Language Manual

HQ German

Language Manual: HQ German

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Chapter 1. General

This document discusses certain aspects of text-to-speech processing for the German text-to-speech system, in particular the different types of input characters and text that are allowed.

This version of the document corresponds to the High Quality (HQ) voices Julia, Sarah, Klaus and Andreas.

Please note that the *User's Guide*, mentioned several times in the manual, is called *Help* in some applications.

Note: This language manual is general and applies to all Acapela Group HQ German voices. One or more of the voices may be included in a certain Acapela Group product.

Note: For efficiency reasons, the processing described in this document has a different behaviour in some Acapela Group products. Those products are:

- Acapela TTS for Windows Mobile
- Acapela TTS for Linux Embedded
- Acapela TTS for Symbian

For these products, the default processing of numbers, phone numbers, dates and times has been simplified for the low memory footprint (LF) voice formats. Developers have the possibility to change the default behaviour from *simplified* to *normal* preprocessing by setting corresponding parameters in the configuration file of the voice. Please see the documentation of these products for more information. In the following chapters, each simplification will be described by the indication *[not SP]* following the description of the standard behaviour. The *SP* in the indication stands for *Simplified Processing*.

Chapter 2. Letters in orthographic text

Characters from *A-Z, a-z, äÄ , ëË , ïÏ , öÖ , üÜ , éÉ , èÈ* and *ß* may constitute a word. Certain other characters are also considered as letters, notably those used as letters in other European languages, i.e. *ñ, õ, å, ç*. These letters are not pronounced as in their native languages though, they are pronounced as regular *n, o, a, c* when occurring in a word

Characters outside of these ranges, i.e. numbers, punctuation characters and other non-alphanumeric characters, are not considered as letters.

Chapter 3. Punctuation characters

Punctuation marks appearing in a text affect both rhythm and intonation of a sentence. The following punctuation characters are permitted in the normal input text string: *, : ; “ ” . ? ! ( ) { } [ ]*

3.1. Comma, colon and semicolon

Comma ',', colon ':' and semicolon ';' cause a brief pause to occur in a sentence, accompanied by a small rising (,;) or falling (:) intonation pattern just prior to the character.

3.2. Quotation marks

Quotes '“ ”' appearing around a single word or a group of words cause a brief pause before and after the quoted text.

3.3. Full stop

A full stop '.' is a sentence terminal punctuation mark which causes a falling end-of-sentence intonation pattern and is accompanied by a somewhat longer pause. A full stop may also be used as a decimal marker in a number (see chapter *Number processing*) and in abbreviations (see chapter *Abbreviations*).

3.4. Question mark

A question mark '?' ends a sentence and causes a rising intonation, question-intonation.

3.5. Exclamation mark

The exclamation mark '!' is treated in a similar manner to the full stop, causing a falling intonation pattern followed by a pause.

3.6. Parentheses, brackets and braces

Parenthesis '()', brackets '[]' and braces '{}' appearing around a single word or a group of words cause a brief pause before and after the bracketed text.

Chapter 4. Other non alphanumeric characters

4.1. Non-punctuation characters

The characters listed below are processed as non-letter, non-punctuation characters. Some are pronounced at all times and others are only pronounced in certain contexts, which are described in the following sections of this chapter.

Table 4.1. Non-punctuation characters

Symbol	Reading
/	Schrägstrich
+	Plus
$	Dollar
£	Pfund
€	Euro
¥	Yen
<	Kleiner-als
>	Größer-als
%	Prozent
^	Zirkumflex
³	*(see below)*
~	Tilde
@	At
=	Gleich
²	*(see below)*
*	(see below)
-	*(see below)*

4.2. The ² and ³ signs

[not SP] The reading of expressions with ² is *hoch 2* and ³ is read *hoch 3*. The reading changes if they are preceded by a number and a lenghth or volume abbreviation. is:

Expression	Reading
1 mm²	ein Quadratmillimeter
1 cm²	ein Quadratzentimeter
1 m²	ein Quadratmeter
1 km²	ein Quadratkilometer
1 mm³	ein Kubikmillimeter
1 cm³	ein Kubikzentimeter
1 m³	ein Kubikmeter
1 km³	ein Kubikkilometer

4.3. Symbols whose pronunciation varies depending on the context

4.3.1. Hyphen

A hyphen '-' is pronounced *minus* in two cases:

1. if followed by a digit and no other digit is found in front of the hyphen, i.e. as in the pattern -X but not in X-Y or X -Z where X, Y, and Z are numbers.

2. if followed by a digit and an equals sign '=', i.e. as in the pattern X-Y=Z. Space is allowed between digits, hyphen and equals sign.

If there is no equals sign, as in X-Y or X -Z, the hyphen is pronounced *Bindestrich*.

In certain date formats, in between years or dates that are followed by a month, the hyphen is pronounced *bis*. In other cases, i.e. between two words or in “full“ date formats, the hyphen is not pronounced.

Expression	**Reading**	
-3	minus drei	
44-3	vierundvierzig Bindestrich drei	
44-3=41	vierundvierzig minus drei gleich einundvierzig	
44 - 3 = 41	vierundvierzig minus drei gleich einundvierzig	
15-18 Oktober	fünfzehnter bis achtzehnter Oktober	[not SP]
6-10 Nov	sechster bis zehnter November	[not SP]
1998-2004	neunzehnhundertachtundneunzig bis zweitausendvier	[not SP]
02-02-2002	zweiter Februar zweitausendzwei	
Adolf-Menge	Adolf Menge	

4.3.2. Asterisk

Asterisk '*' is pronounced *mal* if enclosed by digits that are followed by '='. In other cases it is pronounced *Stern*.

Expression	**Reading**
2*3=6	zwei mal drei gleich sechs
2*3	zwei Stern drei
*bc	Stern B C

Chapter 5. Number Processing

Strings of digits that are sent to the text-to-speech converter are processed in several different ways, depending on the format of the string of digits and the immediately surrounding punctuation or non-numeric characters. To familiarize the user with the various types of formatted and non-formatted strings of digits that are recognized by the system, a brief description of the basic number processing is provided below, along with examples. Number processing is subdivided into the following categories:

Full number pronunciation
Leading zero
Decimal numbers
Currency amounts
Ordinal numbers
Arithmetic operators
Mixed digits and letters
Time of day
Year
Dates
Phone numbers
Roman numerals

5.1. Full number pronunciation

Full number pronunciation is given for the whole number part of the digit string.

Example	
2425	zweitausendvierhundertfünfundzwanzig
2.425	zweitausendvierhundertfünfundzwanzig
2 425	zweitausendvierhundertfünfundzwanzig
24,25	vierundzwanzig Komma zwei fünf

Numbers denoting thousands, millions and billions (numbers larger than 999) may be grouped using space or full stop. In order to achieve the right pronunciation the grouping must be done correctly.

The rules for grouping numbers are the following:

- Numbers are grouped in groups of three starting at the end.
- The first group in a number may consist of one, two, or three digits.
- If a group, other than the first, does not contain exactly three digits, the sequence of digits is not interpreted as a full number.
- The highest cardinal number read is 999999999999 (12 digits). Larger numbers are read as separate digits.

Note: Numbers between 1100 and 1999 are interpreted as years and are always read as hundreds. [not SP]

Number	**Reading**
2580	zweitausendfünfhundertachtzig
2 580	zweitausendfünfhundertachtzig
2.580	zweitausendfünfhundertachtzig
25800	fünfundzwanzigtausendachthundert

Number	Reading
25 800	fünfundzwanzigtausendachthundert
25.800	fünfundzwanzigtausendachthundert
2580350	zwei Millionen fünfhundertachtzigtausenddreihundertfünfzig
2 580 350	zwei Millionen fünfhundertachtzigtausenddreihundertfünfzig
2.580.350	zwei Millionen fünfhundertachtzigtausenddreihundertfünfzig
1000000000	eine Milliarde
1234567890123	eins zwei drei vier fünf sechs sieben acht neun null eins zwei drei

5.2. Leading zero

Numbers that begin with *0* (zero) are read as full numbers preceded by a *null*.

