National Remote Sensing Centre Limited

ERS-1 ALONG TRACK SCANNING RADIOMETER PRODUCTS USER GUIDE

ISSUE 1.0

7 JULY 1995

PF-UG-NRL-OP-0002

Prepared for

The United Kingdom Processing and Archiving Facility

By

National Remote Sensing Centre Limited

ATSR/06

MASTER

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NOTICE

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1.0	First Issue	N/A	7/7/95

Contents

1 INTRODUCTION

1.1 Introduction

This "ERS-1 Along Track Scanning Radiometer Products User Guide has been generated using a previous ESA internal version of such a document "Preliminary ATSR-1 Products Guide" and another (now obsolete) document "ERS-1 ATSR Sea Surface Temperature Product Guide", DC-MA-EOS-ED-0016, issue 1.0 of April 1992, taking into account the changes that have occurred in 1992, 1993 and 1994 in the product definitions, the algorithms used and the processing machines at the UK-PAF. Clearly acknowledgements are due to the authors of the previous documents.

1.2 Scope of Document

This document intends to inform the user of the Along Track Scanning Radiometer (ATSR) products about the ATSR instrument, the way it operates, the definitions and descriptions of the ATSR products and the product format description.

1.3 Intended Audience

This document is intended for use by all scientists who intend to use ATSR data.

1.4 Document Structure

Following this section the document has five main sections and three Annexes:

- 2 The ERS-1 Space Segment
- 3 The ATSR Sensor
- 4 Calibration

5 ATSR Product Descriptions

6 CEOS Format Definitions

- Annex A ERS-1.ATS.IBT CEOS Format Definition
- Annex B ERS-1.ATS.SST CEOS Format Definition
- Annex C ERS-1.ATS.PST CEOS Format Definition

1.5 Point of Contact

For further information on the UK-PAF and UK-PAF products please contact:

ESRIN ERS Help Desk

ESRIN
P.O.Box 64
00044 Frascati
Italy

Telephone 39 6 94180 600
Telefax 39 6 94180 510
Telex 610637 ESRIN I

1.6 Abbreviations and Acronyms

The following is a list of the abbreviations and acronyms which are used in this document.

ATSR	Along Track Scanning Radiometer
ATS.IBT	ATSR Infrared Brightness Temperature Product
ATS.SST	ATSR Sea Surface Temperature Image
ATS.PST	ATSR Precision Spatially Averaged Sea Surface Temperatures
CEOS	Committee on Earth Observation Satellites
EECF	Earthnet ERS Central Facility
ERS-1	First European Remote Sensing Satellite
ESA	European Space Agency
ESRIN	European Space Research Institute
LSB	Least Significant Bit
MSB	Most Significant Bit
NRSC	National Remote Sensing Centre Limited
RAL	Rutherford Appleton Laboratory
SADIST	Synthesis of ATSR data into Sea Surface Temperatures
UK-PAF	United Kingdom Processing and Archiving Facility
UTC	Universal Time Coordinated

2 THE ERS-1 SPACE SEGMENT

2.1 The ERS-1 Spacecraft

The ERS-1 satellite was launched successfully on 17th July 1991 by flight V44 of the ARIANE launcher, from Kourou in French Guiana.

The satellite carries the following sensors;

- Active Microwave Instrument
  - Synthetic Aperture Radar
  - Wave Scatterometer
  - Wind Scatterometer
- Radar Altimeter
- Along Track Scanning Radiometer
- Microwave Sounder
- Precise Range and Range Rate Equipment
- Laser Retroreflector.

The ERS-1 spacecraft consists of the platform and the instrument payload, as depicted in Figure 2.1.

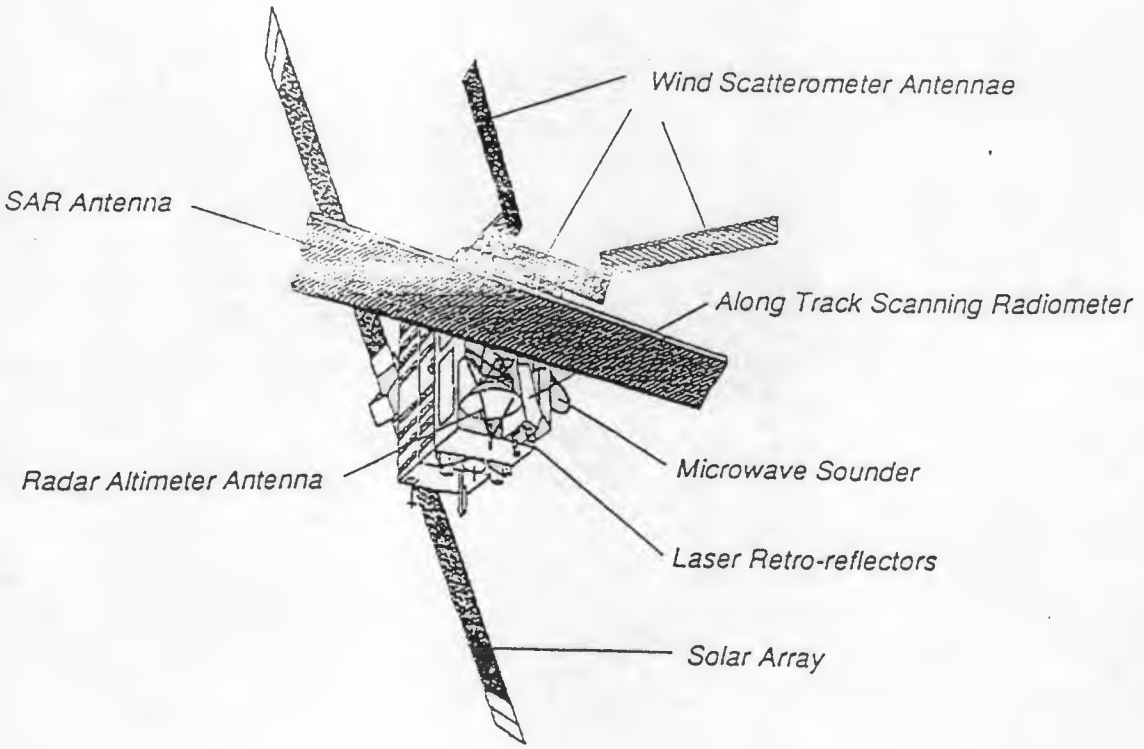

Figure 2.1 — The ERS-1 Spacecraft

2.1.1 The Platform

The platform is based on the design developed for the SPOT programme, but adapted to the specific requirements of the ERS-1. It provides all of the support functions of attitude and orbit control and power supply, plus communications and data handling required for successful utilisation of the payload.

2.1.2. The Payload

The ERS-1 payload consists of several instruments and support systems:

Along Track Scanning Radiometer and Microwave Sounder - combining an infra-red radiometer and microwave sounder for measurements of sea-surface temperature, cloud- top temperature and cloud cover, and atmospheric water vapour.

Active Microwave Instrument - a C-band radar with three modes of operation:

- Synthetic Aperture Radar (SAR) Image Mode for acquisition of swath images over the oceans, polar ice caps, coastal zone and land areas.
- SAR Wave Mode operates whenever Image Mode is not in use, providing down to 5 km square imagettes (depending on mode of operation) at regular intervals along-track to give the length and direction of ocean waves.
- Wind Scatterometer Mode operates whenever SAR Image Mode is not in use, interleaved with SAR Wave Mode. The three separate antennae of the Wind Scatterometer enable measurements of the sea-surface wind speed and direction.

Radar Altimeter - providing accurate measurements of the sea-surface elevation, significant wave heights, sea-surface wind speeds and several ice parameters.

Precise Range and Range Rate Equipment - for determination of satellite position and orbit using ground based PRARE transponder stations. Note: PRARE stopped working just after end of commissioning phase.

Laser Retro-Reflectors - for accurate determination of satellite position and orbit using ground based laser ranging stations.

Instrument Data Handling and Transmission (IDHT) - system controls on-board data storage and data transmission to ground receiving stations. The instrument data is transmitted via X-band links.

2.1.3 Instrument Operations

The relative coverage of the ERS-1 instruments is shown in Figure 2.2. The ATSR, Microwave Sounder and Radar Altimeter look in the sub-satellite track direction. The SAR and Wind Scatterometer swaths are offset to the right of the satellite track. While the ATSR is a wide-swath instrument (looking to nadir and

55°), the Microwave Sounder and Radar Altimeter gather data from the atmospheric column off the nadir and to the nadir respectively. The ATSR, Microwave Sounder and Radar Altimeter are valuable for their ability to provide simultaneous measurements of geophysical parameters. There is some overlap with the SAR and Wind Scatterometer at the right margin of the ATSR swath.

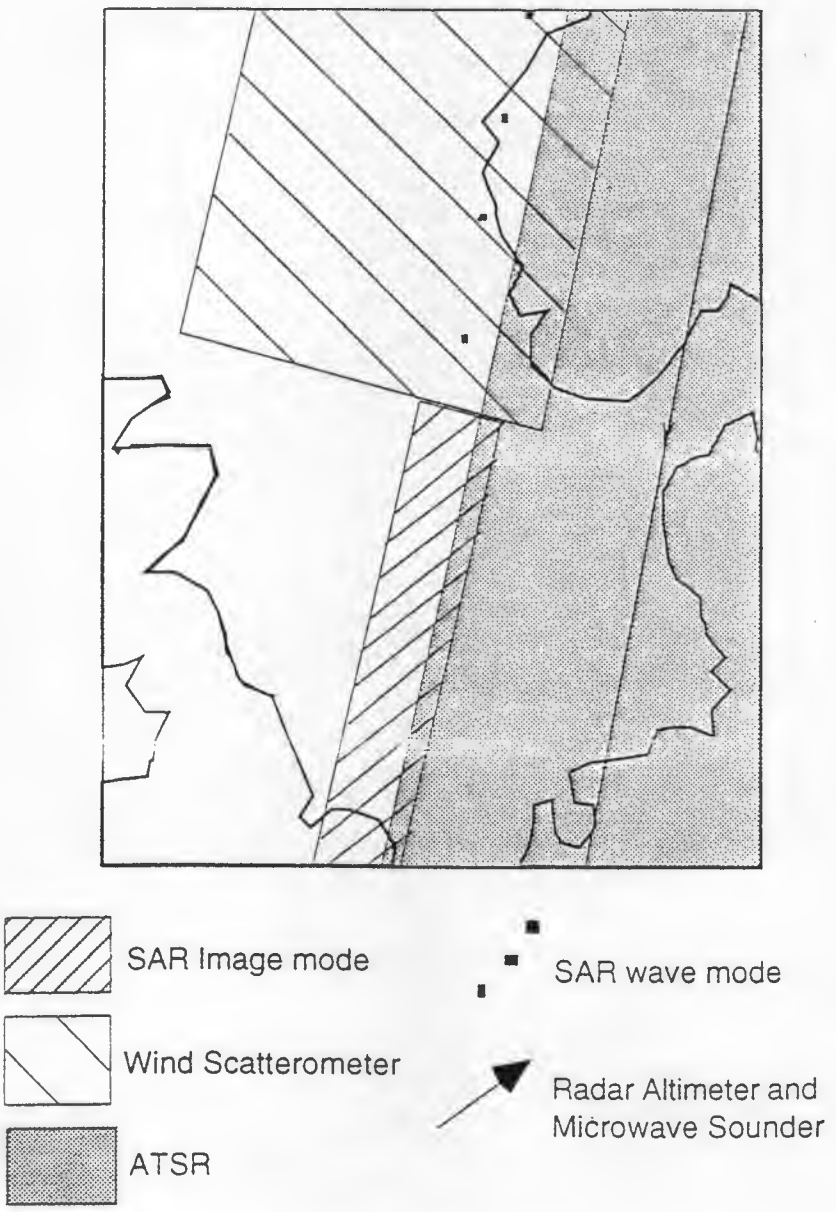

Figure 2.2 — Relative Coverage of ERS-1 Instruments

3 THE ATSR SENSOR

3.1 Design Objectives

The ATSR (see Figure 3.1) was designed to provide the following types of data and observations:

- sea surface temperature with absolute accuracy of better than 0.5°K with a spatial resolution of 50 km and in conditions of up to 80% cloud cover
- images of surface temperature with 1 km resolution and 500 km swath, relative accuracy around 0.1°K.

The 1.6 µm channel was added to the original three channel radiometer to improve sea surface temperature retrievals by detecting cloud during day-time operation of the Infra-Red Radiometer.

The Microwave Sounder in Figure 3.1, although a separate instrument, is physically attached to the ATSR.

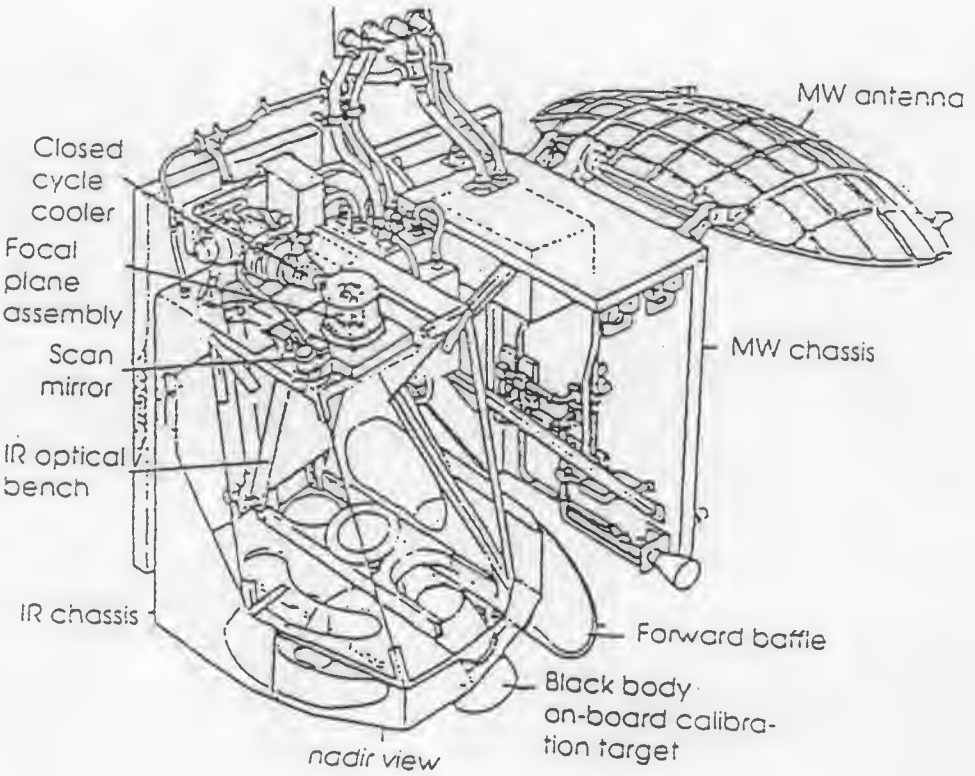

Figure 3.1 — ATSR Line Drawing

3.2 Operational Concept

The ATSR employs a rotating mirror giving a conically scanned field of view of the Earth's surface in two curved swaths, 500 km wide and separated by about 900 km (see Figure 3.2 and 3.3). Data from these two swaths is combined to retrieve accurate and precise atmospheric corrections for radiometric measurements from space. For comparison purposes Figure 3.2 includes the Microwave Sounder (MWS) coverage spots. Although the ATSR is simple in concept, it involves several technically advanced features. On-board calibration, which must be achieved with great precision, is carried out by the incorporation of two controlled reference targets (black bodies) into the instrument scan pattern. The black bodies have been carefully designed for high emissivity, uniformity, stability and precise monitoring. The other advanced technical feature is the use of a new mechanical cooler mechanism which ensures that the detectors reach temperatures of as low as 77°K without the use of large and cumbersome passive radiators.

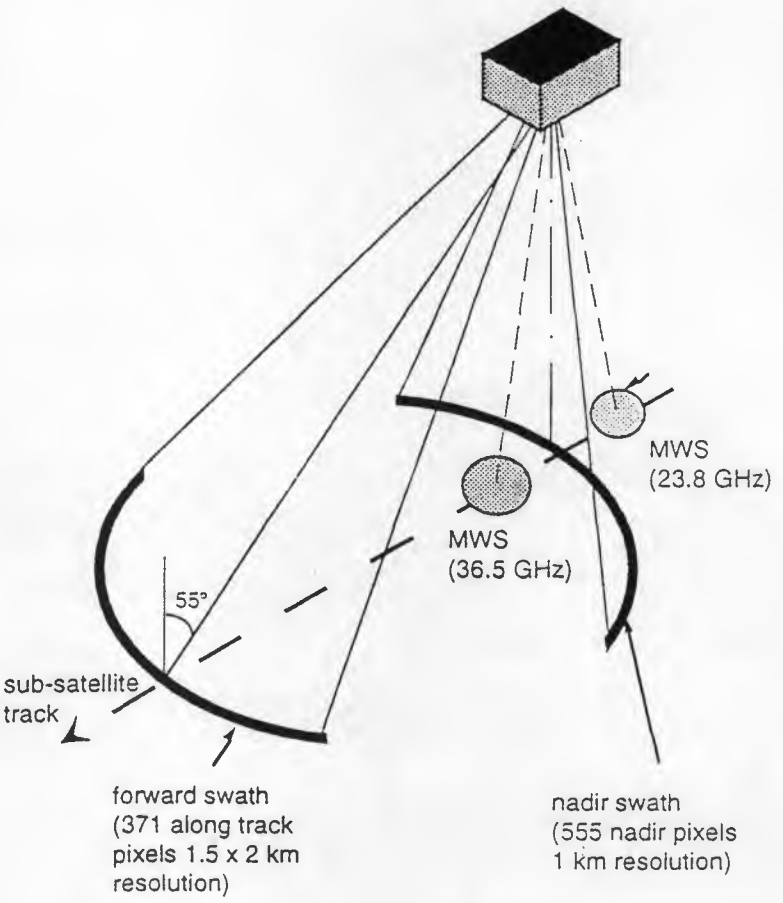

Figure 3.2 — ATSR Viewing Geometry

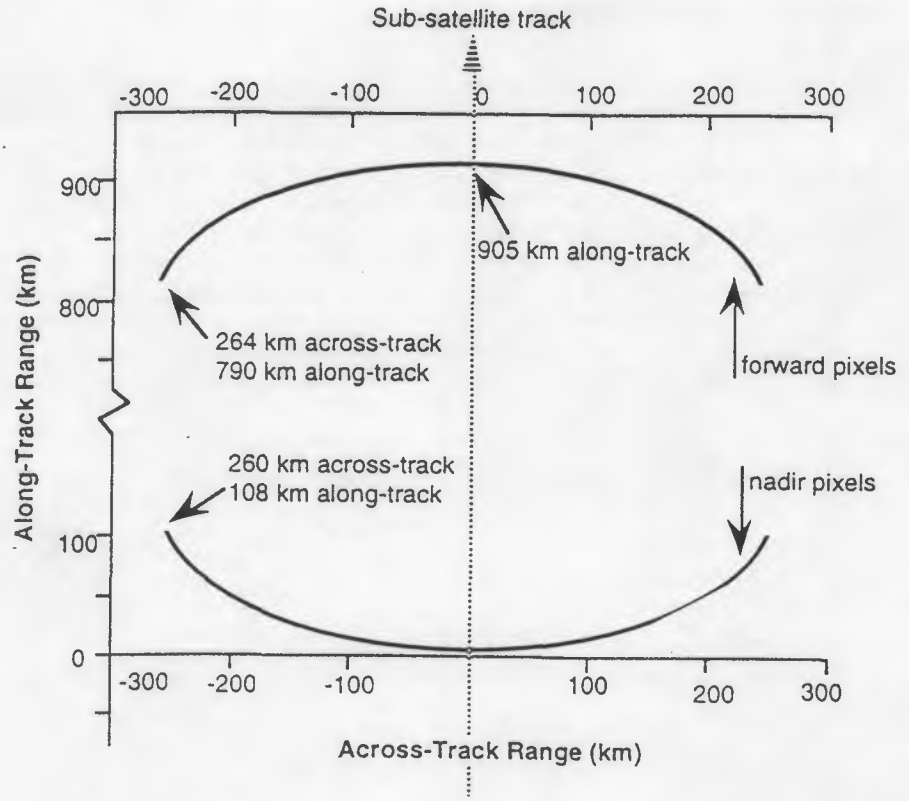

Figure 3.3 — ATSR Scans Projected onto the Earth's Surface

3.2.1 Predicted Accuracy

The predicted accuracy of the average Sea Surface Temperature (SST) Product is better than 0.5°K under most conditions over an area of over 50 x 50 km areas, each containing 2500 pixels within the 500 km wide swath. To obtain the necessary signal resolution performance single-element HgCdTe and InSb detectors are used, cooled by a Stirling-cycle mechanical cooler.

3.2.2 Scanning Optics

To achieve the along track viewing and the swath coverage, a plane inclined mirror is continuously rotated to scan a cone of viewing vectors into the primary paraboloid.

The overall scan parameters are determined by the spacecraft's orbit. The orbital velocity (6.7 kms^{-1}) causes a movement of 1 km per scan during a 150 msec scan period. A scan cone angle of 46.9° gives a zenith angle in the along track view of about 55°. This cone provides adequate atmospheric path length discrimination at the edges of a 500 km swath. A ground resolution of 1 km in the nadir view requires 2000 pixels per scan, corresponding to a full angle of view of 1/777 radian or 0.0737°. The signal channels interogate each pixel for 75 msec, the time taken for ATSR's instantaneous field of view to clear itself. Therefore, along

the scan, the pixel sensitivity profile to incoming radiation is essentially an equilateral triangle of half width 1 km and full width 2 km. Similarly, this profile across the scan is 1 km at nadir, but increased by geometry to 2 km at the along track point. The sampling of nadir view pixels, moved along the scan by the mirror and across the scan by spacecraft motion, is roughly on a 1 x 1 km matrix.

Objective	Sea surface temperature, cloud observations, land and ice surface emissivity
Spectral channels	4 co-registered thermal channels 1.6, 3.7, 10.8 and 12 µm. Note: 3.7 µm channel stopped working end May 1992.
IFOV	1 km x 1 km (nadir), 1.5 km x 2 km (forward view)
Swath width	500 km
Scanning method	Mechanical-rotating plane mirror. Provides two Earth views (nadir and approx. 55° to nadir - approx. 900 km apart). Field of view conically scanned
Detector	Single element HgCdTe and InSb
Cooler	Stirling cycle - mechanical cooler ensures temperatures as low as 77°K
Radiometric precision	< 0.1°K
Predicted SST Accuracy	0.5°K over a 50 x 50 km area with 80% cloud cover
Calibration	Two on-board black bodies which are referenced in the scan pattern
Instrument housing	Carbon fibre composite structure featuring an independent optical bench ensuring optical alignment

Table 3.1 — ATSR Technical Characteristics

4 CALIBRATION

4.1 Internal Calibration

Internal calibration is achieved through the monitoring of instrument functions and parameters and the derivation of corrections using data provided by the on-board spacecraft systems. The data is processed on the ground.

4.2 External calibration

External calibration is the derivation of corrections through comparison with independent references. Instrument operations over calibration sites with natural or man-made targets of known parameters (e.g. location, backscatter coefficient) provide the necessary references within the instrument data.

4.3 Geophysical calibration

Geophysical calibration is the tuning of the ground processing systems to provide accurate values of geophysical parameters (e.g. sea-surface temperature). The processing uses models to produce the geophysical parameters from instrument engineering data. Results from the models are compared with independent in-situ data. Systematic errors are corrected by updating parameters in the model.

4.4 ATSR calibration

As with other sensitive radiometers, the ATSR detectors and their electronics suffer from unavoidable drifts in gain and offset. In addition, the transmission of the ATSR's optical components may vary during the mission, for example, due to vapour condensation. In order to achieve the sea surface temperature measurement accuracy needed for climatic research, the ATSR needs to be calibrated continuously in-flight and this is achieved by means of an on-board calibration sub-system, which consists of two temperature reference targets, together with their associated electronics.

These targets, which are viewed for the equivalent of 16 pixels, as part of the ATSR's conical scan, are simulated black body sources of very accurately known temperature and radiation output. The required absolute accuracy of this calibration is 0.1°K an emissivity of > 0.998, temperature non-uniformity of < 0.03°K and temperature measurement error of < 0.03°K. Tests have shown that these requirements are and will be met during the lifetime of the satellite and the on-board calibration system ensures that the ATSR will be the most accurate radiometer to have been flown in space.

The two on-board black bodies are measured by platinum resistance thermometers, but the 1.6 µm channel will be calibrated by observing ground features, of which the albedo values are known.

In 1989 the ATSR instrument was subjected to a series of tests covering field of view determination, radiometric calibration, thermal vacuum temperature cycling and thermal balance tests, in addition to standard instrument check-outs.

