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GES 10490

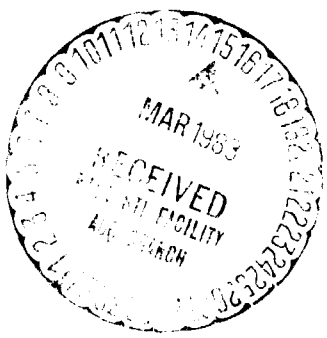
LANDSAT-D

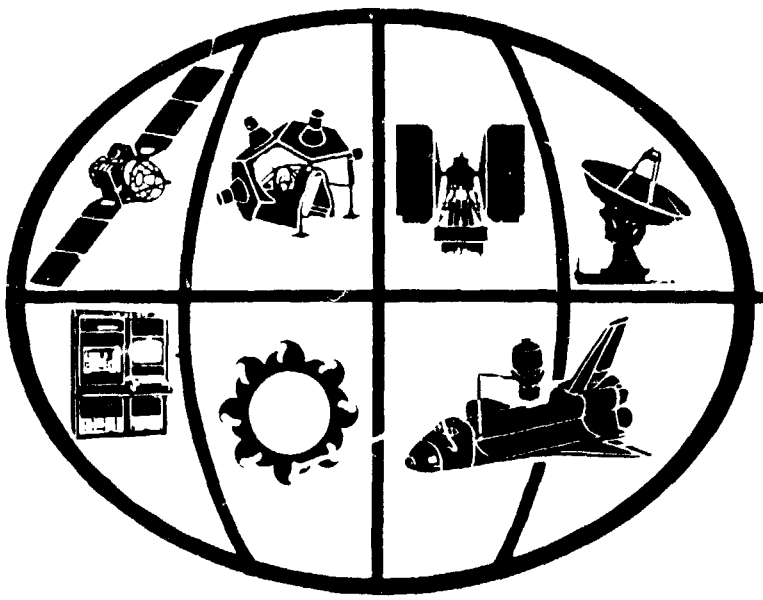
DATA FORMAT CONTROL BOOK

VOLUME VI APPENDIX D

THEMATIC MAPPER COMPUTER COMPATIBLE TAPE

(CCT-AT/PT)





space division SD

CONTRACT NO.
NAS 5-25300

GENERAL ELECTRIC

GES 10490
Revision 0
21 October 1981

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(CCT-AT, CCT-PT)

FORMAT SPECIFICATION

PREPARED FOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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GREENBELT, MARYLAND

UNDER

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SPACE SYSTEMS DIVISION

LANHAM, MARYLAND

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REVISION LOG

This log identifies those portions of this document which have been revised since original issue. Revised portions of each page, for the current revision only, are identified by marginal striping.

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(CCT-AT, CCT-PT)

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TBD/TBR/TBS LOG

PARAGRAPH NUMBER	PARAGRAPH NAME	TYPE	RESOLUTION EXPECTED

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SECTION 1

SCOPE

1.1 INTRODUCTION

The NASA GSFC Landsat-D Project is developing a Data Management System (DMS) to provide a variety of standard image products from the thematic mapper (TM) and multispectral scanner (MSS) instruments. The major digital image processing functions to be performed by the DMS include: screening imagery for quality, determining cloud cover, applying radiometric corrections, computing sets of geometric corrections corresponding to different map projections, and applying a set of geometric corrections (including resampling the data using either cubic convolution or nearest neighbor techniques and presenting the data in either a space oblique mercator, universal transverse mercator, or polar stereographic projection).

The DMS will generate partially processed TM data (radiometric corrections applied and geometric correction matrices appended) which are recorded on high density tapes (HDT-AT). Selected scenes from HDT-ATs will be geometrically corrected and these fully processed scenes will be recorded on HDT-PT. User requested scenes from HDT-ATs and HDT-PTs will be recorded on computer compatible tapes (CCT). A CCT is a nine-track magnetic tape recorded in 1600 bits per inch (bpi) or 6250 bpi format.

This specification establishes the requirements for the format of the Landsat-D CCT-AT and CCT-PT products. These requirements represent both derived and

allocated requirements from the GSFC specification for the Landsat-D System, GSFC-430-D-100.

This document is part of the Landsat-D Data Format Control Book. It is one of several appendices to Volume VI which describe the format of Landsat-D and Landsat-D Prime products.

The CCT format specified here was based on recommendations in the "LGSOWG CCT Format CCB Document: The Standard CCT Family of Tape Formats." This standard was developed by the Canada Centre for Remote Sensing (CCRs) for NASA GSFC. The objective of this standard is to allow data from various remote sensing sources to be usable for a given application. Section 4 describes the superstructure concepts used in this document. Note that, except for the necessary reformatting and addition of the LGSOWG recommended superstructure, the data on the CCT-AT and CCT-PT is identifical in structure and content to that contained on the respective source HDT.

1.2 PURPOSE

The purpose of this document is to define the format of CCTs which contain Landsat-D and D Prime TM image data. This document provides a complete specification of the CCT-AT and CCT-PT data format and should be followed in utilizing and interpreting the format of these tapes.

1.3 APPLICABILITY

This document applies to all Landsat-D and D Prime TM CCTs recorded by the DMS.

SECTION 2

APPLICABLE DOCUMENTS

2.1 GOVERNMENT DOCUMENTS

2.2 GENERAL ELECTRIC COMPANY DOCUMENTS

a. GES 10034

Data Format Control Book, Volume VI, Appendix B

b. GES 10033

Data Format Control Book, Volume VI, Appendix A

2.3 OTHER

a. ANSI X3.39-1973

Recorded Magnetic Tape for Information Interchange

(1600 CPI, PE)

b. CCB-CCT-0002-C

LGSOWG CCT Format CCB Document:

The Standard CCT Family of Tape Formats

SECTION 3

PRODUCT DESCRIPTION

3.1 TAPE FORMAT

Nine-track tapes of either 1600 bpi phase encoded or 6250 bpi group encoded will be used for CCT generation.

A scene from the HDT-AT or HDT-PT shall be recorded on CCT by quadrants. A scene shall be divided into four quadrants such that quadrant 1 contains the upper right quarter of the scene, quadrant 2 contains the upper left quarter, quadrant 3 contains the lower left quarter and quadrant 4 contains the lower right quarter of the scene. One logical volume of CCT represents one quadrant of a scene in all bands. The scene quadrant shall be in either BIL or BSQ format. Figures 3.2-5 through 3.2-8 illustrate how the BIL and BSQ formatted data is to be distributed on the three tapes.

Three 1600 bpi tapes are required to record one scene quadrant. One 6250 bpi tape is sufficient to record one scene quadrant in either BIL or BSQ format.

3.2 LOGICAL VOLUME FORMAT

A logical volume, consisting of three 1600 bpi tapes or one 6250 bpi tape, shall contain header, ancillary, annotation, image data and trailer information for a scene quadrants. All data in a logical volume shall be organized in files. Each logical volume shall consist of the following files.

3.2.1 VOLUME DIRECTORY FILE

This file shall contain all the information pertinent to the logical volume as a whole, such as data source identification, physical volume identification and a brief description of all the remaining files in the volume. This file shall appear at the beginning and end of every logical volume. If the logical volume consists of three 1600 bpi tapes, a copy of the volume directory shall appear at the beginning of every tape with the appropriate fields updated to indicate the new tape identification.

3.2.2 HEADER FILE

This file shall contain scene identification, quality data and annotation data for a complete scene. A CCT-AT header file will also include ancillary data for geometric correction of the scene. One header file shall exist for a CCT-AT logical volume. The CCT-PT logical volume shall contain a header file for each band of the scene.

3.2.3 IMAGE FILE

For the BSQ format, the image data for the scene quadrant shall be in seven separate files. Each file shall contain an image quadrant in a particular band. For the BIL format, the entire image data shall be contained in one file.

3.2.4 TRAILER FILE

This file shall contain trailer data for a scene. A CCT-AT logical volume shall contain one trailer file which will contain quality data for the entire interval from which the particular scene was extracted. The CCT-PT logical volume shall contain a trailer file for each band of the scene.

Figure 3.2-1 illustrates a CCT-AT logical volume in BSQ format on a 6250 bpi tape. Figure 3.2-2 illustrates a CCT-AT logical volume in BIL format on a 6250 bpi tape. Figure 3.2-3 illustrates a CCT-PT logical volume in BSQ format on a 6250 bpi tape. Figure 3.2-4 illustrates a CCT-PT logical volume in BIL format on a 6250 bpi tape. Figures 3.2-5, 3.2-6, 3.2-7 and 3.2-8 illustrate the logical volume formats on 1600 bpi tapes, respectively.

When a logical volume requires more than one physical volume, the transition between tapes shall be established as follows:

a. If the imagery is in BSQ format, the split between volumes shall occur on file boundaries.

b. If the imagery is in BIL format, the split between volumes shall occur on record boundaries.

Figure 3.2-9 illustrates these two cases. When the break is between files, the last file before the break shall be followed by two EOFs and the next tape shall start with a repeated volume directory. When the break is within a file, the last record before the break shall be followed by two EOFs and the next tape shall start with a repeated volume directory. The directory shall be followed by an EOF and the next record in the file shall be recorded.

3.3 RECORDED DATA FORMATS

The following paragraphs describe how the data is physically organized on tape.

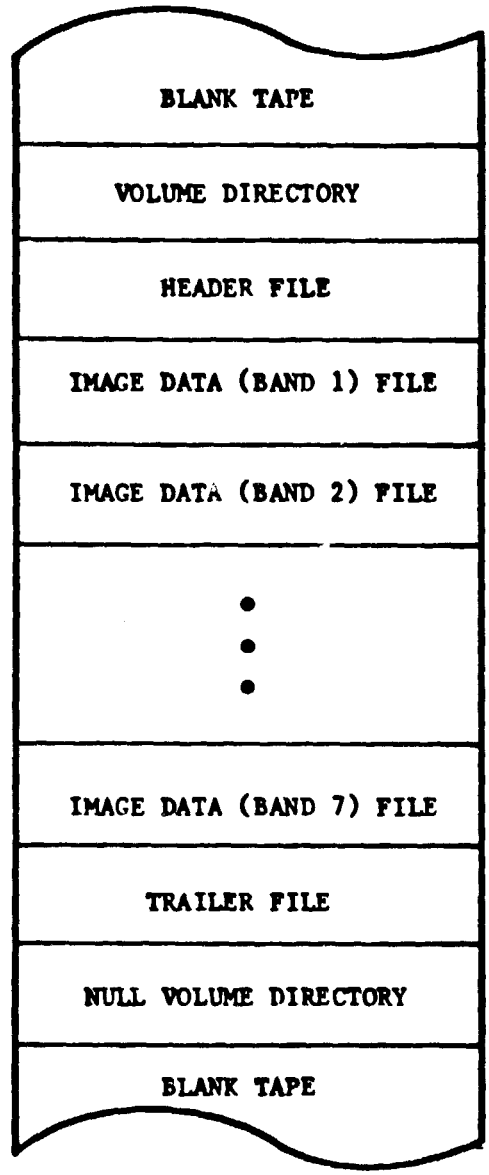


Figure 3.2-1. CCT-AT Scene Quadrant in BSQ Format in 6250 bpi Tar

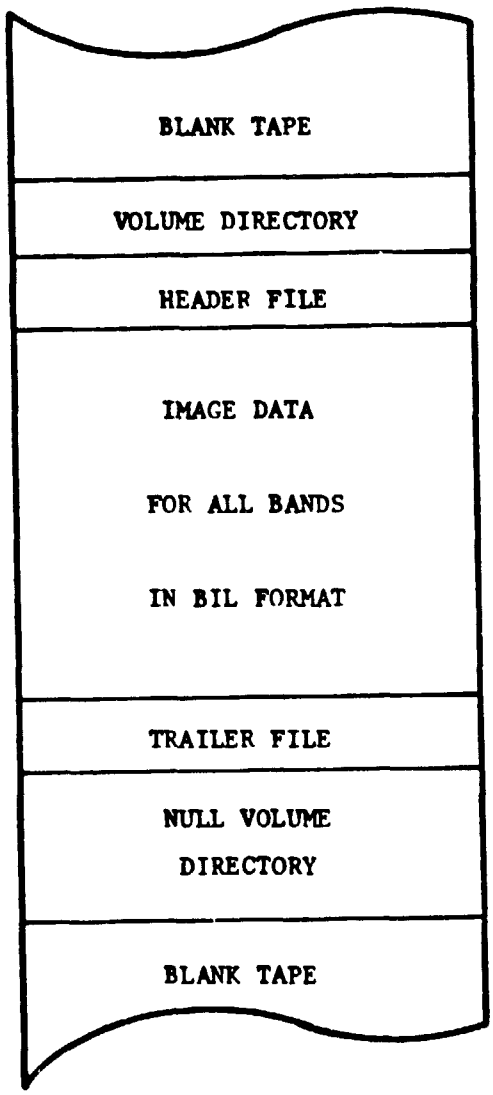


Figure 3.2-2. CCT-AT Scene Quadrant in BIL Format on 6250 bpi Tape

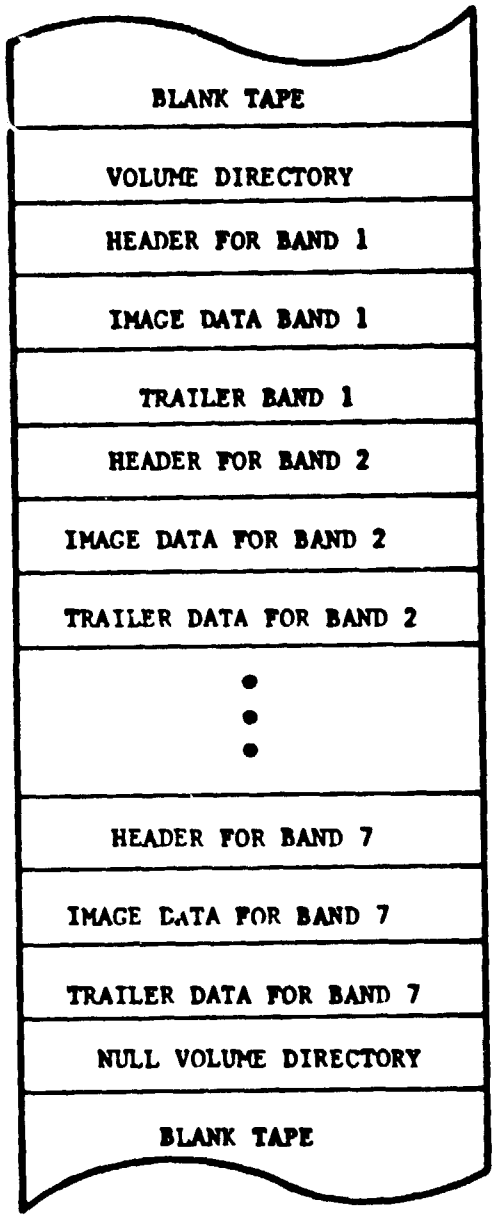


Figure 3.2-3. CCT-PT Scene Quadrant in BSQ Format on 6250 bpi Tape

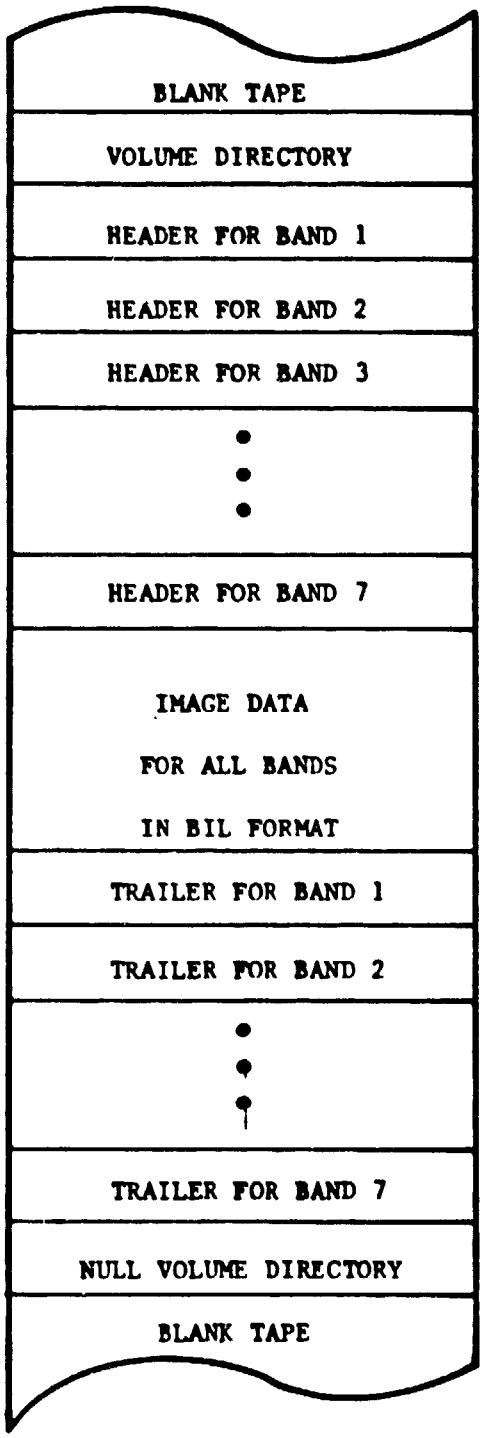


Figure 3.2-4. CCT-PT Scene Quadrant in BIL Format on 6250 bpi Tape

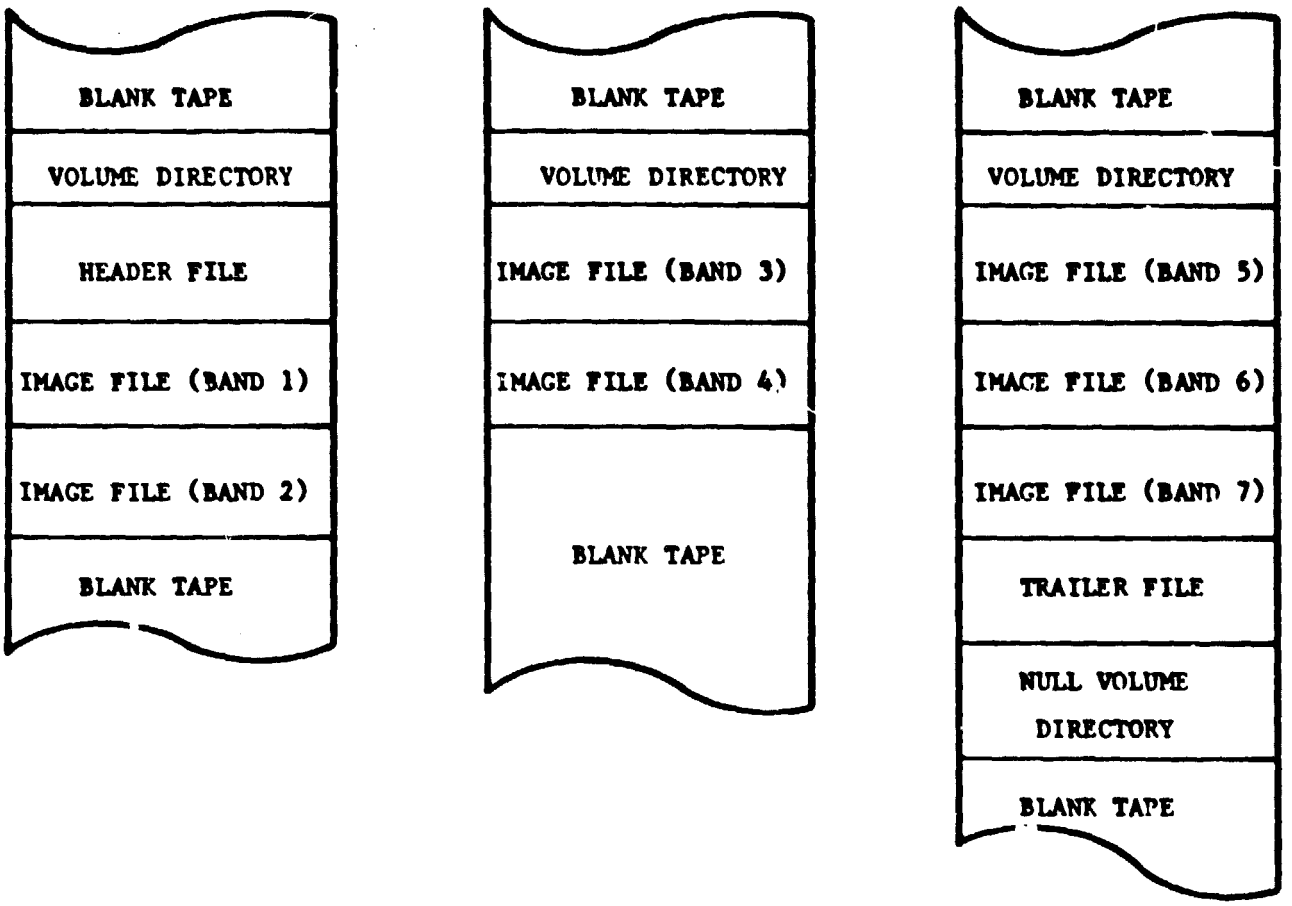


Figure 3.2-5. CCT-AT Scene Quadrant in BSQ Format on 1600 bpi Tapes

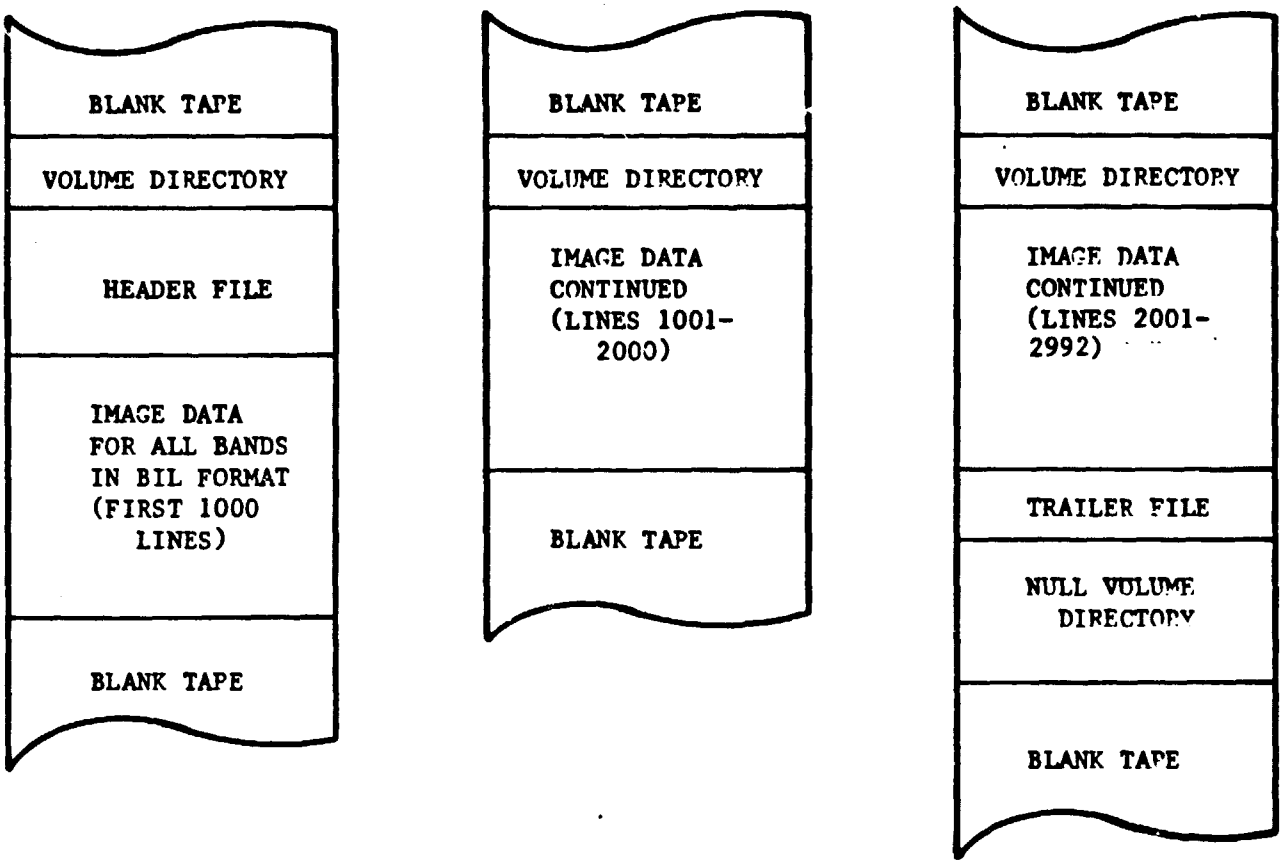


Figure 3.2-6. CCT-AT Scene Quadrant in BIL Format on 1600 bpi Tapes

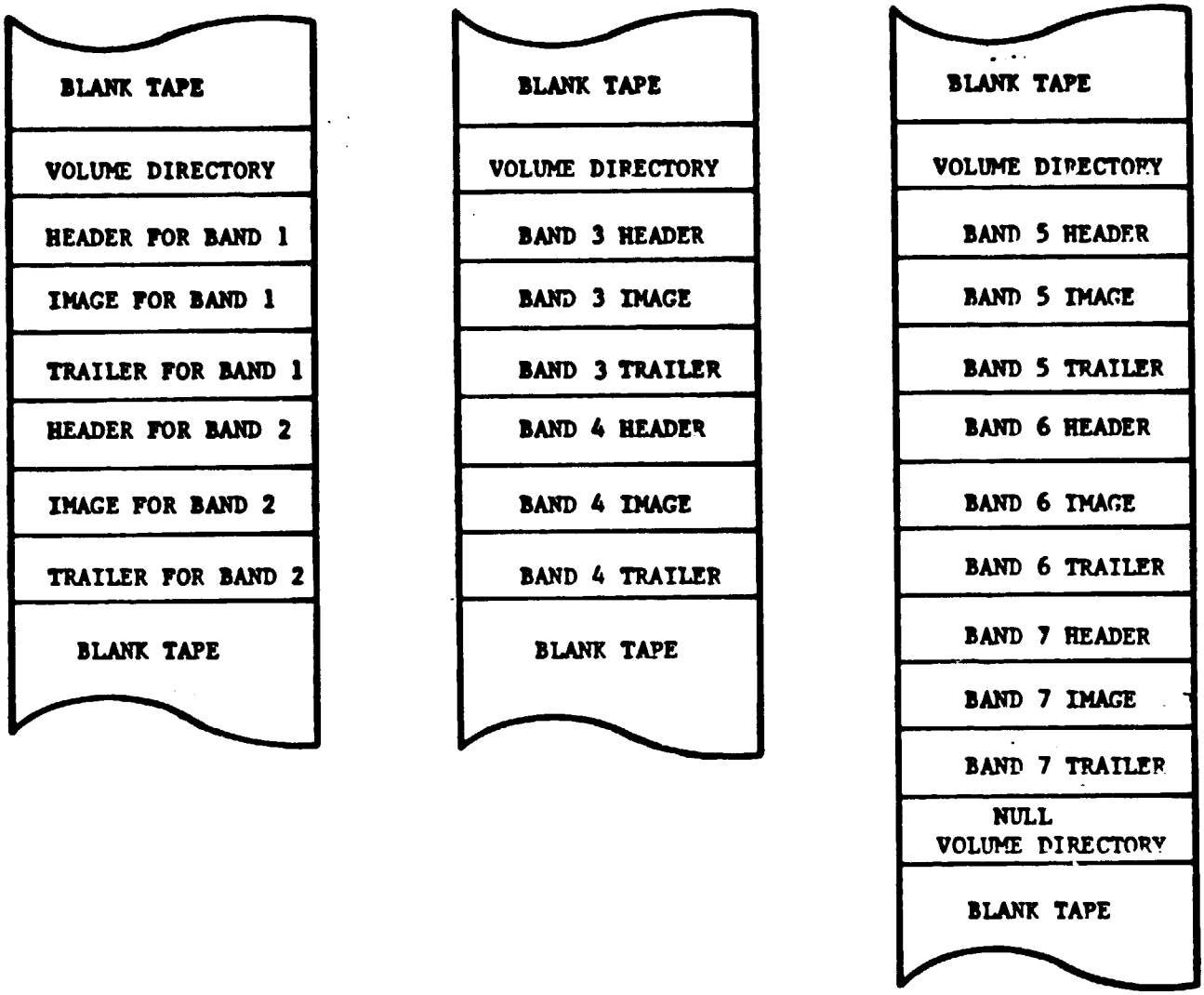


Figure 3.2-7. CCT-PT Scene Quadrant in BSQ Format on 1600 bpi Tapes

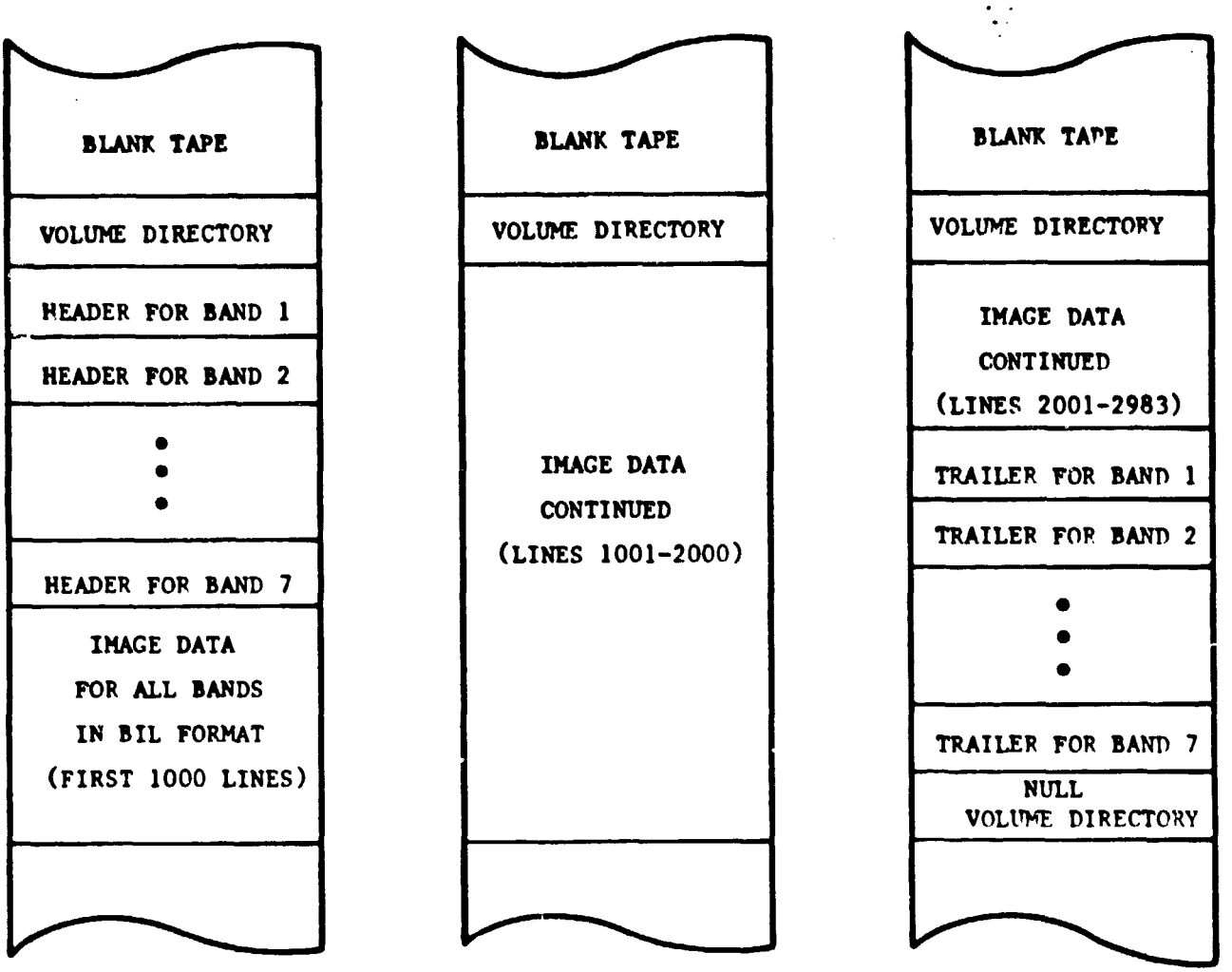


Figure 3.2-8. CCT-PT Scene Quadrant in BIL Format on 1600 bpi Tapes

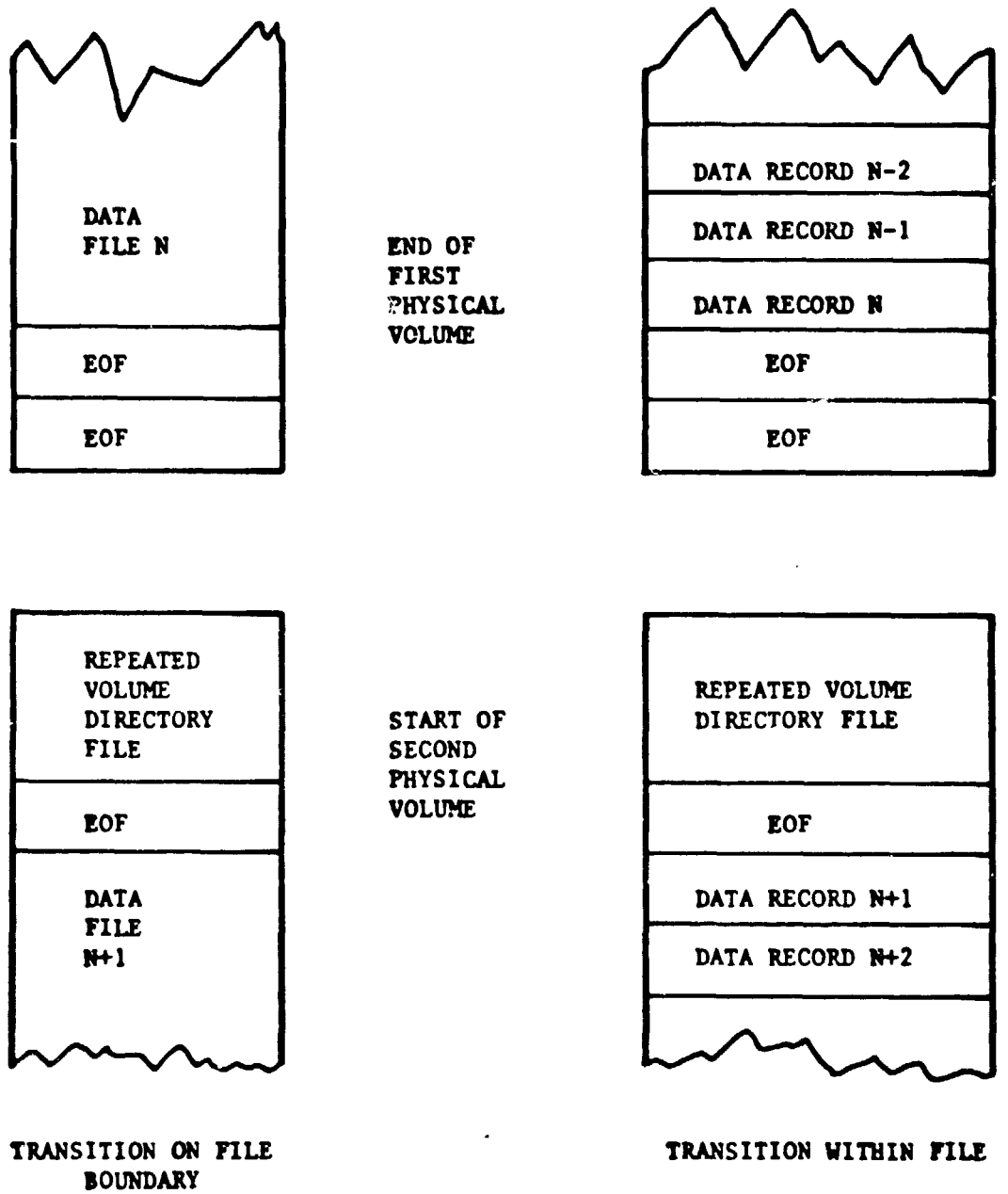


Figure 3.2-9. Illustration of the Two Types of Transitions Between Physical Volumes of a Logical Volume

3.3.1 COMMON CONVENTIONS

The alphanumeric data specified in this document shall be represented in one of the following formats:

a. ASCII

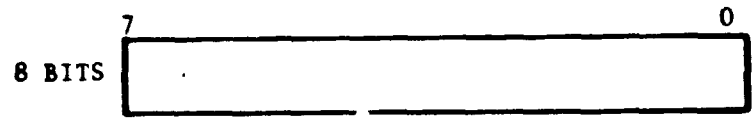
b. Single precision integer (16-bit, 2's complement)

c. Double precision integer (32-bit, 2's complement)

d. Single precision floating point (32-bit).

