

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H04 ELECTRIC COMMUNICATION TECHNIQUE

(NOTE omitted)

## H04R LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRANSDUCERS; DEAF-AID SETS; PUBLIC ADDRESS SYSTEMS (generating mechanical vibrations in general [B06B](#); transducers for measuring particular variables [G01](#); transducers in clocks [G04](#); producing sounds with frequency not determined by supply frequency [G10K](#); transducers in recording or reproducing heads [G11B](#); transducers in motors [H02](#))

### NOTE

This subclass covers :

- loudspeakers, microphones, {acoustic} transducers {therefor} producing acoustic waves or variations of electric current or voltage, or gramophone pick-ups;
- arrangements actuated by variations of electric current or voltage for cutting grooves in records;
- circuits for the above-mentioned {loudspeakers, microphones, acoustic transducers, gramophone pick-ups or} arrangements;
- monitoring or testing {of the above-mentioned loudspeakers, microphones, acoustic transducers, gramophone pick-ups or} arrangements

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>1/00</b>	<b>Details of transducers, {loudspeakers or microphones}</b>		headphones are to be classified in <a href="#">H04R 5/033</a> as well
1/005	• {using digitally weighted transducing elements}	1/1008	• • {Earpieces of the supra-aural or circum-aural type}
1/02	• Casings; Cabinets {; Supports therefor;} Mountings therein ( <a href="#">H04R 1/28</a> takes precedence {; attachments for microphones <a href="#">H04R 1/08</a> ; mounting of transducers in earpieces <a href="#">H04R 1/1075</a> })	1/1016	• • {Earpieces of the intra-aural type}
1/021	• • {incorporating only one transducer}	1/1025	• • {Accumulators or arrangements for charging (secondary cells <i>per se</i> <a href="#">H01M 10/00</a> ; charging in general <a href="#">H02J 7/00</a> )}
1/023	• • {Screens for loudspeakers}	1/1033	• • {Cables or cables storage, e.g. cable reels (cord reels <i>per se</i> <a href="#">H02G 11/02</a> ; arrangements for storing and repeatedly paying-out and re-storing lengths of conductors or cables <a href="#">B65H 75/34</a> ; extensible conductors or cables, e.g. self-coiling cords <a href="#">H01B 7/06</a> )}
1/025	• • {Arrangements for fixing loudspeaker transducers, e.g. in a box, furniture}	1/1041	• • {Mechanical or electronic switches, or control elements (switches in general <a href="#">H01H</a> )}
1/026	• • {Supports for loudspeaker casings}	1/105	• • {Earpiece supports, e.g. ear hooks (for stereophonic headphones <a href="#">H04R 5/0335</a> )}
1/028	• • {associated with devices performing functions other than acoustics, e.g. electric candles}	1/1058	• • {Manufacture or assembly}
1/04	• • Structural association of microphone with electric circuitry therefor (in deaf-aid sets <a href="#">H04R 25/00</a> )	1/1066	• • • {Constructional aspects of the interconnection between earpiece and earpiece support (earpiece support for monophonic headphones <a href="#">H04R 1/105</a> ; earpiece support for stereophonic headphones <a href="#">H04R 5/0335</a> )}
1/06	• Arranging circuit leads; Relieving strain on circuit leads	1/1075	• • • {Mountings of transducers in earphones or headphones}
1/08	• Mouthpieces; {Microphones;} Attachments therefor	1/1083	• • {Reduction of ambient noise (active noise reduction <i>per se</i> <a href="#">G10K 11/175</a> ; protective devices for the ear, e.g. providing acoustic protection <a href="#">A61F 11/06</a> )}
1/083	• • {Special constructions of mouthpieces}		
1/086	• • • {Protective screens, e.g. all weather or wind screens}		
1/10	• Earpieces; Attachments therefor {; Earphones; Monophonic headphones ( <a href="#">H04R 1/28</a> takes precedence; stereophonic headphones <a href="#">H04R 5/033</a> )}		
<b>NOTES</b>			
1. This group <u>covers</u> details of headphones, both of monophonic and stereophonic type.			
2. When classifying in this group or in its subgroups, aspects relating to stereophonic			

