lea 01 Table 5. File Descriptor Record. Record sequence number = 1 1st record sub-type code = 63Record type code = 1922nd record sub-type code = 183rd record sub-type code = 18 Length of this record = 720ASCII/EBCDIC Flag = A Format control document ID for this data file format = CEOS-SAR-CCT Format control document revision level = B File design descriptor revision letter = B Generating software release and revision level = ERS2-RAW-6.8 File number = 1 File name = ERS2.SAR.RAWLEAD Record sequence and location type flag = FSEQ 1 Sequence number location = Sequence number field length = 4 Record Code and location type flag = FTYP Record code location = 5 Record code field length = 4 Record length and location type flag = FLGT Record length location = 9 Record length field length = 4 Number of data set summary records = Data set summary record length = 1886 Number of map projection data records = 0 Map projection record length = 0 Number of platform pos. data records = 1 Platform position record length = 1046 Number of attitude data records = 0 Attitude data record length = 0 Number of radiometric data records = 0 Radiometric record length = 0 Number of rad. compensation records = 0 Radiometric compensation rec. length = Ω Number of data quality summary records = Ο 0 Data quality summary record length = Number of data histograms records = 0 Data histogram record length = 0 Number of range spectra records = 0 Range spectra record length = 0 Number of DEM descriptor records = 0 DEM descriptor record length = 0 Number of radar par. update records = 0 0 Radar par. update record length = Number of annotation data records = 0 Annotation data record length = 0 Number of det.processing records = 0 Det.processing record length = 0 Number of calibration records = 0 0 Calibration record length = Number of GCP records = 0 GCP record length = 0

Number of facility data records = 2 Facility data record maximum length = 12288

lea 01 Table 6. RAW Dataset Summary Record. Record sequence number = 2 1-st record sub-type code = 10 Record-type code = 102 nd record sub-type code = 313 rd record sub-type code = 20 Length of this record = 1886 Data Set Summary Record sequence number (starts at 1) = 1 _____ Scene Parameters. _____ SAR channel indicator = 1 Scene reference number (e.g. orbit - frame number) = ORBIT=05405-FRAME=2799 Scene centre time (UTC) <YYYYMMDDhhmmssttt> = 19960502163209928 Processed scene centre geodetic latitude = 40.0800000 (positive for North latitude, negative for South latitude) Processed scene centre longitude = 273.0880000 Processed scene centre true heading (Not provided by the VMP) = -9999999.9999999 Ellipsoid designator = GEM6 Ellipsoid semimajor axis = 6378.1440000 Ellipsoid semiminor axis = 6356.7590000 Earth mass times gravitational constant (M. G) = 3.9860044 Ellipsoid J2 parameter = 1082.2800000 Ellipsoid J3 parameter = -2.3000000 Ellipsoid J4 parameter = -0.2000000 Scene centre line number = 00014000 (the line number at the scene centre including zero fill) Scene centre pixel number = 00002808 (the pixel number at the scene centre including zero fill) Processed scene length including zero fill = 111.3840000 Scene width including zero fill = 44.3888640 _____ General Mission / Sensor Parameters. _____ Number of SAR channels = 0001 Sensor platform mission identifier = ERS2 Sensor ID and mode of operation for this channel = SAR- C-HR-IM-VV <AAAAAA-BB-CC-DD-EF> where : AAAAAA = sensor identifier; BB = SAR band; CC = resolution mode code; DD = imaging mode code; E = transmit polarisation; F = receiver polarisation Orbit number = 5405 Sensor platform geodetic latitude at nadir corresponding to scene centre (positive for North latitude) = 39.329 Sensor platform longitude at nadir corresponding to scene centre (negative for West longitude) = -83.427Sensor platform heading at nadir corresponding to scene centre = 194.078 (clockwise positive from North) Sensor clock angle as measured relative to sensor platform flight direction = 90.000 Incidence angle at scene centre = 23.763 Page 2

