

1	ELECTRIC MOTOR WITH NONMOTOR DRIVING MEANS (E.G., AXLE DRIVE, MANUAL DRIVE)	568.13	...With particular program teaching method
2	.Manual driving means	568.14	....Manual lead through
3	WITH PARTICULAR MOTOR-DRIVEN LOAD DEVICE	568.15	...With particular interpolation means
4	.Plural, diverse or diversely controlled load device	568.16	...With particular sensing device
5	..Plural motor drive	568.17	...With multimode control (e.g., course-fine, position-force, etc.)
6	.Tension-maintaining type of motor-control system	568.18	....Including velocity control
7	..Plural, diverse or diversely controlled motors	568.19	...With particular coordinate transformation means
8	.Plural, diverse or diversely controlled driving motors (e.g., driving differential gearing)	568.2	...With plural control systems (e.g., the interaction of plural processors to control the plural joints of a single robot):
9	.Power- or motion-transmitting mechanism	568.21	....Including end effector (e.g., gripping jaw, micromanipulator, etc.)
10	..Reversible drive mechanism	568.22	...With particular compensation (e.g., gain, offset, etc.)
11	..Variable speed mechanism	568.23	....Including program modification
12	...Gearing	568.24	...With reliability enhancement means (e.g., monitoring, redundant circuits, etc.)
13	....Differential type	568.25	....Including display device
14	..Motion-converting mechanism	569	..Digital or numerical systems
15	..Mechanical gearing	570	...Contouring systems
16	SUPPLIED OR CONTROLLED BY SPACE- TRANSMITTED ELECTROMAGNETIC OR ELECTROSTATIC ENERGY (E.G., BY RADIO)	571	...With "feed-rate" control
17	PORTABLE-MOUNTED MOTOR AND/OR PORTABLE-MOUNTED ELECTRICAL SYSTEMS THEREFOR	572	...With "zero-offset" or tool radius correction
560	POSITIONAL SERVO SYSTEMS (E.G., SERVOMECHANISMS)	573	...With interpolating means
561	.Adaptive or optimizing systems including "bang-bang" servos	574	...Multiple axes point to point systems
562	.Time-sharing or multiplexing systems	575	..Multiple axes analog systems
563	.With protective or reliability increasing features (e.g., "fail-safe" systems)	576	..Nonmechanical line, seam or edge followers
564	.."Redundant" operating channels	577	...Optical or photoelectric line followers
565	..Monitoring systems	578	...Cam or template followers
566	..Maneuver, force, or load- limiting	579	...Multiple pass systems
567	.Program- or pattern-controlled systems	580	.Vehicular guidance systems with single axis control
568.1	..With program recording or composing means	581	..Radio-controlled
568.11	...Multifunction manipulator (i.e., Robot)	582	..Celestial navigation
568.12	....Mobile robot	583	..Landing systems
		584	..Altitude or pitch control
		585	..Roll control
		586	..Yaw control
		587	..Land vehicles

588	..Marine vehicles	625	.Plural servomotors
589	...Submarine and torpedo systems	626	.Limit or end-stop control
590	..Multiple mode systems	627	..Secto-scanning systems
591	..With mode-engagement features (e.g., manual to automatic)	628	."Feelback" systems
592	..Fine and coarse systems	629	.Unwanted harmonic or voltage component elimination quadrature rejection systems
593	...Separate fine and coarse motors	630	.Antibacklash systems (e.g., with unidirectional approach to balance)
594	...Digital systems	631	.Antistatic friction features (e.g., "dither" voltage)
595	..Multiple speed synchro systems	632	.With compensating features
596	..Combined "on-off" and proportional control	633	.."Two-cycle error" compensation
597	..Slewing systems	634	..Temperature compensation
598	..With a separate slewing motor	635	.With signal-, voltage-, or current-limiting
599	..Pulse-width modulated power input to motor (e.g., "duty cycle" systems)	636	."Sampling" systems including miscellaneous "sampled data" control systems
600	..Digital or numerical systems	637	.Analog computation
601	..Digital comparison	638	.With particular "error- detecting" means
602	...Commutating switch-type encoder	639	..Plural, diverse conditions
603	..Pulse-counting systems	640	..Photoelectric or optical-type measuring instruments
604	..Analogue comparison	641	..With particular temperature measuring instrument
605	...Synchro or resolver (e.g., transmitter simulators)	642	..With liquid level measuring instruments
