1 **EDUCATIONAL OR CONSTRUCTION UNITS OR KITS**
300 **NON-DYNAMOELECTRIC**
301 .Nuclear reaction
302 ..Contact potential difference
303 ..P-N semiconductor
304 ..Secondary electron emission
305 ..Direct charge particle emission
306 .Thermal or pyromagnetic
307 ..With heat actuated bimetal element
308 .Charge accumulating
309 ..Electrostatic
310 ...Friction
311 .Piezoelectric elements and devices
312 ..Adding or subtracting mass
313 R ..Surface acoustic wave devices
313 A ...Orientation of piezoelectric material
313 B ...Interdigitated electrodes
313 C ....Envelope or apodized
313 D ....Grating or reflector in wave path
314 ..Electrical systems
315 ...Temperature compensation circuits
316.01 ...Input circuit for simultaneous electrical and mechanical output from piezoelectric element
316.02 ....Traveling wave motor
316.03 ....Charging and discharging
317 ...Input circuit for mechanical output from piezoelectric element
318 ...Input circuit for electrical output from piezoelectric element
319 ...Electrical output circuit
320 ..Piezoelectric slab having different resonant frequencies at different areas
321 ..Combined with resonant structure
322 ...Acoustic wave type generator or receiver
323.01 ...Direct mechanical coupling
323.02 ....Motor producing continual motion
323.03 .....Traveling wave motor
323.04 ......Stator
323.05 ....Support
323.06 ....Piezoelectric element or electrode
323.07 ....Oval track
323.08 ......Armature
323.09 ....Pressing means detail
323.11 ......Specific material or composition
323.12 .....Langevin or pencil type motor
323.13 ......Output member detail
323.14 ....Roller or ball element
323.15 ....Material or material property
323.16 .....Eliptical motion at fixed point (i.e., walking) or Ratchet and Pawl motor
323.17 ....Positions an object
323.18 ....Device performs work on an object (e.g., welding, cutting)
323.19 ....Horn or transmission line
323.21 ....Detector (e.g., sensor)
324 ...Diaphragm
325 ...Sandwich or Langevin type
326 ..Combined with damping structure
327 ...On back of piezoelectric element
328 ..With mechanical energy coupling means
329 ...Including inertia type operator
330 ...Bending type
331 ....Plural elements
332 .....Multimorph
333 ...Shear or torsional type
334 ...Acoustic wave type generator or receiver
335 ....With lens or reflector
336 ....Nondestructive testing type
337 ....Underwater type
338 ...Force or pressure measuring type
339 ...Voltage, spark or current generator
340 ..Encapsulated or coated
341 ..With temperature modifier and/or gas or vapor atmosphere control
342 ...For plural piezoelectric elements
343 ...With heating element
344 ...Sealed unit
345 ..Supported by elastic material

346 ..With temperature compensating structure
347 ...Compensated air gap
348 ..With mounting or support means
349 ...Air gap
350 ....Adjustable
351 ...Suspended by thin member
352 ....Point contact on major surfce only
353 ....Contact at edges only
354 ...Clamped
355 ....Spring bias
356 .....90 degrees to major surface and margin clamped only
357 ..Orientation of piezoelectric polarization
358 ...Ceramic composition (e.g., barium titanate)
359 ....More than one poling direction (e.g., Rosen transformer)
360 ..Rotation of crystal axis (e.g., cut angle)
361 ...Quartz
362 ...Rochelle salt
363 ..Electrode materials
364 ...Multilayer
365 ..Electrode arrangement
366 ...More than two
367 ..Piezoelectric element shape
368 ...Rectangular plate
369 ...Circular disc, ring, or cylinder
370 ..."U" or "tuning fork" shape
371 ...Sphere or hemisphere

10 **DYNAMOELECTRIC**

11 .Conducting fluid
12 .Linear
13 ..Fixed and movable wound elements
14 ..Solenoid and core type
15 .Reciprocating
16 ..With cooling or temperature modification
17 ..With other elements
19 ...Speed control or time delay
20 ...Motion-converting mechanism
21 ....Pivoted or flat-spring armature
22 .....Plural armatures
23 ....Solenoid and core type
24 .....Plural cores
25 ..Reed type
26 ..Magnetostrictive
27 ..Fixed and movable wound elements
28 ..Direct-connected
29 ...Pivoted or flat-spring armature
30 ...Solenoid and core
31 ..Self-actuated interrupter
32 ...Pivoted or flat-spring armature
33 ....Plural armatures
34 ...Solenoid and core
35 ....Successively energized solenoid coils
36 .Oscillating
37 ..With motion-converting mechanism
38 ..Direct-connected
39 ..With interrupter
40 R .Rotary
40.5 ..Self-nutating or moving (e.g., oscillating fan, etc.)
41 ..With mechanical starters
42 ..With assembling, metal casting or machining feature
43 ..Molded plastic
44 ..Powdered metal
45 ..Impregnated or coated
46 ..Magnetic motors
47 ...Portable or hand tool (e.g., dry shavers)
48 ...With other elements
49 R ...Step-by-step
49 A ....Claw-tooth and printed circuit components
50 ..Portable or hand tool
51 ..Vibration or noise suppression
52 ..Cooling or fluid contact
53 ...With control means
54 ...Liquid coolant
55 ...Nonatmospheric gas
56 ...With gas purification or treating
57 ...Intermediate confined coolant
58 ...Circulation
59 ....Plural units or plural paths
60 R ....Self-forced
61 .....Rotor passage
62 .....Suction pump or fan
63 .....Pressure pump or fan
60 A .....Hollow passages
64 ....Heat-exchange structure

