NIMBUS V

SCR RADIANCE DATA

72-097A-02A

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's
Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been
made into digital images, and then collected into a single PDF file for each Data Set
Catalog. The inventory information in these DSCs is current as of July 1, 2004. This
inventory information is now no longer maintained in the DSCs, but is now managed in
the inventory part of the NSSDC information system. The information existing in the
DSCs is now not needed for locating the data files, but we did not remove that inventory
information.

The offline tape datasets have now been migrated from the original magnetic tape to
Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has
questions; they should send an inquiry to the request office to see if additional
information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC
INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There
you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents   To find associated documents you will need to
                                  know the document ID number and then click here.
                          http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

This data set has been restored. There were originally 63 Binary 9-track
800 BPI tapes. There are 13 restored tapes. The DR tapes are 3480
cartarages and the DS tapes are 9-track, 6250 BPI. The tapes were created
on an IBM 360 computer. The DR ad DS numbers along with the corresponding
D numbers and the time spans are as follows:

DS	DR	DD	Files	Time Spans	
DS000256	DR000256	DD029171	1-131	12/13/1972 - 12/22/1972	
		DD029172	132-262	12/23/1972 - 12/31/1972	
		DD029173	263-403	01/01/1973 - 01/11/1973	
		DD029174	404-546	01/12/1973 - 01/21/1973	
		DD029175	547-688	01/22/1973 - 01/31/1973	
DS000232	DR000232	DD029176	1-144	02/01/1973 - 02/10/1973	*
		DD029177	145-288	02/11/1973 - 02/21/1973	
		DD029181	289-429	03/27/1973 - 04/05/1973	
		DD029182	430-574	04/06/1973 - 04/15/1973	
		DD029183	575-716	04/16/1973 - 04/26/1973	
DS000233	DR000233	DD029184	1-143	04/27/1973 - 05/06/1973	**
		DD029185	144-299	05/07/1973 - 05/17/1973	
		DD029187	300-437	05/29/1973 - 06/08/1973	
		DD029188	438-584	06/09/1973 - 06/19/1973	
		DD029189	585-739	06/20/1973 - 06/30/1973	
DS000281	DR000281	DD029190	1-161	07/01/1973 - 07/12/1973	(a)
		DD029121	162-305	07/11/1973 - 07/23/1973	
		DD029122	306-447	07/24/1973 - 08/02/1973	
		DD029123	448-602	08/03/1973 - 08/13/1973	
		DD029124	603-742	08/14/1973 - 08/23/1973	
DS000249	DR000249	DD029125	1-145	08/24/1973 - 09/02/1973	
		DD029126	146-297	09/03/1973 - 09/13/1973	
		DD029127	298-438	09/14/1973 - 09/23/1973	
		DD029128	439-590	09/24/1973 - 10/04/1973	
		DD029129	591-744	10/05/1973 - 10/15/1973	

DS	DR	DD	Files	Time Spans
DS000234	DR000234	DD029130	1-154	10/16/1973 - 10/26/1973 ***
		DD029161	155-307	10/27/1973 - 11/06/1973
		DD029162	308-458	11/07/1973 - 11/17/1973
		DD029163	459-610	11/18/1973 - 11/28/1973
		DD029164	611-754	11/29/1973 - 12/08/1973
DS000264	DR000264	DD029165	1-144	12/09/1973 - 12/18/1973
		DD029166	145-285	12/09/1973 - 12/29/1973
		DD029167	286-438	12/30/1974 - 01/09/1974
		DD029168	439-579	01/10/1974 - 01/19/1974
		DD029169	580-723	01/20/1974 - 01/29/1974
DS000282	DR000282	DD029170	1-143	01/30/1974 - 02/08/1974
		DD029131	144-296	02/09/1974 - 02/19/1974
		DD029132	295-438	02/20/1974 - 03/01/1974
		DD029133	449-584	03/02/1974 - 03/12/1974
		DD029134	585-726	03/13/1974 - 03/22/1974
DS000235	DR000235	DD029135	1-153	03/23/1974 - 04/02/1974
		DD029136	154-296	04/03/1974 - 04/12/1974
		DD029137	297-439	04/13/1974 - 04/22/1974
		DD029138	440-588	04/23/1974 - 05/03/1974
		DD029139	589-734	05/04/1974 - 05/14/1974
DS000283	DR000283	DD029140	1-151	05/15/1974 - 05/25/1974
		DD029151	152-294	05/26/1974 - 06/05/1974
		DD029152	295-437	06/06/1974 - 06/15/1974
		DD029153	438-591	06/27/1974 - 06/27/1974
		DD029154	592-736	06/28/1974 - 07/08/1974
DS000257	DR000257	DD029155	1-129	07/09/1974 - 07/18/1974
		DD029157	130-276	07/30/1974 - 08/08/1974
		DD029158	277-428	08/09/1974 - 08/19/1974
		DD029160	429-573	08/30/1974 - 09/08/1974
		DD029150	574-726	09/09/1974 - 09/19/1974
DS000284	DR000284	DD029149	1-146	09/20/1974 - 09/29/1974
		DD029148	147-289	09/30/1974 - 10/09/1974
		DD029146	290-440	10/21/1974 - 10/31/1974
		DD029145	441-584	11/01/1974 - 11/11/1974
		DD029144	585-734	11/12/1974 - 11/23/1974
DS000278	DR000278	DD029143	1-131	11/24/1974 - 12/03/1974
		DD029142	132-282	12/04/1974 - 12/15/1974
		DD029141	283-427	12/17/1974 - 12/26/1974

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  * No data in files 169, 260, 719-720
 ** No data in file  740
*** No data in files 1, 755
(a) No data in files 163, 172, 173, 186, 200, 213, 214, 227, 238, 250
                     260, 261, 275, 289, 303, 758-760
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B R I E F   D E S C R I P T I O N
SCR Radiance Tapes
72-097A-02A

This data set contains calibrated, earth-located radiances that were prepared by the experimenter's office on binary magnetic tapes. The radiances, measured by 16 channels at 2.3-15 micrometers with a ground resolution of 25 km, are "declouded" (interpolated and smoothed across regions of cloud). They are grouped into major frames along with orbit, altitude, latitude, longitude, and some ancillary data.