- 1/1091 . . {Details not provided for in groups  
[H04R 1/1008](#) - [H04R 1/1083](#)}
- 1/12 . Sanitary or hygienic devices for mouthpieces or earpieces, e.g. for protecting against infection
- 1/14 . Throat mountings for microphones
- 1/16 . Mounting or connecting stylus to transducer with or without damping means
- 1/18 . . Holders for styli; Mounting holders on transducers
- 1/20 . Arrangements for obtaining desired frequency or directional characteristics (for stereophonic purpose [H04R 5/00](#))
- 1/22 . . for obtaining desired frequency characteristic only (circuit for combining transducers having different responses [H04R 3/00](#) {for hearing aids [H04R 25/407](#)})
- 1/222 . . . {for microphones ([H04R 1/24](#), [H04R 1/26](#) take precedence)}
- 1/225 . . . {for telephonic receivers}
- 1/227 . . . {using transducers reproducing the same frequency band}
- 1/24 . . . Structural combinations of separate transducers or of two parts of the same transducer and responsive respectively to two or more frequency ranges
- 1/245 . . . . {of microphones}
- 1/26 . . . Spatial arrangements of separate transducers responsive to two or more frequency ranges
- 1/265 . . . . {of microphones}
- 1/28 . . . Transducer mountings or enclosures modified by provision of mechanical or acoustic impedances, e.g. resonator, damping means {combinations of transducers with horns, i.e. front-loaded horns [H04R 1/30](#)}
- 1/2803 . . . . {for loudspeaker transducers}
- 1/2807 . . . . {Enclosures comprising vibrating or resonating arrangements (for the reduction of undesired resonances or vibrations [H04R 1/2869](#))}
- 1/2811 . . . . . {for loudspeaker transducers}
- 1/2815 . . . . . {of the bass reflex type}
- 1/2819 . . . . . {for loudspeaker transducers}
- 1/2823 . . . . . {Vents, i.e. ports, e.g. shape thereof or tuning thereof with damping material (number or position of ports [H04R 1/2815](#); vents in bandpass type enclosures [H04R 1/2846](#))}
- 1/2826 . . . . . . {for loudspeaker transducers}
- 1/283 . . . . . {using a passive diaphragm}
- 1/2834 . . . . . {for loudspeaker transducers}
- 1/2838 . . . . . {of the bandpass type}
- 1/2842 . . . . . {for loudspeaker transducers}
- 1/2846 . . . . . {Vents, i.e. ports, e.g. shape thereof or tuning thereof with damping material (number or position of ports [H04R 1/2838](#); vents in bass reflex type enclosures [H04R 1/2823](#))}
- 1/2849 . . . . . . {for loudspeaker transducers}
- 1/2853 . . . . . {using an acoustic labyrinth or a transmission line}
- 1/2857 . . . . . {for loudspeaker transducers}
- 1/2861 . . . . . {using a back-loaded horn}
