CLASS 342, COMMUNICATIONS: DIRECTIVE RADIO WAVE SYSTEMS AND DEVICES (E.G., RADAR, RADIO NAVIGATION)

SECTION I - CLASS DEFINITION

STATEMENT OF THE CLASS SUBJECT MATTER:

A. Systems and processes for transmission or reception of radio wave energy for obtaining or utilizing information (using radio wave transmitters or receivers), as to an object, or as to the directional characteristics of the radio wave energy, per se.

B. This class includes radar systems wherein radio wave energy from a transmitter is reflected or otherwise returned from an object to a receiver which may be at the same location as the transmitter.

C. This class includes subsystems, components, and related processes which are limited to use in connection with the above and not provided for elsewhere.

D. This class is limited to electromagnetic radio frequency waves in the radiation field. Radiation waves produces by lasing (coherent addition) action and induction field electromagnetic waves are excluded from this class, even though they may operate at radio frequencies. See "radio wave" definition above for other type exclusions.

SECTION II - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 570+ for miscellaneous apparatus for testing devices by means of vibratory forces (e.g., certain types of compressional waves), see indented subclasses 584+ where sound waves are used. Class 73 provides for measuring and testing methods and apparatus which involve a radiant energy test and a nonelectrical test. Class 73 is the generic class for measuring and testing methods and apparatus, Search notes to the class definition of Class 73 should be consulted for other classes which provide for measuring and testing processes and apparatus.

89, Ordnance, subclasses 1.1+ and 41 for apparatus designed to control or move a gun for aiming it towards a target, including such apparatus where radiant energy is utilized and subclasses 1.51+ for radiant energy actuated or controlled devices for releasing bombs, flares, etc., from aircraft.

102, Ammunition and Explosives, subclass 384 for drop bombs with direction controlling means, including those controlled by radiant energy; subclasses 416+ and the subclasses specified in the notes thereto for explosive mines adapted to be fixed automatically, the firing device of the mine being actuated by electrical, magnetic, wave or radiant energy and the igniting, per se, for such mines; and subclass 214 for fuses, primers and igniting devices for explosives which involve the utilization of electrical, magnetic, wave or radiant energy in their operation.

136, Batteries: Thermoelectric and Photoelectric, subclasses 200+ for thermoelectric generators, particularly subclasses 213+ for radiation (e.g., infrared) pyrometers.

137, Fluid Handling, appropriate subclasses for fluid flow control systems including radiant energy systems for valve actuation.

178, Telegraphy, appropriate subclasses with respect to inductive coupling where the sole disclosure is of a radiant energy telegraph system, but the claimed subject matter is not limited to radiant energy transmission of the signals. See especially subclass 18.07 and 19.03 for handwriting and drawing systems with inductive coupling, subclass 43 for space induction systems, subclasses 66.1+ for miscellaneous systems using alternating current (including high frequency current) to transmit the signal. Note that many of the patents in subclasses 66.1+ of Class 178 are analogous to the patents of Class 375, subclasses 259+ for miscellaneous telegraph apparatus useful in either radio or wire telegraphy, for example, subclasses 371+ for receivers and subclasses 348+ for keys.

181, Acoustics, is the generic class for inventions in sound wave radiation, transmission or reception and instruments specific thereto.

191, Electricity: Transmission to Vehicles, subclass 10 for systems for transferring energy from a roadway or other place to a movable vehicle by means of electromagnetic induction.

244, Aeronautics and Astronautics, subclass 3.1 for control means for missiles and subclass 77 for systems for automatically controlling aircraft by means of electrical apparatus and radiant energy controlled steering and for a statement as to the lines between the classes.

250, Radiant Energy, subclasses 200 through 239 for light sensitive systems and subclass 336.1 for methods and apparatus utilizing invisible ray energy for measuring and detecting purposes; subclass 492.1 for methods and apparatus utilizing invisible ray energy such as X-rays, ultraviolet infrared rays. Class 250 is the generic class of radiant energy. It and other classes specified in the search class notes to it should be searched for the patents relating to radiant energy apparatus, processes and devices, especially for processes and apparatus for subjecting materials to radiant energy.

318, Electricity: Motive Power Systems, subclass 16 for electric motor systems where the motor is controlled or supplied by space transmitted electromagnetic or electrostatic energy (including radio energy), subclass 460 for electric motor systems controlled by sound or supersonic vibrations, subclass 480 for electric motor systems controlled by radiant energy (e.g., light).

324, Electricity: Measuring and Testing, is the generic class for methods and apparatus for testing to determine electrical properties by electrical means; subclasses 323+ and 344+ provide for ore detection determination by electrical means, including the use of radio waves, except such methods and apparatus which involve the use of reflected or otherwise returned radio waves, the excepted matter being in this class (342). Class 324 provides for electrical testing methods and apparatus which include a test by means of radio waves and another electrical test.

333, Wave Transmission Lines and Networks, appropriate subclasses for wave transmission lines or networks which may be used for communication purposes wherein the wave energy is guided or constrained by a wave propagating medium of appreciable electrical length with respect to the wave length of the propagated energy. For example, subclasses 1+ provides for plural channel systems and subclasses 236+ provides for single channel long lines having distributed electrical parameters, such as parallel conductors, wave guides and shielded lines. This class also contains systems and networks useful in communication with radiant energy. See particularly subclasses 109+ for directional couplers, subclass 117 for hybrid type networks, subclass 13 for resonator type breakdown discharge systems, e.g., T-R or R-T systems, subclass 23 for dissipating terminations for long lines, subclasses 24+ for coupling networks including filters, equalizers, dealt networks and impedance matching networks and subclass 81 for attenuators.

334, Tuners, appropriate subclasses for tuner networks adapted for use in radiant energy systems.

343, Communications: Radio Wave Antennas, appropriate subclass for structural apparatus for the transmission or reception of radio waves.

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 418 through 475 for computer graphics processing.

348, Television, appropriate subclasses for television systems whether the signals are transmitted by radiant energy or otherwise.

356, Optics: Measuring and Testing, appropriate subclasses for devices which utilize visible light and optical principles for the measurement of angles, distances, chromatic effects and the intensity of light, flaw analysis and fiducial instruments not provided for elsewhere.

358, Facsimile and Static Presentation Processing, appropriate subclasses for facsimile systems whether the signals are transmitted by radiant energy or otherwise.

359, Optical: Systems and Elements, subclasses 109+ for light wave communication.

367, Communications, Electrical: Acoustic Wave Systems and Devices, appropriate subclass for apparatus for detecting objects or determining their distance or direction which are provided with means to transmit and receive sonic or supersonic waves, the sonic or supersonic waves being either generated or received by electrical means. See subclasses 87+ for echo systems, subclasses 131+ for underwater systems and subclasses 115+ for distance or direction finding. (Note that the class for acoustics has similar apparatus.)

369, Dynamic Information Storage and Retrieval, subclasses 6+ for combined radio and phonography systems.

375, Pulse or Digital Communication, appropriate subclass for pulse communication via radio waves. (Note: See the Class 178 search note above for Class 375, subclasses 259+, 371+, for and 348+ reference).

380, Cryptography, appropriate subclasses, for cryptographic communications equipment.

455, Telecommunications, appropriate subclass for analog modulated carrier wave. Class 455

includes transmitters and receivers of signals having arbitrary information content, whereas Class 342 is limited to transmitter beacons, directional receivers and radar transponders of regular, periodic and in general nonvarying signals having fixed information content relating to locating or identifying a target.

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c 30 K) superconducting devices, and particularly subclasses 202+ for electrical communication systems.

700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic data processing control systems; and subclasses 90-306 for particular applications of digital data processing systems or calculating computers.

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 400 through 541 and 300+ for computer applications in the area of navigation and determining the relative location between two points.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation and Audio Compression/Decompression, subclasses 200+ for artificial intelligence systems that process speech signals.

706, Data Processing: Intelligent Processing Systems and Methods, various subclasses for artificial intelligence systems that represent, apply, and acquire knowledge.

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 1+ for hybrid computers; subclasses 100+ for digital calculating computers; and subclasses 800+ for analog computers.

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

715, Data Processing: Presentation Processing of Document, Operator Interface Processing, and Screen Saver Display Processing, subclasses 700 through 866 for computer operator interface processing.

SECTION III - GLOSSARY

ACTIVE ANTENNA

Part of the antenna which is directly coupled to free space and radiates electromagnetic energy into, or collects electromagnetic energy from, free space and is also directly coupled to a transmitter or receiver.

COMMUNICATION

The conveying or transferring or information; specifically a system, as a radio, television, telephone for conveying or transferring information.

DISTANCE

The space between two points, which may be immediately juxtaposed or widely spaced.

ELECTROMAGNETIC WAVE POLARIZATION CONVERTER

Structure which acts directly on the electromagnetic wave energy to modify the polarization pattern of the wave, for example, to change a plane polarized wave into a circularly polarized wave.

FAR FIELD

The space beyond the near field of an antenna in which radiation is essentially confined to a fixed pattern falls off inversely with the square of the distance.

FREE SPACE

Space where the movement of energy in any direction is substantially unimpeded, such as the atmosphere, the ocean or the earth.

MESSAGE

A signal used to convey intelligence, such as telephone signals (e.g., speech).

“Message” is used in a more limited sense than “signal” for the purpose of classification in this class, in that “signal” includes the transmission of control impulses for operating mechanisms other than mere signal reproducers.

NEAR FIELD

The electromagnetic field within a distance of 1 wavelength from a transmitting antenna.

ORIENTING

Changing the beam direction of an antenna with respect to some reference point.

RADAR

Acronym for radio detecting and ranging. A system that measures distance (and usually the direction) to an object by determining the amount of time required by electromagnetic energy to travel to and return from an object. Called primary radar when signals are returned by reflection. Called secondary radar when the incident signal triggers a responder beacon and causes it to transmit a second signal.

RADIANT ENERGY

The energy (partially kinetic, partially potential) associated with waves produced in free space by a source of energy, such as light wave, electromagnetic radiation (including radio waves), or neutron and similar radiation, subsonic, supersonic and sonic waves.

RADIATION

The emanation of energy into free space.

RADIATION FIELD

An electromagnetic wave whose frequency spectrum extends over a range from somewhat above the frequency of audible sound waves to somewhat below the frequency of heat and light waves. Values of 10 kilocycles and 30,000 megacycles have been given as the lower the upper limits of the range for radio waves, although values exist beyond these limits. Radio waves as defined here exclude compressional waves, light waves, heat waves, infrared waves, ultraviolet waves, X-ray, cathode rays, gamma rays, and ion beams. The radio waves are produced by oscillations of electric change in an antenna.

SIGNAL

Control impulse, wave energy, intelligence or message, such as sing, or a noise indication agreed upon, under stood and used to convey information at a distance.

TELEGRAPHY

The transmission to a distance of signals, unlimited with respect to the extent of the message communicated, by the utilization of energy, the elements of the message being selected or composed at will according to a prearranged code.

TELEPHONY

The conversion of spoken or sound waves into energy which is transmitted a distance and reconverted into sound waves for reproduction of the speech or sounds.

TELEDYNAMICS

The transmission of signal energy for the control of apparatus or mechanisms, at a distance.

SUBCLASSES

1 RADIO WAVE ABSORBER:
This subclass is indented under the class definition. Subject matter wherein a material or device takes up and dissipates far field radar or radio wave signals.

(1) Note. An example of a device used a radar absorber is an anechoic chamber.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclass 81 for waveguide attenuators or subclass 22 for sidewall absorption.
343, Communications: Radio Wave Antennas, subclasses 700+ for radio wave antenna absorbers, per se.

2 For aircraft or missile:
This subclass is indented under subclass 1. Subject matter including use with air vehicles or projectiles.

3 For camouflage:
This subclass is indented under subclass 1. Subject matter including means to disguises an object by radar absorption.

SEE OR SEARCH THIS CLASS, SUBCLASS:
13+, for radar electronic warfare.

4 With particular geometric configuration:
This subclass is indented under subclass 1. Subject matter wherein the absorber has significant topological structural details.

5 RADAR REFLECTOR:
This subclass is indented under the class definition. Subject matter wherein there are means primarily intended to echo or return far field radar signals.

(1) Note. Subject matter of this subclass excludes antenna reflectors which are part of a radar antenna with nominal radar recitation.

(2) Note. Nominal radar recitation for use with radar reflectors is included in this subclass.

SEE OR SEARCH CLASS:
343, Communications: Radio Wave Antennas, subclasses 700+ for antenna reflectors, per se.

6 With modulation:
This subclass is indented under subclass 5. Subject matter including means to vary the amplitude, frequency of phase of a far field radar signal as it is being reflected.

(1) Note. Subject matter of this subclass excludes passive transponders.

SEE OR SEARCH THIS CLASS, SUBCLASS:
51, for passive transponders.
187, for augmenters, per se.

7 Corner:
This subclass is indented under subclass 5. Subject matter wherein the reflecting surfaces are arranged to intersect so as to provided a retrodirective reflection.

8 Inflatable or collapsible:
This subclass is indented under subclass 7. Subject matter wherein the corner reflector has the capability of being: (1) distended by gas (e.g., air); or (2) deflated of gas; or (3) folded together so as to occupy a smaller volume of space.

9 Decoy or tow target:
This subclass is indented under subclass 7. Subject matter wherein the corner reflectors is (1) either part of a vehicle or part of a device pulled by a vehicle which provides reflected signals which disguise the true location of the vehicle or (2) used to move the primary point of reflection.

10 Inflatable or collapsible:
This subclass is indented under subclass 5. Subject matter wherein the reflector has the capability of being: (1) distended by gas (e.g., air); or (2) deflated of gas; or (3) folded together so as to occupy a smaller volume of space.