The data formats are compatible with DEC VAX 11/780 data representation. The detailed formats are specified in the following paragraphs.

3.3.1.1 ASCII

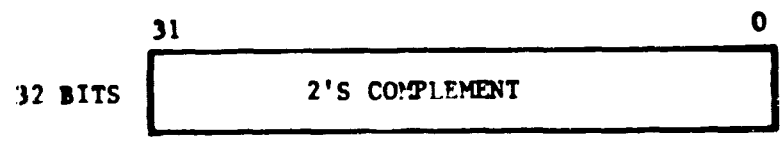


One seven-bit ASCII character per byte (eight bits). The ASCII character occupies the low order seven bits (bits 0-6).

3.3.1.2 Single Precision Integer (Integer*2)

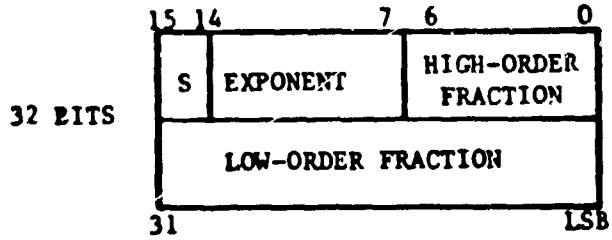
The integers are in two's complement form with bits increasing in significance from 0 through 14 and with bit 15 designating the sign (0 = (+), 1 = (-)). The value of the integer is in the range -32,768 through 32,767.

3.3.1.3 Double Precision Integer (Integer*4)



The integers are in two's complement form with the bits increasing in significance from 0 through 30 and with bit 31 designating the sign. The value of the integer is in the range -2147483648 to +2147483647.

3.3.1.4 Single Precision Floating Point (Real*4)



A single precision floating number is stored in four bytes. The form of a single precision floating number is sign magnitude, with bit 15 the sign bit, bits 14 to 7 an excess 128 binary exponent, and bits 6 to 0 and 31 to 16 a normalized 24-bit fraction with the redundant most significant fraction bit not represented. The magnitude of a number lies in the range .29*(10**-38) through 1.7*(10**38). The precision is typically seven decimal digits.

3.3.2 RECORD

A record is a collection of related data items and is treated as a logical unit. Each record shall include a 12-byte introduction which includes three fields:

a. Record number - this four-byte field shall contain the position of the record within a file

b. Record type - this four-byte field shall contain a record type code and three record subtype codes. The record type codes used in a logical volume are:

1. Superstructure
2. Header
3. Annotation
4. Ancillary
5. Image data
6. Trailer

c. Record length - this four-byte field shall contain the record length in bytes.

Each record is followed by an end of record gap (same as interblock gap). The gap is nominally .6 inches for 1600 bpi tapes and nominally .3 inches for 6250 bpi tapes.

3.3.3 FILES

A file is a collection of several records. The first record in every file shall be the file descriptor record. The first part of this record shall provide general information on how to read this file. The later part of the record is called the variable segment and shall point to key data elements in the file.

Each file is followed by an end of file (EOF) mark (same as tape mark).

3.3.4 TAPE MARKS

The following paragraphs identify the physical tape marks and interblock gaps and relate them to the logical records and files. Figure 3.3.4-1 illustrates their location on the tape in relation to files and records.

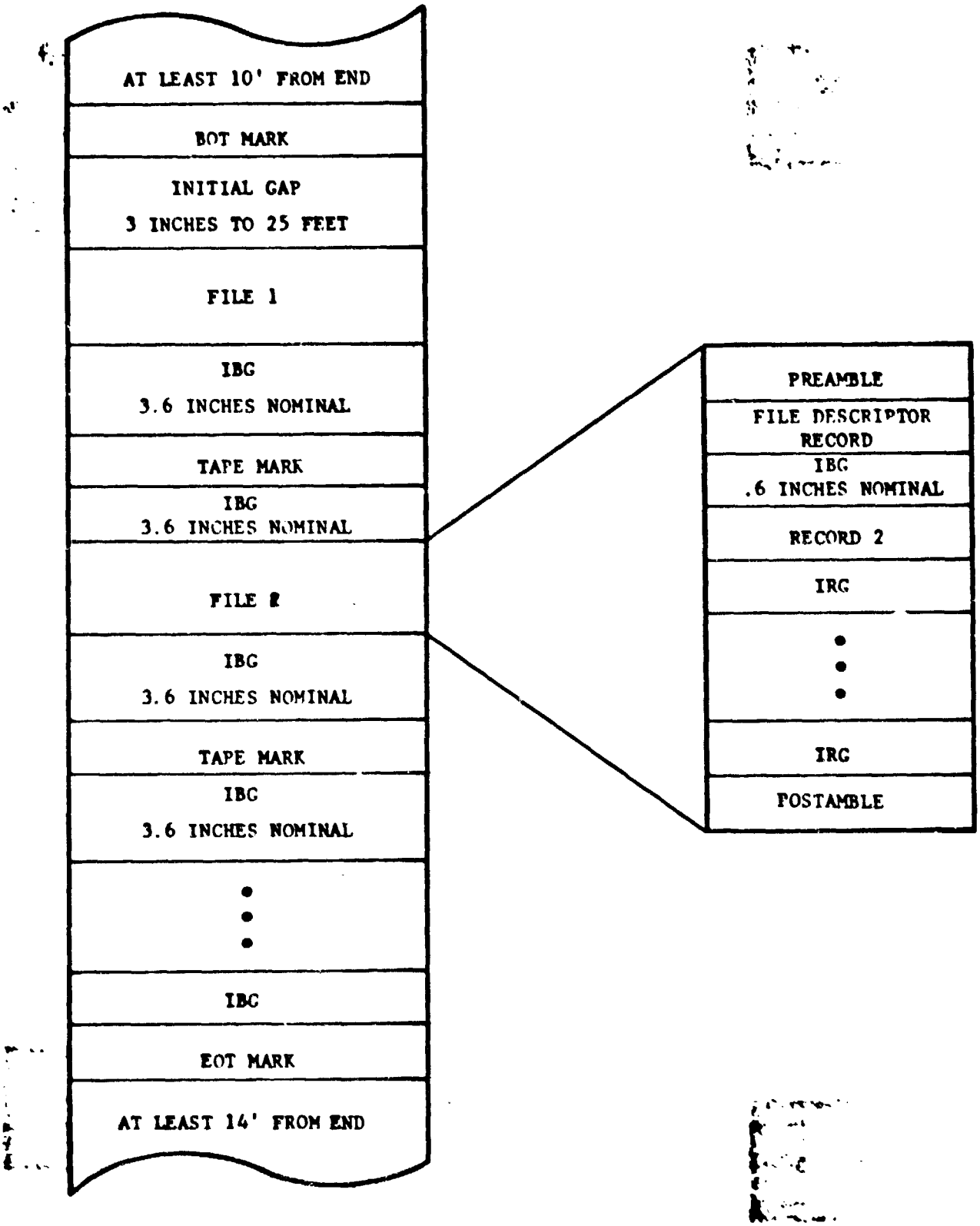


Figure 3.3.4-1. Layout of a 1600 bpi Tape

3.3.4.1 Beginning and End of Tape Markers

The beginning of tape (BOT) and end of tape (EOT) markers are small pieces of reflective tape located on the non-recording side of tape at least ten feet from the beginning and 14 feet from the end of each reel of CCT. The BOT and EOT markers are reference positions defining the permissable recording area of the CCT.

3.3.4.2 Identification Burst and Initial Gap

The identification burst will begin at least 1.7 inches before the trailing edge of the BOT marker and extend to no closer than 0.5 inches from the first data block. The format is discussed in Figure 3.1-3. An initial gap (three inches minimum, 25 feet maximum) separates the BOT marker from the first data block.

3.3.4.3 Interblock Gaps

A standard interblock gap (IBG) is nominally 0.6 inch for 1600 bpi tapes and .3 inch for 6250 tapes in length. A tape mark IBG (TM IBG) is nominally 3.6 inches in length. Adjacent data blocks are separated by a standard IBG, or by a tape mark preceded by a TM IBG and followed by a standard IBG.

3.3.4.4 Tape Mark (End of File)

Tape marks separate files. Detailed explanation of tape mark format is found in Figure 3.3.4-1. Each tape mark is preceded by a 3.6 inch (nominal) tape mark IBG, and followed by a 0.6 inch (nominal) standard IBG.

3.3.4.5 End of Volume

The end of a physical volume is indicated by two consecutive EOF marks. In the

case when a file continues over more than one physical volume, the two EOF marks shall follow the last record of the file on the current physical volume. The end of a logical volume is indicated by three consecutive EOF marks.

3.4 Relationship Between HDT Major Frames and CCT Records

The data from HDT major frames is reorganized into files and records on the CCT. Figures 3.4-1 and 3.4-2 describe the relationship between HDT-AT major frames and CCT-AT files for header and image data. The trailer data major frame of the HDT-AT is translated directly into the trailer record of the trailer file. The imagery is recorded on the HDT-AT on an interval basis. An interval contains image and HAAT data for several scenes. The CCT-AT shall contain image data on a scene quadrant basis, and header, annotation and ancillary data on a scene basis. In addition, the CCT-AT shall include summary data from the HDT-AT interval header and interval trailer for the entire interval from which the scene was extracted. Figures 3.4-3 and 3.4-4 describe the relationship between HDT-PT major frames and CCT-PT files.

3.5 CCT-AT FILE DESCRIPTIONS

The following paragraphs describe all the files in the CCT-AT logical volume.

3.5.1 VOLUME DIRECTORY FILE

The volume directory shall consist of two types of records: volume descriptor records and file pointer records. The volume descriptor record shall appear at the beginning and end of a logical volume. When the record appears at the end of the logical volume, it will be called null volume descriptor. The format for

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OF POOR QUALITY

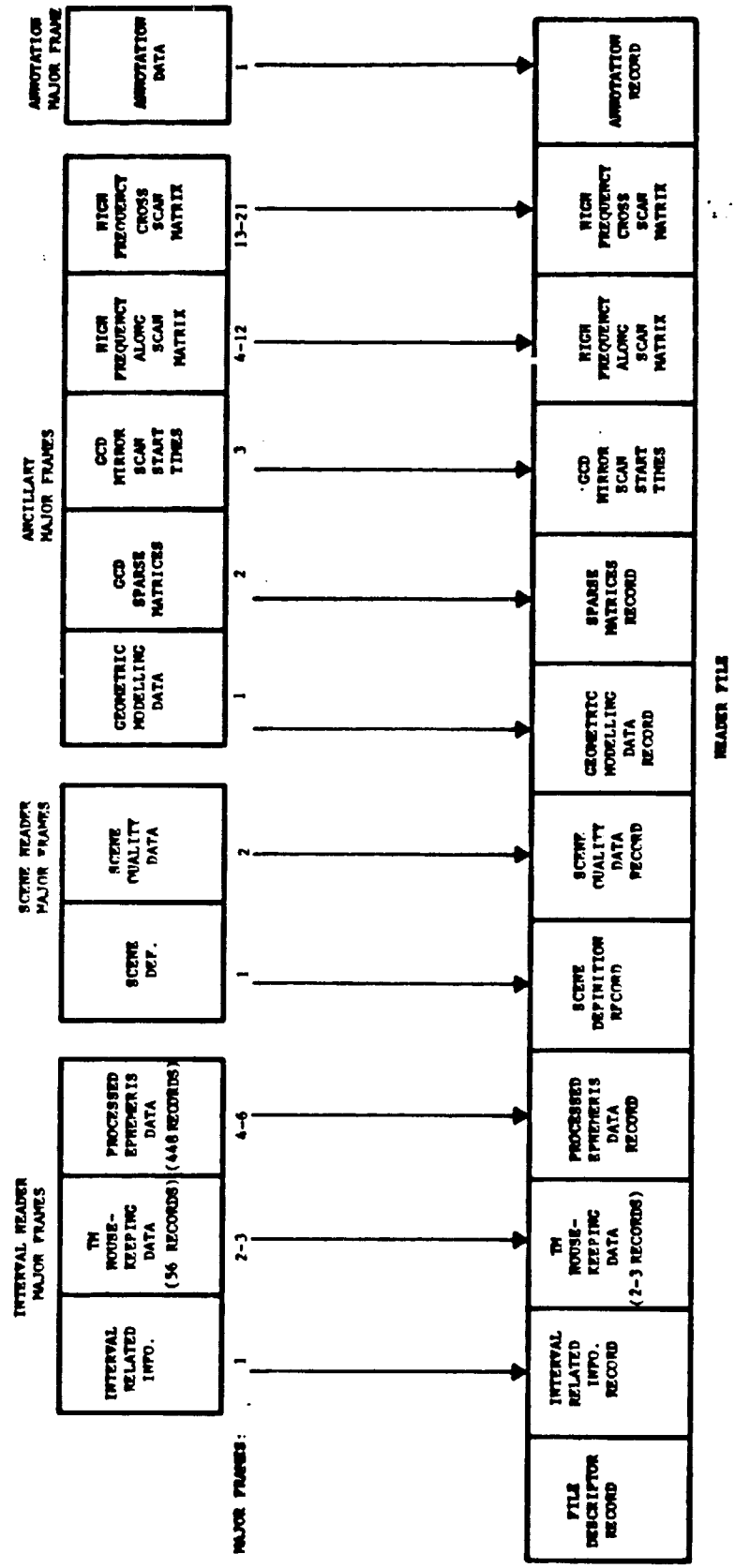

Figure 3.4-1. Relationship Between HDT-AT Major Frames and the CCT Header File

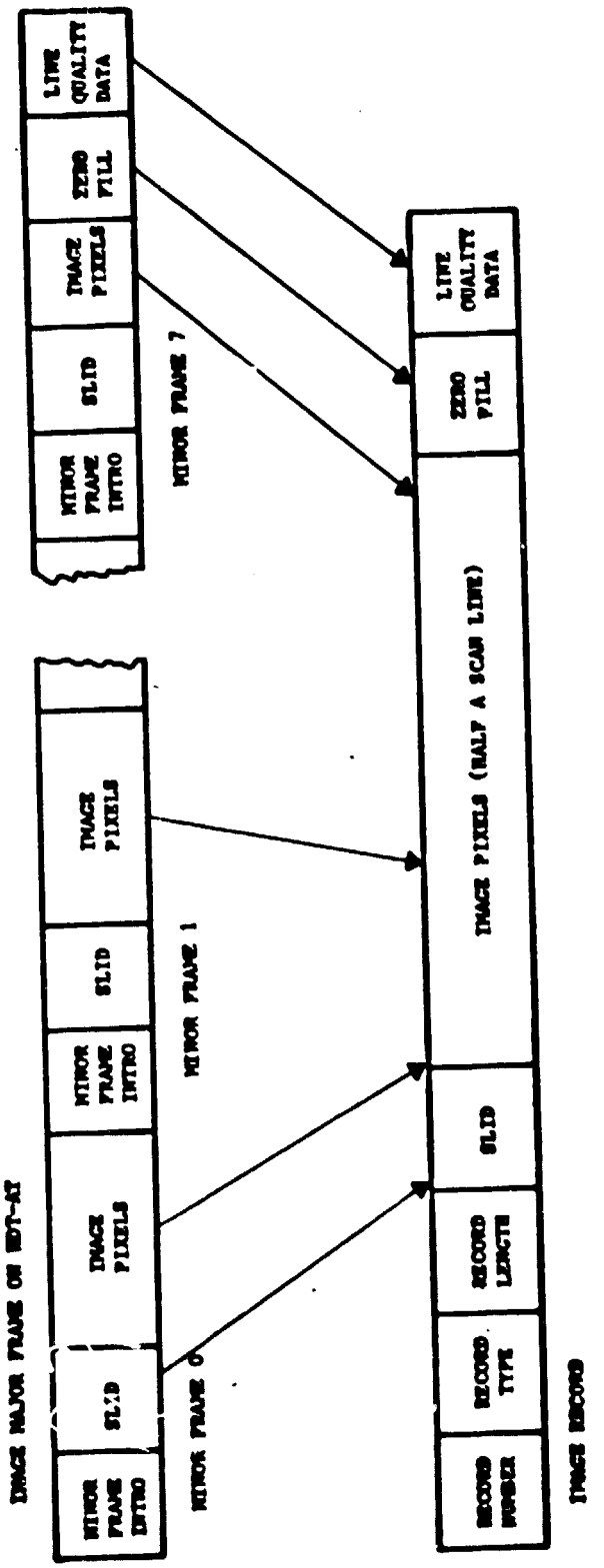

Figure 3.4-2. Relationship Between HDT-AT Image Data Major Frame and CCT-AT Record

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OF POOR QUALITY

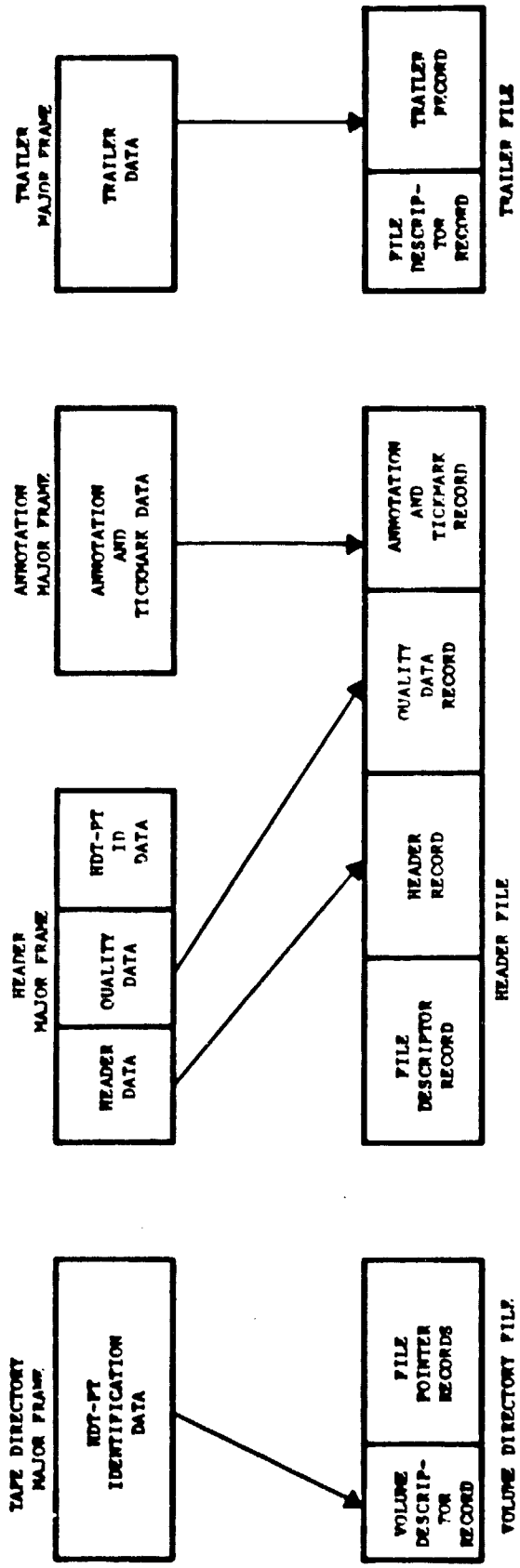

Figure 3.4-3. Relationship Between HDT-PT Non-Image Data Major Frames and CCT-PT Records

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OF POOR QUALITY

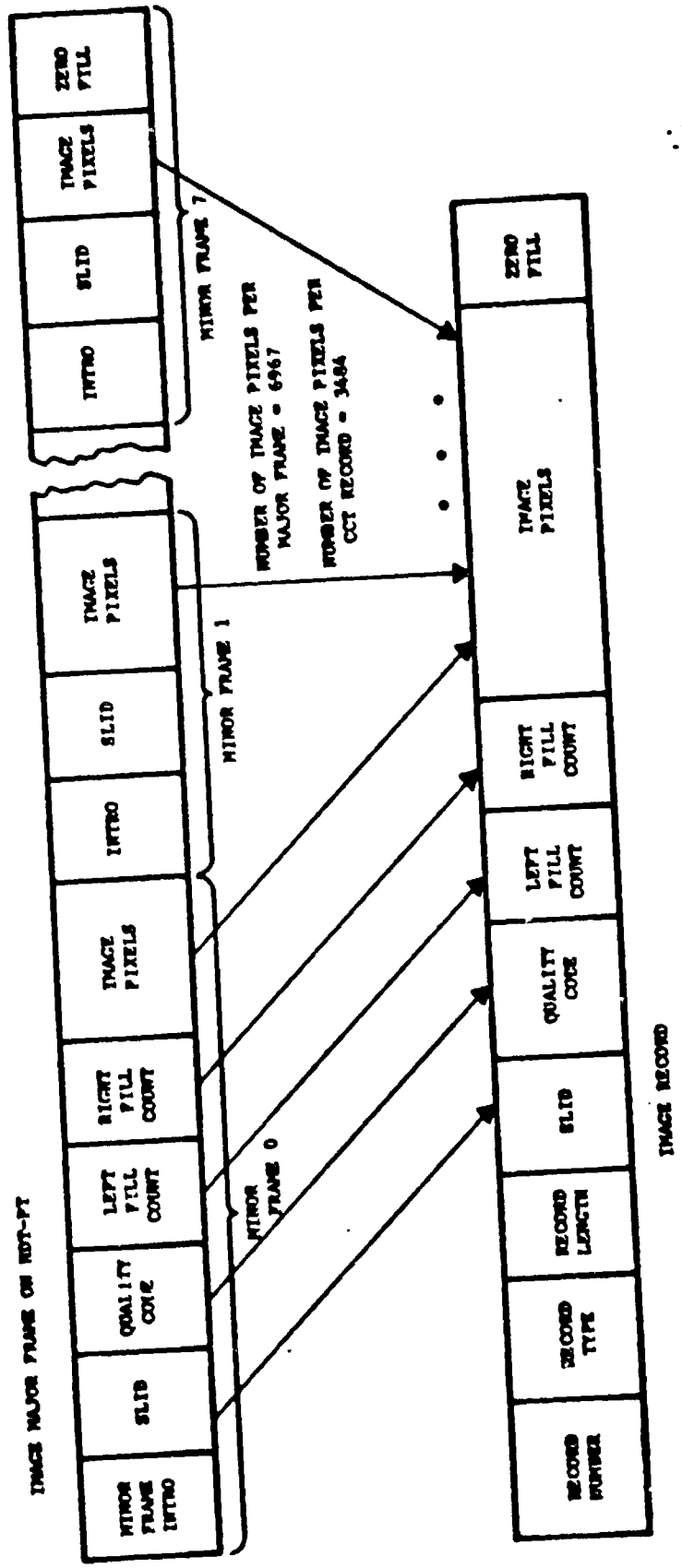


Figure 3.4-4. Relationship Between HDT-PT Image Data Major Frame and CCT-PT Record

the volume descriptor shall be as described in Table 3.5.1-1. A file pointer record shall exist for every file in the logical volume. Its format shall be as described in Table 3.5.1-2. The file pointer records do not appear at the end of the logical volume. When the logical volume consists of three physical tapes, a copy of the volume directory file including the file pointer records shall appear on each tape.

3.5.2 HEADER FILE

The header file shall contain the data belonging to the interval header, scene header, ancillary and annotation major frames of the HDT-AT. The file shall consist of 12 types of records:

a. File descriptor record - this record shall consist of a 180-byte fixed segment and a variable segment. The format for the fixed segment is described in Table 3.5.2-1. The format for the variable segment is described in Table 3.5.2-2.

b. Interval-related information record - this record shall contain all the information recorded by intervals on the HDT-AT, that is: interval definition, telemetry summary data and quality data pertinent to the entire interval. The source of this data shall be the interval header major frames HDT-AT. The format for this data is described in Table 3.5.2-3.

c. TM housekeeping data records - one record exists per PCD telemetry major frame (16.384 seconds). The PCD telemetry major frame start times do not coincide with image major frame start times. Two or three

Table 3.5.1-1. CCT-AT Volume Descriptor Record
(Sheet 1 of 4)

BYTE	TYPE*	DESCRIPTION
1-4	N	RECORD NUMBER, ALWAYS 1
5	N	1ST RECORD SUBTYPE CODE, ALWAYS 300_8 = VOLUME DIRECTORY
6	N	RECORD TYPE CODE, ALWAYS 300_8 = SUPERSTRUCTURE
7	N	2ND RECORD SUBTYPE CODE 077_8 IF NULL VOLUME DESCRIPTOR, OTHERWISE 022_8
8		3RD RECORD SUBTYPE CODE, ALWAYS 022_8
9-12	N	LENGTH OF THIS RECORD, ALWAYS 360
13-14	A	ASCII/EBCDIC FLAG, ALWAYS A$\emptyset$=ASCII
15-16		BLANK
17-28	A	SUPERSTRUCTURE FORMAT CONTROL DOCUMENT NUMBER, ALWAYS CCB-CCT-0002
29-30	A	REVISION NUMBER OF THE ABOVE DOCUMENT
31-32	A	REVISION LETTER OF THIS SUPERSTRUCTURE RECORD FORMATS. INITIALLY CODED $\emptyset$A, THIS CODE UPDATES ONE LETTER CHARACTER, ALPHABETICALLY, EACH TIME THERE IS A CHANGE TO THE FORMAT OF A SUPERSTRUCTURE RECORD (AS OPPOSED TO A CHANGE TO THE CONTROL DOCUMENT WHICH MAY NOT HAVE BEEN A CHANGE IN ACTUAL RECORD FORMAT). THE 26TH REVISION IS CODED AA, THE 27TH AB, THE 28TH AC, AND SO ON.
33-44	A	SOFTWARE RELEASE NUMBER. THE SOFTWARE REFERRED TO HERE IS THAT USED TO WRITE THIS LOGICAL VOLUME. THE CODE IS ALPHANUMERIC, LEFT-JUSTIFIED CODE ASSIGNED BY THE PRODUCING FACILITY. IT IS UPDATED FOR EACH MODIFICATION.

* A = ALPHANUMERIC, N = NUMERIC, B = BINARY

Table 3.5.1-1. CCT-AT Volume Descriptor Record
(Sheet 2 of 4)

BYTE	TYPE	DESCRIPTION
45-60**	A	ID FOR PHYSICAL VOLUME CONTAINING THIS VOLUME DESCRIPTOR (TAPEID). THIS IS THE SAME CODE THAT IS WRITTEN EXTERNALLY ON THE PHYSICAL VOLUME. WHEN A LOGICAL VOLUME SPANS PHYSICAL VOLUMES, THE CODE IS UPDATED FOR THE CONTINUATION PHYSICAL VOLUMES.
61-76*	A	LOGICAL VOLUME ID = TAPE ID OF THE FIRST TAPE OF THE LOGICAL VOLUME
77-92	A	VOLUME SET ID, ALWAYS BLANK
93-94	N	NUMBER OF PHYSICAL VOLUMES IN THE SET, = 1 FOR 6250 BPI TAPE, =3 FOR 1600 BPI TAPES.
95-96	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE FIRST TAPE WITHIN THE LOGICAL VOLUME, =1.
97-98	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE LAST TAPE WITHIN THE LOGICAL VOLUME, =3FOR 1600 BPI TAPES; =1 FOR 6250 BPI
99-100**	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE CURRENT TAPE, =1,2 or 3
101-104**	N	THIS FIELD GIVES THE FILE NUMBER WITHIN THE LOGICAL VOLUME OF THE FIRST FILE WHICH FOLLOWS THIS VOLUME DIRECTORY. THIS CAN BE LARGER THAN ONE (THE NUMBER OF THE FIRST DATA FILE OF A LOGICAL VOLUME) WHEN A LOGICAL VOLUME SPANS MUTIPLE PHYSICAL VOLUMES. VOLUME DIRECTORY FILES ARE NOT INCLUDED IN THE FILE SEQUENCE NUMBER COUNT.
105-108	N	LOGICAL VOLUME NUMBER WITHIN VOLUME SET ALWAYS 1
109-112**	N	LOGICAL VOLUME NUMBER WITHIN PHYSICAL VOLUME, ALWAYS 1
113-120*	A	LOGICAL VOLUME CREATION DATE. THE CODE IS OF THE FORM YYYYMMDD
121-128*	A	LOGICAL VOLUME CREATION TIME. THE CODE IS OF THE FORM HHMMSSXX WHERE XX IS HUNDREDTHS OF SECONDS.

