

How augmented, diminished and whole tone layouts **really** work

The journey is the reward
Taoist Saying

by Max Greco

ver. 1.0
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Introduction

When I started to play harmonica my lack of experience did not help me to understand the reasons behind the existence of alternative harmonica tunings in terms of their note layouts.

It wasn't clear to me on why altered tunings like diminished and augmented layout could simplify playing the chromatic harmonica.

I decided to work out for myself why this would be. This document is the result of this search.

Tunings and layouts

In this document:

- **layout** is the definition of where notes are positioned on the harmonica (e.g. solo layout). Mainly used for clarification between tuning layouts (discussed here) and fine tunings such as 12tET temperament or Just Intonation.
- **tuning** is the change of pitch of a particular reed(s).

E.g. *reeds are tuned in order to change layout.*

Often the terms *tuning* and *layout* are both used to identify the position of the notes. You almost certainly will find documentation referring to "augmented tuning" or "alternate tunings".

In order to improve the readability in this document I tried to be consistent with the definitions given above. However, be aware that outside this document the above definitions may be less rigid.

Names

Naming conventions in the harmonica world are far from being standardized. However, some basic principles appear to be shared between harmonica players.

As a basic rule, what determines the name of a layout is the name of the chord that is produced blowing on the first 3 holes. If this is not enough do define the layout, other elements are added to the name.

The interval between the blow and draw notes has not effect on the name of the layout. For example, the two following layouts are both diminished:

	1	2	3	4	5	6
Blow/s	C#	E	G	A#	C#	E
Blow	C	D#	F#	A	C	D#
Draw	D	F	G#	B	D	F
Draw/s	D#	F#	A	C	D#	F#

	1	2	3	4	5	6
Blow/s	D	F	G#	B	D	F
Blow	C	D#	F#	A	C	D#
Draw	C#	E	G	A#	C#	E
Draw/s	D#	F#	A	C	D#	F#

To differentiate them, the effect of the slide is added to the name: "Diminished *sharp slide*" and "Diminished *wholetone slide*".

There are exceptions to the rule. The *wholetone layout* for instance, gets its name from the scale that is used to define the layout. The *Cmaj7/Dmin7 layout* gets its name from the chords that are produced blowing in the holes 1, 2, 3, 4 *and* drawing on same holes.

MOLT (modes of limited transposition)

With the exclusion of the solo layout, the family of layouts described in this document is called **MOLT (modes of limited transposition)**.

Standard solo layout

Almost all stock chromatic harmonicas are sold with *solo tuning* or *solo layout*. For example, **C Solo** is laid out like so:

	1	2	3	4	5	6
Blow/s	C#	E#	G#	C#	C#	E#
Blow	C	E	G	C	C	E
Draw	D	F	A	B	D	F
Draw/s	D#	F#	A#	C	D#	F#

Chromatic harmonica - Key of C Solo Layout

The reasons behind the actual design of this layout are mainly historical. It originally derived from the middle octave of the Richter harmonica layout invented in early 19th century.

In practical terms it is one way to implement the piano keyboard layout on chromatic harmonica. In a nutshell holes played with the slide out are the white keys and using the slide raises the notes by a semitone allowing access to the black keys, and a couple of enharmonics. With the exception of the inversion of the blow/draw on the 4th hole, if you know the piano keyboard you should be able to find notes on C solo layout relatively easily.

Although the Solo layout has proven popular, it does create some problems.

A little bit of logic

Let's start with some simple facts.

- In the C major scale (based on the white keys of the piano) there are 7 notes (C, D, E, F, G, A and B).
- The remaining 5 notes are "accidentals" (C#, D#, F#, G# and A#). They are grouped asymmetrically.
- The chromatic harmonica has 4 possible notes for each hole (blow slide out, draw slide out, blow-slide in and draw-slide in).

The above facts lead to an asymmetrical distribution of intervals in any given octave.

The result is a monster: a different pattern for every major/minor scale. It is impossible to transpose scales without a change in pattern. In the case of the major scales: 12 keys, means 12 scales and 12 patterns.

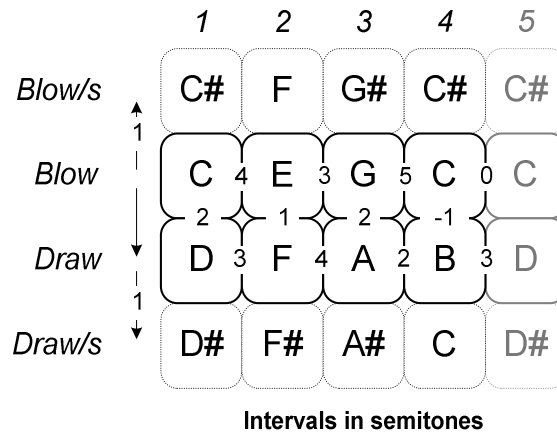
Moreover, as this layout has a few choice notes or enharmonics¹, so some scales may have more than one pattern and some don't. Scales that have enharmonics on any layout generally prove to have an advantage over those that don't. The main advantage is that it is possible to find an alternative way to play particularly challenging phrases.

