Revision of the Hornbostel-Sachs Classification of Musical Instruments by the MIMO Consortium

INTRODUCTION

The MIMO (Musical Instrument Museums Online) project has created a single access point to digital content and information on the collections of musical instruments held in a consortium of European museums. Co-funded by the European Union through the *e*Content*plus* programme, the project has entailed the harvesting of the digital content of the museums' collections databases, to be made available online through EUROPEANA, the portal to the digital resources of Europe's museums, libraries, archives and audio-visual collections. The MIMO project has also involved the revision of the Hornbostel Sachs classification of musical instruments, with the main aim of classifying instruments such those in the new Electrophones class 5, invented since the publication of the original scheme of 1914 by Erich M. von Hornbostel and Curt Sachs.[1] A number of scholars have at various times revised or extended the scheme. The MIMO consortium's version is closely based on the revised version (classes 1-4) by Jeremy Montagu[2] to whom the consortium owes a debt of gratitude for generously sharing with us with us all resources associated with it; we also thank him and the editors of *Muzyka* for permitting the reproduction of the classification and some of the introductory comments in his article. The classification has been revised by the MIMO working group for classification and thesauri, chaired by Margaret Birley (The Horniman Museum, London) with contributions from many different members. Especial thanks are due to Arnold Myers (University of Edinburgh) and to Saskia Willaert (Musical Instrument Museum, Brussels). This version of classification has been incorporated within the databases of a number of the museums in the MIMO project.

Many of the new categories that have been introduced for instruments in classes 1-4 derive from the work of Jeremy Montagu. One is the addition of 'retreating reeds', a term used by Francis Galpin[3] to describe what are usually wood or cane aerophones of tubular form, with a proximal open end and a distal end formed by natural node that is split in half, or built in two halves that are closed with a binding. Air blown through the tube forces the two halves to open and close periodically, creating sound. Since the vibrating air is not confined within the tube, 'retreating reeds' fall within the free aerophones category. Montagu's 'Dilating reeds' category, within wind instruments proper, is for reeds made 'from stalks of plants such as rice with vertical slits in the sides. When blown from one end of the stalk, the slits dilate under the air pressure, opening and closing.'[4] 'Edgetone instruments that are not flutes'[5] include 'double disks, with a central hole passing through both sides of the disk, that one places between the lips and the teeth. These are made from tinplate, bottle-tops, or fruit stones, and are sometimes called widgeon whistles or labial whistles, and one plays them by breathing in and out through the hole.'[6]

Performance techniques in instruments unknown to the authors in 1914 have also given rise to new categories in the classification. ‘Concussion bells’ (111.143) were added by Montagu to the classification ‘after acquiring a pair of Nigerian double-bells that are struck concussively against each other’.[7]

In the membranophones group, the MIMO consortium has expanded and renamed the kettledrums section to include vessel drums of all shapes in which the single membrane and body form an enclosed entity, and has introduced a new category of vase-shaped drums many of which are represented in the collections of the Royal Museum of Central Africa in Tervuren, Belgium, one of the partners in the project. Museums often have no information as to whether or not both heads of a double-membrane tubular drum are struck, and the new subdivisions have an inclusive category for drums with two membranes, one of which may or may not be played.

Since the classification deals with instruments world-wide, the MIMO consortium advocates changes to nomenclature in the aerophones section, with the use of the more neutral term ‘reedpipes’ for all wind instruments proper played with a reed as an alternative to ‘oboes’ and ‘clarinets’ which are closely associated with western orchestral instruments with specific bore-profiles. ‘Horns’ and ‘trumpets’ may similarly evoke European brasswind. In addition to replacing these terms with ‘labrosones’,[8] thus reinforcing awareness of the fact that not all lip-vibrated instruments are made of brass, the MIMO consortium has also expanded the classification to deal with specific types of European brass instruments. There are numerous examples in European collections, and the existing Hornbostel-Sachs classification does not succeed in dividing them into classes which correspond to how the instruments are treated by makers, musicians, or composers. Arnold Myers has extended the Hornbostel-Sachs classes to more usefully divide brasswind. This is particularly difficult since one accepted species of instrument can merge into another without a clearly defined boundary. The principles of division are:

A. chromatic capability provided by: tone-holes / slides / valves

This distinction is easily recognised by non-specialists.

B. Bore profile is: conical / intermediate / cylindrical

No instruments are perfectly conical or completely cylindrical, but these terms are widely used and have an intuitive meaning. There is no clear boundary between these profiles. However, most users will probably recognise the examples given and be able to apply the classification scheme.

C. Bore is: narrow / wide

Again, there is no clear boundary between these profiles, but most users will probably recognise the examples given.

D. Air column is: short (less than 2m) / long (more than 2m)

Clearly, small and large instruments are different species in most cases. The air column length of valved instruments is in most cases the shortest possible provided by the valves. There are some anomalies and problems (such as distinguishing the larger valve trumpets from the small valve trombones) but the scheme does allow useful subdivision to be made.

The classification of Electrophones owes its coverage of the field to the scholarship of Maarten Quanten of the Musical Instrument Museum in Brussels, and his thesis (in the course of development) that categorises components of electrophones as a series of interchangeable modules. While his full classification reflects the use of electrophones in the sound workshop, in composition and in performance, the modified and abbreviated version devised for the MIMO project uses separate categories for instruments and modules, facilitating their allocation to different classes by non-specialists. An original aim of the MIMO project was to develop a 'simplified version of Hornbostel Sachs classification' and this section of the classification remains within this remit. We are grateful to Maarten Quanten for his work, also to Dr Tim Boon of the Science Museum in London and Professor Clive Greated of the University of Edinburgh for their advice on this section of the classification. Unmodified acoustic instruments with attached microphones or pickups are classed within groups 1-4, according to the primary source of acoustic or mechanical vibration. All other instruments that use materials generating acoustic sounds, mechanically-driven signal sources, electronically stored data or electronic circuitry and produce electrical signals that are passed to a loudspeaker to deliver sound fall within the Electrophones group (5). The main subdivisions of the electrophones group include those identified by Hugh Davies[9] and other authors[10] as electroacoustic, electromechanical and electronic instruments.

In the Introduction to their classification, Sachs and Hornbostel identified ways of creating numerical codes for instruments such as bagpipes, which comprise more than one category, giving examples of ways in which the code might be reconfigured to highlight different aspects of a given instrument. Since the numerical codes must be used consistently within the databases of the different MIMO partners, in the practical application of Hornbostel Sachs numbers to multicategory instruments within this digital context none of the abbreviations suggested by Hornbostel and Sachs have been used, rather, the codes have been used in full, without colons or brackets. As a general principle, the numerical code for any suffix that applies (or suffixes that apply) to all the categories appears at the end of the series of numbers. Thus the full numerical code for the Highland bagpipe would appear as 422.112-7+422.22-62 Double-reed chanter, conical bore (-7 with fingerholes) + set of single-reed drones with cylindrical bore (-62) flexible air reservoir for all pipes.

Classification

This revision of the Hornbostel-Sachs classification is published on the CIMCIM website in two versions. In this version none of the revisions made by

Jeremy Montagu or by the MIMO Consortium to the original classification as published in translation in the Galpin Society Journal in 1961 are shown. Another version of this document showing all revisions is published separately on the CIMCIM website.