* UNDEFINED IN NULL VOLUME DESCRIPTOR
** FIELDS TO BE UPDATED IN A REPEATED VOLUME DIRECTORY

Table 3.5.1-1. CCT-AT Volume Descriptor Record
(Sheet 3 of 4)

BYTE	TYPE	DESCRIPTION
129-140*	A	LOGICAL VOLUME GENERATING COUNTRY, ALWAYS = U.S.A.
141-148*	A	LOGICAL VOLUME GENERATING AGENCY, ALWAYS = NASAGSFC
149-160*	A	LOGICAL VOLUME GENERATING FACILITY = TIPSb1 OR TIPSb2
161-164*	N	NUMBER OF POINTER RECORDS IN VOLUME DIRECTORY = 9 FOR BSQ FORMAT, = 3 FOR BIL FORMAT
165-168*	N	NUMBER OF RECORDS IN VOLUME DIRECTORY = 10 FOR BSQ FORMAT, = 4 FOR BIL FORMAT.
169-260		VOLUME DESCRIPTOR SPARE SEGMENT, ALWAYS BLANK
		HDT-A TAPE IDENTIFICATION DATA
261-276	A	HDT-A TAPE REEL IDENTIFICATION CONTAINS 16 BYTES OF TAPE ID IN THE FORMAT LNTHAYYDDDXXbbbb 'L' = LANDSAT MISSION DESIGNATOR N = MISSION NUMBER 4 FOR LANDSAT-D 5 FOR LANDSAT-D' 0 FOR BOTH LANDSAT D AND D' 'T' = TM SENSOR 'HA' = TAPE TYPE (HDT-AT) YY = YEAR LAST 2 DIGITS (00-99) DDD = DAY OF YEAR ON WHICH THE ORIGINAL HDT-AT WAS GENERATED (001-366) XX = UNIQUE TAPE ID FOR EACH HDT-AT GENERATED ON DAY DDD (1-99) b = BLANK
277-284	A	SOURCE OF HDT-AT PRODUCTION EITHER CONTAINS THE CHARACTER STRING TIPS#1bb OR ADDSbbbb OR TIPS#2bb OR LASbbbb
285-288	A	HDDR IDENTIFICATION RECORDER ON WHICH THE ORIGINAL HDT-AT WAS GENERATED 0-99
289-304	A	SOFTWARE VERSION NUMBER OF THE SOFTWARE WHICH CREATED THE HDT-AT
305-308		ZERO FILL

Table 3.5.1-1. CCT-AT Volume Descriptor Record
(Sheet 4 of 4)

		IMAGERY IDENTIFICATION WITHIN THE LOGICAL VOLUME
309-320	A	SCENE IDENTIFICATION NUMBER - EACH SCENE HAS A UNIQUE IDENTIFIER WHICH WILL CONTAIN ENCODED INFORMATION CONTAINING PRIMARILY OF TIME OF ACQUISITION (UNIVERSAL TIME) RELATIVE TO LAUNCH. ITS FORMAT IS E-NDDDD-HHMMS-Ø, AND IS INTERPRETED AS FOLLOWS: E = ENCODED PROJECT IDENTIFIER N = LANDSAT MISSION NUMBER DDDD = DAY NUMBER RELATIVE TO LAUNCH, AT TIME OF OBSERVATION HH = HOUR AT TIME OF OBSERVATION MM = MINUTE AT TIME OF OBSERVATION S = TENS OF SECONDS
321-324	N	QUADRANT NUMBER OF THE SCENE = 1,2,3 OR 4
325-328	N	INTERLEAVING TYPE 0 - BSQ 1 - BIL
329-360		BLANK

Table 3.5.1-2. CCT-AT File Pointer Record
(Sheet 1 of 2)

BYTE	TYPE	DESCRIPTION
1-4	N	RECORD NUMBER, ALWAYS = 2
5	N	1ST RECORD SUBTYPE CODE = 333_8= pointer
6	N	RECORD TYPE CODE, ALWAYS = 300_8=SUPER-STRUCTURE
7	N	2ND RECORD SUBTYPE CODE = 022_8 (DEFAULT)
8	N	3RD RECORD SUBTYPE CODE = 022_8 (DEFAULT)
9-12	N	LENGTH OF THIS RECORD, ALWAYS = 360
13-14	A	ASCII/EBCDIC FLAG FOR THE REFERENCED FILE, ALWAYS = A$ FOR ASCII
15-16		BLANK
17-20	N	REFERENCED FILE NUMBER = 1 TO 9 FOR BSQ, = 1 TO 3 FOR BIL
21-36	A	REFERENCED FILE NAME, ONE OF THE FOLLOWING: HEADER;OR IMAGERY$N WHERE N = 1 FOR BIL FORMAT N = 1 TO 7 FOR BSQ FORMAT; OR TRAILER
37-64	A	REFERENCED FILE CLASS, ONE OF THE FOLLOWING: LEADER, IMAGERY, TRAILER
65-68	A	REFERENCED FILE CLASS CODE LEAD FOR LEADER, IMGY FOR IMAGERY AND TRAL FOR TRAILER
69-96	A	REFERENCED FILE DATA TYPE, ALWAYS = MIXED$BINARY$AND$ASCII
97-100	A	REFERENCED FILE DATA TYPE CODE, ALWAYS = MBAA
101-108	N	NUMBER OF RECORDS IN REFERENCED FILE = 13 OR 14 FOR HEADER FILE = UPTO 2865 FOR IMAGE FILE IN BSQ FORMAT = UPTO 20049 FOR IMAGE FILE IN BIL FORMAT = 2 FOR TRAILER FILE

Table 3.5.1-2. CCT-AT File Pointer Record
(Sheet 2 of 2)

BYTE	TYPE	DESCRIPTION
109-116	N	REFERENCE FILE FIRST RECORD LENGTH = 540 FOR HEADER FILE = 3600 FOR IMAGERY FILE = 540 FOR TRAILER FILE
117-124	N	REFERENCED FILE MAXIMUM RECORD LENGTH = 13140 FOR HEADER FILE = 3600 FOR IMAGERY FILE = 4500 FOR TRAILER FILE
125-360	N	ZERO FILL

Table 3.5.2-1. Fixed Segment of the File Descriptor Record
(Sheet 1 of 2)

BYTE	TYPE*	DESCRIPTION
1-4	N	RECORD NUMBER, ALWAYS = 1
5	N	FIRST RECORD SUBTYPE CODE, ALWAYS = 077_8 = FILE DESCRIPTOR
6	N	RECORD TYPE CODE, ALWAYS = 300_8 = SUPER-STRUCTURE
7	N	2ND RECORD SUBTYPE CODE, ALWAYS = 022_8
8	N	3RD RECORD SUBTYPE CODE, ALWAYS = 022_8
9-12	N	LENGTH OF THIS RECORD (IN BYTES)
13-14	A	ASCII/EBCDIC FLAG, ALWAYS = A$ FOR ASCII
15-16		BLANK
17-28	A	SUPERSTRUCTURE FORMAT CONTROL DOCUMENT NUMBER, ALWAYS CCB-CCT-0002
29-30	A	REVISION NUMBER OF THE ABOVE DOCUMENT
31-32	A	REVISION LETTER OF THIS SUPERSTRUCTURE RECORD FORMATS. INITIALLY CODED $A, THIS CODE UPDATES ONE LETTER CHARACTER, ALPHABETICALLY, EACH TIME THERE IS A CHANGE TO THE FORMAT OF A SUPER-STRUCTURE RECORD (AS OPPOSED TO A CHANGE TO THE CONTROL DOCUMENT WHICH MAY NOT HAVE BEEN A CHANGE IN ACTUAL RECORD FORMAT). THE 26TH REVISION IS CODED AA, THE 27TH AB, THE 28TH AC, AND SO ON.
33-44	A	SOFTWARE RELEASE NUMBER. THE SOFTWARE REFERRED TO HERE IS THAT USED TO WRITE THIS LOGICAL VOLUME. THE CODE IS ALPHANUMERIC, LEFT-JUSTIFIED CODE ASSIGNED BY THE PRODUCING FACILITY. IT IS UPDATED FOR EACH MODIFICATION.
45-48	N	FILE NUMBER WITHIN THE LOGICAL VOLUME
49-64	A	FILE NAME THE SAME AS BYTES 21-36 OF THE FILE POINTER RECORD IN VOLUME DIRECTORY FILE.

* A = ALPHANUMERIC, N= NUMERIC, B = BINARY

Table 3.5.2-1. Fixed Segment of the File Descriptor Record (Sheet 2 of 2)

BYTE	TYPE	DESCRIPTION
65-68	A	RECORD SEQUENCE AND LOCATION TYPE FLAG. THIS IS THE FLAG WHICH INDICATES WHETHER EACH RECORD IN THE FILE HAS A SEQUENCE NUMBER, IF THE LOCATION IS FIXED OR VARIABLE, OR IF THE COUNT IS CYCLICAL. ALWAYS = FSEQ (FOR RECORD SEQUENCE NUMBER PRESENT IN THE SAME LOCATION IN ALL RECORDS)
69-76	N	SEQUENCE NUMBER LOCATION, ALWAYS = 1, INDICATING THAT REOCRD NUMBER IS LOCATED STARTING AT 1ST BYTE OF THE RECORD.
77-80	N	SEQUENCE NUMBER FIELD LENGTH, ALWAYS = 4.
81-84	A	RECORD CODE AND LOCATION TYPE FLAG, ALWAYS = FTYP MEANING THAT THE RECORD TYPE CODE IS PRESENT IN THE SAME LOCATION IN ALL THE DATA RECORDS OF THE FILE.
85-92	N	RECORD CODE LOCATION, ALWAYS = 5, INDICATING THAT THE RECORD TYPE APPEARS STARTING AT BYTE 5 OF EVERY RECORD IN FILE.
93-96	N	RECORD CODE FIELD LENGTH, ALWAYS = 4.
97-100	A	RECORD LENGTH AND LOCATION TYPE FLAG, ALWAYS = FLGT MEANDING THAT THE RECORD LENGTH FIELD IS PRESENT IN THE SAME LOCATION IN ALL THE RECORDS OF THE FILE.
101-108	N	RECORD LENGTH LOCATION, ALWAYS = 9.
109-112	N	RECORD LENGTH FIELD LENGTH, ALWAYS = 4.
113	A	FLAG INDICATING WHETHER DATA INTERPRETATION INFORMATION IS INCLUDED IN THE FILE DESCRIPTOR RECORD (IN THE VARIABLE SEGMENT), ALWAYS = Y FOR YES.
114	A	FLAG INDICATING WHETHER DATA INTERPRETATION INFORMATION IS INCLUDED IN RECORDS OTHER THAN FILE DESCRIPTOR, ALWAYS = N FOR NO.
115	A	FLAG INDICATING WHETHER DATA DISPLAY INFORMATION IS IN THE FILE DESCRIPTOR RECORD, ALWAYS = Y FOR YES.
116	A	FLAG INDICATING WHETHER DATA DISPLAY INFORMATION IS ELSEWHERE, ALWAYS = N.
117-180		BLANK

Table 3.5.2-2. Variable Segment of the CCT-AT Header File Descriptor Record (Sheet 1 of 3)

BYTE	TYPE	DESCRIPTION
1-6	N	NUMBER OF INTERVAL RELATED INFORMATION RECORDS, ALWAYS = 1.
7-12	N	RECORD LENGTH OF THE INTERVAL RECORD, ALWAYS = 540 BYTES
13-18	N	NUMBER OF TM HOUSEKEEPING DATA RECORDS = 2 OR 3.
19-24	N	TM HOUSEKEEPING DATA RECORD LENGTH, ALWAYS = 360.
25-30	N	NUMBER OF PROCESSED EPHEMERIS DATA RECORDS, ALWAYS = 1
31-36	N	PROCESSED EPHEMERIS DATA RECORD LENGTH, ALWAYS = 540
37-42	N	NUMBER OF SCENE DEFINITION RECORDS, ALWAYS = 1
43-48	N	SCENE DEFINITION RECORD LENGTH, ALWAYS = 540
49-54	N	NUMBER OF SCENE QUALITY DATA RECORDS, ALWAYS = 1
55-60	N	SCENE QUALITY DATA RECORD LENGTH, ALWAYS = 12420
61-66	N	NUMBER OF GEOMETRIC MODELLING DATA RECORDS, ALWAYS = 1
67-72	N	GEOMETRIC MODELLING DATA RECORD LENGTH, ALWAYS = 720
73-78	N	NUMBER OF SPARSE MATRICES RECORDS, ALWAYS = 1
79-84	N	SPARSE MATRICES RECORD LENGTH, ALWAYS = 4680
85-90	N	NUMBER OF GCD MIRROR SCAN START TIMES RECORDS, ALWAYS = 1
91-96	N	GCD MIRROR SCAN START TIME RECORD LENGTH, ALWAYS = 3060
97-102	N	NUMBER OF HIGH FREQUENCY ALONG SCAN MATRIX RECORDS, ALWAYS = 1

Table 3.5.2-2. Variable Segment of the CCT-AT Header File Descriptor Record (Sheet 2 of 3)

BYTE	TYPE	DESCRIPTION
103-108	N	HIGH FREQUENCY ALONG SCAN MATRIX RECORD LENGTH, ALWAYS = 13140
109-114	N	NUMBER OF HIGH FREQUENCY CROSS SCAN MATRIX RECORDS, ALWAYS = 1
115-120	N	HIGH FREQUENCY CROSS SCAN MATRIX RECORD LENGTH, ALWAYS = 13140
121-126	N	NUMBER OF ANNOTATION RECORDS, ALWAYS = 1
127-132	N	ANNOTATION RECORD LENGTH, ALWAYS = 180
	LOCATOR FIELDS	
		THE LOCATOR FIELDS POINT TO THE POSITION IN THE FILE WHERE VARIOUS INFORMATION CAN BE FOUND. THE LOCATOR INFORMATION IS CODED IN 16 BYTES IN ASCII AS FOLLOWS: 6 BYTES - RECORD NUMBER CONTAINING THAT FIELD 6 BYTES - BYTE NUMBER OF THE FIELD WITHIN THE RECORD 3 BYTES - LENGTH OF THE FIELD IN BYTES 1 BYTE - TYPE OF DATA CODE A = ALPHANUMERIC, N - NUMERIC B - BINARY
133-148	A	SCENE IDENTIFICATION FIELD LOCATOR, ALWAYS = 00000n000013012A WHERE n=SCENE DEFINITION RECORD NUMBER
149-164	A	WRS IDENTIFICATION LOCATOR, ALWAYS = 00000n000025008A WHERE n=SCENE DEFINITION RECORD NUMBER
165-180	A	MISSION IDENTIFICATION FIELD LOCATOR, ALWAYS = 00000n000014001A WHERE n=SCENE DEFINITION RECORD NUMBER
181-196	A	SENSOR IDENTIFICATION FIELD LOCATOR, ALWAYS = 00000n000033002A WHERE n=SCENE DEFINITION RECORD NUMBER
197-212	A	SCENE CENTER DATE-TIME FIELD LOCATOR, ALWAYS = 00000n0000195016A WHERE n= SCENE DEFINITION RECORD NUMBER

Table 3.5.2-2. Variable Segment of the CCT-AT Header File Descriptor Record (Sheet 3 of 3)

BYTE	TYPE	DESCRIPTION
213-228	A	GEOGRAPHIC REFERENCE FIELD LOCATOR, ALWAYS = BLANK
229-244	A	IMAGE PROCESSING PERFORMED FIELD LOCATOR, ALWAYS = 00000n000228005A WHERE n=SCENE DEFINITION RECORD NUMBER
245-260		IMAGERY FORMAT FIELD LOCATOR, ALWAYS = 00000n000226002A WHERE n=SCENE DEFINITION RECORD NUMBER
261-276		BANDS INDICATOR FIELD LOCATOR, ALWAYS = 00000n000236008A WHERE n=SCENE DEFINITION RECORD NUMBER
277-292		QUADRANT INDICATOR LOCATOR, ALWAYS = BLANK
293-360		BLANK

Table 3.5.2-3. Interval Related Information Record for CCT-AT
(Sheet 1 of 5)

BYTE	DATA	DESCRIPTION
1-2	N N	RECORD NUMBER (INTEGER *4)
3-4	N N	ALWAYS = 2
		RECORD TYPE
5-6	S_1 T	S_1- 1ST SUBTYPE, ALWAYS = 111_8 (INTERVAL RELATED DATA)
7-8	S_2 S_3	T - RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2- 2ND SUBTYPE, ALWAYS = 111_8 (DATA BY INTERVAL BASIS) S_3- 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-10	N N	RECORD LENGTH (INTEGER *4)
11-12	N N	RECORD SIZE IN BYTES ALWAYS = 540
13-14	N N	NUMBER OF SCENES IN THE INTERVAL (INTEGER *2)
15-24	Z	ZERO FILL
25-26	Y Y	IMAGING INTERVAL START SPACECRAFT TIME (ASCII)
	D D	YY = YEAR (00-99)
	D H	DDD = DAY OF YEAR (001-366)
	H M	HH = HOUR (00-23)
	M S	MM = MINUTE (00-59)
	S T	SS = SECOND (00-59)
	T T	TTT = MILLISECOND (000-999)
39-40	F F	FF = SIXTEENTH OF MILLISECOND (0-15)
41-42	Y Y	IMAGING INTERVAL STOP SPACECRAFT TIME (ASCII)
	D D	FORMAT SAME AS ABOVE
	D H	
	H M	
	M S	
	S T	
	T T	
55-56	F F	

Table 3.5.2-3. Interval Related Information Record for CCT-AT
(Sheet 2 of 5)

BYTE	DATA	DESCRIPTION
57-58	Y Y D D D H H M M S S T T T F F	PCD TELEMETRY INTERVAL START SPACECRAFT TIME FORMAT SAME AS ABOVE
71-72		
73-74	Y Y D D D H H M M S S T T T F F	PCD TELEMETRY INTERVAL STOP SPACECRAFT TIME FORMAT SAME AS ABOVE
87-88		
89-92	N	ORBIT NUMBER (INTEGER *4) SPACECRAFT ORBIT AT THE START OF TELEMETRY ACQUISITION
93-94	M ␣	ORBITAL DIRECTION (ASCII) M = D FOR DESCENDING NODE = A FOR ASCENDING NODE ␣ = BLANK
95-120	Z	ZERO FILL
121-122	E ␣	EPHEMERIS SOURCE (ASCII) E = G FOR GPS = U FOR UPLINKED
123-124	␣ ␣	BLANK

Table 3.5.2-3. Interval Related Information Record for CCT-AT
(Sheet 3 of 5)

BYTE	DATA	DESCRIPTION
125-128	X	INITIAL EPHEMERIS POINTS (REAL *4) POSITION X, Y, Z IN KM
129-132	Y	
133-136	Z	VELOCITY $\dot{X}$, $\dot{Y}$, $\dot{Z}$ IN KM/SECOND IN EARTH CENTERED INERTIAL COORDINATES
137-140	$\dot{X}$	
141-144	$\dot{Y}$	
145-148	$\dot{Z}$	
149-152	N	NUMBER OF RAW EPHEMERIS POINTS (INTEGER *4)
153-156	N	NUMBER OF REJECTED RAW EPHEMERIS POINTS (INTEGER *4)
157-160	A(X)	ACCURACY OF EPHEMERIS FIT (REAL *4) RMS DIFFERENCE IN METERS BETWEEN THE FIT AND THE DATA POINTS. THREE VALUES FOR ATTITUDE, ALONG TRACK POSITION AND CROSS TRACK POSITION IN EARTH CENTERED INERTIAL COORDINATES
161-164	A(Y)	
165-168	A(Z)	
169-188	Z	ZERO FILL
189-192	AT	TIME SEPARATION BETWEEN SUCCESSIVE DRIRU DATA POINTS (REAL *4) - IN SECONDS
193-196	N	NUMBER OF LOW FREQUENCY ATTITUDE (DRIRU) DATA POINTS (REAL *4)
197-200	N	NUMBER OF REJECTED (AND SUBSTITUTED) DRIRU DATA POINTS (REAL *4)
201-204	N	NUMBER OF MISSING DRIRU DATA POINTS (REAL *4)
205-208	N	NUMBER OF SUSPECT DRIRU DATA POINTS (REAL *4)
209-212	R	MEAN OF ANGULAR INCREMENTS BETWEEN SUCCESSIVE DRIRU DATA POINTS (REAL *4) ROLL, PITCH, YAW (R,P,Y) AFTER RATE COMPENSATION IN MILLIRADIANS
213-216	P	
217-220	Y	

Table 3.5.2-3. Interval Related Information Record for CCT-AT
(Sheet 4 of 5)

BYTE	DATA	DESCRIPTION
221-232		VARIANCE OF DRIRU DATA INCREMENTS
233-244		MAXIMUM DRIRU DATA INCREMENT
245-256		MINIMUM DRIRU DATA INCREMENT FORMAT AND ORDER (R,P,Y) SAME AS BYTES 209-220
257-260	R	TOTAL RANGE OF DRIRU DATA (REAL *4) ROLL, PITCH, YAW (R,P,Y) ANGULAR RANGE AFTER RATE COMPENSATION IN MILLIRADIANS
261-264	P	
265-268	Y	
269-272	AT	TIME SEPARATION BETWEEN SUCCESSIVE ADS DATA POINTS (REAL *4) - IN SECONDS
273-276	N	NUMBER OF HIGH FREQUENCY ATTITUDE (ADS) DATA POINTS REAL *4)
277-280	N	NUMBER OF REJECTED (AND SUBSTITUTED) ADS DATA POINTS (REAL *4)
281-284	N	NUMBER OF MISSING ADS DATA POINTS (REAL *4)
285-288	N	NUMBER OF SUSPECT ADS DATA POINTS (REAL *4)
289-292	R	MEAN OF ANGULAR INCREMENTS BETWEEN SUCCESSIVE DATA POINTS (REAL *4, ROLL, PITCH, YAW (R,P,Y) AFTER RATE COMPENSATION IN MILLIRADIANS
293-296	P	
297-300	Y	
301-312		VARIANCE OF ADS DATA INCREMENTS
313-324		MAXIMUM ADS DATA INCREMENT
325-336		MINIMUM ADS DATA INCREMENT FORMAT AND ORDER (R,P,Y) SAME AS BYTES 209-220
337-340	R	TOTAL RANGE OF ADS DATA (REAL *4) ROLL, PITCH, YAW, (R,P,Y) ANGULAR RANGE AFTER RATE COMPENSATION IN MILLRADIANS
341-344	P	
345-348	Y	
349-352	ΔT	TIME SEPARATION BETWEEN SUCCESSIVE PROCESSED DATA POINTS (REAL *4) - IN SECONDS

Table 3.5.2-3. Interval Related Information Record for CCT-AT
(Sheet 5 of 5)

BYTE	DATA	DESCRIPTION
353-356	N	NUMBER OF PROCESSED ATTITUDE DATA POINTS (REAL *4)
357-360	N	NUMBER OF REJECTED (AND SUBSTITUTED) PROCESSED DATA POINTS (REAL *4)
361-364	N	NUMBER OF MISSING PROCESSED DATA POINTS (REAL *4)
365-368	N	NUMBER OF SUSPECT PROCESSED DATA POINTS (REAL *4)
369-372	R	MEAN OF ANGULAR INCREMENTS BETWEEN SUCCESSIVE DATA POINTS (REAL *4) ROLL, PITCH, YAW (R,P,Y) AFTER RATE COMPENSATION IN MILLIRADIANS
373-376	P	
374-380	Y	
381-392		VARIANCE OF PROCESSED DATA INCREMENTS
393-404		MAXIMUM PROCESSED DATA INCREMENT
405-416		MINIMUM PROCESSED DATA INCREMENT
		FORMAT AND ORDER (R,P,Y) SAME AS BYTES 209-220.
417-420	R	TOTAL RANGE OF PROCESSED DATA (REAL *4) ROLL, PITCH, YAW (R,P,Y) ANGULAR RANGE AFTER RATE COMPENSATION IN MILLIRADIANS
421-424	P	
425-428	Y	
429-540	Z	ZERO FILL

telemetry records are required to cover the duration of a scenes worth of image data. The exact number of records (2 or 3) depends upon how well the PCD major frame start times coincide with the image scan start times. The record format is described in Table 3.5.2-4.

d. Processed ephemeris data records - one record per 2.048 seconds exists. Space is reserved for 15 records (15 x 2.048 = 30.72 seconds) which is sufficient to cover a scene (23.92 seconds). The format for this record shall be as described in Table 3.5.2-5.

e. Scene definition record - this record shall contain data extracted from the scene header major frame of the HDT-AT. The format for this record is specified in Table 3.5.2-6.

f. Scene quality data - This record shall contain indicators corresponding to the quality of image data, radiometric and geometric correction, control points and processed GCD. The record format is specified in Table 3.5.2-7.

g. Geometric modeling data - this data shall be extracted from the ancillary major frames of the HDT-AT. The data shall be on a scene basis. The format of this record is specified in Table 3.5.2-8.

h. Sparse matrices - this record contains two benchmark matrices and several vectored data of the ancillary GCD corresponding to a scene. The record format is specified in Table 3.5.2-9.

i. GCD mirror scan start times - mirror scan start times of the scene relative to PCD telemetry start time shall be provided in this record. The record format is specified in Table 3.5.2-10.

Table 3.5.2-4. CCT-AT TM Housekeeping Data Records
(Sheet 1 of 5)

BYTE	DATA	DESCRIPTION
1-2	N N	RECORD NUMBER (INTEGER *4)
3-4	N N	ALWAYS = 3 OR 4 OR 5
5-6	S_1 T	RECORD TYPE
7-8	S_2 S_3	S_1 = 1ST SUBTYPE, ALWAYS = 177_8 (TM HOUSEKEEPING DATA) T = RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2 = 2ND SUBTYPE ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8
9-12	N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 360
13-20	N	OBSERVATION TIME (REAL *8) SPACECRAFT TIME RELATIVE TO PCD TELEMETRY START TIME
21-108	T	PROCESSED TM HOUSEKEEPING DATA INSTRUMENT TEMPERATURES (REAL *4) SPACE RESERVED FOR 22 DATA ITEMS SIZE 22x4 = 88 BYTES/RECORDS
		BLACKBODY TEMP (1S-59)* (^{o}C)
		SILICON FPA TEMP (1S-60) (^{o}C)
		CALIBRATION SHUTTER FLAG TEMP (IS-61) (^{o}C)
		BACKUP SHUTTER TEMP (IS-62) (^{o}C)
		BAFFLE TEMP (IS-69) (^{o}C)
		COLD STAGE FPA MONITOR TEMP (IS-70) (OK)
		COLD STAGE FPA CONTROL TEMP (IS-67) (OK)
		CAL LAMPS FILTER TEMP (IS-95) (^{o}C)
		SLC TEMP (IS-94) (^{o}C)
		CAL SHUTTER HUB TEMP (IS-86) (^{o}C)
		EVEN AMBIENT PREAMP TEMP (IS-83) (^{o}C)

Table 3.5.2-4. CCT-AT TM Housekeeping Data Records
(Sheet 2 of 5)

BYTE	DATA	DESCRIPTION
		THERMAL BAND POST AMP TEMP (IS-75) (^{o}C)
		RELAY OPTICS TEMP (IS-73) (^{o}C)
		COLD PREAMP TEMP (IS-72) (^{o}C)
		ODD AMBIENT PREAMP TEMP (IS-71) (^{o}C)
		PRIMARY MIRROR TEMP (IS-79) (^{o}C)
		PRIMARY MIRROR MASK TEMP (IS-80) (^{o}C)
		SECONDARY MIRROR TEMP (IS-81) (^{o}C)
		SECONDARY MIRROR MASK TEMP (IS-82) (^{o}C)
		TELESCOPE HOUSING TEMP (IS-84) (^{o}C)
		TELESCOPE BASEPLATE TEMP (IS-85) (^{o}C)
		SPARE
109-188	BIT 0 / BIT 1 BIT 2 / BIT 3 BIT 4 / BIT 5 BIT 6 / BIT 7	PROCESS TM HOUSEKEEPING DATA SERIAL WORDS (BINARY) SPACE RESERVED FOR 10 SERIAL WORDS. EACH BIT OF EVERY SERIAL WORD IS REPRESENTED BY ONE ASCII CHARACTER SIZE = 10x8 = 80 BYTES

SERIAL WORD A:	BIT
SPARE	0
THERMAL SHUTDOWN ENABLED/ DISABLED	1
SMA +Z HEATER CONTROLLER ON/OFF	2
SMA -Z HEATER CONTROLLER ON/OFF	3
SERIAL COMMAND RECEIVER 1 ON/OFF	4
SHUTTER FUSIBLE LINK SWITCH A CLOSED/OPEN	5
SHUTTER FUSIBLE LINK SWITCH B CLOSED/OPEN	6
SHUTTER FUSIBLE LINK SWITCH C CLOSED/OPEN	7

Table 3.5.2-4. CCT-AT TM Housekeeping Data Records
(Sheet 3 of 5)

BYTE	DATA	DESCRIPTION	BIT
		SERIAL WORD B:	
		BAND 1 ON/OFF	0
		BAND 2 ON/OFF	1
		BAND 3 ON/OFF	2
		BAND 4 ON/OFF	3
		BAND 5 ON/OFF	4
		BAND 6 ON/OFF	5
		BAND 7 ON/OFF	6
		COLD STAGE TELEMETRY ON/OFF	7
		SERIAL WORD C:	
		COOLER DOOR CLOSED/OPEN	0
		COOLER DOOR POSITION OUTGAS/ NOT OUTGAS	1
		COOLER DOOR FULL OPEN/NOT FULL OPEN	2
		COOLER DOOR MAGNET ON/OFF	3
		COOLER DOOR MOTOR ON/OFF	4
		COOLER DOOR FUSE LINK SWITCH A CLOSED/OPEN	5
		COOLER DOOR FUSE LINK SWITCH B CLOSED/OPEN	6
		COOLER DOOR FUSE LINK SWITCH C CLOSED/OPEN	7
		SERIAL WORD D:	
		CAL LAMP 1 ON/OFF	0
		CAL LAMP 2 ON/OFF	1
		CAL LAMP 3 ON/OFF	2
		CAL LAMP 1 OVERRIDE ON/OFF	3
		CAL LAMP 2 OVERRIDE ON/OFF	4
		CAL LAMP 3 OVERRIDE ON/OFF	5
		CAL SEQUENCER ON/OFF	6
		MULTIPLEXER BACKUP ON/OFF	7

Table 3.5.2-4. CCT-AT TM Housekeeping Data Records
(Sheet 4 of 5)

BYTE	DATA	DESCRIPTION	BIT
		SERIAL WORD E:	
		INCHWORM POWER ON/OFF	0
		LVDT ON/OFF	1
		BLACKBODY ON/OFF	2
		BLACKBODY T2 ON/OFF	3
		BLACKBODY T3 ON/OFF	4
		BLACKBODY BACKUP ON/OFF	5
		SME 1 ON/OFF	6
		SME 2 ON/OFF	7
		SERIAL WORD F:	
		BAFFLE HEATER CONTROLLER ON/OFF	0
		BAFFLE HEATER BACKUP ON/OFF	1
		MACRODISCRETE GENERATOR A PRIMARY ON/OFF	2
		MACRODISCRETE GENERATOR A REDUNDANT ON/OFF	3
		MACRODISCRETE GENERATOR B PRIMARY ON/OFF	4
		MACRODISCRETE GENERATOR B REDUNDANT ON/OFF	5
		MULTIPLEXER ON/OFF	6
		MIDSCAN PULSE ON/OFF (PRIMARY)	7
		SERIAL WORD G:	
		SCAN LINE CORRECTOR 1 ON/OFF	0
		SCAN LINE CORRECTOR 2 ON/OFF	1
		CAL SHUTTER ON/OFF	2
		CAL SHUTTER PHASE ERROR YES/NO	3
		CAL SHUTTER AMPLITUDE ERRORS YES/NO	4
		BACKUP SHUTTER ON/OFF	5
		BACKUP SHUTTER PHASE ERROR YES/NO	6
		BACKUP SHUTTER AMPLITUDE ERROR YES/NO	7

Table 3.5.2-4. CCT-AT TM Housekeeping Data Records
(Sheet 5 of 5)

BYTE	DATA	DESCRIPTION	BIT
		SERIAL WORD H:	
		COLD STAGE HEATER CONTROLLER ON/OFF	0
		COLD STAGE OUTGAS HEATER ENABLED/DISABLED	1
		INTERMEDIATE STAGE HEATER CONTROL ON/OFF	2
		INTERMEDIATE STAGE HEATER ENABLED/DISABLED	3
		COLD FPA HEATER CONTROLLER ON/OFF	4
		COLD FPA T2 ON/OFF	5
		COLD FPA T3 ON/OFF	6
		COLD FPA TELEMETRY ON/OFF	7
		SERIAL WORD L:	
		DC RESTORE NORMAL/NOT NORMAL	0
		FRAME DC RESTORE SELECTED YES/NO	1
		TELEMETRY SCALING ON/OFF	2
		SMA +Z HEATER ENABLED/DISABLED	3
		SMA -Z HEATER ENABLED/DISABLED	4
		MIDSCAN PULSE BACKUP ON/OFF	5
		SME 1 SELECT SAM	6
		SPARE	7
		SPARE SERIAL WORD	
189-220	Q | Q	PROCESSED TM HOUSEKEEPING DATA	
		QUALITY INDICATORS (ASCII)	
		SPACE RESERVED FOR 32 QUALITY INDICATORS 22 QUALITY INDICATORS FOR INSTRUMENT TEMPERATURES 10 QUALITY INDICATORS FOR SERIAL WORD DATA	
221-360	Z	ZERO FILL	

Table 3.5.2-5. CCT-AT Processed Ephemeris Data Record

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 | T	RECORD TYPE
7-8	S_2 | S_3	S_1 = 1ST SUBTYPE, ALWAYS = 366_8 (EPHEMERIS) T = RECORD TYPE = 022_8 (HEADER) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-12	N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES, ALWAYS = 540

THE FOLLOWING 32 WORDS ARE REPEATED UPTO 15 TIMES FOR 15 PROCESSED EPHEMERIS DATA RECORDS FROM THE HDT-A. IF LESS THAN 15 RECORDS ARE PRESENT, THEN THE LAST 32 WDS ARE ZEROES.

