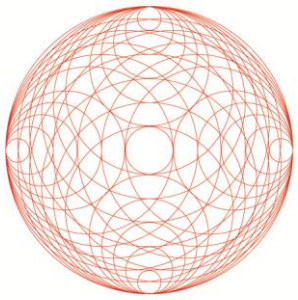


The Cosmic Scale

The Esoteric Science of Sound

By Dean Carter

Introduction

The Cosmic Scale is about the universality and prevalence of the Overtone Scale not just in musical or sound terms but, as you will see, in sacred geometry, in growth ratios, in the body, as a fundamental attribute of the very nature of sound—in every aspect of manifested life on the planet and in the universe. We will also learn that the Major Scale we use in the West is derived from it, and can therefore be regarded as natural, valid and sacred. Yet we will also learn that we largely use not the true Major Scale at all but an approximation of this scale called the Tempered Scale which is mathematically invalid and not true to Nature. That there is indeed order rather than chaos in Nature readily discernable to any who can be bothered to look with an open mind argues that there is indeed an ordering intelligence within, throughout, and behind the universe, call that intelligence what you will.

An earlier version of this book under the same title was produced for private distribution by me a few years ago, but its exploratory style and perhaps over-abundance of information distracted readers from the crux of the matter as related to the Overtone Scale. I also found that much of my source material was inaccurate, as a curious myopia has developed within Western music regarding the Overtone Scale. Very, very curious as, without overtones, there would simply be neither harmony or dissonance, nor even any difference between one instrument and another—so, in fact, there would be no instruments as such anyway. This 'curious myopia', prevalent even among Western theorists, one could almost consider a deliberate dumbing-down…like many other aspects of our mis-education.

The Cosmic Scale is the first volume of an at least two part series. While this book deals with matters of tone, pitch and musicality, the as it were vertical axis of sound, and is therefore about the 'tone ether' in Esoteric terms, the second volume will deal more with practical aspects and application of overtone singing, and the relationship to vocal sounds, language, and mantra—therefore it will have special regard to the sacred languages by which mantra are/were constructed, especially Sanskrit. We have discovered, for example, that there is even a letter in Sanskrit which is an instruction to produce overtones. That forthcoming volume will therefore deal more specifically with matters of sacred sound in the area of the 'sound ether'.

Stay tuned!

Dean Carter

Centre for Pure Sound 2011

Chapter One

Pure Sound and the Overtone Scale

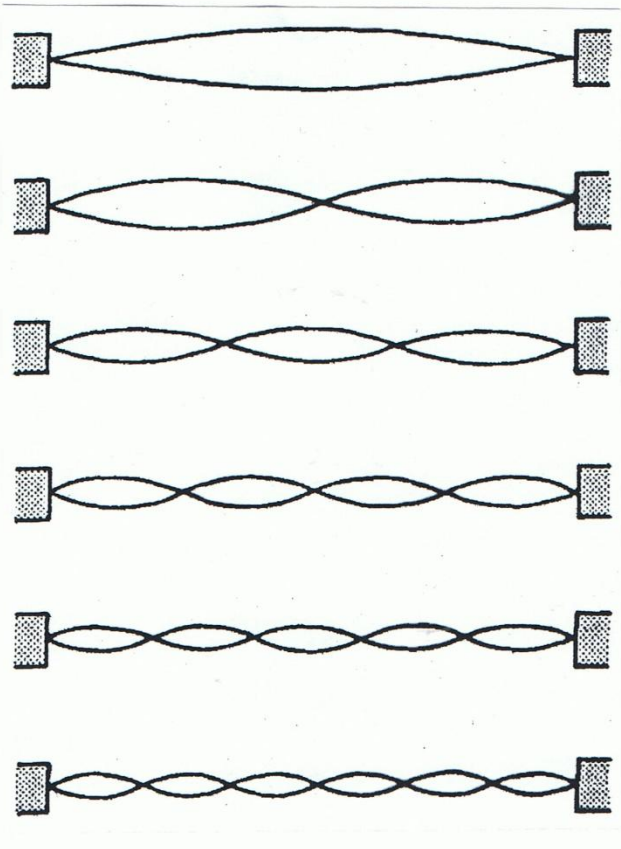
Hidden in every note you sing, in fact even within every word you speak out loud, is a universal archetype, a cosmic pattern—**the Overtone Scale** or *harmonic series*. This archetype, a function of the laws of acoustic physics, is related to just about every aspect of the universe you can think of. All other scales and modes in music are derived from it, and it therefore relates to laws of geometry, sacred or otherwise, the Fibonacci sequence which governs growth patterns, the Golden Mean, and other archetypes of proportion and growth in the universe, and so on. Without the factor of overtones there would be no harmony, no consonance or dissonance, and in fact not even any difference in the sound of one instrument or voice from another.

