2. STAGE B3 DATA USER'S GUIDE

2.1. OVERVIEW

The ISCCP Reduced Resolution Radiance Data delivery format is designed to:

(1) maximize format uniformity and predictability while preserving the original character of data from different satellites,

(2) enhance the value and ease of use for research by providing uniform and complete calibration and navigation information while minimizing the data volume, and

(3) provide flexible access to large volumes of data for global climatological studies.

The first objective is met by a fixed hierarchical organization of the data that is identical in structure except within the individual image files and by provision of a single set of software modules which can read and decode **any** B3 dataset. The second objective is met by provision of three different radiance calibrations to convert counts into two different physical quantities for each spectral channel and of complete earth-location and viewing geometry information for each image pixel in a coded form. The third objective is met by organizing the data in a fixed pattern, by providing a complete Table of Contents for each grouping of data and by keeping the characteristics of the images simple and constant. Complete software for manipulation of the data is provided. A new naming convention has been adopted for all ISCCP products (2.2.) .
B3 data are composed of the following files:

B3 README file :	ISCCP.B3REAME.0.GLOBAL.YYYY.MM.DD.HHMM.GPC.
B3 Table Of Contents file :	ISCCP.B3TOC.V. YYYY.MM.DD.HHMM.GPC.
Land/Water Map Data:	ISCCP.B3LWMAP.0.GLOBAL.YYYY.MM.DD.HHMM.GPC.
B3READ FORTRAN code:	ISCCP.B3READ.0.GLOBAL.YYYY.MM.DD.GPC.
N number of B3 Images	ISCCP.B3.V.SATIDNN.YYYY.MM.DD.HHMM.GPC

The B3 dataset is organized as independent chronological sequences of images for each satellite. A single image represents the multi-spectral radiance measurements made at a particular time; for polar orbiter data, each complete orbit of data is considered a single image. Each data grouping in the sequence for a particular satellite covers a fixed period of time (one month), even if some data are missing during a particular period. Each file contains a single B3 image. Each day of data is arranged sequentially in 3hr time slots centered on 0000, 0300, 0600, 0900, 1200, 1500, 1800, 2100 GMT; for polar orbiters, the orbits are arranged in order of occurrence. One month of data starts with the 0000 GMT slot (2230-0130) on the first day and ends with the 2100 GMT (1930-2230) on the last day.

All B3 data shipments contain a FORTRAN 77 source module designed to read and decode any B3 image.

The first several 8000 byte records (the number depends on the number of spectral channels on a particular satellite) in an image data file contain descriptive and calibration information for that particular image. Subsequent records each contain a whole, but variable, number of scan lines of image data with navigation information for each pixel. The first portion of a data record contains redundant descriptive information about the data. Each scan line of data in a data record is composed of a scan line directory, navigation directory, data directory and radiance values for a fixed number of image pixels representing one image scan line. All of these parts of the file structure are explained in the following sections.

2.2. NEW DATASET NAMING CONVENTION FOR ISCCP (2001)

COMMENTS: The old dataset naming convention concerned data TAPES of a nearly universal form and their manipulation with mainframe operating systems. The new convention concerns data FILES for ftp over the Internet, their storage on disc drives and a wide variety of media, and their manipulation with UNIX workstations. There will be no duplicate file names: that is, if two files are found to have the same name, they will be identical in content. The proposed new naming convention assumes groupings of data files into directories at monthly time steps and by satellite where appropriate (there is one very small dataset for which the directory will cover whole years). The proposed new naming convention tries to preserve as much of the old convention as possible and tries to be as informative as possible. To that end, each transmission of a directory will be accompanied by a number of ancillary meta-data files (many of which are fixed) that, together with the data files, provide a set of files that resembles the structure of the old data tapes. In addition, each ftp transmission session will include a LOG file that gives a one-line summary of each data file sent: file name, file size (number of bytes), checksum and md5 output. This file will be used to verify proper transmission of the data and then discarded. AC and BC data will not use this naming convention since an Internet form for these data already exists and does not need to be changed. Stage A data is not included in this convention and is assumed to remain in the original format with the original labeling for each data center. The C-series cloud products will not be modified to change to this new naming convention.

FILE Name = ISCCP.TTTTTT.V.SATIDNN.YYYY.MM.DD.HHMM.DCN

(maximum length = 44 characters), where TTTTTT, SATIDNN and DC are of variable length and all other fields are fixed length and the number of fields is fixed at 9.

- **TTTTTT** = Data Type = B1, B2, XXOA, B3, BT, XXTOC, B3LWMAP, SN, SI, TOVS, IS, TVX, DX, D1, D2, XXGRID, XXREAD, XXREADME, XXOA = Orbit & Attitude files for each type of data where needed (XX = B1, B2) XXTOC = OPTIONAL Table of Contents (second file in directory) summarizing image data information for each type of data (currently XX = B1, B3, BT, DX, D1, D2, TV, IS) **B3LWMAP** = fixed Land/Water Map information accompanying B3 data
- **SN** = Snow cover data from NOAA, **SI** = Sea Ice cover data from NSIDC, **IS** = ISCCP merged snow/sea ice dataset

- **TOVS** = TOVS, RTOB or ATOB = TOVS data from NOAA, **TVX** = ISCCP version of TOVS (each monthly TV directory will contain a climatology meta-data file, **TVC**, the monthly file = **TVM**, and the daily files = **TVD**
- **XXGRID** = fixed ancillary file giving map Grid information (XX = IS, TV, D1, D2)
- **XXREAD** = READ-programs for each type of ISCCP data product (XX = B3, BT, IS, TV, DX, D1, D2); date field indicates the date of last change
- **XXREADME** = fixed meta-data file (first file in directory), adapted from the original tape header files for ISCCP data products (XX = B3, BT, IS, TV, DX, D1 and D2)
- **V** = Version number (always one number)
- **SATIDNN**

  GOE-5 (6, 7, 8, 9, 10, 11)
  MET-2 (3, 4, 5, 6, 7, later MSG)
  GMS-1 (2, 3, 4, 5, later MTSAT)
  INS-1
  FY2-B
  NOA-7 (8, 9, 10, 11, 12, 14, 15, 16), for polar DX data, the satellite number is extended to indicate the geographic sector (N=north pole, S=south pole, A-C = three 120 degree longitude sectors at low latitudes plus/minus 50 degrees in daytime, D-F = same sectors at night), e.g., NOA-15S NOAA TOVS uses SATIDNN = CP for composites of satellites GLOBAL for combined satellite (gridded) ISCCP products (IS, TV, D1 and D2)
- **YYYY** = Year = 1981...2005 (always 4 numbers, fill = 9999)
- **MM** = Month number = 01, 02, 03...12 (always 2 numbers,fill = 99) DD = Day of month = 01, 02, 03...31 (always 2 numbers,fill = 99)
- **HHMM** = Hour-Minute (always 4 characters, fill = 9999). For B1, B2 and XXOA data files, this field is the image start time to the nearest minute, where there is a leading zero for times less than 1000 on a 24-hour clock. If more than one data file has the same start time (to within one minute, i.e., polar orbiter data), the second and any subsequent files should have times ending in a letter (e.g., if there are three files with start times within one minute of 1215, they would have HHMM = 1215, 121b, 121c). For all other datasets, this is the Nominal Time of Day = 0000, 0300, ...2100 GMT.

Each type of data has an implicit time period covered most of the datasets represent one instant of time within a 3-hr interval. For the SN, SI, IS, TVM and D2 datasets, these time intervals are one week, one week, 5-days, one month, and one month, respectively. For these datasets HHMM = 9999 and the date information indicates the beginning date of a time interval with any unused time unit filled with 9's. Any climatology files may have the year filled but indicate a specific month, e.g., for the TVC dataset, YYYY.MM = 9999.03. For ancillary meta-data files (e.g., XXREADME, XXREAD, B3LWMAP and XXGRID), the date field will indicate the date of last change.

- **DCN** = Data Center Name: For B1, B2, XXOA, SN, SI and TOVS datasets, these names are NOA, CSU, MSC (used to be AES), JMA, EUM (used to be ESA), (CMA

will be added later), and SCC as appropriate. For B3, BT and DX datasets (also the associated meta-data file, XXTOC), these names will be a set of names used at the GPC that are a combination of SPC names and some indication of satellite position (eg., for METEOSAT-3 from CSU we use CME, for METEOSAT-5 over the Indian Ocean we use MTI, for morning NOAA polar orbiters, we use NOM). For all other datasets, the DCN is GPC.

ISCCP ftp Protocols

Each SPC will "push" data to the GPC and ICA and the GPC will "push" data to the ICA (and NASA Langley ASDC). For this purpose and to allow checking and revision of files, each center will have an account on the target center's ftp server. The data will be transmitted uncompressed (unless this is absolutely necessary in specific cases). Each file transmitted will be named using the filename convention described above. Each ftp session may transmit a single or multiple files. Data files will be organized in monthly directories. Directory names will follow the filename convention, except that the DD and HHMM fields will be dropped:

DIRECTORY Name = ISCCP.TTT.V.SATID.YYYY.MM.DCN

The version number will be reserved for use to re-transmit the same dataset if it is changed at a later date. For IS data, MM = 99, that is this directory will contain a whole year of data. TTT in these directories will only include actual data types (B1, B2, B3, BT, SN, SI, TOVS, IS, TV, DX, D1, D2), not the meta-data types (XXOA, XXTOC, B3LWMAP, XXGRID, XXREAD, XXREADME). The files transmitted in each ftp session will be accompanied by a LOG file that is named:

ISCCP.XXFTPLOG.YYYY.MM.DD.HHMM.DCN

Where XX is the data type and the date and time fields can be filled with 9's as appropriate to the frequency of transmission sessions. The LOG file will contain a one-line summary for each file in the session:

filename, filesize (number of bytes), checksum, md5 output

Inclusion of md5 is optional but desired. The contents of the LOG file will refer to the uncompressed data, if data compression is used. If ftp data transmissions from the SPC are routine and on schedule, then no notification of data transmission is required. All data for a given month must be transmitted to the GPC and ICA by the 15th of the following month and a report (the current monthly report matrix) sent by e-mail by the same date. If data will be transmitted late or replaced after the cutoff date, then notification is required. The GPC and ICA will cross-check data files received against the monthly report matrices and notify each SPC within one-two working days that all files have been successfully received. The GPC will notify both the ICA and NASA Langley ASDC when data products are ready for transmission; this notification will also go to all data centers so that anyone may collect copies of the ISCCP data products.

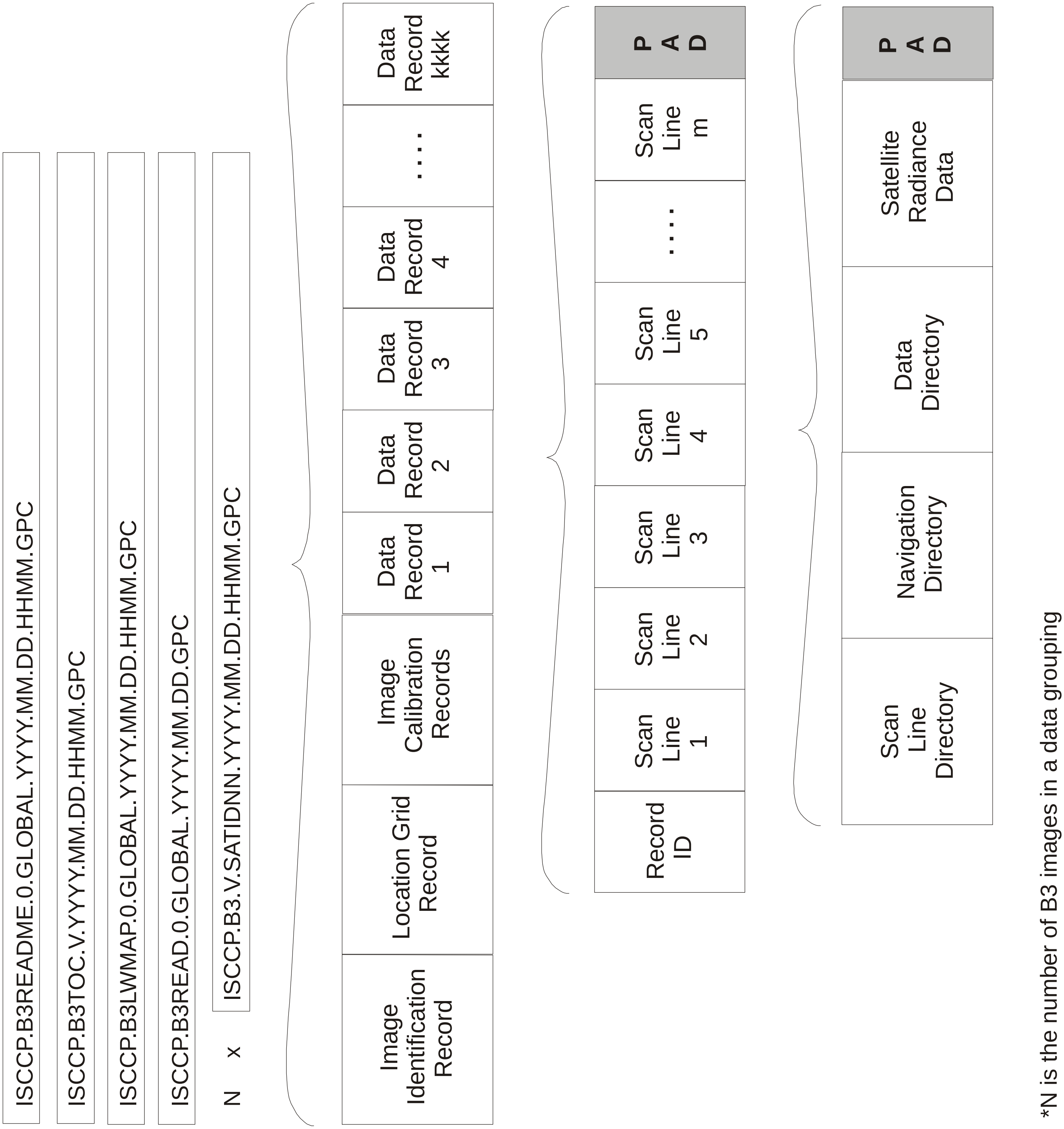

Figure 2.1. B3 data grouping format.