65 .....Spacers (e.g., laminae, coils, etc.)
66 ..With other elements
67 R ...Inbuilt or incorporated unit
67 A ....Bicycle-hub generators
68 R ...Electric circuit elements
69 ....Shaft-driven switch (e.g., blasting generators)
70 R .....Distributor or timer (e.g., ignition magnetos)
70 A ......Ignition systems
71 ....Connectors, terminals or lead-ins
72 ....Impedance devices
73 ....Illuminating devices
68 A ....Manually operable (e.g., switches, rheostats, etc.)
68 B ....Condition responsive (e.g., position, torque, etc.)
68 C ....Temperature, current-responsive, i.e., protectors
68 D ....Conversion elements, (e.g., transformers, rectifiers, etc.)
68 E ....Motion responsive (e.g., centrifugal switches)
74 ...Inertia or fly-wheel device
75 R ...Drive mechanism
76 ....Brake and clutch
77 ....Brake
78 ....Clutch
79 ....Shaft and armature timing or phasing connection
80 ....Motion conversion
81 .....Unbalanced weight (e.g., vibrators)
82 .....Swash plate
83 .....Gearing
84 .....Impulse coupling
75 A ....Spring or gravity drive
75 B ....Hand- or foot-operated
75 C ....Rim drive (e.g., bicycle generator drive by wheel, rim, or tire)
75 D ....Flexible shaft or coupling and hollow shaft drive
85 ...Mechanical shields or protectors
86 ....Shield in air gap
87 ....Submersible
88 ....Dirt, moisture or explosion proof
89 ....Housings, windows or covers
90 ...Bearing or air-gap adjustment or bearing lubrication
90.5 ....Magnetic bearing
91 ...Supports
92 ..Torque-transmitting clutches or brakes
93 ...Brake type
94 ...Automatic control
95 ....By speed
96 ...With other drive mechanism
97 ....Output bias or resistance device
98 ....Drive motor
99 ....Gearing
100 ....Mechanical clutch
101 ...Plural units
102 R ...Generator-motor type
102 A ....Homopolar clutches
103 ...Magnetic field type
104 ....With air-gap shield
105 ....Induced or eddy current type
106 .....Magnetic reluctance feature
107 .....With collection means for induced current
108 ......Delivery to external device
109 ....Electric motor
110 ....Impedance
111 ..Generated wave-form modification
112 ..Plural units, structurally united
113 ...Motor-generator sets
114 ..Plural rotary elements
115 ...Field and armature both rotate
116 ....Limited movement
117 .....Mechanical bias
118 ....With interconnecting drive mechanism
119 .....Fluid-drive mechanism
120 .....Friction-drive mechanism
121 .....Mechanically controlled element
122 ......By additional dynamoelectric machine
123 ......Friction brake
124 ...Plural short-circuited rotary elements
125 ....Squirrel cage type
126 ...Plural armatures in common field
127 ..Plural collector-type machines
128 ...Commutator and slip-ring type
129 ....Synchronous or rotary converter
130 .....For plural wire D.C. system
131 ....Different armature circuits

