Language Manual

Italian

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1 General

This document discusses certain aspects of text-to-speech processing for the Italian 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 Density voice Roberto.

1.1 Notational conventions

The following notational conventions are used in this manual:

- For linguistic entities in general, **boldface** is used.
- Input text is written in a `non proportional font`.
- Output text is written in *italics*.
- Keyboard entities are written within angle brackets < >.
- Phonetic transcriptions are written within slashes (/ /) or hash marks (# #) depending on the phonetic alphabet used.

The following abbreviations are used in this manual:

LM	Letter mode
SM	Sentence mode

See the User's Guide for a description of the two different reading modes. Note that Sentence mode is sometimes referred to as Normal mode.

2 Letters in orthographic text

The characters **A-Z** and **a-z** as well as the accented vowels listed in Tables 1 and 2 may constitute a word and are thus considered to be letters. Characters outside of these ranges, i.e. digits and non-alphanumeric characters such as punctuation characters and currency markers etc, are not considered as letters. If such a non-letter is included within a word, the word is ended where the non-letter appears and the following letters are considered belonging to a new word.

The accented characters are converted internally in the system to a two-character code (an apostrophe < ‘ > followed by a vowel). Either the accented character or its internal code may be used in the input text string. Table 1 gives a list of the most common accented characters in Italian and alternative representations of them in the system.

Character	Example	Alternative representation	Example
é	perché	'e	perch'e
à	città	'a	citt'a
è	è	'e	'e
ì	così	'i	cos'i
ò	farò	'o	far'o
ù	più	'u	pi'u

Table 1 Accented characters and their internal representation

Table 2 lists the accented characters and some non-Italian characters that are permitted in the system.

Character		SM	LM
Á	á	*a*	*a con accento acuto*
À	à	*a*	*a con accento grave*
Â	â	*a*	*a con accento circonflesso*
Ä	ä	*a*	*a con dieresi*
Ã	ã	*a*	*a con tilde*
Æ	æ	*e*	*AE attaccate*
Å	å	*a*	*a con tondino*
É	é	*e*	*e con accento acuto*
È	è	*e*	*e con accento grave*
Ê	ê	*e*	*e con accento circonflesso*
Ë	ë	*e*	*e con dieresi*
Í	í	*i*	*i con accento acuto*
Ì	ì	*i*	*i con accento grave*
Î	î	*i*	*i con accento circonflesso*
Ï	ï	*i*	*i con dieresi*
Ó	ó	*o*	*o con accento acuto*
Ò	ò	*o*	*o con accento grave*
Ô	ô	*o*	*o con accento circonflesso*
Ö	ö	*o*	*o con dieresi*
Õ	õ	*o*	*o con tilde*
Œ	œ	*e*	*OE attaccate*
Ú	ú	*u*	*u con accento acuto*
Ù	ù	*u*	*u con accento grave*
Û	û	*u*	*u con accento circonflesso*
Ü	ü	*u*	*u con dieresi*
Ý	ý	*i*	*ipsilon con accento grave*
Ç	ç	*c*	*c con cedilla*
Ñ	ñ	*ni*	*n con tilde*

Table 2 Accented and non-Italian characters

3 Non-alphanumeric characters

The processing of non-alphanumeric characters varies, depending on the reading mode, context of the character, and its function within that context. There are three types of non-alphanumeric characters to be distinguished:

- Characters normally processed as punctuation, and having a direct effect on the intonation and pausing in SM.
- Non-punctuation characters that are always pronounced, with no effect on the intonation or pausing.
- Characters whose pronunciation varies according to context.

Below is a discussion of the characters grouped by type. For each character, the pronunciation is given in LM and SM.

3.1 Punctuation characters

Punctuation characters are only pronounced in LM. In SM, they have an effect on the intonation and rhythm of the phrase or sentence, as described above. Table 3 lists the pronunciation of the punctuation characters in three basic reading modes.

Character	LM
.	*punto*
!	*punto esclamativo*
?	*punto interrogativo*
,	*virgola*
:	*due punti*
;	*punto e virgola*
"	*virgoletta*
(	*aperta parentesi*
)	*chiusa parentesi*
[	*aperta parentesi quadra*
]	*chiusa parentesi quadra*
{	*aperta parentesi graffa*
}	*chiusa parentesi graffa*

Table 3 Punctuation characters

3.1.1 Comma, colon, semicolon

A comma, colon, and semicolon cause a short pause to occur where the respective character is in the sentence. Comma is used as decimal marker in numbers, see section 4.3.