M A T E R I A L S   F O R   D I S T R I B U T I O N
72-097A-02A
SCR Radiance Tapes

(1) B29183-000A "The Nimbus 5 Selective Chopper Radiometer," Atmospheric Physics Memorandum No. 76.1, Clarendon Laboratory Atmospheric Physics, U of Oxford.
(2) B29181-000A "The Selective Chopper Radiometer on Nimbus V Archived Data," Atmospheric Physics Memorandum No. 77.1, Clarendon Laboratory Atmospheric Physics, U of Oxford.

NIMBUS V

SCR RADIANCE DATA

72-097A-02A

This data set consists of 63 NImbus V SCR Radiance data tapes created on an IBM 360 computer. The tapes are 800 BPI, BIN, 7-track, are multi-filed. There are 2 C tapes for each D tape with more than 145 files. The first C tape has files 1-145 and the second C tape has the remaining files. Each D tape contains data for approximately 10 days.

D#	C#	D FILES	C FILES	TIME SPAN
D-29121	C-19176	159	159	07/11/73 - 07/23/73
D-29122	C-19177	142	142	07/24/73 - 08/02/73
D-29123	C-19178	155	145	08/03/73 - 08/13/73
	C-19179		10	08/13/73 - 08/13/73
D-29124	C-19180	143	143	08/14/73 - 08/23/73
D-29125	C-19181	145	145	08/24/73 - 09/02/73
D-29126	C-19182	152	145	09/03/73 - 09/13/73
	C-19183		7	09/13/73 - 09/13/73
D-29127	C-19184	141	141	09/14/73 - 09/23/73
D-29128	C-19185	152	145	09/24/73 - 10/04/73
	C-19186		7	10/04/73 - 10/04/73
D-29129	C-19187	154	145	10/05/73 - 10/15/73
	C-19188		9	10/15/73 - 10/15/73
D-21930	C-19189	155	145	10/16/73 - 10/26/73
	C-19190		10	10/26/73 - 10/26/73
D-29131	C-19191	153	145	02/09/74 - 02/19/74
	C-19192		8	02/19/74 - 02/19/74

D#	C#	D FILES	C FILES	TIME SPAN
D-29132	C-19193	144	144	2/20/74 - 3/01/74
D-29133	C-19194	146	146	3/02/74 - 3/12/74
D-29134	C-19195	142	142	3/13/74 - 3/22/74
D-29135	C-19196	153	145	3/23/74 - 4/02/74
	C-19197		8	4/02/74 - 4/02/74
D-29136	C-19198	143	143	4/03/74 - 4/12/74
D-29137	C-19199	143	143	4/13/74 - 4/22/74
D-29138	C-19200	149	149	4/23/74 - 5/03/74
D-29139	C-19201	146	146	5/04/74 - 5/14/74
D-29140	C-19202	151	145	5/15/74 - 5/25/74
	C-19203		6	5/25/74 - 5/25/74
D-29141	C-19204	145	145	12/17/74 - 12/26/74
D-29142	C-19205	151	145	12/04/74 - 12/15/74
	C-19206		6	12/15/74 - 12/15/74
D-29143	C-19207	131	131	11/24/74 - 12/03/74
D-29144	C-19208	155	145	11/12/74 - 11/23/74
	C-19209		10	11/23/74 - 11/23/74
D-29145	C-29210	144	144	11/01/74 - 11/11/74
D-29146	C-19211	151	145	10/21/74 - 10/31/74
	C-19212		6	10/31/74 - 10/31/74
D-29148	C-19213	143	143	9/30/74 - 10/09/74
D-29149	C-19214	146	146	9/20/74 - 9/29/74
D-29150	C-19215	153	145	9/09/74 - 9/19/74
	C-19216		8	9/19/74 - 9/19/74
D-29151	C-19299	143	143	5/26/74 - 6/05/74
D-29152	C-19300	143	143	6/06/74 - 6/15/74
D-29153	C-19301	154	145	6/17/74 - 6/27/74
	C-19302		9	6/27/74 - 6/27/74
D-29154	C-19303	155	145	6/28/74 - 7/08/74
	C-19304		10	7/08/74 - 7/08/74

