

American Association of Motor Vehicle Administrators (AAMVA)

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Bar Code Data Encoding Requirements – AAMVA International Specification – Motor Vehicle Documents

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Foreword

The American Association of Motor Vehicle Administrators is a tax-exempt, nonprofit organization striving to develop model programs in motor vehicle administration, police traffic services and highway safety. The association serves as an information clearinghouse for these same disciplines, and acts as the international spokesman for these interests.

Founded in 1933, AAMVA is a voluntary, nonprofit, tax exempt, educational organization. AAMVA represents the state and provincial officials in the United States and Canada who administer and enforce motor vehicle laws.

The association's programs encourage uniformity and reciprocity among the states and provinces, and liaisons with other levels of government and the private sector. Its program development and research activities provide guidelines for more effective public service.

AAMVA understands the importance of standardized data encoding on motor vehicle administration documents. These documents are used by law enforcement to gather data for the completion of accident reports, citations, roadside safety inspections, etc. Inconsistencies in the formatting of the data on motor vehicle administration documents has frustrated law enforcement's efforts to develop reporting systems that are interoperable with other jurisdictions.

Introduction

Over the past several years, bar codes have played a prominent role in motor vehicle agency documentation, such as titles, vehicle registrations, inspection stickers, motor carrier cab cards, drivers' licenses and identification (DL/ID) cards. The purpose of this specification is to provide the jurisdictions with a standardized layout of data elements for one-dimensional and two-dimensional bar codes found in documents other than DL/ID cards. The standardized layout for DL/ID cards can be found in AAMVA 's Personal Identification – AAMVA International Specification – DL/ID Card Design.

Since 1993, the American Association of Motor Vehicle Administrators has issued several “Best Practices” regarding machine-readable technologies. AAMVA’s first “Best Practice” was for magnetic strips on DL/ID cards. After the publication of the **Magnetic Strip Best Practice**, AAMVA and its membership came to a consensus that there was a need to address both linear and Hi-Density bar codes. As a result, in 1996, AAMVA published its **Bar Code Best Practice**. However, this “Best Practice” only gave details to the layout of data elements within 1D and 2D bar codes on DL/ID cards. As this technology was implemented on other motor vehicle agency documents, a growing need was found to address the standardization of the data elements within these bar codes.

Compliance with this specification is voluntary. A jurisdiction may choose to follow the specification for one, all, or none of its documents. However, voluntary compliance with the specification will result in a higher degree of interoperability between jurisdictions. A jurisdiction should follow all the requirements of this specification if it wishes to make the claim that its document is compliant with the AAMVA specification.

1 Scope

This specification was developed by AAMVA for the production and use of government-issued documents for motor vehicle administration purposes, excluding DL/ID cards. Specifications for DL/ID cards are covered under another AAMVA specification for card design.

Private institutions and other organizations may benefit from uniformity established by this specification, but the functional requirements are primarily for the benefit of motor vehicle agencies and law enforcement.

This specification supersedes the **AAMVA Best Practices Recommendations**, last published in 1996. Requests for interpretation, suggestions for improvement or addenda, or defect reports are welcome. They should be sent to AAMVA Standards Program, 4301 Wilson Boulevard, Suite 400, Arlington, VA 22206.

2 Conformance

A bar code printed on a motor vehicle document is in conformance with this standard if it meets all mandatory requirements specified directly or by reference herein, including requirements contained in the annexes applicable to that document.

3 Normative reference(s)

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this AAMVA specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

AAMVA, *Magnetic Strip Best Practices*, August 1993

AAMVA, *Best Practice Recommendation for the use of Bar – Codes*, January 1997

ASCII/ISO 8859-1

ANSI D20, *Data Dictionary for Traffic Record Information Systems*, April 2003

AAMVA, *Policy Positions & Bylaws of the American Association of Motor Vehicle Administrators*, October 2003

ISO/IEC 15416, *Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols*, August 2000

ISO/IEC 16388, *Automatic identification and data capture techniques – Bar code symbology specifications - Code 39*, 1999

ISO/IEC 15417, *Automatic identification and data capture techniques – Bar code symbology specifications - Code 128*, 2000

ISO/IEC 15438, *Automatic identification and data capture techniques – International Two-dimensional Symbology Specification – PDF417*, October 2001

ISO/IEC 15415, *Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Two dimensional symbols*, June 2004

4 Term(s) and definition(s)

For the purposes of this AAMVA specification, the terms and definitions given in the following apply:

4.1

A

alphabetic

Alpha characters (UPPERCASE letters from A to Z).

4.2

data element

item of data that may appear on the license in either human or machine-readable form.

4.3

digital

any data that is composed of a discrete sample or collection of discrete samples that are represented as finite numbers.

4.4

human-readable

data or information that is printed or engraved that is visually present on a document.

4.5

image

digital data that represents the visual likeness of its subject, such as a portrait, finger print, or signature. Images may be collected, stored, and rendered for visual inspection using a variety of digital formats.

4.6

machine-readable

data or information that is encoded into a machine-readable medium, such as a magnetic stripe, bar code, optical memory, or integrated circuit card.

4.7

N

numeric

digits 0 to 9.

4.8

S

visual special characters

! " # \$ % & ' () * + , - . : ; < = > ? [\] ^ _ @. A special character is removed from this category when it is used as a delimiter between data elements in machine-readable technology.

