July 2000

NATIONAL LAND ARCHIVE PRODUCTION SYSTEM (NLAPS)
SYSTEMATIC FORMAT DESCRIPTION DOCUMENT
United States Geological Survey Format Specifications for Geometrically Corrected Landsat Level 1 Digital Data Products

Table of Contents

This document replaces the original NLAPS Systematic Format Description Document with NLAPS II version of processing examples referenced.

1.0 Introduction

This document describes the various data formats for the National Land Archive Processing System (NLAPS) produced geometrically corrected Landsat digital data products. The main emphasis is on Landsat satellite's 1 through 5 and 7 data, however NLAPS supports multiple sensors and formats. Currently, the United States Geological Survey's EROS Data Center (EDC) uses the NLAPS system to process data and produce products from data collected by the Landsat multispectral scanner (MSS) sensor, the thematic mapper (TM) sensor, and the enhanced thematic mapper plus (ETM+) sensor. The EDC offers six standard NLAPS digital product formats.

Specifically the document describes the NLAPS Data Format (NDF) for MSS, TM, and ETM+ data, the Hierarchical Data Format (HDF) for ETM+ data, the Fast L7A Data Format for ETM+ data, the Fast B Data Format for TM data, the Fast C Data Format for TM data, and the Geographic Tagged Image File Format (GeoTiff) for ETM+ data systematically corrected digital products.

1.1 General Format Definition

1.1.1 NLAPS Data Format (NDF) = MSS, TM, and ETM+ Data

The Landsat data are provided in NDF for radiometrically and geometrically corrected products. Data may be represented in both binary and American Standard Code for Information Interchange (ASCII) formats. Bit and byte ordering follow conventions set by the Institute of Electrical and Electronics Engineers (IEEE) with the term "byte" being synonymous with octet as used by the International Organization for Standardization. For more information on the National Land Processing System, see the following Web site: http://edcwww.cr.usgs.gov/glis/hyper/guide/nlaps.html

1.1.2 Hierarchical Data Format (HDF) = ETM+ Data

The Landsat-7 data are provided in HDF for radiometrically and geometrically corrected products. Data may be represented in both binary and American Standard Code for Information Interchange (ASCII) formats. Bit and byte ordering follow conventions set by the Institute of Electrical and Electronics Engineers (IEEE) with the term "byte" being synonymous with octet as used by the International Organization for Standardization.

For more information on HDF structures, visit the following Web sites:

HDFinfo at: http://www.scispy.com/

The National Center for Supercomputing Applications

HDF Home Page at: http://hdf.ncsa.uiuc.edu/

1.1.3 Fast L7A = ETM+ Data

The Landsat-7 data are provided in FAST-L7A for radiometrically and geometrically corrected products.

1.1.4 Fast B Format = TM Data Only

The Landsat TM data are provided in FAST B for radiometrically and geometrically corrected products. The FAST B Format volume set contains a header file, image files, and a trailer file. The trailer file provides additional information about the image data. Current ingest software can read the header and image files. Ingest software modification may be required to read the trailer file.

1.1.5 Fast C Format = TM Data

The Landsat data are provided in FAST C for radiometrically and geometrically corrected products.

1.1.6 Geographic Tagged Image File (GeoTIFF) = ETM+ Data

The Landsat data are provided in GeoTIFF for radiometrically and geometrically corrected products. GeoTIFF defines a set of publicly available TIFF tags that describe all cartographic and geodetic information associated with TIFF imagery. GeoTIFF is a means for tying a raster image to a known model space or map projection, and for describing those projections. The initial tags are followed by image data, that in turn, may be interrupted by more descriptive tags. By using the GeoTIFF format, both metadata and image data can be encoded into the same file.

1.2 General Format Composition

All field definitions follow the American National Standard Institute (ANSI) and International Organization for Standardization (ISO) standards. In addition, the CEOS Working Group On Information Systems and Services Data Subgroup's Guidelines On Standard Formats and Data Description Languages, Version 1.0 was considered in an effort to address customer usability issues.

1.2.1 NLAPS Data Format (NDF)

This product contains Landsat data files in standard National Land Archive Processing System Data Format (NDF) format. The Landsat 1, 2, and 3 satellites carried the multispectral scanner (MSS) sensor; the Landsat 4 and 5 satellites carries both the MSS and the thematic mapper (TM) sensors; and the Landsat-7 satellite carries the enhanced thematic mapper plus (ETM+) sensor. All three sensors are a part of an ongoing mission to provide quality remote sensing data in support of research and applications activities. Information on the Landsat 1 through 5 satellites is available at the Websites:

http://edcwww.cr.usgs.gov/nsdi/html/landsat_mss/landsat_mss
http://edcwww.cr.usgs.gov/nsdi/html/landsat_tm/landsat_tm

Information about the Landsat-7 satellite, the ETM+ sensor, and Landsat-7 data collection, is available in the "Landsat 7 Science Data Users Handbook" at the Web site:

http://edcwww.cr.usgs.gov/l7dhf/L7MMO/L7Documentation.html

1.2.2 Hierarchical Data Format (HDF)

This product contains Landsat 7 data files in standard Hierarchical Data Format (HDF) format. The Landsat-7 satellite carries the enhanced thematic mapper plus (ETM+) sensor and is part of an ongoing mission to provide quality remote sensing data in support of research and applications activities. Information on the Landsat-7 Program, including information about the Landsat-7 satellite, the ETM+ sensor, and Landsat-7 data collection, is available in the "Landsat 7 Science Data Users Handbook." The HDF files are described in detail in the "Level 1 Product Output Files Data Format Control Book, Volume 5, Book 2.

1.2.3 Fast L7A Format

This product contains Landsat 7 data files in FAST-L7A format. The Landsat-7 satellite carries the enhanced thematic mapper plus (ETM+) sensor and is part of an ongoing mission to provide quality remote sensing data in support of research and applications activities. Information on the Landsat-7 Program, including information about the Landsat-7 satellite, the ETM+ sensor, and Landsat-7 data collection, is available in the "Landsat 7 Science Data Users Handbook." The FAST-L7A files are described in detail in the "Level 1 Product Output Files Data Format Control Book, Volume 5, Book 2".

1.2.4 Fast B Format

This product contains Landsat data files in FAST B format. The Landsat 4 and 5 satellites carry the thematic mapper sensors and are part of an ongoing mission to provide quality remote sensing data in support of research and applications activities. The FAST B files are described in detail in the "EOSAT Fast Format Document – Version B, Effective October 1, 1991."

1.2.5 Fast C Format

This product was produced by the U.S. Geological Survey (USGS) and contains Landsat data files in FAST C format. The Landsat 4 and 5 satellites carry the thematic mapper sensors and are part of an ongoing mission to provide quality remote sensing data in support of research and applications activities.

The FAST C files are described in detail in the “Earth Observation Satellite Company (EOSAT) Fast Format Document for Digital Products - Version C, Effective April 23, 1996 (Revised July 29, 1996).”

1.2.6 Geographic Tagged Image File (GeoTIFF)

This product was produced by the U.S. Geological Survey (USGS) and contains Landsat data `Files` in GeoTIFF (Geographic Tagged Image-File Format). The GeoTIFF files for Landsat 7 data are described in detail in the "Level 1 Product Output Files Data Format Control Book, Volume 5, Book 2".

2.0 Detailed Format Description

2.1.1 NLAPS Data Format (NDF)

The product composition for geometrically and radiometrically corrected Landsat data includes one or more header files, image files, a work order report file, and a history and processing parameters file. In band sequential (BSQ) format, each band of a satellite image is separately stored in one image file (i.e., scan lines are sequentially written to the same image file).

Geometrically corrected products, which have had terrain correction applied, may also contain a digital elevation model (DEM) header file and a DEM file containing the terrain model used to correct the product.

The Landsat data files are stored separately from the NDF directory file, which contains the file names and pointers for the data files. The level-1R (TM data only) and level-1G (MSS, TM and ETM+) image files are in absolute radiance units scaled to 8 bits.

NDF Product Composition:

Up to six file types are included with each NDF product. One or more image header files describe the product delivered and provide necessary information for further processing. One or more image files contain the binary image data. If a digital elevation model (DEM) is used for terrain correction, a DEM header and DEM image file may be included as well. Also, each NDF product includes a correction processing (formerly known as a work order) report file and a history file indicating processing parameters.

Image and DEM Header File Format:

The image and DEM header files contain information describing the image data in the image or DEM files. This format is more general than earlier versions of Fast Format headers but is enhanced by additional sensors, DEM data, and non-satellite imagery information. The header is intended to be easy to read and uses only ASCII-text to represent information (i.e., there is no binary information in the header).

In order to accommodate multi-resolution products, one header file is written for each resolution in the output product. This is in contrast to previous versions of the NDF format in which all data files in the same volume (data set) were required to have the same pixel spacing and pixel format, with different resolutions requiring a separate volume set.

Image and DEM Files:

The image and DEM files contain the raw image pixels or elevation samples. There are no header records within the file, nor are there any prefix and/or suffix data to the individual image records. If the image file is part of a BSQ product, then it contains information for only one band, and the image lines for that band are stored sequentially.

Data File Names

NDF file name formats defines the naming convention for the file types that may be produced with an NDF-format product.

File type	Format
Header files for imagery	<SceneID>.H<header file #>, where <SceneID> reflects the acquisition footprint and <header file #> is 1 for single-resolution footprint and increments from 1 for each header file in a multi-resolution footprint.
Image files	<SceneID >.I<band #>, where <SceneID> is as above and <band #> is an integer ranging from 1 to the number of bands in the product for BSQ.
Work order report files	<SceneID>.WO, where <SceneID> is as above and a WO suffix is appended.
History and processing parameters files	<SceneID>.HI, where <SceneID> is as above and a HI suffix references the history and processing parameters used to process this product.
Header files for DEM data	<SceneID>.DH, where <SceneID> is as above and a DH suffix references the DEM header (optional)
DEM data files	<SceneID>.DD, where <SceneID> is as above and DD suffix references the DEM data (optional).

Sample Product Band and File Combinations — ETM+

ETM+ Bands in Product	Resolution(s)	File Organization	Header Files	Image Files
1-5, 7 6, 9 8	30 60 15	BSQ	<SceneID>.H1 <SceneID>.H2 <SceneID>.H3	<SceneID>.I1 <SceneID>.I2 <SceneID>.I3 <SceneID>.I4 <SceneID>.I5 <SceneID>.I6 <SceneID>.I7 <SceneID>.I8 <SceneID>.I9 < SceneID >.WO < SceneID >.HI
1-5 9	30 60	BSQ	<SceneID>.H1 <SceneID>.H2	<SceneID>.I1 <SceneID>.I2 <SceneID>.I3 <SceneID>.I4 <SceneID>.I5 <SceneID>.I9 < SceneID >.WO < SceneID >.HI
1 8	30 15	BSQ	<SceneID>.H1 <SceneID>.H2	<SceneID>.I1 <SceneID>.I8 < SceneID >.WO < SceneID >.HI
1-5, 7 6, 9 8	30 30 30	BSQ	<SceneID>.H1	<SceneID>.I1 <SceneID>.I2 <SceneID>.I3 <SceneID>.I4 <SceneID>.I5 <SceneID>.I6 <SceneID>.I7 <SceneID>.I8 <SceneID>.I9 < SceneID >.WO < SceneID >.HI

The sequence of the image data files that are produced with an NDF-format product are as follows: **(ETM+ sample)**

LE7018033009924650.H1 -- Product header #1
LE7018033009924650.H2 -- Product header #2
LE7018033009924650.H3 -- Product header #3
LE7018033009924650.I1 -- ETM+ band 1
LE7018033009924650.I2 -- ETM+ band 2
LE7018033009924650.I3 -- ETM+ band 3
LE7018033009924650.I4 -- ETM+ band 4
LE7018033009924650.I5 -- ETM+ band 5
LE7018033009924650.I6 -- ETM+ band 6, low
LE7018033009924650.I7 -- ETM+ band 7
LE7018033009924650.I8 -- ETM+ band 8
LE7018033009924650.I9 -- ETM+ band 6, high
LE7018033009924650.WO -- Job report file
LE7018033009924650.HI -- Job history file
LE7018033009924650.DH -- DEM header (optional)
LE7018033009924650.DD -- DEM data (optional)

(TM sample)

LT5018033009924650.H1 -- Product header #1
LT5018033009924650.I1 -- TM band 1
LT5018033009924650.I2 -- TM band 2
LT5018033009924650.I3 -- TM band 3
LT5018033009924650.I4 -- TM band 4
LT5018033009924650.I5 -- TM band 5
LT5018033009924650.I6 -- TM band 6
LT5018033009924650.I7 -- TM band 7
LT5018033009924650.WO -- Job report file
LT5018033009924650.HI -- Job history file
LT5018033009924650.DH -- DEM header (optional)
LT5018033009924650.DD -- DEM data (optional)

(MSS sample)

LM5018033009924650.H1 -- Product header #1
LM5018033009924650.I1 -- MSS band 1
LM5018033009924650.I2 -- MSS band 2
LM5018033009924650.I3 -- MSS band 3
LM5018033009924650.I4 -- MSS band 4
LM5018033009924650.I5 -- MSS band 5 (Landsat 3 only)
LM5018033009924650.WO -- Job report file
LM5018033009924650.HI -- Job history file
LM5018033009924650.DH -- DEM header (optional)
LM5018033009924650.DD -- DEM data (optional)

For additional file and processing parameter information refer to the following attachments:

- ATTACHMENT 3 = NLAPS Correction Processing Report (formerly known as the Work Order Report) for TM data in a NDF format.

- ATTACHMENT 4 = NDF Image and DEM Header File Format

- ATTACHMENT = 5 NLAPS processing history sample for TM data in a NDF format.

- ATTACHMENT 6 = NLAPS System Production Options.
    - Table A-1. USGS horizontal datums.
    - Table B-1. USGS projection parameters (array elements 1-8).
    - Table B-2. USGS projection parameters (array elements 9-15).
    - Table B-3. Landsat processing levels.

2.1.2 Hierarchical Data Format (HDF)

The Landsat-7 data files are stored separately from the HDF directory file, which contains the file names and pointers for the data files. Image data files are in absolute radiance units scaled to 8 bits.

The HDF product's directory file also includes ancillary information which consists of: the product metadata, min_max radiance values, the min_max pixel values and the product parameters. The metadata is product-specific information such as corner coordinates, the number of scans, and level-1 correction information. The other values and parameters are self-explanatory.

The Earth image data are collected by the Landsat ETM+ sensor in eight bands with band 6 being collected in both high- and low-gain modes.

Level 1 = The HDF full-band, level-1 product file format is nearly identical to the full-band, level-0 product file format except that the two MSCD files have been merged and the two PCD files have been merged. The merging of the files is referred to as consensus. In addition, the metadata contain level-1 correction information.

The file naming convention for HDF is as follows:

L7fppprrr_rrrYYYYMMDD_AAA.XXX where:

L7 = the Landsat-7 mission.
f = the ETM+ data format.
ppp = the starting path of the product.
rrr_rrr = the starting and ending rows of the product.
YYYYMMDD = the acquisition date of an image.
AAA = the file type:

B10 = the band 1
B20 = band 2
B30 = band 3
B40 = band 4
B50 = band 5
B61 = band 6L (low gain)
B62 = band 6H (high gain)
B70 = the band 7
B80 = the band 8
HDF = HDF directory file
XXX = product type

2.1.3 Fast L7A Format

The Landsat-7 data files are stored separately from the FAST-L7A directory file, which contains the file names and pointers for the data files. The image files are in absolute radiance units scaled to 8 bits.

The FAST-L7A product consists of header files and linked image files:

Header File

Administrative Record: Contains information that identifies the product, the image, and the data specifically needed to ingest the imagery for each particular band. In order to import the image data, it is necessary to read the entries in the administrative record.

Radiometric Record: Contains the coefficients needed to convert the image values into at-satellite spectral radiance for each particular band.

Geometric Record: Contains geodetic location information. To align the imagery to other data sources, it is necessary to read the entries in the geometric record for each particular band.

Image File

Each image file contains one ETM+ band of image pixels. There are no header records, prefix data, or suffix data in the image records. Image data are unblocked, and image files are 8-bit unsigned integers.

A separate header file exists for each of the following band groups:

1. Panchromatic
2. Visible Near Infrared/Shortwave Infrared (VNIR/SWIR)
3. Thermal

Data File Names

The file naming convention for FAST-L7A is as follows:

L7fppprrr_rrrYYYYMMDD_AAA.FST where:

L7	= the Landsat-7 mission.
f	= the ETM+ data format.
ppp	= the starting path of the product.
rrr_rrr	= the starting and ending rows of the product.
YYYYMMDD	= the acquisition date of an image.
AAA	= the file type:

- HRF = Header for reflective bands.
- HPN = Header for pan band.
- HTM = Header for thematic mapper bands.

B10	= the band 1
B20	= band 2
B30	= band 3
B40	= band 4
B50	= band 5
B61	= band 6L (low gain)
B62	= band 6H (high gain)
B70	= the band 7
B80	= the band 8
FST	= the the FAST-L7A file extension.

2.1.4 Fast B Format

The Fast Format (Version B – *see Attachment 1*) volume set contains a Header File, Image and Trailer Files.

Header File:
The first file on each volume, a Read-Me-First file, contains header data. It is in American Standard Code for Information Interchange (ASCII), to ANSI and ISO standards.

Alphanumeric fields are left justified and numeric fields are right justified. Dates are given in ANSI full year, month and day-of-month format. All processing options and map projection information for the product are also contained in this file.

Image Files:
All image files contain only one TM band of image pixels. There are no header records within the image file, nor are there prefix and/or suffix data in the individule image records. Image data may be blocked or unblocked. Blocking is performed to condense as much data onto the tape as possible.

Trailer Files:
The last volume of the Fast Format image set includes a trailer file after the image files. This file may require software modification to read, but does not need to be read to ingest the image files. The trailer file contains ephemeris information to compute the approximate spacecraft position for each pixel in the image. This files is in ASCII, to ANSI and ISO standards.

The Header File appears as follows (metadata is in a continuous line):

```
PRODUCT =00013123-01
WRS =047/02600
ACQUISITION DATE =19960727
SATELLITE =L5
INSTRUMENT =TM10
PRODUCT TYPE =ORBIT ORIENTED
PRODUCT SIZE =SUBSCENE
TYPE OF GEODETIC PROCESSING =SYSTEMATIC
RESAMPLING =NN
RAD GAINS/BIASES =
0.99992/-0.0100  2.42430/-0.0232  1.36344/-0.0078
2.62901/-0.0193  0.58771/-0.0080  3.20107/0.25994
0.38674/-0.0040
VOLUME #/# IN SET =1/1
START LINE #=    1
LINES PER VOL=61600
ORIENTATION =-12.42
PROJECTION =UTM
USGS PROJECTION # = 1
USGS MAP ZONE = 10
USGS PROJECTION PARAMETERS =
6378137.000000000000000 6356752.314245179300000  0.000000000000000      0.000000000000000
0.000000000000000      0.000000000000000      0.000000000000000      0.000000000000000      0.000000000000000
0.000000000000000      0.000000000000000      0.000000000000000      0.000000000000000      0.000000000000000
0.000000000000000
EARTH ELLIPSOID =WGS 84
SEMI-MAJOR AXIS =6378137.000
SEMI-MINOR AXIS =6356752.314
PIXEL SIZE =27.50
PIXELS PER LINE= 6170 LINES
PER IMAGE= 8800
UL 1232950.1976W 495922.7897N   464354.040   5537599.960
UR 121155.2412W  493854.6571N   630030.756   5501110.236
LR 1215750.0385W 473155.0416N   577984.544   5264801.365
LL 1241020.5879W 475132.3008N   412307.828   5301291.089
BANDS PRESENT =1234567
BLOCKING FACTOR =   1
RECORD LENGTH = 6170
SUN ELEVATION =52
SUN AZIMUTH =131
```

CENTER 1224435.3584W 484017.1249N 518909.539 5390962.374
3085 4782
OFFSET= 450
REVB

The Image Files appear as follows:

```
 ----------------------
|  Image Header File  |
 ----------------------

 -----------------------
|  Image File (Band 1)|  <----- Each image file contains only
 -----------------------          one band.  The image file sequence
            *                     begins with the lowest band number.
            *                     The number of bands present
            *                     depends on the product ordered.
 -----------------------
|  Image File (Band N)|
 -----------------------

 ------------------------
|       Trailer File       |
 ------------------------
```

2.1.5 Fast C Format

The Fast Format (Version C) volume set contains a Header file and Image files. The contents and format of the Header File in this version have been expanded to accommodate additional information pertinent to the datasets provided by EOSAT. Whereas the contents and format of the Image Files have not changed from the EOSAT Fast Format Document – Version B, Effective October 1, 1991.

The Fast Format (Version C) volume set contains a Header File and Image Files.

Header File:
The first file on each volume, a Read-Me-First file, contains header data. It is in American Standard Code for Information Interchange (ASCII) format, to ANSI and ISO standards. Alphanumeric fields are left justified and numeric fields are right justified. Dates are given in yyyydd mm format (full year, month and day-of-month format). All processing options, radiometric calibration, geometric characteristics and map projection information for the product are contained in this file. The table breaks the information into 80 byte units with a carriage return as the eightieth character allowing convenient printing of the file. For this reason each 80 byte unit is referred to as a line. The table lists the field number in each record, the start and stop byte number, a FORTRAN format representation and a short text describing the field contents. *See Attachment 2 for additional header content information.*

Image Files:
Each image file contains one band of image data. There are no header records within the image file, nor are there prefix and/or suffix data in the individual image records. Image data may be blocked or unblocked. Blocking is performed to condense as much data onto the tape as possible; it was deemed necessary to block image data such that one record on the CCT contained several image lines. This blocking results in writing fewer End-of-Record gaps on the tape and allows more data to be written to the tape. Certain map oriented products on CCT are blocked. No blocking is done for products on 8mm Exabyte tapes, CD ROMs and Cartridges. The blocking factor used while writing in the media is indicated in the header file administrative record.

2.1.6 Geographic Tagged Image File (GeoTIFF)

Each band of Landsat data in the GeoTIFF format is delivered as a grayscale, uncompressed, 8- bit string of unsigned integers. No other files accompany the product except for the Readme file.

Data File Names

The file naming convention for GeoTIFF is as follows:

L7fppprrr_rrrYYYYMMDD_AAA.TIF where:

L7		= the Landsat mission.	
f		= the ETM+ data format.	
ppp		= the starting path of the product.	
rrr_rrr		= the starting and ending rows of the product.	
YYYYMMDD		= the acquisition date of an image.	
AAA		= the file type:	
	B10		= band 1
	B20		= band 2
	B30		= band 3
	B40		= band 4
	B50		= band 5
	B61		= band 6L (low gain)
	B62		= band 6H (high gain)
	B70		= the band 7
	B80		= the band 8
TIF		= the the GeoTIFF file extension.	

3.1 Example Data

3.1.1 NLAPS Data Format (NDF) = ETM+, TM and MSS Data

Header examples are listed below to demonstrate how the metadata appear in the first file of each digital product.