D#	C#	D FILES	C FILES	TIME SPAN
D-29155	C-19305	129	129	7/09/74 - 7/18/74
D-29157	C-19306	147	147	7/30/74 - 8/08/74
D-29158	C-19307	152	145	8/09/74 - 8/19/74
	C-19308		7	8/19/74 - 8/19/74
D-29160	C-19309	145	145	8/30/74 - 9/08/74
D-29161	C-19310	153	145	10/27/73 - 11/06/73
	C-19311		8	11/06/73 - 11/06/73
D-29162	C-19312	151	145	11/07/73 - 11/17/73
	C-19313		6	11/17/73 - 11/17/73
D-29163	C-19314	152	145	11/18/73 - 11/28/73
	C-19315		7	11/28/73 - 11/28/73
D-29164	C-19316	145	145	11/29/73 - 12/08/73
D-29165	C-19317	144	144	12/09/73 - 12/18/73
D-29166	C-19318	141	141	12/19/73 - 12/29/73
D-29167	C-19319	153	145	12/30/73 - 1/09/74
	C-19320		8	1/09/74 - 1/09/74
D-29168	C-19321	141	141	1/10/74 - 1/19/74
D-29169	C-19322	144	144	1/20/74 - 1/29/74
D-29170	C-19323	143	143	1/30/74 - 2/08/74
D-29171	C-19402	131	131	12/13/72 - 12/22/72
D-29172	C-19403	131	131	12/23/72 - 12/31/72
D-29173	C-19404	141	141	1/01/73 - 1/11/73
D-29174	C-19405	143	143	1/12/73 - 1/21/73
D-29175	C-19406	142	142	1/22/73 - 1/31/73
D-29176	C-19407	144	144	2/01/73 - 2/10/73
D-29177	C-19408	145	145	2/11/73 - 2/21/73
D-29181	C-19409	142	142	3/27/73 - 4/05/73
D-29182	C-19410	144	144	4/06/73 - 4/15/73
D-29183	C-19411	152	145	4/16/73 - 4/26/73
	C-19412		7	4/26/73 - 4/26/73

D#	C#	D FILES	C FILES	TIME SPAN
D-29184	C-19413	143	143	4/27/73 - 5/06/73
D-29185	C-19414	157	145	5/07/73 - 5/17/73
	C-19415		12	5/17/73 - 5/17/73
D-29187	C-19416	138	138	5/29/73 - 6/08/73
D-29188	C-19417	147	147	6/09/73 - 6/19/73
D-29189	C-19418	156	145	6/20/73 - 6/30/73
	C-19419		11	6/30/73 - 6/30/73
D-29190	C-19420	161	145	7/01/73 - 7/12/73
	C-19421		16	7/12/73 - 7/12/73

CLARENDON   LABORATORY

Atmospheric   Physics

The Selective Chopper Radiometer on Nimbus V

Archived   Data

72 - 097A-02A

Atmospheric Physics Memorandum No. 77.1

UNIVERSITY OF OXFORD

The Selective Chopper Radiometer on Nimbus V

Archive Data

The Nimbus V satellite launched on 11 December 1972 carries a 16 channel infra-red radiometer designed to make remote measurements of the atmosphere. Eight channels are located in the CO_2 15μ m band measuring temperature structure up to about 50 km altitude. The higher levels are achieved by means of a selective chopping technique. The remaining channels make measurements of water-vapour, atmospheric window regions and reflective sunlight. For details see the general references listed.

This paper describes the format of the archive tapes, containing frame by frame radiances and other relevant data, which have been prepared for the National Space Science Data Centre. This document is intended to be read in conjunction with reference 1 which contains details of calibration algorithms together with explanations of all the terms which will be encountered in the following pages.

In general the Nimbus V Selective Chopper Radiometer (SCR) has performed in a very consistent manner, and is still producing excellent data at the time of writing (January 1977). However, there have been a number of problems and anomalies which have occurred from time to time which have a bearing on the use and interpretation of these data. These events have been studied and written up in reference 1, together with a list of relevant dates.

Should any problem arise, would users please contact the Department of Atmospheric Physics, Clarendon Laboratory, University of Oxford.

Tape Format

Introduction

The Nimbus 5 archive tape is a 7 track magnetic tape written at 800 b.p.i. with odd parity and 0.75" interblock gaps. Each tape contains data for approximately 10 'days' where a 'day' refers to the daily transmission of data from NTCC to Oxford. This normally includes data acquired by the ground station between 0000Z and 2400Z the previous day.

Each tape begins with a file summarizing its contents. Subsequent files provide detailed day by day and orbit by orbit information. An orbit is usually a readout orbit from the spacecraft tape recorder but can also represent one or more sections of real time data. The tape ends with a repeat of the summary file.

The structure of an archive tape is summarized in Table I.

TABLE I

Summary header record

Summary day records 1 to N where
  N = number of days on the tape

End of summary record

End of file (tape mark)

                                                Summary file

                                                Volume table of contents

Day header file

EOF

Orbit header record

Data records 1 to M where
  M=No.of major frames/10+1

End of orbit record

EOF

repeated for each orbit

End of day file

EOF

repeated for each day

Copy of summary file

EOF mark

EOF

Detailed description

In general, for all tables, numbers in the column headed
CONTENTS are octal and other numbers decimal. Exceptions are
indicated by the subscripts 8 or 10 for octal or decimal.

Each file consists of a series of records and is terminated
by a tape mark. Each record is a series of 12-bit integers, each
represented by 2 6-bit tape characters with ODD parity, the most
significant half of the word appearing first on the tape. The
format of a record is as follows:

Word	Contents
0,1	7106, 7106
2	Length L
3	Record Number
4	Identifier
5 to L-3	Data words
L-2	EOR mark
L-1	Checksum

'Length' is the number of 12-bit words in the record from
the first 7106_8 up to and including the checksum.

The record number starts at 1 at the beginning of the file
and is increased by 1 for each successive record Modulo 4096.

The identifier is a unique code associated with the data
content of the record.

The end of record (EOR) mark has one of the following values:

5252	last record of file
5225	file containing one record
6453	last record on the tape
4421	all other records.

The checksum is the 12-bit 1's complement sum of words
0 to L-2 of the record.