- 1/2865 . . . . . {for loudspeaker transducers}
- 1/2869 . . . . . {Reduction of undesired resonances, i.e. standing waves within enclosure, or of undesired vibrations, i.e. of the enclosure itself}
- 1/2873 . . . . . {for loudspeaker transducers}
- 1/2876 . . . . . {by means of damping material, e.g. as cladding (damping material for tuning desired resonances [H04R 1/2807](#), e.g. in vents [H04R 1/2823](#), [H04R 1/2846](#))}
- 1/288 . . . . . {for loudspeaker transducers}
- 1/2884 . . . . . {by means of the enclosure structure, i.e. strengthening or shape of the enclosure (by means of Helmholtz resonators [H04R 1/2869](#))}
- 1/2888 . . . . . {for loudspeaker transducers}
- 1/2892 . . . . . {Mountings or supports for transducers}
- 1/2896 . . . . . {for loudspeaker transducers}
- 1/30 . . . Combinations of transducers with horns, e.g. with mechanical matching means {, i.e. front-loaded horns}(horns in general [G10K](#); {transducer enclosures or mountings using a back-loaded horn [H04R 1/2861](#); application of horns as guiding means to obtain a predetermined directivity characteristic [H04R 1/345](#)})
- 1/32 . . for obtaining desired directional characteristic only {(specially adapted for hearing aids [H04R 25/40](#))}
- 1/323 . . . {for loudspeakers ([H04R 1/34](#) and [H04R 1/40](#) take precedence)}
- 1/326 . . . {for microphones ([H04R 1/34](#) and [H04R 1/40](#) take precedence)}
- 1/34 . . . by using a single transducer with sound reflecting, diffracting, directing or guiding means {(specially adapted for hearing aids [H04R 25/402](#))}
- 1/342 . . . . {for microphones}
- 1/345 . . . . {for loudspeakers}
- 1/347 . . . . . {for obtaining a phase-shift between the front and back acoustic wave}
- 1/36 . . . . by using a single aperture of dimensions not greater than the shortest operating wavelength
- 1/38 . . . . in which sound waves act upon both sides of a diaphragm and incorporating acoustic phase-shifting means, e.g. pressure-gradient microphone
- 1/40 . . . by combining a number of identical transducers {(specially adapted for hearing aids [H04R 25/405](#))}
- 1/403 . . . . {loud-speakers}
- 1/406 . . . . {microphones}
- 1/42 . Combinations of transducers with fluid-pressure or other non-electrical amplifying means
- 1/44 . Special adaptations for subaqueous use, e.g. for hydrophone
- 1/46 . Special adaptations for use as contact microphones, e.g. on musical instrument, on stethoscope (throat mountings [H04R 1/14](#))
- 3/00 Circuits for transducers {, loudspeakers or microphones}**
- 3/002 . {Damping circuit arrangements for transducers, e.g. motional feedback circuits}

