

## DICOM Correction Item

Correction Number CP-319	
Log Summary: Corrections to new MR object	
Type of Modification	Name of Standard
Correction	PS 3.3, 3.6 2001 + Sup 49
<p>Rationale for Correction</p> <p>Some element names in the data dictionary of Sup 49 are inconsistent with the modules and macros, or internally inconsistent in PS 3.3.</p> <p>Some attribute requirements are incorrect (condition specified but type 1).</p> <p>An attribute from the old MR object has been used with a different name, but the named not updated in the old object or dictionary ... use the new name everywhere.</p> <p>A functional group macro is inconsistently named in section A and section C of PS 3.3.</p> <p>In the Multi-Coil Definition Sequence, the attributes should be type 1 not 1C, and the number of permissible items should be specified.</p> <p>Lossy Image Compression should be type 1, not 1C, and the presence of Lossy Image Compression Ratio predicated on the value of Lossy Image Compression, not the real-world condition.</p> <p>Some defined terms for code string values in Respiratory Cycle Position exceed the maximum 16 characters allowed.</p> <p>Temporal Position Index should be described as starting from 1.</p> <p>The Supplemental Palette Color Table Module is supposed to mirror the Palette Color Table Module, but the restriction on the number of bits per entry that applies to the Palette Color Table Module was not propagated to the new Module.</p> <p>The MR Spectroscopy Attribute Multiplicity Ordering for 1D or 2D spectra is incorrectly predicated on Data Point Columns rather than Data Point Rows.</p> <p>The description of restrictions on Bits Stored and Bits Allocated is incorrectly positioned in the MR Image and Spectroscopy Instance Macro section, rather than the Enhanced MR Image Module section.</p>	
Sections of documents affected	
Sup 49 additions to PS 3,3, 3.6 (section and table references are to draft 2002 standard).	
Correction Wording:	

*Correct the following typographic errors:*

**Table A.36-2  
ENHANCED MR IMAGE FUNCTIONAL GROUP MACROS**

...	...	...
MR Diffusion	C.8.13.5.9	C - Required if Acquisition <b>Pixel</b> Contrast (0008,9209) in any MR Image Frame Type Functional Group in the SOP Instance equals DIFFUSION and Image Type (0008,0008) Value is ORIGINAL or MIXED. May be present otherwise.
...	...	...

**Table A.36-4  
MR SPECTROSCOPY FUNCTIONAL GROUP MACROS**

...	...	...
MR Diffusion	C.8.13.5.9	C - Required if Acquisition <b>Pixel</b> Contrast (0008,9209) in any MR Image Frame Type Functional Group in the SOP Instance equals DIFFUSION and Image Type (0008,0008) Value is ORIGINAL or MIXED. May be present otherwise.
...	...	...

*Correct the following attribute tag:*

**C.7.6.16.2.2.4 Concatenations and Stacks**

...

In order to allow interoperable operations on stacks, 2 different frames with the same Stack ID (0020,9056) can only have the same In-Stack Position Number (0020,9057) if they have the same values for the following attributes:

1. Dimension Organization UID (0020,~~92229164~~) or if absent Concatenation UID (0020,9133) to qualify the Stack ID

*Fix Code String values that are too long:*

**Table C.7.6.16-3  
 FRAME CONTENT MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
>Respiratory Cycle Position	(0018,9214)	3	Description of the position in the respiratory cycle that is most representative of this frame.  Defined Terms: <b>START_OF_RESPIRATION</b> <b>START_RESPIR</b> <b>END_OF_RESPIRATION</b> <b>END_RESPIR</b> UNDETERMINED
>Temporal Position Index	(0020,9157)	3	Ordinal number ( <b>starting from 1</b> ) of the frame in the set of frames with different temporal positions.
...	...	...	...

*Rename attribute in existing MR object:*

**C.8.3.1 MR Image Module**

...

**Table C.8-4  
 MR IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
<b>In-plane</b> Phase Encoding Direction	(0018,1312)	3	The axis of phase encoding with respect to the image. Enumerated Values:  ROW = phase encoded in rows. COL = phase encoded in columns.
...	...	...	...

*Correct name of macro to be consistent with its definition in Section C:*

**Table A.36-2**  
**ENHANCED MR IMAGE FUNCTIONAL GROUP MACROS**

Functional Group Macro	Section	Usage
...	...	...
MR Imageing Modifier	C.8.12.5.6	C – Required if Image Type (0008,0008) Value is ORIGINAL or MIXED. May be present otherwise.
...	...	...

*Correct the following attribute conditions:*

**MR FOV/GEOMETRY MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
MR FOV/Geometry Sequence	(0018,9125)	1	Identifies the geometry parameters of this frame. Only a single Item shall be permitted in this sequence.
>In-plane Phase Encoding Direction	(0018,1312)	1C	The axes of the in-plane phase encoding with respect to the frame. Enumerated Values: COLUMN ROW OTHER Required if Frame Type (0008,9007) Value of this frame is ORIGINAL. May be present otherwise.
>MR Acquisition Frequency Encoding Steps	(0018,9058)	1C	Number of Frequency Encoding steps (kx) acquired Required if Frame Type (0008,9007) Value is ORIGINAL. May be present otherwise.
>MR Acquisition Phase Encoding Steps in-plane	(0018,9231)	1C	Number of In-Plane Phase Encoding steps (ky) acquired Required if Frame Type (0008,9007) Value is ORIGINAL. May be present otherwise.
...	...	...	...

