

# **Staldophone (Eco)**

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## **Preamble**

The origin of the Tenorstaldophone lies in the tenor saxophone. In contrast to the saxophone, the Staldophone relies on playing overtones. Of course, this requires an adapted learning method. Instead of around 22 keys and pushers, the Staldophon only has ten keys (peeling the onion). With these few keys and a few special grips, all tones can be generated over several octaves in semitone steps. The remaining attachments, such as buttons and the whole mechanism, as well as the thumb rest / thumb hook are therefore reduced to a minimum. Therefore, the horn can be constructed with just a few assemblies, from the music stand holder (marching fork holder) to the horn bow. This allows the horn to vibrate more freely the entire way. This contributes significantly to the sound improvement. The present Staldophon (Eco) Horn is inexpensive and easy to manufacture. To put it bluntly, it is a fine sounding horn, which is much more than just a "stripped down" tenor saxophone.

## **1. The advantages of the Staldophone at a glance**

- ▶ The Staldophone has a beautiful, singing sound that is rich in overtones.
- ▶ The Staldophone is lightweight.
- ▶ The Staldophone only needs a few fingerings (around 90 for the saxophone).
- ▶ The Staldophone has a simple button and valve mechanism.
- ▶ The Staldophone has a good price / performance ratio due to the simplification.

## **2. History of the origin of the Staldophone and Copyright**

Building the Staldophone in its original version requires a lot of basic research. This is associated with a lot of effort and costs.

As a result, the "Staldophone (Eco)" was developed.

The following link shows how the Staldophone was intended in its original version and its history of development:

<https://www.quantophon.com/Staldophone-Hist.pdf>

The designation "Staldophone" (German: Staldofon / Staldophon) with the underlying musical instrument is protected by copyright.

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### 3. Terminology

Various wind instrument explanations make no difference between buttons and valves. In this documentation buttons are assigned to the fingers and valve cover the tone holes. In this documentation, the "Staldophone Eco" will only be referred to as Staldophone in the following.

### 4. Focus

The Staldophone (Staldofon, Staldophon) is a modified saxophone with the following features:

- The middle piece (resonance pipe) only has five tone holes;
- In total there are only ten holes on the instrument;
- All tones can be played over several octaves with just ten keys;
- Each tone hole can be closed or opened individually across the entire instrument;
- Because each key is assigned to a tone hole flap, extraordinary sound images can be generated.

## 5. General overview of the Staldophone

The tone holes of the Staldophone begin with the B $\flat$  and the last tone hole is the A (no buttons are pressed, so the A sounds). The Staldophone has no G-tone hole, which is why a replacement-fingerings is used here.

Only five tone holes and its mechanic, namely those for D, E, F, G sharp and A, therefore influence the resonance behaviour.

The Staldophone focuses on a sound that is as rich in overtones as possible. Therefore the G-tone is omitted. This is reflected in the fingering of the individual notes.

## 6. Playing with the Staldophone

Every single button operates a single key (compared to the saxophone there are no valve connections).

The little finger of the left hand, however, has two buttons to operate. So that both keys can be pressed together, the same key type is used as with the C / D $\sharp$  keys and arranged side by side in the direction of the S-bow / horn bow. Thus, the principle is taken into account that all valve combinations are possible.

Since each key can be operated individually, a multiphonic sound is possible. And with the option of having different timbres sound, an individual sound image can be created.

In order to be able to play the B $\flat$ , all valves must be closed. Expressed in a simple way, except for the C $\sharp$ , D $\sharp$  and G $\sharp$  buttons, all buttons must be pressed.

The keys are all arranged in ascending order, with the exception of the D $\flat$  key and those on the little finger table. The little finger table only contains the C $\flat$  and H (B) buttons. The top key belongs to A $\sharp$ 1 (B $\flat$ 1) and this is where overtone play begins.

## Assignment of root tone to keys

The following list shows the relationship between the (noted) tones and the keys to be pressed. These fingerings apply to the fundamental tones (1st partial), the first overtones (2nd partial) and the third overtones (4th partial). Above the fourth partial tone, the fingering becomes individual. This depends on the tone to be played (sounding as overtone), the skill level of the player, the intonation and the desired timbre.

The keys in brackets allow intonation and timbre adjustments.