ETM+ NLAPS Header Example:

```
NDF_REVISION=2.00;
DATA_SET_TYPE=EDC_ETM+;
PRODUCT_NUMBER=ndfetm;
PIXEL_FORMAT=BYTE;
PIXEL_ORDER=NOT_INVERTED;
BITS_PER_PIXEL=8;
PIXELS_PER_LINE=9048;
LINES_PER_DATA_FILE=8577;
DATA_ORIENTATION=UPPER_LEFT/RIGHT;
NUMBER_OF_DATA_FILES=6;
DATA_FILE_INTERLEAVING=BSQ;
TAPE_SPANNING_FLAG=1/1;
START_LINE_NUMBER=1;
START_DATA_FILE=1;
LINES_PER_VOLUME=51462;
BLOCKING_FACTOR=1;
RECORD_SIZE=9048;
UPPER_LEFT_CORNER=0990225.1489W,0424435.5517N,496700.000,4732300.000;
UPPER_RIGHT_CORNER=0961642.3389W,0424239.1292N,722875.000,4732300.000;
LOWER_RIGHT_CORNER=0962131.5257W,0404654.7399N,722875.000,4517900.000;
LOWER_LEFT_CORNER=0990220.8586W,0404843.5776N,496700.000,4517900.000;
REFERENCE_POINT=SCENE_CENTER;
REFERENCE_POSITION=0974044.7685W,0414612.5447N,609787.500,4625100.000,4524.50,4289.00;
REFERENCE_OFFSET=207.83,12.21;
ORIENTATION=0.000000;
MAP_PROJECTION_NAME=UTM;
USGS_PROJECTION_NUMBER=1;
USGS_MAP_ZONE=14;
```

USGS_PROJECTION_PARAMETERS=0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000
,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.00000000000000
0,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000;
HORIZONTAL_DATUM=WGS84;
EARTH_ELLIPSOID_SEMI-MAJOR_AXIS=6378137.000;
EARTH_ELLIPSOID_SEMI-MINOR_AXIS=6356752.314;
EARTH_ELLIPSOID_ORIGIN_OFFSET=0.000,0.000,0.000;
EARTH_ELLIPSOID_ROTATION_OFFSET=0.000000,0.000000,0.000000;
PRODUCT_SIZE=FULL_SCENE;
PIXEL_SPACING=25.0000,25.0000;
PIXEL_SPACING_UNITS=METERS;
RESAMPLING=CC;
PROCESSING_DATE/TIME=1999-11-23T15:19:52;
PROCESSING_SOFTWARE=NLAPS_4_1_0;
NUMBER_OF_BANDS_IN_VOLUME=6;
WRS=029/031;
ACQUISITION_DATE/TIME=1999-02-12T16:51:24Z;
SATELLITE=LANDSAT_7;
SATELLITE_INSTRUMENT=ETM+;
PROCESSING_LEVEL=09;
SUN_ELEVATION=28.93;
SUN_AZIMUTH=149.31;
BAND1_NAME=ETM+_BAND_1;
BAND1_FILENAME=ndfetm_I1.dat;
BAND1_WAVELENGTHS=0.45,0.52;
BAND1_RADIOMETRIC_GAINS/BIAS=0.7862745,-6.1999969;
BAND2_NAME=ETM+_BAND_2;
BAND2_FILENAME=ndfetm_I2.dat;
BAND2_WAVELENGTHS=0.52,0.60;
BAND2_RADIOMETRIC_GAINS/BIAS=0.8172549,-6.0000000;
BAND3_NAME=ETM+_BAND_3;
BAND3_FILENAME=ndfetm_I3.dat;
BAND3_WAVELENGTHS=0.63,0.69;
BAND3_RADIOMETRIC_GAINS/BIAS=0.6396078,-4.5000000;
BAND4_NAME=ETM+_BAND_4;
BAND4_FILENAME=ndfetm_I4.dat;
BAND4_WAVELENGTHS=0.76,0.90;
BAND4_RADIOMETRIC_GAINS/BIAS=0.6352941,-4.5000000;
BAND5_NAME=ETM+_BAND_5;
BAND5_FILENAME=ndfetm_I5.dat;
BAND5_WAVELENGTHS=1.55,1.75;
BAND5_RADIOMETRIC_GAINS/BIAS=0.1284706,-1.0000019;
BAND6_NAME=ETM+_BAND_7;
BAND6_FILENAME=ndfetm_I6.dat;
BAND6_WAVELENGTHS=2.08,2.35;
BAND6_RADIOMETRIC_GAINS/BIAS=0.0444392,-0.3500004;
END_OF_HDR;

ETM+ NLAPS DEM Header Example:

NDF_REVISION=2.00;
DATA_SET_TYPE=NLAPS_DEM**;**
PRODUCT_NUMBER=ndfetm;
PIXEL_FORMAT=2BYTEINT;
PIXEL_ORDER=NOT_INVERTED;
BITS_PER_PIXEL=16;
PIXELS_PER_LINE=9048;
LINES_PER_DATA_FILE=8577;
DATA_ORIENTATION=UPPER_LEFT/RIGHT;
NUMBER_OF_DATA_FILES=1;
DATA_FILE_INTERLEAVING=BSQ;
TAPE_SPANNING_FLAG=1/1;
START_LINE_NUMBER=1;
START_DATA_FILE=1;
LINES_PER_VOLUME=8577;
BLOCKING_FACTOR=1;
RECORD_SIZE=9048;
UPPER_LEFT_CORNER=0990225.1489W,0424435.5517N,496700.000,4732300.000;
UPPER_RIGHT_CORNER=0961642.3389W,0424239.1292N,722875.000,4732300.000;

LOWER_RIGHT_CORNER=0962131.5257W,0404654.7399N,722875.000,4517900.000;
LOWER_LEFT_CORNER=0990220.8586W,0404843.5776N,496700.000,4517900.000;
REFERENCE_POINT=SCENE_CENTER;
REFERENCE_POSITION=0974044.7685W,0414612.5447N,609787.500,4625100.000,4524.50,4289.00;
REFERENCE_OFFSET=207.83,12.21;
ORIENTATION=0.015359;
MAP_PROJECTION_NAME=UTM;
USGS_PROJECTION_NUMBER=1;
USGS_MAP_ZONE=14;
USGS_PROJECTION_PARAMETERS=0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000
,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.00000000000000
0,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000;
HORIZONTAL_DATUM=WGS84;
EARTH_ELLIPSOID_SEMI-MAJOR_AXIS=6378137.000;
EARTH_ELLIPSOID_SEMI-MINOR_AXIS=6356752.314;
EARTH_ELLIPSOID_ORIGIN_OFFSET=0.000,0.000,0.000;
EARTH_ELLIPSOID_ROTATION_OFFSET=0.000000,0.000000,0.000000;
PRODUCT_SIZE=FULL_SCENE;
PIXEL_SPACING=25.0000,25.0000;
PIXEL_SPACING_UNITS=METERS;
RESAMPLING=BL;
PROCESSING_DATE/TIME=1999-11-23T15:19:52;
PROCESSING_SOFTWARE=NLAPS_4_1_0;
NUMBER_OF_BANDS_IN_VOLUME=1;
DEM_NAME=DEM;
UNIT_OF_ELEVATION_MEASURE=METERS;
VERTICAL_DATUM=SEA_LEVEL;
END_OF_HDR;

TM NLAPS Header Example:

NDF_REVISION=2.00;
DATA_SET_TYPE=EDC_TM;
PRODUCT_NUMBER=ndftm;
PIXEL_FORMAT=BYTE;
PIXEL_ORDER=NOT_INVERTED;
BITS_PER_PIXEL=8;
PIXELS_PER_LINE=6605;
LINES_PER_DATA_FILE=5984;
DATA_ORIENTATION=UPPER_LEFT/RIGHT;
NUMBER_OF_DATA_FILES=7;
DATA_FILE_INTERLEAVING=BSQ;
TAPE_SPANNING_FLAG=1/1;
START_LINE_NUMBER=1;
START_DATA_FILE=1;
LINES_PER_VOLUME=41888;
BLOCKING_FACTOR=1;
RECORD_SIZE=6605;
UPPER_LEFT_CORNER=0342737.0377E,0051532.1361N,661831.424,581474.829;
UPPER_RIGHT_CORNER=0361341.0793E,0050013.6897N,858032.206,553965.054;
LOWER_RIGHT_CORNER=0355950.7891E,0032356.4256N,833109.284,376213.801;
LOWER_LEFT_CORNER=0341357.9128E,0033906.1755N,636908.502,403723.575;
REFERENCE_POINT=SCENE_CENTER;
REFERENCE_POSITION=0351346.9680E,0041943.9770N,747470.354,478844.315,3303.00,2992.50;
REFERENCE_OFFSET=-111.20,-0.66;
ORIENTATION=7.981543;
MAP_PROJECTION_NAME=UTM;
USGS_PROJECTION_NUMBER=1;
USGS_MAP_ZONE=36;
USGS_PROJECTION_PARAMETERS=0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000
,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.00000000000000
0,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000;
HORIZONTAL_DATUM=WGS84;
EARTH_ELLIPSOID_SEMI-MAJOR_AXIS=6378137.000;
EARTH_ELLIPSOID_SEMI-MINOR_AXIS=6356752.314;
EARTH_ELLIPSOID_ORIGIN_OFFSET=0.000,0.000,0.000;
EARTH_ELLIPSOID_ROTATION_OFFSET=0.000000,0.000000,0.000000;
PRODUCT_SIZE=FULL_SCENE;
PIXEL_SPACING=30.0000,30.0000;
PIXEL_SPACING_UNITS=METERS;

```
RESAMPLING=CC;
PROCESSING_DATE/TIME=1999-11-26T13:59:00;
PROCESSING_SOFTWARE=NLAPS_4_1_0;
NUMBER_OF_BANDS_IN_VOLUME=7;
WRS=170/057;
ACQUISITION_DATE/TIME=1995-01-28T07:06:02Z;
SATELLITE=LANDSAT_5;
SATELLITE_INSTRUMENT=TM;
PROCESSING_LEVEL=08;
SUN_ELEVATION=44.07;
SUN_AZIMUTH=121.13;
BAND1_NAME=TM_BAND_1;
BAND1_FILENAME=ndftm_I1.dat;
BAND1_WAVELENGTHS=0.45,0.52;
BAND1_RADIOMETRIC_GAINS/BIAS=0.6024314,-1.5200000;
BAND2_NAME=TM_BAND_2;
BAND2_FILENAME=ndftm_I2.dat;
BAND2_WAVELENGTHS=0.52,0.60;
BAND2_RADIOMETRIC_GAINS/BIAS=1.1750981,-2.8399999;
BAND3_NAME=TM_BAND_3;
BAND3_FILENAME=ndftm_I3.dat;
BAND3_WAVELENGTHS=0.63,0.69;
BAND3_RADIOMETRIC_GAINS/BIAS=0.8057647,-1.1700000;
BAND4_NAME=TM_BAND_4;
BAND4_FILENAME=ndftm_I4.dat;
BAND4_WAVELENGTHS=0.76,0.90;
BAND4_RADIOMETRIC_GAINS/BIAS=0.8145490,-1.5100000;
BAND5_NAME=TM_BAND_5;
BAND5_FILENAME=ndftm_I5.dat;
BAND5_WAVELENGTHS=1.55,1.75;
BAND5_RADIOMETRIC_GAINS/BIAS=0.1080784,-0.3700000;
BAND6_NAME=TM_BAND_6;
BAND6_FILENAME=ndftm_I6.dat;
BAND6_WAVELENGTHS=10.40,12.50;
BAND6_RADIOMETRIC_GAINS/BIAS=0.0551584,1.2377996;
BAND7_NAME=TM_BAND_7;
BAND7_FILENAME=ndftm_I7.dat;
BAND7_WAVELENGTHS=2.08,2.35;
BAND7_RADIOMETRIC_GAINS/BIAS=0.0569804,-0.1500000;
END_OF_HDR;
```

MSS NLAPS Header Example:

```
NDF_REVISION=2.00;
DATA_SET_TYPE=EDC_MSS;
PRODUCT_NUMBER=ndfmss;
PIXEL_FORMAT=BYTE;
PIXEL_ORDER=NOT_INVERTED;
BITS_PER_PIXEL=8;
PIXELS_PER_LINE=4606;
LINES_PER_DATA_FILE=4607;
DATA_ORIENTATION=UPPER_LEFT/RIGHT;
NUMBER_OF_DATA_FILES=4;
DATA_FILE_INTERLEAVING=BSQ;
TAPE_SPANNING_FLAG=1/1;
START_LINE_NUMBER=1;
START_DATA_FILE=1;
LINES_PER_VOLUME=18428;
BLOCKING_FACTOR=1;
RECORD_SIZE=4606;
UPPER_LEFT_CORNER=0935947.4085W,0441312.8238N,420400.000,4896600.000;
UPPER_RIGHT_CORNER=0910651.8287W,0441232.4373N,650650.000,4896600.000;
LOWER_RIGHT_CORNER=0911037.6680W,0420810.5518N,650650.000,4666300.000;
LOWER_LEFT_CORNER=0935747.9980W,0420848.1313N,420400.000,4666300.000;
REFERENCE_POINT=SCENE_CENTER;
REFERENCE_POSITION=0923346.2248W,0431112.9180N,535525.000,4781450.000,2303.50,2304.00;
REFERENCE_OFFSET=75.09,7.56;
ORIENTATION=0.000000;
MAP_PROJECTION_NAME=UTM;
```

```
USGS_PROJECTION_NUMBER=1;
USGS_MAP_ZONE=15;
USGS_PROJECTION_PARAMETERS=0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000
,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.00000000000000
0,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000,0.000000000000000;
HORIZONTAL_DATUM=NAD27;
EARTH_ELLIPSOID_SEMI-MAJOR_AXIS=6378206.400;
EARTH_ELLIPSOID_SEMI-MINOR_AXIS=6356583.800;
EARTH_ELLIPSOID_ORIGIN_OFFSET=-9.053,130.314,199.390;
EARTH_ELLIPSOID_ROTATION_OFFSET=0.000000,0.000000,0.000000;
PRODUCT_SIZE=FULL_SCENE;
PIXEL_SPACING=50.0000,50.0000;
PIXEL_SPACING_UNITS=METERS;
RESAMPLING=CC;
PROCESSING_DATE/TIME=1999-11-22T16:30:58;
PROCESSING_SOFTWARE=NLAPS_4_1_0;
NUMBER_OF_BANDS_IN_VOLUME=4;
WRS=026/030;
ACQUISITION_DATE/TIME=1992-08-30T16:15:34Z;
SATELLITE=LANDSAT_5;
SATELLITE_INSTRUMENT=MSS;
PROCESSING_LEVEL=09;
SUN_ELEVATION=48.27;
SUN_AZIMUTH=136.08;
BAND1_NAME=MSS_BAND_1;
BAND1_FILENAME=ndfmss_I1.dat;
BAND1_WAVELENGTHS=0.50,0.60;
BAND1_RADIOMETRIC_GAINS/BIAS=0.3058824,2.0000000;
BAND2_NAME=MSS_BAND_2;
BAND2_FILENAME=ndfmss_I2.dat;
BAND2_WAVELENGTHS=0.60,0.70;
BAND2_RADIOMETRIC_GAINS/BIAS=0.2274510,2.0000000;
BAND3_NAME=MSS_BAND_3;
BAND3_FILENAME=ndfmss_I3.dat;
BAND3_WAVELENGTHS=0.70,0.80;
BAND3_RADIOMETRIC_GAINS/BIAS=0.5725490,4.0000000;
BAND4_NAME=MSS_BAND_4;
BAND4_FILENAME=ndfmss_I4.dat;
BAND4_WAVELENGTHS=0.80,1.10;
BAND4_RADIOMETRIC_GAINS/BIAS=0.4888902,2.0000000;
END_OF_HDR;
```

3.1.2 Hierarchical Data Format (HDF) = ETM+ Data

```
GROUP = LPGS_METADATA_FILE
        GROUP = METADATA_FILE_INFO
                REQUEST_ID =
                PRODUCT_CREATION_TIME = 1999-11-22T16:27:29Z
                STATION_ID = EDC
                LANDSAT7_XBAND = 0
                GROUND_STATION = EDC
                LPS_PROCESSOR_NUMBER = 0
                SUBINTERVAL_NUMBER = 00
        END_GROUP = METADATA_FILE_INFO
        GROUP = PRODUCT_METADATA
                PRODUCT_TYPE = L1G
                SPACECRAFT_ID = Landsat7
                SENSOR_ID = ETM+
                ACQUISITION_DATE = 1999-09-03
                WRS_PATH = 018
                STARTING_ROW = 033
                ENDING_ROW = 033
                BAND_COMBINATION = 123456678
                PRODUCT_UL_CORNER_LAT = +39.4997
                PRODUCT_UL_CORNER_LON = -082.5004
                PRODUCT_LR_CORNER_LAT = +37.9999
                PRODUCT_LR_CORNER_LON = -080.5000
                BAND_1_FILE_NAME = L71018033_03319990903_B10.L1G
                BAND_2_FILE_NAME = L71018033_03319990903_B20.L1G
```

```
        BAND_3_FILE_NAME = L71018033_03319990903_B30.L1G
        BAND_4_FILE_NAME = L71018033_03319990903_B40.L1G
        BAND_5_FILE_NAME = L71018033_03319990903_B50.L1G
        BAND_6L_FILE_NAME = L71018033_03319990903_B61.L1G
        BAND_6H_FILE_NAME = L72018033_03319990903_B62.L1G
        BAND_7_FILE_NAME = L72018033_03319990903_B70.L1G
        BAND_8_FILE_NAME = L72018033_03319990903_B80.L1G
        METADATA_LPGS_FILE_NAME = L71018033_03319990903_MTL.L1G
        HDF_DIR_FILE_NAME = L71018033_03319990903_HDF.L1G
END_GROUP = PRODUCT_METADATA
GROUP = MIN_MAX_RADIANCE
        MAX_DETECTED_RADIANCE_LEVEL_BAND1 = 194.300
        MIN_DETECTED_RADIANCE_LEVEL_BAND1 =  -6.200
        MAX_DETECTED_RADIANCE_LEVEL_BAND2 = 202.400
        MIN_DETECTED_RADIANCE_LEVEL_BAND2 =  -6.000
        MAX_DETECTED_RADIANCE_LEVEL_BAND3 = 158.600
        MIN_DETECTED_RADIANCE_LEVEL_BAND3 =  -4.500
        MAX_DETECTED_RADIANCE_LEVEL_BAND4 = 157.500
        MIN_DETECTED_RADIANCE_LEVEL_BAND4 =  -4.500
        MAX_DETECTED_RADIANCE_LEVEL_BAND5 =  31.760
        MIN_DETECTED_RADIANCE_LEVEL_BAND5 =  -1.000
        MAX_DETECTED_RADIANCE_LEVEL_BAND6L =  17.040
        MIN_DETECTED_RADIANCE_LEVEL_BAND6L =   0.000
        MAX_DETECTED_RADIANCE_LEVEL_BAND6H =  12.650
        MIN_DETECTED_RADIANCE_LEVEL_BAND6H =   3.200
        MAX_DETECTED_RADIANCE_LEVEL_BAND7 =  10.982
        MIN_DETECTED_RADIANCE_LEVEL_BAND7 =  -0.350
        MAX_DETECTED_RADIANCE_LEVEL_BAND8 = 244.000
        MIN_DETECTED_RADIANCE_LEVEL_BAND8 =  -5.000
END_GROUP = MIN_MAX_RADIANCE
GROUP = MIN_MAX_PIXEL_VALUE
        MAX_PIXEL_VALUE_BAND1 = 255.0
        MIN_PIXEL_VALUE_BAND1 =   0.0
        MAX_PIXEL_VALUE_BAND2 = 255.0
        MIN_PIXEL_VALUE_BAND2 =   0.0
        MAX_PIXEL_VALUE_BAND3 = 255.0
        MIN_PIXEL_VALUE_BAND3 =   0.0
        MAX_PIXEL_VALUE_BAND4 = 255.0
        MIN_PIXEL_VALUE_BAND4 =   0.0
        MAX_PIXEL_VALUE_BAND5 = 255.0
        MIN_PIXEL_VALUE_BAND5 =   0.0
        MAX_PIXEL_VALUE_BAND6L = 255.0
        MIN_PIXEL_VALUE_BAND6L =   0.0
        MAX_PIXEL_VALUE_BAND6H = 255.0
        MIN_PIXEL_VALUE_BAND6H =   0.0
        MAX_PIXEL_VALUE_BAND7 = 255.0
        MIN_PIXEL_VALUE_BAND7 =   0.0
        MAX_PIXEL_VALUE_BAND8 = 255.0
        MIN_PIXEL_VALUE_BAND8 =   0.0
        END_GROUP = MIN_MAX_PIXEL_VALUE
GROUP = PRODUCT_PARAMETERS
        CORRECTION_METHOD_GAIN = CPF
        CORRECTION_METHOD_BIAS = CPF
        BAND1_GAIN = H
        BAND2_GAIN = H
        BAND3_GAIN = H
        BAND4_GAIN = H
        BAND5_GAIN = H
        BAND6_GAIN1 = L
        BAND6_GAIN2 = H
        BAND7_GAIN = H
        BAND8_GAIN = L
        SUN_AZIMUTH =  142.977
        SUN_ELEVATION =  53.8454
        OUTPUT_FORMAT = HDF
END_GROUP = PRODUCT_PARAMETERS
GROUP = CORRECTIONS_APPLIED
        STRIPING = Y
        BANDING = Y
        COHERENT_NOISE = Y
```

```
            MEMORY_EFFECT = N
            SCAN_CORRELATED_SHIFT = Y
            INOPERABLE_DETECTORS = Y
            DROPPED_LINES = Y
        END_GROUP = CORRECTIONS_APPLIED
        GROUP = PROJECTION_PARAMETERS
            REFERENCE_DATUM = WGS84
            REFERENCE_ELLIPSOID = WGS84
            GRID_CELL_SIZE_PAN =  15.00
            GRID_CELL_SIZE_THM =  30.00
            GRID_CELL_SIZE_REF =  30.00
            ORIENTATION = IMG
            RESAMPLING_OPTION = CC
            MAP_PROJECTION = UTM
        END_GROUP = PROJECTION_PARAMETERS
        GROUP = UTM_PARAMETERS
            ZONE_NUMBER = 017
        END_GROUP = UTM_PARAMETERS
    END_GROUP = LPGS_METADATA_FILE
    END
```

3.1.3 Fast L7A Format = ETM+ Data

```
REQ ID =fastL7Aetm      LOC =018/0330000     ACQUISITION DATE =19990309
SATELLITE =LANDSAT7   SENSOR =ETM+     SENSOR MODE =NORMAL LOOK ANGLE =  0.00
           LOCATION =              ACQUISITION DATE =
SATELLITE =       SENSOR =       SENSOR MODE =     LOOK ANGLE =
           LOCATION =              ACQUISITION DATE =
SATELLITE =       SENSOR =       SENSOR MODE =     LOOK ANGLE =
           LOCATION =              ACQUISITION DATE =
SATELLITE =       SENSOR =       SENSOR MODE =     LOOK ANGLE =
PRODUCT TYPE =ORBIT ORIENTED    PRODUCT SIZE =SUBSCENE
TYPE OF PROCESSING =SYSTEMATIC  RESAMPLING =CC
VOLUME #/# IN SET =01/01 PIXELS PER LINE = 6715 LINES PER BAND = 4391/ 4391
START LINE # =    1 BLOCKING FACTOR = 1 REC SIZE  =     6715 PIXEL SIZE = 30.00
OUTPUT BITS PER PIXEL = 8 ACQUIRED BITS PER PIXEL = 8
BANDS PRESENT =123457
FILENAME =L71018033_03319990903_B10.FSTFILENAME =L71018033_03319990903_B20.FST
FILENAME =L71018033_03319990903_B30.FSTFILENAME =L71018033_03319990903_B40.FST
FILENAME =L71018033_03319990903_B50.FSTFILENAME =L72018033_03319990903_B70.FST


REV       L7A
GAINS AND BIASES IN ASCENDING BAND NUMBER ORDER
   -0.040919979636669      1.277351043359785
   -0.049200001358986      1.653171494501638
   -0.030150000751019      1.058452895236417
   -0.057600002735853      2.008094283701535
   -0.021700040662287      0.686489284965737
   -0.009450010675192      0.295351223779649
    0.000000000000000      0.000000000000000
    0.000000000000000      0.000000000000000
```

3.1.4 Fast B Format = TM Data (all 1536 bytes are strung together in a continuous line).

```
PRODUCT =00013123-01 WRS =047/02600 ACQUISITION DATE =19960727
SATELLITE =L5    INSTRUMENT =TM10    PRODUCT TYPE =ORBIT ORIENTED
PRODUCT SIZE =SUBSCENE

TYPE OF GEODETIC PROCESSING =SYSTEMATIC
RESAMPLING =NN

RAD GAINS/BIASES =
 0.99992/-0.0100  2.42430/-0.0232  1.36344/-0.0078  2.62901/-0.0193  0.58771/-0.0080  3.20107/0.25994  0.38674/-0.0040

VOLUME #/# IN SET =1/1      START LINE #=    1       LINES PER VOL=61600
ORIENTATION =-12.42
```

```
PROJECTION =UTM            USGS PROJECTION # =     1       USGS MAP ZONE =     10
USGS PROJECTION PARAMETERS = 6378137.000000000000000 6356752.314245179300000       0.000000000000000
0.000000000000000       0.000000000000000       0.000000000000000       0.000000000000000       0.000000000000000
0.000000000000000       0.000000000000000       0.000000000000000       0.000000000000000       0.000000000000000
0.000000000000000       0.000000000000000

EARTH ELLIPSOID =WGS 84             SEMI-MAJOR AXIS =6378137.000        SEMI-MINOR AXIS =6356752.314
PIXEL SIZE =27.50 PIXELS         PER LINE= 6170        LINES PER IMAGE= 8800
UL 1232950.1976W 495922.7897N    464354.040   5537599.960
UR 1211155.2412W 493854.6571N    630030.756   5501110.236
LR 1215750.0385W 473155.0416N    577984.544   5264801.365
LL 1241020.5879W 475132.3008N    412307.828   5301291.089

BANDS PRESENT =1234567               BLOCKING FACTOR =   1
RECORD LENGTH = 6170                 SUN ELEVATION =52
SUN AZIMUTH =131
CENTER 1224435.3584W 484017.1249N    518909.539   5390962.374  3085  4782
OFFSET= 450 REVB
```

3.1.5 Fast C Format = TM Data

The Header File's Administrative Record appears as follows:

```
PRODUCT ID =99330123-01 LOCATION =170/0570000       ACQUISITION DATE =19952801
SATELLITE =L5        SENSOR =TM        SENSOR MODE =TM     LOOK ANGLE = -0.09
                LOCATION =                ACQUISITION DATE =
SATELLITE =          SENSOR =          SENSOR MODE =       LOOK ANGLE =
                LOCATION =                ACQUISITION DATE =
SATELLITE =          SENSOR =          SENSOR MODE =       LOOK ANGLE =
                LOCATION =                ACQUISITION DATE =
SATELLITE =          SENSOR =          SENSOR MODE =       LOOK ANGLE =
PRODUCT TYPE =ORBIT ORIENTED     PRODUCT SIZE =FULL SCENE
TYPE OF PROCESSING =SYSTEMATIC  RESAMPLING =CC
VOLUME #/# IN SET =01/01 PIXELS PER LINE = 6605 LINES PER BAND = 5984/ 5984
START LINE # =    1 BLOCKING FACTOR = 1 RECORD LENGTH = 6605 PIXEL SIZE = 30.00
OUTPUT BITS PER PIXEL = 8 ACQUIRED BITS PER PIXEL = 8
BANDS PRESENT =1234567
```

The Header File's Radiometric Record appears as follows:

```
REV  C  BIASES AND GAINS IN THE BAND ORDER AS ON THIS TAPE
    -0.151999998092651       15.150354059724247
    -0.283999991416931       29.564604497703858
    -0.116999995708466       20.349883090327765
    -0.150999999046326       20.539135977240168
    -0.037000000476837        2.708337348173647
     0.123779964447021        1.524318740177973
    -0.015000000596046        1.432360731518152
     0.000000000000000        0.000000000000000


SENSOR GAIN STATE =    2   2   2   2   2   2   1
```

The Header File's Geometric Record appears as follows:

```
GEOMETRIC DATA MAP PROJECTION =UTM  ELLIPSOID =WGS_84           DATUM =WGS84
USGS PROJECTION PARAMETERS =  6378137.000000000000000  6356752.314245179300000
    36.000000000000000       0.000000000000000       0.000000000000000
     0.000000000000000       0.000000000000000       0.000000000000000
     0.000000000000000       0.000000000000000       0.000000000000000
     0.000000000000000       0.000000000000000       0.000000000000000
     0.000000000000000
UL = 0342737.0377E 051532.1361N    661831.424    581474.829
UR = 0361341.0793E 050013.6897N    858032.206    553965.054
LR = 0355950.7891E 032356.4256N    833109.284    376213.801
LL = 0341357.9128E 033906.1755N    636908.502    403723.575
CENTER = 0351249.9032E 041722.4226N    745722.814    474489.569  3265  3144
```

```
OFFSET =    74 ORIENTATION ANGLE = -7.98
SUN ELEVATION ANGLE =44.1 SUN AZIMUTH ANGLE =121.1
```

The Image Files appear as follows:

```
 ----------------------
|  Image Header File  |
 ----------------------

 ------------------------
|  Image File (Band 1)|  <----- Each image file contains only
 ------------------------         one band.  The image file sequence
            *                     begins with the lowest band number.
            *                     The number of bands present
            *                     depends on the product ordered.
 ------------------------
|  Image File (Band N)|
```

3.1.6 Geographic Tagged Image File (GeoTIFF)

```
Geotiff_Information:
  Version: 1
  Key_Revision: 1.0
  Tagged_Information:
    ModelTiepointTag (2,3):
      0              0              0
      175485         -67065         0
    ModelPixelScaleTag (1,3):
      60             60             1
    End_Of_Tags.
  Keyed_Information:
    GTModelTypeGeoKey (Short,1): ModelTypeProjected
    GTRasterTypeGeoKey (Short,1): RasterPixelIsArea
    GTCitationGeoKey (Ascii,25): "Corrected Satellite Data"
    GeographicTypeGeoKey (Short,1): GCS_WGS_84
    GeogAngularUnitsGeoKey (Short,1): Angular_Degree
    ProjectedCSTypeGeoKey (Short,1): User-Defined
    PCSCitationGeoKey (Ascii,12): "LCC / WGS84"
    ProjectionGeoKey (Short,1): User-Defined
    ProjCoordTransGeoKey (Short,1): CT_LambertConfConic_2SP
    ProjLinearUnitsGeoKey (Short,1): Linear_Meter
    ProjStdParallel1GeoKey (Double,1): 29.5833333
    ProjStdParallel2GeoKey (Double,1): 30.75
    ProjNatOriginLatGeoKey (Double,1): 29
    ProjFalseEastingGeoKey (Double,1): 0
    ProjFalseNorthingGeoKey (Double,1): 0
    ProjCenterLongGeoKey (Double,1): -84.5
    End_Of_Keys.
  End_Of_Geotiff.
```

4.0 References

National Aeronautics and Space Administration, 1981, Draft Landsat-D worldwide reference system (WRS) users guide: [Greenbelt, Md.], National Aeronautics and Space Administration [variously paged].

