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User's Guide and Tape Specification for ERB 7 DELMAT

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User's Guide and Tape Specification for ERB 7 DELMAT

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NIMBUS 7

EARTH RADIATION BUDGET (ERB)

DELMAT USER'S GUIDE

Part I

SECTION 1. INTRODUCTION

1.1 Purpose of the User's Guide

The DELMAT User's Guide has been written to fulfill the following objectives:

a. To provide guidance to the DELMAT user, primarily in the areas of the purpose, use, and limitations of the DELMAT tapes and software.

b. To provide the DELMAT tape specifications to the user.

c. To summarize the input MAT's and tape characteristics applicable to the DELMAT tapes.

For a description of the Nimbus-7 Earth Radiation Budget (ERB) Experiment and data products, the reader is referred to the references in section 1.2.

1.2 Project References

The Calibration Adjustment Task is performed by the ERB Processing Team under the management of Dr. H. Lee Kyle (GSFC/Code 636), with the cooperation of the Nimbus-7 ERB Experiment Team. The software has been developed for, and is operated on, the GSFC SACC computers. The following documents are references for this task:

1.2.1 Ardanuy, P.E., and J. Rea, Degradation Asymmetries and recovery of the Nimbus-7 radiation budget shortwave radiometer, J. Geophysical Research, In press, 1984.

1.2.2 Groveman, B.S., User's Guide for ERB-7 MAT, NASA Contractor Report CR 170514, Goddard Space Flight Center, 1984.

1.2.3 Jacobowitz, H., H.V. Soule, H.L. Kyle, F. House, and the Nimbus-7 ERB Experiment Team, The Earth Radiation Budget Experiment: An Overview, J. Geophysical Research, 89, 5021-5038, 1984.

1.2.4 Kyle, H.L., F. House, P. Ardanuy, H. Jacobowitz, R. Maschhoff, and J. Hickey, New In-flight Calibration Adjustment of the Nimbus 6 and 7 Earth Radiation Budget Wide Field of View Radiometers, J. Geophysical Research, 89, 5057-5076, 1984.

1.2.5 Maschhoff, R., A. Jalink, J. Hickey and J. Swedberg, Nimbus Earth Radiation Budget Sensor Characterization for Improved Data Fidelity, J. Geophysical Research, 89, 5049-5056, 1984.

Additional internal references are given in Appendix B.

The algorithms used in the Calibration Adjustment Task were developed cooperatively by the ERB Nimbus Experiment Team and the Goddard Space Flight Center ERB Processing Team. The ERB Experiment Team has guided the Nimbus-7 ERB Experiment since 1976. Its members are listed below:

Jacobowitz, H.	NOAA/NESDIS
Arking, A.	NASA/GSFC
Campbell, G.G.	CIRA, Colorado State University
Hickey, J.R.	Eppley Lab, Inc.
House, F.B.	Drexel University
Ingersoll, A.P.	California Institute of Technology
Kyle, H.L.	NASA/GSFC
Maschhoff, R.H.	Gulton Industries, Inc.
Smith, G.L.	NASA/LaRC
Stowe, L.L.	NOAA/NESDIS
Vonder Haar, T.H.	Colorado State University

1.3 Terms and Abbreviations

ERB - Earth Radiation Budget

WFOV - Wide Field of View

BPI - Bytes Per Inch

CAT - Calibration Adjustment Table

TDF - Trailing Document File

DELMAT - MAT Monthly Calibration Adjustment Tape

PDELTA - Preliminary MAT Calibration Adjustment Tape

JCL - Job Control Language

GSFC - Goddard Space Flight Center

SACC - Science Applications Computing Center

RDS - Research and Data Systems, Inc.

NET - Nimbus Experiment Team

2. Method of Calibration Adjustment

Calibration adjustment of the ERB WFOV total (Channel 12), and filtered channel shortwave (channel 13) and near-infrared (channel 14) radiometers is accomplished through the application of several offset terms and a sensitivity change. The DELMAT tape contains offsets describing the sensors' responses to internal thermal gradients (termed the "midnight offset" because of the zero bias at night) and to infrared absorption, warming, and subsequent reradiation by the multiple filter domes (termed longwave heating). The Calibration Adjustment Table, or CAT, contains a calibration adjustment slope which varies with a modified solar zenith angle[1] and day of year. An additional empirically-determined offset is also provided.

2.1 DELMAT

The DELMAT tape contains one data-month's worth of calibration adjustments for the correction of the filtered channel irradiances. The data month begins on the first data day of the calendar month and extends beyond the end of the calendar month to the last data day of the last ERB 6-day cycle begun in that month. Thus, up to 5 days of the next calendar month may be included. The tape specification document (Part II) describes the tape in detail. It is sufficient to say here that there is one physical file per day. Each data day is as defined on the respective MAT: data begins with the first orbit (starting at the first descending node after 00:00:00 GMT) and terminates with the end of the last orbit (starting at the last descending node prior to 23:59:59 GMT, and often extending into the next calendar day). Neglecting data gaps, more or less than 24 hours of data will exist in the day due to the 104-minute orbital period of the Nimbus-7 spacecraft.

The DELMAT is designed to complement, rather than replace, the MAT. Therefore, an extensive amount of data, not pertinent to the calibration adjustment problem, does not exist on the DELMAT, though it is available on the MAT. What is retained, however, is a set of record identifiers and time tags, enabling the matching of a DELMAT record to the corresponding MAT record. Once a match has been made, instrument status words can be checked, as well as the data quality loss interval flags and general data quality (the DELMAT contains a summary status word) and the appropriate parameters extracted from each tape.

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[1] To make the solar zenith angle a unique descriptor of orbit position, it is multiplied by the sign of the rate-of-change of the solar zenith angle.

The DELMAT calibration adjustments are additive. Where questionable data is encountered, the DELMAT software employs interpolation algorithms (spline fit for small gaps, trend-matched zonal averages for large gaps) to replace the data. A low-pass, 3-point (.25, .50, .25) filter is also employed to identically remove an inherent every-other-observation oscillation in the data. To the user of filtered channel irradiances (total channels are unchanged) there exist three options within the DELMAT record; (1) the use of the uncorrected irradiances; (2) the use of the uncorrected irradiances with the calibration adjustments added; or (3) the use of the corrected irradiances.

