

FEXLTTS-SOFGE-01-03 (Ver. 1.3)

OKI

OKI middle ware for Speech Control Processor

German Text To Speech Ver 1.0 User's Manual

July 12, 2001

Modification History

- 1) 30-Mar-2000 : modify of speed rate range

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1 Introduction

The German Text To Speech system correctly synthesises the majority of German texts. It is sometimes necessary, however, to modify the text to make it compatible with the constraints given in the following paragraphs before submitting it to the Text To Speech process.

2 User interface description

Data transmission/receipt between MSM7630 and the host processor is called the user interface. Section of interface type is determined by the settings of the configuration register, explained below. Data means text data, dictionary data and control codes.

2.1 Reading the configuration register

When MSM7630 starts up, it reads external configuration register values and makes user interface and other environment settings

The user interface to be used is determined by the configuration register value (see table 2-1). Therefore the serial port and parallel port cannot be used in parallel.

Table 2-1

Register Value	Interface
000	2400bps serial port
001	4800bps serial port
010	9600bps serial port
011	19200bps serial port
100	Micro-controller interface

The configuration register is connected to pins D[26:24]. Pull-up 10K register gives register value "1", also Pull-down 10K register gives value "0". (when the bus capacitance is 100pF)

Determine the value of each register so that the bus will stabilize within 18micro second.

2.2 Individual Interface description

2.2.1 Serial port interface

When a serial port interface is selected by the configuration register (when register value is set to 000,001,010 or 011), the data transmit/receive specification is as follows:

Data Format	8bit, no parity, 1stop bit
Transfer Rate	Selectable from 2400, 4800, 9600 or 19200bps
Busy Control	RTS Control

The diagram below shows a serial port interface example.

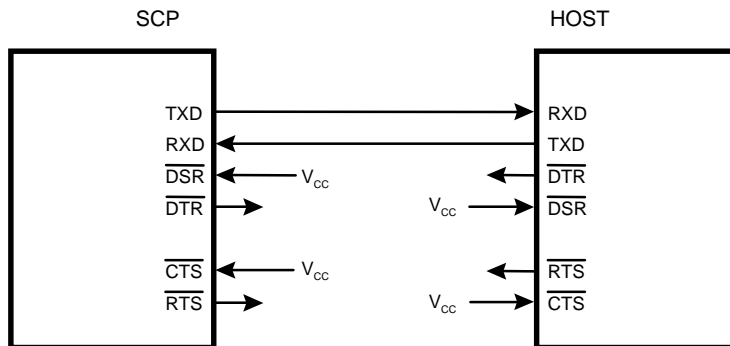


Figure 2-1

Be sure that the ports have sufficient drive capability.

The transmit/receive process from the host is as follows.

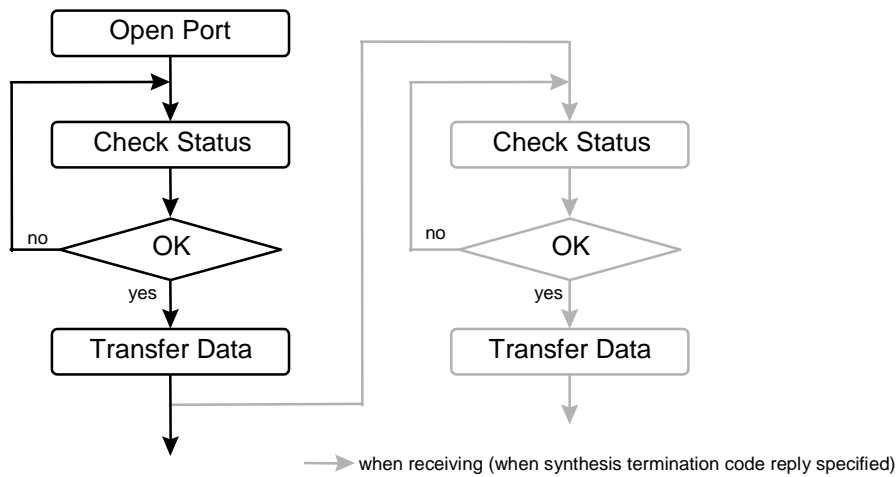


Figure 2-2

The RTS pin will output “0” during reset and immediately after its release. When the serial port cannot accept data, or in other words when the serial port buffer (1Kbyte) has become full, the RTS pin output will change to “1”. When the serial port can accept data, the RTS pin will output “0”.

Because RTS is controlled by software, tens of clock may pass from output of the stop bit until RTS rises. However, RTS is set to become invalid when 128 bytes remain in the receive buffer, so there will be no worry about overrun.

There is no standard time interval from the rise of RTS to the fall of the start bit.

2.2.2 Micro-controller Interface

When a micro-controller interface is selected by the configuration register (when register value is set to 100), the data transmit/receive specification is as follows.

8-Bit data port	PD
Status	PIBF, POBF
Control	PCS, PA, PWR, PRD

Table 2-2

PCS,PA,PWR,PRD	Operation
1xxx	Not operating
0x11	Not operating
0010	PIBF, POBF = output, PD = high-impedance
0110	PIBF, POBF = high-impedance, PD = output
0001	Prohibited input
0101	Write to PD
0x00	Prohibited input

x: Don't care

For example, to access from a host CPU, connect as shown in the falling diagram.

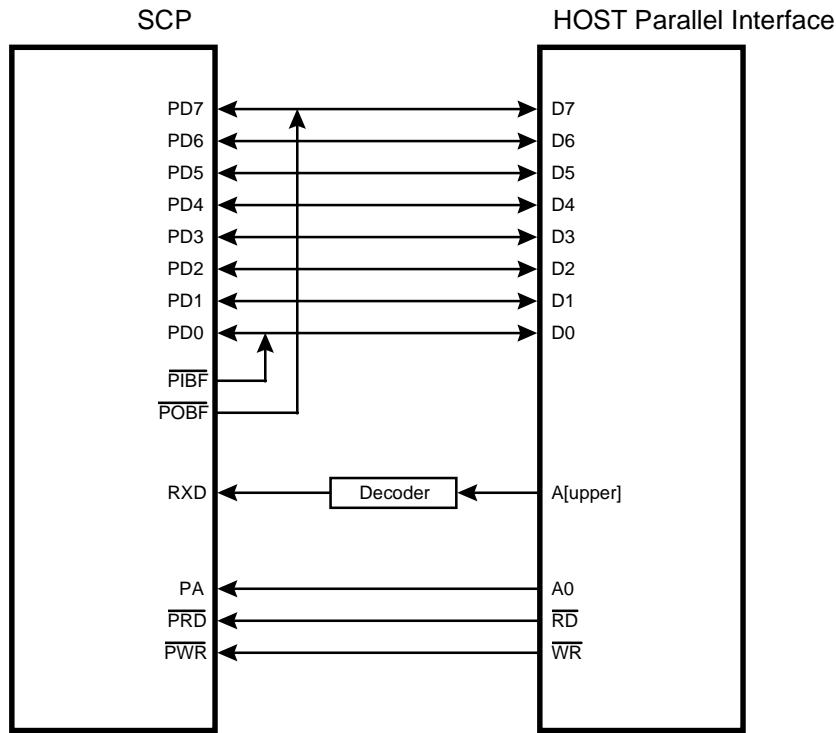


Figure 2-3

In the above case, PIBF (write buffer bit) and POBF (read buffer bit) are connected wire-OR to data port bits 7 and 0 respectively, so the relation between address, status, and data is as follows.