606	..Frequency- or phase-modulated systems	643	..With moisture content or wetness measuring instruments
607	..Frequency comparison	644	..With flow measuring instruments
608	..Phase comparison	645	..With fluid pressure measuring instruments
609	."Reset" systems (P.I.)	646	..With force or weight measuring instruments
610	..With rate (P. I. D.) (e.g., reset windup prevention)	647	..With magnetic field measuring instruments
611	..With stabilizing features (e.g., anti-hunting, damping)	648	..With inertial, direction or inclination measuring instrument
612	..Electric braking near balance (e.g., dynamic)	649	...Stable platforms
613	...D.C. in A.C. windings	650	..With current, voltage or electrical power measuring instruments
614	..Friction-braking near balance including magnetic or eddy current brakes	651	..With acceleration measuring instruments
615	..By auxiliary feedback loop	652	..With particular position measuring instruments
616	...Rate feedback	653	...Magnetic transducers
617	...Variable rate feedback	654	...Synchro control transmitter- transformer systems
618	...Tachometer feedback	655	...With synchro differential
619	..Variable gain bandwidth		
620	..Nonlinear circuits		
621	..Lead or lag networks		
622	...A.C. networks		
623	..Load stabilization (e.g., viscous, magnetic or friction dampers)		
624	..By deadband at null (e.g., threshold circuits)		

656	...Differential transformer systems	692	.Having induction or "selsyn" type transmitter
657	....Linear differential transformer	693	.Having impedance-type transmitter
658	...."E" type transformer	694	.Having commutated dynamoelectric machine transmitter
659	...."Microsyn" type	695	.Having commutating switch-type transmitter
660	...."Inductosyn" systems	696	OPEN-LOOP STEPPING MOTOR CONTROL SYSTEMS
661	....Resolver systems	34	PLURAL, DIVERSE OR DIVERSELY CONTROLLED ELECTRIC MOTORS
662	...Variable capacitor systems	35	.Motors with diverse motions (e.g., reciprocating and rotary motors)
663	...Potentiometer systems including autotransformers and Wheatstone bridges	37	.Plural reciprocating or oscillating motors
664	....Minor arc seeking	38	.Plural linear-movement motors
665	....Continuous rotation, unlimited range	39	.Work and feed motors (e.g., indexing)
666	....Controlled tap and slidewire	40	.Motor biased against rotation
667	....With a bridge in the feedback circuit	41	.Having electrical synchronizing interconnections
668	....Recalibrating systems	42	..Between windings on auxiliary dynamo-electric machines
669	...Standing wave	43	..D.C. or A.C. commutator motors with slip rings
670	...Contact resistance	44	..Between induction motor secondaries
671	.With particular motor control system responsive to the "actuating signal"	45	.Mechanically coupled in fixed ratio of movement
672	..Discontinuous or "on-off" control	46	..Motors having unlike operating characteristics
673	...Seeking switch type	47	...Synchronous and nonsynchronous motors
674	..Wheatstone bridge type	48	..Mechanically coupled in torque opposition
675	..One transmitter or controller element follows another	49	.Motors electrically connected in cascade or tandem
676	..Transmitter or controller element returned (e.g., force balance systems)	50	..With means for effecting other motor interconnections
677	..With particular servoamplifier	51	.Plural, diverse motor controls for different motors
678	...Differential amplifier	52	.Slipping and/or racing control for electric motors
679	...Diverse types of amplifiers in different stage	53	.Plural, diverse motor controls
680	...Magnetic servoamplifiers	54	..Motor-reversing
681	...Solid-state servoamplifiers	55	...With running-speed control
682	...Rotating amplifier (e.g., "Ward Leonard" control)	56	....And braking
683	..With particular phase discriminator	57	...And braking
684	..With particular modulator or detector (e.g., choppers)	58	...And acceleration control
685	.. "Step-by-step" motors in closed-loop servos	59	..Running-speed control
686	..Reciprocating or oscillating motors	60	...And braking
687	..Linear movement motors	61	...And acceleration control
688	..Shaded pole motors		
689	TORQUING MOTORS		
690	SELF-SYNCHRONOUS TYPE OF MOTOR		
691	.With means to amplify transmitter signals		

62	...And automatic starting and/or stopping and/or with time delay	92	..Control of both armature (or primary) and field (or secondary) circuits