- 3/005 . {for combining the signals of two or more microphones (specially adapted for hearing aids [H04R 25/407](#))}
- 3/007 . {Protection circuits for transducers}
- 3/02 . for preventing acoustic reaction {, i.e. acoustic oscillatory feedback (specially adapted for hearing aids [H04R 25/453](#))}
- 3/04 . for correcting frequency response
- 3/06 . . of electrostatic transducers
- 3/08 . . of electromagnetic transducers
- 3/10 . . of variable resistance microphones
- 3/12 . for distributing signals to two or more loudspeakers {(specially adapted for hearing aids [H04R 25/407](#))}
- 3/14 . . Cross-over networks
- 5/00 Stereophonic arrangements** (stereophonic pick-ups [H04R 9/16](#), [H04R 11/12](#), [H04R 17/08](#), [H04R 19/10](#))
- NOTE**
- In this group, the expression "stereophonic arrangements" covers quadraphonic or similar arrangements.
- 5/02 . Spatial or constructional arrangements of loudspeakers
- 5/023 . . {in a chair, pillow}
- 5/027 . Spatial or constructional arrangements of microphones, e.g. in dummy heads
- 5/033 . Headphones for stereophonic communication {(details thereof, e.g. relating to batteries, cables or control elements [H04R 1/10](#))}
- 5/0335 . . {Earpiece support, e.g. headbands or neckrests (for monophonic headphones [H04R 1/105](#))}
- 5/04 . Circuit arrangements, {e.g. for selective connection of amplifier inputs/outputs to loudspeakers, for loudspeaker detection, or for adaptation of settings to personal preferences or hearing impairments (combinations of amplifiers [H03F 3/68](#); stereophonic systems [H04S](#))}
- 7/00 Diaphragms for electromechanical transducers** (in general [F16J 3/00](#)); **Cones** (for musical instruments [G10](#)){(cones, diaphragms or the like, for emitting or receiving sound in general [G10K 13/00](#); Mounting thereof)}
- 7/02 . characterised by the construction
- 7/04 . . Plane diaphragms
- 7/045 . . . {using the distributed mode principle, i.e. whereby the acoustic radiation is emanated from uniformly distributed free bending wave vibration induced in a stiff panel and not from pistonic motion}
- 7/06 . . . comprising a plurality of sections or layers
- 7/08 . . . . comprising superposed layers separated by air or other fluid
- 7/10 . . . . comprising superposed layers in contact
- 7/12 . . Non-planar diaphragms or cones
- 7/122 . . . {comprising a plurality of sections or layers}
- 7/125 . . . . {comprising a plurality of superposed layers in contact}
- 7/127 . . . {dome-shaped}
- 7/14 . . . corrugated, pleated or ribbed
- 7/16 . Mounting or tensioning of diaphragms or cones
- 7/18 . . at the periphery
- 7/20 . . . Securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands
- 7/22 . . . Clamping rim of diaphragm or cone against seating
- 7/24 . . Tensioning by means acting directly on free portions of diaphragm or cone
- 7/26 . Damping by means acting directly on free portion of diaphragm or cone ([air damping H04R 1/28](#))
- 9/00 Transducers of moving-coil, moving-strip, or moving-wire type**
- 9/02 . Details
- 9/022 . . {Cooling arrangements}
- 9/025 . . {Magnetic circuit}
- 9/027 . . . {Air gaps using a magnetic fluid}
- 9/04 . . Construction, mounting, or centering of coil
- 9/041 . . . {Centering}
- 9/042 . . . . {by pressurised air}
- 9/043 . . . . {Inner suspension or damper, e.g. spider (outer suspension or surround [H04R 7/16](#))}
- 9/045 . . . {Mounting ([H04R 9/043](#) takes precedence)}
- 9/046 . . . {Construction}
- 9/047 . . . . {in which the windings of the moving coil lay in the same plane}
- 9/048 . . . . . {of the ribbon type}
- 9/06 . Loudspeakers
- 9/063 . . {using a plurality of acoustic drivers ([H04R 1/24](#) and [H04R 1/403](#) take precedence)}
- 9/066 . . {using the principle of inertia}
- 9/08 . Microphones
- 9/10 . Telephone receivers
- 9/12 . Gramophone pick-ups using a stylus; Recorders using a stylus
- 9/14 . . comprising two or more styli or transducers ([H04R 9/16](#) takes precedence)
- 9/16 . . signals recorded or played back by vibration of a stylus in two orthogonal directions simultaneously
- 9/18 . Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 11/00 Transducers of moving-armature or moving-core type** (acoustic diaphragm of magnetisable material directly coacting with electromagnet [H04R 13/00](#))
- 11/02 . Loudspeakers
- 11/04 . Microphones
- 11/06 . Telephone receivers
- 11/08 . Gramophone pick-ups using a stylus; Recorders using a stylus
- 11/10 . . comprising two or more styli or transducers ([H04R 11/12](#) takes precedence)
- 11/12 . . signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously
- 11/14 . Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 13/00 Transducers having an acoustic diaphragm of magnetisable material directly co-acting with electromagnet**
- 13/02 . Telephone receivers
- 15/00 Magnetostrictive transducers** (magnetostrictive elements in general [H10N 30/00](#))