Number	Reading
09253	null neuntausendzweihundertdreiundfünfzig
020	null zwanzig

5.3. Decimal numbers

Comma or full stop may be used when writing decimal numbers.

The full number part of the decimal number (the part before comma or full stop) is read according to the rules in the section *Full number pronunciation* . The decimals (the part after comma or full stop) are read as separate digits.

Number	Reading
16,234	sechzehn Komma zwei drei vier
3,1415	drei Komma eins vier eins fünf
1251,04	eintausendzweihunderteinundfünfzig Komma null vier
1.251,04	eintausendzweihunderteinundfünfzig Komma null vier
2.0	zwei Punkt null
2,00	zwei Komma null null
2.50	zwei Punkt fünf null
2,50	zwei Komma fünf null
3,141	drei Komma eins vier eins

5.4. Currency amounts

The following principles are followed for currency amounts:

- Numbers with zero or two decimal places preceded or followed by the currency markers *£, $, ¥, €, DM, Sfr.,* or *ös.* are read as currency amounts.
- Numbers with zero or two decimal places followed by the words *Pfund, Dollar, Yen* or *Euro* (singular or plural) are read as currency amounts.

- Accepted decimal markers are comma ',' and full stop '.'.
- The decimal part (consisting of two digits) in currency amounts is read as *und nn Pence* and *und nn Cent*.
- If the decimal part is *00* it will not be read.

Example	**Reading**
$15,00	fünfzehn Dollar
15,00£	fünfzehn Pfund
€ 200,50	zweihundert Euro und fünfzig Cent
1.000.000 DM	eine Million D-Mark

There is also the possibility of writing large amounts as follows:

$ 1 Million	eine Million Dollar

5.5. Ordinal numbers

Numbers are read as ordinals in the following cases:

- If a number is followed by '.' and a space.
- If a numbers is followed by the name of a month, an abbreviation of a month, or is in a “full” date format.
- A number followed by *:*, and a space, is read as an enumeration, similar to an ordinal but always with the ending *-tens*, ex: '*1:* ' is read as *erstens*.

Ordinal numbers in German are inflected depending on their number, gender and case. This system inflects ordinals depending on whether they are preceded by certain articles and prepositions. Note: Certain articles may be used in more then one number or case, but the system will map such articles just to one number/case, see examples of *die* below. If an ordinal is not preceded by function words denoting its inflection it is read with the strong inflection in masculine, nominative, singular, e.g. with the ending *-ter*.

Example	**Reading**
2.	zweiter
3 Januar	dritter Januar
4. Mar.	vierter März
01.05.2005	erster Mai 2005
der 2. Spieler	der zweite Spieler
das 2. Bild	das zweite Bild
die 2. Frage	die zweite Frage
die 2. Fragen	die zweite Fragen
den 2. Oktober	den zweiten Oktober
dem 3. Bild	dem dritten Bild
des 10. Kapitels	des zehnten Kapitels
am 4. Juli	am vierten juli
am 01.05.2005	am ersten Mai 2005
im 3. Quartal	im dritten Quartal

5.6. Arithmetic operators

Numbers together with arithmetical operators are read according to the examples below. In certain cases a '=' is needed in order for an arithmetic operator to be read as such, i.e. '/, *' and '-'.