Three versions of DELMAT tapes produced by three corresponding versions of DELMAT software currently exist. Version 1.0 software produced by the corresponding version of DELMAT software was used to process data from May, 1980 through October, 1981. Version 2.0 software was used to process data from November, 1981 through October, 1983. Version 3.0 software, used to process data after October, 1983, is being used to reproduce DELMAT's for the prior time period. The physical format of the three versions is presented in Part II. The differences in algorithm are discussed in Section 3.

2.2 Calibration Adjustment Table

The Calibration Adjustment Table (CAT) contains empirically determined slopes and offsets to be applied to each WFOV channel. These values are presented in writing and are applied at MATRIX-level processing.

2.3 Calibration Overview

Figure 1 displays the ERB processing steps from the initial spacecraft-transmitted data to final user products. The DELMAT and the channel 13 CAT are used in conjunction with the original MAT in level-2 processing producing SEFDT and MATRIX.

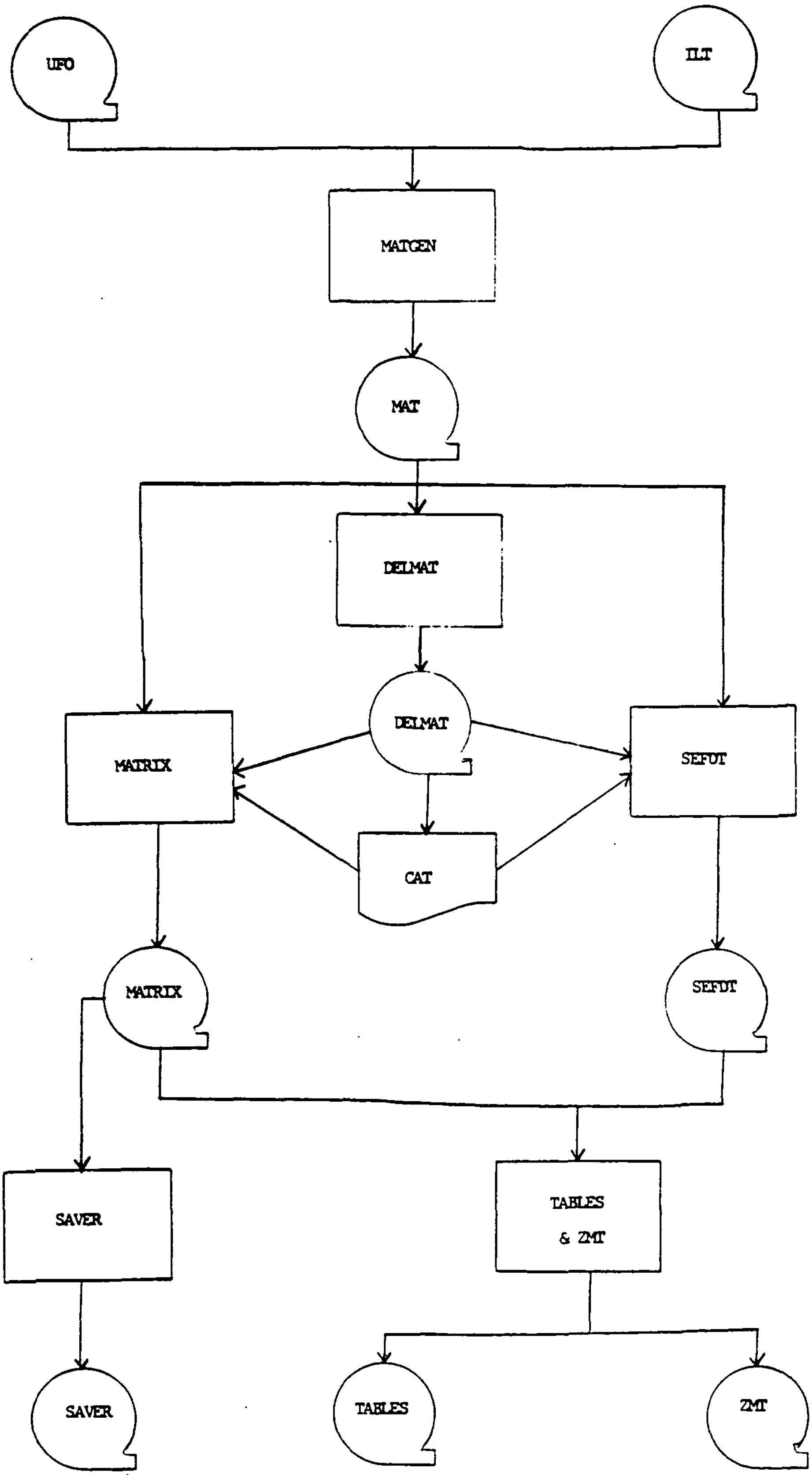

Figure 1 ERB Processing steps

3. Summary of DELMAT Corrections

3.1 Midnight Offset

3.1.1 Description

The midnight offset correction is provided to remove the zero bias evident at night from each of the two filtered channels. A midnight point is defined for each orbit as that point in the orbit farthest from the sun (maximum solar zenith angle). At this point the calibrated signal is extracted from the shortwave and near-infrared radiometers. The former is corrected for longwave heating. In general, 13 or 14 data points (one per orbit) are obtained for each day. A cubic spline is fitted to these midnight points and evaluated at every observation during the orbits.

3.1.2 Assumptions

It is assumed that the spacing of three shortwave-heating time constants between the sunblips and the midnight points renders the shortwave heating contamination of the midnight offsets negligible. In version 3.0, these values are removed by adjusting the midnight offset correction. This removed a slight residual error. Information from adjoining days is not included in the spline fit for the day under consideration. A constant value of the midnight offset is applied prior to the first midnight point and after the last midnight point to avoid extrapolation. Estimates of longwave heating are removed from the channel 13 midnight values to yield an independent correction for zero bias. Because of the one-data-point per orbit curve fit, the smallest oscillation that can be represented has a period of two orbits; the primary correction is the removal of the ERB duty cycle.

