|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 8.3.1.6.3.2-1. Format of AMSU-A Data Record (Version 4, post-January 25, 2006, all spacecraft).** | | | | | | | | |
| **Field Name** | **Start Octet** | **End Octet** | **Data Type** | **Word Size** | **Number of Words** | **Scale Factor** | **Units** | **Notes** |
| Scan Line Number (cumulative, starting with 1) | 1 | 2 | u | 2 | 1 | 0 |  |  |
| Scan Line Year (four digits, e.g., 2000) | 3 | 4 | u | 2 | 1 | 0 | year |  |
| Scan Line Day of Year (e.g., 365) | 5 | 6 | u | 2 | 1 | 0 | day |  |
| Satellite Clock Drift Delta | 7 | 8 | i | 2 | 1 | 0 | milliseconds |  |
| Scan Line UTC Time of Day | 9 | 12 | u | 4 | 1 | 0 | milliseconds |  |
| Scan Line Bit Field bit 15: Satellite direction (0 = northbound data; 1 = southbound data) bit 14: Clock drift correction (0 = not corrected; 1 = scan time corrected for clock drift) bits 13-0: <zero fill> | 13 | 14 | u | 2 | 1 | 0 |  |  |
| Major Frame Count (cumulative, starting with 1) | 15 | 16 | u | 2 | 1 | 0 |  |  |
| <Zero Fill> | 17 | 24 | i | 4 | 2 | 0 |  |  |
| **QUALITY INDICATORS** | | | | | | | | |
| Quality Indicator Bit Field *(If a bit is on (=1) then the statement is true.)* bit 31: do not use scan for product generation bit 30: time sequence error detected within this scan (see below) bit 29: data gap precedes this scan bit 28: insufficient data for calibration (see below) bit 27: earth location data not available (see below) bit 26: first good time following a clock update (nominally 0) bit 25: instrument status changed with this scan bits 24 - 4: <zero fill> bit 3: AMSU sync error detected bit 2: AMSU minor frame error detected bit 1: AMSU major frame error detected bit 0: AMSU parity error detected | 25 | 28 | u | 4 | 1 | 0 |  |  |
| Scan Line Quality Flags [Additional Calibration Problem Code] (If a bit is on (=1) then the statement is true. See "Scan Line Quality Flags [Calibration Problem Code]", below.) bits 7-0: <zero fill> | 29 | 29 | u | 1 | 1 | 0 |  |  |
| Scan Line Quality Flags [Time Problem Code] (If a bit is on (=1) then the statement is true. All bits off implies the scan time is as expected.) bit 7: time field is bad but can probably be inferred from the previous good time bit 6: time field is bad and can't be inferred from the previous good time  bit 5: this record starts a sequence that is inconsistent with previous times (i.e., there is a time discontinuity). This may be associated with a spacecraft clock update. (See bit 26, Quality Indicator Bit Field.) bit 4: start of a sequence that apparently repeats scan times that have been previously accepted  bits 3-0: <zero fill> | 30 | 30 | u | 1 | 1 | 0 |  |  |
| Scan Line Quality Flags [Calibration Problem Code] (If a bit is on (=1) then the statement is true. These bits, along with those in "Scan Line Quality Flags [Additional Calibration Problem Code]", complement the channel indicators; all bits set to 0 indicates normal calibration.) bit 7: scan line was not calibrated because of bad time bit 6: scan line was calibrated using fewer than the preferred number of scan lines because of proximity to start or end of data set or to a data gap bit 5: scan line was not calibrated because of bad or insufficient PRT data bit 4: scan line wa calibrated but with marginal PRT data bit 3: some uncalibrated channels on this scan (see channel indicators) bit 2: uncalibrated due to instrument mode bit 1: questionable calibration because of antenna position error of space view  bit 0: questionable calibration because of antenna position error of blackbody view | 31 | 31 | u | 1 | 1 | 0 |  |  |
| Scan Line Quality Flags [Earth Location Problem Code] (If a bit is on (=1) then the statement is true. All bits set to 0 implies the earth location was normal.) bit 7: not earth located because of bad time; earth location fields zero-filled bit 6: earth location questionable: questionable time code (see time problem flags above) bit 5: earth location questionable: marginal agreement with reasonableness check bit 4: earth location questionable: fails reasonableness check bit 3: earth location questionable because of antenna position check bits 2-0: <zero fill> | 32 | 32 | u | 1 | 1 | 0 |  |  |
