IRS-1C/1D/P6
DIGITAL DATA PRODUCTS FORMAT
FOR REVISION C FAST FORMAT PRODUCTS

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DOCUMENT CONTROL AND DATA SHEET

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1.0 INTRODUCTION

This document describes the format for IRS-1C/1D/P6 fast format digital data products.

1.1 GENERAL FORMAT RULES

1. All field definitions strictly follow American National Standard 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 .

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

4. A digital product is referred to as a volume set. Individual media (8mm DAT, CD) are referred to as volumes. A volume set may have one or more volumes, depending on image size and output media capacity.

1.2 GENERAL FORMAT DESCRIPTION

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

1.2.1 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, confirming to ANSI and ISO standards.

Alphanumeric fields are left justified and numeric fields are right justified. Dates are given in yyyy dd 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. Appendix D contains a table of the entries in the Header 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.

1.2.2 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.

1.2.3 BLOCKED RECORDS

This blocking results in writing fewer End-of-Record gaps on the tape and allows more data to be written to the tape.

2.0 DETAILED FORMAT DESCRIPTION

2.1 HEADER FILES

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

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.

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.

2.1.1 ADMINISTRATIVE RECORD

The first field in this record contains 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 but 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), 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 IRS-1C/1D/P6 the values are 2, 3, 4, 5 for LISS-3,2,3,4 for LISS-4,3,4 for WiFS and 2,3,4,5 for AWiFS and P for PAN . The sequence terminates in a blank.

For blocked data, fields 91 (Start Line), and either 93 (Blocking Factor) or 95 (Record Length) 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 the 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 along with control points.
TERRAIN	Radiometric and geometric corrections using spacecraft system data, along with control points and digital elevation model (DEM)

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

CC = Cubic convolution NN = Nearest neighbour SI=Sinc16 KI=Kaiser

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 (i.e., "234b" for full IRS-1C LISS-3 data sets or "Pb" for IRS-1C panchromatic data sets). 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.

2.1.2 RADIOMETRIC RECORD

Fields 4-41 (bytes 81-689) contains the coefficients needed to convert scene digital values to at-satellite spectral radiances.

2.1.3 GEOMETRIC RECORD

Line 1 contains the map projection (field 3), Earth ellipsoid (field 5) and datum (field 7) used in producing the product. Appendix A contains the list of supported map projections and Appendix B 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:

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)
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.

2.2 SOFTWARE :

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

General Cartographic Transformation Package (GCTP)

Software Reference
NOAA 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
USGS Map Sales
P.O.Box 25286
Denver, CO 80225

APPENDIX-A : Map Projections

This appendix contains the map projections used in EOSAT's products. This list of map projections shows the name and the identifier used in Record 3. Field 3 of the header file.

Projection Name	Mnemonic
Universal Transverse Mercator	UTM
State Plane Coordinate System	SPCS
Albers Conical Equal Area	ACEA
Lambett's Conformal Conic	LCC
Mercator	MER
Polar Stereographic	PS
Polyconic	PC
Equidistant Conic (Type A & B)	EC
Transverse Mercator (Gauss-Krueger)	TM
Stereographic	SG
Lamberts Azimuthal Equal Area	LAEA
Azimuthal Equidistant	AE
Gnomonic	GNO
Orthographic	OG
General Vertical Near-Side Perspective	GVNP
Sinusoidal	SIN
Equirectangular (Plate Career)	ER
Miller Cylindrical	MC
Van Der Grintern I	VDG
Oblique Mercator (Type A & B)	OM
Space Oblique Mercator	SOM

APPENDIX- B-1 : Earth Ellipsoids

This appendix contains the earth ellipsoids used in products.

