NASA-CR-170514

NASA-CR-170514
19840015066

N84-23134

COMEX

A Service of:

National Aeronautics and Space Administration

Scientific and Technical Information Office

BEST

AVAILABLE

COPY

NASA
Contractor
Report
CR 170514

April 1984

User's Guide for ERB 7 MAT

Brian Groveman

(NASA-CR-170514) USERS GUIDE FOR ERB 7 MAT (INCLUDING THE FIRST YEAR QUALITY CONTROL) (Research and Data Systems, Inc.) 114 p HC A06/MF A01 CSCL 09B

N84-23134

Unclas
G3/61 19020

NASA

NASA Contractor Report CR 170514

1984

User's Guide for ERB 7 MAT.

Brian Groveman

Prepared For:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

Prepared By:

RESEARCH AND DATA SYSTEMS, INC.
10300 GREENBELT ROAD
LANHAM, MARYLAND 20706

UNDER CONTRACT NO. NAS 5-27728
TASK ASSIGNMENT 3

Acknowledgments

The software used to generate the Master Archival Tape validation products described in this report were developed by Research and Data Systems, Inc., under the leadership of Dr. H. Lee Kyle, Technical Monitor. The author would also like to extend his sincerest appreciation to Philip Ardanuy for technical comments and guidance, Michael Fromm for technical comments; the Science and Applications Computing Center (SACC) at the NASA Goddard Space Flight Center for assistance in the data processing. This work was supported under NASA Contract NAS 5-27728.

ERB NET Members

**Arking, A	NASA/GSFC
**Campbell, G.G.	CIRA, Colorado State U.
***Coulson, K.L.	University of California, Davis
Hickey, J.R.	Eppley Lab., Inc.
House, F.B.	Drexel University
Ingersoll, A.P.	California Inst. of Technology
*Jacobowitz, H.	NOAA/NESDIS
*Kyle, 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

*Jacobowitz was elected team leader in 1976.
He was succeeded in 1983 by Kyle.

**Elected Members

***Left the NET because of other committments

PREFACE

VALIDATION STATEMENT

The Nimbus-7 ERB NET, on 11/16/81, agreed that the first year ERB Master Archival Tapes are valid (the scientific algorithms represent our state-of-the-art knowledge and have been correctly implemented in computer code), provided that a document be written summarizing currently known anomalies, for distribution to archive users.

DOCUMENT INFORMATION CONTENT

This document will provide necessary background information to the scientific community for using ERB-7 Master Archival Tapes (MAT). Three separate documents are required to provide this information. Two are contained in this report.

- MAT User's Guide and as Appendix D, the MAT Quality Control for the First Year

The third, the MAT Tape Specifications Document, is in The Nimbus Observation Processing System Requirements Document #NG-13.

Most of the references listed in the text are only available from Dr. Kyle, the NASA NET team leader. Those available from most technical libraries are also given in the reference section.

User's Guide for ERB-7 MAT

Table of Contents

PAGE

List of Figures

List of Tables

1.0 INTRODUCTION

1.1 Content of this User's Guide

The MAT User's Guide will describe the Earth Radiation Budget (ERB) experiment along with a general description of the ERB instrument. The document will also include information on the contents of the MAT, the calibration, and the earth-location methods used in the production of the MAT. The User's Guide will serve as the principal document for using MAT data by the scientific community. The MAT Quality Control Document will be a supplement to the User's Guide and will contain a detailed description of the consistency of the format of the MAT and the scientific validity of the data on the MAT. These descriptions will be done on a daily basis for each data-year. A third document will contain the tape specifications for the MAT. The tape specifications document will provide the format of the MAT along with descriptions of the information contained on the tapes.

1.2 Background On Nimbus and ERB Experiment

The Nimbus-7 spacecraft was launched on October 24, 1978 from the Western Test Range of Vandenberg Air Force Base, California by a thrust-augmented Delta Vehicle. The spacecraft is in a 955 kilometer sun-synchronous polar orbit. The satellite orbit has equator crossings at close to local noon (ascending) and midnight (descending) with 26.1 degrees of longitude separation. The orbital period is about 104.16 minutes. The Nimbus-7 spacecraft is shown in Figure 1.

The Nimbus-7 mission has afforded the opportunity to conduct a variety of experiments in the pollution, oceanographic and meteorological disciplines. It provides an opportunity to assess each instrument's operation in the space environment and to collect a sizable body of data with the global and seasonal coverage needed for support of each experiment. This mission also extends and refines the sounding and atmospheric structure measurement capabilities demonstrated by experiments on previous Nimbus observatories. There are seven experiments and one subsystem (THIR) aboard the spacecraft.

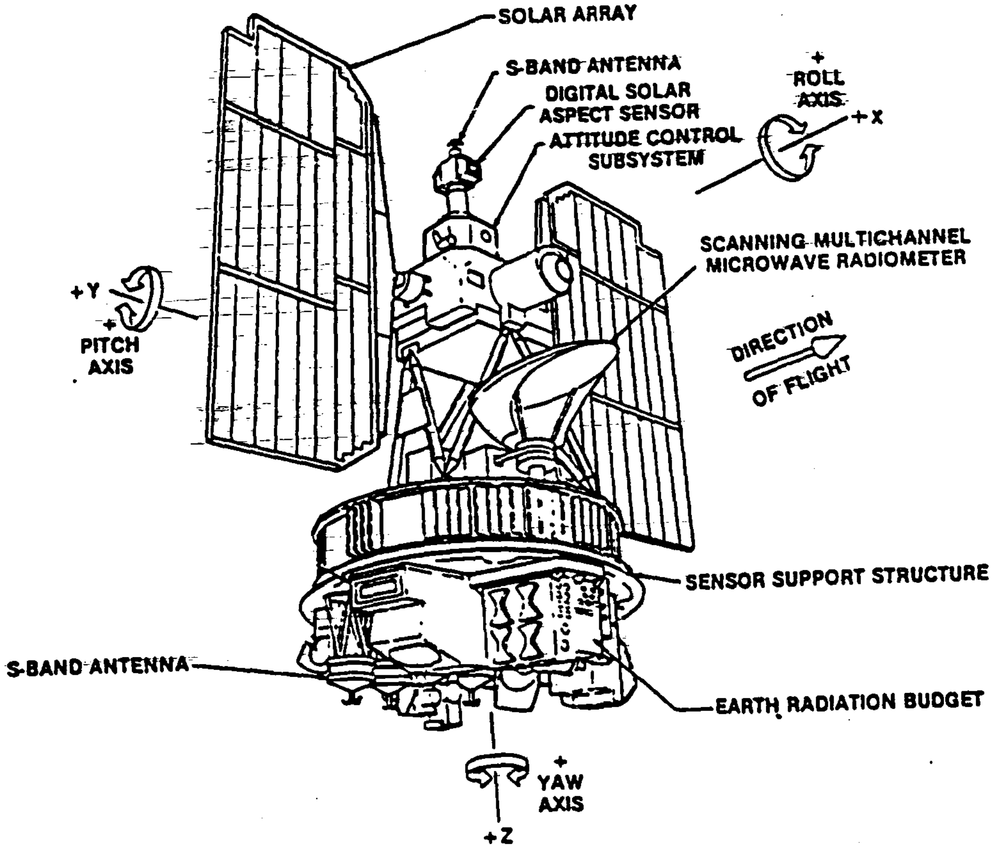


Figure 1 NIMBUS 7 Spacecraft System

The Earth Radiation Budget (ERB) experiment utilizes an instrument very similar to the ERB experiment on Nimbus-6. The ERB-7 instrument began recording data routinely on November 16, 1978. The objective of the experiment is to determine, over time scales of a year, the earth radiation budget on both synoptic and planetary scales by simultaneous measurement of:

- o Incoming solar radiation
- o Out-going earth-reflected (shortwave) and earth emitted long wave radiation by:
  - a. Fixed wide-angle sampling of these terrestrial fluxes at the satellite altitude.
  - b. Scanned narrow-angle sampling of the angular radiance components.

A second objective is to develop angular models of the reflection and emission of radiation from clouds and earth surfaces[1,2,3].

One purpose of this multi-instrument satellite was to allow data from two or more instruments to be used together to provide more information regarding the interaction between the sun and the earth's weather and climate. Some studies which include ERB data are: (1) The use of THIR cloud data in conjunction with the ERB scanner data to develop bi-directional reflectance models for sunlight reflected from various targets, e.g. high, middle, and low clouds, open ocean, snow and ice and various land surfaces[4]; (2) Data from the ERB NFOV channels were compared with co-located narrow-band (channel 5) data from the Coastal Zone Color Scanner to perform a cross-check on the inferred ERB calibration adjustments[5].

The ERB scanner operated on a two day on, one day off duty cycle (see Table 5 on page 47) from December 1978 - April 1979 due to interference from the LIMS instrument. When the LIMS instrument became inoperative around April 1979 the ERB scanner duty cycle became 3 days on, one day off. This pattern continued until the ERB-7 scanner failed on June 22, 1980. A daily tabulation of the ERB scan mode history can be found in the appropriate MAT QC Document.

1.3 Quality Statement on Master Archival Tapes (MAT)

The ERB-7 MAT's for the first year of data from November 1978 -October 1979 have been processed by the Nimbus Observation Processing System (NOPS) at Goddard Space Flight Center (GSFC). The MAT's contain calibrated radiances/irradiances and raw digital data values for all channels, plus temperature monitoring data, orbital and attitude data, and Digital Solar Aspect Sensor (DSAS) data. In addition, summary statistics and information are computed for each orbit and for the day. These tapes are then sent to the National Space Science Data Center (NSSDC) for archiving. The NSSDC will then make the MAT's available to the scientific community. To assist the user in making maximum utilization of this data set, the ERB Nimbus Experiment Team (NET) has scientifically evaluated the MAT data. The NET analysis indicates that the data contained on the first-year MAT's are of excellent quality; however, several peculiarities of the data must be properly understood in order to use it for scientific studies. The peculiarities of the data are explained in more detail in a later section of this document (see Appendix B) and also in the MAT QC Document. Information on the range of expected values for the digital count data and the irradiance/radiance data along with various other "housekeeping" data are also provided in the separate MAT QC Document. Monthly Summary (MS) tapes containing all the MAT QC data and the orbital and daily summaries from the first year MAT's have been created to assist the ERB NET in evaluating the overall scientific validity of the MAT data. The MAT QC data represents a complete and detailed analysis of the MAT data and should be helpful to users of this data.

Each MAT contains data which was calibrated by using the equations and coefficients developed by the ERB-7 NET team. These equations represent the latest state-of-the-art technology available when the processing software was developed (1977-1980). The calibration history will be discussed in somewhat more detail in a later section of this user's guide. For a more complete description of the calibration algorithms and history the user should review references 6 through 9.

The calibration methods used for some of the channels were not the optimal techniques for ERB-type studies. For example, degradation of the sensor (channel 13), sensor memory of the preceeding scenes (channel 13 and 14) and heating of the dome and sensor (channel 13, 14) are not corrected for in the processing of the MAT. However, in producing the solar and earth radiation budget products (SEFDT, MATRIX data sets) from the MAT's several improved calibration techniques were used. For example, a solar zenith angle and time dependent Calibration Adjustment Table (CAT) is applied to channel 13 in the processing of the SEFDT and MATRIX data sets. The calibration techniques and equations used in the processing of the MAT are discussed in more detail in the Calibration Section 4.0 (on page 27) and in Section 3.4-3.6 (on pages 21 through 26) on the Calibration Adjustment Tables.

2.0 OVERVIEW OF ERB EXPERIMENT AND INSTRUMENT DESCRIPTION

The ERB instrument consists of one radiometer unit with approximate dimensions 33 cm x 36 cm x 48 cm and a weight of 32.7 kg (Figure 2). The instrument measures radiation in 22 different optical channels. Ten solar channels (labeled 1 through 10c) measure incoming solar radiation. Four earth-viewing channels (11 through 14) with fixed wide-angle fields-of-view (FOV) measure radiation from the entire earth disc. Eight earth-viewing channels scan from nadir to horizon in several vertical planes with narrow-angle fields-of-view. Channels 15-18 measure short wavelength radiation while channels 19-22 measure long wavelength radiation[6]. The spectral characteristics of the solar, wide field-of-view (WFOV) and narrow field-of-view (NFOV) channels are provided in Tables 1, 2 and 3 respectively. Some additional details on the solar, WFOV and NFOV channels along with a brief description on the ERB scan modes and data sampling rates are provided by Jacobowitz et al. (1978) and Soule (1983).[7,8]

The following two journal papers provide a description of the Nimbus-6 ERB experiment and data and should be useful for general background information since both experiments are similar.

- Jacobowitz, H., W. L. Smith, H. B. Howell, F. W. Nagle, J. R. Hickey, 1979. The First 18 Months of Planetary Radiation Budget Measurements from the Nimbus-6 ERB Experiment. Journal of the Atmospheric Sciences, 36, 501-507.
- W. L. Smith, J. Hickey, H. B. Howell, H. Jacobowitz, D. T. Hilleary, and A. J. Drummond, 1977. Nimbus-6 Earth Radiation Budget Experiment. Applied Optics, 16, 306-318.

2.1 Solar Channels

The ERB experiment measures the incoming solar radiation in ten spectral channels at the southern terminator crossing as the satellite orbits over Antarctica. The spectral intervals monitored by these channels are shown in Figure 3 along with the 1971 standard extraterrestrial NASA curve. These bands were selected to provide meaurements of the "solar constant", necessary for earth heat budget

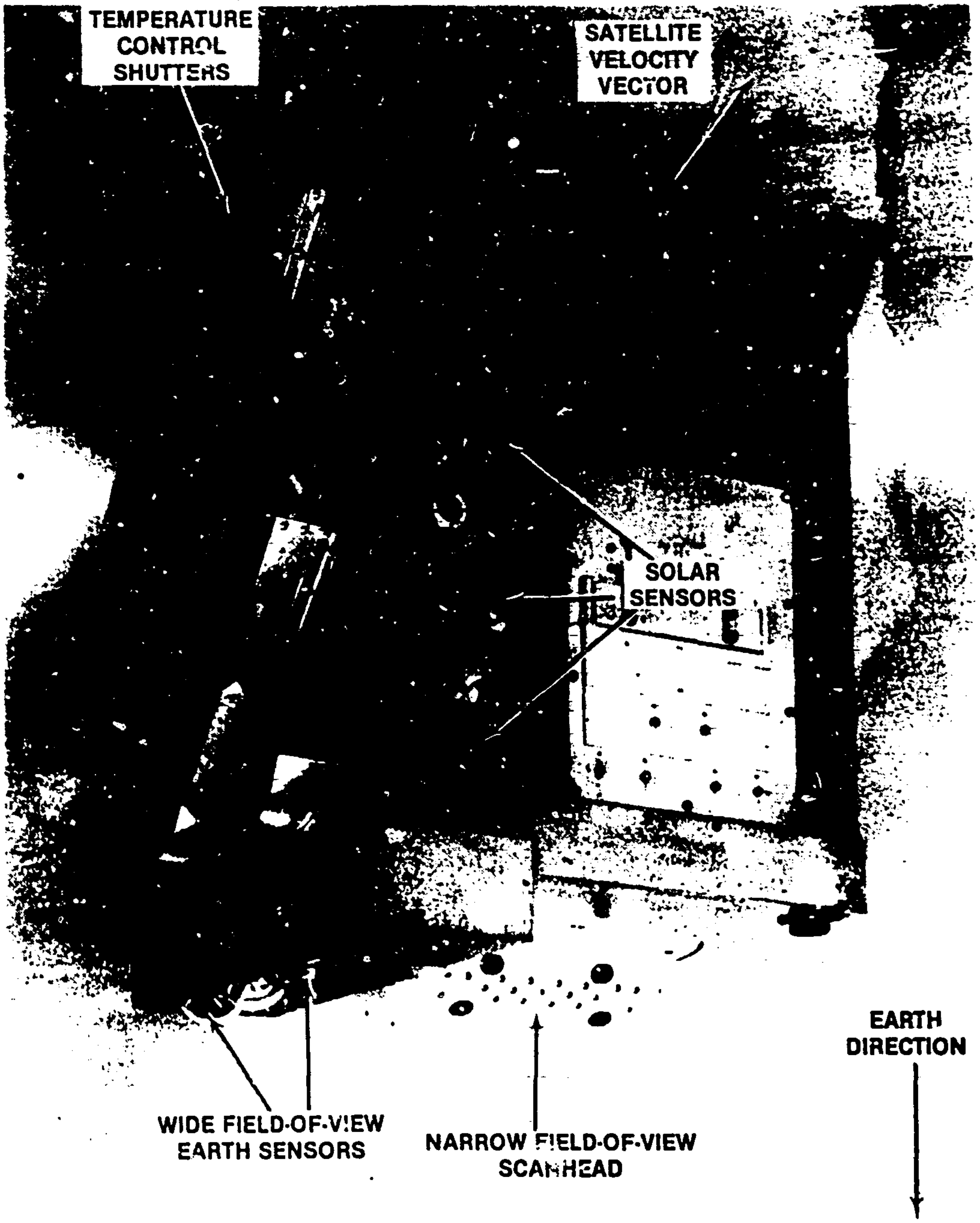


Figure 2 Earth Radiation Budget Sensor

TABLE 1

CHARACTERISTICS OF ERB SOLAR CHANNELS

Channel	Sensor (c) Type	Wavelength Limits (μm)	Filter	Solar Irradiance (d) Air Mass Zero (Wm^{-2})	Gain	Noise Equivalent Irradiance (Wm^{-2})
1	N3	0.2 – 3.8	Suprasil W	1370	692.3	1.77×10^{-2}
2 (a)	N3	0.2 – 3.8	Suprasil W	1370	685.8	1.77×10^{-2}
3	N3	(0.2 to) 50	None	1370	607.2	1.43×10^{-2}
4	N3	0.526 – 2.8	OG530	970	974.5	1.94×10^{-2}
5	N3	0.698 – 2.8	RG695	679	1339.4	1.91×10^{-2}
6	N3	0.395 – 0.508	Interference Filter	206	8512.7	3.58×10^{-2}
7	N3	0.344 – 0.460	"	166	17964.7	5.73×10^{-2}
8	N3	0.300 – 0.410	"	109	26985.3	7.55×10^{-2}
9	K2	0.275 – 0.360	"	57	9808.6	0.94×10^{-2}
10C (b)	H-F	(0.2 to) 50	None	1370	2791.0	2.39×10^{-2}

Notes: (a) Channels 1 and 2 are redundant. Channel 1 is normally shuttered and is open periodically to adjust value of Channel 2.
(b) Channel 10C is a self-calibrating cavity channel added to Nimbus 7 and replacing a UV channel on Nimbus 6.
(c) All are types of Eppley wire wound thermopiles.
(d) Values obtained from adjusted Nimbus 6 results.

- The unencumbered FOV for all channels is 10 degrees; the maximum field is 26 degrees for Channels 1 through 8 and 10C. The maximum FOV for Channel 9 is 28 degrees.

TABLE 2
CHARACTERISTICS OF ERB WFOV CHANNELS

Channel	Wavelength Limits (μm)	Filter	Irradiance Range Anticipated (Wm^{-2})	Approximate Non-Amplified Signal Output (mV)	Amplified Operational Sensitivity ($Bits/Wm^{-2}$)	Noise Equivalent Irradiance (Wm^{-2})
11	<0.2 to >50	None	-200 to +600	-2.1 to 7.6	1.707	6.55×10^{-3}
12*	<0.2 to >50	None	-200 to +600	-2.1 to 7.6	1.707	6.55×10^{-3}
13	0.2 to 3.8	2 Suprasil W Hemispheres	0 to 450	0 to 5.7	2.276	6.55×10^{-3}
14	0.695 to 2.8	RG695 Hemispheres Between 2 Suprasil W Hemispheres	0 to 250	0 to 3.2	4.096	6.65×10^{-3}

Notes: *Channels 11 and 12 are redundant channels. Channel 11 has black painted baffles and is used for in-flight calibration of Channel 12. Channel 12 has polished aluminum baffles similar to those on Nimbus 6.

- All channels have type N3 thermopile sensors.
- All channels have an unencumbered FOV of 121 degrees and a maximum FOV of 133.3 degrees. Channel 12 has an additional FOV selection of 89.4 degrees unencumbered, 112.4 degrees maximum.
- Output of these channels is a 3.8 second integral of the instaneous readings.

TABLE 3
CHARACTERISTICS OF ERB NFOV SCANNING CHANNELS

Channel	Wavelength Limits (μm)	Filter	FOV (Degrees)	Responsivity (V/W RMS/RMS)	Noise Equivalent Radiance (W cm^{-2} sr^{-1})	NEP (W Hz$^{-1/2}$)
15-18	0.2 to 4.8	Suprasil W	0.25 x 5.12	50	3.7×10^{-5}	6.65×10^{-9}
19-22	4.5 to 50	Deposited Layers On Diamond Substrate	0.25 x 5.12	50	1.8×10^{-5}	1.73×10^{-9}

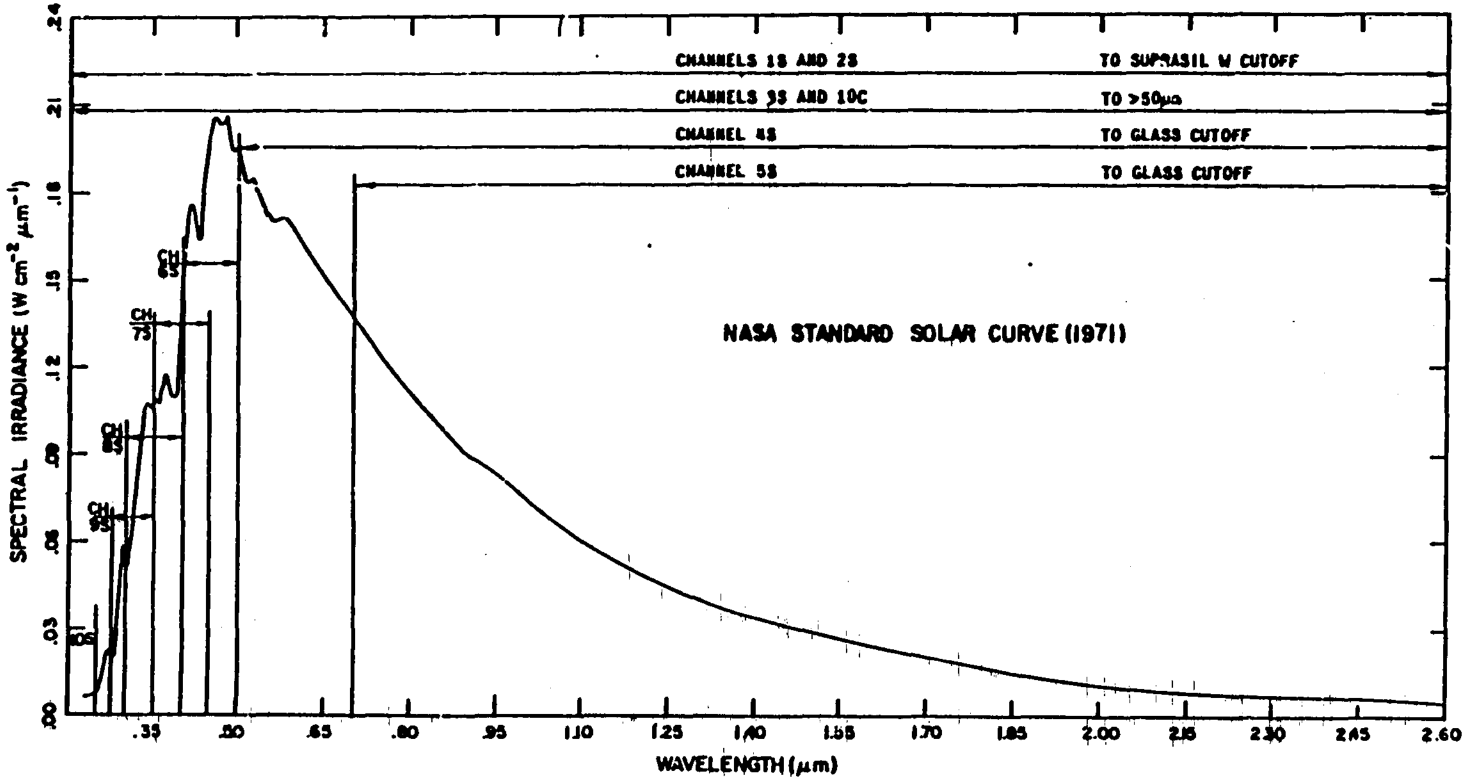


Figure 3: Spectral Intervals Monitored by the ERB solar channels (with 1971 NASA standard extraterrestrial solar curve).

computations, and of solar energy in spectral subdivisions in the ultraviolet and visible regions where solar emission variability may occur and where uncertainties exist in present values of the solar emission spectrum. The "solar constant" channels 3 and 10c measure the entire solar spectrum from 0.2 um to 50 um.

2.2 WFOV Channels

Earth-emitted infrared radiation and earth-reflected solar radiation are measured with fixed, wide-angle FOV sensors. The four sensors each have an unencumbered FOV of 121 degrees and a maximum FOV of 133.3 degrees. From the Nimbus-7 orbit altitude of 955 km the earth subtends an angle of 120.8 degrees. This angle is greater than that for the Nimbus-6 ERB because the Nimbus-6 altitude is higher; thereby reducing the angle subtended by the earth. The channel FOV's were not modified for Nimbus-7.

The measurements taken by these channels provide a direct measure of the terrestrial flux passing through a unit area at satellite altitude. An integration of these measurements over the entire globe, together with the solar constant observations, provide a measure of the net radiation balance for the earth-atmosphere system. Measurements of the radiation flux reflected in the shortwave region (0.2 um to 3.8 um), in addition to those of the total earth radiation flux (0.2 um to 50 um), permit separation of the planetary albedo and long wave flux components of the observed net radiation flux.

An earth flux channel (14) and a solar flux channel (5) measure radiation in the 0.698 um to 2.8 um interval enabling the planetary albedo to be defined for the spectral subregions below 0.695 um and above 0.695 um. These two spectral regions separate the total backscattered radiation into the molecular plus aerosol contribution and the aerosol-dominant spectral contribution. The separation is important for assessing the contribution of aerosols to any detectable variations of the earth's planetary albedo.

2.3 NFOV Scanning Channels

The ERB also obtains measurements of the radiance of earth-reflected solar radiation (0.2 um to 4.8 um) from channels 15 through 18 and earth-emitted long wave radiation (5 um to 50 um) from channels 19 through 22. These channels, which have a rectangular Instantaneous Field-of-View (IFOV) of 0.25 degrees x 5.12 degrees are designed to obtain a large number of angularly-independent views of the same geographical area as the Nimbus spacecraft orbits overhead. The orientation of the 5.12 degree width is in the direction perpendicular to the scan direction and the orientation of the 0.25 degree path is in the scan direction. As the scanner passes near nadir, 20 IFOV's are integrated by the onboard processor to form a single $5^\circ \times 5.12^\circ$ effective aperture. This drops to 10 IFOV's at a nadir angle of 35°, to 5 IFOV's at 50° and to one IFOV at 56° off nadir angle. The effective size of the earth footprints are indicated in Figure 4A for several satellite zenith angles as viewed from the center of the footprint. The speed of the scan slows at increased nadir angles so that the dwell time on an effective footprint remains constant.

The ERB Nimbus Experiment Team (NET) has utilized the scanner data in two relevant studies. Stowe et al.,[2, 3] have constructed characteristic angular distribution models for a variety of reflecting surface conditions such as high, middle and low clouds, clear ocean, snow and ice, and various land surfaces. In addition, the NET is utilizing some of these models with the scanning channel observations to determine daily, monthly and seasonal radiation budgets on a scale of about 500 km (ERB-7 MATRIX). This data set will also be available from the National Space Science Data Center (NSSDC) at the NASA Goddard Space Flight Center.