3.1.2 Quotation mark

Quotation mark < " > may surround a single word or a group of words. The quotation mark is not pronounced if a letter directly precedes or follows it. However, if a space precedes and follows the quotation mark, the character is pronounced *virgoletta*.

3.1.3 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. Full stop has a special function in numbers, see section 4.1.

3.1.4 Question mark

A question mark < **?** > is a sentence terminal punctuation mark which causes a rising intonation pattern followed by a pause.

3.1.5 Exclamation mark

The exclamation mark < **!** > has the same effect as the full stop, causing a falling intonation pattern followed by a pause. It is often helpful to use the emphatic stress mark to signal the key word of the phrase, thus adding more expression to the sentence, see section 5.3.2.

3.1.6 Parentheses, brackets and braces

Parentheses < **( ) [ ] { }** > appearing around a single word or a group of words causes a brief pause before and after the bracketed text.

3.2 Non-punctuation characters

The characters listed below are processed as non-letter, non-punctuation characters which are pronounced at all times in all reading modes.

Character	LM/SM
#	*cancelletto*
£	*lira-lire*
ª	*a innalzata*
º	*o innalzata*
¿	*punto interrogativo rovesciato*
½	*un mezzo*
¼	*un quarto*
¡	*punto esclamativo rovesciato*
«	*marescialli aperti*
»	*marescialli chiusi*
¢	*centesimo*
¥	*Yen*
ß	*beta*
±	*piú o meno*
¾	*tre quarti*
°	*gradi*
²	*al quadrato* (see also 8.1 and Table 11)

Table 4 Non-punctuation characters

Reading of the character <²>
In SM, **cm²**, **km²**, **mm²** and **m²** are read as *centimetro quadrato* / *centimetri quadrati, chilometro quadrato* / *chilometri quadrati* etc.

cm, **km**, **mm** are also read as abbreviations. However, the letter **m** is read as the name of the letter by default. In order to have this read as an abbreviation (*metro / metri*), it is necessary to enter a special transcription in the user lexicon, see section 8.1.

3.3 Characters with varying pronunciation

The pronunciation of the characters listed in Table 5 varies according to their context.

Character	LM	SM
-	*trattino*	(see 3.3.1 and 3.3.3)
*	*asterisco*	(see 3.3.2 and 3.3.3)

Table 5 Characters with varying pronunciation

All examples below show the reading in SM.

3.3.1 Hyphen

The reading of hyphen, <->, follows the following principles:

- If a digit immediately follows and no digit precedes, it is pronounced *meno.*
- If surrounded by digits, it is pronounced *trattino.*
- Hyphen is discarded at the end of a line, and causes the two parts of the hyphenated word to be joined into a single word.
- If surrounded by spaces, it is pronounced as a short pause.

Expression	Reading
`-8`	*meno otto*
`555-4758`	*555 trattino 4758*
`L'ultimo conferenziere è stato addirit-<CR> tura fantastico .`	*L'ultimo conferenziere è stato addirittura fantastico.*
`A proposito - sa che ora è?`	*A proposito* (pause) *sa che ora è?*

3.3.2 Asterisk

The asterisk < ***** > is pronounced *per* in SM if a digit immediately precedes and follows it; it is pronounced *asterisco* in all other cases.

Expression	Reading
`2*3`	*due per tre*
`*bc`	*asterisco B C*

3.3.3 Multiple occurrences of the same character

In SM, if more than three of the same character occur in sequence without a space separating them, only the first three occurrences will be pronounced. This is only valid for the following characters < *** + - = / @** >.

Expression	Reading
`********`	*asterisco asterisco asterisco*
`++++++`	*più più più*
`-----`	*trattino trattino trattino*
`========`	*uguale uguale uguale*
`////`	*barra barra barra*
`@@@@`	*chiocciola chiocciola chiocciola*

3.4 Characters ignored by the system

All characters that are not described in section 2 and 3 and that are not phonetic symbols or digits, are ignored by the system. Normally, these characters are omitted but some of them may cause the sentence they appear in to be silent.

4 Number processing

Strings of digits that are sent to the text-to-speech converter are processed in several different ways, depending on the reading mode, format of the digit string, and the immediately surrounding punctuation or non-numeric characters. To familiarise the user with the various types of formatted and non-formatted strings of digits that are recognised by the system, we provide below a brief description of the basic number processing along with examples.