Expression	Reading
-12	minus zwölf
14-2	vierzehn Bindestrich zwei
14-2=12	vierzehn minus zwei gleich zwölf
+24	plus vierundzwanzig
2+3	zwei plus drei
2+3=5	zwei plus drei gleich fünf
2÷3	zwei geteilt durch drei
2×3	zwei mal drei
2*3	zwei Stern drei
2*3=	zwei mal drei gleich
6/3	sechs drittel
6/3=	sechs drittel gleich
6/3=2	sechs durch drei gleich zwei
25%	fünfundzwanzig Prozent
3.4%	drei Punkt vier Prozent

5.7. Mixed digits and letters

If a letter appears within a sequence of digits, the groups of digits will be read as numbers according to the rules above. The letter marks the boundary between the numbers. The letter will also be read.

Expression	Reading
77B84Z3	siebenundsiebzig B vierundachtzig Z drei
0092B87-B	null null zweiundneunzig B siebenundachtzig B

5.8. Time of day

The colon is used to separate hours, minutes and seconds. Possible time formats are:

a. *hh:mm* or *h:mm*

   Example: 22:01

b. *hh:mm:ss* or *h:mm:ss*

   Example: 12:00:25

c. *hh:mm U*

   Example: 15:25 U

d. hh.mm U

   Example: 15.25 U

h = hour, *m* = minute, *s* = second.

In pattern a:

If the *mm*-part is equal to *00*, it will not be read. If they are read the reading is followed by *Minute/Minuten* and *Sekunde/Sekunden*. If *hh* is equal to *00* it will be read as *Mitternacht*. An *und* is inserted before the reading of *ss*, in b).

Expresion	**Reading**
2:53 U	zwei Uhr dreiundfünfzig
14.05Uhr	vierzehn Uhr fünf
12:25:00	zwölf Uhr fünfundzwanzig
2:01:00	zwei Uhr eine Minute
15:01:01	fünfzehn Uhr eine Minute und eine Sekunde
00:20:01	Mitternacht 20 Minuten und eine Sekunde
14:00:15	vierzehn Uhr und fünfzehn Sekunden

If *pm* precedes a time format, it is read following the time, similar to the reading of English time formats.

Expresion	**Reading**
pm 2:30	zwei Uhr dreißig pm

5.9. Year

Numbers between 1100 and 1999 are always read as hundreds (year reading) with the exception of numbers containing decimals.

Expression	**Reading**	
1988	neunzehnhundertachtundachtzig	[not SP]
1949-55	neunzehnhundertneunundvierzig bis fünfundfünfzig	[not SP]
2088	zweitausendachtundachtzig	
1988,0	eintausendneunhundertachtundachtzig Komma null	
1988,32	eintausendneunhundertachtundachtzig Komma drei zwei	
September 1999	September neunzehnhundertneunundneunzig	

5.10. Dates

The valid date formats are:

1. *dd-mm-yyyy*, *dd.mm.yyyy*, and *dd/mm/yyyy*

2. *dd-mm-yy*, *dd.mm.yy*, and *dd/mm/yy*

yyyy is a four-digit number, *yy* is a two-digit number, *mm* is a month number between 1 and 12 and *dd* a day number between 1 and 31. One or two digits may be used in the *mm* and *dd* in all formats, and numbers below 10 can be preceded by a zero. The *dd* is an ordinal number, it is inflected in some cases depending on what precedes the date. Hyphen, full stop and slash may be used as delimiters.

Examples of valid formats and their readings:

Type 1:	**Reading**
10-02-2003 or 10-2-2003	zehnter Februar zweitausenddrei
10.02.2003 or 10.2.2003	zehnter Februar zweitausenddrei
10/02/2003 or 10/2/2003	zehnter Februar zweitausenddrei

Type 2:	**Reading**
10-02-03 or 10-2-03	zehnter Februar zweitausenddrei
10.02.03 or 10.2.03	zehnter Februar zweitausenddrei
10/02/03 or 10/2/03	zehnter Februar zweitausenddrei

Ranges of days and years are also supported. [not SP]