11 With spherical lens (e.g., Luneberg lens):
This subclass is indented under subclass 5. Subject matter wherein the reflector includes a spherically shaped structure transparent to radio waves having a relative dielectric constant different from unity.

(1) Note. A Luneberg lens is a lens with a circular cross section having an index of refraction varying only in the radial direction such that a feed located on or near a surface or edge of the leans produce a major lobe diametrically opposite the feed.

SEE OR SEARCH CLASS:
343, Communications: Radio Wave Antennas, subclass 911 for an antenna with a Luneberg lens.

12 Chaff:
This subclass is indented under subclass 5. Subject matter wherein the reflector including thin, narrow, metallic strips of various length and frequency responses.

(1) Note. Subject matter of this subclass excludes chaff dispensing means.

SEE OR SEARCH CLASS:
102, Ammunition and Explosives, appropriate subclasses for explosive type chaff dispensers.
221, Article Dispensing, appropriate subclasses for chaff dispensers, per se.
222, Dispensing, appropriate subclasses for chaff dispensing processes or systems.

13 RADAR EW (ELECTRONIC WARFARE):
This subclass is indented under the class definition. Subject matter including means for intentionally interfering with systems or devices within the class, for avoiding such interference or for use in support of such means.

14 ECM (electronic countermeasures, i.e., jamming):
This subclass is indented under subclass 13. Subject matter including means for intentionally interfering with the transmission or reception of signals of systems or devices with the this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9, for decoy corner reflectors.
12, for chaff.

SEE OR SEARCH CLASS:
455, Telecommunications, subclass 1 for jamming of telecommunication signals, per se.

15 With repeater:
This subclass is indented under subclass 14. Subject matter including means to provide a false target replica of a received radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
187, for radar augmenter circuitry, per se.
353, for retransmissions of directive radio wave energy be an object in orbit about the earth.

16 ECCM (electronic counter-/countermeasures, i.e., anti-jamming):
This subclass is indented under subclass 13. Subject matter including means to avoid interferences with the transmission or reception of signals by systems or devices within this class.

17 Radar reacts to jamming:
This subclass is indented under subclass 16. Subject matter wherein a radar system being interfered with changes its mode of operation in response to the interference.

18 By changing frequency:
This subclass is indented under subclass 17. Subject matter wherein the radar system changes its operating frequency in response to being jammed.

19 By varying gain or blocking receiver:
This subclass is indented under subclass 17. Subject matter wherein the receiver gain is reduced or the receiver is gated off in response to being jammed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
94+, for returned signal control of radar systems by gating the radar receiver.

20 Detection of surveillance:
This subclass is indented under subclass 13. Subject matter including means to indicate only the presence of systematic radio signal observation means.

(1) Note. This subclass includes devices commonly called "Fuzzbuster".

21 BASE BAND SYSTEM:
This subclass is indented under the class definition. Subject matter wherein a radar signal extends over a broad band of frequencies rather than being at a single carrier frequency.

SEE OR SEARCH CLASS:
375, Pulse or Digital Communications, subclass 256 for pulse transmission via radiated base band.

22 TRANSMISSION THROUGH MEDIA OTHER THAN AIR OR FREE SPACE:
This subclass is indented under the class definition. Subject matter wherein a radar signal is sent through a substance other than air or free space.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 323+ for electrical wave subsurface geophysical exploration.
455, Telecommunications, subclass 40 for transmission of modulated carrier wave signals through the medium of earth or water, per se.

23 BERTHING OR DOCKING:
This subclass is indented under the class definition. Subject matter wherein a radar system is used to assist in bringing a vehicle to a space allowed for its safety or convenience between other vehicles, piers, wharves or portals.

24 BLIND AID:
This subclass is indented under the class definition. Subject matter wherein a radar system generates the effect of a long antenna by signal processing means rather than by the actual use of a long physical antenna.

25 SYNTHETIC APERTURE RADAR (EPO):
This subclass is indented under the class definition. Subject matter wherein a radar system generates the effect of a long antenna by signal processing means rather than by the actual use of a long physical antenna.

(1) Note. The long antenna is synthesized through the motion of a small antenna relative to the target with either the antenna or the target or both moving. The signal received by the antenna is processed coherently over an integration time. The synthesized antenna length is given by the trajectory traversed by the small antenna relative to the target during the coherent integration time. Because of the two-way phase shift in forming the effective radiation pattern, the effective half-power beam-width must be computed considering twice the synthesized antenna length.

26 RADAR FOR METEOROLOGICAL USE (EPO):
This subclass is indented under the class definition. Subject matter wherein a radar systems is used to evaluate meteorological conditions.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (G01S 13/95).

SEE OR SEARCH THIS CLASS, SUBCLASS:
460, for storm position indicating using radio wave directive devices.

27 PRESENCE DETECTION ONLY:
This subclass is indented under the class definition. Subject matter wherein a radar system senses the existence of a target without quantifying any of its characteristics.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 541+ for intrusion detection alarm systems.

28 By motion detection:
This subclass is indented under subclass 27. Subject matter wherein the presence of a target is detected by sensing target movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
104+, for determining velocity by radar sensing of target motion.
106+, for moving target indicators (MTI), per se, where the signals from non-moving targets are eliminated.

29 AIRCRAFT COLLISION AVOIDANCE SYSTEM (CAS):
This subclass is indented under the class definition. Subject matter wherein a radar signal is used to assist in preventing aircrafts from flying into one another, or other obstacles.

SEE OR SEARCH THIS CLASS, SUBCLASS:
455, for collision avoidance position indicating.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 903 and 961 for potential collision alerting systems.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 17 for computerized radar for vehicle indication or guidance; subclass 514 for computerized radar ground scanners; and subclass 301 for computer avoidance collision systems.

30 With transponder:
This subclass is indented under subclass 29. Subject matter including a radio signal receiver-transmitter to convey the radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

42+, for radar transponder systems, per se.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 870.31+ for inductively coupled signal transmitter used in continuously variable indicating systems.

375, Pulse or Digital Communications, subclasses 211+ for pulse or digital signal repeaters.

455, Telecommunications, subclasses 7+ for carrier wave repeaters.

31 Including synchronized clock:

This subclass is indented under subclass 30. Subject matter including means to operate plural transponders on separate aircraft or on the ground, on a common time base.

SEE OR SEARCH CLASS:

368, Horology: Time Measuring Systems or Devices, subclass 47 for wireless synchronization of timepieces, per se.

32 Included in secondary surveillance radar (SSR or air traffic control radio beacon system (ATCRBS):

This subclass is indented under subclass 30. Subject matter wherein the transponder means are part of a secondary surveillance radar (SSR) or an air traffic control radio beacon system (ATCRBS).

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for air traffic control system including SSR or ATCRBS, per se.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 120+ for aircraft traffic control by computers.

33 AIRCRAFT LANDING SYSTEM:

This subclass is indented under the class definition. Subject matter wherein a radar signal is used by an airborne vehicle to enable the vehicle to land safely on the ground.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for air traffic control system including SSR OR ATCRBS, per se.

410+, for directive signal glide slope transmitters or receivers.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 17 for computerized radar guidance of vehicle landing.

34 Ground control approach (GCA):

This subclass is indented under subclass 33. Subject matter including a ground radar system providing information by which aircraft approaches to landing may be directed via radio communications.

35 Microwave landing system (MLS):

This subclass is indented under subclass 33. Subject matter including an airfield approach microwave radar generating a guideline for landing.

36 AIR TRAFFIC CONTROL:

This subclass is indented under the class definition. Subject matter wherein a radar signal is used to maintain cognizance or to regulate the movement of aircraft in relation to each other or to other objects.

SEE OR SEARCH THIS CLASS, SUBCLASS:

454+, for directive position signaling for plurality of vehicles.

37 Secondary surveillance radar (SSR) or air traffic control radar beacon system (ATCRBS):

This subclass is indented under subclass 36. Subject matter including a radar beacon-transponder means to maintain cognizance or to regulate the paths of selected vehicles within a selected area such as an airport terminal area or air route.

SEE OR SEARCH THIS CLASS, SUBCLASS:

32, for aircraft collision avoidance systems having SSR or ATCRBS.

38 With altitude information:
This subclass is indented under subclass 37. Subject matter wherein the transponder signal includes information about the vertical distance of an aircraft or other object above a given reference plane such as the ground or sea.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118+, for radar distance determination, per se.

39 With side lobe suppression:
This subclass is indented under subclass 37. Subject matter including circuitry means to exclude or greatly attenuate a portion of the beam for an antenna, other than the main lobe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
379+, for directive radio wave communications utilizing correlation techniques to eliminate side lobes.

40 With defruiting or degarbling:
This subclass is indented under subclass 37. Subject matter including means to eliminate random nonsynchronous unintentional return signals in a beacon system or to decode multiple overlapping signal transmission interference.

SEE OR SEARCH THIS CLASS, SUBCLASS:
159+, for clutter elimination, per se.

41 SHIP COLLISION AVOIDANCE:
This subclass is indented under the class definition. Subject matter wherein a radar signal is used to assist in preventing naval craft from running into one another.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 301 for computer navigation systems having collision avoidance means.

42 RADAR TRANSPONDER SYSTEM:
This subclass is indented under the class definition. Subject matter having means wherein the radar signal is received from an originating station, has information coded thereon or added and is retransmitted to the originating station.

SEE OR SEARCH THIS CLASS, SUBCLASS:
15, for repeater jammers which add false information to the radar signal.
30+, for transponder used in aircraft collision avoidance systems.
187, for radar augmenter circuitry, per se.

43 Combined with primary radar system:
This subclass is indented under subclass 42. Subject matter wherein the transponder system is combined with a system in which the retransmitted (reply) signal is a reflection of the transmitted energy from the surface of the target.

44 Unique identity:
This subclass is indented under subclass 42. Subject matter wherein the coded radar retransmitted (reply) signal contains information used to distinguish the transponder station from all others.

45 IFF or SIF:
This subclass is indented under subclass 42. Subject matter including means to transmit radio signals between two stations located on ships, aircraft, or the ground, for automatic identification of particular station characteristics, such as station type (e.g., ally or enemy, bomber or fighter, etc.).

(1) Note. IFF is an acronym for Identification - Friend or Foe.

(2) Note. SIF is an acronym for Selective Identification Feature.

46 Navigational:
This subclass is indented under subclass 42. Subject matter wherein the transponder system is used to direct a vehicle to an intended destination.

SEE OR SEARCH THIS CLASS, SUBCLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 200+ for computer navigation systems, per se.

47 Distance measuring equipment (DME):
This subclass is indented under subclass 46. Subject matter including means to provide distance information by measuring total round-trip time of transmission from an interrogator to a transponder and return, with internationally recognized signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
125, for distance determining system having an augmenter.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 400 through 541 for computer navigation systems and particularly subclass 492 for computer navigation systems utilizing VOR/DME equipment.

48 With automatic lock-on:
This subclass is indented under subclass 47. Subject matter wherein the interrogator station includes circuit means which is self-activating to lock-on the reply signal.

49 With VOR/TACAN:
This subclass is indented under subclass 47. Subject matter including means operating at VHF and providing radial lines of positioning any direction as determined by bearing selection within the receiving equipment, or means operating at UHF using pulse techniques to provide a polar coordinate (rho-theta) system of navigation.

(1) Note. The VOR means emits a (variable) modulation whose phase relative to a reference modulation is different for each bearing of the receiving point from the interrogator station.

(2) Note. For TACAN the distance, (rho), function operates as DME and the bearing function is derived by rotating the ground transponder antenna so as to obtain a rotating multilobe pattern for coarse and fine information.

SEE OR SEARCH THIS CLASS, SUBCLASS:
399, for directive radio communication beacon systems including TACAN equipment and subclasses 401+ and 404+ for systems which include VOR equipment.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 492 for computer navigation systems utilizing TACAN equipment.

50 With telemetry:
This subclass is indented under subclass 42. Subject matter wherein the coded transponder signal contains telemetry information.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 807.1+ for generic telemetering.
455, Telecommunications, appropriate subclass for telecommunications subject matter, per se.

51 Radar transponder only:
This subclass is indented under subclass 42. Subject matter including a radar transponder means, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:
30+, for transponders in aircraft collision avoidance systems.
37+, for transponders in SSR or ATCRBS systems.

52 COMBINED WITH DIVERSE TYPE RADIANT ENERGY SYSTEM:
This subclass is indented under the class definition. Subject matter wherein a radar system operates in conjunction with a different type of far field radiant energy system.

53 With infrared device:
This subclass is indented under subclass 52. Subject matter including a device which operates using radiant energy within the wavelength range 780 to 10^5 nanometers.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 338+ for infrared responsive electric signaling apparatus.
356, Optics: Measuring and Testing, subclass 51 for infrared optical measuring and testing systems.
372, Coherent Light Generators, subclass 4 for infrared coherent, light generators, per se.

54 With laser:
This subclass is indented under subclass 52. Subject matter including a device which provides an intense, coherent, directional beam of light by stimulating electronic, ionic or molecular transitions to lower energy levels.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167, for testing or calibrating radar apparatus with laser means.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, appropriate subclasses for laser radar, per se.
372, Coherent Light Generators, for laser apparatus, per se.

55 With television:
This subclass is indented under subclass 52. Subject matter including the electronic transmission and reception of transient visual images.

SEE OR SEARCH THIS CLASS, SUBCLASS:
142+, for distance and direction determination with pulse modulation and CRT display.
176+, for radar display circuitry, per se.

SEE OR SEARCH CLASS:
348, Television, appropriate subclass for television systems, per se.

56 With direction finding:
This subclass is indented under subclass 52. Subject matter including a device used to determine the direction of arrival of remotely transmitted radio signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107+, and 113, for radar device or systems which determine velocity and direction.
133, 139+ and 146, for radar devices or systems which determine distance and direction.
147+, for radar direction finding, per se.
350+, for radio wave direction finding devices or system other than radar devices or systems.

