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USER'S MANUAL
SSM/I ANTENNA TEMPERATURE TAPES
Revision 2

By: Frank J. Wentz

Prepared by:

Remote Sensing Systems

1101 COLLEGE AVE., SUITE 220, SANTA ROSA, CA 95404

(707) 545-2904



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SECTION 1. INTRODUCTION

This document is the second revision of the Special Sensor Microwave/Imager (SSM/I) Antenna Temperature (T_A) Tapes User's Manual. The original User's Manual for the SSM/I T_A tapes was issued on March 25, 1988, and the first revision was issued on December 1, 1991. This second revision is a supplement to Revision 1 and provides the User with the following new features:

1. F10 SSM/I T_A 's are now intercalibrated with the F08 observations.
2. Data inventory figures and erroneous data time windows are now available for F10 and F11.
3. More quality control procedures are now provided to the Users.

In addition, there are several other extensions that are discussed herein. The User is advised to pay particular attention to the underlined sentences in Section 2. They describe important changes that need to be considered when implementing this Revision-2 update.

A diskette is included with this manual and contains the following files:

DECODE2.FOR	- The Revision-2 decoding Fortran routine
QUAL1.FOR	- A quality control Fortran routine that flags erroneous observations
BADLOC.D08	- A data file containing erroneous data periods for F08
BADLOC.D10	- A data file containing erroneous data periods for F10
BADLOC.D11	- A data file containing erroneous data periods for F11
BADCAL.D08	- A data file containing erroneous calibration periods for F08
BADCAL.D10	- A data file containing erroneous calibration periods for F10
BADCAL.D11	- A data file containing erroneous calibration periods for F11

Routine QUAL1.FOR reads the BADLOC and BADCAL data files and uses this information to flag erroneous observations. Note that all files other than the BADCAL files are formatted ASCII files. The three BADCAL files are binary files described in Section 5.

SECTION 2. THE REVISION-2 DECODING ROUTINE: DECODE2

The Revision-2 T_A tape decoding routine is called DECODE2. The previous version (Revision-1), which was simply called DECODE, is thoroughly described in the Rev-1 SSM/I T_A User's Manual. For DECODE2, the following five changes have been made.

1. The ITB=0 option is the same as before. Unadjusted antenna temperatures are stored in the arrays TALO, ATAH1, and BTAH1. However, the ITB=1 option is different. In this case, the T_A 's are corrected for along-scan biases, and the F10 T_A 's are adjusted so as to agree with the F08 T_A 's (see Section 6). These adjusted T_A 's are stored in the arrays TALO, ATAH1, and BTAH1. Note that no adjustments are done to the 85 GHz T_A 's. Brightness temperatures T_B are also computed for the ITB=1 option, and they are stored in a new common area called:

COMMON /TBDATA/ TBLO(5,64), ATBHI(2,128), BTBHI(2,128)

We now suggest the ITB=1 option always be used, since it provides both corrected T_A values and T_B values. Thus with DECODE2, the arrays TALO, ATAH1, and BTAH1 always contain T_A 's, and if the User wants T_B 's, then they must access the new common /TBDATA/.

2. Along-scan biases for F10 and F11 are now implemented. In Rev-1 DECODE, only the F08 along-scan biases were implemented, and the F10 and F11 biases had been set to zero. When ITB=1 option is set, the along-scan biases are applied to the T_A 's. The F10 along-scan biases were found by binning the T_A 's according to scan position and averaging over one year of ocean observations. This is the same method that was used to find the F08 along-scan biases. We found that the F08 and F10 biases were very similar (± 0.05 K). It thus appears that the along-scan bias is a stable characteristic of the SSM/I sensor and is probably due to the radiometer horn seeing the cold sky reflector at one edge of the Earth scan segment. We did not compute the along-scan biases for the F11. Rather, we assume that the along-scan bias is a stable characteristic of the SSM/I sensor, and DECODE2 simply sets the F11 along-scan biases to the F08 values.

3. The F10 T_A 's are adjusted to correspond to the F08 T_A 's. The adjustment coefficients were found by doing a cross-calibration between F08 and F10 over the year 1991. The F10-F08 correction is done when ITB is set to 1. This intercalibration is discussed in more detail in Section 6. No adjustment is made to the F11 T_A because we have not yet done the cross-calibration between F10 and F11. We plan to do the F11-F10 cross-calibration in the first quarter of 1994.

4. Starting in August 1992, an additional quality control procedure was implemented. This procedure detects sensor calibration errors and is discussed in Section 4. On the T_A tapes, quality flags are written to 64 bytes, which had been spare bytes. DECODE2 uses these quality flags to indicate calibration errors. When a calibration error occurs, DECODE2 appends a minus sign to the T_A and T_B value. Thus when using DECODE2 with the August 1992 data and thereafter, the User must check for negative T_A or T_B and discard these observations.

5. For a given frequency, if either the v-pol or h-pol uncorrected T_A value is outside the range 55 to 320 K, then for this pair of observations, no corrections or adjustments are done to the T_A 's, and the brightness temperatures are set equal to the unadjusted T_A values. In this way, routine FDTATB in DECODE2 does not modify the anomalous T_A 's (outside the 55-320 K range) nor the negative T_A 's (calibration errors).

6. Previous to this update, we had been using a value of 44.75° for the F08 nadir angle. This value came from prelaunch measurements of the F08 SSM/I. Post-launch analyses now indicate that the true value of the F08 nadir angle is closer to 45.0° . This new value corrects the 10-km along-track geolocation error discussed in Section 6 of the Rev-1 SSM/I T_A User's Manual and improves the consistency between the F08 and F10 T_A 's. This change in nadir angle corresponds to a 0.336° increase in the incidence angle. Accordingly DECODE2 now adds 0.336° to the old F08 incidence angle.

SECTION 3. DATA INVENTORY FIGURES AND ERRONEOUS DATA TIME WINDOWS

Enclosed are the data inventory figures and erroneous data time windows for F10 and F11 through March 1993. The method of identifying erroneous data periods for F08 is described in Section 7 of the Rev-1 SSM/I T_A User's Manual. For F10 and F11, there is one modification of the procedure. The T_A 's that are outside the range of possible Earth values are excluded from the statistics shown in the figures. Thus, the F10 and F11 data inventory figures do not show these out-of-bounds (OOB) observations. The exclusion of OOB observations is done by the quality control routine QUAL1 described in Section 5.

Excluding the OOB T_A 's from the figures results in a better discrimination of erroneous data periods. In the old procedure a few obviously bad observations, which could easily be identified and excluded, were producing small scatter groups in the data inventory figures that were difficult to interpret.

In producing the F10 figures prior to October 1991, the F08 data were used to specify the semimonthly T_A base map. Then, starting in October 1991, the F10 data from the previous semimonthly period were used to specify the T_A base map. There is less scatter when the F08 data are used because the time period for the base map is the same as that for the observations. The base maps for the F11 figures were generated from the F10 observations for the specified semimonthly period. The vertical bars in the figures show the time windows for erroneous data, as is discussed in the next paragraph.

We have visually inspected the F08, F10, and F11 data inventory figures and have identified the begin and end times for periods of erroneous data. Three small ASCII data files called BADLOC.D08, BADLOC.D10, and BADLOC.D11 containing these times are on the enclosed 3.5-inch diskette. BADLOC.D08 covers the period from the F08 launch in June 1987 through December 1991. BADLOC.D10 covers the period from the F10 launch in December 1990 through March 1993. BADLOC.D11 covers the period from the F11 launch in December 1991 through March 1993. The format of these files is given in Section 7 of the Rev-1 SSM/I T_A User's Manual.

In addition to the periods of erroneous data identified from the data inventory figures, BADLOC.D08 and BADLOC.D10 includes the following special time windows for data that should be excluded:

F08, day 190, 1987:	SSM/I turned on and cycling through AGC
F08, day 013, 1988:	SSM/I turned on and cycling through AGC
F10, day 342, 1990:	SSM/I turned on and cycling through AGC
F10, day 353-355, 1990:	Many observations outside possible T_A range
F10, day 5-6, 1991:	SSM/I turned on again and cycling through AGC
F10, day 353, 1991:	Many observations outside possible T_A range

SECTION 4. CALIBRATION ERRORS AND SCAN AVERAGING

Normally the SSM/I cold counts are between 200 and 2000, and the hot counts are between 1500 and 3400. Also the rms variation of the counts for a given channel and a given scan is only a few counts. Occasionally the cold and/or hot counts fall outside the specified ranges and/or show a large variation (greater than 9 counts). This is clearly erroneous data and should be excluded.

The calibration error problem is compounded by the fact that starting on October 9, 1990, Fleet Numerical Oceanography Center (FNOC) implemented new software that averages the cold and hot counts over ten pairs of A/B scans. Thus the erroneous OOB calibration data corrupts 10 pairs of scans rather than 1 pair. There are two other problems associated with the FNOC scan averaging procedure. First, the averaging is done over 10 pairs of scans without regard to data gaps. When there are data gaps exceeding a few minutes, the assumption of calibration stability over the averaging period may be violated. The second, less serious problem is that the averaging period is not centered on the scan time but is rather a forward average of 10 pairs of scans. This offset in the average time relative to the scan time produces small systematic errors of the order of 0.1 K which vary with orbit position.

Starting with the T_A data on August 29, 1992, we undo the FNOC scan averaging. Thus our F10 and F11 T_A data from August 29, 1992, and onward are computed from the calibration data for a single scan rather than 10 pairs of scans. Previous to this, our F10 and F11 T_A data are computed using the FNOC scan averaging procedure.

We are providing the User with three data files: BADCAL.D08, BADCAL.D10, and BADCAL.D11 (one for each SSM/I). These files contain the times for groups of scans that were corrupted by the calibration error problem between October 9, 1990 and August 29, 1992. The routine QUAL1 described in Section 5 reads the BADCAL file and excludes these groups of bad scans.