Number processing is subdivided into the following categories:

- 4.1 Full number pronunciation
- 4.2 Leading zero
- 4.3 Decimal numbers
- 4.4 Monetary amounts
- 4.5 Time of day
- 4.6 Arithmetic operators
- 4.7 Mixed digits and letters
- 4.8 Ordinal numbers and Roman numerals

The examples in this section show the reading in SM. In LM, all digits are read as separate digits and all punctuation marks are read.

Note that the current Italian system does not recognise any date formats.

4.1 Full number pronunciation

Full number pronunciation is given for the whole number part of the digit string, i.e. the part to the left of the decimal marker (comma).

Numbers denoting thousands, millions and billions (numbers larger than 999) may be grouped in groups of three digits starting from the end of the number or from a decimal marker. Full stop < . > is used as separator. Numbers that do not follow this pattern are read group by group. The highest number read is 999.999.999.999 (twelve digits). Numbers higher than this are read as single digits with pauses between three-digit groups.

Number	**Reading**
2425	*due mila quattrocento venticinque*
2.425	*due mila quattrocento venticinque*
1000000000	*un miliardo*
1234567890123	*uno due tre* (pause) *quattro cinque sei* (pause) *sette otto nove* (pause) *zero uno* (pause) *due tre*

4.2 Leading zero

Numbers that begin with 0 (zero) are read as single digits, with pausing between groups of digits if there are four or more digits.

Number	**Reading**
09253	*zero nove due* (pause) *cinque tre*
0210	*zero due* (pause) *uno zero*

4.3 Decimal numbers

In decimal amounts, the digits to the left of the decimal marker < **,** > observe the rules for full number pronunciation and leading zero, see section 4.1 and 4.2 respectively.

Digits occurring to the right of the decimal marker are read as full numbers or as single digits depending on the number of digits. If there are two or three digits following the decimal mark, and the first digit is not a zero, the decimal portion is read as a full number. In all other cases the decimal portion is read as single digits, with pausing occurring between groups of digits if there are four or more digits. Note that full stop < **.** > is not recognised as a decimal marker in any reading mode.

Number	**Reading**
16,234	*sedici virgola duecento trentaquattro*
1251,04	*mille duecento cinquantuno virgola zero quattro*
3,1415	*tre virgola uno quattro* (pause) *uno cinque*
2,50	*due virgola cinquanta*
2.5	*due* (pause) *cinque*
.65	*sessantacinque*

4.4 Monetary amounts

In the current version of Italian, the symbol < **£** > denotes Lire. In addition, the symbols < **$** > and < **€** > are recognised as currency symbols.

Number	**Reading**
£19000	*lire diciannovemila*
$190	*dollari cento novanta*
€10	*euro dieci*

4.5 Time of day

Time of day is read in SM if the following format is observed:

H.MM **H** represents the hours
MM represents the minutes

The hours and minutes must be separated by a period < **.** >. The minutes field is optional.

Expression	**Reading**
10.30	*dieci e trenta*
1.15	*una e quindici*
0.00	*mezzanotte*
08.45	*otto e quarantacinque*
0.30	*mezzanotte e trenta*

4.6 Arithmetic operators

Digits together with arithmetical operators are read according to the examples below. See also section 3.3.

Expression	**Reading**
-12	*meno dodici*
+24	*più ventiquattro*
2*3	*due per tre*
25%	*venticinque percento*
3,45%	*tre virgola quarantacinque percento*
,05%	*virgola zero cinque percento*

4.7 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. If there is a sequence of letters within a digit string, the sequence will be read according to the normal pronunciation rules.

Expression	**Reading**
77B84Z3	*settantasette B ottantaquattro Z tre*
208L	*duecento otto L*
0092B87-B	*zero zero* (pause) *nove due B ottantasette trattino B*

4.8 Ordinal numbers and Roman numerals

Numbers are processed as cardinal numbers (*uno, due, tre* etc.) in most cases. They are processed as ordinal numbers (*primo, secondo, terzo* etc.), in SM only, in the following cases:

- if they are followed by one of the symbols < º > or < ª > (see section 4.8.1)
- in some cases if they are written as Roman numerals (see section 4.8.2)

4.8.1 Arabic numerals followed by < º > or < ª >

If an Arabic numeral is followed by one of the symbols < º > or < ª >, this will be read as an ordinal number.

Expression	**Reading**
23º	*ventitreesimo*
4ª	*quarta*

4.8.2 Roman numerals

Some, but not all, Roman numerals will always be read as ordinals. This pertains to numbers up to 30 that can not normally be read as anything other than a Roman numeral. **I**, **V**, **VI** and **X**, can equally well be read as the name of letters (**I**, **V** and **X**) or as an ordinary word (**VI**). These will only be read as numbers if they are immediately preceded by certain proper names, mainly names of popes and monarchs. By adding entries in the user lexicon, it is possible to override these principles in both directions.

