EDMS 680306
December 15, 2005

Muon System Part Numbering and Labeling

G. Carboni

Roma II

December 15, 2005

1 Introduction

The official LHC part numbering scheme is described in EDMS Document No. 100 243. EDMS Document 369 654 and references therein apply to LHCb specifically.

This is quoted from EDMS 100 243:

"It is clear that to be able to uniquely identify all physical parts produced for the LHC and its experiments and to follow each individual component throughout its whole lifecycle, some sort of part identifier is needed. The idea is that this id number should also be physically attached on the component for quick and unique identification in the LHC environment. When querying the CERN EDMS with this part identifier a full description along with the complete history of the component will be given. This code will then be the link between the physical components and the information about them stored in the engineering databases at CERN. The part identifier is proposed to be an alphanumeric code where the first two characters are centrally controlled and where the rest is composed under the responsibility of each project or experiment."

2 The part identifier

The part identifier for LHCb comprises 14 alphanumeric fields: the six most significant ones are the **prefix** whereas the remaining eight are the **sequential number**. For some of these fields alphabetic symbols are used, but for convenience numerical abbreviations also exist.
The format of the part identifier for the Muon system is summarized in Table 1.
The **prefix** contains (from left to right):

- Field 1: the experiment code. For LHCb is the digit 4.
- Fields 2-3: the sub-system identifier, as described in EDMS 373 610. Field 2 is always "U" (Muon). Field 3 is used to specify the various sub-systems (see below.)
- Fields 4-6: the institute identifier, as described in EDMS 373 611. A numeric or mnemonic code can be used for these fields.

Table 1 Part identifier format for the LHCb Muon System

Field	Mnemonic code	Numeric code	Description
1		4	LHCb Identifier
2	U		Muon Identifier
3	Sub-system identifier		
	A		Wire Chamber
	B		GEM Chamber
	C		Cable
	E		Electronics
	F		Filter
	G		Gas System
	H		HV System
	I		Infrastructure
	L		LV System
	M		Misc. Mechanical Parts
	Q		DAQ, ECS
	S		Detector supports
	V-Z		Reserved
4-6	Institute identifier		
	CER	008	CERN
	PNB	111	PNPI
	RM1	143	Roma 1
	RM2	146	Roma 2
	LNF	155	LNF
	CBP	201	CBPF
	CAG	209	Cagliari
	FER	210	Ferrara
	FIR	211	Firenze
7	Reserved		
8-9	Category identifiers		
10-14		1-99,999	Sequential number

The **sequential number** (Fields 7-14) structure is the following. Field 7 is normally zero. If not zero, it will be used to specify commercial parts that could have their own identification or serial number (for example crates, power supplies, HV modules, etc.) The proposed code is:

- 1: CAEN
- 2: Wiener
- $\cdots$ other manufacturers to be added

When parts are manufactured in a commercial firm, but under direct responsibility of an Institute, they shall carry the Institute identifier and shall not be considered as commercial parts

(Field 7 = 0.)

Field 8 and 9 (Category) are used to give some fine structure to the identifier. For example for electronics these fields specify the type of electronics card (see examples below). For detectors, field 8 will indicate the station and field 9 the region.

The last fields (10-14) give the serial number of the part. It is recommended that the serial numbering does not contain “holes”.

Below some examples are given. Parts not covered below can be assigned identifiers in the future by the responsible institutes.

2.1 Chambers

- Field 3:
  - A: Wire Chamber
  - B: GEM Chamber
- Field 7: 0
- Field 8: station no. (1-5)
- Field 9: region no. (1-4)
- Fields 10-14: serial number for the given chamber type

Fig. 1 shows the two different formats of the part identifier for the 41th M3R3 MWPC built in Frascati.

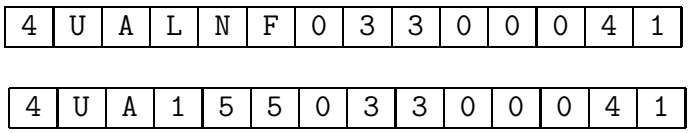

Figure 1 Example of label written in alphanumeric format (top) and purely numeric format (bottom), for an M3R3 chamber (no. 41) built in LNF

2.2 Electronics

- Field 3: E
- Field 7: normally 0
- Fields 8-9:
  - 01: CARDIAC
  - 02: CARDIAC GEM

  - 03: Reserved
  - 04: Voltage regulator on chamber
  - 11: TB Board
  - 12: IB Board
  - 21: ODE Board
  - 31: SB Board
  - 32: PDM Module

- Fields 10-14: serial number of the part.

3 Barcode stickers

All complete parts must carry a barcode sticker. Several different encodings for barcode stickers exist. We use the **128 Code** (see EDMS Document 100 243) which allows alphanumeric information. Fig. 2 gives the flavors of different stickers for the already given example of a chamber built in Frascati.

Figure 2 Examples of barcode stickers

4 Use of barcode readers

It is recommended that barcode readers are used as much as possible to speed up gathering information in the various phases of assembly and tests. For example, during chamber dressing the CARDIAC test procedure foresees that chip calibration data are automatically recovered from a database. During this phase the CARDIAC and the voltage regulator boards will also be assigned to a given chamber, and the use of barcode readers will minimize the probability of errors. A proper interface with the experiment database will be developed.