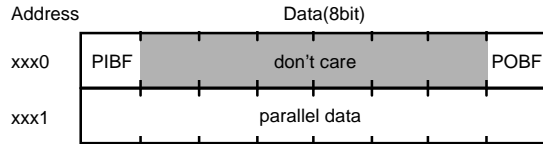


Figure 2-4

The data transfer process is as follows. The “xxx” indicates a MSM7630 parallel port address.

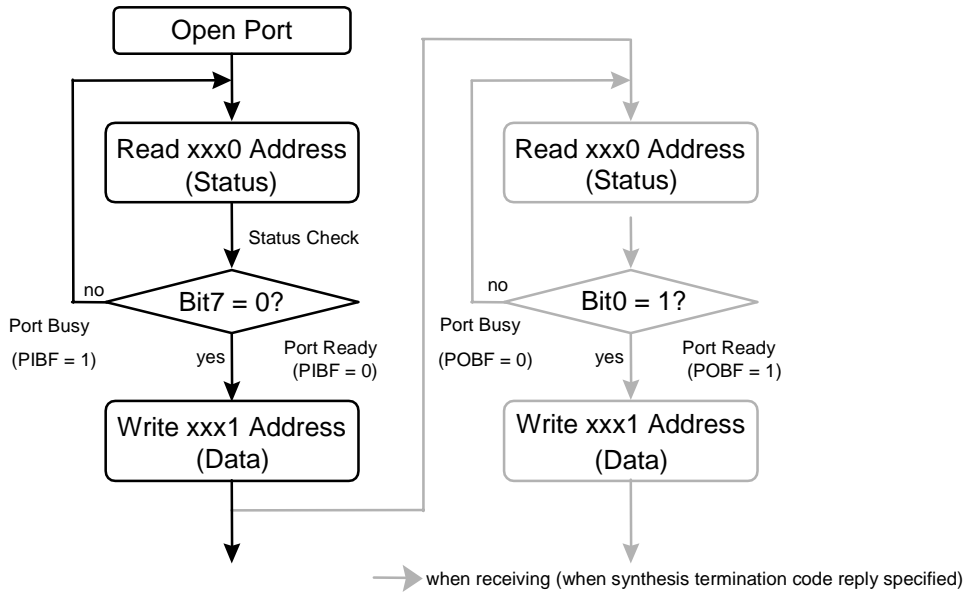


Figure 2-5

For a parallel port when a synthesis termination code replay is specified, the termination code might be missed unless the port is polled until a sentence has been transferred and the termination code accepted.

2.2.3 MSM7630 Start-up Sequence

MSM7630 operates under the following sequence when reset is applied. Make reference to the flow chart, when designing a text to speech synthesiser device that uses MSM7630.

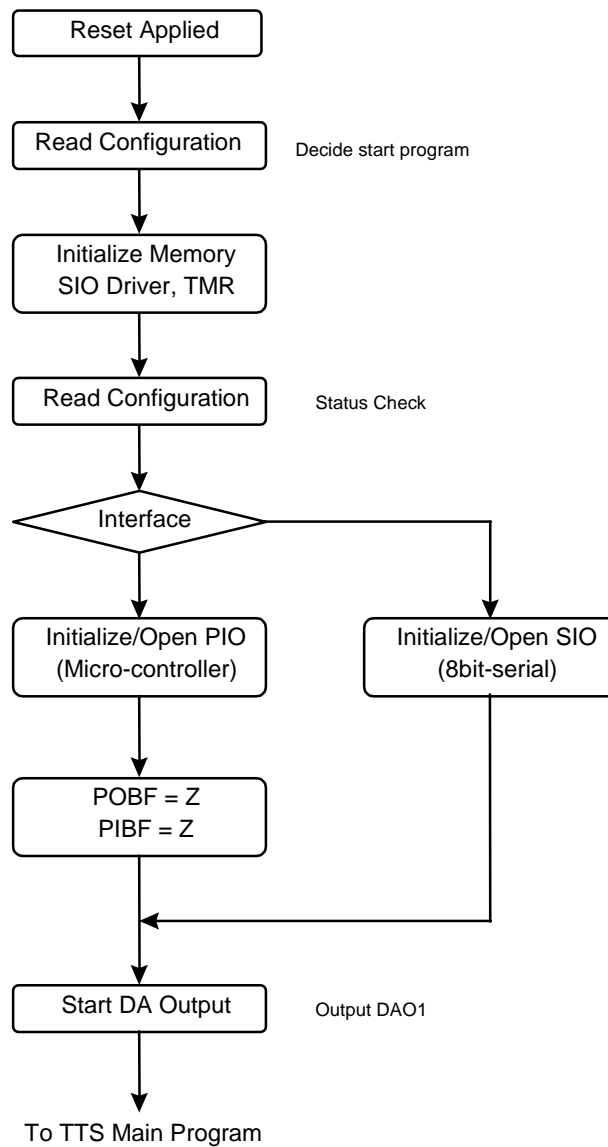


Figure 2-6

ROM accesses are granted immediately after reset. A[23:1] will fluctuate at this time Cache reads are performed, so in particular the three low-order bits will continuously change.

Active signals at this time will be as follows.

A[23:1](especially A[3:1]), ROM, RD

Next the configuration register value will be read, and the DRAM used will be set. This starts DRAM refresh, so the following signals will become active.

RAS, CAS0, CAS1

Next the SIO drive will be initialized. For male phoneme simplex data, the mode will be set, the configuration register value will be read again, and the interface used will be set.

Based on these settings, the following signals will become active.

8-Bit serial interface	RTS,{TXD}
Micro-controller interface	{POBF, PIBF, PD}

However, these signals might not be seen as active for data.

Finally initialization of DA register (internal) values will begin, and DAO1 pin output voltage will become active 1.5Volt. Control will then jump to the main routine. After this the individual interface will wait for input.

The above start-up sequence needs about 700mSec. MSM7630 does not perform self-diagnostic as part of its start-up process.

3 Text To Speech program specification

3.1 Operating Mode

MSM7630 has the operating modes shown in the table below. The operating mode is selected by an operating mode specification (refer to the control code/command listing in Appendix Table). The default mode is text to speech synthesis mode. When in this mode, input sentences can be output as synthesized speech.

Table 3-1

<i>Mode</i>	<i>Function</i>
0	Text To Speech synthesis mode
1	Phonetic To Speech synthesis mode
2	Unused
3	Exception dictionary read mode

Control codes and commands are provided to control MSM7630 operation. The validity of control codes and commands differs depending on the operating mode. The table below gives a summary of control codes and commands.

Table 3-2

Category		Function
Level1 control codes	Escape codes	Valid except in exception dictionary read mode. These codes primarily set the initial operating state of MSM7630.
Level2 control codes	Text-related	Valid in text-to-speech synthesis mode. These code primarily control how sentences are read.
Level3 control codes	Text-related	Valid except in exception dictionary read mode. These codes primarily control speech quality.
Commands	Control codes	Valid in text-to-speech synthesis mode. Commands control the speech synthesis sequence.

3.1.1 Text To Speech synthesis mode

In this mode, sentences are input and then speech synthesised. MSM7630 detects a termination in the input text (by a termination character) and starts the speech synthesizing operation.

