SENSOR/INSTRUMENT: THIR

TAPE SPEC. NO. T343041 , REVISION D DATED 7/20/81

SPEC. TITLE CLOUDS--SBUV/TOMS TAPE (CLT)

REVIEWED BY: _____ DATE _____

APPROVED BY: _____ DATE _____
Gary Wolford
NOPS Manager

PAGES 1-39

REV. A 9/5/78
REV. B 9/14/78
REV. C 6/9/80
REV. D 7/20/81

NIMBUS-G

NIMBUS OBSERVATION PROCESSING SYSTEM (NOPS)

REQUIREMENTS DOCUMENT NG #8

TAPE SPECIFICATION NO. T343041

THIR CLOUDS-SBUV/TOMS TAPE (CLT)

PREPARED BY: R.A. Stephenson DATE: 7/19/77

REVISED BY: G.T. Cherrix DATE: 9/5/78

REV. A Revision includes major reformatting of all records.
REV. B Changes items on pp. 15,17,19,22,23 & 24
REV. C Changes items on pp. 1,14,15,18,23 & 26
REV. D Minor change on pp.2 and addemdum to Section V (new standard)

ABSTRACT

The THIR Clouds-SBUV/TOMS Tape (CLT) is a 9-track 1600 BPI tape generated by either a MODCOMP IV or UNIVAC 1180 or 1108. The first file contains a NOPS STANDARD HEADER RECORD written twice. Each subsequent file contains data from 1 GMT day (in whole orbits). There are up to 7 tapes per week generated, each containing a daily fill. Clouds-SBUV/TOMS tapes are generated whenever the THIR sensor is "ON" and the SBUV and/or TOMS sensor is "ON".

Within a daily file, there may be up to 14 orbits of data. Each orbit of THIR data will be processed scan by scan such that the THIR samples are placed into SBUV and TOMS IFOV histogram bins by location. After accumulating all possible THIR samples for a TOMS scan line, the data is written on the CLT. After accumulating all possible THIR samples for an SBUV IFOV, that data is saved and written on the CLT at the end of the orbit, of after all TOMS scans for that orbit have been written on the tape.

The CLT uses a logical record format with 8 logical records blocked per physical record. Each orbit begins with an orbital summary logical record at the beginning of the first physical record. All TOMS logical records then follow until the end of the orbit. Finally, the SBUV logical records are written and the physical record filled out with dummy logical records. Each orbit begins with a new physical record. As many as 714 physical records (5712 logical records) may be written in one daily file on a CLT under nominal daytime only operation.

A Dummy Physical Record, consisting of 8 Dummy logical records, may be written as the last record in a file, or as the only record(s) in the last file on a CLT.

I. REQUIREMENT IDENTIFICATION

THIR CLOUDS "T" (SBUV/TOMS) Tape Specification No. T343041.

II. INPUT DATA SOURCE

THIR Calibrated located data tape (CLDT) Specification No. T344011, and

ERB Sub-Target Area Geographical Season Tape (STAGS) Tape Specification No. T173051.

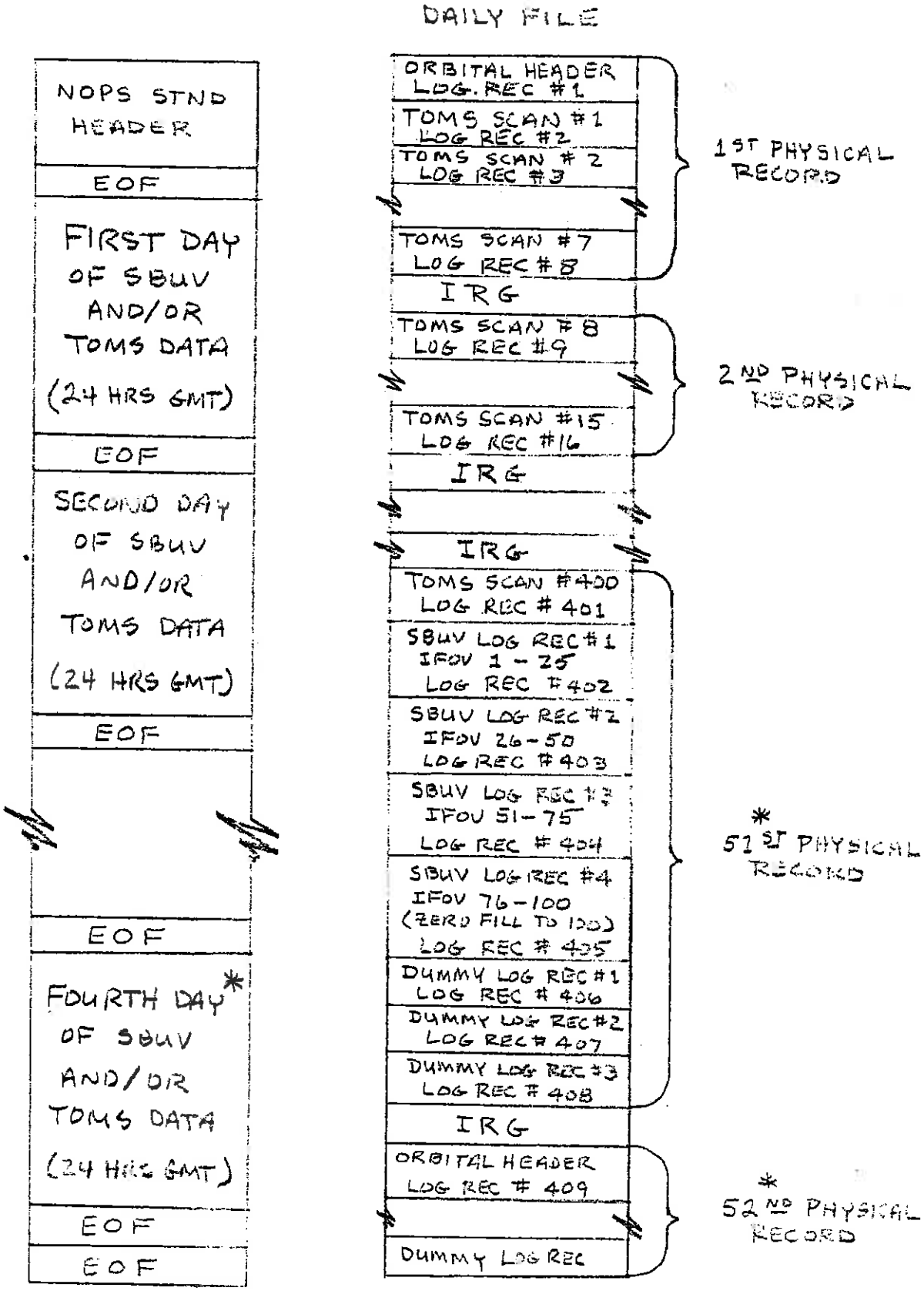
III. OPERATING MODE

Data will be available based on the THIR Sensor being ON and the SBUV and/or TOMS Sensor being ON.

No physical record contains data from more than one data orbit. An orbit of CLT data may require up to 51 physical records under normal daytime only operation and up to 123 physical records under full time operation (very rare).

Seven days of data which match an ILT (Sunday through Saturday) will be stacked on each CLT commencing with data obtained after 21 June 1980. These stacked outputs will be on 6250 BPI tapes.

