ASCII or EBCDIC
Translation Tables

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Introduction

The following conversion table is provided as a reference for ASCII and EBCDIC translation. When moving information *(files or data buffers)* between EBCDIC machines and ASCII machines it is quite often necessary to convert the information. If the data strings contain only display or printable characters then it is a straightforward, byte-for-byte conversion. However, in the real world the actual conversion of data strings between an ASCII and EBCDIC encoding schema is usually more complicated than a simple byte-for-byte conversion. For example, if the data strings contain packed or binary data or control information then the data conversion becomes content sensitive.

The translation of records or data strings within a file may be an explicitly defined task or it may be done as part of a file transfer process when files are being moved between systems that use a different encoding schema. If a data conversion is done by the file transfer process the data should be reviewed to ensure that special characters *(currency symbols, the copyright symbol, the trademark symbol and more)* are correctly converted.

For more information about the automated or programmatic conversion between EBCDIC and ASCII refer to the Downloads and Links to Similar Pages at the end of this document.

We have made a significant effort to ensure the documents and software technologies are correct and accurate. We reserve the right to make changes without notice at any time. The function delivered in this version is based upon the enhancement requests from a specific group of users. The intent is to provide changes as the need arises and in a timeframe that is dependent upon the availability of resources.

The ASCII and EBCDIC Tables

The following is the ASCII and EBCDIC translation tables. In addition to the ASCII and EBCDIC values the following tables include the decimal, hexadecimal and binary values.

(Next) (Previous) (Table-of-Contents) (Decimal **000-031**) (Hexadecimal **00-1F**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
000	00	NUL	NUL	0000 0000	016	10	DLE	DLE	0001 0000

001	01	SOH	SOH	0000 0001	017	11	DC1	DC1	0001 0001
002	02	STX	STX	0000 0010	018	12	DC2	DC2	0001 0010
003	03	ETX	ETX	0000 0011	019	13	DC3	DC3	0001 0011
004	04	SEL	EOT	0000 0100	020	14	RES/ENP	DC4	0001 0100
005	05	TAB	ENQ	0000 0101	021	15	NL	NAK	0001 0101
006	06	RNL	ACK	0000 0110	022	16	BS	SYN	0001 0110
007	07	DEL	BEL	0000 0111	023	17	POC	ETB	0001 0111
008	08	GE	BS	0000 1000	024	18	CAN	CAN	0001 1000
009	09	SPS	TAB	0000 1001	025	19	EM	EM	0001 1001
010	0A	RPT	LF	0000 1010	026	1A	UBS	SUB	0001 1010
011	0B	VT	VT	0000 1011	027	1B	CU1	ESC	0001 1011
012	0C	FF	FF	0000 1100	028	1C	IFS	FS	0001 1100
013	0D	CR	CR	0000 1101	029	1D	IGS	GS	0001 1101
014	0E	SO	SO	0000 1110	030	1E	IRS	RS	0001 1110
015	0F	SI	SI	0000 1111	031	1F	ITB/IUS	US	0001 1111

(Next) (Previous) (Table-of-Contents) (Decimal **032-063**) (Hexadecimal **20-3F**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
032	20	€	Space	0010 0000	048	30		0	0011 0000
033	21	SOS	!	0010 0001	049	31		1	0011 0001
034	22	FS	"	0010 0010	050	32	SYN	2	0011 0010
035	23	WUS	#	0010 0011	051	33	IR	3	0011 0011
036	24	BYP/INP	$	0010 0100	052	34	PP	4	0011 0100
037	25	LF	%	0010 0101	053	35	TRN	5	0011 0101
038	26	ETB	&	0010 0110	054	36	NBS	6	0011 0110
039	27	ESC	'	0010 0111	055	37	EOT	7	0011 0111
040	28	SA	(	0010 1000	056	38	SBS	8	0011 1000
041	29	SFE	)	0010 1001	057	39	IT	9	0011 1001
042	2A	SM/SW	*	0010 1010	058	3A	RFF	:	0011 1010
043	2B	CSP	+	0010 1011	059	3B	CU3	;	0011 1011
044	2C	MFA	,comma	0010 1100	060	3C	DC4	<	0011 1100
045	2D	ENQ	-	0010 1101	061	3D	NAK	=	0011 1101
046	2E	ACK	.	0010 1110	062	3E		>	0011 1110
047	2F	BEL	/	0010 1111	063	3F	SUB	?	0011 1111