Paolo is one of the names that cause **VI** to be read as *sesto*, *Silvio* is not.

Expression	**Reading**
Paolo VI	*Paolo sesto*
Silvio vi ha invitato	*Silvio vi ha invitato*
Silvio xi ha invitato	*Silvio undicesimo ha invitato*

XI is always read as *undicesimo*. We assume that **'xi'** was written by mistake instead of **'vi'**. Note that the system does not normally distinguish between capital letters and small letters, but see below, regarding the user lexicon.

By adding entries in the user lexicon, it is possible to override the default readings described here. If the user wishes to have (for instance) the letter string **IV** (or **iv** or **Iv** or even **iV**) read, not as *quarto*, but some other way, then this can be achieved by specifying this in the user lexicon.

Note that the user lexicon is *case sensitive*, that is, it distinguishes between capital letters and small letters in the *look-up part* of the entries, unlike the default rules of the text-to-speech converter which treat upper-case (capital) and lower-case (small) letters identically. If *all* the letters in the look-up part are lower-case (small letters), then all combinations of capital and small letters will match this. If at least one of the letters is upper-case, then only an exact match will be accepted. This way it is possible to have **vi** read as a normal word (pronoun, adverb) when written with small letters, and as *sesto* when it is written with capital letters.

The entries in the user lexicon would look like this:

RULSYS:		SAMPA:	
VI	# mV'I+ #	VI	/ _m v i1 _+ /
vi	# V'I+ #	vi	/ v i1 _+ /

Since the look-up part of the first entry above contains at least one capital letter, this entry will only be accepted if the input text matches exactly. Since the look-up part of the second entry is all in small letters this will match all possible combinations of capital and small letters. However, entries with at least one capital letter have priority over entries with small letters only. Therefore the first entry will match **VI** and the second entry will match **vi**, **vI** and **Vi**.

The lower-case '**m**' in the transcription is a special code which causes this particular transcription to be read as *sesto* after e.g. **Paolo**, and *sesta* after e.g. **Anastasia**. The following entry:

RULSYS:		SAMPA:	
VI	# S'E1STO #	VI	/ s E1 s t o/

would result in *sesto* being read in all cases for this entry.

5 Italian Phonetic Text

In the current version of the current text-to-speech system, SAMPA (Speech Assessment Methods Phonetic Alphabet) is used when making lexicons or using phonetic strings within texts. In earlier versions, RULSYS was used. For the voices based on RULSYS, a conversion is made automatically from SAMPA to RULSYS inside the system.

We recommend new users to use only SAMPA since this is the notation that will be used in future development. Users who are already familiar with the RULSYS alphabet still have the possibility to use it for all RULSYS-based voices (among them the Italian voice Roberto). There will be a description of RULSYS in the next section.

For the sake of clarity, SAMPA transcriptions are written within slashes (/ /) and RULSYS transcriptions within hash marks (# #). Note that neither the slashes nor the hash marks are part of the actual transcription.

The Italian system uses a phonetic alphabet similar to the Italian subset of SAMPA. The phonetic alphabet is described below.

If the pronunciation is incorrect the user may write phonetic transcriptions in the text. Then, a PRN-tag is needed to switch to phonetic mode, see User's Guide. It is also possible to make user lexicons (see User's Guide), or change the orthography of a word (see section 7) in order to achieve the preferred pronunciation.

5.1 Consonants

The table below lists the phonetic symbols used for the Italian consonants along with example words (the letters corresponding to the consonant sound are in boldface) and their transcriptions.

Consonant symbol	Example	Transcription
b	**b**a**bb**o	/b a1 bb o/
tS	**c**iao	/tS a1 o/
d	**d**a**d**o	/d a1 d o/
dz	man**z**o	/m a1 n dz o
f	**f**i**f**a	/f i1 f a/
g	**g**or**g**o	/g o1 r g o/
dZ	**gi**orno	/dZ o1 r n o/
L	**gl**i	/L i1/
J	biso**gn**o	/b i z o1 JJ o/
j	**p**iù	/p j u1/
k	**c**o**cc**o	/k O1 kk o/
l	**l**i**ll**a	/l i1 ll a/
m	**m**a**mm**a	/m a1 mm a/
n	**n**o**nn**o	/n O1 nn o/
N	go**ng**	/g O1 N/
p	**p**a**pp**a	/p a1 pp a/
r	**r**a**r**o	/r a1 r o/
s	**s**a**ss**o	/s a1 ss o/
S	**sc**i	/S i1/
t	**t**u**tt**o	/t u1 tt o/
ts	for**z**a	/f O1 r ts a/
v	**v**i**v**a	/v i1 v a/
w	**qu**esta	/k w e1 s t a/
z	ro**s**a	/r O1 z a/