Returning synthesis termination code

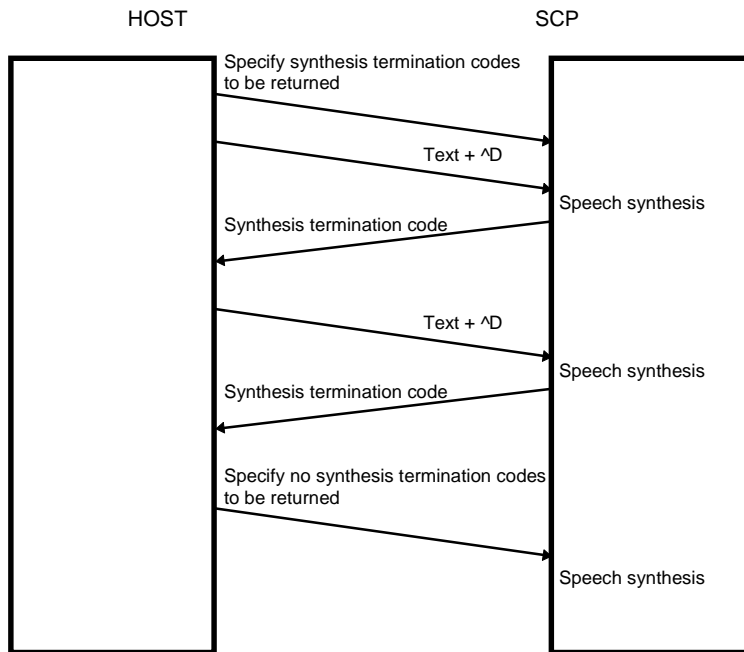


Figure 3-1

In the text to speech synthesis process, MSM7630 normally just synthesizes speech from accepted text, and does not return anything, so a host cannot inspect MSM7630 software status.

For these case MSM7630 can be made to return a synthesis termination code each time synthesis processing of s sentence completes (each time the synthesized sound is output) by specifying that a synthesis termination code is to be returned (refer to “Control Codes/Commands (1) Level 1”).

When a synthesis termination code has been specified to be returned, only the response request code ^D (04H), not the termination characters, will be recognized as a terminator. The host appends the response request code ^D (04H) to each sentence of text and sends the sentence to MSM7630. The host then must not send further text or Level 1 control codes until MSM7630 returns the synthesis termination code. MSM7630 will return the synthesis termination code when output of synthesized sound ends. After the synthesis termination code has been returned, the host can immediately send the next text. Fig. 3-1 shows the sequence when return of synthesis termination codes has been specified, and Fig. 3-2 shows the format of the synthesis termination code.

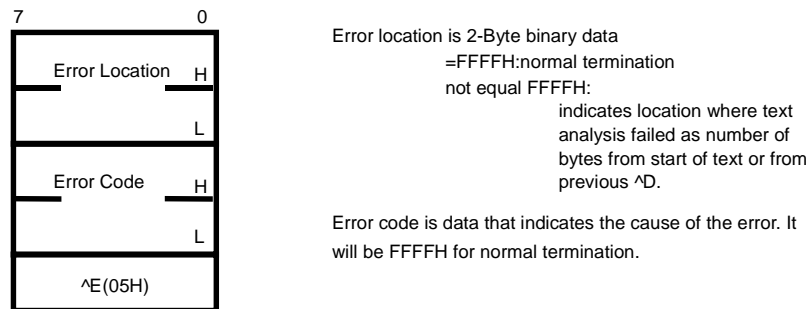


Figure 3-2

3.1.2 Exception Dictionary Read Mode

In this mode, an exception dictionary created by a utility that runs on the host is downloaded into the devices. An exception dictionary is not appended to the previously sent user dictionary, but entirely overwrites it. An exception dictionary that has been sent cannot then be read.

3.1.2.1 Dictionary transfer procedure for serial and microcontroller interfaces

After the host has specified exception dictionary read mode (refer to “Control Codes/Commands (1) Level 1”), it will receive an ACK (06H) code from MSM7630, and then will send the exception dictionary. After MSM7630 receives the exception dictionary, it performs a BCC check and, based on the result, sends a termination response of ACK (06H) for normal termination or NACK (15H) for abnormal termination. After it sends the termination response, MSM7630 will automatically transfer to its default operating mode (text-to-speech synthesis mode).

3.1.2.2 Time-out

In exception dictionary read mode, MSM7630 will monitor the time interval between character transmissions. When the interval timer times out (about one second), MSM7630 will transfer to text-to-speech synthesis mode. It will not inform the host.

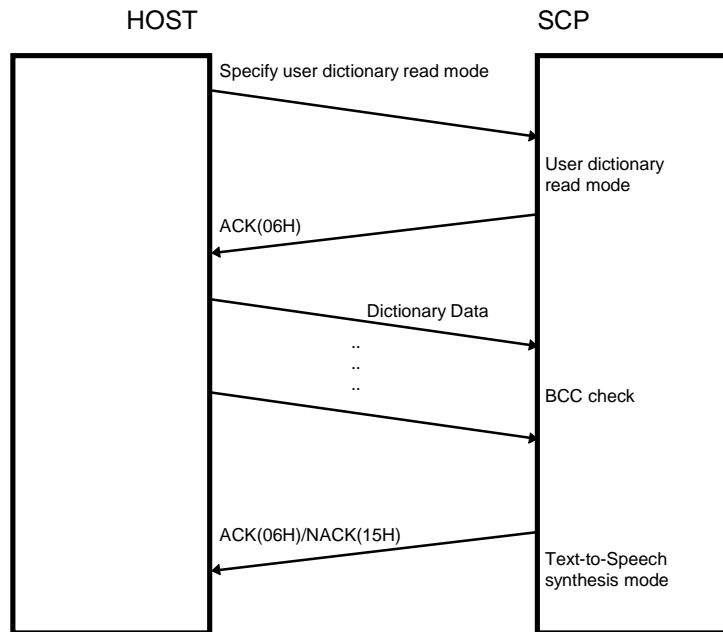
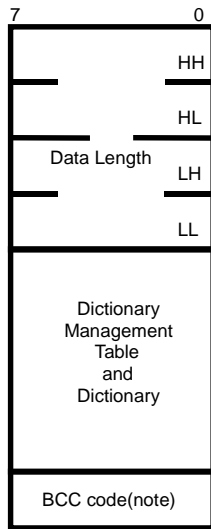


Figure 3-3



Note: The BCC code (1 byte) is for the exclusive OR of all data in the dictionary management table and the dictionary.

Figure 3-4

3.1.3 Hardware sound output (busy signal)

Busy signal should be given while sound output. Busy signal is active low level.

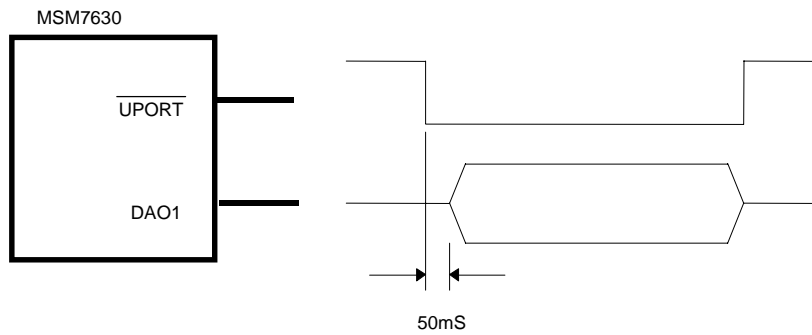


Figure 3-5

3.2 Control Codes Specifications

Control codes are sent by the host to control MSM7630's speech synthesis operations before starting. Some are sent alone, and some are sent inserted anywhere between sentences or words in the text.