2.3. DATA CHARACTERISTICS

B3 image data is composed of ***n*** 8000 byte records (see Fig. 2.1.)

(1) Radiance data are coded in one byte representing integers from 0 to 255. These values are the **original** radiometer count values (except for the changes noted in Section 3).

(2) The value 255 always represents bad or missing data.

(3) The second record in each image data file is the location grid record, which indicates the geographical coverage by the number of image pixels located in each 10° interval of latitude and longitude.

(4) The image calibration records provide tables for each radiometer spectral channel that convert count values to two alternate physical quantities using three different calibrations. The third calibration is preferred.

(5) Data structures contain both location pointers and data values to allow for reasonable packing efficiency and easy access to each scan line of data.

(6) Data structures contain a variable number of whole image scan lines of data; no scan line spans a data structure boundary.

(7) Scan lines are composed of a fixed number of image pixels, unique to each satellite. The number of bytes required for a scan line also depends on the number of spectral channels that are active.

(8) The number of active spectral channels is constant within a single image but may change from image to image.

(9) Data processing must be sequential by scan line.

(10) Observation time to the nearest second is given for each scan line.

(11) Earth-location (latitude, longitude) and observation viewing geometry (cosine of satellite zenith angle, cosine of solar zenith angle, relative azimuth angle) are given for each image pixel.

(12) Earth-location can be converted into a surface type (land, water, coast) flag for each pixel if the land/water option in the B3READ FORTRAN module is implemented.

(13) Count values for all active spectral channels are reported for each pixel; the standard visible (0.6 ìm) and infrared (11 ìm) channels are reported first, followed by any other spectral channels available.

(14) The three geostationary images nearest local midnight have no visible channel data reported. This is indicated by a day/night flag in the Table of Contents and image identification record.

2.4. TABLE OF CONTENTS (ISCCP.B3TOC. V. YYYY.MM.99.9999.GPC)

Line	Content
1	THIS DATA IS FOR YEAR YYYY MONTH MM
2	NUMBER OF B3 IMAGES PROCESSED : No (the next 4 lines are for internal check)
3	SATELLITE-DEPENDENT INFO READ SUCCESSFULLY
4	NORMALIZATION COEFFICIENTS READ SUCCESSFULLY
5	ABSOLUTE CAL COEFFICIENTS READ SUCCESSFULLY (next line nr. 6 is kept for compatibility with the old tape convention and represents standard ISCCP tape number now used as monthly data label)
6	III.DD.NNNN.V.YYDDD.YYDDD.SATID where each field is: III = GPC (processing center) DD = B3 (data type) NNNN = 0000 (old tape number not used anymore, now filled with 0) V = version number, starting with 0 YYDDD = year and Julian day of 1st image in the data grouping YYDDD = year and Julian day of last image in the data grouping SATID = satellite identification for data in the data grouping
7	Project name (= ISCCP)
8-9	GPC tape numbers for SPC source data tapes (B2 input data used)
10	Satellite ID and image header code number
11	Sector Processing Center (SPC) ID and image header code number
12	Year and Julian day of first and last image on tape
13	GPC tape creation date
14	First channel ID, spectral range, and image header code number
15	Second channel ID, spectral range, and image header code number
*16	Third channel ID, spectral range, and image header code number
17	Fourth channel ID, spectral range, and image header code number
18	Fifth channel ID, spectral range, and image header code number
19	Visible channel normalization coefficients from SCC (slope, intercept, rms deviation of regression, minimum, maximum)
20	Infrared channel normalization coefficients from SCC
21	Third channel normalization coefficients from SCC
22	Fouth channel normalization coefficients from SCC

23	Fifth channel normalization coefficients from SCC
21	Visible channel absolute calibration coefficients from GPC
22	Infrared channel absolute calibration coefficients from GPC
23	Third channel absolute calibration coefficients from GPC
24	Fourth channel absolute calibration coefficients from GPC
25	Fifth channel absolute calibration coefficients from GPC
23	Maximum error in latitude fit (degrees)
24	Maximum error in longitude fit (degrees)
25	Maximum error in cosine satellite zenith angle fit
26	Maximum error in cosine solar zenith angle fit
27	Maximum error in relative azimuthal angle fit (degrees)
28	Total number of images on tape
29	……The Volume Table Of Contents continues with an image by image directory of the data for the month .

Lines 16-18 may be blank if no extra spectral channels are active
*Calibration information only included for active channels. If the number of active channels is less than five, the error information would begin at a smaller line number. For example if there were three active channels, normal coefficients would be found on lines 19-21, absolute coefficients on lines 22-24, and the error information would begin on line 25.

Nominal date and time GMT of the image represent the nearest standard time (0000, 0300, 0600, etc.) at the start of an image (geostationary) or at the beginning of an orbit (polar orbiter). The geographic location codes for polar orbiters are two integer values that indicate the subsatellite longitude at ascending (northward) and descending (southward) equator crossing. For geostationary satellites the two integers represent the subspacecraft longitude and latitude. The GMT codes for polar orbiters are two integers representing the times of equator crossing (ascending/descending); for geostationary satellites the GMT codes are the nominal image GMT given twice. Bad scan lines contain no actual data in B3 images; good scan lines may be missing data from a particular channel, which is indicated in the channel availability flags. The day/night flag for geostationary satellites indicates whether the VIS channel data were (=0) or were not (=1) collected. This flag is equal to 0 for all polar orbiter data. The calibration flag is set to zero when calibration data are not supplied by the SPC; the visible calibration flag is zero at night. The channel availability flag indicates the active channels in the image: zero indicates inactive, one indicates active.

The image header codes for the satellite ID and SPC ID provide an alternate numerical identification in the image headers. The codes are defined as follows.

SPC	Code Number	Satellite	Code Number
NOA	1	NOAA-7, 9, 11, 14, 16	11, 12, 13, 14, 15
NOM	1	NOAA-8, 10, 12, 15 , 17	61, 62, 63, 64, 65

CSU	2	GOES-6, 9, 10	21, 22, 23, 24
UWS, AES(now MSC), CME[*]	3	GOES-5, 7[**], 8, 12	31, 32, 33, 34
ESA, EUM	4	METEOSAT-2, 3[H], 4, 5[a], 6, 7	41, 42, 43, 44, 45, 46
JMA	5	GMS-1, 2, 3, 4, 5	51, 52, 53, 54, 55
CIN[HH]	6	INSAT-1B	71

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[*] CSU processing METEOSAT-3 data in GOES-EAST position.
[**] CSU also processed GOES-7 data.
[H] METEOSAT-3 also operated in GOES-EAST position.
[HH] CSU processing INSAT-1B data.
[a] METEOSAT-5 operates in 63^0 EAST longitude and is processed by ISCCP as MTI

2.5 FORTRAN B3READ MODULE (ISCCP.B3READ.0.GLOBAL.9999.99.99.GPC)

This is the primary program to read and **decode** all of the information in a B3 image file. The B3 image file is composed of ***n*** 8000 byte records (each of those having a structure outlined in section 2.3., 2.7, 2.8, fig 2.1). The module is shown as a subroutine in a sample MAIN program to illustrate its use. In this example, the MAIN uses B3READ to print all navigation and radiance data for one scan line; all user-specified input quantities are given default values in a BLOCK DATA section at the end of the source code. The resulting output is shown in Section 2.9. The example illustrates a key feature of the module, namely, that the image data are accessed one record at a time (8000 bytes) to limit required core storage and decoded one scan line at a time in sequence. Each call to B3READ returns one decoded scan line to MAIN.

The structure of this module is illustrated by the flow chart shown in Fig. 2.2 which parallels the organization of the module source code, itself. The first call to B3READ **per image** initializes a number of quantities providing information about the image, including a location summary grid and calibration tables. The calibration tables retrieved are selected by a user-specified array (ICLFLG). **These tables should now be replaced by corresponding tables obtained from the latest version of the BT dataset.** A subroutine (JULCNV) is provided that converts the Julian dates in image headers into month and day. The latitude window option is a feature of B3READ which allows for rapid checking of image data records until the beginning of a user-specified latitude range is encountered; subsequent records are decoded in the usual way **to the end of the image** unless terminated by the user MAIN program. The default latitude range is -90° to 90°; unless the range is changed (by changing the values of ALATLO and ALATHI), the whole image will be decoded. If the land/water option (discussed below) is active, then the initialization includes reading the file ISCCP.B3LWMAP.0.GLOBAL.YYYY.MM.DD.HHMM.GPC.

The first call to B3READ (each READ statement fetches an 8000 byte record) obtains from the data structure header descriptive information about the scan lines in that record; this first call also decodes the first scan line. Subsequent calls to B3READ decode each scan line, one per call, in sequence.

Quality of the returned scan line can be checked by examining the value of DATERR. The values of this flag are:

-4	=	at least one missing calibration table
-3	=	error in B3 initialization section
-2	=	I/O error
-1	=	end of data
0	=	good data
1	=	scan line quality flag $\neq 0$
2	=	any channel quality flag $\neq 0$

If the scanline quality flag (SCQUAL) 0, the returned scan line is filled with 255 since no data are actually recorded in B3 images. Bad scan lines occur if the data are missing, if the data are bad as determined by a check of the SPC transmitted quality flag, a test for > 75% on-planet count values

= 0 or = 255, if an error occurred in scan line navigation, or in the navigation coding. However, a particular active channel may be labeled as bad (check CHNFLG) in good scan lines if the data are missing or if > 75% of on-planet count values = 0 or = 255. If calibration is missing, the presence or absence of calibration for the VIS or IR data is indicated by the values of IVSCAL and IIRCAL.

Information about the range of navigation angles in a record is contained in the record identification. The scan line and data directories provide location pointers to actual data values. Navigation information appended to each image pixel is decoded if the user specifies the appropriate values in the array NAVFLG. Longitudes are coded in B3 data structures with values ranging from -360° to 360°; however, the B3READ module changes these values to the range 0° to 360°. The version of B3READ provided fetches all data in a scan line supplied by the SPCs, both on and off the planet. However, an option can be activated to overwrite the off-planet data with 255 values. Another option provided (**in inactive form**) sets a surface type flag (land, water, coast) for every image pixel. This is done by comparing the latitude and longitude of every image pixel to the mapped dataset described in Section 2.7. This option can be activated by removing the comment symbol, "C," from indicated portions of the code.

