

DTA Report Nr 30

Implementation of Swiss Character Set and Code Page 500

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1 Introduction

*This report is written in english to allow discussion and clarification of details with international experts. The outcome of this effort also is of great value for user groups, of which OBRZ is a member (SEAS, G.U.I.D.E.).*

During 1986 guidelines concerning exchange of data (specially for text and documents) were set up. It is stated therein to use code page 500 in the IBM environment. However nothing was told about how to do so.

A more general introduction to the problems of encoding text - in particular in the area of data processing - can be found in the OBRZ publication 410.10.25 (will also be available in French <sup>1)</sup> and English soon). These ideas were put forward to the IKA <sup>2)</sup> at the beginning of 1988.

Now it's the task of OBRZ/DTA to set up a way of implementing code page 500. This must be done in cooperation with customers of OBRZ. Hence a team dealing with this topic was set up.

The team consists of K. Daube (OBRZ/DTA), H. Kalisnik (OBRZ/SA2), E. Kupferschmid (OBRZ/SA3), Th. Maurer (CZ/SDK), A. Oertli (WO/DV) and U. Surber (SBA). Additional people were kept informed about the ongoing discussions.

Some background has to be observed for the implementation of cp 500:

- Code page 500 is proposed for *data exchange* in the guidelines mentioned. However an increasing number of IS-services calls for data with national characters, which have to be entered and displayed.
- Exchange of data takes place between different systems (IBM/MVS, electronic mail, DEC systems, systems /3x etc.)
- The ASCII world is as diverse as the EBCDIC world, however the coding is much more coherent (US-ASCII → ISO 8859/1)
- Actual desires of users on the MVS systems are not simply *implement code page 500* but *support national characters*.
- The hardware of today has to be taken into consideration, but not too much weight should be given this fact, because hardware is cheap compared to the manpower needed in the transition process.
- Since the team cannot take any decisions with financial impact, a proposal to the OBRZ committee has been formulated [10]. Cost estimates are derived from the list of tasks to be done. No accuracy of the figures can be guaranteed, since there are many hidden obstacles in such an undertaking.

1) Translated courtesy by Gouvernement de Québec, Ministère des Communications

2) IKA = IS Koordinations Ausschuss

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## 1.1 Summary of Results

The following items must be presented to the OBRZ Komitee to support a GO/NOGO decision:

- An increasing number of applications call for a richer character set than traditional EDP can service. This is especially in the area of electronic mail, text- and document processing.
- Users in office environments no longer accept a multitude of equipment and various keyboard layouts. They call for a standardized keyboard (VSM).
- Also in host based applications it will become necessary to support not just the language(s) of the "home country". All languages - at least proper names - should be processable on such a system.
- The project *transition to code page 500* must be staffed with people both experienced in many applications and with sense of duty.
- External experts also should be taken into consideration.
- Detailed scheduling should be based on the assumption, that the transition period should be restricted to 6 month. There must be provision for additional 3 month.
- There must be sufficient funding both for hardware and the work to be done.
- It has to be mentioned, that only 1/2 of the work finally done can be foreseen and thus scheduled. This figure is based on the experience of other installations.
- New hardware must be purchased according to the list given in section *Guidelines for Providing*.
- New software must be checked against the list given in section *Guidelines for Providing*.
- Guidelines to make "homegrown" applications use national characters (and language) efficiently should be established.

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1.2 User Demand

- The current coding scheme (DP 94 with some minor modifications done by OBRZ) is to a large extent similar to code page 037, which is the US Country Extended Code Page. This coding scheme is the "common" denominator for most EDP applications. So compiler, utilities etc use this code page.  
These tools must be usable also in the future without special coding tricks at the terminal (braintwisting activities).
- Both for text- and document processing as well as for electronic mail an extended character set holding all national characters of Switzerland are required or at least declared as "nice to have".
- Character set 904, which is available on older IBM terminals is not sufficient for data processing (programming), since both some national characters and special characters (¢, | and ¬) are missing.
- Both devices and processes should be capable of the full character set 697 providing all the symbols (190) of code page 037 or 500. This character set supports all languages of Western Europe.
- OBRZ standards for job names and logon keys call for the number sign (#) on all keyboards.
- For display of texts and documents it would be desirable to support forms drawing characters from PC code page 850. They also should be defined in the GDDM tables.
- All symbols displayable on the VDU's must be displayable on the printers. Both local printers and central printers hence must support character set 697.
- Printers at PCs must support the full character set of code page 850, which is a superset of character set 697. Applications for document processing on the host should be able to handle all these symbols to support documentation of PC applications.

