Main Header for Matrix Data Files

Byte	Variable Name	Type	Comment
0	MAGIC_NUMBER	Character*14	UNIX file type identification number (NOT PART OF THE MATRIX HEADER DATA)
14	ORIGINAL_FILE_NAME	Character*32	Scan file's creation name
46	SW_VERSION	Integer*2	Software version number
48	SYSTEM TYPE	Integer*2	Scanner model (i.e., 951, 951R, 953, 953B, 921, 922, 925, 961, 962, 966)
50	FILE_TYPE	Integer*2	Enumerated type (00=unknown, 01=Sinogram, 02=Image-16, 03=Attenuation Correction, 04=Normalization, 05=Polar Map, 06=Volume 8, 07=Volume 16, 08=Projection 8, 09=Projection 16, 10=Image 8, 11=3D Sinogram 16, 12=3D Sinogram 8, 13=3D Normalization, 14=3D Sinogram Fit)
52	SERIAL_NUMBER	Character*10	The serial number of the gantry
62	SCAN_START_TIME	Integer*4	Date and time that acquisition was started (in secs from base time)
66	ISOTOPE_NAME	Character*8	Isotope
74	ISOTOPE_HALFLIFE	Real*4	Half-life of isotope specified (in sec.)
78	RADIOPHARMACEUTICAL	Character*32	Free format ASCII
110	GANTRY_TILT	Real*4	Angle (in degrees)
114	GANTRY_ROTATION	Real*4	Angle (in degrees)
118	BED_ELEVATION	Real*4	Bed height (in cm.) from lowest point
122	INTRINSIC_TILT	Real*4	Angle that the first detector of Bucket 0 is offset from top center (in degrees)
126	WOBBLE_SPEED	Integer*2	Revolutions/minute (0 if not wobbled)
128	TRANSM_SOURCE_TYPE	Integer*2	Enumerated type (SRC_NONE, _RRING, _RING, _ROD, _RROD)
130	DISTANCE_SCANNED	Real*4	Total distance scanned (in cm)
134	TRANSAXIAL_FOV	Real*4	Diameter (in cm.) of transaxial view
138	ANGULAR_COMPRESSION	Integer*2	Enumerated Type (0=no mash,1=mash of 2, 2=mash of 4)
140	COIN_SAMP_MODE	Integer*2	Enumerated type (0=Net Trues, 1=Prompts and Delayed, 3= Prompts, Delayed, and Multiples)
142	AXIAL_SAMP_MODE	Integer*2	Enumerated type (0=Normal, 1=2X, 2=3X)
144	ECAT_CALIBRATION_FACTOR	Real*4	Quantification scale factor (to convert from ECAT counts to activity counts)
148	CALIBRATION_UNITS	Integer*2	Enumerated type (0=Uncalibrated, 1=Calibrated,)
150	CALIBRATION_UNITS_LABEL	Integer*2	Enumerated type (BLOOD_FLOW, LMRGLU)
152	COMPRESSION_CODE	Integer*2	Enumerated type (COMP_NONE, (This is the only value))
154	STUDY_TYPE	Character*12	Study descriptor
166	PATIENT_ID	Character*16	Patient identification descriptor
182	PATIENT_NAME	Character*32	Patient name (free format ASCII)
214	PATIENT_SEX	Character*1	Enumerated type (SEX_MALE, _FEMALE, _UNKNOWN)
215	PATIENT_DEXTERITY	Character*1	Enumerated type (DEXT_RT, _LF, _UNKNOWN)
216	PATIENT_AGE	Real*4	Patient age (years)
220	PATIENT_HEIGHT	Real*4	Patient height (cm)
224	PATIENT_WEIGHT	Real*4	Patient weight (kg)
228	PATIENT_BIRTH_DATE	Integer*4	Format is YYYYMMDD
232	PHYSICIAN_NAME	Character*32	Attending Physician name (free format)
264	OPERATOR_NAME	Character*32	Operator name (free format)
296	STUDY_DESCRIPTION	Character*32	Free format ASCII

328 ACQUISITION_TYPE . . . . Integer*2. . . . Enumerated type (0=Undefined, 1=Blank,
2=Transmission, 3=Static emission, 4=Dynamic emission,
5=Gated emission, 6=Transmission rectilinear, 7=Emission
rectilinear)