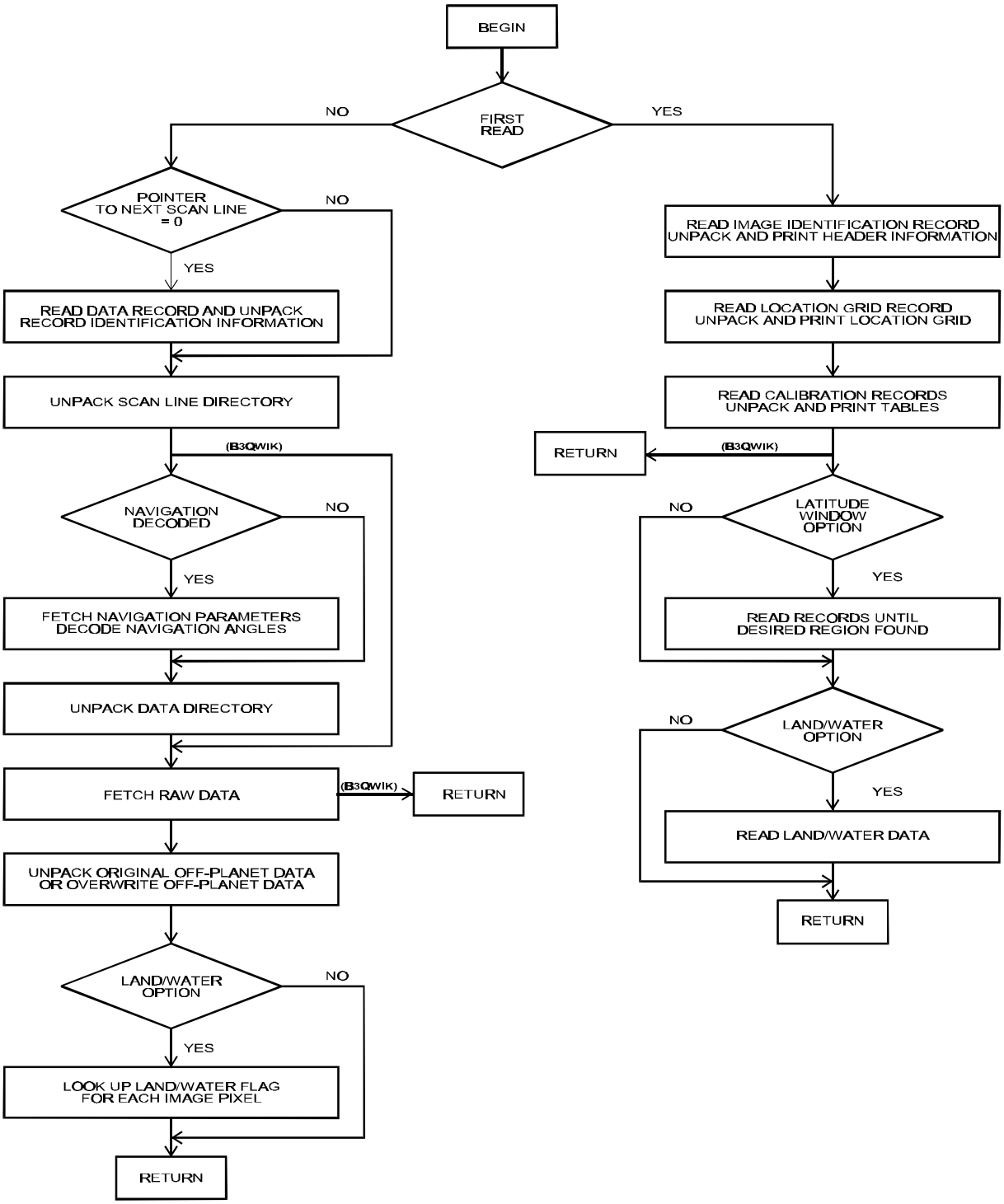

Figure 2.2. Flow diagram for FORTRAN module called B3READ. Function block labels in this diagram correspond to annotation in the module source code.

2.5.1 COMMENTS ON USE OF SOURCE MODULES

IBM RS6000 users and those with compatible architectures should experience little difficulty using these modules. Some non-IBM users will either have to make modifications[1] to the source code or have to use appropiate compiler options to implement data **input** properly, however, once these **input** changes are made the modules should work without further modification (see below). Principal features of the B3 format, which are not wholly supported by FORTRAN 77, are:

(1) Intermingling of CHARACTER*1 (8 bits), INTEGER*2 (16 bits), and INTEGER*4 (32 bits) variables in a single 8000 byte data structure.

(2) Reliance on EQUIVALENCE declarations to align all array variables properly on common boundaries. Data pointers which are multiples of 1, 2 and 4 are used to access different data types.

(3) IBM-based assumptions on the nesting of these data types.

Intermingling of different data types in a data structure is necessary to use memory efficiently while providing flexible access to the data. The **smallest unit** of data used is (8-bit) CHARACTER*1, used primarily for the radiance data. In addition, (16-bit or halfword) INTEGER*2 and (32-bit or word) INTEGER*4 data types are used. **These are the only data unit sizes used.** Combinations of different data types are **always aligned with 32-bit word boundaries.** The B3READ subroutine changes the data type of some quantities; the most important such change is the conversion of the radiance data (coded in counts) from their storage form in one byte (CHARACTER*1) to two bytes (I*2) so that further arithmetic operations can be performed more efficiently.

Unpacking of the intermingled data types by the provided FORTRAN modules is accomplished by EQUIVALENCE declarations which, in effect, overlay named arrays with different declared data types. These EQUIVALENCE declarations are clearly marked in the module source codes. B3READ program statements then use indices to address the proper portion of these arrays. Fig. 2.3 illustrates this principle by showing an example involving three arrays: A(I) which is an I*4 array, B(I) which is an I*2 array and C(I) which is a C*1 array. READ statements in B3READ always fill I*4 arrays. Subsequent B3READ program statements, which need the quantities shown to the right in the diagram, access only certain parts of the relevant arrays using selected indices. In the example shown, the only indices used for A(I) are 1, 5 and 6, for B(I) they are 3, 4 and 7, and for C(I) they are 9, 10, 11, 12, 15, 16, 25 and 26.

[1] NOTE :

SGI users: change recl=lrecl to recl=lrecl/4 in open statement

DEC users : change recl=lrecl to recl=lrecl/4 in open statement ;
add convert='little_endian' to open statement change each occurance of chars(4) to chars(1)

2.6. B3 README (ISCCP.B3README.0.GLOBAL.9999.99.99.9999.G)

The B3 Readme file contains the following text unless it was changed after the writing of this document

ISCCP-B3 Reduced Resolution Radiance Data
International Satellite Cloud Climatology Project
World Climate Research Programe

This dataset is the primary radiance data product (B3) which has a nominal spatial sampling interval of ~30 km, a time sampling interval of 3 hours (except for polar orbiting satellites which have no time sampling), and radiance values normalized to a single standard radiometer (AVHRR on NOAA-9).

To use this product you need the following FORTRAN code :

ISCCP.B3READ.0.GLOBAL.2001.04.02.9999.GPC

And land/water information from :

ISCCP.B3LWMAP.0.GLOBAL.2001.04.02.9999.GPC

These files can be found on our web site at http://isccp.giss.nasa.gov if they are not included with your data request.

2.7. LAND/WATER MAP DATA (ISCCP.B3LWMAP.0.GLOBAL.2001.04.02.9999.GPC)

This file contains data used by the land/water option in the B3READ module (FORTRAN ISCCP.B3READ.0.GLOBAL.YYYY.MM.DD.HHMM.GPC). The module sets a flag value to 1 (=water), 2 (=land) or 3 (=coastline). To obtain this information at full B3 resolution (approximately 0.25^0 by 0.25^0) without storing an array of more than 1 Mbyte, the subroutine interrogates four nested maps of varying resolution. At 2^0 by 2^0 resolution about 87% of the 180 x 90 map cells covering the world are completely water or land, so that only 13% of the Earth's surface needs to be represented by higher resolution maps. Thus the dataset contains a $2^0 \times 2^0$ a map of the whole world (with flag values 1, 2 and 3), a 1^0 x 1^0 map of all 2^0 map cells with flag value 3, a 0.5^0 x 0.5^0 map of all 1^0 map cells with flag value 3, and a 0.25^0 x 0.25^0 map of all 0.5^0 map cells with flag value 3. Total number of cells in this nested map series is <90,000. The map grids are written in 23 consecutive 8000 byte records.

The land/water option is **not active** in the provided module. To activate the land/water option remove the comment symbol, "C," from all lines indicated in the source code and read the land/water map data file on Fortran unit 9. The specific lines in B3READ that must have the "C" removed are 636-642, 1414-1424, 1765-1822, and 1917-1924.

2.8. RADIANCE DATA (ISCCP.B3.V.SATID.YYYY.MM.DD.HHMM.GPC)

A B3 image is defined as a single time/space related set of satellite radiance measurements in the form of a rectangular array of scan lines and pixels. For geostationary satellites an image is a whole Earth view, whereas for polar orbiter satellites an image consists of a single orbit swath. The first two spectral radiances reported **in the B3READ output array (DATBUF)** always represent

the two standard channels (≈ 0.6 ìm, ≈ 11 ìm) used for cloud analysis. **In the B3 image** the first radiance is visible or infrared depending on whether the geostationary image is a day or night image, respectively (check day/night flag). The first radiance is always the visible channel for the polar orbiter. **All IR radiances are coded so that cold temperature (low radiance) corresponds to high count value**.

Each image data file consists of 4 segments:

Segment #	Content	8000 byte Record # Beginning	Ending
1	Image Identification Record	1	1
2	Location Grid Record	2	2
3	Calibration/Normalization Tables	3	N+2
4	Data Records	N+3	K+N+2

The number of calibration records (N) depends on the number of active channels given in word 10 of the first segment record. There are 6 calibration tables for each active channel. The total number of data records comprising the image (K) is given in word 22 of the first segment record. A word is 4 bytes.

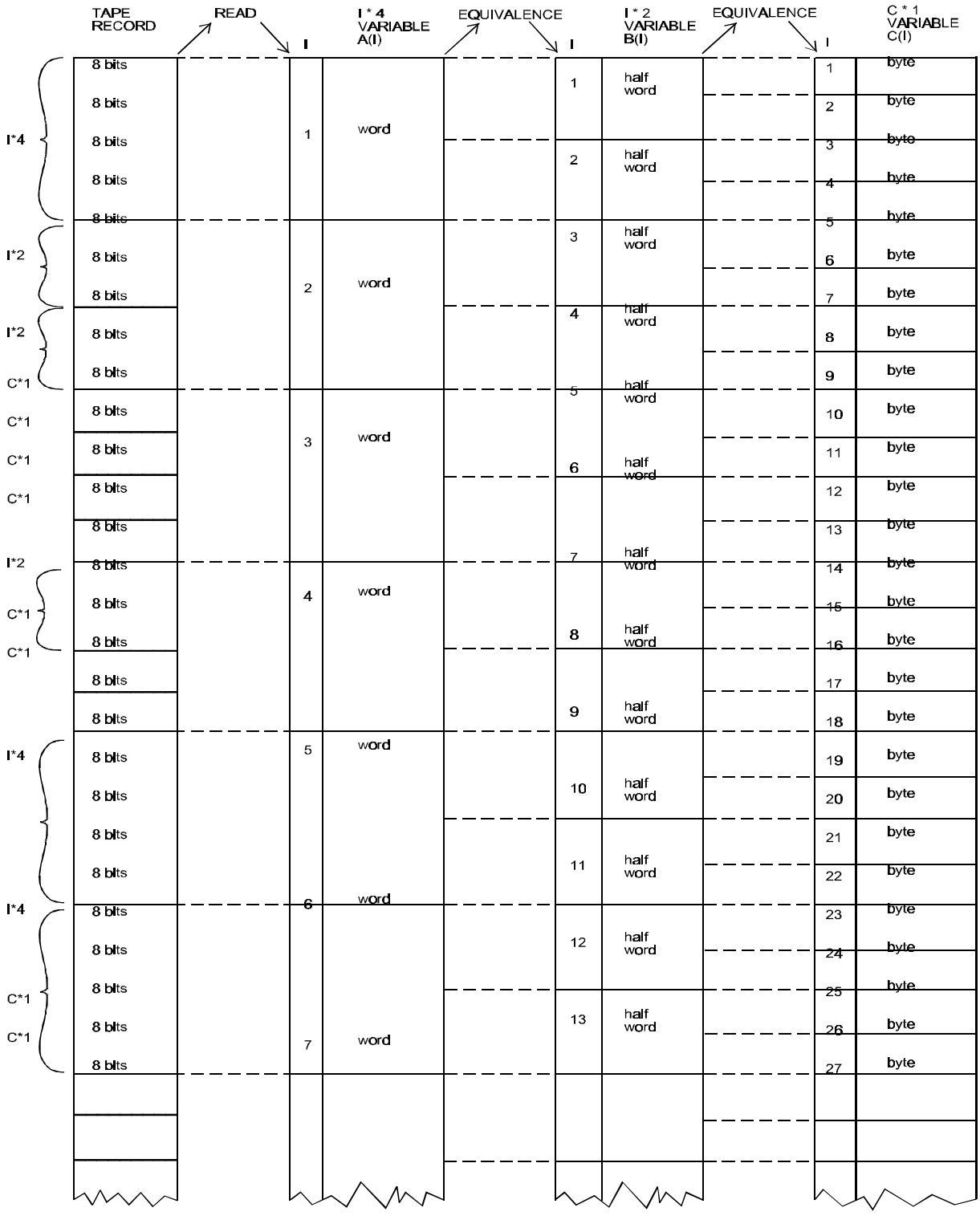

Figure 2.3. Schematic of data record structure with intermingled data types showing the scheme for decoding into three different data type arrays.