(Next) (Previous) (Table-of-Contents) (Decimal **064-095**) (Hexadecimal **40-5F**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
064	40	Space	@	0100 0000	080	50	&	P	0101 0000
065	41	RSP	A	0100 0001	081	51	é	Q	0101 0001
066	42	â	B	0100 0010	082	52	ê	R	0101 0010
067	43	ä	C	0100 0011	083	53	ë	S	0101 0011
068	44	à	D	0100 0100	084	54	è	T	0101 0100
069	45	á	E	0100 0101	085	55	í	U	0101 0101
070	46	ã	F	0100 0110	086	56	î	V	0101 0110
071	47	å	G	0100 0111	087	57	ï	W	0101 0111
072	48	ç	H	0100 1000	088	58	ì	X	0101 1000
073	49	ñ	I	0100 1001	089	59	ß	Y	0101 1001
074	4A	¢	J	0100 1010	090	5A	!	Z	0101 1010
075	4B	.	K	0100 1011	091	5B	$	[	0101 1011

076	4C	<	L	0100 1100	092	5C	*	\	0101 1100
077	4D	(	M	0100 1101	093	5D	)	]	0101 1101
078	4E	+	N	0100 1110	094	5E	;	^	0101 1110
079	4F	|	O	0100 1111	095	5F	¬	_	0101 1111

(Next) (Previous) (Table-of-Contents) (Decimal **096-127**) (Hexadecimal **60-7F**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
096	60	-	`	0110 0000	112	70	ø	p	0111 0000
097	61	/	a	0110 0001	113	71	É	q	0111 0001
098	62	Â	b	0110 0010	114	72	Ê	r	0111 0010
099	63	Ä	c	0110 0011	115	73	Ë	s	0111 0011
100	64	À	d	0110 0100	116	74	È	t	0111 0100
101	65	Á	e	0110 0101	117	75	Í	u	0111 0101
102	66	Ã	f	0110 0110	118	76	Î	v	0111 0110
103	67	Å	g	0110 0111	119	77	Ï	w	0111 0111
104	68	Ç	h	0110 1000	120	78	Ì	x	0111 1000
105	69	Ñ	i	0110 1001	121	79	`	y	0111 1001
106	6A	¦	j	0110 1010	122	7A	:	z	0111 1010
107	6B	,comma	k	0110 1011	123	7B	#	{	0111 1011
108	6C	%	l	0110 1100	124	7C	@	|	0111 1100
109	6D	_	m	0110 1101	125	7D	'	}	0111 1101
110	6E	>	n	0110 1110	126	7E	=	~	0111 1110
111	6F	?	o	0110 1111	127	7F	"	DEL	0111 1111

(Next) (Previous) (Table-of-Contents) (Decimal **128-159**) (Hexadecimal **80-9F**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
128	80	Ø	€	1000 0000	144	90	DLE		1001 0000
129	81	a		1000 0001	145	91	j		1001 0001
130	82	b		1000 0010	146	92	k		1001 0010
131	83	c		1000 0011	147	93	l		1001 0011
132	84	d		1000 0100	148	94	m		1001 0100
133	85	e		1000 0101	149	95	n		1001 0101
134	86	f		1000 0110	150	96	0		1001 0110
135	87	g		1000 0111	151	97	p		1001 0111
136	88	h		1000 1000	152	98	q		1001 1000
137	89	i		1000 1001	153	99	r		1001 1001
138	8A			1000 1010	154	9A			1001 1010
139	8B			1000 1011	155	9B			1001 1011
140	8C			1000 1100	156	9C	æ		1001 1100
141	8D	ý		1000 1101	157	9D			1001 1101
142	8E			1000 1110	158	9E	Æ		1001 1110
143	8F			1000 1111	159	9F		Ÿ	1001 1111

(Next) (Previous) (Table-of-Contents) (Decimal **160-191**) (Hexadecimal **A0-BF**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
160	A0			1010 0000	176	B0	^		1011 0000
161	A1	~		1010 0001	177	B1	£		1011 0001
162	A2	s	¢	1010 0010	178	B2	¥		1011 0010
163	A3	t	£	1010 0011	179	B3			1011 0011
164	A4	u		1010 0100	180	B4	©		1011 0100

165	A5	v	¥	1010 0101	181	B5		1011 0101
166	A6	w	¦	1010 0110	182	B6		1011 0110
167	A7	x		1010 0111	183	B7		1011 0111
168	A8	y		1010 1000	184	B8		1011 1000
169	A9	z	©	1010 1001	185	B9		1011 1001
170	AA			1010 1010	186	BA	[	1011 1010
171	AB			1010 1011	187	BB	]	» 1011 1011
172	AC		¬	1010 1100	188	BC		1011 1100
173	AD	Ý		1010 1101	189	BD		1011 1101
174	AE		®	1010 1110	190	BE		1011 1110
175	AF	®		1010 1111	191	BF		1011 1111