5 Motor Vehicle Administration (MVA) Authority Documents

MVA authorities find that documents that are used by other jurisdictions or by other private and/or public agencies may benefit from inclusion of machine-readable technology. Specifically, bar codes have been integrated with many MVA documents in an effort to boost productivity, increase data entry accuracy, and reduce operating costs. This specification responds to the need of interagency and inter-jurisdictional interchange of these documents in a standardized format. The MVA documents covered by this specification are:

Vehicle title (Annex A)

Vehicle registration (Annex B)

Motor carrier cab card (Annex C)

Motor carrier registrant (Annex C)

Safety inspection (Annex D)

Vehicle owners (Annex E)

Future iterations of this specification may encompass additional MVA-related documents that are subject to the same interagency, inter-jurisdictional, or inter-information system exchange, such as commercial driver medical certificates, traffic safety citations, and motor carrier out-of-service citations.

There are other documents that are incorporating machine-readable technology which may benefit from the example of this specification. These documents are not currently subject to this specification as they are used primarily by one agency, one jurisdiction, or one cohesive information system. Such documents include various renewal notices, customer service tracking receipts, and emissions inspections. AAMVA will entertain requests to include specifications for these documents in future iterations of this specification, provided the case is made for interagency, inter-jurisdiction, or inter-information system exchange. Requests must be submitted to the AAMVA Standards Program, 4301 Wilson Boulevard, Suite 400, Arlington, Virginia 22206.

6 Bar code symbologies

This specification supports one-dimensional and two-dimensional bar code symbologies. Annexes specific to each type of MVA document describe minimum data to be incorporated into each symbology.

- One-dimensional bar code symbologies: Code 39 and Code 128
- Two-dimensional bar code symbology: PDF417

6.1 One-dimensional bar codes

Code 39 symbols must conform to ISO/IEC 16388 -1999, *Automatic identification and data capture techniques – Bar code symbology specifications - Code 39*.

Code 128 symbols must conform to ISO/IEC 15417 - 2000, *Automatic identification and data capture techniques – Bar code symbology specifications - Code 128*.

6.2 Two-dimensional bar code PDF417

PDF417 symbols must conform to ISO/IEC 15438 *Automatic identification and data capture techniques - International Two-dimensional Symbology Specification - PDF417*.

The following PDF417 symbology variants as defined in the ISO/IEC 15438 *shall not* be used:

- Compact PDF417
- MicroPDF417
- MacroPDF417

6.3 Dimensions and Print Quality

6.3.1 Narrow element dimension

The narrow element dimension (X dimension) range shall be from .170mm (.0066 inch) to .380mm (.015 inch) as determined by the printing capability of the supplier/printer. Symbols with narrow elements at the lower end of this range, i.e., .170mm (.0066 inch) to .250mm (.010 inch), may require special care to meet the print quality requirements of this standard.

6.3.2 Row height

The symbol shall have a minimum row height (height of the symbol element) of three (3) times the width of the narrow element ("X" dimension). Increasing the row height may improve scanning performance but will reduce the number of characters that can be encoded in a given space.

6.3.3 Quiet zone

The symbol shall have a minimum quiet zone of 1X (X = the narrow element dimension) above, below, to the left, and to the right. The quiet zone is included within the calculation of the size of the symbol.

6.3.4 Print quality

6.3.4.1 Print quality guidelines

Bar code print quality guidelines from the following specifications shall be used to determine the print quality of symbols compliant with this specification:

- ISO/IEC 15416-2000, *Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols*
- ANSI/AIM BC1-1995, *Uniform Symbology Specification – Code 39*
- ANSI/AIM BC4-1999, *International Symbology Specification - Code 128*
- ISO/IEC 15438 *Automatic identification and data capture techniques - International Two-dimensional Symbology Specification - PDF417*
- ISO/IEC 15415-2004, *Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Two-dimensional symbols*

6.3.4.2 Print quality grades

The minimum symbol grade shall be 3.5/10/660, where:

Recommended Print Quality grade 3.5 (A) at the point of printing the symbol before lamination and a Print Quality Grade of 2.5 (B) after lamination. If lamination is not placed over the bar code, a Print Quality Grade of 3.5 is given.

6.3.4.3 Print quality measurement parameters

Measurement Aperture = .250mm (0.010 inch)

Light Source Wavelength = 660 nanometers (nm) \pm 10 nm

The above symbol quality and measurement parameters assure scanability over a broad range of scanning environments.

It is important that the bar code be decodable throughout the life time of the document. For this reason, quality tests should not be limited to production inspection but also should be followed through to the end use.

6.3.5 PDF417 Error Correction

PDF417 symbols shall use a minimum Error Correction Level of 3. Where space allows, an Error Correction Level of 5 is recommended. Error correction is important for decoding the bar code because certain security laminates interfere with the readability of bar codes, and higher error correction levels help to ensure the prolonged usability of the bar code as abrasions and other damage are incurred over time.

6.3.6 Character sets

The AAMVA community shall use the 256-character table known as ASCII/ISO 8859-1 as the character set table when generating Hi-Density symbols, and for efficiency shall use the 128 character subset TEXT COMPACTION TABLE as defined in the specification.

6.3.7 Compression

No specific recommendation is presented at this time. The AAMVA community has no need to employ specific Compression techniques beyond the field truncation constructs incorporated into the overall Data Structure option recommended in this standard.

7 Data Encoding Structure

One-dimensional bar code symbologies do not require a specific "structure" due to their limited data capacities. All requirements for one-dimensional bar code symbologies are contained within the annex applicable to each MVA document.

Two-dimensional bar code symbologies require a great degree of organization due to their data capacity and the variability of data to be stored. All compliant 2D symbols shall have a file header that allows interested parties to interpret the encoded data. Subfiles shall be employed to carry the specific information. The combination of a header and a subfile designator shall make up a compliant 2D symbol.

Each two-dimensional bar code shall begin with a file header that will identify the bar code as complying with AAMVA specifications. The header shall be followed by a subfile designator to identify the data type stored in the file. Each data element contained in a subfile shall be prefaced by a data element identifier (Element ID). The use of a field separator character shall serve to both terminate a field and indicate the presence of a following element ID. The subfile designators are defined in 7.2, and element IDs are found in the annexes pertaining to specific subfile types or MVA documents.