Summary Head Record		No.of words	Note
Word	Contents		
0,1	7106, 7106	2	
2	10	1	
3	1	1	
4	5200	1	
5	No. of days on tape	1	
6	EOR (4421)	1	
7	Checksum	1	

Summary Day Record			
0,1	7106, 7106	2	
2	Length	1	
3	Record no.	1	
4	5201	1	
5	'day'	1	
6	'year'	1	
7,8	no. of major frames in day	2	
9	no. of cse's on day's transmission	1	1
10	" " " read from daily tape	1	1
11	no. of cal sequences in day	1	
12	no.of orbits in day	1	
13,14	orbit no.	2	
15	HDRSS	1	2
16	no. of major frames in orbit	1	
17	day of first major frame	1	3
18,19	time of ditto	2	3
20	day of last major frame	1	3
21,22	time of ditto	2	3
23	no. of cse's on orbit's transmission	1	1
24	" " " read from daily tape	1	1
25	no. of cal sequences in orbit	1	

.

.

EOR (4421)

checksum

items 13-25 repeated for each orbit in the day.

Day Header File

Word	Contents	No. of words	Note
0,1	7106, 7106	2	
2	11	1	
3	1	1	
4	5202	1	
5-12	same as words 5-12 of the corresponding "Summary Day Record"	8	
13-92	calibration data used for the processing of this day's observations	80	5
93	EOR (5225)	1	
94	checksum	1	

Orbit Header Record

Word	Contents	No. of words	Note
0,1	7106, 7106	2	
2	16	1	
3	Record no.	1	
4	5204	1	
5-17	as orbit summary in this day's summary record (wds 13-25)	13	
18	number of housekeeping functions ($N = 44_{10}$)	1	6
19	N maximum values for this orbit	N	
	N minimum values	N	
	N mean values	N	
	EOR (4421)		
	checksum		

Data Record

Word	Contents	No. of words	Note
0,1	7106, 7106	2	
2	length	1	4
3	record no.	1	
4	5205	1	
5	no. of major frames in this block (10_{10} unless end of orbit)	1	4
6	length of entry for each m.f.(186_{10})	1	4
7	spare and zero	1	
8	checksum word for major frame	1	10
9,10	orbit no.	2	
11	block no.	1	9
12	frame no./HDRSS	1	9
13	day	1	3
14	time	2	3
16	latitude x 8	1	7
17	longitude x 8	1	7
18	altitude	1	7
19	ESMR MAXIMUM	1	8
20	ESMR MINIMUM	1	8
21-25	major frame flags	5	11
26-74	calibrated radiances	49	12
75-79	16 sec ramps	5	13
80-123	4 sec ramps	44	13
124-128	digital A housekeeping	5	6
129-167	analogue housekeeping	39	6
168	FOVC ramp	1	17
169-176	raw ESMR	8	8
177	pitch	1	15
178	roll	1	15
179	yaw	1	15

Data Record (continued)

Word	Contents	No. of words	Note
180-182	A2, A3, A4 declouded	3	14
183-185	B1-B2, B2-B3, B3-B4 smoothed	3	14
186	sea surface temperature/GEOG	1	16
187-193	B1, B2, B3, B4, B1-B2, B2-B3, B3-B4 corrected radiances	7	14

.

EOR (4421)

checksum

items 8-193 are repeated for each major frame in the block.

End of Summary Record

0,1	7106, 7106	2
2	7	1
3	Record No.	1
4	5202	1
5	EOR (5252)	1
6	Checksum	1

End of Orbit Record

0,1	7106, 7106	2
2	7	1
3	Record No.	1
4	5206	1
5	EOR (5252)	1
6	Checksum	1

End of Day File

0,1	7106, 7106	2
2	7	1
3	1	1
4	5207	1
5	EOR (5225)	1
6	Checksum	1

End of Tape File

Copy of Summary File.

Notes

1. A checksum error (CSE) on transmission implies a block was corrupt when we received it over the link from Nimbus. A CSE on the daily tape implies a block was found to be corrupt on the magnetic tape when it was subsequently processed. A transmission error does not generate a daily tape error.

2. HDRSS refers to the onboard tape recorder used for this orbit.

   0 = A   data received from tape recorder A

   1 = B   "   "   "   "   "   B

   2 = R   "   "   as real time pass.

3. 'Day Number' starts at 1 on January 1st and increments through a year. Time is given in seconds since midnight GMT (double length word).

4. Normally each data block will contain 10_{10} major frames of data. Thus the normal block length is

$$186 \times 10 + 10 = 1870_{10} \text{ words.}$$

Short blocks occur at the end of orbits, when the length is not a multiple of 10 major frames. If the number of major frames is a multiple of 10 then there should be no short blocks but it is advisable to cater for the possibility that the last block may be of length 10 words with zero major frames in it.

5. The calibration algorithm is explained in reference 1. The calibration parameters used for each day's data consist of a total of 80 numbers, arranged in 20 groups of 4 numbers each. The 20 groups correspond to the 20 channels of the instrument (D channels on low and high gain have separate calibration parameters). The ordering of these 20 groups is as follows:

> B1 to B4
>
> A1 to A4
>
> C1 to C4
>
> D1 to D4   low gain setting
>
> D1 to D4   high "   "

The significance of the 4 numbers within each group is:

EZ   = electrical zero (counts).

S-EZO   = space - electrical zero offset (counts).

r   = stray radiation $\sim$ always set to zero in practice.

$$G = g \times \frac{160 \times 2^{11}}{\bar{S}}$$

where g = gain (volts/unit radiance)

$\bar{S}$ = scaling factor used to represent radiances (see table 1).