57 With radio voice communication:
This subclass is indented under subclass 52. Subject matter including the transmission and reception of human voice communication by radio wave.

SEE OR SEARCH CLASS:
455, Telecommunications, for generic radio wave voice communications.

58 With transmission to a remote station:
This subclass is indented under subclass 52. Subject matter including radiant energy means to send a received radar signal to a distant location.

59 PLURAL RADAR:
This subclass is indented under the class definition. Subject matter wherein there are two or more radar systems.

60 TRANSMITTING INTELLIGENCE:
This subclass is indented under the class definition. Subject matter wherein the radar signal beam is used as a carrier for transmitting information in addition to radar information.

SEE OR SEARCH CLASS:
455, Telecommunications, appropriate subclass for communication systems operating at radar frequencies.

61 RETURN SIGNAL CONTROLS EXTERNAL DEVICE:
This subclass is indented under the class definition. Subject matter wherein the reflected radar signal is used to regulate a device separate from the radar system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
73+, for return signal control of the radar system.

62 Missile or spacecraft guidance:
This subclass is indented under subclass 61. Subject matter including control of a projectile or a space vehicle.

SEE OR SEARCH CLASS:
244, Aeronautics and Astronautics, subclasses 3.1 and 158-173.3 for control of missile or spacecraft, per se.

63 Aircraft guidance:
This subclass is indented under subclass 61. Subject matter including means to control an air-borne vehicle"s flight path.

SEE OR SEARCH CLASS:
244, Aeronautics and Astronautics, subclasses 175+ for aircraft guidance control, per se.

64 With map matching:
This subclass is indented under subclass 63. Subject matter including means to compare radar data with previously stored location information to derive guidance signals.

65 With terrain avoidance or alarm:
This subclass is indented under subclass 63. Subject matter including means either (1) to automatically control the aircraft to follow ground contour or to prevent the aircraft from hitting ground based obstacles or (2) to develop signals to alert the aircraft operator.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 945 for aircraft alarm or indicating systems, per se.

66 Camera:
This subclass is indented under subclass 61. Subject matter including means to control the operation of a photographic device.

SEE OR SEARCH CLASS:
396, Photography, subclasses 89+ for automatic range and focus control for photographic devices.

67 Gun (e.g., fire control):
This subclass is indented under subclass 61. Subject matter including means to control the operation of a firearm.

SEE OR SEARCH CLASS:
42, Firearms, appropriate subclass for firearms and firearm operation, per se.
89, Ordnance, subclasses 125+ for automatic gun control, per se.
235, Registers, subclasses 400+ for ordnance or weapons system computers, per se.

68 Proximity fuze:
This subclass is indented under subclass 61. Subject matter including means to control the operation of a fuze device as it approaches its target.

SEE OR SEARCH THIS CLASS, SUBCLASS:
166, for testing or radar apparatus which includes means to control the operation of a fuze device.

SEE OR SEARCH CLASS:
102, Ammunition and Explosives, subclasses 211+ for proximity fuze, per se.

69 Device actuated by presence of land vehicle:
This subclass is indented under subclass 61. Subject matter including means controlled by a return signal indicative of the presence of a land vehicle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
27+, for radar presence detection, per se.

70 Radar mounted on and controls land vehicle:
This subclass is indented under subclass 61. Subject matter including radar means attached to a land vehicle and the return signal is used to control the operation of the land vehicle.

71 With control of brakes or steering:
This subclass is indented under subclass 70. Subject matter including regulation of the land vehicle"s stopping means or its direction control means.

SEE OR SEARCH CLASS:
180, Motor Vehicles, subclasses 167+ for motor vehicle control means responsive to electromagnetic radiation including radio waves reflected from a surface located apart from the vehicle.

72 With control of safety device (e.g., air bags):
This subclass is indented under subclass 70. Subject matter including regulation of the operation of occupant protective means.

SEE OR SEARCH CLASS:
280, Land Vehicles, subclass 735 for land vehicle air bag inflation sensors, per se.

73 RETURN SIGNAL CONTROLS RADAR SYSTEM:
This subclass is indented under the class definition. Subject matter wherein the reflected radar signal is used to regulate the operation of the radar system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
61+, for return signal control of external devices.
422+, for self-orienting antenna pattern directional receivers.

74 Antenna control:
This subclass is indented under subclass 73. Subject matter including control by the returned signal of the radar system antenna.

SEE OR SEARCH CLASS:
343, Communications: Radio Wave Antennas, subclasses 757+ for control means for moving directive antennas.

75 Physical orientation:
This subclass is indented under subclass 74. Subject matter including control of which way the antenna is pointing or its bearing.

76 With ground tracking:
This subclass is indented under subclass 75. Subject matter wherein the returned signal is used to align the antenna in an aircraft with the actual path of the aircraft along the ground.

77 With signal error correction:
This subclass is indented under subclass 75. Subject matter wherein circuitry is provided to correct for errors in the returned signal.

(1) Note. Other than boresight errors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
189, for radar signal correlation circuitry, per se.

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

78 Conical scan:
This subclass is indented under subclass 75. Subject matter wherein the rotation of the beam of the radar system describes a cone, the axis of which coincides with that of the antenna boresight.

SEE OR SEARCH THIS CLASS, SUBCLASS:
158, for radar direction determination by scanning.

79 Lobe switching:
This subclass is indented under subclass 75. Subject matter wherein the antenna"s maximum reception orientation is periodically switched to each of two or more direction in turn.

SEE OR SEARCH THIS CLASS, SUBCLASS:
155, for radar direction determination by lobe switching.

80 Monopulse:
This subclass is indented under subclass 75. Subject matter including the use of a technique in which information concerning the angular location of a source or target is derivable from each pulse or signal detection by comparison of signals received simultaneously in two or more antenna beams.

SEE OR SEARCH THIS CLASS, SUBCLASS:

149+, for radar direction determination with monopulse techniques.

427, for self-orienting antenna pattern monopulse directional receivers.

81 Beam direction by phase or frequency control:

This subclass is indented under subclass 74. Subject matter including control of which way the signal emanating from the antenna is directed by varying the phase or frequency of the signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

83+, for control of the radar transmitter signal phase or frequency other than pulse repetition frequency (PRF).

154, for radar direction determination combined with beam steering.

157, for radar direction determination with frequency or phase steering.

82 Transmitter:

This subclass is indented under subclass 73. Subject matter including control by the returned signal of the means used to transmit the radar signal.

83 Signal phase or frequency other than pulse repetition frequency (PRF):

This subclass is indented under subclass 82. Subject matter including control of the radar signal phase or frequency other than pulse repetition frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

81, for return signal control of antenna beam direction by frequency control.

84 Function of doppler frequency:

This subclass is indented under subclass 83. Subject matter wherein the radar transmitter frequency shift component of the returned signal which is due to the target velocity as it approaches toward or recedes from the radar.

SEE OR SEARCH THIS CLASS, SUBCLASS:

99, for doppler frequency tracking by returned signal control of radar receiver means.

104+, for velocity determination be radar using doppler techniques.

171, for testing radar apparatus with simulated doppler signals.

85 Function of distance:

This subclass is indented under subclass 83. Subject matter wherein the radar transmitter frequency is varied as function of target distance.

86 With constant phase:

This subclass is indented under subclass 85. Subject matter wherein a constant phase relationship is maintained between the transmitted and returned signals.

87 With constant beat frequency:

This subclass is indented under subclass 85. Subject matter wherein a constant beat frequency is maintained between the transmitted and received signals.

88 Transmission Timing (e.g., Ring Around):

This subclass is indented under subclass 82. Subject matter including control of the transmitter signal timing.

(1) Note. Ring Around is the triggering of a radar transmitter by its own returned signal.

89 Receiver:

This subclass is indented under subclass 73. Subject matter including control of the means used to receive the radar signal.

90 Automatic target detection:

This subclass is indented under subclass 89. Subject matter including self-acting means to distinguish between the presence of a return signal from a source having predetermined characteristics versus noise or clutter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

27+, for presence detection only radar systems.

91 Gain or threshold:
This subclass is indented under subclass 89. Subject matter including control of the receiver signal strength or sensitivity.

92 Automatic gain control (AGC):
This subclass is indented under subclass 91. Subject matter including self-acting circuit means to adjust the receiver gain.

93 Constant false alarm rate (CFAR):
This subclass is indented under subclass 91. Subject matter including means specially designed to regulate false alarm caused by noise, or clutter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
16, for electronic counter-countermeasures (ECCM), per se.
159+, for clutter elimination, per se.

94 Gating:
This subclass is indented under subclass 89. Subject matter including control of a device having the ability to permit or inhibit the passage of a signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19, for electronic counter-countermeasures by varying the gain of or blocking the radar receiver.

95 Automatic range tracking:
This subclass is indented under subclass 94. Subject matter including self-acting circuit means to control the timing of a gate in relation to the range of the target.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47+, for navigational radar transponder systems having distance measuring equipment (DME).

96 Automatic track while scan (ATWS):
This subclass is indented under subclass 95. Subject matter including self-acting circuit means to control a gate to keep a receiver locked on a target while continuing to receive return signals from various elements in a given region.

97 With automatic lock-on:
This subclass is indented under subclass 95. Subject matter including self-acting circuit means to continuously track a target.

98 Frequency:
This subclass is indented under subclass 89. Subject matter including control of the receiver frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
81, for return signal control of antenna beam direction by frequency control.

99 Doppler frequency tracking:
This subclass is indented under subclass 98. Subject matter wherein circuitry is provided to follow variations in the doppler component of the returned signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
84, for radar transmitter control by returned signal control as a function of doppler frequency.
104+, for velocity determination by radar using doppler techniques.
171, for testing radar apparatus with simulated doppler signals.

100 With local oscillator control:
This subclass is indented under subclass 98. Subject matter wherein the returned signal is used to regulate the frequency of the receiver local oscillator.

101 With filter control:
This subclass is indented under subclass 98. Subject matter wherein the returned signal is used to vary the center frequency or the bandwidth of a receiver filter circuit.

102 Phase:
This subclass is indented under subclass 98. Subject matter including control of the receiver phase.

103 Phase locked loop:
This subclass is indented under subclass 102. Subject matter including circuit means to compare the phases of an output signal and the return signal of a target, with any phase differ-

ences converted into a correction voltage that causes the phase of the output signal to change so that it tracks the return signal.

104 DETERMINING VELOCITY:
This subclass is indented under the class definition. Subject matter wherein a returned radar signal is used to measure the speed of an object.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 160+ for electrical speed measuring, per se.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 142 through 149 for computerized speed determination, per se.

105 Other than doppler (e.g., range rate):
This subclass is indented under subclass 104. Subject matter including velocity determination other than by measuring the doppler shift of the radar signal.

(1) Note. For example, the velocity may be obtained by measuring the rate of change of the range (i.e., range rate) of an object.

106 Combined with determining acceleration:
This subclass is indented under subclass 104. Subject matter including measurement of the rate of change in the velocity of the object.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclass 141 for acceleration, determination and subclasses 142+ for speed determination.

107 Combined with determining distance and direction:
This subclass is indented under subclass 104. Subject matter including the radar measurement of the distance and direction of the object from a given point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
109+, for velocity and distance determination only.
113, for velocity and direction determination only.

108 With correlation:
This subclass is indented under subclass 107. Subject matter including a measurement of a relationship between the transmitted and the received radar signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
145, for radar distance determination with correlation.
189, for radar correlation circuitry, per se.
378+, for directive radio communication utilizing correlation techniques.

109 Combined with determining distance:
This subclass is indented under subclass 104. Subject matter including the radar measurement of the distance of an object from a given point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107+, for velocity, distance and direction determination.
118+, for radar distance determination, per se.

110 With plural fixed range gates:
This subclass is indented under subclass 109. Subject matter wherein the returned signal corresponding to the respective transmitted radar pulses is applied to plural processing channels which are sequentially activated for short predetermined periods of time to represent range increments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
136, for distance determination using pulse modulation with digital processing and plural fixed range gates.

111 With plural receiver frequency band separation:
This subclass is indented under subclass 109. Subject matter including the use of more than one frequency separation filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
116, for velocity determination with plural received frequency band separation.

112 With plural frequencies transmission:
This subclass is indented under subclass 109. Subject matter including transmitting two or more discrete frequencies and determining distance from changes in each of the received frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:
116, for velocity determination with plural received frequency band separation.

113 Combined with determining direction (i.e., bearing):
This subclass is indented under subclass 104. Subject matter including the radar gauging of direction of an object from a given point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107+, for velocity, distance and direction determination by radar systems or device.
133, 139+ and 146, for radar distance and direction determination without velocity determination.
350+, for direction finding with radio wave signals other than radar systems or devices.

114 Combined with determining sense of motion (i.e., approaching or receding):
This subclass is indented under subclass 104. Subject matter including detection of whether an object is moving toward or from a given point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28, for presence detection only with motion detection.

115 Digital:
This subclass is indented under subclass 104. Subject matter including digital processing of the returned radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
195+, for radar signal digital processing, per se.

116 With plural received frequency band separation:
This subclass is indented under subclass 104. Subject matter including the use of more than one frequency separation filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
111, for determining velocity combined with plural receiver frequency band separation.

117 With plural beams (e.g., "Janus"):
This subclass is indented under subclass 104. Subject matter including the use of two or more radar beams in making the velocity determination.

(1) Note. The "Janus"-type systems comprise two "back-to-back" antennas, respectively facing forward and rearward with nonoverlapping radiation patterns, each antenna serving to provide transmitting and receiving functions. The respective backscatter signal portions received by the antennas are added and subtracted to derive sum and difference signals from which the Doppler speed is determined.

