

Adabas for Linux and Cloud

Code Page Support, Code Page User Exit

Version 7.4.0

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This document applies to Adabas for Linux and Cloud Version 7.4.0 and all subsequent releases.

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Code Page Support

This document contains information about code page support and the code page user exit.

The following topics are covered:

- *Code Page Support*
- *Code Page User Exit*

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About this Documentation

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Document Conventions

| Convention | Description |
|----------------|--|
| Bold | Identifies elements on a screen. |
| Monospace font | Identifies service names and locations in the format <i>folder.subfolder.service</i> , APIs, Java classes, methods, properties. |
| <i>Italic</i> | Identifies: Variables for which you must supply values specific to your own situation or environment. New terms the first time they occur in the text. References to other documentation sources. |
| Monospace font | Identifies: Text you must type in. Messages displayed by the system. Program code. |
| { } | Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols. |
| | Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the symbol. |
| [] | Indicates one or more options. Type only the information inside the square brackets. Do not type the [] symbols. |
| ... | Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...). |

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2 Code Page Support

In heterogeneous client/server architectures, where the client and servers reside on machines with different architectures, Adabas supports a method whereby the client nodes that require different character sets (also called code pages) are provided with the appropriate translation tables for the conversions. An example of this would be an Adabas nucleus running on a Linux machine, with one application running on a mainframe (EBCDIC code) and another application running on a language-sensitive PC; in this case, the nucleus would require 2 translation tables in order to handle the data from both applications correctly.

Code page support is available for:

- ADANUC (ADABAS nucleus)
- ADACMP (compression utility)
- ADADCU (decompression utility)

Adabas supports the use of plain text files as private code pages. In addition to this, DLLs or shared libraries can be used (see [Code Page User Exit](#) below for further details). The translation text file to be used is attached to Adabas with the environment variable ADATRT, but the file must have the extension `.txt` (or `.TXT`), for example:

```
ADATRT = trt.dll # use code pages with built dll
ADATRT = trt.txt # use code pages with text file
```

The syntax of such a text file is as follows:

- Characters and names are not case sensitive.
- A table declaration must start with the code name, either ASCII or EBCDIC. The ASCII table can be used for remote ASCII clients running on a different code page, the EBCDIC table can be used for mainframe clients. One ASCII and/or EBCDIC table may be translated with the text file.

- The character pairs to be translated are specified in hexadecimal notation, separated by a comma. The first character specifies the client value, the second specifies the (ASCII) value on the server side. Only one pair per line is permitted.
- Only the characters that are different need to be supplied, e.g. the translation from EBCDIC “A” to ASCII “A” can be omitted.
- Empty lines are permitted and comments can be made starting with a semicolon.

The following is an example of how to define a private EBCDIC translation file:

```
trt.txt:
EBCDIC
4A,C4    ; translate EBCDIC Ae (0x4A) to ASCII C4
E0,D6    ; translate EBCDIC 0e (0xE0) to ASCII D6
```



Note: The use of text files and shared libraries is mutually exclusive.

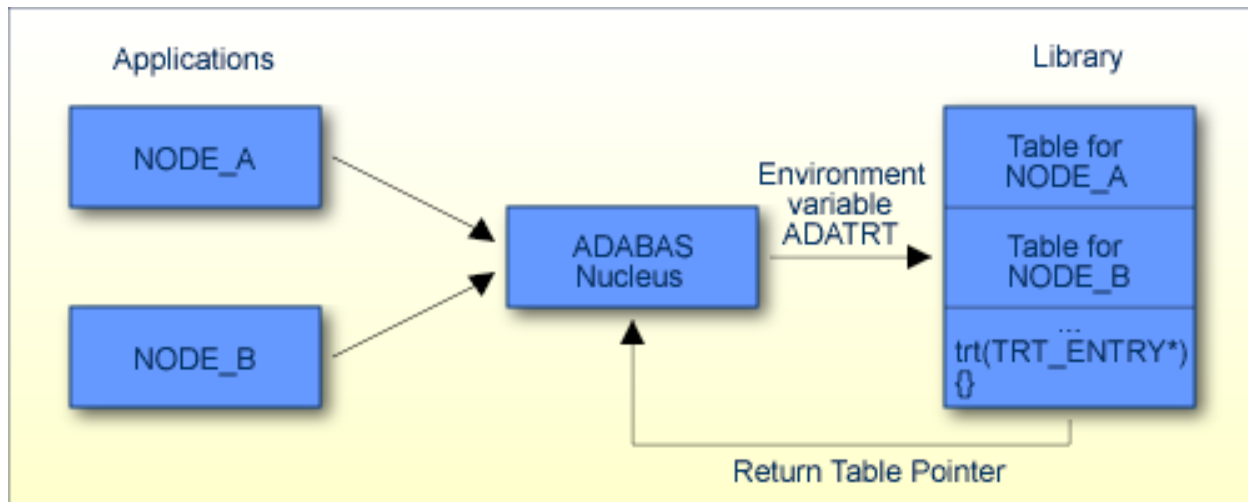
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Code Page User Exit