This list of ellipsoids shows the name and the identifier used in Record

3. Field 3 of the header file.

Ellipsoid Name (meters)	Semi-Major Axis (meters)	Semi-Minor Axis	Mncmonic
Clarke 1866	6378206.400000	6356583.800000	CLARKE_1866
Clarke 1880	6378249.145000	6356514.869550	CLARKE_1880
International 1967	6378157.500000	6356772.200000	INTERNATL_1967
International 1909	6378388.000000	6356911.646130	INTERNATL_1909
WGS 66	6378145.000000	6356759.769356	WGS_66
WGS 72	6378135.000000	6356750.519915	WGS_72
WGS 84	6378137.000000	6356752.314000	WGS_84
GRS 1980	6378137.000000	6356752.314140	GRS_80
Airy	6377563.396000	6356256.910000	AIRY
Modified Airy	6377340.189000	6356034.448000	MODIFIED_AIRY
Everest	6377276.345200	6356075.41330	EVEREST
Modified Everest	6377304.063000	6356103.039000	MODIFIED_EVEREST
Mercury 1960	6378166.000000	6356784.283666	MERCURY_1960
Modified Mercury 1968	6378150.000000	6356768.337303	MOD_MERC_1968
Bessel	6377397.155000	6356078.962840	BESSEL
Walbeck	6376896.000000	6355834.846700	WALBECK
Southeast Asia	6378155.000000	6356773.320500	SOUTHEAST_ASIA
Australian Natl.	6378160.000000	6356774.719000	AUSTRALIAN_NATL
Krassovsky	6378245.000000	6356863.018800	KRASSOVSKY
Hough	6378270.000000	6356794.343479	HOUGH
6370997 Sphere	6370997.000000	6370997.000000	6370997_M_SPHERE

APPENDIX- B-2: Ellipsoid and Datum Mnemonics

Ellipsoid Name	Ellipsoid Mnemonic	Possible Datum Name	Datum Mnemonics
Clarke 1866	CLARKE_1866	Datum_North_American_Datum_1927	NAS-E
Clarke 1880	CLARKE_1880	Datum_Adindan	ADI-M
International 1967	INTERNATL_1967	Datum_New_Zealand_Geodetic_Datum_1949	GEO
International 1909/1924	INTERNATL_1909	Datum_European_Datum_1950	EUR-M
WGS 66	WGS_66	WGS_66	WGS_66
WGS 72	WGS_72	WGS_72	WGS_72
WGS 84	WGS_84	WGS_84	WGS_84
GRS 1980	GRS_80	Datum_North_American_Datum_1983	NAR-B
Airy	AIRY	Datum_OSGB_1936	OGB_M
Modified Airy	MODIFIED_AIRY	Datum_TM65	IRL
Everest	EVEREST	Datum_Kalianpur	IND-I
Modified Everest	MODIFIED_EVEREST	Datum_Kalianpur	IND-I
Mercury 1960	MERCURY_1960	NOT DEFINED	
Modified Mercury 1968	MOD_MERC_1968	NOT DEFINED	
Bessel	BESSEL	Datum_Tokyo	TOY-M
Walbeck	WALBECK	Datum_European_Datum_1950	EUR-M
Southeast Asia	SOUTHEAST_ASIA	Datum_Southasia	SOA
Australian Natl.	AUSTRALIAN_NATL	Datum_Australian_Geodetic_datum_1984	AUG
Krassovsky	KRASSOVSKY	Datum_Pulkovo_1942	PUK
Hough	HOUGH	Datum_Wake-Eniwetok_1960	ENW
6370997 Sphere	6370997_M_SPHERE	NOT DEFINED	

APPENDIX – C : USGS Projection Parameters

Fast Format Revision C Supports 17 USGS projections. For all projections except State Plane, USGS parameters 1 and 2 are semi major and minor axes of the requested earth ellipsoid.

* Not every parameter will be used by the designated projection.

* If a parameter is not used the field for the parameter will be initialized to Zero.

* All latitude and longitude fields will be specified in Decimal Degree (floating point)

* All other fields will be specified as double precision floating point values.

Please note that all co-ordinates for State Plane System contained in the Fast Format is in map metres (not in feet).

C1(U) Universal Transverse Mercator (UTM)

Parameter 3* UTM Zone number (Optional)

C2(**A) Albers Conical Equal Area (ACEA)**

Parameter 3	Latitude of first Standard Parallel
Parameter 4	Latitude of second Standard Parallel
Parameter 5	Longitude of central meridian
Parameter 6	Latitude of projection's Origin
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C3(L) Lamberts Conformal Conic (LCC)

Parameter 3	Latitude of first Standard Parallel
Parameter 4	Latitude of second Standard Parallel
Parameter 5	Longitude of central meridian
Parameter 6	Latitude of projection's Origin
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C4(M) Mercator (Mer)

Parameter 5	Longitude of central meridian
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C5(D) Polar Stereographic (PS)

Parameter 5	Longitude directed straight down below pole of map
Parameter 6	Latitude of true scale

Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C6(P) Polyconic (POL)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of projection's Origin
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C7(T) Tranverse Mercator (TM)

