Label Specification for IBM 3592 Cartridges when used in IBM Libraries (Revision 2.2)

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Notes:

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ABOUT THIS DOCUMENT

This document is intended to provide a functional specification for the cartridge barcode label used on IBM 3592 tape cartridges, both with and without an embedded RFID tag, for use in automation solutions

Summary of Changes

Revision 1 - First draft version.

Revision 1.1 - Minor Corrections

Revision 1.2 - Minor Corrections

Revision 1.3 - Add definitions for 700 GB 3592 tape cartridge labels.

Revision 2.0 - Added the definitions of an RFID tag that may be embedded within the Barcode Label and added environmental requirements.

Revision 2.1 - Added further definitions of RFID tag contents and testing requirements for RFID tag read range.

Revision 2.2 - (Released February 2009)
Added further definitions of RFID tag contents.

Introduction

This document defines the format and contents of the external cartridge barcode label both with and without an embedded RFID tag for use in IBM libraries. The requirements stated herein are defined to standardize the label and allow users to purchase or print labels. The 3592 cartridge label uses the bar code symbology of USS-39. A description and definition is available from the Automatic Identification Manufacturers (AIM) specification Uniform Symbol Specification (USS-39) and the ANSI MH10.8M-1993 ANSI Barcode specification. Further, the definitions of an RFID tag that may be embeddded within the Barcode Label are set forth.

Surface Reflectivity

The front surface of the label shall have a matte or non-reflective finish.

Optical Specification

The optical requirements and measurement techniques are further defined in the AIM Uniform Symbol USS-39 specification.

1. The print contrast of the Mcbeth PCMII shall be calibrated using the white calibration standard. All calibration and measurement shall be done with the filter select switch set in position A.
2. The reflectivity of the white background, RW, shall be defined for use in note 3 as the reflectivity measured in the center of narrow spaces using the Mcbeth PCMII print contrast meter. RW shall be between 70% and 85%. This measurement should avoid isolated print defects and edge roughness.
3. A spot is defined as an area anywhere within the white background in which the reflectivity is less than 65%. No spot may be greater than 0,102 mm enclosed diameter. There may be no more than five (5) spots, in the bar code area, per label. No two spots may be within 0,254 mm of each other.
4. The reflectivity of the black areas, RB, may be measured anywhere within any black area on the barcode. The print contrast signal, PCS, shall be defined as (RW-RB)/RW and is to be measured using the Mcbeth PCMII print contrast meter. PCS shall be 0.85 minimum. The PCS measurement shall avoid isolated print defects and edge roughness.
5. A void is defined as an area within a black area in which the PCS is less than 0.85. No voids may be greater than 0,102 mm enclosed diameter. There may be no more than five (5) voids, in the bar code area, per label. No two voids may be within 0,254 mm of each other.

Physical Parameters

The 3592 label dimensions are derived using the AIM USS-39 specification and the physical space provided in the cartridge for this label

1. Barcode Symbol height - 7,0 mm minimum. As measured to the inside of the edge roughness.
2. Wide to narrow ratio - 2,75
3. Narrow element width - 0,500 mm + 0,03/- 0,07 mm
4. Nominal width of the Wide spaces and bars is 1,375 mm.
5. Inter character gap - 0,500 mm + 0,03/- 0,07 mm
6. Bar code element width maximum shall be measured to the outside of the edge roughness as defined in Note 10. Space width is then the distance between bar maxima.
7. Quiet zone at beginning and end of printed barcode string - 10X narrow width = 5,0 mm
8. Total barcode string length (including quiet zones) nominal - 85,75 mm
9. The barcode string may be printed in either direction on the label. But, must begin/end with a valid start/stop character (✶).
10. The edge of the bar code shall be defined as the edge of all printed area attached to the bar. The edge roughness shall be defined as the transition encountered as a horizontal line is moved vertically from all black to all white. The edge roughness shall be 0,04 mm maximum
11. Unless otherwise specified, tolerances are X,XXX ± 0,127 mm, X,XX ± 0,76 mm.
12. Variation between all wide bars, white and black, shall be less than ± 0,04 mm. Variation between all narrow bars, white and black, shall be less than ± 0,04 mm.
13. Label stock dimensions: 88.5 mm x 11.9 mm +/- 0,4. Corners are cut with a 1,0 ± 0, 5 mm radius.
14. The maximum label thickness when applied to a cartridge, including RFID tag if present, together with any associated layers and adhesives shall not exceed 0,75 mm.
15. The barcode label and associated adhesive shall have an environmental performance to match or exceed the environmental specification of the cartridge to which it is applied.

Encodation

The description/format of start, series of characters and the stop character is described in the AIM Uniform Symbol USS-39 specification.