329 *OK*

330 PATIENT_ORIENTATION . . . . . . Integer*2. . . . Enumerated Type (Bit 0 clear - Feet first, Bit 0 set - Head
first, Bit 1-2 00 - Prone, Bit 1-2 01 - Supine,
Bit 1-2 10 - Decubitus Right, Bit 1-2 11 - Decubitus Left)
332 FACILITY_NAME . . . . Character*20. Free format ASCII
352 NUM_PLANES. . . . . Integer*2. . . . Number of planes of data collected
354 NUM_FRAMES . . . . Integer*2. . . . Number of frames of data collected OR Highest frame
number (in partially reconstructed files)
356 NUM_GATES . . . . Integer*2. . . . Number of gates of data collected
358 NUM_BED_POS . . . . Integer*2. . . . Number of bed positions of data collected
360 INIT_BED_POSITION. . . . . Real*4. . . . . . Absolute location of initial bed position (in cm.)
364 BED_POSITION(15) . . . . Real*4. . . . . . Absolute bed location (in cm.)
424 PLANE_SEPARATION . . . . Real*4. . . . . . Physical distance between adjacent planes (in cm.)
428 LWR_SCTR_THRES. . . . . Integer*2. . . . Lowest threshold setting for scatter (in KeV)
430 LWR_TRUE_THRES. . . . . Integer*2. . . . Lower threshold setting for trues in (in KeV)
432 UPR_TRUE_THRES . . . . Integer*2. . . . Upper threshold setting for trues in (in KeV)
434 USER_PROCESS_CODE . . . . . . Character*10. Data processing code (defined by user)
444 ACQUISITION_MODE. . . . . Integer*2. . . . Enumerated Type (0=Normal, 1=Windowed, 2=Windowed
& Nonwindowed, 3=Dual energy, 4=Upper energy,
5=Emission and Transmission)
446 BIN_SIZE . . . . Real*4. . . . . . Width of view sample (in cm)
450 BRANCHING_FRACTION. . . . . . Real*4. . . . . . Fraction of decay by positron emission
454 DOSE_START_TIME . . . . Integer*4. . . . Actual time radiopharmaceutical was injected or flow was
started (in sec since base time)
458 DOSAGE . . . . Real*4. . . . . . Radiopharmaceutical dosage (in bequerels/cc) at time of
injection
462 WELL_COUNTER_CORR_FACTOR . Real*4. . . . . . TBD
466 DATA_UNITS . . . . Character*32.
498 SEPTA_STATE . . . . Integer*2. . . . Septa position during scan (0=septa extended, 1=septa
retracted)
500 FILL(6) . . . . Integer*2. . . . CTI Reserved space (12 bytes)

Subheader for Matrix Scan Files

Byte	Variable Name	Type	Comment
0	DATA_TYPE	Integer*2	Enumerated type (DTYPE_BYTES, _I2, _I4, _VAXR4, _SUNFL, _SUNIN)
2	NUM_DIMENSIONS	Integer*2	Number of Dimensions
4	NUM_R_ELEMENTS	Integer*2	Total elements collected (x dimension)
6	NUM_ANGLES	Integer*2	Total views collected (y dimension)
8	CORRECTIONS_APPLIED	Integer*2	Designates processing applied to scan data (Bit encoded, Bit 0 - Norm, Bit 1 - Atten, Bit 2 - Smooth)
10	NUM_Z_ELEMENTS	Integer*2	Total elements collected (z dimension) For 3D scans
12	RING_DIFFERENCE	Integer*2	Maximum acceptance angle
14	X_RESOLUTION	Real*4	Resolution in the x dimension (in cm)
18	Y_RESOLUTION	Real*4	Resolution in the y dimension (in cm)
22	Z_RESOLUTION	Real*4	Resolution in the z dimension (in cm)
26	W_RESOLUTION	Real*4	TBD
30	FILL(6)	Integer*2	RESERVED for gating
42	GATE_DURATION	Integer*4	Gating segment length (msec, Average time if phased gates are used)
46	R_WAVE_OFFSET	Integer*4	Time from start of first gate (Average, in msec.)
50	NUM_ACCEPTED_BEATS	Integer*4	Number of accepted beats for this gate
54	SCALE_FACTOR	Real*4	If data type=integer, use this factor, convert to float values
58	SCAN_MIN	Integer*2	Minimum value in sinogram if data is in integer form
60	SCAN_MAX	Integer*2	Maximum value in sinogram if data is in integer form
62	PROMPTS	Integer*4	Total prompts collected in this frame/gate
66	DELAYED	Integer*4	Total delays collected in this frame/gate
70	MULTIPLES	Integer*4	Total multiples collected in this frame/gate
74	NET_TRUES	Integer*4	Total net trues (prompts—randoms)
78	COR_SINGLES(16)	Real*4	Total singles with loss correction factoring
142	UNCOR_SINGLES(16)	Real*4	Total singles without loss correction factoring
206	TOT_AVG_COR	Real*4	Mean value of loss-corrected singles
210	TOT_AVG_UNCOR	Real*4	Mean value of singles (not loss corrected)
214	TOTAL_COIN_RATE	Integer*4	Measured coincidence rate (from IPCP)
218	FRAME_START_TIME	Integer*4	Time offset from first frame time (in msec.)
222	FRAME_DURATION	Integer*4	Total duration of current frame (in msec.)
226	DEADTIME_CORRECTION_FACTOR	Real*4	Dead-time correction factor applied to the sinogram
230	PHYSICAL_PLANES(8)	Integer*2	Physical planes that make up this logical plane
246	FILL(83)	Integer*2	CTI Reserved space (166 bytes)
412	FILL(50)	Integer*2	User Reserved space (100 bytes) Note: Use highest bytes first

