

# Guide to setting up a parts database

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## Foreword

This Published Document is one of several which have been issued by the British Standards Society. Established in 1960, the Society has, as one of its key aims, the assistance of management in the application of standards in design, manufacture, quality assurance, in-service support, information technology and other relevant activities. The Society has a number of special interest groups dealing with the application of standards in various specialist technical areas, one of which is the Electronics Standards Group.

The Electronics Standards Group has prepared this Published Document as a result of difficulties experienced by its members and their contacts throughout industry in obtaining adequate computer assistance for parts identification. It is an attempt to address this problem by detailing the elements which need to be considered when creating a specialized database for this purpose. The document represents an invaluable aid to setting up such a parts database or as a means of evaluating the effectiveness of proprietary systems which are now becoming available. It is suitable for use by designers, engineers and data processing specialists in any engineering industry.

The document was drafted by members of the BSS Electronics Standards Group and further refined as a result of feedback from an open forum held by the Group in November 1996. The Society is grateful to all the members who have been involved in its preparation and particularly to Graham Goring (Racal Avionics), Roger Leach (GEC-Marconi) and the Group's Chairman, Bob Vallance.



R V Wright  
Chairman, British Standards Society

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

## Introduction

This Published Document outlines a basis for a data set required for a bought-out parts database and could be applied to any commodity or type of part (modified or assembled). It is aimed at the designer or engineer responsible for the selection of parts for original design or maintenance purposes. It could also be used by data processing specialists as a means of understanding how to model the requirements that an engineer faces daily in the “real world” of part selection. It is assumed that the techniques and facilities for building a database are available. The particular examples chosen are based on the electronics industry, and use fictitious names and part numbers.

Most organizations have some form of database for managing their parts inventory. The identity of the part is usually indicated by a code or reference number and a brief description. However the exact meaning of this identity is often difficult to determine especially for bought out parts, due to the volatility of supply. This is particularly relevant where suppliers are frequently updating their catalogue ranges or are liable to be merged with other companies. Furthermore, parts may be covered by a national or international standard which itself can be superseded or renumbered. The effect of this is to create uncertainties about the exact identity of the parts held in the inventory.

This Published Document is an attempt to address this problem by detailing the elements to be considered when applying a code or reference number to parts which are to be held in an inventory or quoted on a parts list, etc. The assumption is made that a specialized database is necessary to identify a part fully, complete with historical reference to changes which have occurred during its life. In order to create a database it is necessary to define the various elements in a data model.

## 1 Definitions

For the purposes of this Published Document, the following definitions apply.

### 1.1

#### **system**

the parts database

### 1.2

#### **entity**

tangible object of interest in the problem area about which an information record is needed

NOTE Entity names are written in upper case, (e.g. PART, DOCUMENT) except where the name appears within an attribute or key description (e.g. Part Number).

### 1.3

#### **maker**

manufacturer of ITEMS

### 1.4

#### **user**

manufacturer of the equipment into which ITEMS are incorporated

### 1.5

#### **PART**

a record of the product as defined by the user (see 2.4 for further information)

### 1.6

#### **ITEM**

record of the product as defined by its maker(s) or supplier(s) (see also 2.3)

### 1.7

#### **DOCUMENT**

any DOCUMENT referenced within the system

### 1.8

#### **ORGANIZATION**

entity that supplies, makes or acts as a service for an ITEM or DOCUMENT

### 1.9

#### **attributes**

data elements which make up the entity, as defined in the data dictionary

NOTE Attributes are usually written in Title Case, e.g. Part = Identification + Description +...; Document = Name + Issue + Title +... .

### 1.10 value

value of an attribute for a particular entity occurrence, e.g. the value of Name for a particular DOCUMENT may be “ISO 9000”; the value of Description for a particular PART may be “SCREW COUNTERSUNK SLOT HEAD M3 10mm”.

### 1.11

#### **key**

attribute, or set of attributes, the value of which uniquely defines one occurrence of an entity, e.g. “Part Identification” could be used as the key to “PART”, since no two PARTS will have the same Part Identification

### 1.12

#### **relationship**

connection between two entities, e.g. PART and MANUFACTURER; DOCUMENT and AUTHOR

### 1.13

#### **Entity Relationship diagram**

illustration of the types of relationships between the entities in the model (one to one, one to many, etc.)