2.8.1. SEGMENT 1: IMAGE IDENTIFICATION RECORD

2.8.1.a. B3 DATA (PRIOR TO 1996)

Word #	Content	Data Type
1	Record sequence number within image (always 1)	I
2	Image sequence number per month/Record type	I*2,I*2
3-4	SPC ID (code number in word 95)	EBCDIC (see note at the section's end)
5-6	Satellite ID (code number in word 96)	EBCDIC
7	Year	I
8	Julian day	I
9	Nominal GMT (HHMMSS)	I
10	Number of active channels in image (N)	I
11	Channel 1 ID (code number in word 97)	EBCDIC
12	Channel 2 ID (code number in word 98)	EBCDIC
13	Channel 3 ID (code number in word 99)	EBCDIC
14	Channel 4 ID (code number in word 100)	EBCDIC
15	Channel 5 ID (code number in word 101)	EBCDIC
16	Number of scan lines in image	I
17	Number of pixels per scan line (fixed)	I
18	GMT of first scan line (HHMMSS)	I
19	GMT of last scan line (HHMMSS)	I
20	Year and Julian day of first scan line (YYDDD)	I
21	Year and Julian day of last scan line (YYDDD)	I
22	Number of data records in image (K)	I
23	Scale factor used to convert latitude to degrees	I
24	Scaled maximum error in latitude fit	I
25	Scale factor used to convert longitude to degrees	I
26	Scaled maximum error in longitude fit	I
27	Scale factor for cosine of satellite zenith angle (î)	I
28	Scaled maximum error in satellite zenith angle fit	I

Word #	Content	Data Type
29	Scale factor for cosine of solar zenith angle (ì $_o$)	I
30	Scaled maximum error in solar zenith angle fit	I
31	Scale factor for relative azimuth angle (ö)	I
32	Scaled maximum error in relative azimuth angle fit	I
33	Noise estimate for channel 1 in counts (0-255)	I
34	Noise estimate for channel 2 in counts (0-255)	I
35	Noise estimate for channel 3 in counts (0-255)	I
36	Noise estimate for channel 4 in counts (0-255)	I
37	Noise estimate for channel 5 in counts (0-255)	I
38-47	Channel 1 descriptive information (see 2.4. line 14)	EBCDIC
48-57	Channel 2 descriptive information (see 2.4. line 15)	EBCDIC
58-67	Channel 3 descriptive information (see 2.4. line 16)	EBCDIC
68-77	Channel 4 descriptive information (see 2.4. line 17)	EBCDIC
78-87	Channel 5 descriptive information (see 2.4. line 18)	EBCDIC
88	Calibration flag for visible channel	I
89	Calibration flag for infrared channel	I
90	Percentage bad scan lines in image	I
91	Ascending (northward) equator crossing longitude (polar orbiter) or subsatellite longitude (geostationary)	I
92	Ascending equator crossing GMT (polar orbiter) or nominal image GMT (geostationary)	I
93	Descending equator crossing longitude (polar orbiter) or subsatellite latitude (geostationary)	I
94	Descending equator crossing GMT (polar orbiter) or nominal image GMT (geostationary)	I
95	SPC ID code number (see 2.4.)	I
96	Satellite ID code number (see 2.4.)	I
97	First channel ID code number (see 2.4.)	I
98	Second channel ID code number (see 2.4.)	I
99	Third channel ID code number (see 2.4.)	I
100	Fourth channel ID code number (see 2.4.)	I
101	Fifth channel ID code number (see 2.4.)	I

Word #	Content	Data Type
102	Channel 1 (VIS) availability flag	I
103	Channel 2 (IR) availability flag	I
104	Channel 3 availability flag	I
105	Channel 4 availability flag	I
106	Channel 5 availability flag	I
107	Day/night flag	I
108-750	(Currently zero filled)	I
751-2000	SPC header information used for image navigation written in original format for documentation purposes only	(variable)

2.8.1.b. B3 DATA (1996 AND FORWARD)

Word #	Content	Data Type
1	Record sequence number within image (always 1)	I
2	Image sequence number per month/Record type	I*2,I*2
3-4	SPC ID (code number in word 95)	EBCDIC
5-6	Satellite ID (code number in word 96)	EBCDIC
7	Year	I
8	Julian day	I
9	Nominal GMT (HHMMSS)	I
10	Number of active channels in image (N)	I
11	Channel 1 ID (code number in word 97)	EBCDIC
12	Channel 2 ID (code number in word 98)	EBCDIC
13	Channel 3 ID (code number in word 99)	EBCDIC
14	Channel 4 ID (code number in word 100)	EBCDIC
15	Channel 5 ID (code number in word 101)	EBCDIC
16	Number of scan lines in image	I
17	Number of pixels per scan line (fixed)	I
18	GMT of first scan line (HHMMSS)	I
19	GMT of last scan line (HHMMSS)	I
20	Year and Julian day of first scan line (YYDDD)	I

Word #	Content	Data Type
21	Year and Julian day of last scan line (YYDDD)	I
22	Number of data records in image (K)	I
23	Scale factor used to convert latitude to degrees	I
24	Scaled maximum error in latitude fit	I
25	Scale factor used to convert longitude to degrees	I
26	Scaled maximum error in longitude fit	I
27	Scale factor for cosine of satellite zenith angle (ì)	I
28	Scaled maximum error in satellite zenith angle fit	I
29	Scale factor for cosine of solar zenith angle (ì $_o$)	I
30	Scaled maximum error in solar zenith angle fit	I
31	Scale factor for relative azimuth angle (ö)	I
32	Scaled maximum error in relative azimuth angle fit	I
33	Noise estimate for channel 1 in counts (0-255)	I
34	Noise estimate for channel 2 in counts (0-255)	I
35	Noise estimate for channel 3 in counts (0-255)	I
36	Noise estimate for channel 4 in counts (0-255)	I
37	Noise estimate for channel 5 in counts (0-255)	I
38-47	Channel 1 descriptive information (see Volume ID)	EBCDIC
48-57	Channel 2 descriptive information (see Volume ID)	EBCDIC
58-67	Channel 3 descriptive information (see Volume ID)	EBCDIC
68-77	Channel 4 descriptive information (see Volume ID)	EBCDIC
78-87	Channel 5 descriptive information (see Volume ID)	EBCDIC
88	Calibration flag for visible channel	I
89	Calibration flag for infrared channel	I
90	Calibration flag for third channel (if available)	I
91	Calibration flag for fourth channel (if available)	I
92	Calibration flag for fifth channel (if available)	I
93	Percentage bad scan lines in image	I
94	Ascending (northward) equator crossing longitude (polar orbiter) or subsatellite longitude (geostationary)	I

Word #	Content	Data Type
95	Ascending equator crossing GMT (polar orbiter) or nominal image GMT (geostationary)	I
96	Descending equator crossing longitude (polar orbiter) or subsatellite latitude (geostationary)	I
97	Descending equator crossing GMT (polar orbiter) or nominal image GMT (geostationary)	I
98	SPC ID code number (see Volume ID)	I
99	Satellite ID code number (see Volume ID)	I
100	First channel ID code number (see Volume ID)	I
101	Second channel ID code number (see Volume ID)	I
102	Third channel ID code number (see Volume ID)	I
103	Fourth channel ID code number (see Volume ID)	I
104	Fifth channel ID code number (see Volume ID)	I
105	Channel 1 (VIS) availability flag	I
106	Channel 2 (IR) availability flag	I
107	Channel 3 availability flag	I
108	Channel 4 availability flag	I
109	Channel 5 availability flag	I
110	Day/night flag	I
111-750	(Currently zero filled)	I
751-2000	SPC header information used for image navigation	
	written in original format for documentation purposes only	(variable)

Image sequence number is 1 to total number of images per month. Record type is 1 (= ID or Calibration record), 2 (= Data record). Noise estimates are set to -1 if not available. Channel descriptive information is also available in the Volume ID file. Calibration flag is zero if no calibration coefficients are supplied by the SPC; visible calibration flag is always zero at night. Location and GMT codes (words 91-94) repeat information in Table of Contents.

NOTE : for all data processed on the IBM Mainframe the data is stored in EBCDIC, for data processed in the UNIX environment (IBM AIX) the fields are in ASCII. In either case the variables are read correctly by the read software.

2.8.2. SEGMENT 2: LOCATION GRID RECORD

The Location Grid Record summarizes the geographic coverage provided by each image by indicating the number of image pixels in each 10° X 10° latitude-longitude cell on the earth. The Location Grid Record is arranged as follows.

Word #	Content	Data Type
1	Record sequence number within image (always 2)	I
2	Image sequence number on tape/Record type	I*2,I*2
3-650	Number of image pixels in each 10° cell	I
651-2000	Unused	

The map cells are listed for each 10° longitudinal range, starting with 0° to 10° East, in each latitude zone and proceeds from south to north pole in 10° latitude increments (-90° to -80°, -80° to -70°, etc.). The number of image pixels in each cell indicates the number of on-planet, good pixels sent in the original data from the SPC.

2.8.3. SEGMENT 3: CALIBRATION/NORMALIZATION TABLES

2.8.3.1. RECORD 3: Calibration/Normalization Information for Channel 1

The calibration information represents six tables used to convert count values to various physical quantities. The first three tables convert count values to radiances (watts m^{-2} sr^{-1}) using three different calibrations: nominal (see Section 4.1), normalized (see Section 4.2), and absolute (see Section 4.3). The last three tables convert count values to scaled radiance or brightness temperature (depending on whether the channel is solar or thermal) using the same three calibrations. The coefficients in words 45-49 and similar locations in the other tables are those used to express the radiance normalization calculated by the SCC (Tables 2 and 5) and the absolute radiance calibration provided by the GPC (Tables 3 and 6). These words are set to zero in Tables 1 and 4. **Use of Tables 3 and 6 represents the best calibration information available to ISCCP. The tables found in B3 data should be replaced by the corresponding tables from the latest version of the BT dataset.**

Word #	Content	Data Type
1	Record sequence number within image (always ≥ 3)	I
2	Image sequence number per month/Record type	I*2,I*2
3	Channel ID	I
4-23	Definition of radiance physical units	EBCDIC
24-43	Source of information describing radiance physical units conversion using nominal calibration	EBCDIC
44	Scale factor for radiance physical units	I
45	Scaled slope (radiance normalization data)	I

Word #	Content	Data Type
46	Scaled intercept (radiance normalization data)	I
47	Scaled rms deviation (radiance normalization data)	I
48	Scaled minimum (radiance normalization data)	I
49	Scaled maximum (radiance normalization data)	I
50-305	Table of scaled radiance physical units (watts m^{-2} sr^{-1}) corresponding to count values of 0-255 (Table 1)	I
306-607	Repeat of words 4-305 except that normalized radiance calibration is used (Table 2)	(see word 4 to 305)
608-909	Repeat of words 4-305 using absolute calibration (Table 3)	(see word 4 to 305)
910-1211	Repeat of words 4-305 using nominal calibration and converting radiances into alternate physical units (scaled radiance/brightness temperature) (Table 4)	(see word 4 to 305)
1212-1513	Repeat of words 910-1211 using normalized calibration (Table 5)	(see word 910 to 1211)
1514-1815	Repeat of words 910-1211 using absolute calibration (Table 6)	(see word 910 to 1211)
1816-2000	Unused	

The remainder of the 8000 byte record is filled with zeroes. Calibration tables are zero-filled when no nominal calibration information is available but the data channel is active. The normalization data (words 44-49 and similar locations in other tables) are stored as scaled integers. The scale factor for the slope is 1000; other scale factors are the same as described in section 2.8.3.1. If no normalization results are available (e.g., polar orbiter), then words 306-607 and 1212-1513 are repeats of words 4-305 and 910-1211, respectively, with the values in words 347-351 and 1253-1257 set to 1, 0, -1, 0 and 0. If results are interpolated, then slope and intercept values are given and the last three words have values -1, 0 and 0. If no absolute calibration results are available, then words 608-909 and 1514-1815 are repeats of words 306-607 and 1212-1513, respectively, with the values in words 649-653 and 1555-1559 set to 1, 0, -1, 0 and 0.

2.8.3.2. RECORD 4: Same as record 3 for channel 2 if channel data available.

2.8.3.3. RECORD 5: Same as record 3 for channel 3 if channel data available.

2.8.3.4. RECORD 6: Same as record 3 for channel 4 if channel data available.

2.8.3.5. RECORD 7: Same as record 3 for channel 5 if channel data available.

2.8.4. SEGMENT 4: DATA RECORDS

The number of data records (K) comprising an image is given in word 22 of the Image Identification record for that particular image. The number of scan lines in the image (given in word number 16 in the Image Identification record) represents the total number sent by the SPC. Any missing scan lines within the image are filled by the SPC to maintain proper scan line numbering; however, missing lines at the beginning or end of an image are not filled. In the B3 image data, the scan lines are numbered sequentially, but filled lines are labelled as bad scan lines. **Bad scan lines are represented only by a scan line directory with no data present; however, the B3READ subroutine returns a whole scan line filled with 255s.**

Each Data Record (8000 byte) consists of a **Record Identification** followed by a variable number of **whole scan lines** (Figure 2.4). The remainder of any partially filled data record is filled by 255s.

