B42453-000

SENSOR/INSTRUMENT: THIR

TAPE SPEC. NO. T344011, REVISION A & E DATED 07/15/81

SPEC. TITLE CALIBRATED--LOCATED DATA TAPE

78-098A-10C

REVIEWED BY: Gail R. McConaughy DATE 7/8/80
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B42453-000 Revision A (11/1/78) Revision D Revision E 07/15/81

NIMBUS-G

NIMBUS OBSERVATION PROCESSING SYSTEM (NOPS)

REQUIREMENTS DOCUMENT #NG-5

TAPE SPECIFICATION NO. T344011 - THIR CLDT

THIR CALIBRATED-LOCATED DATA TAPE

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CHANGES:

- Gross Output Format
  - Addition of Dummy Record to End of each Data File.
- Major Revisions to Documentation Record Format.
- Minor Revisions to Data Record Format.
- Inclusion of Dummy Record Format Description.
- Revision A (11/1/78)
  - Change of time units in Documentation Record Format. pp 13
  - Change of time units in Data Record Format. pp 19
- Revision E adds new standard header

ABSTRACT

The THIR Calibrated-Located Data Tape (CLDT) is a 9-track, 1600 BPI tape generated by a MODCOMP IV computer. The first file of a CLDT contains a NOPS Standard Header record written twice. Each subsequent file contains one orbit of data. (An orbit is defined as beginning at one descending node and ending at the next descending node.) Nominally, there are either six or seven orbital files (½ day of data) on a CLDT, terminated by double end-of-file marks.

Within each orbital file, there may be as many as 5000 THIR scans of data. The THIR scans are arranged in ascending time order. Only the earth-view portion of the scan is written to the CLDT. Each physical record in an orbital file can contain ten THIR scans. Thus, including a single Documentation Record at the beginning of the file and a single Dummy Record at the end of the file, as many as 502 physical records may be written for each orbit.

I. REQUIREMENT IDENTIFICATION

THIR Calibrated - Located Data Tape: Project Data Format Code ID; NOPS Specification No. T344011.

II. INPUT DATA SOURCES

1. Stripped THIR Tape (STT), PDF Code IB, NOPS Specification No. T344081.

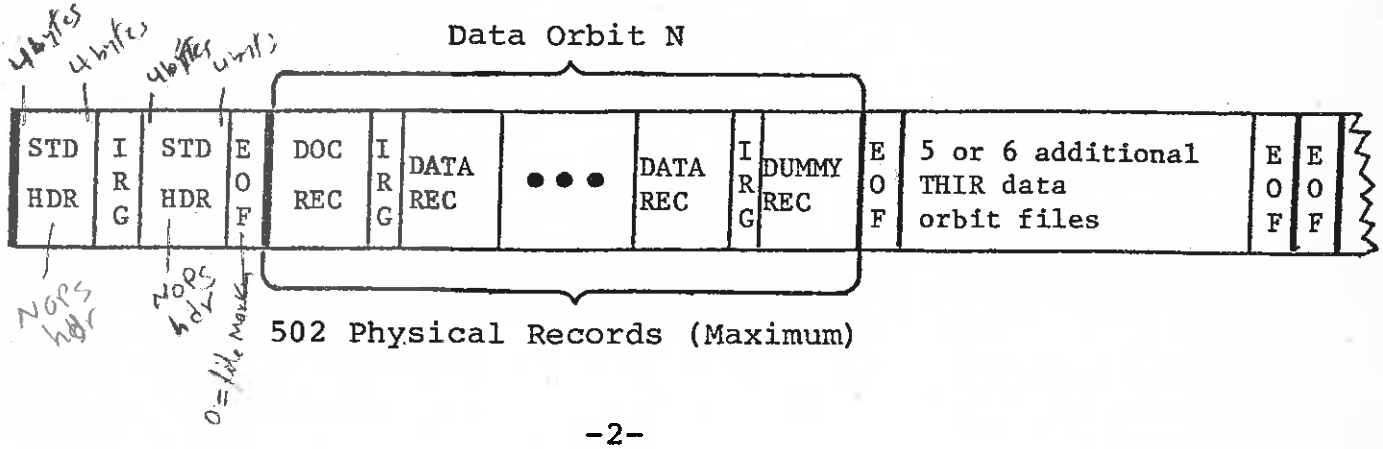
2. THIR Image Location Tape (ILT-T), PDF Code LI, NOPS Specification No. T324021.

III. OPERATING MODE

THIR data is available on the CLDT only when the THIR sensor is on.

When a CLDT has accumulated ½ day of data (6 or 7 orbits), the tape is terminated. If further THIR data is available for the day, a new CLDT is then initiated. CLDT sequence numbers are assigned sequentially in correspondence with the date of the THIR data, with two consecutive numbers being reserved for each day of S/C operation.

IV. GROSS OUTPUT FORMAT



V. STANDARD HEADER

All magnetic tapes used as interfaces within NOPS will require some form of identification. A standardized series of records in the initial file on each tape will be used and will be called a NOPS "Standard Header File." Some tapes used within a NOPS facility which do not pass an interface will be exempt from this requirement - although it is a recommended procedure.

→ The STD HRD will contain the spec number of the tape generated. The interface spec numbering system is shown in Table V-1.

Each STD HDR will be written in EBCDIC so that it can be easily printed for quick identification of the tape. Figure V-1 shows the standard header format using 24 bit words.

Because of the real possibility of an original tape being damaged in handling (resulting in the loss of many computations), each processing facility within NOPS will generate duplicate copies of master tapes. These duplicates will be delivered to IPD for data product generation or user copy generation → and will be indicated by the characters "-2" added to the sequence number in → the STD HDR. The original will be indicated by the characters "-1" and will be retained in a secure environment at the originating facility. When IPD returns copy no. 2 due to tape errors, a new copy will be sent to IPD with the → same copy number, but identified on the tape cannister as "-2A", then "-2B" for a subsequent redo, etc.

IPD will include a shipping letter with every tape distributed. The shipping letter will be printed directly from the STD HDR on the tape. In the case of copies made from tapes not generated in IPD, a new set of 126 characters reflecting IPD as the source, and the Nimbus experimenter to whom the tape is being sent, as the destination, is produced. This new 126 character set is put at the start of the header and the second through fifth blocks of 126 characters are the first through fourth blocks from the original copy 2 tape (the fifth block of the copy 2 will be lost)

The format of a NOPS Standard Header Record is shown in Figure V-1. The contents of the record are as follows:

1. TAPE SPECIFICATION NUMBER (6 Characters) - Each distinct NOPS tape format is identified by an unique Tape Specification Number. The specification numbering system for NOPS interface tapes is shown in Table V-1.

2. PROJECT DATA FORMAT CODE (2 Characters) - Each distinct NOPS tape format is also identified by an unique Project Data Format (PDF) Code. PDF Codes for NOPS interface tapes are shown in Table V-2.

3. TAPE SEQUENCE NUMBER (5 Characters) - This number uniquely identifies a particular tape of a given PDF Code. Each processing facility within NOPS is responsible for deciding how to assign sequence numbers to the tapes that it generates. A sequence number of zero indicates that the tape is not a finished product (e.g., non-definitive ephemeris used, artificial VIP data used, etc.).

4. TAPE COPY NUMBER (1 Character) - This number distinguishes different copies of a tape having a given PDF Code and Sequence Number. Because of the real possibility of an original tape being damaged in handling, resulting in the loss of many computations, each NOPS processing facility generates duplicate copies of master tapes. These duplicates are delivered to IPD for data product generation or user copy generation, and are distinguished by a Tape Copy Number of 2. The original tape is identified by a Tape Copy Number of 1, and is retained in a secure environment at the originating facility. If IPD returns a duplicate tape due to tape errors, a new copy is sent to IPD with the Tape Copy Number incremented by one.

5. SUBSYSTEM ID (4 Characters) - This field identifies the NOPS Subsystem responsible for the generation of the tape. A list of these Subsystem ID's is included in Table V-1.

6. SOURCE FACILITY ID (4 Characters) - This field identifies the NOPS processing facility that generated the tape. A list of NOPS processing facilities is included in Table V-1.