### 1.14

#### **NATO stock number (NSN)**

identifier allocated by the NATO codification bureau

NOTE An item may have many INTERNATIONAL IDENTITY numbers allocated by various authorities.

## 2 The data model

### 2.1 Structure

The data model represents the “real world” information that the system has to implement in terms of entities, the attributes of those entities and the relationships between entities. It has to do so as accurately as possible so that the specialists who use it are not misled by the information in the “virtual world” of the database. It is not dependent on any particular software tool but can be applied in any database system.

Figure 1 shows a data model for a parts database system. Each “plan database cylinder” on the diagram represents a tangible entity in the system; relationships between entities are represented by lines. Each entity may be described by its attributes listed in the boxes in the diagram. The classification attribute tables are separately identified by the smaller cross-hatched database cylinders.

The text describing the entities and their attributes is read left to right, top to bottom. A “crow’s foot” at the end of the line indicates that the relationship refers to many of the entities to which it is attached, for example “many CONTACTs are available at an ORGANIZATION”. Some relationships may have a “crow’s foot” at both ends of the line indicating “many-to-many”, e.g. “an ITEM may have many alternative ITEMS and conversely an ITEM may be alternate to many other ITEMS”.

### 2.2 Interpretation

A typical piece of equipment produced by an organization comprises many separate PARTS. Each PART consists of an ITEM or set of ITEMS which exist in the “real world” and need to be represented accurately in the data model. These ITEMS each have to be identified by a unique set of attributes. Because the manufacturer’s part number, organization, or document (specification or standard) often do not identify an ITEM uniquely, there can be an apparent vagueness, and a great deal of flexibility and care needs to be applied to ITEM identification. This Published Document sets out some of the criteria which must be used when recording the identification data.

### 2.3 ITEM identification

The data model identifies an ITEM by the following attributes.

- a) Class is always known and has to be made mandatory in the database, (e.g. the ITEM is known to be a RESISTOR). Each Class name has to be predefined and held in a classification table in the database.

- b) Properties are known (even if they have a null value) by specification or measurement. Each Property requires a defined format or dictionary of values appropriate for a particular Class held in a Properties table in the database.

- c) An Identifier may also be required, either from the maker’s Part Number, or from a specification, or any combination of these.

By combining these three attributes (accepting that null values may be unavoidable in some cases), identifying an ITEM uniquely from these is possible, e.g. “the 10  $\Omega$ , 1 % tolerance resistor that is made by RESISTOR INC to part number PR4”.

When a new ITEM needs to be introduced into a user organization, initial problems of accurate identification are often ignored in order to be able to create a record of the item’s existence. It later becomes necessary to amend the ITEM attributes whilst making the incompleteness of the initial information visible to the database user.

This is a bad practice which should be avoided whenever possible since it could potentially create duplications and ambiguities. The software should, therefore, mandate certain fields where a null value is unacceptable because such fields are used to create unique indexes so as to avoid duplications (e.g. CLASS, PROPERTIES, MANUFACTURER, PART NUMBER and/or SPECIFICATION). Special update procedures should apply to making new entries in the predefined tables for CLASS and PROPERTIES. Other rules should be implemented for consistent identification, such as “entities have to exist as a database record before they can be linked to ITEMS”, “ITEMs have to exist before they can be attached to PARTs”. Algorithms to format names of other entities such as ORGANIZATION, DOCUMENT, etc should also be established (see also clause 3).

### 2.4 PART identification

A PART is a record of the product as defined by the user, as distinct from an ITEM which is defined by the maker(s) or supplier(s). This distinction is unavoidable, and has to be taken into account in the database. For example, one PART may allow the use of a family of interchangeable ITEMS from several sources, or the PART may be known in the user organization by a different Class and/or set of Properties from those given to it by the supplier (for example, the user may refer to a PART as a “pillar” which is known to the supplier as a “spacer”). These differences should be avoided if possible, but the database has to make allowance for them. The PART record should, if possible, be copied from the ITEM details with minimum alteration and will also normally be allocated an internal (user organization) code number with revision details and other notes.