1-8	T	OBERVATION TIME (REAL *8) SPACECRAFT TIME RELATIVE TO THE PCD TELEMETRY START TIME.
9-32	X Y Z $\dot{X}$ $\dot{Y}$ $\dot{Z}$	PROCESSED EPHEMERIS (REAL *4) POSITION X, Y, Z IN KM VELOCITY $\dot{X}$, $\dot{Y}$, $\dot{Z}$ IN KM/SECOND.
481-540		BLANK

Table 3.5.2-6. CCT-AT Scene Definition Record
(Sheet 1 of 5)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 T S_2 S_3	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 222_8 (SCENE HEADER) T = RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8
9-12	N	RECORD LENGTH (INTEGER *4) RECORD LENGTH IN BYTES ALWAYS = 540
A. IMAGE IDENTIFICATION		
13-14	␣ N	IMAGE IDENTIFICATION (ASCII) UNIQUE IMAGE IDENTIFIER OF THE FORM: ␣NDDDDHHMMS WHERE ␣ = BLANK N = LANDSAT MISSION NUMBER DDDD = DAY NUMBER, RELATIVE TO TIME OF LAUNCH, AT TIME OF OBSERVATION HH = HOUR AT THE TIME OF OBSERVATION MM = MINUTES AT THE TIME OF OBSERVATION S = TENS OF SECONDS AT TIME OF OBSERVATION
15-16	D D	
17-18	D D	
19-20	H H	
21-22	M M	
23-24	S ␣	
25-26	␣ M	WRS DESIGNATOR (ASCII) UNIQUE TERRESTRIAL IMAGE IDENTIFIER OF THE FORM: ␣MPPPRRR WHERE ␣ = BLANK M = A (ASCENDING NODE) OR D (DESCENDING NODE) PPP = NOMINAL WRS PATH NUMBER RRR = NOMINAL WRS ROW NUMBER ZERO FILL
27-28	P P	
29-30	P R	
31-32	R R	
33-44	Z	
B. SPACECRAFT DESCRIPTION		
45-46	T M	SENSOR IDENTIFICATION (ASCII) - THE SENSOR WILL BE ALWAYS BE TM. TM = THEMATIC MAPPER ␣ = BLANK
47-48	␣ ␣	
49-50	␣ ␣	
51-52	␣ ␣	

Table 3.5.2-6. CCT-AT Scene Definition Record
(Sheet 2 of 5)

BYTE	DATA	DESCRIPTION
53-56	N	ORBIT NUMBER (INTEGER *4) ORBIT NUMBER OF THE SPACECRAFT
57-58 59-60	D_1 D_2 D_3 D_4	ACTIVE DETECTOR STATUS (ASCII) CONTAINS DETECTOR STATUS FOR THE 100 TM DETECTORS 0 = INACTIVE 1 = ACTIVE
153-154 155-156	D97 D98 D99 D100	
157-158 159-160	X X Y Y	ACTIVE DETECTOR COUNT (ASCII) THE NUMBER OF ACTIVE DETECTORS BASED ON THE ACTIVE DETECTOR STATUS XX = 00-99
161-164	6320	NOMINAL NUMBER OF PIXELS/SCAN LINE (INTEGER *4) ORIGINAL GEOMETRICALLY UNCORRECTED IMAGE
165-175	Z	ZERO FILE

C. TIME OF EXPOSURE/WRS DESIGNATOR

175-180	S_1	SCENE START SLID (6 BYTES): BYTE 1-2 = ZERO; BYTE 3-4 = MIRROR SCAN COUNTER WITHIN THE INTERVAL; BYTE 5 = ZERO; BYTE 6: BIT 7 = SWEEP DIRECTION; BITS 6-3=DETECTOR NUMBER; BIT 2-0= BAND NUMBER
181-186	S_2	WRS SCENE CENTER SLID - FORMAT AS ABOVE
187-192	S_3	SCENE STOP SLID - FORMAT AS ABOVE

Table 3.5.2-6. CCT-AT Scene Definition Record
(Sheet 3 of 5)

BYTE	DATA	DESCRIPTION
193-194	Y Y	SCENE START SPACECRAFT TIME (ASCII)
	D D	YY = LAST 2 DIGITS OF YEAR
	D H	DDD = DAY OF YEAR
	H M	HH = HOUR
	M S	MM = MINUTES
	S T	SS = SECONDS
	T T	TTT = MILLISECONDS
207-208	F F	FF = SIXTEENTH OF MILLISECOND
209-210	Y Y	SCENE CENTER SPACECRAFT TIME (ASCII)
	D D	FORMAT SAME AS ABOVE
	D H	
	H M	
	M S	
	S T	
	T T	
223-224	F F	
225-228	L	WRS DESIGNATOR IN FULLY PROCESSED IMAGE
229-232	P	(INTEGER *4)
		L = SCAN LINE NUMBER OF WRS CENTER
		P = PIXEL NUMBER OF WRS CENTER
232-334	Z	ZERO FILL
335	O	IMAGE DATA FORMAT (ASCII)
		0 = GEOMETRICALLY UNCORRECTED
		1 = GEOMETRICALLY CORRECT
336	T	INTERLEAVING TYPE (ASCII)
		0 = BSQ
		1 = BIL
337	C	LINE INTERLEAVING COUNT (ASCII)
		0 = NON-INTERLEAVED
		7 = ALL SEVEN BANDS INTERLEAVED

Table 3.5.2-6. CCT-AT Scene Definition Record
(Sheet 4 of 5)

BYTE	DATA	DESCRIPTION
338	0	GEOMETRIC CORRECTION APPLIED (ASCII) 1 = YES 0 = NO
339	1	GEOMETRIC CORRECTION DATA PRESENT (ASCII) 0 = NO 1 = YES
340	1	RADIOMETRIC CORRECTION APPLIED (ASCII) 0 = NO 1 = YES
341	0	RADIOMETRIC DATA PRESENT (ASCII) 0 = NO 1 = YES
342	0	RESAMPLING APPLIED (ASCII) 0 = NOT APPLICABLE 1 = CUBIC CONVOLUTION 2 = NEAREST NEIGHBORS
343	X	MAP PROJECTION SELECTED (CORRESPONDS TO FIRST MAP PROJECTION IN ANCILLARY AND ANNOTATION DATA SELECTIONS, SECOND MAP PROJECTION IN ALWAYS SPACE OBLIQUE MERCATOR): 0 = UNIVERSAL TRAVERSE MERCATOR (UTM) 1 = POLAR STEREOGRAPHIC (LPS)
344	0	IMAGE DATA JUSTIFICATION (ASCII) ALWAYS = 0 (LEFT JUSTIFIED (1)
345	0	LOCATION OF MOST SIGNIFICANT BIT (ASCII) ALWAYS 0 = LEFT MOST BIT
346-347	N 1 2 3 4 5 6 7	BAND INDICATOR (ASCII) N = NUMBER OF BANDS PER SCENE 1-7 = BAND NUMBER ␣ = BLANK IF A BAND OF IMAGE DATA IS ABSENT THEN CORRESPONDING FIELD IS BLANK FILLED
354	␣	
355-368		BLANK FILL

Table 3.5.2-6. CCT-AT Scene Definition Record
(Sheet 5 of 5)

BYTE	DATA	DESCRIPTION
369-372	N	NUMBER OF PIXELS PER SCAN LINE (INTEGER *4)
373-376	N	NOMINAL OVERLAP MARK PIXELS OFFSET (INTEGER *4)
377-540		ZERO FILL

Table 3.5.2-7. CCT-AT Scene Qaulity Data Record (Sheet 1 of 10)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 | T	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 055_8 (QUALTIY DATA) T = RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
7-8	S_2 | S_3	
9-12	N	RECORD SIZE (INTEGER *4) RECORD SIZE IN BYTES, ALWAYS = 12420
13-26	B1 B2 . . . B6 B7	OVERALL BAND QUALITY CODE (ASCII) TWO BYTES FOR EACH BAND, IN THE ORDER BAND 1, 2, 3, 4, 5, 6, 7
27-30	Z	ZERO FILLED

E.1 IMAGE DATA QUALITY

31-32	S | W	DATA SOURCE (ASCII) W = TDRSS/WHITE SANDS T = TRANSPORTABLE GROUND STATION
33-36	T	DATA TRANSMISSION ACCURACY (ASCII)
37-48	Z	ZERO FILL
49-50	S | W	PRIMARY LINE LENGTH SOURCE (ASCII) FOR SCD GENERATION IN PCS I = IMBEDDED LINE LENGTH D = DSM LINE LENGTH C = COMPUTED INTERNALLY

Table 3.5.2-7. CCT-AT Scene Qaulity Data Record (Sheet 2 of 10)

BYTE	DATA	DESCRIPTION
51-54	N	NUMBER OF TIME CODE SUBSTITUTION (INTEGER *4) DURING PAYLOAD CORRECTION DATA (PCD) PROCESSING
55-58	N	NUMBER OF TIME CODE SUBSTITUTIONS (INTEGER *4) DURING PASS 1 INGEST IN TIPS
59-62	N	NUMBER OF MAJOR FRAME SYNC LOSSES (INTEGER *4) DURING PASS 1 INGEST IN TIPS
63-66	N	NUMBER OF MINOR FRAME SYNC LOSSES (INTEGER *4) DURING PASS 1 INGEST IN TIPS
67-70	N	NUMBER OF MINOR FRAME SYNC ERRORS (INTEGER *4) DURING PASS 1 INGEST IN TIPS
71-74	N	NUMBER OF BIT SLIPS (INTEGER *4) DURING PASS 1 INGEST IN TIPS
75-100	Z	ZERO FILL
101-108	N	NUMBER OF IMBEDDED LINE LENGTH SUBSTITUTION (INTEGER *4) IN PCD PROCESSING. TWO VALUES, ONE FOR FOREWARD SCANS, ONE FOR REVERSE SCANS
109-116	N	NUMBER OF COUNTED ACTIVE LINE LENGTH SUBSTITUTION (INTEGER *4) IN PCD PROCESSING. TWO VALUES, OR VOR FOREWARD SCANS, ONE FOR REVERSE SCANS
117-180	X	UNPROCESSED MIRROR SCAN CORRECTION DATA (MSCD) (REAL *4) - FROM PCD PROCESSING, EIGHT VALUES FOR BOTH FOREWARD AND REVERSE SCANS: MAXIMUM IMBEDDED LINE LENGTH MINIMUM IMBEDDED LINE LENGTH MEAN IMBEDDED LINE LENGTH IMBEDDED LINE LENGTH RMS VARIATION MAXIMUM COUNTED ACTIVE LINE LENGTH MINIMUM COUNTED ACTIVE LINE LENGTH MEAN COUNTED ACTIVE LINE LENGTH COUNTED ACTIVE LINE LENGTH RMS VARIATION

Table 3.5.2-7. CCT-AT Scene Quality Data Record (Sheet 3 of 10)

BYTE	DATA	DESCRIPTION
181-244	X	PROCESSED MSCD (REAL *4) FROM PCD PROCESSING, EIGHT VALUES FOR BOTH FOREWARD AND REVERSE CANS (UNITS ARE MILLI-SECONDS): MAXIMUM FIRST HALF SCAN TIME MINIMUM FIRST HALF SCAN TIME MEAN FIRST HALF SCAN TIME FIRST HALF SCAN TIME RMS VARIATION MAXIMUM SECOND HALF SCAN TIME MINIMUM SECOND HALF SCAN TIME MEAN SECOND HALF SCAN TIME SECOND HALF SCAN TIME RMS VARIATION
245-268	N	NUMBER OF LINE LENGTH SUBSTITUTIONS (INTEGER *4) BASED ON PASS 1 INGEST IN TIPS. SIX VALUES, THREE EACH FOR FOREWARD AND REVERSE SCANS; IMBEDDED LINE LENGTH, FOREWARD SCAN IMBEDDED LINE LENGTH, REVERSE CAN COUNTED ACTIVE LINE LENGTH, FOREWARD SCAN COUNTED ACTIVE LINE LENGTH, REVERSE SCAN CURRENT LINE LENGTH, FOREWARD SCAN CURRENT LINE LENGTH, REVERSE SCAN
269-364	X	LINE LENGTH DATA (REAL *4) FROM PASS 1 INGEST IN TIPS. THE MAXIMUM, MINIMUM, MEAN, AND RMS VARIATION FOR BOTH FOREWARD AND REVERSE SCANS WILL BE GIVEN FOR THE FOLLOWING THREE TYPES OF LINE LENGTH: IMBEDDED LINE LENGTH ACTIVE COUNTED LINE LENGTH CURRENT LINE LENGTH
365-400	Z	ZERO FILL

E.2 RADIOMETRIC CORRECTION

401-407	B1 B2 B3 B4 B5 B6 B7	RADIOMETRIC CALIBRATION METHOD (ASCII) SEPERATE VALUE FOR EACH BAND, IN THE ORDER BAND 1, 2, 3, 4, 5, 6, 7 N = NO CORRECTIONS APPLIED H = HISTOGRAM METHOD C = INTERNAL CALIBRATION ONLY (NO HISTOGRAMS) U = NON-STANDARD CORRECTIONS APPLIED
408	Z	ZERO FILL (NOT USED)
409	M	INTERNAL CALIBRATION LAMP MODE (ASCII) S = SEQUENCE MODE C = CONSTANT LAMP LEVEL MODE

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 4 of 10)

BYTE	DATA	DESCRIPTION
410-412	L1 / L2 L3	INTERNAL CALIBRATION LAMPS USED (ASCII) FOR CONSTANT LAMP LEVEL MODE ONLY, BLANK FILL FOR SEQUENCER MODE VALUE IS ZERO IF LAMP IS NOT USED AND "1" IF LAMP IS USED. THREE VALUES, ONE FOR EACH LAMP
413-430	Z	ZERO FILL (NOT USED)
431	X	USE OF NOMINAL CALIBRATION LAMP VALUES (ASCII) N = NOT USED C = USED FOR COMPARISON ONLY R = USED TO REPLACE INTERNAL CALIBRATION VALUES OUTSIDE WINDOW, BUT NOT USED IN RADIOMETRIC CALIBRATION A = USED TO REPLACE INTERNAL CALIBRATION VALUES OUTSIDE WINDOW AND USED IN RADIOMETRIC CALIBRATION
432	Z	ZERO FILL
433-436	W	CALIBRATION WINDOW SIZE (INTEGER *4) THE NEIGHBORHOOD OF THE NOMINAL VALUES TO WHICH THE ACTUAL INTERNAL CALIBRATION VALUES ARE COMPARED
437-460	Z	ZERO FILL (NOT USED)
461-464	N	NUMBER OF SCANS IN A CALIBRATION SEGMENT (INTEGER *4)
465-468	N	NUMBER OF SUBSEGMENTS IN A CALIBRATION SEGMENT (INTEGER *4)
		FOR EACH BAND THE FOLLOWING TWO VALUES WILL BE GIVEN. THE ORDER IS BAND 1,2,3,4,5, 6, 7
469-496	A	RELATIVE CALIBRATION ACCURACY (REAL *4) MAXIMUM DIFFERENCE BETWEEN DETECTOR MEANS FOR THE IMAGE
497-524	D	RELATIVE GAIN DIFFERENCE (REAL *4) LARGEST RATIO OF STANDARD DEVIATIONS FOR EACH DETECTOR IN THE IMAGE

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 5 of 10)

BYTE	DATA	DESCRIPTION
525-700	Z	ZERO FILL
701-5500		FOR EACH DETECTOR (IN THE ORDER D1, D2,—— D100) THE FOLLOWING 20 VALUES WILL BE GIVEN. THE UNUSED SPACES FOR THE THERMAL BAND WILL CONTAIN ZERO. (THERE ARE 48 BYTES/DETECTOR)
	M	MULTIPLICATIVE RADIOMETRIC CORRECTION CONSTANT (REAL *4)
	A	ADDITIVE RADIOMETRIC CORRECTION CONSTANT (REAL *4)
	C1	FIRST NOMINAL CALIBRATION VALUE (INTEGER *2)
	S1	NUMBER OF SUBSTITUTIONS (INTEGER *2) FOR FIRST NOMINAL CALIBRATION VALUE
	C8	SECOND THROUGH EIGHT NOMINAL CALIBRATION VALUES AND NUMBER OS SUBSTITUTIONS
	S8	
	M	CALIBRATED MEAN RADIANCE (REAL *4)
	SD	CALIBRATED RADIANCE STANDARD DEVIATION (REAL *4)
5501-5900	Z	ZERO FILL
E.3 CONTROL POINTS		FIRST HISTORICAL INFORMATION ABOUT THE REFERENCE SCENE AND THE CP EXTRACTION ARE GIVEN (BYTES 5901-6000), THIS IS FOLLOWED BY INFORMATION FROM THE CURRENT INTERVAL AND THIS SCENE IN PARTICULAR. (BYTES 6021-6588)
5901-5914	B1	OVERALL BAND QUALITIES OF REFERENCE SCENE (ASCII) - 2 BYTES/BAND, IN THE ORDER BAND 1, 3,4,5,6,7
	B6	

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 6 of 10)

BYTE	DATA	DESCRIPTION
5915-5918	N	NUMBER OF SCENES (INTEGER *4) IN CONTROL POINT (CP) EXTRACT INTERVAL
5919-5922	N	SEQUENCE NUMBER (INTEGER *4) OF THE REFERENCE SCENE IN CP EXTRACTION INTERVAL
5923-5926	N	NUMBER OF GEODETIC POINTS (INTEGER *4) USED IN CP GENERATION PROCESS, FOR THE INTERVAL
5927-5930	N	NUMBER OF GEODETIC POINTS (INTEGER *4) WHICH WERE IN THE REFERENCE SCENE
5931-5936	Z	ZERO FILL (NOT USED)
5937-5940	P	AVERAGE* INITIAL AUTO CORRELATION PEAK VALUE (REAL *4) FOR CPs FROM THE REFERENCE SCENE
5941-5944	C	AVERAGE* INITIAL PEAK CURVATURE (REAL *4) FOR CPs FROM THE REFERENCE SCENE
5945-5964	ID	REFERENCE SCENE ID (ASCII) 20 BYTES
5965-5980	E	NINETY PERCENT ERROR ELLIPSE (REAL *4) 4 VALUES IN THE FOLLOWING ORDER (UNITS ARE METERS): ALONG-TRACK, FOR THE INTERVAL ACROSS-TRACK, FOR THE INTERVAL ALONG-TRACK, FOR THE REFERENCE SCENE ACROSS-TRACK, FOR THE REFERENCE SCENE
5981-5996	Z	ZERO FILL (NOT USED)
5997-6000	S	AVERAGE* PREVIOUS REGISTRATION SUCCESS (REAL *4) PERCENT PREVIOUS SUCCESSFUL REGISTRATIONS OF CONTROL POINTS
6001-6020	Z	ZERO FILL (NOT USED)

* AVERAGE OF CPs USED IN CALCULATIONS FOR PRESENT SCENE

Table 3.5.2-7. CCT-AT Scene Quality Data Record (Sheet 7 of 10)

BYTE	DATA	DESCRIPTION
6021-6024	N	NUMBER OF SCENES IN INTERVAL (INTEGER *4)
6025-6028	N	SEQUENCE NUMBER (INTEGER *4) OF THIS SCENE IN INTERVAL
6029-6032	N	TOTAL NUMBER OF CPs (INTEGER *4) USED IN PERFORMING GEOMETRIC CORRECTIONS, FOR THE INTERVAL
6033-6036	N	NUMBER OF CPs (INTEGER *4) WHICH WERE FROM THIS SCENE
6037-6040	Z	ZERO FILL (NOT USED)
6041-6044	N	NUMBER OF CPs (INTEGER *4) WHICH WERE FROM SCENES PRIOR TO THIS IN THE INTERVAL
6045-6048	N	NUMBER OF GEODETIC CPs (INTEGER *4) USED IN GEOMETRIC CORRECTIONS, FOR THE INTERVAL
6049-6052	N	TOTAL NUMBER OF CP CORRELATIONS ATTEMPTED (INTEGER *4) - FOR THE INTERVAL
6053-6056	N	NUMBER OF CPs (INTEGER *4) REJECTED DURING CORRELATION PROCESS
6057-6060	N	NUMBER OF CORRELATED CPs (INTEGER *4) IN THE INTERVAL REJECTED DURING MODELING PROCESS
6061-6064	N	TOTAL NUMBER OF CP CORRELATIONS ATTEMPTED (INTEGER *4) - FOR THIS SCENE
6065-6068	N	TOTAL NUMBER OF CPs (INTEGER *4) IN THIS SCENE REJECTED DURING CORRELATION PROCESS
6069-6072	N	NUMBER OF CORRELATED CPs (INTEGER *4) IN THIS SCENE REJECTED DURING MODELING PROCESS

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 8 of 10)

BYTE	DATA	DESCRIPTION
6073-6076	N	NUMBER OF CPs (INTEGER *4) REJECTED FOR CLOUD COVER
6077-6080	N	NUMBER OF CPs (INTEGER *4) IN THIS SCENE REJECTED FOR SNOW COVER
6081-6084	N	NUMBER OF USED CPs (INTEGER *4) FROM THIS SCENE CONTAIN >50% CLOUD COVER
6085-6100	Z	ZERO FILL (NOT USED)
6101-6580	CP1 CP2 . . . CP19 CP20	FOR EACH USED CP IN THIS SCENE THE FOLLOWING INFORMATION WILL BE GIVEN (24 BYTES FOR EACH CP, UP TO 20 CPs): CONTROL POINT ID - 15 ASCII CHARACTERS ZERO FILL - 1 BYTE CONTROL POINT LOCATION (REAL *4) - 2 VALUES, LINE AND PIXEL IN FULLY PROCESSED SCENE
6581-6584	P	AVERAGE* CP CORRELATION PEAK VALUE (REAL *4) FOR THIS SCENE
6585-6588	C	AVERAGE* CP CORRELATION PEAK CURVATURE (REAL *4) FOR THIS SCENE
6589-6600	Z	ZERO FILL (NOT USED)

E.4 GEOMETRIC CORRECTION

6601-6602	Q	OVERALL GEOMETRIC QUALITY CODE (ASCII)
6603-6618	E	RMS GEOMETRIC MODELING ERRORS (REAL *4) HOW WELL THE GEOMETRIC MODEL MATCHED THE CP DATA. 4 VALUES APE GIVEN (UNITS ARE METERS): ALONG TRACK, FOR THE INTERVAL ACROSS TRACK, FOR THE INTERVAL ALONG TRACK, FOR THE SCENE ACROSS TRACK, FOR THE SCENE
6619-6630	O	EPHEMERIS OFFSETS (REAL *4) THREE VALUES (X,Y,Z) (UNITS ARE KM)

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 9 of 10)

BYTE	DATA	DESCRIPTION
6631-6646	D	ESTIMATED DISTORTIONS (REAL *4) FOUR VALUES AS FOLLOWS (UNITS ARE METERS): ALONG TRACK SKEW ALONG TRACK STRETCH ACROSS TRACK SKEW ACROSS TRACK STRETCH
6647-6668	Z	ZERO FILL (NOT USED)
6669-6748	FB	GEOMETRIC MODELING RESULTS (REAL *4) FILTER BIASES FOR THE SCENE. THERE WILL BE UP TO 20 VALUES, ONE VALUE FOR EACH PARAMETER ESTIMATED IN THE FILTER COMPUTATIONS
6749-6828	SV	STATE VECTOR AT SCENE CENTER (REAL *4) UP TO 20 COMPONENTS
6829-8428	M	STATE ERROR COVARIANCE MATRIX AT SCENE CENTER (REAL *4) - A SQUARE MATRIX WITH AS MANY ROWS AND COLUMNS AS STATE VECTOR COMPONENTS
8429-10028	M	DYNAMIC NOISE MATRIX AT SCENE CENTER (REAL *4) A SQUARE MATRIX WITH AS MANY ROWS AND COLUMNS AS STATE VECTOR COMPONENTS
10029-10402	Z	ZERO FILL

E.5 PROCESSED GCD

ALL VALUES ARE REAL *4

10403-10530	X	FOR THE BENCHMARK MATRIX AND THE HIGH FREQUENCY MATRIX TWO SETS ARE VALUES ARE GIVEN, ONE FOR FOREWARD SCANS AND ONE FOR REVERSE SCANS. THE VALUES ARE AS FOLLOWS: .MEAN AND VARIANCE OF THE DIFFERENCE BETWEEN SUCCESSIVE POINTS, IN THE MATRIX, BOTH ACROSS AND DOWN .MAXIMUM AND MINIMUM DIFFERENCE BETWEEN SUCCESSIVE POINTS IN THE MATRIX BOTH ACROSS AND DOWN

Table 3.5.2-7. CCT-AT Scene Quality Data Record
(Sheet 10 of 10)

BYTE	DATA	DESCRIPTION
10531-10544	X	MAXIMUM AND MINIMUM VALUES IN THE HIGH FREQUENCY MATRIX FOR BOTH FOREWARD AND REVERSE SCANS
10545-10552	X	NORMALIZED CHANGE FROM NOMINAL OF THE MIDSCAN POSITION FOR BOTH THE FOREWARD AND REVERSE SCANS (UNITS ARE MILLISECONDS)
10553-10572	X	FOR THE SCAN GAP SIZE, THE SCAN GAP SKEW, AND THE HORIZONTAL STRIP (SEGMENT) INPUT PIXEL DISTANCE THE FOLLOWING FIVE VALUES ARE GIVEN: MAXIMUM VALUE, MINIMUM VALUE, MEAN VALUE, NUMBER EXCEEDING MAXIMUM THRESHHOLD, AND NUMBER EXCEEDING MINIMUM THREHHOLD
10573-12420	Z	ZERO FILL

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 1 of 6)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6 7-8	S_1 | T S_2 | S_3	RECORD TYPE S_1 = 1ST SUBTYPE ALWAYS = 14_8 (GEOMETRIC MODELLING DATA) T = RECORD TYPE, ALWAYS = 044_8 (ANCILLARY) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE ALWAYS = 022_8 (DEFAULT)
9-12	N	RECORD SIZE (INTEGER *4) RECORD SIZE IN BYTES, ALWAYS = 720
A. SCENE INDEPENDENT DATA		
13-16	N	NOMINAL NUMBER OF PIXELS PER INPUT LINE (INTEGER *4)
17-20	N	NUMBER OF INPUT LINES IN THE PARTIALLY PROCESSED IMAGE (INTEGER *4)
21-24	S	NOMINAL SCALE OF INPUT INTER-PIXEL DISTANCE IN METERS PER PIXEL (REAL *4)
25-28	S	NOMINAL SCALE OF INPUT INTER-LINE DISTANCE IN METERS PER PIXEL (REAL *4)
29-32	N	NUMBER OF PIXELS PER OUTPUT LINE OF FULLY PROCESSED IMAGE (INTEGER *4)
33-36	N	NUMBER OF LINES PER OUTPUT IMAGE OF FULLY PROCESSED IMAGE (INTEGER *4)
37-40	S	SCALE OF FULLY PROCESSED OUTPUT INTER-PIXEL DISTANCE IN METERS PER PIXEL (REAL *4)
41-44	S	SCALE OF FULLY PROCESSED OUTPUT INTER-LINE DISTANCE IN METERS PER PIXEL (REAL *4)
45-48	S	NOMINAL SPACECRAFT ALTITUDE IN METERS (REAL *4)
49-52	W	NOMINAL INPUT SWATH WIDETH IN METERS (REAL *4)

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 2 of 6)

BYTE	DATA	DESCRIPTION
53-76	C_{0F} . . . C_{5F}	TM MIRROR MODEL COEFFICIENTS FOR FOREWARD AND REVERSE SCAN (6 COEFFICIENTS EACH) (REAL *4)
77-100	C_{0R} . . . C_{5R}	
101-104	A	TM MAXIMUM MIRROR ANGLE IN RADIANS (REAL *4)
105-108	S	SCAN SKEW CONSTANT (AS A RESULT OF FINITE SCAN TIME) (REAL *4)
109-112	T_t	NOMINAL TIME BETWEEN SUCCESSIVE TM MIRROR SWEEPS IN SECONDS (REAL *4)
113-116	T_a	NOMINAL TIME FOR THE ACTIVE PORTION OF AN TM MIRROR SWEEP IN SECONDS (REAL *4)
117-120	R_a	SEMI-MAJOR AXIS OF EARTH ELLIPSOID IN METERS (INTERNATIONAL SPHEROID) (REAL *4)
121-124	R_b	SEMI-MINOR AXIS OF EARTH ELLIPSOID IN METERS (INTERNATIONAL SPHEROID) (REAL *4)
125-128	E_c	EARTH CURVATURE CONSTANT (DEPENDENT ON SPACECRAFTs NOMINAL ALTITUDE AND EARTH RADIUS) (REAL *4)
129-268	Z	ZERO FILL
B. SCENE DEPENDENT DATA		
269-272	P	WRS PATH (INTEGER *4)
272-276	R	WRS ROW (INTEGER *4)

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 3 of 6)

BYTE	DATA	DESCRIPTION
277-292	Y Y D D D H H M M S S T T T F F	FIRST SCAN SPACECRAFT TIME (ASCII) YY = YEAR (00-99) DDD = DAY OF YEAR (001-366) HH = HOUR (00-59) MM = MINUTE (00-59) SS = SECONDS (00-59) TTT = MILLISECOND (000-999) FF = SIXTEENTH OF MILLISECOND (00-15)
293-308	Y Y D D D H H M M S S T T T F F	LAST SCAN SPACECRAFT TIME (ASCII) (374TH SCAN RELATIVE TO FIRST) FORMAT SAME AS ABOVE
309-324	Y Y D D D H H M M S S T T T F F	PCD START SPACECRAFT TIME (ASCII) SAME FORMAT AS ABOVE
325-332	T	SCENE CENTER SPACECRAFT TIME RELATIVE TO PCD TELEMETRY START (REAL *8)
333-336	N	SCENE CENTER SWEEP NUMBER (INTEGER *4)

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 4 of 6)

ORIGINAL PAGE IS
OF POOR QUALITY

BYTE	DATA	DESCRIPTION
337-340	374	NUMBER OF SCANS FOR WHICH GCD DATA IS COMPUTED (INTEGER *4) ALWAYS = 374
341-344	R_E	EARTH RADIUS AT WRS SCENE CENTER IN METERS (REAL *4)
345-348	R_S	SPACECRAFT ORBIT RADIUS AT WRS SCENE CENTER IN METERS (REAL *4)
349-352	LAT	WRS CENTER LATITUDE IN RADIANS (REAL *4)
353-356	LONG	WRS CENTER LONGITUDE IN RADIANS (REAL *4)
357-360	R	EARTH ROTATION PARAMETER (IMAGE SKEW) IN RADIANS (REAL*4)
361-524	Z	ZERO FILL
C.1 MAP PROJECTION DEPENDENT DATA (SOM)		
525-526	S O	MAP PROJECTION IDENTIFICATION (ASCII) ALWAYS = SOM
527-528	M Ø	
529-532	X	WRS SCENE CENTER X COORDINATE ON THE SOM PROJECTION IN METERS (REAL *4)
533-536	Y	WRS SCENE CENTER Y COORDINATE ON THE SOM PROJECTION IN METERS (REAL *4)
537-540	R	DISPLAY ROTATION ANGLE IN RADIANS (REAL *4)
541-544	H	HORIZONTAL DISPLAY SHIFT IN PIXELS (INTEGER *4)
545-548	LAT	OUTPUT PRODUCT SCENE CENTER LATITUDE IN RADIANS (REAL *4)
549-552	LONG	OUTPUT PRODUCT SCENE CENTER LONGITUDE IN RADIANS (REAL *4)
553-564	X Y Z	OUTPUT PRODUCT SCENE CENTER IN EARTH-CENTERED EARTH-FIXED COORDINATES IN METERS (REAL *4) - (3 VALUES)

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 5 of 6)

BYTE	DATA	DESCRIPTION
565-568	H	SPACECRAFT HEADING ANGLE AT OUTPUT PRODUCT SCENE CENTER IN RADIANS (REAL *4)
569-572	L	SCAN LINE NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE (INTEGER *4)
573-576	N	PIXEL NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE (INTEGER *4)
577-580	V_S	NORMALIZED SPACECRAFT VELOCITY ERROR FROM NOMINAL AT THE OUTPUT PRODUCT SCENE CENTER IN METERS PER SECOND (REAL *4)
581-584	V_E	EARTH ROTATION VELOCITY AT OUTPUT R-PRODUCT SCENE CENTER IN METERS PER SECOND (REAL *4)
585-604	Z	ZERO FILL

C.2 MAP PROJECTION DEPENDENT DATA (VTM OR PS)

605-608	M A P ⌴	MAP PROJECTION IDENTIFICATION (ASCII) MAP = UTM = PS⌴
609-612	X	WRS SCENE CENTER X COORDINATE ON THE SOM PROJECTION IN METERS (REAL *4)
613-616	Y	WRS SCENE CENTER Y COORDINATE ON THE SOM PROJECTION IN METERS (REAL *4)
617-620	R	DISPLAY ROTATION ANGLE IN RADIANS (REAL *4)
621-624	H	HORIZONTAL DISPLAY SHIFT IN PIXELS (INTEGER *4)
625-628	LAT	OUTPUT PRODUCT SCENE CENTER LATITUDE IN RADIANS (REAL *4)
629-632	LONG	OUTPUT PRODUCT SCENE CENTER LONGITUDE IN RADIANS (REAL *4)

Table 3.5.2-8. CCT-AT Geometric Modelling Data Record
(Sheet 6 of 6)

BYTE	DATA	DESCRIPTION
633-644		OUTPUT PRODUCT SCENE CENTER IN EARTH-CENTERED, EARTH-FIXED COORDINATE IN METERS (REAL *4) - (3 VALUES)
645-648	H	SPACECRAFT HEADING ANGLE AT OUTPUT PRODUCT SCENE CENTER IN RADIANS (REAL *4)
649-652	L	SCAN LINE NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE (INTEGER *4)
651-656	N	PIXEL NUMBER OF OUTPUT PRODUCT SCENE CENTER IN PARTIALLY PROCESSED IMAGE (INTEGER *4)
657-660	V_S	NORMALIZED SPACECRAFT VELOCITY ERROR FROM NOMINAL AT THE OUTPUT PRODUCT SCENE CENTER IN METERS PER SECOND (REAL *4)
661-664	V_E	EARTH ROTATION VELOCITY AT OUTPUT R-PRODUCT SCENE CENTER IN METERS PER SECOND (REAL *4)
665-720	Z	ZERO FILL

Table 3.5.2-9. CCT-AT Sparse Matrices Record
(Sheet 1 of 3)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 T	S_1 = 1ST SUBTYPE, ALWAYS = 244_8 (GCD SPARSE MATRICES) T = RECORD TYPE, ALWAYS = 044_8 S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
7-8	S_2 S_3	
9-12	N	RECORD SIZE (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 4680

A. GCD: BENCHMARK MATRICES #1 (SOM)

13-14	S O M ␣	MAP PROJECTION IDENTIFICATION (ASCII) ALWAYS = SOM
17-1040	$P_o(i,j,k)$ $Y_o(i,j,k)$ $P_1(i,j,k)$ $Y_1(i,j,k)$	BENCHMARK MATRICES (REAL *4) P = IN PIXELS Y = IN KM i = 1,...,8 X COORDINATE INDEX j = 1,2,3,4 SWEEP INDEX k = 1,2 SCAN DIRECTION (1 = FORWARD, 2 = REVERSE)

ORDERING: $P_o(1,1,1), Y_o(1,1,1), P_1(1,1,1), Y_1(1,1,1), P_o(2,1,1), Y_o(2,1,1)\ldots\ldots$
$Y_1(8,4,2)$

B. GCD: BENCHMARK MATRICES #2 (UTM OR PS)

1041-1042 1043-1044	M A P ␣	MAP PROJECTION IDENTIFICATION (ASCII) MAP = UTM␣ = PS␣␣
1045-2068	$P_o(i,j,k)$ $Y_o(i,j,k)$ $P_1(i,j,k)$ $Y_1(i,j,k)$	BENCHMARK MATRICES (REAL *4) P = IN PIXELS Y = IN KM i = 1,...,8 X COORDINATE INDEX j = 1,2,3,4 SWEEP INDEX k = 1,2 SCAN DIRECTION (1 = FOREWARD, 2 = REVERSE)