(Next) (Previous) (Table-of-Contents) (Decimal **192-223**) (Hexadecimal **C0-DF**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
192	C0	{	À	1100 0000	208	D0	}		1101 0000
193	C1	A	Á	1100 0001	209	D1	J	Ñ	1101 0001
194	C2	B	Â	1100 0010	210	D2	K	Ò	1101 0010
195	C3	C	Ã	1100 0011	211	D3	L	Ó	1101 0011
196	C4	D	Ä	1100 0100	212	D4	M	Ô	1101 0100
197	C5	E	Å	1100 0101	213	D5	N	Õ	1101 0101
198	C6	F	Æ	1100 0110	214	D6	O	Ö	1101 0110
199	C7	G	Ç	1100 0111	215	D7	P		1101 0111
200	C8	H	È	1100 1000	216	D8	Q	Ø	1101 1000
201	C9	I	É	1100 1001	217	D9	R	Ù	1101 1001
202	CA		Ê	1100 1010	218	DA		Ú	1101 1010
203	CB	ô	Ë	1100 1011	219	DB	û	Û	1101 1011
204	CC	ö	Ì	1100 1100	220	DC	ü	Ü	1101 1100
205	CD	ò	Í	1100 1101	221	DD	ù	Ý	1101 1101
206	CE	ó	Î	1100 1110	222	DE	ú		1101 1110
207	CF	õ	Ï	1100 1111	223	DF	ÿ	ß	1101 1111

(Next) (Previous) (Table-of-Contents) (Decimal **224-255**) (Hexadecimal **E0-FF**)

DEC	HEX	EBCDIC	ASCII	BINARY	DEC	HEX	EBCDIC	ASCII	BINARY
224	E0	\	à	1110 0000	240	F0	0		1111 0000
225	E1		á	1110 0001	241	F1	1	ñ	1111 0001
226	E2	S	â	1110 0010	242	F2	2	ò	1111 0010
227	E3	T	ã	1110 0011	243	F3	3	ó	1111 0011
228	E4	U	ä	1110 0100	244	F4	4	ô	1111 0100
229	E5	V	å	1110 0101	245	F5	5	õ	1111 0101
230	E6	W	æ	1110 0110	246	F6	6	ö	1111 0110
231	E7	X	ç	1110 0111	247	F7	7		1111 0111
232	E8	Y	è	1110 1000	248	F8	8	ø	1111 1000
233	E9	Z	é	1110 1001	249	F9	9	ù	1111 1001
234	EA		ê	1110 1010	250	FA		ú	1111 1010
235	EB	Ô	ë	1110 1011	251	FB	Û	û	1111 1011
236	EC	Ö	ì	1110 1100	252	FC	Ü	ü	1111 1100
237	ED	Ò	í	1110 1101	253	FD	Ù	ý	1111 1101
238	EE	Ó	î	1110 1110	254	FE	Ú		1111 1110
239	EF	Õ	ï	1110 1111	255	FF	Ÿ	ÿ	1111 1111

Decimal Values
0-31 | 32-63 | 64-95 | 96-127 | 128-159 | 160-191 | 192-223 | 224-255
Hexadecimal Values
00-1F | 20-3F | 40-5F | 60-7F | 80-9F | A0-BF | C0-DF | E0-FF

Special Characters or Symbols

The following tables are provided as a matter of convenience. The symbols are included in the preceding table but may be easier to find in the smaller tables that follow.

Grave-Acute-Circumflex-Umlaut-Tilde

The following table shows the ASCII and EBCDIC values for the alternate symbols of the Acute, Circumflex, Grave, Tilde and Umlaut. The "Courier New (*fixed font*)" and "Times Roman (*proportional font*)" fonts will display the following characters.