After August 29, 1992, there is no scan averaging for our T_A data, and the detection of calibration errors is a simpler, two-step process that does not require the BADCAL data. First, when producing the T_A tapes, we do consistency checks among the FNOC computed calibration coefficients, the T_A 's, and the cold/hot counts. Occasionally anomalous FNOC values are found, and the best course of action is to exclude these observations. Accordingly, a new Q/C flag is included on the T_A tapes. The new Q/C flag is placed in 64 bytes in each T_A logical record (i.e., bytes 386, 396, ..., 1016). Previously, these bytes were set to zero and were not used. The new decoding routine DECODE2 accesses these bytes, and if the flag is set, DECODE2 appends a negative sign to the appropriate T_A or T_B value. It is then the Users' responsibility to check for negative T_A or T_B and discard these values.

The second step of detecting and removing calibration errors is to check the calibration data that is written to the T_A tapes. If the calibration values are out of range, then the entire scan should be excluded. These calibration checks are done by the Q/C routine QUAL1 discussed in Section 5.

For T_A data prior to October 9, 1990, there was no scan averaging and the BADCAL data are not need. The routine QUAL1 uses the scan time to determine if the BADCAL file needs to be read.

SECTION 5. THE QUALITY CONTROL ROUTINE: QUAL1

We are supplying the Users with a quality control routine call QUAL1.FOR. This Fortran routine automatically handles the data quality problems discussed in Sections 3 and 4. It interfaces with the DECODE2 common area /OUTDAT/. The User must call this routine once for each SSM/I A-B scan. When called, QUAL1 checks for the following conditions, and if the condition occurs, then a flag is set:

1. The scan time is within an erroneous data time period (see Section 3).
2. The calibration data for the scan is erroneous (see Section 4)
3. The scan is within a group of 10 scans that has erroneous calibration data (see Section 4)
4. The T_A value is outside the range of possible Earth values (see Section 3)

QUAL1 reads the data files containing erroneous data periods (BADLOC.D**) and the erroneous calibration periods (BADCAL.D**) that are listed in Section 1. The BADLOC files are formatted ASCII files, and the BADCAL files are binary files. The data in the BADCAL files are a simple series of 4-byte integers, with no header or record marks. Each integer is a time in units of seconds from the beginning of 1987. The integers are such that the first byte is the least-significant byte (i.e., the Microsofttm convention).

There are two important requirements for the proper usage of QUAL1. First, the routine must be called in chronological order. That is to say, the time ITIME in common /OUTDAT/ must not decrease from one call to the next. This requirement for chronological calls is due to the sequential method of reading the data files BADLOC and BADCAL.

The second requirement is that the array TALO in common /OUTDAT/ must contain T_A 's, not T_B 's. The new Revision-2 DECODE2 guarantees that T_A 's will be in TALO, regardless of the setting of the ITB option (see Section 2).

The routine QUAL1 is intended as an example of quality control for SSM/I. Depending on the application, the User does not necessarily need to implement the entire routine. However, as a minimum, we do suggest that the erroneous data time periods be excluded and that T_A 's outside the range of possible Earth values not be used. With respect to calibration errors, the above condition 2 occurs for about 0.05% of the scans, and condition 3 occurs for about 0.5% of the scans. Condition 3 occurs ten times as frequently as condition 2 because the 10-scan averaging propagates a single scan error over 10 scans. If the highest quality data is required, then these two conditions should also be checked.

SECTION 6. CROSS-CALIBRATION OF F08 AND F10 SSM/I

Considerable effort was spent cross-calibrating F10 with F08. We first found that it was necessary to only use F08-F10 orbit crossovers in order to minimize the error due to the space-time mismatch. A crossover is defined as the overlap region of the F08 and F10 swaths. Two crossovers occur for each complete orbit. The typical time difference between F08 and F10 at a crossover is 30 minutes. Over the ocean, this time difference, on the average, has a negligible effect on the comparison statistics. However, over land for the morning crossovers, the land temperature is rapidly increasing by about +4 K/hour, thus making a time difference of 30 minutes significant. We therefore did not use morning land crossovers in the intercalibration. For the evening land crossovers, the cooling rate is about -1 K/hour. We applied a first-order correction to compensate for this cooling rate and then used the evening land crossovers in the intercalibration. For the ocean, no cooling or heating in the T_A 's was detected, as was expected.

Before comparing the F08 and F10 T_A 's, an adjustment is required to correct for the difference between the F08 and F10 incidence angle θ . The incidence angle difference is typically about 0.2° . Over land and ice, this θ difference has a very small effect (less than 0.1 K) on T_A , and no correction was made for land or ice. Over the oceans, the θ difference corresponds to a T_A difference of 0.2 K for horizontal polarization and 0.4 K for vertical polarization. For ocean observations, the F10 T_A 's were first normalized to the F08 incidence angle before doing the intercalibration. The θ adjustment is based on the standard ocean brightness temperature model.

The F10 minus F08 T_A differences were regressed to the following linear expression.

$$T_{A10} - T_{A08} = A + B (T_{A10} + T_{A08})/2$$

The regression coefficients A and B were found for the five lower SSM/I channels:

CHANNEL	A (K)	B
19V	+0.08	0.00221
19H	+0.35	0.00079
22V	-0.33	0.00161
37V	-0.01	0.00335
37H	+0.44	0.00165

Over the range of Earth values from 120 K to 280 K, the F10 T_A 's are about 0.5 to 0.8 K higher than the F08 T_A 's, except for the 22V channel for which the difference is near zero. There is also a small tendency for the F10 minus F08 offset to increase with T_A .

To check this analysis, the F10 minus F08 offset was calculated in another, simpler way. Monthly, 1° latitude by 1° longitude ocean maps of the F08 and F10 T_A 's were first computed. Then these monthly maps were differenced. The offsets found from this simpler approach agreed with the above offsets found from the crossover analysis to within 0.15 K.

Using the A and B coefficients, the routine DECODE2 adjusts the F10 T_A 's to correspond to the F08 T_A 's. The adjustment is the following:

$$T_{A10adj} = (1 - B) T_{A10} - A$$

T_{A10adj} can then be used in geophysical retrieval algorithms to generate products that are free of biases due to the sensor calibration difference between F08 and F10.

**APPENDIX A. LIST OF ERRONEOUS DATA PERIODS
FOR F08 SATELLITE FROM JULY 1987 THROUGH DECEMBER 1991**

(File BADLOC.D08 on enclosed 3.5" diskette)

1987 190 0.0	1987 190 15.7	1988 145 15.2	1988 145 18.0
1987 198 4.0	1987 198 5.0	1988 146 5.1	1988 146 7.5
1987 217 21.5	1987 217 23.5	1988 147 23.5	1988 148 2.0
1987 219 12.0	1987 219 14.0	1988 148 11.2	1988 148 12.5
1987 228 14.0	1987 228 16.0	1988 148 14.9	1988 148 16.4
1987 233 4.5	1987 233 6.5	1988 149 17.2	1988 149 21.1
1987 236 13.5	1987 239 15.0	1988 149 23.0	1988 150 0.5
1987 246 13.5	1987 246 14.5	1988 150 10.9	1988 150 11.8
1987 250 11.0	1987 250 12.0	1988 152 16.5	1988 152 17.9
1987 252 14.0	1987 252 16.0	1988 153 5.5	1988 153 9.1
1987 253 10.5	1987 253 12.5	1988 154 20.6	1988 154 22.4
1987 255 13.5	1987 255 15.0	1988 166 21.2	1988 166 22.9
1987 263 16.5	1987 263 18.0	1988 169 2.2	1988 169 4.2
1987 267 21.5	1987 267 23.0	1988 169 10.4	1988 169 11.0
1987 269 14.0	1987 269 16.0	1988 171 15.2	1988 171 15.4
1987 272 14.5	1987 272 16.0	1988 176 14.0	1988 176 15.7
1987 273 15.0	1987 273 15.5	1988 180 19.9	1988 180 21.0
1987 277 14.0	1987 277 15.5	1988 180 23.6	1988 181 0.6
1987 280 11.5	1987 280 13.0	1988 181 1.2	1988 181 1.6
1987 283 1.0	1987 283 3.0	1988 181 4.9	1988 181 6.1
1987 284 21.3	1987 284 23.0	1988 181 9.9	1988 181 11.2
1987 294 21.0	1987 294 22.0	1988 181 20.7	1988 181 21.0
1987 304 22.0	1987 304 23.7	1988 182 3.6	1988 182 4.0
1987 310 14.0	1987 310 15.0	1988 182 5.1	1988 182 5.3
1987 312 5.0	1987 312 5.7	1988 182 12.9	1988 182 13.5
1987 316 21.0	1987 316 23.5	1988 182 17.8	1988 182 19.7
1987 317 14.2	1987 317 16.0	1988 188 11.5	1988 188 13.2
1987 321 5.3	1987 321 7.8	1988 192 14.1	1988 192 16.0
1987 323 5.3	1987 323 6.0	1988 217 20.0	1988 217 21.0
1987 329 2.0	1987 329 3.7	1988 224 13.6	1988 224 15.3
1987 329 10.1	1987 329 10.8	1988 225 9.0	1988 225 11.4
1988 013 0.0	1988 013 19.0	1988 225 12.5	1988 225 13.1
1988 018 2.5	1988 018 4.5	1988 227 3.8	1988 227 5.2
1988 018 9.0	1988 018 10.3	1988 229 16.3	1988 229 16.8
1988 019 15.8	1988 019 17.5	1988 230 12.0	1988 230 13.7
1988 022 5.3	1988 022 8.6	1988 230 16.4	1988 230 19.5
1988 025 4.8	1988 025 7.2	1988 230 21.5	1988 230 22.8
1988 026 10.8	1988 026 12.6	1988 231 15.7	1988 231 16.1
1988 026 23.0	1988 027 1.0	1988 232 1.1	1988 232 3.3
1988 030 22.1	1988 030 23.5	1988 233 17.3	1988 233 21.3
1988 031 11.5	1988 031 13.3	1988 234 12.2	1988 234 12.8
1988 032 22.0	1988 032 23.3	1988 236 10.1	1988 236 11.2
1988 035 6.1	1988 035 6.8	1988 236 11.9	1988 236 12.6
1988 067 4.5	1988 067 5.1	1988 237 22.1	1988 237 22.8
1988 069 14.1	1988 069 15.8	1988 237 23.7	1988 238 0.9
1988 075 23.3	1988 076 0.2	1988 238 2.1	1988 238 2.6
1988 076 10.9	1988 076 13.1	1988 239 21.7	1988 239 23.6
1988 084 7.5	1988 084 9.8	1988 240 0.0	1988 240 0.5
1988 091 21.6	1988 092 1.1	1988 240 2.0	1988 240 4.0
1988 092 21.4	1988 092 23.5	1988 240 9.2	1988 240 10.0
1988 108 1.1	1988 108 2.0	1988 241 7.7	1988 241 8.0
1988 110 0.7	1988 110 3.3	1988 241 9.0	1988 241 12.2
1988 110 12.2	1988 110 16.0	1988 242 4.1	1988 242 6.2
1988 114 13.2	1988 114 15.2	1988 242 7.7	1988 242 8.0
1988 117 4.2	1988 117 7.5	1988 242 21.1	1988 242 22.4
1988 118 0.7	1988 118 2.3	1988 242 22.9	1988 242 23.3
1988 118 13.9	1988 118 16.0	1988 243 3.9	1988 243 4.6
1988 120 5.2	1988 120 6.9	1988 243 9.8	1988 243 10.0
1988 138 23.8	1988 139 1.0	1988 243 11.6	1988 243 12.6
1988 140 1.2	1988 140 3.6	1988 243 16.2	1988 243 19.1
1988 145 3.7	1988 145 5.6	1988 243 21.1	1988 243 21.4