IV. GROSS TAPE FORMAT



*ASSUMING NORMAL DAYTIME ONLY DUTY CYCLE OF SBUV AND TOMS SENSORS.

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.

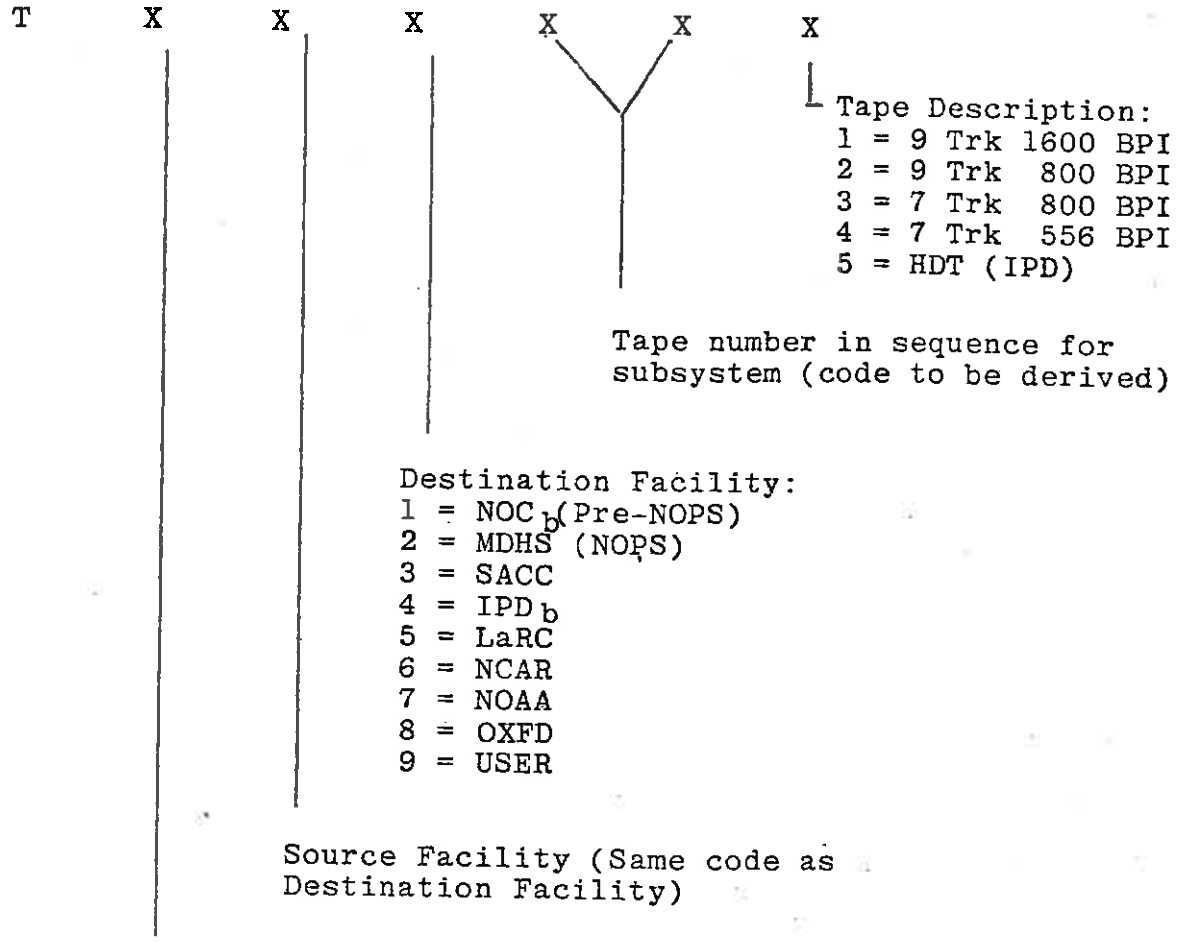
Because of the real possibility of an original tape being damaged in handling (resulting in the loss of many computations), each processing facility within NOPS will generate duplicate copies of master tapes. These duplicates will be delivered to IPD for data product generation or user copy generation 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 120 characters reflecting IPD as the source, and the Virtual experimenter to whom the tape is being sent, as the destination, is produced. This new [illegible] at the start of the header and the [illegible]

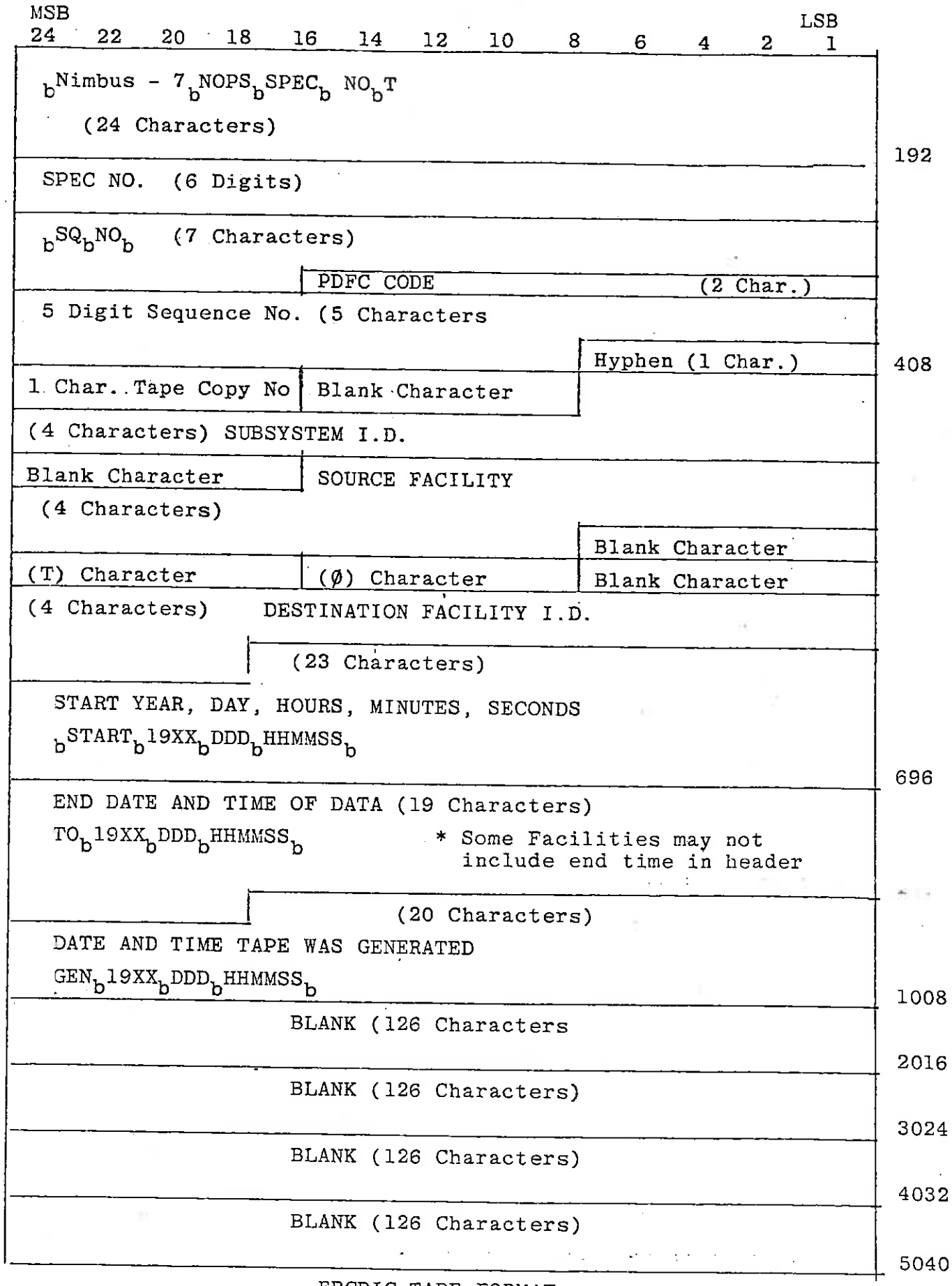
TABLE V -1

NOPS SPECIFICATION NUMBERING CODE

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



STANDARD HEADER (PHYSICAL RECORD FORMAT)