| Calibration Quality Flags (all bits off implies a good calibration) *Word 1:* Channel 1 (all bits off implies a good calibration) bits 15 - 9: <zero fill> bit 8: this scan line is either the last one before or the first one after a sudden, anomalous jump (or drop) in calibration counts bit 7: lunar contamination was detected in the space view counts of this channel bit 6: the space view couonts of this channel were corrected for lunar contamination when used in the calibration (only applicable if the previous flag [bit 7] is 1; otherwise, zero) bit 5: All bad blackbody view counts for scan line bit 4: All bad space view counts for scan line bit 3: All bad PRTs for this line bit 2: Marginal blackbody view counts for this line bit 1: Marginal space view counts for this line bit 0: Marginal PRT temps on this line *Words 2 - 15:* Channels 2 through 15, in order *Word 16:* <zero fill> | 33 | 64 | u | 2 | 16 | 0 |  |  |
| <Zero Fill> | 65 | 80 | i | 4 | 4 | 0 |  |  |
| **CALIBRATION COEFFICIENTS *Note: The following coefficients are only available in Full Scan mode, otherwise the coefficient fields are <Zero Fill>. Refer to Digital A Telemetry, Digital Housekeeping Word 1 for the current mode.*** | | | | | | | | |
| Primary Calibration Ch 1 Second Order Term, a2 | 81 | 84 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 1 First Order Term, a1 | 85 | 88 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 1 Zeroth Order Term, a0 | 89 | 92 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 2 Second Order Term, a2 | 93 | 96 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 2 First Order Term, a1 | 97 | 100 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 2 Zeroth Order Term, a0 | 101 | 104 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 3 Second Order Term, a2 | 105 | 108 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 3 First Order Term, a1 | 109 | 112 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 3 Zeroth Order Term, a0 | 113 | 116 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 4 Second Order Term, a2 | 117 | 120 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 4 First Order Term, a1 | 121 | 124 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 4 Zeroth Order Term, a0 | 125 | 128 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 5 Second Order Term, a2 | 129 | 132 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 5 First Order Term, a1 | 133 | 136 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 5 Zeroth Order Term, a0 | 137 | 140 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 6 Second Order Term, a2 | 141 | 144 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 6 First Order Term, a1 | 145 | 148 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 6 Zeroth Order Term, a0 | 149 | 152 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 7 Second Order Term, a2 | 153 | 156 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 7 First Order Term, a1 | 157 | 160 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 7 Zeroth Order Term, a0 | 161 | 164 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 8 Second Order Term, a2 | 165 | 168 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 8 First Order Term, a1 | 169 | 172 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 8 Zeroth Order Term, a0 | 173 | 176 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 9 Second Order Term, a2 | 177 | 180 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 9 First Order Term, a1 | 181 | 184 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 9 Zeroth Order Term, a0 | 185 | 188 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 10 Second Order Term, a2 | 189 | 192 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 10 First Order Term, a1 | 193 | 196 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 10 Zeroth Order Term, a0 | 197 | 200 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 11 Second Order Term, a2 | 201 | 204 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 11 First Order Term, a1 | 205 | 208 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 11 Zeroth Order Term, a0 | 209 | 212 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 12 Second Order Term, a2 | 213 | 216 | i | 4 | 1 | 18 |  |  |
