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Computer codes for phonetic symbols

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The process of assigning computer codes to phonetic symbols began when the 1989 Kiel Convention of the International Phonetic Association was called to revise the Association's alphabet. The Workgroup on Computer Coding formed at that time had the task of determining how to represent the IPA alphabet numerically, and of developing a set of numbers referring to IPA symbols unambiguously. This involved assembling phoneticians who work with computer representations of phonetic symbols, and communicating with specialists in computer coding to gauge the fit between the phonetician's perspective on symbol usage and the non-phonetician's understanding of how to identify and use phonetic symbols. Prior to Kiel, a collection of practical approaches to coded representations was outlined in *JIPA* (Esling 1988), which dealt mainly with keyboard assignments of characters.

At Kiel, after reviewing several submissions on current practice, the Workgroup concluded that each symbol used by the IPA should be assigned a unique, three-digit number known as its IPA Number. IPA Numbers were assigned in linear order following the new IPA Chart which resulted from the deliberations at Kiel (IPA 1989a). IPA Numbers were not only created for approved consonant, vowel, diacritic and suprasegmental symbols, but also for symbols often referred to in IPA deliberations or implied by IPA convention but which do not appear explicitly on the IPA Chart.

The conclusions and recommendations reached by the Workgroup at Kiel appeared in *JIPA* (IPA 1989b), followed by a supplementary report with an initial listing of IPA Numbers by symbol and symbol name (Esling 1990). There were several recommendations, including the use of two levels of transcription when entering coded phonetic values to accompany data, but what is most important to point out about the process of associating each possible character with a discrete numerical entity is its comprehensive nature. No symbols could be ignored, and the application of diacritics had to be made explicit. The result is that the list of IPA Numbers includes more characters than are specified on the IPA Chart alone. Thus, in addition to the IPA Chart, an IPA Number Chart was also established to show the equivalent Number for each symbol; and a comprehensive list was drawn up that includes symbols cited by the IPA since 1949, as well as some nonIPA symbols, cross-referenced to their equivalent Numbers.

The reason for the comprehensive inclusion of all symbols is to anticipate the possibility that some symbols may be withdrawn while other symbols may be reintroduced into current usage; and a numerical listing of character shapes and types must be comprehensive enough to support slight revisions in symbol specification or diacritic placement as well as to be available to a wide spectrum of phonetic users of

Table 1. IPA Number Chart (revised to 1993)

THE INTERNATIONAL PHONETIC ALPHABET (revised to 1993)   **NUMBER CHART**

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	101 102			103 104		105 106	107 108	109 110	111 112		113
Nasal		114	115	116		117	118	119	120		
Trill		121		122					123		
Tap or Flap				124		125					
Fricative	126 127	128 129	130 131	132 133	134 135	136 137	138 139	140 141	142 143	144 145	146 147
Lateral fricative				148 149							
Approximant		150		151		152	153	154			
Lateral approximant				155		156	157	158			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.
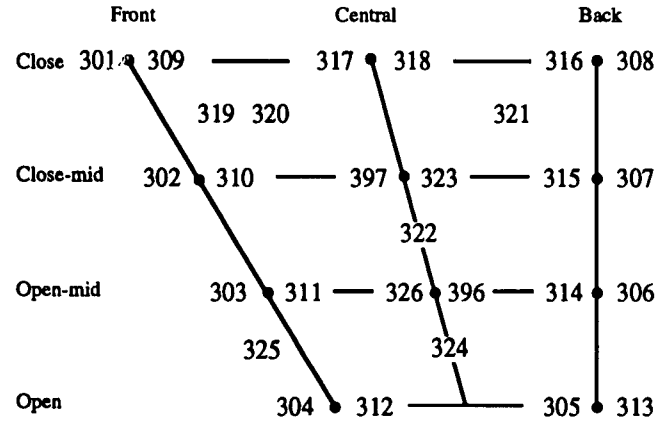
CONSONANTS (NON-PULMONIC)

Clicks		Voiced implosives		Ejective	
				401	
				as in:	
176	Bilabial	160	Bilabial	101+401	Bilabial stop
177	Dental	162	Dental/alv.	103+401	Dental/alv. stop
178	(Post)alveolar	164	Palatal	109+401	Velar stop
179	Palatoalveolar	166	Velar	132+401	Alveolar fricative
180	Alveolar lateral	168	Uvular		

SUPRASEGMENTALS

501 Primary stress
502 Secondary stress
503 Long
504 Half-long
505 Extra-short
506 Syllable break
507 Minor (foot) group
508 Major (inton.) group
509 Linking (absence
         of a break)

TONES & WORD ACCENTS

LEVEL			CONTOUR		
512	519	Extra high	524	529	Rising
513	520	High	525	530	Falling
514	521	Mid	526	531	High rising
515	522	Low	527	532	Low rising
516	523	Extra low	528	533	Rising-falling
					etc.
	517	Downstep		510	Global rise
	518	Upstep		511	Global fall

Table 1, Continued.