The second overtone (the third partial tone) is the duodecim (for c the g2) and has the same fingering as in the first column.

Nomenclature: german H / B = english B / Bb

Notated tone		Keys pressed	
Root	Duodezim	Left hand	Right hand
<b>B (Ais1)</b>	<i>F</i>	A, B	F, E, D, C
<b>A</b>	<i>E</i>	(B)	(C) (F)
<b>Gis</b>	<i>Dis</i>	A, Gis	
<b>G</b>	<i>D</i>	A, Gis (B)	F, E (D+C)*
<b>Fis</b>	<i>Cis</i>	A	(E)
<b>F</b>	<i>C</i>	A	F
<b>E</b>	<i>H</i>	A	F, E
<b>Dis</b>	<i>B</i>	A, H	F, E, D, Dis
<b>D</b>	<i>A</i>	A	F, E, D
<b>Cis</b>	<i>Gis</i>	A, Cis	F, E, D
<b>C</b>	<i>G</i>	A	F, E, D, C
<b>H</b>	<i>Fis</i>	A, H	F, E, D, C

\* only applies to the lowest G

We are looking for a certain overtone (e.g. a1): you “press” the D and play it as the second overtone (ie the “a1”). This gives the same tone as if the A had been played as the first overtone (the octave) - but with a different timbre.

At the third overtone you have the root again, but two octaves higher.

If the tone you are looking for lies between two natural tones, woodwinds shorten the air column by opening holes.

You can download an overtone slide via the following link (two PDF files). The starting tone is the noted tone according to the table: "Assignment of tone to fingering".

<https://www.oberton.org/portfolio-item/obertonschieber-und-weiteres-lehrmaterial/>

## Assignment of tone to fingering

From the sixth partial tone onwards, this table is to be regarded as a theoretical basis.

PTn = partial tone.

Tone		Piano	Root variant 1		Root variant 2		Personal	
Notated	Sounding	Hz	Fingering	Hz	Fingering	Hz	Fingering	Add.
<b>ais</b>	Gis	<b>103.8</b>	B / PT 1	103.8				
<b>h</b>	A	<b>110</b>	H / PT 1	110				
<b>c1</b>	Ais	<b>116.5</b>	C / PT1	116.5				
<b>cis1</b>	H	<b>123.4</b>	Cis / PT1	123.4				
<b>d1</b>	c	<b>130.8</b>	D / PT1	130.8				
<b>dis1</b>	cis	<b>138.6</b>	Dis / PT1	138.6				
<b>e1</b>	d	<b>146.8</b>	F / PT1	146.8				
<b>f1</b>	dis	<b>155.5</b>	F / PT1	155.5				
<b>fis1</b>	e	<b>164.8</b>	Fis / PT1	164.8				
<b>g1</b>	f	<b>174.6</b>	G / PT1	174.6				
<b>gis1</b>	fis	<b>185</b>	Gis / PT1	185				
<b>a1</b>	g	<b>196</b>	A / PT1	196				
This is where the overtone range for the Staldophone begins.								
<b>ais1</b>	gis	<b>207.6</b>	B / PT2	207.6				
<b>h1</b>	a	<b>220</b>	H / PT2	220				
<b>c2</b>	ais	<b>233</b>	C / PT2	233				
<b>cis2</b>	h	<b>246.9</b>	Cis / PT2	246.8				
<b>d2</b>	c1	<b>261.6</b>	D / PT2	221.6				
<b>dis2</b>	cis1	<b>277.2</b>	Dis / PT2	277.2				
<b>e2</b>	d1	<b>293.6</b>	E / PT2	293.6				
<b>f2</b>	dis1	<b>311.1</b>	B / PT3	311.4	F / PT2	311		
<b>fis2</b>	e1	<b>329.6</b>	H / PT3	330	Fis / PT2	329.6		
<b>g2</b>	f1	<b>349.2</b>	C / PT3	349.5	G / PT2	349.2		
<b>gis2</b>	fis1	<b>370</b>	Cis / PT3	370	Gis / PT2	370		
<b>a2</b>	g1	<b>392</b>	D / PT3	292.4	A / PT2	392		
<b>ais2</b>	gis1	<b>415.3</b>	B / PT4	415.2	Dis / PT3	311		
<b>h2</b>	a1	<b>440</b>	H / PT4	440	E / PT3	440.4		
<b>c3</b>	ais1	<b>466.2</b>	C / PT4	466	F / PT3	466.5		
<b>cis3</b>	h1	<b>493.9</b>	Cis / PT4	493.6	Fis / PT3	494.4		