118 DETERMINING DISTANCE:
This subclass is indented under the class definition. Subject matter wherein a returned radar signal is used to measure the range of an object from a reference point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
458, for directive radio wave communication distance determination apparatus.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 3+ for range finding using visible radiation signals.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 158+ for linear distance or length determination, and subclasses 163+ for rotary distance or length determination.

119 Miss distance indicator (MDI):
This subclass is indented under subclass 118. Subject matter including measuring the distance to an object at the closest point of approach to a reference point.

120 Altimeter:
This subclass is indented under subclass 118. Subject matter including determining the distance an aircraft to the earth"s surface from the aircraft.

SEE OR SEARCH THIS CLASS, SUBCLASS:
38, for air traffic control systems with altitude information.

121 With additional indicator:
This subclass is indented under subclass 120. Subject matter including means to display information in addition to altitude.

122 FM type:
This subclass is indented under subclass 120. Subject matter wherein the radar altimeter carrier signal is frequency modified.

SEE OR SEARCH THIS CLASS, SUBCLASS:
128+, for radar distance determination with frequency modulation circuitry, per se.
200+, for frequency modulation radar circuitry, per se.

123 Height finder:
This subclass is indented under subclass 118. Subject matter including determining the distance from the earth"s surface to an aircraft from the ground.

(1) Note. Earth curvature correction (ECC) circuits are included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
38, for air traffic control system with altitude information.

124 Material level within container:
This subclass is indented under subclass 118. Subject matter including determining the height of a substance in a vessel.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 290+ for liquid level measurement, per se.

125 With remote cooperating station:
This subclass is indented under subclass 118. Subject matter including determining the distance between the radar station and a station detached from the radar station using means on the detached station to interact cooperatively with the radar station"s radar signal.

126 Triangulation:
This subclass is indented under subclass 118. Subject matter including distance determination be radar derived procedures of finding the location of a third point by taking bearings from two fixed points a known distance apart from each other or the third point; or by determining the distance from a third point to two known points.

SEE OR SEARCH THIS CLASS, SUBCLASS:
450+, for position determining using triangulation by the transmission or reception of signals from two or more points from or to another point.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 3.01+ for triangulation by light beam.

127 Phase comparison:
This subclass is indented under subclass 118. Subject matter including determining distance by comparing the phase of the transmitted radar with the returned radar carried signal.

128 With frequency modulation:
This subclass is indented under subclass 118. Subject matter including determining distance by using a frequency modified radar carrier signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
122, for radar altitude determination with FM type altimeters.
200+, for frequency modulation radar circuitry, per se.

129 Plural frequency transmitted:
This subclass is indented under subclass 128. Subject matter including the transmission of two or more discrete frequency modulated radar carrier signals.

130 Plural modulation:
This subclass is indented under subclass 128. Subject matter wherein the radar carrier signal is modified by more than one modifying signal.

131 Combined with pulse modulation (e.g., frequency agile):
This subclass is indented under subclass 130. Subject matter including the use of pulse modified radar carrier signals in making the distance determination.

(1) Note. Frequency agile radar is a pulse radar in which the transmitter carrier frequency is changed between pulses in a random or pseudo-random way be an amount comparable to the reciprocal of the pulse width, or multiple thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
134+, for distance determination using pulse modulation radar.
201, for radar frequency modulation combined with pulse modulation circuitry, per se.
202+, for radar pulse modulation circuitry, per se.

132 Within pulse modulation (e.g., "CHIRP"):
This subclass is indented under subclass 131. Subject matter including modulation of the frequency within the duration of the pulse modulation.

(1) Note. "CHIRP" is a technique for pulse compression which uses linear frequency modulation during the pulse.

133 Combined with determining direction:
This subclass is indented under subclass 128. Subject matter including determining the direction of the object from the radar source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
139, for distance and direction determination with pulse modulated radar signals.
146, for distance and direction determination with radar signals, per se.

134 With pulse modulation:
This subclass is indented under subclass 118. Subject matter including the use of pulse modified radar carrier signals in making the distance determination.

SEE OR SEARCH THIS CLASS, SUBCLASS:
131+, for distance determination by using frequency modulation combined with pulse modulation radar.
201, for radar frequency modulation combined with pulse modulation circuitry, per se.
202+, for radar pulse modulation circuitry, per se.

135 Digital (e.g., with counter):
This subclass is indented under subclass 134. Subject matter including digitally processing the returned radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
195+, for radar signal digital processing, per se.

136 With plural fixed range gates:
This subclass is indented under subclass 135. Subject matter wherein the returned signal corresponding to respective transmitted radar pulses is applied to plural processing channels which are sequentially activated for short predetermined periods of time to represent range increments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
110, for velocity determination combined with distance determination using plural fixed range gates.

137 With variable pulse repetition frequency (PRF) or pulse width:
This subclass is indented under subclass 134. Subject matter including changing the rate of the pulse transmission or the width of the pulse transmissions from the radar source.

138 With type "A" or "J" range scope:
This subclass is indented under subclass 134. Subject matter including cathode ray tube display of the returned radar signal as ordinates vs. time as abscissas (Type "A") or with the time base as a circle and the returned signal appearing as a radial deflection from it (Type "J").

SEE OR SEARCH THIS CLASS, SUBCLASS:
55, for radar systems combined with television.
142+, for radar distance and direction determination with CRT display.
176+, for radar display circuitry, per se.

139 Combined with determining direction:
This subclass is indented under subclass 134. Subject matter including determining the direction of the object from the radar source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for distance and direction determination with frequency modulation radar signals.
146, for distance and direction determination with radar signal, per se.

140 With azimuth and elevation determination:
This subclass is indented under subclass 139. Subject matter including the object"s angular measurement in a horizontal plane and in a clockwise direction and its angular position tangent to the earth"s surface.

141 Off boresight:
This subclass is indented under subclass 139. Subject matter including means for measuring the angle between the antenna boresight and the line of sight to the target.

142 With CRT display:
This subclass is indented under subclass 139. Subject matter including cathode ray tube (CRT) display means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
55, for radar system combined with television.
138, for radar distance determination with pulse modulation and with a type "A" or "J" range scope (CRT) display.
176+, for radar display circuitry, per se.

143 Plural:
This subclass is indented under subclass 142. Subject matter including more than one CRT.

144 PPI type:
This subclass is indented under subclass 142. Subject matter wherein the display represents the signal as a bright spot, with range indicated by the distance of the spot from the center of the screen and the bearing by the radial angle of the spot.

145 With correlation:
This subclass is indented under subclass 118. Subject matter including a measurement of relationship between the transmitted and the received radar signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108, for velocity, distance and direction determination with radar signal correlation.
189, for radar correlation circuitry, per se.
378+, for directive radio communication utilizing correlation techniques.

146 Combined with determining direction:
This subclass is indented under subclass 118. Subject matter including determining the direction of the object from the radar source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for distance and direction determination with frequency modulated radar signals.

139+, for distance and direction determination with pulse modulated radar signals.

147 DETERMINING DIRECTION:
This subclass is indented under the class definition. Subject matter wherein a returned radar signal is used to indicate the direction of an object from a reference point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107, and 113, for radar velocity and direction determination.
133, 139 and 146, for radar distance and direction determination.

148 Low angle processing:
This subclass is indented under subclass 147. Subject matter including direction determination of an object at a low angle elevation with respect to the radar signal source.

(1) Note. This subclass contains circuitry to eliminate indirect radar signal returns due to reflection off the ground.

149 Monopulse:
This subclass is indented under subclass 147. Subject matter including the use of a radar technique in which the angular location information of a source or target object is derivable from each pulse or signals received simultaneously in two or more antenna beams, i.e., sum and difference channels in the receiver compare the amplitudes or phases of the antenna outputs.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80, for antenna physical orientation control by return signal monopulse techniques.
427, for self-orienting antenna pattern monopulse directional receivers.

150 With common if channel:
This subclass is indented under subclass 149. Subject matter wherein the signals for comparison share an IF channel.

151 With channel equalization:
This subclass is indented under subclass 149. Subject matter including means to balance the signal processing in each of the channels.

152 With quadrature difference processing:
This subclass is indented under subclass 149. Subject matter wherein the "in phase" sum signal is combined with the "quadrature" phase difference signals.

(1) Note. "In phase" signals have the same frequency and pass through their maximum and minimum vales of like polarity at the same instant.

(2) Note. "Quadrature" signals exist when the phase difference between them and the "in phase" signals is one-fourth of a period of 90 degrees.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194, for complex signal circuitry having means to separate returned radar signals into "in phase" and "quadrature" components.

153 With particular antenna or waveguide:
This subclass is indented under subclass 149. Subject matter including a significant antenna apparatus or wave guide structure.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, appropriate subclasses for wave guides, per se.
343, Communications: Radio Wave Antennas, appropriate subclass for structural apparatus for the transmission or reception of radio waves.

154 Combined with beam steering:
This subclass is indented under subclass 149. Subject matter including control of which direction the signal is emanating from the antenna by varying the phase or frequency of the signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
81, for beam direction by returned signal phase or frequency control.

155 Lobe switching:
This subclass is indented under subclass 147. Subject matter including periodically and discretely shifting a directive radiation pattern in position so as to produce a variation of the signal at the target.

SEE OR SEARCH THIS CLASS, SUBCLASS:
79, for return signal control of the physical orientation of the radar antenna by lobe switching.

156 Interferometer:
This subclass is indented under subclass 147. Subject matter including a receiving antenna system which determines the angle of arrival of the radar signal by phase comparison in the signals at several points on the antenna system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
424, for self-orienting antenna pattern plural antenna tracking interferometers.

157 With frequency or phase steering:
This subclass is indented under subclass 147. Subject matter including means to adjust by radar signal over the elements of a given region.

158 Scanning:
This subclass is indented under subclass 147. Subject matter including directing the radar signal over the elements of a given region.

SEE OR SEARCH THIS CLASS, SUBCLASS:
78, for conical scan radar, per se.

159 CLUTTER ELIMINATION:
This subclass is indented under the class definition. Subject matter wherein unwanted echoes are cancelled from the returned radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
40, for elimination of unwanted transponder replies in air traffic control systems.

160 MTI (moving target indicator):
This subclass is indented under subclass 159. Subject matter including means to eliminate stationary targets from the returned radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28, for presence detection by motion detection.
104+, for determining velocity by radar sensing of target motion.

161 With vehicle movement compensation (e.g., AMTI (airborne MTI):
This subclass is indented under subclass 160. Subject matter including means to adjust for the movement of the craft in which the MTI radar is located.

162 Digital:
This subclass is indented under subclass 160. Subject matter including means to process the returned radar signal as information in the form of one of a discrete number of codes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
195+, for radar digital signal processing, per se.

163 With blind speed elimination:
This subclass is indented under subclass 160. Subject matter wherein circuitry is provided to compensate for targets having radial velocities such that the returned signals cancel each other to produce a false indication of a stationary target.

164 With storage tube:
This subclass is indented under subclass 160. Subject matter including a CRT that stores images on a separate screen behind the viewing screen to distinguish between target return signals having variations indicative of motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
176+, for radar display circuitry, per se.

165 TESTING OR CALIBRATING OF RADAR SYSTEMS:

This subclass is indented under the class definition. Subject matter wherein either: (1) a determination is made how the radar apparatus is functioning, including the existence, type and location of any trouble; or (2) a comparison or measurement is made of the radar apparatus with a standard in order to: (a) determine its accuracy; (b) devise a corrected scale; (c) determine the performance level of the equipment with regard to technical order specification; or (d) generate a correction or compensation signal.

SEE OR SEARCH CLASS:

375, Pulse or Digital Communications, subclasses 224+ for measuring or testing pulse communication.

455, Telecommunications, subclasses 115.1 through 115.4 for measuring, testing or monitoring radio wave transmitters, per se, and subclasses 226.1-226.4 for measuring or testing radio wave receivers, per se.

166 Proximity fuze:

This subclass is indented under subclass 165. Subject matter wherein the radar apparatus under test includes means to control the operation of a fuze device as it approaches its target.

SEE OR SEARCH THIS CLASS, SUBCLASS:

68, for radar return signal control of proximity fuzes.

167 With laser:

This subclass is indented under subclass 165. Subject matter wherein the radar test apparatus includes a device for transforming incoherent light of various frequencies of vibration into a very narrow, intense beam of coherent light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54, for radar apparatus combined with laser means.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, appropriate subclasses for laser radar, per se, and measuring and testing with visible light.

168 With noise generation:

This subclass is indented under subclass 165. Subject matter including means in the test apparatus to produce random electrical disturbances or spurious signals.

169 By simulation:

This subclass is indented under subclass 165. Subject matter wherein the test apparatus includes means to apply signals representative of radar return signals (e.g., simulating a radar target object) to the radar apparatus.

(1) Note. Systems for generating a simulated radar return signal for testing a radar apparatus are classified here.

SEE OR SEARCH CLASS:

434, Education and Demonstration, for pertinent subclass(es) as determined by schedule review.

170 Microwave:

This subclass is indented under subclass 169. Subject matter wherein the radar testing apparatus utilizes radio waves in the frequency range of 1 gigahertz and upward.

171 Doppler:

This subclass is indented under subclass 169. Subject matter wherein the radar apparatus under test utilizes the change of frequency of its transmitted signals caused by the time rate of change of the effective distance travelled by the signals between the source of signal transmission and the point of observation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84, 99 and 104+, for radar systems or devices using doppler techniques.

172 With delay:

This subclass is indented under subclass 169. Subject matter including circuit means in the simulator to retard the passage of signals from one part of the apparatus under test to another.

173 By monitoring:
This subclass is indented under subclass 165. Subject matter including means to observe the performance characteristics of the radar apparatus under test.

