Musical Instrument Range Reference Tables

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This is a compact engineering reference. Values are approximate and refer to normal playing of common instruments at sounding pitch. Frequencies for pitched sources are fundamentals; for unpitched percussion they are dominant resonant or spectral bands. Noise frequencies mean prominent nonpitched energy such as breath, bow, pick, reed, mechanism, impact, or scrape.

Pitch conversions use A4 = 440 Hz. Published acoustic ranges and attack data are anchored to NIST, DPA, Philharmonia, and Yamaha references; unlisted values are informed engineering estimates. Dynamic range means typical usable musical span, not maximum Sound Pressure Levels.

Vocals

Source	Note	Frequency	Noise frequencies	Dynamic	Attack
Male speech	E2 to C4	82 Hz to 262 Hz	Aspiration and fricatives, 1.5 kHz to 10 kHz	25 dB to 45 dB	5 ms to 40 ms
Female speech	A2 to G4	110 Hz to 392 Hz	Aspiration and fricatives, 2 kHz to 12 kHz	25 dB to 45 dB	5 ms to 40 ms
Bass	E2 to E4	82 Hz to 330 Hz	Breath and fricatives, 0.8 kHz to 8 kHz	35 dB to 55 dB	20 ms to 120 ms
Tenor	C3 to C5	131 Hz to 523 Hz	Breath and fricatives, 1 kHz to 10 kHz	35 dB to 60 dB	15 ms to 100 ms
Baritone	G2 to G4	98 Hz to 392 Hz	Breath and fricatives, 1 kHz to 9 kHz	35 dB to 60 dB	20 ms to 110 ms
Alto	F3 to F5	175 Hz to 698 Hz	Breath and fricatives, 1.5 kHz to 11 kHz	35 dB to 60 dB	15 ms to 100 ms
Soprano	C4 to C6	262 Hz to 1,047 Hz	Breath and sibilance, 2 kHz to 14 kHz	35 dB to 65 dB	10 ms to 90 ms
Mezzo soprano	A3 to A5	220 Hz to 880 Hz	Breath and sibilance, 1.5 kHz to 12 kHz	35 dB to 65 dB	15 ms to 100 ms

Male conversational speech commonly centers near 93 Hz to 135 Hz, while female conversational speech commonly centers near 162 Hz to 238 Hz.

String Instruments

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Acoustic guitar	E2 to C6	82 Hz to 1,047 Hz	Pick and finger noise, 1.5 kHz to 8 kHz; fret squeak, 3 kHz to 10 kHz	35 dB to 50 dB	5 ms to 60 ms
Baritone guitar	B1 to E5	62 Hz to 659 Hz	Pick, finger, and fret noise, 1.5 kHz to 8 kHz	35 dB to 50 dB	8 ms to 60 ms
Electric guitar	E2 to E6	82 Hz to 1,319 Hz	Pick and fret noise, 2 kHz to 10 kHz; amplifier hiss, 4 kHz to 12 kHz	40 dB to 65 dB	2 ms to 20 ms
Bass guitar	E1 to G4	41 Hz to 392 Hz	Finger, pick, and fret noise, 0.8 kHz to 8 kHz	35 dB to 55 dB	8 ms to 60 ms
Banjo	G3 to D6	196 Hz to 1,175 Hz	Pick and finger noise, 2 kHz to 10 kHz	30 dB to 45 dB	2 ms to 15 ms
Dobro or resonator guitar	E2 to C6	82 Hz to 1,047 Hz	Pick and slide noise, 1 kHz to 10 kHz	35 dB to 50 dB	3 ms to 25 ms
Mandolin	G3 to E7	196 Hz to 2,637 Hz	Pick and fret noise, 2 kHz to 10 kHz	30 dB to 45 dB	2 ms to 15 ms
Viola	C3 to A6	131 Hz to 1,760 Hz	Bow noise, 1 kHz to 8 kHz; finger noise, 2 kHz to 6 kHz	30 dB to 40 dB	20 ms to 80 ms
Violin	G3 to G7	196 Hz to 3,136 Hz	Bow noise, 1 kHz to 10 kHz; finger noise, 2 kHz to 8 kHz	30 dB to 45 dB	5 ms to 50 ms
Cello	C2 to C6	65 Hz to 1,047 Hz	Bow noise, 0.8 kHz to 6 kHz; finger noise, 2 kHz to 5 kHz	35 dB to 50 dB	5 ms to 80 ms
Contrabass	C1 to G4	33 Hz to 392 Hz	Bow noise, 0.5 kHz to 5 kHz; finger noise, 1.5 kHz to 5 kHz	35 dB to 50 dB	20 ms to 450 ms
Hammered dulcimer	D3 to D6	147 Hz to 1,175 Hz	Hammer impact, 1 kHz to 8 kHz	35 dB to 50 dB	2 ms to 12 ms
Autoharp	C2 to A5	65 Hz to 880 Hz	Pick and string release, 1 kHz to 8 kHz	30 dB to 45 dB	5 ms to 30 ms
Orchestral harp	C1 to G7	33 Hz to 3,136 Hz	Finger release and string scrape, 1 kHz to 8 kHz; pedal noise, 100 Hz to 1 kHz	40 dB to 55 dB	5 ms to 40 ms