One advantage of solo layout is that the **names of the notes** are almost in logical positions. This may be an advantage for some beginners learning to read music and music theory since key of C major is a common point of reference.

In appendix 1 you can find the 12 major scales of the standard solo layout in C. Please note that in practical terms some scales can be played in more than one way. The patterns shown are just one possibility.

¹ the same note can be found in more than on place

Intervals



As expected, intervals in the solo layout are irregular.

Augmented layout

One interesting approach to the chromatic harmonica layout is instead of using notes names to structure the layout; we can use intervals and/or chords.

The *augmented chord* has the three notes at the same distance (4 semitones interval, that's a 3rd major). Using four augmented chords:

C#aug	C#	F	A
Caug	C	E	G#
Daug	D	F#	A#
D#aug	D#	G	B

We can tune the harmonica in order to play the chords on blow slide-in, blow, draw, draw slide-in.

The layout is called *augmented sharp slide layout* as the slide raises the note by a semitone. This is the layout assumed when someone simply refers to "augmented layout". The same layout is also referred to *whole-tone* since the two scales that are related to this layout are the *whole-tone* scales (C D E F# G# A# C and Db Eb F G A B Db).

The slide

The slide raises the notes a semitone. Another option is to setup the layout to use the slide to lower the notes a semitone, known as "flat slide".

In a nutshell, changes in breath direction change the notes by a wholetone. Using the slide changes the notes by a semitone.

	1	2	3	4	5	6
Blow/s	C#	F	A	C#	F	A
Blow	C	E	G#	C	E	G#
Draw	D	F#	A#	D	F#	A#
Draw/s	D#	G	B	D#	G	B

Augmented layout

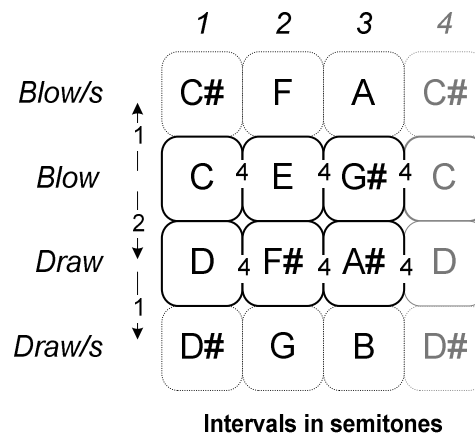
Another way to see this is the slide switches between the two whole-tone scales: C, D, E, F#, G#, A# and C#, D#, F, G, A, B

Intervals

Looking more closely to the *augmented layout* we notice some interesting points:

1. The scale repeats itself every 3 holes instead of 4 holes like *solo layout*. Consequently 12 hole chromatic harmonica has almost 4 octaves range with this layout.
2. There are no enharmonics. There is one position for each note and a unique note for every position.

3. Intervals are uniform:



4. The constant pattern of intervals has an important consequence. **Intervals do not change while we move horizontally.** In other words, if we play the same scale starting from say blow 1st hole (C) or blow 2nd hole (E) the only thing that will change is the key (hence the notes) of the scales. The pattern itself will just shift one hole right.

	1	2	3	4	5	6
Blow/s	C# / D ^b	F (E#)	A	C# / D ^b	F (E#)	A
Blow	C	E	G# / A ^b	C	E	G# / A ^b
Draw	D	F# / G ^b	A# / B ^b	D	F# / G ^b	A# / B ^b
Draw/s	D# / E ^b	G	B (Cb)	D# / E ^b	G	B (Cb)

C major scale

	1	2	3	4	5	6
Blow/s	C# / D ^b	F (E#)	A	C# / D ^b	F (E#)	A
Blow	C	E	G# / A ^b	C	E	G# / A ^b
Draw	D	F# / G ^b	A# / B ^b	D	F# / G ^b	A# / B ^b
Draw/s	D# / E ^b	G	B (Cb)	D# / E ^b	G	B (Cb)

E major scale

So the only thing that determines the shape of the pattern needed to produce a scale in any given key is the vertical position where we begin the scale (i.e. blow slide out, blow-slide in, draw slide out, draw-slide in). In the diagram above, horizontal movements use the same pattern for each key, only vertical movements change the pattern. Hence, there are only four patterns for every possible scale.

In appendix 2 you can see patterns for the *augmented layout*. The *augmented layout* has no enharmonics; consequently the patterns shown are the only possible ways to play the scales indicated.

