HOW TO TUNE AN ORGAN

by Dan Barton, Organbuilder

The first consideration is temperature. An organ should stand for 24 hours with the temperature at the same level it will be when the organ is being played. If installed in an auditorium where the temperature is allowed to drop in cold weather, the organ lofts should be equipped with electric heaters with thermostatic controls to maintain a steady temperature. Heat raises the organ pitch and cold lowers the pitch. The pitch does not change to the same degree throughout the organ. The wood pipes make little change while the metal pipes make severe changes, and not all metal pipes change the same. It will be readily understood that to listen to an organ tuned at one temperature and played at another can be a trifle dismal.

The first step in tuning is to set a temperament, but some explanation is necessary before we start. A chromatic scale of one octave consists of 12 semitones — C, C#, D, D#, E, F, F#, G, G#, A, A# and B, each semitone increasing in vibrations per second as we go up the scale. If the low C vibrates at 1000 times per second and is tuned in unison with the next higher C, the higher C will be vibrating exactly twice as fast or 2000 times per second, and the two pipes sounded together will sound like one pipe. The fifth, or G, when tuned in unison with C will vibrate one and a half times as fast as C or 1500 times per second, and when sounded with C will also sound like one pipe. These figures of 1000, 1500 and 2000 are used only as an example. The actual rate of vibrations per second will depend on whether the organ is tuned to International Pitch, American Standard Pitch, or somewhere in between.

If we divide the 12 semitones exactly equally into the octave we would have a pure scale, but if we add the next higher C at the same rate of division the C will not be in unison with the lower C. Our modern keyboard or octave is thus shown to be imperfect. To learn exactly why, you would have to read a history of modern music, but suffice it to say that the imperfect scale was adopted in the 14th century and is now in universal use throughout the world.

To correct this peculiarity and allow the two C tones to be in unison, it is necessary to slightly modify each interval of the pure scale. Each semitone is flatted. This process of flatting the semitones is called tempering, hence the word "temperament." When the process is complete we have a tempered scale instead of a pure scale.

To determine exactly how much to flatten each semitone, we make use of a phenomenon that occurs in certain intervals when two tones are sounded together that are not in exact tune or unison. There is a conflict of sound waves created which produces a wave, pulsation or beat. If C and G are tuned in unison they sound like one pipe, but if G is either sharp or flat of the C, this beat becomes apparent to the ear. You hear a "yow — yow — yow" that is the beat, and it only occurs when the pipes are not in unison.

There are several methods used to set a temperament. One method uses two full octaves, one an octave and a half and another a single octave. I will explain the one octave method, as it is used by many professional organ tuners.

The equipment is a tuning fork for standard pitch C at 523.3 cps (A = 440 cps), a narrow blade chisel or screwdriver and someone to hold the keys while you work in the organ loft. Use an 8' string stop for the temperament. Start with middle C, the third C from the bottom of the keyboard. Tune this C in unison with the tuning fork. Hold this C and the fifth above, which is G. If there is no beat the pipes are in unison. If there is a beat, tap the scroll, which is the roll of metal at the bottom of the slot near the top of the pipe, with your tool until the G is in unison with C. Now you flat the G until you hear a slow beat, about one beat per second to three beats in five seconds. Practice and experience will tell you exactly how much to flat. To ascertain whether a pipe is flat or sharp hold the edge of your tuning chisel across the bottom of the slot directly on top of the scroll. This lessens the slot opening and is the same as rolling the scroll upward. If the beat increases, the pipe is flat. If the beat decreases, the pipe is sharp. Do not touch a metal pipe with your hands. The heat from your hand will raise the pitch of the pipe and destroy your tuning efforts.

The following explanation shows how to set a temperament. You flat each semitone as explained in the previous paragraph.

Each tone is numbered to make the rotation easier to understand. The low C is the third C from the bottom of the keyboard.

C - C# - D - D# - E - F - F# - G - G# - A - A# - B - C
1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13

Tune the low C with tuning fork.

Tune G to C — No. 8 to 1.
Tune D to G — No. 3 to 8.
Tune A to D — No. 10 to 3.
Tune E to A — No. 5 to 10.
Tune B to E — No. 12 to 5.
Tune F# to B — No. 7 to 12.
Tune C# to F# — No. 2 to 7.
Tune G# to C# — No. 9 to 2.
Tune D# to G# — No. 4 to 9.
Tune A# to D# — No. 11 to 4.
Tune F to A# — No. 6 to 11.
Tune C to F — No. 13 to 6.

This article is reprinted from *Posthorn,* April 1962.