Table 6 Phonetic symbols for Italian consonants (SAMPA)

5.2 Comments on phonetic symbols for consonants

5.2.1 Double consonants

In phonetic transcription of Icelandic, a long consonant is denoted simply by doubling the consonant symbol. If the consonant symbol consists of two letters, only the first is doubles, i.e. the long variant of `/tS/` is denoted `/ttS/`.

Examples

babbo	/b a1 bb o/
pizza	/p i1 tts a/
mezzo	/m E1 ddz o/
piaccia	/p j a1 ttS a/

5.3 Vowels

Table 7 lists the phonetic symbols used for the Italian vowels along with example words and their transcriptions.

Vowel symbol	Example	Transcription
a	s**a**cc**a**	/s a1 kk a/
e	s**e**ra	/s e1 r a/
E	s**e**tte	/s E1 tt e/
i	s**i**to	/s i1 t o/
o	s**o**tt**o**	/s o1 tt o/
O	s**o**rte	/s O1 r t e/
u	s**u**cco	/s u1 kk o/

Table 7 Phonetic symbols for Italian vowels (SAMPA)

5.4 Comments on phonetic symbols for vowels

5.4.1 Diphthongs

Diphthongs are created by combining the (orthographic) vowels **a**, **e** and **o** with **i** and **u**. Use the two appropriate vowel symbols to denote the diphthong.

Example **aurora** /a u r O1 r a/
lei /l E i1/
feudo /f E u1 d o/

However, if a diphthong in the orthography is written with the letters **i** or **u** followed by **a**, **e** or **o**, the **i** and **u** are often represented by the phonetic symbols #J# and #W#, respectively.

Example **luogo** /l w O1 g o/
ieri /j E1 r i/

If these characters are used, a text processing error occur and parts of the text may consequently be lost.

5.5 Extra symbols for phonetic details

In the current version of the Italian synthesis certain phonetic details can be specified in phonetic text. This can be exploited in case the user wishes to achieve an unusual pronunciation, or if the transcription automatically generated by the system is inaccurate.

5.5.1 Stress marks

Stress is used to indicate the level of prominence of a syllable in a word (word-level stress, see section 5.5.2) or of a word in a sentence (phrase level stress, see section 5.5.3).

Knowing where the stress falls on an Italian word is very important, since the meaning of a word can be altered by a change in the placement of the stress. For example, the word **ancora** can be pronounced **an**cora (anchor) or **an**co**r**a (again). In these "ambiguous" cases, the system has a default pronunciation which can be changed manually by the user, see below.

Many words in Italian are stressed on the next to the last syllable.

Examples **cucina**
maggiore
servire

Words that have their stress on the final syllable normally have it indicated by an accent mark.

Examples **citta**
caffe
quantita

Not all words have stress. The so-called function words (prepositions, pronouns, articles, etc.) are usually not stressed. When a word is combined with other words in a phrase, the stress that occurs when the word is in isolation may be lost in favour of stressing the last word of a phrase.

Example **la mia macchina**.

A word can also be stressed in a sentence to emphasise its importance.

Example **La piccola raggazza**, **non la grande.**

Both types of stress use special phonetic symbols to indicate the type of stress.

5.5.2 Word level stress

To indicate the stressed syllable within a word, the stress is represented by a < **1** > placed after the vowel to receive the stress.

Examples **amico** `/a m i1 k o/`
impossibile `/i m p o ss i1 b i l e/`

It is important to have stress marks in a sentence written in phonetic text. There should be at most only one stress mark per word. If no stress marks appear in a sentence at all, the text-to-speech converter will produce a monotone reading of the sentence.

Remember that only vowels are stressed, i.e., a stress mark must be preceded by a vowel written in phonetic characters.

5.5.3 Phrase level stress

It is also possible to emphasise or reduce the stress on a particular word in a phrase or sentence. In the input text string, this is done by placing < **_X** >, where **X** represents a single digit between **0** and **9**, within a PRN-tag (see User's Guide) immediately before the word whose prominence is to be altered. The emphasis mark can also be used in transcriptions in a user lexicon.