7. DESTINATION FACILITY ID (4 Characters) - This field identifies the NOPS processing facility that is the primary user of the tape. A list of NOPS processing facilities is included in Table V-1.

8. DATA START YEAR, DAY OF YEAR, AND TIME OF DAY (4 Characters, 3 Characters, and 6 Characters respectively) - These three fields are used to record a lower bound for the time associated with any data written on the tape. The Year is given as a four-digit number, and Day of the Year as a three-digit number. The Time of the Day is given in Hours, Minutes, and Seconds, with two digits allowed for each. Leading blanks or zeroes may be used where necessary to pad out these fields.

9. DATA END YEAR, DAY OF YEAR, AND TIME OF DAY (4 Characters, 3 Characters, and 6 Characters respectively) - These three fields are used to record an upper bound for the time associated with any data written on the tape. The Year is given as a four-digit number, and the Day of the Year as a three-digit number. The Time of the Day is given in Hours, Minutes, and Seconds, with two digits allowed for each. Leading blanks or zeroes may be used where necessary to pad out the fields. (Some facilities may not include end date and time in the header, in which case these fields will be left blank.)

10. TAPE GENERATION YEAR, DAY OF YEAR, AND TIME OF DAY (4 Characters, 3 Characters, and 6 Characters respectively)- These three fields are used to record the date and time of the tape's generation at the NOPS source facility. The Year is given as a four-digit number, and the Day of the Year as a three-digit number. The Time of Day is given in Hours, Minutes, and Seconds, with two digits allowed for each. Leading blanks or zeroes may be used where necessary to pad out these fields.

11. ORIGINAL HEADER DATA (126 Characters) - This field will be used by IPD, when generating user copies of NOPS interface tapes, to record the first 126 characters of Standard Header information from the original tape. This will assist the user in correctly identifying the original source of the data. If unused for this purpose, this field will be blank filled.

12. SUBSYSTEM DATA 1, 2, and 3 (126 Characters each) - These three fields are available for the use of the Subsystem Analysts for further identification of the tape's data. If unused, these fields will be blank filled.

EXAMPLE: An ERB matrix tape covering the month of February 1979, is generated by SACC and sent to IPD for production of contour maps on 16 mm microfilm. The NOPS Standard Header File on the tape which IPD receives would contain two of the following records.

bNIMBUS-7bNOPSbSPECbNObT134031bSQbNO

AA00027-2bERBbbSACCbTObIPDbbSTARTb1979b

032b000432bTOb1979b059b235742bGENb

1979b104b094500b(followed by 504 blanks)

630 bytes

MSB 7 — LSB 0	BYTES
"NIMBUS-7$_b$NOPS$_b$SPEC$_b$NO$_b$T" (24 Characters)	1-24
TAPE SPECIFICATION NUMBER (6 Characters)	25-30
"$_b$SQ$_b$NO$_b$" (7 Characters)	31-37
PDF CODE (2 Characters)	38-39
TAPE SEQUENCE NUMBER (5 Characters)	40-44
"-" (1 Character)	45
TAPE COPY NUMBER (1 Character)	46
BLANK (1 Character)	47
SUBSYSTEM ID (4 Characters)	48-51
BLANK (1 Character)	52
SOURCE FACILITY ID (4 Characters)	53-56
"$_b$TO$_b$" (4 Characters)	57-60
DESTINATION FACILITY ID (4 Characters)	61-64
"$_b$START$_b$" (7 Characters)	65-71
DATA START YEAR (4 Characters)	72-75
BLANK (1 Character)	76
DATA START DAY OF YEAR (3 Characters)	77-79
BLANK (1 Character)	80
DATA START HOURS, MINUTES, SECONDS (6 Characters)	81-86
"$_b$TO$_b$" (4 Characters)	87-90
DATA END YEAR (4 Characters)	91-94
BLANK (1 Character)	95
DATA END DAY OF YEAR (3 Characters)	96-98
BLANK (1 Character)	99
DATA END HOURS, MINUTES, SECONDS (6 Characters)	100-105

Figure V-1. NOPS Standard Header Record Format

"bGENb" (5 Characters)	106-110
TAPE GENERATION YEAR (4 Characters)	111-114
BLANK (1 Character)	115
TAPE GENERATION DAY OF YEAR (3 Characters)	116-118
BLANK (1 Character)	119
TAPE GENERATION HOURS, MINUTES, SECONDS (6 Characters)	120-125
BLANK (1 Character)	126
ORIGINAL HEADER DATA (126 Characters)	127-252
SUBSYSTEM DATA #1 (126 Characters)	253-378
SUBSYSTEM DATA #2 (126 Characters)	379-504
SUBSYSTEM DATA #3 (126 Characters)	504-630

105 48-BIT WORDS

140 36-BIT WORDS 315 16-BIT WORDS

210 24-BIT WORDS 630 8-BIT BYTES

FIGURE V-1. NOPS STANDARD HEADER RECORD FORMAT (Concluded)

A six digit number, prefixed with a "T" to denote TAPE, will be used.