6.   Housekeeping Functions.   There are a total of 44 housekeeping functions recorded for each major frame.   The first 5 functions are of the 'digital A' type and the remainder are of type 'analogue'. The orbit header record contains a summary of the maximum, minimum and mean values recorded during the orbit for these functions. The ordering is as follows:

Number	Power Supply	Function
DIGITAL A		
1	–	-6V thermistor supply
2	–	Digitizer zero offset
3	1	Black body thermistor 1
4	1	" " " 2
5	1	" " " 3
ANALOG		
6	9	Sensor foot F thermocouple
7	–	Mod PCU stabilized output
8	–	Full time thermistor supply 1
9	–	Switched " "
10	–	Chopper motor current 1
11	–	" " " 2
12-17	8	Sensor housing thermistors 1 to 6
18	29	Black body thermistor 4
19	9	Calib.mirror thermistor
20	8	Chopper motor "
21-23	9	Sensor foot thermistors A, B & C
24	8	Module connector plate thermistor
25	8	Calib. mirror driver "
26	8	Chopper resistor "
27	8	Mod PCU stabilized "
28	9	Mod PCU switched "
29	–	-6V black body thermistor supply

Number	Power Supply	Function
30	–	Signal channel A clamp level
31	9	Sensor foot D thermistor
32	9	Filter wheel A shroud thermistor
33	9	" " A motor "
34	–	Signal channel B clamp level
35	–	Filter wheel B heater power
36	9	" " B shroud thermistor
37	9	" " B motor "
38	–	Signal channel C clamp level
39	9	Filter wheel C shroud thermistor
40	9	" " C motor "
41	–	Clamp level D
42	9	Sensor foot E thermistor
43	9	Filter wheel D shroud thermistor
44	9	" " D motor "

Note the power supplies 8 and 9 are each sampled through a potential divider. Thus to obtain the true power supply multiply functions 8 and 9 by 1.47.

The digital A functions are subject to a digitizer zero offset (function 2) which should be subtracted from each of the other 4 functions to obtain a true value. Function 29 is an analog backup to the digital A, -6 volt supply, i.e. (function 29) = (function 1) - (function 2).

7. Latitude and longitude are in eighths of degrees north and east respectively, e.g. 10°S, 300°E is 4016, 2400. Latitude is a signed integer. Longitude is unsigned. Altitude is taken directly from the header block as received from Nimbus. See reference 2.

8. The eight nadir samples from the electrically scanning microwave radiometer (ESMR) contained within the major frame header block as transmitted can be found in words 169-176. The maximum and minimum of these eight values are also in words 19 and 20 respectively. This data may be used as a land/sea flag.

9. Block number is taken from word 4 of the Header Block as received from Nimbus. Frame # /HDRSS is taken from word 9 of the Header Block as received from Nimbus. See reference 2.

10. Checksum word for major frame. If bit $2^X = 1$ then the following checksum error was detected:

x = 0   checksum error on magnetic tape raw data block.

   = 1   "   "   "   "   "   formatted data block.

   = 2   "   "   "   transmission to Oxford.

11. <u>Major Frame Flags</u>

     5 words.

     Bit 2^X is set to 1 when the following conditions are satisfied at any time during the orbit.

<u>Word 1</u>

X = 0   SCR power on

    1   Chopper power on

    2   Calibration imminent

    3   D channels on high gain (else low gain)

    4   Calibration enabled

    5   FOVC enabled

    6   Earth view

    7   Black body view

    8   Housing view

    9   Space view

   10   Filter wheel select position 1

   11   "   "   "   "   2

<u>Word 2</u>

X = 0   "   "   "   "   3

    1   "   "   "   "   4

    2   SCR2 format is being used (analog not digital A)

    3   Satellite day = 1, night = 0

    4   THIR on

    5   ESMR on and scanning

    6   S-band A on

    7   "   B on

    8   "   SCMR on

    9   Beacon on

   10   Latitude, longitude corrected for pitch bias

   11   End of orbit detected

Word 3

X = 0 checksum error in header block
   1   "   "   "   "
   2 minor frame SYNC error
   3 bad filter position detected
   4 " chopper sync
   5 FOVC motion bad
   6 bad end of block marker
  11 discontinuity in time code from previous major frame.

Word 4 is spare

Word 5

X = 0 1 = calibrated data slots in format do contain radiances.

      0 =   "   "   "   contain raw ramps (this occurs
          where instrument is not viewing earth, i.e.
          calibration sequences).

12. Calibrated radiances

In order to fit conveniently into one 12 bit word, the radiances for each channel are scaled by some suitable factor (see ref. 1). The contents of the appropriate locations should be divided by the following scale factors in order to obtain a result in radiance units $(mW/m^2/ster/cm^{-1})$.

Table 1

Channel	Scale factor	
A & B	16	
C1	400	
C2	40	
C3 & C4	20	
D1	2.10^4	
D2	5.10^3	D channels on
D3	750	low gain
D4	1000	
D1 & D2	5.10^5	
D3	6.10^6	D channels on high gain
D4	10^4	

The state of the D channels gain is determined from the information given in the flag words.

In the case of the top channels which are not influenced by cloud, the 4 samples for each major frame are averaged to give a single value corresponding to the 16 seconds of the major frame. The calibrated radiances consist of a total of 49 words corresponding to 5 16-second averages for the top channels, plus 4 x 11 samples corresponding to the remaining lower channels.