_2	normal stress for most words
_0	makes a word non-stressed
_1	gives stress to a normally unstressed word
_3 - **_9**	gives levels of emphatic stress

Compare how the meaning is changed when the emphatic stress is varied in the sentence below.

Example E la figlia dei nostri vicini.
E la `/_4/` figlia dei nostri vicini.
E la figlia dei `/_6/` nostri vicini.

These emphatic stress marks may also appear in a phonetic text string, and must be placed at the beginning of the string.

Example E la `/_4 f i1 LL a/` dei `/_6/` nostri vicini.

Note that the necessary PRN-tag is not included in the examples above.

5.5.4 Punctuation marks

The punctuation marks < **. ! ? ,** > used in phonetic text have the same effect on intonation as when appearing in orthographic text. In SAMPA the punctuation marks are denoted /**_.**/, /**_!**/, /_?/, and /**_com**/ respectively.

6 The RULSYS phonetic alphabet

Note that we recommend new users to use only SAMPA since this is the notation that will be used in future development. Note also that it is only possible to use RULSYS when making user lexicons, not in the input text string.

The following differentiates RULSYS from SAMPA in the Italian system:

- no spaces are used within words in transcriptions
- the lexical accent is placed before the vowel to be stressed, not after as in SAMPA

Note that the hash marks (# #) are used to indicate RULSYS transcriptions and to differentiate from SAMPA transcriptions; the hash marks are not part of the actual transcriptions.

If the pronunciation is incorrect the user may write phonetic transcriptions in the text. Then, a PRN-tag is needed to switch to phonetic mode, see User's Guide. It is also possible to make user lexicons (see User's Guide), or change the orthography of a word (see section 7) in order to achieve the preferred pronunciation.

6.1 RULSYS Consonants

The table below lists the phonetic symbols used for the Italian consonants in RULSYS notation along with example words (the letters corresponding to the consonant sound are in boldface) and their transcriptions.

Consonant symbol	Example	Transcription
B	ba**bb**o	#B'AB:0#
ch	**c**iao	#ch'AO#
D	**d**a**d**o	#D'ADO#
dz	man**z**o	#M'AndzO#
F	**f**i**f**a	#F'IFA#
G	**g**or**g**o	#G'ORGO#
gh	**gi**orno	#gh'ORNO#
gl	**gl**i	#gl'I#
gn	biso**gn**o	#BIZ'Ogn:O#
J	più	#PJ'U#
K	**c**o**cc**o	#K'O1K:O#
L	**l**i**ll**a	#L'IL:A#
M	**m**a**mm**a	#M'AM:A#
N	**n**o**nn**o	#N'O1N:O#
ng	go**ng**	#G'O1ng#
P	**p**a**pp**a	#P'AP:A#
R	**r**a**r**o	#R'ARO#
S	**s**a**ss**o	#S'AS:O#
sh	**sc**i	#sh'I#
T	**t**u**tt**o	#T'UT:O#
ts	for**z**a	#F'O1RtsA#
V	**v**i**v**a	#V'IVA#
W	q**u**esta	#KW'ESTA#
Z	ro**s**a	#R'O1ZA#

Table 8 Phonetic symbols for Italian consonants (RULSYS)

6.2 Comments on phonetic symbols for consonants

6.2.1 Double consonants

To represent a double consonant in phonetic transcription in RULSYS, place a colon < **:** > after the consonant to be doubled.

Examples		
	babbo	`#B'AB:0#`
	pizza	`#P'Its:A#`
	mezzo	`#M'E1dz:O#`
	piaccia	`#PJ'Ach:A#`

6.3 RULSYS Vowels

Table 9 lists the phonetic symbols used for the Italian vowels in RULSYS notation along with example words and their transcriptions.

Vowel symbol	Example	Transcription
A	s**a**cc**a**	#S'AK:A#
E	s**e**ra	#S'ERA#
E1	s**e**tte	#S'E1T:E#
I	s**i**to	#S'ITO#
O	s**o**tt**o**	#S'OT:O#
O1	s**o**rte	#S'O1RTE#
U	s**u**cco	#S'UK:O#

Table 9 Phonetic symbols for Italian vowels (RULSYS)

6.4 Comments on phonetic symbols for vowels

6.4.1 Diphthongs

Diphthongs are created by combining the (orthographic) vowels **a**, **e** and **o** with **i** and **u**. Use the two appropriate vowel symbols to denote the diphthong.