EBCDIC TAPE FORMAT
FIGURE V -1

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:

$_b$NIMBUS-7$_b$NOPS$_b$SPEC$_b$NO$_b$T	(24 char.)	
XXXXXX (6 digit spec number)	(6 char.)	
$_b$SQ$_b$NO$_b$	(7 char.)	PDFC Designator and 5 digit sequence No.
AAXXXXX (5 digit sequence No.)	(7 char.)	

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

-X (copy number 1 or 2)	(2 char.)
$_b$YYYY$_b$ (4 char. subsystem ID)	(6 char.)
YYYY (Generation Facility ID)	(4 char.)
$_b$TO$_b$YYYY (4 char. Des. Fac. ID)	(8 char.)
$_b$START$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (Start year, day of year, hours, minutes, seconds)	(23 char.)
TO$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (end data and time of data)	(19 char.)
GEN$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (date and time tape was generated)	(20 char.)
	(126 char.)

The second group of 126 characters will contain blanks (to allow for the original 126 characters when IPD duplicates tape for distribution).

The third, fourth, and fifth groups of 126 characters each are intended for the use of the Subsystem Analysts for further identification 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 which IPD receives would contain two of the following records.

bNIMBUS-7bNOPSbSPECbNObT134031bSQbNOb

AA00027-2bERBbbSACCbTObIPDbbSTARTb1979b

032b000432bTOb1979b059b235742bGENb

...

1979b104b094500bfollowed by 504 blanks

NIMBUS-G PROJECT DATA FORMAT CODES (MAY 5, 1980) REV. FROM MARCH 3, 1980

SENSOR	TAPE ID	ORIG.	COPIES	PDF	DATA TYPE	HORIZ LABEL / VERTIC COLORS
ERB	MATRIX	12	72	AA	MAAA	D RED / L RED
ERB	TABLES	12	-	AB	TAAB	D RED / D PINK
	MAT*	365	2555	AC	MTAC	D RED / D RED
	SEFOT*	12	84	AD	SEAD	D RED / YELLOW
	ZMT*	2	14	AE	ZMAE	L RED / L PINK
	STAGS	1	-	AG	STAG	D RED / D ORANGE
TOTALS		*379	2653			
	OTHER	25	72			
SMMR	MATRIX-30	12	-	BA	MABA	L TAN / YELLOW
	MATRIX-LO	12	-	BB	LOBB	L BRWN / L GRN
	MATRIX-SS	12	-	BC	SSBC	L BRWN / L ORAN
	MAP-30*	12	60	BD	MPBD	L BRWN / L PINK
	MAP-LO*	12	60	BE	LOBE	L BRWN / BLUE
	MAP-SS*	12	60	BF	SSBF	M TAN / M TAN
	PARM-30*	60	360	BG	PABG	M TAN / YELLOW
	PARM-LO*	30	150	BH	LOBH	M BRWN / YELLOW
	PARM-SS*	30	120	BI	SSBI	M BRWN / M BRWN
	TAT*	183	732	BJ	TABJ	D BRWN / YELLOW
	CELL-ALL*	61	427	BK	DEBK	D BRWN / L GRN
TOTALS		*400	1969			
	OTHER	36	-			
THIR	SOURCE	5110	-	IA	SOIA	D ORAN / D ORAN
	STT	1095	-	IB	STIB	D ORAN / YELLOW
	BSHT	365	-	IC	BSIC	D RED EXP LABEL
	CLDT	730	1460	ID	CLID	D ORAN / D GRN
	CLE	219	1095	IE	CLIE	D ORAN / D PINK
	CLT	365	1825	IF	CLIF	M ORAN / GREY
	ILT-T	52	-	LI	ILLI	L ORAN / L PINK
	ILT-C	52	-	LC	ILLC	L ORAN / L BRWN
TOTALS (R)		7988	4380			
SAM II	MATRIX	4	24	DA	MADA	D PURP / D PURP
	PROFILE	12	72	DB	PRDB	D PURP / D ORAN
	RDAT*	12	72	DC	RDDC	M PURP / D GRN
	BANAT*	12	72	DD	BADD	M PURP / YELLOW
	NMCT@	52	-	DE	NMDE	D ORAN EXP LABEL
	ILT@	52	-	LD	ILLD	D ORAN EXP LABEL
TOTALS		* 24	144			
		@104	-			
	OTHER	16	96			

SENSOR	TAPE ID	ORIG.	COPIES	PDF	DATA TYPE	HORIZ LABEL / VERTIC COLORS
LIMS	MATRIX-M	14	28	EA	MAEA	YELLOW / BLUE
	MATRIX-C	14	28	EB	MAEB	YELLOW / L GREEN
	PROFILE-R	7	14	EC	PREC	YELLOW / L PINK
	PROFILE-I	21	42	ED	PRED	YELLOW / M TAN
	RAT*	210	945	EE	RAEE	YELLOW / D PINK
	IPAT*	105	347	EF	IPEF	YELLOW / D ORANGE
	MAT*	70	294	EG	MTEG	YELLOW / YELLOW
	CAT*	70	210	EH	CTEH	YELLOW / GREY
	SMAT*	7	28	EI	SMEI	YELLOW / L BROWN
	SCAT*	7	21	EM	SCEM	YELLOW / D GREEN
	NMCT@	52	-	EK	NMEK	YELLOW EXP LABEL
	UFO@	295	-	UE	UFUE	YELLOW EXP LABEL
	ILT@	30	-	LE	ILLE	YELLOW EXP LABEL
TOTALS		*469	1845			
		@377	-			
	OTHER (R)	56	112			
SBUV/ TOMS	MATRIX	24	216	FA	MAFA	D GRN / D ORAN
	TABLES	12	-	FB	TAFB	L GRN / L PINK
	MONTAGE	52	-	FC	MOFC	D GRN / D PINK
	RUT-S*	26	26	FD	SRFD	GREY / D GRN
(R)	OZONE-S*	12	100	FE	OSFE	L GRN / L BRWN
(R)	OZONE-T*	180	1440	FF	OTFF	D GRN / D GRN
	ZMT*	2	16	FH	ZMFH	L GRN / L PINK
	RUT-T*	120	120	FJ	TRFJ	D GRN / YELLOW
TOTALS (R)		*340	1702			
	OTHER	88	216			
CZCS (R)	CRT360*	100	400	ZI	CRZI	BLUE / BLUE
	SOURCE	4500	-	ZA	SOZA	STANDARD STA LABEL
(R)	CRCST*	250	1000	ZB	CRZB	BLUE / D GRN
	CAT	12	96	ZC	CAZC	BLUE / D ORAN
	CRT-L	900	1800	ZD	CRZD	BLUE / YELLOW
	ILT	52	-	LZ	ILLZ	BLUE / M TAN
(R)	CRT	2750	5500	ZE	CRZE	BLUE / D GRN
	ILT-L@	52	-	LL	ILLL	BLACK EXP LABEL
(R)	CCT-F	225	-	ZH	CCZH	BLUE / PINK
(R)	LOIT#	250	-	ZF	LOZF	L GRN / GREY
(R)	OPIT#	250	-	ZG	OPZG	GRN / BLUE
TOTALS (R)		*350	1400			
		@ 52	-			
(R)		#500	-			
(R)		8439	7446			
SAMS	MATRIX	24	24	HA	MAHA	YEL-OR / L PINK
	RAT*	180	198	HC	RAHC	YEL-OR / YELLOW
	ILT@	183	-	LH	ILLH	GREY EXP LABEL
	NMCT@	52	-	HD	NMHD	GREY EXP LABEL
TOTALS		@ 235	-			
		* 180	198			
	OTHER	24	24			