Overtones, also known as *harmonics,* are the bridge between heaven and earth, between the audible and manifest reality (in Sanskrit *Dhvani*) and the inaudible and transcendent (*Sphoṭa*)—the hitherto mysterious *Nāda* ('supersonic sound which can be but is not necessarily heard'). Learning to overtone is a matter of making this power manifest audibly, and thus sending you on a healing journey across this bridge. Furthermore an overtone is a **pure sound**, a sound which itself acts in a very different way, an intrinsically healing, meditative way, on our nervous systems and bodies, than the usual compound sounds we hear. When we sing a normal note we are making a **compound sound**, but if we learn to overtone we can isolate and make audible one of these pure sounds that the compound sound is composed of. Tibetan bowls also produce audible pure sounds, although metallaphones like bowls and gongs and glockenspiels produce random single overtones rather than the structured ordered overtone scale sequence produced by wind or string instruments. Crystal bowls and tuning forks produce a fundamental which is in itself pure, having no, or virtually no, audible overtones.

In terms of acoustic science we can be precise and say that A PURE SOUND IS A SOUND THAT PRODUCES NO OVERTONES. OVERTONES THEMSELVES PRODUCE NO OVERTONES, AND ARE THEREFORE PURE SOUNDS.

Here's how it works. Plato called us humans 'the featherless biped', and, like our feathered cousins, in terms of sound we are wind instruments. When an air column in a wind instrument or a string on a string instrument is energised or agitated into producing sound it behaves in the way shown in **Fig 1.**

Figure 1: How the vibrating string or air column produces the overtone scale.



Whole string vibrating

produces

half string vibrating
(First overtone)

one third of string vibrating
(Second overtone)

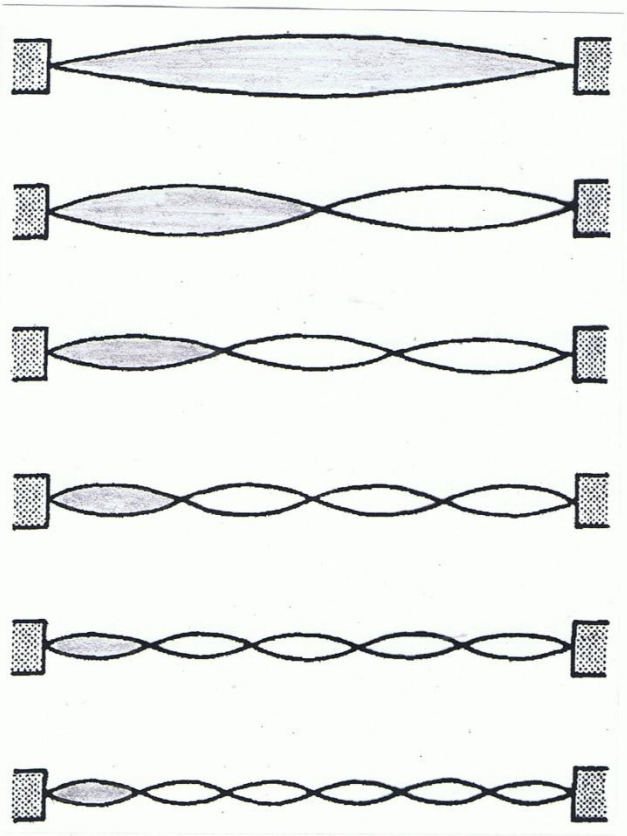
one quarter of string
vibrating
(Third overtone)

one fifth of string
vibrating
(Fourth overtone)

one sixth of string
vibrating
(Fifth overtone)

