APPENDIX R

BACKGROUND AND TECHNICAL DETAILS FOR 2-DIMENSIONAL (2D) SYMBOLOGY ON THE PERSONAL PROPERTY MILITARY SHIPPING LABEL (MSL)

A. TRANSPORTATION PROCESSING

1. Advance Transportation Control and Movement Document (ATCMD) Available. The MSL 2D symbol improves the accuracy of transportation in-check when ATCMD data is available in the automated information system (AIS) being used to process the cargo.

    a. When the ATCMD data is available in the AIS, three TCMD bar code data points are used from the MSL 2D symbol of each shipment unit (SU) to complete the in-check: the Transportation Control Number (TCN) of the SU, the piece number, and the consignee agents' Department of Defense Activity Address Code (DODAAC).

    b. To meet this requirement, the MSL 2D symbol label must contain the International Standards Organization (ISO)/International Engineering Consortium (IEC) 15418 (American National Standards Institute (ANSI) Materials Handling (MH) 10.8.2) data identifiers (DI), Department of Defense Data Element Identifiers (DEI), and related data that are mapped to the source document header TCMD prime data.

2. ATCMD Not Available. When ATCMD data are not available, the 2D symbol is also intended to improve the speed and accuracy of transportation in-check by the processing activity. The MSL 2D symbol is intended to provide selected MSL and TCMD data to resolve a "no-hit" situation that occurs during shipment in-check when header ATCMD prime and/or trailer data are not available.

3. Reprint MSL. The 2D symbol can also serve as a data file to assist in reprinting a label that has been damaged or for printing a new label when information changes. The MSL 2D symbol will contain information that is human readable on the MSL. The 2D symbol may contain TCMD coded information that will have to be converted to in-the-clear text for printing on the MSL, e.g., deletion of leading zeros from pieces, weight, cube; conversion of date/times codes to in-the-clear text; or conversion of mode code to text.

B. EXPLANATION OF MSL 2D PORTABLE DATA FILE 417 (PDF417) SYMBOL STRUCTURE FOR CODING MSL TEXT AND TCMDS

1. Each SU must be marked with a 2D symbol shipping label and the 2D symbol will contain the data elements from Table R-2, which provides the content of the data streams for personal property MSLs. The data elements include MSL information and prime TCMD header data (T_1) with the respective trailer data (T_5, T_8, T_9) for an export shipment. See this Regulation, Part II, Appendix X, for detailed descriptions of DI/DEIs.

2. All SU data in the MSL 2D symbol replicate data from the Transportation Operational Personal Property Standard System or from shipment information entered in-the-clear on the MSL.

3. When an MSL 2D symbol is generated IAW Table R-2, it does not need to include data elements that are blank.

5. Explanation of Table R-2.

   a. Compliance Indicator (Column 1) shows the special formatting characters associated with the ISO/IEC 15434 (ANSI MH10.8.3) data format. The Compliance Indicator will be the first three characters in the Message Header. The Compliance Indicator will be [)> (left bracket, right parenthesis, and greater than).

   b. Format Codes "06" and "07" (Columns 2 through 4) consist of a Format Header (a two-digit numeric identifier which identifies the rules governing the format), and variable MSL 2D symbol header format for DIs or DEIs, respectively, which define the separators used and control information of the standards.

   c. Data Field (Column 5) contains the description of the data field.

   d. Data Format Type/Length (Columns 6 and 7) contains indicators of whether the data is alpha and/or numeric and the length of the actual data represented by this field, e.g., "an..25". A convention of "an..25" means a variable length data string of up to 25 alphanumeric characters, where "an25" means a fixed length of precisely 25 alphanumeric characters. A convention of "an13..15" means a minimum of 13 characters and a maximum of 15 characters. The plus symbol (+) is used to show concatenated data fields within a DI/DEI string and it may or may not be part of the data sub-string. When specifically referenced to Note 1 in the Data Format column, the plus symbol (+) becomes part of the data sub-string to separate different types of data that are encoded within a single field, e.g., DIs 2L, 3L, and 5L. Variable length fields are not zero-filled unless the information is extracted from an external data source that requires leading zeros.

   e. Sample Data (Column 8) contains sample data for the field indicated.

   f. Element Separators (Column 9) shows the separator or terminal code for that particular part of the data stream. The Format Trailer Character ($^{R}_{S}$) will be used as the fourth character in the Message Header and at the end of each format series of data. The Data Element Separator ($^{G}_{S}$) separates data elements within each format series of the data table. The Message Trailer ($^{E}O_{T}$) identifies the end of the message within the data stream. Also see Table R-1.

Table R-1. Excerpt from Subset of ASCII/ISO 646

(Table of Hexadecimal and Decimal Values)

ASCII/ISO 646	HEX	DEC
$^{R}_{S}$	1E	30
$^{G}_{S}$	1D	29
$^{E}O_{T}$	04	04

   g. Total Characters (Column 10) shows the total number of characters including compliance characters, format indicators, data elements and termination/separator characters for a particular data segment.

6. Data entries for listed DIs/DEIs are mandatory if:

   a. The text is shown on the MSL for a respective DI/DEI.

   b. The data is available from the shipment unit TCMD.

