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Saxophone without mouthpiece

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Citation

Kahl, D. P. (2025, January 28). *Saxophone without mouthpiece*. Retrieved from <https://hdl.handle.net/1887/4177913>

Version: Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).

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Personal Audio and Video Performance Repository

The recordings listed below constitute artistic output over the course of several years. This work also includes several of my colleagues across two professional ensembles, namely the Ensemble du Bout du Monde (with current members Noa Mick, Simona Castria, and Salvatore Castellano and former members Kay Zhang, Pablo de la Fuente, and Quentin Darricau) and Duo Entre-Nous (with Jackie Glazier). Commissioned works are marked as such. All recordings are publicly available and several, where applicable, are released on full-length albums.

Solo Works:

For Felipe M. (Commissioned Work) - Stratis Minakakis

Live Performance - https://youtu.be/LFlH1_ay-Ds?si=ZsA6B_GFKiR5aX0h

Video Recording - <https://youtu.be/jpf7mYXNFo8?si=EtXGI5R8fam3GcTQ>

Audio Recording - https://youtu.be/-OEXoe_Zhng?si=MwcoPd3qtexnGJAg

Go Within (Commissioned Work) - Eleni Ralli

Live Performance - <https://youtu.be/GwaisJoHlbo?si=ZwgIQ9jV93B7xPqc>

Score Follower - https://youtu.be/bBrJ3atAN_U?si=9ah3CI7XDldwg_B-

Audio Recording - <https://youtu.be/dyReFcxa1jo?si=UnzAftOsOERihft7>

el gran cabrón - Germán Alonso

Live Performance - https://youtu.be/n20_dNZ6dI?si=ckqx1e2Gf3NbyvrU

Vision (Urban Music II) - Rainer Rubbert

Live Performance - https://youtu.be/4kGjvI3jPeo?si=vMOqjbR_8ABeut-2

Sikuri I - Juan Arroyo

Live Performance - <https://on.soundcloud.com/q8u7EUn5yBYHCbJTA>

Saxophone and Clarinet Duo Works:

Anemoi Dances (Commissioned Work) - Max Grafe

Live Performance - <https://youtu.be/3NCnuS-bpQI?si=Ybk7rO3oT3lwGo-G>

Audio Recording - <https://youtu.be/6KkkXokRcQM?si=Vczq3wapcqjqO48Q>

Air Mirrors (Commissioned Work) - María Eugenia Luc

Live Performance - https://youtu.be/tb-L-iCNHP8?si=ZYGnpXNa8Hr2H_KU

Audio Recording - <https://youtu.be/LEKmaGyb1uk?si=har1eikd0RaWYirx>

Saxophone Quartet Works:

Irrational (Commissioned Work) - Chaya Czernowin

Live Performance - <https://youtu.be/Wu-YuG71lU?si=jwsdXrGcmoV2vxpY>

Zeruan (Commissioned Work) - María Eugenia Luc

Video Recording - https://youtu.be/2iLGqOVbDKo?si=2_TjflIE-UIHEoVq

Live Performance - <https://youtu.be/QTkZtkTPk9A?si=0YVVxd1DC6AdTyFU>

Audio Recording -

<https://open.spotify.com/track/3IvkXj2EXZNM8UMC8gVIYF?si=a970f2b407424fc9>

Thalassografia A (Commissioned Work) - Stratis Minakakis

Live Performance - <https://youtu.be/HGuD4farJV8?si=u-3lxy9T6FFT1hrr>

Jalkin - Ramon Lazkano

Video Performance - <https://youtu.be/hWIIwCkqyOQ?si=920iEjxkPWXeDtlW>

Live Performance - <https://youtu.be/KT1DNvbHwQA?si=AS4xItF-0lHlMB3w>

Der Blutige Schaffner - Robin Hoffmann

Video Performance - <https://youtu.be/SNG8IsSWeil?si=mrGQhvPFkFAred4O>

Live Performance - <https://youtu.be/CAdLtBwiEUc?si=8mPoUQrd5olhrzFc>

YUN - María Eugenia Luc

Video Performance - https://youtu.be/Wr8ddjdxxkIE?si=g0-JTBLOdSY_0cTS

Albums Released with SWMP Techniques:

Go Within - Don-Paul Kahl -

<https://open.spotify.com/album/1OVot3tfdTYGGNsV59MgqN?si=SDh0mD1cTKyEcSSUaabYg>

Fresh Ink - Duo Entre-Nous -

<https://open.spotify.com/album/0eK1Er9KC6q7iWFzUOwE4r?si=iKxx1LgmRRSh5xiqw7I9iA>

María Eugenia Luc - Solo & Chamber Music -

<https://open.spotify.com/album/7zmKxJmpUuu42BBdkd0Sel?si=x46CewXpTD6vWo42NxgR4A>

Pitch Manual

Recording Method

All recordings that are part of this manual were made on the 10th of March 2022 in the recording studios at the Koninklijk Conservatorium Den Haag with sound engineer Pablo Gastaldello. Recordings can be accessed at the following webpages:

Air Pitch:

<https://www.saxowithoutmouthpiece.com/pitch-manual/air-pitch/>

Tongue Ram:

<https://www.saxowithoutmouthpiece.com/pitch-manual/tongue-ram/>

Trumpet Sounds:

<https://www.saxowithoutmouthpiece.com/pitch-manual/trumpet-sounds/>

Saxo-Flute Hybridity:

<https://saxowithoutmouthpiece.com/pitch-manual/saxo-flute-hybridity/>

Materials:

- Two Neumann KM184 paired microphones were placed about 2 meters from the saxophone.
- One Neumann U87 microphone was placed about 1.5 meters from the saxophone.
- Focusrite RedNet2 with a Solid State Logic (SSL) XLogic VHD Pre preamp was used for audio recording.
- Reaper recording software was used to record raw material.
- Sonic Visualizer with the YIN plugin. YIN is a vamp implementation of the Yin algorithm for monophonic frequency estimation. It is used to analyze the fundamental frequencies of single monophonic pitches and was developed by Matthias Mauch and Simon Dixon.

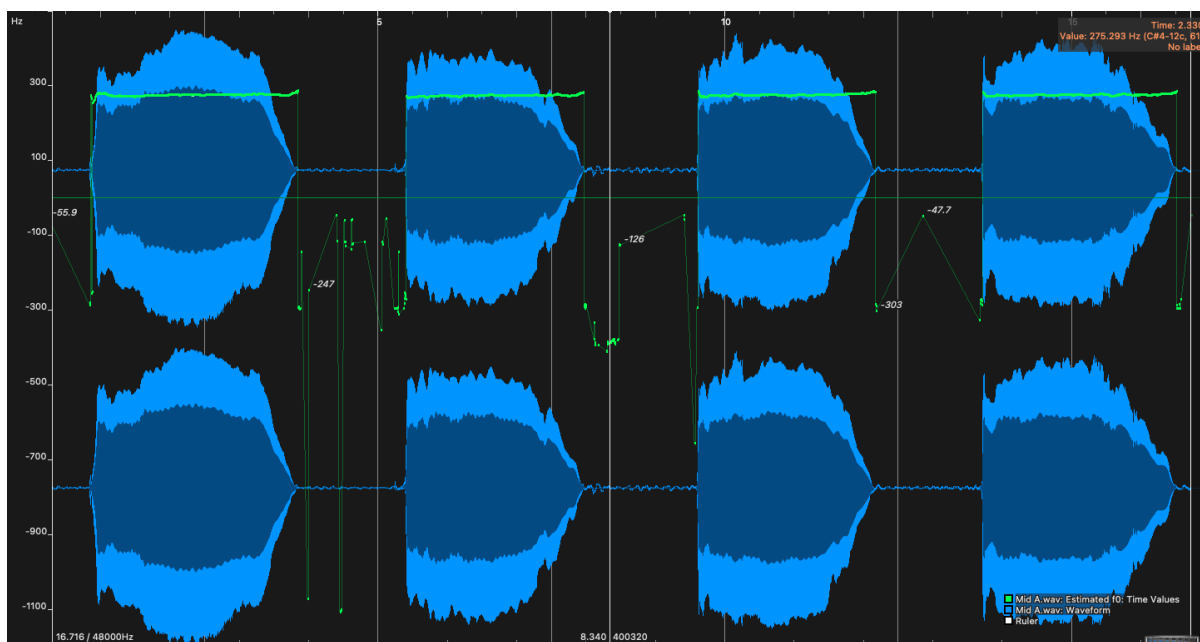


Saxophone Models Used in this Study:

- Soprano Saxophone - Henri Selmer Paris - Super Action 80 Series III - Solid Silver Neck
- Alto Saxophone - Henri Selmer Paris - Supreme - Lacquered Neck
- Tenor Saxophone - Henri Selmer Paris - Super Action 80 Series III - Solid Silver Neck
- Baritone Saxophone - Henri Selmer Paris - Super Action 80 Series II - Lacquered Neck

Methodological Steps:

1. Recordings were made of each individual note produced by the four saxophones without mouthpiece. For the sake of this study only the standard fingerings were used. No alternate, eighth-tone, quarter-tone, or multiphonic fingerings were used. (However, these can be integrated through a future study).
2. Four to six test recordings were made to ensure accuracy of the material.
3. Each note was examined in Sonic Visualizer using the YIN plugin. Below you can see a screenshot from Sonic Visualizer with its pitch analyses.