and so on

Figure 2: Overtones as ratios



Whole string vibrating
1:1

half string vibrating
(First overtone)
2:1

one third of string vibrating
(Second overtone)
3:2

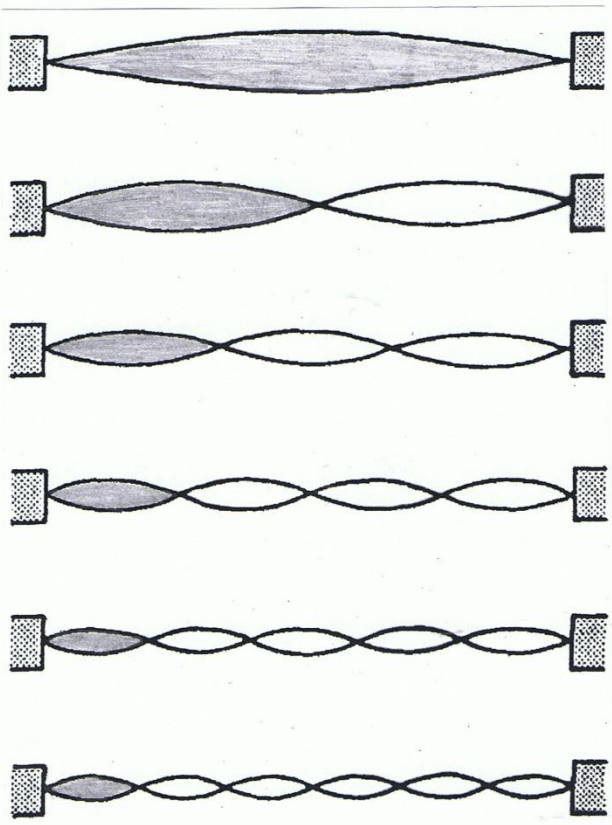
one quarter of string
vibrating
(Third overtone)
4:3

one fifth of string
vibrating
(Fourth overtone)
5:4

one sixth of string
vibrating
(Fifth overtone)
6:5

and so on

Figure 3: Overtones as intervals



Whole string vibrating
1:1 = fundamental

half string vibrating
(First overtone)
2:1 = octave

one third of string vibrating
(Second overtone)
3:2 = perfect fifth

one quarter of string vibrating
(Third overtone)
4:3 = perfect fourth

one fifth of string vibrating
(Fourth overtone)
5:4 = major third

one sixth of string vibrating
(Fifth overtone)
6:5 = minor third

and so on

Figure 4: how the multiple pure sounds of the ovetone series plus the fundamental create the overall compund sound we hear.

