optics: Measuring and Testing, particularly subclasses 430+ for flaw detection in webs; and subclasses 237.1+ for flaw testing generally.

374, Thermal Measuring and Testing, subclasses 4+ for flaw detection by a thermal determination.

378, X-Ray or Gamma Ray Systems or Devices, subclasses 58+ for X-ray flaw analysis.

217 Railroad rail flaw testing:

This subclass is indented under subclass 200. Subject matter which includes means to magnetize a railroad rail to create a test magnetic field in the rail, the apparatus to sense and indicate the sensing of the magnetic field being responsive to the field of the rail to note any change in the indication from the normal known magnetic pattern of the magnetized rail.

(1) Note. The subcombinations of means to magnetize a rail and of means to sense the magnetization of the rail are classified here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

62+, for the resistance testing of rails.

65, particularly for the flaw testing of rails by resistance means.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 636+ for the testing of rails for flaws by vibration.

346, Recorders, subclass 33 for a marking device which is responsive to a magnetic rail flaw detection device.

218 Rail joint cutout:

This subclass is indented under subclass 217. Subject matter wherein the tested rail has ends and is joined to other rails by connectors forming joints between the rails, and includes means to prevent the sensing and indicating of the magnetic field of the joints by the apparatus to sense and indicate the sensing of the magnetic field of the rail.

219 Magnetic sensor within material:

This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense a magnetic field includes a sensor placed within tested material which has magnetic field associated with it, the apparatus to indicate the sensing of a magnetic field being responsive to the magnetic field of the material sensed by the sensor.

220 Sensor supported, positioned, or moved within pipe:

This subclass is indented under subclass 219. Subject matter wherein the material tested is a tube and the sensor has (1) means to transport the sensor through the tube, or (2) a support to position or hold the sensor within the tube.

(1) Note. The subcombination of a magnetic sensor and a support to hold, position, or move the sensor within a pipe is here.

(2) Note. An indicator of the distance traveled by the magnetic sensor in the pipe may be additionally claimed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

260, for magnetic sensors with a support generally.

262, for magnetic sensor supports, per se.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 700 for bore extensometers, subclasses 772+ for rolling contact-type tube interior gauges, subclasses 792+ for internal dial gauges, and subclasses 814+ for screw adjustment type inside or inside-outside gauges.

250, Radiant Energy, subclass 358.1 for pipe inspection by radiant energy examination.

378, X-Ray or Gamma Ray System or Devices, subclasses 59+ for X-ray pipe testing.

221 Borehole pipe testing:

This subclass is indented under subclass 220. Subject matter wherein the tested pipe is a casing or a borehole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

345, for geological and subsurface testing for materials by a magnetic test.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 302+ for borehole interior study processes, and subclasses 304+ for borehole direction or inclination meters.

73, Measuring and Testing, subclasses 152.01+ for borehole and drilling study apparatus.

166, Wells, subclass 64 for time or distance measuring, subclass 65.1 for electrical means combined with a well, and subclasses 250.01+ for processes involving indicating, testing, measuring, or locating within a well.

175, Boring or Penetrating the Earth, subclass 4.51 for boring or penetrating with orienting or indicting.

250, Radiant Energy, subclasses 253+ for geological testing or irradiating with radiant energy.

361, Electricity: Electrical Systems and Devices, subclasses 248+ for igniting systems for explosive devices within a well bore.

367, Communications, Electrical: Acoustic Wave System and Devices, subclasses 14+ for compressional wave geophysical systems, and subclass 86 for well bore electrical communications.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for geochemical exploration.

222 Hysteresis or eddy current loss testing:
This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field includes apparatus to measure the loss of energy of a cyclically varying magnetic field resulting from it passage through a magnetic material or through a material in which eddy currents are induced by the varying magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57, for mutual inductance tests to determine inductance which cause eddy currents.
113, for recording the result of an electrical measurement.
121, for a cathode-ray tube indication of an electrical measurement.
142, for the measurement of electrical real power.
451, for power loss testing of magnetic material by causing heat by passing cyclic current through the material and measuring the power which causes the heat.

223 Hysteresis loop curve display or recording:
This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field is responsive to a material magnetized by a changing magnetic field going from a minimum to a maximum in one direction and than going from a minimum to a maximum in the opposite direction and produces a signal applied to a visual display or recorder which is the magnetization curve of the material.

SEE OR SEARCH CLASS:
313, Electrical Lamp and Discharge Devices, subclasses 1+ for cathode-ray tube circuits of general application, and subclasses 364+ for deflection circuits for a cathode-ray tube.
346, Recorders, subclasses 33+ for recorders combined with external recorder operating means.
347, Incremental Printing of Symbolic Information, subclasses 226+ for recorders operated by a light beam including a cathode ray beam.

224 With temperature control of material or element of test circuit:
This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field is also responsive to magnetic fields modified by tested materials placed in a magnetic field and includes means to control the temperature of the material tested or some element of the apparatus to sense and indicate the sensing of the magnetic field.

(1) Note. The means to control the temperature includes heating and cooling.

SEE OR SEARCH THIS CLASS, SUBCLASS:
248, for superconductive magnetometers which require low temperatures to function.

SEE OR SEARCH CLASS:
62, Refrigeration, appropriate subclasses for devices to cool.
73, Measuring and Testing, subclasses 15+ for thermal tests, and subclasses 339+ for temperature measuring means, per se.
148, Metal Treatment, subclass 121 for the heat treatment of magnetic materials to intentionally change the magnetic properties, and subclass 509 for heat treatment of solid or semi-solid metal to modify or maintain the internal physical structure (i.e., microstructure) or chemical property of metal combined with the measuring, sensing, or testing of magnetic properties.
165, Heat Exchange, particularly subclass 58 for heating and cooling.
219, Electric Heating, subclasses 50+ for metal heating, and subclass 200 for heating devices for nonmetals.
361, Electricity: Electrical Systems and Devices, subclass 140 for thermal change compensation for electromagnetic device control circuits, and subclass 141 for superconductivity electromagnetic device control circuits.
432, Heating, appropriate subclass for the heating of materials nonelectrically.

225 With compensation for test variable:

This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of the magnetic field includes structure to correct for some condition which affects the test.

(1) Note. The magnetic field tested may be a magnetic field, per se, or a magnetic field modified by a material under test.

(2) Note. The condition may be magnetic interference, the spacing of the material tested with respect to the magnetic sensing means, or some condition of the apparatus to sense and indicate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

224, for temperature control of the tested material or an element of the test circuit.

244, for magnetometers having disturbing magnetic field compensation.

226 Combined:

This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field is combined with the subject matter of another class when not provided for elsewhere.

(1) Note. The examination of material by magnetic fields and the testing of magnetic fields are here when combined with other subject matter.

(2) Note. In combination with magnetic testing are: demagnetizing, the conveying of material to or from the test, or the conveying of the magnetic test apparatus, diverse test apparatus of other classes and subject matter of other classes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

157, for measuring or sensing electricity combined with other subject matter.

SEE OR SEARCH CLASS:

194, Check-Actuated Control Mechanisms, subclasses 320+ for material testers which use magnets.

209, Classifying, Separating, and Assorting Solids, subclasses 38+ for the separation of solids from solids by magnetizing means and other separation means, subclasses 567+, 609, and 636 for article separating means involving magnetism, and subclasses 212+ for the separation of magnetic material from other material which is nonmagnetic or less magnetic.

356, Optics: Measuring and Testing, subclass 72 for the combination of an optical test with other subject matter.

227 Plural tests:

This subclass is indented under subclass 200. Subject matter wherein (1) two or more variable magnetic parameters are separately sensed and indicated, at least one of which is sensed and indicated by apparatus to sense and indicate the sensing of a magnetic field, or (2) at least one of two or more separate tests is a magnetic test.

(1) Note. The separate tests may be performed sequentially or simultaneously.

(2) Note. A. Subject matter of this subclass includes, for example, permeameters wherein a sensed voltage is used to indicate a change in flux for a given value of magnetomotive force indicated by the current causing the force. B. Subject matter of this subclass includes, for example, (1) a nonmagnetic hardness test combined with a magnetic flaw test, or (2) two simultaneous but spatially separated magnetic flaw tests.

SEE OR SEARCH THIS CLASS, SUBCLASS:

403+, for lamp and discharge device tests involving plural diverse characteristics or conditions.

228 With means to create magnetic field to test material:
This subclass is indented under subclass 200. Subject matter which includes structure to form a magnetic field for testing material, the apparatus to sense and indicate the sensing of the magnetic field being responsive to the field as modified by the material tested.

229 Thickness measuring:
This subclass is indented under subclass 228. Subject matter wherein the material tested has two different surfaces, and the distance between the surfaces is measured by placing the two surfaces in the magnetic field and the apparatus to sense and indicate the sensing of the field is responsive to the field as modified by the material between the two surfaces to thus sense and indicate the distance between the surfaces.

(1) Note. Class 324 measures thickness by sensing a change in magnetic property of magnetic test. For measuring thickness by having contacts touching the tested material, see the Search Note below.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, measures thickness by having contacts touching the tested material; see subclasses 783+ for distance measuring devices, particularly subclass 835 for coating thickness measurement, and subclasses 174+ for gauges.

73, Measuring and Testing, subclass 37.5 for the measurement of a dimension of a material by fluid means.

250, Radiant Energy, appropriate subclasses for the measurement of a dimension of a material by invisible radiation.

356, Optics: Measuring and Testing, subclass 629 for determining the thickness of light permeable material.

374, Thermal Measuring and Testing, subclass 7 for a thickness determination by a thermal test.

378, X-Ray or Gamma Ray Systems or Devices, subclasses 50, 54+, and 89+ for X-ray thickness measuring.

230 Layer of layered material:
This subclass is indented under subclass 229. Subject matter wherein the material tested is composed of dissimilar layered material and the thickness of one layer is found by placing the layered material in the magnetic field and the apparatus to sense and indicate the sensing of the magnetic field is responsive to the magnetic field modified by the layer to thus sense and indicate the depth of the layer.

231 With backing member:
This subclass is indented under subclass 229. Subject matter which includes a part next to one surface of the material and the apparatus to sense and indicate the sensing of the magnetic field next to the other surface opposite to the part; the part and the apparatus cooperating with each other to place tested material in the same relation each time with respect to the magnetic field and the apparatus to sense and indicate the sensing of the field.

(1) Note. The part generally but not always is part of the magnetic test circuit.

232 Plural magnetic fields in material:
This subclass is indented under subclass 228. Subject matter which includes means to create two or more magnetic fields in the tested material, the apparatus to sense and indicate the sensing of the magnetic field being responsive to the fields modified by the material to indicate some characteristic of the material.

(1) Note. Included are diverse magnetic fields at the same location in the material, or magnetic fields at different locations in the material, but not two fields of the same type aiding each other at the same place in the material.

233 With phase sensitive element:
This subclass is indented under subclass 228. Subject matter wherein the apparatus to sense and indicate the sensing of the magnetic field modified by the material tested includes an element which compares the electrical phase of the signal as received by the apparatus with the phase of the magnetic field used in the test, the difference in phase being used by the apparatus to show some characteristic of the tested material.

(1) Note. Here are mostly eddy current tests which do not fall out in the preceding subclasses. Eddy current tests not classified here will be found in the subclasses following when no phase detection is claimed.

234 Electrically energized nonforce type sensor:
This subclass is indented under subclass 228. Subject matter wherein the apparatus to sense and indicate the sensing of the magnetic field modified by the material includes a sensor which requires an electrical current to pass therethrough, and which senses and indicates the magnetic field other than by a force measurement.

(1) Note. Included are self-inductance-type field sensors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for the testing of material magnetically by torque magnetometers and electrically energized sensors of force.
244, for magnetometers.
260, for magnetic sensors not electrically energized.
300+, for the testing of material by nuclear or electronic induction.
323+, for the magnetic testing of material by a magnetic field.
332+, especially, which requires a magnetic field to test material within or part of the upper natural surface of the earth.

235 Noncoil type:
This subclass is indented under subclass 234. Subject matter wherein the energized sensor does not rely solely on inductive effects.

(1) Note. Here are sensors of the magnetoresistive and galvanomagnetic type which includes Hall effect sensors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
251, for Hall plate magnetometers.
252, for magnetoresistive and semiconductor solid-state magnetometers.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 32 for magnetoresistive and for Hall effect devices, per se.

236 Oscillator type:
This subclass is indented under subclass 234. Subject matter wherein the sensor is part of a frequency generator whereby the material-modified magnetic field is sensed by the sensor to control the frequency or the amplitude of the electrical wave generated by the frequency generator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
234, for sensing material-modified magnetic fields by self-inductive type sensors.

SEE OR SEARCH CLASS:
331, Oscillators, subclass 65 for oscillators with a device responsive to an external physical condition. See subclass 64 of Class 331 for the line between Classes 331 and 324.

237 Material flaw testing:
This subclass is indented under subclass 236. Subject matter wherein the material is magnetically tested for defects in the material.

238 Material flaw testing:
This subclass is indented under subclass 234. Subject matter wherein the material is magnetically tested for defects in the material.

(1) Note. A defect is any blemish, crack, or other inherent imperfection in a material that weakens the material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
213, for magnetic recording mediums attached to a tested magnetized material to record the material field.
216, for flaw testing of magnetized material with magnetic particles.
217+, for railroad flaw testing.
219+, for flaw testing when the sensor is within the material.
237, for flaw testers of the oscillator type.

239 Induced voltage-type sensor:
This subclass is indented under subclass 228. Subject matter wherein a voltage is induced in an electrical coil as a result of the change in the magnetic test field caused by the material tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
219+, for testing material by placing a magnetic sensor within the material tested.
233, for the testing of material by a test device which compares the phase of a test magnetic field with the phase of the signal sensed by the magnetic sensor.
254, for fixed coil magnetometers responsive to a changing magnetic field.
257, for moving coil magnetometers.
260+, for magnetic field detection device sensors of the induced voltage type.

SEE OR SEARCH CLASS:
323, Electricity: Power Supply or Regulation Systems, subclass 355 for transformers to deliver power to a single load.
336, Inductor Devices, particularly subclass 221 for coil and core, and subclasses 222+ and 225+ for electrical windings, per se, which introduce electrical inductance into an electrical circuit.

240 Material flaw testing:
This subclass is indented under subclass 239. Subject matter wherein the material is magnetically tested for defects in the material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217+, for rail flaw testing.
219+, for magnetic flaw sensors placed within material tested magnetically.
260+, for magnetic field dated on devices generally including those of the induced voltage type.

241 Opposed induced voltage sensors:
This subclass is indented under subclass 240. Subject matter wherein there are two or more magnetic coil sensors of the magnetic field modified by the test material, the apparatus to indicate the sensing of the field modified by the test material being connected to two or more of the sensors to indicate the difference in the voltages induced in the sensors.

242 Plural sensors:
This subclass is indented under subclass 240. Subject matter wherein there are two or more magnetic coil sensors of the magnetic field modified by the test material, the apparatus to indicate the sensing of the field modified by the test material being connected to two or more of the sensors to indicate the combined sensing of the material-modified field.

243 Plural sensors:
This subclass is indented under subclass 239. Subject matter wherein there are two or more coil sensors of the induced voltage type, the apparatus to indicate the sensing of the magnetic field being connected to two or more of the sensors to note the combined sensing of material-modified magnetic field.

244 Magnetometers:
This subclass is indented under subclass 200. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field is responsive to the intensity of the sensed magnetic field or the direction of the sensed magnetic field.

(1) Note. Subject matter classifiable in this subclass includes subcombinations or perfecting features peculiar to magnetometers and not classifiable elsewhere such as field compensating means for magnetometers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
227, plural magnetic tests of a magnetic field.
228+, for the testing of material by magnetic fields which use magnetometers for the defection of the material-modified magnetic field.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclasses 300+ for compasses, particularly subclasses 356+ for magnetic field responsive error compensation.

174, Electricity: Conductors and Insulators, subclasses 32 through 397 for anti-inductive structures, particularly subclass 352 for shielded coils.

307, Electrical Transmission or Interconnection Systems, subclass 89 for systems to prevent induction having means to control a magnetic field, and subclass 101 for residual or remnant magnetism control.

361, Electricity: Electrical Systems and Devices, subclass 93.6 for abnormal current condition protection including transformer sensor.

244.1 Optical:

This subclass is indented under subclass 244. Subject matter wherein the apparatus or method for sensing and indicating a magnetic field includes a medium which responds to the magnetic field by altering the propagation (e.g., path, passage, etc.) or a property (e.g., polarization) of radiant light energy therethrough, where the output of the medium is representative of the magnetic field measured.

(1) Note. This subclass includes physical changes of the light path affecting the light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96+, for devices which measure electricity using radiant energy.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 200+ for photocells, circuits, and apparatus.

356, Optics: Measuring and Testing , subclass 450 for optical testing by light wave interference.

359, Optics: Systems (Including Communication) and Elements, subclasses 280+ for changing a bulk optical parameter by an applied magnetic field.

385, Optical Waveguides, subclasses 12+ for environmentally sensing optical waveguides.

245 Plural sensor axis misalignment correction:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense and indicate the sensing of the magnetic field includes plural magnetic field sensors aligned with each other, the sensors when not aligned with each other producing errors in the magnetic field measurement, and means responsive to the sensing of the magnetic field by both sensors to adjust for the misalignment of the sensors, the apparatus to indicate being connected to the sensors.

246 With means to align field sensor with magnetic field sensed:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense and indicate the sensing of the magnetic field includes a movable magnetic field sensor of the tested magnetic field and apparatus responsive to the magnetic field connected to the magnetic sensor responsive to the magnetic field to physically move the sensor to a predetermined position with respect to the sensed magnetic field.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, subclass 647 for electric servo motors under the control of magnetic field sensing sensors.

247 Nonparallel plural magnetic sensors:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense the magnetic field includes several magnetic sensors positioned angularly with respect to each other so that an axis of another sensor will intersect the other axis and the apparatus to indicate is connected to the several sensors to note the combined sensing of the tested magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227, for plural magnetic tests each having a magnetic field sensor.

228, for magnetic tests to subject material to a magnetic field.

242, particularly for material flaw testing apparatus using plural magnetic coil sensors.

243, for material tests using plural magnetic coil sensors to examine material.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 300 for indicator of direction of force traversing material media apparatus

including direction or inclination instruments, gyromagnetic compasses and magnetic field responsive instruments.

340, Communications: Electrical, subclass 870.33 for continuously variable indicating apparatus having indication transmitters of the magnetic flux sensor type combined with circuitry connected to the transmitters, and subclass 345 for code transmitters which include magnetic flux sensing devices, per se.

248 Superconductive magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field includes a sensor of the magnetic field or a magnetic shield for the apparatus to sense a magnetic field made of a material which has nearly zero resistance in one state and appreciable resistance in a second state.

(1) Note. Superconductivity is a property possessed by some metals, alloys, or compounds whereby the electrical resistance of the metals, alloys, or compounds decreases until a critical temperature is reached and the resistance becomes practically zero when the temperature of the metal, alloy, or compound is reduced to within a few degrees of absolute zero.

(2) Note. The apparatus to produce the low temperatures in the superconductors in order to permit the superconductors to function as a shield or a magnetic field sensor is not always claimed.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 599 for processes of manufacturing superconductor electrical devices.

323, Electricity: Power Supply or Regulation Systems, subclass 44 for transformer systems using superconductors.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 527+ for miscellaneous superconductive circuits.

331, Oscillators, subclass 107 for superconductive oscillators using a superconductive active element.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclass 216 for superconductive magnets and electromagnets.

338, Electrical Resistors, subclass 32 for superconductive resistors, per se.

365, Static Information Storage and Retrieval, subclasses 160+ for superconductive magnetic storage systems.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 93 for electrically operated registers using superconductors.

249 Thin film magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field includes a thin single domain ferromagnetic film magnetized in a predetermined direction known as the easy axis of the film, the magnetization of the film upon placement in an external magnetic field to be tested assumes a different direction which is the resultant field vector of the film's easy axis and the tested field axis, means to cyclically change the resultant magnetic field axis of the film, sensing means to note the cyclical changes in the magnetic field of the film caused by the shift of the resultant magnetic field due to the means to cyclically change the resultant magnetic field axis, and the apparatus to indicate being connected to the sensing means to note the result of the cyclical changes in the film.

(1) Note. A thin film is defined as a ferromagnetic element formed so as to have its magnetic domains aligned in a predetermined direction. This is usually done by vapor depositing the film in a magnetic field. In the absence of an external field the magnetization vector or magnetic moment will be aligned with the preferred “easy axis” of magnetization of the film. The “hard axis” of the magnetization of the film is in an orthogonal direction to the “easy axis”. A thin magnetic film so formed has uniaxial anisotropy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227, for plural separate magnetic tests.