Wavelength µm	Gain mW/count	NEDT K	Digitisation K per count
Black-body Temperature=261.44 K, N=500 samples			
10.8	0.03451	0.026	0.030
11.8	0.03814	0.036	0.031 (2x for 11 bit digitisation)
3.7	0.00022	0.065	0.107
Black-body Temperature=298.03 K, N=500 samples			
10.8	0.03451	0.019	0.021
11.8	0.03814	0.028	0.022 (2x for 11 bit digitisation)
3.7	0.00022	0.025	0.020

Table 4.1 — Black-body calibration

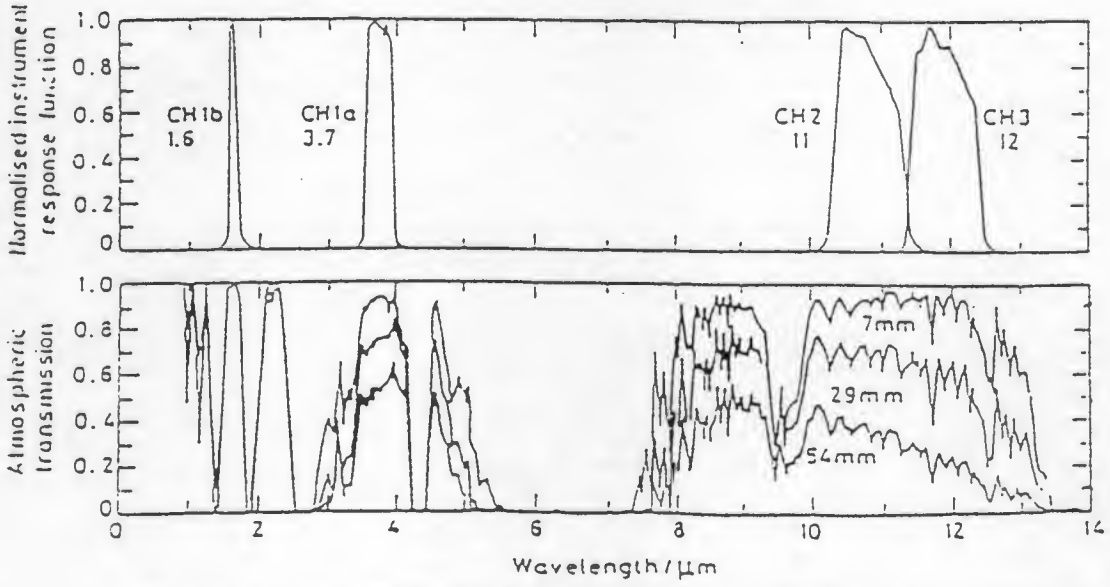

Figure 4.1 — ATSR response functions relative to atmospheric transmission

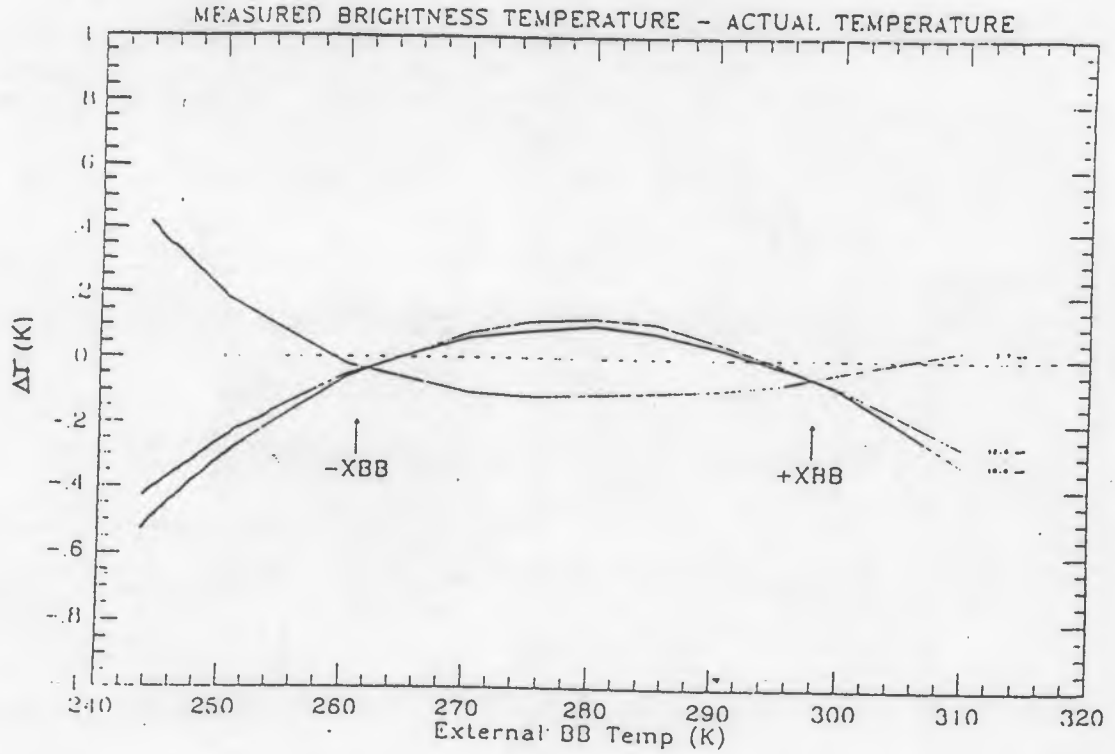

Figure 4.2— Brightness Temperature calibration results

Verification of ATSR data depends on the collection of ground truth data during the satellite overflights, principally by radiometers on aircraft, ships, towers and by surface and upper air meteorological observations. Sea surface temperature is required in two forms: 'skin' temperature as measured by radiometers and 'bulk' temperature from immersed instruments. A comparison can then be made between ground measurements and ATSR temperatures, aided by knowledge of local conditions, to resolve uncertainties caused by imperfect atmospheric modelling and meteorological effects.

The first validation report has appeared for the averaged sea surface temperature product, ASST, as it was generated with the facility at the Tromso Satellite Station in Norway.

The document bears the title:

The ATSR Near Real Time Demonstration Project, compiled by the UK Meteorological Office with input from the Rutherford Appleton Laboratory and Tromso satellite Station under ESA/ESRIN contract no 9617/91/HGE-I.

ESA have validated the CEOS formatted ATSR products generated by the UK-PAF and the results are given in document "ATSR Products Validator", DPE/OU-PG-94001, 9 November 1994.

5 ATSR PRODUCT DESCRIPTION

Currently the ATSR products ERS-1.ATS.IBT, ERS-1.ATS.SST and ERS-1.ATS.PST are generated at the UK-PAF on DEC-Alpha computer under VMS operating systems using the latest version of the software provided by Rutherford Appleton Laboratory, which is called SADIST.

Present ATSR product processing software version is: SADIST 600.

Reference document for SADIST 600:

SADIST Products Version 600.
Paul Bailey
Space Science Department
Rutherford Appleton Laboratory
25 May 1994 release.

This will be upgraded to SADIST-2 (v100) approximately 4 months after the ERS-2 launch. This version v100 will process only ATSR-2 data and only the thermal channels. SADIST-2 (v200) will be then released at approximately launch + 7 months. This updated version v200 will ingest/process both ATSR-1 and ATSR-2 data and will generate level 1.5 visible channel products.

ATSR Product clarifications as copied from above reference document.

Below follow clarifications of certain fields for the ATS.IBT product. Where relevant they are also applicable for the ATS.SST and ATS.PST.

Default values:

Solar angles	-999	image incomplete such that solar angles could not be derived
Temperatures	-1	data not available to compute temperature.

IBT Imagery File, Image Record

Field 10, Station Time UT

This field is filled with the default value -1, because this information is not made available as output from the SADIST600 software.

Field 21, Satellite Time Code

Item as Field 10.

Field 38, Pixel X/Y Offsets:

This field provides the offset from the centres of the image pixels to which they have been assigned to increase the precision with which the pixel across- and along-track coordinates may be determined. Each one-byte pixel x/y offset contains an x-offset (that is, an offset in the across-track direction) within the most significant four bits, and a y-offset (that is an offset in the

along-track direction) within the least four significant bits. The range of possible values of each offset (0000 to 1111), represents offsets from the centre of the image pixel of -0.46875 km to +0.46875 km, in steps of 0.0625 km (1/16 km). Negative offsets represent movement towards the left-hand swath edge (for x-offsets) or against the direction of satellite motion (for y-offsets); positive offsets represent movement towards the right-hand swath-edge (for x-offsets) or with the direction of satellite motion (for y-offsets).

Field 14 and 15, 11 μm and 12 μm channel Brightness Temperatures (K x 100):

The signs of the values are physically meaningless. When referencing the brightness temperature, use the absolute value.

The sign bit of the 11 μm channel is used to store the blanking pulse, which when set, indicates operation of one of the active ERS-1 instruments (SAR, Altimeter, Scatterometer). (In versions before SADIST 500 the sign bit of the 12 μm channel was used, in version 500 and all subsequent versions this was changed to the 11 μm channel.)

Due to the undersampled nature of the ATSR forward view (371 pixels to fill 512 image pixels across-track), a significant number of pixels remain unfilled after image geolocation. (Though there are 555 nadir-view pixels per scan, a small number of nadir-image pixels also remain unfilled after geolocation.) Any such pixels are "cosmetically" filled by copying from the spatially-nearest of their eight neighbours. The 12 μm and 11 μm channel images are always filled in this way. Unfilled pixels within the 3.7 μm / 1.6 μm image are filled using the channel of the nearest neighbouring pixel. The **sign bit of the 12 μm** brightness temperature values is used to indicate which pixels have been "cosmetically" filled. When the bit is set, and the brightness temperature is negative, cosmetic filling has been employed.

Fields 13 and 16, 3.7 μm and 1.6 μm channel Brightness Temperatures / Reflectance

Whilst the ATSR instrument always collects data from these detectors the data is not always transmitted to the ground. The nominal mode of operation is such that the 1.6 μm channel is transmitted during the day-light part of an orbit and the 3.7 μm channel during the night-time part of the orbit. The selection is made on a pixel by pixel basis by testing that the 1.6 μm channel against a preset threshold. This means that normally one of the product fields will not contain valid data.

Note that after May 1992 the ATSR 3.7 μm channel failed. This means that products generated after this date will not contain valid data for both the 3.7 μm and 1.6 μm channels during night-time part of the orbit.

IBT Nadir Leader File, Image Map Projection Ancillary Record

Fields 35 - 40, Solar Elevation/Azimuth Differences along Central Nadir/Forward Scan

The solar elevation, elevation and azimuth differences are provided at eleven equally-spaced points along the nadir and forward scans; the first point is at the first scan-pixel; the sixth point is at the middle scan-pixel; the eleventh

point is at the last scan-pixel. For both views the points at which angles are provided traverse the scan from left to right; that is, even though ATSR scans are clockwise, and the forward and nadir view scans are acquired in different directions, the angles are consistent in both views. The scan used in each case can be assumed to have been acquired within 6 seconds of the time at which the sub-satellite point crossed the image (forward or nadir) centre. Note that if a brightness temperature image product is incompletely filled (data are missing at the beginning or at the end of the product), the solar angles may be missing; values of -999 degrees will be present within the record.

SST Imagery File, Image Record

Field 13, Sea Surface Temperatures (KX160)

Every pixel within the sea-surface temperature image contains a value. There are three cases:

The pixel is cloud-free. In this case, a dual-view sea-surface temperature retrieval algorithm is used. The 3.7 μm channel brightness temperature is used if and when it is present.

The pixel is cloudy. If only the forward view is cloudy, a nadir-only sea-surface temperature retrieval algorithm is used. If the nadir view is cloudy, or if both views are cloudy, a dual-view sea-surface temperature retrieval is used. This scheme assumes that:

- If the pixel is truly cloudy, an sea-surface temperature derivation will be equally invalid;
- If, however, the pixel is actually cloud free (and has been incorrectly identified as cloud), the algorithm used should attempt to retrieve the best possible sea-surface temperature.

The pixel is over land. Since derivation of a sea-surface temperature over land is nonsense, and the retrieval algorithm is valid only over clear sea, no derivation takes place. Such pixels contain simple 11.0 μm brightness temperature values.

Correct interpretation of the value contained within each pixel requires use of the processing and confidence word. The cloud and land flags (bits 1 and 2) may be used to retrieve the state of each pixel; the forward-view-used and 3.7 μm-used flags (bits 8 and 11) indicate the sea-surface temperature retrieval algorithm used in each case.

Note the derivation of sea-surface temperatures requires the presence of the nadir-view 12.0 μm and 11.0 μm brightness temperatures. If either or both are missing, retrieval cannot take place, and sea-surface temperature values of -1 are returned.

Field 15. SST Composite Quality Flag

Bit no.	Meaning if set to 1
0	Pixel is cloudy in nadir-view
1	Pixel is cloudy in forward-view
2	Pixel is over land
3	Unused
4	Unused
5	1.6 μm channel present in source data
6	3.7 μm channel present in source data
7	12.0 μm channel present in source data
8	Forward view used in sea-surface temperature derivation
9	1.6 μm reflectance histogram cloud test used dynamic threshold
10	1.6 μm reflectance histogram cloud test performed
11	3.7 μm channel used in sea-surface temperature derivation
12	1.6 μm reflectance histogram cloud test detected sunglint
13	Unused
14	Blanking pulse occurred during this pixel
15	Sea-surface temperature used cosmetically filled pixel in either nadir or forward view.

PST Data File, Data Record

Field 11. Mean across-track band number

The five across-track bands (numbered 0 - 4) are symmetric about the ground track. Each band is 50 km wide (except the fifth, which is 62 km wide, and extends to the edge of the swath).

Field 12. Best average sea surface temperature (K x 100)

A half-degree sea-surface temperature using the best available ten-arcminute cell sea-surface temperature in each case; that is, using nadir/forward-view derived sea-surface temperatures if available, and nadir-only sea-surface temperatures otherwise.

Field 13. Dual-only average sea surface temperature (K x 100)

A half-degree sea-surface temperature using those ten-arcminute cells whose sea-surface temperatures were derived using nadir- and forward-view data.

Field 14. Nadir average sea surface temperature (K x 100)

A half-degree sea-surface temperature using those ten-arcminute cells whose sea-surface temperatures were derived using nadir-view data only.

Field 19. PST confidence word

Bit no.	Meaning if set to 1
0	12.0 μm channel present in source data
1	11.0 μm channel present in source data
2	3.7 μm channel present in source data
3	1.6 μm channel present in source data
4	Cloud-identification used 1.6 μm histogram reflection cloud test
5	1.6 μm histogram reflectance cloud test used a dynamic threshold
6	Sunglint detected by 1.6 μm reflectance cloud test
7	3.7 μm channel used in sea-surface temperature retrieval

8	SST derivation used day-time data (night-time if zero)
9-12	Number of ten-arcminute cell SST's derived using nadir-only retrieval (1-9)
13-16	Number of ten-arcminute cell SST's derived using dual-only retrieval (0-9)
17-31	Unused.

Default value of -1 is used for the Standard Deviation fields if fewer than 3 ten-arcminute cells contributed to the half-degree spatially averaged sea-surface temperature.

5.1 ERS 1.ATS.IBT PRODUCT DESCRIPTION

5.1.1 PRODUCT NAME ERS 1.ATS.IBT

Infrared Brightness Temperature image

5.1.2 PRODUCT DEFINITION

This product consists of three brightness temperature images and one reflectance image corresponding to the four ATSR/IR wavebands.

Both forward and nadir views are presented. The two views are collocated geographically.

Input

- ATS engineering counts and calibration coefficients
- ATS raw data

Algorithm

The following major operations shall be performed in the generation of this product:

- Convert IR counts to brightness temperatures
- Convert radiance counts to reflectance values
- Geolocate selected scans
- Map views onto Earth grid
- Place Views in Blocks
- Produce IR brightness temperature quality assessment report

Output

- Brightness Temperatures and reflectances for 3 IR channels and 2 views
- Reflectance for 1 radiance channel and 2 views
- 10 arcminute cell numbers and x, y offsets from image cell centres for each pixel in the image
- Earth Reference Grid annotations for the image (latitude/longitude pairs for all grid points within the image)
- Longitude of ascending node
- Julian date of ascending node
- Julian date at image centre
- Solar elevation at image centre
- d/dx of solar elevation
- d/dy of solar elevation
- Sunglint angles
- orbit state vector (x, y, z, dx/dt, dy/dt, dz/dt)

5.1.3 PRODUCT SPECIFICATIONS

Units

Brightness Temperatures	10^{-2} kelvin
Reflectance	percent
Earth reference grid	degrees
Ascending node longitude	degrees
Julian date	Julian days
Solar elevation angle	degrees
Rate of solar elevation	degrees/Km
Sunglint angle	degrees
Orbit state vector	Km, m/s

Parameters Accuracy

Absolute calibration accuracy	better than 0.1 K (brightness) (nominal) better than 5% (reflectance)

Geographical Coverage

Image size 512x512 Km.

Image centres of adjacent images are 500 Km apart hence there is a 12 Km overlap.

Pixel size

1 x 1 Km

Spatial resolution

1 x 1 Km (nadir)
1.5 x 2 Km (forward)

Product Location Accuracy

The pixels are located to the nearest 0.5 Km. Additional information is given to show the deviation from that 0.5 Km grid to 1/16th of a Km.

Geolocation accuracy

+1/16 Km along track
+1/16 Km across track

Coordinate system used

Geographical latitude and longitude
Geoid model used is GEM 10B

Absolute Calibration: yes

Calibration includes on board black body measurements (3.7 μm, 11 μm, 12 μm) and known ground reflectance (for 1.6 μm band).

5.1.4 DATA VOLUME

A CEOS Volume contains the following files with sizes indicated:

1. Volume Directory File	2,880 bytes
2. Leader File Forward View	10,240 bytes
3. Data File Forward View	4,990,464 bytes
4. Trailer File Forward View	20,640 bytes
5. Leader File Nadir View	49,296 bytes
6. Data File Nadir View	4,990,464 bytes
7. Trailer File Nadir View	20,640 bytes
8. Null Volume Directory File	360 bytes

A volume for 1 ATS.IBT frame has a size of about 10 Megabytes.

5.1.5 PRESENTATION MEDIUM

Low density Exabyte cassette tape or CCT.

Exabyte is the standard product medium. CCT will take longer to produce.

5.1.6 REMARKS

This product is only available when the spacecraft is in Yaw Steering Mode. If the attitude of the spacecraft deviates grossly from the nominal values the forward and nadir geolocation will be compromised.

3.7 μm channel data not available after May 1992 due to failure of detector.

5.2 ERS 1.ATS.SST PRODUCT DESCRIPTION

5.2.1 PRODUCT NAME ERS 1.ATS.SST

Sea Surface Temperature image

5.2.2 PRODUCT DEFINITION

This product consists of a 512 Km square sea surface temperature image and associated positional information. It is produced by the combination of forward and nadir views of the ATSR instrument.

Input

- ATS engineering counts and calibration coefficients
- ATS raw data

Algorithm

The following major operations shall be performed in the generation of this product:

- Detect Land/Clouds
- Calculate Sea Surface Temperature
- Produce sea surface image quality assessment report

Output

- Sea Surface Temperature
- x, y offsets from image cell centres for each pixel in the image
- Composite confidence flags for each SST cell
- Ancillary information as per ATS.IBT

5.2.3 PRODUCT SPECIFICATIONS

Units

Sea surface temperature	10^{-2} Kelvin
Earth reference grid	degrees
Ascending node longitude	degrees
Julian date	Julian days
Solar elevation angle	degrees
Rate of solar elevation	degrees/Km
Sunglint angle	degrees
Orbit state vector	Km, m/s

Geographical Coverage

Image size 512 x 512 Km.

Image centres of adjacent images are 500 Km apart hence there is a 12 Km overlap between adjacent images.

Pixel size

1 x 1 Km

Spatial resolution

1 x 1 Km in Nadir
1.5 x 2 Km in Forward view

Product Location Accuracy

The pixels are located to the nearest 0.5 Km. Additional information is given to show the deviation from that 0.5 Km grid to 1/16th of a Km.

Geolocation accuracy

+1/16 Km along track
+1/16 Km cross track

Coordinate system used

Geographical latitude and longitude
Geoid model used is GEM 10B

Absolute Calibration: yes

Calibration includes in situ measurements and measurements against external SST fields.

5.2.4 DATA VOLUME

A CEOS Volume contains the following files with sizes indicated:

1. Volume Directory File	1,800 bytes
2. Leader File	35,136 bytes
3. Data File	3,939,840 bytes
4. Trailer File	20,640 bytes
5. Null Volume Directory File	360 bytes

A volume for 1 ATS.SST frame has a size of about 4 Megabytes.

5.2.5 PRESENTATION MEDIUM

Low density Exabyte cassette tape or CCT.

Exabyte is the standard product medium. CCT will take longer to produce.

5.2.6 REMARKS

This product is only available when the spacecraft is in Yaw Steering Mode. If the attitude of the spacecraft deviates grossly from the nominal values the forward and nadir geolocation will be compromised.

5.3 ERS 1.ATS.PST PRODUCT DESCRIPTION

5.3.1 PRODUCT NAME ERS 1.ATS.PST

Precision Spatially Averaged Sea Surface Temperature map

5.3.2 PRODUCT DEFINITION

This product consists of sea surface temperature averaged over 30 arcminute square cells, aligned with lines of latitude and longitude. It also contains the standard deviation of the temperatures of the 10 arcminute cells that make up the larger cells.

Only cloud free ocean cells are provided in the product. Latitude and longitude information is provided for each SST value in the product.

Input

- ATS engineering counts and calibration coefficients
- ATS raw data

Algorithm

The following major operations shall be performed in the generation of this product:

- Detect Land/Clouds
- Derive Average Sea Surface Temperature
- Produce average sea surface quality assessment report

Output

- Average Sea Surface Temperature
- Standard deviation of SSTs of 10 arcminute cells
- Single /dual view SST difference for each 30 arcminute cell
- 30 arcminute cell number
- Quality assessment flag
- Ancillary Information as per ATS.IBT

5.3.3 PRODUCT SPECIFICATIONS

Units

Average sea surface temperature	10^{-2} Kelvin
Standard deviation of 10 arcminute SSTs	10^{-2} Kelvin
Single/dual view SST difference	10^{-2} Kelvin

Geographical Coverage

Variable number of 30 arcminute cells, depending on latitude of product.

Product Location Accuracy

The 30 arcminute cells are located to the nearest 0.5 Km.

Geolocation accuracy

+0.5 Km along track
+0.5 Km cross track

Coordinate system used

Geographical latitude and longitude
Geoid model used is GEM 10B

5.3.4 DATA VOLUME

A CEOS Volume contains the following files with sizes indicated:

1. Volume Directory File	1,440 bytes
2. Leader File	15,856 bytes
3. Data File	86,016 bytes
4. Null Volume Directory File	360 bytes

A volume for 1 ATS.PST product (for an average of 600 30 arcminute cells) has a size of about 100 kilobytes.

5.3.5 PRESENTATION MEDIUM

Low density Exabyte cassette tape or CCT.

Exabyte is the standard product medium. CCT will take longer to produce.

5.3.6 REMARKS

This product is only available when the spacecraft is in Yaw Steering Mode. If the attitude of the spacecraft deviates grossly from the nominal values the forward and nadir geolocation will be compromised.

6 CEOS FORMAT DEFINITIONS

Present CEOS format software version number is: UK-PAF V1.1

Present ATSR product processing software version is: SADIST 600.

The version information is located in "Software Release10" field 12 of Volume Description Record and "Generation Source" in the EODC Product Quality Summary Record.

6.1 CEOS SHARP tape specification

The CEOS SHARP output format for the UK-PAF products ATS.IBT, ATS.SST and ATS.PST are provided in Annexes A, B and C respectively. The product format and description is illustrated in the relevant annexes together with the content of a test tape.

The specification defines the files to be written, the records within each file, the fields within each record, and the format and content for each field.

The data shall be written to the output media using the IBM byte ordering convention ie words are addressed by the highest order byte when writing to the output media. In addition the following IBM bit level conventions shall be used:

- the most significant bit (MSB) of a word shall be that bit that is transferred first.
- the least significant bit (LSB) of a word shall be that bit that is transferred last.
- the MSB of a word shall be numbered 0.
- the LSB of a word shall be numbered n (eg 7, 15)
- when representing words and bytes diagrammatically the LSB shall be drawn on the right.

This specification describes the ATS logical volume data set (volume directory file, along track leader file, along track imagery file, along track trailer file, nadir or standard leader file, nadir or standard imagery file, nadir or standard trailer file, and null volume directory file) for the case where only a single physical volume is required.

ANNEX A ATS.IBT CEOS FORMAT

Tape Structure

Volume Directory File	Volume Descriptor Record Forward Leader File Pointer Record Forward Imagery File Pointer Record Forward Trailer File Pointer Record Nadir Leader File Pointer Record Nadir Imagery File Pointer Record Nadir Trailer File Pointer Record Text Record
Forward Leader File	File Descriptor Record Image Header Record
Forward Imagery File	File Descriptor Record Image Record
Forward Trailer File	File Descriptor Record Image Trailer Record (one for each channel)
Nadir Leader File	File Descriptor Record Image Header Record Image Map Projection Ancillary Record Image Orbit and Attitude Data Record EODC Product Quality Summary Record
Nadir Imagery File	File Descriptor Record Image Record
Nadir Trailer File	File Descriptor Record Image Trailer Record (one for each channel)
Null Volume Directory File	Volume Descriptor Record

Format	Meaning	Example
A	field contains ASCII characters	$$$ERS-1
B	field contains unformatted binary integer	Represented numerically e.g 256
D	Field contains formatted (ASCII) double precision floating point number	45.88888888888888888
F	Field contains formatted (ASCII) floating point number	27.678
I	Field contains formatted (ASCII) integer	256

The $ symbol indicates the presence of an ASCII character, or an ASCII blank.