Parameter 3	Scale Factor at central meridian
Parameter 5	Longitude of central meridian
Parameter 6	Latitude of projections's origin
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C8(H) Stereographic (SG)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C9(Z) Lamberts Azimuthal Equal Area (LAEA)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C10(E) Azimuthal Equidistant (AE)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C11(G) Gnomonic (GNO)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C12(R) Orthographic (OG)

Parameter 5	Longitude of central meridian
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C13(N) General Vertical Near-Side Perspective (GVNP)

Parameter 3	Height of perspective point above sphere
Parameter 5	Longitude of centre of projection
Parameter 6	Latitude of centre of projection
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C14(I) Sinusoidal (SIN)

Parameter 5	Longitude of central meridian
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C15(C) Miller Cylinderical (MC)

Parameter 5	Longitude of central meridian
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C16(V) Van Der Grinten (VDG)

Parameter 5	Longitude of central meridian
Parameter 7	False Easting (in metres)
Parameter 8	False Northing (in metres)

C17(S) Space Oblique Mercator (SOM)

Parameter 4	Angle of azimuth east of north for central line of projection
Parameter 9	Longitude of the ascending Node
Parameter 11	Longitude of descending Node

APPENDIX-D : Fast Format Header File Record Format Tables

The following tables are a description of the three records in the Header File. Each record described below is separated by a blank typed line every eighty characters for case for reading. A group of eighty characters can be thought of as a (printed) line. See the accompanying text for more explanation of critical entries.

Administrative Record

Line	Field	Start Byte	End Byte	Format	Description
1	1	1	12	A12	"PRODUCTbIDb="
	2	13	23	A11	Product order number in yydddnnn-cc format yyddd=First 1 to 5 Char nnn=8-10th char, of Unique ProductID. cc=Scene Number.
	3	24	34	A11	"bLOCATIONb="
	4	35	51	A17	First scene location path/ row/fraction(shift %)/subscene(or quadrant) in ppp/rrrffss format In case of LISS4 Multi Spectral Mode Path=Strip Number,Row=Scene Number.
	5	52	70	A19	"bACQUISITIONbDATEb="
	6	71	78	A8	First scene acquisition date in yyyyddmm format
	7	79	79	1X	Blank fill
	8	80	80	A1	Carriage return
2	9	81	91	A11	"SATELLITEb="
	10	92	101	A10	First scene satellite Name:IRS 1C,1D,P6
	11	102	110	A9	"bSENSORb="
	12	111	120	A10	First scene sensor Name:
	13	121	134	A14	LISS3, PAN, WIFS, LISS4, AWIFS
	14	135	140	A6	"bSENSORbMODEb="
	15	141	1453	A13	First scene sensor Mode
	16	154	159	F6.2	“bLOOKbANGLEb=”First scene off-nadir angle in degrees
	17	160	160	A1	Carriage return
3	18	161	183	23X	Blank fill
	19	184	194	A11	"bLOCATIONb="
	20	195	211	A17	Second scene location path/ row/fractions/subscene in ppp/rrrffss format
	21	212	230	A19	"bACQUISITIONbDATEb="
	22	231	238	A8	Second scene acquisition date in yyyyddmm format
	23	239	239	1X	Blank fill
	24	240	240	A1	Carriage return
4	25	241	251	A11	"SATELLITEb="
	26	252	261	A10	Second scene satellite Name:,1C,1D,P6
	27	262	270	A9	"bSENSORb="
	28	271	280	A10	Second scene sensor Name: PAN, WIFS,LISS4,AWIFS