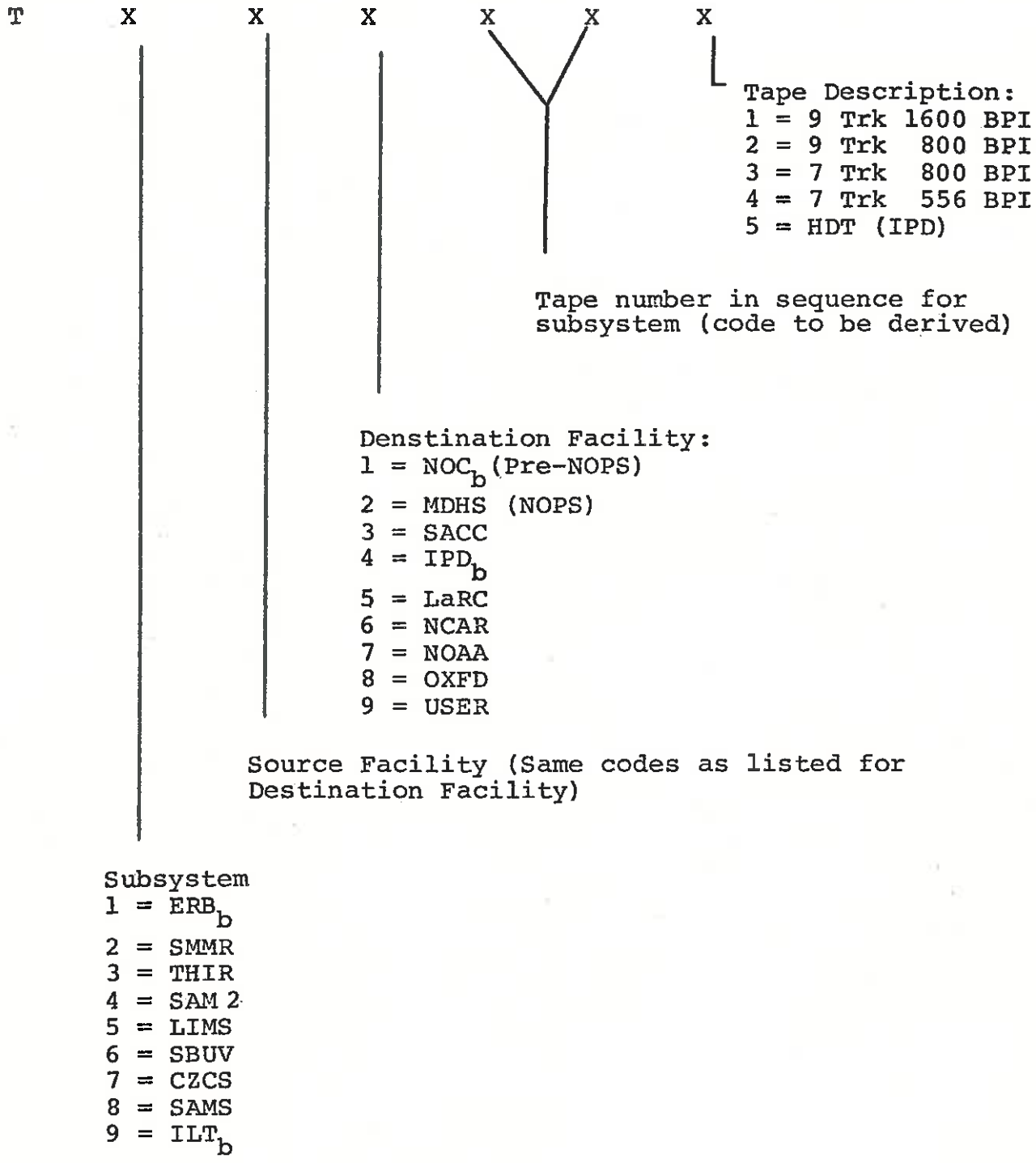


TABLE V-1. NOPS TAPE SPECIFICATION NUMBERING CODE

SUBSYSTEM	TAPE ID	PDF
ERB	MATRIX	AA
	TABLES	AB
	MAT	AC
	SEFDT	AD
	ZMT	AE
	STAGS	AG
SMMR	MATRIX-30	BA
	MATRIX-LO	BB
	MATRIX-SS	BC
	MAP-30	BD
	MAP-LO	BE
	MAP-SS	BF
	PARM-30	BG
	PARM-LO	BH
	PARM-SS	BI
	TAT	BJ
	CELL ALL	BK
	CELL-LO/SS	BL
THIR	SOURCE	IA
	STT	IB
	BSHT	IC
	CLDT	ID
	CLE	IE
	CLT	IF
	HDT	IP
SAM II	MATRIX	DA
	PROFILE	DB
	RDAT	DC
	BANAT	DD
	NMCT	DE
ILT	ILT/ERB	LA
	ILT/SMMR	LB
	ILT/THIR	LI
	ILT/SAM II	LD
	ILT/LIMS	LE
	ILT/SBUV	LF
	ILT/CZCS	LZ
	ILT/SAMS	LH
	ILT/CLOUDS	LC
	ILT/LANNION	LL

SUBSYSTEM	TAPE ID	PDF
LIMS	MATRIX-M	EA
	MATRIX-C	EB
	PROFILE-R	EC
	PROFILE-I	ED
	RAT	EE
	IPAT	EF
	MAT	EG
	CAT	EH
	SMAT	EI
	NMCT	EK
	SCAT	EM
SBUV/ TOMS	MATRIX	FA
	TABLES	FB
	MONTAGE	FC
	RUT-S	FD
	OZONE-S	FE
	OZONE-T	FF
	ZMT	FH
	RUT	FJ
CZCS	SOURCE	ZA
	CRCST	ZB
	CAT	ZC
	CRCST-L	ZD
	HDT	ZQ
SAMS	MATRIX	HA
	RAT	HC
USER	UFO/ERB	UA
	UFO/SMMR	UB
	UFO/LIMS	UE
	UFO/SBUV	UF
	UFO/ILT	UL

TABLE V-2. NIMBUS-G PROJECT DATA FORMAT CODES.
(as of 1 May 1978)

The following new standard header specification was added to this document on July 15, 1981.

All of these tape types with a generation date after _____ will conform to this standard header.

Tapes processed before this date will conform to the preceeding standard header documentation.

EFFECTIVE DATE:_____

STANDARD HEADER SPECIFICATION AND TAPE DOCUMENTATION

V.1 GENERAL

All computer compatible tapes (CCT's) that are used as interfaces within NOPS require some form of identification. This applies to all CCT's that are currently defined by a NOPS tape specification, and that are also used for distribution or archiving purposes.

In addition to defining a "latest" product, data relating to previous products that went into the making of the "latest" product provides useful information when system problems occur.

→ The purpose of this revision to existing NOPS tape specifications is to define a scheme that allows the recording of the genealogy of a "latest" product, and in general adheres to existing tape documentation standards.

In brief the system is as follows:

1. A documentation file that consists of a string of physical records follows the data on any tape defined by a current NOPS tape specification. This will be referred to as a → Trailing Documentation File (TDF), and be the last file on a tape when it exists.

2. The standard NOPS header file remains as defined, with minor modifications to the standard header record that reflect both the existence of a TDF and adherence to the IPD standard for sequence numbers.

The following sections define the NOPS standard header records and file, and the TDF. Data files as currently defined in NOPS tape specification remain unchanged.

V.2 STANDARD HEADER RECORD (SHR)

The SHR will consist of one physical record that consists of 5 logical records of 126 EBCIDIC characters. The first 126 characters will remain as previously defined with the exception of CHARACTER 1, and those characters that define the sequence number (40-45). CHARACTER 1 will contain an asterisk (*) and serve to notify all systems that a TDF is likely to follow the main data files and that the next logical record contains information relevant to complete identification. As of the implementation date of this specification, all sequence numbers will have the following form that is an IPD standard:[1]

[1]This does not apply to CZCS Data. For CZCS data, CHARACTERS 40 to 45 represent a 6-digit sequence number.

CHARACTER 40 = The last digit of the year in which the data were acquired.

CHARACTER 41-43 = Julian day of the year in which the data were acquired.

CHARACTER 44 = Sequence number for this particular product (usually a 1) (e.g., CLDT's will have a 1 and 2, as there are 2 products per day).

CHARACTER 45 = The existing hyphen remains unless there is a remake of the tape for any reason. In this case, an ascending alpha character will replace the hyphen, and the most recent reasons for remake will be recorded in logical record 4 of the header.

CHARACTER 47 = This will remain as a blank unless it is needed to remove ambiguities in CHARACTER 40. This may occur if data are being acquired on October 24, 1988.

This scheme will uniquely identify any tape when used in conjunction with the tape specification number, the PDFC code, and the subsystem identification.

The second logical record consisting of 126 characters will contain information that is required to complete the history of the product.

CHARACTER 1-12 = Software program name and version number.

CHARACTER 13-18 = Program documentation reference number, if it exists.

CHARACTER 20-126 = User defined comments that may be more relevant to the user than the preceding ones.

630 x 2

The NOPS standard header file will continue to consist of 2 records, the second being a duplicate of the first. Logical records 3 and 4 may be used for anything desired if no remake information is required.[2]

V.3 TRAILING DOCUMENTATION FILE (TDF)

The TDF will consist of all NOPS standard header records (non-duplicated) that relate to products that have gone into the making of the current product. Documentation records will be