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In the past, ADABAS had a default internal EBCDIC/ASCII translation table. But in order to provide full flexibility with specific translation tables in complex client/server systems, ADABAS also supports a special code-page user exit.

The ADABAS nucleus calls the user exit when it processes a command that was issued from a remote node. The user exit is called with a pointer to a structure that contains the node name (see the following diagram). The user exit now uses a user-written algorithm to determine which translation table to use, and returns a pointer to a table. Adabas then uses this table for the conversions.



The environment variable ADATRT holds the name of the shared library (Linux) or dynamic link library (Windows) that is created by the user with the appropriate options. Plain text files with the extension .txt can also be used (see *Code Page Support* for further information). The default name for the user function is 'trt', but any name can be selected, for example:

```
setenv ADATRT "$ADADATADIR/db100/adatrt.sl" (Linux C shell)
set ADATRT= %ADADATADIR%\db100\adatrt.dll (Windows)
```

or

```
setenv ADATRT "adatrt.so my_trt" (Linux C shell)
set ADATRT=adatrt.dll my_trt (Windows)
```

The environment variable ADATRT must be set before the nucleus or a utility is started. If it is not defined, the default internal translation table will be used if an EBCDIC/ASCII conversion is required. If ADATRT is defined, but the library cannot be loaded successfully, the nucleus will abort during its startup phase and a corresponding error message will be issued.

Function Interface

```
Format: unsigned char *trt (struct trt_entry *)
```

The trt Structure

trt_node

The basic input is the name of the node that issues the current ADABAS call. On the basis of the node name, the function selects the appropriate code page table. If selected, the function returns a pointer to the table. If nothing is selected, a NULL pointer may be specified to indicate that either no or just the default conversions are to be made.

trt_ctype

The function is called with one of two values. A TRT_INIT call will be performed during the nucleus/utility startup: it will return a value of NULL if it is successful. A TRT_CODE_PAGE call has the node name set so that the function can select a translation table. If the function is called from the utilities ADACMP or ADADCU, the TRT_CODE_PAGE call will be performed once, and the node name will be 'adacmp' or 'adadcu'.

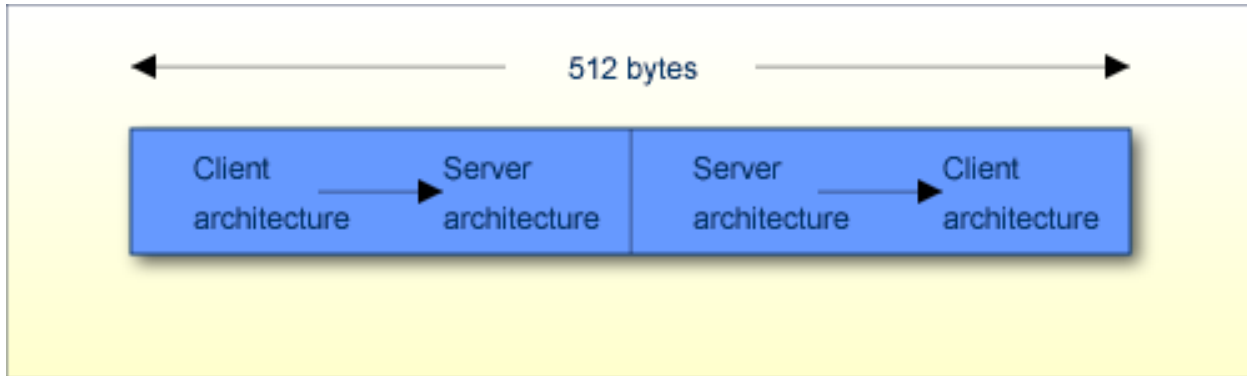
trt_dbid

This specifies the current database number. This is necessary because the translation table function may be shared between several databases.

