Basic Tuning for the Autoharp

There are many options in tuning, especially for an autoharp. The more experienced player has learned that there are different tuning possibilities in addition to what is referred to as "standard" tuning. However, the beginner should understand and employ the basics, especially when expecting to play with other instruments in a jam. It is simply not true that all other instruments use purely "standard" tuning, but in a group situation, virtually all players depend upon various devices which provide or measure a standard reference pitch. The autoharper's life is easiest when owning and using an electronic tuner. However, there are more traditional methods for obtaining satisfactory results, in the absence of an electronic tuner and special expertise. A pitch pipe, tuning fork, or other instrument already "in tune" are useful references to obtain the foundation pitch(s) for autoharp tuning.

In this attempt to provide a method for tuning we will provide two approaches. The first will be a basic guide to using an electronic tuner. The second will be a method for tuning by ear with a reference pitch.

Introduction

The typical autoharp has 36 or 37 strings with a pitch range of 3 octaves plus a fifth interval. For example, the standard chromatic autoharp starts on F for the lowest note and ranges to C at the highest note. The "middle" octave is the principal melody octave around which most arrangements are built. This octave should be tuned first as the "foundation" for all other octaves. The middle octave begins at 2-3 strings above the corner at the tuning pin end, where the strings become progressively shorter. On a standard chromatic that would be at the F note. The standard foundation octave is thus middle F to middle E above. Refer to the last section for definitions of terminology.

Setting The Foundation Octave

Tuning with the aid of an electronic tuner

Electronic tuners detect the "absolute" pitch of a string. The partial harmonics also emitted by the sound of a plucked string are not integrated in the tuner device's perception. Therefore, superior final results can be achieved by the experienced ear. Nonetheless, the electronic tuner is invaluable in reducing the time, increasing the accuracy, and providing consistency in tuning any instrument.

Tuners either provide the sound of a range of reference pitches or an instrument reading of the accuracy of the tuning of individual pitches. Some of the more expensive tuners provide both sound and instrument readings and some even provide readings relative to non-standard temperaments. The typical tuner design has either a dial with +- scale or an LED light, which goes on when the pitches are close to the prevailing standard. Some tuners have both an instrument reading and a pitch-matching light.

The best results are achieved by using the tuner only on the foundation octave and then tuning other octaves as will be described later. It can, however, save time to use the tuner on all but the lowest octave to achieve

"rough" tuning, followed by fine tuning of the octaves against the foundation octave by ear. The typical tuner is not capable of perceiving the weak fundamental harmonic of the lowest bass strings. The best results on these strings are always achieved by ear. When bass strings are in tune by ear, expect the tuner to detect them as "flat", if at all. This is natural and you should trust your ear, not the tuner, to decide which is correct.

For satisfactory results in standard tuning there are tuners that are quite inexpensive. If you wish to have more pleasing-sounding chords that are still compatible with other instruments in standard tuning, you will need a more expensive tuner with an instrument reading and graduated in tuning units called "cents". Refer to Alternate Standards.

Tuning by ear

With any method available, sound a reference pitch that is considered in tune for any note in the foundation octave. The pitch pipe will always provide a complete set of standard reference pitches. Tune the matching string to sound exactly the same. Repeat for as many notes for which there is a reference pitch within the foundation octave. If reference pitches are not available for a complete octave, results will be quite variable depending upon your ability to base the entire sound on one or a few pitches.

If only one or a few reference pitches are available, use the chords that include each tuned note and try to tune a satisfactory-sounding chord without changing any note tuned to a reference pitch. This method requires familiarity with chord structures and how each type of chord should sound. Strum and tune the chord only within the foundation octave. When a chord has been tuned, it now includes at least three notes that are "in tune". These notes occur in other chords, so continue to tune other chords that include both notes already tuned and notes not yet tuned. If adjusting a note previously tuned, you must recheck all chords that use the note. Standard or "equal temperament" tuning is not a natural chordal tuning, so it may be difficult to find the compromise pitch that makes a note sound "satisfactory" in all its roles in various chords. This is always a reiterative process and may take significantly longer than having a complete set of reference pitches.

Using this method, it may be unlikely that the same result will be achieved every time. Consistent results usually require the use of an electronic tuner.

Tuning The Other Octaves

When all the strings in the foundation octave of F to E have been tuned, tune all other octaves by comparing the sound of all the strings that should be an octave apart. For example, pluck the middle F which you have already in tune and then immediately pluck any other F note in any other octave. Tune these notes to match as closely as you can. Tune all the F's in all the octaves before moving on to another note. For bass notes it may be helpful to tune down one octave at a time from the foundation octave. For example, the foundation F has two corresponding F's in lower octaves. Tune the first octave down, then use the lower octave pitch as the reference for the next and lowest F. Proceed to the next higher foundation octave pitch (e.g., F#) and create a match in its corresponding bass notes.

An aid to verifying the octave interval above the foundation octave is use of a small piece of gift wrap tissue folded and hung over the octave string. When sounding the foundation string and the octave is in tune, the octave harmonic will cause the tissue to be moved by the sympathetic vibrations. This works best on the smaller strings, which are more easily excited by harmonics.

Octave Stretching

Many find that they need to override the tuner's perception of high string pitches by setting the tuning slightly sharp. This is considered completely valid due to the stiffness of the strings and the resulting effect on the harmonics. Correspondingly, the lower octaves may be flatted somewhat to sound just right. The tuner is not judging the partial harmonics, only the fundamental, and the ear must be used to balance the sound when the fundamental is weak in the bass strings or the partials are strong in the high strings.