1 IDIOPHONES The substance of the instrument itself, owing to its solidity and elasticity, vibrates and may radiate sound[11] without requiring stretched membranes or strings

11 Struck idiophones The instrument is made to vibrate by being struck upon

111 Idiophones struck directly The player himself executes the movement of striking; whether by mechanical intermediate devices, beaters, keyboards, or by pulling ropes, etc., is immaterial; it is definitive that the player can apply clearly defined individual strokes and that the instrument itself is equipped for this kind of percussion

111.1 Concussion idiophones or clappers Two or more complementary sonorous parts are struck against each other

111.11 Concussion sticks or stick clappers *Vietnam, India, Marshall Is.*

111.12 Concussion plaques or plaque clappers *China, India*

111.13 Concussion troughs or trough clappers *Burma [Myanmar]*

111.14 Concussion vessels or vessel clappers Even a slight hollow in the surface of a board counts as a vessel

111.141 Castanets Vessel clappers, either natural, or artificially hollowed out

111.142 Cymbals Vessel clappers with everted rim

111.143 Concussion bells *Nigeria*

111.2 Percussion idiophones The instrument is struck either with a non-sonorous object (hand, stick, striker) or against a non-sonorous object (human body, the ground)

111.21 Percussion sticks

111.211 (Individual) percussion sticks *Japan, Vietnam, Balkans; also the triangle*

111.212 Sets of percussion sticks Several percussion sticks of different pitch are combined to form a single instrument *All xylophones*

111.22 Percussion plaques

111.221 (Individual) percussion plaques *In the oriental Christian Church,*

111.222 Sets of percussion plaques *Lithophone (China), and most metallophones*

111.23 Percussion tubes

111.231 (Individual) percussion tubes *Tubular bell*

NB Not slit drums, which are a sub-group of bells, 111.243

111.232 Sets of percussion tubes *Tubaphon, tubular xylophone*

111.24 Percussion vessels

111.241 Gongs The vibration is strongest near the vertex

111.241.1 (Individual) gongs *S. and E. Asia* *including the so-called metal drums, or rather kettle-gongs*[12]

111.241.11 Bossed gongs, flat gongs (with flange) and intermediate types

111.241.12 Gongs with divided surface sounding different pitches *Steel drum (Caribbean)*

111.241.2 Sets of gongs [gong chimes]
111.241.21 Sets of bossed, flat gongs (with flange) and intermediate types *S.E.Asia, E. Asia*
111.241.22 Sets of gongs with divided surface sounding different pitches *Steel drums (Caribbean)*
111.242 Bells The vibration is weakest near the vertex
111.242.1 (Individual) Bells
111.242.11 Resting bells The cup is placed on the palm of the hand or on a cushion; its mouth faces upwards *China, Indo-China, Japan*
111.242.12 Suspended bells The bell is suspended from the apex
111.242.121 Suspended bells struck from the outside No striker is attached inside the bell, there being a separate beater
111.242.122 Clapper bells A striker (clapper) is attached inside the bell
111.242.123 Bells with attached external clapper/s
111.242.2 Sets of bells *[chimes]* (subdivided as 111.242.1):
111.242.21 Sets of resting bells
111.242.22 Sets of suspended bells
111.242.221 Sets of suspended bells struck from the outside
111.242.222 Sets of clapper bells
111.242.223 Sets of bells with attached external clappers
111.243 Slit Drums
111.244 Percussion troughs e.g. some forms of 'slit drum' such as Fijian *lali* where the whole 'mouth' is open
111.25 Percussion boulders *Rock gongs*
112 Indirectly struck idiophones The player himself does not go through the movement of striking; percussion results indirectly through some other movement by the player. The intention of the instrument is to yield clusters of sounds or noises, and not to let individual strokes be perceived
112.1 Shaken idiophones or rattles The player executes a shaking motion
112.11 Suspension rattles Perforated idiophones are mounted together, and shaken to strike against each other
112.111 Strung rattles Rattling objects are strung in rows on a cord *Necklaces with rows of shells*
112.112 Stick rattles Rattling objects are strung on a bar (or ring) *Sistrum with rings*
112.12 Frame rattles Rattling objects are attached to a carrier against which they strike
112.121 Pendant rattles Rattling objects are hung from a frame *Dancing shield with rattling rings*
112.122 Sliding rattles Non-sonorous objects slide to and fro in the slots of the sonorous object so that the latter is made to vibrate; or sonorous objects slide to and fro in the slots of a non-sonorous object, to be set in vibration by the impacts *Anklung, sistrum with rods*
112.13 Vessel rattles Rattling objects enclosed in a vessel strike against each other or against the walls of the vessel, or usually against both. NB The Benue gourd rattles with handle, in which the rattling objects, instead of being enclosed, are knotted into a net slipped over the outer surface, count as a variety of vessel rattle *Fruit shells with seeds, 'pellet bells' enclosing loose percussion pellets*

112.2 Scraped idiophones The player causes a scraping movement directly or indirectly: a non-sonorous object moves along the notched surface of a sonorous object, to be alternately lifted off the teeth and flicked against them; or an elastic sonorous object moves along the surface of a notched non-sonorous object to cause a series of impacts. This group must not be confused with that of friction idiophones
112.21 Scraped sticks A notched stick is scraped with a little stick
112.211 Scraped sticks without resonator *S. America, India (notched musical bow), Congo*
112.212 Scraped sticks with resonator *Usumbara, E. Asia (tiger)*
112.22 Scraped tubes *S. India*
112.23 Scraped vessels The corrugated surface of a vessel is scraped *S. America, Congo region*
112.24 Scraped wheels or cog rattles A cog wheel, whose axle serves as the handle, and a tongue fixed in a frame which is free to turn on the handle; when whirled, the tongue strikes the teeth of the wheel one after another *Europe, India*
112.25 Scraped boards *Jazz washboard*
112.3 Split idiophones Instruments in the shape of two springy arms connected at one end and touching at the other; (in some examples) the arms are forced apart by a little stick, to jingle or vibrate on recoil *China (huan t'u), Malacca now West Malaysia, Iran (qašik), Balkans*
12 Lamellaphones[13] **(or plucked idiophones)** Lamellae, i.e. elastic plaques, fixed at one end, are flexed and then released to return to their position of rest
121 In the form of a frame The lamella vibrates within a frame or hoop
121.1 Clack idiophones (cricri) The lamella is carved in the surface of a fruit shell, which serves as a resonator *Melanesia*
121.2 Guimbardes (trumps,[14] **also known as jew's harps)** The lamella is mounted in a rod- or plaque-shaped frame and depends on the player's mouth cavity for resonance
121.21 Idioglot guimbardes The lamella is carved in the frame itself, its base remaining joined to the frame *India, Indonesia, Melanesia*
121.22 Heteroglot guimbardes A lamella is attached to a frame
121.221 (Single) heteroglot guimbardes *Europe, India, China*
121.222 Sets of heteroglot guimbardes Several heteroglot guimbardes of different pitches are combined to form a single instrument *Aura*
122 In board- or comb-form The lamellae are attached to a board or cut out from a board like the teeth of a comb
122.1 With laced-on, or hooked-in[15] **lamellae**
122.11 Without resonator *All lamellaphones*[16] *on a plain board*
122.12 With resonator *All lamellaphones with a box or bowl below the board*
122.2 With cut-out lamellae (musical boxes) Pins on a cylinder pluck the lamellae
13 Friction Idiophones The instrument is made to vibrate by friction
131 Friction sticks
131.1 (Individual) friction sticks *Sandpaper blocks*
131.2 Sets of friction sticks

131.21 With direct friction The sticks themselves are rubbed *Nail fiddle, nail piano, Stockspiele*
131.22 With indirect friction The sticks are connected with others which are rubbed and, by transmitting their longitudinal vibration, stimulate transverse vibration in the former *Chladni's euphon*
132 Friction plaques
132.1 (Individual) friction plaques *(unknown)*
132.2 Sets of friction plaques *[livika] New Ireland*
133 Friction vessels
133.1 (Individual) friction vessels *Brazil (tortoise shell)*
133.2 Sets of friction vessels *Verillon (glass armonica)*
134 Friction sheet *Theatrical wind machine*
14 Blown idiophones The instrument is made to vibrate by being blown upon
141 Blown sticks
141.1 (Individual) blown sticks *Unknown*
141.2 Sets of blown sticks *Aeolsklavier*
142 Blown plaques
142.1 (Individual) blown plaques *Unknown*
142.2 Sets of blown plaques *Piano chanteur*
15 Metal sheets the vibrating material consists of a flexible sheet of metal
151 Played by friction Bowed musical saw
152 Directly struck *Hammered musical saw, theatrical thunder sheet played with a hammer*[17]
153 Played by shaking *Theatrical thunder sheet (played without hammer)*
154 Shaken and indirectly struck *Flexatone*
16 Flexed diaphragms A diaphragm is flexed when a string passing through its centre is pulled, before returning to rest. *England, modified yoghurt pot or metal watering-can rose mimicking the sound of a clucking cockerel*
Suffixes for use with any division of idiophones:
-1 The vibrations are coupled with a transducer to create an electrical signal that is processed through an amplifier and loudspeaker (*Applied only to instruments that have not been structurally modified or designed to be played through a loudspeaker; all these are classed as Electrophones in Group 5)*
-11 With non-integral microphones
-12 With non-integral pickups
-8 With keyboard
-9 Mechanically driven