ORDERING: $P_o(1,1,1), Y_o(1,1,1), P_1(1,1,1), Y_1(i,1,1), P_o(2,1,1), Y_o(2,1,1)\ldots\ldots,$
$Y_1(8,4,2)$

BYTE	DATA	DESCRIPTION
C. GCD: OTHER MATRICES		
2069-3564	LL(i)	SCAN LINE LENGTH (INTEGER *4) NUMBER OF COMPLETE MIRROR FRAMES DETERMINED FROM IMBEDDED LINE LENGTH INFORMATION (PCS OUTPUT) i = 1,...374 SCAN NUMBER
ORDERING: LL(1),LL(2),...,LL(374)		
3565-3568	FSR	NOMINAL POINTING VECTOR SCAN RATE ACROSS DISPLAY DATA (REAL *4) FSR = FORWARD SCAN RATE (RAD/SEC) RSR = REVERSE SCAN RATE (RAD/SEC)
3569-3572	RSR	
3573-3600	$\Delta\theta(m)$	NOMINAL ALONG SCAN FOCAL PLANE BAND LOCATIONS DATA IN RADIANS (REAL *4) m = 1,...7 BAND NUMBER
ORDERING: $\Delta\theta(1),\ldots,\Delta\theta(7)$		
3601-4496	$\delta\theta(n,k,m)$	ALONG SCAN FOCAL PLANE DETECTOR LOCATIONS DATA IN RADIANS (REAL *4) m = 1,...,7 BAND NUMBER n = 1,...,16 DETECTOR NUMBER k = 1,2 SCAN DIRECTION (1 = FORWARD, 2 = REVERSE)
ORDERING: $\delta\theta(1,1,1),\delta\theta(2,1,1),\ldots,\delta\theta(16,7,2)$		
4497-4524	$\Delta\sigma(m)$	CROSS SCAN DETECTOR ARRAY CENTER LOCATIONS DATA IN RADIANS (REAL *4) m = 1,...,7 BAND NUMBER
ORDERING: $\Delta\sigma(1),\ldots\Delta\sigma(7)$		
4525-4556	$d\sigma(m)$	CROSS SCAN FOCAL PLANE DETECTOR SPACING DATA IN RADIANS (REAL *4) m = 1,...,7 BAND NUMBER
ORDERING: $d\sigma(1),\ldots,d\sigma(7)$		

Table 3.5.2-9. CCT-AT Sparse Matrices Record
(Sheet 3 of 3)

BYTE	DATA	DESCRIPTION
4557-4612	Nd(m,k)	DFP ODD DETECTOR SAMPLE SHIFT DATA IN PIXELS (INTEGER *4) m = 1,...,7 BAND NUMBER k = 1,2 SCAN DIRECTION (1 = FORWARD, 2 = REVERSE
4613-4680	Z	ZERO FILL

ORDERING: Nd(1,1),Nd(2,1)...Md(7,2)

Table 3.5.2-10. CCT-AT GCD Mirror Scan Start Times Record

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 | T	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 344_8 (MIRROR SCAN START TIMES) T = RECORD TYPE, ALWAYS = 044_8 (ANCILLARY)
7-8	S_2 | S_3	S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-12	N	RECORD SIZE (INTEGER *4) ALWAYS = 3060 BYTES
13-3004	TAN(i)	MIRROR SCAN START TIME RELATIVE TO PCD TELEMETRY START TIME IN SECONDS (REAL *8) i = 1,...,374 SCAN NUMBER

ORDERING: TAN(1), TAN(2),... ,TAN(374)

3005-3060 ZERO FILL

Table 3.5.2-11. CCT-AT High Frequency Along Scan Matrix

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6	S_1 | T	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 544_8 (HIGH FREQUENCY ALONG SCAN MATRIX) T = RECORD TYPE, ALWAYS = 044_8 (ANCILLARY) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
7-8	S_2 | S_3	
9-12	N	RECORD LENGTH (INTEGER *4) ALWAYS = 131[illegible] BYTES
13-13102	THETA(i,j)	HIGH FREQUFNCY ALONG SCAN MATRIX IN RADIANS (REAL *4) i = 1,...,35 SAMPLE NUMBER j = 1,...374 SCAN NUMBER

ORDERING: THETA(1,1), THETA(2,1),...,THETA(35,374)

13103-13140	ZERO FILL

Table 3.5.2-12. CCT-AT High Frequency Cross Scan Matrix Record

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4) ALWAYS = 13
5-6 7-8	S_1 | T S_2 | S_3	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 644_8 (HIGH FREQUENCY CROSS SCAN MATRIX) T = RECORD TYPE, ALWAYS = 044_8 (ANCILLARY) S_2 = 2ND SUBTYPE, ALWAYS = 222_8 (DATA BY SCENE BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-12	N	RECORD SIZE (INTEGER *4) ALWAYS = BYTES
13-13102	SIGMA(i,j)	HIGH FREQUENCY CROSS SCAN MATRIX IN RADIANS (REAL *4) i = 1,...,35 SAMPLE NUMBER j = 1,...,374 SCAN NUMBER

ORDERING: SIGMA(1,1), SIGMA(2,1),...,SIGMA(35,374)

13103-13140 ZERO FILL

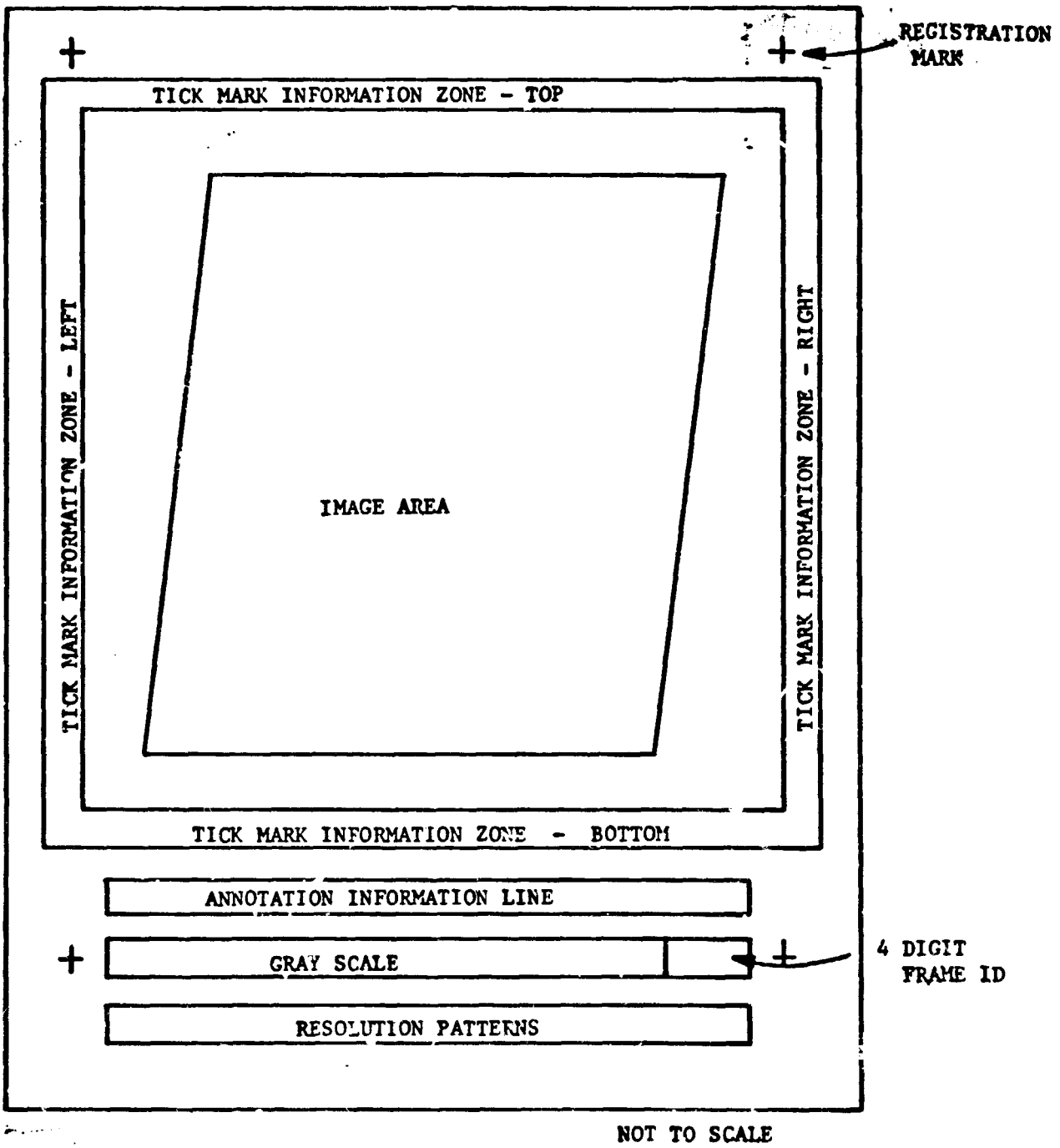


Figure 3.5.2-1. Relationship Between Annotation Information and Image Writing Area

DATA FIELD:	a	b	c	d	e	f	g	h	i
CHARACTER POSITION:	12345678	1111111111722222 90123456789012345	222233333 678901234	3333344444444455 56789012345678901	5555555566 2345678901	66666666777777 23456789012345	777788888888 678901234567	1 8899999999990 8901234567890	111111111111111 000000000111111 123456789012345
EXAMPLE:	07JUN-83	C N33-05/W115-18	D.02-101	N N33-03/W115-42	M 1	SUN EL30 A015	R P-CP-N	NASA LANDSAT	E-41042-16032-1
OTHER POSSIBLE DATA ELEMENTS:			A		234567		S S NG A G U O		2 3 4 5 6 7

Figure 3.5.2-2. The Annotation Field for Landsat-D TM Imagery

Table 3.5.2-13. CCT-AT Annotation Record: Field 1 (Sheet 1 of 3)

BYTE	DATA	DESCRIPTION
1-2	N N / N N	RECORD NUMBER (INTEGER *4)
5-6 7-8	S_1 T / S_2 S_3	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 022_8 (DEFAULT) T = RECORD TYPE, ALWAYS = 333_8 (ANNOTATION) S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-10 11-12	N N / N N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 180

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
a	13-20	09JUN83␣	DAY, MONTH AND YEAR OF SCENE EXPOSURE
b	21-37	C␣N33-05/W115-18␣	FORMAT CENTER - LATITUDE AND LONGITUDE AT THE CENTER OF THE TM IMAGE FORMAT ARE INDICATED IN DEGREES AND MINUTES
c	38-46	D202-101␣	NOMINAL CENTER PATH AND ROW IDENTIFIER, AND ORBITAL DIRECTION INDICATOR. THE 202 IS PATH NUMBER AND 101 IS ROW NUMBER. "A" = ASCENDING NODE "D" = DESCENDING NODE
d	47-63	N␣N33-03/W115-42␣	NOMINAL CENTER LATITUDE AND LONGITUDE
e	64-73	T␣1234567␣	SENSOR AND SPECTRAL BAND IDENTIFICATION CODE. THE PRESENCE OF A NUMBER INDICATES PRESENCE OF THAT BAND; A BLANK FIELD INDICATES ABSENCE OF THAT BAND. IN THE EXAMPLE, ALL BANDS ARE PRESENTED IN POSITION. ONLY ONE BAND IS PRESENT NORMALLY.

Table 3.5.2-13. CCT-AT Annotation Record: Field 1 (Sheet 2 of 3)

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
f	74-87	SUN␣EL30␣A015␣	SUN ANGLES - THE SUN ELEVATION ANGLE AND SUN AZIMUTH ANGLE MEASURED CLOCKWISE FROM TRUE NORTH AT THE MIDPOINT OF TM FRAME IS SPECIFIED TO THE NEAREST DEGREE. USUALLY A BLANK FOR NIGHT PASSES.
g	88-99	G␣P-CP-N␣␣␣␣	PROCESSING CODES:
	88		CHARACTER POSITION 88 DEFINES THE TYPE OF GEOMETRIC CORRECTION APPLIED TO THE DATA: "U" = UNCORRECTED "S" = SYSTEM LEVEL CORRECTED "G" = GEOMETRICALLY CORRECTED BASED ON GEODETIC CONTROL POINTS (NO TEMPORAL REGISTRATION PERFORMED) "T" = TEMPORALLY REGISTERED USING GEODETIC INFORMATION "R" = TEMPORAL REGISTRATION TO A SINGLE REFERENCE SCENE (NO GEODETIC INFORMATION AVAILABLE)
	90		CHARACTER POSITION 90 DEFINES THE PROJECTION: "P" = POLAR STEREOGRAPHIC PROJECTION "S" = SPACE OBLIQUE MERCATOR PROJECTION "U" = UNIVERSAL TRANSVERSE MERCATOR PROJECTION
	92		CHARACTER POSITION 92 INDICATES THE RESAMPLING ALGORITHM: "C" = CUBIC CONVOLUTION "N" = NEAREST NEIGHBOR
	93		CHARACTER POSITION 93 INDICATES THE TYPE OF EPHEMERIS DATA USED TO COMPUTE THE IMAGE CENTER: "P" = PREDICTIVE "G" = GPS "D" = DEFINITIVE

NOTE: CHARACTER SUB-FIELDS ARE SHOWN IN FIGURE 3.5.4-4.

Table 3.5.2-13. CCT-AT Annotation Record: Field 1 (Sheet 3 of 3)

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
	95		CHARACTER POSITION 95 GIVES THE PROCESSING PROCEDURE: "N" = NORMAL PROCESSING PROCEDURE "A" = ABNORMAL PROCESSING PROCEDURE (DEFINED AS ANY PROCESSING PROCEDURE OTHER THAN THE NORMAL PROCEDURE)
h	100-112	NASA␣LANDSAT␣	INDENTIFIES THE AGENCY AND THE
i	113-127	E-41042-16032-1	SCENE IDENTIFICATION NUMBER--EACH IMAGE OR FRAME WILL HAVE A UNIQUE IDENTIFIER WHIXH WILL CONTAIN ENCODED INFORMATION CONSISTING PRIMARILY OF TIME OF EXPOSURE RELATIVE TO LAUNCH. ITS FORMAT IS E-MDDDD-HHMMS-B AND IS INTERPRETED AS FOLLOWS
	113		"E" = ENCODED PROJECT IDENTIFIER (FIXED)
	115		"M" = MISSION
	116-119		DDDD = DAY NUMBER, RELATIVE TO LAUNCH, AT TIME OF OBSERVATION
	121-122		HH = HOUR AT TIME OF OBSERVATION
	123-124		MM = MINUTE AT TIME OF OBSERVATION
	125		S = TENS OF SECONDS AT TIME OF OBSERVATION
	127		B = BAND IDENTIFICATION CODE: 1,2,3,4,5,6, OR 7
	128		
	129-180		BLANK FILL

Table 3.5.3-1. Variable Segment of the CCT-AT Image File Descriptor Record
(Sheet 1 of 3)

BYTE	TYPE	DESCRIPTION
1-6	N	NUMBER OF IMAGE RECORDS, ALWAYS = UPTO 2864 FOR BSQ FORMATTED TAPES AND UPTO 20048 FOR BIL FORMATTED TAPES
7-12	N	IMAGE RECORD LENGTH, ALWAYS = 3600 BYTES
13-36		BLANKS
		PIXEL GROUP DATA
37-40	N	NUMBER OF BITS PER PIXEL, ALWAYS = 8
41-44	N	NUMBER OF PIXELS PER DATA GROUP, ALWAYS = 1
45-48	N	NUMBER OF BYTES PER DATA GROUP, ALWAYS = 1
49-52	A	JUSTIFICATION OF PIXELS WITHIN DATA GROUP, ALWAYS = 'ROLR' INDICATING THAT PIXELS ARE RIGHT JUSTIFIED WITH FIRST PIXEL LEFTMOST
		IMAGE DATA
53-56	N	NUMBER OF IMAGES (BANDS) IN THIS FILE, ALWAYS = 1 FOR BSQ FORMAT, AND ALWAYS = 7 FOR BIL FORMAT
57-64	N	NUMBER OF LINES PER IMAGE 2864 MAXIMUM
65-68	N	NUMBER OF LEFT BORDER PIXELS PER LINE ALWAYS = 0
69-76	N	NUMBER OF IMAGE PIXELS PER LINE, ALWAYS = 3088 (NOMINAL)
77-80		NUMBER OF RIGHT BORDER PIXELS PER LINE, ALWAYS = 0
81-84		NUMBER OF TOP BORDER LINES, ALWAYS = 0

Table 3.5.3-1. Variable Segment of the CCT-AT Image File Descriptor Record
(Sheet 2 of 3)

BYTE	TYPE	DESCRIPTION
85-88		NUMBER OF BOTTOM BORDER LINES, ALWAYS = 0
89-92		INTERLEAVING INDICATOR, EITHER = BSQ OR BIL
		RECORD DATA IN THIS FILE
93-94		NUMBER OF PHYSICAL RECORDS PER LINE, ALWAYS = 1
95-96		NUMBER OF PHYSICAL RECORDS PER MULTISPECTRAL LINE, ALWAYS = 1
97-100		NUMBER OF BYTES OF PREFIX DATA PER RECORD, ALWAYS = 18
101-108		NUMBER OF BYTES OF IMAGE DATA PER RECORD, ALWAYS = 3088
109-112		NUMBER OF BYTES OF SUFFIX DATA PER RECORD, ALWAYS = 64
113-116		PREFIX/SUFFIX REPEAT FLAG, ALWAYS = BLANK
		PREFIX/SUFFIX DATA LOCATORS THE FORMAT OF A 8 BYTE ASCII LOCATOR SHALL BE AS FOLLOWS: 4 BYTES - BYTE NUMBER WITHIN PREFIX/SUFFIX WHICH BEGINS THE FIELD TO BE LOCATED 2 BYTES - LENGTH IN BYTES OF THE FIELD TO BE LOCATED 1 BYTE - THE LETTER P OR S CODED IN THIS BYTE INDICATES THAT THE INFORMATION IS IN THE SCAN LINE PREFIX OR SUFFIX RESPECTIVELY 1 BYTE - TYPE OF DATA A = ALPHANUMERIC, B = BINARY, N = NUMERIC
117-124		SCAN LINE NUMBER LOCATOR, ALWAYS = 001702PN
125-132		IMAGE (BAND) NUMBER LOCATOR, ALWAYS = 001601PN
133-140		TIME OF SCAN LINE LOCATOR, ALWAYS = 321716SA
141-148		LEFT FILL COUNT LOCATOR, ALWAYS = BLANK

Table 3.5.3-1. Variable Segment of the CCT-AT Image File Descriptor Record (Sheet 3 of 3)

BYTE	TYPE	DESCRIPTION
149-156		RIGHT FILL COUNT LOCATOR ALWAYS = BLANK
157-188		BLANK
189-196		SCAN LINE QUALITY CODE LOCATOR, ALWAYS = 323304SA
197-204		CALIBRATION INFORMATION FIELD LOCATOR, ALWAYS = 324124SN
205-212		GAIN VALUES FIELD LOCATOR, ALWAYS = 325704SN
213-220		BIAS VALUES FIELD LOCATOR ALWAYS = 326104SN
221-252		BLANKS
		PIXEL DATA DESCRIPTION
253-256		NUMBER OF LEFT FILL BITS WITHIN PIXEL, ALWAYS = 0
257-260		NUMBER OF RIGHT FILL BITS WITHIN PIXEL, ALWAYS = 0
261-268		MAXIMUM DATA RANGE OF PIXEL, ALWAYS = 255
269-3420		BLANKS

BAND 1 LINE 1
BAND 2 LINE 1
BAND 3 LINE 1
BAND 4 LINE 1
BAND 5 LINE 1
BAND 6 LINE 1
BAND 7 LINE 1
BAND 1 LINE 2
BAND 2 LINE 2
BAND 3 LINE 2
•
•
•
BAND 7 LINE 2
•
•
•
•
•

SCAN LINE #1

BAND 1 LINE 16
BAND 2 LINE 16
BAND 3 LINE 16
BAND 4 LINE 16
BAND 5 LINE 16
BAND 6 LINE 16
BAND 7 LINE 16

Figure 3.5.3-1. Band Interleaved By Line Format

Table 3.5.3-2. CCT-AT Image Data Record
(Sheet 1 of 3)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4)
5-6 7-8	S_1 T S_2 S_3	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 355_8 (FOR IMAGE) T = RECORD TYPE, ALWAYS = 355_8 (FOR DATA) S_2 = 2ND SUBTYPE, ALWAYS = 333_8 (DATA BY QUADRANT BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-12	N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 3600
13-18	0 0 Q B L L	SCAN LINE IDENTIFICATION (SLID) BYTE 1 and = 0 BYTE 3 (Q) = QUADRANT NUMBER RANGES FROM 1-4 (BINARY) BYTE 4 (B) = BAND NUMBER RANGES FROM 1-7 (BINARY) TYPE 5 AND 6 (L) = LINE NUMBER WITHIN THE QUADRANT FOR A PARTICULAR BAND RANGES FROM 1 TO 2864 (MAXIMUM)
19-3106		IMAGE PIXELS (BINARY) NOMINALLY 3088 PIXELS PER HALF LINE ONE BYTE PER PIXEL.
3106-3204		ZERO FILL
3205-3268		SUPPORT DATA
3205-3208	LL	COUNTED LINE LENGTH (INTEGER *4) NUMBER OF PIXELS COUNTED IN THE ORIGINAL GEOMETRICALLY UNCORRECTED SCAN LINE: IT IS DETERMINED FROM THE ACTIVE TIME LENGTH COUNTED BY THE DSM (PASS 1)
3209-3212	LL	IMBEDDED LINE LENGTH (INTEGER *4) NUMBER OF PIXELS IN THE SCAN LINE DETERMINED FROM THE LINE LENGTH INFORMATION IMBEDDED IN THE DATA STREAM BY THE SPACECRAFT (PASS 1)

Table 3.5.3-2. CCT-AT Image Data Record
(Sheet 2 of 3)

BYTE	DATA	DESCRIPTION
3213-3216	LL	CURRENT LINE LENGTH (INTEGER *4) NUMBER OF PIXELS IN THIS SCAN LINE AFTER PIXEL ALIGNMENT (PASS)
3217-3220	LL	LINE LENGTH RECEIVED FROM PCS (INTEGER *4)
3221-3236	Y Y D D D H H M M S S T T T F F	SPACESCRAFT TIME CODE (ASCII) YY = YEAR (00-99) DDD = DAY OF YEAR (001-366) HH = HOUR (00-59) MM = MINUTE (00-59) SS = SECOND (00-59) TTT = MILLISECOND (000-999) FF = SIXTEENTH OF MILLISECOND (0-9)
3237-3244	Q_1 Q_2 Q_3 Q_4 b b b b	QUALITY INDICATORS (ASCII) Q_1 = SPACECRAFT TIME CODE QUALITY 0 = GOOD 1 = SUBSTITUTED/FLY WHEELS Q_2 = SCAN LINE QUALITY 0 = GOOD 1 = LINE SUBSTITUTED ON INPUT (PASS 1) 2 = LINE SUBSTITUTED/FILLED ON OUTPUT (PASS 2) 3 = LINE SUBSTITUTED/FILLED ON INPUT AND OUTPUT 4 = LINE SUBSTITUTED/FILLED DUE TO BAD DETECTOR Q_3 = CAL. LAMP VALUE QUALITY 0 = GOOD 1 = SUBSTITUTED 2 = NOT USED 3 = NOT USED Q_4 = LINE LENGTH QUALITY RECEIVED FROM PCS 0 = GOOD 1 = SUBSTITUTED
3245-3248	N	NUMBER OF SUBSTITUTED CAL. LAMP VALUES (INTEGER *4) NUMBER OF CAL. LAMP VALUES THAT WERE SUBSTITUTED (OR REJECTED) IN THIS SCAN LINE

Table 3.5.3-2. CCT-AT Image Data Record
(Sheet 3 of 3)

BYTE	DATA	DESCRIPTION
3249-3252	C	CAL. LAMP STATE VALUE (REAL *4) COMPUTED CAL. LAMP STATE VALUE NORMALLY ONE OF 8 STATES, CHANGING EVERY 40 SCANS
3253-3256	G	CAL. LAMP GAIN VALUE (REAL *4) COMPUTED IN THE RADIOMETRIC CORRECTION PROCESS USING CAL. LAMP DATA
3257-3260	B	CAL. LAMP BIAS VALUE (REAL *4) COMPUTED IN THE RADIOMETRIC CORRECTION PROCESS USING CAL. LAMP DATA
3261-3264	G	APPLIED GAIN VALUE (REAL *4) FINAL GAIN VALUE USED TO COMPUTE THE RLUTS, AFTER SCENE CONTENT CORRECTION AND BLENDING
3265-3268	B	APPLIED BIAS VALUE (REAL *4) FINAL BIAS VALUE USED TO COMPUTE THE RLUTS, AFTER SCENE CONTENT CORRECTION AND BLENDING
3269-3600		ZERO FILL

j. High frequency along scan matrix - this ancillary data record shall consist of 35 samples for each of the 374 possible scans of the scene. The format is specified in Table 3.5.2-11.

k. High frequency cross scan matrix - the record format for this is specified in Table 3.5.2-12.

l. Annotation record - the annotation record shall contain the alphanumeric inforation printed at the bottom of an image on the film product. Figure 3.5.2-1 describes the location of the annotation in relation to the image on film. Figure 3.5.2-2 given an example of an annotation line. The record structure is described in Table 3.5.2-13.

3.5.3 IMAGE FILE

The image files shall contain image pixels corresponding to one scene quadrant. For the BSQ format, seven image files shall exist, each file containing image data for one band. For the BIL format, one image file shall contain the entire scene quadrant. The record formats in the file remain the same in any case. The first record in the file shal be the file descriptor record, and its variable segment format shall be as described in Table 3.5.3-1; the fixed segment format shall be described in Table 3.5.2-1. One image record shall correspond to half a line of an image in one band. Up to 2992 image records shall exist for each file in BSQ format tape. Image records in BIL format shall appear as described in Figure 3.5.3-1. Up to 20944 image records shall exist in the image file for BIl format tape. The image record format shall be as described in Table 3.5.3-2. In either the BIL or BSQ format the thermal band

data is replicated (as a part of the partial correction process) such that it appears similar in format to the data in other spectral bands. The thermal band replication is defined in GES 10033, Landsat-D Data Format Control Book, Volume VI, Appendix A, Partially Processed TM High Density Tape (HDT-AT).

3.5.4 TRAILER FILE

The trailer file shall contain the quality infomration on the image data for the entire interval. The quality information consists of:

a. Quality indicator summary counts

b. Line quality maps

c. R-tape read errors for pass 1 and pass 2

d. A-tape write errors for pass 2.

The content and format of the trailer file are given in Tables 3.5.4-1 and 3.5.4-2.

3.6 CCT-PT FILE DESCRIPTIONS

The following paragraphs describe all the files in the CCT-PT logical volume.

3.6.1 CCT-PT VOLUME DIRECTORY FILE

The volume directory shall consist of two types of records: volume descriptor records and file pointer records. The volume descriptor record shall appear at the beginning and end of a logical volume. When the record appears at the end of the logical volume, it will be called null volume descriptor. The format for the volume descriptor shall be as described in Table 3.6.1-1. A file pointer record shall exist for every file in the logical volume. Its format shall be as

Table 3.5.4-1. CCT-AT Trailer File Descriptor Record (Variable Segment)

BYTE	TYPE	DESCRIPTION
1-6	N	NUMBER OF TRAILER RECORDS, ALWAYS = 1
7-12	N	TRAILER RECORD LENGTH, ALWAYS = 4500
13-360		BLANKS

Table 3.5.4-2. CCT-AT Trailer Data Record
(Sheet 1 of 2)

BYTE	DATA	DESCRIPTION
1-4	N	RECORD NUMBER (INTEGER *4) ALWAYS = 1
5-6	S_1 T	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 022_8 (DEFAULT) T = RECORD TYPE, ALWAYS = 366_8 (TRAILER) S_2 = 2ND SUBTYPE, ALWAYS = 111_8 (DATA BY INTERVAL BASIS) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
7-8	S_2 S_3	
9-12	N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 4500
13-16	N	SCAN COUNT (INTEGER *4) TOTAL NUMBER OF SCAN IN THE INTERVAL
17-20	NQ1	QUALITY INDICATOR SUMMARY COUNTS (INTEGER *4) THE NUMBER OF SCANS (NQi) IN THE INTERVAL HAVING THE QUALITY Qi. WHERE Qi ARE: Q1 = SCAN WITH SUBSTITUTED OR FLYWHEELED SPACECRAFT TIME Q2 = SCAN WITH GOOD IMAGE DATA Q3 = SCAN WITH IMAGE DATA (SCAN LINES) SUBSTITUTED ON THE INPUT (PASS 1) Q4 = SCAN WITH IMAGE DATA (SCAN LINES) SUBSTITUTED ON THE OUTPUT (PASS 2) Q5 = SCAN WITH IMAGE DATA (SCAN LINES) SUBSTITUTED BOTH ON INPUT AND OUTPUT
21-24	NQ2	
25-28	NQ3	
29-32	NQ4	
33-2032	LQM(1) . . . . . LQM(500)	LINE QUALITY MAPS (INTEGER *2) INDICATES THE NUMBER OF CONSECUTIVE SCANS THAT HAVE THE SAME QUALITY Qi = Q2, Q3, Q4, and Q5 DEFINED ABOVE. THE LINE QUALITY MAP REPORTS ONLY THE MOST SEVERE ERRORS. HIGHER THE QUALITY INDICATOR NUMBER MORE SEVERE IS THE ERROR SPACE IS RESERVED FOR UP TO 1000 LINE QUALITY MAP COUNTS. UNUSED SPACE IS ZERO FILLED.

BYTE	DATA	DESCRIPTION
2033- 2832	$N_1(1)$ $N_2(1)$ • • • • • $N_1(200)$ $N_2(200)$	R-TAPE READ ERRORS PASS I (INTEGER *2) COUNT OF CORRECTED AND UNCORRECTED BIT ERRORS FOR THE INTERVAL ON A 5 SECOND BASIS. (LAST 5 SECONDS IGNORED). N_1 = UNCORRECTED ERROR COUNT N_2 = CORRECTED ERROR COUNT SPACE RESERVED FOR 1000 SECONDS OF DATA (200 SAMPLE) UNUSED SPACE IS ZERO FILLED
2833-3632	$N_1(1)$ $N_2(1)$ • • • • • $N_1(200)$ $N_2(200)$	R-TAPE READ ERRORS PASS 2 (INTEGER *2) FORMAT SAME AS ABOVE
3633-4432	$N_1(1)$ $N_2(1)$ • • • • • $N_1(200)$ $N_2(200)$	A-TAPE WRITE ERRORS (INTEGER *2) FORMAT SAME AS ABOVE
4433-4500	Z	ZERO FILL

Table 3.6.1.1. CCT-PT Volume Descriptor Record
(Sheet 1 of 4)

BYTE	TYPE*	DESCRIPTION
1-4	N	RECORD NUMBER, ALWAYS 1
5	N	1ST RECORD SUBTYPE CODE, ALWAYS 300_8 = VOLUME DIRECTORY
6	N	RECORD TYPE CODE, ALWAYS 300_8 = SUPERSTRUCTURE
7	N	2ND RECORD SUBTYPE CODE 077_8 IF NULL VOLUME DESCRIPTOR, OTHERWISE 022_8.
8		3RD RECORD SUBTYPE CODE, ALWAYS 022_8
9-12	N	LENGTH OF THIS RECORD, ALWAYS 360
13-14	A	ASCII/EBCDIC FLAG, ALWAYS AØ = ASCII
15-16		BLANK
17-28	A	SUPERSTRUCTURE FORMAT CONTROL DOCUMENT NUMBER, ALWAYS CCB-CCT-0002
29-30	A	REVISION NUMBER OF THE ABOVE DOCUMENT
31-32	A	REVISION LETTER OF THIS SUPERSTRUCTURE RECORD FORMATS. INITIALLY CODED ØA, THIS CODE UPDATES ONE LETTER CHARACTER, ALPHABETICALLY, EACH TIME THERE IS A CHANGE TO THE FORMAT OF A SUPERSTRUCTURE RECORD (AS OPPOSED TO A CHANGE TO THE CONTROL DOCUMENT WHICH MAY NOT HAVE BEEN A CHANGE IN ACTUAL RECORD FORMAT). THE 26TH REVISION IS CODED AA, THE 27TH AB, THE 28TH AC, AND SO ON.
33-44	A	SOFTWARE RELEASE NUMBER. THE SOFTWARE REFERRED TO HERE IS THAT USED TO WRITE THIS LOGICAL VOLUME. THE CODE IS ALPHANUMERIC, LEFT-JUSTIFIED CODE ASSIGNED BY THE PRODUCING FACILITY. IT IS UPDATED FOR EACH MODIFICATION.
45-60**	A	ID FOR PHYSICAL VOLUME CONTAINING THIS VOLUME DESCRIPTOR (TAPE ID). THIS IS THE SAME CODE THAT IS WRITTEN EXTERNALLY ON THE PHYSICAL VOLUME. WHEN A LOGICAL VOLUME SPANS PHYSICAL VOLUMES, THE CODE IS UPDATED FOR THE CONTINUATION PHYSICAL VOLUMES.