		ORIGINALS	COPIES	PDF
(R)	* TOTALS	2,142	3,911	27
	@ TOTALS	768	-	3
(R)	# TOTALS	500	-	2
(R)	OTHER TOTALS	16,672	12,346	30
(R)	GRAND TOTALS	20,082	22,257	57

NIMBUS G PROJECT DATA FORMAT CODES (Cont'd.)

SENSOR	TAPE ID	PDFC CODE
LOCATION	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
USER	UFO/ERB	UA
	UFO/SMMR	UB
	UFO/LIMS	UE
	UFO/SBUV	UF
	UFO/ILT	UL

1st CHARACTER	SOURCE/SENSOR	2nd CHARACTER	USER/SENSOR OR TAPE NUMBER
ERB	A		
SMMR	B		
THIR	I		
SAM II	D		
LIMS	E		
SBUV/TOMS	F		
CZCS	Z		
SAMS	H		
ILT	L		
UFO	U		

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.

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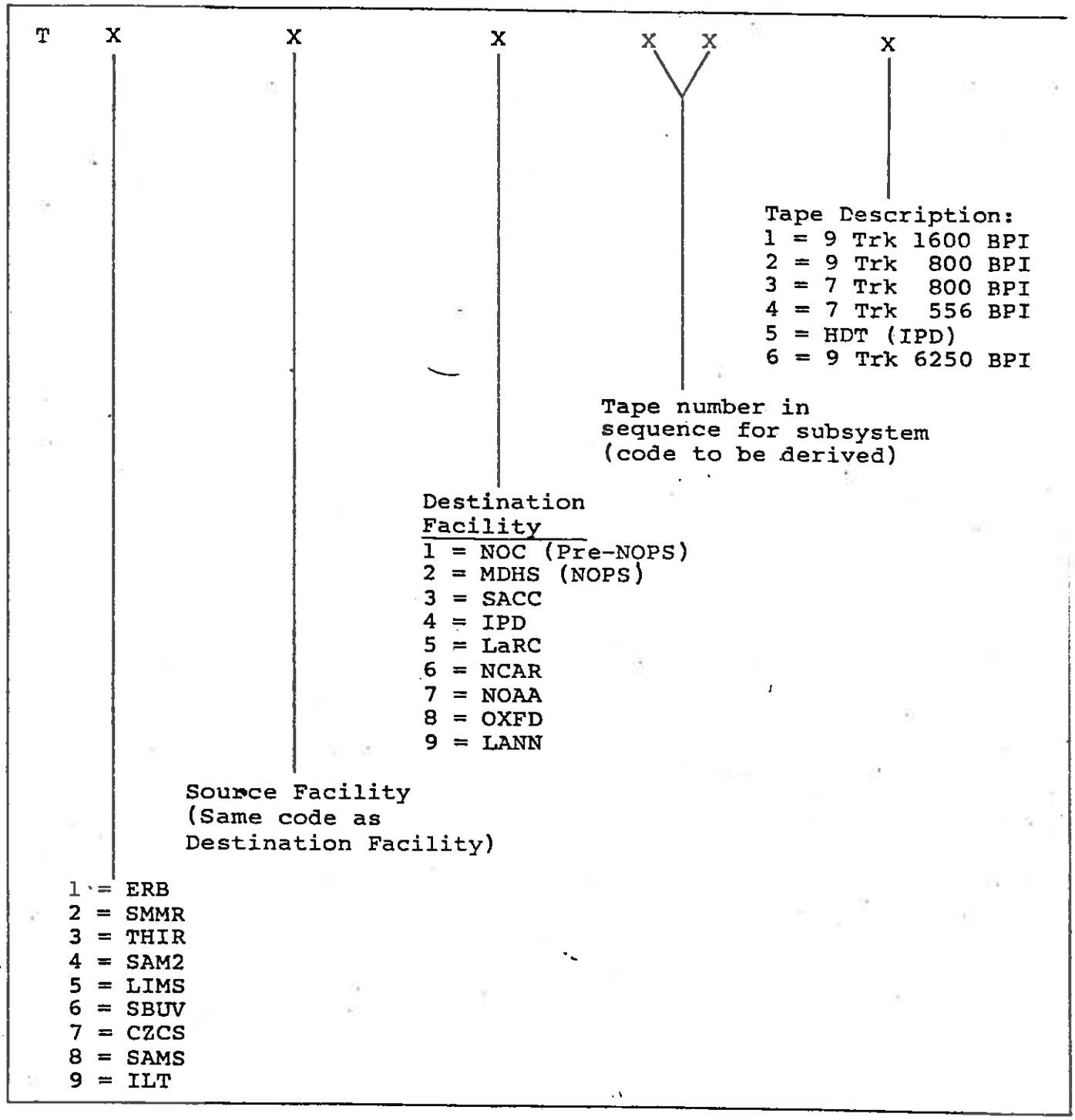
[2]In the case of CZCS these logical records are used to define the genealogy of the image rather than the method of V.3.

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 proviso that 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