1988 244 0.1 1988 244 1.0
 1988 244 2.4 1988 244 5.5
 1988 244 9.0 1988 244 9.8
 1988 244 15.3 1988 244 16.6
 1988 246 6.9 1988 246 8.0
 1988 246 11.7 1988 246 12.2
 1988 246 14.9 1988 246 16.4
 1988 249 10.2 1988 249 12.0
 1988 249 12.7 1988 249 13.6
 1988 249 17.6 1988 249 20.3
 1988 250 4.1 1988 250 7.6
 1988 250 8.9 1988 250 9.6
 1988 250 12.4 1988 250 13.2
 1988 250 15.6 1988 250 15.8
 1988 251 15.6 1988 251 16.1
 1988 254 9.8 1988 254 15.8
 1988 254 17.4 1988 254 18.6
 1988 255 3.1 1988 255 4.1
 1988 255 14.8 1988 255 15.4
 1988 255 18.0 1988 255 21.9
 1988 255 23.3 1988 255 23.5
 1988 256 3.8 1988 256 4.1
 1988 256 11.1 1988 256 12.7
 1988 257 7.6 1988 257 9.1
 1988 257 10.9 1988 257 14.4
 1988 258 0.8 1988 258 2.2
 1988 258 8.9 1988 258 10.0
 1988 258 10.8 1988 258 11.9
 1988 258 15.5 1988 258 15.7
 1988 258 16.7 1988 258 19.8
 1988 258 20.9 1988 258 21.1
 1988 259 22.7 1988 259 23.7
 1988 260 2.2 1988 260 3.3
 1988 260 10.3 1988 260 10.6
 1988 260 13.8 1988 260 14.2
 1988 260 14.7 1988 260 14.9
 1988 261 22.8 1988 261 23.0
 1988 262 22.9 1988 262 23.4
 1988 263 2.6 1988 263 3.4
 1988 263 9.7 1988 263 10.4
 1988 263 10.9 1988 263 11.4
 1988 263 23.0 1988 263 23.2
 1988 264 2.6 1988 264 2.8
 1988 264 4.7 1988 264 6.6
 1988 265 7.7 1988 265 8.3
 1988 265 8.6 1988 265 9.1
 1988 265 11.3 1988 265 12.7
 1988 265 23.1 1988 266 0.8
 1988 284 15.7 1988 284 15.9
 1988 284 16.9 1988 284 20.2
 1988 284 20.7 1988 284 20.9
 1988 286 8.3 1988 286 8.9
 1988 286 15.0 1988 286 16.2
 1988 286 16.6 1988 286 21.2
 1988 286 22.2 1988 286 23.4
 1988 289 7.7 1988 289 8.3
 1988 289 9.3 1988 289 11.0
 1988 289 11.7 1988 289 12.0
 1988 289 14.5 1988 289 15.2
 1988 290 12.7 1988 290 15.1
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 1988 290 16.8 1988 290 17.3
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 1988 291 0.8 1988 291 1.6
 1988 291 8.9 1988 291 12.0
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1988 292 8.8 1988 292 10.1
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 1988 328 2.0 1988 328 3.1
 1988 328 18.3 1988 328 18.9
 1988 329 17.9 1988 329 20.0
 1988 330 23.1 1988 331 1.0
 1988 331 9.1 1988 331 10.8
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 1988 334 5.6 1988 334 7.8
 1988 335 20.7 1988 335 21.3
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 1988 349 15.6 1988 349 16.8
 1988 349 17.0 1988 349 18.1
 1988 349 18.5 1988 349 20.7
 1988 349 21.0 1988 349 22.5
 1988 349 22.7 1988 349 23.4
 1988 350 3.9 1988 350 5.2
 1988 350 5.4 1988 350 5.7
 1988 350 6.0 1988 350 8.1
 1988 350 8.6 1988 350 9.9
 1988 350 10.2 1988 350 11.5
 1988 350 12.0 1988 350 12.4
 1988 350 16.8 1988 350 18.0
 1988 351 16.6 1988 351 19.7
 1988 351 20.0 1988 351 20.3
 1988 351 21.6 1988 351 21.8
 1988 351 23.8 1988 352 0.7
 1988 352 1.6 1988 352 2.3
 1988 352 2.9 1988 352 3.1
 1988 352 4.8 1988 352 5.3
 1988 352 5.6 1988 352 7.1
 1988 352 8.1 1988 352 8.9
 1988 352 9.8 1988 352 10.6
 1988 354 9.8 1988 354 11.0
 1988 354 11.2 1988 354 11.9
 1988 354 16.2 1988 354 17.5
 1988 356 6.0 1988 356 6.6
 1988 357 2.7 1988 357 3.0
 1989 7 5.8 1989 7 8.8
 1989 30 14.1 1989 30 15.8
 1989 46 14.2 1989 46 15.8
 1989 56 3.2 1989 56 4.2
 1989 56 4.8 1989 56 7.4
 1989 92 1.4 1989 92 2.0
 1989 130 23.5 1989 131 0.0
 1989 155 23.7 1989 156 0.0
 1989 156 23.4 1989 157 0.0
 1989 163 23.6 1989 164 0.0
 1989 164 23.3 1989 165 0.0
 1989 169 22.2 1989 170 0.0
 1989 173 23.1 1989 174 0.0
 1989 179 23.6 1989 180 0.0
 1989 182 22.9 1989 183 0.0
 1989 186 23.7 1989 187 0.0
 1989 187 23.5 1989 188 0.0
 1989 195 23.6 1989 196 0.0
 1989 207 22.7 1989 208 0.0
 1989 234 23.6 1989 235 0.0
 1989 271 20.8 1989 271 22.5
 1989 276 23.0 1989 277 1.0
 1990 019 16.6 1990 019 17.0
 1990 065 23.9 1990 066 0.0
 1990 169 3.1 1990 169 5.0
 1990 216 14.2 1990 216 16.2
 1990 243 9.9 1990 243 11.4
 1990 272 22.1 1990 273 0.1
 1990 282 9.7 1990 282 10.4
 1990 294 0.0 1990 294 3.0
 1990 300 20.5 1990 300 21.5
 1990 301 6.0 1990 301 7.5
 1990 307 18.7 1990 307 19.8
 1990 308 0.0 1990 308 1.0
 1990 309 0.0 1990 309 1.0
 1991 74 0.0 1991 74 0.8
 1991 98 18.5 1991 98 19.3
 1991 134 15.0 1991 134 16.0
 1991 181 22.1 1991 181 22.6
 1991 184 8.0 1991 184 8.5

1991 201 21.9 1991 201 23.7
 1991 204 16.1 1991 204 16.4
 1991 219 12.7 1991 219 13.1
 1991 228 0.0 1991 228 9.0
 1991 229 2.1 1991 229 2.4
 1991 335 3.5 1991 335 3.8

**APPENDIX B. LIST OF ERRONEOUS DATA PERIODS
FOR F10 SATELLITE FROM DECEMBER 1990 THROUGH MARCH 1993**

(File BADLOC.D10 on enclosed 3.5" diskette)

1990 342	15.7	1990 342	17.6
1990 346	20.1	1990 346	20.8
1990 353	13.9	1990 355	18.0
1991 005	16.0	1991 006	1.5
1991 223	9.0	1991 223	9.4
1991 267	6.3	1991 267	6.8
1991 293	0.0	1991 293	2.6
1991 353	13.6	1991 353	14.6
1992 008	2.8	1992 008	3.4
1992 078	1.6	1992 078	3.0
1992 095	19.6	1992 095	21.5
1992 185	19.5	1992 185	19.9
1992 200	0.0	1992 200	1.0
1992 203	1.6	1992 203	1.9
1993 011	21.5	1993 011	22.0
1993 025	14.0	1993 025	15.0
1993 025	20.7	1993 025	21.7
1993 035	21.0	1993 035	23.2
1993 053	4.4	1993 053	6.1

**APPENDIX C. LIST OF ERRONEOUS DATA PERIODS
FOR F11 SATELLITE FROM DECEMBER 1991 THROUGH MARCH 1993**

(File BADLOC.D11 on enclosed 3.5" diskette)