Expression	**Reading**
1998-1999	neunzehnhundertachtundneunzig bis neunzehnhundertneunundneunzig
1939-45	neunzhenhundertneununddreißig bis fünfundvierzig
2002/3	zweitausendzwei bis drei
14-15 Januar	vierzehnter bis fünfzehnter Januar

Other possible date formats include using the written name of a month or day. The day can be followed by a comma or not. Listed below are the month and day abbreviations that are supported by the date processing, all abbreviations can also be followed by a full stop. The abbreviations for days are just resolved if followed by an optional comma, a date (one or two digits), and the name of a month. The month abbreviations are also resolved in other contexts then the formats described below.

Months:

Jan, Feb, Mar, Apr, Jun, Jul, Aug, Sep, Okt, Nov, Dez

Days [not SP]:

Mon, Dien, Mit, Don, Fre, Sam, Son

Mo, Di, Mi, Do, Fr, Sa, So

Expression	**Reading**	
Montag, 15 Januar	Montag, fünfzehnter Januar	[not SP]
Mon. 1 Feb.	Montag erster Februar	[not SP]
30 April 1999	dreißigster April neunzehnhundertneunundneunzig	[not SP]
Januar 1953	Januar neunzehnhundertdreiundfünfzig	[not SP]
3 Jan	dritter Januar	[not SP]

5.11. Phone numbers

This section describes telephone number formats that are recognized by the system.

The digits of a phone numbers may be written together or grouped with spaces, '-', '.', and '/'. Groups of numbers of 3 or less digits are read as cardinals. If a group of numbers contains more then 3 digits the numbers are divided by the system into groups of two and three digits, which then are read as cardinals. The division starts from the end of the group of numbers. Parenthesis can be used to define the area code.

Numbers that are not recognized as telephone numbers are numbers that can be defined as a cardinal number, e.g. *10.000* and *10.000.000*. If such a number is preceded by an area

code or a country code, it will be recognized as a phone number, e.g. *01/10 000* or *+49 10.000.000*.

5.11.1. Ordinary phone numbers

Sequences of digits in the following formats are treated as phone numbers.

Format	Example	
xx xx xx xx xx xx	07 01 96 45 60 00	
(x xx xx) xx xx xx	(0 28 52) 50 77 97	
(xx xx) xx xx xx	(03 11) 43 16 81	
(xx xx) x xx xx x	(08 11) 9 49 63 0	
(xx xx) x xx xx xx	(04 21) 4 80 29 42	
x xx xx xx	4 07 88 45	
x xx xx x	9 49 63 0	
xx xx xx	83 63 65	
xxx xxxx x	241 4133 0	[not SP]
xxxx xx xx xx	5121 49 28 24	[not SP]
xxx x xx xxxx	174 4 75 6359	[not SP]
xxx xxxxxxx	030 1234567	[not SP]
xxx xxxxx-xx	030 12345-67	[not SP]
xxxx x xxxxx	0190 8 12345	[not SP]
xxxx x xxxxxx	0900 5 123456	[not SP]
xxxx / xxx xx xx	0650 / 480 23 60	[not SP]
xxxx / xx xx xx xx	0699 / 11 32 59 83	[not SP]
xxxx / xxx xx	07221 / 634 39	[not SP]
xxx xxx xx xx	071 282 50 82	[not SP]
xx xxx xx xx	01 211 18 10	[not SP]
xxx-xxx xx xx	071-282 50 82	[not SP]
xx-xxx xx xx	01-211 18 10	[not SP]
xxx/xxx xx xx	071/282 50 82	[not SP]
xx/xxx xx xx	01/211 18 10	[not SP]

Example	Reading	
01/211.18.10	nulleins zweihundertelf achtzehn zehn	[not SP]
0900 5 123456	nullneun nullnull fünf zwölf vierunddreissig sechsundfünfzig	[not SP]
030 12345-67	nulldreissig einhundertdreiundzwanzig fünfundvierzig ziebenundsechzig	[not SP]

5.11.2. International phone numbers

International phone numbers are written with the prefix '**+**' or '*00*' and a country code, followed by telephone formats described in the section above.