lea_01 Radar frequency = 5.300 Radar wavelength = 0.0566660 Motion compensation indicator = 00 (00=no compensation,01=on board compensation 10=in processor compensation, 11=both on board and in processor) Range pulse code specifier = LINEAR FM CHIRP Nominal range pulse (chirp) amplitude coefficient, Constant term = 1.000000e+00 Nominal range pulse (chirp) amplitude coefficient, Linear term = 0.000000e+00 Nominal range pulse (chirp) amplitude coefficient, Quadratic term = 0.000000e+00 Nominal range pulse (chirp) amplitude coefficient, Cubic term = 0.000000e+00 Nominal range pulse (chirp) amplitude coefficient, Quartic term = 0.000000e+00 Nominal range pulse (chirp) phase coefficient, Constant term = 0.0000000e+00 Nominal range pulse (chirp) phase coefficient, Linear term = 0.0000000e+00 Nominal range pulse (chirp) phase coefficient, Quadratic term = 2.0889400e+11 Nominal range pulse (chirp) phase coefficient, Cubic term = 0.0000000e+00 Nominal range pulse (chirp) phase coefficient, Quartic term = 0.0000000e+00 Down linked chirp extraction index = 29 Range sampling rate = 18.9624680 Range gate delay at early edge (in time) at the start of the image = Range pulse length = 37.1200000 Range compressed flag (YES = range compressed data) = NO Quantization per channel I & Q = 00000005 Ouantizer descriptor = UNIFORM IO -0.0400000 0.0190000 DC Bias for Q-component (actual value) = Gain imbalance for T () DC Bias for I-component (actual value) = Gain imbalance for I & Q (actual value) (Not provided by the VMP) = -9999999.9999999 Antenna mechanical boresight angle relative to platform vertical axis = 20.3550000 Pulse Repetition Frequency (PRF) (actual value) = 1679.9020000 _____ Sensor Specific Parameters. -----Satellite encoded binary time code = 4063880035 Satellite clock time (UTC) <YYYYMMDDhhmmssttt\$\$\$...\$> = 19960502160948243 Satellite clock step length = 3906249 _____ General Processing Parameters. _____ Processing facility identifier (D-PAF, UK-PAF, ES) = ES Processing system identifier (VMP for D-PAF, UK-PAF and ES) = VMP Processing version identifier = 6.8Product type specifier = SAR RAW SIGNAL DATA Processing algorithm identifier (Not relevant for the RAW product) =

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Nominal number of looks processed in azimuth (Not relevant for the RAW product) = -9999999.9999999Nominal number of looks processed in range (Not relevant for the RAW product) = -9999999.9999999 Bandwidth per look in azimuth (null-to-null) (Not relevant for the RAW product) = -9999999.9999999Bandwidth per look in range (Not relevant for the RAW product) = -9999999.9999999 Total processor bandwidth in azimuth (Not relevant for the RAW product) = -9999999.9999999 Total processor bandwidth in range (Not relevant for the RAW product) = -9999999.9999999 Weighting function designator in azimuth (Not relevant for the RAW product) = Weighting function designator in range (Not relevant for the RAW product) = Data input source = HDDT Nominal resolution in range (3-dB width) (Not relevant for the RAW product) = -9999999.9999999 Nominal resolution in azimuth (3-dB width) (Not relevant for the RAW product) = -9999999.9999999Along track Doppler frequency centroid at early edge of image, Constant term (Not provided for the RAW product) = -99999999.9999999 Along track Doppler frequency centroid at early edge of image, Linear term (Not provided for the RAW product) = -99999999.9999999 Along track Doppler frequency centroid at early edge of image, Quadratic term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency centroid at early edge of image, Constant term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency centroid at early edge of image, Linear term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency centroid at early edge of image, Quadratic term (Not provided for the RAW product) = -99999999.9999999 Time direction indicator along pixel direction = INCREASE Time direction indicator along line direction = INCREASE Along track Doppler frequency rate at early edge of image, Constant term (Not provided for the RAW product) = -99999999.9999999 Along track Doppler frequency rate at early edge of image, Linear term (Not provided for the RAW product) = -99999999.9999999 Along track Doppler frequency rate at early edge of image, Quadratic term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency rate at early edge of image, Constant term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency rate at early edge of image, Linear term (Not provided for the RAW product) = -99999999.9999999 Cross track Doppler frequency rate at early edge of image, Quadratic term (Not provided for the RAW product) = -99999999.9999999 Line content indicator = RANGE Clutterlock applied flag = NOT Autofocussing applied flag = NOT Line spacing = 3.9780000 7.9040000 Pixel spacing = Processor range compression designator (Not provided for the RAW product) =

Sensor Specific Local Use Segment.