3.2 Longwave Heating

3.2.1 Description

The longwave heating offset correction is provided to remove the variable channel 13 sensor response to infrared radiation. A constant response correction is already applied in the count-to-irradiance calibration equation. It has been shown that there is no significant "longwave leak" through the pair of Suprasil-W filter domes. Instead, the outer dome is subjected to a time-varying incident longwave radiance field, modulated primarily by the equator-to-pole terrestrial thermal gradient. This produces a temperature response in the dome with a corresponding change in the amount of emitted longwave radiation. Some of this radiation is absorbed by the inner filter dome, which changes temperature and radiates, in part, onto the exposed radiometer. Unless corrected for, this response is assumed to be due to incident shortwave radiation.

3.2.2 Assumptions

Laboratory studies on a prototype channel 13 radiometer, inflight studies on the N-6 ERB Channel 13, as well as 2 years of data on the N-7 ERB channel 13 all indicate that the double-dome longwave heating response is well represented by a single point convolution of impulse response and longwave forcing. Based on empirical studies, a constant phase lag of 21 major frames (approximately $5\frac{1}{2}$ minutes) is used along with a sensitivity of 4 percent. It is assumed that this longwave heating response, based on the first 2 data-years, does not change with time. The longwave heating response of channel 14, with 3 filter domes, is assumed to be negligable. This appears on the tape as a fill value, 22222. The algorithm for computing the channel 13 longwave heating correction is as follows:

DAY	LWH =	0.04 * (CH 12 irrad. - CH 13 irrad.)
NIGHT	LWH =	0.04 * CH 12 irrad.

3.3 Shortwave Heating

A large body of studies have shown that a shortwave heating response is present in, at least, the filtered channel 13 and 14 irradiances. This is most evident following a sunset sunblip, where psuedo-exponential decay curves with time constants of 20 and 30 major frames, respectively, for channels 13 and 14 are observed. Through some geometric simplifications, the amount of shortwave forcing can be computed, allowing the determination of appropriate sensitivities. These are noted to generally increase and decrease for channels 13 and 14, respectively, with time as the channels degrade.

What is uncertain is in the transfer of this model from direct solar to terrestrial-reflected solar radiation. Because this effect proved impossible to properly replicate under laboratory conditions, this model was not implemented to describe terrestrial reflected shortwave heating responses. In version 1.0 and 2.0, the shortwave heating correction for both channel 13 and 14 is set to zero. In version 3.0, the direct solar correction is used, while the terrestrial-reflection correction is set to zero.

3.4 Clipping

In the version 3.0 DELMAT, two additional corrections are added, and they are jointly referred to as clipping corrections. The first involves the interpolation across, or "clipping" of, all sunblips. Using a tensioned spline interpolation, channels 12, 13 and 14 are estimated for the region between solar zenith angles 90° and 121°.* The difference between these interpolated values (with all other applicable corrections applied) and the original sunblip irradiance is stored for each channel as the clipping correction. In addition, after all applicable corrections are applied, all channel 13 and 14 irradiances at solar zentih angles greater than 121° are set to zero. The difference between these corrected irradiances and zero are also stored as clipping corrections.

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* The irradiances for all WFOV channels are reduced in the SZA region 90° to 99° to eliminate the out-of-field response observed in this region prior to using them as knots for the interpolation.

APPENDIX A

The following is a sample of the documentation available for DELMAT tapes. This information may be obtained from Dr. H. Lee Kyle, GSFC code 636.

Summary of Input MAT's Used to Produce Year-2 DELMAT Tapes

The following MAT's were used to produce the May, 1980 DELMAT tape AJ01211-2

DATE	JULIAN DAY	SEQUENCE NUMBER
May 1, 1980	122	AC07951A3
May 2, 1980	123	AC07961A3
May 3, 1980	124	AC07971A3
May 5, 1980	126	AC08021A3
May 6, 1980	127	AC08031A3
May 7, 1980	128	AC08041A3
May 9, 1980	130	AC08061A3
May 10, 1980	131	AC08071A3
May 11, 1980	132	AC08111A3
May 13, 1980	134	AC08131A3
May 14, 1980	135	AC08141A3
May 15, 1980	136	AC08151A3
May 17, 1980	138	AC08171A3
May 18, 1980	139	AC08211A3
May 19, 1980	140	AC08221A3
May 21, 1980	142	AC08241A3
May 22, 1980	143	AC08251A3
May 23, 1980	144	AC08261B3
May 25, 1980	146	AC08311A3
May 26, 1980	147	AC08321A3
May 27, 1980	148	AC08331B3
May 29, 1980	150	AC08351A3
May 30, 1980	151	AC08361A3
May 31, 1980	152	AC08371A3
June 2, 1980	154	AC08421A3
June 3, 1980	155	AC08431A3
June 4, 1980	156	AC08441A3

The following MAT's were used to produce the June, 1980 DELMAT tape AJ01521-2

DATE	JULIAN DAY	SEQUENCE NUMBER
June 2, 1980	154	AC08421A3
June 3, 1980	155	AC08431A3
June 4, 1980	156	AC08441A3
June 6, 1980	158	AC08461A3
June 7, 1980	159	AC08471A3
June 8, 1980	160	AC08511A3
June 10, 1980	162	AC08531A3
June 11, 1980	163	AC08541A3
June 12, 1980	164	AC08551A3
June 14, 1980	166	AC08571A3
June 15, 1980	167	AC08611A3
June 16, 1980	168	AC08621A3
June 18, 1980	170	AC08641A3
June 19, 1980	171	AC08651A3
June 20, 1980	172	AC08661A3
June 22, 1980	174	AC08711A3
June 26, 1980	178	AC08751A3
June 27, 1980	179	AC08761B3
June 28, 1980	180	AC08771A3
June 30, 1980	182	AC08821A3
July 1, 1980	183	AC08831A3
July 2, 1980	184	AC08841A3
July 4, 1980	186	AC08861A3
July 5, 1980	187	AC08871A3