| Primary Calibration Ch 12 First Order Term, a1 | 217 | 220 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 12 Zeroth Order Term, a0 | 221 | 224 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 13 Second Order Term, a2 | 225 | 228 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 13 First Order Term, a1 | 229 | 232 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 13 Zeroth Order Term, a0 | 233 | 236 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 14 Second Order Term, a2 | 237 | 240 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 14 First Order Term, a1 | 241 | 244 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 14 Zeroth Order Term, a0 | 245 | 248 | i | 4 | 1 | 9 |  |  |
| Primary Calibration Ch 15 Second Order Term, a2 | 249 | 252 | i | 4 | 1 | 19 |  |  |
| Primary Calibration Ch 15 First Order Term, a1 | 253 | 256 | i | 4 | 1 | 13 |  |  |
| Primary Calibration Ch 15 Zeroth Order Term, a0 | 257 | 260 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 1 Second Order Term, a2 | 261 | 264 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 1 First Order Term, a1 | 265 | 268 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 1 Zeroth Order Term, a0 | 269 | 272 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 2 Second Order Term, a2 | 273 | 276 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 2 First Order Term, a1 | 277 | 280 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 2 Zeroth Order Term, a0 | 281 | 284 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 3 Second Order Term, a2 | 285 | 288 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 3 First Order Term, a1 | 289 | 292 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 3 Zeroth Order Term, a0 | 293 | 296 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 4 Second Order Term, a2 | 297 | 300 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 4 First Order Term, a1 | 301 | 304 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 4 Zeroth Order Term, a0 | 305 | 308 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 5 Second Order Term, a2 | 309 | 312 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 5 First Order Term, a1 | 313 | 316 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 5 Zeroth Order Term, a0 | 317 | 320 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 6 Second Order Term, a2 | 321 | 324 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 6 First Order Term, a1 | 325 | 328 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 6 Zeroth Order Term, a0 | 329 | 332 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 7 Second Order Term, a2 | 333 | 336 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 7 First Order Term, a1 | 337 | 340 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 7 Zeroth Order Term, a0 | 341 | 344 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 8 Second Order Term, a2 | 345 | 348 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 8 First Order Term, a1 | 349 | 352 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 8 Zeroth Order Term, a0 | 353 | 356 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 9 Second Order Term, a2 | 357 | 360 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 9 First Order Term, a1 | 361 | 364 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 9 Zeroth Order Term, a0 | 365 | 368 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 10 Second Order Term, a2 | 369 | 372 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 10 First Order Term, a1 | 373 | 376 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 10 Zeroth Order Term, a0 | 377 | 380 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 11 Second Order Term, a2 | 381 | 384 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 11 First Order Term, a1 | 385 | 388 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 11 Zeroth Order Term, a0 | 389 | 392 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 12 Second Order Term, a2 | 393 | 396 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 12 First Order Term, a1 | 397 | 400 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 12 Zeroth Order Term, a0 | 401 | 404 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 13 Second Order Term, a2 | 405 | 408 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 13 First Order Term, a1 | 409 | 412 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 13 Zeroth Order Term, a0 | 413 | 416 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 14 Second Order Term, a2 | 417 | 420 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 14 First Order Term, a1 | 421 | 424 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 14 Zeroth Order Term, a0 | 425 | 428 | i | 4 | 1 | 9 |  |  |