Translation Table Layout

Translation tables must be 512 bytes long. The first half is used for translations from the client machine architecture to the server architecture; the second 256 bytes are used for the reverse conversions.

Each table must be a real translation table. This means that the value of the input character is the index to the table, and that the character stored in the corresponding cell will be taken.



The user may use as many translation tables as his heterogeneous environment requires.

Calling Conventions

The following rules apply to the use of code pages:

- The user-written function is always called if the current Adabas call comes from a remote node and is a read or update command.
- If the user-written function returns a pointer (to a code page), it will be used for the conversion. Only alphanumeric (format A) data will be converted.
- If the user-written function returns a NULL and both the remote and local architectures are the same, no conversion will be performed.
- If the user-written function returns a NULL and the remote and local architectures are different, the default Adabas conversion table will be used for the conversion.

Creating a Code Page User Exit

The Adabas kit contains a corresponding C header file and an example source file for a code page user exit.

Linux Platforms

The structure `trt_entry` is defined in the file `adaux.h`, which is located in `$ADAPROGDIR/inc`.

An example source file for the code page user exit (file name `adatrt.c`) and the corresponding makefile are located in `$ADAPROGDIR/examples/server`.

Enter the following in order to build this user exit example:


```
cd $ADAPROGDIR/examples/server
make trt
```

The shared library for the user exit is created in \$ADAPROGDIR/examples/server.

Windows Platforms

The structure `trt_entry` is defined in the file `adaux.h`, which is located in the subdirectory “Adabas\inc” of the installation directory.

An example source file for the code page user exit (file name `adatrt.c`) and the corresponding makefile are located in the subdirectory “Adabas\examples\server” of the installation directory.

Enter the following in order to build this user exit example:

```
cd <install_dir>\Adabas\examples\server
nmake trt
```

The DLL for the user exit created in the subdirectory “Adabas\examples\server” of the installation directory.

Default Translation Tables

The following are the default translation tables used by Adabas.

Conversion ASCII ISO-8-bit (8859-1) to EBCDIC



Note: Undefined characters not contained in the table will be converted to 0xFF.

| Decimal Value | ASCII Hex Value | ASCII Character | EBCDIC Hex Value |
|---------------|-----------------|-----------------|------------------|
| 0 | 0x00 | | 0x00 |
| 1 | 0x01 | | 0x01 |
| 2 | 0x02 | | 0x02 |
| 3 | 0x03 | | 0x03 |
| 4 | 0x04 | | 0x37 |
| 5 | 0x05 | | 0x2D |
| 6 | 0x06 | | 0x2E |
| 7 | 0x07 | | 0x2F |
| 8 | 0x08 | | 0x16 |
| 9 | 0x09 | | 0x05 |

| Decimal Value | ASCII Hex Value | ASCII Character | EBCDIC Hex Value |
|---------------|-----------------|-----------------|------------------|
| 10 | 0x0A | | 0x25 |
| 11 | 0x0B | | 0x0B |
| 12 | 0x0C | | 0x0C |
| 13 | 0x0D | | 0x0D |
| 14 | 0x0E | | 0x0E |
| 15 | 0x0F | | 0x0F |
| 16 | 0x10 | | 0x10 |
| 17 | 0x11 | | 0x11 |
| 18 | 0x12 | | 0x12 |
| 19 | 0x13 | | 0x13 |
| 20 | 0x14 | | 0x3C |
| 21 | 0x15 | | 0x3D |
| 22 | 0x16 | | 0x32 |
| 23 | 0x17 | | 0x26 |
| 24 | 0x18 | | 0x18 |
| 25 | 0x19 | | 0x19 |
| 26 | 0x1A | | 0x3F |
| 27 | 0x1B | | 0x27 |
| 28 | 0x1C | | 0x1C |
| 29 | 0x1D | | 0x1D |
| 30 | 0x1E | | 0x1E |
| 31 | 0x1F | | 0x1F |
| 32 | 0x20 | SP | 0x40 |
| 33 | 0x21 | ! | 0x4F |
| 34 | 0x22 | " | 0x7F |
| 35 | 0x23 | # | 0x7B |
| 36 | 0x24 | \$ | 0x5B |
| 37 | 0x25 | % | 0x6C |
| 38 | 0x26 | & | 0x50 |
| 39 | 0x27 | ' | 0x7D |
| 40 | 0x28 | (| 0x4D |
| 41 | 0x29 |) | 0x5D |
| 42 | 0x2A | * | 0x5C |
| 43 | 0x2B | + | 0x4E |
| 44 | 0x2C | , | 0x6B |
| 45 | 0x2D | - | 0x60 |