4. This material was analyzed and a hertz value was extracted for each of the four test pitches.
5. This value was confirmed by ear with a pure sine wave of the same value to ensure accuracy. This step was important: despite being powerful software, it is not infallible and it is only a tool to aid in analysis. Everything had to be tested through the software and then confirmed aurally.
6. The recorded hertz values of all four tests were combined to create an average hertz value. The standard deviation was also calculated in order to understand the variability between the individual tests. This statistic shows how unstable the pitch result for a specific fingering might be.
7. The average hertz value was tested by ear with a pure sine wave of the same hertz value.
8. The average hertz value was converted to the precise musical pitch using the following formula:

$$m_p = 12 * \log_2 \left(\frac{f_0}{440\text{Hz}} \right) + 69$$

where m_p is the musical pitch and f_0 is the frequency of the individual averaged pitch.

9. This formula gives the MIDI number which represents the closest tempered semitone, plus how far out of tune this pitch is from that semitone.
10. I converted this pitch value to the nearest eighth-tone.
11. From the nearest eighth-tone value, I converted this to musical notation.

Accidentals

Below are the eighth-tone and quarter-tone accidental signs used in this study.

sharpened by an eighth-tone	
sharpened by a quarter-tone	
sharpened by three quarter-tones	
lowered by an eighth-tone	
lowered by a quarter-tone	
lowered by three quarter-tones	

Pitch Manual for Air Pitch:

Soprano Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	Std Dev (Hz)	Musical Notation
A#3 / Bb3	255.95	254.347	256.79	254.45	255.38425	1.19	C4 minus 42 cents
B3	263.9	266.47	261.6	259.22	262.7975	3.11	C4 plus 8 cents
C4	288.4	287.84	296.86	288.21	290.3275	4.36	D4 minus 20 cents
C#4 / Db4	323.32	326.76	326.9	326.14	325.78	1.67	E4 minus 20 cents
D4	348	338.22	330.04	345.31	340.3925	8.04	F4 minus 44 cents
D#4 / Eb4	355.59	358.52	357.04	357.95	357.275	1.28	F4 plus 39 cents
E4	388.46	401.98	404.39	400.44	398.8175	7.09	G4 plus 30 cents
F4	432.61	433.08	432.07	433.47	432.8075	0.60	A4 minus 29 cents
F#4 / Gb4	458.41	457.42	458.64	461.97	459.11	1.98	A#4 minus 26 cents
G4	501.38	503.65	508.82	503.67	504.38	3.15	B4 plus 36 cents
G#4 / Ab4	555.67	547.41	534.45	543.24	545.1925	8.83	C#5 minus 29 cents
A4	583.11	593.51	597.32	601.65	593.8975	7.92	D5 plus 19 cents
A#4 / Bb4	641.94	640.94	635.21	640.46	639.6375	3.02	D#5 plus 48 cents
B4	684.08	693.18	683.77	685.49	686.63	4.43	F5 minus 30 cents
C5	738.45	727.86	746.1	700.19	728.15	20.08	F#5 minus 28 cents
C#5 / Db5	811.58	817.63	813.01	815.47	814.4225	2.67	G#5 minus 34 cents
D5 (with palm keys)	846.19	844.32	846.53	850.27	846.8275	2.49	G#5 plus 33 cents
D#5 / Eb5 (with palm keys)	932.5	936.31	937.87	939.72	936.6	3.07	A#5 plus 8 cents
E5 (with palm keys)	992.2	973.01	934.33	1054.45	988.4975	50.12	B5 plus 1 cent
F5 (with palm keys)	1064.39	1094.39	1118.2	1099	1093.995	22.27	C#6 minus 23 cents
F#5 / Gb5 (with palm keys)	1127.5	1119.84	1108.34	1160.52	1129.05	22.41	C#6 plus 31 cents
G5 (with palm keys)	1224.49	1316.4	1338.24	1234.2	1278.3325	57.40	D#6 plus 46 cents

Alto Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	164.4	165.11	164.93	164.02	164.615	0.50	E3 minus 2 cents
B3	186.94	187.82	191.03	182.47	187.065	3.53	F#3 plus 19 cents
C4	197.64	201.5	199.12	193.69	197.9875	3.28	G3 plus 17 cents
C#4 / Db4	210.37	211.82	209.11	212.71	211.0025	1.59	G#3 plus 28 cents
D4	220.55	232	229.54	228.76	227.7125	4.97	A#3 minus 40 cents
D#4 / Eb4	231.01	246.72	247.71	248.57	243.5025	8.36	B3 minus 24 cents
E4	262.41	262.81	263.33	259.28	261.9575	1.82	C4 plus 2 cents
F4	272.82	280.57	274.89	282.06	277.585	4.43	C#4 plus 3 cents
F#4 / Gb4	309.58	287.88	309.17	309.53	304.04	10.77	D#4 minus 40 cents
G4	318.18	320.3	320.8	323.98	320.815	2.40	E4 minus 47 cents
G#4 / Ab4	356.49	351.32	353.45	353.67	353.7325	2.12	F4 plus 22 cents
A4	392.93	392.42	388.25	391.68	391.32	2.11	G4 minus 3 cents
A#4 / Bb4	416.14	419.22	417.37	415.3	417.0075	1.70	G#4 plus 7 cents
B4	443.64	442.04	443.25	444.16	443.2725	0.90	A4 plus 13 cents
C5	496.71	493.31	497.46	496.74	496.055	1.86	B4 plus 8 cents
C#5 / Db5	539.72	532.75	534.05	535.93	535.6125	3.03	C5 plus 40 cents
D5 (with palm keys)	559.09	571.61	578.76	562.34	567.95	8.95	C#5 plus 42 cents
D#5 / Eb5 (with palm keys)	613.47	613.3	614.02	613.78	613.6425	0.32	D#5 minus 24 cents
E5 (with palm keys)	630.95	628.68	630	630.54	630.0425	0.99	D#5 plus 22 cents
F5 (with palm keys)	690.89	684.48	692.9	692.21	690.12	3.85	F5 minus 21 cents
F#5 / Gb5 (with palm keys)	746.54	742.82	742.61	743.17	743.785	1.85	F#5 plus 9 cents

Tenor Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	121.73	123.03	122.16	122.31	122.3075	0.54	B2 minus 16 cents
B3	131.12	131.92	133.37	131.13	131.885	1.06	C3 plus 14 cents
C4	137.78	137.82	136.83	139.36	137.9475	1.05	C#3 minus 8 cents
C#4 / Db4	154.12	152.07	153.09	153.04	153.08	0.84	D#3 minus 28 cents
D4	166.55	167.75	166.27	164.3	166.2175	1.43	E3 plus 15 cents
D#4 / Eb4	172.59	172.64	172.45	173.42	172.775	0.44	F3 minus 18 cents
E4	180.21	181.53	181.11	180.44	180.8225	0.61	F#3 minus 40 cents
F4	205.14	204.98	203.59	202.6	204.0775	1.21	G#3 minus 30 cents
F#4 / Gb4	220.28	224.18	224.66	223.26	223.095	1.96	A3 plus 24 cents
G4	232.58	232.51	233.33	231.98	232.6	0.56	A#3 minus 4 cents
G#4 / Ab4	255	254.13	254.08	254.12	254.3325	0.45	C4 minus 49 cents
A4	273.65	273.75	273.39	272.79	273.395	0.43	C#4 minus 24 cents
A#4 / Bb4	295.75	295.63	294.6	295.09	295.2675	0.53	D4 plus 9 cents
B4	317.25	316.38	317.78	318.24	317.4125	0.80	D#4 plus 35 cents
C5	358.56	355.99	357.17	360.98	358.175	2.14	F4 plus 44 cents
C#5 / Db5	375.12	375.12	374.81	375.45	375.125	0.26	F#4 plus 24 cents
D5 (with palm keys)	414.23	414.99	414.33	414.31	414.465	0.35	G#4 minus 4 cents
D#5 / Eb5 (with palm keys)	439.87	440.55	440.73	441.13	440.57	0.53	A4 plus 2 cents
E5 (with palm keys)	473.93	474.85	475.28	473.53	474.3975	0.81	A#4 plus 30 cents
F5 (with palm keys)	523.59	523.66	523.28	524.01	523.635	0.30	C5 plus 1 cent
F#5 / Gb5 (with palm keys)	557.53	558.3	554.72	554.86	556.3525	1.83	C#5 plus 6 cents