Example	**aurora**	#AUR'O1RA#
	lei	#L'E1I#
	feudo	#F'E1UDO#

However, if a diphthong in the orthography is written with the letters **i** or **u** followed by **a**, **e** or **o**, the **i** and **u** are often represented by the phonetic symbols #**J**# and #**W**#, respectively.

Example	**luogo**	#LW'O1GO#
	ieri	#J'E1RI#

If these characters are used, a text processing error occur and parts of the text may consequently be lost.

6.5 Extra symbols for phonetic details

6.5.1 Word level stress

For a description of word level and phrase level stress, see section 5.5.

To indicate the stressed syllable within a word, the stress is represented in RULSYS by an apostrophe < ' > placed before the vowel to receive the stress.

Examples	**amico**	#AM'IKO#
	impossibile	#IMPOS:'IBILE#

It is important to have stress marks in a sentence written in phonetic text. There should be at most only one stress mark per word. If no stress marks appear in a sentence at all, the text-to-speech converter will produce a monotone reading of the sentence.

Remember that only vowels are stressed, i.e., a stress mark must be followed by a vowel written in phonetic characters. Be sure, for example, that you do not leave a real apostrophe in the phonetic text.

6.5.2 Phrase level stress

In RULSYS, phrase level stress is denoted in the same way as in SAMPA. See section 5.5.2.

6.5.3 Punctuation marks

The punctuation marks < **, . ? !** > are also permitted in phonetic text, and have the same effect as in normal text, affecting both the rhythm and intonation of the sentence.

The character < ' > has a completely different function when writing in phonetic text than in ordinary text. It is a reserved character used to mark stress in a word, see section 6.5.1, and cannot be used to quote text or elide words in phonetic text.

How to change pronunciation errors

Words that are not pronounced correctly by the text-to-speech converter can be entered in the user lexicon (see User's guide). There are two ways to do this: either, the user enters a phonetic transcription of the word (see section 5), or, the user rewrites the word orthographically. Phonetic transcriptions can also be entered directly in the text, using a PRN-tag (see User's guide).

6.6 Change the orthography

6.6.1 Spelling incorrectly

It is possible to intentionally misspell a word by trying to spell a word in a more phonetic manner, i.e., choosing non-ambiguous letter combinations to represent difficult sounds. For example, the letters **ew** in **New York** might better be represented by the letter **u** , which is closer to the actual sound in the word.

Example **Chicago** can be misspelled **Scicago**

6.6.2 Use of apostrophe

A stress error can often be corrected by placing an apostrophe < ' > before or after the vowel to be stressed. An apostrophe may also be used to disambiguate words whose spelling may have two different pronunciations.

Examples **Padova** can be written **Pa'dova** or **P'adova**

ancora (anchor) can be distinguished from **ancora** (again)
by including a stress mark before or after
the vowel in the first syllable **a'ncora** or **'ancora**.

6.6.3 Expanding acronyms

Not very many acronyms are handled by the current Italian system (see section 8). Therefore, it may be very useful to expand them in the user dictionary. Since acronyms should be expanded to more than one word it may be difficult to enter a proper transcription. It is much easier to enter the words in question orthographically.

Examples	**FIA**	Federation Internationale de l'Automobile
	STIPEL	Societa Telefonica Interregionale Piemontese E Lombarda

6.7 Using phonetic text

When unable to correct a pronunciation error by misspelling the word, phonetic text should be used to produce the desired pronunciation. When phonetic text is used, the system bypasses the normal spelling pronunciation rules, and pronounces each phonetic symbol "literally", according to the examples listed in Tables 6 and 7.

6.7.1 Choosing the right phonetic symbols

A helpful way to transcribe in phonetic text is to work with a dictionary. Normally, dictionaries give the pronunciation for each word. They also provide a pronunciation key to show how to pronounce the special symbols used in the pronunciation guide. Similarly, Tables 6 and 7 give the pronunciation key for the special phonetic symbols used in Italian for the text-to-speech converter.

Using a dictionary, look up the word you want to transcribe. Next to the word you should find the pronunciation. Working with the dictionary's pronunciation key and Tables 6 and 7, convert the dictionary pronunciation symbols to the appropriate Italian symbols for the text-to-speech converter. Symbols that are used in the dictionary to mark syllable or word boundaries should be ignored. Be sure

to include the stress assignment information since lexical stress is an important part of a word's pronunciation.