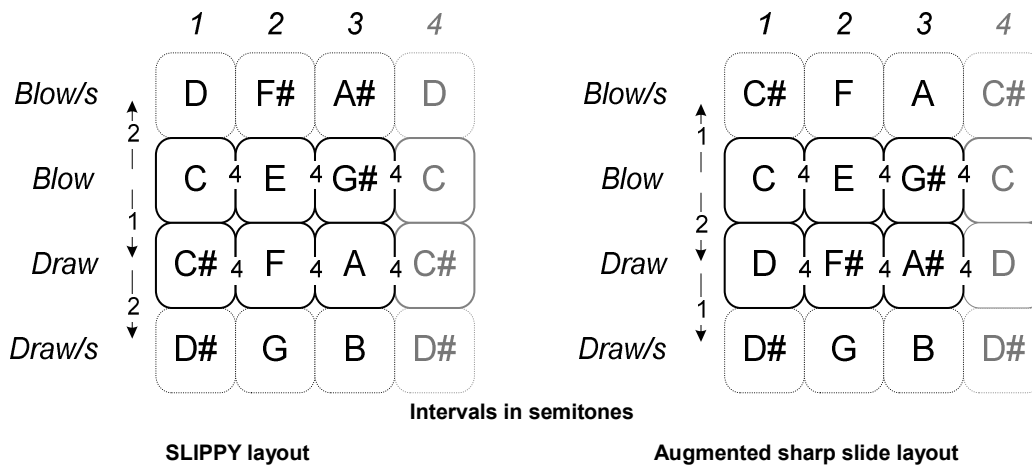
Augmented wholetone slide layout (aka SLIPPY)

There is an interesting variation of the augmented layout called *augmented wholetone slide* - also known as *SLIPPY*.

	1	2	3	4	5	6
Blow/s	D	F#	A#	D	F#	A#
Blow	C	E	G#	C	E	G#
Draw	C#	F	A	C#	F	A
Draw/s	D#	G	B	D#	G	B

SLIPPY layout

The following diagram compares intervals on *augmented sharp slide layout* and SLIPPY layout.



The main difference between the two layouts is that breath changes and slide intervals are inverted. On augmented sharp slide layout a breath change alters the note by a semitone. On SLIPPY layout it alters the note by a wholetone.

On augmented sharp slide layout using the button changes the note by a wholetone. On SLIPPY layout it alters the note by a semitone.

Compared to augmented sharp slide layout, SLIPPY layout requires less breath changes for major/minor scales. The main consequence is that the SLIPPY layout is slightly easier to play as breath changes are more demanding than using the slide.

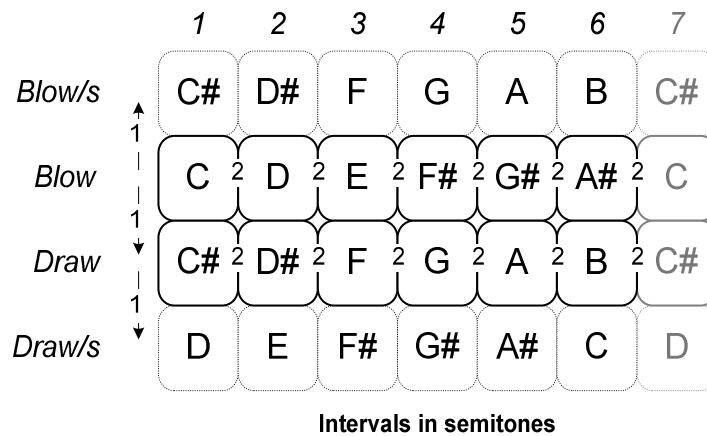
Appendix 3 contains patterns for all major and minor diatonic scales using SLIPPY layout.

Wholetone layout

This layout is based on the two wholetone scales. The scale is laid horizontally across the harmonica. The second wholetone scale is found by either using the slide or changing breath.

	1	2	3	4	5	6	7
Blow/s	C#	D#	F	G	A	B	C#
Blow	C	D	E	F#	G#	A#	C
Draw	C#	D#	F	G	A	B	C#
Draw/s	D	E	F#	G#	A#	C	D

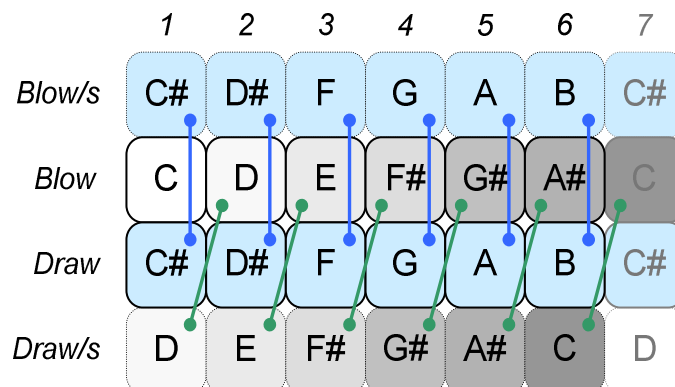
The intervals are symmetric.



Breath changes and using the slide produce the same affect: raising the note by one semitone. Hole shifts alter the note by a wholetone.

In geometrical terms this is the simplest and most symmetrical of all the interval-based layouts.