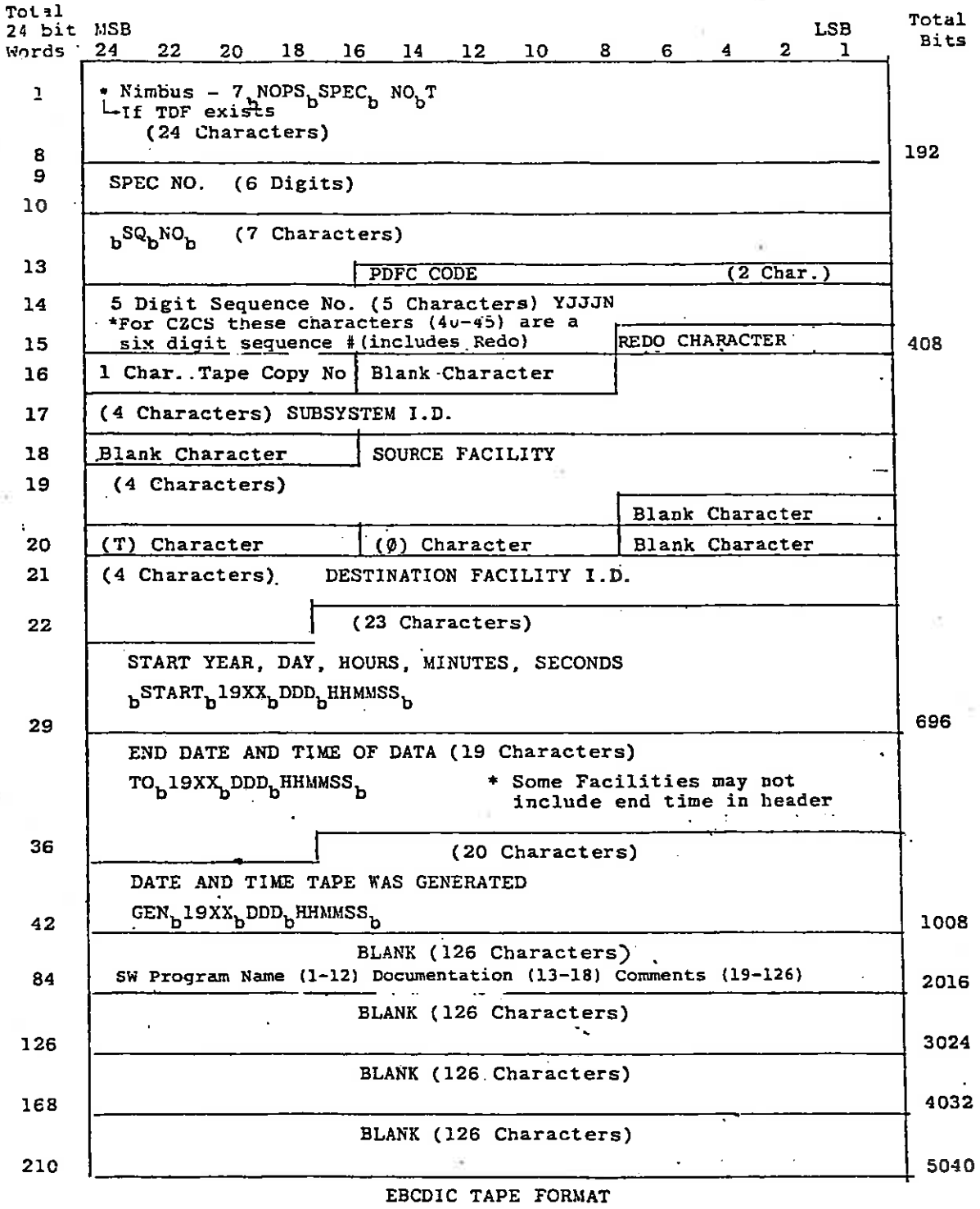


Figure V -1. Standard Header (Physical Record Format)
(1 Character = 8 bits)

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)
XXXXX (96 digit spec number)	(25 - 30 Character Count)
$_b$SO$_b$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.) *

-X (redo character, 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.

$*NIMBUS\text{-}7NOPS_bSPEC_bNO_bT134031_bSQ_bNO_b$

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.

C L T

VI. PHYSICAL RECORD FORMAT.

For each orbit that the THIR Subsystem is "ON" and the SBUV and/or TOMS Subsystem is "ON" at least one physical record of data is generated. For normal full time (day-time only) operation 51 physical records will be output. These records are based on data orbits and contain only data from a single orbit. Each physical record contains 8 logical records. There are four types of logical records on this tape:

1. SBUV/TOMS HEADER LOGICAL RECORD
2. TOMS DATA LOGICAL RECORD
3. SBUV DATA LOGICAL RECORD
4. SBUV/TOMS DUMMY LOGICAL RECORD

Each is described in the appropriate sections following. The data is output in ascending time order by whole scan lines for TOMS and by IFOV's for SBUV.

The actual histogram ranges for the population counts of the 11 um channel THIR data are determined from the ERB STAGS Tape NOPS Spec. No. T173051.

The values used for bin separation are expressed in radiances. Conversion tables from radiances to Temperature for both channels are available in the THIR/CLDT documentation (T344011).

The first 32 bits of all logical records follow the standard NOPS format for a physical record which is described as follows:

(1a) PHYSICAL RECORD NO. (12 BITS) - This is the number at this physical record within the file. It starts at 1 and increments by 1 throughout the file. All logical records within a physical record repeat the same number.

(1b) SPARE. (4 BITS) - Zeroes for word alignment.

(1c) FILE CONTROL. (2 BITS) - The MSB is set to 1 if this physical record is the last one in the file. The LSB is set to 1 for all records (logical or physical) in the last file on a tape.

(1d) RECORD ID. (6 BITS) - This number identifies the logical record type and is the following:

1) SBUV/TOMS HEADER LOGICAL RECORD ID = 30

2) TOMS DATA (SCAN LINE) LOGICAL RECORD ID = 31

3) SBUV DATA LOGICAL RECORD ID = 32

4) SBUV/TOMS DUMMY LOGICAL RECORD ID = 33

(1e) SPARE. (8 BITS) - Zeroes for word alignment.

VIa. SBUV/TOMS HEADER LOGICAL RECORD.

Figure VI-1 shows the contents of this type of record. A Header Logical record is always placed at the beginning of the first physical record of a data orbit. The first 32-bit word is as described in the previous section. The remaining 251 32-bit words are as follows:

(2a) DATA ORBIT NO. (16 BITS) - The data is output based on a data orbit which starts at a descending node and ends at the following descending node. The orbit number will be the NASA orbit number at the beginning of the data orbit. (NASA orbit is defined as beginning at the ascending node).

(2b) START DAY OF DATA ORBIT. (16 BITS) - The GMT day number at the start of the data orbit (descending node). (0-366).

(3a) YEAR NUMBER. (16 BITS) - The full year number as of the start of data orbit.

(3b) SPARE. (16 BITS) - Zeroes for boundary alignment.

(4) START TIME OF DATA ORBIT. (32 BITS) - The integer seconds of day at the beginning of the data orbit.

(5) END TIME OF DATA ORBIT. (32 BITS) - The Integer seconds of day at the end of the data orbit.

Note: Words 2 thru 9 are taken from the appropriate SBUV/TOMS ILT record.

(6) TIME OF FIRST SBUV DATA. (32 BITS) - The GMT in milliseconds of day at the beginning of the first SBUV IFOV (VIP Major Frame time) in the orbit.