7.1 Header

Compliant 2D symbols must begin with a header in the following format:

Table D.1 — 2D symbol header format

| Field | Bytes | Contents |
|-------|-------|---|
| 1 | 1 | Compliance Indicator: A 2D symbol encoded according to the rules of this standard shall include a Compliance Indicator. The Compliance Indicator as defined by this standard is the Commercial At Sign (“@”) (ASCII/ISO 646 Decimal “64”) (ASCII/ISO 646 Hex “40”). The Compliance Indicator is the first character of the symbol. |
| 2 | 1 | Data Element Separator: The Data Element Separator is used in this standard to indicate that a new data element is to follow, <i>and</i> that the current field is terminated. Whenever a Data Element Separator is encountered (within a Subfile type which uses Data Element Separators), the next character(s) shall either be a Segment Terminator or shall define the contents of the next field according to the template of the specific Subfile. The Data Element Separator as defined by this standard is the Line Feed character (“ ^L F” ASCII/ISO 646 Decimal “10”) (ASCII/ISO 646 Hex “0A”). The Data Element Separator is the second character of the symbol. |
| 3 | 1 | Record Separator: The Record Separator as defined by this standard is the Record Separator character (“ ^R S” ASCII/ISO 646 Decimal “28”) (ASCII/ISO 646 Hex “1C”). As this report is presented for ratification, there is no special case defined for when this field will be used. It is embodied within the recommendation for future growth. The Record Separator is the third character of the symbol and shall always be reflected within the header in a compliant symbol. |

| Field | Bytes | Contents |
|-------|-------|---|
| 4 | 1 | Segment Terminator: As used in this standard the Segment Terminator is used to end Subfiles where Field Identifiers are employed. The Segment Terminator as defined by this standard is the Carriage Return character (“ ^C _R ” ASCII/ISO 646 Decimal “13”) (ASCII/ISO 646 Hex “0D”). The Segment Terminator is the fourth character of the symbol. |
| 5 | 5 | File Type: This is the designator that identifies the file as an AAMVA compliant format. The designator is defined as the 5-byte upper character string “AAMVA,” with a blank space after the fifth character . |
| 6 | 6 | Issuer Identification Number (IIN): This number uniquely identifies the issuing jurisdiction and can be obtained by contacting the ISO Issuing Authority (AAMVA). |
| 7 | 2 | AAMVA Version Number: This is a decimal value between 00 and 99 that specifies the version level of the PDF417 bar code format. Version “0” and “00” is reserved for bar codes printed to the specification of AAMVA prior to the adoption of the AAMVA specifications. All bar codes compliant with the “AAMVA Best Practices Recommendations” for bar codes, last updated in 1996, are designated Version “0.” All bar codes compliant with this current AAMVA specification shall be designated Version “01.” Should a need arise requiring major revision to the format, this field provides the means to accommodate additional revision. |
| 8 | 2 | Number of Entries: This is a decimal value between “02 and 99” that specifies the number of different Subfile types that are contained in the bar code. This value defines the number of individual subfile designators that follow. All subfile designators (as defined below) follow one behind the other. The data related to the first subfile designator follows the last Subfile Designator. |

7.2 Subfile Designator

All compliant 2D bar code symbols must contain the subfile structure as defined below immediately after the Header as defined in D.7.6. Each AAMVA-compliant 2D bar code must contain a subfile – the standard-compliant subfile.

Table D.2 – Subfile designator format

| Field | Bytes | Contents |
|-------|-------|--|
| 1 | 2 | <p>Subfile Type: This is the designator that identifies what type of data is contained in this portion of the file.</p> <p>The 2-character field defined for each standard-compliant MVA document type and corresponding subfile is as follows:</p> <ul style="list-style-type: none"> • Title: "TD" • Registration: "RG" • Motor carrier cab card: "MC" • Motor carrier registrant: "IR" • Vehicle safety inspection: "VS" • Vehicle owners: "OW" • Vehicle: "VH" |
| 2 | 4 | <p>Offset: These bytes contain a 4-digit numeric value that specifies the number of bytes from the head or beginning of the file to where the data related to the particular sub-file is located. The first byte in the file is located at offset 0.</p> |
| 3 | 4 | <p>Length: These bytes contain a 4-digit numeric value that specifies the length of the Subfile in bytes. The segment terminator must be included in calculating the length of the subfile. The segment terminator is 1 byte long.</p> |

7.3 Data elements

Annexes A through E define mandatory and optional data elements that are accommodated in the subfiles. Jurisdiction-specific data elements may also be encoded, provided the bar code ID is a 3-character uppercase character field beginning with "Z." The jurisdictions may use the second and third character to their discretion.

Mandatory data elements for which no data exists or in the event data is *not available* for a mandatory data element, the field can be left empty.

8 Encryption

All mandatory and optional data must be unencrypted. Issuing jurisdictions may encrypt jurisdiction specific data in a separate subfile or within a different storage media.

Annex A

Title Documents

A.1 PDF417 Data Elements

A.1.1 Data element definitions

Where the description of data elements differ to the definitions found in ANSI D20, ANSI D20 should be considered the authoritative source for data element definitions.

A.1.2 Date format

Encoded date formats are CCYYMMDD.

A.1.3 Data field padding

There are no padding requirements for data elements that do not require the full amount of allotted space in fixed-length fields.

A.1.4 Data element tables

Tables A.1 and A.2 specify mandatory and optional data elements that appear within AAMVA-compliant PDF417 bar codes on title documents.