3.2.1 Level1 Control Code

Level 1 control codes are output before the text file to set the operating state of MSM7630. Text characters are specified in half size capitals to follow the escape code (1BH). Lists the Level 1 control code

Table 3-3

<i>Level 1 Control Code</i>	<i>Description</i>
1	Code format
2	Operating mode
3	Synthesis termination code

3.2.1.1 Code format

Specifies the code format of input text. The word *dos* refers to IBM extended characters.

Table 3-4

	<i>Code format</i>	<i>Description</i>
1	[ESC]C0	IBM dos (default)
2	[ESC]C1	ISO 8859-1
3	[ESC]CD	Return to default

3.2.1.2 Operating mode specification

Specifies the MSM7630's operating mode.

Table 3-5

	<i>Code format</i>	<i>Description</i>
1	[ESC]M0	Text-to-Speech synthesis mode (default)
2	[ESC]M1	Phonetic-to-Speech synthesis mode
3	[ESC]M2	reserved
4	[ESC]M3	Exception dictionary read mode

3.2.1.3 Phonetic-to-Speech synthesis mode

In this mode, Phonetic-to-Speech synthesis mode. Example :

"Guten tag,in ESC M1 e."l."an" ##en"f."O."r."m."A."t."l."k." ESC M0
 schon..... "

3.2.1.4 Synthesis termination codes returned/not returned

This feature specifies whether or not a synthesis termination code is to be returned after synthesis ends for each sentence. Since MSM7630 normally speech synthesizes the text it receives without returning anything, the host cannot inspect its status. Therefore, while the host shows text one character at a time on its display and sends the text to the MSM7630 for speech synthesis processing, the display and synthesized sounds may not be synchronized (since there is a process delay from text input to synthesis start). Synthesis termination codes are used to synchronize the host and MSM7630 processes.

Table 3-6

	<i>Code format</i>	<i>Description</i>
1	[ESC]E0	Do not return synthesis termination codes (default). (note 1) The terminating character will be recognized as the end of text. If text analysis is not possible, then the portion of text that cannot be analyzed will be skipped, but the speech synthesis process will be performed.
2	[ESC]E1	Return synthesis termination code. Instead of a terminating character, only the response request code ^D (04H) will be recognized as the end of text (note 2).
3	[ESC]ED	Return to default setting

Note 1: Fig. 3-2 shows the format of synthesis termination codes.

Note 2: The response request code is appended after the text's terminating character.

3.2.2 Level 2 Control Code

Level 2 control codes not only set the operating state prior to sending a text, but can also used between sentences in a text. They are specified with characters, and affect text following the control code.

Table 3-7

<i>Level 2 Control Code</i>	<i>Description</i>
1	numeric form pronunciation

These controls allow the numeric forms to be pronounced in several ways depending on the context. The default mode is "usual". There are 6 control codes: "usual", "scientific", "commercial", "date", "telephone", "roman".

Table 3-8

<i>Control Code</i>	<i>Description</i>	<i>INFORMATION VALUE</i>
[u]	To restore the default mode	No information value
[s]	To pronounce scientific expressions	No information value
[c]	To pronounce Commercial expressions	No information value
[t]	To pronounce telephone numbers	No information value
[d]	To pronounce the dates	No information value
[R+]	To pronounce roman numbers	+ to enable and - to disable
[a]	To pronounce the number of address	No information value

3.2.2.1 Usual pronunciation [u]

This control restores the default mode.

The Control Name is **u**, there is not Control Information.

Example:

".....[u] 521,8563"

3.2.2.2 Scientific pronunciation [s]

This control permits to pronounce the scientific expressions with the characters "+, -, *, \, =".

The Switch Name is **s**, there is not Switch Information. To disable this control it is necessary to use an other control as "usual", "commercial", "date" or "telephone", "address", because these control codes are exclusive.

Examples:

This control permits to pronounce:

- the numeric value into a word or an expression like a number

"\s 12+13+14=39 \u" will be pronounced *"zwölf plus dreizehn plus vierzehn ist gleich neununddreissig"*

- always the minus sign

"[s] 13 - 12 = 1 [u]" and "[s] 13-12=1 [u]" will be pronounced *"dreizehn minus zwölf ist gleich eins"*

- the numeric value after the decimal comma digit per digit

"[s] 456,1234 [u]" will be pronounced *"vierhundertsechsfünfzig komma eins zwei drei vier"*

3.2.2.3 Commercial pronunciation [c]

The Switch Name is **c**, there is not Switch Information. To disable this control it is necessary to use an other control: "usual", "scientific", "date", "telephone", "address", because these control codes are exclusive.

This control permits to pronounce:

- the numeric value after the decimal comma digit per digit,

Example:

"[c] 456,1234 [u]" will be pronounced *"vierhundertsechsfünfzig komma eins zwei drei vier"*

- the dash after the decimal comma like "Mark"

Example:

"[c] 12,- [u]" will be pronounced *"zwölf Mark"*

3.2.2.4 Pronunciation of dates [d]

This control permits to pronounce the thousands in hundreds.

The Switch Name is **d**, there is not Switch Information. To disable this control it is necessary to use an other control: "usual", "scientific", "commercial", "telephone", "address", because these control codes are exclusive.

Example:

"[d] 1912 [u]" will be pronounced "*neunzehnhundertzwölf*"

3.2.2.5 Pronunciation of telephone numbers [t]

This control permits to pronounce the telephone numbers digit per digit.

The Switch Name is **t**, there is not Switch Information. To disable this control it is necessary to use an other control: "usual", "scientific", "commercial", "date ", "address", because these control codes are exclusive.

Example:

"[t] 1234567 [u]" will be pronounced "*eins zwei (pause) drei vier (pause) fünf sechs sieben*"

3.2.2.6 Pronunciation of roman numbers [R+]

This control permits to pronounce the roman numbers. The roman numbers are composed with the capital letters: I V X L C D M.

The Switch Name is **R**, the Switch Information is **+** to enable and **-** to disable. The control "usual" permits also to disable it.

Example:

"[R]+ IV [R]-" will be pronounced "*vier*"

3.2.2.7 Pronunciation of address([a])

Example:

"[a] Zum Junen Str. 7-9 [u]" the number will be pronounced "*sieben bis neun*"

"[a] Zum Junen Str 7 -9 [u]" the number will be pronounced "*sieben bis neun*"

"[a] Zum Junen Str 7- 9 [u]" the number will be pronounced "*sieben bis neun*"

3.2.3 Level 3 Control Code

Level 3 control codes can be inserted anywhere between words in the text, not just between sentence. They primarily voice quality, enabling fine control of voice quality for each word.

Table 3-9

<i>Level 3 Control Code</i>	<i>Description</i>
1	Pitch modification
2	Speed rate modification
3	Voice volume
4	Pause control
5	Modulated sound output

3.2.3.1 Pitch modification

This control permits to change the pitch in the text.