Baritone Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A3	74.6	74.95	74.7	74.87	74.78	0.16	D2 plus 32 cents
A#3 / Bb3	82.47	80.09	80.5	80.55	80.9025	1.07	E2 minus 32 cents
B3	85.9	86.14	86.03	86.24	86.0775	0.15	F2 minus 25 cents
C4	91.61	90.93	91.35	92.68	91.6425	0.75	F#2 minus 16 cents
C#4 / Db4	101.36	101.83	101.97	100.74	101.475	0.56	G#2 minus 40 cents
D4	111.22	112.29	111.37	111.46	111.585	0.48	A2 plus 25 cents
D#4 / Eb4	117.89	117.12	117.68	116.58	117.3175	0.59	A#2 plus 11 cents
E4	124.41	127.2	123.37	122.33	124.3275	2.09	B2 plus 12 cents
F4	131.75	130.16	130.81	130.57	130.8225	0.67	C3 plus 0 cents
F#4 / Gb4	143.71	143.91	144.86	143.65	144.0325	0.56	D3 minus 33 cents
G4	153.72	155.02	153.6	153.52	153.965	0.71	D#3 minus 18 cents
G#4 / Ab4	165.06	166.12	165.06	167.37	165.9025	1.10	E3 plus 11 cents
A4	183.54	181.89	183.36	183.49	183.07	0.79	F#3 minus 18 cents
A#4 / Bb4	190.29	190.75	192.15	191.76	191.2375	0.86	G3 minus 43 cents
B4	211.42	207.71	210.24	211.15	210.13	1.69	G#3 plus 21 cents
C5	227.33	226.4	228.54	224.78	226.7625	1.59	A#3 minus 48 cents
C#5 / Db5	247.12	247.75	248.39	248.49	247.9375	0.64	B3 plus 7 cents
D5 (with palm keys)	260.15	258.68	259.02	258.8	259.1625	0.67	C4 minus 16 cents
D#5 / Eb5 (with palm keys)	276.21	278.22	276.84	277.45	277.18	0.86	C#4 plus 0 cents
E5 (with palm keys)	299.49	298.62	298.52	299.69	299.08	0.60	D4 plus 32 cents
F5 (with palm keys)	320.03	320.29	320.44	320.09	320.2125	0.19	D#4 plus 50 cents
F#5 / Gb5 (with palm keys)	349.98	348.86	349.73	349.54	349.5275	0.48	F4 plus 1 cent

Pitch Manual for Tongue Ram:

Soprano Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	222.63	221.28	222.63	222.42	222.24	0.65	A3 plus 18 cents
B3	232.41	232.33	231.37	233.08	232.2975	0.70	A#3 minus 6 cents
C4	245.31	245.18	245.95	245.38	245.455	0.34	B3 minus 10 cents
C#4 / Db4	260.92	265.15	262.49	266.29	263.7125	2.45	C4 plus 14 cents
D4	290.29	286.69	286.44	283.28	286.675	2.87	D4 minus 42 cents
D#4 / Eb4	304.31	303.35	305	306.17	304.7075	1.19	D#4 minus 36 cents
E4	329.13	325.08	330.37	330.6	328.795	2.56	E4 minus 4 cents
F4	357.24	358.42	359.61	355.49	357.69	1.76	F4 plus 41 cents
F#4 / Gb4	367.82	365.16	365.64	365.16	365.945	1.27	F#4 minus 19 cents
G4	429.99	426.94	427.03	413.22	424.295	7.52	G#4 plus 37 cents
G#4 / Ab4	436.77	435.07	433.21	431.08	434.0325	2.45	A4 minus 24 cents
A4	460.19	465.29	459.16	458.4	460.76	3.11	A#4 minus 20 cents
A#4 / Bb4	487.13	500.96	514.48	484.13	496.675	13.95	B4 plus 10 cents
B4	545.71	537.08	536.76	550.4	542.4875	6.71	C#5 minus 37 cents
C5	565.36	573.38	568.3	565.45	568.1225	3.76	C#5 plus 42 cents
C#5 / Db5	651.54	639.7	636.25	655.93	645.855	9.38	E5 minus 36 cents
D5 (with palm keys)	663.95	663.73	662.78	663.55	663.5025	0.51	E5 plus 11 cents
D#5 / Eb5 (with palm keys)	677.83	674.51	678.24	687.5	679.52	5.58	F5 minus 48 cents
E5 (with palm keys)	727.61	715.72	716.16	727.29	721.695	6.65	F#5 plus 43 cents
F5 (with palm keys)	788.25	784.01	785.25	777.4	783.7275	4.58	G5 minus 1 cent
F#5 / Gb5 (with palm keys)	803.56	X	809.44	801.56	804.8533333	4.10	G5 plus 45 cents
G5 (with palm keys)	844.67	848.4	857.41	X	850.16	6.55	G#5 plus 40 cents

Alto Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	146.79	144.44	146.24	145.23	145.675	1.05	D3 minus 14 cents
B3	154.74	154.87	154.3	154.65	154.64	0.24	D#3 minus 10 cents
C4	163.83	163.89	163.19	163.15	163.515	0.40	E3 minus 14 cents
C#4 / Db4	175.57	175.4	175.07	174.92	175.24	0.30	F3 plus 6 cents
D4	187.78	186.45	186.24	185.16	186.4075	1.08	F#3 plus 13 cents
D#4 / Eb4	192.38	193.27	193.78	193.63	193.265	0.63	G3 minus 24 cents
E4	204.6	204.36	204.17	205.05	204.545	0.38	G#3 minus 26 cents
F4	226.98	223.33	223.83	224.54	224.67	1.62	A3 plus 36 cents
F#4 / Gb4	243.65	242.5	242.38	242.78	242.8275	0.57	B3 minus 29 cents
G4	251.31	251.67	250.61	250.23	250.955	0.65	B3 plus 28 cents
G#4 / Ab4	273.35	269.18	272.72	273.2	272.1125	1.97	C#4 minus 32 cents
A4	297.96	297.51	297.98	296.22	297.4175	0.83	D4 plus 22 cents
A#4 / Bb4	316.57	313.47	312.24	312.78	313.765	1.94	D#4 plus 15 cents
B4	347	340.72	339.23	337.61	341.14	4.11	F4 minus 41 cents
C5	368.52	365.73	363.48	364.7	365.6075	2.15	F#4 minus 21 cents
C#5 / Db5	397.84	394.17	394.23	393.88	395.03	1.88	G4 plus 13 cents
D5 (with palm keys)	425.34	410.53	422.02	413.35	417.81	7.01	G#4 plus 10 cents
D#5 / Eb5 (with palm keys)	434.19	439.3	430.54	430.6	433.6575	4.13	A4 minus 25 cents
E5 (with palm keys)	462.16	464.7	465.84	461.6	463.575	2.02	A#4 minus 10 cents
F5 (with palm keys)	494.9	495.02	492.9	494.14	494.24	0.97	B4 plus 1 cent
F#5 / Gb5 (with palm keys)	521.48	521.88	523.57	520.49	521.855	1.28	C5 minus 5 cents

Tenor Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	110.4	110.55	110.49	110.56	110.5	0.07	A2 plus 8 cents
B3	117.38	117.84	117.88	117.81	117.7275	0.23	A#2 plus 18 cents
C4	124.57	125.86	124.21	124.94	124.895	0.71	B2 plus 20 cents
C#4 / Db4	129.41	130.84	129.77	133	130.755	1.62	C3 minus 1 cent
D4	140.59	139.32	140.24	139.16	139.8275	0.70	C#3 plus 15 cents
D#4 / Eb4	144.24	148.64	144.7	145.19	145.6925	2.00	D3 minus 13 cents
E4	155.91	155.37	155.9	155.77	155.7375	0.25	D#3 plus 2 cents
F4	165.75	165.33	165.91	165.43	165.605	0.27	E3 plus 8 cents
F#4 / Gb4	174.58	176.21	175.11	175.03	175.2325	0.69	F3 plus 6 cents
G4	186.89	186.85	186.3	186.58	186.655	0.27	F#3 plus 15 cents
G#4 / Ab4	198.93	198.66	198.91	198.29	198.6975	0.30	G3 plus 24 cents
A4	220.47	221.24	221.19	222.46	221.34	0.83	A3 plus 11 cents
A#4 / Bb4	232.88	231.08	233.12	232.1	232.295	0.92	A#3 minus 6 cents
B4	246.57	246.2	246.86	246.21	246.46	0.32	B3 minus 3 cents
C5	269.89	269.11	267.53	267.15	268.42	1.30	C4 plus 44 cents
C#5 / Db5	289.92	288.48	288.56	287.82	288.695	0.88	D4 minus 30 cents
D5 (with palm keys)	307.66	307.2	305.3	305.58	306.435	1.17	D#4 minus 26 cents
D#5 / Eb5 (with palm keys)	333.5	328.99	328.44	326.5	329.3575	2.96	E4 minus 1 cent
E5 (with palm keys)	363.49	364.5	362.8	361.62	363.1025	1.21	F#4 minus 33 cents
F5 (with palm keys)	379.03	379.77	382.4	379.4	380.15	1.53	F#4 plus 47 cents
F#5 / Gb5 (with palm keys)	403.17	405.98	401.41	403.17	403.4325	1.89	G4 plus 50 cents

