PmtMetadataKeysForExif

Version 1.0, February 10, 2004

Authors:

Katherine Miller-Mullins,
Robert Reisch and
Daniel Rupe
Eastman Kodak Company
343 State Street
Rochester, NY 14650 USA

1 Introduction to PmtMetadataKeysForExif

The PmtMetadataKeysForExif document provides information about PMT metadata keys. This document is actually a combination of three other documents, or sections. Each section is discussed below.

2 Metadata Keys

The first section is the **Metadata Keys** section. The Metadata Keys section is a table of all the PMT metadata keys that are associated with the Exif 2.2 file format. Each row in the table provides helpful information associated with a particular metadata key. (If you are unfamiliar with the concept of metadata keys, please refer to the document entitled **PmtUserGuide.pdf**, which is available in the **doc** directory of a PMT distribution. PMT is available for download at: http://www.sourceforge.net/projects/picturemetadata.)

2.1 Columns in the Metadata Keys

The following paragraphs discuss the meanings of the columns in the Metadata Keys Section. The **C++** column is very important. Using the proper value from it ensures that a C++ application successfully manages the values in its PmtMetadata objects - it is discussed more below. Other columns may or may not be useful to you, depending on what it is you're doing. Specifically, the **ExifFieldName**, **ExifTag**, and **AppSegIFD#** columns will be useful if you know what metadata you want to use from an Exif perspective. However, if you want to determine the metadata to use from the **Metadata Definition** column, the Exif-specific columns of information will probably not be needed. If you are new to using metadata, or are not familiar with the Exif 2.2 file format, it is suggested that you ignore the Exif-specifc columns, and rely primarily on the other columns in the table, especially the **Metadata Definition** column.

The first column, the **MetadataName** column, contains the name of the metadata key as used in PMT. Specifically, the metadata key listed in the MetadataName column can be used in PMT's PmtMetadata class interface with methods such as **getMetadatum(...)**, **getMetadata(...)**, and **deleteMetadata(...)**. Please note the **MetadataName** column is sometimes preceded by a numeric footnote reference. Consult the footnotes at the end of the Metadata Keys Section for important additional information pertaining to the metadata object. It is imperative that footnote instructions are adhered to, to help keep metadata valid. Certain metadata objects currently have particular restrictions of use, or should not be used at all. Future changes in restriction of use are planned to be communicated in the **ReleaseNote.txt** file in the PMT distribution and/or in updates to this document.

The **Metadata Definition** column contains a definition, or an English description, of the key. This column can be particularly useful in determining which metadata items to use in your application. This column also contains other pertinent information associated

with a metadata item, such as its valid values. Invalid values should not be placed into a PmtMetadata object. (Placing values into, or reading values from PmtMetadata objects is discussed in **PmtUserGuide.pdf**)

The **C++ Type** column indicates the C++ type that's to be used for the key's associated PmtMetadataT<TYPE> object. That is, it shows the C++ template type that the PmtMetadataT<TYPE> object has been instantiated as. Specifically, when using dynamic casting in C++ with a PmtMetadataT<TYPE> object, in order to work with a PmtMetadata object's value, (via the value() methods), make sure you use the appropriate C++ Type. (Examples of working with values with dynamic casting and the **value()** methods can be seen in the **PmtUserGuide.pdf** file, and in the test programs distributed with PMT.)

The **PMT Type Table Index** is a number that refers to an entry in the second section of this document, the **PMT Type Table Section**. The PMT Type Table Index maps the metadata keys to an entry in the PMT Type Table. The details of the PMT Type Table are discussed below.

The **ExifFieldName** column contains the Exif field name, as used in the Exif 2.2 Specification. The Exif 2.2 Specification is available for web browsing at: http://tsc.jeita.or.jp/avs/data/cp3451.pdf. Please note that the Japanese fonts must be installed for Adobe Acrobat Reader to be able to sucessfully show the document. You may obtain the proper installation program for the fonts at: http://www.adobe.com:80/products/acrobat/acrrasianfontpack.html. From that web page, select the Japanese language and the appropriate platform before selecting the download button.

The **ExifTag** column contains the Exif tag number, as used in the Exif 2.2 Specification.

The **AppSegIFD#** indicates which Exif application marker segment (APP segment) and IFD the metadata key is located within, in an Exif file. Although the values in this column are string constants used in PMT's implementation, they map in an apparent way to the APP segments and IFDs used in Exif. For example, **APP3_IFD0** represents **APP3, 0th IFD** in Exif. **APP1_IFD0.EXIF_IFD** represents **APP1, 0th IFD, Exif IFD**.

3 PMT Type Table

The PMT Type Table Section is another table that gives multiple mappings of metadata type information. Most users will probably not need to be concerned with this table. If you are uninterested in additional Exif-specific types, XML Schema types, or the types used by PMT in its implementation, then you can skip over the PMT Type Table Section.

However, for those interested in more type detail specific to Exif, XML Schema, or PMT's implementation, this table may prove useful. For example, if you want to create your own XML Schema to extend PMT's capabilities, and/or want to write an additional

PmtAccessor to support another file format, then understanding how PMT works with the various types for the currently supported binary image file formats (Exif and TIFF) can be helpful.

Please refer to the PMT Type Table Section for more.

4 PmtExif2.2MetadataManagementGuidelines

The last major section of this document exists to help ensure that metadata is properly maintained by applications, in relation to its image data. An application developer should be aware of the implications of altering metadata or image metadata. Changing the metadata sometimes means that the image data should be updated to match the metadata changes. In such cases, the metadata should not be changed unless the appropriate changes are also made to the image data. Conversely, altering the image data means that certain metadata items should be adjusted, as well as the thumbnail image. Please refer to the PmtExif2.2MetadataManagementGuidelines Section below for more.

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
CaptureConditions.Aperture	The unit of lens aperture is the APEX (Additive System of Photographic Exposure) value.	float	8	ApertureValue	37378	APP1_IFD0.EXIF_IFD
CaptureConditions.Brightness	The unit of brightness is the APEX value. Ordinarily it is given in the range of -99.99 to99.99.	float	10	BrightnessValue	37379	APP1_IFD0.EXIF_IFD
CaptureConditions.Contrast	This metadata object indicates the direction of contrast processing applied by the camera when the image was shot. Th metadata object has the following enumerations: 0 = Normal 1 = Soft 2 = Hard Other = reserved	unsigned char	3	Contrast	41992	APP1_IFD0.EXIF_IFD
CaptureConditions.CustomRendered	This metadata object indicates the use of special processing on image data, such as rendering geared to output. When special processing is performed, the reader is expected to disable or minimize any further processing. The metadata object has the following enumerations: 0 = Normal process 1 = Custom process Other = reserved	unsigned char	3	CustomRendered	41985	APP1_IFD0.EXIF_IFD
CaptureConditions.DeviceSettingDescription	This metadata object indicates information on the picture-takin conditions of a particular camera model. The tag is used only tc indicate the picture-taking conditions in the reader. The information is recorded in the format shown in Figure 17. The data is recorded in Unicode using SHORT type for the number of display rows and columns and UNDEFINED type for the camera settings. The Unicode (UCS-2) string including Signature is NULL terminated. The specifics of the Unicode string are as given in ISO/IEC 10646-1.	vector<unsigned char>	11	DeviceSettingDescription	41995	APP1_IFD0.EXIF_IFD
CaptureConditions.DigitalZoomRatio	This metadata object indicates the digital zoom ratio when the image was shot. If the numerator of the recorded value is 0, this indicates that digital zoom was not used.	float	8	DigitalZoomRatio	41988	APP1_IFD0.EXIF_IFD
CaptureConditions.ExposureBias	The unit of exposure Bias is the APEX value. Ordinarily it is given in the range of -99.99 to 99.99.	float	10	ExposureBiasValue	37380	APP1_IFD0.EXIF_IFD
CaptureConditions.ExposureIndex	The exposure index selected on the camera or input device at th time the image is captured.	float	8	ExposureIndex	41493	APP1_IFD0.EXIF_IFD
CaptureConditions.ExposureMode	This metadata object indicates the exposure mode set when the image was shot. In auto-bracketing mode, the camera shoots a series of frames of the same scene at different exposure settings	unsigned char	3	ExposureMode	41986	APP1_IFD0.EXIF_IFD
CaptureConditions.ExposureProgram	Defines the class of the program used by the camera to set exposure when the picture is taken. The values are defined as follows: 0 = Not defined 1 = Manual 2 = Normal program 3 = Aperture priority 4 = Shutter priority 5 = Creative program (biased toward depth of field) 6 = Action program (biased toward fast shutter speed) 7 = Portrait mode (for closeup photos with the background out of focus) 8 = Landscape mode (for landscape photos with the background in focus) 9 to 255 = reserved	unsigned char	3	ExposureProgram	34850	APP1_IFD0.EXIF_IFD
CaptureConditions.ExposureTime	Exposure time, given in seconds.	float	8	ExposureTime	33434	APP1_IFD0.EXIF_IFD
CaptureConditions.Flash.Energy	Indicates the strobe energy at the time the image is captured, as measured in Beam Candle Power Seconds (BCPS).	float	8	FlashEnergy	41483	APP1_IFD0.EXIF_IFD

	MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
6	CaptureConditions.Flash.Fired	Indicates that the camera activated the flash system.					
	CaptureConditions.Flash.Flash	This tag indicates the status of flash when the image was shot. Bit 0 indicates the flash firing status, bits 1 and 2 indicate the flash return status, bits 3 and 4 indicate the flash mode, bit 5 indicates whether the flash function is present, and bit 6 indicates "red eye" mode. Values for bit 0 indicating whether th flash fired. 0b = Flash did not fire. 1b = Flash fired. Values for bits 1 and 2 indicating the status of returned light. 00b = No strobe return detection function 01b = reserved 10b = Strobe return light not detected. 11b = Strobe return light detected. Values for bits 3 and 4 indicating the camera's flash mode. 00b = unknown 01b = Compulsory flash firing 10b = Compulsory flash suppression 11b = Auto mode Values for bit 5 indicating the presence of a flash function. 0b = Flash function present 1b = No flash function Values for bit 6 indicating the camera's red eye mode. 0b = No red-eye reduction mode or unknown 1b = Red-eye reduction supported (The other descriptions about Flash Tag definition which were mentioned in Exif Version 2.2 are invalid.)	unsigned char	3	Flash	37385	APP1_IFD0.EXIF_IFD
6	CaptureConditions.Flash.Return	Indicates that the camera detected reflected light from the flash					
	CaptureConditions.Fnumber	The F number.	float	8	Fnumber	33437	APP1_IFD0.EXIF_IFD
	CaptureConditions.FocalLength	The actual focal length of the lens, in mm. Conversion is not made to the focal length of a 35 mm film camera.	float	8	FocalLength	37386	APP1_IFD0.EXIF_IFD
	CaptureConditions.FocalLengthIn35mmFilm	This metadata object indicates the equivalent focal length assuming a 35mm film camera, in mm. A value of 0 means the focal length is unknown. Note that this tag differs from the FocalLength tag.	unsigned short	6	FocalLengthIn35mmFilm	41989	APP1_IFD0.EXIF_IFD
	CaptureConditions.GainControl	This metadata object indicates the degree of overall image gain adjustment. The metadata object has the following enumerations: 0 = None 1 = Low gain up 2 = High gain up 3 = Low gain down 4 = High gain down Other = reserved	unsigned char	3	GainControl	41991	APP1_IFD0.EXIF_IFD
	CaptureConditions.LightSource	The light source, defined as follows: 0 = unknown 1 = Daylight 2 = Fluorescent 3 = Tungsten (incandescent light) 4 = Flash 9 = Fine weather 10 = Cloudy weather 11 = Shade 12 = Daylight fluorescent (D 5700 – 7100K) 13 = Day white fluorescent (N 4600 – 5400K) 14 = Cool white fluorescent (W 3900 – 4500K) 15 = White fluorescent (WW 3200 – 3700K) 17 = Standard light A 18 = Standard light B 19 = Standard light C 20 = D55 21 = D65 22 = D75 23 = D50 24 = ISO studio tungsten 255 = other light source Other = reserved	unsigned char	3	LightSource	37384	APP1_IFD0.EXIF_IFD
	CaptureConditions.Magnification	Magnification is the ratio of the focal length divided by the subject distance	float	8	Magnification	50023	APP3_IFD0
	CaptureConditions.MaxAperture	The smallest F number of the lens is the APEX value.	float	8	MaxApertureValue	37381	APP1_IFD0.EXIF_IFD

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
CaptureConditions.MeteringMode	The metering mode, defined as follows: 0 = unknown 1 = Average 2 = CenterWeightedAverage 3 = Spot 4 = MultiSpot 5 = Pattern 6 = Partial 7 to 254 = reserved, 255 = other	unsigned char	3	MeteringMode	37383	APP1_IFD0.EXIF_IFD
CaptureConditions.PAR	PAR, PrintAspectRatio, defines the desired print format of the current image. The PAR Flag has the following enumeration: 0 = the complete image area is displayed 1 = APS Print, H print (~16:9) 2 = APS Print, P print (~3:1) 3 = APS Print, C print (~3:2)	unsigned char	3	IntendedPrintArea	50002	APP3_IFD0
CaptureConditions.PrintQuantity	This field stores the number of prints requested for this image	unsigned short	6	PrintQuantity	50284	APP3_IFD0
CaptureConditions.Saturation	This metadata object indicates the direction of saturation processing applied by the camera when the image was shot. Th metadata object has the following enumerations: 0 = Normal 1 = Low saturation 2 = High saturation Other = reserved	unsigned char	3	Saturation	41993	APP1_IFD0.EXIF_IFD
CaptureConditions.SceneCaptureType	This metadata object indicates the type of scene that was shot. can also be used to record the mode in which the image was shot. Note that this differs from the scene type (SceneType) tag The metadata object has the following enumerations: 0 = Standard 1 = Landscape 2 = Portrait 3 = Night scene Other = reserved	unsigned char	3	SceneCaptureType	41990	APP1_IFD0.EXIF_IFD
CaptureConditions.Sharpness	This metadata object indicates the direction of sharpness processing applied by the camera when the image was shot. Th metadata object has the following enumerations: 0 = Normal 1 = Soft 2 = Hard Other = reserved	unsigned char	3	Sharpness	41994	APP1_IFD0.EXIF_IFD
CaptureConditions.ShutterSpeed	The unit of shutter speed. is the APEX (Additive System of Photographic Exposure) setting.	float	10	ShutterSpeedValue	37377	APP1_IFD0.EXIF_IFD
CaptureConditions.SubjectArea	This metadata object indicates the location and area of the mai subject in the overall scene.	vector<unsigned short>	14	SubjectArea	37396	APP1_IFD0.EXIF_IFD
CaptureConditions.SubjectDistance	The distance to the subject in meters.	float	8	SubjectDistance	37382	APP1_IFD0.EXIF_IFD
CaptureConditions.SubjectDistanceRange	This metadata object indicates the distance to the subject. The metadata object has the following enumerations: 0 = unknown = Macro 2 = Close view 3 = Distant view Other = reserved	unsigned char	3	SubjectDistanceRange	41996	APP1_IFD0.EXIF_IFD
CaptureConditions.WhiteBalance	This metadata object indicates the white balance mode set whe the image was shot. The metadata object has the following enumerations: 0 = Auto white balance 1 = Manual white balance Other = reserved	unsigned char	3	WhiteBalance	41987	APP1_IFD0.EXIF_IFD
CaptureDevice.CameraOwner.CameraOwner	A character string that identifies the name of the camera owner Photographer or image creator.	string	4	Artist	315	APP1_IFD0
CaptureDevice.CameraOwner.EK	A character string that identifies the name of the camera owner Photographer or image creator.	vector<unsigned char>	11	CameraOwnerID	50003	APP3_IFD0
CaptureDevice.CFAPattern	CFAPattern indicates the color filter array (CFA) geometric pattern of the image sensor when a one-chip color area sensor i used.	vector<unsigned char>	11	CFAPattern	41730	APP1_IFD0.EXIF_IFD

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
CaptureDevice.FID	This field contains a string which records information from the photo finisher that is used to identify an order. In the case of Advanced Photo System film, the FID will be written; for other film, the lab will use its own discretion.	vector<unsigned char>	11	OrderID	50007	APP3_IFD0
CaptureDevice.FilmCategory	FilmCategory defines the category of the film used. FilmCategory vales are defined as follows: 0 = Unidentified 1 = Negative B&W 2 = Negative Color 3 = Negative B&W 4 = Reversal Color 5 - 255 = Reserved	unsigned char	3	FilmCategory	50010	APP3_IFD0
CaptureDevice.FilmGencode	FilmGencode defines the film gencode.	string	4	FilmgenCode	50011	APP3_IFD0
CaptureDevice.FilmProductCode	FilmProductCode defines the film product code	string	4	FilmProductCode	50000	APP3_IFD0
CaptureDevice.FilmSize	FilmSize defines the size of the film. Valid values : 0 = 135 (35mm) 1 = 124(APS) 2 - 254 = Reserved 255 = Unidentified	unsigned char	3	FilmSize	50013	APP3_IFD0
CaptureDevice.FocalPlaneResolutionUnit	Indicates the unit for measuring FocalPlaneXResolution and FocalPlaneYResolution. This value is the same as the ResolutionUnit. The values are defined as follows: 2 = inches 3 = centimeters, Others = reserved	unsigned char	3	FocalPlaneResolutionUnit	41488	APP1_IFD0.EXIF_IFD
CaptureDevice.FocalPlaneXResolution	Indicates the number of pixels in the image width (X) direction per FocalPlaneResolutionUnit on the image device focal plane.	float	8	FocalPlaneXResolution	41486	APP1_IFD0.EXIF_IFD
CaptureDevice.FocalPlaneYResolution	Indicates the number of pixels in the image height (Y) direction per FocalPlaneResolutionUnit on the image device focal plane.	float	8	FocalPlaneYResolution	41487	APP1_IFD0.EXIF_IFD
CaptureDevice.ISOSpeedRating	Indicates the ISO Speed and ISO Latitude of the camera or input device as specified in ISO 12232.	unsigned short	6	ISOSpeedRatings	34855	APP1_IFD0.EXIF_IFD
CaptureDevice.Make	The manufacturer of the recording equipment. This is the manufacturer of the DSC, scanner, video digitizer or other equipment that generated the image. When the field is left blan it is treated as unknown.	string	4	Make	271	APP1_IFD0
CaptureDevice.MakerNotes	A character string that identifies from a manufacturers perspective, any desired information about the image writer or capture device.	vector<unsigned char>	11	MakerNote	37500	APP1_IFD0.EXIF_IFD
CaptureDevice.Model	The model name or model number of the equipment. This is the model name of number of the DSC, scanner, video digitizer or other equipment that generated the image. When the field is lef blank, it is treated as unknown.	string	4	Model	272	APP1_IFD0
CaptureDevice.NativePhysicalResolutionUni	Indicates the unit for measuring NativePhysicalXResolution an NativePhysicalYResolution.	unsigned short	6	NativePhysicalResolutionUn it	50042	APP3_IFD0
CaptureDevice.NativePhysicalXResolution	Indicates the number of pixel sensors in the X direction per the NativePhysicalResolutionUnit on the image sensor focal plane.	float	8	NativePhysicalXResolution	50028	APP3_IFD0
CaptureDevice.NativePhysicalYResolution	Indicates the number of pixel sensors in the Y direction per the NativePhysicalResolutionUnit on the image sensor focal plane.	float	8	NativePhysicalYResolution	50029	APP3_IFD0