```
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_____
                                                     5.5456750
Zero-doppler range time (two-way) of first range pixel =
Zero-doppler range time (two-way) of centre range pixel = 5.69375
Zero-doppler range time (two-way) of last range pixel = 5.8418390
                                                      5.6937570
Zero-doppler azimuth time of first azimuth pixel (UTC) = 02-MAY-1996
16:32:01.595
Zero-doppler azimuth time of centre azimuth pixel (UTC) = 02-MAY-1996
16:32:09.928
Zero-doppler azimuth time of last azimuth pixel (UTC) = 02-MAY-1996
16:32:18.262
Table 7. Raw Platform Position Data Record.
Record sequence number = 3
1-st record sub-type code = 10
Record-type code = 30
2 nd record sub-type code = 31
3 rd record sub-type code = 20
Length of this record (not fixed length) = 1046
  _____
Positional Data Points.
-----
Number of data points (always 5 for the VMP) = 0005
Year of data point <YYYY> = 1996
Month of data point <$$MM> = 0005
Day of data point <$$DD> = 02
Day in the year <GMT> (1st January = Day 1) = 0123
Seconds of day of data = 5.95215950000000E+04
Time interval between data points = 4.16700000000000E+00
Reference coordinate system = Earth Centred Rotating
Greenwich mean hour angle (Not provided by the VMP) = -9.999999999999998E+03
Along track position error (Not provided by the VMP) = -99999999.9999999
Across track position error (Not provided by the VMP) = -99999999.9999999
Radial position error (Not provided by the VMP) = -99999999.9999999
  _____
1th Positional Data Point.
_____
1th data point - Position vector X = 6.45033840000000E+05
1th data point - Position vector Y = -5.464265840000000E+06
1th data point - Position vector Z = 4.57947237000000E+06
1th data point - Position vector X' = -1.281359540000000E+03
1th data point - Position vector Y' = -4.87536614000000E+03
1th data point - Position vector Z' = -5.62200281000000E+03
_____
2th Positional Data Point.
_____
2th data point - Position vector X = 6.39682340000000E+05
2th data point - Position vector Y = -5.48452811000000E+06
2th data point - Position vector Z = 4.55600284000000E+06
2th data point - Position vector X' = -1.28720483000000E+03
2th data point - Position vector Y' = -4.84995461000000E+03
2th data point - Position vector Z' = -5.64270913000000E+03
_____
3th Positional Data Point.