63	..Braking	93	...Series-parallel connected armature or primary circuits
64	..Acceleration control	94	..Armature or primary circuit control
65	..Motor-reversing	95	...Series-parallel connections
66	..Running-speed control	96	...With armature circuit impedance
67	..Diverse speeds for different motors	97	..Field or secondary circuit control
68	..Relative motor speed control	98	.Load control
69	...With speed-difference detector	99	..Fixed ratio of load or current division
70	...Electrical-type detectors	100	..By field or secondary circuit control
71	....Voltage and/or current difference detector	101	.Starting and/or stopping
72	....Dynamoelectric machine detector	102	..Sequential or successive starting and/or stopping
73	....Synchronously operated impedance detectors	103	..Selective starting and/or stopping
74	....Synchronously actuated switch detectors	104	..Armature (or primary) circuit control
75	.....Plural switches connected in series	105	.Plural, diverse or diversely controlled sources of armature (or primary) supply
76	....Differential-gearing detector	106	..Diverse sources
77	..Controlling motor speed in response to speed of another motor	107	...A.C. and D.C.
78	....Controlling A.C. frequency or rate of electrical impulses to other motor	108	...Different voltages
79	...Control of both armature (or primary) and field (or secondary) circuits	109	...Different voltages
80	..Armature or primary circuit control	110	...Different frequencies
81	..Field secondary circuit control	111	.Series-parallel connected motors
82	..Armature or primary circuit control	112	.Parallel connected motors
83	...Series-parallel armature circuit connections	113	.Series connected motors
84	..Field or secondary circuit control	114	IMPACT, MECHANICAL SHOCK, OR VIBRATION-PRODUCING MOTORS
85	..Synchronizing or phasing control	115	MOTOR WITH DIVERSE MOTIONS (E.G., ROTARY AND RECIPROCATING)
86	..Braking	116	NONMAGNETIC MOTOR
87	..Motor used as braking generator (dynamic braking)	117	.Thermoelectric motor
88	...Load or current division during braking	118	MAGNETOSTRICTIVE MOTOR
89	..Motor as exciter for another motor	119	RECIPROCATING OR OSCILLATING MOTOR
90	..Acceleration control	120	.Stopping after predetermined number of reciprocations or cycles (including single cycle)
91	..Accelerating motors in succession or selectively	121	.Having means to produce a progressing or traveling motor field flux
		122	.Plural, diverse or diversely controlled motor windings

123	..Polyphase or diverse or diversely controlled sources of motor supply	150	.With flywheel on generator or on motor
124	...A.C. and D.C. sources	151	.Control of both the generator and the circuit to the motor
125	..Unidirectionally conductive devices in energizing circuit	152	..With motor control
126	.Energizing winding circuit control	153	.Control of both the generator and the motor
127	..Automatic in response to predetermined position, movement or condition in or of the motor or driven device	154	..Control of excitation (field) circuit of both
128	..Noise, sound, vibration, movement or position of motor	156	.Plural, diverse or diversely actuated, generator control means
129	..By means for producing periodic electrical pulses in the energizing circuit	157	.Generator speed control
130	...Electrical oscillation or condenser charging and/or discharging circuits	158	.Generator field circuit control
131	..Motor or escapement-controlled means	159	HAVING ROTOR ELEMENT BIASED AGAINST ROTATION
132	..By space-discharge or unidirectionally conductive devices in energizing circuit	160	.By resilient biasing means (e.g., spring)
133	..By impedance devices in energizing circuit	161	WITH FLYWHEEL OR MASSIVE ROTARY MEMBER
134	..By circuit making and/or braking devices	162	CONTROL BY PATTERNS OR OTHER PREDETERMINED SCHEDULE MEANS
135	LINEAR-MOVEMENT MOTORS	163	.Motor running-speed control
136	AUXILIARY MEANS FOR PRODUCING MECHANICAL STARTING OR ACCELERATING TORQUE	164	..Cyclically varying or repeated speed schedules
137	.By auxiliary motor	700	SYNCHRONOUS MOTOR SYSTEMS
139	BATTERY-FED MOTOR SYSTEMS	400.01	.Brushless motor closed-loop control
140	GENERATOR-FED MOTOR SYSTEMS HAVING GENERATOR CONTROL	400.02	..Vector control (e.g., dq-axis control, 3-2 phase conversion, etc.)