Column 1 (**Item #**): serves as a reference indicator for citation elsewhere in this standard.

Column 2 (**Data element ID**): three-letter code used to identify data elements encoded in a PDF417 bar code.

Column 3 (**Data element**): common name or phrase that designates what information is to be inscribed on the card. When abbreviations are provided in bold, they are available for use by an Issuing Authority for additional visual designation on cards.

Column 4 (**Description**): meaning of the data element, including any exceptions.

Column 5 (**Field maximum length/type**): valid field length (i.e., the number of characters) for each data element. The nature of the field length is defined by F=fixed length and V=variable length.

A.1.5 Mandatory PDF417 Data Elements

Title (TD Subfile) Data

Table A.1 – Mandatory PDF417 Data Elements

| Item # | Data element ID | Data element | Description | Field maximum length / type | | |
|--------|-----------------|----------------------|---|-----------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | TAC | Titling jurisdiction | The code for the jurisdiction (U.S., Canadian, or Mexican) that titled the vehicle. | F | 2 | AN |

| Item # | Data element ID | Data element | Description | Field maximum length / type | | |
|--------|-----------------|-------------------------------------|--|-----------------------------|--------|------|
| | | | | F/V | Length | Type |
| b. | TAA | Title number | A unique set of alphanumeric characters assigned by the titling jurisdiction to the certificate of title of a vehicle. | F | 17 | AN |
| c. | TAV | Title issue date | The date the jurisdiction's titling authority issued a title to the owner of the vehicle. The format is CCYYMMDD. | F | 8 | N |
| d. | VAL | Vehicle model year | The year that is assigned to a vehicle by the manufacturer. The format is CCYY. | F | 4 | AN |
| e. | VAK | Vehicle make | The distinctive (coded) name applied to a group of vehicles by a manufacturer. | F | 4 | AN |
| f. | VAD | Vehicle identification number (VIN) | A unique combination of alphanumeric characters that identifies a specific vehicle or component. The VIN is affixed to the vehicle in specific locations and formulated by the manufacturer. State agencies under some controlled instances may assign a VIN to a vehicle. | F | 17 | AN |
| g. | TAF | Odometer reading—mileage | This is the odometer reading registered with the DMV either at the time of titling or registration renewal. | F | 12 | AN |
| h. | TAU | Vehicle purchase date | The date a vehicle was purchased by the current owner. The format is CCYYMMDD. | F | 8 | N |
| i. | NAA | Family name | Family name (commonly called surname or last name) of the owner of the vehicle. | V | 40 | ANS |
| j. | NAE | Given name | Given name or names (includes all of what are commonly referred to as first and middle names) of the owner of the vehicle. | V | 80 | ANS |
| k. | NAR | Address-street | Street portion of the owner's address. | V | 35 | AN |
| l. | NAT | Address-city | City portion of the owner's address. | V | 20 | AN |
| m. | NAU | Address-jurisdiction code | Jurisdiction portion of the owner's address. | F | 2 | A |
| n. | NAV | Address-zip code | The ZIP code or Postal code portion of the owner's address. | V | 11 | AN |
| o. | TAG | Odometer disclosure | This is the federal odometer mileage disclosure. The mandatory information is: (1) Actual vehicle mileage; (2) Mileage exceeds mechanical limitations; (3) Not actual mileage; (4) Mileage disclosure not required. | F | 1 | AN |

Note:

ANSI D20 contains formatting requirements for names and addresses that must be followed.

A.1.6 Optional PDF417 Data Elements

Table A.2 – Optional PDF417 Data Elements

| Item # | Data element ID | Data element | Description | Field maximum length / type | | |
|--------|-----------------|-------------------------------|--|-----------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | TPJ | Previous titling jurisdiction | The code for the jurisdiction (U.S., Canadian, or Mexican) that titled the vehicle immediately prior to the current titling jurisdiction. | F | 2 | AN |
| b. | TAZ | Previous title number | The title number assigned to the vehicle by the previous titling jurisdiction. | F | 17 | AN |
| c. | TAY | Title brand | Code providing information about the brand applied to the title. | F | 1 | AN |
| d. | VAO | Vehicle body style | The general configuration or shape of a vehicle distinguished by characteristics such as number of doors, seats, windows, roofline, and type of top. The vehicle body type is 2-character alphanumeric. | F | 2 | AN |
| e. | TAH | Odometer date | The date the odometer reading was recorded by the jurisdiction. | F | 8 | N |
| f. | TAW | New / used indicator | This code represents whether the vehicle/vessel is new or used. Note: jurisdictions' definitions of these classifications may vary a little due to state regulations on demo vehicles, states between dealers, application of state taxes, etc. N = New, U = Used. | F | 1 | A |
| g. | LAA | First lien holder name | Name of the first lien holder of the vehicle. | V | 35 | ANS |
| h. | LAF | First lien holder ID | A code that uniquely identifies the first holder of a lien. | F | 16 | AN |
| i. | VAM | Vehicle model | A code denoting a family of vehicles (within a make), which has a degree of similarity in construction, such as body, chassis, etc. The field does not necessarily contain a standard code; it may contain a value provided by the originator of the field. | F | 6 | AN |
| j. | TAI | Odometer reading—kilometers | This is the odometer reading registered with the DMV either at the time of titling or registration renewal in kilometers. | F | 12 | ANS |
| k. | BBC | Business Name | The name of business that owns the vehicle. | V | 35 | AN |

| Item # | Data element ID | Data element | Description | Field maximum length / type | | |
|--------|-----------------|---------------|---|-----------------------------|--------|------|
| | | | | F/V | Length | Type |
| I. | VBD | Vehicle color | Where the vehicle/vessel is one color, this is the appropriate code describing that color. When the vehicle is two colors, this is the code for the top-most or front-most color. | F | 3 | AN |

A.1.7 PDF417 Data Structure for Title Documents

The Bar-Code community has used the term “license plate” to define a Bar Code which is an index, a pointer or a key. The UPC Bar Code we see on products sold in grocery stores are examples of “license plates.” The product and the price are not in the code itself; rather, the code is a key to a data base and the system looks up the key in the data base and gets the product information and the price. The electronic cash register displays the price, adds the price to the running total and prints a product description and price on the receipt. Many traditional Bar Codes are license plates; they are keys or indexes which provide a search argument allowing related data to be found in a file or data base, retrieved and used as appropriate. When all that is needed is an index or key, the implication is that this data will be used to access a data base or the application’s needs are fulfilled by the key itself. In such cases it is likely that a linear symbology will be the best choice.