Table 3-10

	<i>Code format</i>	<i>Description</i>
1	{H+n}	n: From -100 (low) to +100 (high) . The default value is 0.
2	{HD}	Return to default setting

This control¹ permits to change the pitch in the text.

The Switch Name is **pitch**, the Switch Information is a value ranging from -100 to +100 surrounded with brackets.

Example:

"Guten tag {H+10} herr Schmidt {H-10}"

¹Not supported by all the platforms

3.2.3.2 Speed rate modification

This control permits to modify the speech rate of the text.

Table 3-11

	<i>Code format</i>	<i>Description</i>
1	{T+n}	n: From +100(slow) to -10(fast: male voice) - 0(fast: female voice). The default value is 0.
2	{TD}	Return to default setting

This control² permits to change the speech rate in the text.

The Switch Name is **duree**, the Switch Information is a value ranging from -10 (fast: male voice) -0 (fast: female voice) to +100 (slow) surrounded with brackets.

Example:

"Guten tag {T+10} herr Schmidt {T-10}"

3.2.3.3 Voice volume

Specifies the loudness of voice.

Table 3-12

	<i>Code format</i>	<i>Description</i>
1	{P-n}	n: From -100(min) to 0(max) . The default value is 0.
2	{PD}	Return to default setting

²Not supported by all the platforms

3.2.3.4 Pause Control

This control allows a pause in the text.

Table 3-13

	<i>Code format</i>	<i>Description</i>
1	{p1000ms}	1000 millisecond pause in the text
2	{p1s}	1 second pause in the text
3	{p2mn}	2 minute pause in the text

This control allows a pause in the text.

The Switch Name is **pause**, the Switch Information is a duration either in millisecond or in second or in minute surrounded with brackets.

Example:

"Guten tag {p1000ms} meine....."

"Guten tag {p1s} meine....."

"Guten tag {p2mn} meine....."

3.2.3.5 Modulated sound output

Output modulated sounds.

Table 3-14

	<i>Code format</i>	<i>Description</i>
1	{B0}	500Hz, 160ms sine wave
2	{B1}	1kHz, 160ms sine wave
3	{B2}	2kHz, 160ms sine wave
4	{B3}	Chime 1 (short-long)
5	{B4}	Chime 2 (rising tone: short-short-short-long)
6	{B5}	Chime 3 (falling tone: short-short-short-long)

3.2.4 Command Specification

Commands are interrupting processes that are completely asynchronous with MSM7630's internal processes. Synthesis Stop, pause and restart are provided by commands. Commands are invalid in text-to speech synthesis, used primarily to control the sequence of speech synthesis. Commands are allocated to control codes below 0x20.

3.2.4.1 Stop

Stops the current text-to-speech synthesis process.

Table 3-15

	<i>Code format</i>	<i>Description</i>
1	^C(03H)	Stop the current Text-to-Speech synthesis process

The stop command causes MSM7630 to discard all text captured so far during synthesis, including speech synthesis parameters. MSM7630 will then return to an input wait state.

3.2.4.2 Initialize

Stops processing of the current operating mode. Returns all Level 1 to 3 Code settings (including mode specification) to their defaults.

Table 3-16

	<i>Code format</i>	<i>Description</i>
1	^R(12H)	Stop processing of the current operating mode

4 Rules to be applied

4.1 Sentence

4.1.1 Number of characters

A sentence must not be more than 1024 characters long (markers³ and control codes⁴ included). Longer sentences will be truncated between two words to produce two or several sentences which will be less than 1024 characters long⁵.

4.1.2 Number of words

A sentence must not be more than 60 words long (markers⁶ and control codes⁷ excluded). If a sentence contains more than 60 words without punctuation, the system automatically inserts a full stop.

4.2 Word

A word must not be more than 150 characters long. Longer words will be truncated to 150 characters to produce two or several words of less than 150 characters.

³ See chapter Markers

⁴ See chapter Switches

⁵ An overflow may be caused by the translation of numbers and acronyms. For example the number 033544628, which has 9 characters, will have 46 characters after translation.

⁶ See chapter Markers

⁷ See chapter Switches

4.3 Character

A character must be coded in IBM extended ASCII or in ISO 8859-1⁸.

Refer to appendix B for the translation of ASCII codes.

4.4 Dash

The presence of a dash between two words is used by the system to recognize a hyphenated word or to apply a liaison between the two words. The presence of a dash between two digits is used to recognize a scientific expression. The correct use of the dash is therefore very important.

4.4.1 Between words

- **Pause**

When the dash is separated from the words by a space, it is translated by a pause like a comma.

Example:

"Mein Name hallt von kriegerischen Echos - der Satz stammt von Herrn Ferri."

- **Hyphen**

The hyphen is correct if directly connected to the first part of the word and just before a carriage return.

⁸Depending on the platform

Example:

Between lines :

"demon-
stration".

• **Ignored**

When the dash is directly connected to the words, it is ignored and translated like a space character.

Example:

"Baby-Haut" will be pronounced "*Baby Haut*"

4.4.2 Between digits

The dash "-" between two digits is pronounced "*strich*" when the dash is directly connected to the first digit.

Example:

"34-35" will be pronounced "*drei vier strich drei fünf*"

"34 - 35" will be pronounced "*vierunddreissig (pause) fünfunddreissig*"

The dash will be pronounced "*Minus*" with the control⁹ \s.

4.5 Punctuation

Punctuation plays an important part in the texts analysed by the system. It is necessary to put a space character just after the punctuation mark.

⁹See chapter Switches

4.5.1 List of pronunciations recognised by the system and their effects

Table 4-1

<i>PUNCTUATION</i>	<i>INTONATION</i>	<i>PAUSE</i>
.	falling	long
;	falling	long
:	rising	medium
,	rising	medium
!	falling	long
?	rising	long
-	rising	medium

4.5.2 Automatic breaks

If a sentence contains too many words or too many characters without punctuation, the system automatically inserts a full stop¹⁰.

4.5.3 Full stop

A "." is always considered as a punctuation mark if it is not preceded by an abbreviation or by a number¹¹.

4.6 Acronyms and abbreviations

4.6.1 Acronyms

The system does not deal with acronyms. It will try to pronounce the acronym as a normal word.

¹⁰See chapter Sentence

¹¹See chapter Ordinal numbers

4.6.2 Abbreviations :

List of abbreviations

See the *ABREVIAT.RGS* ASCII file.

Adding or modifying an abbreviation

See the chapter *Abbreviations lexicon*.

Note:

At the end of the sentence, if the last point is a full stop, it must be separated from the abbreviation by a space character.

4.7 Numeration

4.7.1 Numbers

• Integers

Examples:

"-12" will be pronounced "*minus zwölf*"

"123343" or "123.343" will be pronounced "*123 Tausend 343*"¹²

"1912" will be pronounced "*eintausendneunhundertzwölf*"

"123 456 567 678 678" will be pronounced "*123 456 567 678 678*"

"123.78.890.556" will not be processed as an integer because the groups separated by "." are not composed of 3 digits. It will be pronounced digit per digit.

"012" will be pronounced "*null eins zwei*"

Remark:

It is possible to pronounce integers digit per digit using the control \t¹³.