141	.Automatic generator control and/or with time-delay means	400.03	..Plural reference comparison (e.g., reference changes during startup, upper/lower reference, etc.)
142	..Responsive to diverse conditions or with time-delay means	400.04	..Specific processing of feedback signal or circuit therefore (i.e., A-D conversion, compression, or modification)
143	...Plural electrical conditions	400.05	...With reference signal generation (e.g., from external system, mechanical oscillator, etc.)
144	..Armature or primary current of motor	400.06	...Comparator circuit or method
145	..Terminal voltage or counter e.m.f. of motor	400.07	...Plural diverse feedback (e.g., torque and speed, load and speed, etc.)
146	..Speed of motor or driven device	400.08	...With nonmotor parameter or remote condition detected (e.g., temperature, light, airflow, position of diverse object, etc.)
147	..Speed or frequency of generator or its drive means		
148	.Alternating-current-motor system		
149	.With plural, diverse or diversely controlled generators		

- 400.09 ..Plural mode control (e.g., open and closed loop, starting and braking, plural-phase and single-phase operation, open and closed loop, etc.)
- 400.1 ...With timing or delay
- 400.11 ...With separate starting mode or "ramp-up" mode (e.g., open-loop control for startup, startup initialization, etc.)
- 400.12 ..With table lookup, stored map, or memory table (e.g., speed table, stored current profile, etc.)
- 400.13 ..With timing, delay, or clock pulse counting circuit or generation
- 400.14 ...Phase shifted as function of speed or position
- 400.15 ..With torque or load determination (e.g., by calculation, detection, or estimation, etc.)
- 400.16 ..Control or position information digitally stored on disk (e.g., computer hard drive position detection, etc.)
- 400.17 ..Modification or waveshaping of switching control signal (e.g., switching control input to inverter, etc.)
- 400.18 ..With manual control (e.g., foot switch, surgical tool, etc.)
- 400.19 ..Slew rate control (e.g., slew limiting, etc.)
- 400.2 ..Phase voltage wave-shaping circuit or method (e.g., output from inverter, phase energizing signal, trapezoidal wave, etc.)
- 400.21 ..Having protection means (e.g., switching circuit protection, stall protection, failure to start, "wrong" direction, etc.)
- 400.22 ...Current or voltage limiting (e.g., over-voltage or over-current protection, etc.)
- 400.23 ..Torque ripple stabilization or acoustic noise attenuation (e.g., cogging prevention, etc.)
- 400.24 ..Electrical noise attenuation (e.g., EMI, EMR, RFI, etc.)
- 400.25 ...Switching noise transient attenuation (e.g., switching error prevention, masking, blanking, etc.)
- 400.26 ..switching circuit structure or component (e.g., inverter, bridge circuit, etc.)
- 400.27 ...Having both high-side and low-side switching elements for plural-phase motor
- 400.28 ...Diverse high side or low side switching
- 400.29 ...H-bridge
- 400.3 ..Power supply voltage feature (e.g., power supply voltage, Vcc compensation, rectifier circuit, power regulator, auxiliary or secondary power supply, etc.)
- 400.31 ..Utilization or dissipation of stored or collapsing field energy (e.g., freewheeling, discharging one winding through another, etc.)
- 400.32 ..Sensorless feedback circuit
- 400.33 ...Voltage injection detection (e.g., voltage injected at startup to determine position, etc.)
- 400.34 ...Electromotive force sensor (e.g., back or counter EMF sensor, etc.)
- 400.35 ...With zero-crossing detection (e.g., polarity reversal, etc.)
- 400.36 ...With center-tap feedback circuit
- 400.37 ..With sensor structure (e.g., tachometer, reed switch, cam-controlled switching, etc.)