National Oceanic and Atmospheric Administration, 1983, Landsat data users notes: [Sioux Falls, S. Dak.], National Oceanic and Atmospheric Administration [variously paged]

U.S. Geological Survey and National Oceanic and Atmospheric Administration, 1984, Landsat 4 data users handbook: [Washington, D.C.], U.S. Geological Survey and National Oceanic and Atmospheric Administration [variously paged].

Earth Observation Satellite Company (EOSAT) Fast Format Document for Digital Products– Version B, Effective October 1, 1991.

Earth Observation Satellite Company (EOSAT) Fast Format Document for Digital Products - Version C, Effective April 23, 1996 (Revised July 29, 1996).

Level 1 Product Output Files DFCB, Vol. 5, Book 2, Revision 4, January 2000.

5.0 ATTACHMENTS

Landsat Program Homepage Table of Contents Web site: http://geo.arc.nasa.gov/sge/landsat/tofc.html

USGS Landsat 7 Program Web site: http://landsat7.usgs.gov/

- Level 1 Product Output Files DFCB, Vol. 5, Book 2, Revision 4, January 2000.
  - This document is available as a PDF (436KB) file.
    - *Note*: Data Format Control Books are revised periodically and it is advised to check for the latest revision at the Web site: http://edcwww.cr.usgs.gov/l7dhf/L7MMO/document.htm - DFCB_vol
- Landsat Science Data Handbook found at Web site: http://ltpwww.gsfc.nasa.gov/IAS/handbook/handbook_toc.html
- **ATTACHMENT 1** = Earth Observation Satellite Company (EOSAT) Fast Format Document for Digital Products– Version B, Effective October 1, 1991.
- **ATTACHMENT 2** = Fast Format C Header Files
- **ATTACHMENT 3** = NLAPS Correction Processing Report (formerly known as the Work Order Report) for TM data in a NDF format.
- **ATTACHMENT 4** = NDF Image and DEM Header File Format
- **ATTACHMENT 5** = NLAPS processing history sample for TM data in a NDF format.
- **ATTACHMENT 6** = NLAPS System Production Options.
  - **Table A-1**. USGS horizontal datums.
  - **Table B-1**. USGS projection parameters (array elements 1-8).
  - **Table B-2**. USGS projection parameters (array elements 9-15).
  - **Table B-3**. Landsat processing levels.

FAST FORMAT DOCUMENT

for TM Digital Products

Version B, Effective November 1, 1993

INTRODUCTION

This document describes the revised EOSAT Fast Format for Thematic Mapper (TM) digital products. The changes in this document pertain to expanded header file field descriptions and the addition of a trailer file to the tape structure.

GENERAL FORMAT RULES:

1. All field definitions strictly follow American National Standards Institute (ANSI) and International Organization for Standardization (ISO) standards.

2. Only Band Sequential (BSQ) image structure is supported because data to be written to tape is made available a single band at a time. (Geometric corrections to the image are done one band at a time.)

3. Image files consist of a single band of data.

4. A digital product is referred to as a volume set. Individual tapes are referred to as volumes. A volume set may have one or more volumes, depending on image size and output tape density. Multi-resolution data sets have a volume set for each resolution.

GENERAL FORMAT DESCRIPTION

The Fast Format volume set contains a header file, image files, and now a **trailer file.** The contents and format of the header and image files have not changed. The trailer file provides additional information about the image data. Current ingest software can read the header and image files. Ingest software modification may be required to read the trailer file.

HEADER FILE

The first file on each volume, a Read-Me-First file, contains header data. It is in American Standard Code for Information Interchange (ASCII), to ANSI and ISO standards.

Alphanumeric fields are left justified and numeric fields are right justified. Dates are given in ANSI full year, month, and day-of-month format. All processing options and map projection information for the product are also contained in this file.

IMAGE FILES

All image files contain only one TM band of image pixels. There are no header records within the image file, nor are there prefix and/or suffix data in the individual image records. Image data may be blocked or unblocked. Blocking is performed to condense as much data onto the tape as possible; map-oriented full scenes otherwise would not fit onto four tapes.

TRAILER FILE

The last volume of the Fast Format image set includes a trailer file after the image files. This file may require software modification to read, but does not need to be read to ingest the image files. The trailer file contains ephemeris information to compute the approximate spacecraft position for each pixel in the image. This file is in ASCII, to ANSI and ISO standards. For information about the current content of the trailer file refer to EOSAT's Fast Format Trailer File Document.

NOTE: EOSAT will use the trailer file to test the utility of new fields for customer use. Users should code the ingest of this file carefully because other data may be added to future versions of the trailer file. We recommend that you follow a procedure similar to:

1) Read the line as an 80 character ASCII string.
2) Decode the first few characters and test against expected entries.
3) Continue to read and decode if the first characters match the expected entry, otherwise print the line for visual interpretation.
4) Terminate on the characters END OF TRAILER FILE.

The file is in ASCII and is readable as whole, and printable using standard system command utilities. Some users may prefer to "dump" the trailer file and print it using standard command language operations and therefore will not need to write new code.

Detailed Format Description

HEADER FILES

The header file contains a single 1536-byte ASCII record. The accompanying table describes its format, including the number of bytes, the FORTRAN format statement and a brief description of each field in the header file. All alphanumerics are left justified, and all numerics right justified. Fields of fixed (constant) values are represented with capital letters in quotes (e.g., "PRODUCT ="). Variable fields are represented with lower case letters. In both fixed and variable fields, blank spaces are indicated by the Greek character "δ" (delta).

Fields 35, 37, 39, 61, 95, 97, and 99 of each volume's header file must be read in order to import the image data. These fields are volume specific and must be read for each volume of a set.

Fields 41, 43, 47, and 63-93 contain information necessary to convert from image coordinates to map projection and geodetic (latitude and longitude) coordinates.

Field 10 (bytes 90-93) identifies the Thematic Mapper (TM) instrument mode and multiplexer where mode 1 = bands 1,2,3,4,5,6,7.

Fields 21-33 (bytes 301-401) contain the maximum and minimum detected radiance levels within the scene for the corresponding bands present on the current volume. (See Field 95 to identify which bands are present on the current volume.) The maximum and minimum radiance values are in radiance units: milliwatts/(square cm-steradian). The nominal maximum and minimum radiance values for each satellite are included in Table 1.

These values can be used to calculate the gains and biases to convert the image digital counts to spectral radiance values. To obtain gains and biases, use the following equation:

$$\text{Gain} = \left(\frac{\text{Maximum Radiance}}{254}\right) - \left(\frac{\text{Minimum Radiance}}{255}\right)$$

Bias = Minimum Radiance

Table 1 Radiance Values for Landsats 4 and 5 in milliwatts/(square cm-steradian)

Landsat 4			Landsat 5	
Maximum	**Minimum**		**Maximum**	**Minimum**
1.104547	-0.022181	Band 1	1.059476	-0.016946
2.455621	-0.049292	Band 2	2.611919	-0.041805
1.402240	-0.033929	Band 3	1.639662	-0.026226
3.128049	-0.128175	Band 4	2.949823	-0.059251
0.643351	-0.015569	Band 5	0.683888	-0.016548
1.568660	0.125240	Band 6	1.524310	0.123780
0.457179	-0.009181	Band 7	0.424707	-0.008528

Table 2 Bandwidths for Landsats 4 and 5 in microns.

	Band1	Band2	Band3	Band4	Band5	Band6	Band7
Landsat 4	0.066	0.081	0.069	0.129	0.216	1.000	0.250
Landsat 5	0.066	0.082	0.067	0.128	0.217	1.000	0.252

Note: These calculated Gain and Bias values will give spectral radiance values in units of milliwatts/(square cm-steradian). To obtain band radiance units of milliwatts/(square cm-steradian-micron), divide the computed radiance value by the detector bandwidth. The bandwidths for Landsat 4 and 5 in microns, are included in Table 2.

Field 35 (bytes 439-441) contains the tape spanning flag, which indicates whether the tape is part of a multi-volume set. This field will be "1/1" (one of one) for tapes containing one or more complete image files and will be either "1/2" or "2/2" for full-scene image files spanning two volumes.

Field 37 (bytes 456-460) identifies the first image line on the tape volume. This is "1" unless the tape is the second or higher numbered volume of a multi-volume set (e.g. field 35 is "2/2"). In this case it is the line number in the complete image of the first image line on the tape (nominally N/2 + 1 for two-tape sets, where N is the total number of lines in the image). This is a right-justified ASCII numeric field.

Field 39 (bytes 476-480) contains the number of image lines on the tape volume. This is the number of lines in each image file (the same as field 61) for tapes containing one or more complete image files. For multi-volume sets it is the number of image lines on the tape volume (nominally N/2 for two-tape sets, where N is the total number of lines in the image). This is a right-justified ASCII numeric field.

Field 41 (bytes 495-500) identifies the orientation angle of the scene. For non-polar scenes the orientation angle of the scene is relative to the scene alignment to map or grid north. For non-polar, map-oriented scenes this field should be zero. A negative angle implies a clockwise rotation of the scene to align with map north whereas a positive angle implies a counterclockwise rotation of the scene to align with map north. To calculate the orientation angle of any image use the following equation:

$$\text{ANGLE} = \arctan\left(\frac{\text{NORTHDIFF}}{\text{EASTDIFF}}\right)$$

Where

NORTHDIFF = URNORTH - ULNORTH
EASTDIFF = UREAST - ULEAST
URNORTH = Upper right corner point Northing (field 77)
ULNORTH = Upper left corner point Northing (field 69)
UREAST = Upper right corner point Easting (field 75)
ULEAST = Upper left corner point Easting (field 67)

Field 47 (bytes 560-565) contains the Universal Transverse Mercator zone code or the National Ocean Survey (NOS) State Plane Coordinate System zone code number when either of these map projections are selected (see fields 43 or 45).

Field 61 (bytes 1108-1112) would also normally be read before importing the image data files. This field contains the total number of lines in the image and is needed to determine the amount of disk space required for the image.

Fields 63-93 (bytes 1117-1344) contain the corresponding corner pixel locations (latitude, longitude, easting, northing) relative to the resampled pixel center for all bands on the current tape volume. To calculate the Northing and Easting of any pixel within the image use the map coordinates of the image corner points and the following equations:

$$PE = \frac{(NP-P)(NL-L)ULE+(P-1)(NL-L)URE+(NP-P)(L-1)LLE + (P-1)(L-1)LRE}{(NP-1)(NL-1)}$$

$$PN = \frac{(NP-P)(NL-L)ULN+(P-1)(NL-L)URN+(NP-P)(L-1)LLN+(P-1)(L-1)LRN}{(NP-1)(NL-1)}$$

Where

PE = Desired pixel location Easting
PN = Desired pixel location Northing
ULE = Upper left corner point Easting (field 67)
URE = Upper right corner point Easting (field 75)
LLE = Lower left corner point Easting (field 91)
LRE = Lower right corner point Easting (field 83)
ULN = Upper left corner point Northing (field 69)
URN = Upper right corner point Northing (field 77)
LLN = Lower left corner point Northing (field 93)
LRN = Lower right corner point Northing (field 85)
P = Pixel number of desired location (counted from left)
L = Line number of desired location (counted from top)
NP = Number of pixels per image line (field 59)
NL = Total number of lines in the output image (field 61)

Field 95 (bytes 1361-1367) contains the band identifiers for the image files on the tape volume. This field is composed of seven one-byte sub-fields containing from one to seven of the band identifiers "1", "2", "3", "4", "5", "6", "7". The band identifiers are listed in the order in which the image files appear on the tape and are left justified in the seven-byte ASCII alphanumeric field.

Field 97 (bytes 1386-1389) contains the blocking factor used to minimize the number of CCT tapes required to accommodate the image set. This field is always '1' for 8mm tapes. (See Blocking Factor explanation under Image Files.)

Field 99 (bytes 1406-1410) contains the physical tape record length. The value is right justified in an ASCII numeric field. The number of pixels (samples) per image line can be determined by dividing this field by the value in field 97 or by reading field 59 (bytes 1086-1090).

Field 101 (bytes 1427-1428) contains the sun elevation angle in degrees for the scene center location at the scene center acquisition time. This angle specifies the solar parallel of altitude on the celestial sphere as referenced from the celestial horizon of the scene center.

Field 103 (bytes 1443-1445) contains the sun azimuth (west) in degrees for the scene center location at the scene center acquisition time. This angle specifies the vertical circle (west) on which the sun's location is measured from the principal vertical circle of the scene center.

Field 115 (bytes 1528-1531) contains the horizontal offset of the true scene center from the nominal WRS scene center in units of whole pixels. A negative value implies a westerly offset of the scene center from the nominal WRS scene center in daytime scenes (rows 1-120) and an easterly offset of the scene center in nighttime scenes (rows 125-244).

IMAGE FILE FORMAT

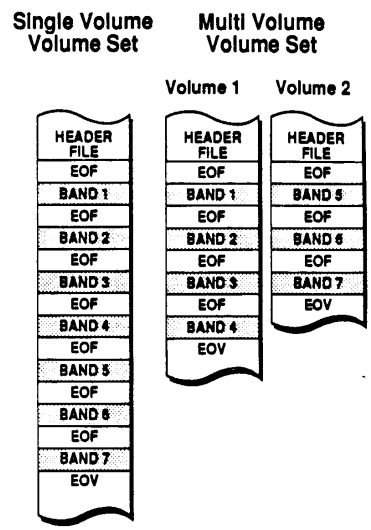
BLOCKING FACTOR

Blocking factor is a procedure EOSAT uses to minimize the number of CCT tapes required to accommodate a full-scene seven band image set. Image data is written to tape in individual records and between each record is an inter-record gap (IRG), 0.35 of an inch, separating image file records. Unblocked data, also described as having a blocking factor of one, contains one line of image data per tape record. Data written at a blocking factor of three consolidates three lines of image data into one tape record. By using blocking factors, a significant amount of CCT tape space is saved within each image file. For example, a blocking factor of three eliminates two IRGs required in the unblocked format to write out the same three image lines, saving 0.70 inches; for a Landsat scene, the total savings is more than 116 feet of tape.

Blocked data have a maximum tape record of 32,768 bytes (pixels). Depending on the image line length, EOSAT Image Processing System (EIPS) software calculates the maximum number of image lines that can be consolidated into a tape record. This number of image lines within the tape record is the tape blocking factor as set in the product header file (field 97). The actual length of the tape record, as determined by the image data line length and blocking factor, is also calculated by the EIPS software and set in the product header file (field 99). Copying blocked data from tape to disk is normally handled by the system software on your computer. Your system software will need the blocking factor to separate the image data lines from within the tape record. Certain computer operating systems cannot read large (32,768 byte) records from tape. (Check with your system manager.) We can provide unblocked products (blocking factor set to one) that will have more tapes per scene than blocked data. Certain full-scene, map-oriented products cannot be produced at a blocking factor of one because the files are too big. All subscene products are supplied with the blocking factor set to one.

TAPE STRUCTURE

Examples of the tape structure for a single-volume and a multi-volume set are presented below. Each file is followed by an End-Of-File (EOF) marker. An End-Of-Volume (EOV) marker consists of three EOFs.



CCT TAPE STRUCTURE

The cartographic software package used in processing the Landsat imagery is described in the following references:

General Cartographic Transformation Package (GCTP)
Software Reference
NOAA Technical Technical Report NOS 124 CGS 9
General Cartographic Transformation Package GCTP, Version II
Atef A. Elassal - February 1987
U.S. Dept. of Commerce
National Geodetic Information Center, NOAA
Rockville, MD 20852

USGS Map Projection Reference
Map Projections - A Working Manual
U.S. Geological Survey Professional Paper 1395
(Supersedes USGS Bulletin 1532)
John P. Snyder - 1987
U.S.G.S. Map Sales
P.O. Box 25286
Denver, CO 80225

Appendix A: Path-Oriented Products

This appendix contains the map projections and ellipsoid used in EOSAT's path-oriented TM digital products. This list of map projections shows the two-digit USGS projection number found in field 45 of the header file, the name, and the identifier used in field 43 of the header file. The ellipsoid includes the semi-major axis and the semi-minor axis.

MAP PROJECTIONS

09	Transverse Mercator	TM
21	Space Oblique Mercator	SOM
06	Polar Stereographic	PS

EARTH ELLIPSOID

	Semi-Major Axis (meters)	Semi-Minor Axis (meters)
International 1909	6378388.000000	6356911.946130

Appendix B: Map-Oriented Products

This appendix contains the map projections and the ellipsoids used in EOSAT's map-oriented TM digital products. This list of map projections shows the two-digit USGS projection number found in field 43 of the header file, the name, and the identifier used in field 43 of the header file. The list of ellipsoids includes the semi-major axis and the semi-minor axis.

MAP PROJECTIONS

01	Universal Transverse Mercator	UTM
02	State Plane Coordinate System	SPCS
03	Albers Conical Equal Area	ACEA
04	Lambert's Conformal Conic	LCC
05	Mercator	MER
06	Polar Stereographic	PS
07	Polyconic	PC
08	Equidistant Conic (Type A & B)	EC
09	Transverse Mercator (Gauss-Krueger)	TM
10	Stereographic	SG
11	Lamberts Azimuthal Equal Area	LAEA
12	Azimuthal Equidistant	AE
13	Gnomonic	GNO
14	Orthographic	OG
15	General Vertical Near-Side Perspective	GVNP
16	Sinusoidal	SIN
17	Equirectangular (Plate Carree)	ER
18	Miller Cylindrical	MC
19	Van Der Grinten I	VDG
20	Oblique Mercator (Type A & B)	OM
21	Space Oblique Mercator	SOM

EARTH ELLIPSOIDS

	Semi-Major Axis (meters)	Semi-Minor Axis (meters)
Clarke 1866	6378206.400000	6356583.800000
Clarke 1880	6378249.145000	6356514.869550
International 1967	6378157.500000	6356772.200000
International 1909	6378388.000000	6356911.946130
WGS 66	6378145.000000	6356759.769356
WGS 72	6378135.000000	6356750.519915
GRS 1980	6378137.000000	6356752.314140
Airy	6377563.396000	6356256.910000
Modified Airy	6377340.189000	6356034.448000
Everest	6377276.345200	6356075.413300
Modified Everest	6377304.063000	6356103.039000
Mercury 1960	6378166.000000	6356784.283666
Modified Mercury 1968	6378150.000000	6356768.337303
Bessel	6377397.155000	6356078.962840
Walbeck	6376896.000000	6355834.846700
Southeast Asia	6378155.000000	6356773.320500
Australian National	6378160.000000	6356774.719000
Krassovsky	6378245.000000	6356863.018800
Hough	6378270.000000	6356794.343479
6370997 Sphere	6370997.000000	6370997.000000

	Field	Bytes	Format	Description
*	1	1-9	A9	"PRODUCTδ="
*	2	10-20	A11	Product order number in 'yydddnnn-cc' format
	3	21-26	A6	"δWRSδ="
*	4	27-35	A9	WRS Path/Row/Fraction in 'ppp/rrrff' format
	5	36-54	A19	"δACQUISITIONδDATEδ="
	6	55-62	A8	Date in 'yyyymmdd' format
	7	63-74	A12	"δSATELLITEδ="
	8	75-76	A2	Satellite number: 'L4' 'L5'
	9	77-89	A13	"δINSTRUMENTδ="
*	10	90-93	A4	Instrument type: 'TMmn' where "m" = mode number "n" = multiplexer number
	11	94-108	A15	"δPRODUCTδTYPEδ="
*	12	109-122	A14	Product type: 'MAPδORIENTEDδδ', 'ORBITδORIENTED'
*	13	123-137	A15	"δPRODUCTδSIZEδ="
*	14	138-147	A10	Product size: 'FULLδSCENE', 'SUBSCENEδδ', 'MAPδSHEETδ'
*	15	148-225	A78	Map sheet name (if applicable)
	16	226-255	A30	"δTYPEδOFδGEODETICδPROCESSINGδ="
*	17	256-265	A10	Type of geodetic processing used: 'SYSTEMATIC', 'PRECISIONδ', 'TERRAINδδδ'
	18	266-278	A13	"δRESAMPLINGδ="
	19	279-280	A2	Resampling algorithm used: 'CC', 'BL', 'NN'
*	20	281-300	A20	"δRADδGAINS/BIASESδ=δ"
*	21	301-316	A16	Maximum and Minimum detectable radiance values for the first band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format. The maximum and minimum radiance units: milliwatts/(square cm - steradian). See Detailed Format Description for band gain and bias value conversions.
*	22	317-317	1X	Blank
*	23	318-333	A16	Maximum and Minimum detectable radiance values for the second band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	24	334-334	1X	Blank
*	25	335-350	A16	Maximum and Minimum detectable radiance values for the third band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	26	351-351	1X	Blank
*	27	352-367	A16	Maximum and Minimum detectable radiance values for the fourth band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	28	368-368	1X	Blank
*	29	369-384	A16	Maximum and Minimum detectable radiance values for the fifth band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	30	385-385	1X	Blank
*	31	386-401	A16	Maximum and Minimum detectable radiance values for the sixth band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	32	402-402	1X	Blank
*	33	403-418	A16	Maximum and Minimum detectable radiance values for the seventh band (see Field 95) on the tape in 'mm.mmmmm/n.nnnnn' format (if applicable).
*	34	419-438	A20	"δVOLUMEδ#/#δINδSETδ="
*	35	439-441	A3	Tape volume number and number of volumes in tape set in 'n/m' format (for multi-volume image).
*	36	442-455	A14	"δSTARTδLINEδ#="
*	37	456-460	I5	First image line number on this volume (for multi-volume image)
*	38	461-475	A15	"δLINESδPERδVOL="
*	39	476-480	I5	Number of image lines on this volume (for multi-volume image)
	40	481-494	A14	"δORIENTATIONδ="

* Indicates a changed or additional field from Rev. A.

NOTES: 1.) Double quotes are fixed fields and single quotes are product specific fields.
2.) The character δ (delta) stands for blank.

	Field	Bytes	Format	Description

* Indicates a changed or additional field from Rev. A.

	Field	Bytes	Format	Description
	41	495-500	F6.2	Orientation angle in degrees (may be negative)
	42	501-513	A13	"δPROJECTIONδ="
	43	514-517	A4	Map projection name
	44	518-537	A20	"δUSGSδPROJECTIONδ#δ="
	45	538-543	I6	USGS projection number
	46	544-559	A16	"δUSGSδMAPδZONEδ="
	47	560-565	I6	USGS map zone
	48	566-594	A29	"δUSGSδPROJECTIONδPARAMETERSδ="
	49	595-954	15D24.15	The USGS projection parameters in standard USGS order. The meaning of these values depends on the projection used.
	50	955-972	A18	"δEARTHδELLIPSOIDδ="
	51	973-992	A20	Ellipsoid used
	52	993-1010	A18	"δSEMI-MAJORδAXISδ="
	53	1011-1021	F11.3	Semi-major axis of earth ellipsoid in meters
	54	1022-1039	A18	"δSEMI-MINORδAXISδ="
	55	1040-1050	F11.3	Semi-minor axis of earth ellipsoid in meters
	56	1051-1063	A13	"δPIXELδSIZEδ="
	57	1064-1068	F5.2	Pixel size in meters
*	58	1069-1085	A17	"δPIXELSδPERδLINE="
*	59	1086-1090	I5	Number of pixels per image line
*	60	1091-1107	A17	"δLINESδPERδIMAGE="
*	61	1108-1112	I5	Total number of lines in the output image (on all volumes)
	62	1113-1116	A4	"δULδ"
	63	1117-1129	A13	Geodetic Longitude of Upper Left corner of image. As per FIPS PUB 70, longitude will be expressed as degrees, minutes, seconds. Example: 5 degrees, 15 minutes, 13.2 seconds west of the prime meridian will be expressed as "0051513.2000W."
	64	1130-1130	1X	Blank
	65	1131-1142	A12	Geodetic Latitude of Upper Left corner of image. As per FIPS PUB 70, latitude will be expressed as degrees, minutes, seconds. Example: 9 degrees, 4 minutes, 24.2334 seconds north of the equator will be expressed as "090424.2334N."
	66	1143-1143	1X	Blank
	67	1144-1156	F13.3	Easting of Upper Left corner of image in meters X
	68	1157-1157	1X	Blank
	69	1158-1170	F13.3	Northing of Upper Left corner of image in meters Y
	70	1171-1174	A4	"δURδ"
	71	1175-1187	A13	Geodetic Longitude of Upper Right corner of image
	72	1188-1188	1X	Blank
	73	1189-1200	A12	Geodetic Latitude of Upper Right corner of image
	74	1201-1201	1X	Blank
	75	1202-1214	F13.3	Easting of Upper Right corner of image in meters X
	76	1215-1215	1X	Blank
	77	1216-1228	F13.3	Northing of Upper Right corner of image in meters Y
	78	1229-1232	A4	"δLRδ"
	79	1233-1245	A13	Geodetic Longitude of Lower Right corner of image
	80	1246-1246	1X	Blank
	81	1247-1258	A12	Geodetic Latitude of Lower Right corner of image
	82	1259-1259	1X	Blank
	83	1260-1272	F13.3	Easting of Lower Right corner of image in meters X
	84	1273-1273	1X	Blank
	85	1274-1286	F13.3	Northing of Lower Right corner of image in meters Y

NOTES: 1.) Double quotes are fixed fields and single quotes are product specific fields.
2.) The character δ (delta) stands for blank.