Subheader for Matrix Attenuation Files

Byte	Variable Name	Type	Comment
0	DATA_TYPE	Integer*2	Enumerated type (DTYPE_BYTES, _I2, _I4, _VAXR4, _SUNFL, _SUNIN)
2	NUM_DIMENSIONS	Integer*2	Number of dimensions
4	ATTENUATION_TYPE	Integer*2	E. type (ATTEN_NONE, _MEAS, _CALC)
6	NUM_R_ELEMENTS	Integer*2	Total elements collected (x dimension)
8	NUM_ANGLES	Integer*2	Total views collected (y dimensions)
10	NUM_Z_ELEMENTS	Integer*2	Total elements collected (z dimension)
12	RING_DIFFERENCE	Integer*2	Maximum acceptance angle.
14	X_RESOLUTION	Real*4	Resolution in the x dimension (in cm)
18	Y_RESOLUTION	Real*4	Resolution in the y dimension (in cm)
22	Z_RESOLUTION	Real*4	Resolution in the z dimension (in cm)
26	W_RESOLUTION	Real*4	TBD
30	SCALE_FACTOR	Real*4	Attenuation Scale Factor
34	X_OFFSET	Real*4	Ellipse offset in x axis from center (in cm.)
38	Y_OFFSET	Real*4	Ellipse offset in y axis from center (in cm.)
42	X_RADIUS	Real*4	Ellipse radius in x axis (in cm.)
46	Y_RADIUS	Real*4	Ellipse radius in y axis (in cm.)
50	TILT_ANGLE	Real*4	Tilt angle of the ellipse (in degrees)
54	ATTENUATION_COEFF	Real*4	Mu-absorption coefficient (in cm^{-1})
58	ATTENUATION_MIN	Real*4	Minimum value in the attenuation data
62	ATTENUATION_MAX	Real*4	Maximum value in the attenuation data
66	SKULL_THICKNESS	Real*4	Skull thickness in cm
70	NUM_ADDITIONAL_ATTEN_COEFF	Integer*2	Number of attenuation coefficients other than the Mu absorption coefficient above (max 8)
72	ADDITIONAL_ATTEN_COEFF(8)	Real*4	The additional attenuation coefficient values
104	EDGE_FINDING_THRESHOLD	Real*4	The threshold value used by the automatic edge-detection routine (fraction of maximum)
108	STORAGE_ORDER	Integer*2	Data storage order (RThetaZD, RZThetaD)
110	SPAN	Integer*2	Axial compression specifier (number of ring differences spanned by a segment)
112	Z_ELEMENTS(64)	Integer*2	Number of "planes" in z direction for each ring difference segment
240	FILL(86)	Integer*2	Unused (172 bytes)
412	FILL(50)	Integer*2	User Reserved space (100 bytes) Note: Use highest bytes first