228+, for means to create a magnetic test field and a magnetic sensor to sense the test field.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclasses 108, 414, and 421-427, for devices responsive to magnetic field.

307, Electrical Transmission or Interconnection Systems, subclass 403 for nonlinear reactor systems having thin film parametron.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclass 567 for miscellaneous thin film circuits.

365, Static Information Storage and Retrieval, subclasses 171+ for thin film magnetic signal storage systems.

427, Coating Processes, subclasses 547+ for pretreatment of a substrate or posttreatment of a coated substrate using magnetic field or force, 598+ to directly apply a coating using magnetic field or force.

250 Electronic tube or microwave magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field includes (1) an ionizable gas tube magnetic field sensor having electrodes connected to appropriate voltages wherein the tested magnetic field causes the gas to ionize at different electrode voltages dependent upon the strength of the magnetic field, (2) an energized vacuum tube magnetic field sensor having a cathode ray beam and one or more electrodes or a fluorescent screen connected to appropriate voltages to attract the beam wherein the tested magnetic field acts to deflect the beam an amount dependent upon the strength of the tested field, or (3) an electrically conductive enclosure magnetic field sensor to which a signal is applied having a ferromagnetic material in the enclosure wherein the tested field affects the material to change the signal passed through the enclosure dependent upon the strength of the field.

(1) Note. The enclosure is a waveguide, resonant cavity, or a transmission line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

58+, for measuring microwave parameters or using microwave devices for determining nonelectric properties.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 360 for magnetic field direction indicating apparatus using cathode-ray tubes or photo-electric cells.

250, Radiant Energy, subclass 298 for ionic separation or analysis apparatus using magnetic means to separate or deflections, and subclass 396 for apparatus to deflect or focus a charged particle beam.

313, Electric Lamp and Discharge Devices, subclass 153 for electric lamp and discharge devices having a magnetic device, and subclass 364 for cathode-ray tubes, particularly subclass 421 for the beam deflection means of the cathode-ray tube.

315, Electric Lamp and Discharge Devices: Systems, subclass 399 for cathode-ray tube beam deflection circuits.

333, Wave Transmission Lines and Networks, subclasses 141+ for transmission line systems utilizing magnetic effects.

251 Hall plate magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field includes a thin sheet of conductive material whose thickness is small compared to a dimension of the sides of the sheet, electrical means connected at first diametrical points on the edge of the sheet to pass an electrical current through the sheet, electrical output means connected to second diametrical points on the edge of the sheet at right angles to the first diametrical points and the apparatus to indicate being connected to the electrical output means whereby the solid-state sheet when placed in a magnetic field to be measured nor-

mal to the first diametrical points will cause a voltage, consistent with the intensity of the tested magnetic field, at the second diametrical points, which voltage is sensed by the apparatus to indicate.

(1) Note. Compensation for misalignment of axis by means of potential balancing is here.

(2) Note. Hall plates may be made of germanium, bismuth, tellurium, copper, or indium antimonide.

SEE OR SEARCH THIS CLASS, SUBCLASS:

117, for measuring electricity, per se, with a Hall effect device.

127, for measuring current in a split core transformer with a Hall effect device.

207.2, for magnetic displacement measurement wherein a sensor utilizes the Hall effect.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 3 for Hall effect generators or converters.

323, Electricity: Power Supply or Regulation Systems, subclass 368 for impedance systems including a Hall effect resistor.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclass 511 for miscellaneous circuits having Hall effect devices sensitive to external magnetic effects.

329, Demodulators, appropriate subclasses for magnetic demodulators which include Hall effect devices.

330, Amplifiers, subclass 6 for amplifiers using the Hall effect.

332, Modulators, subclass 172 for magnetic amplitude modulators using the Hall effect.

338, Electrical Resistors, subclass 32 for Hall effect devices, per se.

365, Static Information Storage and Retrieval, subclass 170 for Hall effect magnetic signal storage devices.

252 Semiconductor type solid-state or magnetoresistive magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense and indicate the sensing of a magnetic field includes (1) a resistance of magnetic material having a current flow there-through and an indicator connected to the resistance whereby the magnetic field tested passing through the material changes the current noted on the indicator, or (2) a sensor of semiconductor material having a current flow therethrough and an indicator connected to the sensor to note the change in current caused by the tested magnetic field acting on the sensor.

(1) Note. Subject matter of this subclass type includes, for example, p-n junction semi-conductor sensors wherein the current flow therethrough is used to indicate the magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207.21, for magnetic displacement measurement wherein a sensor is magnetoresistive.

228, for noncoil type magnetic sensors including transistors and other solid-state magnetic sensors responsive to a magnetic field modified by a tested material.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclasses 108, 414, and 421-427, for devices responsive to magnetic field.

323, Electricity: Power Supply or Regulation Systems, for circuits including active solid-state devices controlled by a magnetic field which controls the voltage or current in the circuits.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 510+ for miscellaneous circuits and systems subjected to external magnetic effects.

330, Amplifiers, subclass 62 for magnetoresistive-type amplifiers.

338, Electrical Resistors, subclass 32 for magnetic field-type resistors.

360, Dynamic Magnetic Information Storage or Retrieval, subclass 113 for information type magnetoresistive transducer structures.

361, Electricity: Electrical Systems and Devices, subclass 235 for control circuits for electromagnetic devices having barrier layer devices controlled by a magnetic field.

365, Static Information Storage and Retrieval, subclass 158 for magnetoresistive storage systems.

253 Saturable core magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field includes a ferromagnetic core having an alternating magnetic flux passing through the core, the magnetic field tested being concurrently passed through the core with the alternating flux and an electrical coil to sense the change in the magnetic flux caused by the magnetic field in the core, the apparatus to indicate being responsive to the electrical coil sensing the magnetic field change in the core.

SEE OR SEARCH THIS CLASS, SUBCLASS:

228, for the magnetic testing of material.

236+, particularly, which use coil-type magnetic field sensors.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 361 for flux gate sensors used in magnetic field responsive instruments indicating the direction of force traversing natural media.

318, Electricity: Motive Power Systems, subclass 47 for magnetic field sensors that control an electric motor servo-system.

340, Communications: Electrical, subclass 870.33 for continuously variable indicating apparatus having an inductor of the flux gate type.

341, Coded Data Generation or Conversion, subclasses 20+ and 173+ for a code transmitter having a flux gate magnetic sensor.

360, Dynamic Magnetic Information Storage or Retrieval, subclass 111 for flux gate magnetic sensing heads to sense or record information.

361, Electricity: Electrical Systems and Devices, subclass 93.6 for abnormal current condition protection including transformer sensor, and subclasses 143+ for drive circuits for flux gate magnetic sensing devices which create the alternating flux for the sensing devices.

254 Second harmonic type:

This subclass is indented under subclass 253. Subject matter wherein the electrical coil sensing the change in the magnetic field in the core is connected to the apparatus to indicate by means of a circuit which passes only a harmonic signal of the alternating magnetic flux impressed upon the core so that the apparatus to indicate the result of the sensing is responsive only to the harmonic signal passed by the circuit.

255 Peak voltage type:

This subclass is indented under subclass 253. Subject matter wherein the composite alternating flux and the magnetic field tested produce a cyclically alternating magnetic flux in the core which will produce peak flux values each half cyclic of the alternating flux although the peaks are not symmetrical half waves of flux, and wherein electrical circuitry connected between the electrical sensing coil and the apparatus to indicate the sensing of the field determines the (1) peak value, (2) the difference in the peak value, or (3) the average value of the voltage induced in the sensing coil caused by the alternate half cycles of the flux in the core.

256 Energized movable sensing coil magnetometers:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field is a movable electrically energized magnetic field sensing coil, the magnetic field created by the coil interacts with the magnetic field tested to produce a force which moves the sensing coil, and the apparatus to indicate the sensing of the field is connected to the coil to note the movement of the coil.

(1) Note. The magnetic field created in the sensing coil may be a steady state or a changing magnetic field.

(2) Note. The sensing coil may turn or be vibrated by the force caused by the interaction of the tested magnetic field with the field of the sensor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

236, for magnetic field sensors of the coil type which sense the change in a magnetic field caused by a tested material.

260, for magnetic field sensors of the induction type not classified elsewhere.

257 Moving coil magnetometer:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field is a movable magnetic field sensing coil placed within the field to be tested and has means to move the movable coil, and the apparatus to indicate the sensing of the magnetic field is connected to the sensing coil whereby the coil moving in the tested field has induced therein a voltage proportional to the number of turns of the coil and the time it takes for the moving coil to complete a cycle of movement.

(1) Note. The sensing coil may or may not have a ferromagnetic core.

(2) Note. The movement may be rotary, vibrator, or translatory.

(3) Note. A single conductor sensing a magnetic field connected to an indicator is included in the subject matter of this subclass type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

323+, for geophysical surface or subsurface exploration which may include a moving coil magnetometer to detect objects below the surface of the earth or material within the earth or a magnetic field within the earth.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 361 for indicators of direction of force traversing natural media which use a rotating or vibrating magnetic detector.

343, Communications: Radio Wave Antennas, subclass 1 for radar devices which utilize a moving antenna, subclass 100 for directive radio systems that use a moving antenna, and subclass 757 for antennas with scanning, sweeping, or orienting means to move the antennas.

258 Fixed coil-magnetometer:

This subclass is indented under subclass 244. Subject matter wherein the apparatus to sense a magnetic field is a stationary electrical coil placed in a changing magnetic field to be tested, and the apparatus to indicate the sensing of the field is connected to the coil whereby the changing magnetic field induces in the coil a voltage proportional to the number of turns of the coil and the time it takes the changing field to make a complete change.

(1) Note. The tested changing field may be the movement of a magnetic core in the magnetic field tested, the magnetic core being moved relative to the sensing coil.

(2) Note. The sensing coil may include a ferromagnetic core.

259 Movable magnet or magnetic member interacts with magnetic field:

This subclass is indented under subclass 244. Subject matter with a movable permanent magnet acting as a magnetic field detector or a movable member of low magnetic reluctance acting as a magnetic field detector which includes material that can be temporarily magnetized by the tested field, the movable magnet's magnetic field or the magnetic field of the temporarily magnetized material reacting to the tested magnetic field by moving until the force between the tested magnetic field and the movable magnet or the movable temporarily magnetized material is zero.

(1) Note. Magnetic polarity testers are here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

205, for permanent magnet testing.

225, for test apparatus with compensation for a test variable.

256, for magnetometers having a movable energized coil which reacts with a tested magnetic field to indicate the direction or strength of the tested field.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 310 for borehole movable magnetic indicators for direction or inclination, subclass 319 for gyroscopically mounted magnetic compasses, subclass 352 for magnetic compass type directional indicators, and subclasses 355+ for magnetic compasses.

73, Measuring and Testing, subclasses 382+ for scales using permanent magnets to determine the force of gravity.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 205+ for permanent magnet actuated switches, and subclasses 302+ for magnets, per se.

260 Magnetic field detection devices:

This subclass is indented under subclass 200. Subject matter which includes magnetic field sensing devices, per se, which are not classified elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:

213, for a magnetic recording medium placed on a magnetized test material which assumes the magnetization of the material and requires iron particles to visibly see the pattern of recording medium.

214, for paramagnetic particles placed in a tested magnetic field to note the pattern of the test field or on a magnetized test material to note the magnetization pattern of the magnetized material.

220+, for magnetic field sensing device and a support for the device to hold, position, or move the device in a pipe or borehole.

226, for apparatus involving a magnetic field detector combined with a diverse art device of another class.

228+, for means to create a magnetic test field and a magnetic sensor of the test magnetic field.

244+, for magnetometers which involve a magnetic sensor and an indicator responsive to the sensor.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 595 for indicating transducer making processes.

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclasses 108, 414, and 421-427, for devices responsive to magnetic field.

338, Electrical Resistors, subclasses 32+ for magnetic field or compass resistive devices including those of the Hall and superconductive type.

343, Communications: Radio Wave Antennas, subclasses 700+ for antennas.

360, Dynamic Magnetic Information Storage or Retrieval, subclasses 110+ for magnetic transducers, per se, used in dynamic magnetic information systems.

361, Electricity: Electrical Systems and Devices, subclasses 139+, particularly subclasses 170+ for condition responsive control circuits for electromagnetic relay or solenoid devices, including subclasses 179+ for metal presence or absence devices.

365, Static Information Storage and Retrieval, for static magnetic information devices and the storage elements, per se, especially subclass 157 for magnetostrictive; and subclass 160 for superconductive information storage devices.

367, Communication, Electrical: Acoustic Wave Systems and Devices, subclasses 156 and 168 for underwater magnetostrictive transducers.

261 With support for article:

This subclass is indented under subclass 260. Subject matter wherein material is to be examined magnetically by a magnetic field sensing device and structure is provided to hold the

material with respect to the sensor so that the sensing can be performed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

158.1, for test fixtures used in electrical testing generally.

226, for testing material magneticallym and conveying the tested material to or from the test.

262, for supports for magnetic sensing devices.

SEE OR SEARCH CLASS:

248, Supports, subclasses 176+ for article stands, and subclasses 309+ for article brackets.

250, Radiant Energy, subclass 491.1 for means to align or position an object relative to a detector.

262 Magnetic test structure elements:

This subclass is indented under subclass 200. Subject matter which includes supports for tested material and sensing devices, and other elements not provided for elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:

158, for test fixtures and supports for sensors generally.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, particularly subclasses 32+ for anti-inductive structures.

248, Supports, for holding devices for materials, particularly subclasses 2+ for machinery supports.

263 Current through test material forms test magnetic field:

This subclass is indented under subclass 200. Subject matter which includes an electric circuit including terminals to contact a material to be magnetically tested so that current through the material and the terminals create a magnetic field in the material for test purposes.

(1) Note. Demagnetization as well as magnetization can be claimed as long as the test material forms the test field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

217+, for testing railroad rails by magnetizing the rail and sensing the magnetic field in the rail with or without an indication of the sensing.

228+, for magnetically testing material.

SEE OR SEARCH CLASS:

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 209+ for magnets and electromagnets, and subclass 284 for magnetizing and demagnetizing magnets and electromagnets.

336, Inductor Devices, subclasses 5+ for inductors, per se, which are impedance devices which produce a magnetic field when energized.

361, Electricity: Electrical Systems and Devices, subclasses 143+ for systems for magnetizing, demagnetizing, or controlling the magnetic field, and subclass 267 for demagnetizing systems and processes.

300 PARTICLE PRECESSION RESONANCE:

This subclass is indented under the class definition. Subject matter relating to the measurement of the energy interchange between precessing atomic particles in a surrounding electromagnetic field.

(1) Note. The energy interchange may be characterized by a ratio between the mechanical angular momentum and the magnetic moment of an atomic system.

(2) Note. Precession is a change in the orientation of the axis of a rotating particle, the effect of which is to rotate this axis (axis of spin) about a line (axis of precession) perpendicular to its original direction and to the axis (axis of torque) of the moment producing the change.

(3) Note. Resonant frequency is the frequency at which a given system or object will respond with maximum amplitude when driven by an external sinusoidal force of constant amplitude.

301 Using magnetometer:
This subclass is indented under subclass 300. Subject matter utilizing means to measure the effects of external magnetic fields upon the resonance of a host material in a controlled electromagnetic field.

(1) Note. Host material is a material in which the resonance properties have been determined under controlled magnetic field conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
244+, for magnetometers, per se.

302 To determine direction:
This subclass is indented under subclass 301. Subject matter wherein the magnetometer is used to determine the direction of an external magnetic field relative to the location of the magnetometer.

(1) Note. External is used to mean those magnetic fields external of the instrument being used.

303 Using well logging device:
This subclass is indented under subclass 300. Subject matter in which earth subsurface materials are subjected to magnetic resonance measurement by using a well logging device to transport the components of the testing system to the location to be tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
346, for systems using magnetic means to determine the electrical characteristics of the subsurface.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 152.02+ for a process or an apparatus for well logging, per se, wherein the process or the apparatus is not purely electrical or purely magnetic.

304 Using optical pumping or sensing device:
This subclass is indented under subclass 300. Subject matter in which a source of optical energy is applied to the sample and a resultant amount of optical energy is reradiated and sensed as a measure of a controlled interaction between the metastable state of an atomic system and a steady magnetic field.

(1) Note. Metastable is the marginal energy state of an electron above a reference ground within an atom, and having a definite lifetime.

305 Having particular optical cell structure:
This subclass is indented under subclass 304. Subject matter wherein the optical cell is designed to aid the sensing of reradiated optical energy.

306 Determine fluid flow rate:
This subclass is indented under subclass 300. Subject matter in which a fluid is magnetically tagged as a net magnetization in a predetermined direction at a tagging station for detection at a known distance downstream at a detection station within a measured time interval.

(1) Note. Magnetically tagged refers to the magnetic resonance of a fluid volume upon passage through a magnetic induction coil.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 861.11 for electromagnetic induction-type volume or rate of flow meters.
116, Signals and Indicators, subclass 112 for fluid flow indicators.
600, Surgery, particularly subclass 419 for magnetic resonance imaging or spectroscopy of fluid flow limited to medically evaluating a body liquid or gas traveling through a living body and where structure particularly adapted for placement on or in the body is claimed.

307 Using a nuclear resonance spectrometer system:
This subclass is indented under subclass 300. Subject matter in which a spectrometer is used to induce and measure resonance in the nucleus of an atom or group of atoms.

(1) Note. The spectrometer system would include at least a polarizing magnetic field element, a signal transmitter and

receiver along with transducer coils coupled to a sample material being measured, and an indicator to readout information obtained.

SEE OR SEARCH CLASS:
600, Surgery, particularly subclasses 410+ for a magnetic resonance imaging or spectroscopy device where structure particularly adapted for placement on or in a living body is claimed.

308 Including a test sample and control sample:
This subclass is indented under subclass 307. Subject matter in which the nuclear resonance measurement of an unknown material is made by comparison with the resonance of a known material.

309 To obtain localized resonance within a sample:
This subclass is indented under subclass 307. Subject matter in which a measurement of nuclear magnetic resonance at controlled locations within a sample volume is obtained.

310 By scanning sample frequency spectrum:
This subclass is indented under subclass 307. Subject matter wherein the application of pulsed energy to an atom nucleus over a controlled range of frequencies results in relative energy absorption by the atom or atoms of a sample material at resonance.

(1) Note. Scanning may also take place as a result of an increase or decrease in magnetic field strength.

311 With signal decoupling:
This subclass is indented under subclass 307. Subject matter in which feedback from the signal receiver to the transmitter is suppressed or eliminated.

(1) Note. The receiver feedback is not restricted to signals from the receiving coil and electronic components, but also includes the received and reradiated energy of the resonant sample material.

312 By spectrum storage and analysis:
This subclass is indented under subclass 307. Subject matter wherein the nuclear resonant frequencies of the sample material are transformed to memory and recalled for computation.

(1) Note. Transformation may include the conversion of resonant frequency signal information from analog to digital form.

313 Including polarizing magnetic field/radio frequency tuning:
This subclass is indented under subclass 307. Subject matter wherein the degree of resolution at resonance is a result of adjustment between magnetic field strength and the frequency at which magnetic resonance occurs.

314 With conditioning of transmitter signal:
This subclass is indented under subclass 307. Subject matter in which the signal information applied to the sample to induce resonance is made to conform with the predetermined frequency or phase conditions of a transmitter.

(1) Note. The subject matter under frequency or phase control of a transmitted signal would involve an improvement in sample resonance resolution, sensitivity, stability, or possibly the removal of unwanted sidebands from a frequency system.

315 With sample resonant frequency and temperature interdependence:
This subclass is indented under subclass 307. Subject matter in which the nuclear resonance of the sample material is measured as a function of temperature, or the temperature of the sample material is measured as a function of nuclear resonance.

316 Using an electron resonance spectrometer system:
This subclass is indented under subclass 300. Subject matter in which a spectrometer is used to induce and measure electron resonance of a sample material.

(1) Note. The electrons of atoms of a sample material refers to the electrons of a single atom as well as electrons of bonded atoms.

(2) Note. A spectrometer system as used here would include at least a signal transmitter coupled to a microwave cav-

ity in which a sample material is placed between the poles of a steady magnetic field and a receiver coupled to relay sample material resonance to an indicator.

317 Including a test sample and control sample:
This subclass is indented under subclass 316. Subject matter wherein the electron resonance of an unknown material is made by comparison with the resonance of known material.