Every note is present twice:



There are inarguable pros in this layout:

1. There are only two patterns to learn to be able to play in all keys.
2. If we are producing a note by blowing in a hole and we want to lift it by a semitone we can decide if we want to draw or use the slide.
3. Because the same notes are present twice playing legato is very easy.

Unfortunately, there are important cons:

How augmented, diminished and wholetone layouts really work

1. With an octave using 6 holes, a 12 hole chromatic harmonica has only two octaves.
2. The wide distribution of notes of the layout makes playing big intervals difficult. The following table shows the number of hole shifts for some intervals:

Interval	wholetone	augmented	diminished	solo
C – D	1	0	0	0
C – G#	3	2	2	2
C – A	4	2	3	2

In appendix 4 you can find two patterns required to play all major scales.

Diminished layout

A diminished chord is made by four notes at the same distance (3rd minor). We can use the diminished chords: Cdim (C, Eb, Gb, A), Ddim (D, F, G#, B) and D^bdim (Db, E, G, Bb) to build a layout.

The slide

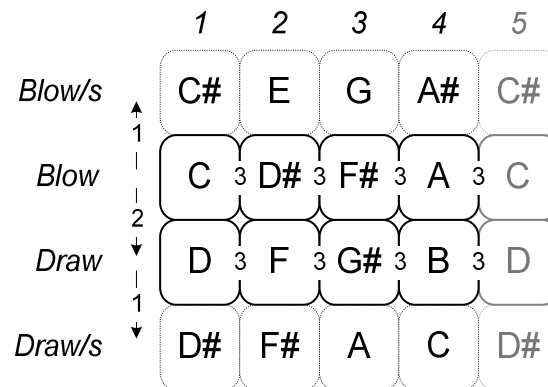
It is possible to set up the layout with a sharp slide (the slide rises the notes by a semitone) or flat slide (the slide lower the notes by a semitone). Alternatively, we can use the slide with a *wholetone slide* or *flat wholetone slide* i.e. raising or lowering the played note by a wholetone respectively.

When referring to *Diminished layout* without specifying the slide it is generally assumed the instrument is set up with a sharp slide as this is the most common configuration currently in use. It is questionable whether there is any advantage in any of the layout variations available other than the player's personal preference.

	1	2	3	4	5	6
Blow/s	C#	E	G	A#	C#	E
Blow	C	D#	F#	A	C	D#
Draw	D	F	G#	B	D	F
Draw/s	D#	F#	A	C	D#	F#

Chromatic harmonica - Diminished sharp slide layout

Intervals



Intervals in semitones

Even if the idea behind the diminished layout is similar to the augmented layout, there are some differences:

1. This layout covers 4 holes per octave (same as the *solo layout*).
2. Every *draw slide-in* note can be found blowing slide out on the next hole up. Consequently it would be possible to play any scale or melody without using any draw slide-in, or without blow slide out.

This layout (as the augmented and wholetone layouts) has regular intervals. For the diminished layout, you only need to learn three patterns to play in all keys.

On appendix 5 you can find patterns for major diatonic scales. Please note that because of the enharmonics, the patterns shown are only one possible way to play the scales indicated. The C[#]major scale for instance can be played in 8 different ways.

Why MOLT layouts make sense

I am a bass player and on bass, transposition is quite easy. Any scale can be transposed simply moving the left hand (if you are right handed) along the neck. 6 strings bass simplify transposition even more allowing easy transposition across the strings.

As soon as I started play chromatic harmonica, I noticed that my first problem was that the intervals are very hard to “guess”. If you are improvising (or simply playing a melody by hear) on a standard solo layout harmonica, finding *the next note* can be very difficult.

This is mainly due to a reason. Intervals in the solo layout are not regular. The main consequently equal geometrical “jumps” do not produce the same intervals.

Moving one hole right, for example, produces different results depending from where we start:

Starting point	1 hole right	interval
C (1 st hole)	E	3maj
D	F	3min
E	G	3min
F	A	3maj
G	C	4
A	B	2
C (4 th hole)	C	unison
B	D	3min

The situation is similar if we change from blow to draw:

Blow	Draw	interval (semitones)
C (1 st)	D	2
E	F	1
G	A	2
C (4 th)	B	-1

This does not help. If I am playing a note and I want to play a 3rd minor, I have to know where I am (which hole) and what I am doing (blowing/drawing and slide position) in order to find the next note I want to play.

The set of layouts that addresses this issue is the MOLT. In all its variations (wholetone, diminished, augmented ...) horizontal and vertical distances are constant. Consequently geometrical distances and intervals are much more correlated.

The diminished layout, for instance, addresses this issue very well:

	1	2	3	4	5
Blow/s	C [#]	E	G	A [#]	C [#]
Blow	C	D[#]	F[#]	A	C
Draw	D	F	G[#]	B	D
Draw/s	D [#]	F [#]	A	C	D [#]

Diminished layout

This layout uses the same principles of the solo layout: the slide raises the pitch by a semitone and changing the breath from blow to draw raises the notes by a wholetone.