15/02	• Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency	25/00	<b>Deaf-aid sets {, i.e. electro-acoustic or electro-mechanical hearing aids; Electric tinnitus maskers providing an auditory perception (electrical stimulation of auditory nerves to promote the auditory function <a href="#">A61N 1/36038</a>; optical stimulation of auditory nerves to promote the auditory function <a href="#">A61N 5/0622</a>)}</b>
<b>17/00</b>	<b>Piezo-electric transducers; Electrostrictive transducers (piezo-electric or electrostrictive elements in general <a href="#">H10N 30/00</a>; details of piezo-electric or electrostrictive motors, generators or positioners {<a href="#">H10N 30/00</a>})</b>		<b>NOTE</b>
17/005	• {using a piezo-electric polymer}		Classification should be directed to groups <a href="#">H04R 25/02</a> , <a href="#">H04R 25/04</a> or <a href="#">H04R 25/50</a> and its subgroups, if and only if the technical subject in consideration cannot be classified elsewhere under the main group <a href="#">H04R 25/00</a>
17/02	• Microphones		
17/025	• • {using a piezo-electric polymer}		
17/04	• Gramophone pick-ups using a stylus; Recorders using a stylus		
17/06	• • comprising two or more styli or transducers ( <a href="#">H04R 17/08</a> takes precedence)		
17/08	• • signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously	25/02	• adapted to be supported entirely by ear
17/10	• Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency	25/04	• comprising pocket amplifiers
<b>19/00</b>	<b>Electrostatic transducers</b>	25/30	• {Monitoring or testing of hearing aids, e.g. functioning, settings, battery power}
19/005	• {using semiconductor materials}	25/305	• • {Self-monitoring or self-testing}
19/01	• characterised by the use of electrets	25/35	• {using translation techniques}
19/013	• • {for loudspeakers}	25/353	• • {Frequency, e.g. frequency shift or compression}
19/016	• • {for microphones}	25/356	• • {Amplitude, e.g. amplitude shift or compression}
19/02	• Loudspeakers ( <a href="#">H04R 19/01</a> takes precedence)	25/40	• {Arrangements for obtaining a desired directivity characteristic}
19/04	• Microphones ( <a href="#">H04R 19/01</a> takes precedence)	25/402	• • {using constructional means}
19/06	• Gramophone pick-ups using a stylus; Recorders using a stylus ( <a href="#">H04R 19/01</a> takes precedence)	25/405	• • {by combining a plurality of transducers}
19/08	• • comprising two or more styli or transducers ( <a href="#">H04R 19/10</a> takes precedence)	25/407	• • {Circuits for combining signals of a plurality of transducers}
19/10	• • signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously	25/43	• {Electronic input selection or mixing based on input signal analysis, e.g. mixing or selection between microphone and telecoil or between microphones with different directivity characteristics ( <a href="#">H04R 25/407</a> takes precedence)}
<b>21/00</b>	<b>Variable-resistance transducers (gaseous resistance transducers <a href="#">H04R 23/00</a>; magneto-resistive transducers <a href="#">H04R 23/00</a>)</b>	25/45	• {Prevention of acoustic reaction, i.e. acoustic oscillatory feedback}
21/02	• Microphones	25/453	• • {electronically}
21/021	• • {with granular resistance material}	25/456	• • {mechanically}
21/023	• • {with more than one granular chamber}	25/48	• {using constructional means for obtaining a desired frequency response ( <a href="#">H04R 25/652</a> takes precedence)}
21/025	• • {disposition of the granular chamber in microphones}	25/50	• {Customised settings for obtaining desired overall acoustical characteristics}
21/026	• • {in which the sound is perpendicular to the current crossing the transducer material}	25/502	• • {using analog signal processing}
21/028	• • {with a fluid as resistance material}	25/505	• • {using digital signal processing}
21/04	• Gramophone pick-ups using a stylus; Recorders using a stylus	25/507	• • • {implemented by neural network or fuzzy logic}
<b>23/00</b>	<b>Transducers other than those covered by groups <a href="#">H04R 9/00</a> - <a href="#">H04R 21/00</a> {(diaphragms for transducers of the distributed-mode type <a href="#">H04R 7/045</a>)}</b>	25/55	• {using an external connection, either wireless or wired}
23/002	• {using electrothermic-effect transducer}	25/552	• • {Binaural}
23/004	• {using ionised gas}	25/554	• • {using a wireless connection, e.g. between microphone and amplifier or using Tcoils}
23/006	• {using solid state devices (solid state devices per se <a href="#">H01L</a> )}	25/556	• • {External connectors, e.g. plugs or modules ( <a href="#">H04R 25/607</a> takes precedence)}
23/008	• {using optical signals for detecting or generating sound}	25/558	• • {Remote control, e.g. of amplification, frequency}
23/02	• Transducers using more than one principle simultaneously	25/60	• {Mounting or interconnection of hearing aid parts, e.g. inside tips, housings or to ossicles (ear wax retarders, e.g. mounting thereof <a href="#">H04R 25/654</a> )}
		25/602	• • {of batteries}
		25/603	• • {of mechanical or electronic switches or control elements}
		25/604	• • {of acoustic or vibrational transducers}