2 MEMBRANOPHONES The sound is excited by tightly stretched membranes
21 Struck drums The membranes are struck
211 Drums struck directly The player himself executes the movement of striking; this includes striking by any intermediate devices, such as beaters, keyboards, etc; drums that are shaken are excluded
211.1 Vessel drums The single playing head encloses a body in the form of a vessel that is curvilinear or rectilinear in profile *Kettledrums*
211.11 Separate vessel drums *European timpani*

211.12 Sets of vessel drums *W. Asian permanently joined pairs of kettledrums*
211.2 Tubular drums The body is tubular, with membranes enclosing one or both ends
211.21 Cylindrical drums The diameter is essentially the same at the middle and the ends. Occasionally the ends will taper slightly or have projecting discs
211.211 Single-skin cylindrical drums The drum has only one membrane and the opposite end is open
211.211.1 Individual single-skin cylindrical drums, with single membranes and open ends *Malacca, now West Malaysia*
211.211.2 Sets of single-skin cylindrical drums, with single membranes and open ends
211.212 Double-skin cylindrical drums, the drum has two[18] membranes
211.212.1 Individual double-skin cylindrical drums
211.212.11 Individual double-skin cylindrical drums, one skin used for playing *Side drum, tenor drum, tambourin de Provence*
211.212.12 Individual double-skin cylindrical drums, both heads played *Turkey (davul). Almost world-wide (bass drum in marching band).*
211.212.2 Sets of double-skin cylindrical drums
211.212.21 Sets of double-skin cylindrical drums with single playing heads *USA/Europe drum kit*
211.212.22 Sets of double-skin cylindrical drums, both heads played
211.22 Barrel-shaped drums The diameter is larger at the middle than at the ends; the body is curvilinear *Asia, Africa, Ancient Mexico*
Subdivisions as for 211.21
211.221 Single-skin barrel drums
211.221.1 Individual single-skin barrel drums
211.221.2 Sets of single-skin barrel drums
211.222 Double-skin barrel drums
211.222.1 Individual double-skin barrel drums
211.222.11 Individual double-skin barrel drums, one skin used for playing
211.222.12 Individual double-skin barrel drums, both heads played
211.222.2 Sets of double-skin barrel drums
211.222.21 Sets of double-skin barrel drums with single playing heads
211.222.22 Sets of double-skin barrel drums, both heads played
211.23 Double-conical drums The diameter is larger at the middle than at the ends; the body is rectilinear with angular profile *India (mrdanga, pakhavaj)*
Subdivisions as for 211.21
211.231 Single-skin double-conical drums
211.231.1 Individual single-skin double-conical drums
211.231.2 Sets of single-skin double-conical drums
211.232 Double-skin double-conical drums
211.232.1 Individual double-skin double-conical drums
211.232.11 Individual double-skin double-conical drums, one skin used for playing
211.232.12 Individual double-skin double-conical drums, both heads played

211.232.2 Sets of double-skin double-conical drums
211.232.21 Sets of double-skin double-conical drums with single playing heads
211.232.22 Sets of double-skin double-conical drums, both heads played
211.24 Hourglass-shaped drums The diameter is smaller at the middle than at the ends *Asia, Melanesia, E. Africa*
Subdivisions as for 211.21
211.241 Single-skin hourglass-shaped drums
211.241.1 Individual single-skin hourglass-shaped drums
211.241.2 Sets of single-skin hourglass-shaped drums
211.242 Double-skin hourglass-shaped drums
211.242.1 Individual double-skin hourglass-shaped drums
211.242.11 Individual double-skin hourglass-shaped drums, one skin used for playing
211.242.12 Individual double-skin hourglass-shaped drums, both heads played
211.242.2 Sets of double-skin hourglass-shaped drums
211.242.21 Sets of double-skin hourglass-shaped drums with single playing heads
211.242.22 Sets of double-skin hourglass-shaped drums, both heads played
211.25 Conical drums The diameter at the ends differ considerably; some minor departures from strict conicity, inevitably met, are disregarded here
211.251 Single-skin conical drums
211.251.1 Individual single-skin conical drums
211.251.2 Sets of single-skin conical drums
211.252 Double-skin conical drums
211.252.1 Individual double-skin conical drums
211.252.11 Individual double-skin conical drums, one skin used for playing
211.252.12 Individual double-skin conical drums, both heads played
211.252.2 Sets of double-skin conical drums
211.252.21 Sets of double-skin conical drums with single playing heads
211.252.22 Sets of double-skin conical drums, both heads played
211.26 Goblet-shaped drums The body consists of a main section which is either cup shaped or cylindrical, and a slender stem; borderline cases of this basic design like those occurring notably in Indonesia, do not affect the identification, so long as a cylindrical form is not in fact reached *Darabukka*
211.27 Cylindro-conical drums. The body is in two sections, a cylindrical upper and a conical lower section
211.271 Single-skin cylindro-conical drums
211.271.1 Individual single-skin cylindro-conical drums. Sometimes the foot is flared.
211.271.2 Sets of single-skin cylindro-conical drums
211.272 Double-skin cylindro-conical drums
211.272.1 Individual double-skin cylindro-conical drums
211.272.11 Individual double-skin cylindro-conical drums, one skin used for playing *Uganda drum*

211.272.12 Individual double-skin cylindro-conical drums, both heads played
211.272.2 Sets of double-skin cylindro-conical drums
211.272.21 Sets of double-skin cylindro-conical drums with single playing heads *Uganda (Entenga drum chime)*
211.272.22 Sets of double-skin cylindro-conical drums, both heads played
211.28 Vase-shaped drums. The body is waisted and rests on an open foot that may be flared. The upper section is conical, and the lower section, which is rectilinear or curvilinear in profile, tapers towards the foot. These drums have a single membrane
211.3 Frame drums The depth of the body does not exceed the radius of the membrane. NB The European side-drum, even in its most shallow form, is a development from the long cylindrical drum and hence is not included among frame drums
211.31 Frame drums (without handle)
211.311 Single-skin frame drums *Tambourine*
211.312 Double-skin frame drums *N. Africa, Portugal*
211.32 Frame drum with handle A stick is attached to the frame in line with its diameter
211.321 Single-skin frame drums with handle *Inuit*
211.322 Double-skin frame drums with handle *Tibet*
212 Rattle drums (sub-divisions as for drums struck directly, 211) The drum is shaken; percussion is by impact of pendant or enclosed pellets, or similar objects India, Tibet
212.1 Vessel rattle drums
212.2 Tubular rattle drums
212.21 Cylindrical rattle drums
212.211 Individual cylindrical rattle drums
212.212 Sets of cylindrical rattle drums
212.22 Barrel-shaped rattle drums
212.221 Individual barrel-shaped rattle drums
212.222 Sets of barrel-shaped rattle drums
212.23 Double-conical rattle drums
212.231 Individual double-conical rattle drums
212.232 Sets of double-conical rattle drums
212.24 Hourglass-shaped rattle drums
212.241 Individual hourglass-shaped rattle drums
212.242 Sets of hourglass-shaped rattle drums
212.3 Frame rattle drums
212.31 Single-skin frame rattle drums
212.32 Double-skin frame rattle drums
212.321 Individual double-skin frame rattle drums
212.322 Sets of double-skin frame rattle drums
23 Friction drums The membrane is made to vibrate by friction
231 Friction drums with stick A stick in contact with the membrane is either itself rubbed, or is employed to rub the membrane
231.1 With inserted stick The stick passes through a hole in the membrane
231.11 Friction drums with fixed stick The stick cannot be moved; the stick alone is subjected to friction by rubbing *Africa*