Tone		Piano	Root variant 1		Root variant 2		Personal	
Notated	Sounding	Hz	Fingering	Hz	Fingering	Hz	Fingering	Add.
<b>d3</b>	c2	<b>523.2</b>	D / PT4	523.2	G / PT3	523.8		
<b>dis3</b>	cis2	<b>554.3</b>	H / PT5	↑ 550	Gis / PT3	555		
<b>e3</b>	d2	<b>587.3</b>	E / PT4	587.2	A / PT3	588		
<b>f3</b>	dis2	<b>622.2</b>	B / PT6	622.8	F / PT4	622		
<b>fis3</b>	e2	<b>659.2</b>	H / PT6	660	Fis / PT4	659.2		
<b>g3</b>	f2	<b>698.4</b>	C / PT6	699	G / PT4	698.4		
<b>gis3</b>	fis2	<b>740</b>	Cis / PT6	740.4	Gis / PT4	740		
<b>a3</b>	g2	<b>784</b>	D / PT6	784.8	A / PT4	784		
<b>ais3</b>	gis2	<b>830.6</b>	B / PT8	830.4	Cis / PT3	831.5		
<b>h3</b>	a2	<b>880</b>	H / PT8	880	E / PT6	880.8		
<b>c4</b>	ais2	<b>932.3</b>	C / PT8	932	F / PT6	933		
<b>cis4</b>	h2	<b>987.7</b>	Cis / PT8	987.2	Fis / PT6	988.8		
<b>d4</b>	c3	<b>1046.5</b>	D / PT8	1046.4	G / PT6	1047.6		
<b>dis4</b>	cis3	<b>1108.7</b>	Cis / PT9	↓1110.6	Gis / PT6	1110		
<b>e4</b>	d3	<b>1174.6</b>	E / PT8	1174.4	A / PT6	1176		
<b>f4</b>	dis3	<b>1244.5</b>	B / PT12	1245.6	F / PT8	1244		
<b>fis4</b>	e3	<b>1318.5</b>	Fis / PT8	1318.4				
<b>g4</b>	f3	<b>1396.9</b>	G / PT8	1396.8				
<b>gis4</b>	fis3	<b>1479.9</b>	Cis / PT12	1480.8	Gis / PT8	1480		
<b>a4</b>	g3	<b>1567.9</b>	A / PT8	1568				
<b>ais4</b>	gis3	<b>1661.2</b>	B / PT16	1660.8				
<b>h4</b>	a3	<b>1760</b>	E / PT12	1761.6				
<b>c5</b>	ais3	<b>1864.6</b>	F / PT12	↓1866				
<b>cis5</b>	h3	<b>1975.5</b>	Cis / PT16	1974.4				

## 7. Characteristics of the Staldophone

The origin is the tenor saxophone

Weight of the Staldophone, approx.	2.2 kg (compared to 3.3 kg for the tenor sax.)
Keys, tone holes and keys	10 (compared to about 22 on the tenor saxophone)
Length of resonance tube	61 cm (with only five tone holes)
Resonance pipe diameter above	3 cm
Resonance pipe diameter below	6 cm
Wall thickness of the resonance pipe	0.7 mm

## 8. Staldophone construction instructions

The prototype is primarily built using only known materials and techniques. Therefore only with gold-lacquered brass as far as sound-influencing parts are concerned.