**Table C.8.13-19**  
**MR MODIFIER MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
MR Modifier Sequence	(0018,9115)	1	Identifies general acquisition parameters of this frame. Only a single Item shall be permitted in this sequence.
...	...	...	...
>Parallel Reduction Factor In-plane	(0018,9069)	1C	...
>Parallel Reduction Factor out-of-plane	(0018,9155)	1C	...
>Parallel Reduction Factor Second In-plane	(0018,9168)	1C	...

*Correct the following attribute conditions:*

**Table C.8.13-21**  
**MR RECEIVE COIL MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
>Multi-Coil Definition Sequence	(0018,9045)	1C	A sequence <b>which that</b> provides information regarding each element of a multi-coil. It should include attributes for all elements, whether used in the current acquisition or not. <b>One or more Items shall be present.</b>  Required if Frame Type (0008,9007) Value□ of this frame is ORIGINAL and Receive Coil Type (0018,9043) equals MULTICOIL. May be present otherwise <b>only if Receive Coil Type (0018,9043) equals MULTICOIL.</b>
>>Multi-Coil Element Name	(0018,9047)	1C	Name of element of multi-coil.
>>Multi-Coil Element Used	(0018,9048)	1C	Indicates whether the multi-coil element was used in the current acquisition. Enumerated Values: YES NO
...	...	...	...

**Table C.8.13-23  
 MR DIFFUSION MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
MR Diffusion Sequence	(0018,9117)	<u>21</u>	Identifies the diffusion parameters of this frame. <del>Zero or</del> one Item <b>may shall</b> be included in this sequence.  <b>One item is required if Acquisition Contrast (0008,9209) equals DIFFUSION.</b>
....			

*Correct the following attribute conditions:*

**C.8.13.1 Enhanced MR Image Module**

...

**Table C.8.13-1  
 ENHANCED MR IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Lossy Image Compression	(0028,2110)	<del>1C</del>	Specifies whether an Image has undergone lossy compression.  Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression.  See C.7.6.1.1.5 for further explanation. <b>Required if Lossy Compression has been performed on the Image.</b>
Lossy Image Compression Ratio	(0028,2112)	1C	Describes the approximate lossy compression ratio(s) that have been applied to this image.  See C.7.6.1.1.5 for further explanation.  May be multivalued if successive lossy compression steps have been applied.  Note: For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30.  <b>Required if Lossy Image Compression (0028,2110) is "01" has been performed on the Image.</b>

*Move the following text here into new section:*

**C.8.13.1.1 Enhanced MR Image Module Attribute Description**

**C.8.13.1.1.1 Bits Allocated and Bits Stored**

Table C.8.13-2 specifies the allowed combinations of Bits Allocated (0028,0100) and Bits Stored (0028,0101).

**Table C.8.13-2  
 ALLOWED COMBINATIONS OF ATTRIBUTE VALUES  
 FOR BITS ALLOCATED AND BITS STORED**

Bits Allocated	Bits Stored
8	8
16	12, 16

*Renumber the table and delete the moved text from the next section:*

**C.8.13.2 MR Image and Spectroscopy Instance Macro**

Table C.8.13-~~23~~ specifies the common attributes Enhanced MR Image Module and MR Spectroscopy Module.

**Table C.8.13-~~23~~  
 MR IMAGE AND SPECTROSCOPY INSTANCE MACRO**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Referenced Image Evidence Sequence	(0008,9092)	1C	Full set of Composite SOP Instances referred to inside the Referenced Image Sequences of this Enhanced MR Image SOP Instance. See C.8.12.2.1.32 for further explanation.  One or more Items may be included in this sequence.  Required if the Referenced Image Sequence (0008,1140) is present.
<i>&gt;Include 'SOP Instance Reference Macro' Table C.17-3</i>			
Source Image Evidence Sequence	(0008,9154)	1C	Full set of Composite SOP Instances referred to inside the Source Image Sequences of this Enhanced MR Image SOP Instance. See C.8.13.2.1.32 for further explanation.  One or more Items may be included in this sequence.  Required if the Source Image Sequence (0008,2112) is present.
<i>&gt;Include 'SOP Instance Reference Macro' Table C.17-3</i>			
...	...	...	...

Content Qualification	(0018,9004)	1	Content Qualification Indicator Enumerated Values: PRODUCT RESEARCH SERVICE  See C.8.12.2.1.21 for further explanation.
...	...	...	...