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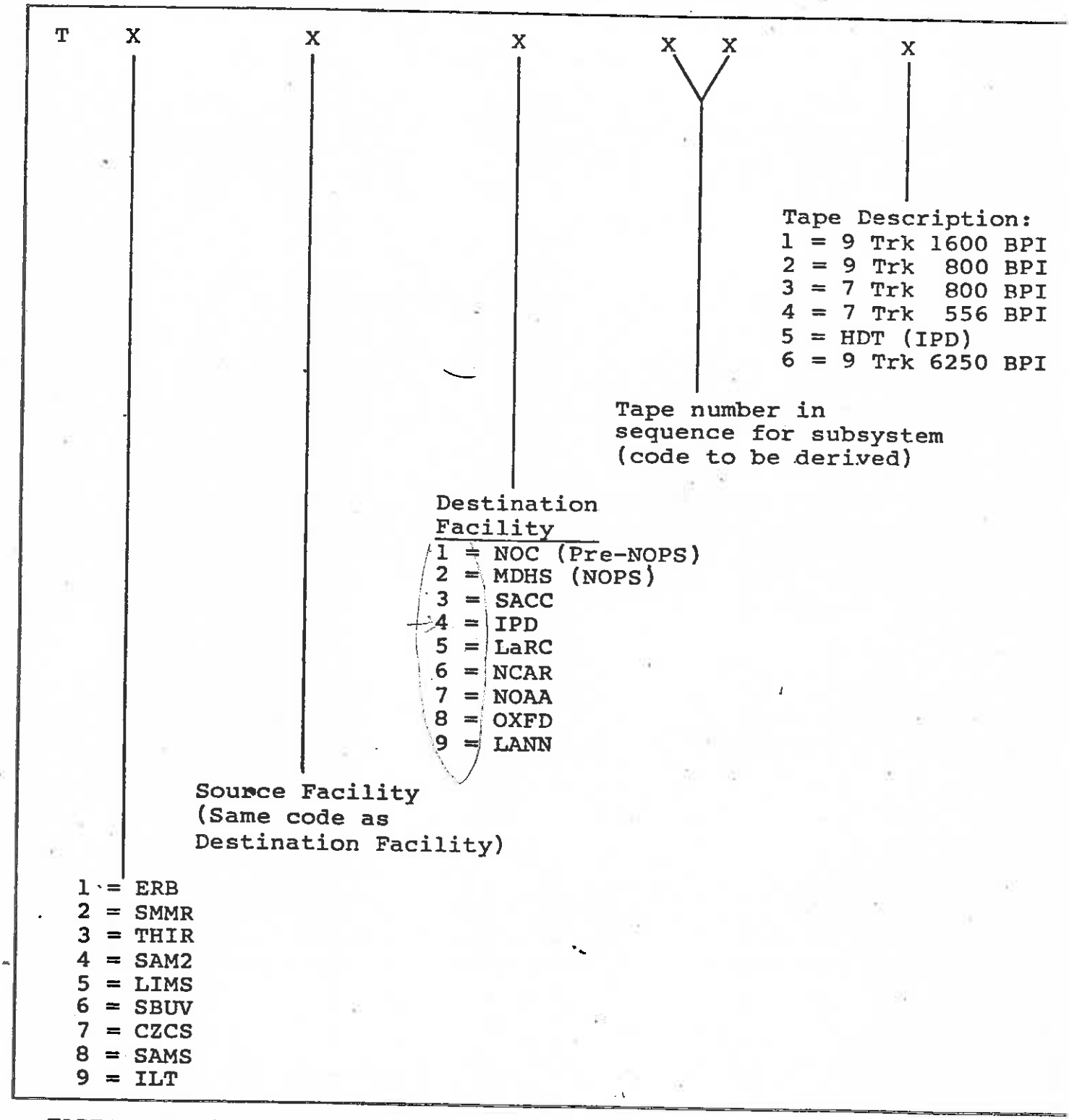
[2]In the case of CZCS these logical records are used to define the genealogy of the image rather than the method of V.3.

sequenced in accordance with their access; that is, first in is the first recorded. Every TDF is 630 bytes in length.

The first record of this file will serve to identify the file as a TDF. This will be accomplished by placing asterisks in CHARACTERS 1 to 10 followed by "NOPS TRAILER DOCUMENTATION FILE FOR TAPE PRODUCT T [SPEC NO (6 digits)] GENERATED ON DDD HH MM". The exact spacing of this comment is noncritical as long as it is less than 116 characters. The second physical record will be a repeat of the header file NOPS standard header record for this type with the provisonthat data referring to the end-time are correct for the data set. Following physical records will be an accumulation of TDF's of all input tapes. For those products that require more than one tape, the TDF will appear on the last tape only as well as the warning asterisk.

Table V-1

NOPS Specification Numbering Code



TAPES: A six digit number prefixed with a T to denote TAPE will be used.

Rev. D adds 6250 bpi tapes as a possible product

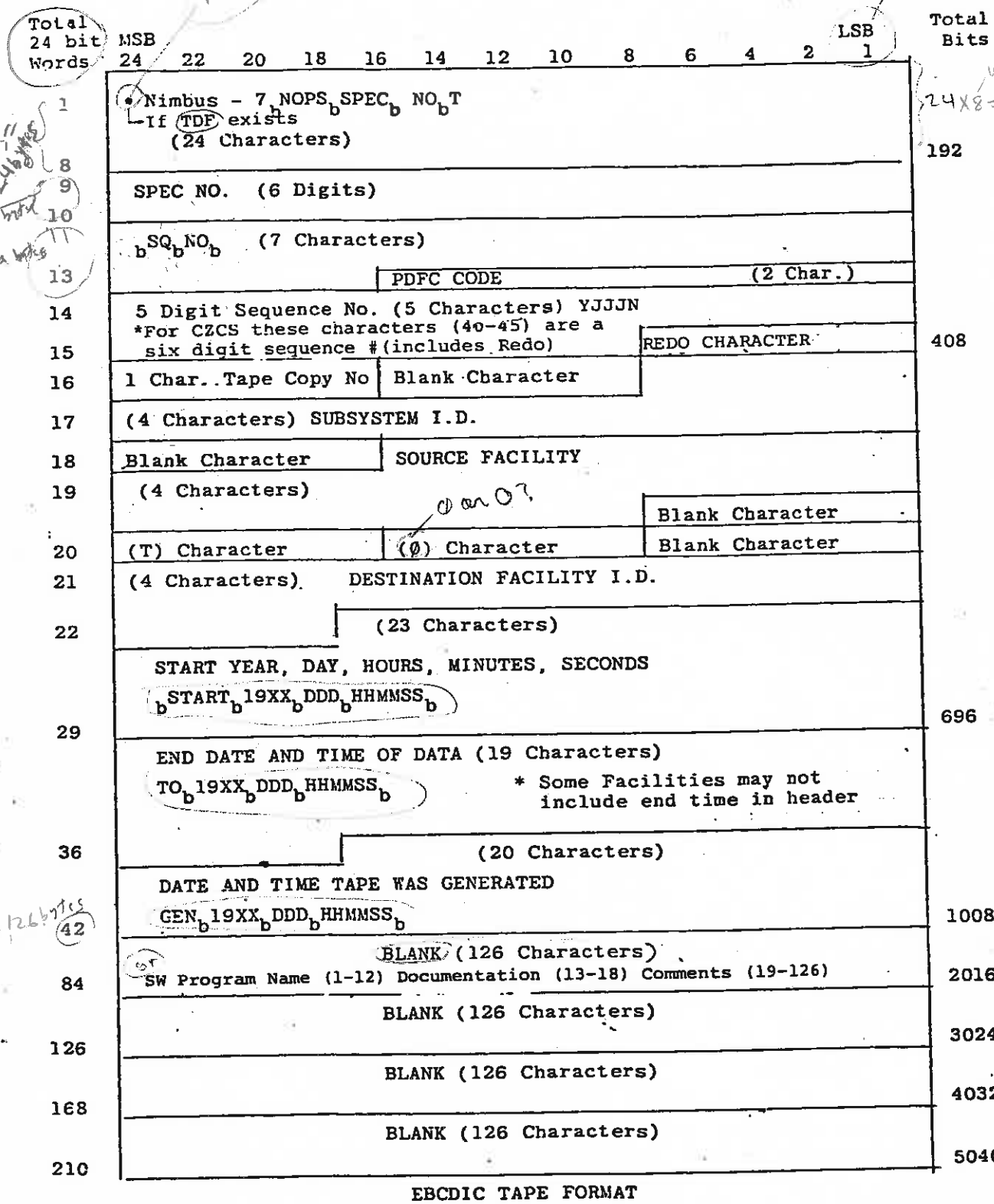


Figure V -1. Standard Header (Physical Record Format)
(1 Character = 8 bits)

The STD HDR will contain the following:

Two identical records (physical) of 630 characters (eight bits each) followed by an end-of-file.

The first 126 characters of the first record will consist of:

*NIMBUS-7$_b$NOPS$_b$SPEC$_b$NO$_b$T (optional)	(1 - 24 Character Count)
XXXXXX (96 digit spec number)	(25 - 30 Character Count)
$_b$SQ$_b$NO$_b$	(31 - 37 Character Count)
AA XXXXX (5 digit sequence No.)	(38 - 44 Character Count)

NOTE: If sequence number is zero, tape is not a finished product (i.e., definitive ephemeris not used, artificial VIP data, etc.) *

redo character -X (copy number 1 or 2)	(45, 46 Character Count)
$_b$YYYY$_b$ (4 character subsystem ID)	(47 - 52 Character Count)
YYYY (Generation Facility ID)	(53 - 56 Character Count)
$_b$TO$_b$YYYY (4 Char. Des. Fac. ID)	(57 - 64 Character Count)
$_b$START$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (Start year, day of year, hours, minutes, seconds)	(65 - 87 Character Count)

*For CZCS, characters 40 to 45 are a 6-digit sequence number.