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
CaptureDevice.OECF	OECF the "Opto-Electronic Conversion Function" is the relationship between the optical input and the image file code value output of an electronic camera. It is expressed as a vecto of floats. The first element m and subsequent elements m+4 is the Log Exposure (where m is equal to or greater then1). The second element n and subsequent elements n+4 is the RED output level (where n is equal to or greater than 2). The third element o and subsequent elements 0+4 is the GREEN output level (where o is equal to or greater than 3). The fourth elemen is p and subsequent elements p+4 is the BLUE output level (where p is equal to or greater than 4).	vector<unsigned char>	11	OECF	34856	APP1_IFD0.EXIF_IFD
CaptureDevice.Scanner.ModelAndVersion	A character string that records the name and version number of the scanner software or firmware.	string	4	ScannerSoftware	50012	APP3_IFD0
CaptureDevice.SensingMethod	The image sensor type on the camera or input image device. Th defined values are as follows: 1 = Not defined 2 = One-chip color area sensor 3 = Two-chip color area sensor 4 = Three-chi color area sensor 5 = Color sequential area sensor 7 = Trilinear sensor 8 = Color sequential linear sensor, Other = reserved	unsigned char	3	SensingMethod	41495	APP1_IFD0.EXIF_IFD
CaptureDevice.SerialNumber.Camera	A character string that identifies the serial number of the camer	vector<unsigned char>	11	CameraSerialNum	50004	APP3_IFD0
CaptureDevice.Software	This metadata object records the name and version of the software or firmware of the camera or image input device used to generate the image. The detailed format is not specified, but is recommended that the example shown below be followed. When the field is left blank, it is treated as unknown.	string	4	Software	305	APP1_IFD0
CaptureDevice.SpatialFrequencyResponse	The spatial frequency response(SFR) of a camera or image capture device as defined in ISO/TC42/WG18 work item [188] Working Draft 6.0, "Photography -Electronic Still Picture Cameras - Resolution Measurement" is represented as a vector of floats. The first element m and subsequent elements m+3 is the Spatial Frequency of the line widths per picture height(where m is greater than or equal to 1). The second element n and subsequent elements n+3 is the Horizontal SFR(where n is equal to or greater then 2). The third element o and subsequent elements o+3 is the Vertical SFR(where o is equal to or greater then 3). A non value entry will be identified by a -1.0.	vector<unsigned char>	11	SpatialFrequencyResponse	41484	APP1_IFD0.EXIF_IFD
CaptureDevice.SpectralSensitivity	Indicates the spectral sensitivity of each channel of the camera used. The tag value is an ASCII string compatible with the standard developed by the ASTM Technical committee.	string	4	SpectralSensitivity	34852	APP1_IFD0.EXIF_IFD
DigitalProcess.EnhancementPathUtilized	This field indicates the Enhancement path used to create the primary image data stored within the file. The values of this field are enumerated as follows: 0 = Ansel Locked Beam for Digital and Color Negative Paths 1 = Ansel Enhanced for Digital and Color Negative Paths 2 = Ansel Balance Digital Path and Optical Color Negative Path 3 = Ansel Premium for Digital and Color Negative Paths 4 = EasyShare Shasta 5 = EasyShare Custom 6 = Restoration 7 = Auto Enhance; 4 - 65535 are reserved for future path definitions.	unsigned short	6	EnhancementPathUtilized	50287	APP3_IFD0

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
DigitalProcess.EnhancementPathVersionNumber	This field contains a string that records the version number of the enhancement path specified in the EnhancementPathUtilize tag (tag ID 50287) used to create the primary image data stored within this file. Example version numbers are "3.5b2", "3.6" an "4.0".	string	4	EnhancementPathVersionNumber	50027	APP3_IFD0
DigitalProcess.History.EditTagArray	From the Picture CD Appendix C specification: The Edit Tags are designed to help manage the maintenance issues associated with metadata as different operations that modify or edit an image are applied. The array contains a summary of the edit operations and therefore only one occurrence of each defined edit functions will be stored in the array. The values of the array are enumerated in the following manner: 1. Digital image created 2. Image cropped 3. Image rotated 4. Global tone/ color adjustment applied. e. g., color balance, contrast adjust, density adjust, etc. 5. Global spatial adjustment applied e. g., sharpening, extreme compression , substantial subsampling, blur, noise suppression, etc. 6. Image retouched e. g., redeye, scratch removal 7. Pixels edited extensively, significantly changing the captured scene content. e. g., object removal, image warping or morphing operations 8. Image composited with another image or background, or graphics and/ or text added 9. Regional tone/ color adjustment applied. e. g., digital "dodge & burn" operation, selective color adjustment, etc. 0, 10 - 65535 Reserved for future edit functional definitions	vector<unsigned short>	14	EditTagArray	50022	APP3_IFD0
DigitalProcess.History.SBAExposureRecord	SBAExposureRecord field contains the complete exposure record from the SBA algorithm. The purpose of this field is for use by the creation system in diagnostics mode. The count is the number of bytes in the data stream.If this information is available to the creation system this field shall be written, otherwise this field shall be omitted.	vector<unsigned char>	11	CompleteExposureRecord	50017	APP3_IFD0
DigitalProcess.History.SBAInputImageBitDepth	SBAInputImageBitDepth field indicates the bit depth of each channel of the RGB input image to the SBA algorithm. The first value is the bit depth of the red channel, the second value is the bit depth of the green channel, and the third value is the bit depth of the blue channel. If the creation system applied SBA adjustments to the primary image this field shall be written, otherwise this field shall be omitted.	vector<unsigned short>	14	SBAInputChannelDepth	50016	APP3_IFD0
DigitalProcess.History.SBAInputImageColorspace	SBAInputImageColorspace defines the colorspace used as an input to the SBA. Defined vales are: 0 = Uncalibrated 1 = RIM 2 = ROM 3 = RPD 4 = RLSE Others = reserved	unsigned short	6	SBAInputColorspace	50015	APP3_IFD0

	MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
	DigitalProcess.History.SBARGBShifts	SBARGBShifts contains the scene balance shifts that were calculated by the SBA algorithm. The actual definition of the recorded shifts is dependent upon the color space of the input image to the SBA algorithm. It is assumed that the input image to the SBA is three channel and it's composition is an RGB representation. The first value of this field is the SBA shift for the Red channel, the second value is the SBA shift for the Gree channel, and the third value if for the Green channel. If the input image color space is reference printing densities (RPD), then the SBA _RGB_Shifts field is defined as reference printin densities * 1000.	vector<long>	18	SBARGBShifts	50014	APP3_IFD0
	DigitalProcess.History.UserAdjSBARGBShifts	UserAdjSBARGBShifts field contains the SBA shifts that were determined via user feedback while viewing (i.e. operator at th scan service) the image. It will be assumed that the image was viewed in a "SRGB" colorspace. The shifts are represented in pixel code values. The first value in the field is the shift for the red channel, the second value is the shift for the green channel, and the third value is the shift for the blue channel.	vector<long>	18	UserAdjSBARGBShifts	50018	APP3_IFD0
5	DigitalProcess.ImageFileChangeDateTime	The date and time of the last change that has been made to the image file. The format is "YYYY:MM:DD HH:MM:SS.TH" with time shown in 24-hour format including fractions of a second, and the date and time separated by one blank character [20.H]. When the date and time are unknown, all the character spaces except colons (":") may be filled with blank characters, o else the entire field may be filled with blank characters. The character string length is 20 bytes including NULL for termination. When the field is left blank, it is treated as unknown. Note, at file creation this value is identical to ImageFileCreationDateTime.	string	4	DateTime	306	APP1_IFD0
5	DigitalProcess.ImageFileCreationDateTime	The date and time when the image was stored as a digital file. The format is "YYYY:MM:DD HH:MM:SS.TH" with time shown in 24-hour format including fractions of a second, and the date and time separated by one blank character [20.H]. When the date and time are unknown, all the character spaces except colons (":") may be filled with blank characters, or else the entire field may be filled with blank characters. The character string length is 20 bytes including NULL for termination. When the field is left blank, it is treated as unknown.	string	4	DateTimeDigitized	36868	APP1_IFD0.EXIF_IFD
	DigitalProcess.ImagePrintStatus	ImageRotationStatus field indicates the print status of the imag as detected by the system that created the image. Defined value 0 = Image may be printed, no detected problems 1 = Image not suitable for printing, REASON 2 = Image not suitable for printing, REASON 3 = Image not suitable for printing, REASON 4 = Image not suitable for printing, REASON 5 - 25 = Reserved	unsigned char	2	ImagePrintStatus	50286	APP3_IFD0

	MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
	DigitalProcess.ImageRotationStatus	ImageRotationStatus field indicates what triggered the system t rotate the image from the orientation of the original scan. Defined values: 0 = image not rotated 1 = rotated based off of user input (i. e. Scan operator) 2 = rotated based off of custome direction 3 = rotated based off of algorithm input 4 - 254 = Reserved 255 = Unknown Reason	unsigned char	3	ImageRotationStatus	50019	APP3_IFD0
	DigitalProcess.ImageSource	The image source indicating the source of the image. If a DSC recorded the image, this tag value always be set to 3, indicating that the image was recorded on a DSC. 0 = others 1 = scanner of transparent type 2 = scanner of reflex type 3 = DS Other = reserved	unsigned char	2	FileSource	41728	APP1_IFD0.EXIF_IFD
	DigitalProcess.ImageSourceEK	The image source indicating the device source of the image. Th values defined are as follows: 0 =unidentified 1 =film scanner 2 =reflection print scanner 3 =digital still camera 4 =still from video 5 =computer graphics Others =reserved	unsigned short	6	ImageSource	50001	APP3_IFD0
7	DigitalProcess.Jpeg.AlphaQTable	JPEG compression quantization table applied to the alpha channel of the image.				70001	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.Chroma1QTable	JPEG compression quantization table applied to the first chromanance channel of the image.				70002	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.Chroma2QTable	JPEG compression quantization table applied to the second chromanance channel of the image.				70003	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.LuminQTable	JPEG compression quantization table applied to the luminance channel of the image.				70004	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.ChrominanceSampling	This is the chrominance sampling of the compressed image. It i read from the SOF marker.				70006	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.Components	This is the number of channels in the compressed image. It is read from the SOF marker.				70007	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.Height	This is the height of the compressed image. It is read from the SOF marker.				70010	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.HorizontalSampling	This is a vector with the Horizontal Sampling factors for each component in the compressed image. It is read from the SOF marker.				70008	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.Precision	This is the data precision in bits of each channel in the compressed image. It is read from the SOF marker.				70011	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.VerticalSampling	This is a vector with the Vertical Sampling factors for each component in the compressed image. It is read from the SOF marker.				70009	UNDEFINED_LOCATION
7	DigitalProcess.Jpeg.SOF.Width	This is the width of the compressed image. It is read from the SOF marker.				70012	UNDEFINED_LOCATION
	DigitalProcess.RollGuid	RollGuid is a unique identifier for a roll of film that was assigned during the digitization process. Further definition is TBD	vector<unsigned char>	11	RollGuid	50020	APP3_IFD0

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
1 DigitalProcess.ScanFrameSequenceNumber	This field contains the sequence number of the frame as it was scanned. For APS scans, this field will contain the frame numb that is decoded from the latent image barcode.	unsigned short	6	ScanFramSeqNum	50009	APP3_IFD0
ImageContainer.ActualImageHeight	(Deprecated) The compressed image height applies to compressed images and represents the valid height of the meaningful image. An uncompressed image will have no value for this field.	unsigned long	7	PixelYDimension	40963	APP1_IFD0.EXIF_IFD
ImageContainer.ActualImageWidth	(Deprecated) The compressed image width applies to compressed images and represents the valid width of the meaningful image. An uncompressed image will have no value for this field.	unsigned long	7	PixelXDimension	40962	APP1_IFD0.EXIF_IFD
ImageContainer.BitsPerSample	The number of bits per image component (pixel).	vector<unsigned short>	14	BitsPerSample	258	APP1_IFD0
ImageContainer.ColorSpaceInformation	The color space information records the color space specified.	unsigned short	6	ColorSpace	40961	APP1_IFD0.EXIF_IFD
ImageContainer.ComponentsConfiguration	The compressed image data channels of each component are arranged in order from the 1st component to the 4th. For uncompressed data the data arrangement is given in the PhotometricInterpretation.	vector<unsigned char>	11	ComponentsConfiguration	37121	APP1_IFD0.EXIF_IFD
ImageContainer.CompressedBitsPerPixel	The compressed image compression mode indicated in unit bits per pixel.	float	8	CompressedBitsPerPixel	37122	APP1_IFD0.EXIF_IFD
ImageContainer.Compression	The compression scheme used for the image data.	unsigned short	6	Compression	259	APP1_IFD0
ImageContainer.DisplayResolutionUnit	The unit for measuring Xresolution and Yresolution. The value are defined as follows: 2 = inches 3 = centimeters Others = reserved	unsigned char	3	ResolutionUnit	296	APP1_IFD0
ImageContainer.DisplayXResolution	The number of pixels per ResolutionUnit in the Width direction	float	8	Xresolution	282	APP1_IFD0
ImageContainer.DisplayYResolution	The number of pixels per ResolutionUnit in the Height direction.	float	8	Yresolution	283	APP1_IFD0
ImageContainer.ExifVersion	The version of Exif Standard	vector<unsigned char>	11	ExifVersion	36864	APP1_IFD0.EXIF_IFD
ImageContainer.FlashpixVersion	The version of the Flashpix Specification	vector<unsigned char>	11	FlashPixVersion	40960	APP1_IFD0.EXIF_IFD
ImageContainer.Gamma	This metadata object indicates the value of coefficient gamma. The formula of transfer function used for image reproduction is expressed as follows. (Reproduced value) = (Input value)^gamma Both reproduced value and input value indicate normalized value, whose minimum value is 0 and maximum value is 1.	float	8	Gamma	42240	APP1_IFD0.EXIF_IFD
ImageContainer.Height	The number of rows of image data.	unsigned long	7	ImageLength	257	APP1_IFD0
ImageContainer.ImageUniqueID	This field indicates an identifier assigned uniquely to each image. It is recorded as an ASCII string equivalent to hexadecimal notation and 128-bit fixed length.	string	4	ImageUniqueID	42016	APP1_IFD0.EXIF_IFD

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
ImageContainer.Interoperability.Index	Indicates the identification of the Interoperability rule. The following rules are defined. Four bytes used including the termination code (NULL). "R98" = Indicates a file conforming to R98 file specification of Recommended Exif Interoperability Rules (ExifR98) or to DCF basic file stipulated by Design Rule for Camera File System. "THM" = Indicates a file conforming to DCF thumbnail file stipulated by Design rule for Camera Fil System. "R03" = Indicates a file conforming to DCF Option Fil (Adobe RGB color space) stipulated by Design rule for Camera File System.	string	4	InteroperabilityIndex	1	APP1_IFD0.EXIF_IFD .INTEROP_IFD
ImageContainer.Interoperability.Version	This metadata object records the Interoperability version. Since the file content is equivalent to ExifR98, the value is the 4-byte ASCII “0100” meaning Version 1.00. This is not terminated by NULL since the Type is UNDEFINED.	vector<unsigned char>	11	InteroperabilityVersion	2	APP1_IFD0.EXIF_IFD .INTEROP_IFD
4 ImageContainer.IPTC_NAA	This element encodes relevent information concerning the imag that is useful for newspaper photographs. The information is defined in Application Record No. 2 of the IPTC-NAA (International Press Telecommunications Council-Newspaper Association of America) Information Interchange Model and Digital NewsphotoParameter Record, Version 2, April 14 1993 (Note: the record contains capture condition, intellectual property, scene content, etc. information) (See TIFF/EP spec)		No Mapping	IPTC/NAA	33723	APP1_IFD0
ImageContainer.MetadataNumber	The version of the metadata in the APP3 segment.	vector<unsigned char>	11	MetadataVersionNum	50021	APP3_IFD0
ImageContainer.Orientation	The image orientation viewed in terms of rows and columns.	unsigned char	3	Orientation	274	APP1_IFD0
ImageContainer.PhotometricInterpretation	The pixel composition.(SRGB, YcbCr, etc.)	unsigned char	3	PhotometricInterpretation	262	APP1_IFD0
ImageContainer.PlanarConfiguration	Indicates whether pixel components are recorded in chunky or planar format.	unsigned char	3	PlanarConfiguration	284	APP1_IFD0
ImageContainer.PrimaryChromaticities	The chromaticity of the three primary colors of the image.	vector<float>	17	PrimaryChromaticities	319	APP1_IFD0
ImageContainer.ReferenceBlackWhite	The reference black point value and reference white point value	vector<float>	17	ReferenceBlackWhite	532	APP1_IFD0
ImageContainer.RowsPerStrip	The number of rows per strip when an image is divided into strips.	unsigned long	7	RowsPerStrip	278	APP1_IFD0
ImageContainer.SamplesPerPixel	The number of components per pixel.	unsigned short	6	SamplesPerPixel	277	APP1_IFD0
ImageContainer.SourceImageDirectory	This field contains a Unicode string which records the Sources Image Directory.	vector<unsigned char>	11	SourceImageDirectory	50200	APP3_IFD0
ImageContainer.SourceImageFileName	This field contains a Unicode string which records the Sources Image File Name.	vector<unsigned char>	11	SourceImageFileName	50201	APP3_IFD0
ImageContainer.SourceImageVolumeName	This field contains a Unicode string which records the Sources Image Volume Name.	vector<unsigned char>	11	SourceImageVolumeName	50202	APP3_IFD0
ImageContainer.StripByteCounts	The total number of bytes in each strip.	vector<unsigned long>	16	StripByteCounts	279	APP1_IFD0