2.8.4.1. Record Identification

Word #	Content	Data Type
1	Record sequence number within image	I
2	Image sequence number per month/Record type	I*2,I*2
3	Beginning scan line number/Ending scan line number	I*2,I*2
4	Scaled minimum latitude in record/Scaled maximum latitude in record	I*2,I*2
5	Scaled minimum longitude in record/Scaled maximum longitude in record	I*2,I*2
6	Scaled minimum λ-value in record/Scaled maximum λ-value in record	I*2,I*2
7	Scaled minimum λ_o-value in record/Scaled maximum λ_o-value in record	I*2,I*2
8-9	Undefined	
Note:	To obtain latitude and longitude in units of degrees, multiply by 0.05; to obtain λ and λ_o values, multiply by 0.01.	

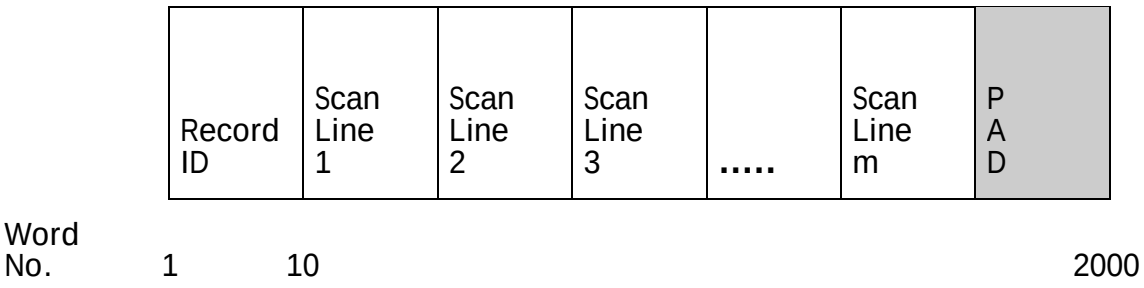

Figure 2.4. Radiance data record structure.

2.8.4.2. Scan Line

For each Data Record (8000 bytes) the precise number of whole scan lines of data and navigation parameters (no spanning of scan line data across record boundaries is allowed) depends on the on/off planet and daytime/nighttime conditions of the data, in addition to the number of pixels per scan line and the number of active spectral channels. However, in all cases the first scan line within each data record begins on word 10 of the Data Record. Any unused remainder of data records is filled with 255s.

Each scan line in a Data Record consists of a **Scan Line Directory, Navigation Directory**, and **Data Directory** followed by **satellite radiance data** (Figure 2.5). Padding is added (if necessary) to each scan line so that the next scan line of data starts at a word boundary.

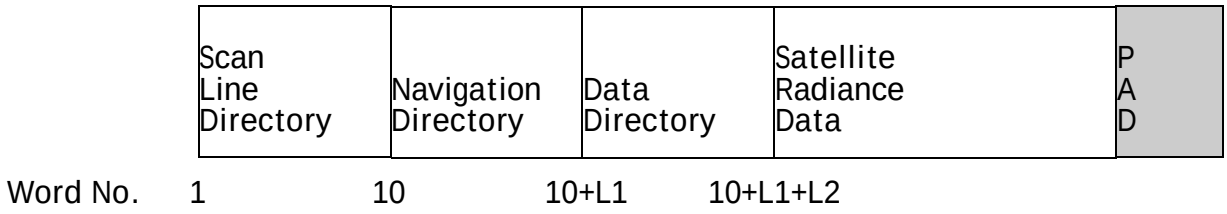

Figure 2.5. Sample scan line structure.

2.8.4.2.1. Scan Line Directory (Total of 9 words)

Word #	Half word #	Byte #	Content
	1	1-2	Pointer to next scan line in Data Record (0 if none
1	2	3-4	Scan line number within image (1 to m, the total number of scan lines in image)
	3	5-6	Unused (zero filled)
2	4	7-8	Pointer used to access satellite radiance data only
	5	9-10	n_1 = number of latitude ranges for given scan line
3	6	11-12	n_2 = number of longitude ranges for given scan line
	7	13-14	n_3 = number of ì ranges for given scan line
4	8	15-16	n_4 = number of ì $_o$ ranges for given scan line
	9	17-18	n_5 = number of ö ranges for given scan line
5	10	19-20	n_d = number of data ranges for given scan line
	11	21-22	Scan line quality flag
6	12	23-24	Channel 1 quality flag for given scan line
	13	25-26	Channel 2 quality flag for given scan line
7	14	27-28	Channel 3 quality flag for given scan line
8	15	29-30	Channel 4 quality flag for given scan line

Word #	Half word #	Byte #	Content
	16	31-32	Channel 5 quality flag for given scan line
9		33-36	GMT of scan line (HHMMSS)

The meaning of the scan line quality flag is as follows:

0 = good data
1 = bad scan line
2 = navigation error
3 = navigation fit error.
>3 = satellite specific flags

If the scan line quality flag > 0, only the scan line directory is present on the data tape; however, the B3READ module will return a complete scan line filled with 255s.

The meaning of the channel quality flag is as follows.

-1 = data missing
0 = good data
>0 = bad data

If the channel is active and the channel quality flag is 0, then all count values for that channel in the scan line are set to 255 on the data tape.

2.8.4.2.2. Navigation Directory [L1 = 4 words per navigation range for a total of $4 \times (n_1 + n_2 + n_3 + n_4 + n_5)$ words] where for **each navigation range** (see Section 2.9 for definitions of quantities):

Word #	Content	Data Type
1	Beginning pixel number/Ending pixel number	I*2,I*2
2	F_o (initial value in range)	I
3	$Ä_1$ (first order increment)	I
4	$Ä_2$ (second order increment)	I

and n_1 through n_5 are given in the scan line directory. The details of the navigation coding/decoding scheme are as follows.

(1) The five navigation parameters (latitude, longitude, ì, $ì_0$ and ö) are coded in the form of second order polynomial fits to each parameter along a scan line, constrained within specified error limits. Given an initial value, F_0, for a particular navigation angle and two increment values, $Ä_1$ and $Ä_2$, the value of F_i (the navigation angle at step i) is computed iteratively according to the following algorithm:

$$F_i \leftarrow F_{i-1} + (\Delta_1)_{i-1} \qquad (2.1)$$
$$\Delta_{1_i} \leftarrow (\Delta_1)_{i-1} + \Delta_2$$

This is numerically equivalent to the following quadratic equation:

$$F_i = F_0 + i\,\Delta_1 + \frac{i(i-1)}{2}\,\Delta_2 \qquad (2.2)$$

(2) Since the error values are different for each navigation parameter, and since the precise navigation characteristics will differ from scan line to scan line, each of the navigation parameters is represented in **one or more ranges** of data pixels, each range having specific values of F_0, $Ä_1$ and $Ä_2$. The decoding process may be performed in either iterative fashion, by means of Eq. (2.1), or random-access fashion as in Eq. (2.2).

(3) Error limits are 0.06° for latitude and longitude, 0.01 for ì and ì$_o$, and 0.5° for relative azimuth angle.

(4) To decrease the number of navigation ranges near the Greenwich meridian and the International Date Line, **longitudes in a B3 image data are coded for the range –360° to 360°; but B3READ converts these coded values to the range 0° to 360°.**

2.8.4.2.3. Data Directory (L2 = 2 words per data range for a total of $2 \times n_d$ words) where for <u>each data range:</u>

<u>Word #</u>	<u>Half word #</u>	<u>Byte #</u>	<u>Content</u>
1	1	1-2	Bytes per pixel (dependent on number of active channels)
	2	3-4	Pointer to first data byte
2	3	5-6	Data code
	4	7-8	Number of pixels in range

and n_d is given in the scan line directory. A data range is defined by consecutive pixels that have the same data code. The meaning of the data code is as follows.

-1	=	off planet
0	=	on planet day-time
1	=	on planet night-time

2.8.4.2.4. Satellite Radiance Data

The satellite radiance data are stored in satellite coordinates with all active channels given for each pixel. Radiance values are coded as one byte integers, representing count values from 0-255. The value 255 always represents bad data or no data present. Channels are interleaved:

1 Byte Each	VS 1	IR 1	WV 1	VS 2	IR 2	WV 2	VS 3	IR 3	WV 3	VS 4	IR 4	WV 4	VS 5	IR 5	WV 5	VS 6	IR 6	WV 6	VS 7	IR 7	WV 7
Pixel No.	1			2			3			4			5						n		

Figure 2.6. Sample radiance data structure.

2.9. SAMPLE OUTPUT FROM READING MODULES

The next pages illustrate a sample of ISCCP.B3TOC.0.YYYY.MM.DD.MMHH.GPC and the output obtained using source module B3READ in the sample main program to read and decode one scan line of data from a polar orbiter image.

```
ISCCB3 TAPE VOLUME HEADER INFORMATION
-------------------------------------
THIS IS B3 DATA FOR YEAR 1983 MONTH 9

NUMBER OF IMAGES 112

SATELLITE-DEPENDENT INFO READ SUCCESSFULY
SATELLITE-DEPENDENT INFO READ SUCCESSFULY
SATELLITE-DEPENDENT INFO READ SUCCESSFULLY

GPC.B3.0000.1.83244.83251.NOAA-7

ISCCP

B2 INPUT TAPE/FILE S : P00099 P00100
                       P00101
SATELLITE :   NOAA-7                    IMAGE HEADER CODE NUMBER :    11

SPC :         NOA                       IMAGE HEADER CODE NUMBER :     1

DATE OF FIRST IMAGE : 83244             LAST IMAGE :  83251
GPC DATASET CREATION DATE : 10/14/88       B3 SOFTWARE VERSION NUMBER :  880930

CHANNEL IDENTIFICATION
----------------------
VIS      (   .58  -    .68  )  MICRONS      IMAGE HEADER CODE NUMBER :   1
IR       ( 10.5   -  11.3   )  MICRONS      IMAGE HEADER CODE NUMBER :   2
.725     (   .725 -   1.10  )  MICRONS      IMAGE HEADER CODE NUMBER :   3
3.55     (  3.55  -   3.93  )  MICRONS      IMAGE HEADER C ODE NUMBER :   4
11.5     ( 11.5   -  12.5   )  MICRONS      IMAGE HEADER CODE NUMBER :   5

CALIBRATION COEFFICIENTS       SLOPE   INTERCEPT    RMS     MINIMUM   MAXIMUM
-----------------------      -------  ---------  --------  -------   -------
VIS NORMALIZED CALIBRATION    001.000   000.000    -1.000   000.000   000.000
IR  NORMALIZED CALIBRATION    001.000   000.000    -1.000   000.000   000.000
VIS  ABSOLUTE  CALIBRATION    001.000   000.000    -1.000   000.000   000.000
IR   ABSOLUTE  CALIBRATION    001.000   000.000    -1.000   000.000   000.000

ERROR INFORMATION
-----------------
NAVIGATION FIT ERROR IN  LATITUDE   (DEGREES)            .06
NAVIGATION FIT ERROR IN  LONGITUDE  (DEGREES)            .06
NAVIGATION FIT ERROR IN  COSINE SATELLITE ZENITH         .01
NAVIGATION FIT ERROR IN  COSINE SOLAR ZENITH             .01
NAVIGATION FIT ERROR IN  RELATIVE AZIMUTH  (DEGREES)     .50

TOTAL NUMBER OF IMAGES :  112
```