132 .....Polyphase armature winding
133 ....Common armature winding
134 .....With plural field windings
135 ....Commutator in field circuit
136 ...Plural commutator type
137 ....Double current D. C. machines
138 .....Dynamotor type
139 .....Hetero-axial excitation
140 ....Plural armature windings
141 .....Plural field windings
142 ....Plural field windings
143 ...Plural slip-ring sets
144 ....Plural armature windings
145 .....Plural sets of poles
146 .....Polyphase windings
147 .....Slip rings in field circuit
148 ...Plural sets of brushes
149 ....Plural field windings
150 .....Polyphase arrangement
151 ....Short circuiting conductor between brushes
152 ..Permanent magnet machines
153 ...Inbuilt with flywheel (magneto)
154.01 ...Permanent magnet stator
154.02 ....Combined with generating coil
154.03 ....Means for securing magnet
154.04 .....Cantilevered
154.05 .....Axial
154.06 .....Plural sets of magnets
154.07 .....Adhesive
154.08 .....Mounted to magnet yoke
154.09 .....Split housing/yoke
154.11 .....Embedded in core or pole
154.12 .....Cylindrical sleeve holder
154.13 .....Holder with pocket for magnet
154.14 .....Spring clip
154.15 .....Clip secured to housing
154.16 .....Axially pressing on magnets
154.17 .....Wedging between
154.18 .....With a magnetic wedge
154.19 .....With an integral wedge
154.21 ....Permanent magnet characterized by the shape of the magnet
154.22 .....With specific dimension
154.23 .....Horseshoe
154.24 .....Bar, square or rectangular
154.25 .....Disk, ring, or cylinder
154.26 ....With means to prevent or reduce demagnetization (i.e., auxiliary magnetic poles)
154.27 .....With an auxiliary pole extending between stator magnet and rotor
154.28 ....Specific magnetization
154.29 .....Specific position or shape
154.31 ....Single pole pair
154.32 .....Permanent magnet extends along an axis
154.33 .....Plural rotors
154.34 .....With adjustable magnetic structure
154.35 .....With specific pole pieces or pole shoes
154.36 .....Circumferentially spaced poles and magnets
154.37 .....Poles extending axially from magnets
154.38 .....Pole shoe shape
154.39 .....Different size
154.41 .....Laminated
154.42 .....Induced flux return pole
154.43 ....Additional permanent magnets
154.44 ....Additional shield or coating (non-magnetic)
154.45 ....Multiple pole pairs
154.46 .....With specific pole shoe pieces
154.47 .....Magnet extending between two poles
154.48 .....Induce flux return pole
154.49 .....Adjustable
155 ....Inductor type
156.01 ...Permanent magnet rotor
156.02 ....Transverse flux
156.03 ....With a hysteresis ring
156.04 ....Separate portion of the rotor magnet used as a thrust bearing
156.05 ....Separate portion of the rotor magnet used as a magnet for sensing (i.e., for position or frequency)
156.06 ....Combined with flux for sensing
156.07 ....Additional flux directing magnets
156.08 ....Mounting (such as on a surface of a shaft)
156.09 .....Keyed to shaft
156.11 .....Magnets in shaft
156.12 .....Mounted on a sleeve/hub
156.13 .....Keyed to a sleeve/hub
156.14 .....Knurl between the sleeve/hub and a shaft

156.15 ......Induced flux pole on sleeve/hub
156.16 .....Spring mounted
156.17 ......Spring mounted flux shunt
156.18 .....With a threaded fastener
156.19 .....With a wedge
156.21 .....With an adhesive
156.22 .....With an axial end clamp
156.23 .....With casting material around the magnet
156.24 .....Including a spring mount to adjust a flux
156.25 .....Axially offset and radially magnetized magnets
156.26 .....Mounted on a bell shape hub
156.27 .....Including thermal compensation
156.28 .....Sleeve covering magnet face
156.29 .....Sleeve parallel to magnetic face
156.31 .....Banding around magnet
156.32 ....Including an axial air gap
156.33 .....With pole shoes
156.34 .....With a stator between a rotating flux return plate and rotor magnet
156.35 .....With single rotor magnet and plural stators
156.36 .....With plural sets of rotating magnets
156.37 ......With single stator and plural sets of rotating magnets
156.38 ....Specific shape
156.39 .....Horseshoe
156.41 .....Triangular
156.42 .....Star
156.43 .....Specific magnetization
156.44 ......Different pole width
156.45 ......Specific dimensions
156.46 ......Shaped to vary air
156.47 ......Skewed
156.48 ....Pole shoes/pole pieces
156.49 .....Radial flux path and radially positioned pole shoes
156.51 ......Laminated pole shoes with multiple pole pairs
156.52 ......Laminated pole shoes with single pole pair
156.53 ......Embedded in a core
156.54 ......Induced flux return poles
156.55 .....Circumferential flux path and circumferential pole shoes
156.56 ......Embedded
156.57 ......With slots or holes to guide flux
156.58 .....Different size pole shoes
156.59 ......Pole shoes fixed to hub or shaft
156.61 ......Pole shoes fixed with end plates
156.62 .....Axially magnetized with poles shoes at one end
156.63 ......Laminated pole shoes
156.64 .....Axially magnetized with pole shoes at both ends
156.65 ......Laminated pole shoes
156.66 ....Claw poles/interfitting poles/lundel
156.67 .....Laminated pole shoes
156.68 .....Poles formed by magnet
156.69 .....Plural sets of claw poles
156.71 .....Claw poles extend in the same axial direction
156.72 .....Additional support for magnet
156.73 .....Additional support for claw pole tips
156.74 ....Damping features
156.75 .....Damper plate on magnetic face
156.76 .....Damper in pole pieces
156.77 .....Damper cage around magnet
156.78 ....Squirrel cage
156.79 .....Including laminated ring
156.81 .....Magnet positioned between squirrel cage and stator
156.82 .....Axially magnetized magnets or axially positioned magnets
156.83 .....Including a flux barrier
156.84 ......Flux barrier is a magnet
157 ..Vertically disposed
158 ..Universal (A.C. or D.C.)
159 ..A.C.
160 ...Frequency converters
161 ...Phase-shifter type
162 ...Synchronous
163 ....Reaction type
164 .....Toroidal coil
165 ....D.C. excited
166 ...Induction
167 ....With repulsion-starting
168 ....Inductor-type generators (variable reluctance)
169 .....High frequency
170 ......Multifrequency
171 ....Induction generators