Example
Suppose we want to transcribe the place name **Sydney**. We sound out the word, **S-I-D-N-I**, and decide that the stress should be on the first vowel since it is the most prominent, i.e., **SYDney.**
Using Tables 6 and 7, we find the following corresponding symbols:

s (**s**a**ss**o), i (s**i**to), d (**d**a**d**o), n (**n**o**nn**o), 1 (stress)

Now we can transcribe **Sydney** using the Italian phonetic symbols for the text-to-speech converter:

```
/s i1 d n i/
```

7 Abbreviations

In the current version of the Italian text-to-speech system, the following abbreviations are recognized in all contexts in SM only. These abbreviations are case-insensitive, and do not require a period in order to be processed as an abbreviation. In SM, if a period accompanies the abbreviation, the sentence is terminated at the abbreviation and output. Note that the abbreviations `Dr` and `prof` are read as if referring to male persons, in all cases.

Expression	Reading
`Il Dr Rossi non è disponibile.`	*Il Dottore Rossi non è disponibile.*
`La Dr. Rossi non è disponibile.`	*La Dottore. Rossi non è disponibile.*

The user lexicon may be used to redefine any of the abbreviations below, or to create your own.

Abbreviation	L	W/S
dr	*D R*	*dottore*
ecc	*E C C*	*eccetera*
es	*E S*	*esempio*
etc	*E T C*	*eccetera*
prof	*P R O F*	*professore*
spett	*S P E T T*	*spettabile*

Table 10 Abbreviations in the Italian system

7.1 Abbreviations that are context dependent or depend on special entries in the user lexicon

The text-to-speech system recognises certain abbreviations for weights and measures, namely **mm**, **cm**, **dm**, **km**, **cl**, **dl**, **hg**, **kg**. The letters **m**, **g** and **l** are ambiguous in that they can be used to refer to the name of the letters themselves, or be used as abbreviations, notably with the readings *metro /metri, litro / litri* and *grammo / grammi*.

The current version of the Italian text-to-speech system contains a mechanism whereby the user, by entering special codes in the user lexicon, can control the exact reading of these three letters. Table 11 below gives the various transcriptions that have to be entered, and indicates which pronunciations are achieved by each of them.

For **m** the options are:

1) read as *metro / metri* only after a number or before the character < **²** >,
2) read as *metro / metri* only before the character < **²** > (this is also the default reading, if no transcription is entered in the user lexicon)
3) always read as *metro / metri*
4) always read as the name of the letter.

For **g** and **l** the options are:

1) read as *grammo / grammi; litro / litri* only after a number
2) read as *grammo / grammi; litro / litri* in all cases.

The default reading is to read **g** and **l** as the name of the letters in all cases.

Note that the user lexicon is case-sensitive, so that it is possible to have, e.g., **m** and **M** read differently, by entering a special code for one or both of these. See the more detailed description of this feature in connection with the reading of Roman numerals, section 4.8.2.

The singular forms of these, and of the other abbreviations of weights and measures that are recognised by the system, e.g. *metro, chilometro, chilo, grammo* are used if the number **1** precedes; in all other cases the plural forms are used (*metri, chilometri, chili, grammi* etc.)

Note that the transcriptions are given in both RULSYS and SAMPA,; use one of them, not both.

Lexicon Entry	Transcription	Example text input	Pronunciation in SM
M	# @GM #	12 m	*dodici metri*
	/ _@ g m /	12 m²	*dodici metri quadrati*
		m²	*metri quadrati*
		l m n	*L M N*
M	# @QM #	12 m	*dodici M*
	/ _@ ? m /	12 m²	*dodici metri quadrati*
		m²	*metri quadrati*
		l m n	*L M N*
M	# @ZM #	1 m	*un metro*
	/ _@ z m /	1 m²	*un metro quadrato*
		m²	*metri quadrati*
		l m n	*L metri N*
M	# @AM #	12 m	*dodici m*
	/ _@ a m /	12 m²	*dodici m al quadrato*
		m²	*metri quadrati*
		l m n	*L M N*
G	# @GG #	20 g	*venti grammi*
	/ _@ g g /	1g	*un grammo*
		f g	*F G*
G	# @ZG #	20 g	*venti grammi*
	/ _@ z g /	1g	*un grammo*
		f g	*F grammi*
G	# @G #	20 g	*venti G*
	/ _@ g /	1g	*un G*
		f g	*F G*
L	# @GL #	3 l	*tre litri*
	/ _@ g l /	1l	*un litro*
		n l	*N L*
L	# @ZL #	3 l	*tre litri*
	/ _@ z l /	1l	*un litro*
		n l	*N litri*
L	# @L #	3 l	*tre L*
	/ _@ l /	1l	*un L*
		n l	*N L*

Table 11 Special codes in user lexicon and resulting readings of some input strings