2.4 Scan Geometry and Scan Modes

The basic scan geometry of the ERB is shown in Figure 4B. The five ERB scan modes are shown schematically in Figure 5. These scan modes permit the observation of radiation from various scenes over a wide variety of incident and emerging angles. Four scan patterns are a composite of long and short grids. A long grid in the forward direction is followed by a short grid in the cross-track

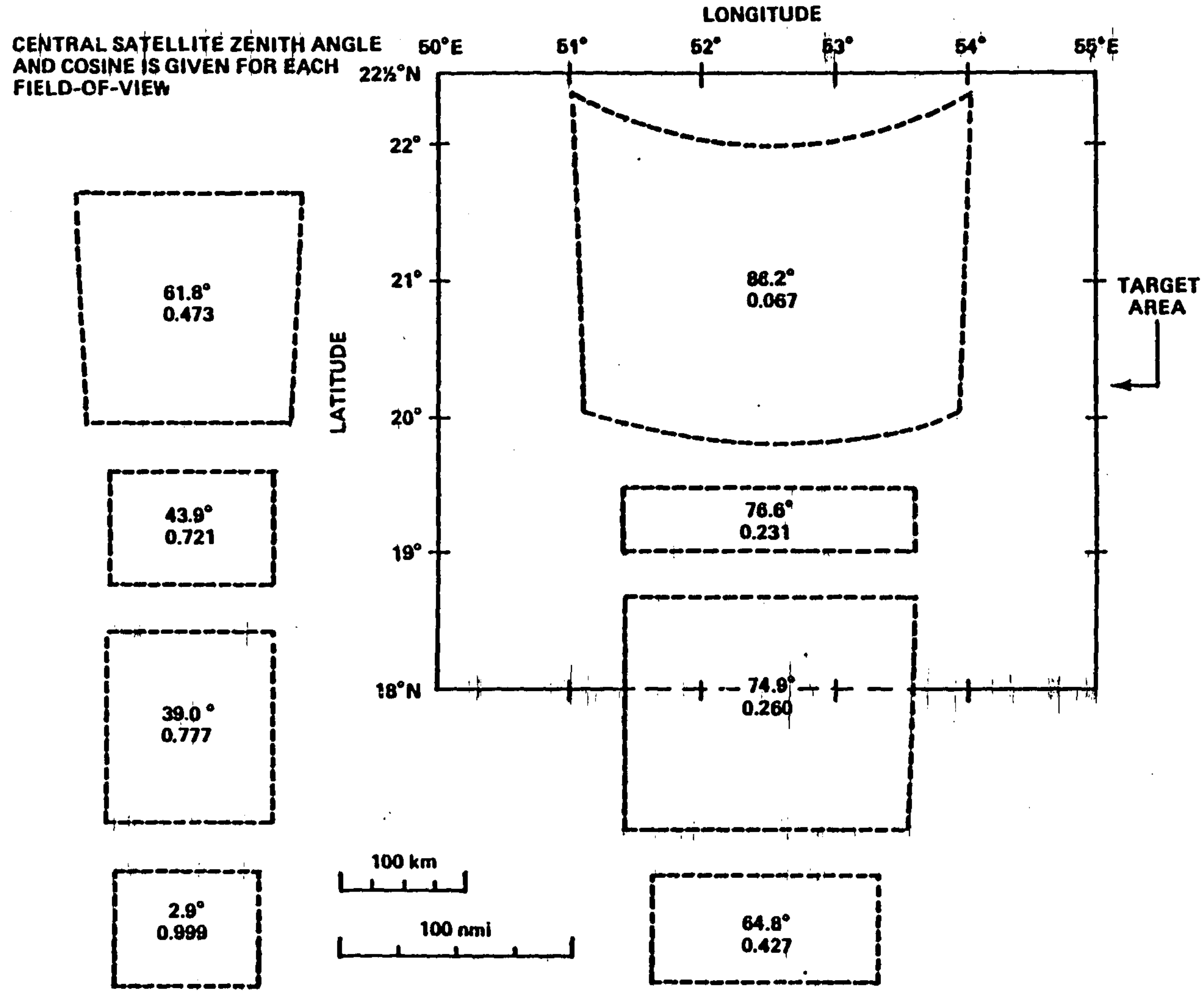
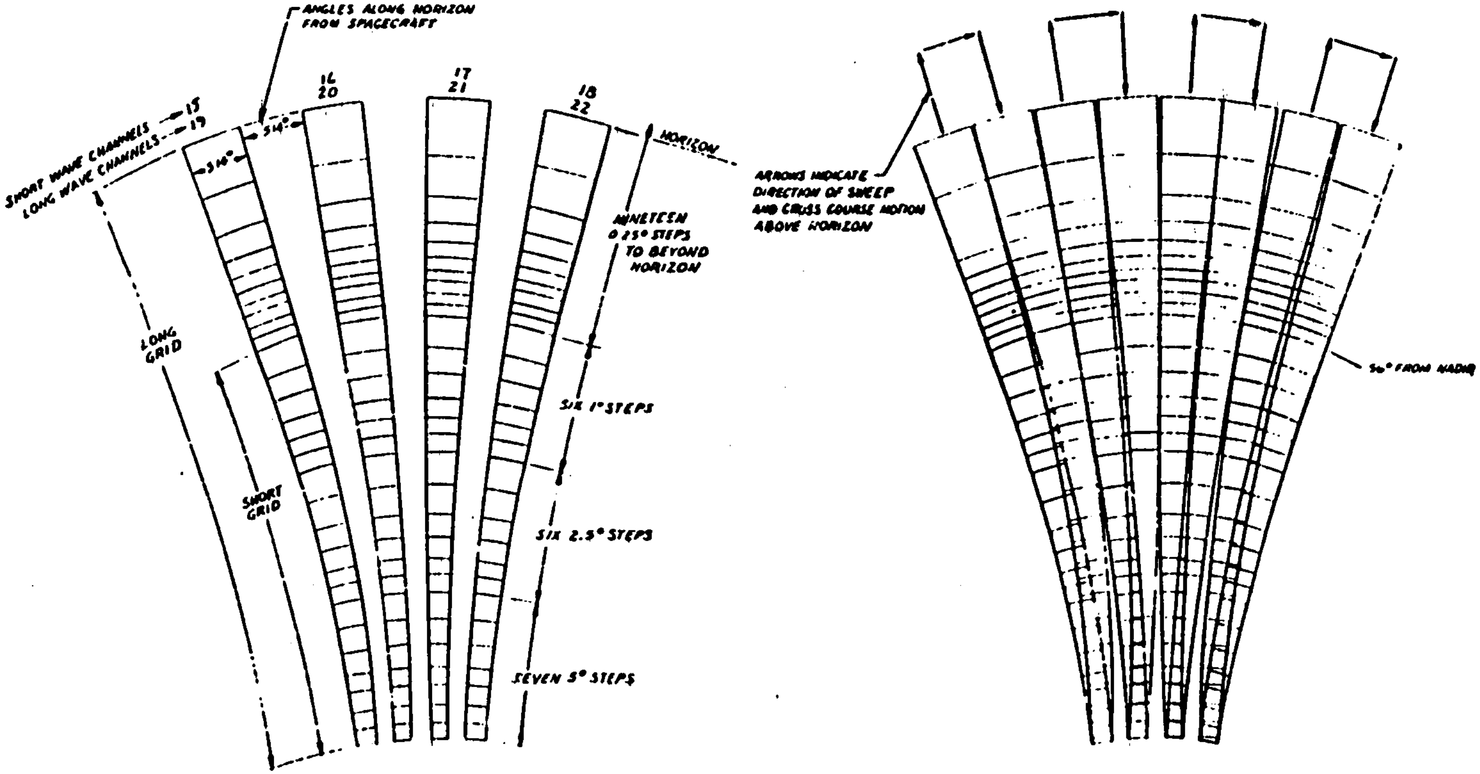


Figure 4A: Approximate Earth Coverage for ERB Fields-Of-View



SCAN PATTERN ON EARTH FOR SINGLE SCAN HEAD
SWEEP FROM NADIR TO HORIZON (SPACECRAFT MOTION NEGLECTED).
SHORT GRID LIMITED TO 56° NADIR ANGLE (1250 n mi FROM SSP).
LONG GRID EXTENDS BEYOND HORIZON
SHORT WAVE AND LONG WAVE CHANNEL FIELDS OF VIEW ARE COINCIDENT.

PATTERN ON EARTH WITH NADIR TO HORIZON AND RETURN SWEEPS SUPERIMPOSED. GIMBAL IS TURNED 6° ABOUT S/C Z AXIS BETWEEN SWEEPS. LONG GRID SHOWN. GIMBAL IS TURNED AT END OF SAMPLE WITH 56° UPPER EDGE DURING SHORT GRID.

Figure 4B: ERB Scan Grid Earth Patterns

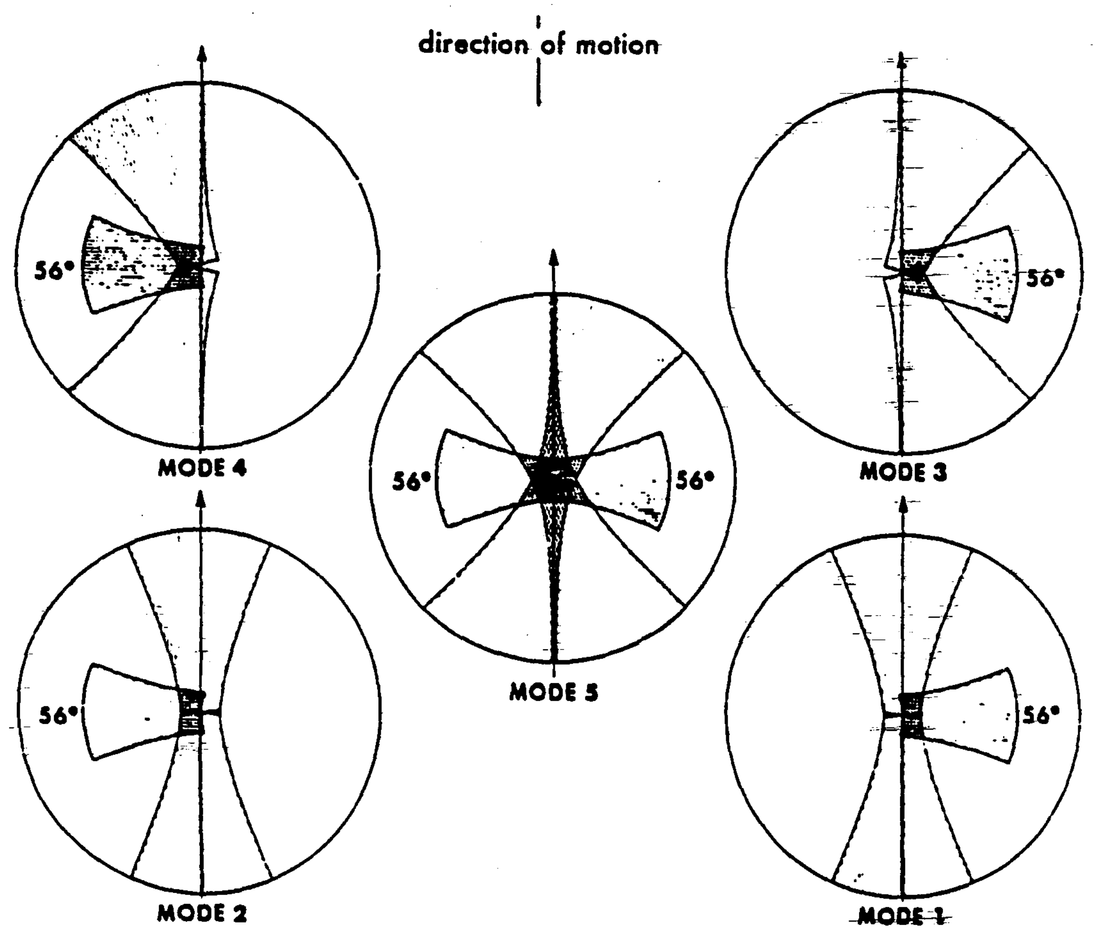


Figure 5 ERB Scan Modes.

direction and then concluded with a long grid in the aft direction. Scan pattern five is a composite of scan mode 3 followed immediately by mode 4. Scan modes 1–4 obtain a maximum number of angularly independent views of a given geographical area. When the instrument is in one of these four modes of operation, the scan pattern is repeated every 112 seconds (7 major frames) or every 700 km along the subpoint track. These four scan modes ensure the ability to obtain numerous observations in the principal plane of the sun, the plane in which the greatest angular variations in reflected sunlight occur. Scan mode 5, which was designed to be the normal mode of operation to obtain maximum earth coverage, is repeated every 224 seconds or every 1400 km along the subpoint track. Under normal operating conditions about 19 percent of the scanning data is lost due to space looks and gimbal motion of the scan head (see Section 3.3 on Data Quality Flags on the MAT).

2.5 Data Sampling

Radiance observations from the NFOV scanning channels 15-22 are taken every 0.5 seconds, and irradiance observations every 4 seconds for the WFOV channels 11-14. The solar channels 1-10 are sampled every second. The ERB data, together with data from several other instruments, are grouped by the onboard satellite Versatile Information Processor (VIP) into data blocks consisting of 80x80 word matrices called major frames (MF). Each MF contains 16 seconds of data. For each MF the ERB data consists of 32 measurements for each NFOV channel 15-22, 4 measurements for each WFOV channel 11-14 and 16 measurements for each solar channel 1-10 plus temperature and housekeeping data. The data from the other instruments is not contained on the MAT. The scan patterns 1–4 each require 7 MF (112 seconds) to complete and scan pattern 5 requires 14 MF (224 seconds) to complete.

3.0 CONTENTS OF THE MAT

The MAT contains calibrated radiance/irradiance data and raw digital counts for all 22 channels. Temperature monitoring data as well as orbital, attitude, scan encoder and Digital Solar Aspect Sensor (DSAS) data are also provided. The tape also contains information on the data quality of the radiance/irradiance measurements, temperature measurements, and DSAS data. These quality flags are discussed in more detail in Section 3.3. In addition, the locations on the earth of both the WFOV and NFOV data are also provided. These data are arranged such that 16 seconds, or one major frame (MF) of data is contained in a logical record.

The orbital and daily summary records contain summary statistics and information on the orbit and day. Each of these records is also contained in one logical record on the MAT.

A header record containing information on the MAT day, generation date, and algorithm version number is found at the beginning of the tape. This header record appears on the MAT two times and constitutes one file. The logical and physical records containing the MF data, orbital and daily summaries constitute a second file (there are two logical records in each physical record). A Calibration Adjustment Table (CAT) is contained in the third and last file on the tape. For more complete information on the specifications of the MAT it will be necessary to review the MAT Tape Specifications Document[9] prepared by the Nimbus Observation Processing System (NOPS).

3.1 Description of Radiance/Irradiance Data

The raw digital count values for all channels are provided for each MF of data on the MAT as follows:

- Solar channels 1-10: One observation for each channel per second, 16 observations times 10 channels per MF.

- WFOV channels 11-14: One observation for each channel every 4 seconds, 4 observations times 4 channels per MF.
- NFOV channels 15-22: One observation per channel every half second, 32 observations times 8 channels per MF.

The calibrated irradiance/radiance data for WFOV channels 11-14 and NFOV channels 15-22 are also provided on the MAT with the same observational frequency as the raw digital counts.

3.2 Description of Orbital and Daily Summary Data

The information contained in the orbital summary record is summarized as follows:

- orbital track information, e.g. time of orbit, terminator crossings.
- Instrument status summary
- Average MF irradiance at the solar peak and at the other 4 solar time intervals for channels 1-10[1].
- Average counts at solar peak for channels 1-10.
- Statistics for the 80 temperature monitors (minimum, maximum, mean and standard deviation).
- Channel 11 and 12 calibration and shutter statistics

The information contained in the daily summary record is summarized as follows:

- Times and dates of first and last orbits of day
- Calibration slopes and intercepts for channels 11-12
- Orbit numbers contained on the MAT
- Sensitivity factors for channels 1-10
- Scan statistics
- Statistics for normalized solar irradiances
- Statistics for electronic gain ratios and go/no go net count ratios

---

[1] The solar peak, T_o is computed in MATGEN by locating the two maximum count values in the orbit for channel 2 and then finding the relative minimum count which occurs between these maximums. The other 4 solar time intervals are $T_o \pm 13$ minutes and $T_o \pm 26$ minutes.

3.3 Descriptions of Data Quality Flags

The data quality flags are turned on (bit = 1) when the data is taken in a "data quality loss interval" and set to zero (bit = 0) when the data is not taken in "data quality loss interval." The MAT contains "data quality loss flags" for the following data for each major frame:

- o WFOV channels 11-14 observations (16 flags)
- o NFOV channels 15-22 observations (256 flags)
- o Solar channels 1-10 observations (160 flags)
- o DSAS Alpha and Beta angle (32 flags, 16 flags)
- o Platinum Temperature Monitor (48 flags)
- o Thermistor Temperature Monitor (80 flags)

In the first year MAT data set, ephemeris errors originating on the Image Location Tape (ILT) resulted in the occurrence of undefined subsatellite point (SSP) locations for a small number of major frames on several MAT's. The "data quality loss interval" flags for all channels, the alpha and beta angles and the temperature monitors were all set to one for the affected major frames. The MAT QC Document contains additional details of this problem as well as the specific MAT's which are affected by this problem.

It is also important to note that MATGEN processing (generation of a MAT) does not reject any "bad" data from the MAT, it merely labels the data through these data quality flags.

Field-Of-View (FOV) locations on the earth for the ERB scanning channels contain fill values when the FOV is undefined. The latitudes and longitudes are set equal to 222.22 (22222 is the actual value on the MAT, scaled by 100) when the following conditions occur:

(1) FOV is over horizon (this typically occurs about 7 percent of the time for a day).

(2) Gimbal motion of scan head (this occurs for 26/224 scan head positions or about 11.6% of the time for a day).

(3) When the FOV on the earth is undefined due to ephemeris errors stemming from the ILT. In the first year MAT data set, this occurs on 5 MAT's and only for a small number of major frames of data on each tape.

This results in, nominally, 19 percent of the scan data (channels 15-22) for a day being unusable. The actual radiance data on the MAT is not set to fill values. The fill values for the latitudes and longitudes serve as a flag for screening this data.

The FOV locations on the earth for the WFOV channels 11-14 and for the SSP latitudes and longitudes for each major frame also contain fill values of 222.22 (22222 on the MAT, scaled by 100) when the FOV is undefined. For the WFOV irradiance data this occurs when there are mislocations due to ephemeris errors stemming from the ILT. (See MAT Quality Control Document for the specific days and orbits where this problem occurs).

3.4 Calibration Adjustment Table (CAT) on MAT

The CAT is provided in the third file on each MAT. The adjustments for each channel in the CAT are not applied to the irradiance/radiance data on the MAT. These adjustments are performed in the various level-2 products such as SEFDT and MATRIX for all channels except channel 13. In addition, a solar zenith angle and time-dependent CAT for channel 13 is applied to the MAT irradiances in the SEFDT and MATRIX processing. This varying channel 13 CAT does not appear on any of the first year MAT's[1]. The data contained in the CAT on the MAT is as follows:

---

[1] The channel 13 CAT is available on the SEFDT or MATRIX tapes which are also available from the NSSDC. The basic data used as input for the generation of this CAT are provided in Table 4 (pg. 23).

Adjustments valid from:	11-6-78 to 11-21-79		
CAT generated on:	08-11-80		
Adjustments:	Slope	Intercept	Percent Uncertainty
Channel 1	1.0	0.	1.0
Channel 2	1.0	0.	1.0
Channel 3	1.0	0.	1.0
Channel 4	1.0	0.	1.0
Channel 5	1.0	0.	1.0
Channel 6	1.0	0.	2.0
Channel 7	1.0	0.	4.0
Channel 8	1.0	0.	6.0
Channel 9	1.0	0.	9.0
Channel 10c	1.0	0.	0.5
Channel 11	1.0	6.0	2.0
Channel 12	1.0	0.	2.0
Channel 12N	1.04	10.0	2.0
Channel 13[2]	1.05	-3.0	2.0
Channel 14	1.04	-3.0	2.0
Channel 15	0.91	0.	2.0
Channel 16	0.87	0.	2.0
Channel 17	0.92	0.	2.0
Channel 18	0.83	0.	2.0
Channel 19	1.0	0.	1.0
Channel 20	1.0	0.	1.0
Channel 21	1.0	0.	1.0
Channel 22	1.0	0.	1.0

3.5 Channel 13 Calibration Adjustments

A solar zenith angle and time-dependent calibration adjustment has been developed for the WFOV channel 13 by the ERB NET and is outlined in a report by Dwivedi (1982).[10] This data set was later used to generate a varying channel 13 CAT (CH13 CAT) which is applied in SEFDT and MATRIX processing. The data consists of a slope and intercept adjustment for 6 solar zenith angle ranges computed for 13 ERB cycles from the first year MAT data set. The adjustments provided in Table 4 are given for the 12 days which represent the mid-point of the ERB cycles used.

---

[2] Original channel 13 adjustment; see footnote 1, p. 21.

[c] Cavity Radiometer

[N] When in its narrow FOV mode.

Table 4

CHANNEL 13 CALIBRATION ADJUSTMENTS[1]

SOLAR ZENITH ANGLE RANGES

DATE*	90°-60° SLOPE	90°-60° INT.	60°-30° SLOPE	60°-30° INT.	30°-0° SLOPE	30°-0° INT.	0°-30° SLOPE	0°-30° INT.	30°-60° SLOPE	30°-60° INT.	60°-90° SLOPE	60°-90° INT.
November 20, 1978	1.042	-5.2	1.027	0.4	1.032	-2.7	1.024	-2.4	1.041	-4.6	1.043	-5.8
December 2, 1978	1.048	-5.2	1.032	-0.6	1.026	-1.9	1.033	-3.9	1.046	-7.7	1.049	-7.4
December 14, 1978	1.052	-4.6	1.036	-0.6	1.060	-7.9	1.047	-4.4	1.060	-8.4	1.068	-8.4
January 1, 1979	1.055	-3.3	1.027	4.5	1.046	-2.8	1.021	0.7	1.042	-3.4	1.047	-5.7
February 3, 1979	1.069	-4.7	1.024	7.1	1.031	1.5	1.055	-3.6	1.043	-3.1	1.027	-1.9
March 18, 1979	1.076	-2.2	1.084	-4.0	1.045	1.9	1.041	0.5	1.047	-1.8	1.047	-2.2
April 22, 1979	1.086	-1.5	1.077	-0.2	1.050	2.1	1.034	3.0	1.058	-3.4	1.048	-1.7
May 31, 1979	1.118	-2.6	1.042	6.3	1.044	3.2	1.042	1.9	1.063	-3.6	1.059	-4.2
July 7, 1979	1.115	-0.3	1.052	8.1	1.056	3.2	1.057	0.5	1.069	-4.1	1.064	-3.8
August 17, 1979	1.110	-1.5	1.059	6.7	1.052	5.3	1.032	4.7	1.083	-6.5	1.074	-4.2
September 17, 1979	1.099	-4.5	1.076	1.6	1.051	4.2	1.047	2.2	1.064	-2.1	1.064	-3.8
October 17, 1979	1.078	-2.0	1.065	2.1	1.062	1.3	1.058	1.0	1.070	-3.6	1.068	-4.7
November 15, 1979	1.071	-0.1	1.059	2.1	1.044	4.0	1.037	3.6	1.056	-1.8	1.059	-4.9

*The date represents the center of the ERB cycle for which the corrections should apply

---

[1] Dwivedi, P.H., 1982. ERB-7 Channel 13 Sensitivity Study: November 1978-October 1979. Prepared for GSFC by Research and Data Systems, Inc., under contract NAS 5-26123.

The actual channel 13 CAT was generated by performing a bi-linear interpolation on the daily values of the slope and intercepts for each of the 6 solar zenith angle ranges provided. The result is a first year channel 13 CAT containing 201 slopes and intercepts (-100° to +100°, in one degree increments) for each day. For those angles exceeding ±100 degrees, the value at the extremes is used. The adjustment factors are also assumed constant within a day.

The channel 13 CAT for the first year is contained on the SEFDT and MATRIX tapes and can be made available from the NSSDC when ordering a MAT. The specifications of the format of the channel 13 CAT contained on the SEFDT tape can be found in the SEFDT Data User's Guide.[11]

3.6 Extraction of Data From the MAT and Application of Calibration Adjustments

Parameters can be extracted from the MAT in the following manner[1]:

1. Position MAT to first file and read in header record consisting of 630 -8 bit words.

2. Position to file two and read in a physical record consisting of 6732 - 16 bit words. Within each physical record there are 2 logical records. Each logical record consists of 3364 - 16 bit words, with the last 4-16 bit words spares. A logical record can either contain a major frame of data, an orbital or a daily summary. If a physical record from the MAT is read into a 16 bit array of length 6732 (MATPR) then each array position corresponds to a word in the record. In general, each word corresponds to a parameter in the record (there are some exceptions, e.g. satellite altitude is given in two words or 32 bits).

---

1 The methodology described here has proven to work efficiently on the IBM 360/91 and 3081 at GSFC. It is recognized that various other methods are available depending on the computer system used.

3. Assign a pointer to identify the logical record within the physical record. The first position in the array MATPR (0+1) corresponds to word one, logical record one. The array position MATPR (3364+1) corresponds to word one, logical record two. Similarly:

MATPR (0+2)   MATPR (3364+2)
MATPR (0+3)   MATPR (3364+3)

MATPR (0+3364)   MATPR (3364+3364)

4. Determine the logical record type (i.e. major frame, orbital or daily summary) by examining the second 16-bit word in the array (MATPR(0+2), MATPR(3364+2)). The logical record identification is contained in bits 9-14 (from the right) of the word. By using a bit manipulation routine these 6 bits can be isolated and the type of logical record identified.

5. After identifying the record type, refer to the appropriate record format in the MAT Tape Specifications Document to locate various parameters of interest. Some examples are the following:

   a. Channel 13 irradiance for a major frame, 4 observations (N=0, 3364 and denotes the logical record number within the physical record):
      - MATPR (N+2455 to 2458).
   b. Subsatellite point latitude and longitude, 4 each for the major frame:
      - latitude: MATPR (N+59 to 62)
      - longitude: MATPR (N+63 to 66)
   c. Channel 16 radiances for a major frame, 32 observations:
      - MATPR (N+2503 to 2534)
   d. The average counts at the time of the solar peak, T_0, for the solar channels 1-10 from the orbital summary:
      - MATPR (N+45 to 54)

Application of Calibration Adjustments

1. The calibration adjustments for all channels 1-22 consist of a slope (A_1) and an intercept (A_2) which are related to the irradiance/radiance (I) on the MAT by the following equation (I* is the calibrated or corrected irradiance/radiance):

$$I^* = A_1 I + A_2$$

2. For example, the corrected radiance (I^*) for a channel 16 observation (I_{16}) is as follows:

$$I_{16}^* = 0.87 I_{16} + 0$$

where $A_2 = 0$ in this case.

The values for A_1, A_2 are found in Section 3.4 of this document or in the third file on each MAT.

3. The corrected irradiance for channel 13 requires identifying the solar zenith angle for the major frame, and the day corresponding to the data. With this information the values for A_1, A_2 can be found in the channel 13 CAT by utilizing a look-up table method.

(+)

4.0 CALIBRATION

The information contained in this section is summarized from references 12 and 13. The constants and equations given here represent data from many sources. For more specific references to the various equations and constants it will be necessary to refer to these two documents.

4.1 Pre-Launch Calibration

4.1.1 Solar Channels

The pre-launch calibration for the solar channels consists of a number of absolute comparisons and transfer operations. The reference for the absolute calibrations is the new World Radiometric Reference (WRR) scale which is embodied in a number of self-calibrating cavity radiometers. Channel 10c of the Nimbus-7 ERB is itself such a device. This new scale can be referenced to previous scales such as the International Pyrheliometric Scale (IPS 1956).

The four major solar channels (1,2,3 and 10c) have been directly compared with self-calibrating cavity instruments of both the JPL-PACRAD and Eppley model H-F types. The PACRAD employed in this program has been an Eppley manufactured version (serial number 11402). This unit has been involved in a number of comparisons, including International Pyrheliometric Comparison IV (IPCIV).

For transfer operations usually employing a solar simulator as source, Normal Incidence Pyrheliometers (NIP) of the ERB reference set are employed. The two devices used for the solar channel comparisons bear serial numbers 12016E6 and 12018E6. Both of these are also traceable to the WRR.

When calibrating the solar filtered channels (4,5,6,7,8 and 9), the NIP was fitted with a filter wheel containing filters matching the flight set. The incident irradiance is calculated using the measured irradiance and the appropriate filter factor for the particular filter.

The ERB Reference Sensor Model (RSM), which is a duplicate of the flight instruments relative to the solar channels, has been employed as a transfer and checking device throughout the Nimbus-6 and -7 calibration programs. This device is being maintained in order to trace calibrations as required. All vacuum calibrations of the Nimbus-6 and -7 ERB solar channels can be referenced through the RSM as well as many of the calibrations performed at atmospheric pressure.

It should be noted that the solar channels are not calibrated during thermal vacuum testing of the spacecraft. Their calibrations are checked during an ambient test after the thermal vacuum testing. Final calibration values for the solar channels are expressed in units of Counts/Watt/meter^2 (C/Wm^{-2}), relating the on-sun signal output to the incident extraterrestrial solar irradiance in the pertinent spectral band of the channel.

4.1.2 WFOV Channels 11-14

There are longwave and shortwave calibrations of channels 11 and 12. The longwave calibrations are performed during thermal vacuum testing with a special blackbody source referred to as the Total Earth-flux Channel Blackbody (TECB). The source is a double cavity blackbody unit designed for calibrating channels 11 and 12 after they are mounted on the ERB radiometer unit. It operates over a temperature range of 180 °K to 390 °K with an apparent emissivity under test conditions in a vacuum of 0.995 or greater. Temperatures are measured and controlled to an accuracy of 0.1°C during these calibrations. These calibrations are performed during both instrument and spacecraft level testing. The entire FOV of the channels is filled by the TECB including the annular ring which normally views space in the angular element between the unencumbered and maximum FOV's. Channel 12 was also calibrated for shortwave response by normal incident irradiation by the solar simulator while the instrument was in vacuum. The reference NIP was employed as the transfer standard during this calibration.