172 ....Shifting field (e.g., shading pole)
173 ...Commutated
174 ....Single phase
175 .....Conduction operation
176 .....Transformer operation
177 ..D.C.
178 ...Homopolar
179 ..Windings and core structure
180 ...Field or excitation windings or structure
181 ....Combined permanent and electromagnet
182 ....With short-circuited winding or conductor
183 .....Damper winding
184 ....Plural field windings
185 .....Plural sets of poles
186 .....Interpole, compensating or neutralizing poles
187 .....Slotted or divided pole
188 .....Differentially related
189 ....Variable length or tapped winding
190 ....Magnetic shunts for shifting field flux
191 ....Adjustable magnetic structure
192 ....Nonmagnetic inserts or air gaps
193 ....Nonuniform core cross section
194 ....Coil supports and spools
195 ...Armature or primary
196 ....Corona-prevention
197 ....With short-circuited winding or conductor
198 ....Plural windings
199 .....Combined stationary and rotary
200 ....Variable length or tapped windings
201 ....Bar windings
202 ....Open windings
203 ....Closed windings
204 .....Equalizers
205 .....Multiplex
206 .....Lap
207 .....Wave
208 ....Coils
209 ....Adjustable magnetic structure
210 ...Secondary windings or conductors
211 ....Squirrel cage
212 .....Inherently variable impedance (double squirrel cage)
213 ...Antiparasitic conductors (imbricated)
214 ...Coil retainers or slot closers
215 ...Slot liners
216 ...Core features
217 ....Securing laminae
218 ....Pole assembly and securing means
219 ..Current collectors
220 ...Spark-reduction
221 ....Arc extinguishers
222 ....Spark-neutralizing current
223 ....Flux compensators
224 .....Commutating poles or windings
225 .....Short-circuited coil circuit
226 .....Field-distortion
227 ...With cooling
228 ...With cleaning, lubricating, resurfacing or repairing
229 ...Brush-traversing
230 ...Circumferential brush shifting on reversal
231 ...Rotary structure
232 ....Slip rings
233 ....Commutators
234 .....Winding connectors
235 .....Molded support
236 .....Cylindrical or drum
237 .....Disc
238 ...Fixed structure
239 ....Brush holders or rigging
240 .....Brush-lifting
241 .....Circumferential adjustment
242 .....Brush engagements or guides
243 .....Fluid pressure-operated
244 .....Brush affixed to pivoted arm
245 .....Slidable brush
246 ......Pressure arm
247 ......Axial spring
248 ....Brushes
249 .....With electrical connector
251 .....Structure (e.g., composite material)
252 .....With composition feature
253 ......Carbonaceous
254 ..Stator structure
255 ...For railway-type machines
256 ...Stray field flux loss prevention

257 ...Interfitting or claw-tooth stators
258 ...Frame and core type
259 ....Core assembly
260 ....End turn supports
261 ..Rotor structure
262 ...High-speed rotor type
263 ...Interfitting or claw tooth rotors
264 ...Armatures
265 ....Drum
266 ....Hollow (e.g., double air gap)
267 ....Ring
268 ....Disc
269 ....Salient pole
270 ...End turn supports
271 ...Banding
272 ..Elements
273 ..Miscellaneous
40 MM ..Miniature motors

CROSS-REFERENCE ART COLLECTIONS

800 **PIEZOELECTRIC POLYMERS (E.G., PVDF)**

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

FOR 100 **PERMANENT MAGNET STATOR (310/154)**
FOR 101 **PERMANENT MAGNET ROTOR (310/156)**

DIGESTS

DIG 2 **HYSTERESIS ROTORS AND MOTORS**

DIG 3 **HALL EFFECT GENERATORS AND CONVERTERS**
DIG 6 **PRINTED-CIRCUIT MOTORS AND COMPONENTS**