318 Spectrometer components:
This subclass is indented under subclass 300. Subject matter comprising structural components of a spectrometer.

SEE OR SEARCH CLASS:
600, Surgery, particularly subclass 419 for a magnetic resonance imaging or spectroscopy system component where structure particularly adapted for contacting or conforming to a body part of a patient is claimed.

319 Polarizing field magnet:
This subclass is indented under subclass 318. Subject matter comprising the details of polarizing field magnet structure designed specifically for use with a spectrometer.

320 With homogeneity control:
This subclass is indented under subclass 319. Subject matter where magnetic circuit component design permits a uniform magnetic field gradient to be obtained.

321 Sample holder structure:
This subclass is indented under subclass 318. Subject matter comprising sample holders to be used specifically with a spectrometer.

322 Electronic circuit elements:
This subclass is indented under subclass 318. Subject matter comprising basic circuit elements which include active and passive devices designed specifically for use in a spectrometer system.

323 OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU:
This subclass is indented under the class definition. Subject matter relating to the determination of an electrical characteristic of the subsurface of the earth in situ.

(1) Note. Subsurface is defined as including everything, whether composition, article, structure, or formation which lies below the upper natural surface of the earth. The upper surface is defined as being the uppermost nongaseous thing which lies on the earth, and may be mud, water, snow, leaves, dead trees, ice pavements, crops of buildings and such upper surface is defined as being natural if of the same type (e.g., leaves) which is found in nature, whether deposited by nature or not. Thus, under the subclass definition, the determination of geologic structure under building foundations or the location or treasure buried in the earth is included, but the location of treasure concealed in the building wall is not included.

(2) Note. The electrical characteristics which are determined may include streaming, telluric, terrestrial or self-potentials, resistance, dielectric constant, magnetic reluctance, inductance, conductance, capacitance, and magnetism.

SEE OR SEARCH THIS CLASS, SUBCLASS:
376, for the analysis of core samples, not in situ in the earth, and other appropriate subclasses for the analysis of samples which are not in situ, or for the location of objects which are not below the natural surface of the earth. Note particularly subclasses 67, 158, and 200+.

SEE OR SEARCH CLASS:
23, Chemistry: Physical Processes, subclass 230 for geochemical exploration.
73, Measuring and Testing, subclasses 152.01+ for mechanical (e.g., thermal) analysis of bore holes.

166, Wells, subclasses 250+ for well processes including indicating, testing, or measuring steps; subclass 64 for well apparatus including time or distance measuring, temperature responsive or counting means; and subclass 66 for well apparatus including electrical indicating means.

175, Boring or Penetrating the Earth, subclass 40 and particularly subclass 50 for the combination of earth boring with electrical earth formation logging. The mere nominal recitation of a conventional earth boring step or means will not preclude classification in Class 324.

181, Acoustics, subclass .5 for nonelectrical geophysical exploration by the use of seismic waves. Also note the reference to Class 340 below.

250, Radiant Energy, subclasses 253+ for geophysical exploration by the use of radiant energy of the invisible type, including electromagnetic waves above the microwave frequency band.

340, Communications: Electrical, subclass 853.8 for a wellbore telemetering system.

343, Communications: Radio Wave Antennas, subclasses 5+ for radar systems which are used in geophysical exploration, as for example, radar sets which are lowered down a bore hole to determine the size of the bore.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 14+ for seismic prospecting using electrical acoustic wave systems.

324 Including borehole fluid investigation:

This subclass is indented under subclass 323. Subject matter relating to the determination of an electrical property of the fluid in a well, borehole, or other opening in the earth.

(1) Note. The fluid may be oil, gas, water, brine, or any other fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

438, for determining the pH or conductivity of an electrolyte.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 152.18+ for fluid analysis in a borehole or drilling test wherein the analysis is not made by purely electrical or purely magnetic means.

204, Chemistry: Electrical and Wave Energy, subclasses 400+ as the residual home for apparatus used for electrolytic analysis or testing, per se.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 775+ as the residual home for a process of electrolytic analysis or testing, per se.

252, Compositions, subclass 62.2 for electrolytes of general utility.

325 To determine fluid entry:

This subclass is indented under subclass 324. Subject matter relating to the determination of the subsurface location of the point or region of entry of a fluid into or out of a well, borehole, or other opening in the earth.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 40.5 for the determination of the leakage or ingress of fluid from or into a conduit in situ and subclasses 152.18+ for a rate of fluid flow measuring or fluid analysis in a borehole or drilling test wherein the measurement or the analysis is not made by purely electrical means or purely magnetic means.

326 For small object detection or location:

This subclass is indented under subclass 323. Subject matter relating to the detection or location in the earth of items which are relatively small compared to the size of the geoligic formation in which they are found.

(1) Note. The items may be objects such as land mines, unexploded shells, lost or buried treasure, pipes, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67, and 200+, for the detection of concealed objects, not below the natural surface of the earth, using magnetic or

electromagnetic sensing, as the location of pipe in walls.

327 Using oscillator coupled search head:
This subclass is indented under subclass 326. Subject matter wherein one or more parameters of an oscillator, coupled to or formed in conjunction with a coil or antenna moved over the region of exploration, are monitored.

SEE OR SEARCH THIS CLASS, SUBCLASS:
332, for subject matter under subclass 323 using a radiant energy transmitter.

SEE OR SEARCH CLASS:
331, Oscillators, for a particular type of oscillator circuitry.

328 Of the beat frequency type:
This subclass is indented under subclass 327. Subject matter having means for mixing the search head signal with another signal to produce a difference frequency output.

SEE OR SEARCH CLASS:
331, Oscillators, subclasses 37+ for beat frequency oscillator circuits in general.

329 Using movable transmitter and receiver:
This subclass is indented under subclass 326. Subject matter wherein an antenna or coil means for generating an electromagnetic field and a separate pickup coil or antenna means responsive to the electromagnetic field as modified by the object to be detected are transported simultaneously over the area of investigation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
330, for transmitters and receiver combinations used in aerial surveys.
334, for transmitter-receiver systems for geophysical prospecting in general.

SEE OR SEARCH CLASS:
455, Telecommunications, subclass 90.1 for portable transmitter-receiver systems having particular application.

330 By aerial survey:
This subclass is indented under subclass 323. Subject matter in which the determination of the electrical property is made by means which are situated by a substantial distance above the earth's surface.

(1) Note. The means may, for example, be carried by a projectile, rocket, aircraft, balloon, or may be supported on towers. The transportation of such means in a mere surface vehicle, such as an automobile, is not considered to be within the scope of this subclass.

331 For magnetic field detection:
This subclass is indented under subclass 330. Subject matter having means for detecting a component of the earth's magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:
345, for magnetic prospecting means in general.

332 With radiant energy or nonconductive-type transmitter:
This subclass is indented under subclass 323. Subject matter having means for radiating electrostatic or electromagnetic energy into the earth and for measuring a circuit parameter of the radiating means.

(1) Note. The means for radiating the energy, for example, may be an oscillator search coil, and the reaction of the formation on the oscillator field, due to variable loading, may furnish the indication which is desired.

SEE OR SEARCH THIS CLASS, SUBCLASS:
327, for the measurement of oscillator circuit parameters in small object detection.

333 Within a borehole:
This subclass is indented under subclass 332. Subject matter in which the transmitter is adapted for use within a drill hole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

338, for borehole investigation with separate pickup of radiated energy.

346, for borehole investigation using magnetic means.

351, 355 and 366+, for electrode arrangements used in a borehole.

334 With separate pickup:

This subclass is indented under subclass 332. Subject matter having means distinct from the radiating means, for detecting the energy which has been radiated.

(1) Note. The earth, for example, may act as a mutual inductance to convey a variable amount of energy from a transmitter coil to a receiver coil, in dependence upon the electrical characteristics of the formation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

329, for the detection of small objects using transmitter-receiver means.

330, for transmitter-receiver systems used in aerial surveys.

SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 39+ for particular transmitter-receiver systems used in communication.

335 Employing multiple frequencies:

This subclass is indented under subclass 334. Subject matter in which more than one frequency is employed for investigating the subsurface formation between the transmitter and pickup.

(1) Note. The plurality of frequencies may be produced by varying the frequency of the signal from a single source, or, by provision of a plurality of different frequency sources.

336 To detect transient signals:

This subclass is indented under subclass 334. Subject matter wherein the transmitter signal is such as to cause decaying secondary signals to emanate from subsurface ore bodies and mineral deposits and the pickup means detects such decaying secondary signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:

360, for electrode systems which detect transient-type signals.

337 To detect return wave signals:

This subclass is indented under subclass 334. Subject matter having the pickup means positioned at the same location as the transmitter for receiving reflections or reradiations of the transmitted signal.

SEE OR SEARCH CLASS:

343, Communications: Radio Wave Antennas, subclasses 5+ for radar systems.

338 Within a borehole:

This subclass is indented under subclass 334. Subject matter adapted for use within a drill hole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

333, for measuring parameters of a radiant energy means positioned in the borehole.

346, for borehole investigation using magnetic means.

351+, 355 and 366+, for electrode arrangements used in a borehole.

339 By induction logging:

This subclass is indented under subclass 338. Subject matter in which eddy currents are induced in the formations surrounding the borehole by an alternating electromagnetic field from a transmitter coil and a secondary electromagnetic field set up by the eddy currents induces an electromotive force in the pickup or receiver coil.

SEE OR SEARCH THIS CLASS, SUBCLASS:

239+, for induced voltage-type sensors in magnetic testing.

340 To measure susceptibility:

This subclass is indented under subclass 339. Subject matter relating to the measurement of magnetic properties of the formation.

341 To measure dielectric constant:
This subclass is indented under subclass 339. Subject matter relating to the measurement of permittivity properties of the formation.

342 Using a toroidal coil:
This subclass is indented under subclass 339. Subject matter in which one or both of the transmitter and pickup coils are in the configuration of a toroid.

343 Using angularly spaced coils:
This subclass is indented under subclass 339. Subject matter in which the axis of one or more of the transmitter coils is nonparallel to the axis of one or more of the receiver coils.

344 With radiant energy or nonconductive-type receiver:
This subclass is indented under subclass 323. Subject matter having means for receiving electrostatic or electromagnetic energy from above or below the surface of the earth.

(1) Note. The means, for example, may be responsive to radiant energy produced by natural sources but not by artificial sources. Receivers responsive to energy produced by an artificial source are classifiable elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:
332+, for this subject matter having transmitter means to radiate electrostatic or electromagnetic energy into the earth.
334, for receivers responsive to energy produced by an artificial source.
359, for a radiant energy pickup means responsive to radiant energy produced by artificial earth currents.

345 By magnetic means:
This subclass is indented under subclass 323. Subject matter having magnetic means to determine the electrical characteristics of the subsurface.

(1) Note. For example, the magnetic field, due to artificial or natural earth current, may be determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
331, for determining the magnetic field by aerial survey.

346 Within a borehole:
This subclass is indented under subclass 345. Subject matter adapted for use within a drill hole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:
303, for magnetic resonance measuring using well logging systems.
333, for measuring parameters of a radiant energy means positioned in the borehole.
338, for borehole investigation with separate pickup of radiant energy.
351, 355 and 366+, for electrode arrangements used in a borehole.

347 Using electrode arrays, circuits, structure, or supports:
This subclass is indented under subclass 323. Subject matter relating to means for introducing electric currents into the subsurface or for collecting electric currents from the subsurface by conduction.

(1) Note. This subclass includes the structure or configuration of one or more electrodes and the means for supporting such electrodes. The electrodes and their supports are primarily of the borehole type, although not limited thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
437, 445 through 449, for electrode structures and systems.

SEE OR SEARCH CLASS:
128, Surgery, subclasses 2.06 and 2.1 for the structure of electrodes utilized in medical diagnosis, such as gelatin electrodes.

348 For detecting naturally occurring fields, currents, or potentials:
This subclass is indented under subclass 347. Subject matter for measuring a field, current, or potential which exists as a result of the inherent

nature of the subsurface formations and not arising by virtue of an artificial current source.

(1) Note. For purposes of this subclass naturally occurring fields, currents, or potentials are considered to include those resulting from such sources as electric powerlines, electrical machinery, and underground pipes. These sources are considered a permanent part of the environment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72, for detecting potentials in a specific environment.

349 Of the telluric type:
This subclass is indented under subclass 348. Subject matter wherein the potentials or fields are associated with naturally occurring variable current which permanently circulate in vast sheets within the outermost layer of the earth's crust.

350 Including magneto-telluric type:
This subclass is indented under subclass 349. Subject matter for carrying out the telluric measurements in conjunction with measurements of the earth's magnetic field.

351 Within a borehole:
This subclass is indented under subclass 348. Subject matter adapted for use within a hole which has been drilled or is being drilled within the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

333, for measuring parameters of a radiant energy means positioned in the borehole.
338+, for borehole investigation with separate pickup of radiated energy.
346, for borehole investigation using magnetic means.
355, for borehole electrodes coupled to an artificial current source.
366+, for separate pickup electrodes.

352 Combined with artificial source measurement:
This subclass is indented under subclass 351. Subject matter including one or more additional types of electrode measurements employing a source of electrical energy other than a natural source.

(1) Note. The “additional” types of measurements include only those which would be classified within this class (324).

353 With fluid movement or pressure variation:
This subclass is indented under subclass 351. Subject matter including means for causing the movement of the fluid or variations in the pressure of the fluid existing within the borehole or the formations surrounding the borehole.

354 Coupled to artificial current source:
This subclass is indented under subclass 347. Subject matter in which a parameter of the current introduced into the subsurface is measured.

355 Within a borehole:
This subclass is indented under subclass 354. Subject matter adapted for use within a drill hole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

333, for measuring parameters of a radiant energy means positioned in the borehole.
338+, for borehole investigation with separate pickup of radiated energy.
346, for borehole investigation using magnetic means.
351+, for borehole electrode arrangements used in detecting naturally occurring fields and potentials.
366+, for borehole electrode arrangements with current emitting electrodes and separate potential pickup electrodes.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 152.01+ for an apparatus or a process for borehole testing, per se, wherein the test is not made by purely electri-

cal means or by purely magnetic measuring means.

356 While drilling:
This subclass is indented under subclass 355. Subject matter associated with a drill string so that measurements can be carried out during drilling of the borehole.

SEE OR SEARCH THIS CLASS, SUBCLASS:
368, for borehole logging while drilling devices having separate pickup means.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 152.03+, 152.19+, and 152.43+ for an apparatus or a process for borehole testing during drilling, per se, wherein the test is not made by purely electrical means or by purely magnetic measuring means.

357 Including separate pickup of generated fields or potentials:
This subclass is indented under subclass 354. Subject matter having means distinct from the current introduction means, for detecting the fields or potentials resulting from the current which has been caused to flow into the subsurface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
64, for the detection of potentials caused by current flow in conducting resistance measurements in general.

358 With three electrodes:
This subclass is indented under subclass 357. Subject matter having three potential pickup electrodes.

359 With nonelectrode pickup means:
This subclass is indented under subclass 357. Subject matter having means for detecting radiant energy produced by the artificial current flow, including magnetic, electromagnetic, and electrostatic fields.

(1) Note. Subclass 345 takes precedence when detecting a magnetic field if the means for introducing the artificial current flow is not significant.

360 Using a pulse-type current source:
This subclass is indented under subclass 357. Subject matter wherein the current introduced into the subsurface has an abruptly changing waveform such as a pulse, step impulse, square wave, etc.

(1) Note. The introduced current may include a single pulse-type signal or a plurality of such signals.

361 With mechanical current reversing means:
This subclass is indented under subclass 360. Subject matter in which the current is caused to reverse direction by mechanical switching apparatus.

362 To measure induced polarization:
This subclass is indented under subclass 360. Subject matter adapted to determine the polarization effects produced at the interface between a mineral body and a surrounding electrolyte in response to current flow.

363 By varying the path of current flow:
This subclass is indented under subclass 357. Subject matter in which the current introduced is caused to travel through the subsurface formations over different paths.

364 Using frequency variation:
This subclass is indented under subclass 363. Subject matter in which the current flow paths are varied by changing the frequency of the current.

365 Offshore:
This subclass is indented under subclass 357. Subject matter adapted for use on or below the surface of a body of water.

366 For well logging:
This subclass is indented under subclass 357. Subject matter adapted for use within a drill hole in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:
333, for measuring parameters of a radiant energy means positioned in the borehole.

338, for borehole investigation with separate pickup of radiated-energy.
346, for borehole investigation using magnetic means.
351, for borehole electrode arrangements used in detecting naturally occurring fields and potentials.
355, for borehole electrodes coupled to an artificial current source.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 152.02+ for formation logging, per se, in a borehole or a drilling test wherein the measurement or the analysis is not made by purely electrical means or purely magnetic means.

367 Using a pad member:
This subclass is indented under subclass 366. Subject matter in which the electrodes are mounted on the face of a support structure (pad member) adapted to extend into engagement with the borehole wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
374, for pad members used with focussing electrodes.

368 Cased borehole:
This subclass is indented under subclass 366. Subject matter in which the drill hole to be investigated contains a metal sheath or casing.

369 While drilling:
This subclass is indented under subclass 366. Subject matter associated with a drill string so that measurements can be carried out during drilling of the borehole.

SEE OR SEARCH THIS CLASS, SUBCLASS:
355, for borehole logging while drilling in which a parameter of current from an artificial current source is measured.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 152.03+ for formation logging, per se, in a borehole while drilling, and subclasses 152.19+ and 152.43+ for a borehole or drilling test while drilling wherein the measurement or the analysis is not made by purely electrical means or purely magnetic means.

370 Using surface current electrodes:
This subclass is indented under subclass 366. Subject matter in which potentials detected along the borehole are created by current flowing between electrodes located at the earth's surface on opposite sides of the borehole.

371 Using plural fields:
This subclass is indented under subclass 366. Subject matter having means for creating more than one field in the formations surrounding the borehole and pickup electrode means responsive to each of the fields.

(1) Note. The fields may be created simultaneously or at different times and may have the same or different frequencies.

372 Between spaced boreholes:
This subclass is indented under subclass 366. Subject matter in which electrode means are lowered within two or more drill holes in the earth for investigating the formations between the boreholes.

373 Using current focussing means:
This subclass is indented under subclass 366. Subject matter in which main survey current and auxiliary guard current electrodes are provided so as to confine or “focus” the survey current to a thin horizontal path into the formations.

374 Including pad member:
This subclass is indented under subclass 373. Subject matter in which the electrodes are mounted on the face of a support structure (pad member) adapted to extend into engagement with the borehole wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
367, for nonfocusing electrodes mounted on a pad member.

375 Including plural current focussing arrays:
This subclass is indented under subclass 373. Subject matter having more than one focussing electrode configuration on a single borehole tool.

(1) Note. The plural configurations may include different focussing electrode systems such as an elongated array combined with a pad member array, a single type system with means for switching between electrodes to form the plural configurations, or separate arrays of the same type vertically spaced along the borehole. This subclass does not include a plurality of similar pad member arrays horizontally spaced around the borehole.

376 OF SUBSURFACE CORE SAMPLE:
This subclass is indented under the class definition. Subject matter relating to the analysis by electrical means of core samples which have been removed from the subsurface of the earth.

(1) Note. For a definition of subsurface as used in these definitions see the definitions of subclass 323 of the class.

SEE OR SEARCH THIS CLASS, SUBCLASS:
323+, for this subject matter where the core sample is analyzed in situ in the earth.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 152.07, 152.09, and 152.11 for logging a formation by a core sample analysis and subclasses 152.23+ for a fluid flow measuring or a fluid analysis in a borehole or drilling test combined with sampling wherein the measurement or the analysis is not made by purely electrical means or purely magnetic means.
175, Boring or Penetrating the Earth, subclass 44 providing core position identification for core sample orientation.

377 For magnetic properties:
This subclass is indented under subclass 376. Subject matter wherein a magnetic property of the sample is analyzed.

(1) Note. For example, magnetic orientation, susceptance, permeability, dip and strike.

378 INTERNAL-COMBUSTION ENGINE IGNITION SYSTEM OR DEVICE:
This subclass is indented under the class definition. Subject matter relating to the testing of electrical systems and devices which cause the rapid combustion of a fuel in an internal-combustion engine.

(1) Note. This subclass includes, for example, means for testing spark plugs, spark plug wires, coils, distributor points, magnetos, ignition timing, etc.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 116+ for testing of engines which do not use an electrical ignition system, for example, diesel engine.
123, Internal-Combustion Engines, subclass 146.5 for internal-combustion engine structure in combination with the ignition system under test.