$_bTO_b19XX_bDDD_bHHMMSS_b$ (88 - 106 Character Count)

(End data and time of data)

$GEN_b19XX_bDDD_bHHMMSS_b$ (107 - 126 Character Count)

(Date and time tape was generated)

The second group of 126 characters will contain continuation documentation of the original 126 characters when required.

The third, fourth, and fifth groups of 126 characters each are intended for the use of the subsystem analysts for further identifications of their data. They may contain blanks, EBCDIC, BDC, or binary characters or zeros.

The second record in the file is a duplicate of the first record for redundancy.

The PDFC codes are as defined in Table V-2.

EXAMPLE: An ERB matrix tape covering the month of February 1979 is generated by SACC and sent to IPD for production of contour maps on 16 mm microfilm. The NOPS STD HDR file on the tape that IPD receives would contain two of the following records.

*NIMBUS-7NOPS$_b$SPEC$_b$NO$_b$T134031$_b$SQ$_b$NO$_b$

1st day of time period

AA90321-2$_b$ERB$_{bb}$SACC$_b$TO$_b$IPD$_{bb}$START$_b$1979$_b$

032$_b$000432$_b$TO$_b$1979$_b$059$_b$235742$_b$GEN$_b$

1979$_b$104$_b$094500$_b$followed by 504 blanks

First day of time period may not be first data day in the event of multiday-stacked products that are based in an ILT week.

V.4 TAPE DUPLICATION

It has been determined that the duplication of master tapes is neither time nor cost effective, thus the requirement of duplication implied in the preceding specification is rescinded. However, some tapes that require a great deal of effort to produce in terms of manpower and computer time should be duplicated.

If a redo is required due to tape errors or algorithm changes, this will be noted both on the CCT (HEADER C-45) and on the canister.

V.5 SHIPPING LETTERS

IPD will include a shipping letter with every tape distributed. The shipping letter will be printed directly from the first 126 (or 138)

characters of the first physical record of SHF. In the event of copies made from CCT's that are not generated in IPD, a new physical record reflecting IPD as the source and the Nimbus experimenter to whom the tape is being sent as the destination, will be added as the second record of the TDF. All existing records in the TDF will be pushed down, but none will be lost. This record should also replace those in the SHF.

VI- A. DOCUMENTATION RECORD

The first physical record of each data file is always the Documentation Record. All of the documentation information for the file is contained in this record. The format of this record appears in Figure VI-1. The contents of this record are as follows:

1. PHYSICAL RECORD NUMBER (12 Bits) - The number of the physical record within the current file is given as an unsigned binary integer. The Documentation Record always has a Record Number of 1, as it is always the first physical record of a data file.

2. PHYSICAL RECORD ID (8 Bits) - This field identifies the last physical record in a data file, the physical records in the last data file on a tape, and the record type. The MSB is set to "1" if the physical record is the last one in the data file. The second MSB is set to "1" in all physical records in the last data file on the tape. The 6 LSB's are used to identify the type of physical record being read.

$001010_2 = 10_{10}$ = Documentation Record

$001011_2 = 11_{10}$ = Data Record

$001111_2 = 15_{10}$ = Dummy Record (ignore remainder of record)

3. FILE NUMBER (32 Bits) - This number is used as a quick means of locating data on the tape, and recovering from abnormal program runs, power downs, etc. This number is incremented by 1 for each file on the tape.

4. DATA ORBIT NUMBER (32 Bits) - Each CLDT file corresponds to a data orbit, which starts at a descending node and ends at the next descending node. The data orbit number will be the current NASA orbit number at the beginning of the data orbit. (A NASA orbit is defined as beginning at the ascending node.)

5. DATA ORBIT START TIME (96 Bits) - The starting time of the data orbit, expressed as three 32-bit integers: the year, the day of the year, and the GMT of the day.

   a. YEAR (32 Bits) - Year numbers are given as all 4 digits of the calendar year (e.g., 1978).

   b. DAY OF YEAR (32 Bits) - Permissable values range from 1 to 365 (or 366 for leap years).

   c. GMT OF DAY (32 Bits) - The GMT is given in milliseconds of the day. Permissable values will range from 0 to 86399999.

   This time represents the earliest possible time for a THIR scan contained in this CLDT file.

Scan #1?

6. DATA ORBIT END TIME (96 Bits) - The ending time of the data orbit, expressed as three 32-bit integers: year, day of year, GMT of day. (See Item 5 for further description.) This time represents the latest possible time for a THIR scan contained in this CLDT file.

7. TERMINATOR CROSSING TIMES (96 Bits each) - The times during the data orbit at which the S/C crossed the Southern terminator and the Northern terminator, as calculated from S/C and Solar ephemeris data. Both times are expressed as three 32-bit integers: year, day of year, GMT of day. (See Item 5 for further description.)

8. NODE LONGITUDES (32 Bits each) - The longitudes of the descending node at the beginning of the data orbit and the ascending node half-way through the data orbit. Longitudes are expressed as non-negative values, measured eastward from the Greenwich meridian. The units of longitude are degrees; LSB weight is 1/10. Permissable values range from 0 to 3599.

9. TIME OF ASCENDING NODE (96 Bits) - The time of the ascending node that occurs half-way through the data orbit. This time is expressed as three 32-bit integers: year, day of year, GMT of day. (See Item 5 for further description.)

NOTE:
The time of the descending node at the beginning of the data orbit is the same as the start time of the data orbit, given previously as Item 5.

10. SOLAR DECLINATION AT ASCENDING NODE (32 Bits) - The solar declination at the time of the ascending node that occurs half-way through the orbit. Solar declination is expressed as a non-negative value, measured northward from the South Pole. The units of solar declination are degrees; LSB weight is 1/1000. Permissable values range from 0 to 180000.

11. RADIANCE-TO-TEMPERATURE TABLES (4096 Bits each) - These tables permit the conversion of the THIR radiance measurements contained in each CLDT file into temperature values. Separate tables are provided for the 6.7 micron channel measurements and the 11.5 micron channel measurements. Each table consists of 256 16-bit temperature values. To perform a radiance-to-temperature conversion, the 8-bit radiance measurement is treated as an integer from 0 to 255 and used as a displacement from the first entry in the appropriate table. The temperature value thus located is the one that corresponds to the given radiance measurement. The units of temperature are degrees Kelvin; the LSB weight is 1/64. All temperature values are non-negative. (See Table VI-1.)

12. SPARES (65440 Bits) - These bits are used to fill out the Documentation Record to the same size as the Data Records. All spare bits will be zeroed.

WORDS	MSB 31 — 24 | 23 — 16 | 15 — 8 | 7 — 0 LSB	BYTES
1	PHYS. REC. NO (12 bits) | SPARE (4 bits) | RECORD ID (8 bits) | SPARE (8 bits)	1-4
2	FILE NO. (32 bits)	5-8
3	DATA ORBIT NO. (32 bits)	9-12
4-6	DATA ORBIT START TIME (96 bits)	13-24
7-9	DATA ORBIT STOP TIME (96 bits)	25-36
10-12	SOUTHERN TERMINATOR CROSSING TIME (96 bits)	37-48
13-15	NORTHERN TERMINATOR CROSSING TIME (96 bits)	49-60
16	LONGITUDE OF DESCENDING NODE (32 bits)	61-64
17	LONGITUDE OF ASCENDING NODE (32 bits)	65-68
18-20	TIME OF ASCENDING NODE (96 bits)	69-80
21	SOLAR DECLINATION AT ASCENDING NODE (32 bits)	81-84
22-149	RADIANCE-TO-TEMPERATURE TABLE FOR 6.7 MICRON CHANNEL (256 16-BIT TEMPERATURES) (4096 bits)	84-596
150-277	RADIANCE-TO-TEMPERATURE TABLE FOR 11.5 MICRON CHANNEL (256 16-BIT TEMPERATURES) (4096 bits)	597-1108
278-2322	SPARES (All Spare Bits are Zeroed) (65440 bits)	1109-9288

1548 48-BIT WORDS
2064 36 BIT WORDS
3096 24-BIT WORDS

2322 32-BIT WORDS
4644 16-BIT WORDS
9288 8-BIT BYTES

FIGURE VI-1. THIR CLDT - DOCUMENTATION RECORD FORMAT

RADIANCE-TO-TEMPERATURE CONVERSION TABLES

256 16-bit entries for the 6.7 micron channel.

