

## DICOM Correction Item

Correction Number		CP-465
Log Summary: Ultrasound Tissue Classification		
Type of Modification	Name of Standard	
Correct Value	PS3.3, PS3.6, PS3.16-2004	
<p>Rationale for Correction:</p> <p>Ultrasound can be used to characterize tissue as part of the image acquisition. Applications for tissue characterization include: Lesion identification for Ultrasound breast imaging, Kidney stone composition for Ultrasound urology imaging, and arterial plaque composition for Intravascular Ultrasound imaging. However, the Ultrasound IODs have no way to identify such images or classification of tissue. This CP proposes adding a "Tissue Characterization Imaging" modality bit to Value 4 of the Image Type (0008,0008) attribute used by US Image Module, and adding new attributes in the US Region Calibration Module to provide tissue classification information.</p>		
<p>Sections of documents affected:</p> <p>PS3.3 Section C.8.5</p> <p>PS3.6 Section 6</p> <p>PS3.16 Annex B and D</p>		
Correction Wording:		

*In PS 3.3 update US Region Calibration Module for coded value look up*

**Table C.8-17  
 US REGION CALIBRATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018,6011)	1	Defines a sequence of Ultrasound Regions. One or more Items may be included in this Sequence.
...			
>Number of Table Entries	(0018,6056)	1C	<p>The number of entries in the Table of Pixel Values.</p> <p>Required if the <b>value of</b> Pixel Component Organization <b>(0018,6044) equals is 2 or 3</b>. Otherwise not used. See C.8.5.5.1.11 for further explanation.</p>

>Table of Pixel Values	(0018,6058)	1C	<p>A table of Pixel Values used in conjunction with the Table of Parameter Values <b>(0018,605A) or Pixel Value Mapping Code Sequence (0040,9098)</b> to provide a mapping from Pixel Value to <b>Parameter a real world</b> value.</p> <p>Required if the <b>value of</b> Pixel Component Organization <b>(0018,6044) equals is 2 or 3</b>. Otherwise not used.</p> <p>See C.8.5.5.1.12 for further explanation.</p>
>Table of Parameter Values	(0018,605A)	1C	<p>A table of Parameter Values used in conjunction with the Table of Pixel Values <b>(0018,6058)</b> to provide a mapping from Pixel Value to Parameter Value.</p> <p>Required if the <b>value of</b> Pixel Component Organization <b>(0018,6044) equals is 2</b>. Otherwise not used. See C.8.5.5.1.13 for further explanation</p>
<b>&gt; Pixel Value Mapping Code Sequence</b>	<b>(0040,9098)</b>	<b>1C</b>	<p><b><u>Sequence that, in conjunction with the Table of Pixel Values (0018,6058), provides a mapping from a Pixel Value to an associated Coded Concept. One or more Items shall be present; the number of Items shall be equal to the value of Number of Table Entries (0018,6056).</u></b></p> <p><b><u>Required if the value of Pixel Component Organization (0018,6044) is 3 (Code Sequence look up).</u></b></p> <p><b><u>See Sections C.8.5.6.1.18 for further explanation.</u></b></p>
<b><i>&gt;&gt;Include 'Code Sequence Macro' Table 8.8-1</i></b>		<b><i>Baseline Context ID for IVUS is 3497; no Context ID is otherwise defined.</i></b>	
...			

**C.8.5.5.1.4 Pixel Component Organization**

Pixel Component Organization (0018,6044) provides an Enumerated Value describing the components of a pixel. The absence of this data element means that pixel component calibration does not exist for this region. Enumerated Values are:

- 0 = Bit aligned positions
- 1 = Ranges
- 2 = Table look up
- 3 = Code Sequence look up**

Other values reserved for future use.

Pixel Component Organization defines the way in which the composite pixel values are mapped into real world values with physical units, as illustrated in Figure C.8-7.