Subheader for Matrix Image Files

Byte	Variable Name	Type	Comment
0	DATA_TYPE	Integer*2	Enumerated type (0=Unkonwn Matrix Data Type, 1=Byte Data, 2=VAX_Ix2, 3=VAX_Ix4, 4=VAX_Rx4, 5=IEEE Float, 6=Sun short, 7=Sun long)
2	NUM_DIMENSIONS	Integer*2	Number of dimensions
4	X_DIMENSION	Integer*2	Dimension along x axis
6	Y_DIMENSION	Integer*2	Dimension along y axis
8	Z_DIMENSION	Integer*2	Dimension along z axis
10	X_OFFSET	Real*4	Offset in x axis for recon target (in cm)
14	Y_OFFSET	Real*4	Offset in y axis for recon target (in cm.)
18	Z_OFFSET	Real*4	Offset in z axis for recon target (in cm.)
22	RECON_ZOOM	Real*4	Reconstruction magnification factor (zoom)
26	SCALE_FACTOR	Real*4	Quantification scale factor (in Quant_units)
30	IMAGE_MIN	Integer*2	Image minimum pixel value
32	IMAGE_MAX	Integer*2	Image maximum pixel value
34	X_PIXEL_SIZE	Real*4	X dimension pixel size (in cm)
38	Y_PIXEL_SIZE	Real*4	Y dimension pixel size (in cm.)
42	Z_PIXEL_SIZE	Real*4	Z dimension pixel size (in cm.)
46	FRAME_DURATION	Integer*4	Total duration of current frame (in msec.)
50	FRAME_START_TIME	Integer*4	Frame start time (offset from first frame, in msec)
54	FILTER_CODE	Integer*2	Enumerated type (0=no filter, 1=ramp, 2=Butterfield, 3=Hanning, 4=Hamming,5=Parzen, 6=Shepp)
56	X_RESOLUTION	Real*4	Resolution in the x dimension (in cm)
60	Y_RESOLUTION	Real*4	Resolution in the y dimension (in cm)
64	Z_RESOLUTION	Real*4	Resolution in the z dimension (in cm)
68	NUM_R_ELEMENTS	Real*4	Number R elements from sinogram
72	NUM_ANGLES	Real*4	Number of angles from sinogram
76	Z_ROTATION_ANGLE	Real*4	Rotation in the xy plane (in degrees). Use right-hand coordinate system for rotation angle sign.
80	DECAY_CORR_FCTR	Real*4	Isotope decay compensation applied to data
84	PROCESSING_CODE	Integer*4	Bit mask (0=Not Processed, 1=Normalized, 2=Measured Attenuation Correction, 4=Calculated Attenuation Correction, 8=X smoothing, 16=Y smoothing, 32=Z smoothing, 64=2D scatter correction, 128=3D scatter correction, 256=Arc correction, 512=Decay correction, 1024=Online compression) 2048 _Fourier Rebinning_
88	GATE_DURATION	Integer*4	Gate duration (in msec)
92	R_WAVE_OFFSET	Integer*4	R wave offset (For phase sliced studies, average, in msec)
96	NUM_ACCEPTED_BEATS	Integer*4	Number of accepted beats for this gate
100	FILTER_CUTOFF_FREQUENCY	Real*4	Cutoff frequency
104	FILTER_RESOLUTION	Real*4	Do not use
108	FILTER_RAMP_SLOPE	Real*4	Do not use
112	FILTER_ORDER	Integer*2	Do not use
114	FILTER_SCATTER_FRACTION	Real*4	Do not use
118	FILTER_SCATTER_SLOPE	Real*4	Do not use
122	ANNOTATION	Character*40	Free format ASCII
162	MT_1_1	Real*4	Matrix transformation element (1,1).
166	MT_!_2	Real*4	Matrix transformation element (1,2).
170	MT_1_3	Real*4	Matrix transformation element (1,3).
174	MT_2_1	Real*4	Matrix transformation element (2,1).
178	MT_2_2	Real*4	Matrix transformation element (2,2).
182	MT_2_3	Real*4	Matrix transformation element (2,3).

186	MT_3_1	Real*4	Matrix transformation element (3,1).
190	MT_3_2	Real*4	Matrix transformation element (3,2).
194	MT_3_3	Real*4	Matrix transformation element (3,3).
198	RFILTER_CUTOFF	Real*4	
202	RFILTER_RESOLUTION	Real*4	
206	RFILTER_CODE	Integer*2	
208	RFILTER_ORDER	Integer*2	
210	ZFILTER_CUTOFF	Real*4	
214	ZFILTER_RESOLUTION	Real*4	
218	ZFILTER_CODE	Integer*2	
220	ZFILTER_ORDER	Integer*2	
222	MT_1_4	Real*4	Matrix transformation element (1,4)
226	MT_2_4	Real*4	Matrix transformation element (2,4)
230	MT_3_4	Real*4	Matrix transformation element (3,4)
234	SCATTER_TYPE	Integer*2	Enumerated type (0=None, 1=Deconvolution, 2=Simulated, 3=Dual Energy)
236	RECON_TYPE	Integer*2	Enumerated type (0=Filtered backprojection, 1=Forward projection 3D (PROMIS), 2=Ramp 3D, 3=FAVOR 3D, 4=SSRB, 5=Multi-slice rebinning, 6=FORE)
238	RECON_VIEWS	Integer*2	Number of views used to reconstruct the data
240	FILL(87)	Integer*2	CTI Reserved space (174 bytes)
414	FILL(48)	Integer*2	User Reserved space (100 bytes) Note: Use highest bytes first