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	192	192	18	18	360

Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
13	45	60	A16	Physical Tape Id	' UP600367'
14	61	76	A16	Logical Set Id	'E01R 95158125601'
15	77	92	A16	Volume Set Id	' UP600367'
16	93	94	I2	Physical Volumes in Logical Set	1
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1

20	101	104	I4	1st File within Physical Volume	1
21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	'19950607'
24	121	128	A8	Volume Creation Time	'12564369'
25	129	140	A12	Generating country	'UK'
26	141	148	A8	Generating agency	'ESA'
27	149	160	A12	Generating facility	'UK-PAF'
28	161	164	I4	Number of Pointer Records	6
29	165	168	I4	Number of Records in Directory	8
30	169	172	I4	Logical Volumes in Physical Set	10
31	173	260	A88	Spare Segment	
	173	260			
32	261	360	A100	Local Use Segment	
	261	350			
	351	360			

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '

	17	360		File Identification Segment	
				~~	
9	17	20	I4	File Number	1
10	21	36	A16	File Name	'ERS1.ATS.IBTALDR'
11	37	64	A28	File Class	'ATS LEADER FILE '
12	65	68	A4	File Class Code	'ATSL'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	2
16	109	116	I8	File 1st Record Size	5120
17	117	124	I8	File Maximum Record Size	5120
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	2
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			' '
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
3	3	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	219

3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
				~~	
9	17	20	I4	File Number	2
10	21	36	A16	File Name	'ERS1.ATS.IBTAIMP'
11	37	64	A28	File Class	'ATS IMAGERY FILE '
12	65	68	A4	File Class Code	'IMOP'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	513
16	109	116	I8	File 1st Record Size	9728
17	117	124	I8	File Maximum Record Size	9728
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	513
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			'
25	261	360	A100	Local Use Segment	'
	261	350		'	'
	351	360			'

CEOS codes					
Record No	Sequence No	File	Record	Mission	Origin	Length
4	4	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
9	17	20	I4	File Number	3
10	21	36	A16	File Name	'ERS1.ATS.IBTATRA'
11	37	64	A28	File Class	'ATS TRAILER FILE '
12	65	68	A4	File Class Code	'TRAI'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	5
16	109	116	I8	File 1st Record Size	4128
17	117	124	I8	File Maximum Record Size	4128
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	5
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			'
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			'

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
5	5	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	5
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
9	17	20	I4	File Number	4
10	21	36	A16	File Name	'ERS1.ATS.IBTNLDR'
11	37	64	A28	File Class	'ATS LEADER FILE '
12	65	68	A4	File Class Code	'ATSL'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	5
16	109	116	I8	File 1st Record Size	5120
17	117	124	I8	File Maximum Record Size	28816
18	125	136	A12	File Record Length Type	'VARIABLE LEN'
19	137	140	A4	File Record Length Type Code	'VARE'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	5

24	161	260	A100	Record Pointer Spare Segment
	161	250		'
	251	260		
25	261	360	A100	Local Use Segment
	261	350		'
	351	360		

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
6	6	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	6
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
9	17	20	I4	File Number	5
10	21	36	A16	File Name	'ERS1.ATS.IBTNIMP'
11	37	64	A28	File Class	'ATS IMAGERY FILE '
12	65	68	A4	File Class Code	'IMOP'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	513
16	109	116	I8	File 1st Record Size	9728

17	117	124	I8	File Maximum Record Size	9728
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	1
24	161	260	A100	Record Pointer Spare Segment	513
	161	250		'	'
	251	260			'
25	261	360	A100	Local Use Segment	'
	261	350		'	'
	351	360			'
					'

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
7	7	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	7
3	6		B1	Record Code	219
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	360
8	15	16	A2	Reserved	'A '
					' '
	17	360		File Identification Segment	
9	17	20	I4	File Number	6

10	21	36	A16	File Name	'ERS1.ATS.IBTNTRA'
11	37	64	A28	File Class	'ATS TRAILER FILE '
12	65	68	A4	File Class Code	'TRAI'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	5
16	109	116	I8	File 1st Record Size	4128
17	117	124	I8	File Maximum Record Size	4128
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	5
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	
	251	260			
25	261	360	A100	Local Use Segment	
	261	350		'	
	351	360			

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
8	8	18	63	18	18	360

Volume Directory File: Text Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	8
2	5		B1	File Code	18
3	6		B1	Record Code	63
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360

7	13	14	A2	ASCII/EBCDIC Flag	
8	15	16	A2	Continuation Flag	'A '
					' '
	17	360		Product Identification Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
9	17	56	A40	Product Id Segment	
10	57	116	A60	Product Location/Date-Time	'PRODUCT:E01R 95158125601 UK-PAF '
11	117	156	A40	Physical Volume Identification	'PROCESS.UK.ESA.UKPAF.1995060712564369
12	157	196	A40	Scene Identification	'TAPE ID:UP600367 , TAPE 01 OF 01 '
13	197	236	A40	Scene Location	'ORBIT : 4221 D920506-T154221 '
14	237	256	A20	Spares	'FRAME CENTRE: S 8.70 W 79.41 '
15	257	360	A104	Spares	' '
	257	346		'	
	347	360			' '

Record No	Sequence No	File	Record	Mission	Origin	Length
		CEOS codes				
1	1	63	192	18	18	5120

Forward Leader File: File Descriptor Record

Field name =====	Start byte ====	Last byte ====	Format ======	Description ===========	Content =======
	1	16		Record Identification Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	1
3	6		B1	Record Code	63
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	5120
8	15	16	A2	Reserved	'A '
					' '
	17	44		Volume Documentation Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~	

9	17	28	A12	Control Document Id		' '
10	29	30	A2	Control Document Revision Number		' A'
11	31	32	A2	Format Revision Number		' A'
12	33	44	A12	Software Release Id		'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment		
				~~		
13	45	48	I4	File Number		1
14	49	64	A16	File Name		'ERS1.ATS.IBTALDR'
15	65	68	A4	Record Sequence and Location Type Flag		'FSEQ'
16	69	76	I8	Sequence Number Location		1
17	77	80	I4	Sequence Number Field Length		4
18	81	84	A4	Record Code and Location Type		'FTYP'
19	85	92	I8	Record Code Location		. 5
20	93	96	A4	Record Code Field Length		' 4'
21	97	100	A4	Record Length and Location Type		'FLGT'
22	101	108	I8	Record Length Location		9
23	109	112	I4	Record Length Field Length		4
24	113		A1	Descriptor has Data Interpretation information included		'Y'
25	114		A1	Other has Data Interpretation information included		'N'
26	115		A1	Descriptor has Data Display information included		'N'
27	116		A1	Other has Data Display information included		'N'
28	117	180	A64	Reserved Segment '		'
	181	EOR		File Descriptor Variable Segment		
				~~		
29	181	186	I6	Number of Scene Header records		
30	187	192	I6	Length of Scene Header record		
31	193	198	I6	Number of Ancillary records		
32	199	204	I6	Length of Ancillary record		
33	205	210	I6	Number of Annotation records		
34	211	216	I6	Length of Annotation record		
	217	360		Locator Fields		
				~~		
35	217	232	A16	Scene Id	Field Locator	' 2 197 16A'
36	233	248	A16	Mission Id	Field Locator	' 2 309 16A'
37	249	264	A16	Sensor Id	Field Locator	' 2 325 16A'

38	265	280	A16	Exposure Date-Time	Field Locator	2	117	32A'
39	281	296	A16	Geographic Reference	Field Locator	2	213	32N'
40	297	312	A16	Image Processing Performed	Field Locator	2	1477	16A'
41	313	328	A16	Image Format Indicator	Locator	2	1717	16A'
42	329	344	A16	Band Indicator	Locator	2	1653	16A'
43	345	360	A16	Reserved				'
44	361	376	A16	Reserved				'
45	377	382	I6	Number of Image Header records				1
46	383	388	I6	Length of Image Header record				5120
47	389	394	I6	Number of Image Map Projection records				0
48	395	400	I6	Length of Image Map Projection record				0
49	401	406	I6	Number of Ground Control Points records				
50	407	412	I6	Length of Ground Control Points record				
51	413	418	I6	Number of Orbit/Attitude records				0
52	419	424	I6	Length of Orbit/Attitude record				0
53	425	430	I6	Number of Image Grid records				
54	431	436	I6	Length of Image Grid record				
55	437	442	I6	Number of EODC PQSR records				0
56	443	448	I6	Length of EODC PQSR record				0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	10	10	34	50	5120

ATS Leader File: Image Header Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	10
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120

7	13	16	I4	Image Header Record Sequence Number	1
8	17	20	A4	Reserved	' '
	21	308		Scene Parameters ~~~~~~~~~~~~~~~~	
9	21	36	A16	Product Identification	'ERS1.ATS.IBT '
10	37	52	A16	Scene Identification	'R920506154007424'
11	53	68	F16.8	Input Scene Centre Latitude (deg)	-8.70400047
12	69	84	F16.8	Input Scene Centre Longitude (deg)	-79.40799713
13	85	100	F16.8	Line at Input Scene Centre	256
14	101	116	F16.8	Pixel at Input Scene Centre	256
15	117	148	A32	Input Scene Centre Time	'19920506154007424 '
16	149	164	I16	Spare	' '
17	165	180	A16	Spare	
18	181	196	I16	Spare	
19	197	212	A16	Processed Scene Identification	'R920506154007424'
20	213	228	F16.8	Processed Scene Centre Latitude (deg)	-8.70400047
21	229	244	F16.8	Processed Scene Centre Longitude (deg)	-79.40799713
22	245	260	F16.8	Line at Processed Scene Centre	256
23	261	276	F16.8	Pixel at Processed Scene Centre	256
24	277	292	I16	Reserved	
25	293	308	I16	Reserved	
	309	404		Mission Parameters ~~~~~~~~~~~~~~~~~~	
26	309	324	A16	Mission Identification	'ERS-1 '
27	325	340	A16	Sensor Identification	'ATSR '
28	341	356	I16	Orbit Number	4221
29	357	372	A16	Ascending/Descending Flag	'DESCENDING 1992'
30	373	388	F16.8	Ascending Node (deg)	89.94500000
31	389	404	A16	Time of Ascending Node	' 0506163007000'
	405	1428		Sensor Parameters ~~~~~~~~~~~~~~~~~~	
32	405	1412	A1008	Upper/Lower Limits of Wavelength Range in Nanometers	
	405	494		'Band 1 is wavelen. 3.7 micron with half normalised transmittence at 3.934 and 3.521 micron'	
	495	584		' Band 2 is wavelen. 11 micron with half normalised transmittence at 10.526 and 11.299 micr'	
	585	674		'on Band 3 is wavelen. 12 micron with half normalised transmittence at 11.147 and 12.315 mi'	
	675	764		'cron Band 4 is wavelen. 1.6 micron with half normalised transmittence at 1.568 and 1.693 m'	

	765	854		'icron	
	855	944		'	'
	945	1034		'	'
	1035	1124		'	'
	1125	1214		'	'
	1215	1304		'	'
	1305	1394		'	'
	1395	1412			'
					'
33	1413	1428	I16	Active Bands in Processed Image	3
	1429	1476		Frame Parameters ~~~~~~~~~~~~~~~~	
34	1429	1444	I16	Processed Scene Pixels/Line	512
35	1445	1460	I16	Processed Scene Lines/Image	512
36	1461	1476	A16	Spare	'
	1477	1448		Processing Parameters ~~~~~~~~~~~~~~~~~~~~	
37	1477	1492	A16	Radiometric Calibration Designator The first 4 bytes define :- NONE - No radiometric calibration correction CAL - Earth rotation correction The second 4 bytes define :- NLIN - Non-linear RAW - LIN - Linear LOG - Logarithmic	'CAL LIN '
38	1493	1508	I16	Radiometric Resolution Designator	16
39	1509	1524	A16	Scenic Radiometric Corrorrection Designator The first bytes define :- NONE - No Scenic Radiometric correction S - Sun illumination correction H - Haze correction	'NONE '
40	1525	1540	A16	Geometric Correction Designator The first bytes define :- NONE - No geometric correction E - Earth rotation correction P - Panoramic and Earth curvature correction L - Line length correction	'SEPL '

Field name	Start byte	Last byte	Format	Description	Content
				S - Conic scan correction (ATSR only)	
41	1541	1556	A16	Resampling Algorithm Designator The first 4 bytes define :- NONE - No resampling NN - Nearest neighbour CC - Cubic convolution S8 - 8 point sin(x)/x DS8 - 8 point damped sin(x)/x S16 - 16 point sin(x)/x DS16 - 16 point damped sin(x)/x	'NN '
42	1557	1572	A16	Map Projection Identifier	'ATSR '
43	1573	1588	A16	Product Level Indicator	' 2A'
44	1589	1604	I16	Number of Map Projection Records	0
45	1605	1620	I16	Number of Ground Control Point Record	0
46	1621	1636	I16	Number of Orbit/Attitude Records	0
47	1637	1652	I16	Number of Radiometric Records	0
48	1653	1716	A64	Active Bands	'0111000000000000000000000000000000000000000000000000000000000000'
49	1717	1732	A16	Interleaving Indicator	'LINN '
50	1733	1740	A8	Geographic Ancillary Information Indicator	'YNNNNNNN'
	1733		A1	Earth Location in Suffix	'Y'
	1734		A1	Sun Angle in Suffix	'N'
	1735		A1	Satellite Angles	'N'
	1736		A1	State Boundary Flag used	'N'
	1737		A1	Coastlines Flag used	'N'
	1738		A1	Lat/Long Grid Flag used	'N'
	1739		A1	Classifications Flags used	'N'
	1740		A1	Blanking Pulse Flag used	'N'

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
1	1	63	192	18	18	9728

Forward Imagery File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	

1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	1
3	6		B1	Record Code	63
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	9728
8	15	16	A2	Reserved	'A '
					' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	
10	29	30	A2	Control Document Revision Number	' '
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	' A'
					'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
				~~	
13	45	48	I4	File Number	
14	49	64	A16	File Name	2
15	65	68	A4	Record Sequence and Location Type Flag	'ERS1.ATS.IBTAIMP'
16	69	76	I8	Sequence Number Location	'FSEQ'
17	77	80	I4	Sequence Number Field Length	1
18	81	84	A4	Record Code and Location Type	4
19	85	92	I8	Record Code Location	'FTYP'
20	93	96	A4	Record Code Field Length	5
21	97	100	A4	Record Length and Location Type	' 4'
22	101	108	I8	Record Length Location	'FLGT'
23	109	112	I4	Record Length Field Length	9
24	113		A1	Descriptor has Data Interpretation information included	4
25	114		A1	Other has Data Interpretation information included	'Y'
26	115		A1	Descriptor has Data Display information included	'N'
27	116		A1	Other has Data Display information included	'Y'
28	117	180	A64	Reserved Segment	'N'
					'
	181	EOR		File Descriptor Record Variable Segment	
				~~	
29	181	186	I6	Number of Image(Data) records	512

30	187	192	I6	Length of Image(Data) record	9728
31	193	216	A24	Reserved	
	217	232		Pixel Group Parameters (N/A for LINN format)	
32	217	220	I4	Number of Bits/Pixel	0
33	221	224	I4	Number of Pixels/Data Group	0
34	225	228	I4	Number of Bytes/Data Group	0
35	229	232	A4	Pixel Justification & Order in Data Group	
	233	272		Image Parameters	
36	233	236	I4	Number of Bands of Image(Data)	4
37	237	244	I8	Number of Lines(Data pts) in file	512
38	245	248	I4	Number of Left Border Pixels	0
39	249	256	I8	Number of Image Pixels/Line	512
40	257	260	I4	Number of Right Border Pixels	0
41	261	264	I4	Number of Top Border Pixels	0
42	265	268	I4	Number of Bottom Border Pixels	0
43	269	272	A4	Interleaving Indicator	'LI04'
	273	296		Record Parameters	
44	273	274	I2	Number of Physical records/Line	1
45	275	276	I2	Physical recs/Multispectral Line	1
46	277	280	I4	Bytes of Prefix data per record	24
47	281	288	I8	Bytes of data per record	4608
48	289	292	I4	Bytes of Suffix data per record	4968
49	293	296	I4	Prefix/Suffix Repeat Flag	
	297	432		Prefix/Suffix Locators	

The 8 byte Locator string is constructed as :-
- Bytes 1..4 - Start byte number of field within prefix/suffix
- Bytes 5..6 - Byte Length of field (lengths > 99 are set to 99)
- Byte 7 - P for prefix, S for suffix
- Byte 8 - Field data type; A (ASCII),B (binary),N (Numeric)

50	297	304	A8	Scan Line Number Locator	' 1 4PB'
51	305	312	A8	Image (Band) Number Locator	' '
52	313	320	A8	Time of Scan Line Locator	' 13 4PB'
53	321	328	A8	Left Fill Count Locator	' 17 4PB'
54	329	336	A8	Right Fill Count Locator	' 21 4PB'
55	337	344	A8	Pad Pixels Present Indicator	' '
56	345	368	A24	Blanks	' '
57	369	376	A8	Scan Line Quality Code Locator	' 1 4SB'
58	377	384	A8	Calibration Information Locator	' 3799SB'
59	385	392	A8	Gains Value Field Locator	' 45716SB'
60	393	400	A8	Offset Values Locator	' 47316SB'
61	401	432	A32	Reserved	' '
	433	464		Pixel Data Description (N/A for LINN)	
				~~	
62	433	436	I4	Number of Left Fill Bits/Pixels	0
63	437	440	I4	Number of Right Fill Bits/Pixels	0
64	441	448	I8	Max Unsigned Data Range of Pixel	0
65	449	456	A8	Left Fill Pixel Bits data description	' '
66	457	464	A8	Right Fill Pixel Bits data description	' '
	465	468		LINN Description	
				~~	
67	465	468	I4	Number of Bands/Line for LINN	4
	469	708		LINN Pixel Group Data	
				~~	
Band 1					
68	469	472	I4	Number of Bits/Pixel	16
69	473	476	I4	Number of Pixels/Data Group	1
70	477	480	I4	Number of Bytes/Data Group	2
71	481	484	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 2					
72	485	488	I4	Number of Bits/Pixel	16
73	489	492	I4	Number of Pixels/Data Group	1
74	493	496	I4	Number of Bytes/Data Group	2
75	497	500	A4	Pixel Justification & Order in Data Group	'RJLR'

Band 3					
76	501	504	I4	Number of Bits/Pixel	16
77	505	508	I4	Number of Pixels/Data Group	1
78	509	512	I4	Number of Bytes/Data Group	2
79	513	516	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 4					
80	517	520	I4	Number of Bits/Pixel	16
81	521	524	I4	Number of Pixels/Data Group	1
82	525	528	I4	Number of Bytes/Data Group	2
83	529	532	A4	Pixel Justification & Order in Data Group	'RJLR'
	533	628		LINN Pixel Data Description Data	
Band 1					
84	533	536	I4	Number of Left Fill Bits/Pixels	0
85	537	540	I4	Number of Right Fill Bits/Pixels	0
86	541	548	I8	Max Unsigned Data Range of Pixel	32200
87	549	556	A8	Spare	
Band 2					
88	557	560	I4	Number of Left Fill Bits/Pixels	0
89	561	564	I4	Number of Right Fill Bits/Pixels	0
90	565	572	I8	Max Unsigned Data Range of Pixel	32200
91	573	580	A8	Spare	
Band 3					
92	581	584	I4	Number of Left Fill Bits/Pixels	0
93	585	588	I4	Number of Right Fill Bits/Pixels	0
94	589	596	I8	Max Unsigned Data Range of Pixel	32200
95	597	604	A8	Spare	
Band 4					
96	605	608	I4	Number of Left Fill Bits/Pixels	0
97	609	612	I4	Number of Right Fill Bits/Pixels	0
98	613	620	I8	Max Unsigned Data Range of Pixel	10000
99	621	628	A8	Spare	
100	629	636	A8	Flags Bytes <cccSCLB >, where :- ccc - Classification at bits 0-2	

Six classes are defined :-
1 - Land
2 - Sea
3 - Cloud
4 - Sunglint
5 - Ice/Snow
6 - Other

S - State Boundary at bit 3
C - Coastline at bit 4
C - Lat/Long Grid at bit 5
B - Blanking pulse Flag at bit 6

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	50	22	34	50	9728

IBT Imagery File: Image Record

Field name	Start byte	Last byte	Format	Description	Content
	1	12		Record Identification Segment	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	2
3	6		B1	Record Code	50
4	7		B1	Mission Code	22
5	8		B1	Origin Code	34
6	9	12	B4	Length of this record	50
					9728
	13	36		IBT Line Prefix Data	
7	13	16	B4	Scan Line Number	
8	17	20	B4	Channel Number	1
9	21		B1	Grid Contents Indicators : State Boundary	0
	22		B1	Coastline Grid	0
	23		B1	Latitude/Longitude Grid	0
					0

	24		B1	Class	
10	25	28	B4	Station Time UT (Millisecond Of Day)	0
11	29	32	B4	Number of Left Fill pixels	-1
12	33	36	B4	Number of Right Fill pixels	0
					0
	37	5532		IBT Image Data	
				~~	
13	37	1060	512B2	3.7um Channel Brightness Temperatures (K X 100)	
				[1..13]	0 0 0 0 0 0 0 0 0 0 0 0 0
				[495..507]	27302-27430 27517 27517 27607 27705 27599-27320-27315-27315 27427-27617 27831
				[508..512]	27680 27348 26998 26998 26607
15	2085	3108	512B2	12um Channel Brightness Temperatures (K X 100)	
				[1..13]	-26017-2601 26014 26074 26122 26079 26077 26124 26191-26191 26283 26129 26714
				[495..507]	26973 2708 27169 27169 27219 27246 27135 26809 26760-26760 26895 27087 27316
				[508..512]	27271 27090-26796 26796 26361
16	3109	4132	512B2	1.6um Channel Radiance Values	
				[1..13]	4890 505 5050 4610 4550 4770 4740 4710 4740 4740 4810 4870 3770
				[495..507]	2800 275 2670 2670 2670 2760 2820 2780 2770 2770 2810 2980 3090
				[508..512]	2310 1005 945 945 940
17	4133	4644	512B1	Surface Flags	
				[1..20]	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				[481..500]	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				[501..512]	0 0 0 0 0 0 0 0 0 0 0 0
	4645	4680		IBT Line Suffix Data	
				~~	
18	4645	4648	B4	Scan Line quality	0
19	4649	4668	A20	Spare	
20	4669	4672	B4	Line length of one band	512
21	4673	4676	B4	Satellite Time Code (MJD)	-1
	4677	4680	B4	(Millisecond Of Day)	-1
	4681	4972		ATSR Calibration Data	
				~~	
22	4681	4808	64B2	-XBB Black Body Pixels (16 per channel)	
				[1..13]	0 0 0 0 0 0 0 0 0 0 0 0 0 0

					[40..52]	0	0	0	0	0	0	0	0	0	0	0	0	0
					[53..64]		0	0	0	0	0	0	0	0	0	0	0	0
23	4809	4822	7B2	-XBB Black Body Temperatures														
					[1..7]							0	0	0	0	0	0	0
24	4823	4826	B4	Derived -XBB Black Body Temperature (milliDegrees)														0
25	4827	4954	64B2	+XBB Black Body Pixels														
					[1..13]	0	0	0	0	0	0	0	0	0	0	0	0	0
					[40..52]	0	0	0	0	0	0	0	0	0	0	0	0	0
					[53..64]		0	0	0	0	0	0	0	0	0	0	0	0
26	4955	4968	7B2	+XBB Black Body Temperatures														
					[1..7]							0	0	0	0	0	0	0
27	4969	4972	B4	Derived +XBB Black Body Temperature (milliDegrees)														0
	4973	5004		Detector PreAmp Gain and Offset Values														
28	4973	4976	B4	Gain 3.7u														0
29	4977	4980	B4	Gain 11u														0
30	4981	4984	B4	Gain 12u														0
31	4985	4988	B4	Gain 1.6u														0
32	4989	4992	B4	Offset 3.7u														0
33	4993	4996	B4	Offset 11u														0
34	4997	5000	B4	Offset 12u														0
35	5001	5004	B4	Offset 1.6u														0

	5005	EOR		IBT Earth Location Data								
36	5005	7052	512B4	Pixel Latitudes (microdegrees)								
					[1..7]	-6948000	-6946000	-6944000	-6942000	-6940000	-6938000	-6936000
					[505..511]	-5961000	-5959000	-5957000	-5955000	-5953000	-5951000	-5949000
					[512..512]							-5947000
37	7053	9100	512B4	Pixel Longitudes (microdegrees)								
					[1..7]	-76655000	-76664000	-76673000	-76682000	-76690000	-76699000	-76708000
					[505..511]	-81103000	-81112000	-81121000	-81129000	-81138000	-81147000	-81156000
					[512..512]							-81165000

```
   38  9101  9612   512B1  Pixel X/Y Offsets
                                        [  1..16 ]  0xfc 0xa0 0x60 0x83 0xa5 0xc8 0xea 0x0d 0x2f 0xd1 0x33 0x46 0x59 0x7c 0x8f 0x71
                                        [497..512]  0x70 0x90 0x83 0x77 0x6a 0x4c 0x2f 0xd1 0x02 0xf5 0xd8 0xba 0xad 0x80 0x80 0x63

   39  9613  9728    A116  Spare
       9613  9702
       9703  9728
```

CEOS codes							
Record No	Sequence No	File	Record	Mission	Origin	Length	
3	3	50	22	34	50	9728	
:	:	*	*	*	*	*	(for 510 records)
513	513	50	22	34	50	9728	

IBT Imagery File: Image Record

CEOS codes							
Record No	Sequence No	File	Record	Mission	Origin	Length	
1	1	63	192	18	18	4128	

Forward Trailer File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	4128
7	13	14	A2	ASCII/EBCDIC Flag	'A '

8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	
10	29	30	A2	Control Document Revision Number	' '
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	' A'
					'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
				~~	
13	45	48	I4	File Number	3
14	49	64	A16	File Name	'ERS1.ATS.IBTATRA'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'
25	114		A1	Other has Data Interpretation information included	'N'
26	115		A1	Descriptor has Data Display information included	'Y'
27	116		A1	Other has Data Display information included	'N'
28	117	180	A64	Reserved Segment	' '
	181	EOR		File Descriptor - Variable Segment	
				~~	
29	181	186	I6	Number of trailer records	4
30	187	192	I6	Trailer Record Length	4128

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	1
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel [1..7]	0 0 0 0 0 0 0
				[988..994]	0 0 0 0 0 0 0
				[995..1000]	0 0 0 0 0 0 0
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
3	3	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content

	1	20		Record Identification Segment								
				~~								
1	1	4	B4	Record Sequence Number								
2	5		B1	File Code								3
3	6		B1	Record Code								90
4	7		B1	Mission Code								10
5	8		B1	Origin Code								34
6	9	12	B4	Length of this record								50
7	13	16	I4	Trailer Record Sequence Number								4128
8	17	20	A4	Reserved								2
	21	EOR		Trailer Data								
				~~								
9	21	4020	1000B4	Histogram of Raw Data for Channel								
				[1..7]	0	0	0	0	0	0	0	
				[988..994]	383	409	360	409	427	421	435	
				[995..1000]		472	395	503	503	467	497	
10	4021	4024	B4	Pixel increment for Histogram								1
11	4025	4028	B4	Line increment for Histogram								1
12	4029	4032	B4	Parity Error Count								0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
4	4	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	4
3	6		B1	Record Code	90
					10

4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	3
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
				~~	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7] 0 0 0 0 0 0 0	
				[988..994] 439 428 382 349 360 349 329	
				[995..1000] 317 257 290 245 288 213	
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
5	5	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	5
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	4
8	17	20	A4	Reserved	

	21	EOR		Trailer Data									
				~~									
9	21	4020	1000B4	Histogram of Raw Data for Channel									
				[1..7]	0	0	0	0	0	0	0		
				[988..994]	0	0	0	0	0	0	0		
				[995..1000]		0	0	0	0	0	0		
10	4021	4024	B4	Pixel increment for Histogram									1
11	4025	4028	B4	Line increment for Histogram									1
12	4029	4032	B4	Parity Error Count									0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
1	1	63	192	18	18	5120