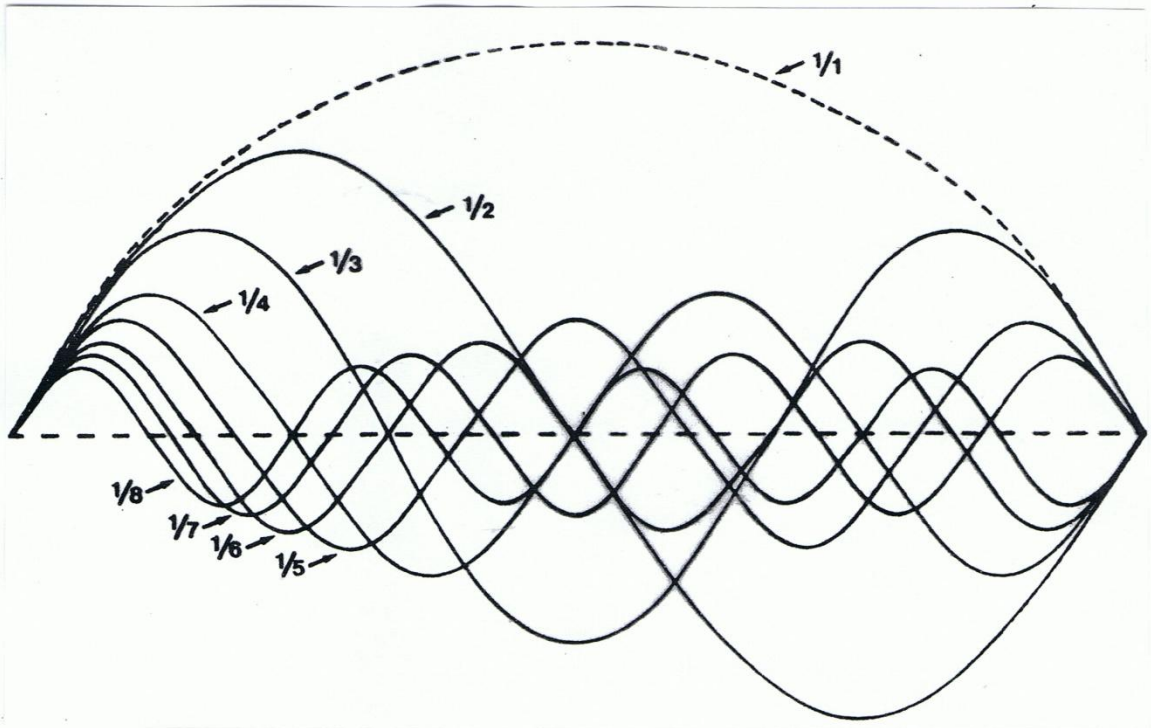
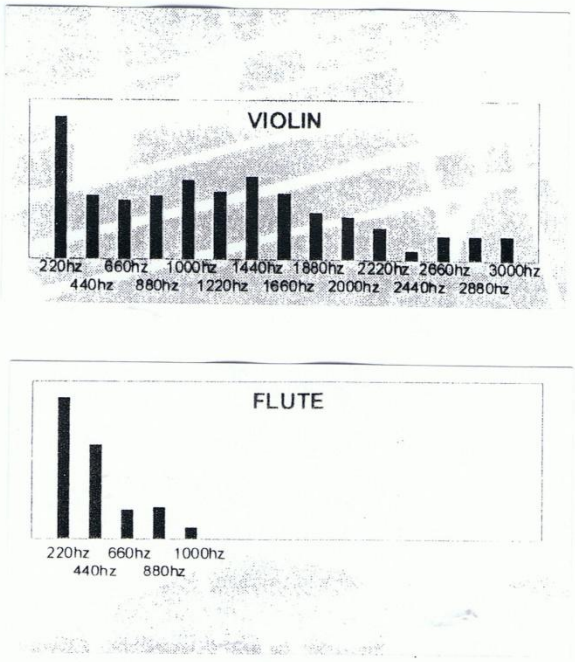


Figure 5: comparison of 'overtone profile' of the sound of a violin and a flute.



Note that the fundamental (far left bar on both graphs) is simply louder than the overtones, which is why we can't normally detect them. Note also that the first overtone is an octave higher than the fundamental (i.e. twice the frequency), and that octaves recur regularly in the series: 440Hz, 880 Hz, 1660 Hz

What basically happens is that the *whole* string (or air column) vibrates first producing the audible note that we can all hear. We call this the **Fundamental**, or 'root note', whatever frequency, that is however high or low in pitch, that note is. *This note however creates a whole series of sub-vibrations in an exact mathematical way,* as shown. The first of these sub-vibrations is the sound of one half of the string vibrating, the second of these sub-vibrations is one third of the string vibrating, the third sub-vibration is the sound of one quarter of the string vibrating, and so on. The energy behaves in this specific way and produces the overtone scale. We simply can't hear the overtones separately because the volume of the Fundamental blocks them out. *The Fundamental is simply the loudest of the series which it itself activates.* (This can be seen from **Fig 5**).

So the overtones are present, although we can't normally hear them, and they lend the particular **timbre** or *tone colour* to any note. Timbre and tone colour are usually only vaguely described and indeed understood by music teachers, as understanding of these basic aspects of sound are themselves not understood. We can see from **Fig 5** how, for example, a flute and a violin playing a fundamental of the same pitch (220 Hz, the 'A' below 'middle C' on a piano) have a very different overtone profile to each other. If they didn't we wouldn't be able to tell them apart! The flute is generating only the first four of the overtone series, while the violin is very rich in harmonics. *Musical timbre is specifically a matter of the absence or presence and relative volume of overtones.* Another flute might only have those same four overtones, for example, but they might be a little louder or softer in volume.