Fast Format Trailer File

FAST Format Trailer File Document
For TM Digital Products Version 1.0
Effective November 1, 1993

The last volume of the FAST format image set includes a trailer file after the image files. This file may require software modification to read, but does not need to be read to ingest the image files. The trailer file contains ephemeris information to compute the approximate spacecraft position for each pixel in the image. This enables users to compute terrain displacement and bi-directional reflectance image analysis functions. This file is in American Standard Code for Information Interchange (ASCII), to American National Standards Institute (ANSI) and International Organization for Standardization (ISO) standards.

The ephemeris information contains seven orbit point records across the scene which specify the spacecraft position, velocity, and subsatellite point in image coordinates.

NOTE: EOSAT will use the trailer file to test the utility of the new fields for customer use. Users should code the ingest of this file carefully because other data may be added to future versions of the trailer file. We recommend that you follow a procedure similar to:

1) Read the line as an 80 character ASCII string.

2) Decode the first few characters and test against expected entries.

3) Continue to read and decode if the first characters match the expected entry, otherwise print the line for visual interpretation.

4) Terminate on the characters END OF TRAILER FILE.

The file is in ASCII and is readable as whole, and printable using standard system command utilities. Some users may prefer to "dump" the trailer file and print it using standard command language operations and will not need to write new code.

The trailer file contains fifteen ASCII records, each eighty bytes long. The format of each of these records is described in the following table.

Record #1 - File Header

The first record contains fixed text to identify the beginning of the trailer file.

Field	Bytes	Format	Description
1	18	A18	"BEGINδTRAILERδFILE"
2	62	62X	Blank filled.

Record #2 - Scene Center Reference

The second record contains the scene center date and time. These fields provide the imaging time for the scene center point defined in the FAST format header file. The time is expressed in spacecraft time (UTC).

Field	Bytes	Format	Description
1	27	A27	"SCENEδCENTERδ DATE δANDδ TIME"
2	9	A9	Scene center date as " yyyymmdd"
3	11	A11	Scene center time as " hhmmss.sss"
4	33	33X	Blank filled.

Record #3 - Datum Shift

The third record contains the geocentric datum shift parameters. These parameters are used to convert the Earth Centered Inertial (ECI) spacecraft ephemeris data to ellipsoid centered Cartesian coordinates relative to the local datum. These shift parameters are expressed in meters and should be subtracted from the geocentric position vectors contained in records 9 through 15 to convert them to datum (ellipsoid) centered coordinates.

Field	Bytes	Format	Description
1	23	A23	"DATUMδSHIFTδPARAMETERS="
2	10	F10.1	Geocentric datum shift X component.
3	10	F10.1	Geocentric datum shift Y component.
4	10	F10.1	Geocentric datum shift Z component.
5	27	27X	Blank filled.

Record #4 - Number of Orbit Points

The fourth record contains the number of ephemeris (orbit) point records contained in the file. This is fixed at seven.

Field	Bytes	Format	Description
1	24	A24	"NUMBERδOFδORBITδRECORDS="
2	2	I2	Orbit record count (always 7).
3	54	54X	Blank filled.

Record #5 - Time of First Orbit Point

The fifth record contains the time of the first orbit point in seconds from the scene center time provided in the second trailer file record. The first point is nominally generated 15 seconds before the scene center.

Field	Bytes	Format	Description
1	26	A26	"TIMEδOFδFIRSTδORBITδPOINT="
2	8	F8.3	Time offset for first orbit point.
3	46	46X	Blank filled.

Record #6 - Time Interval Between Orbit Points

The sixth record contains the time interval between orbit points in seconds. Ephemeris points are normally generated every 5 seconds.

Field	Bytes	Format	Description
1	26	A26	"TIMEδBETWEENδORBITδPOINTS="
2	8	F8.3	Time interval between orbit points.
3	46	46X	Blank filled.

Record #7 - Orbit Record Header

The seventh record describes the layout of the seven orbit records to follow. The fields in this record are aligned to serve as column headers above the orbit record fields below.

Field	Bytes	Format	Description
1	11	A11	"Xδδδδδδδδδδ"
2	11	A11	"Yδδδδδδδδδδ"
3	11	A11	"Zδδδδδδδδδδ" continued
4	9	A9	"XDOTδδδδδ"
5	9	A9	"YDOTδδδδδ"
6	9	A9	"ZDOTδδδδδ"
7	10	A10	"PIXELδδδδδ"
8	10	A10	"LINEδδδδδδ"

Records #8 through #14 - Orbit Data Records

The seven orbit records contain spacecraft state vectors (position and velocity) at five second intervals over the scene. The middle point (point #4) corresponds to the scene center. Each record contains the geocentric spacecraft position vector (X,Y,Z) in meters, the spacecraft velocity vector (XDOT,YDOT,ZDOT) in meters per second in Earth fixed coordinates, and the pixel/line image coordinates of the corresponding subsatellite point.

Field	Bytes	Format	Description
1	11	F11.1	Cartesian X coordinate in meters.
2	11	F11.1	Cartesian Y coordinate in meters.
3	11	F11.1	Cartesian Z coordinate in meters.
4	9	F9.2	Velocity X component in meters/sec.
5	9	F9.2	Velocity Y component in meters/sec.
6	9	F9.2	Velocity Z component in meters/sec.
7	10	F10.2	Subsatellite point pixel location.
8	10	F10.2	Subsatellite point line location.

Record #15 - File Terminator

The fifteenth and last record in the trailer file contains fixed text and identifies the end of the trailer file.

Field	Bytes	Format	Description
1	16	A16	"ENDδTRAILERδFILE"
2	64	64X	Blank filled.

Sample Trailer File

A sample FAST format trailer file is contained in the following figure.

```
BEGIN TRAILER FILE
SCENE CENTER DATE AND TIME= 19920123 173450.975
DATUM SHIFT PARAMETERS=    -8.0   160.0   176.0
NUMBER OF ORBIT RECORDS=    7
TIME OF FIRST ORBIT POINT=    -15.000
TIME BETWEEN ORBIT POINTS=  5.000
   X            Y           Z           XDOT       YDOT       ZDOT       PIXEL      LINE
 -2454403.3  -5442583.4  3800677.4   -3191.85   -2930.05   -6234.87   4470.82    145.78
 -2470333.5  -5457151.8  3769449.7   -3180.20   -2897.25   -6256.19   4222.40   1257.24
 -2486205.2  -5471555.9  3738115.9   -3168.45   -2864.38   -6277.34   3973.49   2368.60
 -2502017.8  -5485795.5  3706676.7   -3156.58   -2831.44   -6298.31   3724.11   3479.86
 -2517770.8  -5499870.2  3675133.1   -3144.59   -2798.43   -6319.10   3474.25   4591.02
 -2533463.6  -5513779.6  3643485.9   -3132.50   -2765.34   -6339.72   3223.93   5702.09
 -2549095.6  -5527523.4  3611736.1   -3120.29   -2732.19   -6360.15   2973.17   6813.07
END TRAILER FILE
```

ATTACHMENT 2 Fast Format C Header Files

2.1 Fast Format C Administrative Record

The Header File contains three 1536-byte ASCII records. The first record is the Administrative Record which contains information that identifies the product, the scene and the data specifically needed to ingest the imagery from the digital media. In order to import the image data, it is necessary to read entries in the Administrative Record.

The first field in this record contain the Product ID, a unique identifier for the product as ordered by the customer. The remainder of the initial two lines in this record describe the source of the image with pertinent sensor parameters. The next six lines are replicates of the first two without the Product ID. These are growth regions allowing for mosaic products containing up to four images and co-registered Panchromatic and multi-spectral imagery. These products are proposed and not yet implemented.

Line nine describes the type of product contained on the media i.e., size and orientation. Line ten describes the characteristics of the processing: i.e., level of geometric correction and resampler used. The remainder of the Administrative Record contains the critical fields required to import the image data to computer memory.

For unblocked data (8mm and CD-ROM), ingest of the imagery requires knowledge of the contents of fields 83 (pixels per line), 85 (Line per Band on this volume and (87) No. of lines in output image) and 105 (Bands Present). It is necessary to count the number of non-blank entries in the Bands Present field to get the count of the number of bands. Each character (byte) in this field will have an ASCII character with the band label, usually a number. For Landsat the value is P for PAN . The sequence terminates in a blank.

For blocked data,fields 91 (Start Line),and either 93 (Blocking Factor) and 87 (Number of lines in the output image) are also needed. Note that the (blocked) record length is equal to the blocking factor times the number of pixels per line. One may choose which parameter that best fits their system software interface. Fields 79 and 81 (Volume #/# in Set) relate to which volume number in a set and field 100 indicates Bits per Pixel. Field 73 (bytes 741-751) in Line 10 contains the level of processing that has been performed on the image.

RAW : No corrections applied
RADIOMETRIC : Radiometric corrections only
SYSTEMATIC : Radiometric and geometric corrections using spacecraft system data only.
PRECISION : Radiometric and geometric corrections using spacecraft system data and with control points used.
TERRAIN : Radiometric and geometric corrections using spacecraft system data and with control points and digital elevation model (DEM) used.

Field 75 (bytes 765-766) in Line 10 contains the resampling algorithn that has been applied to the image.

CC = Cubic convolution NN = Nearest neighbour

Field 83 (bytes 843-847) in Line 11 contains the number of image pixels on each image line of each image band on the tape.

Field 85 (bytes 865-869) in Line 11 contains the number of image lines per band on this volume (This is the number of lines in each image file for tapes containing one or more complete image files.).

Field 87 (Bytes 871-875) contains the number of image lines for the entire band (The band may be split across multiple volumes). These are right-justified numeric fields.

Field 91 (bytes 895-899) in Line 12 identifies the first image line on this tape volume. This is "b1" unless the tape is the second or higher numbered volume of a multi-volume set (e.g. fields 79 & 81 are "b2/b2"). In this case it is the line number in the complete image of the first image line on the tape ((nominally N/2 + 1 for two-tape sets, where N is the total number of lines in the image)). This is a right-justified ASCII numeric field.

Field 93 (bytes 918-919) in Line 12 contains the blocking factor used to minimize the number of CCT tapes required to accommodate the image set. This field is always "1" for 8mm tapes. (See Blocking Factor explanation under Image Files).

Field 95 (bytes 936-940) in Line 12 contains the physical tape record length. The value is right justified in an ASCII numeric field. the number of pixels (samples) per image line can be determined by dividing this field in the value in

Field 93 or by directly reading field 83 (bytes 843-847).

Field 100 (bytes 984-985) in Line 13 contains the integer number of bits per pixel that is used in the output media to represent the digital value of each individual pixel. (This value may be different from Field 102).

Field 102 (bytes 1012-1013) in Line 13 contains the integer number of bits per pixel that each individual pixel was quantized the satellite instrument. (This value may be different from field 100) IRS-1C panchromatic data is transmitted as six bit pixels, while the digital products are always produced are always produced with eight bit pixels.

Field 106 (bytes 1056-1087) in Line 14 contains the band identifiers for the image files on the tape volume. This field is composed of thirty-two- one-byte sub-fields containing from one to thirty-two of the band identifies. The band identifiers are listed in the order in which the image files appear on the tape and are single character fields. So the leftmost character (byte 1056) must be non-zero. The sequence ends with trailing blanks.

Field 107 (bytes 1088-1120) in Line 14 contains a nine character product code.(e.g. STPCA02AI)

First Two character is product type e.g. ST ,GR ,QR ,TR ,G3 ,G4 ,SR etc... then single character code Projection ,Resampling , Ellipsoid, enhancement ,level of correction ,product format & output media.

Field 111 (bytes 1121-1182) in Line 15 contains software version number and scene Acqisition time is in HH:mm:SS:mmm format.

2.2 Fast Format C Radiometric Record

The second record is the Radiometric Record which contains the coefficients needed to convert the scene digital values into at-satellite spectral radiance.

Fields 4-41 (bytes 81-689) contains the coefficients needed to convert scene digital values to at-satellite spectral radiances. The minimum detectable radiance value LMIN and the saturation radiance value LMAX for each spectral bands are provided for the operating gain. The conversion formula for Digital Count to radiance is as follows ..

Lrad = (DN / MaxGray) * (Lmax - Lmin) + Lmin where
Lrad = Radiance for a given DN value
DN = Digital Count

MaxGray = 63 for PAN, 127 for WiFS and LISS-III for Raw product. 255 for corrected products of all sensors.

Lmin = Minimum radiance value for a given band
Lmax = Maximum radinace value for a given band

Here in this record Bias corresponds to Lmin and Gain corresponds to Lmax.

2.3 Geometric Record

The third record is the Geometric Record which contains the scene geodetic location information. In order to align the imagery to other data sources, it will be necessary to read entries in the Geometric Record.

Line 1 contains the map projection (field 3), Earth ellipsoid (field 5) and datum (field 7) used in producing the product.

Appendix 5 contains the list of supported map projections and Appendix 6 contains the list of supported Earth ellipsoids and comments about the datum. Products are not always available in all projections and ellipsoids.

Fields 11-44 (bytes 110-504, lines two to six) contain the USGS projection parameters used to process the image in standard USGS order. The meaning of these values depends on the projection used. For information about the contents of each of the map projection fields see Appendix C.

Fields 47-88 (bytes 561-859, lines eight to eleven) contain the corresponding corner pixel locations (longitude, latitude, easting, northing) relative to the resampled pixel center for all bands on the current tape volume. Line twelve contains the same information about the scene center as well as the location of the scene center relative to the top right corner of the image on this medium. To calculate the Northing and Easting of any pixel within the image.Use the map coordinates of the image corner points and the following equations:

correction

PE = ((NP-P)(NL-L)ULE + (P-1)(NL-L)URE + NP-P)(L-1)LLE +
(P-1)(L-1)LRE)/(NP-1)(NL-1))

Pn = ((NP-P)(NL-L)ULE+(P-1)(NL-L)URN+(NP-P)(L-1)LLN+
(P-1)(L-1)LRN)/(NP-1)(NL-1))

Where

PE = Desired pixel location Easting
PN = Desired pixel location Northing
ULE - Upper left corner point Easting (Field 53)
URE - Upper right corner point Easting (Field 64)
LLE - Lower left corner point Easting (Field 86)
LRE - Lower right corner point Easting (Field 75)
ULN - Upper left corner point Northing (Field 55)
URN - Upper right corner point Northing (Field 66)
LLN - Lower left corner point Northing (Field 88)
LRN - Lower right corner point Northing (Field 77)
P - Pixel number of desired location (counted from left)
L - Line number of desired location (counted from top)
NP - Number of pixels per image line
(Record 1, Field 83)
NL - Total number of lines in the output image
(Record 1, Field 87)

Field 107 (bytes 969-974) in Line thirteen contains the horizontal offset of the true scene center from the nominal scene center in units of whole pixels. A negative value implies a westerly offset of the scene center from the nominal scene center in daytime scenes and an easterly offset of the scene center in nighttime scenes.

Field 109 (bytes 995-1000) in Line thirteen identifies the orientation angle of the scene. For non-polar scenes the orientation angle of the scene is relative to the scene alignment to map or grid north. For non polar map oriented scenes this field should be zero. A negative angle implies a clockwise rotation of the scene to align with map north whereas a positive angle implies a counterclockwise rotation of the scene to align with map north. To calculate the orientation angle of any image use the following equation:

ANGLE = arctan (NORTHDIFE/EASTDIFF)

Where
NORTHDIFF = URNORTH - ULNORTH
EASTDIFF = UREAST - ULEAST
URNORTH = Upper right corner point Northing (field 66)

ULNORTH = Upper left corner point Northing (field 55)
UREAST = Upper right corner point Easting (field 64)
ULEAST = Upper left corner point Easting (field 53)

Field 113 (bytes 1062-1065) in Line fourteen contains the sun elevation in degrees for the scene center location at the scene center acquisition time. This angle specifies the solar parallel of altitude on the celestial sphere as referenced from the celestial horizon of the scene center.

Field 115 (bytes 1086-1090) contains the sun azimuth (west) in degrees for the scene center location at the scene center acquisition time. This angle specifies the vertical circle (West) on which the sun's location is measured from the principal vertical circle of the scene center.

The accompanying tables in Appendix D describe the format of the three records, including the number of bytes, the FORTRAN format statement and a brief description of each field in the header file. All alphanumeric fields are left justified, and all numeric fields right justified. Fields of fixed (constant) values are represented with capital letters in quotes (e.g., "PRODUCT="). Variable fields are represented with lower case letters. In both fixed and variable fields, blank spaces are indicated by the lower case"b" character.

All three records in the Header File have a carriage return every eightieth character.

ATTACHMENT 3 - NLAPS Correction Processing Report (formerly known as the Work Order Report) for TM data in a NDF format.

Multiple processing stage examples are listed below to display how the work order file appears in a product file.

NOTE: Latitudes and longitudes are specified in degrees. Heights are specified in meters.
The Correction Processing Report File provides a record of the work executed in response to a DORRAN Product Order. It is in ASCII format for easy readability, and contains the following information:
(Notes describing units and/or formats are used for latitude, longitude, heights, dates, etc.)

- Product order information
  - Processing stage reports:
    - Name of processing stage
    - Start and completion date/time of processing stage
    - Summary/status information
  - Processing stages may include:
    - Ingest
    - Precision Modelling
    - DEM Ingest
    - DEM Processing
    - Apply Despike Filter
    - Apply Deband Filter
    - Image Correction
    - Geometric Quality Assessment
    - Radiometric Quality Assessment
    - Product Formatting
  - Summary Information (e.g., Work Order start and stop date/times and total CPU time)

NLAPS CORRECTION PROCESSING REPORT

```
Work Order:        01100012700020002        Priority:        6
Satellite:        Landsat-5                Sensor:          TM
Camera Number:     N/A                          Sensor Mode:        N/A

Input Data Ident:   BE2368
Input Media Type:   DCT                    File Number:        N/A
Orbit Number:     10223

Processing Level:   Systematic Geocorrection   Resampling:        CC
Map Projection:     UTM                    Zone:          -19
Earth Ellipsoid:    WGS84                  Product Orient.:    Satellite
Projection Params:
  6.378137000000000e+06  6.356752314140000e+06  0.000000000000000e+00
  0.000000000000000e+00  0.000000000000000e+00  0.000000000000000e+00
  0.000000000000000e+00  0.000000000000000e+00  0.000000000000000e+00
  0.000000000000000e+00  0.000000000000000e+00  0.000000000000000e+00
  0.000000000000000e+00  0.000000000000000e+00  0.000000000000000e+00
Line Spacing:       028.5                 Pixel Spacing:      028.5

Path/Strip no.:     229                   Start Row no.:     089.0
                                   End Row no.:       N/A

Image Lines:        6299                  Image Pixels:       6969
Image Orientation:   12.23  deg from N        Output Bands:       1234567
Viewing Angle:       -0.10  deg

Scene center lat:   -41.772 deg              Scene center long:   -67.065 deg
```

Sun Elevation: 44.75 deg	Sun Azimuth: 71.47 deg
Scene center date: 1986 02 01	Scene center time: 13:38:21.5621
Output Media: Disk	Output Product Id: N/A
Product Format: NDF	Interleaving : BSQ
Catalogued: FALSE	
Completion date: 2000 01 27	Completion time: 11:12:47

Termination Status: Successful Completion

DETAILED PROCESSING RESULTS

RADIOMETRIC CORRECTION

Algorithm: NASA

Band	Ref Detector	DN to Radiance gain	DN to Radiance offset	Default Abs Calib?
1	15	0.602431	-1.52000	FALSE
2	10	1.175100	-2.84000	FALSE
3	2	0.805765	-1.17000	FALSE
4	1	0.814549	-1.51000	FALSE
5	2	0.108078	-0.37000	FALSE
6	4	0.055158	1.237800	FALSE
7	15	0.056980	-0.15000	FALSE

Band 1 Destriping Coefficients:

Detector	Forward gain	Forward offset	Backward gain	Backward offset
1	0.880025	-2.15764	0.880025	-2.15764
2	0.873767	-1.89963	0.873767	-1.89963
3	0.867875	-1.84191	0.867875	-1.84191
4	0.871425	-1.82531	0.871425	-1.82531
5	0.873611	-1.86046	0.873611	-1.86046
6	0.875311	-1.95659	0.875311	-1.95659
7	0.874542	-2.00864	0.874542	-2.00864
8	0.864113	-1.54496	0.864113	-1.54496
9	0.866667	-1.90289	0.866667	-1.90289
10	0.864826	-1.09980	0.864826	-1.09980
11	0.863702	-1.66680	0.863702	-1.66680
12	0.871381	-1.24911	0.871381	-1.24911
13	0.871064	-1.98886	0.871064	-1.98886
14	0.874952	-1.42873	0.874952	-1.42873
15	0.869424	-1.20295	0.869424	-1.20295
16	0.882461	-1.57046	0.882461	-1.57046

Band 2 Destriping Coefficients:

Detector	Forward gain	Forward offset	Backward gain	Backward offset
1	0.847230	0.845614	0.847230	0.845614
2	0.858467	0.885332	0.858467	0.885332
3	0.848993	0.963734	0.848993	0.963734
4	0.854513	0.857952	0.854513	0.857952
5	0.858727	0.904953	0.858727	0.904953
6	0.858012	1.010140	0.858012	1.010140
7	0.855505	0.842200	0.855505	0.842200
8	0.843260	1.108280	0.843260	1.108280
9	0.860288	1.041660	0.860288	1.041660

10	0.845318	1.010090	0.845318	1.010090
11	0.855796	1.044040	0.855796	1.044040
12	0.848174	0.927959	0.848174	0.927959
13	0.852735	0.892748	0.852735	0.892748
14	0.845389	1.307270	0.845389	1.307270
15	0.853984	0.974160	0.853984	0.974160
16	0.857507	1.384260	0.857507	1.384260

Band 3 Destriping Coefficients:

Detector	Forward		Backward	
	gain	offset	gain	offset
1	0.773912	1.810970	0.773912	1.810970
2	0.766092	1.811450	0.766092	1.811450
3	0.769100	1.755890	0.769100	1.755890
4	0.761379	1.739420	0.761379	1.739420
5	0.771544	1.698800	0.771544	1.698800
6	0.756449	1.945050	0.756449	1.945050
7	0.765868	1.843240	0.765868	1.843240
8	0.755297	2.056700	0.755297	2.056700
9	0.763824	1.970740	0.763824	1.970740
10	0.753195	1.923310	0.753195	1.923310
11	0.757606	1.961240	0.757606	1.961240
12	0.763800	1.980020	0.763800	1.980020
13	0.769963	1.761940	0.769963	1.761940
14	0.761460	2.041200	0.761460	2.041200
15	0.777496	1.942840	0.777496	1.942840
16	0.763761	2.494960	0.763761	2.494960

Band 4 Destriping Coefficients:

Detector	Forward		Backward	
	gain	offset	gain	offset
1	0.844551	1.524820	0.844551	1.524820
2	0.838394	1.649850	0.838394	1.649850
3	0.846798	1.632600	0.846798	1.632600
4	0.839642	1.555190	0.839642	1.555190
5	0.839863	1.562540	0.839863	1.562540
6	0.845273	1.561300	0.845273	1.561300
7	0.859585	0.877270	0.859585	0.877270
8	0.833292	1.656400	0.833292	1.656400
9	0.850691	1.616930	0.850691	1.616930
10	0.850049	1.707270	0.850049	1.707270
11	0.847481	1.420590	0.847481	1.420590
12	0.839002	1.715680	0.839002	1.715680
13	0.832060	1.597300	0.832060	1.597300
14	0.841556	1.629540	0.841556	1.629540
15	0.843241	1.629830	0.843241	1.629830
16	0.848198	2.206710	0.848198	2.206710

Band 5 Destriping Coefficients:

Detector	Forward		Backward	
	gain	offset	gain	offset
1	0.859228	0.775387	0.859228	0.775387
2	0.857950	0.795179	0.857950	0.795179

3	0.848746	1.312790	0.848746	1.312790
4	0.854230	1.061870	0.854230	1.061870
5	0.852688	1.032150	0.852688	1.032150
6	0.851521	0.993151	0.851521	0.993151
7	0.858836	0.802902	0.858836	0.802902
8	0.857096	0.722193	0.857096	0.722193
9	0.866707	1.457440	0.866707	1.457440
10	0.842060	0.612885	0.842060	0.612885
11	0.845297	0.929959	0.845297	0.929959
12	0.857438	1.092110	0.857438	1.092110
13	0.837641	1.009530	0.837641	1.009530
14	0.850783	1.043680	0.850783	1.043680
15	0.844125	1.140980	0.844125	1.140980
16	0.856336	1.138960	0.856336	1.138960

Band 6 Destriping Coefficients:

Detector	Forward		Backward	
	gain	offset	gain	offset
1	1.107020	-108.516	1.107020	-108.516
2	1.136080	-113.466	1.136080	-113.466
3	1.103490	-108.354	1.103490	-108.354
4	1.179590	-118.607	1.179590	-118.607

Band 7 Destriping Coefficients:

Detector	Forward		Backward	
	gain	offset	gain	offset
1	0.819389	1.950710	0.819389	1.950710
2	0.820868	1.702970	0.820868	1.702970
3	0.812010	1.974920	0.812010	1.974920
4	0.809730	2.032330	0.809730	2.032330
5	0.811770	1.873100	0.811770	1.873100
6	0.821715	2.021500	0.821715	2.021500
7	0.806054	1.995040	0.806054	1.995040
8	0.817763	2.025900	0.817763	2.025900
9	0.810190	2.057130	0.810190	2.057130
10	0.811815	1.987500	0.811815	1.987500
11	0.801273	2.063170	0.801273	2.063170
12	0.816317	2.417470	0.816317	2.417470
13	0.816020	2.121760	0.816020	2.121760
14	0.815221	2.211720	0.815221	2.211720
15	0.810124	1.934710	0.810124	1.934710
16	0.820410	2.355500	0.820410	2.355500

RADIOMETRIC QUALITY ASSESSMENT

NOTE:
Mean, Std.Dev, Striping are in DN's (Digital Numbers).