| Decimal Value | ASCII Hex Value | ASCII Character | EBCDIC Hex Value |
|---------------|-----------------|-----------------|------------------|
| 46 | 0x2E | . | 0x4B |
| 47 | 0x2F | / | 0x61 |
| 48 | 0x30 | 0 | 0xF0 |
| 49 | 0x31 | 1 | 0xF1 |
| 50 | 0x32 | 2 | 0xF2 |
| 51 | 0x33 | 3 | 0xF3 |
| 52 | 0x34 | 4 | 0xF4 |
| 53 | 0x35 | 5 | 0xF5 |
| 54 | 0x36 | 6 | 0xF6 |
| 55 | 0x37 | 7 | 0xF7 |
| 56 | 0x38 | 8 | 0xF8 |
| 57 | 0x39 | 9 | 0xF9 |
| 58 | 0x3A | : | 0x7A |
| 59 | 0x3B | ; | 0x5E |
| 60 | 0x3C | < | 0x4C |
| 61 | 0x3D | = | 0x7E |
| 62 | 0x3E | > | 0x6E |
| 63 | 0x3F | ? | 0x6F |
| 64 | 0x40 | @ | 0x7C |
| 65 | 0x41 | A | 0xC1 |
| 66 | 0x42 | B | 0xC2 |
| 67 | 0x43 | C | 0xC3 |
| 68 | 0x44 | D | 0xC4 |
| 69 | 0x45 | E | 0xC5 |
| 70 | 0x46 | F | 0xC6 |
| 71 | 0x47 | G | 0xC7 |
| 72 | 0x48 | H | 0xC8 |
| 73 | 0x49 | I | 0xC9 |
| 74 | 0x4A | J | 0xD1 |
| 75 | 0x4B | K | 0xD2 |
| 76 | 0x4C | L | 0xD3 |
| 77 | 0x4D | M | 0xD4 |
| 78 | 0x4E | N | 0xD5 |
| 79 | 0x4F | O | 0xD6 |
| 80 | 0x50 | P | 0xD7 |
| 81 | 0x51 | Q | 0xD8 |

| Decimal Value | ASCII Hex Value | ASCII Character | EBCDIC Hex Value |
|---------------|-----------------|-----------------|------------------|
| 82 | 0x52 | R | 0xD9 |
| 83 | 0x53 | S | 0xE2 |
| 84 | 0x54 | T | 0xE3 |
| 85 | 0x55 | U | 0xE4 |
| 86 | 0x56 | V | 0xE5 |
| 87 | 0x57 | W | 0xE6 |
| 88 | 0x58 | X | 0xE7 |
| 89 | 0x59 | Y | 0xE8 |
| 90 | 0x5A | Z | 0xE9 |
| 91 | 0x5B | [| 0x4A |
| 92 | 0x5C | \ | 0xE0 |
| 93 | 0x5D |] | 0x5A |
| 94 | 0x5E | ^ | 0x5F |
| 95 | 0x5F | _ | 0x6D |
| 96 | 0x60 | ` | 0x79 |
| 97 | 0x61 | a | 0x81 |
| 98 | 0x62 | b | 0x82 |
| 99 | 0x63 | c | 0x83 |
| 100 | 0x64 | d | 0x84 |
| 101 | 0x65 | e | 0x85 |
| 102 | 0x66 | f | 0x86 |
| 103 | 0x67 | g | 0x87 |
| 104 | 0x68 | h | 0x88 |
| 105 | 0x69 | i | 0x89 |
| 106 | 0x6A | j | 0x91 |
| 107 | 0x6B | k | 0x92 |
| 108 | 0x6C | l | 0x93 |
| 109 | 0x6D | m | 0x94 |
| 110 | 0x6E | n | 0x95 |
| 111 | 0x6F | o | 0x96 |
| 112 | 0x70 | p | 0x97 |
| 113 | 0x71 | q | 0x98 |
| 114 | 0x72 | r | 0x99 |
| 115 | 0x73 | s | 0xA2 |
| 116 | 0x74 | t | 0xA3 |
| 117 | 0x75 | u | 0xA4 |