VOLUME TABLE OF CONTENTS

FILE NUMBER	IMAGE NUMBER	NOMINAL DATE	NOMINAL GMT	LOCATION 1 / 2	GMT 1	GMT 2	NUMBER RECORDS	NUMBER SCANS	PERCENT BAD PIXELS	DAY/NIGHT AVAILABILITY	CALIBRATION VIS	CALIBRATION IR	CHANNEL VIS	CHANNEL IR	CHANNEL 3	CHANNEL 4	CHANNEL 5
5	1	83244	0	-148/ 44	10716	1614	134	1601	0	65	0	1	1	1	1	1	1
6	2	83244	0	-173/ 18	24915	15813	145	1709	0	65	0	1	1	1	1	1	1
7	3	83244	30000	160/ -6	43113	34011	142	1683	0	65	0	1	1	1	1	1	1
8	4	83244	60000	135/ -32	61311	52209	144	1703	0	65	0	1	1	1	1	1	1
9	5	83244	60000	109/ -57	75509	70407	134	1598	0	65	0	1	1	1	1	1	1
10	6	83244	90000	84/ -83	93708	84606	133	1587	0	65	0	1	1	1	1	1	1
11	7	83244	90000	58/-108	111907	102805	126	1514	0	65	0	1	1	1	1	1	1
12	8	83244	120000	33/-134	130106	121004	131	1568	0	65	0	1	1	1	1	1	1
13	9	83244	120000	-1/-159	-1	135202	60	733	0	65	0	1	1	1	1	1	1
14	10	83244	150000	-17/ 174	162504	153359	131	1558	0	65	0	1	1	1	1	1	1
15	11	83244	180000	-43/ 149	180701	171559	114	1362	0	65	0	1	1	1	1	1	1
16	12	83244	180000	-68/ 123	194859	185757	129	1543	0	65	0	1	1	1	1	1	1
17	13	83244	210000	-68/ 98	194858	203954	143	1708	0	65	0	1	1	1	1	1	1
18	14	83245	0	-145/ 47	5453	353	131	1565	0	65	0	1	1	1	1	1	1
19	15	83245	0	-170/ 21	23651	14549	135	1607	0	65	0	1	1	1	1	1	1
20	16	83245	30000	163/ -3	41849	32749	144	1707	0	65	0	1	1	1	1	1	1
21	17	83245	60000	138/ -29	60049	50947	142	1686	0	65	0	1	1	1	1	1	1
22	18	83245	60000	112/ -54	74247	65145	142	1683	0	65	0	1	1	1	1	1	1
23	19	83245	90000	87/ -80	92445	83343	134	1594	0	65	0	1	1	1	1	1	1
24	20	83245	90000	61/-105	110643	101541	125	1504	0	65	0	1	1	1	1	1	1
25	21	83245	120000	36/-131	124842	115741	134	1595	0	65	0	1	1	1	1	1	1
26	22	83245	120000	10/-156	143042	133940	133	1583	0	65	0	1	1	1	1	1	1
27	23	83245	150000	-14/ 177	161239	152137	133	1580	0	65	0	1	1	1	1	1	1
28	24	83245	150000	-40/ 152	175437	170335	132	1579	0	65	0	1	1	1	1	1	1
29	25	83245	180000	-65/ 126	193635	184535	112	1339	0	65	0	1	1	1	1	1	1
30	26	83245	210000	-65/ 101	193636	202732	143	1709	0	65	0	1	1	1	1	1	1
31	27	83245	210000	-116/ 75	230032	220930	135	1616	0	65	0	1	1	1	1	1	1
32	28	83246	0	-142/ 50	4232	235128	132	1574	0	65	0	1	1	1	1	1	1
33	29	83246	0	-167/ 25	22430	13328	137	1635	0	65	0	1	1	1	1	1	1
34	30	83246	30000	166/ 0	40627	31517	137	1629	0	65	0	1	1	1	1	1	1
35	31	83246	30000	141/ -25	54827	45725	144	1710	0	65	0	1	1	1	1	1	1
36	32	83246	60000	115/ -51	73025	63923	143	1690	0	65	0	1	1	1	1	1	1
37	33	83246	90000	90/ -76	91222	82120	134	1595	0	65	0	1	1	1	1	1	1
38	34	83246	90000	64/-102	105421	100319	127	1520	0	65	0	1	1	1	1	1	1
39	35	83246	120000	39/-127	123619	114517	132	1578	0	65	0	1	1	1	1	1	1
40	36	83246	120000	13/-153	141818	132716	134	1600	0	65	0	1	1	1	1	1	1
41	37	83246	150000	-11/-178	160017	150915	133	1576	0	65	0	1	1	1	1	1	1
42	38	83246	150000	-37/ 155	174216	165113	132	1575	0	65	0	1	1	1	1	1	1
43	39	83246	180000	-62/ 130	192414	183312	112	1337	0	65	0	1	1	1	1	1	1
44	40	83246	180000	-62/ 104	192414	201510	135	1619	0	65	0	1	1	1	1	1	1
45	41	83246	210000	-88/ 79	210611	215707	143	1710	0	65	0	1	1	1	1	1	1
46	42	83247	0	-139/ 53	3008	233906	132	1576	0	65	0	1	1	1	1	1	1

50	46	83247	60000	118/	-48	71801	62659	144	1702	0	65	0	1	1	1	1	1	1	1	1
51	47	83247	90000	93/	-73	90001	80857	132	1578	0	65	0	1	1	1	1	1	1	1	1
52	48	83247	90000	67/	-99	104159	95056	125	1507	0	65	0	1	1	1	1	1	1	1	1
53	49	83247	120000	42/	-124	122358	113254	133	1581	0	65	0	1	1	1	1	1	1	1	1
54	50	83247	120000	16/	-150	140555	131453	133	1581	0	65	0	1	1	1	1	1	1	1	1
55	51	83247	150000	-8/	-175	154755	145651	133	1574	0	65	0	1	1	1	1	1	1	1	1
56	52	83247	150000	-33/	158	172951	163849	132	1569	0	65	0	1	1	1	1	1	1	1	1
57	53	83247	180000	-59/	133	191151	182049	111	1327	0	65	0	1	1	1	1	1	1	1	1
58	54	83247	180000	-59/	107	191151	200247	134	1602	0	65	0	1	1	1	1	1	1	1	1
59	55	83247	210000	-84/	82	205349	214445	142	1707	0	65	0	1	1	1	1	1	1	1	1
60	56	83248	0	-135/	56	1745	232643	134	1603	0	65	0	1	1	1	1	1	1	1	1
61	57	83248	0	-161/	31	15946	10842	135	1612	0	65	0	1	1	1	1	1	1	1	1
62	58	83248	30000	173/	5	34143	25041	143	1706	1	65	0	1	1	1	1	1	1	1	1
63	59	83248	30000	147/	-19	52341	43239	143	1700	0	65	0	1	1	1	1	1	1	1	1
64	60	83248	60000	122/	-45	70540	61436	144	1705	0	65	0	1	1	1	1	1	1	1	1
65	61	83248	90000	71/	-96	102935	93833	143	1706	0	65	0	1	1	1	1	1	1	1	1
66	62	83248	120000	45/	-121	121135	112032	112	1362	0	65	0	1	1	1	1	1	1	1	1
67	63	83248	120000	45/	-121	121135	112033	103	1236	0	65	0	1	1	1	1	1	1	1	1
68	64	83248	120000	20/	-147	135333	130231	132	1589	2	65	0	1	1	1	1	1	1	1	1
69	65	83248	150000	-5/	-172	153532	144428	133	1586	0	65	0	1	1	1	1	1	1	1	1
70	66	83248	150000	-30/	161	171730	162626	131	1564	0	65	0	1	1	1	1	1	1	1	1
71	67	83248	180000	-56/	136	185928	180826	112	1334	0	65	0	1	1	1	1	1	1	1	1
72	68	83248	180000	-56/	110	185928	195023	134	1599	0	65	0	1	1	1	1	1	1	1	1
73	69	83248	210000	-81/	85	204127	213222	143	1710	0	65	0	1	1	1	1	1	1	1	1
74	70	83248	210000	-132/	59	524	231419	132	1583	0	65	0	1	1	1	1	1	1	1	1
75	71	83249	0	-158/	34	14723	5619	135	1621	0	65	0	1	1	1	1	1	1	1	1
76	72	83249	30000	176/	8	32919	23817	144	1705	0	65	0	1	1	1	1	1	1	1	1
77	73	83249	30000	150/	-16	51118	42016	144	1709	0	65	0	1	1	1	1	1	1	1	1
78	74	83249	60000	125/	-42	65317	60215	145	1709	0	65	0	1	1	1	1	1	1	1	1
79	75	83249	60000	99/	-67	83515	74413	132	1580	0	65	0	1	1	1	1	1	1	1	1
80	76	83249	90000	74/	-93	101714	92610	143	1705	0	65	0	1	1	1	1	1	1	1	1
81	77	83249	120000	48/	-118	115912	110809	116	1402	0	65	0	1	1	1	1	1	1	1	1
82	78	83249	120000	23/	-144	134111	125007	131	1561	0	65	0	1	1	1	1	1	1	1	1
83	79	83249	150000	-2/	-169	152309	143206	132	1573	0	65	0	1	1	1	1	1	1	1	1
84	80	83249	150000	-27/	164	170507	161404	132	1577	0	65	0	1	1	1	1	1	1	1	1
85	81	83249	180000	-53/	139	184705	175603	112	1344	0	65	0	1	1	1	1	1	1	1	1
86	82	83249	180000	-53/	113	184706	193802	133	1589	0	65	0	1	1	1	1	1	1	1	1
87	83	83249	210000	-78/	88	202904	212000	143	1710	0	65	0	1	1	1	1	1	1	1	1
88	84	83249	210000	-129/	62	235302	230158	133	1590	0	65	0	1	1	1	1	1	1	1	1
89	85	83250	0	-155/	37	13459	4357	135	1609	0	65	0	1	1	1	1	1	1	1	1
90	86	83250	30000	179/	11	31658	22554	143	1692	0	65	0	1	1	1	1	1	1	1	1
91	87	83250	30000	153/	-13	45855	40754	142	1680	0	65	0	1	1	1	1	1	1	1	1
92	88	83250	60000	128/	-39	64055	54951	145	1709	0	65	0	1	1	1	1	1	1	1	1
93	89	83250	60000	102/	-64	82253	73149	133	1583	0	65	0	1	1	1	1	1	1	1	1
94	90	83250	90000	77/	-89	100451	91349	143	1708	0	65	0	1	1	1	1	1	1	1	1
95	91	83250	120000	51/	-115	114651	105547	116	1398	0	65	0	1	1	1	1	1	1	1	1
96	92	83250	120000	26/	-140	132848	123744	132	1577	0	65	0	1	1	1	1	1	1	1	1
97	93	83250	150000	0/	-166	151047	141943	132	1574	0	65	0	1	1	1	1	1	1	1	1
98	94	83250	150000	-24/	168	165245	160141	133	1580	0	65	0	1	1	1	1	1	1	1	1
99	95	83250	180000	-50/	142	183443	174340	113	1349	0	65	0	1	1	1	1	1	1	1	1

100	96	83250	180000	-50/	117	183444	192537	130	1552	0	65	0	1	1	1	1	1	1	1
101	97	83250	210000	-75/	91	201641	210737	143	1710	0	65	0	1	1	1	1	1	1	1
102	98	83250	210000	-126/	66	234038	224936	136	1626	0	65	0	1	1	1	1	1	1	1
103	99	83251	0	-152/	40	12237	3133	133	1587	0	65	0	1	1	1	1	1	1	1
104	100	83251	30000	-177/	15	30435	21333	133	1572	0	65	0	1	1	1	1	1	1	1
105	101	83251	30000	156/	-10	44634	35530	144	1709	0	65	0	1	1	1	1	1	1	1
106	102	83251	60000	131/	-35	62832	53728	145	1709	0	65	0	1	1	1	1	1	1	1
107	103	83251	60000	105/	-61	81031	71927	134	1598	0	65	0	1	1	1	1	1	1	1
108	104	83251	90000	80/	-86	95229	90125	143	1711	0	65	0	1	1	1	1	1	1	1
109	105	83251	90000	54/	-112	113427	104323	116	1404	0	65	0	1	1	1	1	1	1	1
110	106	83251	120000	29/	-137	131626	122522	132	1579	0	65	0	1	1	1	1	1	1	1
111	107	83251	150000	3/	-163	145825	140721	133	1577	0	65	0	1	1	1	1	1	1	1
112	108	83251	150000	-21/	171	164023	154919	133	1581	0	65	0	1	1	1	1	1	1	1
113	109	83251	180000	-47/	145	182221	173117	113	1345	0	65	0	1	1	1	1	1	1	1
114	110	83251	180000	-47/	120	182222	191316	130	1557	0	65	0	1	1	1	1	1	1	1
115	111	83251	210000	-72/	94	200419	205515	143	1709	0	65	0	1	1	1	1	1	1	1
116	112	83251	210000	-123/	69	232816	223713	135	1612	0	65	0	1	1	1	1	1	1	1

TEMPORAL COVERAGE

DAY OF MONTH

GMT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	2	1	1	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	2	2	2	2	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	2	2	2	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	2	1	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	1	1	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
OUTPUT FROM SAMPLE PORGRAM USING B3READ SUBROUTINE TO ACCESS B3 -FORMATTED DATA