Band	Chip Location		Chip Size		Mean	Std Dev	Striping
	Line	Pixel	Lines	Pixels			
1	1837.60	1268.00	128	128	93.60	0.529	0.0503

1	3674.20	2535.00	128	128	87.85	0.883	0.0772
1	5510.80	3802.00	128	128	101.07	3.375	0.0746
1	7347.40	5069.00	128	128	98.85	1.757	0.1060
2	1837.60	1268.00	128	128	43.06	0.447	0.1195
2	3674.20	2535.00	128	128	40.54	0.614	0.0708
2	5510.80	3802.00	128	128	47.86	2.743	0.0700
2	7347.40	5069.00	128	128	47.30	1.317	0.0758
3	1837.60	1268.00	128	128	57.80	1.003	0.1349
3	3674.20	2535.00	128	128	53.97	0.951	0.0890
3	5510.80	3802.00	128	128	65.58	3.291	0.0781
3	7347.40	5069.00	128	128	64.07	2.468	0.1545
4	1837.60	1268.00	128	128	55.38	2.183	0.1662
4	3674.20	2535.00	128	128	47.03	2.296	0.2589
4	5510.80	3802.00	128	128	59.23	1.559	0.0687
4	7347.40	5069.00	128	128	60.43	1.495	0.0803
5	1837.60	1268.00	128	128	92.38	3.313	0.2623
5	3674.20	2535.00	128	128	91.92	1.938	0.2117
5	5510.80	3802.00	128	128	96.67	1.654	0.0961
5	7347.40	5069.00	128	128	104.41	1.719	0.0812
6	460.00	318.40	128	128	150.37	1.078	0.0450
6	919.00	635.80	128	128	139.09	0.484	0.0612
6	1378.00	953.20	128	128	148.18	1.161	0.0876
6	1837.00	1270.60	128	128	153.84	0.908	0.0508
7	1837.60	1268.00	128	128	52.50	1.875	0.1290
7	3674.20	2535.00	128	128	52.28	1.163	0.0925
7	5510.80	3802.00	128	128	56.58	1.054	0.1067
7	7347.40	5069.00	128	128	58.29	1.713	0.0888

PRODUCT FORMATTING

Product Scene Center Location (lat/long) : -41.772 -67.065
Product Scene Center Date/Time (yyyy mm dd): 1986 2 1 13:38:21.5621

Product Extent:

```
 Lat:      -40.80  ---------------------------------- Lat:      -41.14
 Long:     -68.02                               Long:     -65.70
 North: 5482498.22                              North: 5440436.23
 East:   582784.54                              East:   776866.95
 |                                                 |
 |                                                 |
 |                                                 |
 |                                                 |
 |                                                 |
 |                                                 |
 Lat:      -42.39                               Lat:      -42.73
 Long:     -68.46                               Long:     -66.08
 North: 5307077.58                              North: 5265015.59
 East:   544766.97  ---------------------------------- East:   738849.38
```

EXECUTION INFORMATION

Stage	Start	End	CPU
Ingest	Thu Jan 27 09:10:10 2000	Thu Jan 27 09:57:52 2000	46.60
ImCorr	Thu Jan 27 09:58:06 2000	Thu Jan 27 10:00:19 2000	652.82
RadQa	Thu Jan 27 10:00:21 2000	Thu Jan 27 10:00:23 2000	0.53

Output	Thu Jan 27 11:12:19 2000	Thu Jan 27 11:12:36 2000	10.95
Catalog	Thu Jan 27 11:12:38 2000	Thu Jan 27 11:12:40 2000	0.44

711.34

ATTACHMENT 4 NDF Image and DEM Header File Format

The Image Header File contains information describing image data. The header file is an ASCII text file. Information in the header file consists of keyword/value entries in the format:

<keyword> = <value1> [,<value2>,<value3>,...,<valueN>];

The characters "," and ";" serve as value and entry delimiters, respectively, whereas "=" separates the keyword field from value field(s). These special characters are not to be used in keyword and value fields. In rare instances when these special characters are required in keyword and value fields, the desired field must be enclosed in double quotes (i.e.,"<field>", where the <field> contains the above-mentioned special character(s)).

In the rare event that the double quote character is required in a field, it is represented by a backslash, followed by a double quote (e.g., "\""). A backslash in a field is denoted by two consecutive backslashs (e.g., "\\").

The first and last characters of keywords and values are non-blank characters. <Keywords> are unique and are single tokens. Words in keyword fields are connected by underscores. An example of a keyword is "BITS_PER_PIXEL".

Where possible, each entry in the <value> field is a single token. The keyword in the first entry of the header is “NDF_REVISION". All other header entries can appear in any order, except for the keyword "END_OF_HDR", which has no parameters and represents the end of a header. This entry is also terminated by a semicolon.

Each keyword starts at the beginning of a new line. Any number, including zero, or white spaces may appear outside the keyword and value fields. White spaces refer to space, tab, carriage-return (CR), and line-feed (LF) characters.

Only required parameters are entered in the file. Those parameters that are not required may not be included. For example, NDF files containing mosaicked DEM data will not have BAND1-RADIOMETRIC_GAINS/BIAS entries. A parameter with a specified default value may not be included if it is to take on its default value.

All header files include the parameters listed in Table 1-1, except for parameters that are to be set to their default values. Header files for MSS and TM image data also contain the parameters specified in Table 1-2.

Within the parameter tables, the following notation is used:

<type> specifies the type or format of data to be used as a keyword value
[optional type] specifies the type or format of optional data for a keyword
value| represents "or", used for specifying alternative keyword values
"<character>" specifies that the <character> must be included as part of the keyword value or value list, and the character set includes : _ , / = ; .

Table 1-1. General parameters.

KEYWORD	DESCRIPTION
NDF_REVISION	Format version code <m>"."<nn>. This document describes version "2.00"
DATA_SET_TYPE	Type of data. Format of data type: <company>”_”<sensor>|<data type>[FMT<nnn>] Valid types are: “EDC_MSS”, “EDC_TM”, “EDC_ETM+”, and “NLAPS_DEM”
PRODUCT_NUMBER	Product order number in <NNNYYMMDDSSSSdddd> format with NNN = Node, YY = year, MM = month, DD = day, SSSS = Sequence Number, and dddd = unit number.
PIXEL_FORMAT	Format of pixel. Valid values are: "BIT", "BYTE", "2BYTEINT", "4BYTEINT", "REAL", "DOUBLE". Note that integers may be signed or unsigned.
PIXEL_ORDER	Valid values are: "NOT_INVERTED", "[<n>-]BYTE_INVERTED", "[<n>-]BIT_INVERTED". An example is: "BYTE_INVERTED". Default value is "NOT_INVERTED".

BITS_PER_PIXEL	Number of bits per pixel. Integer format.
PIXELS_PER_LINE	Number of pixels per line. Integer format.
LINES_PER_DATA_FILE	Number of data lines for each data/image file. For example, for a 3-band BIL imagery data file. the value of LINES_PER_DATA_FILE will equal the number of lines in each band multiplied by 3. Integer format. For BSQ imagery, the value of LINES_PER_DATA_FILE will equal the number of lines in each band.
DATA_ORIENTATION	Data orientation in <position>"/" <direction> formatc. Valid values are: "UPPER_LEFT/RIGHT", "UPPER_LEFT/BOT", "UPPER_RIGHT/LEFT", "UPPER_RIGHT/BOT", "BOTTOM_LEFT/RIGHT", "BOTTOM_LEFT/TOP", "BOTTOM_RIGHT/LEFT", "BOTTOM_RIGHT/TOP".
NUMBER_OF_DATA_FILES	Total number of image/data files. Header, work order report and history files are excluded. Integer format.
DATA_FILE_INTERLEAVING	Interleaving type. Valid values are: "BSQ".
TAPE_SPANNING_FLAG	Tape spanning flag for images that span multiple volumes in <n>"/"<m> format, where <n> is the current volume number and <m> is the total number of volumes.
START_LINE_NUMBER	First data/image line number on this volume (for multiple volumes). Integer format.
START_DATA_FILE	First data file number on this volume (for multiple volumes). Integer format.
LINES_PER_VOLUME	Number of data lines on this volume (for multiple volumes). Integer format.
BLOCKING_FACTOR	Blocking factor. Number of data records per block. Integer format. Default is "1".
RECORD_SIZE	Length of physical record in bytes. Integer format.
UPPER_LEFT_CORNER	<Longitude>"," <Latitude>"," <Easting>", "<Northing> where Longitude and Latitude represent geodetic coordinates in <DDDMMSS>"."<SSSSC> format with DDD = degrees, MM = minutes, SS.SSSS = seconds, and C = "N", "S", "E" or "W". Easting and Northing are expressed in meters, in F13.3 format. These 4 measurements are taken at the center of the upper-left-most pixel. An example of longitude: 5 degrees, 13 min., 12.7 sec. west of prime meridian will be expressed as "0051312.7000W". An example of latitude: 18 degrees, 12 min., 54.7 sec. north of the equator will be expressed as "0181254.7000N".
UPPER_RIGHT_CORNER	<Longitude>"," <Latitude>", "<Easting>","<Northing>. The format is similar to that of UPPER_LEFT_CORNER. These 4 measurements are taken at the center of the upper-right-most pixel.
LOWER_RIGHT_CORNER	<Longitude>"," <Latitude>", "<Easting>","<Northing>. The format is similar to that of UPPER_LEFT_CORNER. These 4 measurements are taken at the center of the lower-right-most pixel.
LOWER_LEFT_CORNER	<Longitude>"," <Latitude>", “<Easting>","<Northing>. The format is similar to that of UPPER_LEFT_CORNER. These 4 measurements are taken at the center of the lower_left-most pixel.
REFERENCE_POINT	Valid values are: "SCENE_CENTER", "NONE".
REFERENCE_POSITION	<Longitude>","<Latitude>", "<Easting>", "<Northing>", "<Pixel #>","<Line #>. Used to geographically reference the image to the ground. The longitude, latitude, easting and northing formats are the same as those in UPPER_LEFT_CORNER. Pixel # and Line # refer to reference point pixel and line numbers respectively, with the first pixel in the image being 1,1. They both have F9.2 formats and can be negative. Integer line/pixel numbers correspond to the center of a pixel.
REFERENCE_OFFSET	<x-offset>","<y-offset>. Horizontal offset of the true reference point from the nominal WRS scene center in units of whole pixels. Both are F9.2 format.
ORIENTATION	Orientation angle in degrees measured clockwise from grid (map) North. May be negative. F11.6 format.
MAP_PROJECTION_NAME	Map projection name, as specified in GCTP documentationa.
USGS_PROJECTION_NUMBER	USGS supported projection number, as specified in GCTP documentationa.

USGS_MAP_ZONE	USGS map zone code, for UTM and State Plane Cartographic System. (Negative numbers are used to indicate southern hemisphere for UTM zone).
USGS_PROJECTION_ PARAMETERS	USGS map projection parametersa. There are 15 PARAMETERS parameters, all with the same format (D26.15).
HORIZONTAL_DATUM	Name of the horizontal datum used, Valid values are: “NAD27”, “NAD83”, “WGS84”, “ELLIPSOID”. See Appendix 6.
EARTH_ELLIPSOID_ SEMI-MAJOR_AXIS	Semi-major axis of Earth ellipsoid. F11.3 format, in meters.
EARTH_ELLIPSOID_ SEMI-MINOR_AXIS	Semi-minor axis of Earth ellipsoid. F11.3 format, in meters.
EARTH_ELLIPSOID_ ORIGIN_OFFSET	<x-offset>","<y-offset>","<z-offset> x-, y- & z-offsets of Earth ellipsoid in meters. F11.3 format.
EARTH_ELLIPSOID_ ROTATION_OFFSET	<x-plane offset>","<y-plane offset>", "<z-plane offset> Angular offset from x-plane, y-plane & z-plane of Earth ellipsoid in degrees. F9.6 format.
WRS	WRS Path/Row in <ppp>"/"<rrr.n> format, where n is the fractional row value.
ACQUISITION_DATE/TIME	UTC date and time of acquisition of reference point in ISO-compliant format:YYYY-MM-DDThh:mm:ssZ. ©
SATELLITE	Satellite number. Valid values are "LANDSAT_"<m>, where m is an integer 1 – 5 or 7.
SATELLITE_INSTRUMENT	Instrument type: <SSSSSS>, where <SSSSSS> is the sensor type. Valid values are: "MSS", "TM", and ETM+.
PRODUCT_SIZE	Valid values are: "FULL_SCENE", "SUBSCENE", "MULTI_SCENE".
PIXEL_SPACING	<Horizontal pixel size>","<vertical pixel size>. Horizontal and vertical pixel size in PIXEL_SPACING_UNITS. F9.4 format.
PIXEL_SPACING_UNITS	Units of measure: "METERS"
PROCESSING_LEVEL	Processing level. For ETM+, TM & MSS, valid values are: "01", "02", "03", "04", "05", "06", "07", "08", "09", "10". These correspond to the standard Landsat processing levels.
RESAMPLING	Resampling kernel. Valid values are: "NN", "BL", "CC", "KD16","SINC8", "SINC16", "NONE", <user-defined>, where <user-defined> is an unique name for an user-definable kernel.
PROCESSING_DATE/TIME	Processing date.time in ISO-compliant format: YYYY-MM-DDThh:mm:ss. In local system time. ©
PROCESSING_SOFTWARE	Processing software version: "NLAPS_"<xx>" where xx = software version number.
SUN_ELEVATION	Sun elevation in degrees at the reference point (acquisition time). F6.2 format.
SUN_AZIMUTH	Sun azimuth in degrees at the reference point (acquisition time). F6.2 format.
NUMBER_OF_BANDS_ IN_VOLUME	Number of bands in the volume. Integer format.

a. Data Orientation. For an image, the first pixel starts from the top-left corner and the next pixel lies to its right. Thus, this can be represented by a start/direction pair of UPPER-LEFT/RIGHT. NDF has been expanded to include start positions of “UPPER-LEFT,” “UPPER-RIGHT”, “LOWER-LEFT” & “LOWER-RIGHT” and directions of “TOP”, “BOT”, “LEFT” & “RIGHT”.

b. It is the production system that splits the data when multiple volumes are required, NLAPS will output files to only one volume. Thus, from NLAPS the parmeters TAPE_SPANNING_FLAG, START_DATA_FILE and START_LINE_NUMBER will have values 1/1. 1 and 1 respectively. LINES_PER_VOLUME will be equal to LINES_PER_DATA_FILE times NUMBER_OF_DATA_FILES.

c. Note that dates and times are specified in ISO-compliant format.

d. For a listing of the Horizontal Datum names, a datum name's default ellipsoid/Earth model, and a brief geographical reference, see Appendix 5. For a listing of the General Cartographic Transformation Package (GCTP) map projection names, map projection numbers, and map projection parameters, see Table B-1 and Table B-2 in Appendix 6.

e. For a listing of the standard Landsat processing level definitions, see Table B-3 in Appendix 6.

ATTACHMENT 5 NLAPS processing history sample for TM data in a NDF format.

A processing history file is found in each NLAPS data product. This file provides documentation about the original customer request and the processing parameters used to produce the NLAPS digital product.


```
================================================================
01100012700020002  PROCESSING HISTORY
================================================================

================================================================
/usr1/nlaps/RT/productorders/01100012700020002.po:
================================================================
{
InputParams =
{
satellite = "Landsat-5";
sensor = "TM";
AOS_time = "1986 02 01 12:00:00";
inputDatasetId = "BE2368";
inputMediaType = "DCT";
inputDataFormat = "RAW";
dctId = "9630501TMR";
inputStartAddress = 8296621L;
inputStopAddress = 8396820L;
}
ControlParams =
{
type = "Correction";
orderId = "01100012700020002";
priority = 6L;
}
Inspection =
{
viewInput = FALSE;
viewOutput = TRUE;
geometricQA = FALSE;
}
OutputProductParams =
{
productFormat = "NDF";
bandSelection = "1234567";
distributionMediaType = "Disk";
outputMediaInterleaving = "BSQ";
}
iccHeader =
{
messageType = "PGS_ORDER";
originator = "DORRAN";
originatorAddress = "edcsgs11.cr.usgs.gov";
recipient = "PGS";
creationTime = 948959212L;
messageId = "/usr1/nlaps/RT/icc/incoming/target/DORRAN__PGS__01100012700022.PGS_ORDER";
monitorId = "0_142308";
}
CorrectionParams =
{
correctionLevel = "Systematic Geocorrection";
productOrientation = "Satellite";
```

mapParams =
{
name = "UTM";
projectionCode = 1L;
projectionParams =
[
6.378137000000000e+06;
6.356752314140000e+06;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
zoneNumber = -19L;
}
earthEllipsoid = "WGS84";
resamplingKernel = "CC";
productFramingMethod = "Path Row";
path = 229L;
row = 8.900000000000000e+01;
lineSpacing = 2.850000000000000e+01;
pixelSpacing = 2.850000000000000e+01;
scanGapCorrection = TRUE;
radiometricCorrection =
{
method = "NASA";
deband = FALSE;
despike = FALSE;
memoryEffectCorrection = FALSE;
}
elevationCorrection = "None";
}
header =
{
name = "internal-formatted PO";
version = 0L;
productOrderType = "Correction";
origin = "External";
creationTime = 948985793L;
}
}

==
PreIngest.input:
==

{
commonChildInputParams =
{
reportName = "PreIngest.report";
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
}
satelliteName = "LS5 ";
sensorName = "TM ";

```
referenceTime =
{
year = 1986;
month = 2;
day = 1;
hour = 12;
minute = 0;
sec = 0;
usec = 0;
time_system = 2;
}
}
==================================================================
Ingest.input:
==================================================================
{
commonChildInputParams =
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
reportName = "Ingest.report";
}
priority = 4.000000000000000e+00F;
manualPositioningRequired ?= FALSE;
AOSTime =
{
year = 1986;
month = 2;
day = 1;
hour = 12;
minute = 0;
sec = 0;
usec = 0;
time_system = 2;
}
satellite = "LS5 ";
sensor = "TM  ";
numberOfScenes = 1.500000000000000e+00F;
ingestBoundaryType ?= 0;
pathRowCentre ?=
{
path = 229;
row = 89;
sceneCentreOffset ?= 0.000000000000000e+00F;
}
bandList =
{
numBands = 7;
bandsUsed =
[
1;
2;
3;
4;
5;
6;
7;
0;
0;
]
}
inputIsTarred ?= FALSE;
memoryEffectCorrectionRequired ?= FALSE;
```

```
mediumData =
{
mediumType = 0;
format = 4;
volumeInfo =
[
{
filenames =
[
"BE2368";
]
mediumId = "BE2368";
inputStartAddress ?= 8296621L;
inputStopAddress ?= 8396820L;
saveset ?= "9630501TMR";
}
]
}
sampleSceneStats = FALSE;
}
================================================================
Ingest.output:
================================================================
{
InputImage =
{
InputImageHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_INGMT_IngestTmEtm.tif";
InputImageResourceId = "/image2";
InputImageAllocationId = 114498L;
}
IngestQualityFlag = TRUE;
IngestPredictedOrbitFlag = TRUE;
orbitNumber = 10223;
}================================================================
Ingest.report:
================================================================
{
ReportHeader =
{
ReportName = "Ingest";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 09:10:10 2000";
StartTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 9;
minute = 10;
sec = 10;
usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 09:57:52 2000";
CompletionTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 9;
minute = 57;
```

sec = 52;
usec = 0;
time_system = 2;
}
CpuTime = 4.660000000000000e+01;
}
IngestHeader =
{
WorkOrderID = "01100012700020002";
Satellite = "LS5 ";
Sensor = "TM ";
}
ProcessingInformation =
{
TotalNumberOfSwaths = 574L;
TotalNumberSwathsWithSyncLosses = 7L;
TotalNumberOfSyncLosses = 888L;
NumberBadSwaths = 0L;
InputCentreDateAndTimeAtStation =
{
year = 1986L;
month = 2L;
day = 1L;
hour = 13L;
minute = 38L;
sec = 21L;
usec = 522640L;
time_system = 2L;
}
}
InputSpecification =
{
InputMedia = "DCRSi";
InputDataFormat = "R";
VolumeInformation =
[
{
NumberOfScenes = 1L;
SceneId =
[
"9630501TMR";
]
}
]
NumberOfBandsIngested = 7L;
BandNumbersIngested =
[
1L;
2L;
3L;
4L;
5L;
6L;
7L;
]
}
}==
DemInit.input:
==
{
inputImageFileName = "/usr1/nlaps/RT/workorders/01100012700020002/Input_INGMT_IngestTmEtm.tif";
acqModelIdentifier = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";

```
spheroidParams =
{
earth_spheroid_name = "WGS84";
semimajor_axis = 6.378137000000000e+06;
eccentricity_squared = 6.694379990141320e-03;
earth_centre_offset =
{
lowerB = 1;
upperB = 3;
Bstore =
[
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
}
ellipsoidCode = 7030;
}
sceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
demType = 0;
baseElevation ?= 0.000000000000000e+00F;
demPath ?= "";
}
================================================================
ProductDefinition.input:
================================================================
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
satelliteID = "LS5 ";
sensorID = "TM  ";
inputFramingType = 113;
outputFramingType = 200;
bandTypeAtReferenceResolution ?=
[
FALSE;
TRUE;
FALSE;
FALSE;
]
bandList =
{
numBands = 7;
bandsUsed =
[
1;
2;
3;
4;
5;
6;
7;
0;
0;
]
}
mapProjectionParams =
{
projDescription =
{
projName = "UTM";
projection = 1;
projCoeffs =
```

[
6.378137000000000e+06;
6.356752314140000e+06;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
referenceSpheroid =
{
earth_spheroid_name = "WGS84";
semimajor_axis = 6.378137000000000e+06;
eccentricity_squared = 6.694379990141320e-03;
earth_centre_offset =
{
lowerB = 1;
upperB = 3;
Bstore =
[
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
}
ellipsoidCode = 7030;
}
}
GCTPZone = -19;
}
orientationChoice = 3;
path ?= 229;
row ?= 89;
sceneShift ?= 0.000000000000000e+00F;
mapPixelSpacing ?= 2.850000000000000e+01;
mapLineSpacing ?= 2.850000000000000e+01;
performRegionCheck = FALSE;
performDEM_Correction = FALSE;
performElevationCorrection = FALSE;
performBaseElevationCorrection = FALSE;
baseElevation = 0.000000000000000e+00F;
}
==
ProductDefinition.output:
==
{
inputLimits =
{
inputLimits =
[
{
startPixel = 1;
endPixel = 6336;
startLine = 1;

endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 1584;
startLine = 1;
endLine = 2296;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
]
}
imageSize =
[
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}

{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 0;
numPixels = 0;
}
{
numLines = 0;
numPixels = 0;
}
]
outputResolution =
[
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 0.000000000000000e+00F;
pixelSpacing = 0.000000000000000e+00F;

}
{
lineSpacing = 0.000000000000000e+00F;
pixelSpacing = 0.000000000000000e+00F;
}
]
outputImageRefPoint =
[
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 0.000000000000000e+00F;
pixel = 0.000000000000000e+00F;
}
{
line = 0.000000000000000e+00F;
pixel = 0.000000000000000e+00F;
}
]
outputMapRefPoint =
{
x = 5.827736302444468e+05;
y = 5.482515164873494e+06;
height = 0.000000000000000e+00;
}
outputOrientation = 2.134218144483686e-01;
mapProjectionParams =
{
projDescription =
{
projName = "UTM";
projection = 1;
projCoeffs =
[
6.378137000000000e+06;
6.356752314140000e+06;

0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
referenceSpheroid =
{
earth_spheroid_name = "WGS84";
semimajor_axis = 6.378137000000000e+06;
eccentricity_squared = 6.694379990141320e-03;
earth_centre_offset =
{
lowerB = 1;
upperB = 3;
Bstore =
[
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
}
ellipsoidCode = 7030;
}
}
GCTPZone = -19;
}
path = 229;
row = 89;
startRow = 0;
endRow = 0;
floatingEndRow = 0.000000000000000e+00F;
geodeticCentre =
{
latitude = -7.290518595817833e-01;
longitude = -1.170509543219812e+00;
height = 0.000000000000000e+00;
}
mapCentre =
{
x = 6.608060504379499e+05;
y = 5.373773847532777e+06;
height = 0.000000000000000e+00;
}
geodeticSceneCorners =
[
{
latitude = -7.049086701521144e-01;
longitude = -1.183412671269625e+00;
height = 0.000000000000000e+00;
}
{
latitude = -7.105991332833751e-01;
longitude = -1.143951025470554e+00;

height = 0.000000000000000e+00;
}
{
latitude = -7.532697789767701e-01;
longitude = -1.157257045237109e+00;
height = 0.000000000000000e+00;
}
{
latitude = -7.473467160828039e-01;
longitude = -1.198247568869282e+00;
height = 0.000000000000000e+00;
}
]
geodeticProductCorners =
[
{
latitude = -7.397996823962590e-01;
longitude = -1.194788641831034e+00;
height = 0.000000000000000e+00;
}
{
latitude = -7.457855184965190e-01;
longitude = -1.153354184558337e+00;
height = 0.000000000000000e+00;
}
{
latitude = -7.180295313951198e-01;
longitude = -1.146698710862163e+00;
height = 0.000000000000000e+00;
}
{
latitude = -7.121676120492884e-01;
longitude = -1.187150174071988e+00;
height = 0.000000000000000e+00;
}
]
mapProductCorners =
[
{
x = 5.447500227068143e+05;
y = 5.307066670345686e+06;
height = 0.000000000000000e+00;
}
{
x = 7.388602875685844e+05;
y = 5.264998640352074e+06;
height = 0.000000000000000e+00;
}
{
x = 7.768838951062170e+05;
y = 5.440447134879882e+06;
height = 0.000000000000000e+00;
}
{
x = 5.827736302444468e+05;
y = 5.482515164873494e+06;
height = 0.000000000000000e+00;
}
]
blackfillEdgeChoice = 1;
alignmentChoice = 2;
}

```
================================================================
ImageCorrection.input:
================================================================
{
commonChildInputParams =
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
productSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";
reportName = "ImageCorrection.report";
}
priority = 4.000000000000000e+00F;
InputImageFile = "/usr1/nlaps/RT/workorders/01100012700020002/Input_INGMT_IngestTmEtm.tif";
InputDemFile ?= "None";
ResampleImageOrDemFlag = TRUE;
productSpecification =
{
satellite = "LS5 ";
sensor = "TM  ";
processingLevel = "Systematic Geocorrection";
outputPixelType = 2;
blackfillEdgeChoice = 1;
path = 229;
row = 89;
bandList =
{
numBands = 7;
bandsUsed =
[
1;
2;
3;
4;
5;
6;
7;
0;
0;
]
}
mapProjectionParams =
{
projDescription =
{
projName = "UTM";
projection = 1;
projCoeffs =
[
6.378137000000000e+06;
6.356752314140000e+06;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
```