While Hi-Density symbologies can be used as “license plates,” because they are so dense they are often used to carry the data base in the symbol itself. In such cases, there is no need to access any remote file. The system interpreting the symbol has the data contained in that symbol to use locally and immediately.

The ability to carry a relatively large amount of information in a machine-readable Bar Code opens up great potential for the DMV community. The information contained on a MCO for example, if encoded into a Hi-Density Bar Code, can be read directly into a computer system. But to be understood by the system, there has to be some structure in how the data is encoded.

Whether linear or Hi-Density, when symbols are printed in one jurisdiction and are likely to be read in other jurisdictions, the need to identify the specific data fields encoded in the symbol is of critical importance. The use of “Field Identifiers” in such symbols is the only practical approach to facilitate inter-community understanding of the data contained in a symbol. Symbols printed within a jurisdiction intended for use only within that jurisdiction need not contain identifiers. An example of such might be the registration number of a regulated dealership, assigned by a DMV for in-jurisdiction use only and having no community-wide definition. But for fields or data elements having a community-wide frame of references, Field Identifiers should be used.

A further component of data structure is desirable in our opinion. There should be a certain structure within the symbol itself; a structure which allows “types of fields” to be isolated. This “base structure” will allow systematic growth and adaptation to occur. Such a structure will protect our community’s investment by a allowing evolutionary change.

The header as defined in 7.1 must be used, followed by a standard-compliant subfile.

All compliant 2D symbols shall employ a file header that allows interested parties to interpret the encoded data. Subfiles shall be employed to carry the specific information. The combination of a header and a subfile designator shall make up a compliant 2D symbol.

Each 2-dimensional bar code shall begin with a file header, as defined in 7.1, which will identify the bar code as complying with the standard. Title document subfile designators to identify the type of data type stored in the files shall follow the header.

A.1.7.1 Standard-compliant title document subfile

Tables A.1 and A.2 define mandatory and optional data elements that are accommodated in the title document subfiles. Data element identifiers shall preface each data element contained in a standard-compliant subfile as defined in column two in Tables A.1 and A.2. The use of a field separator character shall serve to both terminate a field and indicate the presence of a following field identifier.

Mandatory data elements for which no data exists or in the event data is *not available* for a mandatory data element, the field can be left empty or filled with spaces.

There are no padding requirements for data elements that do not require the full amount of allotted space in fixed-length fields

A.1.7.2 Jurisdiction-defined subfile

Jurisdiction-specific data elements may be encoded, provided the data element identifier is a 3-character uppercase character field beginning with "Z." The jurisdictions may use the second and third character to their discretion.

A.2 One-dimensional bar codes

A.2.1 One-dimensional bar code symbologies

AAMVA-compliant one-dimensional bar codes must use the Code 39 or Code 128 symbology.

A.2.2 One-dimensional bar code data elements

AAMVA-compliant title documents may contain a one-dimensional bar code. AAMVA-compliant one-dimensional bar codes shall begin with the character "A" to denote the bar code is AAMVA-compliant, followed by the title number and the odometer reading that is printed on the title document. Title documents may contain additional jurisdiction-specific one-dimensional bar codes provided they do not begin with the character "A."

Annex B Registration Documents

Note:

The general guidelines for PDF417 and One-Dimensional bar codes found in Annex A for title documents also apply to bar codes for registration documents.

B.1.1 Mandatory PDF417 Data Elements

Registration (RG Subfile) Data

Table B.1 – Mandatory PDF417 Data Elements

| Item # | Data element ID | Data element | Description | Field maximum length/type | | |
|--------|-----------------|---------------------------|---|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | RBB | Registration issue date | The date in which the registration was issued. Format is CCYYMMDD. | F | 8 | N |
| b. | RAG | Registration expiry date | The date in which the registration expired. Format is CCYYMMDD. | F | 8 | N |
| c. | RAM | Registration plate number | The characters assigned to a registration plate or tag affixed to the vehicle, assigned by the jurisdiction. | F | 9 | ANS |
| d. | RBD | Registrant family name | Family name (commonly called surname or last name) of the registered owner of a vehicle. | V | 40 | ANS |
| e. | RBE | Registrant given name | Given name or names (includes all of what are commonly referred to as first and middle names) of the registered owner of a vehicle. | V | 80 | ANS |
| f. | RBI | Address-street | Street portion of the owner's address. | V | 35 | AN |
| g. | RBK | Address-city | City portion of the owner's address. | V | 20 | AN |
| h. | RBL | Address-jurisdiction code | Jurisdiction portion of the owner's address. | F | 2 | A |
| i. | RBM | Address-zip code | The Zip code or Postal code of the vehicle owner's residence address. | V | 11 | AN |