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2 Symbols in Question

Looking at the various coding schemes in use on IBM systems shows the fact, that "only" few symbols use different coding. National characters are generally an extension to the "traditional" charactersets used in the EDP environent. The coding schemes relevant for us are:

- DP94 with minor extensions done by OBRZ
- cp 037/1 US CECP (Country Extended Code Page)
- cp 500/1 International code page
- MNCS (Multi National Character Set on /3x systems) <sup>3)</sup>

	DP94-OBRZ	cp 037	cp500	MNCS
ø	x'4A'	x'4A'	x'B0'	x'B0'
!	x'5A'	x'5A'	x'4F'	x'4F'
	x'4F', x'6A'	x'4F'	x'BB'	x'BB'
┘	x'5F'	x'5F'	x'BA'	x'BA'
	undefin.	x'6A'	x'6A'	x'6A'
[	x'AD'	x'BA'	x'4A'	x'4A'
]	x'BD'	x'BB'	x'5A'	x'5A'
<i>f</i>	undefin.	undefin.	undefin.	x'B4'
=	undefin.	undefin.	undefin.	x'BF'
num.sp.	undefin.	undefin.	undefin.	x'E1'

3) The version of MNCS considered here was published in "IBM S/3x Kundeninformation 2/88". It can be assumed that by the time it will be identical to code page 500

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## 2.1 Usage of these Symbols

To our knowledge the symbols in question are used in several applications. Most of them are system applications like utilities and system services. Team representatives from our customer companies claim that no real applications exist, which use these characters in a syntactically relevant manner (e.g. as command delimiter).

Syntactically relevant means, that these symbols are associated with a special meaning (not text). This may be command delimiter, record separator or else. In this context the meaning also includes, that these symbols can not be defined outside the process. They are so called "hard coded" in the application.

### 2.1.1 Applications

Application	Symbols	Usage
Artikel-DB (CZ), CAPOSS	\$	Output only
COMES-II		Command delimiter
Textformatter <i>SUSI</i>	\$ ¢   ¬	Various syntactic meanings; no problem due to .codepage command
ISPF	¢ !     [ ]	Various meanings; tables tailorable
Application System (AS)	!   ¬	Command delimiter, logical operators
Fortran Precompiler MCSTRUFO	!   ¬ [ ]	Comment introducer, logical operators; code page can be loaded
Query Management Facility (QMF)	¬	Logical operator
Librarian	¬	Logical operator
Compiler PL/1	¬	Logical operator
Compiler Pascal (Pascal 8000, VS Pascal)	¬ [ ]	Logical operators, array declarator; substitutions for [ and ] are ( and .)
Compiler C (VS C)	!   ¬ [ ]	Operators, array declarators
REXX	¬	Logical Operators

### 2.1.2 Special Applications

#### Screen Definition Facility

SDF uses nearly all special characters. Hence it is very sensitive to coding.

#### ASCII ↔ EBCDIC Translation

- Tape I/O with OPTCD=Q

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- Gateway between DEC and IBM systems

This translation must make use of the full code page. That is, ASCII will become ISO 8859/1 and EBCDIC will be code page 500.

**Terminal Emulation** Current emulations assume some sort of DP94 as host code page. Code page 500 is only useful, if a Swiss keyboard is connected to the PC. For US keyboards and older emulation packages code page 500 cannot be established.

**File Transfer** Current file transfers assume some sort of DP94 as host code page as well as US-ASCII on the PC. That is, all national characters on the PC are cut off. File transfers must allow for transparent transmission, that is no translation at all. There also must be a translation between code page 850 and 500.

**Utilities** There are some utilities around to support special treatment of data. They rely on translate tables for ASCII ↔ EBCDIC and "printable characters" or lower-to upper case translations.

**ASCITOS** Read an arbitrary tape file in ASCII and translate to EBCDIC record structure. Usage of this utility has deminished.

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## 2.2 Code dependent Applications

These are applications, which contain tables to classify or handle textual data. These tables assume a symbol at a specified code point. These code points are not similar in all cases for the symbols involved.

- Restrict input to certain symbols (e.g. syntactic character set)
- Restrict output to certain symbols (e.g. translate all to upper case)
- The coding of the input is translated without knowledge of the user.
- Codes are interpreted with a special meaning (e.g. what is an upper case character, what is a punctuation character, translation from lower to upper case)

Currently these tables are based on DP94. They must be changed or expanded both for usage with code page 037 and 500.

The National Language Support Cookbook gives a list of such applications:

- ISPF
- DFSORT
- GDDM
- ASCII ↔ EBCDIC translation (e.g. tape I/O)
- TSO/E
- PC ↔ Host File transfer
- MEMO

It is recommended to remove all output filters from programs. They do not allow to display national characters. Besides that it is not the task of an individual program or application to take account of the real output capabilities of a device. This is the task of JES or similar device drivers.

For system utilities this also is true, since most of them also run only, if JES is active. So it is not necessary to avoid "unprintable" symbols in the text portion of **dumps**.

Newer GDDM releases provide a change of the code table.

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### 2.3 Terminal Emulation

PC-environment	Host-environment for file transfer	Remarks, actions
3278/79 [IBM] XT, AT, PS/2	IBM programm <i>send/receive</i> running in native TSO	table probably hidden → ZAPS; eventually new version needed
IRMALAN 3270 PS/2 and PC with Tokenring adaptor	-Forté Filetransfer -IBM program -IRMA filetransfer	problems with keyboard drivers may arise
IBM Workstation pgm 1.1 3270 PC with special hardware PS/2 + 3270 card or Tokenring card	same program as for IBM 3278/79	table is hidden → ZAPS necessary (if table can be found!)
DEC Gateway		presumable easy to implement
NETWAY 1000 (Mac)	special program	cp 500 can <del>not</del> be defined; for download to Mac the code to be received can be defined
Mac Irma Mac II with special card	same programs as for IRMA	very elegant emulation, installed at OBRZ/DTA
S/36 -DSX	DSX	There is no translation at all. Transfer thus is fully transparent (MNCS ↔ cp500)

On PC's code page 850 should be established as default, since then all symbols from code page 500 are also present on the PC. However code page 850 holds more symbols than code page 500 (e.g. smily face and forms drawing)

An adequate support of text processing including forms drawing characters could be established with special translations. This should be done in special applications rather than common file transfer. This function is beyond the scope of implementing cp 500.