Nadir Leader File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	1
3	6		B1	Record Code	63
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	5120
8	15	16	A2	Reserved	'A '
					' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	
10	29	30	A2	Control Document Revision Number	
11	31	32	A2	Format Revision Number	' A'
					' A'

12	33	44	A12	Software Release Id		'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment		
				~~		
13	45	48	I4	File Number		4
14	49	64	A16	File Name		'ERS1.ATS.IBTNLDR'
15	65	68	A4	Record Sequence and Location Type Flag		'FSEQ'
16	69	76	I8	Sequence Number Location		1
17	77	80	I4	Sequence Number Field Length		4
18	81	84	A4	Record Code and Location Type		'FTYP'
19	85	92	I8	Record Code Location		5
20	93	96	A4	Record Code Field Length		' 4'
21	97	100	A4	Record Length and Location Type		'FLGT'
22	101	108	I8	Record Length Location		9
23	109	112	I4	Record Length Field Length		4
24	113		A1	Descriptor has Data Interpretation information included		'Y'
25	114		A1	Other has Data Interpretation information included		'N'
26	115		A1	Descriptor has Data Display information included		'N'
27	116		A1	Other has Data Display information included		'N'
28	117	180	A64	Reserved Segment		' '
	181	EOR		File Descriptor Variable Segment		
				~~		
29	181	186	I6	Number of Scene Header records		
30	187	192	I6	Length of Scene Header record		
31	193	198	I6	Number of Ancillary records		
32	199	204	I6	Length of Ancillary record		
33	205	210	I6	Number of Annotation records		
34	211	216	I6	Length of Annotation record		
	217	360		Locator Fields		
				~~		
35	217	232	A16	Scene Id Field Locator		' 2 197 16A'
36	233	248	A16	Mission Id Field Locator		' 2 309 16A'
37	249	264	A16	Sensor Id Field Locator		' 2 325 16A'
38	265	280	A16	Exposure Date-Time Field Locator		' 2 117 32A'
39	281	296	A16	Geographic Reference Field Locator		' 2 213 32N'
40	297	312	A16	Image Processing Performed Field Locator		' 2 1477 16A'
41	313	328	A16	Image Format Indicator Locator		' 2 1717 16A'

42	329	344	A16	Band Indicator	Locator	2	1653 16A
43	345	360	A16	Reserved			
44	361	376	A16	Reserved			
45	377	382	I6	Number of Image Header records			1
46	383	388	I6	Length of Image Header record			5120
47	389	394	I6	Number of Image Map Projection records			1
48	395	400	I6	Length of Image Map Projection record			5120
49	401	406	I6	Number of Ground Control Points records			
50	407	412	I6	Length of Ground Control Points record			1
51	413	418	I6	Number of Orbit/Attitude records			5120
52	419	424	I6	Length of Orbit/Attitude record			
53	425	430	I6	Number of Image Grid records			1
54	431	436	I6	Length of Image Grid record			28816
55	437	442	I6	Number of EODC PQSR records			
56	443	448	I6	Length of EODC PQSR record			

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	10	10	34	50	5120

ATS Leader File: Image Header Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	10
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Image Header Record Sequence Number	1
8	17	20	A4	Reserved	

	21	308		Scene Parameters ~~~~~~~~~~~~~~~~	
9	21	36	A16	Product Identification	'ERS1.ATS.IBT '
10	37	52	A16	Scene Identification	'R920506154221655'
11	53	68	F16.8	Input Scene Centre Latitude (deg)	-8.70400047
12	69	84	F16.8	Input Scene Centre Longitude (deg)	-79.40799713
13	85	100	F16.8	Line at Input Scene Centre	256
14	101	116	F16.8	Pixel at Input Scene Centre	256
15	117	148	A32	Input Scene Centre Time	'19920506154221655 '
16	149	164	I16	Spare	' '
17	165	180	A16	Spare	
18	181	196	I16	Spare	
19	197	212	A16	Processed Scene Identification	'R920506154221655'
20	213	228	F16.8	Processed Scene Centre Latitude (deg)	-8.70400047
21	229	244	F16.8	Processed Scene Centre Longitude (deg)	-79.40799713
22	245	260	F16.8	Line at Processed Scene Centre	256
23	261	276	F16.8	Pixel at Processed Scene Centre	256
24	277	292	I16	Reserved	
25	293	308	I16	Reserved	
	309	404		Mission Parameters ~~~~~~~~~~~~~~~~~~	
26	309	324	A16	Mission Identification	'ERS-1 '
27	325	340	A16	Sensor Identification	'ATSR '
28	341	356	I16	Orbit Number	4221
29	357	372	A16	Ascending/Descending Flag	'DESCENDING 1992'
30	373	388	F16.8	Ascending Node (deg)	89.94500000
31	389	404	A16	Time of Ascending Node	' 0506163007000'
	405	1428		Sensor Parameters ~~~~~~~~~~~~~~~~~~	
32	405	1412	A1008	Upper/Lower Limits of Wavelength Range in Nanometers	
	405	494		'Band 1 is wavelen. 3.7 micron with half normalised transmittence at 3.934 and 3.521 micron'	
	495	584		' Band 2 is wavelen. 11 micron with half normalised transmittence at 10.526 and 11.299 micr'	
	585	674		'on Band 3 is wavelen. 12 micron with half normalised transmittence at 11.147 and 12.315 mi'	
	675	764		'cron Band 4 is wavelen. 1.6 micron with half normalised transmittence at 1.568 and 1.693 m'	
	765	854		'icron	
	855	944		'	
	945	1034		'	

	1035	1124			
	1125	1214			
	1215	1304			
	1305	1394			
	1395	1412			
33	1413	1428	I16	Active Bands in Processed Image	3
	1429	1476		Frame Parameters ~~~~~~~~~~~~~~~~	
34	1429	1444	I16	Processed Scene Pixels/Line	512
35	1445	1460	I16	Processed Scene Lines/Image	512
36	1461	1476	A16	Spare	
	1477	1448		Processing Parameters ~~~~~~~~~~~~~~~~~~~~	
37	1477	1492	A16	Radiometric Calibration Designator The first 4 bytes define :- NONE - No radiometric calibration correction CAL - Earth rotation correction The second 4 bytes define :- NLIN - Non-linear RAW - LIN - Linear LOG - Logarithmic	'CAL LIN
38	1493	1508	I16	Radiometric Resolution Designator	16
39	1509	1524	A16	Scenic Radiometric Corrorrection Designator The first bytes define :- NONE - No Scenic Radiometric correction S - Sun illumination correction H - Haze correction	'NONE
40	1525	1540	A16	Geometric Correction Designator The first bytes define :- NONE - No geometric correction E - Earth rotation correction P - Panoramic and Earth curvature correction L - Line length correction S - Conic scan correction (ATSR only)	'SEPL
41	1541	1556	A16	Resampling Algorithm Designator The first 4 bytes define :-	'NN

```
                                NONE  - No resampling
                                NN    - Nearest neighbour
                                CC    - Cubic convolution
                                S8    -  8 point sin(x)/x
                                DS8   -  8 point damped sin(x)/x
                                S16   - 16 point sin(x)/x
                                DS16  - 16 point damped sin(x)/x
  42  1557  1572     A16  Map Projection Identifier                                                    'ATSR            '
  43  1573  1588     A16  Product Level Indicator                                                     '              2A'
  44  1589  1604     I16  Number of Map Projection Records                                                          1
  45  1605  1620     I16  Number of Ground Control Point Record                                                     1
  46  1621  1636     I16  Number of Orbit/Attitude Records                                                         1
  47  1637  1652     I16  Number of Radiometric Records                                                            0
  48  1653  1716     A64  Active Bands                  '0111000000000000000000000000000000000000000000000000000000000000'
  49  1717  1732     A16  Interleaving Indicator                                                        'LINN            '
  50  1733  1740      A8  Geographic Ancillary Information Indicator                                          'YNNNNNNN'
      1733             A1  Earth Location in Suffix                                                              'Y'
      1734             A1  Sun Angle      in Suffix                                                              'N'
      1735             A1  Satellite Angles                                                                      'N'
      1736             A1  State Boundary  Flag used                                                           'N'
      1737             A1  Coastlines      Flag used                                                           'N'
      1738             A1  Lat/Long Grid   Flag used                                                           'N'
      1739             A1  Classifications Flags used                                                         'N'
      1740             A1  Blanking Pulse  Flag used                                                         'N'
```

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
3	3	10	20	34	50	5120

ATS Leader File: Image Map Projection Ancillary Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	10

3	6		B1	Record Code	20
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Map Projection Ancillary Sequence Number	1
8	17	20	A4	Reserved	
	21	580		Map Projection Data	
9	21	36	F16.8	Nominal Scene Data Pixels/Line	512.00000000
10	37	52	F16.8	Nominal Scene Lines/Image	512.00000000
11	53	68	F16.8	Nominal Scale of Pixels (m)	1000.00000000
12	69	84	F16.8	Nominal Scale of Lines (m)	1000.00000000
13	85	100	F16.8	UTM Zone Number for Input Image	
14	101	116	F16.8	Northing of Image Centre (m)	
15	117	132	F16.8	Easting of Image Centre (m)	
16	133	148	F16.8	Orientation of Image Centre(deg)	
17	149	164	F16.8	Actual Scene Data Pixels/Line	512.00000000
18	165	180	F16.8	Actual Scene Lines/Image	512.00000000
19	181	196	F16.8	Actual Scale of Pixels (m)	1000.00000000
20	197	212	F16.8	Actual Scale of Lines (m)	1000.00000000
21	213	228	F16.8	UTM Zone Number(Processed Image)	
22	229	292	A64	Reserved	
23	293	356	A64	Reserved	
24	357	420	A64	Reserved	
25	421	436	F16.8	Orientation of Processed Image Centre	
26	437	452	F16.8	Nominal Altitude (m)	
27	453	468	F16.8	Nominal Ground/Speed (m/s)	6.70485115
28	469	484	F16.8	Satellite Heading (deg)	
29	485	500	F16.8	Angle of Drift at Centre (deg)	
30	501	516	F16.8	Sun Elevation Angle at Centre	55.28000000
31	517	532	F16.8	Sun Azimuth Angle at Centre	
32	533	548	F16.8	Cross Track field of view (deg)	25.40000000
33	549	564	F16.8	Sensor Scan Rate (scans/s)	6.00000000
34	565	580	F16.8	Sensor Active Sampling Rate	2000.00000000
35	581	596	11F16.2	Solar Elevations along Central Nadir Scan	
				[1..4] 55.28, 55.41, 55.45, 55.40	
				[5..8] 55.27, 55.06, 54.77, 54.43	
				[9..11] 54.01, 53.54, 53.02	

36	757	772	11F16.2	Solar Elevation Differences along Central Nadir Scan				
				[1..4]	12.52,	16.61,	20.96,	25.38
				[5..8]	30.02,	34.49,	30.95,	26.86
				[9..11]		22.81,	18.96,	15.25
37	933	948	11F16.2	Solar Azimuth Differences along Central Nadir Scan				
				[1..4]	-82.88,	-78.13,	-73.26,	-68.35
				[5..8]	-62.67,	9.10,	122.39,	127.97
				[9..11]		132.98,	137.76,	142.51
38	1109	1124	11F16.2	Solar Elevations along Central Forward Scan				
				[1..4]	56.42,	55.92,	55.44,	55.02
				[5..8]	54.65,	54.35,	54.13,	53.98
				[9..11]		53.91,	53.92,	54.00
39	1285	1300	11F16.2	Solar Elevation Differences along Central Forward Scan				
				[1..4]	-19.27,	-19.73,	-20.02,	-20.14
				[5..8]	-20.10,	-19.89,	-19.54,	-19.03
				[9..11]		-18.39,	-17.60,	-16.68
40	1461	1476	11F16.2	Solar Azimuth Differences along Central Forward Scan				
				[1..4]	-124.28,	-127.88,	-131.49,	-135.12
				[5..8]	-138.76,	-142.40,	-146.05,	-149.68
				[9..11]		-153.31,	-156.93,	-160.52

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
4	4	10	40	34	50	5120

ATS Leader File: Image Orbit and Attitude Data Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	10

3	6		B1	Record Code	40
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Orbit/Attitude Ancillary Sequence Number	1
8	17		A1	Flags: Orbit Data Available Flag	'1'
	18		A1	Additional Data Available Flag	'1'
	19		A1	State Vector Available Flag	'1'
	20		A1	Attitude Data Available Flag	' '
	21		A1	Correction Data Available Flag	' '
	22		A1	Original Orbit Included Flag	' '
9	23	24	A2	Reserved	' '
10	25	40	I16	Epoch year & day of year YYYYDDD	
11	41	56	I16	Epoch time of day (ms)	
	57	152		Part 1: Mean Brouwer Orbital Elements	
12	57	72	F16.8	Semi-Major Axis (km)	7159.49561000
13	73	88	F16.8	Eccentricity	0.00116500
14	89	104	F16.8	Inclination (deg)	98.45290000
15	105	120	F16.8	Right Ascension of Ascending Node (hhmmss)	89.94500000
16	121	136	F16.8	Argument of Perigee (deg)	90.00000000
17	137	152	F16.8	Mean Anomaly (deg)	270.13340000
	153	220		Part 2: Additional Orbital Parameters	
18	153	168	I16	Orbit no of Data Acquisition	4221
19	169	172	A4	Ascending/Descending Node Flag	'DDDD'
20	173	188	F16.8	Equator Crossing Node (deg)	89.94500000
21	189	204	I16	Equator Crossing Date YYYYDDD	1992127
22	205	220	I16	Equator Crossing Time (ms)	59407000
	221	316		Part 3: State Vector	
23	221	236	F16.8	X-position component (km)	6.90144000
24	237	252	F16.8	Y-position component (km)	7165.49457000
25	253	268	F16.8	Z-position component (km)	0.00124000
26	269	284	F16.8	X-velocity component (km/s)	1.63121600

27	285	300	F16.8	Y-velocity component (km/s)	-0.01033800
28	301	316	F16.8	Z-velocity component (km/s)	7.37709000
	317	364		Part 4: Attitude Information	
29	317	332	F16.8	Pitch (deg)	
30	333	348	F16.8	Yaw (deg)	
31	349	364	F16.8	Roll (deg)	
	365	400		Part 5: Correction Information	
32	365	380	F16.8	Time difference (GS-Sat) (ms)	
33	381	396	F16.8	Actual Sensor Scan rate scan/s	
	401	EOR		Part 6: Original Orbit Information Source	

		CEOS codes				
Record No	Sequence No	File	Record	Mission	Origin	Length
5	5	10	92	34	50	28816

IBT Leader File: EODC Product Quality Summary Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	5
2	5		B1	File Code	10
3	6		B1	Record Code	92
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	28816
7	13	16	I4	EODC PQSR Record Sequence Number	1

17 EOR EODC Product Quality Report

17	96	A80	Line	1:	Number of QA lines in QA report	359	
97	176	A80	Line	2:	REPORT SUMMARY FILE		
177	256	A80	Line	3:	REPORT SUMMARY DESCRIPTOR RECORD		
257	336	A80	Line	4:	Report identifier	UK.ATS.QR05	
337	416	A80	Line	5:	Report name	ATS IBT Product QA Report	
417	496	A80	Line	6:	Date generated	07-Jun-1995 12:56:43	
497	576	A80	Line	7:	Covers period starting	06-May-1992 15:41:43	
577	656	A80	Line	8:	Covers period ending	06-May-1992 15:42:59	
657	736	A80	Line	9:	Generation source	SADIST A600 BT	Post-processed
737	816	A80	Line	10:	Generation source algorithm	SADIST+IBT	
817	896	A80	Line	11:	Report documentation specification no.	DC-DO-NRL-SE-0002	
897	976	A80	Line	12:	Are data sets included	Y	
977	1056	A80	Line	13:	Are results files included	Y	
1057	1136	A80	Line	14:	Are outputs included	Y	
1137	1216	A80	Line	15:	Text record	PACIFIC$205061449_21000_50607_a600.bt	
1217	1296	A80	Line	16:	RESULTS SUMMARY FILE		
1297	1376	A80	Line	17:	RESULTS DESCRIPTOR RECORD		
1377	1456	A80	Line	18:	Number of results files in report	3	
1457	1536	A80	Line	19:	Number of results summary records	3	
1537	1616	A80	Line	20:	No. of actual results files with report	3	
1617	1696	A80	Line	21:	RESULTS SUMMARY RECORD #1		
1697	1776	A80	Line	22:	Results generic name	Quality Flags	
1777	1856	A80	Line	23:	Results summary name	IBT Image QA Flags	
1857	1936	A80	Line	24:	No of different record formats in result	1	
1937	2016	A80	Line	25:	Frequency of results file records	Per Internal Product	
2017	2096	A80	Line	26:	Number of results file records	1	
2097	2176	A80	Line	27:	No. parameters in results record #1	16	
2177	2256	A80	Line	28:	Results stored with report	Y	
2257	2336	A80	Line	29:	RESULTS SUMMARY RECORD #2		
2337	2416	A80	Line	30:	Results generic name	Measured Values of Quality Parameters	
2417	2496	A80	Line	31:	Results summary name	IBT Image QA Statistics	
2497	2576	A80	Line	32:	No of different record formats in result	1	
2577	2656	A80	Line	33:	Frequency of results file records	Per Internal Product	
2657	2736	A80	Line	34:	Number of results file records	1	
2737	2816	A80	Line	35:	No. parameters in results record #2	51	
2817	2896	A80	Line	36:	Results stored with report	Y	
2897	2976	A80	Line	37:	RESULTS SUMMARY RECORD #3		
2977	3056	A80	Line	38:	Results generic name	Thresholds for Quality Parameters	

3057	3136	A80	Line	39:	Results summary name	IBT Image QA Parameters
3137	3216	A80	Line	40:	No of different record formats in result	1
3217	3296	A80	Line	41:	Frequency of results file records	Per Internal Product
3297	3376	A80	Line	42:	Number of results file records	1
3377	3456	A80	Line	43:	No. parameters in results record #3	29
3457	3536	A80	Line	44:	Results stored with report	Y
3537	3616	A80	Line	45:	RESULTS FILE FORMATS	
3617	3696	A80	Line	46:	Results name #1	Quality Flags
3697	3776	A80	Line	47:	Image failure summary	N
3777	3856	A80	Line	48:	Forward 1.6um Channel not present	N
3857	3936	A80	Line	49:	Forward 3.7um Channel not present	Y
3937	4016	A80	Line	50:	Forward 11.0um Channel not present	N
4017	4096	A80	Line	51:	Forward 12.0um Channel not present	N
4097	4176	A80	Line	52:	Nadir 1.6um Channel not present	N
4177	4256	A80	Line	53:	Nadir 3.7um Channel not present	Y
4257	4336	A80	Line	54:	Nadir 11.0um Channel not present	N
4337	4416	A80	Line	55:	Nadir 12.0um Channel not present	N
4417	4496	A80	Line	56:	Image contains channel not present	N
4497	4576	A80	Line	57:	Forward 1.6um Channel values out range	N
4577	4656	A80	Line	58:	Forward 3.7um Channel values out range	N
4657	4736	A80	Line	59:	Forward 11.0um Channel values out range	N
4737	4816	A80	Line	60:	Forward 12.0um Channel values out range	N
4817	4896	A80	Line	61:	Nadir 1.6um Channel values out range	N
4897	4976	A80	Line	62:	Nadir 3.7um Channel values out range	N
4977	5056	A80	Line	63:	Nadir 11.0um Channel values out range	N
5057	5136	A80	Line	64:	Nadir 12.0um Channel values out range	N
5137	5216	A80	Line	65:	Image values out of range	N
5217	5296	A80	Line	66:	Forward 1.6um Channel with low contrast	N
5297	5376	A80	Line	67:	Forward 3.7um Channel with low contrast	N
5377	5456	A80	Line	68:	Forward 11.0um Channel with low contrast	N
5457	5536	A80	Line	69:	Forward 12.0um Channel with low contrast	N
5537	5616	A80	Line	70:	Nadir 1.6um Channel with low contrast	N
5617	5696	A80	Line	71:	Nadir 3.7um Channel with low contrast	N
5697	5776	A80	Line	72:	Nadir 11.0um Channel with low contrast	N
5777	5856	A80	Line	73:	Nadir 12.0um Channel with low contrast	N
5857	5936	A80	Line	74:	Image with low contrast	N
5937	6016	A80	Line	75:	Geolocation failure	N
6017	6096	A80	Line	76:	Colocation failure	N
6097	6176	A80	Line	77:	Location failure	N
6177	6256	A80	Line	78:	Number Mis-matched Cells	0
6257	6336	A80	Line	79:	Results name #2	Measured Values of Quality Parameters
6337	6416	A80	Line	80:	Forward 12.0um Number Unfilled Pixels	833

6417	6496	A80	Line	81:	Forward 11.0um Number Unfilled Pixels	0
6497	6576	A80	Line	82:	Forward 3.7um Number Unfilled Pixels	262144
6577	6656	A80	Line	83:	Forward 1.6um Number Unfilled Pixels	0
6657	6736	A80	Line	84:	Nadir 12.0um Number Unfilled Pixels	353
6737	6816	A80	Line	85:	Nadir 11.0um Number Unfilled Pixels	0
6817	6896	A80	Line	86:	Nadir 3.7um Number Unfilled Pixels	262144
6897	6976	A80	Line	87:	Nadir 1.6um Number Unfilled Pixels	0
6977	7056	A80	Line	88:	Forward 12.0um Number Out Of Range Pixel	0
7057	7136	A80	Line	89:	Forward 11.0um Number Out Of Range Pixel	0
7137	7216	A80	Line	90:	Forward 3.7um Number Out Of Range Pixel	0
7217	7296	A80	Line	91:	Forward 1.6um Number Out Of Range Pixel	0
7297	7376	A80	Line	92:	Nadir 12.0um Number Out Of Range Pixel	0
7377	7456	A80	Line	93:	Nadir 11.0um Number Out Of Range Pixel	0
7457	7536	A80	Line	94:	Nadir 3.7um Number Out Of Range Pixel	0
7537	7616	A80	Line	95:	Nadir 1.6um Number Out Of Range Pixel	0
7617	7696	A80	Line	96:	Forward Number Filled Pixels	80398
7697	7776	A80	Line	97:	Nadir Number Filled Pixels	2201
7777	7856	A80	Line	98:	Forward 12.0um Pixel Value Mean	28579.3
7857	7936	A80	Line	99:	Forward 11.0um Pixel Value Mean	28769.5
7937	8016	A80	Line	100:	Forward 3.7um Pixel Value Mean	0.0
8017	8096	A80	Line	101:	Forward 1.6um Pixel Value Mean	1752.4
8097	8176	A80	Line	102:	Nadir 12.0um Pixel Value Mean	28946.6
8177	8256	A80	Line	103:	Nadir 11.0um Pixel Value Mean	29116.7
8257	8336	A80	Line	104:	Nadir 3.7um Pixel Value Mean	0.0
8337	8416	A80	Line	105:	Nadir 1.6um Pixel Value Mean	1450.8
8417	8496	A80	Line	106:	Forward 12.0um Pixel Value Median	28762
8497	8576	A80	Line	107:	Forward 11.0um Pixel Value Median	28762
8577	8656	A80	Line	108:	Forward 3.7um Pixel Value Median	0
8657	8736	A80	Line	109:	Forward 1.6um Pixel Value Median	1248
8737	8816	A80	Line	110:	Nadir 12.0um Pixel Value Median	29387
8817	8896	A80	Line	111:	Nadir 11.0um Pixel Value Median	29387
8897	8976	A80	Line	112:	Nadir 3.7um Pixel Value Median	0
8977	9056	A80	Line	113:	Nadir 1.6um Pixel Value Median	1248
9057	9136	A80	Line	114:	Forward 12.0um Pixel Value Mode	28762
9137	9216	A80	Line	115:	Forward 11.0um Pixel Value Mode	28762
9217	9296	A80	Line	116:	Forward 3.7um Pixel Value Mode	0
9297	9376	A80	Line	117:	Forward 1.6um Pixel Value Mode	250
9377	9456	A80	Line	118:	Nadir 12.0um Pixel Value Mode	29387
9457	9536	A80	Line	119:	Nadir 11.0um Pixel Value Mode	29387
9537	9616	A80	Line	120:	Nadir 3.7um Pixel Value Mode	0
9617	9696	A80	Line	121:	Nadir 1.6um Pixel Value Mode	250
9697	9776	A80	Line	122:	Forward 12.0um Pixel Standard Deviation	859.3

9777	9856	A80	Line 123:	Forward 11.0um Pixel Standard Deviation	869.5
9857	9936	A80	Line 124:	Forward 3.7um Pixel Standard Deviation	0.0
9937	10016	A80	Line 125:	Forward 1.6um Pixel Standard Deviation	1495.4
10017	10096	A80	Line 126:	Nadir 12.0um Pixel Standard Deviation	726.6
10097	10176	A80	Line 127:	Nadir 11.0um Pixel Standard Deviation	747.5
10177	10256	A80	Line 128:	Nadir 3.7um Pixel Standard Deviation	0.0
10257	10336	A80	Line 129:	Nadir 1.6um Pixel Standard Deviation	1364.6
10337	10416	A80	Line 130:	Forward 12.0um Minimum Pixel Value	22015
10417	10496	A80	Line 131:	Forward 11.0um Minimum Pixel Value	22117
10497	10576	A80	Line 132:	Forward 3.7um Minimum Pixel Value	0
10577	10656	A80	Line 133:	Forward 1.6um Minimum Pixel Value	120
10657	10736	A80	Line 134:	Nadir 12.0um Minimum Pixel Value	22633
10737	10816	A80	Line 135:	Nadir 11.0um Minimum Pixel Value	22845
10817	10896	A80	Line 136:	Nadir 3.7um Minimum Pixel Value	0
10897	10976	A80	Line 137:	Nadir 1.6um Minimum Pixel Value	80
10977	11056	A80	Line 138:	Forward 12.0um Maximum Pixel Value	31632
11057	11136	A80	Line 139:	Forward 11.0um Maximum Pixel Value	30870
11137	11216	A80	Line 140:	Forward 3.7um Maximum Pixel Value	0
11217	11296	A80	Line 141:	Forward 1.6um Maximum Pixel Value	6390
11297	11376	A80	Line 142:	Nadir 12.0um Maximum Pixel Value	31644
11377	11456	A80	Line 143:	Nadir 11.0um Maximum Pixel Value	31221
11457	11536	A80	Line 144:	Nadir 3.7um Maximum Pixel Value	0
11537	11616	A80	Line 145:	Nadir 1.6um Maximum Pixel Value	6950
11617	11696	A80	Line 146:	Histogram of 12.0um Forward Channel	
11697	11776	A80	Line 147:	19700 to 20325	0
11777	11856	A80	Line 148:	20325 to 20950	0
11857	11936	A80	Line 149:	20950 to 21575	0
11937	12016	A80	Line 150:	21575 to 22200	18
12017	12096	A80	Line 151:	22200 to 22825	77
12097	12176	A80	Line 152:	22825 to 23450	133
12177	12256	A80	Line 153:	23450 to 24075	292
12257	12336	A80	Line 154:	24075 to 24700	427
12337	12416	A80	Line 155:	24700 to 25325	1318
12417	12496	A80	Line 156:	25325 to 25950	3536
12497	12576	A80	Line 157:	25950 to 26575	6290
12577	12656	A80	Line 158:	26575 to 27200	9449
12657	12736	A80	Line 159:	27200 to 27825	14936
12737	12816	A80	Line 160:	27825 to 28450	22544
12817	12896	A80	Line 161:	28450 to 29075	167403
12897	12976	A80	Line 162:	29075 to 29700	28898
12977	13056	A80	Line 163:	29700 to 30325	5853
13057	13136	A80	Line 164:	30325 to 30950	52