| Secondary Calibration Ch 15 Second Order Term, a2 | 429 | 432 | i | 4 | 1 | 19 |  |  |
| Secondary Calibration Ch 15 First Order Term, a1 | 433 | 436 | i | 4 | 1 | 13 |  |  |
| Secondary Calibration Ch 15 Zeroth Order Term, a0 | 437 | 440 | i | 4 | 1 | 9 |  |  |
| <Zero Fill> | 441 | 444 | i | 2 | 2 | 0 |  |  |
| **NAVIGATION** | | | | | | | | |
| <Zero Fill> | 445 | 450 | i | 2 | 3 | 0 |  |  |
| Total Applied Attitude Correction Word 1: Roll Word 2: Pitch Word 3: Yaw | 451 | 456 | i | 2 | 3 | 3 | degrees |  |
| Navigation Status Bit Field bits 31-18: <zero fill> bit 17: earth location at the satellite subpoint is accurate and reasonable, i.e., is within tolerance defined by "Nadir Earth Location Tolerance" in header (0 = out of tolerance; 1 = in tolerance) bit 16: earth location corrected for Euler angles (0=FLASE; 1=TRUE) bits 15 - 12: earth location indicator (0 = earth location available; 1 = user ephemeris files greater than 24 hours old; 2= no earth location available) bits 11 - 8: spacecraft attitude control (0 = operating in YGC or NOMINAL mode; 1 = operating in another mode; 2 = attitude exceeds nominal tolerance; 3 = both 1 and 2) bits 7 - 4: attitude SMODE (0 = NOMINAL mode; 1 = rate nulling mode; 2 = YGC mode; 3 = search mode; 4 = coast mode) bits 3 - 0: attitude PWTIP$AC (0 = NOMINAL mode/no test; 1 = yaw axis test in progress; 2 = roll axis test in progress; 3 = pitch axis test in progress) | 457 | 460 | u | 4 | 1 | 0 |  |  |
| Time Associated with Euler Angles | 461 | 464 | i | 4 | 1 | 0 | seconds |  |
| Euler Angles *Word 1*: Roll *Word 2*: Pitch *Word 3*: Yaw | 465 | 470 | i | 2 | 3 | 3 | degrees |  |
| Spacecraft Altitude above Reference Ellipsoid | 471 | 472 | u | 2 | 1 | 1 | kilometers |  |
| Angular Relationships *(relative azimuth range +/- 180.00)* Word 1: Solar Zenith Angle, FOV 1 Word 2: Satellite Zenith Angle, FOV 1 Word 3: Relative Azimuth Angle, FOV 1 Word 4: Solar Zenith Angle, FOV 2 ... (set of 3 angles every FOV) ... *Word 90*: Relative Azimuth Angle, FOV 30 | 473 | 652 | i | 2 | 90 | 2 | degrees |  |
| Earth Location (North latitude and East longitude are positive) Word 1: Latitude, FOV 1 Word 2: Longitude, FOV 1 Word 3: Latitude, FOV 2 ... (lat/lon word pair for every FOV) ... Word 60: Longitude, FOV 30 | 653 | 892 | i | 4 | 60 | 4 | degrees |  |
| <Zero Fill> | 893 | 896 | i | 4 | 1 | 0 |  |  |
| **AMSU-A1 DIGITAL A TELEMETRY** | | | | | | | | |
| Synchronization Sequence (hex FF) | 897 | 899 | u | 1 | 3 | 0 |  |  |
| Unit Identification and Serial Number 5 = Protoflight Model Module (PFM) s/n 102 (NOAA-L) 9 = Flight Model (FM) 1 s/n 103 (NOAA-K) 13 = FM 2 s/n 104 (NOAA-M) 17 = FM 3, s/n 105 (NOAA-P) 33 = FM 7, s/n 109 (NOAA-N) | 900 | 900 | u | 1 | 1 | 0 |  |  |
| Digital Housekeeping *Word 1*: Data 1 bit 7: <zero fill> bit 6: cold cal position msb bit 5: cold cal position lsb (cold cal position: 0 = 6.667 deg from -Z; 1 = 8.333 deg; 2 = 9.999 deg; 3 = 13.332 deg) bit 4: nadir mode (0 = not in nadir; 1 = nadir) bit 3: cold cal mode (0 = not in cold cal; 1 = cold cal) bit 2: warm cal mode (0 = not in warm cal; 1 = warm cal) bit 1: full scan mode (0 = not full scan; 1 = full scan) bit 0: <zero fill> *Word 2*: Data 2 bits 7-5: <zero fill> bit 4: survival heater power (0 = off; 1 = on) bit 3: PLL power (0 = redundant; 1 = primary) bit 2: scanner A1-2 power (0 = off; 1 = on) bit 1: scanner A1-1 power (0 = off; 1 = on) bit 0: <zero fill> *Words 3-4*: <zero fill> | 901 | 904 | u | 1 | 4 | 0 |  |  |