1991	337	18.6	1991	337	19.2
1991	343	17.4	1991	343	18.1
1991	361	10.1	1991	361	12.8
1991	362	18.0	1991	362	20.5
1992	008	11.5	1992	008	12.5
1992	021	8.3	1992	021	10.0
1992	117	0.5	1992	117	1.5
1992	208	7.2	1992	208	9.9
1992	247	12.7	1992	247	13.3
1993	053	7.5	1993	053	9.7
1993	065	2.9	1993	065	3.3
1993	072	10.2	1993	072	12.3

APPENDIX D. LISTING OF SUBROUTINE DECODE2, REVISION 2

(File DECODE2.FOR on the enclosed 3.5" diskette)


```

SUBROUTINE DECODE2(I85GHZ,ITB,IADJ,IREC,LREC)
C
C REVISION-2 DECODE. SAME AS REVISION-1 EXCEPT FOR THE FOLLOWING:
C 1. CROSS-SCAN BIASES FOR F10 ARE IMPLEMENTED (IF ITB=1)
C 2. F10 TA'S ARE ADJUSTED TO CORRESPOND TO F08 TA'S (IF ITB=1)
C 3. 0.336 DEG HAS BEEN ADDED TO F08 THT
C 4. OPTION ITB=0 IS THE SAME AS BEFORE, I.E., ONLY TA'S ARE
C ARE COMPUTED AND NO TA CORRECTIONS ARE APPLIED.
C OPTION ITB=1 IS NOW DIFFERENT. IN THIS CASE, THE TA'S
C ARE CORRECTED FOR ALONG-SCAN BIASES AND THE F10 TA'S
C ARE ADJUSTED SO AS TO AGREE WITH THE F08 TA'S. THESE
C ADJUSTED TA'S ARE STORED IN ARRAY TALO(5,64). NO ADJUSTMENTS
C ARE DONE FOR THE 85 GHZ CHANNELS. ALSO, WHEN ITB=1, THE
C TB'S ARE COMPUTED FROM THE ADJUSTED TA'S AND ARE STORED IN
C A NEW COMMON CALLED:
C COMMON /TBDATA/ TBLO(5,64),ATBHI(2,128),BTBHI(2,128)
C THUS WHEN ITB=1, TA'S AND TB'S ARE BOTH AVAILABLE.
C NOTE THAT IF THE V OR H-POL TA IS O.O.B., THEN NO TA ADJUSTMENT
C AND THE TB'S ARE SET TO THE UNADJUSTED TA VALUES.
C 5. TA'S ARE SET NEGATIVE IF CALIBRATION DATA IS BAD
C
C ***** DESCRIPTION OF ARGUMENTS *****
C I85GHZ=0 PROCESSES ONLY THE 19, 22, AND 37 GHZ OBS.
C I85GHZ=1 PROCESSES ALL CHANNELS
C
C ITB=0 COMPUTES UNADJUSTED TA'S
C ITB=1 COMPUTES ADJUSTED TA'S AND TB'S
C
C IADJ=0 DOES NO ALONGTRACK LOCATION CORRECTION
C IADJ=1 DOES AN ALONGTRACK LOCATION CORRECTION
C
C IREC DENOTES LOGICAL RECORD NUMBER (1 THROUGH 16)
C
C LREC IS THE ARRAY THAT CONTAINS THE BYTES IN THE TAPE BLOCK
C THE USER MUST SUPPLY THE TAPE READ ROUTINE FOR FILLING LREC
C BEFORE CALLING THIS ROUTINE

```

```

C
C ***** DECLARATION OF VARIABLES, ARRAYS, AND COMMONS *****
C
      CHARACTER*1 LREC(1784,16)
C
      INTEGER*2 IBUF
      COMMON /INDATA/ IBUF(1784)
C
      REAL*8 REV,XTIME
      INTEGER*4 ITIME,ITIMSC,IVOLT,IAGC,ICOLDA,IHOTA,ICOLDB,IHOTB,IASCTM
      INTEGER*4 IATOIL,IBTOIL,ISAT
      REAL*4 XLATSC,XLONSC,ALTSC,THT,HLTEMP,RFTEMP,FRTEMP
      REAL*4 PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,SPACER
      REAL*4 ALAT,ALON,BLAT,BLON,TALO,ATAHI,BTAHI
      COMMON/OUTDAT/ REV,XTIME,ITIME,ITIMSC,XLATSC,XLONSC,ALTSC,THT,
1 HLTEMP(3),IVOLT(2),RFTEMP,FRTEMP,IAGC(6),
2 IASCTM,PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,ISAT,SPACER(6),
2 ICOLDA(5,7),IHOTA(5,7),ICOLDB(5,2),IHOTB(5,2),
3 ALAT(128),ALON(128),BLAT(128),BLON(128),
4 TALO(5,64),ATAHI(2,128),BTAHI(2,128),IATOIL(128),IBTOIL(128)
C
C ***** DATA INITIALIZATION *****
C
      DATA N1,N2,N3/256,65536,16777216/
      DATA RAD/0.017453293/
C
C ***** BEGIN EXECUTION *****
C
      TRANSFER TAPE BYTES IN IREC LOGICAL RECORD TO ARRAY IBUF
C
      DO 100 I=1,1784
      IBUF(I)=ICHAR(LREC(I,IREC))
100 CONTINUE
C
C      FIND SCAN TIME
C
      ITIME= N3*IBUF( 1)+N2*IBUF( 2)+N1*IBUF( 3)+IBUF( 4)
      IFRCTM=N3*IBUF(17)+N2*IBUF(18)+N1*IBUF(19)+IBUF(20)
      IF(IFRCTM.EQ.0) XTIME=ITIME
      IF(IFRCTM.NE.0) XTIME=ITIME+1.D-4*(IFRCTM-10000)

```

```

C
C FIND SPACECRAFT TIME AND ORBIT NUMBER
C IOLD=1 FOR ALL SCANS BEFORE 1989
C
IF(ITIME.LT.63163966) THEN
IOLD=1
ITIMSC= N3*IBUF( 9)+N2*IBUF(10)+N1*IBUF(11)+IBUF(12)
ELSE
IOLD=0
ITIMSC=ITIME
ENDIF
C
IF(ITIME.GE.63163966.AND.ITIME.LT.84156110) THEN
REV=1.D-4*(N3*IBUF( 9)+N2*IBUF(10)+N1*IBUF(11)+IBUF(12))
ELSE
REV=1.D-4*(N3*IBUF( 5)+N2*IBUF( 6)+N1*IBUF( 7)+IBUF( 8))
ENDIF
C
C FIND SPACECRAFT LATITUDE, LONGITUDE, AND ALTITUDE
C
XLATSC=1.D-6*(N3*IBUF(13)+N2*IBUF(14)+N1*IBUF(15)+IBUF(16))-90.
XLONSC=1.D-6*(N3*IBUF(21)+N2*IBUF(22)+N1*IBUF(23)+IBUF(24))
ALTSC= 1.D-3*(N3*IBUF(25)+N2*IBUF(26)+N1*IBUF(27)+IBUF(28))
C
C DETERMINE SATELLITE NUMBER AND INCIDENCE ANGLE
C FACTOR OF .7040147 = SIN(44.75 DEG)
C FACTOR OF .7116583 = SIN(45.37 DEG)
C
IF(ITIME.GT.144554200) THEN
ITERM=N3*IBUF( 9)+N2*IBUF(10)+N1*IBUF(11)+IBUF(12)
THT=0.001*INT(ITERM/1000)
ISAT=ITERM-1000*INT(ITERM/1000)
C
ELSE
C EARTH=RADIUS OF CURVATURE OF EARTH'S SURFACE
EARTH=6345.7+55.0*SIN(RAD*XLATSC)**2
DIFREV=DABS(REV-300-(XTIME-16530609)/6118.)
IF(DIFREV.LT.100.) THEN
ISAT=8
THT=ASIN(0.7040147*(EARTH+ALTSC)/EARTH)/RAD
ELSE
ISAT=10
THT=ASIN(0.7116583*(EARTH+ALTSC)/EARTH)/RAD
ENDIF
C
ENDIF
C
IF(ISAT.EQ.8) THT=THT+0.336

```

C
C
C

FIND RADIOMETER CALIBRATION DATA

HLTEMP(3)=0.01*(N1*IBUF(29)+IBUF(30))
HLTEMP(2)=0.01*(N1*IBUF(31)+IBUF(32))
HLTEMP(1)=0.01*(N1*IBUF(33)+IBUF(34))
RFTEMP= 0.01*(N1*IBUF(39)+IBUF(40))
FRTEMP= 0.01*(N1*IBUF(41)+IBUF(42))
IVOLT(2)= N1*IBUF(35)+IBUF(36)
IVOLT(1)= N1*IBUF(37)+IBUF(38)
IAGC(3)= N1*IBUF(43)+IBUF(44)
IAGC(2)= N1*IBUF(45)+IBUF(46)
IAGC(1)= N1*IBUF(47)+IBUF(48)

C

N=-2
DO 200 ICH=1,7
IF(ICH.LE.6) SPACER(ICH)=0.
DO 200 IP=1,5
N=N+2
ICOLDA(IP,ICH)=N1*IBUF(N + 77)+IBUF(N + 78)
IHOTA(IP,ICH)= N1*IBUF(N +147)+IBUF(N +148)
200 CONTINUE

C

IAGC(6)=N1*IBUF(217)+IBUF(218)
IAGC(5)=N1*IBUF(219)+IBUF(220)
IAGC(4)=N1*IBUF(221)+IBUF(222)