	29	281	294	A14	"bSENSORbMODEb="
	30	295	30	A6	Second scene sensor Mode
	31	301	313	A13	"bLOOKbANGLEb="
	32	314	319	F6.2	Second scene off-nadir angle in deg.
	33	320	320	A1	Carriage return
5	34	321	343	23X	Blankfill
	35	344	354	A11	"bLOCATIONb="
	36	355	371	A17	Third scene location path/ row/fraction/subscene in ppp/rrrffss format
	37	372	390	A19	"bACQUISITIONbDATEb="
	38	391	398	A8	Third scene acquisition date in yyyyddmm format
	39	399	399	1X	Blank fill
	40	400	400	A1	Carriage return
6	41	401	411	A11	"SATELLITEb="
	42	412	421	A10	Third scene satellite Name: 1C,1D,P6
	43	422	430	A9	"bSENSORb="
	44	431	440	A10	Third scene sensor Name: LISS3, PAN, WIFS,LISS4,AWIFS
	45	441	454	A14	"bSENSORbMODEb="
	46	455	460	A6	Third scene sensor Mode
	47	461	473	A13	"bLOOKbANGLEb="
	48	474	479	F6.2	Third scene off-nadir angle in degree
	49	480	480	A1	Carriage return
7	50	481	503	23X	Blank fill
	51	504	514	A11	“Blocationb=”
	52	515	531	A17	Fourth scene location path/ Row/fraction/subscene in Ppp/rrrffss format
	53	532	550	A19	"bACQUISITIONbDATEb="
	54	551	558	A8	Fourth scene acquisition date in yyyyddmm format
	55	559	559	1X	Blank fill
	56	560	560	A1	Carriage return
8	57	561	571	A11	"SATELLITEb="
	58	572	581	A10	Fourth scene satellite Name: 1C,1D,P6
	59	582	590	A9	"bSENSORb="
	60	591	600	A10	Fourth scene sensor Name: LISS3,PAN, WIFS, LISS4,AWIFS
	61	601	614	A14	"bSENSORbMODEb="
	62	615	620	A6	Fourth scene sensor mode
	63	621	633	A13	"bLOOKbANGLEb="
	64	634	639	F6.2	Fourth scene off-nadir angle In deg.
	65	640	640	A1	Carriage return
9	66	641	654	A14	"PRODUCTbTYPEb="
	67	655	672	A10	Product type: MAPbORIENT0dbbbbbb'. 'ORBITbORIENTEDbbbb'

	68 69 70 71	673 688 698 720	687 697 719 720	A15 A10 22X A1	"bPRODUCTbSIZEb=" Product size:'FULLbSCENE', 'SUBSCENEbb'. 'MAPbSHEETb'.,'QUADRANT'. blank fill carriage return
10	72 73 74 75 76 77	721 741 752 765 767 800	740 751 764 766 799 800	A20 A11 A13 A2 33X A1	"TYPEbOFbPROCESSINGb=" Type of processing used: 'SYSTEMATICb','PRECISIONbb', 'TERRAINbbbb','RADIOMETRIC", 'RAWbbbbbbbb' "bRESAMPLINGb=" Resampling algorithm used: 'CC','NN',’SI’,’KI’ Blank fill Carriage return
11	78 79 80 81 82 83 84 85 86 87 88 89	801 820 822 823 825 843 848 865 870 871 876 880	819 821 822 824 842 847 864 869 870 875 879 880	A19 I2 A1 I2 A18 I5 A17 I5 A1 I5 4X A1	'VOLUMEb#/#bINbSETb=" Tape volume number in tape set (for multi-volume image)"/" Number of volumes in tape set (for multi-volume image) “bPIXELSbPERLINEb=” Number of pixels per image Line “bLINESbPERbB/ANDb=” Number of lines on this volume “/” Number of lines in the output Image Blank fill Carriage return
12	90 91 92 93 94 95 96 97 98	881 895 900 918 920 936 941 954 960	894 899 917 919 935 940 953 959 960	A14 15 A18 12 A16 15 A13 F6.2 A1	"STARTbLINEb#b=" First image line number on this vloume (for multi-volume image) "bBLOCKINGbFACTORb=" Tape blocking Factor "bRECORDbLENGTHb=" Length of physical file record in bytes "bPIXELbSIZEb=" Pixel size in meters Carriage return
13	99 100 101 102 103 104	961 984 986 1012 1014 1040	983 985 1011 1013 1039 1040	A23 I2 A26 I2 26X A1	"OUTPUTbBITSbPERbPIXELb=" Output bits per pixel "bACQUIREDbBITSbPERbPIXELb=" Acquired bits per pixel Blank fills Carriage return
14	105 106 107 108	1041 1056 1088 1103	1055 1087 1102 1111	A15 A32 A14 A9	"BANDSbPRESENTb= Image bands present on this volume “PRODUCTbCODEb=” product code e.g. STPCD02AI ST : Two Char Product Type (e.g ST for STANDARD pathbased) P : 1 Char Projection Code (e.g. Polyconic)