231.12 Friction drums with semi-fixed stick The stick is movable to a sufficient extent to rub the membrane when it is itself rubbed by the hand *Africa*
231.13 Friction drums with free stick The stick can be moved freely; it is not itself rubbed, but is employed to rub the membrane *Venezuela*
231.2 With tied stick The stick is tied to the membrane in an upright position *Europe*
232 Friction drum with cord A cord, attached to the membrane, is rubbed
232.1 Stationary friction drums with friction cord the drum is held stationary *Europe, Africa*
232.11 Single-skin stationary drums with friction-cord
232.12 Double-skin stationary drums with friction-cord
232.2 Friction drum with whirling stick The drum is whirled on a cord which rubs on a [resined] notch in the holding stick *Waldteufel [cardboard buzzer] (Europe, India, E. Africa)*
233 Hand friction drums The membrane is rubbed by the hand
NB This does not include the orchestral tambourine which remains a frame drum
24 Singing membranes (Kazoos) The membrane is made to vibrate by speaking or singing into it; the membrane does not yield a note of its own but merely modifies the voice *Europe, W. Africa*
241 Free kazoos The membrane is incited directly, without the wind first passing through a chamber *Comb-and-paper*
242 Tube- or vessel-kazoos The membrane is placed on top of a tube or box *Africa; while also E. Asian flutes with a lateral hole sealed by a membrane, exhibit an affinity with the principle of the tube kazoo*
Suffixes for use with any division of membranophones:
-1 The vibrations are coupled with a transducer to create an electrical signal that is processed through an amplifier and loudspeaker (*Applied only to instruments that have not been structurally modified or designed to be played through a loudspeaker; all these are classed as Electrophones in Group 5)*
-11 With non-integral microphones
-12 With non-integral pickups
-6 With membrane glued to drum
-7 With membrane nailed to drum
-8 With membrane laced to drum
-81 Cord-(ribbon-) bracing The cords are stretched from membrane to membrane or arranged in the form of a net, without employing any of the devices described below
-811 With tension ligature Cross ribbons or cords are tied round the middle of the lacing to increase its tension *Sri Lanka*
-812 With tension loops The cords are laced in a zigzag; every pair of strings is caught together with a small ring or loop *India*
-813 With wedge-bracing Wedges are inserted between the wall of the drum and the cords of the lacing; by adjusting the position of the wedges it is possible to control the tension *India, Indonesia, Africa*
-82 Cord-and-hide bracing The cords are laced at the lower end to a non-sonorous piece of hide *Africa*

-83 Cord-and-board bracing The cords are laced to an auxiliary board at the lower end *Sumatra*
-84 Cord-and-flange bracing The cords are laced at the lower end to a flange carved from the solid *Africa*
-85 Cord-and-belt bracing The cords are laced at the lower end to a belt of different material *India*
-86 Cord-and-peg bracing The cords are laced at the lower end to pegs stuck into the wall of the drum *Africa*
NB -82 to -86 are sub-divided as -81 above
-9 With membrane lapped on A ring is slipped over the edge of the membrane
-91 With membrane lapped onto a ring of cord *Africa*
-92 With membrane lapped onto a hoop
-921 With mechanism *Machine timpani*
-9211 With pedals *Pedal timpani*

3 CHORDOPHONES One or more strings are stretched between fixed points
31 Simple chordophones or zithers The instrument consists solely of a string bearer, or of a string bearer with a resonator which is not integral and can be detached without destroying the sound-producing apparatus
311 Bar zithers The string bearer is bar-shaped; it may be a board placed edgewise
311.1 Musical bows The string bearer is flexible (and curved)
311.11 Idiochord musical bows The string is cut from the bark of the cane, remaining attached at each end
311.111 Mono-idiochord musical bows The bow has one idiochord string only *New Guinea (Sepik R.), Togo*
311.112 Poly-idiochord musical bows or harp-bows The bow has several idiochord strings which pass over a toothed stick or bridge *W. Africa (Fan)*
311.12 Heterochord musical bows The string is of separate material from the bearer
311.121 Mono-heterochord musical bows The bow has one heterochord string only
311.121.1 Without resonator NB If a separate, unattached resonator is used, the specimen belongs to 311.121.21. The human mouth is not to be taken into account as a resonator
311.121.11 Without tuning noose *Africa (ganza, samuius, to)*
311.121.12 With tuning noose A fibre noose is passed round the string, dividing it into two sections *South-equatorial Africa (n'kungo, uta)*
311.121.2 With resonator
311.121.21 With independent resonator *Borneo (busoi)*
311.121.22 With resonator attached
311.121.221 Without tuning noose *S. Africa (hade, thomo)*
311.121.222 With tuning noose *S. Africa, Madagascar (gubo, hungo, bobre)*
311.122 Poly-heterochord musical bows The bow has several heterochord strings
311.122.1 Without tuning noose *Oceania (kalove)*
311.122.2 With tuning noose *Oceania (pagolo)*

311.2 Stick zithers The string carrier is rigid
311.21 Musical bow cum stick The string bearer has one flexible, curved end. NB Stick zithers with both ends flexible and curved, like the Basuto bow, are counted as musical bows *India*
311.22 (True) stick zithers NB Round sticks which happen to be hollow by chance do not belong on this account to the tube zithers, but are round-bar zithers; however, instruments in which a tubular cavity is employed as a true resonator, like the modern Mexican *harpa*, are tube zithers
311.221 With one resonator gourd *India (tuila), Celebes (suleppe)*
311.222 With several resonator gourds *India (vina)*
312 Tube zithers The string bearer is a vaulted surface
312.1 Whole-tube zithers The string carrier is a complete tube
312.11 Idiochord (true) tube zithers *Africa and Indonesia (gonra, togo, valiha)*
312.12 Heterochord (true) tube zithers
312.121 Without extra resonator *S.E.Asia (alligator)*
312.122 With extra resonator An internode length of bamboo is placed inside a palm leaf tied in the shape of a bowl *Timor*
312.2 Half-tube zithers The strings are stretched along the convex surface of a gutter *East Asia*
312.21 Idiochord half-tube zithers *Flores*
312.22 Heterochord half-tube zithers *E. Asia*
313 Raft zithers The string bearer is composed of canes tied together in the manner of a raft
313.1 Idiochord raft zithers *India, Upper Guinea, Central Congo*
313.2 Heterochord raft zithers *N. Malawi region*
314 Board zithers The string bearer is a board; the ground too, is to be counted as such
314.1 True board zithers The plane of the strings is parallel with that of the string bearer
314.11 Without resonator *Borneo*
314.12 With resonator
314.121 With resonator bowl The resonator is a fruit shell or similar object, or an artificially carved equivalent *Malawi region*
314.122 With resonator box (box zither) The resonator is made from slats **NB** This is true of the early piano only; modern pianos have no bottom and are board zithers. Harpsichords and some clavichords are box zithers *Qin, koto, zither, Hackbrett, pianoforte*
314.2 Board zither variations The plane of the strings is at right angles to the string bearer
314.21 Ground zithers The ground is the string bearer; there is only one string *Malacca now West Malaysia, Madagascar*
314.22 Harp zithers A board serves as string bearer; there are several strings and a notched bridge *Borneo, Africa: Bokongo, harp zither from the Bambinga people of the Uele district, Congo-Kinshasa*
315 Trough zithers The strings are stretched across the mouth of a trough *Tanzania*
315.1 Without resonator
315.2 With resonator The trough has a gourd or a similar object attached to it