13137	13216	A80	Line 165:	30950 to 31575	0
13217	13296	A80	Line 166:	>= 31575	85
13297	13376	A80	Line 167:	Histogram of 11.0um Forward Channel	
13377	13456	A80	Line 168:	19700 to 20325	0
13457	13536	A80	Line 169:	20325 to 20950	0
13537	13616	A80	Line 170:	20950 to 21575	0
13617	13696	A80	Line 171:	21575 to 22200	2
13697	13776	A80	Line 172:	22200 to 22825	67
13777	13856	A80	Line 173:	22825 to 23450	90
13857	13936	A80	Line 174:	23450 to 24075	237
13937	14016	A80	Line 175:	24075 to 24700	314
14017	14096	A80	Line 176:	24700 to 25325	894
14097	14176	A80	Line 177:	25325 to 25950	2994
14177	14256	A80	Line 178:	25950 to 26575	5476
14257	14336	A80	Line 179:	26575 to 27200	7402
14337	14416	A80	Line 180:	27200 to 27825	13228
14417	14496	A80	Line 181:	27825 to 28450	20060
14497	14576	A80	Line 182:	28450 to 29075	105718
14577	14656	A80	Line 183:	29075 to 29700	84087
14657	14736	A80	Line 184:	29700 to 30325	20489
14737	14816	A80	Line 185:	30325 to 30950	1086
14817	14896	A80	Line 186:	30950 to 31575	0
14897	14976	A80	Line 187:	>= 31575	0
14977	15056	A80	Line 188:	Histogram of 3.7um Forward Channel	
15057	15136	A80	Line 189:	15000 to 15860	0
15137	15216	A80	Line 190:	15860 to 16720	0
15217	15296	A80	Line 191:	16720 to 17580	0
15297	15376	A80	Line 192:	17580 to 18440	0
15377	15456	A80	Line 193:	18440 to 19300	0
15457	15536	A80	Line 194:	19300 to 20160	0
15537	15616	A80	Line 195:	20160 to 21020	0
15617	15696	A80	Line 196:	21020 to 21880	0
15697	15776	A80	Line 197:	21880 to 22740	0
15777	15856	A80	Line 198:	22740 to 23600	0
15857	15936	A80	Line 199:	23600 to 24460	0
15937	16016	A80	Line 200:	24460 to 25320	0
16017	16096	A80	Line 201:	25320 to 26180	0
16097	16176	A80	Line 202:	26180 to 27040	0
16177	16256	A80	Line 203:	27040 to 27900	0
16257	16336	A80	Line 204:	27900 to 28760	0
16337	16416	A80	Line 205:	28760 to 29620	0
16417	16496	A80	Line 206:	29620 to 30480	0

16497	16576	A80	Line 207:	30480 to 31340	0
16577	16656	A80	Line 208:	>= 31340	0
16657	16736	A80	Line 209:	Histogram of 1.6um Forward Channel	
16737	16816	A80	Line 210:	1 to 500	93953
16817	16896	A80	Line 211:	500 to 999	25905
16897	16976	A80	Line 212:	999 to 1498	12339
16977	17056	A80	Line 213:	1498 to 1997	10207
17057	17136	A80	Line 214:	1997 to 2496	21050
17137	17216	A80	Line 215:	2496 to 2995	38107
17217	17296	A80	Line 216:	2995 to 3494	25524
17297	17376	A80	Line 217:	3494 to 3993	14110
17377	17456	A80	Line 218:	3993 to 4492	8790
17457	17536	A80	Line 219:	4492 to 4991	6869
17537	17616	A80	Line 220:	4991 to 5490	4106
17617	17696	A80	Line 221:	5490 to 5989	1130
17697	17776	A80	Line 222:	5989 to 6488	54
17777	17856	A80	Line 223:	6488 to 6987	0
17857	17936	A80	Line 224:	6987 to 7486	0
17937	18016	A80	Line 225:	7486 to 7985	0
18017	18096	A80	Line 226:	7985 to 8484	0
18097	18176	A80	Line 227:	8484 to 8983	0
18177	18256	A80	Line 228:	8983 to 9482	0
18257	18336	A80	Line 229:	>= 9482	0
18337	18416	A80	Line 230:	Histogram of 12.0um Nadir Channel	
18417	18496	A80	Line 231:	19700 to 20325	0
18497	18576	A80	Line 232:	20325 to 20950	0
18577	18656	A80	Line 233:	20950 to 21575	0
18657	18736	A80	Line 234:	21575 to 22200	0
18737	18816	A80	Line 235:	22200 to 22825	12
18817	18896	A80	Line 236:	22825 to 23450	52
18897	18976	A80	Line 237:	23450 to 24075	61
18977	19056	A80	Line 238:	24075 to 24700	132
19057	19136	A80	Line 239:	24700 to 25325	188
19137	19216	A80	Line 240:	25325 to 25950	1022
19217	19296	A80	Line 241:	25950 to 26575	3706
19297	19376	A80	Line 242:	26575 to 27200	5268
19377	19456	A80	Line 243:	27200 to 27825	9219
19457	19536	A80	Line 244:	27825 to 28450	16905
19537	19616	A80	Line 245:	28450 to 29075	84918
19617	19696	A80	Line 246:	29075 to 29700	115962
19697	19776	A80	Line 247:	29700 to 30325	22988
19777	19856	A80	Line 248:	30325 to 30950	1344

19857	19936	A80	Line 249:	30950 to 31575	1
19937	20016	A80	Line 250:	>= 31575	13
20017	20096	A80	Line 251:	Histogram of 11.0um Nadir Channel	
20097	20176	A80	Line 252:	19700 to 20325	0
20177	20256	A80	Line 253:	20325 to 20950	0
20257	20336	A80	Line 254:	20950 to 21575	0
20337	20416	A80	Line 255:	21575 to 22200	0
20417	20496	A80	Line 256:	22200 to 22825	0
20497	20576	A80	Line 257:	22825 to 23450	49
20577	20656	A80	Line 258:	23450 to 24075	41
20657	20736	A80	Line 259:	24075 to 24700	99
20737	20816	A80	Line 260:	24700 to 25325	146
20817	20896	A80	Line 261:	25325 to 25950	709
20897	20976	A80	Line 262:	25950 to 26575	3024
20977	21056	A80	Line 263:	26575 to 27200	4613
21057	21136	A80	Line 264:	27200 to 27825	7575
21137	21216	A80	Line 265:	27825 to 28450	14299
21217	21296	A80	Line 266:	28450 to 29075	50278
21297	21376	A80	Line 267:	29075 to 29700	148579
21377	21456	A80	Line 268:	29700 to 30325	22966
21457	21536	A80	Line 269:	30325 to 30950	9645
21537	21616	A80	Line 270:	30950 to 31575	121
21617	21696	A80	Line 271:	>= 31575	0
21697	21776	A80	Line 272:	Histogram of 3.7um Nadir Channel	
21777	21856	A80	Line 273:	15000 to 15860	0
21857	21936	A80	Line 274:	15860 to 16720	0
21937	22016	A80	Line 275:	16720 to 17580	0
22017	22096	A80	Line 276:	17580 to 18440	0
22097	22176	A80	Line 277:	18440 to 19300	0
22177	22256	A80	Line 278:	19300 to 20160	0
22257	22336	A80	Line 279:	20160 to 21020	0
22337	22416	A80	Line 280:	21020 to 21880	0
22417	22496	A80	Line 281:	21880 to 22740	0
22497	22576	A80	Line 282:	22740 to 23600	0
22577	22656	A80	Line 283:	23600 to 24460	0
22657	22736	A80	Line 284:	24460 to 25320	0
22737	22816	A80	Line 285:	25320 to 26180	0
22817	22896	A80	Line 286:	26180 to 27040	0
22897	22976	A80	Line 287:	27040 to 27900	0
22977	23056	A80	Line 288:	27900 to 28760	0
23057	23136	A80	Line 289:	28760 to 29620	0
23137	23216	A80	Line 290:	29620 to 30480	0

23217	23296	A80	Line 291:	30480 to 31340	0
23297	23376	A80	Line 292:	>= 31340	0
23377	23456	A80	Line 293:	Histogram of 1.6um Nadir Channel	
23457	23536	A80	Line 294:	1 to 500	110475
23537	23616	A80	Line 295:	500 to 999	20582
23617	23696	A80	Line 296:	999 to 1498	14540
23697	23776	A80	Line 297:	1498 to 1997	23678
23777	23856	A80	Line 298:	1997 to 2496	33202
23857	23936	A80	Line 299:	2496 to 2995	23579
23937	24016	A80	Line 300:	2995 to 3494	13477
24017	24096	A80	Line 301:	3494 to 3993	7693
24097	24176	A80	Line 302:	3993 to 4492	5918
24177	24256	A80	Line 303:	4492 to 4991	4891
24257	24336	A80	Line 304:	4991 to 5490	2952
24337	24416	A80	Line 305:	5490 to 5989	1020
24417	24496	A80	Line 306:	5989 to 6488	123
24497	24576	A80	Line 307:	6488 to 6987	14
24577	24656	A80	Line 308:	6987 to 7486	0
24657	24736	A80	Line 309:	7486 to 7985	0
24737	24816	A80	Line 310:	7985 to 8484	0
24817	24896	A80	Line 311:	8484 to 8983	0
24897	24976	A80	Line 312:	8983 to 9482	0
24977	25056	A80	Line 313:	>= 9482	0
25057	25136	A80	Line 314:		
25137	25216	A80	Line 315:		
25217	25296	A80	Line 316:		
25297	25376	A80	Line 317:	Results name #3	Thresholds for Quality Parameters
25377	25456	A80	Line 318:	Minimum Brightness Temperature	15000
25457	25536	A80	Line 319:	Maximum Brighness Temperature	32200
25537	25616	A80	Line 320:	Minimum Reflectance	1
25617	25696	A80	Line 321:	Maximum Reflectance	10000
25697	25776	A80	Line 322:	BT Histogram Intervals	20
25777	25856	A80	Line 323:	Reflectance Histogram Intervals	20
25857	25936	A80	Line 324:	BT Low Contrast Percentage	95
25937	26016	A80	Line 325:	Reflectance Low Contrast Percentage	95
26017	26096	A80	Line 326:	BT Intervals For Low Contrast	3
26097	26176	A80	Line 327:	Reflectance Intervals For Low Contrast	3
26177	26256	A80	Line 328:	Geolocation Tolerance	15
26257	26336	A80	Line 329:	Colocation Number of Cells Threshold	7.50
26337	26416	A80	Line 330:	Latitude Failure	4.60
26417	26496	A80	Line 331:	Longitude Failure	43.00
26497	26576	A80	Line 332:	OUTPUTS SUMMARY FILE	

```
26577 26656     A80  Line 333:
26657 26736     A80  Line 334:
26737 26816     A80  Line 335:
26817 26896     A80  Line 336:
26897 26976     A80  Line 337:
26977 27056     A80  Line 338:
27057 27136     A80  Line 339:
27137 27216     A80  Line 340:
27217 27296     A80  Line 341:
27297 27376     A80  Line 342:
27377 27456     A80  Line 343:
27457 27536     A80  Line 344:
27537 27616     A80  Line 345:
27617 27696     A80  Line 346:
27697 27776     A80  Line 347:
27777 27856     A80  Line 348:
27857 27936     A80  Line 349:
27937 28016     A80  Line 350:
28017 28096     A80  Line 351:
28097 28176     A80  Line 352:
28177 28256     A80  Line 353:
28257 28336     A80  Line 354:
28337 28416     A80  Line 355:
28417 28496     A80  Line 356:
28497 28576     A80  Line 357:
28577 28656     A80  Line 358:
28657 28736     A80  Line 359:
28737 28816     A80  Line 360:
```

OUTPUTS DESCRIPTOR RECORD	
Number of output files in report	2
Number of output summary records	2
No. actual output files with report	2
OUTPUT SUMMARY RECORD #1	
Outputs generic name	Summary Quality Flags
Outputs summary name	IBT Image QA Flags
No of different record formats in output	1
Frequency of output file records	Per Internal Product
Number of output file records	1
No. parameters in outputs record #1	4
Outputs stored with report	Y
OUTPUT SUMMARY RECORD #2	
Outputs generic name	Total Summary Quality Flag
Outputs summary name	IBT Image Quality Flag
No of different record formats in output	1
Frequency of output file records	Per Internal Product
Number of output file records	1
No. parameters in outputs record #2	1
Outputs stored with report	Y
OUTPUT FILE FORMATS	
Output name #1	Summary Quality Flags
Image contains channel not present	N
Image values out of range	N
Image with low contrast	N
Location failure	N
Output name #2	Total Summary Quality Flags
Image failure summary	N

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	63	192	18	18	9728

Nadir Imagery File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
=====	====	====	======	==========	=======

	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	1
3	6		B1	Record Code	63
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	9728
8	15	16	A2	Reserved	'A '
					' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	
10	29	30	A2	Control Document Revision Number	' '
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	' A'
					'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
				~~	
13	45	48	I4	File Number	
14	49	64	A16	File Name	5
15	65	68	A4	Record Sequence and Location Type Flag	'ERS1.ATS.IBTNIMP'
16	69	76	I8	Sequence Number Location	'FSEQ'
17	77	80	I4	Sequence Number Field Length	1
18	81	84	A4	Record Code and Location Type	4
19	85	92	I8	Record Code Location	'FTYP'
20	93	96	A4	Record Code Field Length	5
21	97	100	A4	Record Length and Location Type	' 4'
22	101	108	I8	Record Length Location	'FLGT'
23	109	112	I4	Record Length Field Length	9
24	113		A1	Descriptor has Data Interpretation information included	4
25	114		A1	Other has Data Interpretation information included	'Y'
26	115		A1	Descriptor has Data Display information included	'N'
27	116		A1	Other has Data Display information included	'Y'
28	117	180	A64	Reserved Segment	'N'
					' '
	181	EOR		File Descriptor Record Variable Segment	
				~~	

29	181	186	I6	Number of Image(Data) records	
30	187	192	I6	Length of Image(Data) record	512
31	193	216	A24	Reserved	9728
	217	232		Pixel Group Parameters (N/A for LINN format)	
				~~	
32	217	220	I4	Number of Bits/Pixel	
33	221	224	I4	Number of Pixels/Data Group	0
34	225	228	I4	Number of Bytes/Data Group	0
35	229	232	A4	Pixel Justification & Order in Data Group	0
	233	272		Image Parameters	
				~~	
36	233	236	I4	Number of Bands of Image(Data)	4
37	237	244	I8	Number of Lines(Data pts) in file	512
38	245	248	I4	Number of Left Border Pixels	0
39	249	256	I8	Number of Image Pixels/Line	512
40	257	260	I4	Number of Right Border Pixels	0
41	261	264	I4	Number of Top Border Pixels	0
42	265	268	I4	Number of Bottom Border Pixels	0
43	269	272	A4	Interleaving Indicator	'LI04'
	273	296		Record Parameters	
				~~	
44	273	274	I2	Number of Physical records/Line	1
45	275	276	I2	Physical recs/Multispectral Line	1
46	277	280	I4	Bytes of Prefix data per record	24
47	281	288	I8	Bytes of data per record	4608
48	289	292	I4	Bytes of Suffix data per record	4968
49	293	296	I4	Prefix/Suffix Repeat Flag	
	297	432		Prefix/Suffix Locators	
				~~	

The 8 byte Locator string is constructed as :-
- Bytes 1..4 - Start byte number of field within prefix/suffix
- Bytes 5..6 - Byte Length of field (lengths > 99 are set to 99)
- Byte 7 - P for prefix, S for suffix

Byte 8 - Field data type; A (ASCII),B (binary),N (Numeric)

50	297	304	A8	Scan Line Number Locator	' 1 4PB'
51	305	312	A8	Image (Band) Number Locator	' '
52	313	320	A8	Time of Scan Line Locator	' 13 4PB'
53	321	328	A8	Left Fill Count Locator	' 17 4PB'
54	329	336	A8	Right Fill Count Locator	' 21 4PB'
55	337	344	A8	Pad Pixels Present Indicator	' '
56	345	368	A24	Blanks	' '
57	369	376	A8	Scan Line Quality Code Locator	' 1 4SB'
58	377	384	A8	Calibration Information Locator	' 3799SB'
59	385	392	A8	Gains Value Field Locator	' 45716SB'
60	393	400	A8	Offset Values Locator	' 47316SB'
61	401	432	A32	Reserved	' '
	433	464		Pixel Data Description (N/A for LINN)	
				~~	
62	433	436	I4	Number of Left Fill Bits/Pixels	0
63	437	440	I4	Number of Right Fill Bits/Pixels	0
64	441	448	I8	Max Unsigned Data Range of Pixel	0
65	449	456	A8	Left Fill Pixel Bits data description	' '
66	457	464	A8	Right Fill Pixel Bits data description	' '
	465	468		LINN Description	
				~~	
67	465	468	I4	Number of Bands/Line for LINN	4
	469	708		LINN Pixel Group Data	
				~~	
Band 1					
68	469	472	I4	Number of Bits/Pixel	16
69	473	476	I4	Number of Pixels/Data Group	1
70	477	480	I4	Number of Bytes/Data Group	2
71	481	484	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 2					
72	485	488	I4	Number of Bits/Pixel	16
73	489	492	I4	Number of Pixels/Data Group	1
74	493	496	I4	Number of Bytes/Data Group	2

75	497	500	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 3					
76	501	504	I4	Number of Bits/Pixel	16
77	505	508	I4	Number of Pixels/Data Group	1
78	509	512	I4	Number of Bytes/Data Group	2
79	513	516	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 4					
80	517	520	I4	Number of Bits/Pixel	16
81	521	524	I4	Number of Pixels/Data Group	1
82	525	528	I4	Number of Bytes/Data Group	2
83	529	532	A4	Pixel Justification & Order in Data Group	'RJLR'
	533	628		LINN Pixel Data Description Data	
Band 1					
84	533	536	I4	Number of Left Fill Bits/Pixels	0
85	537	540	I4	Number of Right Fill Bits/Pixels	0
86	541	548	I8	Max Unsigned Data Range of Pixel	32200
87	549	556	A8	Spare	
Band 2					
88	557	560	I4	Number of Left Fill Bits/Pixels	0
89	561	564	I4	Number of Right Fill Bits/Pixels	0
90	565	572	I8	Max Unsigned Data Range of Pixel	32200
91	573	580	A8	Spare	
Band 3					
92	581	584	I4	Number of Left Fill Bits/Pixels	0
93	585	588	I4	Number of Right Fill Bits/Pixels	0
94	589	596	I8	Max Unsigned Data Range of Pixel	32200
95	597	604	A8	Spare	
Band 4					
96	605	608	I4	Number of Left Fill Bits/Pixels	0
97	609	612	I4	Number of Right Fill Bits/Pixels	0
98	613	620	I8	Max Unsigned Data Range of Pixel	10000
99	621	628	A8	Spare	
100	629	636	A8	Flags Bytes	

<cccSCLB >, where :-
ccc - Classification at bits 0-2
Six classes are defined :-
1 - Land
2 - Sea
3 - Cloud
4 - Sunglint
5 - Ice/Snow
6 - Other
S - State Boundary at bit 3
C - Coastline at bit 4
C - Lat/Long Grid at bit 5
B - Blanking pulse Flag at bit 6

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	50	22	34	50	9728

IBT Imagery File: Image Record

Field name	Start byte	Last byte	Format	Description	Content
	1	12		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	50
3	6		B1	Record Code	22
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	9728
	13	36		IBT Line Prefix Data	
7	13	16	B4	Scan Line Number	1
8	17	20	B4	Channel Number	0
9	21		B1	Grid Contents Indicators : State Boundary	0

Field	Start	End	Format	Description	Value
	22		B1	Coastline Grid	0
	23		B1	Latitude/Longitude Grid	0
	24		B1	Class	0
10	25	28	B4	Station Time UT (Millisecond Of Day)	-1
11	29	32	B4	Number of Left Fill pixels	0
12	33	36	B4	Number of Right Fill pixels	0
	37	5532		IBT Image Data ~~~~~~~~~~~~~~	
13	37	1060	512B2	3.7um Channel Brightness Temperatures (K X 100)	

[1..13]	0	0	0	0	0	0	0	0	0	0	0	0	0
[495..507]	0	0	0	0	0	0	0	0	0	0	0	0	0
[508..512]	0	0	0	0	0								

Field	Start	End	Format	Description
14	1061	2084	512B2	11um Channel Brightness Temperatures (K X 100)

[1..13]	26070	26094	26209	26924	26856	26684	-26823	26580	26305	-26312	-26250	26447	-26631
[495..507]	28172	28191	28602	-28637	28636	28708	-28996	-29146	29188	-29133	-29208	29141	29303
[508..512]	29323	29301	28687	-28382	-28382								

Field	Start	End	Format	Description
15	2085	3108	512B2	12um Channel Brightness Temperatures (K X 100)

[1..13]	26046	26067	26139	26526	26658	26465	26462	26466	26245	26325	26237	26358	26464
[495..507]	27815	27850	28211	28279	28292	28351	28636	28756	28820	28793	28822	28748	28904
[508..512]	28903	28912	28530	28266	-28266								

Field	Start	End	Format	Description
16	3109	4132	512B2	1.6um Channel Radiance Values

[1..13]	5350	5110	4590	3460	3500	3680	3410	4070	4650	4810	4870	4210	4200
[495..507]	2690	2730	2680	2740	2580	2540	2830	2850	2770	2770	2900	2860	3370
[508..512]	3350	3050	1140	520	520								

Field	Start	End	Format	Description
17	4133	4644	512B1	Surface Flags

[1..20]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[481..500]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[501..512]	0	0	0	0	0	0	0	0	0	0	0	0								

Field	Start	End	Format	Description	Value
	4645	4680		IBT Line Suffix Data ~~~~~~~~~~~~~~~~~~~~	
18	4645	4648	B4	Scan Line quality	0
19	4649	4668	A20	Spare	.
20	4669	4672	B4	Line length of one band	512
21	4673	4676	B4	Satellite Time Code (MJD)	-1

```
     4677  4680     B4                    (Millisecond Of Day)
                                                                                                      -1
     4681  4972         ATSR Calibration Data
                        ~~~~~~~~~~~~~~~~~~~~~

 22  4681  4808   64B2  -XBB Black Body Pixels (16 per channel)
                                  [  1..13 ]    0    0    0    0    0    0    0    0    0    0    0    0    0
                                  [ 40..52 ]    0    0    0    0    0    0    0    0    0    0    0    0    0
                                  [ 53..64 ]         0    0    0    0    0    0    0    0    0    0    0    0

 23  4809  4822    7B2  -XBB Black Body Temperatures
                                  [  1..7  ]
                                                                            0    0    0    0    0    0    0

 24  4823  4826     B4  Derived -XBB Black Body Temperature (milliDegrees)
 25  4827  4954   64B2  +XBB Black Body Pixels                                                             0
                                  [  1..13 ]    0    0    0    0    0    0    0    0    0    0    0    0    0
                                  [ 40..52 ]    0    0    0    0    0    0    0    0    0    0    0    0    0
                                  [ 53..64 ]         0    0    0    0    0    0    0    0    0    0    0    0

 26  4955  4968    7B2  +XBB Black Body Temperatures
                                  [  1..7  ]
                                                                            0    0    0    0    0    0    0

 27  4969  4972     B4  Derived +XBB Black Body Temperature (milliDegrees)
                                                                                                           0
     4973  5004         Detector PreAmp Gain and Offset Values
                        ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

 28  4973  4976     B4  Gain 3.7u
 29  4977  4980     B4  Gain  11u                                                                          0
 30  4981  4984     B4  Gain  12u                                                                          0
 31  4985  4988     B4  Gain 1.6u                                                                          0
 32  4989  4992     B4  Offset 3.7u                                                                        0
 33  4993  4996     B4  Offset 11u                                                                         0
 34  4997  5000     B4  Offset 12u                                                                         0
 35  5001  5004     B4  Offset 1.6u                                                                        0
                                                                                                           0
                                                                                                           0
     5005   EOR         IBT Earth Location Data
                        ~~~~~~~~~~~~~~~~~~~~~~~

 36  5005  7052  512B4  Pixel Latitudes  (microdegrees)
                                [  1..7  ]   -6948000  -6946000  -6944000  -6942000  -6940000  -6938000  -6936000
                                [505..511]   -5961000  -5959000  -5957000  -5955000  -5953000  -5951000  -5949000
```

```
                                 [512..512]                                                                                  -5947000

  37  7053  9100   512B4  Pixel Longitudes (microdegrees)
                                 [  1..7  ]   -76655000  -76664000  -76673000  -76682000  -76690000  -76699000  -76708000
                                 [505..511]   -81103000  -81112000  -81121000  -81129000  -81138000  -81147000  -81156000
                                 [512..512]                                                                            -81165000

  38  9101  9612   512B1  Pixel X/Y Offsets
                                 [  1..16 ]  0x89 0xb6 0xf3 0x6d 0xaa 0xd6 0x13 0x9e 0xdb 0x18 0x65 0xa2 0xe0 0x6a 0xa7 0xf4
                                 [497..512]  0xe0 0x5b 0x18 0xd5 0x93 0x40 0xcb 0x88 0x45 0x12 0x9c 0x59 0x26 0xe3 0xa0 0x60

  39  9613  9728    A116  Spare
      9613  9702
      9703  9728
```