- 400.38 ...Magnetic field sensor or responsive device (e.g., Hall element, magneto-resistance, etc.)
- 400.39 ...Rotating sensor component separate from motor structure (e.g., resolver, magnetically sensed rotating disk, etc.)
- 400.4 ...Optical sensor (e.g., encoder, photodetector, etc.)
- 400.41 ..Having specific motor structure (e.g., bifilar windings, airgap dimension, auxiliary winding, phase winding with midtap, etc.)

400.42	.Brushless motor open-loop control	733	..Commutator connected to secondary winding
701	.Hysteresis or reluctance motor systems	734	..Slip rings connected to secondary winding
702	.Antihunting or damping	735	...Rotor shaft coupled to dynamoelectric machine
703	.Braking		....Slip rings connected to dynamoelectric machine winding
704	.Pole changing motor winding circuits	736	.Self-cascaded motor windings
705	.Synchronization systems	737	..With commutated winding
706	..With armature power removal upon failure to synchronize or loss of synchronism	738	.Reversing
		739	..With diverse motor operation
707	...Upon failure to resynchronize	740	...With braking
708	...Responsive to thermal electrical element in system	741	....Electromagnetic brakes
		742	.....Generator action
		743	.....Plugging
709	..Having different armature voltage prior to synchronism	744	..With controlled saturable reactor in primary circuit
		745	...Two phase motor
710	..With d.c. field removal	746	..Two phase motor
711	...With electronic control element in system	747	..With plural primary windings or winding portions having common connection
712	..With field excitation application	748	..Operating from a single phase source
		749	...Shaded pole motor
713	...Responsive to slip voltage frequency in d.c. field winding		...Split phase motor with capacitor interchangeably connected in series with either primary winding
714	...Responsive to armature current	750	...With controlled electronic device to provide the series connection
715	..Responsive to rotor speed or rotor driven member	751	..With de-energizable start winding
716	.Field winding circuits		...With separate winding or winding portion energized for each direction of rotation
717	..Responsive to a motor condition		...Automatic current reversal on start winding
718	...Induced voltage in field winding	752	..With controlled electronic switch for phase reversal
		753	.Braking
719	...Speed responsive field power sources		..With diverse operation
720	.Armature winding circuits	754	..Dynamic braking
721	..Responsive to rotor shaft position or speed		...Direct current primary winding braking circuit
722	..Having electronic power conversion circuit	755	...Rotating rotor controls braking current in primary winding
723	..Having variable frequency supply	756	...With a.c. to d.c. conversion circuit
724	..Having a plurality of windings or winding portions	757	..Reversal of power to primary winding
725	REPULSION MOTOR SYSTEMS	758	...Three phase power reversal
726	.With added motor winding or convertible to series motor	759	
		760	
727	INDUCTION MOTOR SYSTEMS		
728	.Repulsion start	761	
729	.Power-factor control		
730	.With plural separately movable rotors	762	
731	.With voltage source connected to motor secondary	763	
732	..Electronic device controls current in secondary circuit	764	

765	..Eddy current braking circuits	795	.....With plural capacitors
766	.Primary and secondary circuits	796	....Saturable winding in capacitor run motor circuit
767	.Primary circuit control		
768	..Three phase motor operated from single phase source	797	....Phase splitting using stator winding mutual inductance or saturable winding
769	...With dynamoelectric converter		
770	..Dual voltage motors	798	..Responsive to motor condition
771	..Delta-wye, plural wye, or plural delta connected primary windings	799	...Responsive to speed or rotation phase angle
772	..Plural speed	800	...With controlled power conversion
773	...Pole changing	801	.....Including inverter
774	....Single phase motor	802	.....Responsive to an additional condition
775	.....Separate primary running winding for each pole number, alternately energized	803	.....With controlled a.c. to d.c. circuit in inverter supply
776	.....Entire primary running winding energized for each running speed	804	...With controlled magnetic reactance
777	....Separate primary running winding for each pole number, alternately energized	805	..Responsive to motor voltage
778	..Starting control	806	..Condition responsive
779	...With speed control	807	..Frequency control
780	..Three phase motor with variable transformer to initially adjust voltage to motor windings	808	...With voltage magnitude control