316 Frame zithers The strings are stretched across an open frame
316.1 Without resonator *Perhaps amongst medieval psalteries*
316.2 With resonator *W. Africa, amongst the Kru (kani)*
32 Composite chordophones A string bearer and a resonator are organically united and cannot be separated without destroying the instrument
321 Lutes The plane of the strings runs parallel with the sound-table
321.1 Bow lutes *[pluriarc]* Each string has its own flexible carrier *Africa (akam, kalangu, wambi)*
321.2 Yoke lutes or lyres The strings are attached to a yoke which lies in the same plane as the sound-table and consists of two arms and a cross-bar
321.21 Bowl lyres A natural or carved-out bowl serves as the resonator *Lyra, E. African lyre*
321.22 Box lyres A built-up wooden box serves as the resonator *Kithara, crwth*
321.3 Handle lutes The string bearer is a plain handle. Subsidiary necks, as e.g. in the Indian *prasarini vina* are disregarded, as are also lutes with strings distributed over several necks, like the *harpolyre,* and those like the Lyre-guitars, in which the yoke is merely ornamental
321.31 Spike lutes The handle passes diametrically through or over[19] the resonator
321.311 Spike bowl lutes The resonator consists of a natural or carved-out bowl *Iran, India, Indonesia*
321.312 Spike box lutes or spike guitars The resonator is built up from wood, the body of the instrument is in the form of a box *Banjo*, *Egypt (rebab)*
321.313 Spike tube lutes The handle passes diametrically through the walls of a tube *China, Indochina*
321.32 Necked lutes The handle is attached to or carved from the resonator, like a neck
321.321 Necked bowl lutes *Mandolin, theorbo, balalaika*
321.322 Necked box lutes or necked guitars NB Lutes whose body is built up in the shape of a bowl are classified as bowl lutes *Violin, viol guitar*
321.33 Half-spike lutes or tanged[20] lutes the handle is neither attached to the resonator nor passes all the way through it but terminates within the body *W.Africa*
321.331 Half-spike or tanged bowl lutes
321.332 Half-spike or tanged box lutes
322 Harps The plane of the strings lies at right angles to the sound-table; a line joining the lower ends of the strings would point towards the neck
322.1 Open harps The harp has no pillar
322.11 Arched harps The neck curves away from the resonator *Burma [Myanmar] and Africa*
322.111 Arched harps - Wachsmann type 1 the neck rests on the bottom of the resonator 'like a spoon in a cup'[21] *Uganda*
322.112 Arched harps - Wachsmann type 2 the tanged neck fits tightly into a hole at the narrow end of the resonator 'like a cork in a bottle'[22] *Democratic Republic of Congo, Zande, Nzakara, Banda, Mangebetu*
322.113 Arched harps - Wachsmann type 3 a carved finial extends from the resonator, usually in the form of a human head; it is often tied to the neck. [23]*Gabon*, *Kele, Tsogo, Fang*
322.12 Angular harps The neck makes a sharp angle with the resonator

Assyria, Ancient Egypt, Ancient Korea, Mauretania (ardin)
322.2 Frame harps The harp has a pillar
322.21 Without tuning action *All medieval harps*
322.211 Diatonic frame harps
322.212 Chromatic frame harps
322.212.1 With the strings in one plane *Most of the older chromatic harps*
322.212.2 With the strings in two planes crossing one another *The Lyon chromatic harp*
322.212.3 With the strings in two or more parallel planes *Triple harp*
322.22 With tuning action The strings can be shortened by mechanical action
322.221 With manual action The tuning can be altered by hand-levers *Hook harp, dital harp, harpinella*
322.222 With pedal action The tuning can be altered by pedals
323 Spike harps with tall stringholders
The plane of the strings lies at right angles to the soundtable; a tall stringholder or bridge holds the strings at successive levels, their sounding lengths increasing with their distance from the soundtable; the body resembles a spike lute, with a neck bisecting a calabash resonator
323.1 Arched spike harps with tall stringholders the neck curves away from the resonator *Guinea (bolon), Gambia (simbango)*
323.2 Spike harps with pressure bridges (bridge harps or harp-lutes) a line joining the lower ends of the strings would be perpendicular to the straight neck, notched bridge *Gambia (kora)*
324 Tanged harps with tall stringholders a carved extension of the resonator forms the socket for the shaft of the neck[24]
33 Variable tension chordophones or 'plucked drums'
331 With loose string attached to the drum-head *India (anandalahari)*
332 With string attached to the end of a neck and to the drum-head *India (gopi yantra)*
Suffixes for use with any division of chordophones:
-1 The vibrations are coupled with a transducer to create an electrical signal that is processed through an amplifier and loudspeaker (*Applied only to instruments that have not been structurally modified or designed to be played through a loudspeaker; all these are classed as Electrophones in Group 5)*
-11 With non-integral microphones
-12 With non-integral pickups
-2 Sounded by scraping
-21 Scraping the string *devil's fiddle*
-22 Scraping the string bearer *some musical bows*
-3 Sounded by blowing *!gora, aeolian harps*
-4 Sounded by hammers or beaters
-5 Sounded with the bare fingers
-6 Sounded by plectrum
-7 Sounded by bowing
-71 With a bow
-72 By a wheel
-73 By a ribbon *[Band]*
-8 With keyboard

-9 With mechanical drive
These last two are secondary to -4 to -7 above; i.e. 314.122-6-8 would define the harpsichord

4 AEROPHONES The air itself is the vibrator in the primary sense. In this group also belong reed instruments sounded by a flow of air
in which the reed is the primary vibrator
41 Free aerophones The vibrating air is not confined by the instrument
411 Displacement free aerophones The air-stream meets a sharp edge, or a sharp edge is moved through the air. In either case, according to more recent views, a periodic displacement of air occurs to alternate flanks of the edge *Whip, sword-blade*
412 Interruptive free aerophones The air-stream is interrupted periodically
412.1 Idiophonic interruptive aerophones or reeds The air-stream is directed against a lamella, setting it in periodic vibration to interrupt the stream intermittently. In this group also belong reeds with a 'cover', i.e. a tube in which the air vibrates only in a secondary sense, not producing the sound but simply adding roundness and timbre to the sound made by the reed's vibration; generally recognizable by the absence of fingerholes *Organ reed stops*
412.11 Paired reeds Two lamellae make a gap which closes periodically during their vibration *A split grass-blade*
412.12 Beating reeds
A single lamella periodically opens and closes an aperture
412.121 Individual beating reeds *Brit. Columbia. Also single-note motor horn*
412.122 Sets of beating reeds *The earlier reed stops of organs*
412.13 Free reeds The lamella vibrates through a closely-fitting slot
412.131 (Individual) free reeds
412.132 Sets of free reeds NB In instruments like the Chinese *sheng* the fingerholes do not serve to modify the pitch and are therefore not equivalent to the fingerholes of other pipes *Reed organ, mouthorgan, accordion*
412.14 Ribbon reeds The air-stream is directed against the edge of a stretched band or ribbon. The acoustics of this process has not yet been studied *Brit. Columbia*
412.15 Retreating reeds Elements naturally or artificially sprung together that separate periodically when blown *Morocco, British Columbia*[25]
412.2 Non-idiophonic interruptive instruments The interruptive agent is not a reed
412.21 Rotating aerophones The interruptive agent rotates in its own plane *Sirens*, *whirring disc*
412.22 Whirling aerophones The interruptive agent turns on its axis *Bullroarer, ventilating fan*
The whirring disc rotates in its own plane and does not turn on its axis
413 Plosive aerophones The air is made to vibrate by a single density stimulus condensation shock
413.1 Explosive aerophones The air is forced out *Pop guns*
413.2 Implosive aerophones The air is forced in *W.Africa, shantu*
42 Wind instruments proper The vibrating air is confined within the instrument itself