- 25/606 . . . {acting directly on the eardrum, the ossicles or the skull, e.g. mastoid, tooth, maxillary or mandibular bone, or mechanically stimulating the cochlea, e.g. at the oval window}
- 25/607 . . {of earhooks}
- 25/609 . . {of circuitry (of electronic switches or control elements [H04R 25/603](#))}
- 25/65 . {Housing parts, e.g. shells, tips or moulds, or their manufacture}
- NOTE**
- Housing parts for mechanical mounting or interconnection of hearing aid parts covered by [H04R 25/60](#) are to be classified in [H04R 25/60](#)
- 25/652 . . {Ear tips; Ear moulds (hybrid ear moulds or post-processing thereof for their customisation [H04R 25/659](#))}
- 25/654 . . . {Ear wax retarders}
- 25/656 . . . {Non-customized, universal ear tips, i.e. ear tips which are not specifically adapted to the size or shape of the ear or ear canal}
- 25/658 . . {Manufacture of housing parts}
- 25/659 . . . {Post-processing of hybrid ear moulds for customisation, e.g. in-situ curing}
- 25/70 . {Adaptation of deaf aid to hearing loss, e.g. initial electronic fitting}
- 25/75 . {Electric tinnitus maskers providing an auditory perception}
- 27/00 Public address systems** (circuits for preventing acoustic reaction [H04R 3/02](#); circuits for distributing signals to loudspeakers [H04R 3/12](#); {monitoring or testing arrangements for public address systems [H04R 29/007](#)}; amplifiers [H03F](#))
- 27/02 . Amplifying systems for the deaf
- 27/04 . Electric megaphones
- 29/00 Monitoring arrangements; Testing arrangements** {(for hearing aids [H04R 25/30](#); detection of loudspeaker connection [H04R 5/04](#); sound-field adaptation dependent on speaker detection [H04S 7/308](#))}
- 29/001 . {for loudspeakers ([H04R 29/007](#) takes precedence)}
- 29/002 . . {Loudspeaker arrays}
- 29/003 . . {of the moving-coil type}
- 29/004 . {for microphones ([H04R 29/007](#) takes precedence)}
- 29/005 . . {Microphone arrays}
- 29/006 . . . {Microphone matching}
- 29/007 . {for public address systems (public address systems *per se* [H04R 27/00](#))}
- 29/008 . {Visual indication of individual signal levels (visual indication of stereophonic sound image [H04S 7/40](#))}
- 31/00 Apparatus or processes specially adapted for the manufacture of transducers or diaphragms therefor** {(manufacture of microstructural arrangements of deformable or non-deformable structures in general [B81C 1/00182](#))}
- 31/003 . {for diaphragms or their outer suspension}
- 31/006 . {Interconnection of transducer parts (of diaphragm and outer suspension by moulding [H04R 31/003](#))}
- 2201/00 Details of transducers, loudspeakers or microphones covered by [H04R 1/00](#) but not provided for in any of its subgroups**
- 2201/003 . Mems transducers or their use (of the electrostatic type [H04R 19/005](#))
- 2201/02 . Details casings, cabinets or mounting therein for transducers covered by [H04R 1/02](#) but not provided for in any of its subgroups
- 2201/021 . . Transducers or their casings adapted for mounting in or to a wall or ceiling
- 2201/023 . . Transducers incorporated in garment, rucksacks or the like
- 2201/025 . . Transducer mountings or cabinet supports enabling variable orientation of transducer of cabinet
- 2201/028 . . Structural combinations of loudspeakers with built-in power amplifiers, e.g. in the same acoustic enclosure ([H04R 2499/10](#) takes precedence; Single (sub)woofer with two or more satellite loudspeakers for mid- and high-frequency band reproduction driven via the (sub)woofer [H04R 2205/026](#))
- 2201/029 . . Manufacturing aspects of enclosures transducers
- 2201/10 . Details of earpieces, attachments therefor, earphones or monophonic headphones covered by [H04R 1/10](#) but not provided for in any of its subgroups
- 2201/103 . . Combination of monophonic or stereophonic headphones with audio players, e.g. integrated in the headphone
- 2201/105 . . Manufacture of mono- or stereophonic headphone components
- 2201/107 . . Monophonic and stereophonic headphones with microphone for two-way hands free communication
- 2201/109 . . Arrangements to adapt hands free headphones for use on both ears
- 2201/34 . Directing or guiding sound by means of a phase plug
- 2201/40 . Details of arrangements for obtaining desired directional characteristic by combining a number of identical transducers covered by [H04R 1/40](#) but not provided for in any of its subgroups
- 2201/401 . . 2D or 3D arrays of transducers
- 2201/403 . . Linear arrays of transducers
- 2201/405 . . Non-uniform arrays of transducers or a plurality of uniform arrays with different transducer spacing
- 2203/00 Details of circuits for transducers, loudspeakers or microphones covered by [H04R 3/00](#) but not provided for in any of its subgroups**
- 2203/12 . Beamforming aspects for stereophonic sound reproduction with loudspeaker arrays
- 2205/00 Details of stereophonic arrangements covered by [H04R 5/00](#) but not provided for in any of its subgroups**
- 2205/021 . Aspects relating to docking-station type assemblies to obtain an acoustical effect, e.g. the type of connection to external loudspeakers or housings, frequency improvement
- 2205/022 . Plurality of transducers corresponding to a plurality of sound channels in each earpiece of headphones or in a single enclosure