Keyboards

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Upright piano	A0 to C8	28 Hz to 4,186 Hz	Hammer and felt, 1 kHz to 8 kHz; action and pedal, 100 Hz to 5 kHz	45 dB to 65 dB	2 ms to 15 ms
Baby grand piano	A0 to C8	28 Hz to 4,186 Hz	Hammer and felt, 1 kHz to 8 kHz; pedal and mechanism, 100 Hz to 5 kHz	50 dB to 70 dB	2 ms to 12 ms
Grand piano	A0 to C8	28 Hz to 4,186 Hz	Hammer and felt, 1 kHz to 8 kHz; pedal and mechanism, 100 Hz to 5 kHz	50 dB to 70 dB	2 ms to 12 ms
Harpsichord	F1 to F6	44 Hz to 1,397 Hz	Plectrum and key mechanism, 1 kHz to 8 kHz	15 dB to 25 dB	1 ms to 8 ms
Rhodes electric piano	E1 to E7	41 Hz to 2,637 Hz	Tine and key noise, 1 kHz to 6 kHz; amplifier hiss, 4 kHz to 12 kHz	35 dB to 55 dB	5 ms to 30 ms
Electronic organ	C2 to C7	65 Hz to 2,093 Hz	Key clicks, 1 kHz to 5 kHz; blower and rotary noise, 20 Hz to 300 Hz	25 dB to 45 dB	3 ms to 80 ms
Cathedral organ	C1 to C8	33 Hz to 4,186 Hz	Blower noise, 20 Hz to 120 Hz; valves and wind, 1 kHz to 8 kHz	50 dB to 80 dB	20 ms to 300 ms
Synthesizer	C2 to C7 typical keyboard	65 Hz to 2,093 Hz; engine may cover 20 Hz to 20 kHz	Noise oscillator and circuit noise, 20 Hz to 20 kHz	90 dB to 120 dB	0.1 ms to 1,000 ms
Electronic keyboard	C2 to C7	65 Hz to 2,093 Hz	Key, speaker, and circuit noise, 2 kHz to 12 kHz	70 dB to 100 dB	1 ms to 30 ms
Calliope	C3 to C7	131 Hz to 2,093 Hz	Steam and valve noise, 1 kHz to 10 kHz	50 dB to 75 dB	10 ms to 50 ms

A modern 88 key piano spans A0 to C8, or approximately 28 Hz to 4,186 Hz.