174 Calibrating:
This subclass is indented under subclass 173. Subject matter including means to adjust the radar apparatus utilizing a correction or compensation signal as determined by monitoring, or in order to devise an accurate scale.

175 WITH PARTICULAR CIRCUIT:
This subclass is indented under the class definition. Subject matter wherein a circuit associated with the radar system is significant.

176 Display:
This subclass is indented under subclass 175. Subject matter including means to present for viewing, the radar information.

SEE OR SEARCH THIS CLASS, SUBCLASS:
55, for radar systems combined with television.
138, for radar distance determination pulse modulation and with a type "A" or "J" range scope (CRT) display.
142+, for radar distance and direction determination with CRT display.

SEE OR SEARCH CLASS:
315, Electrical Lamp and Discharge Devices: Systems, subclasses 1+ for CRT circuits, per se.
345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 1.1 through 3.4 for visual display systems with selective electrical control.

177 Plural:
This subclass is indented under subclass 176. Subject matter including more than one display.

178 Projection type:
This subclass is indented under subclass 176. Subject matter wherein the display of the radar information is provided by optical means causing the information to be represented on a surface or screen.

179 Image production:
This subclass is indented under subclass 176. Subject matter including means to provide a likeness of the radar target for display.

180 Stereoscopies or tridimensional:
This subclass is indented under subclass 176. Subject matter including means to produce a three-dimensional view or to indicate distance, azimuth and elevation on a single display surface.

SEE OR SEARCH CLASS:
348, Television, subclasses 42+ for stereoscopies applied in television.

181 Color:
This subclass is indented under subclass 176. Subject matter including means to produce the display in color.

SEE OR SEARCH CLASS:
348, Television, appropriate subclasses for color or pseudo-color television circuitry, per se.

182 Electronic marker generation:
This subclass is indented under subclass 176. Subject matter including means to electronically generate symbols representative of radar target information.

(1) Note. The marker may take the form of alphanumeric characters or special symbols other than the usual radar video display.

183 Cursor:
This subclass is indented under subclass 182. Subject matter including the generation of a reference marking (e.g., a line) which moves back and forth over the display surface to enable accurate readings.

SEE OR SEARCH CLASS:
345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 157 through 167 for a cursor mark position control device.
715, Data Processing: Presentation Processing of Document, Operator Inter-

face Processing, and Screen Saver Display Processing, subclasses 856 through 862 for a cursor operator interface.

184 With stabilization (e.g., true motion, true north):
This subclass is indented under subclass 176. Subject matter including means to control the orientation of the display, or to compensate for movement to the display or target indicia on display.

185 Scan conversion:
This subclass is indented under subclass 176. Subject matter including means to transform one display format or rate into another.

SEE OR SEARCH CLASS:
348, Television, subclasses 441+ for television format conversion means.

186 With sweep expansion:
This subclass is indented under subclass 176. Subject matter including means to enlarge part of all of the display sweep.

187 Augmenter:
This subclass is indented under subclass 175. Subject matter wherein an active repeater is provided for returning the radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
15, for radar electronic countermeasures with a repeater.
30+, for radar transponders used in aircraft collision avoidance systems.
51, for radar transponders, per se.
125, for radar distance determination including an augmenter.

188 With polarization:
This subclass is indented under subclass 175. Subject matter including means to polarize the radar signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
361, for directive polarized radio wave signal means.

189 For correlation:
This subclass is indented under subclass 175. Subject matter including circuitry for the measurement of the relationship between the transmitted and the received signals.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108, for velocity, distance and direction determination with radar signal correction.
145, for radar distance determination with correlation.
378+, for signal correlation of directive radio signals.

190 With recording:
This subclass is indented under subclass 175. Subject matter including circuit means for making and storing a copy of the returned radar signal.

191 Mapping:
Subject matter including means to make a s:graphic representation of radar information received in the returned signal.

192 Spectrum analysis:
This subclass is indented under subclass 175. Subject matter including means to study the energy distribution of the returned radar signal.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 76.12+ for complex wave analysis of electrical signals, per se.

193 Harmonic:
This subclass is indented under subclass 192. Subject matter including means to identify and evaluate harmonics that make up the returned radar signal.

194 Complex signal (in phase and quadrature):
This subclass is indented under subclass 175. Subject matter including receiver circuit means to separate returned radar signals into “in phase” and quadrature” components.

(1) Note. “In phase” signals have the same frequency and pass through their maximum and minimum values of like polarity at the same instant.

(2) Note. "Quadrature" signals exist when the phase difference between them and the "in phase" signals is one-fourth of a period or 90 degrees.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152, for monopulse radar with quadrature processing.

195 Digital processing:

This subclass is indented under subclass 175. Subject matter including receiver circuit means to process the returned radar signal by transforming the information contained therein into data carrying signals wherein the information is in the form of one of a discrete number of codes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

115, for radar velocity determination with digital processing of the returned signal.

135+, for radar distance determination with digital processing of the returned signal.

162, for clutter elimination in an MTI radar system with digital processing of the returned signal.

196 Fast fourier transform (FFT):

This subclass is indented under subclass 195. Subject matter including means to perform a fast fourier transform.

SEE OR SEARCH CLASS:

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 403+ for digital computing of Fourier transforms and subclass 821 for analog computing of Fourier transforms.

197 With video quantizer:

This subclass is indented under subclass 195. Subject matter including means to digitize the radar video signal.

198 For receiver protection:

This subclass is indented under subclass 175. Subject matter wherein circuitry such as duplexes, T-R device, or blanking circuit is provided to prevent the transmitter signal from entering the receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for electronic counter-countermeasures by varying the gain or blocking the receiver.

199 Automatic frequency control (AFC):

This subclass is indented under subclass 175. Subject matter wherein the circuitry is provided to maintain the frequency of the radar at a constant value or in a fixed relation with respect to some other section of the radar.

200 For frequency modulation:

This subclass is indented under subclass 175. Subject matter wherein the frequency or phase of the transmitted radar signal is variably controlled as a function of time or other factor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

83, for control of the radar transmitter signal phase or frequency other than pulse repetition frequency (PRF).

122, for radar FM type altimeters.

128+, for radar distance determination with frequency modulation.

201 Combined with pulse modulation:

This subclass is indented under subclass 200. Subject matter including control of the transmitted radar signal to form discrete pulses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

131+, for radar distance determination with frequency modulation combined with pulse modulation used in making the determination.

134+, for distance determination using pulse modulation radar.

202+, for radar pulse modulation circuitry, per se.

202 For pulse modulation:

This subclass is indented under subclass 175. Subject matter including control of the transmitted radar signal to form discrete pulses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

131+, and 134+, for radar distance determination with pulse modulation.

201, for radar frequency modulation combined with pulse modulation circuitry, per se.

203 With noise reduction:

This subclass is indented under subclass 202. Subject matter including circuitry to distinguish between target echoes and noise pulses.

204 With pulse shaping:

This subclass is indented under subclass 202. Subject matter including circuitry for altering the radar pulse shape, bandwidth or spectrum.

205 Sensitivity time control (STC):

This subclass is indented under subclass 175. Subject matter including means to vary the gain (sensitivity) of the radar receiver as a function of time within each pulse repetition interval or observation time in order to prevent overloading of the receiver by strong echoes from targets or clutter at close ranges.

350 DIRECTIVE:

This subclass is indented under the class definition. Devices and processes for sending or receiving radio wave energy which is characterized by some quality that varies according to the relative direction or position of the sender or receiver.

(1) Note. The received wave is not the reflected or returned transmitted wave.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1, through 205+, for similar systems which involve “echo” or reflected wave reception (radar systems) including directive systems of the reflected wave type.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 22+ for traffic and vehicle direction or position indicators using electrical communication apparatus.

343, Communications: Radio Wave Antennas, subclasses 700+ for directive antenna and antenna array structures.

370, Multiplex Communications, appropriate subclasses for nondirective type systems or devices involving the transmission or reception of multiplexed signals, per se.

375, Pulse or Digital Communications, appropriate subclasses for nondirective type systems or devices involving the transmission or reception of pulse or digital signals, per se.

434, Education and Demonstration, subclasses 1+ and 29+ for devices for instructing or training in the characteristics or operation of navigational apparatus including radio beacons, blind landing systems, radio direction finders, etc.

455, Telecommunications, appropriate subclasses for nondirective signal transmission or reception systems, per se.

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 400 through 541 for computer navigation systems using electrical computers or data processors.

351 Including a radiometer:

This subclass is indented under subclass 350. Subject matter including means to measure the signal strength of the radio wave energy.

352 Including a satellite:

This subclass is indented under subclass 350. Subject matter wherein the radio wave energy is transmitted or received by an object in space, in orbit about the earth.

SEE OR SEARCH CLASS:

370, Multiplex Communications, subclass 324 for synchronization in time division multiple access satellite communications.

455, Telecommunications, subclasses 12.1+ for roulette space satellites.

353 Having a signal repeater:

This subclass is indented under subclass 352. Subject matter wherein the satellite retransmits the directive signal to a remote receiver.

354 With beam steering:
This subclass is indented under subclass 352. Subject matter wherein the position of satellite antenna beam is changed by electrical means.

355 With control of satellite attitude:
This subclass is indented under subclass 352. Subject matter wherein the attitude of the satellite is controlled by a signal from a remote transmitter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
358, for correction of satellite transmission signals by a signal from a remote transmitter.

356 Synchronous satellite:
This subclass is indented under subclass 352. Subject matter wherein the satellite speed in orbit is matched to the speed of rotation of the earth on its axis.

357.2 With position, velocity, or attitude determination (IPC):
This subclass is indented under subclass 352. Subject matter including a receiver which interacts with the object in space for determining the location, speed or bearing of the receiver, transmitters and receivers for such systems, ancillary equipment contributing to the proper function of such systems, or methods or devices for calculating location, speed or bearing of the receiver, based on signals received from the object in space.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/00.

357.21 Determining a navigation solution using signals transmitted by a satellite radio beacon positioning system (IPC):
This subclass is indented under subclass 357.2. Subject matter comprising devices or methods for calculating the location or orientation of a receiver based on signals transmitted by a satellite-borne radio wave transmitter.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/38.

357.22 The satellite radio beacon positioning system transmitting time-stamped messages; e.g., GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite System] or GALILEO (IPC):
This subclass is indented under subclass 357.21. Subject matter wherein the transmitter sends a message encoded with time of transmission for used in determining travel time; e.g., at receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/39.

357.23 Correcting position, velocity, or attitude (IPC):
This subclass is indented under subclass 357.22. Subject matter comprising devices or methods for eliminating or reducing errors in the calculation of the location of the receiver, its velocity with respect to a relatively stationary reference or the inclination of the axes of a body to some frame of reference.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/40.

357.24 Differential correction; e.g., DGPS [differential GPS] (IPC):
This subclass is indented under subclass 357.23. Subject matter wherein the correction is based on error information from a source at another location.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/41.

357.25 Determining position (IPC):
This subclass is indented under subclass 357.22. Subject matter comprising devices or methods for determining the location of the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/42.

357.26 Using carrier phase measurements; e.g., kinematic positioning; using long or short baseline interferometry (IPC):
This subclass is indented under subclass 357.25. Subject matter comprising devices or methods for (1) measuring carrier phase at a plurality of spaced antennas and using the difference, (2) for counting the number of cycles that carry the code signal, or (3) using the accumulated phase of the carriers of the system signal.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/43.

357.27 Carrier phase ambiguity resolution; floating ambiguity; LAMBDA [Least-squares AMBiguity Decorrelation Adjustment] method (IPC):
This subclass is indented under subclass 357.26. Subject matter comprising devices and methods to resolve the number of unknown integer cycles.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/44.

357.28 By combining measurements of signals from the satellite radio beacon positioning system with a supplementary measurement (IPC):
This subclass is indented under subclass 357.25. Subject matter wherein the position is calculated by combining distances measured from a satellite with data from some other measurement.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/45.

357.29 The supplementary measurement being of a radio-wave signal type (IPC):
This subclass is indented under subclass 357.28. Subject matter wherein the other measurement is made using radio waves.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/46.

357.3 The supplementary measurement being an inertial measurement, e.g. tightly coupled inertial (IPC):
This subclass is indented under subclass 357.28. Subject matter wherein the other measurement is based on the dynamics of a fixed or moving mass; e.g., IMU or INS.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/47.

357.31 By combining or switching between position solutions derived from the satellite radio beacon positioning system and position solutions derived from a further system (IPC):
This subclass is indented under subclass 357.25. Subject matter wherein position is determined by combining or switching between two calculated positions of which one is derived from a satellite radio beacon positioning system and one from another type of system.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/48.

357.32 Whereby the further system is an inertial position system; e.g. loosely-coupled (IPC):
This subclass is indented under subclass 357.31. Subject matter wherein the calculated position of the other type of system is derived from the dynamics of a fixed or moving mass; e.g., IMU or INS.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/49.

357.33 Whereby the position solution is constrained to lie upon a particular curve or surface; e.g. for locomotives on railway tracks (IPC):
This subclass is indented under subclass 357.25. Subject matter wherein the determined position is confined to a set of values associated with a given curve or surface.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/50.

357.34 Relative positioning (IPC):
This subclass is indented under subclass 357.25. Subject matter comprising devices or methods for determining a first location relative to a second location.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/51.

357.35 Determining velocity (IPC):
This subclass is indented under subclass 357.22. Subject matter comprising devices or methods for determining the time rate of change of position of the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/52.

357.36 Determining attitude (IPC):
This subclass is indented under subclass 357.22. Subject matter wherein the inclination of the axes of a body to some frame of reference is determined.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/53.