C

N=-2
DO 300 ICH=1,2
DO 300 IP=1,5
N=N+2
ICOLDB(IP,ICH)=N1*IBUF(N +223)+IBUF(N +224)
IHOTB(IP,ICH)= N1*IBUF(N +243)+IBUF(N +244)
300 CONTINUE

```

C
C   FIND ORBIT PARAMETERS
C
  IF(ITIME.LT.84156110) THEN
    IASCTM=0
    PERIOD=0.
    ASCLOC=0.
    ANGINC=0.
    AXIS=0.
    ECC=0.
    ANGPER=0.
  C
  ELSE
    IASCTM=      N3*IBUF(49)+N2*IBUF(50)+N1*IBUF(51)+IBUF(52)
    PERIOD= 1.D-4*(N3*IBUF(53)+N2*IBUF(54)+N1*IBUF(55)+IBUF(56))
    ASCLOC= 1.D-3*(N3*IBUF(57)+N2*IBUF(58)+N1*IBUF(59)+IBUF(60))
    ANGINC= 1.D-6*(N3*IBUF(61)+N2*IBUF(62)+N1*IBUF(63)+IBUF(64))
    ANGINC=180.-ANGINC
    AXIS=   1.D-4*(N3*IBUF(65)+N2*IBUF(66)+N1*IBUF(67)+IBUF(68))
    ECC=   1.D-10*(N3*IBUF(69)+N2*IBUF(70)+N1*IBUF(71)+IBUF(72))
    ANGPER= 1.D-5*(N3*IBUF(73)+N2*IBUF(74)+N1*IBUF(75)+IBUF(76))
  ENDIF
  C
  C   DETERMINE IF ALONGTRACK AND YAW ADJUSTMENT IS NEEDED
  C   TRKADJ=-1.2 CORRESPONDS TO A 15 KM ALONGTRACK ADJUSTMENT
  C   YAW=.3125 CORRESPONDS TO A 0.5 DEG. YAW ROTATION
  C
    TRKADJ=0.
    IF(IOLD.EQ.1.AND.IADJ.EQ.1) TRKADJ=-1.2
    YAW=0.
    IF(ISAT.EQ.8) YAW=.3125
  C
  C   FIND CELL LATITUDES AND LONGITUDES
  C
    J85GHZ=I85GHZ
    IF(TRKADJ.NE.0.) J85GHZ=1
    CALL FDLTLN(J85GHZ,IOLD,YAW)
    IF(TRKADJ.NE.0.) CALL ADJLOC(TRKADJ)
  C
  C   FIND EITHER TA'S OR TB'S
  C
    CALL FDTA(I85GHZ)
    IF(ITB.NE.0) CALL FDTATB(I85GHZ)
  C
  RETURN
  END
  C

```

```

SUBROUTINE FDLTLN(J85GHZ,IOLD,YAW)
C
C THIS SUBROUTINE FINDS THE LATS AND LONS FOR THE SSMI CELLS
C J85GHZ=0 DOES NOT DO 85 GHZ LAT/LON, J85GHZ=1 DOES 85 GHZ LAT LON
C
INTEGER*4 INDEX(19),JNDEX(3,109)
C
C SPECIFY COMMON /INDATA/
C
INTEGER*2 IBUF
COMMON /INDATA/ IBUF(1784)
C
C SPECIFY COMMON /OUTDAT/
C
REAL*8 REV,XTIME
INTEGER*4 ITIME,ITIMSC,IVOLT,IAGC,ICOLDA,IHOTA,ICOLDB,IHOTB,IASCTM
INTEGER*4 IATOIL,IBTOIL,ISAT
REAL*4 XLATSC,XLONSC,ALTSC,THT,HLTEMP,RFTEMP,FRTEMP
REAL*4 PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,SPACER
REAL*4 ALAT,ALON,BLAT,BLON,TALO,ATAHI,BTAHI
COMMON/OUTDAT/ REV,XTIME,ITIME,ITIMSC,XLATSC,XLONSC,ALTSC,THT,
1 HLTEMP(3),IVOLT(2),RFTEMP,FRTEMP,IAGC(6),
2 IASCTM,PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,ISAT,SPACER(6),
2 ICOLDA(5,7),IHOTA(5,7),ICOLDB(5,2),IHOTB(5,2),
3 ALAT(128),ALON(128),BLAT(128),BLON(128),
4 TALO(5,64),ATAHI(2,128),BTAHI(2,128),IATOIL(128),IBTOIL(128)

```

C
C
C

DATA INITIALIZATION

DATA N1/256/

DATA RAD/0.017453293/

DATA INDEX/1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,123,
1 127,128/

DATA JINDEX/

1 5, 1, 9, 13, 9, 17, 21, 17, 25, 29, 25, 33, 37, 33, 41,
1 45, 41, 49, 53, 49, 57, 61, 57, 65, 69, 65, 73, 77, 73, 81,
1 85, 81, 89, 93, 89, 97,101, 97,105,109,105,113,117,113,121,
1 3, 1, 5, 7, 5, 9, 11, 9, 13, 15, 13, 17, 19, 17, 21,
1 23, 21, 25, 27, 25, 29, 31, 29, 33, 35, 33, 37, 39, 37, 41,
1 43, 41, 45, 47, 45, 49, 51, 49, 53, 55, 53, 57, 59, 57, 61,
1 63, 61, 65, 67, 65, 69, 71, 69, 73, 75, 73, 77, 79, 77, 81,
1 83, 81, 85, 87, 85, 89, 91, 89, 93, 95, 93, 97, 99, 97,101,
1 103,101,105,107,105,109,111,109,113,115,113,117,119,117,121,
1 125,123,127, 2, 1, 3, 4, 3, 5, 6, 5, 7, 8, 7, 9,
1 10, 9, 11, 12, 11, 13, 14, 13, 15, 16, 15, 17, 18, 17, 19,
1 20, 19, 21, 22, 21, 23, 24, 23, 25, 26, 25, 27, 28, 27, 29,
1 30, 29, 31, 32, 31, 33, 34, 33, 35, 36, 35, 37, 38, 37, 39,
1 40, 39, 41, 42, 41, 43, 44, 43, 45, 46, 45, 47, 48, 47, 49,
1 50, 49, 51, 52, 51, 53, 54, 53, 55, 56, 55, 57, 58, 57, 59,
1 60, 59, 61, 62, 61, 63, 64, 63, 65, 66, 65, 67, 68, 67, 69,
1 70, 69, 71, 72, 71, 73, 74, 73, 75, 76, 75, 77, 78, 77, 79,
1 80, 79, 81, 82, 81, 83, 84, 83, 85, 86, 85, 87, 88, 87, 89,
1 90, 89, 91, 92, 91, 93, 94, 93, 95, 96, 95, 97, 98, 97, 99,
1 100, 99,101,102,101,103,104,103,105,106,105,107,108,107,109,
1 110,109,111,112,111,113,114,113,115,116,115,117,118,117,119,
1 120,119,121,122,121,123,124,123,125,126,125,127/

C
C
C
C
C

BEGIN EXECUTION

SET TABLE LAT/LON FOR A-SCAN

N=-2

DO 100 JCEL=1,19

N=N+2

ICEL=INDEX(JCEL)

ALAT(ICEL)=0.01*(N1*IBUF(N +263)+IBUF(N +264)-9000)

ALON(ICEL)=0.01*(N1*IBUF(N +301)+IBUF(N +302))

IF(ALON(ICEL).GE.360.) ALON(ICEL)=ALON(ICEL)-360.

100 CONTINUE

C
C
C

SET MID-POINTS FOR A-SCAN

```
NCEL=46
IF(J85GHZ.EQ.1) NCEL=109
DO 200 JCEL=1,NCEL
ICEL=JNDEX(1,JCEL)
I1=JNDEX(2,JCEL)
I2=JNDEX(3,JCEL)
DIFLAT=ALAT(I2)-ALAT(I1)
AVGLAT=0.5*(ALAT(I1)+ALAT(I2))
DIFLON=ALON(I2)-ALON(I1)
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
AVGLON=ALON(I1)+0.5*DIFLON
XSQ=(2.*RAD*AVGLAT)**2
XFAC=1.-0.16627142*XSQ+0.00807934*XSQ*XSQ-0.000151880*XSQ*XSQ*XSQ
ALAT(ICEL)=AVGLAT*(1.+0.125*(RAD*DIFLON)**2*XFAC)
X=RAD*(90.-ABS(AVGLAT))
TANLAT=1./(X+X*X*X/3.)
IF(AVGLAT.LT.0.) TANLAT=-TANLAT
ALON(ICEL)=AVGLON-0.2500*RAD*DIFLAT*DIFLON*TANLAT
IF(ALON(ICEL).LT. 0.) ALON(ICEL)=ALON(ICEL)+360.
IF(ALON(ICEL).GE.360.) ALON(ICEL)=ALON(ICEL)-360.
```

200 CONTINUE

C
C
C

DO YAW CORRECTION

```
IF(J85GHZ.EQ.0) THEN
IF(YAW.EQ.0.) RETURN
```

C

```
DO 260 ICEL=1,127,2
IF(ICEL.EQ.127) GO TO 250
DIFLAT=ALAT(ICEL+2)-ALAT(ICEL)
DIFLON=ALON(ICEL+2)-ALON(ICEL)
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
```

250 CONTINUE

```
ALAT(ICEL)=ALAT(ICEL)+YAW*DIFLAT
ALON(ICEL)=ALON(ICEL)+YAW*DIFLON
IF(ALON(ICEL).LT. 0.) ALON(ICEL)=ALON(ICEL)+360.
IF(ALON(ICEL).GE.360.) ALON(ICEL)=ALON(ICEL)-360.
```

260 CONTINUE

```
RETURN
ENDIF
```


C
C
C

SET TABLE LAT/LON FOR B-SCAN

N=-2
DO 300 JCEL=1,19
N=N+2
ICEL=INDEX(JCEL)
IDEL=N1*IBUF(N +339)+IBUF(N +340)
IF(IDEL.GT.32767) IDEL=IDEL-65536
LATDEL=(IDEL+30000)/1000-30
LONDEL=IDEL+29100-1000*(LATDEL+30)
BLAT(ICEL)=ALAT(ICEL)+0.01*LATDEL
BLON(ICEL)=ALON(ICEL)+0.01*LONDEL
IF(BLON(ICEL).LT. 0.) BLON(ICEL)=BLON(ICEL)+360.
IF(BLON(ICEL).GE.360.) BLON(ICEL)=BLON(ICEL)-360.
300 CONTINUE