**C.8.13.2.1 MR Image and Spectroscopy Instance Macro Attribute Description**

**C.8.13.2.1.1 ~~Bits Allocated and Bits Stored~~**

~~Table C.8.13-3 specifies the allowed combinations of Bits Allocated (0028,0100) and Bits Stored (0028,0101).~~

**Table C.8.13-3  
 ALLOWED COMBINATIONS OF ATTRIBUTE VALUES  
 FOR BITS ALLOCATED AND BITS STORED**

Bits Allocated	Bits Stored
8	8
16	12, 16

**C.8.13.2.1.21 Content Qualification**

...

**C.8.13.2.1.32 Evidence Sequence Attributes**

...

*Correct the following attribute conditions:*

**Table C.8.14-1  
 MR SPECTROSCOPY MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
....			
De-coupling	(0018,9059)	<del>1</del> <b>C</b>	Indicates whether de-coupling was active. Enumerated Values: YES NO Required if Image Type (0008,0008) Value is ORIGINAL or MIXED. May be present otherwise.
....			



**C.8.14.1.1 MR Spectroscopy Attribute Multiplicity Ordering**

The following attributes may have a Value Multiplicity of one or two depending whether one or two frequency axes are used as specified by the value of Data Point **Columns Rows** (0028,9002~~1~~):

- Transmitter Frequency (0018,9098)
- Resonant Nucleus (0018,9100)
- Spectral Width (0018,9052)
- Chemical Shift Reference (0018,9053)
- De-coupled Nucleus (0018,9060)
- De-coupling Frequency (0018,9061)
- De-coupling Chemical Shift Reference (0018,9063)
- Time Domain Filtering (0018,9065)
- Number of Zero Fills (0018,9066)

Value 1 shall contain the value corresponding to the sampling time axis (the axis along a data point row).

Value 2, if present, shall contain the value corresponding to the evolution time axis (the axis along a data point column).

**Table C. 8.14-5  
 MR SPECTROSCOPY DATA MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Signal Domain Columns	(0028,9003)	1	Domain of represented signal in column direction. Enumerated Values: FREQUENCY TIME
Signal Domain Rows	(0028,9235)	1C	Domain of represented signal in row direction. Enumerated Values: FREQUENCY TIME Required if Data Point Rows (0028,9001) has a value of more than 1.
...	...	...	...

*Clarify length of palette color LUT entries:*

**C.7.6.3.1.5 Palette Color Lookup Table Descriptor**

...

When the Palette Color Lookup Table Descriptor (0028,1101-1103) are used as part of the Palette Color Lookup Table Module **or the Supplemental Palette Color Lookup Table Module**, the third value shall be equal to 16.

*Correct the following element names and remove duplicate entries and correctly sort:*

(0018,1312)	<u>In-plane</u> Phase Encoding Direction	CS	1
<del>(0018,9069)</del>	<del>Parallel Reduction Factor In-plane</del>	<del>FD</del>	<del>1</del>
(0008,9092)	<u>Referring Referenced</u> Image Evidence Sequence	SQ	1
<del>(0018,9096)</del>	<del>Parallel Reduction Factor In-plane</del>	<del>FD</del>	<del>1</del>
(0018,9037)	<u>Gating Cardiac</u> Synchronization Technique	CS	1
(0018,9125)	MR FOV/Geometry Sequence	SQ	1
<del>(0018,9127)</del>	<del>Spectroscopy Acquisition Data Columns</del>	<del>UL</del>	<del>1</del>
(0018,9126)	Volume Localization Sequence	SQ	1
<del>(0018,9127)</del>	<del>Spectroscopy Acquisition Data Columns</del>	<del>UL</del>	<del>1</del>
(0018,9152)	<u>MR</u> Metabolite Map Sequence	SQ	1
(0018,9170)	Respiratory Motion Compensation <u>Technique</u>	CS	1
(0018,9173)	Bulk Motion Signal <u>Source</u>	CS	1
(0018,9175)	Applicable Safety Standard <u>Version Description</u>	LO	1
(0018,9176)	Operation <u>ng</u> Mode Sequence	SQ	1
(0018,9178)	Operation <u>ng</u> Mode	CS	1
(0018,9214)	Respiratory <u>Motion Status Cycle Position</u>	CS	1
(0018,9236)	Cardiac <u>Motion Status Cycle Position</u>	CS	1
(0020,9116)	Plane Orientation Sequence	SQ	1
<del>(0018,9127)</del>	<del>Spectroscopy Acquisition Data Columns</del>	<del>UL</del>	<del>1</del>
(0020,9128)	Temporal Position Index	UL	1
(0020,9167)	Functional Group <u>Sequence</u> Pointer	AT	1
(0020,9222)	Dimension <u>Index</u> Sequence	SQ	1
(0028,9003)	Signal Domain <u>Columns</u>	CS	1-2
(0028,9110)	Pixel <u>Matrix Measures</u> Sequence	SQ	1
(0040,9211)	Real World Value <u>LUT</u> Last Value Mapped	US/SS	1
(0040,9216)	Real World Value <u>LUT</u> First Value Mapped	US/SS	1