	109 110	1112 1120	1119 1120	8X A1	C : 1 Char Resampling Option (e.g. Cubic Convolution) D : 1 char Ellipsdoid Code (e.g. Everest) 0 : Enhancement Code(Zero Always) I : Media Code(e.g. I for DAT, J for CDROM, Z for DISK)
15	111 112 113 114 115 116 117	1121 1133 1145 1153 1171 1183 1200	1132 1144 1152 1170 1182 1199 1200	A12 A12 8X A18 A12 17X A1	“VERSION NO =” DPS software version Blank fill “ACQUISITIONbTIME =” time in HH:MM:SS:mmm Blank fill Carriage return
16	118 119 120 121 122 123 124	1201 1221 1233 1236 1255 1265 1280	1220 1232 1235 1254 1264 1279 1280	A20 A12 3X A19 A10 15X A1	“GENERATINGbCOUNTRYb=” Generating Country Name Blank fill “GENERATINGbAGENCYb=” Generating Agency Name Blank Fill Carriage Return
17	125 126 127 128 129 130	1281 1302 1310 1326 1333 1360	1301 1309 1325 1332 1359 1360	A21 A8 A16 A7 27X A1	“GENERATINGbFACILITYb=” facility Name “PRODUCTbENDIANb=” Endian in which product has been generated. e.g. **BIG** : For product generated with MOTOROLA Architecture(MSB First) **LITTLE** : For product generated with INTEL Architecture(LSB First) Blank fill Carriage return
18	131 132	1361 1440	1439 1440	79X A1	Blank fill Carriage return
19	133 134	1441 1520	1519 1520	79X A1	Blank fill Carriage return
20	135 136	1521 1536	1535 1536	15X A	"REVbbbbbbbbbbbb" Format version code (A-Z). This document describes version

Radiometric Record

Line	Field	Start Byte	End Byte	Format	Description
1	1	1	50	A50	"BIASESbANDbGAINSbINbTHE bBANDbORDERbASbONbTHISbTAPE"
	2	51	79	29X	Blank fill
	3	80	80	A1	Carriage return
2	4	81	104	D24.15	Bias for first Band on this tape
	5	105	105	1X	Blank fill
	6	106	129	D25.15	Gain for first Band on this tape
	7	130	159	30X	Blank fill
	8	160	160	A1	Carriage return
3	9	161	184	D24.15	Bias for Second Band on this tape
	10	185	185	1X	Blank fill
	11	186	209	D24.15	Gain for second band on this tape
	12	210	239	30X	Blank fill
	13	240	240	A1	Carriage return
4	14	241	264	D24.15	Bias for Third Band on this tape
	15	265	265	1X	Blank fill
	16	266	289	D24.15	Gain for Third band on this tape
	17	290	319	30X	Blank fill
	18	320	320	A1	Carriage return
5	19	321	344	D24.15	Bias Fourth Band on this tape
	20	345	345	1X	Blank fill
	21	346	369	D24.15	Gain for Fourth Band on this tape
	22	370	399	30X	Blank fill
	23	400	400	A1	Carriage Return
6	24	401	424	D24.15	* Bias for Fifth Band on this tape
	25	425	425	1X	Blank fill
	26	426	449	D24.15	Gain for Fifth Band on this tape
	27	450	479	30X	Blank fill
	28	480	480	A1	Carriage return
7	29	481	504	D24.15	Bias for Sixth Band on this tape
	30	505	505	1X	Blank fill
	31	506	529	D25.15	Gain for Sixth Band on this tape
	32	530	559	30X	Blank fill
	33	560	560	A1	Carriage return
8	34	561	584	D24.15	Bias for Seventh Band on this tape
	35	585	585	1X	Blank fill
	36	586	609	D24.15	Gain for Seventh Band on this tape
	37	610	639	30X	Blank fill
	38	640	640	A1	Carriage return
9	39	641	664	D24.15	Bias for Eighth Band on this tape
	40	665	665	1X	Blank fill
	41	666	689	D24.15	Gain for Eighth Band on this tape
	42	690	719	30X	Blank fill
	43	720	720	A1	Carriage return