Channels 13 and 14 are calibrated for response within their respective spectral bands only. These tests were performed in the same manner as the shortwave calibration of channel 12. For channel 14 the reference NIP is fitted with a matching RG695 filter (as for channel 5) in order to isolate the radiation to its proper spectral band.

An angular response scan is performed on each wide FOV channel in order to relate the normal incidence calibrations described above to the overall angular response of the channels.

4.1.3 Shortwave NFOV Channels 15-18

These channels are calibrated for radiance response by viewing a diffuse target. Three methods have been employed. These are: (1) the viewing of a smoked magnesium oxide (or Barium sulphate) plate which is irradiated by the solar simulator; (2) exposure in a diffuse hemisphere illuminated internally by tungsten lamps, and (3) viewing a diffusing sphere from outside. The last method employs the "Hovis Sphere" as the source. For methods (1) and (3) the reference instrument is a high sensitivity NIP calibrated in terms of radiance. The second method employs a pyranometer as a reference instrument. Differences in the results obtained by the various methods are still under investigation. The sensitivity values selected for use are an average of methods (1) and (3). Unfortunately these tests can only be performed at atmospheric pressure while the scan channel performance is superior in vacuum.

Another calibration of these channels is the in-flight check target. With the channels in the shortwave check position (viewing the scan target) the instrument is irradiated by the solar simulator beam. This test is performed at normal incidence when the instrument is in a vacuum with one of the NIP's as a reference. In air the instrument is similarly calibrated at a number of angles both in elevation and azimuth to obtain the angular characteristics necessary for the reduction of in-flight shortwave check operations.

4.1.4 Longwave NFOV Channels 19-22

These channels are calibrated in vacuum at both the instrument and spacecraft level thermal vacuum tests. The sensors view a special blackbody source called the longwave scanning channel blackbody (LWSCB) which has a separate cavity source for each channel. The procedure is straightforward and covers a range of temperatures covering the complete range of in-flight measurement possibilities.

4.2 In-Flight Calibration

In-flight calibration of the main solar channels utilizes channel 10c, a self-calibration channel using the cavity heater activated by the GO/NO GO heater command. In addition the degradation of channel 2 is checked by an occasional comparison with channel 1. Channels with filters do not have a direct method of optically checking their calibration and therefore must rely on whatever correlations are made with the main channels.

All the thermopile channels are equipped with a GO/NO GO heater which is used to check for response during pre-launch activities to assure that the channels are functioning. The heater can be used in flight as a rough check for all channels except 10c. Also, channels 1 through 14 are equipped with an electrical calibration which inserts a precision voltage at the input to the entire signal conditioning stream. While the electronic calibration cannot be used to infer sensor or optics changes, it ensures against mis-interpretation of an electronic problem.

Channel 12 relies on the stability of the normally shuttered matching channel 11. Channels 13 and 14 have no inherent in-flight calibration capability and they rely on occasional looks at the sun during the spacecraft transitions to aid in assessment of drift or degradation. For this mission, a spacecraft pitch maneuver is required.

Channels 15 through 18 are checked using the shortwave scan channel check target as previously described. They also view space as a "zero radiation" reference to evaluate offset. The longwave scan channels can view space or the on-board reference blackbody. They share the only true in-flight calibration capability with channel 10c.

4.3 Post-Processing Data Checks

Additional calibration checks have been performed on the ERB-7 data after it has been processed into located radiance data. These checks include the following:

(1) Comparison between the WFOV and NFOV data to determine an adjustment to the original calibrations based on the in-flight calibration of channels 19-22.

(2) Estimation of the channel 13 irradiance by subtracting channel 12 night values from channel 12 day values when they are observed over a uniformly emitting surface (e.g. Pacific Ocean)[10].

(3) Comparison of channel 11 and 12 when both are not shuttered.

(4) Analysis of data taken during spacecraft pitch-up maneuvers that allow the WFOV channels to view the sun directly.

(5) As part of the ERB-6 reprocessing, ERB-6 WFOV data were compared with the ERB-7 WFOV data ("truth") for orbits that are approximately co-located[14].

4.4 Equations for Converting Counts to Radiance/Irradiance

For all ERB channels the slope and intercept values of the equations used to convert counts to radiances were obtained from regressions based on either operational or laboratory measured data. These data were taken in a vacuum chamber with the complete sensor system viewing a temperature controlled blackbody radiation emitting target.

For the infrared scanning channels (19 through 22) a completely different radiation detection technique was used. In these cases internal blackbody radiation and earth radiation were alternately viewed producing an alternate pattern of radiation flux on the detector. Thus the detector responded in AC fashion to the difference between the blackbody radiation and the earth radiation. This relationship was linear for a large range of radiances and is given in equation (9).

The radiation produced by the earth/atmosphere as a function of wavelength is different from that produced by a blackbody. Thus, detectors having a physical filter in the radiation path or having a response which varies as a function of wavelength will have a different response to earth/atmosphere radiation than they had in blackbody radiation measurements. This difference must be theoretically determined and used in the data processing stream.

A theoretical convolution of both the blackbody and earth radiances through the long wavelength filter produced the coefficients given in equation (13). Using this equation the measured earth irradiance was determined. The effects of the large change in sensor detectivity as a function of wavelength on this theoretical analysis are still being investigated.

A characteristic of all past satellite sensors which has not been included in these algorithms is the effect of contamination on the optical transmittance of the sensors. Its filtering effect on the sensor system becomes increasingly important as the wavelength decreases in the visible spectral region.

Because of various problems, some of which are discussed above, the pre-launch calibration algorithms did not prove adequate in providing accurate in-flight radiances and irradiances from the earth viewing channels (11-22). Post-launch algorithms had to be developed. These include filtered to unfiltered radiance corrections for channels 19-22, correction of the channel 12 geometric view factor, channel 13-18 adjustments and a bias shift of channels 11 and 12.

Only the channel 19-22 corrections and the channel 12 geometric view factor correction were made in MATGEN. The other post-launch calibration adjustments are found in the various level-2 products such as SEFDT and MATRIX. The following equations were those used in the processing algorithms for the ERB-7 sensor channels. Further details of the calibration of the ERB-7 sensor can be found in references 12, 13 and 15.

ERB-7 Equations

Solar Channels 1-10

For channels 1 to 9 the following is used:

$$H = (V - V_o)/(S_V \cdot f(T_B)) \qquad (1)$$

$$f(T_B) = 1.0 + 0.01\,A\,(T_B - 25.0^oC) \qquad (2)$$

where

H = Solar irradiance (watts/m^2)

V = Average on-sun counts

V_o = Average off-sun counts

S_V = Channel sensitivity at 25°C (counts/watt m^{-2})

A = Temperature correction coefficient (% per °C deviation from 25°C)

T_B = Thermopile base temperature (°C)

The equations used to convert counts to irradiance for channel 10c, a self-calibrating cavity thermopile, are:

$$H_{10c} = E_m c_f / S_p(T) \qquad (3)$$

$$E_m = E_{os} - \frac{E(-13) + E(+13)}{2} \qquad (4)$$

$$S_p(T) = S_0 + ST_H \qquad (5)$$

where

H_{10c} = channel 10c irradiance (watts/m^2)

c_f = channel 10c correction factor for aperture area and nonequivalence (m^{-2})

E_{os} = Average channel 10c on-sun counts

$E(\pm 13)$ = Average channel 10c counts at $\pm$13 minutes from on-sun time.

S_0 = Power sensitivity zero level (counts/watt)

S = Power sensitivity slope (counts/watt °C)

T_H = Channel 10c heat sink temperature (°C)

WFOV Channel 11-14

For channels 11 and 12 the following equation is used:

$$H_T \cdot F_T = [\Delta W - \varepsilon_s F_s \sigma T_s^4 + \varepsilon_D F_D \sigma (T_D + k \cdot V)^4] \qquad (6)$$

where

$H_T \cdot F_T$ = Combined Target irradiance (Watts/m^2) and target configuration factor (see 3 below)

ΔW = Effective irradiance received by Thermopile (Watts/m^2)

ε_s = Emissivity of the FOV stop

F_s = Configuration factor of FOV stop

σ = The Stefan-Boltzman constant = 5.6697 x 10^{-8} Watts/m^{2}K

T_s = Temperature of the FOV stop (K) (Thermister value)

ε_D = Emissivity of the thermopile

F_D = Configuration factor of the thermopile

T_D = Temperature of the thermopile (K) (Thermister value)

k = Correction factor for the the thermopile surface (K/count)

V = Thermopile output (counts)

The equation developed for ΔW for ERB-7 is:

$$\Delta W = \frac{V - [V_o + b(T - 25°C)]}{s + a(T - 25°C)}$$

where

V_o = Zero offset in counts at 25°C

b = Zero offset temperature coefficient (counts/°C)

T = Module temperature (°C)

s = Channel sensitivity at 25°C (counts/watts m^{-2})

a = Sensitivity temperature coefficient (counts/watts $m^{-2}/°C$)

For channels 13 and 14 the following equation is used:

$$H_T = (V - V_o)/s' \quad (7)$$

$$s' = s\,[1.0 + (0.01)(A)(T_B - 25°C)] \quad (8)$$

where

H_T = Target irradiance (Watts/m^2)

V = Channel output (counts)

V_o = Channel offset (counts determined at a 25°C sensor temperature)

s' = Corrected channel sensitivity (counts/Watts m^{-2})

s = Channel sensitivity in vacuum at 25°C

A = Channel sensitivity correction factor (% per °C deviation from 25°C)

T_B = Channel thermopile base temperature (°C)

NFOV Channels 15-22

For scanning channels 15 through 18 the ERB-7 equations for converting counts to radiances are the same as those given above for fixed earth flux channels 13 and 14, except that the units for s' are (counts/Watts m^{-2} sr^{-1}).

For scanning channels 19-22 the following equations are used:

$$N_T = N_m + a_o + a_1 \cdot V \quad (9)$$

where

N_m = module computed filtered radiance (W m^{-2} $ster^{-1}$)

a_o = channel intercept (W·m^{-2} $ster^{-1}$)

a_1 = channel slope (W·m^{-2} $ster^{-1}$/count)

V = channel output (counts)

Coefficients a_o and a_1 were determined from early in-flight calibrations using pre-flight thermal-vacuum calibrations as a guide.

The module radiance is computed by the solution of:

$$N_m = \exp \quad (A_o + A_1 \ \ln(T) + A_2 \ \ln(T)^2 + A_3 \ \ln(T)^3 + A_4 \ \ln(T)^4) \qquad (10)$$

Here the coefficients A_i, $i=0, 1, \ldots 4$ are determined prior to launch for the temperature ranges 50K-200K, 200K-298K and 298K-400K and are given in the ERB-7 MATGEN.

If the filtered radiance reading from the channel is less than or equal to 30.0 W/m^2sr the unfiltered radiance (R) is computed using the Stefan-Boltzmann law as follows:

$$R = \frac{\sigma T^4}{\pi} \qquad (11)$$

$$\ln R = \ln \left(\frac{\sigma}{\pi}\right) + 4 \ln T = \ln \left(\frac{\sigma}{\pi}\right) + 4 \sum_{n=o}^{4} A_n (\ln R_f)^n \qquad (12)$$

where

R_f = filtered radiance (Watts/m^2 sr)(in MATGEN $R_f = N_T$)
R = unfiltered radiance (Watts/m^2 sr)
T = equivalent blackbody temperature (K) (see Attachment B)
σ = Stefan-Boltzmann constant
A_n = regression coefficients determined as indicated in ref. 12

Thus, knowing the filtered radiance and the regression coefficients, the unfiltered radiance can be computed.

Different sets of regression coefficients are used depending on the filtered radiance value. The regression coefficients for equation (12) for the two ranges of filtered radiance values (R_f) is given by:

for a range of $0.005 \le R_f < 17.5$ $Wm^{-2}sr^{-1}$

$A_o = 4.68705$
$A_1 = 2.03572 \times 10^{-1}$
$A_2 = 4.14465 \times 10^{-3}$
$A_3 = -3.24279 \times 10^{-4}$
$A_4 = -5.80911 \times 10^{-5}$

for a range of $17.5 \le R_f \le 30.0$ $Wm^{-2}sr^{-1}$

$A_o = 4.68888$
$A_1 = 2.00549 \times 10^{-1}$
$A_2 = 5.78289 \times 10^{-3}$
$A_3 = -1.18646 \times 10^{-3}$
$A_4 = 1.63483 \times 10^{-4}$

Several special cases apply to filtered radiances less than 30.00 W/m^2 sr).

If $R_f \le 0$, $|R_f|$ is used in the conversion formula and the resulting unfiltered radiance is multiplied by -1.0.

If $R_f < -3.0$ Wm^2sr^{-1} the unfiltered radiance is set "out of range".

If $0.0 \le |R_f| \le 0.005$ the unfiltered radiance is set equal to the filtered radiance.

For telescope readings of the filtered earth irradiance (R_f) greater than 30.0 $Wm^{-2}sr^{-1}$ the unfiltered radiance is computed using the formula:

$$R = b_o + b_1 R_f$$

where:

$b_o = 8.8584$ $Wm^{-2}sr^{-1}$
$b_1 = 1.2291$
In MATGEN $R_f = N_T$

If the filtered radiance is greater than 300.0 $Wm^{-2}sr^{-1}$ the unfiltered radiance value is set "out of range".

ERB-7 Coefficients

The ERB-7 values for S_v and A used in equations (1) and (2) for channels 1 through 9 are:

CHANNEL	S_v	A
1	1.299	+0.07
2	1.275	+0.08
3	1.214	+0.08
4	1.719	+0.07
5	2.424	+0.06
6	6.931	+0.07
7	9.588	+0.03
8	12.715	-0.04
9	30.170	-0.11

For solar channel 9 a correction term of 34 counts is added to V_0.

The constants used for the ERB-7 channel 10c equations (3) and (5) calibration are:

CONSTANT	VALUE
c_f	19.9970
S_0	25.6020
S	0.01834

The constants for the ERB-7 channels 11 and 12 for equation (6) are:

CONSTANT	VALUE
s	0.965
D	0.977
K	0.0031

CONSTANT	CH 11	CH 12 (W)	CH 12 (N)
s	1.49166	1.60700	1.60700
a	0.00115	0.00109	0.00168
V_0	-12.13000	-23.10000	-22.34000
b	- 0.46200	- 0.63800	- 0.65000
F_D	0.80461	0.86280	0.86280
F_s	- - - - -	- - - - -	0.24710
F_T	1.00000	1.00000	1.00000

NOTE: For channel 11 and 12(W), F_s is equal to 0 and $F_T = F_O$.

The constants for ERB-7 channels 13 and 14 for equations (7) and (8) are:

CONSTANT	CH 13	CH 14
V_0	-43.000	-44.000
s	1.939	4.179
A	0.040	0.030

The constants for channels 15 through 18 used in equations (7) and (8) for ERB-7 are:

CHANNEL	V_0	s	A
15	5	3.617	0.0
16	11	4.236	0.0
17	-2	4.550	0.0
18	-1	3.616	0.0

The constants for channels 19-22 for ERB-7 equation (9) are:

CHANNEL	a_0	a_1
19	1.29	0.17728
20	0.90	0.20014
21	0.86	0.17952
22	0.49	0.19331

Appendix A

REFERENCES

(Many of these references must be obtained from Dr. H. L. Kyle, Code 910.2, GSFC)

1 Stowe, L.L. and V.R. Taylor. Emission Characteristics of Earth and Cloud Surfaces as Measured by the ERB Scanning Channels on the Nimbus-7 Satellite, 4th Conf. on Atmos. Rad., Toronto, Canada, June, 1981.

2 Stowe, L.L., H. Jacobowitz and V.R. Taylor. Reflectance Characteristics of Earth and Cloud Surfaces as Measured by the ERB Scanning Channels on the Nimbus-7 Satellite. Pro. of the Intern. Rad. Symp., Aug. 11-16, 1980. Ft. Collins, Colorado.

3 Stowe, L.L., V.R. Taylor, H. Jacobowitz, L Ruff, M. Chen, E. Baldwin, F. Van Cleef, M. Hilland and D. Coleman. A Unique Data Base For Studying Reflectance and Emittance Characteristics of Earth and Cloud Surfaces. Pro. of the Intern. Rad. Symp., August 11-16, 1980, Ft. Collins, Colorado.

4 Stowe, L.L., M. Chen, H. Jacobowitz and L Ruff. Classification of Clouds for the Nimbus Satellite ERB Experiment Using THIR Data. Third Conf. on Atmos. Rad., Davis, California. 1978

5 Davis, P.A. and G.R. Major. An Assessment by Correlative Analysis of the Nimbus-7 ERB Shortwave Scanning Channels. Final Report, Contract NA-80-SAC-00687, Research and Data Systems, Inc., Lanham, MD. 1982

6 Jacobowitz, H., L.L.Stowe, and J.R. Hickey. The Earth Radiation Budget Experiment, Nimbus-7 User's Guide, NASA/GSFC, p. 33. 1978

7 Ibid., p. 33-69.

8 Soule, Harold V., Nimbus 6 and 7 ERB Sensor Details and Component Tests. NASA/GSFC TM 83906, by Research and Data Systems, Lanham, Maryland, under contract NAS 5-26123, Feb. 1983.

9 Nimbus-7, Nimbus Observation Processing System (NOPS) Requirements Document #NG-13, Tape Specification No. T1B4081 ERB MAT, ERB Master Archival Tape, 1982.

10 Dwivedi, P.H., ERB-7 Channel 13 Sensitivity Study: November 1978-October 1979. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland,under contract NAS 5-26123. 1982

11 Ray, S.N., Nimbus Observation Processing System (NOPS) ERB SEFDT Data User's Guide. Prepared by Systems and Applied Sciences Corporation for GSFC under contract NAS 5-26123, October, 1982.

[12] Soule, Harold V., Nimbus-7 ERB MATGEN Science Document. NASA TM 83906 prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123. 1984

[13] Soule, Harold V., Preliminary Report on the ERB Calibration Algorithm History. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123 (in press). 1984

[14] Ardanuy, P.E., ERB-6/ERB-7 WFOV Comparison Study, Preliminary Report, prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, November 1981.

[15] Hickey, J.R., and Karoli, A.R., "Radiometric Calibration for the Earth Radiation Budget Experiment", Appl. Opt., Vol. 13, p. 523, Mar. 1974.

[16] Fromm, M.D. and P.H. Dwivedi, Validation of First Year ERB-7 NFOV Data. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

[17] Groveman, B.S., M.D. Fromm, P.H. Dwivedi and R. Ferraro, Data Validation of ERB-7 MAT Data, November 1978-October 1979 Results, Monthly Reports. Prepared for GSFC by Research and Data Systems, Inc., Lanham, MD., under contract NAS 5-26123. 1981-82, (Reports provided zonal irradiance data).

[18] Discussions of Radiometric Implications of ERB Duty Cycle, Minutes of ERB Calibration Workshop, August 4-5, 1982. GSFC, Greenbelt, Maryland.

[19] Ciannola, R., and F. House, 14th Earth Radiation Budget, Nimbus Experiment Team Minutes, Colorado State University, Florida, Collins, Co. 1979

[20] Ardanuy, P.E., An Estimation of the Effect of Platinum Temperature Monitor Coefficient Errors on the Nimbus-7 Radiance and Irradiance Measurements, Prepared for GSFC, by Research and Data Systems under contract NAS 5-26123 (1981).

[21] Ardanuy, P.E., ERB PTM Coefficient Error Study, ERB Calibration Workshop Minutes, Held at GSFC, Aug. 4-5, 1982.

Appendix A (Cont.)

REFERENCES

The following additional references are also provided and should be available in a scientific library:

Ardanuy, P., and J. Rea (1984), Degradation Asymmetries and Recovery of the Nimbus-7 Earth Radiation Budget Shortwave Radiometer, Special Nimbus 7 issue of Geophys. Res, Spring, 1984.

Ardanuy, P.E., and H. Jacobowitz, A Calibration Technique Combining ERB Parameters from Different Remote Sensing Platforms into a Long-Term Dataset, Special Nimbus 7 issue of Geophys Res, spring, 1984.

Bess, T.D., R.N. Green and G.L. Smith, 1981. Deconvolution of Wide Field of View Radiometer Measurements of Earth Emitted Radiation, Part III: Analysis of First Year of Nimbus-6 ERB Data, J. of the Atmos. Sci., 38, 474-488.

Green, R.N. and G.L. Smith, (1978), "Parameter Estimation Applied to Nimbus-6 Wide Angle Longwave Radiation Measurements", NASA Tech. paper 1307, Dec. 1978.

Green, R.N., (1981), "Comparison of Data Diversion Techniques for Remotely Sensed Wide-Angle Observations of Earth Emitted Radiation", NASA TP 1924, LaRC, Hampton, VA.

Hickey, J.R., B.M. Alton, F.J. Griffin, H. Jacobowitz, P. Pellegrino, R.H. Maschhoff, E.A. Smith and T.H. Vonder Haar, 1982. Extraterrestrial Solar Irradiance Variability, Two and One-Half Years of Measurements from Nimbus-7. Solar Energy, 29, 125-127.

Jacobowitz, H., W.L. Smith, H.B. Howell, F.W. Nagle, and J.R. Hickey, 1979. The First 18 Months of Planetary Radiation Budget Measurements from the Nimbus-6 ERB Experiment. J. Atmos. Sci., 36, 501-507, 1979.

Maschhoff, R., A. Jalink, J. Hickey and J. Swedberg, Nimbus-ERB Earth Flux Sensor Characterization for Improved Data Reduction Fidelity, Special Nimbus 7 issue of Geophys Res, spring, 1984.

Jacobowitz, H., R.J. Tighe, and the Nimbus-7 ERB Experiment Team, The Earth Radiation Budget Derived from the Nimbus-7 ERB Experiment, Special Nimbus 7 issue of Geophys Res, Spring, 1984.

Predmore, R., H. Jacobowitz and J.R. Hickey, Exosphere Cleaning of the ERB Solar Radiometer During Solar Maximum, paper in Spacecraft Contamination Environment, Proceedings of Soc. Photo-optical Inst. Eng. (SPIE) Meeting, Arlington, VA., May 3-7, Vol. 338, pp. 104-113, 1982.

Smith, W.L. J. Hickey, B. Howell, H. Jacobowitz, D.T. Hilleary and A.J. Drummond, Nimbus-6 Earth Radiation Budget Experiment, Appl. Opt., 16, 306-318, 1977.

Appendix B

SUMMARY OF DATA PECULIARITIES FOR ERB-7 MAT's

B1. Contamination of the Channel 18 Signal:

When the channel 18 sensor was in scanning mode the signal became noisy during late December 1978. The number of "out-of-limits" (-10, 370 W/m^2sr) radiance observations increased from much less than one percent of the total radiance observations for a day (approximately 160,000) to about 2 percent of the total data beginning on December 27, 1978 and to 5 percent on December 28, 1978. The abrupt increase in the number of "out-of-limits" observations occurred in orbit 888 on the 27th. The "out-of-limits" observations increased abruptly a second time to about 16 percent after March 5, 1979. The majority of the "out-of-limits" observations were below -10 W/m^2 sr. More details of this analysis are provided in the MAT QC Document (Appendix D) and in reference 16.

In another study, data from the ERB NFOV channels were compared with co-located narrow-band (channel 5) data from the CZCS instrument to perform a cross-check on the inferred ERB calibration adjustments[5]. A correlation analysis of the channel 18 nadir (non-scanning) data and the CZCS data for a limited number of orbits from 12 March to 9 May 1979 reveals that channel 18 nadir radiances were quite useable over this period. The authors did point out that although the ERB and CZCS regression coefficients were reasonably stable there was an increase in the standard deviation of the residuals. This is probably an indication of deterioration in the channel 18 signal during the non-scanning mode; however, more analysis is required to completely evaluate the data. It appears that much of the channel 18 nadir (non-scanning) data for the first year may be useable.

B2. Radiometric Implications of the ERB Duty Cycle

Due to limitations in Spacecraft (S/C) power, a predominately three day on one day off duty cycle was imposed on the Earth Radiation Budget (ERB) experiment for the first year of Nimbus-7 operations. A finite warm-up time of the ERB experiment exists after the ERB electronics are turned on within each duty cycle.

A "warm-up" period is defined by a channel 2 thermopile base temperature of less than $17^{\circ}C$ for the major frame . Major frames in this category are excluded from further processing by the MATRIX program. Typically, this criteria is satisfied after the first few orbits from within the first "ERB-ON" day following each "ERB-OFF" day.

Even after the channel 2 thermopile base temperatuare exceeds $17^{\circ}C$ this phenomona can introduce a cyclic variability in radiometric quantities derived from WFOV irradiances on the MAT. For example, 30 degree zonally averaged irradiances for channels 12-14 for a number of days were analyzed[17]. When the average for various zones were composited according to the day within the ERB Duty Cycle (one, two or three days after an "ERB-OFF" day) and averaged over all 3 day cycles in a typical month, a variability between composite days occurs. This variation was observed to be as much as a 5-10 W/m^2 for channel 13 irradiances. The implication of this is that a time dependent offset exists which is a function of time since the ERB instrument was turned on. This variability has implications to a wide range of products derived from the MAT[18,19].

B3. Contamination of WFOV Data by Sun

The 4 wide field-of-view (WFOV) channels 11-14 are contaminated by direct sunlight at satellite sunrise and sunset. This occurs at a solar zenith angle range of 99°-123° at sunrise and 102°-123° at sunset. Because the maximum field-of-view of the WFOV channels is larger than the solid angle subtended by the earth-disc, there are two periods (spacecraft sunrise and sunset) when solar radiation, shining over the earth horizon, impinges directly on the detectors. The detector output is in this case the net result of two effects: direct-sun and earth reflected/emitted irradiances. Regions where the two signals are mixed are, therefore, physically unrealistic from an earth-flux point of view. These periods are characterized by a large spike in the irradiance time-series and are referred to as "sun-blips".

Though removed through data screening from later processing into gridded data, this contaimination does exist on the MAT. The contamination is contained primarily within subsatellite solar zenith angles of 99° and 123° in the southern hemisphere (sunrise) and 102° and 123° in the northern hemisphere (sunset).

The effect exists longer on channels 13 and 14 than on channel 12 due to the presence of filter domes which: (a) are warmed and re-radiate heat into the detectors and (b) act in a "greenhouse" sense to trap longwave emissions exiting from the detector, which has been warmed by the direct solar radiation.

B4. Calibration of Solar Channels

Solar channel counts used in computing the pre-peak and post-peak offsets required to yield solar observations for all ten channels are subjected to a limit checking process. If the raw counts exceed the specified tolerance limits, default, or "nominal", offsets are applied. The tolerance limits imposed in MATGEN appear, however, to be representative of the pre-peak offset values alone. As a consequence, solar channels 6, 7 and 8 routinely fail the limit checking process for the post-peak offsets. As the default offsets are again representative of pre-peak values, a bias from the "nominal" calibration is introduced. The resultant offset applied to the calibration for these 3 solar channels is thus representative of the pre-peak only, rather than a mean offset.

B5. DSAS Alpha and Beta Angles Equal on MAT

The Digital Solar Aspect Sensor (DSAS) alpha and beta angles on the MAT are occasionally equal to each other near the time of minimum solar elevation angle. The alpha and beta angles have the same non-zero value and are equal to the azimuth angle (beta). The problem occurs in various orbits throughout the first year MAT data set.

B6. DSAS Errors Due to ILT

It was determined that the following MAT's contain "erroneous" DSAS data due to errors on the Image Location Tape (ILT):

January 1, 3, 4, 5, 7, 8, 9, 11, 12, 13
September 9, 10, 12, 13, 14

B7. Channel 11 Shutter Status

The instrument status word on the MAT will occasionally indicate that the channel 11 shutter is open for very short periods of time (e.g., 10 major frames in a day). When these channel 11 irradiances are compared with those for channel 12 the channel 11 data shows very poor agreement. Thus, the instrument status word may be in error in reporting that the channel 11 shutter is actually open.

B8. ERB/Scanner Duty Cycle

The normal duty cycle for the ERB instrument and for the scanner has been 3 days on/1 day off. However, due to interference from the LIMS instrument and power constraints this duty cycle had to be curtailed from December 1978 to May 1979. The ERB and scanner duty cycles for the first data year are summarized in Table 5. The reduction in the operation of the ERB scanner in January-February 1979 resulted in a sampling problem of descending node data in the Northern Hemisphere.