| | | | | | | |
|----|-----|-------------------------------------|--|---|----|----|
| j. | VAD | Vehicle identification number (VIN) | A unique combination of alphanumeric characters that identifies a specific vehicle or component. The VIN is affixed to the vehicle in specific locations and formulated by the manufacturer. State agencies under some controlled instances may assign a VIN to a vehicle. | F | 17 | AN |
| k. | VAK | Vehicle make | The distinctive (coded) name applied to a group of vehicles by a manufacturer. | F | 4 | AN |
| l. | VAL | Vehicle model year | The year which is assigned to a vehicle by the manufacturer. The format is CCYY. | F | 4 | N |
| m. | VAO | Vehicle body style | The general configuration or shape of a vehicle distinguished by characteristics such as number of doors, seats, windows, roofline, and type of top. The vehicle body type is 2-character alphanumeric. | F | 2 | AN |
| n. | RBT | Registration year | The year of registration. Format is CCYYMMDD. | F | 8 | N |
| o. | RBU | Registration window sticker decal | A unique number printed on the tab/decal and stored as part of the registration record. | F | 20 | N |

B.1.2 Optional PDF417 Data Elements

Table B.2 – Optional PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length / type | | |
|-------|-----------------|--------------|---|-----------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | VPC | Vehicle use | Indicates the use of the vehicle. | F | 4 | AN |
| b. | FUL | Fuel | The type of fuel used by the vehicle. In most cases, the fuel type would be diesel. | F | 8 | AN |
| c. | VBC | Axles | The number of common axles of rotation of one or more wheels of a vehicle, | F | 2 | AN |

| | | | | | | |
|----|-----|----------------------|---|---|----|-----|
| | | | whether power driven or freely rotating. | | | |
| d. | VAT | Gross vehicle weight | The unladen weight of the vehicle (e.g., the single-unit truck, truck combination) plus the weight of the load being carried at a specific point in time. | F | 9 | ANS |
| e. | VAM | Vehicle model | A code denoting a family of vehicles (within a make), which has a degree of similarity in construction, such as body, chassis, etc. The field does not necessarily contain a standard code; it may contain a value provided by the originator of the field. | F | 6 | AN |
| f. | BBC | Business Name | The business name of the first registrant of a vehicle. | V | 35 | AN |
| g. | VBD | Vehicle color | Where the vehicle is one color, this is the appropriate code describing that color. When the vehicle is two colors, this is the code for the top-most or front-most color. | F | 3 | AN |

Annex C

Motor Carrier Cab Cards

Note:

The general guidelines for PDF417 and One-Dimensional bar codes found in Annex A for title documents also apply to bar codes for motor carrier cab cards.

C.1.1 Mandatory PDF417 data elements

Motor Carrier (MC Subfile) Data

Table C.1 – Mandatory PDF417 Data Elements

| Item # | Data element ID | Data Element | Description | Field maximum length/type | | |
|--------|-----------------|----------------|--|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | MAN | USDOT number | A unique identifier assigned to the carrier responsible for safety issued by the U.S. Department of Transportation – Federal Motor Carrier Safety Administration. | V | 12 | N |
| b. | MAA | Carrier name | The name of the carrier responsible for safety. This can be an individual, partnership or corporation responsible for the transportation of persons or property. This is the name that is recognized by law. | V | 35 | AN |
| c. | MAK | Street address | This is the mailing address of the individual carrier. This information is utilized by the base jurisdiction to send information to the carrier that purchased the IRP credentials. | V | 35 | AN |
| e. | MAL | City | This is the city for the mailing address of the individual carrier. This information is utilized by the base jurisdiction to send information to the carrier that purchased the IRP credentials. | V | 20 | AN |
| f. | MAI | Jurisdiction | This is the jurisdiction of the residential address of the individual carrier. This information is utilized by the base jurisdiction to send information to the carrier that purchased the IRP credentials. | F | 2 | AN |
| g. | MAO | Zip | The ZIP or Postal code of the resident address of the vehicle owner. | V | 11 | N |

Registrant and Vehicle Data (IR Subfile)

C.1.2 Mandatory PDF417 Data Elements

Table C.2 – Mandatory PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length/type | | |
|-------|-----------------|-------------------------------------|--|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | RBC | Carrier name-registrant | The name of the first registrant of a vehicle. Registrant's name may be a combined individual name or the name of a business | V | 35 | AN |
| b. | RBI | Address | The first line of the registrant's residence address. | V | 35 | AN |
| c. | RBK | City | The registrant's residence city name. | V | 20 | AN |
| d. | RBL | Jurisdiction | The state or province of the registrant's residence address. | F | 2 | AN |
| e. | RBM | Zip code | The ZIP or Postal code of the resident address of the registrant. | V | 11 | AN |
| f. | IEG | Unit number | A number, assigned by the registrant of the commercial vehicle or trailer, to identify the vehicle or trailer in the fleet. No two units in a fleet can have the same number. A.K.A vehicle unit number or owner's equipment number. | V | 9 | AN |
| g. | VAD | Vehicle identification number (VIN) | A unique combination of alphanumeric characters that identifies a specific vehicle or component. The VIN is affixed to the vehicle in specific locations and formulated by the manufacturer. State agencies under some controlled instances may assign a VIN to a vehicle. | F | 17 | AN |
| h. | VAL | Model year | The year which is assigned to a vehicle by the manufacturer. The format is YY. | F | 2 | AN |
| i. | VAK | Vehicle make | The distinctive (coded) name applied to a group of vehicles by a manufacturer. | V | 4 | AN |
| j. | VBB | Type of vehicle | The type of vehicle operated for the transportation of persons or property in the furtherance of any commercial or industrial enterprise, for hire or not for hire. Not all states will use all values. | F | 2 | AN |
| k. | RAP/ VBC | Number of seats/axles | The seat capacity of a commercial vehicle designed for transportation of more than then passengers. The number of common axles of rotation of one or more wheels of a vehicle, whether power design or freely rotating. | V | 2 | N |