Example	Reading
+49 4 07 88 45	plus neunundvierzig vier nullsieben achtundachtzig fünfundvierzig

Example	Reading	
00 49 4 07 88 45	nullnull neunundvierzig vier nullsieben achtundachtzig fünfundvierzig	
+43(3116)8408	plus dreiundvierzig einunddreissig sechzehn vierundachtzig nullacht	[not SP]
+43/1/313 26	plus dreiundvierzig eins dreihundertdreizehn sechsundzwanzig	[not SP]
0043-1-52 36 316	nullnull dreiundvierzig eins zweiundfünfzig sechsunddreissig dreihundert…	[not SP]
+41 81 7202121	plus einundvierzig einundachzig siebenhundertzwanzig einundzwanzig…	[not SP]
0041-31-991 21 38	nullnull einundvierzig einunddreissig neunhunderteinundneunzig …	[not SP]

5.12. Roman Numerals

Certain letter combinations are interpreted as roman numerals, see the list below. Roman numerals are only recognized if they are written with capital letters.

Example	Reading
II	zwei
III	drei
IV	vier
VI	sechs
VII	sieben
VIII	acht
IX	neun
XI	elf
XII	zwölf
XIII	dreizehn
XIV	vierzehn
XV	fünfzehn
XVI	sechzehn
XVII	siebzehn
XVIII	achtzehn
XIX	neunzehn

Chapter 6. How to change the pronunciation

Words that are not pronounced correctly by the text-to-speech converter, or that the user wants to be pronounced differently, can be entered into a user lexicon (see *User's guide*). In this lexicon, the user defines the desired phonetic transcription of a word (see chapter *German Phonetic Text*).

Phonetic transcriptions can also be entered directly in the text, using the *PRN* tag (see *User's guide*).

The quickest way of changing the pronunciation of the word is to change the spelling of the word directly in the text. Changing a single letter, or adding a hyphen, can often make the pronunciation better.

Correct Spelling	**Alternative Spelling**
Zugausfälle	Zug-Ausfälle
Computersimulation	Computer-Simulation

This strategy can also be useful with foreign words. Try to write an incorrect pronounced word as they sound in German.

Correct Spelling	**"German" Spelling**
chunk	tschank
knife	naif

Chapter 7. German Phonetic Text

The German text-to-speech system uses the German subset of the SAMPA phonetic alphabet (*Speech Assessment Methods Phonetic Alphabet*). The symbols are written with a space between each phoneme.

Only the symbols listed here may be used in phonetic transcriptions. Symbols not listed here are not valid in phonetic transcriptions and will be ignored if included in the user lexicon or in a *PRN* tag.

7.1. Consonants

Table 7.1. Symbols for the German Consonants

Symbol	Word	Phonetic text	Comment
p_h	Pass	p_h a1 s	aspirated p
t_h	Tier	t_h i:1 6	aspirated t
k_h	Kasse	k_h a1 s @	aspirated k
p	Koppel	k_h O1 p l=	
t	Leute	l OY1 t @	
k	Kubik	k u b i:1 k	
pb	Spiel	S pb i:1 l	unaspirated p
td	Stunde	S td U1 n d @	unaspirated t
kg	Skandal	s kg a n d a:1 l	unaspirated k
b	Bier	b i:1 6	
d	Danke	d a1 N k @	
g	Gasse	g a1 s @	
f	Vogel	f o:1 g l=	
v	Wasser	v a1 s r=	
s	Ast	? a1 s t	
S	Schuh	S u:1	
z	See	z e:1	
Z	Genie	Z e n i:1	
x	Dach	d a1 x	
C	dich	d I1 C	
h	Hut	h u:1 t	
j	jetzt	j E1 ts t	
pf	Pferd	pf e:1 6 t	
ts	Zwei	ts v aI	
tS	Cello	tS E1 l o	
dZ	Dschungel	dZ U1 N l=	
l	Liebe	l i:1 b @	
R	Riese	R i:1 z @	
6	Vier	f i:1 6	
m	Mut	m u:1 t	
n	Nase	n a:1 z @	