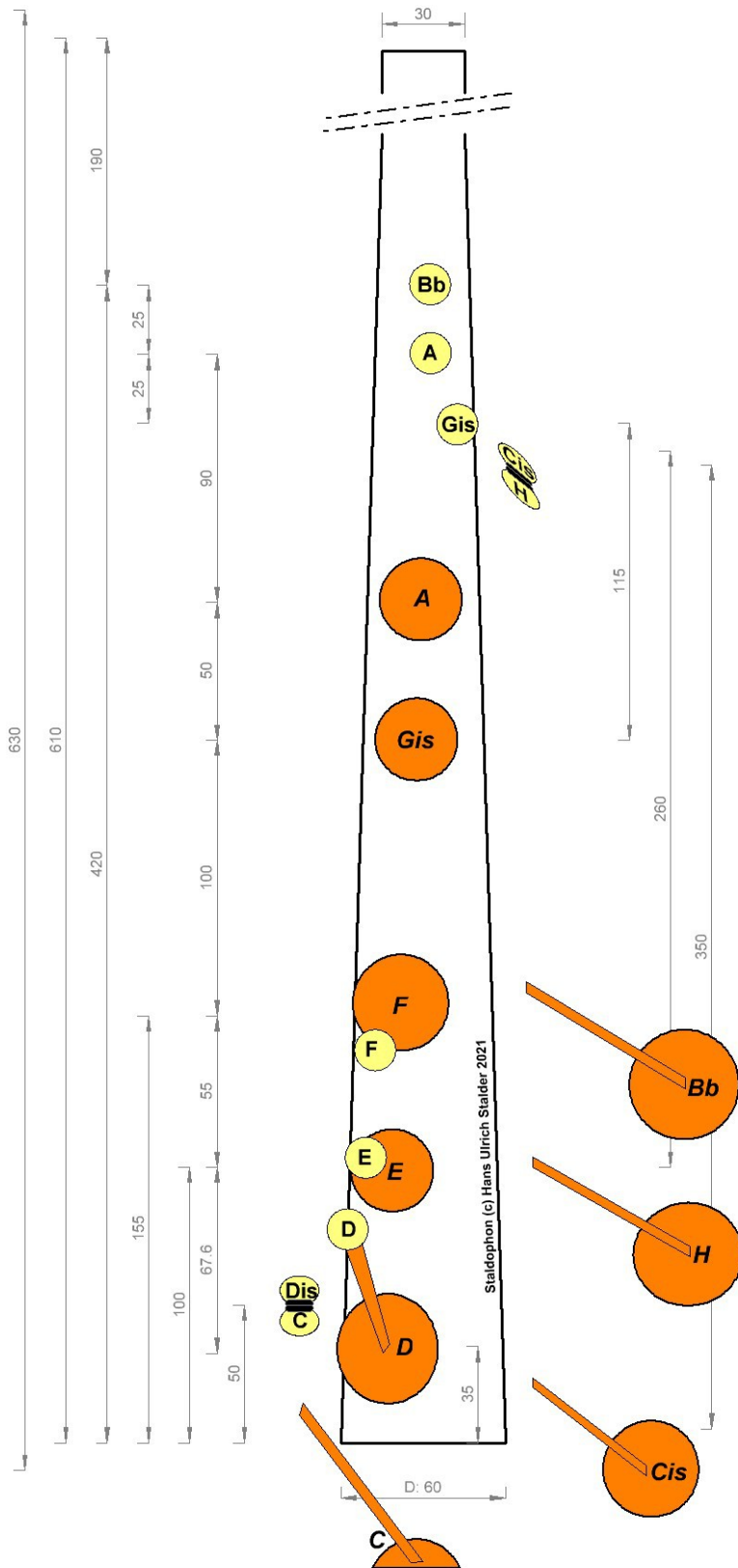
The upper thumb rest can also be realized with a thumb hook. The thumb rests are to be attached exactly at the level of the index finger buttons.

For the prototype of the Tenorstaldophone, an inexpensive, existing tenor saxophone should be assumed. As a result, only the middle resonance tube with the five tone holes has to be replaced. In the existing neck the octave key driver has to be removed and the interference hole has to be closed permanently. Furthermore, it is the transitions of the key mechanism to the horn bow and the bell that have to be adjusted. In any case, existing material from the underlying horn should be used whenever possible.

## 9. Detailed technical drawing

The length specifications in the following drawing are only guidelines. For experienced instrument makers, the information given here should suffice to allow the instrument to grow “organically” during construction.

For the mechanics of C#, Dis# and G#, where the flaps are closed in the idle state, a reverse construction is necessary. Existing technology, including the existing pipe connections, can be built on.





## **10. Exclusion of liability / disclaimer**

This instrument is purely theoretical. No legal responsibility or liability of any kind can be assumed for incorrect information and its consequences. Subject to changes.

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