357.37 Using carrier phase measurements; using long or short baseline interferometry (IPC):
This subclass is indented under subclass 357.36. Subject matter comprising devices or methods for (1) measuring carrier phase at a plurality of spaced antennas and using the difference therebetween for generating attitude information, (2) for counting the number of cycles that carry the code signal, or (3) using the accumulated phase of the carriers of the system signal.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/54.

357.38 Carrier phase ambiguity resolution; floating ambiguity; LAMBDA [Least-squares AMBiguity Decorrelation Adjustment] method (IPC):
This subclass is indented under subclass 357.37. Subject matter comprising devices and methods to resolve the number of unknown integer cycles.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/55.

357.39 Satellite radio beacon positioning systems transmitting time-stamped messages; e.g., GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite System] or GALILEO (IPC):
This subclass is indented under subclass 357.2. Subject matter wherein the transmitter sends a message encoded with time of transmission for use in determining travel time; e.g., at receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/01.

357.395 Details of the space or ground control segments (IPC):
This subclass is indented under subclass 357.39. Subject matter comprising features of the satellite's communication or data processing systems or features of ground based satellite tracking, monitoring or data uploading systems.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/02.

357.4 Cooperating elements; interaction or communication between different cooperating elements or between cooperating elements and receivers (IPC):
This subclass is indented under subclass 357.39. Subject matter comprising additional elements or subsystems, including receivers of other users, which interact or communicate with the receiver or the satellite positioning systems or details of the interactions or communications between such additional elements or subsystems.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/03.

357.41 Providing carrier phase data (IPC):
This subclass is indented under subclass 357.4. Subject matter wherein the cooperating element supplies information to the receiver regarding the phase of the carrier wave transmitted by the satellite.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/04.

357.42 Providing aiding data (IPC):
This subclass is indented under subclass 357.4. Subject matter under subclass 357.4 wherein the cooperating element provides information to a receiver (e.g., ephemeris data, Doppler or timing information) which either speeds up the acquisition process in the receiver by obviating the need to decode the navigation message transmitted by a satellite, or allows acquisition in environments where decoding of the navigation message is not possible.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/05.

357.43 Employing an initial estimate of the location of the receiver as aiding data or in generating aiding data (IPC):
This subclass is indented under subclass 357.42. Subject matter wherein the cooperating element provides approximate location data to the receiver or uses the approximate location data to generate aiding data.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/06.

357.44 Providing data for correcting measured positioning data; e.g. DGPS [differential GPS] or ionosphere corrections (IPC):
This subclass is indented under subclass 357.4. Subject matter wherein the cooperating element supplies information for improving the accuracy of the receiver's positioning data, or for correcting the positioning data for the effects of the ionosphere on the received satellite signal.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/07.

357.45 Providing integrity information; e.g., health of satellites or quality of ephemeris data (IPC):
This subclass is indented under subclass 357.4. Subject matter wherein the cooperating element provides information relating to the ability of the receiver to detect and indicate system malfunctions (not operating within specified performance limits).

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/08.

357.46 Providing processing capability normally carried out by the receiver (IPC):
This subclass is indented under subclass 357.4. Subject matter wherein the cooperating element performs such data processing or calculations as are usually performed by the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/09.

357.47 Providing dedicated supplementary positioning signals (IPC):
This subclass is indented under subclass 357.4. Subject matter wherein the cooperating element transmits additional positioning signals to the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/10.

357.48 Wherein the cooperating elements are pseudolites or satellite radio beacon positioning system signal repeaters (IPC):
This subclass is indented under subclass 357.47. Subject matter wherein the cooperating element is a ground-based transmitter which transmits or re-transmits positioning signals to a receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/11.

357.49 Wherein the cooperating elements are telecommunication base stations (IPC):
This subclass is indented under subclass 357.47. Subject matter wherein the supplementary signal is provided via a telecommunication transmitting station.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/12.

357.51 Receivers (IPC):
This subclass is indented under subclass 357.39. Subject matter comprising features of the detector and processor of positioning signals from the satellite.

(1) Note. If the modification enables the application of more than a specific application, then it is not classified here.

357.52 Specially adapted for specific applications (IPC):
This subclass is indented under subclass 357.51. Subject matter comprising features of a receiver which make it particularly useful for purposes other than or in addition to the determination of position in general.

(1) Note. If the modification enables the application or more than the specific application, then it is not "specifically adapted for specific application".

(2) Note. Documents classified here on the basis of use should also be classified elsewhere on the basis of structure.

(3) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/14.

357.53 Aircraft landing systems (IPC):
This subclass is indented under subclass 357.52. Subject matter comprising receivers specifically adapted for use in guiding aircraft to the ground.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/15.

357.54 Anti-theft; abduction (IPC):
This subclass is indented under subclass 357.52. Subject matter comprising receivers specifically adapted for use in tracking or locating articles or persons illegally removed.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/16.

357.55 Emergency applications (IPC):
This subclass is indented under subclass 357.52. Subject matter comprising receivers specifically adapted for use in threatening situations.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/17.

357.56 Military applications (IPC):
This subclass is indented under subclass 357.52. Subject matter comprising receivers specifically adapted for use by armed forces.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/18.

357.57 Sporting applications (IPC):
This subclass is indented under subclass 357.52. Subject matter comprising receivers specifically adapted for use in games involving physical activity and skill.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/19.

357.58 Integrity monitoring, fault detection or fault isolation of space segment (IPC):
This subclass is indented under subclass 357.51. Subject matter wherein the receiver detects improper functioning of systems on the satellite or which prevents such improper functioning from affecting the receiver's position determination.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/20.

357.59 Interference related issues (IPC):
This subclass is indented under subclass 357.51. Subject matter comprising means or processes to detect or ameliorate the effect on the receiver of signals from undesired sources.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/21.

357.61 Multipath-related issues (IPC):
This subclass is indented under subclass 357.51. Subject matter whereby the effects of a signal from a satellite arriving at the receiver over more than one path are detected or ameliorated.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/22.

357.62 Testing, monitoring, correcting or calibrating of a receiver element (IPC):
This subclass is indented under subclass 357.51. Subject matter comprising means or processes to insure the proper functioning of the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/23.

357.63 Acquisition or tracking of signals transmitted by the system (IPC):
This subclass is indented under subclass 357.51. Subject matter comprising receiver means or methods for detecting a system signal or maintaining receipt of a system signal over time.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/24.

357.64 Involving aiding data received from a cooperating element; e.g. assisted GPS (IPC):
This subclass is indented under subclass 357.63. Subject matter wherein the acquisition or tracking of system signals in the receiver is facilitated by data provided from elements or subsystems, including receivers of other users, which interact or communicate with the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/25.

357.65 Involving a sensor measurement for aiding acquisition or tracking (IPC):
This subclass is indented under subclass 357.63. Subject matter wherein the acquisition or tracking of signals transmitted by the systemis facilitated or assisted by the output of a sensor device or element.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/26.

357.66 Creating, predicting or correcting ephemeris or almanac data within the receiver (IPC):
This subclass is indented under subclass 357.63. Subject matter wherein ephemeris or almanac data transmitted by, and normally received from, the satellite is created, predicted or corrected by the receiver itself.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/27.

357.67 Satellite selection (IPC):
This subclass is indented under subclass 357.63. Subject matter comprising receiver means or methods for selecting which satellites to acquire or track.

(1) Note. This subclass does not cover the selection of satellites on the basis of satellite geometry; i.e., Dilution of Precision (DOP) information, since such satellites have been acquired and traced and since the DOP is used in the selection of positions.

(2) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/28.

357.68 Carrier related (IPC):
This subclass is indented under subclass 357.63. Subject matter wherein the acquisition or tracking of a signal is based on a characteristic of the signal's carrier wave.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/29.

357.69 Code related (IPC):
This subclass is indented under subclass 357.63. Subject matter wherein the acquisition or tracking of a signal is based on a characteristic of the data modulated onto its carrier wave.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/30.

357.71 Acquisition or tracking of other signals for positioning (IPC):
This subclass is indented under subclass 357.51. Subject matter whereby a receiver detects or maintains a signal other than a system signal.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/31.

357.72 Multimode operation in a single same satellite system; e.g. GPS L1/L2 (IPC):
This subclass is indented under subclass 357.51. Subject matter in which the receiver processes two or more different types of signals from the system wherein the different types conventionally include different carrier frequencies (e.g., L1, L2, L5, etc.) or different codes (e.g., C/A and P).

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/32.

357.73 Multimode operation in different systems which transmit time stamped messages; e.g. GPS/GLONASS (IPC):
This subclass is indented under subclass 357.51. Subject matter in which the receiver is able to selectively process signals from two or more different satellite radio beacon positioning systems transmitting time-stamped messages.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/33.

357.74 Power consumption (IPC):
This subclass is indented under subclass 357.51. Subject matter relating to electric power consumed by the receiver.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/34.

357.75 Constructional details or hardware or software details of the signal processing chain (IPC):
This subclass is indented under subclass 357.51. Subject matter comprising structural features of the receiver or features of its data processing circuitry or of the control thereof.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/35.

357.76 Relating to the receiver front end (IPC):
This subclass is indented under subclass 357.75. Subject matter relating to the processing of signals between the receiver's antenna and its data processing circuits.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/36.

357.77 Hardware or software details of the signal processing chain (IPC):
This subclass is indented under subclass 357.75. Subject matter comprising that part of the receiver that calculates its position from the data received by its antenna.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 19/37.

357.78 Using Doppler frequency shift:
This subclass is indented under subclass 357.2. Subject matter wherein position is determined using the magnitude of the change in the observed wave cycles per time when the satellite and object are moving with respect to each other.

(1) Note. The subject matter in this subclass is substantially the same in scope as IPC G01S 5/10.

358 With satellite signal correction:
This subclass is indented under subclass 352. Subject matter wherein the signal sent by the satellite is corrected by a signal sent from a remote transmitter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
355, for correction of satellite attitude by a signal from a remote transmitter.

359 Including antenna orientation:
This subclass is indented under subclass 350. Subject matter including means to orient an antenna to a predetermined position.

SEE OR SEARCH THIS CLASS, SUBCLASS:
422, for self-orienting antennas.

360 Including antenna pattern plotting:
This subclass is indented under subclass 350. Subject matter including apparatus for providing a s:graphical representation of the radiation properties of an antenna as a function of space coordinates.

(1) Note. Radiation properties include power flux density, field strength, phase and polarization.

361 Including polarized signal communication transmitter or receiver:
This subclass is indented under subclass 350. Subject matter including a transmitter/receiver apparatus which utilizes radio wave energy have a quality that varies according to the polarization of the signal.

(1) Note. Since all radio systems have a transmitted wave which is polarized, this and indented subclasses include only those systems whose operation depends on, or is specially designed to produce, a particular mode of polarization.

SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclass 21 for polarization converters (waveguide).
343, Communications: Radio Wave Antennas, subclass 756 for antennas with polarization converter or filter.

362 Receiver only:
This subclass is indented under subclass 361. Subject matter including polarized signal receiving apparatus only.

363 Circular:
This subclass is indented under subclass 362. Subject matter including the simultaneous transmission of vertically and horizontally polarized radio waves, such that a vector representing the waves has a constant magnitude and varies continuously about a point.

364 Elliptical:
This subclass is indented under subclass 362. Subject matter including the polarization of the signal such that the wave vector for the signal rotates in an elliptical orbit about a point.

365 Circular:
This subclass is indented under subclass 361. Subject matter including the simultaneous transmission of vertically and horizontally polarized radio waves, such that a vector representing the waves has a constant magnitude and varies continuously about a point.

366 Elliptical:
This subclass is indented under subclass 361. Subject matter including the polarization of the signal such that the wave vector for the signal rotates in an elliptical orbit about a point.

367 Including directive communication system:
This subclass is indented under subclass 350. Subject matter including a system for sending or receiving information for some purpose other than direction finding.

SEE OR SEARCH CLASS:
370, Multiplex Communications, appropriate subclasses for nondirective type systems including the transmission of multiplexed information signals.
375, Pulse or Digital Communications, appropriate subclasses for nondirective type systems including the transmission or pulse or digital information signals, per se.
455, Telecommunications, appropriate subclasses for nondirective signal transmission/reception systems, per se.

368 Including a steerable array:
This subclass is indented under subclass 350. Subject matter wherein an antenna array directional beam is adjusted by electrical means.

369 Injection radiation type:
This subclass is indented under subclass 368. Subject matter wherein a receiving station includes means for emitting signals of such character as to facilitate the alignment of the directional pattern of the receiver with the direction of travel of the received signal.

(1) Note. Usually, the emitted signal is received by different antenna elements of an array along with the received signal with which it combines to accentuate the difference in phase or some other characteristic of the signal as received in the different antenna elements.

370 Retrodirective:
This subclass is indented under subclass 368. Subject matter wherein a beam pattern is steered in the exact reverse direction of the direction of a received wave.

371 With electronic scanning:
This subclass is indented under subclass 368. Subject matter wherein a beam of radio-frequency energy is directed successively over the antenna array elements of a given region of the corresponding process in reception.

(1) Note. For example, the phase of the transmitted/received signals are shifted in a particular manner.

372 Controlled:
This subclass is indented under subclass 371. Subject matter including means to regulate the scanning angle of the array antennas.

(1) Note. For example, the input to or the output from the antenna array is used to produce various antenna scan angle control signals.

373 With a matrix:
This subclass is indented under subclass 368. Subject matter including an orderly two-dimensional array of circuit elements.

374 With a switch:
This subclass is indented under subclass 368. Subject matter including a connect/disconnect or circuit selector means in the interface between the steerable array and the electrical steering circuitry.

375 With a delay line (e.g., serpentine transmission line, frequency scanning):
This subclass is indented under subclass 368. Subject matter including a transmission line or equivalent device designed to retard a signal or wave for a predetermined length of time.