Moreover, solo layout and diminished layout share 50% of the notes:

	1	2	3	4
Blow/s	C [#]	E	G	A [#]
Blow	C	D [#]	F [#]	A
Draw	D	F	G [#]	B
Draw/s	D [#]	F [#]	A	C

From the intervals point of view of a diminished layout, breath changes are always one tone apart and horizontal movements of one hole produce always a 3rd minor interval.

This regularity really helps to find *the next note*. More in general, MOLT layouts are easier to play by ear than solo layout because of the regular patterns and intervals.

Custom layouts

Even if the MOLT layouts described in this document should cover the great majority of the player preferences and needs, nothing stops you to design your own layout.

What really define a MOLT layout are the horizontal intervals and the fact that vertical intervals do not change while we move from one hole to the next.

You may decide for instance that you would like to have a semitone interval between blow and draw and a semitone interval for the slide:

	1
Blow/s	C [#]
Blow	C
Draw	C[#]
Draw/s	D

Given this initial structure you can develop your layout as diminished:

	1	2	3	4	5
Blow/s	C [#]	E	G	A [#]	C [#]
Blow	C	D[#]	F[#]	A	C
Draw	C[#]	E	G	A[#]	C[#]
Draw/s	D	F	G [#]	B	D

or wholetone:

	1	2	3	4	5	6	7
Blow/s	C [#]	D [#]	F	G	A	B	C [#]
Blow	C	D	E	F[#]	G[#]	A[#]	C
Draw	C[#]	D[#]	F	G	A	B	C[#]
Draw/s	D	E	F [#]	G [#]	A [#]	C	D

If you want to retune your harmonica, you can ask a professional like G (<http://harmonica.7p.com>) or Brendan Power (<http://www.brendan-power.com>). In case you decide to retune the harmonica yourself, I suggest you the excellent "Altered States" by Pat Missin (see *References* for details).

Conclusions

So which layout is the best? I do not think any given layout is necessarily better than others.

Among the MOLT layouts, augmented and SLIPPY layouts are more technically demanding to play than other layouts because they use breath changes, hole changes and the slide simultaneously regularly and do not have enharmonics to mitigate this. This is typical of any compact 3 hole octave layout.

Legato is more difficult on the augmented layouts, but if your preference of phrasing demands staccato notes and large interval leaps, one of the augmented layouts might be a good choice for you.

Because the augmented layouts do not have enharmonic sounds, visualization of the patterns is simplified since there is only one way to play them. For some people this makes this layout easier to play by ear than. On the other hand there is no alternative way to rearrange any challenging phrase over the instrument. Another advantage of the augmented layout is that large interval leaps are easier because the tuning is compact.

Diminished layouts offer a good balance between regular intervals, spread of enharmonics (giving plenty of legato possibilities), and octave spread. Moreover, diminished layouts need only three patterns to play a given scale in any key.

There is no answer to the question "what is the best layout". Every layout has some aspects that are better than other layouts. The best layout *for you* depends on your playing style, the music you play and ultimately the way you *feel* about the instrument.

I hope this document will help you in your journey.

References

Information on the chromatic harmonica on the internet would be almost not existent if it wasn't for the fantastic work of G:

Harp On! Chromatic Harmonica Reference

<http://www.angelfire.com/music/HarpOn/>

and for more details on altered layouts/tunings:

<http://www.angelfire.com/music/harmonica/altered.html>

G offers very interesting "budget 10 hole chromatic harmonicas" on his web site. They are ideal if you would like to try some of the layouts described in this document but you have a limited budget.

Budget Altered Layout 10 Hole Hohner Chromatic Harmonicas

<http://harmonica.7p.com/chromatics.html#budget>

I strongly suggest the reading of Pat Missin's article:

Some Musings On Altered Layouts For the Chromatic Harmonica

<http://www.angelfire.com/music/HarpOn/patsmusings.html>

If you decide to tune a harmonica as MOLT yourself I recommend the excellent "**Altered States**" by Pat Missin available from:

<http://www.patmissin.com/tunings/tunings.html>

Another interesting web site about tuning and maintenance is the **Franz Chmel workshop**

<http://www.chmel-classic.de/sites/workshops.html>

Tinus has published some of the layouts from *Altered States* on his website

<http://www.tenhole.com>

Acknowledgements

Huge thanks to G for this time, patience, constructive comments and interesting ideas.

Thanks to Pat Missin for the time he spent to review the final version of this document and for his valuable comments.

Comments

For comments and suggestions feel free to send me an e-mail to maxg5150@yahoo.com.