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
ImageContainer.StripOffsets	For each strip, the byte offset of that strip.	vector<unsigned long>	16	StripOffsets	273	APP1_IFD0
ImageContainer.Thumbnail.BitsPerSample	The number of bits per image component(pixel).	vector<unsigned short>	14	BitsPerSample	258	APP1_IFD1
ImageContainer.Thumbnail.BytesOfJPEGDa a	This field contains the number of bytes of JPEG compressed thumbnail data.	unsigned long	7	JPEGInterchangeFormatLen gth	514	APP1_IFD1
ImageContainer.Thumbnail.Compression	The compression scheme used for the image data.	unsigned short	6	Compression	259	APP1_IFD1
ImageContainer.Thumbnail.DisplayResolutio nUnit	The unit for measuring Xresolution and Yresolution. The value are defined as follows: 2 = inches 3 = centimeters Others = reserved	unsigned char	3	ResolutionUnit	296	APP1_IFD1
ImageContainer.Thumbnail.DisplayXResolut on	The number of pixels per ResolutionUnit in the Width directio	float	8	Xresolution	282	APP1_IFD1
ImageContainer.Thumbnail.DisplayYResolut on	The number of pixels per ResolutionUnit in the Height direction.	float	8	Yresolution	283	APP1_IFD1
ImageContainer.Thumbnail.Height	The number of rows of image data.	unsigned long	7	ImageLength	257	APP1_IFD1
ImageContainer.Thumbnail.OffsetToJPEGSC I	This field contains the offset to the start byte (SOI) of JPEG compressed thumbnail data.	unsigned long	7	JPEGInterchangeFormat	513	APP1_IFD1
ImageContainer.Thumbnail.Orientation	The image orientation viewed in terms of rows and columns.	unsigned char	3	Orientation	274	APP1_IFD1
ImageContainer.Thumbnail.PhotometricInter retation	The pixel composition.(SRGB, YcbCr, etc.)	unsigned char	3	PhotometricInterpretation	262	APP1_IFD1
ImageContainer.Thumbnail.PlanarConfigurat on	Indicates whether pixel components are recorded in chunky or planar format.	unsigned char	3	PlanarConfiguration	284	APP1_IFD1
ImageContainer.Thumbnail.RowsPerStrip	The number of rows per strip when an image is divided into strips.	unsigned long	7	RowsPerStrip	278	APP1_IFD1
ImageContainer.Thumbnail.SamplesPerPixel	The number of components per pixel.	unsigned short	6	SamplesPerPixel	277	APP1_IFD1
ImageContainer.Thumbnail.StripByteCounts	The total number of bytes in each strip.	vector<unsigned long>	16	StripByteCounts	279	APP1_IFD1
ImageContainer.Thumbnail.StripOffsets	For each strip, the byte offset of that strip.	vector<unsigned long>	16	StripOffsets	273	APP1_IFD1
ImageContainer.Thumbnail.Width	The number of columns of image data, equal to the number of pixels per row.	unsigned long	7	ImageWidth	256	APP1_IFD1
ImageContainer.Thumbnail.YCbCrCoefficier ts	Same as ImageContainer.YCbCrCoefficients, but for the thumbnail.	vector<float>	17	YCbCrCoefficients	529	APP1_IFD1
ImageContainer.Thumbnail.YCbCrPositionin g	Same as ImageContainer.YCbCrPositioning, but for the thumbnail.	unsigned char	3	YCbCrPositioning	531	APP1_IFD1
ImageContainer.Thumbnail.YCbCrSubSamp ing	Same as ImageContainer.YCbCrSubSampling, but for the thumbnail.	vector<unsigned short>	14	YCbCrSubSampling	530	APP1_IFD1
ImageContainer.TransferFunction	A tabular style transfer function for the image.	vector<unsigned short>	14	TransferFunction	301	APP1_IFD0

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
ImageContainer.WhitePoint	The chromaticity of the white point of the image.	vector<float>	17	WhitePoint	318	APP1_IFD0
ImageContainer.Width	The number of columns of image data, equal to the number of pixels per row.	unsigned long	7	ImageWidth	256	APP1_IFD0
ImageContainer.YCbCrCoefficients	The matrix coefficients for transformation from RGB to YCbCr image data.	vector<float>	17	YCbCrCoefficients	529	APP1_IFD0
ImageContainer.YCbCrPositioning	The position of chrominance components in relation to the luminance component.	unsigned char	3	YCbCrPositioning	531	APP1_IFD0
ImageContainer.YCbCrSubSampling	The sampling ratio of chrominance components in relation to the luminance component.	vector<unsigned short>	14	YCbCrSubSampling	530	APP1_IFD0
IntellectualProperty.Copyright	A character string that identifies both the photographer and editor Copyright information.	string	4	Copyright	33432	APP1_IFD0
IntellectualProperty.ImageCreator	A character string that identifies both the photographer and editor Copyright information.	string	4	Artist	315	APP1_IFD0
IntellectualProperty.Photographer	A character string that identifies the name of the photographer.	string	4	Artist	315	APP1_IFD0
OutputOrder.Information.DealerIDNumber	The Dealer ID Number data item contents a Dealer ID Number assigned by the industry.	vector<unsigned char>	11	DealerID	50006	APP3_IFD0
OutputOrder.Information.EnvelopeNumber	The Envelope Number data item contains the 6 least significant digits of the number printed on the order envelope.	vector<unsigned char>	11	BagNum	50008	APP3_IFD0
OutputOrder.Information.VendorOrderNumber	Identification number of an order and unique to a vendor.	vector<unsigned char>	11	OrderID	50007	APP3_IFD0
OutputOrder.SimpleRenderInst.FrameNumber	The Frame Number data item contains the number of the current frame. Valid numbers are 01 through 40.	unsigned short	6	ScanFramSeqNum	50009	APP3_IFD0
SceneContent.Audio	This is the entry to special audio API of the EXIF toolkit. Need to change.	vector<unsigned char>	No Mapping	audio API	70005	APP1_IFD0
SceneContent.GPS.Altitude	Altitude indicates the altitude based on the reference in AltitudeRef. Altitude is expressed as one RATIONAL value. The reference unit is meters.	float	8	GPSAltitude	6	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.AltitudeRef	AltitudeRef indicates the altitude used as the reference altitude. The reference unit is meters. The defined values are: 0 = Sea level Others = reserved	unsigned char	1	GPSAltitudeRef	5	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.AreaInformation	This field contains a character string recording the name of the GPS area.	vector<unsigned char>	11	GPSAreaInformation	28	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DateStamp	This field contains a character string recording date and time information relative to UTC (Coordinated Universal Time). The format is "YYYY:MM:DD."	string	4	GPSDateStamp	29	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestBearing	DestBearing indicates the bearing to the destination point. The range of values is from 0.00 to 359.99.	float	8	GPSDestBearing	24	APP1_IFD0.GPSINFO_IFD

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
SceneContent.GPS.DestBearingRef	DestBearingRef indicates the reference used for giving the bearing to the destination point. The defined values are: 'T' = True direction 'M' = Magnetic direction Others = reserved	string	4	GPSDestBearingRef	23	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestDistance	DestDistance indicates the distance to the destination point.	float	8	GPSDestDistance	26	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestDistanceRef	DestDistanceRef indicates the unit used to express the distance to the destination point. The defined values are: 'K' = Kilometer 'M' = Miles 'N' = Knots Others = reserved	string	4	GPSDestDistanceRef	25	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestLatitude	DestLatitude indicates the latitude of the destination point. The latitude is expressed as three RATIONAL values giving the degrees, minutes, and seconds, respectively. When degrees, minutes and seconds are expressed, the format is dd/1,mm/1,ss/1. When degrees and minutes are used and, for example, fractions of minutes are given up to two decimal places, the format is dd/1,mmmm/100,0/1.	vector<float>	17	GPSDestLatitude	20	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestLatitudeRef	DestLatitudeRef indicates whether the latitude of the destinatio point is north or south latitude. The defined values are: 'N' = North latitude 'S' = Sourth latitude Others = reserved	string	4	GPSDestLatitudeRef	19	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestLongitude	DestLongitude indicates the longitude of the destination point. The longitude is expressed as three RATIONAL values giving the degrees, minutes, and seconds, respectively. When degrees, minutes and seconds are expressed, the format is ddd/1,mm/1,ss/1. When degrees and minutes are used and, for example, fractions of minutes are given up to two decimal places, the format is ddd/1,mmmm/100,0/1.	vector<float>	17	GPSDestLongitude	22	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DestLongitudeRef	DestLongitudeRef Indicates whether the longitude of the destination point is east or west longitude. The defined values are: 'E' = East longitude 'W' = West longitude Others = reserved	string	4	GPSDestLongitudeRef	21	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Differential	This field Indicates whether differential correction is applied to the GPS receiver. 0 = Measurement without differential correction 1 = Differential correction applied	unsigned char	3	GPSDifferential	30	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.DOP	DOP indicates the GPS DOP (data degree of precision). An HDOP value is written during two-dimensional measurement and PDOP during three-dimensional measurement.	float	8	GPSDOP	11	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.ImgDirection	ImgDirection indicates the direction of the image when it was captured. The range of values is from 0.00 to 359.99.	float	8	GPSImgDirection	17	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.ImgDirectionRef	ImgDirectionRef indicates the reference for giving the direction of the image when it is captured. The defined values are: 'T' = True direction 'M' = Magnetic direction Others = reserved	string	4	GPSImgDirectionRef	16	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Latitude	Latitude indicates the latitude. The latitude is expressed as three RATIONAL values giving the degrees, minutes, and seconds, respectively. When degrees, minutes and seconds are expressed the format is dd/1,mm/1,ss/1. When degrees and minutes are used and, for example, fractions of minutes are given up to two decimal places, the format is dd/1,mmmm/100,0/1.	vector<float>	17	GPSLatitude	2	APP1_IFD0.GPSINFO_IFD