379 With analysis of displayed waveform:
This subclass is indented under subclass 378. Subject matter having a cathode-ray tube (CRT) display or a drive circuit for a CRT responsive to an electrical ignition system to display the waveform generated by the ignition system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
394, for the use of a CRT in the testing of spark plugs in situ.

380 Electronic ignition system:
This subclass is indented under subclass 378. Subject matter wherein the ignition system utilizes solid-state switching devices and electronic components.

(1) Note. These electronic components are, for example, transistors, zener diodes and oscillators.

381 With magnetically controlled circuit:
This subclass is indented under subclass 380. Subject matter wherein a magnetically controlled circuit has no conventional distributor contact points but uses a magnetic impulse generator in lieu thereof to trigger the transistor through an amplifier unit.

382 With capacitor discharge circuit:
This subclass is indented under subclass 380. Subject matter wherein conventional distributor breaker points, or a magnetic impulse generator in the distributor, charges a capacitor that generally discharges to the primary coil circuit.

383 By simulating or substituting for a component under test:
This subclass is indented under subclass 378. Subject matter wherein the test is made by providing the test instrument with a standard, or ideal, component, or components, arranged to be connected into the ignition system under test for similar components therein and thereby indicate faulty components by eliminating the components which are not operating properly.

384 Using plural tests in a conventional ignition system:
This subclass is indented under subclass 378. Subject matter wherein two or more diverse electrical components in an ignition system are tested.

385 Distributor:
This subclass is indented under subclass 378. Subject matter including means for testing components in the primary and secondary circuits of the distributor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
421+, for contact resistance test.

386 Dwell (i.e., cam angle):
This subclass is indented under subclass 385. Subject matter wherein the number of degrees the distributor cam rotates from the time the breaker points close until they open again is measured.

(1) Note. This subclass includes instruments which measure both dwell and revolutions per minute.

SEE OR SEARCH THIS CLASS, SUBCLASS:
160+, for electrical speed measuring.

387 Condenser:
This subclass is indented under subclass 385. Subject matter for testing the operation of the energy storing component in the primary circuit of the ignition system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60+, for measuring capacitance.

388 Coil:
This subclass is indented under subclass 378. Subject matter including means for testing the operation of the voltage transformer of the ignition circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
59, for measuring inductance.

389 Magneto:
This subclass is indented under subclass 378. Subject matter including means for testing the operation of the magnetic pulse generator of the ignition circuit.

390 Low or high tension lead:
This subclass is indented under subclass 378. Subject matter including means for testing the electrical condition of the wires in the primary or secondary circuit of the ignition system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
51, for fault testing and circuit continuity.
54, for insulation testing.
62, for measuring resistance or conductivity.

391 Ignition timing:
This subclass is indented under subclass 378. Subject matter including means for measuring the time when a high voltage surge is provided to fire a spark plug for a particular cylinder relative to the position of the piston in the cylinder.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 116+ for measuring the timing of engines which do not use an electrical ignition system, for example, diesel engines.

392 Using a pulse signal technique:
This subclass is indented under subclass 391. Subject matter wherein the timing measurement is achieved by using pulse signal processing (e.g., digital processing).

393 In situ testing of spark plug:
This subclass is indented under subclass 378. Subject matter wherein the spark plug is tested while in the engine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
403+, for testing of discharge characteristics of space discharge devices including spark plugs.

394 With cathode-ray tube display:
This subclass is indented under subclass 393. Subject matter having a cathode-ray tube (CRT) display or a drive circuit for a CRT responsive to an electrical ignition system to display the waveform generated by the ignition system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
379, for the general use of a CRT in the testing of internal-combustion engine ignition systems.

395 Using an illuminating device to indicate spark plug condition:
This subclass is indented under subclass 393. Subject matter wherein a glow device (e.g., lamp bulb, neon tube, etc.) indicates whether or not a spark plug is operating properly.

396 With an air gap in series with spark plug to indicate spark plug condition:
This subclass is indented under subclass 393. Subject matter having the air gap connected in series with the spark plug secondary circuit to give an indication of the condition of the spark plug.

397 By shorting the plug to ground to indicate spark plug condition:
This subclass is indented under subclass 393. Subject matter wherein the test to indicate the condition of a spark plug consists of shorting the plug to ground and observing the change in the speed of the engine.

398 With air gap in ground circuit:
This subclass is indented under subclass 397. Subject matter having the air gap connected in parallel with the spark plug circuit.

399 Wherein a measured electric quantity indicates spark plug condition:
This subclass is indented under subclass 393. Subject matter wherein an electric characteristic (e.g., current, voltage, resistance, etc.) is evaluated or measured to indicate whether or not a spark plug is operating properly.

400 Spark plug removed or tested in a test fixture:
This subclass is indented under subclass 378. Subject matter wherein the spark plug is removed from the engine or placed in a test fixture to determine the condition of the plug.

401 Using a pressure chamber:
This subclass is indented under subclass 400. Subject matter wherein the test fixture has a means for testing the plug under pressure.

402 Apparatus for coupling a measuring instrument to an ignition system:
This subclass is indented under subclass 378. Subject matter relating to devices which pick up signals from the ignition system and apply them to an analyzer.

403 ELECTRIC LAMP OR DISCHARGE DEVICE:
This subclass is indented under the class definition. Subject matter comprising systems, apparatus, and methods for testing the operativeness or characteristics of electric lamps or electric discharge devices.

(1) Note. This subclass includes, for example, systems for determining the lumen output per watt of input for electric lamps.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57+, for the measurement of the resistance of lamp filaments as long as the claims are not limited to the filaments being mounted in the lamp. These subclasses (20) provide for electrical systems for testing the characteristics

of incandescent lamps, including the testing of the resistance of the filament within the lamp.

378+, for this subject matter utilized to test spark plugs or ignition systems.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, appropriate subclasses for methods and apparatus for automatically separating and assorting, or segregating in grades or classes according to physical characteristics, lamps, and space discharge devices.

315, Electric Lamp and Discharge Devices: Systems, subclasses 120 and 129+ for systems for operating an electric lamp and/or discharge device, the systems including signal, indicator, or alarm means to indicate some condition affecting the operation of the lamp or discharge device.

356, Optics: Measuring and Testing, subclasses 121+ for lamp beam direction or pattern tests with or without focussing of the lamp; subclass 123 for tests to determine the position of a filament with respect to its optical system; and subclasses 213+ for photometers.

445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 3+ for processes; and subclasses 63+ for apparatus for the manufacture of electric lamps or discharge devices which include an operation of testing or means to test the operativeness of the lamp or discharge device.

455, Telecommunications, appropriate subclasses for miscellaneous apparatus and systems for testing radio circuits.

404 Cathode-ray tube:

This subclass is indented under subclass 403. Subject matter for testing a discharge device which has means for forming the electric discharge into a restricted beam or ray.

405 Vacuum tube:

This subclass is indented under subclass 403. Subject matter for testing a device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

406 Plural tubes in the testing circuit:

This subclass is indented under subclass 405. Subject matter having a plurality of vacuum tubes connected in the testing circuit during the testing operation.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclass 130 for miscellaneous plural load device systems having means to indicate a condition affecting the operation of one or more of the lamps and/or discharge devices; and subclasses 312+ and the subclasses specified in the notes to the definitions of these subclasses for miscellaneous systems for supplying electric energy to a plurality of lamps and/or discharge devices.

407 Testing circuit for diverse-type tube:

This subclass is indented under subclass 405. Subject matter wherein the testing system or apparatus is provided with means so that two or more types of vacuum tubes may be tested by the same apparatus or system.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 178+ and the subclasses specified in the notes to the definitions of these subclasses for miscellaneous systems for operating a plurality of diverse-type load devices.

408 Circuit for making diverse test:

This subclass is indented under subclass 405. Subject matter wherein the testing circuit or apparatus is designed to test a plurality of different characteristics of conditions of vacuum tubes under examination.

(1) Note. Making a plurality of tests for short circuits between different electrodes is considered to be plural diverse testing for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

407, wherein the method, apparatus, or testing circuit is designed for use with vacuum tubes of different types.

409 Testing discharge space characteristic (e.g., emission):

This subclass is indented under subclass 405. Subject matter wherein the testing circuit or apparatus is designed to test the condition between two or more of the discharge electrodes of an electric discharge device, or is designed to test the characteristics of the interelectrode discharge space of a discharge device.

(1) Note. These subclasses including testing for short circuits between the electrodes of the discharge device and also deriving an operating characteristic of the discharge device such as the mutual conductance, amplification factor, etc. The testing of the impedance characteristic between one pair of electrodes is not deemed diverse type testing merely because that characteristic may be either normal or abnormal though short circuiting.

SEE OR SEARCH THIS CLASS, SUBCLASS:

408, for apparatus, systems, and methods for making a plurality of different tests.

410 With application of current or potential to the discharge control means:

This subclass is indented under subclass 409. Subject matter wherein the circuit used in making the test includes means to impress current or potential upon the discharge control means of a vacuum tube.

411 Pulsating or alternating current or potential for the discharge control means:

This subclass is indented under subclass 410. Subject matter wherein the current or potential impressed upon the discharge control means is pulsating or alternating current or potential.

412 Pulsating or alternating current for the anode:

This subclass is indented under subclass 411. Subject matter wherein the circuit used in making the test includes means to impress pulsating or alternating current or potential upon the anode of the vacuum tube.

413 Shock testing:

This subclass is indented under subclass 405. Subject matter in which the internal components of the vacuum tube are tested for mechanical vibration by striking the tube envelope with a hammer element.

414 Electric lamp:

This subclass is indented under subclass 403. Subject matter for testing a device which converts electrical energy into visible light or ultraviolet light.

415 ELECTROMECHANICAL SWITCHING DEVICE:

This subclass is indented under the class definition. Subject matter relating to the testing of operational characteristics of electromechanical devices which open and close or change the connection of a circuit.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 635+ for monitoring the condition of electrical apparatus.

416 Voltage regulator:

This subclass is indented under subclass 415. Subject matter which includes determining the electrical properties of an electromechanical device which maintains a load voltage nearly constant over a range of variations of input voltage and load current.

417 Thermostat switch:

This subclass is indented under subclass 415. Subject matter wherein the device under test consists of a temperature responsive circuit element which transforms temperature change to a change in the open or closed state of mating electrical contact surfaces.

418 Relay:
This subclass is indented under subclass 415. Subject matter wherein the device under test consists of a switch contact member actuated by an electromagnet acting against a spring biased member to open or close switch contact surfaces.

419 Reed switch:
This subclass is indented under subclass 418. Subject matter in which the relay to be tested is of the reed switch type.

420 To evaluate contact chatter:
This subclass is indented under subclass 418. Subject matter wherein the resonant frequency at which the relay contact surfaces make and break a circuit is determined.

421 To evaluate contact resistance:
This subclass is indented under subclass 418. Subject matter in which the magnitude of resistance to current flow across mating contact surfaces is determined.

422 To evaluate contact sequence of operation:
This subclass is indented under subclass 418. Subject matter in which the order of make and break operation of plural contacts is determined.

423 To evaluate contact response time:
This subclass is indented under subclass 418. Subject matter in which the rate of time resulting from contact separation as well as closure is determined.

424 Circuit breaker:
This subclass is indented under subclass 415. Subject matter in which the electrical properties inherent to contacts separating in a high voltage-high current circuit are determined.

425 ELECTROLYTE PROPERTIES:
This subclass is indented under the class definition. Subject matter for testing the electrolyte of electrolytic devices, or having electrolytic means for performing the testing to determine specific electrical properties of the electrolyte.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 400+ as the residual home for apparatus used for electrolytic analysis or testing, per se.
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 775+ as the residual home for a process of electrolyltic analysis or testing, per se.

426 Using a battery testing device:
This subclass is indented under subclass 425. Subject matter in which the testing device used is specifically designed to test the condition of or properties of a battery.

(1) Note. This subclass contains, for example, means for testing the conditions of dry cells by means which measure terminal voltage under load.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76+, for electric meters, per se, such as voltmeters which can be utilized to measure battery voltage. Note especially subclass 145.

SEE OR SEARCH CLASS:
320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclass for an indicator for a battery condition in combination with a battery or capacitor charging or discharging circuit.
340, Communications: Electrical, subclasses 636.1 through 636.21 for means for permanently indicating the condition of a battery.
429, Chemistry: Electrical Current Producing Apparatus, Product and Process, subclasses 90+ for testing and indicating where specific battery structure is claimed.

427 To determine ampere-hour charge capacity:
This subclass is indented under subclass 426. Subject matter in which the charge capacity of a battery is determined by external electrical measurement.

428 Including an integrating device:
This subclass is indented under subclass 427. Subject matter in which a charge accumulating or counting device is connected to the battery terminals in order to show the amount of remaining battery charge.

429 To determine load/no-load voltage:
This subclass is indented under subclass 426. Subject matter in which battery condition is determined by terminal voltage measurement with and without a connected load.

430 To determine internal battery impedance:
This subclass is indented under subclass 426. Subject matter with circuitry connected to the battery for the purpose of measuring internal battery impedance.

431 With temperature compensation of measured condition:
This subclass is indented under subclass 426. Subject matter in which a measurement of battery capacity is made under varied temperature conditions.

432 To determine battery electrolyte condition:
This subclass is indented under subclass 426. Subject matter involving an electrical conductivity measurement of a battery electrolyte directly to determine a battery state of charge.

433 To compare battery voltage with a reference voltage:
This subclass is indented under subclass 426. Subject matter for comparing a test battery terminal voltage with a reference voltage in an electrical circuit and determining battery condition as a result of the comparison.

434 To determine plural cell condition:
This subclass is indented under subclass 426. Subject matter including electrical connection to the individual cells of a battery for status determination of each cell and resultant subsequent determination of the battery condition.

435 Having particular meter scale or indicator:
This subclass is indented under subclass 426. Subject matter having an electrical measuring instrument face, scale, or indicator of particular interest.

436 Including oscillator in measurement circuit:
This subclass is indented under subclass 426. Subject matter in which an oscillator connected to a battery to be measured provides an output signal corresponding to battery condition.

437 Including probe structure:
This subclass is indented under subclass 426. Subject matter including the structural connector which makes contact with a battery to be tested.

438 Using a pH determining device:
This subclass is indented under subclass 425. Subject matter using a device designed to determine the hydrogen ion concentration of an electrolyte.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 242+ for pH cells, per se.
436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for this subject matter involving a chemical reaction, such as, for example, tests in which an electrolytic determination is made subsequent to a chemical reaction.

439 Using a conductivity determining device:
This subclass is indented under subclass 425. Subject matter using a device designed to determine the conductivity of an electrolyte.

440 Which includes a dropping mercury cell:
This subclass is indented under subclass 439. Subject matter wherein voltage is applied to a reference electrode and a mercury drop electrode immersed in an electrolyte, whereby the oxidation or reduction at the mercury drop electrode alters the passage of current through the electrode thereby providing an indication of the conductivity of the electrolyte at that voltage.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 219+ for movable liquid electrode cells, per se.

441 Which includes a temperature responsive element:
This subclass is indented under subclass 439. Subject matter in which conductivity measurement is made under temperature compensated conditions.

442 Which includes an oscillator:
This subclass is indented under subclass 439. Subject matter including the passage of alternating current generated by an oscillator through the electrolyte in which resultant current flow is a measure of electrolyte conductivity.

443 Having a bridge circuit:
This subclass is indented under subclass 439. Subject matter including a conductivity cell under test as the arm of a bridge circuit.

444 Which includes current and voltage electrodes:
This subclass is indented under subclass 439. Subject matter including separate pairs of electrodes in which one pair supplies current to an electrolyte and another pair provides a voltage to be measured thereacross.

445 Having inductance probe structure:
This subclass is indented under subclass 439. Subject matter in which an electrolyte provides a mutual inductance medium path between the transmitter and receiver coils of a probe element.

446 Having conductance probe structure:
This subclass is indented under subclass 439. Subject matter in which conductance probe element is of particular interest.

447 With movable or adjustable electrode:
This subclass is indented under subclass 446. Subject matter including movement or adjustment of probe electrodes with respect to one another.

448 With concentric electrodes:
This subclass is indented under subclass 446. Subject matter having probe electrodes positioned concentrically with respect to one another.

449 With axially arranged electrodes:
This subclass is indented under subclass 446. Subject matter having probe electrodes positioned axially with respect to one another.

450 Which includes particular cell container structure:
This subclass is indented under subclass 439. Subject matter in which the cell container structure is of particular interest.

451 A MATERIAL PROPERTY USING THERMOELECTRIC PHENOMENON:
This subclass is indented under the class definition. Subject matter wherein an electromotive force is generated by a temperature difference between the junctions in a circuit composed of two homogeneous electrical conductors of dissimilar compositions; or in a nonhomogeneous conductor, an electromotive force is produced by a temperature gradient in a nonhomogeneous region and used to identify the different types of materials forming the junctions or to measure properties of these materials.

(1) Note. This thermoelectric effect is often referred to as the Seebeck effect.

(2) Note. The material under test forms an integral part of the thermoelectric junction across which the electromotive force is generated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
106, for measuring electricity, per se, having means whose temperature is varied in accordance with the electricity being measured.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 179+ for a thermometer having a thermoelectric sensor.

452 A MATERIAL PROPERTY USING ELECTROSTATIC PHENOMENON:
This subclass is indented under the class definition. Subject matter wherein electrostatic charges are placed upon the material under test and monitored to determine some property of the material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
109, for using electrostatic attraction or repulsion for measuring electricity, per se, rather than a material property.

453 In a liquid:
This subclass is indented under subclass 452. Subject matter wherein the charged material is either a liquid or a material being carried along by a liquid.

(1) Note. If the charged material is a gas, vapor, smoke, or particle in the latter environment it is classified with the subject matter under ionization. Only charged material in a liquid is found here.

454 Frictionally induced:
This subclass is indented under subclass 452. Subject matter wherein an electrostatic charge is placed upon the material by the mechanical separation of electrical charges of opposite sign by processes such as sliding or rubbing dissimilar objects, and the charge is then monitored as a measure of the material property.

455 Corona induced:
This subclass is indented under subclass 452. Subject matter wherein the electrostatic charge is placed upon the material by corona discharge.

456 For flaw detection:
This subclass is indented under subclass 452. Subject matter wherein electrostatically charged particles are placed upon the test material and collect at flaw locations to indicate the position of the flaw.

SEE OR SEARCH THIS CLASS, SUBCLASS:
216, for magnetic particle flaw detection.

SEE OR SEARCH CLASS:
250, Radiant Energy, for flaw testing using fluorescent or luminescent materials.

457 ELECTROSTATIC FIELD:
This subclass is indented under the class definition. Subject matter for measuring the strength of the vector force field set up in the vicinity of nonmoving electrical charges.

(1) Note. The instruments used for measuring an electrostatic field are called electrometers and this subclass is the generic location for such instruments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
72, for testing potential in a specific environment using electrometers wherein the environment is a significant factor in the measurement.
109, for electrostatic attraction or repulsion measurement of electricity, per se.

458 Using modulation-type electrometer:
This subclass is indented under subclass 457. Subject matter wherein the electrostatic phenomenon being monitored is modulated by movement of one of the elements of the electometer to thereby generate an alternating current signal proportional to the phenomenon being measured.

(1) Note. As an example, this measurement can be in the form of a rotating vane cutting the electrostatic field or a plate moving toward and away from the field.

459 USING IONIZATION EFFECTS:
This subclass is indented under the class definition. Subject matter wherein a medium is ionized and the ionized medium is used to measure or monitor a property or condition distinct from the cause of the ionization.

(1) Note. The patents here are measuring a property or condition separate or distinct from the ionized medium itself.

(2) Note. Where the pressure of the ionized medium or its constituents or properties itself are being monitored, it will be found in one of the indented subclasses.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 306+ for using charged particles to inspect sol-

ids or liquids; also, subclasses 374+ for sensing invisible radiation, per se, which causes ionization. The ionization is a measure of the ionizing radiation. Testing for other than radiation, by ionizing means, is classified here.

315, Electric Lamp and Discharge Devices: Systems, for discharge devices, per se, which depend upon ionization for its operation. See subclasses 129+ for indicating some condition of a load device such as a discharge tube.

340, Communications: Electrical, subclass 579 for systems for detecting flame by ionization means; subclass 600 for systems for detecting radiant energy; and subclass 629 for systems for detecting smoke using ionization means.

460 For monitoring pressure:
This subclass is indented under subclass 459. Subject matter wherein the pressure within an area is monitored by ionizing the gas or vapor therein and then analyzing the ionization.