Baritone Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A3	68.77	68.42	68.3	68.51	68.5	0.20	C#2 minus 20 cents
A#3 / Bb3	73.57	73.77	73.7	73.4	73.61	0.16	D2 plus 5 cents
B3	76.36	77.32	76.54	76.86	76.77	0.42	D#2 minus 23 cents
C4	84.04	84.15	84.49	84.32	84.25	0.20	E2 plus 38 cents
C#4 / Db4	88.87	87.17	87.44	88.41	87.9725	0.80	F2 plus 13 cents
D4	92.63	92.66	92.65	92.55	92.6225	0.05	F#2 plus 2 cents
D#4 / Eb4	100.06	98.68	100.58	99.31	99.6575	0.83	G2 plus 29 cents
E4	106.18	106.39	106.3	106.57	106.36	0.16	G#2 plus 42 cents
F4	114.54	114.45	113.12	113.98	114.0225	0.65	A#2 minus 38 cents
F#4 / Gb4	116.62	115.42	116	115.57	115.9025	0.54	A#2 minus 10 cents
G4	129.07	128.31	126.6	127.92	127.975	1.03	C3 minus 38 cents
G#4 / Ab4	136.34	135.33	135.08	135.26	135.5025	0.57	C#3 minus 39 cents
A4	146.73	145.75	144.55	144.67	145.425	1.02	D3 minus 17 cents
A#4 / Bb4	150.74	151.14	150.94	150.01	150.7075	0.49	D3 plus 45 cents
B4	162.69	162.9	163.12	162.56	162.8175	0.25	E3 minus 21 cents
C5	176.21	175.31	176.6	176.13	176.0625	0.54	F3 plus 14 cents
C#5 / Db5	188.52	186.45	185.23	185.85	186.5125	1.43	F#3 plus 14 cents
D5 (with palm keys)	197.21	198.71	199.54	196.14	197.9	1.52	G3 plus 17 cents
D#5 / Eb5 (with palm keys)	206.3	206.75	205.81	206.21	206.2675	0.39	G#3 minus 12 cents
E5 (with palm keys)	221.68	220.3	221.22	221.54	221.185	0.62	A3 plus 9 cents
F5 (with palm keys)	233.84	233.44	233.85	233.02	233.5375	0.39	A#3 plus 3 cents
F#5 / Gb5 (with palm keys)	248.08	248.07	247.45	247.02	247.655	0.52	B3 plus 5 cents

Pitch Manual for Trumpet Sounds:

Soprano Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	209.63	210.7	211.15	215.03	211.6275	2.36	G#3 plus 33 cents
B3	220.65	224.63	226.65	227.06	224.7475	2.93	A3 plus 37 cents
C4	240.08	241.63	242.34	244.92	242.2425	2.02	B3 minus 33 cents
C#4 / Db4	259.14	259.37	259.26	259.68	259.3625	0.23	C4 minus 15 cents
D4	272.31	273.13	275.99	273.88	273.8275	1.58	C#4 minus 21 cents
D#4 / Eb4	293.68	291.58	292.52	289.72	291.875	1.67	D4 minus 11 cents
E4	310.4	313.92	313.76	313.78	312.965	1.71	D#4 plus 10 cents
F4	328.69	331.35	330.21	329.45	329.925	1.13	E4 plus 2 cents
F#4 / Gb4	347.43	355.52	354.67	354.26	352.97	3.73	F4 plus 18 cents
G4	369.88	368.01	371.34	371.64	370.2175	1.66	F#4 plus 1 cent
G#4 / Ab4	400.82	393.59	396.77	399.67	397.7125	3.23	G4 plus 25 cents
A4	427.23	432.16	434.5	432.47	431.59	3.09	A4 minus 33 cents
A#4 / Bb4	456.24	462.08	463.66	466.05	462.0075	4.18	A#4 minus 16 cents
B4	502.54	504.6	500.22	501.23	502.1475	1.89	B4 plus 29 cents
C5	519.34	530.96	524.49	523.56	524.5875	4.80	C5 plus 4 cents
C#5 / Db5	564.11	569.28	560.66	565.02	564.7675	3.55	C#5 plus 32 cents
D5	576	577.77	579.76	576.99	577.63	1.59	D5 minus 29 cents
D#5 / Eb5	599.86	606.22	606.52	608.23	605.2075	3.67	D#5 minus 48 cents
E5	658.69	659.9	651.89	657.87	657.0875	3.56	E5 minus 6 cents
F5	694.21	698.1	700.28	703.63	699.055	3.95	F5 plus 1 cent
F#5 / Gb5	753.18	754.69	754.65	753.16	753.92	0.87	F#5 plus 32 cents
G5	824.28	826.58	810.24	807.19	817.0725	9.78	G#5 minus 28 cents

Alto Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	143.19	145.08	144.93	144.33	144.3825	0.86	D3 minus 29 cents
B3	154.08	154.06	154.52	154.04	154.175	0.23	D#3 minus 16 cents
C4	161.42	161.56	162.19	161.08	161.5625	0.46	E3 minus 34 cents
C#4 / Db4	169.43	170.9	170.75	169.72	170.2	0.73	F3 minus 44 cents
D4	178.65	179.38	179.26	181.45	179.685	1.22	F3 plus 50 cents
D#4 / Eb4	186.9	188.9	190.25	190.42	189.1175	1.63	F#3 plus 38 cents
E4	198.57	200.41	200.36	200.56	199.975	0.94	G3 plus 35 cents
F4	210.39	209.36	211.68	212.52	210.9875	1.39	G#3 plus 28 cents
F#4 / Gb4	223.71	224.38	225	225.82	224.7275	0.90	A3 plus 37 cents
G4	239.22	240.84	241.5	243.76	241.33	1.88	B3 minus 40 cents
G#4 / Ab4	257.89	252.47	254.96	257.86	255.795	2.61	C4 minus 39 cents
A4	275.29	273.37	275.95	277.74	275.5875	1.80	C#4 minus 10 cents
A#4 / Bb4	292.63	291.18	291.73	294.15	292.4225	1.30	D4 minus 7 cents
B4	313.26	314.9	316.75	313.83	314.685	1.54	D#4 plus 20 cents
C5	326.61	324.04	335.96	336.72	330.8325	6.45	E4 plus 6 cents
C#5 / Db5	353.06	348.5	350.41	347.84	349.9525	2.34	F4 plus 4 cents
D5	370.32	371.71	371.98	372.56	371.6425	0.95	F#4 plus 8 cents
D#5 / Eb5	393.2	394.13	395.34	391.74	393.6025	1.52	G4 plus 7 cents
E5	415.55	420.18	422.24	422.24	420.0525	3.15	G#4 plus 20 cents
F5	442.02	455.05	459.12	459.28	453.8675	8.14	A#4 minus 46 cents
F#5 / Gb5	487.75	487.22	489.48	490.82	488.8175	1.65	B4 minus 18 cents
G5	522.07	526.75	525.91	527.71	525.61	2.47	C5 plus 8 cents
G#5 / Ab5	571.86	566.98	567.47	567.78	568.5225	2.25	C#5 plus 44 cents
A5	606.01	612.96	608.07	612.23	609.8175	3.33	D#5 minus 35 cents
A#5 / Bb5	644.57	644.55	640.9	648.21	644.5575	2.98	E5 minus 39 cents

Tenor Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#3 / Bb3	107.73	107.45	108.72	108.8	108.175	0.69	A2 minus 29 cents
B3	115.19	114.37	117.88	114.71	115.5375	1.60	A#2 minus 15 cents
C4	122.18	122.48	122.94	122.17	122.4425	0.36	B2 minus 14 cents
C#4 / Db4	130.01	129.45	129.13	128.4	129.2475	0.67	C3 minus 21 cents
D4	137.93	137.89	136.59	138.12	137.6325	0.70	C#3 minus 12 cents
D#4 / Eb4	147.28	143.76	145.79	145.33	145.54	1.45	D3 minus 15 cents
E4	156.43	158.72	158.36	158.74	158.0625	1.10	D#3 plus 28 cents
F4	164.62	163.6	165.76	166.87	165.2125	1.41	E3 plus 4 cents
F#4 / Gb4	174.07	176.12	176.7	178.35	176.31	1.77	F3 plus 17 cents
G4	185.41	187.66	185.83	185.78	186.17	1.01	F#3 plus 11 cents
G#4 / Ab4	195.72	198.19	199.56	200.29	198.44	2.01	G3 plus 21 cents
A4	212.37	213.13	210.79	213.08	212.3425	1.09	G#3 plus 39 cents
A#4 / Bb4	224.2	223.91	225.91	226.02	225.01	1.11	A3 plus 39 cents
B4	237.44	237.94	236.52	238.89	237.6975	0.99	A#3 plus 34 cents
C5	254.16	255.08	255.13	258.68	255.7625	2.00	C4 minus 39 cents
C#5 / Db5	272.43	272.43	272.33	273.49	272.67	0.55	C#4 minus 28 cents
D5	282.66	283.67	284.78	284.36	283.8675	0.93	C#4 plus 41 cents
D#5 / Eb5	298.81	300	300.25	300.48	299.885	0.74	D4 plus 36 cents
E5	321.74	322.4	319.14	322.12	321.35	1.50	E4 minus 44 cents
F5	341.16	341.63	340.37	342.61	341.4425	0.94	F4 minus 39 cents
F#5 / Gb5	370.78	369.77	366.95	366.55	368.5125	2.08	F#4 minus 7 cents
G5	396.3	398.31	400.36	397.34	398.0775	1.73	G4 plus 27 cents
G#5 / Ab5	424.43	422.36	424	423.32	423.5275	0.90	G#4 plus 34 cents
A5	457.18	454.68	453.71	455.56	455.2825	1.47	A#4 minus 41 cents