		809	...With voltage phase angle control
781	...Operating from a single phase source	810	...With voltage pulse time control
		811	....Pulse width modulation or chopping
782	....With protective features	812	..Voltage control
783	.....Thermal starting and thermal overload protection	813	...With transformer
784	....Impedance for reducing current during starting operation	814	...With impedance control
		815	....Saturable reactor
785	....Start winding removed during running operation	816	...Single phase, split phase motors
			....With capacitor
786	.....By electronic switch	817	..Secondary circuit control
787	.....With transformer for sensing the run winding current	818	..Open secondary member or portion thereof with means to open or close the circuit thereto
		819	..Closed secondary member or member portion with means to change electrical characteristics thereof
788	.....With variable temperature coefficient resistor in switch control circuit	820	..Impedance control of secondary circuit
		821	...Responsive to motor condition
789	.....By electromagnetic switch	822	....Rotor speed or position responsive
790	.....With relay coil in series with main winding	823	....Centrifugal force of rotor controls secondary circuit impedance
791	.....By thermal switch	824	....Induction motor current
792	.....With variable temperature coefficient impedance element	825	.....Primary motor current
793	....By centrifugal switch	826	
794	....Capacitor run motor with different capacitance at starting		

827	...Frequency of secondary current	272	..With automatic starting and/or stopping
828	...Secondary voltage	273	.Motor braking
829	...By manual operation	274	..With acceleration control
830	.With relatively movable cooperating motor parts to control energized motor	275	..With automatic starting and/or stopping
831	..Axially movable cooperating parts	276	.Acceleration control
832	..Dual stators, one or both angularly movable	277	..With automatic starting and/or stopping
244	ALTERNATING CURRENT COMMUTATING MOTORS	278	...In response to an electrical condition
245	.Universal or A.C.-D.C. motors	279	...Automatic stopping means less responsive during acceleration
246	SERIES MOTORS	280	MOTOR-REVERSING
247	.Convertible for nonseries motor operation	281	.Periodic- or intermittent-reversing
248	.With plural, diverse or diversely connected or controlled sources of e.m.f.	282	..In response to movement or position (e.g., limit of travel) of motor or driven device
249	.Control by motor circuit impedance	283	.Automatic and/or with time-delay means
250	..Impedance in series with field windings and in parallel to armature winding	284	..With means to delay reversing until motor substantially stops
251	.Field circuit control	285	..Instant of, or passage or predetermined time or having time-delay means
252	..Plural, diverse or diversely connected or controlled field coils	286	..Movement or position of motor or driven device
253	HOMOPOLAR OR UNIFORM FIELD MOTORS	287	.Armature or primary circuit control
254.1	SWITCHED RELUCTANCE MOTOR COMMUTATION CONTROL	288	..Plural, diverse or diversely controlled armature windings
254.2	.Having asymmetric half-bridge	289	...Phase-reversal
255	PLURAL DIVERSE MOTOR CONTROLS	290	...Selectively energized windings
256	.Motor-reversing	291	..Armature or primary current reversal
257	..With running-speed control	292	...By shifting motor brushes or selecting appropriate set of brushes
258	...And braking	293	...Reversing polarity of current supplied to armature circuit
259	...And acceleration control	294	...Wheatstone bridge type
260	...And acceleration control	295	...Potentiometer-controlled
261	..With braking	296	.Field circuit control
262	..And acceleration control	297	..Plural, diverse or diversely controlled field windings
263	..With acceleration control	298	...Simultaneous energization
264	..With automatic starting and/or stopping	299	...With means for short-circuiting a winding
265	...Stopping upon predetermined movement of or position of motor or driven device	300	..Field-circuit current reversed
266	...At limit-of-travel of motor or driven device		
267	....Dual control circuits alternately energized		
268	.Running-speed control		
269	..With braking		
270	...And acceleration control		
271	..With acceleration control		

Class 388 subclasses 800-841 are an integral part of this Class (Class 318), as shown by the position of this box, and follows the schedule hierarchy of this Class, retaining all pertinent definitions and Class lines of this class.