Checking The Chords

When all the strings in the foundation octave of F to E have been used to tune all octaves, slowly strum each chord to make sure the sound is satisfactory. Do not adjust any foundation string tuned to a reference pitch unless it no longer matches the reference. If any foundation octave string is adjusted, recheck all octaves for the note retuned. The sound of chords can be made more pleasing by tuning the intervals by ear, but the result may no longer match standard tuning exactly. If a chord does not sound quite right it does not mean that the instrument is out of tune. Check the sound of chords only to uncover possibilities where you did not correctly match the octave sound from the foundation octave.

Alternate Standards

Many find that chords sound more pleasing on the autoharp when pitches other than the root of the chord, for which the chord is named, are adjusted by ear slightly away from standard, i.e., major thirds are more narrow and minor thirds are wider. What is then achieved is a more natural sound. The tuning systems used in and prior to the Baroque period of musical history used the same principles. Many systems (standards)of tuning limited to a few keys were devised and formalized prior to the popularity of the piano, for which the repertoire required fixed pitches tempered across every possible key. For use in jamming with the autoharp, the Silbermann temperament is the least subjective alternate tuning. This scheme flats every perfect fifth interval by two cents (rounded up) from standard. The temperament can be used for up to 6 major keys without a conflict in closing the circle of fifths. An example tuning schedule for a standard chromatic with major keys of BbFCGDA and the tuning "centered' at +-0 on C natural is as follows:

Note	Tuner	Fifth	Comment
C	+-0	G	
C#	-14	G#	

D	-4	A	
D#	+6	A#(Bb)	Actually functions here as Eb
E	-8	B	
F	+2	C	
F#	-12	C#	
G	-2	D	
G#	-16	None	*
A	-6	E	
A#	+4	F	Actually functions here as Bb
B	-10	F#	

* Functions only as the fifth above C# on the VIm chord for the key of A. If an Ab chord were present, it would conflict, requiring a G#/Ab at +6. A G# minor would require a D# at -18.

Note that the major chord roots of BbFCGDA are not very much off standard. The real variance occurs in the major third interval and the corresponding root of minor chords. Thus, the system is generally compatible with standard tuning.

While this tuning scheme "centers" the +-0 reading on a key root in the middle of the chord bar arrangement (C natural), a jam might favor more of a GDA mix, in which case the tuning could be centered on G by adding two (2) cents to each reading. This would yield flat keys (FBb) that are perhaps noticeably sharp, but the key of A would sound more "in tune", being less flat to standard. Note that the keys to the right of the "center +-0" trend flat and keys to the left trend sharp.

Conclusion

Learning to tune can seem a chore but over time it can become quite routine. Attention to detail can result in a great deal more satisfaction in playing. An autoharp that is in really fine tuning is a joy to play and hear.

Terminology

Harmonic - one of a series of vibrating frequencies present in the sound emitted by a vibrating string

Fundamental - the principal and dominant harmonic frequency

Partial harmonic - in short, a frequency other than the fundamental

Temperament - tuning system

Octave - multiples of a given frequency. An octave higher than a note is twice the frequency and an octave lower is one half the frequency. There are twelve half steps or chromatic semitones and seven diatonic steps in an octave interval.

Chromatic - a scale having all twelve semitones in an octave, comparable to an octave of both white and black keys on piano.

Diatonic - a scale having seven irregular steps in an octave, comparable to an octave of all the white keys on a piano for the key of C. The familiar do-re-mi-fa-sol-la-ti progression is the Ionian mode (starts on do) of the diatonic scale. Seven unique-sounding scales, each referred to as a mode, can be formed within a given key by starting on a different step and progressing into the next octave.

Interval - number of diatonic scale steps separating two notes. Intervals modified by the chromatic scale are nominally referred to as "flatted" versions of the name of the next higher diatonic interval.

Frequency - rate of vibration

Major third interval - 2 steps in a diatonic octave in a combination equal to 4 semitone steps in a chromatic octave, e.g., G to B.

Minor third interval - 2 steps in a diatonic octave in a combination equal to 3 semitone steps in a chromatic octave, e.g., E to G.

Fifth interval - two notes separated by 4 steps in a diatonic octave. The note at the fourth step is the fifth note in the diatonic scale, and thus the name "fifth". A "perfect" fifth is equal to 7 semitone steps in a chromatic octave, e.g., G to D.

Circle of fifths - a relationship of keys, in which a note or one of its next octaves will be both a root in one chord and a fifth in another, if the progression of perfect fifth intervals is followed either up or down in a chromatic scale. This relationship is shown by arranging all 12 perfect fifths of the chromatic scale in a circle. The sequence would be equivalent to C-G-D-A-E-B-F#-Db-Ab-Eb-Bb-F- and back to C, with, in this format, the fifth interval represented by a dash.

Key - one of twelve possible unique diatonic major scales, each customarily named for the starting note (do) from within the 12 tone chromatic scale. Scales starting on re or mi, etc., are "modes" within a key and may often result in the key being referred to as the name of the triad which can be formed at the first step of the scale rather than its major key, e.g., E minor (Aeolian mode starting on la (6^{th} step) from within the G major key). Keys are distinguished by the number of sharps or flats occurring in the diatonic scale.

Triad – three notes each separated by one diatonic scale note, i.e., every other note. The first and third note are a fifth apart. A minor triad encompasses 3 semitone steps between the first and middle note, while a major

triad encompasses 4 semitone steps. Played together, the three notes form a chord.