420 Edge-tone instruments that are not flutes *Widgeon whistles*
421 Edge instruments or flutes A narrow stream of air is directed against an edge to excite a column of air in a tube or a body of air in a cavity
421.1 Flutes without duct The player himself creates a ribbon-shaped stream of air with his lips
421.11 End-blown flutes The player blows against the sharp rim at the upper open end of a tube
421.111 (Single) end-blown flutes
421.111.1 Open single end-blown flutes The lower end of the flute is open
421.111.11 Without fingerholes *Bengal*
421.111.12 With fingerholes *Almost world-wide*
421.111.2 Stopped single end-blown flutes The lower end of the flute is closed
421.111.3 Partly-stopped single end-blown flutes
421.111.31 Partly-stopped single end-blown flutes without fingerholes
421.111.32 Partly-stopped single end-blown flutes with fingerholes
421.111.21 Without fingerholes *The bore of a key*
421.111.211 Used in sets *Lithuania, S.Africa Venda and others*
421.111.22 With fingerholes *Especially New Guinea*
421.112 Sets of end-blown flutes or panpipes Several end-blown flutes of different pitch are combined to form a single instrument
421.112.1 Open panpipes
421.112.11 Open (raft) panpipes The pipes are tied together in the form of a board, or they are made by drilling tubes in a board *China*
421.112.12 Open bundle (pan-) pipes The pipes are tied together in a round bundle *Solomon Is., New Britain, New Ireland, Admiralty Is.*
NB This is misprinted as 421.112.2 in *GSJ*
421.112.2 Stopped panpipes *Europe, S. America*
421.112.3 Mixed open and stopped panpipes *Solomon Is., S. America*
421.12 Side-blown flutes The player blows against the sharp rim of a hole in the side of the tube
421.121 (Single) side-blown flutes
421.121.1 Open side-blown flutes
421.121.11 Without fingerholes *S. W. Timor*
421.121.12 With fingerholes *European flute*
421.121.2 Partly-stopped side-blown flutes The lower end of the tube is a natural node of the pipe pierced by a small hole *N. W. Borneo*
421.121.3 Stopped side-blown flutes
421.121.31 Without fingerholes
421.121.311 With fixed stopped lower end *Apparently non-existent*
421.121.312 With adjustable stopped lower end (piston flutes) *Malacca, New Guinea*
421.121.32 With fingerholes *E. Bengal, Malacca*
421.122 Sets of side-blown flutes
421.122.1 Sets of open side-blown flutes *Chamber flute-orum*
421.122.2 Sets of stopped side-blown flutes *N. W. Brazil (among the Siusi)*
421.13 Vessel flutes (without distinct beak) The body of the pipe is not tubular but vessel-shaped *Brazil (Karaja), Lower Congo (Bafiote)*

421.14 Notch flutes The player blows into a notch at the top of the tube (treat as 421.11)
421.141 (Single) notch flutes
421.141.1 Open single notch flutes
421.141.11 Open single notch flutes without fingerholes
421.141.12 Open single notch flutes with fingerholes
421.141.2 Stopped single notch flutes
421.141.21 Stopped single notch flutes without fingerholes
421.141.211 Stopped notch flutes without fingerholes used in sets
421.141.22 Stopped single notch flutes with fingerholes
421.142 Sets of notch flutes or panpipes
421.142.1 Open sets of notch-flutes or panpipes
421.142.2 Stopped sets of notch-flutes or panpipes
421.2 Flutes with duct or duct flutes A narrow duct directs the air stream against the sharp edge of a lateral orifice
421.21 Flutes with external duct The duct is outside the wall of the flute; this group includes flutes with the duct chamfered in the wall under a ring-like sleeve and other similar arrangements
421.211 (Single) flutes with external duct
421.211.1 Open flutes with external duct
421.211.11 Without fingerholes *China, Borneo*
421.211.12 With fingerholes *Indonesia*
421.211.2 Partly-stopped flutes with external duct *Malacca*
421.211.3 Stopped flutes with external duct
421.212 Sets of flutes with external duct *Tibet*
(subdivisions as for single flutes with external duct)
421.22 Flutes with internal duct The duct is inside the tube. (Flutes with duct formed by an internal baffle [natural node, block of resin] and an exterior tied-on cover [cane, wood, hide] are classed as 421.23)
421.221 (Single) flutes with internal duct
421.221.1 Open flutes with internal duct
421.221.11 Without fingerholes *European signalling whistle*
421.221.12 With fingerholes *Recorder, flageolet*
421.221.2 Partly-stopped flute with internal duct *India and Indonesia*
421.221.3 Stopped flutes with internal duct
421.221.31 Without fingerholes
421.221.311 With fixed stopped lower end *European signalling whistle*
421.221.312 With adjustable stopped lower end *Piston pipes [swanee whistle]*
421.221.32 Stopped flutes with internal duct with fingerholes *Morocco*
421.221.4 Vessel flutes with duct
421.221.41 Without fingerholes *Zoomorphic pottery whistles (Europe, Asia)*
421.221.42 With fingerholes
421.221.421 With single fingerhole *Dog whistles etc*
421.221.422 With two or more fingerholes *Ocarina*
421.222 Sets of flutes with internal duct
421.222.1 Sets of open flutes with internal duct
421.222.11 Without fingerholes *Open flue stops of the organ*
421.222.12 With fingerholes *Double flageolet*

421.222.2 Sets of partly-stopped flutes with internal duct *Rohrflöte stops of the organ*
421.222.3 Sets of stopped flutes with internal duct *Stopped flue stops of the organ*
421.222.4 Sets of dissimilar flutes with internal duct Two or more flutes of more than one kind (open, partly stopped or stopped) are combined to form a set.
421.23 Flutes with internal duct formed by an internal baffle (natural, node, block of resin) plus an external duct *American Plains, S.E.Asia, Indonesia*
422 Reedpipes The column of air is made to vibrate by the intermittent access of an air stream produced by means of a lamella or lamellae
422.1 Reedpipes with double (or quadruple) reeds (oboes) The pipe has a reed (usually a flattened stem) of paired lamellae which periodically open and close, controlling the flow of air[26]
422.11 (Single) reedpipes with double (or quadruple) reeds ~~oboes~~
422.111 With cylindrical bore
422.111.1 Without fingerholes *Brit. Columbia*
422.111.2 With fingerholes *Aulos, crumhorn*
422.112 With conical bore *European oboe*
422.12 Sets of reedpipes with double (or quadruple) reeds ~~oboes~~
422.121 With cylindrical bore *Double aulos*
422.122 With conical bore *India*
422.2 Reedpipes with single reeds (clarinets) The pipe has a [single] 'reed' consisting of a lamella which periodically opens and closes an aperture, controlling the flow of air
422.21 Individual reedpipes with single reeds
422.211 With cylindrical bore
422.211.1 Without fingerholes *Brit. Columbia*
422.211.2 With fingerholes *European clarinet*
422.212 With conical bore *Saxophone*
422.22 Sets of reedpipes with single reeds *Egypt (zummara)*
422.3 Reedpipes with a reed which vibrates through a closely fitted frame. The air column must be the dominant partner in determining the frequency of vibration, as is the case for instruments with fingerholes, otherwise the instrument belongs to the free reeds 412.13
422.31 Single reedpipes with free reeds
422.32 Double reedpipes with free reeds
422.33 Horns with free reed *Burma [Myanmar]*
422.4 Dilating reeds Grass and similar stems with one or more longitudinal slits. The 'reed' area is wholly enclosed within the mouth
422.41 Dilating reeds without fingerholes[27]
442.42 Dilating reeds with fingerholes *Sami* (*fadno*) [28]
423 Labrosones (or lip-reed instruments) The air-stream passes through the player's vibrating lips, so gaining intermittent access to the air column which is to be made to vibrate
423.1 Natural labrosones Without extra devices to alter pitch other than lengths of tube (crooks etc.) to set the nominal pitch preparatory to playing
423.11 Conches A conch shell serves as a labrosone

423.111 End-blown
423.111.1 Without mouthpiece *India*
423.111.2 With mouthpiece (material has been added to the tube to form a mouthpiece**)** *Japan (rappakai)*
423.112 Side-blown *Oceania*
423.12 Tubular labrosones
423.121 End-blown labrosones
423.121.1 End-blown straight labrosones The tube is neither curved nor folded
423.121.11 Without mouthpiece *Some alphorns*
423.121.12 With mouthpiece (material has been added to the tube to form a mouthpiece**)** *Almost world-wide*
423.121.2 End-blown labrosones with curved or folded tubes
423.121.21 Without mouthpiece *Asia*
423.121.22 With mouthpiece (material has been added to the tube to form a mouthpiece**)** *Lurs*
423.122 Side-blown labrosones The embouchure is in the side of the tube
423.122.1 Side-blown straight labrosones *S. America, Africa*
423.122.2 Side-blown curved labrosones *Africa*
423.2 Chromatic labrosones With extra devices to alter the pitch while playing
423.21 Labrosones with fingerholes *Cornetti, key bugles*
423.211 With cylinder bore *Key trumpet*
423.212 With [narrow] conical bore *Cornetti*
423.213 With [wider] conical bore *Key bugles, serpents*
423.22 Slide trumpets The tube can be lengthened by extending a telescopic section of the instrument whilst it is played. (This category includes slide trombones with one or two thumb valves) *European trombone*
423.23 Labrosones with valves The tube is lengthened or shortened by connecting or disconnecting auxiliary lengths of tube *Europe*
423.231 Valve bugles The tube is predominantly conical
423.231.1 With narrow bore
423.231.11 With short air column (less than 2m) NB some Eastern European flugel horns have a wider bore but can be included here with Western European narrow bore instrumens *Flugel horn*
423.231.12 With long air column (more than 2m) *Wagner tuba*
423.231.2 With wide bore *Euphonium, tuba*
423.232 Valve horns The tube is of intermediate bore profile
423.232.1 With narrow bore
423.232.11 With short air column (less than 2m) *Cornet, F alto horn, B flat altissimo horn*
423.232.12 With long air column (more than 2m) *Most French horns*
423.232.2 With wider bore *Althorn; tenor and baritone saxhorns*
423.233 Valve trumpets The tube is predominantly cylindrical
423.233.1 With short air column (less than 2m) *Most valve trumpets*
423.233.2 With long air column (more than 2m) *Most valve trombones*
424 Membranopipes The column of air is made to vibrate by the intermittent access of an air stream produced by means of a membrane that periodically opens and closes an aperture
Suffixes for use with any division of this class (aerophones):