| Scene Telemetry (Scanner is parked at warm cal position while in warm cal mode, cold cal position while in cold cal mode, and nadir position while in nadir mode (see Digital Housekeeping Word 1, above). In parked modes, words 1 through 17 are repeated 29 times for a total of 30 data sets at the designated scanner position. In full scan mode, the scanner is stepped from positions 1 to 30 as indicated.) *Word 1*: Reflector A1-1, position 1, first reading *Word 2*: Reflector A1-2, position 1, first reading *Word 3*: Reflector A1-1, position 1, second reading *Word 4*: Reflector A1-2, position 1, second reading *Words 5 - 17*: Scene count at position 1, channels 3 through 15 (in order) *Word 18*: Reflector A1-1, position 2, first reading ... (seventeen words for every position) ... *Words 498 - 510*: Scene count at position 30, channels 3 through 15 (in order) | 905 | 1924 | u | 2 | 510 | 0 |  |  |
| Cold Calibration Telemetry (These words are zero-filled in warm cal, cold cal, and nadir modes. In full scan mode, these words contain the following data.) *Word 1*: Reflector A1-1, cold calibration position, first reading *Word 2*: Reflector A1-2, cold calibration position, first reading *Word 3*: Reflector A1-1, cold calibration position, second reading *Word 4*: Reflector A1-2, cold calibration position, second reading *Words 5 - 17*: Cold cal count 1, channels 3 through 15 (in order) *Words 18 - 30*: Cold cal count 2, channels 3 through 15 (in order) | 1925 | 1984 | u | 2 | 30 | 0 | counts |  |
| Temperature Sensor Telemetry (in counts, all modes) *Word 1*: scan motor A1-1 *Word 2*: scan motor A1-2 *Word 3*: feed horn A1-1 *Word 4*: feed horn A1-2 *Word 5*: RF mux A1-1 *Word 6*: RF mux A1-2 *Words 7 - 12*: local oscillator channels 3 through 8 *Word 13*: local oscillator channel 15 *Word 14*: PLLO #2 Channels 9 through 14 *Word 15*: PLLO #1 Channels 9 through 14 *Word 16*: PLLO (reference oscillator) *Words 17 - 22*: Mixer/IF amplifier channels 3 through 8 *Word 23*: Mixer/IF amplifier channel 9/14 *Word 24*: Mixer/IF amplifier channel 15 *Word 25*: IF amplifier channel 11/14 *Words 26 - 28*: IF amplifier channels 9, 10, and 11 (in order) *Word 29*: DC/DC converter *Words 30 - 31*: IF amplifier channels 13 and 14 (in order) *Word 32*: IF amplifier channel 12 *Word 33*: RF shelf A1-1 *Word 34*: RF shelf A1-2 *Word 35*: Detector/Preamp Assembly *Words 36 - 39*: A1-1 warm load 1 through 4 *Word 40*: A1-1 warm load center *Words 41 - 44*: A1-2 warm load 1 through 4 *Word 45*: A1-2 warm load center *Word 46*: reference voltage | 1985 | 2076 | u | 2 | 46 | 0 | counts | [4](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note4) |
| Warm Calibration Telemetry (These words are zero-filled in warm cal, cold cal, and nadir modes. In full scan mode, these words contain the following data.) *Word 1*: Reflector A1-1, warm calibration position, first reading *Word 2*: Reflector A1-2, warm calibration position, first reading *Word 3*: Reflector A1-1, warm calibration position, second reading *Word 4*: Reflector A1-2, warm calibration position, second reading *Words 5 - 17*: Warm cal count 1, channels 3 through 15 (in order) *Words 18 - 30*: Warm cal count 2, channels 3 through 15 (in order) | 2077 | 2136 | u | 2 | 30 | 0 | counts |  |
| <Zero Fill> | 2137 | 2140 | i | 4 | 1 | 0 |  |  |
| **AMSU-A1 DIGITAL B TELEMETRY** | | | | | | | | |
| Digital B Telemetry Update Flags (If bit=1, associated telemetry item was not updated during most recent minor frame cycle - possibly due to lost frame.) bit 15: <zero fill> bit 14: cold cal position, msb bit 13: cold cal position, lsb bit 12: antenna in nadir position bit 11: antenna in cold cal position bit 10: antenna in warm cal position bit 9: full scan mode bits 8 - 6: <zero fill> bit 5: module power bit 4: survival heater bit 3: Phase Lock Loop bit 2: scanner A1-2 power bit 1: scanner A1-1 power bit 0: <zero fill> | 2141 | 2142 | u | 2 | 1 | 0 |  |  |