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Appendix 1 - Solo C

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	B.I. ² = 6
Blow	C	E	G	C	C	E	G	R.C. ³ = 0
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. ⁴ = 3
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	Cmaj - Amin		C D E F G A B C					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	B.I. = 6
Blow	C	E	G	C	C	E	G	R.C. = 0
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 3
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	C#maj - A#min		C# D# F F# G# A# C C#					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	❖ ⁵ B.I. = 6
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	Dmaj - Bmin		D E F# G A B · C#D					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	B.I. = 4
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	Ebmaj - Cmin		Eb F G Ab Bb C D Eb					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	❖ B.I. = 6
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	Emaj - C#min		E F# G# A B C# D# E					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	B.I. = 4
Blow	C	E	G	C	C	E	G	R.C. = 2
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	Fmaj - Dmin		F G A Bb C D E F					

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E [#])	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E [#])	G [#] /A ^b	B.I. = 4
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E [#])	A	B (Cb)	D	F (E [#])	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
	F#maj - D#min		F# G# A# B C# D# F F#					

² B.I.: The number of breath changes required to play a scale.

³ R.C.: The number of times the slide needs to be pressed or released.

⁴ H.S. The number of hole-shifts required to play a scale.

⁵ ❖ the scale doesn't contain enharmonics. This is the only way to play this scale on this layout

How augmented, diminished and wholetone layouts **really** work

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E#)	G [#] /A ^b	B.I. = 6
Blow	C	E	G	C	C	E	G	R.C. = 2
Draw	D	F (E#)	A	B (Cb)	D	F (E#)	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
<i>Gmaj - Emin</i> G A B C D E F# G								

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E#)	G [#] /A ^b	B.I. = 4
Blow	C	E	G	C	C	E	G	R.C. = 2
Draw	D	F (E#)	A	B (Cb)	D	F (E#)	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
<i>Abmaj - Fmin</i> Ab Bb C Db Eb F G Ab								

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E#)	G [#] /A ^b	❖ B.I. = 6
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E#)	A	B (Cb)	D	F (E#)	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
<i>Amaj - F#min</i> A B C# D E F# G# A								

	1	2	3	4	5	6	7	
Blow/s	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E#)	G [#] /A ^b	B.I. = 2
Blow	C	E	G	C	C	E	G	R.C. = 4
Draw	D	F (E#)	A	B (Cb)	D	F (E#)	A	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	
<i>Bbmaj - Gmin</i> Bb C D Eb F G A Bb								

	1	2	3	4	5	6	7	8	
Blow/s	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	C [#] /D ^b	F (E#)	G [#] /A ^b	C [#] /D ^b	❖ B.I. = 6
Blow	C	E	G	C	C	E	G	C	R.C. = 4
Draw	D	F (E#)	A	B (Cb)	D	F (E#)	A	B (Cb)	H.S. = 4
Draw/s	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	D [#] /E ^b	F [#] /G ^b	A [#] /B ^b	C	
<i>Bmaj - G#min</i> B C# D# E F# G# A# B									

Appendix 2 - Augmented Layout

Sharp Slide

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

① Cmaj - Amin C D E F G A B C

B.I.⁶ = 6
R.C.⁷ = 2
H.S.⁸ = 3

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

② C[#]maj - A[#]min C[#] D[#] F[#] A^b A[#] C C[#]

B.I. = 6
R.C. = 2
H.S. = 3

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

③ Dmaj - Bmin D E F[#] G A B C[#]D

B.I. = 6
R.C. = 2
H.S. = 3

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

④ E^bmaj - Cmin E^b F G G[#] B^b C D E^b

B.I. = 6
R.C. = 2
H.S. = 3

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

⑤ E^bmaj - C[#]min E F[#] G[#] A B C[#] E^b E

⑤ E^bmaj - C[#]min E F[#] G[#] A B C[#] E^b E

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

⑥ Fmaj - Dmin F G A B^b C D E F

⑥ Fmaj - Dmin F G A B^b C D E F

	1	2	3	4	5	6
Blow/s	C [#] / D ^b	F (E [#])	A	C [#] / D ^b	F (E [#])	A
Blow	C	E	G [#] / A ^b	C	E	G [#] / A ^b
Draw	D	F [#] / G ^b	A [#] / B ^b	D	F [#] / G ^b	A [#] / B ^b
Draw/s	D [#] / E ^b	G	B (Cb)	D [#] / E ^b	G	B (Cb)

⑦ F[#]maj - D[#]min F[#] G[#] B^b B C[#] E^b F[#]

⑦ F[#]maj - D[#]min F[#] G[#] B^b B C[#] E^b F[#]

⁶ B.I.: The number of breath changes required to play a scale.

⁷ R.C.: Number of times the slide needs to be pressed or released.

⁸ H.S.: The number of hole-shifts required to play a scale.