VOWELS

	Front	Central	Back
Close	301 309	317 318	316 308
	319 320	321	
Close-mid	302 310	397 323	315 307
		322	
Open-mid	303 311 — 326 396 — 314 306		
	325	324	
Open	304 312	305 313	

Where symbols appear in pairs, the one to the right
represents a rounded vowel.

OTHER SYMBOLS

169	Voiceless labial-velar fricative
170	Voiced labial-velar approximant
171	Voiced labial-palatal approximant
172	Voiceless epiglottal fricative
174	Voiced epiglottal fricative
173	Epiglottal plosive

182 183	Alveolo-palatal fricatives
181	Alveolar lateral flap
175	Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary.   433

DIACRITICS

Diacritics may be place above a symbol with a descender, e.g. 402B

402	Voiceless	405	Breathy voiced	408	Dental
403	Voiced	406	Creaky voiced	409	Apical
404	Aspirated	407	Linguolabial	410	Laminal
411	More rounded	420	Labialized	424	Nasalized
412	Less rounded	421	Palatalized	425	Nasal release
413	Advanced	422	Velarized	426	Lateral release
414	Retracted	423	Pharyngealized	427	No audible release
415	Centralized	428	Velarized or pharyngealized		
416	Mid-centralized	429	Raised		
431	Syllabic	430	Lowered		
432	Non-syllabic	417	Advanced Tongue Root		
419	Rhoticity	418	Retracted Tongue Root		

computer systems. The set of IPA Numbers also allows for the addition of new symbols, within the 100 series for consonants, the 200 series for extra symbols and cross-reference to other phonetic sets, the 300 series for vowels, the 400 series for diacritics, and the 500 series for suprasegmental symbols. Ligatures for affricates, for example, are included in the 200 series as formerly recognized IPA symbols although they do not occupy a specific location on the IPA Chart.

As the 1989 IPA Chart was subjected to review, several modifications emerged, resulting in the publication of the 1993 IPA Chart (IPA 1993). No new Numbers were required to specify these symbols, even though a few symbols were revived and reinstated. Although the order of IPA Numbers is different from the 1989 order, since the original order was itself arbitrary, the changes on the 1993 Chart do not impinge on the IPA Number scheme as an effective numerical interface. In some small measure, the Numbers that accompany the symbols help to document the history of their development. The IPA Number Chart that corresponds to the 1993 IPA Chart is shown as Table 1.

The major benefit of the IPA Number scheme since 1989 has been to assist the IPA in representing its alphabet to computer coding associations such as the International Standards Organization (ISO) and the Text Encoding Initiative (TEI) in developing writing system descriptions (wsd) and entity sets being collected as part of a new universal standard to represent the characters of the world's writing systems. The task of these initiatives was to enable any language, i.e., set of symbols, to be used with computerized systems for entering and communicating text. To solicit the range of sets of symbols used, various national and linguistic groups were asked to submit a closed and clearly defined set of characters for inclusion in the new standard. Unicode was one of these initiatives, which has since been combined into the ISO character set, ISO 10646, or universal (coded) character set (UCS). The alphabet of the IPA was one of the "languages" or sets of symbols considered by ISO in 1990, due in large part to the fortunate timing of the propagation of the 1989 Kiel revision and the IPA Number tables. In 1989, phoneticians had produced a closed character set of the form required for submission to ISO and, more essentially, had abstracted from local phonetic practice by introducing the IPA Number referents. It is important to note that submissions of phonetic characters were received by ISO and Unicode from a variety of sources, not just from the IPA, and that these were considered as a whole by the ISO working groups responsible for the phonetic set, who then made their own submissions as part of a process of review and approval based on "informatic" as well as phonetic criteria. Character set 10646 has now been approved by the ISO, including the phonetic characters submitted to them as listed in tables 3 and 4, and was published on May 1 1993. The full ISO set comprises over 40,000 characters. Those phonetic characters not accepted by ISO (for example, the Chao "tone letters") have not been assigned a code, and this column is therefore filled with dashes in Tables 3 and 4.