376 Including a remote energy source:
This subclass is indented under subclass 368. Subject matter including a separate transmitter of radio wave energy which is located apart from the steerable antenna array, and which drives the array.

377 Including a computer:
This subclass is indented under subclass 368. Subject matter including a device capable of accepting electronic signal information and performing arithmetic and logical operations with the information to supply a signal to the steerable antenna array circuitry.

378 Utilizing correlation techniques:
This subclass is indented under subclass 350. Subject matter wherein the directive communication includes circuitry which provides a relationship between the signals from two or more antennas.

(1) Note. Generally, this subclass does not provide for correlation between transmitted and received signals of the radar or sonar type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1, through 205+, for radar devices using correlation techniques.

SEE OR SEARCH CLASS:
367, Communications, Electrical: Acoustic Wave System And Devices, appropriate subclass for sonar devices using correlation techniques.

708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 422+ for correlation techniques involving the use of an electrical digital computer.

379 Side lobe elimination:
This subclass is indented under subclass 378. Subject matter wherein a receiving apparatus utilizing correlation techniques suppresses at least one portion of the beam from an antenna other than the main lobe.

SEE OR SEARCH CLASS:
455, Telecommunications, subclasses 283+ for undesired signal or noise control in telecommunication systems.

380 Sum of each antenna channel signal:
This subclass is indented under subclass 379. Subject matter wherein the receiving apparatus contains at least two antenna channels (main and auxiliary) which are connected to a summing circuit.

381 Difference of each antenna channel signal:
This subclass is indented under subclass 379. Subject matter wherein the receiving apparatus contain at least two antenna channels (main and auxiliary) which are connected to a subtraction circuit.

382 Mixing each antenna channel signal:
This subclass is indented under subclass 379. Subject matter wherein the receiving apparatus contains at least two antenna channels (main and auxiliary) which are connected to a mixing circuit.

383 Sum of each antenna channel signal:
This subclass is indented under subclass 378. Subject matter wherein the receiving apparatus contains at least two antenna channels (main and auxiliary) which are connected to a summing circuit.

384 Difference of each antenna channel signal:
This subclass is indented under subclass 378. Subject matter wherein the receiving apparatus contains at least two antenna channels (main and auxiliary) which are connected to a subtraction circuit.

385 Beacon or receiver:
This subclass is indented under subclass 350. Subject matter including means for sending or receiving distinctive directive signals.

(1) Note. By “directive” signals is meant signals which denote course, direction, or orientation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
450+, for position indicating involving the use of signals which have no distinctive bearing or position determinative characteristics.

386 With transmission of bearing or position determinative signals:
This subclass is indented under subclass 385. Subject matter including one or more radiating stations whose radiated energy when received, allows a determination of the location of the receiving station in one or more lines or planes having known fixed locations relative to the radiating stations.

(1) Note. Frequently two or more bearing determinations are used to fix the position of the receiving station by intersection of bearing lines or planes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
450+, for position indicating involving the use of signals which have no distinctive bearing or position determination characteristics.

387 Iso-chronic type:
This subclass is indented under subclass 386. Subject matter wherein a distinctive signal or pulse, emitted by one radiating station, and a similar signal or pulse, emitted by a second remote radiating station and bearing a fixed time relationship to the first signal or pulse, are received by a navigation receiver and compared as to their time relationship.

(1) Note. The time difference in the signals is a measure of the difference in distances between the receiving station and each of the radiating stations thereby enabling the fixing of the position of the

receiving station along a hyperbola or hyperboloid which are the loci of all points in space having a constant difference in distance to the radiating stations. These loci are known as "iso-chromes".

388 Loran:

This subclass is indented under subclass 387. Subject matter wherein the radiating stations comprise a master and two or more slave stations.

(1) Note. Usually they are installed along a coastline to serve vehicles on or over the ocean.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 493 for computerized navigation apparatus using Loran equipment.

389 Loran-C:

This subclass is indented under subclass 388. Subject matter wherein the loran system provides a coarse measurement of time-difference through the matching of pulse envelopes, and a fine measurement by the comparing of phase between the carrier wave.

(1) Note. Loran-C is generally useful to distance of 1,000 to 1,500 nautical miles (1,850 to 2,800 kilometers) over water; it uses a baseline of about 500 nautical miles and operates at approximately 100 kilohertz.

(2) Note. A typical example of Loran-C system would include a master station nine at a repetition rate of 10 to 25 groups per second with a spacing of 1,000 micro sec between the pulses of a group; a slave station which after a delay of at least the one-way time from master to slave, plus and additional 2,000 micro sec transmits an eight pulse group, also spaced 1,000 micro sec and later still another slave station which transmits a similar group, and wherein the apparatus receiving these pulses conducts the following operations. (1) Searching for the master signal; (2) Identifying it by repetition rate and phase code; (3) Locking a local reference oscillator onto the master signals; (4) Locking onto the two or more slave signals; and (5) Determining their time difference from the master (commonly these differences are manually translated to hyperbolic lines on a chart).

390 With cycle selection:

This subclass is indented under subclass 389. Subject matter providing cycle tracking of received master an slave transmissions on a predetermined cycle identified from a predetermined Loran pulse envelope point.

391 Loran-A:

This subclass is indented under subclass 389. Subject matter wherein the Loran system provides time-difference measurement by matching the leading edges of the pulses (usually with an oscilloscope).

(1) Note. Loran-A is generally useful to distances of 500 to 1,500 nautical miles (900 to 2,800 kilometers) over water and it uses a baseline of about 300 nautical miles 550 kilometers) while operating at approximately 2 megahertz.

(2) Note. A typical example of a Loran-A system would include a master station transmission of pulses which are received and rebroadcast by the slave stations to be ultimately received by the vehicular receiver which measures the differential delay between reception of the master pulses and slave pulse (usually by oscilloscope observation of the time difference), and for each such differential time, there is a hyperbolic line of position with master and slave as foci, wherein the intersection of two such lines, one from each slave, provides a fix (commonly the oscilloscope readout is manually translated to a chart on which the hyperbolic lines are already printed).

(3) Note. Various chains or Loran-A systems are distinguished from each other by using three carrier frequencies and twenty four sets of pulse repetition rates.

392 With automatic gain control:
This subclass is indented under subclass 387. Subject matter including means to regulate by automatically equalizing or otherwise compensating for differences in the received signal strength in the navigation receiver.

393 Iso-frequency type:
This subclass is indented under subclass 386. Subject matter in which similar frequency modulated signals or pulses, simultaneously emitted by two or more remote radiating stations, are received and compared as to their instantaneous frequencies.

(1) Note. The difference in frequencies between the two received signals is a measure of the difference in the times required for the radiations to travel to the receiving station and so is a function of the difference in distance between each radiating station and the receiving station, thereby enabling the fixing of the position of the receiving station along a known hyperbola or hyperboloid which are the loci of all points in space having a constant difference in distances to the radiating stations.

394 Iso-phase type:
This subclass is indented under subclass 386. Subject matter wherein a distinctive signal or pulse in emitted by one radiating station and a similar signal or pulse (bearing a know, fixed phase relationship to the first signal or pulse) is emitted by a second remote radiating station, and wherein both are received and compared as to their phase relationship by a receiving station to provide a measure of the difference in distance between each radiating station and the receiving station, thereby enabling the fixing of the receiving station position along a known hyperbola or hyperboloid which are the loci of all points in space having a constant difference in distances to the radiating stations.

395 With hetrodyne synchronization:
This subclass is indented under subclass 394. Subject matter including spaced transmitting stations which are not phase synchronized.

(1) Note. The transmitted signals are received by a fixed reference or link station and hetrodyned. The resulting beat frequency is transmitted to the mobile craft for phase comparison with a beat frequency developed in the craft from direct reception of the signals from the spaced transmitting stations.

396 Omega:
This subclass is indented under subclass 394. Subject matter wherein hyperbolic lines of position are determined by measuring the changes in distances from the transmitters by counting radio-frequency wavelengths in space or lanes (iso-phase lines) as a vehicle moves from a known position, the lanes being counted by phase comparison with a stable oscillator aboard the vehicle.

(1) Note. Omega is a very-long-distance navigation system which operates at approximately 10 kilohertz usually transmitting signals in long bursts of continuous waves every 10 seconds.

397 Decca:
This subclass is indented under subclass 394. Subject matter wherein sets of hyperbolic lines of position are determined by comparison of the phase of (1) one reference continuous wave signal from a centrally located master transmitter with (2) each of several continuous wave signals from plural slave transmitter located in a star pattern, each about 70 nautical miles (130 kilometers) from the master.

(1) Note. Decca is a radio navigation system which transmits on several frequencies near 100 kilohertz and is generally useful to about 200 nautical miles (370 kilometers).

(2) Note. A typical decca transmitting chain comprises a master station which is referred to by the “color” of the phase meter associated with each at the receiver. Each station transmits a stable continuous-wave frequency that bears a fixed relationship to the frequencies of other three stations, and therefore phase comparison produces a family of hyperbolic lines of position where the phases are equal (the spaces between the lines are called lanes).

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 493 for computerized navigation apparatus using Decca equipment.

398 Rotating beacon signal:

This subclass is indented under subclass 386. Subject matter wherein the direction of the beacon radiation is continuously changing.

399 TACAN:

This subclass is indented under subclass 398. Subject matter including a complete ultra-high-frequency polar coordinate (RHO-THETA) navigation system using pulse techniques, wherein the distance (RHO) function operates as distance measuring equipment (DME) and the bearing function is derived by rotating the ground transmitter antenna so as to obtain a rotating multiple pattern for coarse and fine bearing information.

(1) Note. A typical TACAN system is comprised of the following: (a) a parasitic antenna element rotating at 900 RPM, generating an amplitude-modulated pattern at 15HZ, with phase proportional to the bearing of the receiver, (b) nine other parasitic elements, also rotating at 900 RPM, generating a multilobe pattern at 135 HZ, to improve the bearing accuracy; and (c) Reference pulses at 15 and 135 HZ to which the above variable phase signals are compared in the receiver to establish its bearing.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 492 for computer navigation apparatus using TACAN equipment.

400 Receiver only:

This subclass is indented under subclass 398. Subject matter comprising apparatus used in the reception of the rotating beacon signal.

401 VOR:

This subclass is indented under subclass 400. Subject matter including receiver means operating at VHF and providing radial lines of position in any direction as determined by comparing the phase of the beacon signal, which is a variable modulated signal, with that of a nondirectional reference modulated signal, within the receiver.

(1) Note. The variable signal has a phase relative to the reference signal which is different for each bearing point of the receiver from the beacon station.

(2) Note. A typical VOR system operates in the following manner: (a) The ground station (beacon) radiates a cardioid pattern that rotates at 30 CPS, generating a 30 Hz sine wave at the output of any airborne receiver; (b) The ground station also radiates and omni directional signal, modulated with a fixed 30 Hz reference tone; (c) The phase between the two 30 Hz tones varies directly with the bearing of the aircraft.

(3) Note. VOR us as abbreviation for VHF or omnirange.

402 Doppler:

This subclass is indented under subclass 401. Subject matter wherein the variable signal has been developed by sequentially feeding a radio-frequency signal to a multiplicity of antennas and detecting the subsequent “Shift in the signal frequency” by the receiver.

(1) Note. The operation of feeding the signal sequentially to the antennas simulates the rotation of a single antenna.

(2) Note. Doppler effect is the observed change of the frequency of a wave caused by a time rate of change of the effective distance travelled by the wave between the source and the point of observation.

403 With circular array of antennas:

This subclass is indented under subclass 402. Subject matter wherein the antennas are arranged in a ring shaped pattern.

404 VOR:

This subclass is indented under subclass 398. Subject matter including means operating at VHF and providing radial lines of position in any direction as determined by comparing

within the receiving equipment the phase of variably modulated beacon signal with that of a modulated nondirectional reference signal.

(1) Note. The variable signal has a phase relative to the reference signal which is different for watch bearing point of the receiver from the beacon station.

405 Doppler:
This subclass is indented under subclass 404. Subject matter wherein the variable signal has been developed by sequentially feeding a radio-frequency signal to a multiplicity of antennas and detecting the subsequent "Shift in the signal frequency" by the receiver.

(1) Note. The operation of feeding the signal sequentially to the antennas simulates the rotation of a single antenna.

(2) Note. Doppler effect is the observed change of the frequency of a wave caused by a time rate of change of the effective distance travelled by the wave between the source and the point of observation.

406 With circular array of antennas:
This subclass is indented under subclass 405. Subject matter wherein the antennas are arrayed in a ring shaped pattern.

407 Fixed course of bearing indicating:
This subclass is indented under subclass 386. Subject matter wherein signals transmitted from one or more beacons are so modulated or directed that a characteristic signal or lack of signal is received so long as the receiver is maintained within a fixed bearing line or plane.

(1) Note. Usually a plurality of directional radiators are so arranged that they have overlapping directional patterns, the signal received in the overlap region determining the bearing or course.

408 Moving beam:
This subclass is indented under subclass 407. Subject matter wherein the transmitted signal changes direction.

409 With superimposed images:
This subclass is indented under subclass 407. Subject matter wherein superposition of two or more visual images is presented within the field of view of an aircraft pilot as an aid to landing or navigation.

(1) Note. Included are systems which superimpose either a facsimile image of a landing area, or flight path marked images, upon a screen so as to be viewed simultaneously with the "real world" by the aircraft pilot.

410 Glide slope transmitter or receiver:
This subclass is indented under subclass 407. Subject matter including means to transmit or receive bearing line or plane informating including the landing or take-off path of an aircraft where the glide slope is the vertical guidance portion of the path.

(1) Note. The glide slope antenna establishes a radiation pattern is space from which a signal is derived proportional to the vertical displacement from the glide path.