- 2205/024 . Positioning of loudspeaker enclosures for spatial sound reproduction
- 2205/026 . Single (sub)woofer with two or more satellite loudspeakers for mid- and high-frequency band reproduction driven via the (sub)woofer
- 2205/041 . Adaptation of stereophonic signal reproduction for the hearing impaired
- 2207/00 Details of diaphragms or cones for electromechanical transducers or their suspension covered by [H04R 7/00](#) but not provided for in [H04R 7/00](#) or in [H04R 2307/00](#)**
- 2207/021 . Diaphragm extensions, not necessarily integrally formed, e.g. skirts, rims, flanges
- 2209/00 Details of transducers of the moving-coil, moving-strip, or moving-wire type covered by [H04R 9/00](#) but not provided for in any of its subgroups**
- 2209/021 . Reduction of eddy currents in the magnetic circuit of electrodynamic loudspeaker transducer
- 2209/022 . Aspects regarding the stray flux internal or external to the magnetic circuit, e.g. shielding, shape of magnetic circuit, flux compensation coils
- 2209/024 . Manufacturing aspects of the magnetic circuit of loudspeaker or microphone transducers
- 2209/026 . Transducers having separately controllable opposing diaphragms, e.g. for ring-tone and voice ([H04R 2400/03](#) takes precedence)
- 2209/027 . Electrical or mechanical reduction of yoke vibration
- 2209/041 . Voice coil arrangements comprising more than one voice coil unit on the same bobbin
- 2209/043 . Short circuited voice coils driven by induction
- 2217/00 Details of magnetostrictive, piezo-electric, or electrostrictive transducers covered by [H04R 15/00](#) or [H04R 17/00](#) but not provided for in any of their subgroups**
- 2217/01 . Non-planar magnetostrictive, piezo-electric or electrostrictive benders
- 2217/03 . Parametric transducers where sound is generated or captured by the acoustic demodulation of amplitude modulated ultrasonic waves
- 2225/00 Details of deaf aids covered by [H04R 25/00](#), not provided for in any of its subgroups**
- 2225/021 . Behind the ear [BTE] hearing aids
- 2225/0213 . . Constructional details of earhooks, e.g. shape, material
- 2225/0216 . . BTE hearing aids having a receiver in the ear mould
- 2225/023 . Completely in the canal [CIC] hearing aids
- 2225/025 . In the ear hearing aids [ITE] hearing aids
- 2225/31 . Aspects of the use of accumulators in hearing aids, e.g. rechargeable batteries or fuel cells
- 2225/33 . Aspects relating to adaptation of the battery voltage, e.g. its regulation, increase or decrease
- 2225/39 . Aspects relating to automatic logging of sound environment parameters and the performance of the hearing aid during use, e.g. histogram logging, or of user selected programs or settings in the hearing aid, e.g. usage logging
- 2225/41 . Detection or adaptation of hearing aid parameters or programs to listening situation, e.g. pub, forest
- 2225/43 . Signal processing in hearing aids to enhance the speech intelligibility
- 2225/49 . Reducing the effects of electromagnetic noise on the functioning of hearing aids, by, e.g. shielding, signal processing adaptation, selective (de)activation of electronic parts in hearing aid
- 2225/51 . Aspects of antennas or their circuitry in or for hearing aids
- 2225/53 . Hearing aid for unilateral hearing impairment using Contralateral Routing Of Signals [CROS]
- 2225/55 . Communication between hearing aids and external devices via a network for data exchange
- 2225/57 . Aspects of electrical interconnection between hearing aid parts
- 2225/59 . Arrangements for selective connection between one or more amplifiers and one or more receivers within one hearing aid
- 2225/61 . Aspects relating to mechanical or electronic switches or control elements, e.g. functioning
- 2225/67 . Implantable hearing aids or parts thereof not covered by [H04R 25/606](#)
- 2225/77 . Design aspects, e.g. CAD, of hearing aid tips, moulds or housings
- 2225/81 . Aspects of electrical fitting of hearing aids related to problems arising from the emotional state of a hearing aid user, e.g. nervousness or unwillingness during fitting
- 2225/83 . Aspects of electrical fitting of hearing aids related to problems arising from growth of the hearing aid user, e.g. children
- 2227/00 Details of public address [PA] systems covered by [H04R 27/00](#) but not provided for in any of its subgroups**
- 2227/001 . Adaptation of signal processing in PA systems in dependence of presence of noise
- 2227/003 . Digital PA systems using, e.g. LAN or internet
- 2227/005 . Audio distribution systems for home, i.e. multi-room use
- 2227/007 . Electronic adaptation of audio signals to reverberation of the listening space for PA
- 2227/009 . Signal processing in [PA] systems to enhance the speech intelligibility
- 2231/00 Details of apparatus or processes specially adapted for the manufacture of transducers or diaphragms therefor covered by [H04R 31/00](#), not provided for in its subgroups**
- 2231/001 . Moulding aspects of diaphragm or surround
- 2231/003 . Manufacturing aspects of the outer suspension of loudspeaker or microphone diaphragms or of their connecting aspects to said diaphragms
- 2307/00 Details of diaphragms or cones for electromechanical transducers, their suspension or their manufacture covered by [H04R 7/00](#) or [H04R 31/003](#), not provided for in any of its subgroups**
- 2307/021 . Diaphragms comprising cellulose-like materials, e.g. wood, paper, linen
- 2307/023 . Diaphragms comprising ceramic-like materials, e.g. pure ceramic, glass, boride, nitride, carbide, mica and carbon materials
- 2307/025 . Diaphragms comprising polymeric materials
- 2307/027 . Diaphragms comprising metallic materials
- 2307/029 . Diaphragms comprising fibres