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3 Transition to Code Page 500

To support an extended character set (with national characters) peripheral devices must be capable of handling these symbols. Generally spoken it would be necessary to have some indication of the used coding, if more than one coding scheme would be in use at certain times:

- Files have attributes (e.g. in the file directory) stating their code page.
- I/O devices can be queried, what code and character set they are supporting.

Both demands are satisfied today only within a special application, the formatter *SUSI* :

- Text may contain the command `.codepage xxx`. This command may be present in the text as often as necessary (change of coding).
- In ISPF additional terminal types SWISS and SWISA are defined. Since currently no device can be queried, the user must enter the proper definition into the related panel.

This method cannot be proposed for general use, since the user at a terminal normally does not know the details about his equipment. However, any solution should allow to use the keyboard fully. So "nullifying" the function of the umlaut keys is not a solution for an enduser!

Filtering of national characters and other symbols which applications cannot digest can **not be done at the terminal controller**. Besides the fact that at the same controller there may be users who need these symbols, this method easily could be bypassed by PCs emulating both controller and terminal. Hence only a centralized version of filters (like a VTAM-umbrella) can do the job.

The level of function for filters has to be chosen carefully. This may be for all transactions (e.g. in CICS) or based on individual transactions.

Since there are non IBM devices used in our environment we also have to remember, that IBM only can give hints like the National Language Support Cookbook for their equipment. To deal with non-IBM equipment is the responsibility of our customer companies.

Since transition from one coding scheme to another is not a trivial task, contacts to people and installations who have done this job or at least gained some experience are vital. Short reports about these works are noticed in the literature.

With respect to the experience of other installations the following order of tasks should be observed:

- 1 Hardware upgrade or change with support of "old" coding scheme
- 2 Software filters to shield applications from undigestable symbols
- 3 Convert data to new coding (only very few should be affected)
- 4 Free hardware capabilities and switch to new coding

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### 3.1 Hardware

Actions in this area depend on several factors:

- What code has to be supported at the terminal (cp 037 or cp500)
- Has the full character set 697 to be supported?
- Must a terminal be capable to generate more than one encoding?
- Is it expectable from a user to support the identification of the terminal?
- Is the terminal in question used for more than one application?

#### 3.1.1 Possible Changes at Terminals

The National Language Support Cookbook proposes for implementation of cp 500 some actions and precautions:

- A certain level of micro code for controller and printer
- RPQ in controller, also necessary in printer
- Modification of keyboard (exchange of keycaps)
- Distinct version of control program for PC-3270
- ROM upgrade in printers

Older devices of the 327x series can not be expanded in their function to support the full Swiss character set. So it is not possible to have both US and Swiss keyboards connected to the same controller.

#### 3.1.2 Actions related to Terminals

Customer companies of OBRZ must check their situation concerning terminals, printers and controllers to support the estimation of costs and manpower needed for the transition of the coding scheme.

Since the Swiss standard keyboard (VSM) generates 131 different symbols, all terminals must support this number of characters. So called "cheap solutions" supporting less characters will not be accepted by end users.

#### 3.1.3 Other Output

Printers must be capable of printing all symbols from character set 697. This should be the default for centrally installed printers (e.g. **laser printers**). Applications must be freed from dealing with printer details.

If additional graphics will be possible on these printers, their repertoire should be chosen from code page 850. Forms drawing and mathematical symbols are first candidates.

Since PC's are more and more replacing ordinary (dumb) terminals also **PC printers** must support the full character set 697. This is especially true for printers connected via the PC to the host.

Great attention must be drawn to applications which produce data for external services like VESR tapes for PTT or accounting information exchanged with banks. This may call for special translate tools resp. system services.



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### 3.2 Software

- Filters to protect applications from characters which they cannot digest.
- **VTAM-umbrella** for centralizing code translations from and to old and new terminal equipment. Feasibility of this device must be studied carefully. It may be necessary to take certain assumptions for the function of this mechanism (like: old data do not contain any [ or ]) to avoid ambiguity in the code translation. These assumptions have to be proved.
- Outputfilters must be eliminated from applications. It is the task of device drivers like JES to protect devices from undigestable codes.
- Compilers will need preprocessors to allow usage of code page 500. National characters must be allowed in "string constants" as well as comments. However, it would be better to avoid code dependent information in program code at all (separate code and data).
- A set of subroutines dealing with textual information like
  - Translate to upper case
  - Classify symbol (is upper, is lower, is punctuation etc.)
  - Translate code page
  - etc.
 will be necessary to support the enabling of applications.
- When applications need modification for supporting the expanded character set or new code page, it should be considered, to
  - obey rules given by IBM in [1]
  - separate program code and data (strings, messages, ...)
  - do not assume a certain coding of the input (e.g. allow specification of separator symbols).