How augmented, diminished and wholetone layouts **really** work

	1	2	3	4	5	6
Blow/s	C [#] /D ^b	F _(E#)	A	C [#] /D ^b	F _(E#)	A
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Draw/s	D [#] /E ^b	G	B _(Cb)	D [#] /E ^b	G	B _(Cb)

④ Gmaj - Emin G A B C D E F# G

	1	2	3	4	5	6
Blow/s	C [#] /D ^b	F _(E#)	A	C [#] /D ^b	F _(E#)	A
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Draw/s	D [#] /E ^b	G	B _(Cb)	D [#] /E ^b	G	B _(Cb)

① G#maj - Fmin G# Bb C C# Eb F G G#

	1	2	3	4	5	6
Blow/s	C [#] /D ^b	F _(E#)	A	C [#] /D ^b	F _(E#)	A
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Draw/s	D [#] /E ^b	G	B _(Cb)	D [#] /E ^b	G	B _(Cb)

② Amaj - F#min A B C# D E F# G# A

	1	2	3	4	5	6
Blow/s	C [#] /D ^b	F _(E#)	A	C [#] /D ^b	F _(E#)	A
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Draw/s	D [#] /E ^b	G	B _(Cb)	D [#] /E ^b	G	B _(Cb)

⑤ Bbmaj - Gmin Bb C D Eb F G A Bb

	1	2	3	4	5	6
Blow/s	C [#] /D ^b	F _(E#)	A	C [#] /D ^b	F _(E#)	A
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Draw/s	D [#] /E ^b	G	B _(Cb)	D [#] /E ^b	G	B _(Cb)

④ Bmaj - G#min B C# Eb E F# G# Bb B

Appendix 3 - Augmented *wholetone slide* (aka SLIPPY) layout.

Hole	1	2	3	4	5	6
Blow/s	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	C [#] /D ^b	F (E [#])	A	C [#] /D ^b	F (E [#])	A
Draw/s	D [#] /E ^b	G	B (Cb)	D [#] /E ^b	G	B (Cb)

① Cmaj - Amin C D E F G A B C

B.I.⁹ = 2
R.C.¹⁰ = 6
H.S.¹¹ = 3

Hole	1	2	3	4	5	6
Blow/s	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	C [#] /D ^b	F (E [#])	A	C [#] /D ^b	F (E [#])	A
Draw/s	D [#] /E ^b	G	B (Cb)	D [#] /E ^b	G	B (Cb)

② C[#]maj - A[#]min C[#] D[#] F F[#] G[#] A[#] C C[#]

B.I. = 2
R.C. = 6
H.S. = 3

Hole	1	2	3	4	5	6
Blow/s	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	C [#] /D ^b	F (E [#])	A	C [#] /D ^b	F (E [#])	A
Draw/s	D [#] /E ^b	G	B (Cb)	D [#] /E ^b	G	B (Cb)

③ Dmaj - Bmin D E F[#] G A B C[#] D

B.I. = 2
R.C. = 6
H.S. = 3

Hole	1	2	3	4	5	6
Blow/s	D	F [#] /G ^b	A [#] /B ^b	D	F [#] /G ^b	A [#] /B ^b
Blow	C	E	G [#] /A ^b	C	E	G [#] /A ^b
Draw	C [#] /D ^b	F (E [#])	A	C [#] /D ^b	F (E [#])	A
Draw/s	D [#] /E ^b	G	B (Cb)	D [#] /E ^b	G	B (Cb)

④ Ebmaj - Cmin Eb F G Ab Bb C D Eb

B.I. = 2
R.C. = 6
H.S. = 3

The following scales use the same patterns shown above:

- ① Emaj - C[#]min E F[#] G[#] A B C[#] D[#] E
- ② Fmaj - Dmin F G A B^b C D E F
- ③ F[#]maj - D[#]min F[#] G[#] A[#] B C[#] D[#] F F[#]
- ④ Gmaj - Emin G A B C D E F[#] G

- ① G[#]maj - Fmin G[#] A[#] C C[#] D[#] F G G[#]
- ② Amaj - F[#]min A B C[#] D E F[#] G[#] A
- ③ B^bmaj - Gmin B^b C D E^b F G A B^b
- ④ Bmaj - G[#]min B C[#] D[#] E F[#] G[#] A[#] B

⁹ B.I.: The number of breath changes required to play a scale.

¹⁰ R.C.: Number of times the slide needs to be pressed or released.

¹¹ H.S. The number of hole-shifts required to play a scale.

Appendix 4 - Wholetone layout

	1	2	3	4	5	6	7	8	9
Blow/s	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Blow	C	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E
Draw	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Draw/s	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E	F [#] /G ^b

① Cmaj - Amin C D E F G A B C

	1	2	3	4	5	6	7	8	9
Blow/s	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Blow	C	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E
Draw	C[#]/D^b	D[#]/E^b	F	G	A	B	C[#]/D^b	D [#] /E ^b	F
Draw/s	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E	F [#] /G ^b

② C#maj - A#min C# D# F# G# A# C C#

The following scales use the same patterns shown above:

- ① Dmaj - Bmin D E F# G A B C# D
- ② E^bmaj - Cmin Eb F G Ab Bb C D Eb

- ① Emaj - C[#]min E F# G# A B C# D# E
- ② Fmaj - Dmin F G A Bb C D E F

- ① F[#]maj - D[#]min F# G# A# B C# D# F#
- ② Gmaj - Emin G A B C D E F# G

- ① G[#]maj - Fmin G# A# C C# D# F G G#
- ② Amaj - F[#]min A B C# D E F# G# A

- ① B^bmaj - Gmin Bb C D Eb F G A Bb
- ② Bmaj - G[#]min B C# D# E F# G# A# B

Alternative patterns (no breath direction changes)