A#5 / Bb5	483.4	494.09	494.53	495.37	491.8475	5.66	B4 minus 7 cents
B5	532.17	530.43	528.48	554.35	536.3575	12.09	C5 plus 43 cents
C6	583.5	581.8	581.98	580.68	581.99	1.16	D5 minus 16 cents

Baritone Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A3 - 1°	133.45	132.7	135.2	136.47	134.455	1.70	C3 plus 48 cents
A#3 / Bb3 - 1°	147.75	147.13	146.79	142.48	146.0375	2.40	D3 minus 9 cents
B3 - 1°	153.06	153.51	151.98	155.88	153.6075	1.65	D#3 minus 22 cents
C4 - 1°	162.01	162.67	162.4	162.66	162.435	0.31	E3 minus 25 cents
C#4 / Db4 - 1°	174.78	173.31	174.52	174.97	174.395	0.75	F3 minus 2 cents
D4 - 1°	183.41	185.08	185.15	185.82	184.865	1.03	F#3 minus 1 cent
D#4 / Eb4 - 1°	194.83	194.84	196.26	194.84	195.1925	0.71	G3 minus 7 cents
E4 - 1°	205.35	203.27	209.34	209.05	206.7525	2.95	G#3 minus 8 cents
F4 - 1°	218.31	221.67	222.25	223.17	221.35	2.12	A3 plus 11 cents
F#4 / Gb4 - 1°	236.35	238.69	238.18	240.15	238.3425	1.57	A#3 plus 39 cents
G4 - 1°	251.44	252.89	253.6	252.22	252.5375	0.92	B3 plus 39 cents
G#4 / Ab4 - 1°	268	270.46	270.79	271.96	270.3025	1.66	C#4 minus 44 cents
A4 - 1°	288.87	287.92	290.03	292.59	289.8525	2.02	D4 minus 23 cents
A#4 / Bb4 - 1°	306.97	309.44	309.62	312.33	309.59	2.19	D#4 minus 9 cents
B4 - 1°	336.54	335.76	336.7	335.04	336.01	0.77	E4 plus 33 cents
C5 - 1°	355.31	357.36	358.31	361.71	358.1725	2.67	F4 plus 44 cents
C#5 / Db5 - 1°	390.35	390.27	393.6	393.98	392.05	2.02	G4 plus 0 cents
D5 - 1°	416.46	414.05	413.81	415.43	414.9375	1.24	G#4 minus 2 cents
D#5 / Eb5 - 1°	418.04	418.66	421.94	421.69	420.0825	2.02	G#4 plus 20 cents
E5 - 1°	441.15	442.53	437.79	442.35	440.955	2.20	A4 plus 4 cents
F5 - 1°	477.46	477.43	477.07	478.17	477.5325	0.46	A#4 plus 42 cents

F#5 / Gb5 - 1°	495.52	497.72	496.86	494.92	496.255	1.27	B4 plus 8 cents
G5 - 1°	537.64	537.84	538.91	540.67	538.765	1.39	C#5 minus 49 cents
G#5 / Ab5 - 1°	586.37	586.65	589.99	588.65	587.915	1.72	D5 plus 2 cents
A5 - 1°	597.98	590.98	598.06	598.36	596.345	3.58	D5 plus 26 cents
D5 - 2°	278.57	279.92	281	281.21	280.175	1.21	C#4 plus 19 cents
D#5 / Eb5 - 2°	292.22	298.25	298.78	298.82	297.0175	3.21	D4 plus 20 cents
E5 - 2°	317.48	319.31	319.54	320.85	319.295	1.39	D#4 plus 45 cents
F5 - 2°	337.88	341.62	342.25	343.54	341.3225	2.43	F4 minus 40 cents
F#5 / Gb5 - 2°	367.36	366.7	368.75	371.8	368.6525	2.27	F#4 minus 6 cents
G5 - 2°	393.76	397.65	398.16	398.54	397.0275	2.21	G4 plus 22 cents
G#5 / Ab5 - 2°	428.87	429.08	429.55	429.18	429.17	0.28	A4 minus 43 cents
A5 - 2°	459.76	456.67	457.03	456.85	457.5775	1.46	A#4 minus 32 cents
A#/Bb 5 - 2°	501.15	501.2	493.18	497.25	498.195	3.82	B4 plus 15 cents

Pitch Manual for Saxo-Flute Hybridity:

Soprano Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
F#4 / Gb4	436.11	437.19	436.24	438.39	436.9825	1.05	A4 minus 12 cents
G4	X	482.69	496	485.63	488.1066667	6.99	B4 minus 20 cents
G#4 / Ab4	510.14	512.96	508.33	513.97	511.35	2.58	C5 minus 40 cents
A4	550.4	550.8	550.77	551.2	550.7925	0.33	C#5 minus 11 cents
A#4 / Bb4	586.74	592.53	589.81	583.74	588.205	3.80	D5 plus 3 cents
B4	654.23	655.3	653.02	654.33	654.22	0.93	E5 minus 13 cents
C5	730.15	722.74	721.38	720.99	723.815	4.29	F#5 minus 38 cents
C#5 / Db5	780.34	781.32	780.49	780.46	780.6525	0.45	G5 minus 7 cents
D5 (with palm keys)	811.94	827.51	826.87	828.38	823.675	7.85	G#5 minus 15 cents

D#5 / Eb5 (with palm keys)	873.01	869.77	870.96	879.56	873.325	4.37	A5 minus 13 cents
E5 (with palm keys)	926.99	937.65	929.43	926.18	930.0625	5.24	A#5 minus 4 cents
F5 (with palm keys)	985.14	985.4	987.43	994.01	987.995	4.14	B5 plus 0 cents
F#5 / Gb5 (with palm keys)	1035.97	1043.18	1040.27	1049.26	1042.17	5.58	C6 minus 7 cents
G5 (with palm keys)	1093.91	1108.74	1096.14	1109.11	1101.975	8.08	C#6 minus 11 cents

Alto Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
A#4 / Bb4 - Low Octave	402.44	401.79	401.06	398.47	400.94	1.74	G4 plus 39 cents
B4 - Low Octave	438.62	435.99	435.54	437.99	437.035	1.50	A4 minus 12 cents
C5 - Low Octave	476.25	476.27	473.9	475.88	475.575	1.13	A#4 plus 35 cents
C#5 / Db5 - Low Octave	519.66	519.03	514.73	520.65	518.5175	2.61	C5 minus 16 cents
D5 (with palm keys) - Low Octave	547.13	545.22	547.64	548.09	547.02	1.26	C#5 minus 23 cents
D#5 / Eb5 (with palm keys) - Low Octave	587.95	588.63	589.66	589.05	588.8225	0.72	D5 plus 4 cents
E5 (with palm keys) - Low Octave	621.06	622.94	627.5	632.18	625.92	4.97	D#5 plus 10 cents
F5 (with palm keys) - Low Octave	667.21	664.22	665.21	664.45	665.2725	1.36	E5 plus 16 cents
F#5 / Gb5 (with palm keys) - Low Octave	700.15	710.73	704.31	710.24	706.3575	5.06	F5 plus 19 cents
D#4 / Eb4 - Mid Octave	466.59	466.65	464.69	463.01	465.235	1.74	A#4 minus 3 cents
E4 - Mid Octave	493.77	487.97	492.06	488.99	490.6975	2.69	B4 minus 11 cents
F4 - Mid Octave	528.14	525.99	529.7	528.12	527.9875	1.52	C5 plus 16 cents
F#4 / Gb4 - Mid Octave	560.85	561.29	556.86	556.52	558.88	2.54	C#5 plus 14 cents
G4 - Mid Octave	632.77	632.94	632.98	633.86	633.1375	0.49	D#5 plus 30 cents
G#4 / Ab4 - Mid Octave	675.13	681.5	683.01	675.24	678.72	4.13	E5 plus 50 cents
A4 - Mid Octave	730.25	732.26	724.36	729.32	729.0475	3.36	F#5 minus 26 cents
A#4 / Bb4 - Mid Octave	767.29	780.93	778.35	779.75	776.58	6.28	G5 minus 16 cents
B4 - Mid Octave	829.54	827.76	829.27	830.66	829.3075	1.19	G#5 minus 3 cents

