PROSENSING

SYSTEMS ENGINEERING FOR ENVIRONMENTAL REMOTE SENSING

The calibration equation for the SFMR-2000-P, S/N US002 has the following form:

$$T_B = a_0 + a_1 \cdot \frac{t_L}{35} + a_2 \cdot \gamma + a_3 \cdot \gamma \cdot \frac{t_L}{35} + a_4 \cdot \frac{t_5}{35} + a_5 \cdot \frac{t_2}{35} \qquad (1)$$

where,

$T_B$ = brightness temperature (K),
$a_i$ = calibration coefficients (see table below),
$t_i$ = physical temperatures of components inside the radiometer (C),
$t_L = (t_3 + t_4)/2$,

and $\gamma$ is calculated from the digital counts found in the SFMR B-record: $C_A$ (antenna), $C_W$ (warm calibration load), and $C_C$ (cold calibration load):

$$\gamma = \frac{C_W - C_A}{C_W - C_C}. \qquad (2)$$

The physical temperatures, $t_i\,(C)$, can be calculated using the counts values, $t_i\,(counts)$, found in the SFMR T-record as follows:

$$t_i(C) = 0.102 \cdot t_i(counts) - 41.0, \quad (for\ all\ t_i) \qquad (3)$$

**SFMR S/N-US002 Brightness Temperature Calibration Coefficients (June 2005).**

| | F0 4.74 GHz | F1 5.31 GHz | F2 5.57 GHz | F3 6.02 GHz | F4 6.69 GHz | F5 7.09 GHz |
|---|---|---|---|---|---|---|
| **a0** | 277.95 | 275.69 | 279.15 | 244.75 | 273.73 | 296.84 |
| **a1** | 30.89 | 39.70 | 35.09 | 57.25 | 47.63 | 32.11 |
| **a2** | -283.86 | -277.37 | -259.79 | -238.20 | -176.10 | -158.85 |
| **a3** | -16.60 | -22.94 | -18.35 | -31.78 | -10.13 | 6.75 |
| **a4** | 0.220 | 0.428 | 1.814 | 0.471 | -0.281 | 0.712 |
| **a5** | 0.065 | -3.521 | -4.569 | -2.572 | -0.565 | -0.999 |