-1 The vibrations are coupled with a transducer to create an electrical signal that is processed through an amplifier and loudspeaker (*Applied only to instruments that have not been structurally modified or designed to be played through a loudspeaker; all these are classed as Electrophones in Group 5)*

-11 With non-integral microphones

-12 With non-integral pickups

-4 With lengths of tube (crooks etc.) to set nominal pitches preparatory to playing

-5 With wind-cap

-6 With air reservoir

-61 With rigid air reservoir

-62 With flexible air reservoir

-7 With fingerhole stopping

-71 With keys

-72 With *Bandmechanik* [presumably a perforated roll or ribbon]

-8 With keyboard

-9 With mechanical drive

We can cover 'Natural labrosones' that have a fingerhole, such Fijian conches and African sideblown horns, by using the suffix -7

5 ELECTROPHONES Instruments that use materials generating acoustic sounds, mechanically-driven signal sources, electronically stored data or electronic circuitry to produce electrical signals that are passed to a loudspeaker to deliver sound. (Unmodified acoustic instruments with attached microphones or pickups are classed within groups 1-4, according to the primary source of sound.)

51 Electro-acoustic instruments and devices Modules and configurations of acoustic, vibratory mechanisms (often resembling traditional acoustic instruments) and electronic circuitry such as transducers and amplifiers. The acoustic or mechanical vibration is transduced into an analogue fluctuation of an electric current. All instruments built or structurally modified to deliver a signal to an amplifier and loudspeaker are classed as electrophones, even if they have some capability of sounding acoustically

511 Electro-acoustic idiophones *Fender-Rhodes, Wurlitzer electric piano, Hohner Electra Piano*

512 Electro-acoustic membranophones

513 Electro-acoustic chordophones *Electric guitar, Neo-Bechstein electric piano, Yamaha Electric Grand, electric violin*

514 Electro-acoustic aerophones

515 Transducers *Microphones, pick-ups, loudspeakers*

52 Electromechanical instruments and devices Configurations of (electrically excited) silent, mechanical moving parts with encoded patterns, and electronic circuitry. The movement enables the encoded patterns to be transduced into an analogue fluctuation of an electric current

521 Tone wheel instruments Electromagnetic, electrostatic, photoelectric etc.) *Hammond tone wheel organ*

522 Photoelectric electromechanical instruments

523 Record/playback devices (Electromechanical, electromagnetic etc.), *Tape recorder EMI BTR/2*

524 Electromechanical samplers *Mellotron, Chamberlin*

525 Electromechanical sound processing devices *Spring line reverberation unit, tape echo (Watkins/WEM CopiCat tape echo unit)*
53 Analogue electronic instruments, modules and components . Continuously varying electrical signals are passed to a loudspeaker to produce sound. The electrical signals are generated using electronic circuitry. Modules and configurations containing analogue fully electronic devices used to produce, process and communicate electronic sound signals and/or sequences of signals
531 Analogue synthesizers and other electronic instruments with thermionic valve (vacuum-tube) or solid state circuitry (transistor and/or analogue integrated circuitry) generating and/or processing electric sound signals
531.1 Analogue synthesizers and other electronic instruments with electronic valve/vacuum tube based devices generating and/or processing electric sound signals *Trautonium, Theremin, ondes Martenot, Ondioline, Clavioline*
531.2 Analogue synthesizers and other electronic instruments with solid state circuitry (transistor and/or integrated circuitry) generating and processing electric sound signals
531.21 Analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using additive synthesis
531.22 Analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using subtractive synthesis
531.221 Modular analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using subtractive synthesis
531.222 Preset analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using subtractive synthesis
531.222.1 Preset, monophonic analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using subtractive synthesis
531.222 Preset, partially or fully polyphonic analogue synthesizers with solid state circuitry based devices generating and processing electric sound signals using subtractive synthesis
531.23 Analogue synthesizers using hybrid subtractive and additive synthesis
532 Voltage control sources
532.1 Voltage control sources - control voltage sequence generators (Envelope generator, low frequency oscillator, sequencer, slew generator, peak amplitude follower/envelope follower, sample and hold) *Analogue sequencer*
532.2 Voltage control sources - controllers and interfaces Human interface devices, keyboards, foot switches, sensors, wheels, touchpad
533 Other analogue modules or configurations
533.1 Analogue modules: **audio signal generators; analogue signal combining, modifying, reproducing and processing devices**

533.11 Analogue modules: audio signal generators (oscillators producing sine, square and saw tooth waves, beat frequency oscillator and heterodyne systems); *Ring modulator*
533.12 Analogue modules: signal modifiers or processors analogue signal combining, modifying, reproducing and processing devices (mixers, sum/difference/multiple output generator etc. timbre modifier, filter devices; amplitude modifier, amplifier device, reverb modifier)
533.2 Analogue configurations: mixer consoles (also containing filters, ring modulators etc.), sequencer based configurations, experimental configurations, sound sculptures *BBC Mark III Radio Mixing Desk, Funktionsgenerator*
533.3 Modules communicating between devices/signal convertors other than transducers
54 Digital instruments, modules and components. Electrical signals are generated in the form of quantized sequences of pulses. These are converted to continuous signals that activate a loudspeaker. Modules and configurations containing devices to digitally design and process electronic sound signals and/or sequences of signals
541 Digital synthesizers
541.1 Digital synthesizers using frequency modulation synthesis
541.11 Digital synthesizers using frequency modulation synthesis without fixed keyboard controllers
541.12 Digital synthesizers using frequency modulation synthesis with fixed keyboard controllers *Yamaha DX7*
541.2 Digital Synthesizers using additive synthesis
541.21 Digital Synthesizers using additive synthesis without fixed keyboard controllers
541.22 Digital Synthesizers using additive synthesis with fixed keyboard controllers *Kawai K5*
541.3 Digital synthesizers using phase distortion techniques
541.31 Digital synthesizers using phase distortion techniques without fixed keyboard controllers
541.32 Digital synthesizers using phase distortion techniques with fixed keyboard controllers *Casio CZ series*
541.4 Digital synthesizers using physical modelling techniques
541.41 Digital synthesizers using physical modelling techniques without fixed keyboard controllers
541.41 Digital synthesizers using physical modelling techniques with fixed keyboard controllers *Yamaha VL70*
542 Digital control sources and interfaces Human interface devices, keyboards, joy-sticks/wheels, touchpad/touch screen, foot switches, sensors, detectors of environmental change.[29] *Digital sequencer*, *MIDI controller*
543 Digital signal mixing, modifying, reproducing and processing devices Timbre modifier, filter device, amplitude modifier, amplifier device, reverb modifier *Mixer, PA, digital delay, Effects box*
544 Digital samplers and sampling synthesizers *Korg DSS-1*
545 Digital record/playback devices
546 Other digital modules, components or configurations
547 Digital modules communicating between devices/signal convertors