_____
3th data point - Position vector X = 6.34306560000001E+05
3th data point - Position vector Y = -5.50468429000000E+06
3th data point - Position vector Z = 4.53244725000000E+06
```

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lea_01 3th data point - Position vector X' = -1.293010540000000E+033th data point - Position vector Y' = -4.82444836000000E+033th data point - Position vector Z' = -5.663309070000000E+03-----4th Positional Data Point. _____ 4th data point - Position vector X = 6.28906670000000E+054th data point - Position vector Y = -5.52473400000000E+064th data point - Position vector Z = 4.50880604000000E+064th data point - Position vector X' = -1.29877651000000E+03 4th data point - Position vector Y' = -4.79884787000000E+03 4th data point - Position vector Z' = -5.683802240000000E+03_____ 5th Positional Data Point. _____ 5th data point - Position vector X = 6.23482850000000E+055th data point - Position vector Y = -5.54467683000000E+065th data point - Position vector Z = 4.48507967000000E+06 5th data point - Position vector X' = -1.304502570000000E+03 5th data point - Position vector Y' = -4.77315367000000E+03 5th data point - Position vector Z' = -5.70418826000000E+03 Table 8. Raw Facility Related Data Record (General Type). Record sequence number = 4 1-st record sub-type code = 10 Record-type code = 2002 nd record sub-type code = 313 rd record sub-type code = 50 Length of this record = 12288Name of this facility related data record = FACILITY RELATED DATA RECORD [ESA GENERAL TYPE] _____ Signal Data Quality. _____ Date of last release of QC software (Not relevant for the RAW product) = Date of the last calibration update <YYMMDD> (Not relevant for the RAW product) =Overall QA summary flag (Sum of the next 9 following flags) = 0000 PRF code change flag (0 = PRF constant in scene) = 0Sampling window start time change flag (0 = SWST constant) = 0Cal. system & receiver gain change flag (0 = Cal/Rx gain constant) = 0 Chirp replica quality flag (0 = Replica XCF in limits) = 0 Input data statistics flag (0 = Raw data mean & sd in limits) = 0 Doppler centroid confidence measure flag (0 = in limits) = 0 Doppler centroid value (0 = Dopp-centroid less than PRF/2) = 0Doppler ambiguity confidence measure flag (0 = in limits) = 0Output data Mean flag (0 = Image mean or sd in limits) = 0 On ground / on board range compressed flag (0 = OGRC, 1=OBRC) = 0 Number of PRF code changes = 0Number of sampling window time changes = 0 Number of calibration subsystems gain changes = 0 Number of missing lines (i.e. raw data input lines) = 0 Number of receiver gain changes = 0 3-dB width of Cross Correlation Function (CCF) between first extracted chirp and nominal chirp [for Bangkok processor this is the CCF between best extracted chirp and nominal chirp] = 1.1350000

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lea_01 First side lobe level of chirp CCF = -9.6070000 ISLR of chirp CCF = -6.7910000 Doppler centroid confidence measure = 0.0000000 (value normalized such that it takes a value of zero for the best case and a value of one for the worst case) Doppler ambiguity confidence measure = 0.0000000 (value normalized such that it takes a value of one for the best case and a value of zero for the worst case) Estimated mean of I input data (once the nominal bias of 15.5 has been -0.0400000 applied) = Estimated mean of Q input data (once the nominal bias of 15.5 has been applied) = 0.0190000 Estimated standard deviation of I input data = 5.2680000 Estimated standard deviation of Q input data = 5.2860000 Calibration system gain of first processed line (telemetry value) = 7.0000000 Receiver gain of first processed line (telemetry value) = 19.0000000 Doppler ambiguity number = 0.000000 _____ Calibration Information. _____ Bias correction applied to I channel (to be added to the nominal bias) = 0.0400000 Bias correction applied to Q channel (to be added to the nominal bias) = -0.0190000 I/Q gain imbalance correction (applied to I channel) = 1.0000000