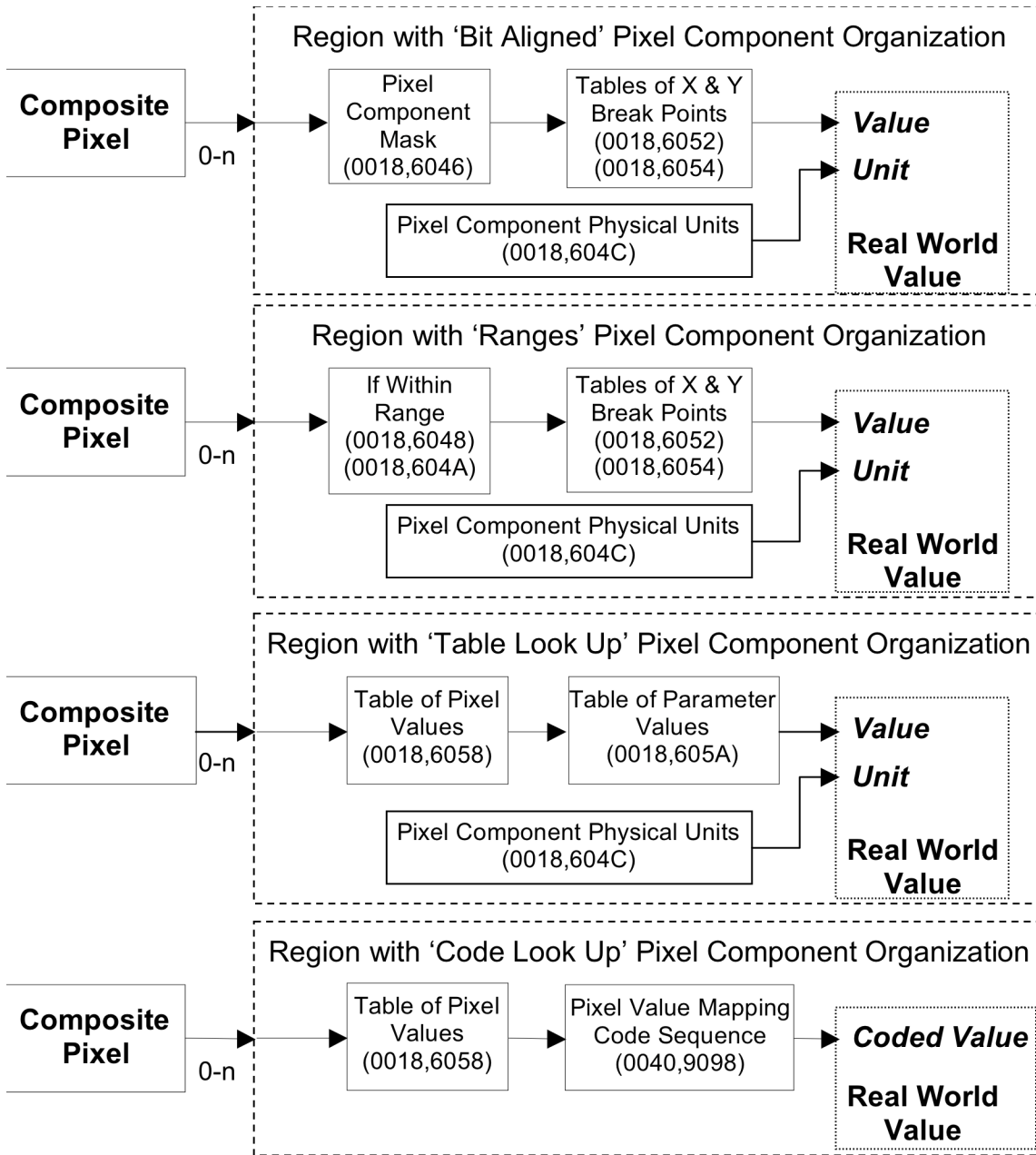


Figure C.8-7 Pixel Component Calibration

*Editor's note: figure is replacement for current Figure C.8-7*

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#### C.8.5.5.1.7 Pixel Component Data Type

For Pixel Component Data Type (0018,604E), the Enumerated Values indicating the type of data for the pixel component are:

Value	Meaning	Value	Meaning
0000H	None or not applicable	0001H	Tissue
0002H	Spectral doppler	0003H	Color Flow Velocity
0004H	Color Flow Variance	0005H	Color Flow Intensity
0006H	Gray bar	0007H	Color bar
0008H	Integrated Backscatter	0009H	Computed Border

**000AH Tissue Classification**

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**C.8.5.5.1.11 Number of Table Entries**