FIGURE VI-1 SBUV/TOMS HEADER LOGICAL RECORD (FIRST IN ORBIT)

WORD	32 — 24	16	8 — 1	BITS
1	PHYSICAL RECORD NUMBER (12 BITS)	SPARE (4 BITS) / FILE CONT. 2 BITS	RECORD ID = 30 (6 BITS)	SPARE (8 BITS)	32
2	DATA ORBIT NUMBER (16 BITS)	DAY OF YEAR AT START OF DATA ORBIT (16 BITS)		64
3	YEAR AT START OF DATA ORBIT (16 BITS)	SPARE (ZEROES) (16 BITS)		96
4	GMT (SECONDS OF DAY) AT START OF DATA ORBIT (32 BITS)			128
5	GMT (SECONDS OF DAY) AT END OF DATA ORBIT (32 BITS)			160
6	GMT MILLISECONDS OF FIRST SBUV DATA LOGICAL RECORD IN ORBIT (32 BITS)			192
7	GMT MILLISECONDS OF LAST SBUV DATA LOGICAL RECORD IN ORBIT (32 BITS)			224
8	GMT MILLISECONDS OF FIRST TOMS DATA LOGICAL RECORD (SCAN) IN ORBIT (32 BITS)			256
9	GMT MILLISECONDS OF LAST TOMS DATA LOGICAL RECORD (SCAN) IN ORBIT (32 BITS)			288
10	SPARE (ZEROES) 972 BYTES FOR RECORD LENGTH COMPATIBILITY (7,776 BITS)			8,064
252				

224 36 BIT WORDS 252 32 BIT WORDS 336 24 BIT WORDS 1,008 BYTES 8,064 BITS

(18)

(7) TIME OF LAST SBUV DATA. (32 BITS) - The GMT in milliseconds of day at the beginning of the last SBUV IFOV (VIP Major Frame time) in the orbit as taken from the Clouds-ILT (T324051).

(8) TIME OF FIRST TOMS SCAN. (32 BITS) - The GMT in milliseconds of day at the beginning of the first TOMS SCAN (VIP Major Frame time) in the orbit.

(9) TIME OF LAST TOMS SCAN. (32 BITS) - The GMT in milliseconds of day at the beginning of the last TOMS SCAN (VIP Major Frame time) in the orbit as taken from the Clouds-ILT (T324051).

(10) SPARES. (7,776 BITS) - Zeroes to fill logical record to required length.

VIb. TOMS DATA LOGICAL RECORD.

Figure VI-2 shows the contents of this type of record. One of these logical records is generated for each scan line of TOMS data collected as determined from the SBUV/TOMS-ILT. The first 32-Bit word is as described in a previous section. The remaining 251 32-Bit words are as follows:

(2) TIME OF TOMS SCAN. (32 BITS) - The GMT in milliseconds of day of this TOMS Scan line as determined by the VIP Major frame time given on the SBUV/TOMS-ILT.

Words 3 through 9 refers to the first TOMS IFOV of this scan.

(3a) SURFACE CATEGORY CODE. (8 BITS) - This code is taken from the STAGS tape and indicates the type of surface in the ERB-STA in which this IFOV falls. The only valid codes are:

1 = Land 2 = Water 3 = Land and Water 4 = Ice or Snow

5 = Ice and Land 6 = Ice/Snow and Water

7 = Ice, Land, and Water

(3b) POPULATION OF 11.5U SURFACE SAMPLES. (8 BITS) - The number of THIR 11.5 um samples accumulated in the IFOV whose radiances are higher than the SURFACE range described in word (4a).

(3c) MEAN RADIANCE OF SURFACE 11.5 UM. (8 BITS) - The mean of all the 11.5 UM radiances from the samples accumulated in word (3b). The LSB represents 0.125 W/M^2-STER.

(3d) MEAN RADIANCE OF SURFACE 6.7 U. (8 BITS) - The mean of all the 6.7 um radiances for samples colocated with those 11.5 um samples accumulated in word (3b). The LSB represents 0.015625 W/M^2-STER.

FIGURE VI - 2 TOMS DATA LOGICAL RECORD

WORD	32	24	16	8	1	BITS
1	PHYSICAL RECORD NUMBER (12 BITS)	SPARE (4 BITS)	FILE CONT (2)	RECORD ID=31 (6 BITS)	SPARE (8 BITS)	32
2	GMT MILLISECONDS OF DAY AT START OF TOMS SCAN (32 BITS)					64
3	SURFACE CODE (8 BITS)	POPULATION SURFACE (8 BITS)	MEAN RADIANCE 11.5 SURFACE (8 BITS)	MEAN RADIANCE 6.7 SURFACE (8 BITS)		96
4	SURFACE/LOW CLOUDS RADIANCE (8 BITS)	POPULATION LOW CLOUDS (8 BITS)	MEAN RADIANCE 11.5 LOW CLOUDS (8 BITS)	MEAN RADIANCE 6.7 LOW CLOUDS (8 BITS)		128
5	LOW/MEDIUM CLOUDS RADIANCE (8 BITS)	POPULATION MEDIUM CLOUDS (8 BITS)	MEAN RADIANCE 11.5 MEDIUM CLOUDS (8 BITS)	MEAN RADIANCE 6.7 MEDIUM CLOUDS (8 BITS)		160
6	MEDIUM/HIGH CLOUDS RADIANCE (8 BITS)	POPULATION HIGH CLOUDS (8 BITS)	MEAN RADIANCE 11.5 HIGH CLOUDS (8 BITS)	MEAN RADIANCE 6.7 HIGH CLOUDS (8 BITS)		192
7	SPARE (8 BITS)	CIRRUS LOW/HIGH RADIANCE 6.7 (8 BITS)	TERRAIN HEIGHT (16 BITS)			224
8	RMS DEV 11.5 SURFACE (8 BITS)	RMS DEV 11.5 LOW CLOUDS (8 BITS)	RMS DEV 11.5 MEDIUM CLOUDS (8 BITS)	RMS DEV 11.5 HIGH CLOUDS (8 BITS)		256
9	RMS DEV 6.7 SURFACE (8 BITS)	RMS DEV 6.7 LOW CLOUDS (8 BITS)	RMS DEV 6.7 MEDIUM CLOUDS (8 BITS)	RMS DEV 6.7 HIGH CLOUDS (8 BITS)		288
10	REPEAT WORDS 3 THRU 9 34 TIMES FOR A TOTAL OF 35 TOMS IFOVS IN ONE					
247	TOMS SCAN 28x34= 952 BYTES				(7,616 BITS)	7,904
248	SPARES (ZEROES) 18 BYTES FOR RECORD LENGTH COMPATIBILITY				(144 BITS)	
252			LAST RECORD IN ORBIT FLAG		(16 BITS)	8,064
	224 36 BIT WORDS	252 32 BIT WORDS	336 24 BIT WORDS	1008 BYTES	8,064 BITS	

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(4a) SURFACE/LOW CLOUD RADIANCE. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the lowest histogram level; between Surface and Low Altitude Clouds. The LSB represents 0.125 W/M^2-STER.

(4b) POPULATION OF LOW CLOUD SAMPLES 11.5 UM. (8 BITS) - The number of THIR 11.5 UM samples accumulated in this IFOV whose radiances fall between word (4a) and word (5a).

(4c) MEAN RADIANCE OF LOW CLOUD SAMPLES 11.5 UM. (8 BITS) - Same as word (3c) except for samples accumulated in word (4b).

(4d) MEAN RADIANCE OF LOW CLOUDS 6.7 UM. (8 BITS) - Same as word (3d) except for samples accumulated in word(4b).

(5a) LOW/MEDIUM CLOUD RADIANCE. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the two mid-level histograms; between low and medium altitude clouds. The LSB represents 0.125 W/M^2-STER.

(5b) POPULATION OF MEDIUM CLOUD SAMPLES 11.5 UM. (8 BITS) - The number of THIR 11.5 UM samples accumulated in the IFOV whose radiances fall between words (5a) and (6a).

(5c) MEAN RADIANCE OF MEDIUM CLOUS SAMPLES 11.5 UM. (8 BITS) - Same as word (3c) except for samples accumulated in word (5b).