(1) Note. The gas or vapor may be ionized by application of a radio frequency field to the area and the glow discharge then analyzed. The color of the glow is an indication of pressure.

(2) Note. The discharge characteristics, i.e., voltage or current can also be measured as an indication of pressure.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 384 for atmospheric pressure measurement not involving ionization; also subclasses 700+ for fluid pressure measurement not involving ionization.

461 Using a radioactive substance:
This subclass is indented under subclass 460. Subject matter wherein a radioactive material is used to ionize the gas or vapor in the environment wherein the pressure is being measured.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclass 600 for systems for detecting radiant energy.

462 Using thermionic emissions:
This subclass is indented under subclass 460. Subject matter wherein a heated element emits electrons which collide with and ionize the gas or vapor in the environment wherein the pressure is being monitored.

(1) Note. The collision produces positive ions, which are collected. The rate of formation of ions is approximately proportional to gas pressure.

463 Using a magnetic field:
This subclass is indented under subclass 460. Subject matter wherein a magnetic field is used with an ionizing electron source to cause the electrons to flow in a longer path.

(1) Note. This longer path increases the probability of ionizing collisions.

(2) Note. The magnetic field here is not used to ionize the gas. The field can be alternating current or direct current and can originate from an electromagnet or permanent magnet.

464 For analysis of gas, vapor, or particles of matter:
This subclass is indented under subclass 459. Subject matter wherein a gas, vapor, or particles of matter to be monitored are ionized and the ionized material is then monitored to determine properties of the material itself.

(1) Note. The discharge properties of a gas, vapor, etc., can be monitored, i.e., current and voltage. Also, the glow of the discharge can be used to indicate the properties of the test material.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclass 232 for gas analysis wherein a chemical reaction is involved.

73, Measuring and Testing, subclasses 19+ for gas analysis wherein the gas is not ionized as part of the analysis.

250, Radiant Energy, appropriate subclasses for similar subject matter specifically provided for therein.

340, Communications: Electrical, subclass 629 for ionization gas detectors wherein the indication is in the form of an alarm. If the indication is nonquantitative, i.e., alarm, classification is in Class 340. If indication is quantitative (except for smoke detectors as noted above in Class 250) or there is a combination of quantitative and nonquantitative indicators, classification is in Class 324.

465 Using electronegative gas sensor:
This subclass is indented under subclass 464. Subject matter wherein a gas whose molecules exhibit electron affinity or an ability to pick up free electrons and form negative ions, is sensed.

(1) Note. These types of sensors normally utilize an ionization source to ionize a carrier gas in which the electronegative gas is present.

(2) Note. These devices are often called electron capture detectors.

(3) Note. Some examples of electronegative gases are O_2, HCL, SO_2, $C1_2$ and nonflammable fluorocarbons gas.

466 Using a filter:
This subclass is indented under subclass 464. Subject matter wherein a filter or membrane is used, which passes only the gas, vapor, etc., which is to be tested, to the ionization chamber where it is ionized and analyzed.

467 Using test material desorption:
This subclass is indented under subclass 464. Subject matter wherein the material to be monitored is placed upon a filament which is heated until the material evaporates (desorbs) forming ions which are then analyzed.

468 Using thermal ionization:
This subclass is indented under subclass 464. Subject matter wherein the gas, vapor, etc., to be monitored contacts a heated positive electrode causing positive ion emission, which ions are then collected for analysis by a negative electrode spaced from the heated positive electrode.

(1) Note. The mechanism here differs from thermionic emission ionization below since ionization is not caused by electron collision.

469 Using a radioactive substance:
This subclass is indented under subclass 464. Subject matter wherein a radioactive material is used to ionize the gas, vapor, etc., to be analyzed.

470 Using thermionic emission:
This subclass is indented under subclass 464. Subject matter wherein a heated element emits electrons which ionize the gas, vapor, etc., to be analyzed.

500 FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC COMPONENTS:
This subclass is indented under the class definition. Subject matter including means for testing for the existence, or location, of an electrical defect by providing a quantitative or nonquantitative output.

(1) Note. The indented subclasses under this subclass have three main sections: (I) Special types of fault testing circuits and instruments; (II) Circuits and instruments for locating faults; (III) Circuits and instruments for testing electric elements for faults.

(2) Note. This subclass includes fault detecting circuits and fault detecting instruments.

(3) Note. The instruments are classified with the type of test, or the element tested, if a particular subclass exists.

(4) Note. This subclass includes the following faults: (A) Ground Fault - where defective insulation causes an electrical conductor to leak current to ground; (B) Short Circuit - where defective insulation causes two electrical conductors to come in contact unintentionally; (C) Open Circuit - where a electrical conductor breaks.

(5) Note. If the fault detecting circuit produces a quantitative output indication, it is included in this subclass.

(6) Note. If the fault detecting circuit produces a nonquantitative output indication and it is temporarily connected to the object under test, it is included in this subclass.

(7) Note. If the fault detecting circuit produces a nonquantitative output indication and it is permanently connected to the object under test, it is not included in this subclass. For this, see the search note below.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 500+ for fault detecting circuit that produces a nonquantitative output indication permanently connected to the object under test; subclasses 635+ for determining the condition of electrical apparatus where a fault testing circuit produces a nonquantitative output and the test circuit is permanently connected to the apparatus under test.

361, Electricity: Electrical Systems and Devices, subclasses 23+ for safety and protection of systems and devices which include fault sensing combined with control.

501 Using radiant energy:

This subclass is indented under subclass 500. Subject matter wherein some form of radiant energy, e.g., electron beam, light, etc., is used to test the continuity of a conductor line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

71.3, for using a beam of atomic particles to determine nonelectric properties by measuring electric properties.

133, for nonquantitative indication, e.g., polarity testers and “hot line” indicators.

502 In an ignitor or detonator:

This subclass is indented under subclass 500. Subject matter wherein a test is made to check the ability of a circuit, or component thereof to fire an explosive device.

(1) Note. The test could relate to a switch for a blasting device, primer for electrically fired ammunition, ignition circuit of rocket motors, continuity testing of explosive igniting circuits, etc.

503 In vehicle wiring:

This subclass is indented under subclass 500. Subject matter to determine the presence of faults located in vehicle circuits.

(1) Note. This subclass includes, for example, testers for determining whether a short exists in the lighting circuit of an automobile.

(2) Note. This subclass does not include the testing of ignition systems or devices in vehicle internal combustion engines. Also, this subclass does not include the testing of vehicle generating systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

158, for testing vehicle generating systems.

378+, for testing vehicle ignition systems.

504 With trailer:

This subclass is indented under subclass 503. Subject matter for testing the operability of various lighting and signal circuits located on trailers.

505 Combined with window glass:

This subclass is indented under subclass 503. Subject matter for testing the continuity of electrical conductors embedded in a glass sheet, deposited on a glass sheet, or laminated between a pair of glass sheets.

(1) Note. This subclass includes, for example, the testing for discontinuities in resistive heating strips supported on rear windows of motor vehicles and antenna wires located in vehicle windshields.

506 Combined with a flashlight:
This subclass is indented under subclass 500. Subject matter where a flashlight is modified to include an electric tester.

507 With fuse testing attachment:
This subclass is indented under subclass 506. Subject matter where a flashlight is modified to include an adapter for testing continuity in fuses.

508 With electric power receptacle for line wire testing:
This subclass is indented under subclass 500. Subject matter where a tester is adapted to be inserted into an electric outlet socket or receptacle for testing the electrical circuits connected to the electrical receptacle.

(1) Note. This subclass includes, for example, means for determining if a receptacle is wired correctly, the quality of a ground, continuity, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
509, for ground faults.
541, for insulation fault in a multiconductor cable.
544, for insulation fault in a single conductor cable.
551, for insulation fault.

509 Of ground fault indication:
This subclass is indented under subclass 500. Subject matter for detecting an unintentional electrical path where defective insulation causes an electrical conductor to leak current to ground.

SEE OR SEARCH THIS CLASS, SUBCLASS:
508, for determining a ground fault in a line wire connected to a receptacle.
541, for insulation fault in a multiconductor cable.
544, for insulation fault in a single conductor cable.
551, for insulation fault.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 42+ for ground fault protection control circuits, and subclass 170 for relay circuits responsive to external conditions.

510 Of electrically operated apparatus (power tool, appliance, machine, etc.):
This subclass is indented under subclass 509. Subject matter for detecting an undesirable current leakage between an ungrounded and grounded part of equipment normally caused by defective insulation.

(1) Note. The object under test could be an electric circuit, or a portable device, where detection is limited to a ground fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
511, for electrical faults, other than a ground fault, or other faults in addition to a ground fault, in an electrically operated power tool, appliance, machine, equipment, etc.

511 Of electrically operated apparatus (power tool, appliance, machine, etc.):
This subclass is indented under subclass 500. Subject matter for testing the condition of electric power tools, appliances, machines, equipment, etc., for safe use with respect to proper grounding, shorts or continuity.

(1) Note. This subclass is distinguishable from subclass 510 in that it includes faults, other than a ground fault, or it can include the faults along with a ground fault.

512 For fault location:
This subclass is indented under subclass 500. Subject matter where a signal produced indicates either direction or distance to a fault.

(1) Note. Subclasses, which are indented under fault location, distinguish from the main sections preceding and subsequent thereto in that here, under the fault location section, a determination is made as

to where the fault is located as opposed to whether or not a fault exists.

(2) Note. The indented subclasses under this subclass include a circuit or an instrument for determining the location of a defect.

SEE OR SEARCH CLASS:
379, Telephonic Communications, subclass 175.3, for locating faults in telephone lines.

513 Where components moves while under test:
This subclass is indented under subclass 512. Subject matter where component under test is moved linearly, or by stressing, bending, rotating, jarring, vibrating, flexing, etc., while under test.

(1) Note. This subclass includes for example, a cable under test passing a stationary sensing electrode, which locates a fault in the cable, as a cable is wound on a takeup reel.

514 By exposing component to liquid or gas while under test:
This subclass is indented under subclass 513. Subject matter where the component under test is immersed, passes through, or contacts a liquid or gas while a test is being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:
547, for transformer testing.
553, for insulating oil testing.
557, testing for insulation fault of a noncircuit element.

515 Using a particular sensing electrode:
This subclass is indented under subclass 513. Subject matter where details of the sensing electrode are significant.

SEE OR SEARCH THIS CLASS, SUBCLASS:
529, for magnetic field sensor structure.
530, for electric field sensor structure.

516 Metal chain:
This subclass is indented under subclass 515. Subject matter where the sensing electrode comprises flexible linked elements which contact the moving component under test.

517 Wire bristles:
This subclass is indented under subclass 515. Subject matter where the sensing electrode comprises stiff flexible spring wire elements which contact the moving component under test.

518 Metal pellets or beads:
This subclass is indented under subclass 515. Subject matter where the sensing electrode comprises metal spheres which contact the moving component under test.

519 By capacitance measuring:
This subclass is indented under subclass 512. Subject matter where a capacitance related signal is used to locate a break, ground or short in a conductor.

520 By frequency sensitive or responsive detection:
This subclass is indented under subclass 512. Subject matter where a frequency related signal is used to locate a break, ground, or short in a conductor.

521 By phase sensitive or responsive detection:
This subclass is indented under subclass 512. Subject matter where a phase related signal is used to locate a break, ground, or short in a conductor.

522 By voltage or current measuring:
This subclass is indented under subclass 512. Subject matter where a fault causes a change or abnormality of a normal condition to produce a voltage drop or a current surge etc., which is detected to locate the fault.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 56, 57, 65, 91.1+, and 93.1+ for safety and protection of systems and devices which include voltage and current responsive fault sensors. Subclass 187 for voltage or

current level condition responsive relay control circuits.

523 Of an applied test signal:
This subclass is indented under subclass 522. Subject matter where a measured fault signal is derived from the voltage or current of a applied test signal to indicate the location of the fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
527+, for applying a test signal where means other than voltage or current are measured to locate a fault.

524 Polarity responsive:
This subclass is indented under subclass 522. Subject matter where direction or distance to a fault is determined by a positive or negative signal.

525 By resistance or impedance measuring:
This subclass is indented under subclass 512. Subject matter where measured resistance or impedance value indicate the location of a fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57+, for impedance measuring and testing.
62, for resistance measuring.

526 Using a bridge circuit:
This subclass is indented under subclass 525. Subject matter where resistance values are evaluated by a circuit which compares the resistance values to locate a fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
Dig. 1, for bridge circuits.

527 By applying a test signal:
This subclass is indented under subclass 512. Subject matter where a test signal is applied to the conductor under test to locate the fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
523, for measuring the current or voltage of an applied test signal to locate a fault.

528 Tracing test signal of fault location:
This subclass is indented under subclass 527. Subject matter where an applied test signal undergoes a change at the location of the fault.

529 Using a magnetic field sensor:
This subclass is indented under subclass 528. Subject matter where a search or exploring coil responds to a magnetic field produced by the applied test signal to determine fault location.

SEE OR SEARCH THIS CLASS, SUBCLASS:
200+, for magnetic testing.

SEE OR SEARCH CLASS:
361, Electrical Systems and Devices, subclass 93.6 for abnormal current condition protection including transformer sensor.

530 Using an electric field sensor:
This subclass is indented under subclass 528. Subject matter where a capacitive pickup device for probe responds to an electric field produced by the applied test signal to determine fault location.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60, for capacitance measuring.
61, for capacitance measuring to determine a nonelectric property.

531 At fault site:
This subclass is indented under subclass 527. Subject matter where the applied test signal causes, creates, or produces a fault signal at or near the fault site.

532 Using time measuring:
This subclass is indented under subclass 527. Subject matter where the applied test signal is evaluated as to time to indicate the location of a fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
535, where the defect produces a fault signal which is evaluated as to time to indicate fault location.

533 Of reflected test signal:
This subclass is indented under subclass 532. Subject matter where the defect causes the applied test signal to be reflected and the reflected signal is evaluated as to time to determine the location of the fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
534, for reflection evaluation techniques which do use an applied test signal.

534 By reflection technique:
This subclass is indented under subclass 512. Subject matter where the defect causes, creates, or produces a fault signal which is reflected and evaluated to indicate the location of the fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
533, for an evaluation of a reflected applied test signal to indicate fault location.

535 By time measuring:
This subclass is indented under subclass 512. Subject matter where a defect produces a fault signal which is evaluated as to time to indicate the location of the fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
532, for an evaluation of the time of an applied test signal to indicate fault location.

536 By spark or arc discharge:
This subclass is indented under subclass 512. Subject matter where a defect causes a voltage breakdown at a void or discontinuity to indicate the location of a fault.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514, where a component is tested while exposed to a liquid or a gas.
530, where an electric field sensor is used to locate a fault.

537 Of individual circuit component or element:
This subclass is indented under subclass 500. Subject matter relating to the detection of the presence or absence of a defect in an electric component, or element, by giving a nonquantitative indication thereof.

(1) Note. This subclass includes a circuit, or an instrument, which is used to test the particular component or element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71, for testing semiconductors for a nonelectrical property.
378+, for testing internal combustion engine ignition testing.
403+, for testing lamp or discharge devices.
415+, for testing switching devices.
425+, for battery testing.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 635+ for monitoring the condition of electric components and elements.

538 Electrical connectors:
This subclass is indented under subclass 537. Subject matter for detecting open and closed circuit conditions in an electrical apparatus and the correctness of inner circuit connections in multi-connection devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:
66, for determining the location of a particular conductor or for identifying a particular conductor out of many.
415+, for the testing of operational characteristics of electro-mechanical devices which open and close or change the connections of a circuit.

SEE OR SEARCH CLASS:
439, Electrical Connectors, appropriate subclasses for structural details of electrical connectors.

539 Multiconductor cable:
This subclass is indented under subclass 537. Subject matter wherein an assembly of more than one conductor is tested to determine if the

conductors are continuous, grounded or shorted by giving a nonquantitative indication.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513, where the conductors move while under test.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 651 for testing the condition of plural circuit conductors.

540 With sequencer:
This subclass is indented under subclass 539. Subject matter where a mechanical or electrical device is included which tests one cable after another for a defect.

SEE OR SEARCH THIS CLASS, SUBCLASS:
73, for making a plurality of tests automatically.

541 For insulation fault:
This subclass is indented under subclass 539. Subject matter for checking a defect in a nonconductive material which separate one conductor from another and causes an unintentional electrical path between two conductors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
509+, where an insulation failure in a circuit causes an unintentional current leakage to ground.
544, for an insulation defect in a single conductor.
551+, for detecting the presence of a defect in a nonconductive material used in an electric circuit or component in general.
557+, for detecting defects in insulating material not used in an electric circuit or component.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 647 and 651 for testing the condition of insulation.

542 Having a light or sound indicator:
This subclass is indented under subclass 539. Subject matter where a visual or audible device makes information available to a human concerning the existence of a defect in a multiconductor cable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
503+, for testers having light or sound indicators.
538, for electrical connectors having light indicators.
540, for multiconductor cable testers having light indicators.
556, for fault testing instruments and devices having lamp or light indicators.

543 Single conductor cable:
This subclass is indented under subclass 537. Subject matter which includes a solid conductor, or stranded group of solid cylindrical conductors, having a low resistance to flow, together with any insulation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513+, where a conductor si in motion while under test.

544 For insulation fault:
This subclass is indented under subclass 543. Subject matter for checking a defect in a nonconductive material which separates the conductor from an unintentional electrical path to ground.

SEE OR SEARCH THIS CLASS, SUBCLASS:
509+, where an insulation failure in a circuit causes an unintentional current leakage to ground.
541, for an insulation fault in a multiconductor cable.
551+, for detecting a defect in a nonconductive material used in an electric circuit or component in general.
557+, for detecting defects in insulating material not used in an electric circuit or component.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 647 for testing the condition of insulation.

545 Armature or rotor:
This subclass is indented under subclass 537. Subject matter for testing the rotating part of a generator or motor.

(1) Note. This subclass does not include the testing of an assembled motor or generator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
772, for motor generator testing.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 648 for testing the condition of a motor.

546 Winding or coil:
This subclass is indented under subclass 537. Subject matter for testing a number of turns of wire wound around an iron core or onto a form made of insulating material, or one which is self supporting.

SEE OR SEARCH THIS CLASS, SUBCLASS:
59, for measuring inductive reactance quantitatively.
200+, for magnetic field testing.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 646 for testing the condition of a transformer.

547 Transformer:
This subclass is indented under subclass 546. Subject matter for checking a defect in a component of an electrical device, which transfers electric energy from one winding to another by electromagnetic induction, and gives a "go-no-go" type of indication.

(1) Note. This subclass includes, for example, the checking for excessive surge characteristics such as voltage, impulse produced failures, faults in insulation of windings, failure of insulating liquid, corone discharges, excessive moisture content of insulation, etc.

(2) Note. This subclass does not include the testing of transformer properties, e.g., the ratio of windings.

SEE OR SEARCH THIS CLASS, SUBCLASS:
55, for testing transformer properties.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 646 for checking the condition of a transformer.

548 Capacitor:
This subclass is indented under subclass 537. Subject matter for checking the condition of a circuit element, consisting of at least two conducting surfaces separated by an insulator, and giving a "go-no-go" type of indication or checking the condition of any part thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60, for measuring capacitance quantitatively.
509, where an insulation failure in a circuit causes an unintentional leakage to ground.
541, for insulation fault in a multiconductor cable.
544, for an insulation defect in a single conductor.
551, for detecting a defect in a nonconducting material used in an electric circuit or component in general.
557+, for detecting defects in insulating material not used in an electric circuit or component.

549 Resistor:
This subclass is indented under subclass 537. Subject matter for checking the condition of a circuit element, which is designed to offer a predetermined opposition to current flow, by giving a "go-no-go" type of indication.

SEE OR SEARCH THIS CLASS, SUBCLASS:
62, for measuring resistance or conductance quantitatively.

550 Fuse:
This subclass is indented under subclass 537. Subject matter for checking the condition of a circuit protective element designed to open the circuit when current exceeds a rated value, by giving a "go-no-go" indication.

SEE OR SEARCH THIS CLASS, SUBCLASS:
507, for flashlights with fuse testing attachments.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 638 for detecting the condition of a fuse or circuit breaker.

551 Insulation:
This subclass is indented under subclass 537. Subject matter for checking a defect in a nonconductive material which separates the conductor from an unintentional electrical path between another conductor or ground.

SEE OR SEARCH THIS CLASS, SUBCLASS:
509+, for ground fault indication.
541, for insulating fault in a multiconductor cable.
544, for insulation fault in a single conductor.
548, for insulator faults in a capacitor.
557+, for detecting faults in insulating material not used in an electric circuit or component.