The long-term goal of the coding initiatives was to give computer users access to a public entity set to use in developing a translation table for import and export of written characters to or from their local system. This eliminates the disparity among software systems in the numerical representation of phonetic symbols, and increases the ease of electronic transmission. The major change introduced by the new standards is the 16-bit (double byte) representation of characters, so that each code has a first pair of hexadecimal numbers referring to a table, followed by a second pair of hexadecimal numbers referring to a location in the table. Although locations in these tables were

worked out based on all phonetic submissions, the name used generally to refer to these symbols is "IPA." As with many other writing system declarations, IPA characters have been given UCS identities in ISO 10646 as well as identities in the central international database of AFII (Association for Font Information Interchange) glyphs. The AFII glyph registry is essentially an option to allow for possible font standardization in the future. Table 2 illustrates that the 26 Roman characters within the IPA character set have retained their original or 'ASCII' numbers as their UCS codes. They belong to the 00 or "base" table of ISO 10646. More specialized phonetic symbols have been assigned to subsequent tables in the writing system declaration.

Table 2. UCS codes retain original ASCII coding for Roman characters in the IPA set.

Symbol	Symbol Name	Phonetic Description	IPA Number	UCS Code	AFII Code
a	Lower-case A	Open front unrounded vowel	304	0061	E25B
b	Lower-case B	Voiced bilabial plosive	102	0062	E2A3
c	Lower-case C	Voiceless palatal plosive	107	0063	E2D9
d	Lower-case D	Voiced dental or alveolar plosive	104	0064	E2B1
e	Lower-case E	Close-mid front unrounded vowel	302	0065	E256
f	Lower-case F	Voiceless labiodental fricative	128	0066	E2AC
g	Looptail G	Voiced velar plosive *Equivalent to 110*	210	0067	------
h	Lower-case H	Voiceless glottal fricative	146	0068	E2EE
i	Lower-case I	Close front unrounded vowel	301	0069	E251
j	Lower-case J	Voiced palatal approximant	153	006A	E2DB
k	Lower-case K	Voiceless velar plosive	109	006B	E2DE
l	Lower-case L	Voiced dental or alveolar lateral approximant	155	006C	E2BD
m	Lower-case M	Voiced bilabial nasal	114	006D	E2A1
n	Lower-case N	Voiced dental or alveolar nasal	116	006E	E2AF
o	Lower-case O	Close-mid back rounded vowel	307	006F	E269
p	Lower-case P	Voiceless bilabial plosive	101	0070	E2A2
q	Lower-case Q	Voiceless uvular plosive	111	0071	E2E6
r	Lower-case R	Voiced dental or alveolar trill	122	0072	E2C0
s	Lower-case S	Voiceless alveolar fricative	132	0073	E2B6
t	Lower-case T	Voiceless dental or alveolar plosive	103	0074	E2B0
u	Lower-case U	Close back rounded vowel	308	0075	E265
v	Lower-case V	Voiced labiodental fricative	129	0076	E2AD
w	Lower-case W	Voiced labial-velar approximant	170	0077	E2A8
x	Lower-case X	Voiceless velar fricative	140	0078	E2E0
y	Lower-case Y	Close front rounded vowel	309	0079	E252
z	Lower-case Z	Voiced alveolar fricative	133	007A	E2B7

The Kiel Convention Workgroup on Pathological Speech and Voice Quality has developed specialized symbols and diacritics with IPA Numbers from 600 to 699. They are described in Duckworth, Allen, Hardcastle, & Ball (1990), and listed together with their Number assignments in Ball (1991). They are not included in the present tables

because they were not considered among the submissions made to ISO for universal coding. At the moment, therefore, there are no UCS codes or AFII codes that can be easily associated with the "Extended IPA" characters for disordered speech and voice quality of the 600 series.

Table 3 lists all phonetic consonant and vowel symbols that have been given a code in the universal coded character set, cross-referencing symbol shape, symbol name, articulatory description, IPA Number, UCS code, and AFII code. The symbols are arranged in pseudo-alphabetical order. Table 4 lists all phonetic diacritic and suprasegmental symbols that have been given a code in the universal coded character set, arranged in the order of the 1993 IPA Chart. Symbols in the declaration which are not IPA symbols and those which are no longer in IPA usage are specified, with an indication of the date when they were removed from IPA usage or superseded by other symbols. The publication of these lists of coding assignments should not be construed as an endorsement of every character in the list by the IPA, but as a convenient reference to the location of any potential phonetic character in the coding tables as currently constituted. A version of these tables will appear in the forthcoming *Handbook of the IPA*. Comments on such matters as the choice of names for symbols and the notes on their history and status are welcomed and may be sent to the Secretary of the IPA or the Editor of the *Journal*.