(2) Note. For example a modulated carrier signal by 90 and 150 Hz in a spatial pattern that allows the 90 Hz modulation to be detected above the glide path at an amplitude proportional to angular displacement from the path. Below the glide path, the 90 Hz signals radiated by the antenna are 1805 out of phase and subtract leaving the 150 Hz signal to be detected. Predominance of the 150 Hz signal causes a "fly up" indication in the cross-pointer meter off light direction; predominance of the 90 Hz signal causes a "fly down" signal.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 945+ for airport traffic control systems including landing guidance observable electrical signal indicators.

411 Receiver only:
This subclass is indented under subclass 410. Subject matter including only the apparatus to receive the beacon signal.

412 Transmitter only:
This subclass is indented under subclass 410. Subject matter including only apparatus to transmit a glide slope signal.

413 Localizer transmitter or receiver:
This subclass is indented under subclass 407. Subject matter including transmission or reception of signals for the lateral guidance of aircraft with respect to the center line of a runway.

(1) Note. The localizer course is aligned with the projected runway center line. The carrier is modulated at 90 and 150 Hz in a spatial pattern that makes the 90 Hz modulation predominate when the aircraft is to the left of the course, with a difference in depth modulation proportional to the angular displacement from the course. The left-right cross-pointer meter or flight director show "fly right" when it receivers 90 Hz signals. To the right of the course the 90 Hz signals subtract, leaving the predominant 150 Hz signal proportional to the displacement from the course.

414 Distinctive frequencies equi-signal type:
This subclass is indented under subclass 407. Subject matter in which a beacon is caused to radiate along two fixed, angularly disposed, directional patterns with radiations in each pattern being given a modulation which is a distinctive frequency.

(1) Note. The different frequencies when received in equal or proportional strengths, given an indication that the receiver is located on course, while predominance of one frequency over the other indicates the sense of the deviation from course.

415 Coded equi-signal (e.g., A and N type):
This subclass is indented under subclass 414. Subject matter in which a beacon is caused to alternately radiate in accordance with either one of two fixed angularly disposed directional patterns with the alternations being so timed that the radiation is each pattern is interrupted in accordance with a code which is distinctive with that pattern.

(1) Note. Classified here are patents on range beacons of the "A and N" type in which one pattern radiates a dot and a dash (A) and the other radiates a dash and a dot (N) which when received in equal strength by a single receiver combine to produce an uninterrupted signal indicative of the fact that the receiver is on course, while predominance of either the "A" or the "N" over the other indicates the sense of the deviation from course.

416 Sequentially effective reflectors:
This subclass is indented under subclass 414. Subject matter in which the alteration of the directional patterns is produced by alternating the effectiveness of two reflecting units.

417 Direction-finding receiver only:
This subclass is indented under subclass 385. Subject matter including a receiver station which is capable of determining the time of travel or bearing of the received signals with respect to the station.

SEE OR SEARCH THIS CLASS, SUBCLASS:

147+, for reflected (radar) or otherwise returned radio wave systems which include a direction finding receiver.

386+, for systems under subclass 350 which include a directional transmitting station and a receiving station so that the location of the receiving station in a line or plane with respect to the transmitting station may be determined.

407+, for receivers especially designed to receive a characteristic signal or lack of signals transmitted from one or more beacons, so long as the receiver is maintained within a fixed bearing line or plane.

SEE OR SEARCH CLASS:

329, Demodulators, appropriate subclasses for demodulators of modulated wave energy.

418 Doppler:
This subclass is indented under subclass 417. Subject matter wherein the received signals have an apparent change in frequency due to the doppler effect.

(1) Note. Doppler effect is the observed change of the frequency of a wave caused by a time rate of change of the effective distance travelled by the wave between the source and the point of observation.

419 Portable:
This subclass is indented under subclass 417. Subject matter wherein the direction finding receiver is capable of being carried or conveyed.

420 With error or deviation compensator or eliminator:
This subclass is indented under subclass 417. Subject matter including means which apply to the direction indication, a correction for known errors of the indication or for a desired deviation from the indication, or which are provided with means to eliminate or reduce the effects of unwanted signals or for deviations in the signal wave caused by disturbing influences.

(1) Note. This subclass contains patents for systems in which means are provided to compensate for or to eliminate the errors caused by metallic masses. Many of the systems in this subclass are designed for use on ships and airplanes where large metallic masses and other disturbing devices are located near the receiver. Included are systems where a screen is applied between the mass and the receiving antenna, and systems which include means so that the reading obtained is corrected for known errors. In the indented subclass are systems where the wave transmitted is in the form of pulses, the system being provided with means to eliminate or compensate for unwanted signal pulses, such as reflected sky waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:
358, for satellite signal correction means.

SEE OR SEARCH CLASS:
714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for electrical signal error correction/compensation, per se.

421 Pulse-type noise elimination or compensation (e.g., sky waves):
This subclass is indented under subclass 420. Subject matter wherein the signal is in the form of pulses.

(1) Note. The systems in this subclass are usually provided with means to eliminate or compensate for unwanted signal pulses, such as reflected sky waves.

422 With self-orienting antenna pattern:
This subclass is indented under subclass 417. Subject matter wherein the receiver automatically alters its directional characteristic to coincide with the line of travel of selected radio waves.

423 Plural antennas:
This subclass is indented under subclass 422. Subject matter wherein the receiver apparatus includes more than one antenna.

424 Tracking interferometer:
This subclass is indented under subclass 423. Subject matter wherein means for the combined reception pattern of the antennas is automatically adjusted to direction of and in response to, an incoming signal.

(1) Note. Usually the signals received by the antenna are compared in a phase discriminator.

425 Conical scan antenna type:
This subclass is indented under subclass 422. Subject matter wherein the antenna of the receiver is operated in a conical pattern about a pointing axis of the tracking system.

426 Step track antenna type:
This subclass is indented under subclass 422. Subject matter wherein the antenna of the receiver is aimed at a signal source through rotation in discrete angular steps about an axis.

(1) Note. The direction of the antenna rotation is controlled usually by signals developed from incoming signal strength comparison.

427 Monopulse or pseudo monopulse tracking antenna type:
This subclass is indented under subclass 422. Subject matter wherein tracking of the signal source is accomplished by comparing overlapping pattern or lobe signals received by the receiver antenna to determine any discrepancy between the direction of the signal source, and any discrepancy is reduced to pointing error signals used for correcting the pointing direction of the antenna.

428 With continuously movable antenna pattern:
This subclass is indented under subclass 417. Subject matter wherein means are provided for constantly altering a direction characteristic of the receiver.

(1) Note. The alteration of the directional characteristic is frequently by rotation of a directional antenna for the receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:
398+, rotating transmitting beacons.

429 Including a stationery antenna:
This subclass is indented under subclass 428. Subject matter including a separate antenna that has an antenna pattern which does not move.

430 Including plural moving antennas:
This subclass is indented under subclass 428. Subject matter including more than one antenna that changes position, usually rotating about an axis.

431 Including a goniometer:
This subclass is indented under subclass 428. Subject matter wherein means receiving energy from two or more antennas having fixed angularly disposed directional characteristics, sets up, adjacent an orientable pick up device, singularly disposed fields whose resultant field bears a fixed angular relation to the direction of the received energy.

432 With plural fixed antenna pattern comparing:
This subclass is indented under subclass 417. Subject matter wherein the receiving station provides for comparison of the energy received by a plurality of fixed directional antennas or by two antennas having dissimilar or received directional characteristics.

433 Successively commutated:
This subclass is indented under subclass 432. Subject matter wherein the receiver is periodically connected to the various antennas in sequence.

434 Including more than antennas:
This subclass is indented under subclass 433. Subject matter wherein more than two antennas are connected in sequence.

435 By diode switching:
This subclass is indented under subclass 433. Subject matter wherein the receiver is periodically connected to the various antennas by diode switching means.

436 By modulation:
This subclass is indented under subclass 433. Subject matter wherein commutation is effected by varying the amplitude, frequency, or phase of a wave by impressing one wave on another wave of constant properties.

437 Including more than two antennas:
This subclass is indented under subclass 432. Subject matter including more than two fixed directional antennas.

438 Including separate indicators:
This subclass is indented under subclass 432. Subject matter wherein the comparison is made by use of two or more distinct indicating devices.

439 Including combined effect indicator:
This subclass is indented under subclass 432. Subject matter wherein comparison is made by a single indicating device which is responsive to at least two of the quantities to be compared.

440 Including a goniometer:
This subclass is indented under subclass 432. Subject matter wherein means receiving energy from two or more antennas having fixed angularly disposed directional characteristics, sets up, adjacent an orientable pick up device, singularly disposed fields whose resultant field bears a fix angular relation to the direction of the received energy.

SEE OR SEARCH CLASS:
336, Inductor Devices, subclasses 115+ and the subclasses specified in the Notes thereto for the structure of transformers with relatively movable coils.

441 Having a goniometer:
This subclass is indented under subclass 417. Subject matter wherein means receiving energy from two or more antennas having fixed angularly disposed directional characteristics, sets up, adjacent an orientable pick up device, singularly disposed fields whose resultant field bears a fixed angular relation to the direction of the received energy.

442 Having a phase detector:
This subclass is indented under subclass 417. Subject matter wherein the received signals are coupled to a phase detector to provide resultant bearing signal.

443 Having a direction indicator:
This subclass is indented under subclass 417. Subject matter wherein the receiver includes a direction indicating device.

444 Having plural receivers:
This subclass is indented under subclass 417. Subject matter wherein each received signal is connected to a separate receiver.

445 Having more than two antennas:
This subclass is indented under subclass 417. Subject matter wherein the direction finding receiver is coupled to more than two antennas.

446 Unequal distance between at least three antennas:
This subclass is indented under subclass 445. Subject matter wherein the distance from the first receiving antenna to the second receiving antenna is different than the distance from the second receiving antenna to the third receiving antenna.

447 Having a spiral antenna:
This subclass is indented under subclass 417. Subject matter wherein the direction finding receiver is coupled to an antenna which has the form of a helix.

448 Having a coil or loop type antenna:
This subclass is indented under subclass 417. Subject matter wherein the direction finding receiver is coupled to an antenna which consists of one or more loops of wire.

449 Having a moving antenna:
This subclass is indented under subclass 417. Subject matter wherein the direction finding receiver is coupled to an antenna which changes position, usually around an axis and is not classified elsewhere.

450 Position indicating (e.g., triangulation):
This subclass is indented under subclass 350. Subject matter including apparatus for determining the position in space of an object, vehicle or atmospheric condition by the reception of signals not having distinctive bearing or position determinative characteristics.

(1) Note. Usually position is fixed by triangulation using two or more bearing determinations.

SEE OR SEARCH THIS CLASS, SUBCLASS:
357, for position indicating means including a satellite.
358+, for beacons or receivers having means for sending or receiving distinctive directive signals which may be used to determine the position of an object.

451 By computers:
This subclass is indented under subclass 450. Subject matter including the use of a device capable of accepting the signal information and applying prescribed computational processes to this form of the information for the determination of the position indication.

(1) Note. Subject matter classified in this subclass must include significant details

of the structure of the directional device or apparatus.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 301 for computerized collision avoidance equipment.

452 By plotting table:
This subclass is indented under subclass 450. Subject matter including apparatus for indicating the position on a map.

453 By reflected or repeated signal:
This subclass is indented under subclass 450. Subject matter wherein the receiver signals have been deflected by an object or a surface or have been retransmitted by a repeater station.

(1) Note. The receiver is at a remote location from the transmitter.

454 Traffic:
This subclass is indented under subclass 450. Subject matter wherein the positions of a plurality of vehicles or objects are continuously monitored either with respect to each other or to a common reference point of both.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 22+ for traffic and vehicle systems having position indicators.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 1+ for computerized vehicle collision systems.

455 Having collision avoidance:
This subclass is indented under subclass 454. Subject matter including means to enable vehicles to steer clear of each other or other obstacles.

(1) Note. Airborne collision avoidance equipment may perform, for example, one or more of the following functions: (a) Detecting all potentially dangerous aircraft in the surrounding airspace; (b) Evaluating the actual occurrance or miss distance of a collision hazard; (c) Determining the precise maneuver needed, if any, to avoid a collision; (d) Specifying when the maneuver should be initiated in order to ensure safe clearance.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 301 for computerized collision avoidance systems.

456 Having traffic control:
This subclass is indented under subclass 454. Subject matter including means to regulate the positions of the vehicles or objects.

(1) Note. For example, air-traffic control would provide for the safe, orderly and expeditious flow of aircraft to an from the airspace around an airport.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 22+ for traffic and vehicle control systems having an indicator.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 1+ for computerized systems to control vehicles.

457 Land vehicle location (e.g., bus police car):
This subclass is indented under subclass 450. Subject matter wherein the position of a means of conveyance over dry terrain is determined.

458 Distance:
This subclass is indented under subclass 450. Subject matter including means to determine the extent of a space between two points.

459 Underground object location:
This subclass is indented under subclass 450. Subject matter wherein the position of an atmosphere disturbance or nuclear detonation is determined.

460 Storm or atomic explosion location:
This subclass is indented under subclass 450. Subject matter wherein the position of an atmospheric disturbance or nuclear detonation is determined.

461 With speed determination:
This subclass is indented under subclass 450. Subject matter including means to determine the velocity of an object.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 160+ for speed measurement using electrical means, per se.

462 With altitude determination:

This subclass is indented under subclass 450. Subject matter including means to determine the height above sea level of air object.

463 Having plural transmitters or receivers:

This subclass is indented under subclass 450. Subject matter wherein the position indicating device includes more than one transmitter or receiver.

464 Plural transmitters only:

This subclass is indented under subclass 463. Subject matter including more than one transmitter.

465 Plural receivers only:

This subclass is indented under subclass 463. Subject matter including more than one receiver.

END