READ AND DECODE IMAGE NUMBER :    5
FOR SCAN LINE    200  PRINT DATA VALUES AND ANGLE VALUES FOR ALL PIXELS

IMAGE DESCRIPTION
=================

IMAGE SEQUENCE NUMBER :     5
SPC ID NOA      CODE     1    SATELLITE ID NOAA -7   CODE   11
JULIAN DAY (DDD): 244   YEAR (YYYY): 1983  MONTH :  9  DAY :  1
NOMINAL GMT (HHMMSS) :  60000  HOUR :  6 MINS :   0
NUMBER OF DATA RECORDS :   134
NUMBER OF SCAN LINES :  1598
PERCENTAGE BAD SCAN LINES :     0
GMT (HHMMSS) OF BEGINNING SCAN LINE :    63949   ENDING :   82617
DATE (YYDDD) OF BEGINNING SCAN LINE :   83244  ENDING :   83244
NUMBER OF PIXELS / SCAN LINE :      65
NUMBER OF ACTIVE CHANNELS :       5
CHANNEL  1     VIS      (   .58   -    .68  )  MICRONS            CODE :     1
CHANNEL  2     IR       ( 10.30   -  11.30  )  MICRONS            CODE :     2
CHANNEL  3     .725     (   .725  -   1.10  )  MICRONS            CODE :     3
CHANNEL  4     3.55     (  3.55   -   3.93  )  MICRONS            CODE :     4
CHANNEL  5     11.5     ( 11.50   -  12.50  )  MICRONS            CODE :     5
CALIBRATION FLAGS (VIS IR):     1    1
DAY OR NIGHT  FLAG     0
ASCENDING EQUATOR CROSSING LONGITUDE      109  GMT    75509
DESCENDING EQUATOR CROSSING LONGITUDE     -57  GMT    70407
```

LOCATION GRID
=============

LATITUDE

LONG	-85	-75	-65	-55	-45	-35	-25	-15	-5	5	15	25	35	45	55	65	75	85
5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	639	221
15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	578	159
25	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	367	140
35	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	306	139
45	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	355	134
55	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	406	127
65	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	386	458	118
75	9	0	0	0	0	0	0	0	0	0	0	0	0	0	48	367	611	461	102
85	15	0	0	0	0	0	0	0	0	0	0	20	217	554	806	774	391	88
95	43	1	0	0	0	0	0	0	71	219	466	811	1097	1206	1010	619	281	79
105	44	113	117	150	219	352	555	861	1186	1467	1595	1510	1224	869	567	353	195	64
115	66	194	356	608	936	1288	1529	1553	1366	1074	743	472	296	186	126	86	97	46
125	80	292	639	1020	1160	1011	725	397	173	38	0	0	0	0	0	0	0	44
135	90	398	766	761	515	185	10	0	0	0	0	0	0	0	0	0	0	14
145	105	459	591	350	41	0	0	0	0	0	0	0	0	0	0	0	0	9
155	119	453	371	60	0	0	0	0	0	0	0	0	0	0	0	0	0	8
165	126	397	201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
175	135	347	97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
185	138	304	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
195	144	278	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
205	139	277	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
215	139	279	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
225	138	299	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
235	136	335	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
245	132	392	170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
255	117	441	336	30	0	0	0	0	0	0	0	0	0	0	0	0	0	24
265	110	466	546	271	12	0	0	0	0	0	0	0	0	0	0	0	15	44
275	92	417	749	674	383	79	0	0	0	0	0	0	0	0	0	0	154	75
285	81	314	693	1037	1063	834	489	213	45	0	0	0	0	0	0	0	193	72
295	66	214	412	705	1079	1398	1524	1402	1127	775	480	279	158	92	44	64	392	124
305	52	123	162	217	325	513	791	1126	1437	1637	1623	1401	1060	725	488	423	600	141
315	45	8	0	0	0	0	0	49	173	374	6 85	1040	1274	1258	965	790	729	176
325	18	0	0	0	0	0	0	0	0	0	0	74	332	686	895	1030	819	191
335	10	0	0	0	0	0	0	0	0	0	0	0	0	92	441	803	842	215
345	8	0	0	0	0	0	0	0	0	0	0	0	0	92	495	808	230
355	3	0	0	0	0	0	0	0	0	0	0	0	0	0	262	706	235

CALIBRATION INFORMATION
=======================

CHANNEL 1 TABLE 6
UNITS :
SOURCE : GLOBAL PROCESSING CENTER
COEFS : 1.0000 0.0000 -1.0000 0.0000 0.0000

CHANNEL 2 TABLE 6
UNITS : KELVIN
SOURCE : GLOBAL PROCESSING CENTER
COEFS : 1.0000 0.0000 -1.0000 0.0000 0.0000

CHANNEL 3 TABLE 6
UNITS :
SOURCE : GLOBAL PROCESSING CENTER
COEFS : 1.0000 0.0000 -1.0000 0.0000 0.0000

CHANNEL 4 TABLE 6
UNITS : KELVIN
SOURCE : GLOBAL PROCESSING CENTER
COEFS : 1.0000 0.0000 -1.0000 0.0000 0.0000

CHANNEL 5 TABLE 6
UNITS : KELVIN
SOURCE : GLOBAL PROCESSING CENTER
COEFS : 1.0000 0.0000 -1.0000 0.0000 0.0000

CALIBRATION TABLE
==========

COUNT	CHANNEL 1	2	3	4	5
0	0.00	322.08	0.00	321.44	326.88
1	0.00	321.78	0.00	321.31	326.53
2	0.00	321.44	0.00	321.25	326.19
3	0.00	321.14	0.00	321.13	325.84
4	0.00	320.83	0.00	321.00	325.48
5	0.00	320.50	0.00	320.93	325. 10
6	0.00	320.19	0.00	320.79	324.74
7	0.00	319.89	0.00	320.64	324.39
8	0.00	319.56	0.00	320.57	324.03
9	0.00	319.25	0.00	320.43	323.69
10	0.01	318.94	0.01	320.36	323.34
11	0.01	318.61	0.01	320.21	323.00
12	0.02	318.31	0.02	320.07	322.63
13	0.02	318.00	0.02	320.00	322.23
14	0.02	317.66	0.02	319.87	321.87
15	0.03	317.34	0.03	319.73	321.52
16	0.03	317.00	0.03	319.67	321.1 6
17	0.04	316.69	0.04	319.53	320.81
18	0.04	316.37	0.04	319.40	320.45
19	0.05	316.03	0.05	319.33	320.10
20	0.05	315.71	0.05	319.20	319.73
21	0.05	315.40	0.05	319.07	319.33
22	0.06	3 15.06	0.06	319.00	318.97
23	0.06	314.74	0.06	318.86	318.60
24	0.07	314.41	0.07	318.79	318.23
25	0.07	314.06	0.07	318.64	317.87
26	0.08	313.74	0.08	318.50	317.50
27	0.08	313.41	0.08	318.43	317.13
28	0.08	313.06	0.08	318.29	316.77
29	0.09	312.74	0.09	318.14	316.37
30	0.09	312.41	0.09	318.07	316.00
31	0.10	312.06	0.10	317.92	315.63
32	0.10	311.74	0.10	317.77	315.27
33	0.11	31 1.41	0.11	317.69	314.90
34	0.11	311.06	0.11	317.54	314.52
35	0.11	310.73	0.11	317.38	314.14
36	0.12	310.39	0.12	317.31	313.76
37	0.12	310.03	0.12	317.15	313.34
38	0.13	309.71	0.13	317.00	312.97
39	0.13	309.38	0.13	316.93	312.60

40	0.14	309.03	0.14	316.79	312.23
41	0.14	308.70	0.14	316.71	311.86
42	0.14	308.36	0.14	316.57	311.46
43	0.15	308.00	0.15	316.43	311.07
44	0.15	307.66	0.15	316.36	310.69
45	0.16	307.31	0.16	316.21	310.28
46	0.16	306.94	0.16	316.07	309.90
47	0.17	306.61	0.17	316.00	309.52
48	0.17	306.27	0.17	315.83	309.14
49	0.17	305.91	0.17	315.67	308.75
50	0.18	305.56	0.18	315.58	308.36
51	0.18	305.22	0.18	315.42	307.96
52	0.19	304.84	0.19	315.25	307.57
53	0.19	304.50	0.19	315.17	307.18
54	0.20	304.16	0.20	315.00	306.75
55	0.20	303.77	0.20	314.92	306.36
56	0.20	303.42	0.20	314.77	305.96
57	0.21	303.06	0.21	314.62	305.57
58	0.21	302.69	0.21	314.54	305.18
59	0.22	302.34	0.22	314.38	304.78
60	0.22	302.00	0.22	314.23	304.37
61	0.23	301.61	0.23	314.15	303.96
62	0.23	301.26	0.23	314.00	303.52
63	0.23	300.87	0.23	313.82	303.11
64	0.24	300.52	0.24	313.73	302.71
65	0.24	300.16	0.24	313.55	302.32
66	0.25	299.77	0.25	313.36	301.93
67	0.25	299.40	0.25	313.27	301.52
68	0.26	299.03	0.26	313.09	301.11
69	0.26	298.65	0.26	313.00	300.69
70	0.26	298.29	0.26	312.83	300.23
71	0.27	297.93	0.27	312.67	299.81
72	0.27	297.53	0.27	312.58	299.41
73	0.28	297.17	0.28	312.42	299.00
74	0.28	296.79	0.28	312.25	298.58
75	0.29	296.38	0.29	312.17	298.15
76	0.29	296.00	0.29	312.00	297.73
77	0.29	295.63	0.29	311.82	297.31
78	0.30	295.23	0.30	311.73	296.85
79	0.30	294.86	0.30	311.55	296.42
80	0.31	294.48	0.31	311.36	296.00
81	0.31	294.07	0.31	311.27	295.58
82	0.32	293.69	0.32	311.09	295.15
83	0.32	293.31	0.32	311.00	294.73
84	0.32	292.90	0.32	310.82	294.31
85	0.33	292.52	0.33	310.64	293.88
86	0.33	292.14	0.33	310.55	293.40
87	0.34	291.71	0.34	310.36	292.96
88	0.34	291.32	0.34	310.18	292.52
89	0.35	290.93	0.35	310.09	292.08

90	0.35	290.52	0.35	309.90	291.64
91	0.35	290.14	0.35	309.70	291.20
92	0.36	289.75	0.36	309.60	290.76
93	0.36	289.32	0.36	309.40	290.32
94	0.37	288.93	0.37	309.20	289.84
95	0.37	288.52	0.37	309.10	289.40
96	0.38	288.07	0.38	308.90	288.96
97	0.38	287.68	0.38	308.80	288.50
98	0.38	287.29	0.38	308.60	288.04
99	0.39	286. 85	0.39	308.40	287.60
100	0.39	286.44	0.39	308.30	287.16
101	0.40	286.04	0.40	308.10	286.71
102	0.40	285.59	0.40	307.90	286.21
103	0.41	285.19	0.41	307.80	285.74
104	0.41	284.78	0.41	307.60	285.26
105	0.41	284.33	0.41	307.40	284.79
106	0.42	283.92	0.42	307.30	284.33
107	0.42	283.50	0.42	307.10	283.88
108	0.43	283.04	0.43	306.90	283.42
109	0.43	282.62	0.43	306.80	282.96
110	0.44	282.1 9	0.43	306.60	282.48
111	0.44	281.73	0.44	306.50	281.96
112	0.44	281.31	0.44	306.30	281.48
113	0.45	280.85	0.45	306.10	281.00
114	0.45	280.42	0.45	306.00	280.52
115	0.46	280.00	0.46	305.78	280.04
116	0.46	279.52	0.46	305.56	279.55
117	0.46	279.08	0.46	305.44	279.05
118	0.47	278.64	0.47	3 05.22	278.57
119	0.47	278.16	0.47	305.00	278.04
120	0.48	277.72	0.48	304.89	277.55
121	0.48	277.28	0.48	304.67	277.05
122	0.49	276.80	0.49	304.44	276.55
123	0.49	276.36	0.49	304.33	276.05
124	0.49	275.92	0.49	304.11	275.55
125	0.50	275.42	0.50	304.00	275.05
126	0.50	274.96	0.50	303.75	274.55