*A = ALPHANUMERIC, N = NUMERIC, B = BINARY
**FIELDS TO BE UPDATED IN A REPEATED VOLUME DIRECTORY

Table 3.6.1.1. CCT-PT Volume Descriptor Record
(Sheet 2 of 4)

BYTE	DATA	DESCRIPTION
61-76*	A	LOGICAL VOLUME ID = TAPE ID OF THE FIRST TAPE OF THE LOGICAL VOLUME.
77-92	A	VOLUME SET ID, ALWAYS BLANK
93-94	N	NUMBER OF PHYSICAL VOLUMES IN THE SET. = 1 FOR 6250 BPI TAPE, = 3 FOR 1600 BPU TAPES.
95-96	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE FIRST TAPE WITHIN THE LOGICAL VOLUME, = 1
97-98	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE LAST TAPE WITHIN THE LOGICAL VOLUME = 3 FOR 1600 BPI TAPES; 1 FOR 6250 BPI
99-100**	N	PHYSICAL VOLUME SEQUENCE NUMBER OF THE CURRENT TAPE = 1, 2 OR 3
101-104**	N	THIS FIELD GIVES THE FILE NUMBER WITHIN THE LOGICAL VOLUME OF THE FIRST FILE WHICH FOLLOWS THIS VOLUME DIRECTORY. THIS CAN BE LARGER THAN ONE (THE NUMBER OF THE FIRST DATA FILE OF A LOGICAL VOLUME) WHEN A LOGICAL VOLUME SPANS MULTIPLE PHYSICAL VOLUMES. VOLUME DIRECTORY FILES ARE NOT INCLUDED IN THE FILE SEQUENCE NUMBER COUNT.
105-108	N	LOGICAL VOLUME NUMBER WITHIN VOLUME SET, ALWAYS 1
109-112**	N	LOGICAL VOLUME NUMBER WITHIN PHYSICAL VOLUME, ALWAYS 1
113-120*	A	LOGICAL VOLUME CREATION DATE. THE CODE IS OF FORM YYYYMMDD
121-128*	A	LOGICAL VOLUME CREATION TIME. THE CODE IS OF THE FORM HHMMSSXX WHERE XX IS HUNDREDTHS OF SECONDS.
129-140*	A	LOGICAL VOLUME GENERATING COUNTRY, ALWAYS U.S.A.
141-148*	A	LOGICAL VOLUME GENERATING AGENCY, ALWAYS NASA GSFC.
149-160*	A	LOGICAL VOLUME GENERATING FACILITY = TIPS␣1 OR TIPS␣2

*UNDEFINED IN NULL VOLUME DESCRIPTOR
**FIELDS TO BE UPDATED IN A REPEATED VOLUME DIRECTORY

Table 3.6.1.1. CCT-PT Volume Descriptor Record
(Sheet 3 of 4)

BYTE	TYPE	DESCRIPTION
161-164*	N	NUMBER OF POINTER RECORDS IN VOLUME DIRECTORY = 21 FOR BSQ FORMAT, = 15 FOR BIL FORMAT
165-168*	N	NUMBER OF RECORDS IN VOLUME DIRECTORY = 22 FOR BSQ FORMAT = 16 FOR BIL FORMAT
169-260		VOLUME DESCRIPTOR SPARE SEGMENT, ALWAYS BLANK
		HDT-P TAPE IDENTIFICATION DATA
261-276	A	HDT-P TAPE REEL IDENTIFICATION CONTAINS 16 BYTES OF TAPE ID IN THE FORMAT LNTHPYYDDDXXbbbb "L" - LANDSAT MISSION DESIGNATOR N = MISSION NUMBER 4 FOR LANDSAT-D 5 FOR LANDSAT-D' 0 FOR BOTH LANDSATS D AND D' "T" = TM SENSOR "HP" = TAPE TYPE (HDT-PT) YY = YEAR. LAST 2 DITIS (00-99) DDD = DAY OF YEAR ON WHICH THE ORIGINAL HDT-PT WAS GENERATED XX = UNIQUE TAPE ID FOR EACH HDT-PT GENERATED ON DAY DDD (1-99) b = BLANK
277-284	A	SOURCE OF HDT-PT PRODUCTION, EITHER CONTAINS THE CHARACTER STRING TIPS#1bb OR ADDSbbbb OR TIPS#2bb OR LASbbbb
285-288	A	HDDR IDENTIFICATION - RECORDER ON WHICH THE ORIGNAL HDT-PT WAS GENERATED 0-99
289-304	A	SOFTWARE VERSION NUMBER OF THE SOFTWARE WHICH CREATED THE HDT-PT
305-308		ZERO FILL
309-320	A	IMAGERY IDENTIFICATION WITHIN THE LOGICAL VOLUME
309-320		SCENE IDENTIFICATION NUMBER - EACH SCENE HAS A UNIQUE IDENTIFIER WHICH WILL CONTAIN ENCODED INFORMATION CONSISTING PRIMARILY OR TIME OF

*UNDEFINED IN NULL VOLUME DESCRIPTOR

Table 3.6.1.1. CCT-PT Volume Descriptor Record
(Sheet 4 of 4)

BYTE	TYPE	DESCRIPTION
		ACQUISITION (UNIVERSAL TIME) RELATIVE TO LAUNCH. ITS FORMAT IS E-NDDDD-HHMMS-M, AND IS INTERPRETED AS FOLLOWS: E = ENCODED PROJECT IDENTIFIER N = LANDSAT MISSION NUMBER DDDD = DAY NUMBER, RELATIVE TO LAUNCH, AT TIME OF OBSERVATION HH = HOUR AT TIME OF OBSERVATION MM = MINUTE AT TIME OF OBSERVATION S = TENS OF SECONDS
321-324	N	QUADRANT NUMBER OF THE SCENE = 1, 2, 3 OR 4
325-328	N	INTERLEAVING TYPE: 0 = BSQ, 1 = BIL
328-360		BLANK

described in Table 3.6.1-2. The file pointer records do not appear at the end of the logical volume. When the logical volume consists of three physical tapes, a copy of the volume directory file including the file pointer records shall appear on each tape.

3.6.2 CCT-PT HEADER FILE

The header file shall contain the data belonging to the header and annotation major frame of the HDT-PT. The file shall consist of four records:

a. File descriptor record - this record consists of a 180-byte fixed segment is described in Table 3.5.2-1. The format for the variable segment is described in Table 3.6.2-1.

b. Header record - this record shall contain image identification and data characteristics. The format for this record is described in Table 3.6.2-2.

c. Quality data record - the format for this record shall be as described in Table 3.6.2-3.

d. Annotation - the annotation record contains both the alphanumeric information printed at the bottom of a film product and the tickmark information that surrounds the fully processed framed image for a specific map projection. Figure 3.5.2-1 describes the location of the annotation and tick marks in relation to the film image. Figure 3.5.2-2 gives an example of an annotation line. The first half of the annotation record which includes record identification and annotation line is described in Table 3.6.2-4.

Table 3.6.1.2. CCT-PT File Pointer Record
(Sheet 1 of 2)

BYTE	TYPE	DESCRIPTION
1-4	N	RECORD NUMBER, ALWAYS = 2
5	N	1ST RECORD SUBTYPE CODE = 333_8 = POINTER
6	N	RECORD TYPE CODE, ALWAYS = 300_8 = SUPERSTRUCTURE
7	N	2ND RECORD SUBTYPE CODE = 022_8 (DEFAULT)
8	N	3RD RECORD SUBTYPE CODE = 022_8 (DEFAULT)
9-12	N	LENGTH OF THIS RECORD, ALWAYS = 360
13-14	A	ASCII/EBCDIC FLAG FOR THE REFERENCED FILE, ALWAYS = A␣ FOR ASCII
15-16		BLANK
17-20	N	REFERENCED FILE NUMBER = 1 TO 21 FOR BSQ, 1 TO 15 FOR BIL
21-36	A	REFERENCED FILE NAME. ONE OF THE FOLLOWING: HEADER␣N WHERE (N = 1 TO 7) OR IMAGERY␣N WHERE N = 1 FOR BIL FORMAT N = 1 TO 7 FOR BSQ FORMAT TRAILER␣N WHERE (N = 1 TO 7)
37-64	A	REFERENCED FILE CLASS, ONE OF THE FOLLOWING: LEADER, IMAGERY, TRAILER
65-68	A	REFERENCED FILE CLASS CODE LEAD FOR LEADER, IMGY FOR IMAGERY AND TRAL FOR TRAILER
69-96	A	REFERENCED FILE DATA TYPE, ALWAYS = MIXED␣BINARY␣AND␣ASCII
97-100	A	REFERENCED FILE DATA TYPE CODE, ALWAYS = MBAA
101-108	N	NUMBER OF RECORDS IN REFERENCED FILE = 4 FOR HEADER FILE, = 2984 FOR IMAGERY FILE (BSQ FORMAT) = 20882 FOR IMAGERY FILE IN BIL FORMAT = 2 FOR TRAILER FILE
109-116	N	REFERENCED FILE FIRST RECORD LENGTH = 540 FOR HEADER FILE = 3600 FOR IMAGERY FILE = 540 FOR TRAILER FILE

BYTE	TYPE	DESCRIPTION
117-124	N	REFERENCED FILE MAXIMUM RECORD LENGTH = 6480 FOR HEADER FILE = 3600 FOR IMAGERY FILE = 7200 FOR TRAILER FILE
125-136	A	REFERENCED FILE RECORD LENGTH TYPE = FIXEDbLENGTH FOR IMAGERY FILE = VARIABLEbLEN FOR ALL OTHER FILES
137-140	A	REFERENCED FILE RECORD LENGTH TYPE CODE = FIXb FOR FIXED LENGTH = VARb FOR VARIABLE LENGTH
141-142	N	REFERENCED FILE PHYSICAL VOLUME NUMBER, START OF FILE = 1, 2 OR 3 FOR 1600 BPI TAPES = 1 FOR 6250 BPI TAPES
143-144	N	REFERENCED FILE PHYSICAL VOLUME NUMBER, END OF FILE - SAME FORMAT AS ABOVE
145-152	N	REFERENCED FILE PORTION, 1ST RECORD NUMBER FOR THIS PHYSICAL VOLUME, NOMINALLY = 1 EXCEPT WHEN THE IMAGE FILE SPANS OVER THREE 1600 BPI TAPES. IN THAT CASE, THE APPROPRIATE RECORD NUMBER WILL BE ENTERED.
153-260		BLANK
261-360		UNUSED (BLANK)

Table 3.6.2-1. Variable Segment of the CCT-PT Header File Descriptor Record (Sheet 1 of 2)

BYTE	TYPE	DESCRIPTION
1-6	N	NUMBER OF HEADER RECORDS, ALWAYS = 1
7-12	N	HEADER RECORD LENGTH, ALWAYS = 540
13-18	N	NUMBER OF QUALITY RECORDS, ALWAYS = 1
19-24	N	QUALITY RECORD LENGTH, ALWAYS = 6480
25-30	N	NUMBER OF ANNOTATION RECORDS, ALWAYS = 1
31-36	N	ANNOTATION RECORD LENGTH, ALWAYS = 540
37-52	A	IMAGE IDENTIFICATION FIELD LOCATOR THE FORMAT OF A LOCATOR IS AS FOLLOWS: 6 BYTES = RECORD NUMBER CONTAINING THAT FIELD 6 BYTES = BYTE NUMBER OF THE FIELD WITHIN THE RECORD 3 BYTES = LENGTH OF THE FIELD IN BYTES 1 BYTE = TYPE OF DATA CODE A - ALPHANUMERIC, N - NUMERIC, B - BINARY THE CORRESPONDING VALUE FOR SCENE IDENTIFICATION LOCATOR IS 000002000013012A
53-68	A	WRS IDENTIFICATION LOCATOR, ALWAYS = 000002000025008A
69-84	A	MISSION IDENTIFICATION FIELD LOCATOR, ALWAYS = 000002000014001A
85-100	A	SENSOR IDENTIFICATION FIELD LOCATOR, ALWAYS = 000002000045008A
101-116		IMAGE CENTER DATE-TIME FIELD LOCATOR, ALWAYS = 000002000207016A
117-132		GEOGRAPHIC REFERENCE FIELD LOACTOR, ALWAYS = BLANK
133-148		IMAGE PROCESSING PERFORMED FIELD LOCATOR, ALWAYS = 000002000240005A
149-164		IMAGERY FORMAT FIELD LOCATOR, ALWAYS = 000002000238002A
165-180		BANDS INDICATOR LOCATOR, ALWAYS = 000002000249007A

Table 3.2-1. Variable Segment of the CCT-PT Header, File Descriptor Record (Sheet 2 of 2)

BYTE	TYPE	DESCRIPTION
181-196		QUADRANT INDICATOR LOCATOR, ALWAYS = 0000020002570O4N
197-360		BLANKS

Table 3.6.2-2. CCT-PT Header Record Format
(Sheet 1 of 8)

BYTE	DATA	DESCRIPTION
1-2 3-4	N N N N	RECORD NUMBER (INTEGER *4) ALWAYS = 2
5-6 7-8	S_1 T S_2 S_3	RECORD TYPE S_1 = 1 ST SUBTYPE, ALWAYS = 022_8 (DEFAULT) T = RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-10 11-12	N N N N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 540
13-14 15-16 17-18 19-20 21-22 23-24	␣ N D D D D H H M M S B	IMAGE IDENTIFICATION (ASCII) UNIQUE IMAGE IDENTIFIER OF THE FORM: ␣NDDDDHHMMSB WHERE N = LANDSAT MISSION NUMBER 4 = D 5 = D' DDDD = DAY NUMBER, RELATIVE TO LAUNCH, AT TIME OF OBSERVATION HH = HOUR AT TIME OF OBSERVATION (00-23) MM = MINUTES AT TIME OF OBSERVATION (00-59) S = TENS OF SECONDS AT TIME OF OBSERVATION (0-5) B = BAND IDENTIFICATION CODE (TM: 1,2,3,4,5,6, OR 7)
25-26 27-28 29-30 31-32	␣ M P P P R R R	WRS DESIGNATOR (ASCII) UNIQUE TERRESTRIAL IMAGE IDENTIFIER OF THE FORM: ␣MPPPRRR WHERE M = A (FOR ASCENDING NODE) OR D (FOR DESCENDING NODE) PPP = NOMINAL WRS PATH NUMBER RRR = NOMINAL WRS ROW NUMBER

Table 3.6.2-2. CCT-PT Header Record Format
(Sheet 2 of 8)

BYTE	DATA	DESCRIPTION
		ZERO FILL
33-44	Z	
45-46	T M	SENSOR IDENTIFICATION (ASCII) THE SENSOR WILL ALWAYS BE TM "TM" = THEMATIC MAPPER B = BLANK
47-48	B B	
49-50	B B	
51-52	B B	
53-54	N N	ORBIT NUMBER (INTEGER *4) ORBIT NUMBER OF THE SPACECRAFT NNNN = ORBIT NUMBER
55-56	N N	
57-58	D_1 D_2	ACTIVE DETECTOR STATUS (ASCII) CONTAINS DETECTOR STATUS FOR THE 100 TM DETECTORS 0 = INACTIVE 1 = ACTIVE
59-60	D_3 D_4	
	.	
	.	
	.	
153-154	D_{97} D_{98}	
155-156	D_{99} D_{100}	
157-158	X X	ACTIVE DETECTOR COUNT (ASCII) THE NUMBER OF ACTIVE DETECTORS BASED ON THE ACTIVE DETECTOR STATUS XX = 00-99
159-160	N N	NOMINAL NUMBER OF PIXELS PER SCAN LINE (INTEGER *4) IN ORIGINAL GEOMETRICALLY UNCORRECTED IMAGE NNNN = 6176 (DECIMAL)
161-162	N N	
163-164	0 0	ZERO FILL
	:	

Table 3.6.2-2. GCT-PT Header Record Format
(Sheet 3 of 8)

BYTE	DATA	DESCRIPTION
171-172	0 0	
173-174	S S	BAND START SCAN LINE IDENTIFICATION (SLID). THE SLID FORMAT IS AS FOLLOWS: BYTES 1 AND 2 = 0 BYTE 3 = QUADRANT NUMBER, RANGES FROM 1 TO 4 BYTE 4 = BAND NUMBER, RANGES FROM 1 TO 7 BYTES 5 AND 6 = LINE NUMBER WITHIN THE BAND WITHIN THE QUADRANT
175-176	S S	
177-178	S S	
179-180	S S	WRS BAND CENTER SLID
181-182	S S	
183-184	S S	
185-186	S S	BAND STOP SLID
187-188	S S	
189-190	S S	
191-192	Y Y	BAND START SPACECRAFT TIME (ASCII) YY = LAST TWO DIGITS OF YEAR (00-99) DDD = DAY OF YEAR (001-366) HH = HOUR (TWO DIGITS: 00-23) MM = MINUTES (TWO DIGITS: 00-59) SS = SECONDS (TWO DIGITS: 00-59) TTT = MILLISECONDS (000-999) FF = SIXTEENTHS OF MILLISECONDS (00-15)
193-194	D D	
195-196	D H	
197-198	H M	
199-200	M S	
201-202	S T	
203-204	T T	
205-206	F F	
207-208	Y Y	BAND CENTER SPACECRAFT TIME (ASCII) (SAME FORMAT AS ABOVE)
209-210	D D	
211-212	D H	
213-214	H M	
215-216	M S	
217-218	S T	
219-220	T T	
221-222	F F	

BYTE	DATA	DESCRIPTION
223-224	L L	WRS DESIGNATOR IN FULLY PROCESSED IMAGE
225-226	L L	LLLL = SCAN LINE NUMBER OF 3 CENTER
227-228	P P	PPPP = PIXEL NUMBER OF WRS CENTER
229-230	P P	
231-332	Z	ZERO FILL
333	1	IMAGE DATA FORMAT (ASCII) "0" = GEOMETRICALLY UNCORRECTED "1" = GEOMETRICALLY CORRECTED
334	0	INTERLEAVING TYPE (ASCII) "0" = BSQ "1" = BIL
335	0	LINE INTERLEAVING COUNT (ASCII) "0" = NON-INTERLEAVED "7" = ALL SEVEN BANDS INTERLEAVED
336	1	GEOMETRIC CORRECTIONS APPLIED (ASCII) ALWAYS "1" = YES
337	0	GEOMETRIC CORRECTION DATA PRESENT (ASCII) ALWAYS = "0" = NO
338	1	RADIOMETRIC CORRECTION APPLIED (ASCII) ALWAYS = "1" = YES
339	0	RADIOMETRIC CORRECTION DATA PRESENT (ASCII) ALWAYS "0" = NO
340	R	RESAMPLING APPLIED (ASCII) "0" = NOT APPLICABLE "1" = CUBIC CONVOLUTION "2" = NEAREST NEIGHBOR

Table 3.6.2-2. CCT-PT Header Record Format (Sheet 5 of 8)

ORIGINAL PAGE IS
OF POOR QUALITY

BYTE	DATA	DESCRIPTION
341	M	MAP PROJECTION (ASCII) "0" = UNIVERSAL TRANSVERSE MERCATOR (UTM) "1" = POLAR STEREOGRAPHIC (PS) "2" = SPACE OBLIQUE MERCATOR (SOM)
342	0	IMAGE DATA JUSTIFICATION (ASCII) ALWAYS "0" = LEFT JUSTIFICATION
343	0	LOCATION OF MOST SIGNIFICANT BIT (ASCII) ALWAYS "0" = LEFT MOST BIT
344	7	NUMBER OF BANDS PER SCENE (ASCII) ALWAYS = "7"
345-346	1 2	BAND IDENTIFIER (ASCII) DESCRIBED BY THIS HEADER FILE IDENTIFIES THE BAND BY PLACING THE BAND NUMBER IN THE PROPER POSITION AND BLANKING ALL OTHER POSITIONS
347-348	3 4	
349-350	5 6	
351-352	7 b	
353-354	b b	BLANKS
355-368	b b	
369-372	N N N N	WRS OFFSET FROM FULLY PROCESSED IMAGE CENTER (INTEGER *4) RIGHT (POSITIVE) OR LEFT (NEGATIVE) PIXEL DISPLACEMENT OF THE WORLD REFERENCE SYSTEM DESIGNATION WITH RESPECT TO THE PICTURE CENTER PIXEL (SCAN LINE 2983 PIXEL 3484)
372-376	N N N N	NOMINAL OVERLAP MARK PIXEL OFFSET (INTEGER *4)

Table 3.6.2-2. CCT-PT Header Record Format
(Sheet 6 of 8)

BYTE	DATA	DESCRIPTION
377-378	0 0	ZERO FILL
523-524	0 0	
524-525	Ø N	TEMPORAL REGISTRATION SCENE IDENTIFICATION (ASCII) (BLANK IF NOT REGISTERED) N = MISSION NUMBER (4=D, 5=D') DDDD = DAY NUMBER, RELATIVE TO LAUNCH, AT TIME OF OBSERVATION HH = HOUR AT TIME OF OBSERVATION (00-23) MM = MINUTES AT TIME OF OBSERVATION (00-59) S = TENS OF SECONDS AT TIME OF OBSERVATION (0-5) A = NODE IDENTIFICATION "A" = ASCENDING "D" = DESCENDING
	D D	
	D D	
	H H	
	M M	
535-536	S A	
537-538	P P	TEMPORAL REGISTRATION WRS DESIGNATOR (ASCII) PPP = PATH NUMBER RRR = ROW NUMBER
539-540	P R	
541-542	R R	
543-544	Ø Ø	
545-546	A A	TEMPORAL REGISTRATION POINTS (INTEGER *4) (BLANK IF NOT REGISTERED) (SEE FIGURE 3.6.2-1. AAAA = PROCESSED IMAGE UPPER LEFT SCAN LINE BBBB = PROCESSED IMAGE UPPER LEFT PIXEL CCCC = REFERENCE IMAGE UPPER LEFT SCAN LINE DDDD = REFERENCE IMAGE UPPER LEFT PIXEL
	A A	
	B B	
	B B	
	C C	
	C C	
	D D	
559-560	D D	

Table 3.6.2-2. CCT-PT Header Record Format (Sheet 7 of 8)

BYTE	DATA	DESCRIPTION
561-562	E E E E F F F F G G G G H H H H	EEEE = PROCESSED IMAGE UPPER RIGHT SCAN LINE FFFF = PROCESSED IMAGE UPPER RIGHT PIXEL GGGG = REFERENCE IMAGE UPPER RIGHT SCAN LINE HHHH = REFERENCE IMAGE UPPER RIGHT PIXEL
575-576		
577-578	I I I I J J J J K K K K L L L L	IIII = PROCESSED IMAGE LOWER LEFT SCAN LINE JJJJ = PROCESSED IMAGE LOWER LEFT PIXEL KKKK = REFERENCE IMAGE LOWER LEFT SCAN LINE LLLL = REFERENCE IMAGE LOWER LEFT PIXEL
591-592		
593-594	M M M M N N N N O O O O P P P P	MMMM = PROCESSED IMAGE LOWER RIGHT SCAN LINE NNNN = PROCESSED IMAGE LOWER RIGHT PIXEL OOOO = REFERENCE IMAGE LOWER RIGHT SCAN LINE PPPP = REFERENCE IMAGE LOWER RIGHT PIXEL
607-608		
609-610	Q Q Q Q R R R R	OVERLAP DATA (INTEGER *4) QQQQ = UPPER LEFT SCAN LINE RRRR = UPPER LEFT PIXEL

BYTE	DATA		DESCRIPTION
	S	S	SSSS = UPPER RIGHT SCAN LINE
	S	S	TTTT = UPPER RIGHT PIXEL
	T	T	
623-624	T	T	
625-626	U	U	UUUU = LOWER LEFT SCAN LINE
	U	U	VVVV = LOWER LEFT PIXEL
	V	V	
631-632	V	V	
633-634	W	W	WWWW = LOWER RIGHT SCAN LINE
	W	W	XXXX = LOWER RIGHT PIXEL
	X	X	
639-640	X	X	

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 1 of 14)

BYTE	DATA	DESCRIPTION
1-2 3-4	N N N N	RECORD NUMBER (INTEGER *4) ALWAYS = 2
5-6 7-8	S_1 T S_2 S_3	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 055_8 (QUALITY DATA) T = RECORD TYPE, ALWAYS = 022_8 (HEADER) S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-10 11-12	N N N N	RECORD LENGTH (INTEGER *4) RECORD SIZE IN BYTES ALWAYS = 6480
13-14	Q Q	OVERALL BAND QUALITY CODE (ASCII) TWO BYTES
15-16 17-18	0 0 0 0	ZERO FILL
9		IMAGE DATA QUALITY
19	S	DATA SOURCE (ASCII) W = TDRSS/WHITE SANDS T = TRANSPORTABLE GROUND STATION
20	0	ZERO FILL
21-22 23-24	T T T T	DATA TRANSMISSION ACCURACY (ASCII)
25-26	0	ZERO FILL
37-38	0 0	

Table 3.6.2-3. CCT-PT Quality Data Record (Sheet 2 of 14)

BYTE	DATA	DESCRIPTION
39	S	PRIMARY LINE LENGTH SOURCE (ASCII) FOR SCD GENERATION I = IMBEDDED LINE LENGTH D = DSM LINE LENGTH C = COMPUTED INTERNALLY
40	O	ZERO FILL
41-42 43-44	N N N N	NUMBER OF TIME CODE SUBSTITUTIONS (INTEGER *4) DURING PAYLOAD CORRECTION DATA (PCD) PROCESSING
45-46 47-48	N N N N	NUMBER OF TIME CODE SUBSTITUTIONS (INTEGER *4) DURING PASS 1 INGEST IN TIPS
49-50 51-52	N N N N	NUMBER OF MAJOR FRAME SYNC LOSSES (INTEGER *4) DURING PASS 1 INGEST IN TIPS
53-54 55-56	N N N N	NUMBER OF MINOR FRAME SYNC LOSSES (INTEGER *4) DURING PASS 1 INGEST IN TIPS
57-58 59-60	N N N N	NUMBER OF MINOR FRAME SYNC ERROR (INTEGER *4) DURING PASS 1 INGEST IN TIPS
61-62 63-64	N N N N	NUMBER OF BIT SLIPS (INTEGER *4) DURING PASS 1 INGEST IN TIPS
65-66	O O	ZERO FILL
91-92	O O	

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 3 of 14)

BYTE	DATA	DESCRIPTION
93-94	N N	NUMBER OF IMBEDDED LINE LENFTH SUBSTITUTIONS (INTEGER *4)
	N N	IN PCD PROCESSING, TWO VALUES, ONE FOR FORWARD
	N N	SCANS AND ONE FOR REVERSE SCANS
99-100	N N	
101-102	N N	NUMBER OF COUNTED ACTIVE LINE LENGTH SUBSTITUTIONS (INTEGER *4)
	N N	IN PCD PROCESSING, TWO VALUES, ONE FOR FORWARD
	N N	AND ONE FOR REVERSE SCANS
109-108	N N	
109-110	X X	UNPROCESSED MIRROR SCAN CORRECTION DATA (MSCD) (REAL *4)
	.	MAXIMUM IMBEDDED LINE LENGTH
	.	MINIMUM IMBEDDED LINE LENGTH
	.	MEAN IMBEDDED LINE LENGTH
	.	IMBEDDED LINE LENGTH RMS VARIATION
	.	MAXIMUM COUNTED ACTIVE LINE LENGTH
	.	MINIMUM COUNTED ACTIVE LINE LENGTH
	.	MEAN COUNTED ACTIVE LINE LENGTH
	.	COUNTED ACTIVE LINE LENGTH RMS VARIATION
171-172	X X	
173-174	X X	PROCESSED MSCD (REAL *4)
	.	FROM PCD PROCESSING EIGHT VALUES FOR BOTH
	.	FORWARD AND REVERSE SCANS:
	.	MAXIMUM FIRST HLF SCAN TIME
	.	MINIMUM FIRST HALF SCAN TIME
	.	MEAN FIRST HALF SCAN TIME
	.	FIRST HALF SCAN TIME RMS VARIATION
	.	MAXIMUM SECOND HALF SCAN TIME
	.	MINIMUM SECOND HALF SCAN TIME
	.	MEAN SECOND HALF SCAN TIME
235-236	X X	SECOND HALF SCAN TIME RMS VARIATION

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 4 of 14)

BYTE	DATA	DESCRIPTION
237-238	N N	NUMBER OF LINE LENGTH SUBSTITUTIONS (INTEGER *4) BASED ON PASS 1 INGEST IN TIPS. SIX VALUES, THREE EACH FOR FORWARD AND REVERSE SCANS: IMBEDDED LINE LENGTH, FORWARD SCAN IMBEDDED LINE LENGTH, REVERSE SCAN COUNTED ACTIVE LINE LENGTH, FORWARD SCAN COUNTED ACTIVE LINE LENGTH, REVERSE SCAN CURRENT LINE LENGTH, FORWARD SCAN
259-260	N N	CURRENT LINE LENGTH, REVERSE SCAN
261-262	X X	LINE LENGTH DATA (REAL *4) FROM PASS 1 INGEST IN TIPS. THE MAXIMUM, MINIMUM, MEAN AND RMS VARIATION FOR BOTH FORWARD AND REVERSE SCANS WILL BE GIVEN FOR THE FOLLOWING THREE TYPES OF LINE LENGTH IMBEDDED LINE LENGTH ACTIVE COUNTED LINE LENGTH CURRENT LINE LENGTH
355-356	X X	
357-358	0 0	ZERO FILL
391-392	0 0	
		RADIOMETRIC CORRECTIONS
393	R	RADIOMETRIC CALIBRATION METHOD (ASCII) N = NO CORRECTIONS APPLIED H = HISTOGRAM METHOD C = INTERNAL CALIBRATION ONLY (NO HISTOGRAM) U = NON-STANDARD CORRECTIONS APPLIED
394	0	ZERO FILL
395	M	INTERNAL CALIBRATION LAMP MODE (ASCII) S = SEQUENCER MODE C = CONSTANT LAMP LEVEL MODE

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 5 of 14)

BYTE	DATA	DESCRIPTION
396 397-398	L1 L2 L3	INTERNAL CALIBRATION LAMPS USED (ASCII) FOR CONSTANT LAMP LEVEL MODE ONLY, BLANK FILL FOR SEQUENCER MODE. VALUE IS ZERO IF LAMP IS NOT USED AND "1" IF LAMP IS USED. THREE VALUES, ONE FOR EACH LAMP
399-400	0 0	ZERO FILL
415-416	0 0	
417	X	USE OF NOMINAL CALIBRATION VALUES (ASCII) N = NOT USED C = USED FOR COMPARISON ONLY R = USED TO REPLACE INTERNAL CALIBRATION VALUES OUTSIDE WINDOW, BUT NOT USED IN RADIOMETRIC CALIBRATION
418 419-420	0 0 0	ZERO FILL
421-424	W W W W	CALIBRATION WINDOW SIZE (INTEGER *4) THE NEIGHBORHOOD FO THE NOMINAL VALUES TO WHICH THE ACTUAL INTERNAL CALIBRATION VALUES ARE COMPARED
425-426	0 0	ZERO FILL
447-448	0 0	
449-452	N N N N	NUMBER OF SCANS IN A CALIBRATION SEGMENT (INTEGER *4)
453-456	N N N N	NUMBER OF SUBSEGMENTS IN A CALIBRATION SEGMENT (INTEGER *4)

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 6 of 14)

BYTE	DATA	DESCRIPTION
457-460	A A A A	RELATIVE CALIBRATION ACCURACY (REAL *4) MAXIMUM DIFFERENCE BETWEEN DETECTOR MEANS FOR THE IMAGE
461-464	D D D D	RELATIVE GAIN DIFFERENCE (REAL *4) LARGEST RATIO OF STANDARD DEVIATIONS FOR EACH DETECTOR IN THE IMAGE
465-466	0 0	ZERO FILL
.	.	
.	.	
639-640	0 0	
		FOR EACH DETECTOR IN THE BAND, THE FOLLOWING 20 VALUES WILL BE GIVEN. THE UNUSED SPACES FOR THE THERMAL BAND WILL CONTAIN ZERO. RE (THERE ARE 48 BYTES PER DETECTOR)
641-644	M M M M	MULTIPLICATIVE RADIOMETRIC CORRECTION CONSTANT (REAL *4)
	A A A A	ADDITIVE RADIOMETRIC CORRECTION CONSTANT (REAL *4)
	C1 C1	FIRST NOMINAL CALIBRATION VALUE (INTEGER *2)
	S1 S1	NUMBER OF SUBSTITUTIONS FOR 1ST NOMINAL CAL VALUE (INTEGER *2)
	C2 C2	2ND NOMINAL CALIBRATION VALUE (INTEGER *2)
	S2 S2	NUMBER OF SUBSTITUTIONS FOR 2ND NOMINAL CAL VALUE (INTEGER *2)
	C3 C3	3RD NOMINAL CALIBRATION VALUE (INTEGER *2)
	S3 S3	NUMBER OF SUBSTITUTIONS FOR 3RD NOMINAL CAL VALUE (INTEGER *2)

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 7 of 14)

BYTE	DATA	DESCRIPTION
	C4 C4	4TH NOMINAL CALIBRATION VALUE (INTEGER *2)
	S4 S4	NUMBER OF SUBSTITUTIONS FOR 4TH NOMINAL CAL VALUE (INTEGER *2)
	C5 C5	5TH NOMINAL CALIBRATION VALUE (INTEGER *2)
	S5 S5	NUMBER OF SUBSTITUTIONS FOR 5TH NOMINAL CAL VALUE (INTEGER *2)
	C6 C6	6TH NOMINAL CALIBRATION VALUE (INTEGER *2)
	S6 S6	NUMBER OF SUBSTITUTIONS FOR 6TH NOMINAL CAL VALUE (INTEGER *2)
	C7 C7	7TH NOMINAL CALIBRATION VALUE (INTEGER *2)
	S7 S7	NUMBER OF SUBSTITUTIONS FOR 7TH NOMINAL CAL VALUE (INTEGER *2)
	C8 C8	8TH NOMINAL CALIBRATION VALUE (INTEGER *2)
	S8 S8	NUMBER OF SUBSTITUTIONS FOR 8TH NOMINAL CAL VALUE (INTEGER *2)
	M M M M	CALIBRATED MEAN RADIANCE (REAL *4)
1407-1408	SD SD SD SD	CALIBRATED RADIANCE STANDARD DEVIATION (REAL *4)
1409-1410	0 0	ZERO FILL
1755-1758	0 0	
1759-1760	Q Q	OVERALL BAND QUALITY OF REFERENCE SCENE (ASCII) 2 BYTES/BAND
1761-1764	N N N N	NUMBER OF SCENES (INTEGER *4) IN CONTROL POINT (CP) EXTRACTION INTERVAL