Acute			Circumflex			Grave			Tilde			Umlaut		
Sym	ASC	EBC	Sym	ASC	EBC	Sym	ASC	EBC	Sym	ASC	EBC	Sym	ASC	EBC
Á	C1	65	Â	C2	62	À	C0	64	Ã	C3	66	Ä	C4	63
á	E1	45	â	E2	42	à	E0	44	ã	E3	46	ä	E4	43
É	C9	71	Ê	CA	72	È	C8	74				Ë	CB	73
é	E9	51	ê	EA	52	è	E8	54				ë	EB	53
Í	CD	75	Î	CE	76	Ì	CC	78				Ï	CF	77
í	ED	55	î	EE	56	ì	EC	58				ï	EF	57
Ó	D3	EE	Ô	D4	EB	Ò	D2	ED	Õ	D5	EF	Ö	D6	EC
ó	F3	CE	ô	F4	CB	ò	F2	CD	õ	F5	CF	ö	F6	CC
Ú	DA	FE	Û	DB	FB	Ù	D9	FD				Ü	DC	FC
ú	FA	DE	û	FB	DB	ù	F9	DD				ü	FC	DC
Ý	DD	AD										Ÿ	9F	FF
ý	FD	8D										ÿ	FF	DF
									Ñ	D1	69			
									ñ	F1	49			

Note: *In the preceding table the "Y" character with an umlaut (both upper and lower case characters of Ÿ and ÿ) may affect program logic that is dependent on a High-Values or HEX "FF" content.*

Currency Symbols and More

The following table shows the ASCII and EBCDIC values for currency symbols and more of the alternate symbols. The "Courier New (*fixed font*)" and "Times Roman (*proportional font*)" fonts will display the following characters.

Symbol	ASCII	EBCDIC	Comment
$	x'24' or 036	x'5B' or 091	Dollar Sign
€	x'80' or 128	x'20' or 032	Euro Currency

¢	x'A2' or 162	x'4A' or 074	US Cent
£	x'A3' or 163	x'B1' or 177	Pound
¥	x'A5' or 165	x'B2' or 178	Yen
¦	x'A6' or 166	x'6A' or 106	Two-Piece Vertical Bar
ß	x'DF' or 223	x'59' or 089	Strasse, Germany
Å	x'C5' or 197	x'67' or 103	A-ring
å	x'E5' or 229	x'47' or 071	a-ring
Ç	x'C7' or 199	x'68' or 104	letter "C" with cedilla (*upper case*)
ç	x'E7' or 231	x'48' or 072	letter "c" with cedilla (*lower case*)
Ø	x'D8' or 216	x'80' or 128	O-slash
ø	x'F8' or 248	x'70' or 112	o-slash
Æ	x'C6' or 198	x'9E' or 158	Diphthong
æ	x'E6' or 230	x'9C' or 156	Diphthong
¬	x'AC' or 172	x'5F' or 095	Logical NOT
©	x'89' or 169	x'B4' or 180	Copyright
®	x'AE' or 174	x'AF' or 175	Registered Trademark
X™	x'99' or 153	Unknown	Trademark (Superset TM)
nn° or °	x'B0' or 176		Degree Symbol, specify as **°** or **°**
¨	x'A8' or 168		Umlaut

Note: *The ASCII and EBCDIC columns of the preceding table show the two-byte hexadecimal notation or the three-digit numeric value for the symbol.*

Copyright & Registered Trademark

The copyright symbol © *(a circled "C" Character)* may be placed in an HTML document using the © text string. The Registered Trademark symbol ® *(a circled "R" Character)* may be placed in an HTML document using the ® text string.

Another way to accomplish the task is to use the following.

The copyright symbol © *(a circled "C" Character)* may be placed in an HTML document using the © text string.
The Registered Trademark symbol ® *(a circled "R" Character)* may be placed in an HTML document using the ® text string.

Note: *The Copyright symbol for ASCII-encoding is 169 or x'89'. The copyright symbol for EBCDIC-encoding is 180 or x'B4'.*

Note: *The Registered Trademark symbol for ASCII-encoding is 174 or x'AE'. The Registered Trademark symbol for EBCDIC-encoding is 175 or x'AF'.*

The trademark symbol ™ *(a "TM" in superscript)* may be placed in an HTML document using the ™ text string.
Another approach would be to use the ^{TM} for HTML documents. This would produce the following results - My_Symbol^{TM}.

Summary

The purpose of this document is to provide a quick reference for ASCII and EBCDIC translation. This document may be used as a tutorial for new programmers or as a quick reference for experienced programmers.

In the world of programming there are many ways to solve a problem. This documentation and software were developed and tested on systems that are configured for a SIMOTIME environment based on the hardware, operating systems, user requirements and security requirements. Therefore, adjustments may be needed to execute the jobs and programs when transferred to a system of a different architecture or configuration.

SIMOTIME Services has experience in moving or sharing data or application processing across a variety of systems. For additional information about SIMOTIME Services or Technologies please contact us using the information in the Contact, Comment or Feedback section of this document.

Software Agreement and Disclaimer

Downloads and Links

This section includes links to documents with additional information that are beyond the scope and purpose of this document. The first group of documents may be available from a local system or via an internet connection, the second group of documents will require an internet connection.