10	44 45	721 800	799 800	79X A1	Blank fill Carriage return
11	46 47 48 49	801 520 852 880	819 851 879 880	A19 8*14 28X A1	"SENSOR GAIN STATE=" bbbnbbbnbbbnbbbnbbbnbbbnbbbnbbn Blank fill Carriage return
12	50 51A 51B 51C	881 895 903 960	894 902 959 960	14A A8 57X A1	"SENSORbSTATEB=" Correction Alogrithm Used 1:ORIG or 2:CORLTN or 3:1DCC for LISS-3 GOOD or DEGRADED for PAN Default is GOOD. Blank fill Carriage return
13	50 51	961 1040	1038 1040	79X A1	Blank fill Carriage return
14	52 53	1041 1120	1119 1120	79X A1	Blank fill Carriage return
15	54 55	1121 1200	1199 1200	79X A1	Blank fill Carriage return
16	56 57	1201 1280	1279 1280	79X A1	Blank fill Carriage return
17	58 59	1281 1360	1359 1360	79X A1	Blank fill Carriage return
18	60 61	1361 1440	1439 1440	79X A1	Blank fill Carriage return
19	62 63	1441 1520	1519 1520	79X A1	Blank fill Carriage return
20	64 65	1521 1536	1535 1536	15X A1	Blank fill Carriage return

*** NOTE: - In IRS series only four bands are present so information related to fifth to eighth band are filled with blank.**

Geometric Record

Line	Field	Start Byte	End Byte	Format	Description
1	1	1	14	A14	"GEOMETRICbDATA"
	2	15	31	A17	"bMAPbPROJECTIONb="
	3	32	35	A4	Map projection name (see Appendix A for list of mnemonies)
	4	36	47	A12	"bELLIPSOIDb="
	5	48	65	A18	Earth Ellipsoid used (see Appendix B for list of mnemonies)
	6	66	73	A8	"bDATUMb="
	7	74	79	A6	Datum name (see Appendix B for list of mnemonics)
	8	80	80	A1	Carriage return
2	9	81	108	A28	"USGSbPROJECTIONbPARAMETERSb="
	10	109	109	1X	Blank fill
	11	110	133	D24.15	USGS projection parameter #1:Semimajor axis
	12	134	134	1X	Blank fill
	13	135	158	D24.15	USGS projection parameter #1:Semiminor axis
	14	159	159	1X	Blank fill
	15	160	160	A1	Carriage return
3	16	161	184	D24.15	USGS projection parameter #3.
	17	185	185	1X	Blank fill
	18	186	209	D24.15	USGS projection parameter #4
	19	210	210	1X	Blank fill
	20	211	234	D24.15	USGS projection parameter #5
	21	235	239	5x	Blank fill
	22	240	240	A1	Carriage return
4	23	241	264	D24.15	USGS projection parameter #6
	24	265	265	1x	Blank fill
	25	266	289	D24.15	USGS projection parameter #7
	26	290	290	1x	Blank fill
	27	291	314	D24.15	USGS projection parameter #8
	28	315	319	5x	Blank fill
	29	320	320	A1	Carriage return
5	30	321	344	D24.15	USGS projection parameter #9
	31	345	345	1x	Blank fill
	32	346	369	D24.15	USGS projection parameter #10
	33	370	370	1x	Blank fill
	34	371	394	D24.15	USGS projection parameter #11
	35	395	399	5x	Blank fill
	36	400	400	A1	Carriage return
6	37	401	424	D24.15	USGS projection parameter #12
	38	425	425	1x	Blank fill
	39	426	449	D24.15	USGS projection parameter #13
	40	450	450	1x	Blank fill
	41	451	474	D24.15	USGS projection parameter #14
	42	475	479	5x	Blank fill
	43	480	480	A1	Carriage return

7	44 45 46	481 505 560	504 559 560	D24.15 55X A1	USGS projection parameter #15 Blank fill Carriage return
8	47 48 49 50 51 52 53 54 55 56 57	561 565 566 579 580 592 593 606 607 620 640	564 565 578 579 591 592 605 606 619 639 640	A4 1x A13 1x A12 1x F13.3 1x F13.3 20x A1	"ULb=" Blank fill Geodetic Longitude of Upper Left corner of image. As per FIPS PUB 70, longitude will be expressed as FIBSPUB degrees, minutes, seconds. Example: 5 degrees, 15 minutes, 13.2 seconds west of the prime meridian will be "0051513.2000W" Blank fill Geodetic latitude of Upper Left corner of image. As per FIPS PUB 70latitude Will be expressed as Degrees, minutes, Seconds. Example: 9 degrees,4 minutes, 24.2334 seconds expressed as PUB 70 Seconds north of the Equator will be "090424.2334N" Blank fill Easting of Upper corner of image in projection units Blank fill Northing of Upper corner of image in projection units Blank fill Carriage return
9	58 59 60 61 62 63 64 65 66 67 68	641 645 646 659 660 672 673 686 687 700 720	644 645 658 659 671 672 685 686 699 719 720	A4 1x A13 1x A12 1x F13.3 1x F13.3 20X A1	"URb=" Blank fill Geodetic Longitude of Upper Right corner of image Blank fill Geodetic Latitude of Upper Right corner of image Blank fill Easting of Upper Right corner Of image in projection units Blank fill Nothing of Upper Right corner Of image in projection units Blank fill Carriage return