256 16-bit entries for the 11.5 micron channel.

TABLE VI-1

(To Be Provided)

VI-B. DATA RECORD

Figure VI-2 shows the THIR CLDT Data Record format for 32-bit word machines. The format was designed to accommodate slight variations in orbital altitude that would affect the number of THIR samples in the Earth View of each scan. Each physical Data Record contains 10 scans of THIR data.

Figure VI-3 shows the format of each THIR scan within the physical record. Each scan contains 92 THIR words of located earth-view data. The nadir-view sample of the scan is always placed in the 47th THIR word, and the remaining samples centered around that position.

Figure VI-4 shows the format of each THIR word within the THIR scan. Each THIR word consists of a latitude value, a longitude value, and six THIR samples (radiance measurements). The latitude and longitude are applicable to the first 11.5 micron and 6.7 micron samples in the THIR word. The location of the other samples in the THIR word can be obtained by interpolation.

1. PHYSICAL RECORD NUMBER (12 Bits) - The number of the physical record within the current file is given as a unsigned binary integer. At the start of each new data file, the value of this field is reset to 1. The expected maximum value for a CLDT data file is 502.

2. PHYSICAL RECORD ID (8 Bits) - This field identifies the last physical record in a data file, the physical records in the last data file on a tape, and the record type. The MSB is set to "1" if the physical record is the last one in the data file. The second MSB is set to "1" in all physical records in the last data file on the tape. The 6 LSB's are used to identify the type of physical record being read.

$001010_2 = 10_{10}$ = Documentation Record

$001011_2 = 11_{10}$ = Data Record

$001111_2 = 15_{10}$ = Dummy Record
(ignore remainder of record)

3. THIR SCAN (7392 Bits) - Each THIR scan consists of 92 THIR words. The information from each scan is centered on the 47th THIR word (the nadir-view sample), and contains padded data on either side as necessary.

NOTE:

Scan direction is East-to-West at Ascending Node.
Scan direction is West-to-East at Descending Node.

4. TIME OF NADIR SAMPLE (16 Bits) - The time of the nadir-view sample in the scan is given in quarter (¼) seconds from the start time given in the Documentation Record of the data file.

5. DATA FLAGS FOR THIR SCAN (16 Bits) The data flags indicate various conditions for the data in the THIR scan. In the optimum situation, all flag bits are zero. The meanings of the flag bits are as follows:

2^{15}: 1 = Scan is empty - ignore contents.
0 = Scan contains data.

2^{14}: 1 = One or more scan lines prior to this one are missing - could not be recovered from telemetry stream.

0 = No scan lines missing between this one and the previous one.

2^{13}: 1 = Data quality of this scan line has been compromised due to one or more problems as specifically indicated in flag bits 2^{12} through 2^{1} below.

0 = Data quality of this scan line is satisfactory.

2^{12}: 1 = VIP telemetry not available for this scan line. Had to use interpolated or estimated values for calibration.

0 = VIP telemetry available for this scan line.

2^{11}: 1 = Non-definitive spacecraft ephemeris used to locate data.

0 = Definitive spacecraft ephemeris used to locate data.

2^{10}: 1 = Nominal attitude used to locate data.
0 = Actual attitude used to locate data.

2^9: (Unused)

2^8: (Unused)

2^7: 1 = No stair-step averages were available for voltage calibration of this scan line. Nominal or estimated values used.

0 = Stair-step averages were available.

2^6: 1 = No average space levels were available for radiometric calibration of this scan line. Nominal or estimated values used.

0 = Average space levels were available.

2^5: 1 = No average backscan levels were available for radiometric calibration of this scan line. Nominal or estimated values used.

0 = Average backscan levels were available.

2^4: 1 = Earth-view portion of scan line contains one or more located dummy (i.e., fill-value) samples.

0 = Earth-view portion of scan line contains all valid located samples.

2^3: (Unused)

2^2: (Unused)

2^1: (Unused)

2^0: 1 = Second 11.5 micron sample of the 47th THIR word is the nadir-view 11.5 micron sample.

0 = First 11.5 micron sample of the 47th THIR word is the nadir-view 11.5 micron sample.

6. THIR WORD (80 Bits) - Each THIR word consists of a latitude value, a longitude value, and six THIR radiance measurements in the following channel sequence: 11.5 micron, 6.7 micron, 11.5 micron, 11.5 micron, 6.7 micron and 11.5 micron. The latitude and the longitude given are applicable to the first 11.5 micron and 6.7 micron measurements. The location of the other four measurements in the THIR word can be obtained by interpolating between this position and the position given in the next THIR word in the scan group. This should be done as follows:

   - For the location of the 2nd 11.5 micron measurement, interpolate at the one-quarter point.
   - For the location of the 3rd 11.5 micron measurement, and the 2nd 6.7 micron measurement, interpolate at the half-way point.
   - For the location of the 4th 11.5 micron measurement, interpolate at the three-quarter point.

7. LATITUDE (16 Bits) - The units of latitude are degrees. Values range from 0° to 180°, where 0° indicates the South Pole, 90° the Equator, and 180° the North Pole. Thus, no negative values are used. The 16-bit latitude word is divided into a 9-bit integer part followed by 7-bit fractional part. This provides a resolution of 0.0078125 degrees (1/128°).

8. LONGITUDE (16 Bits) - The units of longitude are degrees. Values range from 0° to 360°, where 0° indicates the Greenwich Meridian, and larger values represent displacements eastward from Greenwich. Thus, no negative values are used. The 16-bit longitude word is divided into a 9-bit integer part followed by a 7-bit fractional part. This provides a resolution of 0.0078125 degrees.

NOTE:

If both the latitude and the longitude words are set to their maximum value ($FFFF_{16} = 65535_{10}$, or 511.9921875 degrees), this indicates that no position is associated with the THIR measurement in this THIR word. This would be the case if the measurements were taken in the atmosphere at the limb, or if the THIR word only represented fill at the beginning or end of the scan.

9. RADIANCE SAMPLES (8 Bits) - The units of radiance are watts/square-meter/steradian. All values are non-negative. For the 11.5 micron channel measurements, the LSB weight is 0.125, with permissable values ranging from 0 to 31.75. For the 6.7 micron channel measurements, the LSB weight is 0.015625, with permissable values ranging from 0 to 3.96875.

$\frac{31.75}{0.125} = 254$

$\frac{3.96875}{0.015625} = 254$

0 → 254 (index into temp conv. tbl.)

0 → 254 (index into temperature table)

0 - 255

9. (continued)

NOTE:

If a radiance sample is set to its maximum value ($FF_{16} = 255_{10}$), this indicates that the sample represents a missing or non-existent measurement.

10. THIR ENGINEERING AND HOUSKEEPING DATA (96 Bits) - The following data items are written in the order listed below for each set of 10 THIR scans. The items are all 8 bits each.

a. 3 Scan housing temperatures, VIP functions No. 9021, No. 9022 and No. 9023. Units are °C. Representation is unsigned fixed point; LSB weight is 0.2.

b. Scan motor temperature, VIP Function No. 9024. Units are °C. Representation is unsigned fixed point; LSB weight is 0.2.

c. Electronics temperature, VIP Function No. 9020. Units are °C. Representation is unsigned fixed point; LSB weight is 0.2.