| | | | | | | |
|----|-----|-------------------------------------|---|---|----|----|
| l. | RBT | Registration year | This field is the registration year assigned by the jurisdiction. The format is CCYY. | F | 4 | N |
| m. | IFJ | Registration issue date | The date in which the registration was issued. CCYYMMDD format. | F | 8 | N |
| n. | RAM | Registration plate number | The characters assigned to a registration plate or tag affixed to the vehicle, assigned by the jurisdiction. | V | 9 | N |
| o. | RAD | Registration decal number | The number assigned to the registration decal in those jurisdictions that issue decals. | V | 10 | N |
| p. | RAF | Registration enforcement date | The registration enforcement date is the date that the current registration was enforced. This may or may not be the original registration date. The date format is CCYYMMDD. | F | 8 | N |
| q. | RAG | Registration expiration date | The date in which the registration expired. The date format is CCYYMMDD. | F | 8 | N |
| r. | VAT | Gross vehicle weight | The unladen weight of the vehicle (e.g., single-unit truck, truck combination) plus the weight of the maximum load for which vehicle registration fees have been paid within a particular jurisdiction. | V | 9 | AN |
| s. | RAU | Base jurisdiction registered weight | The declared base jurisdiction registration weight. | V | 10 | N |

Annex D

Vehicle Safety Inspection Documents

Note:

The general guidelines for PDF417 and One-Dimensional bar codes found in Annex A for title documents also apply to bar codes for safety inspection documents.

D.1.1 Mandatory PDF417 Data Elements

Vehicle Safety Inspection Document (VS Subfile) Data

Table D.1 – Mandatory PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length/type | | |
|-------|-----------------|---------------------------------|---|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | ISN | Inspection station number | Station number performing the inspection. | F | 4 | AN |
| b. | IIN | Inspector identification number | A unique number assigned to each licensed vehicle inspector. | F | 7 | N |
| c. | VAK | Vehicle make | The distinctive (coded) name applied to a group of vehicles by a manufacturer. | V | 4 | AN |
| d. | VAL | Vehicle model year | The year which is assigned to a vehicle by the manufacturer. The format is CCYY. | F | 4 | N |
| e. | VAO | Vehicle body type | The general configuration or shape of a vehicle distinguished by characteristics such as number of doors, seats, windows, roofline, and type of top. The vehicle body type is 2-character alphanumeric. | F | 2 | AN |
| f. | ORI | Odometer reading at inspection | The vehicle's odometer reading (to the nearest mile or kilometer) at the time of inspection. | F | 12 | ANS |

D.1.2 Optional PDF417 Data Elements

Table D.2 – Optional PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length/type | | |
|-------|-----------------|--|---|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | IAN | Inspection address | The street name and number, city, state and zip code of the inspection facility. | V | 108 | ANS |
| b. | IPD | Inspection air pollution device conditions | Identifies whether the pollution control devices meet the minimum inspection criteria. | F | 2 | A |
| c. | IFI | Inspection facility identifier | The unique number assigned to an inspection facility. | F | 5 | AN |
| d. | INC | Inspection form number, current | A unique number assigned to a current vehicle inspection form for identification purposes. | F | 10 | N |
| e. | INP | Inspection form number, previous | The number of the last inspection form excluding the current inspection. | F | 10 | N |
| f. | ISC | Inspection smog certificate indicator | An indicator that specifies whether or not the vehicle has a current smog certificate. | F | 1 | AN |
| g. | INC | Inspection sticker number, current | Preprinted unique number on the motor vehicle inspection sticker currently issued to a motor vehicle which has passed inspection. | F | 9 | N |
| h. | INP | Inspection sticker number, previous | The certification number of the last inspection sticker, excluding the current inspection. | F | 9 | N |

Annex E

Vehicle Owners

Note:

The general guidelines for PDF417 and One-Dimensional bar codes found in Annex A for title documents also apply to bare codes for owners.

E.1.1 Mandatory PDF417 Data Elements

Vehicle Owner (OW Subfile) Data

Table E.1 – Mandatory PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length/type | | |
|-------|-----------------|-------------------------|---|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | NAA | First owner total name | Name of the (or one of the) individual(s) who owns the Vehicle as defined in the ANSI D-20 Data Element Dictionary. (Lastname@Firstname@MI@Suffix if any.) | V | 35 | AN |
| b. | NAB | First owner last name | Last Name or Surname of the Owner. Hyphenated names acceptable, spaces between names acceptable, but no other use of special symbols. | V | 35 | AN |
| c. | NAC | First owner name | First Name or Given Name of the Owner. Hyphenated names acceptable, but no other use of special symbols. | V | 35 | AN |
| d. | NAD | First owner middle name | Middle Name(s) or Initial(s) of the Owner. Hyphenated names acceptable, spaces, between names acceptable, but no other use of special symbols. | V | 35 | AN |
| e. | NAE | Second owner total name | Name of the (or one of the) individual(s) who owns the Vehicle as defined in the ANSI D-20 Data Element Dictionary. (Lastname@Firstname@MI@Suffix if any.) | V | 35 | AN |
| f. | NAF | Second owner last name | Last Name or Surname of the Owner. Hyphenated names acceptable, spaces between names acceptable, but no other use of special symbols. | V | 35 | AN |
| g. | NAG | Second owner name | First Name or Given Name of the Owner. Hyphenated names acceptable, but no other use of special symbols. | V | 35 | AN |