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 8 of 14)

BYTE	DATA	DESCRIPTION
1765-1768	N N N N	SEQUENCE NUMBER (INTEGER *4) OF THE REFERENCE SCENE IN CP EXTRACTION INTERVAL
1769-1772	N N N N	NUMBER OF GEODETIC POINTS (INTEGER *4) USED IN CP GENERATION PROCESS, FOR THE INTERVAL
1773-1776	N N N N	NUMBER OF GEODETIC POINT (INTEGER *4) WHICH WERE IN THE REFERENCE SCENE
1777-1784	0 0 ⋮ 0 0	ZERO FILL
1785-1788	P P P P	AVERAGE* INITIAL AUTO CORRELATION PEAK VALUE (REAL *4) FOR CPs FROM THE REFERENCE SCENE
1789-1792	C C C C	AVERAGE* INITIAL PEAK CURVATURE (REAL *4) FOR CPs FROM THE REFERENCE SCENE
1793-1794 ⋮ 1811-1812	I I ⋮ I I	REFERENCE SCENE ID (ASCII) 20 BYTES
1813-1814 ⋮ 1827-1828	E E ⋮ E E	NINETY PERCENT ERROR ELLIPSE (REAL *4) 4 VALUES IN THE FOLLOWING ORDER (UNITS ARE METERS) ALONG-TRACK, FOR THE INTERVAL ACROSS-TRACK, FOR THE INTERVAL ALONG-TRACK, FOR THE REFERENCE SCENE ACROSS-TRACK, FOR THE REFERENCE SCENE
1829-1830 ⋮ 1843-1844	0 0 ⋮ 0 0	ZERO FILL

*AVERAGE OF CPs USED IN CALIBRATIONS FOR PRESENT SCENE

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 9 of 14)

BYTE	DATA	DESCRIPTION
1845-1848	S S S S	AVERAGE* PREVIOUS REGISTRATION SUCCESS (REAL *4) PERCENT PREVIOUS SUCCESSFUL REGISTRATIONS OF CONTROL POINTS
1849-1850	0 0	ZERO FILL
1867-1868	0 0	
1869-1872	N N N N	NUMBER OF SCENES IN INTERVAL (INTEGER *4)
1873-1876	N N N N	SEQUENCE NUMBER OF THIS SCENE IN INTERVAL (INTEGER *4)
1877-1880	N N N N	TOTAL NUMBER OF CPs (INTEGER *4) USED IN PERFORMING GEOMETRIC CORRECTIONS FOR THE INTERVAL
1881-1884	N N N N	NUMBER OF CPs (INTEGER *4) WHICH WERE FROM THIS SCENE
1885-1888	0 0 0 0	ZERO FILL
1889-1892	N N N N	NUMBER OF CPs (INTEGER *4) WHICH WERE FROM SCENES PRIOR TO THIS IN THE INTERVAL
1893-1896	N N N N	NUMBER OF GEODETIC CPs (INTEGER *4) USED IN GEOMETRIC CORRECTIONS FOR THE INTERVAL
1897-1900	N N N N	TOTAL NUMBER OF CP CORRELATIONS ATTEMPTED (INTEGER *4) FOR THE INTERVAL

* AVERAGE OF CPs USED IN CALIBRATIONS FOR PRESENT SCENE

BYTE	DATA	DESCRIPTION
1901-1904	N N / N N	NUMBER OF CPs (INTEGER *4) REJECTED DURING CORRELATION PROCESS
1905-1908	N N / N N	NUMBER OF CORRELATED CPs (INTEGER *4) IN THE INTERVAL REJECTED DURING MODELING PROCESS
1909-1912	N N / N N	TOTAL NUMBER OF CP CORRELATIONS ATTEMPTED (INTEGER *4)
1913-1916	N N / N N	TOTAL NUMBER OF CPs (INTEGER *4)
1917-1920	N N / N N	NUMBER OF CORRELATED CPs (INTEGER *4) IN THIS SCENE REJECTED DURING MODELING PROCESS
1921-1924	N N / N N	NUMBER OF CPs (INTEGER *4) REJECTED FOR CLOUD COVER
1925-1928	N N / N N	NUMBER OF CPs (INTEGER *4) REJECTED FOR SNOW COVER
1929-1932	N N / N N	NUMBER OF USED CPs (INTEGER *4) FROM THIS SCENE CONTAINING > 50% CLOUD COVER
1933-1934	O O	ZERO FILL
1947-1948	O O	

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 11 of 14)

BYTE	DATA	DESCRIPTION
1949-1950	CP1 CP1	FOR EACH USED CP IN THIS SCENE, THE FOLLOWING INFORMATION WILL BE GIVEN (24 BYTES FOR EACH CP, UP TO 20 CPs):
		CONTROL POINT ID - 15 ASCII CHARACTERS
		ZERO FILL - 1 BYTE
		CONTROL POINT LOCATION (REAL *4) LINE
2427-2428	CP20 CP20	AND PIXEL IN FULLY PROCESSED SCENE
2429-2432	P P P P	AVERAGE* CP CORRELATION PEAK VALUE (REAL *4) FOR THIS SCENE
2433-2436	C C C C	AVERAGE* CP CORRELATION PEAK CURVATURE (REAL *4)
2437-2438	0 0	ZERO FILL
2447-2448	0 0	
		GEOMETRIC CORRECTION
2449-2450	Q Q	OVERALL GEOMETRIC QULAITY CODE (ASCII)
2451-2452	b b	BLANK
2453-2454	E E	RMS GEOMETRIC MODELING ERRORS (REAL *4)
		HOW WELL THE GEOMETRIC MODEL MATCHED THE CP DATA. 4 VALUES ARE GIVEN (UNITS ARE METERS)
		ALONG TRACK, FOR THE INTERVAL
		ACROSS TRACK, FOR THE INTERVAL
		ALONG TRACK, FOR THE SCENE
2467-2468	E E	ACROSS TRACK, FOR THE SCENE

* AVERAGE OF CPs USED IN CALIBRATIONS FOR PRESENT SCENE

BYTE	DATA	DESCRIPTION
2469-2470	X X	EPHEMERIS OFFSETS (REAL *4)
	X X	THREE VALUES (X,Y,Z)
	Y Y	UNITS ARE KILOMETERS
	Y Y	
	Z Z	
2479-2480	Z Z	
2481-2482	D D	ESTIMATED DISTORTIONS (REAL *4)
	.	FOUR VALUES AS FOLLOWS (UNITS ARE METERS)
	.	ALONG-TRACK SKEW
	.	ALONG-TRACK STRETCH
2495-2496	D D	ACROSS-TRACK SKEW
		ACROSS-TRACK STRETCH
2497-2498	0 0	ZERO FILL
	.	
	.	
2515-2516	0 0	
2517-2518	B B	GEOMETRIC MODELING RESULTS (REAL *4)
	.	FILTER BIASES FOR THE SCENE, THERE WILL BE UP
	.	TO TBD VALUES, ONE VALUE FOR EACH PARAMETER
	.	ESTIMATED IN THE FILTER COMPUTATIONS.
2595-2596	B B	
2597-2598	SV SV	STATE VECTOR AT SCENE CENTER (REAL *4)
	.	
	.	
	.	
2675-2676	SV SV	
2677-2678	M M	STATE ERROR COVARIANCE MATRIX AT SCENE CENTER (REAL *4)
	.	
	.	A SQUARE MATRIX WITH AS MANY ROWS AND COLUMNS
		AS STATE VECTOR COMPONENTS
4275-4276	M M	

Table 3.6.2-3. CCT-PT Quality Data Record
(Sheet 13 of 14)

BYTE	DATA	DESCRIPTION
4277-4278	M M	DYNAMIC NOISE MATRIX AT SCENE CENTER (REAL *4)
		A SQUARE MATRIX WITH AS MANY ROWS AND COLUMNS AS STATE VECTOR COMPONENTS
5875-5876	M M	
5877-5878	0 0	ZERO FILL
6251-6252	0 0	
		PROCESSED GCD ALL VALUES ARE REAL *4
6253-6254	X X	FOR THE BENCHMARK MATRIX AND THE HIGH FREQUENCY MATRIX, TWO SETS OF VALUES ARE GIVEN, ONE FOR FORWARD SCANS AND ONE FOR REVERSE SCANS. THE VALUES ARE AS FOLLOWS: . MEAN AND VARIANCE OF THE DIFFERENCE BETWEEN SUCCESSIVE POINTS IN THE MATRIX, BOTH ACROSS AND DOWN . MAXIMUM AND MINIMUM DIFFERENCE BETWEEN SUCCESSIVE POINTS IN THE MATRIX, BOTH ACROSS AND DOWN
6379-6380	X X	
6381-6382	X X	MAXIMUM AND MINIMUM VALUES IN THE HIGH FREQUENCY MATRIX FOR BOTH FORWARD AND REVERSE SCANS
6395-6396	X X	
6397-6398	X X	NORMALIZED CHANGE FROM NOMINAL OF THE MIDSCAN POSITION FOR BOTH THE FORWARD AND REVERSE SCANS (UNITS ARE MILLISECONDS)
6399-6400	X X	
6401-6402	X X	
6403-6404	X X	

BYTE	DATA	DESCRIPTION
6405-6406	X X	FOR THE SCAN GAP SIZE, THE SCAN GAP SKEW, AND THE HORIZONTAL STRIP (SEGMENT) INPUT PIXEL DIFFERENCE, THE FOLLOWING 5 VALUES ARE GIVEN:
	.	MAXIMUM VALUE
	.	MINIMUM VALUE
	.	MEAN VALUE
	.	NUMBER EXCEEDING MAXIMUM THRESHOLD
	.	NUMBER EXCEEDING MINIMUM THRESHOLD
6423-6424	X X	
6425-6480	0 0	ZERO FILL
	.	
	.	
	.	
	0 0	

Table 3.6.2.4. CCT-PT Annotation Record: Field 1
(Sheet 1 of 3)

BYTE	DATA	DESCRIPTION
1-2	N N	RECORD NUMBER (INTEGER *4)
3-4	N N	ALWAYS = 3
5-6	S_1 T	RECORD TYPE
7-8	S_2 S_3	S_1 = 1ST SUBTYPE, ALWAYS = 022_8 (DEFAULT) T = RECORD TYPE, ALWAYS = 333_8 (ANNOTATION) S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
9-10	N N	RECORD LENGTH (INTEGER *4)
11-12	N N	RECORD SIZE IN BYTES ALWAYS = 540

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
a	13-20	07JUN83	DAY, MONTH AND YEAR SCENE EXPOSURE
b	21-37	C␣N33-05/W115-18␣	FORMAT CENTER - LATITUDE AND LONGITUDE AT THE CENTER OF THE TM IMAGE FORMAT ARE INDICATED IN DEGREES AND MINUTES
c	38-46	D202-101␣	NOMINAL CENTER PATH AND ROW INDENTIFIER, AND ORBITAL DIRECTION INDICATOR. THE 202 IS PATH NUMBER AND 101 IS ROW NUMBER. "A" = ASCENDING NODE "D" = DESCENDING NODE
d	47-63	N␣N33-03/W115-42␣	NOMINAL CENTER LATITUDE AND LONGITUDE
e	64-73	T␣1234567␣	SENSOR AND SPECTRAL BAND IDENTIFICATION CODE. THE PRESENCE OF A NUMBER INDICATES PRESENCE OF THAT BAND; A BLANK FIELD INDICATES ABSENCE OF THAT BAND. IN THE EXAMPLE, ALL BANDS ARE PRESENTED IN POSITION. ONLY ONE BAND IS PRESENT NORMALLY

Table 3.6.2.4. CCT-PT Annotation Record: Field 1 (Sheet 2 of 3)

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
f	74-87	SUN␣EL30␣A015␣	SUN ANGLES - THE SUN ELEVATION ANGLE AND SUN AZIMUTH ANGLE MEASURED CLOCKWISE FROM TRUE NORTH AT THE MIDPOINT OF TM FRAME IS SPECIFIED TO THE NEAREST DEGREE. USUALLY A BLANK FOR NIGHT PASSES
g	88-99	G␣P-CP-N␣␣␣	PROCESSING CODES:
	88		CHARACTER POSITION 88 DEFINES THE TYPE OF GEOMETRIC CORRECTION APPLIED TO THE DATA: "U" = UNCORRECTED "S" = SYSTEM LEVEL CORRECTED "G" = GEOMETRICALLY CORRECTED BASED ON GEODETIC CONTROL POINTS (NO TEMPORAL REGISTRATION PERFORMED) "T" = TEMPORALLY REGISTERED USING GEODETIC INFORMATION FROM A SINGLE REFERENCE SCENE. "R" = TEMPORAL REGISTRATION TO A SINGLE REFERENCE SCENE (NO GEODETIC INFORMATION AVAILABLE)
	90		CHARACTER POSITION 90 DEFINES THE PROJECTION: "P" = POLAR STEREOGRAPHIC PROJECTION "S" = SPACE OBLIQUE MERCATOR PROJECTION "U" = UNIVERSAL TRANSVERSE MERCATOR PROJECTION
	92		CHARACTER POSITION 92 INDICATES THE RESAMPLING ALGORITHM: "C" = CUBIC CONVOLUTION "N" = NEAREST NEIGHBOR
	93		CHARCTER POSITION 93 INDICATES THE TYPE OF EPHEMERIS DATA USED TO COMPUTE THE IMAGE CENTER: "P" = PREDICTIVE "G" = GPS "D" = DEFINITIVE
	95		CHARACTER POSITION 95 GIVES THE PROCESSING PROCEDURE: "N" = NORMAL PROCESSING PROCEDURE "A" = ABNORMAL PROCESSING PROCEDURE (DEFINED AS ANY PROCESSING PROCEDURE OTHER THAN THE NORMAL PROCEDURE)

NOTE: CHARACTER SUB-FIELDS ARE SHOWN IN FIGURE 3.5.4-4.

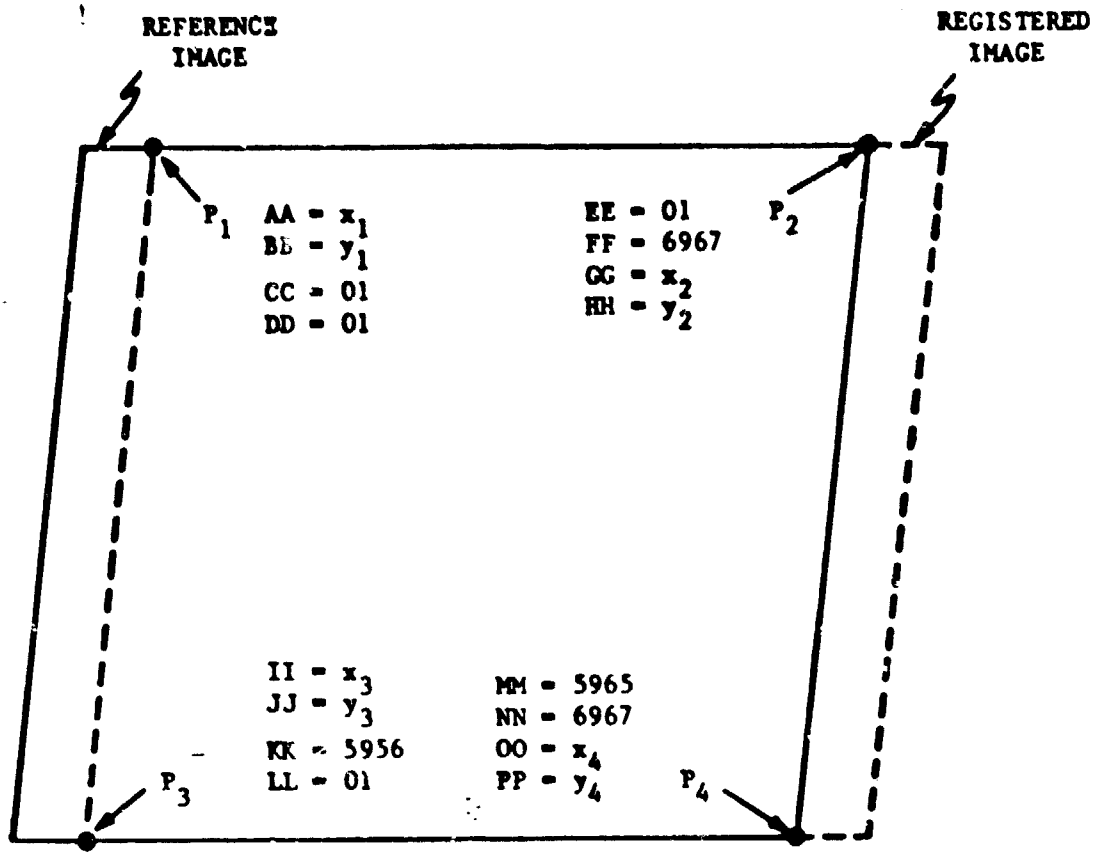
Table 3.6.2.4. CCT-PT Annotation Record: Field 1
(Sheet 3 of 3)

CHARACTER SUBFIELD	BYTE NUMBER WITHIN FIELD 1	EXAMPLE	EXPLANATION
h	100-112	NASA␣LANDSAT␣	IDENTIFIES THE AGENCY AND THE PROJECT
i	113-127	E-41042-16032-1	SCENE IDENTIFICATION NUMBER--EACH IMAGE OR FRAME WILL HAVE A UNIQUE IDENTIFIER WHICH WILL CONTAIN ENCODED INFORMATION CONSISTING PRIMARILY OF TIME OF EXPOSURE RELATIVE TO LAUNCH. ITS FORMAT IS E-MDDDD-HHMMS-B AND IS INTERPRETED AS FOLLOWS:
	113		"E" = ENCODED PROJECT IDENTIFIER (FIXED)
	115		"M" = MISSION NUMBER
	116-119		DDDD = DAY NUMBER, RELATIVE TO LAUNCH, AT TIME OF OBSERVATION
	121-122		HH = HOUR AT TIME OF OBSERVATION
	123-124		MM = MINUTE AT TIME OF OBSERVATION
	125		S = TENS OF SECONDS AT TIME OF OBSERVATION
	127		B = BAND IDENTIFICATION CODE: 1,2,3,4,5,6, AND 7
	128-140		BLANK FILLED

Up to eight tick marks are provided for each edge of an image. The tick marks may be for one of three map projections. Latitude/longitude tick marks will be provided for the scene centers for all three map projections. Figure 3.6.2-1 gives examples of the four types of tick marks. Table 3.6.2-5 describes the formats for the four types of tick marks. Table 3.6.2-6 gives the format for the second half of the annotation record which includes the tick mark information.

3.6.3 IMAGE FILE

The image files shall contain image pixels corresponding to one scene quadrant. For the BSQ format, seven image files shall exist, each file containing image data for one band. For the BIL format, one image file shall contain the entire scene quadrant. The record formats in the file remain the same in any case. The first record in the file shall be the file descriptor record, and its variable segment format shall be as described in Table 3.6.3-1; the fixed segment format shall be as described in Table 3.5.2-1. One image record shall correspond to half a line of an image in one band. 2984 image records shall exist for each file in BSQ format tape. Image records in BIl format shall appear as described in Figure 3.5.3-1. 20888 image records shall exist in the image file for BIL format tape. The image record format shall be as described in Table 3.6.3-2. The PT scene image always includes some overlap at the top and bottom with its neighboring scenes. These overlap areas are marked and the marks are included as part of the image data. Figure 3.6.3-1 describes the position of the overlap marks within the image, and Table 3.6.3-3 describes



VALUES SHOWN ARE FOR ILLUSTRATIVE EXAMPLE ONLY.

WHERE P_1, P_2, P_3, AND P_4 ARE THE CORNERS OF THE OVERLAPPING REGION OF THE REFERENCE IMAGE AND THE REGISTERED IMAGE.

Figure 3.6.2-1. Symbolic Representation of Temporal Registration

Table 3.6.2-5. CCT-PT Tick Mark Format
(Sheet 1 of 2)

TICK MARK DATA MAY EXIST IN ONE OF FOUR DIFFERENT FORMATS. THREE TYPES OF MAP PROJECTIONS MAY BE USED (UNIVERSAL TRANSVERSE MERCATOR (UTM), POLAR STEREOGRAPHIC (PS), OR SPACE OBLIQUE MERCATOR (SOM). LATITUDE/LONGITUDE TICK MARKS WILL BE PROVIDED FOR THE SCENE CENTERS IN ALL THREE MAP PROJECTIONS. ALL FORMATS ARE NINE BYTES IN LENGTH CONTAINING TWO COMMON FIELDS:

a) A 2 BYTE LOCATION FIELD DEFINING THE PIXEL NUMBER LOCATION FOR A TICK MARK ON THE TOP OR BOTTOM OF THE PICTURE, OR LINE NUMBER LOCATION FOR A TICK MARK ON THE LEFT OR RIGHT OF THE PICTURE.

b) A 7 BYTE IDENTIFICATION FIELD WHICH CONTAINS THE CHARACTERS USED TO IDENTIFY THE TICK MARK.

BYTES	DATA	DESCRIPTION
1-2	L L	UTM COORDINATE TICK MARK
3-4	P N	LL = LOCATION OF TICK MARK (BINARY)
5-6	N N	P = POSITION; NORTHING-SIDES-(N) OR EASTING-TOP AND BOTTOM-(E)
7-8	ß ß	NNN = COORDINATE
9	ß	ß = BLANK

TRAILING BLANK FORMAT

1-2	L L
3-4	ß ß
5-6	ß P
7-8	N N
9-10	N

LEADING BLANK FORMAT

1-2	L L
3-4	P S
5-6	N N
7-8	N ß
9	ß

PS TICK MARK
LL = LOCATION OF TICK MARK (BINARY)
P = POSITION X OR Y
S = QUADRANT SIGN OF COORDINATE (+,-)
NNN = COORDINATE
ß = BLANK

TRAILING BLANK FORMAT

1-2	L L
3-4	ß ß
5-6	P S
7-8	N N
9	N

LEADING BLANK FORMAT

Table 3.6.2-5. CCT-PT Tick Mark Format
(Sheet 2 of 2)

BYTE	DATA	DESCRIPTION
1-2	L L	SOM TICK MARK
3-4	P N	LL = LOCATION OF TICK MARK (BINARY)
5-6	N N	P = POSITION; TOP AND BOTTOM (V) SIDES (U)
7-8	N ␣	NNNN = COORDINATE
9	␣	␣ = BLANK

TRAILING BLANK FORMAT

1-2	L L	
3-4	␣ ␣	
5-6	␣ P	
7-8	N N	
9	N	

LEADING BLANK FORMAT

1-2	L L	LATITUDE/LONGITUDE TICK MARK
3-4	P D	LL = LOCATION OF TICK MARK (BINARY)
5-6	D D	P = POSITION; NORTH (N)
7-8	- M	EAST (E)
9	M	SOUTH (S)
		WEST (W)
		DDD = DEGREES
		MM = MINUTES

Table 3.6.2-6. CCT-DT Annotation Record: Field 2

BYTE NUMBER WITHIN FIELD	DATA	DESCRIPTION
141-149	TICK MARK FORMAT	TOP EDGE TICK MARK #1
150-158	IS DESCRIBED IN	#2
159-167	FIGURE 3.6.2-2.	#3
168-176		#4
177-185		#5
186-194		#6
195-203		#7
204-212		#8
213-221		LEFT EDGE TICK MARK #1
222-230		#2
231-239		#3
240-248		#4
249-257		#5
258-266		#6
267-275		#7
276-284		#8
285-293		RIGHT EDGE TICK MARK #1
294-302		#2
303-311		#3
312-320		#4
321-329		#5
230-338		#6
339-347		#7
248-356		#8
357-365		BOTTOM EDGE TICK MARK #1
366-374		#2
375-383		#3
384-392		#4
393-401		#5
402-410		#6
411-419		#7
420-428		#8
429-540		BLANK

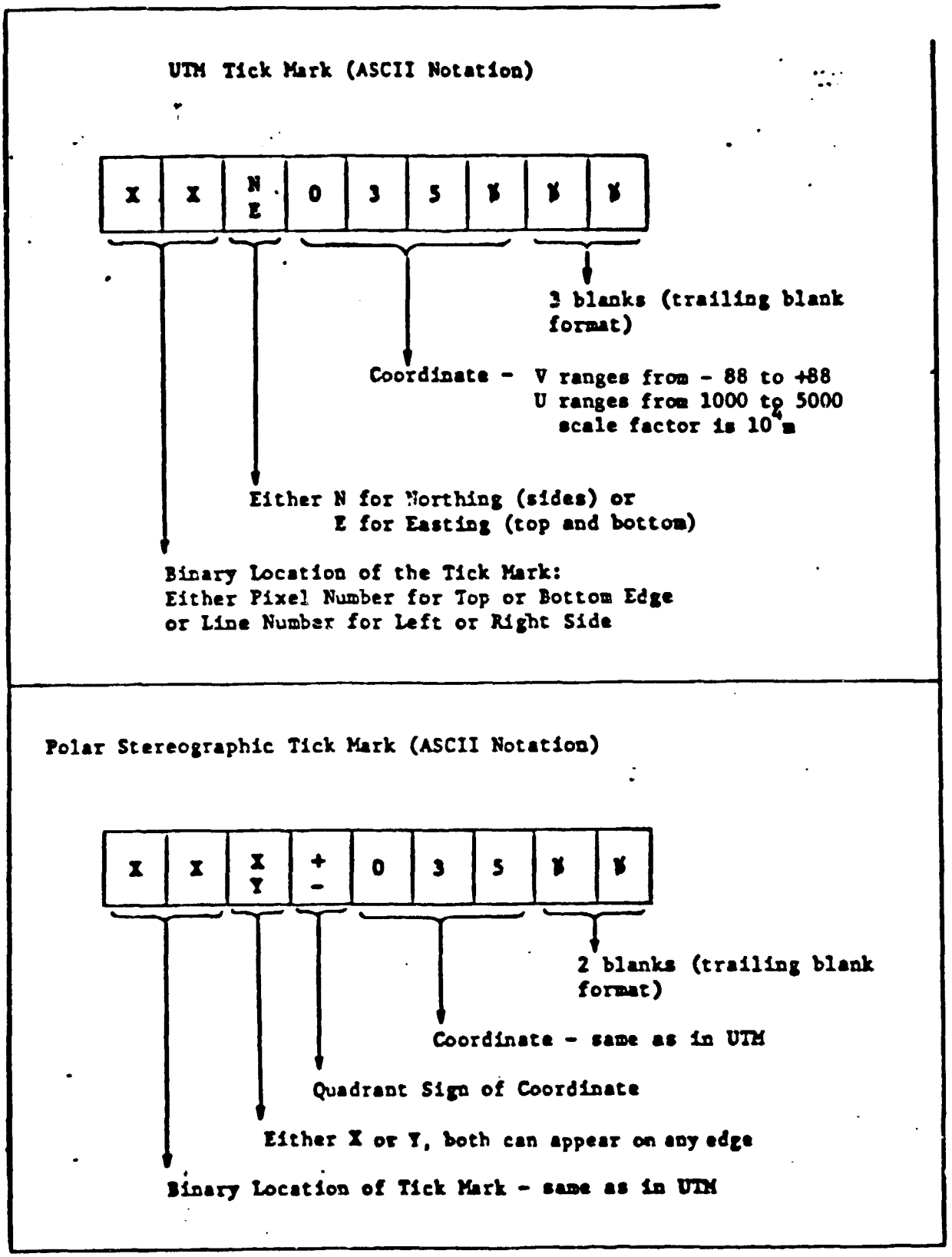


Figure 3.6.2-2. Examples of the Four Types of Tick Marks

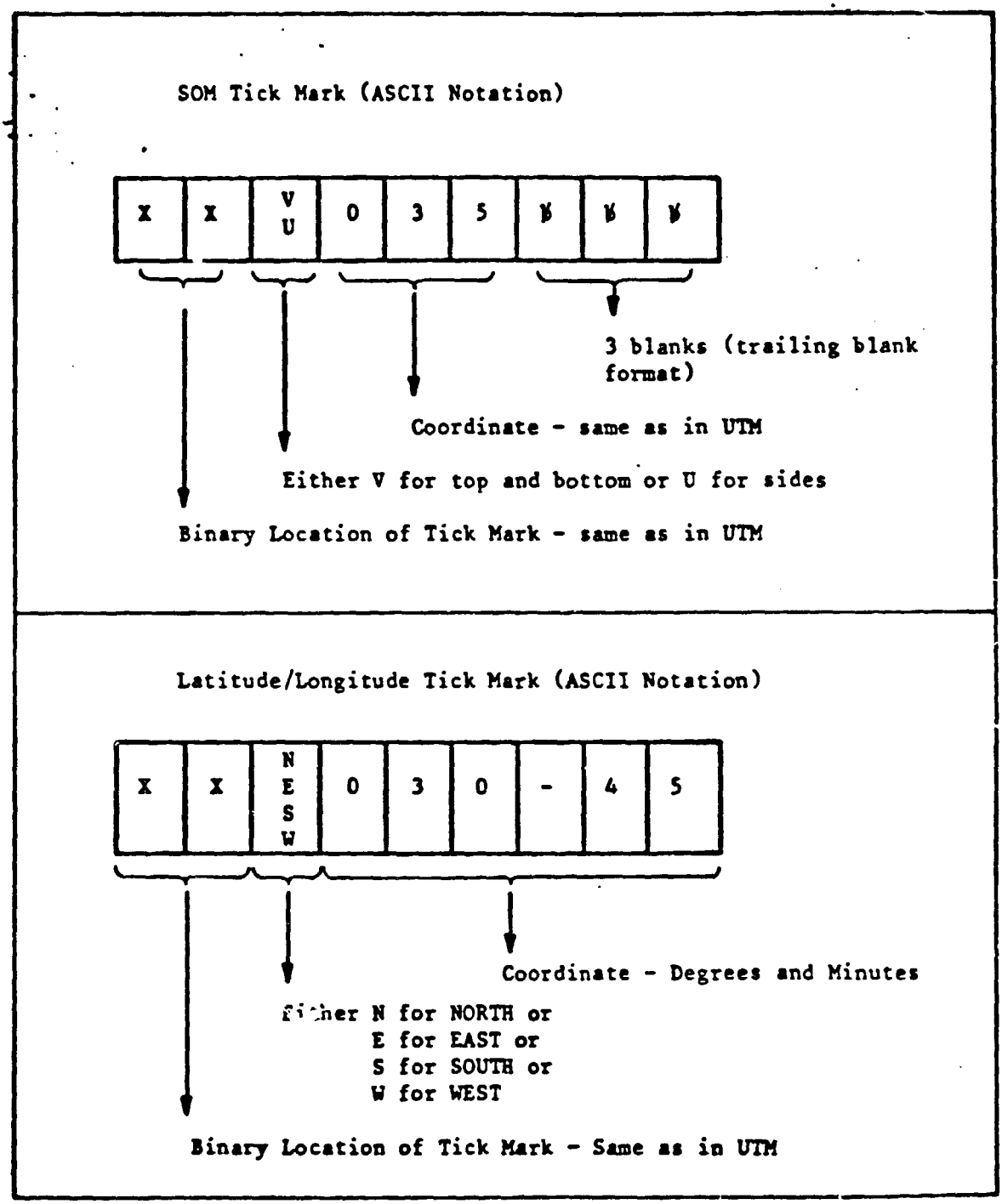


Figure 3.6.2-2. Examples of the Four Types of Tick Marks (cont'd)

Table 3.6.3-1. Variable Segment of the CCT-PT Image File Descriptor Record (Sheet 1 of 3)

BYTE	TYPE	DESCRIPTION
1-6	N	NUMBER OF IMAGE RECORDS, ALWAYS = 2983 FOR BSQ FORMATTED TAPES AND 20881 FOR BIL FORMATTED TAPES
7-12	N	IMAGE RECORD LENGTH, ALWAYS = 3600 BYTES
13-36		BLANKS
		PIXEL GROUP DATA
37-40	N	NUMBER OF BITS PER PIXEL, ALWAYS = 8
41-44	N	NUMBER OF PIXELS PER DATA GROUP, ALWAYS = 1
45-48	N	NUMBER OF BYTES PER DATA GROUP, ALWAYS = 8
49-52	A	JUSTIFICATION OF PIXELS WITHIN DATA GROUP, ALWAYS = 'ROLR' INDICATING THAT PIXELS ARE RIGHT JUSTIFIED WITH FIRST PIXEL LEFT MOST
		IMAGE DATA
53-56	N	NUMBER OF IMAGES (BANDS) IN THIS FILE, ALWAYS = 1 FOR BSQ FORMAT, AND ALWAYS = 7 FOR BIL FORMAT
57-64	N	NUMBER OF LINES PER IMAGE, ALWAYS = 2983
65-68	N	NUMBER OF LEFT BORDER PIXELS PER LINE ALWAYS = 0
69-76	N	NUMBER OF IMAGE PIXELS PER LINE, ALWAYS = 3484
77-80		NUMBER OF RIGHT BORDER PIXELS PER LINE, ALWAYS = 0
81-84		NUMBER OF TOP BORDER LINES, ALWAYS = 0
85-88		NUMBER OF BOTTOM BORDER LINES ALWAYS = 0
89-92		INTERLEAVING INDICATOR, EITHER = BSQ$ OR BIL$

Table 3.6.3-1. Variable Segment of the CCT-PT Image File Descriptor Record (Sheet 2 of 3)

BYTE	DATA	DESCRIPTION
		RECORD DATA IN THIS FILE
93-94		NUMBER OF PHYSICAL RECORDS PER LINE, ALWAYS = 1
95-96		NUMBER OF PHYSICAL RECORDS PER MULTISPECTRAL LINE, ALWAYS = 1
97-100		NUMBER OF BYTES OF PREFIX DATA PER RECORD, ALWAYS = 26
101-108		NUMBER OF BYTES OF IMAGE DATA PER RECORD, ALWAYS = 3484
109-112		NUMBER OF BYTES OF SUFFIX DATA PER RECORD, ALWAYS = 0
113-116		PREFIX/SUFFIX REPEAT FLAG, ALWAYS = BLANK
		PREFIX/SUFFIX DATA LOCATORS THE FORMAT OF A 8 BYTE LOCATOR SHALL BE AS FOLLOWS: 4 BYTES - BYTE NUMBER WITHIN PREFIX/SUFFIX WHICH BEGINS THE FIELD TO BE LOCATED. 2 BYTES - LENGTH IN BYTES OF THE FIELD TO BE LOCATED 1 BYTE - THE LETTER P OR S CODED IN THIS BYTE INDICATES THAT THE INFORMATION IS IN THE SCAN LINE PREFIX OR SUFFIX RESPECTIVELY
117-124		SCAN LINE NUMBER LOCATOR, ALWAYS = 001306PN
125-132		IMAGE (BAND) NUMBER LOCATOR, ALWAYS = 001601PN
133-140		TIME OF SCAN LINE LOCATOR, ALWAYS = BLANKS
141-148		LEFT FILE COUNT LOCATOR, ALWAYS = 002302PN

Table 3.6.3-1. Variable Segment of the CCT-PT Image File Descriptor Record (Sheet 3 of 3)

BYTE	DATA	DESCRIPTION
149-156		RIGHT FILE COUNT LOCATOR, ALWAYS = 002502PN
157-188		BLANK
189-196		SCAN LINE QUALITY CODE LOCATOR, ALWAYS = 001904PA
197-204		CALIBRATION INFORMATION FIELD LOCATOR, ALWAYS = BLANKS
205-212		GAIN VALUES FIRLD LOCATOR, ALWAYS = BLANKS
213-220		BIAS VALUES FIELD LOCATOR, ALWAYS = BLANKS
220-252		BLANKS
		PIXEL DATA DESCRIPTION
253-256		NUMBER OF LEFT FILL PITS WITHIN PIXEL, ALWAYS = 1
257-260		NUMBER OF RIGHT FILL BITS WITHIN PIXEL, ALWAYS = 0
261-268		MAXIMUM DATA RANGE OF PIXEL, ALWAYS = 255
269-3420		BLANKS

Table 3.6.3-2. CCT-PT Image Record Format
(Sheet 1 of 2)

BYTE	DATA	DESCRIPTION
1-2	N N	RECORD NUMBER (INTEGER *4)
3-4	N N	RANGES FROM 2 TO 2984
5-6	S_1 T	RECORD TYPE S_1 = 1ST SUBTYPE ALWAYS = 355_8 (FOR IMAGE) T = RECORD TYPE ALWAYS = 355_8 (FOR DATA) S_2 = 2ND SUBTYPE ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE ALWAYS = 022_8 (DEFAULT)
7-8	S_2 S_3	
9-10	N N	RECORD LENGTH (INTEGER *4) RECORD SIZE BYTES ALWAYS = 3600
11-12	N N	
13-18	O O Q B L L	SLID OR SCAN LINE IDENTIFICATION FORMAT BYTES 1 AND 2 = 0 BYTE 3 (Q) = QUADRANT NUMBER RANGES FROM 1 TO 4 (BINARY BYTE 4 (B) = BAND NUMBER RANGES FROM 1 TO 7 (BINARY) BYTE 5 AND 6 (L) = LINE NUMBER WITHIN THE BAND WITHIN THE QUADRANT. RANGES FROM 1 TO 2983 (BINARY)
19-22	S ∅ ∅ ∅	QUALITY CODE (ASCII) BYTE 1 (S) = LINE STATUS "E" IF LINE CONSTRUCTED ENTIRELY FROM EXTENSION LINE "N" IF NORMAL OUTPUT LINE
23-24	N N	LEFT FILL COUNT (INTEGER *2) TELLS THE NUMBER OF FILLER PIXELS ON THE LEFT SIDE OF THE IMAGE LINE. THE FILL PIXELS ARE NECESSARY FOR THE SCAN ALLIGNMENT DUE TO EARTH ROTATION SKEW.