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### 3.3 Data

- Data may be of different encoding, if only the **syntactic character set** is used. These data are code indifferent.
- Either all data related to an application must be converted to a different coding scheme or the application must know about the coding by some mechanism:
  - Imbedded directives (like in *SUSI* with the `.codepage` command).
  - Data set naming conventions (e.g. `...CP500...`)
  - Reference to a data dictionary
  - Implicitely (hard coded) which is an undesirable method.
  - File attribute (which is not available on MVS or PC/DOS)
- Very often no change to the data is necessary, since data come from the card punch eara, where nothing than upper case and some symbols were possible. However the situation **must** be checked.
- Fully automatic translation by some utility can only be achieved, if there is access to a data dictionary. The worst thing that may happen is translation of binary (e.g. packed) data...

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3.4 Guidelines for Providing *Procuring?*

OBRZ customers are advised to select from the following list if new hardware will be provided.

3.4.1 **Hardware**

**Controller** 3174 with microcode level A.3 and CECP RPQ (supporting 190 characters in codepage 500); terminal attributes are queryable.

**Terminal** Provide only terminals from the 31-series:  
3179; 3179-G; 3192; 3192-G; 3194

**PC with Terminal Emulation**

- IRMA (coax connection to controller)
- IRMALAN (TR connection)
- MacIrma (coax connection to controller)

**Printer** 4224; 4234

**PC printers** These printers must be equipped with the character set of code page 850 (which includes character set 697). There may be PC applications which will produce unwanted results in this case, since some of the **forms drawing** symbols are no more existent in code page 850.

3.4.2 **Software**

**Host-software** An application must be able to deal with different coding of data, that is must be code independent. Symbols relevant for the function must not be "hard coded". At a minimum the code table must be definable. A better solution (especially for applications like utilities) uses meta commands in the input data (→ *SUSI*).

**PC-software** PC software must be able to work with code page 850. This must be checked.

**Terminal emulation**

**Tokenring** IRMALAN  
**Coax connected** IRMA

**File transfer** While sending data to the host code page 500 must be produced.

- PC with OS/2 extended edition (supports full transparent file transfer)
- Forté file transfer
- IRMA file transfer

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4 Action Plan for Transition

4.1 Project Management

- Project leader must be both energetic and optimistic
- Leader and members of team **only dedicated** to transition task!
- Delegated decisions have to be taken quickly
- Weekly meetings during the transition period
- Availability of system programmers must be guaranteed
- Applications programmers with detailed knowledge both of the application program and the data structures must be at hand
- Communications people must be available permanently
- Detailed plan of actions must be derived from a closer look to an application which
  - demands for national character support
  - uses corporate data (not only relevant to that particular application).
  - is not the only application on many terminals (that is must share its input capabilities with other applications).

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## 4.2 Overall Schedule

To allow a limited time period for the transition a sufficiently large number of people must be allocated to the project. It is recommended to schedule the transition for at most 1/2 year. However, spare time (1/4 year) should be scheduled also.

### 4.2.1 Tools

- Which tools are needed, based on the close look to a selected application?
- Subroutines for string handling should rely on global code page tables, which have to be established in a proper manner. Assembler macros are not a desirable solution.
- Preprocessors for compilers and utilities as well as command processors (CLIST or REXX) for foreground activities.
- Utilities to convert sequential and partitioned data sets in a batch mode.
- These tools have to be programmed in a manner to be easily combined. interaction with the user is recommended, since not all needed behaviour can be foreseen and programmed.
- A general macro processor like ML/1 may also do some work.
- ...

### 4.2.2 Identify Applications and their Data

All applications have to be checked for their use of data with respect to the symbols in question. A list must allow for reporting the success or failure of the transition process. It is not allowed to assume a certain property of data.

### 4.2.3 Exchange or upgrade Hardware

The decision what has to be done depends on the applications which are run at a particular terminal equipment. If currently only the syntactic set of characters is used, only keycaps need to be changed and the change of the coding will have no effect at all.

Allowance for the extended character set can only be given, if the related applications either protect themselves by input filters or can digest all the symbols.

### 4.2.4 Convert Data to new Code

There is no need for any conversion, if the data do not contain any of the symbols in question. Since we are introducing an extended character set, data currently should not contain any national characters.

A real conversion must be done very carefully based on data fields.

### 4.2.5 Establish VTAM-Umbrella

At this time nothing can be said about feasibility of such an instrument. In any case this function is based on a VTAM exit, which has to be provided by IBM (at least IBM Denmark has it...).

The purpose of a VTAM-umbrella is the control of the data flow from and to the terminal controllers. Depending on the conflicts in old and new code both old and new equipment can be served simultaneously. However the data (or applications) may only be in one code (preferable the new one - code page 500).

This function must be studied.

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#### 4.2.6 Be prepared

Be prepared for all sorts of problems like:

- Mass compiling and linking has its own hazards. There are no MAKE utilities on an MVS system...
- Character sets and security passwords are a chapter of itself.
- Non IBM keyboards are also a source of troubles ...
- etc.