Brass

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Tuba	E ♭ 1 to G4	39 Hz to 392 Hz	Breath and valve noise, 0.8 kHz to 5 kHz	40 dB to 60 dB	20 ms to 80 ms
Sousaphone	B ♭ 0 to F4	29 Hz to 349 Hz	Breath and valve noise, 0.8 kHz to 5 kHz	45 dB to 65 dB	20 ms to 80 ms
French horn	B1 to F5	62 Hz to 698 Hz	Breath, hand, and valve noise, 1 kHz to 8 kHz	35 dB to 60 dB	20 ms to 80 ms
Trombone	E2 to C5	82 Hz to 523 Hz	Breath and slide noise, 1 kHz to 8 kHz	40 dB to 65 dB	20 ms to 50 ms
Trumpet	E3 to D6	165 Hz to 1,175 Hz	Breath, lip, and valve noise, 1 kHz to 12 kHz	40 dB to 65 dB	10 ms to 40 ms
Euphonium	B ♭ 1 to B ♭ 4	58 Hz to 466 Hz	Breath and valve noise, 0.8 kHz to 6 kHz	40 dB to 60 dB	20 ms to 60 ms
Cornet	E3 to C6	165 Hz to 1,047 Hz	Breath, lip, and valve noise, 1 kHz to 10 kHz	40 dB to 60 dB	15 ms to 40 ms
Bugle	B ♭ 3 to B ♭ 5	233 Hz to 932 Hz	Breath and lip noise, 1 kHz to 8 kHz	35 dB to 55 dB	20 ms to 50 ms

Woodwinds

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Tenor saxophone	A ♭ 2 to E ♭ 5	104 Hz to 622 Hz	Reed and breath noise, 1 kHz to 10 kHz	25 dB to 50 dB	20 ms to 60 ms
Alto saxophone	D ♭ 3 to A ♭ 5	139 Hz to 831 Hz	Reed and breath noise, 1 kHz to 10 kHz	30 dB to 55 dB	20 ms to 60 ms
Soprano saxophone	A ♭ 3 to E ♭ 6	208 Hz to 1,245 Hz	Reed and breath noise, 1.5 kHz to 12 kHz	30 dB to 55 dB	20 ms to 60 ms
Clarinet	D3 to C7	147 Hz to 2,093 Hz	Breath and key noise, 1 kHz to 8 kHz	40 dB to 60 dB	20 ms to 60 ms
Western concert flute	B3 to D7	247 Hz to 2,349 Hz	Air and key noise, 2 kHz to 12 kHz	30 dB to 50 dB	20 ms to 180 ms
Piccolo	D5 to C8	587 Hz to 4,186 Hz	Air and key noise, 3 kHz to 16 kHz	30 dB to 55 dB	20 ms to 60 ms
Bassoon	B ♭ 1 to E5	58 Hz to 659 Hz	Reed, breath, and key noise, 0.8 kHz to 6 kHz	30 dB to 50 dB	20 ms to 120 ms
Oboe	C4 to A6	262 Hz to 1,760 Hz	Reed and breath noise, 1 kHz to 10 kHz	25 dB to 50 dB	20 ms to 120 ms
Baroque recorder, alto in F	F4 to G6	349 Hz to 1,568 Hz	Breath and fipple noise, 2 kHz to 10 kHz	20 dB to 35 dB	15 ms to 80 ms

Drums and Percussion: Drums and Cymbals

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Timpani	C2 to A3	65 Hz to 220 Hz	Mallet impact, 1 kHz to 5 kHz; pedal noise, 100 Hz to 1 kHz	40 dB to 65 dB	10 ms to 18 ms
Kick drum	Unpitched; nominal E1 to C3	40 Hz to 400 Hz	Beater click, 1 kHz to 6 kHz	60 dB to 80 dB	8 ms to 20 ms
Tom tom	Unpitched; nominal C2 to C5	65 Hz to 523 Hz	Stick and rim impact, 1 kHz to 8 kHz	50 dB to 75 dB	5 ms to 15 ms
Snare	Unpitched; shell modes G2 to D4	80 Hz to 4 kHz	Wire rattle and impact, 1.5 kHz to 12 kHz	55 dB to 80 dB	2 ms to 8 ms
High hat	Unpitched	300 Hz to 16 kHz	Metal wash, 1 kHz to 18 kHz	50 dB to 75 dB	1 ms to 4 ms
Cymbals	Unpitched	100 Hz to 18 kHz	Metal wash, 1 kHz to 18 kHz	50 dB to 80 dB	2 ms to 5 ms
Crash	Unpitched	100 Hz to 18 kHz	Metal wash, 1 kHz to 18 kHz	55 dB to 85 dB	1 ms to 4 ms
Ride	Unpitched	100 Hz to 16 kHz	Metal wash, 1 kHz to 16 kHz	45 dB to 75 dB	1 ms to 5 ms
China cymbal	Unpitched	100 Hz to 18 kHz	Metal wash, 1 kHz to 18 kHz	55 dB to 85 dB	1 ms to 4 ms
Splash cymbal	Unpitched	300 Hz to 18 kHz	Metal wash, 2 kHz to 18 kHz	45 dB to 75 dB	0.5 ms to 2 ms
Cowbell	Unpitched; modes near C4 to G5	250 Hz to 8 kHz	Strike and metallic ring, 1 kHz to 8 kHz	45 dB to 70 dB	1 ms to 4 ms
Vibraslap	Unpitched	100 Hz to 8 kHz	Rattle and impact, 1 kHz to 10 kHz	35 dB to 55 dB	2 ms to 10 ms
Tambourine	Unpitched; head modes G3 to D5	200 Hz to 12 kHz	Jingles and slap, 2 kHz to 15 kHz	45 dB to 75 dB	1 ms to 6 ms