127	0.51	274.50	0.51	303.50	274.00
128	0.51	274.00	0.51	303.38	273.48
129	0.52	273.54	0.52	30 3.13	272.95
130	0.52	273.08	0.52	302.88	272.43
131	0.52	272.57	0.52	302.75	271.90
132	0.53	272.09	0.53	302.50	271.38
133	0.53	271.63	0.53	302.25	270.86
134	0.54	271.13	0.54	302.13	270.33
135	0.54	270.65	0.54	301.88	269.76
136	0.55	270.17	0.55	301.63	269.24
137	0.55	269.65	0.55	301.50	268.70
138	0.55	269.17	0.55	301.25	268.15
139	0.56	268.68	0.56	301.13	267.62
140	0.56	268.14	0.56	300 .88	267.10
141	0.57	267.64	0.57	300.63	266.55

142	0.57	267.14	0.57	300.50	266.00
143	0.58	266.59	0.58	300.25	265.40
144	0.58	266.09	0.58	300.00	264.84
145	0.58	265.59	0.58	299.86	264.26
146	0.59	265.05	0.59	299.57	263.70
147	0.59	264.55	0.59	299.29	263.15
148	0.60	264.05	0.60	299.14	262.58
149	0.60	263.48	0.60	298.86	262.00
150	0.61	262.95	0.61	298.57	261.42
151	0.61	262.43	0.61	29 8.43	260.79
152	0.61	261.86	0.61	298.14	260.21
153	0.62	261.33	0.62	298.00	259.63
154	0.62	260.80	0.62	297.71	259.05
155	0.63	260.20	0.63	297.43	258.44
156	0.63	259.67	0.63	297.29	257.83
157	0.64	259.14	0.64	297.00	257.22
158	0.64	258.55	0.64	296.71	256.61
159	0.64	258.00	0.64	296.57	256.00
160	0.65	257.42	0.65	296.29	255.33
161	0.65	256.80	0.65	296.00	254.72
162	0.66	256.25	0.66	295 .83	254.11
163	0.66	255.63	0.66	295.50	253.50
164	0.67	255.05	0.67	295.17	252.88
165	0.67	254.47	0.67	295.00	252.24
166	0.67	253.84	0.67	294.67	251.59
167	0.68	253.26	0.68	294.50	250.94
168	0.68	252.68	0.68	294.17	250.24
169	0.69	252.05	0.69	293.83	249.59
170	0.69	251.44	0.69	293.67	248.94
171	0.70	250.83	0.70	293.33	248.25
172	0.70	250.17	0.70	293.00	247.56
173	0.70	249.56	0.70	292. 83	246.88
174	0.71	248.94	0.71	292.50	246.24
175	0.71	248.24	0.71	292.17	245.53
176	0.72	247.61	0.72	292.00	244.75
177	0.72	247.00	0.72	291.60	244.06
178	0.73	246.29	0.73	291.20	243.38
179	0.73	245.65	0.73	291.00	242.67
180	0.73	245.00	0.73	290.67	241.93
181	0.74	244.25	0.74	290.50	241.20
182	0.74	243.59	0.74	290.17	240.47
183	0.75	242.94	0.75	289.80	239.73
184	0.75	242.19	0.75	289.6 0	238.93
185	0.76	241.50	0.76	289.20	238.20
186	0.76	240.80	0.76	288.80	237.43
187	0.76	240.00	0.76	288.60	236.64
188	0.77	239.31	0.77	288.20	235.86
189	0.77	238.60	0.77	287.75	235.07
190	0.78	237.80	0.78	287.50	234.29
191	0.78	237.07	0.78	287.00	233.50
192	0.79	236.33	0.79	286.60	232.62
193	0.79	235.50	0.79	286.40	231.77
194	0.79	234.73	0.79	286.00	230.92
195	0.80	234.00	0.80	285.75	230.08
196	0.80	233.14	0.80	285.25	229.23
197	0.81	232.31	0.81	284.75	228.38
198	0.81	231.50	0.81	284.50	227.50

199	0.82	230.62	0.82	284.00	226.62
200	0.82	229.79	0.82	283.50	225.67
201	0.82	229.00	0.82	283.25	224.75
202	0.83	228.08	0.83	282.75	223.83
203	0.83	227.17	0.83	282.25	222.91
204	0.84	226.31	0.84	282.00	221.92
205	0.84	225.33	0.84	281.50	221.00
206	0.85	224.42	0.85	281.0 0	220.00
207	0.85	223.50	0.85	280.67	219.00
208	0.85	222.50	0.85	280.00	217.90
209	0.86	221.55	0.86	279.75	216.82
210	0.86	220.55	0.86	279.25	215.80
211	0.87	219.45	0.87	278.67	214.73
212	0.87	218.45	0.87	278.33	213.70
213	0.88	217.36	0.88	277.67	212.56
214	0.88	216.30	0.88	277.00	211.40
215	0.88	215.27	0.88	276.67	210.22
216	0.89	214.10	0.89	276.00	209.10
217	0.89	212.90	0.89	275.33	207.78
218	0.90	211.78	0.90	275.00	206.56
219	0.90	210.50	0.90	274.33	205.25
220	0.90	209.33	0.91	273.50	204.00
221	0.91	208.11	0.91	273.00	202.63
222	0.91	206.67	0.91	272.33	201.25
223	0.92	205.38	0.92	272.00	199.88
224	0.92	204.00	0.92	271.00	198.43
225	0.93	202.50	0.93	270.33	196.86
226	0.93	201.13	0.93	270.00	195.29
227	0.93	199.57	0.94	269.00	193.71
228	0.94	197.86	0.94	268.00	192.00
229	0.94	196.29	0.94	267.50	190.33
230	0.95	194.67	0.95	266.50	188.50
231	0.95	192.67	0.95	265.50	186.67
232	0.96	190.83	0.96	265.00	184.67
233	0.96	189.00	0.96	263.50	182.50
234	0 .96	186.80	0.97	262.50	180.40
235	0.97	184.60	0.97	262.00	178.00
236	0.97	182.25	0.97	260.50	175.50
237	0.98	179.60	0.98	260.00	173.00
238	0.98	177.00	0.98	258.00	170.00
239	0.99	174.00	0.99	257.00	167.00
240	0.99	170.33	0.99	256.00	163.33
241	0.99	166.67	1.00	254.00	159.33
242	1.00	162.50	1.00	252.00	154.50
243	1.00	157.00	1.00	251.00	0.00
244	1.01	150.00	1.01	248.00	0.00
245	1. 01	0.00	1.01	246.00	0.00
246	1.02	0.00	1.02	244.00	0.00
247	1.02	0.00	1.02	241.00	0.00
248	1.02	0.00	1.03	237.00	0.00
249	1.03	0.00	1.03	234.00	0.00
250	1.03	0.00	1.03	227.00	0.00
251	1.04	0.00	1.04	221.00	0.00
252	1.04	0.00	1.04	221.00	0.00
253	1.05	0.00	1.05	221.00	0.00
254	1.05	0.00	1.05	221.00	0.00
255	1.05	0.00	1.05	221.00	0.00

INITIAL READ SECTION COMPLETED DATERR FLAG =   0
DIAGNOSTICS FOR SCAN LINE NUMBER   200
TOTAL NUMBER OF PIXELS IN SCAN LINE :   65
TOTAL NUMBER OF OFF PLANET PIXELS IN SCAN LINE :   0

RAW DATA VALUES FOR ACTIVE CHANNELS

PIXEL #	PLANETARY FLAG	CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4	CHANNEL 5
1	1	9	198	10	243	195
2	1	9	197	9	255	193
3	1	9	192	9	248	189
4	1	9	184	9	242	183
5	1	9	118	10	170	124
6	1	9	91	10	157	98
7	1	9	133	9	222	136
8	1	9	134	9	217	137
9	1	9	114	9	220	116
10	1	9	1 27	9	206	130
11	1	9	132	10	210	132
12	1	9	115	9	206	118
13	1	9	120	9	211	123
14	1	9	132	9	226	132
15	1	9	125	9	211	126
16	1	9	154	10	229	153
17	1	9	166	9	239	165
18	1	9	147	9	233	146
19	1	9	138	1 0	221	140
20	1	9	121	10	197	123
21	1	9	131	10	199	135
22	1	9	118	10	197	124
23	1	9	139	10	213	142
24	1	9	141	10	217	142
25	1	9	135	10	200	138
26	1	9	1 16	10	193	119
27	1	9	120	10	211	123
28	1	9	104	10	205	107
29	1	9	108	10	210	112
30	1	9	115	10	199	117
31	1	9	115	10	179	118
32	1	9	114	10	202	117
33	1	9	128	10	215	130
34	1	9	117	10	218	119
35	1	9	118	1 0	208	120
36	1	9	169	10	215	170
37	1	9	118	10	206	120
38	1	9	152	10	231	150
39	1	9	156	10	248	156

40	1	9	153	10	243	151
41	1	9	150	10	223	149
42	1	9	146	10	225	146
43	1	9	145	10	220	144
44	1	9	149	10	2 45	148
45	1	9	184	10	249	180
46	1	9	203	10	245	198
47	1	9	198	10	246	193
48	1	9	204	10	244	199
49	1	9	185	10	250	181
50	1	9	115	10	206	120
51	1	9	111	10	193	117
52	1	9	117	10	201	121
53	1	9	129	10	218	12 9
54	1	9	100	10	192	103
55	1	9	90	9	170	96
56	1	9	113	10	202	115
57	1	9	87	9	162	93
58	1	9	99	10	179	102
59	1	9	87	10	172	94
60	1	9	87	10	1 74	94
61	1	9	88	10	161	94
62	1	9	87	10	158	94
63	1	9	88	10	161	94
64	1	9	93	10	180	98
65	1	9	89	10	184	95

VALUES FOR SELECTED ANGLES FOR EACH PIXEL

PIXEL #	PLANETARY FLAG	ANGLE 1	ANGLE 2	ANGLE 3	ANGL E 4	ANGLE 5
1	1	40.09	297.80	0.43	-0.48	-1.00
2	1	40.04	298.85	0.47	-0.47	-1.00
3	1	40.00	299.81	0.50	-0.46	-1.00
4	1	39.96	300.70	0.54	-0.46	-1.00
5	1	39.92	301.51	0.57	-0.45	-1.00
6	1	39.87	302.24	0.60	-0.45	-1.00
7	1	39.83	302.89	0.63	-0.44	-1.00
8	1	39.79	303.46	0.66	-0.43	-1.00
9	1	39.74	304.03	0.69	-0.43	-1.00
10	1	39.70	304.52	0.71	-0.42	-1.00
11	1	39.66	305.00	0.74	-0.42	-1.00
12	1	39.61	305.46	0.76	-0.41	-1.00
13	1	39.57	305.90	0.78	-0.41	-1.00
14	1	39.53	306.33	0.81	-0.40	-1.00
15	1	39.48	306.74	0.83	-0.40	-1.00
16	1	39.44	307.14	0.85	-0.40	-1.00
17	1	39.40	307.53	0.86	-0.39	-1.00
18	1	39.35	307.90	0.88	-0.39	-1.00
19	1	39.31	308.25	0.90	-0.38	-1.00
20	1	39.26	308.59	0.91	-0.38	-1.00
21	1	39.22	308.91	0.92	-0.38	-1.00
22	1	39.17	309.22	0.94	-0.37	-1.00
23	1	39.13	309.51	0.95	-0.37	-1.00
24	1	39.08	309.79	0.96	-0.36	-1.00
25	1	39.0 4	310.09	0.97	-0.36	-1.00
26	1	38.99	310.36	0.97	-0.36	-1.00
27	1	38.95	310 .63	0.98	-0.36	-1.00
28	1	38.90	310.91	0.99	-0.35	-1.00
29	1	38.86	311.18	0 .99	-0.35	-1.00
30	1	38.81	311.46	0.99	-0.35	-1.00
31	1	38.77	311.73	1.00	-0.34	-1.00
32	1	38.72	312.01	1.00	-0.34	-1.00
33	1	38.68	312.29	1.00	-0.34	-1.00
34	1	38.63	312.57	0.99	-0.34	-1.00
35	1	38.58	312.85	0.99	-0.34	-1.00
36	1	38.54	313.13	0.99	-0.33	-1.00
37	1	38.49	313.42	0.98	-0.33	-1.00
38	1	38.45	313.70	0.99	-0.33	-1.00
39	1	38.40	313.98	0.98	-0.33	-1.00

40	1	38.35	314.27	0.98	-0.33	-1.00
41	1	38.31	314.56	0.97	-0.32	-1.00
42	1	38.26	314.84	0.96	-0.32	-1.00
43	1	38.21	315.13	0.95	-0.32	-1.00
44	1	38.16	315.42	0.94	-0.32	-1.00
45	1	38.12	315.71	0.93	-0.31	-1.00
46	1	38.06	316.00	0.91	-0.31	-1.00
47	1	38.01	316.32	0.90	-0.31	-1.00
48	1	37.95	316.63	0.88	-0.30	-1.00
49	1	37.88	316.96	0.87	-0.30	-1.00
50	1	37.81	317.30	0.85	-0.30	-1.00
51	1	37.73	317.67	0.83	-0.29	-1.00
52	1	37.64	318.05	0.81	-0.29	-1.00
53	1	37.55	318.45	0.79	-0.28	-1.00
54	1	37.46	318.87	0.76	-0.28	-1.00
55	1	37.36	319.31	0.74	-0.27	-1.00
56	1	37.25	319.77	0.71	-0.26	-1.00
57	1	37 .14	320.24	0.69	-0.26	-1.00
58	1	37.02	320.73	0.66	-0.25	-1.00
59	1	36.89	3 21.24	0.63	-0.25	-1.00
60	1	36.76	321.84	0.60	-0.24	-1.00
61	1	36.59	322.50	0.57	-0.23	-1.00
62	1	36.40	323.22	0.54	-0.23	-1.00
63	1	36.19	323.99	0.50	-0.22	-1.00
64	1	35.96	324.83	0.47	-0.21	-1.00
65	1	35.71	325.73	0.43	-0.20	-1.00