- 2307/201 . Damping aspects of the outer suspension of loudspeaker diaphragms by addition of additional damping means
- 2307/204 . Material aspects of the outer suspension of loudspeaker diaphragms
- 2307/207 . Shape aspects of the outer suspension of loudspeaker diaphragms

#### 2400/00 Loudspeakers

##### NOTE

[H04R 2400/00](#) itself is only to be used for those cases where the classification does not allow specification the type of transducer and the type is important, e.g. frequency control circuit ([H04R 3/04](#) and subgroups) may require different circuits for microphones or for loudspeakers

- 2400/01 . Transducers used as a loudspeaker to generate sound as well as a microphone to detect sound
- 2400/03 . Transducers capable of generating both sound as well as tactile vibration, e.g. as used in cellular phones
- 2400/07 . Suspension between moving magnetic core and housing
- 2400/11 . Aspects regarding the frame of loudspeaker transducers
- 2400/13 . Use or details of compression drivers

#### 2410/00 Microphones

##### NOTE

[H04R 2410/00](#) itself is only to be used for those cases where the classification does not allow specification the type of transducer and the type is important, e.g. frequency control circuit ([H04R 3/04](#) and subgroups) may require different circuits for microphones or for loudspeakers

- 2410/01 . Noise reduction using microphones having different directional characteristics
- 2410/03 . Reduction of intrinsic noise in microphones
- 2410/05 . Noise reduction with a separate noise microphone
- 2410/07 . Mechanical or electrical reduction of wind noise generated by wind passing a microphone

#### 2420/00 Details of connection covered by [H04R](#), not provided for in its groups

- 2420/01 . Input selection or mixing for amplifiers or loudspeakers ([for hearing aids H04R 25/43](#))
- 2420/03 . Connection circuits to selectively connect loudspeakers or headphones to amplifiers
- 2420/05 . Detection of connection of loudspeakers or headphones to amplifiers
- 2420/07 . Applications of wireless loudspeakers or wireless microphones
- 2420/09 . Applications of special connectors, e.g. USB, XLR, in loudspeakers, microphones or headphones

#### 2430/00 Signal processing covered by [H04R](#), not provided for in its groups

- 2430/01 . Aspects of volume control, not necessarily automatic, in sound systems
- 2430/03 . Synergistic effects of band splitting and sub-band processing

- 2430/20 . Processing of the output signals of the acoustic transducers of an array for obtaining a desired directivity characteristic ([H04R 2203/12 takes precedence](#))
- 2430/21 . . Direction finding using differential microphone array [DMA]
- 2430/23 . . Direction finding using a sum-delay beam-former
- 2430/25 . . Array processing for suppression of unwanted side-lobes in directivity characteristics, e.g. a blocking matrix

#### 2440/00 Bending wave transducers covered by [H04R](#), not provided for in its groups

- 2440/01 . Acoustic transducers using travelling bending waves to generate or detect sound
- 2440/03 . Resonant bending wave transducer used as a microphone
- 2440/05 . Aspects relating to the positioning and way or means of mounting of exciters to resonant bending wave panels
- 2440/07 . Loudspeakers using bending wave resonance and piston motion to generate sound

#### 2460/00 Details of hearing devices, i.e. of ear- or headphones covered by [H04R 1/10](#) or [H04R 5/033](#) but not provided for in any of their subgroups, or of hearing aids covered by [H04R 25/00](#) but not provided for in any of its subgroups

- 2460/01 . Hearing devices using active noise cancellation
- 2460/03 . Aspects of the reduction of energy consumption in hearing devices
- 2460/05 . Electronic compensation of the occlusion effect
- 2460/07 . Use of position data from wide-area or local-area positioning systems in hearing devices, e.g. program or information selection
- 2460/09 . Non-occlusive ear tips, i.e. leaving the ear canal open, for both custom and non-custom tips ([H04R 2460/11 takes precedence](#))
- 2460/11 . Aspects relating to vents, e.g. shape, orientation, acoustic properties in ear tips of hearing devices to prevent occlusion
- 2460/13 . Hearing devices using bone conduction transducers
- 2460/15 . Determination of the acoustic seal of ear moulds or ear tips of hearing devices
- 2460/17 . Hearing device specific tools used for storing or handling hearing devices or parts thereof, e.g. placement in the ear, replacement of cerumen barriers, repair, cleaning hearing devices

#### 2499/00 Aspects covered by [H04R](#) or [H04S](#) not otherwise provided for in their subgroups

- 2499/01 . General technical reviews, overviews, tutorials
- 2499/10 . General applications
- 2499/11 . . Transducers incorporated or for use in hand-held devices, e.g. mobile phones, PDA's, camera's
- 2499/13 . . Acoustic transducers and sound field adaptation in vehicles
- 2499/15 . . Transducers incorporated in visual displaying devices, e.g. televisions, computer displays, laptops