B9. Scan-head Alpha and Beta angles

In current Nimbus-7 MATGEN codes, the unpacked input values of the scan head alpha angles are written on the MAT. The beta angles written are, in contrast, "ideal" beta values obtained by checking the input beta values against default values and replacing any which differ by more than a tolerance factor with the default values. This comparison and filling of the "ideal" beta angle array is performed in subroutine BETVFY* which is called by PROSCN*. PROSCN is called only for VIP frames when a scan is being performed. Thus, the array of "ideal" beta values is only defined when the scanner is on but is written to the MAT in all cases. The array written on the MAT could contain uninitialized values or the values left from the last scanning VIP. The beta values could be used in subsequent location of the scan channel while the scanner is in nadir position. All internal location routines give correct results since they only use the ideal values if these values are defined. This results in beta encoder values written to the MAT which are unreliable in all modes except the 5 scan modes (e.g., Nadir, LW check, SW check, etc).

---

*These are MATGEN subroutines.

Table 5

ERB INSTRUMENT/SCANNER DUTY CYCLE

DATE	ERB INSTRUMENT*	SCANNER*	COMMENT
November 16-December 8, 1978	3/1	3/1	
December 10, 1978-January 21, 1979	3/1	2/1	12/30/78-1/21/79 Scanner "ON" for about 70% of data in day.
January 23-February 6, 1979	1/1	1/1	Scanner "OFF" for scattered periods.
February 8-22 1979	3/1	2/1	Scanner on for about 70% of data in day.
February 24,26, 1979	1/1	"OFF"	Scanner "OFF" for two days.
February 28-March 30, 1979	3/1	2/1	Scanner "OFF" for scattered periods
April 1-13, 1979	1/1	"OFF"	Scanner "OFF" during entire period.
April 14-29, 1979	3/1	3/1	ERB and scanner "ON" for extended periods 4/14-4/19, 4/26-4/29.
May 1, 1979	1/1	1/1	Scanner "OFF:
May 3-5, 1979	3/1	3/1	Scanner "ON" all days.
May 7-9, 1979	3/1	1/1	Scanner "ON" for May 8 only.
May 11, 1979	1/1	1/1	Scanner "ON"
May 13-15, 1979	3/1	3/1	Scanner "ON" all days
May 17, 1979	1/1	1/1	Scanner "ON"
May 19-October 31, 1979	3/1	3/1	Scanner "ON"

* Number of days "ON/OFF".

B10. Dome and Instrument Heating of Channels 13 and 14

The presence of the filter dome sets on the shortwave channel 13 and near-infrared channel 14 wide field-of-view radiometers introduces additional terms into the irradiance calibration equation. These are (1) a correction for incident longwave flux upon the detector after inward emission from the innermost filter dome and (2) a correction for a thermal wave within the module after absorption of a portion of the incident scene reflected and/or direct solar shortwave radiation.

Because this term is modeled as a constant offset in the MATGEN level calibration, variablility in the temperature of the inner dome (and therefore the longwave radiation incident upon the detector) causes a bias in the calibrated irradiance output from the respective channels. Warmer, or colder than nominal domes produce calibrated shortwave irradiance values indicative of a greater, or lesser, amount of shortwave incident radiation respectively. Channel 14 also experiences additional thermal forcing induced by the shortwave absorption from the middle near-infrared filter dome.

In practice, a post-calibration adjustment table derived from comparisons with scanning channel integrals is used to correct for this and other imperfect sensor characteristics.

B11. Platinum Temperature Monitor (PTM) Coefficient Error

Due to the erroneous use of engineering coefficients in the calibration equations for the platinum temperature monitors (PTM's), some error has been introduced into the terrestrial radiance and irradiance observations of the ERB-7. The channels affected are the wide field of view (WFOV) total channels 11-12 and the narrow field of view (NFOV) longwave channels 19-22.

Through application of the NOAA Calibration Adjustment Table (CAT), derived with this contamination in all longwave radiation estimates, all earth-flux data is affected (channels 11-22). The error magnitude appears to be in the 0.25% range for channels 11 and 12 and in the 1.5% range for channels 13-22.[20,21]

Appendix C

LIST OF ACRONYMS

CAT	Calibration Adjustment Table
CZCS	Coastal Zone Color Scanner
ERB	Earth Radiation Budget
FOV	Field of View
GMT	Greenwich Mean Time
GSFC	Goddard Space Flight Center
IFOV	Instantaneous Field-of-View
ILT	Image Location Tape
IPCIV	International Pyrheliometric Comparison IV
IPD	Information Processing Division
IPS	International Pyheliometric Scale
LIMS	Limb Infrared Monitor of the Stratosphere
MAT	Map Archival Tape
MATRIX	Mapped Data Matrix
MetOCC	Meteorological Operations Control Center
MF	Major Frame
NASA	National Aeronautics and Space Administration
NIP	Normal Incidence Pyrheliometers
NET	Nimbus Experiment Team(s)
NFOV	Narrow Field of View
NOAA	National Oceanic and Atmospheric Administration
NOPS	Nimbus Observation Processing System
NSSDC	National Space Science Data Center
RSM	Reference Sensor Models
SACC	Science and Applications Computer Center
SAM II	Stratospheric and Aerosol Measurement II
SAMS	Stratospheric and Mesospheric Sounder
SBUV/TOMS	Solar Backscattered Ultraviolet/Total Ozone Mapping Spectrometer
S/C	Spacecraft
SMMR	Scanning Multichannel Microwave Radiometer
SSP	Sub Satellite Point
TECB	Total Earth-flux Channel Blackbody

THIR	Temperature-Humidity Infrared Radiometer
VIP	Versatile Information Processor
WFOV	Wide Field of View
WM^{-2}	Watts per square meter
WRR	World Radiometric Reference

Appendix D

NIMBUS-7 EARTH RADIATION BUDGET
MASTER ARCHIVAL TAPE
QUALITY CONTROL DOCUMENT
YEAR 1:

NOVEMBER 16, 1978 - OCTOBER 31, 1979

RDS TR-82-08-04

PREFACE

This document will provide specific details regarding the scientific validity and quality of ERB-7 Master Archival Tape (MAT) data to the scientific user. The MAT data analyzed in this report covers the period from November 16, 1978 to October 31, 1979. This data set is referred to as Year 1 MAT data. The information given in this document was compiled from various sources but primarily through the results of checking each MAT with the ERB-7 Data Validation (MATQC) and the Narrow Field-of-View Quality Control (NFOVQC) programs. This report identifies problems with specific MAT's as well as provides an overview of the data in general. If additional information is necessary for using the MAT data, a more detailed analysis of each MAT has been compiled in twelve separate monthly Data Validation Reports available through Dr. H. Lee Kyle, Special Projects Office, National Aeronautics and Space Administration, Greenbelt, Maryland, 20771.

Appendix D

Table of Contents

Table of Contents (continued)

FIRST YEAR MAT DATA QUALITY TABLES

1.0 INTRODUCTION

1.1 Objective of Quality Control

The objective of the quality control (QC) was to examine each Nimbus-7 Earth Radiation Budget (ERB-7) Master Archival Tape (MAT) for Year 1 and check each logical (major frame), orbital summary and daily summary record for scientific validity and overall consistency of the data. The ERB-7 MAT Data Validation Programs (MATQC and NFOVQC) were developed to analyze MAT data and compile various QC parameters for each orbit and day. This included the extraction of the orbital and daily summaries from each MAT and then the writing of this data to a separate output tape. In addition, numerous data from each record on the MAT is printed out for further manual inspection. These output tapes were used to examine the QC parameters on an orbital, daily and monthly basis. The analysis of this data has provided the basis for the MAT data validation process.

1.2 Overview of MAT Data for Year One: November 16, 1978-October 31, 1979

The MAT's for the first ERB data year have been processed by the Nimbus Observation Processing System (NOPS) at the Goddard Space Flight Center (GSFC). The MAT's are then sent for archiving at the National Space Science Data Center (NSSDC) where the tapes are made available to the scientific community. During the first data year the ERB instrument operated on a predominantly 3 day on/1 day off duty cycle. This duty cycle resulted in the processing of 255 tapes (one data day per tape) for the year.

Each MAT generally consists of at least 13 or 14 orbits of data, except in cases where complete orbits were not available for processing. The beginning of a data day on a MAT is defined by the first orbit that starts[1] after Greenwich midnight on the data day. Therefore, if an orbit begins just before midnight, the orbit would appear on the MAT for the day on which the orbit began although the majority of

---

[1] Each orbit is nominally centered about its ascending node and starts and stops at the surrounding two descending nodes.

the data contained in the orbit may be for the next day. The orbit numbers found on each of the MAT's along with the sequence number and version number of the algorithm that created the MAT are found in the summary table of the ERB Experiment/Instrument in Section 3.0. The scientific user should be sure that the sequence/version number of the MAT agrees with the number listed in Section 3.0 since a previous sequence or version numbered MAT may contain different data from the final MAT.

1.2.1 Summary of Quality Checks

The overall consistency of the format of the first year of MAT's is excellent, although there are several anomalies about which the user should be aware. These problems should not present any constraints towards the use of the data tapes. The format/data anomalies for the first year MAT data set are summarized below.

The Julian start date given in each orbital summary has been found to contain incorrect dates in many orbital summaries on year one MAT's. These start dates will give the Julian date as one greater than the actual date. This date problem has occurred on 65 MAT's in the first year (see Sections 2.2.1 and 3.0 for a list of the affected MAT's and orbits). In all of these cases the Julian date given in the first major frame record on the MAT in the affected orbits is the correct date.

As a result of the duplication process of the MAT's by the NASA/GSFC Information Processing Division (IPD) the number of physical data records on the "user copy" MAT is not always the same number as on the original. This problem is identified by counting the number of logical records in an orbit and comparing this with the number of major frames listed in the corresponding orbital summary. If the number of logical records on a MAT is less than the number of major frames listed in the orbital summary then a "physical record" was lost in the copy process of the MAT. This record "drop-out" problem has occurred on approximately 20 first year MAT's received from GSFC/IPD. These missing records have all occurred randomly and have all contained major-frame records. It is suggested that the user check each MAT received to identify missing physical records as this will result in discrepancies in the orbital summary major frame counter. If the missing record contains an orbital or daily summary the user should notify GSFC and request a different copy of the MAT.

There are five MAT's which originally contained subsatellite point (SSP) location errors. The affected major frames on the appropriate MAT's were "filled". These MAT's are listed in the ERB Summary Table in Section 3.0 on page 72. There are also numerous missing orbits which have also been identified in the Summary Table.

1.2.2 Summary of Data Checks

The wide field-of-view (WFOV) digital count and irradiance data for channels 12-14 and the narrow field-of-view (NFOV) radiance data for channels 15-22 (with the exception of channel 18 after December 27, 1978) were all found to be within physically acceptable limits. The count and irradiance observations for channels 12-14 for the first year of MAT data have each been screened against representative threshold values and the number of observations "out-of-limits" for each orbit have been tabulated. The majority of these "out-of-limits" observations can be accounted for by the behavior of the ERB instrument. On an average daily basis the number of channel 12-14 irradiance observations "out-of-limits" is about one percent of the data. For the NFOV radiance data each observation was also checked against representative threshold values on a channel by channel basis. This procedure was used to randomly screen NFOV data for approximately one-third of the first year MAT data set. The results of this data checking have shown that the number of channel 15-22 observations "out-of-limits" is less than one percent of the total data on an average for a day. For channel 18 radiance data the "out-of-limits" observations increased to about 2 percent on December 27, 1978, 7 percent on December 28, 1978 and to 16 percent after March 5, 1979. The user is therefore cautioned against using channel 18 scanning data after December 27, 1978.

The irradiances from the MAT's were also used to compute 10° and 30° zonal averages for each "ERB-ON" day in the first year. The irradiance data was screened for "out-of-limits" observations and for "abnormal" instrument behavior (e.g. channel 12 shutter closed, GO/NO GO heater test etc.). Examination of the 30° zonal average irradiances for year one data reveals a systematic bias, for channel 13 and 14 irradiance data, induced by the 3 day on/1 day off ERB duty cycle. This phenomona is a function of the time rate of change of the module temperatures ~~and results in as much~~ as a 5 to 10 W/m^2 (channel 13) and a 1-3 W/m^2 (channel 14) ~~difference between latitude~~ averaged irradiances when comparing data for the first day and third day after the ERB instrument is turned on.

2.0 SUMMARY OF QUALITY CONTROL PARAMETERS

2.1 Description of Parameters The ERB-7 MAT Data Validation (MATQC) and the NFOV Validation (NFOVQC) Programs were developed for NASA/GSFC to scientifically evaluate the MAT data set. The MATQC program checks the overall format of each MAT, the WFOV digital count and irradiance data and also performs various other ancillary data checks. The NFOVQC program provides a check of the NFOV radiance data, location checks and examines the associated "data quality bit flags" for approximately one-third of the first year MAT's. The various parameters which are compiled along with the orbital and daily summaries from the MAT's (MATQC) are written to separate output tapes to facilitate the analysis of the quality control (QC) data over time periods longer than one day.

The parameters which are compiled by the MATQC program are listed in Table 1 (page 59). These parameters are written to an output tape for each orbit and day (one MAT) along with the orbital and daily summaries from the respective MAT's analyzed. The parameters compiled by the NFOVQC program, listed in Table 2 (page 60), are also written on an orbital and daily basis to a separate output tape.

The MATQC program provides various other checks on each MAT and also prints-out numerous ancillary data which is examined manually. The information compiled by the program is summarized below.

2.1.1 Summary of MATQC Elements

- Format checks
- "Out-of-Limits" digital count/irradiance checks
- Instrument status checks
- Computation of 10° and 30° zonal average irradiances along with the number of major frame samples and the standard deviation of the irradiances in each 10° and 30° band.
- The major frame subsatellite point latitudes and longitudes are located on a 4.5° by 4.5° grid for each MAT. The number of major frames located in each grid square are plotted and then manually checked for gross mislocations.

Table 1

LIST OF QC PARAMETERS COMPILED BY ERB-7 MAT DATA VALIDATION PROGRAM (MATQC)

Orbit Number/Julian Day
LR Date Check
Daily Summary Check
Orbital Summary Check
Number of Orbits Check
Number LR/MF Check
Number Data Gaps in Orbit/Day
Number of Missing MF in Orbit/Day
Digital Counts observations "out-of-limits" for Channels 12-14
Major frames with irradiances "out-of-limits" for Channels 12-14
Major frames with solar zenith angle between 99°-123° (sunrise) or 102°-123° (sunset)
Major frames with the ~~Earth Flux Channels~~ (11-14) Flag not equal to zero
Number of LR out-of-time-sequence in Orbit/Day
Data gap between the orbit and the previous orbit
Number of orbits with data gaps between the orbit and the previous orbit
Number of missing major frames between the orbit and the previous orbit
Number of missing major frames ~~from~~ between orbits in the day
Number of major frames in each of the five ERB scan modes for the Orbit/Day
Irradiance observations "out-of-limits" in solar blip for channels 12-14
Total Irradiance observations "out-of-limits" for channels 12-14
Irradiance observations within 10% of lower limit, 10% of the upper limit for channels 12-14
Digital counts observations within 10% of lower limit, 10% of upper limit for channels 12-14
Irradiance observations in solar blip within 10% of the upper limit for channels 12-14
Irradiance observations greater than 10% above the upper limit for channels 12-14
Number of major frames in orbit/day with:
- Channel 12 FOV narrow
- Channel 11 shutter open
- Channel 12 shutter closed
- Go/No Go heater on (includes 40 major frames after heater is turned on for the last time)
- Electronic calibration on
- ERB "Warm-up" period
- Rejected for any of the WFOV data screens
- Number of major frames in day which are used in the 30° zonal average irradiance computation for channels 12, 13, 14

Missing Orbit Numbers

Table 2

LIST OF QC PARAMETERS COMPILED BY NFOV DATA VALIDATION PROGRAM (NFOVQC)

Number of radiance observations "out-of-limits" (ch. 15-22)
Number of radiance observations within 10% of lower and upper "out-of-limits" thresholds (ch. 15-22)
Number of radiance observations exceeding 10% of the lower and upper "out-of-limits" thresholds (ch. 15-22)
Number of occurrences of "out-of-limits" observations and the corresponding Data Quality Loss Interval (DQLI) bit flag (ch. 15-22)
Number of "out-of-limits" observations with no DQLI bit flag set (ch. 15-22)
Number of occurrences of DQLI flag with no "out-of-limits" observation (ch. 15-22)
Number of "valid" radiance observations (ch. 15-22)
Number of total radiance observations (ch. 15-22)
Number of times/major frames platinum temperature DQLI flags are set (ch. 19-22)
Number of times the FOV latitude, longitude is undefined (equal to 222.22 on MAT) for SW/LW pairs ch. 15/19, 16/20, 17/21, 18/22
Number of major frames on MAT
Number of major frames with scanner on
Number of times alpha encoder values are more than one count off the nominal and also greater than 266.
Number of major frames when there is "bad" alpha encoder data for three consecutive major frames.

- Solar data for each orbit is manually checked. The average counts at the time of the solar peak found in each orbital summary for channels 1-10 are printed-out from each MAT. Orbits which do not contain any solar data are identified.
- The following major frame data is printed-out for manual inspection: (1) Greenwich mean time, (2) geodetic latitude, longitude, (3) average irradiance of the 4 observations in the major frame for channels 12-14, (4) solar zenith angle, (5) DSAS elevation (alpha) and azimuth (beta) angles, (6) channel 2 thermopile base temperature, (7) Greenwich hour angle, (8) instrument status word.

2.2 Summary of Results

2.2.1 Format

The overall consistency of the format of the first year MAT data set is excellent. There were several anomalies that were identified through the validation process. These items are summarized below.

2.2.1.1 Orbital Summary Start Dates

The Julian date of the first major frame was compared to the start date in the orbital summary record for each orbit on the MAT's. This check revealed that the orbital summary dates were incorrect for at least one orbit on 65 MAT's. The affected orbits contained a start date which was one day greater than the actual date. The affected MAT's are summarized below and the specific orbits are listed in the table in Section 3.0.

November 16
December 10, 11, 19
January 8, 11, 13, 15, 17, 20, 23
February 12, 17
March 2, 5, 29
April 21, 29
May 8, 13, 14, 17, 19 23, 24, 27 29

June 2, 4, 5, 6, 9, ~~10, 16,~~ 21, 26
~~July 19, 20, 23, 24, 30~~
August 4, 9, ~~16, 20, 21, 24,~~ 27
September 6, ~~9, 12, 17, 18,~~ 20, 22, 28, 29
October 2, 3, 4, 10, 15, 26, 27, 31

2.2.1.2 Missing Physical Records

The quality control of the first ~~year MAT's has identified~~ several MAT's with missing physical record(s) from the ~~original tapes.~~ The missing records are identified by a 2 major frame data gap and by the fact that the physical record number of those major frames that are lost will be omitted from the tape. The user should be aware of the possibility of a missing record. About 8 percent of the first year MAT's had one or more physical records missing.

2.2.1.3 Header Error

There were five MAT's which originally contained several major frame location errors of the subsatellite point (SSP) latitude and longitude. These location problems stemmed from errors in the position vector of the spacecraft on the Image Location Tape (ILT). The major ~~frames on~~ these five MAT's which are affected by this problem where denoted by filling the SSP latitudes and longitudes with a value of "22222" (see MAT User's Guide, Tape Specifications Document for further details of filled data). The "filled" records were also denoted in the header record of each MAT. The "MF" (major frame) number of the filled records from the beginning of the MAT is given in the header. The MF label is incorrect and the record numbers actually refer to the "LR" (logical record) number from the beginning of the MAT. This LR number counts orbital summary records in the value given. The "filled" records should be ignored and the data contained in these records omitted from scientific studies. The dates and sequence numbers of the affected MAT's are listed below:

April 7, 1979	AC90971B3 V9
April 26, 1979	AC91161B3 V7
June 5, 1979	AC91561A3 V9
August 8, 1979	AC92201A3 V9
October 22, 1979	AC92951B3 V9

2.2.1.4 Missing Data

The MAT's were each checked to identify existing data gaps. An attempt was made to recover additional data and regenerate a MAT if the gap was approximately two orbits or more in length. ~~In many instances~~ the missing data could not be recovered. The number of ~~major frames of data~~ that are missing from within or between orbits on the MAT's has been tabulated by the MATQC program (See Table D-5 on page 98). On an average basis for each MAT the percentage of missing data for the first data year was only several percent. There were several scattered MAT's which were missing greater than 20% of the expected data. In addition, several MAT's are missing a complete orbit(s) of data. The orbits found on each of the MAT's and the orbits which are missing are all listed in the table in Section 3.0. The following are dates of the MAT's missing one or more orbits.

December 4, 28, 31
January 15, 27, 31
February 6, 18, 22, 26, 28
March 18, 30
April 25, 26
May 20, 25, 28
June 1, 8, 13, 20, 24
~~July 14,~~ 15, 22
~~August 25~~
September 1, 9, 17, 26
October 3, 6, 7, 11, 14, 20, 22

2.2.2 Ancillary Data

There were various parameters on the first year MAT's that were checked for scientific validity. In general, all data was found to be within physically acceptable limits. There are a few anomalies identified for various parameters which are summarized below.

2.2.2.1 Solar Zenith Angle

The solar zenith angle (SZA) of each major frame is checked to identify and "screen-out" the "solar blip" which contaminates the WFOV data. The SZA range is 99^{o}-123^{o} for satellite sunrise and 102^{o}-123^{o} for sunset. The number of major frames in each orbit and on each MAT in this SZA range are tabulated by the MATQC program. The results for each day are summarized in Table D-2, on page 91. The nominal value of major frames in this SZA range for a day is between 600-700. The lower than nominal values result from missing data at the time of the "solar blip".

The SZA on the MAT's was also found to be "out-of-limits" for a group of orbits in January and September 1979[1]. The SZA for the affected orbits was found to be within a degree of the SZA threshold (+180°) and occurred mostly for SZA's near 180°. The affected orbits are listed in Table D-2 and the dates of the MAT's are listed below.

January 3, 4, 5, 7 8
September 24, 26, 28

In the processing of the MAT's (MATGEN) a +4/10 degree bias was introduced in the solar zenith angle placed on the MAT's. This bias results from a "round-up" error to the tenths place of the SZA when it is stored on the MAT. This anomaly may also have caused the SZA to be slightly "out-of-limits" on the days noted above. This bias should not result in any constraints towards the scientific utility of this data.

2.2.2.2 Solar Azimuth Angle

The solar azimuth angle (SAA) on the MAT's was found to be "out-of-limits" (±180°) on several groups of orbits for January and September 1979[1]. —The SAA's were also found to be within a degree of the threshold. The affected orbits are also listed in Table D-3 on page 92 and the dates of the MAT's are listed below.

January 1, 3, 4, 5, 7 8
September 24, 25, 26, 28, 29

2.2.2.3 DSAS Alpha and Beta Angles

The DSAS alpha and beta angles on the first year MAT's were found to be "out-of-limits" for only several days in the first year. The affected MAT's are found during the periods January 1-13 and September 9-12. In addition, occasionally when the DSAS alpha angle passes through 0° the alpha and beta angles may be equal and non-zero. The user should be aware of this anomaly if the DSAS data is used for further scientific studies.

---

[1] Solar Earth Flux Data Tape (SEFDT), Nimbus Observation Processing System (NOPS) Quality Control Report, Prepared by Systems and Applied Sciences Corp, July 1982.

2.2.2.4 Solar Data

The average counts at the time of the solar peak for each orbit (given in the orbital summary) are examined for solar channels 1-10. The data is checked to determine consistency within each channel over the orbits in a day and to identify "fill" data when the peak could not be found. In ~~nearly all cases,~~ when an orbital summary contained a "fill" value for a ~~particular channel the major~~ frame data around the time of the solar observation was missing from the MAT. An explanation for missing solar data when the major frame data is present on the MAT has not been determined. The average counts at the time of the solar peak for year 1 MAT data were all found to be within physically acceptable limits. The following is a list of the dates of the MAT's which contain at least one orbit with no solar data. The specific orbits are listed in Table D-1 ~~on page 88.~~

November 16, 20, 21

December 2, 3, 11

January 11, 15, 19 23
February 12, 13, 17, 26, 28
March 2, 4, 9 10, 14, 20, 22, 25, 26, 29
April 1, 3, 15, 16, 21, 27, 28, 29

May 1, 3, 8, 9, 13, 14, 17, 19, 21, 23, 24, 25, 28
June 1, 4, 8, 9, 10, 12, 13, 16, 20, 24, 25, 26, 28, 29, 30

July 2, 3, 4, 6, 7, 16, 20, 22, 23, 24
August 4, 5, 7, 8, 15, 17, 20, 21, 24, 27, 31
September 6, 8, 9, 10, 14, 16, 17, 18, 22, 25, 26, 28
October 2, 4, 6, 7, 14, 20, 27, 31

2.2.3 WFOV/NFOV Data

The WFOV digital count and irradiance data for channels 12-14 and NFOV radiance data for channels 15-22 were checked for data "out-of-limits". The WFOV data was checked for each MAT in the first year and the NFOV data was analyzed for approximately one-third of the total data set. The digital ~~count and irradiance~~ thresholds that were used to screen "out-of-limits" observations for WFOV data is as follows:

WFOV "Out-of-Limits" Thresholds[1]

	LL, UL (W/m^2)	LL, UL (counts)
Channel 12	100,550	-450,300
Channel 13	-10,400	-65,735
Channel 14	-10,240	-85,1000

---

[1] LL Lower limit, UL Upper limit, Note: Lower limit (-10%) thresholds for channels 13, 14 and 15-22 were decreased to give more meaningful results.

	10% Thresholds LL, UL (W/m^2)	LL, UL (counts)
Channel 12	90,600	-500,330
Channel 13	-20,440	-85,840
Channel 14	-20,265	-130,1100

The number of observations "out-of-limits", within 10% of the lower and upper thresholds, and exceeding the upper 10% threshold are tabulated by the MATQC program for each channel 12-14 for each orbit and day. The NFOV radiance "out-of-limits" thresholds are as follows:

NFOV "Out-of-Limits Thresholds[1]

	LL, UL (W/m^2 ster)
Channels 15-18	-10,370
Channels 19-22	-10,180

10% Thresholds

	LL, UL (W/m^2 ster)
Channels 15-18	-20,400
Channels 19-22	-20,200

The number of observations "out-of-limits", within 10% of the lower and upper thresholds and exceeding the 10% lower and upper thresholds for channels 15-22 are tabulated by the NFOVQC program for each orbit and day.

The results of the WFOV/NFOV data checking are summarized in Tables D-4, D-5 and D-8 on pages 93, 98 and 111 respectively. These tables contain the number of irradiance observations "out-of-limits" for each day and the number of radiance observations "out-of-limits" for about one-third of the MAT days in year one.

2.2.3.1 WFOV Data "Out-of-Limits"

The WFOV channel 12-14 irradiance and digital count data for the first year of MAT data are all within physically acceptable limits and are of high quality. The number of irradiance observations "out-of-limits" for the WFOV channels 12-14 is less than 2 percent on an average daily basis. A large percentage of the irradiance

---

1 LL Lower limit, UL Upper limit, Note: Lower limit (-10%) thresholds for channels 13, 14 and 15-22 were decreased to give more meaningful results.

data "out-of-limits" is within 10% of the upper and/or lower thresholds particularly for channels 12 and 13. The percentage of data "out-of-limits" for channel 14 is much less than one percent on an average daily basis.

The majority of the channel 12 observations ~~within 10% of the lower~~ threshold (90-100 W/m^2) are the result of the channel 12 ~~Field-of-View (FOV) in~~ its narrow mode. The majority of the channel 12 and 13 observations within 10% of the upper threshold occur primarily in the ascending half of the orbit at varying latitudes and appear to be valid data. The majority of the ~~channel 13 observations~~ within 10% of the lower threshold occur primarily in the decending half of the orbit and result from the night-time shift in the zero-level offset of the detector. In general, a large percentage the of detector "out-of-limits" observations result from the various instrument tests, i.e. GO/NO GO heater and electronic calibrations, and are therefore accounted for by the behavior of the instrument.

The digital count data was also checked against appropriate thresholds and was also found to be within physically acceptable limits. Comparison of the number of digital count observations "out-of-limits" with the number of irradiance observations "out-of-limits" reveals some minor discrepancies. The number of digital count and irradiance observations "out-of-limits" for channel 14 agree very well. The digital count values, in general, underestimate the irradiance values for channel 12 and 13. For channel 12 this is due to a much stronger temperature dependence between the digital counts and the irradiances. This results in a substantial difference between the irradiance values which correspond to the digital count thresholds which are used for checking. ~~For channel~~ 13, the digital count values will underestimate the irradiance values when there are a large number of "out-of-limits" observations near the lower threshold of -10 W/m^2. This is because an irradiance of -10 W/m^2 corresponds to a digital count of about 61.5 and the lower count threshold is -65. The user should be aware of these discrepancies when trying to compare the results of the count and irradiance data checking.