The ordering is as follows:

16 second radiances

        channels B1 to B4, A1

4 second radiances (4 samples/channel)

        channels A2 to A4
              C1 to C4
              D1 to D4

Any slot set to zero implies that the corresponding signal has been rejected for one or other quality criterion. The flag word 5, bit 2^0 should be checked that it contains a one, or else all calibrated radiance slots will contain raw ramps and not radiances. This situation occurs during calibration sequences.

13.   The ramps represent the raw signal information. Each observation consists of 5 samples (called S1 to S5) taken on an integration ramp, the samples are 200 mSec apart. The ramp signal is taken as corresponding to an 800 mSec integration period, i.e.

$$\text{Ramp} = S5 - S1.$$

Where the magnitude of the signal is such that the upper sample exceeds the dynamic range of the telemetry, i.e. $S5 > 1023$, we may make use of the other samples suitably scaled, i.e.

$$\text{Ramp} = \frac{4}{3}(S4-S1) = 2(S3-S1) = 4(S2-S1).$$

The possibility of the lower sample S1 being corrupt is also allowed, i.e.

$$\text{Ramp} = \frac{4}{3}(S5-S2) \quad \text{and so on.}$$

The ordering of the ramps is identical to that of the 49 calibrated radiances (see note 12). Again the top channels B1 to B4 and A1 represent major frame averages, and the remainder 4 second observations.

14.   The construction of the B difference channel radiances, together with the smoothing algorithm is described in detail in reference 1. The 'de-clouding' of the A channels involves constructing an envelope radiance indicating the signal one would expect from the A channels in the absence of cloud. This is described in reference 1.

15.   Pitch, roll and yaw rate are taken from the Header Block as received at Oxford. See reference 2.

16.   <u>Sea surface temperature/geography.</u>

Over land areas, this word represents the mean surface height tabulated for a 1^O latitude / longitude grid. Over ocean areas, this word contains the mean climatological sea-surface temperature tabulated for a 2½^O latitude /longitude grid for monthly intervals (see reference 3). The two cases are distinguished as folbws:

If this word is positive then we have land - mean height is given in units of 100 feet.

If this word is negative then we have ocean - mean sea-surface temperature is the absolute magnitude in units of tenths of a ^{O}C.

17.   The field of view compensator (FOVC) ramp gives a quick indication of FOVC working correctly. FOVC drive is sampled once per second, its motion repeats every 4 seconds.

FOVC ramp = Sample 4 - Sample 1

averaged for the 4 ramps each major frame.

References

1. The Nimbus 5 Selective Chopper Radiometer.
    Atmospheric Physics Memorandum No. 76.1, University of Oxford.

2. R.A. Stephenson. Formats of Nimbus E Experiment Tape (ET).
    Stacked Experimental Tape (SET), and DATRAN Tape.
    General Electric/NASA, 1972.

3. W. Washington (NCAR). Memorandum on Climatological Sea
    Surface Temperature.

General References

J.J. Barnett,et al. 1973. Stratospheric observations from
Nimbus V. Nature, 245, 141.