SEE OR SEARCH CLASS:
340, Communications: Electric, subclass 647 for checking the condition insulation.

552 Bushing:
This subclass is indented under subclass 551. Subject matter where the insulation qualities of an insulating element which electrically isolates, and is generally used to support, a conductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
557, for insulation fault of a noncircuit element.

553 Oil:
This subclass is indented under subclass 551. Subject matter wherein the insulating qualities of an oil used in electrical equipment is tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
547, for transformers where insulating oils are used.
548, for capacitors where insulating oils are used.

554 Sheet material:
This subclass is indented under subclass 551. Subject matter where sheets of insulating material used for electric circuits and in electric components are tested for insulation qualities.

SEE OR SEARCH THIS CLASS, SUBCLASS:
548, for capacitor which use insulating sheet material as a dielectric.
557+, for testing qualities of insulating materials in general.

555 Instruments and devices for fault testing:
This subclass is indented under subclass 500. Subject matter relating to apparatus and circuits for detecting defects in electric circuits or electric components.

(1) Note. If the apparatus is specifically designed for a special application, for example, testing vehicle wiring, or for further example, testing a particular component, such as an armature, the special application and particular component test take priority for classification purposes.

556 Having a lamp or light indicator:
This subclass is indented under subclass 555. Subject matter where the apparatus includes a visual indicator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
503+, for testers having light or sound indicators.
538, for electrical connectors having light indicators.
540, for multiconductor cable testers having light indicators.

542, for multicable conductor having light or sound indicators.

557 FOR INSULATION FAULT OF NONCIRCUIT ELEMENT:
This subclass is indented under the class definition. Subject matter where a defect in the insulation of a noncircuit element is determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
509+, for a ground fault.
541, for an insulation fault in a multiconductor.
544, for an insulation fault in a single conductor cable.
551+, for an insulation fault in general.

558 Where element moves while under test:
This subclass is indented under subclass 557. Subject matter where the noncircuit element under test moves while under test.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513+, where a circuit component moves while under test.

559 Where a moving sensing electrode scans a stationary element under test:
This subclass is indented under subclass 557. Subject matter where a moving sensing electrode scans a stationary noncircuit element under test.

600 IMPEDANCE, ADMITTANCE OR OTHER QUANTITIES REPRESENTATIVE OF ELECTRICAL STIMULUS/ RESPONSE RELATIONSHIPS:
This subclass is indented under the class definition. Subject matter wherein the measurement or test means determines a property (parameter) defined by (1) the flow, storage or change of current value in a circuit or substance; or (2) the relationship between two or more electrical values in a circuit or substance.

(1) Note. The parameter represents typically the relationship between a stimulus and its response, and it usually is a constant at the time of measurement, but may take other values under different circumstances. The stimulus/response relationship frequently indicates the proportionality between two active electrical variable. For instance, a resistance is a ratio between the voltage across and the current along a resistive element. Either the current or the voltage can be the stimulus with the resultant resistance value always equal to the ratio of voltage to current. Other parameters expressable as a ratio are, for instance, the reflection coefficient, a ratio between reflected and incident complex power. Parameters not expressable as a ratio are also covered. For instance, the time lag in a network is a time differential between a signal arrival at the input and its appearance at the output.

(2) Note. The subclass also includes sensing structures and devices when the contribute directly to the extraction of the parameter of interest.

(3) Note. This subclass also includes measurement conditions such as using radiant energy effects, for example heating, in preparation for making the test. For electric heating, see the search note below.

(4) Note. This subclass includes measuring temperature for the purpose of compensating for temperature variations during testing. For generic temperature measurement, see the Search Note below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76+, for measuring and testing relating to the measurement of intangible electrical voltage or current or combinations thereof occurring in a nonspecific environment.
459+, for electrical measuring and testing using ionization effects.

SEE OR SEARCH CLASS:
219, Electric Heating, for electric heating.
374, Thermal Measuring and Testing, for generic temperature measurement.

601 Calibration:
This subclass is indented under subclass 600. Subject matter wherein the measurement or test device is compared with a standard to deter-

mine its accuracy or to establish a corrected scale.

(1) Note. Calibration differs from a measurement in that while being calibrated the testing instrument itself is measured for accuracy which in turn is used to measure some other electrical component, device or object.

(2) Note. Calibration is limited herein to the measurement of instruments used for the subject matter under 600.

SEE OR SEARCH THIS CLASS, SUBCLASS:

74, for calibrating electric meters.

202, for calibration of electrical measuring or testing apparatus used to determine parameters of magnetic circuits or substances.

619, for the measurement of quantities, or parameters relating to selectivity, e.g., tuning.

602 With auxiliary means to condition stimulus/response signals:

This subclass is indented under subclass 600. Subject matter including other than measuring or testing means to prepare or process the stimulus/response signal to influence or improve the quality of the measuring or testing.

(1) Note. This subclass includes means for discriminating, comparing or selecting particular signals or parts of a signal developed from a substance or circuit undergoing measurement or test. Also included are means for stimulating circuits or substances undergoing measurement or test.

603 For excitation:

This subclass is indented under subclass 602. Subject matter wherein the auxiliary means generates a stimulus signal component.

604 Including marker signal generator circuit:

This subclass is indented under subclass 603. Subject matter wherein the auxiliary means includes a circuit which injects one or more pips of specific frequency onto the response curve from the circuit or substance being measured or tested.

605 For response signal evaluation or processing:

This subclass is indented under subclass 602. Subject matter wherein the auxiliary means is used to analyze the parameter being measured or tested.

606 Including a signal comparison circuit:

This subclass is indented under subclass 605. Subject matter wherein the several quantities are matched for the purpose of determining their relative values to evaluate signal correlation, difference or compensation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

647, for a comparison or difference signal evaluation or process is used in the measurement of transmitted or reflected energy distributions.

656, for a comparison or difference signal evaluation or process is used in inductive type measurements.

665, for a comparison or difference signal evaluation process is used in capacitive type measurements for water content of objects.

672, for a comparison or difference signal evaluation or process is used where a material or object forms part of a dielectric characteristic under measurement.

705, for a comparison or difference signal evaluation or process is used in resistive or conductive type measurements.

607 Including a conversion (e.g., A->D or D->A) process:

This subclass is indented under subclass 605. Subject matter wherein an evaluation or process involving the measure and takes place as part of a conversion scheme.

(1) Note. The most common conversions are the A->D and D->A types, but conversions to other forms of signal types are also included, such as pulse width ratio in a dual slope integrator, for example.

SEE OR SEARCH CLASS:
341, Coded Data Generation or Conversion, appropriate subclasses for code converters.

608 Including a ratiometric function:
This subclass is indented under subclass 605. Subject matter wherein the evaluation or process includes a value which represents the ratio of a first signal to a second signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
614, for signal to noise ratio measurements.
645, for standing wave ratio measurements.
653, for determining the value of Q which designates the ratio of reactance of the resistance of an element or circuit.
704, for using a ratio in resistive or conductive type measurements.

609 For sensing:
This subclass is indented under subclass 602. Subject matter including an auxiliary adaptation of the sensing portion of the circuit to improve or influence the quality of the measuring or testing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
715, for sensing involving a particular probing technique in resistive or conductive type measurements.

610 Including a bridge circuit:
This subclass is indented under subclass 609. Subject matter wherein the additional means for sensing includes a bridge circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
648, for bridge circuits used in distributive type measurements.
651, for bridge circuits used in vector analysis.
657, for bridge circuits used in inductance measurements.
666, for bridge circuits used to determine water content with capacitance measurements.
673, for bridge measurements used to determine the dielectric characteristic of a material or object under test.
680, for bridge circuits used in capacitive measurements.
706, for bridge circuits used in resistive or conductive measurements.
725, for miscellaneous bridge circuits.

611 Including a remote type circuit:
This subclass is indented under subclass 609. Subject matter wherein the additional means for sensing operates at a distance from the circuit or substance being measured or tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
669+, for providing compensation in a capacitive measuring circuit which determines water content.
684, for providing compensation for errors in capacitive measuring circuits.
720, for providing compensation for errors in resistive or conductive measuring circuits.

612 Parameter related to the reproduction or fidelity of a signal affected by a circuit under test:
This subclass is indented under subclass 600. Subject matter wherein the parameter relates to the accuracy with which a circuit reproduces at its output the essential characteristics of a signal impressed on its input.

(1) Note. Some instances of parameters relating to signal reproduction or fidelity are: (a) a transfer function characterizing a circuital behavior; (b) the desired or undesired noise characteristics of a network; (c) the effects of poor common mode rejection; (d) the distortion of any type induced by a network; (e) tuning characteristics, etc.

SEE OR SEARCH CLASS:
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 165+ for testing or calibrating radar systems.
455, Telecommunications, subclasses 67.11 through 67.7, 115.1-115.4, 226.1-226.4, and 295 for measuring

or testing telecommunication transmitters or receivers.

613 Noise:
This subclass is indented under subclass 612. Subject matter wherein the evaluated parameter is representative of an unwanted electrical disturbance or a spurious signal in the circuit or substance being measured or tested.

SEE OR SEARCH CLASS:
455, Telecommunications, subclasses 62, 296, and 501 for noise reduction, prevention or elimination systems.

614 Signal to noise ratio or noise figure:
This subclass is indented under subclass 613. Subject matter including means to measure the ratio between a signal reference level and the level of unwanted noise.

(1) Note. Signal to noise ratio and noise figure are usually expressed in DB.

(2) Note. The parameter of interest expresses the amount by which a component, device, or network under test differs from an ideal component, device, or network having no noise.

615 Transfer function type characteristics:
This subclass is indented under subclass 612. Subject matter wherein the parameter tested is based on determining how a circuit responds to input energy at different frequencies.

(1) Note. The relationship is in general expressable as a complex entity (descriptive of multiple quantities), like a matrix, a multidimensional plot or a set of distributions for spectral variables.

(2) Note. Generalized transfer function Network Analyzers are classifiable in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
638, for microwave network analyzers.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 108+ for testing system, particularly subclasses 109+ for transfer function determination.

616 Gain or attenuation:
This subclass is indented under subclass 615. Subject matter wherein the measured or tested parameter is based on the increase or decrease in voltage, current or power when a signal is transmitted from one point to another.

617 Response time or phase delay:
This subclass is indented under subclass 615. Subject matter wherein the transmission characteristic of the signal being evaluated relates to transit time or phase changes.

618 Transient response or transient recovery time (e.g., damping):
This subclass is indented under subclass 615. Subject matter wherein the response of a circuit to an impulse or other instantaneous excitation is measured or tested.

619 Selective type characteristics:
This subclass is indented under subclass 615. Subject matter including measuring or testing characteristics which determine the extent to which the desired signal can be distinguished from disturbances or other signals, e.g., tuning.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 47+ for circuits where an output is present only at a predetermined input signal frequency.

620 Distortion:
This subclass is indented under subclass 612. Subject matter including measuring or testing for undesired changes in the waveform of a signal being evaluated.

(1) Note. Distortion is different from noise in that the effects are in general predictable as opposed to noise, where there is no set pattern.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 551+ for unwanted signal suppression.

455, Telecommunications, subclasses 63.1 through 65 , 295, 296-312, and subclasses 501-506 for distortion prevention or reduction in radio communication systems.

621 Envelope delay:
This subclass is indented under subclass 620. Subject matter including measuring or testing the rate of change of phase shift with respect to frequency.

(1) Note. The departure from a straight line defines the lack of uniformity in the delay for different frequencies.

622 Phase:
This subclass is indented under subclass 620. Subject matter including measuring or testing the lack of phase linearity with respect to other signal variables.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83, for measuring or testing phase comparison in a nonspecific environment.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 1+ for phase discriminating.

623 Harmonic:
This subclass is indented under subclass 620. Subject matter wherein the input signal is sinusoidal and the output signal which is a multiple of the input signal is measured or tested.

624 Intermodulation:
This subclass is indented under subclass 620. Subject matter including measuring or testing nonlinearity, characterized by the appearance of frequencies in the output equal to the sum and differences of integral multiples of the component frequencies present in the input signal.

625 Dissymmetry or asymmetry:
This subclass is indented under subclass 620. Subject matter including measuring or testing a lack of signal fidelity due to imperfect matching of parameter values.

(1) Note. Some examples of dissymmetry include common mode rejection, hybrid directivity, etc.

(2) Note. This does not include distributive lines matching impedance evaluations. Dissymmetry is not necessarily a nonlinearity.

626 Nonlinearity:
This subclass is indented under subclass 620. Subject matter including the measuring or testing of distortion that occurs when the output does not rise and fall in direct in proportion to the input.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 334+ for circuits where the output is a nonlinear function of the input.

627 Shielding effectiveness (SE):
This subclass is indented under subclass 612. Subject matter including measuring or testing the relative reduction of radiated electromagnetic energy levels caused by the use of an enclosure either to contain or exclude the energy.

628 Circuit interference (e.g., crosstalk) measurement:
This subclass is indented under subclass 627. Subject matter for determining the amount of undesired coupling between two conductors in proximate relationship.

SEE OR SEARCH CLASS:
370, Multiplex Communications, subclass 201 for crosstalk suppression in a multiplex communication system.
379, Telephonic Communication, subclasses 22.02 and 27.03 for measurement of crosstalk between two telephone lines or loops by measuring the effect on a line of a tone applied to an adjacent line.

629 Distributive type parameters:
This subclass is indented under subclass 600. Subject matter wherein the measured or tested parameter cannot be taken as being concen-

trated at any one point in the circuit or substance.

630 Plural diverse parameters:
This subclass is indented under subclass 629. Subject matter wherein more than one type of parameter is measured.

631 Using wave polarization (e.g., field rotation):
This subclass is indented under subclass 629. Subject matter wherein the test substance has properties with directional preferences (i.e., anisotropy).

(1) Note. An anisotropic substance is one that exhibits different properties when tested along different directions.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 364+ for analogous testing or measuring using visible radiation.

632 Using particular field coupling type (e.g., fringing field):
This subclass is indented under subclass 629. Subject matter wherein a sensor located in close proximity to a substance under test, produces an electric field which links or couples the substance under test to the sensor.

(1) Note. The substance under test typically influences the propagation characteristics of the testing sensor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
687+, for fringing field coupling type sensing structures in lumped capacitive configurations.
688, for use of a guard electrode to improve sensing.

633 Using resonant frequency:
This subclass is indented under subclass 629. Subject matter including a circuit for measuring the frequency at which a measured substance will respond with maximum amplitude when subject to an external sinusoidal wave of a particular frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
652, for measuring a lumped type resonant circuit parameters.
655, for using a resonant circuit in inductive measurements.
658, for using a tuned or resonant circuit in capacitive measuring circuits.
675, for using a tuned or resonant circuit in capacitive measuring circuits.
708, for using a tuned or resonant circuit in resistive or conductive measuring circuits.

634 To determine water content:
This subclass is indented under subclass 633. Subject matter wherein the analyzed parameter of a substance under resonant test is moisture content.

SEE OR SEARCH THIS CLASS, SUBCLASS:
640, for determining water content by using electric energy transmitted through a substance under test.
643, for determining water content by using electric energy reflected from a substance under test.
658, and 667, for determining moisture content of a substance using a resonant capacitive sensing device or apparatus.
694+, for determining moisture content of a substance using a resistive or conductive type measurement device or apparatus.
696, for resistive probe type structure used to determine water content.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 73+ for moisture control or absorption characteristics of material; and subclasses 29.02+ for hygrometers.
200, Electricity: Circuit Makers and Breakers, subclass 61.04 for liquid responsive switches.
338, Electrical Resistors, subclass 35, for moisture sensing resistors.
340, Communications: Electrical, subclasses 602+ for moisture condition responsive indicating systems.

361, Electricity: Electrical Systems and Devices, subclasses 178 and 286 for humidity responsive circuits and capacitors.

635 To determine dimension (e.g., distance or thickness):
This subclass is indented under subclass 633. Subject matter wherein the size or distance of a substance from a reference point is measured using resonance effects.

SEE OR SEARCH THIS CLASS, SUBCLASS:
644, for measuring a dimension using transmitted or reflected energy distributions.
662, and 671, for dimensional measurement by using capacitive-type measurements.
699, for using conductivity effects to determine the dimensional characteristics of an object.
716, for dimensional measurement by using resistive or conductive type measurements.

636 With a resonant cavity:
This subclass is indented under subclass 633. Subject matter including a resonant circuit type wherein current is distributed on an inner surface of a closed chamber.

637 Using transmitted or reflected microwaves:
This subclass is indented under subclass 629. Subject matter wherein distributive type parameters associated with an object or substance are measured or tested using transmitted or returned microwaves.

(1) Note. See Class 250, Radiant Energy, for microwave absorption wave meters for measuring microwave power, per se.

SEE OR SEARCH CLASS:
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), for object detection, distance or direction using transmitted or reflected radio waves.

638 Scattering type parameters (e.g., complex reflection coefficient):
This subclass is indented under subclass 637. Subject matter including the measurement of characteristics at network ports which are complex ratios representing the amplitude and phase of incident and reflected power in traveling waves.

(1) Note. Measurements of voltage and current become more difficult as frequency increases, therefore directional power ratio measurements, expressed as scattering parameters, are used to characterize objects at high frequencies.

(2) Note. Microwave network analyzers belong in this subclass. Low frequency network analyzers belong in subclass 650 or subclass 615.

639 Where energy is transmitted through a test substance:
This subclass is indented under subclass 637. Subject matter including measurement of a microwave that passes through an object or substance.

640 To determine water content:
This subclass is indented under subclass 639. Subject matter for determining the water content of the test substance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
634, for determination of water content by measuring distributive type parameters using resonant frequency.
643, for determination of water content by using electric energy reflected from a substance under test.
664+, for determination of water content by using capacitive type measurement.
689, for determination of moisture content of a substance by using a capacitive sensing device or apparatus.
694+, for determination of moisture content of a substance using a resistive or conductive type measurement device or apparatus.
696, for resistive probe structure used to determine water content.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 73+ for moisture control or absorption characteristics of material; and subclasses 335+ for hygrometers.

200, Electricity: Circuit Makers and Breakers, subclass 61.04 for liquid responsive switches.

338, Electrical Resistors, subclass 35, for moisture sensing resistors.

340, Communications: Electrical, subclasses 602+ for moisture condition responsive indicating systems.

361, Electricity: Electrical Systems and Devices, subclasses 178 and 286 for humidity responsive circuits and capacitors.

641 To determine insertion loss:

This subclass is indented under subclass 639. Subject matter wherein measurement of the change provides information regarding the loss of power between two points on an object under test.

642 Where energy is reflected (e.g., reflectometry):

This subclass is indented under subclass 637. Subject matter including measurement of the returned signal energy from a high frequency wave that strikes the surface of a test object, the junction of two media or a discontinuity in the medium it is traveling in.

643 To determine water content:

This subclass is indented under subclass 642. Subject matter including measurement of the test substance water content.

SEE OR SEARCH THIS CLASS, SUBCLASS:

634, for determination of water content by measuring distributive type parameters using resonant frequency.

640, for determination of water content by using microwave energy transmitted through a substance under test.

664, for determination of water content by using capacitive measurement.

689, for determination of moisture content of a substance using a capacitive sensing device or apparatus.

694+, for determination of moisture content of a substance using a resistive or conductive type measurement device or apparatus.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 73+ for moisture content or absorption characteristics of material; subclasses 335+ for hygrometers.

200, Electricity: Circuits Makers and Breakers, subclasses 61.04+ for liquid responsive switches.

338, Electrical Resistors, subclass 35 for moisture sensing resistors.

340, Communications: Electrical, subclasses 602+ for moisture condition responsive systems.

361, Electricity: Electrical Systems and Devices, subclasses 78 and 286 for humidity responsive circuits and capacitors.

644 To determine dimension (e.g., distance or thickness):

This subclass is indented under subclass 642. Subject matter including measurement of the physical characteristics of the test substance pertaining to its size or its distance from a reference point.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635, for dimensional measurement of a test object by measuring the object's distributive type parameters using resonance.

662, and 671, for dimensional measurement using capacitive-type measurements.

716, for dimensional measurement by using resistive or conductive type measurements.

645 Having standing wave pattern:

This subclass is indented under subclass 642. Subject matter including measurement of the spatial distribution of transmitted or reflected energy on a transmission line formed by two sets of waves traveling in opposite direction and characterized by the presence of a number of points of successive maxima and minima in the distribution curves.

(1) Note. A standing wave is also called a stationary wave and it is a wave disturbance which is not progressive, i.e., one in which any component of the field can be specified as a function of position multiplied by a sinusoidal function of time.