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
SceneContent.GPS.LatitudeRef	LatitudeRef indicates whether the latitude is north or south latitude. The defined values are: 'N' = North latitude 'S' = South latitude Others = reserved	string	4	GPSLatitudeRef	1	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Longitude	Longitude indicates the longitude. The longitude is expressed a three RATIONAL values giving the degrees, minutes, and seconds, respectively. When degrees, minutes and seconds are expressed, the format is dd/1,mm/1,ss/1. When degrees and minutes are used and, for example, fractions of minutes are given up to two decimal places, the format is dd/1,mmmm/100,0/1.	vector<float>	17	GPSLongitude	4	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.LongitudeRef	LongitudeRef indicates whether the longitude is east or west longitude. The defined values are: 'E' = East longitude 'W' = West longitude Others = reserved	string	4	GPSLongitudeRef	3	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.MapDatum	MapDatum indicates the geodetic survey data used by the GPS receiver. If the survey data is restricted to Japan, the value of this tag is 'TOKYO' or 'WGS-84'. If a GPS Info is recorded, it is strongly recommended that MapDatum be recorded.	string	4	GPSMapDatum	18	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.MeasureMode	MeasureMode Indicates the GPS measurement mode. '2' means two-dimensional measurement and '3' means three-dimensional measurement is in progress. Other values are reserved.	string	4	GPSMeasureMode	10	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.ProcessingMethod	This field contains a character string recording the name of the method used for location finding.	vector<unsigned char>	11	GPSProcessingMethod	27	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Satellites	Satellites indicates the GPS satellites used for measurements. This metadata object can be used to describe the number of satellites, their ID number, angle of elevation, azimuth, SNR and other information in ASCII notation.	string	4	GPSSatellites	8	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Speed	Speed indicates the speed of GPS receiver movement.	float	8	GPSSpeed	13	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.SpeedRef	SpeedRef indicates the unit used to express the GPS receiver speed of movement. The defined values are: 'K' = Kilometers pe hour 'M' = Miles per hour 'N' = Knots Others = reserved	string	4	GPSSpeedRef	12	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Status	Status indicates the status of the GPS receiver when the image recorded. 'A' means measurement is in progress, and 'V' means the measurement is interrupted. Other values are reserved.	string	4	GPSStatus	9	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.TimeStamp	TimeStamp indicates the time as UTC (Coordinated Universal Time). TimeStamp is expressed as three RATIONAL values giving the hour, minute, and second.	vector<float>	17	GPSTimeStamp	7	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.Track	Indicates the direction of GPS receiver movement. The range of values is from 0.00 to 359.99.	float	8	GPSTrack	15	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.TrackRef	TrackRef indicates the reference for giving the direction of GPS receiver movement. The defined values are: 'T' = True direction 'M' = Magnetic direction Others = reserved	string	4	GPSTrackRef	14	APP1_IFD0.GPSINFO_IFD
SceneContent.GPS.VersionID	VersionID indicates the version of InfoIFD. The version is give as a string.	vector<unsigned char>	No Mapping	GPSVersionID	0	APP1_IFD0.GPSINFO_IFD

	MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
1	SceneContent.GroupCaption.GroupCaption	Use SceneContent.GroupCaption.UserSelectGroupTitle					
1	SceneContent.GroupCaption.UserInputGroup Title	A title assigned to a group or collection of images. The group title has been selected from a predefined collection.					
1	SceneContent.GroupCaption.UserSelectGrou Title	This is a user selectable title for a group of images.	vector<unsigned char>	11	GroupCaption	50005	APP3_IFD0
5	SceneContent.ImageCaptureDateTime.Image CaptureDateTime	The date and time of the original Image Scene. The format is "YYYY:MM:DD HH:MM:SS.TH" with time shown in 24-hou format including fractions of a second, and the date and time separated by one blank character [20.H]. When the date and time are unknown, all the character spaces except colons (":") may be filled with blank characters, or else the entire field may be filled with blank characters. The character string length is 2(bytes including NULL for termination. When the field is left blank, it is treated as unknown.	string	4	DateTimeOriginal	36867	APP1_IFD0.EXIF_IFD
	SceneContent.ImageDescription	A character string giving the title of the image.	string	4	ImageDescription	270	APP1_IFD0
	SceneContent.RelatedSoundFile	A character string that identifies an audio file that is related to the image data. The only relational information recorded here is the Exif audio file name and extension (an ASCII string consisting of 8 characters plus '.' plus 3 characters). The path is not recorded.	string	4	RelatedSoundFile	40964	APP1_IFD0.EXIF_IFD
	SceneContent.SceneType	The SceneType indicates the type of scene. The values defined are as follows: 1 = A directly photographed image Others = reserved	unsigned char	2	SceneType	41729	APP1_IFD0.EXIF_IFD
	SceneContent.SubjectLocation	Subject Location indicates the location of the main subject in tl scene. The value this item represents the pixel at the center of the main subject relative to the left edge, prior to rotation processing as per the Rotation tag. The first value is the X column number and second indicates the Y row number.	vector<unsigned short>	14	SubjectLocation	41492	APP1_IFD0.EXIF_IFD
	SceneContent.UserComment.UserComment	A character string that identifies from a user perspective, any desired information about the image. This is in addition to any comments identified in ImageDescription metadata. The first 8 bytes identify a character code ID field. Current registered Character Code Ids are ASCI, JIS and Unicode.	vector<unsigned char>	11	UserComment	37510	APP1_IFD0.EXIF_IFD

Footnotes:

1: This key does not work for EXIF. Do not use this key. This key may be supported in the future.

2: This key does not work for EXIF when the value is written, the file is closed, and then reopened for reading.This key may be used with these restrictions.

MetadataName	Metadata Definition	C++ Type	PMT Type Table Index	ExifFieldName	ExifTag	AppSegIFD#
	3: This key does not work for EXIF if the value is written and then read without closing the file in between. This key may be used with these restrictions. 4: This metadata object does not support encoding of information using a LONG (32-bit) data type. (IPTC NAA) 5: Recording seconds in the time is not currently allowed. Recording seconds would result in an invalid file. Also, when reading these keys, no seconds will be returned, even if they exist in the file. 6: DO NOT USE THIS KEY UNDER ANY CIRCUMSTANCES. It may or may not be supported in the future. This key is not supported currently. 7: These tag ID's exceed 65535. They are metadata items that are not defined through the use of tags. The illegal tag ID has been assigned for mapping purposes only					

PMT Type Table Section:

The following table maps the Schema types used by PMT to the types used in other contexts within PMT.

The **Schema** column refers to either a XML Schema built-in type, or to a PMT derived data type as specified in PMT's default schema (PmtDefaultDefinitioins.xsd).

The **TT Type** and **TT Translator** columns refer to entries in the default Translation Table (PmtTranslationTbl.h) or a Translation Table you create. (**TT** is an abbreviation for Translation Table.)

The **Exif/TIFF** column: For Exif file formats, it refers to the type taken from bytes 2-3 of the Exif IFD Structure, which is the type of data stored in an Exif file. For TIFF file formats, it refers to the type taken from bytes 2-3 of the TIFF IFD Entry, which is the type of data stored in a TIFF file.

The **C++** column refers to the type used in C++ code.

Notice that there is more than one possible mapping for a particular type. Only an entire row of types is unique. For example, notice that there are three entries for the Schema type **unsignedByte** below. Taking each of the other columns (types) into consideration makes each **unsignedByte** entire row entry unique.

Table 1. Mapping of XML Schema types to Translation Table types, Translation Table translators, Exif/TIFF, and C++ types.

Index	*Schema*	*TT Type*	*TT Translator*	*Exif/TIFF*	*C++*
1	unsignedByte	ubyte	builtin2uchar	BYTE	unsigned char
2	unsignedByte	undefined	builtin2undefined	UNDEFINED	unsigned char
3	unsignedByte	ushort	builtin2ushort	SHORT	unsigned char
4	string	ascii	builtin2ascii – for Exif builtin2string – for TIFF	ASCII	string
5	string	ascii	builtin2ascii	UNDEFINED	vector<unsigned char>
6	unsignedShort	ushort	builtin2ushort	SHORT	unsigned short
7	unsignedInt	ulong	builtin2ulong	LONG	unsigned long
8	float	urational	builtin2float	RATIONAL	float
9	int	long	builtin2long	SLONG	long
10	float	rational	builtin2float	SRATIONAL	float
11	pmt_vuint8	undefined	builtin2undefined	UNDEFINED	vector<unsigned char>
12	pmt_vuint8	undefined	builtin2undefined	BYTE (multiple)	vector<unsigned char>
13	pmt_vuint8	ubyte	builtin2uchar	BYTE (multiple)	vector<unsigned char>
14	pmt_vuint16	ushort	builtin2ushort	SHORT (multiple)	vector<unsigned short>
15	pmt_vint16	short	builtin2short	SSHORT (multiple)	vector<short>
16	pmt_vuint32	ulong	builtin2ulong	LONG (multiple)	vector<unsigned long>
17	pmt_vfloat	urational	builtin2float	RATIONAL (multiple)	vector<float>
18	pmt_vint32	long	builtin2long	SLONG (multiple)	vector<long>

PMT Exif 2.2 Metadata Management Guidelines

Version 2.0, October 24, 2002

Author:

Eastman Kodak Company
343 State Street
Rochester, NY 14650 USA

Table of Contents

1. Introduction

1.1. Purpose

The intent of the PMT Exif 2.2 Metadata Management Guidelines is to help ensure that Exif image files are properly handled when they are edited by software applications that utilize PMT. The tags or PMT metadata objects, provided through the Exif image files include very valuable information about the digital image. When Exif images are manipulated by software applications and a new Exif image file is saved, the Exif tag or PMT metadata object information should be properly maintained. For most PMT metadata objects, the information can be copied from the original Exif file into the newly saved Exif image file. However, certain PMT metadata objects as well as the thumbnail image must be updated to reflect changes due to image manipulation by the software application.

1.2. Scope

This document address the metadata management guidelines for an Exif image file as the following basic edit functions are applied to the image:

- Rotation (90 degree)
- Exposure adjustment
- Brightness/contrast adjustment
- Sharpen
- Trim (crop)
- Red Eye removal
- Backlight
- Flash in face
- White Balance
- Sepia
- Image Outline

1.3. Disclaimer

Eastman Kodak Company reserves the right to change this information without notice, and makes no warranty, expressed or implied, with respect to this information. Kodak shall not be liable for any loss or damage, including consequential or special damages, resulting from the use of this information, even if loss or damage is caused by Kodak's negligence or fault.

1.4. Definitions, Acronyms, Abbreviations

1.4.1. Backlight

Backlight - corrects for common backlighting occurrences in consumer photography (ie. indoor subject standing in front of a brightly lit window.)

1.4.2. Flash in face

Flash in face - Flash in the face corrects for subject overflash, such as when the subject is too close in a flash photography situation.

1.4.3. White Balance

White Balance - corrects for florescent /incandescent lighting conditions

1.4.4. Sepia

Sepia - gives pictures an old-fashioned type of effect (brown tinted monochrome).

1.4.5. Image Outline

Image Outline - an image outline effect.