Table 3. Phonetic Consonant/Vowel Symbol Codes (in Pseudo-Alphabetical Order by Symbol Shape)

Symbol	Symbol Name	Phonetic Description / *Status*	IPA Number	UCS Code	AFII Code
a	Lower-case A	Open front unrounded vowel	304	0061	E25B
ɐ	Turned A	Near-open central unrounded vowel	324	0250	E263
ɑ	Script A	Open back unrounded vowel	305	0251	E26C
ɒ	Turned Script A	Open back rounded vowel	313	0252	E26D
æ	Ash; Lower-case A E ligature	Near-open front unrounded vowel	325	00E6	E25A
b	Lower-case B	Voiced bilabial plosive	102	0062	E2A3
ɓ	Hooktop B	Voiced bilabial implosive	160	0253	E2A9
ʙ	Small capital B	Voiced bilabial trill	121	0299	E2F0
β	Beta	Voiced bilabial fricative	127	03B2	2662
c	Lower-case C	Voiceless palatal plosive	107	0063	E2D9
ƈ	Hooktop C	Voiceless palatal implosive *Withdrawn (1993)*	163	0188	2376
č	C haček	Voiceless postalveolar affricate *Not IPA usage*	299	010D	F1AE
ç	C cedilla	Voiceless palatal fricative	138	00E7	E2DA
ɕ	Curly-tail C	Voiceless alveolo-palatal fricative	182	0255	E2CE
ʗ	Stretched C	Postalveolar click *Superseded by 178 (1989)*	202	0297	E2C4
d	Lower-case D	Voiced dental or alveolar plosive	104	0064	E2B1

ɗ	Hooktop D	Voiced dental or alveolar implosive	162	0257	E2C2
ɖ	Right-tail D	Voiced retroflex plosive	106	0256	E2C8
ʤ	D-Z ligature	Voiced alveolar affricate; *Superseded by 104+133*	212	02A3	E2F9
ʤ	D-Yogh ligature	Voiced postalveolar affricate; *Superseded by 104+135*	214	02A4	E2FA
ʥ	D-Curly-tail-Z ligature	Voiced alveolo-palatal affricate*Superseded by 104+183*	216	02A5	E2FB
ð	Eth	Voiced dental fricative	131	00F0	E2B3
e	Lower-case E	Close-mid front unrounded vowel	302	0065	E256
ə	Schwa	Mid central unrounded vowel	322	0259	E25F
ᵊ	Superscript schwa	Mid central unrounded vowel release	218	------	------
ɚ	Right-hook schwa	R-colored mid central vowel *Equivalent to 322+419*	327	025A	E260
ɘ	Reversed E	Close-mid central unrounded vowel	397	0258	E26E
ɛ	Epsilon	Open-mid front unrounded vowel	303	025B	E258
ɞ	Closed epsilon	Open-mid central rounded vowel	396	029A	E273
ɜ	Reversed epsilon	Open-mid central unrounded vowel	326	025C	E262
ɞ	Closed reversed epsilon	*Not IPA usage*	395	025E	E270
f	Lower-case F	Voiceless labiodental fricative	128	0066	E2AC
g	Opentail G	Voiced velar plosive *Equivalent to 210*	110	0261	E2DF
ɠ	Hooktop G	Voiced velar implosive	166	0260	E27E
g	Looptail G	Voiced velar plosive *Equivalent to 110*	210	0067	------
ɢ	Small capital G	Voiced uvular plosive	112	0262	E2E7
ʛ	Hooktop small capital G	Voiced uvular implosive	168	029B	E2F1
ɣ	Gamma	Voiced velar fricative	141	0263	E2E1
ˠ	Superscript gamma	Velarized	422	02E0	------
ɤ	Ram's horns	Close-mid back unrounded vowel	315	0264	E268
h	Lower-case H	Voiceless glottal fricative	146	0068	E2EE
ʰ	Superscript H	Aspirated	404	02B0	D565
ħ	Crossed H	Voiceless pharyngeal fricative	144	0127	E2EB
ɦ	Hooktop H	Voiced glottal fricative	147	0266	E2EF
ɧ	Hooktop heng	Simultaneous voiceless postalveolar and velar fricative	175	0267	E2D6
ɥ	Turned H	Voiced labial-palatal approximant	171	0265	E2A6
ʜ	Small capital H	Voiceless epiglottal fricative	172	029C	E2F2
i	Lower-case I	Close front unrounded vowel	301	0069	E251
ı	Undotted I	*Not IPA usage*	394	0131	00F5
ɨ	Barred I	Close central unrounded vowel	317	0268	E25D