The largest number of irradiance observations "out-of-limits" occurs on April 13 and 21 when 5-6% of the channel 13 and 14 irradiance observations were below the 10% threshold (-20 W/m^2). These low irradiance observations result from the

GO/NO GO heater test on for 615 and 583 major frames during each day respectively. In summary, the irradiance observations "out-of-limits" on the first year MAT's can all be explained by the characteristics of the ERB instrument. **The WFOV digital count and irradiance data for channels 12-14 is therefore acceptable for further scientific study.**

2.2.3.2 NFOV Data "Out-of-Limits"

The NFOVQC program was used to analyze 89 first year MAT's or about one-third of the entire MAT data set. The number of NFOV (channel 15-22) radiance observations "out-of-limits" represents approximately 0.1%(except channel 18) of the total data for an average day (See Table D-5 on page 98). The shortwave channels (15-18) had a somewhat larger number of "out-of-limits" observations than for the longwave channels (19-22).

There are no days analyzed where the "out-of-limits" observations exceeded 1% of the total data except for channel 18. A considerable portion of the "out-of-limits" observations occur near the thresholds for the shortwave channels only. The majority of the shortwave "out-of-limits" data exceeds the upper radiance threshold while the longwave "out-of-limits" data exceed the lower threshold. **All NFOV (Channel 15-22) radiance data (except for channel 18 after December 27, 1978) is therefore acceptable for further scientific analyses.**

2.2.3.3 Channel 18 Signal Contamination

The number of radiance observations "out-of-limits" for channel 18 abruptly increases on December 27, 1978 (day 361) to about 2 percent of the total data (approximately 3500 observations) and to about 7 percent on December 28, 1978 (day 362). The "out-of-limits" observations remain stable (about 8-10%) from late December 1978 to just after March 5 1979 (day 64) when they steadily increase to between 25-28,000 observations per day representing between 16-18% of the total data. The "out-of-limits" observations are nearly all below the lower threshold of -10 W/m^2 ster.

Figure 1 is an illustration of the orbit by orbit change of the number of channel 18 "out-of-limits" observations for December 26-28, 1978 (days 360, 361 and 362). The increase in "out-of-limits" observations begins near orbit 889 on December 27 (day 361). Figure 2 is a plot by day of the number of negative channel 18 "out-of-limits" observations from February to April 1979. After day 64 the number of "out-of-limits" observations increases suddenly and then remains high through the remainder of the year. It is therefore suggested that channel 18 scanning data not be used for scientific analysis after December 27, 1978.

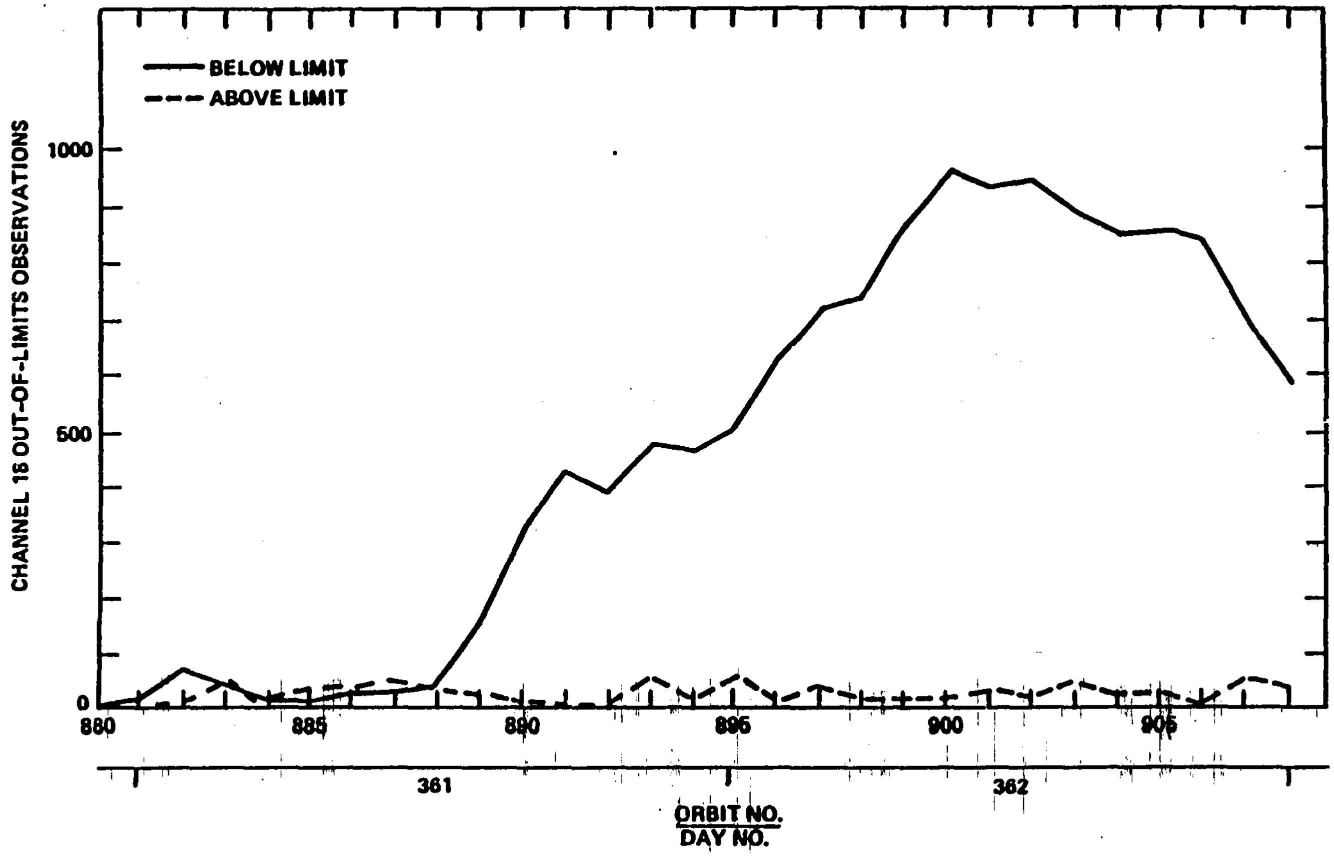


Figure 1 Number of Channel 18 "Out-of-Limits" Observations for December 26-28, 1978, (Ref. Fromm and Dwivedi, 1982).

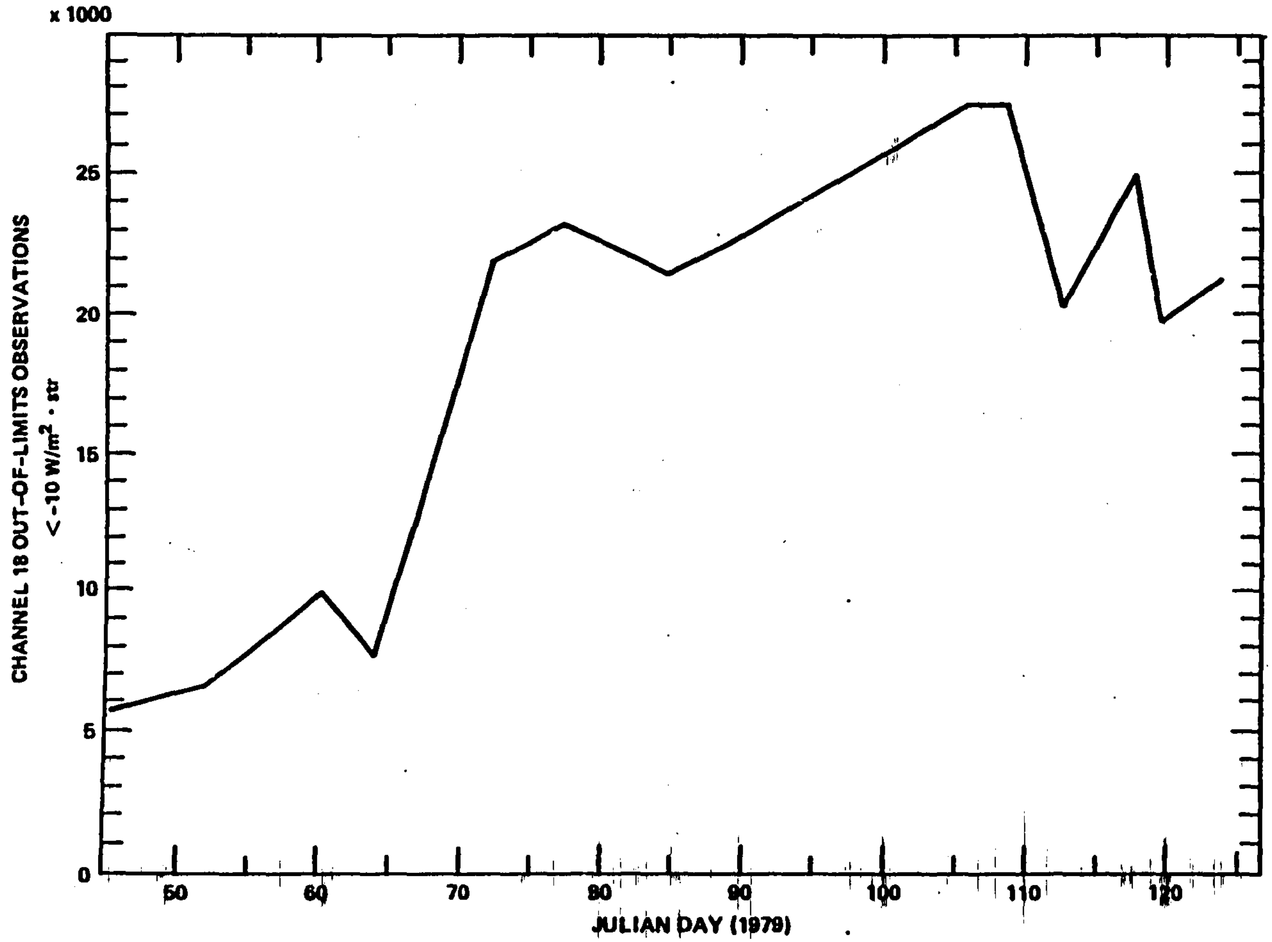


Figure 2 Number of Channel 18 "Out-of-Limits" Observations for February-May 1979, (Ref. Fromm and Dwivedi, 1982).

3.0 SUMMARY TABLE OF ERB EXPERIMENT/INSTRUMENT CHARACTERISTICS FOR YEAR ONE MAT DATA

The following pages contain monthly summaries of the available ERB-7 MAT's for the first year of data (November 1978 - October 1979). The Julian and calendar dates of the MAT's, along with the sequence and version number of the scientific algorithm that created the tape (MATGEN Version Number) are provided in this table[1]. The dates that do not have a MAT available due to the ERB instrument being "OFF" are also indicated on the summary table. In addition, a notation of any special characteristics or anomalies of the experiment (e.g., calibration of WFOV channels 11,12), the particular MAT (e.g., missing orbits, incorrect orbital summary start dates) and/or data peculiarities (e.g., large number of radiances/irradiances "out-of-limits") are summarized for each MAT day.

3.1 Legend For ERB Experiment/Instrument Characteristics Table

ACRONYM	DESCRIPTION
11P	Channel 11 Shutter Open (> 20 Major Frames)
12C	Channel 12 Shutter Closed (> 20 Major Frames)
12N	Channel 12 FOV Narrow (> 20 Major Frames)
WU	ERB "Warm-Up" Period
EC	Electronic Calibrations (> 10 Major Frames)
G/N	GO/NO GO Heater Testing (> 40 Major Frames)
OSD(#)	Orbital Summary start date is incorrect (Orbit Number)
CAL12	Channel 11, 12 Calibration
PUP	Spacecraft Pitch-Up Maneuver
G/N (#MFS)	GO/NO GO Heater Test Performed (Duration of test period in major frames)
EC (#MFS)	Electronic Calibrations Performed (duration of calibration period in major frames)
MO (##)	Missing Orbit(s) from the MAT
DSAS	Indicates problems with DSAS Alpha/Beta angles on MAT
HD	Several Subsatellite Point Latitudes, Longitudes are filled with a value of "22222". The Header Record label "MF" (Major Frame) should be "LR" (Logical Record) indicating the Logical Record number(s) of the "Filled" data. The data contained in these filled records should be ignored.

----

[1] Any MAT's with sequence numbers different from those published in this Table (as contained in the header record) must be considered invalid by the user.

ACRONYM	DESCRIPTION
SZA	Solar Zenith Angles "Out-of-Limits" ($\pm 180^{\circ}$)
SAA	Solar Azimuth Angles "Out-of-Limits" ($\pm 180^{\circ}$)
*	1% Occurrence

The percentage of major frames in each ERB scan mode was obtained by dividing the total number of major frames in each mode by the total number of major frames on each MAT. The percentages are rounded-off to the nearest whole percent. The sum of the percentages for the 5 scan modes will yield the percentage of time that the scanner was on for the day (subtraction of the "ON" time from 100% will yield the percentage of time with scanner off for the day).

3.2 Monthly ERB Summary Tables

The tables on pages 74 through 85 summarize on a monthly basis the available ERB-7 MAT's for the first year of data.

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY:

NOVEMBER 1978

Date	Julian Day	Sequence #	Var. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16	320	ACB3201-3	9	315-328	*	0	0	0	47	12N, 11P, 12C, G/N, WU	5153	G/N (222), CAL12	OSD (320,321, 32N)
17	321	ACB3211-3	4	329-341	15	8	10	18	32	12N	4796		
18	322	ACB3221-3	4	342-355	0	0	46	52	0	12N, 11P, G/N, EC	5316	EC (26), CAL12, PUP	
19	323	ERB-OFF											
20	324	ACB3241-3	4	369-383	*	0	41	52	6	G/N, WU	5394		
21	325	ACB3251-3	4	384-397	0	0	76	24	0		5422		
22	326	ACB3261-3	4	398-411	*	0	62	37	0		5333		
23	327	ERB-OFF											
24	328	ACB3281-3	4	425-438	*	*	47	52	0	WU	5428		
25	329	ACB3291A3	10	439-452	0	0	44	48	0	G/N	5379		
26	330	ACB3301-3	4	453-466	0	0	48	51	0		5197		
27	331	ERB-OFF											
28	332	ACB3321-3	4	481-494	0	*	51	48	0	11P, WU	5293		
29	333	ACB3331-3	4	495-507	0	0	62	38	0	G/N	5001		
30	334	ACB3341-3	4	508-521	0	0	18	47	0		5360		

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS OF POOR QUALITY

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: DECEMBER 1978

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	335	ERB-OFF											
2	336	ACB3361A3	10	536-549	10	*	29	52	0	WU	5179		
3	337	ACB3371-3	9	550-563	*	0	24	54	18		5175		
4	338	ACB3381-3	4	564-576	7	0	49	43	0		4869		MO (577)
5	339	ERB-OFF											
6	340	ACB3401-3	4	591-604	0	0	47	47	0	WU	5420		
7	341	ACB3411-3	4	605-618	0	7	47	45	0		5369		
8	342	ACB3421-3	4	619-632	0	0	33	43	17	12N, 11P, 12C, G/N, EC	5265	G/N (115), CAL12	
9	343	ERB-OFF											
10	344	ACB3441-3	4	647-660	0	0	0	0	0	WU	5343		OSD (660)
11	345	ACB3451A3	10	661-673	0	0	71	28	0	G/N	4303		OSD (670)
12	346	ACB3461-3	4	674-687	0	0	39	61	0		5358		
13	347	ERB-OFF											
14	348	ACB3481-3	9	702-715	0	0	*	0	0	WU	5351		
15	349	ACB3491-3	4	716-729	*	*	53	44	0		5408		
16	350	ACB3501-3	4	730-743	0	0	43	55	*	G/N, EC	5326	EC (26)	
17	351	ERB-OFF											
18	352	ACB3521-3	4	757-770	0	0	0	0	0	WU	5417		
19	353	ACB3531-3	4	771-784	0	0	51	46	0		5452		OSD (771)
20	354	ACB3541-3	4	785-798	*	*	35	32	29	11P	5252	PUP	
21	355	ERB-OFF											
22	356	ACB3561-3	5	813-826	0	0	7	1	0	12N, 12C, WU	5346	CL12	
23	357	ACB3571-3	4	827-839	0	0	45	54	*	12N, 12C	5044	CL12	
24	358	ACB3581-3	4	840-853	0	0	50	49	0	12N, 12C	5347	CL12	
25	359	ERB-OFF											
26	360	ACB3601-3	4	868-881	0	0	*	0	0	WU	5384		
27	361	ACB3611-3	4	882-895	0	0	49	50	*		5391		CH18
28	362	ACB3621-3	4	896-908	0	0	55	43	0		4991		MO (909)
29	363	ERB-OFF											
30	364	ACB3641A3	9	924-936	0	0	*	0	0	WU	5055		
31	365	ACB3651-3	4	937-39,941-49	0	0	29	42	*	12N, 11P, 12C, G/N	4502	G/N (113), CAL12	MO (940), DSAS

CH18: Channel 18 signal becomes noisy, in orbit 888. Approximately 5% of the radiance observations are "out-of-limits"

CL12: Channel 12 shutter was closed and the FOV in narrow mode for nearly the entire day.

ORIGINAL PAGE IS
OF POOR QUALITY

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: JANUARY 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# NF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	1	AC90011A3	4	951-964	*	0	43	37	20		5304		DSAS,SAA
2	2	ERB-OFF											
3	3	AC90031-3	9	979-991	0	0	1	0	0	EC,WU	4904		DSAS,SZA,SAA
4	4	AC90041-3	4	992-1005	0	0	31	32	0	G/N,EC	5424		DSAS,SZA,SAA
5	5	AC90051-3	4	1006-1019	0	0	33	33	*		5276		DSAS,SZA,SAA
6	6	ERB-OFF											
7	7	AC90071-3	4	1034-1047	0	0	*	0	0	WU	5413		DSAS,SZA,SAA
8	8	AC90081-3	4	1048-1061	0	0	32	27	0		5430		OSD(1048),DSAS,SZA,SAA
9	9	AC90091-3	4	1062-1074	0	0	32	37	0		4904		DSAS,SZA,SAA
10	10	ERB-OFF											
11	11	AC90111-3	4	1089-1102	0	0	1	0	0	WU	5443		OSD(1089-1102)DSAS,NS
12	12	AC90121-3	4	1103-1116	0	0	26	30	13	12N,11P,12C,G/N,EC	5325	G/N(232),EC(31),CAL(2,PUP	DSAS
13	13	AC90131-3	5	1117-1130	0	0	34	33	0		5390		OSD(1117),DSAS
14	14	ERB-OFF											
15	15	AC90151-3	9	1145-1157	0	0	0	0	0	WU	4261		OSD(1152,57)MO(1158)
16	16	AC90161-3	9	1159-1171	0	0	31	35	0		4983		
17	17	AC90171A3	10	1172-1185	0	0	43	23	0	G/N	4811		OSD(1184)
18	18	ERB-OFF											
19	19	AC90191-3	9	1200-1213	0	0	0	0	0	WU	4921		
20	20	AC90201-3	9	1214-1227	0	0	30	29	4		5400		OSD(1227)
21	21	AC90211-3	4	1228-1240	0	0	21	27	0	G/N	4995		
22	22	ERB-OFF											
23	23	AC90231-3	4	1255-1268	0	0	0	0	0	WU	5061		OSD(1255,56)
24	24	ERB-OFF											
25	25	AC90251-3	9	1283-1296	0	0	37	31	0	WU	5391		
26	26	ERB-OFF											
27	27	AC90271A3	4	1311-1323	0	0	22	36	0	WU	4873		MO(1310)
28	28	ERB-OFF											
29	29	AC90291A3	10	1338-1351	0	0	29	28	*	G/N,EC,WU	5291		
30	30	ERB-OFF			.								
31	31	AC90311A3	4	1366-1378	0	0	25	24	0	WU	4946		MO(1379)

NS: This MAT does not contain solar data for channels 1-10 in any of the orbital summaries.

There exists a sampling deficiency for scanner observations in the descending node, northern hemisphere for many days in the month.

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY

FEBRUARY 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	32	ERB-OFF											
2	33	AC90331-[illegible]	9	1394-1406	0	0	9	31	0	WU	4969		
3	34	ERB-OFF											
4	35	AC90351-3	4	1421-1434	0	0	0	0	0	WU	5393		
5	36	ERB-OFF											
6	37	AC90371-[illegible]	4	1449-1461	0	0	0	*	19	WU	5002		MO(1462)
7	38	ERB-OFF											
8	39	AC90391-3	4	1476-1489	0	0	0	0	0	WU	5395		
9	40	AC90401-3	5	1490-1503	0	0	0	0	68		267		
10	41	AC90411-3	5	1504-1517	0	*	0	0	67		5264		
11	42	ERB-OFF											
12	43	AC90431-3	4	1531-1545	0	0	0	0	5	G/N, WU	4958		OSD(1545)
13	44	AC90441-3	5	1546-1558	0	0	0	0	65	12N,11P,12C,G/N	4205	CAL12,PUP	
14	45	AC90451-3	5	1559-1572	0	0	0	0	68		5387		
15	46	ERB-OFF											
16	47	AC90471-3	5	1587-1600	0	0	0	0	0	WU	5390		
17	48	AC90481-3	9	1601-1614	0	0	0	*	78	12N,12C,G/N,EC	5371		OSD(1614)
18	49	AC90491-3	4	1615-1627	*	0	0	*	74		4622		MO(1628)
19	50	ERB-OFF											
20	51	AC90511-3	9	1642-1655	0	0	0	0	0	WU	5427		
21	52	AC90521-3	5	1656-1669	0	0	0	0	68		5312		
22	53	AC90531A3	5	1671-1683	0	0	0	0	68		4966		MO(1670)
23	54	ERB-OFF											
24	55	AC90551A3	5	1698-1710	0	0	0	0	0	WU	4691		
25	56	ERB-OFF											
26	57	AC90571A3	5	1725-1737	0	0	0	0	0	WU	4203		MO(1738)
27	58	ERB-OFF											
28	59	AC90591-3	9	1758-1766	0	0	*	0	0	WU	3202		MO(1753-57)

There exists a sampling deficiency for scanner observations in the descending node, northern hemisphere for many days in the month.

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: MARCH 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MP on MAT	Calibration Operations/ Testing	Data Peculiarities
1	60	AC90601A3	5	1767-1780	0	0	0	*	66	12N, 11P, 12C, G/N	5381	CAL12, PUP	
2	61	AC90611B3	10	1781-1793	0	0	0	0	68		4952		OSD(1789)
3	62	ERB-OFF											
4	63	AC90631-3	5	1808-1821	0	0	0	0	0	G/N, WU	4720		
5	64	AC90641A3	5	1822-1835	0	0	0	0	63		5367		OSD(1822)
6	65	AC90651A3	5	1836-1849	0	0	0	0	68		5356		CH 18
7	66	ERB-OFF											
8	67	AC90671A3	5	1864-1876	0	0	0	0	0	WU	5011		
9	68	AC90681A3	5	1877-1890	22	*	0	*	10	.	5081		
10	69	AC90691A3	5	1891-1904	100	0	0	*	6		4707		
11	70	ERB-OFF											
12	71	AC90711A3	5	1919-1932	0	1	0	0	0	WU	5413		
13	72	AC90721A3	5	1933-1946	0	98	0	*	0	12N, 12C, G/N	5426		
14	73	AC90731A3	5	1947-1959	0	100	0	0	0		4589		
15	74	ERB-OFF											
16	75	AC90751A3	5	1974-1987	*	0	0	0	0	WU	5452		
17	76	AC90761A3	5	1988-2001	100	0	0	0	0		5399		
18	77	AC90771-3	5	2002-2014	100	0	0	0	0	G/N	4978		MO(2015)
19	78	ERB-OFF											
20	79	AC90791A3	9	2029-2042	0	*	0	0	0	WU	4864		
21	80	AC90801-3	9	2043-2056	0	100	0	0	0		5431		
22	81	AC90811A3	5	2057-2070	0	100	0	*	0		4908		
23	82	ERB-OFF											
24	83	AC90831A3	5	2085-2098	0	0	0	0	0	G/N, WU	5400		
25	84	AC90841A3	5	2099-2111	95	0	0	*	0	12N, 11P, 12C, G/N	4975	CAL12, PUP	
26	85	AC90851A3	9	2112-2125	100	0	0	*	0		4941		
27	86	ERB-OFF											
28	87	AC90871A3	9	2140-2153	0	0	0	0	0	WU	5334		
29	88	AC90881A3	9	2154-2167	0	77	0	0	0	11P	5052		OSD(2167)
30	89	AC90891A3	9	2168-2180	0	95	0	*	0		5045		MO(2181)
31	90	ERB-OFF											

CH18: Channel 18 signal noise increases. Approximately 16% of the radiance observations are now "out-of-limits".

There exists a sampling deficiency for scanner observations in the descending node, northern hemisphere for many days in the month.

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY:

APRIL 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	91	AC90911-3	9	2195-2208	0	0	0	0	0		4814		
2	92	ERB-OFF											
3	93	AC90931A3	9	2223-2236	0	0	0	0	0	WU	5083		
4	94	ERB-OFF											
5	95	AC90951A3	9	2251-2263	0	0	0	0	0	WU	4979		
6	96	ERB-OFF											
7	97	AC90971B3	,9	2278-2291	0	0	0	0	0	12N,12C,WU	5015		ND
8	98	ERB-OFF											
9	99	AC90991A3	5	2306-2319	0	0	0	0	0	12N,12C,WU	5420		
10	100	ERB-OFF											
11	101	AC91011A3	5	2334-2346	0	0	0	0	0	12N,WU	4952		
12	102	ERB-OFF											
13	103	AC91031A3	5	2361-2374	*	0	0	0	0	G/N,WU	5180	G/N(615)	OLD
14	104	AC91041A3	5	2375-2388	100	0	0	*	0		5432		
15	105	AC91051-3	5	2389-2402	100	0	0	0	0		5097		
16	106	AC91061A3	5	2403-2416	98	0	0	0	0	12N,11P,12C,G/N	5379	CAL12,PUP	
17	107	AC91071A3	5	2417-2429	100	0	0	0	0		5053		
18	108	AC91081A3	5	2430-2443	98	0	0	0	*	12N,12C,G/N	5464		
19	109	AC91091A3	5	2444-2457	98	0	0	*	0		5374		
20	110	ERB-OFF											
21	111	AC91111-3	9	2472-2485	0	9	0	0	0	G/N, WU	4773	G/N(583)	OSD(2485),OLD
22	112	AC91121-3	9	2486-2498	0	100	0	0	0		5058		
23	113	AC91131A3	9	2499-2512	0	97	0	*	0		5343		
24	114	ERB-OFF											
25	115	AC91151A3	7	2527-31, 33-40	*	0	0	0	0	WU	4998		MO(2532)
26	116	AC91161B3	7	2541-43, 45-54	100	0	0	0	0	G/N	4984	G/N(127)	MO(2544),ND
27	117	AC91171A3	5	2555-2568	100	0	0	*	0	11P	5124	CAL12	
28	118	AC91181A3	6	2569-2581	97	0	0	*	0	12N,11P,12C,G/N	4725	CAL12	
29	119	AC91191-3	9	2582-2595	93	0	0	0	0		5004		OSD(2593)
30	120	ERB-OFF											

OLD: Large Number of "Out-of-Limits" observations (>1000) for WFOV channels 13, 14 resulting from extensive GO/NO Go heater testing

ORIGINAL PAGE IS
OF POOR QUALITY

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY:

MAY 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	121	AC91211-3	9	2610-2623	0	0	0	0	0	WU	4856		
2	122	ERB-OFF											
3	123	AC91231-3	9	2638-2650	0	0	0	*	97	WU	4701		
4	124	AC91241-3	9	2651-2664	0	0	0	*	100		5338		
5	125	AC91251-3	9	2665-2678	0	*	0	*	60	G/N	5190		
6	126	ERB-OFF											
7	127	AC91271-3	5	2693-2706	0	0	0	0	0	WU	5349		
8	128	AC91281-3	9	2707-2720	0	0	0	*	91		4684		OSD(2720)
9	129	AC91291-3	5	2721-2733	0	0	0	0	0		4322		
10	130	ERB-OFF											
11	131	AC91311-3	5	2748-2761	0	0	0	37	60	WU	5365		
12	132	ERB-OFF											
13	133	AC91331-3	9	2776-2789	0	0	0	0	98	12N,12C,G/N,WU	4826		OSD(2789
14	134	AC91341-3	9	2790-2803	3	0	0	*	100	12N	5068		OSD(2800,03)
15	135	AC91351-3	9	2804-2816	0	0	0	0	100		4985		
16	136	ERB-OFF											
17	137	AC91371-3	9	2831-2844	0	0	0	9	79	11P,WU	3925		OSD(2841),MD
18	138	ERB-OFF											
19	139	AC91391-3	2	2859-2872	0	0	0	*	100	G/N, WU	5157		OSD(2872)
20	140	AC91401-3	5	2873-2884	0	0	0	0	100		4481		MO(2885)
21	141	AC91411-3	10	2886-2899	0	0	0	0	100	G/N	4832		
22	142	ERB-OFF											
23	143	AC91431-3	9	2914-2917	0	0	0	*	99	WU	5053		OSD(2926)
24	144	AC91441-3	9	2928-2941	0	0	0	*	98	12N,11P,12C,G/N	4989	CAL12,PUP	OSD(2940,41)
25	145	AC91451-3	9	2942-2954	0	0	0	*	100	G/N	4742		MO (2955)
26	146	ERB-OFF											
27	147	AC91471-3	5	2969-2982	0	0	0	*	100	WU	5442		OSD (2969)
28	148	AC91481-3	5	2983-84,87-96	0	0	*	*	100		4126		MO(2985,86)
29	149	AC91491-3	5	2997-3010	0	0	0	*	66		5352		OSD(3010)
30	150	ERB-OFF											
31	151	AC91511-3	5	3025-3037	0	0	0	0	100	WU	5038		

MD: This MAT is missing approximately 27% of the total amount of Data expected on a MAT.