]
referenceSpheroid =
{
earth_spheroid_name = "WGS84";
semimajor_axis = 6.378137000000000e+06;
eccentricity_squared = 6.694379990141320e-03;
earth_centre_offset =
{
lowerB = 1;
upperB = 3;
Bstore =
[
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
}
ellipsoidCode = 7030;
}
}
GCTPZone = -19;
}
processingOptions =
{
resamplingKernel = "CC";
resamplingMethod = "1Pass2Dimensional";
performRadiometricCorrection = TRUE;
radiometricAlgorithm = 1;
performGeometricCorrection = TRUE;
performDEM_Correction = FALSE;
performElevationCorrection = FALSE;
performBaseElevationCorrection = FALSE;
baseElevation = 0.000000000000000e+00F;
performAtmosphericCorrection = FALSE;
performBadLineReplacement = TRUE;
performScanGapCorrection = TRUE;
alignmentRequired = FALSE;
performHistogramming = TRUE;
performDebandFilter = FALSE;
performDespikeFilter = FALSE;
}
outputMapRefPoint =
{
x = 5.827736302444468e+05;
y = 5.482515164873494e+06;
height = 0.000000000000000e+00;
}
outputOrientation = 2.134218144483686e-01;
inputLimits =
{
inputLimits =
[
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;

endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 1584;
startLine = 1;
endLine = 2296;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
]
}
imageSize =
[
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;

numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 6299;
numPixels = 6969;
}
{
numLines = 0;
numPixels = 0;
}
{
numLines = 0;
numPixels = 0;
}
]
outputResolution =
[
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 2.850000000000000e+01F;
pixelSpacing = 2.850000000000000e+01F;
}
{
lineSpacing = 0.000000000000000e+00F;
pixelSpacing = 0.000000000000000e+00F;
}
{
lineSpacing = 0.000000000000000e+00F;
pixelSpacing = 0.000000000000000e+00F;
}
]

outputImageRefPoint =
[
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 5.000000000000000e-01F;
pixel = 5.000000000000000e-01F;
}
{
line = 0.000000000000000e+00F;
pixel = 0.000000000000000e+00F;
}
{
line = 0.000000000000000e+00F;
pixel = 0.000000000000000e+00F;
}
]
}
}
===
ImageCorrection.output:
===
{
outputImage =
{
outputImageHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
outputImageAllocationId = 114518L;
}
}
===
ImageCorrection.report:
===
{
ReportHeader =
{
ReportName = "resamplerReport";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 09:58:06 2000";
StartTimeRecord =

{
year = 2000;
month = 1;
day = 27;
hour = 9;
minute = 58;
sec = 6;
usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 10:00:19 2000";
CompletionTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 10;
minute = 0;
sec = 19;
usec = 0;
time_system = 2;
}
CpuTime = 6.528200000000001e+02;
}
GeometricCorrectionLevel = "map-projected";
ProductInfo =
{
Projection = "UTM";
GCTPZone = -19;
Datum = "WGS84";
Orientation = 1.222816922391569e+01;
}
ResamplingInfo =
{
Method = "1 PASS";
Kernel = "CC";
}
SatelliteAngleOfIncidence = 2.932937270058602e-01;
SatelliteAngleOfIncidenceDirection = "L";
SatelliteIncidentOrientation = 3.532183939382259e+02;
SatelliteOffNadirPointingAngle = -9.518498410549020e-02;
OffNadirPointingAngle = 0.000000000000000e+00;
DemCorrection =
{
WasApplied = FALSE;
}
ElevationCorrection =
{
WasApplied = FALSE;
}
RadiometricCorrection =
{
WasApplied = TRUE;
RadCorrTableReport =
{
calOption = "NASA";
bandInProduct =
[
TRUE;
TRUE;
TRUE;
TRUE;

TRUE;
TRUE;
TRUE;
FALSE;
FALSE;
]
bandData =
[
{
bandNumber = 1L;
gainOffsetCoefficient =
{
gain = 6.02431e-01;
offset = -1.52000e+00;
}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 15L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 8.80025e-01;
offset = -2.15764e+00;
}
{
gain = 8.73767e-01;
offset = -1.89963e+00;
}
{
gain = 8.67875e-01;
offset = -1.84191e+00;
}
{
gain = 8.71425e-01;
offset = -1.82531e+00;
}
{
gain = 8.73611e-01;
offset = -1.86046e+00;
}
{
gain = 8.75311e-01;
offset = -1.95659e+00;
}
{
gain = 8.74542e-01;
offset = -2.00864e+00;
}
{
gain = 8.64113e-01;
offset = -1.54496e+00;
}
{
gain = 8.66667e-01;
offset = -1.90289e+00;
}
{
gain = 8.64826e-01;
offset = -1.09980e+00;

}
{
gain = 8.63702e-01;
offset = -1.66680e+00;
}
{
gain = 8.71381e-01;
offset = -1.24911e+00;
}
{
gain = 8.71064e-01;
offset = -1.98886e+00;
}
{
gain = 8.74952e-01;
offset = -1.42873e+00;
}
{
gain = 8.69424e-01;
offset = -1.20295e+00;
}
{
gain = 8.82461e-01;
offset = -1.57046e+00;
}
]
[
{
gain = 8.80025e-01;
offset = -2.15764e+00;
}
{
gain = 8.73767e-01;
offset = -1.89963e+00;
}
{
gain = 8.67875e-01;
offset = -1.84191e+00;
}
{
gain = 8.71425e-01;
offset = -1.82531e+00;
}
{
gain = 8.73611e-01;
offset = -1.86046e+00;
}
{
gain = 8.75311e-01;
offset = -1.95659e+00;
}
{
gain = 8.74542e-01;
offset = -2.00864e+00;
}
{
gain = 8.64113e-01;
offset = -1.54496e+00;
}
{
gain = 8.66667e-01;
offset = -1.90289e+00;

```
}
{
gain = 8.64826e-01;
offset = -1.09980e+00;
}
{
gain = 8.63702e-01;
offset = -1.66680e+00;
}
{
gain = 8.71381e-01;
offset = -1.24911e+00;
}
{
gain = 8.71064e-01;
offset = -1.98886e+00;
}
{
gain = 8.74952e-01;
offset = -1.42873e+00;
}
{
gain = 8.69424e-01;
offset = -1.20295e+00;
}
{
gain = 8.82461e-01;
offset = -1.57046e+00;
}
]
]
}
{
bandNumber = 2L;
gainOffsetCoefficient =
{
gain = 1.17510e+00;
offset = -2.84000e+00;
}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 10L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 8.47230e-01;
offset = 8.45614e-01;
}
{
gain = 8.58467e-01;
offset = 8.85332e-01;
}
{
gain = 8.48993e-01;
offset = 9.63734e-01;
}
{
gain = 8.54513e-01;
offset = 8.57952e-01;
```

```
}
{
gain = 8.58727e-01;
offset = 9.04953e-01;
}
{
gain = 8.58012e-01;
offset = 1.01014e+00;
}
{
gain = 8.55505e-01;
offset = 8.42200e-01;
}
{
gain = 8.43260e-01;
offset = 1.10828e+00;
}
{
gain = 8.60288e-01;
offset = 1.04166e+00;
}
{
gain = 8.45318e-01;
offset = 1.01009e+00;
}
{
gain = 8.55796e-01;
offset = 1.04404e+00;
}
{
gain = 8.48174e-01;
offset = 9.27959e-01;
}
{
gain = 8.52735e-01;
offset = 8.92748e-01;
}
{
gain = 8.45389e-01;
offset = 1.30727e+00;
}
{
gain = 8.53984e-01;
offset = 9.74160e-01;
}
{
gain = 8.57507e-01;
offset = 1.38426e+00;
}
]
[
{
gain = 8.47230e-01;
offset = 8.45614e-01;
}
{
gain = 8.58467e-01;
offset = 8.85332e-01;
}
{
gain = 8.48993e-01;
offset = 9.63734e-01;
```

}
{
gain = 8.54513e-01;
offset = 8.57952e-01;
}
{
gain = 8.58727e-01;
offset = 9.04953e-01;
}
{
gain = 8.58012e-01;
offset = 1.01014e+00;
}
{
gain = 8.55505e-01;
offset = 8.42200e-01;
}
{
gain = 8.43260e-01;
offset = 1.10828e+00;
}
{
gain = 8.60288e-01;
offset = 1.04166e+00;
}
{
gain = 8.45318e-01;
offset = 1.01009e+00;
}
{
gain = 8.55796e-01;
offset = 1.04404e+00;
}
{
gain = 8.48174e-01;
offset = 9.27959e-01;
}
{
gain = 8.52735e-01;
offset = 8.92748e-01;
}
{
gain = 8.45389e-01;
offset = 1.30727e+00;
}
{
gain = 8.53984e-01;
offset = 9.74160e-01;
}
{
gain = 8.57507e-01;
offset = 1.38426e+00;
}
]
]
}
{
bandNumber = 3L;
gainOffsetCoefficient =
{
gain = 8.05765e-01;
offset = -1.17000e+00;

}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 2L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 7.73912e-01;
offset = 1.81097e+00;
}
{
gain = 7.66092e-01;
offset = 1.81145e+00;
}
{
gain = 7.69100e-01;
offset = 1.75589e+00;
}
{
gain = 7.61379e-01;
offset = 1.73942e+00;
}
{
gain = 7.71544e-01;
offset = 1.69880e+00;
}
{
gain = 7.56449e-01;
offset = 1.94505e+00;
}
{
gain = 7.65868e-01;
offset = 1.84324e+00;
}
{
gain = 7.55297e-01;
offset = 2.05670e+00;
}
{
gain = 7.63824e-01;
offset = 1.97074e+00;
}
{
gain = 7.53195e-01;
offset = 1.92331e+00;
}
{
gain = 7.57606e-01;
offset = 1.96124e+00;
}
{
gain = 7.63800e-01;
offset = 1.98002e+00;
}
{
gain = 7.69963e-01;
offset = 1.76194e+00;
}
{

```
gain = 7.61460e-01;
offset = 2.04120e+00;
}
{
gain = 7.77496e-01;
offset = 1.94284e+00;
}
{
gain = 7.63761e-01;
offset = 2.49496e+00;
}
]
[
{
gain = 7.73912e-01;
offset = 1.81097e+00;
}
{
gain = 7.66092e-01;
offset = 1.81145e+00;
}
{
gain = 7.69100e-01;
offset = 1.75589e+00;
}
{
gain = 7.61379e-01;
offset = 1.73942e+00;
}
{
gain = 7.71544e-01;
offset = 1.69880e+00;
}
{
gain = 7.56449e-01;
offset = 1.94505e+00;
}
{
gain = 7.65868e-01;
offset = 1.84324e+00;
}
{
gain = 7.55297e-01;
offset = 2.05670e+00;
}
{
gain = 7.63824e-01;
offset = 1.97074e+00;
}
{
gain = 7.53195e-01;
offset = 1.92331e+00;
}
{
gain = 7.57606e-01;
offset = 1.96124e+00;
}
{
gain = 7.63800e-01;
offset = 1.98002e+00;
}
{
```

gain = 7.69963e-01;
offset = 1.76194e+00;
}
{
gain = 7.61460e-01;
offset = 2.04120e+00;
}
{
gain = 7.77496e-01;
offset = 1.94284e+00;
}
{
gain = 7.63761e-01;
offset = 2.49496e+00;
}
]
]
}
{
bandNumber = 4L;
gainOffsetCoefficient =
{
gain = 8.14549e-01;
offset = -1.51000e+00;
}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 1L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 8.44551e-01;
offset = 1.52482e+00;
}
{
gain = 8.38394e-01;
offset = 1.64985e+00;
}
{
gain = 8.46798e-01;
offset = 1.63260e+00;
}
{
gain = 8.39642e-01;
offset = 1.55519e+00;
}
{
gain = 8.39863e-01;
offset = 1.56254e+00;
}
{
gain = 8.45273e-01;
offset = 1.56130e+00;
}
{
gain = 8.59585e-01;
offset = 8.77270e-01;
}
{

gain = 8.33292e-01;
offset = 1.65640e+00;
}
{
gain = 8.50691e-01;
offset = 1.61693e+00;
}
{
gain = 8.50049e-01;
offset = 1.70727e+00;
}
{
gain = 8.47481e-01;
offset = 1.42059e+00;
}
{
gain = 8.39002e-01;
offset = 1.71568e+00;
}
{
gain = 8.32060e-01;
offset = 1.59730e+00;
}
{
gain = 8.41556e-01;
offset = 1.62954e+00;
}
{
gain = 8.43241e-01;
offset = 1.62983e+00;
}
{
gain = 8.48198e-01;
offset = 2.20671e+00;
}
]
[
{
gain = 8.44551e-01;
offset = 1.52482e+00;
}
{
gain = 8.38394e-01;
offset = 1.64985e+00;
}
{
gain = 8.46798e-01;
offset = 1.63260e+00;
}
{
gain = 8.39642e-01;
offset = 1.55519e+00;
}
{
gain = 8.39863e-01;
offset = 1.56254e+00;
}
{
gain = 8.45273e-01;
offset = 1.56130e+00;
}
{

```
gain = 8.59585e-01;
offset = 8.77270e-01;
}
{
gain = 8.33292e-01;
offset = 1.65640e+00;
}
{
gain = 8.50691e-01;
offset = 1.61693e+00;
}
{
gain = 8.50049e-01;
offset = 1.70727e+00;
}
{
gain = 8.47481e-01;
offset = 1.42059e+00;
}
{
gain = 8.39002e-01;
offset = 1.71568e+00;
}
{
gain = 8.32060e-01;
offset = 1.59730e+00;
}
{
gain = 8.41556e-01;
offset = 1.62954e+00;
}
{
gain = 8.43241e-01;
offset = 1.62983e+00;
}
{
gain = 8.48198e-01;
offset = 2.20671e+00;
}
]
]
}
{
bandNumber = 5L;
gainOffsetCoefficient =
{
gain = 1.08078e-01;
offset = -3.70000e-01;
}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 2L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 8.59228e-01;
offset = 7.75387e-01;
}
{
```

```
gain = 8.57950e-01;
offset = 7.95179e-01;
}
{
gain = 8.48746e-01;
offset = 1.31279e+00;
}
{
gain = 8.54230e-01;
offset = 1.06187e+00;
}
{
gain = 8.52688e-01;
offset = 1.03215e+00;
}
{
gain = 8.51521e-01;
offset = 9.93151e-01;
}
{
gain = 8.58836e-01;
offset = 8.02902e-01;
}
{
gain = 8.57096e-01;
offset = 7.22193e-01;
}
{
gain = 8.66707e-01;
offset = 1.45744e+00;
}
{
gain = 8.42060e-01;
offset = 6.12885e-01;
}
{
gain = 8.45297e-01;
offset = 9.29959e-01;
}
{
gain = 8.57438e-01;
offset = 1.09211e+00;
}
{
gain = 8.37641e-01;
offset = 1.00953e+00;
}
{
gain = 8.50783e-01;
offset = 1.04368e+00;
}
{
gain = 8.44125e-01;
offset = 1.14098e+00;
}
{
gain = 8.56336e-01;
offset = 1.13896e+00;
}
]
[
{
```

```
gain = 8.59228e-01;
offset = 7.75387e-01;
}
{
gain = 8.57950e-01;
offset = 7.95179e-01;
}
{
gain = 8.48746e-01;
offset = 1.31279e+00;
}
{
gain = 8.54230e-01;
offset = 1.06187e+00;
}
{
gain = 8.52688e-01;
offset = 1.03215e+00;
}
{
gain = 8.51521e-01;
offset = 9.93151e-01;
}
{
gain = 8.58836e-01;
offset = 8.02902e-01;
}
{
gain = 8.57096e-01;
offset = 7.22193e-01;
}
{
gain = 8.66707e-01;
offset = 1.45744e+00;
}
{
gain = 8.42060e-01;
offset = 6.12885e-01;
}
{
gain = 8.45297e-01;
offset = 9.29959e-01;
}
{
gain = 8.57438e-01;
offset = 1.09211e+00;
}
{
gain = 8.37641e-01;
offset = 1.00953e+00;
}
{
gain = 8.50783e-01;
offset = 1.04368e+00;
}
{
gain = 8.44125e-01;
offset = 1.14098e+00;
}
{
gain = 8.56336e-01;
offset = 1.13896e+00;
```

```
}
]
]
}
{
bandNumber = 6L;
gainOffsetCoefficient =
{
gain = 5.51584e-02;
offset = 1.23780e+00;
}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 4L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 4L;
destriping =
[
[
{
gain = 1.10702e+00;
offset = -1.08516e+02;
}
{
gain = 1.13608e+00;
offset = -1.13466e+02;
}
{
gain = 1.10349e+00;
offset = -1.08354e+02;
}
{
gain = 1.17959e+00;
offset = -1.18607e+02;
}
]
[
{
gain = 1.10702e+00;
offset = -1.08516e+02;
}
{
gain = 1.13608e+00;
offset = -1.13466e+02;
}
{
gain = 1.10349e+00;
offset = -1.08354e+02;
}
{
gain = 1.17959e+00;
offset = -1.18607e+02;
}
]
]
}
{
bandNumber = 7L;
gainOffsetCoefficient =
{
gain = 5.69804e-02;
offset = -1.50000e-01;
```

}
lowerReflectanceLimit = 0L;
upperReflectanceLimit = 100L;
referenceDetector = 15L;
useDefaultAbsCalibration = FALSE;
numberDetectors = 16L;
destriping =
[
[
{
gain = 8.19389e-01;
offset = 1.95071e+00;
}
{
gain = 8.20868e-01;
offset = 1.70297e+00;
}
{
gain = 8.12010e-01;
offset = 1.97492e+00;
}
{
gain = 8.09730e-01;
offset = 2.03233e+00;
}
{
gain = 8.11770e-01;
offset = 1.87310e+00;
}
{
gain = 8.21715e-01;
offset = 2.02150e+00;
}
{
gain = 8.06054e-01;
offset = 1.99504e+00;
}
{
gain = 8.17763e-01;
offset = 2.02590e+00;
}
{
gain = 8.10190e-01;
offset = 2.05713e+00;
}
{
gain = 8.11815e-01;
offset = 1.98750e+00;
}
{
gain = 8.01273e-01;
offset = 2.06317e+00;
}
{
gain = 8.16317e-01;
offset = 2.41747e+00;
}
{
gain = 8.16020e-01;
offset = 2.12176e+00;
}
{

```
gain = 8.15221e-01;
offset = 2.21172e+00;
}
{
gain = 8.10124e-01;
offset = 1.93471e+00;
}
{
gain = 8.20410e-01;
offset = 2.35550e+00;
}
]
[
{
gain = 8.19389e-01;
offset = 1.95071e+00;
}
{
gain = 8.20868e-01;
offset = 1.70297e+00;
}
{
gain = 8.12010e-01;
offset = 1.97492e+00;
}
{
gain = 8.09730e-01;
offset = 2.03233e+00;
}
{
gain = 8.11770e-01;
offset = 1.87310e+00;
}
{
gain = 8.21715e-01;
offset = 2.02150e+00;
}
{
gain = 8.06054e-01;
offset = 1.99504e+00;
}
{
gain = 8.17763e-01;
offset = 2.02590e+00;
}
{
gain = 8.10190e-01;
offset = 2.05713e+00;
}
{
gain = 8.11815e-01;
offset = 1.98750e+00;
}
{
gain = 8.01273e-01;
offset = 2.06317e+00;
}
{
gain = 8.16317e-01;
offset = 2.41747e+00;
}
{
```

gain = 8.16020e-01;
offset = 2.12176e+00;
}
{
gain = 8.15221e-01;
offset = 2.21172e+00;
}
{
gain = 8.10124e-01;
offset = 1.93471e+00;
}
{
gain = 8.20410e-01;
offset = 2.35550e+00;
}
]
]
}
]
}
}
}
==
RadQa.input:
==
{
commonChildInputParams =
{
productSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";
reportName = "RadQa.report";
}
MeasureBandSaturation = TRUE;
ImagePathname = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
MeasureDetectorStriping = TRUE;
satellite = "LS5 ";
sensor = "TM ";
}
==
RadQa.report:
==
{
ReportHeader =
{
ReportName = "RadiometricQA_Report";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 10:00:21 2000";
StartTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 10;
minute = 0;
sec = 21;
usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 10:00:23 2000";
CompletionTimeRecord =
{
year = 2000;

month = 1;
day = 27;
hour = 10;
minute = 0;
sec = 23;
usec = 0;
time_system = 2;
}
CpuTime = 5.300000000000000e-01;
}
BandSaturationCounts =
[
{
Band = 1L;
NumSaturatedPixels = 4.429000000000000e+03;
PercentSaturatedPixels = 1.008935974390111e-02;
}
{
Band = 2L;
NumSaturatedPixels = 6.290000000000000e+02;
PercentSaturatedPixels = 1.432875881443622e-03;
}
{
Band = 3L;
NumSaturatedPixels = 1.225000000000000e+03;
PercentSaturatedPixels = 2.790577034608008e-03;
}
{
Band = 4L;
NumSaturatedPixels = 6.300000000000000e+02;
PercentSaturatedPixels = 1.435153903512690e-03;
}
{
Band = 5L;
NumSaturatedPixels = 6.900000000000000e+02;
PercentSaturatedPixels = 1.571835227656755e-03;
}
{
Band = 6L;
NumSaturatedPixels = 1.110000000000000e+02;
PercentSaturatedPixels = 2.528604496665215e-04;
}
{
Band = 7L;
NumSaturatedPixels = 7.500000000000000e+02;
PercentSaturatedPixels = 1.708516551800821e-03;
}
{
Band = 8L;
NumSaturatedPixels = 0.000000000000000e+00;
PercentSaturatedPixels = 0.000000000000000e+00;
}
{
Band = 9L;
NumSaturatedPixels = 0.000000000000000e+00;
PercentSaturatedPixels = 0.000000000000000e+00;
}
]
StripingMeasurement =
{
BandMeasurements =
[

{
Band = 1L;
BandStriping = 7.701136527680763e-02;
}
{
Band = 2L;
BandStriping = 8.402920230489475e-02;
}
{
Band = 3L;
BandStriping = 1.141361700022678e-01;
}
{
Band = 4L;
BandStriping = 1.435171015658702e-01;
}
{
Band = 5L;
BandStriping = 1.628537037851145e-01;
}
{
Band = 6L;
BandStriping = 6.113025869940933e-02;
}
{
Band = 7L;
BandStriping = 1.042299495220671e-01;
}
]
ChipMeasurements =
[
{
Band = 1L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 9.359918212890625e+01;
StandardDeviation = 5.293505278980519e-01;
ChipStriping = 5.027239435047798e-02;
}
{
Band = 1L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 8.785150146484375e+01;
StandardDeviation = 8.832917368495927e-01;
ChipStriping = 7.717159438988741e-02;
}
{
Band = 1L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 1.010732421875000e+02;
StandardDeviation = 3.374588835360429e+00;
ChipStriping = 7.457056570317055e-02;
}
{

```
Band = 1L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;
CentrePixelAttr = 5.069000000000000e+03;
Mean = 9.884881591796875e+01;
StandardDeviation = 1.756509008305699e+00;
ChipStriping = 1.060309066636946e-01;
}
{
Band = 2L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 4.306024169921875e+01;
StandardDeviation = 4.471932856600674e-01;
ChipStriping = 1.195065569512074e-01;
}
{
Band = 2L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 4.054382324218750e+01;
StandardDeviation = 6.141508582417181e-01;
ChipStriping = 7.084860575869230e-02;
}
{
Band = 2L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 4.786480712890625e+01;
StandardDeviation = 2.742704347526565e+00;
ChipStriping = 7.000688823887893e-02;
}
{
Band = 2L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;
CentrePixelAttr = 5.069000000000000e+03;
Mean = 4.729980468750000e+01;
StandardDeviation = 1.317346978177384e+00;
ChipStriping = 7.575475827080033e-02;
}
{
Band = 3L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 5.779699707031250e+01;
StandardDeviation = 1.003180207905057e+00;
ChipStriping = 1.349000450076834e-01;
}
{
Band = 3L;
Lines = 128L;
```

PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 5.397198486328125e+01;
StandardDeviation = 9.510813969655469e-01;
ChipStriping = 8.901973877095586e-02;
}
{
Band = 3L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 6.557525634765625e+01;
StandardDeviation = 3.291379551334421e+00;
ChipStriping = 7.811487050061582e-02;
}
{
Band = 3L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;
CentrePixelAttr = 5.069000000000000e+03;
Mean = 6.406628417968750e+01;
StandardDeviation = 2.467895550078523e+00;
ChipStriping = 1.545100257298160e-01;
}
{
Band = 4L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 5.538409423828125e+01;
StandardDeviation = 2.183330546469372e+00;
ChipStriping = 1.661960675037182e-01;
}
{
Band = 4L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 4.703247070312500e+01;
StandardDeviation = 2.296223749229797e+00;
ChipStriping = 2.588935157649463e-01;
}
{
Band = 4L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 5.922698974609375e+01;
StandardDeviation = 1.558618625404119e+00;
ChipStriping = 6.871884276292259e-02;
}
{
Band = 4L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;