Symbol	Word	Phonetic text	Comment
N	bange	b a1 N @	
w	Web	w E1 p	English
r	rain	r EI1 n	English
T	think	T I1 N k	English
D	that	D E t	English

7.2. Vowels

Table 7.2. Symbols for the German vowels

Symbol	Word	Phonetic text	Comment
aI	Eins	? aI1 n s	
OY	neu	n OY1	
aU	auf	? aU1 f	
@	sehen	z e:1 @ n	
i:	bieten	b i:1 t n=	
i	Aktivität	? a k t i v i t_h E:1 t	short closed, never stressed
I	bitten	b I1 t n=	
y:	Übung	? y:1 b U N	
y	Büro	b y R o:1	short closed, never stressed
Y	Ypsilon	? Y1 p s i l O n	
e:	Beten	b e:1 t n=	
e	Element	? e l e m E1 n t	short closed, never stressed
E	Betten	b E1 t n=	
E:	ähnlich	? E:1 n l I C	
2:	öfen	? 2:1 f n=	
9	öffnen	? 91 f n @ n	
u:	Schule	S u:1 l @	
u	Student	S td u d E1 n t	short closed, never stressed
U	lustig	l U1 s t l C	
o:	Ofen	? o:1 f n=	
o	Oboe	? o b o:1 @	short closed, never stressed
O	offen	? O1 f n=	
a:	aber	? a:1 b r=	
a	Alarm	? a l a1 R m	
r=	Lager	l a:1 g r=	
m=	Graben	g R a:1 b m=	
n=	Retten	R E1 t n=	
l=	Vogel	f o:1 g l=	
E~	Bulletin	b Y l t E~1	French
a~	Pendant	p a~ d a~1	French
o~	nonchalant	n o~ S a l a~1	French
9~	Parfum	p a R f 9~1	French

Symbol	Word	Phonetic text	Comment
EI	E-Mail	? i:1 m EI2 l	English
@U	No	n @U1	English

7.3. Aspiration

In German, the voiceless stop sounds are aspirated in certain positions of a word. That is, they are followed by a “puff of breath”. The intensity of the "air puff" varies, three levels of aspiration are used in the transcriptions:

- aspirated */ p_h /*, */ t_h /*, */ k_h /*
- unaspirated */ pb /*, */ td /*, */ kg /*
- "neutral" aspiration */ p /*, */ t /*, */ k /*

The transcriptions are aspirated if a stop is in the beginning of a syllable and followed by a primary or secondary stressed vowel. Between the aspirated stop and the stressed vowel one of the following consonants may appear */ R l v m n j r w /*.

Examples

Kaufvertrag /k_h aU1 f f E 6 t_h R a:2 k/

Atomkern /? a t_h o:1 m k_h E2 R n/

Pressevertreter /p_h R E1 s @ f E 6 t_h R e:2 t r=/

Teetasse /t_h e:1 t_h a2 s @/

Industriebetrieb /? I n d U s t_h R i:1 b @ t_h R i:2 p/

Preis /p_h R aI1 s/

Klage /k_h l a:1 g @/

Knecht /k_h n E1 C t/

Portier /p O R t_h j e:1/

Quelle /k_h v E1 l @/

Crime /k_h r aI1 m/

Queen /k_h w i:1 n/

A stop is unaspirated if it is preceded in the beginning of a syllable by */ s /* or */ S /*.