C
C
C

SET MID-POINTS FOR B-SCAN

DO 400 JCEL=1,109
ICEL=JINDEX(1,JCEL)
I1=JINDEX(2,JCEL)
I2=JINDEX(3,JCEL)
DIFLAT=BLAT(I2)-BLAT(I1)
AVGLAT=0.5*(BLAT(I1)+BLAT(I2))
DIFLON=BLON(I2)-BLON(I1)
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
AVGLON=BLON(I1)+0.5*DIFLON
XSQ=(2.*RAD*AVGLAT)**2
XFAC=1.-0.16627142*XSQ+0.00807934*XSQ*XSQ-0.000151880*XSQ*XSQ*XSQ
BLAT(ICEL)=AVGLAT*(1.+0.125*(RAD*DIFLON)**2*XFAC)
X=RAD*(90.-ABS(AVGLAT))
TANLAT=1./(X+X*X*X/3.)
IF(AVGLAT.LT.0.) TANLAT=-TANLAT
BLON(ICEL)=AVGLON-0.2500*RAD*DIFLAT*DIFLON*TANLAT
IF(BLON(ICEL).LT. 0.) BLON(ICEL)=BLON(ICEL)+360.
IF(BLON(ICEL).GE.360.) BLON(ICEL)=BLON(ICEL)-360.
400 CONTINUE

C
C
C

CORRECT CELL 128 FOR DATA BEFORE 1989

```
IF(IOLD.EQ.1) THEN
DIFLAT=ALAT(127)-ALAT(126)
DIFLON=ALON(127)-ALON(126)
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
ALAT(128)=ALAT(127)+DIFLAT
ALON(128)=ALON(127)+DIFLON
IF(ALON(128).LT. 0.) ALON(128)=ALON(128)+360.
IF(ALON(128).GE.360.) ALON(128)=ALON(128)-360.
```

C

```
DIFLAT=BLAT(127)-BLAT(126)
DIFLON=BLON(127)-BLON(126)
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
BLAT(128)=BLAT(127)+DIFLAT
BLON(128)=BLON(127)+DIFLON
IF(BLON(128).LT. 0.) BLON(128)=BLON(128)+360.
IF(BLON(128).GE.360.) BLON(128)=BLON(128)-360.
ENDIF
```

C
C
C

DO YAW CORRECTION

```
IF(YAW.EQ.0.) RETURN
DO 600 ICEL=1,128
IF(ICEL.EQ.128) GO TO 580
DIFLAT1=ALAT(ICEL+1)-ALAT(ICEL)
DIFLON1=ALON(ICEL+1)-ALON(ICEL)
IF(DIFLON1.LT.-180.) DIFLON1=DIFLON1+360.
IF(DIFLON1.GT. 180.) DIFLON1=DIFLON1-360.
DIFLAT2=BLAT(ICEL+1)-BLAT(ICEL)
DIFLON2=BLON(ICEL+1)-BLON(ICEL)
IF(DIFLON2.LT.-180.) DIFLON2=DIFLON2+360.
IF(DIFLON2.GT. 180.) DIFLON2=DIFLON2-360.
```

580 CONTINUE

```
ALAT(ICEL)=ALAT(ICEL)+2.*YAW*DIFLAT1
ALON(ICEL)=ALON(ICEL)+2.*YAW*DIFLON1
IF(ALON(ICEL).LT. 0.) ALON(ICEL)=ALON(ICEL)+360.
IF(ALON(ICEL).GE.360.) ALON(ICEL)=ALON(ICEL)-360.
BLAT(ICEL)=BLAT(ICEL)+2.*YAW*DIFLAT2
BLON(ICEL)=BLON(ICEL)+2.*YAW*DIFLON2
IF(BLON(ICEL).LT. 0.) BLON(ICEL)=BLON(ICEL)+360.
IF(BLON(ICEL).GE.360.) BLON(ICEL)=BLON(ICEL)-360.
```

600 CONTINUE

```
RETURN
END
```

C

```

SUBROUTINE ADJLOC(TRKADJ)
C
C CORRECT FOR ALONGTRACK ERROR
C
C SPECIFY COMMON /OUTDAT/
C
REAL*8 REV,XTIME
INTEGER*4 ITIME,ITIMSC,IVOLT,IAGC,ICOLDA,IHOTA,ICOLDB,IHOTB,IASCTM
INTEGER*4 IATOIL,IBTOIL,ISAT
REAL*4 XLATSC,XLONSC,ALTSC,THT,HLTEMP,RFTEMP,FRTEMP
REAL*4 PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,SPACER
REAL*4 ALAT,ALON,BLAT,BLON,TALO,ATAHI,BTAHI
COMMON/OUTDAT/ REV,XTIME,ITIME,ITIMSC,XLATSC,XLONSC,ALTSC,THT,
1 HLTEMP(3),IVOLT(2),RFTEMP,FRTEMP,IAGC(6),
2 IASCTM,PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,ISAT,SPACER(6),
2 ICOLDA(5,7),IHOTA(5,7),ICOLDB(5,2),IHOTB(5,2),
3 ALAT(128),ALON(128),BLAT(128),BLON(128),
4 TALO(5,64),ATAHI(2,128),BTAHI(2,128),IATOIL(128),IBTOIL(128)
C
C BEGIN EXECUTION
C
DO 100 ICEL=1,128
DIFLAT=BLAT(ICEL)-ALAT(ICEL)
ALAT(ICEL)=ALAT(ICEL)+TRKADJ*DIFLAT
BLAT(ICEL)=BLAT(ICEL)+TRKADJ*DIFLAT
C
DIFLON=BLON(ICEL)-ALON(ICEL)
IF(DIFLON.LT.-180.) DIFLON=DIFLON+360.
IF(DIFLON.GT. 180.) DIFLON=DIFLON-360.
C
ALON(ICEL)=ALON(ICEL)+TRKADJ*DIFLON
IF(ALON(ICEL).LT. 0.) ALON(ICEL)=ALON(ICEL)+360.
IF(ALON(ICEL).GE. 360.) ALON(ICEL)=ALON(ICEL)-360.
C
BLON(ICEL)=BLON(ICEL)+TRKADJ*DIFLON
IF(BLON(ICEL).LT. 0.) BLON(ICEL)=BLON(ICEL)+360.
IF(BLON(ICEL).GE. 360.) BLON(ICEL)=BLON(ICEL)-360.
100 CONTINUE
RETURN
END
C

```

```

SUBROUTINE FDTA(I85GHZ)
C
C THIS SUBROUTINE FINDS THE ANTENNA TEMPERATURES AND SURFACE TYPES
C
INTEGER*4 ITALO(5),ITAH1(8),NBIT(7)
C
C SPECIFY COMMON /INDATA/
C
INTEGER*2 IBUF
COMMON /INDATA/ IBUF(1784)
C
C SPECIFY COMMON /OUTDAT/
C
REAL*8 REV,XTIME
INTEGER*4 ITIME,ITIMSC,IVOLT,IAGC,ICOLDA,IHOTA,ICOLDB,IHOTB,IASCTM
INTEGER*4 IATOIL,IBTOIL,ISAT
REAL*4 XLATSC,XLONSC,ALTSC,THT,HLTEMP,RFTEMP,FRTEMP
REAL*4 PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,SPACER
REAL*4 ALAT,ALON,BLAT,BLON,TALO,ATAHI,BTAHI
COMMON/OUTDAT/ REV,XTIME,ITIME,ITIMSC,XLATSC,XLONSC,ALTSC,THT,
1 HLTEMP(3),IVOLT(2),RFTEMP,FRTEMP,IAGC(6),
2 IASCTM,PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,ISAT,SPACER(6),
2 ICOLDA(5,7),IHOTA(5,7),ICOLDB(5,2),IHOTB(5,2),
3 ALAT(128),ALON(128),BLAT(128),BLON(128),
4 TALO(5,64),ATAHI(2,128),BTAHI(2,128),IATOIL(128),IBTOIL(128)
C
DATA N1,N2/256,65536/
DATA NBIT/1,2,4,8,16,32,64/
C
C BEGIN EXECUTION
C
N=-10
M=-12
C

```

```

DO 100 ICEL=1,64
JCEL=2*ICEL-1
C
C FIND THE TA'S FOR THE 3 LOWER FREQUENCIES
C
N=N+10
C
IWORK4=N2*IBUF(N +377)+N1*IBUF(N+378)+IBUF(N+379)
ITAV=INT(IWORK4/4096)
ITALO(1)=ITAV
ITALO(2)=IWORK4-4096*ITAV
C
IWORK4=N2*IBUF(N +380)+N1*IBUF(N+381)+IBUF(N+382)
ITAV=INT(IWORK4/4096)
ITALO(4)=ITAV
ITALO(5)=IWORK4-4096*ITAV
C
IWORK4=N2*IBUF(N +383)+N1*IBUF(N+384)+IBUF(N+385)
ITAV=INT(IWORK4/4096)
ITALO(3)=ITAV
C
IQUAL=IBUF(N+386)
C
C SCALE THE TA'S
C
DO 20 ICH=1,5
IF(ITALO(ICH).LE.3800) THEN
TALO(ICH,ICEL)=0.1*ITALO(ICH)
ELSE
TALO(ICH,ICEL)=ITALO(ICH)-3420
ENDIF
IF(IAND(NBIT(ICH),IQUAL).NE.0) TALO(ICH,ICEL)=-TALO(ICH,ICEL)
20 CONTINUE
C
C FIND THE TOIL FLAGS
C
IRES=IWORK4-4096*ITAV
ITOIL1=INT(IRES/512)
IATOIL(JCEL)=ITOIL1
C
IF(I85GHZ.EQ.0) GO TO 100
C
C FIND 85 GHZ TOILS'S AND TA'S
C
M=M+12
C
IRES=IRES-ITOIL1*512
ITOIL2=INT(IRES/64)
IRES=IRES-ITOIL2*64
ITOIL3=INT(IRES/8)
ITOIL4=IRES-ITOIL3*8
IBTOIL(JCEL)=ITOIL2
IATOIL(JCEL+1)=ITOIL3
IBTOIL(JCEL+1)=ITOIL4