| Digital B Telemetry for AMSU-A1  (If bits 9-12 are all set to 0, the instrument is either in the warm calibration position (NOAA KLM) or operating in "NO" mode (NOAA-N,-P). When in "NO" mode, digital A telemetry, analog telemetry, and bits 3, 13, and 14 of the digital B telemetry should be ignored. For cold cal position bits 13 and 14: 0=6.667; 1=8.333; 2=9.999; 3=13.332 degrees from -Z.) bit 15: <zero fill> bit 14: cold cal position, msb bit 13: cold cal position, lsb bit 12: antenna in nadir position (0 = no; 1 = yes) bit 11: antenna in cold cal position (0 = no; 1 = yes) bit 10: antenna in warm cal position (0 = no, unless bits 9, 11, and 12 also 0; 1 = yes) bit 9: full scan mode (0 = no; 1 = yes) bits 8 - 6: <zero fill> bit 5: module power (0 = disconnect; 1 = connect) bit 4: survival heater (0 = off; 1 = on) bit 3: Phase Lock Loop (0 = redundant; 1 = primary) bit 2: scanner A1-2 power (0 = off; 1 = on) bit 1: scanner A1-1 power (0 = off; 1 = on) bit 0: <zero fill> | 2143 | 2144 | u | 2 | 1 | 0 |  | [1](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note1) |
| <Zero Fill> | 2145 | 2148 | i | 4 | 1 | 0 |  |  |
| **AMSU-A1 ANALOG TELEMETRY** | | | | | | | | |
| Analog Telemetry Update Flags (If bit = 1, associated telemetry item was not updated during most recent minor frame cycle - possibly due to lost frame.) bits 31-28: <zero fill> bit 27: GDO voltage 89.0 GHz Ch. 15 bit 26: PLLO redundant lock detect bit 25: PLLO primary lock detect bit 24: LO voltage 55.5 GHz Ch. 8 bit 23: LO voltage 54.94 GHz Ch. 7 bit 22: LO voltage 54.4 GHz Ch. 6 bit 21: LO voltage 53.596 GHz Ch. 5 bit 20: LO voltage 52.8 GHz Ch. 4 bit 19: LO Voltage 50.3 GHz Ch. 3 bit 18: -15 VDC phase lock loop ch. 9/14 bit 17: +15 VDC phase lock loop Ch. 9/14  bit 16: +8.5 VDC phase lock loop Ch. 9/14 (NOAA KLM) or +10 VDC receiver mixer/IF (NOAA-N,-P) bit 15: +5 VDC (antenna drive) bit 14: +5 VDC (signal processing) bit 13: +8 VDC (receiver amplifiers) bit 12: -15 VDC (antenna drive) bit 11: -15 VDC (signal processing) bit 10: +15 VDC (antenna drive) bit 9: +15 VDC (signal processing) bit 8: antenna A1-2 drive motor current (avg) bit 7: antenna A1-1 drive motor current (avg) bit 6: warm load A1-2 temperature bit 5: warm load A1-1 temperature bit 4: RF shelf A1-2 temperature  bit 3: RF shelf A1-1 temperature  bit 2: A1-2 scanner motor temperature bit 1: A1-1 scanner motor temperature bit 0: <zero fill> | 2149 | 2152 | u | 4 | 1 | 0 |  | [3](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note3) |
| A1 Analog Telemetry (range: 0-255) *Word 1*: A1-1 Scanner Motor Temperature *Word 2*: A1-2 Scanner Motor Temperature *Word 3*: RF Shelf A1-1 Temperature *Word 4*: RF Shelf A1-2 Temperature *Word 5*: Warm Load A1-1 Temperature *Word 6*: Warm Load A1-2 Temperature *Word 7*: Antenna A1-1 Drive Motor Current (Avg) *Word 8*: Antenna A1-2 Drive Motor Current (Avg) *Word 9*: +15 VDC (Signal Processing) *Word 10*: +15 VDC (Antenna Drive) *Word 11*: -15 VDC (Signal Processing) *Word 12*: -15 VDC (Antenna Drive) *Word 13*: +8 VDC (Receiver Amplifiers) *Word 14*: +5 VDC (Signal Processing) *Word 15*: +5 VDC (Antenna Drive) *Word 16*: +8.5 VDC Phase Lock Loop Ch. 9/14 (NOAA KLM) or +10 VDC receiver mixer/IF (NOAA-N,-P) *Word 17*: +15 VDC Phase Lock Loop Ch. 9/14 *Word 18*: -15 VDC Phase Lock Loop Ch. 9/14 *Word 19*: LO Voltage 50.3 GHz Ch. 3 *Word 20*: LO Voltage 52.8 GHz Ch. 4 *Word 21*: LO Voltage 53.596 GHz Ch. 5 *Word 22*: LO Voltage 54.4 GHz Ch. 6 *Word 23*: LO Voltage 54.94 GHz Ch. 7 *Word 24*: LO Voltage 55.5 GHz Ch. 8 *Word 25*: PLLO Primary Lock Detect *Word 26*: PLLO Redundant Lock Detect *Word 27*: GDO Voltage 89.0 GHz Ch. 15 *Word 28*: <Zero Fill> | 2153 | 2180 | u | 1 | 28 | 0 | counts | [3](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note3) |
| <Zero Fill> | 2181 | 2184 | i | 4 | 1 | 0 |  |  |
| **AMSU-A2 DIGITAL A TELEMETRY** | | | | | | | | |
| Synchronization Sequence (hex FF) | 2185 | 2187 | u | 1 | 3 | 0 |  |  |
| Unit Identification and Serial Number 6 = Protoflight Model Module (PFM) s/n 102 (NOAA-K) 10 = Flight Model (FM) 1 s/n 103 (NOAA-L) 14 = FM 2 s/n 104 (NOAA-M) 18 = FM 3, s/n 105 (NOAA-N) 26 = FM 5, s/n 107 (NOAA-P) | 2188 | 2188 | u | 1 | 1 | 0 |  |  |
| Digital Housekeeping *Word 1*: Data 1 bit 7: <zero fill> bit 6: cold cal position msb bit 5: cold cal position lsb bit 4: nadir mode (0 = not in nadir; 1 = nadir) bit 3: cold cal mode (0 = not in cold cal; 1 = cold cal) bit 2: warm cal mode (0 = not in warm cal; 1 = warm cal) bit 1: full scan mode (0 = not full scan; 1 = full scan) bit 0: <zero fill> *Word 2*: Data 2 bits 7-5: <zero fill> bit 4: survival heater power (0 = off; 1 = on) bit 3: <zero fill> bit 2: scanner compensator power (0 = off; 1 = on) bit 1: scanner A2 power (0 = off; 1 = on) bit 0: <zero fill> *Word 3*: <zero fill> *Word 4*: <zero fill> | 2189 | 2192 | u | 1 | 4 | 0 |  |  |