C5 - Mid Octave	871.73	871.49	876.13	862.15	870.375	5.88	A5 minus 19 cents
C#5 / D $\flat$ 5 - Mid Octave	952.58	951.62	950.44	942.51	949.2875	4.60	A#5 plus 31 cents
D5 (with palm keys) - Mid Octave	1017.1	1020.09	1015.66	1022.94	1018.9475	3.24	C6 minus 46 cents
D#5 / E $\flat$ 5 (with palm keys) - Mid Octave	1078.89	1082.02	1089.15	1097.42	1086.87	8.24	C#6 minus 34 cents
E5 (with palm keys) - Mid Octave	1157.28	1165.98	1160.97	1167.53	1162.94	4.70	D6 minus 17 cents
F5 (with palm keys) - Mid Octave	1226.2	1223.29	1229.68	1232.34	1227.8775	3.96	D#6 minus 23 cents
F#5 / G $\flat$ 5 (with palm keys) - Mid Octave	1310.78	1315.21	1309.93	1322.08	1314.5	5.56	E6 minus 5 cents

Tenor Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
E4 - Mid Octave	182.47	186.43	183.43	183.28	183.9025	1.74	F#3 minus 10 cents
F4 - Mid Octave	195.56	194.58	195	195.66	195.2	0.51	G3 minus 7 cents
F#4 / G $\flat$ 4 - Mid Octave	212.56	209.39	210.57	210.39	210.7275	1.33	G#3 plus 25 cents
G4 - Mid Octave	229.54	226.46	227.47	226.61	227.52	1.42	A#3 minus 42 cents
G#4 / A $\flat$ 4 - Mid Octave	241.13	241.81	242.37	242	241.8275	0.52	B3 minus 36 cents
A4 - Mid Octave	267.26	260.64	263.57	261.82	263.3225	2.89	C4 plus 11 cents
A#4 / B $\flat$ 4 - Mid Octave	283.73	282.1	279.57	280.19	281.3975	1.89	C#4 plus 26 cents
B4 - Mid Octave	304.05	307.8	306.17	308.4	306.605	1.95	D#4 minus 25 cents
C5 - Mid Octave	331.93	333	330.91	334.02	332.465	1.34	E4 plus 15 cents
C#5 / D $\flat$ 5 - Mid Octave	360.29	358.68	360.46	357.18	359.1525	1.54	F4 plus 49 cents
D5 (with palm keys) - Mid Octave	387.56	389.09	386.75	383.47	386.7175	2.37	G4 minus 23 cents
D#5 / E $\flat$ 5 (with palm keys) - Mid Octave	414.77	416.73	416.97	419.54	417.0025	1.96	G#4 plus 7 cents
E5 (with palm keys) - Mid Octave	447.27	448.04	449.02	448.01	448.085	0.72	A4 plus 32 cents
F5 (with palm keys) - Mid Octave	476.89	481.66	489.55	480.53	482.1575	5.33	B4 minus 42 cents
F#5 / G $\flat$ 5 (with palm keys) - Mid Octave	509.68	510.12	515.03	512.55	511.845	2.47	C5 minus 38 cents
G4 - High Octave	448.03	458.27	453.55	451.21	452.765	4.31	A4 plus 50 cents

G#4 / Ab4 - High Octave	483.12	486.91	485.91	485.48	485.355	1.61	B4 minus 30 cents
A4 - High Octave	525.41	519.03	520.72	515.27	520.1075	4.21	C5 minus 10 cents
A#4 / Bb4 - High Octave	556.63	567.63	565.72	564.65	563.6575	4.84	C#5 plus 29 cents
B4 - High Octave	602.01	601.77	600.13	602.18	601.5225	0.94	D5 plus 41 cents
C5 - High Octave	X	633.8	631.65	630.41	631.9533333	1.72	D#5 plus 27 cents
C#5 / Db5 - High Octave	720.35	724.66	719.24	724.31	722.14	2.75	F#5 minus 42 cents
D5 (with palm keys) - High Octave	775.56	774.44	771.93	772.74	773.6675	1.64	G5 minus 23 cents
D#5 / Eb5 (with palm keys) - High Octave	824.44	825.33	826.2	829.73	826.425	2.32	G#5 minus 9 cents
E5 (with palm keys) - High Octave	890.88	897.76	898.29	902.43	897.34	4.79	A5 plus 34 cents
F5 (with palm keys) - High Octave	968.93	968.32	971.38	974.26	970.7225	2.70	B5 minus 30 cents
F#5 / Gb5 (with palm keys) - High Octave	1041.27	1042.13	1044.57	1041.83	1042.45	1.46	C6 minus 7 cents

Baritone Saxophone							
Fingering	Test 1 (Hz)	Test 2 (Hz)	Test 3 (Hz)	Test 4 (Hz)	Average (Hz)	St Dev (Hz)	Musical Notation
B4 - Low Octave	208.76	206.18	205.67	205.92	206.6325	1.43	G#3 minus 9 cents
C5 - Low Octave	221.7	220.88	223.59	223.99	222.54	1.49	A3 plus 20 cents
C#5 / Db5 - Low Octave	237.22	236.8	238.79	236.31	237.28	1.07	A#3 plus 31 cents
D5 (with palm keys) - Low Octave	252.19	253.15	252.16	254.84	253.085	1.26	B3 plus 43 cents
D#5 / Eb5 (with palm keys) - Low Octave	272.18	273.72	272.1	273.92	272.98	0.97	C#4 minus 26 cents
E5 (with palm keys) - Low Octave	292.49	294.17	291.2	292.2	292.515	1.23	D4 minus 7 cents
F5 (with palm keys) - Low Octave	311.79	314.24	312.69	313.29	313.0025	1.03	D#4 plus 10 cents
F#5 / Gb5 (with palm keys) - Low Octave	337.45	338.19	339.39	338.18	338.3025	0.80	E4 plus 45 cents
C5 - Mid Octave	431.73	431.16	428.9	427.54	429.8325	1.96	A4 minus 40 cents
C#5 / Db5 - Mid Octave	469.31	472.51	469.84	466.06	469.43	2.65	A#4 plus 12 cents
D5 (with palm keys) - Mid Octave	501.92	499.23	500.25	501.16	500.64	1.16	B4 plus 24 cents

D#5 / Eb5 (with palm keys) - Mid Octave	530.94	531.75	535.01	537.63	533.8325	3.08	C5 plus 35 cents
E5 (with palm keys) - Mid Octave	574.19	574.26	578.79	579.24	576.62	2.77	D5 minus 32 cents
F5 (with palm keys) - Mid Octave	608.65	611.5	613.1	611.17	611.105	1.84	D#5 minus 31 cents
F#5 / Gb5 (with palm keys) - Mid Octave	661.23	671.01	672.91	671.04	669.0475	5.29	E5 plus 26 cents
C5 - High Octave	635.43	631.9	629.46	631.98	632.1925	2.45	D#5 plus 27 cents
C#5 / Db5 - High Octave	688.4	693.95	694.96	692.48	692.4475	2.88	F5 minus 15 cents
D5 (with palm keys) - High Octave	743.2	738.14	739.37	745.88	741.6475	3.55	F#5 plus 4 cents
D#5 / Eb5 (with palm keys) - High Octave	790.86	783.07	792.1	796.26	790.5725	5.51	G5 plus 14 cents
E5 (with palm keys) - High Octave	840.19	840.58	838.92	838.92	839.6525	0.86	G#5 plus 19 cents
F5 (with palm keys) - High Octave	895.75	892.29	895.24	892.2	893.87	1.89	A5 plus 27 cents
F#5 / Gb5 (with palm keys) - High Octave	947.57	959.62	953.25	961.43	955.4675	6.33	A#5 plus 42 cents
D5 (with palm keys) - Altissimo Octave	1008.32	1005.88	1007.49	1010.15	1007.96	1.78	B5 plus 35 cents
D#5 / Eb5 (with palm keys) - Altissimo Octave	1059.27	1063.31	1068.6	1059.56	1062.685	4.35	C6 plus 27 cents

Repertoire

The following repertoire list includes pieces that use SWMP in any form. It includes the name of the composition, typical composer information, the year(s) of composition, instrumentation, publisher (if relevant), and for whom the work was written (if known). Additionally, on the website, further information concerning which SWMP techniques are featured in the work, a link to purchase or download the work (if available), and a link to the composers' website are included. Where applicable, I have included a link to a video or audio performance of the work, either by me or by other artists.