1.5. References and Applicable Documents

1.5.1. JEITA Exif 2.2 Specification

Title: Standard of Japan Electronics and Information Technology Industries Association ,JEITA CP-3451,Exchangeable image file format for digital still cameras: Exif Version 2.2
Version: 2.2
Date: February 19, 2002, last revision
Author: Standard of Japan Electronics and Information Technology Industries Association ,JEITA
Web Access: The document is available from the following web site:
http://tsc.jeita.or.jp/WTO-01.htm
On the web page select "New Standard No.CP –3451" The PDF file requires that your Acrobat Reader has Japanese Font support.

1.5.2. ISO/IEC 10918-1, JPEG Specification

Title: Information technology - Digital compression and coding of continuous-tone still images: Requirements and guidelines, Reference number ISO/IEC 10918-1:1994(E)
Version: 1
Date: 2/15/94
Author: CCIT Study Group VIII and the Joint Photographic Experts Group (JPEG) of ISO/IEC JTC 1/SC 29/WG 10
Web Access: Document is available from Global Engineering Documents. Global Engineering Documents web site is http://global.ihs.com/

1.5.3. Eastman Kodak Company JPEG File Implementation Guide

Title: Eastman Kodak Company JPEG File Implementation Guide
Version: 1.2
Date: December 3, 1999
Author: Robert Reisch
Web Access: At the Kodak Developer Relations Group site a registered member that has access to a Personal Access page will be able to down load the Kodak JPEG File Implementation Guide, Version 1.2 . The Kodak Developer Relations Group is located at:

http://www.kodak.com/go/DRG

1.5.4. Eastman Kodak Company Picture Metadata Guidelines (for 2000-2001)

Title:	Eastman Kodak Company Picture Metadata Guidelines (for 2000-2001)
Version:	1.0
Date:	December 21, 1999
Author:	J. R. Milch and R. Reisch
Web Access:	At the Kodak Developer Relations Group site a registered member that has access to a Personal Access page and will be able to down load the Guideline Document. The Kodak Developer Relations Group is located at:

http://www.kodak.com/go/DRG

1.5.5. Eastman Kodak Company Picture CD Image/Exif File Format V 1.1

Title:	Eastman Kodak Company Picture CD Image/Exif File Format V 1.1
Version:	Version 1.1
Date:	03/03/2000
Author:	Rob Reisch
Web Access:	At the Kodak Developer Relations Group site a registered member that has access to a Personal Access page will be able to down load the Eastman Kodak Company Picture CD Image/Exif File Format V 1.1 The Developer Relations Group is located at:

http://www.kodak.com/go/DRG

2. General Description

The metadata management guidelines are comprised of a number of tables. Each table addresses a section of the image file where the PMT metadata object is stored through the Exif Accessor. The first row of each table has a list of operations that will modify an Exif image file. The left-hand column of the table list the PMT metadata objects. **Each cell in the table has a specific instruction or values for the metadata that is based on the operation being conducted. If a group of operations are performed, like Rotate and Trim or Crop then the resultant metadata instructions or values are a combination of the two columns.**

2.1. Format of an Exif JPEG Image File

Figure 1 The Format of an Exif Image File, on the next page provides a general description of the format and structures used in an Exif image file to store metadata. See the JEITA Exif 2.2 Specification for more details.

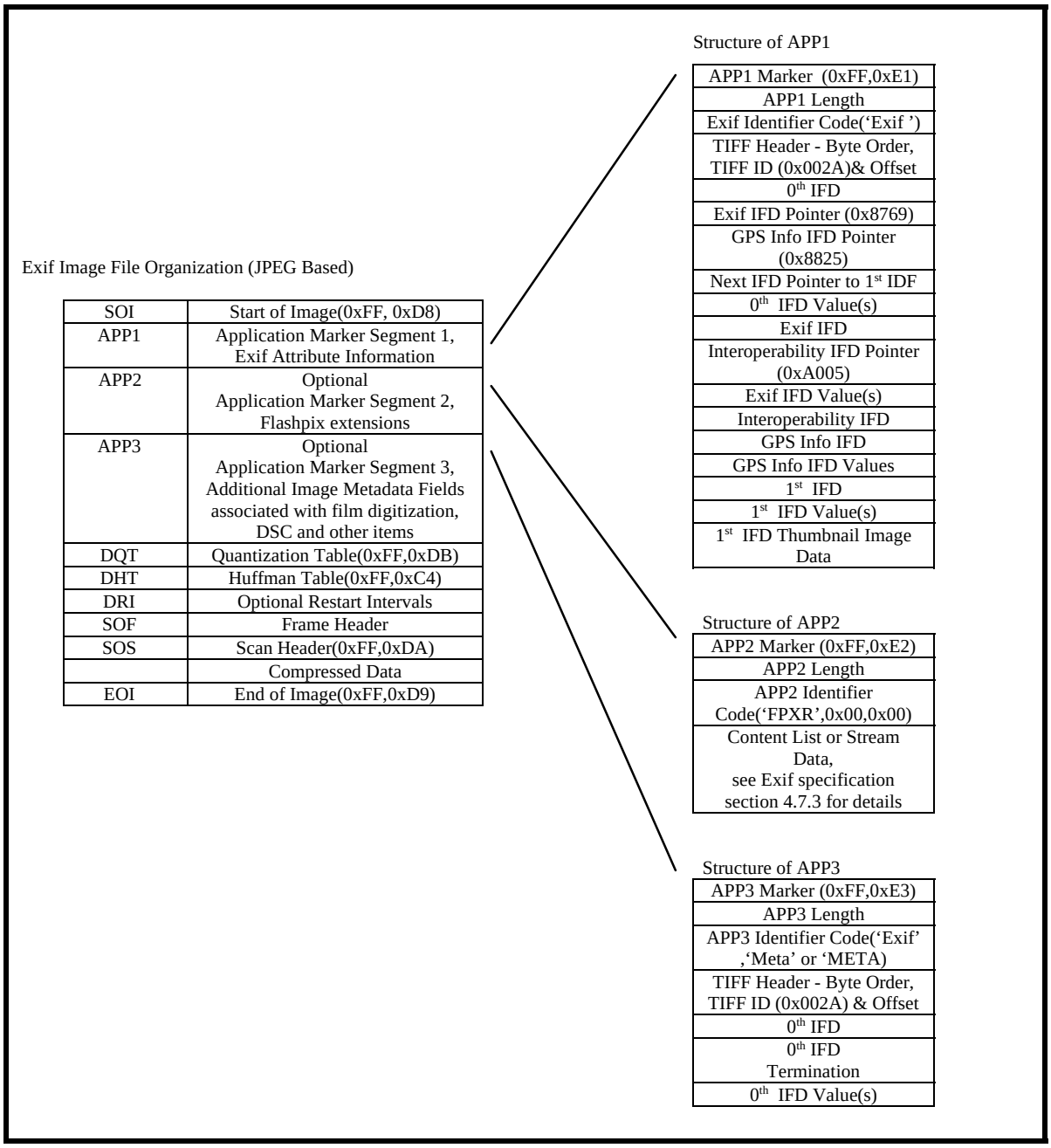

Figure 1 The Format of an Exif Image File (JPEG Based)

3. Specific Guidelines

The following sections of this document are comprised of different portions of an Exif image file that contains the PMT metadata objects. Each section contains a table that lists the defined PMT metadata object in the left-hand column of the table. The first row of the table contains the following operations that will modify an image:

- Rotation (90 degree)
- Exposure Adjustment
- Brightness/contrast adjustment
- Sharpen
- Trim (crop)
- Red Eye removal
- Backlight
- Flash in face
- White Balance
- Sepia
- Image Outline

Each cell in the table has a specific instruction or value for the metadata that is based on the operation being conducted. If a group of operations are performed, like Rotate and Trim then the resultant metadata instructions or values are a combination of the two columns.

The following sections comprising the metadata defined for an Exif JPEG image file:

- 3.1 APP1, 0th IFD, Primary Image
- 3.2 APP1, Exif IFD, Primary Image
  - 3.2.1 APP1, Exif IFD, Interoperability IFD
- 3.3 APP1, GPS Info IFD, Primary Image
- 3.4 APP1, 1st IFD, Compressed Thumbnail Metadata
- 3.5 APP3, 0th IFD, Additional Metadata Items

The sections are combined together and the specific instructions or values shall be applied to the Exif image file as operations that modify the image are applied. If the original Exif image file does not contain one of the listed metadata items then the row of values and instructions are ignored.

Intentionally left blank

3.1. APP1, 0th IFD, Primary Image

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
SceneContent.ImageDescription	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.Make	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.Model	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.Orientation	No Change, set to 1.	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1	No Change, set to 1
ImageContainer.DisplayXResolution	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.DisplayYResolution	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.DisplayResolutionUnit	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.TransferFunction	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.Software	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same.	Update to indicate the editing software program. PMT metadata object value will change or remain the same	Update to indicate the editing software program. PMT metadata object value will change or remain the same	Update to indicate the editing software program. PMT metadata object value will change or remain the same	Update to indicate the editing software program. PMT metadata object value will change or remain the same	Update to indicate the editing software program. PMT metadata object value will change or remain the same
DigitalProcess.ImageFileChangeDateTime	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1	Update, PMT metadata object value will change. See note 1
CaptureDevice.CameraOwner.CameraOwner	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.WhitePoint	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
ImageContainer.PrimaryChromaticities	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.YCbCrCoefficients	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.YCbCrPositioning	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.ReferenceBlackWhite,	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
IntellectualProperty.Copyright	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

Note 1: Value set to the date and time when the last operation was completed on the image.