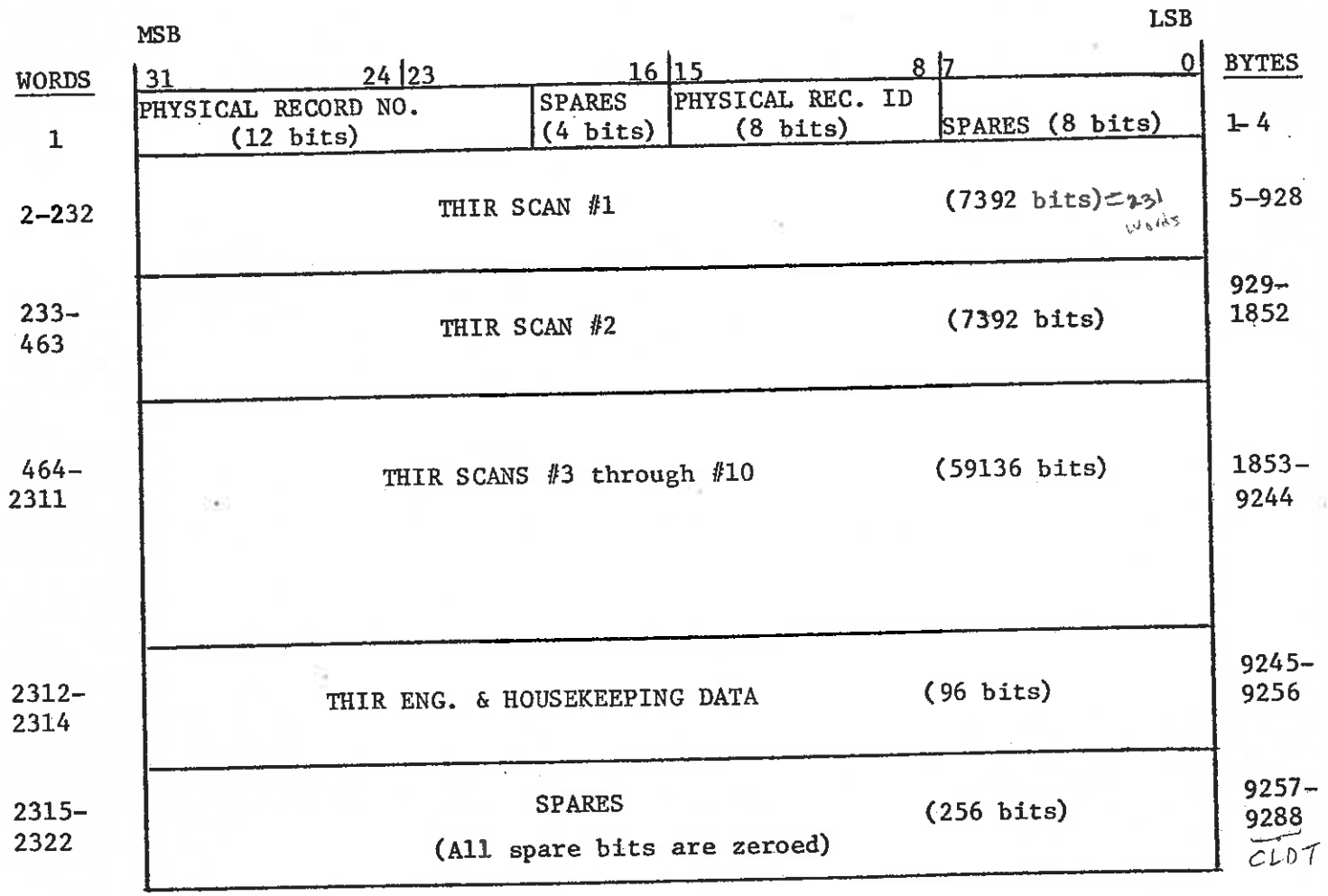
d. 2 Bolometer temperatures (11.5 micron and 6.7 micron channels), VIP Functions No. 9019 and No. 9018. Units are °C. Representation is unsigned fixed point; LSB weight is 0.2.

e. 2 Average space-level counts (11.5 micron and 6.7 micron channels). - Average space-level reading over the 10 scans in the record. Units are raw

(uncalibrated) counts. Representation is unsigned fixed point; LSB weight is 1 for the 11.5 micron channel, 1 for the 6.7 micron channel.

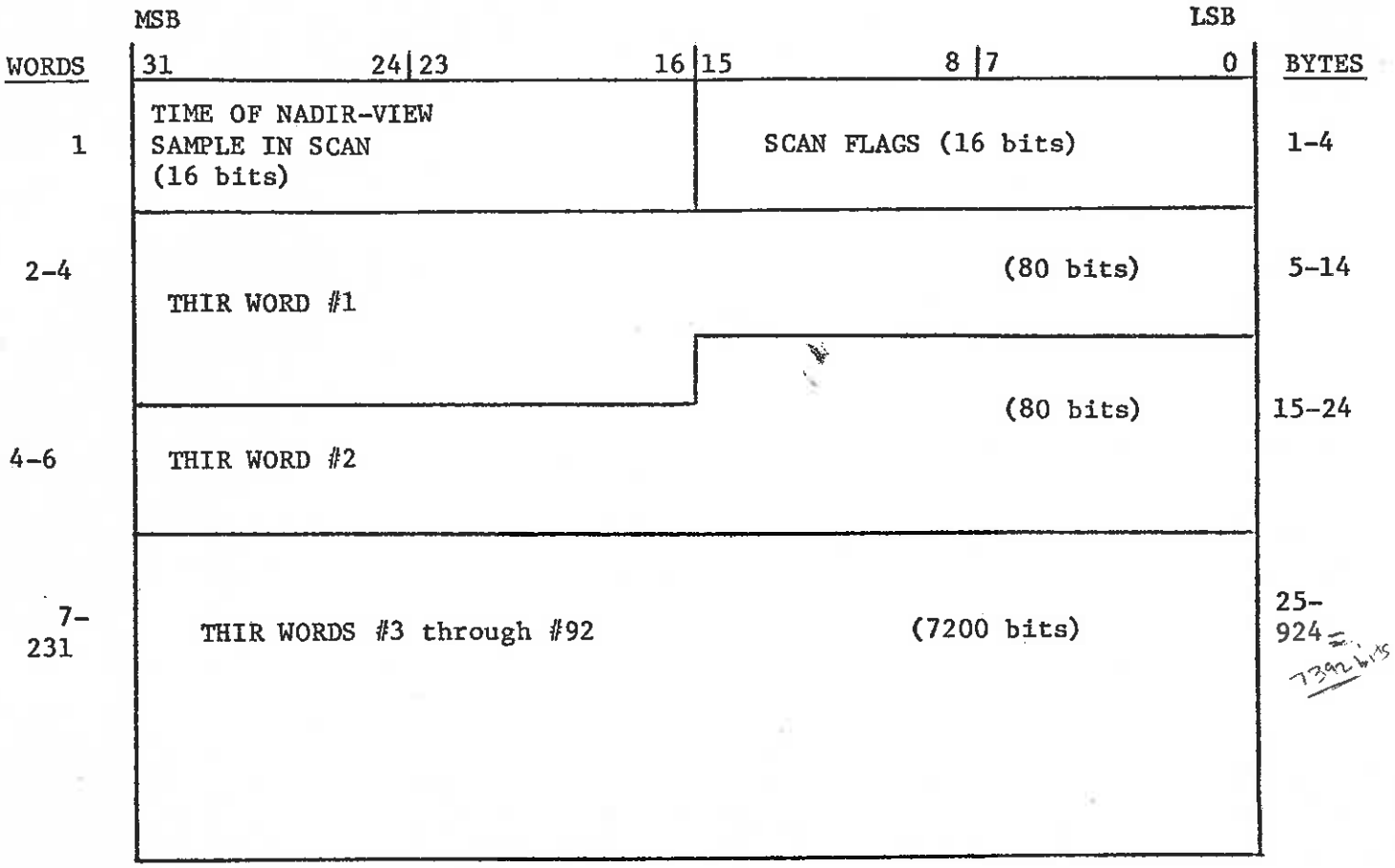
f. 2 Average housing-level counts (11.5 micron and 6.7 micron channels). - Average housing-level (backscan) readings over the 10 scans in the record. Units are raw (uncalibrated) counts. Representation is unsigned fixed-point; LSB weight is 1 for the 11.5 micron channel, and 1 for the 6.7 micron channel.

g. Spare. (Unused.)