```

```
C
IWORK4=N2*IBUF(M+1017)+N1*IBUF(M+1018)+IBUF(M+1019)
ITAV=INT(IWORK4/4096)
ITAH1(1)=ITAV
ITAH1(3)=IWORK4-4096*ITAV
```

```
C
IWORK4=N2*IBUF(M+1020)+N1*IBUF(M+1021)+IBUF(M+1022)
ITAV=INT(IWORK4/4096)
ITAH1(2)=ITAV
ITAH1(4)=IWORK4-4096*ITAV
```

```
C
IWORK4=N2*IBUF(M+1023)+N1*IBUF(M+1024)+IBUF(M+1025)
ITAV=INT(IWORK4/4096)
ITAH1(5)=ITAV
ITAH1(7)=IWORK4-4096*ITAV
```

```
C
IWORK4=N2*IBUF(M+1026)+N1*IBUF(M+1027)+IBUF(M+1028)
ITAV=INT(IWORK4/4096)
ITAH1(6)=ITAV
ITAH1(8)=IWORK4-4096*ITAV
```

```
C
SCALE THE TA'S
```

```
C
K=0
DO 40 KCEL=JCEL,JCEL+1
DO 40 ICH=1,2
K=K+1
IF(ITAH1(K).LE.3800) THEN
ATAH1(ICH,KCEL)=0.1*ITAH1(K)
ELSE
ATAH1(ICH,KCEL)=ITAH1(K)-3420
ENDIF
```

```
C
K=K+1
```

```
C
IF(ITAH1(K).LE.3800) THEN
BTAH1(ICH,KCEL)=0.1*ITAH1(K)
ELSE
BTAH1(ICH,KCEL)=ITAH1(K)-3420
ENDIF
```

```
C
IF(IAND(NBIT(ICH+5),IQUAL).NE.0) THEN
ATAH1(ICH,KCEL)=-ATAH1(ICH,KCEL)
BTAH1(ICH,KCEL)=-BTAH1(ICH,KCEL)
ENDIF
```

```
C
40 CONTINUE
```

```
C
100 CONTINUE
```

```
RETURN
END
```

```
C
```

SUBROUTINE FDTATB(I85GHZ)

C
C
C

THIS SUBROUTINE ADJUST THE ANTENNA TEMPS AND FIND BRIGHTNESS TEMPS

REAL*4 DELTA(4),CHI(2,4),AVGTA(5),GCOEF(5),HCOEF(5)
REAL*4 SBIAS1(64),SBIAS2(64),SBIAS3(64),SBIAS4(64),SBIAS5(64)
REAL*4 TBIAS1(64),TBIAS2(64),TBIAS3(64),TBIAS4(64),TBIAS5(64)
REAL*4 AVW(4),AHV(4),AOV(4),AHH(4),AVH(4),AOH(4)

C
C
C

SPECIFY COMMON /OUTDAT/

REAL*8 REV,XTIME
INTEGER*4 ITIME,ITIMSC,IVOLT,IAGC,ICOLDA,IHOTA,ICOLDB,IHOTB,IASCTM
INTEGER*4 IATOIL,IBTOIL,ISAT
REAL*4 XLATSC,XLONSC,ALTSC,THT,HLTEMP,RFTEMP,FRTEMP
REAL*4 PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,SPACER
REAL*4 ALAT,ALON,BLAT,BLON,TALO,ATAHI,BTAHI
COMMON/OUTDAT/ REV,XTIME,ITIME,ITIMSC,XLATSC,XLONSC,ALTSC,THT,
1 HLTEMP(3),IVOLT(2),RFTEMP,FRTEMP,IAGC(6),
2 IASCTM,PERIOD,ASCLOC,ANGINC,AXIS,ECC,ANGPER,ISAT,SPACER(6),
2 ICOLDA(5,7),IHOTA(5,7),ICOLDB(5,2),IHOTB(5,2),
3 ALAT(128),ALON(128),BLAT(128),BLON(128),
4 TALO(5,64),ATAHI(2,128),BTAHI(2,128),IATOIL(128),IBTOIL(128)

C

COMMON /TBDATA/ TBLO(5,64),ATBHI(2,128),BTBHI(2,128)

C
C
C

DATA INITIALIZATION

DATA ISTART/1/
DATA DELTA/0.03199,0.02685,0.01434,0.01186/
DATA CHI/.00379,.00525,.00983,0.0,.02136,.02664,.01387,.01967/
DATA AVGTA/190.93,130.14,215.42,211.39,158.16/

C
C
C

GCOEF,HCOEF ARE F10-F08 INTERCALIBRATION COEFS.

DATA GCOEF/0.08, 0.35,-0.33,-0.01, 0.44/
DATA HCOEF/.221132E-02,.786968E-03,.161037E-02,.335131E-02,
1 .165331E-02/

C
C
C

F08 X-SCAN BIASES

DATA SBIAS1/
+ .09, .10, .12, .12, .13, .13, .13, .13, .13, .14,
+ .14, .14, .14, .14, .15, .15, .14, .14, .13, .12,
+ .12, .11, .11, .11, .11, .11, .12, .11, .10, .10,
+ .09, .07, .06, .05, .05, .04, .03, .03, .02, .01,
+ -.01, -.02, -.04, -.05, -.06, -.08, -.09, -.09, -.11, -.12,
+ -.14, -.18, -.21, -.26, -.30, -.36, -.43, -.52, -.63, -.75/
DATA SBIAS2/
+ .01, .01, .01, .01, .01, .01, .01, .02, .03, .04,
+ .04, .05, .05, .05, .05, .05, .04, .04, .04, .04,
+ .04, .04, .04, .04, .04, .05, .06, .07, .07, .08,
+ .07, .07, .06, .07, .07, .06, .06, .06, .06, .06,
+ .05, .04, .04, .04, .04, .02, .00, -.01, -.02, -.03,
+ -.04, -.06, -.09, -.12, -.16, -.20, -.26, -.32, -.39, -.48/
DATA SBIAS3/
+ .08, .09, .10, .11, .11, .12, .12, .13, .14, .14,
+ .15, .15, .17, .17, .16, .16, .15, .14, .14, .14,
+ .13, .13, .13, .13, .13, .13, .14, .13, .14, .13,
+ .12, .11, .10, .09, .09, .08, .07, .05, .04, .03,
+ .02, .00, -.01, -.02, -.04, -.05, -.07, -.10, -.12, -.14,
+ -.17, -.20, -.25, -.31, -.36, -.42, -.50, -.63, -.79, -.97/
DATA SBIAS4/
+ .03, .04, .05, .06, .06, .07, .09, .10, .11, .13,
+ .14, .15, .15, .16, .16, .16, .16, .16, .16, .15,
+ .14, .14, .14, .13, .13, .13, .14, .13, .13, .13,
+ .12, .11, .10, .10, .09, .08, .08, .06, .06, .05,
+ .04, .03, .02, .01, .00, -.02, -.05, -.07, -.09, -.12,
+ -.16, -.18, -.22, -.27, -.33, -.42, -.50, -.60, -.74, -.90/
DATA SBIAS5/
+ -.14, -.13, -.12, -.10, -.09, -.10, -.09, -.07, -.05, -.04,
+ -.03, .00, .01, .03, .04, .04, .04, .05, .05, .05,
+ .04, .04, .04, .05, .05, .07, .08, .09, .10, .11,
+ .10, .10, .09, .10, .10, .09, .09, .09, .09, .08,
+ .07, .07, .07, .09, .09, .08, .08, .08, .08, .08,
+ .06, .04, .00, -.03, -.07, -.11, -.16, -.22, -.29, -.41/