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#### 4.3 Cost Estimation

##### 4.3.1 Hardware

Number	Activity at the devices	Costs per unit	Costs
	Exchange key-caps (KB modification): terminal 3178: not possible terminal 3179: ok terminal 3179-G (DFT): ok terminal 3180: ok terminal 3191: ok terminal 3192: ok terminal 3192-G (DFT): ok terminal 3194: ok terminal 3278: not possible terminal 3279: not possible		
	Exchange character set ROM: printer 3278: 116 graphics only printer 3268-2 + IBM-CH RPQ (131 graphics) printer 4214-1 + IBM-CH RPQ (131 graphics) printer 4224 (131 graphics or CECP) printer 4234 (131 graphics or CECP)	ask CE	
	Replace with new equipment: terminal 3279-3B PC 3270 replace during midrange time scale		
	Microcode level A1 + RPQ 8K1345 provides 131 symbols) controller 3174, KB modifications possible		
	Microcode level A3 + RPQ 8K0566 provides 190 symbols) controller 3174		
	Microcode level D65 up and RPQ 7L8011 provides 131 symbols) controller 3274, KB modifications possible Microcode level C47 up and RPQ 7L8011 provides 131 symbols) controller 3274, KB modifications possible	215,-  215,-	

##### 4.3.2 Tools

A very raw estimation is 1/2 manyear for only a few subroutines and utilities. It is assumed that some tools can be "borrowed" from other installations.



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#### 4.3.3 System Software

In this area major work is expected. Either application programmers are supported in their tasks with effort in this area or they have to deal with many inconveniences (enter  $\emptyset$  if an  $\neg$  is needed or the like).

#### 4.3.4 Applications

Well, no estimation at this time, since I don't know anything about the applications.

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5 Character Set and Code Pages

5.1 Character Sets

5.1.1 Syntactic Character Set

Type of symbol	Symbols
Alphabetical	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
Numerical	1 2 3 4 5 6 7 8 9 0
Special	. , ; ? ( ) ' " - _ & + % * = < >

There are no problems at all for applications dealing only with symbols from the set shown here, since the coding of these symbols is similar among all the Country Extended Code Pages. Code Page 500 is a special variant, since it is the "international" code page.

5.1.2 Character Set 697/1

Type of symbol	Symbols
Alphabetical	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
Diacritical	Á Â Ã Ä Å Æ Ç Ð Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö Ø Þ Ù Ú Û Ü Ý á â ã ä å æ ç ð é è ê ë ì í î ï ñ ò ó ô õ ö ø ß þ ù ú û ü ý ÿ
Numerical	1 2 3 4 5 6 7 8 9 0 <sup>1</sup> <sup>2</sup> <sup>3</sup> $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$
Special	+ ± < = > ÷ × □ £ \$ ¢ ¥ ' ` ^ ¨ ~ , . # % & * @ [ \ ] {   } ~ µ ° ª § ¶ © ®   ~ ! ; " ' ( ) , _ - . / : ; ? ¡ ¢ * » <i>req.blank</i>

These symbols are used in the Country Extended Code Pages (e.g. cp037 and cp500). They are also present in the PC code page 850.

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## 5.2 Data Processing Code DP94

This is the common coding scheme at OBRZ up to now. In comparison to code page 037 both [ and ] are coded differently. We also do not support the broken vertical, hence | is defined twice.

This coding scheme is a mixture of code pages 037 and 264 (text applications) for those characters present in ASCII.

	4x	5x	6x	7x	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0	space	&	-						{ }		\	0
x1			/		a	j	~		A J			1
x2					b	k	s		B K		S	2
x3					c	l	t		C L		T	3
x4					d	m	u		D M		U	4
x5					e	n	v		E N		V	5
x6					f	o	w		F O		W	6
x7					g	p	x		G P		X	7
x8					h	q	y		H Q		Y	8
x9				`	i	r	z		I R		Z	9
xA	¢	!		:								
xB	.	\$	,	#								
xC	<	*	%	@								
xD	(	)	_	'			[	]				
xE	+	;	>	=								
xF		┘	?	"								all bits

space      space, blank

all bits    x'ff', all bits set

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5.3 IBM Codepage 037/1

	4x	5x	6x	7x	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0	space	&	-	ø	Ø	°	µ	^	{	}	\	0
x1	req. sp	é	/	É	a	j	~	£	A	J	÷	1
x2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
x3	ä	ë	Ä	Ë	c	l	t	•	C	L	T	3
x4	à	è	À	È	d	m	u	©	D	M	U	4
x5	á	í	Á	Í	e	n	v	§	E	N	V	5
x6	â	î	Ã	Î	f	o	w	¶	F	O	W	6
x7	ã	ï	Ä	Ï	g	p	x	¼	G	P	X	7
x8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
x9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
xA	ç	!		:	«	ä	i	[	syl. hy	¹	²	³
xB	.	\$	,	#	»	ø	¿	]	ô	û	Ô	Û
xC	<	*	%	@	ð	æ	Ð	-	ö	ü	Ö	Ü
xD	(	)	_	'	ý	.	Ý	"	ò	ù	Ò	Ù
xE	+	;	>	=	þ	Æ	Þ	'	ó	ú	Ó	Ú
xF		¬	?	"	±	□	®	×	õ	ÿ	Õ	all bits