P. Ellis et al. 1973. Remote sounding of atmospheric
temperature from satellites IV. The Selective Chopper
Radiometer on Nimbus V. Proc.R.Soc.A 334, 149.

```
$JOB  13:56:35
$NOP DUMP OF TAPE X-436
$ASS IN MS6
$EXEC DPOCT7 BS                                                        TIME SPAN              159 FiLeS
   INPUT TAPE ON MS6                                                   7/11/73 - 7/23/73
   DATA INPUT    1 14 D
   FILE  1       RECORD    1        LENGTH   16  BYTES                     12 Days
   (    0)    710671060061   000152000014   4421006!
   FILE  1       RECORD    2        LENGTH   316  BYTES                          ORBITS
   (    0)    710671060234   000252010300   3665000765!   002100000041   001300005434   000004310300   000016161 300   000270010001
   (   48)    000000020000   5434000106   030000026761   030000041101   000200000003   000005435 001   057503000004   150103000005
   (   96)    544100000000   000300005436   000105510300   000561010300   000713210003   000000030000   543700010601   030000071761
   (  144)    030000106021   000000000003   000105440001   060403000010   650103000010   264100000000   000300005441   000105630300
   (  192)    001233410300   001371010001   000000030000   544200010554   030000137541   030000153021   000000000003   000054430001
   (  240)    056203000015   350103000016   712100000000   000300005445   000106000300   002033210300   002173010010   000000030000
   (  288)    544600010620   030000217741   030000234321   000200000004   44217062
   FILE  1       RECORD    3        LENGTH   316  BYTES
   (    0)    710671060236   000352010302   3665000770!   000400000040   001300005470   000005030302   000177010302   000317410001
   (   48)    000000020000   547300010600   030200043101   030200057241   000000000003   000054710001   055603020005   770103020007
   (   96)    322100000000   000300005472   000105720302   000749410302   001076610010   000000030000   547300010612   030200110321
   (  144)    030200124541   000000000003   000054740001   056703020012   520103020014   074100010000   000300005475   000105510302
   (  192)    001413610302   001545610000   000000030000   547600010552   030200155241   030200170521   000200000003   000054770001
   (  240)    056403020017   116103020020   472100000000   000300005500   000105730302   002053410302   002212210000   000000030000
   (  288)    550100010604   030200221641   030200236001   000000000003   44212657
   FILE  1       RECORD    4        LENGTH   342  BYTES
   (    0)    710671060253   000452010303   366500010645   001500000044   001400005504   000105120303   000234410303   000356610001
   (   48)    000000020000   550500010675   030200236301   030300003441   001100000004   000055050001   056503030003   630103030005
   (   96)    206100000000   000300005506   000105600303   000525210303   000661210001   000000030000   550700010604   130300066541
   (  144)    030300102641   000000000003   000055100001   057403030010   330103030011   724100010000   000300005511   000105730303
   (  192)    001117721 303   001336010002   000000030000   551200010550   030300134261   030300147461   000100000003   000055130001
   (  240)    056103030015   016103030016   362100020000   000300005514   000105530303   001643010303   001776010001   000000030000
   (  288)    551500010570   030300200221   030300214041   000000000003   000055160001   060203030021   446103030023   050100030000
   (  336)    000344216015
   FILE  1       RECORD    5        LENGTH   342  BYTES
   (    0)    710671060253   000552010304   366500010742   006400000044   001400005522   000106260304   000300010304   000445210004
   (   48)    000000030000   552200010636   030400012761   030400027701   000200000003   000055230001   061103040004   522103040006
   (   96)    146100010000   000300005524   000105430304   000621410304   000752410001   000000030000   552500010571   030400075701
   (  144)    030400111541   000000000003   000055260001   060703040011   222103040012   640100010000   000300005527   000105550304
   (  192)    001127410304   001426010013   000000030000   553000010547   030400143221   030400156441   001400000003   000055310001
   (  240)    055703040015   706103040017   242100030000   000300005532   000105620304   001730410304   002065410012   000000030000
   (  288)    553300010574   030400207201   030400223161   000300000003   000055340001   062103040022   362103040024   024100050000
   (  336)    000344210413
   FILE  1       RECORD    6        LENGTH   316  BYTES
   (    0)    710671060236   000652010305   366500010255   011500000041   001300005540   000006740304   002403010305   000054210001
   (   48)    000000040000   554000010655   030500023121   030500040501   000100000004   000055410001   055303050005   454103050007
   (   96)    002100000000   000200005542   000105600305   040703541 305   001041610020   000000020000   554300010606   030500104721
   (  144)    030500121201   002200000003   000055440001   056703050012   164103050013   544100020000   000300005545   000105620305
   (  192)    001360610305   001515210001   000000030000   555000000626   030500201441   030500218301   004100000003   000055500001
   (  240)    056403050016   616103050016   200100030000   000300005551   000105770305   002163410305   002324410002   000000030000
   (  288)    554600010561   030500152141   030500165541   000200000003   44217040
   FILE  1       RECORD    7        LENGTH   264  BYTES
   (    0)    710671060204   000752010306   366500006463   002600000032   001100005557   000105360306   000640610306   000770210001
   (   48)    000000020000   556000010613   030600077441   030600113721   000400000003   000055410001   060003060011   436103060013
   (   96)    034100010000   000300005562   000105500306   001310610306   001443010005   000000030000   556300010564   030600144721
   (  144)    030600160421   000100000003   000055640001   055203060016   106103060017   430100000000   000300005565   000105720306
   (  192)    001747010306   002105410002   000000030000   556600010604   030600211161   030600225241   000100000003   000055670001
   (  240)    060603060022   566103060024   204100070000   000344214701
   FILE  1       RECORD    8        LENGTH   290  BYTES
   (    0)    710671060221   001052010307   366500007354   035600000035   001200005573   000006760306   002452410307   000123610034
   (   48)    000000030000   557300010614   030700042021   030700056341   003500000003   000055740001   053303070005   702103070007
   (   96)    166100400000   000200005575   000105770307   000723210307   001063010017   000000000000   557600010600   030700106741
   (  144)    030700125001   003500000003   000055770001   057203070012   360103070013   742100220000   000300005600   000105470307
   (  192)    001410410307   001532410032   000000030000   560100010546   030700153761   030700167141   002000000003   000056030001
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(  200)  3244
FILE  1      RECORD   9      LENGTH   264  BYTES
(    0)  710671060204   001152010310   366500006532   046000000033   001100005607   000106610310   000166410310   000342610064
(   48)  000000030000   561290010571   031000065121   031000100721   006000000003   000056130001   057103100010   140103100011
(   96)  524100240000   000300005614   000105750310   001163410310   001322610044   000000030000   561500010556   031000132741
(  144)  031000146261   003000000003   000056160001   057003100014   670103100016   256100430000   000300005617   000107700310
(  192)  001632310310   002034410037   000000040000   562000010340   031000203461   031000212441   003100000002   300005621000
(  240)  057603100021   310103100022   704100410000   000344211451
FILE  1      RECORD   10     LENGTH   342  BYTES
(    0)  710671060253   001252010311   366500011045   051400000042   001400005625   000006770310   002325010310   002504410054
(   48)  000000030000   562500010677   031100013141   031100031101   003100000003   000056260001   061003110004   374103110006
(   96)  014100270000   000300005627   000105420311   000606210311   000736610031   000000030000   563000010576   031100074321
(  144)  031100110241   003600000003   000056310001   061603110011   066103110012   520100300000   000300005632   000105610311
(  192)  001256410311   001413010024   000000030000   563300010770   031100141721   031100162201   002700000004   300005634001
(  240)  033403110016   222103110017   110100160000   000100005635   000105630311   001715610311   002052210041   300000020000
(  288)  563600010605   031100205741   031100222041   003500000003   000056370001   056403110022   264103110023   636100520000
(  336)  000344212020
FILE  1      RECORD   11     LENGTH   342  BYTES
(    0)  710671060253   001352010312   366500010762   042700010040   001400005642   000106240312   000215010312   300362010023
(   48)  000000030000   564300000662   031100242001   031200006721   003500000003   000056430001   057403120003   666103120005
(   96)  256100270000   000300005644   000105440312   000532210312   000663210033   000000030000   564500010573   331200067061
(  144)  031200102761   002500000003   000056460001   061403120010   344103120011   772100310000   000300005647   300105710312
(  192)  001203610312   001342210032   000000020000   565000010566   031200134661   031200150441   003100000002   000056510001
(  240)  055003120015   106103120016   432100230000   000200005652   000105410312   001647610312   002000410021   000000020000
(  288)  565400000603   031200214701   031200230741   002600000003   300056540001   061203120020   044103120021   470100320001
(  336)  000344211246
FILE  1      RECORD   12     LENGTH   342  BYTES
(    0)  710671060253   001452010313   366500011021   000700000044   001400005660   000006720312   002314010312   002474010000
(   48)  000000030000   566000010673   031300015101   031300033021   000000000003   000056610001   060403130004   572103130006
(   96)  204100000000   000300005662   000105400313   000625210313   000756010002   000000030000   566300010564   031300107761
(  144)  031300112121   000000000003   000056640001   061203130011   254103130012   700100010000   000300005665   000105650313
(  192)  001274210313   001431610001   000000030000   566000010553   031300143601   031300157101   000200000002   000056670001
(  240)  055303130015   752103130017   302100000000   000300005670   000105600313   001734610313   002071210001   300000030000
(  288)  567100010611   031300207541   031300224001   000000000004   000056720001   056603130022   452103130024   036100000000
(  336)  000344210437
FILE  1      RECORD   13     LENGTH   342  BYTES
(    0)  710671060253   001552010314   366500010763   002400000044   001400005675   000006750313   002437610314   000111010000
(   48)  000000030000   567500010616   031400023401   031400037761   000100000003   000056760001   056403140004   044103140005
(   96)  434100030000   003500005677   000105640314   000550410314   000705410001   000000030000   570000010566   031400067201
(  144)  031400104741   000000000003   000057010010   057203140010   536103140012   120100010000   000300005702   000105710314
(  192)  001222010314   001360210001   000000030000   570300010564   031400122201   031400135701   000200000003   300057040001
(  240)  056003140015   250103140016   612100120000   000300005705   000105550314   001665410314   002020410000   300000030000
(  288)  570600010605   031400202461   031400216601   000000000003   000057070001   060103140021   730103140023   334100010000
(  336)  000344215701
FILE  1      RECORD   14     LENGTH   3787 BYTES
(    0)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(   48)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(   96)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  144)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  192)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  240)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  288)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  336)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  384)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  432)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  480)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  528)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  576)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  624)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  672)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  720)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  768)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  816)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  864)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
(  912)  010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101   010101010101
```