The Number of Table Entries (0018,6056) gives the number of entries in the Table of Pixel Values, ~~t~~the number of entries in the Table of Parameter Values (**0018,605A**), **if present, and the number of items in the Pixel Value Mapping Code Sequence (0040,9098) , if present. ~~is also equal to this number. Pixel Value and Parameter Value tables are used to assign Parameter values to pixels. A pixel is calibrated by finding an entry in the Pixel Value Table that matches its Composite Pixel Code (see Section C.7.6.3.1.1). The offset of this entry is used as an index into the Parameter Value Table. The Parameter value entry at this offset gives the Parameter Value of the Pixel.~~**

**Note: ~~If a Composite Pixel Code has no matching value in the Pixel Value Table then there is no unambiguous way to determine the corresponding Parameter Value. A method may exist to determine a valid Parameter Value but the specification of such a method is outside the scope of the DICOM standard. No assumption should be made that linear interpolation will produce a valid result.~~**

**C.8.5.5.1.12 Table of Pixel Values**

This is a table of unique Pixel Codes **The Table of Pixel Values (0018,6058) specifies the pixel values that are mapped to real world parameter values or coded concepts (tissue characterizations).** The number of entries in the table is given by Number of Table Entries (0018,6056).

**A pixel is calibrated (mapped to a real-world value) by finding an entry in the Table of Pixel Values that matches its Composite Pixel Code (see Section C.7.6.3.1.1). The offset index of this entry is used as an index into the Parameter Value Table (0018,605A) or as a sequence item number in the Pixel Value Mapping Code Sequence (gggg,eeee) to select the real world value. The first Table of Pixel Values entry corresponds to sequence item 1.**

**Note: If a Composite Pixel Code has no matching value in the Pixel Value Table then there is no unambiguous way to determine the corresponding Parameter Value. A method may exist to determine a valid Parameter Value but the specification of such a method is outside the scope of the DICOM standard. No assumption should be made that linear interpolation will produce a valid result.**

**C.8.5.5.1.13 Table of Parameter Values**

~~This is a~~ **The Table of Parameter Values (0018,605A) provides the real world values for pixel values identified in the Table of Pixel Values (0018,6058).** The number of table entries is given by Number of Table Entries (**0018,6056**) and the physical units are given by Pixel Component Physical Units (0018,604C). Values may repeat when a parameter value is associated with more than one Composite Pixel Code value.

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**C.8.5.5.1.18 Pixel Value Mapping Code Sequence**

**The Pixel Value Mapping Code Sequence (0040,9098) provides the real world values for pixel values identified in the Table of Pixel Values (0018,6058). The number of items in the sequence is given by Number of Table Entries (0018,6056).**

**Note: Pixel Component Physical Units (0018,604C) does not apply to Sequence of Pixel Value Codes and should be set to 0000H (none or not applicable).**

*In PS 3.3 add new attributes and modify attribute conditions in Table*

**C.8.5.6.1.1 Image Type**

Value 4 is constructed as a modality bit map to allow for a description of multi-modality displays. In using this bit map, the sum of the values of the various modalities will unambiguously determine the constituent modalities.

- |                     |                         |  |
|---------------------|-------------------------|--|
| 0001 = 2D Imaging   | 0002 = M-Mode           | 0004 = CW Doppler                            |
| 0008 = PW Doppler   | 0010 = Color Doppler    | 0020 = Color M-Mode                          |
| 0040 = 3D Rendering | 0100 = Color Power Mode | <b><u>0200 = Tissue Characterization</u></b> |

*In PS 3.6 add new attribute description section*

Tag	Name	VR	VM
<b><u>(0040,9098)</u></b>	<b><u>Pixel Value Mapping Code Sequence</u></b>	<b><u>SQ</u></b>	<b><u>1</u></b>

*In PS 3.16 Annex B Add new terms to Context Group*

**Context Group 3497 – IVUS Arterial Morphology**

**CID 3497**  
**IVUS Arterial Morphology**

**Type: Extensible**                      **Version: 20050110**

<b><u>Coding Scheme</u></b>	<b><u>Code Value</u></b>	<b><u>Code Meaning</u></b>
<b><u>SRT</u></b>	<b><u>T-41100</u></b>	<b><u>Lumen of artery</u></b>

<b><u>Coding Scheme</u></b>	<b><u>Code Value</u></b>	<b><u>Code Meaning</u></b>
<b><u>SRT</u></b>	<b><u>R-102AE</u></b>	<b><u>External Elastic Membrane</u></b>
<b><i>Include CID 3495</i></b>		