¹² The full stop can be used to separate groups of 3 digits in large numbers

¹³ See chapter *Switches*

- **Decimal numbers**

They are correct if there is no space character between the "," and the numbers (for instance "36,55" is correct, but "36, 55" is not).

Examples:

"4,56" will be pronounced "*4 komma 56*"

"-3,4" will be pronounced "*minus drei komma vier*"

"0,456" will be pronounced "*null komma 456*"

"1.234.456,123" will be pronounced "*1 Million 234 Tausend 456 komma einhundertdreinundzwanzig*"

"1912, 123" will be pronounced "*eintausendneunhundertzwölf (pause) 123*"

- **Ordinal numbers**

An ordinal number is a number terminated by a point or by "er".

Examples:

"20." will be pronounced "*zwanzigsten*"

"40er" will be pronounced "*vierziger*".

Remark:

At the end of the sentence, if the last point is a full stop, it must be separated from the number by a space (blank character).

4.7.2 Time

Examples:

"5h", "5 h", "5Uhr" and "5 Uhr" will be pronounced "*fünf Uhr*"

"5:45", "5h45" and "5 Uhr 45" will be pronounced "*fünf Uhr fünfundvierzig*"

"5:45 Uhr", "5:45Uhr", "5:45 h" and "5:45h" will be pronounced "*fünf Uhr fünfundvierzig*"

"5.45 Uhr" and "5.45 h" will be pronounced "*fünf Uhr fünfundvierzig*"

4.7.3 Date

The date format is as follow : three numbers separated by points or slashes.

Examples:

"16.03.1994" and "16/03/1994" will be pronounced "16er (pause) 3er (pause) 1994"

"16.03.94" and "16/03/94" will be pronounced "16er (pause) 3er (pause) 94"

"45.9.1989" will not be processed as a date because $45 > 31$ and will be pronounced "vier fünf (pause) neun (pause) eins neun acht neun"

4.7.4 Currency

Examples:

"5,13 DM", "5,13DM", "DM 5,13" and "DM5,13" will be pronounced "fünf Mark dreizehn"

"5,-- DM" will be pronounced "fünf Mark null"

"5,56 FF" will be pronounced "5 französische franc 56"

4.7.5 Telephone numbers

It is possible to pronounce the numbers digit per digit in using the control¹⁴ \t.

¹⁴See chapter Switches

4.7.6 Combination of digits and others characters

Examples:

"(02)123454" will be pronounced "*null zwei (pause) eins zwei (pause) drei vier (pause) fünf vier*"

"(12)2345-456" will be pronounced "*eins zwei (pause) zwei drei (pause) vier fünf strich vier fünf sechs*"

"ab12xy" will be pronounced "*ah beh zwölf ix üpsilon*"

"#0001" will be pronounced "*doppelkreuz null null null eins*"

"12+13+14=39" will be pronounced "*eins zwei plus eins drei plus eins vier ist gleich drei nein*"¹⁵.

"13-12=1" will be pronounced "*eins drei strich eins zwei ist gleich eins*"¹⁶.

¹⁵See chapter Switches for a scientific pronunciation

¹⁶See chapter Switches for a scientific pronunciation

5 User lexicons

5.1 Exceptions lexicon

The characters in the user lexicon files must be coded in IBM extended ASCII.

5.1.1 Using the lexicon

The exceptions lexicon permits to change the pronunciation of a word or a group of consecutive words. Some german and foreign words which are not pronounced in accordance with the basic rules for german pronunciation can be stored in this user lexicon. It contains a list of exception words with their corresponding pronunciation.

The pronunciation writing uses either an pseudo-orthographic method or a phonetic method:

The pseudo-orthographic method consists of writing the pronunciation with german alphabetical codes. For example, the pronunciation in german of the english word "Clinton" can be written <Clington>.

The phonetic method consists of writing the pronunciation with ALLVOC phonetic codes. For example, the pronunciation in german of the french word "ELAN" can be written [e."l."an"]. This method is easier than the previous one. It requires finding, in a dictionary, the phonetic translation of a word and to change it into ALLVOC phonetic writing. Generally, the phonetic alphabet used in the dictionaries¹⁷ is the one of IPA¹⁸.

Also, it is possible to indicate the grammatical categories of the word.

¹⁷See chapter Correspondence between ALLVOC phonetic codes and IPA symbols

¹⁸International Phonetic Alphabet

5.1.2 Adding an entry to the lexicon file

With a text editor, you can add a new entry to the file called *EXCEPT.TRI* in the installation directory. The maximum length of this file depends on RAM resources¹⁹.

Each exception must be written on one line only (maximum: 256 characters). One exception can consist of one word or several consecutive words (maximum: 5 words). It is necessary to put the same number of pronunciation words than of exception words.

Using punctuation marks in an exception is forbidden. Therefore, it is impossible to write abbreviations in this file. It is not necessary to respect the alphabetic order. The look-up words are case-sensitive. But if you add the option /i, the look-up words are not case sensitive.

Key characters list:

The character : indicates the end of the exception

The codes between < and > indicate orthographic codes

The codes between [and] indicate phonetic codes

The codes between (and) indicate the word categories (optional)

The two characters ## indicate phonetic word boundaries.

The two characters // indicate comments.

The two characters "/i" are optional and indicate to ignore case.

Example:

```
//Beginning of file
Fotoladen : [f."o."t."^o."l."A."A."d."N.](X) /i
ungehalten : [U."n."g."@."h."A."l."t."N.](A)
ASCII Files : [HA"s."k."i."##^Hf."Al"l."z.](N X)
ELAN informatique : [e."l."an"##en"f."O."r."m."A."t."i."k."] /i //French Company
Clinton : <Clington>(N) /i
//End of file
```

Remark:

After modifications, the exceptions lexicon file must be reloaded in the memory.

¹⁹Depending on the platform

5.1.3 Correspondence between German phonetic codes and IPA symbols

See *appendix A*.

5.1.4 Using German phonetic codes

The German phonetic codes are always 3 characters long, except when a special stress or lengthening code (^) is added just before the 3 characters of the basic code.

Coding a glottal:

To code a glottal, the rule of the 3 characters is respected. It is necessary to concatenate the H code with the vowel code. For example: the glottal coded HA" is the result of H with A."

However regarding phonemic vowels ae", oe" and OE", it is not possible to write Hae" for example because there are 4 characters. The F code takes the place of ae, q the place of oe and Q the place of OE.

Here is the translation:

H + ae" = HF"

H + oe" = Hq"

H + OE" = HQ"

For the diphthongs, the glottals are coded like the diphthong but with lower case letters and without H code²⁰.

For the AR" vowel and nasal vowels there are not glottals in German.

It is possible to accentuate a glottal with ^.

5.1.5 Word categories

A : Adverbs,

B : Definite articles,

C : Indefinite articles,

D : Possessive pronouns and possessive adjectives,

E : Personal pronouns,

F : Demonstrative pronouns and demonstrative adjectives,

²⁰See *chart in chapter Correspondence between ALLVOC phonetic codes and IPA symbols*

- G : Relative pronouns,
- H : Interrogative pronouns,
- I : Prepositions with pause,
- J : Prepositions without pause,
- L : Conjunctions of co-ordination,
- M : Conjunctions of subordination, that go together with a verb in final position,
- N : Proper names,
- : Prepositions linked to the preceding context, particles,
- P : Indicative of genitive,
- \$: Verbs,
- + : Words in capital letter,
- X : Not classified word categories, same as no category at all.