. Summary of Year-2 DELMAT Tape Characteristics

May, 1980; Sequence Number: AJ01211-2

File Number	Julian Day	Orbital Span	Physical Records	Logical Data Records	Orbital Summary Records	Daily Summary Records	Fill Data Records	Total Logical Records
1	-	HEADER	2					
2	122	7668-7680	26	5045	13	2	0	5060
3	123	7681-7694	28	5421	14	1	0	5436
4	124	7695-7708	28	5392	14	2	0	5408
5	126	7723-7736	28	5443	14	1	0	5458
6	127	7737-7750	28	5440	14	2	0	5456
7	128	7751-7763	26	5004	13	1	0	5018
8	130	7778-7791	28	5423	14	1	0	5438
9	131	7792-7805	28	5401	14	1	0	5416
10	132	7806-7818	26	5049	13	2	0	5064
11	134	7834-7846	26	5043	13	2	0	5058
12	135	7847-7860	28	5437	14	1	0	5452
13	136	7861-7874	27	5383	14	1	0	5398
14	138	7889-7902	28	5430	14	2	0	5446
15	139	7903-7915	26	5064	13	1	0	5078
16	140	7916-7929	28	5386	14	2	0	5402
17	142	7944-7957	27	5302	14	2	0	5318
18	143	7958-7971	28	5441	14	1	0	5456
19	144	7972-7985	26	4682	14	1	359	5056
20	146	7999-8012	28	5426	14	2	0	5442
21	147	8013-8026	28	5433	14	1	0	5448
22	148	8027-8040	28	5021	14	2	365	5402
23	150	8055-8067	26	5053	13	2	0	5068
24	151	8068-8081	28	5439	14	1	0	5454
25	152	8082-8095	28	5419	14	1	0	5434
26	154	8110-8123	28	5427	14	1	0	5442
27	155	8124-8137	28	5451	14	1	0	5466
28	156	8138-8150	26	5036	13	1	0	5050
29	-	TDF	29					

June, 1980; Sequence Number: AJ01521-2

File Number	Julian Day	Orbital Span	Physical Records	Logical Data Records	Orbital Summary Records	Daily Summary Records	Fill Data Records	Total Logical Records
1	-	HEADER	2					
2	154	8110-8123	28	5427	14	1	0	5442
3	155	8124-8137	28	5451	14	1	0	5466
4	156	8138-8150	26	5036	13	1	0	5050
5	158	8165-8178	28	5410	14	2	0	5426
6	159	8179-8192	28	5433	14	1	0	5448
7	160	8193-8206	28	5432	14	2	0	5448
8	162	8220-8233	28	5408	14	2	0	5424
9	163	8234-8247	28	5442	14	2	0	5458
10	164	8248-8261	28	5424	14	2	0	5440
11	166	8276-8289	28	5415	14	1	0	5430
12	167	8290-8302	26	5028	13	1	0	5042
13	168	8303-8316	28	5404	14	2	0	5420
14	170	8331-8344	28	5442	14	2	0	5458
15	171	8345-8358	28	5439	14	1	0	5454
16	172	8359-8371	26	5046	13	1	0	5060
17	174	8386-8399	26	5031	14	1	0	5046
18	178	8442-8454	23	4576	13	1	0	4590
19	179	8455-8468	28	5387	14	1	0	5402
20	180	8469-8482	27	5371	14	1	0	5386
21	182	8497-8510	28	5431	14	1	0	5446
22	183	8511-8523	26	5039	13	2	0	5054
23	184	8524-8537	28	5433	14	1	0	5448
24	186	8552-8565	28	5448	14	2	0	5464
25	187	8566-8579	27	5368	14	2	0	5384
26	-	TDF	36					

Appendix B

Internal Project References

B.1 "Nimbus-7, Nimbus Observation Processing System (NOPS) Requirements Document #NG-13 Tape Specifications No. T1B4081 ERB MAT, ERB MASTER ARCHIVAL TAPE", Goddard Space Flight Center.

B.2 "The Nimbus-7 User's Guide", the Landsat/Nimbus Project, Goddard Space Flight Center.

B.3 "Federal Information Processing Standards", FIPS Publication 38, National Bureau of Standards, Feb. 15, 1976.

B.4 "The Channel 13 Dome Heating Problem", Giannola, R. J. JaFolla and F. House, Minutes of the Ninth ERB Science Team Meeting, Attachment H, December 1977.

B.5 "Channels 13 and 14 Dome Heating Problem", Giannola R. and F. House, Minutes of the Tenth ERB Science Team Meeting. Attachment L, March 1978.

B.6 "Sunblip and Dome Heating Considerations", Giannola, R. and F. House, Minutes of the Thirteenth ERB Science Team Meeting, Attachment G, April 1979.

B.7 "Untitled Progress Report", Giannola, R. and F. House, Minutes of the Fifteenth ERB Science Team Meeting, Attachment H, January, 1980.

B.8 "Study of the Dome Heating Problem and Science Support of the Nimbus ERB Reprocessing Team", House, F., Technical Proposal submitted to Goddard Space Flight Center, September 1981.

B.9 "Thermal Analysis of Earth Flux", Maschhoff, R. and J. Swedberg, Minutes of the Eighteenth ERB Science Team Meeting, Attachment F, November, 1981.

B.10 "Data Comparison Calibration Strategy", House, F. Minutes of the Eighteenth ERB Science Team Meeting, Attachment G, November, 1981.

B.11 "Thermal Analysis of Earth Flux", Maschhoff, R., Minutes of the first ERB Calibration Workshop, Attachment D, August 1982.

B.12 "Asymmetric Degradation of the Nimbus-7 ERB Shortwave Channel", Ardanuy, P., Minutes of the First ERB Calibration Workshop, Attachment E, August, 1982.

B.13 "Review of the Nimbus-7 ERB CAT Process and Results", fromm, K, August, 1982.

B.14 "Nimbus-7 ERB MAT Calibration Adjustment Task, Functional Requirements Document", Ardanuy, P., October, 1982.

B.15 "Nimbus-7, Nimbus Observation Processing System (NOPS), Requirements Document Tape Specification No. T134101, ERB DELMAT, ERB WFOV Calibration Adjustment Tape", Ardanuy, P., October, 1982.

B.16 "ERB Earth-Flux Channel Thermal Analysis", Hickey, J., Minutes of the Eighteenth ERB Science Team Meeting, Attachment November, 1981.