| Decimal Value | ASCII Hex Value | ASCII Character | EBCDIC Hex Value |
|---------------|-----------------|-----------------|------------------|
| 118 | 0x76 | v | 0xA5 |
| 119 | 0x77 | w | 0xA6 |
| 120 | 0x78 | x | 0xA7 |
| 121 | 0x79 | y | 0xA8 |
| 122 | 0x7A | z | 0x9A |
| 123 | 0x7B | { | 0xC0 |
| 124 | 0x7C | | 0x6A |
| 125 | 0x7D | } | 0xD0 |
| 126 | 0x7E | ~ | 0xA1 |
| 127 | 0x7F | | 0x07 |
| 196 | 0xC4 | Ä | 0x4A |
| 214 | 0xD6 | Ö | 0xE0 |
| 220 | 0xDC | Ü | 0x5A |
| 223 | 0xDF | ß | 0xA1 |
| 228 | 0xE4 | ä | 0xC0 |
| 246 | 0xF6 | ö | 0x6A |
| 252 | 0xFc | ü | 0xD0 |

Conversion EBCDIC to ASCII ISO-8-bit (8859-1)



Note: Undefined characters not contained in the table will be converted to 0x7F.

| Decimal Value | EBCDIC Hex Value | EBCDIC Character | ASCII Hex Value |
|---------------|------------------|------------------|-----------------|
| 0 | 0x00 | | 0x00 |
| 1 | 0x01 | | 0x01 |
| 2 | 0x02 | | 0x02 |
| 3 | 0x03 | | 0x03 |
| 5 | 0x05 | | 0x09 |
| 7 | 0x07 | | 0x7F |
| 11 | 0x0B | | 0x0B |
| 12 | 0x0C | | 0x0C |
| 13 | 0x0D | | 0x0D |
| 14 | 0x0E | | 0x0E |
| 15 | 0x0F | | 0x0F |
| 16 | 0x10 | | 0x10 |
| 17 | 0x11 | | 0x11 |

| Decimal Value | EBCDIC Hex Value | EBCDIC Character | ASCII Hex Value |
|---------------|------------------|------------------|-----------------|
| 18 | 0x12 | | 0x12 |
| 19 | 0x13 | | 0x13 |
| 22 | 0x16 | | 0x08 |
| 24 | 0x18 | | 0x18 |
| 25 | 0x19 | | 0x19 |
| 28 | 0x1C | | 0x1C |
| 29 | 0x1D | | 0x1D |
| 30 | 0x1E | | 0x1E |
| 31 | 0x1F | | 0x1F |
| 37 | 0x25 | | 0x0A |
| 38 | 0x26 | | 0x17 |
| 39 | 0x27 | | 0x1B |
| 45 | 0x2D | | 0x05 |
| 46 | 0x2E | | 0x06 |
| 47 | 0x2F | | 0x07 |
| 50 | 0x32 | | 0x16 |
| 55 | 0x37 | | 0x04 |
| 60 | 0x3C | | 0x14 |
| 61 | 0x3D | | 0x15 |
| 63 | 0x3F | | 0x1A |
| 64 | 0x40 | SP | 0x20 |
| 74 | 0x4A | Ä | 0xC4 |
| 75 | 0x4B | . | 0x2E |
| 76 | 0x4C | < | 0x3C |
| 77 | 0x4D | (| 0x28 |
| 78 | 0x4E | + | 0x2B |
| 79 | 0x4F | ! | 0x21 |
| 80 | 0x50 | & | 0x26 |
| 90 | 0x5A | Ü | 0xDC |
| 91 | 0x5B | \$ | 0x24 |
| 92 | 0x5C | * | 0x2A |
| 93 | 0x5D |) | 0x29 |
| 94 | 0x5E | ; | 0x3B |
| 95 | 0x5F | ^ | 0x5E |
| 96 | 0x60 | | 0x2D |
| 97 | 0x61 | / | 0x2F |