Table 3.6.3-2. CCT-PT Image Record Format
(Sheet 2 of 2)

BYTE	DATA	DESCRIPTION
25-26	N N	RIGHT FILL COUNT (INTEGER *2) TELLS THE NUMBER OF FILLER PIXELS ON THE RIGHT SIDE OF THE IMAGE LINE
27-3510		IMAGE PIXELS (BINARY) 3484 PIXELS PER HALF LINE. ONE BYTE PER PIXEL
3511-3600		ZERO FILL

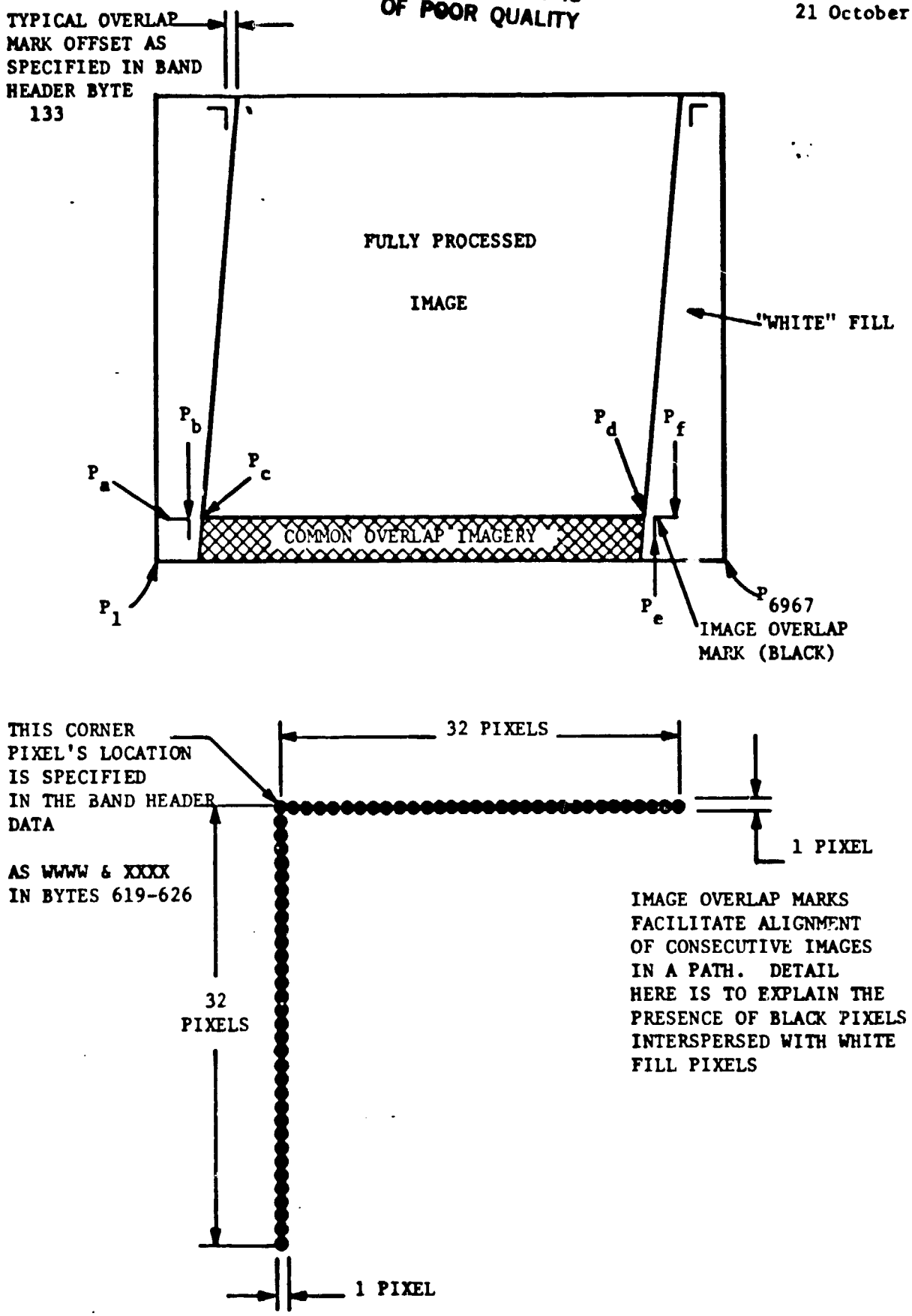


Figure 3.6.3-1. Image Overlap Marks and Common Overlapping Imagery

Table 3.6.3-3. Pixel Assignments

WHERE PIXELS:	ARE SET TO:	INDICATING:
P_1 P_{a-1}	377_8	LEFT FILL WHITE PIXELS
P_a P_b	$000)_8$	LEFT IMAGE BLACK OVERLAP MARK
P_{b+1} P_{c-1}	$377)_8$	LEFT FILL WHITE PIXELS
P_c P_d	$000)_8$ - 377_8	EARTH IMAGERY
P_{d+1} P_{e-1}	377_8	RIGHT FILL WHITE PIXELS
P_e P_f	$000)_8$	RIGHT IMAGE BLACK OVERLAP MARK
P_{f+1} P_{6967}	377_8	RIGHT FILL WHITE PIXELS

3.6.4 TRAILER FILE

The trailer files shall contain all the data belonging to the trailer major frames of the HDT-PT. Seven trailer files shall exist corresponding to the seven bands of the scene. Each file shall contain two records: file descriptor record and trailer record. The variable segment of the file descriptor record shall be as described in Table 3.6.4-1. The fixed segment format shall be as described in Table 3.5.2-1. The trailer record format shall be as described in Table 3.6.4-2.

Table 3.6.4-1. Variable Segment of the CCT-PT Trailer File Descriptor Record

BYTE	TYPE	DESCRIPTION
1-6	I	NUMBER OF TRAILER RECORDS, ALWAYS = 1
7-12		TRAILER RECORD LENGTH, ALWAYS = 7200
13-360		BLANKS

Table 3.6.4-2. CCT-PT Trailer Record Format

BYTE	DATA	DESCRIPTION
1-2	N N	RECORD NUMBER (INTEGER *4) ALWAYS = 1
3-4	N N	
5-6	S_1 T	RECORD TYPE S_1 = 1ST SUBTYPE, ALWAYS = 022_8 (DEFAULT) T = RECORD TYPE, ALWAYS = 366_8 (TRAILER) S_2 = 2ND SUBTYPE, ALWAYS = 022_8 (DEFAULT) S_3 = 3RD SUBTYPE, ALWAYS = 022_8 (DEFAULT)
7-8	S_2 S_3	
9-7200		ZERO FILL

SECTION 4

NOTES

4.1 SUPERSTRUCTURE CONCEPT

This section describes the superstructure concepts recommended by teh GSOWG CCT format CCB document.

The superstructure is composed of two basic components, a volume directory which globally describes the configuration of the tape or tape set and file descriptors which describe in more detail the configuration of the files. The files are logically grouped on a tape or set of tapes and this group is referred to as a logical volume. The individual tapes are the physical volumes. The volume directory introduces the logical volume and the file descriptor introduces the file (see Figure 4.1-1).

There are three types of records which comprise the superstructure: the volume descriptor, file pointer and file descriptor records. The general structure of these records can be seen in Figure 4.1-2. The first 12 bytes are standard and appear on each type of record. They contain a record number, a record type code (which also inlcudes sub-types) and a record length. The remainder of each record is dependent on record type. The volume descriptor and file pointer records each contain a field which is held free for utilization by the user.

4.2 SUPERSTRUCTURE RECORDS

In the volume directory file there is only one volume descriptor record and it is always the first record of the file. It contains three general types of information:

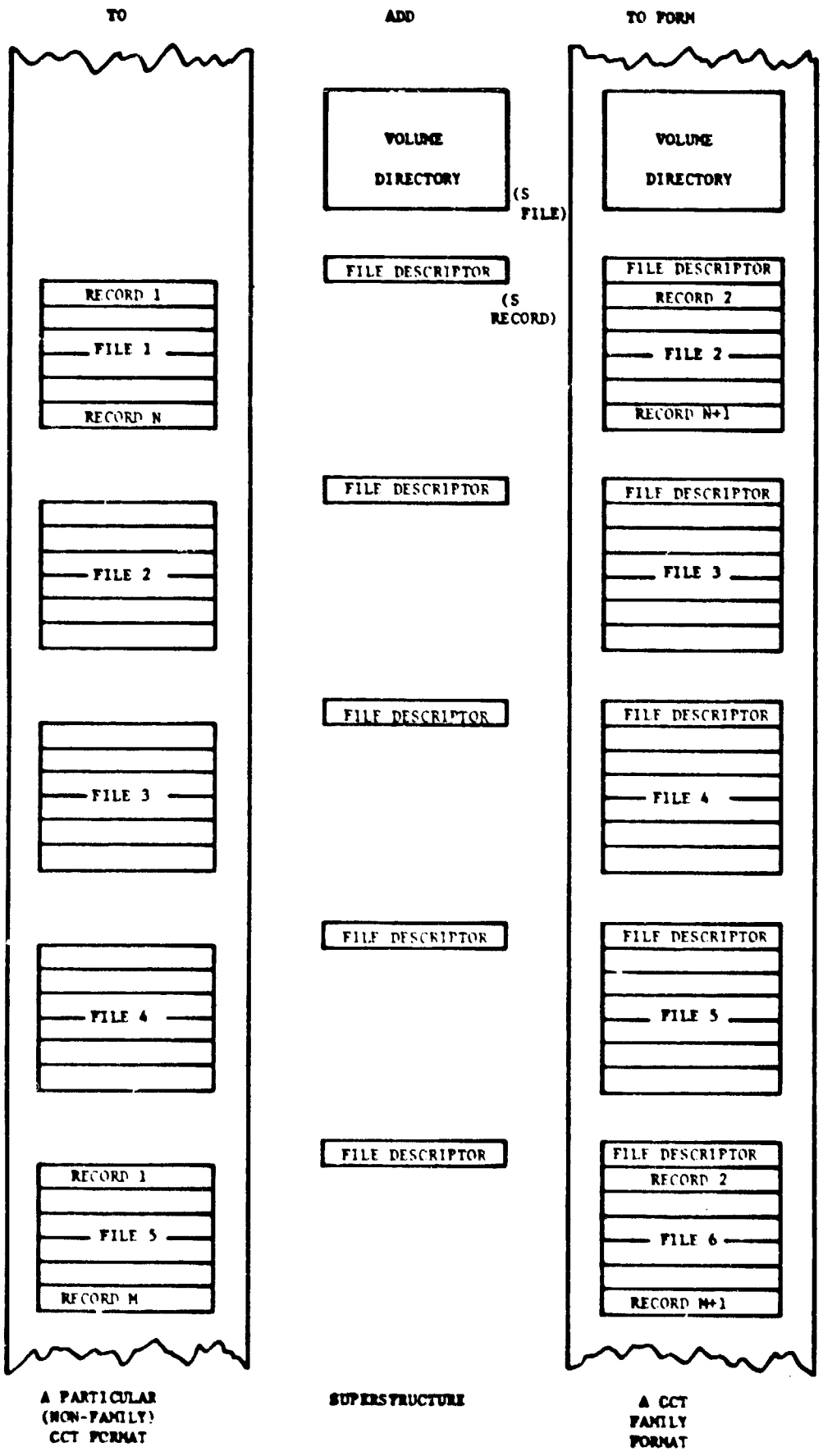
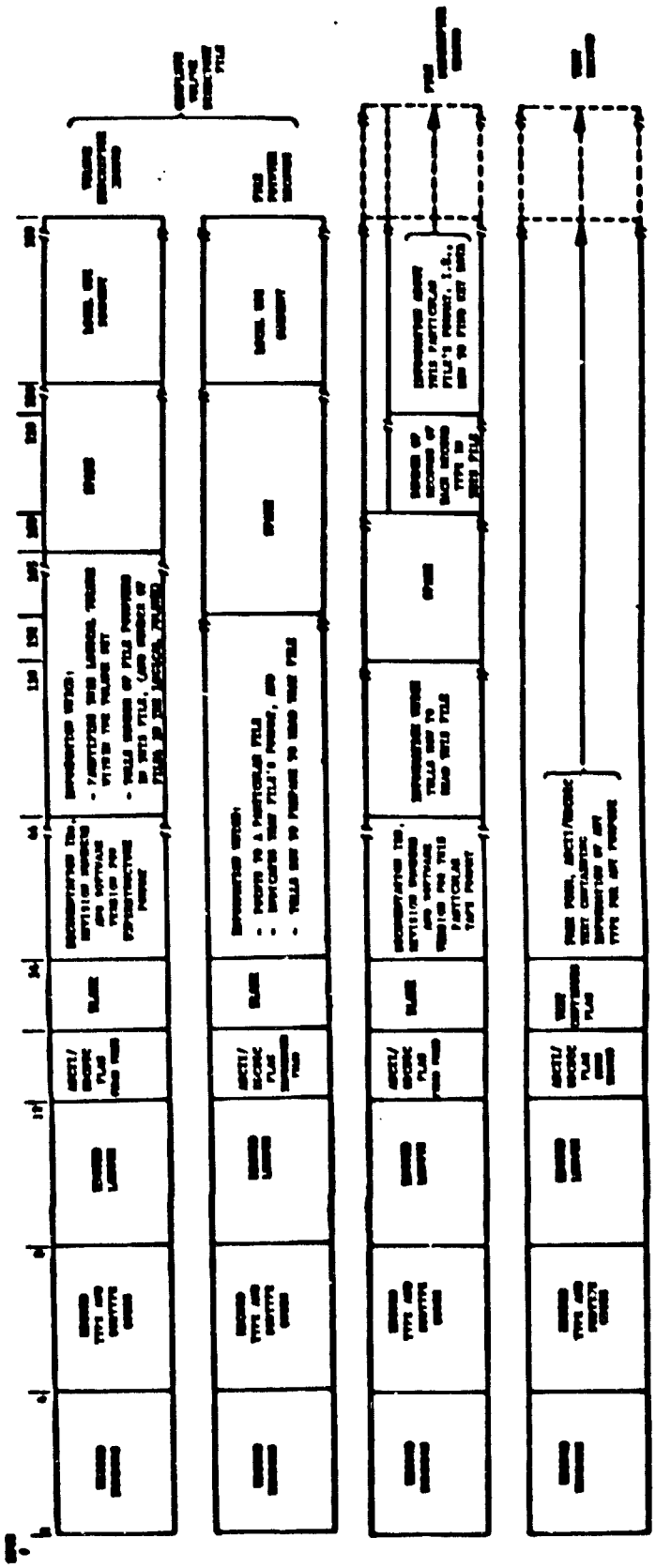


Figure 4.1-1. Example of Converting a Particular CCT Format to a CCT Family Format



*File Descriptor and Text Records will be the same length (N) as the other records of the file. If the other records of the file are not of equal length, these records will then be 360 bytes in length.

Figure 4.1-2. Layout of Superstructure Records

a. The standard data, such as record number, type, length

b. File-specific information, such as number of pointer records in the file

c. Logical-volume-specific information.

This third group of data is the most extensive andn contains all the information which applies to the logical volume as a whole, such as data source identification, physical volume identification, and physical relationship of the logical volume to other logical volumes in the tape or tape set. This record gives the user enough information to be able to locate the data in gross terms within the data tape set. The volume directory file also contains, for each of the remaining data files of the logical volume, a pointer record which points to the file and gives general information about the data in the file. The standard introductory data in the pointer record are followed by the identifying and descriptive information on the referenced file and its format. This includes file number, name, number of records, record lengths, and indication of the content of the file in terms of the type and format of the data. The file pointer records will allow a user to skip files and read only selected ones for performing rudimentary data processing.

The file descriptor record is the first record of each file of the logical volume (except the volume directory file) and it describes with more detail the data in the records of the file. The record contains the standard introductory information (e.g., record number, type, length) and information about the file

(such as file number, name and file format) which will vary from file to file. It also has a segment which contains further identification and description of the file format and content; however, the data elements and layout of this segment depend on the class (type) of data within the file. This segment is called the variable data segment. For each file class there is defined a specific variable data segment. The file descriptor record gives a user enough information to access or display the data without requiring further specifications.

Each of the superstructure records contains a record sequence number, the record length and type code. The record sequence number is located in bytes 1 through 4 of each record and its value starts at 1 and increases sequentially in the subsequent records of the file. Bytes 9 through 12 of each record contain the record length. For the superstructure records, record lengths are: 360 bytes for the volume descriptor record; 360 bytes for the file pointer record; and the same length as the other records in the file for the file descriptor record if the records are of constant length within the file, or 360 bytes if the record lengths within the file are variable. The record type codes, which appear in bytes 5 through 8, are used to identify the type of information contained in the record.

4.3 BASIC CCT TAPE LAYOUT

The simplest and most common form of CCT is the case where one physical volume (tape) contains one logical volume of data. A logical volume is a set of data which is grouped in any way that makes sense to the tape format designer (and

presumably to the tape user). In terms of superstructure concepts, a logical volume is a set of data which is introduced by a volume directory file and concluded with a null volume descriptor record (or the volume directory file of succeeding logical volume). It may contain one or more data files, each introduced by a file descritor record.

The data files contain the actual information for which the CCT is recorded, while the superstructure records direct the user to this data. The layout of a CCT of one physical volume containing one logical volume of N data files is given in Figure 4.3-1. It starts with the volume directory file, which is the introduction to the logical volume and contains the volume descriptor and file pointer records. This is followed by the data files. The files are separated by end-of-file (EOF) indicators, and the records within a file are separated by inter-record gaps (IRGs). After the last data file, a null volume directory marks the end of the logical volume. It is a file consisting of a null volume descriptor record only.

If this particular tape (physical volume) is associated with other tapes so that together they form a set (referred to as a volume set), and if it is not the last volume of the set, the null volume descriptor record is not present and two EOFs indicate that there is no more data recorded on this tape. The two EOFs are referred to as an end-of-volume (EOV) indicator. If this particular tape is the last of a volume set or if it is a single-volume set (i.e., tape is not associated with other tapes as a set), the null volume descriptor record is followed by three EOFs, which are referred to as an end-of-set (EOS) indicator.

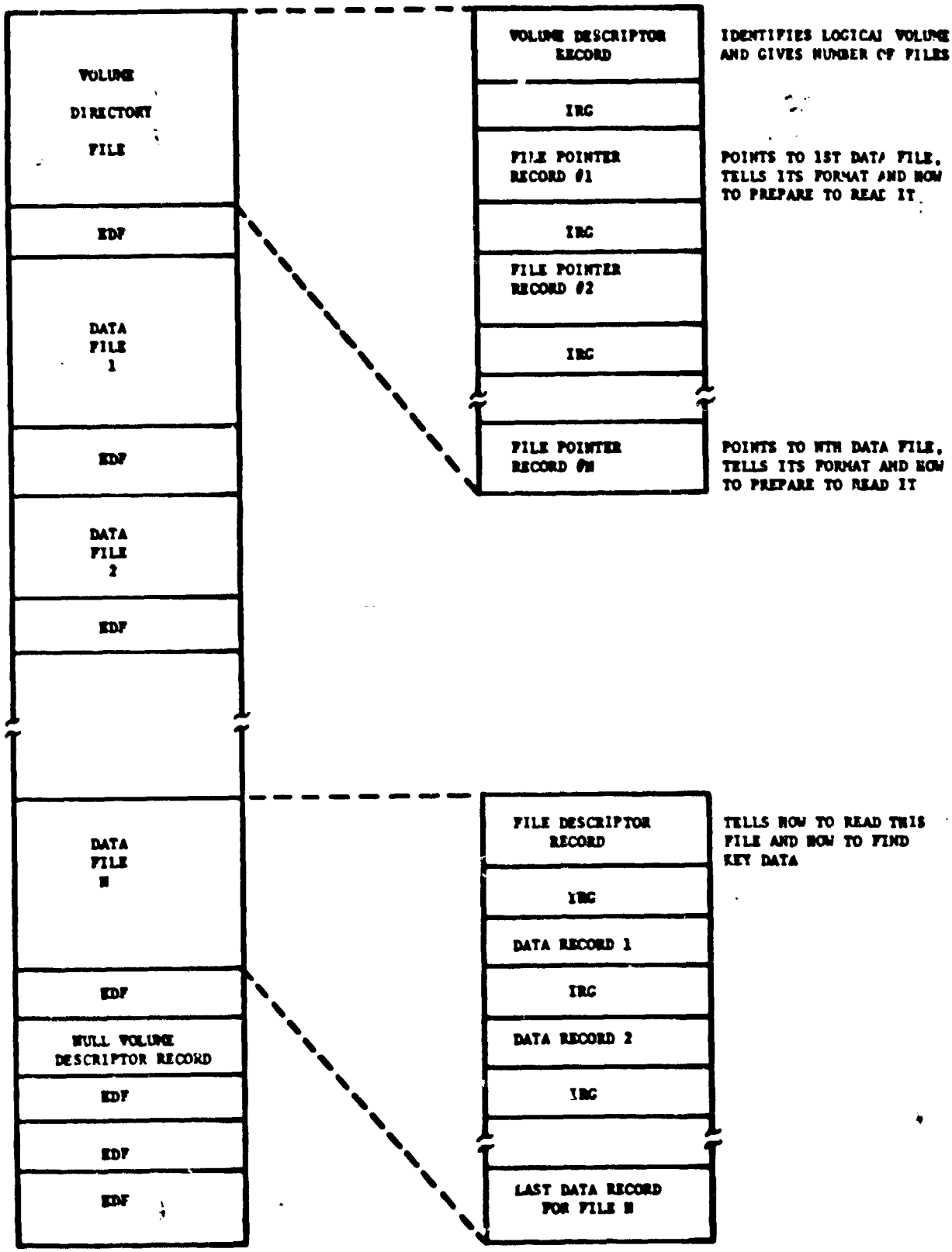


Figure 4.3-1. Basic CCT Tape Layout

(Systems which are unable to detect three consecutive EOFs will have to determine which logical volume is the last of a set by searching for the null volume descriptor record).

4.4 TAPE LAYOUT CONTINGENCIES

Although recording one logical volume per physical volume is the simplest of tape formats, there are many situations which can make this inefficient or even impossible. A discussion of some of these situations will depict the tape layout conventions which apply.

4.4.1 MULTI-VOLUME RECORDING

Multi-volume recording refers to recording a set of data which requires more than one physical volume. It generally implies that the volumes are recorded consecutively at a given time and site. The data can be recorded in the one logical volume per physical volume, as described, but when the length of the logical volume is unknown at recording start time, or if the logical volume is simply too long for one physical volume, the logical volume can be split between tapes. The logical volume may be divided between files, or when necessary between records within a file, although this second method is not recommended.

The method of splitting a logical volume on file boundaries is illustrated in the transition between physical volumes 1 and 2 of Figure 4.4.1-1 The last file of Tape 1 is followed by two EOFs (an EOV). The firs file of Tape 2 is the Volume Directory File. This is the same file which appeared in Tape 1, with the exception that certain data fields have been updated (e.g., Tape ID and Physical

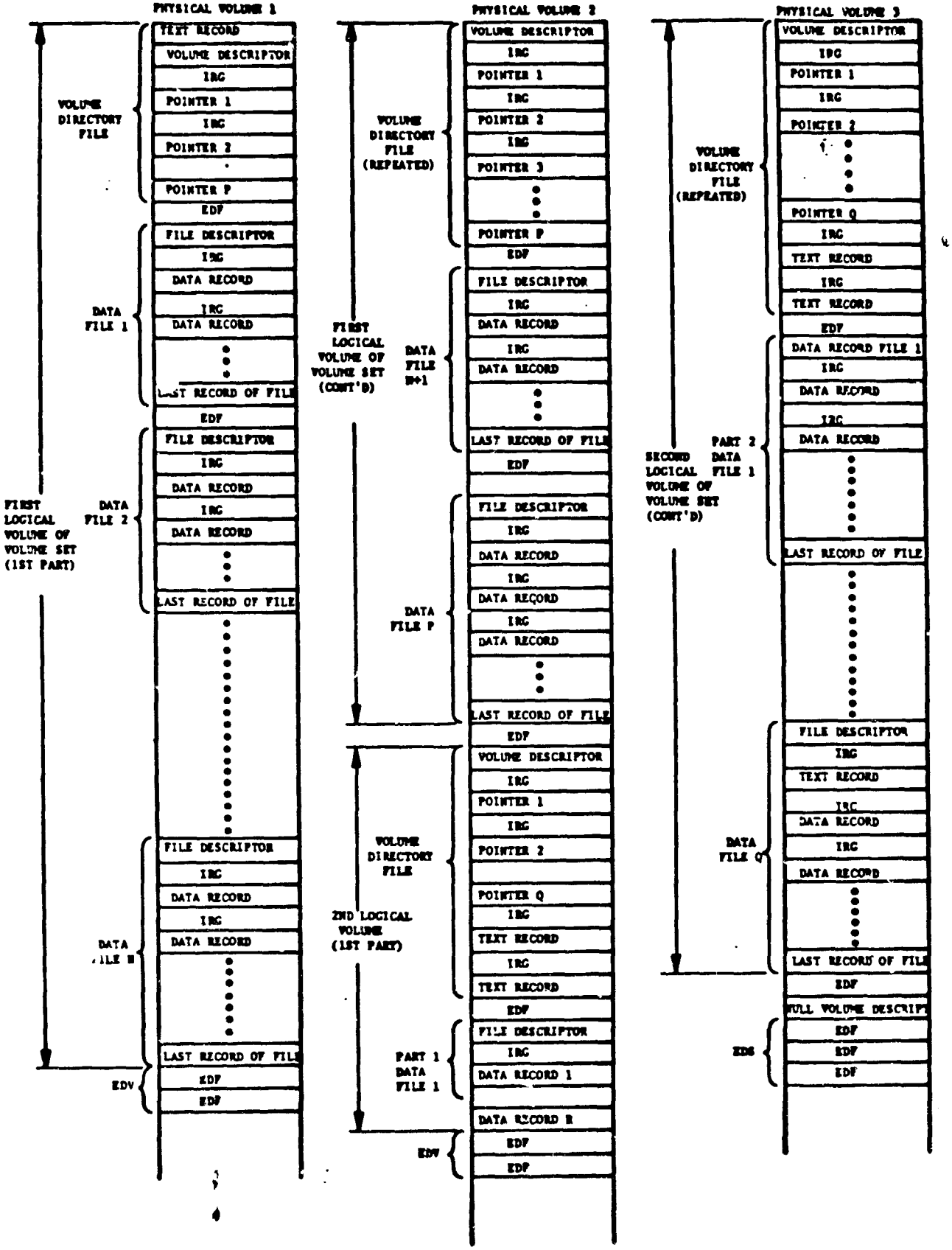


Figure 4.4.1-1. Illustration of CCT Family Tape Layout Conventions

Volume Number). One of the fields to be updated is that indicating the number of the first data file of the present physical volume. When splitting the logical volume between the Nth and (N+1)th files, as in the illustration, this field would contain N+1 in the repeated volume directory. It is this field which indicates that this particular physical volume begins within a logical volume.

An example of splitting a logical volume within a file is illustrated between Physical Volumes 2 and 3 of Figure 4.4.1-1 The last record of Tape 2 is followed by two EOFs (an EOV). Tape 3 begins with the Volume Directory File - the same file which appears at the start of the logical volume on Tape 2, except that, once again, the proper data fields are updated.

This includes a field in the file pointer record referring to the file being split and indicating the record number of the first record of that file on this tape. It is this field which indicates that this tape begins within a file. After an EOF the second portion of the split file is recorded without repeating the file descriptor record.

SECTION 5

ACRONYMS, ABBREVIATIONS, SYMBOLS AND TERMS

ASCII	American Standard for Computer Information Interchange
Band	A collection of pixels representing a spectral portion of a scene
BIL	Band-Interleaved-by-Line
Bit	The smallest element of binary, computer-intelligible data
bpi	Bits per inch - indicate the density of a tape
BSQ	Band sequential
Byte	A unit of data consisting of eight bits
CCT	Computer Compatible Tape
CCT-AT	A CCT containing a scene quadrant from the HDT-AT
CCT-PT	A CCT containing a scene quadrant from the HDT-AT
CP	Control point
Detector	A component of a sensor that is able to sense the energy level in a select spectral band
EDC	EROS Data Center
EDIPS	EDC Digital Image Processing System
EROS	Earth Resources Observation System
GSFC	Goddard Space Flight Center
HDT	High Density Digital Tape
Interval	Set of contiguous scan line imagery comprised of one or more scenes

Landsat	Land Satellite (formerly ERTS)
Line	A cross track motion of an active detector (a full scene width)
Logical volume	A set of CCT containing one scene quadrant
LSB	Least Significant Bit
MSB	Most Significant Bit
Null volume directory	A subset of the volume directory file which is included at the end of a logical volume
Pixel	One image detector sample
PS	Polar Stereographic
Right Justified	Technique of positioning data so that the least significant bit appears in the rightmost position
S/C	Spacecraft
Scan	A cross track motion of an active detector (a full scene width)
Scene	A segment of Landsat image data which corresponds to a 185 x 170 km area or the ground.
Sensor	An imaging instrument (a sensor may consist of one or more detectors)
SLID	Scan Line Identification
SOM	Space Oblique Mercator
Superstructure	Information at the beginning of a logical volume describing its configuration

Swath	The dimension of the ground seen as transverse to spacecraft velocity, within the sensor field of view
Sweep	Two cross-track motions of a sensor; equal to two scan lines
Tick Marks	Positional marks placed on imagery to enable a location grid coordinate system to be constructed
TIPS	TM Image Processing System
TM	Thematic Mapper
UTM	Universal Transverse Mercator
Volume directory	A superstructure file containing information about a logical volume
WRS	World Reference System