Quiet Zone

The quiet zones are the areas preceding the start and after the stop characters and is clear of any printing or reflective properties that would cause spurious reflections, per AIM Uniform Symbol USS-39 specification.

Barcode Label Data

The barcode data string shall consist of a start character, eight alphanumeric characters and the stop character. Quiet zones precede and follow the start/stop characters. The first six (6) characters may be any combination of upper case A-Z or 0-9 (e.g. ABC123) to identify the cartridge Volume Serial Number. The last two (2) characters are determined by the 3592 cartridge Media Type (i.e. "JA" for the first tape cartridge generation).

No characters other than upper case alpha A-Z or numeric 0-9 are allowed.

The format and location of the human readable characters are also specified.

Human Readable Text

While the contents of the human readable text must include the data encoded in the barcode, this area of the label may be formatted to include customer defined text as agreed between the customer and the label vendor. Examples are shown in the figures on pages 7 and 8.

The human readable text must not interfere or intrude into the area defined for the barcode in any way. The specific customer text shall not be encoded in the barcode. The color of the characters and the background behind these human readable characters is by customer definition.

RFID Tag Definition

1. The RFID tag shall conform to the specification - EPCGlobal Inc., Class 1 Generation 2 UHF Air Interface Protocol Standard, version 1.0.9. or later.
2. The range for a successful read of the tag after being placed on a cartridge must be at least 2.0 meters when measured with an Alien 8890 Fixed Reader (ETSI) and with the label face directed toward the reader. The cartridge shall be read individually and shall not be in a carrying case or other packaging.
3. The chip portion of the tag must be positioned under the human readable section of the Barcode Label so that any abrasion of the label surface caused by the increased thickness of the chip will not degrade the barcode.

4. The RFID Tag shall have two data fields,

- Field one shall be a minimum size of 216 bits.
- Field two shall be a minimum size of 256 bits.

Field one shall be encoded as follows and then this entire field shall be locked by the label vendor

- 'Header Field' as defined by the EPC standard, (8 bits long). This field contains the hexadecimal number 0x35. (As an example the hexadecimal number 0x35 has a binary value of 0011 0101).
- 'Manager Number' as assigned to the label vendor by EPC Global Inc, (28 bits long) with the maximum possible decimal value of 268,435,455. This is encoded as a hexadecimal number. (As an example Manager Number 1234567 is 0x012D687 hexadecimal, which is encoded as 0000 0001 0010 1101 0110 1000 0111 binary).
- 'Object Class Field', (24 bits long). This field shall be filled with 0x00 and then the hexadecimal representation of the ASCII values of the two character Media Type letters. The relevant Object Class data is listed in the table under the section 'Volume Identifier Formats' below. (As an example Media Type JA becomes 4A 41 ASCII in hexadecimal format which is encoded as 0000 0000 0100 1010 0100 0001).
- 'Sub Vendor Number' as a hexadecimal number assigned by the owner of the Manager Number referenced above, (8 bits long). (This allows vendors to license out their process, including their Manager Number, to 256 others and yet still produce unique labels numbers). If there is no sub vendor this field shall be 0x00. (As an example Sub Vendor 0xA7 is encoded as 1010 0111).
- Sequence Number, (28 bits long). This shall be a non repeating hexadecimal number starting at zero. (Note: All Sub Vendors may start at zero without risk of duplication). (As an example Sequence Number 14,146 becomes 0x0003742 in hexadecimal which is then encoded as 0000 0000 0000 0011 0111 0100 0010).
- Date in YYDDD format, (40 bits long), encoded as the hexadecimal representation of the ASCII string. (As an example the date 18 Oct 2008 converts to 08291 in the YYDDD format. When represented in hexadecimal format this becomes 30 38 31 39 31 and is encoded as 0011 0000 0011 1000 0011 0001 0011 1001 0011 0001).
- VOLSER, (64 bits long) as defined in the section 'Barcode Label Data' above. Encoded as the hexadecimal representation of the ASCII string. (As an example Barcode Label 123ABCJB when converted to ASCII in hexadecimal format becomes 31 32 33 41 42 43 4A 42 which then encodes as 0011 0001 0011 0010 0011 0011 0100 0001 0100 0010 0100 0011 0100 1010 0100 0010 binary). Any remaining bits in the this Field shall be set to 0x00