Class 388 subclasses 842-860 are an integral part of this Class (Class 318), as shown by the position of this box, and follows the schedule hierarchy of this Class, retaining all pertinent definitions and Class lines of this class.

362	BRAKING	430	MOTOR LOAD, ARMATURE CURRENT OR FORCE CONTROL DURING STARTING AND/OR STOPPING
363	. "Spotting" or adjustment of braking controller during coasting	431	. Initial, "cracking" or "starting from rest" torque control
364	. Automatic and/or with time-delay means	432	CONSTANT MOTOR CURRENT, LOAD AND/OR TORQUE CONTROL
365	.. Plural diverse conditions or with time delay	433	. Control of motor load or device driven
366	.. Condition of motor or driven device	434	LIMITATION OF MOTOR LOAD, CURRENT, TORQUE OR FORCE (E.G., PREVENTING OVERLOAD)
367	... Armature or primary current	436	NONRUNNING, ENERGIZED MOTOR PHASING OR ANGULAR OR LINEAR POSITIONAL CONTROL OF MOVABLE ELEMENT OF THE MOTOR
368	... Armature or primary circuit voltage or terminal or counter e.m.f. voltage	437	POWER FACTOR CONTROL OF ARMATURE OR LINE CIRCUIT
369	... Speed, acceleration, movement or position of motor or driven device	438	HAVING PLURAL, DIVERSE OR DIVERSELY CONTROLLED SOURCES
370	. Plural, diverse or diversely controlled braking means	441	. A.C. and D.C.
371	.. Including both friction braking "plugging" and/or dynamic braking	442	. Different voltages
372	. Friction braking	443	PERIODIC, REPETITIOUS OR SUCCESSIVE OPERATIONS CONTROL OF MOTOR, INCLUDING "JOG" AND "INCH" CONTROL
373	. "Plugging" or application of reverse power to motor	444	. Variable periods or intervals between controlling operations
374	.. Energy flow interrupted when motor stops	445	AUTOMATIC AND/OR WITH TIME-DELAY MEANS (E.G., AUTOMATIC STARTING AND/OR STOPPING)
375	. Dynamic braking	446	. With nonautomatic control means (e.g., manual)
376	.. Regenerative	447	. Nonresponsive or less responsive for limited periods
377	... With additional source of e.m.f.	448	. Anti-hunting
378	.... In series with armature or primary circuit	449	. With respect to a fixed standard, master or reference device
379	.. Locally closed armature circuit	450	.. Electrical detector
380	... Closed through impedance or the like	451	.. Mechanically vibrating device as reference device (e.g., tuning fork)
381	... With field or secondary circuit control	452	. Plural, diverse conditions or with time-delay means
382	. By auxiliary electric generator or by magnetic attraction or repulsion devices	453	.. Electrical condition
383	"ANTI-BRAKING" OR BRAKING-PREVENTION MEANS		

454	...Plural, diverse electrical conditions	488	.Responsive to stress in body or material
455	...Voltage and current (e.g., watts)	489	.Responsive to direction, inclination or angular position of bodies
456	.Rate-of-change of a condition	490	WITH SIGNALS, METERS, RECORDERS OR TESTING DEVICES
457	..Inertia-type detector	491	CONTROL OF BOTH MOTOR CIRCUIT AND MOTOR STRUCTURE
458	..Electrical condition	492	MOTOR MAGNETIC ENERGY DISSIPATION
459	.Terminal voltage or counter-electromotive force of controlled motor	493	CONTROL OF BOTH ARMATURE (OR PRIMARY) CIRCUIT AND FIELD (OR SECONDARY) CIRCUIT
460	.Sound, supersonic vibration or mechanical vibration	494	ARMATURE (OR PRIMARY) CIRCUIT CONTROL
461	.Speed or rate-of-movement	495	.Plural, diverse or diversely controlled, armature or primary windings
462	..Centrifugal-type detector	496	..Polyphase windings
463	..Tachometer-type detector	497	..Series-parallel
464	..Electric generator tachometer	498	..Energized or controlled in predetermined sequence
465	..In excess of a predetermined valve	499	..Wound or energized in magnetic opposition
466	.Movement, position, or limit-of-travel	500	.Plural sources of voltage (including counter e.m.f. cells)
467	..Plural sensing means for determining plural positions or plural limits-of travel	501	.By shunting armature or primary winding