| Scene Telemetry Scanner is parked at warm cal position while in warm cal mode, cold cal position while in cold cal mode, and nadir position while in nadir mode (see Digital Housekeeping Word 1, above). In parked modes, words 1 through 4 are repeated 29 times for a total of 30 data sets at the designated scanner position. In full scan mode, the scanner is stepped from positions 1 to 30 as indicated. *Word 1*: Reflector, position 1, first reading *Word 2*: Reflector, position 1, second reading *Words 3 - 4*: Scene count at position 1, Channels 1 and 2 (in order) *Word 5*: Reflector, position 2, first reading ... (four words every position) ... *Words 119-120*: Scene count at position 30, Channels 1 and 2 (in order) | 2193 | 2432 | u | 2 | 120 | 0 |  |  |
| Cold Calibration Telemetry (These words are zero-filled in warm cal, cold cal, and nadir modes. In full scan mode, these words contain the following data) *Word 1*: Reflector, cold calibration position, first reading *Word 2*: Reflector, cold calibration position, second reading *Words 3 - 4*: Cold cal count 1, channels 1 and 2 *Words 5 - 6*: Cold cal count 2, channels 1 and 2 | 2433 | 2444 | u | 2 | 6 | 0 | counts |  |
| Temperature Sensor Telemetry *Word 1*: scan motor *Word 2*: feed horn *Word 3*: RF mux/diplexer *Words 4 - 5*: Mixer/IF amplifier channels 1 and 2 *Words 6 - 7*: local oscillator channels 1 and 2 *Word 8*: compensation motor *Word 9*: subreflector *Word 10*: DC/DC converter *Word 11*: RF shelf A2 *Word 12*: Detector/Preamplifier Assembly *Word 13*: Warm load center *Words 14 - 19*: Warm load 1 through 6 (in order) *Word 20*: Reference voltage | 2445 | 2484 | u | 2 | 20 | 0 | counts | [2](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note2),[4](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note4) |
| Warm Calibration Telemetry (These words are zero-filled in warm cal, cold cal, and nadir modes. In full scan mode, these words contain the following data.) *Word 1*: Reflector, warm calibration position, first reading *Word 2*: Reflector, warm calibration position, second reading *Words 3 - 4*: Warm calibration 1, channels 1 and 2 *Words 5 - 6*: Warm calibration 2, channels 1 and 2 | 2485 | 2496 | u | 2 | 6 | 0 | counts |  |
| <Zero Fill> | 2497 | 2500 | i | 4 | 1 | 0 |  |  |
| **AMSU-A2 DIGITAL B TELEMETRY** | | | | | | | | |
| Digital B Telemetry Flags (If bit=1, associated telemetry item was not updated during most recent minor frame cycle - possibly due to lost frame.) bit 15: <zero fill> bit 14: cold cal position, msb bit 13: cold cal position, lsb bit 12: antenna in nadir position bit 11: antenna in cold cal position bit 10: antenna in warm cal position bit 9: full scan mode bits 5 - 8: <zero fill> bit 4: survival heater bit 3: module power bit 2: compensator motor bit 1: scanner A2 power bit 0: <zero fill> | 2501 | 2502 | u | 2 | 1 | 0 |  |  |
| Digital B Telemetry for AMSU-A2 (If bits 9-12 are all set to 0, the instrument is either in the warm calibration position (NOAA KLM) or operating in "NO" mode (NOAA-N,-P). When in "NO" mode, digital A telemetry, analog telemetry, and bits 13 and 14 of the digital B telemetry should be ignored. For cold cal position bits 13 and 14: 0 = 6.667; 1 = 8.333; 2 = 9.999; 3 = 13.332 degrees from -Z.) bit 15: <zero fill> bit 14: cold cal position, msb bit 13: cold cal position, lsb bit 12: antenna in nadir position (0 = no; 1 = yes) bit 11: antenna in cold cal position (0 = no; 1 = yes) bit 10: antenna in warm cal position (0 = no; 1 = yes) bit 9: full scan mode (0 = no; 1 = yes) bits 5 - 8: <zero fill> bit 4: survival heater (0 = off; 1 = on) bit 3: module power (0 = disconnect; 1 = connect) bit 2: compensator motor (0 = off; 1 = on) bit 1: scanner A2 power (0 = off; 1 = on) bit 0: <zero fill> | 2503 | 2504 | u | 2 | 1 | 0 |  | [1](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note1) |
| <Zero Fill> | 2505 | 2508 | i | 4 | 1 | 0 |  |  |
| **AMSU-A2 ANALOG TELEMETRY DATA** | | | | | | | | |