space space, blank

req. sp required space

syl. hy syllable hyphen, displayed as -

all bits x'ff', all bits set

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5.4 IBM Codepage 500/1

	4x	5x	6x	7x	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0	space	&	-	ø	Ø	°	µ	¢	{	}	\	0
x1	req. sp	é	/	É	a	j	˘	£	A	J	÷	1
x2		â	ê	Â	Ê	b	k	Ÿ	B	K	S	2
x3		ä	ë	Ä	Ë	c	l	•	C	L	T	3
x4		à	è	À	È	d	m	u	©	D	M	U
x5		á	í	Á	Í	e	n	v	§	E	N	V
x6		ã	î	Ã	Î	f	o	w	¶	F	O	W
x7		å	ï	Å	Ï	g	p	x	¼	G	P	X
x8		ç	ì	Ç	Ì	h	q	y	½	H	Q	Y
x9		ñ	ß	Ñ	˘	i	r	z	¾	I	R	Z
xA		[	]		:	«	ä	ı	˘	syl. hy	ı	2
xB		.	\$	,	#	»	ö	ı	˘	ô	û	Ô
xC		<	*	%	@	đ	æ	Ð	˘	ö	ü	Ö
xD		(	)	_	'	ý	˘	Ý	˘	ò	ù	Ò
xE		+	;	>	=	þ	Æ	Þ	˘	ó	ú	Ó
xF		!	^	?	"	±	ı	®	×	õ	ÿ	Õ

space space, blank

req. sp required space

syl. hy syllable hyphen, displayed as -

all bits x'ff', all bits set

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5.5 IBM Multi National Character Set (S/3x)

	4x	5x	6x	7x	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0	space	&	-	ø	Ø	°	µ	¢	{	}	\	0
x1	req. sp	é	/	É	a	j	˘	£	A	J	num. sp	1
x2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
x3	ä	ë	Ä	Ë	c	l	t	•	C	L	T	3
x4	à	è	À	È	d	m	u	f	D	M	U	4
x5	á	í	Á	Í	e	n	v	§	E	N	V	5
x6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
x7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
x8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
x9	ñ	ß	Ñ	˘	i	r	z	¾	I	R	Z	9
xA	[	]		:	«	a	i	¬	syl. hy	1	2	3
xB	.	\$	,	#	»	o	¿		ô	û	Ô	Û
xC	<	*	%	@	ð	æ	Ð	-	ö	ü	Ö	Ü
xD	(	)	_	'	ý	.	Ý	"	ò	ù	Ò	Ù
xE	+	;	>	=	þ	Æ	Þ	'	ó	ú	Ó	Ú
xF	!	^	?	"	±	□	®	=	õ	ÿ	Õ	all bits

This table was published by IBM Switzerland in "S/3x Kundeninformationen 2/88"

space space, blank

req. sp required space

num. sp numeric space, leerstelle in zahlen

syl. hy syllable hyphen, displayed as -

all bits x'ff', all bits set

5.6 IBM PC Codepage 850

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶		0	@	P	`	p	Ç	É	á	⋮	⊥	ø	Ó	-
-1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⋮	⊥	Ð	β	±
-2	☹	↕	"	2	B	R	b	r	é	Æ	ó	⋮	⊥	Ê	Ô	=
-3	♥	!!	#	3	C	S	c	s	â	ô	ú		⊥	Ë	Ò	¾
-4	♦	¶	\$	4	D	T	d	t	ã	õ	ñ	⊥	—	È	ö	¶
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ	À	+	ı	Ö	§
-6	♠	—	&	6	F	V	f	v	â	û	ª	Â	ã	ı	μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	º	À	Ã	İ	þ	˘
-8	■	↑	(	8	H	X	h	x	ê	ÿ	¸	©	⊥	ı	þ	°
-9	○	↓	)	9	I	Y	i	y	ë	ÿ	®	⊥	⊥	ı	Ú	••
-A	◐	→	*	:	J	Z	j	z	è	Û	¬		⊥	ı	Û	•
-B	♂	←	+	;	K	[	k	{	ï	ø	½	⊥	⊥	■	Û	¹
-C	♀	⊥	,	<	L	\	l		î	£	¼	⊥	⊥	■	ý	³
-D	♪	↔	-	=	M	]	m	}	ı	Ø	ı	■	=		Ý	²
-E	🎵	▲	.	>	N	^	n	~	Ä	×	«	■	⊥	ı	'	■
-F	☼	▼	/	?	O	_	o	△	Å	f	»	⊥	□	■	'	



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5.7 ISO 8859/1

	2x	3x	4x	5x	6x	7x	Ax	Bx	Cx	Dx	Ex	Fx
x0	space	0	@	P	`	p	req. sp	°	À	Ð	à	ð
x1	!	1	A	Q	a	q	¡	±	Á	Ñ	á	ñ
x2	"	2	B	R	b	r	¢	²	Â	Ò	â	ò
x3	#	3	C	S	c	s	£	³	Ã	Ó	ã	ó
x4	\$	4	D	T	d	t	¤	´	Ä	Ô	ä	ô
x5	%	5	E	U	e	u	¥	µ	Å	Õ	å	õ
x6	&	6	F	V	f	v		¶	Æ	Ö	æ	ö
x7	'	7	G	W	g	w	§	•	Ç	×	ç	÷
x8	(	8	H	X	h	x	¨	˙	È	Ø	è	ø
x9	)	9	I	Y	i	y	©	¹	É	Ù	é	ù
xA	*	:	J	Z	j	z	ª	º	Ê	Ú	ê	ú
xB	+	;	K	[	k	{	«	»	Ë	Û	ë	û
xC	,	<	L	\	l		¬	¼	Ì	Ü	ì	ü
xD	-	=	M	]	m	}	syl. hy	½	Í	Ý	í	ý
xE	.	>	N	^	n	~	®	¾	Î	Þ	î	þ
xF	/	?	O	_	o	delete	-	¿	Ï	ß	ï	ÿ