55 Hybrid analogue/digital configurations Devices with analogue oscillators and digital filters etc.
56 Software

---

[1] Erich M. von Hornbostel and Curt Sachs. 'Systematik der Musikinstrumente. Ein Versuch'. *Zeitschrift für Ethnologie,* xlvi 1914, pp.553-590. Translated by Anthony Baines and Klaus Wachsmann as 'Classification of Musical Instruments' *Galpin Society Journal* xiv, 1961, pp. 3-29

[2]Jeremy Montagu. 'It's time to look at Hornbostel-Sachs again'. *Muzyka* i, 2009, pp.7-27

[3] Francis W. Galpin. 'The Whistles and Reed Instruments of the American Indians of the North-West Coast'. *Proceedings of the Musical Association* xxix, 1903, pp.127-129

[4] Montagu, *ibid,* p.12

[5]Laurence Picken. *Folk Musical Instruments of Turkey.* London: Oxford University Press 1975, p.376

[6] Montagu, *ibid,* p.12

[7] Montagu, *ibid*, p.4

[8] 'Labrosone' was coined as 'a handy term for "lip-vibrated instrument"' by Anthony Baines. *Brass Instruments: their History and Development.* London: Faber 1976, p.40

[9] Hugh Davies. 'Electronic Instruments' and 'Electrophones'. *New Grove Dictionary of Musical Instruments* ed. S. Sadie. London and New York: Macmillan 1984, i, pp.657-690, pp.694-695

[10] Three categories of 'electrophonic' instruments that are synonymous with these are identified by Francis W. Galpin in *A Text-book of European Musical Instruments* (London: Williams & Norgate, 1937), cited by Hugh Davies in 'Electrophones' in the *New Grove Dictionary of Musical Instruments,* pp.694-695. Davies' article also summarises the work of authors in the field up to its publication date. More recently work in classifying electrophones has been undertaken by Michael B. Bakan, Wanda Bryant, Guangming Li, David Martinelli and Kathryn Vaughn.'Demystifying and Classifying Electronic Music Instruments'. *Selected Reports in Ethnomusicology* viii,1990, pp. 37-64, and by Hugh Davies 'Electrophone' *New Grove Dictionary of Music and Musicians,* 2nd edition ed. S. Sadie. London and New York: Macmillan 2001, viii, p.110

[11] This revision to the original Hornbostel and Sachs definition '...owing to its solidity and elasticity, **yields the sounds**' has been made in order to encompass idiophones played through a loud-speaker in which the mechanical rather than the acoustic vibration of the primary material is transduced into an analogue fluctuation of an electric current.

[12] Montagu suggests allocating metal drums to the membranophones class. While rigid diaphragms and flexible membranes are at the ends of a continuum, in treating such thin musical instrument sounding components the MIMO consortium has found it useful to retain the original classification, and to allocate to the idiophones class the *hpà-si* bronze drums of Myanmar (Burma), since these have rigid metal diaphragms that may be constrained at their edges but are not tensioned, as opposed to the flexible diaphragms of membranophones, which are under tension.

13 Air-excited lamellaphones (free reed instruments) are treated as aerophones in accordance with conventional usage, although strictly speaking their acoustical behaviour is that of an idiophone.

[14] Scholars who recommend changing the name of the jew's harp to trump include Frederick Crane (*Vierundzwansigsteljahrschrift der Internationalen Maultrommelvirtuosengenossenschaft,* i 1982, pp.29-41, and Jeremy Montagu *Origins and Development of Musical Instruments,* Lanham: Scarecrow Press 2007, p.201 footnote 12

[15] Gerhard Kubik describes the 'iron lamellae immovably hooked into the resonator' of the Makonde and Mwera lamellaphones. 'Lamellophone' *New Grove Dictionary of Music and Musicians,* 2nd edition ed. S. Sadie. London and New York: Macmillan 2001, xiv, p.179

[16] 'Sansa', the term used in the original classification, is almost certainly a 19th century corruption of nsansi/sansi, lamellophone name in the Lower Zambezi valley – see Gerhard Kubik and Peter Cooke, 'Lamellophone', *New Grove Dictionary of Music and Musicians,* 2nd edition ed. S. Sadie. London and New York: Macmillan 2001, xiv, p.173

[17] According to A. Stiller *Handbook of Instrumentation*, Berkeley and London: University of California Press 1985, thunder sheets can be shaken but are usually struck with beaters.

[18] There may be no documentation available for some older examples of double-membrane tubular drums to indicate whether or not the second skin is played, whilst in others the usage will be documented, therefore an inclusive category is required encompassing both playing and non-playing second membranes.

[19] Shlomo Pestcoe defines a spike lute as 'a lute on which the neck passes diametrically over or through the instrument's resonator to extend beyond its tail-end' *Banjo Roots: West Africa,* http://www.myspace.com/banjorootswestafrica, created on July, 11, 2008. See Hans Hickmann *Catalogue general des antiquités égyptiennes du musée du Caire: instruments de musique.* Cairo: Musée du Caire 1949 example 69421 p.160-163, pl. 100 A&B, for an 18th Dynasty spike lute in which the neck passes through the skin soundtable of the instrument rather than the resonator, a feature also found in some half-spike or tanged lutes.

[20] Montagu's preferred term is 'half-spike' lutes. 'Tanged lutes' appeared as one of the 'minor alterations' to the Hornbostel Sachs classification of chordophones in Howard Mayer Brown's article itemising this class of instruments in the *New Grove Dictionary of Musical Instruments* ed. S. Sadie London:Macmillan 1984, ii, p.365. See Eric Charry 'Plucked Lutes in West Africa: an Historical Overview'. *Galpin Society Journal* xlvi 1996, p.7. In 'The Ethnology of African Sound-Instruments (Continued)' *Africa: Journal of the International African Institute,*vi/3 1933, Hornbostel uses 'tanged lute' to describe 'A lute in which the neck is tanged into the resonator, but does not pass right through the latter' a definition he attributes to Henry Balfour (note on p.300); here Hornbostel also uses the term for a (full) spike lute (p.311).

[21] Klaus Wachsmann. 'Human migration and African harps'. *Journal of the International Folk Music Council*, xvi 1964, p.84. The MIMO consortium's subdivisions of arched harps are based on those in Wachsmann's article, and are published by kind permission of the ICTM, the copyright holders and the literary estate of Klaus Wachsmann. See also Ann Griffiths, Joan Rimmer, Sue Carole de Vale (with Robert Anderson) 'Harps' *New Grove Dictionary of Musical Instruments*, ii, p.156, fig. 29a

[22] Klaus Wachsmann, *ibid.* See also Ann Griffiths, Joan Rimmer, Sue Carole de Vale (with Robert Anderson) 'Harps' *New Grove Dictionary of Musical Instruments,* ii, p.156, fig. 29c

[23] Klaus Wachsmann, *ibid.* See also Ann Griffiths, Joan Rimmer, Sue Carole de Vale (with Robert Anderson) 'Harps' *New Grove Dictionary of Musical Instruments* ii, p.156, fig. 29d

[24] S.C. DeVale 'African Harps: Construction, Decoration and Sound'. *Sounding Forms* ed. M-T Brincard. New York: The American Federation of Arts 1989, p.56 fig. 6.3a

[25] F.W.Galpin 'The Whistles and Reed Instruments of the American Indians of the North-West Coast'. *Proceedings of the Musical Association* xxix, pp.127-129

[26] The terms ‘concussion reed’ and ‘percussion reed’ are used by Hornbostel and Sachs for paired and single reeds. The function of reeds in aerophones is to periodically permit and restrict the flow of air into the body of the instrument, thus sustaining standing waves. Any vibration of solids arising from a single reed hitting part of the instrument or two reeds hitting each other is not of primary importance. Indeed, in quiet playing reeds do not always close completely: a wind instrument can sound if the flow of air is reduced rather than being completely interrupted for part of the cycle. Use of the terms ‘concussion’ and ‘percussion’ could be misleading as applied to aerophones.

[27] L E R Picken. *Folk Musical Instruments of Turkey.* London: Oxford University Press 1975, pp.347-50

[28] Ernst Emsheimer, 'A Lapp Musical Instrument', *Ethnos* xii/1-2, 1947, pp.86-92

[29] Controllers used in sound sculptures such as light, temperature etc. sensors.