(2) Note. Voltage Standing Wave Ratio (VSWR), is equal to the ratio of the characteristic impedance of the line to the impedance of the load connected to the output end of the line.

(3) Note. Voltage Standing Wave Ratio (VSWR) = (1+p)/(1-p) where p is the reflection coefficient.

SEE OR SEARCH THIS CLASS, SUBCLASS:

608, for signal evaluation or processing techniques which include a ratio function.

646 To determine reflection coefficient:
This subclass is indented under subclass 642. Subject matter including measurement of the complex (vector or phasor) ratio between the fields associated with the reflected and incident waves.

647 Using a comparison or difference circuit:
This subclass is indented under subclass 629. Subject matter wherein distributive type parameters are measured by correlating two or more electrical quantities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606, for signal evaluation or processing including comparison or difference techniques.

665, for measuring lumped type parameters by capacitive type measurements for water content including comparison or difference circuits.

672, for measuring lumped type parameters of an object or material including its dielectric characteristic by utilizing comparison or difference circuits.

679, for measuring lumped type parameters by capacitive type measurements with a comparison or difference circuit.

705, for measuring lumped type parameters by resistive or conductive type measurement including comparison or difference circuits.

SEE OR SEARCH CLASS:

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 1+ for comparison evaluation circuits.

648 With a bridge circuit:
This subclass is indented under subclass 647. Subject matter including a multi-terminal network arranged so that when an electromotive force is present in one branch, the response of a suitable detecting device may be zeroed by suitable adjustment of the electrical constants of still other branches.

SEE OR SEARCH THIS CLASS, SUBCLASS:

610, for measuring or testing electrical characteristics or parameters using bridge circuits for sensing electrical quantities.

725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

649 Lumped type parameters:
This subclass is indented under subclass 600. Subject matter including the measuring or testing of any circuit parameter, which for the purposes of analysis, can be considered to represent combined or single inductance, capacitance, resistance, etc., throughout the frequency range of interest.

(1) Note. Typically a “lumped” electrical parameter such as impedance is an impedance concentrated in a component, as distinct from being an impedance due to stray or distributed effects.

650 Using phasor or vector analysis:
This subclass is indented under subclass 649. Subject matter including utilization of a quantity that has both magnitude and direction.

(1) Note. The quantity may represent a parameter such as Z, which relates to the

total opposition (i.e., resistance and reactance) a device, component or network offers to the flow of alternating current at a given frequency. Some typical parameters evaluated here are impedance, admittance or immittance. Low frequency network analyzers belong in this Subclass.

(2) Note. Complex impedance network analyzers belong in this Subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

615, for generalized type of transfer function parameters.

638, distributive type measurements of scattering type parameters representable as complex quantities in the microwave range (microwave network analyzers).

651 With a bridge circuit:

This subclass is indented under subclass 650. Subject matter including a multi-terminal network used in a comparison or balancing configuration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

610, for measuring or testing electrical characteristics or parameters using bridge circuits for sensing electrical quantities.

648, for measuring or testing distributive type parameters utilizing bridge circuits.

657, 666, 673, 680, and 706, for measurement of lumped type parameters utilizing bridge circuits.

725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

652 Of a resonant circuit:

This subclass is indented under subclass 649. Subject matter including measuring or testing a circuit which contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when an inductor and capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive nor capacitive, but acts as a large value of resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

633+, for distributive type parameter measuring or testing utilizing resonant frequency determination.

655, for lumped type parameter measuring or testing utilizing inductive type measurement which involves a resonant circuit.

668, 675, 682, and 708, for lumped type parameter measuring or testing which involves a resonant circuit.

653 For figure of merit or Q value:

This subclass is indented under subclass 649. Subject matter including the determination of the ratio of the maximum energy stored in a cycle to the energy dissipated per cycle.

654 Using inductive type measurement:

This subclass is indented under subclass 649. Subject matter including measuring a property of a device, element or circuit which opposes any change in the rate of current flow associated with a magnetic field.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 870.31+ for an inductive transmitter.

655 Including a tuned or resonant circuit:

This subclass is indented under subclass 654. Subject matter including measuring or testing a circuit which contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when an inductor and capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive nor capacitive, but exhibits resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

633+, for distributive type parameter measuring or testing utilizing resonant frequency determination.

652, for lumped type parameter measuring or testing by utilizing reactance or susceptance measurement which involves a resonant circuit.

668, 675, 682, and 708, for lumped type parameter measuring or testing which involves a resonant circuit.

656 Including a comparison or difference circuit:

This subclass is indented under subclass 654. Subject matter wherein lumped type inductive values are measured by correlating two or more electrical quantities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606, for signal evaluation or processing including comparison or difference techniques.

647+, for measuring distributive type parameters by utilizing comparison or difference circuits.

665+, for measuring lumped type parameters by capacitive type measurements for water content including comparison or difference circuits.

672+, for measuring lumped type parameters of an object or material including its dielectric characteristic by utilizing comparison or difference circuits.

705+, for measuring lumped type parameters by resistive or conductive type measurement including comparison or difference circuits.

657 Using a bridge circuit:

This subclass is indented under subclass 656. Subject matter including a multi-terminal network using comparison or balance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

658 Using capacitive type measurement:

This subclass is indented under subclass 649. Subject matter including the measuring of a property of an element, device or circuit which relates to its capacity to store electrical energy by means of an electric field.

(1) Note. Capacitors store energy in their electric fields while inductors store energy in their magnetic fields.

(2) Note. There are three factors that govern a capacitor's capacitance: a. the area (A) of parallel plates facing each other; b. the distance (D) between parallel plates; and c. the dielectric constant (E) of the insulating material between the plates.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclass 870.37 for a capacitive transmitter.

659 With loss characteristic evaluation:

This subclass is indented under subclass 658. Subject matter where the parasitic energy dissipation associated with the capacitance is measured as part of the test.

(1) Note. The loss is sometimes expressed as the percentage of power dissipated with respect to the reactive power stored by the capacitance. Another measure is given by the tangent of the angle between reactive and total current components.

660 With variable electrode area:

This subclass is indented under subclass 658. Subject matter wherein the area of a capacitor's plate (i.e., electrode) is changed in effecting the measurement.

661 With variable distance between capacitor electrodes:

This subclass is indented under subclass 658. Subject matter wherein the space between a capacitor's parallel plates is changed in effecting the measurement.

662 To determine dimension (e.g., thickness or distance):

This subclass is indented under subclass 661. Subject matter wherein the physical characteristics of an object pertaining to its size or distance from a reference point are measured.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635, for dimensional measurement by using resonant frequency measurements.

644, for measuring a dimension using transmitted or reflected energy distributions.

671, for dimensional measurement on a dielectric object by using capacitive type measurements.

716, for dimensional measurement by using resistive or conductive type measurements.

SEE OR SEARCH CLASS:

340, Communication: Electrical, subclass 870.37 for capacitive type dimensional measurements where a significant activity of signal transmission occurs after the measurement is performed.

663 Where a material or object forms part of the dielectric being measured:

This subclass is indented under subclass 658. Subject matter including measurement of the insulating material between the two plates of a capacitor.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 304 for using capacitance to measure level.

664 To determine water content:

This subclass is indented under subclass 663. Subject matter including measurement of the material or object water content.

SEE OR SEARCH THIS CLASS, SUBCLASS:

634, for determination of water content by measuring resonant response to a microwave excitation.

640, and 643, for determination of water content by using microwave energy propagated through a substance under test.

643, for determination of water content by measuring distributive type parameters using reflected energy.

689, for determination of moisture content of a substance using a capacitive sensing device or apparatus.

694+, for determination of moisture content of a substance using a resistive or conductive type measurement device or apparatus.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 73+ for moisture control or absorption characteristics of material; and subclasses 29.02+ for hygrometers.

200, Electricity: Circuit Makers and Breakers, subclass 61.04 for liquid responsive switches.

338, Electrical Resistors, subclass 35, for moisture sensing resistors.

340, Communications: Electrical, subclasses 602+, for moisture condition responsive indicating systems.

361, Electricity: Electrical Systems and Devices, subclasses 178 and 286 for humidity responsive circuits and capacitors.

665 By comparison or difference circuit:

This subclass is indented under subclass 664. Subject matter including means to match two or more electrical quantities for the purpose of determining their relative values in evaluating the water content of a material or object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606, for signal evaluation or processing including comparison or difference techniques.

647+, for measuring distributive type parameters by utilizing comparison or difference circuits.

656+, for measuring lumped type parameters by inductive type measurements including comparison or difference circuits.

672+, for measuring lumped type parameters of an object or material including

its dielectric characteristic by utilizing comparison or difference circuits.

705+, for measuring lumped type parameters by resistive or conductive type measurement including comparison or difference circuits.

666 Including a bridge circuit:

This subclass is indented under subclass 665. Subject matter including a multi-terminal network capable of balance or comparison.

SEE OR SEARCH THIS CLASS, SUBCLASS:

610, for measuring or testing electrical characteristics or parameters using bridge circuits for sensing electrical quantities.

648, for measuring or testing distributive type parameters utilizing bridge circuits.

651, 657, 673, 680, and 706, for measurement of lumped type parameters utilizing bridge circuits.

725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

667 By frequency signal response, change or processing circuit:

This subclass is indented under subclass 664. Subject matter including circuit means to measure using a function of frequency signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

674+, for measuring or testing lumped type parameters by capacitive type measurements including dielectric characteristic measurements by using frequency signal response, change or processing circuitry.

681+, for measuring or testing lumped type parameters by capacitive type measurements using frequency signal response, change or processing circuitry.

707+, for measuring or testing lumped type parameters by resistive or conductive type measurements using frequency signal response, change or processing circuitry.

668 Including a tuned or resonant circuit:

This subclass is indented under subclass 667. Subject matter including a circuit which typically contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when an inductor and capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive nor capacitive, but exhibits resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

633+, for distributive type parameter measuring or testing utilizing resonant frequency determination.

652, for lumped type parameter measuring or testing by utilizing reactance or susceptance measurement which involves a resonant circuit.

655, 675, 682, and 708, for lumped type parameter measuring or testing which involves a resonant circuit.

669 With compensation means:

This subclass is indented under subclass 664. Subject matter including means to offset errors or undesirable characteristics in the measurement or test apparatus or process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

684+, for measuring or testing lumped type parameters by capacitive measurement with compensation.

720+, for measuring or testing lumped type parameters by resistive or conductive measurement with compensation.

670 For temperature variations:

This subclass is indented under subclass 669. Subject matter including the errors or undesirable characteristics caused by an increase or decrease in ambient temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

685, for measuring or testing lumped type parameters by capacitive type mea-

surement with compensation for temperature variation.

721, for measuring or testing lumped type parameters by resistive or conductive type measurement with compensation for temperature variation.

671 To determine dimension (e.g., dielectric thickness):

This subclass is indented under subclass 663. Subject matter wherein the physical characteristics of a dielectric object under test pertaining to its size or distance from a reference point are measured.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635, for dimensional measurement by using resonant frequency measurements at microwave frequencies.

644, for measuring a dimension using transmitted or reflected microwave energy distributions.

662, for dimensional measurement by using capacitive type measurements.

716, for dimensional measurement by using resistive or conductive type measurements.

672 By comparison or difference circuit:

This subclass is indented under subclass 663. Subject matter including means to match two or more electrical quantities for the purpose of determining their relative values in evaluating the dielectric characteristic of a material or object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606, for signal evaluation or processing including comparison or difference techniques.

647+, for measuring distributive type parameters by utilizing comparison or difference circuits.

656+, for measuring lumped type parameters by inductive type measurements including comparison or difference circuits.

655+, for measuring lumped type parameters of an object or material including its dielectric characteristic by utilizing comparison or difference circuits.

679+, for measuring lumped type parameters by capacitive type measurement circuitry including a comparison of difference circuit.

705+, for measuring lumped type parameters by resistive or conductive type measurement including comparison or difference circuits.

673 Including a bridge circuit:

This subclass is indented under subclass 672. Subject matter including a multi-terminal network capable of comparison or balance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

610, for measuring or testing electrical characteristics or parameters using bridge circuits for sensing electrical quantities.

648, for measuring or testing distributive type parameters utilizing bridge circuits.

651, 657, 666, 680, and 706, for measurement of lumped type parameters utilizing bridge circuits.

725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

674 By frequency signal response, change or processing circuit:

This subclass is indented under subclass 663. Subject matter including circuit means to determine or alter a signal as a function of frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

605, for measuring or testing electrical characteristics or parameters using a particular technique for frequency signal evaluation or processing.

667+, for measuring or testing lumped type parameters by capacitive type measurements including dielectric characteristic measurement to determine water content of an object or material by using frequency signal response, change or processing circuitry.

681+, for measuring or testing lumped type parameters by capacitive type measurements using frequency signal

response, change or processing circuitry.

707+, for measuring or testing lumped type parameters by resistive or conductive type measurements using frequency signal response, change or processing circuitry.

675 Including a tuned or resonant circuit:
This subclass is indented under subclass 674. Subject matter including a circuit which typically contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when a inductor and capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive nor capacitive, but exhibits resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

633+, for distributive type parameter measuring or testing utilizing resonant frequency determination.

652, for lumped type parameter measuring or testing by utilizing reactance or susceptance measurement which involves a resonant circuit.

655, 668, 682, and 708, for lumped type parameter measuring or testing which involves a resonant circuit.

676 With pulse signal processing circuit:
This subclass is indented under subclass 658. Subject matter including circuit means utilizing a pulse signal time domain response or shaping.

SEE OR SEARCH THIS CLASS, SUBCLASS:

710+, for measuring or testing lumped type parameters using resistive or conductive type measurements which include pulse signal processing.

677 Including R/C time constant circuit:
This subclass is indented under subclass 676. Subject matter including a time-determining network of resistors and capacitors in which the time constant is defined as resistance times capacitance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

711, for measuring or testing lumped type parameters using resistive or conductive type measurements which include pulse signal processing with R/C time constant circuitry.

678 Including charge or discharge cycle circuit:
This subclass is indented under subclass 676. Subject matter including circuit means to store or release electrical energy periodically.

SEE OR SEARCH CLASS:

320, Electricity: Battery or Capacitor Charging or Discharging, subclasses 166+ for charging or discharging a capacitor, per se.

679 With comparison or difference circuit:
This subclass is indented under subclass 658. Subject matter including means to match two or more electrical quantities for the purpose of determining their relative values.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606, for signal evaluation or processing including comparison or difference techniques.

647+, for measuring distributive type parameters by utilizing comparison or difference circuits.

656+, for measuring lumped type parameters by inductive type measurements including comparison or difference circuits.

665+, for measuring lumped type parameters of an object or material including its dielectric characteristic by utilizing comparison or difference circuits.

672+, for measuring lumped type parameters by capacitive type measurement including dielectric characteristic measurement with a comparison or difference circuit.

705+, for measuring lumped type parameters by resistive or conductive type measurement including comparison or difference circuits.

680 Including a bridge circuit:
This subclass is indented under subclass 679. Subject matter wherein the comparison or difference circuit means includes a multi-terminal network capable of balance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
610, for measuring or testing electrical characteristics or parameters using bridge circuits for sensing electrical quantities.
648, for measuring or testing distributive type parameters utilizing bridge circuit.
651, 657, 666, 673, and 706, for measurement of lumped type parameters utilizing bridge circuits.
725, for miscellaneous bridge circuits used in measuring or testing electrical characteristics or parameters.

681 With frequency signal response, change or processing circuit:
This subclass is indented under subclass 658. Subject matter including circuit means to determine or alter a signal as a function of frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
667+, for measuring or testing lumped type parameters by capacitive type measurements including dielectric characteristic measurement to determine water content of an object or material by using frequency signal response, change or processing circuitry.
674+, for measuring or testing lumped type parameters by capacitive type measurements utilizing frequency signal response, change or processing circuitry.
707+, for measuring or testing lumped type parameters by resistive or conductive type measurements using frequency signal response, change or processing circuitry.

682 Including a tuned or resonant circuit:
This subclass is indented under subclass 681. Subject matter including a circuit which typically contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when an inductor and a capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive nor capacitive, but exhibits resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
633+, for distributive type parameter measuring or testing utilizing resonant frequency determination.
652, for lumped typed parameter measuring or testing by utilizing reactance or susceptance measurement which involves a resonant circuit.
655, 668, 675, and 708, for lumped type parameter measuring or testing which involves a resonant circuit.

683 With phase signal processing circuit:
This subclass is indented under subclass 658. Subject matter including circuit means responsive to the phase of an electrical signal.

(1) Note. When the phase sensitive detection is used to extract quadrature components and compose a phasor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
650+, and 709, for measuring or testing lumped type parameters by resistance or conductance measurement using phase signal processing.

684 With compensation means:
This subclass is indented under subclass 658. Subject matter including means to offset errors or undesirable characteristics in the measurement or test apparatus or process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
669+, for measuring or testing lumped type parameters by capacitive measure-

ment apparatus or process including dielectric characteristic measurement of a material or object for water content and compensation means.

720+, for measuring or testing lumped type parameters by resistive or conductive measurement with compensation.

685 For temperature variation:

This subclass is indented under subclass 684. Subject matter including means to offset effects caused by changes in the ambient temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

670, for measuring or testing lumped type parameters by capacitive type measurement including dielectric characteristic measurement with compensation for temperature variations.

721, for measuring or testing lumped type parameters by resistive or conductive type measurement with compensation for temperature variations.

686 With capacitive sensing means:

This subclass is indented under subclass 658. Subject matter including probing or transducing means which utilizes a capacitor.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 280+ for electrostatic capacitors responsive to external conditions.

687 Having fringing field coupling:

This subclass is indented under subclass 686. Subject matter wherein the sensing means is located in close proximity to a test object and produces an electric field which links or couples the test object to itself, with a change in the electric field caused by the object being utilized to determine a characteristic of the test object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

632, for measuring or testing distributive type parameters using field coupling apparatus.

688 Including a guard or ground electrode:

This subclass is indented under subclass 686. Subject matter including a conducting element of offset or eliminate undesirable electrical effects.

SEE OR SEARCH THIS CLASS, SUBCLASS:

611, for spureous and parasitic signals handling in a sensor remote from the detecting circuit.

689 To determine water content:

This subclass is indented under subclass 686. Subject matter including measurement of the water content of a material of object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

640, 634 and 643, for determination of water content by using microwaves transmitted through a substance under test.

664+, for determination of water content by measuring lumped type parameters which includes dielectric characteristic measurement of a material or object.

694+, for determination of moisture content of a substance using a resistive or conductive type measurement device or apparatus.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 73+ for moisture control or absorption characteristics of material; and subclasses 29.02+ for hygrometers.

200, Electricity: Circuit Makers and Breakers, subclass 61.04 for liquid responsive switches.

338, Electrical Resistors, subclass 35 for moisture sensing resistors.

340, Communications: Electrical, subclasses 602+ for moisture condition responsive indicating systems.

361, Electricity: Electrical Systems and Devices, subclasses 178 and 206 for humidity responsive circuits and capacitors.

690 Including a probe type structure:
This subclass is indented under subclass 686. Subject matter wherein the capacitive sensing means has a particular shape or configuration to improve its transducing or pickup function.

SEE OR SEARCH THIS CLASS, SUBCLASS:
724, for probe used in measuring lumped type parameters by resistive or conductive type measurements.

691 Using resistance or conductance measurement:
This subclass is indented under subclass 649. Subject matter including measuring that property of an object which impedes current and results in the dissipation of power in the form of heat, or the property that is the factor by which the square of an instantaneous voltage must be multiplied to give the corresponding energy lost by dissipation as heat or other permanent radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
439+, for using a conductivity device to determine electrolytic properties.
549, for detecting resistor faults.

692 With living organism condition determination using conductivity effects:
This subclass is indented under subclass 691. Subject matter including means to evaluate properties of a living organism by measuring or testing its ability to conduct electrical current.

693 With object or substance characteristic determination using conductivity effects:
This subclass is indented under subclass 691. Subject matter including means to evaluate the properties of an object by measuring or testing its ability to conduct current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
639+, for electrical means where energy is transmitted through an object to determine characteristics of the object.