The repertoire list below has been updated as of October 2024. For a complete version of this list, please refer to the following webpage: <https://www.saxwithoutmouthpiece.com/repertoire/>

Repertoire for Saxophone Without Mouthpiece (updated October 2024)						
Last Name	First Name	Title of Composition	Year	Instrumentation	Publisher	Written For?
Alonso	Germán	<i>el gran cabrón</i>	2012	Baritone Sax + Electronics	BabelScores	Patrick Stadler
Alonso	Germán	<i>In Heaven Everything is Fine</i>	2011	Sax Quartet	BabelScores	
Aperghis	Georges	<i>Crosswind</i>	1997	Sax Quartet + Viola	Durand	XASAX
Aperghis	Georges	<i>Trio Funambule</i>	2014	Alto Sax + Piano + Percussion	Composer	
Arias	Helga	<i>Milk spilt on a stone</i>	2017	Sax Quartet	BabelScores	Sigma Project
Arroyo	Juan	<i>SAMA</i>	2013	Sax + Flute + Percussion + Piano + Electronics	Tempéraments	Proxima Centauri
Arroyo	Juan	<i>SélioX</i>	2018	Baritone Saxophone + Cello	Tempéraments	Carl-Emmanuel Fisbach
Arroyo	Juan	<i>Sikuri I</i>	2012	Tenor Sax + Electronics	Tempéraments	Hiroe Yasui
Arroyo	Juan	<i>Sikuri II</i>	2023	Sax + Percussion + Electronics	Tempéraments	Marie-Bernadette Charrier
Arroyo	Juan	<i>Sikuri IV</i>	2013	Sax Quartet + Electronics	Tempéraments	
Arroyo	Juan	<i>Sikuri X</i>	2015	Sax Ensemble (10)	Tempéraments	
Arroyo	Juan	<i>Sismo</i>	2014	Baritone Sax + Accordion + Piano + Violin + Cello + Electronics	Tempéraments	Ensemble l'itinéraire
Azguime	Miguel	<i>Mes ententes pour quatre personnages</i>	2012	Sax Quartet	Portuguese Music Research & Information Centre	Quasar
Bacon	Alexis	<i>Ôtzi</i>	2017	Tenor Sax + Electronics	Caramuru Music	Wilson Poffenberger
Bång	Malin	<i>delta waves</i>	2007	Tenor Sax	Composer	Jörgen Peterson

Besingrand	Jean-Patrick	23		2019	Sax Sextet	Composer	Nitchan Pitayathorn
Besingrand	Jean-Patrick	<i>Brouillard d'hiver</i>		2019	Tenor Sax	Composer	Erin Rogers
Besingrand	Jean-Patrick	<i>Cinq regards sur l'horizon</i>		2014	Tenor Sax	Composer	Christopher De Louis
Besingrand	Jean-Patrick	<i>Derive en rouge</i>		2012	Sax Ensemble	Composer	
Besingrand	Jean-Patrick	<i>Des papillons...muets aussi</i>		2019	Sopranino Sax	Composer	Marie Kikuchi
Besingrand	Jean-Patrick	<i>Désirs inassouvis</i>		2018	Sax Duo	Composer	Nitchan Pitayathorn
Besingrand	Jean-Patrick	<i>Instantanés Éphémères</i>		2014	Sax Quartet	BabelScores	SaxOpen
Besingrand	Jean-Patrick	<i>Konohana</i>		2017	Ensemble (sax in ensemble)	Composer	
Besingrand	Jean-Patrick	<i>La lutte pour la lumière</i>		2019	Baritone Sax + Electronics	Composer	Pisol Manatchinapisit
Besingrand	Jean-Patrick	<i>Réminiscence</i>		2017	Sax + Piano + Percussion	Composer	Contemporaneous
Besingrand	Jean-Patrick	<i>Sous les cheveux, la rage</i>		2021	Soprano Sax	Composer	Gerald Preinfalk
Besingrand	Jean-Patrick	<i>Un rêve éveillé</i>		2015	Sax Quartet	Composer	Quatuor Avena
Black	Annesley	<i>Miniature</i>		2005	Sax Quartet	Juliane Klein	Con Calore Quartet
Cano Valiño	Rocío	<i>Antanákasi II</i>		2019	Bass Sax + Electronics	Composer	
Carloséma	Bernard	<i>Clepsydra</i>		1998	Bass, Tenor, & Soprano Sax + Electronics	Fuzeau	Jean-Michel Goury
Cella	Carmine-Emanuele	<i>Improvviso Statico II</i>		2014	Tenor Sax + Electronics	Suvini Zerboni	Mario Marzi
Corajod	Mathieu	<i>Axes</i>		2021	Soprano Sax + Flute	BabelScores	Duo Alto
Corajod	Mathieu	<i>Critical Control Points</i>		2020	Alto Sax + Piano + Percussion + E. Guitar	BabelScores	
Corajod	Mathieu	<i>Subspheres</i>		2021	Sax Duo	BabelScores	Duo Eventuell
Czernowin	Chaya	<i>Irrational</i>		2022	Sax Quartet	Schott	Ensemble du Bout du Monde
Dempster	Thomas	<i>the bunyip</i>		2014	Alto Sax + Electronics	Composer	
Dimou	Stylianios	<i>~Drops~</i>		2017	Sax Quartet	Composer	Quartet Iberosudamericano
Dimou	Stylianios	<i>Machine Learning</i>		2018	Baritone Sax + Electronics	Composer	Fred Lerdahl
Dimou	Stylianios	<i>sur les traces de la fissure</i>		2018	Baritone Sax + Violin + Percussion + Accordion	Composer	
Eckardt	Jason	<i>a fractured silence</i>		2004	Sax Quartet	Composer	PRISM Quartet
Fallahzadeh	Sina	<i>Nafir</i>		2016	Baritone Sax + Electronics	Composer	

Frigon	Michel	Geyser Ghetto	2005	Sax Quartet	Unpublished	Quasar
Gabriele	Claudio	<i>Arriflex 35</i>	2010	Tenor Sax + Electronics	Composer	Jeffrey Vickers
Gabriele	Claudio	<i>NEUMA 31</i>	2012	Sax	Composer	Denis Schaffer
Gabriele	Claudio	<i>SHIFT SHAF</i>	2009	Sax Quartet	Composer	
Geiss	Philippe	<i>Calderosaxo</i>	2012	Sax Ensemble	Composer	Jean Michel-Goury
Gimenez-Comas	Nuria	<i>Clarière quan même</i>	2024	Sax + Soprano Voice + Flute + Percussion + Piano + Electronics	Unpublished	Proxima Centauri
Girard-Charest	Émilie	<i>Bestiaire</i>	2017	Sax Quartet	Unpublished	Quasar
Grafe	Max	<i>Anemol Dances</i>	2020	Alto Sax + Bb Clarinet	American Composers Alliance	Duo Entre-Nous
Hamel	André	<i>À huit</i>	2001	Sax Octet	Unpublished	Quasar
Havel	Christophe	<i>Analog 21•12</i>	2021	Ensemble	Composer	
Havel	Christophe	<i>Eden</i>	2021	Ensemble	Composer	
Havran	Thomas	<i>Overcaffinated</i>	2021	Tenor Sax	Composer	Noa Even
Heyn	Volker	<i>Buon natale, fratello Fritz</i>	1985	Soprano + Tenor Sax	Breitkopf & Härtel	Daniel Kientzy
Hoffmann	Robin	<i>Der blutige Schaffner</i>	1996	Sax Quartet	P. J. Tonger	Ensemble Atmosphere
Ibarra	Victor	<i>Grande Équerre: ensayo sobre la negación</i>	2014	Sax Quartet	Composer	Sigma Project
Ibarra	Víctor	<i>Homenaje a Francisco Toledo</i>	2014	Sax + Ensemble	Composer	
Ibarra	Víctor	<i>Insight</i>	2023	Baritone Sax	Composer	Pablo Coello
Iberg	Helge	<i>Ut å stjæle hester</i>	2016	Tenor Sax + Viola + Piano	Composer	Trio Brax
Kasprzyk	Cory	<i>Split Tree (Wintergarden)</i>	2014	Sax Ensemble + Electronics	Composer	
Katzer	Georg	<i>Dialog Imaginär 6</i>	1995	Tenor Sax + Electronics	Verlag	Johannes Ernst
Krämer	Reiner	<i>Stück</i>	2016	Sax + Flute + Electronics	Composer	Jeffrey Kyle Hutchins
Lauba	Christian	<i>Les Sept Iles</i>	1988	Sax Ensemble + Piano	Composer	Jean-Marie Londeix
Lazkano	Ramon	<i>Jalkin</i>	2012	Sax Quartet	Chant du Monde	Sigma Project
Lee	Junghae	<i>Kyol</i>	2017	Saxophone Ensemble	Composer	Zurich Saxophone Collective
Lemay	Robert	<i>La rédemption...hommage à Martin Scorsese</i>	1994	Sax Quartet + 2 Percussion	Canadian Music Centre	
Lemay	Robert	<i>No Limits</i>	2003	Contrabass Sax	Canadian Music Centre	Serge Bertocchi