Now you test — are the two C's in unison? Chances are good that they are not. It takes a pretty keen organ tuner to hit a temperament the first time through. If the higher C is flat to the low C you have flatted the semitones too much. If the upper C is sharp you have not flatted the semitones enough. Start over again, increasing or decreasing the flatting in accordance with what the unison test of the two C's has shown. It may be necessary to go over the tempering several times to secure a good unison of the two C's. You are not through when you secure the unison. You may have flatted one semitone too much and another not enough. These will average out to give a correct unison, but the temperament will be off. Go through once more to make sure the beats are the same for all the semitones.

Tune the string pipes in octaves with the temperament octave in exact unison. Continue throughout the organ always in unison, except the Celeste stop, which is tuned slightly sharp. On pedal stops tune in unison the 16' register in octaves with the 8' register of the pedal stop. Take time to make sure the temperament is correct. If you have errors in the temperament you will distribute these errors throughout the entire organ.

Tune all stops to the String, never tune Flute to String, then Flute to Tibia, then Tibia to Tuba. If you made an error in tuning, this method will usually multiply the error. Tune every stop to the String and if there is an error it will be in only one rank of pipes.

If the organ is in two lofts, set a temperament in each loft. Never attempt to tune from one loft to the other.

Never blow into a reed pipe or on the reed after the boot has been removed. The moisture from your breath will corrode the reed.

Flue pipes — Strings or Open Diapasons — are tuned by rolling the metal which has been cut from the slot. Some pipe makers cut off the roll of metal and use a metal cylinder fitted over the pipe that can be moved up or down to shorten or lengthen the slot. Open wood pipes of large scale have a wooden slide. Open wood pipes of small scale have a metal flap on the top of the pipe that can be moved up or down like a trap door to change the pitch. Some small-scale wood pipes have a slot with a roll tuner. Stopped wood pipes are tuned by moving the stopper up or down.

Reed pipes have a tuning wire which rests on the reed and is moved up or down to shorten of lengthen the part of the reed which vibrates to produce the tone. Some reed pipes have slots at the top of the pipes and some have a slide or collar at the top of the pipe. These are not used for tuning, but to regulate the power of the pipe.

No musical talent or ability is used in tuning. A fellow who has a tin ear and cannot whistle a tune or sing a simple song can become an expert organ tuner. It is simply training the ear to recognize the beat. □

Manufacturers, distributors or individuals sponsoring or merchandising organ recordings are encouraged to send review copies to the ***Record Reviewer, THEATRE ORGAN, 3448 Cowper Court, Palo Alto, California 94306.*** *Be sure to include purchasing information (post-paid price, ordering address) and a photo of the artist which need not be returned.*

AN AMERICAN IN PARIS. John Seng playing three theatre pipe organs in concert. Available at $8.95 postpaid from Pipe Organ Presentations, Box 20704, Castro Valley, California 94546.

John Seng is a perfectionist, whether playing neatly arranged standards, or, as displayed here, music usually played by a symphony orchestra. John is versatile. His talents range from playing in restaurants to ensemble keyboard work in such large and small screen films as *Magnum PI,* the new *Buck Rogers, Superman* and *The Empire Strikes Back.* He also pursues a now-and-then concert career (as time allows), plus a continuing association with a major builder of electronic keyboard instruments.

We have always admired the recordings of John Seng, starting with his initial "Beyond the Blue Horizon," and there is absolutely no truth to the oft-repeated story he told over the years that his mother took over a paper route to pay for its processing. It became something of a private joke with his fans. Trouble is, John has not recorded often enough. Most of his previous discs are no longer available. His ability deserves wider exposure. There are not too many organists whose talents range from standards to symphonic music.

This recording provides ample proof. First, the pops, although titles listed here are not in playing order.

"On A Clear Day" is beautifully phrased and registered. John starts one chorus on a mellow set of Tibias, much more fluid than ones usually associated with Seng. He likes his Tibias sharp and articulate. There is a wide degree of expressiveness here, and interesting rhythm changes.

"Big Bells and Little Bells" is a rhythmic novelty tune on the "Holiday for Strings" pattern. The old "shave and a haircut" device marks many phrase endings. Lots of "little bells" (Glockenspiel, etc.) but we're still waiting for the "big bells." Nary a bong nor peal.

There are echoes of Crawford in John's conception of "The Song Is Ended," but no imitation. Again, expert phrasing comes into play, with many registration changes.

For "Flight of the Bumble Bee" John uses a high-pitched melody combination against accompaniment on mellow brass, a novel concept.

"Cuban Cutie" is reminiscent of those "the natives are whooping it up tonight" exotic tunes of the '50s, when the "Sacre du Sauvage" music, exploited then by the Martin Denny instrumental quartet, was in vogue. George Wright joined the band wagon with a "Quiet Village" sync'd with erotic bird calls. Enough time has passed for a review of the genre. Emphasis is on an engaging rhythmic pattern which persists throughout, even