ɩ	Iota	Near-close near-front unrounded vowel *Superseded by 319 (1989)*	399	0269	E253
ɪ	Small capital I	Near-close near-front unrounded vowel	319	026A	E254
j	Lower-case J	Voiced palatal approximant	153	006A	E2DB
ʲ	Superscript J	Palatalized	421	02B2	D567
ʝ	Curly-tail J	Voiced palatal fricative	139	029D	E2F3
ǰ	J haček	Voiced postalveolar affricate *Not IPA usage*	298	01F0	------
ɟ	Barred dotless J	Voiced palatal plosive	108	025F	E2D9
ʄ	Hooktop barred dotless J	Voiced palatal implosive	164	0284	E27C
k	Lower-case K	Voiceless velar plosive	109	006B	E2DE
ƙ	Hooktop K	Voiceless velar implosive *Withdrawn (1993)*	165	0199	2363
ʞ	Turned K	*Withdrawn (1979)*	291	029E	E2F4
l	Lower-case L	Voiced dental or alveolar lateral approximant	155	006C	E2BD
ˡ	Superscript L	Lateral release	426	02E1	FDA3
ɫ	L with tilde	Velarized voiced dental or alveolar lateral approximant	209	026B	E27D
ɬ	Belted L	Voiceless dental or alveolar lateral fricative	148	026C	E2BB
ɭ	Right-tail L	Voiced retroflex lateral approximant	156	026D	E2CC
ʟ	Small capital L	Voiced velar lateral approximant	158	029F	E2F5
ɮ	L-Yogh ligature	Voiced dental or alveolar lateral fricative	149	026E	E2BC
λ	Lambda	Voiceless dental or alveolar lateral fricative *Not IPA usage*	295	03BB	266E
ƛ	Crossed lambda	Voiceless dental or alveolar lateral affricate *Not IPA usage*	294	019B	FD7B
m	Lower-case M	Voiced bilabial nasal	114	006D	E2A1
ɱ	Left-tail M (at right)	Voiced labiodental nasal	115	0271	E2AB
ɯ	Turned M	Close back unrounded vowel	316	026F	E264
ɰ	Turned M, right leg	Voiced velar approximant	154	0270	E2E2
n	Lower-case N	Voiced dental or alveolar nasal	116	006E	E2AF
ⁿ	Superscript N	Nasal release	425	207F	------
ƞ	N, right leg	Syllabic nasal *Withdrawn (1976)*	293	019E	E2E5
ɲ	Left-tail N (at left)	Voiced palatal nasal	118	0272	E2D7
ŋ	Eng	Voiced velar nasal	119	014B	E2DD
ɳ	Right-tail N	Voiced retroflex nasal	117	0273	E2C6
ɴ	Small capital N	Voiced uvular nasal	120	0274	E2E4
o	Lower-case O	Close-mid back rounded vowel	307	006F	E269
ʘ	Bull's eye	Bilabial click	176	0298	E2AA
ɵ	Barred O	Close-mid central rounded vowel	323	0275	E261
ø	Slashed O	Close-mid front rounded vowel	310	00F8	E257