CentrePixelAttr = 5.069000000000000e+03;
Mean = 6.042840576171875e+01;
StandardDeviation = 1.495379253669265e+00;
ChipStriping = 8.025998023189351e-02;
}
{
Band = 5L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 9.237756347656250e+01;
StandardDeviation = 3.313292802099279e+00;
ChipStriping = 2.623082101201877e-01;
}
{
Band = 5L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 9.191693115234375e+01;
StandardDeviation = 1.938424135166977e+00;
ChipStriping = 2.117331350934052e-01;
}
{
Band = 5L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 9.666558837890625e+01;
StandardDeviation = 1.654008048604686e+00;
ChipStriping = 9.614664744908338e-02;
}
{
Band = 5L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;
CentrePixelAttr = 5.069000000000000e+03;
Mean = 1.044096679687500e+02;
StandardDeviation = 1.719220391841036e+00;
ChipStriping = 8.122682247778160e-02;
}
{
Band = 6L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 4.600000000000000e+02;
CentrePixelAttr = 3.183999938964844e+02;
Mean = 1.503670043945312e+02;
StandardDeviation = 1.077865111429301e+00;
ChipStriping = 4.497277585800039e-02;
}
{
Band = 6L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 9.190000000000000e+02;
CentrePixelAttr = 6.357999877929688e+02;
Mean = 1.390944213867188e+02;

StandardDeviation = 4.835148488141904e-01;
ChipStriping = 6.117331881326496e-02;
}
{
Band = 6L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.378000000000000e+03;
CentrePixelAttr = 9.532000122070312e+02;
Mean = 1.481828002929688e+02;
StandardDeviation = 1.160927190452483e+00;
ChipStriping = 8.756453442386448e-02;
}
{
Band = 6L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837000000000000e+03;
CentrePixelAttr = 1.270599975585938e+03;
Mean = 1.538446655273438e+02;
StandardDeviation = 9.077502341756043e-01;
ChipStriping = 5.081040570250750e-02;
}
{
Band = 7L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 1.837599975585938e+03;
CentrePixelAttr = 1.268000000000000e+03;
Mean = 5.250256347656250e+01;
StandardDeviation = 1.875331368569940e+00;
ChipStriping = 1.289523398130642e-01;
}
{
Band = 7L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 3.674199951171875e+03;
CentrePixelAttr = 2.535000000000000e+03;
Mean = 5.227917480468750e+01;
StandardDeviation = 1.162728992335128e+00;
ChipStriping = 9.250601931444334e-02;
}
{
Band = 7L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 5.510800292968750e+03;
CentrePixelAttr = 3.802000244140625e+03;
Mean = 5.658209228515625e+01;
StandardDeviation = 1.053905958666242e+00;
ChipStriping = 1.067069038402803e-01;
}
{
Band = 7L;
Lines = 128L;
PixelsPerLine = 128L;
CentreLineAttr = 7.347399902343750e+03;
CentrePixelAttr = 5.069000000000000e+03;
Mean = 5.828601074218750e+01;
StandardDeviation = 1.712618411453311e+00;
ChipStriping = 8.875453512048040e-02;

}
]
}
Evaluation =
[
{
Band = 1L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 2L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 3L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 4L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 5L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 6L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
{
Band = 7L;
StripingTolerance = 1.000000000000000e+00;
BandPassed = TRUE;
}
]
}
==
BlacklineQa.input:
==
{
commonChildInputParams =
{
productSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";
reportName = "BlacklineQa.report";
}
ImagePathname = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
}
==
ViewProduct.input:
==
{
priority = 4.000000000000000e+00F;
commonChildInputParams =
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
productSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";

outputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Output_";
reportName = "/usr1/nlaps/RT/workorders/01100012700020002/ViewProduct.report";
}
DataIngestReport = "Ingest.report";
ImagePathname = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
}
==
ViewProduct.report:
==
{
ReportHeader =
{
ReportName = "ImageAssessmentReport";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 10:00:25 2000";
StartTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 10;
minute = 0;
sec = 25;
usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 11:12:17 2000";
CompletionTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 11;
minute = 12;
sec = 17;
usec = 0;
time_system = 2;
}
CpuTime = 5.230000000000000e+00;
}
Passed = TRUE;
}
==
ProductFormatting_0.input:
==
{
commonChildInputParams =
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
productSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";
outputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/";
reportName = "ProductFormatting_0.report";
}
imagePathname = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
demPathname ?= "None";
productLocation = "/usr1/nlaps/RT/workorders/01100012700020002/";
commonFormattingParams =
{
satellite = "LS5 ";
sensor = "TM ";
dataStartTime =

```
{
year = 1986;
month = 2;
day = 1;
hour = 12;
minute = 0;
sec = 0;
usec = 0;
time_system = 2;
}
inputMediumType = 0;
processingLevel = 2;
standardProductProcessingLevel = "Systematic Geocorrection";
performRadiometricCorrection = TRUE;
radiometricAlgorithm = 1;
resamplingKernel ?= "CC";
performDEM_Correction = FALSE;
performElevationCorrection = FALSE;
performAtmosphericCorrection = FALSE;
mapProjectionParams =
{
projDescription =
{
projName = "UTM";
projection = 1;
projCoeffs =
[
6.378137000000000e+06;
6.356752314140000e+06;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
referenceSpheroid =
{
earth_spheroid_name = "WGS84";
semimajor_axis = 6.378137000000000e+06;
eccentricity_squared = 6.694379990141320e-03;
earth_centre_offset =
{
lowerB = 1;
upperB = 3;
Bstore =
[
0.000000000000000e+00;
0.000000000000000e+00;
0.000000000000000e+00;
]
}
ellipsoidCode = 7030;
}
}
```

GCTPZone = -19;
}
inputLimits =
{
inputLimits =
[
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 1;
endPixel = 1584;
startLine = 1;
endLine = 2296;
}
{
startPixel = 1;
endPixel = 6336;
startLine = 1;
endLine = 9184;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
{
startPixel = 0;
endPixel = 0;
startLine = 0;
endLine = 0;
}
]
}

quadrant = 5;
path = 229;
row = 89;
sceneShift ?= 0.000000000000000e+00F;
outputMediumData =
{
formatOrganization = 1;
formatAgencyType = 0;
outputMediaType = 10;
}
outputBandList =
{
numBands = 7;
bandsUsed =
[
1;
2;
3;
4;
5;
6;
7;
0;
0;
]
}
}
formatSpecificInfo =
{
numberOfScenes = 1.000000000000000e+00F;
orientation = 3;
productSequenceNumber = 123;
geometricOutline ?= 2;
writeDem ?= FALSE;
inputDataFormat ?= 4;
inputDatasetId ?= "BE2368";
}
}
==
ProductFormatting_0.output:
==
{
ReportHeader =
{
ReportName = "ProductFormattingReport";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 11:12:19 2000";
StartTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 11;
minute = 12;
sec = 19;
usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 11:12:36 2000";
CompletionTimeRecord =
{

year = 2000;
month = 1;
day = 27;
hour = 11;
minute = 12;
sec = 36;
usec = 0;
time_system = 2;
}
CpuTime = 1.095000000000000e+01;
}
OutputFormat = "NDF";
ImageOrganization = "BSQ";
OutputPixelHeight = 2.850000000000000e+01F;
OutputPixelWidth = 2.850000000000000e+01F;
OutputBands =
[
1L;
2L;
3L;
4L;
5L;
6L;
7L;
]
SceneCentreDateTime =
{
year = 1986;
month = 2;
day = 1;
hour = 13;
minute = 38;
sec = 21;
usec = 562154;
time_system = 2;
}
SceneStartDateTime =
{
year = 1986;
month = 2;
day = 1;
hour = 13;
minute = 38;
sec = 1;
usec = 29125;
time_system = 2;
}
SceneEndDateTime =
{
year = 1986;
month = 2;
day = 1;
hour = 13;
minute = 38;
sec = 41;
usec = 944750;
time_system = 2;
}
SceneCentreLatLong =
{
Latitude = -4.177174492652354e+01;
Longitude = -6.706512094717222e+01;

}
TopLeftLatLong =
{
Latitude = -4.080435000312042e+01;
Longitude = -6.801856306900883e+01;
}
TopRightLatLong =
{
Latitude = -4.114016559403037e+01;
Longitude = -6.570119315909287e+01;
}
BottomLeftLatLong =
{
Latitude = -4.238730027222827e+01;
Longitude = -6.845614158579684e+01;
}
BottomRightLatLong =
{
Latitude = -4.273021362515220e+01;
Longitude = -6.608246728605135e+01;
}
TopLeftMap =
{
Northing = 5.482498219953598e+06;
Easting = 5.827845387131618e+05;
}
TopRightMap =
{
Northing = 5.440436226410792e+06;
Easting = 7.768669508742907e+05;
}
BottomLeftMap =
{
Northing = 5.307077578814283e+06;
Easting = 5.447669676268093e+05;
}
BottomRightMap =
{
Northing = 5.265015585273269e+06;
Easting = 7.388493793966805e+05;
}
ImageLines = 6299L;
ImagePixels = 6969L;
ImageOrientation = 1.222816922391569e+01;
OffNadirAngle = -9.518498410549020e-02;
SunElevation = 4.475414750721600e+01;
SunAzimuth = 7.146529378731810e+01;
NumberOfVolumes = 1;
MediaIdList =
[
"";
]
OrbitNumber = 10223;
StartFileNumber = 1;
NumberOfFiles = 8;
ProductSize = 2.930516748428345e+02;
SatelliteData =
[
{
Time =
{
year = 1986L;

month = 2L;
day = 1L;
hour = 13L;
minute = 38L;
sec = 1L;
usec = 29125L;
time_system = 2L;
}
OrbitState =
{
Latitude = -4.035774441511026e+01;
Longitude = -6.667711846760558e+01;
Radius = 7.087719945218393e+06;
}
AttitudeState =
{
Roll = 7.252507150106973e-05;
Pitch = -7.878985765225397e-06;
Yaw = 4.995893257127310e-05;
}
}
{
Time =
{
year = 1986L;
month = 2L;
day = 1L;
hour = 13L;
minute = 38L;
sec = 21L;
usec = 562154L;
time_system = 2L;
}
OrbitState =
{
Latitude = -4.157950503618974e+01;
Longitude = -6.707279164471765e+01;
Radius = 7.087798090736559e+06;
}
AttitudeState =
{
Roll = 6.549644338858655e-05;
Pitch = -1.403220403511257e-06;
Yaw = 5.953463251878270e-05;
}
}
{
Time =
{
year = 1986L;
month = 2L;
day = 1L;
hour = 13L;
minute = 38L;
sec = 41L;
usec = 944750L;
time_system = 2L;
}
OrbitState =
{
Latitude = -4.279139892461304e+01;
Longitude = -6.747737363388403e+01;

Radius = 7.087872765463751e+06;
}
AttitudeState =
{
Roll = 1.705043846300678e-05;
Pitch = 2.573349944396647e-05;
Yaw = 4.541022089911252e-05;
}
}
]
procImageryFileInfo =
[
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002I.hdr1";
procImageryFileSize = 2836L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I1.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I2.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I3.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I4.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I5.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I6.dat";
procImageryFileSize = 43897731L;
}
{
procImageryFilename = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002_I7.dat";
procImageryFileSize = 43897731L;
}
]
}
==
Browse.input:
==
{
commonChildInputParams =
{
inputSceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Input_";
reportName = "Browse.report";
}
inputImageFileName = "/usr1/nlaps/RT/workorders/01100012700020002/Product__OPR_MsResampler.tif";
metaDataFormatType = 2;
produceBrowseImages = FALSE;
productDropBoxDirectory = "/usr1/nlaps/RT/workorders/01100012700020002";
productRelativeImageLocation = "./01100012700020002_";
productRelativeMetaDataLocation = "./01100012700020002_";
archiveFiles = FALSE;

destinationLocation =
{
dropBoxDirectory = "/usr1/nlaps/RT/workorders/01100012700020002";
relativeBrowseImageLocation = "01100012700020002_Browse.150925.tif";
relativeBrowseMetaDataLocation = "PGS__01100012700020002.150925__";
}
decimationRecord =
{
decimationType = 4;
maxWidth = 512;
maxHeight = 512;
decimation = 2.500000000000000e-01;
}
workOrderPriority = 4.000000000000000e+00F;
correctionLevel = "Systematic Geocorrection";
productOrientation = 3;
path = 229;
row = 89;
productSceneShift ?= 0.000000000000000e+00F;
productInfo =
{
productInputDataSet = "BE2368";
productOutputDataSet = "";
productGenerationTime = "Thu Jan 27 11:12:36 2000";
outputMediaType = 10;
outputFormat = 0;
productFormat = 0;
mediaInterleaving = 1;
productFramingMethod = "Path Row";
}
correctionParameters =
{
mapProjection = "UTM";
zoneNumber = -19;
earthEllipsoid = "WGS84";
resamplingKernel ?= "CC";
elevationCorrection = "None";
baseElevation = 0.000000000000000e+00F;
framingDefinition ?= "Path/Row";
pixelSpacing ?= 2.850000000000000e+01F;
lineSpacing ?= 2.850000000000000e+01F;
}
stationId ?= "EDC";
}
==
Browse.report:
==
{
ReportHeader =
{
ReportName = "browseImageGeneration";
VersionNumber = 1.000000000000000e+00;
WorkOrderId = "01100012700020002";
StartTime = "Thu Jan 27 11:12:38 2000";
StartTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 11;
minute = 12;
sec = 38;

usec = 0;
time_system = 2;
}
CompletionTime = "Thu Jan 27 11:12:40 2000";
CompletionTimeRecord =
{
year = 2000;
month = 1;
day = 27;
hour = 11;
minute = 12;
sec = 40;
usec = 0;
time_system = 2;
}
CpuTime = 4.400000000000000e-01;
}
}
==
Browse.output:
==
{
browseImageFileName = "01100012700020002_BrowseImage.tif";
browseMetadataFileName = "01100012700020002_BrowseMeta.data";
allocationId = 0L;
}
==
ArchiveRadCorr.input:
==
{
sceneHandle = "/usr1/nlaps/RT/workorders/01100012700020002/Product_";
inputFormat = 4;
}
==
GetProcHistResource.input:
==
{
files =
[
{
fileName = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002.his";
fileSize = 100000L;
}
{
fileName = "/usr1/nlaps/RT/workorders/01100012700020002/01100012700020002.rpt";
fileSize = 100000L;
}
]
}
==
/usr1/nlaps/RT/log/01100012700020002.log:
==
<created: 27-01-2000 09:09:41>
27-01-2000 09:09:41 Info PPGSOCP_Application WCU:0000 WCU_WriteMessageToWo:00066
Work order was edited by operator hansen.

27-01-2000 09:09:41 Info DDWOE_WoEditor MAIN:0009 MAIN_MainCommon.cc:00438
Process DDWOE_WoEditor, PID 151788@edcsgs22, started at 27-01-2000 09:09:41

27-01-2000 09:09:55 Info DDWOE_WoEditor MAIN:0010 MAIN_MainCommon.cc:00470

Process DDWOE_WoEditor, PID 151788@edcsgs22, stopped at 27-01-2000 09:09:55

27-01-2000 09:10:02 Info PPGSOCP_Application WCU:0000 WCU_WriteMessageToWo:00066
Work order was started by operator hansen.

27-01-2000 09:10:05 Info SCON_EvmController MAIN:0009 MAIN_MainCommon.cc:00438
Process SCON_EvmController, PID 150925@edcsgs22, started at 27-01-2000 09:10:05

27-01-2000 09:10:05 Info WOSV_WoManagerServer WOSV:0103 WCU_WriteMessageToWo:00099
Workorder started.

27-01-2000 09:10:05 Info WOSV_WoManagerServer WCU:0000 WCU_WriteMessageToWo:00066
Workorder is executing on host localhost.

27-01-2000 09:10:07 Info ACQ_InitializeAcqModel MAIN:0009 MAIN_MainCommon.cc:00438
Process ACQ_InitializeAcqModel, PID 151705@edcsgs22, started at 27-01-2000 09:10:07

27-01-2000 09:10:09 Info ACQ_InitializeAcqModel MAIN:0010 MAIN_MainCommon.cc:00470
Process ACQ_InitializeAcqModel, PID 151705@edcsgs22, stopped at 27-01-2000 09:10:09

27-01-2000 09:10:10 Info INGMT_IngestTmEtm MAIN:0009 MAIN_MainCommon.cc:00438
Process INGMT_IngestTmEtm, PID 151834@edcsgs22, started at 27-01-2000 09:10:10

27-01-2000 09:48:01 Info INGMT_IngestTmEtm DCRSI:0023 DCRSI_Hddr.cc:01311
fault code 462 received from DCRsi 4001

27-01-2000 09:48:03 Info INGMT_IngestTmEtm DCRSI:0023 DCRSI_Hddr.cc:01311
fault code 462 received from DCRsi 4001

27-01-2000 09:55:09 Warning INGMT_IngestTmEtm IPPT:0012 IPPT_RefineSpaceCraf:00267
Only 2 state vectors in ephemeris data, continuing but calculated OEs not put in dB.

27-01-2000 09:55:10 Warning INGMT_IngestTmEtm ADS:0004 ADS_JitterProcessor.:00324
Bad jitter values detected and replaced in jitter preprocessing.

27-01-2000 09:57:52 Info INGMT_IngestTmEtm MAIN:0010 MAIN_MainCommon.cc:00470
Process INGMT_IngestTmEtm, PID 151834@edcsgs22, stopped at 27-01-2000 09:57:52

27-01-2000 09:57:55 Info DEM_Init MAIN:0009 MAIN_MainCommon.cc:00438
Process DEM_Init, PID 151855@edcsgs22, started at 27-01-2000 09:57:55

27-01-2000 09:57:57 Info DEM_Init MAIN:0010 MAIN_MainCommon.cc:00470
Process DEM_Init, PID 151855@edcsgs22, stopped at 27-01-2000 09:57:57

27-01-2000 09:57:59 Info PDD_DefineGenericProduct MAIN:0009 MAIN_MainCommon.cc:00438
Process PDD_DefineGenericProduct, PID 152668@edcsgs22, started at 27-01-2000 09:57:59

27-01-2000 09:58:01 Info PDD_DefineGenericProduct MAIN:0010 MAIN_MainCommon.cc:00470
Process PDD_DefineGenericProduct, PID 152668@edcsgs22, stopped at 27-01-2000 09:58:01

27-01-2000 09:58:07 Info OPR_MsResampler MAIN:0009 MAIN_MainCommon.cc:00438
Process OPR_MsResampler, PID 152817@edcsgs22, started at 27-01-2000 09:58:07

27-01-2000 10:00:19 Info OPR_MsResampler MAIN:0010 MAIN_MainCommon.cc:00470
Process OPR_MsResampler, PID 152817@edcsgs22, stopped at 27-01-2000 10:00:19

27-01-2000 10:00:21 Info RQA_PerformRadiometricQA MAIN:0009 MAIN_MainCommon.cc:00438
Process RQA_PerformRadiometricQA, PID 152997@edcsgs22, started at 27-01-2000 10:00:21

27-01-2000 10:00:23 Info RQA_PerformRadiometricQA MAIN:0010 MAIN_MainCommon.cc:00470
Process RQA_PerformRadiometricQA, PID 152997@edcsgs22, stopped at 27-01-2000 10:00:23

27-01-2000 10:00:24 Info BQA_BlackfillQa MAIN:0009 MAIN_MainCommon.cc:00438
Process BQA_BlackfillQa, PID 152979@edcsgs22, started at 27-01-2000 10:00:24

27-01-2000 10:00:25 Info BQA_BlackfillQa MAIN:0010 MAIN_MainCommon.cc:00470
Process BQA_BlackfillQa, PID 152979@edcsgs22, stopped at 27-01-2000 10:00:25

27-01-2000 10:00:25 Info IMAS_AssessImage MAIN:0009 MAIN_MainCommon.cc:00438
Process IMAS_AssessImage, PID 152891@edcsgs22, started at 27-01-2000 10:00:25

27-01-2000 11:01:02 Info IMV_Application MAIN:0009 MAIN_MainCommon.cc:00438
Process IMV_Application, PID 132438@edcsgs22, started at 27-01-2000 11:01:02

27-01-2000 11:12:17 Info IMV_Application WCU:0000 WCU_WriteMessageToWo:00066
Work Order 01100012700020002 passed visual inspection by Operator hansen

27-01-2000 11:12:17 Info IMAS_AssessImage MAIN:0010 MAIN_MainCommon.cc:00470
Process IMAS_AssessImage, PID 152891@edcsgs22, stopped at 27-01-2000 11:12:17

27-01-2000 11:12:19 Info IMV_Application MAIN:0010 MAIN_MainCommon.cc:00470
Process IMV_Application, PID 132438@edcsgs22, stopped at 27-01-2000 11:12:19

27-01-2000 11:12:20 Info TOXNF_MakeProduct MAIN:0009 MAIN_MainCommon.cc:00438
Process TOXNF_MakeProduct, PID 134160@edcsgs22, started at 27-01-2000 11:12:20

27-01-2000 11:12:36 Info TOXNF_MakeProduct MAIN:0010 MAIN_MainCommon.cc:00470
Process TOXNF_MakeProduct, PID 134160@edcsgs22, stopped at 27-01-2000 11:12:36

27-01-2000 11:12:38 Info BIM_OpticalBrowse MAIN:0009 MAIN_MainCommon.cc:00438
Process BIM_OpticalBrowse, PID 153630@edcsgs22, started at 27-01-2000 11:12:38

27-01-2000 11:12:40 Info BIM_OpticalBrowse MAIN:0010 MAIN_MainCommon.cc:00470

Process BIM_OpticalBrowse, PID 153630@edcsgs22, stopped at 27-01-2000 11:12:40

27-01-2000 11:12:42 Info RDC_ArchiveReport MAIN:0009 MAIN_MainCommon.cc:00438
Process RDC_ArchiveReport, PID 153813@edcsgs22, started at 27-01-2000 11:12:42

27-01-2000 11:12:43 Info RDC_ArchiveReport MAIN:0010 MAIN_MainCommon.cc:00470
Process RDC_ArchiveReport, PID 153813@edcsgs22, stopped at 27-01-2000 11:12:43

27-01-2000 11:12:44 Info RMAN_GetDiskResource MAIN:0009 MAIN_MainCommon.cc:00438
Process RMAN_GetDiskResource, PID 153875@edcsgs22, started at 27-01-2000 11:12:44

27-01-2000 11:12:45 Info RMAN_GetDiskResource MAIN:0010 MAIN_MainCommon.cc:00470
Process RMAN_GetDiskResource, PID 153875@edcsgs22, stopped at 27-01-2000 11:12:45

Appendix 6 NLAPS Production System Options

Table A-1. USGS horizontal datums.

Column 1 identifies the horizontal datum options.
Column 2 identifies each horizontal datum's default ellipsoid/Earth model.
Column 3 references brief geographical descriptions for each listed datum. The datum listed for each geographical area is only **suggested** as the appropriate datum to be used.