Record No	Sequence No	CEOS codes File	Record	Mission	Origin	Length	
3	3	50	22	34	50	9728	
:	:	"	"	"	"	"	(for 510 records)
513	513	50	22	34	50	9728	

IBT Imagery File: Image Record

Record No	Sequence No	CEOS codes File	Record	Mission	Origin	Length
1	1	63	192	18	18	4128

Nadir Trailer File: File Descriptor Record

```
Field Start  Last
 name  byte  byte  Format  Description                                                                    Content
=====  ====  ====  ======  ===========                                                                    =======

          1    16          Record Identification Segment
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	4128
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
				~~	
13	45	48	I4	File Number	6
14	49	64	A16	File Name	'ERS1.ATS.IBTNTRA'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'
25	114		A1	Other has Data Interpretation information included	'N'
26	115		A1	Descriptor has Data Display information included	'Y'
27	116		A1	Other has Data Display information included	'N'
28	117	180	A64	Reserved Segment	' '
	181	EOR		File Descriptor - Variable Segment	
				~~	
29	181	186	I6	Number of trailer records	4
30	187	192	I6	Trailer Record Length	4128

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	2
3	6		B1	Record Code	90
4	7		B1	Mission Code	10
5	8		B1	Origin Code	34
6	9	12	B4	Length of this record	50
7	13	16	I4	Trailer Record Sequence Number	4128
8	17	20	A4	Reserved	1
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel [1..7]	0 0 0 0 0 0 0
				[988..994]	0 0 0 0 0 0 0
				[995..1000]	0 0 0 0 0 0 0
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
3	3	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	2
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7]	0 0 0 0 0 0 0
				[988..994]	293 286 287 298 266 275 354
				[995..1000]	290 270 304 270 300 286
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
4	4	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content

	1	20		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	4
3	6		B1	Record Code	90
4	7		B1	Mission Code	10
5	8		B1	Origin Code	34
6	9	12	B4	Length of this record	50
7	13	16	I4	Trailer Record Sequence Number	4128
8	17	20	A4	Reserved	3
	21	EOR		Trailer Data	
				~~	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7]	0 0 0 0 0 0 0
				[988..994]	338 382 380 355 375 368 378
				[995..1000]	404 399 392 404 405 431
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
5	5	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	5
					90

3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	4
8	17	20	A4	Reserved	' '
	21	EOR		Trailer Data	
				~~	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7] 0 0 0 0 0 0 0	
				[988..994] 0 0 0 0 0 0 0	
				[995..1000] 0 0 0 0 0 0 0	
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

		CEOS codes				
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	192	192	63	18	360

Null Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	63
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '

	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
				~~	
13	45	60	A16	Physical Tape Id	
14	61	76	A16	Logical Set Id	' UP600367'
15	77	92	A16	Volume Set Id	'E01R 95158130801'
16	93	94	I2	Physical Volumes in Logical Set	' UP600367'
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1
20	101	104	I4	1st File within Physical Volume	1
21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	1
24	121	128	A8	Volume Creation Time	'19950607'
25	129	140	A12	Generating country	'13082219'
26	141	148	A8	Generating agency	' UK'
27	149	160	A12	Generating facility	' ESA'
28	161	164	I4	Number of Pointer Records	' UK-PAF'
29	165	168	I4	Number of Records in Directory	0
30	169	172	I4	Logical Volumes in Physical Set	1
31	173	260	A88	Spare Segment	10
	173	260			
32	261	360	A100	Local Use Segment	
	261	350			
	351	360			

ANNEX B ATS.SST CEOS FORMAT

Tape Structure

Volume Directory File	Volume Descriptor Record
	SST Leader File Pointer Record
	SST Imagery File Pointer Record
	SST Trailer File Pointer Record
	Text Record
SST Leader File	File Descriptor Record
	Image Header Record
	Image Map Projection Ancillary Record
	Image Orbit and Attitude Data Record
	EODC Product Quality Summary Record
SST Imagery File	File Descriptor Record
	Image Record
SST Trailer File	File Descriptor Record
	Image Trailer Record (one for each channel)
Null Volume Directory File	Volume Descriptor Record

Format	Meaning	Example
A	field contains ASCII characters	$$$ERS-1
B	field contains unformatted binary integer	Represented numerically e.g 256
D	Field contains formatted (ASCII) double precision floating point number	45.88888888888888888
F	Field contains formatted (ASCII) floating point number	27.678
I	Field contains formatted (ASCII) integer	256

The $ symbol indicates the presence of an ASCII character, or an ASCII blank.

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	192	192	18	18	360

Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
13	45	60	A16	Physical Tape Id	' UP600344'
14	61	76	A16	Logical Set Id	'E01R 95110133901'
15	77	92	A16	Volume Set Id	' UP600344'
16	93	94	I2	Physical Volumes in Logical Set	1
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1

20	101	104	I4	1st File within Physical Volume	1
21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	'19950420'
24	121	128	A8	Volume Creation Time	'13395540'
25	129	140	A12	Generating country	'UK'
26	141	148	A8	Generating agency	'ESA'
27	149	160	A12	Generating facility	'UK-PAF'
28	161	164	I4	Number of Pointer Records	3
29	165	168	I4	Number of Records in Directory	5
30	169	172	I4	Logical Volumes in Physical Set	71
31	173	260	A88	Spare Segment	
	173	260			
32	261	360	A100	Local Use Segment	
	261	350			
	351	360			

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '

	17	360		File Identification Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~	
9	17	20	I4	File Number	1
10	21	36	A16	File Name	'ERS1.ATS.SSTLEAD'
11	37	64	A28	File Class	'ATS LEADER FILE '
12	65	68	A4	File Class Code	'ATSL'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	5
16	109	116	I8	File 1st Record Size	5120
17	117	124	I8	File Maximum Record Size	14656
18	125	136	A12	File Record Length Type	'VARIABLE LEN'
19	137	140	A4	File Record Length Type Code	'VARE'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	5
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			' '
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
3	3	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	219

3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
				~~	
9	17	20	I4	File Number	2
10	21	36	A16	File Name	'ERS1.ATS.SSTIMOP'
11	37	64	A28	File Class	'ATS IMAGERY FILE '
12	65	68	A4	File Class Code	'IMOP'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	513
16	109	116	I8	File 1st Record Size	7680
17	117	124	I8	File Maximum Record Size	7680
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	513
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			' '
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '

CEOS codes					
Record No	Sequence No	File	Record	Mission	Origin	Length
4	4	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
9	17	20	I4	File Number	3
10	21	36	A16	File Name	'ERS1.ATS.SSTTRAI'
11	37	64	A28	File Class	'ATS TRAILER FILE '
12	65	68	A4	File Class Code	'TRAI'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	5
16	109	116	I8	File 1st Record Size	4128
17	117	124	I8	File Maximum Record Size	4128
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	5
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			' '
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
5	5	18	63	18	18	360

Volume Directory File: Text Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	5
2	5		B1	File Code	18
3	6		B1	Record Code	63
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Continuation Flag	' '
	17	360		Product Identification Segment	
9	17	56	A40	Product Id Segment	'PRODUCT:E01R 95110133901 UK-PAF '
10	57	116	A60	Product Location/Date-Time	'PROCESS.UK.ESA.UKPAF.1995042013395540 '
11	117	156	A40	Physical Volume Identification	'TAPE ID:UP600344 , TAPE 01 OF 01 '
12	157	196	A40	Scene Identification	'ORBIT : 10850 D930812-T174556 '
13	197	236	A40	Scene Location	'FRAME CENTRE: N 79.89 W 51.88 '
14	237	256	A20	Spares	' '
15	257	360	A104	Spares	' '
	257	346		'	'
	347	360			' '

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	63	192	18	18	5120

Leader File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	5120
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
13	45	48	I4	File Number	1
14	49	64	A16	File Name	'ERS1.ATS.SSTLEAD'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'

25	114		A1	Other has Data Interpretation information included					'N'
26	115		A1	Descriptor has Data Display information included					'N'
27	116		A1	Other has Data Display information included					'N'
28	117	180	A64	Reserved Segment					' '
	181	EOR		File Descriptor Variable Segment					
				~~					
29	181	186	I6	Number of Scene Header records					
30	187	192	I6	Length of Scene Header record					
31	193	198	I6	Number of Ancillary records					
32	199	204	I6	Length of Ancillary record					
33	205	210	I6	Number of Annotation records					
34	211	216	I6	Length of Annotation record					
	217	360		Locator Fields					
				~~					
35	217	232	A16	Scene Id	Field Locator	'	2	197	16A'
36	233	248	A16	Mission Id	Field Locator	'	2	309	16A'
37	249	264	A16	Sensor Id	Field Locator	'	2	325	16A'
38	265	280	A16	Exposure Date-Time	Field Locator	'	2	117	32A'
39	281	296	A16	Geographic Reference	Field Locator	'	2	213	32N'
40	297	312	A16	Image Processing Performed	Field Locator	'	2	1477	16A'
41	313	328	A16	Image Format Indicator	Locator	'	2	1717	16A'
42	329	344	A16	Band Indicator	Locator	'	2	1653	16A'
43	345	360	A16	Reserved		'			'
44	361	376	A16	Reserved		'			'
45	377	382	I6	Number of Image Header records					1
46	383	388	I6	Length of Image Header record					5120
47	389	394	I6	Number of Image Map Projection records					1
48	395	400	I6	Length of Image Map Projection record					5120
49	401	406	I6	Number of Ground Control Points records					
50	407	412	I6	Length of Ground Control Points record					
51	413	418	I6	Number of Orbit/Attitude records					1
52	419	424	I6	Length of Orbit/Attitude record					5120
53	425	430	I6	Number of Image Grid records					
54	431	436	I6	Length of Image Grid record					
55	437	442	I6	Number of EODC PQSR records					1
56	443	448	I6	Length of EODC PQSR record					14656

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	10	10	34	50	5120

ATS Leader File: Image Header Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	10
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Image Header Record Sequence Number	1
8	17	20	A4	Reserved	' '
	21	308		Scene Parameters	
9	21	36	A16	Product Identification	'ERS1.ATS.SST '
10	37	52	A16	Scene Identification	'R930812174556022'
11	53	68	F16.8	Input Scene Centre Latitude (deg)	79.88600159
12	69	84	F16.8	Input Scene Centre Longitude (deg)	-51.87799835
13	85	100	F16.8	Line at Input Scene Centre	256
14	101	116	F16.8	Pixel at Input Scene Centre	256
15	117	148	A32	Input Scene Centre Time	'19930812174556022 '
16	149	164	I16	Spare	
17	165	180	A16	Spare	' '
18	181	196	I16	Spare	
19	197	212	A16	Processed Scene Identification	'R930812174556022'
20	213	228	F16.8	Processed Scene Centre Latitude (deg)	79.88600159
21	229	244	F16.8	Processed Scene Centre Longitude (deg)	-51.87799835
22	245	260	F16.8	Line at Processed Scene Centre	256
23	261	276	F16.8	Pixel at Processed Scene Centre	256

24	277	292	I16	Reserved	
25	293	308	I16	Reserved	
	309	404		Mission Parameters	
				~~	
26	309	324	A16	Mission Identification	'ERS-1 '
27	325	340	A16	Sensor Identification	'ATSR '
28	341	356	I16	Orbit Number	10850
29	357	372	A16	Ascending/Descending Flag	'DESCENDING 1993'
30	373	388	F16.8	Ascending Node (deg)	77.73200000
31	389	404	A16	Time of Ascending Node	' 0812171911000'
	405	1428		Sensor Parameters	
				~~	
32	405	1412	A1008	Upper/Lower Limits of Wavelength Range in Nanometers	
	405	494		'Band 1 is wavelen. 3.7 micron with half normalised transmittence at 3.934 and 3.521 micron'	
	495	584		' Band 2 is wavelen. 11 micron with half normalised transmittence at 10.526 and 11.299 micr'	
	585	674		'on Band 3 is wavelen. 12 micron with half normalised transmittence at 11.147 and 12.315 mi'	
	675	764		'cron Band 4 is wavelen. 1.6 micron with half normalised transmittence at 1.568 and 1.693 m'	
	765	854		'icron '	
	855	944		' '	
	945	1034		' '	
	1035	1124		' '	
	1125	1214		' '	
	1215	1304		' '	
	1305	1394		' '	
	1395	1412		' '	
33	1413	1428	I16	Active Bands in Processed Image	3
	1429	1476		Frame Parameters	
				~~	
34	1429	1444	I16	Processed Scene Pixels/Line	512
35	1445	1460	I16	Processed Scene Lines/Image	512
36	1461	1476	A16	Spare	' '
	1477	1448		Processing Parameters	
				~~	

37	1477	1492	A16	Radiometric Calibration Designator The first 4 bytes define :- NONE - No radiometric calibration correction CAL - Earth rotation correction The second 4 bytes define :- NLIN - Non-linear RAW - LIN - Linear LOG - Logarithmic	'CAL LIN '
38	1493	1508	I16	Radiometric Resolution Designator	16
39	1509	1524	A16	Scenic Radiometric Corrorrection Designator The first bytes define :- NONE - No Scenic Radiometric correction S - Sun illumination correction H - Haze correction	'NONE '
40	1525	1540	A16	Geometric Correction Designator The first bytes define :- NONE - No geometric correction E - Earth rotation correction P - Panoramic and Earth curvature correction L - Line length correction S - Conic scan correction (ATSR only)	'SEPL '
41	1541	1556	A16	Resampling Algorithm Designator The first 4 bytes define :- NONE - No resampling NN - Nearest neighbour CC - Cubic convolution S8 - 8 point sin(x)/x DS8 - 8 point damped sin(x)/x S16 - 16 point sin(x)/x DS16 - 16 point damped sin(x)/x	'NN '
42	1557	1572	A16	Map Projection Identifier	'ATSR '
43	1573	1588	A16	Product Level Indicator	' 2B'
44	1589	1604	I16	Number of Map Projection Records	1
45	1605	1620	I16	Number of Ground Control Point Record	1
46	1621	1636	I16	Number of Orbit/Attitude Records	1
47	1637	1652	I16	Number of Radiometric Records	0
48	1653	1716	A64	Active Bands	'0111000000000000000000000000000000000000000000000000000000000000'
49	1717	1732	A16	Interleaving Indicator	'LINN '
50	1733	1740	A8	Geographic Ancillary Information Indicator	'YNNNNNNN'
	1733		A1	Earth Location in Suffix	'Y'
	1734		A1	Sun Angle in Suffix	'N'

1735		A1	Satellite Angles	'N'
1736		A1	State Boundary Flag used	'N'
1737		A1	Coastlines Flag used	'N'
1738		A1	Lat/Long Grid Flag used	'N'
1739		A1	Classifications Flags used	'N'
1740		A1	Blanking Pulse Flag used	'N'

		CEOS codes				
Record No	Sequence No	File	Record	Mission	Origin	Length
3	3	10	20	34	50	5120

ATS Leader File: Image Map Projection Ancillary Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	10
3	6		B1	Record Code	20
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Map Projection Ancillary Sequence Number	1
8	17	20	A4	Reserved	
	21	580		Map Projection Data	
9	21	36	F16.8	Nominal Scene Data Pixels/Line	512.00000000
10	37	52	F16.8	Nominal Scene Lines/Image	512.00000000
11	53	68	F16.8	Nominal Scale of Pixels (m)	1000.00000000
12	69	84	F16.8	Nominal Scale of Lines (m)	1000.00000000
13	85	100	F16.8	UTM Zone Number for Input Image	
14	101	116	F16.8	Northing of Image Centre (m)	
15	117	132	F16.8	Easting of Image Centre (m)	
16	133	148	F16.8	Orientation of Image Centre(deg)	

17	149	164	F16.8	Actual Scene Data Pixels/Line					512.00000000
18	165	180	F16.8	Actual Scene Lines/Image					512.00000000
19	181	196	F16.8	Actual Scale of Pixels (m)					1000.00000000
20	197	212	F16.8	Actual Scale of Lines (m)					1000.00000000
21	213	228	F16.8	UTM Zone Number(Processed Image)					
22	229	292	A64	Reserved					
23	293	356	A64	Reserved					
24	357	420	A64	Reserved					
25	421	436	F16.8	Orientation of Processed Image Centre					
26	437	452	F16.8	Nominal Altitude (m)					6.70485115
27	453	468	F16.8	Nominal Ground/Speed (m/s)					
28	469	484	F16.8	Satellite Heading (deg)					25.67000000
29	485	500	F16.8	Angle of Drift at Centre (deg)					
30	501	516	F16.8	Sun Elevation Angle at Centre					25.40000000
31	517	532	F16.8	Sun Azimuth Angle at Centre					6.00000000
32	533	548	F16.8	Cross Track field of view (deg)					2000.00000000
33	549	564	F16.8	Sensor Scan Rate (scans/s)					
34	565	580	F16.8	Sensor Active Sampling Rate					
35	581	596	11F16.2	Solar Elevations along Central Nadir Scan					
				[1..4]	25.67,	25.18,	24.73,	24.36	
				[5..8]	24.05,	23.81,	23.64,	23.54	
				[9..11]		23.52,	23.59,	23.73	
36	757	772	11F16.2	Solar Elevation Differences along Central Nadir Scan					
				[1..4]	42.09,	46.81,	51.65,	56.41	
				[5..8]	61.24,	65.74,	62.08,	57.73	
				[9..11]		53.28,	48.89,	44.51	
37	933	948	11F16.2	Solar Azimuth Differences along Central Nadir Scan					
				[1..4]	43.11,	47.86,	52.73,	57.64	
				[5..8]	63.31,	27.30,	-111.61,	-106.03	
				[9..11]		-101.03,	-96.25,	-91.50	
38	1109	1124	11F16.2	Solar Elevations along Central Forward Scan					
				[1..4]	23.58,	23.76,	23.86,	23.87	
				[5..8]	23.79,	23.62,	23.37,	23.03	
				[9..11]		22.63,	22.17,	21.67	
39	1285	1300	11F16.2	Solar Elevation Differences along Central Forward Scan					
				[1..4]	13.45,	12.30,	11.44,	10.88	
				[5..8]	10.63,	10.71,	11.09,	11.78	
				[9..11]		12.77,	14.03,	15.53	