Lemay	Robert	Noirs	2023	Tenor Sax +Soprano Sax (1 player) + String Quartet	Note en Bulle	Don-Paul Kahl
Lemay	Robert	<i>Red Shift/Blue Shift</i>	2012	Baritone Sax + Cello	Note en Bulle	
Lemay	Robert	<i>Shadows of Bamian</i>	2001-2002	Sax Quartet	Canadian Music Centre	
Lemay	Robert	<i>Solitude Oubliée</i>	1995	Tenor Sax	Doberman-Yppan	
Lemay	Robert	<i>Triptyque écarlate</i>	1991	Saxophone + Harp + Percussion	Canadian Music Centre	Daniel Gauthier
Lemay	Robert	<i>Un ciel variable pour demain</i>	2003-2004	Sax Quartet	Canadian Music Centre	
Leroux	Philippe	<i>L'Unique trait de Pinceau</i>	2008	Soprano and Baritone Sax (one player) + Orchestra	Billaudot	Claude Delangle
Lillios	Elainie	<i>Veiled Resonance</i>	2008	Soprano Sax + Electronics	Composer	Steve Duke
Litwin	Nahuel	<i>The Reconstruction of Ouisconsin</i>	2022	Sax + Soprano Voice + Flute + Percussion + Piano + Electronics	Composer	Proxima Centauri
López-López	José Manuel	<i>Simog/Civitella</i>	2011	Sax Quartet	Lemoine	Sigma Project
Luc	María Eugenia	<i>Air Mirrors</i>	2018	Tenor Sax + Bb Clarinet	Composer	Duo Entre-Nous
Luc	María Eugenia	<i>YUN</i>	2012	Sax Quartet	Composer	Sigma Project
Luc	María Eugenia	<i>Zeruan</i>	2020	Sax Quartet	Composer	Ensemble du Bout du Monde
Makan	Keeril	<i>Voice Within Voice</i>	2005	Baritone Sax	PSNY	Brian Sacawa
Manotskov	Alexander	<i>Seven Portraits</i>	2011	Alto Sax + Orchestra	Donemus	Ola Asdahl Rokkones
Martínez Hernández	Diego Alonso	<i>Soliloquio</i>	2022	Sax Duo	Composer	
Matitia	Jean	<i>Las Américas: I Samba do Diabo</i>	2019	Sax Ensemble	Composer	Jean-Marie Londeix
Miereanu	Costin	<i>DO-MI-SI-LA-DO-RE</i>	1980-1981	Saxophone + Electronics	Salabert	Daniel Kientzy
Minakakis	Stratis	<i>For Felipe M.</i>	2021	Baritone Sax	Composer	Don-Paul Kahl
Minakakis	Stratis	<i>Thalassografia A</i>	2018	Sax Quartet	Composer	Ensemble du Bout du Monde
Momi	Marco	<i>Cinque Nudi</i>	2012	Tenor Sax + Stomp Boxes	Zerboni	David Brutti
Moore	Ted	<i>Hollow</i>	2018	Alto Sax + Electronics	Composer	Kyle Hutchins
Musikantow	Joshua	<i>Ashera</i>	2019	Sax Trio	Composer	Acute Trio
Nešić	Snežana	<i>Quatre graffitis pour le début du temps</i>	2022	Sax Quartet	Unpublished	Quasar
Núñez	Nuria	<i>Fake (f)or real</i>	2014	Sax Quartet	Composer	Sax Quartet

Oliveiro	Mark	Bone - Crest - Frequency	2018	Sax Quartet	Composer	Nexas Quartet
Oliver	Joan Jordi	<i>Breath</i>	2017	Alto Sax + Electronics	Composer	Joan Jordi Oliver
Pape	Gérard	<i>Makbenach I, III (solo)</i>	1996	Baritone & Alto Sax + Orchestra + Electronics	Composer	Daniel Kientzy
Parra	Hèctor	<i>Sigma-Waves</i>	2015	Sax Quartet	Composer	Sigma Project
Pettersen	Agnes Ida	<i>KPUN</i>	2022	Tenor Sax + Mixed Ensemble (2 Musicians) + Tape	Composer	Zwei-Mann-Orchester
Pont Anglada	Bernat	<i>How to Bread</i>	2022	Sax + Flute + Percussion + Piano + Electronics		Proxima Centauri
Posadas	Alberto	<i>Senderos que se bifurcan</i>	2017	Sax Quartet	Durand	Sigma Project
Ralli	Eleni	<i>Go Within</i>	2020	Tenor Sax + Embedded Speaker	Composer	Don-Paul Kahl
Risset	Jean Claude	<i>Voilements</i>	1987	Tenor Sax + Electronics	Salabert	Daniel Kientzy
Roald	Helge	<i>UT OG STJÆLE HESTER</i>	2015	Tenor Sax + Viola + Piano	Composer	Trio Brax
Rokkones	Ola Asdahl	<i>Jeg lagde meg så silde</i>	2016	Alto Sax	Composer	Ola Asdahl Rokkones
Rolin	Etienne	<i>Partita Polyfolia</i>	1995	Tenor Sax	Robert Martin	
Rotella	Didier	<i>Mogari</i>	2021	Sax + Flute + Percussion + Piano + Electronics	Composer	Proxima Centauri
Rua	Vitor	<i>Saxopera II</i>	2001	Tenor Sax + Electronics	Portugese Music Research & Information Centre	
Rubbert	Rainer	<i>Vision (Urban Music II)</i>	1993	Bass or Baritone Sax	Verlag	Johannes Ernst
Rudel Rey	Demian	<i>Parálaksis</i>	2022	Sax + Flute + Percussion + Piano + Video + Electronics	Unpublished	Proxima Centauri
Sánchez-Verdú	José M.	<i>Khôra I</i>	2013	Sax Quartet	Breitkopf	Sigma Project
Sánchez-Verdú	José M.	<i>Khôra II</i>	2014	Sax Quartet	Breitkopf	Sigma Project
Shi	Pei Yu	<i>Gedicht vom wind des herbstes</i>	2007	Sax + Piano + Percussion + Electronics	Unpublished	
Skoglund	Lars	<i>Scener fra et nabolag</i>	2015	Tenor Sax + Mixed Ensemble (2 Musicians) + Tape	Composer	Zwei-Mann-Orchester
Stifjell	Erik	<i>Zwei-Mann Orchester</i>	2015	Tenor Sax + Mixed Ensemble (2 Musicians) + Tape	Composer	Zwei-Mann-Orchester
Stifjell	Erik	<i>Alo</i>	2018	Tenor Sax (also Baritone Sax) + Sinfonietta	Composer	Ola Asdahl Rokkones
Tarrés	Ariadna Alsina	<i>flickering sparks in connecting tunnels</i>	2022	Sax Quartet + Electronics	Composer	IBSUD
Tarrés	Ariadna Alsina	<i>Les Rêves Circulaires</i>	2018	Alto Sax + Electronics	BabelScores	Nahikari Oloriz
Teruggi	Daniel	<i>Xatys I</i>	1988	Sax + Electronics	Unpublished	Daniel Kientzy
Teruggi	Daniel	<i>Xatys III</i>	1988	Sax + Electronics	Unpublished	Daniel Kientzy
Tidrow	Thierry	<i>Entre Nous</i>	2022	Musical Theater	Unpublished	Quasar
Torres Maldonado	Javier	<i>Huayra Yana</i>	2019	Baritone Sax + Electronics	Zerboni	Stéphane Sordet
Torres Maldonado	Javier	<i>MASIH</i>	2012-2013	Sax Quartet	Zerboni	Sigma Project

Torstensson	Klas	<i>Solo</i>	1988	Bass Sax	Muziekgroup Nederland	
Tzortzis	Nicolas	<i>Member</i>	2020	Solo Baritone Sax	Composer	Don-Paul Kahl
Vaggione	Horacio	<i>Thema</i>	1985	Bass Sax + Electronics	Salabert	Daniel Kientzy
Wanamaker	Gregory	<i>Without</i>	2019	Sax Quartet	Composer	Ensemble du Bout du Monde
Williams	Amy	<i>Child's Play</i>	2014	Sop Sax + Percussion	Composer	Bent Frequency
Young	Bethany	<i>I'll Bleed Your Lines</i>	2020	Ensemble	Composer	113 Composers Collective

Interviews

The interviews listed below offer valuable insights into the practices of composers who have incorporated SWMP techniques into their work. Although these discussions were largely informal, they aimed to explore the composers' specific works, their broader practices, and their general perspectives on SWMP techniques. Among others, the questions cover topics such as notation, challenges encountered by performers, and the future potential of these techniques.

Several of these interviews, conducted in 2017 before the widespread use of Zoom, are of low quality and are audio-only recordings. Despite these limitations, they provide enlightening discussions that reveal the composers' thoughts and approaches.

Additionally, I conducted an interview with Gail B. Levinsky, a saxophonist and researcher, focusing on early saxophone methods from the 1920s and 1930s. This conversation provides a historical context that complements the more contemporary discussions with the composers.

Eleni Ralli - 20 August 2024:

<https://youtu.be/Mq4W04Xfdqw?si=Pe7QKFyKJDmauUEU>

Stylianos Dimou - 19 August 2024:

<https://youtu.be/goRFoXap-fM?si=9PPSbrIeSrIobjLs>

Jean-Patrick Besingrand - 1 December 2023:

https://youtu.be/kVLTUopIdI8?si=s_u8DkdIFKFiHKBg

Robert Lemay - 15 November 2023:

https://youtu.be/8k3jNXSnY4s?si=Y76sDpFuFe0xGK_o

Javier Torres Maldonado - 13 December 2023:

<https://youtu.be/00WIesLY-30?si=gLlpSVpctoqLR474>

Juan Arroyo - 3 November 2017:

<https://youtu.be/wUJzyAoSU8c?si=ByJYUQSV4FINAkIC>

Robin Hoffmann - 5 November 2017:

<https://youtu.be/7ydsaZKRMCM?si=D2kioeLZ8-Qdn6AJ>

Gail B. Levinsky - 23 August 2024:

https://youtu.be/Kfwq1GHeZbg?si=tiNzUgj_RnR089oF