10	69	721	724	A4	"LRb="
	70	725	725	1x	Blank fill
	71	726	738	A13	Geodetic Longitude of Lower Right corner of image
	72	739	739	1x	Blank fill
	73	740	750	A12	Geodetic Latitude of Lower Right corner of image
	74	752	752	1x	Blank fill
	75	753	765	F13.3	Easting of Lower Right Corner Of image in projection units
	76	766	766	1x	Blank fill
	77	767	779	F13.3	Northing of Lower Right corner Of image in projection units
	78	780	799	20X	Blank fill
	79	800	800	A1	Carriage return
11	80	801	804	A4	"LLb"
	81	805	805	1x	Blank fill
	82	806	818	A13	Geodetic Longitude of Lower Corner of image
	83	819	819	1x	Blank fill
	84	820	831	A12	Geodetic Latitude of Lower Corner of image
	85	832	832	1x	Blank fill
	86	833	845	F13.3	Easting of Lower Left corner Of image in projection units
	87	846	846	1x	Blank fill
	88	847	859	F13.3	Northing of Lower Left corner of image in projection units
	89	860	879	20X	Blank fill
	90	880	880	A1	Carriage return
12	91	881	888	A8	"CENTERb="
	92	889	889	1x	Blank fill
	93	890	902	A13	Scene centre geodetic longitude expressed in degrees, as above. This is the true center of the full scene product image was made, and does not product image.
	94	903	903	1x	Blank fill
	95	904	915	A12	Scene center geodetic latitude expressed in degrees, minutes seconds as above. This is the true centre of the full scene from which the product image was made and does not necessarily fall inside product image.
	96	916	916	1x	Blank fill
	97	917	929	F13.3	Scene center Easting in Projection units
	98	930	930	1x	Blank fill
	99	931	943	F13.3	Scene center Northing in Projection units
	100	944	944	1x	Blank fill
	101	945	949	15	Scene center pixel number measured left from the product upper corner, rounded to nearest whole pixel (may be

					negative)
	102	950	950	1x	Blank fill
	103	951	955	15	Scene center line number measured from the product left corner upper rounded to nearest whole pixel
	104	956	959	4x	(may be negative)
	105	960	960	A1	Blank fill Carriage return
13	106	961	968	A8	"OFFSETb="
	107	969	974	16	Horizontal offset of the true scene center in units of whole pixels. (may be negative)
	108	975	994	20A	"bORIENTATIONbANGLEb="
	109	995	1000	F6.2	Orientation angle in degrees (may be negative)
	110	1001	1039	39x	Blank fill
	111	1040	1040	A1	Carriage return
14	112	1041	1061	21A	"SUNBbELEVATIONbANGLEb="
	113	1062	1065	F4.1	Sun elevation angle in Degrees at scene center
	114	1066	1085	A20	"bSUNbAZIMUTHbANGLEb="
	115	1086	1090	F5.1	Sun azimuth in degrees at scene center
	116	1091	1101	A11	“bALTITUDEb=”
	117	1102	1113	F12.5	Altitude in Meters.
	118	1114	1119	6X	Blank fill
	119	1120	1120	A1	Carriage return
15	120	1121	1135	A15	“HEADINGbANGLEb=
	121	1136	1149	F14.6	Heading Angle in degrees.
	122	1150	1199	50X	Blank fill
		1200	1200	A1	Carriage Return
16	123	1201	1279	79X	Blank fill
	124	1280	1280	A1	Carriage return
17	125	1281	1359	79X	Blank fill
	126	1360	1360	A1	Carriage Return
18	127	1361	1439	79X	Blank fill
	128	1440	1440	A1	Carriage Return
19	129	1441	1519	79X	Blank fill
	130	1520	1520	A1	Carriage Return
20	131	1521	1535	79X	Blank fill
	132	1536	1536	A1	Carriage Return

APPENDIX-E : Fast Format Layout