| | | | | | | |
|----|-----|-----------------------------|--|---|----|----|
| h. | NAH | Second owner middle name | Middle Name(s) or Initial(s) of the Owner. Hyphenated names acceptable, spaces between names acceptable, but no other use of special symbols. | V | 35 | AN |
| i. | NAR | Mailing address 1 | Street address line 1. (Mailing) | V | 35 | AN |
| j. | NAS | Mailing address 2 | Street address line 2. (Mailing) | V | 35 | AN |
| k. | NAT | Mailing city | Name of city for mailing address. | V | 15 | AN |
| l. | NAU | Mailing jurisdiction code | Jurisdiction code for mailing address. Conforms to Canadian, Mexican and US jurisdictions as appropriate. Codes for provinces (Canada) and states (US and Mexico). | F | 2 | AN |
| m. | NAV | Mailing zip code | The ZIP code or Postal code used for mailing. (As used by Canadian, Mexican and US jurisdictions.) | V | 11 | N |
| n. | NAM | Residence address 1 | Street address line 1. (Mailing) | V | 35 | AN |
| o. | NAN | Residence address 2 | Street address line 2. (Mailing) | V | 35 | AN |
| p. | NAO | Residence city | Name of city for mailing address. | V | 15 | AN |
| q. | NAP | Residence jurisdiction code | Jurisdiction code for mailing address. Conforms to Canadian, Mexican and US jurisdictions as appropriate. Codes for provinces (Canada) and states (US and Mexico). | F | 2 | AN |
| r. | NAQ | Residence zip code | The ZIP code or Postal code used for mailing. (As used by Canadian, Mexican and US jurisdictions.) | V | 11 | N |
| s. | NAX | First owner ID number | The unique customer number/ID of the first vehicle owner. | V | 35 | AN |
| t. | NAY | Second owner ID number | The unique customer number/ID of the second vehicle owner. | V | 35 | AN |
| v. | NBA | First owner legal status | The legal status of the first vehicle owner. This is only used when a vehicle has multiple owners. A legal status may be ("AND", "OR"). | F | 3 | AN |
| w. | NBB | Second owner legal status | The legal status of the second vehicle owner. This is only used when a vehicle has multiple owners. A legal status may be ("AND", "OR"). | F | 3 | AN |

Annex F

Vehicle

Note:

The general guidelines for PDF417 and One-Dimensional bar codes found in Annex A for title documents also apply to bar codes for vehicles.

F.1.1 Mandatory PDF417 Data Elements

Vehicle (VH Subfile) Data

Table F.1 – Mandatory PDF417 Data Elements

| Item# | Data element ID | Data Element | Description | Field maximum length/type | | |
|-------|-----------------|-------------------------------|--|---------------------------|--------|------|
| | | | | F/V | Length | Type |
| a. | VAA | Major code | State to provide definition. | F | 1 | AN |
| b. | VAB | Minor code | State to provide definition. | F | 1 | AN |
| c. | VAC | Transmission code | Type of transmission the vehicle carries. | F | 1 | AN |
| d. | VAD | Vehicle identification number | A unique combination of alphanumeric characters that identifies a specific vehicle or component. The VIN is affixed to the vehicle in specific locations and formulated by the manufacturer. State agencies under some controlled instances may assign a VIN to a vehicle. | F | 17 | AN |
| e. | VAE | MSRP/FLP | Manufacturer's Suggested Retail Price. No decimal places. Right Justified Zero or space fill. | F | 6 | N |
| f. | VAF | Junked indicator | Vehicle has been junked. | F | 1 | N |
| g. | VAG | Date junked | CCYYMMDD; Date vehicle reported junked. | F | 8 | N |
| h. | VAH | Stolen indicator | Indicates stolen vehicle. | F | 1 | AN |
| i. | VAI | Date stolen | CCYYMMDD; Date vehicle reported stolen. | F | 8 | N |
| j. | VAJ | Date recovered | CCYYMMDD; Date vehicle reported recovered. | F | 8 | N |
| k. | VAK | Vehicle make | The distinctive (coded) name applied to a group of vehicles by a manufacturer. | F | 4 | AN |
| l. | VAL | Make Year | Vehicle manufacture year. | F | 4 | N |

| | | | | | | |
|-----|-----|--------------------------|---|---|----|-----|
| m. | VAM | Vehicle model | Vehicle manufacture model. | F | 3 | A |
| n. | VAN | Fuel type | Type of fuel the vehicle utilizes. | F | 1 | A |
| o. | VAO | Body style | Vehicle manufacture body style. | F | 2 | AN |
| p. | VAP | Number of doors | Number of doors on the vehicle. | F | 1 | N |
| q. | VAQ | Number of cylinders | Number of cylinders the vehicle has. | F | 3 | N |
| r. | VAR | Engine size | The size of a vehicle's engine. | F | 3 | AN |
| s. | VAS | Vehicle status code | This is the status of the vehicle (e.g., active, suspend, etc.) | F | 3 | AN |
| t. | VAT | Manufacture gross weight | Manufacturer's gross vehicle weight rating. | F | 9 | ANS |
| u. | VAU | Horsepower | Manufacturer's rated horsepower. | F | 4 | N |
| v. | VAV | Unladen weight | Gross weight of the vehicle unloaded. | F | 9 | ANS |
| w. | VAW | Engine displacement | Manufacturer's rated engine displacement. | F | 4 | N |
| x. | VAX | IRP indicator | International registration plan indicator. | F | 1 | AN |
| y. | VAY | IFTA indicator | International fuel tax indicator | F | ! | AN |
| z. | VAZ | VLT clac from date | Vehicle license tax calculation from date of purchase. | F | 10 | N |
| aa. | VBA | Vehicle ID number | Unique number to identify the vehicle record. | F | 15 | AN |
| bb. | VBB | Vehicle type code | EPA vehicle classification. | F | 8 | AN |
| cc. | VBC | Number of Axles | Number of axles the vehicle has. | F | 1 | N |