B.17 "Nimbus-7, Nimbus Observation Processing System (NOPS), ERB SEFDFIX Requirements Specification", Yang, C., Systems and Applied Sciences Corp., October 1982.

B.18 "Nimbus-7, Nimbus Observation Processing System (NOPS), ERB MATRIX Modification for DELMAT Acceptance", Yang, C. and J. Neuberger, Systems and Applied Sciences Corp., October, 1982.

B.19 "Nimbus-7 ERB MAT Calibration Adjustment Task, DELTA MAT Program Specifications", Ardanuy, P., October, 1982.

B.20 "Report to the Nimbus ERB NET Working Meeting, November 27-28, 1984". Ardanuy, P., Groveman, B., Hucek, R., Penn, L., Weiss, M. et al., November, 1984.

NIMBUS-7

NIMBUS OBSERVATION PROCESSING SYSTEMS (NOPS)

TAPE SPECIFICATION NO. T-13401

ERB DELMAT

Revisions

Revision A: 11/30/82	Physical record length changed to 24084 bytes to satisfy IPD requirement that the block length be compatible with 24, 32 and 36 bit machines. Changes exist on pages 20, 38 and 39.
Revision B: 1/24/83	Scale factor for solar zenith angle corrected to read 100. Explanation for the existance of fill data added. Changes exist on pages 29 and 36.
Revision C: 10/19/83	Subsatellite latitude and longitude added to previously spare words. This change represents version 2 of the DELMAT algorithm. Changes exist on pages 32 and 37.
Revision D: 11/15/84	Shortwave heating correction activated, sunblip clipping initiated. This change represents version 3 of the DELMAT algorithm. Changes exist on pages 20, 29, 33-38.

ABSTRACT

The ERB DELMAT TAPE is generated by software residing on an IBM 3081 computer and is created as a 9 track 1600 BPI product. It is composed of a set of files; the first file contains the standard header record written twice, the last file contains all the trailing documentation records and each intermediate file will contain one day of data. A tape length calculation is provided in Appendix A.

This tape has been generated in a manner so as to facilitate processing with the MAT data. The following differences and similarities are worth noting:

1. Word 1, while containing data unique to this product, is identical in format to word 1 of each MAT logical record.

2. The MAT data file (file 2) contains several thousand physical records. Each MAT physical record contains two logical records, corresponding to up to two VIP major frames (16 seconds) of data.

3. Except for the first and last files, each DELMAT tape file contains approximately 30 physical records. Each physical record (24,084 bytes) contains 100 logical records. Each logical record (240 bytes) corresponds to a single physical record on the appropriate MAT. The last 84 bytes are spares and contain no useful information. For DELMAT versions 1.0 and 2.0, each physical record contains 24,084 bytes and each logical record 240 bytes. For version 3.0, each physical record contains 31,500 bytes and each logical record 312 bytes.

Due to a maximum of two dropped physical records in the MAT copy process, occasionally a 1:1 MAT to DELMAT tape record comparison based on time-tagging will not be possible. In these isolated cases the user may either drop the mis-matched data from further processing or, in the case of versions 1 and 2, only use corrections from a neighboring record.

I. REQUIREMENT IDENTIFICATION

ERB DELMAT, tape specification number T134101, PDF code AJ.

II. INPUT DATA SOURCE

ERB-MAT, tape specification number T134081, PDF code AC.

III. OPERATING MODE

The DELMAT program will generate one tape for every month of data. The tape will have one standard header file, one trailing documentation file and one additional file for every "ERB-ON" day in the month.[1]

IV. GROSS FORMAT

The Gross Format is as shown below:

STD HDR	IRG	STD HDR	EOF	DELTA PHYREC 1	IRG	DELTA PHYREC 2	IRG	…	IRG	LAST DELTA PHYREC	EOF

File 1 — File 2 (Day 1)

DELTA PHYREC 1	IRG	DELTA PHYREC 2	IRG	…	IRG	LAST DELTA PHYREC	EOF

Next to Last File (Last Day)

TDF	IRG	TDF	IRG	…	IRG	TDF	EOF	EOF

Last File

The number of physical records will vary with the number of orbits/day. The number of files will vary with the number of "ERB-ON" days/month.

[1] A data month is defined here as that time span allowing data to complete the last cycle started prior to the end of the calendar month.

ORIGINAL PAGE IS
OF POOR QUALITY

Total 24 bit Words	MSB 24 · 22 · 20 · 18 · 16 · 14 · 12 · 10 · 8 · 6 · 4 · 2 · LSB 1	Total Bits
1	• Nimbus - 7 NOPS$_b$SPEC$_b$ NO$_b$T └If TDF exists (24 Characters)	
8		192
9	SPEC NO. (6 Digits)	
10		
	$_b$SQ$_b$NO$_b$ (7 Characters)	
13	PDFC CODE (2 Char.)	
14	5 Digit Sequence No. (5 Characters) YJJJN *For CZCS these characters (40-45) are a	
15	six digit sequence (includes Redo) · REDO CHARACTER	408
16	1 Char. Tape Copy No · Blank Character	
17	(4 Characters) SUBSYSTEM I.D.	
18	Blank Character · SOURCE FACILITY	
19	(4 Characters) · Blank Character	
20	(T) Character · (Ø) Character · Blank Character	
21	(4 Characters) DESTINATION FACILITY I.D.	
22	(23 Characters)	
	START YEAR, DAY, HOURS, MINUTES, SECONDS $_b$START$_b$19XX$_b$DDD$_b$HHMMSS$_b$	
29		696
	END DATE AND TIME OF DATA (19 Characters) TO$_b$19XX$_b$DDD$_b$HHMMSS$_b$ · • Some Facilities may not include end time in header	
36	(20 Characters)	
	DATE AND TIME TAPE WAS GENERATED GEN$_b$19XX$_b$DDD$_b$HHMMSS$_b$	
42		1008
84	BLANK (126 Characters) SW Program Name (1-12) Documentation (13-18) Comments (19-126)	2016
126	BLANK (126 Characters)	3024
168	BLANK (126 Characters)	4032
210	BLANK (126 Characters)	5040