1548	48-BIT WORDS	2322	32-BIT WORDS
2064	36-BIT WORDS	4644	16-BIT WORDS
3096	24- BIT WORDS	9288	8-BIT BYTES

FIGURE VI-2. THIR CLDT - DATA RECORD FORMAT

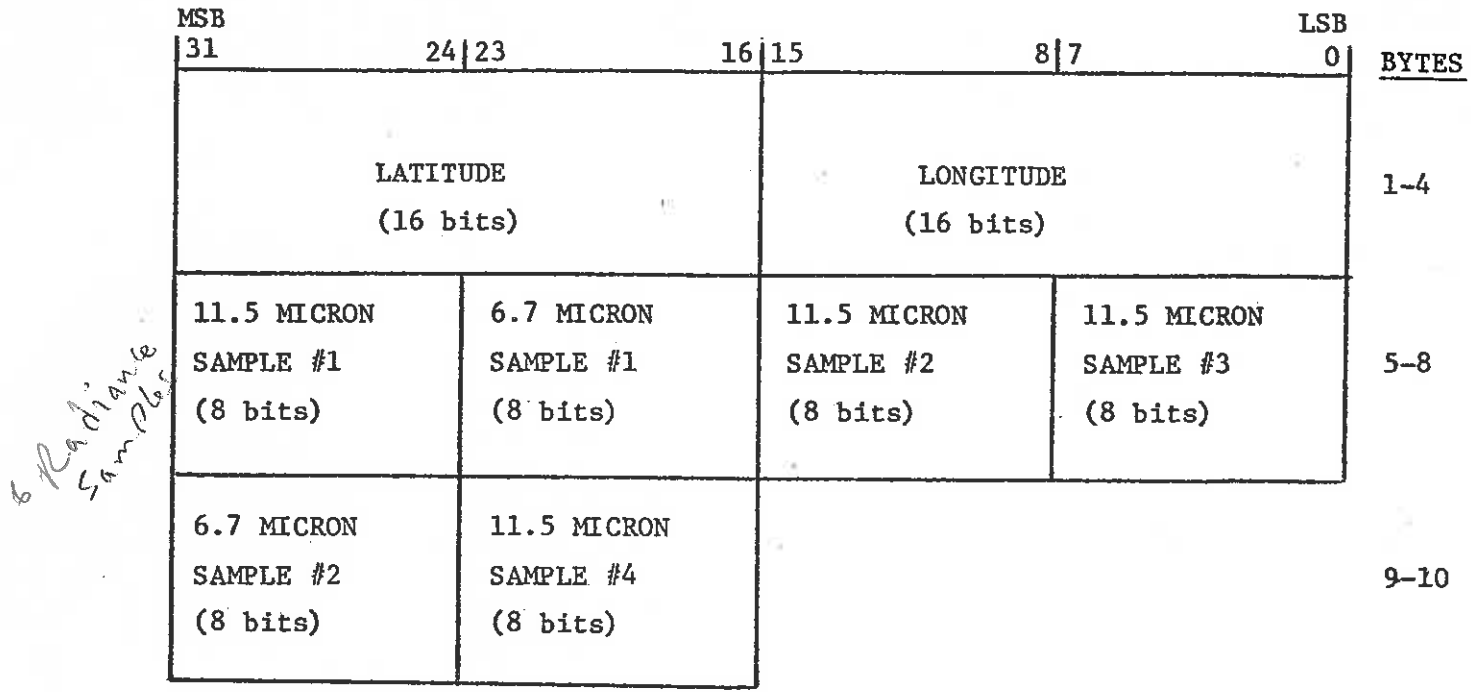


231 32-BIT WORDS

462 16-BIT WORDS

924 8-BIT BYTES

FIGURE VI-3. THIR CLDT - THIR SCAN FORMAT



5 16-BIT WORDS

10 8-BIT BYTES

FIGURE VI-4. THIR CLDT - THIR WORD FORMAT

VI-C. DUMMY RECORD

The last physical record of each data file is always a Dummy Record. This permits the generating software to properly set the Last-Record-In-File bit of the Record ID field without having to know a priori the point of data termination. The format of this record appears in Figure VI-5. The contents of this record are as follows:

1. PHYSICAL RECORD NUMBER (12 Bits) - The number of this physical record within the current file is given as an unsigned binary integer. At the start of each new data file, the value of this field is reset to 1. The expected maximum value for a CLDT data file is 502.

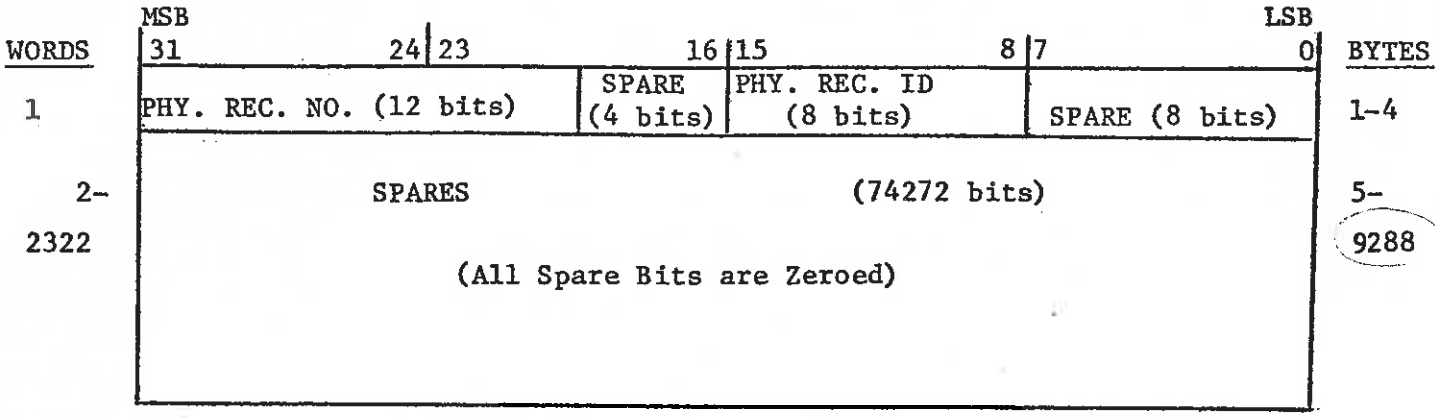
2. PHYSICAL RECORD ID (8 Bits) - This field identifies the the last physical record in a data file, the physical records in the last data file on a tape, and the record type. The MSB is set to "1" if the physical record is the last one in the data file. The second MSB is set to "1" in all physical records in the last data file on the tape. The 6 LSB's are used to identify the type of physical record being read.

$001010_2 = 10_{10}$ = Documentation Record

$001011_2 = 11_{10}$ = Data Record

$001111_2 = 15_{10}$ = Dummy Record (ignore remainder of record)

3. SPARES (74272 Bits) - These bits are used to fill out the Dummy Record to the same size as the Data Record. All spare bits will be zeroed.



1548 48-BIT WORDS	2322 32-BIT WORDS
2064 36-BIT WORDS	4644 16-BIT WORDS
3096 24-BIT WORDS	9288 8-BIT BYTES

FIGURE IV-5. THIR CLDT - DUMMY RECORD FORMAT

APPENDIX A

TAPE LENGTH CALCULATIONS

ASSUMPTIONS:

(1) Tape recording density is 1600 BPI.

(2) Inter-record gap (IRG) length is 0.65".

(3) End-of-file (EOF) gap length is 3.75".

CALCULATIONS:

(1) Standard Header File = 12"

(2) 502 Records/Orbit = 6.5"(including IRG) x 502 = 3263"

(3) 7 Orbits/Tape = 3267"(including EOF gap) x 7 = 22869"

22869" = 1906 Feet for data
1 Foot for Standard Header
1907 Feet, Total Tape Length Used.