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY:

JUNE 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
✓ 1	152	AC91521-3	9	3038-3049	0	0	0	0	100		4532		MO(3050,51)
2	153	AC91531-3	9	3052-3065	0	0	0	0	94		4620		OSD(3063)
3	154	ERB-OFF											
✓ 4	155	AC91551-3	9	3080-3093	0	0	0	*	100	WU	4467		OSD(3093)
5	156	AC91561A3	9	3094-3107	0	0	0	0	98	12N,12C,G/N	5106		OSD(3107),ND
✓ 6	157	AC91571-3	9	3108-3120	0	0	0	*	99		4607		OSD(3117)
7	158	ERB-OFF											
8	159	AC91591-3	9	3136-3148	0	0	0	*	100	G/N	4501		MO(3135)
9	160	AC91601-3	9	3149-3162	0	0	4	*	100	G/N	4060		OSD(3156,58,60,61)
10	161	AC91611-3	9	3163-3175	0	0	0	0	100	G/N	4537		OSD(3175) MO(3176)
11	162	ERB-OFF											
12	163	AC91631-3	9	3190-3203	0	0	0	0	95	WU	4301		
13	164	AC91641-3	9	3206-3217	0	0	0	*	100		3863		MO(3204,05)
✓ 14	165	AC91651-3	9	3218-3231	0	0	0	0	100		4930		
15	166	ERB-OFF											
16	167	AC91671-3	9	3246-3259	0	0	0	*	100	11P,WU	4734	CAL12,PUP	OSD(3255,59)
17	168	AC91681-3	9	3260-3272	0	0	*	0	97	12N,11P,12C,G/N	4670	CAL12	
✓ 18	169	AC91691-3	9	3273-3286	0	0	0	*	95		5006		
19	170	ERB-OFF											
✓ 20	171	AC91711-3	9	3301-10,13-14	0	0	0	0	100	G/N, WU	4275		MO(3311,12)
21	172	AC91721-3	9	3315-3328	*	0	0	*	100		5373		OSD(3328)
✓ 22	173	AC91731-3	9	3329-3341	0	0	0	*	100		4975		
23	174	ERB-OFF											
24	175	AC91751-3	9	3356-60,62-69	0	0	0	0	100	WU	4177		MO(3361)
25	176	AC91761-3	9	3370-3383	0	0	0	*	88	G/N	4755		
✓ 26	177	AC91771-3	9	3384-3397	0	0	0	*	100	G/N	4824		OSD(3397)
27	178	ERB-OFF											
28	179	AC91791-3	9	3412-3424	0	0	0	*	38	WU	4738		
29	180	AC91801-3	9	3425-3438	0	0	0	0	98	12N,12C,G/N	5021		
30	181	AC91811-3	9	3439-3452	0	0	0	*	97		4686		

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: JULY 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	182	ERB-OFF											
2	183	AC91831-3	9	3467-3480	0	0	0	*	97	WU	5050		
3	184	AC91841-3	9	3481-3493	0	0	0	*	100		4324		
4	185	AC91851-3	9	3494-3507	0	0	0	*	100	G/N	4965		
5	186	ERB-OFF											
6	187	AC91871-3	9	3522-3535	0	0	0	*	100	G/N,WU	5030		
7	188	AC91881-3	9	3536-3549	0	0	0	*	100	EC	5104		
8	189	AC91891-3	9	3550-3563	0	0	0	*	100	G/N	5304		
9	120	ERB-OFF											
10	191	AC91911-3	9	3577-3590	0	0	0	*	85	G/N,WU	5245		
11	192	AC91921-3	9	3591-3604	0	0	0	*	92	12N,11P,12C,G/N,EC	5254	CAL12,PUP	
12	193	AC91931-3	9	3605-3618	*	0	0	*	91	G/N	5300		
13	194	ERB-OFF											
14	195	AC91951-3	9	3633-37,40-45	0	0	0	*	100	EC,WU	4076		MO(3638,39)
15	196	AC91961A3	10	3646-3659	0	0	0	*	100				
16	197	AC91971-3	9	3660-3673	0	0	0	*	99	G/N	4891		
17	198	ERB-OFF											
18	199	AC91991-3	9	3668-3701	0	0	0	*	100	12C,G/N, WU	5400		
19	200	AC92001-3	9	3702-3715	0	0	0	*	97		5322		OSD(3715)
20	201	AC92011-3	9	3716-3728	0	0	0	*	100		4686		OSD(3725)
21	202	ERB-OFF											
22	203	AC92031-3	9	3743-3754	0	0	0	*	100	WU	3933		MO(3755,56)
23	204	AC92041-3	9	3757-3770	0	0	0	0	97	12N,12C,G/N,EC	4780		OSD(3760)
24	205	AC92051-3	9	3771-3784	*	0	0	*	98	G/N, EC	5160	G/N(133)	OSD(3777,84)
25	206	ERB-OFF											
26	207	AC92071A3	10	3798-3811	0	0	0	*	100	WU	5297		
27	208	AC92081-3	9	3812-3825	0	0	0	*	100	G/N	5359		
28	209	AC92091-3	9	3826-3839	*	0	0	*	95	EC	5225		
29	210	ERB-OFF											
30	211	AC92111-3	9	3854-3867	0	0	0	0	94	WU	5357		OSD(3867)
31	212	AC92121-3	9	3868-3880	0	0	0	0	100		4939		

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: AUGUST 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/Testing	Data Peculiarities
1	213	AC92131-3	9	3881-3894	0	0	0	*	100	G/N	5351		
2	214	ERB-OFF											
3	215	AC92151-3	9	3909-3922	0	0	0	*	100	WU	5424		
4	216	AC92161-3	9	3923-3936	0	0	0	*	75	12N,11P,12C,G/N,WU	5187	G/N(437),CAL12, PUP	OSD(3936)
5	217	AC92171-3	9	3937-3949	0	0	0	0	100		4715		
6	218	ERB-OFF											
7	219	AC92191A3	10	3964-3977	0	0	0	*	100	G/N	4533		
8	220	AC92201B3	9	3978-3991	0	0	0	*	95	G/N	5042		ND
9	221	AC92211-3	9	3992-4005	0	0	0	0	100	G/N	5298		OSD(4005)
10	222	ERB-OFF											
11	223	AC92231-3	9	4020-4032	0	0	0	*	99	WU	5011		
12	224	AC92241-3	7	4033-4046	0	0	0	*	100	G/N	5435		
13	225	AC92251-3	9	4047-4060	*	*	0	*	100		5385		
14	226	ERB-OFF											
15	227	AC92271-3	7	4075-4088	0	0	*	0	99	WU	5189		
16	228	AC92281-3	9	4089-4102	0	0	0	*	98	12N	5330		OSD(4102)
17	229	AC92291-3	7	4103-4115	0	0	0	*	89		4254		
18	230	ERB-OFF											
19	231	AC92311-3	9	4130-4143	0	0	0	*	90	WU	5436		
20	232	AC92321-3	9	4144-4157	0	0	0	*	94		5137		OSD(4154)
21	233	AC92331-3	7	4158-4171	0	0	0	*	82		4554		OSD(4166)
22	234	ERB-OFF											
23	235	AC92351-3	9	4185-4198	0	0	0	*	90	WU	5416		
24	236	AC92361-3	9	4199-4212	0	0	0	*	97		4860		OSD(4209)
25	237	AC92371-3	7	4213-4225	0	0	0	0	96	G/N	4950		ND(4226)
26	238	ERB-OFF											
27	239	AC92391-3	9	4241-4254	0	0	0	*	100	11P,WU	4701	CAL12, PUP	OSD(4254)
28	240	AC92401-3	9	4255-4267	0	0	0	*	94	12N,11P,12C,G/N	4834	CAL12,PUP	
29	241	AC92411-3	9	4268-4281	0	0	0	0	100	G/N	5283		
30	242	ERB-OFF											
31	243	AC92431-3	7	4296-4309	0	0	0	0	97	G/N,WU	5117		

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY: SEPTEMBER 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	244	AC92441-3	7	4310-4316	0	0	0	*	100		2630		MO(4317-23)
2	245	AC92451-3	9	4324-4336	0	0	0	*	96	WU	5023		
3	246	ERB-OFF											
4	247	AC92471-3	9	4351-4364	0	0	0	*	99	G/N,EC,WU	5389	EC(19)	
5	248	AC92481-3	9	4365-4378	0	0	0	*	100		5432		
6	249	AC92491A3	9	4379-4392	0	0	*	*	92	G/N	5132		OSD(4392)
7	250	ERB-OFF											
8	251	AC92511A3	10	4407-4419	0	0	0	100	*	G/N,WU	5023		
9	252	AC92521C3	10	4420-28,4430-33	0	0	0	74	23	12N,12C,G/N	4291		OSD(4430)MO(4429),DSAS
10	253	AC92531A3	10	4434-4447	0	0	0	99	0		4878		DSAS
11	254	ERB-OFF											
12	255	AC92551-3	8	4462-4475	100	0	*	*	*	WU	5428		OSD(4462),DSAS
13	256	AC92561-3	9	4476-4488	100	*	0	*	0		4878		DSAS
14	257	AC92571-3	8	4489-4502	99	0	0	*	0	12N,12C	4799		DSAS
15	258	ERB-OFF											
16	259	AC92591A3	10	4517-4530	0	0	0	100	0	WU,EC	3811		
17	260	AC92601A3	10	4532-4544	0	0	0	100	0	EC			OSD(4544),MO(4531)
18	261	AC92611-3	9	4545-4558	*	0	0	100	0		4805		OSD(4558)
19	262	ERB-OFF											
20	263	AC92631-3	8	4572-4585	0	0			0	WU	5430		OSD(4572)
21	264	AC92641B3	10	4586-4599	0	0	58	*	0	12N,11P,12C,G/N,EC	5345	CAL12,PUP	
22	265	AC92651-3	9	4600-4613	0	0	99	*	0	G/N	5004		OSD(4613)
23	266	ERB-OFF											
24	267	AC92671-3	9	4628-4640	0	0	60	40	0	G/N,EC,WU	4993		SZA,SAA
25	268	AC92681-3	9	4641-4654	0	0	0	100	0		4365		SAA
26	269	AC92691-3	9	4655-57,59-68	0	0	*	100	0		4707		MO(4658),SZA,SAA
27	270	ERB-OFF											
28	271	AC92711-3	9	4683-4696	0	0	92	0	0	G/N,WU	4761		OSD(4692,90),SZA,SAA
29	272	AC92721-3	9	4697-4710	0	0	7	0	0		5436		OSD(4710),SAA
30	273	AC92731-3	8	4711-4723	0	0	99	0	0		4967		

MASTER ARCHIVAL TAPE (MAT) DATA SUMMARY:

OCTOBER 1979

Date	Julian Day	Sequence #	Ver. #	Orbits on MAT	Scan Modes 1	2	3	4	5	Special Status of Instrument	# MF on MAT	Calibration Operations/ Testing	Data Peculiarities
1	274	ERB-OFF											
2	275	AC92751-3	8	4738-4751	0	0	0	98	*	WU	4797		OSD(4738,40)
3	276	AC92761-3	8	4752-58,60-65	0	0	0	1	0		4778		OSD(4752) MO(4759)
4	277	AC92771-3	8	4766-4778	0	0	0	99	0	12N	4257		OSD(4766,67)
5	278	ERB-OFF											
6	279	AC92791-3	9	4793-4805	*	0	100	*	0	WU	4148		MO(4806)
7	280	AC92801-3	9	4807-4819	*	0	100	*	0		4827		MO(4920)
8	281	AC92811-3	9	4821-4834	0	0	100	*	0		5344		
9	282	ERB-OFF											
10	283	AC92831-3	9	4849-4862	0	0	0	100	0	G/N	5395		OSD(4862)
11	284	AC92841-3	9	4863-68,70-75	0	0	0	100	0	G/N	4642		MO(4869)
12	285	AC92851-3	9	4876-4889	0	0	0	100	0		5392		
13	286	ERB-OFF											
14	287	AC92871-3	9	4905-4917	0	0	100	0	0	WU	4726		MO(4904)
15	288	AC92881-3	9	4918-4931	0	0	98	*	0	12N,12C,G/N	5386		OSD(4918,31)
16	289	AC92891-3	9	4932-4944	0	0	100	*	0	G/N	4874		
17	290	ERB-OFF											
18	291	AC92911A3	10	4959-4972	0	0	0	100	0	12N,WU	3072	CH12	
19	292	AC92921-3	9	4973-4986	0	0	0	100	0	12N	5421	CH12	
20	293	AC92931-3	9	4987-90,4993-99	0	0	0	100	0	12N	3960	CH12	MO(4991-92,5000)
21	294	ERB-OFF											
22	295	AC92951B3	9	5015-21,25-27	0	0	100	0	0	G/N,WU	3782		MO(5022-24),HD
23	296	AC92961-3	9	5028-5041	*	0	100	*	0		5387		
24	297	AC92971-3	9	5042-5055	0	*	99	*	0	12N,12C	5218		
25	298	ERB-OFF											
26	299	AC92991-3	9	5070-5083	0	0	0	93	0	WU	5404		OSD(5083)
27	300	AC93001-3	9	5084-5096	0	0	0	1	0		4682		OSD(5093)
28	301	AC93011-3	9	5097-5110	0	0	0	97	0	12N,11P,12C,G/N	5394	CAL 12, PUP	
29	302	ERB-OFF											
30	303	AC93031-3	9	5125-5138	0	0	100	*	0	WU	5394		
31	304	AC93041-3	9	5139-5152	0	0	1	0	0	11P,G/N	5087	CAL12	OSD(5152)

CH12: Channel 12 FOV in narrow mode for nearly entire day.

4.0 REFERENCES

Fromm, M.D. and P.H. Dwivedi, 1982. Validation of First Year ERB-7 NFOV Data. Research and Data Systems, Inc., Lanham, MD., prepared for GSFC under contract NAS 5-26123.

Groveman, B.S., 1982. ERB-7 MAT User's Guide Document. Prepared by Research and Data Systems, Inc., Lanham, MD, for GSFC under contract NAS 5-26123.

Groveman, B.S. and P.H. Dwivedi, 1981. Data Validation of ERB-7 MAT Data, Description of Software, November 1978 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, December 1978 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, January 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., L.M. Penn, M.D. Fromm, and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, February 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., and R. Ferraro, 1982. Data Validation of ERB-7 MAT Data, March 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., and R. Ferraro, 1982. Data Validation of ERB-7 MAT Data, April 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, May 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, June 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Date, July 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, August 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, September 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Groveman, B.S., M.D. Fromm and P.H. Dwivedi, 1982. Data Validation of ERB-7 MAT Data, October 1979 Results. Prepared for GSFC by Research and Data Systems, Inc., Lanham, Maryland, under contract NAS 5-26123.

Jacobowitz, H., L.L. Stowe and J.A. Hickey, 1978. The Earth Radiation Budget Experiment, Nimbus-7 User's Guide, GSFC, p. 33-69.

Nimbus-7, Nimbus Observation Processing System (NOPS) Requirements Document #NG-13, Tape Specification No. T1B4081 ERB MAT, ERB Master Archival Tape, 1982.

Ray, S.N., (1982). Nimbus Observation Processing System (NOPS) Solar Earth Flux Data Tape (SEFDT) Quality Control Document. Prepared by Systems and Applied Sciences Corporation for GSFC, October, 1982.

FIRST YEAR MAT DATA QUALITY TABLES

Table D-1 MAT'S With Missing Solar Data

The following MAT's contain at least one orbit with no solar data. This is primarily due to missing major frame data at the time of the solar observation. The data was compiled by checking for "fill" values for the average counts at the time of the solar peak in the orbital summaries. The affected days and orbits are as follows:

Date	Orbit(s)
November 16, 1978	315-321
November 20, 1978	369
November 21, 1978	389
December 2, 1978	535
December 3, 1978	553
December 11, 1978	661, 670
January 11, 1979	1089-1102
January 15, 1979	1152, 1157
January 19, 1979	1201
January 23, 1979	1255, 1256
February 12, 1979	1531, 1532
February 13, 1979	1552, 1553, 1558
February 17, 1979	1601-1614
February 26, 1979	1733, 1734
February 28, 1979	1758
March 2, 1979	1789
March 4, 1979	1810, 1815
March 9, 1979	1887
March 10, 1979	1897
March 14, 1979	1953
March 20, 1979	2030, 2033
March 22, 1979	2059
March 25, 1979	2105
March 26, 1979	2120, 2121
March 29, 1979	2160
April 1, 1979	2195, 2196
April 3, 1979	2230
April 13, 1979	2364
April 15, 1979	2391
April 16, 1979	2411
April 21, 1979	2475, 2480
April 27, 1979	2558, 2568

Table D-1 MAT's with Missing Solar Data (cont'd)

Date	Orbit(s)
April 28, 1979	2581
April 29, 1979	2593
May 1, 1979	2610, 2611
May 3, 1979	2645
May 8, 1979	2708, 2709
May 9, 1979	2730, 2732
May 13, 1979	2776, 2886
May 14, 1979	2800
May 17, 1979	2834, 2835, 2841, 2844
May 19, 1979	2867
May 21, 1979	2891
May 23, 1979	2926
May 24, 1979	2928, 2940
May 25, 1979	2951
May 28, 1979	2987
June 2, 1979	3053, 3063
June 4, 1979	3081, 3085
June 8, 1979	3136, 3139
June 9, 1979	3156, 3158, 3160, 3161
June 10, 1979	3175
June 12, 1979	3190, 3196
June 13, 1979	3208
June 16, 1979	3255, 3259
June 20, 1979	3313
June 24, 1979	3362
June 25, 1979	3373
June 26, 1979	3390
June 28, 1979	3414
June 29, 1979	3433
June 30, 1979	3442, 3449
July 2, 1979	3470
July 3, 1979	3484, 3492
July 4, 1979	3501
July 6, 1979	3530
July 7, 1979	3544
July 16, 1979	3672
July 20, 1979	3725
July 22, 1979	3748, 3751
July 23, 1979	3757, 3760
July 24, 1979	3771, 3777
August 4, 1979	3923
August 5, 1979	3948
August 7, 1979	3964, 3965
August 8, 1979	3981
August 15, 1979	4078
August 17, 1979	4103, 4115
August 20, 1979	4154

Table D-1 MAT's with Missing Solar Data (cont'd)

Date	Orbit(s)
August 21, 1979	4162, 4166
August 24, 1979	4209
August 27, 1979	4250
August 31, 1979	4296, 4304
September 6, 1979	4385
September 8, 1979	4411
September 9, 1979	4430
September 10, 1979	4439
September 14, 1979	4498
September 16, 1979	4519, 4526
September 17, 1979	4534, 4543
September 18, 1979	4553, 4558
September 22, 1979	4613
September 25, 1979	4642, 4649, 4652
September 26, 1979	4659
September 28, 1979	4685, 4692
October 2, 1979	4740
October 4, 1979	4766, 4767
October 6, 1979	4796, 4797
October 7, 1979	4811
October 14, 1979	4906
October 20, 1979	4993
October 27, 1979	5093
October 31, 1979	5147

Table D-2 Solar Zenith Angle "Out-of-Limits on MAT's

The following MAT's contain solar zenith angles (SZA) "out-of-limits" (±180°). The SZA's were in most cases found to within a degree of the upper or lower limits. These errors do not affect the solar irradiances.[1] The affected days and orbits are as follows:

Date	Orbit(s)
January 3, 1979	988
January 4, 1979	992, 994, 996, 998, 1000, 1002, 1004
January 5, 1979	1006, 1008, 1010, 1012, 1014, 1016
January 7, 1979	1035–1047
January 8, 1979	1048–1051, 1053–1061
January 9, 1979	1067, 1069, 1071, 1073
September 24, 1979	4628, 4629, 4631–4633, 4635–4640
September 26, 1979	4656, 4659–4662, 4664–4667
September 28, 1979	4683

D-3 Solar Azimuth Angle "Out-of-Limits" on MAT'S

The following MAT's contain ~~solar azimuth~~ angles (SAA) "out-of-limits" ($\pm 180^{o}$). The SAA's were in most cases within-a-degree of the upper or lower limit. These errors do not affect the solar irradiances on the MAT's[2]. The affected days and orbits are as follows:

Date	Orbit(s)
January 1, 1979	963
January 3, ~~1979~~	980, 989-991
January 4, 1979	992, 994, 995, 1002, 1004
January 5, 1979	1009, 1010, 1012, 1015
January 7, 1979	1038, 1040, 1043
January 8, 1979	1053
September 24, ~~1979~~	4631
September 25, 1979	4642, 4646, 4648, 4650, 4651
September 26, 1979	4657, 4660-4665
September 28, 1979	4684, 4695
September 29, ~~1979~~	4697, 4710

[1] Solar Earth Flux Data Tape (SEFDT), Nimbus Observation Processing System (NOPS) Quality Control Report, Systems and Applied Sciences Corporation, July 1982.

[2] Solar Earth Flux Data Tape (SEFDT), Nimbus Observation Processing System (NOPS) Quality Control Report, Systems and Applied Sciences Corporation, July, 1982.

C-2

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-4

Number of WFOV Channel 12-14 Irradiance Observations "Out-of-Limits"

JULDAY	IRRAD OBS OUT-OF-LIMITS CH12	CH13	CH14	IRRAD OBS 10% BELOW, 10% ABOVE LIMITS (IN WATTS/SQ M) 90-100	550-600	-20- -10	400-440	-20- -10	240-265
320.	124.	385.	358.	[illegible]	0.	41.	23.	44.	0.
321.	462.	13.	4.	441.	11.	0.	11.	3.	0.
322.	803.	94.	55.	680.	11.	0.	38.	0.	1.
324.	282.	171.	3.	0.	433.	0.	164.	0.	0.
325.	184.	123.	17.	0.	160.	1.	108.	0.	0.
326.	257.	132.	7.	0.	288.	0.	124.	0.	0.
328.	54.	36.	1.	0.	54.	0.	36.	0.	0.
329.	79.	33.	13.	0.	68.	0.	21.	0.	0.
330.	293.	179.	6.	0.	275.	0.	165.	0.	0.
332.	356.	197.	6.	3.	345.	0.	163.	0.	0.
333.	290.	133.	4.	0.	289.	0.	131.	0.	0.
334.	348.	218.	9.	0.	336.	0.	210.	0.	0.
336.	297.	206.	4.	0.	292.	0.	204.	0.	0.
337.	272.	114.	1.	0.	271.	0.	113.	0.	0.
338.	460.	260.	4.	0.	453.	0.	250.	0.	0.
340.	302.	156.	2.	0.	301.	0.	155.	0.	0.
341.	336.	152.	10.	0.	327.	0.	145.	0.	0.
342.	526.	425.	228.	127.	336.	26.	186.	23.	0.
344.	338.	153.	2.	0.	338.	0.	152.	0.	0.
345.	280.	173.	3.	0.	275.	0.	168.	0.	0.
346.	221.	81.	1.	0.	218.	0.	77.	0.	0.
348.	317.	172.	6.	0.	311.	0.	167.	0.	0.
349.	297.	83.	3.	0.	295.	0.	81.	0.	0.
350.	236.	110.	37.	3.	190.	0.	70.	9.	0.
352.	398.	167.	1.	0.	398.	0.	167.	0.	0.
353.	448.	165.	2.	0.	443.	0.	163.	0.	0.
354.	371.	179.	16.	0.	357.	0.	172.	0.	0.
356.	10.	197.	11.	0.	0.	0.	188.	0.	0.
357.	4.	115.	5.	0.	0.	0.	110.	0.	0.
358.	14.	131.	9.	0.	0.	0.	120.	0.	0.
360.	341.	213.	1.	0.	340.	0.	212.	0.	0.
361.	353.	130.	2.	0.	353.	0.	123.	0.	0.
362.	288.	94.	4.	21.	263.	0.	91.	0.	0.
364.	251.	86.	1.	0.	247.	0.	84.	0.	0.
365.	365.	303.	206.	17.	209.	28.	44.	24.	1.
1.	340.	170.	8.	1.	323.	0.	158.	0.	0.
3.	303.	140.	4.	11.	276.	0.	130.	0.	0.
4.	350.	140.	28.	49.	278.	1.	154.	0.	0.
5.	237.	68.	7.	68.	168.	0.	61.	0.	0.
7.	303.	105.	0.	66.	235.	0.	90.	0.	0.
8.	224.	45.	6.	37.	180.	0.	40.	0.	0.
9.	172.	32.	2.	0.	164.	0.	29.	0.	0.
11.	133.	36.	5.	0.	131.	0.	30.	0.	0.
12.	477.	374.	257.	59.	270.	33.	93.	25.	0.
13.	179.	21.	2.	1.	171.	0.	17.	0.	0.
15.	68.	29.	2.	0.	67.	0.	29.	0.	0.
16.	105.	1.	2.	0.	104.	0.	0.	0.	0.
17.	82.	18.	4.	0.	78.	0.	12.	0.	0.
19.	96.	53.	8.	4.	59.	1.	30.	0.	0.
20.	47.	22.	1.	0.	47.	0.	22.	0.	0.
21.	67.	8.	12.	0.	49.	0.	0.	0.	0.
23.	64.	3.	2.	0.	59.	0.	0.	0.	0.
25.	7.	2.	4.	0.	0.	0.	0.	0.	0.
27.	50.	37.	2.	4.	41.	0.	34.	0.	0.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-4 (Cont'd)

Number of WFOV Channel 12-14 Irradiance Observations "Out-of-Limits"

JULDAY	IRRAD OBS OUT-OF-LIMITS CH12	CH13	CH14	IRRAD OBS 10% BELOW, 10% ABOVE LIMITS (IN WATTS/SQ M) 90-100	330-400	-20- -10	400-440	-40- -10	240-265
29.	60.	37.	17.	0.	39.	0.	19.	0.	0.
31.	37.	3.	1.	0.	31.	0.	0.	0.	0.
33.	3.	0.	0.	1.	0.	0.	0.	0.	0.
35.	59.	20.	2.	0.	53.	0.	18.	0.	0.
37.	33.	5.	2.	0.	25.	0.	0.	0.	0.
39.	0.	0.	3.	0.	0.	0.	0.	0.	0.
40.	14.	10.	14.	0.	0.	0.	0.	2.	0.
41.	17.	11.	13.	1.	0.	0.	0.	0.	0.
43.	89.	5.	4.	0.	84.	0.	0.	0.	1.
44.	183.	137.	106.	62.	0.	38.	0.	23.	0.
45.	2.	4.	4.	0.	0.	0.	0.	0.	0.
47.	47.	26.	1.	2.	43.	0.	25.	0.	0.
48.	169.	143.	118.	77.	0.	38.	0.	22.	0.
49.	20.	3.	4.	0.	13.	0.	0.	0.	0.
51.	23.	1.	1.	0.	22.	0.	0.	0.	0.
52.	23.	9.	4.	0.	21.	0.	5.	0.	0.
53.	6.	3.	3.	0.	0.	0.	0.	0.	0.
55.	3.	4.	2.	1.	0.	0.	0.	0.	0.
57.	2.	3.	5.	0.	0.	0.	0.	0.	0.
59.	5.	0.	1.	0.	0.	0.	0.	0.	0.
60.	269.	174.	106.	164.	22.	44.	29.	22.	0.
61.	60.	9.	6.	0.	38.	0.	0.	1.	0.
63.	0.	4.	8.	0.	0.	0.	0.	0.	0.
64.	5.	3.	1.	0.	0.	0.	0.	0.	0.
65.	6.	2.	3.	2.	0.	0.	0.	0.	0.
67.	62.	45.	2.	0.	61.	0.	45.	0.	0.
68.	5.	3.	0.	0.	0.	0.	0.	0.	0.
69.	9.	8.	5.	0.	0.	0.	0.	0.	0.
71.	21.	2.	3.	0.	20.	0.	0.	0.	0.
72.	219.	142.	108.	125.	54.	40.	0.	22.	0.
73.	31.	20.	7.	0.	15.	0.	20.	0.	0.
75.	13.	2.	1.	0.	0.	0.	0.	0.	0.
76.	7.	2.	2.	0.	0.	0.	0.	0.	0.
77.	10.	1.	2.	0.	6.	0.	0.	0.	0.
79.	13.	16.	11.	0.	0.	0.	0.	0.	0.
80.	3.	4.	6.	0.	0.	0.	0.	0.	0.
81.	5.	5.	7.	0.	0.	0.	0.	0.	0.
83.	5.	7.	3.	0.	0.	0.	0.	0.	0.
84.	90.	140.	114.	21.	0.	36.	0.	22.	0.
85.	36.	4.	11.	7.	17.	0.	0.	0.	0.
87.	16.	11.	13.	0.	0.	0.	0.	0.	0.
88.	2.	6.	8.	0.	0.	0.	0.	0.	0.
89.	43.	35.	15.	0.	29.	0.	24.	0.	0.
91.	3.	1.	0.	0.	2.	0.	0.	0.	0.
93.	0.	0.	2.	0.	0.	0.	0.	0.	0.
95.	101.	38.	3.	0.	78.	0.	35.	0.	0.
97.	84.	55.	3.	0.	75.	0.	40.	0.	0.
99.	45.	6.	4.	0.	38.	0.	0.	0.	0.
101.	23.	4.	3.	7.	13.	0.	0.	0.	0.
103.	286.	1268.	1123.	98.	40.	257.	23.	222.	0.
104.	9.	14.	8.	0.	0.	0.	0.	0.	0.
105.	1.	2.	5.	0.	0.	0.	0.	0.	0.
106.	87.	133.	106.	45.	21.	35.	0.	21.	0.
107.	5.	6.	4.	3.	0.	0.	0.	0.	0.
108.	180.	145.	112.	65.	0.	45.	0.	22.	0.