5.2 Abbreviations lexicon

5.2.1 Using the lexicon

If the abbreviation is listed in the left column of the abbreviations file, it will be pronounced as indicated in the right column.

The translation writing uses a pseudo-orthographic method. For example, the translation of the abbreviation "MwSt". Can be written "*m[^]ehr_wert-steuer*".

5.2.2 Adding an entry to the lexicon file

With a text editor, you can add a new entry to the file called *ABREVIAT.RGS* in the installation directory. The maximum length of this file depends on RAM resources²¹.

Each abbreviation must be written on one line only (maximum: 256 characters).

It is not necessary to respect the alphabetic order. The look-up words are case-sensitive.

²¹ Depending on the platform

Key characters list:

The character ^ indicates the primary stress

The hyphen - indicates word boundaries

The underscore _ indicates the end of prefix.

The blank characters or the tabulations indicate the separation between the abbreviation and its translation.

The two characters // indicate comments.

Example:

```
//Beginning of file
Abb. ^ab_bildung
Hbf. H^aupt-bahn-hof
ISDN ih_ess_dee_enn
Mme mad^amm
//End of file
```

Remark:

After modifications, the abbreviations lexicon file must be reloaded in the memory.

6 APPENDIX A: List of ALLVOC phonetic codes and IPA symbols

6.1 Vowels

<i>German Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
i."	[i:]	Dienstag
l."	[i], [I]	Milch
^e."	[e:]	Leben
e."	[e]	Element
ae"	[ε:]	Wähle
E."	[ε]	Hätte
y."	[y:], [Y:]	Rübe
Y."	[y], [Y]	Füllt
oe"	[ø:]	Öl
OE"	[ø], [oe]	Hölle
u."	[u:]	Hut
U."	[u], [U]	Mutter
^o."	[o:]	Lob
o."	[o]	Tomate
O."	[ɔ]	Sonne
a."	[a:]	Gras
A."	[a], [ɶ]	Kasse
@."	[ɒ]	Spanien
AR"	[e]	Uhr

6.2 Nasal vowels

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
an"	~ [a]	Restaur <u>an</u> t
on"	~ [ɔ̃]	F <u>on</u> d
en"	~ [ɛ̃]	Tim <u>en</u> bre

6.3 Diphthongs (vowel combinations)

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
AI"	[ai]	Re <u>is</u> e
AU"	[au]	H <u>au</u> s
OY"	[ɔ̃y]	Le <u>u</u> te

6.4 Glottals

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
H*" * : vowel code	[?*] * : vowel code	Ha [?a] <u>A</u> msterdam
ai"	[?ai]	<u>Ei</u> tel
au"	[?au]	<u>Au</u> gen
oy"	[?ɔ̃y]	<u>Eu</u> le

6.5 Semi-consonants

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
j."	[j]	<u>J</u> a

6.6 Consonants

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
p."	[p]	<u>P</u> uppe
b."	[b]	<u>B</u> ett
m."	[m]	<u>M</u> ann
t."	[t]	<u>T</u> al
d."	[d]	<u>D</u> ach
n."	[n]	<u>N</u> ase
k."	[k]	<u>K</u> alt
g."	[g]	<u>G</u> ut
ng"	[ŋ]	<u>L</u> ang
f."	[f]	<u>F</u> arbe
v."	[v]	<u>V</u> ase
s."	[s]	<u>R</u> osse
z."	[z]	<u>R</u> ose
sh"	[ʃ]	<u>S</u> chule
jj"	[ʒ]	<u>G</u> enie
ch"	[ç]	<u>M</u> ich
X."	[x]	<u>A</u> ch
h."	[h]	<u>H</u> at
r."	[r],[R]	<u>R</u> at
l."	[l]	<u>L</u> iebe

6.7 Affricate consonants

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
pf"	[pf]	<u>P</u> fund
ts"	[ts]	<u>Z</u> ahl

6.8 Syllabic consonants

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Example</i>
M."	[m] '	Groß <u>m</u>
N."	[n] '	Groß <u>n</u>
L."	[l] '	Nag <u>l</u>
R."	[r] '	Nag <u>r</u>

6.9 Stress

<i>ALLVOC Phonetic Code</i>	<i>IPA Symbol</i>	<i>Definition</i>
^	[']	accent

7 APPENDIX B: List of ASCII codes translated**7.1 7 bits ASCII characters**

<i>Decimal ASCII code</i>	<i>Character</i>	<i>Recognised as / translated by</i>
0	^@ (NUL)	ignored
1	^A (SOH)	marker
...	...	ignored
9	^I (HT)	separator of word
10	^J (LF)	separator of word
...	...	ignored
13	^M (CR)	separator of word
...	...	ignored
32		separator of word
33	!	exclamation point (mark) / pause
34	"	ignored
35	#	ignored
36	\$	sign / <i>dólar</i>
37	%	sign / <i>por ciento</i>
38	&	sign / <i>y</i>
39	'	ignored
40	(punctuation / pause or separator of phone number
41)	punctuation / pause or separator of phone number

<i>Decimal ASCII code</i>	<i>Character</i>	<i>Recognised as / translated by</i>
42	*	sign / <i>estrella</i>
43	+	sign / <i>más</i>
44	,	punctuation / pause or decimal comma / <i>coma</i>
45	-	punctuation / pause or hyphen or sign / <i>menos</i>
46	.	punctuation / pause or date separation
47	/	date or phone number separation
48	0	digit zero
49	1	digit one
50	2	digit two
51	3	digit three
52	4	digit four
53	5	digit five
54	6	digit six
55	7	digit seven
56	8	digit eight
57	9	digit nine
58	:	colon / pause or time separation
59	;	semicolon / pause
60	<	ignored
61	=	sign / <i>es igual</i>
62	>	ignored
63	?	question mark / pause
64	@	ignored
65	A	A capital letter
66	B	B capital letter
67	C	C capital letter
68	D	D capital letter
69	E	E capital letter
70	F	F capital letter

<i>Decimal ASCII code</i>	<i>Character</i>	<i>Recognised as / translated by</i>
71	G	G capital letter
72	H	H capital letter
73	I	I capital letter
74	J	J capital letter
75	K	K capital letter
76	L	L capital letter
77	M	M capital letter
78	N	N capital letter
79	O	O capital letter
80	P	P capital letter
81	Q	Q capital letter
82	R	R capital letter
83	S	S capital letter
84	T	T capital letter
85	U	U capital letter
86	V	V capital letter
87	W	W capital letter
88	X	X capital letter
89	Y	Y capital letter
90	Z	Z capital letter
91	[punctuation / pause
92	\	ignored
93]	punctuation / pause
94	^	ignored
95	_	ignored
96	`	ignored
97	a	a small letter
98	b	b small letter
99	c	c small letter
100	d	d small letter
101	e	e small letter
102	f	f small letter

<i>Decimal ASCII code</i>	<i>Character</i>	<i>Recognised as / translated by</i>
103	g	g small letter
104	h	h small letter or time
105	i	i small letter
106	j	j small letter
107	k	k small letter
108	l	l small letter
109	m	m small letter
110	n	n small letter
111	o	o small letter
112	p	p small letter
113	q	q small letter
114	r	r small letter
115	s	s small letter
116	t	t small letter
117	u	u small letter
118	v	v small letter
119	w	w small letter
120	x	x small letter
121	y	y small letter
122	z	z small letter
123	{	punctuation / pause
124		ignored
125	}	punctuation / pause
126	~	ignored
127		ignored