This 'law of vibration', this way in which the string or the air column vibrates and how the overtones are produced, creates the **intervals** of the overtone series and they can also be expressed as **ratios**. Let's think of them as ratios first, as in **Fig 2.** Here we see how to assign ratios to each vibration, and it couldn't be simpler. The Fundamental is a ratio of 1:1, 'as 1 is in relation to 1', it's the whole string vibrating as one. Then the first overtone is the sound generated by exactly half the string vibrating. When it can be made audible then, for example through overtoning, you are *hearing something you only thought of before as a mathematical abstract,* the *sound* of the fraction ½! As a ratio this is 2:1, 'as 2 is in relation to 1', and its inverse 1:2 'as 1 is in relation to 2'. 2 is 1 more than 1. 1 is 1 less than 2. Perhaps it's the sheer simplicity of this stuff that has led Western theorists to ignore it!

The third overtone is produced by the string vibrating in three perfectly equal segments, and therefore it's the sound of the fraction 1/3! And thus the ratio 3:2. 3 is 1 more than 2, 2 is 1 less than 3. The fourth overtone is produced by the string vibrating in four perfectly equal segments. And so on. The

overtone scale in terms of ratios consists entirely of this sequence, 1:1, 2:1, 3:2, 4:3, 5:4, 6:5, 7:6, 8:7, 9:8, 10:9…and on to infinity.

Then we can see in **Fig 3** how these ratios equal musical intervals with the often rather confusing names we have given them in the West. The first overtone, the first of the sub-vibrations, the ratio 2:1, is **the Octave**, which we will look at next in some detail because of its importance. The second overtone, 3:2, is in musical terms a **Perfect Fifth.** How these intervals come by their names will become apparent when we look at chapter three, because the very terms we base our scale on in the West, known as the **Major Scale,** is in fact derived directly from this underlying archetype of the Overtone Scale**.** Western theorists have, again, overlooked this obviously apparent fact for centuries, relegating the Overtone Scale to the realm of the abstract, while it is in fact the basis of the manifested!

Fig 4 shows how the multiple pure sounds of the Overtone Scale come to create one big compound sound which we hear—but we only consciously take in the sound of the Fundamental**,** as, as the parent of the whole series, it is simply the loudest and drowns the others out, as stated before. Note how this graphic of how sound works (the string or air column is actually energetically functioning in this way) brings about a picture similar to a natural phenomenon like a conch-shell. We are actually here dealing with WHAT IS, rather than mentally constructing what we would like to be in an egoistic sense. And WHAT IS is ordered, symmetrical, perfect, beautiful: an aspect of Cosmic Intelligence.

Most people are put off the whole subject of 'musical theory' even if they love music, due to the inept—or do I mean systematically materialistically distracted?—way in which we were taught it at school. If you're struggling with the term 'Perfect Fifth' for instance, it's just the first two notes of 'Twinkle Twinkle Little Star'! The next interval, the name given to the ratio 4:3, is a **Perfect Fourth**, which takes us at the same time up to the next Octave. In terms of the 'tonic sol-fa' system some of you may be familiar with, we have gone from Doh up to Sol then up to the next Doh. We might for the purpose of understanding visualise this as C up to G then the next C on a keyboard. Note that the G is a fifth UP from the first C but a fourth DOWN from the octave C. This aspect of sound will take us into the area of **interval inversion,** which is extremely important (and again usually overlooked by Western musical theorists) as we will discover in the chapter on the major scale.

An audible sound you might recognise as an example of a fourth down would be the first two notes of Mozart's 'Eine Kleine Nachtmuzik', while an

example of a fourth up would be the first two notes of ‘Auld Lang Syne’, or ‘On Ilkley Moor Bar T’at’, ‘Oh Christmas Tree/The Red Flag’, etc.

The following two overtones in the Overtone Scale are the 5:4 ratio, the sound of one fifth of the string vibrating, which is a **Major Third** (‘While Shepherds Watched Their Flocks…’), and 6:5, the sound of one sixth of the string vibrating, which is a **Minor Third** (‘Greensleeves’).

Fig 6 should make all of the above clear, relating the string lengths/fractions to the notes on a keyboard.