I/Q gain imbalance correction (applied to Q channel) = 0.9960000 I/Q non-orthogonality correction (applied to Q channel) = 0.3100000 Noise power per sample (Not provided by the VMP) = -99999999.9999999 Calibration pulse time delay (Not provided by the VMP) = -99999999.9999999 Number of valid calibration pulses (0 for the VMP) = 0Number of valid noise pulses (0 for the VMP) = 0 Number of valid replica pulses = 1 First sample in replica (Chirp extraction index) = 30.0000000 Mean calibration pulse power (Not provided by the VMP) = -99999999.9999999 Mean noise pulse power (Not provided by the VMP) = -99999999.9999999 Range compression normalisation factor = 12055352.0000000 Replica pulse power = 142661.0000000 Incidence angle at first range pixel (at mid-azimuth) = 19.3920000 Incidence angle at centre range pixel (at mid-azimuth) = 23.76300 Incidence angle at last range pixel (at mid-azimuth) = 27.2830000 23.7630000 Slant range reference (for range spreading loss compensation) = 847.0000000 Antenna pattern correction flag (0 = no correction) = 0 Absolute calibration constant K (scalar) (Not provided for the RAW product) Upper bound calibration constant K (+ 0.75 dB) (Not provided for the RAW product) = -9999999.9999999Lower bound calibration constant K (- 0.75 dB) (Not provided for the RAW product) = -9999999.9999999Estimated noise equivalent s o (Not provided for the RAW product) = -9999999.9999999 Estimated noise equivalent s o (Not provided for the RAW product) = K version number as XXYY, where XX refers to a K update implemented across the ground segment and YY refers to an upgrade only at the source facility (as may arise in case of local software updates) (Not provided for the RAW product) = _____

lea 01 Various Parameters (from SPH fields). _____ Number of duplicated input lines (Not provided by the VMP) = -999Estimated bit error rate (Not provided by the VMP) = -99999999.9999999 Output image mean (Not provided for the RAW product) = -99999999.9999999 Output image standard deviation (Not provided for the RAW product) = -9999999.9999999 Output image maximum value (Not provided for the RAW product) = -9999999.9999999 Time of raw data first input range line (UTC) <dd-MMM-yyyy hh:mm:ss.ttt> = 2-MAY-1996 16:32: 1.595 Time of ascending node state vector (UTC) = Ascending node state vectors X = 0.00000000000000e+00 Ascending node state vectors Y = 0.000000000000000e+00 Ascending node state vectors Z = 0.00000000000000e+00 Ascending node state vectors X' = 0.000000000000000000+00 Ascending node state vectors Z' = 0.00000000000000000+00 Output pixel bit length = 0016 Processor gain #1 = 0.000000 Processor gain #2 = 0.000000 Processor gain #3 = 0.000000 Peak location of Cross Correlation Function (CCF) between first extracted chirp and nominal chirp[for Bangkok processor, CCF between best extracted chirp and nominal chirp] = 00303-dB width of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp = 1.1350000 First side lobe level of chirp CCF between last extracted chirp and nominal chirp = -9.5440000 ISLR of chirp CCF between last extracted chirp and nominal chirp = -6.7470000Peak location of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp = 0030Roll tilt mode flag (0 = not in roll tilt mode) = 0000 Raw data correction flag (0 = correction with defaults parameters) = 0001Look detection flag (1 = power detected and summed) (Not provided) = -999Doppler ambiguity estimation flag (0 = no estimation done) (Not provided) = -999 Azimuth baseband conversion flag (0 = no conversion done) (Not provided) = -999 Samples per line used for the raw data analysis = 1000 Range lines skip factor for raw data analysis = 0010 Time of input state vector (UTC) used to processed the image = 02-MAY-1996 16:32:00.000 <dd-MMM-yyyy hh:mm:ss.ttt> Input state vector - Position vector X = 6.47075240000000e+05Input state vector - Position vector Y = -5.45648406000000e+06Input state vector - Position vector Z = 4.588430610000000e+06 Input state vector - Position vector X' = -1.279112280000000e+03 Input state vector - Position vector Y' = -4.88506523000000e+03 Input state vector - Position vector Z' = -5.614051040000000e+03 Input state vector type flag = 0001 (0= scending node state vectors, i.e predicted orbit, 1=preliminary or precise) Window coefficient for range-matched filter = 0.0000000 0.000000 Window coefficient for azimuth-matched filter = Update period of range-matched filter = 0000 Look scalar gains (up to 8 looks) = 0.000000 Look scalar gains (up to 8 looks) = 0.0000000 Look scalar gains (up to 8 looks) = 0.000000 Look scalar gains (up to 8 looks) = 0.000000