Columns 0x to 7x are identical to US-ASCII respective ISO 646. Columns 0x, 1x, 8x and 9x are reserved for special controls.

space space, blank

req. sp required space

syl. hy syllable hyphen, displayed as -

delete control character delete

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5.8 DEC multinational Character Set

	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0			reserved	°	À	res	à	res
x1			¡	±	Á	Ñ	á	ñ
x2			¢	²	Â	Ò	â	ò
x3			£	³	Ã	Ó	ã	ó
x4			res		Ä	Ô	ä	ô
x5			¥	µ	Å	Õ	å	õ
x6			res	¶	Æ	Ö	æ	ö
x7			§	•	Ç	Œ	ç	#œ
x8			□	res	È	Ø	è	ø
x9			©	¹	É	Ù	é	ù
xA			ª	º	Ê	Ú	ê	ú
xB			«	»	Ë	Û	ë	û
xC			res	¼	Ì	Ü	ì	ü
xD			res	½	Í	Ý	í	ý
xE			res res		Î	res	î	res
xF			res	ì	Ï	ß	ï	reserved

~~This table represents our knowledge as of mid 1987.~~

Columns 8x and 9x contain control characters

reserved reserved

Source: VAX-VMS Internal User Guide, vol 1, version 5 (Jan 89)

There is disagreement with ISO 8859/1 in the following 4 code points: D7, DD, F7 and FD.

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6 Background

6.1 Szenarios

*Stay with DP94*

**Advantages**

- Well, nothing has to be done
- In short time scale obviously the cheapest thing

**Disadvantages**

- End user demands for national characters can not be served
- IBM dislikes to handle US equipment in Switzerland
- Applications for text and document processing will stay in the bronze age of DP. No "leading edge technology" at all.
- Problems arise in exchanging data with the DEC world, where ISO 8859 is the very near goal.
- Problems arise in exchanging data with systems /36 and S/38 as well as AS400, where MNCS is introduced in our companies.
- Problems arise in exchanging data with PC's, since in this area national characters are present since the beginning.

**Conclusions**

There is no sense to stay with this "solution". The existence of our team makes it clear that something must change.

→ This scenario is not accepted as a solution.

*Implement Code Page 037*

**Advantages**

- Existing data do not need any conversion.
- Compiler and Utilities accept this code page.

**Disadvantages**

- Hardware changes (key caps) necessary for Swiss keyboard.
- Older controllers cannot support more than 116 symbols, which is not sufficient.
- Older controllers cannot support a Swiss keyboard layout with code page 037.
- New devices will be "special", since US coding and Swiss keyboard is somewhat strange.
- Applications need modifications for the extended character set (anyway).
- Applications need input filters to restrict the input character set to digestible symbols.

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**Conclusions** In the long range this szenario will be dangerous for our companies. However, there are environments and situations, where this will be an adequate solution (e.g. Swiss Reinsurance with many more terminals outside Switzerland than inside).

→ This szenario is not accepted as a solution.

### *Implement Code Page 500*

#### **Advantages**

- No translations necessary for data coming from the network, if the guidelines for our IS activities are observed.
- IBM's strategic direction for Switzerland.
- On the long term less expensive than implementation of code page 037.
- Code page for multilingual countries (international code page).

#### **Disadvantages**

- Older controllers can not be equipped to support the full character set (190 symbols).
- On the short range more expensive than implementation of code page 037.
- Compiler and utilities are either more difficult to use or need some sort of preprocessing or other adaption.
- Applications need modifications.
- Applications need input filters to restrict the input character set to digestable symbols.

**Conclusions** On systems /3x in the companies of our group MNCS is introduced since some time. Also in the MVS area more support of the end user is demanded. This must be done also if system programmers and application programmers face some difficulties in using their tools and equipment.

→ Transition to code page 500 was decided by IKA (IS Koordinations Ausschuss) - where this is written, when did it happen?? Hence the team should concentrate on the implentation aspects and cost estimates.

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6.3 Actionlist

**Erste Besprechung am 7.7.88**

- Klärung der benützeranforderungen anhand papier 410.10.30
- Diskussion der szenarien.
- Sind applikationen bekannt, die heikle zeichen benützen?
- Gibt es DB-input, der kritische zeichen umfasst?
- Elemente für eine umstellung zusammenstragen

**Für Besprechung am 26.8.88**

- Dr. Müller** Entschluss zu cp500 an IKA weiter geben
- Daube** Broschüre "Text und Code" an Surber, Kupferschmid, Kalisnik und Maurer.
- Daube** MCNS in die zeichentabelle in 410.10.30 eingügen.
- alle** wleche file transfers werden eingesetzt?
- Daube** NLS der file transfers abklären.
- Oertli** Was passiert in OA? Canada ist bilingual.