(5d) MEAN RADIANCE OF MEDIUM CLOUD SAMPLES 6.7 UM. (8 BITS) - Same as word (3d) except for samples accumulated in word (5b).

(6a) MEDIUM/HIGH CLOUD RADIANCE 11.5 UM. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the highest histogram level; between high and medium altitude clouds. The LSB represents 0.125 W/M^2-STER.

(6b) POPULATION OF HIGH CLOUD SAMPLES 11.5 UM. (8 BITS)
The number of THIR 11.5 UM samples accumulated in this IFOV whose radiances fall below word (6a).

(6c) MEAN RADIANCES OF HIGH CLOUD SAMPLES 11.5 UM (8 BITS) - Same as word (3c) except for samples accumulated in word (6b).

(6d) MEAN RADIANCE OF HIGH CLOUD SAMPLES 6.7 UM (8 BITS) - Same as word (3d) except for samples accumulated in word (6b).

(7a) SPARE. (8 BITS) - Zeroes for word alignment.

(7b) CIRRUS HIGH/LOW RADIANCE 6.7 UM. (8 BITS) - The 6.7 UM radiance used in SAC C (SBUV/TOMS) processing to determine the presence of cirrus clouds in the TOMS IFOV. The LSB represents 0.015625 W/M^2- STER. This word is passed from the ERB/STAGS Tape

(7c) TERRAIN HEIGHT (16 BITS) - The average terrain height equivalent for this IFOV expressed in meters from mean sea level. This word is passed from the ERB/STAGS tape.

(8a) RMS DEVIATION SURFACE 11.5 UM. (8 BITS) - The RMS deviation of the 11.5 UM samples averaged in word (3c). The LSB represents 0.015625 W/M^2-STER.

(8b) RMS DEVIATION LOW CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (4c). Scaled the same as word (8a).

(8c) RMS DEVIATION MEDIUM CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (5c). Scaled the same as word (8a).

(8d) RMS DEVIATION HIGH CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (6c) of item (20). Scaled the same as word (8a).

(9a) RMS DEVIATION SURFAC E 6.7 UM. (8 BITS) - The RMS deviation of the 6.7 U samples averaged in word (3d). The LSB represents 0.00392 W/M^2-STER.

(9b) RMS DEVIATION LOW CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for word (4d). Scaled the same as word (9a).

(9c) RMS DEVIATION MEDIUM CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for (5d). Scaled the same as word (9a).

(9d) RMS DEVIATION HIGH CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for word (6d). Scaled the same as word (9a).

(10) IFOVS 2 thru 35 (7,616 BITS) - Repeat words 3 thru 9 34 additional times for a total of 35 IFOVs in this TOMS scan line.

(248) SPARES (144 BITS) Zeroes for word alignment.

(252d) LAST RECORD IN ORBIT FLAG. (16 BITS) - Normally zero these 16 bits are set to all ones (-1) in the last logical record of data in this orbit and all remaining logical records needed to fill out the last physical record.

VIc SBUV DATA LOGICAL RECORD

Figure VI-3 shows the contents of this type of record. One of these logical records contains up to 25 SBUV IFOVs of data collected as determined from the SBUV/TOMS-ILT. The first 32-Bit word is as described in a previous section. The remaining 251 32-Bit words are as follows:

(2) TIME OF SBUV SCAN. (32 BITS) - The GMT in milliseconds of day at the start of this SBUV IFOV as determined by the VIP Major frame time given on the SBUV/TOMS-ILT.

Words 2 thru 11 refer to the first SBUV IFOV of this logical record.

(3a) POPULATION OF 11.5U SURFACE SAMPLES. (16 BITS) - The number of THIR 11.5 um samples accumulated in the IFOV whose radiances are higher than the SURFACE range described in work (10b).

(3b) MEAN RADIANCE OF SURFACE 11.5 UM. (8 BITS) - The mean of all the 11.5 UM radiances from the samples accumulated in word (3a). The LSB represents 0.125 W/M^2-STER.

(3c) MEAN RADIANCE OF SURFACE 6.7 UM (8 BITS) - The mean of all the 6.7 um radiances for samples colocated with those 11.5 um samples accumulated in word (3a). The LSB represents 0.015625 W/M^2-STER.

(4a) POPULATION OF LOW CLOUD SAMPLES 11.5 UM. (16 BITS) - The number of THIR 11.5 UM samples accumulated in this IFOV whose radiances fall between word (10b) and word (10c).

(4b) MEAN RADIANCE OF LOW CLOUD SAMPLES 11.5 UM. (8 BITS) - Same as word (3b) except for samples accumulated in word (4a).

(4c) MEAN RADIANCE OF LOW CLOUDS 6.7 UM. (8 BITS) - Same as word (3c) except for samples accumulated in word (4a).

(5a) POPULATION OF MEDIUM CLOUD SAMPLES 11.5 UM. (16 BITS) - The number of THIR 11.5 UM samples accumulated in the IFOV whose radiances fall between words (10c) and (10d).

(5b) MEAN RADIANCE OF MEDIUM CLOUD SAMPLES 11.5 UM. (8 BITS) - Same as word (3b) except for samples accumulated in word (5a).

(5c) MEAN RADIANCE OF MEDIUM CLOUD SAMPLES 6.7 UM. (8 BITS) - Same as word (3c) except for samples accumulated in word (5a).

FIGURE VI-3 SBUV DATA LOGICAL RECORD

WORD	32	24	16	8	1	BITS
1	PHYSICAL RECORD NUMBER (12 BITS)	SPARE (4 BITS)	FILE CONT (2)	RECORD ID=32 (6 BITS)	SPARE (8 BITS)	32
2	GMT MILLISECONDS OF DAY AT START OF SBUV MAJOR FRAME ZERO (32 BITS)					64
3	POPULATION SURFACE (16 BITS)		MEAN RADIANCE 11.5 SURFACE (8 BITS)	MEAN RADIANCE 6.7 SURFACE (8 BITS)		96
4	POPULATION LOW CLOUDS (16 BITS)		MEAN RADIANCE 11.5 LOW CLOUDS (8 BITS)	MEAN RADIANCE 6.7 LOW CLOUDS (8 BITS)		128
5	POPULATION MEDIUM CLOUDS (16 BITS)		MEAN RADIANCE 11.5 MEDIUM CLOUDS (8 BITS)	MEAN RADIANCE 6.7 MEDIUM CLOUDS (8 BITS)		160
6	POPULATION HIGH CLOUDS (16 BITS)		MEAN RADIANCE 11.5 HIGH CLOUDS (8 BITS)	MEAN RADIANCE 6.7 HIGH CLOUDS (8 BITS)		192
7	SPARE (8 BITS)	CIRRUS LOW/HIGH RADIANCE 6.7 (8 BITS)	TERRAIN HEIGHT (16 BITS)			224
8	RMS DEV 11.5 SURFACE (8 BITS)	RMS DEV 11.5 LOW CLOUDS (8 BITS)	RMS DEV 11.5 MEDIUM CLOUDS (8 BITS)	RMS DEV 11.5 HIGH CLOUDS (8 BITS)		256
9	RMS DEV 6.7 SURFACE (8 BITS)	RMS DEV 6.7 LOW CLOUDS (8 BITS)	RMS DEV 6.7 MEDIUM CLOUDS (8 BITS)	RMS DEV 6.7 HIGH CLOUDS (8 BITS)		288
10	SURFACE CODE (8 BITS)	SURFACE/LOW CLOUD RADIANCE (8 BITS)	LOW/MEDIUM CLOUD RADIANCE (8 BITS)	MEDIUM/HIGH CLOUD RADIANCE (8 BITS)		320
11	GMT MILLISECONDS OF DAY AT 1st THIR SAMPLE IN SBUV IFOV. (32 BITS)					352
12	REPEAT WORDS 2 THRU 11--24 TIMES FOR A TOTAL OF (UP TO) 25 SBUV IFOVs. LOGICAL RECORD WILL BE FILLED OUT WITH ZEROES AT END OF ORBIT (7,680 BITS)					8,032
252	SPARE (ZEROES) 2 BYTES FOR RECORD LENGTH		LAST RECORD IN ORBIT FLAG (16 BITS)			8,064