694 To determine water content:
This subclass is indented under subclass 693. Subject matter including measurement of the water content of the object or substance being tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
634, for determination of water content by measuring distributive type parameters using resonant energy.
640, for determination of water content by using microwave energy transmitted through a substance under test.
643, for determination of water content by measuring distributive type parameters using reflected energy.
664+, for determination of water content by measuring lumped type parameters which includes dielectric characteristic measurement of a material or object.
689, for determination of water content of a substance using capacitive sensing means.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 73+ for moisture control or absorption characteristics of material; and subclasses 335+ for hygrometers.
200, Electricity: Circuit Makers and Breakers, subclass 61.04 for liquid responsive switches.
338, Electrical Resistors, subclass 35 for moisture sensing resistors.
340, Communications: Electrical, subclasses 602+ for moisture condition responsive indicating systems.
361, Electricity: Electrical Systems and Devices, subclasses 178 and 206 for humidity responsive circuits and capacitors.

695 Where the object moves while under test:
This subclass is indented under subclass 694. Subject matter wherein the test substance is in motion during the water content determination.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513+, for locating faults in moving elements.

701, for utilizing conductivity effects to determine the properties of a moving object, per se.

696 With a probe structure:
This subclass is indented under subclass 694. Subject matter with a particular sensing configuration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
724, for conductivity effects detectors having a probe type structure, per se.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 304 for liquid level measurements.
361, Electricity: Electrical Systems and Devices, subclasses 280+ for condition responsive capacitors.

697 For interface:
This subclass is indented under subclass 693. Subject matter including means to evaluate the point or points of contact between different substances.

698 To determine oil qualities:
This subclass is indented under subclass 693. Subject matter including means to evaluate the properties of a fluid containing petroleum or its derivatives (i.e., lubricants).

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 53.05+ for lubricant testing, per se.

699 To determine dimension (e.g., distance or thickness):
This subclass is indented under subclass 693. Subject matter including means to evaluate alterations in the physical shape of an object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
635, for dimensional measurement by using resonant frequency measurements.
644, for measuring a dimension using transmitted or reflected energy distributions.
662, for dimensional measurement by using capacitive type measurements.
671, for dimensional measurement by using dielectric characteristic measurements.
716, for dimensional measurements by using resistive or conductive type measurements.

700 Including corrosion or erosion:
This subclass is indented under subclass 699. Subject matter including means to evaluate the addition or loss of material, to or from a substance, due to environmental conditions.

(1) Note. This subclass covers only those corrosion evaluation devices where the impedance of a sensor is measured. For other types of corrosion evaluation, search the art listed below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71.2, for electrical measuring of erosion not limited to a resistive or conductive measurement.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 86 embrittlement or erosion testing.
204, Chemistry: Electrical and Wave Energy, subclass 404 for corrosion analysis and testing.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 53 for corrosion testers.

701 Where the object moves while under test:
This subclass is indented under subclass 693. Subject matter wherein the test object is in motion during the evaluation of the characteristics of the object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513+, for locating faults in moving elements.
695, for utilizing conductivity effects to determine the water content of a moving object.

702 With radiant energy effects:
This subclass is indented under subclass 691. Subject matter including means to evaluate the properties of an object, utilizing a source of radiant energy as a preparation to the test.

(1) Note. This subclass does not include testing the source of radiation nor the product of that source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71.3, for measuring the properties of beam of particles.
501, for using radiant energy to test for faults (e.g., continuity of a conductor line).

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 336+ for measurements of several spectral types of radiation. Also see the lines notes in the main definitions of this class which pertain to Class 250.
356, Optics: Measuring and Testing, subclasses 432+ for light intensity measurements.

703 Including heating:
This subclass is indented under subclass 702. Subject matter wherein the radiant energy increases the temperature of the object being evaluated.

704 With ratio determination:
This subclass is indented under subclass 691. Subject matter including evaluating means which utilize a value which represents the ratio of a first signal to a second signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
608, for signal evaluation or processing techniques which include a ratio function.
614, for signal to noise ratio measurements.
653, for determining the value of Q which designates the ratio of reactance to resistance of an element or circuit.

705 With comparison or difference circuit:
This subclass is indented under subclass 691. Subject matter including means to match two or more electrical quantities for the purpose of determining their relative values.

SEE OR SEARCH THIS CLASS, SUBCLASS:
606, for signal evaluation or processing including comparison or difference techniques.
647+, for measuring distributive type parameters by utilizing comparison or difference circuits.
656+, for measuring lumped type parameters by inductive type measurements including comparison or difference circuits.
665+, for measuring lumped type parameters of an object or material for water content including its dielectric characteristic by utilizing comparison or difference circuits.
672+, for measuring lumped type parameters by capacitive type measurement including dielectric characteristic measurement with a comparison or difference circuit.
679+, for measuring lumped type parameters of an object or material including its dielectric characteristic by utilizing comparison or difference circuits.

706 Including a bridge circuit:
This subclass is indented under subclass 705. Subject matter wherein the comparison or difference circuit means includes a multi-terminal network capable of balance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
610, for bridge circuits used with condition responsive transducers.
648, for bridge circuits used in distributive type measurements.
651, for bridge circuits used in vector analysis.
657, for bridge circuits used in inductance measurements.
666, for bridge circuits used to determine water content with capacitance measurements.

673, for bridge measurements used to determine the dielectric characteristics of a material or object under test.
680, for bridge circuits used in capacitive measurements.
725, for miscellaneous bridge circuits.

707 With frequency response, change or processing circuit:
This subclass is indented under subclass 691. Subject matter including circuit means to determine or alter a signal as a function of frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
667+, for measuring or testing lumped type parameters by capacitive type measurements including dielectric characteristic measurement to determine water content of an object or material by using frequency signal response, change or processing circuitry.
674+, for measuring or testing lumped type parameters by capacitive type measurements utilizing frequency signal response, change or processing circuitry.
681+, for measuring or testing lumped type parameters by capacitive type measurements which include using frequency signal response, change or processing circuitry.

708 Including a tuned or resonant circuit:
This subclass is indented under subclass 707. Subject matter including a circuit which typically contains both inductance and capacitance and is tuned to resonate at a certain frequency.

(1) Note. A resonant condition exists when an inductor and a capacitor store energy and pass the same energy back and forth. The rate at which this occurs is called the resonant frequency. At the resonant frequency the circuit is neither inductive or capacitive, but acts as a large valve of resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
652, for lumped type parameter measuring or testing by utilizing reactance or susceptance measurement which involves a resonant circuit.
655, 668, 675, and 682, for lumped type parameter measuring or testing which involves a resonant circuit.

709 With phase signal processing circuit:
This subclass is indented under subclass 691. Subject matter including circuit means responsive to the phase of an electrical signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
683, for measuring or testing lumped type parameters by capacitive measurements with phase signal evaluation.

710 With pulse signal processing circuit:
This subclass is indented under subclass 691. Subject matter including circuit means to utilize electrical signal pulses and their time domain response or shaping.

SEE OR SEARCH THIS CLASS, SUBCLASS:
676+, for measuring or testing lumped type parameters by capacitive type measurement which includes pulse signal processing.

711 Including R/C time constant circuit:
This subclass is indented under subclass 710. Subject matter including a time-determining network of resistors and capacitors.

(1) Note. Time constant is defined as resistance times capacitance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
677, for measuring or testing lumped type parameters by capacitive type measurement which includes pulse signal processing using R/C time constant circuitry.

712 Including a digital or logic circuit:
This subclass is indented under subclass 710. Subject matter including a circuit wherein nonarithmetical operations are performed using digital electrical signal information.

(1) Note. Electronic digital logic circuitry is classified in Class 326.

SEE OR SEARCH THIS CLASS, SUBCLASS:

607, for measurements including conversion.

SEE OR SEARCH CLASS:

341, Coded Data Generation or Conversion, appropriate subclasses for converter circuits which extract the value of a variable.

713 With voltage or current signal evaluation:

This subclass is indented under subclass 691. Subject matter including means to measure or test the characteristics of an electrical signal as to its voltage or current.

SEE OR SEARCH THIS CLASS, SUBCLASS:

522+, for means to locate a fault using voltage or current.

714 Including a potentiometer:

This subclass is indented under subclass 713. Subject matter including a variable voltage divider used for measuring an unknown electromotive force or potential difference.

SEE OR SEARCH THIS CLASS, SUBCLASS:

723, for measuring or testing lumped type parameters using resistance or conductance type measurement with conductivity effects determination.

715 Including a particular probing technique (e.g., four point probe):

This subclass is indented under subclass 713. Subject matter wherein electrical contact is made at a specified point, in particular fashion in order to effect a measurement or test.

SEE OR SEARCH THIS CLASS, SUBCLASS:

609, for measuring or testing electrical characteristics or parameters for substance or environment evaluation using a particular sensing technique.

716 To determine dimension (e.g., distance or thickness):

This subclass is indented under subclass 715. Subject matter including means to evaluate alterations in the physical shape of an object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635, for dimensional measurement by using resonant frequency measurements.

644, for measuring a dimension using transmitted or reflected energy distributions.

662, for dimensional measurement by using capacitive type measurements.

671, for dimensional measurements by using dielectric characteristic measurements.

699, for dimensional change measurement by using conductivity effects of lumped type parameters.

717 To determine material composition:

This subclass is indented under subclass 715. Subject matter wherein the voltage or current signal evaluation or processing is used to determine the quantity, quality or percentage of substances that make up the test object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

693, for conductivity effects measurement means to determine the composition of a material.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 61.41 for testing for content or effect of a constituent of a liquid mixture.

718 To detect a flaw defect:

This subclass is indented under subclass 715. Subject matter including means to detect any discontinuity in a substance that would be harmful to the proper functioning of the substance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

537, for fault detection in circuit components.

719 With semiconductor or IC materials quality determination using conductivity effects:
This subclass is indented under subclass 691. Subject matter including means to evaluate the properties of semiconductor or integrated circuit material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
500+, for fault testing of semiconductor devices.
765, for miscellaneous electrical transistor testing.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 73 for automatic sequential tests of PC boards.
438, Semiconductor Device Manufacturing: Process, subclasses 17+ for methods of making semiconductor electrical devices combined with measurement of an electrical condition.
714, Error Detection/Correction and Fault Detection/Recovery, subclasses 724+ for determining faults in ICs by testing information content of signals.

720 With compensation means:
This subclass is indented under subclass 691. Subject matter including means to offset errors or undesirable characteristics in the measurement or test apparatus or process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
611+, for means to compensate for errors introduced in remote type evaluating circuits.
669+, for measuring or testing lumped type parameters by capacitive measurement apparatus or process including dielectric characteristic measurement of a material or object for water content and compensation means.
684+, for measuring or testing lumped type parameters by capacitive type measurement including compensation means.

721 For temperature variation:
This subclass is indented under subclass 720. Subject matter including means to offset effects caused by changes in the ambient temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:
670, for measuring or testing lumped type parameters by capacitive type measurement including dielectric characteristic measurement with compensation for temperature variations.
685, for measuring or testing lumped type parameters by capacitive type measurement with compensation for temperature variations.

722 Device or apparatus determines conductivity effects:
This subclass is indented under subclass 691. Subject matter including means to evaluate the ability of a substance to conduct electrical current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
692, for living organism condition determination using conductivity effects.
693+, for substance characteristic determination using conductivity effects.
719, for semiconductor or IC quality determination using conductivity effects.

723 Potentiometer:
This subclass is indented under subclass 722. Subject matter where the object being evaluated has the structure of a voltage divider.

SEE OR SEARCH THIS CLASS, SUBCLASS:
714, for measuring or testing lumped type parameters using resistance or conductance measurement with a voltage or current signal evaluation or processing circuit which includes a potentiometer.

724 Using a probe type structure:
This subclass is indented under subclass 722. Subject matter wherein the apparatus has a particular shape or configuration to improve its transducing or pickup function.

SEE OR SEARCH THIS CLASS, SUBCLASS:
690, for measuring or testing lumped type parameters with capacitive sensing means which include a probe type structure.
696, for measuring or testing lumped type parameters with water content determination using a conductivity effects detector with a probe type structure.
715+, for measuring or testing lumped type parameters using resistance or conductance type measurement with a voltage or current signal evaluation or processing circuit and a particular probe.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 34+ for condition responsive resistors.

725 Using a particular bridge circuit:
This subclass is indented under subclass 600. Subject matter including a multiterminal network capable of balance or comparison and not elsewhere classified.

(1) Note. This subclass contains those bridge circuits having salient features not readily classifiable under any of the subclasses under 600.

726 Transformer testing (e.g., ratio):
This subclass is indented under subclass 600. Subject matter including means for determining properties of transformers.

(1) Note. This subclass includes for example, the determination of the voltage ratio of instrument transformers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
74+, for the determination or the properties of electric meters, per se.

727 Piezoelectric crystal testing (e.g., frequency, resistance):
This subclass is indented under subclass 600. Subject matter including means for determining the properties of piezoelectric crystals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
78+, for the measurement of frequency.

SEE OR SEARCH CLASS:
29, Metal Working, subclass 25.33 for this subject matter in combination with manufacturing.
310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric elements and devices, per se.

750 System sensing fields adjacent device under test (DUT):
This subclass is indented under subclass 537. Subject matter for detecting faults by sensing an electromagnetic field produced by a device under test.

751 Using electron beam probe:
This subclass is indented under subclass 750. Subject matter wherein a cathode-ray device is used to sense the fields.

752 Using light probe:
This subclass is indented under subclass 750. Subject matter wherein light such as a laser beam is used to sense the fields.

753 Using electro-optic device:
This subclass is indented under subclass 750. Subject matter wherein an electro-optic device such as an electroluminor is used to sense the fields.

754 With probe elements:
This subclass is indented under subclass 537. Subject matter including a feature to enable contact between a device under test (DUT) and a test apparatus.

755 Internal of or on support for device under test (DUT):
This subclass is indented under subclass 754. Subject matter including a support for the DUT and wherein probe elements are mounted in or on the support.

756 Contact confirmation:
This subclass is indented under subclass 754. Subject matter including a feature to enable determination whether proper probe contact has been made.

757 Probe contact enhancement:
This subclass is indented under subclass 754. Subject matter including a feature for aiding the probe to make proper contact.

758 Probe alignment or positioning:
This subclass is indented under subclass 754. Subject matter including a feature for checking or providing for proper position of probes with respect to contact points on the DUT.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 399+ for optical alignment.

759 With recording of test results on DUT:
This subclass is indented under subclass 754. Subject matter including means for receiving the results of a test on the DUT.

760 With temperature control:
This subclass is indented under subclass 754. Subject matter including means to regulate temperature of the DUT or an apparatus used in testing.

761 Pin:
This subclass is indented under subclass 754. Subject matter wherein the probe element is a connecting device such as a spring biased rod or a buckling beam (rod).

762 Cantilever:
This subclass is indented under subclass 754. Subject matter including a probe element set at a first end of a beam wherein the beam has a first end and a second end and the second end is attached to a support.

763 DUT including test circuit:
This subclass is indented under subclass 537. Subject matter wherein a device under test (DUT) has integral elements which can be manipulated to configure the DUT so that tests can be made.

(1) Note. For example, a pad of an IC may, by switching, be connected to enable testing of a part of the IC not normally available for testing.

SEE OR SEARCH CLASS:
257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 48 for test or calibration structure.

764 With identification of DUT:
This subclass is indented under subclass 537. Subject matter wherein a device under test (DUT) has unique marks or codes that can be read to determine the identity of the DUT.

(1) Note. This subclass includes a DUT having identifying marks usable in determining faults or defects in electric components or elements. Identification apparatus and processes of general utility involving bar code are classified elsewhere.

(2) Note. Automated analysis of an image or recognition of a pattern of machine readable, human language symbols are constructed entirely of spaced-apart, substantially parallel bars, lines or strokes is classifiable elsewhere.

SEE OR SEARCH CLASS:
235, Registers, subclasses 462.01+ for bar code.
382, Image Analysis, subclass 12 for characters formed entirely of parallel bars.

765 Test of semiconductor device:
This subclass is indented under subclass 537. Subject matter including a determination of faults in a material which is a solid or liquid conductor with resistivity between that of metals and that of insulators.

SEE OR SEARCH CLASS:
438, Semiconductor Device Manufacturing: Process, subclasses 17+ for methods of making semiconductor electrical devices combined with measurement of an electrical condition.

766 With barrier layer:
This subclass is indented under subclass 765. Subject matter having a region in which the mobile-carrier charge density is insufficient to neutralize the net fixed charge density of donors and acceptors.

767 Diode:
This subclass is indented under subclass 766. Subject matter including a two electrode (anode and cathode), single junction (PN) semiconductor device used as an active switching element responsive to respective input logic signals to perform the logic function.

768 Bipolar transistor:
This subclass is indented under subclass 766. Subject matter including a semiconductor device of the type having at least three electrodes (emitter, base, and collector), two potential barriers and having a controlled current flow of both majority and minority carriers (i.e., holes and electrons).

(1) Note. A conventional bipolar transistor has three electrodes which include NPN or PNP type materials; in the NPN type, current flows from a collector terminal to an emitter terminal, and in the PNP type transistor, current flows from an emitter terminal to a collector terminal.

769 Field effect transistor:
This subclass is indented under subclass 766. Subject matter wherein a logic circuit includes one or more unipolar transistors in which current carriers are injected at a source terminal and pass to a drain terminal through a channel of semiconductor material whose conductivity depends largely on an electrical field applied to the semiconductor from a control electrode (gate).

(1) Note. In a unipolar transistor, the source to drain current involves only one type of charge carrier (i.e., holes in a p-type material channel and electrons in an N-type material channel).

770 Liquid crystal device test:
Subject matter under 537 including test of a device whose reflectance or transmittance properties change when an electric field is applied.

(1) Note. This subclass includes testing singular or plural LCD elements for electrical defects or faults.

(2) Note. Subject matter related to optical properties of an LCD array to produce an image is classified in elsewhere.

(3) Note. Subject matter related to measurement of optical properties of LCD elements or systems is classified elsewhere.

(4) Note. Subject matter related to LCD elements and systems is classified elsewhere.

SEE OR SEARCH CLASS:
345, Computer Graphics Processing and Selective Visual Display Systems, subclass 50, for liquid crystal elements.
349, Liquid Crystal Cells, Elements and Systems, appropriate subclasses for utilizing a liquid crystal device in general.
356, Optics: Measuring and Testing, appropriate subclasses for LCD fault detection and testing, per se.

771 Power supply test:
This subclass is indented under subclass 537. Subject matter including test of an electrical power source wherein the electrical power source is obtained by rectifying an AC source or using a DC source.

(1) Note. This subclass includes electrical testing of rectifying and inverting power supplies. Rectifying and inverting power supplies having means which control magnitude or level of the current, voltage, or phase angle are classified in Class 323.

SEE OR SEARCH CLASS:
323, Electricity: Power Supply or Regulation Systems, for systems for controlling the voltage of electricity and the phase of alternating currents.

772 Motor or generator fault tests:
This subclass is indented under subclass 537. Subject matter including fault tests of (a) prime mover rotating electrical machinery; (b) rotating electrical machinery which changes mechanical energy to electrical energy.

(1) Note. This subclass includes the testing of an assembled motor or generator not elsewhere classifiable.

(2) Note. Subject matter for testing just the rotating part of a motor or generator is classified elsewhere in this class. See the search note below.

(3) Note. Subject matter related to prime-mover dynamo plants is classified elsewhere. See the search note below.

(4) Note. Subject matter related to electrical motor or generator structure is classified elsewhere. See the search note below.

(5) Note. Subject matter related to signalling, recording, metering, or testing of systems of supply or control for an electric motor and the electric motor is classified elsewhere. See the search note below.

(6) Note. Subject matter related to indicating, signalling, recording, or testing a single electric energy generator having means to regulate or control the generator output is classified elsewhere. See the search note below.

(7) Note. Subject matter related to systems of acceleration or speed control of DC motors is classified elsewhere. See the search note below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
545, for armature or rotor.

SEE OR SEARCH CLASS:
290, Prime-Mover Dynamo Plants, for electric generating plants.
310, Electrical Generator or Motor Structure, for generic structure of electric motors.
318, Electricity: Motive Power Systems, subclass 490 for motor systems having signals, recorders, meters or testing devices.
322, Electricity: Single Generator Systems, subclass 99 for the system including a signal, indicator, recorder or testing.
388, Electricity: Motor Control Systems, for controlling the rate of change of speed of a DC motor.

CROSS-REFERENCE ART COLLECTIONS

800 Divining rods:
Subject matter relating to a forked branch or stick alleged to reveal hidden water or minerals by dipping downward.

(1) Note. The existence of this subclass should not be taken to indicate that the Patent Office believes that divining rods are operative. Attention is directed to the evaluation of the divining rod in the following official government publication: Water Supply Paper 416, published by the United States Geological Survey and available at cost through the Government Printing Office. The title of this paper is “The Divining Rod”, and its author is Arthur J. Ellis.

END