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Look scalar gains (up to 8 looks) = 0.000000 Look scalar gains (up to 8 looks) = 0.000000 0.000000 Look scalar gains (up to 8 looks) = 0.000000 Look scalar gains (up to 8 looks) = Sampling window start time bias = 6265 PRF code of first range line (telemetry value) = 2820 PRF code of last range line (telemetry value) = 2820 Sampl. wind. start time code of first range line (telemetry value) = 0922 Sampl. wind. start time code of last range line (telemetry value) = 0922 Calibration system gain of last processed line (telemetry value) = 0007 Receiver gain of last processed line (telemetry value) = 0019 First processed range sample = 0001 Azimuth FFT/IFFT ratio (Not relevant for the RAW product) = -999 Number of azimuth blocks processed (0000 for the RAW product) = 0000 Number of input raw data lines (variable) = 00028000 Initial Doppler ambiguity number = 0000 Chirp quality thresholds - Pulse width of the chirp CCF = 1.5000000 -8.500000 - First sidelobe of the chirp CCF = - ISLR of the chirp CCF = -6.0000000 Input data statistic thresholds - Mean of input I data in fraction of maximum absolute of input data = 0.1000000 - Mean of input Q data in fraction of maximum absolute of input data = 0.1000000 - Standard deviation of input I data in fraction of maximum absolute of input 0.2000000 data = - Standard deviation of input Q data in fraction of maximum absolute of input data = 0.2000000 Doppler ambiguity confidence thresholds = 0.000000 Doppler ambiguity confidence thresholds = 0.000000 Output data statistic thresholds - Mean of output data = 0.000000 - Standard deviation of output data = 0.000000 Satellite binary time of first range line (telemetry value) (Not provided by the VMP) = -9999999.9999999Number of valid pixels per range line (the remaining pixels are zero padded) = 5616 Number of range samples discarded during processing interpolations = 0000 I/ gain imbalance - Lower bound = 0.9980000 I/ gain imbalance - Upper bound = 1.0010000 I/Q quadrature departure - Lower bound = -1.6030000 I/Q quadrature departure - Upper bound = 2.2240000 3-dB look bandwidth (Not relevant for the RAW product) = -99999999.9999999 3-dB processed Doppler bandwidth (Not relevant for the RAW product) = -9999999.9999999 Range sprading loss compensation flag (0 = no compensation) = 0000 Datation flag (1 = azimuth timing improved based on timing information of range line specified in field 136) = 1 Maximum error of range line timing = 0334613 Format number of range line used to synchronize the azimuth timing = 0256403 Automatic ook scalar gain flag (1= automatically calculated) = 0 Maximum value of look scalar gain before the look scalar gains are normalised (Not provided) = -999Replica normalisation method flag = 0000 (0 = normalised by replica power, i.e. Z' = Z . c/Ar where Ar is the replica power and c is specified in field 54, 1 = normalised by the square root of replica power, i.e. Z' = Z / Ar) 4 coefficients of the ground range to slant range conversion polynomial (Not provided) = 1.4693679385e-39 4 coefficients of the ground range to slant range conversion polynomial (Not

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lea_01 provided) = 1.4693679385e-39 4 coefficients of the ground range to slant range conversion polynomial (Not provided) = 1.4693679385e-39 4 coefficients of the ground range to slant range conversion polynomial (Not provided) = 1.4693679385e-39 5 coefficients of the antenna elevation pattern polynomial (Not provided) = -9999.9999999999E-99 5 coefficients of the antenna elevation pattern polynomial (Not provided) = -9999.9999999999E-99 5 coefficients of the antenna elevation pattern polynomial (Not provided) = -9999.9999999999E-99 5 coefficients of the antenna elevation pattern polynomial (Not provided) = -9999.9999999999E-99 5 coefficients of the antenna elevation pattern polynomial (Not provided) = -9999.9999999999E-99 Range time of origin of antenna pattern polynomial (Not provided) = -9999999.9999999 Table 9. Raw Facility Related Data Record PCS Type. Record sequence number = 51-st record sub-type code = 10 Record-type code = 2002 nd record sub-type code = 313 rd record sub-type code = 50 Length of this record = 12288Name of this facility related data record = FACILITY RELATED DATA RECORD [ESA PCS QUALITY TYPE]