Column 1	Column 2	Column 3
Datum name	**Default elipsoid**	**Geographical Area**
ADINDAN_BURKI	Clarke 1880	Adindan, Burkina Faso
ADINDAN_CAMER	Clarke 1880	Adindan, Cameroon
ADINDAN_ETHIO	Clarke 1880	Adindan, Ethiopia
ADINDAN_MALI	Clarke 1880	Adindan, Mali
ADINDAN_MEAN	Clarke 1880	Adindan, MEAN FOR Ethiopia
ADINDAN_SENEG	Clarke 1880	Adindan, Senegal
ADINDAN_SUDAN	Clarke 1880	Adindan, Sudan
AFGOOYE_SOMAL	KRASSOVSKY 1940	Afgooye, Somalia
AIN_EL_ABD_BAHRA	International1924	Ain el Abd 1970, Bahrain
AIN_EL_ABD_SAUDI	International1924	Ain el Abd 1970, Saudi Arabia
AMERICAN_S_AMERI	Clarke1866	American Samoa 1962, American Samoa Islands
ANNA_1_AST_COCOS	AustralianNationalSpheroid	Anna 1 Astro 1965, Cocos Islands
ANTIGUA_IS_ANTIG	Clarke 1880	Antigua Island Astro 1943, Antigua (Leeward Islands)
ARC_1950_BOTSW	Clarke 1880	Arc 1950, Botswana
ARC_1950_BURUN	Clarke 1880	Arc 1950, Burundi
ARC_1950_LESOT	Clarke 1880	Arc 1950, Lesotho
ARC_1950_MALAW	Clarke 1880	Arc 1950, Malawi
ARC_1950_MEAN	Clarke 1880	Arc 1950, MEAN FOR Botswana
ARC_1950_SWAZI	Clarke 1880	Arc 1950, Swaziland
ARC_1950_ZAIRE	Clarke 1880	Arc 1950, Zaire
ARC_1950_ZAMBI	Clarke 1880	Arc 1950, Zambia
ARC_1950_ZIMBA	Clarke 1880	Arc 1950, Zimbabwe
ARC_1960_MEAN	Clarke 1880	Arc 1960, MEAN FOR Kenya
ASCENSION_ASCEN	International1924	Ascension Island 1958, Ascension Island
ASTRONOMIC_MARCU	International1924	Astronomical Station 1952, Marcus Island
ASTRO_BEAC_IWO_J	International1924	Astro Beacon E 1945, Iwo Jima
ASTRO_DOS_ST_HE	International1924	Astro DOS 71/4, St Helena Island
ASTRO_TERN_TERN	International1924	Astro Tern Island (FRIG) 1961, Tern Island
AUSTGEO66_AUSTR	AustralianNationalSpheroid	AustGeo66, Australia
AUSTGEO84_AUSTR	AustralianNationalSpheroid	AustGeo84, Australia
AYABELLE_L_DJIBO	Clarke 1880	Ayabelle Lighthouse, Djibouti
BELLEVUE_EFATE	International1924	Bellevue (IGN), Efate & Erromango Islands
BERMUDA_19_BERMU	Clarke1866	Bermuda 1957, Bermuda
BISSAU_GUINE	International1924	Bissau, Guinea-Bissau
BOGOTA_OBS_COLOM	International1924	Bogota Observatory, Colombia
BRAZIL_GEOID	International1967	
BUKIT_RIMP_INDON	Bessel1841	Bukit Rimpah, Indonesia (Bangka & Belitung Ids)
CAMPO_INCH_ARGEN	International1924	Campo Inchauspe, Argentina
CAMP_AREA_ANTAR	International1924	Camp Area Astro, Antarctica (McMurdo Camp Area)
CANTON_AST_PHOEN	International1924	Canton Astro 1966, Phoenix Islands
CAPE_CANAV_BAHAM	Clarke1866	Cape Canaveral, Bahamas
CAPE_SOUTH	Clarke 1880	Cape, South Africa
CARTHAGE_TUNIS	Clarke 1880	Carthage, Tunisia
CHATHAM_IS_NEW_Z	International1924	Chatham Island Astro 1971, New Zealand (Chatham Island)
CHUA_ASTRO_PARAG	International1924	Chua Astro, Paraguay
CORREGO_AL_BRAZI	International1924	Corrego Alegre, Brazil
DABOLA_GUINE	Clarke 1880	Dabola, Guine
DECEPTION_DECEP	Clarke 1880	Deception Island, Deception Island
DJAKARTA_INDON	Bessel1841	Djakarta (Batavia), Indonesia (Sumatra)
DOS_1968_NEW_G	International1924	DOS 1968, New Georgia Islands (Gizo Island)
EASTER_ISL_EASTE	International1924	Easter Island 1967, Easter Island

ESTONIA	BESSEL 1841	NAMIBIA Estonia
EURO_1950_AUSTR	International1924	Euro 1950, Austria
EURO_1950_BELGI	International1924	Euro 1950, Belgium
EURO_1950_CHANN	International1924	Euro 1950, Channel Islands
EURO_1950_CYPRU	International1924	Euro 1950, Cyprus
EURO_1950_EGYPT	International1924	Euro 1950, Egypt
EURO_1950_ENGLA	International1924	Euro 1950, England Euro 1950
EURO_1950_FINLA	International1924	Euro 1950, Finland
EURO_1950_GREEC	International1924	Euro 1950, Greece
EURO_1950_IRAN	International1924	Euro 1950, Iran
EURO_1950_IRAQ	International1924	Euro 1950, Iraq
EURO_1950_MALTA	International1924	Euro 1950, Malta
EURO_1950_PORTU	International1924	Euro 1950, Portugal
EURO_1950_SARDI	International1924	Euro 1950, Sardinia
EURO_1950_SICIL	International1924	Euro 1950, Sicily
EURO_1950_TUNIS	International1924	Euro 1950, Tunisia
EURO_1979_MEAN	International1924	Euro 1979, MEAN FOR Austria
FORT_THOMA_NEVIS	Clarke 1880	Fort Thomas 1955, Nevis
GAN_1970_REPUB	International1924	Gan 1970, Republic of Maldives
GEODETIC_D_NEW_Z	International1924	Geodetic Datum 1949, New Zealand
GRACIOSA_B_AZORE	International1924	Graciosa Base SW 1948, Azores (Faial
GRACIOSA_B_SAO	International1924	Graciosa Base SW 1948, Sao Jorge
GUAM_1963_GUAM	Clarke1866	Guam 1963, Guam
GUNUNG_SEG_INDON	Bessel1841	Gunung Segara, Indonesia (Kalimantan)
GUX_1_ASTR_GUADA	International1924	GUX 1 Astro, Guadalcanal Island
HERAT_NORT_AFGHA	International1924	Herat, North Afghanistan
HERMANNSKOGEL	BESSEL 1841	NAMIBIA Croatia,Serbia,Bosnia-Herzegovina,Slovenia
HJORSEY_19_ICELA	International1924	Hjorsey 1955, Iceland
HONG_KON_HONG	International1924	Hong Kong 1963, Hong Kong
HU_TZU_SHA_TAIWA	International1924	Hu-Tzu-Shan, Taiwan
INDIAN_54_THAIL	Everest1830_1937Adjustment	Indian 54, Thailand
INDIAN_60_CON_S	Everest1830_1937Adjustment	Indian 60, Con Son Island
INDIAN_60_VIETN	Everest1830_1937Adjustment	Indian 60, Vietnam (Near 16=B0N)
INDIAN_75_THAIL	Everest1830_1937Adjustment	Indian 75, Thailand
INDIAN_BANGL	Everest1830_1937Adjustment	Indian, Bangladesh
INDIAN_INDIA	Everest1830_1975Definition	Indian, India
INDONESIAN 1974	IndonesianNationalSpheroid	Indian, Pakistan
INDONESIAN_INDON	IndonesianNationalSpheroid	Indonesian 1974, Indonesia
IRELAND_19_IRELA	AiryModified1849	Ireland 1965, Ireland
ISTS_061_A_SOUTH	International1924	ISTS 061 Astro 1968, South Georgia Islands
ISTS_073_A_DIEGO	International1924	ISTS 073 Astro 1969, Diego Garcia
JOHNSTON_I_JOHNS	International1924	Johnston Island 1961, Johnston Island
KANDAWALA_SRI_L	Everest1830_1937Adjustment	Kandawala, Sri Lanka
KERGUELEN_KERGU	International1924	Kerguelen Island 1949, Kerguelen Island
KERTAU_194_WEST	Clarke 1880	Kertau 1948, West Malaysia & Singapore
KOREAN	GRS 1980	South Korea
KUSAIE_AST_CAROL	International1924	Kusaie Astro 1951, Caroline Islands
LEIGON_GHANA	Clarke 1880	Leigon, Ghana
LIBERIA_19_LIBER	Clarke 1880	Liberia 1964, Liberia
LUZON_MINDA	Clarke1866	Luzon, (Mindanao)
LUZON_PHILI	Clarke1866	Luzon, Philippines (Excluding Mindanao)
L_C_5_AS_CAYMA	Clarke1866	L. C. 5 Astro 1961, Cayman Brac Island
MAHE_1971_MAHE	Clarke 1880	Mahe 1971, Mahe Island
MASSAWA_ETHIO	Bessel1841	Massawa, Ethiopia (Eritrea)
MERCHICH_MOROC	Clarke 1880	Merchich, Morocco
MIDWAY_AST_MIDWA	International1924	Midway Astro 1961, Midway Islands
MINNA_CAMER	Clarke 1880	Minna, Cameroon
MINNA_NIGER	Clarke 1880	Minna, Nigeria
MONTSERRAT_MONTS	Clarke 1880	Montserrat Island Astro 1958, Montserrat (Leeward Islands)
M_PORALOKO_GABON	Clarke 1880	M'Poraloko, Gabon
NAD27	Clarke 1866	North America
NAD27_ALASKA	Clarke 1866	Alaska (Excluding Aleutian Ids)
NAD27_BAHAMAS	Clarke 1866	Bahamas (Except San Salvador Id)
NAD27_CANAL_ZO	Clarke 1866	Canal Zone
NAD27_CENT_AME	Clarke 1866	Mean for Central America
NAD27_CE_CANAD	Clarke 1866	Canada (Manitoba, Ontario)
NAD27_CONUS	Clarke 1866	Mean for Conus
NAD27_CUBA	Clarke 1866	Cuba

NAD27_EA_CANAD	Clarke 1866	Canada (New Brunswick,Newfoundland, Nova Scotia, Quebec)
NAD27_E_OF_180	Clarke 1866	Alaska (Aleutian Ids East of 180W)
NAD27_GREENLAN	Clarke 1866	Greenland (Hayes Peninsula)
NAD27_ME_CANAD	Clarke 1866	Mean for Canada
NAD27_NW_CANAD	Clarke 1866	Canada (Northwest Territories)
NAD27_SAN_SALV	Clarke 1866	Bahamas (San Salvador Island)
NAD27_WE_CANAD	Clarke 1866	Canada (Alberta, British Columbia)
NAD27_W_OF_180	Clarke 1866	Alaska (Aleutian Ids West of 180W)
NAD27_YU_CANAD	Clarke 1866	Canada (Yukon)
NAD83	GRS1980	North America
NAHRWAN_OMAN	Clarke 1880	Nahrwan, Oman (Masirah Island)
NAHRWAN_SAUDI	Clarke 1880	Nahrwan, Saudi Arabia
NAHRWAN_UNITE	Clarke 1880	Nahrwan, United Arab Emirates
NAPARIMA_B_TRINI	International1924	Naparima BWI, Trinidad & Tobago
NORTHAM_27_MEANE	Clarke1866	NorthAm 27, MEANEast of Mississippi
NORTHAM_27_MEANW	Clarke1866	NorthAm 27, MEANWest of Mississippi
NORTHAM_83_ALASK	GRS1980	NorthAm 83, Alaska (Excluding Aleutian Ids)
NORTHAM_83_ALEUT	GRS1980	NorthAm 83, Aleutian Islands
NORTHAM_83_CANAD	GRS1980	NorthAm 83, Canada
NORTHAM_83_CONUS	GRS1980	NorthAm 83, CONUS
NORTHAM_83_HAWAI	GRS1980	NorthAm 83, Hawaii
NORTHAM_83_MEXIC	GRS1980	NorthAm 83, Mexico
NORTH_SAHA_ALGER	Clarke 1880	North Sahara 1959, Algeria
OBSERVATOR_AZORE	International1924	Observatorio Meteorologico 1939, Azores (Corvo & Flores Is
OLD_EGYPTI_EGYPT	Helmert1906	Old Egyptian 1907, Egypt
OLD_HAWAII_HAWAI	Clarke1866	Old Hawaiian, Hawaii
OLD_HAWAII_INTH	HAYFORD 1924	Hawaii
OLD_HAWAII_INTM	HAYFORD 1924	Maui
OLD_HAWAII_INTO	HAYFORD 1924	Oahu
OLD_HAWAII_KAUAI	Clarke1866	Old Hawaiian, Kauai
OLD_HAWAII_MAUI	Clarke1866	Old Hawaiian, Maui
OLD_HAWAII_MEAN	Clarke1866	Old Hawaiian, MEAN FOR Hawaii
OLD_HAWAII_OAHU	Clarke1866	Old Hawaiian, Oahu
OMAN_OMAN	Clarke 1880	Oman, Oman
OSGRTBRT36_ENGLA	Airy1830	OSGrtBrt36, England
OSGRTBRT36_MEAN	Airy1830	OSGrtBrt36, MEAN FOR England
OSGRTBRT36_SCOTL	Airy1830	OSGrtBrt36, Scotland
OSGRTBRT36_WALES	Airy1830	OSGrtBrt36, Wales
PICO_DE_LA_CANAR	International1924	Pico de las Nieves , Canary Islands
PITCAIRN_A_PITCA	International1924	Pitcairn Astro 1967, Pitcairn Island
POINTE_NOI_CONGO	Clarke 1880	Pointe Noire 1948, Congo
POINT_58_MEAN	Clarke 1880	Point 58, MEAN FOR Burkina Faso & Niger
PORTO_SANT_PORTO	International1924	Porto Santo 1936, Porto Santo
PROSOAM_56_BOLIV	International1924	ProSoAm 56, Bolivia
PROSOAM_56_CHILN	International1924	ProSoAm 56, ChilNorthern
PROSOAM_56_CHILS	International1924	ProSoAm 56, ChilSouthern
PROSOAM_56_COLOM	International1924	ProSoAm 56, Colombia
PROSOAM_56_ECUAD	International1924	ProSoAm 56, Ecuador
PROSOAM_56_GUYAN	International1924	ProSoAm 56, Guyana
PROSOAM_56_MEAN	International1924	ProSoAm 56, MEAN FOR Bolivia
PROSOAM_56_PERU	International1924	ProSoAm 56, Peru
PROSOAM_56_VENEZ	International1924	ProSoAm 56, Venezuela
PROSOCH_63_CHILE	International1924	ProSoCh 63, Chile (Near 53 1/2 S) (Hito XVIII)
PUERTO_RIC_PUERT	Clarke1866	Puerto Rico, Puerto Rico
PULKOVO_19_RUSSI	KRASSOVSKY 1940	Pulkovo 1942, Russia
QATAR_NATI_QATAR	International1924	Qatar, National Qatar
QORNOQ_GREEN	International1924	Qornoq, Greenland (South)
REUNION_MASCA	International1924	Reunion, Mascarene Islands
ROME_1940_ITALY	International1924	Rome 1940, Italy (Sardinia)
SANTO_DOS_ESPIR	International1924	Santo (DOS) 1965, Espirito Santo Island
SAO_BRAZ_AZORE	International1924	Sao Braz, Azores (Sao Miguel)
SAPPER_HIL_EAST	International1924	Sapper Hill 1943, East Falkland Island
SCHWARZECK_NAMIB	BesselNamibia	Schwarzeck, Namibia
SELVAGEM_G_SALVA	International1924	Selvagem Grande 1938, Salvage Islands
SGRTBRT36_ISLE	Airy1830	OSGrtBrt36, Isle of Man
SIERRA_LEONE_60	Clarke 1880	Sierra Leone
SOUTHAM_69_ARGEN	SOUTH AMERICAN 1969	SouthAm 69, Argentina
SOUTHAM_69_BALTR	SOUTH AMERICAN 1969	SouthAm 69, Baltra
SOUTHAM_69_BOLIV	SOUTH AMERICAN 1969	SouthAm 69, Bolivia

SOUTHAM_69_BRAZI	SOUTH AMERICAN 1969	SouthAm 69, Brazil
SOUTHAM_69_CHILE	SOUTH AMERICAN 1969	SouthAm 69, Chile
SOUTHAM_69_COLOM	SOUTH AMERICAN 1969	SouthAm 69, Colombia
SOUTHAM_69_ECUAD	SOUTH AMERICAN 1969	SouthAm 69, Ecuador
SOUTHAM_69_GUYAN	SOUTH AMERICAN 1969	SouthAm 69, Guyana
SOUTHAM_69_MEAN	SOUTH AMERICAN 1969	SouthAm 69, MEAN FOR Argentina
SOUTHAM_69_PARAG	SOUTH AMERICAN 1969	SouthAm 69, Paraguay
SOUTHAM_69_PERU	SOUTH AMERICAN 1969	SouthAm 69, Peru
SOUTHAM_69_TRINI	SOUTH AMERICAN 1969	SouthAm 69, Trinidad & Tobago
SOUTHAM_69_VENEZ	SOUTH AMERICAN 1969	SouthAm 69, Venezuela
SOUTH_ASIA_SINGA	Modified Fischer 1960	South Asia, Singapore
S_42_PULK_ALB	KRASOVSKY	Albania
S_42_PULK_CZECH	KRASOVSKY	Czechoslavakia
S_42_PULK_HUNGA	KRASSOVSKY 1940	S-42 (Pulkovo 1942) Hungary
S_42_PULK_KAZAK	KRASOVSKY	Kazakhstan
S_42_PULK_LATVI	KRASOVSKY	Latvia
S_42_PULK_POLAN	KRASOVSKY	Poland
S_42_PULK_ROMAN	KRASOVSKY	Romania
S_JTSK_CZECH	Bessel1841	S-JTSK, Czechoslavakia (Prior 1 JAN 1993)
TANANARIVE_MADAG	International1924	Tananarive Observatory 1925, Madagascar
TIMBALAI_1_BRUNE	Everest1830_1967Definition	Timbalai 1948, Brunei
TOKYO_JAPAN	Bessel1841	Tokyo, Japan
TOKYO_MEAN	Bessel1841	Tokyo, MEAN FOR Japan
TOKYO_OKINA	Bessel1841	Tokyo, Okinawa
TOKYO_SOUTH	Bessel1841	Tokyo, South Korea
TRISTAN_AS_TRIST	International1924	Tristan Astro 1968, Tristan da Cunha
VITI_LEV_FIJI	Clarke 1880	Viti Levu 1916, Fiji (Viti Levu Island)
VOIROL_196_ALGER	Clarke 1880	Voirol 1960, Algeria
WAKE_ENIWE_MARSH	Hough 1960	Wake-Eniwetok 1960, Marshall Islands
WAKE_ISLAN_WAKE	International1924	Wake Island Astro 1952, Wake Atoll
WGS 1972	NWL10D	Global
WGS 66	NWL9D	Global
WGS84	WGS84	Global
WGS_1972_GLOBA	NWL10D	WGS 1972 Global Definition
WGS_1984_GLOBA	WGS84	WGS 1984 Global Definition
YACARE_URUGU	International1924	Yacare, Uruguay
ZANDERIJ_SURIN	International1924	Zanderij, Suriname

Table B-1. USGS projection parameters (array elements 1-8).

Code and Projection Name	Array Element 1	2	3	4	5	6	7	8
0 Geographic								
1 UTM	SMajor	SMinor						
2 State Plane								
3 Albers Equal Area	SMajor	SMinor	STDPR1	STDPR2	CentMer	OriginLat	FE	FN
4 Lambert Conform. Con.	SMajor	SMinor	STDPR1	STDPR2	CentMer	OriginLat	FE	FN
5 Mercator	SMajor	SMinor			CentMer	TrueScale	FE	FN
6 Polar Stereographic	SMajor	SMinor			LongPol	TrueScale	FE	FN
7 Polyconic	SMajor	SMinor			CentMer	OriginLat	FE	FN
8 Equid. Conic A	SMajor	SMinor	STDPAR		CentMer	OriginLat	FE	FN
Equid. Conic B	SMajor	SMinor	STDPR1	STDPR2	CentMer	OriginLat	FE	FN
9 Transverse Mercator	SMajor	SMinor	Factor		CentMer	OriginLat	FE	FN
10 Stereographic	Sphere				CentLon	CenterLat	FE	FN
11 Lambert Azimuthal	Sphere				CentLon	CenterLat	FE	FN
12 Azimuthal Equidistant	Sphere				CentLon	CenterLat	FE	FN
13 Gnomonic	Sphere				CentLon	CenterLat	FE	FN
14 Orthographic	Sphere				CentLon	CenterLat	FE	FN
15 Gen. Vert. Near Per.	Sphere		Height		CentLon	CenterLat	FE	FN
16 Sinusoidal	Sphere				CentMer		FE	FN
17 Equirectangular	Sphere				CentMer	TrueScale	FE	FN
18 Miller Cylindrical	Sphere				CentMer		FE	FN
19 Van der Grinten	Sphere				CentMer	OriginLat	FE	FN
20 Hotin Oblique Merc. A	SMajor	SMinor	Factor			OriginLat	FE	FN
Hotin Oblique Merc. B	SMajor	SMinor	Factor	AziAng	AzmthPt	OriginLat	FE	FN
21 Robinson	Sphere				CentMer		FE	FN
22 Space Oblique Merc. A	SMajor	SMinor		IncAng	AscLong		FE	FN
Space Oblique Merc. B	SMajor	SMinor	Satnum	Path			FE	FN
23 Alaska Conformal	SMajor	SMinor					FE	FN
24 Goodes Homolosine	Sphere							
25 Mollweide	Sphere				CentMer		FE	FN
26 Interrupt Mollweide	Sphere							
27 Hammer	Sphere				CentMer		FE	FN
28 Wagner IV	Sphere				CentMer		FE	FN
29 Wagner VII	Sphere				CentMer		FE	FN
30 Oblated Equal Area	Sphere		Shapem	Shapen	CentLon	CenterLat	FE	FN

Table B-2. USGS projection parameters (array elements 9-15).

Code and Projection Name	Array Element 9	10	11	12	13
0 Geographic					
1 UTM					
2 State Plane					
3 Albers Equal Area					
4 Lambert Conform. Con.					
5 Mercator					
6 Polar Stereographic					
7 Polyconic					
8 Equid. Conic A	zero				
Equid. Conic B	one				
9 Transverse Mercator					
10 Stereographic					
11 Lambert Azimuthal					
12 Azimuthal Equidistant					
13 Gnomonic					
14 Orthographic					
15 Gen. Vert. Near Per.					
16 Sinusoidal					

17 Equirectangular					
18 Miller Cylindrical					
19 Van der Grinten					
20 Hotin Oblique Merc. A	Long1	Lat1	Long2	Lat2	zero
Hotin Oblique Merc. B					one
21 Robinson					
22 Space Oblique Merc. A	PSRev	LRat	PFlag		zero
Space Oblique Merc. B					one
23 Alaska Conformal					
24 Goodes Homolosine					
25 Mollweide					
26 Interrupt Mollweide					
27 Hammer					
28 Wagner IV					
29 Wagner VII					
30 Oblated Equal Area	Angle				

Table B-2. USGS projection parameters (array elements 9-15).

Code and Projection Name	Array Element				
	9	10	11	12	13
0 Geographic					
1 UTM					
2 State Plane					
3 Albers Equal Area					
4 Lambert Conform. Con.					
5 Mercator					
6 Polar Stereographic					
7 Polyconic					
8 Equid. Conic A	zero				
Equid. Conic B	one				
9 Transverse Mercator					
10 Stereographic					
11 Lambert Azimuthal					
12 Azimuthal Equidistant					
13 Gnomonic					
14 Orthographic					
15 Gen. Vert. Near Per.					
16 Sinusoidal					
17 Equirectangular					
18 Miller Cylindrical					
19 Van der Grinten					
20 Hotin Oblique Merc. A	Long1	Lat1	Long2	Lat2	zero
Hotin Oblique Merc. B					one
21 Robinson					
22 Space Oblique Merc. A	PSRev	LRat	PFlag		zero
Space Oblique Merc. B					one
23 Alaska Conformal					
24 Goodes Homolosine					
25 Mollweide					
26 Interrupt Mollweide					
27 Hammer					
28 Wagner IV					
29 Wagner VII					
30 Oblated Equal Area	Angle				

where

- SMajor — Semi-major axis of ellipsoid. If zero, Clarke 1866 in meters is assumed.
- SMinor — Eccentricity squared of the ellipsoid if less than zero; if zero, a spherical form is assumed, or if greater than zero, the semi-minor axis of ellipsoid.
- Sphere — Radius of reference sphere. If zero, 6370997 meters is used.

```
STDPAR    Latitude of the standard parallel.
STDPR1    Latitude of the first standard parallel.
STDPR2    Latitude of the second standard parallel.
CentMer   Longitude of the central meridian.
OriginLat Latitude of the projection origin.
FE        False easting in the same units as the semi-major axis.
FN        False northing in the same units as the semi-major axis.
TrueScale Latitude of true scale.
LongPol   Longitude down below pole of map.
Factor    Scale factor at central meridian (Transverse Mercator) or
          center of projection (Hotine Oblique Mercator).
CentLon   Longitude of center of projection.
CenterLat Latitude of center of projection.
Height    Height of perspective point.
Long1     Longitude of first point on center line (Hotine Oblique
          Mercator, format A).
Long2     Longitude of second point on center line (Hotine Oblique
          Mercator, format A).
Lat1      Latitude of first point on center line (Hotine Oblique
          Mercator, format A).
Lat2      Latitude of second point on center line (Hotine Oblique
          Mercator, format A).
AziAng    Azimuth angle east of north of center line (Hotine Oblique
          Mercator, format B).
AzmthPt   Longitude of point on central meridian where azimuth occurs
          (Hotine Oblique Mercator, format B).
IncAng    Inclination of orbit at ascending node, counter-clockwise
          from equator (Space Oblique Mercator, format A).
AscLong   Longitude of ascending orbit at equator (Space Oblique
          Mercator, format A).
PSRev     Period of satellite revolution in minutes (Space Oblique
          Mercator, format A).
LRat      Landsat ratio to compensate for confusion at northern end
          of orbit (Space Oblique Mercator, format A -- use 0.5201613).
PFlag     End of path flag for Landsat:  0 = start of path,
          1 = end of path (Space Oblique Mercator, format A).
Satnum    Landsat Satellite Number (Space Oblique Mercator, format B).
Path      Landsat Path Number (Use WRS-1 for Landsat 1, 2 and 3 and
          WRS-2 for Landsat 4, 5 and 6.)  (Space Oblique Mercator,
          format B).
Shapem    Oblated Equal Area oval shape parameter m.
Shapen    Oblated Equal Area oval shape parameter n.
Angle     Oblated Equal Area oval rotation angle.
```

Notes.

Array elements 14 and 15 are set to zero.
All array elements with blank fields are set to zero.
All angles (e.g., latitudes, longitudes, azimuths) are entered in packed degrees/minutes/seconds (DDDMMMSSS.SS) format.

The following notes apply to the Space Oblique Mercator A projection.

- A portion of Landsat rows 1 and 2 may also be seen as parts of rows 246 or 247. To place these locations at rows 246 or 247, set the end of path flag (parameter 11) to 1--end of path. This flag defaults to zero.

  When Landsat-1, -2, -3 orbits are being used, use the following values for the specified parameters:

  ```
  Parameter 4   099005031.2
    Parameter 5   128.87 degrees - (360/251 * path number)
                                 in packed DMS format
    Parameter 9   103.2669323
    Parameter 10  0.5201613
  ```

- When Landsat-4, -5 orbits are being used, use the following values for the specified parameters:

  ```
  Parameter 4   098012000.0
    Parameter 5   129.3 degrees - (360/233 * path number)
                                 in packed DMS format
    Parameter 9   98.884119
    Parameter 10  0.5201613
  ```

Table B-3. Landsat processing levels.

Level	Definition
0	"Raw" Uncorrected, radiometrically and geometrically raw scan lines reversed and nominally aligned.
1	Radiometrically corrected (calibration applied). Scan line reversed and nominally aligned.
8	"Systematically corrected". Radiometrically and geometrically corrected using the satellite model and platform/ephemeris information. Rotated and aligned to the user defined map projection.
9	"Precision corrected". Radiometrically and geometrically corrected using the satellite model and platform/ephemeris information. Rotated and aligned to the user defined map projection using ground control points to improve the satellite model.
10	"Terrain corrected". Radiometrically and geometrically corrected using the satellite model and platform/euphemeris information. Rotated and aligned to the user defined map projection using ground control points and digital terrain model to improve the satellite model and remove the geodetic inaccuracy caused by the parallax error that occurs because of local terrain elevation.