Drums and Percussion: Hand Percussion and Mallet Instruments

Instrument	Note range	Frequency range	Noise frequencies	Dynamic range	Attack
Bongos	Unpitched; nominal G2 to D4	100 Hz to 8 kHz	Slap and finger impact, 1 kHz to 10 kHz	45 dB to 70 dB	2 ms to 8 ms
Guiro	Unpitched	200 Hz to 8 kHz	Scrape noise, 1 kHz to 10 kHz	35 dB to 60 dB	5 ms to 20 ms
Castanets	Unpitched	1 kHz to 4 kHz	Click and wood impact, 2 kHz to 12 kHz	45 dB to 70 dB	0.5 ms to 2 ms
Djembe	Unpitched; bass tone E2 to A3	80 Hz to 10 kHz	Slap and finger impact, 1.5 kHz to 12 kHz	50 dB to 80 dB	2 ms to 10 ms
Conga drums	Unpitched; bass tone C2 to C4	80 Hz to 8 kHz	Slap and finger impact, 1 kHz to 10 kHz	45 dB to 75 dB	3 ms to 15 ms
Maracas	Unpitched	150 Hz to 12 kHz	Seed burst, 1 kHz to 12 kHz	30 dB to 55 dB	1 ms to 10 ms
Cajon	Unpitched; bass tone F1 to C4	50 Hz to 10 kHz	Slap and panel impact, 1 kHz to 12 kHz	45 dB to 75 dB	3 ms to 15 ms
Glockenspiel	C6 to C8	1,047 Hz to 4,186 Hz	Mallet impact, 4 kHz to 16 kHz	35 dB to 60 dB	1 ms to 4 ms
Hand bells	C4 to C7	262 Hz to 2,093 Hz	Clapper and strike noise, 2 kHz to 12 kHz	35 dB to 60 dB	3 ms to 10 ms
Orchestral bells	F5 to C8	698 Hz to 4,186 Hz	Mallet impact, 3 kHz to 15 kHz	40 dB to 65 dB	2 ms to 6 ms
Marimba	C2 to C7	65 Hz to 2,093 Hz	Mallet impact, 1 kHz to 8 kHz	35 dB to 65 dB	3 ms to 12 ms
Vibraphone	F3 to F6	175 Hz to 1,397 Hz	Mallet impact, 1 kHz to 6 kHz; motor near 60 Hz	30 dB to 55 dB	5 ms to 20 ms
Xylophone	F4 to C8	349 Hz to 4,186 Hz	Mallet impact, 2 kHz to 12 kHz	40 dB to 70 dB	2 ms to 6 ms
Kalimba	C4 to E6	262 Hz to 1,319 Hz	Pluck and tine noise, 2 kHz to 10 kHz	25 dB to 45 dB	2 ms to 8 ms

The attack figures are best treated as practical rise time estimates. DPA's published values illustrate the scale: violin approximately 5 ms to 30 ms, winds approximately 20 ms to 60 ms, timpani approximately 10 ms to 18 ms, kick drum approximately 8 ms to 12 ms, and cymbals approximately 2 ms to 4 ms.