œ	Lower-case O-E ligature	Open-mid front rounded vowel	311	0153	E259
Œ	Small capital O-E ligature	Open front rounded vowel	312	0276	E25C
ɔ	Open O	Open-mid back rounded vowel	306	0254	E26B
ѡ	Closed omega	Near-close near-back rounded vowel *Superseded by 321 (1989)*	398	0277	E266
p	Lower-case P	Voiceless bilabial plosive	101	0070	E2A2
ƥ	Hooktop P	Voiceless bilabial implosive *Withdrawn (1993)*	159	01A5	2378
ɸ	Phi	Voiceless bilabial fricative	126	0278	E2A4
q	Lower-case Q	Voiceless uvular plosive	111	0071	E2E6
ʠ	Hooktop Q	Voiceless uvular implosive *Withdrawn (1993)*	167	02A0	E2F6
r	Lower-case R	Voiced dental or alveolar trill	122	0072	E2C0
ɾ	Fish-hook R	Voiced dental or alveolar tap	124	027E	E2C1
ɼ	Long-leg R	*Withdrawn (1989)*	206	027C	E2BE
ɺ	Turned long-leg R	Voiced alveolar lateral flap	181	027A	E2BF
ɽ	Right-tail R	Voiced retroflex flap	125	027D	E2CD
ɹ	Turned R	Voiced dental or alveolar approximant	151	0279	E2BA
ɻ	Turned R, right tail	Voiced retroflex approximant	152	027B	E2CB
ʀ	Small capital R	Voiced uvular trill	123	0280	E2EA
ʁ	Inverted small capital R	Voiced uvular fricative	143	0281	E2E9
s	Lower-case S	Voiceless alveolar fricative	132	0073	E2B6
ˢ	Superscript S	*Withdrawn (1989)*	207	02E2	FDA7
š	S haček	Voiceless postalveolar fricative *Not IPA usage*	297	0161	F1DC
ʂ	Right-tail S (at left)	Voiceless retroflex fricative	136	0282	E2C9
ʃ	Esh	Voiceless postalveolar fricative	134	0283	E2D0
ʆ	Curly-tail esh	*Withdrawn (1989)*	204	0286	E2D2
t	Lower-case T	Voiceless dental or alveolar plosive	103	0074	E2B0
ƭ	Hooktop T	Voiceless dental or alveolar implosive *Withdrawn (1993)*	161	01AD	2379
ƫ	Left-hook T	Palatalized voiceless dental or alveolar plosive *Withdrawn (1989)*	208	01AB	------
ʈ	Right-tail T	Voiceless retroflex plosive	105	0288	E2C7
ʦ	T-S ligature	Voiceless dental or alveolar affricate *Superseded by 103+132*	211	02A6	E2FC
ʧ	T-Esh ligature	Voiceless postalveolar affricate *Superseded by 103+134*	213	02A7	E2FD
ʨ	T-Curly-tail-C ligature	Voiceless alveolo-palatal affricate *Superseded by 103+182*	215	02A8	E2FE

ɿ	Turned T	Dental click *Superseded by 177 (1989)*	201	0287	E2C3
θ	Theta	Voiceless dental fricative	130	03B8	266B
ᶿ	Superscript theta	Voiceless dental fricative release	217	------	------
u	Lower-case U	Close back rounded vowel	308	0075	E265
ʉ	Barred U	Close central rounded vowel	318	0289	E25E
ʊ	Upsilon	Near-close near-back rounded vowel	321	028A	E267
v	Lower-case V	Voiced labiodental fricative	129	0076	E2AD
ʋ	Cursive V	Voiced labiodental approximant	150	028B	E2AE
ʌ	Turned V	Open-mid back unrounded vowel	314	028C	E26A
w	Lower-case W	Voiced labial-velar approximant	170	0077	E2A8
ʷ	Superscript W	Labialized	420	02B7	D56E
ʍ	Turned W	Voiceless labial-velar fricative	169	028D	E2A7
x	Lower-case X	Voiceless velar fricative	140	0078	E2E0
ˣ	Superscript X	Voiceless velar fricative release	292	02E3	E26F
χ	Chi	Voiceless uvular fricative	142	03C7	267B
y	Lower-case Y	Close front rounded vowel	309	0079	E252
ʎ	Turned Y	Voiced palatal lateral approximant	157	028E	E2DC
ʏ	Small capital Y	Near-close near-front rounded vowel	320	028F	E255
z	Lower-case Z	Voiced alveolar fricative	133	007A	E2B7
ž	Z haček	Voiced postalveolar fricative *Not IPA usage*	296	017E	F1F0
ʑ	Curly-tail Z	Voiced alveolo-palatal fricative	183	0291	E2CF
ʐ	Right-tail Z	Voiced retroflex fricative	137	0290	E2CA
ʒ	Yogh; tailed Z	Voiced postalveolar fricative	135	0292	E2D1
ʓ	Curly-tail Yogh	*Withdrawn (1989)*	205	0293	E2D1
ƻ	Crossed Two	*Withdrawn (1976)*	290	01BB	E2B5
ʔ	Glottal stop	Glottal plosive	113	0294	E2ED
ʡ	Barred glottal stop	Epiglottal plosive	173	02A1	E2F7
ƾ	Inverted glottal stop	Alveolar lateral click *Superseded by 180 (1989)*	203	0296	E2C5
ʕ	Reversed glottal stop	Voiced pharyngeal fricative	145	0295	E2EC
ˤ	Superscript reversed glottal stop	Pharyngealized	423	02E4	------
ʢ	Barred reversed glottal stop	Voiced epiglottal fricative	174	02A2	E2F8
ǀ	Pipe	Dental click	177	01C0	23A6
ǂ	Double-barred pipe	Palatoalveolar click	179	01C2	23A4
ǁ	Double pipe	Alveolar lateral click	180	01C1	23A7