**Für Besprechung am 5. 10.88**

- Daube** Punkte zusammenstellen, die rasch einer regelung bedürfen (für IKA).
- Kalisnik** Zusammenstellen der zeichen, die in SDF verwendet werden.
- Oertli** Wie arbeitet DSX? Wo wird übersetzt? Können tabellen definiert werden?
- Daube** 410.10.30 überarbeiten aufgrund bisheriger diskussionen (richtlinien zu filetransfer, HW-umstellung)
- Daube** Zusammenstellung von druckern, die mit cp850 arbeiten können.

**Für Besprechung am 16.11.88**

- Daube** Kann ein "VTAM-umbrella" wie bei Kommunedata unsere umstellung erleichtern?
- Daube** Revision des textes 410.10.30

**Für Verabschiedung des Antrages an IKA**

- Diskussion des papiers 410.10.30, fassung D
- Weitere details zur kostenschätzung zusammentragen
- Diskussion des antrages ans OBRZ komitee bzw den IKA

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<b>OBRZ</b>	<b>ALLGEMEINES ZUR DOKUMENT VERARBEITUNG</b> <b>Implementation of Swiss Character Set</b>	<b>410.10.30</b>	
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Die arbeitsgruppe *Codepage 500*, bestehend aus den herren K. Daube (OBRZ/DTA), H. Kalisnik (OBRZ/SA2), E. Kupferschmid (OBRZ/SA3), Th. Maurer (CZ/SDK), A. Oertli (WO/DV) und U. Surber (SBA) kam in mehreren besprechungen zu folgenden ergebnissen:

- Immer mehr applikationen fordern daten mit nationalen zeichen (umlaute, akzentuierte zeichen). Insbesondere electronic mail, text- und dokumentverarbeitung.
- Benützer in büroumgebung verlangen auf den verschiedenen geräten nach einheitlichen (VSM) tastaturen.
- Es wird auch für host gestützte applikationen notwendig, die zeichen anderer europäischen sprachen zu verarbeiten (zb korrekte namen in daten banken).
- Die forderung nach einem erweiterten Zeichensatz ist also legitim. Aufgrund von bereits erarbeiteten konzern-richtlinien soll die codierung in code page 500 erfolgen.
- Die umstellung auf den erweiterten Zeichensatz mit einer anderen als bisher üblichen kodierung erfordert (am MVS) aufwand in hardware, software und daten. Der gesamte aufwand wird auf ca 2MJ geschätzt.

Diese ergebnisse sind in HB 450.10.30 detailliert dargelegt.

Aus diesen ergebnissen lassen sich arbeiten ableiten, die in einem zeitraum von (geplant) 1/2 jahr durchgeführt werden sollten. Die arbeiten sollen personell nicht in zusammenhang mit der umstellung der ISPF umgebung durchgeführt werden. Es ist darauf zu achten, dass sich diese aufträge nicht überschneiden.

Bei der erteilung des auftrages zur durchführung der umstellung müssen folgende randbedingungen beachtet werden:

- Der projektleiter muss sowohl energisch als auch optimistisch sein.
- Das projekt muss mit leuten ausgestattet werden, die sowohl grosse erfahrungen in verschiedenen applikationen als auch den zugehörigen datenstrukturen haben.
- Es sind genügend leute einzusetzen, sodass das projekt (geplant) innerhalb eines halben jahres durchgeführt werden kann.
- Die am projekt beteiligten müssen sich durch verantwortungsbewusstsein auszeichnen und müssen für die dauer des projektes diesem mit höchster priorität zustehen.
- Ein detailplan der arbeiten muss sich an der nahen betrachtung einer applikation orientieren, die folgende eigenschaften aufweist:
  - Es besteht bedarf für den erweiterten Zeichensatz
  - Es werden daten verwendet, die nicht nur lokal zu dieser applikation sind.
  - Die gewählte applikation ist nicht die einzige, die auf einer menge von terminals abgewickelt wird.Für diese phase sollten auch externe experten beigezogen werden (zb IBM, vertreter von installationen, die eine umstellung hinter sich haben).
- Kompatibilität mit externen diensten wie VESR oder zahlungsverkehr via TELEKURS muss beachtet werden.
- Wöchentliche besprechungen sind unumgänglich.
- Systemprogrammierer und spezialisten des teleprocessing müssen jederzeit verfügbar sein.

Neue software muss sich an den im bericht HB 450.10.30 gegebenen richtlinien orientieren. Für die beschaffung neuer hardware sind *terminals und controller aus der 317x familie zu wählen*. Eine entsprechende auswahl ist im bericht angegeben.

***Die arbeitsgruppe stellt den antrag, entsprechende aufträge an OBRZ und die betroffenen konzernfirmen zu erteilen.***

***Mit der verabschiedung dieses antrages hat die arbeitsgruppe ihren zweck erfüllt und wird aufgelöst.***

**Stellungnahme**

Antrag wird genehmigt (und damit die aufträge erteilt) . . . . .

mit folgenden einschränkungen.....

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Antrag wird abgelehnt.....

aus folgenden gründen.....

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