| Decimal Value | EBCDIC Hex Value | EBCDIC Character | ASCII Hex Value |
|---------------|------------------|------------------|-----------------|
| 106 | 0x6A | ö | 0xF6 |
| 107 | 0x6B | , | 0x2C |
| 108 | 0x6C | % | 0x25 |
| 109 | 0x6D | – | 0x5F |
| 110 | 0x6E | > | 0x3E |
| 111 | 0x6F | ? | 0x3F |
| 121 | 0x79 | ` | 0x60 |
| 122 | 0x7A | : | 0x3A |
| 123 | 0x7B | # | 0x23 |
| 124 | 0x7C | @ | 0x40 |
| 125 | 0x7D | ' | 0x27 |
| 126 | 0x7E | = | 0x3D |
| 127 | 0x7F | " | 0x22 |
| 129 | 0x81 | a | 0x61 |
| 130 | 0x82 | b | 0x62 |
| 131 | 0x83 | c | 0x63 |
| 132 | 0x84 | d | 0x64 |
| 133 | 0x85 | e | 0x65 |
| 134 | 0x86 | f | 0x66 |
| 135 | 0x87 | g | 0x67 |
| 136 | 0x88 | h | 0x68 |
| 137 | 0x89 | i | 0x69 |
| 145 | 0x91 | j | 0x6A |
| 146 | 0x92 | k | 0x6B |
| 147 | 0x93 | l | 0x6C |
| 148 | 0x94 | m | 0x6D |
| 149 | 0x95 | n | 0x6E |
| 150 | 0x96 | o | 0x6F |
| 151 | 0x97 | p | 0x70 |
| 152 | 0x98 | q | 0x71 |
| 153 | 0x99 | r | 0x72 |
| 161 | 0xA1 | ß | 0xDF |
| 162 | 0xA2 | s | 0x73 |
| 163 | 0xA3 | t | 0x74 |
| 164 | 0xA4 | u | 0x75 |
| 165 | 0xA5 | v | 0x76 |

| Decimal Value | EBCDIC Hex Value | EBCDIC Character | ASCII Hex Value |
|---------------|------------------|------------------|-----------------|
| 166 | 0xA6 | w | 0x77 |
| 167 | 0xA7 | x | 0x78 |
| 168 | 0xA8 | y | 0x79 |
| 169 | 0xA9 | z | 0x7A |
| 192 | 0xC0 | ä | 0xE4 |
| 193 | 0xC1 | A | 0x41 |
| 194 | 0xC2 | B | 0x42 |
| 195 | 0xC3 | C | 0x43 |
| 196 | 0xC4 | D | 0x44 |
| 197 | 0xC5 | E | 0x45 |
| 198 | 0xC6 | F | 0x46 |
| 199 | 0xC7 | G | 0x47 |
| 200 | 0xC8 | H | 0x48 |
| 201 | 0xC9 | I | 0x49 |
| 208 | 0xD0 | ü | 0xFC |
| 209 | 0xD1 | J | 0x4A |
| 210 | 0xD2 | K | 0x4B |
| 211 | 0xD3 | L | 0x4C |
| 212 | 0xD4 | M | 0x4D |
| 213 | 0xD5 | N | 0x4E |
| 214 | 0xD6 | O | 0x4F |
| 215 | 0xD7 | P | 0x50 |
| 216 | 0xD8 | Q | 0x51 |
| 217 | 0xD9 | R | 0x52 |
| 224 | 0xE0 | Ö | 0xFC |
| 226 | 0xE2 | S | 0x53 |
| 227 | 0xE3 | T | 0x54 |
| 228 | 0xE4 | U | 0x55 |
| 229 | 0xE5 | V | 0x56 |
| 230 | 0xE6 | W | 0x57 |
| 231 | 0xE7 | X | 0x58 |
| 232 | 0xE8 | Y | 0x59 |
| 233 | 0xE9 | Z | 0x5A |
| 240 | 0xF0 | 0 | 0x30 |
| 241 | 0xF1 | 1 | 0x31 |
| 242 | 0xF2 | 2 | 0x32 |

| Decimal Value | EBCDIC Hex Value | EBCDIC Character | ASCII Hex Value |
|---------------|------------------|------------------|-----------------|
| 243 | 0xF3 | 3 | 0x33 |
| 244 | 0xF4 | 4 | 0x34 |
| 245 | 0xF5 | 5 | 0x35 |
| 246 | 0xF6 | 6 | 0x36 |
| 247 | 0xF7 | 7 | 0x37 |
| 248 | 0xF8 | 8 | 0x38 |
| 249 | 0xF9 | 9 | 0x39 |
| 250 | 0xFA | | 0xFA |
| 255 | 0xFF | | 0xFF |