Field two shall be set to x00 and shall not be locked by the label vendor

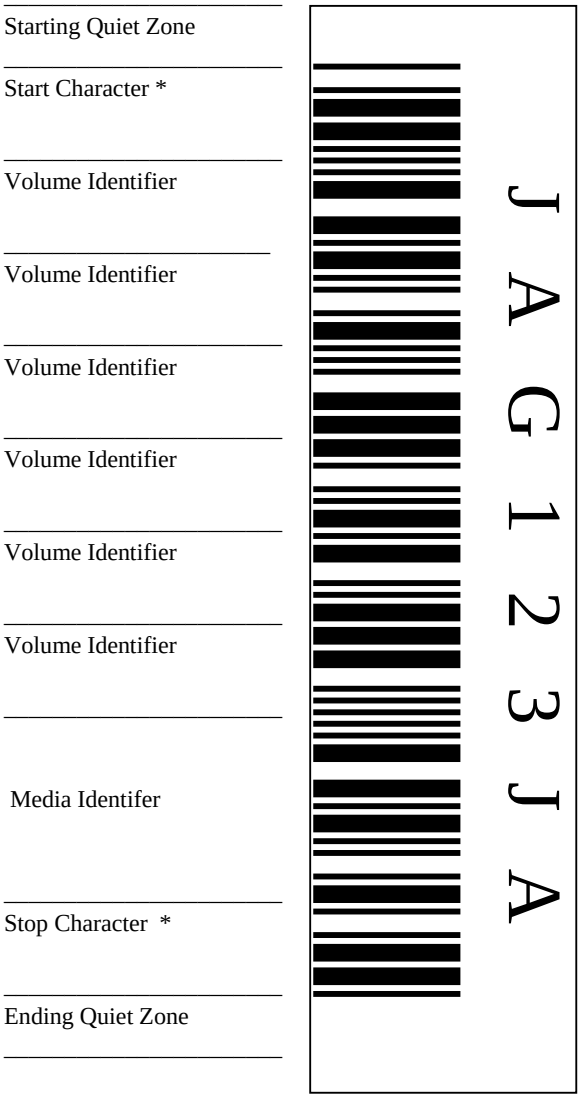
Volume Identifier Formats

1. The volume identifier will be limited to the use of ASCII characters A-Z (41h-5Ah), 0-9 (30h-39h) and the combinations of "CLN" and "CE(space) " as described herein.
2. The prefix "CLNnnnJA" will be reserved for cleaning cartridges. The "nnn" alphanumeric field will be used to track individual cleaning cartridge activity. (i.e. usage and life).
3. Diagnostic/Service cartridges will use the prefix "CE{space}nnnJA". The "nnn" must be a "numeric only" field to identify a specific diagnostic cartridge volume. See note 1 below.
4. The volume identifier field does consist of six (6) left justified alphanumeric characters. SCSI-3 Medium Changer Commands (SMC) ANSI NCITS 314-199X
5. The media identifier characters "J and x "are controlled characters. The "J*" designates the 3592 type of cartridge. The last character "*" (alpha only) will designate a generation and capacity of the 3592 cartridge. Note that it is not a requirement that media be labeled with the subsequent generation label if it is reusable in later drives at the full capacity of that drive.

MEDIA CHARACTERS	DEFINITION	CAPACITY	Object Class for RFID tag
JA	DATA - Generation 1	300 GB	0JA
JB	Extended DATA Cartridge	700 GB	0JB
JJ	Economy DATA - Generation 1	60 GB	0JJ
JR	Economy WORM - Generation 1	60 GB	0JR
JW	WORM - Generation 1	300 GB	0JW
JX	Extended WORM Cartridge	700 GB	0JX

Note 1. Some vendors of software applications may require specific values relating the generation of the drive being cleaned.

Barcode label not to scale: Reference only



Barcode label (not to scale): Reference only - Customer Defined text

Starting Quiet Zone

Start Character *

Volume Identifier

Volume Identifier

Volume Identifier

Volume Identifier

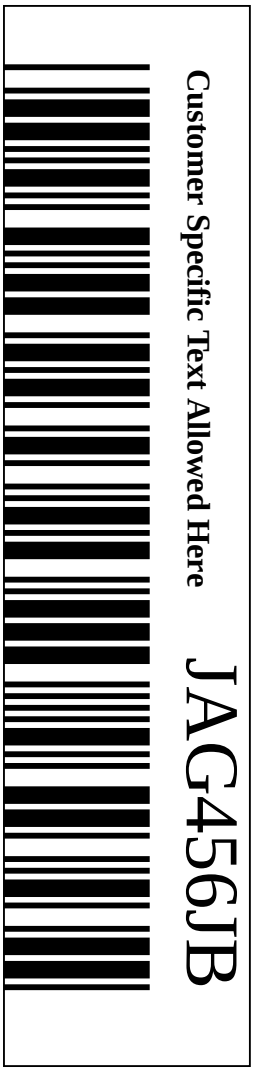
Volume Identifier

Volume Identifier

Media Identifer

Stop Character *

Ending Quiet Zone



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