3.2. APP1, Exif IFD, Primary Image

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
CaptureConditions.ExposureTime	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.FNumber	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.ExposureProgram	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.SpectralSensitivity	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.ISOSpeedRatings	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.OECF	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
ImageContainer.ExifVersion	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.ImageCaptureDateTime. ImageCaptureDateTime	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
DigitalProcess.ImageFileCreationDateTime	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
ImageContainer.ComponentsConfiguration	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
ImageContainer.CompressedBitsPerPixel	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.	The PMT metadata object value will change based on the compression mode applied to the saved image. Therefore, the value will change or remain the same.
CaptureConditions.ShutterSpeedValue	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.Aperture	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.Brightness	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.ExposureBias	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.MaxApertureValue	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
CaptureConditions.SubjectDistance	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.MeteringMode	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.LightSource	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.Flash.Flash	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.FocalLength	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.SubjectArea	Update the value of the PMT metadata object to reflect the new subject location.	No Change	No Change	No Change	Update the value of the PMT metadata object to reflect the new subject location..	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.MakerNotes	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.UserComment.UserComment,	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.FlashPixVersion	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.ColorSpaceInformation	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.ActualImageWidth	Update the value of the PMT metadata object. See Note 2	No Change	No Change	No change	Update the value of the PMT metadata object. See Note 3	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.ActualImageHeight	Update the value of the PMT metadata object. See Note 4	No Change	No Change	No change	Update the value of the PMT metadata object. See Note 5	No change	No change	No change	No change	No change	No change
SceneContent.RelatedSoundFile	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.Flash.Energy	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.SpatialFrequencyResponse	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.FocalPlaneXResolution	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.FocalPlaneY-Resolution	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.FocalPlaneResolutionUnit	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.SubjectLocation	Update the PMT object values to indicate the	No Change	No Change	No Change	Update the PMT object values to indicate the	No Change	No change	No change	No change	No change	No change

PMT Metadata Object Name	**Rotation (90 degrees)**	**Exposure Adjustment**	**Brightness/ Contrast adjustment**	**Sharpen**	**Trim or Crop**	**Red Eye Removal**	**Backlight**	**Flash in face**	**White Balance**	**Sepia**	**Image Outline**
	subject location.				subject location.						
CaptureConditions.ExposureIndex	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.SensingMethod	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
DigitalProcess.FileSource	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.SceneType	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureDevice.CFAPattern	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
CaptureConditions.SubjectArea	Update the PMT object values to indicate the subject area.	No Change	No Change	No Change	Update the PMT object values to indicate the subject area.	No Change	No change	No change	No change	No change	No change
CaptureConditions.CustomRendered (see row below) If CaptureConditions.CustomRendered=0 Then	No change	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.	No change	Update the value to 1 if the size of the effected area is significant otherwise no change to the value.	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.	Update the value to 1 that reflects special processing has been applied to the image.
CaptureConditions.CustomRendered (see row above) If CaptureConditions.CustomRendered=1 Then	No Change	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.	No Change	No Change.	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.	No Change. Preferably this edit function should not be conducted.
ExposureMode	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
WhiteBalance	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
DigitalZoomRatio	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
FocalLengthIn35mmFilm	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
SceneCaptureType	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
GainControl	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
Contrast	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
Saturation	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
Sharpness	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
DeviceSettingDescription	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SubjectDistanceRange	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
ImageUniqueID	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change

Note 2: The PixelXDimension (width) equals PixelYDimension (height) value before the rotate 90 degree operation
Note 3: The PixelXDimension (width) equals the number of pixels in the width of the trimmed or cropped image
Note 4: The PixelYDimension (height) equals PixelXDimension (width) value before the rotate 90 degree operation
Note 5: The PixelYDimension (height) equals the number of pixels in the height of the trimmed or cropped image

3.2.1. APP1, Exif IFD, Interoperability IFD

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
IImageContainer.Interoperability.Index	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
ImageContainer.Interoperability.Version	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change

3.3. APP1, GPS Info IFD, Primary Image

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
SceneContent.GPS.VersionID	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.LatitudeRef	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.Latitude	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.LongitudeRef	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.Longitude	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.AltitudeRef	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.Altitude	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.TimeStamp	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.MeasureMode	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.Satellites	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.MeasureMode	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.DOP	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.SpeedRef	No Change	No Change	No Change	No Change	No Change	No Change	No change	No change	No change	No change	No change
SceneContent.GPS.Speed	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.TrackRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.Track	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.ImgDirectionRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.ImgDirection	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.MapDatum	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestLatitudeRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestLatitude	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestLongitudeRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestLongitude	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestBearingRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestBearing	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DestDistanceRef	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPSDestDistance	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.ProcessingMethod	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.AreaInformation	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GPS.DateStamp	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
SceneContent.GPS.Differential	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

3.4. APP1, 1st IFD, Compressed Thumbnail Metadata

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
ImageContainer.Thumbnail.Compression	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6	No Change, set to 6
ImageContainer.Thumbnail.Orientation	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1	No Change set to 1
ImageContainer.Thumbnail.DisplayXResolution	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.Thumbnail.DisplayYResolution	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.Thumbnail.DisplayResolutionUnit	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.Thumbnail.OffsetToJPEGSOI	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information. Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
ImageContainer.Thumbnail.BytesOfJPEGData	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information. Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.	This PMT metadata object is read only. The Exif tool kit will manage writing this information . Note a new JPEG thumbnail must be generated that reflects the current primary image.
ImageContainer.Thumbnail.YcbCrCoefficients	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.Thumbnail.YCbCrPositioning	No Change set to 1, centered, assumed Y:Cb:Cr=4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling	No Change set to 1, centered, assumed Y:Cb:Cr= 4:2:0 sampling

3.5. APP3, 0th IFD, Additional Metadata Items

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
CaptureDevice.FilmProductCode	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
DigitalProcess.ImageSourceEK	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureConditions.PAR	No Change	No Change	No Change	No Change	Update PMT metadata object value. The value will be set to 0, the complete image is displayed. Therefore the PMT object value will change or remain the same	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.CameraOwner.EK	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.SerialNumber.Camera	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
SceneContent.GroupCaption.UserSelectGroupTitle	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OutputOrder.Information.DealerIDNumber	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.FID	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OutputOrder.Information.EnvelopeNumber	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OutputOrder.SimpleRenderInst.FrameNumber	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.FilmCategory	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.FilmGencode	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.Scanner.ModelAndVersion	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
CaptureDevice.FilmSize	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

PMT Metadata Object Name	**Rotation (90 degrees)**	**Exposure Adjustment**	**Brightness/ Contrast adjustment**	**Sharpen**	**Trim or Crop**	**Red Eye Removal**	**Backlight**	**Flash in face**	**White Balance**	**Sepia**	**Image Outline**
DigitalProcess.ImageRotationStatus	Update the PMT metadata Object value. The value of the PMT Metadata Object must be set to 1, image rotated based on user input. Therefore the value will change or remain the same.	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
DigitalProcess.RollGuid	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
ImageContainer.MetadataNumber	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
DigitalProcess.History.EditTagArray	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 6 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 7 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 7 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 8 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 9 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 10 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 12 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 12 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 7 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 7 for details.	Update PMT metadata object value. Therefore, the value will change or remain the same. If the PMT metadata object does not exist then add the object. See Note 11 for details

PMT Metadata Object Name	Rotation (90 degrees)	Exposure Adjustment	Brightness/ Contrast adjustment	Sharpen	Trim or Crop	Red Eye Removal	Backlight	Flash in face	White Balance	Sepia	Image Outline
CaptureConditions.Magnification	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change

Note 6: Add 3, Image rotated, to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 7: Add 4, Global tone/color adjustment applied. e.g., color balance, contrast adjust, density adjust, etc., to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 8: Add 5, Global spatial adjustment applied e.g., sharpening, extreme compression , substantial subsampling, blur, noise suppression, etc., to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 9: Add 2, Image cropped, to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 10: Add 6, Image retouched e.g., redeye, scratch removal, to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 11: Add 7,Extensive pixel edit, to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 12: Add based on the implementation either 4,Global tone/color adjustment applied, or 9, Regional tone/color adjustment applied. e.g., digital "dodge & burn" operation, selective color adjustment, etc., to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A
Note 13: Add 8, Image composited with another image or background, or graphics and/or text added, to the Edit Tag Array according to the rules defined in the tag definition. See Appendix A

Appendix A. Editing Tag Array IFD Entry

The Edit Tags are designed to help manage the maintenance issues associated with metadata as different operations that modify or edit an image are applied. The array contains a summary of the edit operations and therefore only one occurrence of each defined edit functions will be stored in the array. The values of the array are enumerated in the following manner:

1. Digital image created
2. Image cropped
3. Image rotated
4. Global tone/color adjustment applied. e.g., color balance, contrast adjust, density adjust, etc.
5. Global spatial adjustment applied e.g., sharpening, extreme compression , substantial subsampling, blur, noise suppression, etc.
6. Image retouched e.g., redeye, scratch removal
7. Pixels edited extensively, significantly changing the captured scene content. e.g., object removal, image warping or morphing operations
8. Image composited with another image or background, or graphics and/or text added
9. Regional tone/color adjustment applied. e.g., digital "dodge & burn" operation, selective color adjustment, etc.

0, 10 - 65535 Reserved for future edit functional definitions

The array's maximum size is the number of defined edit functions, currently nine. The originating system that creates the image will store one element that represents the fact that the digital image has been created (1). Note, there will be only one occurrence of each defined edit function in the Tag Array. Image editing software packages will be responsible for build the summary list of edit operations that have been applied to the image and storing the results in this IFD. The summary of edit functions includes past and current edit activities.

Application Segment	=	APP3
Tag Field	=	50022
Type Field	=	SHORT
Count Field	=	1 to the number of defined edit functions
Value / Offset Field	=	When there are less then 2 elements in the array the values will be stored. If there are more then 2 elements then an Offset to the Editing Tag Array is stored