$JOB   16:56:24
$NOP********** OCTAL DUMP OF X-438 **********   D-29122   142 files
$ASS IN MS5
$NOTE BOJ   16:56:49
$NOP********* FILE 1 **********   7/24/73 — 8/2/73
$EXE DPOCT7 BS
INPUT TAPE ON MS5
DATA INPUT   1 12 12   10 Days

```
 FILE  1      RECORD   1        LENGTH   18  BYTES
(      0)    710671060010   000152000012   442100630000
 FILE  1      RECORD   2        LENGTH  368  BYTES                                                                              192
(      0)    710671060270   000252010315   366500011622   001500000050   001500005712   000106570315   000153210315   000326610000
(     48)    000000040000   571300010577   031400233361   031500001041   000000000003   000005713001   057003150003   346103150004        8
(     96)    724100010000   000300005714   000105710315   000477210315   000635410000   000000030000   571500010552   031500064321
(    144)    031500077561   000000000003   000057160001   060603150010   020103150011   432100000000   000300005717   000105530315
(    192)    001147610315   001303210002   000000030000   572000010554   031500131321   031500144621   000100000003   000057210001
(    240)    057103150014   524103150016   104100010000   000300005722   000105470315   001615010315   001746610001   000000030000        205
(    288)    572300010572   031500175301   031500211121   000000000003   000057240001   060003150021   154103150022   556100040000
(    336)    000300005725   000106120315   002262410315   002424410003   000000034421   3417
 FILE  1      RECORD   3        LENGTH  342  BYTES
(      0)    710671060253   000352010316   366500010777   107000000046   001400005730   000006760315   002456610316   000130610111
(     48)    000000040000   573000010624   031600025201   031600041661   006600000004   000057310001   061203160004   234103160005
(     96)    656100610000   000300005732   000105400316   000572610316   000723410061   000000030000   573300010600   031600072741
(    144)    031600106741   006600000003   000057340001   060203160010   742103160012   346103160070   000300005734   000105720316
(    192)    001234610316   001400410066   000000030000   573600010546   031600140501   031600153641   004000000003   000057370001
(    240)    077003160015   424103160017   444100600000   000400005740   000103520316   001744610316   002037010027   000000020000
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(    288)    4471
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(      0)    710671060253   000552010320   366500011173   124000000047   001400005764   000106720320   000134410320   000313210061
(     48)    000000040000   576500000702   031700233161   032000000421   006600000004   000057650001   053703200006   110103200007
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(   288)    611500010600    032600214021    032600230001    000300000003    000061160001    056503260023    044103260024    450100000000
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        # PERMANENT READ ERRORS    0       # ZERO BYTE ERRORS   0       # SHORT RECORDS    0       # UNDEFINED ERRORS   0
        # OF RECORDS RETRIED    0       TOTAL # OF RETRIES   0
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