```
40  1461  1476 11F16.2  Solar Azimuth Differences along Central Forward Scan
                         [  1..4  ]        -4.29,     -7.89,    -11.50,    -15.13
                         [  5..8  ]       -18.77,    -22.41,    -26.05,    -29.69
                         [  9..11 ]                  -33.32,    -36.93,    -40.53
```

Record No	Sequence No	File	Record	Mission	Origin	Length
		CEOS codes				
4	4	10	40	34	50	5120

ATS Leader File: Image Orbit and Attitude Data Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	10
3	6		B1	Record Code	40
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	5120
7	13	16	I4	Orbit/Attitude Ancillary Sequence Number	1
8	17		A1	Flags: Orbit Data Available Flag	'1'
	18		A1	Additional Data Available Flag	'1'
	19		A1	State Vector Available Flag	'1'
	20		A1	Attitude Data Available Flag	' '
	21		A1	Correction Data Available Flag	' '
	22		A1	Original Orbit Included Flag	' '
9	23	24	A2	Reserved	' '
10	25	40	I16	Epoch year & day of year YYYYDDD	
11	41	56	I16	Epoch time of day (ms)	
	57	152		Part 1: Mean Brouwer Orbital Elements	

12	57	72	F16.8	Semi-Major Axis	(km)	7159.49561000
13	73	88	F16.8	Eccentricity		0.00116500
14	89	104	F16.8	Inclination	(deg)	98.45290000
15	105	120	F16.8	Right Ascension of Ascending Node	(hhmmss)	77.73200000
16	121	136	F16.8	Argument of Perigee	(deg)	90.00000000
17	137	152	F16.8	Mean Anomaly	(deg)	270.13340000
	153	220		Part 2: Additional Orbital Parameters		
				~~		
18	153	168	I16	Orbit no of Data Acquisition		10850
19	169	172	A4	Ascending/Descending Node Flag		'DDDD'
20	173	188	F16.8	Equator Crossing Node	(deg)	77.73200000
21	189	204	I16	Equator Crossing Date	YYYYDDD	1993224
22	205	220	I16	Equator Crossing Time	(ms)	62351000
	221	316		Part 3: State Vector		
				~~		
23	221	236	F16.8	X-position component	(km)	1522.58211000
24	237	252	F16.8	Y-position component	(km)	7001.91639000
25	253	268	F16.8	Z-position component	(km)	0.00124000
26	269	284	F16.8	X-velocity component	(km/s)	1.59159800
27	285	300	F16.8	Y-velocity component	(km/s)	-0.35486300
28	301	316	F16.8	Z-velocity component	(km/s)	7.37709000
	317	364		Part 4: Attitude Information		
				~~		
29	317	332	F16.8	Pitch	(deg)	
30	333	348	F16.8	Yaw	(deg)	
31	349	364	F16.8	Roll	(deg)	
	365	400		Part 5: Correction Information		
				~~		
32	365	380	F16.8	Time difference (GS-Sat)	(ms)	
33	381	396	F16.8	Actual Sensor Scan rate scan/s		
	401	EOR		Part 6: Original Orbit Information Source		
				~~		

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
5	4	10	93	34	50	14656

SST Leader File: EODC Product Quality Summary Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	10
3	6		B1	Record Code	93
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	14656
7	13	16	I4	EODC PQSR Record Sequence Number	1
	17	EOR		EODC Product Quality Report	

17	96	A80	Line	1:	Number of QA lines in QA report	182
97	176	A80	Line	2:	REPORT SUMMARY FILE	
177	256	A80	Line	3:	REPORT SUMMARY DESCRIPTOR RECORD	
257	336	A80	Line	4:	Report identifier	UK.ATS.QR06
337	416	A80	Line	5:	Report name	ATS SST Product QA Report
417	496	A80	Line	6:	Date generated	20-Apr-1995 13:39:55
497	576	A80	Line	7:	Covers period starting	12-Aug-1993 17:45:17
577	656	A80	Line	8:	Covers period ending	12-Aug-1993 17:46:34
657	736	A80	Line	9:	Generation source	SADIST A600 SST Post-processed
737	816	A80	Line	10:	Generation source algorithm	SADIST+SST
817	896	A80	Line	11:	Report documentation specification no.	DC-DO-NRL-SE-0002
897	976	A80	Line	12:	Are data sets included	Y
977	1056	A80	Line	13:	Are results files included	Y
1057	1136	A80	Line	14:	Are outputs included	Y
1137	1216	A80	Line	15:	Text record	TSCHERNING$308121719_10500_50125_a600.s

1217	1296	A80	Line	16:	RESULTS SUMMARY FILE		
1297	1376	A80	Line	17:	RESULTS DESCRIPTOR RECORD		
1377	1456	A80	Line	18:	Number of results files in report	3	
1457	1536	A80	Line	19:	Number of results summary records	3	
1537	1616	A80	Line	20:	No. of actual results files with report	3	
1617	1696	A80	Line	21:	RESULTS SUMMARY RECORD #1		
1697	1776	A80	Line	22:	Results generic name	Quality Flags	
1777	1856	A80	Line	23:	Results summary name	SST Image QA Flags	
1857	1936	A80	Line	24:	No of different record formats in result	1	
1937	2016	A80	Line	25:	Frequency of results file records	Per Internal Product	
2017	2096	A80	Line	26:	Number of results file records	1	
2097	2176	A80	Line	27:	No. parameters in results record #1	16	
2177	2256	A80	Line	28:	Results stored with report	Y	
2257	2336	A80	Line	29:	RESULTS SUMMARY RECORD #2		
2337	2416	A80	Line	30:	Results generic name	Measured Values of Quality Parameters	
2417	2496	A80	Line	31:	Results summary name	SST Image QA Statistics	
2497	2576	A80	Line	32:	No of different record formats in result	1	
2577	2656	A80	Line	33:	Frequency of results file records	Per Internal Product	
2657	2736	A80	Line	34:	Number of results file records	1	
2737	2816	A80	Line	35:	No. parameters in results record #2	56	
2817	2896	A80	Line	36:	Results stored with report	Y	
2897	2976	A80	Line	37:	RESULTS SUMMARY RECORD #3		
2977	3056	A80	Line	38:	Results generic name	Thresholds for Quality Parameters	
3057	3136	A80	Line	39:	Results summary name	SST Image QA Parameters	
3137	3216	A80	Line	40:	No of different record formats in result	1	
3217	3296	A80	Line	41:	Frequency of results file records	Per Internal Product	
3297	3376	A80	Line	42:	Number of results file records	1	
3377	3456	A80	Line	43:	No. parameters in results record #3	34	
3457	3536	A80	Line	44:	Results stored with report	Y	
3537	3616	A80	Line	45:	RESULTS FILE FORMATS		
3617	3696	A80	Line	46:	Results name #1	Quality Flags	
3697	3776	A80	Line	47:	Image failure summary	Y	
3777	3856	A80	Line	48:	Forward 1.6um Channel not present	N	
3857	3936	A80	Line	49:	Forward 3.7um Channel not present	Y	
3937	4016	A80	Line	50:	Forward 11.0um Channel not present	N	
4017	4096	A80	Line	51:	Forward 12.0um Channel not present	N	
4097	4176	A80	Line	52:	Nadir 1.6um Channel not present	N	
4177	4256	A80	Line	53:	Nadir 3.7um Channel not present	Y	
4257	4336	A80	Line	54:	Nadir 11.0um Channel not present	N	
4337	4416	A80	Line	55:	Nadir 12.0um Channel not present	N	
4417	4496	A80	Line	56:	Image contains channel not present	Y	
4497	4576	A80	Line	57:	Corrupt image flag	N	

4577	4656	A80	Line	58:	Image with low contrast	Y
4657	4736	A80	Line	59:	Image with high contrast	N
4737	4816	A80	Line	60:	Geolocation failure	N
4817	4896	A80	Line	61:	Colocation failure	N
4897	4976	A80	Line	62:	Location failure	N
4977	5056	A80	Line	63:	Results name #2	Measured Values of Quality Parameters
5057	5136	A80	Line	64:	Number of cloudy pixels	187246
5137	5216	A80	Line	65:	Number of partly cloudy pixels	157488
5217	5296	A80	Line	66:	Number of land pixels	243614
5297	5376	A80	Line	67:	Number of coast pixels	0
5377	5456	A80	Line	68:	Number of lake pixels	0
5457	5536	A80	Line	69:	Number of pixels with 1.6um	262142
5537	5616	A80	Line	70:	Number of pixels with 3.7um	0
5617	5696	A80	Line	71:	Number of pixels with 12um	261456
5697	5776	A80	Line	72:	Number of pixels with forward view	257815
5777	5856	A80	Line	73:	Number of pixels with dynamic threshold	79872
5857	5936	A80	Line	74:	No. pixels with cloud flag set by 1.6um	262144
5937	6016	A80	Line	75:	Number of pixels with 3.7um data used	0
6017	6096	A80	Line	76:	Number of pixels with sunglint	0
6097	6176	A80	Line	77:	Number of pixels with sea ice	0
6177	6256	A80	Line	78:	Number of pixels with blanking pulse	34789
6257	6336	A80	Line	79:	Minimum SST value in Image	0
6337	6416	A80	Line	80:	Maximum SST value in Image	0
6417	6496	A80	Line	81:	Number of min SST pixels	0
6497	6576	A80	Line	82:	Number of max SST pixels	0
6577	6656	A80	Line	83:	Number of valid SST pixels	0
6657	6736	A80	Line	84:	Number of 3_7um forward pixels	0
6737	6816	A80	Line	85:	Percentage of cloudy pixels	71
6817	6896	A80	Line	86:	Percentage of land pixels	92
6897	6976	A80	Line	87:	Percentage of lake pixels	0
6977	7056	A80	Line	88:	Percentage of valid SST pixels	0
7057	7136	A80	Line	89:	Number of values >= 26500 and < 26700	0
7137	7216	A80	Line	90:	Number of values >= 26700 and < 26900	0
7217	7296	A80	Line	91:	Number of values >= 26900 and < 27100	0
7297	7376	A80	Line	92:	Number of values >= 27100 and < 27300	0
7377	7456	A80	Line	93:	Number of values >= 27300 and < 27500	0
7457	7536	A80	Line	94:	Number of values >= 27500 and < 27700	0
7537	7616	A80	Line	95:	Number of values >= 27700 and < 27900	0
7617	7696	A80	Line	96:	Number of values >= 27900 and < 28100	0
7697	7776	A80	Line	97:	Number of values >= 28100 and < 28300	0
7777	7856	A80	Line	98:	Number of values >= 28300 and < 28500	0
7857	7936	A80	Line	99:	Number of values >= 28500 and < 28700	0

7937	8016	A80	Line 100:	Number of values >= 28700 and < 28900	0
8017	8096	A80	Line 101:	Number of values >= 28900 and < 29100	0
8097	8176	A80	Line 102:	Number of values >= 29100 and < 29300	0
8177	8256	A80	Line 103:	Number of values >= 29300 and < 29500	0
8257	8336	A80	Line 104:	Number of values >= 29500 and < 29700	0
8337	8416	A80	Line 105:	Number of values >= 29700 and < 29900	0
8417	8496	A80	Line 106:	Number of values >= 29900 and < 30100	0
8497	8576	A80	Line 107:	Number of values >= 30100 and < 30300	0
8577	8656	A80	Line 108:	Number of values >= 30300 and < 30500	0
8657	8736	A80	Line 109:	Number of values >= 30500 and < 30700	0
8737	8816	A80	Line 110:	Number of values >= 30700 and < 30900	0
8817	8896	A80	Line 111:	Number of values >= 30900 and < 31100	0
8897	8976	A80	Line 112:	Number of values >= 31100 and < 31300	0
8977	9056	A80	Line 113:	Number of values >= 31300	0
9057	9136	A80	Line 114:	Median SST (from histogram)	0
9137	9216	A80	Line 115:	Modal SST value (from_histogram)	0
9217	9296	A80	Line 116:	Standard deviation in pixel SST values	0
9297	9376	A80	Line 117:	Mean SST value	0
9377	9456	A80	Line 118:	Geolocation orbit used	esrin restituted
9457	9536	A80	Line 119:	Results name #3	Thresholds for Quality Parameters
9537	9616	A80	Line 120:	Minimum SST value	26500
9617	9696	A80	Line 121:	Maximum SST value	31300
9697	9776	A80	Line 122:	Number of histogram intervals	25
9777	9856	A80	Line 123:	Low contrast pixel percentage	95
9857	9936	A80	Line 124:	No of intervals to assign low contrast	1
9937	10016	A80	Line 125:	Max perc of pixels equal to max value	40
10017	10096	A80	Line 126:	Max perc of pixels equal to min value	40
10097	10176	A80	Line 127:	Max perc of pixels equal to max/min val	40
10177	10256	A80	Line 128:	Max no of populated histogram intervals	12
10257	10336	A80	Line 129:	Histogram Intervals Thresholds	
10337	10416	A80	Line 130:	Histogram Interval 1 threshold	26500
10417	10496	A80	Line 131:	Histogram Interval 2 threshold	26700
10497	10576	A80	Line 132:	Histogram Interval 3 threshold	26900
10577	10656	A80	Line 133:	Histogram Interval 4 threshold	27100
10657	10736	A80	Line 134:	Histogram Interval 5 threshold	27300
10737	10816	A80	Line 135:	Histogram Interval 6 threshold	27500
10817	10896	A80	Line 136:	Histogram Interval 7 threshold	27700
10897	10976	A80	Line 137:	Histogram Interval 8 threshold	27900
10977	11056	A80	Line 138:	Histogram Interval 9 threshold	28100
11057	11136	A80	Line 139:	Histogram Interval 10 threshold	28300
11137	11216	A80	Line 140:	Histogram Interval 11 threshold	28500
11217	11296	A80	Line 141:	Histogram Interval 12 threshold	28700

11297	11376	A80	Line 142:	Histogram Interval 13 threshold	28900
11377	11456	A80	Line 143:	Histogram Interval 14 threshold	29100
11457	11536	A80	Line 144:	Histogram Interval 15 threshold	29300
11537	11616	A80	Line 145:	Histogram Interval 16 threshold	29500
11617	11696	A80	Line 146:	Histogram Interval 17 threshold	29700
11697	11776	A80	Line 147:	Histogram Interval 18 threshold	29900
11777	11856	A80	Line 148:	Histogram Interval 19 threshold	30100
11857	11936	A80	Line 149:	Histogram Interval 20 threshold	30300
11937	12016	A80	Line 150:	Histogram Interval 21 threshold	30500
12017	12096	A80	Line 151:	Histogram Interval 22 threshold	30700
12097	12176	A80	Line 152:	Histogram Interval 23 threshold	30900
12177	12256	A80	Line 153:	Histogram Interval 24 threshold	31100
12257	12336	A80	Line 154:	Histogram Interval 25 threshold	31300
12337	12416	A80	Line 155:	OUTPUTS SUMMARY FILE	
12417	12496	A80	Line 156:	OUTPUTS DESCRIPTOR RECORD	
12497	12576	A80	Line 157:	Number of output files in report	2
12577	12656	A80	Line 158:	Number of output summary records	2
12657	12736	A80	Line 159:	No. actual output files with report	2
12737	12816	A80	Line 160:	OUTPUT SUMMARY RECORD #1	
12817	12896	A80	Line 161:	Outputs generic name	Summary Quality Flags
12897	12976	A80	Line 162:	Outputs summary name	SST Image QA Flags
12977	13056	A80	Line 163:	No of different record formats in output	1
13057	13136	A80	Line 164:	Frequency of output file records	Per Internal Product
13137	13216	A80	Line 165:	Number of output file records	1
13217	13296	A80	Line 166:	No. parameters in outputs record #1	4
13297	13376	A80	Line 167:	Outputs stored with report	Y
13377	13456	A80	Line 168:	OUTPUT SUMMARY RECORD #2	
13457	13536	A80	Line 169:	Outputs generic name	Total Summary Quality Flag
13537	13616	A80	Line 170:	Outputs summary name	SST Image Quality Flag
13617	13696	A80	Line 171:	No of different record formats in output	1
13697	13776	A80	Line 172:	Frequency of output file records	Per Internal Product
13777	13856	A80	Line 173:	Number of output file records	1
13857	13936	A80	Line 174:	No. parameters in outputs record #2	1
13937	14016	A80	Line 175:	Outputs stored with report	Y
14017	14096	A80	Line 176:	OUTPUT FILE FORMATS	
14097	14176	A80	Line 177:	Output name #1	Summary Quality Flags
14177	14256	A80	Line 178:	Corrupt image	N
14257	14336	A80	Line 179:	Image with low contrast	Y
14337	14416	A80	Line 180:	Image with high contrast	N
14417	14496	A80	Line 181:	Location failure	N
14497	14576	A80	Line 182:	Output name #2	Total Summary Quality Flags
14577	14656	A80	Line 183:	Image failure summary	Y

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	63	192	18	18	7680

Imagery File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	7680
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
13	45	48	I4	File Number	2
14	49	64	A16	File Name	'ERS1.ATS.SSTIMOP'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4

18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'
25	114		A1	Other has Data Interpretation information included	'N'
26	115		A1	Descriptor has Data Display information included	'Y'
27	116		A1	Other has Data Display information included	'N'
28	117	180	A64	Reserved Segment	
	181	EOR		File Descriptor Record Variable Segment	
				~~	
29	181	186	I6	Number of Image(Data) records	512
30	187	192	I6	Length of Image(Data) record	7680
31	193	216	A24	Reserved	
	217	232		Pixel Group Parameters (N/A for LINN format)	
				~~	
32	217	220	I4	Number of Bits/Pixel	
33	221	224	I4	Number of Pixels/Data Group	
34	225	228	I4	Number of Bytes/Data Group	
35	229	232	A4	Pixel Justification & Order in Data Group	
	233	272		Image Parameters	
				~~	
36	233	236	I4	Number of Bands of Image(Data)	1
37	237	244	I8	Number of Lines(Data pts) in file	512
38	245	248	I4	Number of Left Border Pixels	0
39	249	256	I8	Number of Image Pixels/Line	512
40	257	260	I4	Number of Right Border Pixels	0
41	261	264	I4	Number of Top Border Pixels	0
42	265	268	I4	Number of Bottom Border Pixels	0
43	269	272	A4	Interleaving Indicator	'LI01'
	273	296		Record Parameters	
				~~	

44	273	274	I2	Number of Physical records/Line	1
45	275	276	I2	Physical recs/Multispectral Line	1
46	277	280	I4	Bytes of Prefix data per record	24
47	281	288	I8	Bytes of data per record	2560
48	289	292	I4	Bytes of Suffix data per record	4644
49	293	296	I4	Prefix/Suffix Repeat Flag	
	297	432		Prefix/Suffix Locators	
				The 8 byte Locator string is constructed as :- Bytes 1..4 - Start byte number of field within prefix/suffix Bytes 5..6 - Byte Length of field (lengths > 99 are set to 99) Byte 7 - P for prefix, S for suffix Byte 8 - Field data type; A (ASCII),B (binary),N (Numeric)	
50	297	304	A8	Scan Line Number Locator	1 4PB
51	305	312	A8	Image (Band) Number Locator	
52	313	320	A8	Time of Scan Line Locator	13 4PB
53	321	328	A8	Left Fill Count Locator	17 4PB
54	329	336	A8	Right Fill Count Locator	21 4PB
55	337	344	A8	Pad Pixels Present Indicator	
56	345	368	A24	Blanks	
57	369	376	A8	Scan Line Quality Code Locator	1 4SB
58	377	384	A8	Calibration Information Locator	
59	385	392	A8	Gains Value Field Locator	
60	393	400	A8	Offset Values Locator	
61	401	432	A32	Reserved	
	433	464		Pixel Data Description (N/A for LINN)	
62	433	436	I4	Number of Left Fill Bits/Pixels	
63	437	440	I4	Number of Right Fill Bits/Pixels	
64	441	448	I8	Max Unsigned Data Range of Pixel	
65	449	456	A8	Left Fill Pixel Bits data description	
66	457	464	A8	Right Fill Pixel Bits data description	
	465	468		LINN Description	
67	465	468	I4	Number of Bands/Line for LINN	1

	469	708		LINN Pixel Group Data	
				~~	
Band 1					
68	469	472	I4	Number of Bits/Pixel	16
69	473	476	I4	Number of Pixels/Data Group	1
70	477	480	I4	Number of Bytes/Data Group	2
71	481	484	A4	Pixel Justification & Order in Data Group	'RJLR'
Band 2					
72	485	488	I4	Number of Bits/Pixel	
73	489	492	I4	Number of Pixels/Data Group	
74	493	496	I4	Number of Bytes/Data Group	
75	497	500	A4	Pixel Justification & Order in Data Group	
Band 3					
76	501	504	I4	Number of Bits/Pixel	
77	505	508	I4	Number of Pixels/Data Group	
78	509	512	I4	Number of Bytes/Data Group	
79	513	516	A4	Pixel Justification & Order in Data Group	
Band 4					
80	517	520	I4	Number of Bits/Pixel	
81	521	524	I4	Number of Pixels/Data Group	
82	525	528	I4	Number of Bytes/Data Group	
83	529	532	A4	Pixel Justification & Order in Data Group	
	533	628		LINN Pixel Data Description Data	
				~~	
Band 1					
84	533	536	I4	Number of Left Fill Bits/Pixels	0
85	537	540	I4	Number of Right Fill Bits/Pixels	0
86	541	548	I8	Max Unsigned Data Range of Pixel	31300
87	549	556	A8	Spare	
Band 2					
88	557	560	I4	Number of Left Fill Bits/Pixels	
89	561	564	I4	Number of Right Fill Bits/Pixels	
90	565	572	I8	Max Unsigned Data Range of Pixel	
91	573	580	A8	Spare	

```
Band 3
 92   581   584      I4  Number of Left  Fill Bits/Pixels
 93   585   588      I4  Number of Right Fill Bits/Pixels
 94   589   596      I8  Max Unsigned Data Range of Pixel
 95   597   604      A8  Spare

Band 4
 96   605   608      I4  Number of Left  Fill Bits/Pixels
 97   609   612      I4  Number of Right Fill Bits/Pixels
 98   613   620      I8  Max Unsigned Data Range of Pixel
 99   621   628      A8  Spare