| Analog Telemetry Update Flags (If bit = 1, associated telemetry item was not updated during most recent minor frame cycle - possibly due to lost frame) bits 31-16: <zero fill> bit 15: LO voltage Ch. 2 (31.4 GHz) bit 14: LO voltage Ch. 1 (23.8 GHz) bit 13: +5 VDC (antenna drive) bit 12: +5 VDC (signal processing) bit 11: +8 VDC (receiver) (NOAA KLM) or +10 VDC (receiver/mixer/IF) (NOAA-N,P) bit 10: -15 VDC (antenna drive) bit 9: -15 VDC (signal processing) bit 8: +15 VDC (antenna drive) bit 7: +15 VDC (signal processing) bit 6: antenna drive motor current (avg) bit 5: compensator motor current (avg) bit 4: warm load A2 temperature bit 3: RF shelf temperature  bit 2: compensator motor temperature  bit 1: scanner motor temperature  bit 0: <Zero Fill> | 2509 | 2512 | u | 4 | 1 | 0 |  | [3](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note3) |
| A2 Analog Telemetry (range: 0-255) *Word 1*: Scanner Motor Temperature *Word 2*: Compensator Motor Temperature *Word 3*: RF Shelf Temperature *Word 4*: Warm Load A2 Temperature *Word 5*: Compensator Motor Current (Avg) *Word 6*: Antenna Drive Motor Current (Avg) *Word 7*: +15 VDC (Signal Processing) *Word 8*: +15 VDC (Antenna Drive) *Word 9*: -15 VDC (Signal Processing) *Word 10*: -15 VDC (Antenna Drive) *Word 11*: +8 VDC (Receiver) (NOAA KLM) or +10 VDC (receiver/mixer/IF) (NOAA-N,P) *Word 12*: +5 VDC (Signal Processing) *Word 13*: +5 VDC (Antenna Drive) *Word 14*: LO Voltage Ch. 1 (23.8 GHz) *Word 15*: LO Voltage Ch. 2 (31.4 GHz) *Word 16*: <Zero Fill> | 2513 | 2528 | u | 1 | 16 | 0 | counts | [3](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/html/c8/sec83163-2.htm#note3) |
| **LUNAR CONTAMINATION CORRECTION** | | | | | | | | |
| Space View Count Corrections, ΔCc (ΔCc = raw space count - corrected space count. If the ΔCc value is subtracted from the raw space counts, the value of the corrected space counts used in the calibration is obtained. A value of ΔCc=0 indicates that no correction was made. NOTE: The raw space counts are the "cold cal" counts of the "Cold Calibration Telemetry" fields. Range: 0-100) Word 1: ΔCc for channel 1 Words 2-15: ΔCc's for channels 2-15, in order | 2529 | 2543 | u | 1 | 15 | 0 | counts |  |
| <Zero Fill> | 2544 | 2544 | i | 1 | 1 | 0 |  |  |
| Lunar Azimuth Angles (with respect to the space view position of each AMSU-A antenna; range: -180 to +180) Word 1: Angle for A1-1 antenna Word 2: Angle for A1-2 antenna  Word 3: Angle for A2 antenna | 2545 | 2550 | i | 2 | 3 | 2 | degrees |  |
| Lunar Elevation Angles (with respect to the space view position of each AMSU-A antenna; range: -90 to +90) Word 1: Angle for A1-1 antenna Word 2: Angle for A1-2 antenna Word 3: Angle for A2 antenna | 2551 | 2556 | i | 2 | 3 | 2 | degrees |  |
| **FILLER** | | | | | | | | |
| <Zero Fill> | 2557 | 2560 | i | 4 | 1 | 0 |  |  |
| **NOTES:**  1) An AMSU-A instrument on NOAA-N,-P may produce a brief period of erroneous data during its transition between one mode and another. This transition period is defined as "NO" mode. Some "NO" mode events will occur during on-orbit validation (OV). After OV it is expected that the instrument will be kept in the normal scan mode, and thus will not get into "NO" mode.  2) For AMSU-A2, "RF Mux" is only applicable for NOAA KLM, while "RF Diplexer" is only applicable for NOAA-N,-P.  3) The local osciallators (LOs) for the NOAA KLM AMSU-A instruments are Gunn Diode Oscillators (GDOs). The LOs for channels 1-8 of the NOAA-N,-P AMSU-A instruments are Dielectric Resonant Oscillators (DROs). A GDO is still used for channel 15.  4) There are no conversion coefficients available for the last item, "Reference voltage", so none are specified in the header. | | | | | | | | |

[*Amended January 13, 2005*](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/amendmnt.htm#a011305a)

[*Amended April 12, 2005*](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/amendmnt.htm#a041205a)

[*Amended May 4, 2005*](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/amendmnt.htm#a050405a)

[*Amended December 7, 2006*](http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/amendmnt.htm#a120706aa)

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