TABLE D-4 (Cont'd)
Number of WFOV Channel 12-14 Irradiance Observations "Out-of Limits"

JULDAY	IRRAD OBS OUT-OF-LIMITS CH12	CH13	CH14	IRRAD OBS 10% BELOW, 10% ABOVE LIMITS (IN WATTS/SQ M) 90-100	550-600	-20- -10	400-440	-20- -10	240-265
109.	2.	4.	6.	0.	0.	0.	0.	0.	0.
111.	207.	1125.	1021.	80.	0.	229.	0.	206.	0.
112.	0.	1.	1.	0.	0.	0.	0.	0.	0.
113.	14.	5.	4.	0.	9.	0.	0.	0.	0.
115.	30.	13.	12.	0.	10.	0.	0.	0.	0.
116.	16.	12.	12.	0.	1.	2.	0.	0.	0.
117.	68.	34.	3.	0.	65.	0.	31.	0.	0.
118.	182.	154.	107.	76.	0.	51.	0.	22.	0.
119.	0.	2.	1.	0.	0.	1.	0.	0.	0.
121.	19.	1.	2.	0.	19.	0.	0.	0.	0.
123.	65.	26.	0.	0.	46.	0.	29.	0.	0.
124.	14.	9.	8.	3.	0.	0.	0.	0.	0.
125.	74.	24.	13.	3.	58.	10.	0.	0.	1.
127.	7.	9.	6.	0.	0.	0.	0.	0.	0.
128.	99.	8.	12.	12.	78.	0.	0.	0.	0.
129.	68.	7.	6.	8.	52.	0.	0.	0.	0.
131.	40.	4.	8.	23.	13.	0.	0.	0.	0.
133.	131.	129.	95.	44.	34.	24.	25.	20.	0.
134.	162.	66.	9.	34.	64.	0.	34.	0.	0.
135.	100.	62.	8.	6.	79.	0.	54.	0.	0.
137.	105.	37.	6.	44.	56.	0.	35.	0.	0.
139.	53.	8.	8.	42.	2.	0.	0.	0.	0.
140.	58.	2.	1.	56.	1.	0.	0.	0.	0.
141.	66.	14.	4.	56.	0.	10.	0.	0.	0.
143.	88.	25.	4.	50.	35.	0.	21.	0.	0.
144.	287.	131.	108.	147.	0.	30.	0.	21.	0.
145.	72.	19.	3.	68.	0.	14.	0.	0.	0.
147.	143.	4.	1.	89.	36.	0.	0.	0.	0.
148.	120.	9.	7.	90.	1.	3.	0.	0.	0.
149.	130.	32.	10.	93.	0.	23.	0.	0.	0.
151.	85.	1.	1.	45.	38.	0.	0.	0.	0.
152.	153.	26.	4.	80.	0.	24.	0.	0.	0.
153.	143.	16.	1.	83.	0.	16.	0.	0.	0.
155.	190.	40.	38.	103.	25.	2.	0.	2.	0.
156.	401.	276.	74.	211.	31.	246.	0.	14.	0.
157.	122.	90.	4.	97.	0.	85.	0.	0.	0.
159.	166.	10.	10.	98.	4.	0.	0.	0.	0.
160.	95.	34.	2.	53.	28.	29.	0.	0.	0.
161.	212.	76.	5.	102.	57.	62.	3.	0.	0.
163.	186.	0.	1.	112.	0.	0.	0.	0.	0.
164.	198.	117.	2.	123.	0.	116.	0.	0.	0.
165.	168.	94.	0.	104.	21.	94.	0.	0.	0.
167.	159.	6.	4.	100.	0.	0.	0.	0.	0.
168.	412.	231.	107.	207.	0.	96.	37.	20.	0.
169.	215.	171.	3.	107.	23.	169.	0.	0.	0.
171.	112.	6.	7.	81.	0.	0.	0.	0.	0.
172.	169.	51.	9.	146.	0.	44.	0.	0.	0.
173.	191.	24.	6.	127.	0.	19.	0.	0.	0.
175.	248.	35.	1.	105.	65.	0.	33.	0.	0.
176.	232.	158.	6.	121.	13.	146.	0.	0.	0.
177.	202.	101.	9.	107.	0.	89.	0.	0.	0.
179.	227.	9.	7.	131.	18.	0.	0.	0.	0.
180.	405.	170.	111.	177.	36.	71.	0.	20.	0.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-4 (Cont'd)

Number of WFOV Channel 12-14 Irradiance Observations "Out-of-Limits"

JULDAY	IRRAD OBS OUT-OF-LIMITS CH12	CH13	CH14	IRRAD OBS 90-100	10% BELOW, 10% ABOVE LIMITS 330-400	-20- -10	400-440	-20- -10 (IN WATTS/SQ M)	260-285
181.	322.	174.	14.	171.	54.	88.	75.	0.	0.
183.	302.	15.	22.	141.	55.	0.	0.	0.	0.
184.	246.	130.	8.	116.	68.	123.	1.	0.	0.
185.	260.	220.	20.	114.	48.	200.	0.	0.	0.
187.	162.	9.	13.	113.	2.	0.	0.	0.	0.
188.	172.	252.	16.	104.	4.	240.	0.	0.	0.
189.	245.	255.	16.	194.	0.	238.	0.	0.	1.
191.	251.	13.	16.	146.	3.	0.	0.	0.	0.
192.	487.	322.	118.	236.	1.	212.	0.	21.	0.
193.	190.	104.	10.	123.	0.	91.	0.	0.	0.
195.	189.	9.	10.	85.	36.	0.	0.	0.	0.
196.	222.	229.	11.	115.	37.	208.	7.	0.	1.
197.	172.	209.	17.	94.	0.	194.	0.	0.	0.
199.	117.	15.	13.	70.	0.	0.	0.	0.	0.
200.	187.	90.	15.	114.	3.	79.	0.	0.	0.
201.	159.	120.	6.	98.	0.	111.	0.	0.	0.
203.	109.	10.	8.	71.	0.	0.	0.	0.	0.
204.	349.	214.	114.	163.	0.	140.	0.	21.	0.
205.	190.	62.	21.	112.	0.	60.	0.	0.	0.
207.	175.	13.	13.	84.	36.	0.	0.	0.	0.
208.	127.	320.	14.	85.	2.	307.	0.	0.	0.
209.	174.	176.	17.	94.	2.	153.	0.	1.	0.
211.	101.	9.	6.	87.	0.	0.	0.	0.	0.
212.	137.	163.	14.	73.	48.	150.	0.	0.	0.
213.	119.	77.	2.	70.	35.	71.	0.	0.	0.
215.	75.	5.	7.	71.	0.	0.	0.	0.	0.
216.	609.	325.	131.	161.	66.	155.	2.	21.	0.
217.	103.	73.	11.	78.	0.	63.	0.	0.	0.
219.	76.	20.	15.	27.	28.	0.	0.	0.	0.
220.	29.	266.	4.	3.	41.	256.	7.	0.	0.
221.	17.	147.	17.	0.	4.	133.	0.	0.	0.
223.	14.	11.	10.	8.	0.	0.	1.	0.	0.
224.	23.	135.	6.	15.	0.	129.	0.	0.	0.
225.	14.	56.	8.	3.	0.	82.	0.	0.	0.
227.	47.	63.	65.	15.	0.	2.	0.	3.	0.
228.	196.	112.	28.	137.	0.	92.	0.	18.	0.
229.	3.	115.	1.	2.	0.	110.	0.	0.	0.
231.	64.	37.	4.	13.	46.	0.	31.	0.	0.
232.	40.	79.	6.	23.	10.	69.	0.	0.	0.
233.	15.	40.	6.	5.	0.	33.	0.	0.	0.
235.	46.	10.	12.	32.	0.	0.	0.	0.	0.
236.	75.	5.	8.	43.	23.	0.	0.	0.	0.
237.	78.	24.	18.	45.	23.	7.	0.	0.	1.
239.	30.	5.	4.	19.	0.	0.	0.	0.	0.
240.	221.	135.	104.	101.	0.	36.	0.	21.	0.
241.	47.	60.	11.	37.	0.	30.	0.	0.	0.
243.	12.	8.	9.	6.	0.	0.	0.	0.	0.
244.	1.	6.	3.	0.	0.	0.	0.	0.	0.
245.	13.	10.	11.	0.	0.	0.	0.	0.	0.
247.	81.	42.	42.	3.	32.	0.	1.	0.	0.
248.	18.	7.	9.	0.	11.	0.	0.	0.	0.
249.	3.	17.	15.	0.	0.	5.	0.	0.	0.
251.	15.	10.	15.	0.	1.	0.	0.	0.	0.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-4 (Cont'd)

Number of WFOV Channel 12-14 Irradiance Observations "Out-of-Limits"

JULDAY	IRRAD OBS OUT-OF-LIMITS CH12	CH13	CH14	IRRAD OBS 10% BELOW, 10% ABOVE LIMITS (IN WATTS/SQ M) 90-100	550-600	-20--10	400-440	-20--10	240-263
252.	201.	122.	113.	158.	0.	25.	0.	21.	0.
253.	12.	6.	4.	3.	0.	0.	0.	0.	0.
255.	22.	14.	29.	0.	1.	0.	0.	0.	0.
256.	23.	9.	18.	1.	8.	0.	0.	0.	0.
257.	14.	10.	16.	0.	0.	0.	0.	0.	0.
259.	5.	3.	5.	0.	0.	0.	0.	0.	0.
260.	2.	2.	2.	0.	0.	0.	0.	0.	0.
261.	63.	37.	14.	0.	52.	15.	11.	0.	0.
263.	14.	9.	17.	0.	0.	0.	0.	0.	0.
264.	135.	145.	126.	79.	0.	28.	0.	21.	0.
265.	16.	22.	36.	0.	0.	0.	0.	0.	0.
267.	34.	22.	32.	0.	13.	0.	0.	0.	0.
268.	8.	5.	2.	0.	1.	0.	0.	0.	0.
269.	4.	7.	8.	0.	0.	0.	0.	0.	0.
271.	3.	1.	20.	0.	0.	0.	0.	0.	0.
272.	61.	10.	15.	0.	49.	0.	0.	0.	0.
273.	49.	8.	26.	0.	35.	0.	0.	0.	0.
275.	29.	1.	2.	0.	20.	0.	0.	0.	0.
276.	39.	41.	6.	0.	31.	0.	35.	0.	0.
277.	40.	19.	16.	23.	0.	0.	0.	0.	0.
279.	6.	3.	11.	0.	0.	0.	0.	0.	0.
280.	14.	4.	21.	0.	9.	0.	0.	0.	0.
281.	3.	4.	16.	0.	1.	0.	0.	0.	0.
283.	12.	15.	15.	0.	0.	0.	0.	0.	0.
284.	3.	5.	8.	0.	0.	0.	0.	0.	0.
285.	12.	1.	1.	1.	0.	0.	0.	0.	0.
287.	107.	63.	19.	0.	73.	0.	59.	0.	0.
288.	63.	122.	126.	8.	41.	26.	0.	21.	0.
289.	76.	50.	7.	0.	39.	0.	48.	0.	0.
291.	166.	2.	4.	163.	0.	0.	0.	0.	0.
292.	252.	18.	13.	238.	0.	7.	0.	0.	0.
293.	198.	5.	3.	195.	0.	0.	0.	0.	0.
295.	5.	5.	9.	0.	0.	0.	0.	0.	0.
296.	17.	17.	10.	0.	0.	0.	0.	0.	0.
297.	17.	14.	19.	0.	0.	0.	0.	0.	0.
299.	7.	3.	5.	0.	0.	0.	0.	0.	0.
300.	15.	5.	2.	0.	9.	3.	0.	0.	0.
301.	67.	157.	111.	25.	0.	46.	0.	21.	0.
303.	8.	8.	14.	0.	0.	0.	0.	0.	0.
304.	20.	20.	16.	0.	2.	0.	0.	0.	0.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-5

MAT Data Gaps; Number of Digital Count Observations, "Out-of-Limits".

JULDAY	DATA GAPS	MISSING	AT EPCH FLAGGD	COUNTS OBS OUT-OF-LIMITS CH12	CH13	CH14
320.	19.	84.	0.	106.	372.	358.
321.	10.	93.	3.	2.	[illegible]	[illegible]
322.	22.	83.	116.	63.	90.	54.
324.	10.	14.	5.	138.	165.	[illegible]
325.	15.	40.	32.	58.	122.	17.
326.	16.	88.	4.	195.	85.	7.
328.	18.	35.	3.	48.	24.	1.
329.	20.	84.	26.	10.	[illegible]	13.
330.	19.	141.	3.	420.	[illegible]	[illegible]
332.	21.	170.	14.	381.	[illegible]	[illegible]
333.	27.	76.	8.	136.	125.	4.
334.	19.	70.	18.	259.	202.	9.
336.	9.	25.	5.	343.	177.	4.
337.	16.	45.	3.	128.	111.	1.
338.	26.	160.	3.	350.	240.	4.
340.	24.	48.	7.	331.	142.	2.
341.	24.	88.	15.	128.	142.	10.
342.	22.	182.	43.	260.	404.	226.
344.	16.	35.	3.	448.	135.	2.
345.	40.	207.	15.	186.	154.	3.
346.	30.	64.	3.	105.	78.	1.
348.	32.	112.	7.	448.	147.	6.
349.	20.	56.	5.	88.	42.	3.
350.	22.	58.	66.	[illegible]	108.	37.
352.	20.	44.	1.	412.	137.	1.
353.	20.	39.	8.	205.	153.	2.
354.	35.	116.	26.	283.	160.	16.
356.	28.	126.	22.	10.	470.	11.
357.	10.	27.	5.	4.	102.	5.
358.	38.	90.	25.	11.	141.	9.
360.	34.	78.	5.	342.	165.	1.
361.	24.	76.	7.	146.	119.	2.
362.	19.	51.	8.	192.	87.	4.
364.	14.	21.	2.	325.	74.	1.
365.	53.	169.	24.	139.	267.	205.
1.	27.	103.	14.	265.	159.	8.
3.	19.	164.	20.	358.	131.	4.
4.	18.	39.	54.	196.	176.	28.
5.	11.	139.	14.	84.	62.	7.
7.	15.	47.	3.	315.	93.	0.
8.	17.	38.	11.	61.	37.	6.
9.	25.	88.	7.	101.	20.	4.
11.	12.	26.	11.	141.	28.	5.
12.	16.	135.	105.	193.	358.	257.
13.	9.	23.	9.	39.	16.	2.
15.	14.	55.	4.	103.	29.	2.
16.	24.	55.	4.	1.	1.	2.
17.	19.	166.	19.	52.	10.	4.
19.	16.	43.	9.	43.	53.	8.
20.	14.	46.	3.	29.	21.	1.
21.	16.	76.	28.	42.	8.	12.
23.	12.	47.	3.	55.	3.	2.
25.	16.	31.	11.	3.	2.	4.
27.	15.	150.	4.	34.	36.	2.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-5 (Cont'd)
MAT Data Gaps; Number of Digital Count Observations, "Out-of-Limits"

JULDAY	DATA GAPS	MISSING	AT EACH FLAGGED	COUNTS OBS OUT-OF-LIMITS CH12	CH13	CH14
29.	18.	77.	24.	39.	35.	17.
31.	14.	93.	3.	29.	3.	1.
33.	14.	48.	3.	15.	0.	0.
35.	14.	30.	2.	44.	16.	2.
37.	9.	19.	9.	13.	5.	2.
39.	17.	62.	5.	0.	0.	3.
40.	20.	193.	11.	12.	10.	14.
41.	28.	156.	34.	9.	11.	13.
43.	26.	52.	4.	79.	5.	3.
44.	24.	75.	5.	37.	128.	100.
45.	13.	89.	11.	2.	4.	4.
47.	23.	71.	7.	2.	25.	1.
48.	19.	40.	15.	37.	134.	114.
49.	11.	29.	10.	3.	3.	4.
51.	15.	35.	5.	33.	1.	1.
52.	38.	94.	10.	16.	6.	7.
53.	23.	56.	5.	4.	3.	3.
55.	22.	237.	5.	0.	2.	2.
57.	27.	67.	3.	2.	3.	5.
59.	12.	19.	3.	2.	4.	1.
60.	15.	80.	4.	41.	162.	100.
61.	24.	85.	21.	15.	3.	4.
63.	8.	17.	2.	6.	6.	8.
64.	16.	94.	5.	5.	3.	1.
65.	47.	65.	6.	2.	2.	3.
67.	31.	60.	4.	55.	42.	2.
68.	24.	44.	6.	2.	3.	0.
69.	15.	148.	9.	5.	8.	5.
71.	29.	58.	5.	25.	2.	3.
72.	20.	34.	6.	40.	131.	108.
73.	25.	104.	9.	7.	27.	7.
75.	12.	19.	4.	1.	2.	1.
76.	15.	63.	5.	4.	2.	2.
77.	11.	50.	3.	0.	1.	2.
79.	10.	25.	27.	10.	16.	11.
80.	16.	29.	3.	3.	4.	6.
81.	12.	21.	13.	9.	9.	7.
83.	15.	62.	15.	5.	7.	9.
84.	14.	103.	14.	13.	130.	114.
85.	18.	33.	15.	9.	8.	11.
87.	18.	136.	25.	13.	11.	13.
88.	7.	7.	12.	2.	6.	8.
89.	11.	26.	21.	13.	33.	15.
91.	20.	72.	1.	1.	1.	0.
93.	17.	43.	3.	15.	0.	2.
95.	11.	42.	7.	95.	38.	3.
97.	12.	15.	7.	86.	52.	3.
99.	19.	50.	7.	37.	6.	4.
101.	14.	49.	6.	3.	4.	3.
103.	17.	27.	10.	44.	1215.	1123.
104.	25.	32.	20.	9.	18.	8.
105.	13.	359.	10.	1.	2.	5.
106.	19.	82.	4.	16.	125.	108.
107.	15.	24.	13.	2.	6.	4.
108.	10.	16.	9.	39.	132.	112.

TABLE D-5 (Cont'd)
MAT Data Gaps; Number of Digital Count Observations, "Out-of-Limits"

JULDAY	DATA GAPS	MISSING	EPCH FLAG>0	COUNTS OBS OUT-OF-LIMITS CH12	CH13	CH14
109.	20.	31.	11.	2.	4.	6.
111.	10.	64.	19.	14.	1080.	1021.
112.	16.	28.	4.	0.	1.	3.
113.	17.	118.	11.	5.	5.	4.
115.	17.	75.	23.	17.	13.	14.
116.	38.	61.	25.	14.	10.	14.
117.	12.	83.	8.	48.	33.	3.
118.	11.	18.	2.	42.	135.	107.
119.	13.	23.	2.	0.	1.	1.
121.	26.	55.	5.	24.	4.	4.
122.	13.	33.	6.	64.	21.	0.
124.	21.	42.	7.	9.	3.	8.
125.	24.	125.	37.	18.	18.	13.
127.	23.	49.	16.	7.	9.	6.
128.	17.	352.	19.	9.	8.	12.
129.	11.	26.	9.	39.	7.	6.
131.	19.	49.	18.	4.	4.	8.
133.	14.	44.	6.	58.	123.	95.
134.	32.	67.	20.	81.	65.	9.
135.	12.	44.	7.	68.	60.	8.
137.	17.	84.	4.	85.	35.	6.
139.	30.	305.	19.	8.	8.	8.
140.	25.	64.	2.	2.	2.	1.
141.	16.	138.	6.	1.	4.	4.
143.	15.	30.	6.	23.	25.	4.
144.	11.	83.	8.	45.	124.	108.
145.	18.	27.	11.	2.	5.	3.
147.	20.	29.	5.	18.	4.	4.
148.	15.	29.	17.	6.	6.	7.
149.	19.	61.	6.	9.	9.	10.
151.	21.	40.	1.	1.	1.	1.
152.	10.	15.	8.	38.	2.	4.
153.	12.	26.	13.	0.	0.	1.
155.	16.	256.	7.	9.	40.	38.
156.	22.	363.	25.	46.	80.	74.
157.	21.	202.	14.	4.	3.	4.
159.	15.	55.	45.	8.	10.	10.
160.	16.	357.	11.	4.	3.	2.
161.	17.	73.	11.	26.	14.	5.
163.	18.	701.	4.	1.	0.	1.
164.	14.	469.	4.	39.	1.	2.
165.	34.	540.	2.	2.	0.	0.
167.	20.	420.	12.	6.	6.	4.
168.	24.	406.	9.	36.	156.	107.
169.	23.	401.	7.	3.	10.	3.
171.	9.	48.	14.	6.	6.	7.
172.	19.	88.	28.	13.	7.	9.
173.	19.	54.	14.	8.	3.	6.
175.	18.	449.	6.	62.	35.	1.
176.	19.	505.	15.	57.	12.	6.
177.	28.	118.	23.	8.	12.	9.
179.	16.	131.	13.	12.	9.	7.
180.	20.	83.	12.	15.	118.	111.

TABLE D-5 (Cont'd)

MAT Data Gaps; Number of Digital Count Observations, "Out-of-Limits"

JULDAY	DATA GAPS	MISSING OR	SYNC FLAGGED	COUNTS OBS OUT-OF-LIMITS CH12	CH13	CH14
181.	17.	78.	21.	31.	46.	14.
183.	23.	76.	25.	37.	19.	22.
184.	16.	81.	10.	30.	7.	8.
185.	28.	89.	47.	39.	40.	20.
187.	23.	121.	21.	13.	9.	13.
188.	25.	97.	45.	38.	25.	16.
189.	23.	122.	19.	11.	32.	15.
191.	26.	228.	22.	14.	13.	16.
192.	29.	217.	15.	39.	132.	118.
193.	27.	96.	24.	11.	20.	10.
195.	22.	75.	19.	40.	9.	10.
196.	20.	82.	15.	58.	30.	38.
197.	41.	221.	29.	18.	33.	17.
199.	24.	70.	25.	8.	15.	13.
200.	38.	149.	24.	24.	12.	15.
201.	34.	329.	12.	7.	9.	6.
203.	23.	103.	10.	9.	10.	8.
204.	33.	355.	16.	18.	121.	114.
205.	27.	96.	22.	23.	22.	21.
207.	23.	178.	32.	40.	13.	13.
208.	27.	109.	19.	22.	24.	18.
209.	35.	208.	30.	25.	30.	17.
211.	22.	113.	18.	4.	9.	6.
212.	32.	180.	15.	47.	13.	10.
213.	14.	111.	14.	6.	6.	2.
215.	20.	87.	16.	4.	5.	7.
216.	16.	211.	19.	207.	193.	181.
217.	11.	95.	18.	6.	10.	11.
219.	16.	150.	27.	41.	20.	15.
220.	14.	36.	18.	5.	7.	4.
221.	14.	131.	40.	8.	14.	17.
223.	18.	60.	23.	6.	11.	10.
224.	11.	35.	15.	6.	6.	0.
225.	12.	29.	22.	11.	14.	6.
227.	13.	32.	12.	11.	63.	65.
228.	17.	77.	13.	8.	37.	28.
229.	10.	19.	10.	1.	21.	1.
231.	20.	33.	16.	50.	35.	4.
232.	17.	62.	19.	8.	10.	6.
233.	7.	89.	10.	10.	7.	0.
235.	13.	53.	16.	23.	10.	14.
236.	10.	17.	19.	6.	5.	8.
237.	17.	81.	25.	10.	17.	18.
239.	12.	159.	16.	8.	5.	4.
240.	13.	243.	15.	47.	120.	104.
241.	12.	111.	22.	7.	10.	11.
243.	15.	131.	9.	6.	8.	9.
244.	7.	16.	12.	1.	0.	3.
245.	17.	55.	16.	13.	10.	11.
247.	19.	81.	56.	77.	42.	42.
248.	16.	39.	27.	4.	7.	9.
249.	15.	98.	50.	9.	12.	15.
251.	17.	54.	42.	11.	10.	15.
252.	9.	30.	35.	14.	117.	113.
253.	21.	48.	27.	4.	6.	4.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-5 (Cont'd)

MAT Data Gaps; Number of Digital Count Observations, "Out-of-Limits"

JULDAY	DATA GAPS	MISSING AS	EPOCH FLAGGED	COUNTS OBS OUT-OF-LIMITS Ca12	Ch13	Ca14
255.	11.	25.	146.	22.	14.	29.
256.	13.	146.	110.	12.	9.	18.
257.	14.	254.	131.	12.	10.	16.
259.	19.	65.	181.	5.	3.	5.
260.	9.	38.	26.	2.	2.	2.
261.	11.	117.	43.	60.	18.	14.
263.	15.	38.	123.	12.	9.	17.
264.	20.	124.	78.	42.	138.	126.
265.	21.	104.	111.	16.	22.	36.
267.	22.	85.	79.	37.	23.	32.
268.	7.	18.	13.	8.	5.	2.
269.	10.	51.	33.	4.	7.	6.
271.	30.	44.	117.	3.	1.	20.
272.	17.	32.	53.	43.	10.	15.
273.	11.	102.	125.	32.	8.	26.
275.	12.	26.	21.	6.	1.	6.
276.	12.	82.	24.	34.	40.	6.
277.	11.	76.	36.	15.	19.	16.
279.	13.	213.	60.	6.	3.	11.
280.	10.	24.	115.	5.	4.	21.
281.	20.	39.	95.	3.	4.	16.
283.	21.	73.	71.	8.	15.	15.
284.	14.	43.	49.	3.	5.	8.
285.	9.	20.	40.	6.	1.	1.
287.	12.	37.	136.	100.	63.	19.
288.	16.	62.	120.	33.	116.	[illegible]
289.	21.	157.	84.	71.	50.	7.
291.	15.	38.	12.	36.	2.	4.
292.	19.	50.	26.	14.	11.	13.
293.	11.	19.	16.	3.	3.	3.
295.	14.	127.	64.	5.	5.	9.
296.	23.	81.	23.	13.	17.	10.
297.	15.	97.	101.	15.	14.	19.
299.	16.	66.	26.	3.	3.	5.
300.	17.	30.	14.	6.	5.	2.
301.	15.	22.	16.	30.	145.	111.
303.	24.	67.	22.	8.	6.	14.
304.	19.	35.	22.	15.	20.	16.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-6
Instrument Status Summary

	# EFS IN EACH CAT WITH:						
JULDAY	CH12 FOV HARBOR	CH11 SHUT. OPEN	CH12 SHUT. CLOSED	GO/NO GO HEATER ON	ELECTRONIC CALIB. ON	EMS WARM-UP	TOTAL # EFS REJECTED PER DAY
320.	2613.	791.	2609.	222.	4.	889.	2352.
321.	3339.	0.	1.	0.	0.	0.	2954.
322.	3595.	88.	16.	71.	26.	2.	3210.
324.	5.	2.	3.	83.	1.	617.	556.
325.	7.	0.	[illegible]	0.	9.	0.	10.
326.	2.	0.	1.	0.	3.	0.	4.
328.	2.	0.	1.	0.	0.	753.	648.
329.	3.	0.	0.	41.	4.	0.	46.
330.	9.	2.	5.	2.	6.	0.	13.
332.	3.	137.	1.	0.	4.	545.	462.
333.	0.	0.	3.	41.	0.	0.	44.
334.	5.	8.	10.	6.	2.	0.	19.
336.	1.	0.	0.	0.	2.	599.	500.
337.	0.	0.	1.	0.	0.	0.	0.
338.	5.	0.	3.	0.	2.	0.	6.
340.	3.	1.	0.	0.	3.	545.	456.
341.	0.	0.	3.	0.	5.	0.	5.
342.	449.	783.	64.	115.	18.	0.	453.
344.	0.	0.	1.	0.	0.	665.	565.
345.	0.	0.	1.	82.	3.	0.	81.
346.	4.	0.	3.	0.	0.	0.	4.
348.	2.	0.	1.	0.	2.	628.	533.
349.	1.	0.	0.	0.	3.	0.	1.
350.	19.	1.	9.	63.	26.	0.	99.
352.	0.	0.	0.	0.	0.	592.	490.
353.	0.	0.	2.	0.	2.	0.	2.
354.	8.	263.	4.	6.	4.	1.	19.
356.	5344.	0.	5339.	0.	8.	73?.	4664.
357.	5044.	0.	5043.	0.	1.	0.	4407.
358.	5342.	0.	5338.	0.	7.	0.	4685.
360.	0.	0.	1.	0.	1.	595.	494.
361.	0.	1.	[illegible]	0.	0.	0.	0.
362.	6.	6.	4.	6.	1.	0.	13.
364.	1.	0.	0.	0.	2.	637.	535.
365.	421.	756.	57.	113.	9.	1.	417.
1.	7.	2.	5.	0.	4.	0.	10.
3.	5.	0.	1.	0.	10.	501.	436.
4.	2.	0.	6.	82.	11.	0.	93.
5.	6.	0.	5.	0.	2.	0.	8.
7.	0.	0.	0.	0.	0.	502.	429.
8.	1.	0.	1.	0.	4.	0.	5.
9.	6.	3.	5.	3.	0.	0.	10.
11.	2.	0.	0.	0.	4.	493.	422.
12.	462.	1036.	73.	232.	31.	0.	560.
13.	6.	3.	5.	3.	4.	0.	13.
15.	0.	0.	1.	0.	0.	104.	78.
16.	0.	0.	0.	0.	0.	0.	0.
17.	5.	3.	5.	44.	0.	0.	50.
19.	2.	1.	2.	0.	4.	315.	270.
20.	0.	0.	0.	0.	0.	0.	0.
21.	3.	1.	3.	41.	7.	0.	46.
23.	6.	5.	3.	5.	2.	176.	165.
25.	8.	3.	6.	3.	2.	492.	428.
27.	5.	0.	4.	0.	2.	106.	87.