100   629   636      A8  Flags Bytes
                         <cccSCLB >, where :-
                           ccc - Classification at bits 0-2
                                 Six classes are defined :-
                                   1 - Land
                                   2 - Sea
                                   3 - Cloud
                                   4 - Sunglint
                                   5 - Ice/Snow
                                   6 - Other
                          S - State Boundary      at bit 3
                          C - Coastline           at bit 4
                          C - Lat/Long Grid       at bit 5
                          B - Blanking pulse Flag at bit 6
```

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	50	23	34	50	7680

SST Imagery File: Image Record

Field name	Start byte	Last byte	Format	Description	Content
	1	12		Record Identification Segment	

1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	50
3	6		B1	Record Code	23
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	7680
	13	36		SST Line Prefix Data	
7	13	16	B4	Scan Line Number	1
8	17	20	B4	Channel Number	0
9	21		B1	Grid Contents Indicators : State Boundary	0
	22		B1	Coastline Grid	0
	23		B1	Latitude/Longitude Grid	0
	24		B1	Class	0
10	25	28	B4	Station Time UT (Millisecond Of Day)	-1
11	29	32	B4	Number of Left Fill pixels	0
12	33	36	B4	Number of Right Fill pixels	0
	37	2596		SST Image Data	
13	37	1060	512B2	Sea Surface Temperatures (K X 100)	
				[1..13] 25439 25429 25457 25452 25457 25439 25448 25470 25471 25514 25496 25508 25506	
				[495..507] 28076 27054 27299 27581 27237 27312 27187 27166 27119 27166 27166 27172 27166	
				[508..512] 27177 27172 27166 27161 27156	
14	1061	1572	512B1	Surface Flags	
				[1..20] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
				[481..500] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
				[501..512] 0 0 0 0 0 0 0 0 0 0 0 0	
15	1573	2596	512B2	Composite Quality Flags	
				[1..11] 0x05a7 0x05a7 0x05a7 0x05a7 0x45a7 0x05a7 0x85a7 0x05a7 0x05a7 0x05a7 0x05a7	
				[496..506] 0x07a3 0x07a5 0x87a7 0x07a7 0x07a7 0x07a7 0x06a6 0x86a6 0x46a6 0x07a7 0x07a7	
				[507..512] 0x07a4 0x07a7 0x86a6 0x07a4 0x07a4 0x07a4	
	2597	2632		SST Line Suffix Data	

16	2597	2600	B4	Scan Line quality	0
17	2601	2620	A20	Spare	
18	2621	2624	B4	Line length of one band	512
19	2625	2628	B4	Satellite Time Code (MJD)	-1
	2629	2632	B4	(Millisecond Of Day)	-1
	2633	EOR		SST Earth Location Data	

20	2633	4680	512B4	Pixel Latitudes (microdegrees)							
				[1..7]	78739000	78747000	78756000	78764000	78773000	78782000	78790000
				[505..511]	82941000	82949000	82957000	82965000	82973000	82981000	82989000
				[512..512]							82997000
21	4681	6728	512B4	Pixel Longitudes (microdegrees)							
				[1..7]	-35565000	-35578000	-35591000	-35604000	-35617000	-35629000	-35642000
				[505..511]	-45941000	-45973000	-46005000	-46038000	-46072000	-46105000	-46139000
				[512..512]							-46173000

22	6729	7240	512B1	Pixel X/Y Offsets												
				[1..16]	0x56	0x83	0xfd	0x3b	0x68	0xa5	0xd2	0x5d	0x9a	0xd8	0x15	0x52	0xdd	0x1b	0x58	0xa6
				[497..512]	0xc4	0x72	0xfd	0xbb	0x68	0x26	0xe4	0xa1	0x2c	0xe9	0xa7	0x64	0x22	0xad	0x6a	0x37

23	7241	7680	A440	Spare
	7241	7330		
	7331	7420		
	7421	7510		
	7511	7600		
	7601	7680		

CEOS codes

Record No	Sequence No	File	Record	Mission	Origin	Length	
3	3	50	23	34	50	7680	
:	:	"	"	"	"	"	(for 510 records)
513	513	50	23	34	50	7680	

SST Imagery File: Image Record

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	63	192	18	18	4128

Trailer File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	4128
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
13	45	48	I4	File Number	3
14	49	64	A16	File Name	'ERS1.ATS.SSTTRAI'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5

20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'
25	114		A1	Other has Data Interpretation information included	'N'
26	115		A1	Descriptor has Data Display information included	'Y'
27	116		A1	Other has Data Display information included	'N'
28	117	180	A64	Reserved Segment	
	181	EOR		File Descriptor - Variable Segment	
				~~	
29	181	186	I6	Number of trailer records	4
30	187	192	I6	Trailer Record Length	4128

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	1
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
				~~	

9	21	4020	1000B4	Histogram of Raw Data for Channel								
				[1..7]	0	0	0	0	0	0	0	
				[988..994]	0	0	0	0	0	0	0	
				[995..1000]		0	0	0	0	0	0	
10	4021	4024		B4 Pixel increment for Histogram								1
11	4025	4028		B4 Line increment for Histogram								1
12	4029	4032		B4 Parity Error Count								0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
3	3	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	2
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7]	0 0 0 0 0 0 0
				[988..994]	0 0 0 0 0 0 0
				[995..1000]	0 0 0 0 0 0 0

10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
4	4	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	3
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7] 0 0 0 0 0 0 0	
				[988..994] 0 0 0 0 0 0 0	
				[995..1000] 0 0 0 0 0 0 0	
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
5	5	90	10	34	50	4128

ATS Trailer File: Trailer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	20		Record Identification Segment	
1	1	4	B4	Record Sequence Number	5
2	5		B1	File Code	90
3	6		B1	Record Code	10
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	4128
7	13	16	I4	Trailer Record Sequence Number	4
8	17	20	A4	Reserved	
	21	EOR		Trailer Data	
9	21	4020	1000B4	Histogram of Raw Data for Channel	
				[1..7]	0 0 0 0 0 0 0
				[988..994]	0 0 0 0 0 0 0
				[995..1000]	0 0 0 0 0 0 0
10	4021	4024	B4	Pixel increment for Histogram	1
11	4025	4028	B4	Line increment for Histogram	1
12	4029	4032	B4	Parity Error Count	0

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	192	192	63	18	360

Null Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	63
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
13	45	60	A16	Physical Tape Id	' UP600344'
14	61	76	A16	Logical Set Id	'E01R 95110154901'
15	77	92	A16	Volume Set Id	' UP600344'
16	93	94	I2	Physical Volumes in Logical Set	1
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1
20	101	104	I4	1st File within Physical Volume	1
21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	'19950420'
24	121	128	A8	Volume Creation Time	'15494872'
25	129	140	A12	Generating country	' UK'

26	141	148	A8	Generating agency	'ESA'
27	149	160	A12	Generating facility	'UK-PAF'
28	161	164	I4	Number of Pointer Records	0
29	165	168	I4	Number of Records in Directory	1
30	169	172	I4	Logical Volumes in Physical Set	71
31	173	260	A88	Spare Segment	
	173	260		'	'
32	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			'

ANNEX C ATS.PST CEOS FORMAT

Tape Structure

Volume Directory File	Volume Descriptor Record
	PST Leader File Pointer Record
	PST Imagery File Pointer Record
	Text Record
PST Leader File	File Descriptor Record
	EODC Product Quality Summary Record
PST Imagery File	File Descriptor Record
	PST Data File
Null Volume Directory File	Volume Descriptor Record

Format	Meaning	Example
A	field contains ASCII characters	$$$ERS-1
B	field contains unformatted binary integer	Represented numerically e.g 256
D	Field contains formatted (ASCII) double precision floating point number	45.88888888888888888
F	Field contains formatted (ASCII) floating point number	27.678
I	Field contains formatted (ASCII) integer	256

The $ symbol indicates the presence of an ASCII character, or an ASCII blank.

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
1	1	192	192	18	18	360

Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
13	45	60	A16	Physical Tape Id	' UP600373'
14	61	76	A16	Logical Set Id	'E01R 95165082801'
15	77	92	A16	Volume Set Id	' UP600373'
16	93	94	I2	Physical Volumes in Logical Set	1
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1
20	101	104	I4	1st File within Physical Volume	1

21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	'19950614'
24	121	128	A8	Volume Creation Time	'08284223'
25	129	140	A12	Generating country	'UK'
26	141	148	A8	Generating agency	'ESA'
27	149	160	A12	Generating facility	'UK-PAF'
28	161	164	I4	Number of Pointer Records	2
29	165	168	I4	Number of Records in Directory	4
30	169	172	I4	Logical Volumes in Physical Set	141
31	173	260	A88	Spare Segment	
	173	260			
32	261	360	A100	Local Use Segment	
	261	350			
	351	360			

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	
2	5		B1	File Code	2
3	6		B1	Record Code	219
4	7		B1	Mission Code	192
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	18
7	13	14	A2	ASCII/EBCDIC Flag	360
8	15	16	A2	Reserved	'A '
					' '
	17	360		File Identification Segment	

9	17	20	I4	File Number	1
10	21	36	A16	File Name	'ERS1.ATS.PSTLEAD'
11	37	64	A28	File Class	'ATS LEADER FILE '
12	65	68	A4	File Class Code	'ATSL'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	2
16	109	116	I8	File 1st Record Size	5120
17	117	124	I8	File Maximum Record Size	10736
18	125	136	A12	File Record Length Type	'VARIABLE LEN'
19	137	140	A4	File Record Length Type Code	'VARE'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	2
24	161	260	A100	Record Pointer Spare Segment	
	161	250			
	251	260			
25	261	360	A100	Local Use Segment	
	261	350			
	351	360			

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
3	3	219	192	18	18	360

Volume Directory File: File Pointer Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	3
2	5		B1	File Code	219
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360

7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	360		File Identification Segment	
				~~	
9	17	20	I4	File Number	2
10	21	36	A16	File Name	'ERS1.ATS.PSTIMOP'
11	37	64	A28	File Class	'ATS DATA FILE '
12	65	68	A4	File Class Code	'IMOP'
13	69	96	A28	File Data Type	'MIXED BINARY AND ASCII '
14	97	100	A4	File Data Type Code	'MBAA'
15	101	108	I8	Number of Records in File	6
16	109	116	I8	File 1st Record Size	12288
17	117	124	I8	File Maximum Record Size	12288
18	125	136	A12	File Record Length Type	'FIXED LENGTH'
19	137	140	A4	File Record Length Type Code	'FIXD'
20	141	142	I2	File Starts on Physical Volume	1
21	143	144	I2	File Ends on Physical Volume	1
22	145	152	I8	File 1st Record on this Physical Volume	1
23	153	160	I8	File last Record on this Physical Volume	6
24	161	260	A100	Record Pointer Spare Segment	
	161	250		'	'
	251	260			' '
25	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
4	4	18	63	18	18	360

Volume Directory File: Text Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	

1	1	4	B4	Record Sequence Number	4
2	5		B1	File Code	18
3	6		B1	Record Code	63
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Continuation Flag	' '
	17	360		Product Identification Segment	
				~~	
9	17	56	A40	Product Id Segment	'PRODUCT:E01R 95165082801 UK-PAF '
10	57	116	A60	Product Location/Date-Time	'PROCESS.UK.ESA.UKPAF.1995061408284223 '
11	117	156	A40	Physical Volume Identification	'TAPE ID:UP600373 , TAPE 01 OF 01 '
12	157	196	A40	Scene Identification	'ORBIT : 18147 D950103-T162903 '
13	197	236	A40	Scene Location	'STRIP :N 27.25 W 82.75 TO:N 71.75 E 38.2'
14	237	256	A20	Spares	' '
15	257	360	A104	Spares	
	257	346		'	'
	347	360			'

Record No	Sequence No	File	Record	Mission	Origin	Length
		CEOS codes				
1	1	63	192	18	18	5120

Leader File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
				~~	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	5120

7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment	
				~~	
13	45	48	I4	File Number	1
14	49	64	A16	File Name	'ERS1.ATS.PSTLEAD'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	'Y'
25	114		A1	Other has Data Interpretation information included	'N'
26	115		A1	Descriptor has Data Display information included	'N'
27	116		A1	Other has Data Display information included	'N'
28	117	180	A64	Reserved Segment	'
	181	EOR		File Descriptor Variable Segment	
				~~	
29	181	186	I6	Number of Scene Header records	
30	187	192	I6	Length of Scene Header record	
31	193	198	I6	Number of Ancillary records	
32	199	204	I6	Length of Ancillary record	
33	205	210	I6	Number of Annotation records	
34	211	216	I6	Length of Annotation record	
	217	360		Locator Fields	
				~~	

35	217	232	A16	Scene Id	Field Locator	
36	233	248	A16	Mission Id	Field Locator	
37	249	264	A16	Sensor Id	Field Locator	
38	265	280	A16	Exposure Date-Time	Field Locator	
39	281	296	A16	Geographic Reference	Field Locator	
40	297	312	A16	Image Processing Performed	Field Locator	
41	313	328	A16	Image Format Indicator	Locator	
42	329	344	A16	Band Indicator	Locator	
43	345	360	A16	Reserved		
44	361	376	A16	Reserved		
45	377	382	I6	Number of Image Header records		0
46	383	388	I6	Length of Image Header record		0
47	389	394	I6	Number of Image Map Projection records		0
48	395	400	I6	Length of Image Map Projection record		0
49	401	406	I6	Number of Ground Control Points records		
50	407	412	I6	Length of Ground Control Points record		
51	413	418	I6	Number of Orbit/Attitude records		0
52	419	424	I6	Length of Orbit/Attitude record		0
53	425	430	I6	Number of Image Grid records		
54	431	436	I6	Length of Image Grid record		
55	437	442	I6	Number of EODC PQSR records		1
56	443	448	I6	Length of EODC PQSR record		10736

CEOS codes						
Record No	Sequence No	File	Record	Mission	Origin	Length
2	2	10	94	34	50	10736

PST Leader File: EODC Product Quality Summary Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	10
3	6		B1	Record Code	94

4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	10736
7	13	16	I4	EODC PQSR Record Sequence Number	1
	17	EOR		EODC Product Quality Report	

	17	96	A80	Line	1:	Number of QA lines in QA report	133
	97	176	A80	Line	2:	REPORT SUMMARY FILE	
	177	256	A80	Line	3:	REPORT SUMMARY DESCRIPTOR RECORD	
	257	336	A80	Line	4:	Report identifier	UK.ATS.QR07
	337	416	A80	Line	5:	Report name	ATS Average SST Product QA Report
	417	496	A80	Line	6:	Date generated	14-Jun-1995 08:28:42
	497	576	A80	Line	7:	Covers period starting	03-Jan-1995 16:29:03
	577	656	A80	Line	8:	Covers period ending	03-Jan-1995 17:48:07
	657	736	A80	Line	9:	Generation source	SADIST A600 ASST Post-processed
	737	816	A80	Line	10:	Generation source algorithm	SADIST+PST
	817	896	A80	Line	11:	Report documentation specification no.	DC-DO-NRL-SE-0002
	897	976	A80	Line	12:	Are data sets included	Y
	977	1056	A80	Line	13:	Are results files included	Y
	1057	1136	A80	Line	14:	Are outputs included	Y
	1137	1216	A80	Line	15:	Text record	routine%501031546_12007_50613_a600.ASST
	1217	1296	A80	Line	16:	RESULTS SUMMARY FILE	
	1297	1376	A80	Line	17:	RESULTS DESCRIPTOR RECORD	
	1377	1456	A80	Line	18:	Number of results files in report	3
	1457	1536	A80	Line	19:	Number of results summary records	3
	1537	1616	A80	Line	20:	No. of actual results files with report	3
	1617	1696	A80	Line	21:	RESULTS SUMMARY RECORD #1	
	1697	1776	A80	Line	22:	Results generic name	Quality Flags
	1777	1856	A80	Line	23:	Results summary name	SST QA Flags
	1857	1936	A80	Line	24:	No of different record formats in result	1
	1937	2016	A80	Line	25:	Frequency of results file records	Per Internal Product
	2017	2096	A80	Line	26:	Number of results file records	1
	2097	2176	A80	Line	27:	No. parameters in results record #1	12
	2177	2256	A80	Line	28:	Results stored with report	Y
	2257	2336	A80	Line	29:	RESULTS SUMMARY RECORD #2	
	2337	2416	A80	Line	30:	Results generic name	Measured Values of Quality Parameters
	2417	2496	A80	Line	31:	Results summary name	SST QA Statistics
	2497	2576	A80	Line	32:	No of different record formats in result	1
	2577	2656	A80	Line	33:	Frequency of results file records	Per Internal Product
	2657	2736	A80	Line	34:	Number of results file records	1

2737	2816	A80	Line	35:	No. parameters in results record #2	40
2817	2896	A80	Line	36:	Results stored with report	Y
2897	2976	A80	Line	37:	RESULTS SUMMARY RECORD #3	
2977	3056	A80	Line	38:	Results generic name	Thresholds for Quality Parameters
3057	3136	A80	Line	39:	Results summary name	SST QA Parameters
3137	3216	A80	Line	40:	No of different record formats in result	1
3217	3296	A80	Line	41:	Frequency of results file records	Per Internal Product
3297	3376	A80	Line	42:	Number of results file records	1
3377	3456	A80	Line	43:	No. parameters in results record #3	9
3457	3536	A80	Line	44:	Results stored with report	Y
3537	3616	A80	Line	45:	RESULTS FILE FORMATS	
3617	3696	A80	Line	46:	Results name #1	Quality Flags
3697	3776	A80	Line	47:	Product failure summary	N
3777	3856	A80	Line	48:	All 30 arcmin cells over land/cloud	N
3857	3936	A80	Line	49:	Suspect Product - Inconsistent SST	N
3937	4016	A80	Line	50:	Invalid product - Inconsistent SST	N
4017	4096	A80	Line	51:	Invalid product - Mean SST out of range	N
4097	4176	A80	Line	52:	Invalid product - High Std Deviation	N
4177	4256	A80	Line	53:	High 10am Standard Deviation	N
4257	4336	A80	Line	54:	Cell failure summary	Y
4337	4416	A80	Line	55:	Suspect Cell - Inconsistent SST	Y
4417	4496	A80	Line	56:	Invalid Cell - Inconsistent SST	Y
4497	4576	A80	Line	57:	Invalid Cell - High Std Deviation	Y
4577	4656	A80	Line	58:	Invalid Cell - SST out of range	N
4657	4736	A80	Line	59:	Results name #2	Measured Values of Quality Parameters
4737	4816	A80	Line	60:	Minimum SST value	26947
4817	4896	A80	Line	61:	Maximum SST value	30187
4897	4976	A80	Line	62:	Number of maximum 30 arcmin SST values	0
4977	5056	A80	Line	63:	Number of minimum 30 arcmin SST values	0
5057	5136	A80	Line	64:	Mean single/dual view difference	-28
5137	5216	A80	Line	65:	Std Dev of single/dual view diff	41
5217	5296	A80	Line	66:	Max single/dual view difference	144
5297	5376	A80	Line	67:	Mean Std deviation of 10 arcmin cells	32
5377	5456	A80	Line	68:	Southernmost latitude	-71.8
5457	5536	A80	Line	69:	Northernmost latitude	71.8
5537	5616	A80	Line	70:	Easternmost longitude	99.8
5617	5696	A80	Line	71:	Westernmost longitude	-115.8
5697	5776	A80	Line	72:	Mean SST value	29417
5777	5856	A80	Line	73:	Std Dev in 30 arcmin SST	750
5857	5936	A80	Line	74:	Mean No. of 10am cells in 30am cells	4.9
5937	6016	A80	Line	75:	Mean No. of dual-only 10am cells in 30am	4.1
6017	6096	A80	Line	76:	Number of 30 arcmin SST values	1417
6097	6176	A80	Line	77:	0 10 arcmin cells in 30 arcmin cells	0

6177	6256	A80	Line	78:	1 10 arcmin cells in 30 arcmin cells	231
6257	6336	A80	Line	79:	2 10 arcmin cells in 30 arcmin cells	172
6337	6416	A80	Line	80:	3 10 arcmin cells in 30 arcmin cells	156
6417	6496	A80	Line	81:	4 10 arcmin cells in 30 arcmin cells	118
6497	6576	A80	Line	82:	5 10 arcmin cells in 30 arcmin cells	116
6577	6656	A80	Line	83:	6 10 arcmin cells in 30 arcmin cells	150
6657	6736	A80	Line	84:	7 10 arcmin cells in 30 arcmin cells	76
6737	6816	A80	Line	85:	8 10 arcmin cells in 30 arcmin cells	130
6817	6896	A80	Line	86:	9 10 arcmin cells in 30 arcmin cells	268
6897	6976	A80	Line	87:	30am cells with 12um channel on	1417
6977	7056	A80	Line	88:	30am cells with 11um channel on	1417
7057	7136	A80	Line	89:	30am cells with 3.7um channel on	0
7137	7216	A80	Line	90:	30am cells with 1.6um channel on	1118
7217	7296	A80	Line	91:	30am cells cloud clearing used 1.6um	660
7297	7376	A80	Line	92:	30am cells cloud cleared with Dyn Thrsh	19
7377	7456	A80	Line	93:	30am cells with sunglint	322
7457	7536	A80	Line	94:	30am cells with SST from 3.7um chan alg	0
7537	7616	A80	Line	95:	30am cells with SST from day-time data	660
7617	7696	A80	Line	96:	Results name #3	Thresholds for Quality Parameters
7697	7776	A80	Line	97:	Minimum SST value	15000
7777	7856	A80	Line	98:	Maximum SST value	31800
7857	7936	A80	Line	99:	Max single/dual view diff for 30am cell	150
7937	8016	A80	Line	100:	Maximum 10am SST Standard Deviation	100
8017	8096	A80	Line	101:	Maximum mean 10am SST Standard Deviation	50
8097	8176	A80	Line	102:	Maximum 30am SST Standard Deviation	3000
8177	8256	A80	Line	103:	Mean single/dual difference	50
8257	8336	A80	Line	104:	Maximum single/dual view difference	150
8337	8416	A80	Line	105:	OUTPUTS SUMMARY FILE	
8417	8496	A80	Line	106:	OUTPUTS DESCRIPTOR RECORD	
8497	8576	A80	Line	107:	Number of output files in report	2
8577	8656	A80	Line	108:	Number of output summary records	2
8657	8736	A80	Line	109:	No. actual output files with report	2
8737	8816	A80	Line	110:	OUTPUT SUMMARY RECORD #1	
8817	8896	A80	Line	111:	Outputs generic name	Summary Quality Flags
8897	8976	A80	Line	112:	Outputs summary name	Average SST Image QA Flags
8977	9056	A80	Line	113:	No of different record formats in output	1
9057	9136	A80	Line	114:	Frequency of output file records	Per Internal Product
9137	9216	A80	Line	115:	Number of output file records	1
9217	9296	A80	Line	116:	No. parameters in outputs record #1	5
9297	9376	A80	Line	117:	Outputs stored with report	Y
9377	9456	A80	Line	118:	OUTPUT SUMMARY RECORD #2	
9457	9536	A80	Line	119:	Outputs generic name	Total Summary Quality Flag
9537	9616	A80	Line	120:	Outputs summary name	Average SST Image Quality Flag

9617	9696	A80	Line 121:	No of different record formats in output	1
9697	9776	A80	Line 122:	Frequency of output file records	Per Internal Product
9777	9856	A80	Line 123:	Number of output file records	1
9857	9936	A80	Line 124:	No. parameters in outputs record #2	1
9937	10016	A80	Line 125:	Outputs stored with report	Y
10017	10096	A80	Line 126:	OUTPUT FILE FORMATS	
10097	10176	A80	Line 127:	Output name #1	Summary Quality Flags
10177	10256	A80	Line 128:	All 30 arcmin cells over land/cloud	N
10257	10336	A80	Line 129:	Invalid product - Inconsistent SST	N
10337	10416	A80	Line 130:	Invalid product - Mean SST out of range	N
10417	10496	A80	Line 131:	Invalid product - High Std Deviation	N
10497	10576	A80	Line 132:	Cell failure summary	Y
10577	10656	A80	Line 133:	Output name #2	Total Summary Quality Flags
10657	10736	A80	Line 134:	Product failure summary	N

CEOS codes

Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	63	192	18	18	12288

Imagery File: File Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	63
3	6		B1	Record Code	192
4	7		B1	Mission Code	18
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	12288
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '
	17	44		Volume Documentation Segment	

9	17	28	A12	Control Document Id	' '
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	180		File Descriptor Record Fixed Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
13	45	48	I4	File Number	2
14	49	64	A16	File Name	'ERS1.ATS.PSTIMOP'
15	65	68	A4	Record Sequence and Location Type Flag	'FSEQ'
16	69	76	I8	Sequence Number Location	1
17	77	80	I4	Sequence Number Field Length	4
18	81	84	A4	Record Code and Location Type	'FTYP'
19	85	92	I8	Record Code Location	5
20	93	96	A4	Record Code Field Length	' 4'
21	97	100	A4	Record Length and Location Type	'FLGT'
22	101	108	I8	Record Length Location	9
23	109	112	I4	Record Length Field Length	4
24	113		A1	Descriptor has Data Interpretation information included	' '
25	114		A1	Other has Data Interpretation information included	' '
26	115		A1	Descriptor has Data Display information included	' '
27	116		A1	Other has Data Display information included	' '
28	117	180	A64	Reserved Segment	' '
	181	EOR		File Descriptor Record Variable Segment ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
29	181	186	I6	Number of Image(Data) records	5
30	187	192	I6	Length of Image(Data) record	12288
31	193	216	A24	Reserved	' '
	217	232		Pixel Group Parameters (N/A for LINN format) ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
32	217	220	I4	Number of Bits/Pixel	
33	221	224	I4	Number of Pixels/Data Group	
34	225	228	I4	Number of Bytes/Data Group	
35	229	232	A4	Pixel Justification & Order in Data Group	' '
	233	272		Image Parameters ~~~~~~~~~~~~~~~~	

36	233	236	I4	Number of Bands of Image(Data)	1
37	237	244	I8	Number of Lines(Data pts) in file	1417
38	245	248	I4	Number of Left Border Pixels	
39	249	256	I8	Number of Image Pixels/Line	
40	257	260	I4	Number of Right Border Pixels	
41	261	264	I4	Number of Top Border Pixels	
42	265	268	I4	Number of Bottom Border Pixels	
43	269	272	A4	Interleaving Indicator	
	273	296		Record Parameters	
				~~	
44	273	274	I2	Number of Physical records/Line	
45	275	276	I2	Physical recs/Multispectral Line	
46	277	280	I4	Bytes of Prefix data per record	0
47	281	288	I8	Bytes of data per record	12276
48	289	292	I4	Bytes of Suffix data per record	0
49	293	296	I4	Prefix/Suffix Repeat Flag	
	297	432		Prefix/Suffix Locators	
				~~	
				The 8 byte Locator string is constructed as :-	
				Bytes 1..4 - Start byte number of field within prefix/suffix	
				Bytes 5..6 - Byte Length of field (lengths > 99 are set to 99)	
				Byte 7 - P for prefix, S for suffix	
				Byte 8 - Field data type; A (ASCII),B (binary),N (Numeric)	
50	297	304	A8	Scan Line Number Locator	
51	305	312	A8	Image (Band) Number Locator	
52	313	320	A8	Time of Scan Line Locator	
53	321	328	A8	Left Fill Count Locator	
54	329	336	A8	Right Fill Count Locator	
55	337	344	A8	Pad Pixels Present Indicator	
56	345	368	A24	Blanks	
57	369	376	A8	Scan Line Quality Code Locator	
58	377	384	A8	Calibration Information Locator	
59	385	392	A8	Gains Value Field Locator	
60	393	400	A8	Offset Values Locator	
61	401	432	A32	Reserved	
	433	464		Pixel Data Description (N/A for LINN)	
				~~	

62	433	436	I4	Number of Left Fill Bits/Pixels
63	437	440	I4	Number of Right Fill Bits/Pixels
64	441	448	I8	Max Unsigned Data Range of Pixel
65	449	456	A8	Left Fill Pixel Bits data description
66	457	464	A8	Right Fill Pixel Bits data description
	465	468		LINN Description
				~~
67	465	468	I4	Number of Bands/Line for LINN
	469	708		LINN Pixel Group Data
				~~
Band 1				
68	469	472	I4	Number of Bits/Pixel
69	473	476	I4	Number of Pixels/Data Group
70	477	480	I4	Number of Bytes/Data Group
71	481	484	A4	Pixel Justification & Order in Data Group
Band 2				
72	485	488	I4	Number of Bits/Pixel
73	489	492	I4	Number of Pixels/Data Group
74	493	496	I4	Number of Bytes/Data Group
75	497	500	A4	Pixel Justification & Order in Data Group
Band 3				
76	501	504	I4	Number of Bits/Pixel
77	505	508	I4	Number of Pixels/Data Group
78	509	512	I4	Number of Bytes/Data Group
79	513	516	A4	Pixel Justification & Order in Data Group
Band 4				
80	517	520	I4	Number of Bits/Pixel
81	521	524	I4	Number of Pixels/Data Group
82	525	528	I4	Number of Bytes/Data Group
83	529	532	A4	Pixel Justification & Order in Data Group
	533	628		LINN Pixel Data Description Data
				~~

```
Band 1
 84    533    536      I4  Number of Left  Fill Bits/Pixels
 85    537    540      I4  Number of Right Fill Bits/Pixels
 86    541    548      I8  Max Unsigned Data Range of Pixel
 87    549    556      A8  Spare

Band 2
 88    557    560      I4  Number of Left  Fill Bits/Pixels
 89    561    564      I4  Number of Right Fill Bits/Pixels
 90    565    572      I8  Max Unsigned Data Range of Pixel
 91    573    580      A8  Spare

Band 3
 92    581    584      I4  Number of Left  Fill Bits/Pixels
 93    585    588      I4  Number of Right Fill Bits/Pixels
 94    589    596      I8  Max Unsigned Data Range of Pixel
 95    597    604      A8  Spare

Band 4
 96    605    608      I4  Number of Left  Fill Bits/Pixels
 97    609    612      I4  Number of Right Fill Bits/Pixels
 98    613    620      I8  Max Unsigned Data Range of Pixel
 99    621    628      A8  Spare

100    629    636      A8  Flags Bytes
                            <cccSCLB >, where :-
                              ccc - Classification at bits 0-2
                                    Six classes are defined :-
                                      1 - Land
                                      2 - Sea
                                      3 - Cloud
                                      4 - Sunglint
                                      5 - Ice/Snow
                                      6 - Other
                              S - State Boundary      at bit 3
                              C - Coastline           at bit 4
                              C - Lat/Long Grid       at bit 5
                              B - Blanking pulse Flag at bit 6
```

Record No	Sequence No	CEOS codes: File	Record	Mission	Origin	Length
2	2	50	14	34	50	12288

PST Data File: Data Record

Field name	Start byte	Last byte	Format	Description	Content
	1	12		Record Identification Segment	
1	1	4	B4	Record Sequence Number	2
2	5		B1	File Code	50
3	6		B1	Record Code	14
4	7		B1	Mission Code	34
5	8		B1	Origin Code	50
6	9	12	B4	Length of this record	12288
	13	EOR		PST Data	

For each of 340 measurements:

First measurement:

7	13	16	B4	UTC days	16438
8	17	20	B4	UTC msecs	59343000
9	21	24	B4	Latitude (microdegrees)	27250000
10	25	28	B4	Longitude (microdegrees)	-82750000
11	29	30	B2	Mean across-track band number	4
12	31	32	B2	Best average sea surface temperature (K/100)	29271
13	33	34	B2	Dual-only average sea surface temperature (K/100)	29271
14	35	36	B2	Nadir average sea surface temperature (K/100)	29227
15	37	38	B2	Best SST Std Dev of 10 arcmin Cell (K/100)	-1
16	39	40	B2	Dual-only SST Std Dev of 10 arcmin Cell (K/100)	-1
17	41	42	B2	Nadir SST Std Dev of 10 arcmin Cell (K/100)	-1
18	43	44	B2	Mean nadir/dual 10 arcmin SST difference	44
19	45	48	B4	SST confidence Word	0x0000231b

Rest of measurements, fields 20 to 4972:

UTC days [2..9]	16438	16438	16438	16438	16438	16438	16438	16438
UTC days [330..337]	16438	16438	16438	16438	16438	16438	16438	16438
UTC days [338..340]						16438	16438	16438
UTC msecs [2..9]	59410000	59413000	59391000	59409000	59408000	59435000	59428000	59422000
UTC msecs [330..337]	59951000	59939000	59942000	59946000	59932000	59981000	59972000	59977000
UTC msecs [338..340]						59977000	59970000	59965000
Latitude [2..9]	24250000	24250000	24250000	24750000	24750000	22750000	22750000	22750000
Latitude [330..337]	-8250000	-7250000	-7250000	-7250000	-6750000	-9250000	-8750000	-8750000
Latitude [338..340]						-8750000	-8250000	-8250000
Longitude [2..9]	-88250000	-87750000	-83750000	-88250000	-87750000	-85750000	-85250000	-84750000
Longitude [330..337]	-92250000	-95750000	-95250000	-94750000	-95750000	-94250000	-94750000	-94250000
Longitude [338..340]						-93750000	-95250000	-94750000

Mean band number [2..15]	4	3	4	4	2	1	2	3	3	4	3	4	1	0
Mean band number [324..337]	0	1	2	4	3	4	3	4	4	3	4	0	2	0
Mean band number [338..340]												0	2	2

ASST - Best [2..15]	29818	29992	29680	29768	29956	29952	29884	29895	29884	29793	29834	29714	29881	29930
ASST - Best [324..337]	29582	29531	29387	29573	29658	29655	29582	29553	29618	29642	29440	29391	29462	29326
ASST - Best [338..340]												29359	29540	29553
ASST - Dual [2..15]	29769	29982	29680	-1	-1	29952	29884	29895	29884	29793	29803	29718	-1	29930
ASST - Dual [324..337]	-1	29447	29387	29488	29658	-1	29582	29553	29536	29626	29440	29357	29462	29326
ASST - Dual [338..340]												29359	-1	29508
ASST - Nadir [2..15]	29826	30008	29723	29768	29956	29973	29918	29932	29955	29860	29872	29770	29881	29963
ASST - Nadir [324..337]	29582	29596	29641	29693	29654	29655	29603	29723	29701	29706	29682	29519	29545	29524
ASST - Nadir [338..340]												29552	29540	29573

Std Dev - Best [2..15]	73	9	-1	-1	-1	33	15	13	-1	-1	72	23	-1	31
Std Dev - Best [324..337]	16	88	-1	107	-1	-1	-1	-1	112	51	83	94	-1	-1
Std Dev - Best [338..340]												-1	-1	-1
Std Dev - Dual [2..15]	-1	-1	-1	-1	-1	33	15	13	-1	-1	43	23	-1	31
Std Dev - Dual [324..337]	-1	61	-1	18	-1	-1	-1	-1	105	41	83	64	-1	-1
Std Dev - Dual [338..340]												-1	-1	-1
Std Dev - Nadir [2..15]	68	18	-1	-1	-1	21	5	18	-1	-1	45	42	-1	34
Std Dev - Nadir [324..337]	16	9	-1	24	-1	-1	-1	-1	11	7	13	13	-1	-1
Std Dev - Nadir [338..340]												-1	-1	-1

Mean SST diff [2..15]	-23	-48	-43	-1	-1	-20	-33	-37	-71	-67	-49	-68	-1	-33
Mean SST diff [324..337]	-1	-146	-254	-210	4	-1	-21	-170	-167	-80	-241	-159	-83	-198
Mean SST diff [338..340]												-193	-1	-40

Confidence Word [2..8]	0x00004d1b	0x0000273b	0x0000231b	0x0000033b	0x0000033b	0x0000cd1b	0x0000ef1b						
Confidence Word [331..337]	0x0000455b	0x00006d5b	0x00008b5b	0x0000675b	0x00008b5b	0x0000455b	0x0000455b						
Confidence Word [338..340]												0x0000235b	0x0000035b	0x0000255b

	CEOS codes					
Record No	Sequence No	File	Record	Mission	Origin	Length
3	3	50	14	34	50	12288
:	:	"	"	"	"	"
6	6	50	14	34	50	12288

(for 3 records)

PST Data File: Data Record

	CEOS codes					
Record No	Sequence No	File	Record	Mission	Origin	Length
1	1	192	192	63	18	360

Null Volume Directory File: Volume Descriptor Record

Field name	Start byte	Last byte	Format	Description	Content
	1	16		Record Identification Segment	
1	1	4	B4	Record Sequence Number	1
2	5		B1	File Code	192
3	6		B1	Record Code	192
4	7		B1	Mission Code	63
5	8		B1	Origin Code	18
6	9	12	B4	Length of this record	360
7	13	14	A2	ASCII/EBCDIC Flag	'A '
8	15	16	A2	Reserved	' '

	17	44		Volume Documentation Segment	
				~~	
9	17	28	A12	Control Document Id	'CBB-CCT-0002'
10	29	30	A2	Control Document Revision Number	' A'
11	31	32	A2	Format Revision Number	' A'
12	33	44	A12	Software Release Id	'UK-PAF V1.1 '
	45	360		Volume Identification Segment	
				~~	
13	45	60	A16	Physical Tape Id	' UP600373'
14	61	76	A16	Logical Set Id	'E01R 95166081201'
15	77	92	A16	Volume Set Id	' UP600373'
16	93	94	I2	Physical Volumes in Logical Set	1
17	95	96	I2	Physical Volume - Start	1
18	97	98	I2	Physical Volume - End	1
19	99	100	I2	Physical Volume - Sequence Id	1
20	101	104	I4	1st File within Physical Volume	1
21	105	108	I4	Logical Volume within Set	1
22	109	112	I4	Logical Volume within Physical	1
23	113	120	A8	Volume Creation Date	'19950615'
24	121	128	A8	Volume Creation Time	'08123167'
25	129	140	A12	Generating country	' UK'
26	141	148	A8	Generating agency	' ESA'
27	149	160	A12	Generating facility	' UK-PAF'
28	161	164	I4	Number of Pointer Records	0
29	165	168	I4	Number of Records in Directory	1
30	169	172	I4	Logical Volumes in Physical Set	141
31	173	260	A88	Spare Segment	
	173	260		'	'
32	261	360	A100	Local Use Segment	
	261	350		'	'
	351	360			' '