C
C
C

F10 XSCAN BIASES

DATA TBIAS1/										-01,	.03,	.05,	.07,
+	.09,	.10,	.11,	.12,	.12,	.14,	.14,	.14,	.14,	.14,	.14,	.14,	.15,
+	.16,	.15,	.15,	.14,	.14,	.14,	.14,	.14,	.14,	.13,	.13,	.13,	.13,
+	.14,	.14,	.14,	.14,	.14,	.14,	.13,	.13,	.12,	.12,	.12,	.12,	.12,
+	.11,	.10,	.08,	.07,	.07,	.07,	.06,	.05,	.04,	.02,	.02,	.02,	.02,
+	.00,	-.01,	-.03,	-.04,	-.05,	-.06,	-.08,	-.09,	-.11,	-.14,	-.14,	-.14,	-.14,
+	-.15,	-.18,	-.21,	-.26,	-.31,	-.37,	-.46,	-.57,	-.69,	-.82/	-.82/	-.82/	-.82/
DATA TBIAS2/										.00,	.02,	.02,	.02,
+	.01,	.01,	.01,	.01,	.01,	.00,	.00,	.00,	.00,	.00,	.00,	.00,	.00,
+	.00,	.00,	.00,	-.01,	-.02,	-.02,	-.02,	-.02,	-.02,	-.01,	-.01,	-.01,	-.01,
+	.00,	.01,	.02,	.03,	.04,	.05,	.06,	.06,	.06,	.06,	.06,	.06,	.06,
+	.05,	.05,	.05,	.06,	.07,	.08,	.08,	.08,	.07,	.08,	.08,	.08,	.08,
+	.08,	.08,	.08,	.08,	.08,	.07,	.06,	.04,	.03,	.02,	.02,	.02,	.02,
+	.01,	-.01,	-.04,	-.07,	-.11,	-.15,	-.21,	-.27,	-.36,	-.45/	-.45/	-.45/	-.45/
DATA TBIAS3/										-.04,	.01,	.04,	.06,
+	.08,	.09,	.11,	.11,	.12,	.13,	.14,	.15,	.15,	.15,	.15,	.15,	.15,
+	.15,	.15,	.15,	.14,	.13,	.14,	.14,	.14,	.14,	.14,	.14,	.14,	.14,
+	.14,	.15,	.15,	.16,	.16,	.18,	.18,	.16,	.15,	.14,	.14,	.14,	.14,
+	.14,	.14,	.14,	.13,	.11,	.10,	.09,	.08,	.07,	.05,	.05,	.05,	.05,
+	.03,	.01,	-.01,	-.03,	-.05,	-.07,	-.09,	-.12,	-.14,	-.15,	-.15,	-.15,	-.15,
+	-.17,	-.20,	-.24,	-.28,	-.34,	-.42,	-.52,	-.64,	-.77,	-.95/	-.95/	-.95/	-.95/
DATA TBIAS4/										-.09,	-.06,	-.03,	-.02,
+	-.01,	.01,	.02,	.03,	.05,	.06,	.07,	.08,	.09,	.10,	.10,	.10,	.10,
+	.11,	.12,	.12,	.12,	.13,	.13,	.13,	.14,	.14,	.14,	.14,	.14,	.14,
+	.15,	.16,	.16,	.16,	.16,	.17,	.16,	.16,	.15,	.15,	.15,	.15,	.15,
+	.14,	.13,	.12,	.12,	.12,	.11,	.11,	.09,	.08,	.07,	.07,	.07,	.07,
+	.06,	.05,	.04,	.03,	.01,	-.01,	-.04,	-.05,	-.07,	-.09,	-.09,	-.09,	-.09,
+	-.12,	-.16,	-.21,	-.25,	-.31,	-.38,	-.46,	-.56,	-.69,	-.84/	-.84/	-.84/	-.84/
DATA TBIAS5/										-.20,	-.18,	-.16,	-.15,
+	-.15,	-.15,	-.14,	-.13,	-.11,	-.11,	-.10,	-.09,	-.08,	-.07,	-.07,	-.07,	-.07,
+	-.07,	-.05,	-.04,	-.05,	-.05,	-.04,	-.04,	-.03,	-.02,	-.01,	-.01,	-.01,	-.01,
+	.01,	.02,	.04,	.05,	.06,	.08,	.09,	.09,	.10,	.10,	.10,	.10,	.10,
+	.09,	.09,	.10,	.11,	.12,	.12,	.13,	.13,	.13,	.13,	.13,	.13,	.13,
+	.12,	.13,	.12,	.13,	.13,	.13,	.12,	.12,	.12,	.11,	.11,	.11,	.11,
+	.10,	.08,	.05,	.01,	-.02,	-.05,	-.11,	-.18,	-.27,	-.39/	-.39/	-.39/	-.39/

C
C
C

BEGIN EXECUTION

IF (ISTART.EQ.1) THEN

ISTART=0

DO 10 IFREQ=1,4

IF (IFREQ.EQ.2) GO TO 10

XFAC=(1.-CHI(1,IFREQ)*CHI(2,IFREQ))*(1.-DELTA(IFREQ))

AVV(IFREQ)=(1.+CHI(1,IFREQ))/XFAC

AHV(IFREQ)=-CHI(1,IFREQ)*(1.+CHI(2,IFREQ))/XFAC

AOV(IFREQ)=(1.-AVV(IFREQ)-AHV(IFREQ))*2.7

AHH(IFREQ)=(1.+CHI(2,IFREQ))/XFAC

AVH(IFREQ)=-CHI(2,IFREQ)*(1.+CHI(1,IFREQ))/XFAC

AOH(IFREQ)=(1.-AHH(IFREQ)-AVH(IFREQ))*2.7

10 CONTINUE

C

DO 20 ICEL=1,64

SBIAS1(ICEL)=1.-SBIAS1(ICEL)/AVGTA(1)

SBIAS2(ICEL)=1.-SBIAS2(ICEL)/AVGTA(2)

SBIAS3(ICEL)=1.-SBIAS3(ICEL)/AVGTA(3)

SBIAS4(ICEL)=1.-SBIAS4(ICEL)/AVGTA(4)

SBIAS5(ICEL)=1.-SBIAS5(ICEL)/AVGTA(5)

C

TBIAS1(ICEL)=(1.-TBIAS1(ICEL)/AVGTA(1))*(1.-HCOEF(1))

TBIAS2(ICEL)=(1.-TBIAS2(ICEL)/AVGTA(2))*(1.-HCOEF(2))

TBIAS3(ICEL)=(1.-TBIAS3(ICEL)/AVGTA(3))*(1.-HCOEF(3))

TBIAS4(ICEL)=(1.-TBIAS4(ICEL)/AVGTA(4))*(1.-HCOEF(4))

TBIAS5(ICEL)=(1.-TBIAS5(ICEL)/AVGTA(5))*(1.-HCOEF(5))

20 CONTINUE

ENDIF

C

DO 100 ICEL=1,64

C

IBAD1=0

IBAD2=0

IBAD3=0

IF(TALO(1,ICEL).LT.55 .OR. TALO(1,ICEL).GT.320) IBAD1=1

IF(TALO(2,ICEL).LT.55 .OR. TALO(2,ICEL).GT.320) IBAD1=1

IF(TALO(3,ICEL).LT.55 .OR. TALO(3,ICEL).GT.320) IBAD2=1

IF(TALO(4,ICEL).LT.55 .OR. TALO(4,ICEL).GT.320) IBAD3=1

IF(TALO(5,ICEL).LT.55 .OR. TALO(5,ICEL).GT.320) IBAD3=1

C

IF(ISAT.EQ.8) THEN

TA19V=TALO(1,ICEL)*SBIAS1(ICEL)

TA19H=TALO(2,ICEL)*SBIAS2(ICEL)

TA22V=TALO(3,ICEL)*SBIAS3(ICEL)

TA37V=TALO(4,ICEL)*SBIAS4(ICEL)

TA37H=TALO(5,ICEL)*SBIAS5(ICEL)

ENDIF

C

IF(ISAT.EQ.10) THEN

TA19V=TALO(1,ICEL)*TBIAS1(ICEL)-GCOEF(1)

TA19H=TALO(2,ICEL)*TBIAS2(ICEL)-GCOEF(2)

TA22V=TALO(3,ICEL)*TBIAS3(ICEL)-GCOEF(3)

TA37V=TALO(4,ICEL)*TBIAS4(ICEL)-GCOEF(4)

TA37H=TALO(5,ICEL)*TBIAS5(ICEL)-GCOEF(5)

ENDIF

C

IF(ISAT.NE.8 .AND. ISAT.NE.10) THEN

TA19V=TALO(1,ICEL)*SBIAS1(ICEL)

TA19H=TALO(2,ICEL)*SBIAS2(ICEL)

TA22V=TALO(3,ICEL)*SBIAS3(ICEL)

TA37V=TALO(4,ICEL)*SBIAS4(ICEL)

TA37H=TALO(5,ICEL)*SBIAS5(ICEL)

ENDIF

C

IF(IBAD1.EQ.0) THEN

TALO(1,ICEL)=TA19V

TALO(2,ICEL)=TA19H

TBLO(1,ICEL)=AVV(1)*TA19V+AHV(1)*TA19H+AOV(1)

TBLO(2,ICEL)=AHH(1)*TA19H+AVH(1)*TA19V+AOH(1)

ELSE

TBLO(1,ICEL)=TALO(1,ICEL)

TBLO(2,ICEL)=TALO(2,ICEL)

ENDIF

C

```
IF (IBAD2.EQ.0) THEN
TALO(3,ICEL)=TA22V
TBLO(3,ICEL)=1.01993*TA22V+1.994
ELSE
TBLO(3,ICEL)=TALO(3,ICEL)
ENDIF
```

C

```
IF (IBAD3.EQ.0) THEN
TALO(4,ICEL)=TA37V
TALO(5,ICEL)=TA37H
TBLO(4,ICEL)=AVV(3)*TA37V+AHV(3)*TA37H+AOV(3)
TBLO(5,ICEL)=AHH(3)*TA37H+AVH(3)*TA37V+AOH(3)
ELSE
TBLO(4,ICEL)=TALO(4,ICEL)
TBLO(5,ICEL)=TALO(5,ICEL)
ENDIF
```

C

100 CONTINUE

C

```
IF (I85GHZ.EQ.0) RETURN
```

C

```
DO 200 ICEL=1,128
IF (ATAHI(1,ICEL).GE.55 .AND. ATAH(1,ICEL).LE.320 .AND.
1 ATAH(2,ICEL).GE.55 .AND. ATAH(2,ICEL).LE.320) THEN
ATBHI(1,ICEL)=AVV(4)*ATAHI(1,ICEL)+AHV(4)*ATAHI(2,ICEL)+AOV(4)
ATBHI(2,ICEL)=AHH(4)*ATAHI(2,ICEL)+AVH(4)*ATAHI(1,ICEL)+AOH(4)
ELSE
ATBHI(1,ICEL)=ATAHI(1,ICEL)
ATBHI(2,ICEL)=ATAHI(2,ICEL)
ENDIF
```

C

```
IF (BTAHI(1,ICEL).GE.55 .AND. BTAHI(1,ICEL).LE.320 .AND.
1 BTAHI(2,ICEL).GE.55 .AND. BTAHI(2,ICEL).LE.320) THEN
BTBHI(1,ICEL)=AVV(4)*BTAHI(1,ICEL)+AHV(4)*BTAHI(2,ICEL)+AOV(4)
BTBHI(2,ICEL)=AHH(4)*BTAHI(2,ICEL)+AVH(4)*BTAHI(1,ICEL)+AOH(4)
ELSE
BTBHI(1,ICEL)=BTAHI(1,ICEL)
BTBHI(2,ICEL)=BTAHI(2,ICEL)
ENDIF
200 CONTINUE
RETURN
END
```