TABLE D-6 (Cont'd)

Instrument Status Summary

HPS IN EACH CAT WITH:

JULDAY	CH12 POV BARRON	CH11 SHUT OPEN	CH12 SHUT. CLOSED	GO/NO GO STATUS ON	ELECTRONIC CALIB. ON	EMB WARM-UP	TOTAL # HPS REJECTED PER DAY
29.	7.	2.	7.	43.	12.	460.	419.
31.	7.	3.	3.	3.	2.	495.	430.
33.	5.	11.	3.	11.	0.	76.	66.
35.	6.	5.	4.	4.	1.	493.	427.
37.	5.	2.	4.	0.	2.	503.	435.
39.	0.	0.	0.	0.	0.	472.	398.
40.	2.	0.	1.	0.	5.	0.	6.
41.	9.	2.	6.	1.	3.	1.	19.
43.	6.	1.	1.	41.	1.	113.	89.
44.	522.	1099.	23.	51.	6.	0.	465.
45.	4.	0.	4.	0.	2.	0.	7.
47.	1.	0.	0.	0.	2.	493.	415.
48.	528.	0.	24.	52.	11.	0.	476.
49.	6.	1.	4.	0.	2.	0.	6.
51.	0.	1.	2.	0.	2.	489.	416.
52.	1.	0.	1.	0.	4.	0.	4.
53.	6.	3.	5.	3.	3.	0.	10.
55.	6.	4.	3.	3.	1.	97.	79.
57.	0.	0.	3.	0.	2.	485.	414.
59.	3.	0.	1.	0.	1.	504.	494.
60.	528.	1124.	22.	51.	5.	0.	472.
61.	9.	4.	5.	4.	3.	0.	17.
63.	2.	0.	1.	41.	3.	497.	441.
64.	2.	0.	0.	0.	3.	0.	3.
65.	6.	3.	5.	2.	2.	0.	10.
67.	0.	0.	0.	0.	0.	114.	87.
68.	1.	0.	0.	0.	1.	0.	1.
69.	8.	3.	5.	3.	2.	0.	12.
71.	0.	0.	2.	0.	0.	503.	430.
72.	527.	1.	24.	52.	3.	0.	470.
73.	7.	1.	4.	0.	6.	0.	9.
75.	16.	0.	2.	0.	1.	376.	327.
76.	2.	0.	0.	0.	4.	0.	4.
77.	6.	3.	4.	43.	1.	0.	26.
79.	4.	0.	3.	0.	6.	332.	291.
80.	2.	0.	1.	0.	2.	0.	3.
81.	6.	6.	6.	6.	4.	0.	15.
83.	0.	1.	2.	41.	2.	509.	475.
84.	526.	1117.	24.	54.	8.	0.	512.
85.	8.	0.	5.	0.	7.	0.	9.
87.	7.	0.	2.	0.	3.	549.	460.
88.	1.	2.	1.	0.	2.	0.	3.
89.	19.	28.	17.	4.	6.	0.	28.
91.	13.	0.	10.	0.	1.	1.	10.
93.	6.	4.	4.	4.	0.	524.	454.
95.	9.	4.	8.	3.	2.	139.	125.
97.	29.	1.	25.	1.	2.	542.	480.
99.	29.	0.	27.	0.	3.	528.	484.
101.	221.	5.	15.	4.	2.	145.	192.
103.	2.	0.	1.	615.	3.	547.	1017.
104.	1.	2.	4.	0.	3.	0.	8.
105.	1.	0.	2.	0.	1.	0.	3.
106.	527.	1118.	23.	51.	4.	0.	471.
107.	1.	0.	1.	0.	1.	0.	1.
108.	522.	0.	25.	51.	5.	0.	466.

ORIGINAL PAGE IS OF POOR QUALITY

TABLE D-6 (Cont'd)
Instrument Status Summary

JULDAY	# MFS IN EACH DAY WITH: CH12 FOV NARROW	CH11 SHUT. OPEN	CH12 SHUT. CLOSED	GO/NO GO HEATER ON	ELECTRONIC CALIB. ON	ERB WARM-UP	TOTAL # MFS REJECTED FOR DAY
109.	9.	0.	9.	0.	0.	0.	1.
111.	3.	0.	0.	583.	3.	520.	977.
112.	0.	0.	2.	0.	0.	0.	2.
113.	6.	0.	3.	0.	3.	0.	6.
115.	2.	0.	1.	0.	6.	540.	462.
116.	3.	0.	2.	127.	4.	0.	117.
117.	0.	255.	1.	0.	0.	0.	1.
118.	522.	848.	23.	52.	4.	0.	469.
119.	9.	13.	7.	13.	0.	0.	6.
121.	7.	8.	5.	8.	3.	36.	38.
123.	0.	0.	0.	0.	0.	497.	426.
124.	5.	0.	3.	0.	6.	0.	6.
125.	9.	4.	11.	45.	3.	0.	50.
127.	1.	0.	1.	0.	3.	531.	456.
128.	4.	0.	4.	0.	7.	0.	9.
[illegible]	8.	3.	5.	2.	3.	0.	11.
[illegible]	6.	1.	4.	1.	1.	534.	459.
133.	385.	0.	22.	50.	5.	317.	623.
134.	139.	0.	4.	0.	2.	0.	117.
135.	9.	6.	6.	5.	5.	0.	5.
137.	16.	20.	18.	2.	1.	538.	472.
139.	3.	2.	2.	66.	3.	140.	177.
140.	0.	0.	2.	0.	0.	0.	2.
141.	7.	12.	6.	53.	1.	0.	83.
143.	2.	0.	0.	0.	3.	544.	471.
144.	529.	1117.	23.	52.	7.	0.	474.
145.	7.	7.	5.	47.	3.	0.	45.
147.	0.	0.	0.	0.	1.	532.	457.
148.	3.	1.	0.	0.	5.	0.	5.
149.	10.	3.	11.	3.	4.	0.	4.
151.	1.	0.	0.	0.	1.	146.	120.
152.	1.	0.	0.	0.	1.	0.	1.
153.	5.	0.	5.	0.	0.	0.	1.
155.	0.	0.	1.	8.	4.	133.	119.
156.	467.	0.	24.	42.	7.	1.	414.
157.	15.	3.	17.	3.	5.	0.	20.
159.	12.	1.	8.	41.	4.	0.	55.
160.	2.	0.	0.	41.	2.	0.	32.
161.	9.	5.	5.	68.	3.	0.	63.
163.	1.	0.	1.	0.	1.	214.	188.
164.	0.	0.	0.	0.	1.	0.	1.
165.	1.	0.	0.	0.	1.	0.	1.
167.	1.	265.	0.	0.	2.	146.	121.
168.	528.	849.	22.	51.	7.	0.	472.
169.	9.	5.	5.	5.	3.	0.	4.
171.	3.	0.	0.	41.	4.	522.	481.
172.	4.	2.	1.	0.	6.	1.	7.
173.	8.	0.	9.	0.	3.	0.	6.
175.	0.	0.	2.	0.	1.	483.	408.
176.	3.	0.	1.	41.	5.	0.	47.
177.	10.	3.	6.	44.	7.	0.	32.
179.	3.	0.	2.	0.	7.	143.	104.
180.	524.	0.	22.	52.	6.	0.	510.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-6 (Cont'd)

Instrument Status Summary

JULDAY	# HPS IN EACH DAY WITH: CH12 POT NARROW	CH11 SHUT. OPEN	CH12 SHUT. CLOSED	GO/NO GO HEATER ON	ELECTRONIC CALIB. ON	RAD WARM-UP	TOTAL # HPS REJECTED FOR DAY
181.	12.	6.	5.	6.	6.	0.	11.
183.	7.	1.	4.	0.	11.	541.	455.
184.	0.	0.	0.	0.	3.	0.	3.
185.	12.	0.	6.	41.	9.	0.	58.
187.	2.	0.	2.	41.	6.	483.	487.
188.	8.	1.	5.	0.	12.	0.	12.
189.	5.	1.	5.	41.	3.	0.	35.
191.	2.	0.	1.	41.	8.	523.	481.
192.	507.	1098.	28.	52.	10.	0.	467.
193.	3.	0.	2.	41.	4.	0.	38.
195.	10.	0.	1.	0.	12.	541.	458.
196.	4.	0.	0.	0.	6.	0.	4.
197.	9.	2.	8.	43.	8.	0.	83.
199.	2.	1.	2998.	41.	7.	528.	2633.
200.	2.	0.	5.	0.	7.	0.	5.
201.	10.	0.	6.	0.	4.	0.	3.
203.	2.	0.	0.	0.	5.	512.	447.
204.	529.	0.	24.	51.	15.	0.	478.
205.	-10.	13.	7.	133.	10.	0.	117.
207.	5.	0.	1.	0.	8.	549.	460.
208.	4.	0.	1.	41.	7.	0.	36.
209.	12.	4.	5.	3.	12.	0.	18.
211.	4.	0.	3.	0.	7.	528.	458.
212.	1.	0.	3.	0.	7.	0.	8.
213.	7.	1.	7.	41.	3.	0.	51.
215.	-1.	0.	2.	0.	2.	527.	454.
216.	758.	1233.	193.	437.	8.	305.	758.
217.	9.	4.	10.	4.	4.	0.	12.
219.	7.	1.	1.	41.	3.	0.	38.
220.	0.	3.	5.	43.	2.	0.	29.
221.	11.	1.	9.	42.	6.	0.	60.
223.	2.	0.	3.	0.	5.	147.	107.
224.	3.	0.	0.	41.	5.	0.	23.
225.	11.	7.	4.	7.	3.	0.	7.
227.	2.	0.	1.	15.	7.	518.	468.
228.	523.	0.	19.	0.	5.	0.	448.
229.	10.	5.	8.	5.	3.	0.	16.
231.	2.	0.	1.	0.	4.	520.	453.
232.	2.	0.	3.	0.	6.	0.	8.
233.	6.	3.	4.	2.	4.	0.	4.
235.	3.	2.	2.	0.	9.	551.	483.
236.	4.	0.	2.	0.	6.	0.	8.
237.	11.	4.	10.	65.	7.	0.	91.
239.	3.	261.	1.	0.	3.	149.	127.
240.	483.	812.	22.	51.	7.	0.	441.
241.	4.	0.	1.	82.	5.	0.	65.
243.	8.	1.	4.	41.	2.	530.	464.
244.	4.	0.	6.	0.	0.	0.	6.
245.	1.	0.	1.	0.	5.	527.	457.
247.	9.	1.	5.	41.	19.	534.	521.
248.	4.	0.	1.	0.	5.	0.	3.
249.	8.	0.	8.	41.	4.	1.	53.
251.	2.	0.	4.	41.	6.	154.	161.
252.	527.	0.	25.	52.	7.	0.	494.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-6 (Cont'd)
Instrument Status Summary

JULDAY	# MFS IN EACH DAY WITH: CH12 POS. NARROW	CH11 SHUT. OPEN	CH12 SHUT. CLOSED	GO/NO GO HEATER ON	ELECTRONIC CALIB. ON	EMS WARM-UP	TOTAL # MFS REJECTED PER DAY
253.	10.	13.	7.	13.	2.	0.	25.
255.	3.	0.	5.	0.	6.	509.	444.
256.	2.	0.	2.	0.	4.	0.	10.
257.	25.	6.	21.	5.	4.	0.	33.
259.	0.	0.	1.	0.	2.	0.	3.
260.	0.	0.	0.	0.	2.	0.	2.
261.	1.	0.	1.	0.	3.	1.	4.
263.	2.	0.	1.	0.	6.	537.	466.
264.	532.	1123.	24.	51.	11.	0.	478.
265.	12.	2.	12.	82.	9.	0.	82.
267.	6.	1.	4.	41.	10.	204.	209.
268.	1.	1.	1.	0.	4.	0.	5.
269.	1.	9.	4.	0.	2.	0.	4.
271.	1.	0.	1.	41.	1.	530.	497.
272.	2.	0.	3.	0.	6.	0.	322.
273.	14.	5.	14.	5.	3.	0.	25.
275.	2.	0.	2.	0.	5.	484.	414.
276.	2.	0.	0.	0.	4.	0.	4.
277.	147.	6.	10.	6.	5.	0.	173.
279.	0.	0.	0.	0.	3.	485.	412.
280.	1.	1.	0.	0.	1.	0.	1.
281.	0.	0.	0.	0.	1.	0.	1.
283.	5.	1.	5.	41.	8.	134.	153.
284.	0.	1.	6.	41.	2.	0.	48.
285.	4.	0.	2.	0.	4.	0.	7.
287.	1.	0.	0.	0.	1.	148.	102.
288.	527.	0.	22.	52.	5.	0.	511.
289.	9.	0.	10.	41.	1.	0.	52.
291.	3872.	0.	0.	0.	2.	541.	3382.
292.	5421.	0.	3.	0.	4.	0.	4757.
293.	3959.	0.	1.	0.	2.	0.	3444.
295.	2.	0.	0.	41.	3.	159.	141.
296.	4.	0.	0.	3.	8.	0.	7.
297.	35.	0.	33.	0.	9.	0.	42.
299.	1.	1.	0.	0.	1.	484.	409.
300.	1.	0.	2.	0.	3.	0.	6.
301.	533.	1173.	29.	55.	3.	0.	486.
303.	0.	0.	4.	0.	2.	497.	426.
304.	6.	356.	3.	41.	7.	0.	51.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-7
Data Quality Loss Interval Flags for Undefined FOV Locations

JULIAN DATE	A	B**	C	D	E	F
320	77,728	14758/18.99	1/.0003	3/.0040	1/.0016	0/0
321	126,496	24131/19.08	16/.0032	17/.0136	0/0	0/0
322	167,136	31833/19.06	244/.0363	264/.1376	433/.3184	8/.0048
324	171,168	32308/18.92	11/.0016	17/.0096	2/.0008	0/0
326	169,760	32400/19.09	11/.0016	11/.0064	2/.0008	2/.0008
328	172,160	32714/19.00	9/.0052	7/.0040	0/0	0/0
330	164,896	31411/19.05	21/.0032	23/.0136	33/.0208	0/0
333	158,208	30352/19.06	18/.0028	21/.0128	2/.0016	1/.0008
336	145,760	27677/18.99	7/.0012	6/.0040	27/.0184	0/0
338	154,656	29577/19.12	0/0	0/0	33/.0424	4/.0024
340	161,760	30788/19.03	9/.0014	10/.0064	48/.0296	54/.0336
346	170,624	32431/19.01	16/.0023	14/.0088	7/.0040	2/.0008
349	168,800	32226/19.09	0/0	0/0	30/.0176	0/0
354	161,824	31006/19.16	45/.0083	67/.0416	90/.0560	4/.0024
357	159,352	30455/19.09	11/.0017	16/.0104	32/.0200	0/0
360	1,344	242/18.01	0/0	0/0	0/0	0/0
361	171,328	33355/19.47	14/.0020	13/.0072	13290/7.7560	1224/.7144
362	137,664	30177/19.14	14/.0022	21/.0136	87/.0128	1/.0008
364	1,336	279/18.16	0/0	0/0	0/0	0/0
365	104,224	19980/19.17	58/.0012	64/.0616	69/.0664	0/0
1	168,832	32288/19.12	46/.0688	44/.0264	4/.0024	2/.0008
4	110,368	21453/19.44	39/.0134	60/.0544	38/.0344	51/.0048
5	111,880	21758/19.40	45/.0101	37/.0328	3/0	0/0
12	117,984	22611/19.16	29/.0061	20/.0108	31/.0264	1/.0008
20	102,368	19718/19.26	0/0	0/0	0/0	0/0
27	90,016	17423/19.18	0/0	5/.0056	0/0	0/0
33	63,008	11939/18.95	0/0	0/0	0/0	0/0

Cumulative and relative (expressed as a percent right of slash mark) frequency of occurrence of selected parameters for each day checked. Column A is the number of observations for which the scanner was on. Column B is the occurrence of undefined latitude FOV locations for channels 15 and 19. Column C is the Platinum Temperture Monitor Flag for the four longwave channels. Columns D, E, and F are occurrences of the Alpha Encoder quality flag turned on, Alpha angle more than one count from nominal, and Alpha angle greater than 266, respectively.

* Fromm, M.D. and P.H. Dwivedi, 1982. Validation of First Year ERB-7 NFOV Data. Research and Data Systems, Inc. Prepared for GSFC under contract NAS 5-26123.

** The undefined FOV locations which range from 18-20% per day result from the FOV over the horizon and gimbal motion of the scan head. For more details please see page 21 of the MAT User's Guide Document.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-7 (cont'd)

Data Quality Loss Interval Flags for
Undefined FOV Locations

JULIAN DATE	A	B	C	D	E	F
~~40~~	~~114,464~~	21963/19.18	0/0	0/0	0/0	0/0
45	117,728	22498/19.11	2/.0004	2/.0016	0/0	0/0
~~52~~	~~116,000~~	22322/19.24	0/0	8/.0072	1/.0008	0/0
60	113,984	21977/19.28	13/.0029	0/0	1/.0008	0/0
64	107,616	20809/19.34	1/.0002	2/.0016	77/.0712	54/.0504
~~65~~	116,896	22533/19.28	8/.0017	9/.0080	31/.0264	0/0
~~72~~	169,824	32792/19.31	22/.0032	25/.0144	26/.0152	0/0
77	159,072	30721/19.31	7/.0011	6/.0040	0/0	0/0
84	150,784	29107/19.30	25/.0041	24/.0160	32/.0216	1/.0008
89	153,760	29696/19.31	44/.0072	30/.0256	4/.0024	2/.0016
105	162,976	31506/19.32	8/.0012	19/.0120	529/.3248	0/0
108	170,976	33110/19.36	19/.0028	19/.0112	552/.3232	0/0
~~111~~	14,080	2712/19.26	6/.0107	4/.0288	89/.6320	0/0
112	161,824	31360/19.38	1/.002	10/.0064	133/.0824	0/0
117	463,968	31733/19.35	39/.0059	34/.0208	8873/5.4128	0/0
119	116,896	22734/19.45	1/.0002	7/.0056	20403/17453?	0/0
123	146,328	28448/19.42	30/.0051	25/.0168	7315/4.9925	0/0
128	136,256	26350/19.34	22/.0040	32/.0232	29/.0216	5/.0040
134	12,416	2421/19.50	0/0	0/0	0/0	0/0
140	143,328	27910/19.47	0/0	4/.0024	11/.0080	0/0
144	155,776	30197/19.38	33/.0053	23/.0144	0/0	0/0
148	131,680	25642/19.47	46/.0078	33/.0264	74/.0560	4/.0032
152	144,960	28185/19.44	17/.0029	15/.0104	27/.0154	0/0
156	159,872	31085/19.44	17/.0015	15/.0096	96/.0600	3/.0016
~~160~~	~~129,728~~	25185/19.41	43/.0083	27/.0218	18/.0136	13/.0104
164	123,520	24065/19.48	8/.0016	4/.0032	0/0	0/0
168	145,472	28264/19.40	4/.0007	11/.0072	0/0	0/0
172	17,648	33396/19.46	48/.0070	49/.0288	60/.0352	1/.0008
176	133,440	26041/19.52	57/.0107	64/.0480	32/.0240	2/.0016
180	156,672	30523/19.48	27/.0043	23/.0144	50/.0368	0/0
183	156,224	30389/19.45	37/.0059	46/.0296	85/.0544	0/0
187	160,640	31267/19.46	53/.0082	59/.0368	135/.0840	0/0
~~191~~	142,088	27688/19.49	46/.0070	32/.0224	38/.0264	0/0
~~195~~	129,888	25316/19.49	18/.0035	20/.0152	54/.0416	0/0

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-7 (Cont'd)

Data Quality Loss Interval Flags for Undefined Fov Locations

JULIAN DATE	A	B	C	D	E	F
200	165,888	32364/19.31	170/.0256	131/.0012	112/.0672	1/.0008
204	148,704	28934/19.47	17/.0020	22/.0112	61/.0408	0/0
208	171,136	33317/19.47	44/.0064	35/.0208	60/.0352	0/0
212	157,792	30737/19.48	50/.0070	43/.0272	60/.0380	0/0
213	170,848	33200/19.47	13/.0020	22/.0136	30/.0176	0/0
217	150,432	29279/19.46	25/.0043	46/.0304	151/.1064	0/0
221	168,320	32837/19.50	58/.0086	78/.0464	202/.1192	0/0
225	171,648	33488/19.40	36/.0082	40/.0288	85/.0496	0/0
228	166,392	32463/19.48	31/.0047	27/.0160	29/.0176	0/0
237	151,648	29300/19.46	26/.0043	43/.0280	34/.0224	1/.0008
240	144,900	28212/19.46	34/.0080	38/.0240	32/.0224	0/0
244	83,968	16417/19.55	27/.0080	38/.0416	27/.0320	1/.0008
248	172,304	33772/19.40	72/.0104	51/.0296	31/.0016	1/.0008
252	133,088	25700/19.30	75/.0141	50/.0520	25/.0216	0/0
256	155,872	30431/19.53	406/.0796	264/.1824	32/.0208	1/.0008
261	153,536	30050/19.20	125/.0230	80/.0376	113/.0736	4/.0024
265	156,040	31301/19.08	475/.0747	306/.0240	202/.1272	7/.0048
268	130,636	26019/19.30	20/.0062	26/.0144	5/.0040	4/.0032
272	11,072	2343/19.75	11/.0232	14/.2368	32/.4384	0/0
276	1,000	314/19.02	0/0	0/0	0/0	0/0
279	132,376	26657/19.65	236/.0446	1301/.1040	148/.1056	1/.0008
283	172,064	33314/19.36	180/.0282	152/.0080	130/.0732	5/.0032
287	151/072	29738/19.60	600/.0983	3361/.2224	100/.0664	7/.0048
291	123,776	23956/19.35	37/.0073	28/.0224	80/.0648	0/0
295	120,768	23787/19.70	235/.0486	136/.1128	71/.0384	1/.0008
299	160,280	31098/19.41	29/.0048	41/.0512	83/.0528	0/0
303	172,320	33961/19.71	59/.0086	68/.0400	78/.0408	1/.0008

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-8

NFOV Channels 15-22, "Out-of-Limits" Observations.

JUL.DATE	CH15	CH16	CH17	CH18	CH19	CH20	CH21	CH22
320	111	47	21	148	3	6	4	2
321	162	174	125	227	15	16	17	21
322	461	344	324	633	240	266	239	202
324	164	72	77	364	20	17	16	25
326	168	65	60	293	14	10	10	11
328	270	105	53	397	10	3	11	12
330	325	71	59	436	31	26	22	32
333	213	67	56	356	19	17	24	21
336	160	173	93	353	15	12	11	13
340	127	94	50	331	9	9	6	16
343	207	72	63	361	16	8	14	18
344	0	0	0	0	0	0	0	0
346	263	88	50	424	23	13	14	23
349	170	72	43	305	7	1	2	9
352	0	0	0	0	0	0	0	0
354	343	164	106	489	69	64	69	66
357	271	75	41	450	21	15	13	17
360	0	1	0	22	8	0	0	0
361	302	106	65	3500	17	287	16	28
362	194	85	59	10763	25	18	26	27
364	0	1	0	291	6	0	0	0
365	237	102	88	7863	54	50	56	60
1	371	97	90	9009	56	37	27	37
4	257	134	122	1961	78	61	61	63
5	219	98	88	2058	44	28	35	37
12	297	108	83	10354	32	18	19	27
20	287	85	48	4014	9	3	5	0
27	184	93	49	3298	16	3	5	5
33	75	32	23	2725	8	0	3	1
40	153	73	45	6888	1	2	3	2
45	292	143	57	6044	18	3	7	2
52	135	87	49	6897	15	4	10	4
60	134	109	40	10179	12	4	9	5
64	170	60	21	7790	8	7	2	2
65	177	84	34	9810	22	9	9	10
72	31	451	471	22170	46	38	40	24
77	35	478	454	23431	364	23	21	7
84	31	453	425	21611	229	36	38	17
89	80	559	517	22966	90	59	61	43
105	153	447	467	27895	169	29	32	16
108	119	546	509	27618	139	39	36	20
111	9	37	33	2377	4	5	4	4
112	18	416	430	20595	10	23	30	10
117	144	463	508	25200	67	48	40	31
119	60	264	365	19806	58	17	21	5
123	215	58	57	26555	22	20	26	25
128	171	79	41	20540	39	33	33	38
134	220	92	79	23096	53	44	53	47
140	158	70	55	20426	6	7	16	15
144	139	115	62	20992	25	24	25	23
148	217	123	70	20203	30	28	27	44

* Fromm, M.D., and P.H. Dwivedi, 1982. Validation of First Year ERB-7 NFOV Data. Research and Data Systems, Inc., prepared for GSFC under contract NAS 5-26123.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D-8 (Cont'd)
NFOV Channels 15-22, "Out-of-Limits" Observations

JUL. DATE	CH15	CH16	CH17	CH18	CH19	CH20	CH21	CH22
152	189	112	59	20120	22	16	19	21
156	161	114	71	24011	25	17	18	20
160	139	76	61	21943	45	34	22	28
164	136	66	46	21982	13	8	8	6
168	166	96	61	25986	19	12	16	20
172	[illegible]	[illegible]	73	33284	42	31	29	34
176	167	99	43	23799	37	29	26	29
180	143	92	42	28461	29	21	19	20
183	229	164	124	26237	56	46	45	50
187	200	156	114	27929	66	63	53	53
191	173	102	76	29054	33	31	35	34
195	134	86	66	21593	29	22	21	25
200	260	175	150	23459	106	109	69	103
204	144	116	75	23564	25	20	21	24
208	280	192	102	23957	42	37	39	40
212	247	168	110	21464	47	44	42	44
213	233	176	108	22377	27	20	27	26
217	262	166	120	19013	46	46	42	40
221	274	194	139	30394	76	67	67	73
225	328	223	156	27022	45	38	51	47
228	266	144	112	22032	28	22	28	26
237	230	151	90	23723	38	38	37	40
243	225	130	86	17521	31	30	36	35
244	148	98	71	8351	31	27	28	29
248	325	134	146	20616	40	26	31	40
252	132	71	73	14306	32	32	34	36
256	133	850	576	19181	101	103	99	88
261	223	104	162	13268	64	35	41	46
265	648	381	240	19095	135	129	124	132
268	129	47	68	17627	22	16	17	21
272	38	23	12	1629	10	8	9	10
276	0	0	0	436	0	0	0	0
273	340	184	120	15605	47	51	50	42
283	331	181	250	13477	91	81	74	92
237	269	211	115	22983	85	84	81	82
291	238	79	51	17651	35	30	29	35
295	186	148	107	16833	54	45	36	36
299	345	105	103	24208	41	30	27	41
303	206	156	134	23229	48	48	59	56

End of Document