7.2 8 bits ASCII characters

<i>Decimal ASCII code</i>	<i>IBM extended Character</i>	<i>Recognised as / translated by</i>	<i>ISO 8859-1 Character</i>	<i>Recognised as / translated by</i>
128	Ç	Ç capital letter / s	█	ignored
129	ü	ü small letter	█	ignored
130	é	é small letter / e	,	ignored
131	â	â small letter / a	f	ignored
132	ä	ä small letter	„	ignored
133	à	à small letter / a	...	ignored
134	å	å small letter / o	†	ignored
135	ç	ç small letter / s	‡	ignored
136	ê	ê small letter / ä	^	ignored
137	ë	ë small letter / e	‰	ignored
138	è	è small letter / a	Š	ignored
139	ï	ï small letter / i	‹	ignored
140	î	î small letter / i	Œ	ignored
141	ì	ì small letter / i	█	ignored
142	Ä	Ä capital letter	█	ignored
143	Å	Å small letter / o	█	ignored
144	É	É capital letter / e	█	ignored
145	æ	æ small letter / a	˘	ignored
146	Æ	Æ capital letter / a	˙	ignored
147	ô	ô small letter / o	“	ignored
148	ö	ö small letter	”	ignored
149	ò	ò small letter / o	•	ignored
150	û	û small letter / ü	–	ignored
151	ù	ù small letter / ü	—	ignored
152	ÿ	ÿ small letter / ü	~	ignored
153	Ö	Ö capital letter	™	ignored

<i>Decimal ASCII code</i>	<i>IBM extended Character</i>	<i>Recognised as / translated by</i>	<i>ISO 8859-1 Character</i>	<i>Recognised as / translated by</i>
154	Ü	Ü capital letter	š	ignored
155	ø	ø small letter / ö	›	ignored
156	£	sign / pfund	œ	ignored
157	¥	ignored	█	ignored
158	Ⓔ	ignored	█	ignored
159	f	ignored	ÿ	ignored
160	á	á small letter / a	NBSP	ignored
161	í	í small letter / i	ı	ignored
162	ó	ó small letter / o	ø	ignored
163	ú	ú small letter / ü	£	sign / pfund
164	ñ	ñ small letter / n	¤	ignored
165	Ñ	Ñ capital letter / n	¥	ignored
166	ª	ignored	ı	ignored
167	º	ignored	§	ignored
168	¿	ignored	¨	ignored
169	¬	ignored	©	ignored
170	¬	ignored	ª	ignored
171	½	ignored	«	ignored
172	¼	ignored	¬	ignored
173	ı	ignored	-	ignored
174	«	ignored	®	ignored
175	»	ignored	-	ignored
176	⋮	ignored	º	ignored
177	⋮	ignored	±	ignored
178	█	ignored	²	sign / zumquadrat
179		ignored	³	ignored
180	‡	ignored	´	ignored
181	‡	ignored	μ	sign / mikro
182	‡	ignored	¶	ignored
183	π	ignored	·	ignored
184	¶	ignored	¸	ignored
185	¶	ignored	¹	ignored

<i>Decimal ASCII code</i>	<i>IBM extended Character</i>	<i>Recognised as / translated by</i>	<i>ISO 8859-1 Character</i>	<i>Recognised as / translated by</i>
186		ignored	°	ignored
187	¶	ignored	»	ignored
188	¼	ignored	¼	ignored
189	½	ignored	½	ignored
190	¾	ignored	¾	ignored
191	¿	ignored	¿	ignored
192	À	ignored	À	à small letter / a
193	Á	ignored	Á	á small letter / a
194	Â	ignored	Â	â small letter / a
195	Ã	ignored	Ã	A capital letter
196	Ä	ignored	Ä	Ä capital letter
197	Å	ignored	Å	Å capital letter / o
198	Æ	ignored	Æ	Æ capital letter / ä
199	Ç	ignored	Ç	Ç capital letter / s
200	È	ignored	È	è small letter / e
201	É	ignored	É	é small letter / e
202	Ê	ignored	Ê	ê small letter / ä
203	Ë	ignored	Ë	ë small letter / e
204	Ì	ignored	Ì	ì small letter / i
205	Í	ignored	Í	í small letter / i
206	Î	ignored	Î	î small letter / i
207	Ï	ignored	Ï	ï small letter / i
208	Ð	ignored	Ð	D capital letter
209	Ñ	ignored	Ñ	Ñ capital letter / n
210	Ò	ignored	Ò	ò small l letter / o
211	Ó	ignored	Ó	ó small l letter / o
212	Ô	ignored	Ô	ô small letter / o
213	Õ	ignored	Õ	O capital letter
214	Ö	ignored	Ö	Ö capital letter
215	×	ignored	×	x small letter
216	Ø	ignored	Ø	O capital letter
217	Ù	ignored	Ù	Ù capital letter / ü

<i>Decimal ASCII code</i>	<i>IBM extended Character</i>	<i>Recognised as / translated by</i>	<i>ISO 8859-1 Character</i>	<i>Recognised as / translated by</i>
218	Г	ignored	Ú	Ú capital letter / ü
219	■	ignored	Û	Û capital letter / ü
220	■	ignored	Ü	Ü capital letter
221	■	ignored	Ý	Y capital letter
222	■	ignored	Ɔ	ignored
223	■	ignored	ß	German sz
224	α	ignored	à	à small letter / a
225	ß	German sz	á	á small letter / a
226	Г	ignored	â	â small letter / a
227	Π	ignored	ã	a small letter
228	Σ	ignored	ä	ä small letter
229	σ	ignored	å	å small letter / o
230	μ	<i>mikro</i>	æ	æ small letter / ä
231	τ	ignored	ç	ç small letter / s
232	Φ	ignored	è	è small letter / e
233	Θ	ignored	é	é small letter / e
234	Ω	<i>ohm</i>	ê	ê small letter / ä
235	δ	ignored	ë	ë small letter / e
236	∞	ignored	ì	ì small letter / i
237	ø	ignored	í	í small letter / i
238	ε	ignored	î	î small letter / i
239	∩	ignored	ï	ï small letter / i
240	≡	ignored	ð	ignored
241	±	ignored	ñ	ñ small letter / n
242	≥	ignored	ò	ò small letter / o
243	≤	ignored	ó	ó small letter / o
244	∫	ignored	ô	ô small letter / o
245	∫	ignored	õ	o small letter
246	÷	ignored	ö	ö small letter
247	≈	ignored	÷	ignored
248	°	sign / grad	ø	ignored
249	·	ignored	ù	ù small letter / ü

<i>Decimal ASCII code</i>	<i>IBM extended Character</i>	<i>Recognised as / translated by</i>	<i>ISO 8859-1 Character</i>	<i>Recognised as / translated by</i>
250	·	ignored	ú	ú small letter / ü
251	√	ignored	û	û small letter / ü
252	ˆ	ignored	ü	ü small letter
253	²	sign / zumquadrat	ý	y small letter
254	■	ignored	þ	ignored
255		ignored	ÿ	ÿ small letter / ü