Pythagoras is usually credited with ‘discovering’ the Overtone Scale and he is usually associated with the drone instrument known as the monochord, (as in **Fig 6)** but the sequence is easily visibly demonstrated on any stringed instrument, e.g. the guitar. Touch the string gently exactly halfway along its length and then take the finger away as you pluck it (exactly over the 12^{th} fret on a guitar) and there’s your Octave overtone, the sound of 1/2 the string vibrating, the sound of the ratio 2:1. Repeat the procedure at the 7^{th} fret and you have the Perfect Fifth, 1/3 of the string length vibrating, 3:2. And so on. This technique of producing overtones (more usually called *harmonics* in this context) is well known to string instrument players and often incorporated into written music.

Note how the middle column of **Fig 6** replicates the ratios 2;1, 3:2, 4:3, 5:4, 6:5, etc.

Note also that the relation to the keyboard is approximate only. The seventh interval (sixth overtone), the sound of one seventh of the string vibrating, the ratio 7:6, is known as a **Septimal Minor Third** and it is not, in fact, represented on the keyboard at all, being flat of the keyboard B flat. The 10^{th} interval, known as a **Minor Tone,** (the sound of one tenth of the string vibrating, ratio10:9) is also not on the keyboard.

The chapter which deals with **Equal Temperament** (also known as the *Tempered Scale*) will reveal that, worse still, NONE of these intervals apart from those that are also Octaves are truly represented on the keyboard! The keyboard is used here for ease of comprehension, but now you already know, it is in fact not an accurate representation of the true intervals present in Nature. When you learn to overtone you are making the true intervals—you don’t have any choice!—and you are therefore MORE IN TUNE THAN A KEYBOARD. I would recommend overtoning then for anyone who thinks their musical ear is bad. The prevalence of the Tempered Scale in the last few hundred years has, I believe, brought about many ills, including tone-deafness in most Western

people! The re-emergence of overtoning as a technique and knowledge of the overtones is therefore a compensatory, and long overdue, re-balancing,

And note also that the series in **Fig 6** stops at the 10^{th} interval/9^{th} overtone only due to the practicality of making the sounds on the string. Theoretically it could go on forever, as intimated.

Fig 7 shows the overtones written out as notes on the staves in standard Western notation, but as already pointed out, actually the seventh overtone isn't a B flat as written here, but is somewhat flatter (lower in frequency) than Western notation can designate. Our whole system of notation is based around the Tempered Scale as designed for keyboards also. We all know the phrase 'don't confuse the map with the territory', but the Western system goes one worse still and effectively *imposes* a false map which bears little relation at all to the reality, surely a characteristic of the materialistic Western mind in general.

Whether they are used in Western music or not, the overtones already present in everybody's voice are easily made audible with a little practice, and anyone can learn to produce them. They exist in Nature, and it is our loss if we, through the imposition of Equal Temperament, have been pretending for hundreds of years that they don't exist! The 'occult' (= 'hidden') nature of sound is in fact no mystery. It is only our prior (deliberate?) ignorance that has made it seem so. And as we have seen a simple technique exists for the production of overtones in string instruments (and in wind instruments through 'overblowing').

To recap, every apparently single note emanating from a wind or stringed instrument is in fact composed of this ordered scale, reaching up, in some cases, to infinity, or at least past the threshold of normal human hearing (anywhere between 16 and 20 000 CPS/Hz).

Figure 6: string length, overtone scale, ratios—related to the layout of the keyboard.