EBCDIC TAPE FORMAT

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

Table V-1

NOPS Specification Numbering Code

T X X X X X X

Tape Description:

1 = 9 Trk 1600 BPI
2 = 9 Trk 800 BPI
3 = 7 Trk 800 BPI
4 = 7 Trk 556 BPI
5 = HDT (IPD)
6 = 9 Trk 6250 BPI

Tape number in sequence for subsystem (code to be derived)

Destination Facility

1 = NOC (Pre-NOPS)
2 = MDHS (NOPS)
3 = SACC
4 = IPD
5 = LaRC
6 = NCAR
7 = NOAA
8 = OXFD
9 = LANN

Source Facility (Same code as Destination Facility)

1 = ERB
2 = SMMR
3 = THIR
4 = SAM2
5 = LIMS
6 = SBUV
7 = CZCS
8 = SAMS
9 = ILT

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

V. 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 CCTs 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 take 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 is 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 reflects 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 EBCDIC 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 IPD standard form:

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 1) (e.g., CLDTs 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 reason 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.

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 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 TDFs of all input tapes. For those products that require more than one tape, the TDF and the warning asterisk will appear on the last tape only.

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 (1-24 Character Count)
optional

XXXXXX (96 digit spec number) (25-30 Character Count)

$_b$SO$_b$ NO (31-37 Character Count)

AA XXXXX (5 digit sequence number) (38-44 Character Count)

NOTE: *If sequence number is zero, tape is not finished product (i.e., definitive ephemeris not used, artificial VP 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 Character Designated Fac.ID) (57-64 Character Count)

$_b$START$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (65087 Character Count)

(Start year, day of year, hours, minutes, seconds)

$_b$TO$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (88-106 Character Count)

(End data and time of data)

GEN$_b$19XX$_b$DDD$_b$HHMMSS$_b$ (107-126 Character Count)

(Data 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 SACC and sent to IPD for production of contour maps on 16 mm microfilm. The NOPS STD HDR file on the tape that IPD received would contain two of the following records.

*NIMBUS-7 NOPS$_b$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$_b$ 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 multi-day-stacked products that are based on an ILT week.

V.4 TAPE DUPLICATION

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 #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 "-2A", the "-2B" for a subsequent redo, etc.

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 the Standard Header File (SHF). In the event of copies made from CCTs 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. DATA FILES

There is a single type of logical record in each physical record. The logical records each contain data corresponding to one physical record, or two logical records, on the MAT. These may correspond to VIP major frames of data, orbital summaries, daily summaries or fill data records. There are 100 of these 240 byte (312 byte for revision 3.0) logical records placed in each physical record (approximately ½ orbit of data). The data is time-tagged in a manner identical to the appropriate MAT records (words 2 and 3) and, with the exception of words 1, 2, and 4, 22222 filled for all but VIP major frames. The logical data record format and description is presented in subsections VI-A and VI-B.

VII. EXISTANCE OF FILL DATA ON DELMAT

There are three conditions under which irradiance data on the DELMAT tape were replaced with fill (22222) data. These are:

(1) Record type 54: This indicates the existance of a mis-located major frame of data. All corrected irradiance data is filled for this 16 second period.

(2) Record types 52 and 53: These indicate the existance of orbital and daily summary records and are placed in the DELMAT to maintain conformity with the MAT. As no irradiances exist for these records, the corresponding DELMAT words are filled.

(3) Record type 51 (channel 14 longwave heating correction): As no correction for the longwave heating response for channel 14 yet exists, the corresponding DELMAT words are filled.

VIII. LOGICAL DATA RECORD DESCRIPTIONS

Each logical record contains a combination of 2 major frames of data, orbital summaries, daily summaries or fill data. Figure 1 is the format for version 1 tapes (prior to November 1981) and Figure 2 is the format for version 2 tapes (November 1981 through October 1983), and Figure 3 is the format for version 3 tapes (November 1983 and following).

1. Physical Record Number (12 bits): This identifies the physical record within a data file. This number should range from 1 to approximately 28 for each day (file) of data.

2. Record I.D. (8 Bits): This identifies the record type, the last record written in a file and records in the last file in the tape. The MSB will be set to "1" if that record is the last one written in the file. The second MSB will be set on all records in the last file on the tape. The record type will use the 6 LSB of that byte to identify the type of record being used,

   51 = Logical Data Record
   52 = Orbital Summary Record
   53 = Daily Summary Record
   54 = Fill Data Record

3. Logical Record Number (8 Bits): This identifies the logical record within the physical record. The number ranges from 1 to exactly 200 for each physical record.

4. Year (16 Bits): The least two significant numbers of the calendar year (e.g., 82) for the first of the two corresponding MAT logical records.

5. Day of Year (16 Bits): The day of the year (1 to 366) for the first of the two corresponding MAT logical records.

6. Hour/Minute (16 Bits): The GMT hour and minute (100 *hours + minute) of the start of data for the first of the two corresponding MAT logical records.

LOGICAL DATA RECORD FORMAT

DELMAT Version 1

WORD	MSB 32				LSB 1	BIT
1	PHYSICAL REC. NO. (12)	SPARES (4)	FILE CONT (2)	REC I.D (6)	LOGICAL REC. NO. (8)	32
2	YEAR (16)		DAY OF YEAR (16)			64
3	HOUR/MINUTE (16)		GMT SECONDS (16)			96
4	ORBIT NO. (16)		STATUS WORD (16)			128
12	CHANNEL 11-14 (WFOV) UNCORRECTED MAT IRRADIANCES (256)					384
14	CHANNEL 13 MIDNIGHT OFFSET CORRECTIONS (64)					448
16	CHANNEL 13 LONGWAVE HEATING CORRECTIONS (64)					512
18	CHANNEL 13 SHORTWAVE HEATING CORRECTIONS (64)					576
20	CHANNEL 13 REPLACEMENT IRRADIANCES (64)					640
22	CHANNEL 14 MIDNIGHT OFFSET CORRECTIONS (64)					704
24	CHANNEL 14 LONGWAVE HEATING CORRECTIONS (64)					768
26	CHANNEL 14 SHORTWAVE HEATING CORRECTIONS (64)					832
28	CHANNEL 14 REPLACEMENT IRRADIANCES (64)					896
29	SOLAR ZENITH ANGLE (16)		SPARES (16)			928
30	SPARES (32)					960
60	AS IN WORDS 1-30 BUT FOR MAT LOGICAL RECORD 2 (960)					