C. PDF417 SYMBOL FORMAT COMPLIANCE REQUIREMENTS AS REFERENCED IN ANSI MH10.8.1 AND ISO/IEC 15434 (ANSI MH10.8.3)

1. The narrow element dimension ("X" dimension) range will be from 0.010 to 0.017 inches (10 to 17 mils).

2. The minimum bar height of an element will be three times the "X" dimension width.

3. The symbol will not exceed 2.4 inches to include the quiet zone as described in ANSI MH10.8.1.

4. The symbol will be printed with no more than 12 data columns in width. A PDF417 symbol includes a start pattern, a left row indicator column, one or more data columns, a right row indicator column, and a stop pattern. The start and stop patterns appear to be wide and narrow vertical lines on each end. The indicator and data columns appear to be checkered patterns separated by single vertical lines.

5. The symbol will have a minimum quiet zone of 0.04 inches above, below, to the left, and to the right.

6. An error correction level of five will be used.

7. ISO/IEC 15438 Automatic Identification and Data Capture Techniques - Bar Code Symbology Specification - PDF417 will be used to determine a minimum symbol print grade of 2.5/10/660, where:

   a. Print quality grade ≥ 2.5 (B) at point of printing.

   b. Measurement aperture = 0.010 inches.

   c. Light source wavelength = 660 nanometers (nm) ± 10 nm

Table R-2. Personal Property Shipping Label 2D Symbol Format

Compliance Indicator	Format Header	Format 06 DI	Format 07 DEI	Data Field	Data Format Type | Length DI | Data		Sample Data without DI/DEI	Element Separators	Total Characters
[)>				**Message Header Compliance Indicator**	**an3**		**[)>**	**RS**	**4**
	06			**Data Identifier Format Header**	**an2**		**06**	**GS**	**3**
		JKUSM		TCN	an5	an17	F1096305469621JXX	GS	23

Compliance Indicator	Format Header	Format 06 DI	Format 07 DEI	Data Field	Data Format Type | Length DI | Data		Sample Data without DI/DEI	Element Separators	Total Characters
		3D		Ship Date	an2	an4	1090	GS	7
		2K		Bill of Lading	an2	an..12	M1234567	GS	15
		9K		TAC	an2	an4	FZZZ	GS	7
		12K		Personal Property SCAC	an3	an4	XYZW	GS	8
		2L		Ship To Address	an2	an..35 +an..35 +an..35 +an..35 +an..35 See Note 1	1st address line +2nd address line +3rd address line +4th address line +5th address line	GS	182
		3L		From Address	an2	an..35 +an..35 +an..35 See Note 1	1st address line +2nd address line +3rd address line	GS	110
		5L		Consignee Address	an2	an..35 +an..35 +an..35 +an..35 +an..35 See Note 1	1st address line +2nd address line +3rd address line +4th address line +5th address line	GS	182
		2Q		Weight	an2	an..5 +../an2 See Note 2	350	GS	11
		11Q		Tare Weight	an3	an..5 +../an2	40	GS	12
		13Q		Piece Number/Total Pieces	an3	an..4/an..4	1/4	RS	13
	07			**Free Text Format Header**	**an2**		**07**	**GS**	**3**
			12	Cube	an2	an..4 +../an2 See Note 2	36	GS	10
			15	Water Commodity/Special Handling Code	an2	an5	390Z9	GS	8
			23	Air Dimension Code	an2	an1	A	GS	4
			25	POE Code	an2	an3	DOV	GS	6
			26	POD Code	an2	an3	RMS	GS	6
			27	Consignee DODAAC	an2	an6	FB5612	GS	9
			28	Transportation Priority	an2	n1	2	GS	4
			29	Consignor DODAAC	an2	an6	FB4407	GS	9
			30	Mode/Method Code	an2	an1	P	GS	4
			32	RDD	an2	an..3	118	GS	6
			34	TCMD/Manifest Doc ID Code (header DIC only)	an2	an3	TF1	GS	6

Compliance Indicator	Format Header	Format 06 DI	Format 07 DEI	Data Field	Data Format Type | Length DI | Data		Sample Data without DI/DEI	Element Separators	Total Characters
			35	Free Text Comment	an2	an..60	Free text up to 60 characters	GS	63
			45	Owner's Last Name	an2	an..13	Smith	GS	16
			46	Owner's First and Middle Initials	an2	an..2	JB	GS	5
			47	Owner's Grade	an2	an2	O5	GS	5
			48	Type Service	an2	an..10	TGBL UB	GS	13
			49	Air Commodity/Special Handling Code	an2	an2	JZ	GS	5
			50	Type Pack Code	an2	an2	MW	GS	5
			69	Personal Property Code	an2	an1	B	GS	4
			70	Net Weight	an2	an..5 +../an2	310	GS	11
			71	POV Year and Model	an2	n2+an..4	96SABL	GS	9
			72	POV Make	an2	a4	MERC	GS	7
			73	POV State of Registration	an2	a2	VA	GS	5
			74	POV License Number	an2	an..8	PAE8393X	GS	11
			75	POV Vehicle Color	an2	a3	BLK	RS EOT	6 1

Note 1. The plus symbol (+) is used as a delimiter between the data elements and is part of the data sub-string.

Note 2. To accommodate current automated information systems, US default values are assumed as shown. Metric data values may be used in the 2D symbol for generic cargo shipment descriptions, but the data values must be marked with the metric units of measure from the ANSI X12.3 code list 355. The ANSI X12.3 codes selected for use are: KG = kilograms, CM = centimeter, CC = cubic centimeter, MR = meter, CR = cubic meter. Decimal values are allowed in the 2D symbol. Human readable values printed on the DOD MSL will be in US standard unit of measure format and will be rounded to the next higher whole number with leading zeros suppressed.

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