Examples

Demonstrant /d e m O n s td R a1 n t/

Herzstillstand /h E1 R ts S td I2 l S td a n t/

Spitzensportler /S pb I1 ts n= S pb O2 R t l r=/

Spiegelteleskop /S pb i:1 g l= t e l e s kg o:2 p/

In all other positions the stop with a "neutral" aspiration is used.

7.4. Lexical stress

Stress is used to indicate the level of prominence of a syllable in a word (lexical stress) or of a word in a sentence (emphasis and reduction). In German two words that are spelled identically may have different meanings depending on where in the word the stress is found, as in the Name *"August" /? aU1 g U s t/* and the Month *"August" /? aU g U1 s t/*. It is therefore very important to include lexical stress when writing phonetic transcriptions. Note that tran-

scriptions may be read with the correct stress even if no stress mark is included, but this happens randomly and is nothing that can be relied on.

The primary stress of a word is indicated by the symbol */1/* placed directly after the accented vowel. A secondary stress */2/* is used in compounded and derived words to indicate the less prominent accented word part.

Example

Spiegelbild / S pb i:1 g l= b l2 l t /

Autobahn / ? aU1 t o b a:2 n /

durchgefroren / d U1 R C g @ f R o:2 R @ n /

Function words, such as prepositions, conjunctions, determiners, and auxiliaries are unstressed in transcriptions for the German Acapela voices.

7.5. Glottal stop

A glottal stop, represented by the phonetic symbol */?/*, is a small sound which is often used to separate two words when the second word or syllable starts with a stressed vowel. In the phonetic transcriptions a */?/* is used before each word that starts with a vowel, also if such a word is part of a compound, such as *Ast* in *Baumast / b aU1 m ? a s t/*.

7.6. Pause

An underscore /_/ in a phonetic transcription generates a pause.

Chapter 8. Abbreviations

In the current version of the German text-to-speech system the abbreviations in the table below, among others, are recognised. A few of these abbreviations are case-insensitive and require no full stop in order to be recognised as abbreviations.

As previously mentioned, there are also abbreviations for the days of the week and months (see chapter *Ordinal numbers*) and for the most common units like mm, mm², cm² (see section *The ² and ³ signs*).

Table 8.1. Abbreviations

Abbreviation	Reading
Dr.	Doktor
DM	D-Mark (only if preceded or followed by a number)
usw	und so weiter
°C	Grad Celsius (only if preceded by a number, or a number and white-space)
°F	Grad Fahrenheit (only if preceded by a number, or a number and white-space)
°K	Grad Kelvin (only if preceded by a number, or a number and white-space)
sin	Sinus
Cos	Cosinus
Bhf , Bf.	Bahnhof
GmbH	G M B H
Mme	Madame
Abs.	Absender
Abt.	Abteilung
Adr.	Adresse
Ank.	Ankunft
Art.Nr.	Artikelnummer
Bz.	Bezirk
Co.	Company
Fa.	Firma
Frl.	Fräulein
Fr.	Frau
Frh.	Freiherr
Ges.	Gesellschaft
Inst.	Institut
Inh.	Inhalt

Chapter 9. Web-addresses and email

Web-addresses and email-addresses are read as follows:

- *www* is read as three *w*'s spelled letter by letter.
- Full stops '.' are read as *Punkt*, hyphens '-' as *Bindestrich*, underscore '_' as *Unterstricht*, slash '/' as *slash*.
- *us, uk, fr* and all the other abbreviations for countries are spelled out letter by letter.
- The @ is read *At*.
- Words/strings (including *org*, *com* and *edu*) are pronounced according to the normal rules of pronunciation in the system and in accordance with the lexicon.

String	**Reading**
www.acapela-group.com	W W W Punkt Acapela Bindestrich Group Punkt com
http://www.acapela-group.com	H T T P : Schrägstrich Schrägstrich W W W Punkt Acapela Bindestrich Group Punkt com
smith@yahoo.us	smith at yahoo Punkt U S