468	..Limit-of-travel control means	502	.Variable length or tapped armature winding
469	..Overloading limit-of-travel-type control means	503	.Frequency or pulsation control
470	..Magnitude of movement or revolutions	504	.Voltage control
471	.Responsive to thermal conditions	505	.By means to space-discharge devices
472	..Of motor control means	506	..Plural, diverse or diversely connected or controlled space-discharge devices
473	..In or about the motor being controlled	507	..Having discharge-control means (e.g., grids)
474	.Motor load, armature or primary or secondary circuit current	508	.Impedance-controlled
475	..Mechanical-type detector (e.g., by yielding spring devices)	509	..Plural, diverse or diversely controlled impedances
476	..In excess of a predetermined magnitude	510	...Including both reactor and condenser
477	...Intentionally increased load	511	..Inherently or self-variable impedance
478	.Electrical conditions in circuit other than controlled motor circuit	512	..Inductive reactor controlled
479	..Voltage	513	...Having auxiliary means for saturating reactor core
480	.Radiant energy	514	..Resistor-controlled
481	.Pressure in a fluid or granular material	515	...Having short-circuiting means
482	.Level of fluid or granular material	516	...Short-circuited step-by-step
483	.Moisture content or wetness	519	.By armature or primary circuit-making and/or breaking
484	.Time or with time-delay means		
485	..Dash-pot or other mechanical delay means		
486	..Pilot- or servo-motors		
487	..Electromagnetic or inductive time-delay means		

- 520 ..Electromagnetically actuated
- 521 **FIELD OR SECONDARY CIRCUIT CONTROL**
- 523 .Plural, diverse or diversely connected or controlled field windings
- 524 ..Convertible number-of-poles type (e.g., 4-pole or 6-pole)
- 525 ..Differentially wound or energized windings
- 526 ..Series-parallel
- 527 ..Series field winding
- 528 ..With means to short circuit a field winding
- 529 ..Selectively energized
- 530 .Plural, diverse or diversely connected or controlled sources of field circuit voltage
- 531 .Variable length or tapped field winding
- 532 .By means of space-discharge device in field circuit
- 533 .Impedance-controlled
- 534 ..Plural, diverse or diversely connected or controlled field circuit impedances
- 535 ...Wheatstone bridge
- 536 .By field circuit making and/or breaking
- 537 ..Intermittently operated
- 538 **MOTOR STRUCTURE ADJUSTMENT OR CONTROL**
- 539 .Both armature and field structures rotatable or adjustable
- 540 .Rotor element movable axially
- 541 .Brush or other current-collector control
- 542 ..Having movement toward or from cooperating part (e.g., brush lifted from commutator)
- 543 **THREE-OR-MORE-POSITIONS MOTOR CONTROLLER SYSTEMS**
- 544 .With other motor control device
- 545 ..Main line switch
- 546 .Plural, diverse or diversely controlled controllers
- 547 ..Plural control stations
- 548 .Plural control stations
- 549 .Return to "off", "starting" or "neutral" positions
- 550 ..Power-operated controllers
- 551 .Knee- or foot-operated controllers
- 552 .Power-actuated controllers
- 553 ..Separately actuated controller contacts
- 554 ...Electromagnetic actuated
- 555 ..Electromagnetic actuated
- 556 ...Reciprocating or oscillating electromagnetic means
- 557 ...Intermittent or step-by-step operation
- 558 **MISCELLANEOUS**
- FOREIGN ART COLLECTIONS**
- FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**
- Any foreign patents or nonpatent literature from subclasses that have been reclassified have been transferred directly to the FOR Collections listed below. These Collections contain ONLY foreign patents or nonpatent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.
- FOR 100 **SPACE-DISCHARGE-DEVICE COMMUTATED MOTOR (318/138)**
- FOR 101 **SELF-COMMUTATED IMPULSE OR RELUCTANCE MOTORS (318/254)**
- FOR 102 **MOTOR COMMUTATION CONTROL SYSTEMS (318/439)**
- DIGESTS**
- DIG 2 **WINDSHIELD WIPER CONTROLS**