Note: *A SimoTime License is required for the items to be made available on a local system or server.*

Current Server or Internet Access

The following links may be to the current server or to the Internet.

Explore the Principles of Data File Conversion. This link includes guidelines for defining requirements and determining the scope of effort for a data conversion effort.

Explore How to Generate a Data File Convert Program using simple specification statements in a Process Control File (PCF). This link to the User Guide includes the information necessary to create a Process Control File and generate the COBOL programs that will do the actual data file conversion. The User Guide contains a list of the PCF statements that are used for the data file convert process.

Explore The Binary or COMP format for numeric data strings. This numeric structure is supported by COBOL and may be explicitly defined with the "USAGE IS COMP" or "USAGE IS BINARY" clause.

Explore The Edited for Display format for numeric data strings. This numeric structure is supported by COBOL and may be used with an edit-mask to prepare the presentation for readability by human beings.

Explore The Packed-Decimal or COMP-3 format for numeric data strings. This numeric structure is supported by COBOL and may be explicitly defined with the "USAGE IS COMP-3" clause.

Explore The Zoned-Decimal format for numeric data strings. This numeric structure is the default numeric for COBOL and may be explicitly defined with the "USAGE IS DISPLAY" clause.

Explore commonly used formats and processing techniques for managing various numeric formats available on the mainframe.

Explore the Numbers Connection for additional information about the structure and processing of numeric data items *(or numeric fields)*.

Explore the cycle of converting and transferring non-relational data files between an IBM Mainframe System and a Windows, Linux or UNIX System. This discussion will leverage the non-relational file support provided by Micro Focus for the distributed systems.

Explore a typical data file conversion process that may be required when working in a multi-system environment. This suite of documents describes a model for managing non-relational data structures *(Sequential Files and VSAM Data Sets)* that contain ASCII or EBCDIC text strings and various numeric formats such as BINARY, PACKED-Decimal and ZONED-Decimal. This model has the capability of creating a test file for an ASCII or EBCDIC encoded environment. This suite of documents will address many of the challenges of doing a record content conversion of a file that will be transferred between an EBCDIC-encoded Mainframe System and an ASCII-encoded Linux, UNIX or Windows System.

Explore The File Status Return Codes that are used to interpret the results of accessing VSAM data sets and/or QSAM files.

Internet Access Required

The following links will require an internet connection.

A good place to start is The SimoTime Home Page for access to white papers, program examples and product information. This link requires an Internet Connection

Explore The Micro Focus Web Site for more information about products (including Micro Focus COBOL) and services available from Micro Focus. This link requires an Internet Connection.

Explore the GnuCOBOL Technologies available from SourceForge. SourceForge is an Open Source community resource dedicated to helping open source projects be as successful as possible. GnuCOBOL (formerly OpenCOBOL) is a COBOL compiler with run time support. The compiler (cobc) translates COBOL source to executable using intermediate C, designated C compiler and linker. This link will require an Internet Connection.

Glossary of Terms

Explore the Glossary of Terms for a list of terms and definitions used in this suite of documents and white papers.

Comments or Feedback

This document was created and is maintained by SimoTime Technologies. If you have any questions, suggestions, comments or feedback please use the following contact information.

1. Send an e-mail to our helpdesk.
   1.1. helpdesk@simotime.com.
2. Our telephone numbers are as follows.
   2.1. **1 415 763-9430** office-helpdesk
   2.2. **1 415 827-7045** mobile

We appreciate hearing from you.

Company Overview

SimoTime Technologies was founded in 1987 and is a privately owned company. We specialize in the creation and deployment of business applications using new or existing technologies and services. We have a team of individuals that understand the broad range of technologies being used in today's environments. Our customers include small businesses using Internet technologies to corporations using very large mainframe systems.

Quite often, to reach larger markets or provide a higher level of service to existing customers it requires the newer Internet technologies to work in a complementary manner with existing corporate mainframe systems. We specialize in preparing applications and the associated data that are currently residing on a single platform to be distributed across a variety of platforms.

Preparing the application programs will require the transfer of source members that will be compiled and deployed on the target platform. The data will need to be transferred between the systems and may need to be converted and validated at various stages within the process. SimoTime has the technology, services and experience to assist in the application and data management tasks involved with doing business in a multi-system environment.

Whether you want to use the Internet to expand into new market segments or as a delivery vehicle for existing business functions simply give us a call or check the web site at http://www.simotime.com

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ASCII or EBCDIC, Translation Tables

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