| ! | Exclamation point | (Post)alveolar click | | 178 | 01C3 | 23A5 |

Table 4. Phonetic Diacritic and Suprasegmental Symbol Codes (in 1993 IPA Chart Order)

Symbol	Symbol Name	Phonetic Description	Placement/ Status	IPA Number	UCS Code	AFII Code
'	Apostrophe	Ejective	p' k' ts'	401	0315	23CB
̥	Under-ring	Voiceless	n̥ d̥	402A	0325	E229
̊	Over-ring	Voiceless	ŋ̊ g̊	402B	030A	00CA
̬	Subscript wedge	Voiced	s̬ t̬	403	032C	E22A
ʰ	Superscript H	Aspirated	pʰ tʰ	404	02B0	D565
̹	Subscript right half-ring	More rounded	ɔ̹	411	0339	------
̜	Subscript left half-ring	Less rounded	ɔ̜	412	031C	E232
̟	Subscript plus	Advanced	u̟	413	031F	E233
̠	Under-bar	Retracted	e̠	414	0320	E234
̈	Umlaut	Centralized	ë	415	0308	E221
̽	Over-cross	Mid-centralized	e̽	416	033D	------
̩	Syllabicity mark	Syllabic	r̩ n̩ l̩	431	0329	E22E
̯	Subscript arch	Non-syllabic	e̯	432	032D	------
˞	Right hook	Rhoticity	e˞ ɚ ɔ˞	419	02DE	------
̤	Subscript umlaut	Breathy voiced	b̤ a̤	405	0324	E22B
̰	Subscript tilde	Creaky voiced	b̰ a̰	406	0330	23D8
̼	Subscript seagull	Linguolabial	t̼ d̼	407	033C	------
ʷ	Superscript W	Labialized	tʷ dʷ	420	02B7	D56E
ʲ	Superscript J	Palatalized	tʲ dʲ	421	02B2	D567
ˠ	Superscript gamma	Velarized	tˠ dˠ	422	02E0	------
ˤ	Superscript reversed glottal stop	Pharyngealized	tˤ dˤ	423	02E4	------
̪	Subscript bridge	Dental	n̪ d̪	408	032A	E22C
̺	Inverted subscript bridge	Apical	n̺ d̺	409	033A	------
̻	Subscript square	Laminal	n̻ d̻	410	033B	------
̃	Superscript tilde	Nasalized	ẽ õ	424	0303	E222
ⁿ	Superscript N	Nasal release	dⁿ	425	207F	------
ˡ	Superscript L	Lateral release	dˡ	426	02E1	FDA3
̚	Corner	No audible release	p̚ d̚	427	031A	------

~	Superimposed tilde	Velarized or pharyngealized	n̴ d̴	428	0334	E226
˔	Raising sign	Raised	e̝ ɹ̝	429	031D	E22F
˕	Lowering sign	Lowered	e̞ β̞	430	031E	E231
˖	Advancing sign	Advanced tongue root	u̟	417	0318	------
˗	Retracting sign	Retracted tongue root	e̠	418	0319	------
͡	Top tie bar	Affricate or double articulation	k͡p g͡b t͡s d͡ʒ	433	------	------
˺	Open corner	Release/burst	*Not IPA usage*	490	------	------
,	Comma	Pause (comma)	*Not IPA usage*	491	002C	002C
ʻ	Reversed apostrophe	Weak aspiration	*Withdrawn (1979)*	492	2018	00A9
˙	Over-dot	Palatalization/ centralization	*Withdrawn (1979)*	493	0307	E224
-	Minus sign	Retracted variety (backed)	*Use 414 or 418 (1989)*	494	02D7	E239
+	Plus sign	Advanced variety (fronted)	*Use 413 or 417 (1989)*	495	0206	E238
ʸ	Superscript Y	High-front rounding/ palatalized	*Not IPA usage*	496	02B8	D570
.	Under-dot	Closer variety/ fricative	*Use 429 (1989)*	497	0323	E230
ˌ	Subscript right hook	Palatalized	*Superseded by 421 (1989)*	498	0321	E227
ʷ	Subscript W	Labialized	*Superseded by 420 (1989)*	499	032B	E22D