Figure 1 DELMAT format

LOGICAL DATA RECORD FORMAT

DELMAT Version 2

WORD	MSB 32				LSB 1	BIT
1	PHYSICAL REC. NO. (12)	SPARES (4)	FILE CONT (2)	REC. I.D. (6)	LOGICAL REC. NO.(8)	32
2	YEAR (16)		DAY OF YEAR (16)			64
3	HOUR/MINUTE (16)		GMT SECONDS (16)			96
4	ORBIT NO. (16)		STATUS WORD (16)			128
12	CHANNEL 11-14 (WPOV) UNCORRECTED MAT IRRADIANCES (256)					384
14	CHANNEL 13 MIDNIGHT OFFSET CORRECTIONS (64)					448
16	CHANNEL 13 LONGWAVE HEATING CORRECTIONS (64)					512
18	CHANNEL 13 SHORTWAVE HEATING CORRECTIONS (64)					576
20	CHANNEL 13 REPLACEMENT IRRADIANCES (64)					640
22	CHANNEL 14 MIDNIGHT OFFSET CORRECTIONS (64)					704
24	CHANNEL 14 LONGWAVE HEATING CORRECTIONS (64)					768
26	CHANNEL 14 SHORTWAVE HEATING CORRECTIONS (64)					832
28	CHANNEL 14 REPLACEMENT IRRADIANCES (64)					896
29	SOLAR ZENITH ANGLE (16)		LATITUDE (16)			928
30	LONGITUDE (16)		SPARES (16)			960
60	AS IN WORDS 1-30 BUT FOR MAT LOGICAL RECORD 1 (960)					

Figure 2 DELMAT format

LOGICAL DATA RECORD FORMAT

DELMAT Version 3

WORD	MSB 32				LSB 1	BIT
1	PHYSICAL REC. NO. (12)	SPARES (4)	FILE CONT (2)	REC I.D. (6)	LOGICAL REC.NO.(8)	32
2	YEAR (16)		DAY OF YEAR (16)			64
3	HOUR/MINUTE (16)		GMT SECONDS (16)			96
4	ORBIT NO. (16)		STATUS WORD (16)			128
12	CHANNEL 11-14 (WFOV) UNCORRECTED MAT IRRADIANCES (256)					384
14	CHANNEL 12 CLIPPING CORRECTIONS (64)					448
16	CHANNEL 12 REPLACEMENT IRRADIANCES (64)					512
18	CHANNEL 13 CLIPPING CORRECTIONS (64)					576
20	CHANNEL 13 MIDNIGHT OFFSET CORRECTIONS (64)					640
22	CHANNEL 13 LONGWAVE HEATING CORRECTIONS (64)					704
24	CHANNEL 13 SHORTWAVE HEATING CORRECTIONS (64)					768
26	CHANNEL 13 REPLACEMENT IRRADIANCES (64)					832
28	CHANNEL 14 CLIPPING CORRECTIONS (64)					896
30	CHANNEL 14 MIDNIGHT OFFSET CORRECTIONS (64)					960
32	CHANNEL 14 LONGWAVE HEATING CORRECTIONS (64)					1024
34	CHANNEL 14 SHORTWAVE HEATING CORRECTIONS (64)					1088
36	CHANNEL 14 REPLACEMENT IRRADIANCES (64)					1152
37	SOLAR ZENITH ANGLE (16)		LATITUDE (16)			1184
38	LONGITUDE (16)		SPARES (16)			1216
39	SPARES (32)					1248
78	As in words 1-39 But for MAT Logical Record 2 (1248)					2496

Figure 3 DELMAT format

7. GMT Seconds (16 Bits): The GMT seconds (0 through 59) of the start of data for the first of the two corresponding MAT logical records.

8. Orbit Number (16 Bits): The orbit data block number associated with the first of the two corresponding MAT logical records.

9. Status Word (16 Bits): This indicates the procedure used in obtaining the irradiance corrections for the first of the two MAT logical records. A detailed description is found in Appendix B.

10. Uncorrected MAT WFOV Irradiances (256 Bits): 4 irradiances * 4 channels * 16 Bits = 256 Bits. These are the uncorrected channel 11-14 WFOV irradiances copied without change from the first of the two MAT logical records. (Wm^{-2} with a scale factor of 10).

11. Channel 12 Clipping Corrections (64 Bits): 4 corrections *16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 12 irradiances, removes the sunblip contamination of the channel. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

12. Channel 12 Replacement Irradiances (64 Bits): 4 irradiances *16 Bits = 64 Bits. Four irradiances which have been corrected for the effect described above for the first of the two corresponding MAT logical records. These are replacement irradiances for the channel 12 irradiances existing on the MAT. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

13. Channel 13 Clipping Corrections (64 Bits): 4 corrections *16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 13 irradiance removes the sunblip

contamination of the channel, and in concert with other corrections, zeros the channel at night. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

14. Channel 13 Midnight Offset Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 13 irradiances removes the zero-bias of the channel. (Wm^{-2} with a scale factor of 10).

15. Channel 13 Longwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 13 irradiance removes the longwave heating response of the channel. (Wm^{-2} with a scale factor of 10).

16. Channel 13 Shortwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 13 irradiances removes the shortwave heating response of the channel. (Wm^{-2} with a scale factor of 10). (Not used, always equal to zero in versions 1.0 and 2.0).

17. Channel 13 Replacement Irradiances (64 Bits): 4 irradiances * 16 Bits = 64 Bits. Four irradiances which have been corrected for the effects described above for the first of the two corresponding MAT logical records. These are replacement irradiances for the channel 13 irradiances existing on the MAT. (Wm^{-2} with a scale factor of 10).