	1	2	3	4	5	6	7	8	9
Blow/s	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Blow	C	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E
Draw	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Draw/s	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E	F [#] /G ^b

① Cmaj - Amin C D E F G A B C

	1	2	3	4	5	6	7	8	9
Blow/s	C [#] /D ^b	D [#] /E ^b	F	G	A	B	C [#] /D ^b	D [#] /E ^b	F
Blow	C	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E
Draw	C[#]/D^b	D[#]/E^b	F	G	A	B	C[#]/D^b	D [#] /E ^b	F
Draw/s	D	E	F [#] /G ^b	G [#] /A ^b	A [#] /B ^b	C	D	E	F [#] /G ^b

② C#maj - A#min C# D# F# G# A# C C#

The two patterns above do not require breath changes, just the use of the slide. To switch pattern just reverse blow and draw.

Appendix 5 - Diminished Layout

Sharp Slide

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

① Cmaj - Amin C D E F G A B C

B.I.¹² = 5
R.C.¹³ = 5
H.S.¹⁴ = 3

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

② C[#]maj - A[#]min C[#] D[#] F F[#] A^b A[#] C C[#]

B.I. = 6
R.C. = 2
H.S. = 4

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

③ Dmaj - Bmin D E F[#] G A B C[#] D

B.I. = 6
R.C. = 4
H.S. = 4

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

④ E^bmaj - Cmin E^b F G G[#] B^b C D E^b

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

⑤ E^bmaj - C[#]min E F[#] G[#] A B C[#] E^b E

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

⑥ Fmaj - Dmin F G A B^b C D E F

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

⑦ F[#]maj - D[#]min F[#] G[#] B^b B C[#] E^b F F[#]

¹² B.I.: The number of breath changes required to play a scale.

¹³ R.C.: Number of times the slide needs to be pressed or released.

¹⁴ H.S.: The number of hole-shifts required to play a scale.

How augmented, diminished and wholetone layouts **really** work

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

② Gmaj - Emin G A B C D E F[#] G

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

③ G[#]maj - Fmin G[#] B^b C C[#] E^b F G G[#]

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

④ Amaj - F[#]min A B C[#] D E F[#] G[#] A

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

⑤ Bbmaj - Gmin B^b C D E^b F G A B^b

	1	2	3	4	5	6	7	8
Blow/s	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	D	F (E [#])	G [#] /A ^b	B (Cb)	D	F (E [#])	G [#] /A ^b	B (Cb)
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

⑥ Bmaj - G[#]min B C[#] E^b E F[#] G[#] B^b B

Wholetone slide

	1	2	3	4	5	6	7	8
Blow/s	D	F	G [#] /A ^b	B	D	F	G [#] /A ^b	B
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

① Cmaj - Amin C D E F G A B C

B.I.¹⁵ = 5
R.C.¹⁶ = 5
H.S.¹⁷ = 3

	1	2	3	4	5	6	7	8
Blow/s	D	F	G [#] /A ^b	B	D	F	G [#] /A ^b	B
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

② C[#]maj - A[#]min C[#] D[#] F[#] G[#] A[#] C C[#]

B.I. = 4
R.C. = 4
H.S. = 4

	1	2	3	4	5	6	7	8
Blow/s	D	F	G [#] /A ^b	B	D	F	G [#] /A ^b	B
Blow	C	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A
Draw	C [#] /D ^b	E	G	A [#] /B ^b	C [#] /D ^b	E	G	A [#] /B ^b
Draw/s	D [#] /E ^b	F [#] /G ^b	A	C	D [#] /E ^b	F [#] /G ^b	A	C

③ Dmaj - Bmin D E F[#] G A B C[#] D

B.I. = 6
R.C. = 4
H.S. = 4

The following scales use the same patterns shown above:

- ① E^bmaj - Cmin E^b F G A^b B^b C D E^b
- ② Emaj - C[#]min E F[#] G[#] A B C[#] D[#] E
- ③ Fmaj - Dmin F G A B^b C D E F

- ① F[#]maj - D[#]min F[#] G[#] A[#] B C[#] D[#] F F[#]
- ② Gmaj - Emin G A B C D E F[#] G
- ③ G[#]maj - Fmin G[#] A[#] C C[#] D[#] F G G[#]

- ① Amaj - F[#]min A B C[#] D E F[#] G[#] A
- ② B^bmaj - Gmin B^b C D E^b F G A B^b
- ③ Bmaj - G[#]min B C[#] D[#] E F[#] G[#] A[#] B

↓

¹⁵ B.I.: The number of breath changes required to play a scale.

¹⁶ R.C.: Number of times the slide needs to be pressed or released.

¹⁷ H.S.: The number of hole-shifts required to play a scale.