Suprasegmentals

ˈ	Vertical stroke (Superior)	Primary stress	ˌfoʊnəˈtɪʃən	501	02C8	E23E
ˌ	Vertical stroke (Inferior)	Secondary stress	ˌfoʊnəˈtɪʃən	502	02CC	E23F
ː	Length mark	Long	eː	503	02D0	E23A
ˑ	Half-length mark	Half-long	eˑ	504	02D1	E23B
˘	Breve	Extra-short	ĕ	505	0306	E223
.	Period	Syllable break	ɹi.ækt	506	002E	002E
ǀ	Vertical line	Minor (foot) group		507	007C	007C

ǁ	Double vertical line	Major (intonation) group		508	2016	------
‿	Bottom tie bar (across space)	Linking (absence of a break)	ˌfaɪ_ə'weɪ	509	------	------
		Tones and word accents				
˝	Double acute accent (over)	Extra high level	a̋	512	030B	00CD
´	Acute accent (over)	High level	á	513	0301	00C2
¯	Macron	Mid level	ā	514	0304	00C5
`	Grave accent (over)	Low level	à	515	0300	00C1
˵	Double grave accent (over)	Extra low level	ȁ	516	030F	23E2
˥	Extra-high tone letter	Extra high level	ma˥	519	02E5	------
˦	High tone letter	High level	ma˦	520	02E6	------
˧	Mid tone letter	Mid level	ma˧	521	02E7	------
˨	Low tone letter	Low level	ma˨	522	02E8	------
˩	Extra-low tone letter	Extra low level	ma˩	523	02E9	------
ˇ	Haček	Rising contour	ǎ	524	030C	00CF
ˆ	Circumflex	Falling contour	â	525	0302	00C3
˜	Macron plus acute accent	Mid+high rising contour	a᷄	526	------	------
˷	Grave accent plus macron	Mid+low falling contour	a᷅	527	------	------
˜	Grave plus Acute plus grave accent	Rising-falling contour	a᷈	528	------	------
ˈ	Rising tone letter	Rising contour	ma˧˥	529	------	------
ˌ	Falling tone letter	Falling contour	ma˥˧	530	------	------
ˈ	High-rising tone letter	High rising contour	ma˦˥	531	------	------
ˌ	Low-rising tone letter	Low rising contour	ma˩˧	532	------	------
ˈ	Rising-falling tone letter	Rising-falling contour	ma˧˦˧	533	------	------
↓	Down arrow	Downstep		517	2193	------
↑	Up arrow	Upstep		518	2191	------
↗	Upward diagonal arrow	Global rise		510	2197	------
↘	Downward diagonal arrow	Global fall		511	2198	------

ˆ	Superscript arch	Long falling tone; Advanced/palatal	*Not IPA usage*	595	0311	------
ˇ	Haček	Falling-rising tone	*Usage re-defined (1989) See 524*	596	030C	00CF
^	Circumflex	Rising-falling tone	*Usage re-defined (1989) See 525*	597	0302	00C3
ˎ	Subscript grave accent	Low falling tone	*Superseded (1989)*	598	0316	------
ˏ	Subscript acute accent	Low rising tone	*Superseded (1989)*	599	0317	------

Symbols for Pathological Speech and Voice Quality: 600 series

Transcription Delimitation Characters:

Symbol	Symbol Name	Phonetic Description	IPA Number	UCS Code	AFII Code
[	Left square bracket	Begin phonetic transcription	901	005B	005B
]	Right square bracket	End phonetic transcription	902	005D	005D
/	Slash	Begin/end phonemic transcription	903	002F	002F
(	Left parenthesis	Indistinguishable utterance (begin)	906	0028	0028
)	Right parenthesis	Indistinguishable utterance (end)	907	0029	0029
((	Left double parenthesis	Sound obscured (begin)	908	------	------
))	Right double parenthesis	Sound obscured (end)	909	------	------
{	Left brace	Begin prosodic notation	910	007B	007B
}	Right brace	End prosodic notation	911	007D	007D

Acknowledgements

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