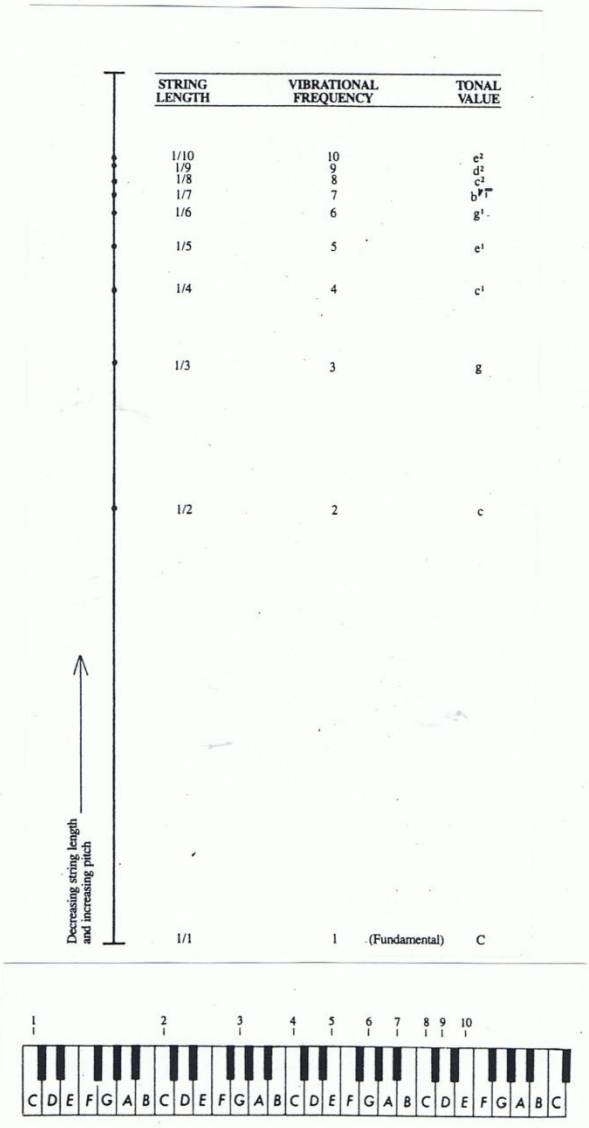
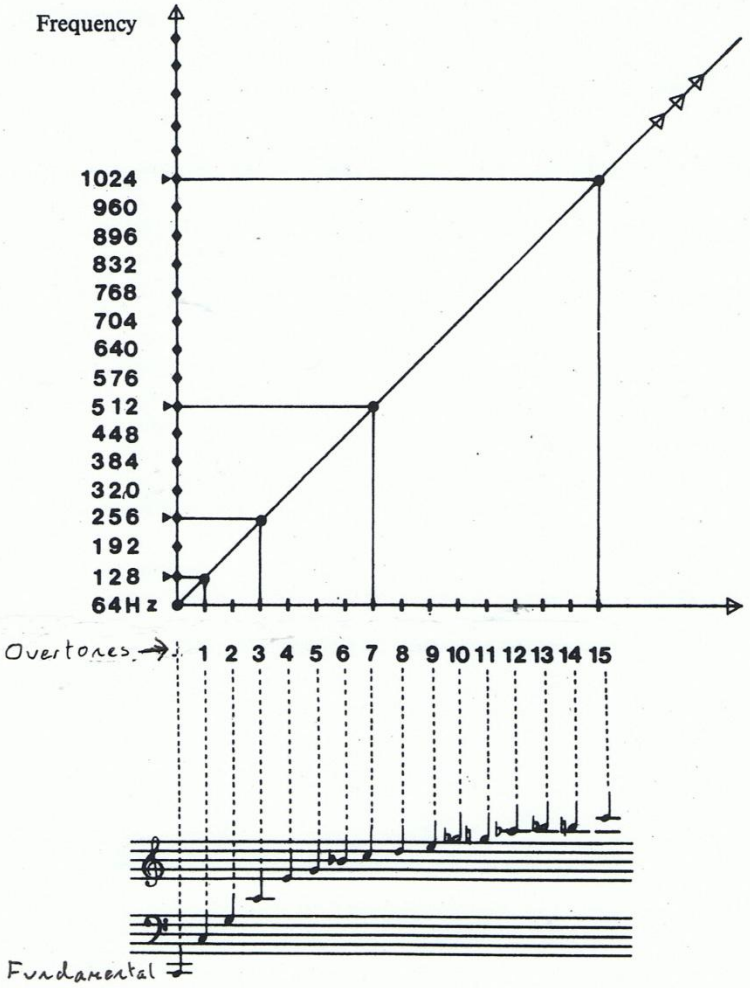


Fig 7: the overtone scale written out in Western notation starting on a low C.



Note that from the sixth overtone onwards there are no ways of designating the true intervals and, as pointed out also in the text, actually the notes of the keyboard don't match their written designation. (see also chapter on equal temperament.)