18. Channel 14 Clipping Corrections (64 Bits): 4 corrections *16 Bits = 64 Bits. Four irradiance corrections terms for the first of the two corresponding MAT logical records. When added to the appropriate

uncorrected MAT channel 14 irradiance removes the sunblip contamination of the channel, and in concert with other corrections, zeroes the channel at night. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

19. Channel 14 Midnight Offset Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the zero-bias response of the channel. (Wm^{-2} with a scale factor of 10).

20. Channel 14 Longwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the longwave heating response of the channel. (Wm^{-2} with a scale factor of 10). (Not used, always filled with 22222.)

21. Channel 14 Shortwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the shortwave heating response of the channel. (Wm^{-2} with a scale factor of 10). (Not used, always equal to zero in versions 1.0 and 2.0).

22. Channel 14 Replacement Irradiances (64 Bits): 4 irradiances * 16 Bits = 64 Bits. Four irradiances which have been corrected for the effects described above for the first of the two corresponding MAT logical records. These are replacement irradiances for the channel 14 irradiances existing on the MAT. (Wm^{-2} with a scale factor of 10).

23. Solar Zenith angle (16 Bits): The solar zenith angle in degrees at the subsatellite point (0 to 180 degrees with a scale factor of 100) for the first of the two corresponding MAT logical records.

24. Subsatellite Latitude (16 Bits): The latitude in degrees at the subsatellite point (-81 to 81 degrees with a scale factor of 100) for the first of four MAT observations in the first of the two corresponding MAT logical records.

25. Subsatellite Longitude (16 Bits): The longitude in degrees at the subsatellite point (-180 to 180 degrees with a scale factor of 100) for the first of four MAT observations in the first of the two corresponding MAT logical records.

26. As in items 1-25, but for the second of the two corresponding MAT logical records.

APPENDIX A: TAPE LENGTH ESTIMATE (version 1.0 and 2.0)*

File one will consist of a NOPS standard header record, written twice, and is called the Standard Header File. The two identical records each contain 630 bytes and are followed by a single end-of-file mark:

0.394 inches =	630 Bytes/1600BPI	(header record)
0.600 inches =		(inter-record gap)
0.394 inches =	630 Bytes/1600BPI	(header record)
0.600 inches =		(inter-record gap)
0.001 inches =	2 Bytes/1600BPI	(end-of-file-mark)
0.600 inches =		(inter-record gap)
2.589 inches		

A set of files will then follow, each one corresponding to a single day of data. Each file will contain on the order of 30 physical records, each 24084 Bytes in length and corresponding to approximately ½ orbit of data. For N data-days and assuming that each day contains 15 complete orbits of data (an overestimate):

N*451.575 inches =	30*24084 - Bytes/1600BPI	(data records)
N*18.000 inches =		(inter-record gap)
N*0.001 inches =	2 Bytes/1600BPI	(end-of-file-mark)
N*0.600 inches =		(inter-record gap)
470.176N inches		

The last file will consist of all NOPS standard header records that relate to products that have gone into the making of this product and is called the Trailing Documentation File:

---

*For version 3.0, use 31500 bytes per physical record instead of 24084.

0.394 inches =	630 Bytes/1600 BPI	(header record)
0.600 inches =		(inter-record gap)
0.394 inches =	630 Bytes/1600 BPI	(TDF identifier)
0.600 inches =		(inter-record gap)
N*0.394 inches =	630 Bytes/1600BPI	(TDF records)
N*0.600 inches =		(inter-record gap)
0.001 inches =	2 Bytes/1600BPI	(end-of-file mark)
0.600 inches =		(inter-record gap)
0.001 inches =	2 Bytes/1600BPI	(end-of-volume mark)
0.600 inches =		(inter-record gap)

.994N + 3.190 inches

The total tape length estimate is simply the sum of the tape length estimates of the header file, the N data files and the trailing documentation file:

Total tape length = 471.170N + 5.779 inches

Rounding up to the nearest foot, this is 40 feet per data-day. For a 31 data-day month, this is 1240 feet or 52% to 56% of a typical tape. Because the ERB is generally operated in a 3-day on, 1-day off duty cycle, each data-month will contain 23 to 24 days of data and will occupy 38% to 44% of a 2200 to 2400 foot magnetic 1600 BPI tape. Up to five additional data-days from the calender month immediately following are included in the data-month to allow the completion of the last data-cycle (6 calender days) started in the calender month.

APPENDIX B: PROCEDURE STATUS WORD

A status word is created internally during the operation of the calibration adjustment software. It combines information from the MAT instrument status word, MAT data quality loss interval (DQLI) flags, interval irradiance quality control and gap fillings procedures.

The units digit gives quality information on the uncorrected MAT WFOV irradiances and has 3 values:

0 - All WFOV data for channels 12-14 is good.
1 - All WFOV data for channels 13-14 is good.
All WFOV data for channel 12 is bad.
2 - All WFOV data for channels 12-14 is bad.

The tens digit gives the cause of the problem:

0 - All WFOV data is good.
1 - DQLI Flags set.
2 - Go/No go heater is on.
3 - Electronic calibration is on.
4 - Channel 12 is shuttered.
5 - Channel 12 is narrow.
6 - WFOV data values are out-of-limits.
7 - WFOV data ranges are out-of-limits.
8 - Go/No go heater cool-down delay.
9 - Dummy data (should never exist external to the calibration adjustment software).

The hundreds digit describes how the corrected WFOV channel 12 irradiances were computed:

0 - All WFOV channel 12 data is unchanged.

1 - All WFOV channel 12 data was replaced by interpolation

2 - All WFOV channel 12 data was replaced with daily normalized zonal averages.

9 - All WFOV channel 12 data is bad.

The thousands digit describes how the corrected WFOV channel 13 and 14 irradiances were computed:

0 - All WFOV channel 13 and 14 data is unchanged.

1 - All WFOV channel 13 and 14 data was replaced by interpolation.

2 - All WFOV channel 13 and 14 data was replaced with daily normalized zonal averages.

9 - All WFOV channel 13 and 14 data is bad (should never exist external to the calibration adjustment software)

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16. Abstract

This document provides guidance to the DELMAT user in the areas of purpose, use and limitations of DELMAT tapes and software. It also provides the DELMAT tape specifications. The ERB-7 ERB MAT and tape characteristics applicable to the DELMAT tapes are also summarized.

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