224 36 BIT WORDS 252 32 BIT WORDS 336 24 BIT WORDS 1008 BYTES 8,064 BITS

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(6a) POPULATION OF HIGH CLOUD SAMPLES 11.5 UM. (16 BITS) - The number of THIR 11.5 UM samples accumulated in this IFOV whose radiances fall below word (10c).

(6b) MEAN RADIANCES OF HIGH CLOUD SAMPLES 11.5 UM. (8 BITS) - Same as word (3b) except for samples accumulated in word (6a).

(6c) MEAN RADIANCE OF HIGH CLOUD SAMPLES 6.7 UM. (8 BITS) - Same as word (3c) except for samples accumulated in word (6a).

(7a) SPARE. (8 BITS) - Zeroes for word alignment.

(7b) CIRRUS HIGH/LOW RADIANCE 6.7 UM. (8 BITS) - The 6.7 UM radiance used in SACC (SBUV/TOMS) processing to determine the presence of cirrus clouds in the SBUV IFOV. The LSB represents 0.015625 W/M^2-STER. This word is passed from the ERB/STAGS Tape.

(7c) TERRAIN HEIGHT. (16 BITS) - The average terrain height equivalent for this IFOV expressed in meters from mean sea level. This word is passed from the ERB/STAGS tape.

(8a) RMS DEVIATION SURFACE 11.5 UM. (8 BITS) - The RMS deviation of the 11.5 UM samples averaged in word (3b). The LSB represents 0.015625 W/M^2-STER.

(8b) RMS DEVIATION LOW CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (4b). Scaled the same as word (8a).

(8c) RMS DEVIATION MEDIUM CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (5b). Scaled the same as word (8a).

(8d) RMS DEVIATION HIGH CLOUDS 11.5 UM. (8 BITS) - The RMS deviation for word (6b). Scaled the same as word (8a).

(9a) RMS DEVIATION SURFACE 6.7 UM. (8 BITS) - The RMS deviation of the 6.7 U samples averaged in word (3c). The LSB represents 0.00392 W/M^2-STER.

(9b) RMS DEVIATION LOW CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for word (4c). Scaled the same as word (9a).

(9c) RMS DEVIATION MEDIUM CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for (5c). Scaled the same as word (9a).

(9d) RMS DEVIATION HIGH CLOUDS 6.7 UM. (8 BITS) - The RMS deviation for word (6c). Scaled the same as word (9a).

(10a) SURFACE CATEGORY CODE. (8 BITS) - This code is taken from the STAGS tape and indicates the type of surface in the ERB-STA in which this IFOV falls. The only valid codes are:

1 = LAND
2 = WATER
3 = LAND AND WATER
4 = ICE OR SNOW
5 = ICE AND LAND
6 = ICE/SNOW AND WATER
7 = ICE/SNOW, LAND AND WATER

(10b) SURFACE/LOW CLOUD RADIANCE. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the lowest histogram level; between Surface and Low Altitude Clouds. The LSB represents 0.125 W/M^2-STER.

(10c) LOW/MEDIUM CLOUD RADIANCE. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the two mid-level histograms; between low and medium altitude clouds. The LSB represents 0.225 W/M^2-STER.

(10d) MEDIUM/HIGH CLOUD RADIANCE 11.5 UM. (8 BITS) - The radiance used to separate the THIR 11.5 UM samples into the highest histogram level; between high and medium altitude clouds. The LSB represents 0.125 W/M^2-STER.

(11) FIRST THIR SAMPLE TIME. (32 BITS) - The GMT in milliseconds of day (given in Header Record) for the first THIR 11.5 UM sample entering this SBUV IFOV.

(12) REPEAT words 2 thru 11 up to 24 additional times for a total of (up to) 25 SBUV IFOVs in this logical record.

(252a) SPARES. (16 BITS) - Zeroes for word alignment.

(252b) LAST RECORD IN ORBIT FLAG. (16 BITS) - Normally zero these 16 bits are set to all ones (-1 in 2's complement) in the last logical record of data in this orbit and in all remaining logical records needed to fill out the last physical record.

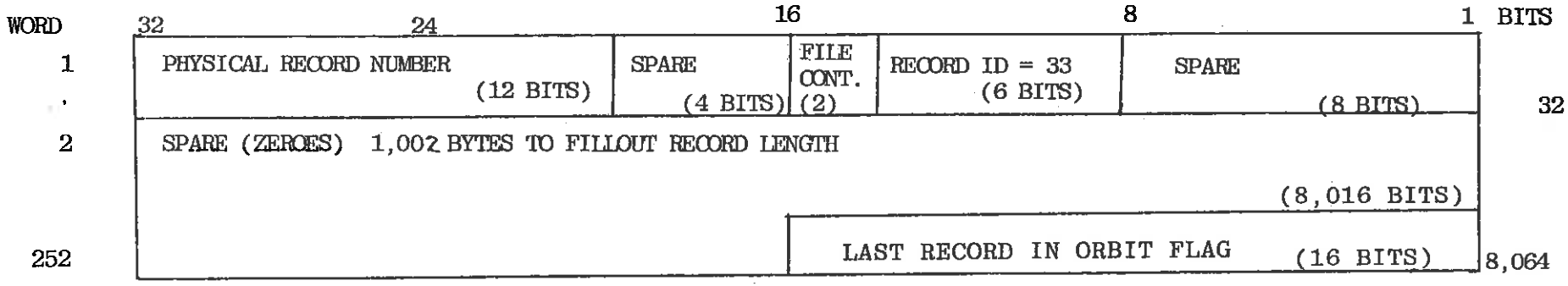
VId SBUV/TOMS DUMMY LOGICAL RECORD

Figure VI-4 shows the contents of this type of record. One or more of these logical records will be written to fill out any physical record as required. These may also be used to generate the last fill on the tape. The first 32-bit word is as described in a previous section. The remaining 251 32-bit words are as follows:

(2) SPARES (8,024 BITS) - 1,002 bytes of zeroes used to fill out the record.

(3) LAST RECORD IN ORBIT FLAG. (16 BITS) - Normally zero, these 16-bits are set to all ones (-1 in 2's complement) in the last logical record of data in this orbit and in all remaining logical records needed to fill out the last physical record.

FIGURE VI-4 SBUV/TOMS DUMMY LOGICAL RECORD



224 36 BIT WORDS 252 32 BIT WORDS 336 24 BIT WORDS 1,008 BYTES 8,064 BITS